

## SECTION 1 - TROUBLE SHOOTING

### CAUTION

Do not turn on radio power with speaker disconnected, as this will cause damage to the set.

With the BC push button depressed, check the voltage between the chassis (test point C) and each of the re-

maining test points indicated in the chart. The voltages given were measured with a 20,000-ohms-per-volt meter, using a power source of 117 volts, 60 cycles, a.c. Any voltage may be considered normal if it is within  $\pm 10\%$  of the indicated value.

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B to C D to C E to C F to C	200 volts 187 volts Negative 13 volts Negative 1.1 volts	Error greater than 10%	Trouble within this section. Isolate by following tests.
2	A to C	250 volts	No voltage Low voltage High voltage	Defective 5Y3GT tube or T100. Shorted C104, C102C, C103, C105, or C416. Defective 5Y3GT tube or T100. Leaky C104, C102C, C103, C105, or C416. Shorted C102A, C102B, or C106. Open L100. Shorted L100. Open R103, R104, or T200.
3	B to C	200 volts	No voltage Low voltage High voltage	Shorted C102A. Open R100. Leaky C102A. Off-value R100. Off-value R100.
4	D to C	187 volts	No voltage Low voltage High voltage	Shorted C102B. Open R101. Leaky C102B. Off-value R101. Off-value R101.
5	E to C	Negative 13 volts	Error greater than 10%	Shorted or leaky C106. Open or off-value R102, R103, or R104. Open, shorted, or partially shorted L100.
6	F to C	Negative 1.1 volts	Error greater than 10%	Open or off-value R104.

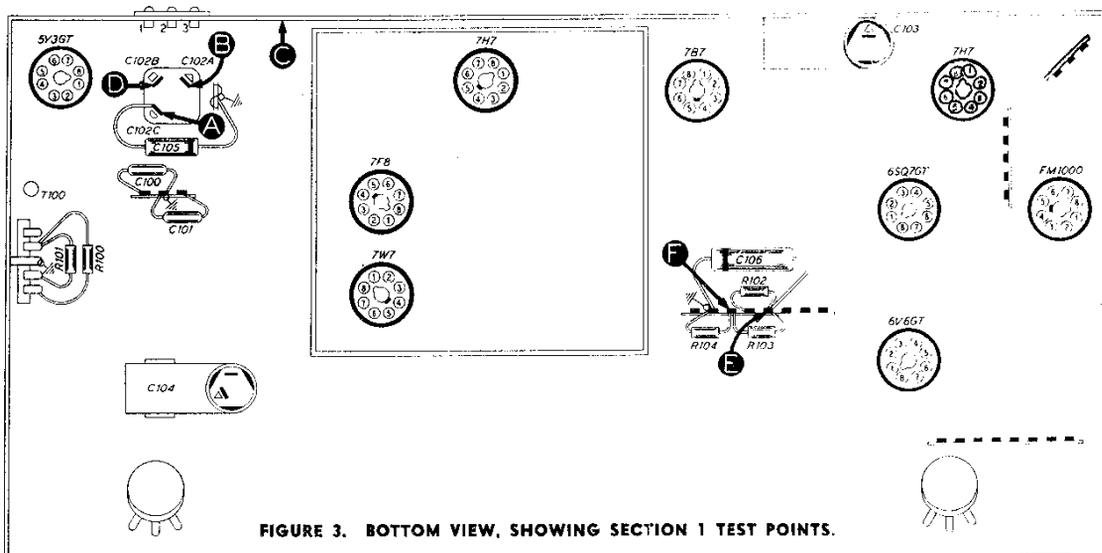


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

## SECTION 2 - TROUBLE SHOOTING

For all tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated.

Set the volume control at maximum, treble tone control clockwise, and bass tone control counter-

clockwise; depress the BC push button. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in the first step, proceed to the tests in Section 3; if not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D	Loud, clear signal with weak signal input	Trouble within this section. Isolate by following tests.
2	A	Loud, clear signal with strong signal input	Defective 6V6GT tube or LS200. Shorted or leaky C205. Open or shorted T200. Open R205 or C204. Shorted or leaky C200 or C201.
3	B	Loud, clear signal with weak signal input	Defective 6SQ7GT (triode section). Open R204 or R202. Leaky or shorted C200.
4	D	Same as step 3	Open or off-value R200. Open C202.

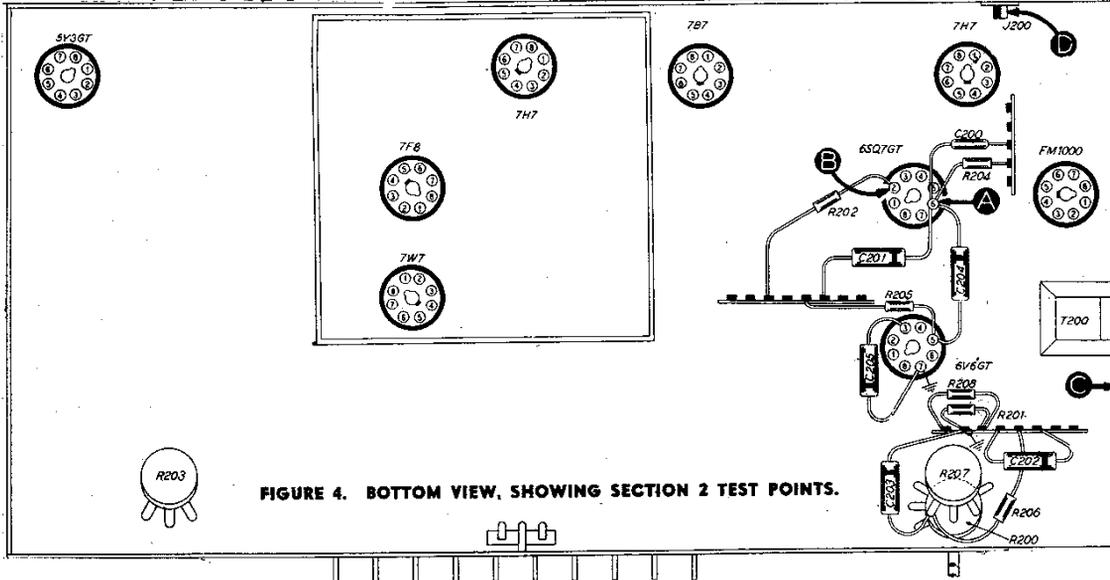


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

### SECTION 3 – TROUBLE SHOOTING (FM DETECTOR)

The tests in this section are made with an audio-frequency generator, an AM r-f signal generator, and a 20,000-ohms-per-volt voltmeter. Use a .1-mf condenser in series with the output lead of each generator.

In Step 1, unmodulated r-f signals, together with d-c voltage readings, are used to check the response of the detector circuit to FM by observing the voltage drops across the audio-load resistor R302 for different input frequencies within the i-f range of the detector. In Step 3, the oscillator section of the FM detector is made inoperative, thereby converting the circuit to an AM detector, and making it possible to check certain components with an AM signal.

The tests in this section will not indicate the condition of alignment of the detector unless the circuit is extremely misaligned.

**NOTE:** In Steps 1 and 3, the AM signal-generator output must be at least .5 volt. If the output is below this value, instead of connecting to test point D, the generator lead may be connected in Section 4, to test point A or B, depending upon the maximum output of the generator used. The tests made from these points will be effective if the last i-f stages are trouble free. If abnormal indications are obtained in BOTH Steps 1 and 3, the i-f stages may be at fault.

