

PHILCO



SERVICE

HOME RADIO

PHILCO RADIO-PHONOGRAPH, MODEL 47-1230

CIRCUIT DESCRIPTION

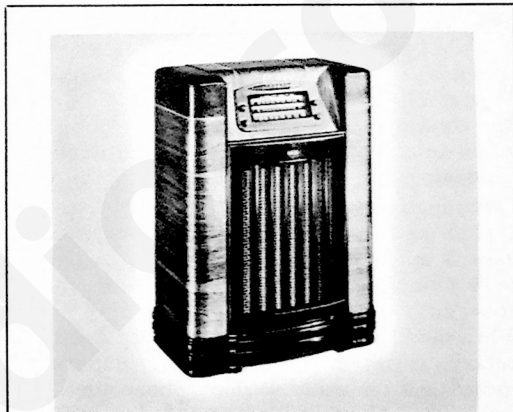
The Philco Model 47-1230 is a radio-phonograph combination incorporating a nine-tube superheterodyne radio and a Philco Model D-10A Automatic Record Changer.

The radio is designed with three tuning ranges, covering the standard broadcast, short-wave and FM bands by manual tuning. In addition, six push buttons are provided, one for phono-radio switching and five for automatic instant tuning of stations in the broadcast band. The function switch selects manual tuning on the broadcast, short-wave or FM bands, or push-button tuning. The ON-OFF switch is combined with the tone control.

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

A high-frequency r-f pentode, type 6AG5, is used in the r-f stage (FM only) and a type 7F8 high-frequency dual-triode is employed as a converter. These stages provide high signal-to-noise ratio, high conversion efficiency and good image rejection.

Two transformer-coupled i-f stages are used. The transformers have two sets of windings; one set is tuned to 455 kc for AM reception, the other to 9.1 mc for FM operation. Both primary and secondary FM windings are tuned to provide



**MODEL 47-1230
SPECIFICATIONS**

CABINET	_____	Wood, walnut finish
CIRCUIT	_____	Nine-tube superheterodyne
FREQUENCY RANGES:		
BROADCAST	_____	540 to 1720 kc.
SHORT WAVE	_____	9.3 to 15.5 mc.
FM	_____	88 to 108 mc.
AUDIO OUTPUT	_____	10 watts
PUSH BUTTONS	_____	Six: Five for broadcast-station selection, one for phono operation
OPERATING VOLTAGE	_____	105-120 volts, 60 cycles, a.c.
POWER CONSUMPTION	_____	110 watts
AERIALS	_____	Built-in cabinet loop, dipole, or external aerial
INTERMEDIATE FREQUENCIES:		
AM	_____	455 kc.
FM	_____	9.1 mc.
PHILCO TUBES USED (9)	_____	6AG5, 7F8, 6BA6, 7R7, 7X7, 7AF7, 6V6GT (2), 5Y3GT
RECORD PLAYER	_____	Philco Automatic Record Changer, Model D-10A
PANEL LAMPS (2)	_____	6-8-volt, Part No. 34-2040
BIN LAMP	_____	6-8-volt, Part No. 34-2039

additional gain at 9.1 mc. A 6BA6 high-frequency pentode is used in the first i-f amplifier stage and the pentode section of a 7R7 high-gain r-f amplifier is used in the second i-f stage. The diode section of the 7R7 is used for AM detection. The high gain achieved in the i-f amplifier at 9.1 mc gives improved FM reception by providing ample signal for proper operation of the FM detector.

A discriminator circuit having improved noise-reducing properties and a superior tuning characteristic is used for FM reception. Greater noise reduction on FM is achieved by preventing short-time amplitude variations across the secondary of the discriminator transformer. The two diodes of a 7X7 tube are connected in series with the secondary, with a large condenser (5 mf) connected across the output circuit of the diodes. As a result of the high current which flows to this condenser whenever the diodes conduct in series, amplitude variations across the secondary are dissipated.

The high- μ triode section of the 7X7 tube is used in the first audio stage. The output of this stage is applied to one section of a dual-triode 7AF7 tube which operates as a phase inverter to drive the two 6V6GT push-pull output tubes. When the PHONO push button is depressed, the cathode circuit of the second i-f amplifier is opened and the other section (phono preamplifier) of the 7AF7 tube is connected to the volume-control circuit in the input of the 7X7 tube.

The push-pull audio-output stage furnishes approximately 10 watts output to the 12-inch electrodynamic loudspeaker.

PHILCO TROUBLE-SHOOTING PROCEDURE

In this manual the circuit is divided into four sections, with individual chassis base layouts and a complete schematic showing test points for each section. The first step in each troubleshooting chart is a master check, which makes it possible to determine whether trouble exists in that section without going through the entire test procedure. Failure to secure "NORMAL INDICATION" in a given step indicates trouble, which should then be located by voltage, resistance, or capacitance checks of the parts associated with point under test, and remedied before testing further.

Service data on the Model D-10A Automatic Record Changer is not included in this manual. Complete service information on the record changer will be found in Philco Service Manual PR-1156.

SYMBOLIZATION AND TERMINOLOGY

All components in the radio circuit are symbolized and located as follows:

C—condenser LA—loop antenna S—switch
I—pilot lamp LS—loudspeaker T—transformer
L—choke or coil R—resistor Z—electrical ass'y

100-series components are in section 1 — the power supply

200-series components are in section 2 — the audio amplifier

300-series components are in section 3 — the i-f amplifier, second detector and/or discriminator, and a.v.c.

400-series components are in section 4 — the antenna, r-f and oscillator.

The main switch assembly, commonly referred to in the past as a "Band Switch", is used, in many instances, for various purposes in addition to band switching. Therefore, in this manual, and in future PHILCO service manuals, the main wafer-switch assembly will be designated as a "Function Switch".

PRELIMINARY CHECKS

Before connecting the radio to a source of power, the following steps are recommended:

1. Inspect both top and bottom of the chassis. Make sure that all tubes are secure in their 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 no. 8 of 5Y3GT rectifier tube) and the radio chassis. When the ohmmeter test leads are connected in proper polarity, the highest resistance reading will be obtained. If the reading is lower than 50,000 ohms, check condensers C102 and C103 for leakage or shorts.

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.

The method of measuring for these points is illustrated in figure 1. Hold a ruler against the scale backplate, with the start of the ruler at the reference line shown, and mark pencil dots at the proper points for the required frequency settings. When the ruler is correctly placed, the index mark is $1\frac{1}{2}$ inches from the reference point indicated in figure 1.

