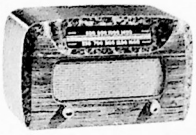
PHILCO SERVICE

HOME RADIO

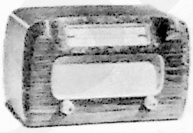
BULLETIN No. 1

PHILCO RADIO



MODEL 46-421

MODEL 46-421-I



SPECIFICATIONS

CABINET.....Model 46-421, walnut finish
Model 46-421-I, ivory finish
CIRCUIT.....Six tube superheterodyne
FREQUENCY RANGE.....540 to 1620 kc.

POWER INPUT
A.C. or D.C., 105 to 120 volts
POWER CONSUMPTION
30 watts at 117 volts
AERIAL.....Loop fastened to chasis; terminal also provided for outside aerial

INTERMEDIATE FREQUENCY.....455 kc.
PHILCO TUBES USED.....7C7, 7A8, 7B7, 7C6, 50L6GT, 35Z5GT/G
PILOT LAMP.....6-8-volt bayonet base, Part No. 34-2068

PHILCO TROUBLE-SHOOTING PROCEDURE

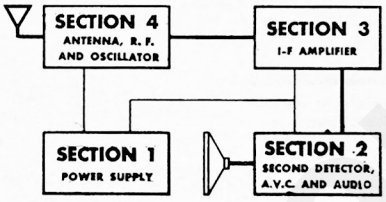


Figure 1. Block diagram (Heavy lines indicate signal path).

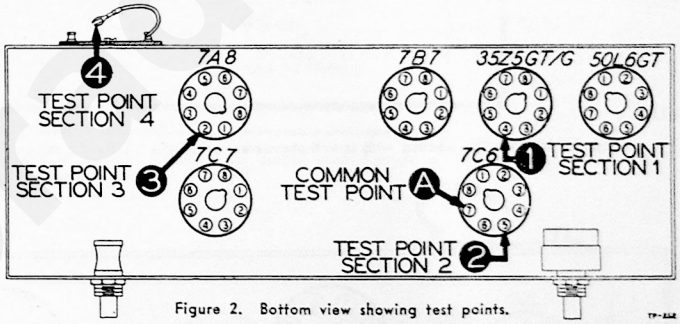


Figure 2. Bottom view showing test points.

In this bulletin, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, see figure 2, and tests made at these points localize the trouble to one section. After the trouble has been localized to one section by the tests given below, proceed with the tests outlined for that section. The equipment required for all tests outlined in this bulletin is a quality signal generator and a volt-ohm-meter. Voltage readings shown in this bulletin were measured with a 20,000-ohm-per-volt meter. Connect the receiver to the power line, turn the volume control full on, and see that all tube filaments are lighted. Proceed with the section tests given in the following chart. If a normal result is not obtained at any test point, the trouble is in the section under test.

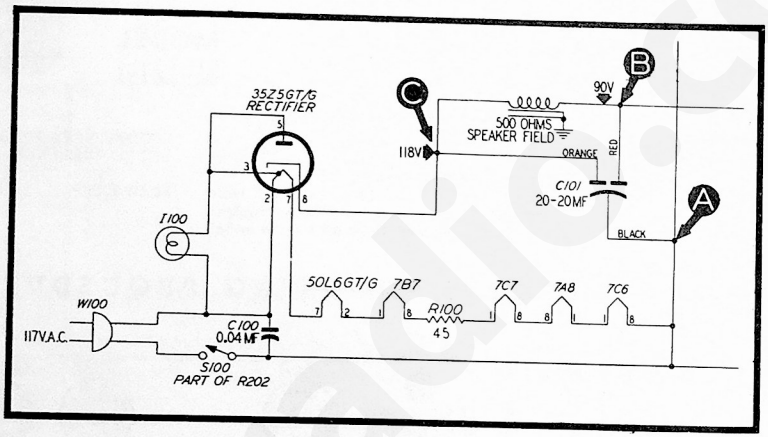
TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between points 1 (+) and A (B–).	90 volts*.
2**	Apply audio signal between points 2 and A.	Loud, clear signal.
3**	Apply a weak, modulated r-f signal (455 kc.) between points 3 and A.	Loud, clear signal.
4**	Apply a weak, modulated r-f signal (frequency to which set is tuned) between points 4 and A.	Loud, clear signal.