Set the radio controls as follows: Volume control at maximum; bass control fully counterclockwise; treble control fully clockwise; FM push button depressed.

If the "NORMAL INDICATION" is obtained in the first test, proceed to the tests for Section 4; if not, isolate and remedy the trouble in this section.

SECTION 3 - (Continued)

STEP	PROCEDURE	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	Connect positive d-c voltmeter lead to test point A, negative lead to test point B, with meter on 50-volt range. Connect AM generator to test point D; turn off modulation and adjust generator output to approximately .5 volt (see NOTE above). Swing generator frequency from approximately 80 kc above to 80 kc below 9.1 mc.	Approximately 15 volts for 9.1-mc signal (or no signal); 8 volts for 80 kc above 9.1 mc; 23 volts for 80 kc below 9.1 mc.	Trouble within this section. Isolate by the following tests.
2	Connect audio-signal generator to test point E; adjust for high generator output.	Loud, clear signal output from radio.	Defective Z300, FM1000, or PB 10. Shorted C305. Open C304 or R303.
3	Short test point F (pin No. 2, FM1000) to chassis. Connect r-f generator output to test point D (see NOTE above). Use modulated signal. Set generator for 9.1 mc and maximum output.	Loud, clear signal output from radio.	Defective FM1000 tube. Shorted or leaky C306 or C307. Open R304, L300, or R302.
4	Remove short from test point F. Connect negative lead of d-c voltmeter to test point F through a 50,000-ohm isolating resistor; connect positive lead to test point C (chassis). Set meter to 10-volt range.	Approximately 2.5 volts negative (osc. grid voltage).	Defective FM1000 tube, or Z300. Open L300 or C301. Shorted or leaky C303. Open R306. Open or off-value R305 or R301.

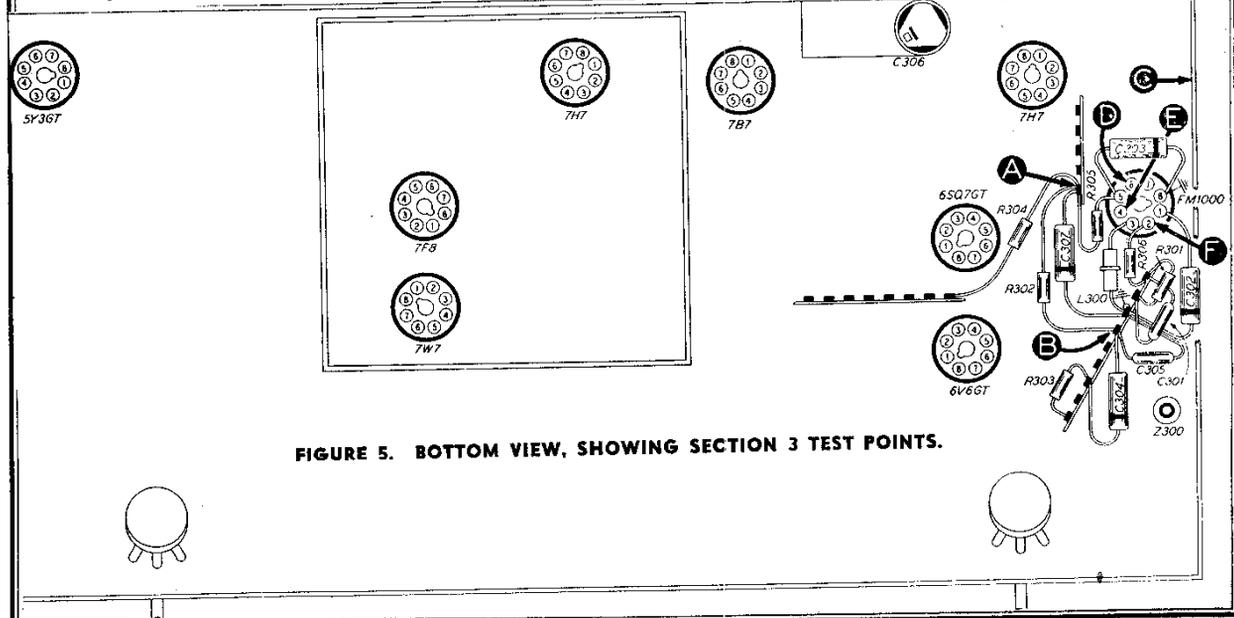


FIGURE 5. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

## SECTION 4 – TROUBLE SHOOTING

### AM CIRCUITS

For the AM circuit tests in this section, use an AM r-f signal generator with frequency set to 455 kc. Connect the signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated. Depress the BC push button (PB 8), set the radio volume control at maximum,

the bass tone control fully counterclockwise, and the treble control fully clockwise. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in the first step, proceed to the tests for FM CIRCUITS in this section, or to Section 5; if not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	A	Clear signal with strong signal input.	Defective or misaligned Z403. Open R416, R418, R419, R411, R414, R415, or C424. Defective 6SQ7GT or 7H7 tube. Shorted, open, or leaky C418, C419 or C420. Shorted C425.
3	B	Clear signal, louder than step 2.	Defective or misaligned Z402. Defective 7B7 tube. Open R405, R406, R409, or R410. Shorted C411 or C414. Shorted, leaky or open C413 or C415.
4	D	Clear signal, louder than step 3.	Defective or misaligned Z401. Defective 7H7 tube. Open R402, R403, R404, or R407. Shorted C407. Shorted, open or leaky C408 or C409.
5	E	Clear signal, approx. same as step 4.	Defective or misaligned Z400. Open R401.

### FM CIRCUITS

For the FM circuit tests in this section, short test point F, in Section 3, to the radio chassis, to permit use of an AM signal. Connect the AM signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated in the chart. With the exception of the i-f switch, tubes, and transformers (all of which may function properly at 455 kc but not at 9.1 mc) and

the parts specified in the chart, the parts in this section which are normal on AM will be normal on FM.

Set the r-f signal generator to 9.1 mc, with modulation ON. Depress the FM push button (PB 10). Set the radio volume control at maximum, the bass tone control fully counterclockwise, and the treble control fully clockwise. Adjust the signal-generator output as required for each step.

SECTION 4 - (Continued)

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	A	Clear signal with strong signal input.	Defective or misaligned Z403. Defective 7H7 or 6SQ7GT (diode section) tube. Shorted or open C423.
3	B	Loud, clear signal with moderate signal input.	Defective or misaligned Z402. Defective 7B7 tube, or PB 10. Open C414.
4	D	Loud, clear signal with weak signal input.	Defective or misaligned Z401. Defective 7H7 tube. Open C407.
5	E	Loud, clear signal with weak signal input.	Defective or misaligned Z400.