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

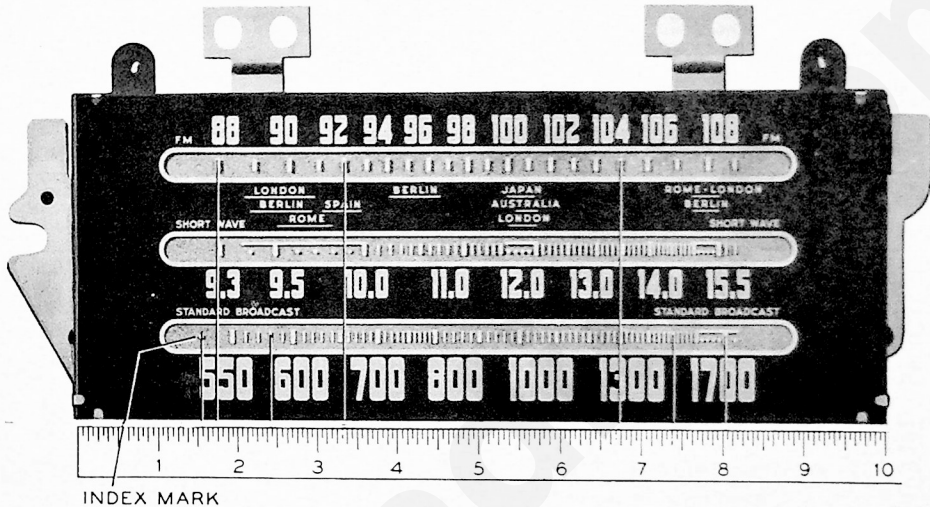


FIGURE 1. DIAL-BACKPLATE CALIBRATION MEASUREMENTS.

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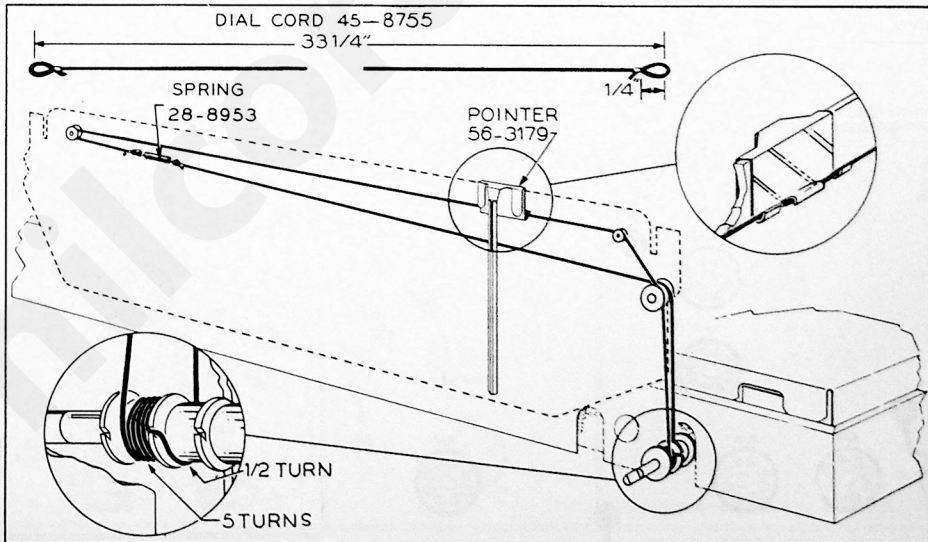


FIGURE 2. POINTER-DRIVE-CORD INSTALLATION DETAILS.

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SECTION 1 – TROUBLE SHOOTING

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

Make the tests for this section with a d-c voltmeter, connecting the leads to the test points indicated in the chart and in figure 3. The voltages given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts a.c.

With function switch set to push-button position, turn volume control to minimum and tone control to nearly off position.

Follow steps in proper sequence; if "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 2; if not, isolate and remedy the trouble in this section.

It will be noted that certain parts in other sections of the radio are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION", since they may produce abnormal voltage readings in Section 1.

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E to C D to C	240 volts 190 volts	No voltage or incorrect voltage	Trouble in this section. Isolate by the following tests.
2	A to C	310 volts	No voltage Low voltage High voltage	Defective 5Y3GT, T100, S100, W100, L100. Shorted C103. Open R100. Defective 5Y3GT, C103, C102A, C419, C314. Open R100, L100, or T200.
3	B to C	Negative 16 volts	Low or no voltage High voltage	Shorted R101. Open R101.
4	D to C	190 volts	No voltage Low voltage High voltage	Open R100. Shorted C102A. Leaky C102A, C103. Defective C419. Open L100, T200.
5	E to C	240 volts	No voltage Low voltage High voltage	Open L100. Shorted C103. Shorted or leaky C102B, C216. Shorted L100. Open R100, T200.
Listening test			Abnormal hum may be caused by open C102A or C103.	

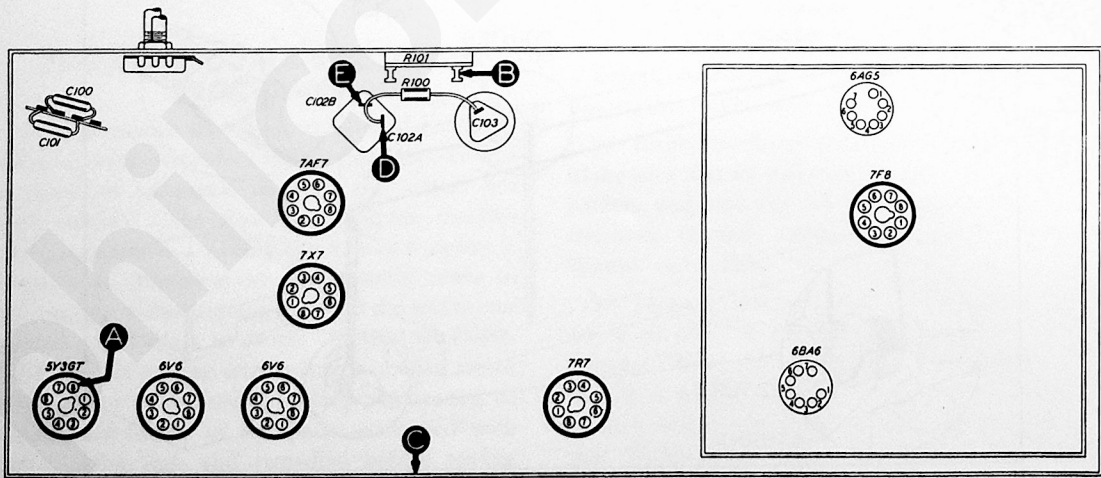


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

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SECTION 2 – TROUBLE SHOOTING

For all tests in this section, use an audio-frequency signal generator. 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.

