VOLUME XIX

PERPETUAL TROUBLE SHOOTER'S MANUAL

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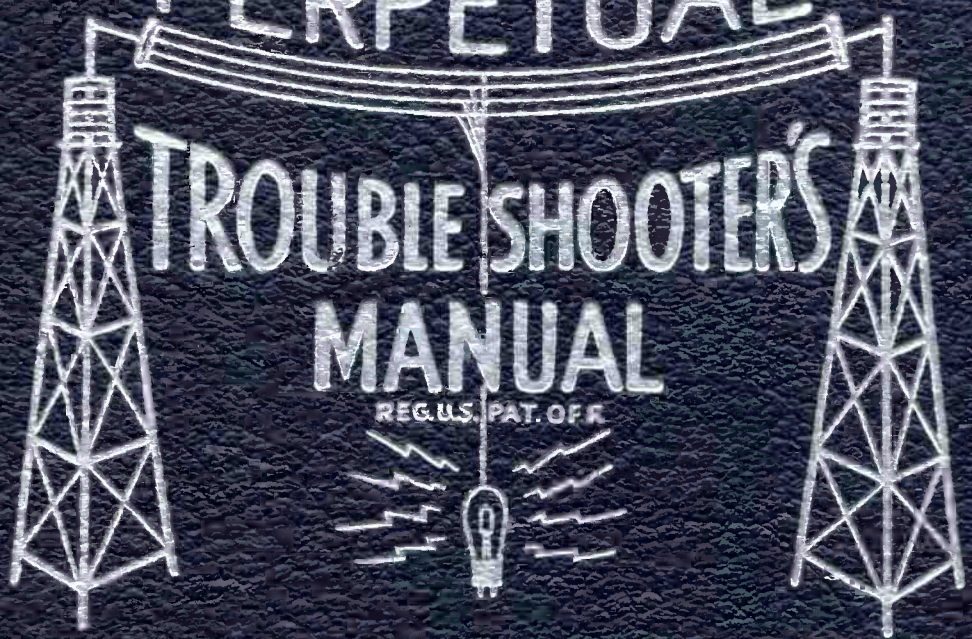
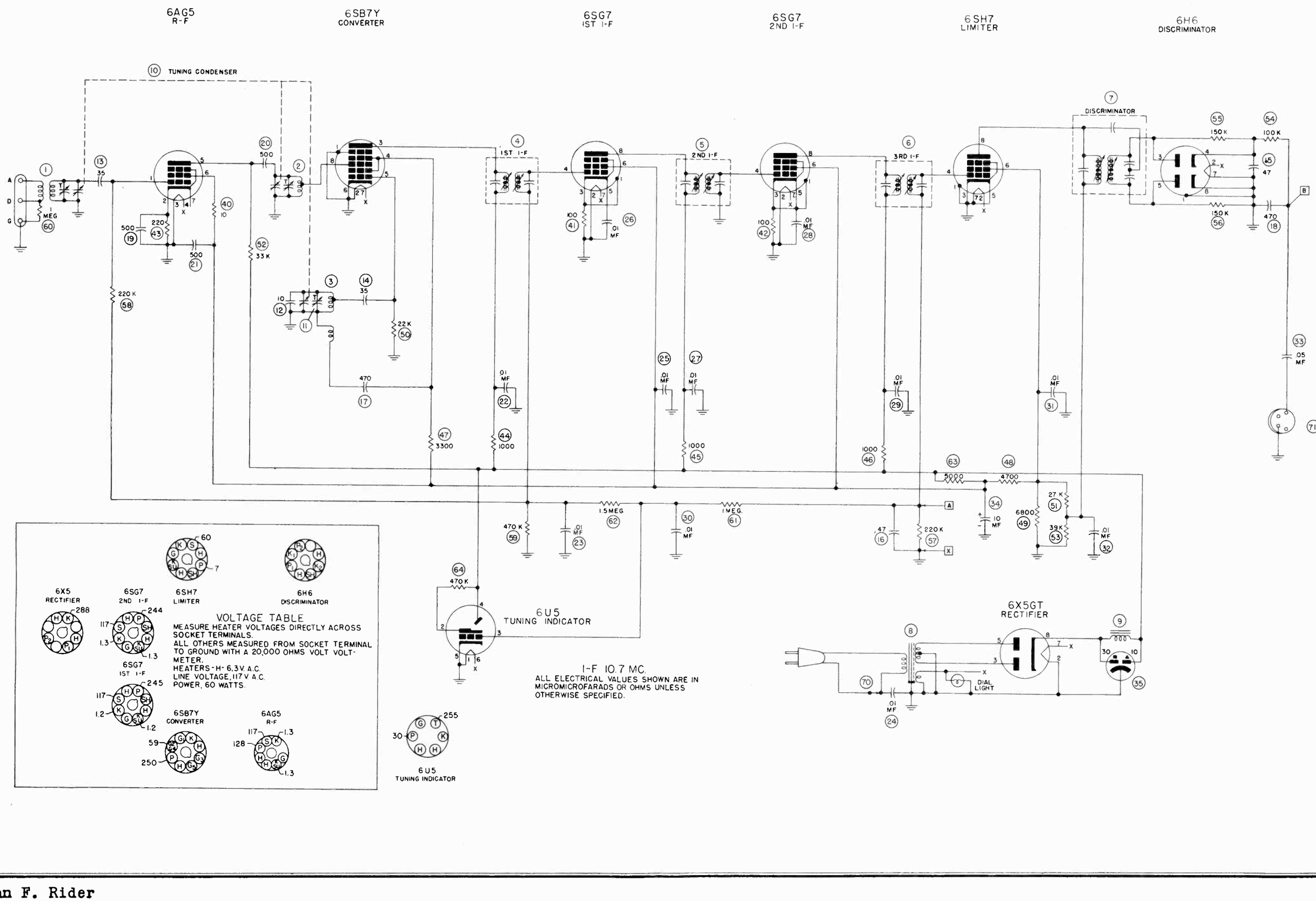


JOHN F. RIDER

THE MAGNAVOX CO.

MODEL CR-206

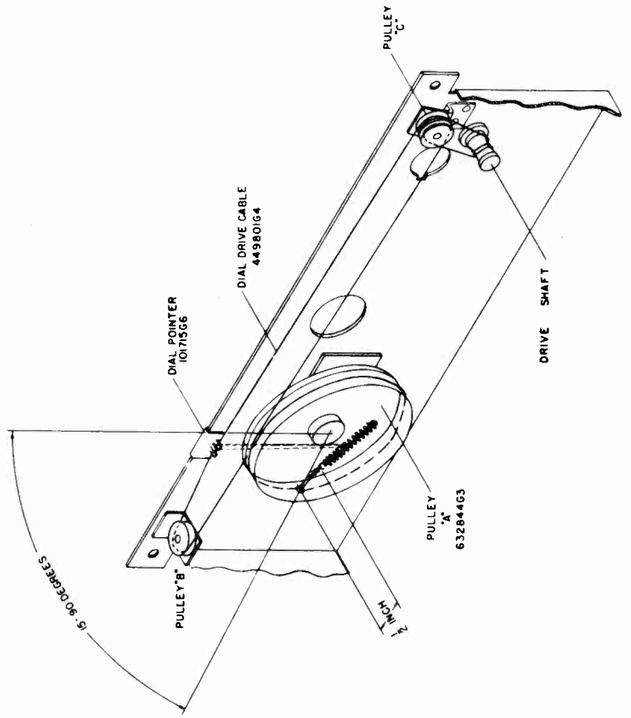


DIAL CORD REPLACEMENT

A single cable transmits motion from the dial tuning knob to rotate the condenser gang and to move the dial pointer. A 30-inch length of string is required to restring this assembly. After the broken cable is removed, turn pulley "A" (see Figure 1) until the condenser gang plates are completely meshed. In this condition, the small hole in the rim of pulley "A" should be within the limits of 15 to 90 degrees to the left of being vertical as shown in Figure 1. If this hole is at a different position from the condition specified, loosen the two screws in the coupling to the condenser gang and turn pulley "A" while holding the condenser plates meshed. Tighten the two set screws after the adjustment has been made.

Lace one end of the new length of cable through the hole in pulley "A" and temporarily fasten it to the hook to which the spring is normally fastened. Make a complete turn around pulley "A" in a counter-clockwise direction, lace it around pulley "B," then across the rear of the dial scale and over the top of the front groove in pulley "C." Proceed down around the tuning shaft for 2½ turns in a clockwise direction and wrapping the cable over pulley "D" from front to back. Continue up over the rear groove of pulley "C" in a clockwise direction for one turn and extend the cable to the left so that the loose end is to the rear of the section of cable that it crosses. The loose end of the cable should now be wound over the top of pulley "A" so that it is nearest the dial frame and into the hole in the pulley groove. Remove the other end of the cable from the hook and while holding both ends taut, insert one end of the spring on the hook in pulley "A." Lace the two free ends of the cable through the opposite end of the spring and pull the cable until the spring is stretched to within ½-inch of the rim on the pulley. Tie a double knot so that the knot is around one coil of the spring, while maintaining tension on the cable.

Turn the tuning control shaft until the condenser gang is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. Press the crimping lugs on the dial pointer together over the cable. After checking to see that the condenser gang is still completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to the cable where it is crimped by the pointer. This completes the operation.



ALIGNMENT PROCEDURE

The alignment of this F-M tuner is made in three major steps namely, I-F alignment, Discriminator alignment and R-F alignment. An F-M generator is not required in aligning this F-M tuner. Any *accurately calibrated* signal generator covering a range in the vicinity of 10.7 megacycles may be used in aligning the I-F and the Discriminator stages. For R-F alignment, the generator must cover the tuning range of the tuner or approximately 87 to 110 megacycles. If such a signal generator is not available, this alignment may be made by using an F-M radio station as a frequency standard.

I-F ALIGNMENT

1. Connect the "high" side of the signal generator to Grid 3 (pin #8) of the 6SB7Y converter tube and the "low" side of the generator to the radio chassis.

2. If a vacuum tube voltmeter is available, connect it across the 220,000 ohm resistor in the grid circuit of the 6SH7 limiter tube at points designated "A" and "X" on the schematic diagram (Figure 2) to measure the limiter grid bias voltage. Set the signal generator to exactly 10.7 megacycles and adjust the third, the second and the first i-f transformer trimmers in that order for maximum reading on the meter. A reading of 2 to 8 volts should be considered normal.

3. If a vacuum tube voltmeter is not available, connect a 0-50 or 0-200 microammeter in series with the "ground" end of the 220,000 ohm resistor in the grid circuit of the 6SH7 limiter tube at point "X" on the schematic diagram. Set the signal generator to exactly 10.7 megacycles and adjust the third, the second and the first i-f transformer trimmers in that order for maximum meter readings. A normal reading will be in the range of 10 to 35 microamperes. At the completion of these adjustments, remove the microammeter and ground the 220,000 ohm resistor to the point where it was originally connected.

DISCRIMINATOR ALIGNMENT

The accurate alignment of the discriminator transformer cannot be overemphasized. Incorrect alignment will result in badly distorted reception. The following steps should be followed in the order given:

1. A DC vacuum tube voltmeter is connected to the output circuit by connecting it from ground to point "B" on the schematic diagram. This measures the detector output voltage. Adjust the signal generator frequency to exactly 10.775 megacycles and adjust both trimmers on the discriminator transformer for maximum reading. If the indicated voltage is less than 3 volts readjust the output of the generator until the meter indicates 3 volts or more. Now adjust the signal generator frequency to 10.7 megacycles and turn the trimmer screw on the top of the discriminator until the voltage is zero. *This is an extremely important adjustment.* Reset the generator frequency to 10.775 and record the meter reading.

2. Reverse the meter connections and set the signal generator frequency to 10.625 megacycles. The meter reading now obtained must be within 10% of the reading recorded in the previous operation—if it is not, the discriminator alignment was not done accurately and must be repeated.

3. The discriminator may also be aligned using a 0-50 or 0-200 microammeter if a vacuum tube voltmeter is not available. In this case, the detector output current is measured. Connect the microammeter to the same points specified in paragraph 1 and proceed in the manner outlined in paragraphs 1 and 2 of this section. In the operation described in paragraph 1, the meter reading should be at least 20 microamperes when the trimmers are peaked at 10.775 megacycles; if not, the generator should be adjusted until that value is obtained.

R-F ALIGNMENT

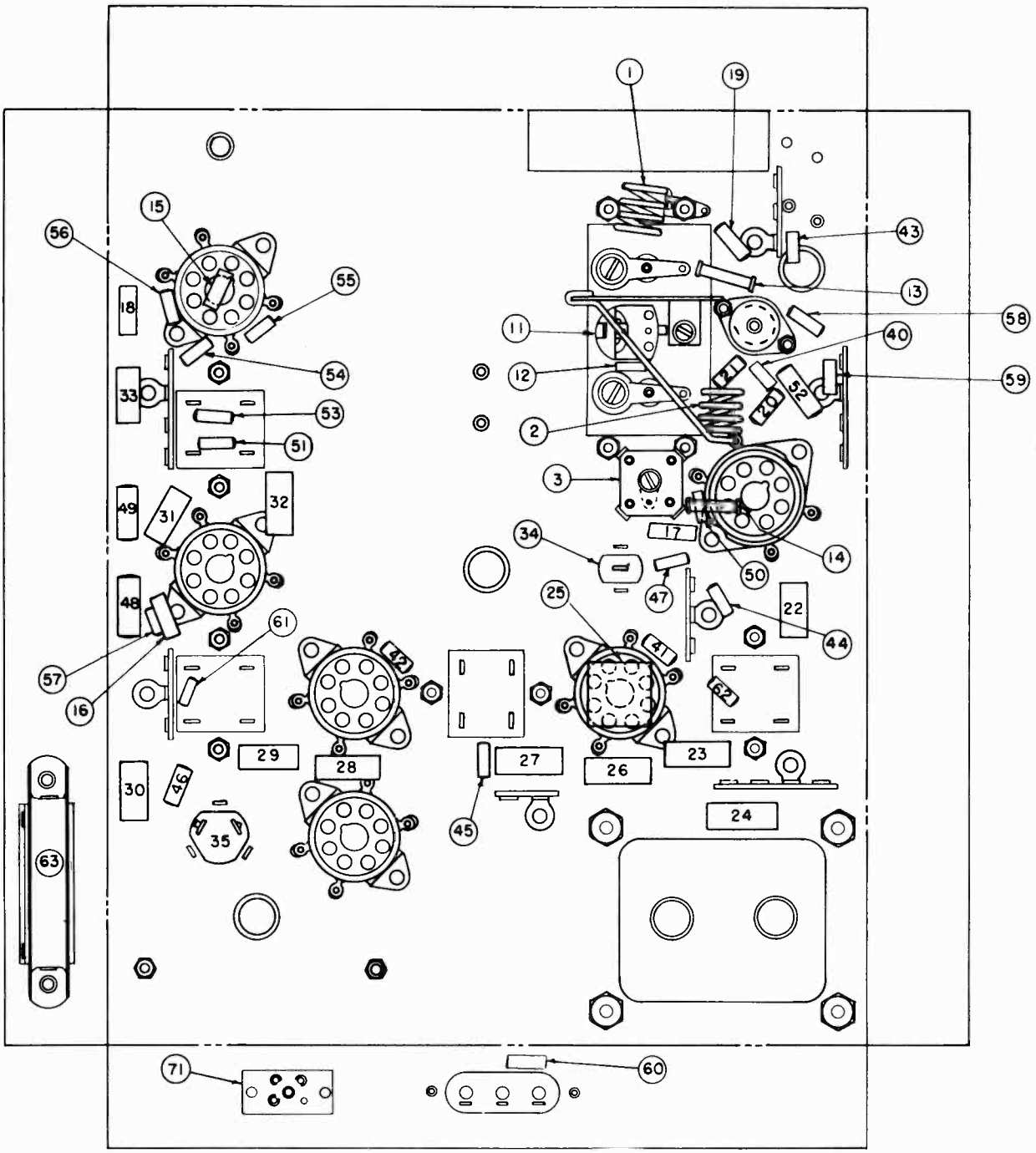
1. Check that the dial pointer is in line with the last mark at the low frequency end of the dial calibration when the condenser gang is fully meshed. If it is not, slide the pointer on its string to the correct position, and crimp the lugs (on the rear of the pointer) tightly around the string and apply a drop of cement to hold the pointer in adjustment.

2. Connect the vacuum tube voltmeter to points "A" and "X" on the schematic diagram or connect a 0-50 or 0-200 microammeter in series with the "ground" end of the 220,000 ohm resistor in the grid circuit of the 6SH7 limiter tube at point "X" on the schematic diagram.

3. An extremely accurate signal generator is a necessity in making the following adjustments and it should be connected to the antenna post through a 300 ohm resistor. If such a generator is not available, connect an F-M antenna to the antenna terminal (A) and use an F-M transmitter for a frequency standard. It is preferable that this station be located in the high frequency end of the band—102 to 108 megacycles.

4. Set the signal generator (if one is used) and the F-M tuner to exactly 108 megacycles—if an F-M station is used as a frequency standard accurately set the tuner to the frequency of the F-M station and adjust the oscillator trimmer for a maximum reading on the meter. Then adjust the antenna trimmer and the r-f trimmer for a maximum meter indication. If too much signal is fed to the tuner, it might appear at several settings of the tuning dial and confuse the adjustment. When the adjustments are completed, the second harmonic of the oscillator frequency will be 10.7 megacycles lower than the signal frequency.

THE MAGNAVOX CO. MODEL CR-206



Special Service Information

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid through 300-ohm resistor at:
98 mc. 1.1

R-F to Converter Grid at:
98 mc. 13.8

R-F on Converter Grid to 1st I-F Grid at:
98 mc. 5.0

I-F on 1st I-F Grid to 2nd I-F Grid at:
10.7 mc. 35

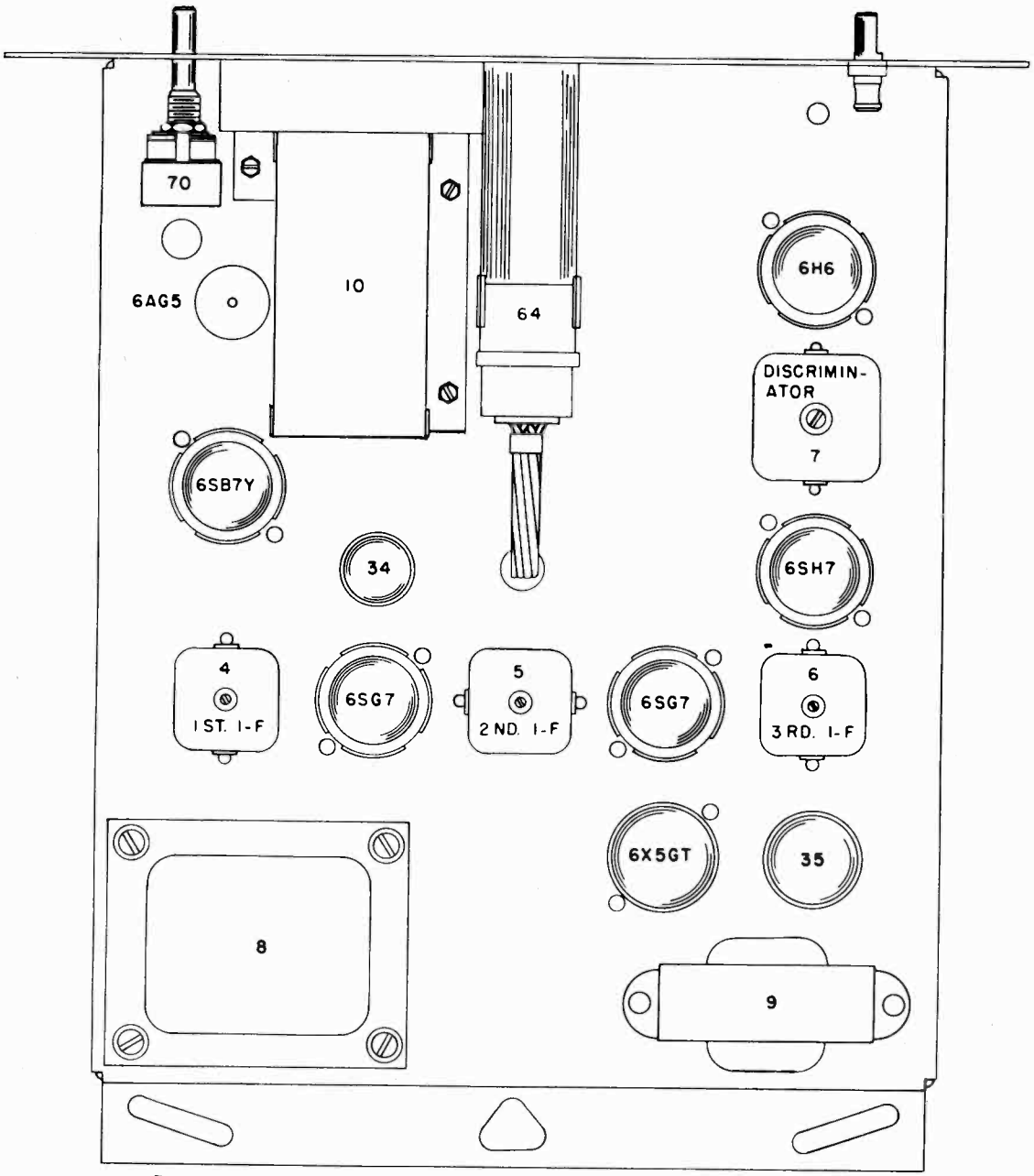
2nd I-F Grid to Limiter Grid at:
10.7 mc. 33

OSCILLATOR GRID VOLTAGE

The DC voltage developed across Oscillator Grid resistor (37) at:
98 mc. 7.0

*Variations of ± 20% are permissible. All readings made with sufficient signal to provide 15 millivolts output at 400 cycles with 22.5 kc. modulation.

MODEL CR-206 THE MAGNAVOX CO.



Power supply	117 volts 50/60 cycles AC
Power consumption	46 watts
Intermediate frequency	10.7 mc.
Tuning frequency range:	87.1–108.9 mc.

Tubes:

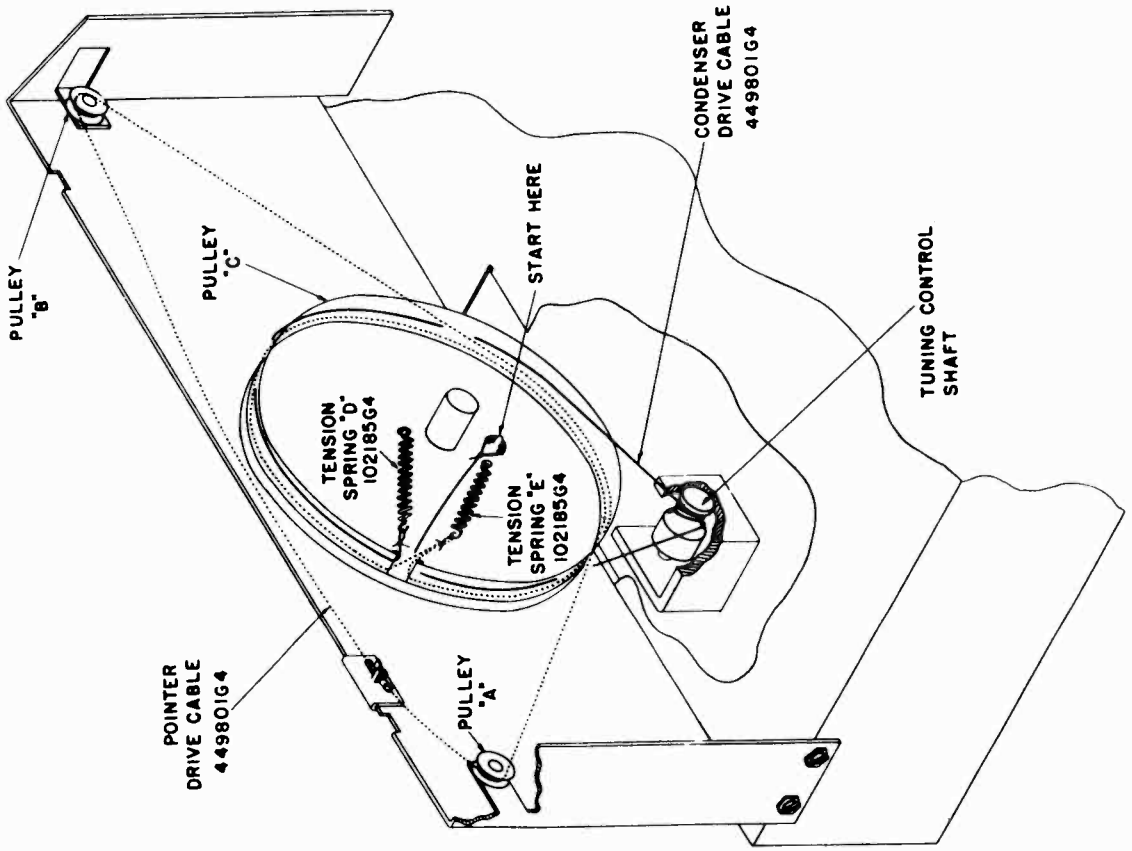
R-F Amplifier	6AG5
Converter	6SB7Y
First I-F Amplifier	6SG7
Second I-F Amplifier	6SG7
Limiter	6SH7
Detector	6H6
Rectifier	6X5GT/G
Tuning Indicator	6U5
Dial Lamp	Mazda No. 51

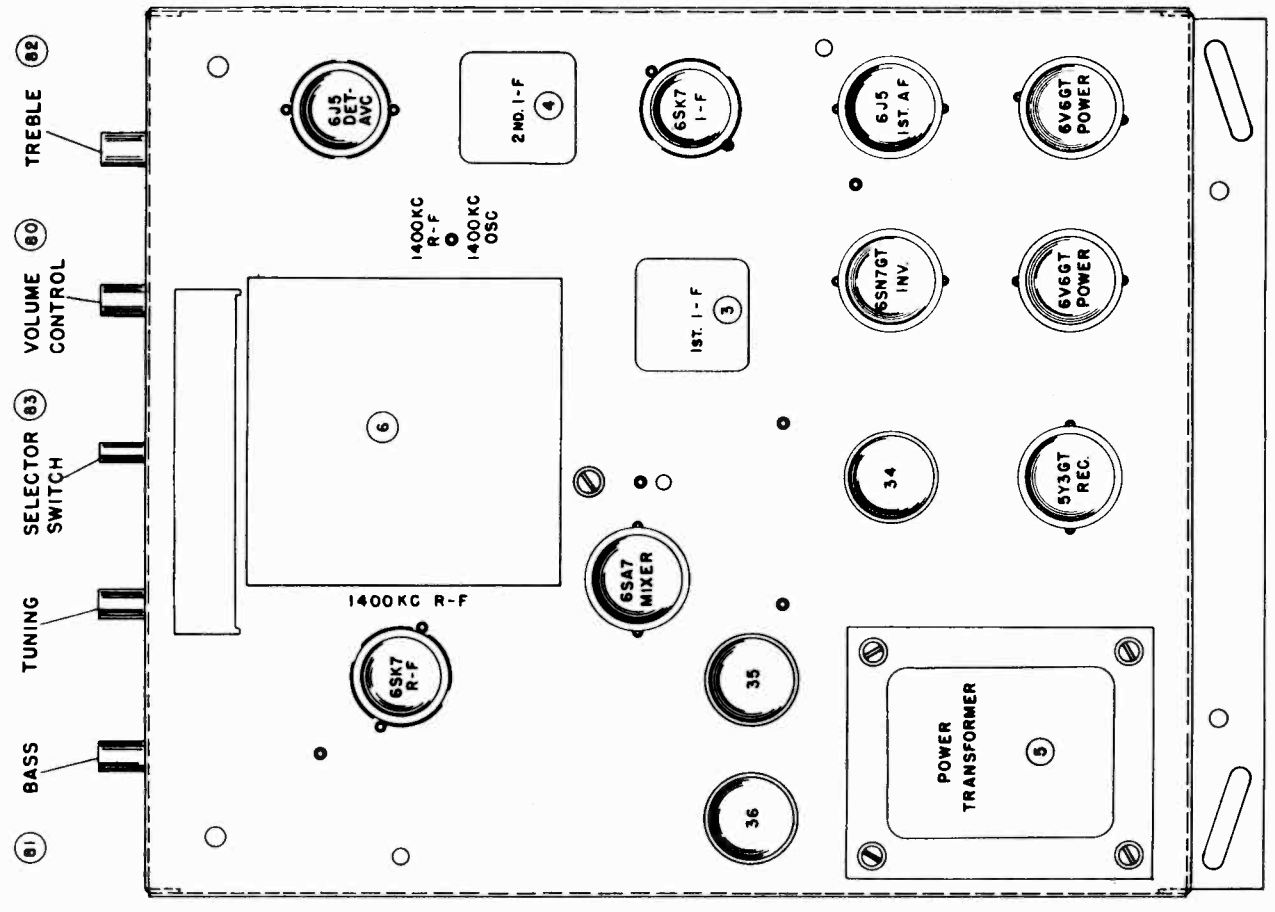
THE MAGNAVOX CO. MODEL CR-206

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, antenna	360311G2
2	Coil assembly, r-f	360312G2
3	Coil assembly, oscillator	360263G2
4	Transformer, 1st i-f	360304G1
5	Transformer, 2nd i-f	360304G1
6	Transformer, 3rd i-f	360304G1
7	Transformer, discriminator	360305G1
8	Transformer, power	300030G1
9	Choke, filter	350032G1
10	Capacitor, variable, three-gang tuning	260059G1
11	Capacitor, trimmer	260067G1
12	Capacitor, ceramic, 10 mmf	250088G8
13	Capacitor, ceramic, 35 mmf	250088G26
14	Capacitor, ceramic, 35 mmf	250088G26
15	Capacitor, mica, 47 mmf	250159G96
16	Capacitor, mica, 47 mmf	250159G96
17	Capacitor, mica, 470 mmf	250159G102
18	Capacitor, mica, 470 mmf, ± 10%	250159G90
19	Capacitor, ceramic, 500 mmf	250088G31
20	Capacitor, ceramic, 500 mmf	250088G31
21	Capacitor, ceramic, 500 mmf	250088G31
22	Capacitor, paper, .01 mfd, 600 V	250129G2
23	Capacitor, paper, .01 mfd, 600 V	250129G2
24	Capacitor, paper, .01 mfd, 600 V	250129G2
25	Capacitor, paper, .01 mfd, 600 V	250129G2
26	Capacitor, paper, .01 mfd, 600 V	250129G2
27	Capacitor, paper, .01 mfd, 600 V	250129G2
28	Capacitor, paper, .01 mfd, 600 V	250129G2
29	Capacitor, paper, .01 mfd, 600 V	250129G2
30	Capacitor, paper, .01 mfd, 600 V	250129G2
31	Capacitor, paper, .01 mfd, 600 V	250129G2
32	Capacitor, paper, .01 mfd, 600 V	250129G2
33	Capacitor, paper, .05 mfd, 600 V	250129G5
34	Capacitor, electrolytic, 10 mfd, 450 V	270026G3
35	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
40	Resistor, composition, 10 ohms, ½ W	230084G1
41	Resistor, composition, 100 ohms, ½ W	230084G7
42	Resistor, composition, 100 ohms, ½ W	230084G7
43	Resistor, composition, 220 ohms, ½ W	230084G9
44	Resistor, composition, 1000 ohms, ½ W	230084G13
45	Resistor, composition, 1000 ohms, ½ W	230084G13
46	Resistor, composition, 1000 ohms, ½ W	230084G13
47	Resistor, composition, 3300 ohms, ½ W	230084G16
48	Resistor, composition, 4700 ohms, ±5% 2 W	230061G175
49	Resistor, composition, 6800 ohms, ± 5% 2 W	230061G179
50	Resistor, composition, 22,000 ohms, ½ W	230084G21
51	Resistor, composition, 27,000 ohms, ± 10% ½ W	230084G79
52	Resistor, composition, 33,000 ohms, ± 10% 1 W	230085G80
53	Resistor, composition, 39,000 ohms, ± 10% ½ W	230084G81
54	Resistor, composition, 100,000 ohms, ±10% ½ W	230084G86
55	Resistor, composition, 150,000 ohms, ±10% ½ W	230084G88
56	Resistor, composition, 150,000 ohms, ±10% ½ W	230084G88
57	Resistor, composition, 220,000 ohms, ½ W	230084G27
58	Resistor, composition, 220,000 ohms, ½ W	230084G27
59	Resistor, composition, 470,000 ohms, ½ W	230084G29
60	Resistor, composition, 1 megohm, ½ W	230084G31
61	Resistor, composition, 1 megohm, ½ W	230084G31
62	Resistor, composition, 1.5 megohm, ½ W	230084G32
63	Resistor, wire wound, 5000 ohms, 5 W	240035G4
64	Resistor, composition, 470,000 ohms, ½ W. (in tuning eye socket)	230084G29
70	Switch, rotary power	160174G1
71	Socket, output	180060G1

MODELS CR-209A,
CR-209B, CR-209C,
CR-209D, CR-209E

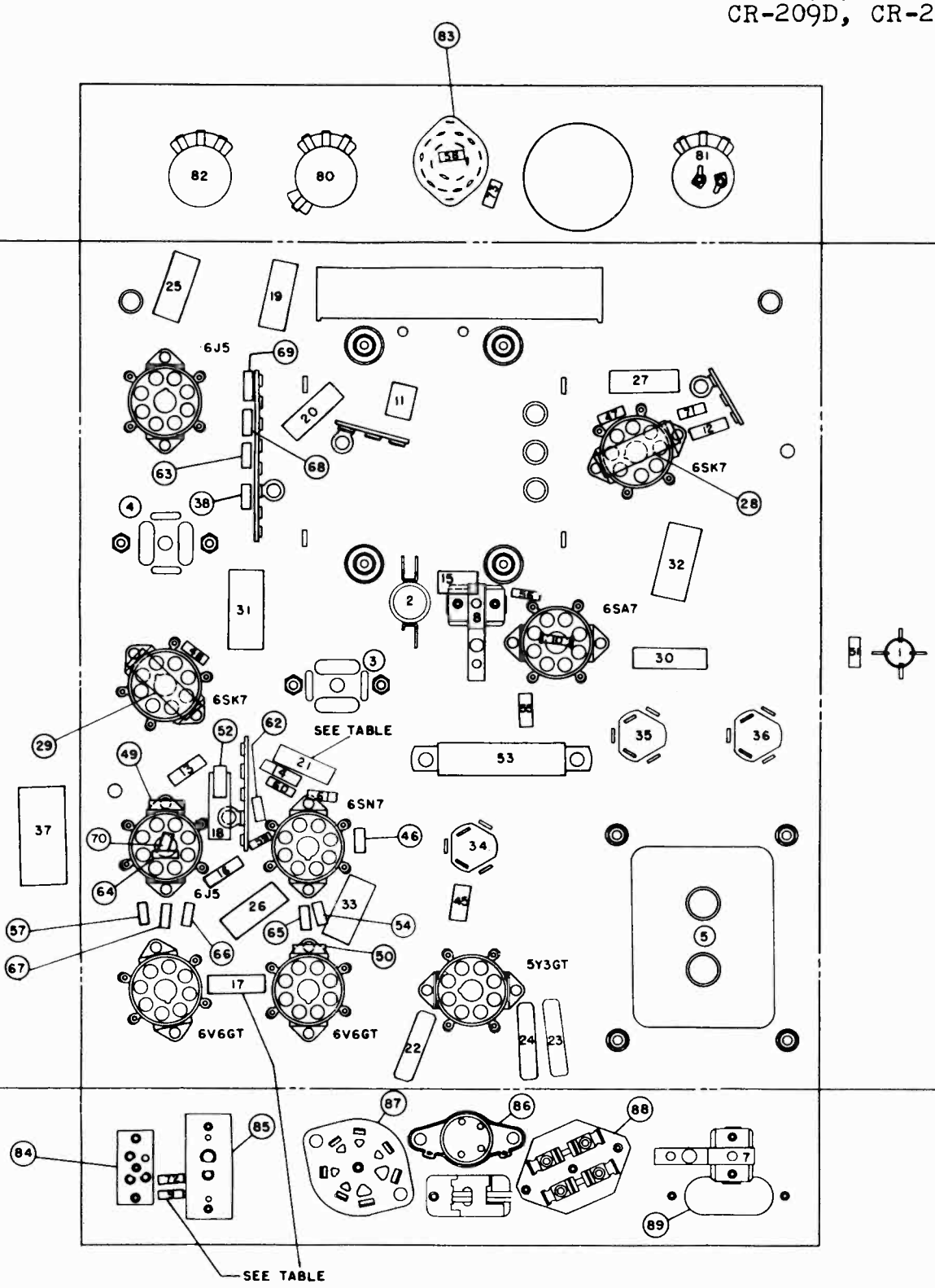
THE MAGNAVOX CO.





THE MAGNAVOX CO.

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E



ITEM NO.	ELECTRICAL VALUES		
	CR209A	CR209B	CR209C
9	8 MMF	33 MMF	33 MMF
17	.002 MFD	.0015 MFD	.0015 MFD
21	.01 MFD	.01 MFD	.002 MFD

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E

THE MAGNAVOX CO.

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 3. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings.

I-F ALIGNMENT

1. Connect the output of the signal generator to the control grid (pin No. 8) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the input selector switch to RAD.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the control grid (pin 4) on 6SK7 RF tube.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, slide the pointer on its string to the correct position. Be sure to crimp the lugs (on the rear of the pointer) tightly around the string to hold the pointer in adjustment.
3. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.
4. Adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter. If considerable adjustment was necessary, recheck the 1400 kc. trimmer setting.
5. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the cabinet antenna.
6. With the signal generator and dial at 1400 kc., adjust the loop antenna trimmer for maximum output.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

R-F Grid to Converter Grid at:
600 kc. 4.7
R-F on Converter to I-F Grid at:
600 kc. 62.5
I-F on Converter Grid to I-F Grid at:
455 kc. (gang closed) 80.0
I-F Grid to Detector Plate at:
455 kc. 72

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor at:
600 kc. ..... 8.8 V.
or 0.4 ma. through 22,000 ohm Oscillator Grid Resistor (56).

AUDIO GAIN

Voltage required across the Volume Control to produce .05 watt speaker output** at 400 cycles is .011 volt with Input Selector Switch in RAD setting.

*Variations of ± 20% are permissible. All readings made with sufficient input signal to provide .05 watt speaker output.

**.05 watt speaker output at 400 cycles is equivalent to a reading of 0.4 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

Tubes:

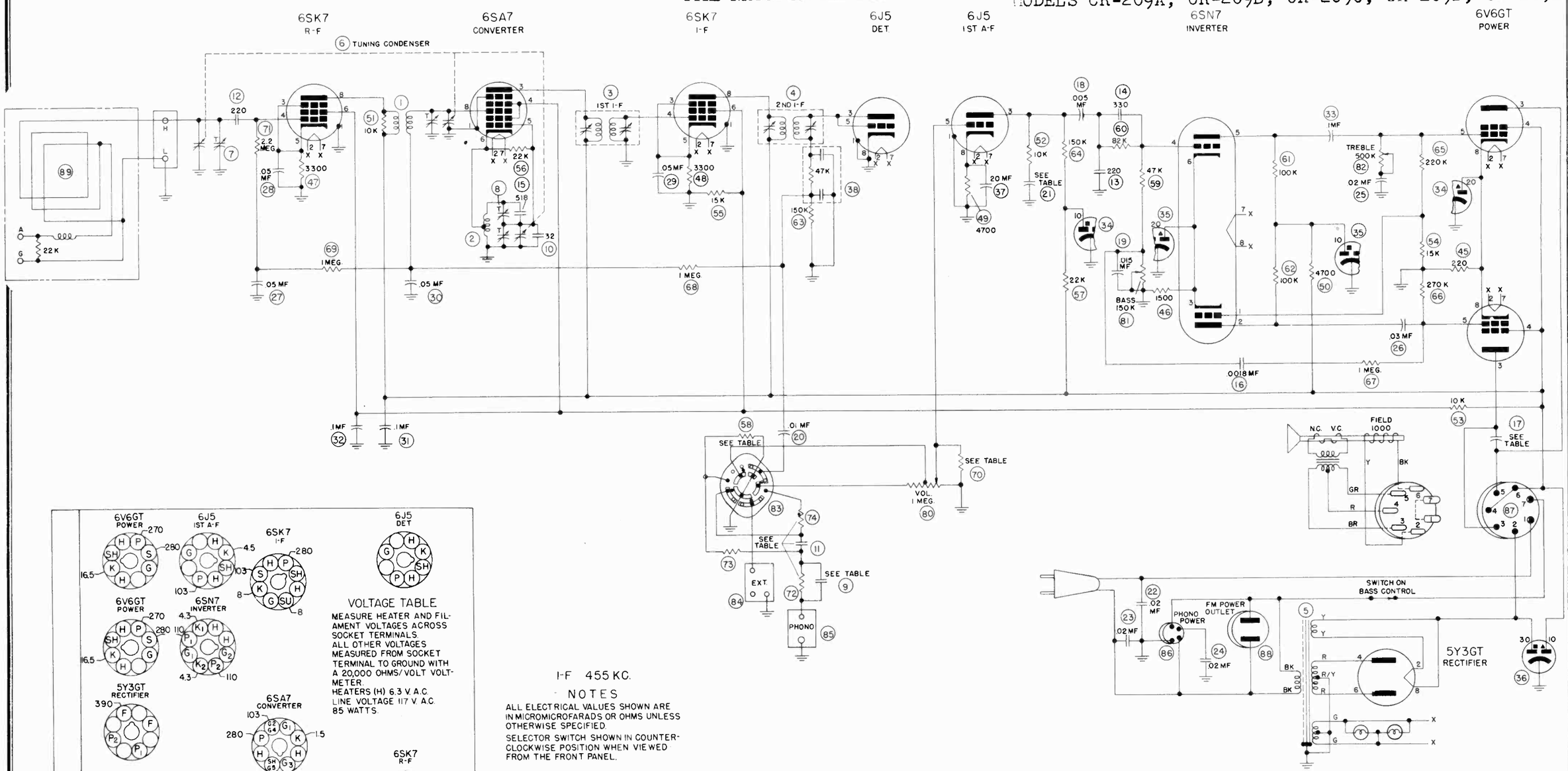
R-F Amplifier	6SK7
Converter	6SA7
I-F Amplifier	6SK7
Detector and AVC	6J5
First Audio	6J5
Inverter	6SN7GT
Power output (push-pull stage)	(2) 6V6GT
Rectifier	5Y3GT
Dial lamps	Mazda No. 44

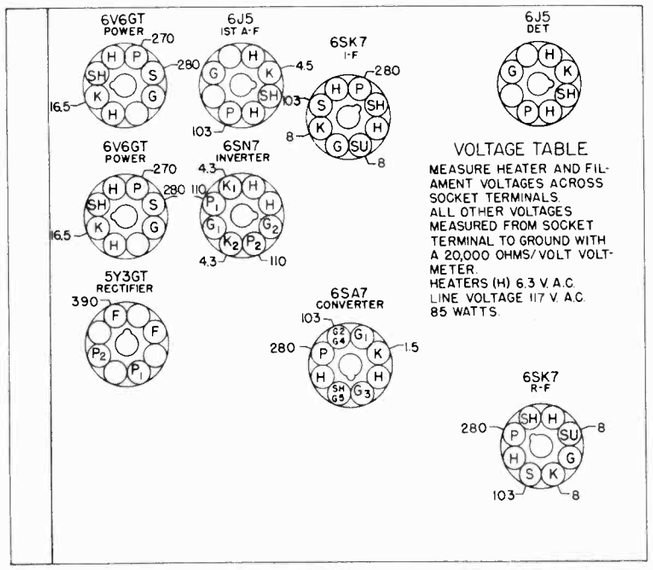
Speakers:

Field coil resistance	1000 ohms
Voice coil impedance (400 cycles)	3.0 ohms
Output transformer	8,000/3 ohms

THE MAGNAVOX CO.

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E





I-F 455 KC.

NOTES

ALL ELECTRICAL VALUES SHOWN ARE IN MICROMICROFARADS OR OHMS UNLESS OTHERWISE SPECIFIED.

SELECTOR SWITCH SHOWN IN COUNTER-CLOCKWISE POSITION WHEN VIEWED FROM THE FRONT PANEL.

ITEM NO.	ELECTRICAL VALUES					
	CR209A	CR209B	CR209C	CR209D	CR209E	
74	OMIT	OMIT	OMIT	330K	470K	
73	4.7 MEG.	4.7 MEG.	4.7 MEG.	1 MEG.	1 MEG.	
72	3.9 MEG.	3.9 MEG.	3.9 MEG.	820 K	820 K	
70	1.5 MEG.	1.5 MEG.	1.5 MEG.	OMIT	OMIT	
58	33 K	33 K	33 K	OMIT	OMIT	
11	150	150	150	470	470	
21	.01 MF	.01 MF	.002 MF	.01 MF	.002 MF	
17	.002 MF	.0015 MF	.0015 MF	.0015 MF	.0015 MF	
9	8	33	33	100	100	

SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC
Power consumption	85 watts
Power output	10 watts
Intermediate frequency	455 kc.
Tuning frequency range	534–1620 kc.

THE MAGNAVOX CO.

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E

DIAL CORD REPLACEMENT

Two separate drive cables are used in the CR-209 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the condenser gang; the other cable actuates the dial pointer whenever the large pulley on the condenser gang is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. Slide a short length (approximately ½ inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length including spring 20¾ inches. Hook loop over the metal hook in pulley "C" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the chassis keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion of the tuning control shaft wrapping 2½ turns *from front to back* then around the opposite side of pulley "C" into the pulley through the slot. Hook the end of tension spring "D" in the hole provided in pulley "C"; completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. Slip a one-half inch length of sleeving into a 42-inch length of dial cable. Tie the two ends to the loop end of the cable spring "E" securely so that the cable doubled measures 20¾ inches end to end including spring.

Place spring hook in bottom hole and draw cable through slot of pulley "C". Loop one end of cable around pulley "C" in a clockwise direction in front of condenser drive cable (viewing chassis from front) then loop the remaining end around pulley in a counterclockwise direction. Secure both ends of cable to chassis at edge of pulley slot with scotch tape, keeping piece of sleeving on remaining loop of cable.

Replace dial assembly and loop cable over pulley "A". While holding cable taut remove scotch tape and loop cable over pulley "B".

Turn the tuning control shaft until the condenser gang is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. The short piece of sleeving installed prior to the stringing operation should be slid to the rear of the dial pointer and the crimping lug on the pointer pressed over the sleeving. After checking to make certain that the condenser gang is completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to each end of the sleeving to which the dial pointer is fastened. This completes the operation.

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, r-f	360280G1
2	Coil assembly, oscillator	360281G1
3	Transformer, first i-f	363700G2
4	Transformer, second i-f	363700G3
5	Transformer, power	300036G1
6	Capacitor, variable, three-gang tuning	260097G1
7	Capacitor, trimmer	250046G1
8	Capacitor, trimmer	250046G1
9	Capacitor, ceramic dielectric, 8 mmf. (CR 209A Only)	250164G1
	Capacitor, ceramic dielectric, 33 mmf. (CR 209B, C Only)	250164G4
10	Capacitor, ceramic, 32 mmf. ±5%	250088G42
11	Capacitor, mica, 150 mmf. ±10%	250159G84
12	Capacitor, mica, 220 mmf.	250159G100
13	Capacitor, mica, 220 mmf.	250159G100
14	Capacitor, mica, 330 mmf. ±10%	250159G88
15	Capacitor, silver mica, 518 mmf. ±1%	250085G35
16	Capacitor, mica, 1800 mmf. ±10%	250160G67
17	Capacitor, paper, .002 mfd. 600 V. (CR 209A Only)	250152G44
	Capacitor, paper, .0015 mfd. 600 V. ±10% (CR 209B, C Only)	250169G1
18	Capacitor, paper, .005 mfd. 600 V.	250152G41
19	Capacitor, paper, .015 mfd. 200 V. ±10%	250152G70
20	Capacitor, paper, .01 mfd. 200 V.	250152G18
21	Capacitor, paper, .01 mfd. 400 V. (CR 290A,B, Only)	250152G27
	Capacitor, paper, .002 mfd. 600 V. ±10% (CR 209C Only)	250169G2

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E

THE MAGNAVOX CO.

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
22	Capacitor, molded paper, .02 mfd. 600 V.	250129G3
23	Capacitor, molded paper, .02 mfd. 600 V.	250129G3
24	Capacitor, molded paper, .02 mfd. 600 V.	250129G3
25	Capacitor, paper, .02 mfd. 200 V.	250152G17
26	Capacitor, paper, .03 mfd. 400 V.	250152G25
27	Capacitor, paper, .05 mfd. 200 V.	250152G15
28	Capacitor, paper, .05 mfd. 200 V.	250152G15
29	Capacitor, paper, .05 mfd. 200 V.	250152G15
30	Capacitor, paper, .05 mfd. 200 V.	250152G15
31	Capacitor, paper, .1 mfd. 400 V.	250152G22
32	Capacitor, paper, .1 mfd. 400 V.	250152G22
33	Capacitor, paper, .1 mfd. 400 V.	250152G22
34	Capacitor, electrolytic, 10 mfd. 450 V., 20 mfd. 25 V.	270023G6
35	Capacitor, electrolytic, 10 mfd. 450 V., 20 mfd. 25 V.	270023G6
36	Capacitor, electrolytic, 10-30 mfd. 475 V.	270023G2
37	Capacitor, electrolytic, 20 mfd. 25 V.	270027G2
38	Capacitor-resistor filter	250170G1
45	Resistor, composition, 220 ohm, 2 W. ±10%	230064G54
46	Resistor, composition, 1500 ohm, ½ W.	230084G14
47	Resistor, composition, 3300 ohm, ½ W.	230084G16
48	Resistor, composition, 3300 ohm, ½ W.	230084G16
49	Resistor, composition, 4700 ohm, ½ W.	230084G17
50	Resistor, composition, 4700 ohm, ½ W.	230084G17
51	Resistor, composition, 10K ohm, ½ W.	230084G19
52	Resistor, composition, 10K ohm, 1 W.	230085G19
53	Resistor, composition, 10K ohm, 3 W.	240035G2
54	Resistor, composition, 15K ohms, ½ W. ±5%	230084G187
55	Resistor, composition, 15K ohm, 2 W.	230086G20
56	Resistor, composition, 22K ohm, ½ W.	230084G21
57	Resistor, composition, 22K ohm, ½ W.	230084G21
58	Resistor, composition, 33K ohm, ½ W.	230084G22
59	Resistor, composition, 47K ohm, ½ W.	230084G23
60	Resistor, composition, 82K ohm, ½ W. ±10%	230084G85
61	Resistor, composition, 100K ohm, ½ W.	230084G25
62	Resistor, composition, 100K ohm, ½ W.	230084G25
63	Resistor, composition, 150K ohm, ½ W.	230084G26
64	Resistor, composition, 150K ohm, ½ W.	230084G26
65	Resistor, composition, 220K ohm, ½ W. ±5%	230084G215
66	Resistor, composition, 270K ohm, ½ W. ±10%	230084G91
67	Resistor, composition, 1 megohm, ½ W. ±10%	230084G98
68	Resistor, composition, 1 megohm, ½ W.	230084G31
69	Resistor, composition, 1 megohm, ½ W.	230084G31
70	Resistor, composition, 1.5 megohm, ½ W.	230084G32
71	Resistor, composition, 2.2 megohm, ½ W.	230084G33
72	Resistor, composition, 3.9 megohm, ½ W. ±10%	230084G105
73	Resistor, composition, 4.7 megohm, ½ W. ±10%	230084G106
80	Control, volume	220074G1
81	Control, bass	220073G5
82	Control, treble	220072G8
83	Switch, selector	160175G1
84	Socket, fm input	180060G1
85	Socket, phonograph input	189741G1
86	Socket, phonograph motor	180501G5
87	Socket, speaker	180504G16
88	Socket, AC	180428G1
89	Antenna loop assembly	360336G1
	Dial glass	150292G2

THE MAGNAVOX CO.

MODELS CR-209A, CR-209B, CR-209C, CR-209D, CR-209E

SUPPLEMENT TO PARTS LIST

REFERENCE NO.		MAGNAVOX PART NO.
	CR 209A	
9	Capacitor, Ceramic Dielectric, 8 mmf.	250164G1
11	Capacitor, Mica, 150 mmf, ± 10%	250159G84
17	Capacitor, Paper, .002 mfd., 600 V.	250152G44
21	Capacitor, Paper, .01 mfd., 400 V.	250152G27
58	Resistor, Composition, 33K ohms, ½ W.	230084G22
70	Resistor, Composition, 1.5 megohm, ½ W.	230084G32
72	Resistor, Composition, 3.9 megohm, ½ W., ±10%	230084G105
73	Resistor, Composition, 4.7 megohm, ½ W., ±10%	230084G106
74	Omitted	
	CR 209B	
9	Capacitor, Ceramic, Dielectric, 33 mmf.	250164G4
17	Capacitor, Paper, .0015 mfd., 600 V., ±10 %	250169G1
	CR 209C	
9	Capacitor, Ceramic Dielectric, 33 mmf.	250164G4
21	Capacitor, Paper, .002 mfd., 600 V., ±10%	250169G2
	CR 209D	
9	Capacitor, Mica, 100 mmf., ±10%	250159G82
11	Capacitor, Mica, 470 mmf., ±10%	250159G90
17	Capacitor, Paper, .0015 mfd., 600 V., ±10%	250169G1
58	Omitted	
70	Omitted	
72	Resistor, Composition, 820K ohms, ½ W., ±10%	230084G97
73	Resistor, Composition, 1 megohm, ½ W., ±10%	230084G98
74	Resistor, Composition, 30K ohms, ½ W., ±10%	230084G92
	CR 209E	
9	Capacitor, Mica, 100 mmf., ±10%	250159G82
11	Capacitor, Mica, 470 mmf., ±10%	250159G90
17	Capacitor, Paper, .0015 mfd., 600 V., ±10%	250169G1
21	Capacitor, Paper, .002 mfd., 600 V., ±10%	250169G2
58	Omitted	
70	Omitted	
72	Resistor, Composition, 820K ohms, ½ W., ±10%	230084G97
73	Resistor, Compositian, 1 megohm, ½ W., ±10%	230084G98
74	Resistor, Composition, 470K ohms, ½ W., ±10%	230084G94

MODELS CR-210A, CR-210B, CR-210C

THE MAGNAVOX CO.

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 3. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings.

All alignment adjustments except antenna trimmer adjustment can be made with the loop antenna leads disconnected. When checking overall operation with the signal generator, the generator can be connected across the loop antenna terminals on the rear of the chassis. It is not necessary to remove the loop antenna from the cabinet for alignment of this receiver.

I-F ALIGNMENT

1. Connect the output of the signal generator to the control grid (pin No. 8) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the input selector switch to RAD.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it across H and L on terminal strip on the rear of the chassis. The high side of the signal generator should be connected to H and the signal generator ground to L.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, slide the pointer on its string to the correct position. Be sure to crimp the lugs (on the rear of the pointer) tightly around the string to hold the pointer in adjustment.
3. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.
4. Set the signal generator and radio receiver to 600 kc. Adjust the oscillator and r-f coil slugs for maximum output. If considerable adjustment was necessary re-check the 1400 kc. trimmer settings.
5. Replace chassis in cabinet and connect loop antenna leads to proper terminals on the rear of the chassis.
6. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the receiver loop antenna.
7. With the signal generator and dial at 1400 kc., adjust the loop antenna trimmer for maximum output.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

R-F Grid to Converter Grid at:
600 kc. 10

R-F on Converter to I-F Grid at:
600 kc. 53

I-F on Converter Grid to I-F Grid at:
455 kc. (gang closed) 61

I-F Grid to Detector Plate at:
455 kc. 46

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor at:
600 kc. ..... 8.3 V.
or 0.38 ma. through 22,000 ohm Oscillator Grid Resistor (46).

AUDIO GAIN

Voltage required across the Volume Control to produce 0.5 watt speaker output** at 400 cycles is .062 volt with Input Selector Switch in RAD setting.

*Variations of ±20% are permissible. All readings made with sufficient input signal to provide 0.5 watt speaker output.

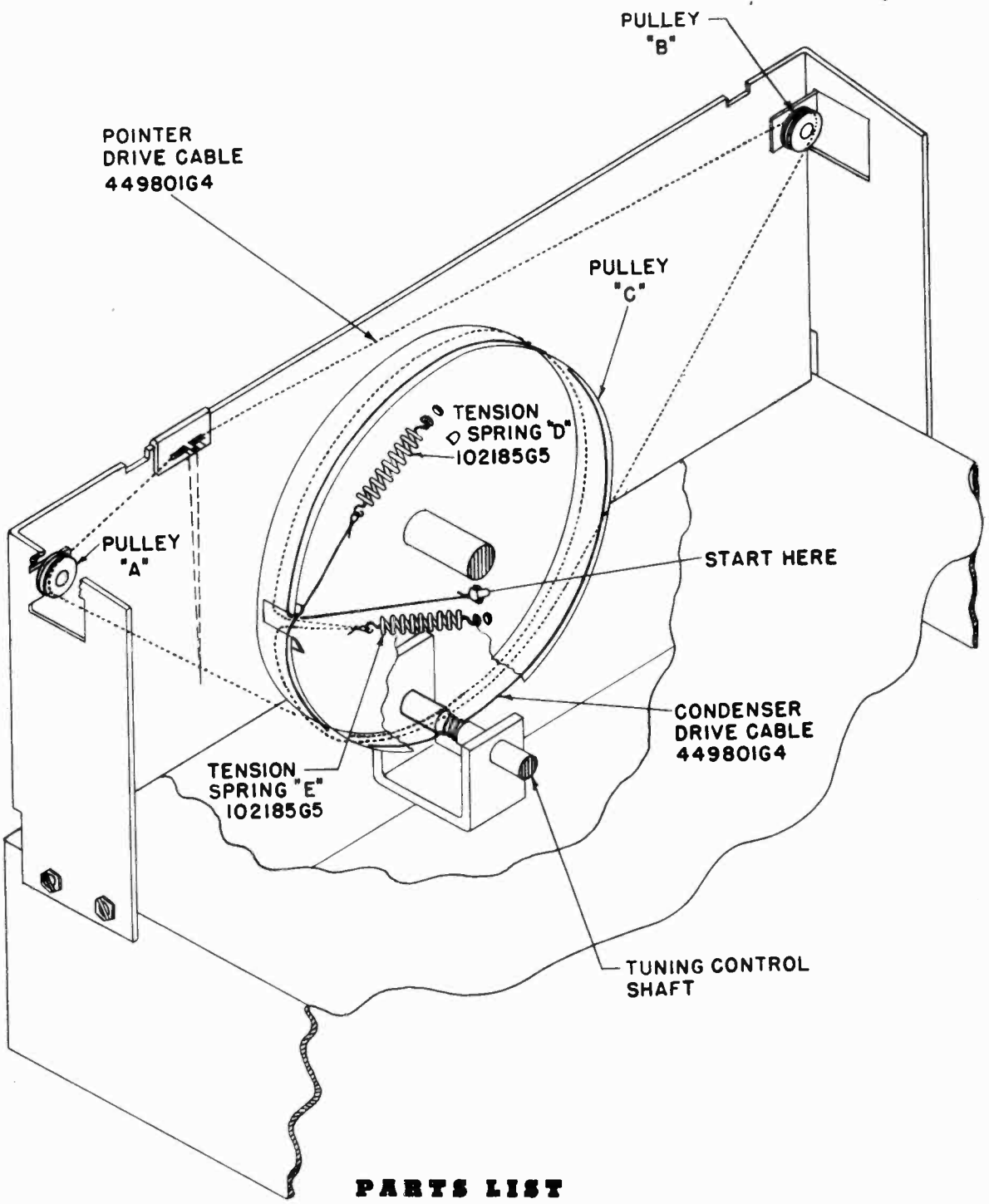
**0.5 watt speaker output at 400 cycles is equivalent to a reading of 1.22 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC
Power consumption	70 watts
Power output	6 watts
Intermediate frequency	455 kc.
Tuning frequency range	540–1620 kc.
Speaker:	
Field coil resistance	1500 ohms
Voice coil impedance (400 cycles)	3.0 ohms
Output transformer	6,500/3 ohms

THE MAGNAVOX CO.

MODELS CR-210A, CR-210B, CR-210C



PARTS LIST

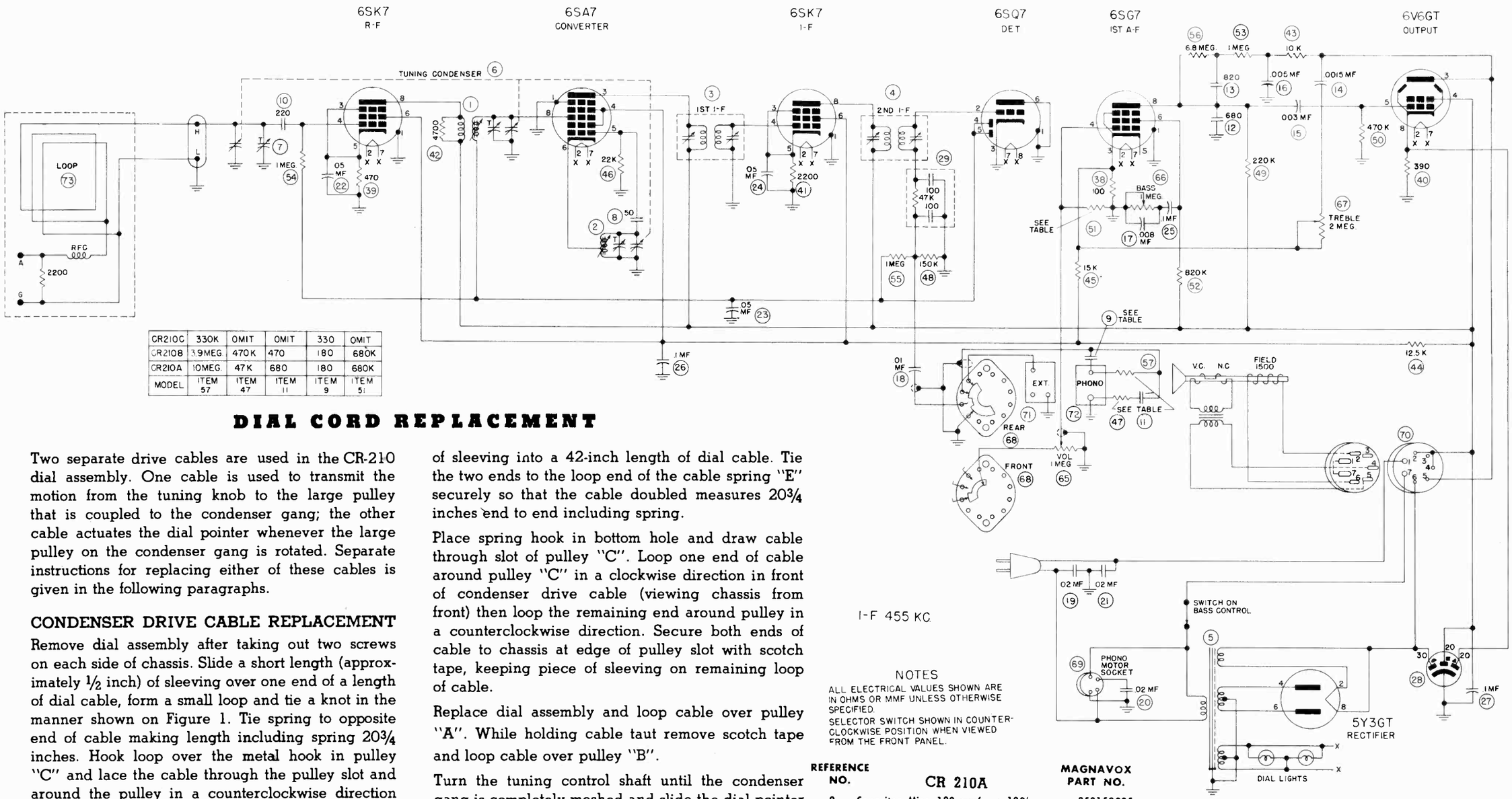
REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil, r-f	360329G1
2	Coil, oscillator	360335G1
3	Transformer, first i-f	363700G4
4	Transformer, second i-f	363700G5
5	Transformer, power	300044G1
6	Capacitor, variable, three-gang tuning	260099G1
7	Capacitor, trimmer	250046G2
8	Capacitor, ceramic, 50 mmf. ±10%	250088G39
9	Capacitor, mica, 180 mmf. ±10%	250159G85
10	Capacitor, mica, 220 mmf.	250159G100

MODELS CR-210A, CR-210B, CR-210C

THE MAGNAVOX CO.

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
11	Capacitor, mica, 680 mmf. (CR 210A Only)	250159G136
	Capacitor, mica, 470 mmf. (CR 210B Only)	250159G102
12	Capacitor, mica, 680 mmf.	250159G136
13	Capacitor, mica, 820 mmf. ±10%	250159G132
14	Capacitor, paper, .0015 mfd. ±10%, 600 V.	250169G1
15	Capacitor, paper, .003 mfd. 600 V.	250152G43
16	Capacitor, paper, .005 mfd. 600 V.	250152G41
17	Capacitor, paper, .008 mfd. 400 V.	250152G28
18	Capacitor, paper, .01 mfd. 200 V.	250152G18
19	Capacitor, paper, .02 mfd. 600 V.	250129G3
20	Capacitor, paper, .02 mfd. 600 V.	250129G3
21	Capacitor, paper, .02 mfd. 600 V.	250129G3
22	Capacitor, paper, .05 mfd. 200 V.	250152G15
23	Capacitor, paper, .05 mfd. 200 V.	250152G15
24	Capacitor, paper, .05 mfd. 200 V.	250152G15
25	Capacitor, paper, .1 mfd. 400 V.	250152G19
26	Capacitor, paper, .1 mfd. 400 V.	250152G19
27	Capacitor, paper, .1 mfd. 400 V.	250152G19
28	Capacitor, electrolytic, 30 mfd. 475 V., 20 mfd. 475 V., 20 mfd. 25 V.	270021G6
29	Capacitor-resistor filter	250170G1
38	Resistor, composition, 100 ohm, ½ W.	230084G7
39	Resistor, composition, 470 ohm, ½ W.	230084G11
40	Resistor, composition, 390 ohm, 1 W.	230085G57
41	Resistor, composition, 2200 ohm, ½ W.	230084G15
42	Resistor, composition, 4700 ohm, ½ W.	230084G17
43	Resistor, composition, 10,000 ohm, 1 W.	230085G19
44	Resistor, composition, 12,500 ohm, 10 W. ±5%	240021G14
45	Resistor, composition, 15,000 ohm, 2 W. ±10%	230086G76
46	Resistor, composition, 22,000 ohm, ½ W.	230084G21
47	Resistor, composition, 47,000 ohm, ½ W. (CR 210A Only)	230084G23
	Resistor, composition, 470,000 ohm, ½ W. (CR 210B Only)	230084G29
48	Resistor, composition, 150,000 ohm, ½ W.	230084G26
49	Resistor, composition, 220,000 ohm, ½ W.	230084G27
50	Resistor, composition, 470,000 ohm, ½ W.	230084G29
51	Resistor, composition, 680,000 ohm, ½ W.	230084G30
52	Resistor, composition, 820,000 ohm, ½ W. ±10%	230084G97
53	Resistor, composition, 1 megohm, ½ W. ±10%	230084G98
54	Resistor, composition, 1 megohm, ½ W.	230084G31
55	Resistor, composition, 1 megohm, ½ W.	230084G31
56	Resistor, composition, 6.8 megohm, ½ W.	230084G36
57	Resistor, composition, 10 megohm, ½ W. (CR 210A Only)	230084G37
	Resistor, composition, 3.9 megohm, ±10%, ½ W. (CR 210B Only)	230084G105
65	Control, volume, 1 megohm	220072G15
66	Control, bass, with AC switch, 1 megohm	220073G12
67	Control, treble, 2 megohm	220072G16
68	Switch, selector	160191G1
69	Socket, phono motor	180501G5
70	Socket, speaker	180504G16
71	Socket, FM	180060G1
72	Socket, phono input	189741G1
73	Antenna loop assembly	*
	Dial glass	150317G1

*The part number of the loop antenna assembly changes with different cabinets. It is therefore important that you specify the STYLE NUMBER of the instrument when ordering a replacement loop antenna assembly.



CR210C	330K	OMIT	OMIT	330	OMIT
CR210B	3.9MEG.	470K	470	180	680K
CR210A	10MEG.	47K	680	180	680K
MODEL	ITEM 57	ITEM 47	ITEM 11	ITEM 9	ITEM 51

DIAL CORD REPLACEMENT

Two separate drive cables are used in the CR-210 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the condenser gang; the other cable actuates the dial pointer whenever the large pulley on the condenser gang is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. Slide a short length (approximately ½ inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length including spring 20¾ inches. Hook loop over the metal hook in pulley "C" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the chassis keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion of the tuning control shaft wrapping 2½ turns *from front to back* then around the opposite side of pulley "C" into the pulley through the slot. Hook the end of tension spring "D" in the hole provided in pulley "C"; completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. Slip a one-half inch length of sleeving into a 42-inch length of dial cable. Tie the two ends to the loop end of the cable spring "E" securely so that the cable doubled measures 20¾ inches end to end including spring.

Place spring hook in bottom hole and draw cable through slot of pulley "C". Loop one end of cable around pulley "C" in a clockwise direction in front of condenser drive cable (viewing chassis from front) then loop the remaining end around pulley in a counterclockwise direction. Secure both ends of cable to chassis at edge of pulley slot with scotch tape, keeping piece of sleeving on remaining loop of cable.

Replace dial assembly and loop cable over pulley "A". While holding cable taut remove scotch tape and loop cable over pulley "B".

Turn the tuning control shaft until the condenser gang is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. The short piece of sleeving installed prior to the stringing operation should be slid to the rear of the dial pointer and the crimping lug on the pointer pressed over the sleeving. After checking to make certain that the condenser gang is completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to each end of the sleeving to which the dial pointer is fastened. This completes the operation.

NOTES

ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MMF UNLESS OTHERWISE SPECIFIED.

SELECTOR SWITCH SHOWN IN COUNTER-CLOCKWISE POSITION WHEN VIEWED FROM THE FRONT PANEL.

REFERENCE NO.	CR 210A	MAGNAVOX PART NO.
9	Capacitor, Mica, 180 mmf., ±10%	250159G85
11	Capacitor, Mica, 680 mmf.	250159G136
47	Resistor, Composition, 47K ohms, ½ W.	230084G23
51	Resistor, Composition, 680K ohms, ½ W.	230084G30
57	Resistor, Composition, 10 megohm, ½ W.	230084G37

CR 210B

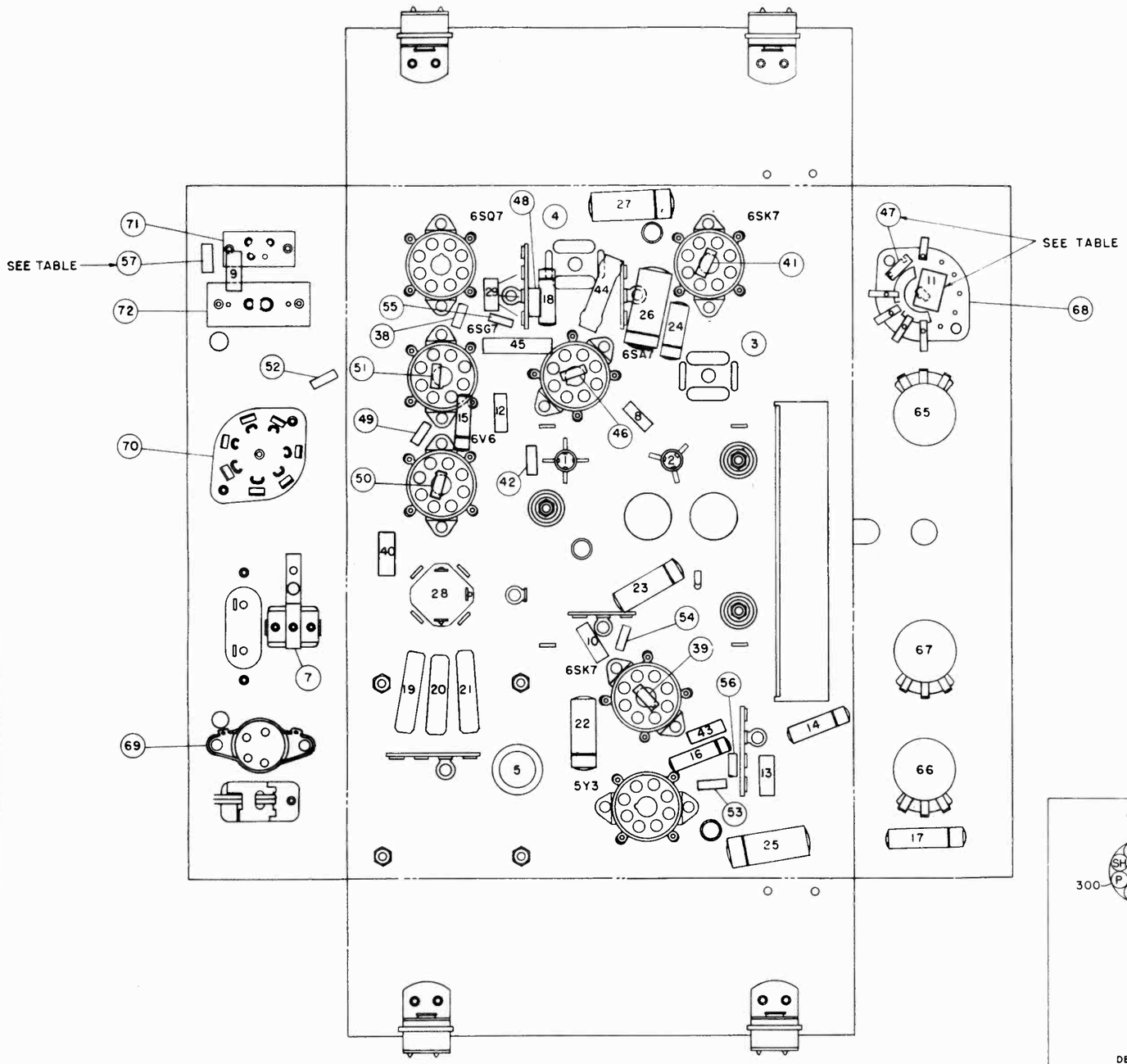
11	Capacitor, Mica, 470 mmf.	250159G102
47	Resistor, Composition, 470K ohms, ½ W.	230084G29
57	Resistor, Composition, 39 megohm, ±10%, ½ W.	230084G105

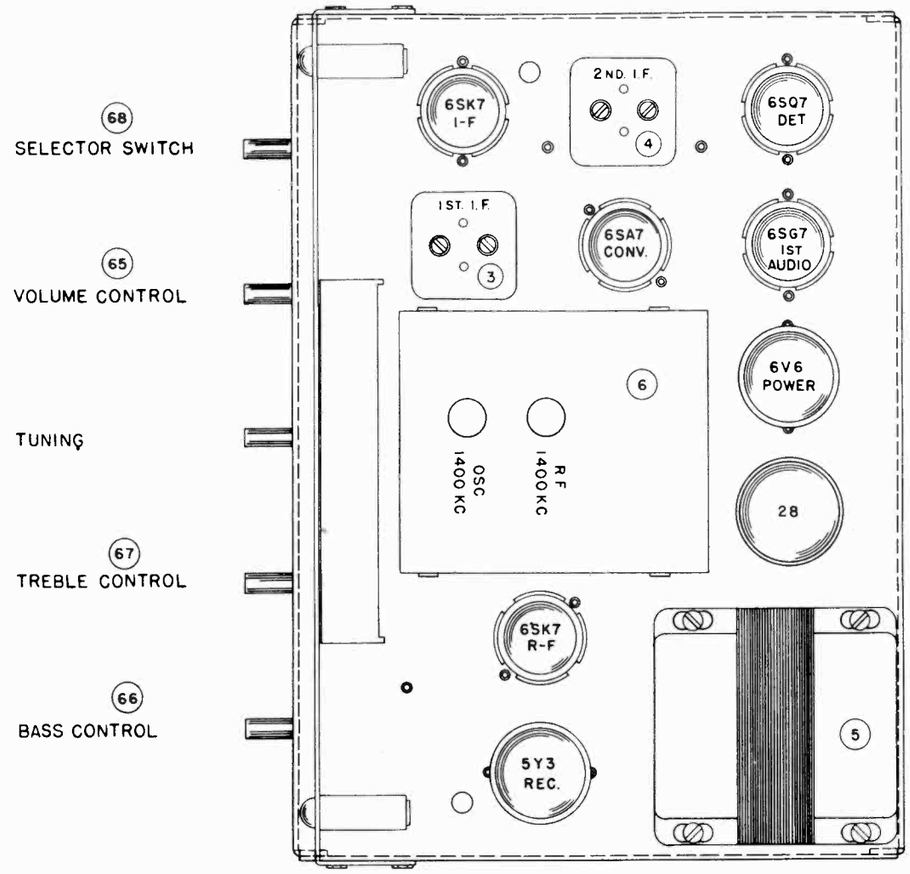
CR 210C

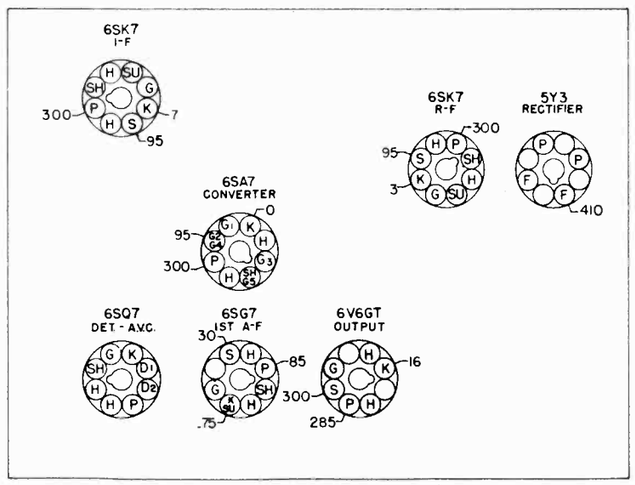
9	Capacitor, Mica, 330 mmf., ±10%	250159G88
11	Omitted	
38	Resistor, Composition, 100 ohms, ½ W., ±5%	230084G135
47	Omitted	
51	Omitted	
57	Resistor, Composition, 330K ohms, ½ W., ±10%	230084G92

MODELS CR-210A,
CR-210B, CR-210C

THE MAGNAVOX CO.







VOLTAGE TABLE

FILAMENT AND HEATER VOLTAGES MEASURED ACROSS SOCKET TERMINALS.

ALL OTHERS MEASURED FROM SOCKET TERMINAL TO GROUND WITH A 20,000 OHMS/VOLT VOLTMETER.

HEATERS (H) 6.3 V. A.C.

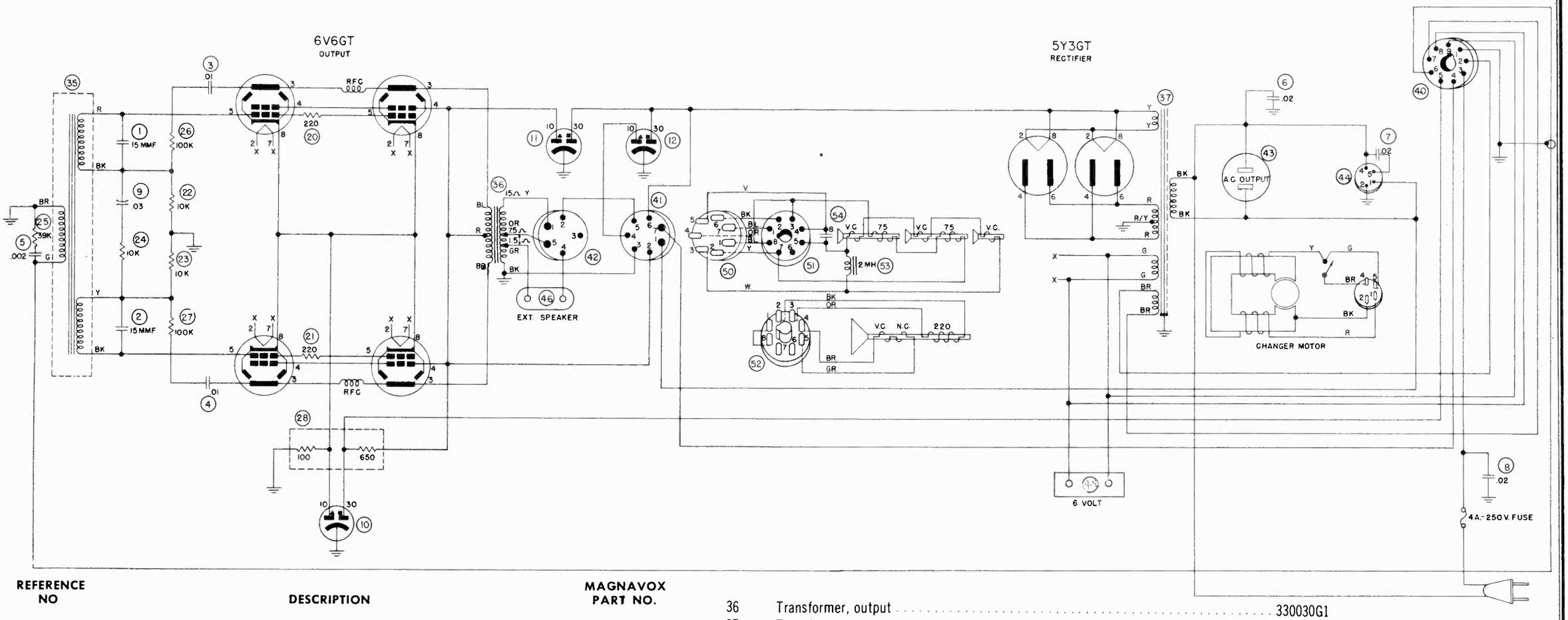
FILAMENTS (F) 5V. A.C.

LINE VOLTAGE 117 V. A.C.

POWER CONSUMPTION 70 WATTS

THE MAGNAVOX CO.

MODEL AMP-116



REFERENCE NO	DESCRIPTION	MAGNAVOX PART NO.
1	Capacitor, molded mica, 15 mmf, 500 V	250159G93
2	Capacitor, molded mica, 15 mmf, 500 V	250159G93
3	Capacitor, paper, .01 mfd, 600 V	250129G2
4	Capacitor, paper, .01 mfd, 600 V	250129G2
5	Capacitor, paper, .002 mfd, ± 10%, 600 V	250169G2
6	Capacitor, paper, .02 mfd, 600 V	250129G3
7	Capacitor, paper, .02 mfd, 600 V	250129G3
8	Capacitor, paper, .02 mfd, 600 V	250129G3
9	Capacitor, tubular, .03 mfd, 400 V	250152G25
10	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
11	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
12	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
20	Resistor, composition, 220 ohm, ½ W	230084G9
21	Resistor, composition, 220 ohm, ½ W	230084G9
22	Resistor, composition, 10,000 ohm, ½ W	230084G19
23	Resistor, composition, 10,000 ohm, ½ W	230084G19
24	Resistor, composition, 10,000 ohm, ± 10%, ½ W	230084G74
25	Resistor, composition, 39,000 ohm, ± 10%, ½ W	230084G81
26	Resistor, composition, 100,000 ohm, 1 W	230085G25
27	Resistor, composition, 100,000 ohm, 1 W	230085G25
28	Resistor, wire wound, 100-650 ohm, 7 W	240040G1
35	Transformer, input	320021G2
36	Transformer, output	330030G1
37	Transformer, power	300037G1
40	Cable & Plug assembly	460634G1
41	Socket, speaker connection	180504G16
42	Socket, speaker switch	180504G6
43	Socket, AC power connection	180428G1
44	Socket, phonograph motor connection	180501G5
45	Socket, 6 volt outlet	189788G2
46	Terminal Board-external speaker connection	209601G2
50	Plug, speaker	180503G4
51	Socket, tweeter	180403G2
52	Plug, bass speaker	180503G5
53	Choke Assembly	350042G2
54	Capacitor, paper, 8 mfd, 100 V	250167G1

SPECIFICATIONS

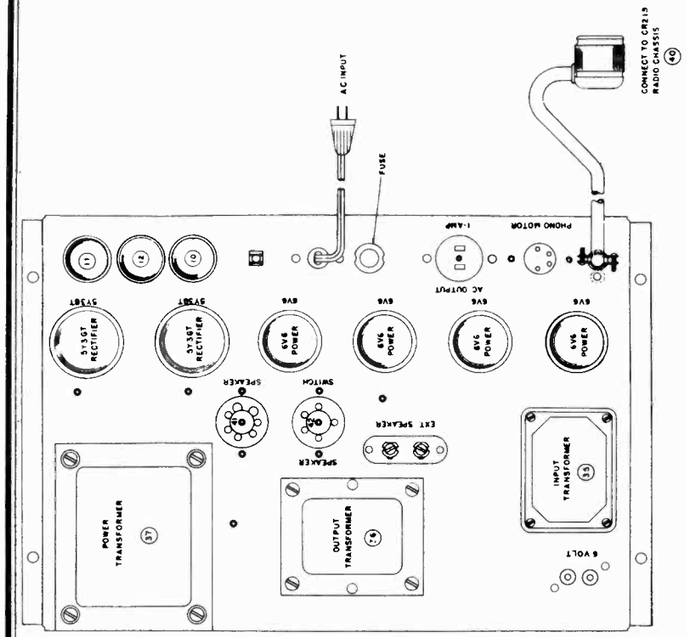
Power supply	117 volts 50/60 cycles AC
Power consumption	*200 watts
Power output	45 watts
Output impedance	15/7.5/1.5 ohms
Tubes:	
Power output (push-pull parallel stage)	(4) 6L6G
Rectifiers	(2) 5U4G

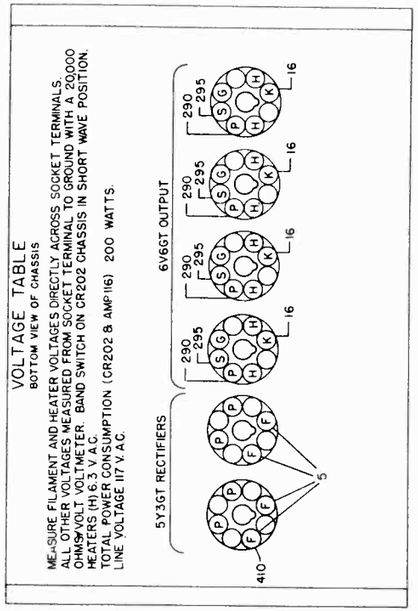
Speakers:	No. 583113 (Bass)	No. 580005 (Tweeter)	(2) No. 583112 (Tweeter)
Field coil resistance	225 ohms	PM	75 ohms
Voice coil resistance	12 ohms	3.2 ohms	†3.2 ohms

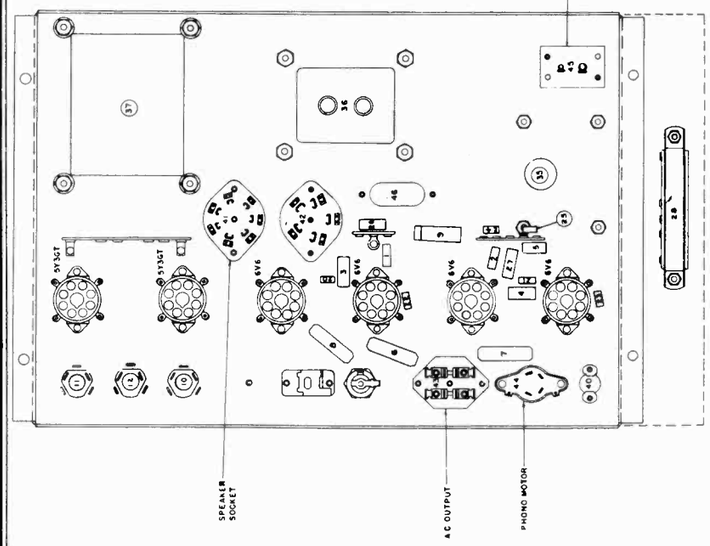
*Power consumption is for amplifier and CR-213 radio chassis.
†Voice coil resistance of one speaker.

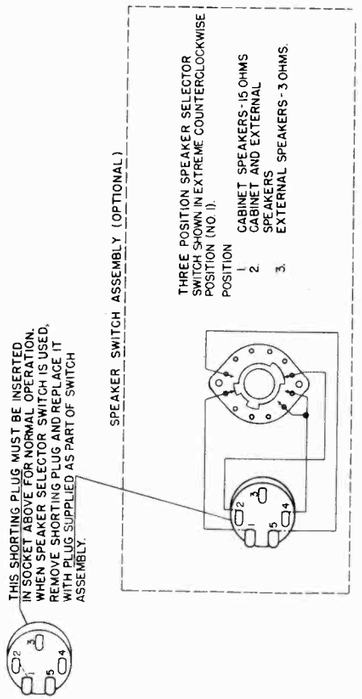
THE MAGNAVOX CO.

MODEL AMP-116



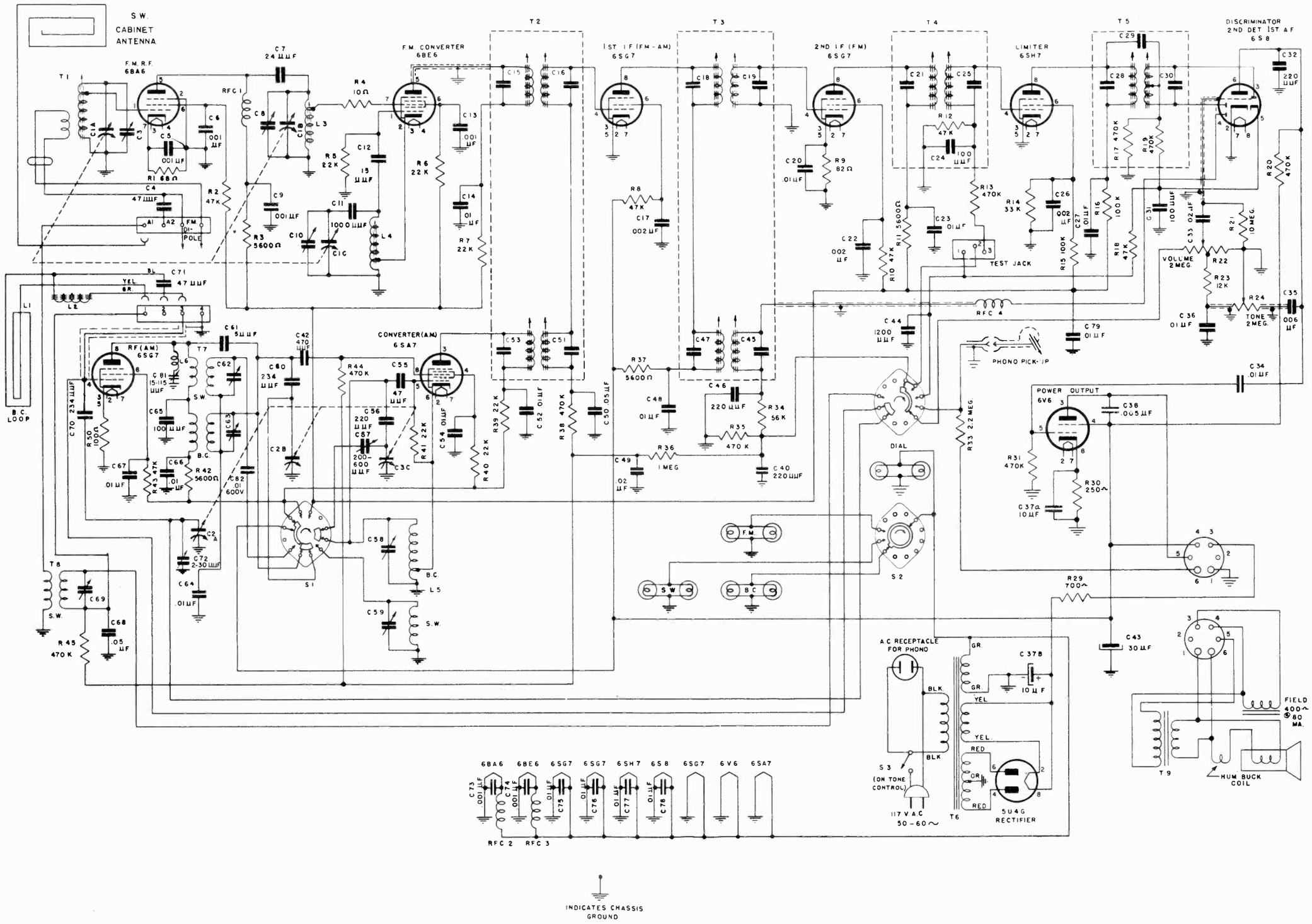






MAJESTIC RADIO & TELEV. CORP.

MODELS 10B27E, 10FM782



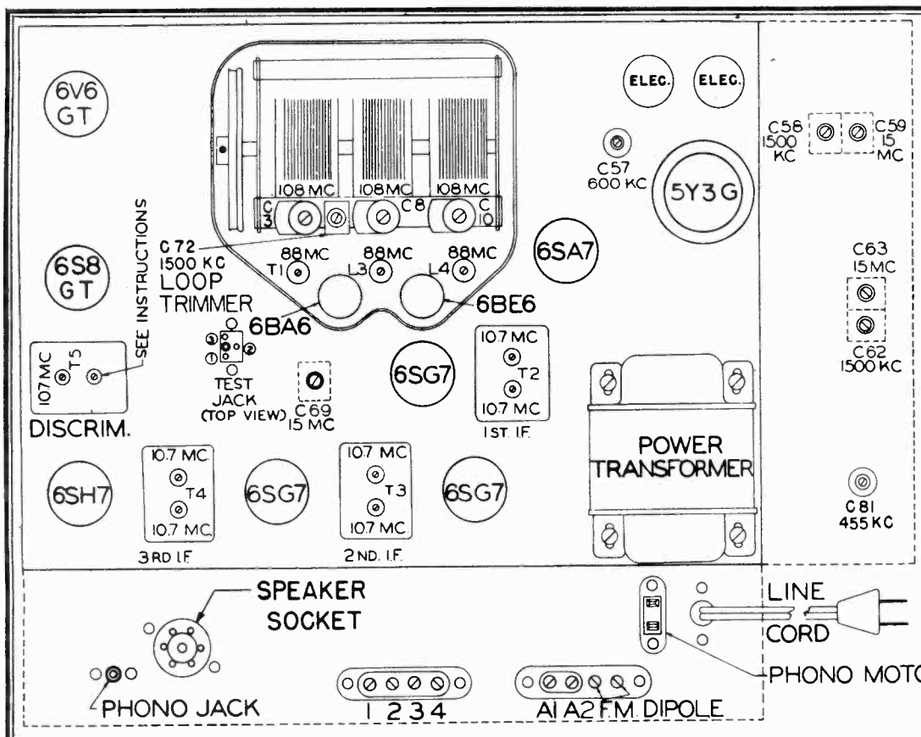
RECORD CHANGER: Oak Model 6666, RCD.CH. 15-1

ALIGNMENT

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
1	Conv. Grid	.01mfd	455 KC	BC	600 KC	T2,T3 Bottom	Align I.F.'s
2	ONE TURN LOOP MADE WITH GENERATOR LEADS		455 KC	BC	600KKC	C81	I.F. trap adjustment for minimum I.F. signal
3			1500 KC	BC	1500 KC	C58	Set BC osc. to scale at 1500 KC
4			1500 KC	BC	1500 KC	C63,C72	Align BC RF. and Loop
5			600 KC	BC	600 KC	C57	Rock Gang to track BC padder
6	Al-Gnd.	400ohm	15 MC	SW	15 MC	C59	Scale osc. at 15 MC
7	Al-Gnd.	400ohm	15 MC	SW	15 MC	C62,C69	Align SW RF and Ant.
8	6SG7 2nd I.F. Grid	.01mfd.	10.7 MC	FM	88 MC	T4 top	Align for max. voltage at test jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response.
9	6SG7 1st. I.F. Grid	.01mfd.	10.7 MC	FM	88 MC	T3 top	Align for max. voltage at test jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response.
10	Converter	.01mfd.	10.7 MC	FM	88 MC	T2 top	Align for max. voltage at text jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response. Re-check peaking of T4, and T3.
11	Converter grid 6BE6	.01mfd.	10.7 MC	FM	88 MC	T5 primary	Align for max. voltage across ½ discriminator Load (un-used Lug bottom of T5 to ground)
12	Converter grid 6B6E	.01mfd.	10.7 MC	FM	88 MC	T5 secondary	Align for zero voltage across full discriminator load (Test jack pin 1 to ground)
13	FM ant.term.	direct	108 MC	FM	108 MC	C10	Scale OSC at 108 MC (max. voltage Test jack pin 3.
14	FM ant.term.	direct	108 MC	FM	108 MC	C8,C3	Align FM RF and Ant. (max. voltage Test jack pin 3.
15	FM ant.term.	direct	88 MC	FM	88 MC	L4	Scale osc. at 88 MC.
16	FM ant.term.	direct	88 MC	FM	88 MC	L3,T1	Align RF and Ant. at 88 MC repeat steps 13, 14, 15, 16 as necessary.

