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SERVICE

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PHILCO TROUBLE-SHOOTING PROCEDURE

In this bulletin, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, 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. To make all tests outlined in this bulletin, a high quality signal generator and a volt-ohmmeter are required. The voltage readings shown were measured with a 20,000-ohm-per-volt meter. To test, connect the receiver to the power line; turn the volume control full on; see that all tube filaments are lighted; then proceed in the order given in the following chart. If a normal result is not obtained at any test point, the trouble is most likely to be in the section under test.

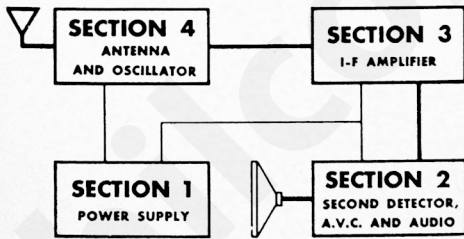
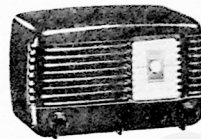
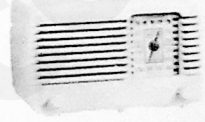


Figure 1. Block Diagram (Heavy lines indicate signal path).



Model 46-200



Model 46-200-1

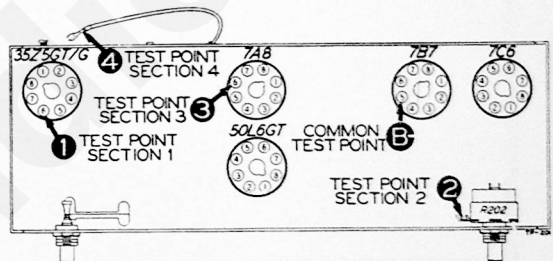


Figure 2. Bottom view showing test points.

SPECIFICATIONS

CABINET	Models 46-200 (Walnut finish), 46-200-1 (Ivory finish).
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540 to 1620 kc.
POWER INPUT VOLTAGE	105 to 120 volts A.C. or D.C.
POWER CONSUMPTION	30 watts at 117 volts
AERIAL	Loop fastened to chassis; terminal also provided for outside aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES USED	7A8, 7B7, 7C6, 50L6GT, 35Z5GT/G
PILOT LAMP	6-8-volt bayonet base, Part No. 34-2068

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

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

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RADIO MODELS 46-200, 46-200-1

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

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.

Test Points	Normal Reading	Possible Cause of Abnormal Reading
A to B-	90 volts	No voltage indicates defective 35Z5GT/G tube, shorted condenser C101, or open speaker field. Low voltage indicates defective 35Z5GT/G tube, leaky condenser C101, or shorted condenser C203.
C to B-	115 volts	No voltage indicates defective 35Z5GT/G tube, or shorted condenser C101. Low voltage indicates defective 35Z5GT/G tube, open condenser C101, or shorted condenser C203.

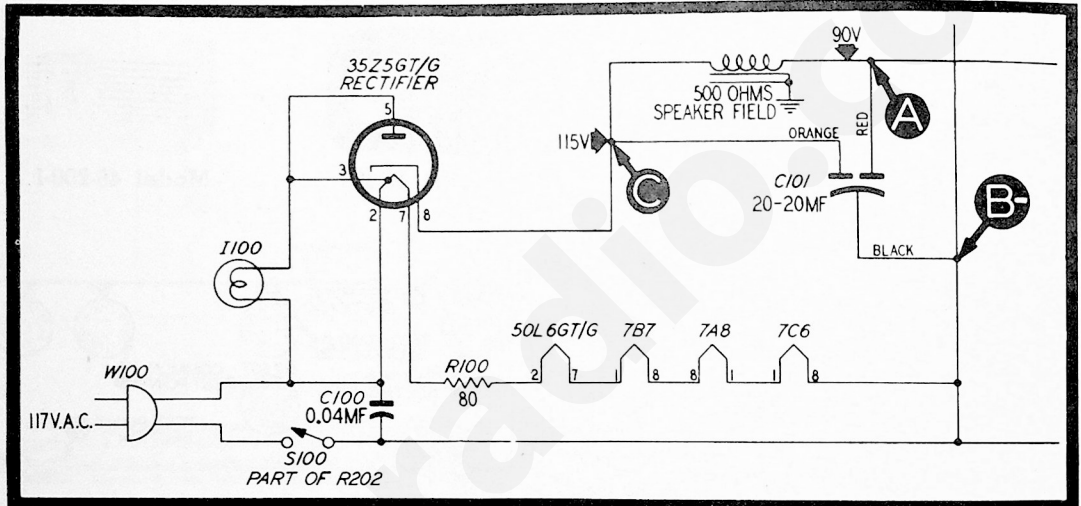


Figure 3. Section 1 schematic.