Set the radio volume control at maximum, tone control at nearly off position. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed to the tests in Section 3. If not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	L* J	Loud, clear signal with weak signal input	Trouble within this section. Isolate by the following tests.
2	A (7AF7 tube removed)	Loud, clear signal with strong signal input	Defective 6V6GT tube, T200 or LS200. Shorted or leaky C216 or C213.
3	B	Loud, clear signal with strong signal input	Defective 6V6GT tube. Shorted or leaky C208.
4	D	Loud, clear signal with strong signal input	Open C213, R215, R216.
5	E	Loud, clear signal with strong signal input	Open C208 or R217.
6	F (7AF7 tube replaced)	Clear signal, louder than preceding test	Defective 7AF7 tube, C204, R203, R206, R207.
7	G	Clear signal, same volume as step 6	Defective C200, R202. Open C204.
8	H	Loud, clear signal with moderate signal input	Defective 7X7 tube, C205, C308. Open R208.
9	J	Loud, clear signal with moderate signal input	Open R200, C202. Shorted C201, C203. Defective R201 (rotate through entire range).
10	K*	Loud, clear signal with moderate signal input	Defective C211, C212.
11	L*	Loud, clear signal with weak signal input	Defective 7AF7 tube, push button PB1. Shorted C215.

* Depress PHONO push button for this test.

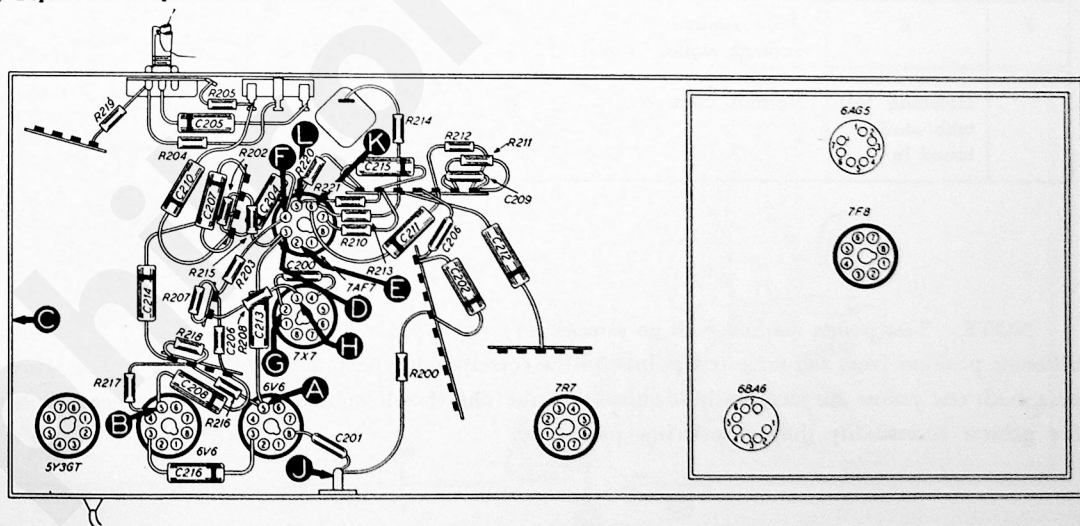


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

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SECTION 3 – TROUBLE SHOOTING

AM TESTS

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", and connect the output lead through a .1-mf condenser to the test points indicated.

Turn the radio volume control to maximum, tone control to nearly off position and set function switch to push-button position.

If the "NORMAL INDICATION" is obtained in the first step, proceed to the FM tests, or to the tests in Section 4; if not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Loud, clear signal with low signal-generator input	Trouble within this section. Isolate by the following tests.
2	A	Normal signal with moderate input	Defective 7R7 tube, 7X7 tube, Z302. Improperly aligned Z302. Defective C314, C419, C317, C310, C311, C315, C312, C314, C328, FS4 (F).
3	B	Same as step 2.	Defective C308, C309. Defective or improperly aligned Z301.
4	D	Much stronger signal than in step 3; decrease input to obtain normal signal	Defective 6BA6 tube, C307. Open R303, R302, FS4 (R), C303, C305.
5	E	Approximately the same strength signal as in step 4	Defective C304, FS4 (R). Defective or improperly aligned Z300.
	Listening test with station tuned in	Normal, clear reception	Distorted signal with hum: defective R316 or FS4 (F). Intense hum or motorboating: open C419 or C328.

NOTE: Test points marked with an asterisk (*) on the base view are physically located in a different position from the same test points on the corresponding section of the main schematic. However, both test points are electrically identical, but the one shown on the base view has been chosen for greater accessibility during servicing procedure.

SECTION 3 — Continued

FM TESTS

Set the function switch to FM position and follow the instructions preliminary to the AM tests with these exceptions; set the signal-generator frequency to 9.1 mc and detune to one side or the other until a satisfactory test signal is obtained.

The most satisfactory check on operation of the discriminator circuit is the ability to make proper alignment as described on pages 256, 257 and 258.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Normal signal with moderate input	Defective or improperly aligned Z302. Defective FS4 (F).
2	B	Same strength signal as in step 1	Defective Z301.
3	D	Much stronger signal than in step 2; decrease input to obtain normal signal	Same parts listed in AM section, step 4.
4	E	Approximately the same strength signal as in step 3	Defective Z300 or any other part listed in AM section, step 5.