NOTE: 1. A much more satisfactory IF and discriminator alignment may be obtained by using a 10.7 MC Signal generator frequency modulated at an audio frequency and swept approximately 600 KC (±300 KC). An oscilloscope should be connected to Test jack pin 3 and all IF screws adjusted for a symmetrical pattern of highest amptitude. See Fig. 1. For discriminator alignment, connect scope to Test jack pin 1 and adjust T5 for highest symmetrical pattern. See Fig. 2.

NOTE: 2. In all FM alignment calling for a voltage measurement at Test jack pin 3 (limiter grid resistor) keep signal generator output to such a value as will result in approximately 2 volts measured with a vacuum Tube voltmeter such as the Voltohmyst, Vomax or equiv.



TUBE LAYOUT

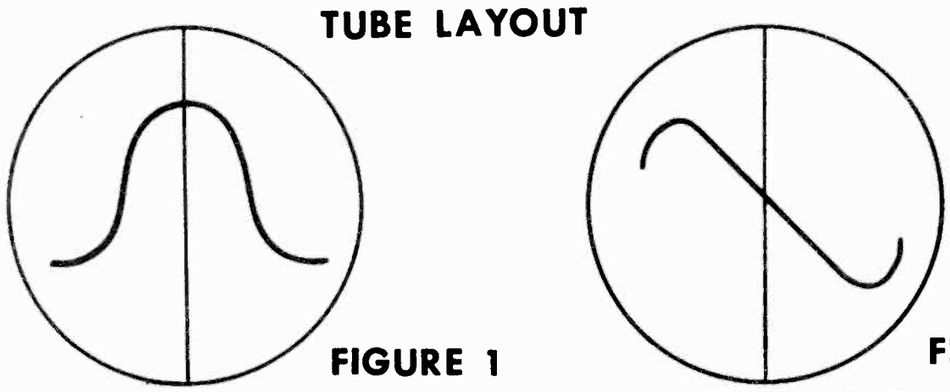
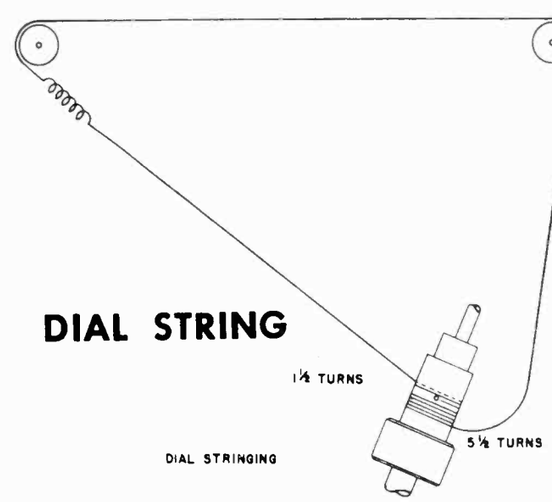


FIGURE 1

DIAL STRING



SHOWN WITH CONDENSER PLATES FULLY OPEN.

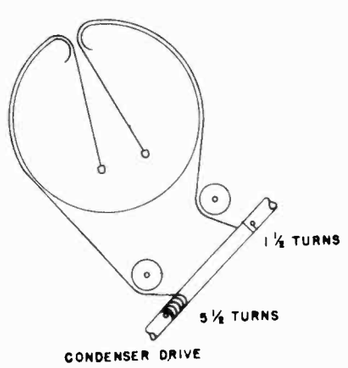


FIGURE 2

MAJESTIC RADIO & TELEV. CORP. MODELS 10B27E, 10FM782

VOLTAGE CHART

Measurements made at 117 volts line; volume control at minimum; zero signal input. Measurements made to chassis ground with vacuum tube voltmeter.

TUBE	ELEMENT	PIN NO.	VOLTAGE
6BA6 R.F. AMP.(F.M.)	plate	5	175
	screen grid	6	83
	cathode	7	.95
	control grid	1	0
6BE6 CONVERTER (F.M.)	plate	5	180
	screen grid	6	97
	cathode	2	0
	control grid	7	0
	osc. injector grid	1	* 3.2 to 3.5
6SG7 R.F. AMP.(A.M.)	plate	8	240
	screen grid	6	195
	cathode	5 & 3	.7
	control grid	4	-.7
6SA7 CONVERTER (A.M.)	plate	3	215
	screen grid	4	90
	cathode	6	0
	control grid	8	-1.0
	osc. injector grid	5	* -13 to +3.6
6SG7 1st I.F. AMP.	plate	8	215
	screen grid	6	130
	cathode	5 & 3	0
	control grid	4	-1.3
6SG7 2nd I.F. AMP.	plate	8	190
	screen grid	6	105
	cathode	5 & 3	1.2
	control grid	4	0
6SH7 LIMITER	plate	8	27
	screen grid	6	40
	cathode	5 & 3	0
	control grid	4	0
6S8 DISC.*-AM DET. 1st I.F. AMP.	plate	6	84
	cathode	2	0
	control grid	top cap	-0.8
5Y3/5U4	plate	4	350-A.C.
	plate	6	350-A.C.
	filament	8/2	325-350 D.C.
6V6 POWER OUTPUT	plate	3	230
	screen grid	4	270
	cathode	8	13
	control grid	5	0

* The Following chart is reference oscillator grid; Oscillator voltage varies with frequency.

Band sw.	Tube	Frequency	Voltage
A.M.	6SA7	600 KC	-11
		1000 KC	-12.5
		1500 KC	-13
S.W.	6SA7	10 MC	4.2
		15 MC	3.6
F.M.	6BE6	88 MC	3.2
		103 MC	3.4
		108 MC	3.5

PARTS LIST

ITEM NO.	PART NO.	DESCRIPTION
C1a,b,c.	7-17	Ganged Tuning Condenser A.M. & F.M.
C2a,b,C3c.	8-38	Trimmer 3-13 mmf (Gang trimmers).
C3,C8,C10.	6-159	47 mmf., 500 V ceramic 20% Condenser.
C4,C55,C71	6-230	.001 mfd 400 V ceramic 10% Condenser.
C5,C6,C9,C13,C73,C74.	6-143	24 mmf 500 V ceramic 10% Condenser.
C7	021-15	1000 mmf 500 V mica 5% Condenser.
C11	6-199	15 mmf 500 V ceramic 5% Condenser
C12	017-5	.01 mfd 600 V paper Condenser
C14,C20,C23,C27,C34, C36,C48,C52,C54,C64, C66,C67,C79,C82.	.....	Part of T2, 1st I.F. transformer.
C15,C16,C51,C53.	6-231	.002 mfd 400 V ceramic 10% Condenser
C17,C22,C26	.....	Part of T3, 2nd I.F. transformer.
C18,C19,C45,C47.	.....	Part of T4, 3rd I.F. transformer.
C21,C24,C25	.....	Part of T5, Discriminator transformer
C28,C29,C30	020-39	100 mmf 500 V mica 20% Condenser.
C31	020-53	220 mmf 500 V mica 20% Condenser.
C32,C40,C46	016-6	.02 mfd 400 V paper Condenser
C33,C49	5-69	.006 mfd 600 V paper Condenser.
C35	19-34	10-10 mfd 450 V electrolytic Condenser.
C37a,b	017-4	.005 mfd 600 V paper Condenser.
C38		

MODELS 10B27E, 10FM782 — MAJESTIC RADIO & TELEV. CORP.

PARTS LIST--Continued

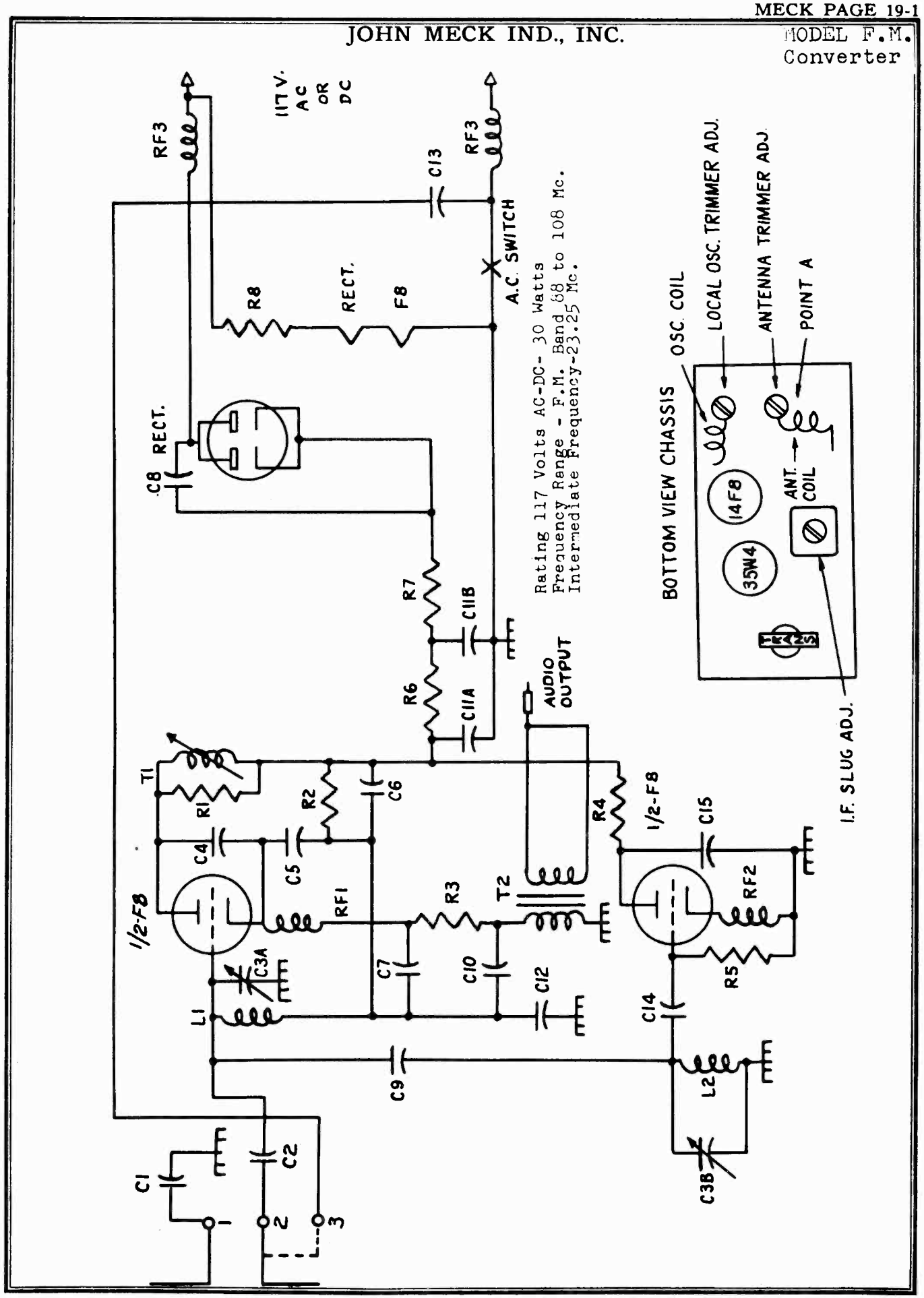
ITEM NO.	PART NO.	DESCRIPTION
C42	020-67	470 mmf 500 V mica 20% Condenser.
C43	19-35	30 mfd 450 V electrolytic Condenser
C44	021-20	1300 mmf 500 V mica Condenser
C50, C68	016-8	.05 mfd 500 V paper Condenser
C56	6-207	220 mmf 500 V ceramic condenser
C57	8-65	200-600 mmf padder condenser.
C58, C59	.....	Part of L5 coil assembly.
C60, C70	6-208	234 mmf 500 V mica condenser.
C61, C62, C63, C65	.....	Part of T7 coil assembly.
C69	.....	Part of T8 coil assembly.
C71	.....	Part of L1 coil assembly (47 mmf.).
C72	8-35	2½-30 mmf ceramic trimmer
C75, C76, C77, C78	021-74	.01 mfd 500 V mica 20% condenser.
C81	8-63	15-115 mmf trimmer (wave trap).
L1	20-27	Broadcast loop assembly (less cover #20-28)
L2	.....	Loading coil (part of 20-27 loop)
L3	3-184	F.M. B.F. coil.
L4	3-189	F.M. oscillator coil.
L5	3-171	A.M. oscillator coil.
L6	S-1468	Wave trap coil.
R1	02-37	68 ohms ½ watt 10% resistor
R2	03-157	47,000 ohms 1 watt 20% resistor
R3, R11, R37, R42	03-118	5600 ohms 1 watt 10% resistor
R4	01-2	10 ohms ¼ watt 10% resistor
R5, R41	9-222	22,000 ohms ½ watt 20% resistor (01-143).
R6, R40	04-143	22,000 ohms 2 watt 20% resistor
R7, R39	02-143	22,000 ohms ½ watt 20% resistor
R8, R10, R43	02-156	47,000 ohms ½ watt 10% resistor
R9	02-41	82 ohms ½ watt 10% resistor
R12	.....	Part of T4 assembly (47,000 ohms ½ w 10%)
R13, R20, R31, R35, R38, R44, R45	02-199	470,000 ohms ½ watt 20% resistor.
R14	02-149	33,000 ohms ½ watt 10% resistor
R15, R16	02-170	100,000 ohms ½ watt 10% resistor.
R17, R19	.....	Part of T5 assembly (470,000 ohms ½ w 10%).
R18	02-157	47,000 ohms ½ watt 20% resistor
R21	02-255	10 megohm ½ watt 20% resistor
R22	13-25	Volume control, 2 megohm with tap
R23	02-132	12,000 ohm ½ watt 10% resistor.
R24	14-7	Tone control 2 megohm, with switch.
R36	02-213	1 megohm ½ watt 20% resistor.
R29	** 9-342	700 ohms 10 watts 10% resistor.
R30	9-290	250 ohm 5 watt 10% wire wound resistor.
R33	02-226	2.2 megohm ½ watt 10% resistor.
R34	01-160	56,000 ohm ½ watt 10% resistor.
R50	02-44	100 ohm ½ watt 10% resistor
RFC-1	3-187	6BA6 plate choke.
RFC-2, RFC-3	3-188	Filament choke.
RFC-4	3-104	Diode plate choke
S1	11-58	Band switch (R.F.).
S2	11-59	Band switch (pilot lites & audio)
S3	.....	Part of Tone control assembly, A.C. switch.
T1	3-183	F.M. antenna transformer.
T2	3-173	1st I.F. transformer.
T3	3-174	2nd I.F. transformer.
T4	3-175	3rd I.F. transformer.
T5	3-176	Discriminator transformer
T6	2-9	Power transformer
T7	3-186	B.C.-S.W. R.F. transformer.
T8	3-185	S.W. antenna transformer.
T9	52-58	Output transformer (part of speaker ass'y).
	15-81	Tube socket (octal)
	15-87	Phono pick-up socket.
	15-135	Phone A.C. receptacle socket.
	26-2	Dial lite (#47 brown bead).
	26-7	Dial lite (#44 blue bead)
	16-34	Tube shield, for 6BA6 & 6BE6 tubes.
	S-1570	Dial pointer & carriage assembly.
	135-30-2	Dial pointer, lower carriage only
	129-56	Dial cord tension spring.
	S-1329	Dial cord, 62 inches long (#134-7).
	S-1328	Dial cord (for condenser gang).
	117-63	Dial scale F.M.
	117-90	Dial scale B.C.
	117-91	Dial scale S.W.
	**22-58	Speaker, 12" complete with output transformer
	115-45-2	Cabinet, combination console.
	122-44	Dial escutcheon grill
	122-20	Escutcheon glass (large).
	21-32	Record changer, Oak
	117-50	Dial masking plate.
	128-85	Knob, (band switch)
	129-46	Spring, insert for above knob
	128-37	Knob, (tone-tuning-volume).
	S-1330 or S-1863	R.F. shelf & tuning condenser ass'y

** Speakers marked with a BLUE X have a change of wiring; ref; speaker plug and chassis socket, pin #2 interchanged with pin #5. Change refers to LATE RUN SETS ONLY.

** R29 (700 ohm) Resistor is omitted in chassis using speaker #22-58. Sets using 10" speakers — schematic circuit remains the same. (TUBES 5Y3GT & 5U4G ARE INTERCHANGEABLE)

JOHN MECK IND., INC.

MODEL F.M. Converter



INSTRUCTIONS

Alignment Notes

GENERAL DESCRIPTION:

In addition to functioning as a converter-oscillator in a superheterodyne circuit, one section comprising of pins 1 - 3 - 4 of the #14F8 double triode, as uaed in the MECK F.M. Converter, is functioning as super-regenerative detector and I.F. amplifier. Since the super-regenerative amplification is at the intermediate frequency, relatively little energy is radiated from the antenna. Pins 5 - 6 - 8 is the triode section of the #14F8 that is used as a local oscillator for normal superheterodyne action. Detection of the frequency modulation is accomplished by the signal being normally resident on the side of the selectivity curve. This is the reason it is necessary to slightly mistune the received signal for best F.M. reception.

CIRCUIT SYMBOL	PART NUMBER	DESCRIPTION
C1, C12, C13, C15	CC-15501	Condenser, Ceramic, 500 Mmf.
C2, C9	CC-1520	Condenser, Ceramic 2 Mmf.
C3A, C3B	CV-10014	F.M. Variable
C4, C5	CC-15300	Condenser, Ceramic, 30 Mmf.
C6	CP-12502	Condenser, Paper .005 Mf.
C7	CP-12522	Condenser, Paper, .0025 Mf.
C8	CP-12103	Condenser, Paper, .01 Mf.
C10	CL-10011	Condenser Elect. 8 Mfd.
C11A, C11B	CL-10007	Condenser, Elect., 30/50 Mfd.
C14	CC-15200	Condenser, Ceramic, 20 Mmf.
R1	RC-26802	Resistor, Carbon 68,000 ohm 1/3 Watt
R2	RC-21503	Resistor, Carbon, 150,000 ohm, 1/3 Watt
R3	RC-21501	Resistor, Carbon, 1,500 ohm 1/3 Watt
R4	RC-21000	Resistor, Carbon, 100 ohm 1/3 Watt
R5	RC-22202	Resistor, Carbon, 22,000 ohm 1/3 Watt
R6	RC-22001	Resistor, Carbon. 2,000 ohm 1/3 Watt
R7	RC-21001	Resistor. Carbon, 1,000 ohm 1/3 Watt
R8	WP-10003	Line Cord Resistor
L1	TRF-10009	F.M. Antenna Coil
L2	TRC-10010	F.M. Osc. Coil
RF1	TSP-10016	Choke (Inside I.F. Can) & (T1)
RF2	LG-10002	12 Uh. Choke
RF3	LG-10001	Line Cord Inductor
T2	TO-10009	Audio Transformer

The super-regenerative circuit is inherently self-regulating; that is, it acts as if it had good automatic volume control. This super-regenerative circuit has the added feature of an automatic regeneration control, applied to the quench-oscillator Capacitor C-7 and the Resistor R-3, in the cathode controls the quench wave shape, selectivity, and is the quench pulse width control. While the Resistor R-2 and the Capacitor C-6 in the plate circuit regulate the average grid current repetition rate and so controls the regeneration automaticelly.

The Converter contains a built-in antenna system which is internally connected to Terminal #3. To use the built-in antenna, connect together Terminals #2 and #3, with a short length of wire. In locations unfavorable to F.M. Reception, improved results will be obtained by using an inside or outside dipole antenna. This antenna must be carefully installed and connected to Terminals #1 and #2.

ALIGNMENT CHART

Use A.M. or F.M. Signal Generator

Alignment made with output meter across voice coil of speaker to which the converter is connected.

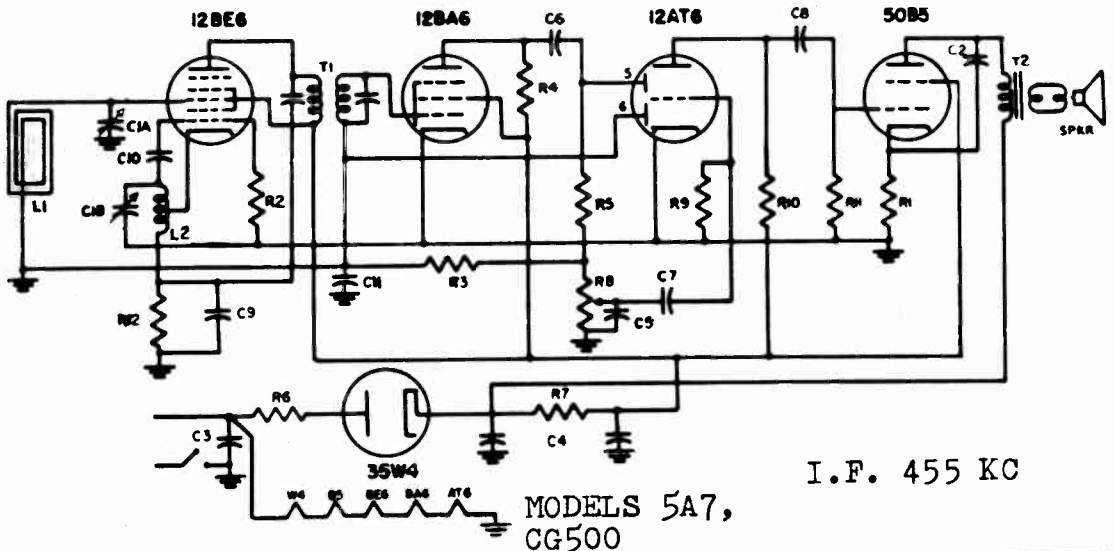
CIRCUIT ALIGNED	DIAL POINTER	SIGNAL GENERATOR 30% Modulation Freq. Connection	TRIMMER OR SLUG ADJUSTMENT	PROCEDURE
I.F.	108 Mc.	23.25 Mc. through .01 Capacitor to Point A or Pin #1 or F8 Tube	Bottom slug I.F. Can	Adjust for maximum output.
R.F.	105 Mc.	105 Mc. through 300 ohms to Terminal #1 and Terminal #2	Local Osc. Trimmer	Adjust for maximum output.
R.F.	105 Mc.	105 Mc. through 300 ohms to Terminal #1 and Terminal #2	Antenna Trimmer	Adjust for maximum output while rocking variable condenser

ALIGNMENT OF F.M. STATION:

If you do not have the equipment to make the necessary alignments djustments, the R.F. section may be easily aligned on a local station. With the proper antenna attached, tune in an F.M. station, preferrably between 97 and 108 Mc. Note any difference in calibration and correct accordingly with the local oscillator trimmer. Then adjust the antenna trimmer for maximum output while rocking the variable condenser.

JOHN MECK IND., INC.

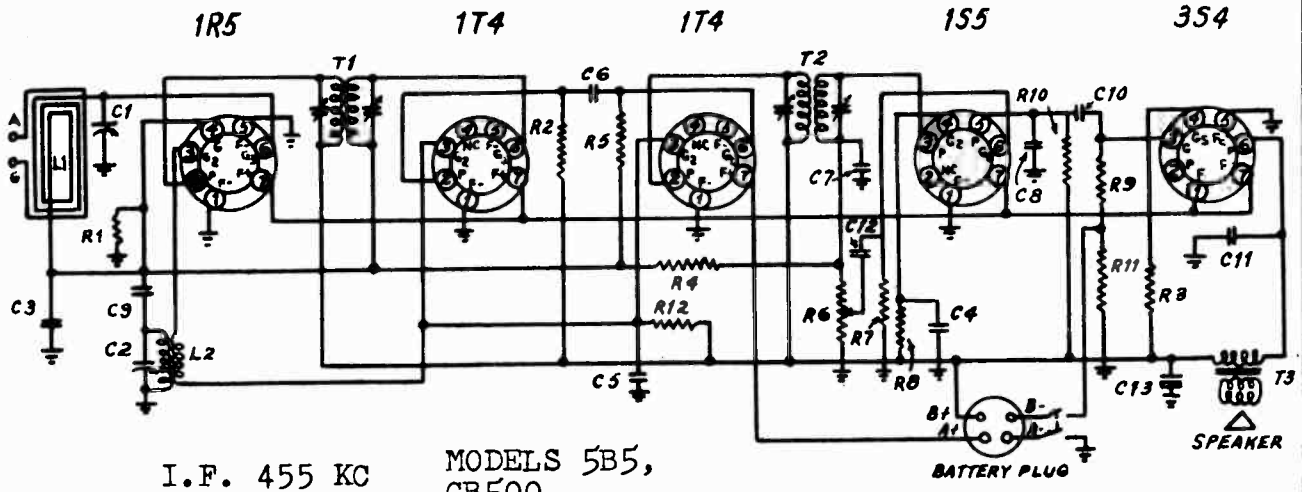
MODELS 5A7, 5B5, CB500, CG500



I.F. 455 KC

MODELS 5A7, CG500

Part No.	Circuit Symbol	Description	Part No.	Circuit Symbol	Description
CV-10008	C1	Variable condenser for Model 5A7	RCP-30220	R6	Resistor carbon 22 ohm ½ watt
CPP-14203	C2	Condenser paper tub .02 mfd-400V	RCP-41001	R7	Resistor carbon 1000 ohm 1 watt
CPP-14503	C3	Condenser paper tub .05 mfd-400V	VCP-10105	R8	Volume control 1 megohm and switch
CLP-10007	C4	Condenser electrolytic 50-30 mfd-150V	VCP-12105	R8	Volume control for Model 5A7- 1 megohm
CMP-15251	C5, C6	Condenser mica 250 mmf-500V	RCP-31005	R9	Resistor carbon 10 megohm ½ watt
CPP-12103	C7, C8	Condenser paper tub .01 mfd-200V	RCP-32203	R10	Resistor carbon 220,000 ohm ½ watt
CPP-11103	C9	Condenser paper tub .01 mfd-150V	RCP-34703	R11	Resistor carbon 470,000 ohm ½ watt
CMP-15500	C10	Condenser mica 50 mmf-500V	ALP-10013	L1	Loop antenna
CPP-12203	C11	Condenser paper .02 mfd-200V	TRCP-10000-D	L2	Oscillator coil
RCP-31500	R1, R12	Resistor carbon 150 ohm ½ watt	TSP-10002	T1	I.F. Transformer
RCP-31002	R2	Resistor carbon 10,000 ohm ½ watt	TOP-10000	T2	Output transformer
RCP-32204	R3	Resistor carbon 2.2 megohm ½ watt	SRP-10005	SPKR	Speaker P.M. 3" round for Model 5A7
RCP-36801	R4	Resistor carbon 6800 ohm ½ watt			
RCP-31003	R5	Resistor carbon 100,000 ohm ½ watt			



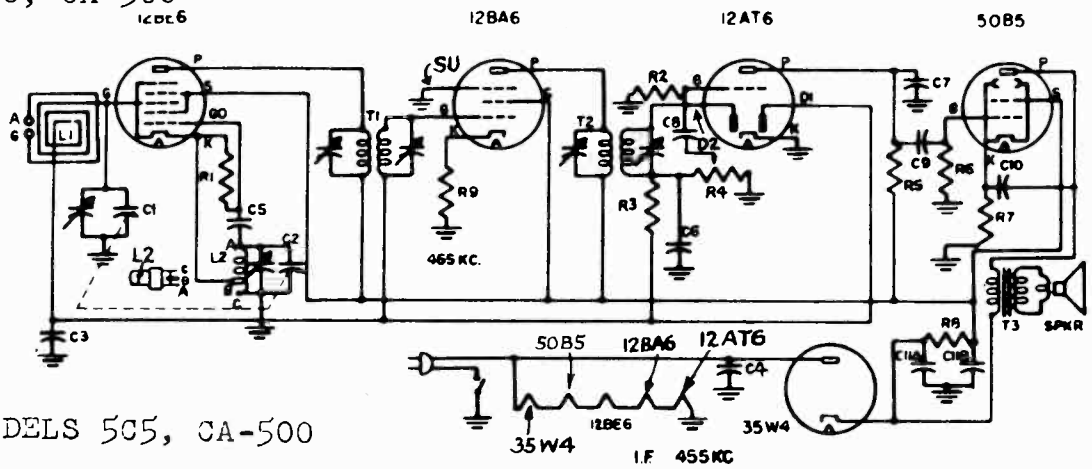
I.F. 455 KC

MODELS 5B5, CB500

Circuit Symbol	Part Number	Description	Circuit Symbol	Part Number	Description
C1, C2	CV-10002-E	Condenser-Variable with pulley	R8, R9	RC-33004	Resistor-Carbon, 3 Meg ohms ½ watt
C3, C4, C5	CP-14503	Condenser-Paper, 0.05 mfd. 400 volt	R10	RC-21004	Resistor-Carbon, 1 Meg ohm ½ watt
C6, C7	CM-15251	Condenser-Mica, 250 mmfd. 500 volt	R11	RC-34000	Resistor-Carbon, 400 ohms ½ watt
C8, C9	CM-15000	Condenser-Mica, 50 mmfd. 500 volt	R12	RC-31002	Resistor-Carbon, 10,000 ohms ½ watt
C10, C11, C12	CP-14103	Condenser-Paper, 0.01 mfd. 400 volt	L1	AL-10004	Antenna-Loop
C13	CL-10006	Condenser-Electr. 12 to 20 mfd. 150 volt	L2	TRC-10001	Coil-Oscillator
R1	RC-31000	Resistor-Carbon, 100,000 ohms ½ watt	T1	TS-10000	Transformer-1st I.F.
R2, R3	RC-30001	Resistor-Carbon, 5,000 ohms ½ watt	T2	TS-10001	Transformer-2nd I.F.
R4, R5	RC-33004	Resistor-Carbon, 3 Meg ohms ½ watt	T3	TO-10002	Transformer-Output
R6	VC-20105	Control-Volume, 1 Meg ohm with d.p.s.t. switch	SPKR	SR-10002	Speaker-P.M. 5" round loss output transformer
R7	RC-31005	Resistor-Carbon, 10 Meg ohms ½ watt			

JOHN MECK IND., INC.

MODELS 5C5, 5D7-W18, CA-500

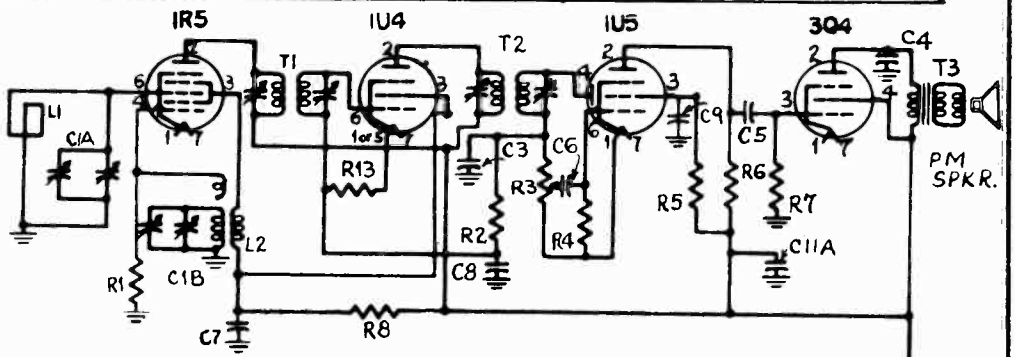


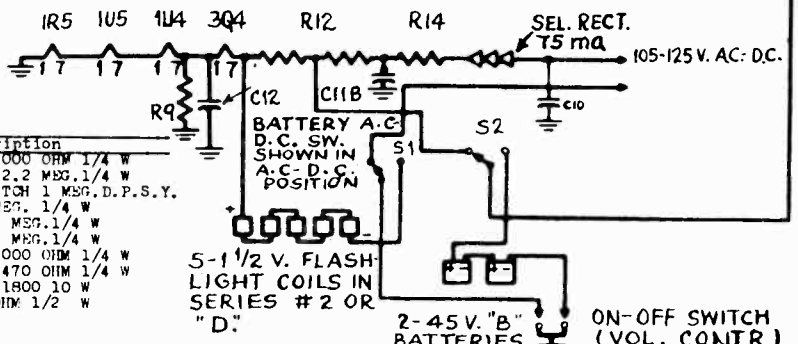
MODELS 5C5, CA-500

PART NO.	CIRC. SYM.	DESCRIPTION
CV-10002-E	C1, C2	Condenser - Variable Tuning with Drum
CP-14503	C3, C4	Condenser - .05 Mfd. 400 Volt
CM-15500	C5	Condenser - .00005 Mfd. Mica
CM-15251	C6, C7	Condenser - .00025 Mfd. Mica
CP-14103	C8, C9	Condenser - .01 Mfd. 400 Volt
CP-14503	C10	Condenser - .05 Mfd. 400 Volt
CL-10001	C11A, C11B	Condenser - 20/20 Mfd. 150 Volt Elect.
RC-32002	R1	Resistor-Carbon 20,000 ohms ½ watt
RC-31005	R2	Resistor-Carbon 10 Meg. ½ watt
RC-32004	R3	Resistor-Carbon 2 Meg. ½ watt
VC-10105	R4	Volume Control - 1 Meg. (with switch)

PART NO.	CIRC. SYM.	DESCRIPTION
RC-32503	R5	Resistor-Carbon 250,000 Ohms ½ watt
RC-35003	R6	Resistor-Carbon 500,000 Ohms ½ watt
RC-31500	R7	Resistor-Carbon 150 Ohms ½ watt
RC-32000	R8	Resistor-Carbon 200 Ohms ½ watt
RC-31500	R9	Resistor-Carbon 150 Ohms ½ watt
AL-10004	L1	Loop Antenna
TRC-10000-D	L2	Coil Oscillator
TS-10000	T1	Transformer 1st. I.F.
TS-10001	T2	Transformer 2nd. I.F.
TO-10000	T3	Transformer-Output for speaker
SR-10000	SPKR	Speaker, 4" P.M.

MODEL 5D7-W18





Circuit Sym	Part No.	Description
R1	RC-11003	RESISTOR CARBON 100,000 OHM 1/4 W
R2,7,13	RC-32204	" " 2.2 MEG.1/4 W
R3	VC-21105	VOLUME CONTROL & SWITCH 1 MEG.D.P.S.Y.
R4	RC-11005	RESISTOR CARBON 10 MEG. 1/4 W
R5	RC-13304	" " 3.3 MEG.1/4 W
R6	RC-11004	" " 1 MEG.1/4 W
R8	RC-11002	" " 10,000 OHM 1/4 W
R9	RC-14700	" " 470 OHM 1/4 W
R12	RX-10004	" WW. 700-1800 10 W
R14	RC-30220	" CARBON 22 OHM 1/2 W
C1	CV-10008	CONDENSER VARIABLE
C3	CM-15251	" MICA 250 MMF 500 V
C4	CP-14502	" PAPER .005 MF 400 V
C5	CP-12502	" " .005 MF 200 V
C7,9	CP-12103	" " .01 MF 200 V
C8	CP-12203	" " .02 MF 200 V
C10	CP-14503	" " .05 MF 400 V
C11	CL-10010	" ELECT. A-80 B-20 150 V
C12	CL-10009	" " 100 MF 25 V
L1	AL-10015	LOOP ANTENNA
L2	TRC-10015	OSCILLATOR COIL
S1,2	VS-10005	SWITCH AC-DC BATTERY
T1	TS-10018A	I.F. TRANSFORMER INPUT
T2	TS-10019A	I.F. TRANSFORMER OUTPUT
T3	TO-10007	OUTPUT TRANSFORMER
SPKR.	SR-10000	SPEAKER 4" PM - ROUND
C6	CP-12202	CONDENSER PAPER .002 MF 200 V

105 to 125 VOLTS A.C. (50 to 60 CYCLES) OR D.C.

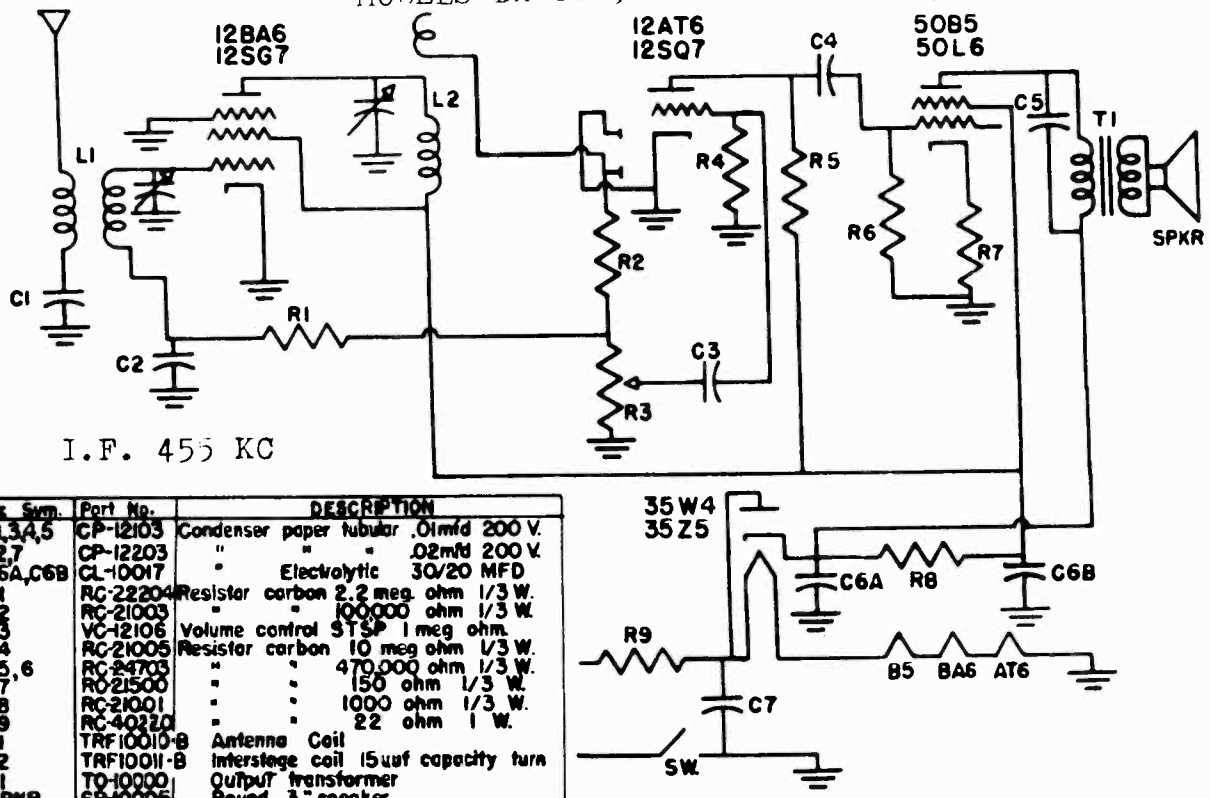
Power Consumption 15 Watts

I.F. 455 KC

JOHN MECK IND., INC.

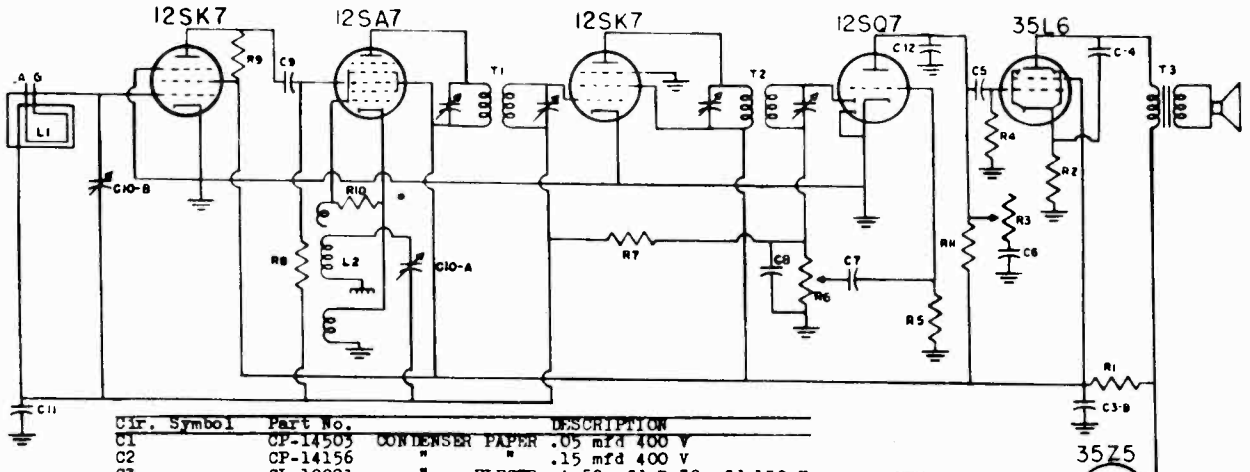
MODELS DA-601, DB-602

MODELS DA-601, DB-602
MODEL 6B8



Cir. Sym.	Part No.	DESCRIPTION
C1,3,4,5	CP-12103	Condenser paper tubular .01mfd 200 V.
C2,7	CP-12203	" " " .02mfd 200 V.
C6A,C6B	CL-10017	" Electrolytic 30/20 MFD
R1	RC-22204	Resistor carbon 2.2 meg. ohm 1/3 W.
R2	RC-21003	" " 100,000 ohm 1/3 W.
R3	VC-12106	Volume control STSP 1 meg ohm.
R4	RC-21005	Resistor carbon 10 meg ohm 1/3 W.
R5,6	RC-24703	" " 470,000 ohm 1/3 W.
R7	RC-21500	" " 150 ohm 1/3 W.
R8	RC-21001	" " 1000 ohm 1/3 W.
R9	RC-40220	" " 22 ohm 1 W.
L1	TRF10010-B	Antenna Coil
L2	TRF10011-B	Interstage coil 15uuf capacity turn
T1	TO-10000	Output transformer
SPKR.	SR-10005	Round 3" speaker

MODEL 6B8

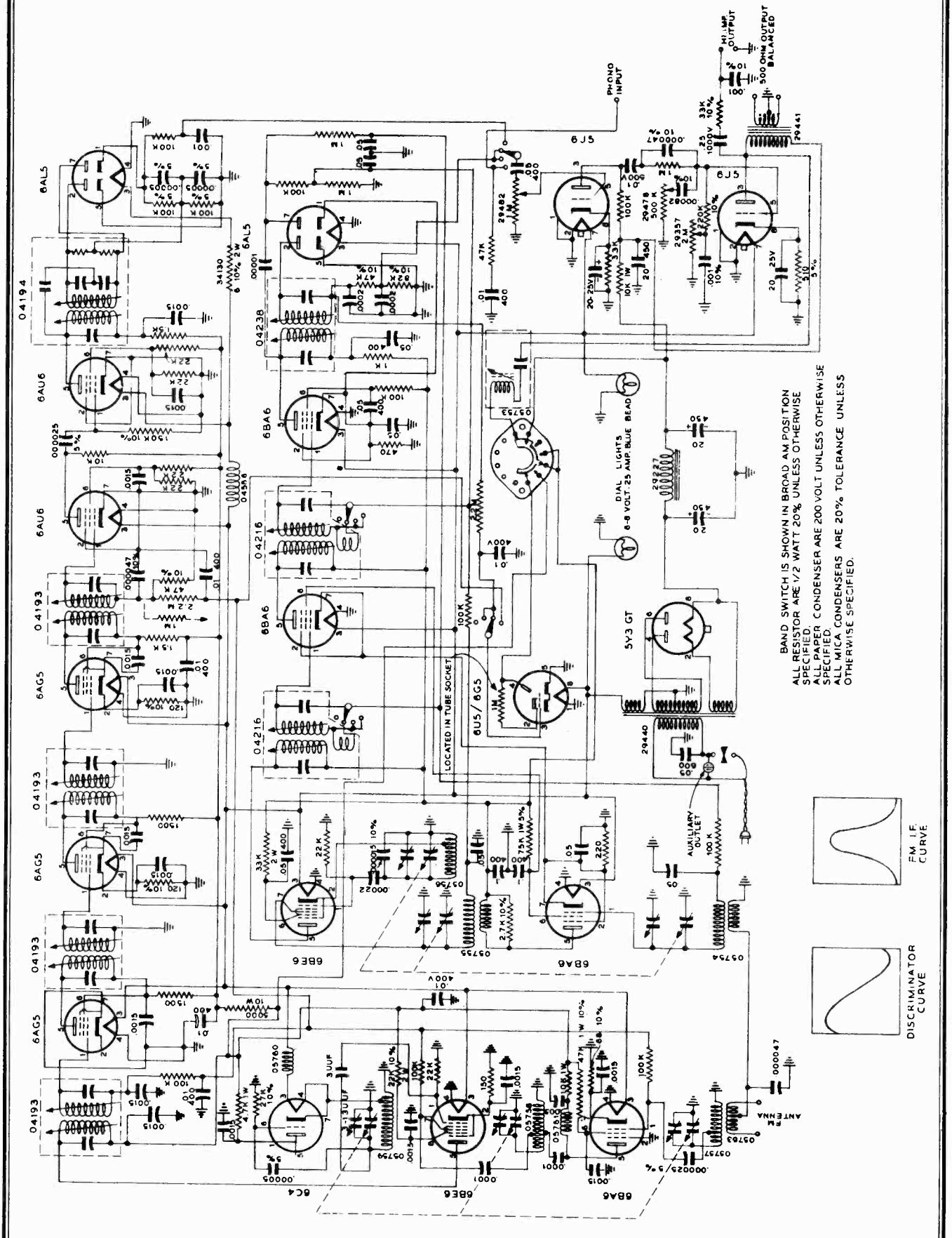


Cir. Symbol	Part No.	DESCRIPTION
C1	CP-14503	CONDENSER PAPER .05 mfd 400 V
C2	CP-14156	" " .15 mfd 400 V
C3	CL-10021	" ELECTR. A-50 mfd B-30 mfd 150 V
C4	CP-14203	" PAPER .05 mfd 400 V
C5	CP-12502	" " .005 mfd 200 V
C6	CP-12302	" " .003 mfd 200 V
C7	CP-12202	" " .002 mfd 200 V
C8,C12	CM-15221	" MICA 220 mmf 500 V
C9	CM-15101	" " 100 mmf 500 V
C10 A-B	CV-10009	" VARIABLE
C11	CP-12104	" PAPER .1 mfd 200 V
L1	AL-10021	ANTENNA LOOP
L2	TRC-10013	OSCILLATOR COIL
R1	RC-51001	RESISTOR CARBON 1000 OHM 2 WATT
R2	RC-31500	" " 150 OHM 1/2 WATT
R3	VC-13105	1 MEG TONE CONTROL
R4	RC-15003	RESISTOR CARBON 500,000 OHM 1/4 WATT
R5	RC-11005	" " 10 MEG OHM 1/4 WATT
R6	VC-11105	1 MEG VOLUME CONTROL WITH SWITCH
R7	RC-12204	RESISTOR CARBON 2.2 MEG OHM 1/4 WATT
R8	RC-11003	" " 100,000 OHM 1/4 WATT
R9	RC-14701	" " 4700 OHM 1/4 WATT
R10	RC-12202	" " 22,000 OHM 1/4 WATT
R11	RC-12203	" " 220,000 OHM 1/4 WATT
T1	TSP-10020	INPUT I.F. TRANSFORMER
T2	TSP-10021	OUTPUT I.F. TRANSFORMER
T3	TO-10011	OUTPUT TRANSFORMER

I.F. 455 KC

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 9-1091C



MODEL 9-1091C

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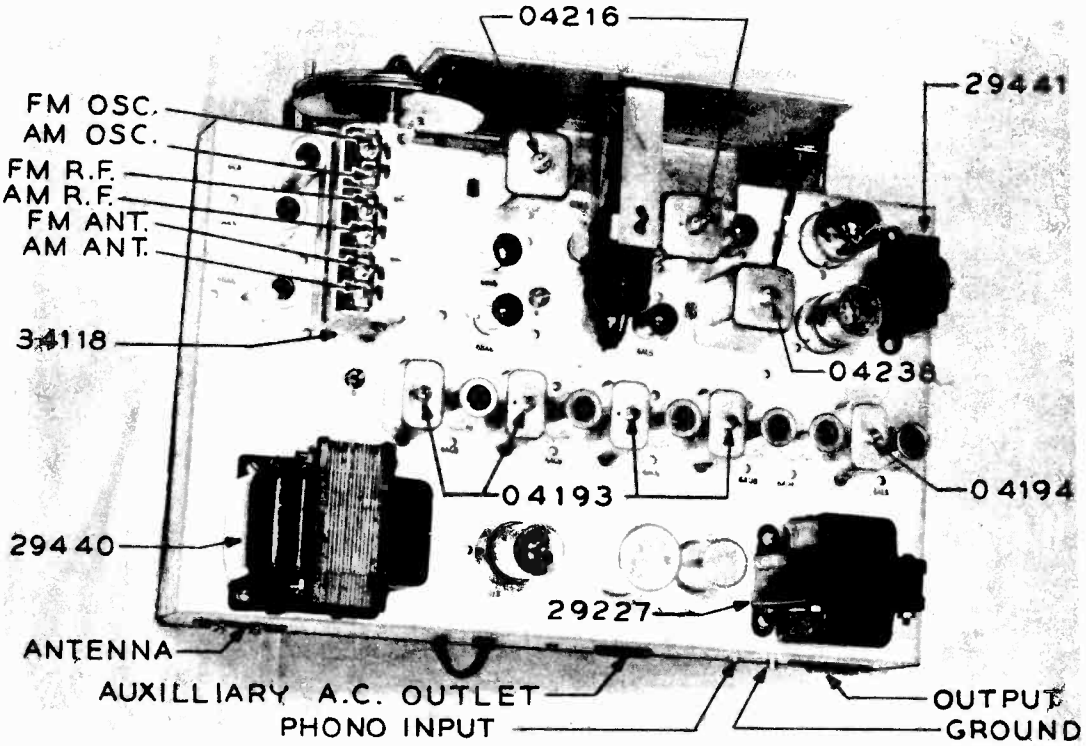

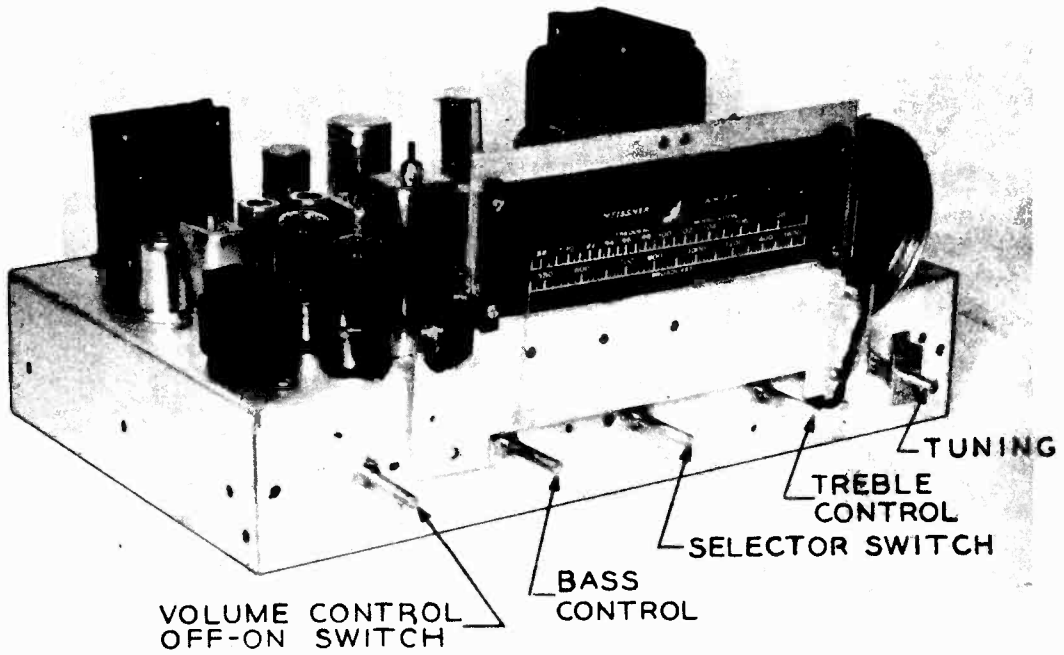

Power Supply 105-125 volts, 50-60 cycles.
CAUTION, DO NOT ATTEMPT TO OPERATE ON OTHER SUPPLY.
Power Consumption 75 watts.
Type of Circuit - Superheterodyne.
Intermediate Frequencies AM 455 kc.
FM 10.7 mc.
Output impedance - 500 ohm balanced and high impedance unbalanced.
Antenna impedance
Broadcast - Standard
F M - - - - 300 ohms.

Alignment AM

The AM alignment may be carried out with an AM signal generator and an output meter. Connect a 500 ohm resistor across the 500 ohm output terminals of the Tuner. The output meter may be connected from the high impedance output terminal to chassis.

For IF alignment introduce a 455 kc. 30% modulated signal into the signal grid of the 6BE6 (Pin #7) through a .1 ufd. coupling condenser. The output of the signal generator should at all times be kept as low as will give a satisfactory reading on the output meter. With the selector switch in the sharp position, adjust the top and bottom adjustments of IF transformers 04216, 04216, and 04238 for maximum output. Now move the selector switch to the broad position and check the symmetry of the IF response curve by swinging the signal generator frequency. The response in the broad position should be double peaked, the dip between the peaks falling at 455 kc. The peaks should be equally spaced on either side of 455 kc. and should be of approximately the same amplitude. The gain in the broad position will be less than the gain in the sharp position. If the above conditions do not exist, then a careful recheck of alignment in the sharp position should be carried out.

For RF alignment introduce a 30% modulated signal through a 200 uuf. dummy antenna to one of the FM antenna terminals. First check dial pointer position by turning the gang condenser to full mesh and setting the pointer to the last reference mark at the low end of the dial scale. With signal generator and Tuner set to 1400 kc., adjust the oscillator trimmer for maximum output, then adjust RF and antenna trimmers for maximum output.

Alignment FM

For FM alignment a frequency modulated generator (60 to 400 cycle modulation, 400 kc. sweep) and an oscilloscope are required. Connect the modulation source on the signal generator into the horizontal amplifier of the oscilloscope. It may be necessary to connect a phase shifting network in this line between the signal generator modulating source and the oscilloscope horizontal amplifier in order to get the correct pattern on the oscilloscope. Connect the Tuner output to the vertical amplifier input of the oscilloscope.

Introduce a 10.7 mc. (400 kc. sweep) signal into the grid of the first 6AU6 limiter tube (Pin #1) through a .01 ufd. condenser. Make the ground connection of the generator to the center post of the 6AU6 socket with as short a lead as

possible. Remove the last 6AG5 IF amplifier tube to avoid the possibility of stray signals coming through the IF system and confusing the discriminator alignment procedure. Adjust the signal generator sweep and signal amplitude, and the oscilloscope for a pattern like the discriminator pattern shown in Fig. 3. Adjust the top adjustment on the 04194 discriminator coil for maximum vertical amplitude on the oscilloscope pattern and adjust the bottom adjustment on this coil for best symmetry of the pattern about the center. Repeat these two adjustments until no further improvement can be made. This completes the adjustment of the discriminator coil. Replace IF tube.

For alignment of the IF amplifier the same oscilloscope set-up is retained except the input to the vertical amplifier. Feed the input to the vertical amplifier with audio taken from the first limiter grid return. This point is identified as point X on the circuit diagram of Fig. 3. Connection should be made to this point through a 1 megohm isolating resistor as shown by dotted line in Fig. 3.

Introduce a 10.7 mc. (400 kc. sweep) signal into the signal grid of the 6BE6 (Pin #7) through a .01 ufd. condenser. Make the ground connection of the signal generator to the center post of the 6BE6 socket with as short a lead as possible. Adjust signal generator and oscilloscope to obtain a pattern like the IF pattern shown in Fig. 3. Adjust top and bottom adjustments on the four 04193 IF coils for maximum amplitude and symmetry of the pattern, keeping the signal level from the generator as low as possible throughout the adjustment. If the pattern tends to become double peaked or badly unsymmetrical during adjustment the trouble is probably due to incorrect placement of some of the connecting leads in the test set-up. Corrections should be made to eliminate the trouble and the adjustments repeated.

For the high frequency adjustments the same oscilloscope set-up may be retained. In connecting the signal generator to the antenna terminals the signal generator is not connected to chassis as in the previous connections. Connect two 150 ohm resistors to the two antenna terminals on the tuner. Connect the other ends of these two resistors to the two generator output terminals. If the setting of the dial pointer has been previously checked during AM alignment it is not necessary to recheck it at this point. Set the signal generator and the Tuner to 106 mc. and adjust the oscillator trimmer (identified in Fig. 1) to bring the pattern to center on the oscilloscope. In case this is possible with two different positions of the oscillator trimmer, use the position of least capacity. Adjust the RF and Antenna trimmers (identified in Fig. 1) for the greatest amplitude of the pattern keeping the generator output as low as possible during the process of adjustment.

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 9-1091C

Voltage Readings

DC taken with 20,000 ohm per volt meter.
AC taken with 1,000 ohm per volt meter.
No signal - AM sharp position except * taken in FM position.
Line voltage 117.

Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
*6BA6	Slight negative DC	0	6.3 AC	0	170 DC	87 DC	0.8 DC	-----
*6BE6	Slight negative DC	1.4 DC	6.3 AC	0	240 DC	87 DC	Slight negative DC	-----
*6C4	170 DC	0	6.3 AC	0	170 DC	Slight negative DC	0	-----
*6AG5	Slight negative DC	0	6.3 AC	0	83 DC	85 DC	0	-----
*6AG5	0	0.7 DC	6.3 AC	0	83 DC	85 DC	0.7 DC	-----
*6AG5	0	0.7 DC	6.3 AC	0	83 DC	85 DC	0.7 DC	-----
*6AU6	Slight negative DC	0	6.3 AC	0	84 DC	44 DC	0	-----
*6AU6	Slight negative DC	0	6.3 AC	0	93 DC	42 DC	0	-----
*6AL5	**-1.3 DC	**-0.7 DC	4.5 AC	0	0	0	**-7.5 DC	-----
6BA6	0	2.2 DC	6.3 AC	0	280 DC	82 DC	2.2 DC	-----
6BE6	-5 DC	0	6.3 AC	0	280 DC	73 DC	0	-----
6BA6	0	2.2 DC	6.3 AC	0	280 DC	82 DC	2.2 DC	-----
6BA6	0	2.8 DC	6.3 AC	0	278 DC	95 DC	2.8 DC	-----
6AL5	2.8 DC	Slight negative DC	6.3 AC	0	0	0	0	-----
6J5	0	0	95 DC	0	0	0	6.3 AC	4.6 DC
6J5	0	0	186 DC	280 DC	0	0	6.3 AC	4.6 DC
6U5/6G5	Green 0	-----	Yellow 0	Red 280 DC	Brown 0	Blue 6.3 AC	-----	-----
5Y3	0	284 DC	0	260 AC	0	260 AC	280 DC	284 DC

NOTE: Normal tolerance on components makes possible a variation of ± 20% in all DC voltage readings.

** Subject to wide variation.

Sensitivity - less than 10 microvolts.
Audio fidelity
  Flat within ± 2 db. from 30 to 15000 cycles.
Band width at 1000 kc.
  Sharp 7 kc.
  Broad 14 kc.
Output
  High impedance 11 volts maximum for 2-1/2% distortion.
  500 ohm 2 volts maximum for 2-1/2% distortion.
Distortion
  2-1/2% at full rated output
  Less at lower levels
Tone control action
  Bass boost at 40 cycles - 12 db.
  Treble suppression at 8000 cycles - 12 db.
Hum
  Maximum - 0.5 micro watts.

MODEL 9-1091C

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

DC Resistance Readings

Band Switch in BC sharp position.
Measured from specified tube pin to chassis.
Tuner turned off.
*Resistance readings in the B+ circuits may vary widely depending on the condition of the filter condensers and the polarity of the ohmmeter.
**With bass control set clockwise.

Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
	Values below given in ohms							
6BA6	2.35M	0	0	0	37K	74K	68	-----
6BE6	22K	150	0	0	27K	49K	2.35M	-----
6C4	32K	Inf.	Less than 1	0	32K	15K	0	-----
6AG5	2.35M	0	0	0	23K	23K	0	-----
6AG5	Less than 1	120	0	0	23K	23K	120	-----
6AG5	Less than 1	120	0	0	23K	23K	120	-----
6AU6	47K	0	0	0	32K	15K	0	-----
6AU6	150K	0	Less than 1	0	23K	15K	0	-----
6AL5	200K	150K	2.5	0	0	Inf.	150K	-----
6BA6	2.2M	220	0	0	*500K	*500K	220	-----
6BE6	22K	Less than 1	0	0	*500K	*500K	1.1M	-----
6BA6	2.1M	220	0	0	*500K	*500K	220	-----
6BA6	1M	470	0	0	*500K	*500K	470	-----
6AL5	470	130K	0	0	0	Inf.	1.1M	-----
6J5	0	0	*500K	Inf.	0 to 200	Inf.	0	3.3K
6J5	0	0	*500K	*500K	**220K	0	0	510
6U5/6G5	Green 0	-----	Yellow 2.3M	Red *500K	Brown 0	Blue 0	-----	-----
5Y3	Inf.	*500K	Inf.	95	Inf.	95	*500K	*500K

Power Amplifier

If this Meissner tuner is to be used with a power amplifier, a power amplifier should be chosen which will give full power output when driven with the maximum output of the Tuner (see "Nominal Performance" ratings). It is not essential that the power amplifier have exactly the right gain, but if best results are to be obtained the gain of the power amplifier should not greatly exceed the requirement. If, for instance, the power amplifier has an input jack for a phonograph pickup, then the Tuner might be fed into this jack through a voltage divider made from a 30,000 ohm potentiometer. This potentiometer should be adjusted to a level where full rated output (11 volts) from the Tuner will just produce full power output from the power amplifier. It is not recommended that the Tuner be fed into the Microphone input jack of a power amplifier.

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961

AUDIO CHANNEL "R"
FM CHANNEL "T"
AM-RF AMP 9003
SW.2 ANT.
SW.1 ANT.
BC ANT.
CABLE CAPACITY 17MMF
SW.2 R.F.
SW.1 R.F.
BC R.F.
6BE6 AM MIXER
"Y" AUDIO CHANNEL
9003 1 IF AMP
2 I.F. AMP 9003
AM DET. 9002
"U" FM CHANNEL
"Y" AUDIO CHANNEL
1MEG IN SOCKET BASE
T.E. (TUNING EYE) 6U5/6G5
"Z" AUDIO CHANNEL
"S" AUDIO CHANNEL
"V" F.M. CHASSIS
"W" F.M. CHANNEL
SW.2 OSC.
SW.1 OSC.
B.C. OSC.
AM. OSC. 6C4
ALTERNATE WIRING - AM DET.
9002
TO SWITCH
EARLY PRODUCTION OF THIS RECEIVER USED THE AM DETECTOR WIRING IMMEDIATELY ABOVE
AM. AVC. 6AG5
6AL5 AVC-T.E. RECT
T.E. AMP. 9003
PUSH BUTTON TUNING ASSEMBLY
LOCATED ON SIDE OF CABINET
LOCATED UNDER TOP OF CABINET
ROTATING DIAL SCALE
BANDSWITCH SHAFT
BANDSWITCH AND DIAL SCALE DRIVE
TUNING DIAL DRIVE
1 1/2 TURNS
MAIN GANG
FM GANG
FM TUNER GANG DRIVE

RECORD CHANGER: Webster Model 70, RCD.CH. 17-1

MODEL 2961

MEISSNER MFG. DIV.
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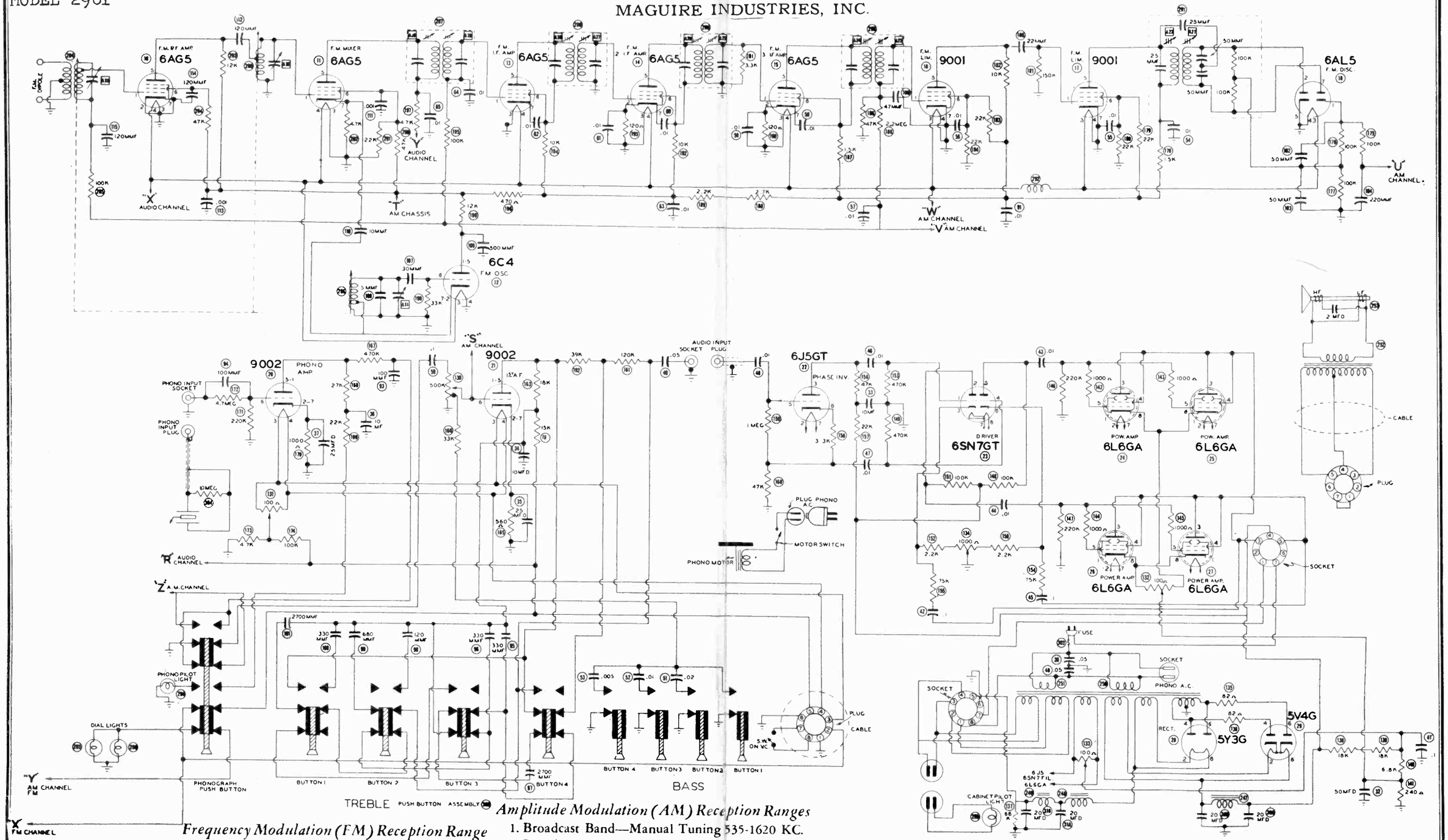


Frequency Modulation (FM) Reception Range

88-108 MC

Intermediate Frequency (IF) Amplifier Characteristics

AM Channel-Peaking Frequency 455 KC
Bandwidth (Normal) 19 KC
Bandwidth (Sharp) 7.3 KC
FM Channel-Peaking Frequency 10.7 MC
Bandwidth 150 KC

Amplitude Modulation (AM) Reception Ranges

1. Broadcast Band—Manual Tuning 535-1620 KC.
2. Broadcast Band—Automatic Tuning. Selection of six desired stations. Each push-button setting is conveniently adjustable to any point within the 535-1620 KC range from the front panel (see Front Cabinet View and Push-Button Alignment procedure). Individual calibration scales are provided for identification of button settings.
3. Shortwave Band No. 1 9.2 MC-12.2 MC
4. Shortwave Band No. 2 14.4 MC-18.4 MC

Audio Amplifier Frequency Range

60-20,000 cycles + .75 db.
—

Power Output Rating

Distortion below 4%.....20 watts

Loudspeaker—Jensen HNP-50 (Special)

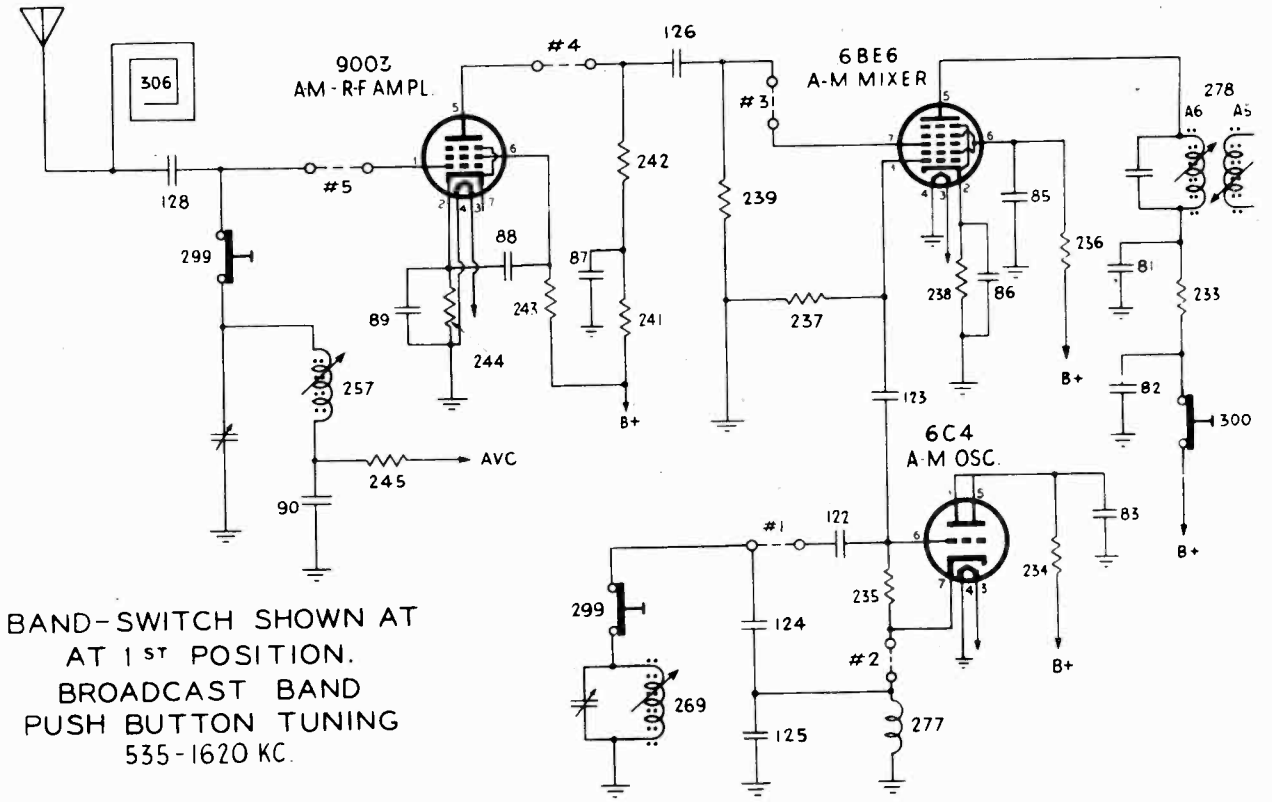
Voice Coil Impedance.....16 ohms
Permanent Magnet, Horn type coaxial, 15" diameter

Power Supply

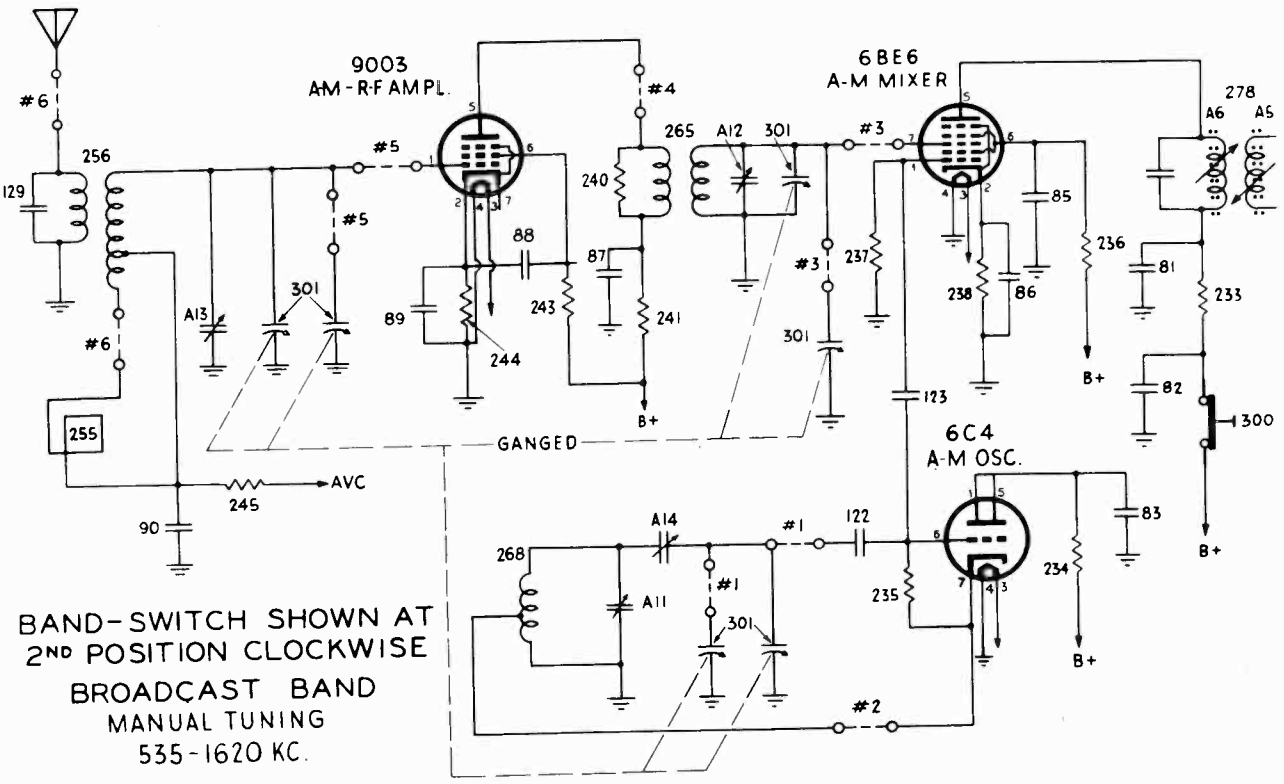
Primary Power Source, 105-125 Volts AC @ 50-60 cycles
Current Consumption, Approximately 200 Watts

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961



BAND-SWITCH SHOWN AT
AT 1ST POSITION.
BROADCAST BAND
PUSH BUTTON TUNING
535-1620 KC.



BAND-SWITCH SHOWN AT
2ND POSITION CLOCKWISE
BROADCAST BAND
MANUAL TUNING
535-1620 KC.

CLARI-SKEMATIX
Registered Trademark

MODEL 2961

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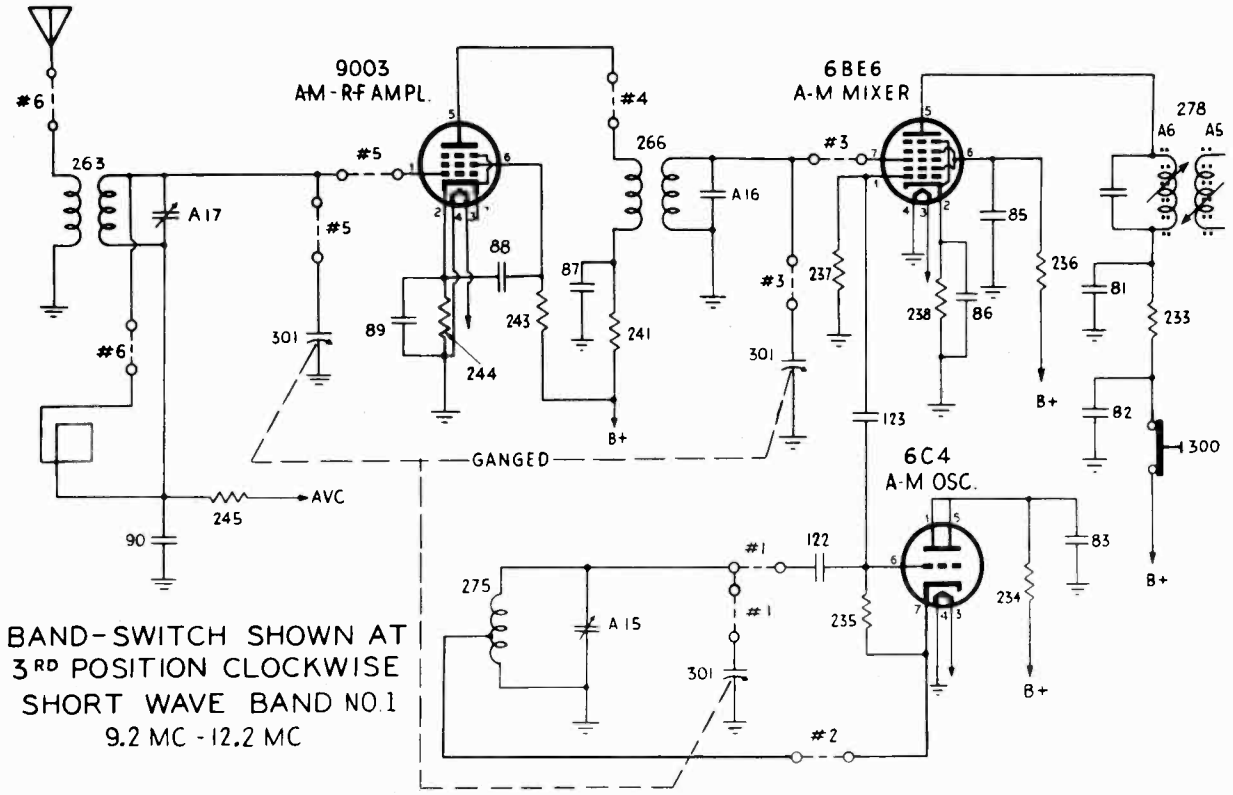
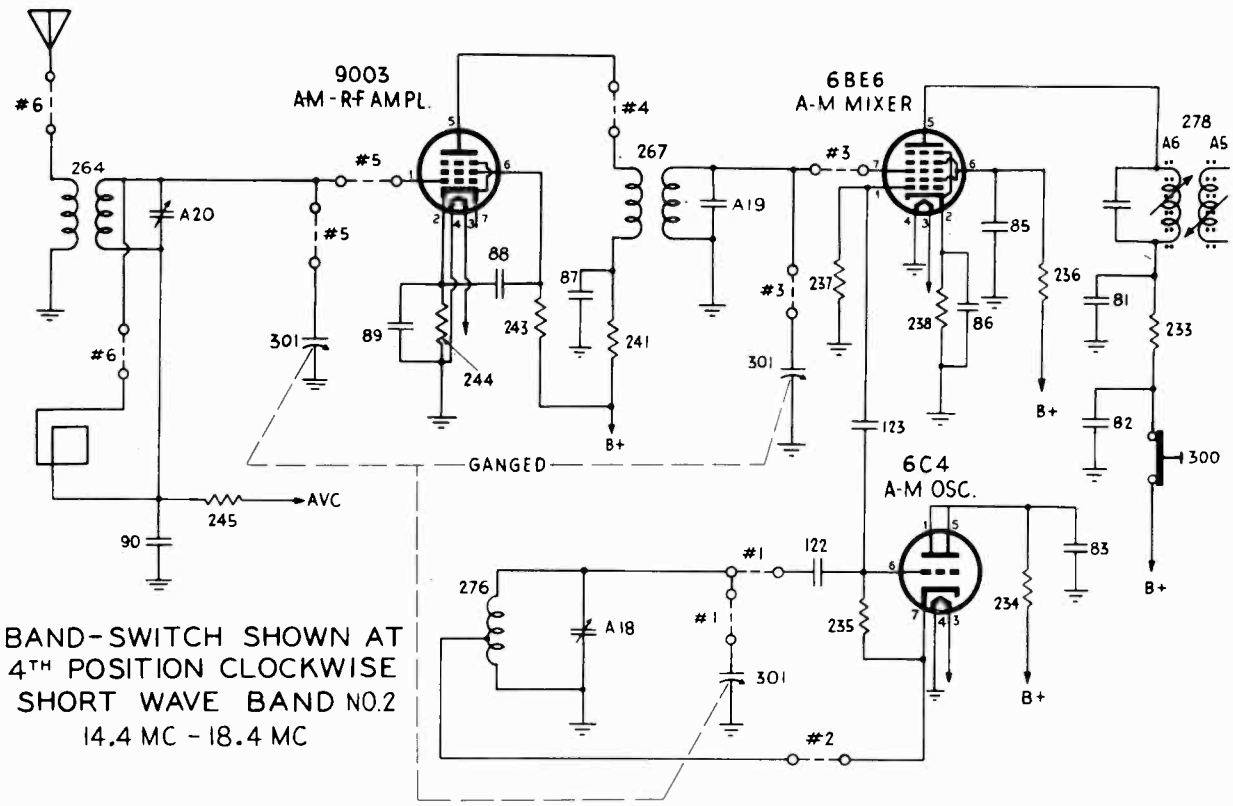




MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961

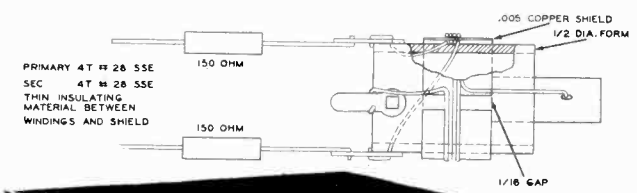
ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer at the last reference mark at the left end of the broadcast band dial. Keep output of signal generator no higher than is necessary to obtain output indication. When aligning FM RF section use dummy antenna and coupling transformer constructed as shown in sketch. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to Pin #1 (grid) of 2nd IF tube. (5). Low side to Pin3 of same tube.	455KC (Freq.Mod. 20KC sweep)	BC	High freq. end. of dial.	Pin #7 (cathode) of Detector (6) & chassis.	A1,A2.	Adjust for maximum amplitude, symmetry and coincidence of pattern on scope.
.1 MFD.	High side to Pin #1 (grid) of 1st IF Tube (4). Low side to Pin 3 of same tube.	"	"	"	"	A3,A4.	Adjust for maximum amplitude, symmetry and coincidence of pattern on scope. Turn selectivity switch to broad. Pattern should still be symmetrical about 455KC. Return selectivity switch to normal.
.1 MFD.	High side to Pin #7 (grid) of mixer tube (2). Low side to ground lug near socket of same tube.	"	"	"	"	A5,A6.	"
.1 MFD.	High side to Pin #1 (grid) of AVC Amp. (7). Low side to ground lug near socket of same tube.	"	"	"	Low side of secondary of AVC IF (281) and chassis.	A7,A8.	"
.1 MFD.	"	"	"	"	Low side of secondary of Tuning Eye IF (282)& chassis.	A9,A10	"
200MMF.	High side to terminal #6 on ant. terminal strip. Low side to chassis.	1500KC	BC	1500KC	Output meter across voice coil.	A11	Adjust for maximum output
200MMF.	"	"	"	"	"	A12,A13	" " " "
200MMF.	"	600KC	"	Tune for maximum output.	"	A14	Rock variable and adjust for maximum output. Repeat last three steps until no further improvement can be made.
400ohms	"	12.0MC	SW 1	12.0MC	"	A15	Adjust for maximum output
400ohms	"	"	"	"	"	A16,A17	Rock variable and adjust for maximum output.
400ohms	"	18.0MC	SW 2	18.0MC	"	A18	Adjust for maximum output
400ohms	"	"	"	"	"	A19,A20	Rock variable and adjust for maximum output.
.005 mica.	High side to Pin #1 (grid) of 1st limiter (16). Low side to ground lug near socket of same tube.	10.7MC (Freq. modulated 200KC deviation)	FM	High freq. end of dial.	To Pin #6 (grid) of audio amp. (21) and chassis.	A21	Adjust so that peaks of curves are symmetrical about the vertical axis and cross over at the horizontal axis.
"	"	"	"	"	"	A22	Adjust for maximum amplitude of peaks.
"	High side to Pin #1 (grid) of 3rd IF (15). Low side to ground lug near same tube.	"	"	"	To low side of secondary of 1st limiter transformer and chassis.	A23,A24	Remove 9001 second limiter (17) from socket. Adjust for maximum amplitude, symmetry and coincidence of pattern on scope.
"	High side to Pin #1 (grid) of 2nd IF (14). Low side to ground lug near same tube.	"	"	"	"	A25,A26	"
"	High side to Pin #1 of 1st IF (13). Low side to ground lug near same tube.	"	"	"	"	A27,A28	"
"	Remove FM mixer tube (11). Temporarily connect insulated lead to Pin #1 and replace tube in socket. Connect high side of signal generator to this lead. Low side to chassis.	"	"	"	"	A29,A30	Remove 9001 second limiter (17) from socket. Adjust for maximum amplitude, symmetry and coincidence of pattern on scope. Care should be taken not to disturb the mixer plate lead after IF alignment is completed as it will detune the 1st IF primary.
300Ω (See pre-alignment instructions)	To FM dipole terminals.	107.9MC	FM	300	To low side of secondary of 1st limiter transformer and chassis.	A31	Replace osc. tube. Adjust for maximum amplitude, symmetry and coincidence of pattern on scope.
"	"	"	"	"	"	A32,A33	Adjust for maximum amplitude. Replace 2nd limiter tube.
200MMF.	High side to terminal #6 on ant. terminal strip. Low side to chassis.	1400KC	Push-button (Depress first push-button from left.	Set left knob to 1400KC.	Across voice coil	B1	Adjust for maximum output
200MMF.	"	"	"	"	"	B2	" " " "

Follow same proceedure for aligning remaining pushbutton channels. Adjust B3,B5,B7,B9 and B11 to tune in generator signal and B4,B6,B8,B10 and B12 for maximum output. Make sure the button is depressed that corresponds to the channel being aligned.

DETAILS OF DUMMY ANTENNA AND 1:1 COUPLING TRANSF. TO GIVE BALANCED OUTPUT



MODEL 2961

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

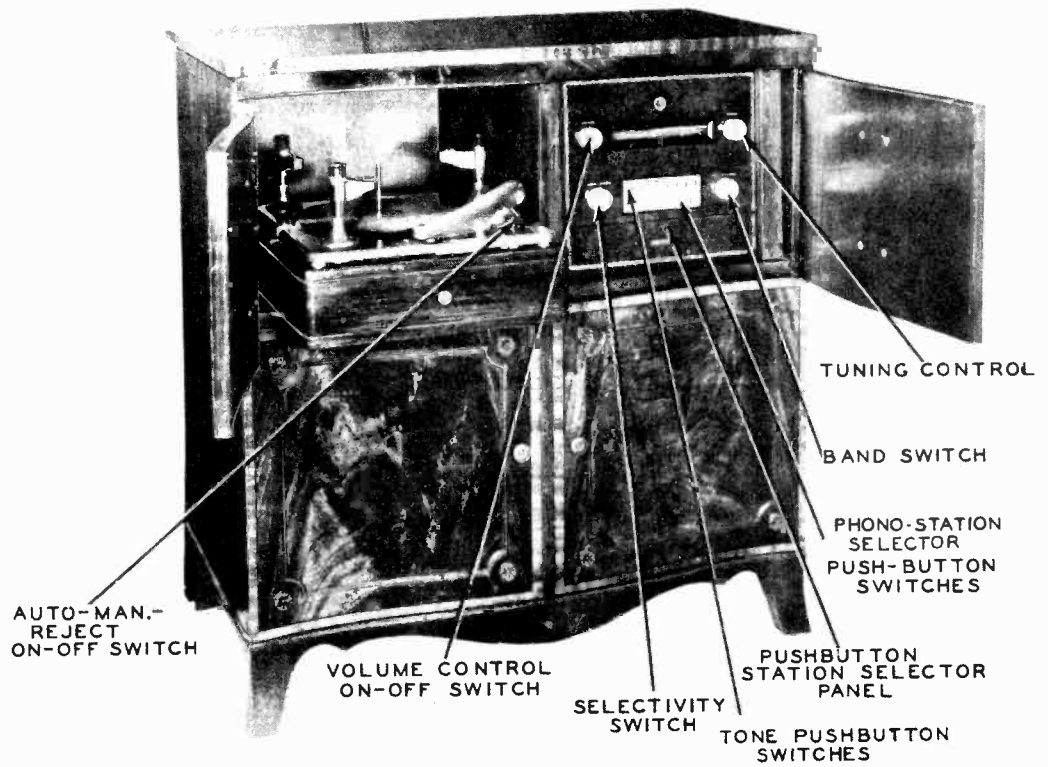
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	9003	1.4 MEG.	475 Ω	.2 Ω	0 Ω	17 KΩ	105 KΩ	475 Ω	
2	6BE6	17 KΩ	170 Ω	.2 Ω	0 Ω	17 KΩ	39 KΩ	5 Ω	
3	6C4	29 KΩ	17 KΩ	.2 Ω	0 Ω	29 KΩ	47 KΩ	.7 Ω	
4	9003	1.4 MEG.	475 Ω	0 Ω	.2 Ω	17 KΩ	65 KΩ	475 Ω	
5	9003	760 KΩ	500 KΩ	0 Ω	.2 Ω	17 KΩ	65 KΩ	500 Ω	
6	9002	29 KΩ	167 KΩ	0 Ω	.2 Ω	29 KΩ	6 Ω	167 KΩ	
7	6AG5	470 KΩ	190 Ω	.2 Ω	0 Ω	17 KΩ	61 KΩ	190 Ω	
8	6AL5	1000 Ω	43 KΩ	0 Ω	.2 Ω	0 Ω	3 MEG.	860 KΩ	
9	9003	94 KΩ	500 Ω	.2 Ω	0 Ω	17 KΩ	490 KΩ	500 Ω	
10	6AG5	1.9 MEG.	0 Ω	0 Ω	.2 Ω	23 KΩ	57 KΩ	0 Ω	
11	6AG5	0 Ω	4 KΩ	0 Ω	.2 Ω	57 KΩ	17 KΩ	4 KΩ	
12	6C4	25 KΩ	INF.	.2 Ω	0 Ω	25 KΩ	32 KΩ	0 Ω	
13	6AG5	.9 MEG.	0 Ω	.2 Ω	0 Ω	20 KΩ	2.5 KΩ	0 Ω	
14	6AG5	.7 Ω	115 Ω	.2 Ω	0 Ω	20 KΩ	20 KΩ	115 Ω	
15	6AG5	.7 Ω	115 Ω	.2 Ω	0 Ω	13 KΩ	13 KΩ	115 Ω	
16	9001	42 KΩ	0 Ω	.2 Ω	0 Ω	22 KΩ	15 KΩ	0 Ω	
17	9001	146 KΩ	0 Ω	.2 Ω	0 Ω	13 KΩ	13 KΩ	0 Ω	
18	6AL5	190 KΩ	145 KΩ	.2 Ω	0 Ω	0 Ω	INF.	145 KΩ	
19	6U5/6G5	0 Ω	1 MEG.	950 KΩ	18 KΩ	0 Ω	.1 Ω		
20	9002	62 KΩ	1000 Ω	4.2 KΩ	4.2 KΩ	62 KΩ	205 KΩ	1000 Ω	
21	9002	46 KΩ	600 Ω	4.2 KΩ	4.2 KΩ	46 KΩ	500 KΩ	600 Ω	
22	6J5GT	0 Ω	6.5 KΩ	112 KΩ	65 KΩ	1.2 MEG.	48 KΩ	6.5 KΩ	50 KΩ
23	6SN7GT	430 KΩ	140 KΩ	2.6 KΩ	470 KΩ	138 KΩ	2.5 KΩ	6.5 KΩ	6.5 KΩ
24	6L6GA	0 Ω	6.5 KΩ	39 KΩ	39 KΩ	215 KΩ	215 KΩ	6.5 KΩ	280 Ω
25	6L6GA	0 Ω	6.5 KΩ	39 KΩ	39 KΩ	215 KΩ	215 KΩ	6.5 KΩ	280 Ω
26	6L6GA	0 Ω	6.5 KΩ	39 KΩ	39 KΩ	215 KΩ	215 KΩ	6.5 KΩ	280 Ω
27	6L6GA	0 Ω	6.5 KΩ	39 KΩ	39 KΩ	215 KΩ	215 KΩ	6.5 KΩ	280 Ω
28	5Y3G	INF.	17 KΩ	INF.	72 Ω	INF.	64 Ω	INF.	17 KΩ
29	5V4G	INF.	39 KΩ	INF.	145 Ω	INF.	138 Ω	INF.	39 KΩ

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	9003	0V.	3.2V DC	6.3V AC	0V.	256V DC	83V DC	3.2V DC	
2	6BE6	-.2V DC	2V. DC	6.3V AC	0V.	265V DC	108V DC	0V.	
3	6C4	157V DC	270V DC	6.3V AC	0V.	157V DC	0V.	0V.	
4	9003	0V.	3.5V DC	0V.	6.3V AC	270V DC	95V DC	3.5V DC	
5	9003	0V.	3.1V DC	0V.	6.3V AC	262V DC	97.5V DC	3.1V DC	
6	9002	270V DC	1.5V DC	0V.	6.3V AC	265V DC	0V.	1.5V DC	
7	6AG5	0V.	1.9V DC	6.3V AC	0V.	262V DC	148V DC	1.9V DC	
8	6AL5	8.3V DC	.3V DC	0V.	6.3V AC	0V.	0V.	0V.	
9	9003	0V.	1.3V DC	6.3V AC	0V.	265V DC	31V DC	1.3V DC	
10	6AG5	-.3V DC	0V.	0V.	6.3V AC	143V DC	132V DC	0V.	
11	6AG5	0V.	2.2V DC	0V.	6.3V AC	250V DC	68V DC	2.4V DC	
12	6C4	150V DC	0V.	6.3V AC	0V.	150V DC	6.4V DC	0V.	
13	6AG5	-.25V DC	0V.	6.3V AC	0V.	123V DC	123V DC	0V.	
14	6AG5	0V.	1.3V DC	6.3V AC	0V.	146V DC	146V DC	1.3V DC	
15	6AG5	0V.	1.1V DC	6.3V AC	0V.	118V DC	118V DC	1.1V DC	
16	9001	-.25V DC	0V.	6.3V AC	0V.	122V DC	57V DC	0V.	
17	9001	-.4V DC	0V.	6.3V AC	0V.	145V DC	57V DC	0V.	
18	6AL5	-1V DC	-1V DC	6.3V AC	0V.	0V.	0V.	-10V DC	
19	6U5/6G5	0V.	22V DC	-2V DC	265V DC	0V.	6.3V AC		
20	9002	124V DC	3.4V DC	12V DC	12V DC	124V DC	0V.	3.4V DC	
21	9002	123V DC	2.5V DC	12V DC	12V DC	123V DC	0V.	2.5V DC	
22	6J5GT	0V.	96V DC	250V DC	340V DC	4V DC	98V DC	96V DC	105V DC
23	5Y3	0V.	165V DC	6.5V DC	0V.	155V DC	5.8V DC	95V DC	96V DC
24	6L6GA	0V.	96V DC	395V DC	395V DC	0V.	0V.	97V DC	40.5V DC
25	6L6GA	0V.	96V DC	395V DC	395V DC	0V.	0V.	97V DC	40.5V DC
26	6L6GA	0V.	96V DC	395V DC	395V DC	0V.	0V.	97V DC	40.5V DC
27	6L6GA	0V.	96V DC	395V DC	395V DC	0V.	0V.	97V DC	40.5V DC
28	5Y3GT	0V.	292V DC	0V.	365V AC	0V.	370V AC	0V.	290V DC
29	5V4G	0V.	410V DC	0V.	350V AC	0V.	350V AC	0V.	410V DC

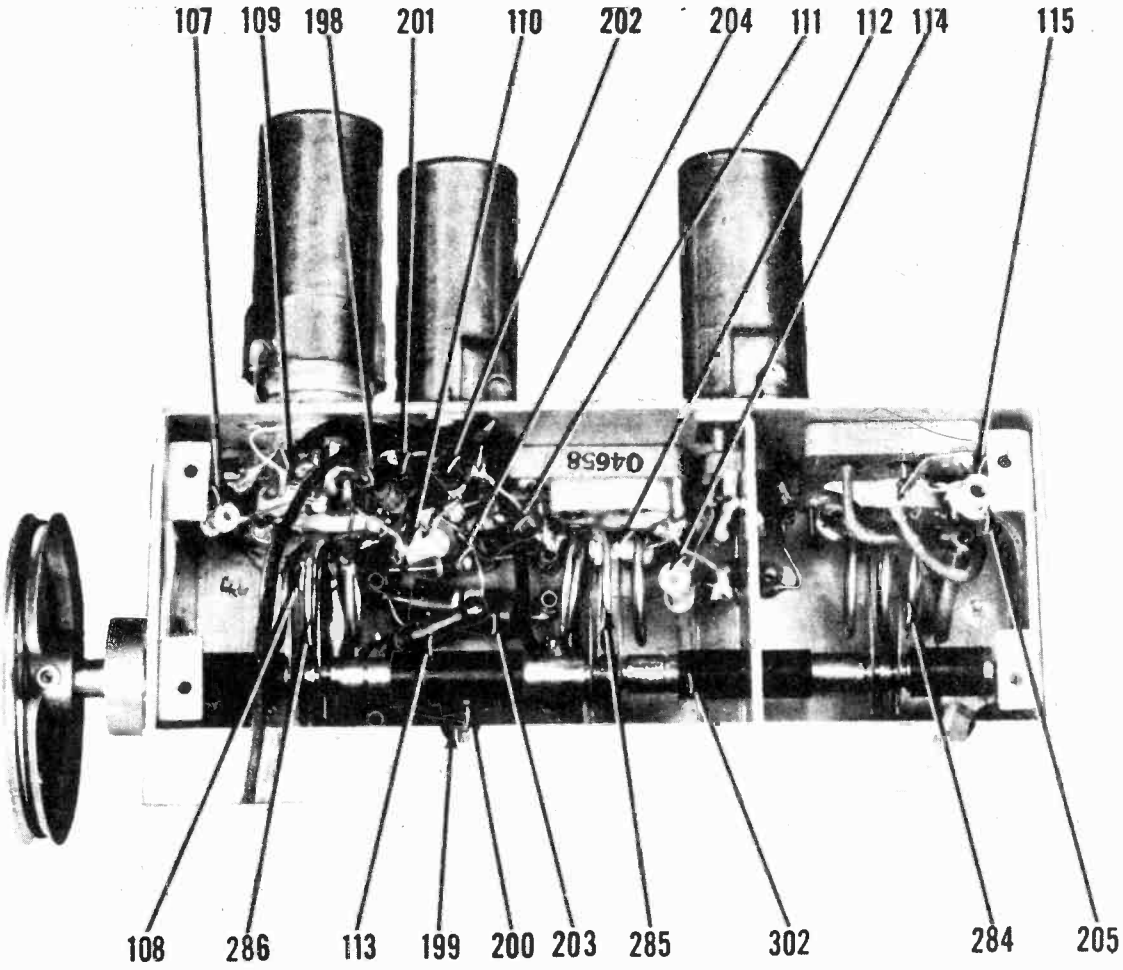
1—DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2—Socket connections are shown as bottom views.
3—Measured values are from socket pin to common negative.
4—Line Voltage maintained at 117 volts for voltage readings.
5—Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6—Volume control at maximum, no signal applied for voltage measurements.