*For 117-volt a-c input. When operating from a d-c power line and no voltage is measured, reverse the power plug.
**Connect signal generator output lead through a condenser (.01 to .25 mf.).

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

Test Points	Normal Reading	Possible Cause of Abnormal Reading
B to A	90 volts	No voltage indicates defective 35Z5GT/G tube, shorted condenser C101, or open speaker field. Low voltage indicates defective 35Z5GT/G tube, or leaky condenser C101, or shorted condenser C203.
C to A	118 volts	No voltage indicates defective 35Z5GT/G tube, or shorted condenser C101. Low voltage indicates defective 35Z5GT/G tube, or open condenser C101, or shorted condenser C203.



Make all tests for this section with a volt-ohmmeter, using the 0-250v d-c range. See figures 3 and 4 for location of test points.

Figure 3. Section 1 schematic.

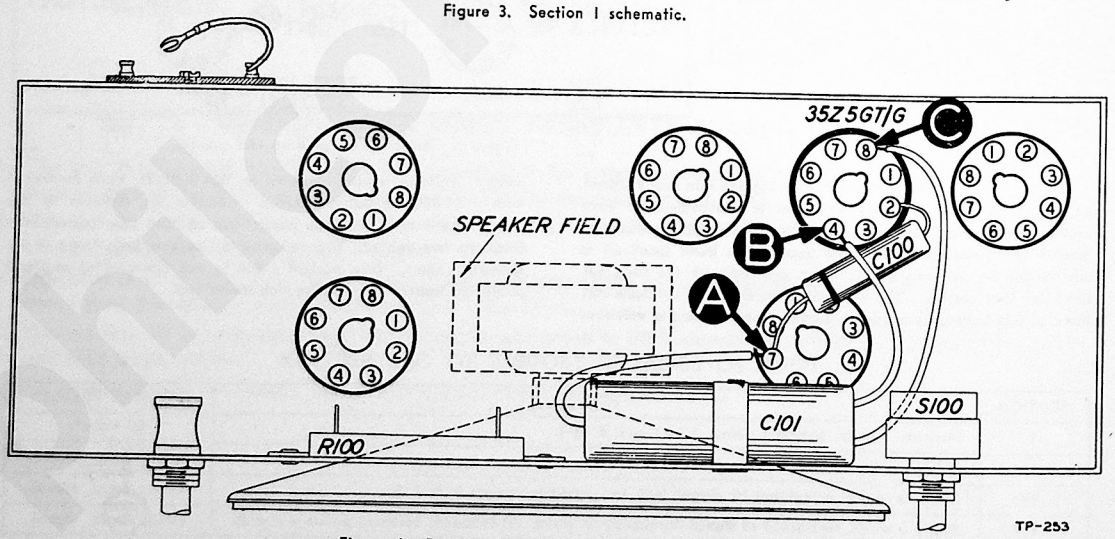
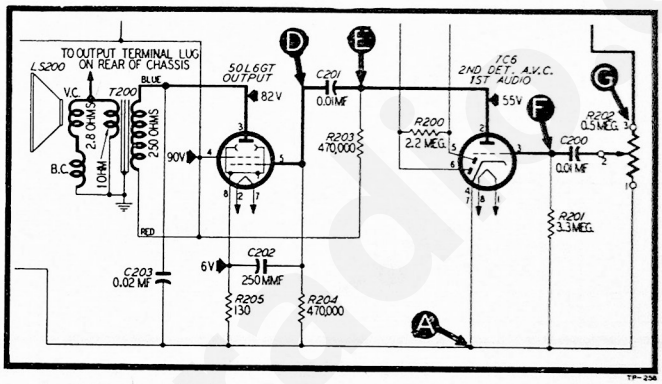