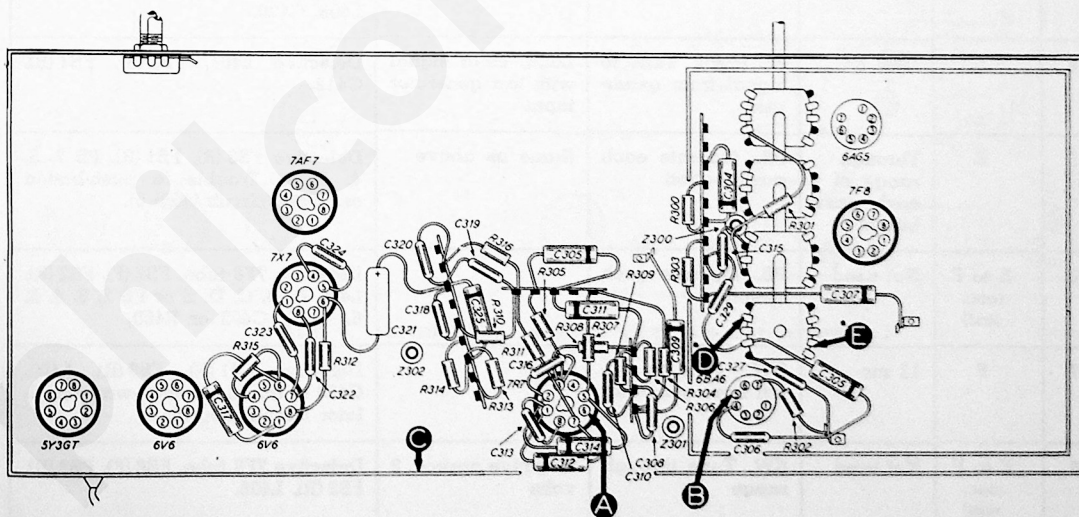


FIGURE 5. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

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SECTION 4 – TROUBLE SHOOTING

For tests indicated in this section, with the exception of oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to the radio chassis, test point "C", and connect the output lead through a .1-mf condenser to the test points indicated.

Turn the radio volume control to maximum and tone control to nearly off position.

Set the function switch, tuning control and signal-generator frequency as indicated in chart.

For oscillator tests (AM test chart, step 3; FM test chart, step 3) attach the positive lead of a high-resistance voltmeter to the 7F8 oscillator cathode, test point "E" (pin 4). Connect the negative lead through a 100,000-ohm isolating resistor to the 7F8 oscillator grid (pin 1), test point "F". Use a suitable meter range (0—10 volts).

Absence of negative grid voltage in either AM or FM position of function switch indicates that the oscillator is not working; check the parts listed in the chart for the oscillator tests.

AM TESTS

STEP	TEST POINT	SIG. GEN. SETTING	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B	1000 kc	BC (dial). Tune to signal from generator	Loud, clear signal with low generator input	Trouble in this section. Isolate by the following tests.
2	A	1000 kc	Same as step 1	Same as above	Defective 7F8 tube, C412, C414, C413, FS4 (R), R406. Open R300, R405. Shorted or leaky C304. Defective or misaligned Z300. Trouble in oscillator circuit (step 3).
3	E to F (osc. test)	Not used	BC. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, C413, C414, C417, FS2 (F), FS2 (R), FS3 (R), R409. Shorted or leaky C419. Defective L408, C420.
4	B	1000 kc	BC (dial). Tune to signal from generator	Loud, clear signal with low generator input	Defective L401, FS3 (R), FS1 (R), C412.
5	B	Through range of each push button	PB. Operate each push button	Same as above	Defective FS3 (R), FS1 (R), PB 2, 3, 4, 5, 6. Trouble in push-button oscillator circuit (step 6).
6	E to F (osc. test)	Not used	PB. Operate each button		Defective 7F8 tube, FS2 (F), FS2 (R), L400 A, B, C, D, E or PB 2, 3, 4, 5, 6. C401, C402 or R400.
7	B	12 mc	SW. Tune to signal from generator		Defective FS1 (R), FS3 (R), L402, C404 or trouble in short-wave oscillator circuit (step 8).
8	E to F (osc. test)	Not used	SW. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, FS2 (F), FS2 (R), FS3 (R), L408.

SECTION 4 — Continued

FM TESTS

STEP	TEST POINT	SIG. GEN. SETTING	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D	95 mc	FM. Tune to signal from generator	Loud, clear signal with low signal input.	Trouble in this section. Isolate by the following tests.
2	A	95 mc	Same as step 1	Same as step 1	Defective 7F8 tube, C412, C414, C413, FS4 (R), R406. Defective or misaligned Z300. Trouble in FM oscillator circuit (step 3).
3	E to F (osc. test)	Not used	FM. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, FS2 (F), FS2 (R), FS3 (R), L406
4	G	95 mc	FM. Tune to signal from generator	Loud, clear signal with moderate signal input	Defective FS1 (R), C410, C411, C421, L404, L405.
5	D	95 mc	FM. Tune to signal from generator	Loud, clear signal with low signal input	Defective 6AG5 tube, C406, C408, C409, L403.

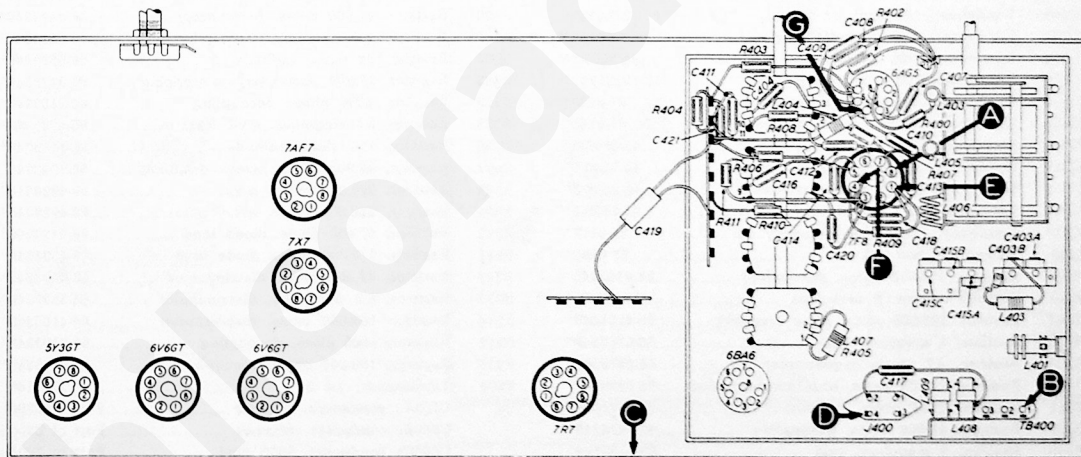


FIGURE 6. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

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REPLACEMENT PARTS LIST — MODEL 47-1230

NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items furnished may differ from the values indicated in the schematic 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." in this parts list.