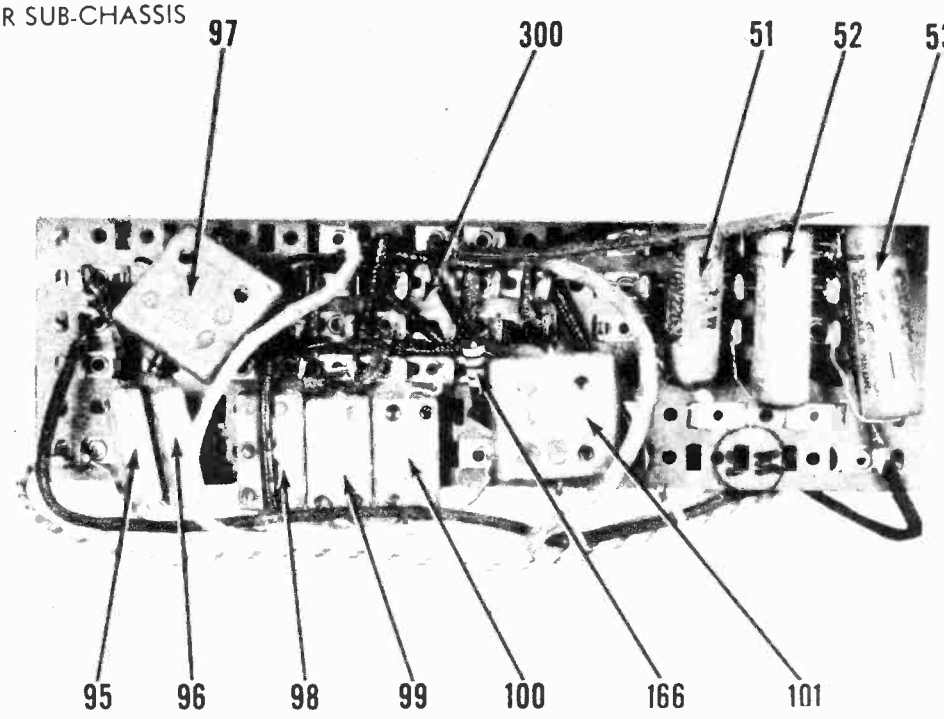
FRONT CABINET VIEW

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961



FM TUNER SUB-CHASSIS



TONE CONTROL SWITCH ASSEMBLY

MODEL 2961

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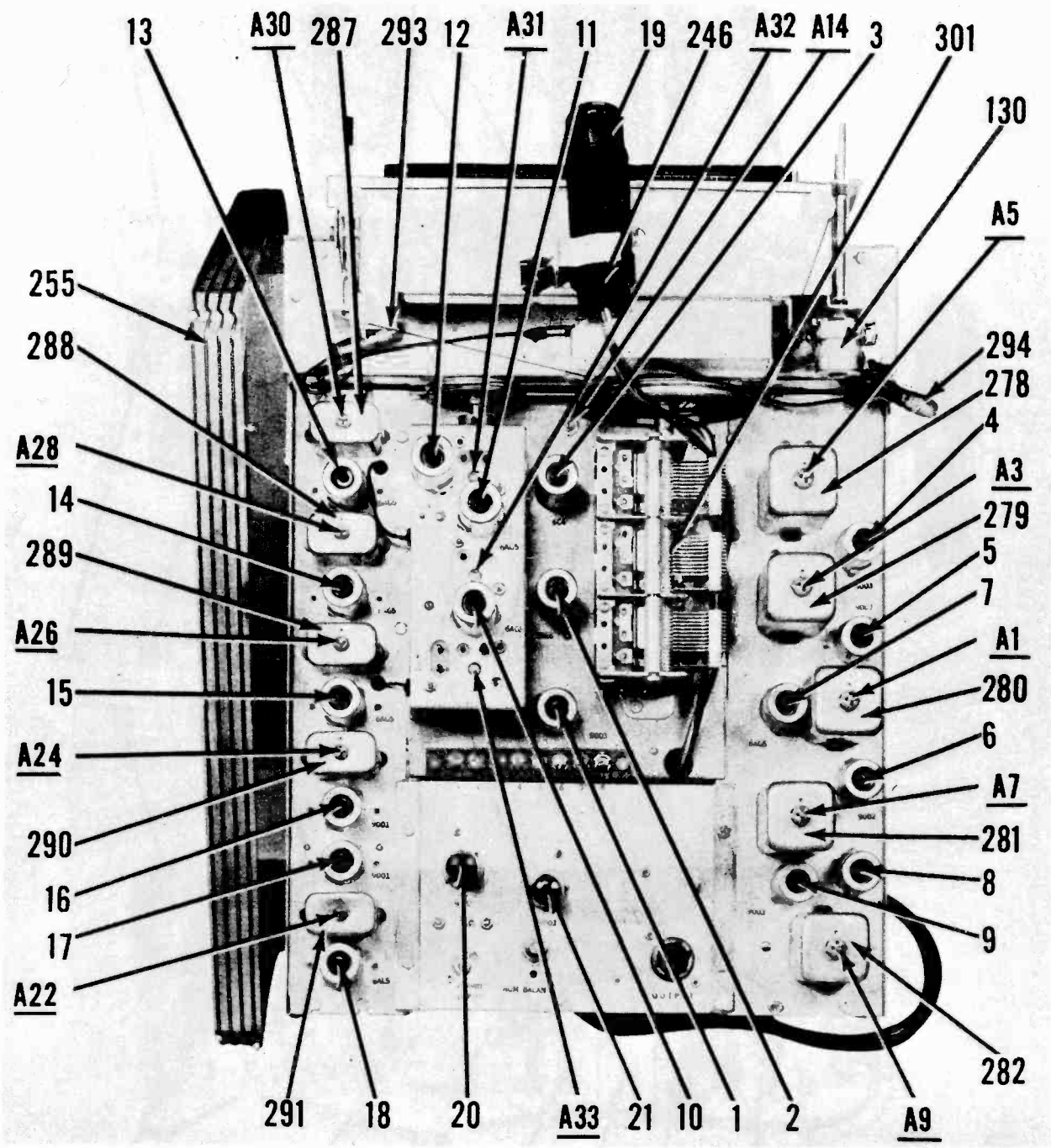
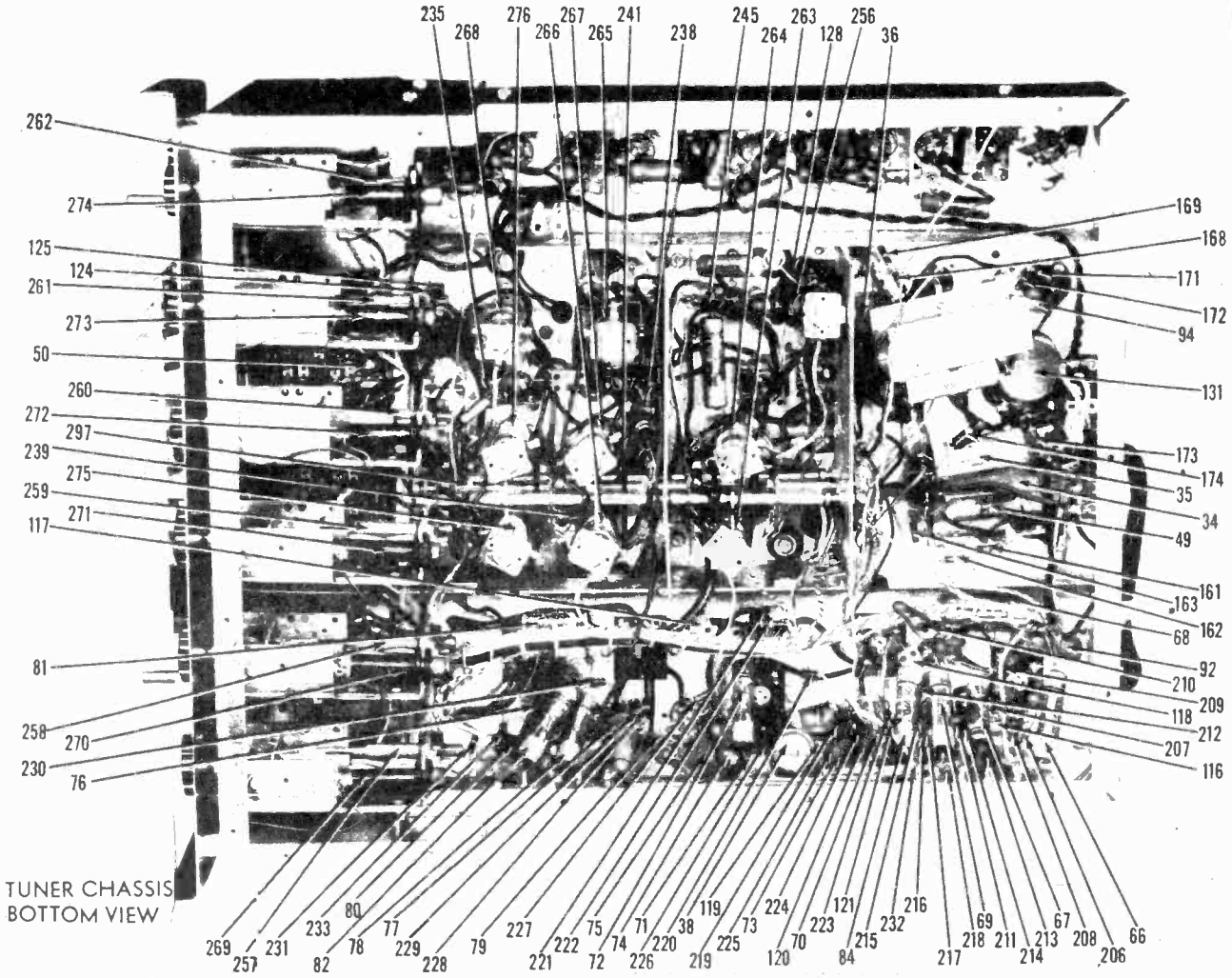
MAGUIRE INDUSTRIES, INC.

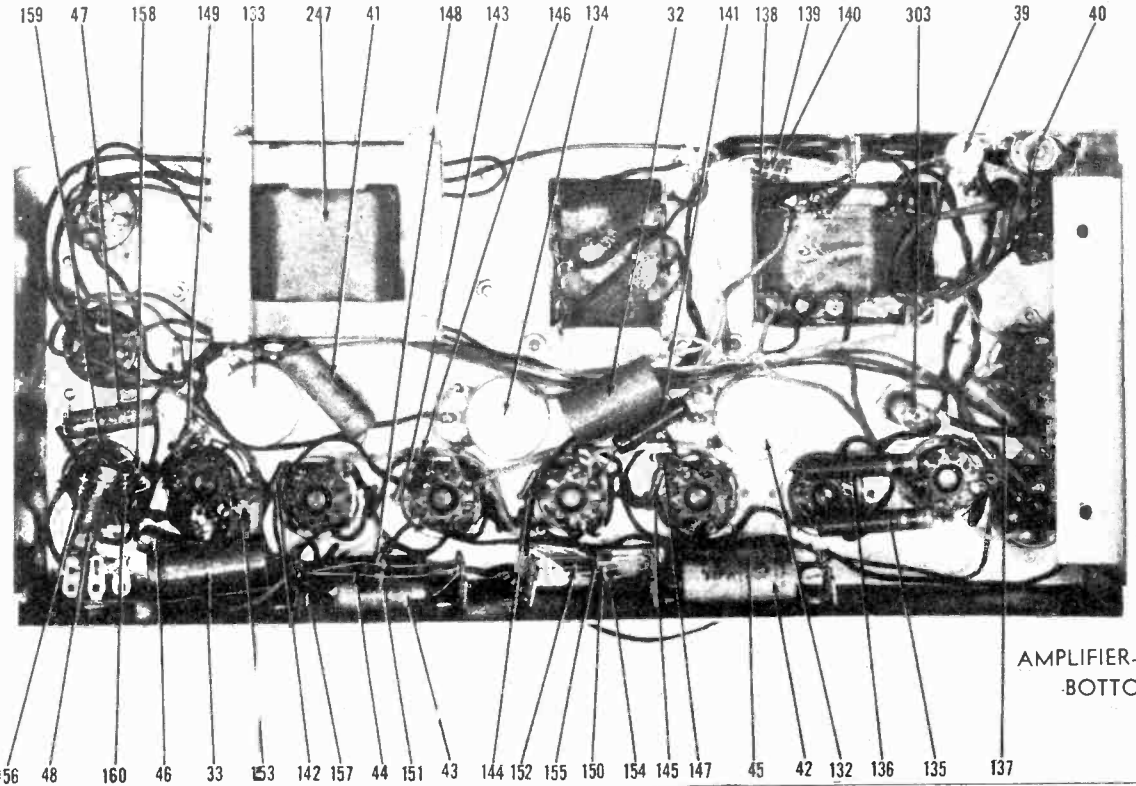


TUNER CHASSIS—TOP VIEW

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961





MODEL 2961

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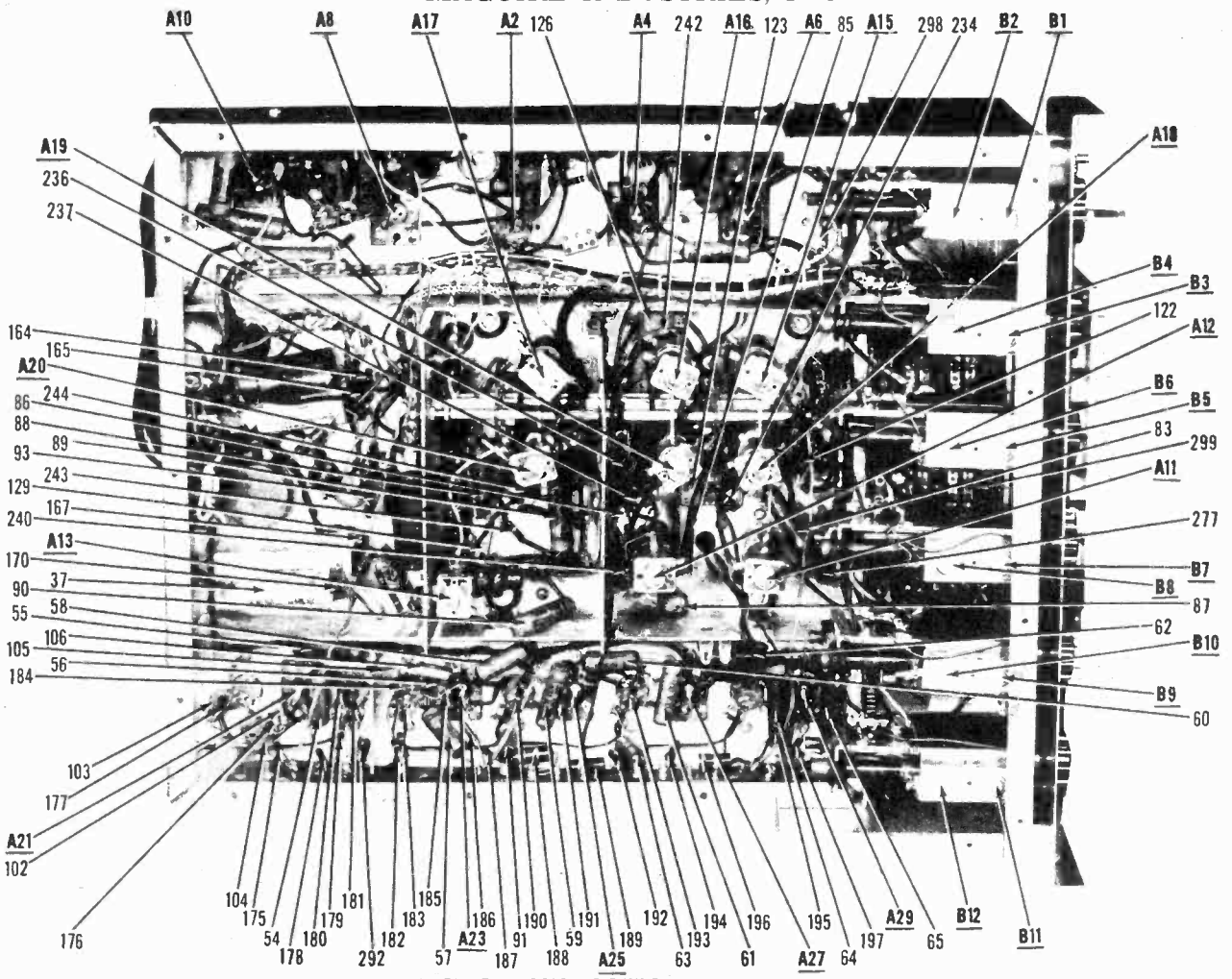
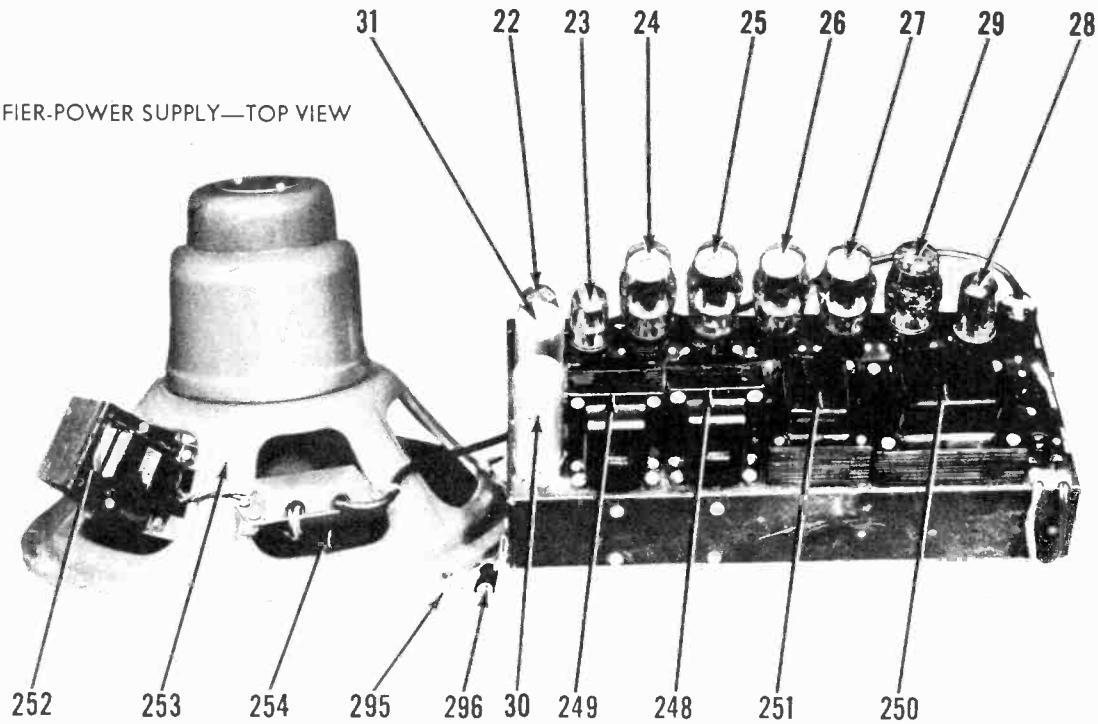


TUNER CHASSIS—BOTTOM VIEW

AMPLIFIER-POWER SUPPLY—TOP VIEW



Item No.	Part No.	Description
1	9003	AM RF Amplifier
2	6BE6	AM Mixer
3	6C4	AM Osc.
4	9003	AM 1st IF Amplifier
5	9003	AM 2nd IF Amplifier
6	9002	AM Detector
7	6AG5	AM AVC Amplifier
8	6AL5	AM Tuning eye—AVC Rectifier
9	9003	AM Tuning eye Amplifier
10	6AG5	FM RF Amplifier
11	6AG5	FM Mixer
12	6C4	FM Osc.
13	6AG5	FM 1st IF Amplifier
14	6AG5	FM 2nd IF Amplifier
15	6AG5	FM 3rd IF Amplifier
16	9001	FM 1st Limiter
17	9001	FM 2nd Limiter
18	6AL5	Discriminator
19	6U5/6G5	Tuning Eye
20	9002	Phono Amplifier
21	9002	1st Audio Amplifier
22	6J5GT	Phase Inverter
23	6SN7GT	Driver
24	6L6GA	Power Output
25	6L6GA	Power Output
26	6L6GA	Power Output
27	6L6GA	Power Output
28	5Y3G	Rectifier
29	5V4G	Rectifier
30	27171	20-20 Mfd. @ 450 v. Filter Capacitor
31	27171	20-20 Mfd. @ 450 v. Filter Capacitor
32	28106	50 Mfd. @ 50 v. Cathode Bypass
33	28109	10 Mfd. @ 450 v. Phase Inverter Decoupling
34	28109	10 Mfd. @ 450 v. 1st Audio Plate Decoupling
35	28105	25 Mfd. @ 25 v. 1st Audio Cathode Bypass
36	28109	10 Mfd. @ 450 v. Phono Amp. Plate Decoupling
37	28105	25 Mfd. @ 25 v. Phono Amp. Cathode Bypass
38	28109	10 Mfd. @ 450 v. AM Detector Plate Bypass
39	28172	.05 Mfd. @ 600 v. Line Bypass
40	28172	.05 Mfd. @ 600 v. Line Bypass
41	28113	.1 Mfd. @ 400 v. Filament Bypass
42	28112	.1 Mfd. @ 600 v. Tone Compensation
43	28101	.01 Mfd. @ 600 v. Audio Coupling
44	28101	.01 Mfd. @ 600 v. Audio Coupling
45	28112	.1 Mfd. @ 600 v. Tone Compensation
46	28101	.01 Mfd. @ 600 v. Audio Coupling
47	28101	.01 Mfd. @ 600 v. Audio Coupling
48	28119	.01 Mfd. @ 400 v. Audio Coupling
49	28103	.05 Mfd. @ 400 v. Audio Coupling
50	28112	.01 Mfd. @ 600 v. Audio Coupling
51	28130	.02 Mfd. @ 200 v. Tone Compensation
52	28129	.01 Mfd. @ 200 v. Tone Compensation
53	28102	.1 Mfd. @ 600 v. Tone Compensation
54	28119	.01 Mfd. @ 400 v. 2nd Limiter Plate Decoupling
55	28119	.01 Mfd. @ 400 v. 2nd Limiter Screen Bypass
56	28119	.01 Mfd. @ 400 v. 1st Limiter Screen Bypass
57	28119	.01 Mfd. @ 400 v. AVC Filter
58	28119	.01 Mfd. @ 400 v. 3rd FM IF Screen Bypass
59	28119	.01 Mfd. @ 400 v. 3rd FM IF Cathode Bypass
60	28119	.01 Mfd. @ 400 v. 2nd FM IF Screen Bypass
61	28119	.01 Mfd. @ 400 v. 2nd FM IF Cathode Bypass
62	28119	.01 Mfd. @ 400 v. 1st FM IF Screen Bypass
63	28119	.01 Mfd. @ 400 v. RF Bypass Power Supply
64	28119	.01 Mfd. @ 400 v. AVC Filter
65	28119	.01 Mfd. @ 400 v. Mixer Plate Decoupling
66	28103	.05 Mfd. @ 400 v. Tuning Eye Grid Filter
67	28117	.02 Mfd. @ 400 v. T.E. Amp. Screen Bypass
68	28103	.05 Mfd. @ 400 v. T.E. Amp. Cathode Bypass
69	28103	.05 Mfd. @ 400 v. AVC Filter
70	28117	.02 Mfd. @ 400 v. AVC Amp. Plate Decoupling
71	28113	.1 Mfd. @ 400 v. AVC Amp. Screen Bypass
72	28103	.05 Mfd. @ 400 v. AVC Amp. Cathode Bypass
73	28117	.02 Mfd. @ 400 v. Detector Plate Bypass
74	28117	.02 Mfd. @ 400 v. 2nd AM IF Plate Decoupling
75	28103	.05 Mfd. @ 400 v. 2nd AM IF Cathode Bypass
76	28109	.01 Mfd. @ 400 v. 2nd AM IF Grid Filter
77	28113	.1 Mfd. @ 400 v. Screen Bypass
78	28103	.05 Mfd. @ 400 v. 1st AM IF Cathode Bypass
79	28113	.1 Mfd. @ 400 v. RF Bypass Power Supply
80	28119	.01 Mfd. @ 400 v. 1st AM IF Grid Filter
81	28117	.02 Mfd. @ 400 v. AM Mixer Plate Decoupling
82	28103	.05 Mfd. @ 400 v RF Bypass Power Supply
83	28119	.01 Mfd. @ 400 v. AM Osc. Plate Bypass
84	28103	.05 Mfd. @ 400 v. AVC Filter
85	28103	.05 Mfd. @ 400 v. AM Mixer Screen Bypass
86	28103	.05 Mfd. @ 400 v. AM Mixer Cathode Bypass
87	28113	.1 Mfd. @ 400 v. AM RF Plate Decoupling
88	28103	.05 Mfd. @ 400 v. AM RF Screen Bypass
89	28103	.05 Mfd. @ 400 v. AM RF Cathode Bypass
90	28132	.025 Mfd. @ 400 v. AVC Filter
91	28119	.01 Mfd. @ 400 v. RF Bypass Power Supply
92	28103	.05 Mfd. @ 400 v. T.E. Amp. Plate Decoupling
93	CM20A101K	100 MMF. @ 500 v. Tone Compensation
94	CM20A101K	100 MMF. @ 500 v. Phono Coupling
95	CM20A331K	330 MMF. @ 500 v. Tone Compensation
96	CM20A331K	330 MMF. @ 500 v. Tone Compensation
97	CM30A272K	2700 MMF. @ 500 v. Tone Compensation
98	CM20A121K	120 MMF. @ 500 v. Tone Compensation
99	CM25A681K	680 MMF. @ 500 v. Tone Compensation
100	CM20A331K	330 MMF. @ 500 v. Tone Compensation
101	CM30A272K	2700 MMF. @ 500 v. Tone Compensation
102	27166	50 MMF. @ 300 v. (Ceramic) Discriminator Filter
103	27166	50 MMF. @ 300 v. (Ceramic) Discriminator Filter
104	CM20A221M	220 M.M.F. @ 500 v. De-emphasis
105	CM20A220M	22 MMF. @ 500 v. Limiter Coupling
106	CM20B470K	47 MMF. @ 500 v. 1st Limiter Grid Filter
107	28127	30 MMF. @ 300 v. (Ceramic) FM Osc. Grid
108	28160	5 MMF. @ 300 v. (Ceramic) Fixed Trimmer
109	28124	120 MMF. @ 300 v. (Ceramic) FM RF Screen Bypass
110	28140	10 MMF. @ 300 v. (Ceramic) Osc. Coupling
111	28125	1000 MMF. @ 500 v. (Ceramic) FM Mixer Screen Bypass
112	28126	120 MMF. @ 300 v. (Ceramic) RF Coupling
113	28125	1000 MMF. @ 500 v. (Ceramic) FM RF Plate Decoupling
114	28120	500 MMF. @ 300 v. (Ceramic) FM Osc. Plate Bypass
115	28126	120 MMF. @ 300 v. (Ceramic) FM RF Grid Filter
116	CM20A271K	270 MMF. @ 500 v. (Ceramic) T.E. Diode Filter
117	CM20A150M	15 MMF. @ 500 v. (Ceramic) T.E. Amp. Coupling
118	CM20A471M	470 MMF. @ 500 v. (Ceramic) AVC Diode Filter
119	CM20A271K	270 MMF. @ 500 v. (Ceramic) IF Filter
120	CM20A271K	270 MMF. @ 500 v. (Ceramic) IF Filter
121	CM20A150M	15MMF. @ 500 v. (Ceramic) AM—AVC Coupling
122	CM20A101M	100 MMF. @ 500 v. (Ceramic) Osc. Grid Capacitor
123	CM20A470M	47 MMF. @ 500 v. (Ceramic) Osc. Coupling
124	CM20A231J	230 MMF. @ 500 v. (Ceramic) Fixed Trimmer
125	CM20A112M	1100 MMF. @ 300 v. (Ceramic) Osc. Cathode Bypass
126	CM20A471M	470 MMF. @ 500 v. (Ceramic) RF Coupling

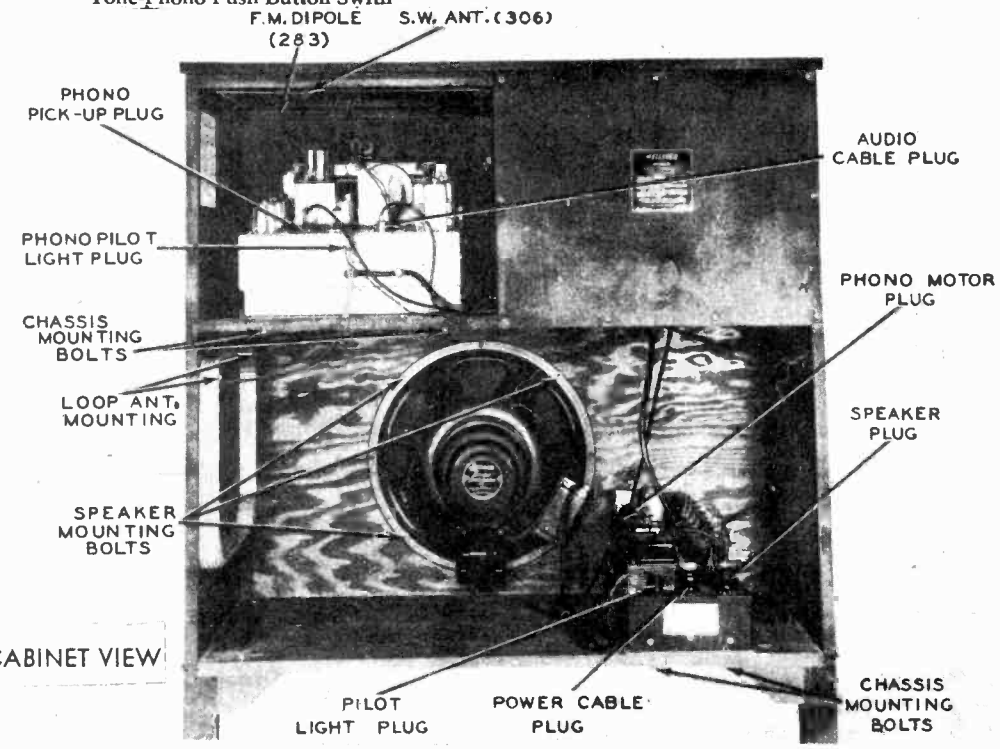
Item No.	Part No.	Description
128	CM20A100M	10 MMF. @ 500 v. (Ceramic) Ant. Coupling
129	CM20A181K	180 MMF. @ 500 v. (Ceramic) Ant. Coupling
130	29232	500 K ohm 1 w. (Ceramic) Volume Control and Switch
131	29260	100 ohm 2 w. (Ceramic) Hum Balance Control
132	29260	100 ohm 2 w. (Ceramic) Bias Balance Control
133	29260	100 ohm 2 w. (Ceramic) Hum Balance Control
134	29259	1000 ohm 2 w. (Ceramic) Feed-back Balance Control
135	28123	82 ohm 2 w. (Ceramic) Rectifier Ballast
136	28123	82 ohm 2 w. (Ceramic) Rectifier Ballast
137	RC40AE683M	68K ohm 2 w. (Ceramic) Bleeder
138	RC30AE183K	18K ohm 1 w. (Ceramic) Bleeder
139	RC30AE183K	18K ohm 1 w. (Ceramic) Bleeder
140	RC30AE682K	6800 ohm 1 w. (Ceramic) Bleeder
141	27195	240 ohm 5 w. (Ceramic) Output Cathode
142	RC20AE102M	1000 ohm ½ w. (Ceramic) Parasitic Suppressor
143	RC20AE102M	1000 ohm ½ w. (Ceramic) Parasitic Suppressor
144	RC20AE102M	1000 ohm ½ w. (Ceramic) Parasitic Suppressor
145	RC20AE102M	1000 ohm ½ w. (Ceramic) Parasitic Suppressor
146	RC20AE224J	220K ohm ½ w. (Ceramic) Output Grid
147	RC20AE224J	220K ohm ½ w. (Ceramic) Output Grid
148	RC20AE104J	100K ohm ½ w. (Ceramic) 1st Driver Plate Load
149	RC20AE474M	470K ohm ½ w. (Ceramic) 1st Driver Grid
150	RC20AE222K	2200 ohm ½ w. (Ceramic) 1st Driver Cathode
151	RC20AE104J	100 K ohm ½ w. (Ceramic) 2nd Driver Plate Load
152	RC20AE222K	2200 ohm ½ w. (Ceramic) 2nd Driver Cathode
153	RC20AE474M	470K ohm ½ w. (Ceramic) 2nd Driver Grid
154	RC20AE753J	75K ohm ½ w. (Ceramic) Feed-back
155	RC20AE753J	75K ohm ½ w. (Ceramic) Feed-back
156	RC20AE473J	47K ohm ½ w. (Ceramic) Phase Inverter Plate Load
157	RC20AE223M	22K ohm ½ w. (Ceramic) Phase Inverter Plate Decoupling
158	RC20AE332K	3300 ohm ½ w. Phase Inverter Cathode
159	RC20AE105M	1 Meg. ½ w. Phase Inverter Grid
160	RC20AE473J	47K ohm ½ w. Phase Inverter Cathode
161	RC20AE124K	120K ohm ½ w. Tone Compensation
162	RC20AE393K	39K ohm ½ w. Tone Compensation
163	RC20AE183K	18K ohm ½ w. Audio Amp. Plate Load
164	RC20AE153M	15K ohm ½ w. Audio Amp. Plate Decoupling
165	RC20AE561K	560 ohm ½ w. Audio Amp. Cathode
166	RC20AE333K	33K ohm ½ w. Tone Compensation
167	RC20AE474K	470K ohm ½ w. Tone Compensation
168	28137	27K ohm ½ w. Phono Amp. Plate Load
169	RC20AE223M	22K ohm ½ w. Phono Amp. Plate Decoupling
170	RC20AE102M	1000 ohm ½ w. Phono Amp. Cathode
171	RC20AE224K	220K ohm ½ w. Phono Amp. Grid
172	RC20AE475K	4.7 Meg. ½ w. Tone Compensation
173	RC20AE472M	4700 ohm ½ w. Bleeder
174	RC30AE104M	100K ohm 1 w. Bleeder
175	RC20AE104M	100K ohm ½ w. De-emphasis Network
176	RC20AE104J	100K ohm ½ w. Discriminator Diode Load
177	RC20AE104J	100K ohm ½ w. Discriminator Diode Load
178	RC20AE152M	1500 ohm ½ w. 2nd Limiter Plate Decoupling
179	RC20AE223M	22K ohm ½ w. 2nd Limiter Screen Dropping
180	RC20AE223M	22K ohm ½ w. 2nd Limiter Screen Bleeder
181	RC20AE154K	150K ohm ½ w. 2nd Limiter Grid
182	RC20AE103M	10K ohm ½ w. 1st Limiter Plate Load
183	RC20AE223M	22K ohm ½ w. 1st Limiter Screen Dropping
184	RC20AE223M	22K ohm ½ w. 1st Limiter Screen Bleeder
185	RC20AE473M	47K ohm ½ w. 1st Limiter Grid Filter
186	RC20AE225M	2.2 Meg. ½ w. A V C Network
187	RC20AE152M	1500 ohm ½ w. 3rd FM IF Plate Decoupling
188	RC40AE272K	2700 ohm 2 w. Voltage Dropping
189	RC40AE222K	2200 ohm 2 w. Voltage Dropping
190	RC20AE121K	120 ohm ½ w. 3rd FM IF Cathode
191	RC20AE332M	3300 ohm ½ w. 3rd FM IF Grid
192	RC20AE103M	10K ohm 1 w. 2nd FM IF Plate Decoupling
193	RC20AE121K	120 ohm ½ w. 2nd FM IF Cathode
194	RC20AE103M	10K ohm 1 w. 1st FM IF Plate Decoupling
195	RC20AE104M	100K ohm ½ w. AVC Network
196	RC40AE471K	470 ohm 2 w. Decoupling
197	RC20AE473K	47K ohm ½ w. FM Mixer Plate Decoupling
198	RC20AE333K	33K ohm ½ w. FM Oscillator Grid
199	RC40AE123K	12K ohm 2 w. FM Oscillator Plate Load
200	RC20AE473K	47K ohm ½ w. FM Mixer Screen Dropping
201	RC20AE223M	22K ohm ½ w. FM Mixer Screen Bleeder
202	RC20AE472M	4700 ohm ½ w. FM Mixer Cathode
203	RC40AE473K	12K ohm 2 w. FM RF Plate Load
204	RC20AE473K	47K ohm ½ w. FM RF Screen Dropping
205	RC20AE104M	100K ohm ½ w. AVC Network
206	RC20AE105M	1 Meg. ½ w. Tuning Eye Grid Filter
207	RC20AE473K	47K ohm ½ w. Tuning Eye Diode Load
208	RC20AE102M	1000 ohm ½ w. Tuning Eye Amp. Plate Decoupling
209	RC20AE474M	470K ohm ½ w. Tuning Eye Amp. Screen Dropping
210	RC20AE471M	470 ohm ½ w. Tuning Eye Amp. Cathode
211	RC20AE104M	100K ohm ½ w. Tuning Eye Amp. Grid
212	RC20AE335M	3.3 Meg. ½ w. Tuning Eye Amp. Grid
213	RC20AE183K	18 K ohm 2 w. Delayed AVC Bleeder Network
214	RC20AE153K	15K ohm 2 w. Delayed AVC Bleeder Network
215	RC20AE102M	1000 ohm ½ w. Delayed AVC Bleeder Network
216	RC20AE684K	680K ohm ½ w. IF Filter
217	RC20AE224M	220K ohm ½ w. AVC Diode Load
218	RC20AE474M	470K ohm ½ w. AVC Network
219	RC20AE102M	1000 ohm ½ w. AVC Amp. Plate Decoupling
220	RC20AE473J	47K ohm ½ w. AVC Amp. Screen Dropping
221	RC20AE221M	220 ohm ½ w. AVC Amp. Cathode
222	RC20AE474M	470K ohm ½ w. AVC Amp. Grid
223	RC20AE154M	150K ohm ½ w. AM Detector Cathode
224	RC40AE153M	15K ohm ½ w. IF Filter
225	RC40AE153M	15K ohm ½ w. AM Detector Plate Load
226	RC20AE102M	1000 ohm ½ w. 2nd AM IF Plate Decoupling
227	RC20AE471M	470 ohm ½ w. 2nd AM IF Cathode
228	RC20AE104M	100K ohm ½ w. AVC Network
229	RC30AE473K	47K ohm 1 w. AM IF Screen Dropping
230	RC20AE471M	470 ohm ½ w. 1st AM IF Cathode
231	RC20AE104M	100K ohm ½ w. AVC Network
232	RC20AE474M	470K ohm ½ w. AVC Network
233	RC20AE102M	1000 ohm ½ w. AM Mixer Plate Decoupling
234	PC30AE153M	15K ohm 1 w. AM Osc. Plate Load
235	RC20AE473M	47K ohm ½ w. AM Osc. Grid
236	RC40AE223K	22K ohm 2 w. AM Mixer Screen Dropping
237	RC20AE223K	22K ohm ½ w. AM Mixer Injector Grid
238	RC20AE181K	180 ohm ½ w. AM Mixer Cathode
239	RC20AE225M	2.2 Meg. ½ w. AM Mixer Signal Grid
240	RC20AE332K	3300 ohm ½ w. BC RF Coil Shunt
241	RC20AE102M	1000 ohm ½ w. AM RF Plate Decoupling
242	RC20AE152M	1500 ohm ½ w. AM RF Plate Load (Push Button)
243	RC20AE104M	100K ohm ½ w. AM RF Screen Dropping
244	RC20AE471M	470 ohm ½ w. AM RF Cathode
245	RC20AE104M	100K ohm ½ w. AVC Network
246	RC20AE105M	1 Meg. ½ w. Tuning Eye Plate Load
247	29224	4.5 Henries 75 ohm D.C. Resis. Filter Choke
248	29227	9 Henries 170 ohm D.C. Resis. Filter Choke
249	29227	9 Henries 170 ohm D.C. Resis. Filter Choke
250	29225	(Power Xfmr.) 117 VAC @ 1.16 A-760 VCT @ .210A-4.9 VAC @ 1.8A-4.9 VAC @ 2.0A
251	29226	(Filament Xfmr.) 117 VAC @ .64A-6.6 VAC @ .3A-6.4 VAC @ 4.3A-6.4 AC @4.5A
252	29290	(Output Xfmr.) Pri. -3500 ohm CT., Secondary -22 ohm (DC Resist. Pri. -110 ohm CT., Secondary 9 ohm)
253	29220-2	Speaker 15" P.M. 16 ohm Voice Coil Impedance
254	None	Speaker Cone — Cone Diam. 14¼"— Voice Coil Diam. 2½"

MEISSNER MFG. DIV.
MAGUIRE INDUSTRIES, INC.

MODEL 2961

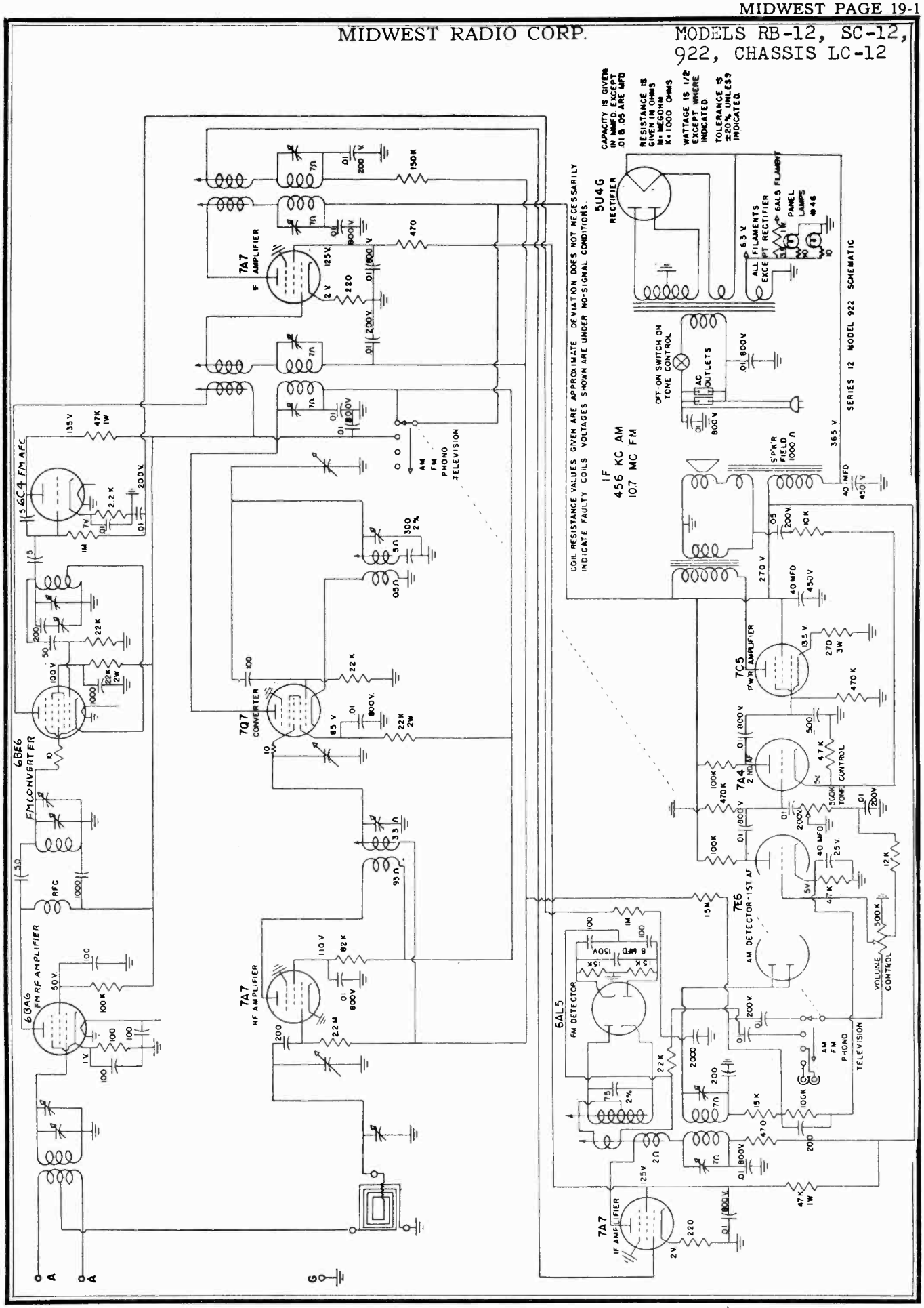
Item No.	Part No.	Description
255	04751	Loop Antenna
256	04607	B.C. Antenna Coil
257	04672	Push-Button Antenna Coil
258	04672	Push-Button Antenna Coil
259	04672	Push-Button Antenna Coil
260	04672	Push-Button Antenna Coil
261	04672	Push-Button Antenna Coil
262	04672	Push-Button Antenna Coil
263	04610	S.W. Ant. Coil Band 1
264	04613	S.W. Ant. Coil Band 2
265	04608	B. C. RF Coil
266	04611	S.W. RF Coil Band 1
267	04614	S.W. RF Coil Band 2
268	04609	B. C. Osc. Coil
269	04673	Push-Button Osc. Coil
270	04673	Push-Button Osc. Coil
271	04673	Push-Button Osc. Coil
272	04673	Push-Button Osc. Coil
273	04673	Push-Button Osc. Coil
274	04673	Push-Button Osc, Coil
275	04612	S.W. Osc. Coil Band 1
276	04615	S.W. Osc. Coil Band 2
277	04650	Osc. Cathode Coil
278	04216	AM Input IF
279	04216	AM Interstage IF
280	04238	AM Output IF
281	04238	AVC IF
282	04421	Tuning Eye IF
283	04878	FM Antenna
284	04590	FM Antenna Coil
285	04590	FM RF Coil
286	04590	FM Osc. Coil
287	04193	FM Input IF
288	04193	FM Interstage IF
289	04193	FM Output IF
290	04193	Limiter Transformer
291	04194	Discriminator Transformer
292	04588	Filament RF Choke
293	29262	Dial Light Type 44
294	29262	Dial Light Type 44
295	29262	Dial Light Type 44
296	29262	Dial Light Type 44
297	04179	Band Switch
298	28299	Selectivity Switch
299	28294	Station Selector Push Button Assembly
300	28295	Tone-Phono Push Button Swith

Item No.	Part No.	Description
301	27168	Tuning Capacitor
302	04638	FM Tuner Shaft and Vanes
303	29276	Fuse
304	RC20AE105M	1 Meg. ½ Watt Tone Compensation
305	RC20AE273K	27 K ohm AM Det. Series Audio ½ Watt
306		SW Antenna Hank
	24294	Fuse Holder
	04724	Input Cable Assembly (Consists of plug 29292A, shell 29292B, and 72" of single conductor shielded cable 228-50)
	04728	8-Conductor Cable Assembly (Consists of plug 29202A and 42" of 8-Conductor Cable 22857)
A13	17057	Trimmer Capacitor
A14	17066	Padder Capacitor (6 plate)
	29255	Tuning Eye Socket and Cable
A32	17062	Trimmer Capacitor (FM RF)
A33	17062	Trimmer Capacitor (FM Ant.)
A31	17060	Trimmer Capacitor (FM Osc.)
	04598	FM Drive Pulley Assembly
	04674	Pulley and Bracket Assembly (Band Selector Drive Cord)
	29274	Dial Light Socket
	29221	Dial Light Socket
	12491	24-inch Cable and Shield (shield outside)
	04515	Complete assembly—single permeability tuner
	22850	12-inch shielded lead-insulated cover. This lead connects between the push-button switch and the band selector switch. It is a part of the tuned circuit and exact replacement must be employed.
	04332	Cover Plate
	19665	Pulley, dial drive, small hole
	04592	Pulley, dial drive, large hole
	04507	Dial Scale
	04556	Dial Backing
	19795	Dial Light Shield
	04329-B	Push-Button Knobs (Ivory)
	04559-B	Push-Button escutcheon (Ivory)
	04353-A	Pointer Knobs, Push-Button Setup
	29278	Push-Button Call Letters (set)



REAR CABINET VIEW

MIDWEST RADIO CORP. MODELS RB-12, SC-12, 922, CHASSIS LC-12



ALIGNMENT — Refer to the alignment chart for step by step procedure. It is preferable to align the FM IF stages with an AM or CW Signal. It should be noted that all adjustment are made for peak avc reading except the secondary of the third transformer. At this point, if you use an AM signal, it may be tuned for minimum audio signal; or the discriminator voltage may be used, reading it with a VTVM, and the secondary may be adjusted to the zero voltage. There may be some discrepancy between these methods, and if it is not excessive, is of no importance.

The FM RF alignment should be made using an FM signal and either avc or audio for peaking. In doing this alignment, or when feeding the IF signal into the FM mixer grid, care must be taken not to move the wiring. If the wiring is displaced so as to affect the inductance of the RF circuits it is difficult to re-establish the RF-Oscillator tracking.

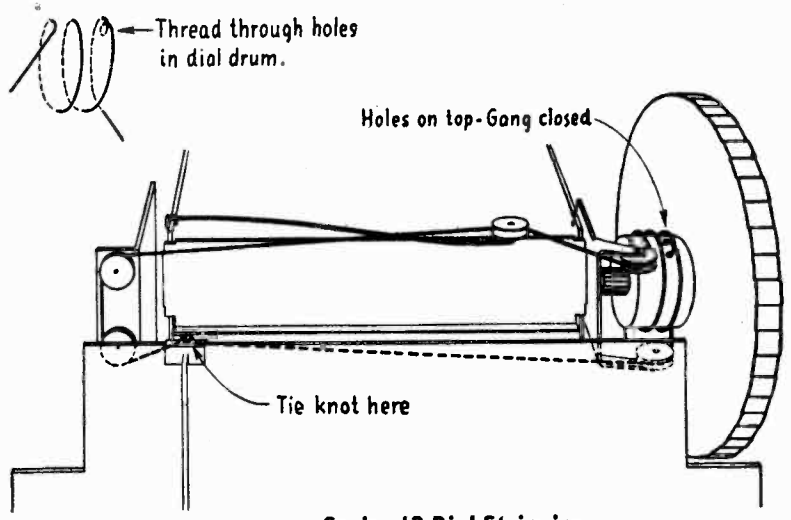
The AM, RF and IF alignment should be done with a VTVM across the avc. The recommended signal value is one which will generate 10 volts of avc. When aligning the "AM" band the loop must be plugged in and you need not adjust the RF padder core. The RF padder is very broad and can be aligned only if the converter grid lead is connected to an RF type VTVM as indicator; this will usually involve a signal level greater than is normally available.

ALIGNMENT CHART

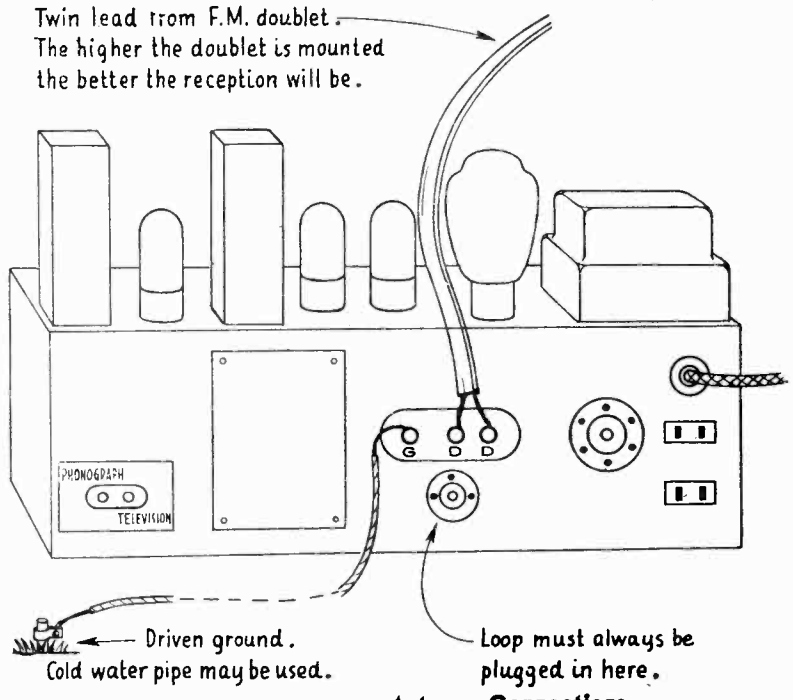
Coupling	Signal	Band Switch	Dial	Adjustment
To 7Q7 converter grid through .05 mfd. capacitor.	456 KC AM	AM	1000 KC	Peak 1st, 2nd and 3rd IF trimmers on top of IF cans.
To "A" on antenna ground terminal strip through 200 mfd. and 400 ohms in series.	1600 KC AM	AM	1600 KC	Peak RF, converter and oscillator trimmers marked "B".
	550 KC AM	AM	550 KC	Peak converter and oscillator padder cores marked "B". Loop must be plugged in. Do not adjust RF.
To 6BE6 mixer grid direct.	10.7 MC AM or CW *	FM	100 MC	Peak core adjustments for avc (around 3 volts) at 1st, 2nd and primary of 3rd IF. Adjust secondary of 3rd IF for audio null from 30% amplitude modulated 10.7 MC IF signal.
To "A" and "A" on doublet terminal strip through a pair 150 ohm resistors.	105 MC FM	FM	105 MC	Peak RF mixer and oscillator trimmers for avc or audio.

*Read text for use of CW for FM-IF alignment.

DIAL STRINGING — Use a light weight flexible dial cord when replacing worn or broken cord such as Beven-Wilcox FSN-25-12.



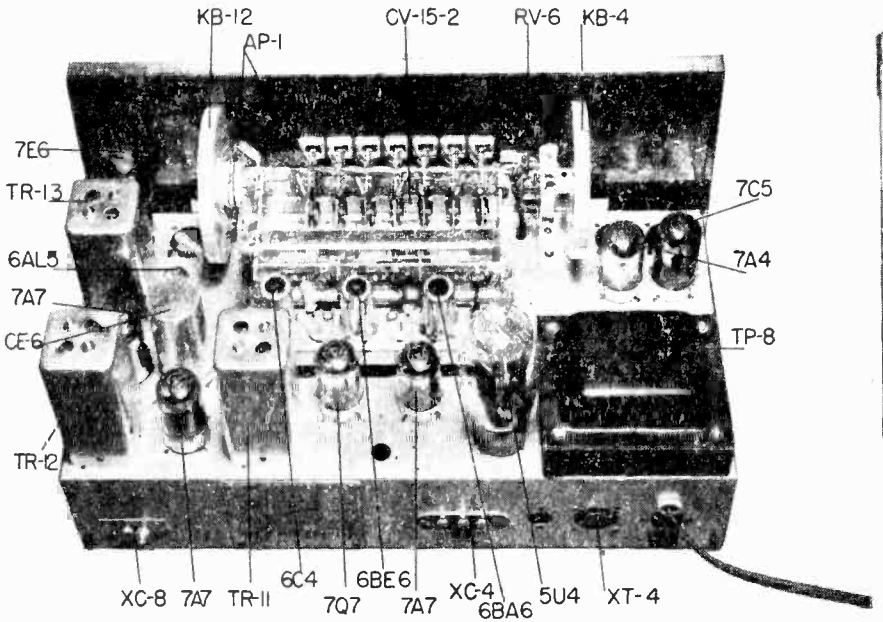
Series 12 Dial Stringing



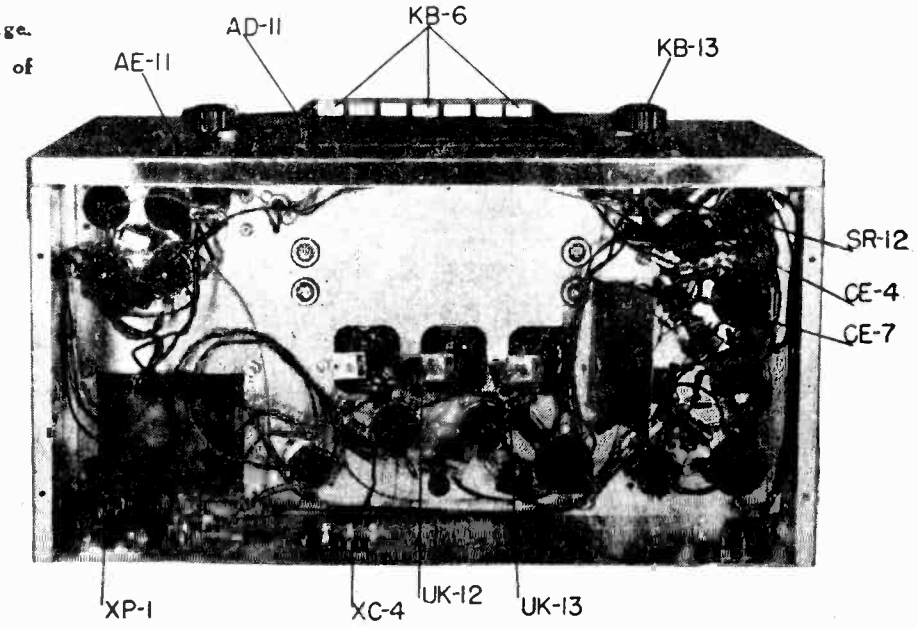
Antenna Connections

Note: Order resistors and condensers by value, tolerance and wattage or voltage.

Note: When ordering include serial number of chassis, since Midwest records of changes in parts specifications are kept by that number.



Top View of Series 12 Chassis



Bottom View of Series 12 Chassis

PARTS LIST

Part	Description
AD-11	Glass Dial
AE-11	Escutcheon
AP-1	Wood Pulley
AP-21	Pointer
AS-1	Wood Pulley Stud
CE-6	Filter Condenser 40-40
CE-4	Cathode Bypass 40 mfd. 25v
CE-7	Electrolytic 8 mfd. 150v
*CV-15-2	Tuning Gang
EG-5	Speaker Grommet
ES-12	Miniature Tube Shield
HE-7	Speaker Mtg. Eyelet
IL-1	Panel Lamp 6-8v
KB-4	Volume Knob
KB-12	Tuning Knob
KB-13	Tone & Band Knob
KB-6	Push Buttons, Set of 7
OG-1	Miter Gear, Pair
PC-3	Loop Plug
PC-5	Phono & Television Plug
RV-5	Tone Control
RV-6	Volume Control
SP-5	Speaker
SR-12	Band Switch
TP-8	Power Transformer
*TR-11	1st IF Transformer
*TR-12	2nd IF Transformer
*TR-13	3rd IF Transformer
*UK-12	Mixer Coil Assembly
*UK-13	Oscillator Coil Assembly

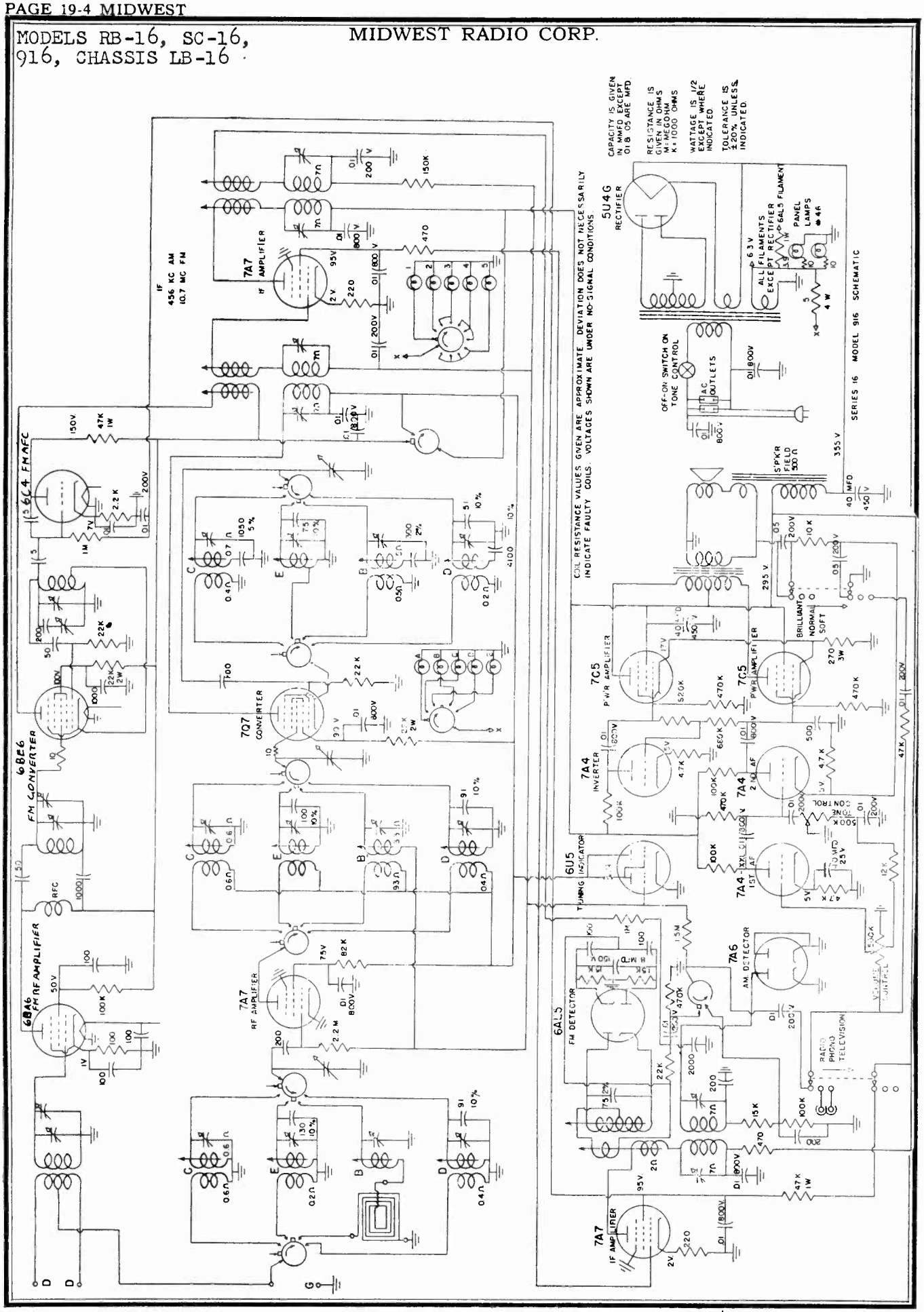
To set the push buttons this exact procedure should be followed. A small screw driver will be needed.

1. Turn on the receiver and allow at least three minutes to warm up.
2. Remove the push button by pulling straight out. A hooked instrument will assist in removing the end buttons.
3. Loosen the LOCK SCREW at least one half turn.
4. Using the screw driver with the blade in the screw slot, push the mechanism in firmly. Hold in during step 5. The mechanism may bind at first. Use sufficient force to break loose so that the push button and tuning control are independent.
5. Tune the pointer past the desired station then back to the desired station and make the tuning adjustment as carefully as you know how.
6. Tighten the LOCK SCREW.
7. Check the setting of this push button by tuning away from the station manually, then pushing in firmly. Pushing the button must return the pointer to the position it had when the LOCK SCREW was tightened. If the station is not now tuned in perfectly repeat the steps 2 to 6 carefully.
8. Adjust each of the seven buttons, or as many as you wish to set, exactly as outlined above.

Any button can be set for any pointer position, however, you may find it more desirable to select the button nearest the pointer position so that each successive adjustment moves the pointer in the same direction. That is, the "M" button will be set for a station at the left of the dial, the "W" button will set for a station near the center, etc.

MODELS RB-16, SC-16, 916, CHASSIS LB-16

MIDWEST RADIO CORP.



RECORD CHANGER: V-M Model 400, RCD.CH. 15-1

ALIGNMENT — Refer to the alignment chart for step by step procedure. It is preferable to align the FM IF stages with an AM or CW Signal. It should be noted that all adjustment are made for peak avc reading except the secondary of the third transformer. At this point, if you use an AM signal, it may be tuned for minimum audio signal; or the discriminator voltage may be used, reading it with a VTVM, and the secondary may be adjusted to the zero voltage. There may be some discrepancy between these methods, and if it is not excessive, is of no importance.

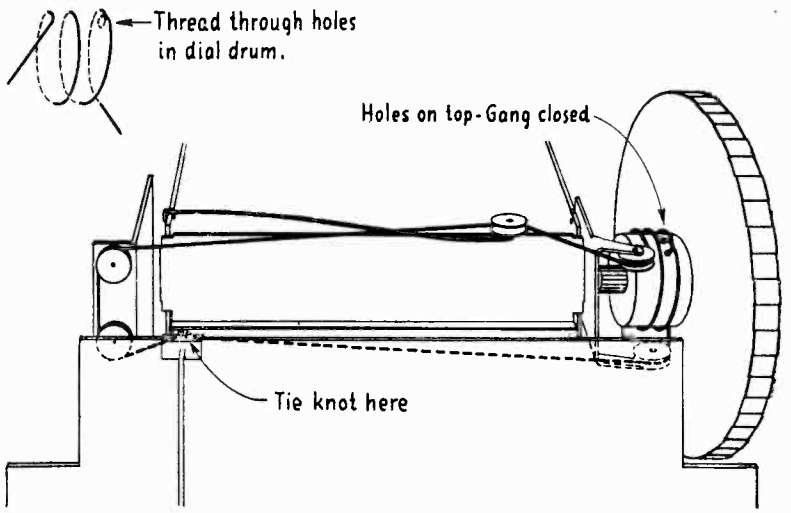
The FM RF alignment should be made using an FM signal and either avc or audio for peaking. In doing this alignment, or when feeding the IF signal into the FM mixer grid, care must be taken not to move the wiring. If the wiring is displaced so as to affect the inductance of the RF circuits it is difficult to re-establish the RF-Oscillator tracking.

The AM, RF and IF alignment should be done with a VTVM across the avc. The recommended signal value is one which will generate 10 volts of avc. When aligning the "B" band the loop must be plugged in and you need not adjust the RF padder core. The RF padder is very broad and can be aligned only if the converter grid lead is connected to an RF type VTVM as indicator; this will usually involve a signal level greater than is normally available.

ALIGNMENT CHART

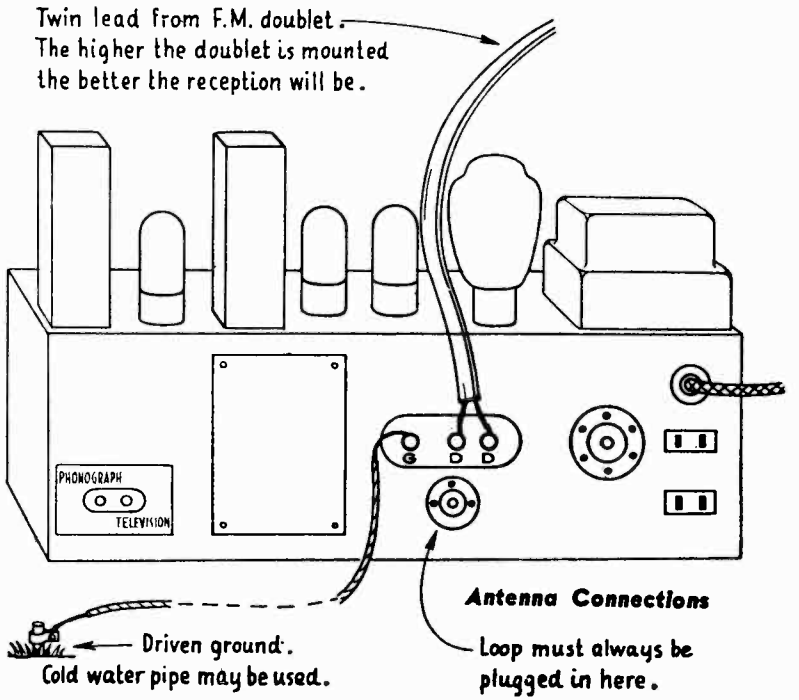
Coupling	Signal	Band Switch	Dial	Adjustment
To 7Q7 converter grid through .05 mfd. capacitor.	456 KC AM	B	1000 KC	Peak 1st, 2nd and 3rd IF trimmers on top of IF cans.
To "D" on antenna ground terminal strip through 200 mfd. and 400 ohms in series.	1600 KC AM	B	1600 KC	Peak RF, converter and oscillator trimmers marked "B".
	550 KC AM	B	550 KC	Peak converter and oscillator padder cores marked "B". Loop must be plugged in. Do not adjust RF.
	4.7 MC AM	C	4.7 MC	Peak "C" trimmers.
	1.6 MC AM	C	1.6 MC	Peak "C" cores.
	10 MC AM	D	10 MC	Peak "D" trimmer
	5 MC AM	D	5 MC	Peak "D" cores.
	22 MC AM	E	22 MC	Peak "E" trimmer.
	11.5 MC AM	E	11.5 MC	Peak "E" cores.
To 6BE6 mixer grid direct.	10.7 MC AM or CW *	A	100 MC	Peak core adjustments for avc (around 3 volts) at 1st, 2nd and primary of 3rd IF. Adjust secondary of 3rd IF for audio null from 30% amplitude modulated 10.7 MC IF signal.
To "D" and "D" on doublet terminal strip above "A-G" strip through a pair 150 ohm resistors.	105 MC FM	A	105 MC	Peak RF mixer and oscillator trimmers for avc or audio.

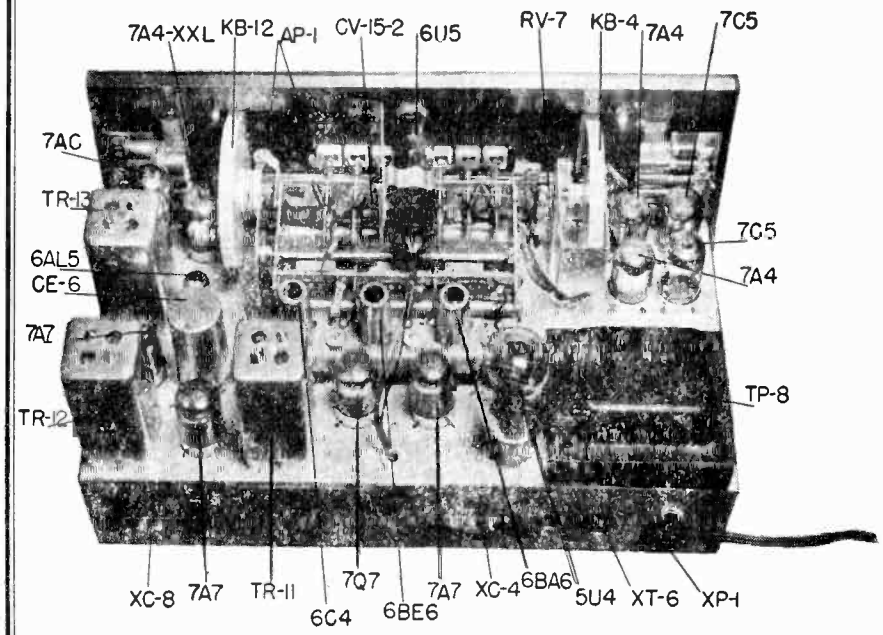
Read text for use of CW for FM-IF alignment.



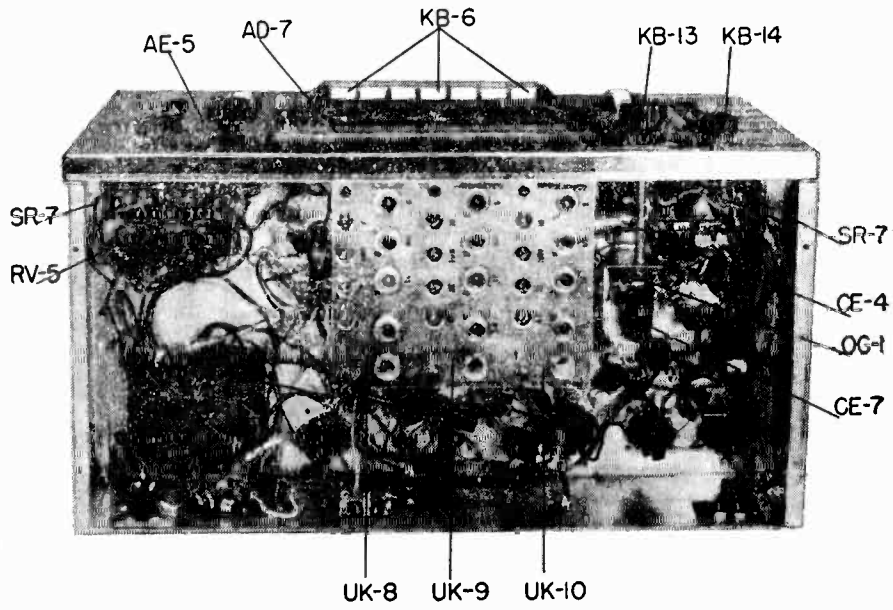
Dial Stringing

DIAL STRINGING — Use a light weight flexible dial cord when replacing worn or broken cord such as Beven-Wilcox FSN-25-12.





Top View of Series 16 Chassis



Bottom View of Series 16 Chassis

Part	Description
AD-6	Short Wave Dial
AD-7	Glass Dial
AD-9	Tone Disc Assembly
AD-10	Selector Disc Assembly
AE-5	Escutcheon
AP-1	Wood Pulley
AP-21	Pointer
AS-1	Wood Pulley Stud
CE-6	Filter Condenser 40-40
CE-4	Cathode Bypass 40 mfd. 25v
CE-7	Electrolytic 8 mfd. 150v
*CV-15-2	Tuning Gang

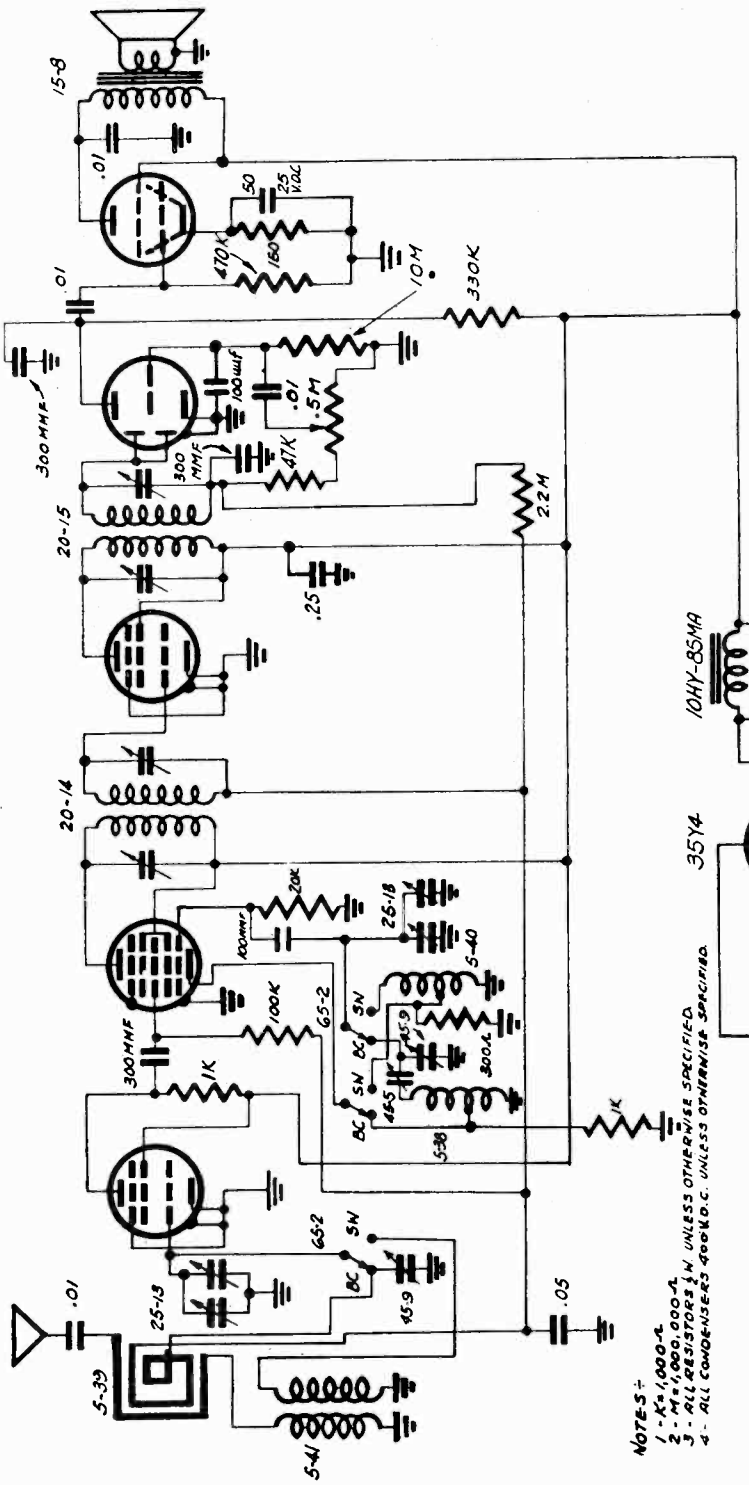
Part	Description
EG-5	Speaker Grommet
ES-12	Miniature Tube Shield
HE-7	Speaker Mtg. Eyelet
IL-1	Panel Lamp 6-8v
KB-4	Volume Knob
KB-12	Tuning Knob
KB-13	Tone & Band Knob
KB-14	Tone & Selector Knob, Small
KB-6	Push Buttons, Set of 7
OG-1	Miter Gear, Pair
PC-3	Loop Plug
PC-5	Phono & Television Plug

RV-5	Tone Control
RV-7	Volume Control
SP-2	Speaker
TP-8	Power Transformer
*TR-11	1st IF Transformer
*TR-12	2nd IF Transformer
*TR-13	3rd IF Transformer
*UK-8	R.F. Coil plate
*UK-9	Mixer coil plate
*UK-10	Oscillator coil plate

REPLACEMENT PARTS — Certain parts are available on an exchange basis; these are shown on the parts list with an "*."

MINERVA CORP. OF AMERICA

MODEL W-725



Tube Complement:—

1—6SK7 RF Amplifier
1—6SA7 Converter
1—6SK7 IF Amplifier
1—6SQ7 2nd Detector, AVC, 1st Audio
1—50L6 Power Amplifier
1—35Y4 Rectifier

Tuning Range—Standard Broadcast 540—1640 KCS.
International Shortwave 5.4—19 MCS.

Power Supply:—105-125 volts direct current or 50 - 60 cycle alternating current.

ANTENNA

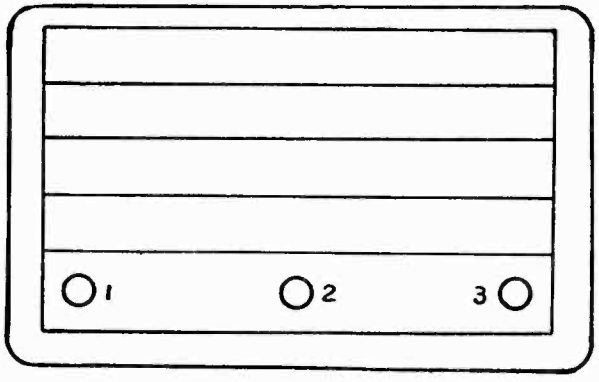
This receiver contains a built-in loop Antenna of excellent design and will give good results even in localities where broadcast signals are weak. It may be necessary, however, to turn the set toward the direction of the desired signal to provide maximum loop pick-up. For best reception of distant stations an external Antenna should be used. A screw connector is provided on the cabinet back for easy connection to an outdoor Antenna. An external Antenna is required for shortwave reception. Where space prohibits an outdoor installation, 10 feet of insulated wire stretched out on the floor will usually give adequate results.

INITIAL ADJUSTMENT

Plug line cord connector into 115 volt current supply outlet. Turn Power Switch (see drawing below) clockwise until a click is heard. Wait one minute for tubes to heat and advance control until a response is heard. If the set does not operate or if a loud hum is heard, remove plug, rotate ½ turn and replace in socket.

CONTROLS

The position and function of the three controls are shown in diagram below:



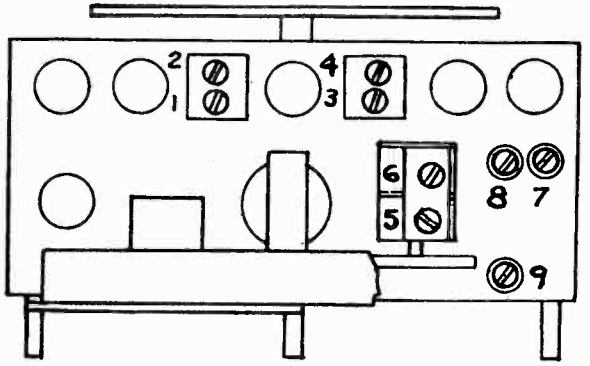
No. 1—Power Switch and Volume Control

No. 2—Tuning Control

No. 3—Band Switch, counter clockwise for broadcast — clockwise for Shortwave.

ALIGNMENT NOTES

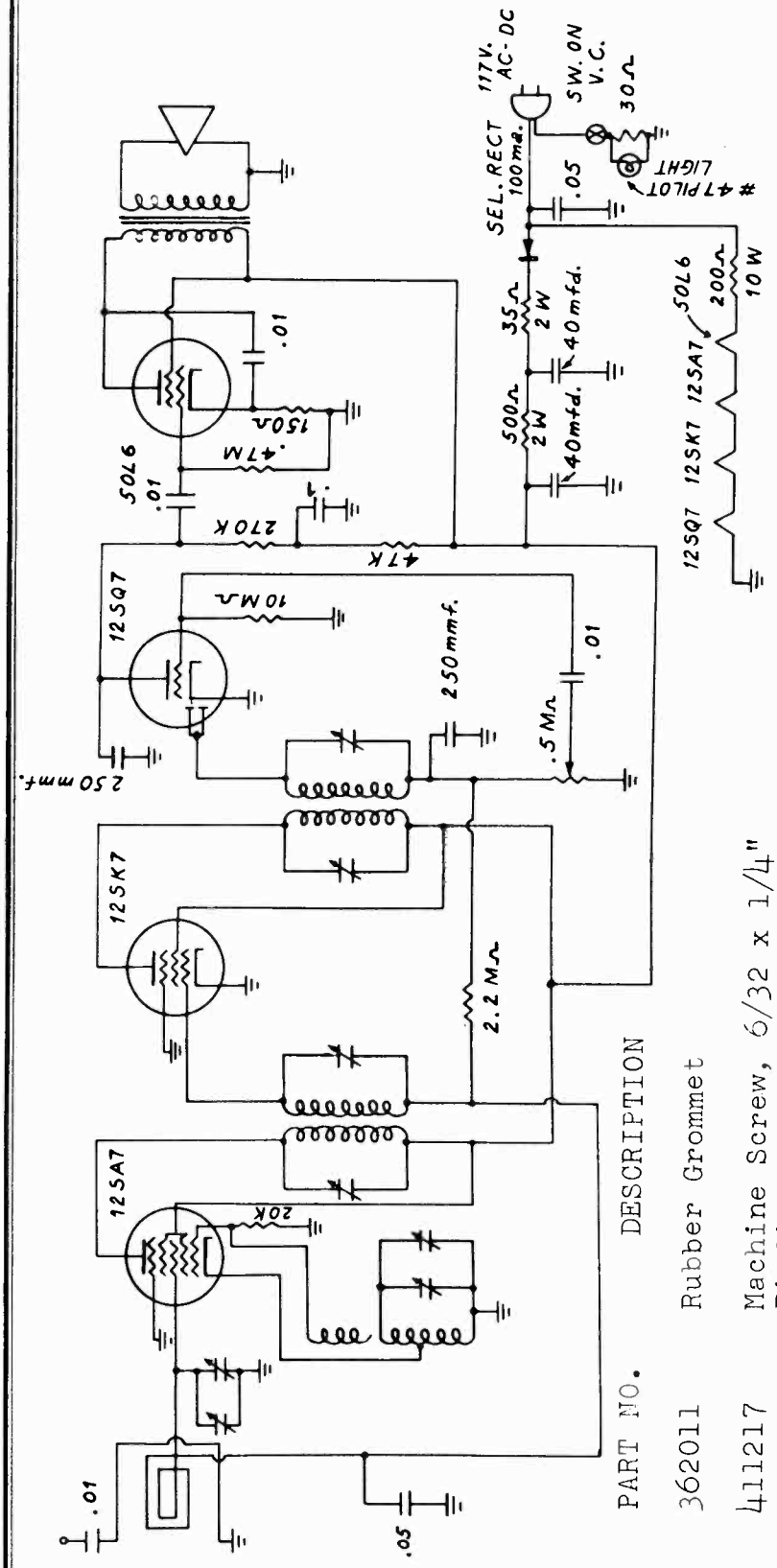
The screws for adjusting the IF and RF Amplifiers, together with the frequencies at which adjustment is to be made, are shown in diagrams below.

