

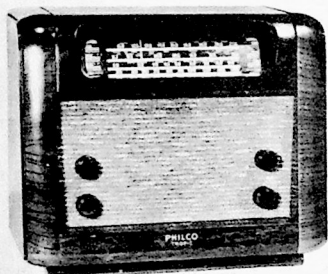
PHILCO



SERVICE

HOME RADIO

PHILCO TROPIC RADIO



Model 46-816

SPECIFICATIONS

CABINET	Model 46-816 (Wood, walnut finish)
CIRCUIT	Five-tube superhetrodyne (four-band); provision for phonograph input
FREQUENCY RANGES	540 to 1680 kc., 3.0 to 9.8 mc., 9.3 to 12.0 mc., and 11.8 to 22.0 mc.
POWER INPUT	120 or 240 volts, 50 to 60 cycles a.c.
POWER CONSUMPTION	35 watts
ANTENNA	External, Philco Part No. 45-1469
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES USED	6J8EG, 7B7E, 7C6, 6K6EGT/G, 7Y4

WARNING: Before operating this receiver, make sure that the power transformer is properly connected for the line voltage on which it is to be used. Instructions are given in Section 1, page 127.

PHILCO TROUBLE-SHOOTING PROCEDURE

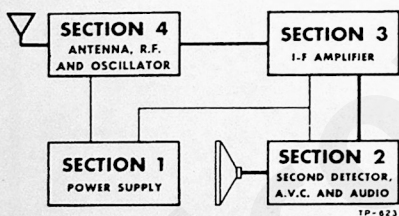


Figure 1. Block diagram (Heavy lines indicate signal path).

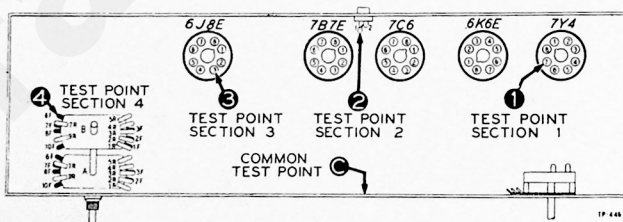


Figure 2. Bottom view, showing test points.

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. Normal indications, secured when checking at these test points, eliminate the section under test as a source of trouble. Isolation of the faulty part is accomplished by testing in the order shown in the sectional test charts. A high-quality signal generator and volt-ohmmeter are required. Voltage readings shown were taken with a 20,000-ohms-per-volt

meter. To localize trouble, connect the receiver to the power line, turn the volume control fully on, and 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.).

When abnormal indications appear, make voltage and resistance checks of the circuit under test. Remedy any defect encountered before proceeding to the next check.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between point 1 and C (chassis).	180 volts
2	Apply audio signal between point 2 and C.	Loud, clear signal
3	Apply weak, modulated signal (455 kc.) between point 3 and C.	Loud, clear signal
4	Check operation on each band by applying a weak, modulated signal between points 4 and C, with the signal generator and set tuned to 1,100 kc., 6 mc., 10.5 mc., and 17 mc., respectively.	Loud, clear signal

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

Make all tests for this section with a volt-ohmmeter, using the applicable d-c ranges. Voltages given were taken with the set operating and the volume control at minimum. See figures 3 and 4 for location of test points.

NOTE: For 240-volt operation, connect together the brown and orange wires from the under side of the power transformer T100. Insulate this connection. Then connect the blue wire to one side of the line, and the white wire to the other. For 120-volt operation, connect the brown and blue wires together to one side of the line; connect the white and orange wires together to the other side of the line.

TEST POINTS	NORMAL READING	POSSIBLE CAUSE OF ABNORMAL READING
A to B— BASS-ON-OFF switch in ON (center) position	266 volts	No voltage indicates defective 7Y4, shorted C100, C101, C104, faulty T100, S100 or power cord.
A to C BASS-ON-OFF switch in ON (center) position	180 volts	No voltage indicates shorted C102 or open speaker field Low voltage indicates leaky C102 or shorted C302 (see Section 3). High voltage indicates shorted speaker field.
A to C BASS-ON-OFF switch in BASS (extreme clock-wise) position	180 volts	Low voltage indicates shorted or leaky C203 (see Section 2).
C to D	-13 volts	Abnormal voltage indicates defective R100, R101, or C103.