SECTION 2 (Continued)

Reference No.	Description	Service Part No.
†C100	Condenser, .01 mf, line filter	61-0120*
†C101	Condenser, .01 mf, line filter	61-0120*
C102	Condenser, two section, electrolytic	30-2570-11
	C102A: condenser, 25 mf, electrolytic, power-supply filter	Part of C102
	C102B: condenser, 25 mf, electrolytic, power-supply filter	Part of C102
C103	Condenser, 20 mf, electrolytic, screen-supply filter	30-2555
C104	Condenser, 100 mmf, r-f by-pass	60-10105237*
I100	Lamp, panel	34-2040
I101	Lamp, panel	34-2040
I102	Lamp, bin-light	34-2039
L100	Field, speaker	Part of LS200
R100	Resistor, 15,000 ohms, isolating	66-3155340
R101	Resistor, 135 ohms, bias	33-3435-2
T100	Transformer, power	32-8248
S100	Switch, power on-off	Part of R209
S101	Switch, bin light	42-1702
W100	Cord, line	L3351

SECTION 2

C200	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C201	Condenser, 100 mmf, r-f by-pass	60-10105237*
C202	Condenser, .006 mf, audio coupling	45-3500-7*
C203	Condenser, 100 mmf, r-f by-pass	60-10105237*
C204	Condenser, .006 mf, audio coupling	45-3500-7*
C205	Condenser, .006 mf, audio coupling	45-3500-7*
C206	Condenser, 100 mmf, r-f by-pass	60-10105237*
C207	Condenser, .01 mf, audio by-pass	61-0120*
C208	Condenser, .006 mf, cathode by-pass	45-3500-7*
C209	Condenser, 100 mmf, r-f by-pass	60-10105237*
C210	Condenser, .01 mf, audio by-pass	61-0120*
C211	Condenser, .01 mf, audio by-pass	61-0120*
C212	Condenser, .2 mf, audio by-pass	45-3500-3*
C213	Condenser, .006 mf, audio coupling	45-3500-7*
C214	Condenser, .2 mf, audio by-pass	45-3500-3*
C215	Condenser, .001 mf, r-f by-pass	45-3500-5*
C216	Condenser, .003, high-frequency cut	61-0117*
J200	Socket, FM test	27-6180*
R200	Resistor, 100,000 ohms, decoupling	66-4103340*
R201	Control, volume, 2 megohms	33-5535-1
R202	Resistor, 220,000 ohms, plate dropping	66-4223340*
R203	Resistor, 1 megohm, grid	66-5103340*
R204	Resistor, 4.7 ohms, degeneration	66-9473340*
R205	Resistor, 33,000 ohms, bass compensation	66-3333340*
R206	Resistor, 4700 ohms, cathode	66-2473340*
R207	Resistor, 47,000 ohms, decoupling	66-3473340*
R208	Resistor, 2 megohms, grid	66-6103340*
R209	Control, tone, 4 megohms	33-5538-1
R210	Resistor, 6800 ohms, cathode	66-2683340*
R211	Resistor, 150,000 ohms, decoupling	66-4153340*
R212	Resistor, 220,000 ohms, decoupling	66-4223340*
R213	Resistor, 150,000 ohms, plate dropping	66-4153340*
R214	Resistor, 47,000 ohms, decoupling	66-3473340*
R215	Resistor, 56,000 ohms, plate dropping	66-3563340*
R216	Resistor, 330,000 ohms, grid	66-4333340*
R217	Resistor, 330,000 ohms, grid	66-4333340*
R218	Resistor, 150,000 ohms, bias filter	66-4153340*
R219	Resistor, 68 ohms, degeneration	66-0683340*
R220	Resistor, 220,000 ohms, decoupling	66-4223340*
R221	Resistor, 4.7 megohms, decoupling	66-5473340*

† Refer to PRODUCTION CHANGES

Reference No.	Description	Service Part No.
T200	Transformer, output	32-8274
LS200	Loudspeaker	36-1595

SECTION 3

C303	Condenser, .01 mf, r-f by-pass	61-0120*
C304	Condenser, .01 mf, plate r-f by-pass	61-0120*
C305	Condenser, .01 mf, a-v-c filter	61-0120*
C306	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C307	Condenser, .01 mf, screen r-f by-pass	61-0120*
C308	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C309	Condenser, .01 mf, plate r-f by-pass	61-0120*
C310	Condenser, 250 mmf, r-f by-pass	60-10255237*
C311	Condenser, .01 mf, a-v-c filter	61-0120*
C312	Condenser, .05 mf, cathode by-pass	61-0170*
C313	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C314	Condenser, .01 mf, screen r-f by-pass	61-0120*
C315	Condenser, 100 mmf, a-v-c r-f by-pass	60-10105237*
C316	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C317	Condenser, .05 mf, plate r-f by-pass	61-0170*
C318	Condenser, 100 mmf, r-f by-pass	60-10105237*
C319	Condenser, 100 mmf, r-f by-pass	60-10105237*
C320	Condenser, 100 mmf, r-f by-pass	60-10105237*
C321	Condenser, 5 mf, electrolytic, discriminator	30-2417
C322	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
†C323	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
†C324	Condenser, 6 mmf, discriminator	30-1224-9
C325	Condenser, .008 mf, r-f by-pass	61-0174*
C326	Condenser, 100 mmf, r-f by-pass	60-10105237*
C327	Condenser, 100 mmf, r-f by-pass	60-10105237*
C328	Condenser, .01 mf, B+ bus by-pass	61-0120*
C329	Condenser, 100 mmf, r-f by-pass	60-10105237*
R300	Resistor, 47,000 ohms, plate dropping	66-3473340*
R301	Resistor, 2.2 megohms, decoupling	66-5223340*
R302	Resistor, 68 ohms, cathode	66-0683340*
R303	Resistor, 27,000 ohms, screen dropping	66-3273340*
R304	Resistor, 1000 ohms, decoupling	66-2103340*
R305	Resistor, 3.3 megohms, a-v-c filter	66-5333340*
R306	Resistor, 150 ohms, cathode	66-1153340*
R307	Resistor, 68,000 ohms, screen dropping	66-3683340*
R308	Resistor, 820,000 ohms, a.v.c.	66-4823340*
R309	Resistor, 220,000 ohms, a.v.c.	66-4223340*
R310	Resistor, 47,000 ohms, diode load	66-3473340*
R311	Resistor, 330,000 ohms, diode load	66-4333340*
R312	Resistor, 47,000 ohms, discriminator	66-3473340*
R313	Resistor, 6.8 megohms, discriminator	66-5683340*
R314	Resistor, 100,000 ohms, discriminator	66-4103340*
R315	Resistor, 1000 ohms, decoupling	66-2103340*
R316	Resistor, 100,000 ohms, decoupling	66-4103340*
Z300	Transformer, 1st 1-f	32-4146
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
	C300C: condenser, 3000 mmf	Part of Z300
	C300D: condenser, trimmer	Part of Z300
	C300E: condenser, 6 mmf, coupling	Part of Z300
Z301	Transformer, 2nd 1-f	32-4158
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser, 300 mmf	Part of Z301
	C301D: condenser, trimmer	Part of Z301
Z302	Transformer, AM detector/FM discriminator	32-4147
	C302A: condenser, 27 mmf	Part of Z302
	C302B: condenser, trimmer	Part of Z302
	C302C: condenser, 25 mmf	Part of Z302
	C302D: condenser, 470 mmf	Part of Z302
	C302E: condenser, trimmer	Part of Z302