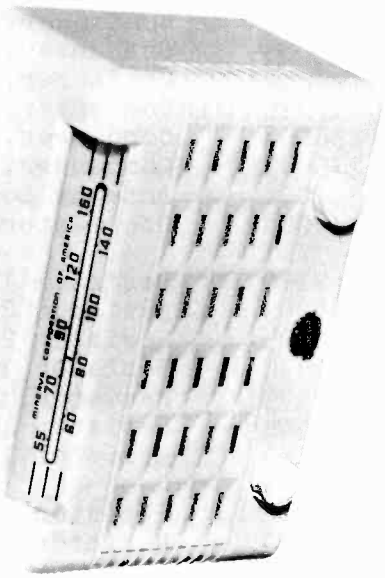


Generator Connection	*Dummy Antenna*	*Band SW Position*	*Freq.*	*Adjust. Trimmers*
Stator rear section gang open	.1 mfd Condenser	B. C.	455 KC	1, 2, 3, 4
Antenna Post	400 ohm Resistor	S. W.	18 MC	5, 6
Antenna Post	200 MMF Condenser	B. C.	1400 KC	7, 8
Antenna Post	200 MMF Condenser	B. C.	600 KC	9 (rock gang)
Antenna Post	200 MMF Condenser	B. C.	1400 KC	7, 8

MINERVA CORP. OF AMERICA

MODELS 410, 411



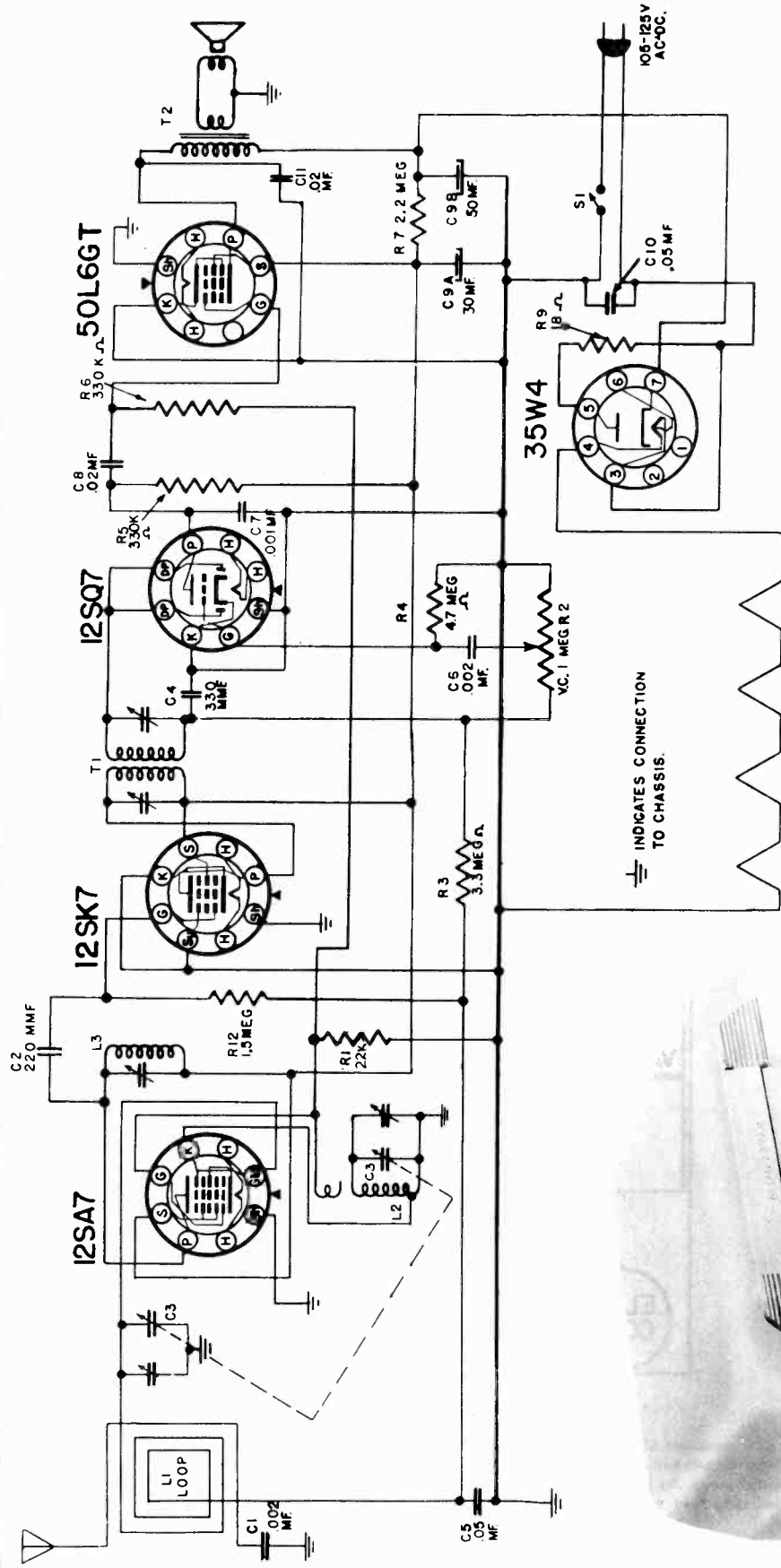


PART NO.	DESCRIPTION
362011	Rubber Grommet
411217	Machine Screw, 6/32 x 1/4" Binding Head
411237	Machine Screw, 6/32 x 1 1/4" Binding Head
431042	Self-tapping Screw, #6 x 1/2" Phillips Round Head
431150	Self-tapping Screw, #6 x 1/4" Phillips Round Head
431614	Self-tapping Screw, #6 x 1/4" Hex Head
461007	Hex Nut, 3/8" x 32 x 1/2"
461009	Hex Nut, 6/32 x 1/4"
491002	#6 I.T. Lockwasher, Shakeproof
491048	3/8" I.T. Lockwasher, Shakeproof

MODELS 410, 411 MINERVA CORP. OF AMERICA

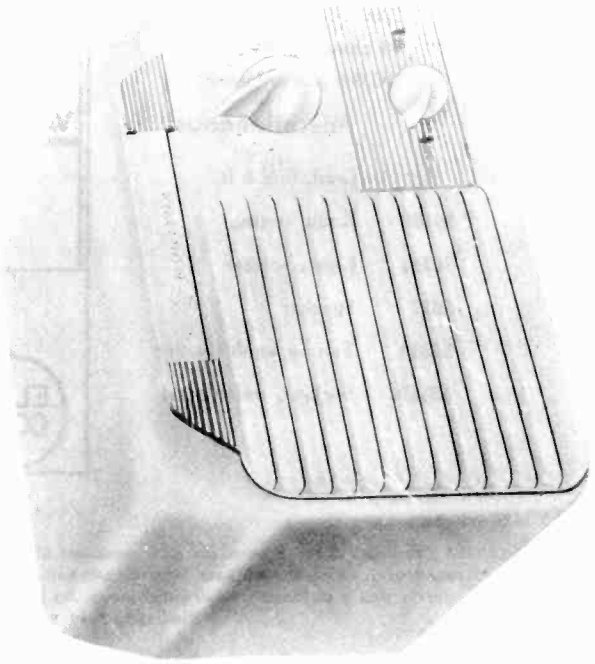
PART NO.	DESCRIPTION
185005	5" PM Speaker w/Transformer
190044	Condenser, .05 Mfd 400V
190005	Condenser, .1 Mfd 200V
190010	Condenser, .01 Mfd 400V
212035	Condenser, Mica, 250 mmf
230008	Condenser, Electrolytic, 2 x 40 Mfd 150V
235003	Condenser, Variable, w/pulley
247001	Antenna Loop
248008	Oscillator Coil
262106	Resistor 10 megohm 1/4 Watt
262203	Resistor 20K ohm 1/4 Watt
262225	Resistor 2.2 megohm 1/4 Watt
262334	Resistor 330K ohm 1/4 Watt
262473	Resistor 47K ohm 1/4 Watt
262474	Resistor 470K ohm 1/4 Watt
282151	Resistor 150 ohm 1 Watt
292350	Resistor 35 ohm 2 Watt
292501	Resistor 500 ohm 2 Watt
300015	Potentiometer w/switch 1 9/16"
303031	Resistor 200 ohm 10 Watt
305002	IF Transformer, input
305003	IF Transformer, output
312003	Tube. type 12SA7
312005	Tube, type 12SK7
312009	Tube, type 12SQ7
312118	Tube, type 50L6
317004	Octal Socket
328002	#6 I.T. Soldering Lug
328008	Terminal Strip, Single Tie
328028	Terminal Strip, 6-Tie, 3rd from left gnd.
337107	3/16" Spaghetti.
333007	AC Line Cord
336001	Dial Cord
344002	Idler Pulley
346007	Dial Pointer
348001	Dial Cord Spring
350018	Loop Mounting Bracket
350019	Condenser Mounting Bracket
350030	Speaker Mounting Bracket
350038	Dial Face Holder
350039	Dial Face Holder Bracket
350040	Dial Light Bracket
350096	Chassis
357010	Dial Drive Shaft Assembly, 1 9/16"
511011	#6 Flat Washer, 5/8" OD x 1/32"
531033	Standard Rivet, 9/64"
551009	Shoulder Rivet, 29/64"
600008	Spacer Sleeve, 7/32"
730001	Selenium Rectifier, 100 ma.
292350	Resistor, 35 ohm, 2 W
316011	Pilot Lamp, #47
319001	Pilot Lamp Assembly

MONITOR EQUIPMENT CORP. MODEL M-500



TECHNICAL DATA

Tuning range	520 to 1590 kc
Intermediate frequency	455 kc
Power consumption	30 watts
Selectivity	1. A.C.A.—3 to 1. 2. A.C.A.—12.5 to 1
Sensitivity (for 0.5 watt output)	600 microvolts average
Power output (in voice coil):	
Undistorted	0.8 watts
Maximum	2.5 watts



MODEL M-500

MONITOR EQUIPMENT CORP.

ALIGNMENT PROCEDURE

(Refer to Chassis View)

- Output meter across 3.2-ohm output load.
- Volume control at maximum.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Connect ground post of signal generator to chassis.

SIGNAL GENERATOR			TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT (in order shown)
Frequency	*Dummy Antenna*	*Connection to Radio*		
455 kc	0.1 mf	Stator of antenna section of gang	Any	Trimmers on I.F. can
1590 kc	50 mmfd	Primary of antenna coil	Rotor full open (plates out of mesh)	Oscillator trimmer
1590 kc	50 mmfd	Primary of antenna coil	Rotor full open (plates out of mesh)	Antenna trimmer

REPLACEMENT PARTS LIST

Capacitors

Ref. No.	*Part No.*	*Description*
C1, C6		Paper, .002 mfd 400 volts
C8-C11		Paper, .02 mfd 400 volts
C5		Paper, .05 mfd 200 volts
C7		Paper, .001 mfd 500 volts
C4		Ceramic 330 mmfd 500 volts
C3	1675	Variable Air—2 gang
C9	2073	Electrolytic, 50-30 mfd 150 volts
C10		Paper, .05 mfd 400 volts

Resistors

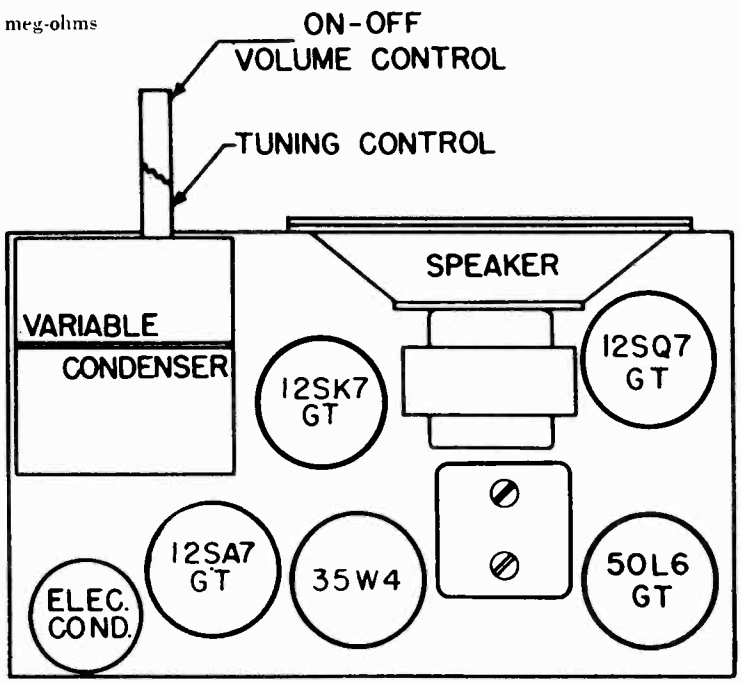
R2	2483	Control, volume with switch. 2 meg-ohms
R1	22K	19,000 ohms, ¼ watt
R3		3.3 meg ohms, ¼ watt
R4, R10		4.7 meg ohms, ¼ watt
R5		220,000 ohms, ¼ watt
R6		330,000 ohms, ¼ watt
R7		2200 ohms, 2 watts
R9		18 ohms, ½ watt
R11		100,000 ohms, ¼ watt

Miscellaneous

	Cord, line 6 ft.
39160	Knob, tuning
39161	Knob, volume
5877	Speaker
54314	Tuning knob washer
18110	Sockets, wafer octal

Coils and Transformers

Ref. No.	*Part No.*	*Description*
L2	28210	Oscillator coil
L3	3535	I.F. transformer
L5	1770	I.F. transformer
L4	1300	Output transformer
L1	62192	Loop

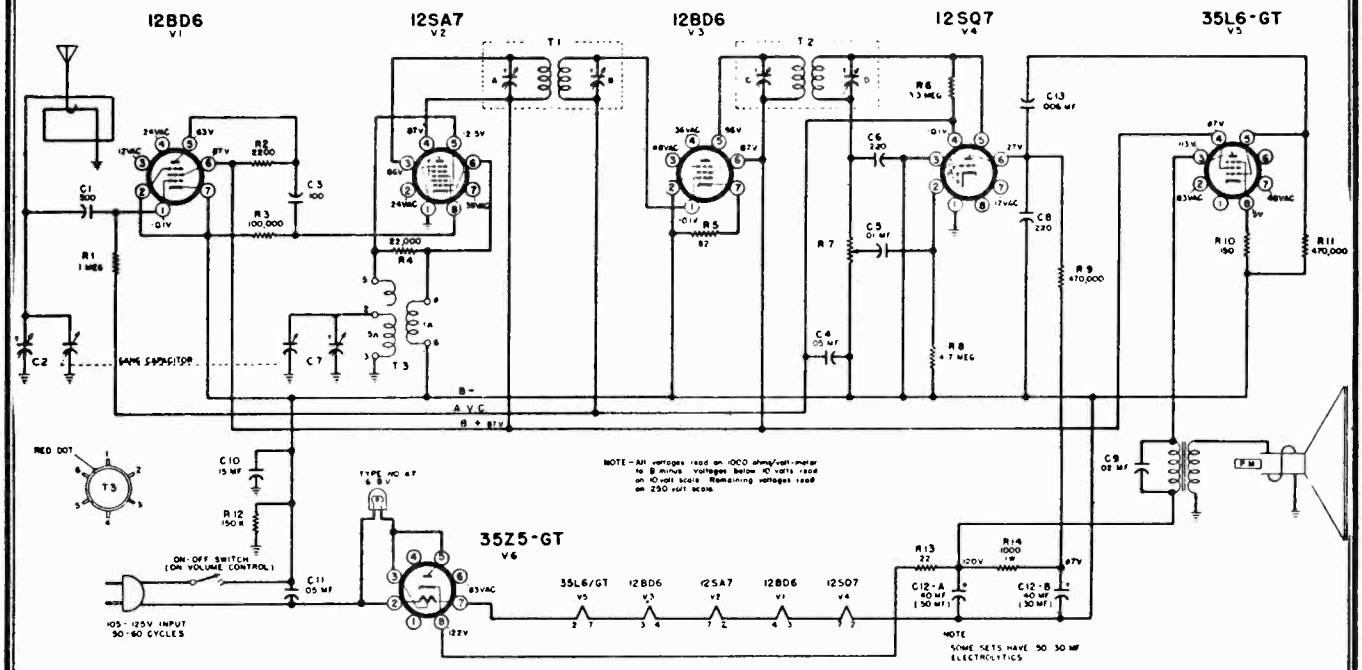


* The values of the resistors and mica capacitors listed above are based on RMA standards. Due to conditions beyond our control some receivers have been shipped with components of pre-standardized values. This receiver will operate equally well with components of either group. An illustration of the differences in both resistors and capacitors follows:

Pre-standardized value—50,000 ohms, 1/3 watt, 10%
RMA value—47,000 ohms, 1/2 watt, 10%
Pre-standardized value—200 mmf, 500 volts, 20%
RMA value—220 mmf, 500 volts, 20%

MONTGOMERY WARD

MODELS 84BR-1517A, 84BR-1518A



NOTE: On some sets slug tuned I.-F.'s are used instead of trimmer tuned I.-F.'s. 108-140Q and 108-145H are trimmer tuned. B-13A-12023-1 and B-13B-12022-1 are slug tuned. The slug tuned I.-F.'s are tuned from the top and bottom (secondary on top, primary on bottom).
When trimmer tuned I.F.'s are used, R5 is 270 ohms.

GENERAL DESCRIPTION

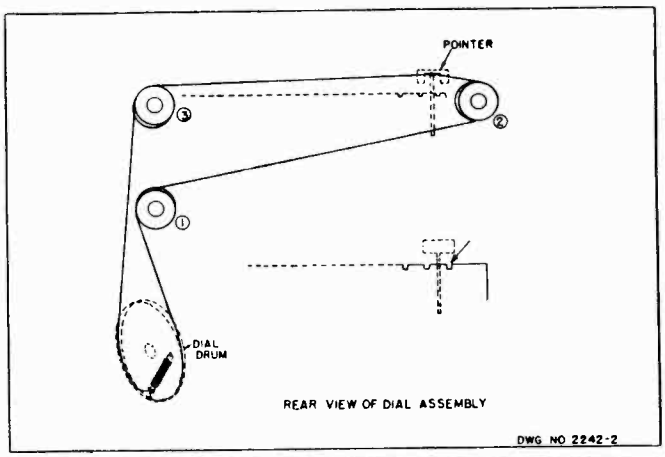
This receiver is a single-band, AC-DC set which uses 5 tubes plus a rectifier. The antenna input and oscillator circuits are tuned by a two-gang capacitor. A loop antenna is built into the cabinet; provision is made also for the connection of an external antenna. AVC voltage is applied to the grids of the R.F.-Amplifier, and IF-amplifier tubes.

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, DC or 50-60 cycle AC, 35 watts.
Frequency Range	530 to 1650 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc, 55 kc at 1000 x signal.
Sensitivity	40 microvolts average for .05 watt output.
Power Output	0.8 watts undistorted, 1 watt maximum.
Loud Speaker	5" P.M., v.c. impedance 3.2 ohms.
Tube Complement	12BD6, R. F. stage. 12SA7, converter. 12BD6, I. F. amplifier. 12SQ7, detector, AVC, audio amplifier. 35L6GT, output amplifier. 35Z5GT, rectifier.

REPLACING DIAL POINTER DRIVE CORD—

1. Rotate tuning knob to extreme clockwise position. This closes the tuning condenser. Knob should remain in this postion until installation of cord is completed.
2. Tie cord to loop in spring in drum. Pass around drum in direction shown.
3. Pass over idler pulley number 1, then around idler pulley number 2 as shown.
4. Pass cord over idler pulley number 3, then down around drum as shown. Tie to loop in spring in such a manner that the spring is partly stretched.
5. Place pointer on top edge of dial plate. Guide cord through the three fingers on the back of the pointer.
6. Make sure the tuning knob is in the extreme clockwise position. Slide the dial pointer along the edge of the dial plate until the left edge of the pointer coincides with the right hand notch on the gold background plate, when viewed from the front.
7. Push the cord firmly into the three fingers and clamp them tightly together.



MODELS 84BR-1517A, 84BR-1518A

MONTGOMERY WARD

SETTING THE PUSHBUTTONS—The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations which you select. They can be set up in any order.

1. Turn on the radio. Allow it to warm up for at least one minute.

2. Push out the call letters of the six stations from the call-letter sheets supplied with this manual.

3. Insert one call-letter tab in the rectangular opening in each of the pushbuttons, in any sequence. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.

4. With the screwdriver supplied, check to see that the locking screw in the center of the tuning knob (see illustration) is loose. If it is not, turn it several turns to the left (counterclockwise).

5. Press the first pushbutton down *all the way*. With one hand hold the button down *firmly* and with the other carefully tune in the desired station. Release the pushbutton.

6. Follow this procedure for each of the five other buttons, adjusting each one for a different station.

7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.

8. The pushbuttons are now properly set for automatic tuning. Any of the six stations may now be tuned in simply by pressing the proper button down as far as it will go. If it is desired to reset any of the buttons for a new station, loosen the locking screw in the center of the tuning knob, set the pushbutton as described above, and re-tighten the locking screw.

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissable. Volume control at maximum for all adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50-MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection			
455 kc.	.1 mf.	Pin No. 8 of 12SA7	12SQ7 Pin 3	Rotor full open	Trimmers on output and input I.F. cans	100 microvolts
1650 kc.	.1 mf.	Pin No. 8 of 12SA7	12SQ7 Pin 3	Rotor full open	Oscillator trimmer C7 (on bottom)	———
1400 kc.	none	See note A	none	Set dial at 1400	Antenna trimmer C2 (on bottom)	———
1400 kc.	.1 mf.	External antenna clip	12SQ7 Pin 3	1400 kc.	———	13 microvolts
400 cycles	.1 mf.	12SQ7, Pin 2	12SQ7 Pin 3	———	———	.05 volts

Note A: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.

MONTGOMERY WARD

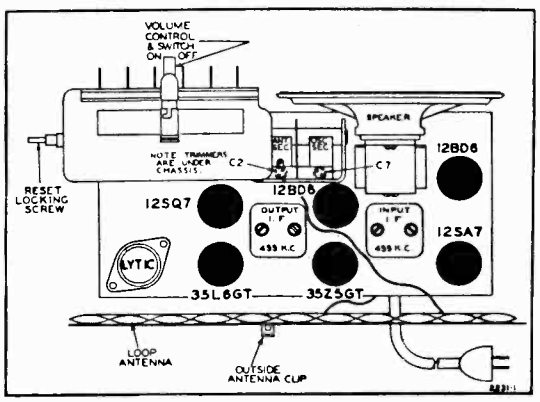
MODELS 84BR-1517A, 84BR-1518A

REPLACEMENT PARTS LIST

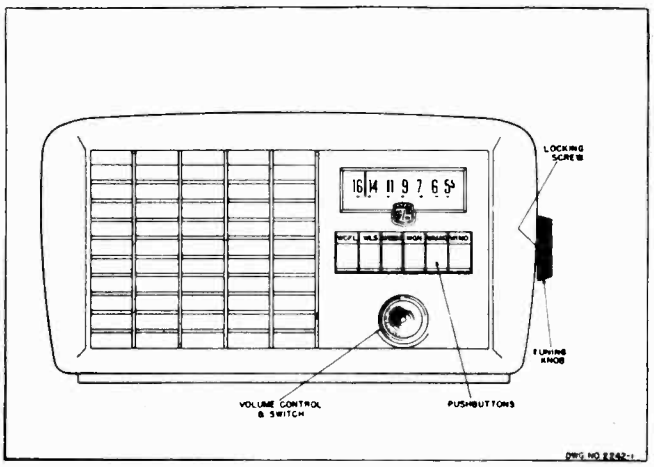
Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description
		CONDENSERS
C12A, C12B	A-8C-15030 or A-8C-15262	Filter cond., 40 mfd. x 40 mfd. x 150 volts Filter cond. 50 mfd. x 30 mfd. x 150 volts
C4	C-8D-10770	.05 x 200 volts, tubular
C9	C-8D-10774	.02 x 400 volts tubular
C5	C-8D-11738	.01 x 200 volts, tubular
C11	C-8D-10813	.05 x 400 volts, tubular
C10	C-8D-10953	.15 x 400 volts, tubular
C13	C-8D-10785	.006 x 600 volts, tubular
C6, C8	C-8G-11733	220 mmf., ceramic
C1	C-8G-11822	500 mmf., ceramic
C3	C-8G-11734	100 mmf., ceramic
		RESISTORS
R14	C-9B2-62	1000 ohms, 1 watt, 10%
R9, R11	C-9B1-94	470K ohms, 1/2 watt, 20%
R8	C-9B1-35	4.7 megohms, 1/2 watt, 20%
R6	C-9B1-34	3.3 megohms, 1/2 watt, 20%
R4	C-9B1-78	2.2K ohms, 1/2 watt, 20%
R13	C-9B1-42	22 ohms, 1/2 watt, 10%
R3	C-9B1-25	100K ohms, 1/2 watt, 20%
R2	C-9B1-66	2200 ohms, 1/2 watt, 10%
R12	C-9B1-26	150K ohms, 1/2 watt, 20%
R1	C-9B1-31	1 megohm, 1/2 watt, 20%
R10	C-9B1-52	150 ohms, 1/2 watt, 10%
R5	C-9B1-49 or C-9B1-55	82 ohms, 1/2 watt, 10% 270 ohms, 1/2 watt, 10%
		COILS
	C-13E-16257	Loop antenna assembly, complete on back
T3	B-13D-15277	Oscillator coil
T1	108140Q or B-13A-12023-1	Input I.F. coil in can, 455 Kc.
T2	108145H or B-13B-12022-1	Output I.F. coil in can, 455 Kc.
(See note on page 3)		
		SOCKETS
	A-15C-16110	7-prong, tube socket
	121171	8-prong socket, laminated
	121216 or B-15B-10076	Socket base, bakelite
	A-47A-15451	Pilot light socket assembly

Ref. No.	Part No.	Description
		SPEAKER
	114197	5-inch P.M. speaker
	B-12C-15278	Output transformer for speaker
		DIAL AND TUNER PARTS
	115448	End plate (right hand bracket)
	115448C	End plate (left hand bracket)
	115146	Cams
	115143	Key washer (12 used on cam shaft)
	115143C	Key washer (one used)
	117528	Brass spacer (one used on cam-shaft)
	117602	Brass spacer (four used on cam-shaft)
	131181	Spring washer for locking collar
	117604	Locking collar
	117600	Lever shaft
	115361	Lever with roller
	120283	Return spring for levers
	A-2G-15449	Pointer
	A-55A-10989	Dial cord, 24 inches used
	C-2C-15428	Dial plate assembly
	A-200-15463	Drum pulley
	A-3H-10299	Idler pulley
	120285	Drum spring
	B-2M-10383	Cinch button
	C-6D-15422	Dial scale
	B-2M-15200	Cinch button for dial scale
	A-2C-15450	Background plate
		MISCELLANEOUS
	10798	Line cord and plug
R7	101218 or A-10A-10626	Volume control and switch, 1 meg.
C1-A, C1-B	B-8A-10211	2-gang variable condenser
	107249	Pilot light bulb, type T-47
	134123	Rubber bumper (bottom of cabinet)
	13141	Cinch buttons, to cover trimmer holes in cabinet
	B-5B-14298-8	Pushbutton (6 used), Ivory
	A-23L-11900	Station call letters, set
	A-6C-14299	Acetate tabs for call letters
	5C-14286-9	Cabinet, bakelite, ivory color
	B-5B-15085-8	Knob, volume, ivory color
	A-5B-10994-9	Knob, tuning, ivory color
	A-3F-10995	Locking screw for tuning knob
	120388	Locking spring for tuning knob
	A-2H-10996	Reset key
	5C-14286-36	Cabinet, walnut
	A-2H-10715	Tube shield

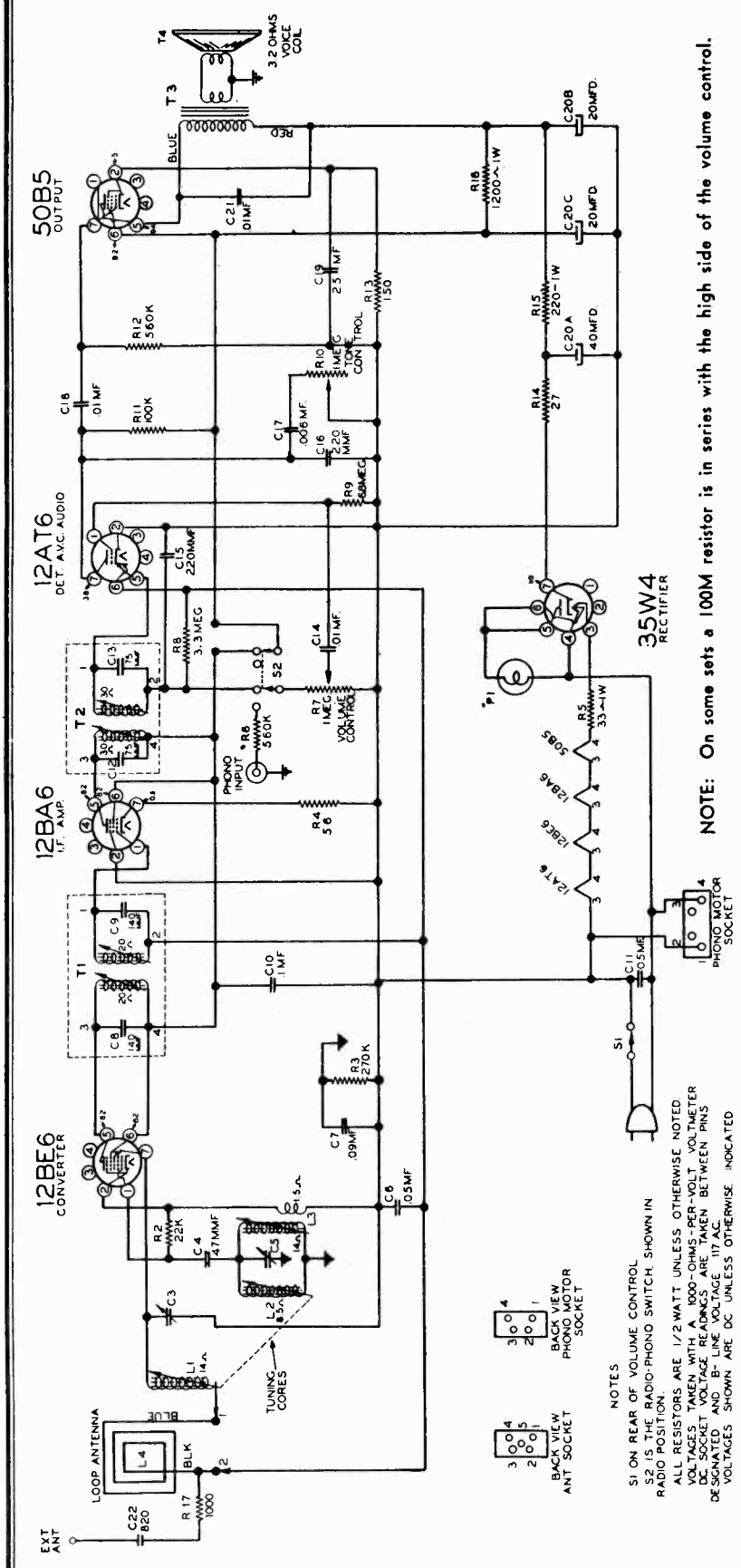


CHASSIS VIEW, SHOWING TUBE LOCATIONS
(See note on I.-F.'s.)



MODEL 84BR-2003C

MONTGOMERY WARD



NOTE: On some sets a 100M resistor is in series with the high side of the volume control.

GENERAL DESCRIPTION

This radio-phonograph is a permeability-tuned, AC set using 4 miniature tubes plus a rectifier. A loop antenna is built into the back of the cabinet. A clip is provided for connection of an external antenna. Simple AVC voltage is applied to the converter and IF-amplifier tubes. The filament string is across the AC line.

ELECTRICAL SPECIFICATIONS

Power Supply.....105 to 125 volts; 60 cycles AC, 60 watts.

Frequency Range.....535 to 1620 kc.

Intermediate Freq.....455 kc.

Selectivity.....At 1000 kc. 50 kc. at 1000 x signal.

Sensitivity.....10 microvolts average for .05 watts output.

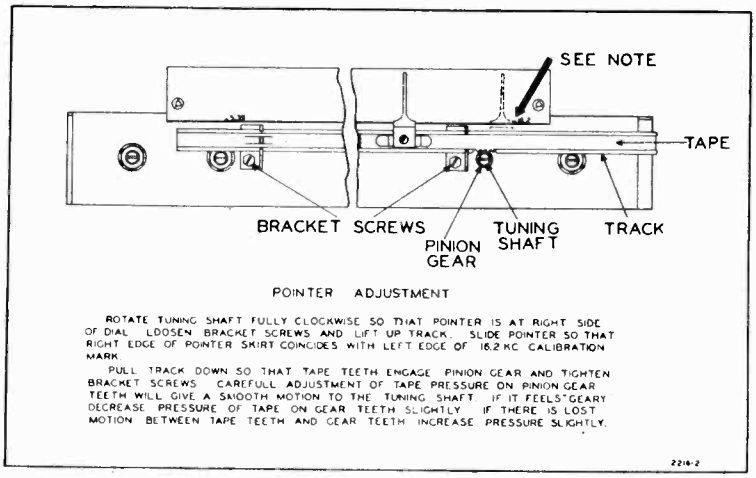
Power Output.....0.75 watts undistorted, 1.0 watts maximum.

Loud Speaker.....4" x 6" oval, P.M., v.c. impedance 3.2 ohms.

Tube Complement.....12BE6, converter
12BA6, I.F. amplifier.
12AT6, detector, AVC, audio amplifier
50B5, output amplifier
35W4, rectifier
Pilot lite, 6-8 volts, T-47.

RECORD CHANGER: V-M Model 800, RCD.CH. 17-1

MONTGOMERY WARD MODEL 84BR-2003C

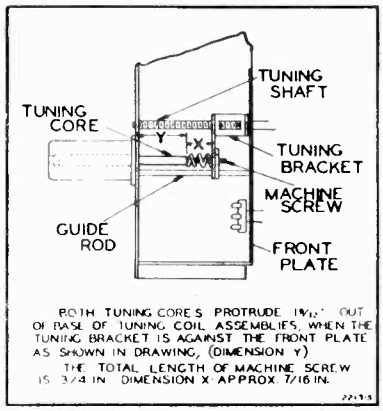


POINTER ADJUSTMENT

ROTATE TUNING SHAFT FULLY CLOCKWISE SO THAT POINTER IS AT RIGHT SIDE OF DIAL. LOOSEN BRACKET SCREWS AND LIFT UP TRACK. SLIDE POINTER SO THAT RIGHT EDGE OF POINTER SKIRT COINCIDES WITH LEFT EDGE OF 16.2 KC CALIBRATION MARK.

PULL TRACK DOWN SO THAT TAPE TEETH ENGAGE PINION GEAR AND TIGHTEN BRACKET SCREWS. CAREFULL ADJUSTMENT OF TAPE PRESSURE ON PINION GEAR TEETH WILL GIVE A SMOOTH MOTION TO THE TUNING SHAFT. IF IT FEELS "GEARY" DECREASE PRESSURE OF TAPE ON GEAR TEETH SLIGHTLY. IF THERE IS LOST MOTION BETWEEN TAPE TEETH AND GEAR TEETH INCREASE PRESSURE SLIGHTLY.

2216-2



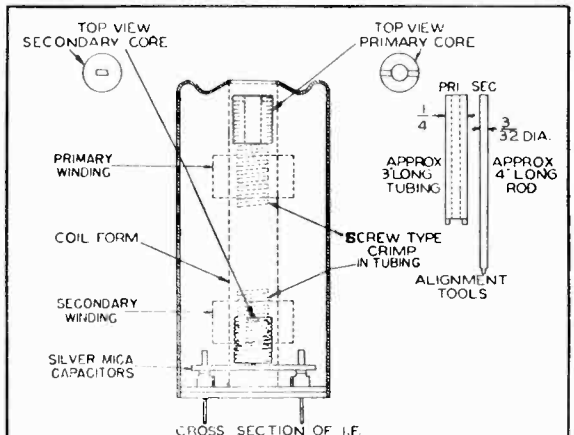
BOTH TUNING CORES PROTRUDE 1 9/32" OUT OF BASE OF TUNING COIL ASSEMBLIES, WHEN THE TUNING BRACKET IS AGAINST THE FRONT PLATE AS SHOWN IN DRAWING, (DIMENSION Y)

THE TOTAL LENGTH OF MACHINE SCREW IS 3/4 IN. DIMENSION X APPROX. 7/16 IN.

2213-1

NOTE: On some sets, pairs of punch marks on the inside of the tape guide are used as calibration markers. They are in the same relative position as the frequencies shown above. The end of the tape is then used as the indicator line.

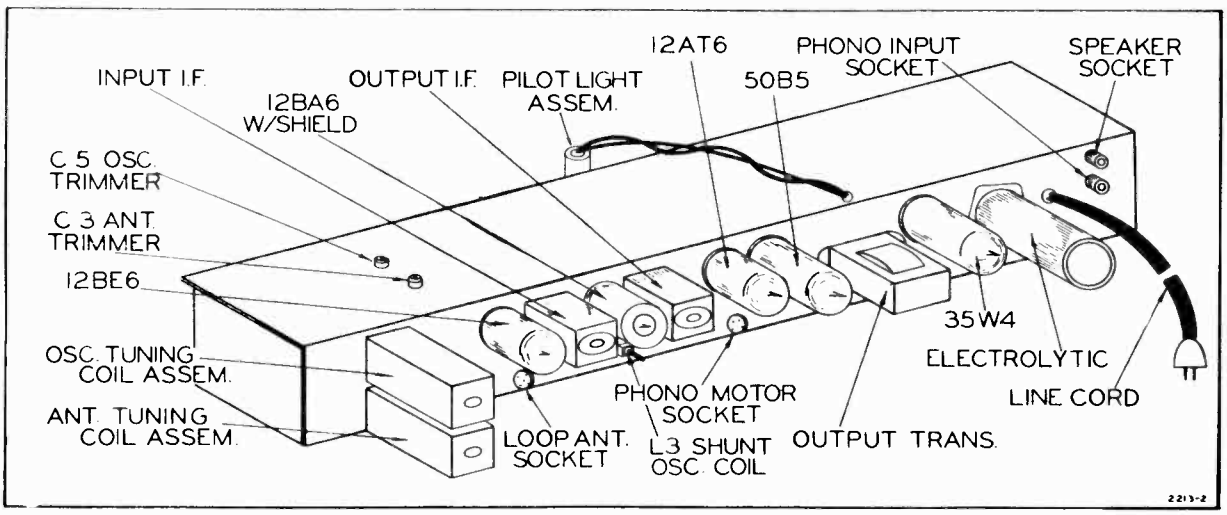
CAUTION: The I.F. transformer construction is such that two resonance peaks occur for each winding, one peak when the slug is above its coil and another peak when the slug is below its coil. Be sure the upper cores are above the top coils and the lower cores are below the bottom coils (see coil drawing).



PRIMARY CORE HAS HOLE THRU THE CENTER TO ALLOW SMALL FIBRE TOOL TO PASS THRU AND ADJUST THE SECONDARY CORE. THE PRIMARY CORE HAS A COMPLETE SLOTTED TOP FOR ADJUSTMENT; SECONDARY CORE HAS A SMALL NITCH IN TOP. BOTH WINDINGS ARE TOP TUNED

THE SECONDARY ALIGNMENT TOOL PASSES THRU THE CENTER OF THE PRIMARY TOOL, FOR SIZE SEE DETAIL DRAWING

2213-3



2213-2

NOTE: On some sets, the loop antenna socket is eliminated and leads are brought out thru the hole.

MODEL 84BR-2003C MONTGOMERY WARD

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissable. Volume control at maximum for all adjustments. Tone control at maximum treble.

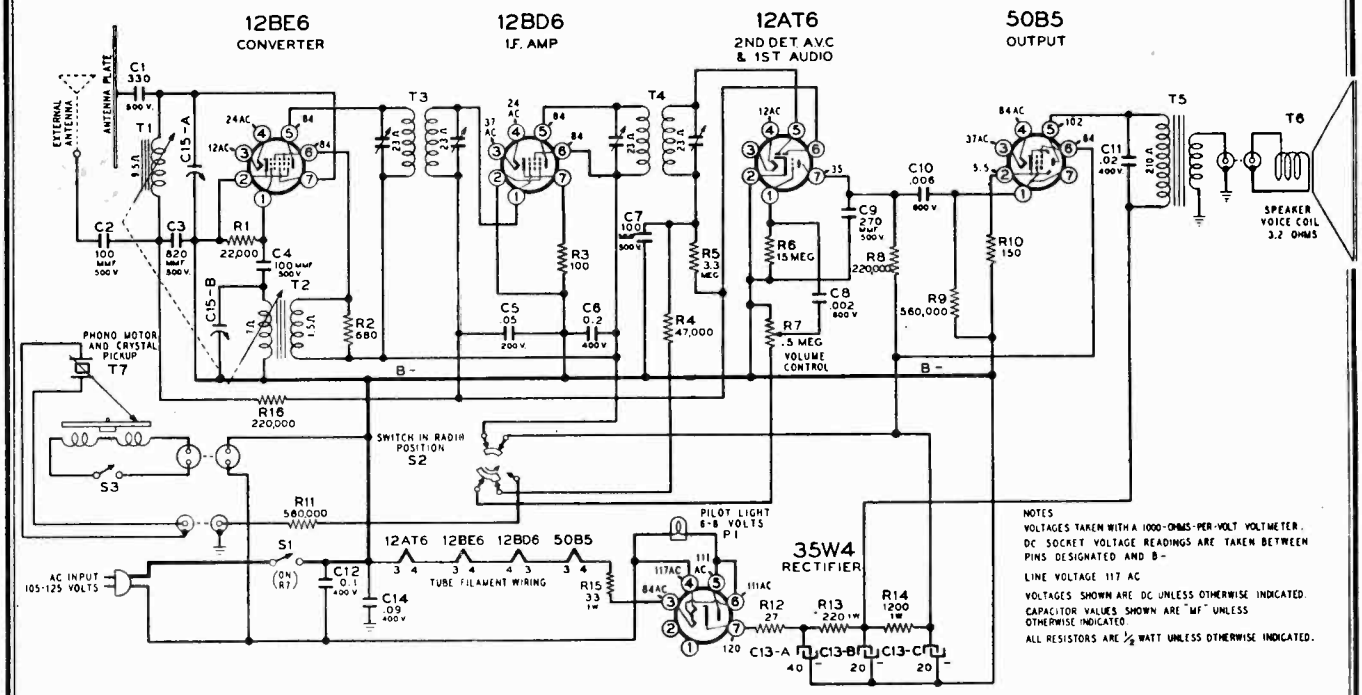
SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50-MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection			
455 kc.	.1 mf	12BE6, Pin 7	12AT6, Pin 2	Iron cores all the way out	Trimmers on output and input I.F. cans	28 microvolts
1620 kc.	.1 mf	12BE6, Pin 7	12AT6, Pin 2	Iron cores all the way out	Oscillator trimmer C5	———
535 kc.	200 mmf	External antenna clip	12AT6, Pin 2	Iron cores all the way in	Shunt osc. coil L3	11 microvolts
1620 kc.	200 mmf	External antenna clip	12AT6, Pin 2	1620 kc.	Antenna trimmer C3*	8 microvolts
1400 kc.	200 mmf	External antenna clip	12AT6, Pin 2	1400 kc.	Adjust position of ant. core (see coil illustration view)	8 microvolts
400 cycles	.1 mf	12AT6, Pin 1	12AT6, Pin 2	———	———	.03 volts

*After the antenna coil has been tracked at 1400 kc, it is necessary to check the antenna trimmer C3 again at 1620 kc. If no appreciable change in trimmer adjustment is necessary, the coil is in track. If the trimmer requires considerable change, the position of the antenna core at 1400 kc must be readjusted. These two adjustments should be made several times, until no trimmer adjustment is required at 1620 kc.

Ref. No.	Part No.	Description	Qty. Used In Set
		CONDENSERS	
C20A, B, C	A-8C-10077	40 mf; 20 mf; 20 mf; 150 volts Electrolytic filter condenser	1
	or A-8C-10937		1
C3, 5	A-2M-12618	Trimmer plate	2
C3, 5	A-6M-12616	Insulator for trimmer—mica	2
C3	A-2M-14054	Trimmer plate	1
C3	A-6M-14203	Insulator for trimmer (laminated)	
C10	C-8D-10771	.1 mf x 200 volts, 20%	1
C14, 18, 21	C-8D-10761	.01 mf x 400 volts, 20%	3
C11	C-8D-10813	.05 mf x 400 volts 20%	1
C6	C-8D-10770	.05 mf x 200 volts, 20%	1
C7	C-8D-11251	.09 mf x 400 volts, 10%	1
C17	C-8D-12243	.006 mf x 600 volts, 10%	1
C19	A-8C-11678	Electrolytic condenser, 25 mf x 25 volts	1
C15, C16	C-8F3-10	220 mmf x 500 volts, 20%, mica	2
C22	C-8F3-124	820 mmf x 300 volts, 10%, mica	1
C4	C-8G-12198	47 mmf, 10%, ceramic	1
		RESISTORS	
R7, S1	A-10A-12654	Volume (1 megohm) control and switch	1
R10	A-11B-12659	Tone control, 1 megohm	1
R3	C-9B1-91	270K ohms, 1/2 watt, 10%	1
R4	C-9B1-47	56 ohms, 1/2 watt, 10%	1
R14	C-9B1-43	27 ohms, 1/2 watt, 10%	1
R5	C-9B2-44	33 ohms, 1 watt, 10%	1
R11	C-9B1-86	100K ohms, 1/2 watt, 10%	1
R13	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R15	C-9B2-54	220 ohms, 1 watt, 10%	1
R16	C-9B2-63	1200 ohms, 1 watt, 10%	1
R2	C-9B1-78	22K ohms, 1/2 watt, 10%	1
R17	C-9B1-62	1000 ohms, 1/2 watt, 10%	1
R6, R12	C-9B1-95	560K ohms, 1/2 watt, 10%	2
R8	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R9	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1
		COILS AND TRANSFORMERS	
T1, C8, 9	B-13A-13071	Input I.F. coil	1
T2, C12, 13	B-13B-13072	Output I.F. coil	1
L4	C-13E-15103	Loop antenna assembly	1
L3	B-13D-12371	Osc. shunt coil assembly	1
L2	A-23D-12667	Osc. tuning coil	1
L1	A-13E-12668	Antenna tuning coil	1
T3	B-12C-12356	Output transformer for speaker	1
		SPEAKER	
T4	B-18A-12839-1	4" x 6", P.M. speaker, less output transformer	1
		PHONO PARTS	
	D-21H-13293	Record changer	1
	P30	Crystal cartridge, with phono needle	1
		Phono needle, see manual 62P-5050	
		DIAL AND TUNING PARTS	
	C-6D-15153	Dial scale	1
	B-5B-13390-58	Knob	4
	A-2G-13281	Pointer	1
	32F4-10830	Screw, 4-40 x 1/8", to fasten pointer	1
	B-2J-13282	Rack tape, with teeth	1
	A-200-13288	Tuning shaft assembly	1
	A-6B-13277	Diffuser	1
	or B-6B-14151	Diffuser	1
	B-2M-7758	Snap-pin rivets to fasten diffuser	2
	A-47A-13360	Pilot lite and bracket assembly	1
P1	A-46A-10793	Pilot lite bulb, 6-8 volt, type T-47	1
		MISCELLANEOUS	
	A-15C-10717	Miniature 7 prong tube socket	5
	B-15B-10076	Mounting plate for lytic	1
	A-19B-12644	Phono motor socket	1
	A-19B-12645	Loop antenna socket	1
	A-19B-11044	Pick-up socket	1
	A-23A-10344	Line cord lock	1
	A-19B-12170	Speaker socket	1
S2	A-20A-12653	Radio-phono switch	1

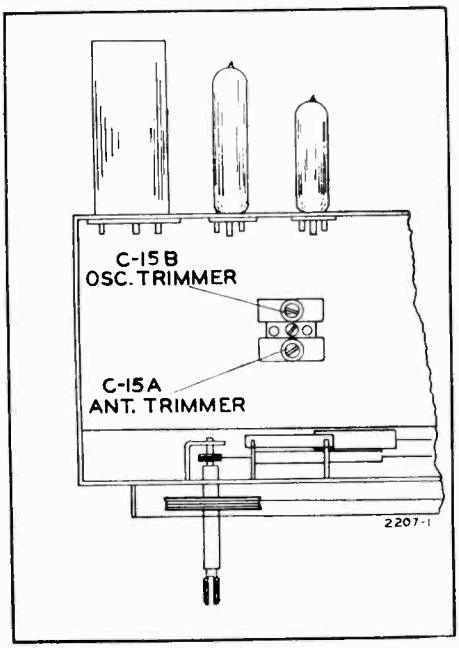
MONTGOMERY WARD

MODEL 84BR-2005A

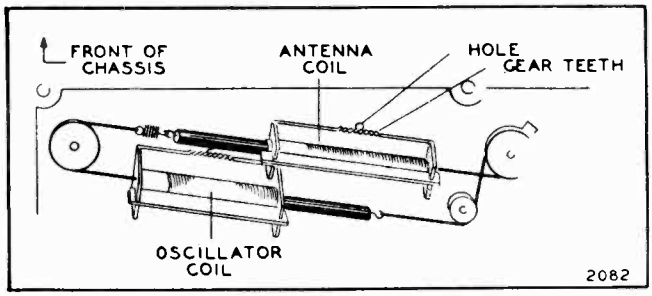


ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts, 60 cycles AC, 55 watts.
Frequency Range	535-1720 kc.
Intermediate Freq.	455 kc.
Antenna	Built-in plate; provisions also for external antenna connection.
Tuning	Permeability.
Speaker	4 x 6-inch, P.M., voice coil impedance 3.2 ohms.
Power Output	0.75 watt undistorted. 1.1 watts maximum.
Sensitivity	34 microvolts average for 50-milliwatts output.
Selectivity	55 kc. broad at 1000 times signal at 1000 kc.

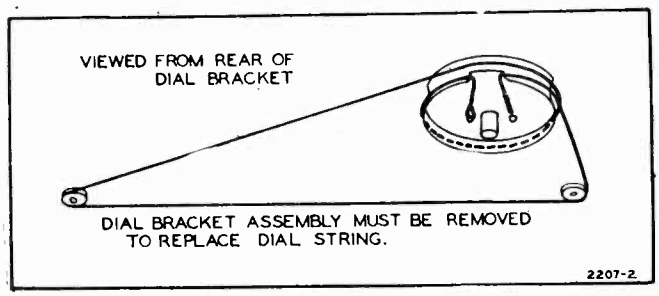


TRIMMER VIEW



VIEW OF COIL ASSEMBLY

The antenna coil assembly is movable left to right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one edge of a screwdriver blade in the hole and engaging the blade in the gear teeth of the coil form.



DIAL STRINGING VIEW

MODEL 84BR-2005A MONTGOMERY WARD

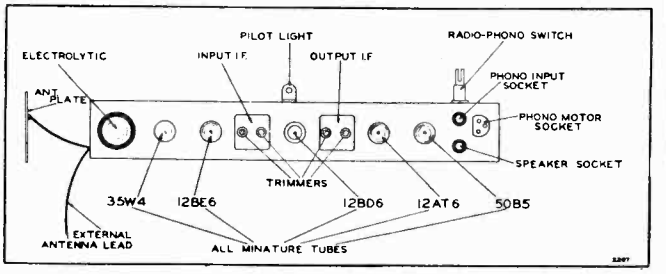
ALIGNMENT PROCEDURE

(Refer to Chassis and Coil Views)

- Output meter across 3.2-ohm resistive output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts which is equal to 50 milliwatts.
- Volume control at maximum for all adjustments.
- Connect ground post of signal generator to B— of radio.

SIGNAL GENERATOR			TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT (in order shown)	INPUT FOR 50-MILLIWATT OUTPUT
Frequency	Dummy Antenna	Connection to Radio			
455 kc.	.1 mf.	Grid (pin 7) of 12BE6	Iron cores all the way out	Trimmers on output and input I.F. cans	90 microvolts
1720 kc.	.1 mf.	Grid (pin 7) of 12BE6	Iron cores all the way out	Oscillator trimmer C-15B	———
1720 kc.	200 mmf	Antenna lead	Iron cores all the way out	Antenna trimmer C-15A	34 microvolts
1400 kc.	200 mmf	Antenna lead	Turn dial to 1400 kc.	Adjust position of antenna coil (see coil view)*	———

*This adjustment and the previous adjustment are interlocking; therefore repeat the two adjustments alternately for best results.



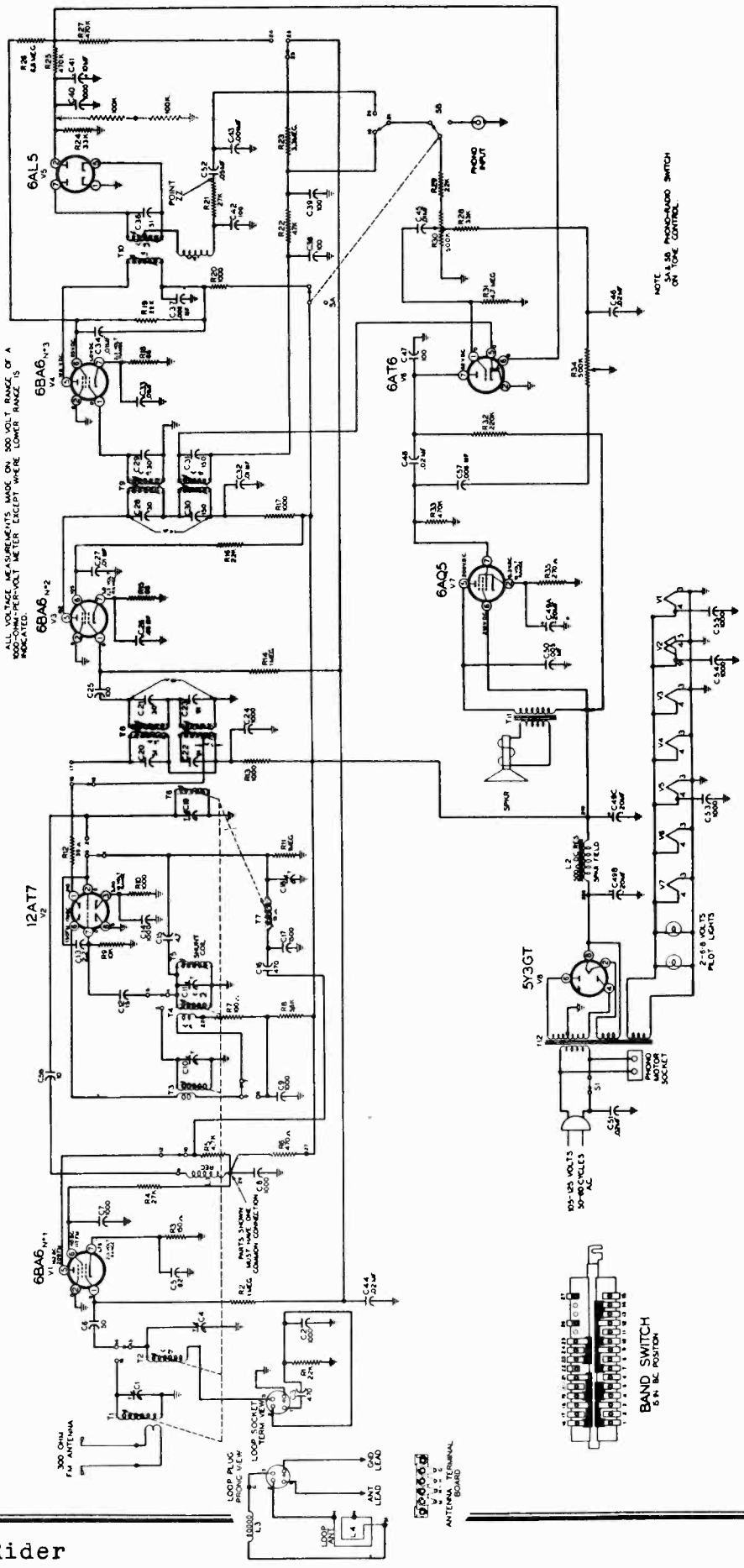
Chassis View

Ref. No.	Part No.	Description	Qty. Used
		CAPACITORS	
C13-A, C13-B, C13-C	A-8C-10077	Electrolytic, 40 x 20 x 20, 150 volts	1
C15-A, C15-B	A-8E-10723	Trimmer condenser, dual antenna and oscillator	1
C14	C-8D-11251	.09 mf x 400 v., 10%, tubular	1
C6	C-8D-10942	.2 mf x 400 volts, 10%, tubular	1
C5	C-8D-10770	.05 mf x 200 v., 20%, tubular	1
C10	C-8D-10785	.006 mf x 600 v., 20%, tubular	1
C8	C-8D-10789	.002 mf x 600 v., 20%, tubular	1
C11	C-8D-10774	.02 mf x 400 v., 20%, tubular	1
C12	C-8D-10760	.1 mf x 400 v., 10%, tubular	1
C1	C-8F3-119	330 mmf x 500 v., 10%, mica	1
C3	C-8F3-247	820 mmf x 500 v., 5%, mica	1
C9	C-8F3-118	270 mmf x 500 v., 10%, mica	1
C2, C4 C7	C-8F3-113	100 mmf x 500 v., 10%, mica	3
		RESISTORS	
R7 S1	A-10A-10720	Volume control (500M ohms) and switch	1
R15	C-9B2-44	33 ohms, 1 watt, 10%	1
R8, R16	C-9B1-90	220K ohms, 1/2 watt, 10%	2
R13	C-9B2-54	220 ohms, 1 watt, 10%	1
R14	C-9B2-63	1200 ohms, 1 watt, 10%	1
R12	C-9B1-43	27 ohms, 1/2 watt, 10%	1
R4	C-9B1-82	47K ohms, 1/2 watt, 10%	1
R3	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R5	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R9 R11	C-9B1-95	560K ohms, 1/2 watt ,10%	2
R10	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R6	C-9B1-302	15 megohms, 1/2 watt, 10%	1
R2	C-9B1-60	680 ohms, 1/2 watt, 10%	1
R1	C-9B1-78	22K ohms, 1/2 watt, 10%	1
		COILS AND TRANSFORMERS	
T1 T2	C-211-10171	Tuner unit, permeability tuned, Ant., and Oscillator coils	1
T3	B-13A-10728	Input I.F. transformer	1
T4	B-13B-10729	Output I.F. transformer	1
T5	B-12C-10074-1	Output speaker transformer	1

Ref. No.	Part No.	Description	Qty. Used
		DIAL AND TUNING PARTS	
	B-6D-15198	Dial scale	1
	B-6A-15199	Dial crystal	1
	C-5B-12718-2-37	Knob, "Volume"	1
	C-5B-12718-3-37	Knob, "Tuning"	1
	B-200-10980-2	Dial and bracket assembly	1
	A-55A-10093	Pilot lite and bracket	1
P1	A-46A-10793	Pilot light bulb, 6-8 volt type	1
	A-2G-10162	Pointer	1
		MISCELLANEOUS	
T6	B-18A-11089	4 x 6" oval P.M. speaker	1
	A-15C-13174	Tube socket	5
	A-2H-10718	Shield base	2
	A-2H-10974	Tube shield	2
	B-15B-10076	Mounting base for electrolytic	1
S2	A-20A-10722	Radio-phono switch	1
	A-19B-10727	Phono-motor socket	1
	A-55A-7386-1	Phono input socket	1
	A-19B-11044	Speaker socket	1
	A-23A-10344	Line cord lock	1
	B-14M-11085	A.C. line cord and plug	1
	B-2E-11038	Antenna plate	1
	A-5B-11239-1	Knob for radio-phono switch	1
	A-3A-15134	Extension shaft for radio-phono switch	1
	A-2M-11074	Spring clamp for shaft	1
	A-2C-10972	Indicator plate	1
		PHONO PARTS	
	C-201-11406-8	Phono motor and turntable assembly. 115 volts, 60-cycles	1
	A-20F-15201	Pushbutton on-off switch. for phono motor	1
	C-48C-10889-46	Pick-up arm with crystal cartridge CR-1	1
		Crystal cartridge, CR-1 only	1

MONTGOMERY WARD

MODELS 84BR-2715C, 84BR-2722A



NOTES: The two 100K ohm resistors in series from Pin No. 2 to ground are connected as shown only when aligning the FM I.F. Refer to FM I.F. alignment procedure

RECORD CHANGERS: For 84BR-2715C, Webster Model 148, RCD.CH. 18-1, V-M Model 800, RCD.CH. 17-1; For 84BR-2722A, Gen. Inst. Model 204, RCD.CH. 15-1, Russell Model C-10M, RCD.CH. 18-1

MODELS 84BR-2715C, 84BR-2722A

MONTGOMERY WARD

GENERAL DESCRIPTION

This is a 2-band, seven tube (plus rectifier) superheterodyne receiver for the reception of both AM and FM stations. It features the most advanced type of FM ratio detector, permeability tuning of both bands, combination double-frequency I.F. coils and miniature tubes. Built-in antennas are provided for broadcast and FM reception; provision is also made for connection of an external broadcast antenna as well as an FM antenna with a 300 ohm lead-in. Both antennas may be connected to the radio at the same time.

The phonograph is equipped with an automatic changer which plays up to ten 12-inch records or twelve 10-inch records at one loading.

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 75 watts. With phono operation 100 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band— 88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-42 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-200 kc. broad at 2 times down. I.F. FM-400 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—5 microvolts average.
FM Sensitivity	(For .5 watt output)—25 microvolts average.
Power Output	2 watts, 10% distortion. 4 watts maximum.
Loud Speaker	12" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.
Tube and Lamp Complement	6BA6, FM—AM R.F. stage. 12AT7, FM—AM oscillator and mixer. 6BA6, FM—AM 1st I.F. 6BA6, FM—2nd I.F. 6AL5, FM ratio detector. 6AT6, AM detector. A.F. AMP. and A.V.C. 6AQ5, Audio output. 5Y3, rectifier. T-44 dial lamp (2 used).
Automatic Changer	See Manuals 5058A, 5057B, 5069, 5050A, 5032A.

ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 2400 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T9 AM windings. See top and bottom views	Maximum output Should be ½ watt
455 Kc. Use 70 microvolts	Pin No. 2 of 12AT7 and ground	Primary and Secondary of T8 AM windings. See top and bottom views	Maximum output Should be ½ watt
400 cycles. Use 60 millivolts	Hot end of volume control and ground	None	Maximum output Should be ½ watt

BROADCAST BAND - R. F. ALIGNMENT

Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

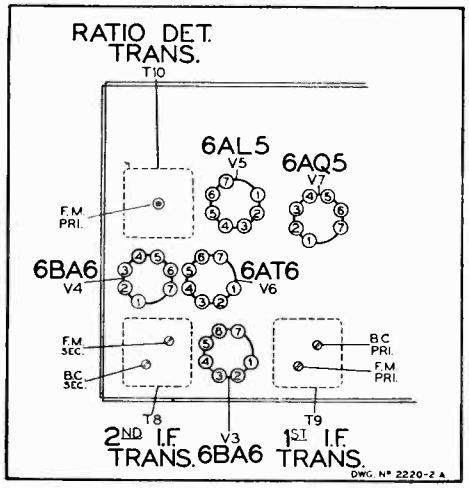
SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1620 Kc.	AM Antenna and Ground	200 mmf.	C11 Osc. trimmer for maximum
535 Kc.	AM Antenna and Ground	200 mmf.	T5 for maximum ½ watt
1620 Kc. Use 5 microvolts	AM Antenna and Ground	200 mmf.	C4 and C18 for max. ½ watt. See note

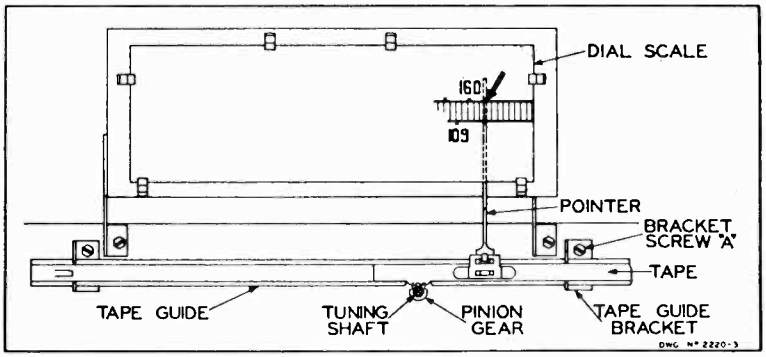
NOTE: Recheck first two adjustments after this adjustment because of inter-locking effects.

MONTGOMERY WARD

MODELS 84BR-2715C, 84BR-2722A

Procedure for disassembly and assembly of dial mechanism.





TO ALIGN POINTER— Loosen bracket screw "A". Then tape guide bracket can be moved up to allow proper meshing of tape teeth with pinion gear. Readjust bracket to eliminate backlash.

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube volt-meter which has a "floating ground". In other words, the meter, when used as a vacuum tube volt-meter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	Pin No. 2 of 6AL5 and ground	Primary of T10	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	See note "A"	Secondary of T10	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 3300 microvolts	Pin No. 1 of 6BA6 no. 2 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of T9 10.7 m.c. windings See top and bottom views	Resonance should be about 3 volts
10.7 Mc. Use about 200 microvolts	Pin No. 2 of 12AT7 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of 10.7 m.c. windings of T8 See top and bottom views	Resonance should be about 3 volts

NOTE ON FM - I.F. ALIGNMENT

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 2 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube volt-meter between the mid-point of the resistors and points zz.

NOTE "B" If T10 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

MODELS 84BR-2715C, 84BR-2722A

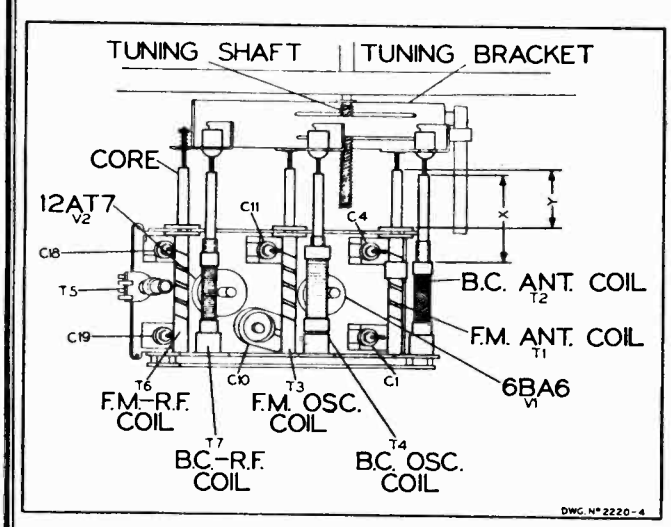
MONTGOMERY WARD

FM - R. F. ALIGNMENT

Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

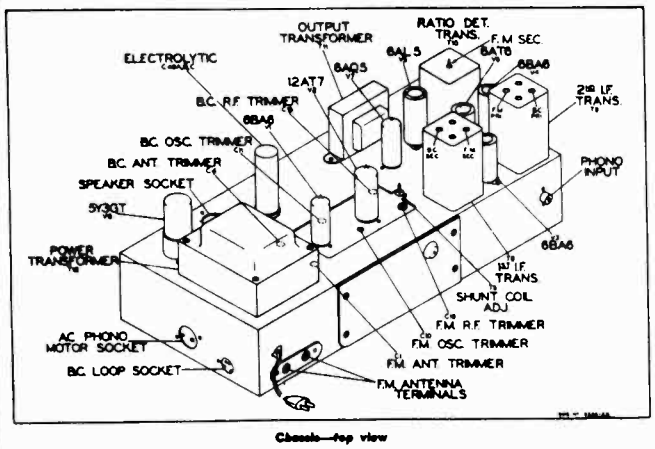
SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 25 microvolts	FM Antenna Terminals See note	300 ohms	C10 Osc. C19 R.F. C1 Ant.	Pin No. 2 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however will not produce 3 volts. NOTE: Connect 300 ohms in series with hot side of generator and connect to one screw. Connect cold side of generator to other screw.

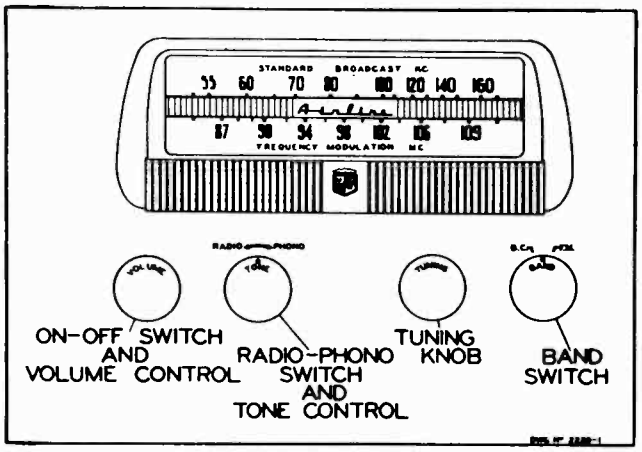


TUNER ADJUSTMENT

With tuner all the way out, dimension "X" should be 1½ inches. "Y" should be 1-1/16 inches. "X" is from the end of the slug to the edge of the coil winding. Check these dimensions before R.F. alignment is attempted of either the AM or FM band. No slug adjustment should be necessary since the slugs are properly set at the factory.



Chassis—top view



REPLACEMENT PARTS ONLY USED IN MODEL 2722A

Part No.	Description	Qty. Used
B-18B-14140	Electrodynamic speaker, 10-inch, less output transformer	1
C-30A-15335	Dial scale	1
B-5B-13978-56	Knob "Tone and Volume"	2
B-5B-13737-56	Knob, "Tuning and Bandswitch"	2
B-5C-15078-56	Escutcheon side pieces	2
A-25A-13818	Chassis rubber grommet	4

Part No.	Description	Qty. Used
	RECORD CHANGER	
B-201-15417	G. I. 204 Changer, with automatic stop	1
	OR	
B-201-14063-1	Russell C-10M Changer with automatic stop	1

MONTGOMERY WARD

MODELS 84BR-2715C, 84BR-2722A

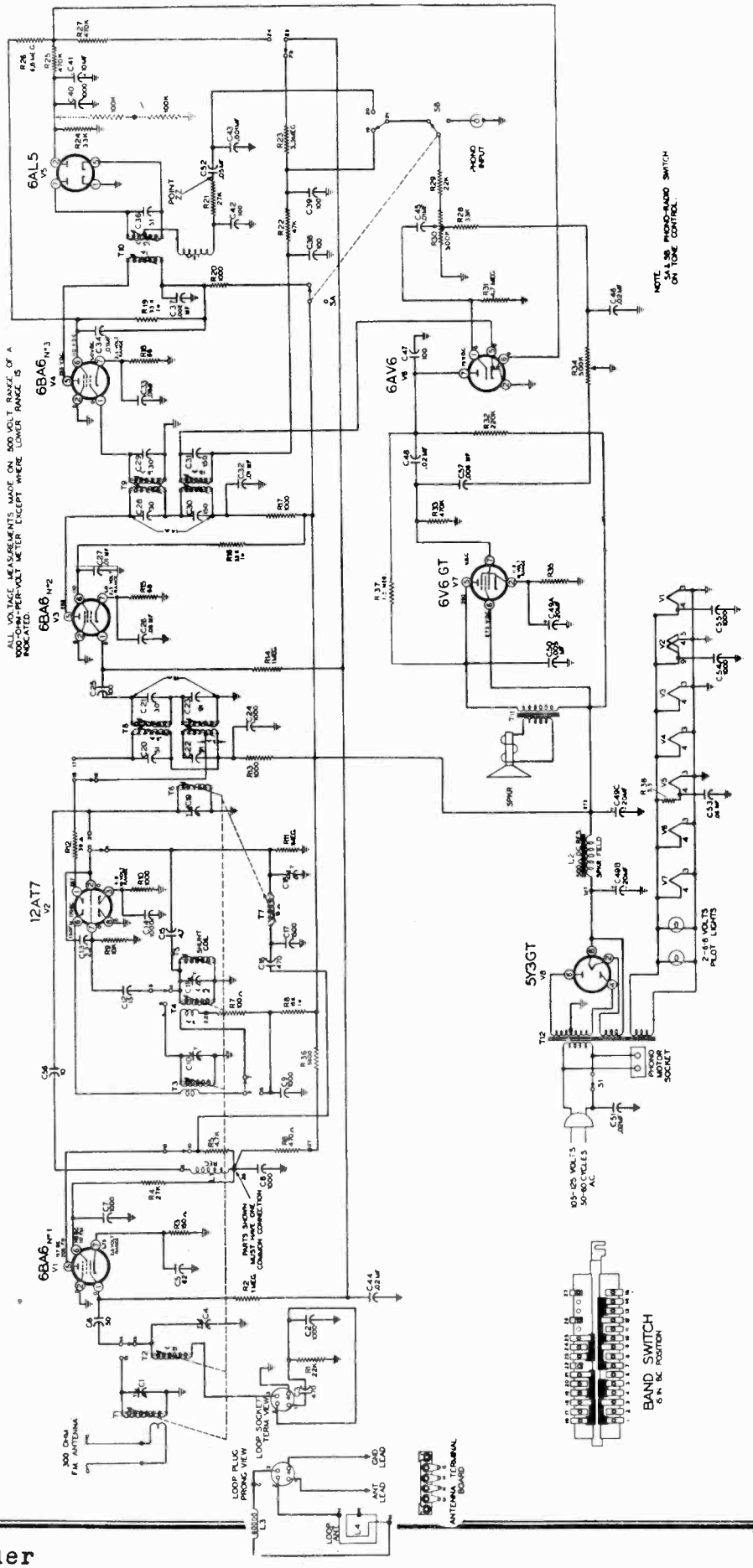
REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used In Set
		TUNER CHASSIS PARTS	
		CONDENSERS	
C10	A-8E-13575	Trimmer condenser	1
C1, 4, 11, 19, 18	A-2M-12618	Trimmer cond. plate	5
C3, 16	C-8G-11732	470 mmf, ±20%	2
C2	C-8G-13695	1000 mmf, ±20%	1
C8, 7, 9, 14, 54, 55	C-8G-13201	1000 mmf, +20%—10%	6
C5	C-8G-13018	62 mmf, ±10%	1
C17	C-8G-11731	1500 mmf, ±20%	1
C12	C-8G-13017	15 mmf, +10%	1
C6	C-8G-11484	50 mmf, ±10%	1
C56	C-8G-11789	10 mmf, ±10%	1
C15	A-8G-12495-6	4.7 mmf, ±20%	1
C13	A-8G-12495-4	2.2 mmf, ±20%	1
C44	C-8D-11304	.02 mfd, 200 volts, ±20%	1
		RESISTORS	
R4	C-9B2-79	27K ohms, 1 watt, 10%	1
R1	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R3	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R5	C-9B1-17	4700 ohms, 1/2 watt, 20%	1
R6	C-9B1-11	470 ohms, 1/2 watt, 20%	1
R9	C-9B1-19	10K ohms, 1/2 watt, 20%	1
R2, 11	C-9B1-31	1 megohm, 1/2 watt, 20%	2
R10	C-9B1-62	1000 ohms, 1/2 watt, 10%	1
R23	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R7	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R12	C-9B1-45	39 ohms, 1/2 watt, 10%	1
		COILS	
T3	B-13D-13027	FM oscillator coil assembly	1
—	B-51B-13056	Core for FM oscillator coil	1
T1	B-13E-13028	FM antenna coil assembly	1
—	B-51A-13058	Core for FM antenna coil	1
T6	B-13C-13029	FM R.F. coil assembly	1
—	B-51A-13057	Core for FM R.F. coil	1
T4	B-13D-13030	AM oscillator coil assembly	1
—	B-51A-12722	Core for B.C. oscillator coil	1
—	B-51A-12723	Core for B.C. ant. and R.F. coil	1
T2	B-13E-13031	AM antenna coil assembly	1
T7	B-13C-13032	AM R.F. coil assembly	1
L1	A-16A-13033	Choke coil assembly	1
T5	B-13D-12974	AM osc. shunt coil assembly	1
		MISCELLANEOUS	
	B-208-13553 or B-201-12967	Band change slide switch	1
	A-15B-12997	7 prong, miniature tube socket	1
	A-15B-13430	9 prong, miniature tube socket	1
	C-2D-14437	Drive bracket assembly	1
	A-25A-13019	Core grommets, for AM Band	3
	A-3M-13020	Insert for core grommet	3
	A-49A-12394	Spiral spring for FM cores	3
	A-2J-11041	Pointer tension spring, "M" shaped	1
	B-2D-12316	Tape guide	1
	B-2J-12922	Rack tape, with teeth and pointer bracket	1
	B-2G-13613	Pointer	1
	A-200-15016	Drive, pinion and lead screw assembly	1
		MAIN CHASSIS PARTS	
		CONDENSERS	
C49B, 49C, 49A	A-8C-13555	Electrolytic, 20—20 x 350 volts; 20 x 25 volts	1
C50	C-8D-10935	.005 mf x 600 volts	1
C27, 32, 33, 34, 37, 45	C-8D-10761	.01 mf x 400 volts, 20%	6
C57	C-8D-10785	.006 mf x 600 volts, 20%	1
C41	A-8C-13132	Electrolytic, 10 mf x 50 volts	1
C43	C-8D-10787	.001 x 600 volts, 20%	1
C52, C26	C-8D-10770	.05 x 200 volts, 20%	2
C51, 46	C-8D-10774	.02 x 400 volts, 20%	2
C48	C-8J-11321	.02 x 600 volts, 20%	1
C25, 47	C-8G-13131	100 mmf, ceramic, 10%	2
C24, 40, 53	C-8G-13016	1000 mmf, ceramic, 20%	3
C42	C-8F3-225	100 mmf, mica, 5%	1
C38, 39	A-8F-13127	.0001 mf, dual mica, 20%	1
C22, 23	C-8G-12160	91 mmf, ceramic, 5%	2
C20	C-8G-13026	51 mmf, ceramic, 5%	1
C30, 31	C-8G-13025	150 mmf, ceramic, 5%	2
C21, 28, 29	C-8G-12159	30 mmf, ceramic, 5%	3
C36	C-8G-11891	51 mmf, ceramic	1
		RESISTORS	
R30, S1	A-10A-13114	Volume control (500K ohms) and switch	1
R34, SA, SB	A-11A-13115	Tone control (500K ohms) and radio-phono switch	1
R32	C-9B1-27	220K ohms, 1/2 watt, 20%	1
R15, 18	C-9B1-48	68 ohms, 1/2 watt, 10%	2
R14	C-9B1-31	1 megohm, 1/2 watt, 20%	1
R19, 16	C-9B2-78	22K ohms, 1 watt, 10%	2
R24, 28	C-9B1-80	33K ohms, 1/2 watt, 10%	2
R21	C-9B1-79	27K ohms, 1/2 watt, 10%	1
R8	C-9B2-71	5600 ohms, 1 watt, 10%	1
R22	C-9B1-23	47K ohms, 1/2 watt, 20%	1
R29	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R31	C-9B1-35	4.7 megohms, 1/2 watt, 20%	1
R25, 27, 33	C-9B1-29	470K ohms, 1/2 watt, 20%	3
R35	C-9B1-55	270 ohms 1/2 watt, 10%	1
R26	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1
R13, 20, 17	C-9B1-13	1000 ohms, 1/2 watt, 20%	2
		COILS	
T8	B-13A-15473	Input I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T9	B-13B-15474	Second I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T10	B-13M-15475	Ratio det. coil assembly 10.7 mc.	1
L3	A-16A-13243	Loop loading coil	1
L4	A-14MA-11066-1	Loop antenna ribbon	1
		TRANSFORMERS	
T12	B-12A-13120	Power transformer, primary, 50-60 cycles. 105-125 volts A.C.	1
T11	B-12C-13556	Output transformer, for speaker	1
		SPEAKER	
L2	B-18B-13585-1	Electrodynamic speaker, 12-inch, less output transformer	1
		MISCELLANEOUS	
	B-30A-13611	Dial scale	1
	B-5B-13744	Knob, mahog. or wal. "Volume"	1
	B-5B-13745	Knob, mahog. or wal. "Tone"	1
	B-5B-13746	Knob, mahog. or wal. "Tuning"	1
	B-5B-13747	Knob, mahog. or wal. "Band switch"	1
	B-2G-13612	Escutcheon, mahog. or walnut	1
	B-14M-11479	Line cord and plug	1
	A-3A-12933-1	Band switch shaft	1
	A-55C-12935	Ball bearing	1
	B-47A-11094-4	Pilot lite and bracket assembly	1
	A-46A-11739	Pilot lite, 6-8 volts, T-44	2
	A-15C-13174	Miniature socket, 7 prong	5
	A-15B-10440	Octal socket, 8 prong	1
	A-19B-12644	Loop antenna socket	1
	B-7B-13050	FM terminal strip	1
	A-15B-11538	Speaker socket	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono input socket	1
		RECORD CHANGER	
	B-201-15176	148 Changer with P-30 cartridge OR	1
	B-201-16042	146 changer with P-30 cartridge OR	1
	D-21H-13293	V-M changer with P-30 cartridge	1
	P-30	Crystal cartridge with needle	1

MODEL 84BR-2715D

MONTGOMERY WARD



MONTGOMERY WARD

MODEL 84BR-2715D

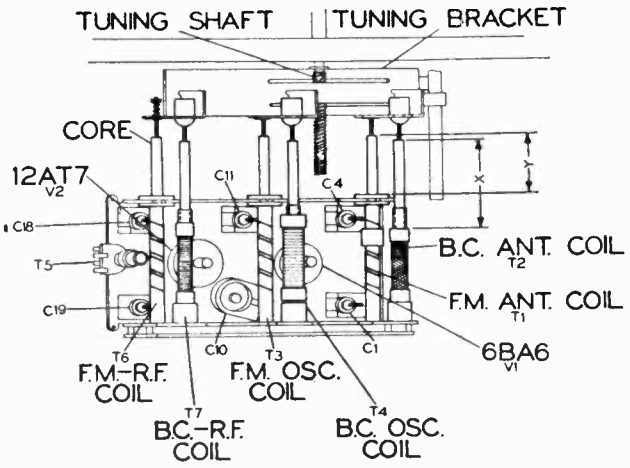
GENERAL DESCRIPTION

This is a 2-band, seven tube (plus rectifier) superheterodyne receiver for the reception of both AM and FM stations. It features the most advanced type of FM ratio detector, permeability tuning of both bands, combination double-frequency I.F. coils and miniature tubes. Built-in antennas are provided for broadcast and FM reception; provision is also made for connection of an external broadcast antenna as well as an FM antenna with a 300 ohm lead-in. Both antennas may be connected to the radio at the same time.

The phonograph is equipped with an automatic changer which plays up to ten 12-inch records or twelve 10-inch records at one loading, and also accommodates the new long-play microgroove records.

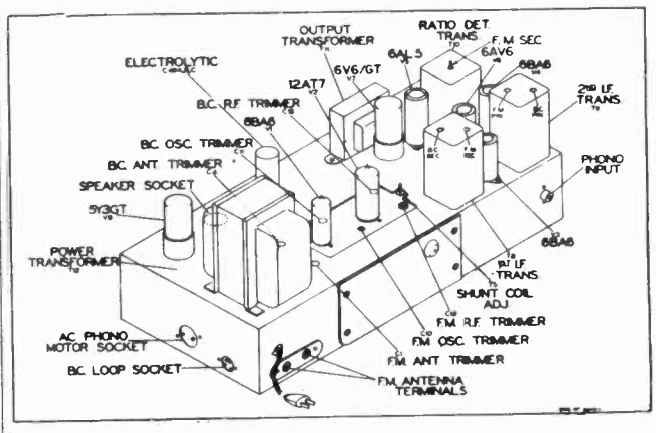
ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 75 watts. With phono operation 100 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band— 88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-42 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-200 kc. broad at 2 times down. I.F. FM-400 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—5 microvolts average.
FM Sensitivity	(For .5 watt output)—25 microvolts average.
Power Output	3.2 watts, 10% distortion. 5.5 watts maximum.
Loud Speaker	12" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.
Tube and Lamp Complement	6BA6, FM—AM R.F. stage. 12AT7, FM—AM oscillator and mixer. 6BA6, FM—AM 1st I.F. 6BA6, FM—2nd I.F. 6AL5, FM ratio detector. 6AV6, AM detector. A.F. AMP. and A.V.C. 6V6GT/G, Audio output. 5Y3, rectifier. T-44 dial lamp (2 used).
Automatic Changer	See Manual 5069A.

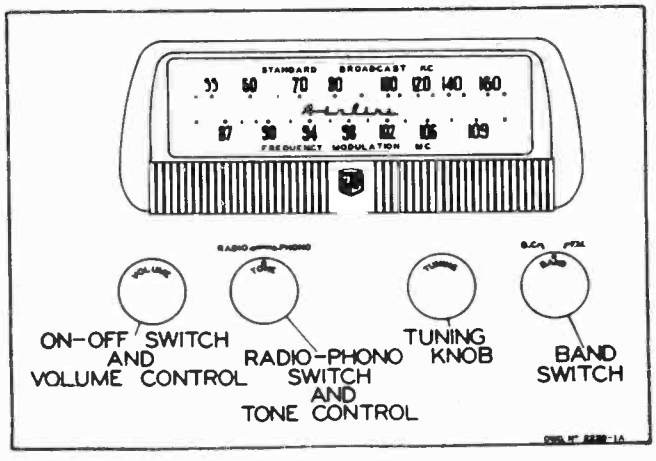


TUNER ADJUSTMENT

With tuner all the way out, dimension "X" should be 1½ inches. "Y" should be 1-1/16 inches. "X" is from the end of the slug to the edge of the coil winding. Check these dimensions before R.F. alignment is attempted of either the AM or FM band. No slug adjustment should be necessary since the slugs are properly set at the factory.



Chassis—top view



MODEL 84BR-2715D

MONTGOMERY WARD

ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 2400 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T9 AM windings. See top and bottom views	Maximum output Should be ½ watt
455 Kc. Use 70 microvolts	Pin No. 2 of 12AT7 and ground	Primary and Secondary of T8 AM windings. See top and bottom views	Maximum output Should be ½ watt
400 cycles. Use 60 millivolts	Hot end of volume control and ground	None	Maximum output Should be ½ watt

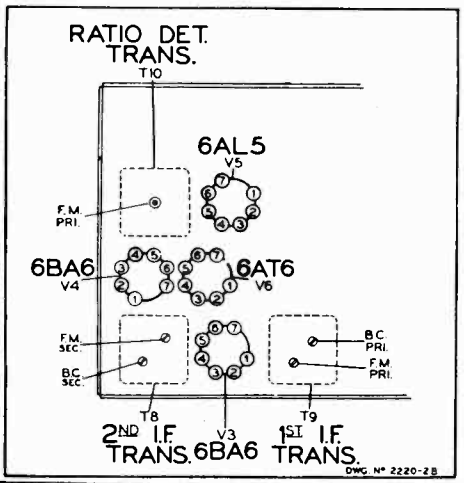
BROADCAST BAND - R. F. ALIGNMENT

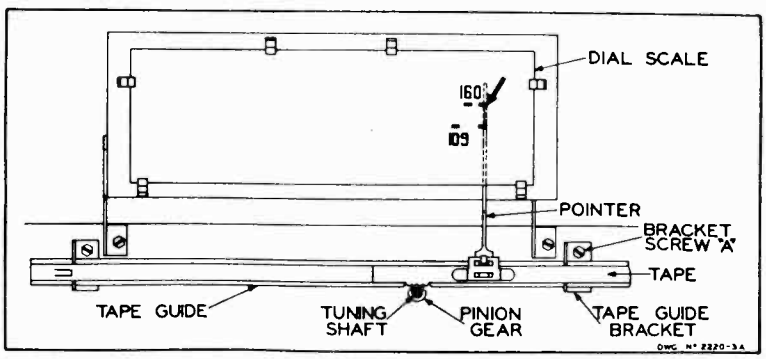
Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1620 Kc.	AM Antenna and Ground	200 mmf.	C11 Osc. trimmer for maximum
535 Kc.	AM Antenna and Ground	200 mmf.	T5 for maximum ½ watt
1620 Kc. Use 5 microvolts	AM Antenna and Ground	200 mmf.	C4 and C18 for max. ½ watt. See note

NOTE: Recheck first two adjustments after this adjustment because of inter-locking effects.

Procedure for disassembly and assembly of dial mechanism.





TO ALIGN POINTER— Loosen bracket screw "A". Then tape guide bracket can be moved up to allow proper meshing of tape teeth with pinion gear. Readjust bracket to eliminate backlash.

MONTGOMERY WARD MODEL 84BR-2715D

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube volt-meter which has a "floating ground". In other words, the meter, when used as a vacuum tube volt-meter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	Pin No. 2 of 6AL5 and ground	Primary of T10	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	See note "A"	Secondary of T10	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 3300 microvolts	Pin No. 1 of 6BA6 no. 2 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of T9 10.7 m.c. windings See top and bottom views	Resonance should be about 3 volts
10.7 Mc. Use about 200 microvolts	Pin No. 2 of 12AT7 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of 10.7 m.c. windings of T8 See top and bottom views	Resonance should be about 3 volts

NOTE ON FM - I.F. ALIGNMENT

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 2 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube volt-meter between the mid-point of the resistors and points xx.

NOTE "B" If T10 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM - R. F. ALIGNMENT

Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 25 microvolts	FM Antenna Terminals See note	300 ohms	C10 Osc. C19 R.F. C1 Ant.	Pin No. 2 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however will not produce 3 volts. NOTE: Connect 300 ohms in series with hot side of generator and connect to one screw. Connect cold side of generator to other screw

MODEL 84BR-2715D MONTGOMERY WARD

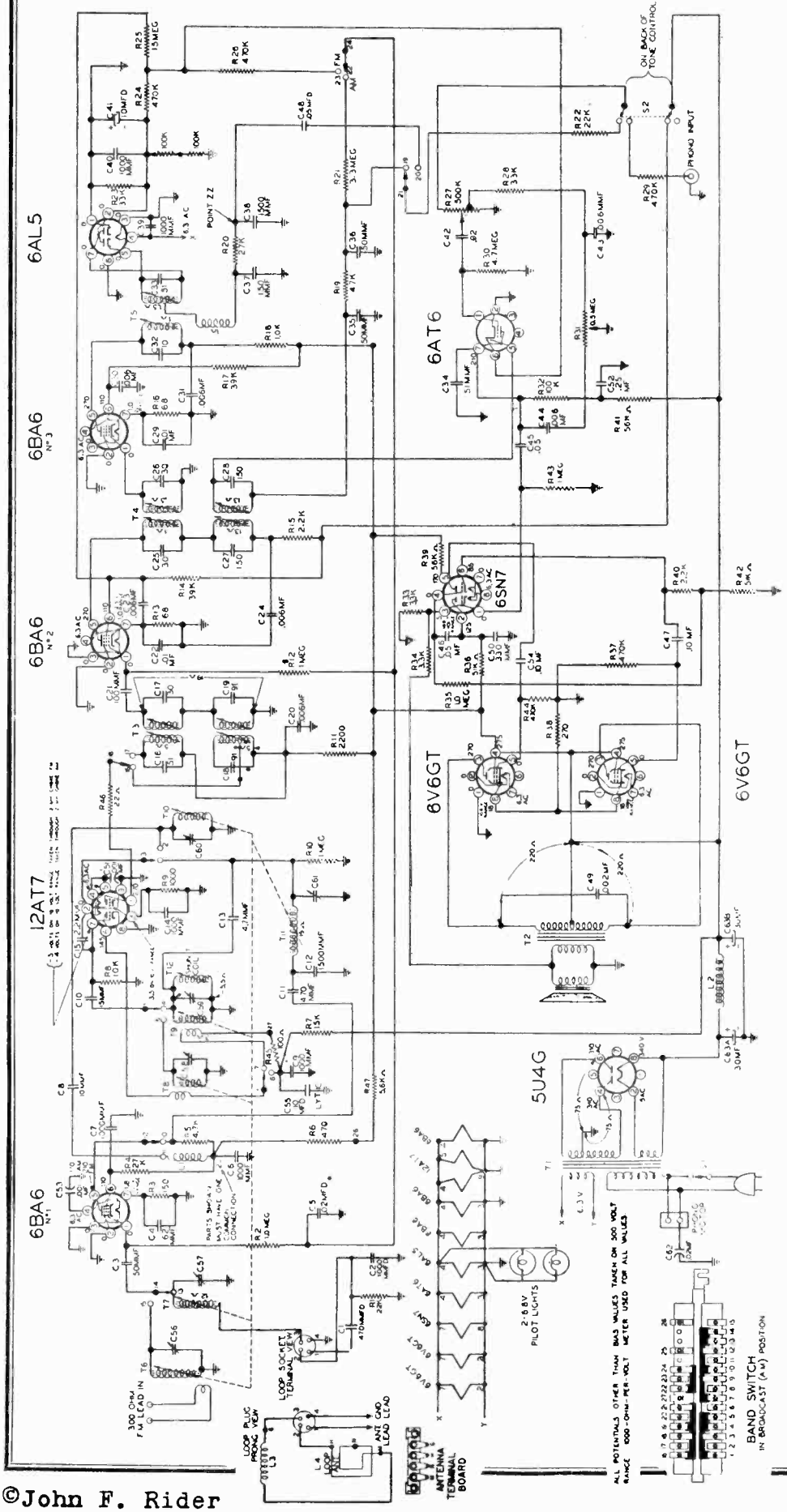
REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used In Set
		TUNER CHASSIS PARTS	
		CONDENSERS	
C10	A-8E-13575	Trimmer condenser	1
C1, 4, 11, 19, 18	A-2M-12618	Trimmer cond. plate	5
C3, 16	C-8G-11732	470 mmf, ±20%	2
C2	C-8G-13695	1000 mmf, ±20%	1
C8, 7, 9, 14, 54, 55	C-8G-13201	1000 mmf, +20%—10%	6
C5	C-8G-13018	62 mmf, ±10%	1
C17	C-8G-11731	1500 mmf, ±20%	1
C12	C-8G-13017	15 mmf, +10%	1
C6	C-8G-11484	50 mmf, ±10%	1
C56	C-8G-11789	10 mmf, ±10%	1
C15	A-8G-12495-6	4.7 mmf, ±20%	1
C13	A-8G-12495-4	2.2 mmf, ±20%	1
C44	C-8D-11304	.02 mfd, 200 volts, ±20%	1
		RESISTORS	
R4	C-9B2-79	27K ohms, 1 watt, 10%	1
R1	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R3	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R5	C-9B1-17	4700 ohms, 1/2 watt, 20%	1
R6	C-9B1-11	470 ohms, 1/2 watt, 20%	1
R9	C-9B1-19	10K ohms, 1/2 watt, 20%	1
R2, 11	C-9B1-31	1 megohm, 1/2 watt, 20%	2
R10	C-9B1-62	1000 ohms, 1/2 watt, 10%	1
R23	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R7	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R12	C-9B1-45	39 ohms, 1/2 watt, 10%	1
R36	C-9B2-71	5600 ohms, 1 watt, 10%	1
		COILS	
T3	B-13D-13027	FM oscillator coil assembly	1
—	B-51B-13056	Core for FM oscillator coil	1
T1	B-13E-13028	FM antenna coil assembly	1
—	B-51A-13058	Core for FM antenna coil	1
T6	B-13C-13029	FM R.F. coil assembly	1
—	B-51A-13057	Core for FM R.F. coil	1
T4	B-13D-13030	AM oscillator coil assembly	1
—	B-51A-12722	Core for B.C. oscillator coil	1
—	B-51A-12723	Core for B.C. ant. and R.F. coil	1
T2	B-13E-13031	AM antenna coil assembly	1
T7	B-13C-13032	AM R.F. coil assembly	1
L1	A-16A-13033	Choke coil assembly	1
T5	B-13D-12974	AM osc. shunt coil assembly	1
		MISCELLANEOUS	
	B-208-13553 or B-201-12967	Band change slide switch	1
	A-15B-12997	7 prong, miniature tube socket	1
	A-15B-13430	9 prong, miniature tube socket	1
	C-2D-14437	Drive bracket assembly	1
	A-25A-13019	Core grommets, for AM Band	3
	A-3M-13020	Insert for core grommet	3
	A-49A-12394	Spiral spring for FM cores	3
	A-2J-11041	Pointer tension spring, "M" shaped	1
	B-2D-12316	Tape guide	1
	B-2J-12922	Rack tape, with teeth and pointer bracket	1
	B-2G-13613	Pointer	1
	A-200-15016	Drive, pinion and lead screw assembly	1
		MAIN CHASSIS PARTS	
		CONDENSERS	
C49B, 49C, 49A	A-8C-15387	Electrolytic, 20—20 x 450 volts; 20 x 25 volts	1
C50	C-8D-10935	.005 mf x 600 volts	1
C27, 32, 33, 34, 45	C-8D-10761	.01 mf x 400 volts, 20%	6
C57	C-8D-10785	.006 mf x 600 volts, 20%	1
C41	A-8C-13132	Electrolytic, 10 mf x 50 volts	1
C43	C-8D-10787	.001 x 600 volts, 20%	1
C53,C26,C52	C-8D-10770	.05 x 200 volts, 20%	2
C48, 46	C-8D-10774	.02 x 400 volts, 20%	2
C51	C-8J-11321	.02 x 600 volts, 20%	1
C25, 47	C-8G-13131	100 mmf, ceramic, 10%	2
C24, 40	C-8G-13016	1000 mmf, ceramic, 20%	3
C42	C-8F3-225	100 mmf, mica, 5%	1
C38, 39	A-8F-13127	.0001 mf, dual mica, 20%	1
C22, 23	C-8G-12160	91 mmf, ceramic, 5%	2
C20	C-8G-13026	51 mmf, ceramic, 5%	1
C30, 31	C-8G-13025	150 mmf, ceramic, 5%	2
C21, 28, 29	C-8G-12159	30 mmf, ceramic, 5%	3
C36	C-8G-11891	51 mmf, ceramic	1
C37	C-8D-15638	.002 x 600 volts, 10%	1
		RESISTORS	
R30, S1	A-10A-13114	Volume control (500K ohms) and switch	1
R34, SA, SB	A-11A-13115	Tone control (500K ohms) and radio-phono switch	1
R32	C-9B1-27	220K ohms, 1/2 watt, 20%	1
R15, 18	C-9B1-48	68 ohms, 1/2 watt, 10%	2
R14	C-9B1-31	1 megohm, 1/2 watt, 20%	1
R19, 16	C-9B2-80	33K ohms 1 watt, 10 %	2
R24, 28	C-9B1-80	33K ohms, 1/2 watt, 10%	2
R21	C-9B1-79	27K ohms, 1/2 watt, 10%	1
R8	C-9B2-76	15K ohms, 1 watt, 10%	1
R22	C-9B1-23	47K ohms, 1/2 watt, 20%	1
R29	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R31	C-9B1-35	4.7 megohms, 1/2 watt, 20%	1
R25, 27, 33	C-9B1-29	470K ohms, 1/2 watt, 20%	3
R35	C-9B2-144	240 ohms, 1 watt, 5%	1
R26	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1
R13, 20, 17	C-9B1-13	1000 ohms, 1/2 watt, 20%	2
R37	C-9B1-100	1.5 megohm, 1/2 watt, 10%	1
R38	C-9B1-1069	3.3 ohms, 1/2 watt, 5%	1
		COILS	
T8	B-13A-15473	Input I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T9	B-13B-15474	Second I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T10	B-13M-15475	Ratio det. coil assembly 10.7 mc.	1
L3	A-16A-13243	Loop loading coil	1
L4	A-14MA-11066-1	Loop antenna ribbon	1
		TRANSFORMERS	
T12	B-12A-15385	Power transformer, primary, 50-60 cycles. 105-125 volts A.C.	1
T11	B-12C-13556	Output transformer, for speaker	1
		SPEAKER	
L2	B-18B-13585-2	Electrodynamic speaker, 12-inch, less output transformer	1
		MISCELLANEOUS	
	B-30A-13611	Dial scale	1
	B-5B-13744	Knob, mahog. or wal. "Volume"	1
	B-5B-13745	Knob, mahog. or wal. "Tone"	1
	B-5B-13746	Knob, mahog. or wal. "Tuning"	1
	B-5B-13747	Knob, mahog. or wal. "Band switch"	1
	B-2G-13612	Escutcheon, mahog. or walnut	1
	B-14M-11479	Line cord and plug	1
	A-3A-12933-1	Band switch shaft	1
	A-55C-12935	Ball bearing	1
	B-47A-11094-4	Pilot lite and bracket assembly	1
	A-46A-11739	Pilot lite, 6-8 volts, T-44	2
	A-15C-13174	Miniature socket, 7 prong	5
	A-15B-10440	Octal socket, 8 prong	1
	A-19B-12644	Loop antenna socket	1
	B-7B-13050	FM terminal strip	1
	A-15B-11538	Speaker socket	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono input socket	1
		RECORD CHANGER	
	B-201-16042	146 changer with P-30 cartridge	1
	P-30	Crystal cartridge with needle	1

MONTGOMERY WARD

MODEL 84BR-2719A



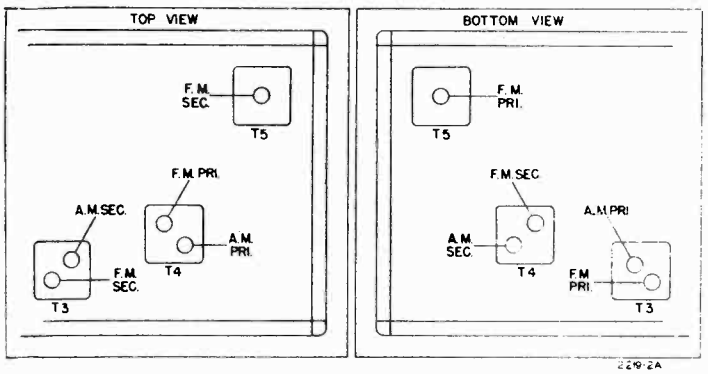
NOTES: On some sets R11 and R15 are 1000 ohms.
The two 100K ohm resistors in series from PIN NO. 2 to ground are connected as shown only when aligning the FM I.F. Refer to FM I.F. alignment procedure.
On some sets C22 is .05 mfd.
On some sets R46 — 22 ohm resistor is replaced with a 39 ohm resistor, Part no. C-981-45.
When T5 is top and bottom tuned, C30 is .01 — 400 volts, and returned to bottom end of C32. C31 becomes .002 — 600 volts; C37 becomes 100 mmfd.; R17 is connected to the top of R18 instead of the bottom. A 1000 mmf. condenser is connected between the B+ supply line of the ratio detector assembly and ground.