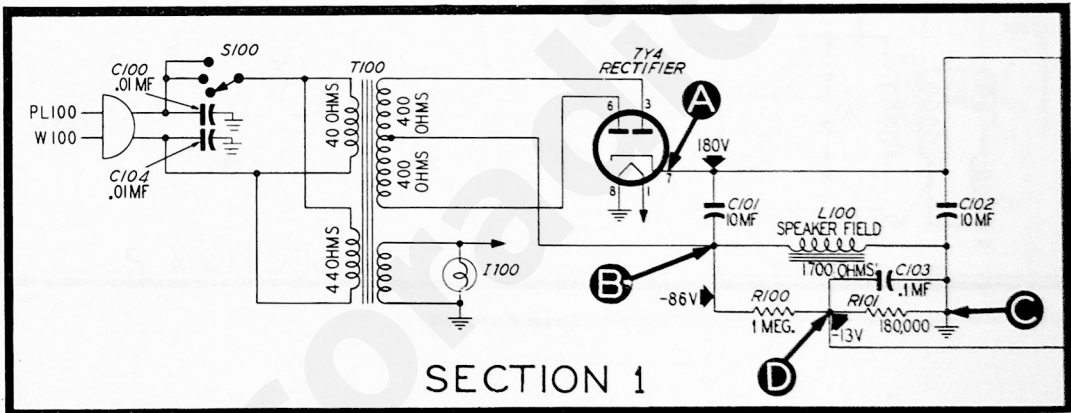


Figure 3. Section 1 schematic.

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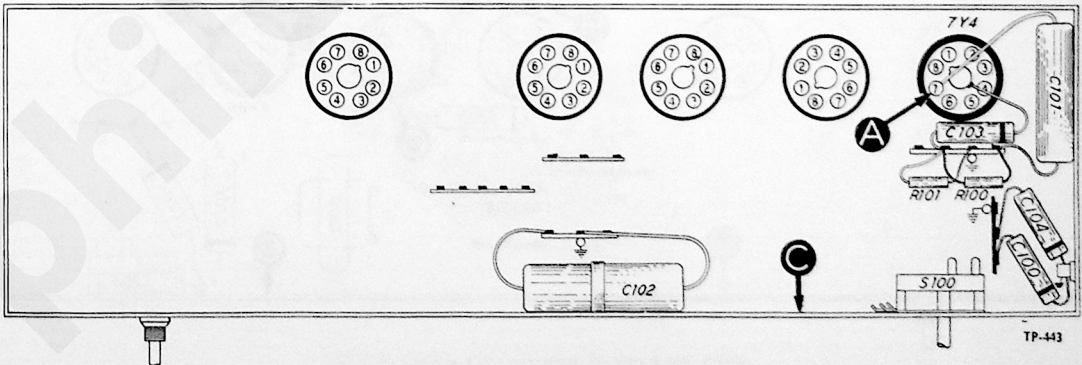


Figure 4. Bottom view, showing Section 1 test points.

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TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

For all tests in this section, use an audio signal. Connect the generator output lead through a condenser (.01 to .25 mf.) to the points indicated; connect the ground lead to the receiver chassis. Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
E to C	Loud, clear signal from speaker.	Defective 6K6E, T200, or LS200, open R203, or shorted or leaky C202.
F to C	Loud, clear signal, same as preceding test.	Open C202 or shorted C201.
G to C	Loud, clear signal with noticeable increase over that obtained in previous tests.	Defective 7C6 or R202.
H to C	Loud, clear signal, same as preceding test.	Open C200 or defective R200. Rotate volume control through entire range for complete check.

