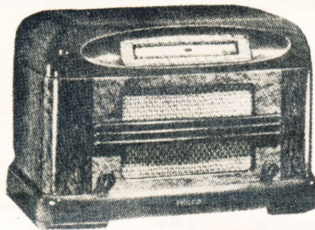


# PHILCO SERVICE



## PHILCO RADIO

### SPECIFICATIONS



MODEL 218

CABINET .....	Model 218 (wood, walnut finish)
CIRCUIT .....	Five-tube superheterodyne
FREQUENCY RANGE .....	540 to 1720 kc.
POWER INPUT .....	90 volts at 8 to 10 milliamperes (plate supply) 1.5 volts at .25 ampere (filament supply) From battery pack—Type Philco 887
POWER CONSUMPTION .....	1.3 watts (total for both plates and filament supply)
AERIAL .....	External, Philco Type 40-6383
INTERMEDIATE FREQUENCY .....	460 kc.
PHILCO TUBES USED .....	1LA6, 1LN5, 1LH4, 1A5GT/G—(2)

### PHILCO TROUBLE-SHOOTING PROCEDURE

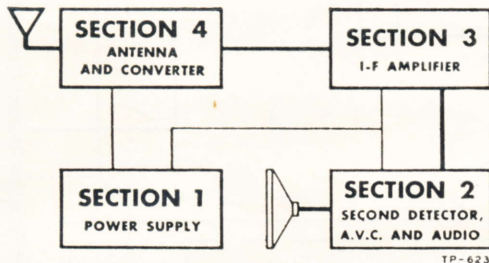


Figure 1. Block diagram (Heavy lines indicate signal path).

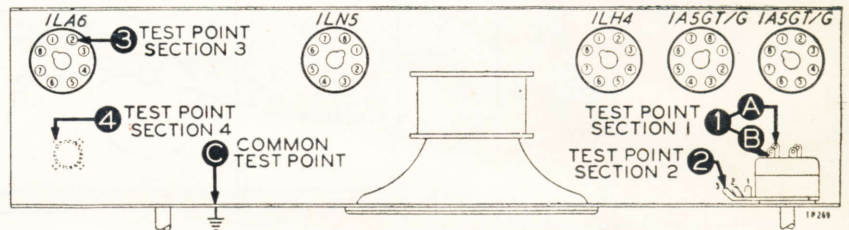


Figure 2. Bottom view showing test points.

In this manual, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, as shown in figure 2. Abnormal indications, secured when checking at these test points, localize trouble to the section under test. After localization, isolation of the faulty part is accomplished by testing in the order shown in the sectional test charts. A high-quality signal generator and a volt-ohmmeter are required. Volt-

age readings shown were taken with a 20,000-ohms-per-volt meter. To localize trouble, turn receiver volume control full on; proceed in the order given in the following chart. When applying a signal, connect the signal-generator output lead through a condenser (.01 to .25 mf.). Remedy any defect encountered before proceeding to the next check.

### TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
Preliminary resistance check	Measure resistance between points 1B and C with battery disconnected from receiver. If resistance is low, check condensers C302 and C202 for leakage or shorts.	100,000 ohms higher
1	Measure voltage between 1A and C (chassis) Measure voltage between point 1B and C (chassis)	1.2 to 1.4 volts 69 to 79 volts
2	Apply audio signal between point 2 and C (chassis)	Loud, clear signal
3	Apply weak, modulated signal (460 kc.) between point 3 and C (chassis)	Loud, clear signal
4	Apply weak, modulated signal (frequency to which set is tuned) between point 4 and C (chassis)	Loud, clear signal

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## TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

NOTE: Make all tests for this section with a volt-ohmmeter, using the 0-250 V d-c range. Voltages were taken with the set operating and drawing normal current from battery. See figures 3 and 4 for location of test points.

TEST POINTS	NORMAL READING	POSSIBLE CAUSE OF ABNORMAL READING
B to C (chassis)	79 volts	No voltage indicates open battery cable, defective switch S100, open resistor R100, shorted condenser C302 (see section 3). Low voltage indicates nearly dead battery, defective resistor R100, leaky condenser C302, or excessive plate or screen current by one or more tubes.
A to C	1.35 volts	No voltage indicates open battery cable or defective switch S100.
D to C	6 volts	Deviation in this voltage indicates change of value by resistor R100, or abnormal current flow because of defective parts in the sections 2, 3, or 4.