RECORD CHANGER: V-M Model 800, RCD.CH. 17-1

MODEL 84BR-2719A MONTGOMERY WARD

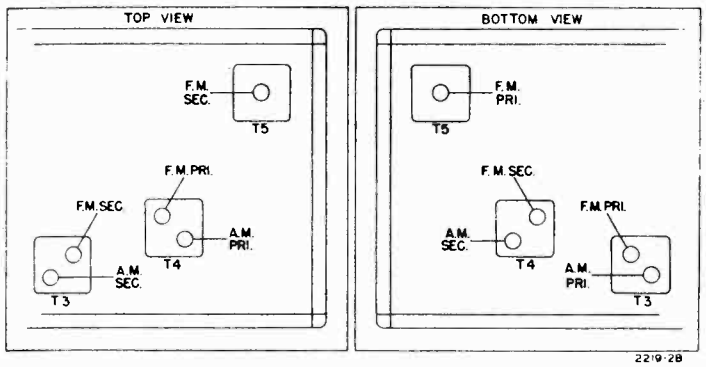
SPECIAL ALIGNMENT INFORMATION

Do not attempt any I.F. alignment until you have referred to the views below. This radio is built with 3 combinations of I. F. coils. Refer to part numbers on the coils. See notes under the circuit diagram.



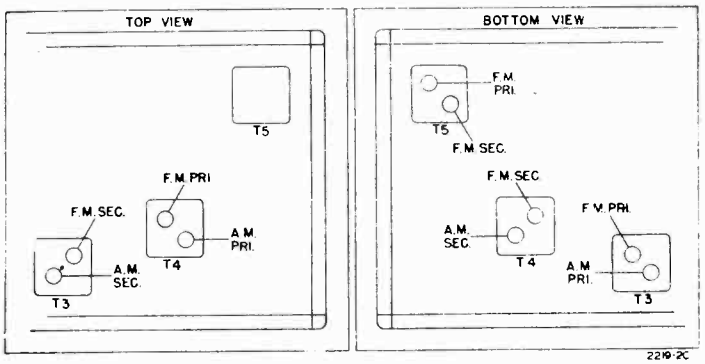
This combination uses the following part numbers:

T3 ..... B-13A-15473
T4 ..... B-13B-15474
T5 ..... B-13M-15475 (top and bottom tuned).



This combination uses the following part numbers:

T3 ..... C-13A-13009-1
T4 ..... C-13B-13014-1
T5 ..... B-13M-15475 (top and bottom tuned).



This combination uses the following part numbers:

T3 ..... C-13A-13009-1
T4 ..... C-13B-13014-1
T5 ..... C-203-11745-1 (bottom tuned). Use this view when T5 has no trimmer on top.

GENERAL DESCRIPTION

This is a 2-band, nine tube (plus rectifier) superheterodyne receiver for the reception of both AM and FM stations. It features the most advanced type of FM ratio detector, permeability tuning of both bands, combination double-frequency I.F. coils and miniature tubes. Built-in antennas are provided for broadcast and FM reception; provision is also made for connection of an external broadcast antenna as well as an FM antenna with a 300 ohm lead-in. Both antennas may be connected to the radio at the same time.

The phonograph is equipped with an automatic changer which plays up to ten 12-inch records or twelve 10-inch records at one loading.

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 122 watts. With phono operation 150 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band—88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-48 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-180 kc. broad at 2 times down. I.F. FM-320 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—3 microvolts average
FM Sensitivity	(For .5 watt output—10 microvolts average.
Power Output	8 watts, 10% distortion. 10 watts maximum.
Loud Speaker	12" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.

ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 1000 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T4 AM windings. See top and bottom views	Maximum output Should be ½ watt
455 Kc. Use 30 microvolts	Pin No. 2 of 12AT7 and ground	Primary and Secondary of T3 AM windings. See top and bottom views	Maximum output Should be ½ watt
400 cycles. Use 28 millivolts	Hot end of volume control and ground	None	Maximum output Should be ½ watt

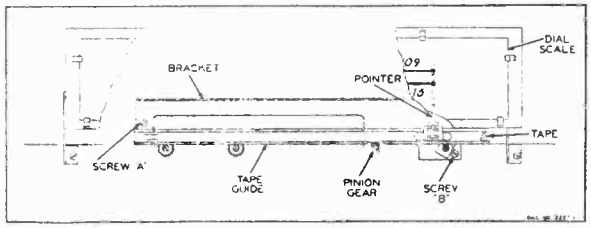
BROADCAST BAND - R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1620 Kc.	AM Antenna and Ground	200 mmf.	C59 Osc. trimmer for maximum
535 Kc.	AM Antenna and Ground	200 mmf.	T12 for maximum ½ watt
1620 Kc. Use 3 microvolts	AM Antenna and Ground	200 mmf.	C57 and C61 for max. ½ watt. See note

NOTE: Recheck first two adjustments after this adjustment because of inter-locking effects.

Procedure for disassembly and assembly of dial mechanism



TO ALIGN POINTER—Loosen bracket screw "A". Then tape guide bracket can be moved up to allow proper meshing of tape teeth with pinion gear. Readjust bracket to eliminate backlash.

MODEL 84BR-2719A MONTGOMERY WARD

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube volt-meter which has a "floating ground". In other words, the meter, when used as a vacuum tube volt-meter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	Pin no. 2 of 6AL5 and ground	Primary of T5	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	See note "A"	Secondary of T5	Zero. Use zero center scale. See note "B"
10.7 Mc. Use about 3300 microvolts	Pin No. 1 of 6BA6 no. 2 and ground	Pin no. 2 of 6AL5 and ground	Primary and Secondary of T4 10.7 m.c. windings See top and bottom views	Resonance should be about 3 volts
10.7 Mc. Use about 200 microvolts	Pin no. 2 of 12AT7 and ground	Pin no. 2 of 6AL5 and ground	Primary and Secondary of 10.7 m.c. windings of T3 See top and bottom views	Resonance should be about 3 volts

NOTES ON FM—I.F. ALIGNMENT

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 2 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube voltmeter between the mid-point of the resistors and point zz.

NOTE "B" If T5 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM - R. F. ALIGNMENT

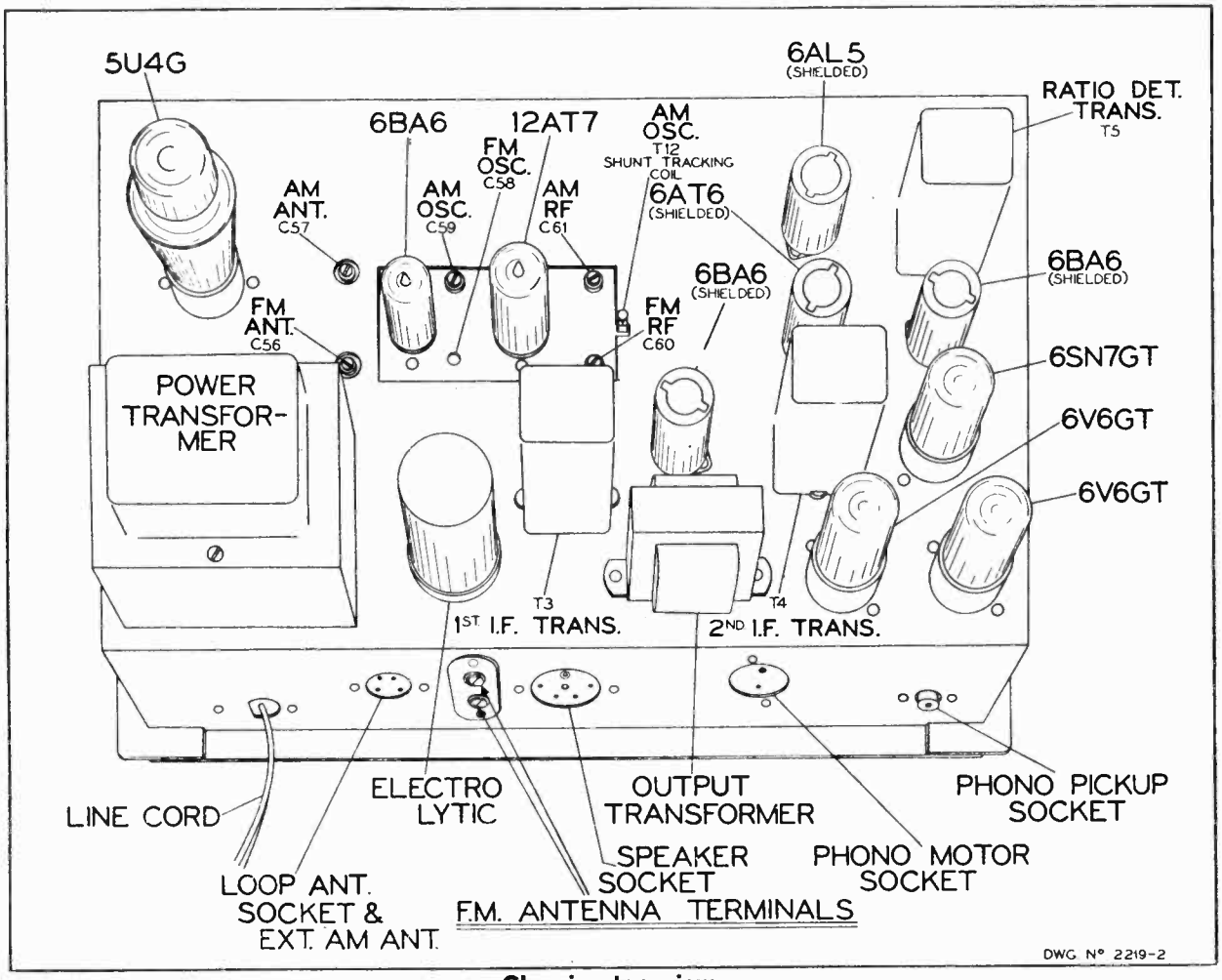
Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 10 microvolts	FM Antenna Terminals See note	300 ohms	C58 Osc. C60 R.F. C56 Ant.	Pin no. 2 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however will not produce 3 volts.

NOTE: Connect 300 ohms in series with hot side of generator and connect to one screw. Connect cold side of generator to other screw

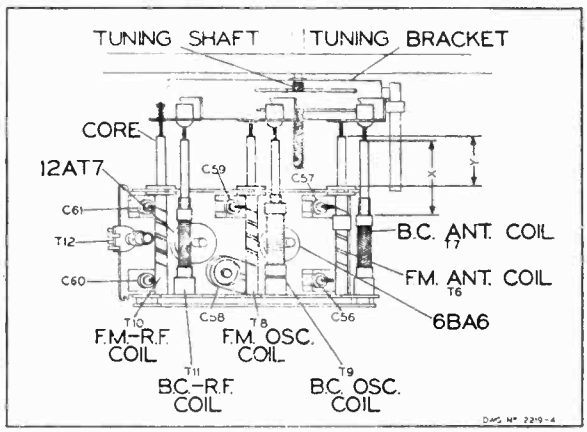
MONTGOMERY WARD MODEL 84BR-2719A



Chassis—top view

Tube and Lamp Complement

6BA6, FM—AM R.F. stage.
12AT7, FM—AM oscillator and mixer.
6BA6, FM—AM 1st I.F.
6BA6, FM— 2nd I.F.
6AL5, FM— ratio detector.
6AT6, AM detector. A. F. AMP. and A.V.C.
6SN7, Push-pull. Driver and phase-inverter.
5U4G, rectifier.
6V6, output.
6V6, output.
T-44 dial lamp (2 used).



TUNER ADJUSTMENT

With tuner all the way out, dimension "X" should be 1½ inches. "Y" should be 1-1/16 inches. "X" is from the end of the slug to the edge of the coil winding. Check these dimensions before R.F. alignment is attempted of either the AM or FM band. No slug adjustment should be necessary since the slugs are properly set at the factory.

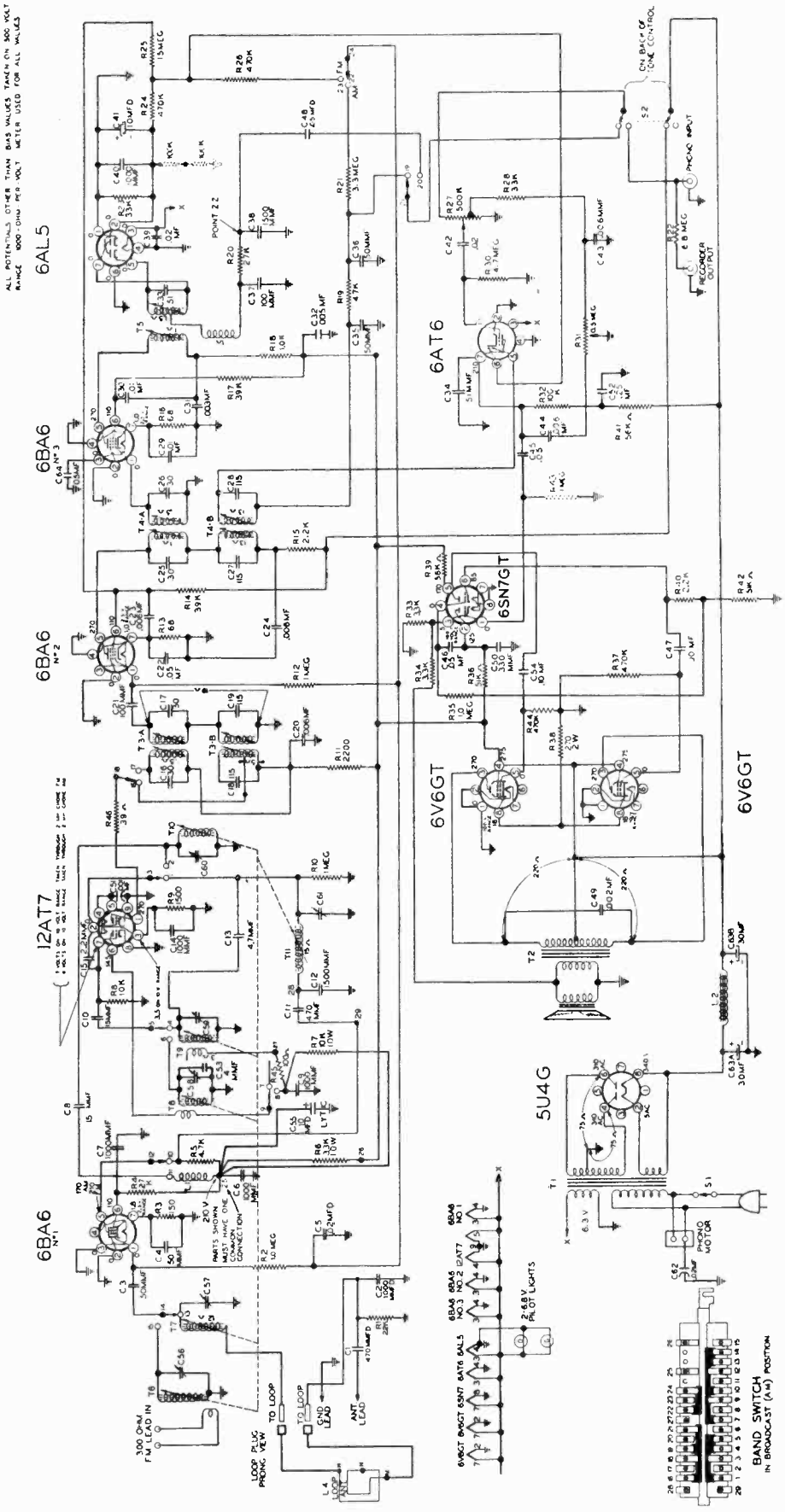
MODEL 84BR-2719A MONTGOMERY WARD

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used In Set
		TUNER PARTS	
		CONDENSERS	
C58	A-8E-13575	Trimmer condenser	1
C56, 57, 59, 60, 61	A-2M-12618	Trimmer cond. plate	5
C1, C11	C-8G-11732	470 mmf, ±20%	2
C2	C-8G-13695	1000 mmf, ± 20%	1
C6, 7, 9, 14 51, 53	C-8G-13201	1000 mmf, +20%—10%	6
C4	C-8G-13018	62 mmf, ± 10%	1
C12	C-8G-11731	1500 mmf, ±20%	1
C10	C-8G-13017	15 mmf, +10%	1
C3	C-8G-11484	50 mmf, ±10%	1
C8	C-8G-11789	10 mmf, ±10%	1
C13	A-8G-12495-6	4.7 mmf, ±20%	1
C15	A-8G-12495-4	2.2 mmf, ± 20%	1
C5	C-8D-11304	.02 mfd, 200 volts, ±20%	1
		RESISTORS	
R4	C-9B2-79	27K ohms, 1 watt, 10%	1
R1	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R3	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R5	C-9B1-17	4700 ohms, 1/2 watt, 20%	1
R6	C-9B1-11	470 ohms, 1/2 watt, 20%	1
R8	C-9B1-19	10K ohms, 1/2 watt, 20%	1
R2, R10	C-9B1-31	1 megohm, 1/2 watt, 20%	2
R9	C-9B1-62	1000 ohms, 1/2 watt, 10%	1
R21	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R45	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R46	C-9B1-42	22 ohms, 1/2 watt, 10%	1
		COILS	
T8	B-13D-13027	FM oscillator coil assembly	1
T6	B-13E-13028	FM antenna coil assembly	1
T10	B-13C-13029	FM R.F. coil assembly	1
T9	B-13D-13030	AM oscillator coil assembly	1
T7	B-13E-13031	AM antenna coil assembly	1
T11	B-13C-13032	AM R.F. coil assembly	1
L1	A-16A-13033	Choke coil assembly	1
T12	B-13D-12974	AM osc. shunt coil assembly	1
		MISCELLANEOUS	
	B-208-13553 or	Band change slide switch	1
	B-201-12967	Band change slide switch	1
	A-15B-12997	7 prong, miniature tube socket	1
	A-15B-13430	9 prong, miniature tube socket	1
	C-2D-14437	Yoke and bracket	1
	* A-200-15060	Pinion gear and lead screw assembly	1
	A-49A-13447	Tension spring for lead screw	1
	A-25A-13019	Core grommets, for AM Band	3
	A-3M-13020	Insert for core grommet	3
	A-49A-12394	Spiral spring for FM cores	3
	C-2D-12990	Tape Guide	1
	B-2J-13006	Rack, with teeth, with A-2D-12910 bracket	1
	B-2G-15009	Pointer	1
		MAIN CHASSIS PARTS	
		CONDENSERS	
63A, 63B	B-8C-11629	Electrolytic condenser, dual, 30-30 x 450 volts	1
C21	C-8G-11734	100 mmf, 20%, ceramic	1
C37	C-8F3-229	150 mmf, mica	1
C38	C-8G-13059	1500 mmf, ceramic	1
C34	C-8G-13060	51 mmf, ceramic	1
C20, 23, 24, 30, 31, 43, 44	C-8D-10785	.006 mf x 600 volts, paper	7
C22, C29	C-8D-10761	.01 mf x 400 volts, paper	2
C45, 46	C-8D-10813	.05 mf x 400 volts, paper	2
C55	A-8C-12154	Electrolytic condenser 10 mf x 450 volts	1
C49	C-8D-10789	.002 mf x 600 volts, paper	1
C39, 40	C-8G-13201	1000 mmf, ceramic	2
C41	A-8C-13132	Electrolytic condenser 10 mf x 50 volts	1
C62	C-8J-11321	.02 mf x 600 volts	1
C48	C-8D-10770	.05 mf x 200 volts	1
C50	C-8G-11741	330 mmf, ceramic	1
C42	C-8D-11304	.02 mf x 200 volts	1
C52	C-8D-13439	.25 mf x 400 volts	1
C47, 54	C-8D-10760	.1 mf x 400 volts	2
C35, 36	A-8F-13047	50 mmf, dual mica	1
C32	C-8G-11789	10 mmf, ceramic, 10%	1
C33	C-8G-11891	51 mmf, ceramic, 5%	1
C27, 28	C-8G-13025	150 mmf, ceramic	2
C17, 25, 26	C-8G-12159	30 mmf, ceramic	3
C18, 19	C-8G-12160	91 mmf, ceramic	2
C16	C-8G-13026	51 mmf, ceramic	1
		RESISTORS	
R27	A-10A-13001	Volume control (500K) and switch	1
R31	A-11A-12988	Tone control (500K) and radio-phono switch	1
R32	C-9B1-86	100K ohms, 1/2 watt, 10%	1
R29, 44	C-9B1-94	470K ohms, 1/2 watt, 10%	2
R39, 41	C-9B1-83	56K ohms, 1/2 watt, 10%	2
R33, 34	C-9B1-68	3300 ohms, 1/2 watt, 10%	2
R30	C-9B1-35	4.7 megohms, 1/2 watt, 20%	1
R23, 28	C-9B1-80	33K ohms, 1/2 watt, 10%	2
R20	C-9B1-79	27K ohms, 1/2 watt, 10%	1
R22	C-9B1-78	22K ohms, 1/2 watt, 20%	1
R13, 16	C-9B1-48	68 ohms, 1/2 watt, 10%	2
R14, 17	C-9B2-81	39K ohms, 1 watt, 10%	2
R24, 26, 37	C-9B1-29	470K ohms, 1/2 watt, 20%	3
R25	C-9B1-302	15 megohms, 1/2 watt, 10%	1
R19	C-9B1-23	47K ohms, 1/2 watt, 20%	1
R7	C-9B4-76	15K ohms, 2 watts, 10%	1
R12, 35, 43	C-9B1-31	1 megohm, 1/2 watt, 20%	3
R40	C-9B1-66	2200 ohms, 1/2 watt, 10%	1
R36, 42	C-9B1-200	51K ohms, 1/2 watt, 5%	2
R38	C-9B4-55	270 ohms, 2 watts, 10%	1
R47	C-9B1-71	5600 ohms, 1/2 watt, 10%	1
R18	C-9B1-13	1000 ohms, 1/2 watt, 20%	1
R15, 11	C-9B2-15	2200 ohms, 1 watt, 20%	2
		COILS	
	See notes on page 2 when ordering I.F. coils.		
T3	C-13A-13009-1 or * B-13A-15473	Input I.F. transformer, combination 455 kc. and 10.7 mc.	1
T4	C-13B-13014-1 or * B-13B-15474	Output I.F. transformer, combination 455 kc. and 10.7 mc.	1
T5	C-203-11745-1 or * B-13M-15475	Ratio det. coil assembly 10.7 mc.	1
L3	A-16A-13243	Loop loading coil	1
L4	B-14MA-11065	Loop antenna,	1
		TRANSFORMERS	
T2	B-12C-13042	Output transformer for speaker	1
	B-12A-13038	Power transformer, primary, 50-60 cycles. 105-125 volts, AC	1
		SPEAKER	
	B-18B-13043-1	Electrodynamic speaker, 12" less output transformer	1
		MISCELLANEOUS	
	B-30A-15010	Dial scale	1
	B-5B-14153-37	Knob, small, with dot, walnut	2
	B-5B-14153-41	Knob, small, with dot, mahogany	2
	B-5B-13308-37	Knob. large, without dot, walnut	2
	B-5B-13308-41	Knob, large, without dot, mahog.	2
	A-2G-14482	Escutcheon	1
	B-14M-11479	A.C. line cord	1
	A-3A-13003	Switch shaft	1
	A-2D-12983	Detent bracket (U shaped on front of set)	1
	A-43D-12934	"U" speed clip	1
	A-55C-12935	Ball bearing	1
	A-2D-13004	Switch activator bracket	1
	B-47A-11094-5	Pilot lite assembly	1
	A-46A-11739	Pilot lite, 6-8 volts, T-44	2
	A-25G-13448	Rubber chassis mounting cushion	4
	32K10-14306	10-32 x 1" Chassis mtg. bolts	4
	A-15C-10717	7 prong, miniature tube socket	4
	A-15B-10440	8 prong, octal socket	4
	A-19B-12644	Antenna socket	1
	A-7B-13050	FM dipole, 2-screw strip	1
	A-15B-11538	Speaker socket	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono input socket	1
		RECORD CHANGER	
	* B-201-13304-1	Record changer (V-M 800) with P-30 cartridge	1
	P-30	Crystal cartridge with needle	1

MONTGOMERY WARD

MODEL 84BR-2719B



NOTE: Two 100K ohm resistors in series from Pin No. 2 of the 6AL5 to ground are connected as shown only when aligning the FM I.F. Refer to FM I.F. alignment procedure.

NOTE: B.C. Oscillator Coil T9 and number 7 terminal of slide switch should be connected together.

NOTE: Resistor R22 removed; with shielded wire from recorder output jack to radio side of radio-phono switch S2 added.

MODEL 84BR-2719B MONTGOMERY WARD

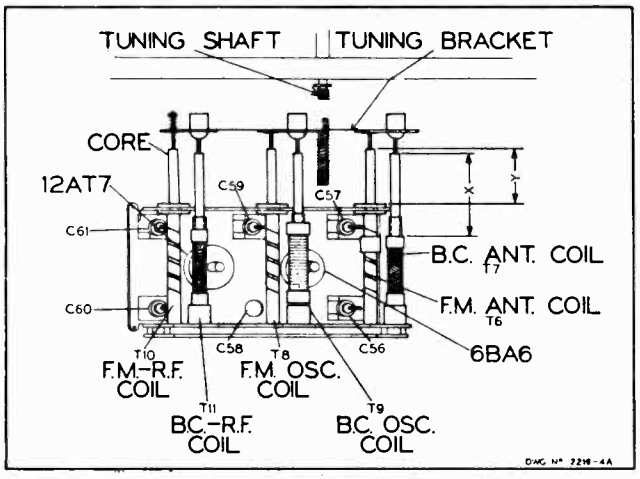
GENERAL DESCRIPTION

This is a 2-band, nine tube (plus rectifier) superheterodyne receiver for the reception of both AM and FM stations. It features the most advanced type of FM ratio detector, permeability tuning of both bands, combination double-frequency I.F. coils and miniature tubes. Built-in antennas are provided for broadcast and FM reception; provision is also made for connection of an external broadcast antenna as well as an FM antenna with a 300 ohm lead-in. Both antennas may be connected to the radio at the same time.

The phonograph is equipped with an automatic changer which plays up to ten 12-inch records or twelve 10-inch records at one loading.

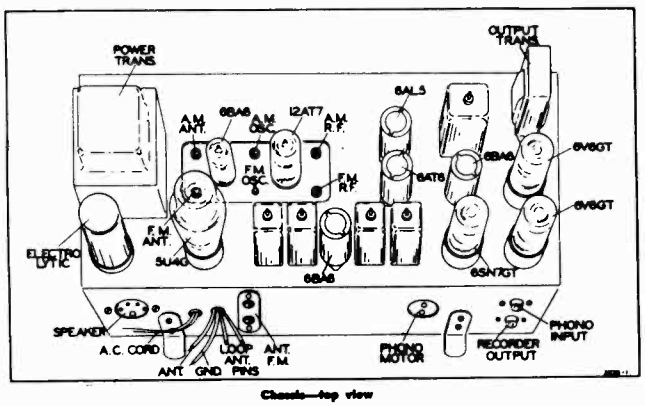
ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 122 watts. With phono operation 150 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band—88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-48 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-180 kc. broad at 2 times down. I.F. FM-320 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—3 microvolts average
FM Sensitivity	(For .5 watt output—10 microvolts average.
Power Output	8 watts, 10% distortion. 10 watts maximum.
Loud Speaker	12" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.
Tube and Lamp Complement	6BA6, FM—AM R.F. stage. 12AT7, FM—AM oscillator and mixer. 6BA6, FM—AM 1st I.F. 6BA6, FM— 2nd I.F. 6AL5, FM— ratio detector. 6AT6, AM detector. A. F. AMP. and A.V.C. 6SN7, Push-pull. Driver and phase-inverter. 5U4G, rectifier. 6V6, output. 6V6, output. T-44 dial lamp (2 used).
Automatic Changer	See Manual ~~5038A~~ 5035 A

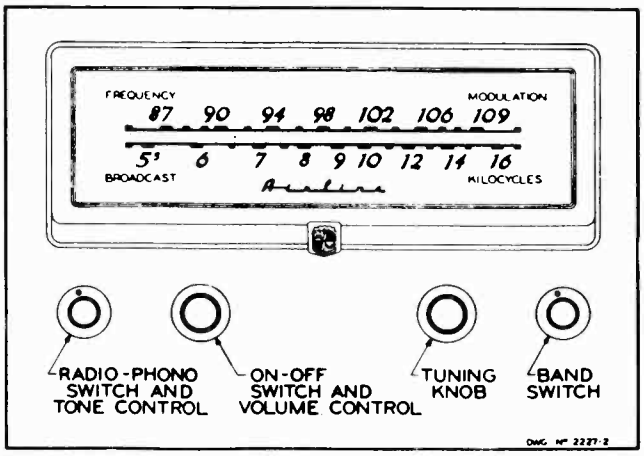


TUNER ADJUSTMENT

With tuner all the way out, dimension "X" should be 1½ inches. "Y" should be 1-1/16 inches. "X" is from the end of the slug to the edge of the coil winding. Check these dimensions before R.F. alignment is attempted of either the AM or FM band. No slug adjustment should be necessary since the slugs are properly set at the factory.



Chassis—top view



MONTGOMERY WARD MODEL 84BR-2719B

ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

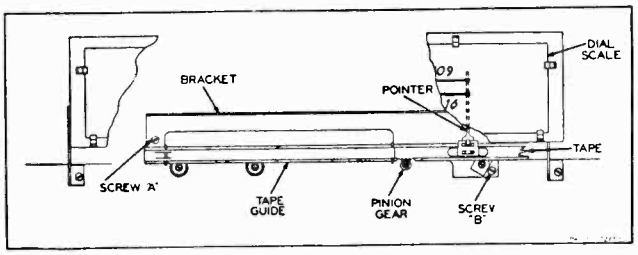
SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 1000 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T4 AM windings. See IF views	Maximum output Should be ½ watt
455 Kc. Use 30 microvolts	Pin No. 2 of 12AT7 and ground	Primary and Secondary of T3 AM windings. See IF views	Maximum output Should be ½ watt
400 cycles. Use 28 millivolts	Hot end of volume control and ground	None	Maximum output Should be ½ watt

BROADCAST BAND - R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1620 Kc. Use 3 microvolts	AM Antenna and Ground	200 mmf.	C59, C57, C61 For maximum, ½ watt

Procedure for disassembly and assembly of dial mechanism



TO ALIGN POINTER—Loosen bracket screw "A". Then tape guide bracket can be moved up to allow proper meshing of tape teeth with pinion gear. Readjust bracket to eliminate backlash.

MODEL 84BR-2719B MONTGOMERY WARD

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube volt-meter which has a "floating ground". In other words, the meter, when used as a vacuum tube volt-meter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	Pin no. 2 of 6AL5 and ground	Primary of T5	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	See note "A"	Secondary of T5	Zero. Use zero center scale. See note "B"
10.7 Mc. Use about 3300 microvolts	Pin No. 1 of 6BA6 no. 2 and ground	Pin no. 2 of 6AL5 and ground	Primary and Secondary of T4A 10.7 m.c. windings See IF views	Resonance should be about 3 volts
10.7 Mc. Use about 200 microvolts	Pin no. 2 of 12AT7 and ground	Pin no. 2 of 6AL5 and ground	Primary and Secondary of 10.7 m.c. windings of T3A See IF views	Resonance should be about 3 volts

NOTES ON FM—I.F. ALIGNMENT

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 2 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube voltmeter between the mid-point of the resistors and point zz.

NOTE "B" If T5 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM - R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 10 microvolts	FM Antenna Terminals See note	300 ohms	C58 Osc. C60 R.F. C56 Ant.	Pin no. 2 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however will not produce 3 volts. NOTE: Connect 300 ohms in series with hot side of generator and connect to one screw. Connect cold side of generator to other screw

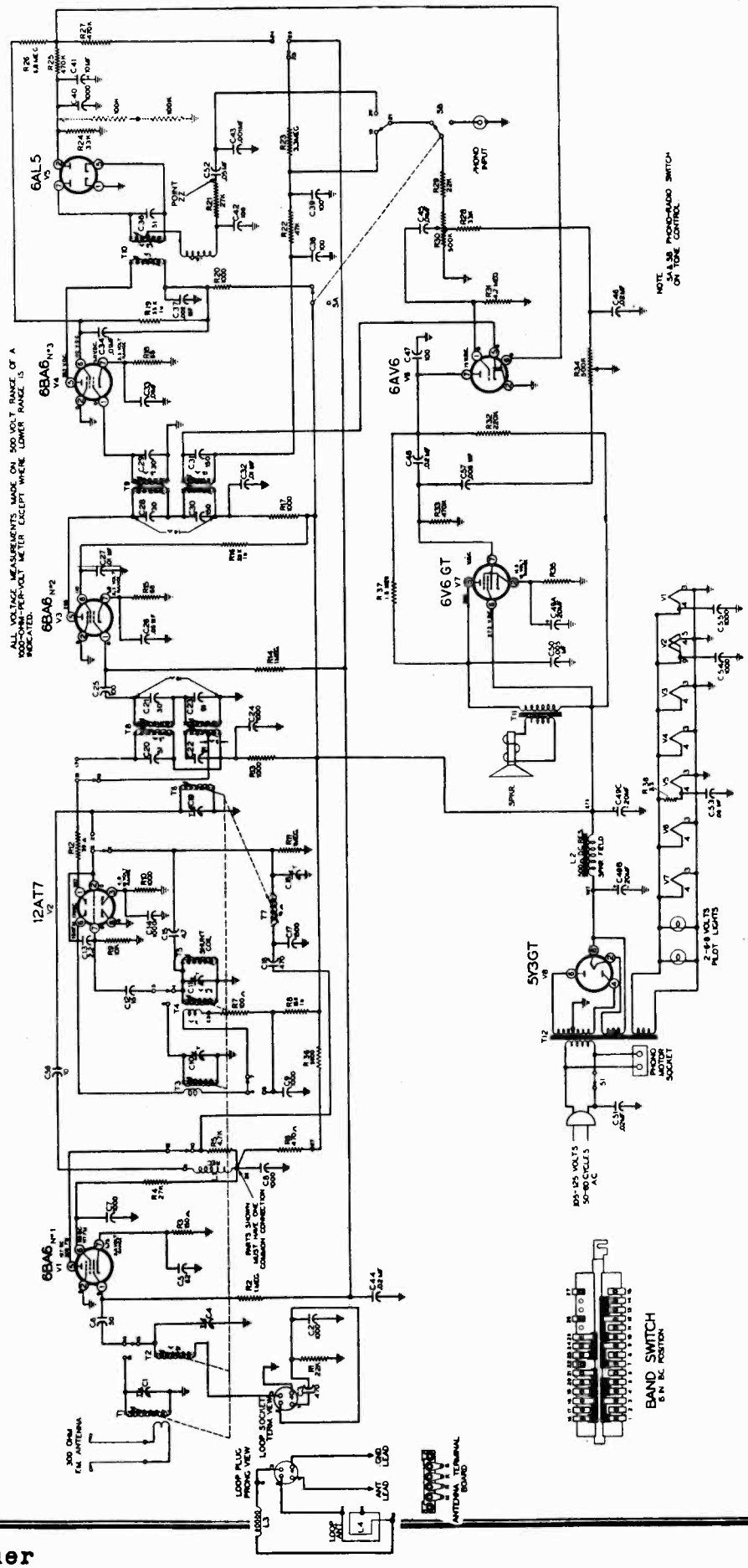
REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used In Set
C38	C-8G-13059	1500 mmf, ceramic	1
C34	C-8G-13060	51 mmf, ceramic	1
C40	C-8G-13201	1000 mmf, ceramic	1
C50	C-8G-11741	330 mmf, ceramic	1
C37	C-8F3-225	100 mmf, mica	1
C39, C42	C-8D-11304	.02 x 200 volts, paper	2
C35, C36	A-8F-13047	Mica condenser, 50 mmf, dual	1
C55	A-8C-12154	Electrolytic, 10 mfd, 450 volts	1
		RESISTORS	
R27, S1	A-10A-13114	Volume control and switch, 500K ohms	1
R31, S2	A-11A-15645	Tone control and phono-radio switch	1
R22	C-9B1-36	6.8 megohms, 1/2 watt	1
R32	C-9B1-86	100K ohms, 1/2 watt	1
R44, R37	C-9B1-94	470K ohms, 1/2 watt	2
R41, R39	C-9B1-83	56K ohms, 1/2 watt	2
R33, R34	C-9B1-68	3300 ohms, 1/2 watt	2
R30	C-9B1-35	4.7 megohms, 1/2 watt	1
R23, R28	C-9B1-80	33K ohms, 1/2 watt	2
R20	C-9B1-79	27K ohms, 1/2 watt	1
R13, R16	C-9B1-48	68 ohms, 1/2 watt	2
R14, R17	C-9B2-81	39K ohms, 1 watt	2
R24, R26	C-9B1-29	470K ohms, 1/2 watt	2
R25	C-9B1-302	15 megohms, 1/2 watt	1
R19	C-9B1-23	47K ohms, 1/2 watt	1
R12,R43,R35	C-9B1-31	1 megohm, 1/2 watt	3
R40	C-9B1-66	2200 ohms, 1/2 watt	1
R36, R42	C-9B1-200	51K ohms, 1/2 watt	2
R38	C-9B4-55	270 ohms, 2 watts	1
R18	C-9B1-13	1000 ohms, 1/2 watt	1
R11, R15	C-9B2-15	2200 ohms, 1 watt	2
		COILS	
T3B	B-13A-15680	Input I.F. transformer, 455 kc.	1
T4B	B-13B-15681	Output I.F. transformer, 455 kc.	1
T3A	B-13A-15682	Input I.F. transformer, 10.7 megohms	1
T4A	B-13B-15683	Second I.F. transformer, 10.7 megohms	1
T5	B-13M-15684	Ratio detector, 10.7 megohms	1
	C-13E-15687	Loop antenna assembly	1
		TRANSFORMERS	
T1	B-12A-13038-1	Power transformer, 105-125 volts, 50-60 cycles, primary	1
T2	B-12C-13042-1	Output transformer, for speaker	1
		SPEAKER	
	B-18B-13043-1	Electrodynamic speaker, 12" less output transformer	1
		MISCELLANEOUS	
	B-30A-15996	Dial scale	1
	B-5B-14153-37	Knob, small, with dot, walnut	2
	B-5B-14153-41	Knob, small, with dot, mahogany	2
	B-5B-13308-37	Knob, large, without dot, walnut	2
	B-5B-13308-41	Knob, large, without dot, mahog.	2
	A-2G-14482	Escutcheon	1
	B-14M-11479	A.C. line cord	1
	A-3A-15630	Switch shaft	1
	A-2D-12313	Detent bracket	1
	A-43D-12934	"U" speed clip	1
	A-55C-12935	Ball bearing	1
	B-47A-11094-5	Pilot lite assembly	1
	A-46A-11739	Pilot lite, 6-8 volts, T-44	2
	A-25G-13448	Rubber chassis mounting cushion	4
	32K10-14306	10 - 32 x 1" Chassis mtg. bolts	4
	A-15C-10717	7 prong, miniature tube socket	4
	A-15B-10440	8 prong, octal socket	4
	A-19B-12644	Antenna socket	1
	A-7B-13050	FM dipole, 2-screw strip	1
	A-15B-11538	Speaker socket	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono input socket	1
	A-19B-11044	Recorder socket	1
		RECORD CHANGER	
	B-201-13109	50 Record changer with cartridge	1
		QT Cartridge	1
		TUNER PARTS	
		CONDENSERS	
C58	A-8H-15444	Trimmer, FM oscillator	1
C56, 57, 59, 61	A-2M-12618	Trimmer plate, large	4
C60	A-2M-14368	Trimmer plate, small	1
	A-5M-12615	Locator, for trimmer plates	5
C59, C61	B-6M-12616-S-2	Silvered mica film	2
C56, 57, 60	A-6M-12616	Clear mica film	3
	A-3C-12617	Spacer, for trimmer plates	5
C1, C11	C-8G-11732	470 mmf, ceramic	2
C2	C-8G-13695	1000 mmf, ceramic	1
C6, 7, 9, 14 51	C-8G-13201	1000 mmf, ceramic	5
C12	C-8G-11731	1500 mmf, ceramic	1
C10, C8	C-8G-13017	15 mmf, ceramic	2
C3, C4	C-8G-11484	50 mmf, ceramic	2
C13	A-8G-12495-6	4.7 mmf, ceramic	1
C15	A-8G-12495-4	2.2 mmf, ceramic	1
C53	C-8G-15859	4 mmf, ceramic	1
C5	C-8D-11304	.02 x 200 volts, paper	1
		RESISTORS	
R4	C-9B2-79	27K ohms, 1 watt	1
R1	C-9B1-21	22K ohms, 1/2 watt	1
R3	C-9B1-52	150 ohms, 1/2 watt	1
R5	C-9B1-17	4700 ohms, 1/2 watt	1
R8	C-9B1-19	10K ohms, 1/2 watt	1
R2, R10	C-9B1-31	1 megohm, 1/2 watt	2
R21	C-9B1-34	3.3 megohms, 1/2 watt	1
R45	C-9B1-50	100 ohms, 1/2 watt	1
R46	C-9B1-45	39 ohms, 1/2 watt	1
R9	C-9B1-64	1500 ohms, 1/2 watt	1
R6	C-9B2-6	3300 ohms, 1 watt	1
R7	C-9B2-74	10K ohms, 1 watt	1
		COILS	
T8	B-13D-13027-1	FM oscillator coil	1
—	B-51A-13056	Core for FM oscillator coil	1
T6	B-13E-13028	FM antenna coil	1
—	B-51A-13058	Core for FM antenna coil	1
T10	B-13C-13029	FM R.F. coil	1
—	B-51A-13057	Core for FM R.F. coil	1
T9	A-13D-15704	B.C. oscillator coil	1
—	B-51A-12722	Core for B.C. oscillator coil	1
T7	B-13E-13031	B.C. antenna coil	1
T11	B-13C-13032	B.C. R.F. coil	1
—	B-51A-12723	Core for B.C. ant. and R.F. coil	2
		MISCELLANEOUS	
	B-20B-15628	Slide switch	1
	A-15B-12997	7-prong miniature tube socket	1
	A-15B-13430	9-prong miniature, tube socket	1
	B-3A-15415	Lead screw	1
	A-3J-12309	Pinion gear	1
	A-49A-13228	Tension spring	1
	A-49A-12394	Spiral spring for slugs	3
	B-2J-13006	Rack tape with teeth and pointer bracket	1
	9-2D-15416	Guide for rack tape	1
	B-2G-16040	Pointer	1
	C-2D-15062	Yoke and bracket	
	A-25A-13019	Core grommet, for AM	3
	A-3M-13020	Insert for core grommet	3
		MAIN CHASSIS PARTS	
		CONDENSERS	
C63A, C63B	B-8C-11629	Electrolytic filter condenser, 30—30 x 450 volts	1
C52	C-8D-13439	.25 mfd x 400 volts	1
C54, C47	C-8D-10760	.1 mfd x 400 volts	2
C31	C-8D-11013	.003 x 600 volts	1
C44, 43, 24, 23, 20	C-8D-10785	.006 x 600 volts	5
C29, C30	C-8D-10761	.01 x 400 volts	2
C45, 46	C-8D-10813	.05 x 400 volts	2
C49	C-8D-10789	.002 x 600 volts	1
C48, C22	C-8D-10770	.05 x 200 volts	2
C64	C-8D-15860	.05 x 200 volts	1
C41	A-8C-13132	Electrolytic, 10 mfd x 50 volts	1
C62	C-8J-11321	.02 x 600 volts, molded case	1
C35	A-2G-13962	.005 x 500 volts, ceramic	1
C21	C-8G-11734	100 mmf, ceramic	1

MODEL 84BR-2726A

MONTGOMERY WARD



MONTGOMERY WARD MODEL 84BR-2726A

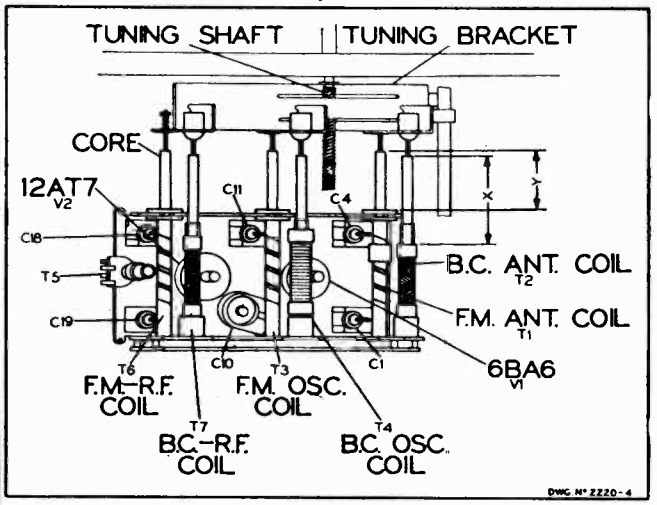
GENERAL DESCRIPTION

This is a 2-band, seven tube (plus rectifier) superheterodyne receiver for the reception of both AM and FM stations. It features the most advanced type of FM ratio detector, permeability tuning of both bands, combination double-frequency I.F. coils and miniature tubes. Built-in antennas are provided for broadcast and FM reception; provision is also made for connection of an external broadcast antenna as well as an FM antenna with a 300 ohm lead-in. Both antennas may be connected to the radio at the same time.

The phonograph is equipped with an automatic changer which plays up to ten 12-inch records or twelve 10-inch records at one loading, and also accommodates the new long-play microgroove records.

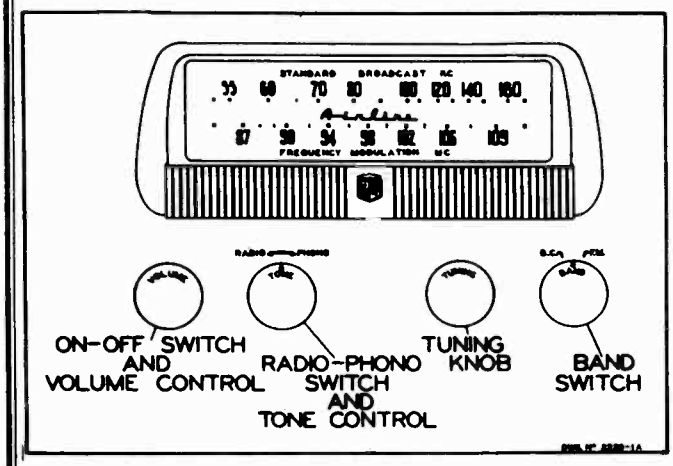
ELECTRICAL SPECIFICATIONS

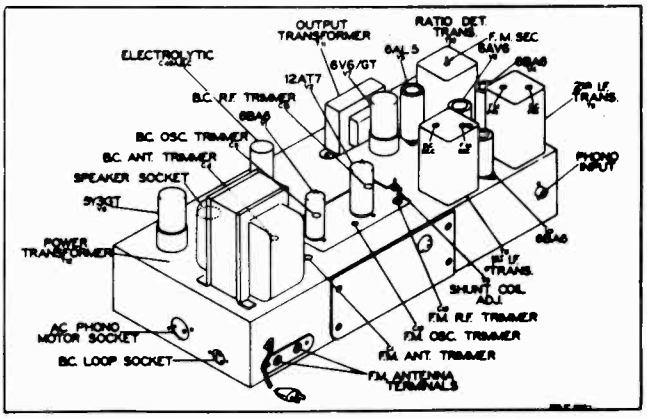
Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 75 watts. With phono operation 100 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band— 88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-42 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-200 kc. broad at 2 times down. I.F. FM-400 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—5 microvolts average.
FM Sensitivity	(For .5 watt output)—25 microvolts average.
Power Output	3.2 watts, 10% distortion. 5.5 watts maximum.
Loud Speaker	12" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.
Tube and Lamp Complement	6BA6, FM—AM R.F. stage. 12AT7, FM—AM oscillator and mixer. 6BA6, FM—AM 1st I.F. 6BA6, FM—2nd I.F. 6AL5, FM ratio detector. 6AV6, AM detector. A.F. AMP. and A.V.C. 6V6GT/G, Audio output. 5Y3, rectifier. T-44 dial lamp (2 used).
Automatic Changer	See Manual 5068A.



TUNER ADJUSTMENT

With tuner all the way out, dimension "X" should be 1½ inches. "Y" should be 1-1/16 inches. "X" is from the end of the slug to the edge of the coil winding. Check these dimensions before R.F. alignment is attempted of either the AM or FM band. No slug adjustment should be necessary since the slugs are properly set at the factory.





Chassis—top view

MODEL 84BR-2726A

MONTGOMERY WARD

ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 2400 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T9 AM windings. See top and bottom views	Maximum output Should be ½ watt
455 Kc. Use 70 microvolts	Pin No. 2 of 12AT7 and ground	Primary and Secondary of T8 AM windings. See top and bottom views	Maximum output Should be ½ watt
400 cycles. Use 60 millivolts	Hot end of volume control and ground	None	Maximum output Should be ½ watt

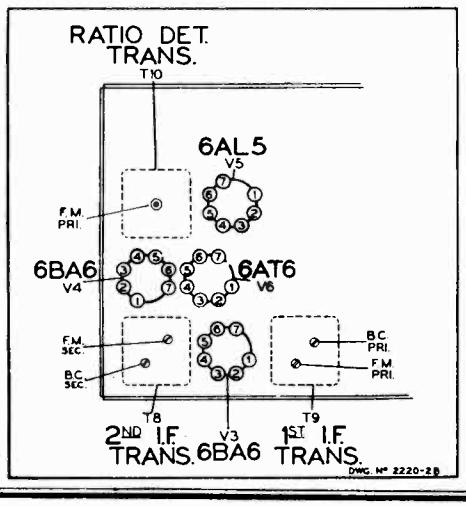
BROADCAST BAND - R. F. ALIGNMENT

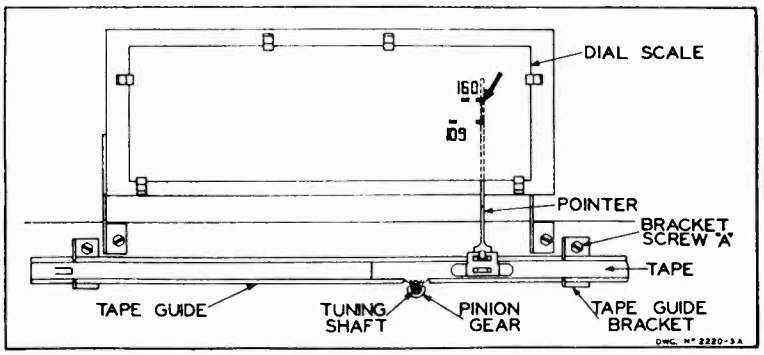
Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1620 Kc.	AM Antenna and Ground	200 mmf.	C11 Osc. trimmer for maximum
535 Kc.	AM Antenna and Ground	200 mmf.	T5 for maximum ½ watt
1620 Kc. Use 5 microvolts	AM Antenna and Ground	200 mmf.	C4 and C18 for max. ½ watt. See note

NOTE: Recheck first two adjustments after this adjustment because of inter-locking effects.

Procedure for disassembly and assembly of dial mechanism.





TO ALIGN POINTER— Loosen bracket screw "A". Then tape guide bracket can be moved up to allow proper meshing of tape teeth with pinion gear. Readjust bracket to eliminate backlash.

MONTGOMERY WARD MODEL 84BR-2726A

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube volt-meter which has a "floating ground". In other words, the meter, when used as a vacuum tube volt-meter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	Pin No. 2 of 6AL5 and ground	Primary of T10	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 6BA6 no. 3 and ground	See note "A"	Secondary of T10	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 3300 microvolts	Pin No. 1 of 6BA6 no. 2 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of T9 10.7 m.c. windings See top and bottom views	Resonance should be about 3 volts
10.7 Mc. Use about 200 microvolts	Pin No. 2 of 12AT7 and ground	Pin No. 2 of 6AL5 and ground	Primary and Secondary of 10.7 m.c. windings of T8 See top and bottom views	Resonance should be about 3 volts

NOTE ON FM - I.F. ALIGNMENT

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 2 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube volt-meter between the mid-point of the resistors and points zz.

NOTE "B" If T10 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM - R. F. ALIGNMENT

Check pointer so that it coincides with the marker to the extreme right when iron cores are all the way out. For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 25 microvolts	FM Antenna Terminals See note	300 ohms	C10 Osc. C19 R.F. C1 Ant.	Pin No. 2 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however will not produce 3 volts. NOTE: Connect 300 ohms in series with hot side of generator and connect to one screw. Connect cold side of generator to other screw.

MODEL 84BR-2726A

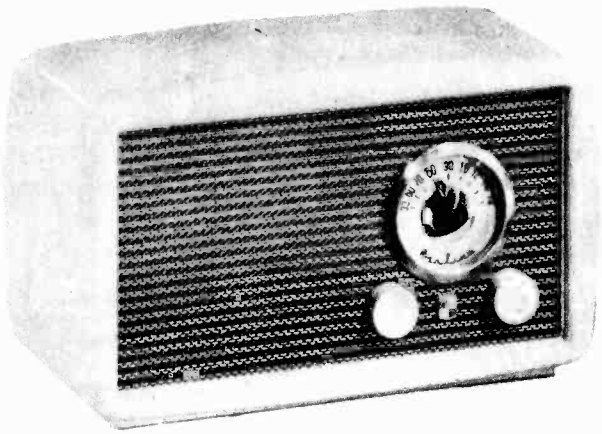
MONTGOMERY WARD

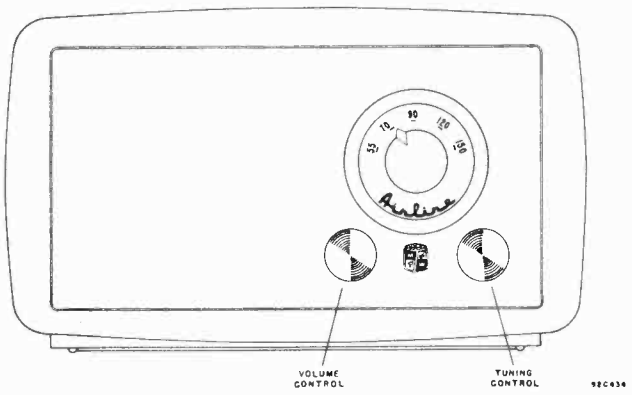
REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used In Set
		TUNER CHASSIS PARTS	
		CONDENSERS	
C10	A-8E-13575	Trimmer condenser	1
C1, 4, 11, 19, 18	A-2M-12618	Trimmer cond. plate	5
C3, 16	C-8G-11732	470 mmf, ±20%	2
C2	C-8G-13695	1000 mmf, ±20%	1
C8, 7, 9, 14, 54, 55	C-8G-13201	1000 mmf, +20%—10%	6
C5	C-8G-13018	62 mmf, ±10%	1
C17	C-8G-11731	1500 mmf, ±20%	1
C12	C-8G-13017	15 mmf, +10%	1
C6	C-8G-11484	50 mmf, ±10%	1
C56	C-8G-11789	10 mmf, ±10%	1
C15	A-8G-12495-6	4.7 mmf, ±20%	1
C13	A-8G-12495-4	2.2 mmf, ±20%	1
C44	C-8D-11304	.02 mfd, 200 volts, ±20%	1
		RESISTORS	
R4	C-9B2-79	27K ohms, 1 watt, 10%	1
R1	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R3	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R5	C-9B1-17	4700 ohms, 1/2 watt, 20%	1
R6	C-9B1-11	470 ohms, 1/2 watt, 20%	1
R9	C-9B1-19	10K ohms, 1/2 watt, 20%	1
R2, 11	C-9B1-31	1 megohm, 1/2 watt, 20%	2
R10	C-9B1-62	1000 ohms, 1/2 watt, 10%	1
R23	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R7	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R12	C-9B1-45	39 ohms, 1/2 watt, 10%	1
R36	C-9B2-71	5600 ohms, 1 watt, 10%	1
		COILS	
T3	B-13D-13027	FM oscillator coil assembly	1
—	B-51B-13056	Core for FM oscillator coil	1
T1	B-13E-13028	FM antenna coil assembly	1
—	B-51A-13058	Core for FM antenna coil	1
T6	B-13C-13029	FM R.F. coil assembly	1
—	B-51A-13057	Core for FM R.F. coil	1
T4	B-13D-13030	AM oscillator coil assembly	1
—	B-51A-12722	Core for B.C. oscillator coil	1
—	B-51A-12723	Core for B.C. ant. and R.F. coil	1
T2	B-13E-13031	AM antenna coil assembly	1
T7	B-13C-13032	AM R.F. coil assembly	1
L1	A-16A-13033	Choke coil assembly	1
T5	B-13D-12974	AM osc. shunt coil assembly	1
		MISCELLANEOUS	
	B-208-13553 or B-201-12967	Band change slide switch	1
	A-15B-12997	7 prong, miniature tube socket	1
	A-15B-13430	9 prong, miniature tube socket	1
	C-2D-14437	Drive bracket assembly	1
	A-25A-13019	Core grommets, for AM Band	3
	A-3M-13020	Insert for core grommet	3
	A-49A-12394	Spiral spring for FM cores	3
	A-2J-11041	Pointer tension spring, "M" shaped	1
	B-2D-12316	Tape guide	1
	B-2J-12922	Rack tape, with teeth and pointer bracket	1
	B-2G-13613	Pointer	1
	A-200-15016	Drive, pinion and lead screw assembly	1
		MAIN CHASSIS PARTS	
		CONDENSERS	
C49B, 49C, 49A	A-8C-15387	Electrolytic, 20—20 x 450 volts; 20 x 25 volts	1
C50	C-8D-10935	.005 mf x 600 volts	1
C27, 32, 33, 34, 45	C-8D-10761	.01 mf x 400 volts, 20%	6
C57	C-8D-10785	.006 mf x 600 volts, 20%	1
C41	A-8C-13132	Electrolytic, 10 mf x 50 volts	1
C43	C-8D-10787	.001 x 600 volts, 20%	1
C53,C26,C52	C-8D-10770	.05 x 200 volts, 20%	2
C48, 46	C-8D-10774	.02 x 400 volts, 20%	2
C51	C-8J-11321	.02 x 600 volts, 20%	1
C25, 47	C-8G-13131	100 mmf, ceramic, 10%	2
C24, 40	C-8G-13016	1000 mmf, ceramic, 20%	3
C42	C-8F3-225	100 mmf, mica, 5%	1
C38, 39	A-8F-13127	.0001 mf, dual mica, 20%	1
C22, 23	C-8G-12160	91 mmf, ceramic, 5%	2
C20	C-8G-13026	51 mmf, ceramic, 5%	1
C30, 31	C-8G-13025	150 mmf, ceramic, 5%	2
C21, 28, 29	C-8G-12159	30 mmf, ceramic, 5%	3
C36	C-8G-11891	51 mmf, ceramic	1
C37	C-8D-15638	.002 x 600 volts, 10%	1
		RESISTORS	
R30, S1	A-10A-13114	Volume control (500K ohms) and switch	1
R34, SA, SB	A-11A-13115	Tone control (500K ohms) and radio-phono switch	1
R32	C-9B1-27	220K ohms, 1/2 watt, 20%	1
R15, 18	C-9B1-48	68 ohms, 1/2 watt, 10%	2
R14	C-9B1-31	1 megohm, 1/2 watt, 20%	1
R19, 16	C-9B2-80	33K ohms 1 watt, 10 %	2
R24, 28	C-9B1-80	33K ohms, 1/2 watt, 10%	2
R21	C-9B1-79	27K ohms, 1/2 watt, 10%	1
R8	C-9B2-76	15K ohms, 1 watt, 10%	1
R22	C-9B1-23	47K ohms, 1/2 watt, 20%	1
R29	C-9B1-21	22K ohms, 1/2 watt, 20%	1
R31	C-9B1-35	4.7 megohms, 1/2 watt, 20%	1
R25, 27, 33	C-9B1-29	470K ohms, 1/2 watt, 20%	3
R35	C-9B2-144	240 ohms, 1 watt, 5%	1
R26	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1
R13, 20, 17	C-9B1-13	1000 ohms, 1/2 watt, 20%	2
R37	C-9B1-100	1.5 megohm, 1/2 watt, 10%	1
R38	C-9B1-1069	3.3 ohms, 1/2 watt, 5%	1
		COILS	
T8	B-13A-15473	Input I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T9	B-13B-15474	Second I.F. transformer, combination, 455 kc. and 10.7 mc.	1
T10	B-13M-15475	Ratio det. coil assembly 10.7 mc.	1
L3	A-16A-13243	Loop loading coil	1
L4	A-14MA-11066-1	Loop antenna ribbon	1
		TRANSFORMERS	
T12	B-12A-15385	Power transformer, primary, 50-60 cycles. 105-125 volts A.C.	1
T11	B-12C-13556	Output transformer, for speaker	1
		SPEAKER	
L2	B-18B-13585-2	Electrodynamic speaker, 12-inch, less output transformer	1
		MISCELLANEOUS	
	B-30A-13611	Dial scale	1
	B-5B-13744	Knob, mahog. or wal. "Volume"	1
	B-5B-13745	Knob, mahog. or wal. "Tone"	1
	B-5B-13746	Knob, mahog. or wal. "Tuning"	1
	B-5B-13747	Knob, mahog. or wal. "Band switch"	1
	B-2G-13612	Escutcheon, mahog. or walnut	1
	B-14M-11479	Line cord and plug	1
	A-3A-12933-1	Band switch shaft	1
	A-55C-12935	Ball bearing	1
	B-47A-11094-4	Pilot lite and bracket assembly	1
	A-46A-11739	Pilot lite, 6-8 volts, T-44	2
	A-15C-13174	Miniature socket, 7 prong	5
	A-15B-10440	Octal socket, 8 prong	1
	A-19B-12644	Loop antenna socket	1
	B-7B-13050	FM terminal strip	1
	A-15B-11538	Speaker socket	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono input socket	1
		RECORD CHANGER	
	B-201-16345	246 Changer with cartridge	1
		Webster V42-2 cartridge	1
		NE-214 Tandem point needle	1

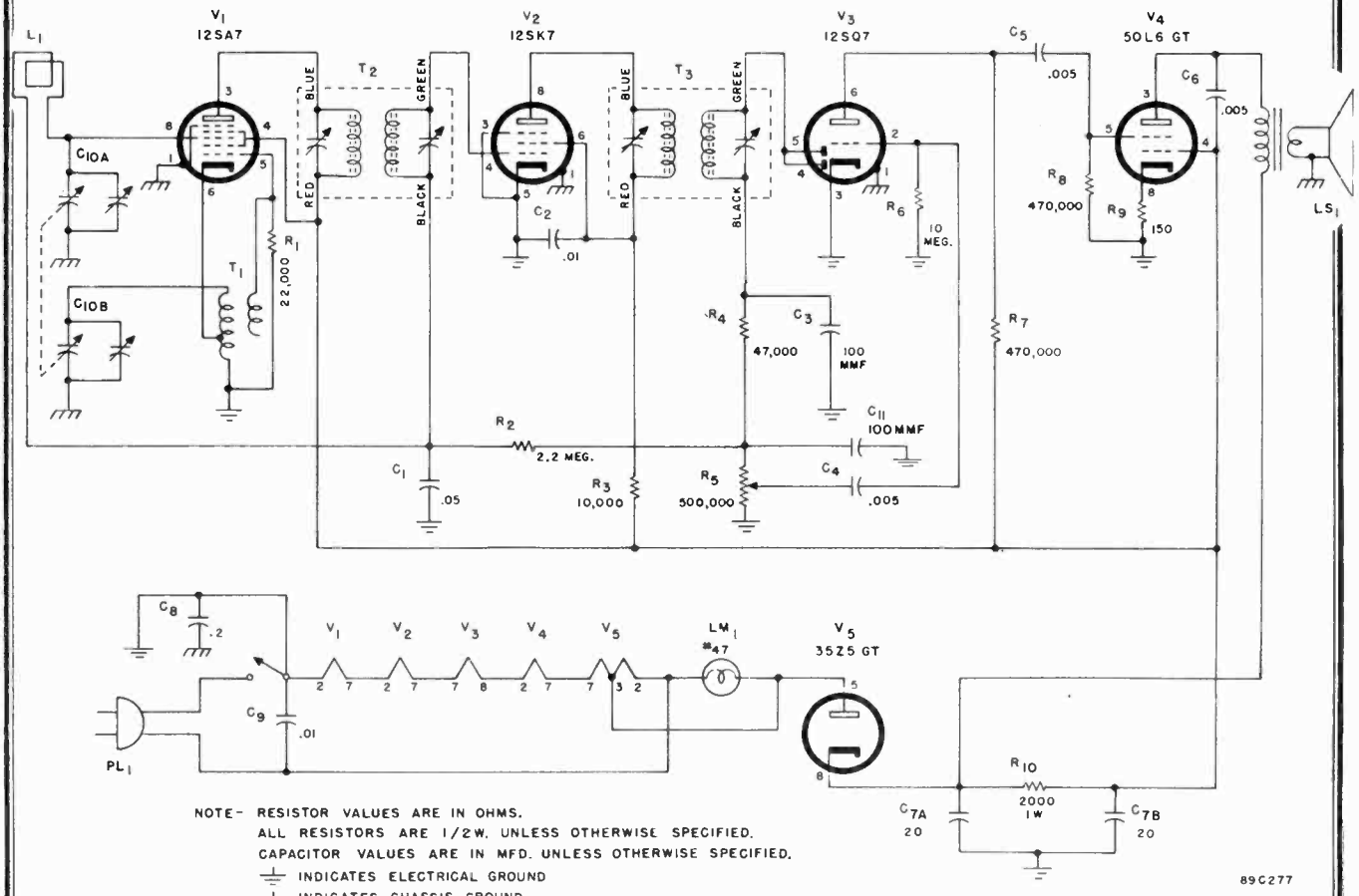
MONTGOMERY WARD

MODELS 84HA-1527A, 84HA-1528A





This radio is a condenser tuned receiver using a cut plate tracking mixer section and employs four tubes in a conventional superheterodyne circuit. The loop provides for signal pickup as well as the inductive component in the tuned circuit of the mixer stage. No provision is made for the use of an external antenna.



NOTE- RESISTOR VALUES ARE IN OHMS.
ALL RESISTORS ARE 1/2W. UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MFD. UNLESS OTHERWISE SPECIFIED.
⏚ INDICATES ELECTRICAL GROUND
⏚ INDICATES CHASSIS GROUND

LAST RESISTOR SYMBOL — R-10
LAST CAPACITOR SYMBOL — C-10

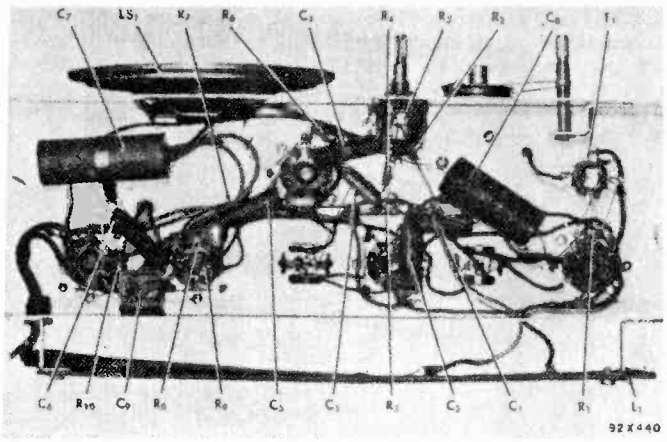
89C277

MODELS 84HA-1527A,
84HA-1528A

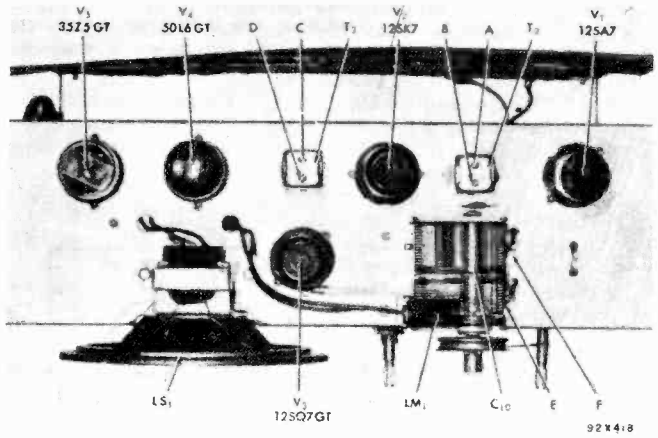
MONTGOMERY WARD

ELECTRICAL SPECIFICATIONS

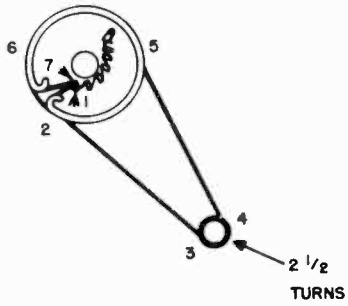
Power Supply	105-125 volts DC or 60 cycle AC, 25 watts
Frequency Range	Broadcast 540-1620 KC
Intermediate Frequency	455 KC
Antenna	Built in loop
Power Output	0.6 watt
Speaker	5 inch P.M.
Voice Coil Impedance	3 ohms
Tube and Dial Lamp Complement	12SA7 Mixer 12SK7 I.F. Amplifier 12SQ7 Detector & Audio 50L6GT Power Amplifier 35Z5GT Rectifier Mazda No. 47 Dial Lamp



For placement of these tubes, see the diagram showing layout.



DIAL CORD STRINGING INSTRUCTIONS



To restring the dial cable, pull the two control knobs and dial pointer from their shafts remove the chassis bolts and pull the chassis from the cabinet. Restring the dial drive with a 12-inch length of 30 lb. test dial cord following the stringing sequence shown in the accompanying illustration. Reinstall the receiver chassis and replace the knobs. Set the tuning condenser at maximum capacity and clip on the dial pointer so that its pointer falls on the left hand limit of the dial scale.

ALIGNMENT PROCEDURE

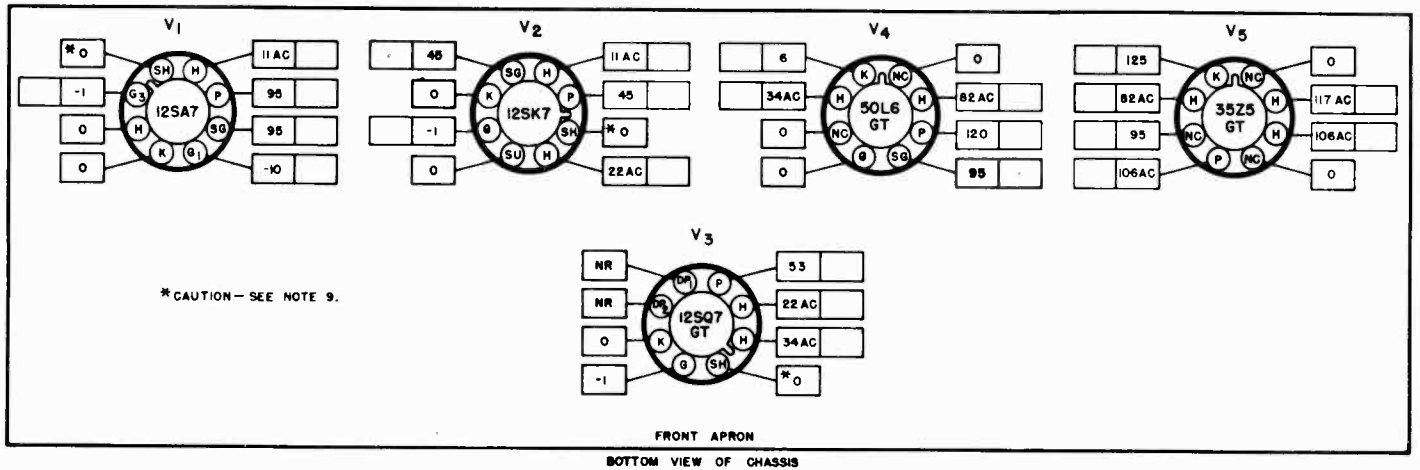
Output meter connection	Across voice coil
Generator ground	To chasis
Volume control position	Maximum

ALIGNMENT CHART

Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Radio Tuned To	Adjust	Remarks
0.01 mfd. cap.	Connect to pin #5 of of 12SA7 through dummy ant.	455 kc	1000 kc	A,B,C.D	Adjust for max. output. IF sensitivity for 50 milliwatt output is approx. 150 microvolts.
None	Do not couple directly to loop, pickup generator signal by radiation only	1500 kc	1500 kc	E*F	Adjust for max. output.

*Note - Calibration adjustment.

TUBE SOCKET VOLTAGE CHART



NOTES-

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND ELECTRICAL GROUND (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE ___ 117 V. AC.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED. AC VOLTAGES SHOWN BECOME DC WHEN OPERATING FROM A DC LINE.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC" — NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR" — NOT READABLE. (READING GENERALLY MEANINGLESS).
8. [ ] SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT THE SAME POTENTIAL WITH THE CHASSIS GROUNDED.

98C428

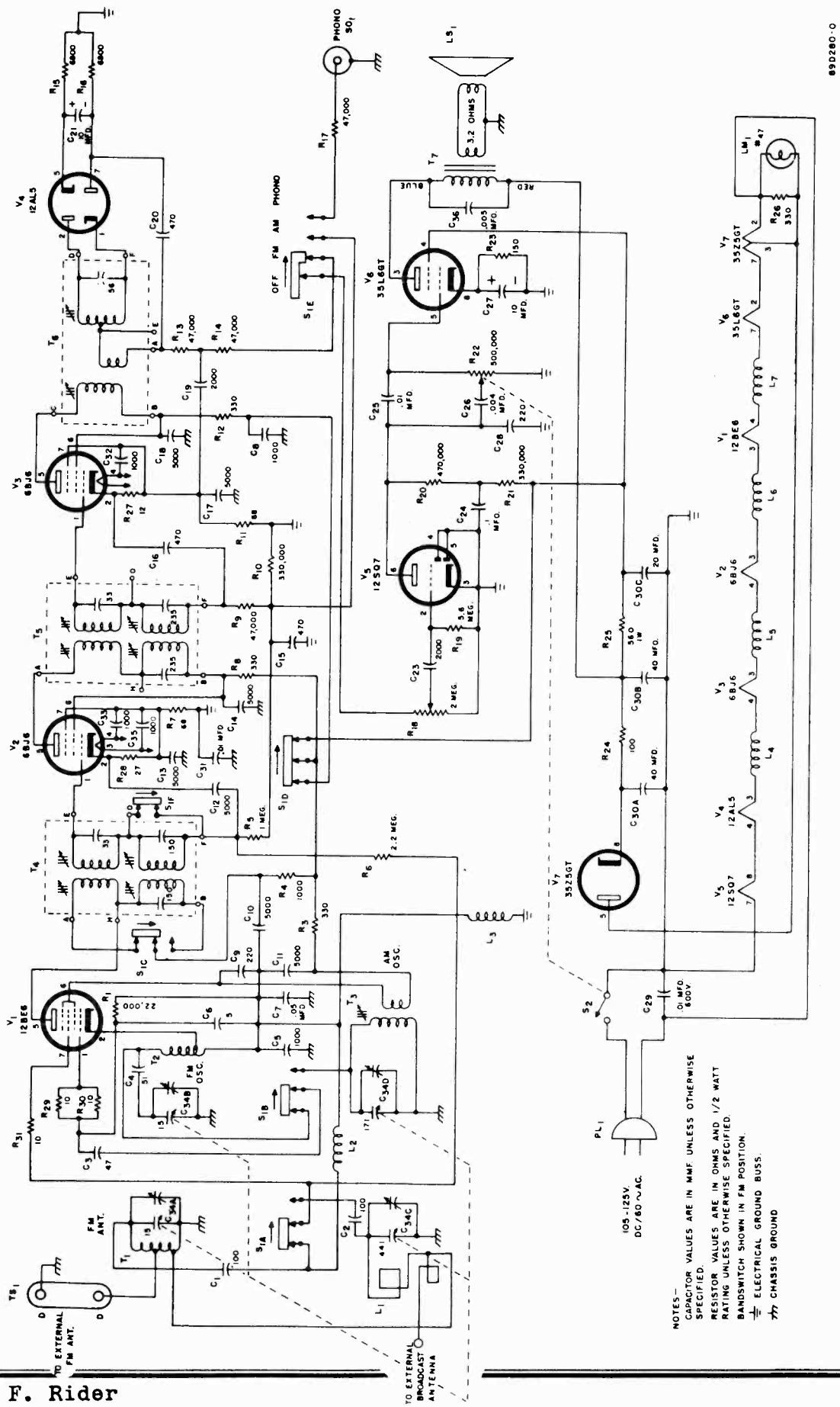
REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description
		CONDENSERS
C-1	46AY503J	.05 mfd. 600 V., tubular
C-2	46AZ103J	.01 mfd. 600 V., tubular
C-3,C-11	CM20A101M	100 mmf. 500 V., mica
C-4,5,6	46AZ502J	.005 mfd. 600 V., tubular
C-7	45B127	20-20 mfd. 150., electrolytic
C-8	46AX204H	.2 mfd. 600., tubular
C-9	46AG103J	.01 mfd. 600., tubular
C-10	48B201	Tuning condenser
		RESISTORS
R-1	RC20AE223M	22,000 ohms ½ watt, carbon
R-2	RC20AE225M	2.2 megohms ½ watt, carbon
R-3	RC20AE103M	10,000 ohms ½ watt, carbon
R-4	RC20AE473M	47,000 ohms ½ watt, carbon
R-5	25B641	Volume control
R-6	RC20AE106M	10 megohms ½ watt, carbon
R-7,8	RC20AE474M	470,000 ohms ½ watt, carbon
R-9	RC20AE151M	150 ohms ½ watt, carbon
R-10	RC30AE202M	2000 ohms 1 watt, carbon
		COILS AND TRANSFORMERS
L-1	57C119	Loop antenna
T-1	51B1058	Oscillator coil
T-2,3	50B374	Transformer IF & Det.

		MISCELLANEOUS
LS-1	85C073	Speaker
	86B066	Pilot light socket & bracket
	6A296	Socket, octal
	87B1669	Line cord
	76A397	Line cord lock
	7C073	Escutcheon
	82B150	Pointer
	22B209	Dial scale
	15B068	Knob, ivory
	15B068-3	Knob, brown
	66E450	Cabinet, ivory finish
	66E450-1	Cabinet, brown finish

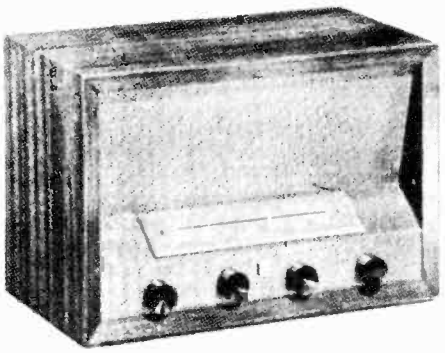
MODEL 84HA-1810A

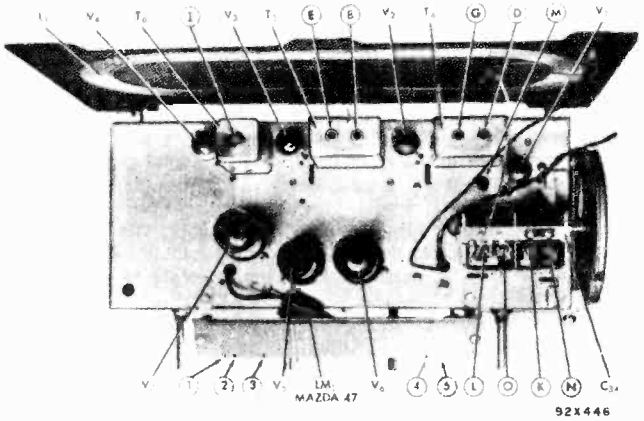
MONTGOMERY WARD



MONTGOMERY WARD

MODEL 84HA-1810A





This radio is a condenser tuned receiver using a cut plate tracking mixer section in the BC band and uncut plates in a conventional two section gang for FM reception. The built-in loop provides pickup for both the BC and FM bands. The BC section of the loop acts as the mixer stage coil while the FM section of the loop is coupled to the FM mixer stage coil. A single terminal (Back cover) is provided for an external BC antenna and a pair of terminals (D-D) are provided for a 300-ohm FM antenna transmission line for an external FM antenna. For FM reception the IF amplifier consists of two conventional amplifier stages feeding a ratio detector circuit. On the BC band the second IF amplifier stage becomes a conventional diode detector circuit using the control grid on the second IF amplifier tube as a diode plate. Since the receiver operates from AC and DC current, a separate ground buss is used and isolated from the chassis.

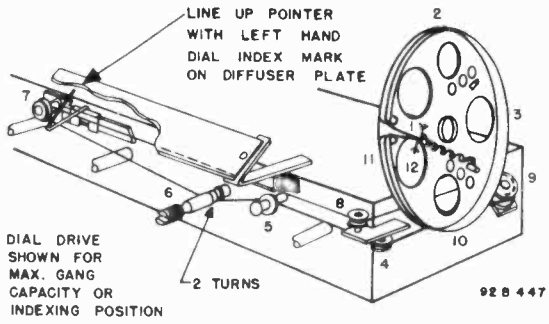
ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts DC or 60 cycle AC, 28 watts
Frequency Range	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	455 KC/10.7 MC
Antenna	Built in loop. Provisions for external BC and FM antennas.
Power Output	1.5 watts max.
Speaker	4 X 6-inch PM.
Voice Coil Impedance	3.2 ohms
Tube and Dial Lamp Complement	12BE6 Mixer/Osc. 6BJ6, 1st I.F. Amp. 6BJ6, 2nd I.F. Amp. (FM) & Detector (BC) 12AL5 Ratio Detector (FM) 12SQ7 Audio Amp. 35L6GT Power Amp. 35Z5GT Rectifier Mazda No. 47 Dial Lamp

For placement of these tubes, see the diagram showing tube layout.

DIAL CORD STRINGING INSTRUCTIONS

To restring the dial cable, pull the four control knobs from their shafts, remove the chassis bolts and pull the chassis from the cabinet. Restring the dial drive with a 48-inch length of 30-lb. test dial cord following the stringing sequence shown in the accompanying illustration. With the gang condenser at maximum capacity (closed) attach the dial pointer to the drive string and line it up with the left hand #1 index marker on the diffuser plate.



ALIGNMENT PROCEDURE

Generator connection	See chart
Generator ground	To chassis
Output meter connection	Across voice coil
Electronic voltmeter connection	See chart
Volume control position	Maximum
Tone control position	Optional

NOTE - Index marks are provided on the diffuser plate to supplement the dial scale when the chassis is removed from the cabinet for alignment. Check the pointer position with the gang fully closed to make sure it lines up with the first marker before starting the alignment procedure outlined below.

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

The loop antenna must be connected during alignment.

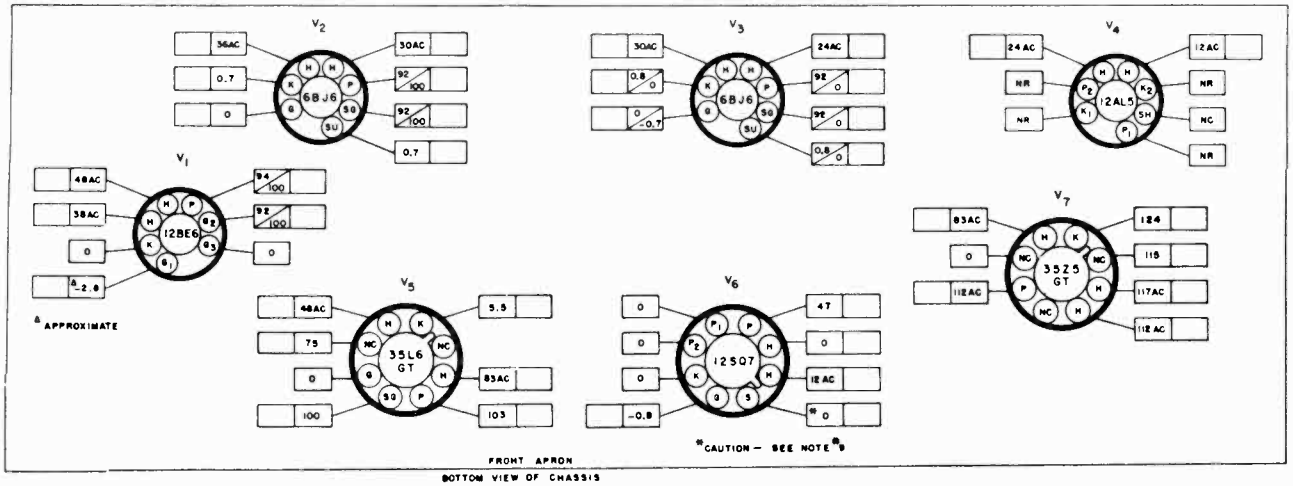
MODEL 84HA-1810A

MONTGOMERY WARD

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Radio Range Switch Position	Diffuser Plate Index Mark	Adjust	Remarks
1.	.01 mfd.	To stator plates of high cap. mixer section	455 kc	2	None (Midscale)	A,B,C,D	Adjust for max. audio output at voice coil. Keep audio output below 50 mw to avoid AVC action.
2.	.01 mfd. cap.	To stator plates of low cap. mixer section	10.7 mc (No modulation)	1	None (Midscale)	E,F,G,H	Adjust for max. DC voltage between pin #7 of the 6AL5 and ground buss. Connect a 500,000 ohm resistor in series with voltmeter probe. Use just enough signal generator output to obtain approx. 2 volts at the electronic voltmeter.
3.	After completing the adjustments required by step 2. detune the signal generator on each side of 10.7 mc and note the generator dial or frequency reading for one half of the DC voltage measured by the electronic voltmeter. Use just enough signal generator output to obtain a maximum of 2 volts at the center frequency of the IF channel. Set the signal generator frequency at the midpoint of the two readings obtained above and align the FM detector transformer as follows:						
4.	Without changing the setup, adjust the primary of the FM detector transformer (I) for maximum DC voltage. Disconnect the electronic voltmeter probe and reconnect it at the junction of R13 and R14 using the 500,000-ohm resistor as before for isolation. Adjust the secondary of the FM detector (J) for the null or zero DC voltage. This completes the IF amplifier adjustment.						
5.	Std. RMA dummy	To BC antenna terminal on cabinet back	1500 kc	2	#4	*K,L	Adjust for max. audio output as in step 1.
			600 kc	2	#3	*M	
6.	300-ohm carbon resistor	To terminals "D-D" on rear chassis apron. Connect resistor to high side or ungrounded terminal	108 mc	1	#5	*N,O	Adjust for max. DC voltage as in step 2.

*Calibration adjustment.



NOTES —

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT. WHERE TWO READINGS ARE SHOWN THE FIRST IS FOR FM THE SECOND FOR BC.
3. LINE VOLTAGE — 117 V. AC. AC VOLTAGES SHOWN WILL BE DC WHEN OPERATING FROM A DC LINE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC" — NO CONNECTION. (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR" — NOT READABLE. (READING GENERALLY MEANINGLESS).
8. ☐ SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT THE SAME POTENTIAL WITH CHASSIS GROUNDED.