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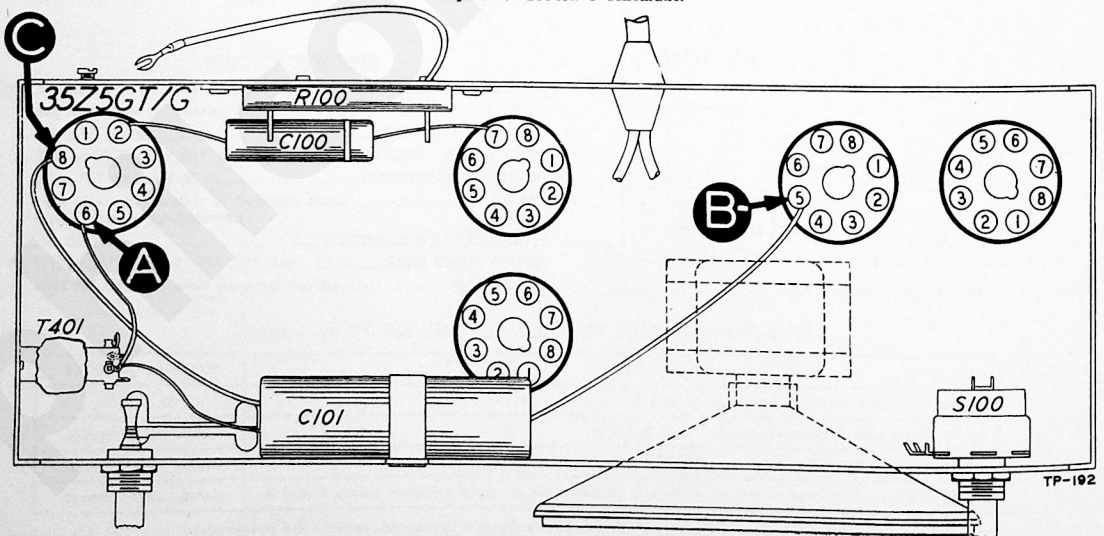


Figure 4. Bottom view showing section 1 test points.

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RADIO MODELS 46-200, 46-200-1

TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

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 B-.

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

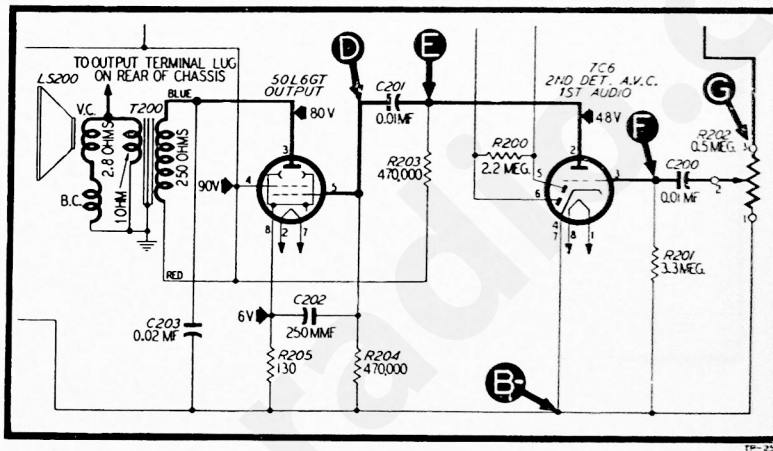


Figure 5. Section 2 schematic.

