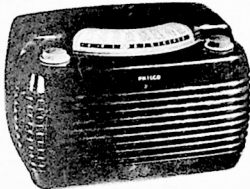




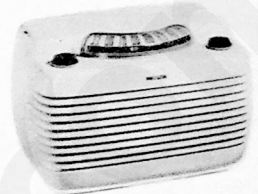
HOME RADIO



PHILCO RADIO

**MODEL
46-420**

**MODEL
46-420-1**



CABINET.....Model 46-420, Walnut finish
Model 46-420-1, Ivory finish
CIRCUIT.....Six tube superheterodyne
FREQUENCY RANGE.....540 to 1620 kc.

SPECIFICATIONS
POWER INPUT VOLTAGE.....105 to 120 volts, A.C. or D.C.
POWER CONSUMPTION.....30 watts at 117 volts
AERIAL Loop fastened to cabinet; 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

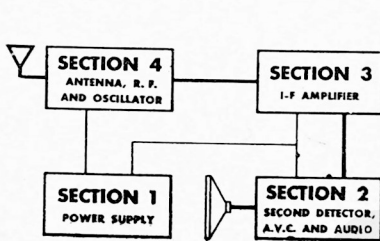


Figure 1. Block diagram (Heavy lines indicate signal path).

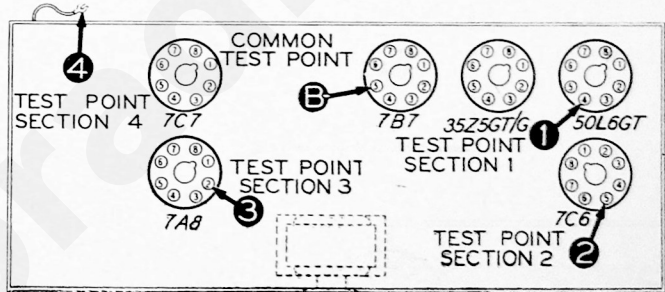


Figure 2. Bottom view, showing test points.

In this manual, 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 manual, 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 probably in the section under test.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between points 1 (+) and B-.	90 volts*.
2**	Apply an 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 46-420 and 46-420-1

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-	118 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.

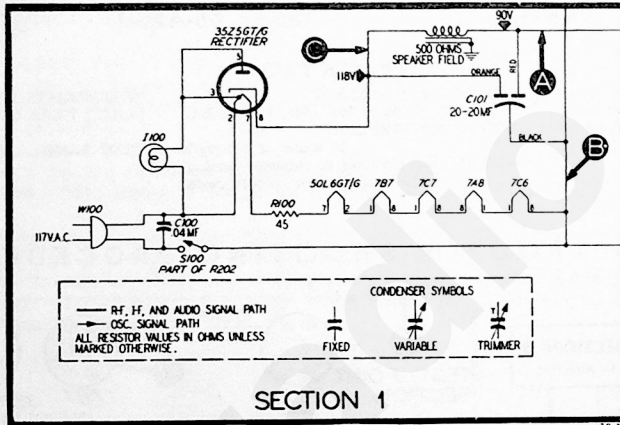


Figure 3. Section 1 schematic.