Figure 4. Bottom view showing section 1 test points.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

Test Points	Normal Indication	Possible Cause of Abnormal Indication
D to A	Audible signal from speaker.	No signal indicates defective 50L6GT tube, defective output transformer T200, defective speaker LS200, shorted condenser C202 or C203, or open resistor R205.
E to A	Audible signal, same as previous test.	No signal indicates open condenser C201.
F to A	Noticeable increase of audible signal.	No signal indicates defective 7C6 tube, or open resistor R203.
G to A	With volume control full on, audible signal, same as previous test.	No signal indicates open condenser C200, or open volume control R202.



For all tests in this section, use the audio range of a signal generator. Connect the output lead through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 5. Section 2 schematic.

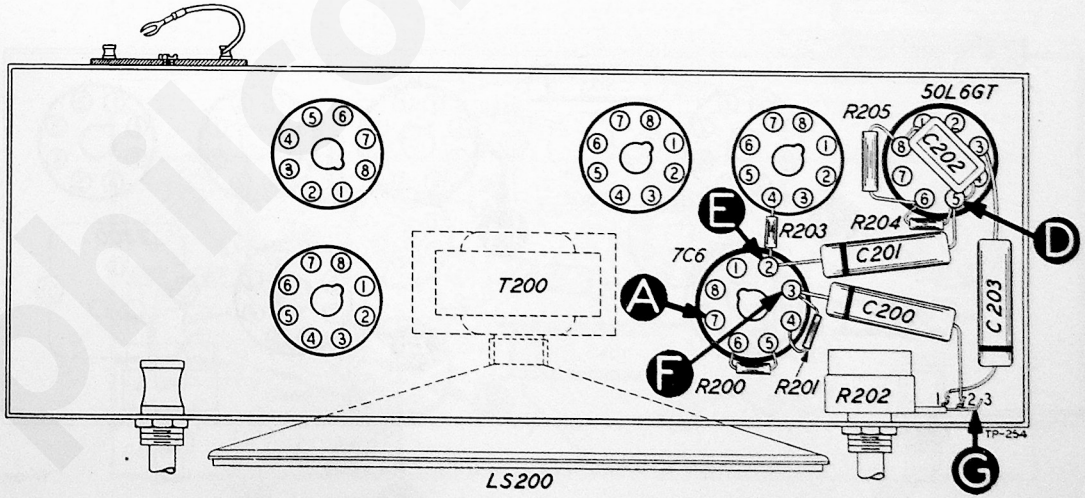
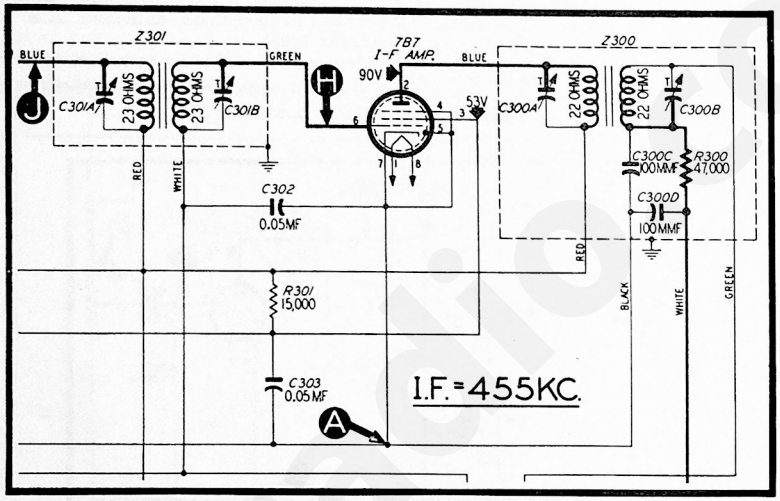


Figure 6. Bottom view showing section 2 test points.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

Test Points	Normal Indication	Possible Cause of Abnormal Indication
H to A	Audible signal from speaker.	No signal indicates defective 7B7 tube, defective i-f transformer Z300, defective 7C6 tube, defective resistor R301, or shorted condenser C303.
J to A	Audible signal from speaker.	No signal indicates defective i-f transformer Z301.