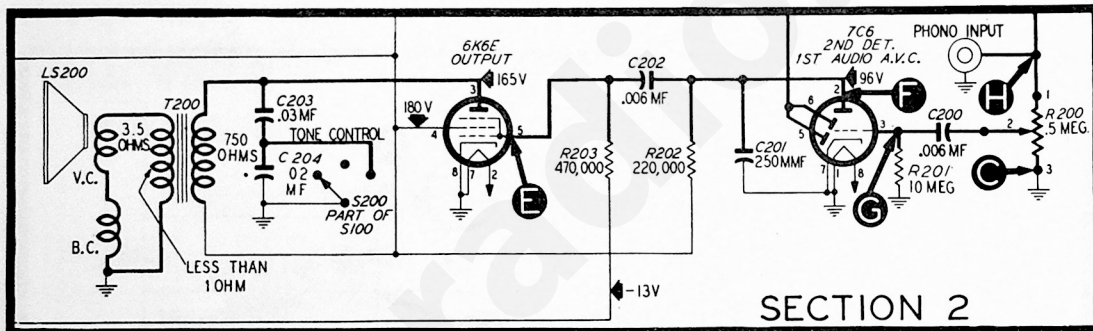


Figure 5. Section 2 schematic.

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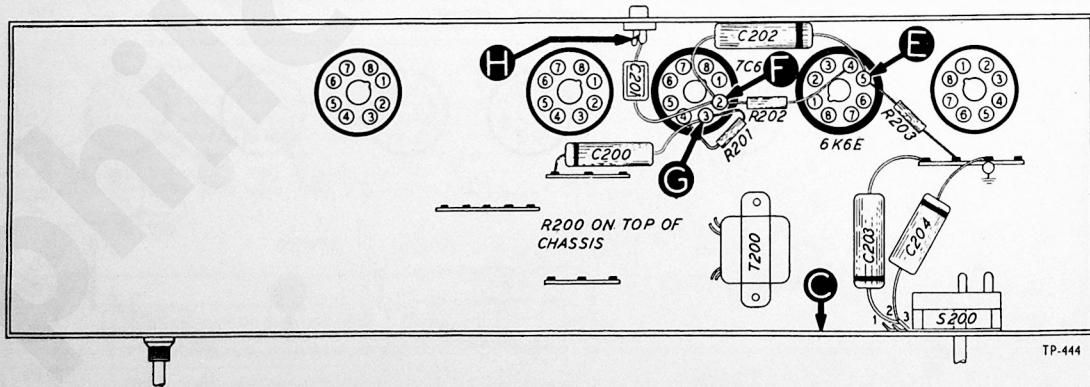


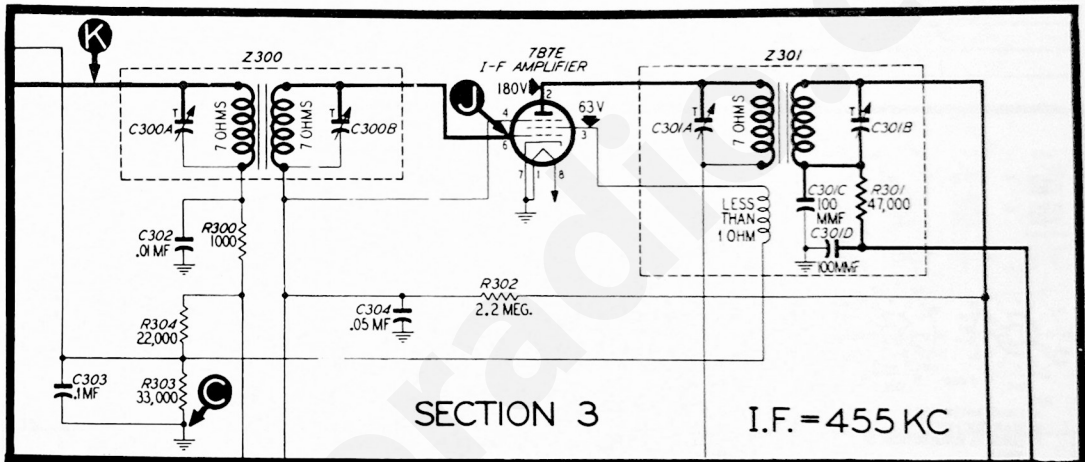
Figure 6. Bottom view, showing Section 2 test points.