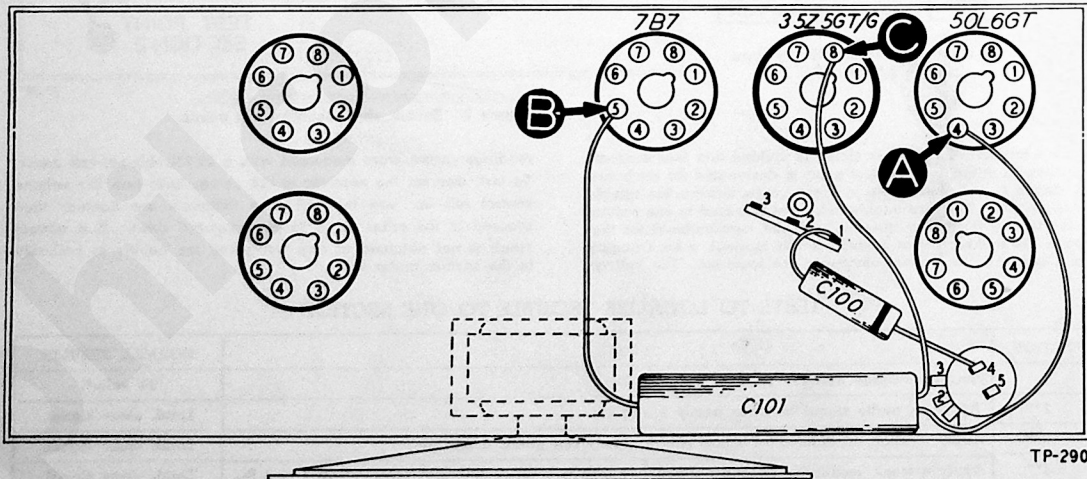


Figure 4. Bottom view, showing section 1 test points.

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RADIO MODELS 46-420 and 46-420-1

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.); connect the ground lead to B-.

Test Points	Normal Indication	Possible Cause of Abnormal Indication
D to B-	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 B-	Audible signal, same as previous test.	No signal indicates open 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, same as previous test.	No signal indicates open condenser C200, or open volume control R202.

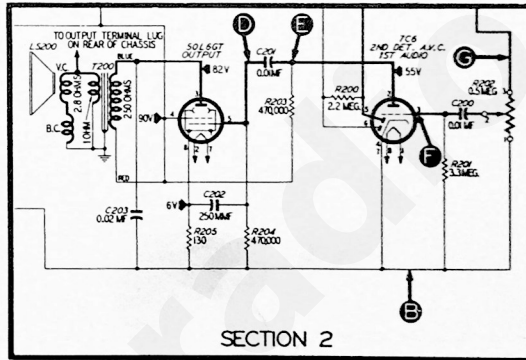


Figure 5. Section 2 schematic.

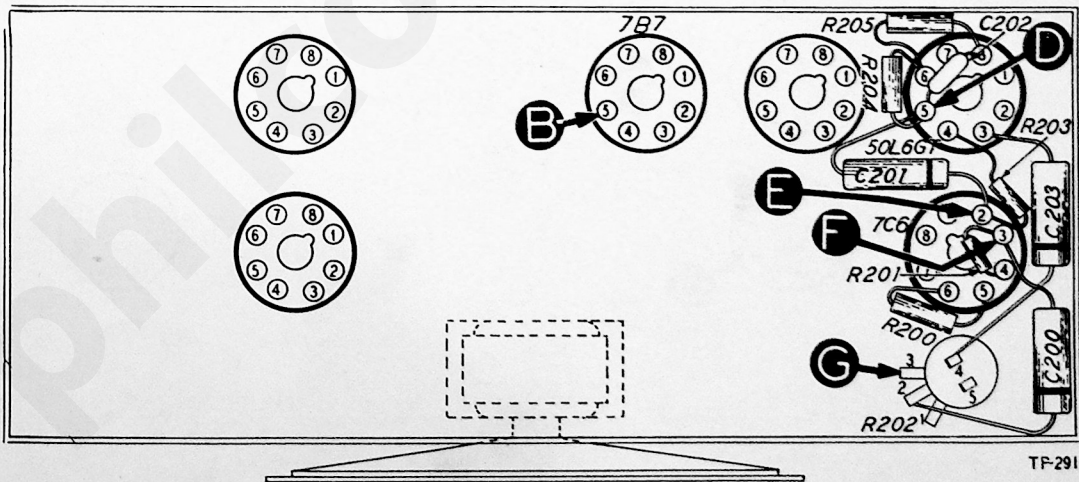


Figure 6. Bottom view, showing section 2 test points.

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RADIO MODELS 46-420 and 46-420-1

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.); connect the ground lead to 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 Z301, defective 7C6 tube, defective resistor R301, or shorted condenser C303.
J to B-	Audible signal from speaker	No signal indicates defective i-f transformer Z300.

