PHILCO RADIO MODELS 47-204 and 47-205

Circuit Description

The Philco Models 47-204 and 47-205 are 5-tube, table-model superheterodyne radios, providing reception in the standard broadcast band. The two models are identical, except for cabinet and dial parts, as indicated in the parts list.

The high-impedance loop aerial normally provides adequate signal pick-up. An external aerial may be connected, if desired, by detaching the aerial lead (shown in figure 6) from the chassis, and connecting the lead to an external aerial lead-in. Do not use a ground.

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

The 7A8 is transformer coupled to the 14A7 i-f amplifier, which is also transformer coupled to the diodes of the 14B6 second detector–first audio-frequency amplifier. A-v-c voltage is applied to the control grids of both the i-f and converter tubes.

The triode section of the 14B6 is the first audio stage, and is resistance coupled to the 50L6GT output tube. The output tube is transformer coupled to a permanent-magnet dynamic speaker.

D-c operating voltages are obtained from a 35Y4 half-wave rectifier, the output of which is filtered by a two-section resistor–condenser filter.

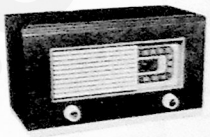
The choke, part of C304, and the condenser C304 in Section 3, figure 3, form a series-tuned circuit, resonant at the intermediate frequency. This combination offers less impedance than a condenser alone, at this frequency, thus reducing any tendency toward oscillation. This choke–condenser combination acts as a condenser for audio frequencies. By-passing at broadcast frequencies is made adequate by connecting the tuning-condenser gang to the chassis.

The 150,000-ohm resistor, R100, in Section 1, prevents hum which might otherwise occur under conditions of high humidity.

Philco TROUBLE-SHOOTING *Procedure*

In this manual, the schematic diagram is divided into four sections, with a chassis layout for each section, showing components and test points for each section. The test points are also indicated on the schematic diagram in the corresponding section. A simplified trouble-shooting procedure is given in a chart for each section. The first step in each chart is a master check, indicating whether trouble exists in that section. Failure to secure the "NORMAL INDICATION" in a given step indicates trouble, which should be located by voltage, resistance, or capacitance checks of parts indicated in the step, and remedied before testing further.

MODEL 47-204



MODEL 47-205

SPECIFICATIONS

CABINET	Wood composition, simulated leather
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540 to 1,620 kc
OPERATING VOLTAGE	105 to 120 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Loop fastened to cabinet; terminal also provided for outside aerial
INTERMEDIATE FREQUENCY	455 kc
PHILCO TUBES (5)	7A8, 14A7, 14B6, 50L6GT, 35Y4
PANEL LAMP	6—8-volt, bayonet base, Part No. 34-2068

TP-2779A & TP-2780A

Preliminary Checks

The following preliminary checks are recommended before turning on the radio:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in their proper sockets (see figure 6), and look for bad connections, burnt resistors, or other obvious sources of trouble.

2. Measure the resistance between B plus and B minus (test points C and B− in figure 1), using the ohmmeter polarity giving the highest resistance reading; if the reading is lower than 50,000 ohms, check C101A, C101B, and C101C, for leakage or shorts.

TROUBLE SHOOTING *Section 1*

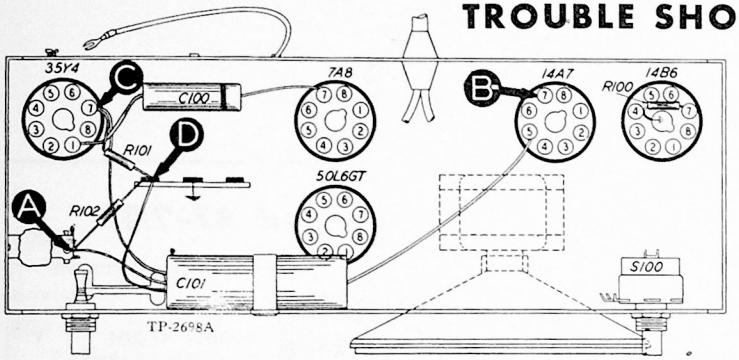


Figure 1. Bottom View, Showing Section 1 Test Points

Make the tests for this section with a d-c voltmeter, connecting the leads to the test points indicated in the chart. The voltages shown were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, 60 cycles.