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TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

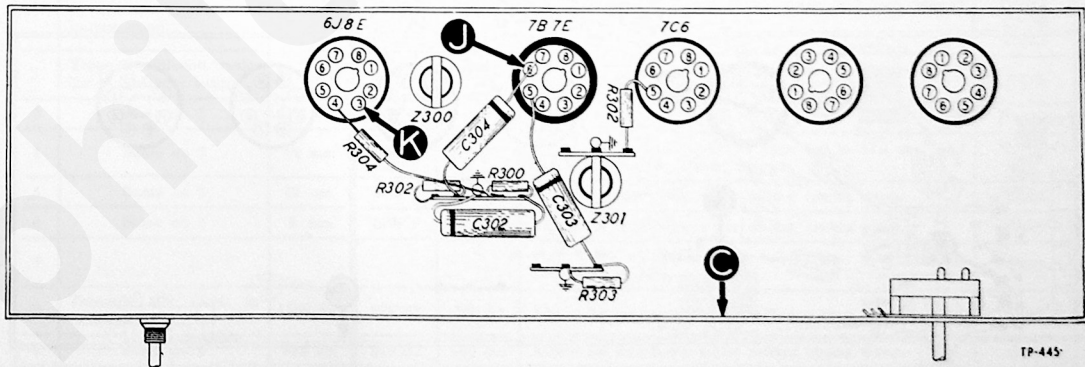
For all tests in this section, set the signal generator to 455 kc., with modulation on. Connect the generator output lead through a condenser (.01 to .25 mf.) to the points indicated; connect the ground lead to the receiver chassis. Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
J to C	Loud, clear signal from speaker	Defective 7B7E, C303, R303, R304, or defective or misaligned Z301.
K to C	Loud, clear signal	Defective or misaligned Z300.



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Figure 7. Section 3 schematic.



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

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TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

1. Set the volume control at maximum. Rotate the tuning condenser through its entire range. Any scraping noise from the speaker indicates bent plates, or dirt between plates or on wiper contacts. Remedy such conditions before proceeding further.

2. Attach the positive lead of a 20,000-ohms-per-volt meter to the receiver chassis, and the prod end of the negative lead through a 50,000-ohm resistor to point N. Set the meter on a 10-volt or similar range, and rotate the tuning condenser through its entire range on each position of the band switch. Absence of

voltage indicates that the oscillator is not functioning. If so, check the components indicated in the first test below, in the order listed.

3. Connect the signal generator as for previous tests, and proceed as below. The normal indication in each case will be a loud, clear signal, when the receiver is tuned to the same frequency as the signal generator. If the signal is abnormally weak, or cannot be detected at a particular point, check the components listed for that point in column 3 of the chart.

TEST POINTS	BAND SWITCH	POSSIBLY DEFECTIVE COMPONENTS
L to C	BDCST	6J8E, R401, R402, R403, T401, L402A, C405, C406, C407, C408, C412, or S400 (or C408 misaligned)
	S-W 1	L402B, C409, C410, S400 (or C409 misaligned)
	S-W 2	T401, C412, C413, S400 (or C413 misaligned)
	S-W 3	S400 (or C412 misaligned)
M to C	BDCST	T400A, C404, C402, C402A, or S400
	S-W 1	T400B, or S400
	S-W 2	L401, C400, C401, C403, or S400
	S-W 3	S400

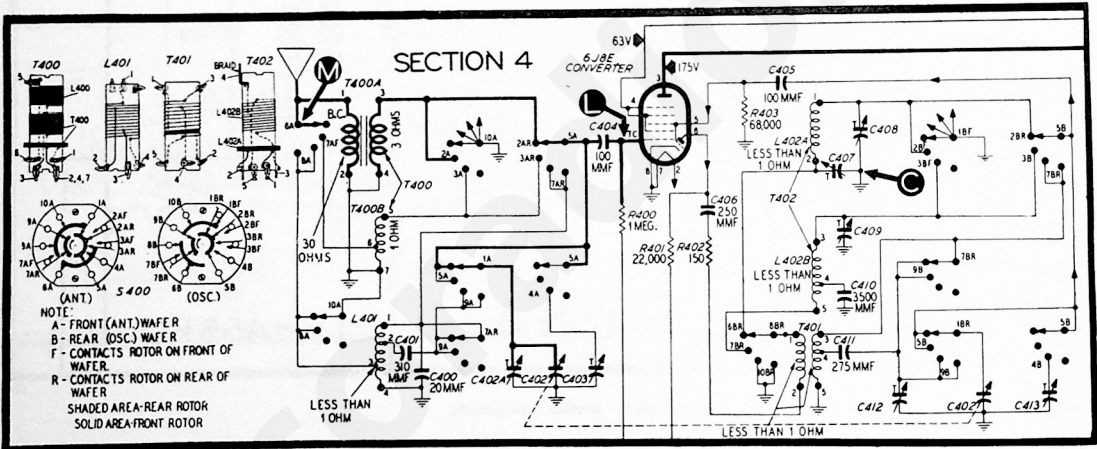


Figure 9. Section 4 schematic.