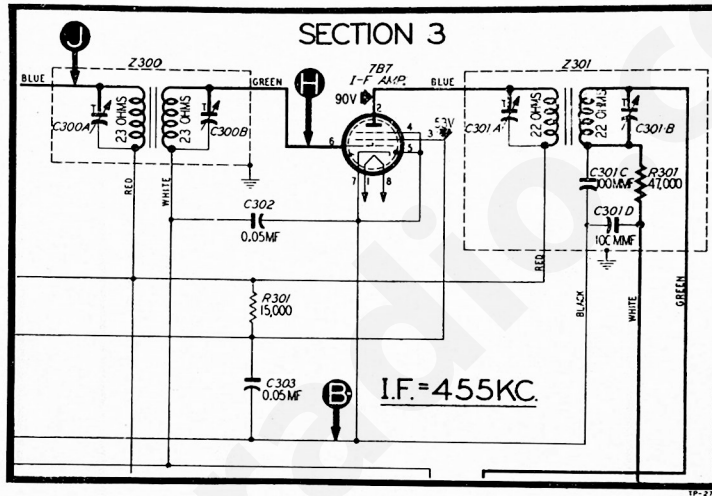


Figure 7. Section 3 schematic.

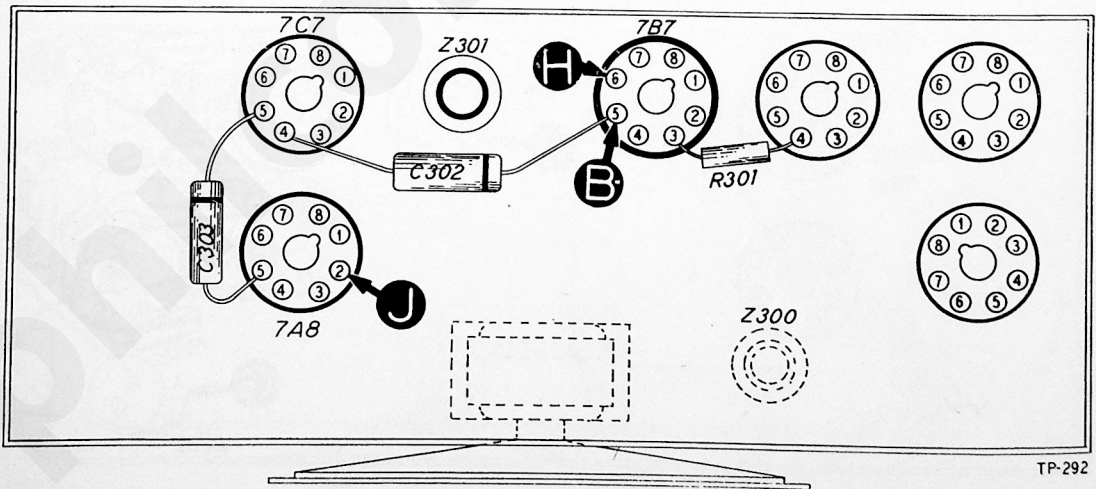


Figure 8. Bottom view, showing section 3 test points.

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RADIO MODELS 46-420 and 46-420-1

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.); connect the ground lead to 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 T400, defective resistors R400 or R402, defective condenser C400, or shorted plates of condenser C404.
L to B-	Audible signal from speaker	No signal indicates defective r-f transformer T401.
M to B-	Increase in audible signal from speaker.	No signal indicates defective 7C7 tube.
N to B-	Same signal output as previous step.	No signal indicates defective antenna transformer T402, loop LA400, coupling condenser C402, or shorted plates of condenser C404.

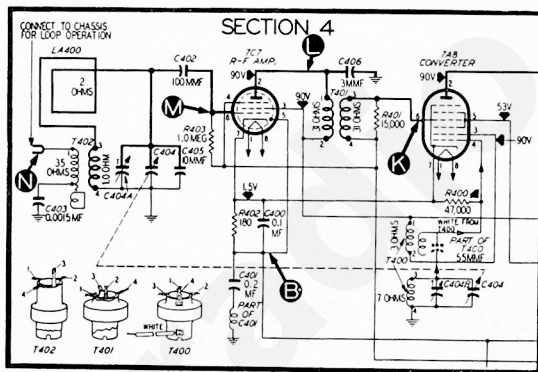


Figure 9. Section 4 schematic.