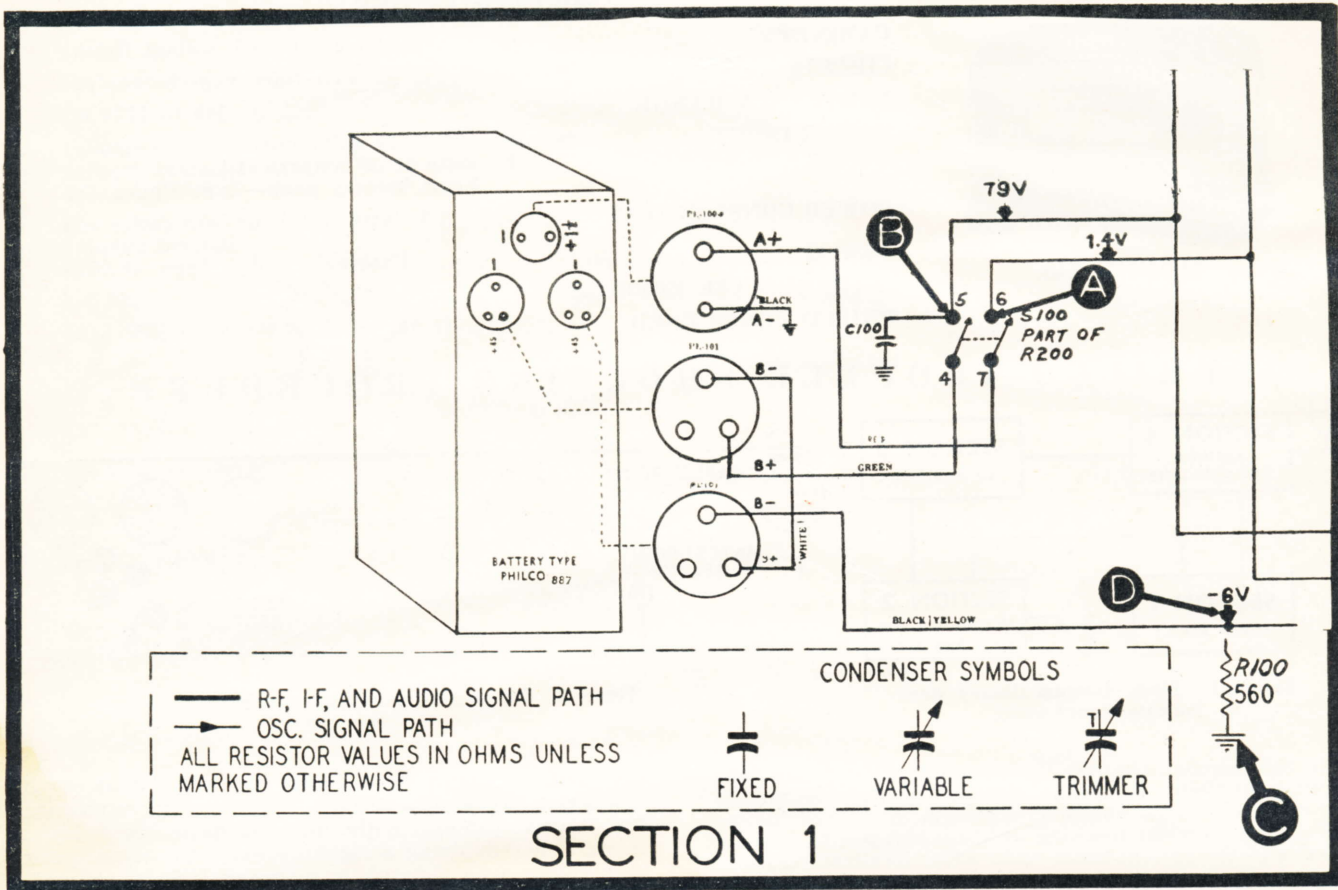


Figure 3. Section 1 schematic.

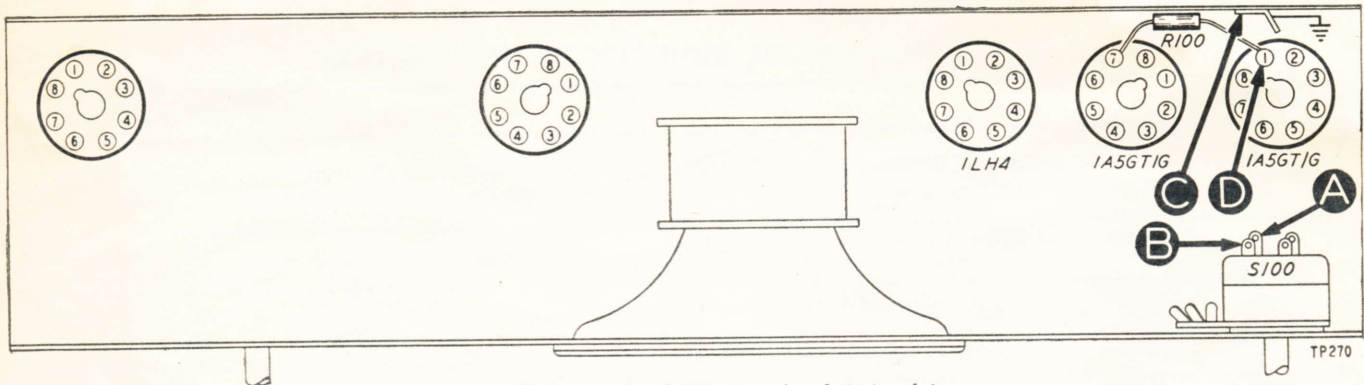


Figure 4. Bottom view showing section 1 test points.

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## RADIO MODEL 218

### TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

For all tests in this section, use the audio range of the signal generator. Connect the generator output lead through a condenser (.01 to .25 mf.) to points indicated, and connect the ground lead to receiver chassis. Adjust signal-generator output for clear audible signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
E to C (chassis)	Clear, audible signal from speaker (receiver volume control at approximately three-fourths maximum).	No signal indicates defective 1A5GT/G tube (into which the signal is fed), defective output transformer T200 or speaker LS200. Low and greatly distorted signal indicates leakage in condensers C203 or C204.
F to C	Clear, audible signal, as in preceding test.	No signal indicates open condenser C203 or shorted condenser C202; distortion indicates leakage in condenser C203.
G to C	Clear, audible signal with noticeable increase over that obtained in previous tests.	No signal indicates defective 1LH4 tube or open resistor R203. Distortion indicates defective 1LH4 tube.
H to C	Clear, audible signal, same as preceding test.	No signal indicates open condenser C201; noisy or otherwise distorted signal indicates defective volume control R200. Rotate control through entire range for complete check.