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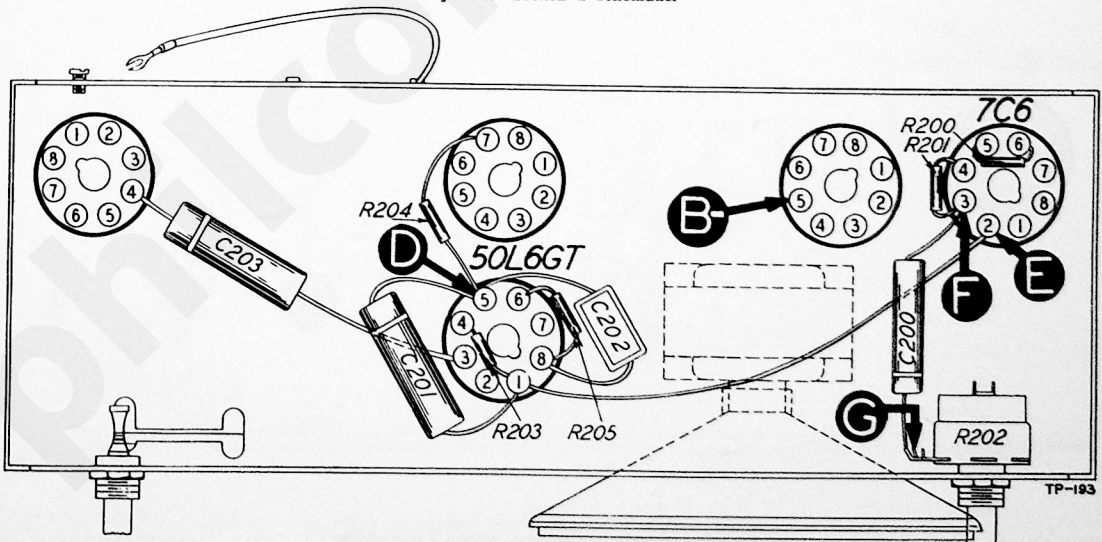


Figure 6. Bottom view showing section 2 test points.

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RADIO MODELS 46-200, 46-200-1

TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

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 B-.

Test Points	Normal Indication	Possible Cause of Abnormal Indication
H to B-	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 B-	Audible signal from speaker.	No signal indicates defective i-f transformer Z301.

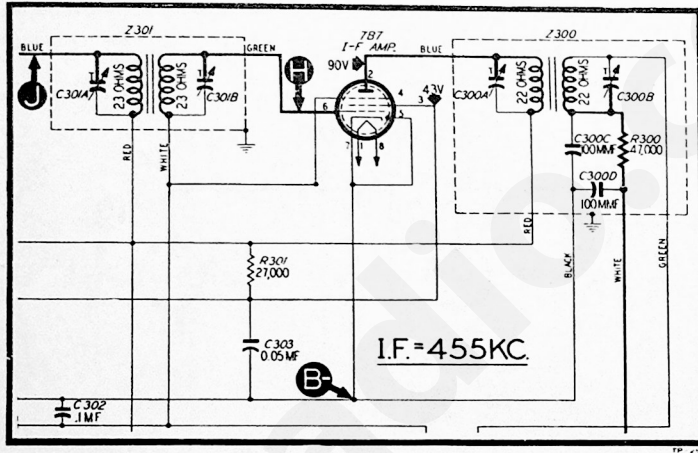


Figure 7. Section 3 schematic.