REPLACEMENT PARTS LIST — Continued

SECTION 4

Reference No.	Description	Service Part No.
C400	Push-button padder-strip assembly	31-6479-1
	C400A, B, C, D, and E: condensers	Part of C400
C401	Condenser, 220 mmf, r-f voltage divider	30-1220-4
C402	Condenser, 1000 mmf, r-f voltage divider	30-1225
C403	Condenser, 2-section, trimmer	31-6476
	C403A: condenser, shunt trimmer,	
	BC aerial	Part of C403
	C403B: condenser, shunt trimmer,	
	SW aerial	Part of C403
C404	Condenser, 250 mmf, spread tuning,	
	SW aerial coil	60-10255237*
C405	Condenser, main tuning gang	31-2703-2
	C405A: condenser, FM aerial coil trimmer	Part of C405
	C405B: condenser, FM r-f coil trimmer	Part of C405
	C405C: condenser, FM osc. coil trimmer	Part of C405
C407	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C408	Condenser, 100 mmf, r-f by-pass	60-10105237*
C409	Condenser, 1500 mmf, screen r-f by-pass	60-20155404*
C410	Condenser, 33 mmf, r-f coupling	30-1223-6*
	SW osc. coil	60-10255237*
C411	Condenser, 1500 mmf, r-f by-pass	60-20155404*
C412	Condenser, 250 mmf, mixer grid, blocking	60-10255237*
C413	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C414	Condenser, 750 mmf, cathode coupling	60-10755301*
C415	Condenser, trimmer and padder assembly,	
	3-section	31-6464
	C415A: BC osc. series padder	Part of C415
	C415B: BC osc. shunt trimmer	Part of C415
	C415C: SW osc. shunt trimmer	Part of C415
C416	Condenser, 250 mmf, spread tuning,	
C417	Condenser, 6 mmf, neutralizing (SW)	30-1224-9
C418	Condenser, 100 mmf, osc. grid feedback	60-10105237*
C419	Condenser, .01 mf, B+ by-pass	61-0120*
C420	Condenser, 250 mmf, osc. plate feedback	60-10255237*
C421	Condenser, 1500 mmf, B+ bus r-f by-pass	60-20155404*
J400	Socket, external aerial	27-6214-1
L400	Push-button coils	
	L400A, B, C: coil, push-button	32-4059-2
	L400D, E: coil, push-button	32-3779
L401	Coil, broadcast aerial	32-4033-2
L402	Coil, FM aerial	32-4158
L403	Coil, short-wave aerial	32-4050-6
L404	Coil, r-f choke	32-4061
L405	Coil, FM r-f	32-4159
L408	Coil, FM oscillator	32-4018-2
L407	Coil, choke, parasitic suppressor	32-4157
L408	Coil, broadcast oscillator	32-4019-4
L409	Coil, short-wave oscillator	32-4113
LA400	Broadcast-loop assembly	76-1989
R400	Resistor, 10 ohms, FM grid	66-0103340*
R401	Resistor, 6800 ohms, push-button	
	oscillator cathode	66-2683340*
R402	Resistor, 150 ohms, FM r-f cathode	66-1153340*
R403	Resistor, 47,000 ohms, FM r-f screen dropping	66-3473340*
R404	Resistor, 1000 ohms, FM r-f plate decoupling	66-2103340*
R405	Resistor, 1500 ohms, mixer plate	
	parasitic suppressor	Part of C407
R408	Resistor, 1500 ohms, mixer cathode	66-2153340*
R407	Resistor, 2.2 megohms, mixer grid	66-5223340*
R408	Resistor, 470,000 ohms, isolating	66-4473340*
R409	Resistor, 15,000 ohms, oscillator grid	66-3153340*
† R410	Resistor, 33,000 ohms, plate dropping	66-3333340*
R411	Resistor, 47,000 ohms, dropping	66-3473340*

† Refer to PRODUCTION CHANGES

SECTION 4 (Continued)

Reference No.	Description	Service Part No.
S400	Switch, function	42-1801
TB400	Terminal board, aerial	38-9942

MISCELLANEOUS

Description	Service Part No.
Bin-Light Parts:	
Bin-light cable, socket and switch assembly	76-2728
Bracket, bin-light	56-2332
Bracket, switch	56-3373
Cord, pull (25-ft. spool)	45-8760*
Socket assembly, bin-light lamp	41-3742
Spring, pull-cord	28-8391
Cabinet and Cabinet Hardware:	
Back, cardboard	40-6825
Baffle, wood	219054
Baffle and cloth assembly	40-6772
Bezel, wood	15601
Bin mechanism, left-hand	76-2176
Bin mechanism, right-hand	76-2174
Cabinet	10645D
Dial scale and backplate assembly	45-1570
Foot, glide (Dome)	45-6042
Frame, mounting assembly	76-2199
Front, tilt	45-6308
Hinge	45-6200
Panel, top	45-6392
Stud, back cardboard	W2235FA9
Clip, BC aerial coil	28-5002FA1
Clip, BC or SW oscillator coil	28-5002
Dial-Scale Hardware:	
Cord, pointer drive (25-ft. spool)	45-8755*
Pointer	56-3179
Scale backplate and pulley assembly	76-2005
Spacer, scale backplate	56-3279
Spring, pointer-drive-cord	28-8953
Function-Switch Hardware:	
Bracket assembly, shaft	76-2187FA3
Link assembly	76-2186
Shaft, link assembly	56-3271FA11
Washer, "C"	1W42535FA3
Grommet, r-f chassis mounting	54-4295
Knob, tuning	54-4105
Lamp, panel	34-2040
Lamp-socket assembly, pilot	54-7278
Loop assembly, BC	76-1989
Push-Button-Assembly Hardware:	
Bracket and lug assembly, rear mounting	76-2214
Core, push-button tuning	56-6100
Cover, push-button switch assembly	76-1343
Grommet, push-button switch mounting	27-4596
Knob, push-button	54-4217
Screw, mounting bracket	1W19670FA3
Sleeve, push-button switch mounting	28-5665FA3
Spring strip, tuning-core stabilizer	56-2249
Switch, push-button (includes phono a-c switch)	42-1756
Tab kit	40-6766
Tab cover	27-5737
Terminal strip, push-button coil mounting	56-2250
Record Changer Mounting Parts, etc.:	
Bolt, changer-mounting (4)	56-3295
Grommet, changer-mounting (4)	54-4313
Nut, T, changer-mounting	1W56643FA3
Nut, changer-mounting	1W29061FA3
Spring, changer-mounting (8)	56-3043
Cable and plug assembly, phono input	41-3735-2
Transformer, phono input	32-8256
Shield, panel lamp	54-7278
Scale backplate and pulley assembly	76-2005
Socket, external aerial	27-6214-1
Socket, Loktal	27-6138
Socket, Loktal	27-6213
Socket, miniature 7-pin (mica-filled)	27-6203-1
Socket, octal	27-6174
Socket, phono power	27-6200
Speaker Hardware:	
Bolt, mounting	W1587
Cable and plug assembly	41-3701
Nut, speaker-mounting	1W1988FA3
Plug, speaker-cable	27-4419-2
Water, capacitor-mounting	45-6239