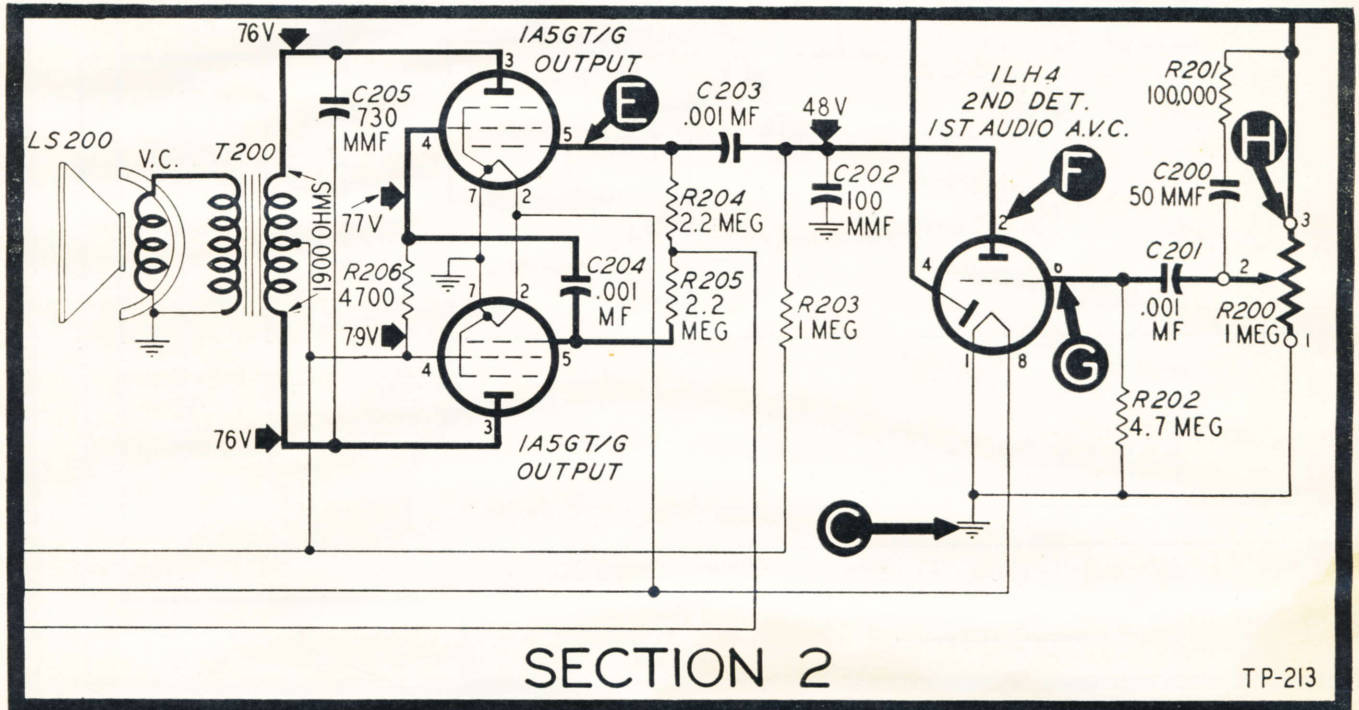


Figure 5. Section 2 schematic.

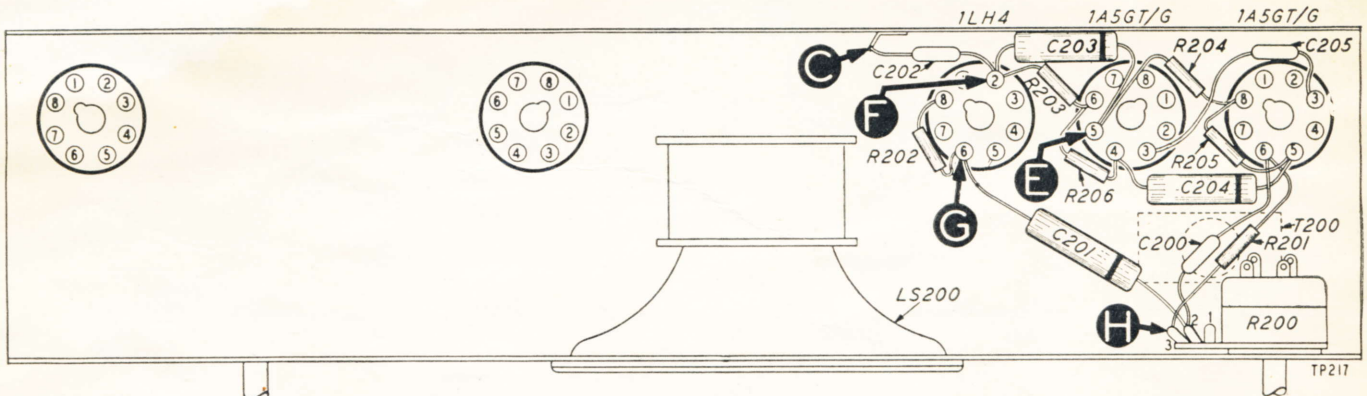


Figure 6. Bottom view showing section 2 test points.