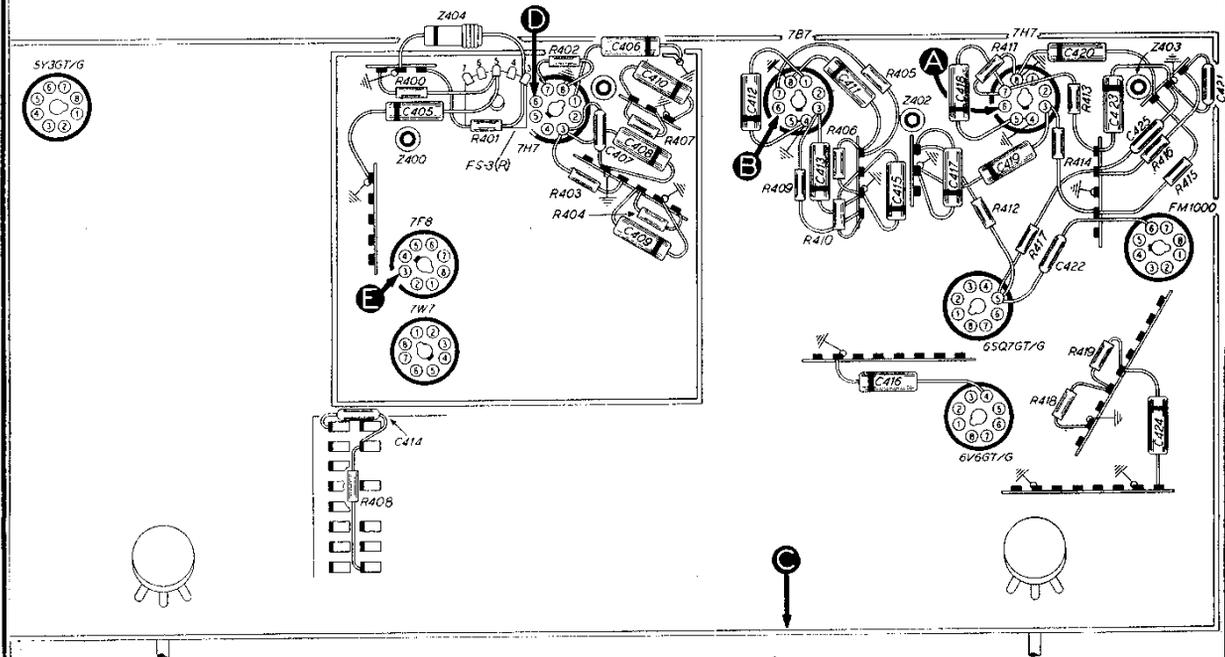


FIGURE 6. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

## SECTION 5 - TROUBLE SHOOTING AM CIRCUITS

For the signal tests, use an r-f signal generator with amplitude-modulated output. Connect the signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated. Turn the radio volume control to maximum, treble tone control fully clockwise, and bass tone control fully counterclockwise. Set the signal generator for weak generator output.

### OSCILLATOR TESTS

For steps 5, 8, and 10, connect the positive lead of a 20,000-ohms-per-volt meter to test point E, and the prod end of the negative lead through a 100,000-ohm isolating resistor to test point D. Read the voltage on the 10-volt range. Absence of negative voltage at any dial or band position indicates that the oscillator is not functioning properly; check the parts listed in the chart for the oscillator tests.

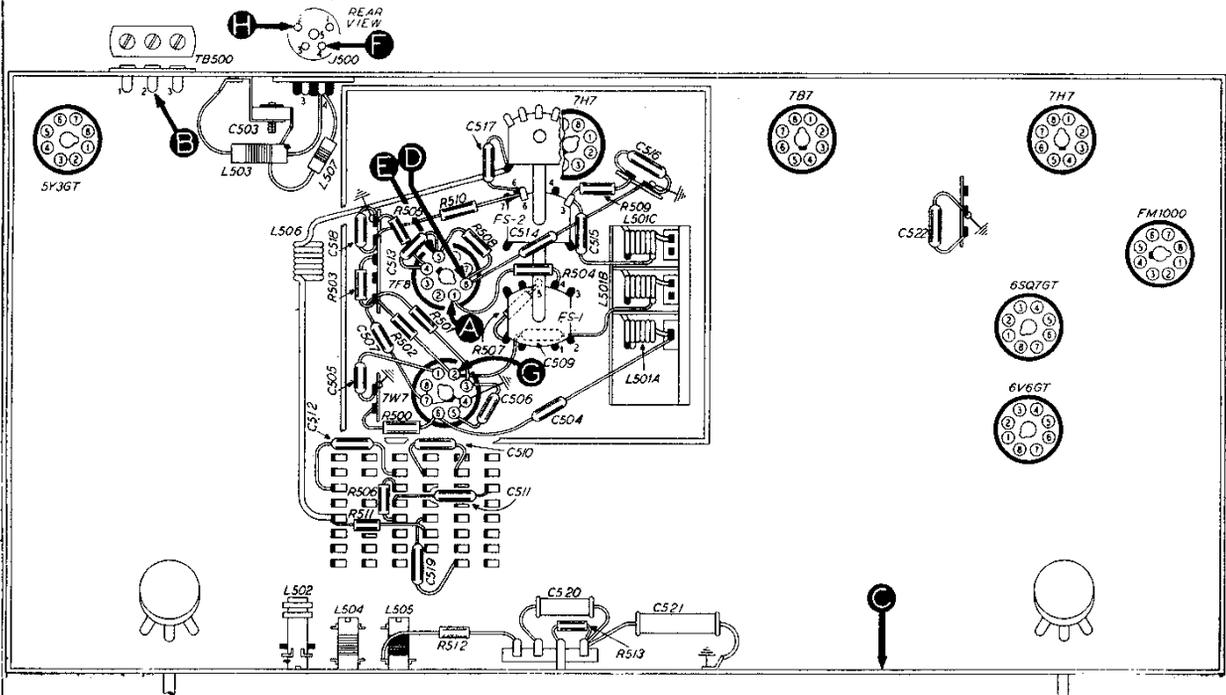
STEP	TEST POINT	SIGNAL-GEN. SETTING	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B	Vary through range of each button	Depress, in order, PB 2 to PB 7	Loud, clear signal when each button is depressed	Trouble within push-button band. Isolate by steps 4, 5, and 6.
2	B	1000 kc	Depress BC push button (PB 8). Tune radio to signal	Loud, clear signal	Trouble within BC band. Isolate by steps 7 and 8.
3	F	12 mc	Depress SW push button (PB 9). Tune radio to signal	Loud, clear signal	Trouble in short-wave section. Isolate by steps 9 and 10.
4	A	Adjust to frequency of push button	Depress PB 7	Loud, clear signal	Defective 7F8 tube or FS 1 (F). Open R505, R400, or C513. Shorted C405.
5	D to E (see OSC. TESTS)		Depress, in order, PB 2 to PB 7	Negative voltage	No voltage for any one push button: Defective coil (L500A to L500F) or push button. No voltage for all push buttons: Defective 7F8 tube, FS 2, PB 9, or PB 8. Open C517, C520, C521, or C514. Open R508, R510, R513, L506, or R511. Shorted C515, C516, C518, or C522.
6	B	Vary through range of each button	Depress, in order, PB 2 to PB 7	Loud, clear signal	Defective L502. Shorted C502A, C500A to C500F. Open C511, R504, or R507.
7	B	1000 kc	Depress BC push button PB 8. Tune to signal from generator	Loud, clear signal	Defective C501, or PB 8.
8	D to E (see OSC. TESTS)		Depress BC push button PB 8. Rotate radio tuning control through entire range	Negative voltage over entire tuning range	Defective L505. Open R512.
9	F	12 mc	Depress SW push button PB 9. Tune to signal from generator	Loud, clear signal	Defective L503 or L507. Shorted C503. Open C510.
10	D to E (see OSC. TESTS)		Depress SW push button PB 9. Rotate tuning control through entire range	Negative voltage over entire tuning range	Defective 7F8 tube, or L504. Shorted C502C. Open C519.