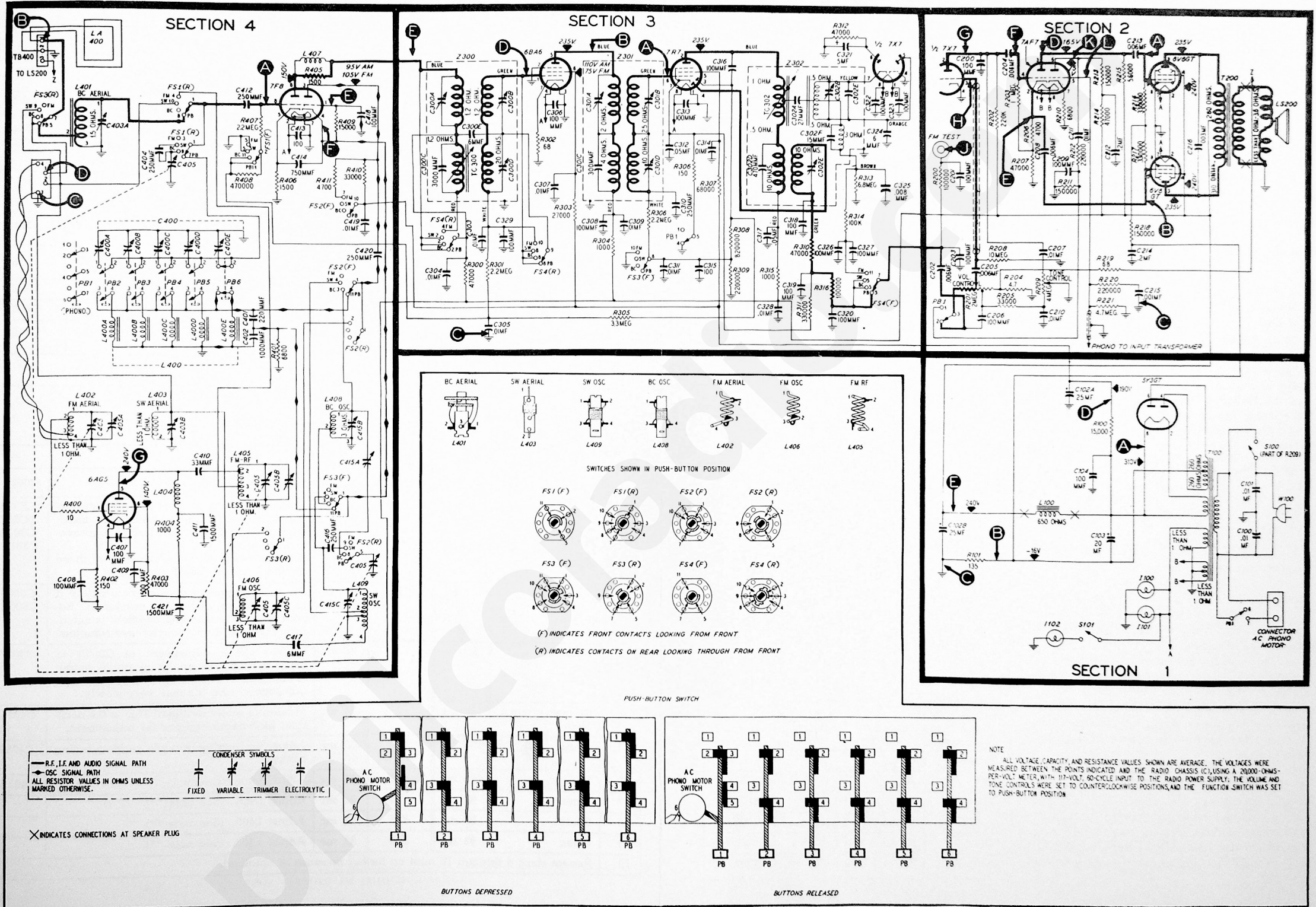


FIGURE 7. PHILCO RADIO-PHONOGRAPH, MODEL 47-1230 — COMPLETE SECTIONALIZED SCHEMATIC, SHOWING TEST POINTS.

AM ALIGNMENT PROCEDURE

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.

CONNECT OUTPUT METER between terminal 3 (voice-coil connection) of aerial terminal board and chassis.

ADJUST RADIO DIAL POINTER, with tuning-condenser plates fully meshed, to make pointer coincide with index mark at low-frequency end of scale.

CONNECT AM SIGNAL GENERATOR ground lead to radio chassis; connect output lead as indicated in chart.

SET VOLUME CONTROL at maximum and **TONE CONTROL** at nearly off position.

SET SIGNAL GENERATOR, RADIO FUNCTION SWITCH and **RADIO DIAL** as indicated in chart.

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

NOTE: Make up a coil of wire, using 6 or 8 turns, about 6 inches in diameter; connect the signal-generator leads and suspend near the radio broadcast loop.

FM ALIGNMENT PROCEDURE

NOTE: Make AM alignment first.