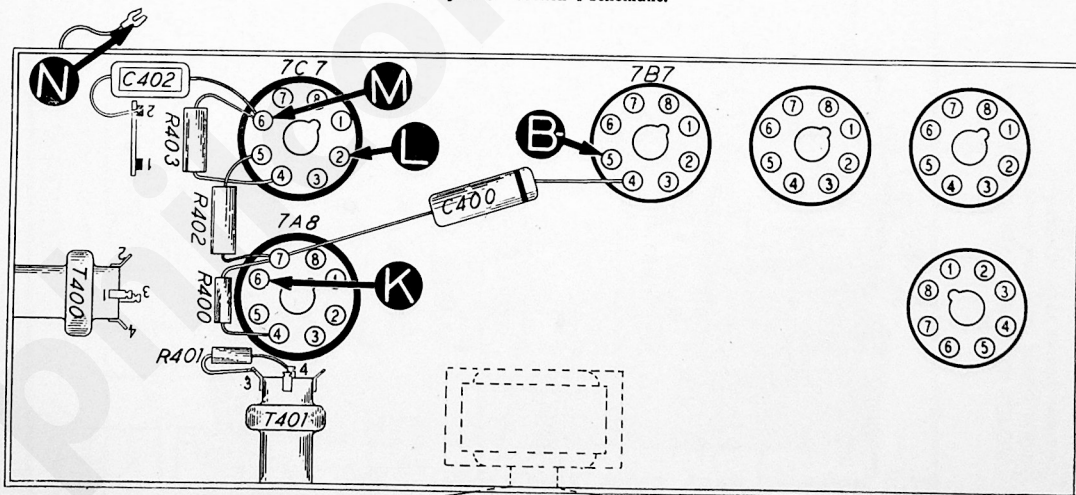


Figure 10. Bottom view, showing section 4 test points.

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PHILCO SERVICE

RADIO MODELS 46-420 and 46-420-1

ALIGNMENT PROCEDURE

In order to perform the i-f alignment it is necessary to remove the chassis from the cabinet. Disconnect the dial cord from the dial pointer and unsolder the aerial-loop leads before removing chassis. After the i-f alignment is completed, install chassis in cabinet, con-

nect loop leads and the dial cord. Set the dial pointer to coincide with the dot at the extreme low-frequency end of the scale with the condenser plates fully meshed. Adjust the oscillator and antenna trimmers as outlined in the accompanying alignment chart.

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.

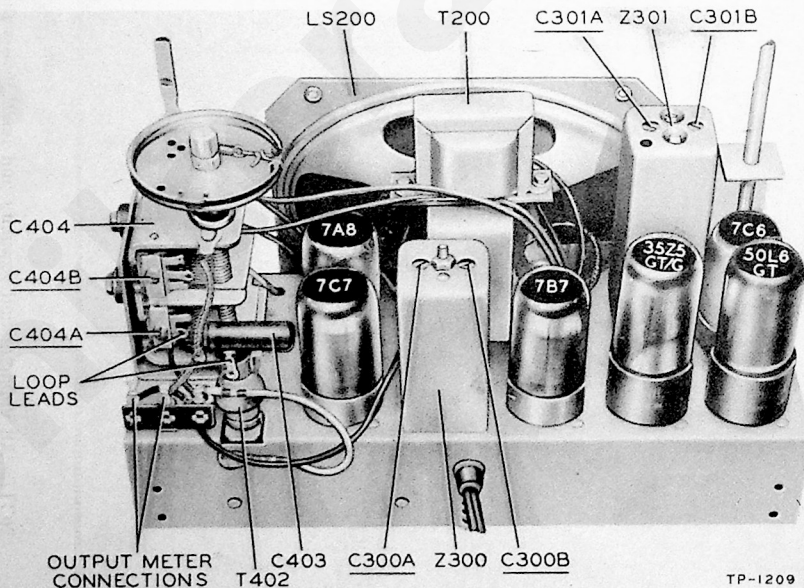
SIGNAL GENERATOR: For i-f alignment, connect high side of generator through .05-mf condenser to point given in chart; low side to B-. For r-f alignment, connect generator to a radiating

loop approximately 6 inches in diameter, made up of six turns of wire. Place this loop three or four inches from loop in receiver. Adjust output of generator to maintain output-meter reading below 1.25 volts during i-f and r-f alignment.