### FM CIRCUITS

Before proceeding with the FM circuit tests, connect test point F, in Section 3, to the radio

chassis. Follow the same general procedure given for AM tests.

STEP	TEST POINT	SIGNAL-GEN. SETTING	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	H	100 mc	Depress FM push button PB 10. Tune to signal	Loud, clear signal	Trouble in FM band. Isolate by following tests.
2	D to E (See OSC. TESTS under AM CIRCUITS)		Depress FM push button PB 10. Rotate tuning control through entire range	Negative voltage over entire range	Defective 7F8 tube, FS 2 (F), L501C, C501, or PB 10. Open R509. Shorted C515 or C501C.
3	G	100 mc	Depress FM push button PB 10. Tune to signal	Loud, clear signal	Defective L501B, C501, or FS 1 (F). Open or shorted C509. Shorted C501B.
4	H	Same	Same	Loud, clear signal	Defective 7W7 tube, L501A, C501. Open R500, R502, or R503. Shorted C506, C501A, or C507.



BOTTOM-VIEW, SHOWING SECTION 5 TEST POINTS.

## CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial backplate below the pointer. The proper locations for the points may be determined as follows:

1. Hold a rule against the dial backplate as shown in figure 1.

2. Mark pencil dots at the proper points for the index mark and the desired frequency settings.

With the tuning gang fully meshed, the dial pointer on the drive cord should be adjusted to coincide with the index mark.

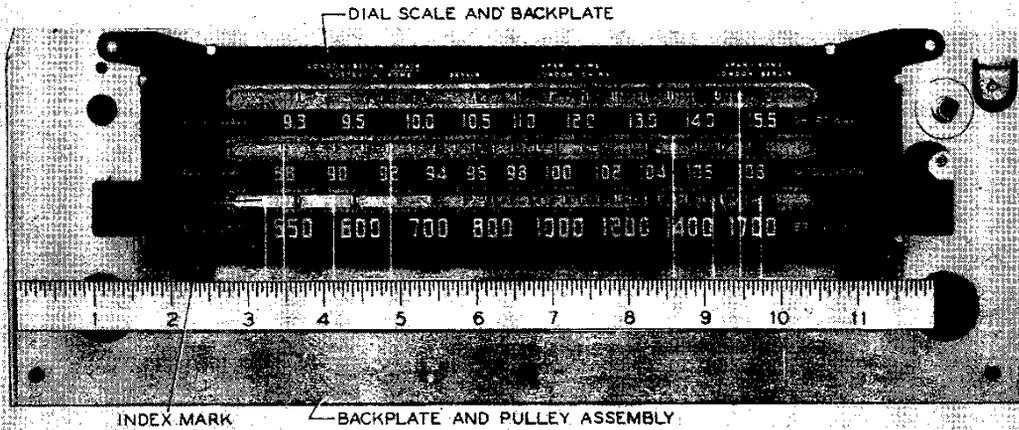


FIGURE 1. DIAL BACKPLATE CALIBRATION MEASUREMENTS.

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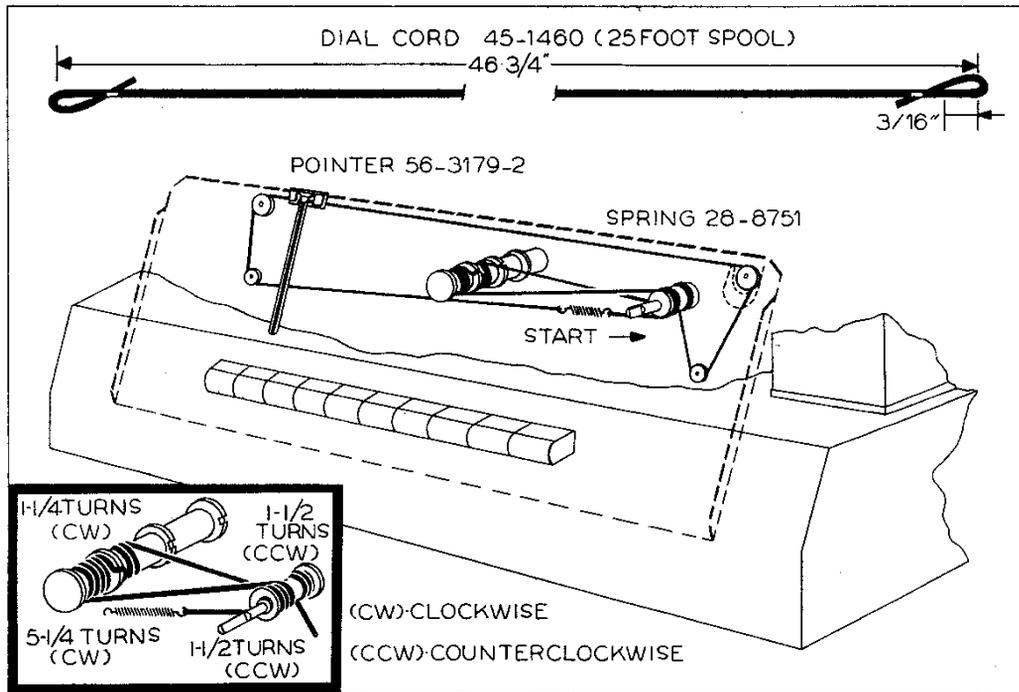


FIGURE 2. DRIVE-CORD INSTALLATION DETAILS.

## ALIGNMENT PROCEDURE

### ALIGNMENT OF AM CIRCUITS

When the complete AM and FM alignment is to be made, the AM alignment should be made **FIRST**; however, if FM alignment is not required, the AM alignment alone may be made.

**OUTPUT METER:** Connect between terminal No. 3 (voice-coil connection) of aerial terminal panel and chassis.

**AM SIGNAL GENERATOR:** Connect ground lead to radio chassis, and output lead as indicated in chart.

**DIAL POINTER:** With tuning condenser fully closed, the dial pointer must coincide with the index mark at

the low-frequency end of the scale. See **CALIBRATING DIAL BACKPLATE**, page 3.

**CONTROLS:** Set volume control at maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise; set the radio band push button, radio dial, and signal-generator dial as indicated in the chart.

**OUTPUT LEVEL:** During alignment, the signal-generator output must be attenuated to maintain the radio output below 1.5 volts, as indicated by the output meter.