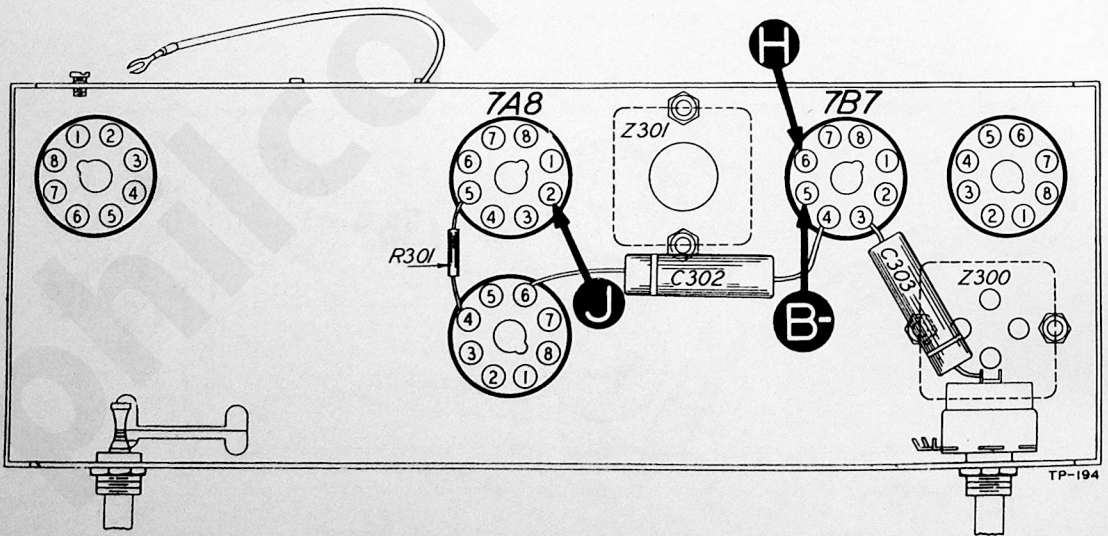


Figure 8. Bottom view showing section 3 test points.

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RADIO MODELS 46-200, 46-200-1

TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

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 B-

Test Points	Normal Indication	Possible Cause of Abnormal Indication
K to B-	Audible signal from speaker.	No signal indicates defective 7A8 tube, defective oscillator transformer T401, defective resistor R400, defective trimmer-condenser C400B or shorted plates of condenser C400.
L to B-	Audible signal from speaker.	No signal indicates defective antenna transformer T400, loop LA400, defective trimmer-condenser C400A, or shorted plates of condenser C400.

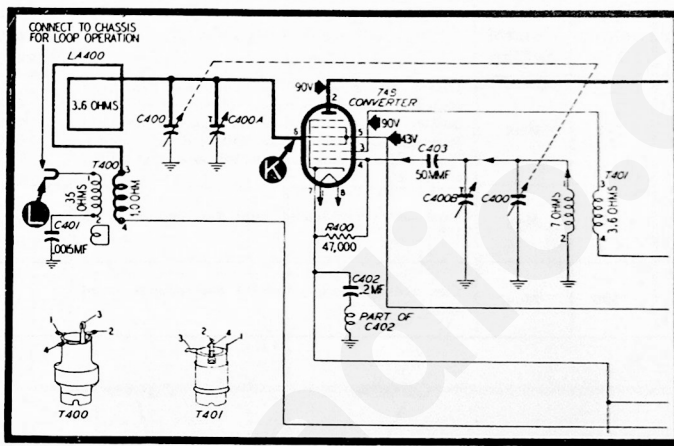


Figure 9. Section 4 schematic.

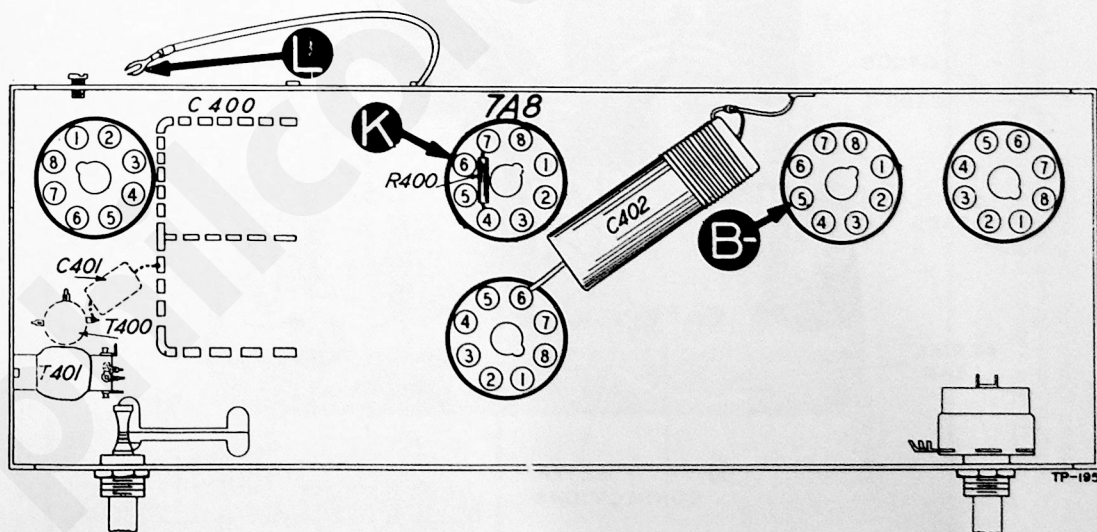


Figure 10. Bottom view showing section 4 test points.