For all tests in this section, set the signal generator to 455 kc., modulation on. Connect the output lead through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 7. Section 3 schematic.

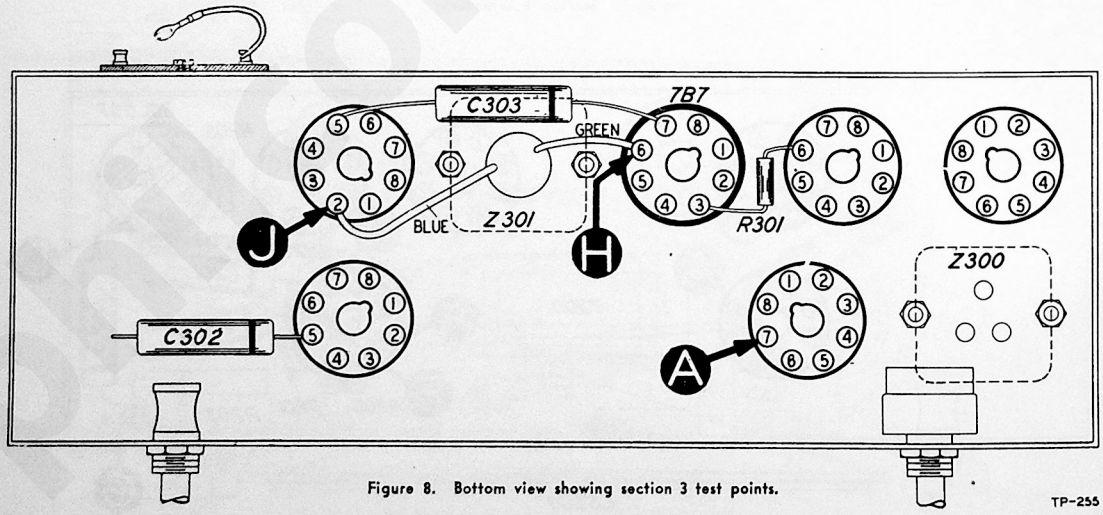


Figure 8. Bottom view showing section 3 test points.

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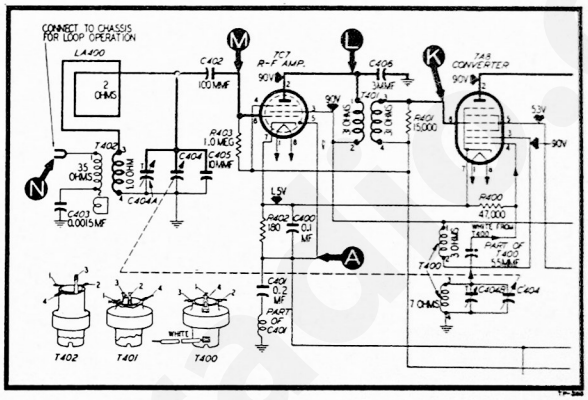
TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

Test Points	Normal Indication	Possible Cause of Abnormal Indication
K to A	Audible signal from speaker.	No signal indicates defective 7A8 tube, defective oscillator transformer T400, defective resistors R400 or R402, defective condenser C400, or shorted plates of condenser C404.
L to A	Audible signal from speaker.	No signal indicates defective r-f transformer T401.
M to A	Increase in audible signal from speaker.	No signal indicates defective 7C7 tube.
N to A	Same signal output as previous step.	No signal indicates defective antenna transformer T402, loop LA400, coupling condenser C402, or shorted plates of condenser C404.