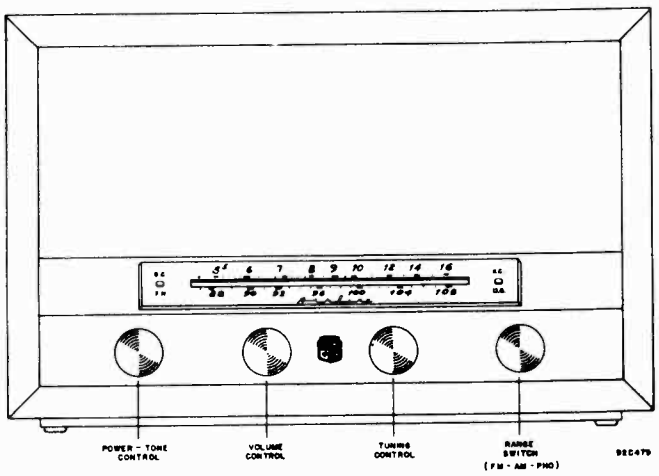
SED448

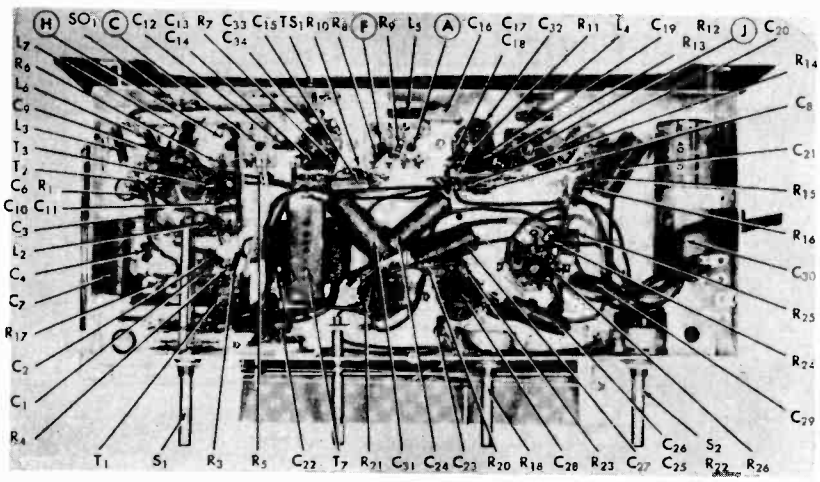
MONTGOMERY WARD

MODEL 84HA-1810A

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description
		RESISTORS (Cont.)
R-23	RC20AE151K	150 ohms ½ watt, carbon
R-24	RC20AE101M	100 ohms ½ watt, carbon
R-25	RC30AE561K	560 ohms 1 watt, carbon
R-27	RC20AE120K	12 ohms ½ watt, carbon
R-28	RC20AE270K	27 ohms ½ watt, carbon
R-39,30,31	RC20AE100K	10 ohms ½ watt, carbon
		TRANSFORMERS AND COILS
T-1	51A1061	Transformer, FM mixer stage
T-2	51A1062	Transformer, FM osc. stage
T-3	51B1063	Transformer, AM osc. stage
T-4	50B399	Transformer, 1st IF
T-5	50B400	Transformer, 2nd IF
T-6	50B401	Transformer, FM detector
T-7	55B111	Transformer, audio output
L-1	57C121	Loop antenna (cabinet back)
L-2,3,4,5, 6,7	53A136	Coil, RF choke
		PLUGS AND SOCKETS
PL-1	87B1669	Line cord and plug
	6A308	Socket, miniature (tube)
	6A296	Socket, octal
SO-1	36A029	Phono jack
	86B069	Socket, pilot light
		MISCELLANEOUS
S-1	60B328	Band switch assembly
	88A379	Terminal strip, antenna (D-D)
	76A397	Lock, line cord
	82A151	Pointer, dial
	22B210	Dial scale
	67A822	Bracket, dial light diffuser
	8B806	Diffuser, dial light
	38A019	Dial cord
	75A012	Spring, dial drive
	15B068-3	Knob
LS-1	85B076	Speaker





92X445

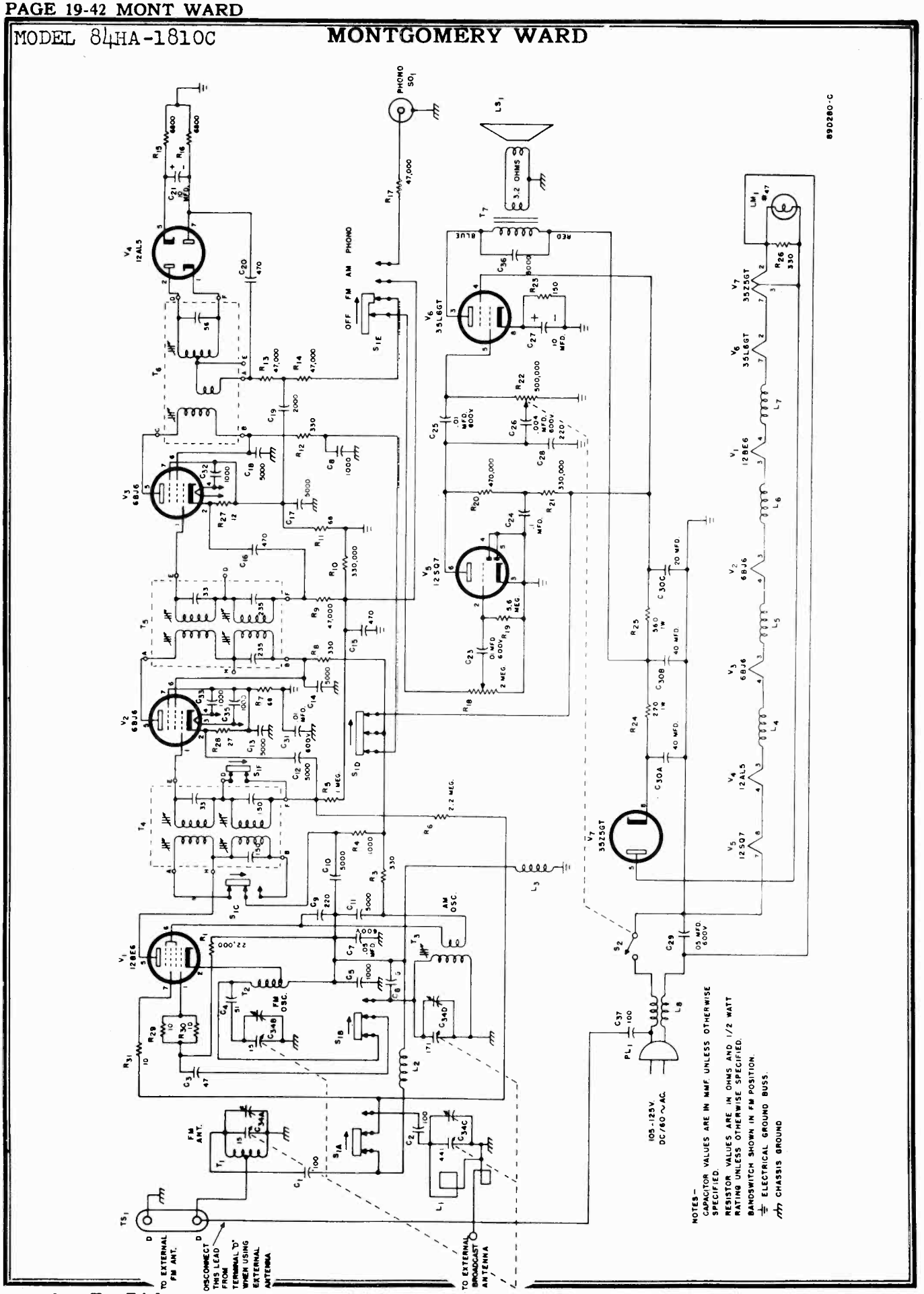
RESISTORS:

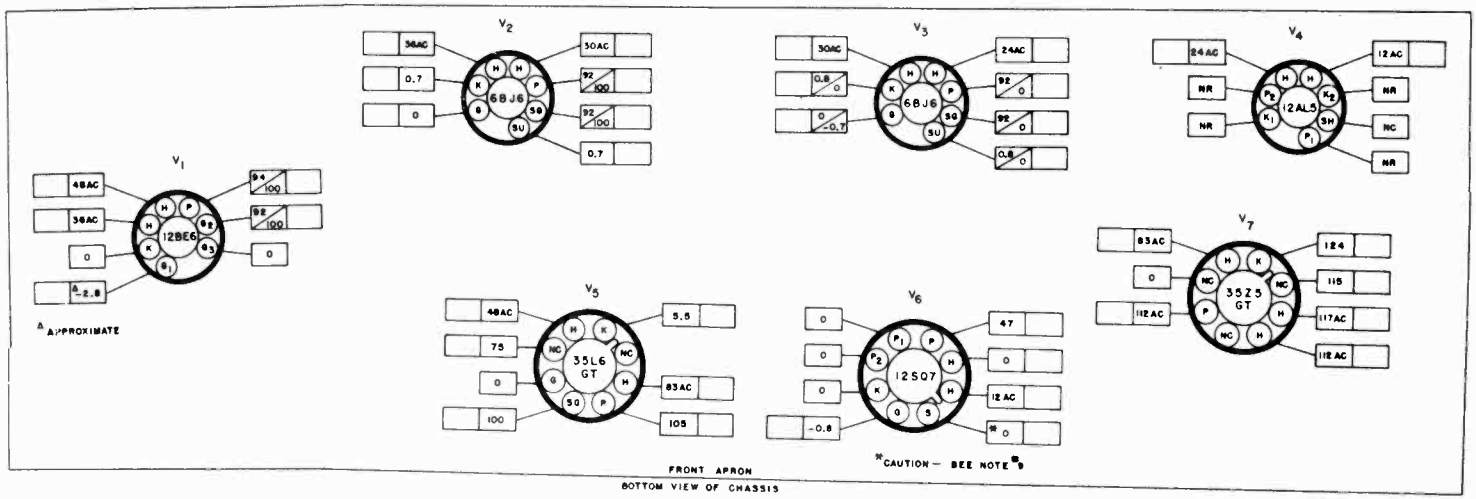
R-1	RC20AE223K	22,000 ohms ½ watt, carbon
R-3,8,12, 26	RC20AE331M	330 ohms ½ watt, carbon
R-4	RC20AE102M	1000 ohms ½ watt, carbon
R-5	RC20AE105M	1 megohm ½ watt, carbon
R-6	RC20AE225M	2.2 megohm ½ watt, carbon
R-7,11	RC20AE680K	68 ohms ½ watt, carbon
R-9,13, 14,17	RC20AE473M	47,000 ohms ½ watt, carbon
R-10,21	RC20AE334M	330,000 ohms ½ watt, carbon
R-15,16	RC20AE682K	6800 ohms ½ watt, carbon
R-18	25B624	2 megohm volume control
R-19	RC20AE565M	5.6 megohms ½ watt, carbon
R-20	RC20AE474M	470,000 ohms ½ watt, carbon
R-22	25B758	500,000 ohms, tone control (switch S2)

Ref. No.	Part No.	Description
		CONDENSERS
C-1,2	CC26UK101K	100 mmf. 500 V., ceramic
C-3	CC21UK470K	47 mmf. 500 V., ceramic
C-4	CC21UK510J	51 mmf. 500 V., ceramic
C-5	47A177	1000 mmf. 500 V., ceramic
C-6	CC21UK050K	5 mmf. 500 V., ceramic
C-7	46AY503J	.05 mfd. 600 V., tubular paper
C-8,32,33, 35	47B20A102N5	1000 mmf. 500 V., ceramic
C-9,28	CM20A221M	220 mmf. 500 V., mica
C-10,11,12, 13,14,17, 18,36	47A168	.005 mfd. 500 V., ceramic
C-15,16,20	CM20A471M	470 mmf. 500 V., mica
C-19,23	47B20A202M5	2000 mmf. 500 V., ceramic
C-21,27	45A121	10 mfd. 25 V., electrolytic
C-24	46AU104J	.1 mfd. 200 V., tubular paper
C-25,31	46AZ103J	.01 mfd. 600 V., tubular paper
C-26	46AZ402J	.004 mfd. 600 V., tubular paper
C-29	46AG103J	.01 mfd. 600 V., molded paper
C-30	45B130	40-40-20 mfd. 150 V., electrolytic
C-34	48C203	Capacitor, main tuning

MODEL 84HA-1810C

MONTGOMERY WARD





92D448

NOTES —

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT. WHERE TWO READINGS ARE SHOWN THE FIRST IS FOR FM THE SECOND FOR BC.
3. LINE VOLTAGE — 117 V. AC. AC VOLTAGES SHOWN WILL BE DC WHEN OPERATING FROM A DC LINE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC" — NO CONNECTION. (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR" — NOT READABLE. (READING GENERALLY MEANINGLESS).
8. ☐ SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT THE SAME POTENTIAL WITH CHASSIS GROUNDED.

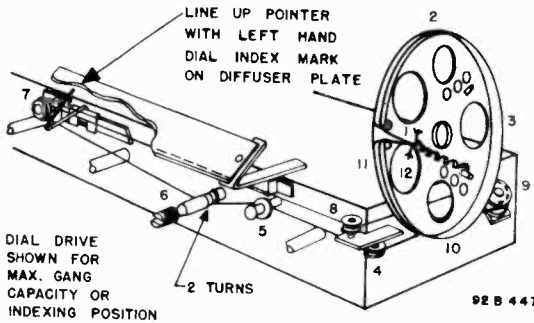
ELECTRICAL SPECIFICATIONS

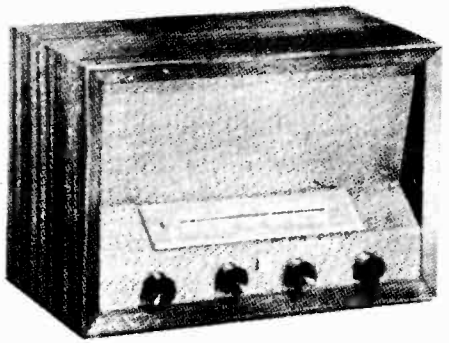
Power Supply	105-125 volts DC or 60 cycle AC, 28 watts
Frequency Range	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	455 KC/10.7 MC
Antenna	Built in loop. Provisions for external BC and FM antennas.
Power Output	1.5 watts max.
Speaker	4 X 6-inch PM.
Voice Coil Impedance	3.2 ohms
Tube and Dial Lamp Complement	12BE6 Mixer/Osc. 6BJ6, 1st I.F. Amp. 6BJ6, 2nd I.F. Amp. (FM) & Detector (BC) 12AL5 Ratio Detector (FM) 12SQ7 Audio Amp. 35L6GT Power Amp. 35Z5GT Rectifier Mazda No. 47 Dial Lamp

For placement of these tubes, see the diagram showing tube layout.

DIAL CORD STRINGING INSTRUCTIONS

To restring the dial cable, pull the four control knobs from their shafts, remove the chassis bolts and pull the chassis from the cabinet. Restring the dial drive with a 48-inch length of 20-lb. test dial cord following the stringing sequence shown in the accompanying illustration. With the gang condenser at maximum capacity (closed) attach the dial pointer to the drive string and line it up with the left hand #1 index marker on the diffuser plate.

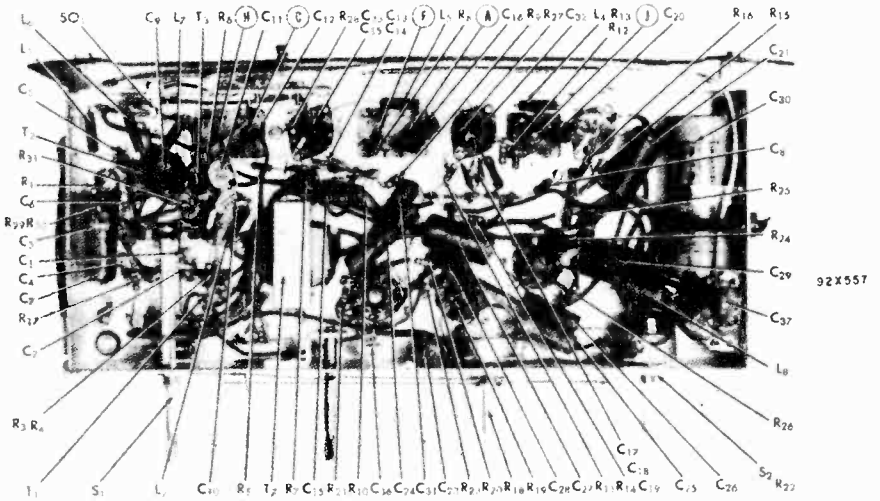




This radio is a condenser tuned receiver using a cut plate tracking mixer section in the BC band and uncut plates in a conventional two section gang for FM reception. The built-in loop provides pickup for both the BC and FM bands. The BC section of the loop acts as the mixer stage coil while the FM section of the loop is coupled to the FM mixer stage coil. A single terminal (Back cover) is provided for an external BC antenna and a pair of terminals (D-D) are provided for a 300-ohm FM antenna transmission line for an external FM antenna. For FM reception the IF amplifier consists of two conventional amplifier stages feeding a ratio detector circuit. On the BC band the second IF amplifier stage becomes a conventional diode detector circuit using the control grid on the second IF amplifier tube as a diode plate. Since the receiver operates from AC and DC current, a separate ground buss is used and isolated from the chassis.

MODEL 84HA-1810C

MONTGOMERY WARD



NOTE - Index marks are provided on the diffuser plate to supplement the dial scale when the chassis is removed from the cabinet for alignment. Check the pointer position with the gang fully closed to make sure it lines up with the first marker before starting the alignment procedure outlined below.

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

The loop antenna must be connected during alignment.

ALIGNMENT PROCEDURE

Generator connection. . . . . See chart

Generator ground . . . . . To chassis

Output meter connection . . . . . Across voice coil

Electronic voltmeter connection . . . . . See chart

Volume control position . . . . . Maximum

Tone control position . . . . . Optional

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Radio Range Switch Position	Diffuser Plate Index Mark	Adjust	Remarks
1.	.01 mfd. cap.	To stator plates of high cap. mixer section	455 kc	2	None (Midscale)	A,B,C,D	Adjust for max. audio output at voice coil. Keep audio output below 50 mw to avoid AVC action.
2.	.01 mfd. cap.	To stator plates of low cap. mixer section	10.7 mc (No modulation)	1	None (Midscale)	E,F,G,H	Adjust for max. DC voltage between pin #7 of the 12AL5 and ground buss. Connect a 500,000 ohm resistor in series with voltmeter probe. Use just enough signal generator output to obtain approx. 2 volts at the electronic voltmeter.
3.	After completing the adjustments required by step 2. detune the signal generator on each side of 10.7 mc and note the generator dial or frequency reading for one half of the DC voltage measured by the electronic voltmeter. Use just enough signal generator output to obtain a maximum of 2 volts at the center frequency of the IF channel. Set the signal generator frequency at the midpoint of the two readings obtained above and align the FM detector transformer as follows:						
4.	Without changing the setup, adjust the primary of the FM detector transformer (I) for maximum DC voltage. Disconnect the electronic voltmeter probe and reconnect it at the junction of R13 and R14 using the 500,000-ohm resistor as before for isolation. Adjust the secondary of the FM detector (J) for the null or zero DC voltage. This completes the IF amplifier adjustment.						
5.	Std. RMA dummy	To BC antenna terminal on cabinet back	1500 kc	2	#4	*K,L	Adjust for max. audio output as in step 1.
			600 kc	2	#3	*M	
6.	300-ohm carbon resistor	To terminals "D-D" on rear chassis apron. Connect resistor to high side or ungrounded terminal	108 mc	1	#5	*N,O	Adjust for max. DC voltage as in step 2.

*Calibration adjustment.

MONTGOMERY WARD

MODEL 84HA-1810C

REPLACEMENT PARTS LIST

CONDENSERS

Ref. No.	Part No.	Description
C-1,2	CC26UK101K	100 mmf. 500 V., ceramic
C-3	CC21UK470K	47 mmf. 500 V., ceramic
C-4	CC21UK510J	51 mmf. 500 V., ceramic
C-5,8,32, 33,35	47B20A102N5	1000 mmf. 500 V., ceramic
C-6	CC21UK050K	5 mmf. 500 V., ceramic
C-7	46AY503J	.05 mfd. 600 V., tubular paper
C-9,28	CM20A221M	220 mmf. 500 V., mica
C-10,11, 12,13,14, 17,18,36	47A168	.005 mfd. 500 V., ceramic
C-15,16,20	CM20A471M	470 mmf. 500 V., mica
C-19,	47B20A202M5	2000 mmf. 500 V., ceramic
C-21,27	45A121	10 mfd. 25 V., electrolytic
C-23,25,31	46AZ103J	.01 mfd. 600V., tubular paper
C-24	46AU104J	.1 mfd. 200 V., tubular paper.
C-26	46AZ402J	.004 mfd. 600 V., tubular paper
C-29	46AR503J	.05 mfd. 600 V., molded paper
C-30	45B130	40-40-20 mfd. 150 V., electrolytic
C-34	48C203	Capacitor, main tuning
C-37	CM20A101M	100 mmf 500V., mica

RESISTORS

R-1	RC20AE223K	22,000 ohms $\frac{1}{2}$ watt, carbon
R-3,8,12, 26	RC20AE331M	330 ohms $\frac{1}{2}$ watt, carbon
R-4	RC20AE102M	1000 ohms $\frac{1}{2}$ watt, carbon
R-5	RC20AE105M	1 megohm $\frac{1}{2}$ watt, carbon
R-6	RC20AE225M	2.2 megohm $\frac{1}{2}$ watt, carbon
R-7,11	RC20AE680K	68 ohms $\frac{1}{2}$ watt, carbon
R-9,13, 14,17	RC20AE473M	47,000 ohms $\frac{1}{2}$ watt, carbon
R-10,21	RC20AE334M	330,000 ohms $\frac{1}{2}$ watt, carbon
R-15,16	RC20AE682K	6800 ohms $\frac{1}{2}$ watt, carbon
R-18	25B624	2 megohm volume control
R-19	RC20AE565M	5.6 megohms $\frac{1}{2}$ watt, carbon
R-20	RC20AE474M	470,000 ohms $\frac{1}{2}$ watt, carbon
R-22	25B758	500,000 ohms, tone control (switch S2)
R-23	RC20AE151K	150 ohms $\frac{1}{2}$ watt, carbon
R-24	RC30AE221M	220 ohms 1 watt, carbon
R-25	RC30AE561K	560 ohms 1 watt, carbon
R-27	RC20AE120K	12 ohms $\frac{1}{2}$ watt, carbon
R-28	RC20AE270K	27 ohms $\frac{1}{2}$ watt, carbon
R-39,30,31	RC20AE100K	10 ohms $\frac{1}{2}$ watt, carbon

RESISTORS (Cont.)

TRANSFORMERS AND COILS

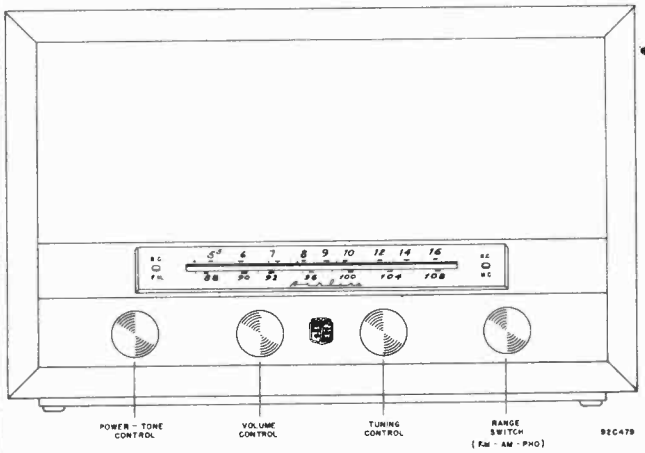
T-1	51A1061	Transformer, FM mixer stage
T-2	51A1062	Transformer, FM osc. stage
T-3	51B1063	Transformer, AM osc. stage
T-4	50B399	Transformer, 1st IF
T-5	50B400	Transformer, 2nd IF
T-6	50B401	Transformer, FM detector
T-7	55B111	Transformer, audio output
L-1	57C121	Loop antenna (cabinet back)
L-2,3,4, 5,6,7	53A153	Coil, RF choke
L-8	53A137	Coil, power line

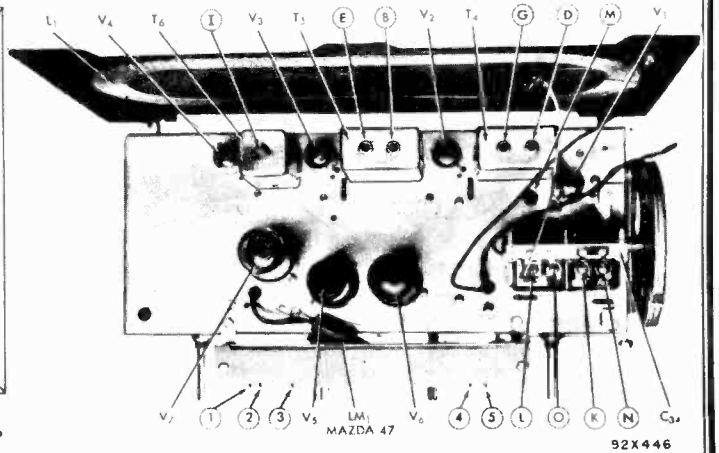
PLUGS AND SOCKETS

PL-1	87B1669	Line cord and plug
	6A308	Socket, miniature (tube)
	6A296	Socket, octal
SO-1	36A020	Phono jack
	86B069	Socket, pilot light

MISCELLANEOUS

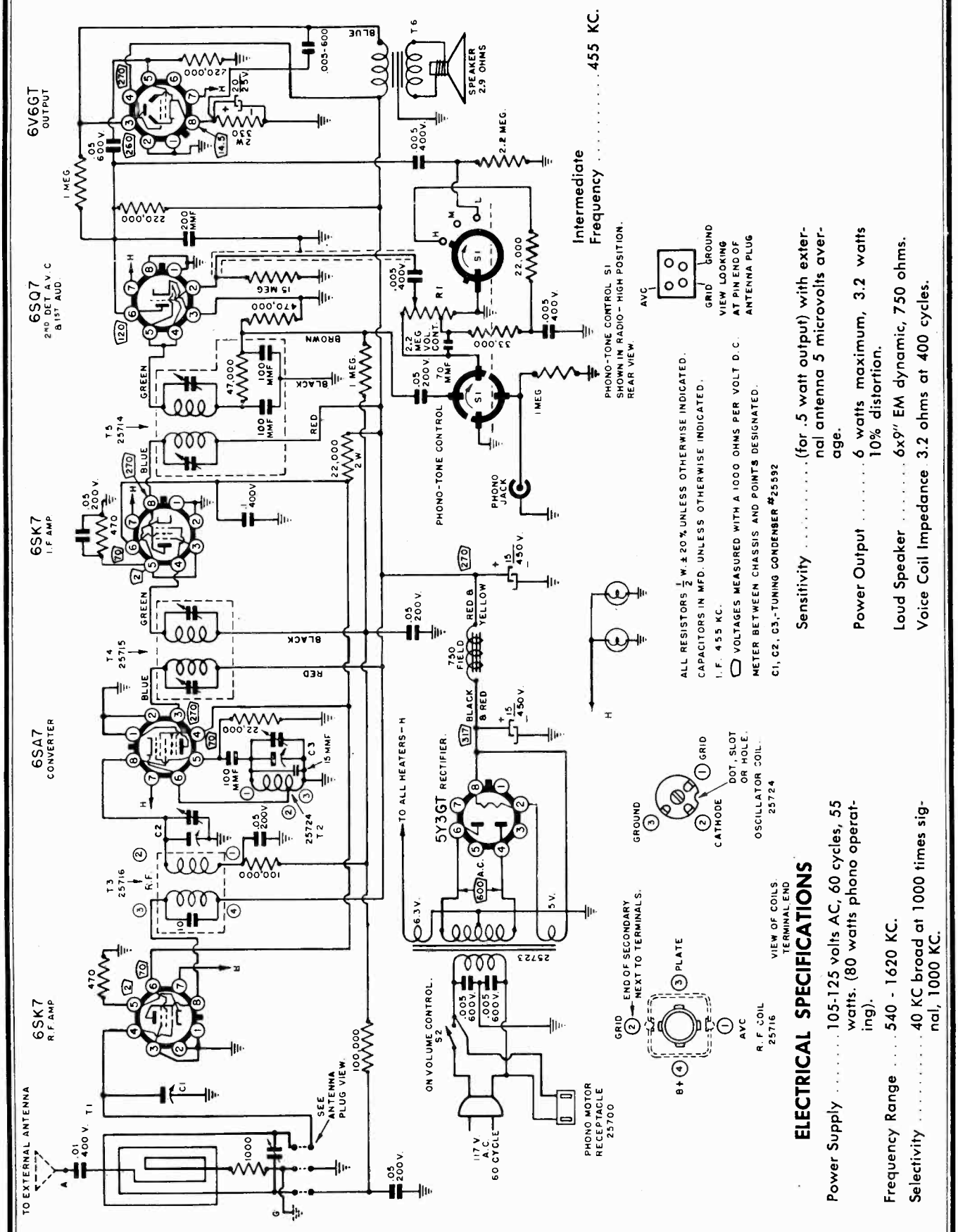
S-1	60B328	Band switch assembly
TS-1	88A379	Terminal strip, antenna (D-D)
	76A397	Lock, line cord
	82A151	Pointer, dial
	22B210	Dial scale
	67A822	Bracket, dial light diffuser.
	8B806	Diffuser, dial light
	38A001	Dial cord
	75A012	Spring, dial drive
	15B067-5	Knob, VOLUME & TUNING controls
	15B142-5	Knob, TONE & RANGE controls.
LS-1	85B076	Speaker





MODEL 84KR-2716A

MONTGOMERY WARD



ELECTRICAL SPECIFICATIONS

Power Supply ..... 105-125 volts AC, 60 cycles, 55 watts. (80 watts phono operating).

Frequency Range .... 540 - 1620 KC.

Selectivity ..... 40 KC broad at 1000 times signal, 1000 KC.

Sensitivity ..... (for .5 watt output) with external antenna 5 microvolts average.

Power Output ..... 6 watts maximum, 3.2 watts 10% distortion.

Loud Speaker ..... 6x9" EM dynamic, 750 ohms.

Voice Coil Impedance 3.2 ohms at 400 cycles.

ALIGNMENT PROCEDURE

VOLUME CONTROL — MAXIMUM FOR ALL ADJUSTMENTS.

Tone control — In "HIGH" position.

Connect radio chassis to ground connection of Signal Generator.

Allow the chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

A signal generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output indicating meter; non-metallic screw driver.

Dummy antennas — .1 mfd., 200 mmfd.

Place loop antenna in its normal relation to the chassis.

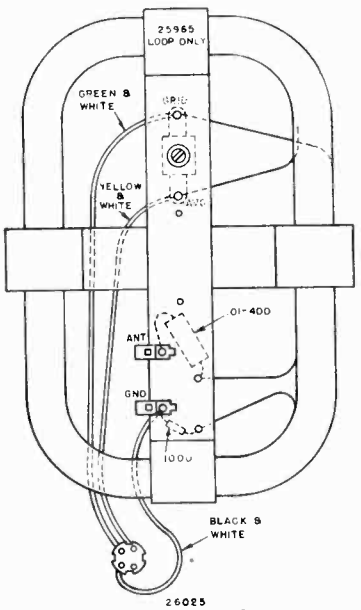
Signal Generator		Connection To Radio	Condenser Setting	Adjust Trimmers To Maximum
Frequency Setting	Dummy Antenna			
455 kc	.1 Mfd.	6SA7, Pin 8	Turn rotor plates to full open	1st IF Transformer. 2nd IF Transformer.
1620 kc	200 Mmfd.	Antenna Lead	Turn rotor plates to full open	Osc. trimmer on tuning condenser.
1400 kc	200 Mmfd.	Antenna Lead	Tune rotor to maximum output.	RF Section trimmer on tuning condenser. Antenna trimmer on loop antenna.

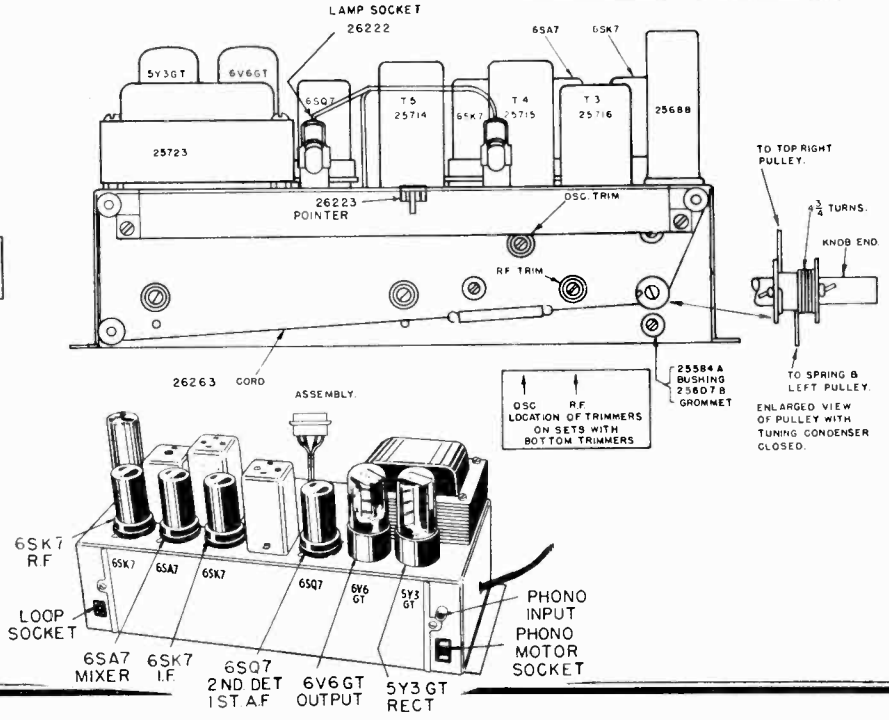
The dial pointer may be adjusted to the scale calibration by slipping the pointer on the dial cord.

RECEIVER STAGE SENSITIVITIES

The following table lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resister across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supply both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

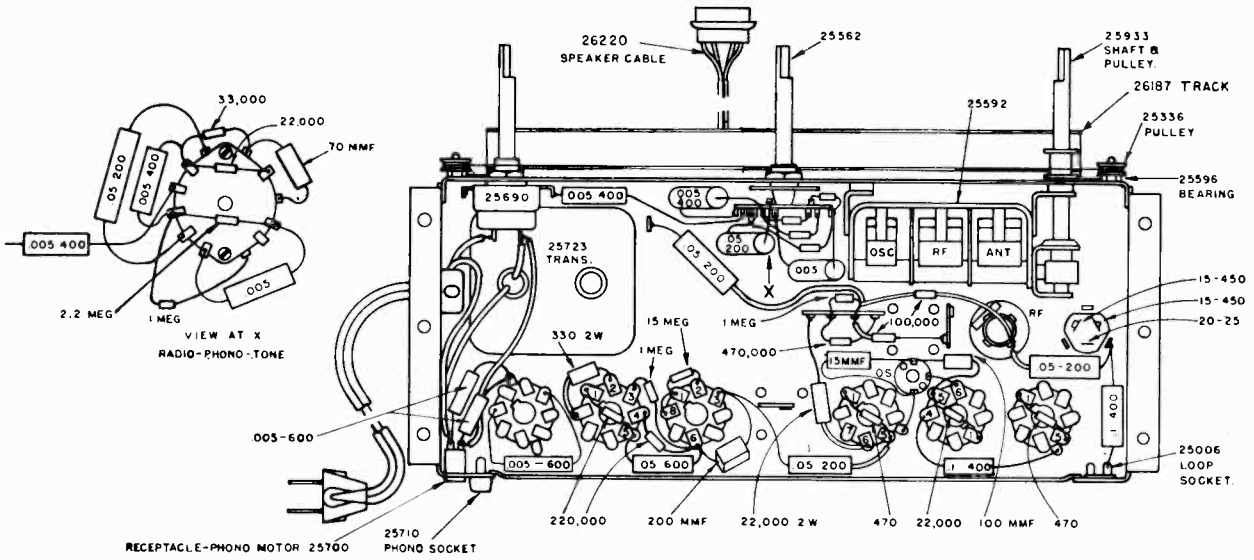
SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
Frequency	Coupling Capacitor	Connection to Reciever	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	5 microvolts
1000 kc	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	175 microvolts
455 kc.	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	160 microvolts
455 kc.	.05 mfd.	6SK7 1-F, Pin 4	Same as above	1600 microvolts
400 cycles	.05 mfd.	6SQ7 1st A-F, Pin 2	Same as above	.12 volts
400 cycles	.05 mfd.	6V6GT Output, Pin 5	Same as above	4.32 volts





MODEL 84KR-2716A

MONTGOMERY WARD



CAPACITORS

Ref. No.	Part No.	Description	Qty. Used In Set
	26221	.000015 Ceramic	1
C 1-2-3	25592	Gang Tuning Capacitor Trimmers	1
	25688	Electrolytic 15-15 Mfd. 450V., 20 Mfd. 25V	1
	8878	.05 Mfd.—600V, Tubular	1
	8661	.05 Mfd.—200V. Tubular	5
	17646	.005 Mfd.—400V. Tubular	3
	17647	.1 Mfd.—400V. Tubular	1
	8583	.01 Mfd. — 400V Tubular	1
	14370	.0002 Mfd. Mica	1
	8872	.0001 Mfd. Mica	1
	25689	.005 Mfd. 600V. Moulded	2
	25964	70 Mmfd. Mica	1
	14061	.005 MMFD—600V Tubular	1

RESISTORS

	25414	1000 Ohm ½W. Carbon	1
	25742	330 Ohm 2W. Carbon	1
	25085	470 Ohm ½W. Carbon	2
	25721	22,000 Ohm, 2W. Carbon	1
	25038	22,000 Ohm ½W. Carbon	2
	25144	33,000 Ohm ½W. Carbon	1
	25042	470,000 Ohm ½W. Carbon	1
	8885	100,000 Ohm ½W. Carbon	2
	25041	220,000 Ohm ½W. Carbon	2
	8766	1,000,000 Ohm ½W. Carbon	3
	25134	2.2 Megohm ½W. Carbon	1
	14365	15 Megohm ½W. Carbon	1
R 1	25690	Volume Control With Switch S2	1

TRANSFORMERS AND COILS

T 1	25965	Loop Antenna	1
T 2	25724	Coil — Oscillator	1
T 3	25597	Coil — RF	1
T 4	25715	Transformer — IF Input	1
T 5	25714	Transformer — IF Output	1
T 6	26226	Transformer — Output Speaker	1
	25723	Transformer — Power — 60 cycle	1

DIAL AND DRIVE ASSEMBLY

	25596	Bearing for Wood Pulleys	3
	25572	Bracket - Tuning Condenser — Front	1
	25573	Bracket - Tuning Condenser — Rear	1
	26263	Cord-Dial	1
	26213	Dial Scale — Plastic	1
	26223	Dial Pointer	1
	26209	Knob — Tone	1
	26208	Knob - Volume — Tuning	2
	25336	Pulley — Wood — Small	3
	25933	Pulley — Manual Drive With Shaft	1
	25607	Rubber — Grommets	3
	26026	Screw — Set for Worm Gear (Tuning Condenser)	2
	26222	Socket — Dial Lamp	2
	25963	Spring — Dial Cord	1
	26187	Track	1
	26191B	Dial - Escutcheon	1

MISCELLANEOUS

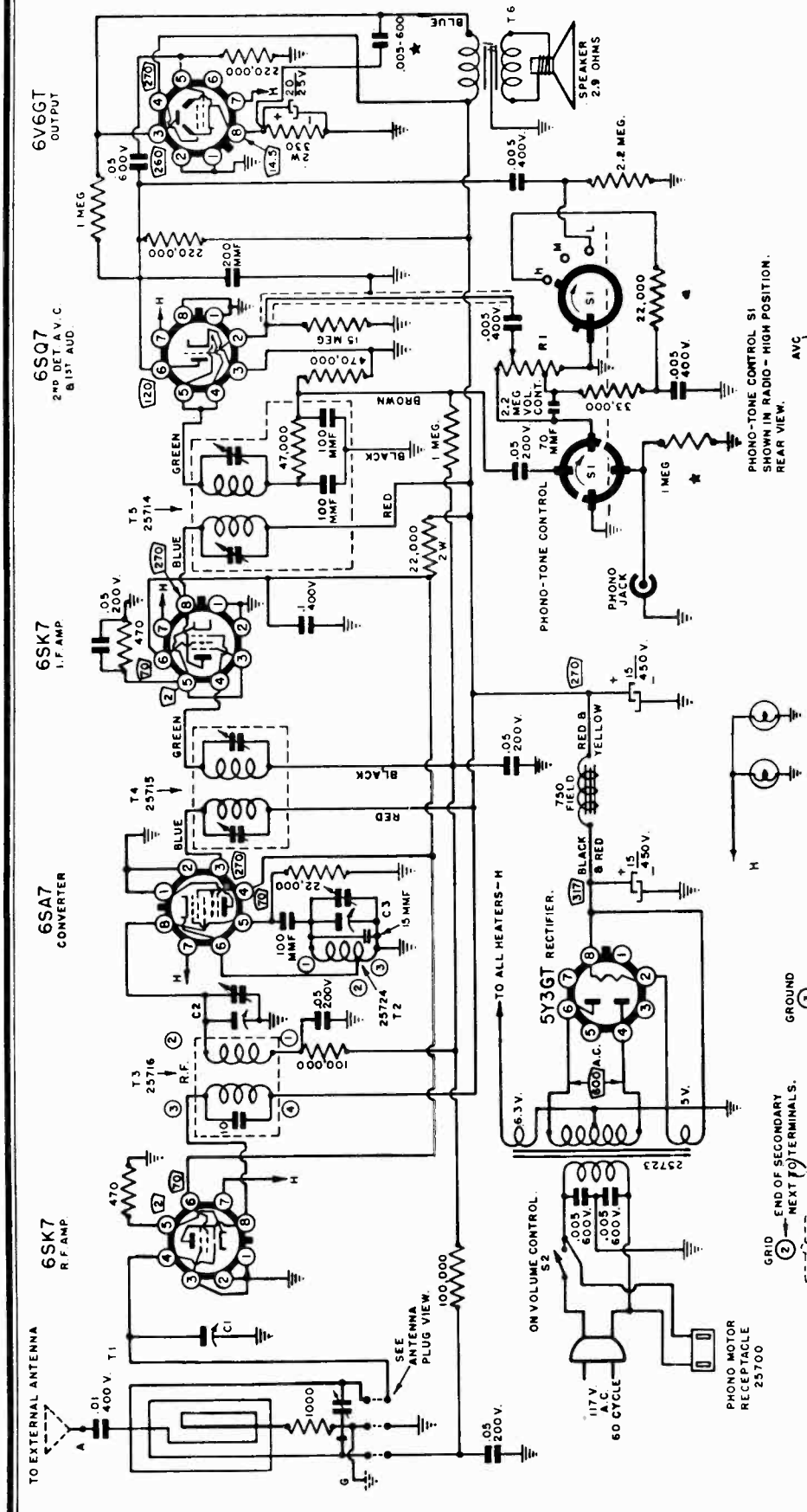
	26264	6x9" EM SPEAKER — With Transformer and Plug	1
	25620	Socket — Octal	6
	25700	Receptacle — Phono Motor	1
	25006	Socket - For Loop Antenna	1
	25710	Socket - Phono Pick-up	1
S 1	25562	Switch — Tone	1
	25068	Cord — AC and Plug	1
	25693	Plug — For Loop	1

RECORD CHANGER PARTS

	26034	Motor, 60 cycle, 117 volts	1
	26035	Shure P-30 Crystal Pickup Cartridge and Needle	1
	26036	Replacement Needle Only	1
	26116	Storage Shaft Assembly	1

MONTGOMERY WARD

MODEL 84KR-2723A



Power Supply ..... 105-125 volts AC, 60 cycles, 55 watts. (80 watts phono operating).

Frequency Range .... 540 - 1620 KC.

Intermediate Frequency ..... 455 KC.

Selectivity ..... 40 KC broad at 1000 times signal, 1000 KC.

Sensitivity ..... (for .5 watt output) with external antenna 5 microvolts average.

Power Output ..... 6 watts maximum, 3.2 watts 10% distortion.

Loud Speaker ..... 6x9" EM dynamic, 750 ohms.

Voice Coil Impedance 3.2 ohms at 400 cycles.

MODEL 84KR-2723A MONTGOMERY WARD

ALIGNMENT PROCEDURE

VOLUME CONTROL — MAXIMUM FOR ALL ADJUSTMENTS.

Tone control — In "HIGH" position.

Connect radio chassis to ground connection of Signal Generator.

Allow the chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

A signal generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output indicating meter; non-metallic screw driver.

Dummy antennas — .1 mfd., 200 mmfd.

Place loop antenna in its normal relation to the chassis.

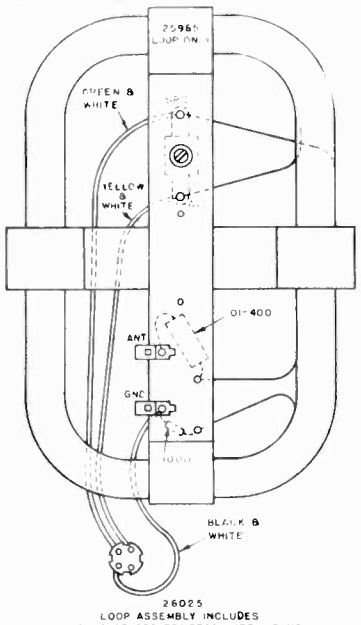
Signal Generator		Connection To Radio	Condenser Setting	Adjust Trimmers To Maximum
Frequency Setting	Dummy Antenna			
455 kc	.1 Mfd.	6SA7, Pin 8	Turn rotor plates to full open	1st IF Transformer. 2nd IF Transformer.
1620 kc	200 Mmfd.	Antenna Lead	Turn rotor plates to full open	Osc. trimmer on tuning condenser.
1400 kc	200 Mmfd.	Antenna Lead	Tune rotor to maximum output.	RF Section trimmer on tuning condenser. Antenna trimmer on loop antenna.

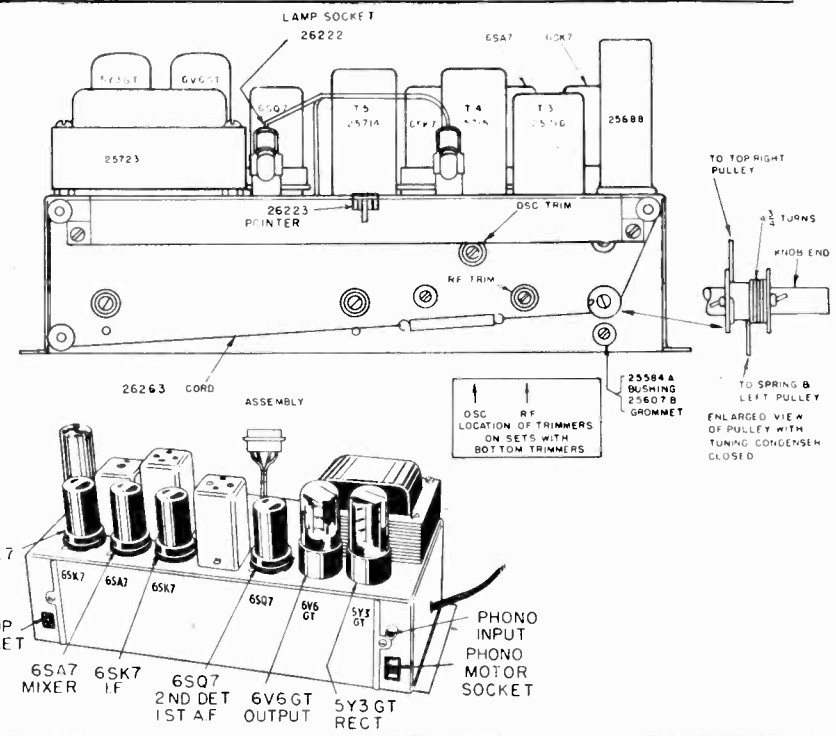
The dial pointer may be adjusted to the scale calibration by slipping the pointer on the dial cord.

RECEIVER STAGE SENSITIVITIES

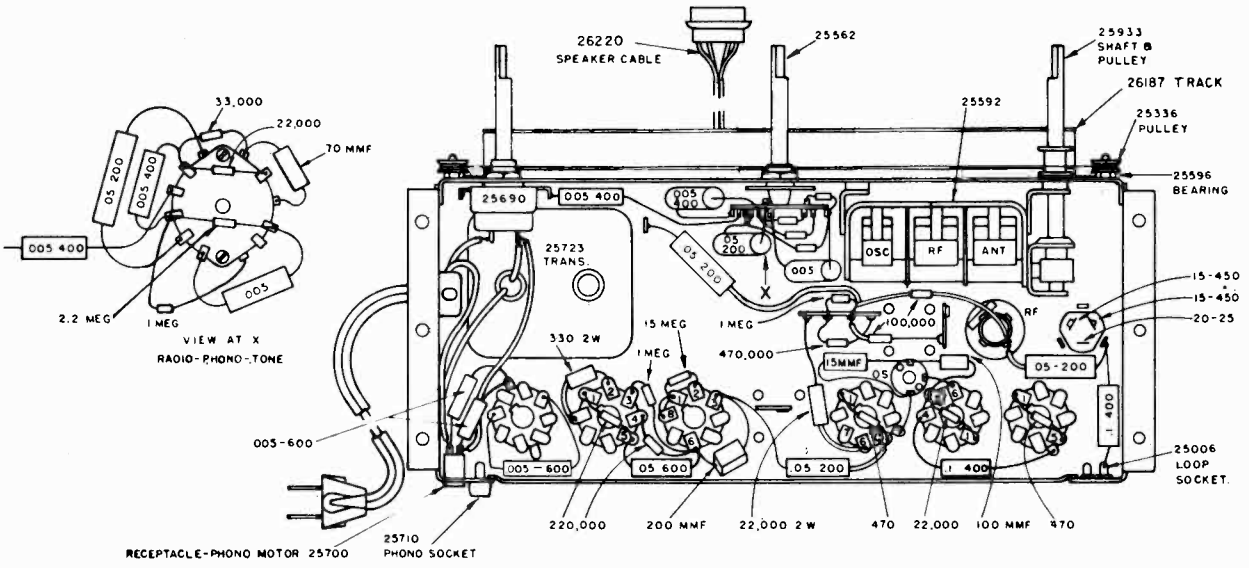
The following table lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resister across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supply both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
Frequency	Coupling Capacitor	Connection to Reciever	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	5 microvolts
1000 kc	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	175 microvolts
455 kc.	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	160 microvolts
455 kc.	.05 mfd.	6SK7 1-F, Pin 4	Same as above	1600 microvolts
400 cycles	.05 mfd.	6SQ7 1st A-F, Pin 2	Same as above	.12 volts
400 cycles	.05 mfd.	6V6GT Output, Pin 5	Same as above	4.32 volts





MONTGOMERY WARD MODEL 84KR-2723A

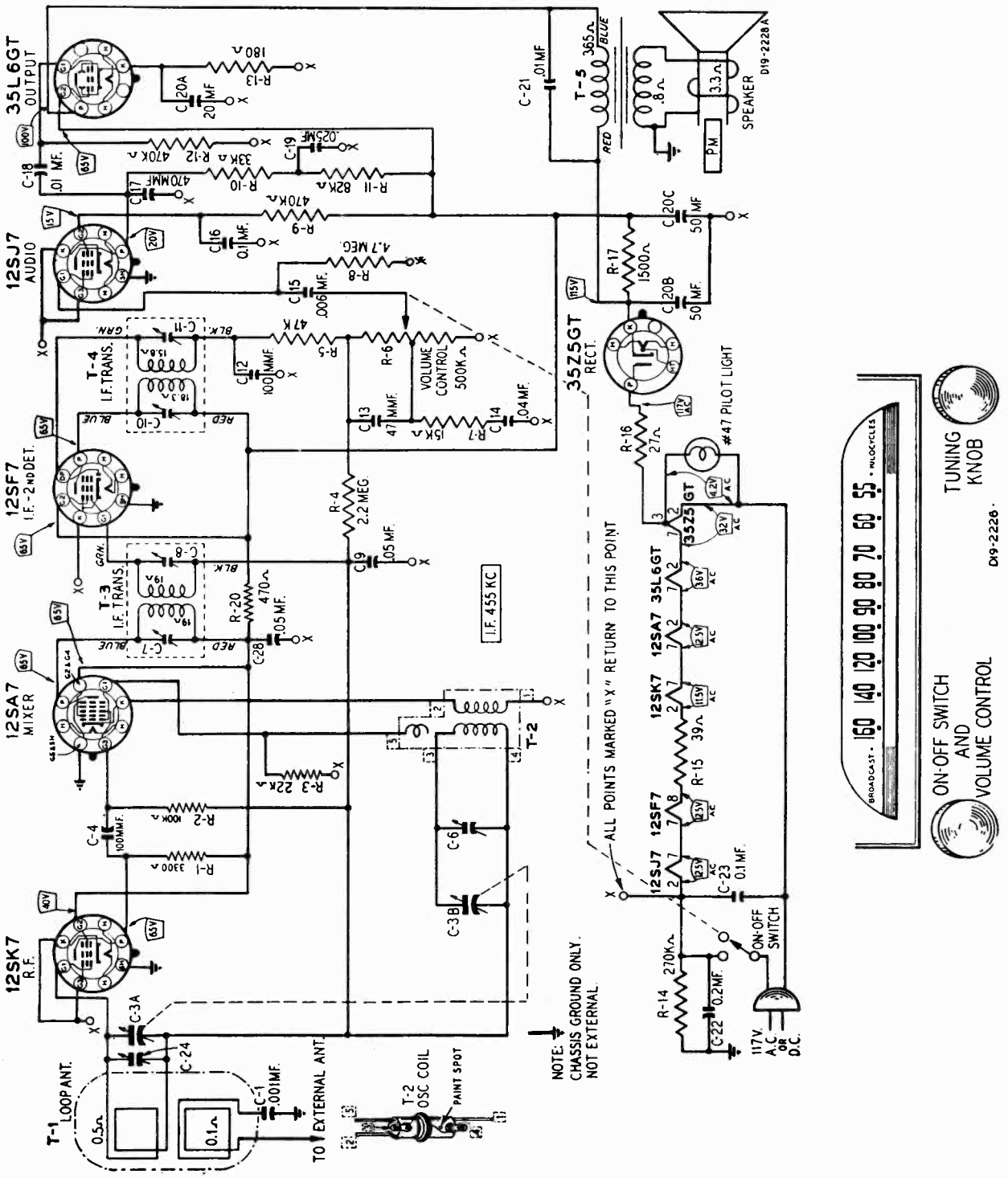


Ref. No.	Part No.	Description	Qty. Used In Set
		CAPACITORS	
	26221	.000015 Ceramic	1
C 1-2-3	25592	Gang Tuning Capacitor Trimmers	1
	25688	Electrolytic 15-15 Mfd. 450V., 20 Mfd. 25V	1
	8878	.05 Mfd.—600V, Tubular	1
	8661	.05 Mfd.—200V. Tubular	5
	17646	.005 Mfd.—400V. Tubular	3
	17647	.1 Mfd.—400V. Tubular	1
	8583	.01 Mfd. — 400V Tubular	1
	14370	.0002 Mfd. Mica	1
	8872	.0001 Mfd. Mica	1
	25689	.005 Mfd. 600V. Moulded	2
	25964	70 Mmfd. Mica	1
	14061	.005 MMFD—600V Tubular	1
		RESISTORS	
	25414	1000 Ohm ½W. Carbon	1
	25742	330 Ohm 2W. Carbon	1
	25085	470 Ohm ½W. Carbon	2
	25721	22,000 Ohm, 2W. Carbon	1
	25038	22,000 Ohm ½W. Carbon	2
	25144	33,000 Ohm ½W. Carbon	1
	25042	470,000 Ohm ½W. Carbon	1
	8885	100,000 Ohm ½W. Carbon	2
	25041	220,000 Ohm ½W. Carbon	2
	8766	1,000,000 Ohm ½W. Carbon	3
	25134	2.2 Megohm ½W. Carbon	1
	14365	15 Megohm ½W. Carbon	1
R 1	25690	Volume Control With Switch S2	1
		TRANSFORMERS AND COILS	
T 1	25965	Loop Antenna	1
T 2	25724	Coil — Oscillator	1
T 3	25597	Coil — RF	1
T 4	25715	Transformer — IF Input	1
T 5	25714	Transformer — IF Output	1
T 6	26226	Transformer — Output Speaker	1
	25723	Transformer — Power — 60 cycle	1

Ref. No.	Part No.	Description	Qty. Used In Set
		DIAL AND DRIVE ASSEMBLY	
	25596	Bearing for Wood Pulleys	3
	25572	Bracket - Tuning Condenser — Front	1
	25573	Bracket - Tuning Condenser — Rear	1
	26263	Cord-Dial	1
	26214	Dial Scale — Plastic	1
	26223	Dial Pointer	1
	26209	Knob — Tone	1
	26208	Knob - Volume — Tuning	2
	25336	Pulley — Wood — Small	3
	25933	Pulley — Manuol Drive With Shaft	1
	25607	Rubber — Grommets	3
	26026	Screw — Set for Worm Gear (Tuning Condenser)	2
	26222	Socket — Dial Lamp	2
	25963	Spring — Dial Cord	1
	26187	Track	1
	26192	Dial - Escutcheon	1
		MISCELLANEOUS	
	26264	6x9" EM SPEAKER — With Transformer and Plug	1
	25620	Socket — Octal	6
	25700	Receptacle — Phono Motor	1
	25006	Socket - For Loop Antenna	1
	25008	Socket - Phono Pick-up	1
S 1	25562	Switch — Tone	1
	25068	Cord — AC and Plug	1
	25693	Plug — For Loop	1
		RECORD CHANGER PARTS	
	26034	Motor, 60 cycle, 117 volts	1
	26035	Shure P-30 Crystal Pickup Cartridge and Needle	1
	26036	Replacement Needle Only	1
	26116	Storage Shaft Assembly.	1

MODELS 84WG-1804D,
84WG-1806A

MONTGOMERY WARD



MONTGOMERY WARD

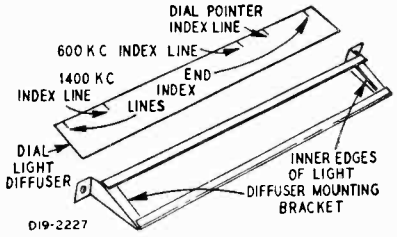
MODELS 84WG-1804D, 84WG-1806A

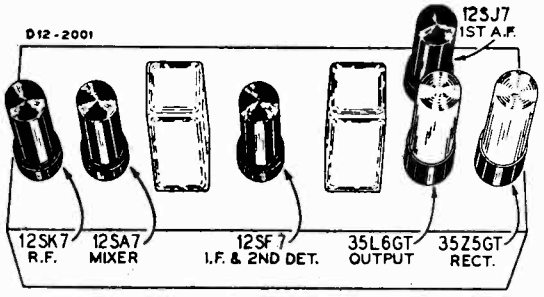
DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial light diffuser for this purpose.

Before aligning the receiver (or when replacing the dial light diffuser) check the position of the diffuser strip, making certain that the two end index lines are aligned with the inner edges of the diffuser mounting bracket opening. The bracket should be crimped at one point to prevent movement of the diffuser strip. To position the dial pointer, turn the gang condenser to the fully closed position. The dial pointer should be directly over the dial pointer index line. (See illustration)

The 1400 KC index line is for use when aligning the receiver.

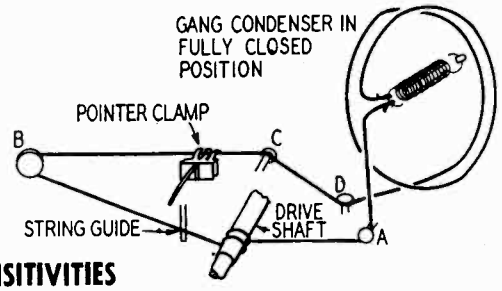




DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new 10X44 drive cord assembly and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim, under stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord over pulley B and stud C under stud D. Pass cord under drive pulley and wind 4 turns counterclockwise around drive pulley Stretch tension spring and fasten free end of cord to spring.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.



RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt AC across this resistor will be equivalent to a 50 milliwatt output. The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR 50 MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	Loop Antenna— External antenna clip	Chassis	19.5 microvolts
1000 kc	.05 mf.	12SA7 Mixer—Pin 8	Point "X" (12SK7 Pin 3)	150 microvolts
455 kc	.05 mf	12SA7 Mixer—Pin 8	Same as above	100 microvolts
455 kc	.05 mf	12SF7 I-F—Pin 2	Same as above	3500 microvolts
400 cycles	.05 mf	12SJ7 1st A-F—Pin 4	Same as above	.042 volt
400 cycles	.05 mf	35L6GT Output—Pin 5	Same as above	1 volt

MODELS 84WG-1804D, 84WG-1806A

MONTGOMERY WARD

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.

Volume Control—Maximum All Adjustments.

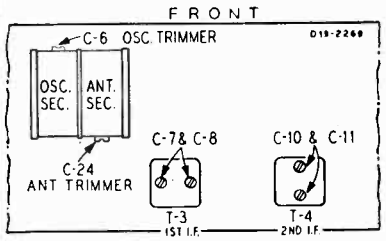
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 50 mmf.



NOTE A:—Index line is on dial light diffuser strip. See DIAL CALIBRATION paragraph.

SIGNAL GENERATOR			Coupling Capacitor	DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT IN ORDER SHOWN (See Trimmer Illustration)
Frequency Setting	Connection to Receiver	Ground Connection			
455 kc	Control Grid 12SF7—I-F (Prong No. 2)	Point "X" 12SK7—R-F (Prong No. 3)	.1 mf	Turn Rotor to full open	2nd I-F (C10) & (C11)
455 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to full open	1st I-F (C7) & (C8)
1620 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to fully open position	Oscillator (C6)
1400 kc	External Antenna Clip on Loop	Chassis	50 mmf	Turn Rotor to 1400 kc Index Line. See Note A	Antenna (C24)

ELECTRICAL SPECIFICATIONS

Power Supply.....105-125 volts AC, 25-60 cycles, 35 watts or 105-125 volts DC

Frequency Range.....540-1600 KC

Intermediate Frequency.455 KC

Selectivity.....At 1000 KC, 50 KC wide at 1000 times signal

Sensitivity.....(for .05 watt output with external antenna) 15 microvolts average

Power Output.....1.3 watts maximum
.75 watt 10% distortion

Loud Speaker.....4"x 6" PM dynamic

Voice Coil Impedance...3.2 ohms at 400 cycles

Tube and Dial Light Complement

1 12SK7 R-F Amplifier
1 12SA7 Mixer
1 12SF7 I-F and 2nd Detector
1 12SJ7 1st A-F
1 35L6GT Power Output
1 35Z5GT Rectifier
1 47 Dial Lamp

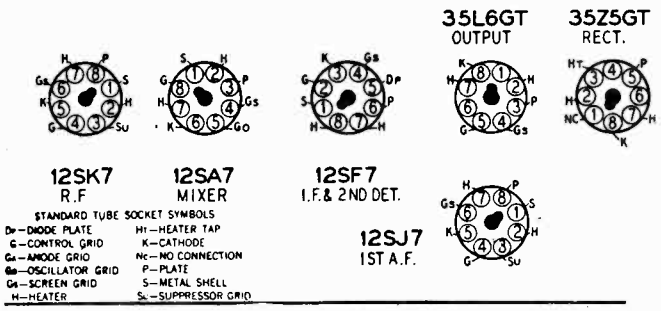
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those for the heater and dial lamp are between the socket terminal and "X" point.

The readings were taken with a 1000 ohm-per-volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

Line voltage.....117 volts AC
Volume control.....maximum
Signal input.....none

A variation of ±10% is usually permissible.



MONTGOMERY WARD

MODELS 84WG-1804D, 84WG-1806A

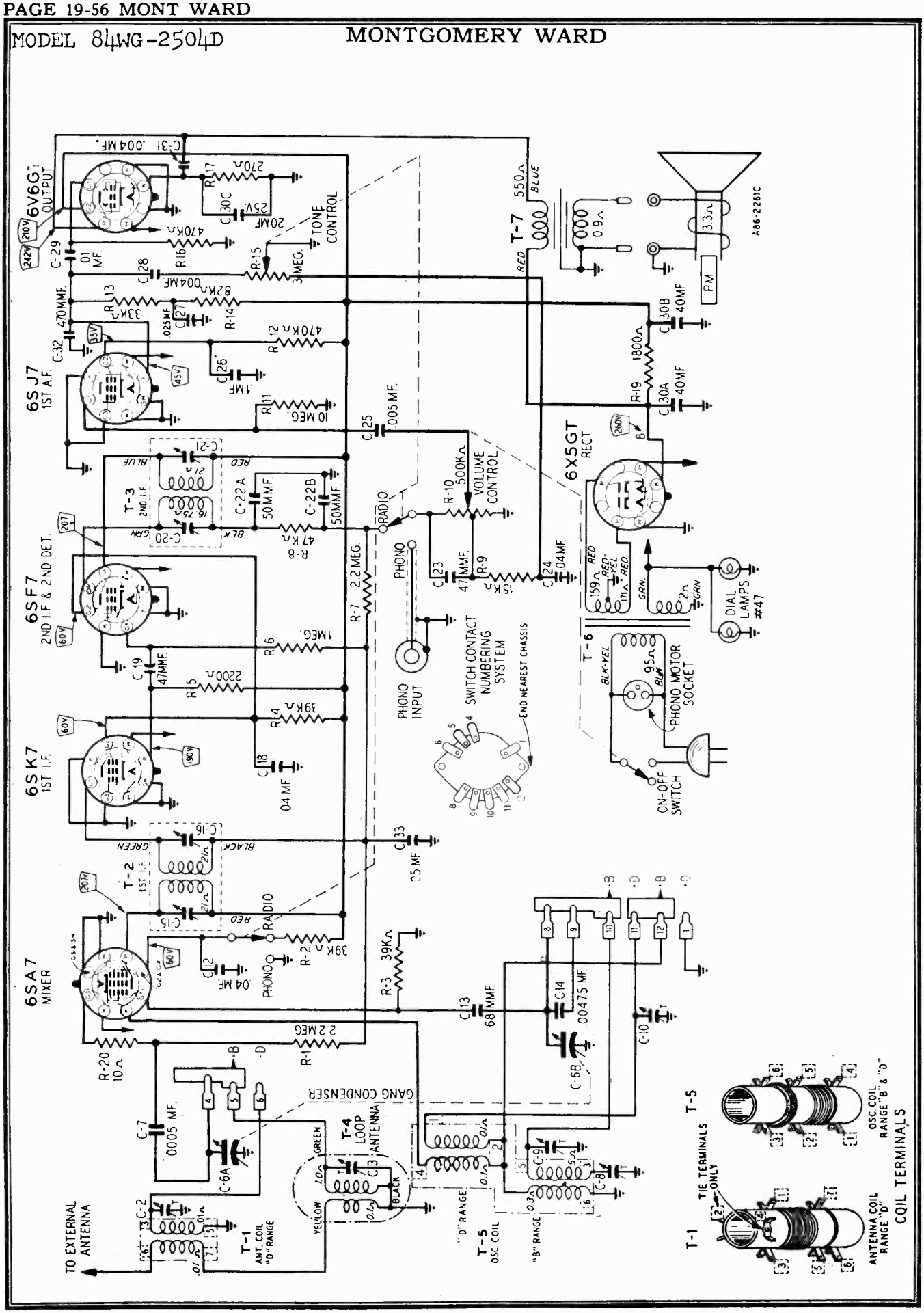
REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	D67102	.001 mf 400 V Tubular	1
C-3A, C-3B	14A194	Gang condenser and pulley assembly	1
C-4, C-12	47X476	100 mmf Molded	2
C-6		Part of C-3	
C-7, C-8		Part of T-3, 1st I-F Transformer	
C-9	B66503	.05 mf 200 V Tubular	1
C-10, C-11		Part of T-4, 2nd I-F Transformer	
C-13	47X463	47 mmf Molded	1
C-14	B67403	.04 mf 200 V Tubular	1
C-15	B67602	.006 mf 200 V Tubular	1
C-16	B66104	.1 mf 200 V Tubular	1
C-17	47X467	470 mmf Molded	1
C-18, C-21	B66103	.01 mf 200 V Tubular	2
C-19	B67253	.025 mf 200 V Tubular	1
C-20A	45X344	20 mf 25 V Dry electrolytic	
C-20B		50 mf 150 V condenser	1
C-20C		50 mf 150 V	
C-22	B67204	0.2 mf 200 V Tubular	1
C-23	D67104	.1 mf 400 V Tubular	1
C-24		Part of C-3	
C-28	B67503	.05 mf 200 V Tubular	1
RESISTORS			
		Ohms Watts	
R-1	B84332	3300 0.5 Carbon	1
R-2	B85104	100,000 0.5 Carbon	1
R-3	B85223	22,000 0.5 Carbon	1
R-4	B85225	2.2 meg. 0.5 Carbon	1
R-5	B85473	47,000 0.5 Carbon	1
R-6	36X347	500,000 Volume control and switch	1
R-7	B84153	15,000 0.5 Carbon	1
R-8	B85475	4.7 meg. 0.5 Carbon	1
R-9	B84474	470,000 0.5 Carbon	1
R-10	B84333	33,000 0.5 Carbon	1
R-11	B84823	82,000 0.5 Carbon	1
R-12	B85474	470,000 0.5 Carbon	1
R-13	B83181	180 0.5 Carbon	1
R-14	B84274	270,000 0.5 Carbon	1
R-15	D84390	39 2.0 Carbon	1
R-16	B84270	27 0.5 Carbon	1
R-17	C84152	1500 1.0 Carbon	1
R-20	B85471	470 0.5 Carbon	1

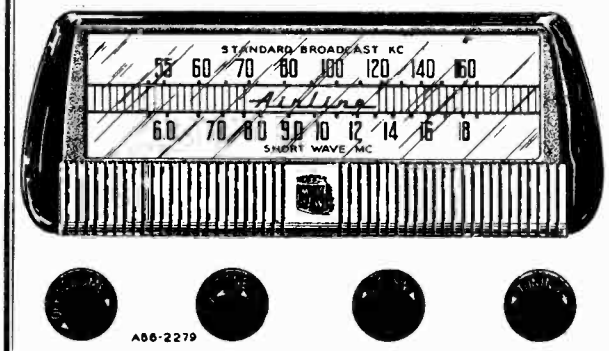
Ref. No.	Part No.	Description	Qty. Used in Set
TRANSFORMERS AND COILS			
T-1	9A1944	"B" Range loop antenna	1
T-2	9A1911	Oscillator coil assembly	1
T-3	9A1775	1st I-F Transformer and can assembly	1
T-4	9A1776	2nd I-F Transformer and can assembly	1
T-5	51X116	Output transformer	1
DIAL AND DRIVE ASSEMBLY			
6X21		Rubber grommet } Gang cond.	3
20X329		Cond. cushion stud } mtg.	3
58X667		Dial	1
25X1461		Dial bracket	1
26A446		Pointer bracket assembly	1
15X217		Pointer	1
25X1398		Pilot light bracket	1
7A192		Pilot light socket assembly	1
7A103		Pilot light No. 47	1
10X44		Drive cord assembly	1
28X95		Drive cord tension spring	1
26X464		Drive shaft	1
19X192		"C" washer (for drive shaft)	2
41X81		Dial light diffuser	1
4X884		Escutcheon (for Walnut Cabinet)	1
4X1025		Escutcheon (for Mahogany Cabinet)	1
25X1460		Escutcheon mounting bracket	2
MISCELLANEOUS			
12A431		4" x 6" speaker with mtg. bracket	1
3A303		Tube socket—octal (8 prong) molded	5
3A421		Tube socket with shield	1
10A297		Knob (walnut) on-off switch, volume control and tuning	2
10A712		Knob (Mahogany)	2
28X292		Snap button (mtg. loop to cabinet)	2
		6 x ¼" slotted hex head P-K type "Z" screw mounting loop to chassis)	2
13X328		Line cord and plug assembly	1

MODEL 84WG-2504D

MONTGOMERY WARD



MONTGOMERY WARD MODEL 84WG-2504D



GENERAL DESCRIPTION

This model is a five tube (plus rectifier tube) AC console receiver. Controls are provided for tuning, volume, tone, and band selection. The dial scale is calibrated in two bands, the broadcast band in channel numbers to cover frequencies between 540-1600 KC and the short wave band directly in megacycles from 5.75 to 18.3 MC. Other features include a built-in Air Wave Aerial, automatic volume control, beam power audio output stage and a PM dynamic speaker. A switch is provided on the tone control for selection of either radio or phono operation.

ELECTRICAL SPECIFICATIONS

Power Supply.....105-125 volts AC, 50-60 cycles, 45 watts.

Frequency Range.....B range—540-1600 KC
D range—5.75 to 18.3 MC

Intermediate Frequency..455 KC

Selectivity.....40 KC broad at 1000 times signal, 1000 KC

Sensitivity.....(for .5 watt output) with external antenna
B range—9 microvolts average
D range—20 microvolts average

Power Output.....4 watts maximum
2.3 watts, 10% distortion

Loud Speaker.....10" PM dynamic

Voice Coil Impedance....3.2 ohms at 400 cycles

Tube and Dial Light Complement

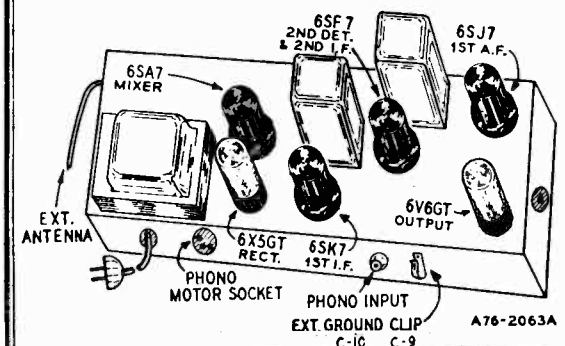
1 6SA7 Mixer
1 6SK7 1st I-F Amplifier
1 6SF7 2nd I-F Amplifier & 2nd Det.
1 6SJ7 1st A-F Amplifier
1 6V6GT Power Output
1 6X5GT Rectifier
2 No. 47 Dial Lamps

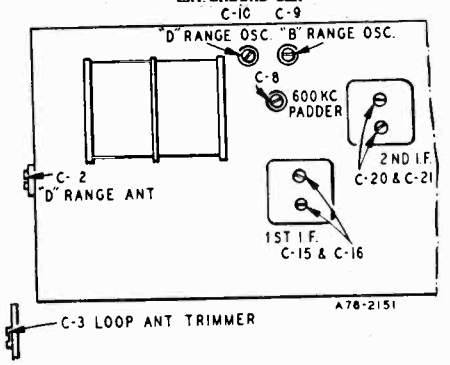
RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
Frequency	**Coupling Capacitor**	**Connection to Receiver**	**Ground Connection**	
1000 kc	200 mmf or RMA Dummy Antenna	External antenna lead	Chassis	9 microvolts
1000 kc	.05 mf	6SA7 Mixer, Pin 8	Same as above	42 microvolts
455 kc	.05 mf	6SA7 Mixer, Pin 8	Same as above	40 microvolts
455 kc	.05 mf	6SK7 1st I-F, Pin 4	Same as above	1075 microvolts
455 kc	.05 mf	6SF7 2nd I-F, Pin 2	Same as above	3900 microvolts
400 cycles	.05 mf	6SJ7 1st A-F, Pin 4	Same as above	.08 volt
400 cycles	.05 mf	6V6GT Output, Pin 5	Same as above	3.75 volts

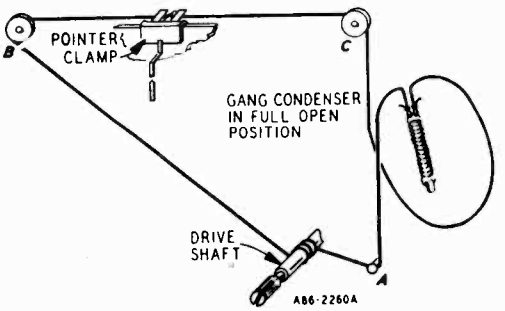
MODEL 84WG-2504D MONTGOMERY WARD





DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully open position. Use a new 10X65 drive cord assembly or a piece of cord 48 inches long and tie one end to the tension spring. Hook the other end of the tension spring to the tab on the drive pulley. Pass the cord through the slot in the drive pulley rim around idler stud A and wind three and one-half turns clockwise around the tuning shaft (turns must progress away from chassis). Then pass cord over idler pulleys B and C. Wrap cord counterclockwise around drive pulley, stretch tension spring and fasten free end of cord to spring.



ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf., and 400 ohms:

	SIGNAL GENERATOR		Dummy Antenna	Band Switch Setting	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
	Frequency Setting	Connection at Radio				
I-F	455 kc	6SA7, Pin 8	.1 mf	B Range	Turn Rotor to Full Open	2nd I-F (C-20) & (C-21) 1st I-F (C-15) & (C-16)
RANGE B	1620 kc	Antenna Lead	50 mmf	B Range	Turn Rotor to Full Open	Oscillator Range B (C9)
	1400 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output. Set Indicator to 1400 KC. See Note A	Antenna Range B (C3)
	600 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output	600 kc (C8) Rock Rotor—See Note B
Repeat above oscillator adjustments at 1620 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement in output.						
RANGE D	18.3 mc	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
	16 mc	Antenna Lead	400 Ohm	D Range	Tune Rotor to Max. Output	Antenna Range D (C2) Rock Rotor—See Note B
LOOP RANGE B	Reassemble chassis in cabinet. 1400 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output	Antenna Range B (C3)

After each range is completed, repeat the procedure as a final check.

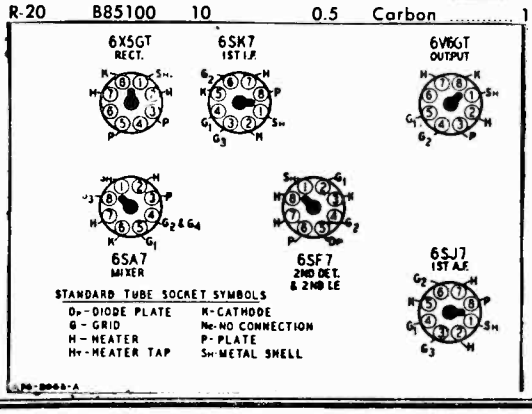
NOTE A—If the pointer is not at 1400 KC on the dial, re-set pointer at the 1400 KC mark on the dial scale.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

MONTGOMERY WARD

MODEL 84WG-2504D

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C-2	17A164	5-50 mmf Trimmer	1
C-3	17A235	2-24 mmf Trimmer	1
C-6A, C-6B	14A196	Gang Condenser with Drive Pulley	1
C-7	B66501	.0005 mf 200 V Tubular	1
C-8	17A155	350-430 mmf Trimmer	1
C-9, C-10	17A109	2.5-35 mmf Dual Trimmer	1
C-12, C-18	D66403	.04 mf 400 V Tubular	2
C-13	47X466	68 mmf Moulded	1
C-14	46X289	.00475 mf Tubular	1
C-15, C-16		Part of T-2 (1st I-F Coil Assy.)	
C-19, C-23	47X463	47 mmf Moulded	2
C-20, C-21		Part of T-3 (2nd I-F Coil Assy.)	
C-22A, C-22B	47X112	50-50 mmf Dual Mica	1
C-24	D64403	.04 mf 400 V Tubular	1
C-25	D66502	.005 mf 400 V Tubular	1
C-26	D67104	.10 mf 400 V Tubular	1
C-27	D64253	.025 mf 400 V Tubular	1
C 28	D66402	.004 mf 400 V Tubular	1
C-29	D66103	.01 mf 400 V Tubular	1
C-30A	45X346	40 mf 450 V, 3 Section Electrolytic	1
C-30B		40 mf 450 V	
C-30C		20 mf 25 V	
C-31	H66402	.004 mf 800 V Tubular	1
C-32	47X467	470 mmf Moulded	1
C-33	B66503	.05 mf 200 V Tubular	1
		RESISTORS	
		OHMS WATTS	
R-1, R-7	B85225	2.2 meg. 0.5 Carbon	2
R-2, R-4	C84393	39 K 1.0 Carbon	2
R-3	B84393	39 K 0.5 Carbon	1
R-5	B84222	2200 0.5 Carbon	1
R-6	B85105	1 meg. 0.5 Carbon	1
R-8	B85473	47 K 0.5 Carbon	1
R-9	B84153	15 K 0.5 Carbon	1
R-10	36X358	500 K Volume Control & Line Switch	1
R-11	B85106	10 meg. 0.5 Carbon	1
R-12, R-16	B85474	470 K 0.5 Carbon	2
R-13	B84333	33 K 0.5 Carbon	1
R-14	B84823	82 K 0.5 Carbon	1
R-15	40X276	3.0 meg. Tone Control & Radio Phono Switch	1
R-17	C84271	270 1.0 Carbon	1
R-19	D84182	1800 2.0 Carbon	1
R-20	B85100	10 0.5 Carbon	1



Ref. No.	Part No.	Description	Qty. Used in Set
		TRANSFORMERS AND COILS	
T-1	9A1917	"D" Range Antenna Coil Assembly	1
T-2	9A1814	1st I-F Coil Assembly	1
T-3	9A1815	2nd I-F Coil Assembly	1
T-4	26A474	"B" Range Loop Antenna Assembly	1
T-5	9A1918	"B" & "D" Range Oscillator Coil Assembly	1
T-6	53X282	117 Volt, 60 Cycle, Standard Power Transformer	1
T-7	51X134	Output Transformer	1
		DIAL AND DRIVE ASSEMBLY	
	S-58X13	Dial Bracket Assembly (including Dial Bracket, Idler Pulley, Rivets, and Dial Glass)	1
	6X21	Rubber Grommet Mtg. Gang Cond.	3
	20X329	Cond. Cushion Stud Mtg. Gang Cond.	3
	26X485	Drive Shaft	1
	19X192	"C" Washer (For Drive Shaft)	2
	15X241	Pointer	1
	28X113	Drive Cord Tension Spring	1
	10X65	Drive Cord Assembly	1
	7A199	Pilot Light Socket Assembly	1
	7A103	No. 47 Pilot Light Bulb	2
	58X696	Dial Glass	1
	4X999	Escutcheon	1
		MISCELLANEOUS	
	12A476	10" P.M. Speaker	1
	3A303	Tube Socket—Octal (8 prong) moulded	6
	3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip	1
	2A372	Band Change Switch	1
	13X328	Line Cord and Plug Assembly	1
	10A651	Knob (Tuning)	1
	10A652	Knob (Off-On Volume)	1
	10A653	Knob (SW-BC)	1
	10A650	Knob (Tone—R.P.)	1

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground.

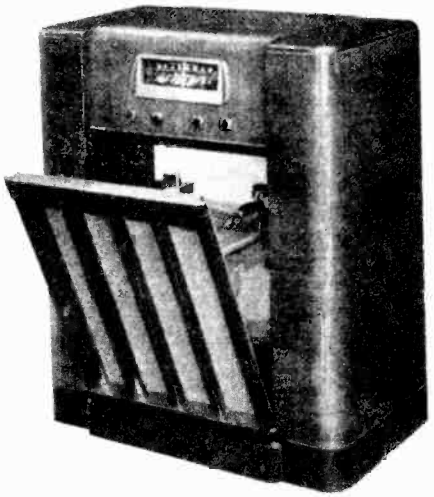
The readings were taken with a 1000 ohm per volt meter and all plate and screen voltages read on a 500 volt scole. Conditions of measurement are:

Line voltage ..... 117 volts AC
Volume control ..... maximum
Signal input ..... none

A variation of ±10% is usually permissible.

MODELS 84WG-2714A, -B, -C, -D, -E

MONTGOMERY WARD



84WG-2714A,B

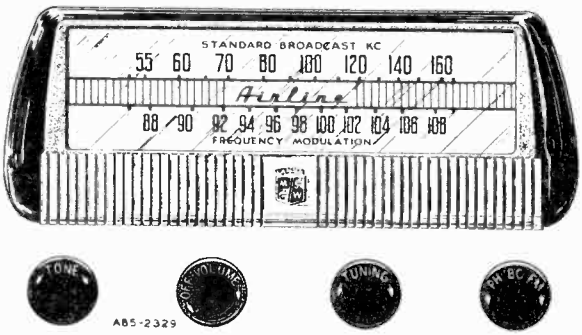
Tube and Dial Lamp Complement

84WG-2714A,B

1 6BE6 FM-AM Converter
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AT6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 5Y3GT Rectifier
2 No. 47 Dial Lamps

ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 60 watts, 80 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455KC FM—10.7 MC
Selectivity	AM—50 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—800 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 20 microvolts average
FM Sensitivity	(For .5 watt output) 200 microvolts average
Power Output	4.5 watts maximum 2.5 watts 10% distortion
Loud Speaker	10" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles



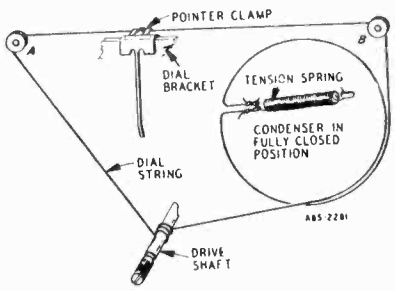
Tube and Dial Lamp Complement

1 6BE6 FM-AM Converter
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 5Y3GT Rectifier
2 No. 47 Dial Lamps

DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X66 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



RECEIVER STAGE SENSITIVITIES

AM AND AUDIO STAGES

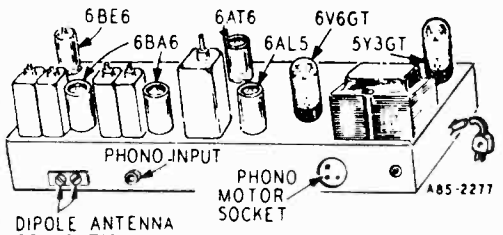
The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output.

The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

84WG-2714A,B **SIGNAL GENERATOR**

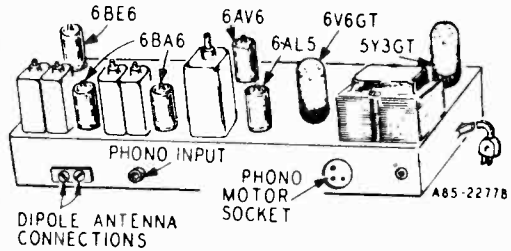
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	INPUT FOR .5 WATT OUTPUT
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	25 Microvolts
1000 KC	.05 mf	6BE6 Converter Pin 7	Chassis	60 Microvolts
455 KC	.05 mf	6BE6 Converter Pin 7	Chassis	58 Microvolts
455 KC	.05 mf	6BA6 1st I-F Pin 1	Chassis	2400 Microvolts
400 cycles	.05 mf	6AT6 1st A-F Pin 1	Chassis	.07 Volt
400 cycles	.05 mf	6V6GT Output Pin 5	Chassis	3.2 Volts



84WG-2714A,B

84WG-2714C,D,E **SIGNAL GENERATOR**

FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	INPUT FOR .5 WATT OUTPUT
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	25 Microvolts
1000 KC	.05 mf	6BE6 Converter Pin 7	Chassis	60 Microvolts
455 KC	.05 mf	6BE6 Converter Pin 7	Chassis	58 Microvolts
455 KC	.05 mf	6BA6 1st I-F Pin 1	Chassis	2400 Microvolts
400 cycles	.05 mf	6AV6 1st A-F Pin 1	Chassis	.07 Volt
400 cycles	.05 mf	6V6GT Output Pin 5	Chassis	3.2 Volts



84WG-2714C,D,E

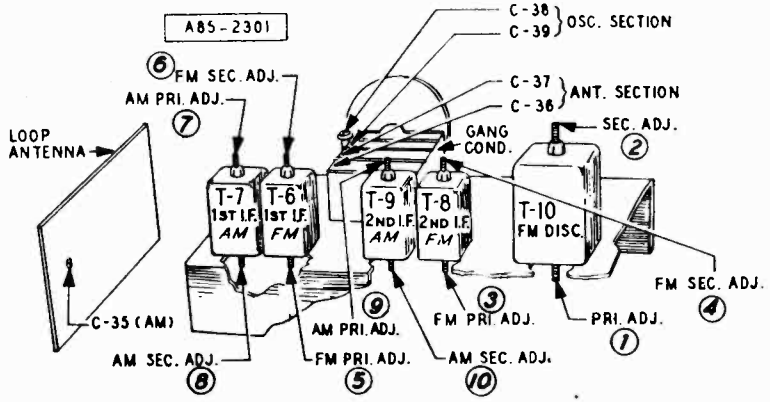
FM STAGES

The tables below lists the sensitivity for the FM stages of the receiver. The receiver must be tuned to 98 MC for all readings. Measurements are based on a .5 watt output the same as for the AM and Audio stage measurements.

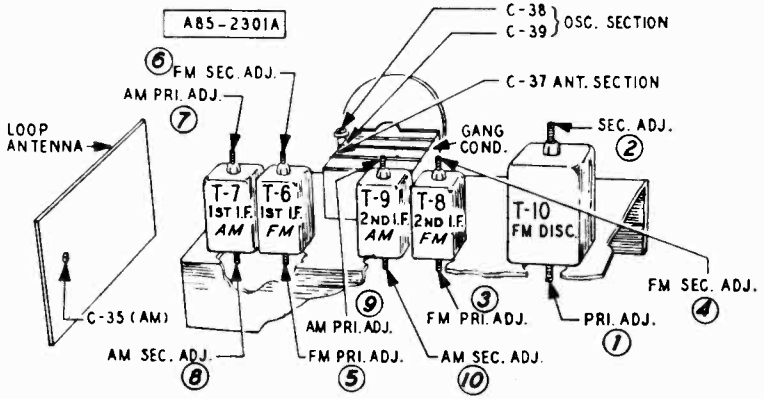
The signal source must be an accurately calibrated signal generator capable of supplying a 98 MC signal modulated by a 400 cycle audio signal. For these measurements the generator must be adjusted for a 22.5 KC deviation. This will correspond to 30% AM modulation.

84WG-2714A,B,C,D,E **SIGNAL GENERATOR**

FREQUENCY	COUPLING TO RECEIVER	CONNECTION TO RECEIVER	GROUND CONNECTION	INPUT FOR .5 WATT OUTPUT
98 MC	300 ohms	External Antenna Lead	Chassis	200 Microvolts
10.7 MC	.01 mf	6BA6 1st I-F Pin 1	Chassis	1,000 Microvolts
10.7 MC	.01 mf	6BA6 2nd I-F Pin 1	Chassis	40,000 Microvolts



84WG-2714A,B,C



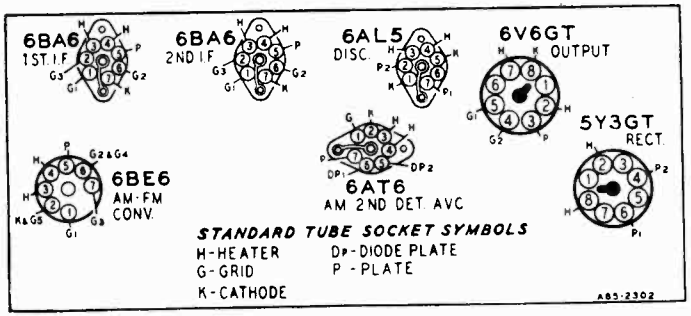
84WG-2714D,E

TUBE SOCKET VOLTAGES

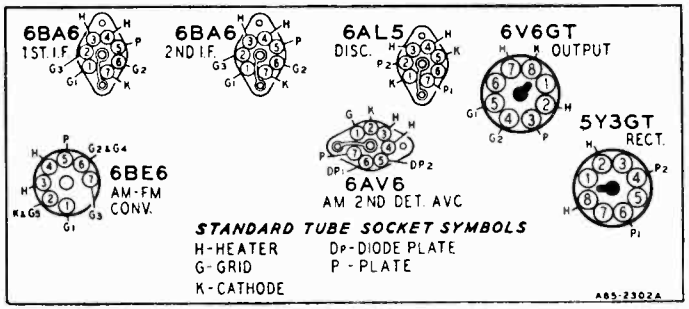
Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage ..... 117 Volts AC
Signal Input ..... None

A variation of ±10% is usually permissible.



84WG-2714A,B



84WG-2714C,D,E

MONTGOMERY WARD

MODELS 84WG-2714A, -B, -C, -D, -E

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. and Sec. (9) and (10)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. and Sec. (7) and (8)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-39	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-35	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generotor providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor — .01 mf, 300 ohms and 100K ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
I-F	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. (3) 2nd I-F Sec. (4) Note C	Maximum Deflection
	10.7 MC	Unsolder lead from Pin 7 to band switch. Insert 100K ohm resistor between Pin 7 and Ground and feed signal into Pin 7 of 6BE6	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (5) Note C	Maximum Deflection
	10.7 MC	Same as above	.01 mf	FM	Rotor Fully Open	1st I-F Sec. (6) Note C	Maximum Deflection
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Ant. and Osc.	108.5 Note D	Disconnect dipole and connect generator to dipole terminals with a 300 ohm resistor in series	300 ohms	FM	Rotor Fully Open	Osc. C-38	Maximum Deflection
	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-37	Maximum Deflection
RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN							

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the A.V.C. line at the 27 K. ohm resistor (R-11) and its junction with terminal strip. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from A.V.C. and connect it at the audio takeoff point at the 1 megohm resistor (R-14) and its junction with the terminol strip. Adjust for zero voltage indication.

NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

NOTE D—Remove the 100 K. ohm load resistor and solder the lead from pin 7 of 6BE6 tube to the band switch before attempting to check the antenna and oscillator adjustments.