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RADIO MODELS 46-200, 46-200-I

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 of sufficient strength 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 C301B down tight. Turn tuning condenser plates to full-mesh position. Make sure that dial pointer is set to the index mark (small dot stamped on the dial to the left or directly below "55"). 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 at 160.	C400B	Maximum output
Aerial lead and B	1500	1500	Max	Turn tuning condenser until dial pointer is at 150.	C400A	Maximum output

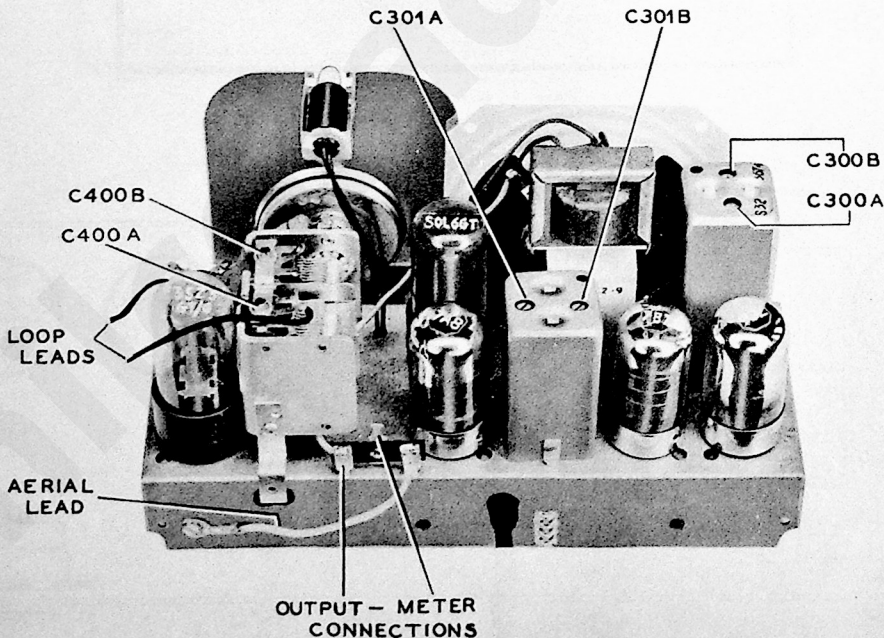


Figure 11. Top view showing trimmer condenser locations.