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SECTION 5

SECTION

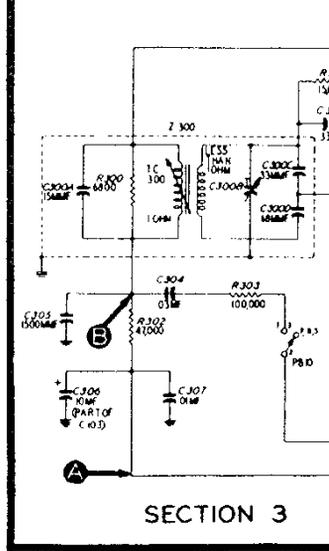
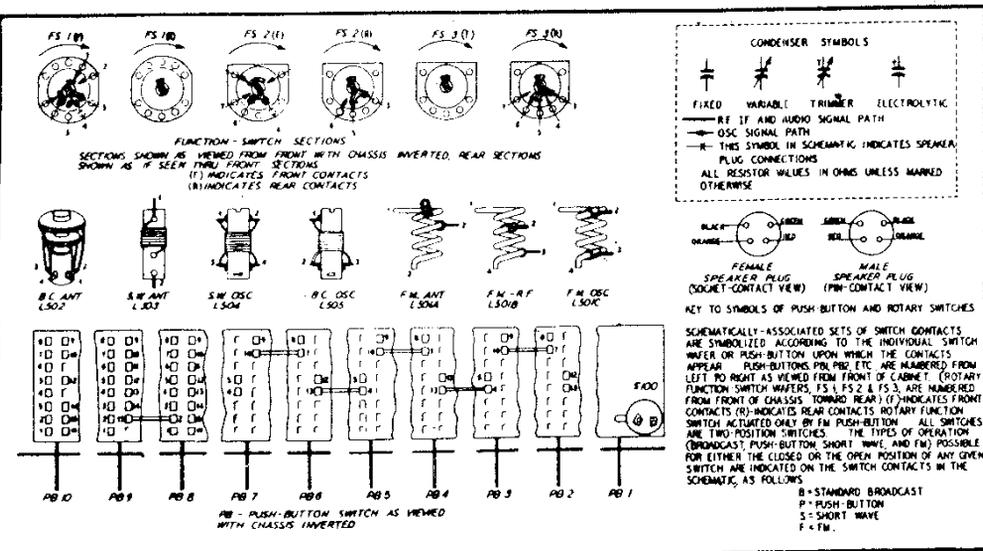
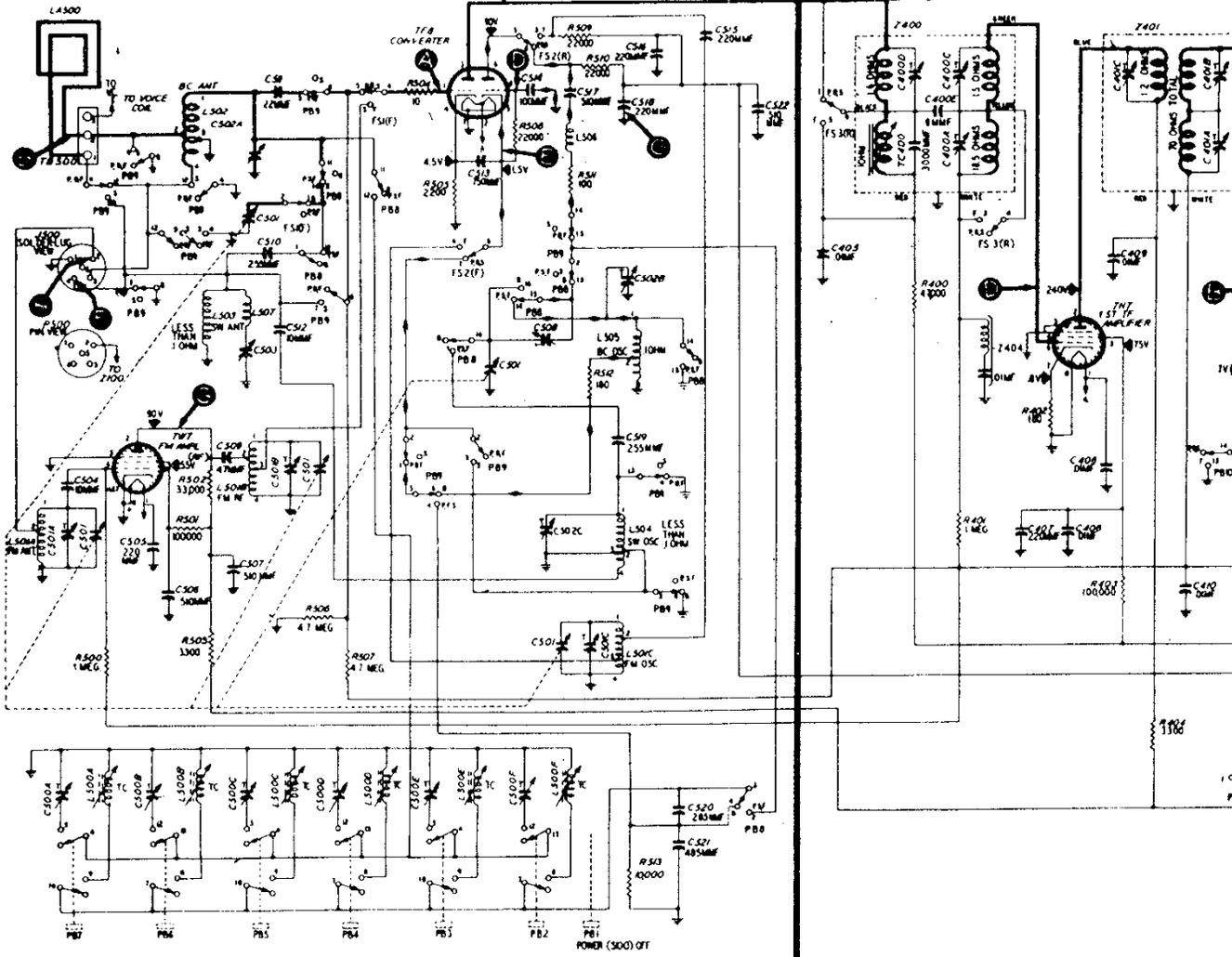


FIGURE 8. PHILCO MODEL 48-482; COMPLETE SECTIONALIZED

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MODEL 48-482

### AM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL SETTING	BAND PUSH BUTTON	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	Through .1-mf condenser to stator of ant. section of tuning gang	455 kc	BC	1700 kc	Adjust each trimmer, in order, for maximum output. Do not repeat adjustments.	C403A C402A TC407 C401A C400A TC400
2	Loosely coupled with loop (see Note below)	15 mc	SW	15 mc	Adjust for maximum output. Check for image at 14.1 mc.	C502C
3	Same	15 mc	SW	15 mc	Adjust for maximum output (rock tuning control).	C502
4	Same	1700 kc	BC	1700 kc	Adjust for maximum output.	C502I
5	Same	1500 kc	BC	1500 kc	Adjust for maximum output.	C502A
6	Same	580 kc	BC	580 kc	Adjust for maximum output (rock tuning control).	C508
7	Repeat steps 4, 5 and 6 in order until no further increase is noted. Then repeat step 4.					

NOTE: Make up a six-to-eight-turn, 6-inch diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

### FM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST TRIMMER	
1	To terminal 3 of L501B (figure 10)	9.1mc (Mod. on)	Gang fully closed	Connect jumper between pin No. 2 of FM1000 tube and chassis (Note 1). Connect loading network (Note 2) between top of padder C403B and chassis (Note 3).	C403C	
2	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of third i-f tube and chassis.	C403B	
3	Same	Same	Same	Connect loading network between pin No. 6 (green lead) of third i-f tube and chassis.	C402D	
4	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of second i-f tube and chassis.	C402C	
5	Same	Same	Same	Connect loading network between pin No. 6 (green lead) of second i-f tube and chassis.	C401C	
6	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of first i-f tube and chassis.	C401B	
7	Same	Same	Same	Leave loading network connected as in step 6.	C400C C400F	
8	To grid (pin No. 6) of third i-f amplifier	9.1 mc (Mod. off)	Same	Remove loading network, and remove jumper from pin No. 2 of FM1000 tube and chassis. Connect jumper between pin No. 4 (blue lead) of FM1000 tube and junction of R302 and red lead of Z300. Adjust trimmer for zero beat.	C300E	
9	Same as step 8	Same	Same	Remove jumper used in step 8. Adjust trimmer for zero beat (see Note 4).	TC300	
10	To terminal No. 2 of J500 (see Note 5)	105 mc (Mod. on)	105 mc	Connect jumper between pin No. 2 of FM1000 tube and chassis. Adjust for maximum output.	C501C	
11	Same as step 10	88 mc	88 mc	Adjust coil L501C for maximum output (Note 6).		
12	Repeat steps 10 and 11 until no further improvement is noted.					
13	Same as step 10	105 mc	105 mc	Adjust for maximum output (rock tuning control).	C501B	
14	See Note 7	105 mc	105 mc	Adjust for maximum output.	C501A	
15	Same as step 14	92 mc	92 mc	Adjust coil L501B, then L501A, for maximum output.		
16	Repeat steps 13, 14 and 15 until no further improvement in sensitivity can be obtained.					