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## TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

NOTE: For all tests in this section, set the signal generator to 460 kc., modulation ON. Connect generator output lead through a condenser (.01 to .25 mf.) to the points indicated, and connect the ground lead to receiver chassis. Adjust signal-generator output for clear, audible signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
J to C (chassis)	Audible signal from speaker.	No signal, or very weak signal, indicates defective 1LN5 tube, defective or misaligned i-f transformer assembly Z301, or defective diode section of 1LH4 tube.
K to C	Audible signal from speaker.	No Signal indicates defective or misaligned i-f transformer assembly Z300.

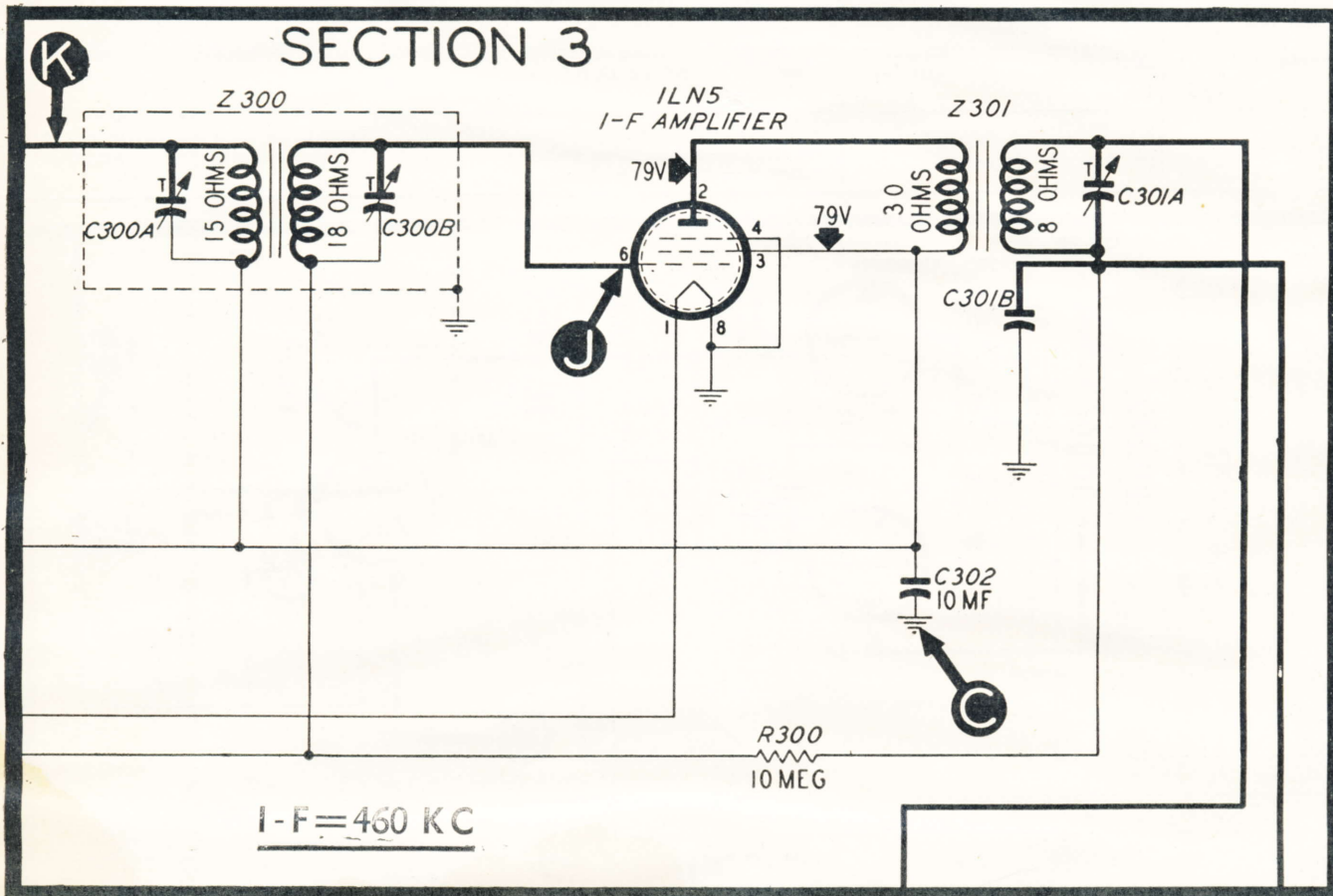


Figure 7. Section 3 schematic.

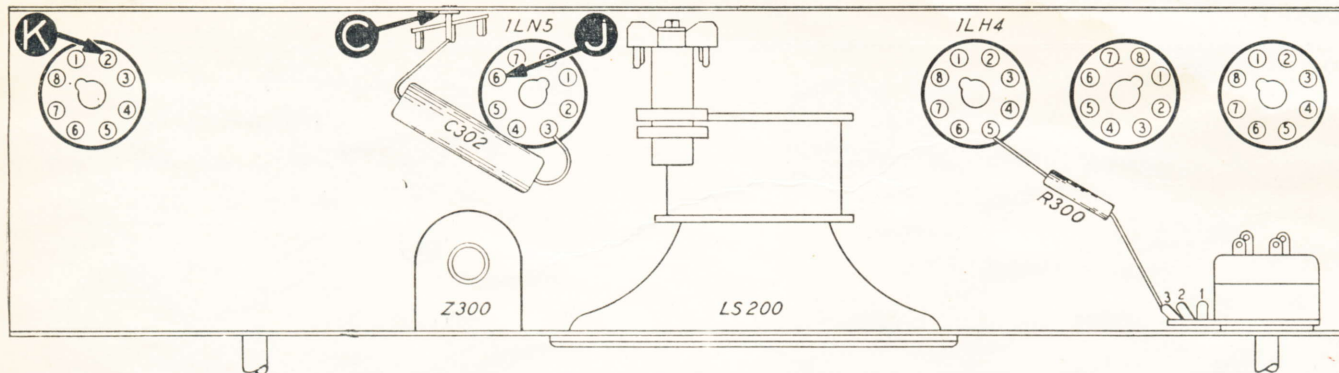


Figure 8. Bottom view showing section 3 test points.