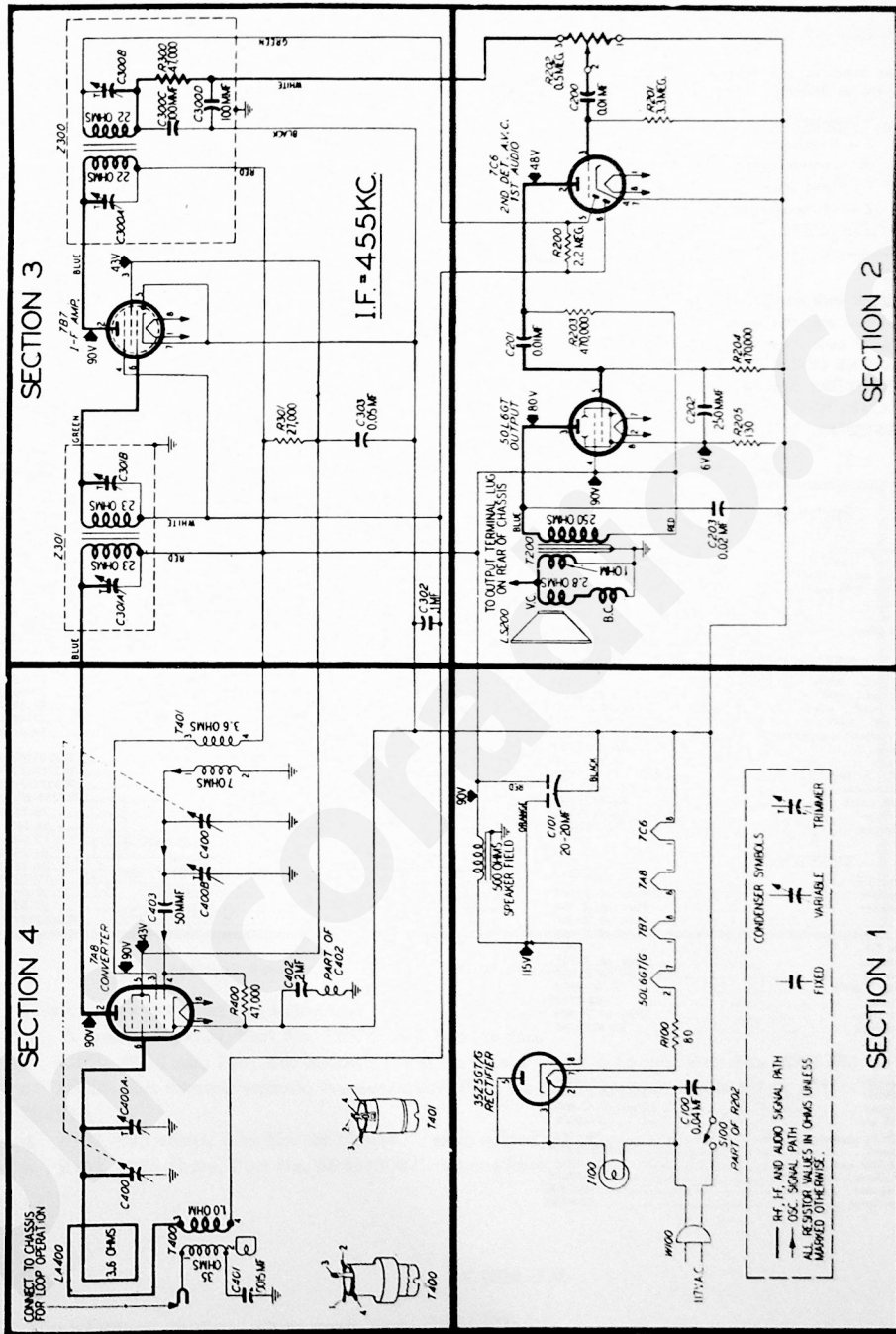


Figure 12. Complete schematic

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

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RADIO MODELS 46-200, 46-200-I

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

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

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

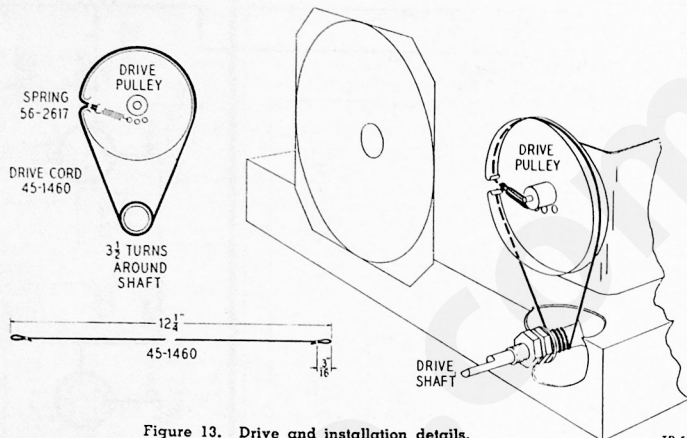


Figure 13. Drive and installation details.