Turn the volume control to minimum, and set the dial pointer at 540 kc.

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

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A to B—	90v		Trouble within this section; isolate by the following tests.
2	C to B—	115v	No voltage	Defective 35Y4 tube. Shorted C101A.
			Low voltage	Defective 35Y4 tube. Open C101A or I100. Leaky C101A.
			High voltage	Open R101.
3	D to B—	105v	No voltage	Shorted C101B.
			Low voltage	Open C101B. Leaky C101B or C203.
			High voltage	Open R102, T200, or R204.
4	A to B—	90v	No voltage	Shorted C101C.
			Low voltage	Leaky C101C.
			High voltage	Open R204.

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

TROUBLE SHOOTING *Section 2*

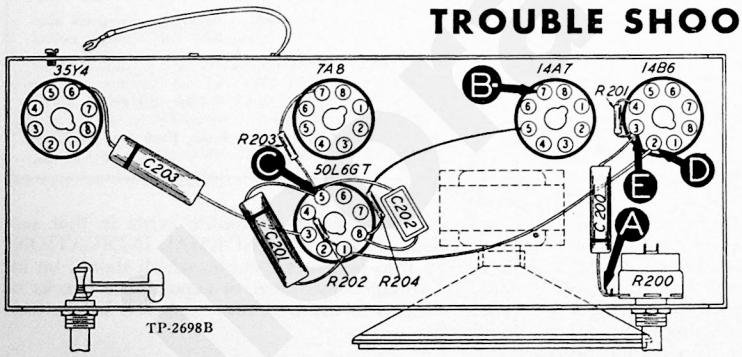


Figure 2. Bottom View, Showing Section 2 Test Points

Make tests for this section by using an audio signal. Connect ground lead of signal generator to B—; connect output lead through a .1-mf condenser to the test points indicated in the chart. Set the volume control at maximum. If "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 3; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	C	Clear signal with high signal-generator output	No signal: Open or shorted LS200 or T200. Shorted C203. Open R204. Defective 50L6GT tube. Weak or distorted signal: Defective 50L6GT tube, or LS200. Leaky C202 or C201. Open R203. Shorted R204.
3	D	Same as step 2	No signal: Open C201. Weak or distorted signal: Leaky C201.
4	E	Same as step 1	No signal: Open R202. Defective 14B6 tube. Weak or distorted signal: Shorted C200. Open R201. Defective 14B6 tube.
5	A	Same as step 1 Note: Rotate R200 through range	No signal: Open C200. Shorted C300D. Weak or distorted signal: Defective R200.