For all tests in this section, set the signal generator and the receiver to 540 kc. Connect the output lead of the signal generator through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 9. Section 4 schematic.

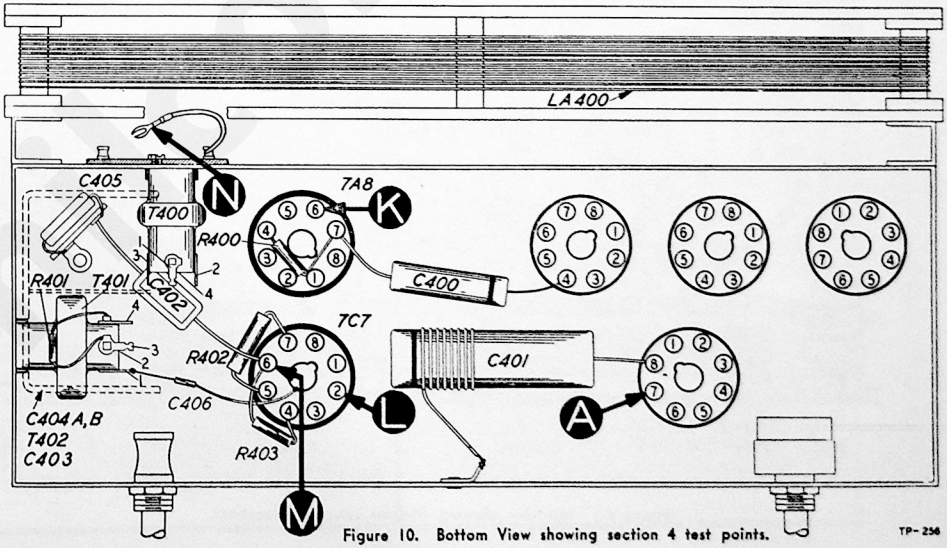


Figure 10. Bottom View showing section 4 test points. TP-256

CONNECTING ALIGNING EQUIPMENT

OUTPUT METER. Connect to output (left hand) and ground (center) lugs of terminal panel on rear of chassis as shown in figure 11.

SIGNAL GENERATOR. Use a 100-mmf. condenser to couple the signal-generator 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 variations in output. Reduce the output of the signal generator if the pointer of the output meter goes off scale as alignment progresses.

Make all adjustments in the order listed.

ALIGNMENT CHART

SIGNAL GENERATOR		RECEIVER				
Connections to Receiver	Dial Setting (kc.)	Dial Setting (kc.)	Volume Control Setting	Special Instructions	Adjust Trimmers in Given Order	Adjust Trimmers For
Stator plate terminal, antenna section of tuning condenser, and B–.	455	540	Max	Turn C-301B down tight. Turn tuning condenser plates to full-meshed position. Make sure that dial pointer is set to the left index line (small mark stamped on lower left side of scale plate reflector). This setting corresponds to a dial setting of 540 KC.	C300A C300B C301A C301B	Maximum output
Aerial lead and B–.	1600	1600	Max	Turn tuning condenser until dial pointer is on the first small index line (from right side) stamped on the scale plate reflector. This setting corresponds to a dial setting of 1600 KC.	C404B	Maximum output
Aerial lead and B–.	1500	1500	Max	Turn tuning condenser until dial pointer is on the second small index line (from right side) stamped on the scale plate reflector. This setting corresponds to a dial setting of 1500 KC.	C404A	Maximum output