- JUST
- MMER
- C403A
- C402A
- TC402
- C401A
- C400A
- TC400
- C502C
- C500
- C502I
- C502A
- C508

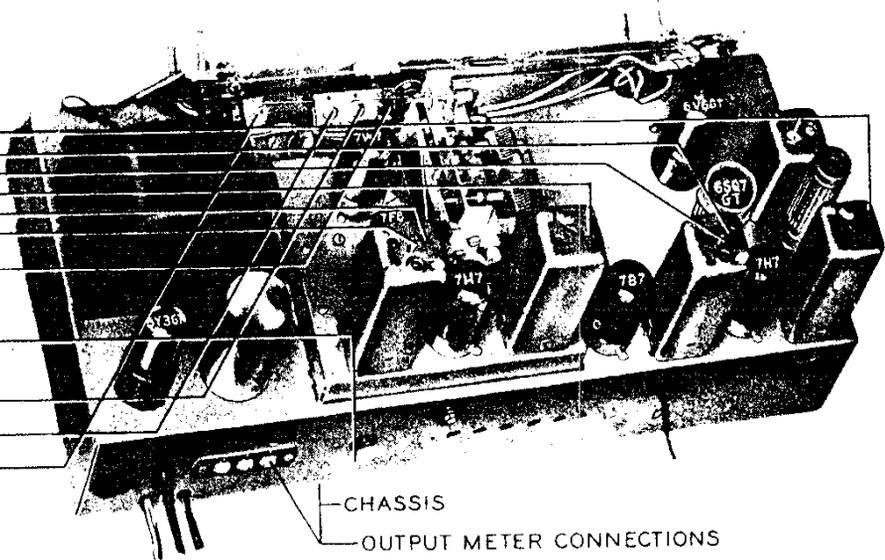


FIGURE 9. CHASSIS VIEW, SHOWING AM TRIMMER LOCATIONS.

- JUST
- MMER
- C403C
- C403B
- C402D
- C402C
- C401C
- C401I
- C400C
- C400I
- C300I
- TC300
- C501C
- C501B
- C501A

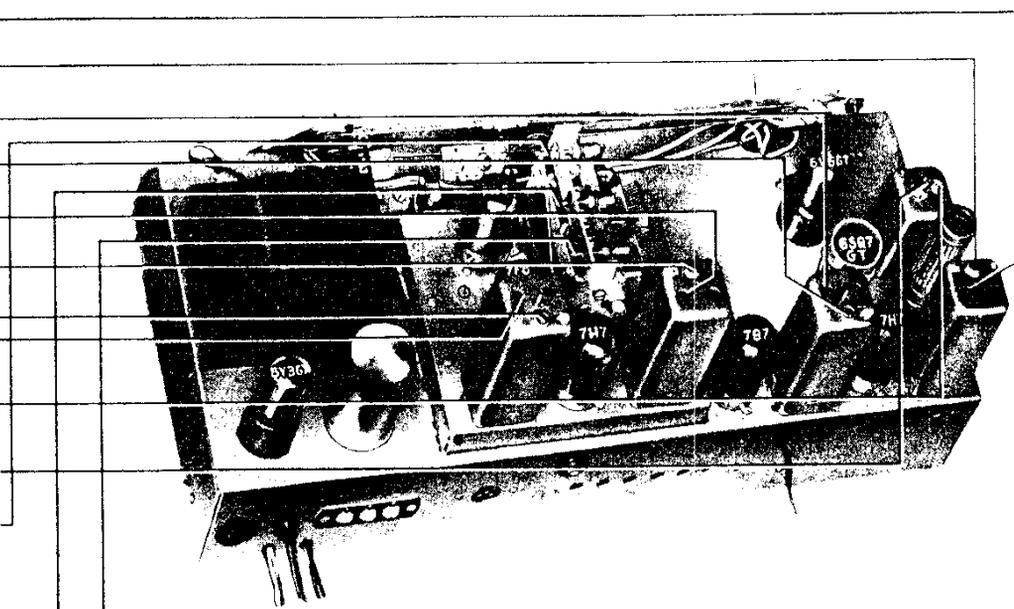


FIGURE 10. CHASSIS VIEW, SHOWING FM TRIMMER LOCATIONS.

## ALIGNMENT OF FM CIRCUITS

Align the AM circuits first.

**AM SIGNAL GENERATOR:** Connect the generator ground lead to the radio chassis; connect the output lead through a .1-mf condenser to the points specified in the chart.

**OUTPUT METER:** Connect the output meter between terminal No. 3 of the aerial terminal panel and the

radio chassis.

**CONTROLS:** Set volume control at maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise. Depress FM push button.

**LOCATION OF FM COILS:** For the location of coils L501A, L501B, and L501C (steps 11 and 15), refer to the base layout of Section 5, figure 7.

## FM ALIGNMENT NOTES

1. When pin No. 2 of the FM1000 tube is connected to the chassis, the oscillator section of the tube is made inoperative, thereby converting the circuit from an FM to an AM detector.

2. Make the loading network by connecting a 4700-ohm resistor and a .1-mf condenser in series. Attach an alligator clip to each free end of the network. When this network is connected across the primary or secondary circuit of an i-f transformer, the network loads the circuit so that the transformer is effectively below critical coupling; the unloaded winding may then be correctly peaked at the intermediate frequency.

3. The top of padder C403B can be reached only from the top of the shield can. Slide a length of flattened solder or wire down between the ceramic form and the edge of the trimmer plate. Attach the loading network between this connection and the chassis.

4. It is essential that the output from the generator be kept below the point where the detector-oscillator locks in, otherwise an erroneous zero-beat will be obtained. When a single very sharp zero-beat point is obtained, the adjustment is correct.

5. The use of a signal generator for steps 10 to 16 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings.

Otherwise, an alternate procedure employing FM broadcast station signals in place of a signal generator is recommended. For adjustment at the high-frequency end of the band, use the station nearest 105 mc; for the low-frequency adjustments, use the stations nearest 88 and 92 mc. If the radio is greatly misaligned, it may be necessary to adjust the padders and coils for maximum noise at each end of the band before station signals can be heard. The oscillator section of the FM detector must be made inoperative, as given in step 10 of FM circuit alignment.

6. Check all coil adjustments with a tuning wand. If inserting the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output reading, compress the turns. If both ends cause a decrease in output, the coil is correctly tuned. Do not change the coils excessively, since only a small adjustment is required at these frequencies.

7. Make two simple dipole aerials to feed signals from the signal generator to the radio. Each dipole aerial may consist of two 30-inch lengths of rubber-covered wire. Connect one dipole aerial to terminal Nos. 1 and 2 on the radio FM aerial socket J500. Connect the other dipole to the output of the signal generator. Space the two dipoles several feet apart.