TROUBLE SHOOTING *Section 3*

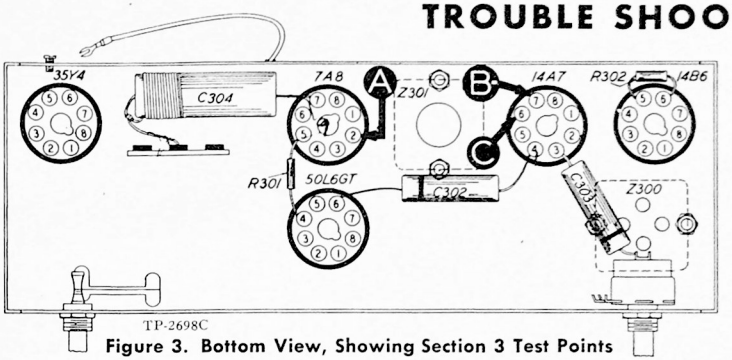


Figure 3. Bottom View, Showing Section 3 Test Points

Make tests for this section by using an r-f signal generator with modulated output. Set generator frequency to 455 kc. Connect ground lead of signal generator to B−; connect output lead through a .1-mf condenser to the test points indicated in the chart. Set the volume control at maximum. If "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 4; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	C	Same as step 1	No signal: Open or shorted Z300. Defective 14B6 or 14A7 tube. Open R301. Shorted C303. Weak or distorted signal: Leaky C303. Open C303 or C304. Defective 14B6 or 14A7 tube. Misaligned Z300. Leaky or open C302.
3	A	Same as step 1	No signal: Open or shorted Z301. Weak or distorted signal: Misaligned Z301.

TROUBLE SHOOTING *Section 4*

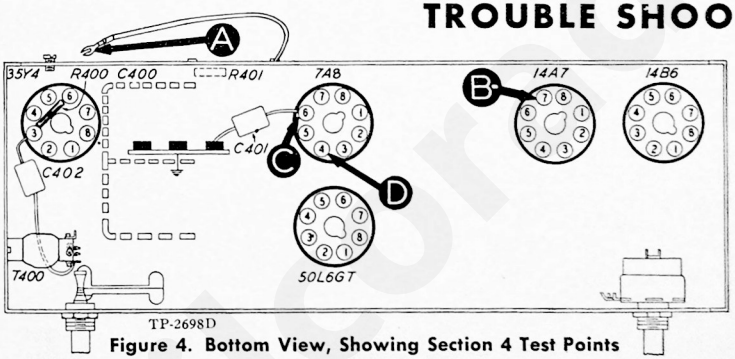


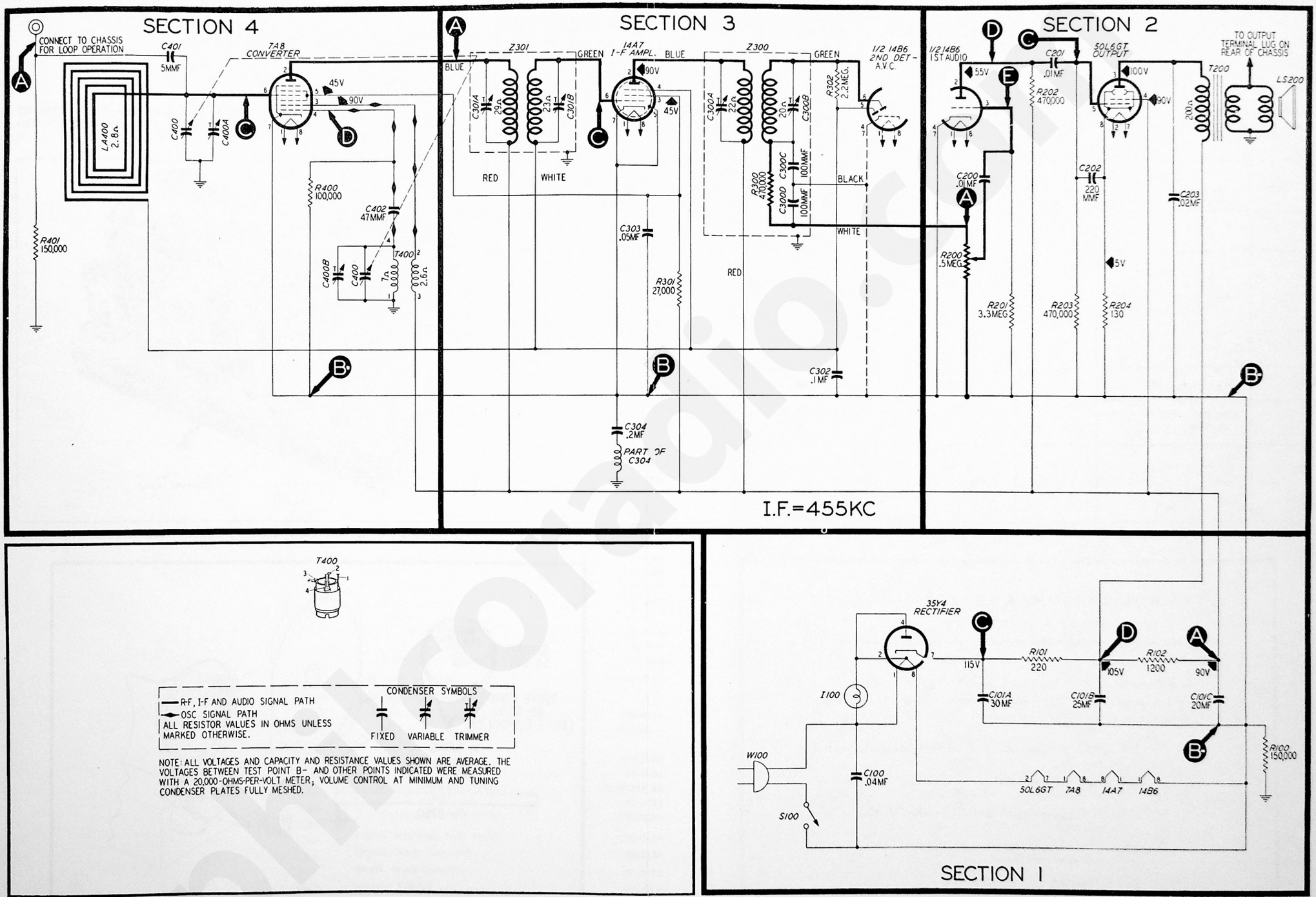
Figure 4. Bottom View, Showing Section 4 Test Points