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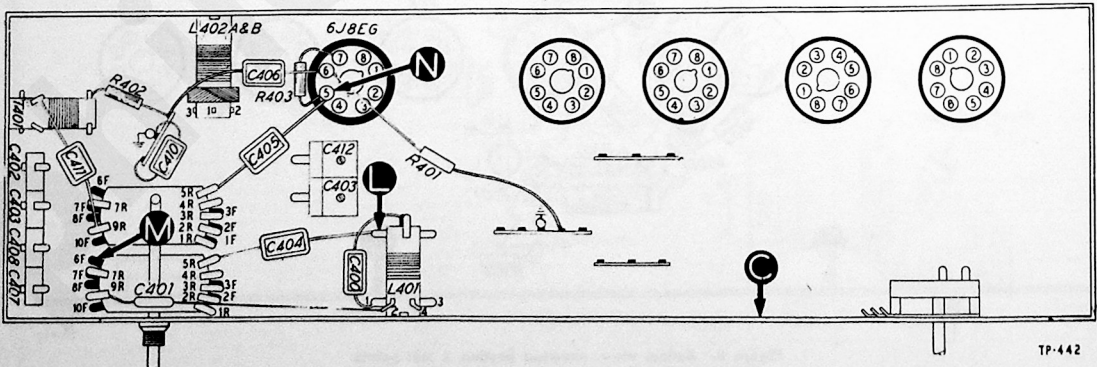


Figure 10. Bottom view, showing Section 4 test points.

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ALIGNMENT PROCEDURE

OUTPUT METER: Connect across speaker voice-coil terminals.

SIGNAL GENERATOR: Set the receiver volume control at maximum, and adjust the signal-generator output to give a readable deflection on the output meter, using the meter range that best indicates small changes in output. Reduce the signal-generator output as alignment progresses to prevent the meter needle from going off scale. Adjust all trimmers listed for maximum output. Set the BASS-ON-OFF switch in ON (center) position.

DIAL CALIBRATION: Make a dummy scale by holding a piece of transparent paper against the scale on the cabinet and marking the following points: 21 mc., 20.1 mc., 12 mc., 9 mc., 1500 kc., 580 kc., and the index mark (the last mark at the extreme low-frequency end of the scale).