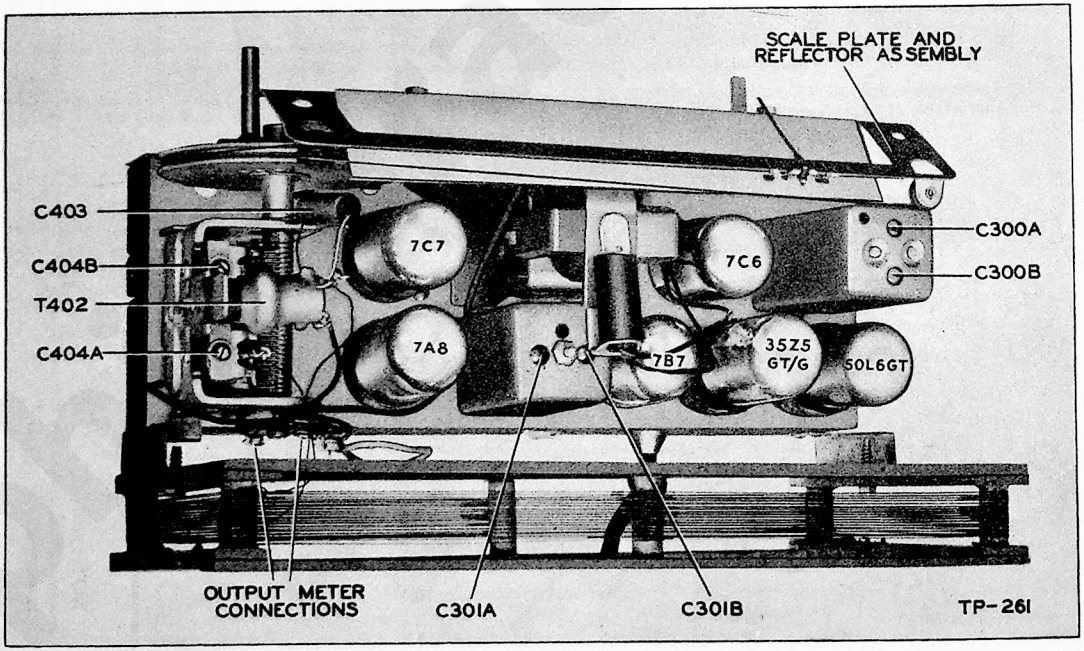


Figure 11. Top view showing trimmer condenser locations.