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SECTION 1

Reference Number	Description	Service Part No.
C-100	Condenser, .04 mf., 400V	30-4119
C-101	Condenser, 20-20 mf., 150V	30-2547*
I-100	Pilot lamp, 6.8V., 150 ma.	34-2068
R-100	Resistor, 80 ohms	33-3425
S-100	Switch, Power	Part of R202
W-100	Power cord and plug	L3363

SECTION 2

C-200	Condenser, .01 mf., 600V.	61-0120*
C-201	Condenser, .01 mf., 600V.	61-0120*
C-202	Condenser, 250 mmf., mica	60-10205307*
C-203	Condenser, .02 mf., 600V.	30-4599*
LS-200	Speaker (with output transformer)	36-1592
R-200	Resistor, 2.2 meg.	66-5223340*
R-201	Resistor, 3.3 meg.	66-5333340*
R-202	Volume Control, .5 meg.	33-5429
R-203	Resistor, 470,000 ohms	66-4473340*
R-204	Resistor, 470,000 ohms	66-4473340*
R-205	Resistor, 130 ohms	66-1123340*
T-200	Transformer, Output	32-8296-5

SECTION 3

Z-300	Transformer, 2nd I-F	32-3952
C-300A	Condenser, Trimmer	Part of Z-300
C-300B	Condenser, Trimmer	Part of Z-300
C-300C	Condenser	Part of Z-300
C-300D	Condenser	Part of Z-300
Z-301	Transformer, 1st I-F	32-3967
C-301A	Condenser, Trimmer	Part of Z-301
C-301B	Condenser, Trimmer	Part of Z-301
C-302	Condenser, .1 mf., 200V.	30-4527
C-303	Condenser, .05 mf.	30-4518*
R-300	Resistor, 47,000 ohms	Part of Z-300
R-301	Resistor, 27,000 ohms	66-3273340

SECTION 4

C-400	Condenser, 2-Section Tuning	31-2658
C-400A	Condenser, Trimmer	Part of C-400
C-400B	Condenser, Trimmer	Part of C-400
C-401	Condenser, .0015 mf.	30-4621
C-402	Condenser-and-choke assembly, .2 mf.	76-1161
C-403	Condenser, 50 mmf.	60-00515307*
LA-400	Loop—Model 46-200 and 200-I	32-4056
R-400	Resistor, 47,000 ohms	66-3473340*
T-400	Transformer, Antenna	32-3394
T-401	Transformer, Oscillator	32-3880

MISCELLANEOUS

Description	Service Part No.
Cabinet and Loop assembly—Model 46-200	76-1869
Model 46-200-I	76-1870
Clip, coil mounting, ant. osc.	28-5002FA1
Clamp, electrolytic condenser mounting	56-1346FA5
Dial scale, Model 46-200	27-5713
Model 46-200-I	27-5840
Pointer, Model 46-200	27-4891
Acetate Window	
Model 46-200	54-4088
Model 46-200-I	54-4088
Acetate window fasteners	28-4279FE7
Back cover, Model 46-200	27-9879
Model 46-200-I	27-9922
Felt feet	W-2190
Knobs, Model 46-200	27-4820
Model 46-200-I	54-4118
Screw and lockwasher, chassis mounting	
Model 46-200	1W37633FA9
Model 46-200-I	1W37633FA9
Screw and Lockwasher, Speaker mtg.	1W32228FA3
Fasteners, Back mounting, Models 46-200—200-I	W2235-2FA9
Terminal panel	76-2148
Spring—Tuning condenser drive cord	56-2617
Drive cord, tuning condenser (25 ft. spool)	45-1460
Shaft, assembly	31-2626
Grommet, tuning condenser mounting	27-4610
Socket assembly, pilot light	76-1280
Socket, Loktal	27-6138*
Socket, octal	27-6199*
Rivet	1W36671FA5

PRODUCTION CHANGES FOR MODELS 46-200, 46-200-1

CODE 121

RUN 2

R400, 47,000 ohms, Part No. 66-3473340, was changed to 120,000 ohms, Part No. 66-4123340*, to improve oscillator stability at low frequencies.