VOLUME CONTROL. In full clockwise position.

ALIGNMENT CHART

SIGNAL GENERATOR		RECEIVER		
Connections to Receiver	Dial Setting	Dial Setting	Special Instructions	Adjust Trimmers
Stator-plate terminal of antenna section of tuning condenser and B-	455 kc.	540 kc.	Turn C303B down tight. Adjust trimmers for maximum in order given. ONCE ONLY.	C301B C301A C300A C300B
Radiating loop.:	1600 kc.	1600 kc.	Adjust for maximum.	C404B
Radiating loop.:	1500 kc.	1500 kc.	Adjust for maximum.	C404A



TP-1209

Figure 11. Top view, showing trimmer condenser locations.

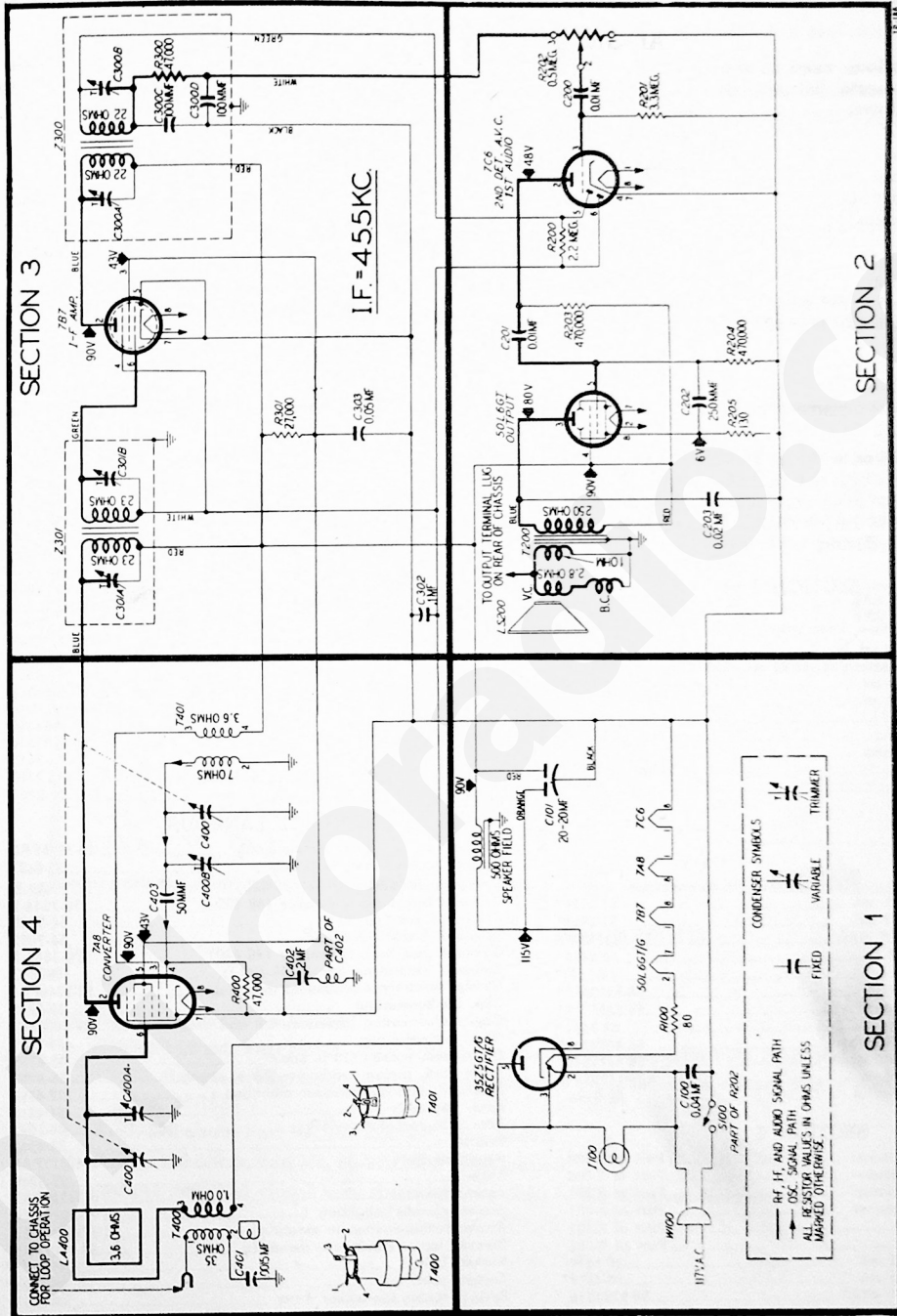


Figure 12. Complete schematic

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.

PHILCO SERVICE

RADIO MODELS 46-420 and 46-420-1

Symbol designations used in the schematic 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

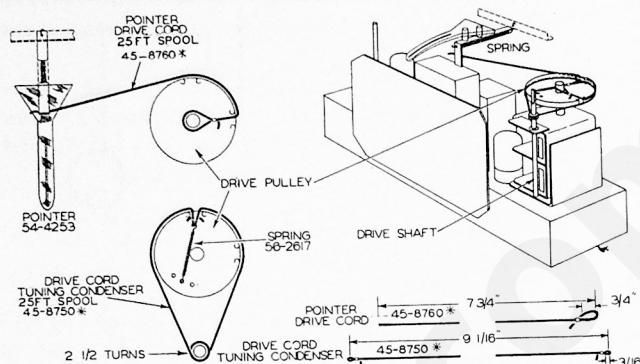


Figure 13. Drive cord installation detail.

NOTE: Parts marked with an asterisk (*) are general replacement items and the part numbers will not be identical with those used on factory assemblies. Use only the "SERVICE PART NUMBERS" shown in this parts list when ordering replacements.