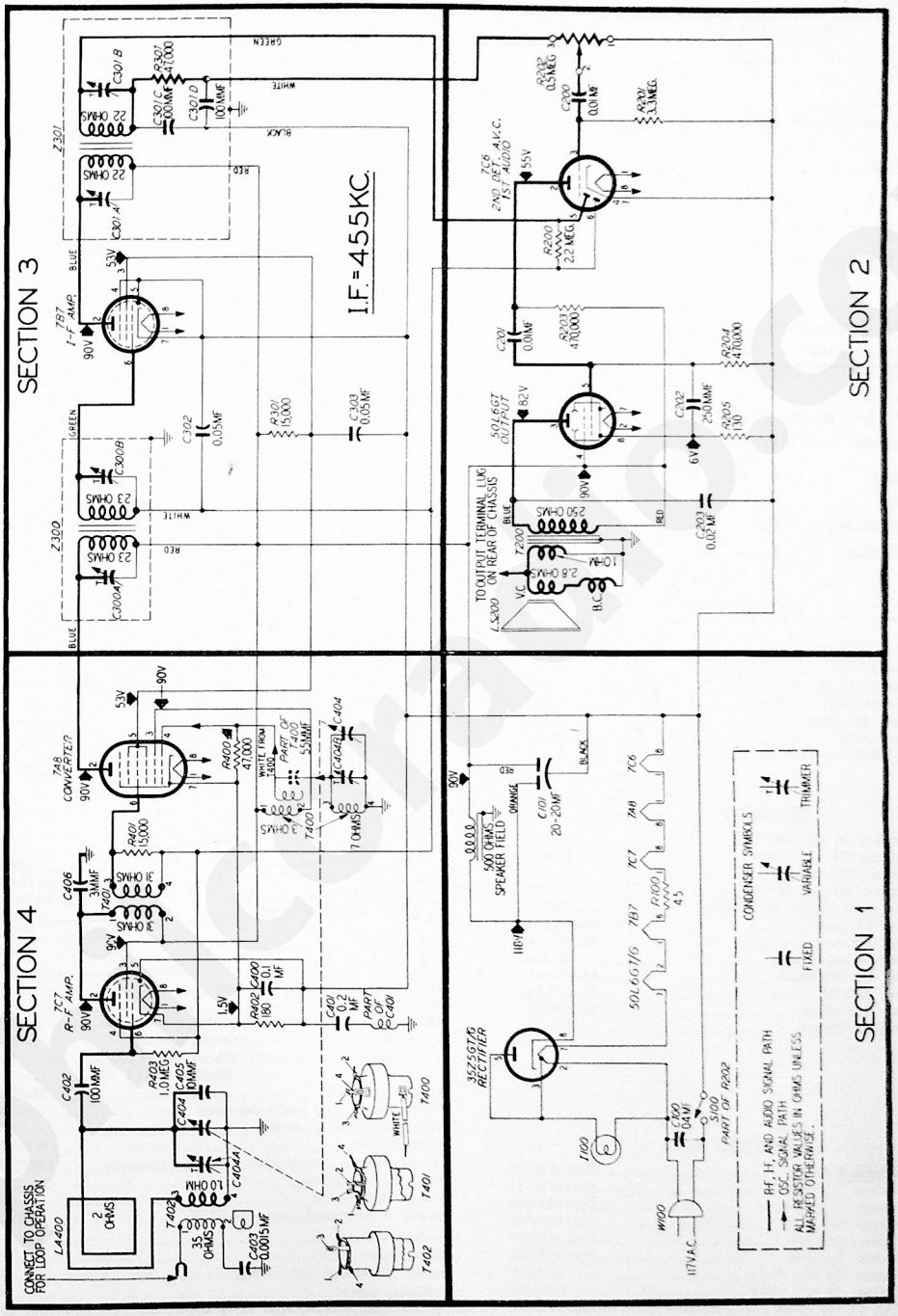


Figure 12. Complete schematic.

NOTE: All voltages and all capacity and resistance values shown are average. Voltages were measured between B- and the points indicated with a 20,000-ohm-per-volt meter; volume control at minimum, tuning condenser plates fully meshed.

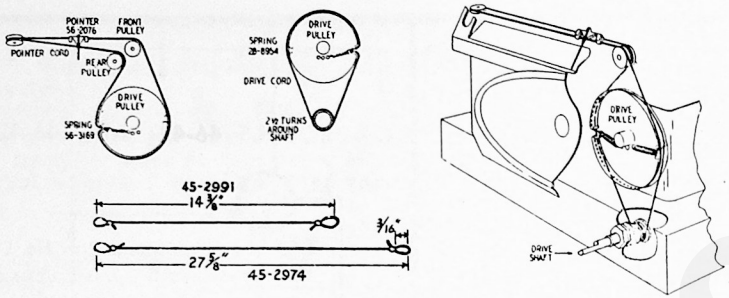


Figure 13. Drive cord installation details.

NOTE: Parts marked with an asterisk (*) are general replacement items and the numbers will not be identical with those used on factory assemblies. ALWAYS USE THE PART NUMBERS SHOWN IN THIS PARTS LIST WHEN ORDERING.

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

SECTION 1

Reference Number	Description	Service Part No.
C100	Condenser, .04 mf., 400V	45-3500-2*
C101	Condenser, 20-20 mf., 150 V.	30-2547*
I100	Pilot Lamp, 6-8V., 150 ma.	34-2068
R100	Resistor, 45 ohms	33-3432
S100	Switch, Power	Part of R-202
W100	Power Cord and Plug	L-3199

SECTION 2

C200	Condenser, .01 mf., 400V.	61-0120*
C201	Condenser, .01 mf., 400V.	61-0120*
C202	Condenser, 250 mmf.	45-5007*
C203	Condenser, .02 mf., 400V.	61-0108*
LS200	Speaker (with output transformer)	36-1591
R200	Resistor, 2.2 meg.	66-5223340*
R201	Resistor, 3.3 meg.	66-5333340*
R202	Volume Control, .5 meg.	45-5007*
R203	Resistor, 470,000 ohms	66-4473340*
R204	Resistor, 470,000 ohms	66-4473340*
R205	Resistor, 130 ohms	66-1133340
T200	Transformer, Output	32-8184