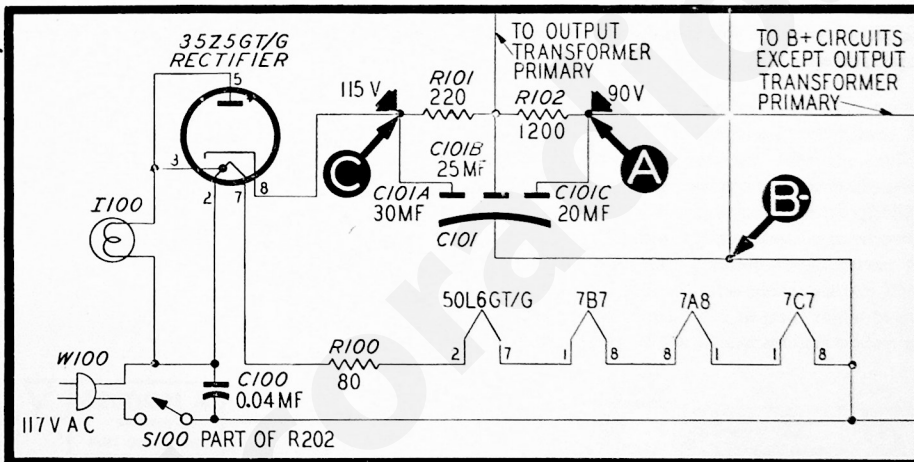
RUN 3

- a. A 120,000-ohm resistor, Part No. 66-4123340*, was added between B— and chassis, to eliminate hum caused by variable leakage under high-humidity conditions.
- b. C400, 2-section tuning condenser, Part No. 31-2658, was changed to Part No. 31-2527-2.
- c. Shaft assembly, Part No. 31-2626, was changed to Part No. 31-2718.
- d. Tuning-condenser drive cord, Part No. 45-1460, was changed to Part No. 45-8750* (25'-t. spool). The length of the cord when made up, 12¼", was changed to 14¼".

CODE 122

The following change was made from Code 121.

The power-supply (Section 1) circuit was changed according to the diagram below, to permit the use of a p-m loud-speaker.



Section 1 Schematic for Models 46-200, 46-200-1, Code 122

This change involves the following:

- a. A terminal panel, Part No. 12W45646, was added.
- b. C101, 20-20 mF., Part No. 30-2547*, was changed to 30-25-20 mF., Part No. 30-2573*.
- c. LS200, the electrodynamic loud-speaker, Part No. 36-1592, was changed to a p-m loud-speaker, Part No. 36-1614.
- d. R101, 220 ohms, Part No. 66-1224340*, was added.
- e. R102, 1200 ohms, Part No. 66-2123340*, was added.

CODE 125

The following changes were made from Code 122:

1. R100, 80 ohms, Part No. 33-3425, was removed.

2. The 7B7 i-f amplifier tube was replaced by a 14A7.
3. The 7C6 2nd detector-a.v.c.-first audio tube was replaced by a 14B6.

NOTE: With the above tubes installed, the filament voltage measured across each should be 12.6 volts instead of the 6.3 volts which was normal for the 7B7 and 7C6 tubes. Other operating voltages and currents are the same as for Code 122.

4. The 35Z5GT/G rectifier tube was replaced by a 35Y4.
5. The following changes were made in the antenna circuit:
 - a. T400, the antenna transformer, Part No. 32-3394, was removed. The "cold" end of the loop was connected directly to the a-v-c line.
 - b. A 5-mmf. condenser, Part No. 60-90505007*, was added. One side of this condenser was connected to the mixer grid of the 7A8; the other side was connected to the lead for the external antenna.
 - c. A 150,000-ohm resistor (antenna discharge), Part No. 66-4153340*, was added; this resistor was connected between the antenna lead and the chassis.
 - d. The cabinet-and-loop assembly for Model 46-200, Part No. 76-1869, was changed to Part No. 10542D. The cabinet-and-loop assembly for Model 46-200-I, Part No. 76-1870, was changed to Part No. 10542E.
6. The 120,000-ohm leakage resistor, Part No. 66-4123340* (added in Run 3 of Code 121), was changed to 150,000 ohms, Part No. 66-4153340*.
7. Condenser-and-choke assembly, Part No. 76-1161, was changed to Part No. 30-4644.

NOTE: These assemblies are electrically the same. Instead of using the externally wound choke, Part No. 30-4644 is constructed with the foil inductively wound; this assembly is identified by the blue-tinted wax with which it is impregnated.