SECTION 1

Reference Number	Description	Service Part No.
C-100	Condenser, .04 mf.	30-4119
C-101	Condenser, electrolytic, 20-20 mf., 150 V.	30-2547
C-101-A	Condenser, 20 mf.	Part of C-101
C-101-B	Condenser, 20 mf.	Part of C-101
I-100	Lamp, pilot	34-2088
L-100	Field, speaker	Part of LS-200
R-100	Resistor, 45 ohms	33-3432
S-100	Switch, A-C	Part of R-202
W-100	Cord, line	L3199

SECTION 2

C-200	Condenser, .01 mf.	81-0120*
C-201	Condenser, .01 mf.	81-0120*
C-202	Condenser, 250 mmf.	80-10245307*
C-203	Condenser, .02 mf.	30-4598*
LS-200	Speaker	38-1591*
R-200	Resistor, 2.2 meg.	66-5223340*
R-201	Resistor, 3.3 meg.	66-5333340*
R-202	Control, volume	33-5491
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	32-8164

SECTION 3

C-300-A	Condenser, trimmer	Part of Z-300
C-300-B	Condenser, trimmer	Part of Z-300
C-301-A	Condenser, trimmer	Part of Z-301
C-301-B	Condenser, trimmer	Part of Z-301
C-301-C	Condenser	Part of Z-301
C-301-D	Condenser	Part of Z-301
C-302	Condenser, .05 mf.	30-4518*
C-303	Condenser, .05 mf.	30-4518*
R-300	Resistor, 15,000 ohms	66-3153340
R-301	Resistor	Part of Z-301
Z-300	Transformer, 1st I-F	32-4028
Z-301	Transformer, 2nd I-F	32-3674