Make tests for this section by using an r-f signal generator with modulated output. Set frequency as noted in chart. Connect generator ground lead to B−; connect output lead through a .1-mf condenser to the test points indicated in the chart.

Inspect tuning condensers for bent plates, dirt, or poor wiper contacts; any or all of these will cause noise. If "NORMAL INDICATION" is not obtained in step 1, isolate trouble by following the remaining steps.

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc	540 kc	Clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	Osc. Test (see Note below)		540 to 1620 kc	Negative voltage	Open or shorted T400, C402, or R400. Shorted C400 or C400B. Defective 7A8 tube.
3	C	540 kc	540 kc	Same as step 1	No signal: Open or shorted Z301. Shorted C400 or C400A. Defective 7A8 tube. Weak or distorted signal: Shorted or open LA400. Defective 7A8 tube.
4	A	540 kc	540 kc	Same as step 1	Weak signal: Open C401.

NOTE: Oscillator test.—Connect positive lead of a 20,000-ohms-per-volt meter to B−; prod end of negative lead through a 100,000-ohm isolating resistor to test point D. Proper operation of oscillator is indicated by a negative voltage of 9 to 12 volts throughout range of tuning condenser.



TP-2698

FIGURE 5. PHILCO MODELS 47-204 AND 47-205; COMPLETE SECTIONALIZED SCHEMATIC, SHOWING ALL TEST POINTS

ALIGNMENT PROCEDURE

TURN ON THE RADIO POWER, AND SET THE VOLUME CONTROL FULL ON

DIAL POINTER—Turn tuning condensers to full-mesh position. Set dial pointer to index dot, located to the left of "55."

OUTPUT METER—Connect to left (output) lug and center (chassis) lug of terminal panel, shown in figure 6.

SIGNAL GENERATOR—Connect ground lead to B—; connect output lead as indicated in the chart.