Connect the negative lead of a 20,000-ohms-per-volt, d-c meter, to pin-6 of the 7X7 tube and the positive lead to ground (across the 5-mf condenser, C321, in the discriminator circuit). Use 10-volt range.

Use an r-f signal generator with **MODULATED** output for the entire alignment. The generator must have sufficient output to give a meter reading greater than 8.5 volts; the reading on the meter should be kept at approximately 9 volts throughout the alignment. Connect the generator ground lead to chassis and the output lead as indicated in the chart.

Set the function switch to FM position. Allow the radio and generator to warm up 15 minutes before starting the alignment.

NOTE: The resonance of the circuits using coils L403, L405 and L406 may be checked by the use of a powdered-iron tuning core, such as Philco Part No. 56-6100. If the signal strength (meter reading) increases when the iron end is inserted in the coil, compress the turns slightly. If the signal increases when the threaded brass end is inserted, spread the turns.

Do not spread or compress turns excessively, since only a small change is required at these frequencies.

Oscillator coil L406: Adjust coil for maximum meter reading.

R-F coil L405: Adjust coil for maximum meter reading while rocking tuning control.

Aerial coil L403: Adjust coil for maximum meter reading.

SETTING THE PUSH BUTTONS

1. Connect the output meter between terminal no. 3 on aerial terminal board and radio chassis.
2. Turn the radio volume control to maximum and the tone control counterclockwise to nearly OFF position.
3. Turn the radio function switch to PB position.
4. Couple the signal generator loosely through a coil of wire to the radio loop aerial, as described in AM alignment Procedure above.
5. Turn on the power and allow the radio to warm up for 15 minutes before starting the adjustments.
6. Starting with the lowest frequency desired, set the signal-generator frequency, push the button, and adjust the associated oscillator tuning core and aerial trimmer 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.
7. Reset the signal-generator frequency and repeat the procedure for each remaining push button.
8. 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.

PUSH-BUTTON (Left to right from front)	FREQUENCY RANGE	OSCILLATOR TUNING CORE	AERIAL TRIMMER
Phono
PB1	540-1000 kc	L400A	C400A
PB2	600-1200 kc	L400B	C400B
PB3	650-1300 kc	L400C	C400C
PB4	850-1500 kc	L400D	C400D
PB5	900-1600 kc	L400E	C400E

AM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	FRE. QUENCY	FUNCTION SWITCH	FRE. QUENCY	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to terminal 3 of TB400	455 kc	BDCST	540 kc	Adjust trimmers for maximum output-meter reading. Align <u>ONCE ONLY</u> in the order given.	C302E C301D C300D TC300
2	Loosely coupled to radio loop. (See Note *)	15 mc	SW	15 mc	Start with loose trimmer screw and adjust for maximum on <u>FIRST</u> signal heard. Image should be heard at 14.1 mc.	C415C
3	Same	15 mc	SW	15 mc	Adjust for maximum while rocking tuning control.	C403B
4	Same		BDCST		Preset C415A by tightening then backing off 1/4 turn.	C415A
5	Same	1700 kc	BDCST	1700 kc	Adjust for maximum.	C415B
6	Same	1500 kc	BDCST	1500 kc	Adjust for maximum.	C403A
7	Same	580 kc	BDCST	580 kc	Adjust for maximum while rocking tuning control.	C415A
8	Repeat steps 5, 6 and 7 until no further increase is noted.					

FIGURE 8. CHASSIS VIEW, SHOWING AM TRIMMER LOCATIONS.

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FM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	FRE. QUENCY	FUNCTION SWITCH	FRE. QUENCY	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to pin 1 of 6BA6 (test point D)	9.1 mc	FM	88 mc	Attenuate signal to give approximately a 10-volt meter reading. Adjust for maximum. Repeat until no further improvement is noted. After this step do not touch any of these trimmers except C302B (in step 3).	C302B TC302 C301B C301A
2	Through .1-mf condenser to pin 8 of 7F8 (test point A)	9.1 mc	FM	88 mc	Attenuate signal to give approximately a 10-volt reading. Adjust for maximum. Repeat until no further improvement is noted. After this step do not touch these trimmers.	C300B C300A
3	Same	9.1 mc	FM	88 mc	Double check adjustment of C302B to make certain that minimum audio output is obtained from speaker. This is a critical adjustment; turn trimmer very slowly.	C302B
4	Connect to pin 4, J400	105 mc	FM	105 mc	Maximum meter reading. This is the oscillator high-frequency padder adjustment.	C405C
5	Same	105 mc	FM	105 mc	Adjust for maximum while rocking tuning control.	C405B
6	Same	105 mc	FM	105 mc	Adjust for maximum.	C405A
7	Same	92 mc	FM	92 mc	Adjust L406. (See note **).	
8	Same	92 mc	FM	92 mc	Adjust L405. (See note **).	
9	Same	92 mc	FM	92 mc	Adjust L403. (See note **).	
10	Repeat steps 4 through 10 until no further increase is obtained.					

FIGURE 9. CHASSIS VIEW, SHOWING FM TRIMMER LOCATIONS.

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PRODUCTION CHANGES FOR MODEL 47-1230
CODE 121

RUN 2

- a. To prevent FM reception in push-button operation, a choke, Part No. 32-4111 was added, between contact 7 of switch-wafer section FS-1(R) and contact 2 of the push-button switch assembly.
- b. R410, 33,000 ohms, Part No. 66-3333340*, was changed to 27,000 ohms, Part No. 66-3273340*.

RUN 3

- a. C324, 6 mmf., Part No. 30-1224-9, was changed to 7.5 mmf., Part No. 30-1224-8.
- b. A choke, Part No. 32-4061, was added, between contact 11 of switch-wafer section FS-2(F) and contact 3 of the push-button switch assembly.

RUN 4

The line filter condenser, .01-.01 mf., Part No. 3903ODG, was changed to two separate condensers (C100 and C101), .01 mf., Part No. 61-0120*.

CRITICAL LEAD DRESS AND PARTS PLACEMENT FOR MODEL 47-1230

1. Lugs 1 and 5 of the 6BA6 socket should be "fanned" down toward the base.
2. All leads of the i-f transformers should be dressed toward the base. The green and blue leads of Z300 should be dressed apart.
3. The leads of Z300, L408, and L409 should be dressed away from L406.
4. R406 and R411 should be dressed away from wafer-switch section FS-2.
5. C414 should be dressed down against the base.