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### TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

**IMPORTANT:** Before applying a test signal to this section, make a preliminary check by rotating the tuning control throughout its entire range. Any scraping noise heard in the speaker indicates bent tuning condenser plates, dirty wiper contacts or dirt between the condenser plates, which conditions should be remedied before pro-

ceeding with the tests. Then connect the signal-generator output lead through a condenser (.01 to .25 mf.) to indicated test point and the generator ground lead to "C" (receiver chassis). For best results, check operation first at 540 kc. and then at 1700 kc.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
L to C (chassis)	Audible signal from speaker.	No signal indicates defective 1LA6 tube, defective oscillator transformer T401, shorted plates in oscillator section of condenser C401, shorted condenser C404 or defective resistor R401 or R402.
M to C	Audible signal from speaker.	No signal indicates defective antenna transformer T400, or shorted plates in antenna section of condenser C401.

**OSCILLATOR GRID BIAS VOLTAGE.** Ground test point "L"; connect a voltmeter (20,000 ohms-per-volt, 10-volt scale) through 50,000 ohm isolating resistor, between "N" (—) and "C" (+). Rotate the tuning control throughout

its entire range. The voltage reading should not fall below 1.5 volts throughout. Insufficient voltage indicates malfunctioning and the components listed in the first test in the above chart should be checked in the order given.

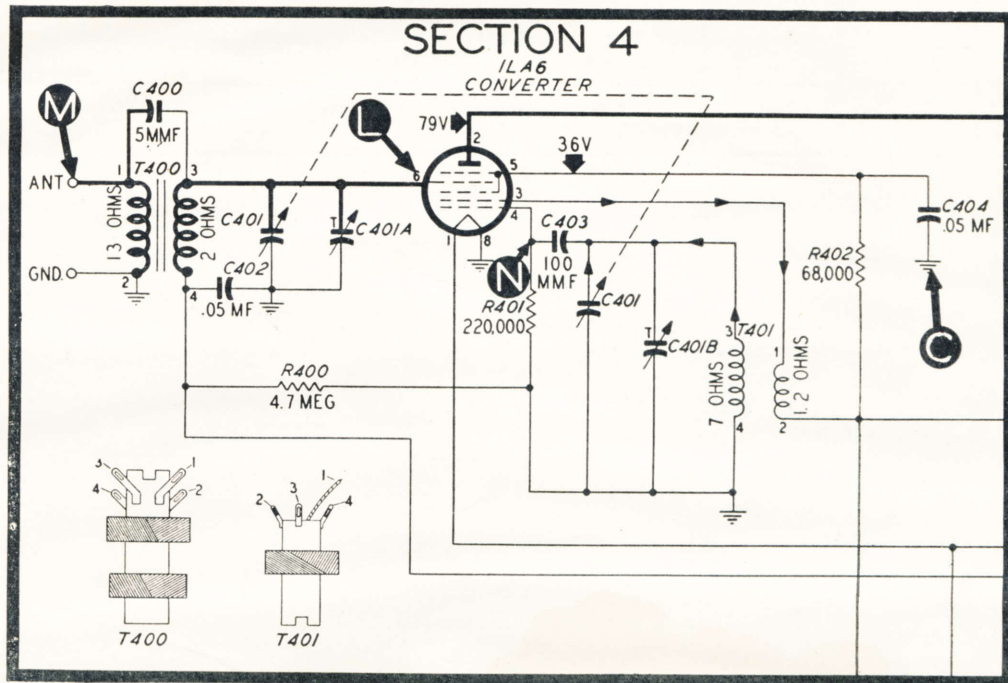


Figure 9. Section 4 schematic.

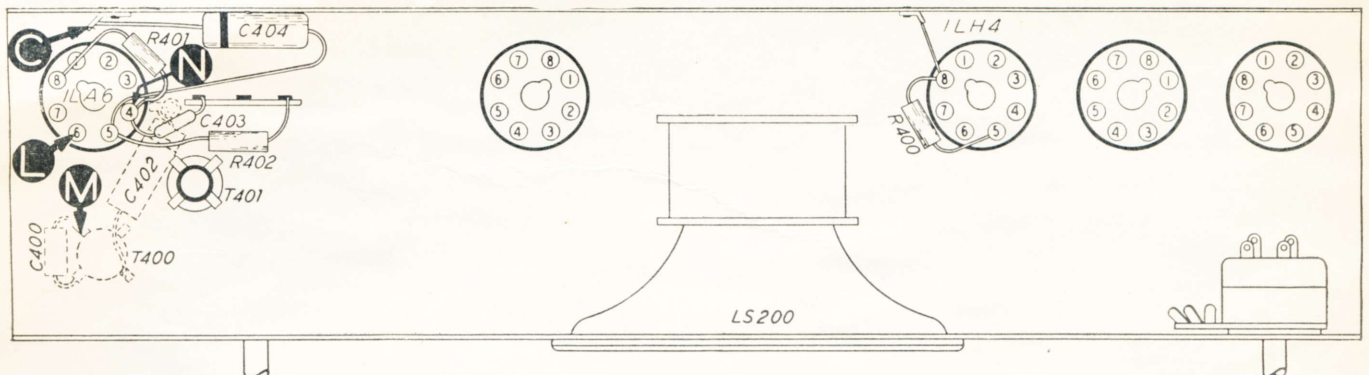


Figure 10. Bottom view showing section 4 test points.