SECTION 3

C300A	Condenser, Trimmer	Part of Z-300
C300B	Condenser, Trimmer	Part of Z-300
C300C	Condenser, 100 mmf.	Part of Z-300
C300D	Condenser, 100 mmf.	Part of Z-300
C301A	Condenser, Trimmer	Part of Z-301
C301B	Condenser, Trimmer	Part of Z-301
C302	Condenser, .05 mf., 200V.	61-0122*
C303	Condenser, .05 mf., 200V.	61-0122*
R300	Resistor, 47,000 ohms	Part of Z-300
R301	Resistor, 15,000 ohms	66-3153340
Z300	Transformer, 2nd I-F	32-3674*
Z301	Transformer, 1st I-F	32-3962

SECTION 4

Reference Number	Description	Service Part No.
C400	Condenser, .1 mf., 200V.	61-0113*
C401	Condenser and Choke Assy	76-1198
C402	Condenser, 100 mmf.	60-10105407*
C403	Condenser, .0015 mf., 600V.	45-3500-6*
C404	Condenser, 2-Section Tuning	31-2705*
C404A	Condenser, Trimmer	Part of C-404
C404B	Condenser, Trimmer	Part of C-404
C405	Condenser, 10 mmf.	60-00105407
C-406	Condenser, 3 mmf.	30-1221
LA400	Loop Aerial	76-1877
R400	Resistor, 47,000 ohms	66-3473340*
R401	Resistor, 15,000 ohms	Part of T-401
R402	Resistor, 180 ohms	66-1184360*
R403	Resistor, 1 meg.	66-5103340*
T400	Transformer, Oscillator	32-3613
T401	Transformer, R-F	32-3595
T402	Transformer, Antenna	32-3394

MISCELLANEOUS

Baffle and cloth assembly, Model 46-421	40-6745
Model 46-421-I	40-6747
Bracket, antenna coil mounting	56-2058FA3
Cabinet, Model 46-421	10630
Model 46-421-I	10630A
Clamp, dial scale mounting	56-2068
Clamp, electrolytic condenser mounting	56-1346FA5
Clip, coil mounting	28-5002FE7
Dial scale, Model 46-421	27-5849
Model 46-421-I	27-5845
Spring clip	56-3587
Drive cord, tuning condenser (25 ft. Spool)	45-8750*
Drive cord, pointer (25 ft. Spool)	45-8755*
Foot, felt	W-2190
Grommet, rubber, tuning condenser mounting	27-4610
Grommet, rubber, tuning condenser mounting	27-4596
Knob and spring assembly, Model 46-421	54-4227
Model 46-421-I	54-4228
Pointer, dial scale	56-2076FCP
Rubber band, dial scale mounting	54-4176
Scale backplate assembly	76-1192
Screw-washer	1W37634FA3
Screw-washer combination, chassis mounting	1W37656FA3
Shaft, tuning drive	31-2664
Shield, loctal tube	56-2731*
Sleeve, tuning condenser mounting	28-5665FA3
Socket, loctal	27-8138*
Socket octal	27-6199*
Socket assembly, pilot lamp	78-2142
Diffusing panel	54-4343
Spring, tuning condenser drive cord	56-2617
Spring, pointer drive cord	56-3167
Wiring panel, 2 lug	12W45646
Wiring panel, 3 lug	78-2148

PRODUCTION CHANGES FOR MODELS 46-421 AND 46-421-I

CODE 121

RUN 2

a. R400, 47,000 ohms, Part No. 66-3473340*, was changed to 120,000 ohms, Part No. 66-4123340*.

b. A 120,000-ohm resistor, Part No. 66-4123340*, was added, between B— bus and chassis.