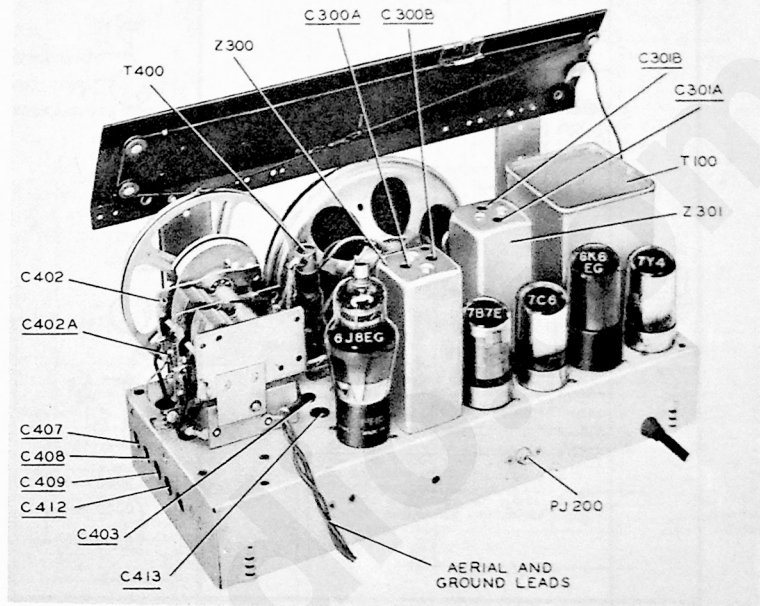
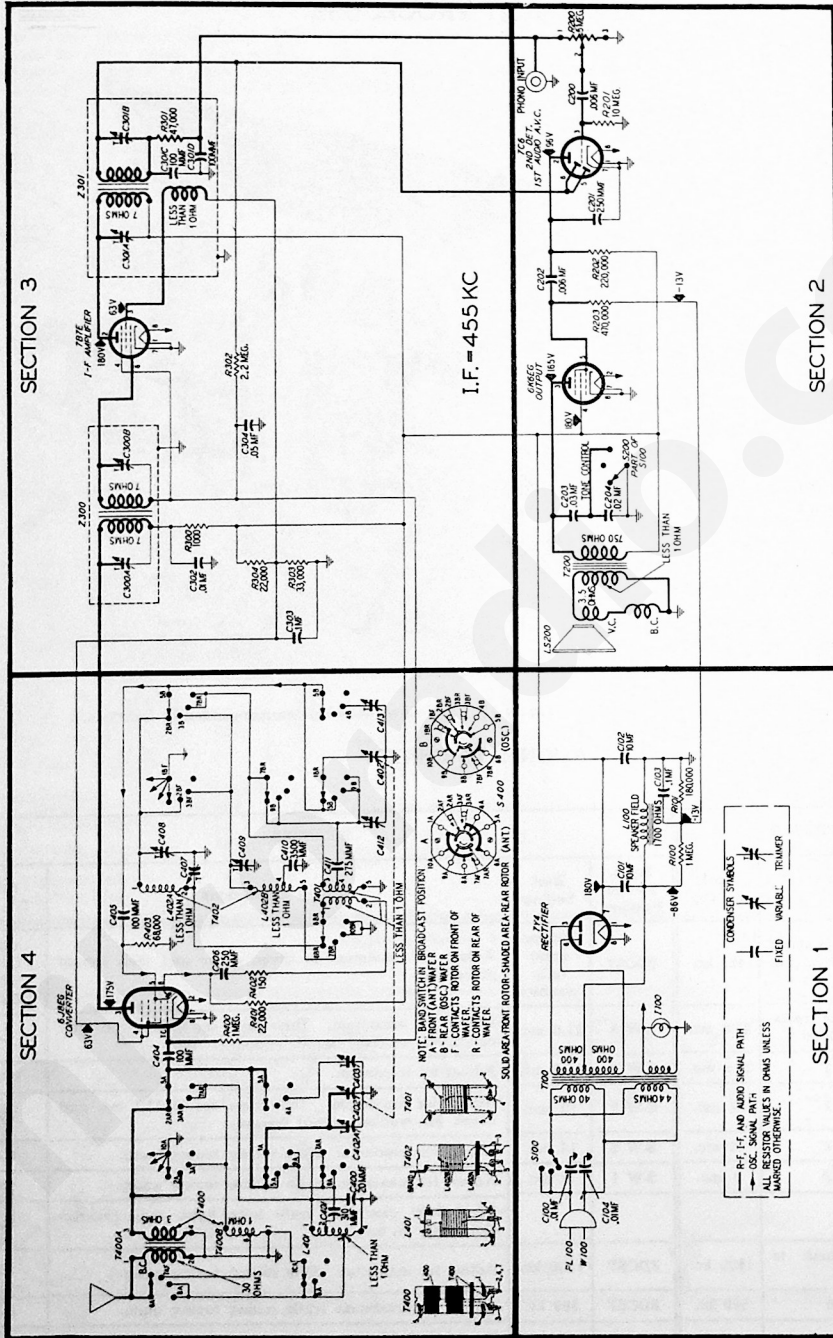


Figure 11. Top view, showing trimmer-condenser locations.