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## CONNECTING ALIGNING EQUIPMENT

**OUTPUT METER.** Connect to voice coil of speaker, as shown in figure 11.

**SIGNAL GENERATOR.** Use a 100-mmf. condenser to couple the output lead to the receiver. Adjust the output of the signal generator to give a signal strength sufficient to cause a readable deflection of the output meter, using the range on the meter which best indicates small varia-

tions in output. Reduce the output of the signal generator if the pointer of the output meter goes off scale as alignment progresses.

**PROCEDURE.** Turn receiver volume control to maximum and adjust all trimmers in the order listed for maximum output

### ALIGNMENT CHART

SIGNAL GENERATOR		RECEIVER		
CONNECTIONS TO RECEIVER	DIAL SETTING (kc.)	DIAL SETTING (kc.)	SPECIAL INSTRUCTIONS	ADJUST TRIMMERS IN GIVEN ORDER
Stator plate terminal, antenna section of tuning condenser and chassis.	460	540	Turn C300B fully clockwise. Turn tuning condenser plates to full meshed position. Make sure that dial pointer is set to the left index mark (the first small hole stamped $3\frac{3}{4}$ inches from left end of scale plate reflector). This setting corresponds to a dial setting of 540 kc.	C301A C300A C300B
Aerial lead and chassis.	1700	1700	Turn tuning condenser until dial pointer is on the first index mark (the first small hole $4\frac{1}{8}$ inches from right end of the scale plate reflector).	C401B
Aerial lead and chassis.	1500	1500 (approx.)	Turn tuning condenser to position providing maximum reading on output meter.	C401A