## REPLACEMENT PARTS LIST

**NOTE:** Parts marked with an asterisk (\*) are general replacement items, and the part numbers may not be identical with those on the original parts; also, the electrical values of some replacement items furnished may differ from the values indicated in the schematic and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

Reference No.	Description	Service Part No.		Description	Service Part No.
C100	Condenser, .01 mf, line filter	61-0120*	C104	Condenser, elec., 15 mf, high-voltage filter	30-2568-1*
C101	Condenser, .01 mf, line filter	61-0120*	C105	Condenser, .003 mf, r-f by-pass	61-0117*
C102	Condenser, electrolytic, 3 section	30-2570-1*	C106	Condenser, .5 mf, bias filter	61-0133*
	C102A: Condenser, 10 mf, isolating filter	Part of C102	I100	Lamp, pilot	34-2040*
	C102B: Condenser, 15 mf, isolating filter	Part of C102	I101	Lamp, pilot	34-2040*
	C102C: Condenser, 30 mf, high-voltage filter	Part of C102	L100	Field, speaker	Part of LS200
C103	Condenser, electrolytic, 2 section	30-2552*	R100	Resistor, 18,000 ohms, voltage dropping	66-3184340*
	C103: Condenser, 10-mf section, high-voltage filter	Part of C103	R101	Resistor, 15,000 ohms, voltage dropping	66-3154340*
C306	Condenser, 15-mf section (see Section 3)	Part of C103	R102	Resistor, 560,000 ohms, bias divider	66-4563340*
			R103	Resistor, 220,000 ohms, bias divider	66-4223340*
			R104	Resistor, 18,000 ohms, bias divider	66-3183340*
			S100	Switch, a-c power (on push-button assembly)	42-1714
			T100	Transformer, power	32-8281
			W100	Cord, line	L-3199

## SECTION 2

C200	Condenser, 220 mmf. r-f by-pass	60-10245307*
C201	Condenser, .01 mf. treble control	61-0120*
C202	Condenser, .02 mf. audio coupling	61-0108*
C203	Condenser, .006 mf. bass compensation	45-3500-7*
C204	Condenser, .006 mf. audio coupling	45-3500-7*
C205	Condenser, .006 mf. high a-f by-pass	61-0153
J200	Socket, single prong, FM test point	27-6180
LS200	Speaker	36-1608
R200	Potentiometer, 2 meg (tap at 1 meg), vol. cont.	33-5535-3
R201	Resistor, 4.7 ohms, divider, inverse feedback	66-9474360*
R202	Resistor, 1 meg, 1st-audio grid	66-5103340*
R203	Potentiometer, 500,000 ohms, treble control	33-5539-3
R204	Resistor, 220,000 ohms, plate loading	66-4223340*
R205	Resistor, 330,000 ohms, output-tube grid	66-4333340*
R206	Resistor, 33,000 ohms, divider, bass compensation	66-3333340*
R207	Potentiometer, 1 meg, bass control	33-5539-4*

Reference No.	Description	Service Part No.
R208	Resistor, 100 ohms, divider, inverse feedback	66-1103340*
T200	Transformer, output	32-8249*

## SECTION 3

C301	Condenser, 33 mmf. osc. grid (FM det.)	66-00365307*
C302	Condenser, .01 mf. fil. by-pass	61-0120*
C303	Condenser, .01 mf. r-f by-pass	61-0120*
C304	Condenser, .03 mf. audio coupling	45-3500-1*
C305	Condenser, 1500 mmf. r-f by-pass	60-20155404*
C306	Condenser, elec., 15 mf. filter	Part of C103
C307	Condenser, .01 mf. r-f by-pass	61-0120*
L300	Choke, r-f osc. cathode (FM det.)	32-3352
R301	Resistor, 15,000 ohms, osc. grid leak (FM det.)	66-3153340*
R302	Resistor, 47,000 ohms, audio load (FM det.)	66-3473340*
R303	Resistor, 100,000 ohms, r-f choke	66-4103340*
R304	Resistor, 15,000 ohms, voltage dropping	66-3153340*
R305	Resistor, 56,000 ohms, voltage dropping	66-3563340*
R306	Resistor, 22 ohms, parasitic suppressor	60-0223340*
Z300	Transformer, FM detector	32-4004
C300A:	Condenser, fixed, 15 mf	Part of Z300
C300B:	Condenser, trimmer (9.1 mc), FM det.	Part of Z300
C300C:	Condenser, 33 mmf. r-f voltage divider	Part of Z300
C300D:	Condenser, 68 mmf. r-f voltage divider	Part of Z300
R300A:	Resistor, 6800 ohms, damping	Part of Z300
TC300:	Core, tuning (9.1 mc), FM det.	Part of Z300

## SECTION 4

C405	Condenser, .01 mf. r-f by-pass	61-0120*
C406	Condenser, .01 mf. fil. by-pass	61-0120*
C407	Condenser, 220 mmf. r-f by-pass	60-10245307*
C408	Condenser, .01 mf. r-f by-pass	61-0120*
C409	Condenser, .01 mf. r-f by-pass	61-0120*
C410	Condenser, .01 mf. r-f by-pass	61-0120*
C411	Condenser, .01 mf. r-f by-pass	61-0120*
C412	Condenser, .01 mf. fil. by-pass	61-0120*
C413	Condenser, .01 mf. r-f by-pass	61-0120*
C414	Condenser, 220 mmf. r-f by-pass	60-10245307*
C415	Condenser, .01 mf. r-f by-pass	61-0120*
C416	Condenser, .01 mf. B+ by-pass	61-0120*
C417	Condenser, .05 mf. a-v-c filter	61-0122*
C418	Condenser, .01 mf. r-f by-pass	61-0120*
C419	Condenser, .01 mf. r-f by-pass	61-0120*