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ALIGNMENT CHART

SIGNAL GENERATOR			RECEIVER			
	Connections to Receiver	Dial Setting	Band-Switch Position	Dial Setting	Special Instructions	Adjust Trimmers
1	Through .05 mf. to stator of antenna section of tuning gang.	455 kc.	BDCST	Tuning gang fully meshed	Adjust for maximum in given order and then repeat procedure.	C301B C301A C300B C300A
2	Through 400-ohm resistor to antenna lead.	21.0 mc.	S-W 3	21.0 mc.	Adjust for maximum. Then tune set to 20.1 mc., and check for weaker signal (image).	C412
3	Same as 2	21.0 mc.	S-W 3	21.0 mc.	Adjust for maximum.	C402A
4	Same as 2	12 mc.	S-W 2	12 mc.	Adjust for maximum. Then tune set to 11.1 mc. and check for weaker signal (image).	C413
5	Same as 2	12 mc.	S-W 2	12 mc.	Adjust for maximum while rolling tuning gang.	C403
6	Same as 2	9 mc.	S-W 1	9 mc.	Adjust for maximum while rolling tuning gang.	C409
7					Turn C407 clockwise until fully tight, then counter-clockwise 1/2 turn.	C407
8	Through 200 mmf. to antenna lead.	1500 kc.	BDCST	1500 kc.	Adjust for maximum while rolling tuning gang.	C408
9	Same as 8	580 kc.	BDCST	580 kc.	Adjust for maximum while rolling tuning gang.	C407
10					Repeat step 8.	



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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).

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

- | | |
|-----------------|----------------------------|
| C—condenser | R—resistor |
| I—pilot lamp | S—switch |
| L—choke or coil | T—transformer |
| LA—loop antenna | W—power cord |
| LS—loudspeaker | 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 in this parts list when ordering replacements.

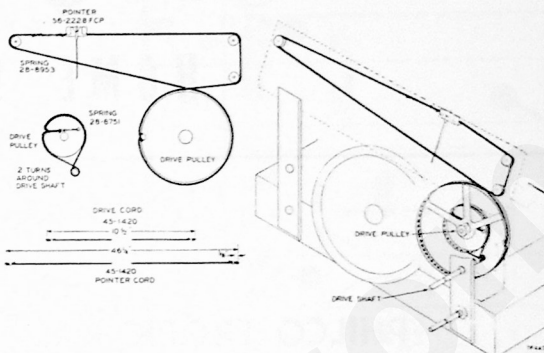


Figure 13. Drive cord installation details.

REPLACEMENT PARTS LIST

SECTION 1

Reference No.	Description	Service Part No.
C100	Condenser, .01 mf.	30-1226-1*
C101	Condenser, electrolytic, 10 mf.	45-3002*
C102	Condenser, electrolytic, 10 mf.	45-3002*
C103	Condenser, .1 mf.	61-0113*
C104	Condenser, .01 mf.	30-1226-1*
I100	Light, pilot	34-2064E
L100	Field, speaker	Part of LS200
PL100	Plug, a-c	L3275
R100	Resistor, 1 meg.	66-5103340
R101	Resistor, 180,000 ohms	66-4183340
S100	Switch, a-c (off-on)	Part of S200
T100	Transformer, power	32-8271
W100	Cord, a-c	L3246

SECTION 2

C200	Condenser, .006 mf.	45-3500-7*
C201	Condenser, 250 mmf.	60-10245307*
C202	Condenser, .006 mf.	45-3500-7*
C203	Condenser, .03 mf.	45-3500-1*
C204	Condenser, .02 mf.	61-0108*
LS200	Speaker	36-1601
PJ200	Socket, phono	27-6186*
R200	Control, volume, .5 meg.	45-3007*
R201	Resistor, 10 mega.	66-6103340*
R202	Resistor, 22,000 ohms	66-4223340*
R203	Resistor, 470,000 ohms	66-4473340*
S200	Switch, tone-control	42-1520*
T200	Transformer, output	32-8116*

SECTION 3

C302	Condenser, .01 mf.	61-0120*
C303	Condenser, .01 mf.	61-0113*
C304	Condenser, .05 mf.	61-0122*
R300	Resistor, 1,000 ohms	66-2103340
R302	Resistor, 2.2 mega.	66-5223340*
R303	Resistor, 33,000 ohms	66-3333340
R304	Resistor, 22,000 ohms	66-3224340
Z300	Transformer, 1st i-f	32-3895
C300A:	condenser, trimmer	Part of Z300
C300B:	condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	32-3907
C301A:	condenser, trimmer	Part of Z301
C301B:	condenser, trimmer	Part of Z301
C301C:	condenser	Part of Z301
C301D:	condenser	Part of Z301
R301:	resistor, 47,000 ohms	Part of Z301