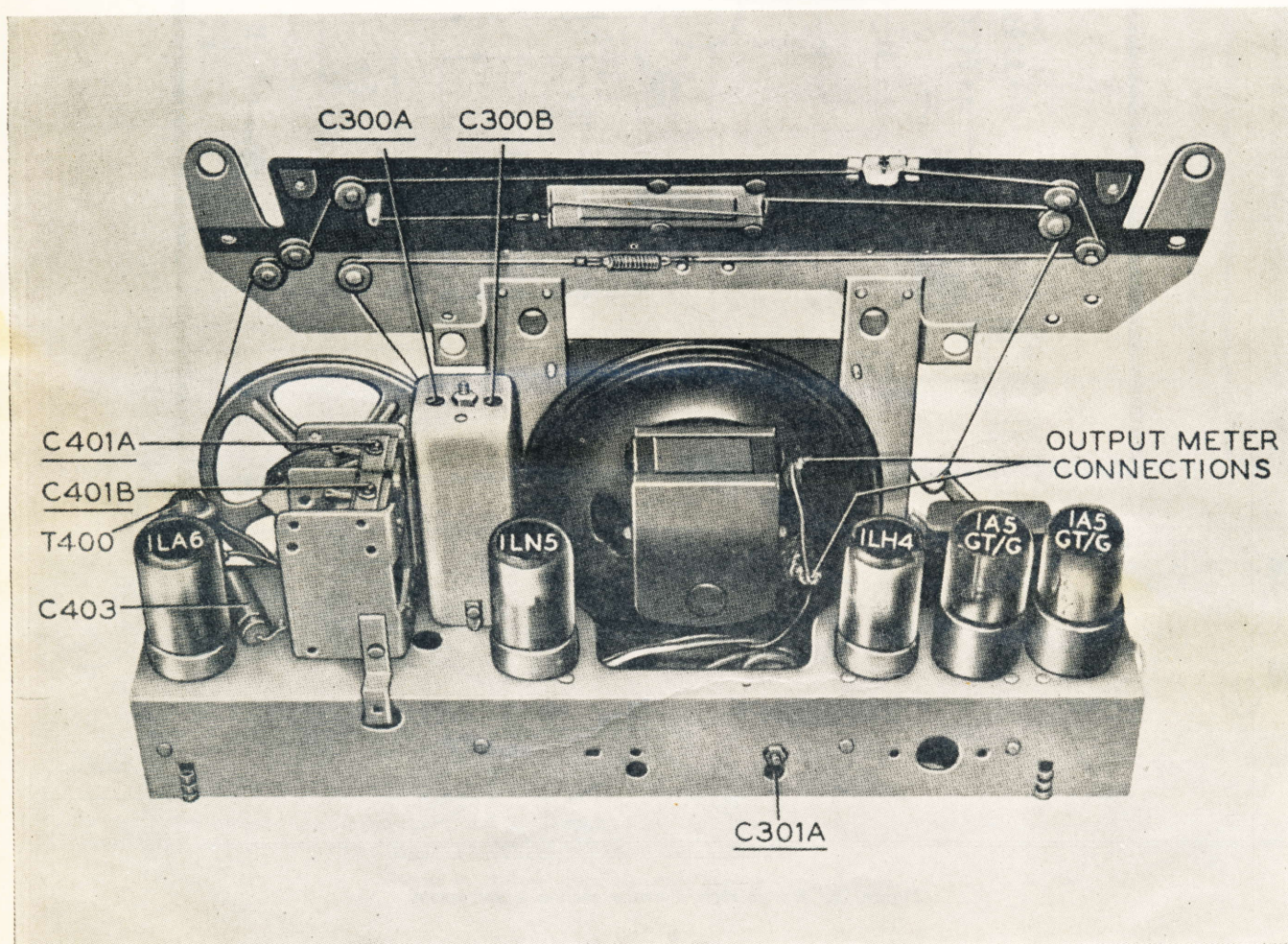
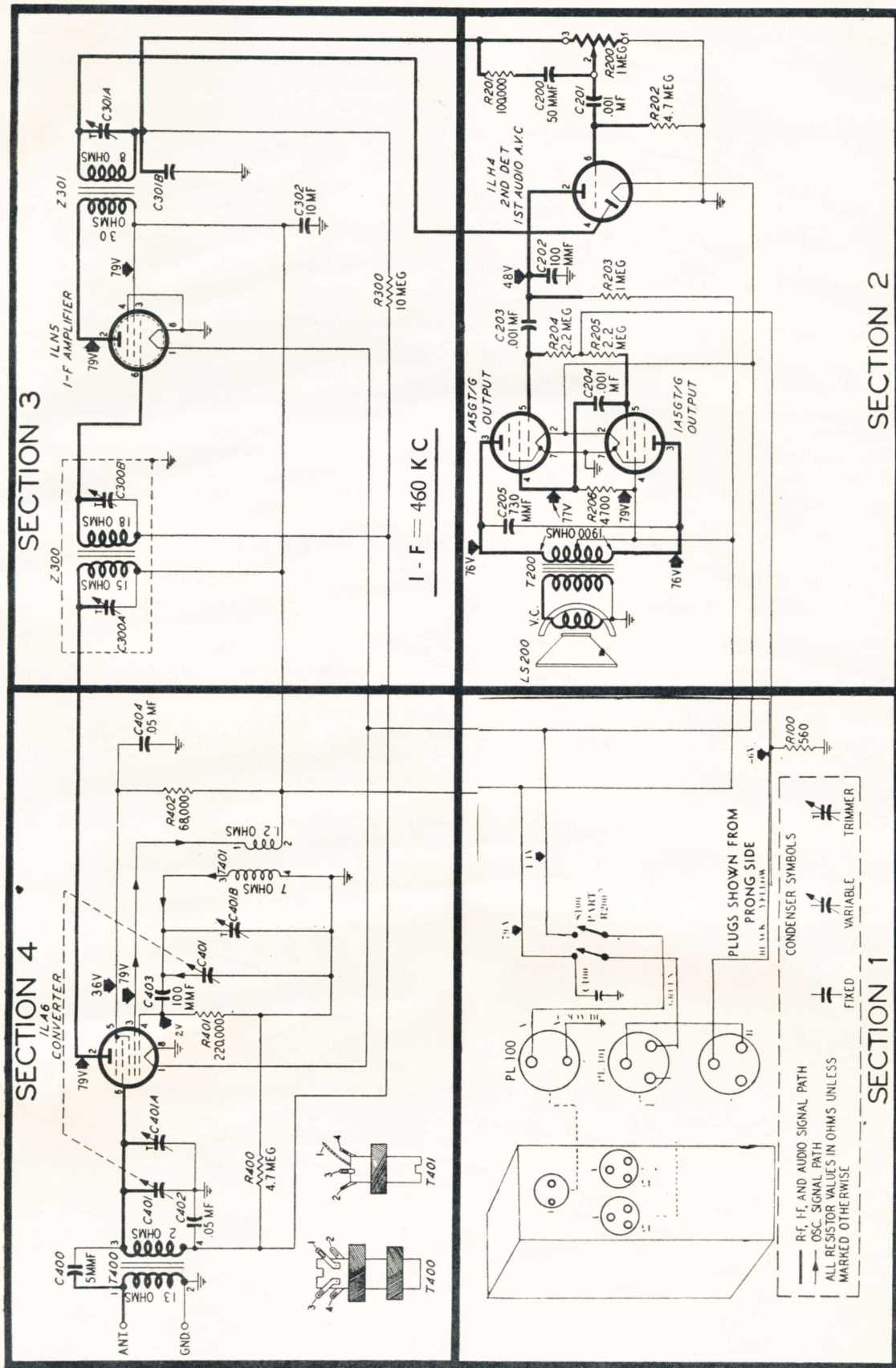


Figure 11. Top view, showing trimmer-condenser locations.



TP-213

Figure 12. Complete Schematic.

NOTE: All voltage, capacity and resistance values shown are average. The voltages shown were measured with a 20,000-ohms-per-volt meter between the indicated test points and C (chassis).

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Symbol designations used in the schematics and parts list are as follows:

- C—condenser
- I—pilot lamp
- LA—loop antenna
- LS—loudspeaker
- R—resistor
- S—switch
- T—transformer
- W—power cord and plug
- Z—i-f transformer assembly

NOTE: Parts marked with an asterisk (\*) are general replacement items and the numbers will not be identical with those used on factory assemblies. Use only the "SERVICE PART NO." shown below when ordering replacements.