SECTION 4

Reference Number	Description	Service Part No.
C-400	Condenser, .1 mf.	30-4527*
C-401	Condenser and choke assembly	76-1198
C-402	Condenser, 100 mmf.	60-10105407*
C-403	Condenser, .0015 mf.	30-4628*
C-404	Condenser, tuning	31-2636
C-404-A	Condenser, trimmer	Part of C-404
C-404-B	Condenser, trimmer	Part of C-404
C-405	Condenser, 10 mmf.	60-00105407
C-406	Condenser, 3 mmf.	30-1221
LA-400	Loop assembly	32-4054
R-400	Resistor, 47,000 ohms	66-3473340*
R-401	Resistor, 15,000 ohms	Part of T-401
R-402	Resistor, 180 ohms	66-1184360*
R-403	Resistor, 1 meg.	66-5103340*
T-400	Coil, oscillator	32-3613
T-401	Coil, R-F	32-3595
T-402	Coil, antenna	32-3394

MISCELLANEOUS

Bracket, tuning-condenser mounting	56-2875FA3
Bushing, control-shaft mounting	27-9437
Cabinet, including scale (46-420)	10629-B
Cabinet and loop assembly (46-420-I)	76-1644-2
Cabinet-back (46-420)	54-7096
Cabinet back (46-420-I)	54-7097
Cabinet and loop-assembly (46-420)	76-1644-1
Cabinet, including scale (46-420-I)	10629-C
Clamp, electrolytic-condenser mounting	56-1348FA5
Clip, back-mounting	56-2726
Clip, coil-mounting (antenna, R-F and oscillator)	28-5002FE7
Clip, scale-mounting	56-3290
Drive cord, pointer (25 ft. spool)	45-8760*
Drive cord, tuning condenser (25 ft. spool)	45-8750*
Grommet, tuning-condenser mounting	27-4596
Knob assembly	54-4218
Pilot light socket assembly	76-1981
Pointer	54-4253
Retaining Ring	1W42537FA3
Scale	27-5916
Screw, speaker	1W32228FA3
Screw, chassis mounting	1W1869FA9
Screw, tuning-condenser mounting	1W32232FA3
Sleeve, tuning-condenser mounting	56-1307FA3
Socket, Loktal	27-6138*
Socket, octal	27-6199*
Spring, tuning-condenser drive	56-2617
Washer, spring	1W56380FE7
Washer, chassis-mounting	1W56950FA9
Washer, tuning-condenser mounting	1W52237FA3

**PRODUCTION CHANGES FOR MODELS 46-420 AND 46-420-1
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.

RUN 3

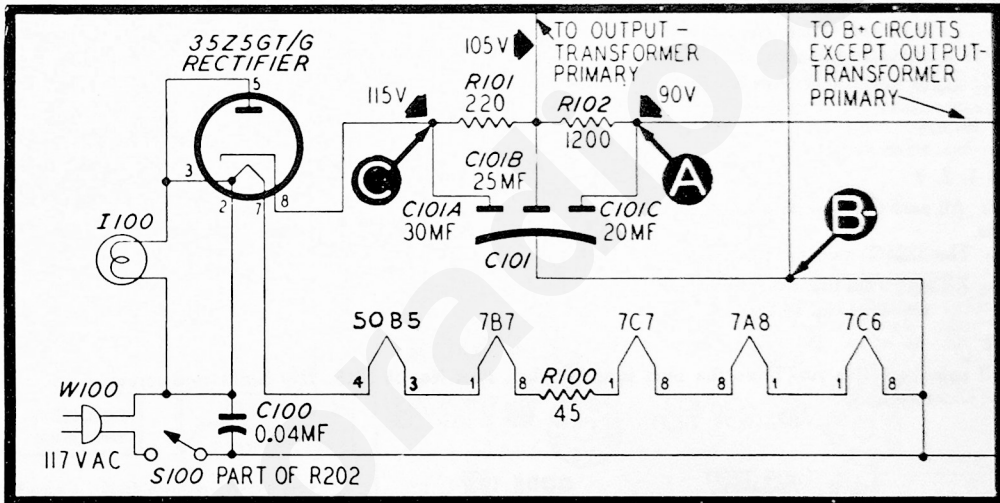
- a. R400, 120,000 ohms, Part No. 66-4123340* (in Run 2), was changed to 100,000 ohms, Part No. 66-4103340*.
- b. The 120,000-ohm resistor, Part No. 66-4123340* (added in Run 2), between B— bus and chassis, was changed to 150,000 ohms, Part No. 66-4153340*