## SECTION 4 (Continued)

Reference No.	Description	Service Part No.
C420	Condenser, .01 mf. r-f by-pass	61-0120*
C421	Condenser, 220 mmf. r-f by-pass	60-10245307*
C422	Condenser, 100 mmf. a-v-c diode coupling (FM)	60-10105407*
C423	Condenser, .01 mf. r-f by-pass	61-0120*
C424	Condenser, .006 mf. audio coupling	45-3500-7*
C425	Condenser, 100 mmf. r-f by-pass	60-10105407*
FS3 (R)	Switch, shorting, 1st i-f	Part of FS
R400	Resistor, 47,000 ohms, voltage dropping	66-3473340*
R401	Resistor, 1 meg, decoupling	66-5103340*
R402	Resistor, 180 ohms, degeneration	66-1183340*
R403	Resistor, 100,000 ohms, voltage dropping	66-4103340*
R404	Resistor, 3300 ohms, decoupling	66-2333340*
R405	Resistor, 180 ohms, degeneration	66-1183340*
R406	Resistor, 3300 ohms, bias (bc, sw)	66-2333340*
R407	Resistor, 1 meg, decoupling	66-5103340*
R408	Resistor, 100,000 ohms, bleeder (bc, sw), 7B7 screen	66-4103340*
R409	Resistor, 100,000 ohms, voltage dropping	66-4103340*
R410	Resistor, 3300 ohms, decoupling	66-2333340*
R411	Resistor, 180 ohms, degeneration	66-1183340*
R412	Resistor, 330,000 ohms, a-v-c filter	66-4333340*
R413	Resistor, 100 ohms, decoupling (FM)	66-1103340*
R414	Resistor, 82,000 ohms, voltage dropping	66-3823340*
R415	Resistor, 3300 ohms, decoupling	66-2333340*
R416	Resistor, 47,000 ohms, decoupling	66-3473340*
R417	Resistor, 1 meg, a-v-c filter	66-5103340*
R418	Resistor, 270,000 ohms, diode lead	66-4273340*
R419	Resistor, 100,000 ohms, r-f choke	66-4105340*
Z400	Transformer, 1st i-f	32-4020-1
C400A:	Condenser, trimmer (455 kc)	Part of Z400
C400B:	Condenser, fixed, 3000 mmf	Part of Z400
C400C:	Condenser, trimmer (9.1 mc)	Part of Z400
C400D:	Condenser, trimmer (9.1 mc)	Part of Z400
C400E:	Condenser, fixed, 9 mmf	Part of Z400
TC400:	Core, tuning (455 kc)	Part of Z400
Z401	Transformer, 2nd i-f	32-4001
C401A:	Condenser, trimmer (455 kc)	Part of Z401
C401B:	Condenser, trimmer (9.1 mc)	Part of Z401
C401C:	Condenser, trimmer (9.1 mc)	Part of Z401
Z402	Transformer, 3rd i-f	32-4002
C402A:	Condenser, trimmer (455 kc)	Part of Z402
C402B:	Condenser, fixed, 330 mmf	Part of Z402
C402C:	Condenser, trimmer (9.1 mc)	Part of Z402
C402D:	Condenser, trimmer (9.1 mc)	Part of Z402
C402E:	Condenser, fixed, 3 mmf	Part of Z402
TC402:	Core, tuning (455 kc)	Part of Z402
Z403	Transformer, 4th i-f	32-4003-2
C403A:	Condenser, trimmer (455 kc)	Part of Z403
C403B:	Condenser, trimmer (9.1 mc)	Part of Z403
C403C:	Condenser, trimmer (9.1 mc)	Part of Z403
C403D:	Condenser, fixed, 270 mmf	Part of Z403
Z404	Condenser (.01 mf) and choke assembly, i-f by-pass	38-9851-3

## SECTION 5

C501	Condenser, main tuning gang	31-2694
C501A:	Condenser, FM aerial-coil trimmer	Part of C501
C501B:	Condenser, FM r-f-coil trimmer	Part of C501
C501C:	Condenser, FM osc. coil trimmer	Part of C501
C502	Condenser, 3-section, trimmer assembly	31-6477
C502A:	Condenser, shunt trimmer, bc aerial	Part of C502

REPLACEMENT PARTS LIST — Continued

SECTION 5 (Continued)

SECTION 5 (Continued)

	Reference No.	Description	Service Part No.	Reference No.	Description	Service Part No.
C502B	Condenser, shunt trimmer, bc osc	Part of C502		R505	Resistor, 2200 ohms, mixer cathode	66-222340*
C502C	Condenser, shunt trimmer, s-w osc	Part of C502		R506	Resistor, 4.7 meg, a-c-v divider (converter)	66-5473340*
C503	Condenser, shunt trimmer, s-w aerial		31-6473-2	R507	Resistor, 4.7 meg, a-c-v divider (converter)	66-5473340*
C504	Condenser, 10 mmf, coupling, r-f tube grid (FM)		60-00105407*	R508	Resistor, 22,000 ohms, osc. grid leak	66-3223340*
C505	Condenser, 220 mmf, fil. r-f bypass		60-10245307*	R509	Resistor, 22,000 ohms, osc. plate dropping (FM)	66-3223340*
C506	Condenser, 510 mmf, r-f bypass		60-10515307*	R510	Resistor, 22,000 ohms, osc. plate dropping (bc, sw)	66-3223340*
C507	Condenser, 510 mmf, r-f bypass		60-10515307*	R511	Resistor, 100 ohms, parasitic suppressor	66-1103340*
C508	Condenser, series trimmer, bc osc.		31-8475-3	R512	Resistor, 180 ohms, degeneration (bc osc.)	66-1103340*
C509	Condenser, 47 mmf, output coupling (FM r-f)		60-00515307*	R513	Resistor, 10,000 ohms, osc. (push-button) cathode choke	66-3103340*
C510	Condenser, 255 mmf, spread tuning, s-w aerial coil		60-10255307*	TB500	Terminal panel, loop aerial	38-9942
C511	Condenser, 22 mmf, coupling (bc), mixer grid		60-00205307*	<b>MISCELLANEOUS</b>		
C512	Condenser, 10 mmf, mixer neutralizing (sw)		60-00105407*	Push-Button-Assembly Hardware		
C513	Condenser, 750 mmf, oscillator-to-mixer coupling		60-10755301*	Cap (10), push button		54-4294
C514	Condenser, 100 mmf, osc. grid feedback		60-10105407*	Clip (6), coil holding		56-2250
C515	Condenser, 220 mmf, osc. plate feedback (FM)		60-10245307*	Core (6), tuning		56-6100
C516	Condenser, 220 mmf, r-f filter, osc. plate circuit		60-10245307*	Grommet (2), rubber, p-b switch mtg.		27-4596
C517	Condenser, 510 mmf, osc. plate feedback (bc, sw)		60-10515307*	Screw (2), p-b switch mtg.		1W19674FA3
C518	Condenser, 220 mmf, r-f filter, osc. plate circuit		60-10245307*	Spring (6) tension		56-2249
C519	Condenser, 255 mmf, spread tuning, s-w osc. coil		60-10255307*	Switch assembly, push button (including a-c switch)		42-1774
C520	Condenser, 285 mmf, r-f voltage divider, osc. (pb)		30-1224-14	Tab kl assembly (coil letters)		40-6766
C521	Condenser, 485 mmf, r-f voltage divider, osc. (pb)		30-1224-15	Tab, BC		54-4318
C522	Condenser, 510 mmf, r-f B + bypass		60-10515307*	Tab, FM		54-4320
FS	Rotary function switch, 3-section		76-2211	Tab, OFF		54-4317
FS 1	switch section	Part of FS		Tab, SW		54-4319
FS 2	switch section	Part of FS		Trimmer condenser and bracket assembly		31-6449-1
FS 3	switch section	Part of FS		R-F Unit Mounting Hardware		
J500	Socket, aerial		27-6214-1	Grommet (3), rubber		54-4295
L501A	Coil, FM aerial		32-3993	Screw (3)		1W19674FA3
L501B	Coil, FM r-f		32-3992	Spacer (3)		1W29158FA3
L501C	Coil, FM oscillator		32-3994	Washer (6)		1W52224FA3
L502	Coil, bc aerial		32-4049	Shield, FM 1000 tube		56-2731
L503	Coil, s-w aerial		32-4050	Shield, 6SQ7C		56-3958
L504	Coil, s-w oscillator		32-3996	Socket assembly, dial light		76-2109
L505	Coil, bc oscillator		32-4019-2	Socket assembly (3 1/2" lead), dial lamp		76-2109-1
L506	Choke, r-f, parasitic suppressor, osc. plate (bc, sw)		32-4089	Socket (3), Loktal, main chassis		27-6138
L507	Choke, r-f, s-w aerial trimmer		32-4111	Socket (2), Loktal, r-f unit		27-6213
			32-4111	Socket, Loktal, r-f unit		27-6138