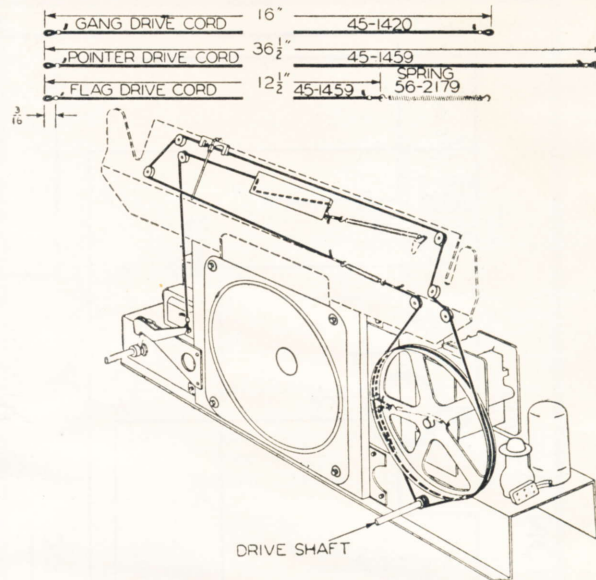
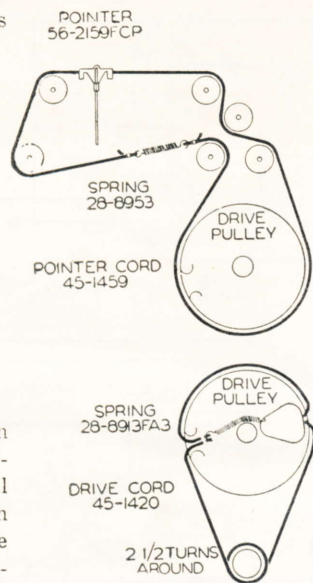


Figure 13. Drive cord installation details.

## REPLACEMENT PARTS LIST

### SECTION 1

Reference Number	Description	Service Part No.
S-100	Switch	Part of R-200
BA-100	Battery, type	887
	"A" Battery Plug	27-4786
	"B" Battery Plug	27-4347
R-100	Resistor, 560 ohms	66-1564360*

### SECTION 2

C-200	Condenser, 50 mmf.	60-00513507*
C-201	Condenser, .001 mf.	30-4620
C-202	Condenser, 100 mmf.	60-10105407
C-203	Condenser, .001 mf.	30-4620
C-204	Condenser, .001 mf.	30-4620
C-205	Condenser, 730 mmf.	60-10755301*
R-200	Volume Control, 1 meg.	33-5493
R-201	Resistor, 100,000 ohms	66-4103340*
R-202	Resistor, 4.7 megs.	66-5473340*
R-203	Resistor, 1 meg.	66-5103340*
R-204	Resistor, 2.2 megs.	66-5223340*
R-205	Resistor, 2.2 megs.	66-5223340*
R-206	Resistor, 4700 ohms	66-2473340
LS-200	Speaker	36-1507
T-200	Transformer, output	32-8152

### SECTION 3

Z-300	Transformer, 1st I-F	32-3949
C-300-A	Condenser, trimmer	Part of Z-300
C-300-B	Condenser, trimmer	Part of Z-300
Z-301	Transformer, 2nd I-F	32-3963
C-301-A	Condenser, trimmer	Part of Z301
C-301-B	Condenser	Part of Z-301
C-302	Condenser, electrolytic, 10 mf.	30-2540
R-300	Resistor, 10 meg.	66-6103340*

### SECTION 4

C-400	Condenser, 5 mmf.	60-90505007
C-401	Condenser, tuning	31-2708
C-401-A	Condenser, trimmer	Part of C-401
C-401-B	Condenser, trimmer	Part of C-401
C-402	Condenser, .05 mf.	30-4518*
C-403	Condenser, 100 mmf.	60-10105407*
C-404	Condenser, .05 mf.	30-4518
R-400	Resistor, 4.7 meg.	66-5473340*
R-401	Resistor, 220,000 ohms	66-4223340*
R-402	Resistor, 68,000 ohms	66-3683340*
T-400	Transformer, antenna	32-3920
T-401	Transformer, oscillator	32-3184

### MISCELLANEOUS

Description	Service Part No.
Coil clip, antenna oscillator mounting	28-5002FE7
Sleeve, tuning condenser mounting	28-5665FA3
Tuning shaft assy.	31-2554
Spring, tuning condenser	28-8913FA3
Spring, pointer drive	28-8953
Spring, flag	56-2179
Flag, operating arm assy.	76-1672
Flag	58-2180FCP
Pointer	56-2159FCP
Grommet, rubber, tuning condenser mounting, back	27-4610
Grommet, rubber, tuning condenser mounting, front	27-4596
Socket, octal	27-6199*
Socket, Loktal	27-6138*
Rivets	1W36671FA5
Knob assy.	54-4101
Cabinet, wood (includes scale and bezel)	10627
Drive drum assy.	76-1176FA3
Terminal panel assy.	12W45654
Screw, chassis mounting	1W19676FA9
Washer, chassis mounting	1W52353FA3
Drive cord, tuning condenser (25 ft. spool)	45-1420
Drive cord, flag and pointer (25 ft. spool)	45-1459
Scale plate and upright assy.	76-1579
Screws, speaker mounting	1W19670FA3
Washer, brass, speaker mounting	2W54094
Baffle and cloth assy.	40-6763
Scale strip	56-2068
Rubber bands, scale mounting	54-4168
Dial scale	27-5876
Felt feet	W2190
Pulley, drive cord	11W29740
Pulley stud	1W2918FA5
Transfer lever arm	56-2184FA3
Transfer lever arm, mounting bracket	56-2185FA3