SECTION 4

C400	Condenser, 22 mmf.	60-00205307*
C401	Condenser, 310 mmf.	30-1220-11
C402	Condenser, tuning	31-2690
C402A:	condenser, trimmer	Part of C402
C403	Condenser, trimmer	31-6416
C404	Condenser, 100 mmf.	60-10105407*
C405	Condenser, 100 mmf.	60-10105407*
C406	Condenser, 250 mmf.	60-10245307*
C407	Condenser, trimmer	31-6411
C408	Condenser, trimmer	31-6411
C409	Condenser, trimmer	31-6411
C410	Condenser, 3,500 mmf.	60-20335404*
C411	Condenser, 275 mmf.	30-1220-7
C412	Condenser, trimmer	31-6416
C413	Condenser, trimmer	31-6411

SECTION 4 (Cont.)

Reference No.	Description	Service Part No.
L401	Coil, s-w antenna	32-3652
L402	Coil, bc. and s-w oscillator	32-3656*
L402A:	coil, bc. oscillator	Part of L402
L402B:	coil, s-w oscillator	Part of L402
R400	Resistor, 1 meg.	66-5103340*
R401	Resistor, 22,000 ohms	66-3223340*
R402	Resistor, 150 ohms	66-1153340*
R403	Resistor, 68,000 ohms	66-3683340*
S400	Switch, band-selector	42-1725
T400	Transformer, bc. and s-w antenna	32-3655
T400A:	transformer, bc. antenna	Part of T400
T400B:	transformer, s-w antenna	Part of T400
T401	Coil, s-w oscillator	32-3651

MISCELLANEOUS

Bearing, drive-shaft, rear	27-9437
Bracket, coil-mounting	56-1634FA33
Bracket assembly, tuning-condenser	76-1485
Bracket assembly, scale	76-1495
Cabinet	10623
Baffle-and-cloth assembly	40-6740
Band, rubber	54-4177*
Feet, felt	W2190
Scale, dial	27-5715*
Strap, scale	56-1752*
Screw, baffle-mounting	1W24756
Clamp, condenser-mounting	56-1346FA5
Clip, coil	28-5007FE7
Cord, tuning-condenser-drive (25-foot spool)	45-8760*
Cord, pointer-drive (25-foot spool)	45-8760*
Drum, drive, assembly	38-9883FA33
Grommet, rubber, chassis-mounting	27-4990
Hose, rubber, drive-shaft	27-9432
Knob, bass-on-off	54-7091
Knob, band-selector	54-7092
Knob, dial-tuning	54-7093
Knob, volume-control	54-7094
Plug, a-c	L3275
Lamp, pilot, assembly	76-1115
Lockwasher, condenser-mounting	1W2425FE7
Panel, terminal, assembly, tracker, oscillator-plate (S-W1)	12W45655
Panel, terminal, assembly (screen-bleeder)	12W45663
Panel, terminal, assembly (a-v-c and grid)	12W45673
Pointer	56-228BFCP
Ring, speaker-mounting (felt)	27-9419
Rivet (sockets, padders, panels, lugs)	1W46671FA5
Screw and lockwasher, speaker-mounting	1W3228FA3
Screw and lockwasher, tuning-condenser-mounting	1W32232FA3
Screw, drive	W630FA3
Screw, scale-bracket-assembly mounting	1W19670EA3
Screw, chassis-mounting	1W18679FA0*
Screw, power-transformer and tuning-condenser	1W19670EA3
Shaft, drive	56-6199FA33*
Shield, power-transformer	56-1525
Sleeve, tuning-condenser-mounting	56-1307FA4
Sleeve, chassis-mounting	28-2258FA3
Spacer	27-9382
Spring, drive-shaft (hairpin)	57-1468FA3
Spring, condenser-drive	28-8751
Spring, pointer-drive	28-8953
Spring, Loktal	27-6138*
Socket, octal	27-6199*
Washer, chassis-mounting	1W52353FA3*
Washer, condenser-mounting (brass)	2W54094
Washer, tuning-condenser-mounting	1W5237FA3