OUTPUT LEVEL—During alignment, adjust the signal-generator output to maintain an output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1				Turn C301B (copper screw) down tight.	
2	Through .1-mf condenser to test-point C of Section 4	455 kc	540 kc	Adjust trimmers, in the order given, for maximum output.	C300A C300B C301A C301B
3	Through 100-mmf condenser to external aerial connector.	1600 kc	1600 kc	Disconnect external aerial lug from chassis. Adjust trimmer for maximum output.	C400B
4	Same	1500 kc	1500 kc	Adjust for maximum output.	C400A

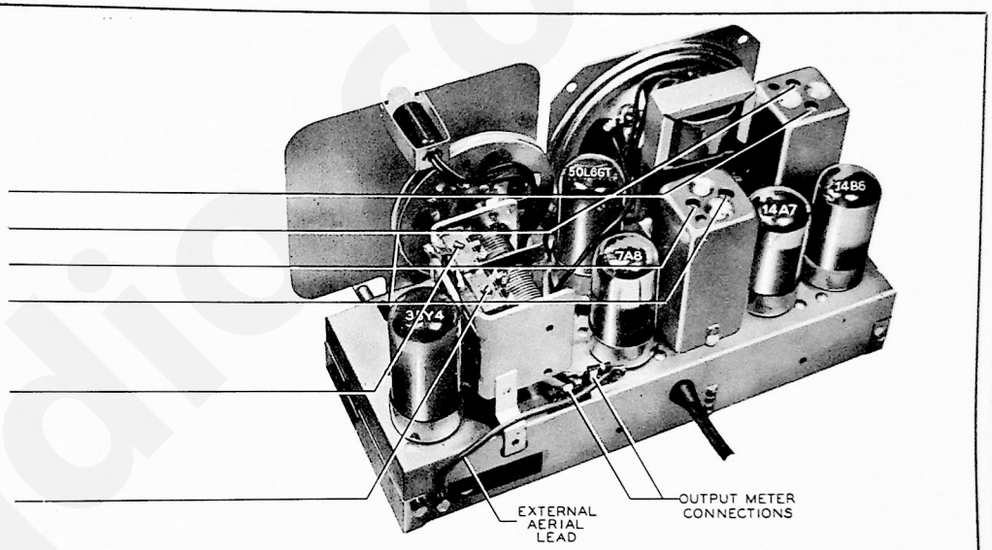


Figure 6. Chassis View, Showing Trimmer Locations TP-3126

SYMBOLIZATION AND TERMINOLOGY

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

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loudspeaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

100-series components are in Section 1, the power supply.

200-series components are in Section 2, the second detector, a.v.c. and audio.

300-series components are in Section 3, the i-f amplifier.

400-series components are in Section 4, the aerial, r.f. and oscillator.

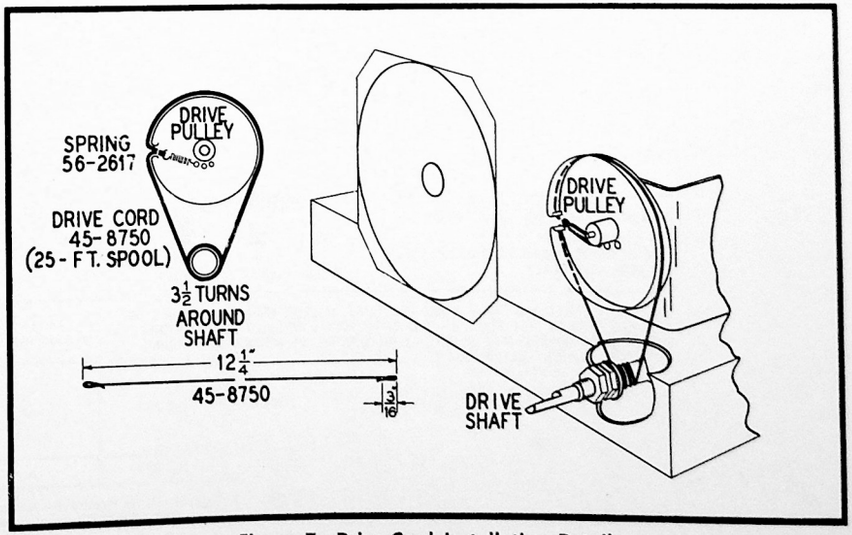


Figure 7. Drive-Cord Installation Details TP-2698E

REPLACEMENT PARTS LIST

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 instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