MODELS 84WG-2714A,
84WG-2714B

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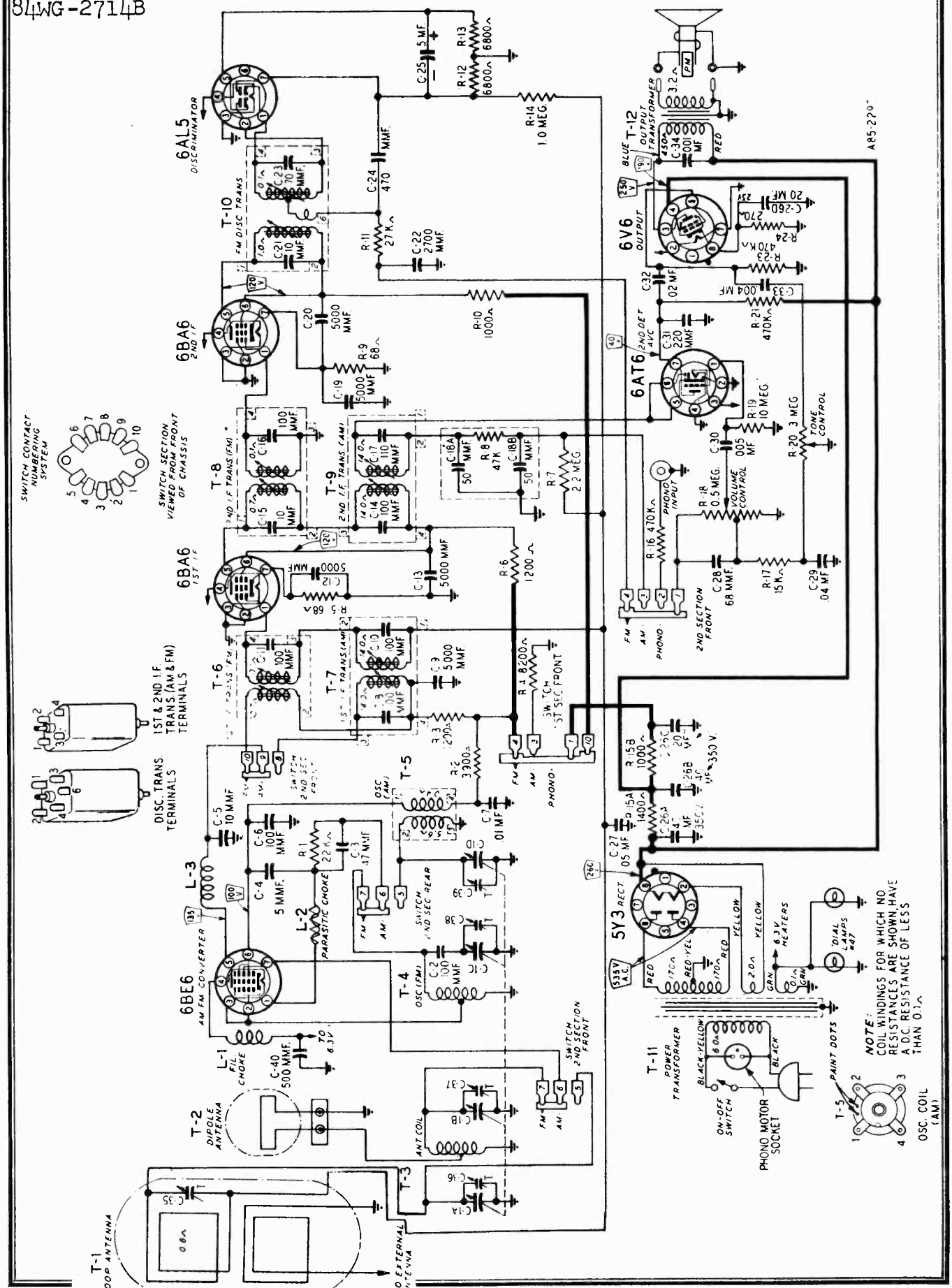
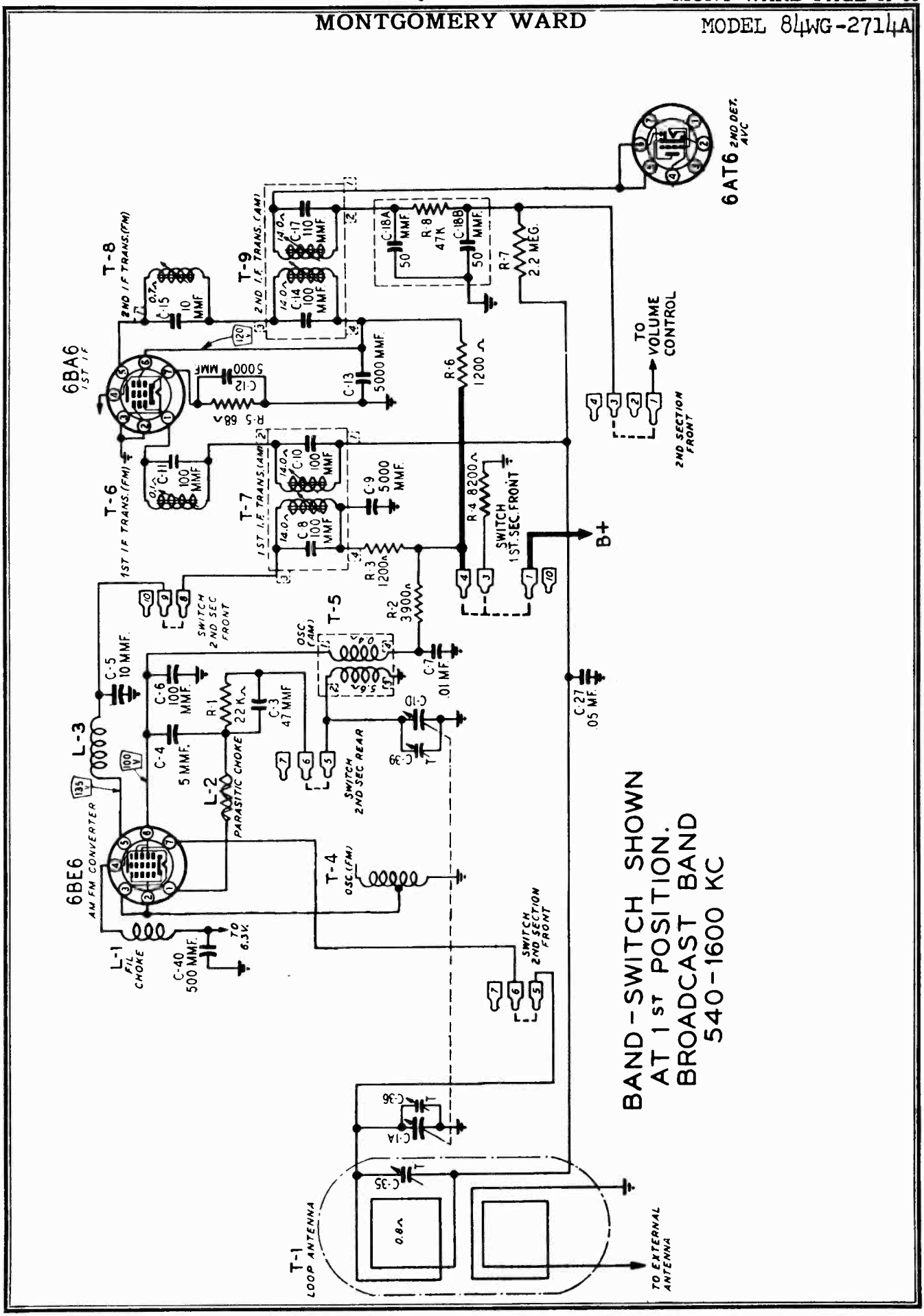


RECORD CHANGER: V-M Model 800, RCD.CH. 17-1

MONTGOMERY WARD MODEL 84WG-2714A



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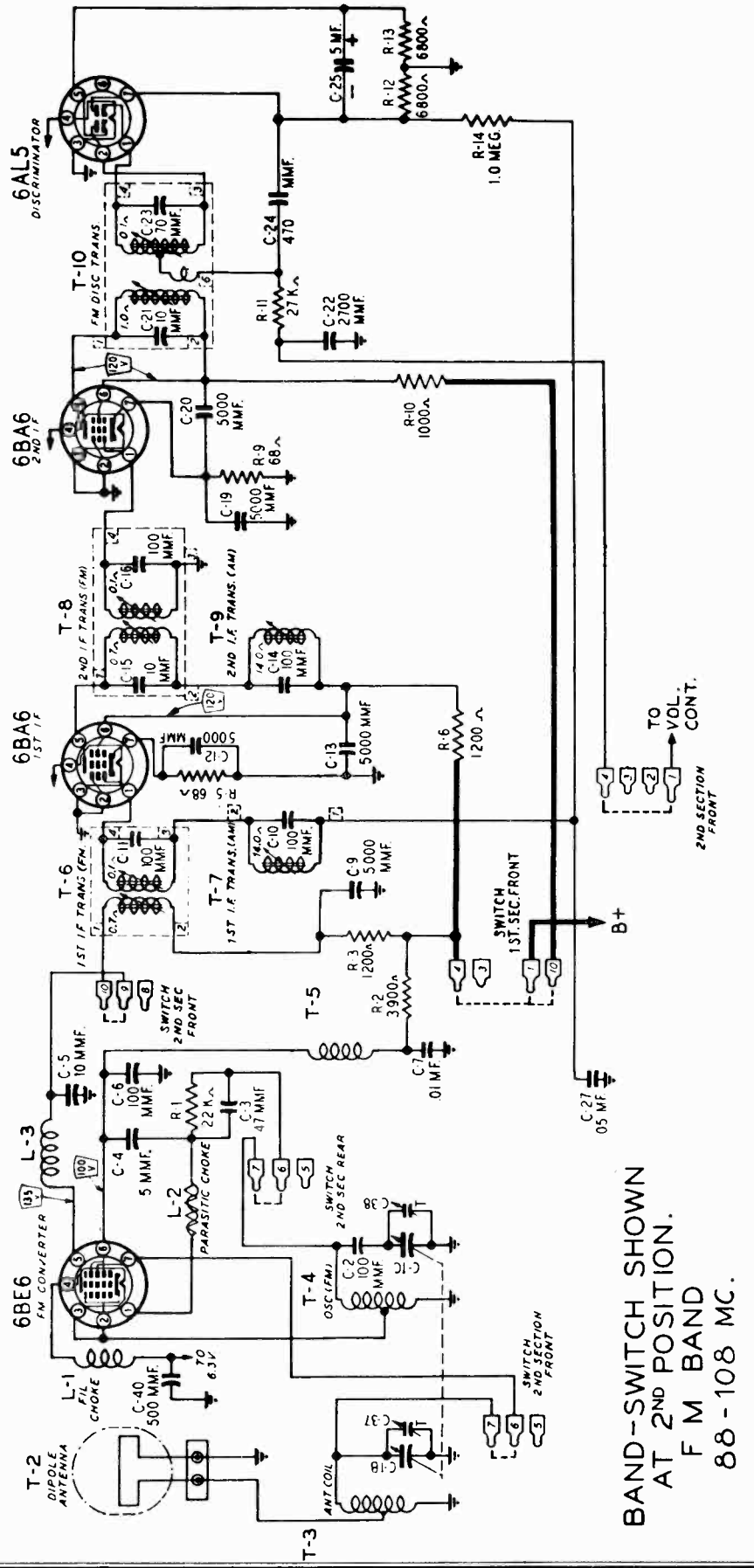
MODEL 84WG-2714A

MONTGOMERY WARD



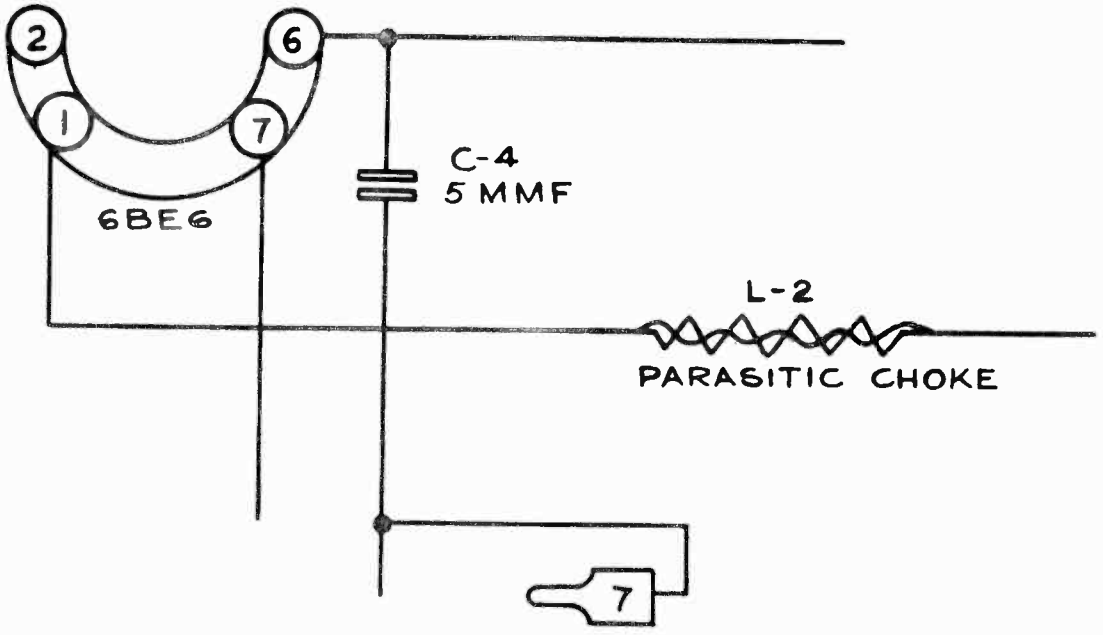
MONTGOMERY WARD MODEL 84WG-2714B

(1) The part number and description of C-6 has been changed. The new description follows:

C-6	47X463	47 MMF	Molded	1 used

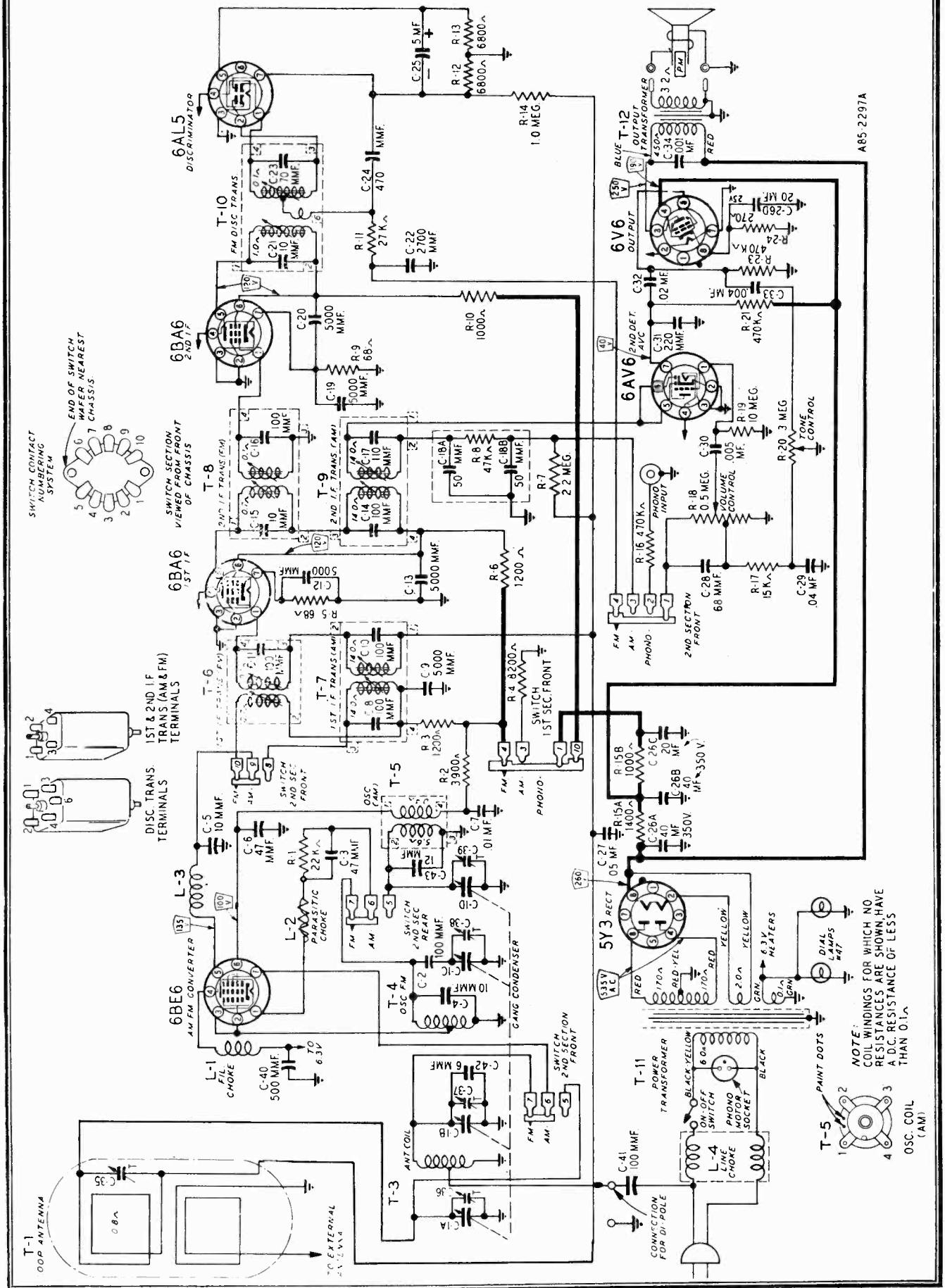
(2) Miniature tube shields (shown in the tube layout drawing and listed in the replacement parts list) are not used.

(3) The circuit connection of the 5 MMF capacitor C-4 has been changed. The new circuit connection is shown in the partial schematic below:



MODEL 84WG-2714C

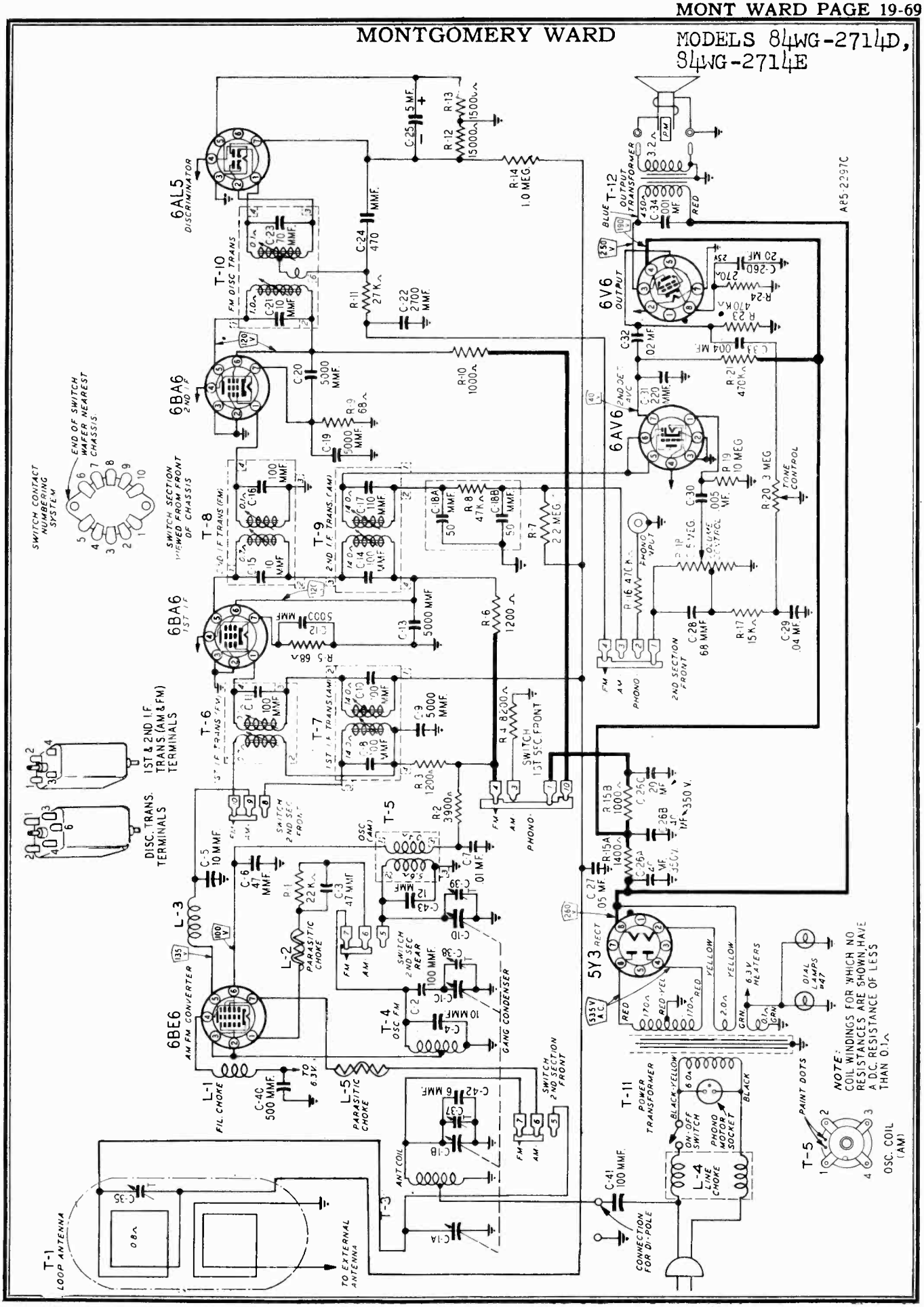
MONTGOMERY WARD



RECORD CHANGER: Webster Model 148, RCD.CH. 18-1

MONTGOMERY WARD

MODELS 84WG-2714D, 84WG-2714E



RECORD CHANGER: Webster Model 148, RCD.CH. 18-1

MODEL 84WG-2714D MONTGOMERY WARD

Information applicable to Model "E" receivers is the same as Model "D" and this Supplement.

1. The part number and description of condenser C-6 has been changed and should read as follows:

   C-6 47X476 100 mmf Molded Mica 1

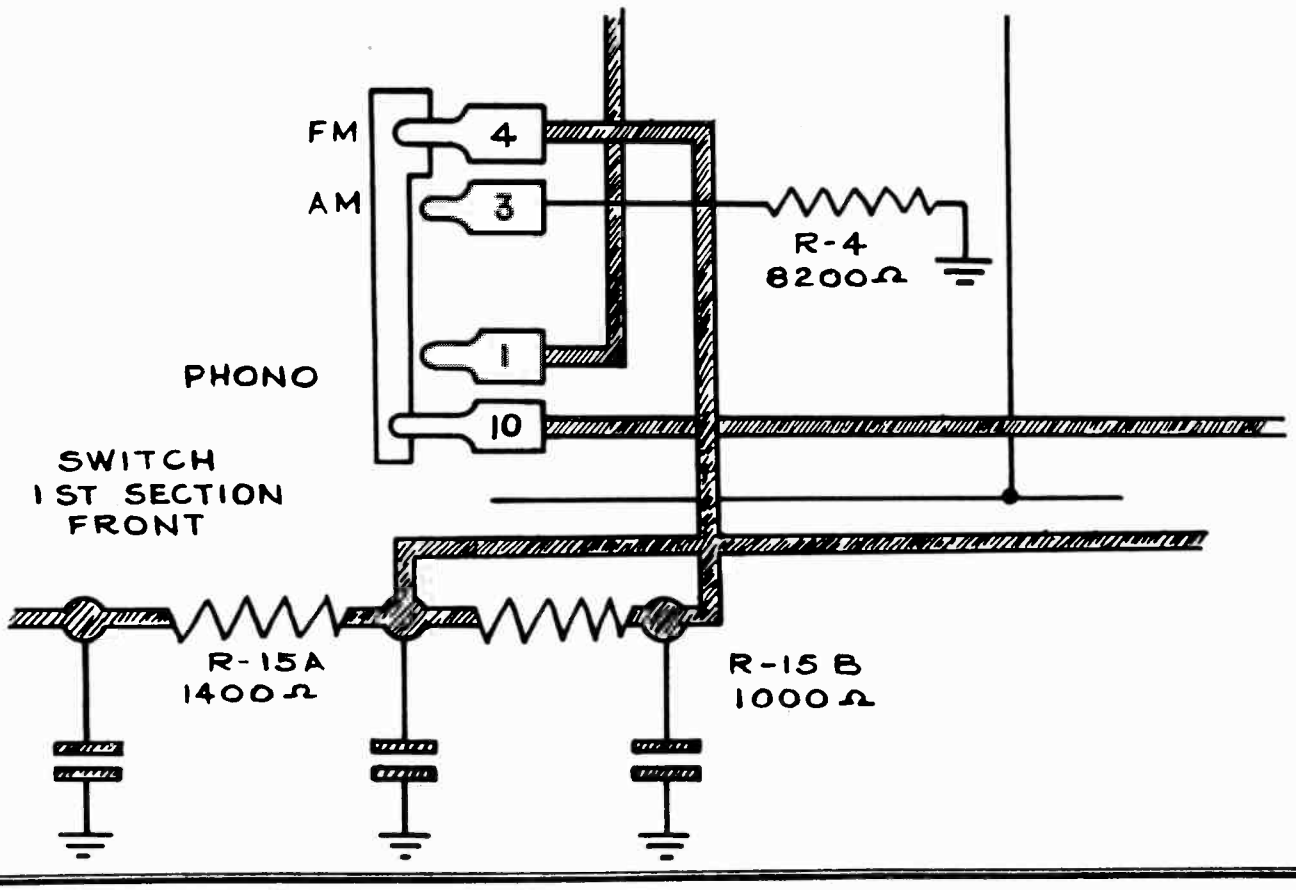
2. A 3.6 ohm resistor has been added in series with the hot side of the heater of the 6AL5 discrininator.

   The part number and description is as follows:

   R-25 43X233 3.6 ohm 0.5 W Wirewound 1

3. Schematic diagram change.

   The wires on lugs 1 and 4 of "SWITCH 1st SEC. FRONT" have been interchanged. This change is shown on the partial schematic below.



MONTGOMERY WARD

MODELS 84WG-2714A, -B, -C, -D, -E

Ref. No.	Part No.	Description			Qty. Used in Set
CAPACITORS					
C-2	47X511	100 mmf		Ceramic	1
C-3	47X517	47 mmf		Ceramic	1
C-5	47X512	10 mmf		Ceramic	1
C-7	D66103	.01 mf	400 V	Tubular	1
C-8, C-10		Part of T-7 (1st I.F. Trans.—AM)			
C-11		Part of T-6 (1st I.F. Trans.—FM)			
C-9, C-12, C-13, C-19, C-20	47X507	5000 mmf		Silvered Ceramic	5
C-14, C-17		Part of T-9 (2nd I.F. Trans.—AM)			
C-15, C-16		Part of T-8 (2nd I.F. Trans.—FM)			
C-18A, C-18B		50-50 mmf (Part of 76X1 Resistor-Capacitor Combination)			
C-21, C-23		Part of T-10 (Discriminator Trans.)			
C-22	47X492	2700 mmf		Molded Mica	1
C-24	47X510	470 mmf		Silvered Mica	1
C-25	45X361	5 mf	100 V	Dry Electrolytic	1
C-26A	45X359	40 mf	350 V	Dry Electrolytic	1
C-26B		40 mf	350 V		
C-26C		20 mf	350 V		
C-26D		20 mf	25 V		
C-27	B66503	.05 mf	200 V	Tubular	1
C-28	47X471	68 mmf		Molded Mica	1
C-29	B66403	.04 mf	200 V	Tubular	1
C-30	D66502	.005 mf	400 V	Tubular	1
C-31	47X468	220 mmf		Ceramic	1
C-32	D66203	.02 mf	400 V	Tubular	1
C-33	B66402	.004 mf	200 V.	Tubular	1
C-34	H66102	.001 mf	800 V	Tubular	1
C-35	17A235	2-24 mmf		Trimmer	1
C-40	47X508	500 mmf		Ceramic	1
RESISTORS					
		Ohms	Watts		
R-1	B84223	22 K	0.5	Carbon	1
R-2	B83392	3900	0.5	Carbon	1
R-3, R-6	B84122	1200	0.5	Carbon	2
R-4	D84822	8200	2.0	Carbon	1
R-5, R-9	B83680	68	0.5	Carbon	2
R-7	B85225	2.2 meg.	0.5	Carbon	1
R-8		47 K		(Part of 76X1 Resistor-Capacitor Combination)	
R-10	B84102	1000	0.5	Carbon	1
R-11	B84273	27 K	0.5	Carbon	1
R-14	B85105	1 meg.	0.5	Carbon	1
R-15A	43X224	1400	6.0	Wire Wound	1
R-15B		1000	4.0		
R-16, R-21, R-23	B85474	470 K	0.5	Carbon	3
R-17	B84153	15 K	0.5	Carbon	1
R-18	36X372	.5 meg.		Volume control and switch	1
R-19	B85106	10 meg.	0.5	Carbon	1
R-20	40X285	3 meg.		Tone Control	1
R-24	B84271	270	0.5	Carbon	1
TRANSFORMERS AND COILS					
L-1, L-3	9A1882	Filament Choke			2
L-2	9A1940	Parasitic Choke			1
T-3	9A1956	Antenna Coil Assembly			1
T-4	9A1938	Oscillator Coil (FM)			1
T-5	9A1929	Oscillator Coil Assembly (AM)			1
T-6	9A1932	1st I.F. Transformer (FM)			1
T-7	9A1934	1st I.F. Transformer (AM)			1
T-9	9A1935	2nd I.F. Transformer (AM)			1
T-11	53X290	Power Transformer			1
T-12	51X134	Output Transformer			1
MISCELLANEOUS					
	76X1	Resistor-Capacitor Combination			1
	12A480	10" P.M. Speaker			1
	3A303	Tube Socket—Octal (8 prong) Molded			2
	3A427	Tube Socket—Miniature (for AM-FM Converter Tube)			1
	3A304	Phono Motor Socket			1
	3A305	Phono Socket—Single Pin Tip			1
	2A375	Band Change Switch			1
	13X546	Line Cord and Plug Assembly			1
	10A651	Knob (Tuning) 1" Diameter			1
	10A652	Knob (Volume Control and Switch) 1" Diameter			1
	10A654	Knob (Tone) 1" Diameter			1
	10A655	Knob (Phono BC FM) 1" Diameter			1
	4X999	Escutcheon			1
	19X192	"C" Washer (Mtg. drive shaft)			2
	6X21	Rubber Grommet (Mtg. gang cond.)			3
	20X260	Condenser Cushion Stud (Mtg. gang condenser)			3
	58X702	Dial background			1

MODELS 84WG-2714A, -B, -C, -D, -E

MONTGOMERY WARD

Ref. No.	Part No.	Description	Qty. Used in Set

DIAL AND DRIVE ASSEMBLY

	58X699	Dial Glass	1
	24X446	Idler Pulley	2
	15X241	Pointer	1
	25X1569	Dial Bracket	1
	7A103	No. 47 Pilot Light Bulb	2
	7A202	Pilot Light Socket Assembly	1
	26X486	Drive Shaft	1
	41X26	Reflector, Dial Light	2
	28X113	Drive Cord Tension Spring	1

84WG-2714A

C-6	47X518	100 mmf Ceramic	1

84WG-2714A, B

C-1A, C-1B, C-1C, C-1D	14A198	Gang Condenser & Pulley	1
C-4	47X513	5 mmf Ceramic	1
C-36, C-37		Part of C-1 Gang Condenser	
C-38	17A247	3-12 mmf Trimmer	1
T-2	9A1900	Di-Pole Antenna	1
	3A312	Tube Socket—Miniature	4
	10A644	Knob (Tuning) 1⅛" Diameter	1
	10A645	Knob (Volume Control and Switch) 1⅛" Diameter	1
	10A647	Knob (Tone) 1⅛" Diameter	1
	10A648	Knob (Phono—BC—FM) 1⅛" Diam.	1
	32X221	Tube Shield (miniature)	4
	10X69	Drive Cord Assembly	1

TYPE V-28A139 RECORD CHANGER PARTS

	V-961-B	Motor Assembly, 60 cycles, 115-120 V.	1
	Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly	1
		Semi-Permanent Needle	1
		(Specify part number and letters stamped on crystal)	

84WG-2714A, B, C

R-12, R-13	B84682	6800 0.5 Carbon	2
T-1	26A478	"B" Range Loop Antenna Assembly	1
T-8	9A1933	2nd I.F. Transformer (FM)	1
T-10	9A1936	Discriminator Coil Assembly	1

Ref. No.	Part No.	Description	Qty. Used in Set

84WG-2714B, C, D

C-6	47X463	47 mmf Ceramic	1

84WG-2714C

C-36, C-37, C-39		Part of C-1 Gang Condenser	

84WG-2714C, D, E

C-1A, C-1B, C-1C, C-1D	14A204	Gang Condenser & Pulley	1
C-4	47X523	10 mmf Ceramic	1
C-38	26A489	1-8 mmf Trimmer	1
C-41	47X476	100 mmf Molded	1
C-42	47X521	6 mmf Ceramic	1
C-43	47X522	12 mmf Ceramic	1
L-4	9A1930	Line Choke	1
	3A426	Tube Socket—Miniature	4
	10X66	Drive Cord Assembly	1

TYPE W-28A148 RECORD CHANGER PARTS

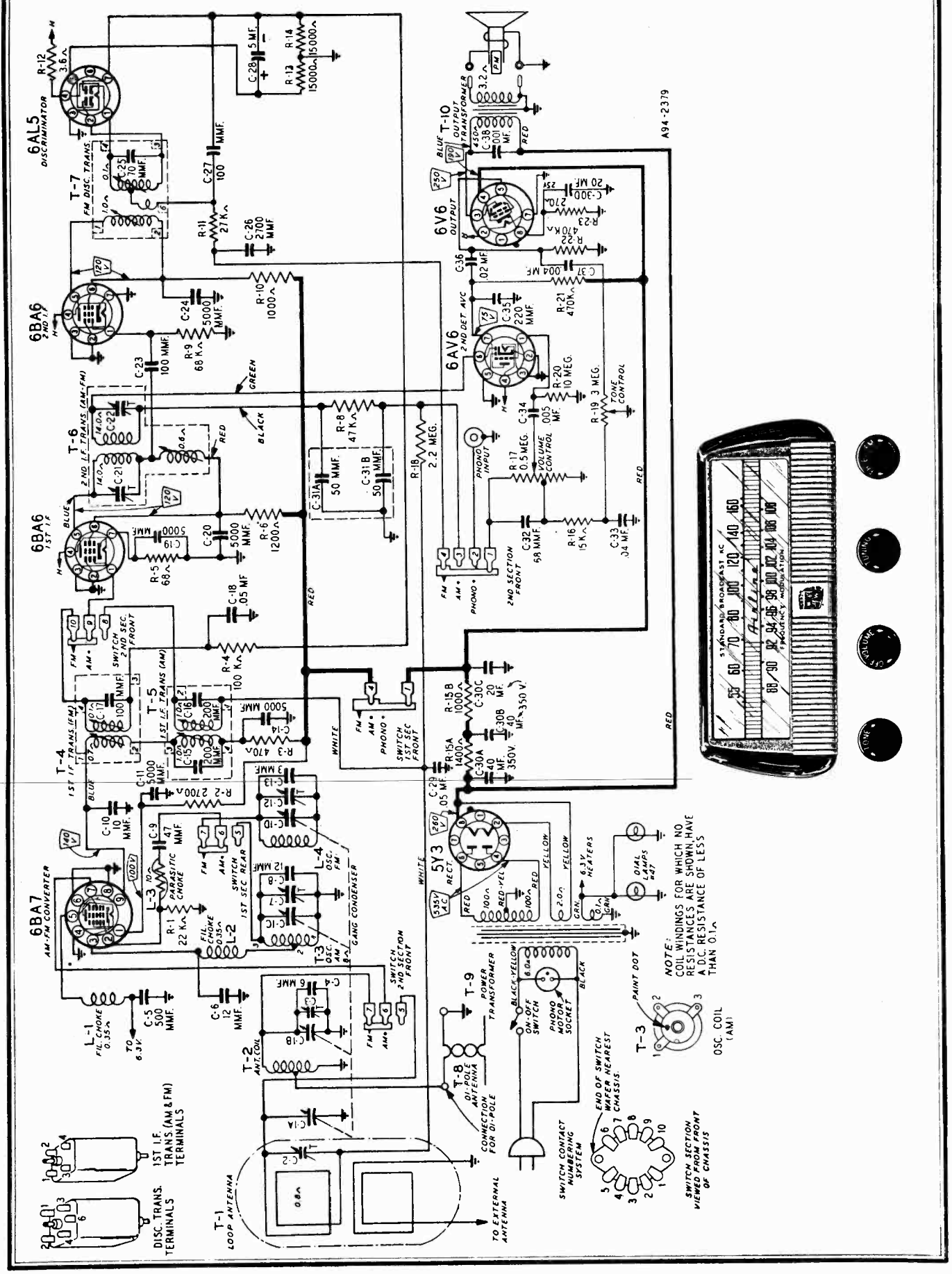
	W-15X090-1	Motor Assembly, 60 cycles, 115-120 V	1
	W-17X412-11	50 Cycle Drive Sleeve Assembly	1
	Shure P30-1	Crystal Cartridge and semi-Permanent Needle Assembly	1
		Semi-Permanent Needle	1
		(Specify part numbers and letters stamped on crystal)	

84WG-2714D, E

C-37, C-39		Part of C-1 Gang Condenser	
R-12, R-13	B84153	15 K 0.5 Carbon	
L-5	9A1967	Parasitic Choke	1
T-1	9A1972	"B" Range Loop Antenna Assembly	1
T-8	9A1933	2nd I.F. Transformer (FM)	1
T-10	9A1936	Discriminator Coil Assembly	1

MONTGOMERY WARD

MODEL 84WG-2714F



MODEL 84WG-2714F

MONTGOMERY WARD

ALIGNMENT PROCEDURES
AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.
Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generatar to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. C-21 and C-22	Maximum Output
455 KC	Control Grid 6BA7 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. and Sec. (7) and (8)	Maximum Output
1620 KC	Control Grid 6BA7 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-7	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generatar providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—2500 mmf 300 ohms and 100K ohms
Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotar Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotar Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
I-F	10.7 MC Note E	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F (3) Note C	Maximum Deflection
	10.7 MC	Unsolder lead from Pin 7 to band switch. Insert 100K ohm resistor between Pin 7 and Ground and feed signal into Pin 7 of 6BA7.	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (5) Note C	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	1st I-F Sec. (6) Note C	Maximum Deflection
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Ant. and Osc.	108.5 Note D	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Osc. C-12	Maximum Deflection
	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-3	Maximum Deflection
RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN							

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC ond connect it at the audio takeoff point at the 27 K ohm resistor (R-11) and its junction with the terminal strip. Adjust for zero voltage indication.
NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.
NOTE D—Remove the 100 K. ohm load resistor and solder the lead from pin 7 of 6BA7 tube to the band switch before attempting to check the antenna and oscillator adjustments.
NOTE E—2nd I F trimmers (AM) must be aligned before attempting to adjust 2nd I-F (FM) tuning slug.

RECEIVER STAGE SENSITIVITIES

AM AND AUDIO STAGES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output.

The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

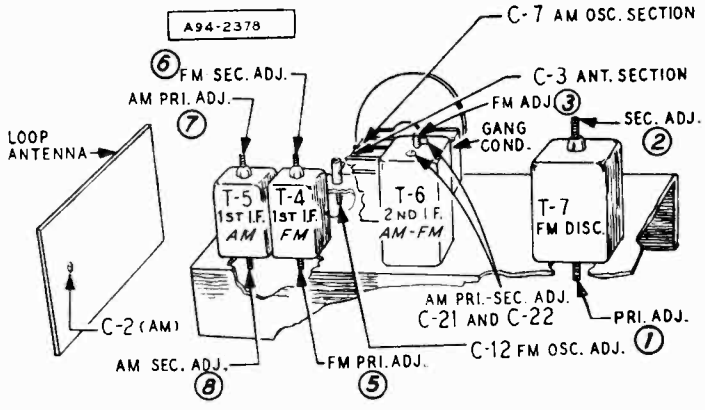
SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	10 Microvolts
1000 KC	.01 mf	6BA7 Converter Pin 7	Chassis	40 Microvolts
455 KC	.01 mf	6BA7 Converter Pin 7	Chassis	35 Microvolts
455 KC	.01 mf	6BA6 1st I-F Pin 1	Chassis	2000 Microvolts
400 cycles	.01 mf	6AV6 1st A-F Pin 1	Chassis	.07 Volt
400 cycles	.01 mf	6V6GT Output Pin 5	Chassis	3.2 Volts

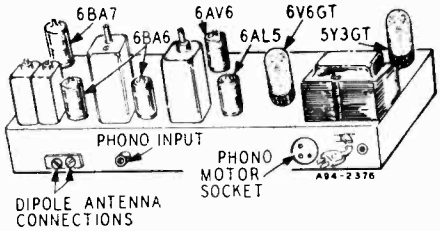
FM STAGES

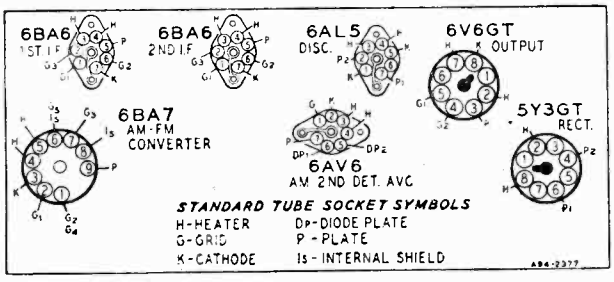
The table below lists the sensitivity for the FM stages of the receiver. The receiver must be tuned to 98 MC for all readings. Measurements are based on a .5 watt output the same as for the AM and Audio stage measurements.

The signal source must be an accurately calibrated signal generator capable of supplying a 98 MC signal modulated by a 400 cycle audio signal. For these measurements the generator must be adjusted for a 22.5 KC deviation. This will correspond to 30% AM modulation.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING TO RECEIVER	CONNECTION TO RECEIVER	GROUND CONNECTION	
98 MC	300 ohms	External Antenna Terminal	Chassis	100 Microvolts
10.7 MC	.01 mf	6BA6 1st I-F Pin 1	Chassis	600 Microvolts
10.7 MC	2500 mmf	6BA6 2nd I-F Pin 1	Chassis	23,000 Microvolts







TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage.....117 Volts AC

Signal Input.....None

A variation of ±10% is usually permissible.

MODEL 84WG-2714F

MONTGOMERY WARD

CAPACITORS

Ref. No.	Part No.	Description	Qty. Used in Set
C-1A, C-1B, C-1C, C-1D	14A204	Gang Condenser Assembly	1
C-2	17A235	2-24 mmf Trimmer	1
C-3, C-7		Part of Gang Condenser	
C-4	47X521	6 mmf Ceramic	1
C-5	47X508	500 mmf Ceramic	1
C-6, C-8	47X522	12 mmf Ceramic	2
C-9	47X517	47 mmf Ceramic	1
C-10	47X512	10 mmf Ceramic	1
C-11, C-14, C-19, C-20, C-24	47X507	5000 mmf Silvered Ceramic	5
C-12	17A255	1-8 mmf Trimmer	1
C-13	47X547	3 mmf Ceramic	1
C-15, C-16		Part of T-5 (1st I.F. Trans.—AM)	
C-17		Part of T-4 (1st I.F. Trans.—FM)	
C-18, C-29	B66503	.05 mf 200 V Tubular	2
C-21, C-22		Part of T-6 (2nd I.F. Trans.—AM-FM)	
C-23	47X497	100 mmf Ceramic	1
C-25		Part of T-7 (Discriminator Trans.)	
C-26	47X492	2700 mmf Molded Mica	1
C-27	47X526	100 mmf Molded Mica	1
C-28	45X361	5 mf 100 V Dry Electrolytic	1
C-30A	45X359	40 mf 350 V	
C-30B		40 mf 350 V	
C-30C		20 mf 350 V	
C-30D		20 mf 25 V	Dry Electrolytic 1
C-31A, C-31B	47X112	50-50 mmf Dual Mica	1
C-32	47X471	68 mmf Molded Mica	1
C-33	B66403	.04 mf 200 V Tubular	1
C-34	D66502	.005 mf 400 V Tubular	1
C-35	47X468	220 mmf Ceramic	1
C-36	D66203	.02 mf 400 V Tubular	1
C-37	B66402	.004 mf 200 V Tubular	1
C-38	H66102	.001 mf 800 V Tubular	1

RESISTORS

Ref. No.	Part No.	Ohms	Watts		Qty. Used in Set
R-1	B84223	22 K	0.5	Carbon	1
R-2	B83272	2700	0.5	Carbon	1
R-3	B84471	470	0.5	Carbon	1
R-4	B85104	100 K	0.5	Carbon	1
R-5	B83680	68	0.5	Carbon	1
R-6	B84122	1200	0.5	Carbon	1
R-8	B85473	47 K	0.5	Carbon	1
R-9	B85683	68 K	0.5	Carbon	1
R-10	B84102	1000	0.5	Carbon	1
R-11	B84273	27 K	0.5	Carbon	1
R-12	43X233	3.6	0.5	Wire Wound	1
R-13, R-14	B84153	15 K	0.5	Carbon	2
R-15A	43X224	1400	6.0	Wire Wound	1
R-15B		1000	4.0		
R-16	B84153	15 K	0.5	Carbon	1
R-17	36X372	.5 meg.		Volume Control	1
R-18	B85225	2.2 meg.	0.5	Carbon	1
R-19	40X285	3 meg.		Tone Control	1
R-20	B85106	10 meg.	0.5	Carbon	1
R-21, R-22	B85474	470 K	0.5	Carbon	2
R-23	B84271	270	0.5	Carbon	1

TRANSFORMERS AND COILS

Ref. No.	Part No.	Description	Qty. Used in Set
L-1, L-2	9A1882	Filament Choke Assembly	2
L-3	9A1940	Parasitic Choke Assembly	1
L-4	9A2021	Oscillator Coil Assembly (FM)	1
T-1	9A1972	"B" Range Loop Antenna Assem.	1
T-2	9A1956	Antenna Coil Assembly	1
T-3	9A1997	Oscillator Coil Assembly (AM)	1
T-4	9A1932	1st I.F. Trans. (FM)	1
T-5	9A1998	1st I.F. Trans. (AM)	1
T-6	9A1999	2nd I.F. Trans. (AM-FM)	1
T-7	9A1970	Discriminator Coil Assembly	1
T-8	9A2004	Dipole Antenna	1
T-9	53X290	Power Transformer	1
T-10	51X134	Output Transformer	1

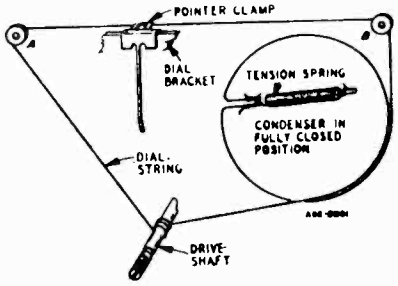
MONTGOMERY WARD MODEL 84WG-2714F

ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455KC FM—10.7 MC
Selectivity	AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 10 microvolts average
FM Sensitivity	(For .5 watt output) 100 microvolts average
Power Output	4.5 watts maximum 2.5 watts 10% distortion
Loud Speaker	10" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles
Record Changer	See Manual No. 5050A

Tube and Dial Lamp Complement

1 6BA7 FM-AM Converter
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 5Y3GT Rectifier
2 No. 47 Dial Lamps



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X66 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

Ref. No.	Part No.	Description	Qty. Used in Set
		MISCELLANEOUS	
	12A480	10" P.M. Speaker	1
	3A303	Tube Socket—Octal (8 prong) Molded	2
	3A426	Tube Socket—Miniature	4
	3A443	Tube Socket—Miniature (for AM-M Converter Tube)	1
	3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip	1
	2A384	Band Change Switch	1
	13X546	Line Cord and Plug Assembly	1
	10A651	Knob (Tuning)	1
	10A652	Knob (Volume Control & Switch)	1
	10A654	Knob (Tone)	1
	10A655	Knob (Phono—BC—FM)	1
	4X999	Escutcheon	1

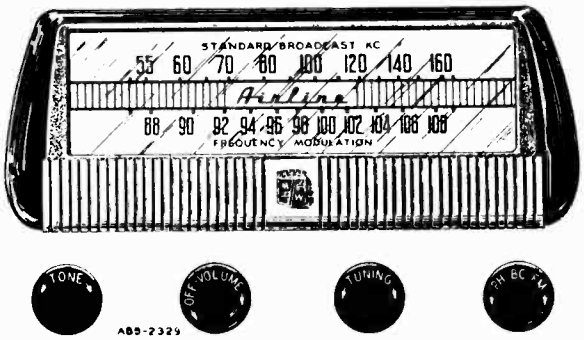
Ref. No.	Part No.	Description	Qty. Used in Set
		DIAL AND DRIVE ASSEMBLY	
	58X715	Dial Glass	1
	24X446	Idler Pulley	2
	15X241	Pointer	1
	25X1569	Dial Bracket	1
	7A103	No. 47 Pilot Light Bulb	2
	7A202	Pilot Light Socket Assembly	1
	26X486	Drive Shaft	1
	41X26	Reflector, Dial Light	2
	28X113	Drive Cord Tension Spring	1
	10X66	Drive Cord Assembly	1
	19X192	"C" Washer (Mtg. drive shaf)	2
	6X21	Rubber Grommet (Mtg. gang cond.)	3
	20X260	Condenser Cushion Stud (Mtg. gang condenser)	3

TYPE V-28A139 RECORD CHANGER PARTS

V-961-B	Motor Assembly, 60 cycles, 115-120 V	1
Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly	1
	Semi-Permanent Needle	1
	(Specify port number and letters stamped on crystal)	

MODEL 84WG-2714G

MONTGOMERY WARD



GENERAL DESCRIPTION

This is a two band, six tube (plus rectifier tube) receiver with automatic record changer for the reception of both AM and FM stations. The I-F stages use the latest type high gain miniature type tubes and built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.

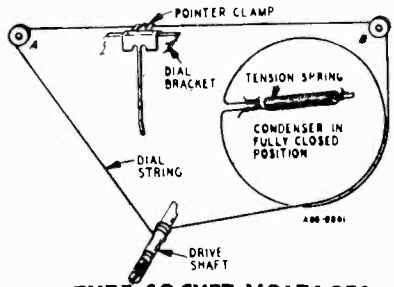
ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455KC FM—10.7 MC
Selectivity	AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 10 microvolts average
FM Sensitivity	(For .5 watt output) 100 microvolts average
Power Output	4.5 watts maximum 2.5 watts 10% distortion
Loud Speaker	10" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles
Record Changer	See Manual No. 5050A
Tube and Dial Lamp Complement	1 6BA7 FM-AM Converter 1 6BA6 1st I-F Amplifier 1 6BA6 2nd I-F Amplifier 1 6AL5 FM Discriminator 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC 1 6V6GT Audio Output 1 5Y3GT Rectifier 2 No. 47 Dial Lamps

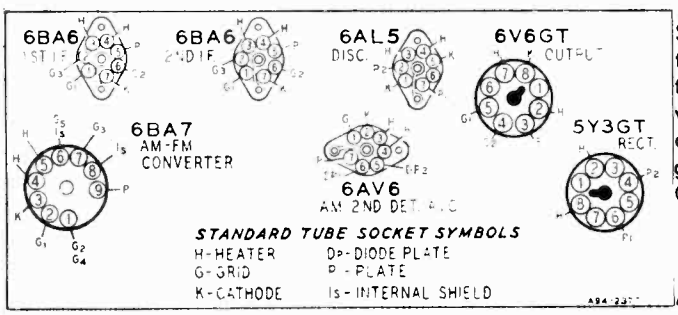
DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X66 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



TUBE SOCKET VOLTAGES



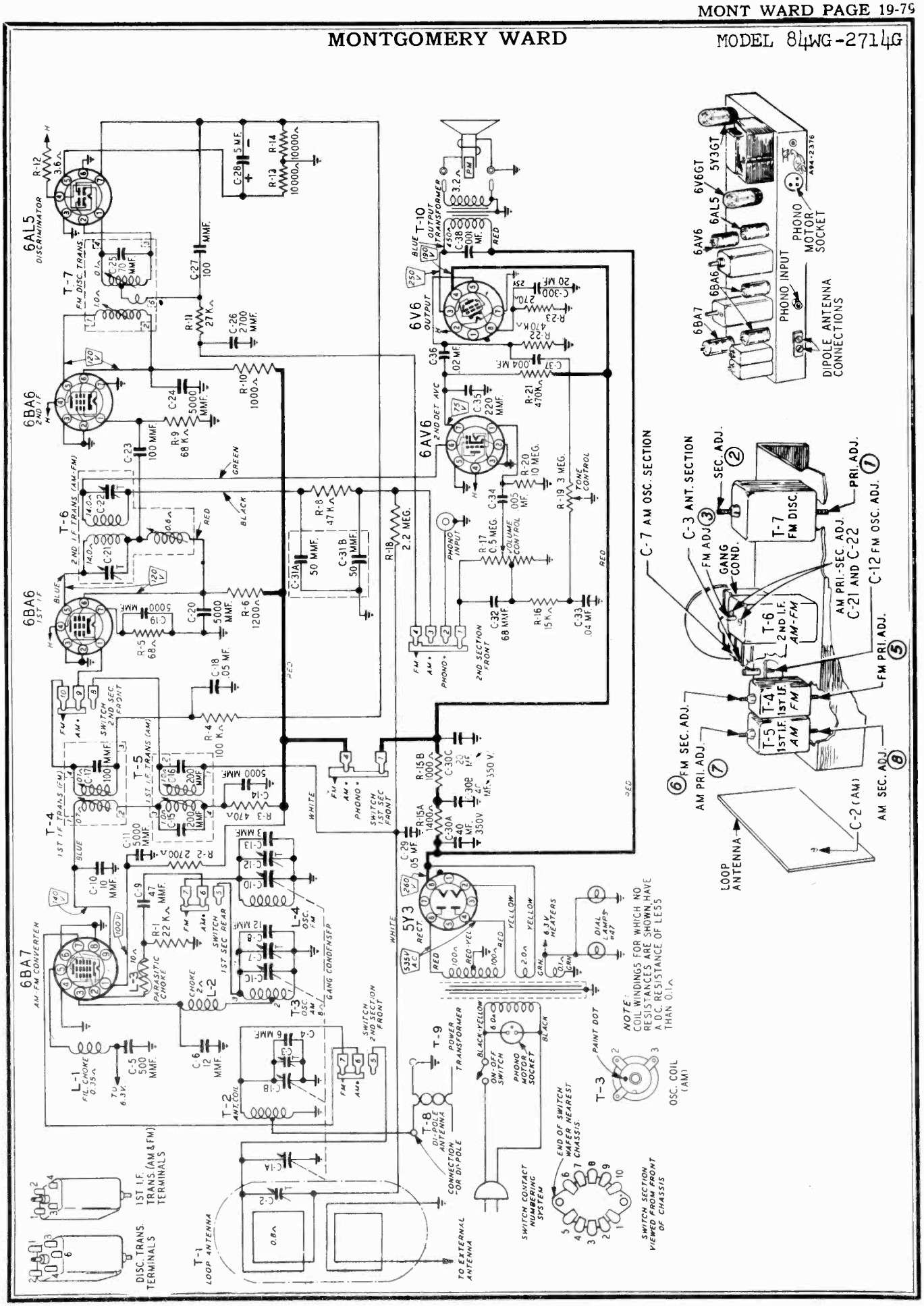
Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage.....117 Volts AC
Signal Input.....None

A variation of ±10% is usually permissible.

MONTGOMERY WARD

MODEL 84WG-2714G



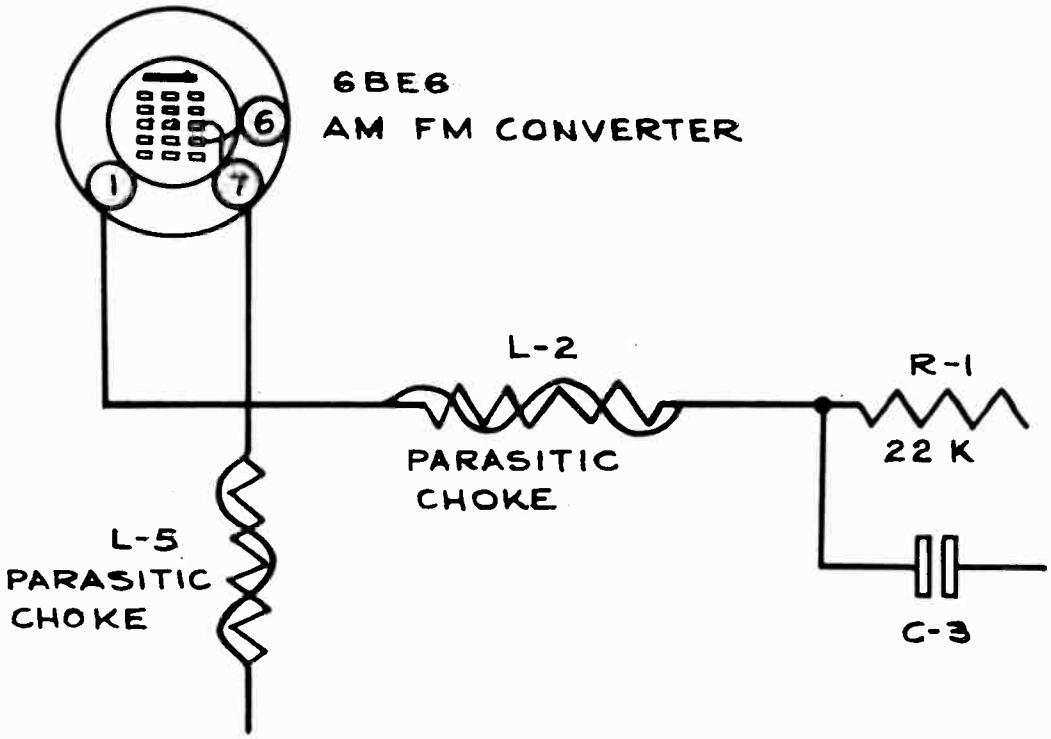
MODEL 84WG-2714G MONTGOMERY WARD

A choke has been added to the circuit to eliminate parasitic oscillation on the FM Band.

PARTS LIST ADDITION

Ref. No.	Part No.	Description	Qty. Used
L-5	9A1967	Parasitic Choke	1

The circuit connection of L-5 is shown in the partial schematic below:



MONTGOMERY WARD MODEL 84WG-2714G

ALIGNMENT PROCEDURES

AM STAGES

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. C-21 and C-22	Maximum Output
455 KC	Control Grid 6BA7 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. and Sec. (7) and (8)	Maximum Output
1620 KC	Control Grid 6BA7 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-7	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms and a 3300 ohm .5 watt resistor with short leads.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
I-F	10.7 MC Note E	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F (3) Note C	Maximum Deflection
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
I-F	10.7 MC	Antenna and Chassis	2500 mmf	FM	Rotor Fully Open	1st. I-F Pri. and Sec. (5) and (6) Note C	Maximum Deflection
	10.7 MC	Antenna and Chassis Solder a 3300 ohm resistor across terminals 3 and 4 of 1st. I-F trans.	2500 mmf	FM	Rotor Fully Open	1st. I-F Pri. (5) Note C	Maximum Deflection
	10.7 MC	Antenna and Chassis Note D	2500 mmf	FM	Rotor Fully Open	1st. I-F Sec. (6) Note C	Maximum Deflection
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Oscillator	108.4 Note F	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Osc. C-12	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-3	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the 27 K ohm resistor (R-11) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

NOTE D—Unsolder 3300 ohm resistor from terminals 3 and 4 of 1st I-F transformer and resolder across terminals 1 and 2.

NOTE E—2nd I-F trimmers (AM) must be aligned before attempting to adjust 2nd I-F (FM) tuning slug.

NOTE F—Remove the 3300 ohm load resistor before attempting to check the antenna and oscillator adjustments.

MODEL 84WG-2714G MONTGOMERY WARD

RECEIVER STAGE SENSITIVITIES

AM AND AUDIO STAGES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output. The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	INPUT FOR .5 WATT OUTPUT
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	10 Microvolts
1000 KC	.01 mf	6BA7 Converter Pin 7	Chassis	40 Microvolts
455 KC	.01 mf	6BA7 Converter Pin 7	Chassis	35 Microvolts
455 KC	.01 mf	6BA6 1st I-F Pin 1	Chassis	2000 Microvolts
400 cycles	.01 mf	6AV6 1st A-F Pin 1	Chassis	.07 Volt
400 cycles	.01 mf	6V6GT Output Pin 5	Chassis	3.2 Volts

FM STAGES

The table below lists the sensitivity for the FM stages of the receiver. The receiver must be tuned to 98 MC for all readings. Measurements are based on a .5 watt output the same as for the AM and Audio stage measurements.

The signal source must be an accurately calibrated signal generator capable of supplying a 98 MC signal modulated by a 400 cycle audio signal. For these measurements the generator must be adjusted for a 22.5 KC deviation. This will correspond to 30% AM modulation.

SIGNAL GENERATOR				
FREQUENCY	COUPLING TO RECEIVER	CONNECTION TO RECEIVER	GROUND CONNECTION	INPUT FOR .5 WATT OUTPUT
98 MC	300 ohms	External Antenna Terminal	Chassis	100 Microvolts
10.7 MC	.01 mf	6BA6 1st I-F Pin 1	Chassis	600 Microvolts
10.7 MC	2500 mmf	6BA6 2nd I-F Pin 1	Chassis	23,000 Microvolts

DIAL AND DRIVE ASSEMBLY

Ref. No.	Part No.	Description	Qty. Used in Set
	58X715	Dial Glass	1
	24X446	Idler Pulley	2
	15X241	Pointer	1
	25X1569	Dial Bracket	1
	7A103	No. 47 Pilot Light Bulb	2
	7A202	Pilot Light Socket Assembly	1
	26X486	Drive Shaft	1
	41X26	Reflector, Dial Light	2
	28X113	Drive Cord Tension Spring	1
	10X66	Drive Cord Assembly	1
	19X192	"C" Washer (Mtg. drive shaft)	2
	6X21	Rubber Grommet (Mtg. gang cond.)	3
	20X260	Condenser Cushion Stud (Mtg. gang condenser)	3

TYPE V-28A139 RECORD CHANGER PARTS

V-961-B	Motor Assembly, 60 cycles, 115-120 V	1
Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly	1
	Semi-Permanent Needle	1
	(Specify part number and letters stamped on crystal)	

MISCELLANEOUS

Ref. No.	Part No.	Description	Qty. Used in Set
	12A480	10" P.M. Speaker	1
	3A303	Tube Socket—Octal (8 prong) Molded	2
	3A426	Tube Socket—Miniature	4
	3A443	Tube Socket—Miniature (for AM-FM Converter Tube)	1
	3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip	1
	2A384	Band Change Switch	1
	13X546	Line Cord and Plug Assembly	1
	10A651	Knob (Tuning)	1
	10A652	Knob (Volume Control & Switch)	1
	10A654	Knob (Tone)	1
	10A655	Knob (Phono—BC—FM)	1
	4X999	Escutcheon	1

MONTGOMERY WARD

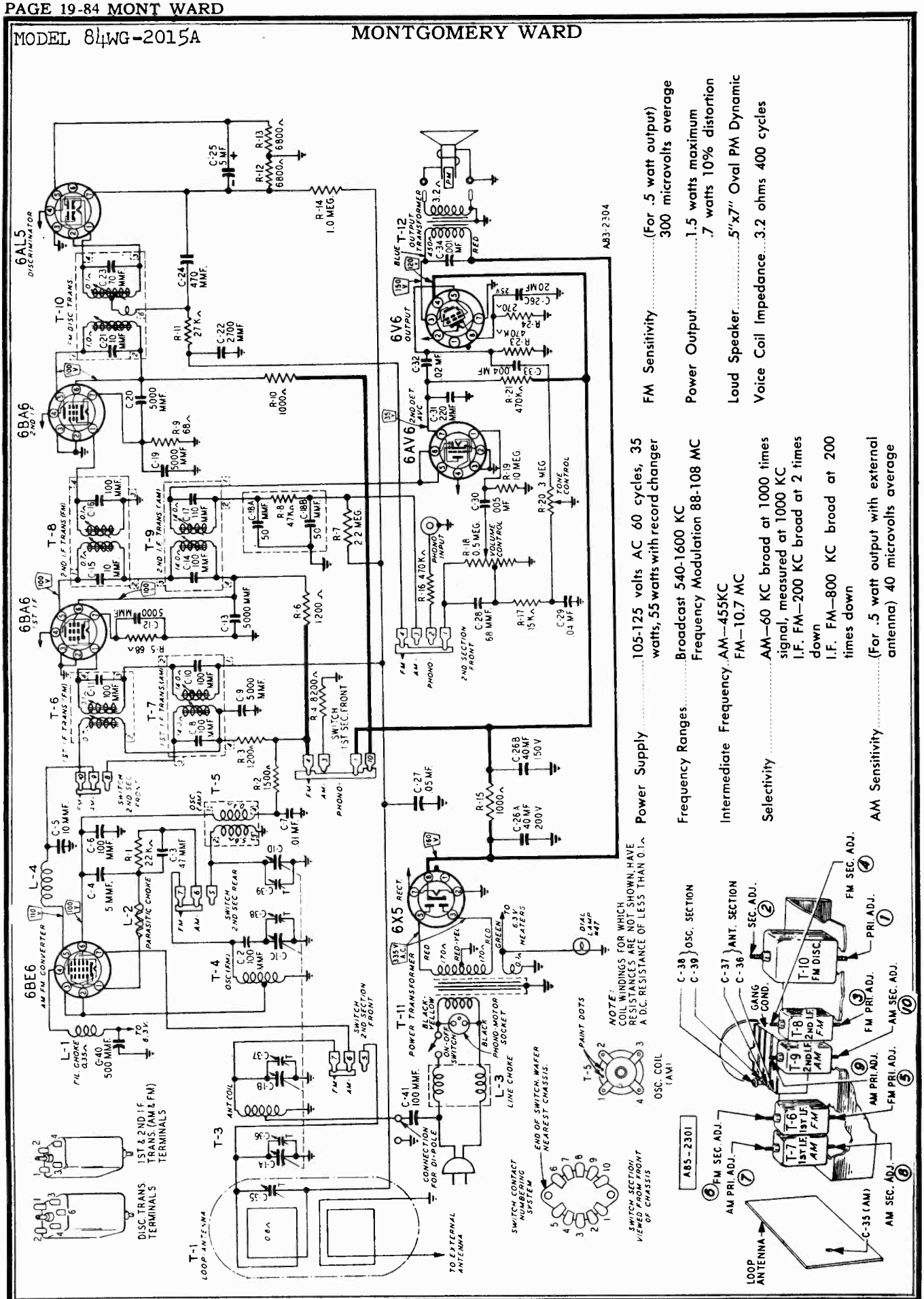
MODEL 84WG-2714G

Ref. No.	Part No.	Description			Qty. Used in Set
		RESISTORS			
		Ohms	Watts		
R-1	B84223	22 K	0.5	Carbon	1
R-2	B83272	2700	0.5	Carbon	1
R-3	B84471	470	0.5	Carbon	1
R-4	B85104	100 K	0.5	Carbon	1
R-5	B83680	68	0.5	Carbon	1
R-6	B84122	1200	0.5	Carbon	1
R-8	B85473	47 K	0.5	Carbon	1
R-9	B85683	68 K	0.5	Carbon	1
R-10	B84102	1000	0.5	Carbon	1
R-11	B84273	27 K	0.5	Carbon	1
R-12	43X233	3.6	0.5	Wire Wound	1
R-13, R-14	B84103	10 K	0.5	Carbon	2
R-15A	43X224	1400	6.0	Wire Wound	1
R-15B		1000	4.0		
R-16	B84153	15 K	0.5	Carbon	1
R-17	36X372	.5 meg.		Volume Control	1
R-18	B85225	2.2 meg.	0.5	Carbon	1
R-19	40X285	3 meg.		Tone Control	1
R-20	B85106	10 meg.	0.5	Carbon	1
R-21, R-22	B85474	470 K	0.5	Carbon	2
R-23	B84271	270	0.5	Carbon	1
		TRANSFORMERS AND COILS			
L-1	9A1882	Filament Choke Assembly			1
L-2	35A1	Insulated Choke			1
L-3	9A1940	Parasitic Choke Assembly			1
L-4	9A2021	Oscillator Coil Assembly (FM)			1
T-1	9A1972	"B" Range Loop Antenna Assem.			1
T-2	9A1956	Antenna Coil Assembly			1
T-3	9A1997	Oscillator Coil Assembly (AM)			1
T-4	9A1932	1st I.F. Trans. (FM)			1
T-5	9A1998	1st I.F. Trans. (AM)			1
T-6	9A1999	2nd I.F. Trans. (AM-FM)			1
T-7	9A1970	Discriminator Coil Assembly			1
T-8	9A2004	Dipole Antenna			1
T-9	53X290	Power Transformer			1
T-10	51X134	Output Transformer			1

Ref. No.	Part No.	Description			Qty. Used in Set
		CAPACITORS			
C-1A, C-1B, C-1C, C-1D	14A204	Gang Condenser Assembly			1
C-2	17A235	2-24 mmf		Trimmer	1
C-3, C-7		Part of Gang Condenser			
C-4	47X521	6 mmf		Ceramic	1
C-5	47X508	500 mmf		Ceramic	1
C-6, C-8	47X522	12 mmf		Ceramic	2
C-9	47X517	47 mmf		Ceramic	1
C-10	47X512	10 mmf		Ceramic	1
C-11, C-14, C-19, C-20, C-24	47X507	5000 mmf		Silvered Ceramic	5
C-12	17A255	1-8 mmf		Trimmer	1
C-13	47X547	3 mmf		Ceramic	1
C-15, C-16		Part of T-5 (1st I.F. Trans.—AM)			
C-17		Part of T-4 (1st I.F. Trans.—FM)			
C-18, C-29	B66503	.05 mf	200 V	Tubular	2
C-21, C-22		Part of T-6 (2nd I.F. Trans.—AM-FM)			
C-23	47X497	100 mmf		Ceramic	1
C-25		Part of T-7 (Discriminator Trans.)			
C-26	47X492	2700 mmf		Molded Mica	1
C-27	47X526	100 mmf		Molded Mica	1
C-28	45X361	5 mf	100 V	Dry Electrolytic	1
C-30A	45X359	40 mf	350 V	Dry Electrolytic	1
C-30B		40 mf	350 V		
C-30C		20 mf	350 V		
C-30D		20 mf	25 V		
C-31A, C-31B	47X112	50-50 mmf		Dual Mica	1
C-32	47X471	68 mmf		Molded Mica	1
C-33	B66403	.04 mf	200 V	Tubular	1
C-34	D66502	.005 mf	400 V	Tubular	1
C-35	47X468	220 mmf		Ceramic	1
C-36	D66203	.02 mf	400 V	Tubular	1
C-37	B66402	.004 mf	200 V	Tubular	1
C-38	H66102	.001 mf	800 V	Tubular	1

MODEL 84WG-2015A

MONTGOMERY WARD

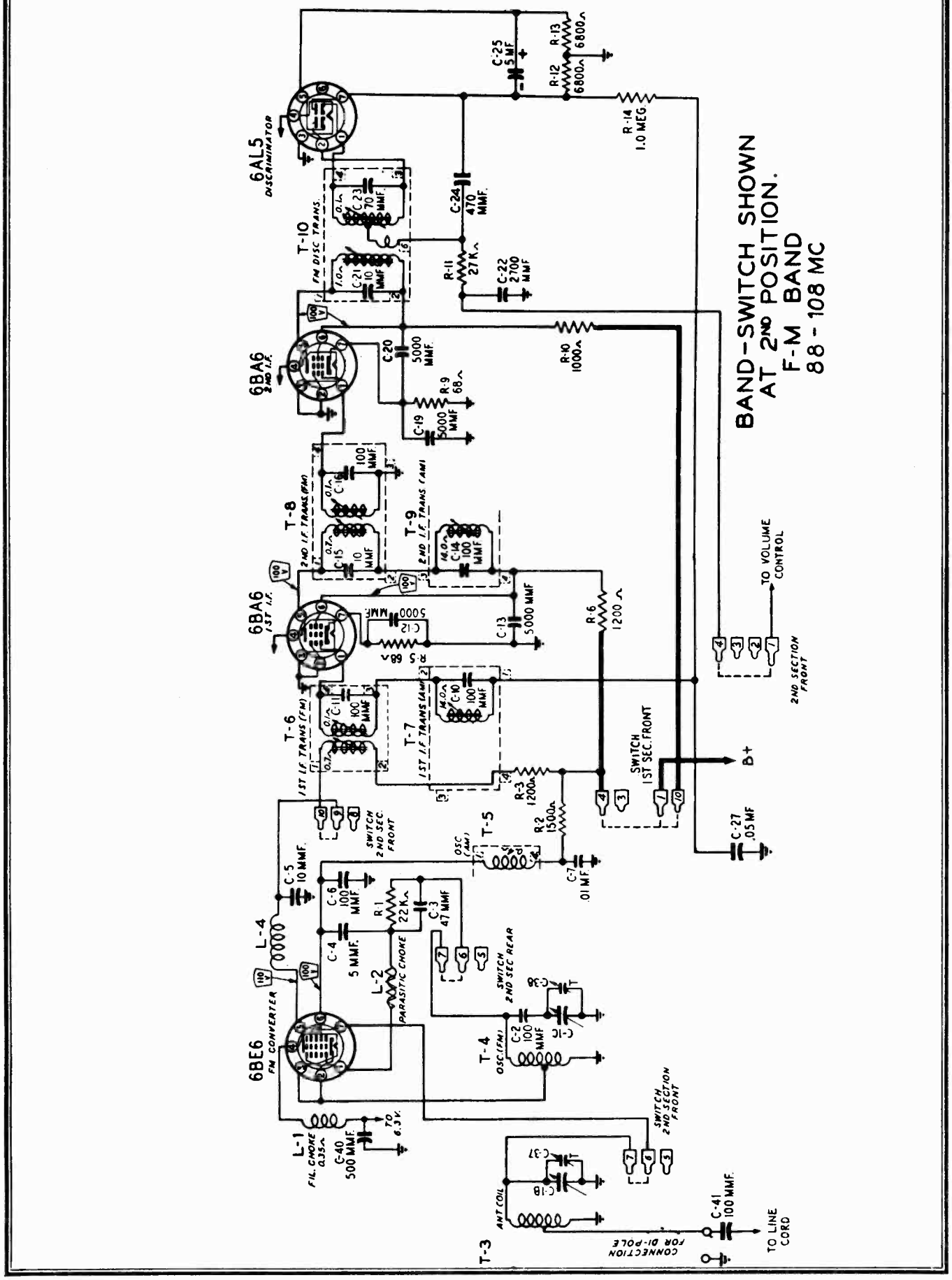


Power Supply	105-125 volts AC 60 cycles, 35 watts, 55 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455KC FM—10.7 MC
Selectivity	AM—60 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—800 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 40 microvolts average
FM Sensitivity	(For .5 watt output) 300 microvolts average
Power Output	1.5 watts maximum .7 watts 10% distortion
Loud Speaker	5"x7" Oval PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles

RECORD CHANGER: Webster Model 148, RCD.CH. 18-1

MONTGOMERY WARD

MODEL 84WG-2015A



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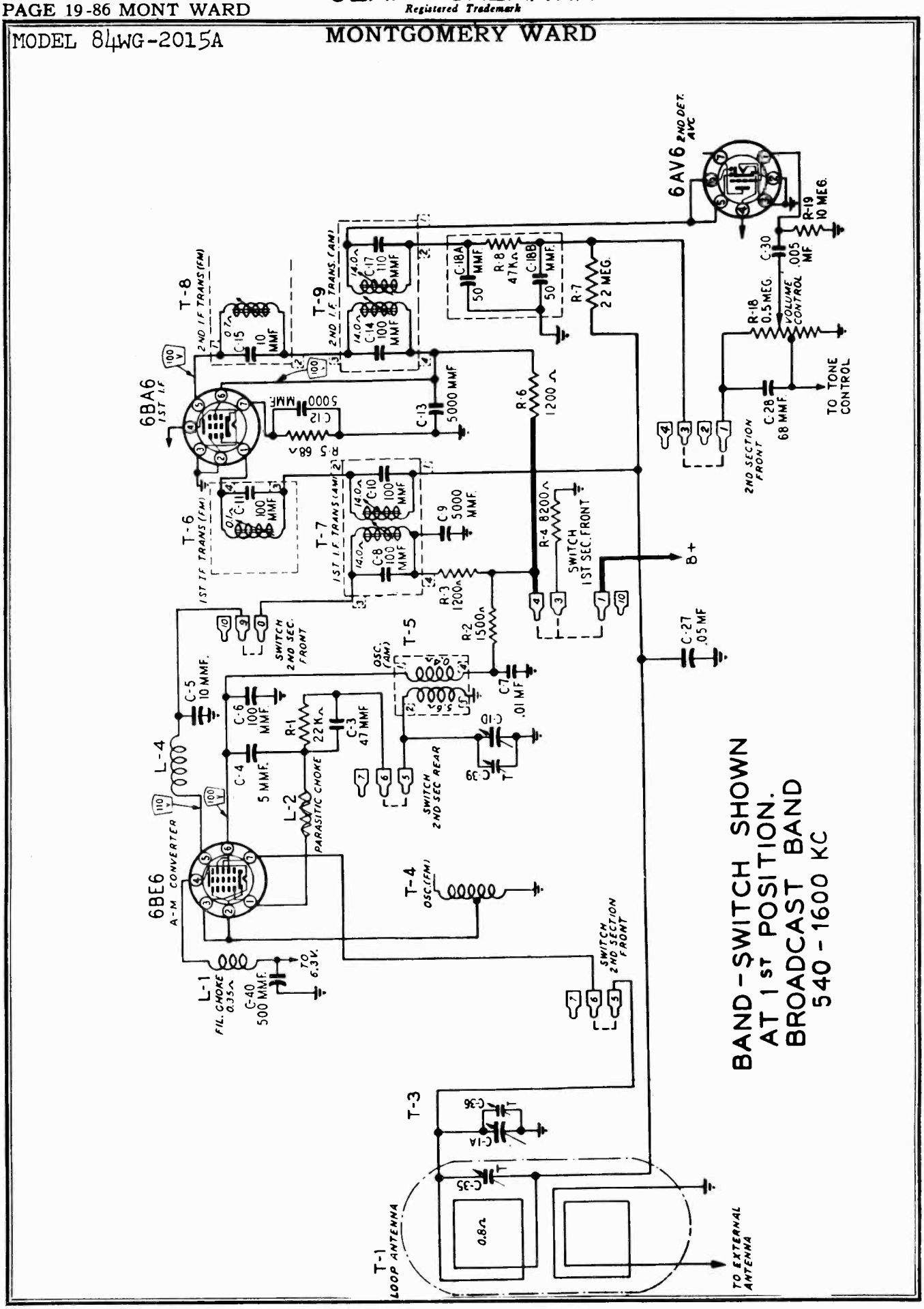
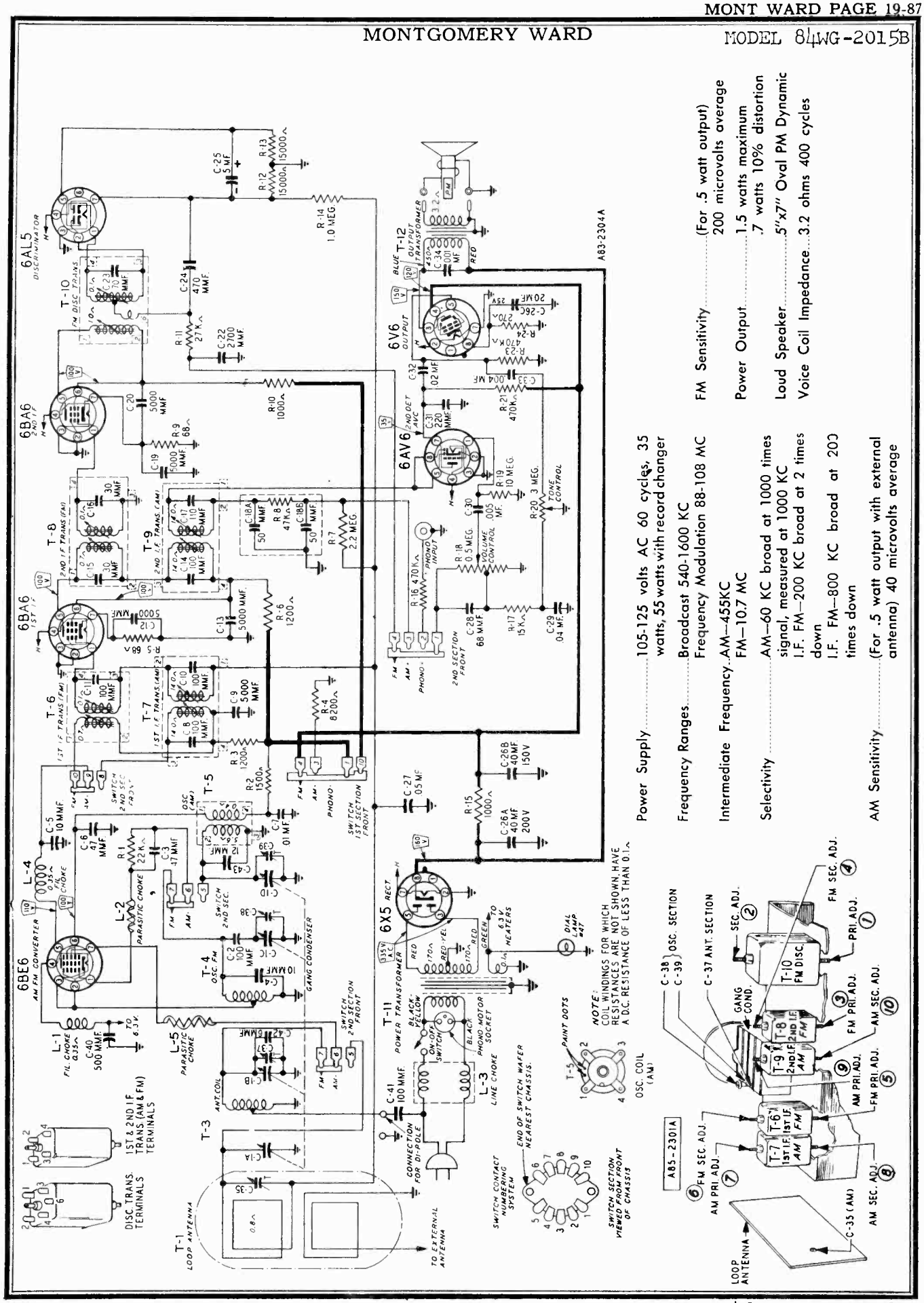
MODEL 84WG-2015A

MONTGOMERY WARD



MONTGOMERY WARD

MODEL 84WG-2015B



Power Supply	105-125 volts AC 60 cycles, 35 watts, 55 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455KC FM—10.7 MC
Selectivity	AM—60 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—800 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 40 microvolts average
FM Sensitivity	(For .5 watt output) 200 microvolts average
Power Output	1.5 watts maximum .7 watts 10% distortion
Loud Speaker	5"x7" Oval PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles

RECORD CHANGER: Webster Model 148, RCD.CH. 18-1

MODELS 84WG-2015A, 84WG-2015B

MONTGOMERY WARD

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. and Sec. (9) and (10)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. and Sec. (7) and (8)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-39	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-35	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor — .01 mf, 300 ohms and 100K ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (1) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (2) Note B	
I-F	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. (3) 2nd I-F Sec. (4) Note C	Maximum Deflection
	10.7 MC	Unsolder lead from Pin 7 to band switch. Insert 100K ohm resistor between Pin 7 and Ground and feed signal into Pin 7 of 6BE6	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (5) Note C	Maximum Deflection
	10.7 MC	Same as above	.01 mf	FM	Rotor Fully Open	1st I-F Sec. (6) Note C	Maximum Deflection
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Ant. and Osc.	108.5 Note D	Disconnect built-in line antenna and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Osc. C-38	Maximum Deflection
	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-37	Maximum Deflection
RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN							

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and AVC line. A signal of .1 volt must be fed into the receiver for this adjustment. Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the 27 K ohm resistor (R-11) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

NOTE D—Remove the 100 K. ohm load resistor and solder the lead from pin 7 of 6BE6 tube to the band switch before attempting to check the antenna and oscillator adjustments.

MONTGOMERY WARD

MODELS 84WG-2015A, 84WG-2015B

RECEIVER STAGE SENSITIVITIES

AM AND AUDIO STAGES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistar across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output.

The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

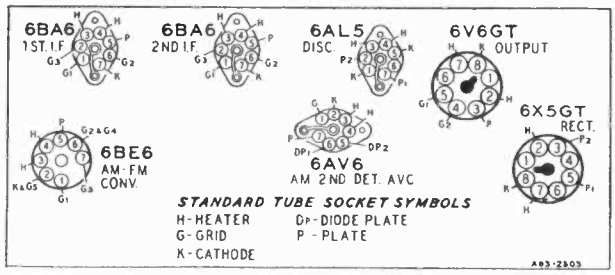
SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	25 Microvolts
1000 KC	.05 mf	6BE6 Converter Pin 7	Chassis	60 Microvolts
455 KC	.05 mf	6BE6 Converter Pin 7	Chassis	58 Microvolts
455 KC	.05 mf	6BA6 1st I-F Pin 1	Chassis	2400 Microvolts
400 cycles	.05 mf	6AV6 1st A-F Pin 1	Chassis	.07 Volt
400 cycles	.05 mf	6V6GT Output Pin 5	Chassis	3.2 Volts

FM STAGES

The table below lists the sensitivity for the FM stages of the receiver. The receiver must be tuned to 98 MC for all readings. Measurements are based on a .5 watt output the same as for the AM and Audio stage measurements.

The signal source must be an accurately calibrated signal generator capable of supplying a 98 MC signal modulated by a 400 cycle audio signal. For these measurements the generator must be adjusted for a 22.5 KC deviation. This will correspond to 30% AM modulation.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING TO RECEIVER	CONNECTION TO RECEIVER	GROUND CONNECTION	
98 MC	300 ohms	External Antenna Lead	Chassis	200 Microvolts
10.7 MC	.01 mf	6BA6 1st I-F Pin 1	Chassis	1,000 Microvolts
10.7 MC	.01 mf	6BA6 2nd I-F Pin 1	Chassis	40,000 Microvolts

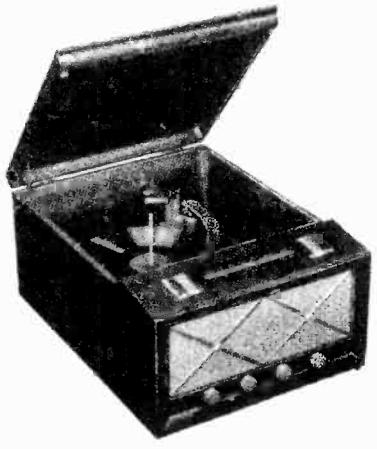


TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage.....117 Volts AC
Signal Input.....None

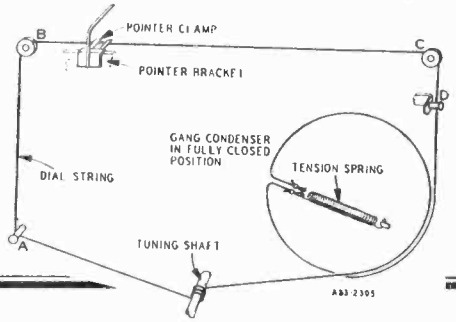
A variation of ±10% is usually permissible.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X70 drive cord assembly or a new length of cord 51 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



MODEL 84WG-2015A

MONTGOMERY WARD

CAPACITORS

Ref. No.	Part. No.	Description	Qty. Used in Set
C-1A, C-1B, C-1C, C-1D	14A202	Gang Condenser & Pulley	1
C-2	47X511	100 mmf Ceramic	1
C-3	47X517	47 mmf Ceramic	1
C-4	47X513	5 mmf Ceramic	1
C-5	47X512	10 mmf Ceramic	1
C-6	47X518	100 mmf Ceramic	1
C-7	D66103	.01 mf 400 V Tubular	1
C-8, C-10		Part of T-7 (1st I.F. Trans.—AM)	
C-11		Part of T-6 (1st I.F. Trans.—FM)	
C-9, C-12, C-13, C-19, C-20	47X507	5000 mmf Silvered Ceramic	5
C-14, C-17		Part of T-9 (2nd I.F. Trans.—AM)	
C-15, C-16		Part of T-8 (2nd I.F. Trans.—FM)	
C-18A, C-18B		50-50 mmf (Part of 76X1 Resistor-Capacitor Combination)	
C-21, C-23		Part of T-10 (Discriminator Trans.)	
C-22	47X492	2700 mmf Molded Mica	1
C-24	47X510	470 mmf Silvered Mica	1
C-25	45X361	5 mf 100 V Dry Electrolytic	1
C-26A C-26B C-26C	45X360	40 mf 200 V 40 mf 150 V 20 mf 25 V Dry Electrolytic	1
C-27	B66503	.05 mf 200 V Tubular	1
C-28	47X471	68 mmf Molded Mica	1
C-29	B66403	.04 mf 200 V Tubular	1
C-30	D66502	.005 mf 400 V Tubular	1
C-31	47X468	220 mmf Ceramic	1
C-32	D66203	.02 mf 400 V Tubular	1
C-33	B66402	.004 mf 200 V Tubular	1
C-34	H66102	.001 mf 800 V Tubular	1
C-35	17A123	1.5-12 mmf Trimmer	1
C-36, C-37, C-39		Part of C-1 Gang Condenser	
C-38	17A247	3-12 mmf Trimmer	1
C-40	47X508	500 mmf Ceramic	1
C-41	47X476	100 mmf Molded	1

RESISTORS

Ref. No.	Part. No.	OHMS	WATTS		Qty. Used in Set
R-1	B84223	22 K	0.5	Carbon	1
R-2	B84152	1500	0.5	Carbon	1
R-3, R-6	B84122	1200	0.5	Carbon	2
R-4	D84822	8200	2.0	Carbon	1
R-5, R-9	B83680	68	0.5	Carbon	2
R-7	B85225	2.2 meg.	0.5	Carbon	1
R-8		47 K	(Part of 76X1 Resistor-Capacitor Combination)		
R-10	B84102	1000	0.5	Carbon	1
R-11	B84273	27 K	0.5	Carbon	1
R-12, R-13	B84682	6800	0.5	Carbon	2
R-14	B85105	1 meg.	0.5	Carbon	1
R-15	D84102	1000	2.0	Carbon	1
R-16, R-21, R-23	B85474	470 K	0.5	Carbon	3
R-17	B84153	15 K	0.5	Carbon	1
R-18	36X347	.5 meg.		Volume control and switch	1
R-19	B85106	10 meg.	0.5	Carbon	1
R-20	40X254	3 meg.		Tone Control	1
R-24	B84271	270	0.5	Carbon	1

TRANSFORMERS AND COILS

Ref. No.	Part. No.	Description	Qty. Used in Set
L-1, L-4	9A1882	Filament Choke	2
L-2	9A1940	Parasitic Choke	1
L-3	9A1930	Line Choke	1
T-1	9A1954	8" Range Loop Anetnna Assembly	1
T-3	9A1956	Antenna Coil Assembly	1
T-4	9A1938	Oscillator Coil (FM)	1
T-5	9A1929	Oscillator Coil Assembly (AM)	1
T-6	9A1932	1st I.F. Transformer (FM)	1
T-7	9A1934	1st I.F. Transformer (AM)	1
T-8	9A1933	2nd I.F. Transformer (FM)	1
T-9	9A1935	2nd I.F. Transformer (AM)	1
T-10	9A1936	Discriminator Coil Assembly	1
T-11	53X291	Power Transformer	1
T-12	51X136	Output Transformer	1

MISCELLANEOUS

Part. No.	Description	Qty. Used in Set
76X1	Resistor-Capacitor Combination	1
12A484	5" x 7" Oval P.M. Speaker	1
3A303	Tube Socket—Octal (8 prong) Molded	2
3A312	Tube Socket—Miniature	4
3A427	Tube Socket—Miniature (for AM-FM Converter Tube)	1
3A304	Phono Motor Socket	1
3A305	Phono Socket—Single Pin Tip	1
2A374	Band Change Switch	1
13X546	Line Cord and Plug Assembly	1
10A659	Knob (Tuning)	1
10A660	Knob (Volume Control and Switch)	1
10A653	Knob (Tone)	1
10A661	Knob (Phono—BC—FM)	1
4X1001	Escutcheon	2
14X429	Grille Ventilator	1
28X290	Snap Buttons (Mtg. Grille)	4

MONTGOMERY WARD

MODELS 84WG-2015A, 84WG-2015B

Ref. No.	Part. No.	Description	Qty. Used in Set
		DIAL AND DRIVE ASSEMBLY	
	58X703	Dial Glass	1
	24X446	Idler Pulley	2
	15X244	Pointer	1
	25X1587	Pointer & Diffuser Mtg. Bracket	1
	7A103	No. 47 Pilot Light Bulb	1
	7A221	Pilot Light Socket Assembly	1
	26X506	Drive Shaft	1
	28X113	Drive Cord Tension Spring	1
	10X70	Drive Cord Assembly	1
	19X192	"C" Washer (Mtg. drive shaft)	2
	6X21	Rubber Grommet (Mtg. gang cond.)	3
	20X260	Condenser Cushion Stud (Mtg. gang condenser)	3
		TYPE W-28A145 RECORD CHANGER PARTS	
W-15X090-1		Motor Assembly, 60 cycles, 115-120 V.	1
W-17X412-11		50 Cycle Drive Sleeve Assembly	1
Shure P30-1		Crystal Cartridge and Semi-Permanent Needle Assembly	1
		Semi-Permanent Needle (Specify part number and letters stamped on crystal)	1

MODEL 84WG-2015B

CAPACITORS

Ref. No.	Part. No.	Description	Qty. Used in Set
C-1A, C-1B, C-1C, C-1D	14A204	Gang Condenser & Pulley	1
C-2	47X511	100 mmf Ceramic	1
C-3	47X517	47 mmf Ceramic	1
C-4	47X523	10 mmf Ceramic	1
C-5	47X512	10 mmf Ceramic	1
C-6	47X463	47 mmf Ceramic	1
C-7	D66103	.01 mf 400 V Tubular	1
C-8, C-10		Part of T-7 (1st I.F. Trans.—AM)	
C-11		Part of T-6 (1st I.F. Trans.—FM)	
C-9, C-12, C-13, C-19, C-20	47X507	5000 mmf Silvered Ceramic	5
C-14, C-17		Part of T-9 (2nd I.F. Trans.—AM)	
C-15, C-16		Part of T-8 (2nd I.F. Trans.—FM)	
C-18A, C-18B		50-50 mmf (Part of 76X1 Resistor-Capacitor Combination)	
C-23		Part of T-10 (Discriminator Trans.)	
C-22	47X492	2700 mmf Molded Mica	1
C-24	47X510	470 mmf Silvered Mica	1
C-25	45X361	5 mf 100 V Dry Electrolytic	1
C-26A	45X360	40 mf 200 V	
C-26B		40 mf 150 V Dry Electrolytic	1
C-26C		20 mf 25 V	
C-27	B66503	.05 mf 200 V Tubular	1
C-28	47X471	68 mmf Molded Mica	1
C-29	B66403	.04 mf 200 V Tubular	1
C-30	D66502	.005 mf 400 V Tubular	1
C-31	47X468	220 mmf Ceramic	1
C-32	D66203	.02 mf 400 V Tubular	1
C-33	B66402	.004 mf 200 V Tubular	1
C-34	H66102	.001 mf 800 V Tubular	1
C-35	17A123	1.5-12 mmf Trimmer	1
C-37, C-39		Part of C-1 Gang Condenser	
C-38	26A489	1-8 mmf Trimmer Assy.	1
C-40	47X508	500 mmf Ceramic	1
C-41	47X476	100 mmf Molded	1
C-42	47X521	6 mmf Ceramic	1
C-43	47X522	12 mmf Ceramic	1

RESISTORS

Ref. No.	Part. No.	OHMS	WATTS		
R-1	B84223	22 K	0.5	Carbon	1
R-2	B84152	1500	0.5	Carbon	1
R-3, R-6	B84122	1200	0.5	Carbon	2
R-4	D84822	8200	2.0	Carbon	1
R-5, R-9	B83680	68	0.5	Carbon	2
R-7	B85225	2.2 meg.	0.5	Carbon	1
R-8		47 K	(Part of 76X1 Resistor-Capacitor Combination)		
R-10	B84102	1000	0.5	Carbon	1
R-11	B84273	27 K	0.5	Carbon	1
R-12, R-13, R-17	B84153	15 K	0.5	Carbon	3
R-14	B85105	1 meg.	0.5	Carbon	1
R-15	D84102	1000	2.0	Carbon	1
R-16, R-21, R-23	B85474	470 K	0.5	Carbon	3
R-18	30X347	.5 meg.		Volume control and switch	1
R-19	B85106	10 meg.	0.5	Carbon	1
R-20	40X287	3 meg.		Tone Control	1
R-24	B84271	270	0.5	Carbon	1

TRANSFORMERS AND COILS

Ref. No.	Part. No.	Description	Qty. Used in Set
L-1, L-4	9A1882	Filament Choke	2
L-2	9A1940	Parasitic Choke	1
L-3	9A1930	Line Choke	1
L-5	9A1967	Parasitic Choke	1
T-1	9A1971	"B" Range Loop Antenna Assembly	1
T-3	9A1956	Antenna Coil Assembly	1
T-4	9A1938	Oscillator Coil (FM)	1
T-5	9A1929	Oscillator Coil Assembly (AM)	1
T-6	9A1932	1st I.F. Transformer (FM)	1
T-7	9A1934	1st I.F. Transformer (AM)	1
T-8	9A1969	2nd I.F. Transformer (FM)	1

MODELS 84WG-2015A, 84WG-2015B

MONTGOMERY WARD

Ref. No.	Part. No.	Description	Qty. Used in Set
T-9	9A1935	2nd I.F. Transformer (AM)	1
T-10	9A1970	Discriminator Coil Assembly	1
T-11	53X291	Power Transformer	1
T-12	51X136	Output Transformer	1
		MISCELLANEOUS	
	76X1	Resistor-Capacitor Combination	1
	12A484	5" x 7" Oval P.M. Speaker	1
	3A303	Tube Socket—Octal (8 prong) Molded	2
	3A426	Tube Socket—Miniature	4
	3A427	Tube Socket—Miniature (for AM-FM Converter Tube)	1
	3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip	1
	2A374	Band Change Switch	1
	13X546	Line Cord and Plug Assembly	1
	10A659	Knob (Tuning)	1
	10A660	Knob (Volume Control and Switch)	1
	10A658	Knob (Tone)	1
	10A661	Knob (Phono—BC—FM)	1
	4X1C01	Escutcheon	2
	14X438	Grille Ventilator	1
	28X290	Snap Buttons (Mtg. Grille)	4

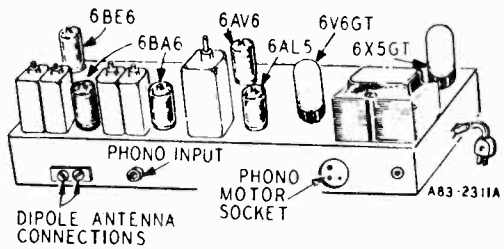
Ref. No.	Part. No.	Description	Qty. Used in Set
		DIAL AND DRIVE ASSEMBLY	
	58X703	Dial Glass	1
	24X446	Idler Pulley	2
	15X244	Pointer	1
	25X1587	Pointer & Diffuser Mtg. Bracket	1
	7A103	No. 47 Pilot Light Bulb	1
	7A221	Pilot Light Socket Assembly	1
	26X506	Drive Shaft	1
	28X113	Drive Cord Tension Spring	1
	10X70	Drive Cord Assembly	1
	19X192	"C" Washer (Mtg. drive shaft)	2
	6X21	Rubber Grommet (Mtg. gang cond.)	3
	20X260	Condenser Cushion Stud (Mtg. gang condenser)	3
		TYPE W-28A145 RECORD CHANGER PARTS	
W-15X090-1		Motor Assembly, 60 cycles, 115-120 V.	1
W-17X412-11		50 Cycle Drive Sleeve Assembly	1
Shure P30-1		Crystal Cartridge and Semi-Permanent Needle Assembly	1
		Semi-Permanent Needle (Specify part number and letters stamped on crystal)	1

MODELS 84WG-2015A, B

50 CYCLE OPERATION

If it is desired to use the record changer on a 50 cycle power supply, it will be necessary to replace the drive sleeve assembly on the record changer motor shaft with a 50 cycle drive sleeve assembly. This assembly is listed in the parts list.

To change the sleeve turn the record selector shelf to the 12" position and lift the turntable off of the record changer. Loosen the set screw holding the drive sleeve on the motor shaft and remove the old sleeve. Install the new 50 cycle drive sleeve and replace the turntable.