CODE 125

RUN 1

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 CODE 125

This change involves the following:

- a. C101, 20-20 ml., Part No. 30-2547, was changed to 30-25-20 ml., Part No. 30-2540-1*.
- b. LS200, the electrodynamic loud-speaker, Part No. 36-1591*, was changed to a p-m loud-speaker, Part No. 36-1615*.
- c. R101, 220 ohms, Part No. 66-1224340*, was added.
- d. R102, 1200 ohms, Part No. 66-2123340*, was added.

The output amplifier circuit was changed according to the diagram below.

This change involves the following:

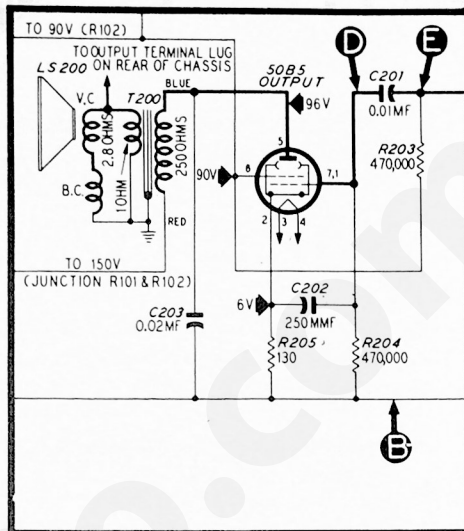
- a. The 50L6GT output tube was changed to a 50B5 (miniature beam-power tube).
- b. The octal socket for the output tube, Part No. 27-6199*, was changed to a miniature socket, Part No. 27-6203. (This socket was mounted on the chassis with a metal adapter plate.)
- c. The plate return end of the output-transformer primary was removed from the 90-volt B+ line and connected to the 105-volt B+ point (see Section 1 Schematic for Code 125).

RUN 2

- a. The oval loud-speaker, Part No. 36-1615, was changed to a round loud-speaker, Part No. 36-1614.
- b. A baffle-and-screen assembly, Part No. 40-6901, was added.

RUN 3

Sets from this run may have either the round loud-speaker, Part No. 36-1614, and baffle-and-screen assembly, Part No. 40-6901, or the oval loud-speaker, Part No. 36-1615.



CODE 128 Output Amplifier Connections for Code 125

RUNS 1, 2, 3

NOTE: All sets from these three runs are identical; run numbers 2 and 3 were erroneously marked on some chassis.

- a. The 35Z5GT rectifier tube was changed to a 35Y4 tube. Voltages are the same as in Code 125.
- b. All sets from this run have the round loud-speaker, Part No. 36-1614, and the baffle-and-screen assembly, Part No. 40-6901.

RUN 4

All sets from this run have the oval loud-speaker, Part No. 36-1615. (No baffle-and-screen assembly is required.)

CODE 122

CRITICAL LEAD DRESS AND PARTS PLACEMENT

1. The rear lead of loop LA400 should be connected to the antenna section of the tuning condenser, C404; the front loop lead should be connected to the No. 3 lug of the antenna coil, T402.
2. Condensers C203 and C100 should be dressed away from the 7C6 grid coupling condenser, C200. C200 should be dressed to the end of the chassis.
3. The blue lead of i-f transformer Z301 and the blue lead of the output transformer, T200, should be dressed away from the volume control, R202, and the 7C6 socket.
4. The white lead of i-f transformer Z301 which is connected to R202 should be dressed away from the green and blue leads of Z301.
5. All wiring should be dressed away from the 220-ohm filter resistor, R101.