SECTION 1

Reference No.	Description	Service Part No.
C100	Condenser, line filter, .04 mf	45-3500-2*
C101	Condenser, electrolytic, 3-section filter	30-2573
C101A:	Condenser, electrolytic, 30 mf	Part of C101
C101B:	Condenser, electrolytic, 25 mf	Part of C101
C101C:	Condenser, electrolytic, 20 mf	Part of C101
R100	Resistor, leakage, 150,000 ohms	66-4153340*
R101	Resistor, filter, 220 ohms	66-1224340*
R102	Resistor, filter, 1200 ohms	66-2123340*
S100	Switch, power	Part of R200
W100	Power cord and plug	L3363
I100	Panel lamp	34-2068

SECTION 2

C200	Condenser, coupling, .01 mf	61-0120*
C201	Condenser, coupling, .01 mf	61-0120*
†C202	Condenser, by-pass, 220 mmf	60-10205307*
C203	Condenser, by-pass, .02 mf	61-0108*
R200	Volume control (with power switch), 500,000 ohms	33-5429
R201	Resistor, grid load, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid load, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
LS200	Speaker	36-1614
T200	Output transformer	Part of LS200

SECTION 3

C302	Condenser, a-v-c by-pass, .1 mf	61-0113*
C303	Condenser, screen by-pass, .05 mf	61-0122*
†C304	Condenser and choke assembly, i-f by-pass, .2 mf	76-1161
R300	Resistor, diode load, 47,000 ohms	Part of Z300
R301	Resistor, screen, 27,000 ohms	66-3273340*
R302	Resistor, a-v-c, 2.2 megohms	66-5223340*
Z300	Transformer, 2nd i-f	32-3952
C300A:	Condenser, trimmer	Part of Z300
C300B:	Condenser, trimmer	Part of Z300
C300C:	Condenser, by-pass, 100 mmf	Part of Z300
C300D:	Condenser, by-pass, 100 mmf	Part of Z300
Z301	Transformer, 1st i-f	32-3675
C301A:	Condenser, trimmer	Part of Z301
C301B:	Condenser, trimmer	Part of Z301

SECTION 4

Reference No.	Description	Service Part No.
†C400	Condenser, tuning, 2-section	31-2527-2
C400A:	Condenser, trimmer	Part of C400
C400B:	Condenser, trimmer	Part of C400
C401	Condenser, coupling, 5 mmf	60-90505007*
C402	Condenser, isolating, 47 mmf	60-00515307*
R400	Resistor, Osc., grid, 100,000 ohms	66-4103340*
R401	Resistor, aerial discharge, 150,000 ohms	66-4153340*
T400	Transformer, oscillator	32-3880
LA400	Loop aerial:	
	Model 47-204	32-4052-3
	Model 47-205	32-4052-3

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Model 47-204	10674
Model 47-205	10673
Cabinet Hardware	
Back	54-7371
Baffle and cloth assembly	
Model 47-204	40-6906
Model 47-205	40-6905
Bezel	54-4152
Foot, felt	W2190
Grill (plastic), speaker	54-4458
Knob	
Model 47-204	54-4375
Model 47-205	54-4228
Window, acetate	27-5616
Clip, coil mounting	28-5002FA1
Dial-Scale Hardware	
†Cord, drive (25-ft. spool)	45-8750
Pointer	54-4148-1
Scale, dial	
Model 47-204	27-5953
Model 47-205	27-5952
Screw, scale mounting	1W19674FA3
Spring, drive cord	56-2617
Washer, scale mounting	2W54094
Panel, terminal, loop aerial	76-2148
Panel, lamp assembly	76-1280
Shaft, drive assembly	31-2718
Socket, Loktal	27-6138*
Socket, octal	27-6174*

†Refer to production changes.