Tube and Dial Lamp Complement

1 6BE6 FM-AM Converter
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 6X5GT Rectifier
1 No. 47 Dial Lamp

MONTGOMERY WARD

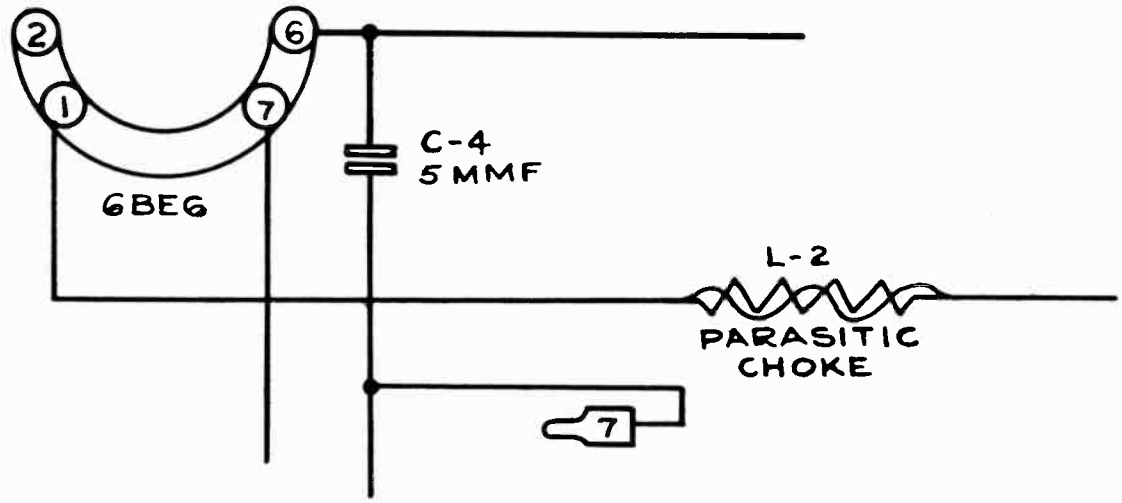
MODEL 84WG-2015A
MODELS 84WG-2718A,
84WG-2720A

MODEL 84WG-2015A

(1) The part number and description of C-6 has been changed. The new description follows:

C-6	47X463	47 MMF	Molded	1 used

(2) The circuit connection of the 5 MMF Capacitor C-4 has been changed. The new circuit connection is shown in the partial schematic below:



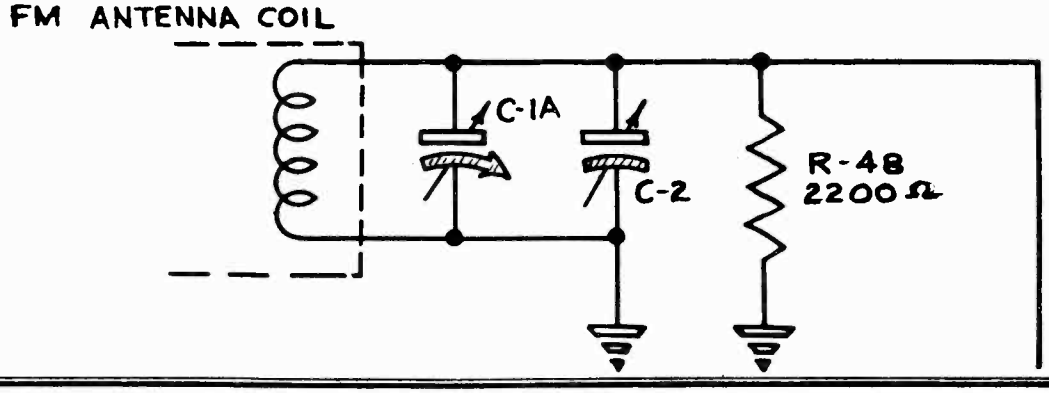
MODELS 84WG-2718A, 84WG-2720A

PARTS LIST ADDITION

The description of the new part follows:

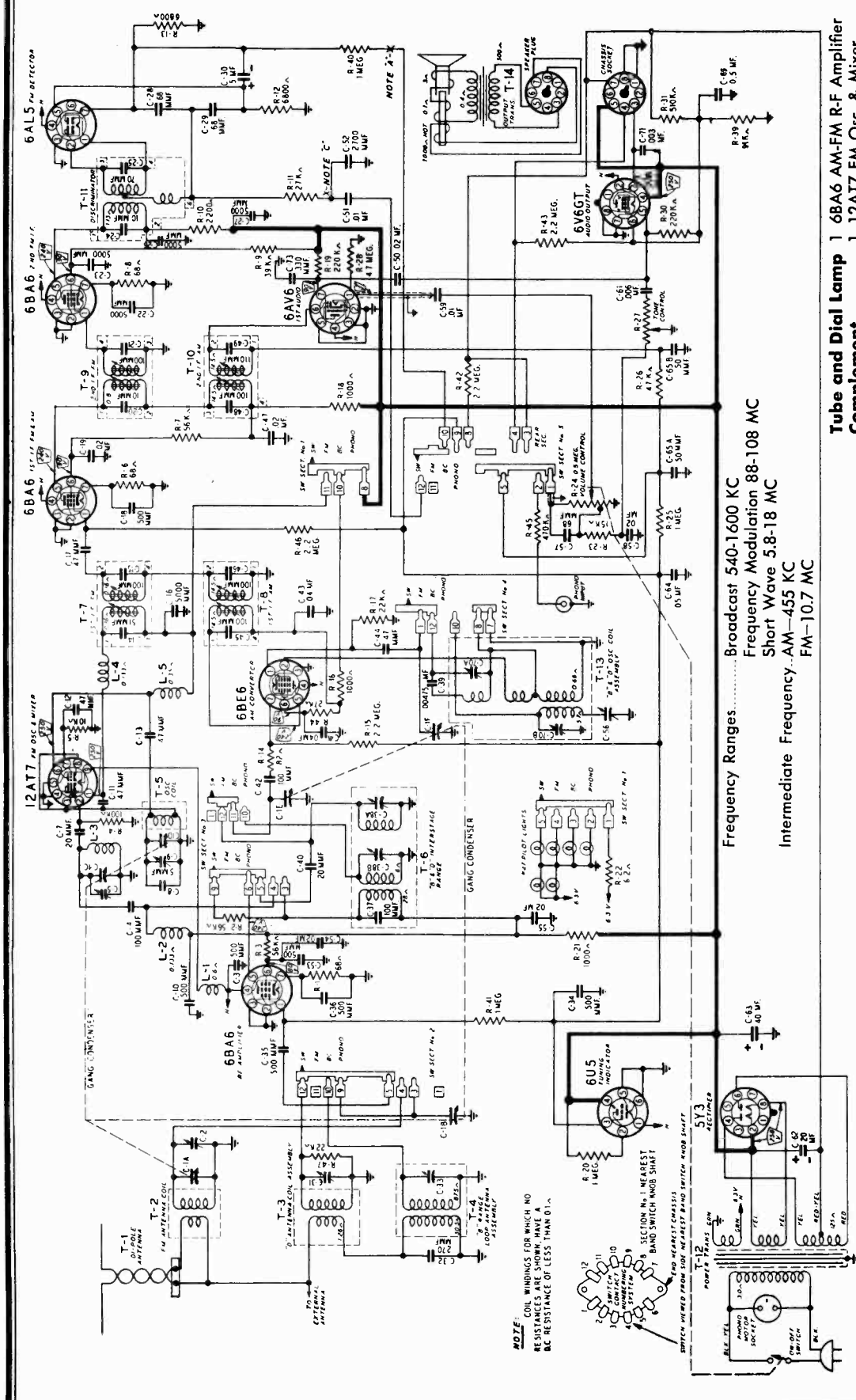
Ref. No.	Part No.	Description	Qty. Used
R-48	B84222	2200 ohms 0.5 watt	1

The circuit connection of resistor R-48 is shown in the partial schematic below. This also applies to Model's 84 WG-2718B, 2724A.



MODELS 84WG-2718A, -B,
84WG-2720A, 84WG-2724A

MONTGOMERY WARD



Tube and Dial Lamp Complement

1	6BA6 AM-FM R-F Amplifier
1	12AT7 FM Osc. & Mixer
1	6BE6 AM Converter
1	6BA6 FM-AM 1st I-F Amplifier
1	6BA6 FM 2nd I-F Amplifier
1	6AL5 FM Detector
1	6AV6 Audio Amplifier, AM 2nd Detector and AVC
1	6V6GT Audio Output
1	6U5/6G5 Tuning Indicator
1	5Y3 Rectifier
6	No. 47 Dial Lamps

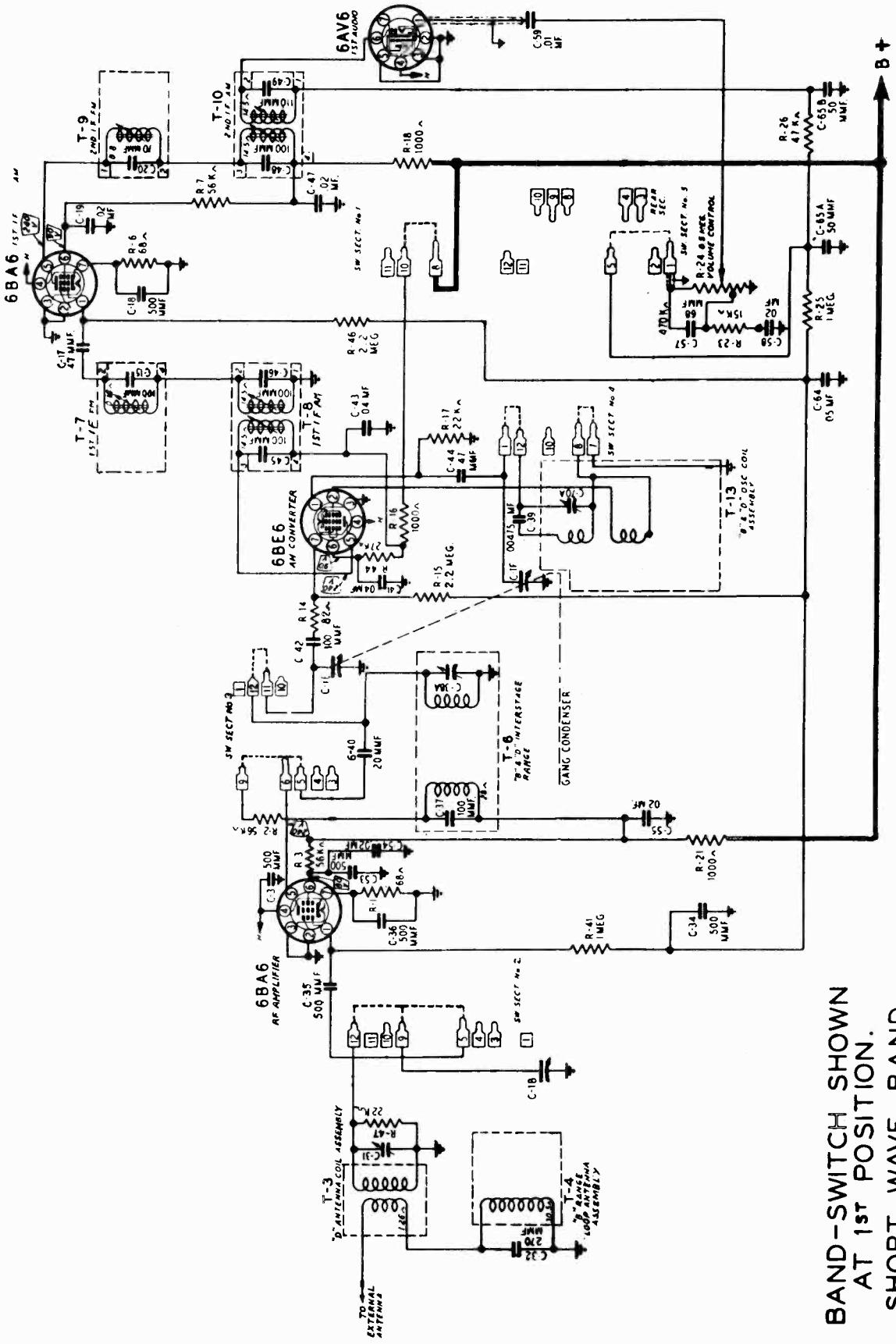
ELECTRICAL SPECIFICATIONS

AM Sensitivity	(For .5 watt output with external antenna) Broadcast, 2 microvolts average Short Wave, 4 microvolts average
FM Sensitivity	(For .5 watt output) 25 microvolts average
Power Output	6.5 watts maximum 3.5 watts 10% distortion
Loud Speaker	12" Electro Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles
Power Supply	105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
Selectivity	AM—37 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—700 KC broad at 200 times down

RECORD CHANGER: Webster Model 50, RCD.CH. 15-1

MONTGOMERY WARD

MODELS 84WG-2718A,
84WG-2720A



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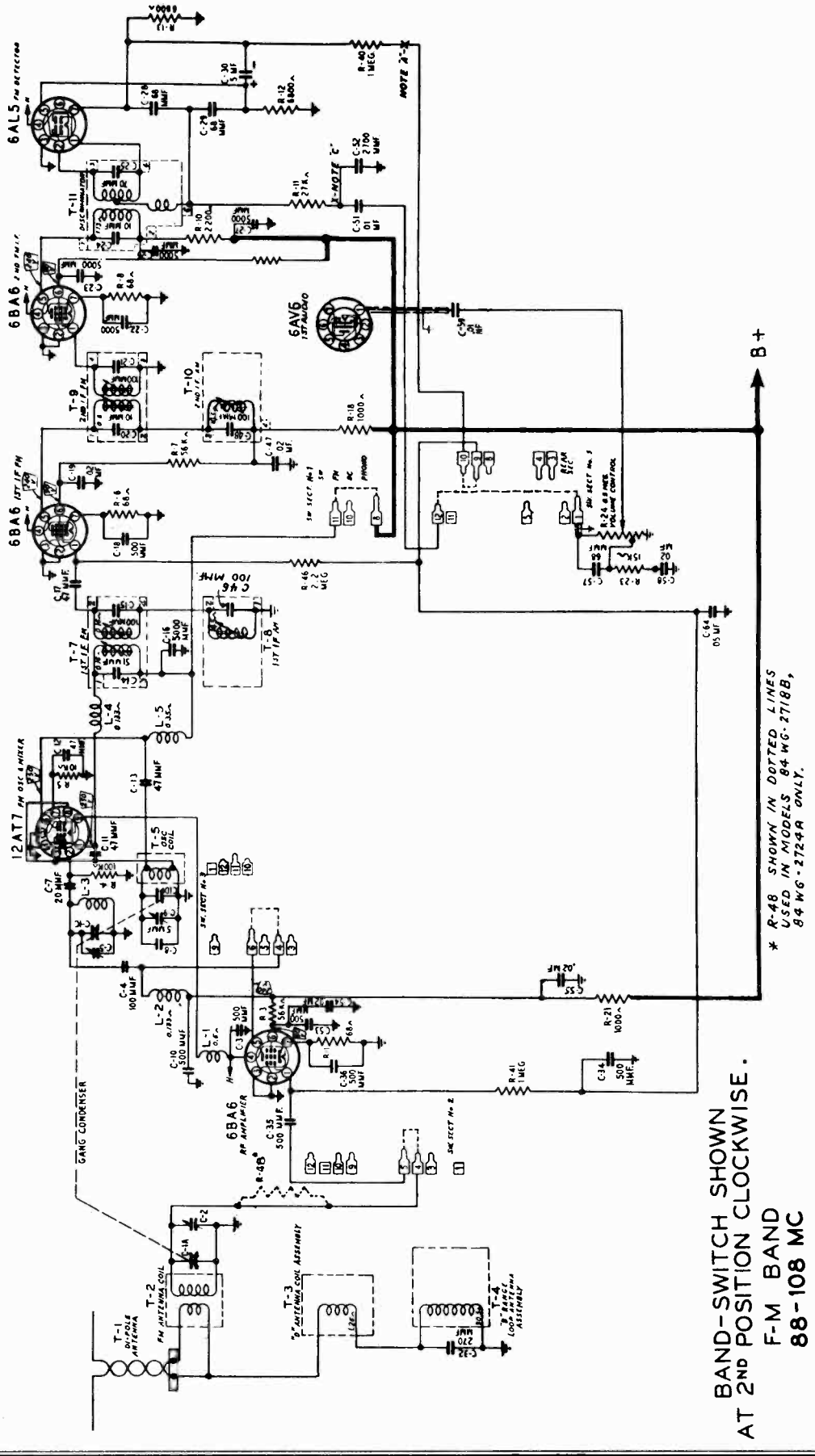
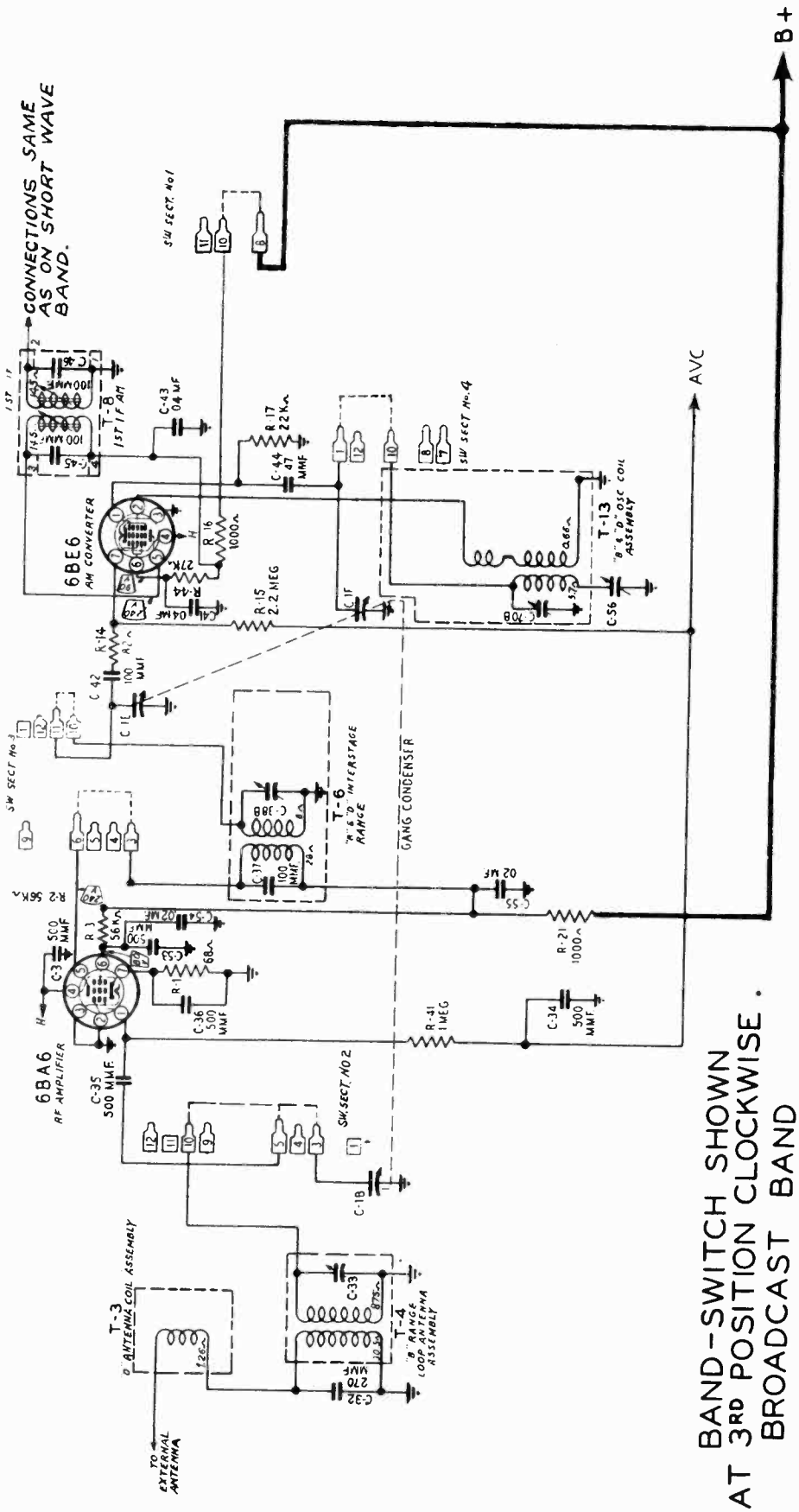
MODELS 84WG-2718A,
84WG-2720A

MONTGOMERY WARD



MONTGOMERY WARD

MODELS 84WG-2718A,
84WG-2720A



MODELS 8[illegible]WG-2718A, -B,
8[illegible]WG-2720A, 8[illegible]WG-2721A

MONTGOMERY WARD

RECEIVER STAGE SENSITIVITIES

AM AND AUDIO STAGES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting an 8 ohm, 10 watt resistor across the secondary winding of the output transformer. A reading of 2 volts across this resistor will be equivalent to a .5 watt output.

The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RECEIVER	GROUND CONNECTION	
1000 KC	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	2 Microvolts
1000 KC	.05 mf	6BA6 Interstage Pin 1	Chassis	8 Microvolts
1000 KC	.05 mf	6BE6 Converter Pin 7	Chassis	65 Microvolts
455 KC	.05 mf	6BE6 Converter Pin 7	Chassis	55 Microvolts
455 KC	.05 mf	6BA6 1st I-F Pin 1	Chassis	2500 Microvolts
400 cycles	.05 mf	6AV6 1st A-F Pin 1	Chassis	.05 Volt
400 cycles	.05 mf	6V6GT Output Pin 5	Chassis	2.8 Volts

FM STAGES

The table below lists the sensitivity for the FM stages of the receiver. The receiver must be tuned to 98 MC for all readings. Measurements are based on a .5 watt output the same as for the AM and Audio stage measurements.

The signal source must be an accurately calibrated signal generator capable of supplying a 98 MC signal modulated by a 400 cycle audio signal. For these measurements the generator must be adjusted for a 22.5 KC deviation. This will correspond to 30% AM modulation.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
FREQUENCY	COUPLING TO RECEIVER	CONNECTION TO RECEIVER	GROUND CONNECTION	
98 Mc	300 ohms	External Antenna Terminal	External Ant. Terminal	25 Microvolts
10.7 MC	.01 mf	6BA6 1st I-F Pin 1	Chassis	2200 Microvolts
10.7 MC	.01 mf	6BA6 2nd I-F Pin 1	Chassis	50,000 Microvolts

ALIGNMENT PROCEDURE

AM BROADCAST AND SHORT WAVE BAND

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, 200 mmf and 400 ohms.

Volume Control—Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
I-F	455 kc	6BE6 Pin 7 and Chassis	.1 mf	Broadcast	Rotor Fully Open	1st I-F Pri. & Sec. (3) & (4) 2nd I.-F. Pri. & Sec. (1) & (2)	Maximum Output
Broadcast	1620 kc	External ant. lead	200 mmf	Broadcast	Rotor Fully Open	Broadcast Oscillator C-70B	
	1400 kc	External ant. lead	200 mmf	Broadcast	Turn Rotor to Max. Output Set pointer to 1400 kc See Note A	Broadcast Interstage C-38B	
	1400 kc	External ant. lead	200 mmf	Broadcast		Loop Antenna C-33	
	600 kc	External ant. lead	200 mmf	Broadcast	Turn Rotor to Max. Output and Rock See Note B	600 kc padder C-56	
Repeat above oscillator adjustments at 1620 and 600 KC until readjusting the oscillator Range B Trimmer C-70B causes no further improvement in output.							
Short Wave	18.3 MC	External ant. lead	400 ohm	Short Wave	Rotor Fully Open	SW Oscillator C-70A	Maximum Output
	17 MC	External ant. lead	400 ohm	Short Wave	Turn Rotor to Max. Output	SW Interstage C-38A "D" Antenna C-31	
Reassemble chassis in cabinet							
Broadcast	1400 kc	External ant. lead	200 mmf	Broadcast	Turn Rotor to Max. Output	Loop Antenna C-33	

After each range is completed, repeat the procedure as a final check.

Note A—If the pointer is not at 1400 KC on the dial, reset pointer at the 1400 KC mark on the dial scale.

Note B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

MONTGOMERY WARD

MODELS 84WG-2718A, -B, 84WG-2720A, 84WG-2724A

ALIGNMENT PROCEDURE

FM STAGES

The following equipment is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 5000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.

Allow chassis and signal generator to warm up for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
I-F	10.7 MC Note F	6BA6 1st I-F, Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. Note A and D (7) 2nd I-F Sec. Note A and E (8)	Maximum Deflection
	10.7 MC Note F	FM-RF Gang Condenser terminal on top of chassis	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (9) 1st I-F Sec. (10) Note A	Maximum Deflection
Recheck I-F Adjustments in order given							
R-F & Osc.	108.4	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Oscillator C-9 Note G	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	RF. C-5	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	Ant. C-2	Maximum Deflection
Recheck R-F and Osc. Adjustments in order given							

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the 1 megohm resistor R-40 and the band switch terminal for all adjustments except the discriminator secondary adjustment, for which see Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

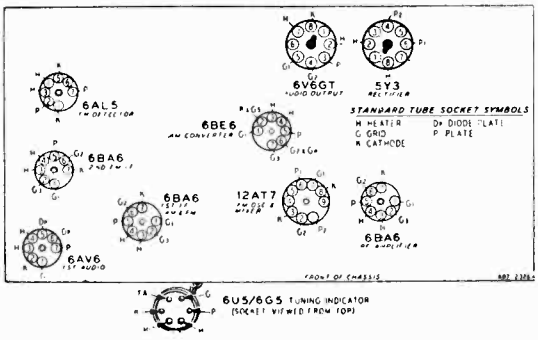
NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and reconnect to junction of R-11, C-51 and C-52. Adjust for zero voltage indication.

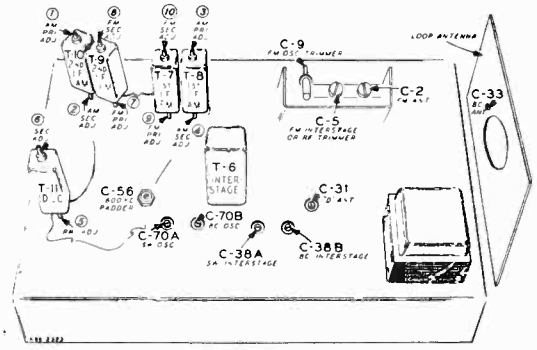
NOTE D—Before adjusting Pri. core connect 5000 ohm load resistor across the 2nd I.F. secondary terminals.

NOTE E—Disconnect 5000 ohm load resistor from secondary terminals and reconnect across the 2nd I.F. primary terminals.

NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency below signal frequency.





TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage.....117 Volts AC

Signal Input.....None

A variation of ±10% is usally permissible.

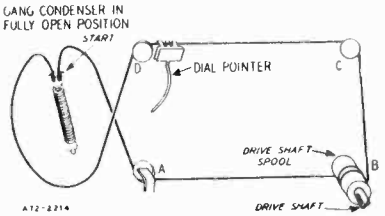
MODELS 84WG-2718A, -B,
84WG-2720A, 84WG-2724A

MONTGOMERY WARD

DRIVE CORD REPLACEMENT

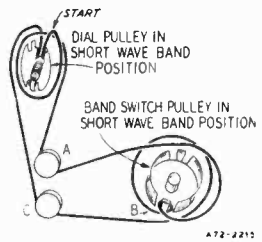
DIAL POINTER CORD

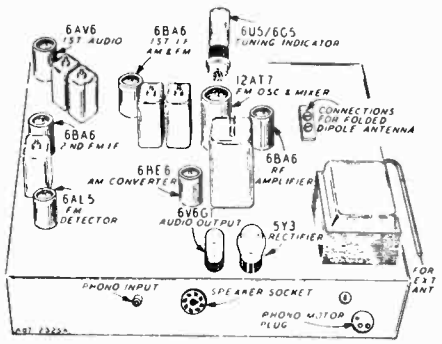
Use a new 10X66 drive cord assembly or a new length of cord 50 inches long for the installation. Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft spool with the turns progressing towards the front end of the drive shaft. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



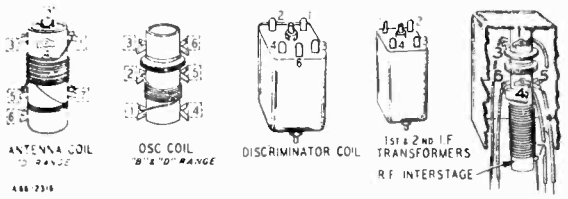
DIAL ROTATION CORD

Use a new 10X60 drive cord assembly or a new length of cord 21 inches long for the installation. Both the dial pulley and the band switch pulley must be turned to the short wave band position as shown in the illustration. Install the new cord exactly as shown then change the position of the band switch several times and note the movement of the dial.





This is a three band, eight tube (plus tuning eye and rectifier tube) receiver with automatic record changer, for the reception of both AM and FM stations. The R-F and I-F stages use the latest type high gain miniature type tubes and built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include the new Roto-Selector dial with only one band visible at a time, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, electro dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.



50 CYCLE AC OPERATION

If it is desired to operate this radio on a 50 cycle 105-125 volt AC power source no changes are necessary to the radio chassis.

If it is desired to use the record changer on a 50 cycle power supply, it will be necessary to replace the drive sleeve assembly on the record changer motor shaft with a 50 cycle drive sleeve assembly. This assembly is listed in the parts list.

To change the sleeve turn the recorder selector shelf to the 12" position and lift the turntable off of the record changer. Loosen the set screw holding the drive sleeve on the motor shaft and remove the old sleeve. Install the new 50 cycle drive sleeve and replace the turntable.

Ref. No.	Part No.	Description			Qty. Used in Set
		CAPACITORS			
C-1	26A483	Tuner and Gang Assembly			1
C-2, C-5	17A247	3.0-12 mmf		Trimmer	2
C-3, C-10, C-18, C-34, C-35, C-36, C-53	47X496	500 mmf		Ceramic	7
C-4, C-42	47X497	100 mmf		Ceramic	2
C-7	47X516	20mmf		Ceramic	1
C-8	47X500	5 mmf		Ceramic	1
C-9	17A255	1-8 mmf		Trimmer	1
C-11	47X499	47 mmf		Ceramic	1
C-12, C-13, C-44	47X498	47 mmf		Ceramic	3
C-14, C-15	Part of T-7 1st I-F (FM)				
C-16, C-22, C-23, C-26, C-27	47X507	5000 mmf		Ceramic	5
C-17, C-19, C-47, C-50, C-54, C-55	47X495	47 mmf		Ceramic	1
	D66203	.02 mf	400 V	Tubular	5
C-20, C-21, C-24, C-25, C-28	Part of T-9 2nd I-F (FM)				
C-29, C-57	47X501	68 mmf		Ceramic	3
C-30	45X361	5 mf	100 V	Dry Electrolytic	1
C-31	17A253	5-50 mmf		Trimmer	1
C-32	47X445	270 mmf		Molded	1
C-37	47X57	100 mmf		Molded	1
C-39	46X289	.00475 mf	180 V	Tubular	1
C-38A, C-38B	17A252	1.3-12 mmf		Dual Trimmer	1
C-40	47X516	20 mmf		Ceramic	1
C-41, C-43	D66403	.04 mf	400 V	Tubular	2
C-45, C-46	Part of T-8 1st I-F (AM)				
C-48, C-49	Part of T-10 2nd I-F (AM)				
C-51, C-59	B66103	.01 mf	200 V	Tubular	2
		MODELS 84WG-2718A, 84WG-2720A			
C-52	47X492	2700 mmf		Molded	1
		MODELS 84WG-2718B, 84WG-2724A			
C-52	47X528	1500 mmf		Molded	1
C-56	17A241	300-475 mmf		Trimmer	1
C-58	B66203	.02 mf	200 V	Tubular	1

MONTGOMERY WARD

MODELS 84WG-2718A, -B, 84WG-2720A, 84WG-2724A

Ref. No.	Part No.	Description			Qty. Used in Set
C-61	D66602	.006 mf	400 V	Tubular	1
C-62	45X351	20 mf	450 V	Dry Electrolytic	1
C-63	45X302	40 mf	450 V	Dry Electrolytic	1
C-64	B66503	.05 mf	200 V	Tubular	1
C-65A / C-65B	47X112	50-50 mmf		Dual Mica	1
C-69	A66504	.5 mf	100 V	Tubular	1
C-70A / C-70B	17A246	3.2-35 mmf		Dual Trimmer	1
C-71	D66302	.003 mf	400 V	Tubular	1
C-73	47X470	330 mmf		Molded	1

RESISTORS

Ref. No.	Part No.	Ohms	Watts		Qty. Used in Set
R-1 / R-6 / R-8	B83680	68	0.5	Carbon	3
R-2	C85223	22K	1.0	Carbon	1
R-3	B85563	56K	0.5	Carbon	1
R-4	B84104	100K	0.5	Carbon	1
R-5	B84103	10K	0.5	Carbon	1
R-7	C84563	56K	1.0	Carbon	1
R-9	C84393	39K	1.0	Carbon	1
R-10	B85222	2200	0.5	Carbon	1
R-11	B84273	27K	0.5	Carbon	1
R-12 / R-13	B83682	6800	0.5	Carbon	2
R-14	B84820	82	0.5	Carbon	1
R-15 / R-42 / R-46	B85225	2.2 meg.	0.5	Carbon	3
R-16 / R-18 / R-21	B85102	1000	0.5	Carbon	3
R-17 / R-47	B84223	22K	0.5	Carbon	2
R-19 / R-30	B85224	220K	0.5	Carbon	2
R-20	Part of 13X549 Cable and Socket Assembly				
R-22	43X217	6.2		Wire Wound	1
R-23	B85153	15K	0.5	Carbon	1
R-24	36X363	.5 meg.		Volume Control	1
R-25 / R-40 / R-41	B85105	1 meg.	0.5	Carbon	3
R-26	B85473	47 K	0.5	Carbon	1
R-27	40X286	3 meg.		Tone Control	1
R-28	B85475	4.7 meg.	0.5	Carbon	1
R-31	B83514	510K	0.5	Carbon	1
R-39	B83913	91K	0.5	Carbon	1
R-43	B84225	2.2 meg.	0.5	Carbon	1
R-44	C84273	27K	1.0	Carbon	1
R-45	B85474	470K	0.5	Carbon	1

TRANSFORMERS AND COILS

L-1	9A1881	Filament Choke Assembly	1
L-2 / L-4	9A1880	FM R-F Plate Choke	2
L-3	9A1946	FM R-F Coil	1
L-5	9A1882	FM Oscillator Plate Choke	1

MODELS 84WG-2718A, 84WG-2720A

T-1	9A1960	Di-Pole Antenna Assembly	1
T-2	9A1945	FM Antenna Coil	1

MODELS 84WG-2718B, 84WG-2724A

T-1	9A1968	Di-Pole Antenna Assembly	1
T-2	9A1966	FM Antenna Coil	1
T-3	9A1957	"D" Antenna Coil Assembly	1
T-4	26A436	Loop Antenna Assembly	1
T-5	9A1948	Oscillator Coil (FM)	1
T-6	9A1947	Interstage "B" & "D" Range Coil Assembly	1
T-7	9A1950	1st I-F Transformer (FM)	1
T-8	9A1934	1st I-F Transformer (AM)	1
T-9	9A1933	2nd I-F Transformer (FM)	1
T-10	9A1935	2nd I-F Transformer (AM)	1
T-11	9A1936	Discriminator Coil	1
T-12	53X286	Power Transformer	1
T-13	9A1918	"B" & "D" Oscillator Coil Assembly	1
T-14		Output Transformer	1

Ref. No.	Part No.	Description			Qty. Used in Set

MISCELLANEOUS

	12A482	12" E.D. Speaker complete with output transformer			1
	3A303	Tube socket—octal (8 prong) molded			3
	3A425	Tube socket (miniature)			5
	32X346	Tube shield (miniature			6
	32X388	Tube Shield (For 12AT7)			1
	3A436	Tube socket (For 12AT7)			1
	3A427	Tube socket (R-F Amp)			1
	3A304	Phono Motor Socket			1
	3A305	Phono Socket—Single pin			1
	2A377	Band Switch			1
	13X328	Line Cord and Plug Assembly			1
	26A486	Escutcheon and Crystal Assy. (Walnut)			1
	26A487	Escutcheon and Crystal Assy. (Blond)			1
	10A509	Tuner Buttons (Walnut)			6
	10A674	Tuner Buttons (Blond)			6
	28X320	Springs (Tuner Button)			6
	4X870	Escutcheon Eye (Walnut)			1
	4X1015	Escutcheon Eye (Blond)			1
	10A662	Knob, Band	Walnut		1
	10A667	Knob, Tuning	Walnut		1
	10A668	Knob, On-Off, Volume	Walnut		1
	10A669	Knob, Tone	Walnut		1
	10A670	Knob, Tuning	Blond		1
	10A671	Knob, Tone	Blond		1
	10A672	Knob, Band	Blond		1
	10A673	Knob, On-Off, Volume	Blond		1
	25X498	Tuning Eye Clamp			1
	25X1396	Tuning Eye Bracket			1
	13X549	Cable and Socket Assembly—Tuning Indicator			1
	6X21	Rubber Grammets	Mtg. Gang Cond.		4
	20X329	Condenser Cushion Stud	Mtg. Gang Cond.		4

DIAL AND DRIVE ASSEMBLY

	26A435	Dial Bracket Assembly	1
	26A484	Dial and Drum Assembly Complete with Dial Background, Collar, Dial Drum and Dial Scale	1
	15X221	Pointer	1
	26X500	Dial Drum Shaft	1
	26A440	Pulley and Collar Assembly (For dial drum shaft)	1
	26A437	Band Switch Pulley Assembly	1
	26X468	Band Switch Shaft	
	26A441	Crown Gear Assembly (For Mtg. to Band Switch)	2
	26A434	Idler Bracket Assembly	1
	25X1389	Drive Shaft Bracket	1
	26X467	Drive Shaft	1
	24X551	Drive Shaft Spool	1
	10X60	Drive Cord Assembly (Band Change)	1
	28X524	Tension Spring (Band Change)	1
	10X66	Drive Cord and Clip Assembly (Dial Drive)	1
	28X530	Tension Spring (Dial Drive)	1
	41X72	Light Shield (Band Indicator)	4
	41X35	Light Shield (Dial)	2
	7A103	No. 47 Pilot Light	6
	7A187	Pilot Light Socket Assembly (Dual)	1
	7A209	Indicator Light Socket Assembly	4

MODELS 84WG-2718A, 2720A

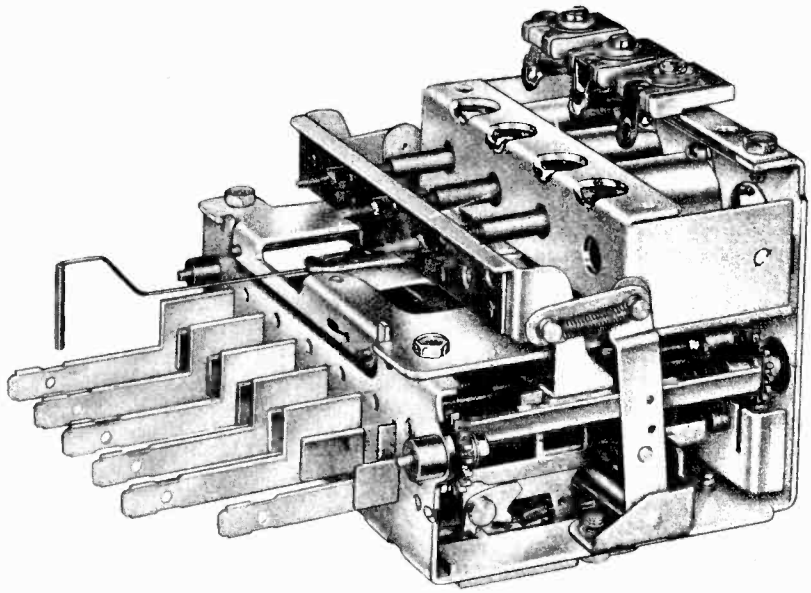
TYPE W-28A147 RECORD CHANGER PARTS

W-15X090-1	Motor Assembly, 60 cycles, 115-120 V.	1
W-17X412-11	50 Cycle Drive Sleeve Assembly	1
Shure P30-1	Crystal Cartridge and semi-Permanent Needle Assembly	1
	Semi-Permanent Needle (Specify part number and letters stamped on crystal)	1

MODELS 84WG-2718B, 2724B

TYPE V-28A150 RECORD CHANGER PARTS

V-1525-A or V-1923	Motor Assembly, 60 cycles, 115-120 V.	1
	Motor Assembly, 50 Cycles, 115-120 V.	1
Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly	1
	Semi-Permanent Needle (Specify port number and letters stamped on crystal)	1



GENERAL INFORMATION

DESCRIPTION

Automatic Tuner AT-58 is used in Motorola specific auto receivers using Chassis 8A, and also in Model CR8. Tuner AT-58 is adapted to fit any receiver using Chassis 8A or Model CR8 by simply using the correct pointer and push buttons.

This is a 3-gang permeability type tuner, mechanically operated by movement of its push buttons. Five pre-set and one manual tuning positions are provided. The frequency range is 535 to 1600 Kc. The pre-set positions can be set in any sequence to any frequency within this range.

SERVICE TOOLS

The simplicity of the tuner allows easy servicing with:

1. 1/4" open end and 1/4" box end wrench.
2. A stiff steel hook 1/16" diameter made of 1/8" rod, ground down and shaped like a #5 to #10 size crochet hook, to hook and unhook the springs.
3. Slab head wrench for coil adjustment: #2/56 head.

TO REMOVE TOP DECK

Unscrew two #8 sheet metal screws (45) on the back of the tuner and two #8 sheet metal screws (45) on the top front of the tuner. (Do not unscrew screws (45) at trimmer bracket). Before removing top deck, unhook springs (53) and links (25). Grasp top deck and lift up and tip back. This leaves both decks open for servicing. See Figures 1 and 2.

SERVICING LOWER DECK

Looking at the top of the lower deck (with front to you), on the right we have the manual drive lead screw assembly (42). The other 5 assemblies (43) are the station set-up screw assemblies.

Note that all assemblies can be easily lifted out after springs (50) are unhooked.

Note also that unless a push button arm (1) is pushed in, all assemblies lay flat. When a push button arm (1) is pushed in, the assembly is tilted about 30°.

Visual inspection will show correct location of all springs in the assemblies and those which hold down the assemblies.

Note action of gear train as manual knob is turned and push button arm is pushed in so gears mesh. Automatic tuning buttons can be checked for any binding by trying each button at their present setting.

DRIVE ARM ADJUSTMENT

It is very important that the carriage drive assembly (12) be correctly adjusted in its bearings so as not to bind or be too loose and allow it to twist and force the tuner out of alignment.

On the left side of the lower deck, you will find a set screw (47) and lock nut (30) for assembly adjustment. Note that the assembly is floated in the base bracket (7) between two ball bearings (4), one on each end. Adjust by loosening lock nut (30) and then turn set screw (47) so that all bearing play is eliminated but yet carriage drive assembly (12) moves freely. Tighten lock nut (30) after adjustment. Before hooking spring (54), tip the tuner several times to make sure carriage drive assembly (12) is free enough to swing up or down by its own weight.

POINTER REPLACEMENT

The pointer is easily removed by downward and outward pressure to unhook it from the pointer arm (2). Pointer is replaced by reversing procedure. Be sure that the correct pointer is used; pointers vary in length, depending on which receiver tuner is to be used in. See Specific Radio Service Manual (i.e., FD8, OE2, etc.) for part number of pointer.

MODEL AT-58 MOTOROLA INC.

ANT., RF OR OSC. CORE REPLACEMENT

The tuner cores (18) are easily unscrewed from clip (14) and pulled out when carriage assembly (13) is extended. Note that the cores are coded with a paint dot on the screw portion; always use replacement cores bearing the same color coding. When ordering replacement cores, always specify color coding together with part number.

TO SET THE PUSH BUTTONS

1. Turn receiver "on" and allow it to warm up for a few minutes.

2. Push the first automatic tuning button in as far as it will go and HOLD IT THAT WAY.

3. With the tuning knob, tune in the station you desire to set up. Tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality. The pointer will indicate station being set up. Release button and knob after tuning in station.

4. Follow above steps 2 and 3 for the remaining four buttons.

SERVICE INFORMATION

The entire top deck of this tuner may be removed, while tuner is mounted in receiver chassis, allowing complete accessibility to all mechanical parts.

TO REPLACE PARTS ON LOWER DECK

Remove top deck of tuner (follow previous instructions). This exposes the 5-station set up screw assemblies (43) and manual lead screw assembly (42). These may be removed by unhooking springs (50) and lifting them out.

If push button arms or slider arms are to be replaced, it will be necessary to remove spring (54); then take out screws (46) from bottom of tuner to allow bracket (7) to move back and permit push button arm assemblies (1) or slider arms (3) to be removed after springs (53) have been removed.

Patience is required to assemble push button arm assemblies (1) and slider arms (3) back into bracket (7). Reassemble tuner by working in reverse order.

Test all parts of lower deck for free operation before assembling to upper deck.

TO REPLACE TOP DECK

Make sure that carriage drive assembly (12) is tipped back (spring (54) unhooked) and carriage assembly (13) carrying the tuning cores is out. Slip in the top deck, making sure the spring washer (70) on the manual drive assembly (42) is between the drive assembly gear and the back of the base before putting in screws and locking the two decks together.

SERVICE HINTS

1. STATION DRIFT (Push Buttons). Check the flat friction spring (56) for breaks or permanent set.

2. TUNER STICKING. Check collars on manual drive assembly (42). If they are cocked or stuck, replace with new assembly.

3. HARD TUNING FOR PRE-SETTING. Check lubricant on the gear train. It should be Stayput #512 or equal.

4. TWISTING CARRIAGE PLATE. Due to poor setting of carriage drive assembly (12). See "Drive Arm Adjustment".

5. ROUGH DRIVE - Check die cast gears (19,20 & 21). Check for lubrication (Stayput #512). Check manual drive bushings.

6. LATCH BAR JAMMING OUT. Check the latch bar spring (51) on the back. If it is bent out of shape, turn it 180° and reshape. If it is weak-replace.

7. STICKING POINTERS. Check the pointer bearing (6) and make sure the linkage of the assembly is free.

8. POINTER NOT RE-POSITIONING OR SLOPPY ACTION. Be sure to check the torsion spring (58) (on the under side of the top deck) for breakage or slipping from the notches on the base and the pointer link plate (34).

MOTOROLA INC. MODEL AT-58

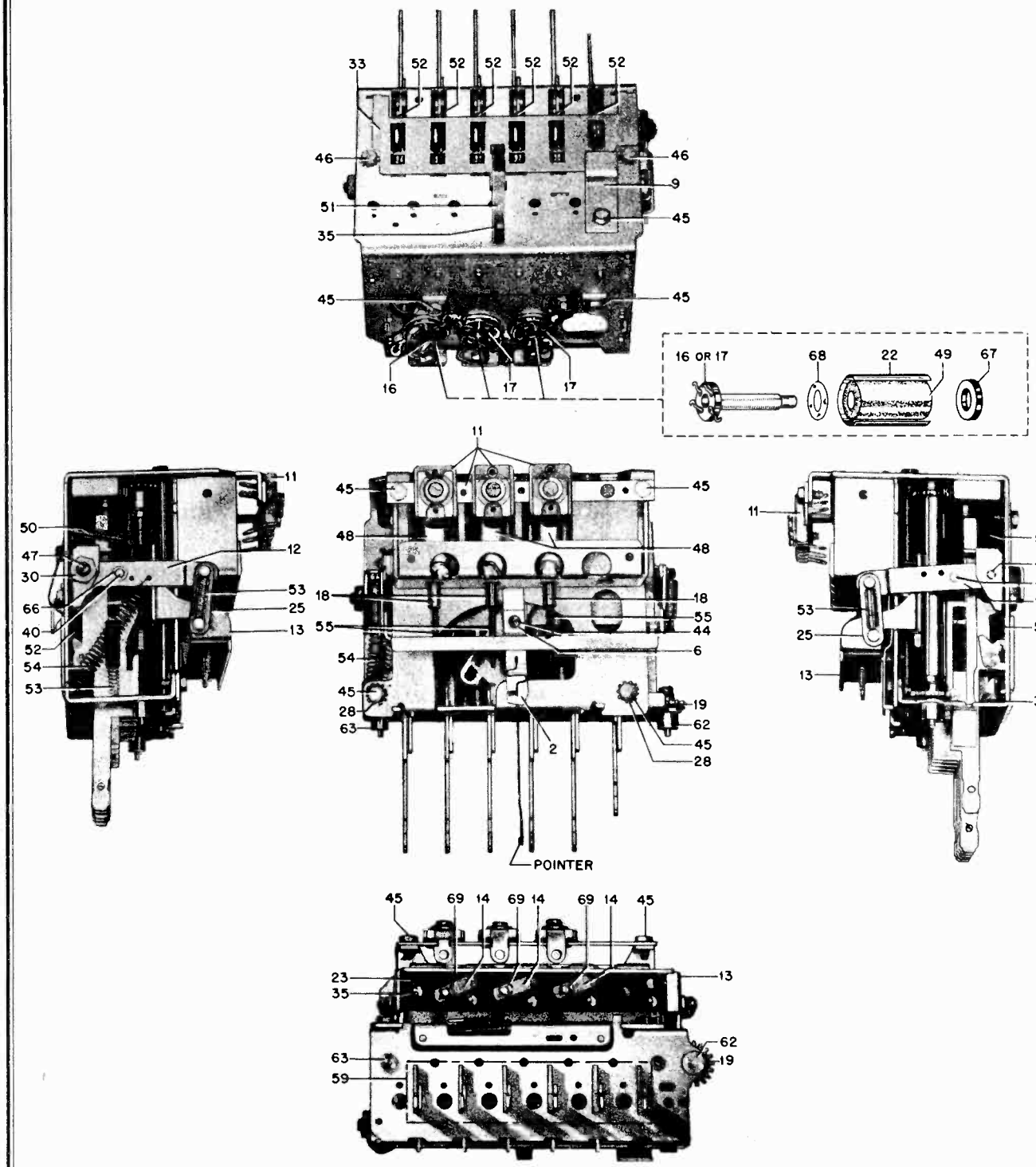


FIGURE 1. AUTOMATIC TUNER AT-58 PARTS LOCATIONS

MODEL AT-58 MOTOROLA INC.

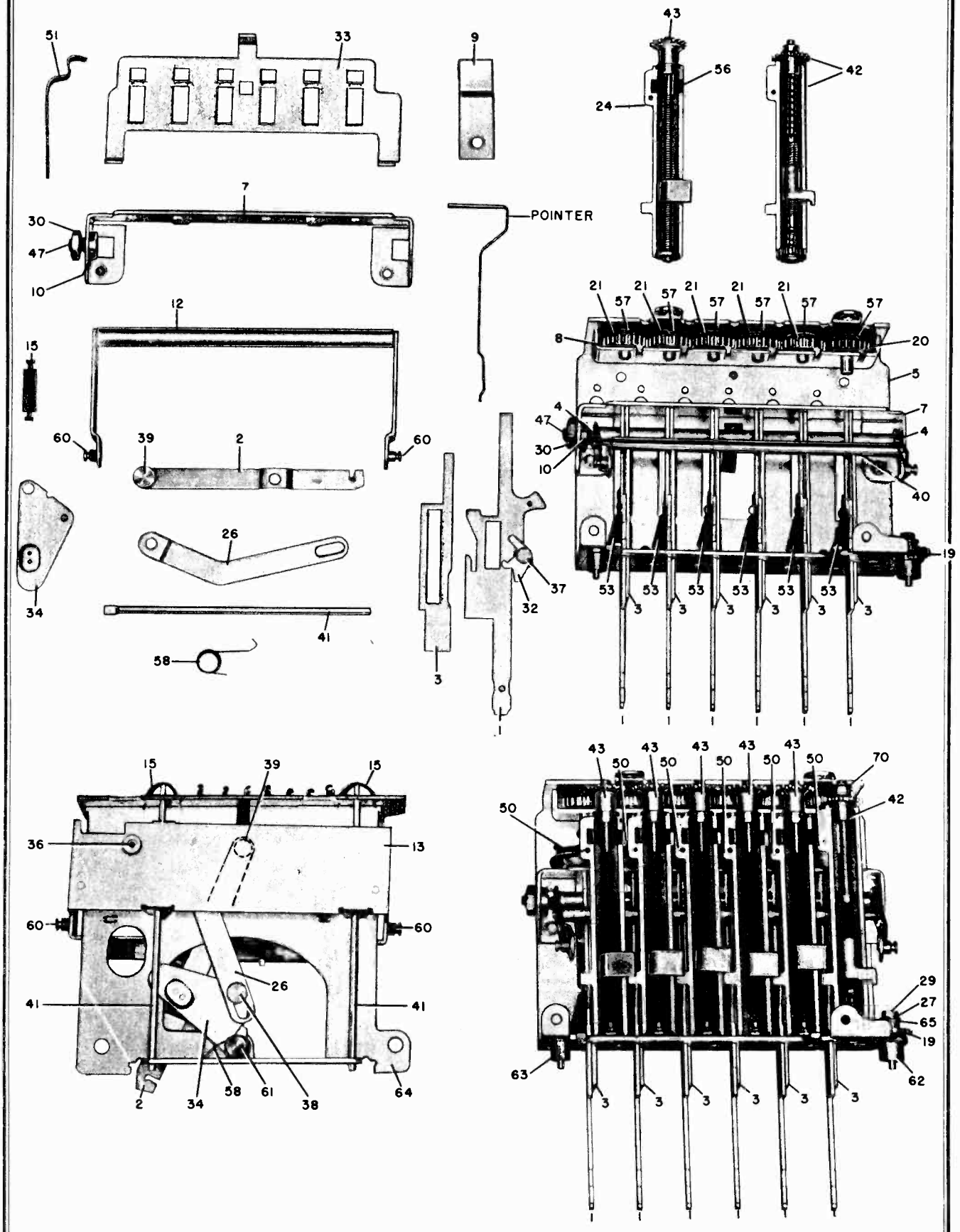


FIGURE 2. AUTOMATIC TUNER AT-58 PARTS LOCATION

REPLACEMENT PARTS LIST

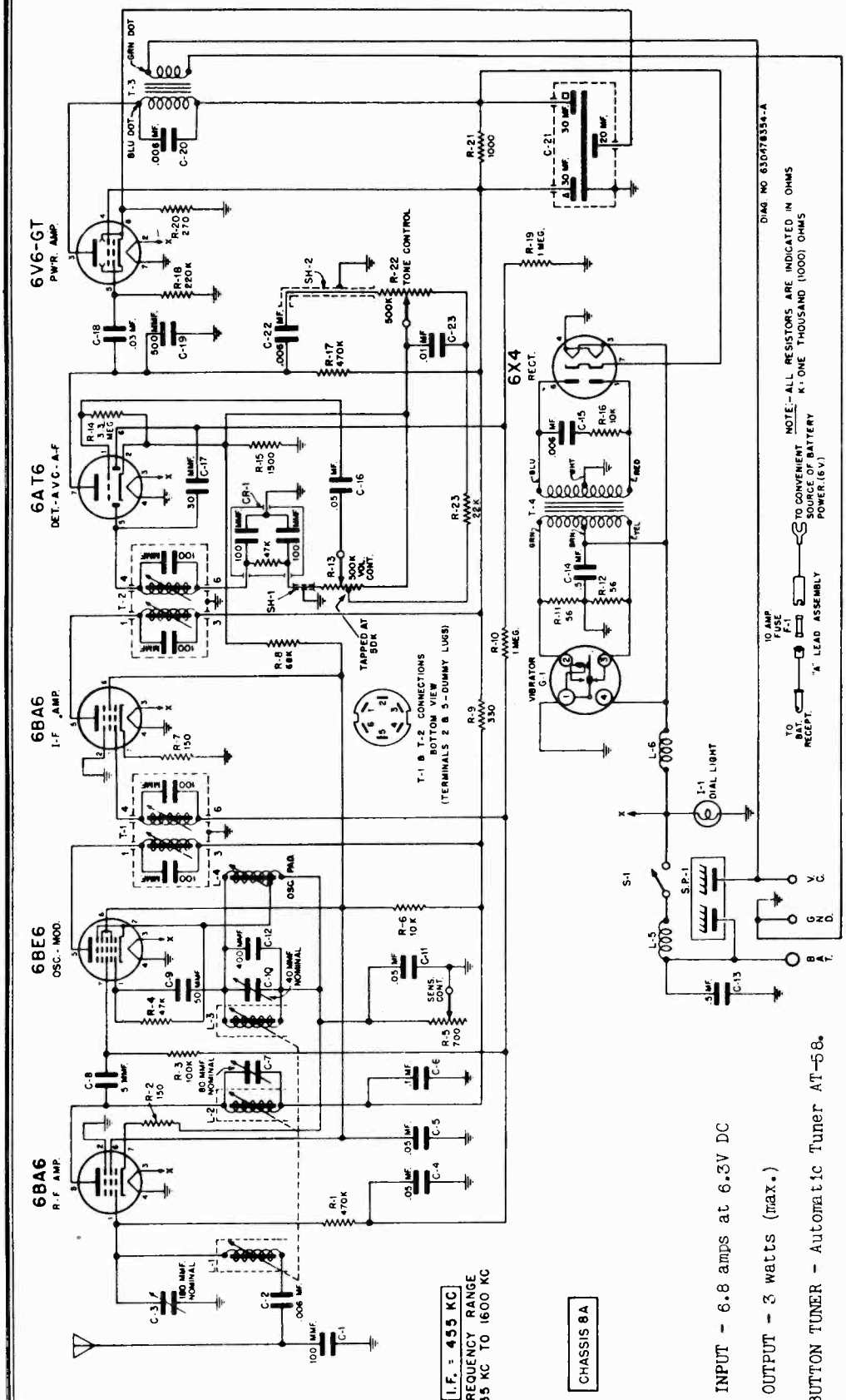
REF. NO.		PART NO.	DESCRIPTION
1		1X472775	Arm Assembly: push button arm with trip pawl
2		45A472698	Arm, pointer
3		45A472692	Arm, slider
4		43A4326	Ball, steel: .125 diameter (tuner drive carriage bearings)
5		1X472773	Base, Gears & Stud Assembly: consists of tuner base, station set-up gear train and locating studs only
6		43A472889	Bearing, pointer
7		1X472776	Bracket & Bushing Assembly
8		7A472723	Bracket, gear retaining
9		7A482508	Bracket, latch plate retaining
10		43A472684	Bushing, drive arm adjustment
11		20A480600	Capacitors & Bracket Assembly: 3 mica trimmers on bracket
12		1X472777	Carriage Drive Assembly
13		1X472788	Carriage, Insulator & Studs Assembly
14		42A70184	Clip, core adjustment: phosphor bronze
15		42A472671	Clip, guide rod retaining
16	*	24B71879	Coil, oscillator
17	*	24B71881	Coil, RF & Antenna
18	*	46K472679	Core, Iron & Screw (tuning cores)
19		44B472721	Gear, idler
20		44A472662	Gear, manual
21		44A472676	Gear, station set-up
22		14A70876	Insulator, coil sleeve
23		14A472680	Insulator, core: bakelite (on carriage plate)
24		45B472696	Lever, stop actuating (on station set-up lead screw)
25		45A472689	Link, drive
26		45A472708	Link, pointer drive
27		4S7683	Lockwasher: #4 internal; cad pl (idler gear mtg)
28		4S7657	Lockwasher: #8 external; cad pl (top deck mtg)
29		2S8376	Nut: 4-40 x 3/16 hex; nkl pl (idler gear mtg)
30		2S7009	Nut: 10-32 x 3/8 hex; cad pl (setscrew lock)
31		35A472695	Pad, felt (push button arm cushion)
32		46A472718	Pawl, trip
33		64B472716	Plate, latch
34		64A472706	Plate, pointer link
35		5S8479	Rivet: .088 x 1/8; steel; nkl pl (latch spring & core ins. mtg)
36		5A472705	Rivet, eccentric shoulder
37		5A472670	Rivet, shoulder (pawl mtg)
38		5A472648	Rivet, shoulder
39		5A472649	Rivet, shoulder
40		47A472678	Rod, drive
41		47A472682	Rod, guide
42		1A472720	Screw Assembly, manual lead: complete with gears, stop & stop actuating lever
43		1A472722	Screw Assembly, station set-up: complete with gear & carriage stop; stop actuating lever not included
44		3S1921	Screw: 2-56 x 1/8 slotted binderhead machine screw; cad pl (pointer bearing mtg)
45		3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cad pl
46		3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw; cad pl (push arm brkt. mtg)
47		3S3852	Setscrew: 10-32 x 3/8 allen head cup point machine screw (tuner drive carriage mtg)
48		26A70878	Shield, coil
49		43A70881	Sleeve, coil: powdered iron
50		41A472675	Spring, coil
51		41A472780	Spring, latch bar
52		41A472694	Spring, coil
53		41A485614	Spring, coil
54		41A472781	Spring, coil
55		41A77595	Spring, coil slug
56		41A472681	Spring, flat friction (on station set-up lead screw)
57		41A472685	Spring, set-up gear
58		41A472659	Spring, torsion
59		35A485615	Strip, anti-rattle: felt (cemented to front of tuner base to prevent push button arms from rattling. NOTE: If this strip is used on tuner not previously equipped with one, replace push button arm springs with stronger springs, Part No. 41A485614)
60		46A472686	Stud
61		46A472657	Stud, link
62		46A472669	Stud, gear mounting
63		46A472672	Stud, locating
64		1X472782	Top Deck Assembly: complete top deck of tuner including coils
65		4S7551	Washer: 9/32 x .120 x .025 thick; brass (idler gear mtg)
66		4K73809	Washer, "C" (drive rod retainer)
67		4A70873	Washer, coil spacer
68		4A74571	Washer, paper
69		4A70956	Washer, slug insulator: bakelite
70		4A473875	Washer, spring (on manual lead screw)

* Specify color of paint dot coding on old part when ordering.

MODELS OE8, PC3, PC8, SR6, 8FDT, 8GMT, etc.
CHASSIS 8A

MOTOROLA INC.

MODELS BK8, BK8X, CT8, FD8, KR8, NH8, OE2



POWER INPUT - 6.8 amps at 6.3V DC

POWER OUTPUT - 3 watts (max.)

PUSH BUTTON TUNER - Automatic Tuner AT-58.

TO SET THE PUSH BUTTONS

1. Turn radio ON and allow it to warm up for a few minutes.
2. Push the number "1" button in as far as it will go and HOLD IT THAT WAY.
3. With the tuning knob, tune in the station you desire to set up. Tune carefully until you are exactly on the station; tuning to either side of it will result in poor quality. Release button and knob after tuning-in station.
4. Follow above steps 2 and 3 for the remaining four buttons.

ALIGNMENT

EQUIPMENT REQUIRED

1. A special tool for adjusting the tuner cores. Use Alignment Tool, Motorola Part No. 66A76278.

2. A small screwdriver for IF & RF alignment.

3. An accurately calibrated AM modulated signal generator.

4. A low range output meter.

5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1. The 21" coaxial lead needed in its construction is the same type as used for lead-in on Motorola car antennas.

PROCEDURE

1. Expose alignment adjustment screws as follows:

Remove the top and bottom covers; replace three front plate screws to hold front plate in position after making sure that the plastic idler gear engages gear on tuner and power switch operating stud engages power switch throw plate. On some models it will also be necessary to remove the escutcheon and escutcheon spacer.

2. Connect a PM speaker (3.2 ohm VC) to VC and GND terminals and connect the output meter across voice coil.

3. Connect a 6 volt storage battery to GND (or chassis) and BAT terminals of receiver; turn receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum. Push "M" button (far enough so it will lock in) to place tuner in manual position.

4. Sensitivity Control. This control must be set to provide 2 ± 1/2 volts bias on the RF tubes before alignment is started. Measure this voltage between sensitivity control terminal and chassis.

5. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

6. IF & RF ALIGNMENT - See Alignment Chart

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

7. SETTING THE SENSITIVITY CONTROL - After alignment is completed, set signal generator to 600 Kc and adjust its output to 1.3 microvolts. Adjust the sensitivity control to provide 1 watt output (1 watt = 1.79 volts on output meter).

8. ANTENNA TRIMMER ADJUSTMENT - Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

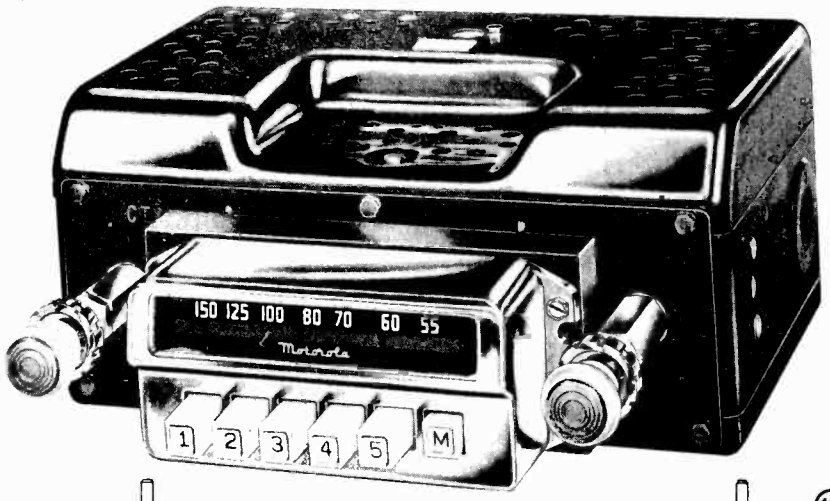
9. POINTER ADJUSTMENT - The pointer can be moved slightly for calibration correction by turning the eccentric adjustment rivet. This rivet has a 1/4" hex head and is exposed only when tuner is tuned to high frequency end. See Figure 1 for its location.

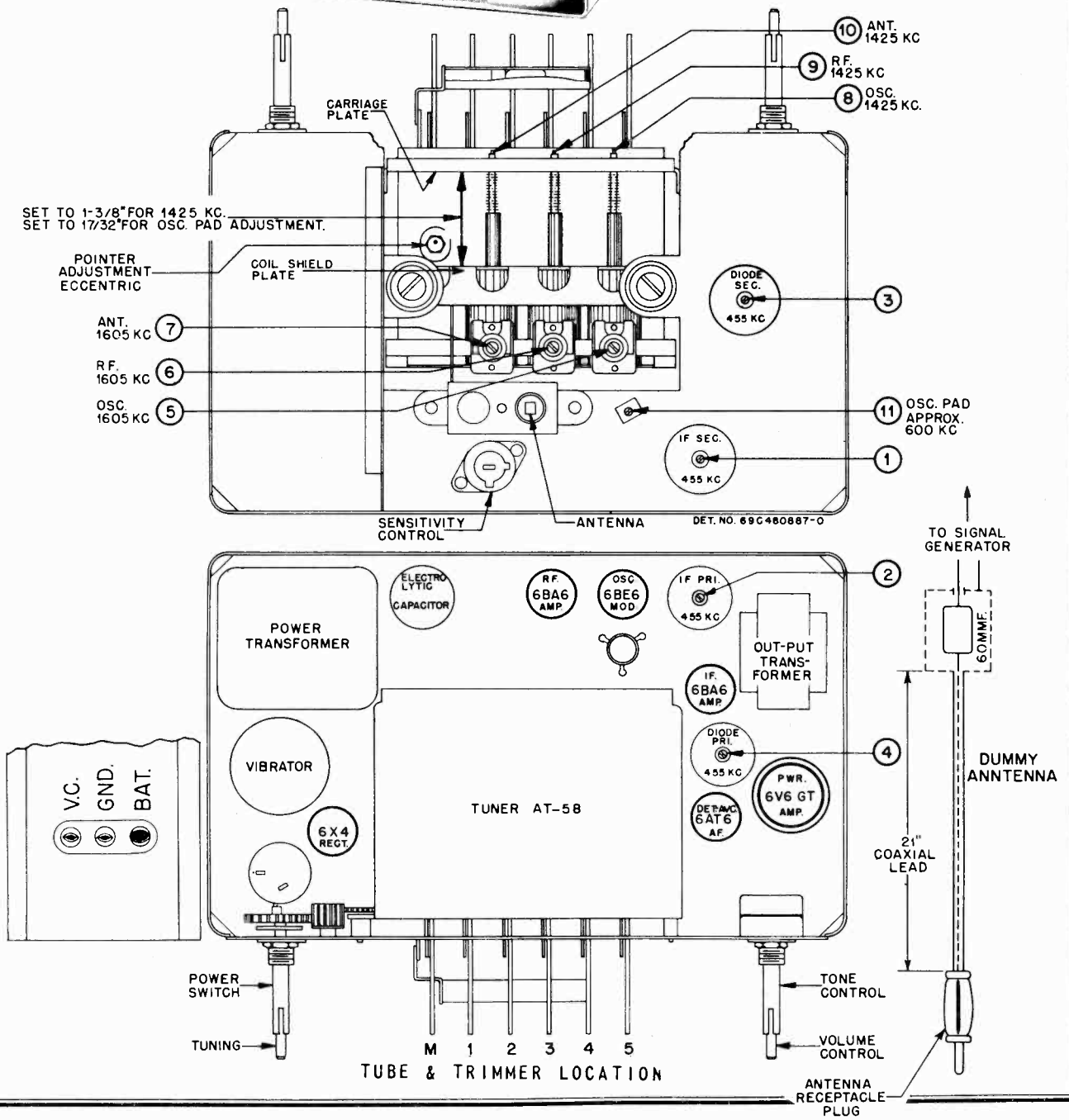
STEP	TUNER SET TO	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR FREQUENCY	ADJUST TRIMMER OR CORE	REMARKS
1.	High frequency end (cores out)	.1 mf	Hi side - 6BE6 grid (pin #7) Lo side - chassis	455 Kc	1,2,3&4	Peak for maximum in order indicated. Check by repeating procedure.
2.	High frequency end. Cores should project 1-1/8" from cans. (Screw out if necessary).	Special -See Fig. 1.	Ant. receptacle through special dummy.	1605 Kc	5,6 & 7	Peak for max. in order indicated.
3.	Set spacing between carriage plate and coil shield plate to 1-3/8".	"	"	1425 Kc	8, 9 & 10	Peak for max. in order indicated.
4.	Set spacing between carriage plate and coil shield plate to 17/32"	"	"	Turn generator power off.	11	Peak oscillator padder for maximum noise. See *
5.	Approx. 1400 Kc	-	-	-	7	With set installed in car, peak antenna trimmer for maximum noise or volume of a weak station. Car antenna should be fully extended.

* If padder core (11) must be moved more than 1/2 turn from its original position, repeat steps 2, 3 & 4 until it is necessary to move the padder core less than 1/2 turn in this step.

CHASSIS 8A,
All Models

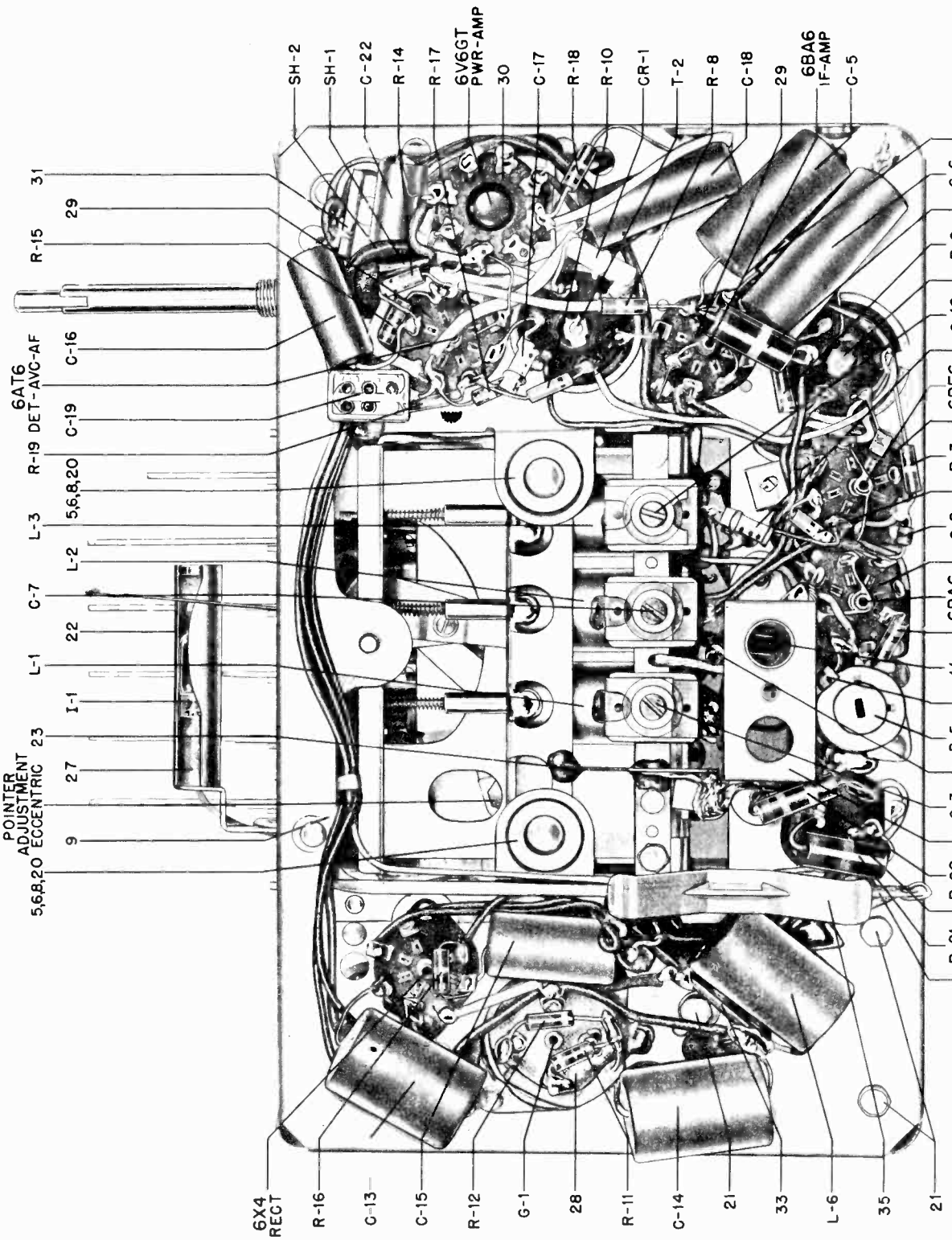
MOTOROLA INC.





MOTOROLA INC.

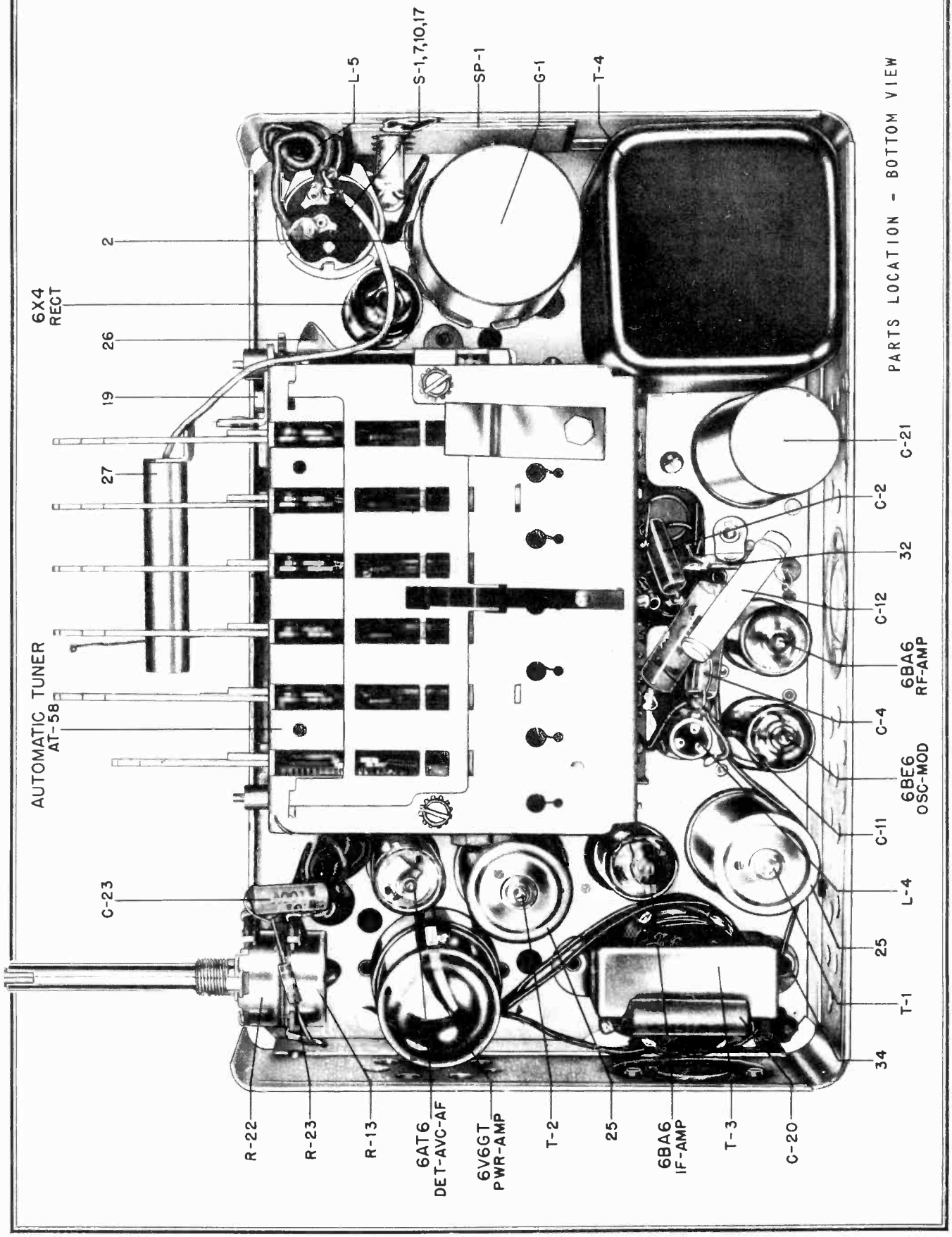
CHASSIS 8A,
All Models

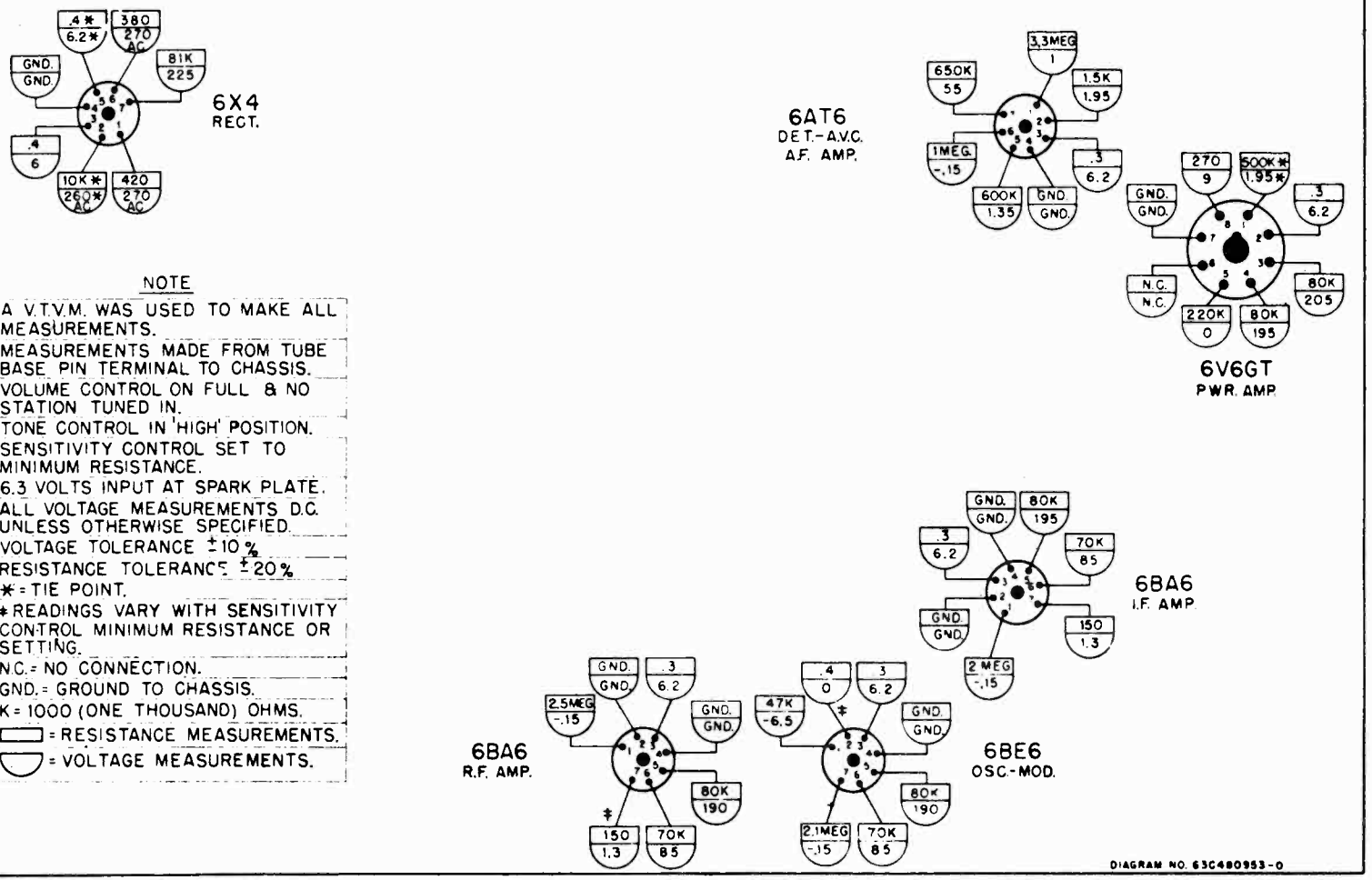


CHASSIS 8A PARTS LOCATION - BOTTOM VIEW

CHASSIS 8A,
All Models

MOTOROLA INC.





CHASSIS 8A ELECTRICAL PARTS

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION
C-1	21B77562	Ceramic: 100 mmf 500V .....
C-2	8A4529	Paper: .006 mf 100V .....
C-3	20A480600	Trimmer, variable mica: 50 to 180 mmf; on same bracket as C-7 and C-10 .....
C-4	8A13514	Paper: .05 mf 100V .....
C-5	8A14791	Paper: .05 mf 400V .....
C-6	8K13166	Paper: .1 mf 400V .....
C-7	20A480600	Trimmer, variable mica: 50 to 180 mmf; on same bracket as C-3 & C-10 .....
C-8	21K70720	Molded: 5 mmf 500V .....
C-9	21K74661	Ceramic: 50 mmf 300V .....
C-10	20A480600	Trimmer, variable mica: 30 to 60 mmf; on same bracket as C-3 & C-7 .....
C-11	8A13514	Paper: .05 mf 100V .....
C-12	21A71872	Ceramic: 400 mmf 5% 500V .....
C-13	8A17028	Paper: .5 mf 100V .....

CHASSIS 8A, All models — MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
C-14	8A17028	Paper: .5 mf 100V
C-15	8A12840	Paper: .006 mf 1600V
C-16	8A13514	Paper: .05 mf 100V
C-17	21K74661	Ceramic: 50 mmf 300V
C-18	8A71911	Paper: .03 mf 400V
C-19	21R6689	Mica: 500 mmf 500V
C-20	8A71910	Paper: .006 mf 400V
C-21	23A473015	Electrolytic: 30-30-20 mf/350-300-25V...
C-22	8A71910	Paper: .006 mf 400V
C-23	8A472754	Paper: .01 mf 100V
CAPACITOR-RESISTOR		
CR-1	21A472571	Capacitor-Resistor: 100 mmf-47,000 ohms 100 mmf
FUSE		
F-1	65A10266	Fuse: 10 amp; type 3AG
VIBRATOR		
G-1	48B3333	Vibrator: non-sync; 4 pin
DIAL LIGHT		
I-1	65X10867	Bulb: 6.3V; .25A; bayonet base; clear...
COILS		
L-1,2	24B71881	RF & Antenna coil (specify color of paint dot on old coil when ordering)
L-3	24B71879	Oscillator coil (specify color of paint dot on old coil when ordering)
L-4	24B70227	Oscillator padder coil: complete with iron tuning core
L-5	24K78026	Choke
L-6	24A472535	Choke, hash
RESISTORS		
NOTE:	All resistors are 1/2W 20% carbon insulated type unless otherwise specified.	
R-1	6R6032	470,000
R-2	6R3982	150
R-3	6R6075	100,000
R-4	6R6056	47,000
R-5	18K77552	Sensitivity control: 700 ohms
R-6	6R476060	10,000 2W
R-7	6R3982	150
R-8	6R6001	68,000
R-9	6R6010	330
R-10	6R6004	1 meg
R-11	6R5614	56 10%
R-12	6R5614	56 10%
R-13	18A472863	Volume Control 500,000 ohms; tapped at 50,000 ohms (dual-also includes tone control R-22)
R-14	6R2118	3.3 Meg
R-15	6R6161	1500
R-16	6R6054	10,000
R-17	6R6032	470,000
R-18	6R6015	220,000
R-19	6R6004	1 meg
R-20	6R6336	270 10% 1W
R-21	6R476004	1,000 2W
R-22	18A472863	Tone Control: 500,000 ohms (dual - also includes volume control R-13)
R-23	6R6028	22,000
SWITCH		
S-1	1A472891	Power Switch: complete with mounting stud
SHIELDS		
SH-1	30K472998	Cable, volume control: single-conductor; white; shielded
SH-2	30K472997	Cable, volume control: single-conductor; blue; shielded
SPARK PLATE		
SP-1	1A472606	Spark Plate Assembly
TRANSFORMERS		
T-1,2	24B76553	Diode or IF, 455 Kc: complete with padding capacitors & tuning cores, but less shield
T-3	25B70171	Output transformer
T-4	25B472533	Power transformer
TUNER		
	1X472770	AT-58 Automatic Tuner (see separate Service Manual-Motorola Part No. 54P480955 for complete breakdown)

CHASSIS 8A MECHANICAL PARTS

REF. NO.	PART NO.	DESCRIPTION
1	7A472580	Bracket, antenna receptacle mtg
2	42A4215	Clip, vibrator grounding
3	15K472593	Cover, bottom
4	15C472592	Cover, top
5	4A51289	Cupwasher (tuner mtg)
6	37A12949	Grommet, rubber (tuner mtg)
7	4S7657	Lockwasher: #8 external; cad. pl. (power sw. mtg)
8	4S7671	Lockwasher: #8 split; cad. pl. (tuner mtg)
9	29R5239	Lug, soldering
10	64A472735	Plate, throw (power switch actuating plate)
11	1X70641	Receptacle, antenna
12	5S7771	Rivet: .088 x 3/16 steel; nickel plated ((tube socket mtg)
13	7S7706	Rivet: .122 x 1/8 steel; nickel plated (term. strip mtg)
14	5S7707	Rivet: .122 x 5/32 steel; nickel plated (tube socket mtg)
15	5S7701	Rivet: .122 x 3/16 steel; nickel plated (vib. socket & output trans. mtg)
16	5S7751	Rivet: .122 x 1/4 steel; antique copper finish (spark plate mtg)
17	3S7150	Screw: #8 x 3/16 slotted binderhead machine screw, cad. pl. (pwr. switch mtg)
18	3S7456	Screw: #8 x 1/4 PKA slotted acorn head sheet metal screw; antique copper finish (housing screws)
19	3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cad. pl (pilot light socket mounting)
20	3S7154	Screw: 8-32 x 1/4 slotted binderhead machine screw; cad. pl. (tuner mtg)
21	3S3397	Screw: #8 x 5/16 PKZ plain hex head sheet metal screw; cad pl. (pwr trans mtg)
22	1X473150	Shield Assembly, light
23	26A473201	Shield, hash
24	26A472560	Shield, hash
25	1A71049	Shield & Sleeve Assembly (for T-1 & T-2)
26	26A472602	Shield, tuner
27	9A472905	Socket, pilot light: includes brackets..
28	9A70208	Socket, tube: 4 pin; with grounding lug (vibrator socket)
29	9A472534	Socket, tube: miniature; 7 prong
30	9A6788	Socket, tube: octal
31	31K27504	Strip, terminal: 1 insulated lug, #1 mtg
32	31K86126	Strip, terminal: 2 insulated lugs, #2 mtg
33	31A472574	Strip, terminal: 4 insulated lugs, #4 mtg
34	4S7555	Washer: 1/4-.128-.033; steel; cad. pl. (output trans. mtg)
35	39A26088	Wiper, grounding

RECEIVER AND SPEAKER INSTALLATION

Install the antenna following instructions supplied with antenna. (Use Motorola Antenna M-276, M-277, M-280, M-255 or M-306).

Refer to Figure 1 for installation detail.

1. Expose the radio openings in the instrument panel.
2. Screw the four speaker mounting screws into the holes provided in the back of the grille. The screws are thread-forming type and may start hard; use a 1/4" Spin-tite wrench for easier installation. Install the speaker on the screws as shown.
3. Assemble the receiver mounting bracket to instrument panel brace. Do not tighten as yet.
4. Plug antenna lead-in into antenna receptacle located on the top of the set.
5. Remove knobs and mounting nuts from receiver and lift receiver into position behind instrument panel.
6. Holding receiver in position, place mounting nuts on control shaft bushings and tighten securely.
7. Assemble receiver mounting bracket to receiver rear mounting stud. Use the hole which most closely lines up with the receiver rear mounting stud. Adjust position of the mounting bracket so the receiver is supported without any undue strain being placed on the control shafts bushings, then tighten all mounting nuts.
8. If the receiver is installed in a Plymouth car,

POWER INPUT - 9 Amps at 6.3V

POWER OUTPUT - 6 watts (max.)

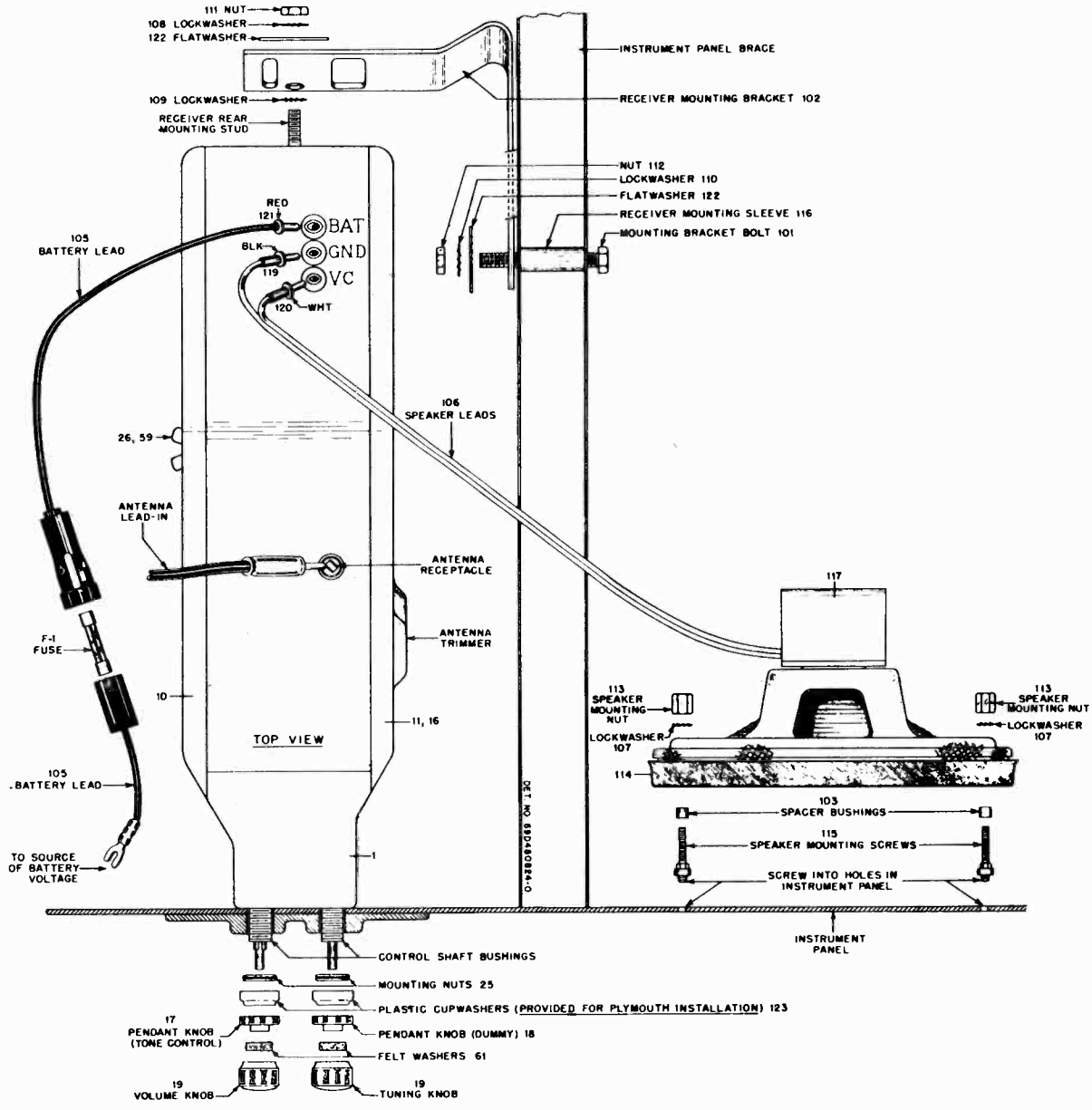


FIGURE 1. RECEIVER & SPEAKER INSTALLATION

use the plastic cup washers to cover the exposed portions of the shaft bushings.
9. Place the tone control and dummy pendant knobs on the shafts.
10. Place a felt washer over each pendant knob.
11. Place knobs on volume and tuning shafts and tighten setscrews securely.
12. Connect speaker leads as shown.
13. Connect the battery lead plug terminal to receiver receptacle marked "BAT" and the lug terminal to a convenient source of battery voltage.
14. Turn radio on. (See OPERATING INSTRUCTIONS). With the dial set to 1400 Kc, the volume control on full, and the antenna fully extended, adjust the antenna trimmer for maximum volume of a weak station or background noise.

TO SET THE PUSH BUTTONS

1. Turn radio on by pushing the top button "in". Allow radio to warm up for a few minutes.
2. Push the number "1" button in as far as it will go and HOLD IT THAT WAY.
3. With the tuning knob, tune in the station you desire to set up. The pointer will indicate the frequency of the station. Tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality. Release button and knob after tuning in station.
4. Follow above steps 2 and 3 for the remaining four buttons.

WARNING

Many late model cars develop exceedingly high voltage due to improper adjustment of voltage regulator; this shortens life of radio tubes, vibrator and all other car electrical equipment. If the voltage exceeds 7.4 volts with no load on a fully charged battery when motor is running at a speed which corresponds to 35 miles per hour, the voltage regulator is defective. Have your auto mechanic replace the voltage regulator.

ELIMINATE INTERFERENCE AS FOLLOWS:

1. Install generator capacitor (Part No. 8A4491) as shown in Figure 2. **WARNING:** Do not connect capacitor to field terminal.

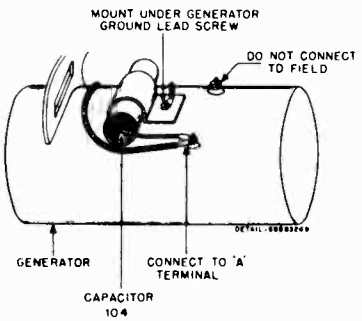


FIGURE 2.

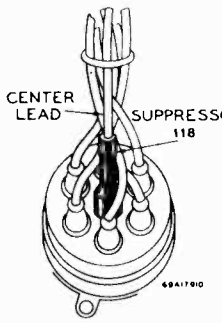


FIGURE 3.

2. Install distributor suppressor as shown in Figure 3.
3. When checking the car for motor noise, clamp the hood down tight. If necessary, install Hood Bond at the shoulder so that the hood makes a good ground to the cowl of the car on the side the antenna is mounted.

OPERATING INSTRUCTIONS

POWER SWITCH. The top button turns the radio ON and OFF. Radio is ON when button is in. Alternate pushes on this button will turn radio on and off.

VOLUME CONTROL. The left-hand knob operates the volume control.

MANUAL TUNING. Push the "M" button in far enough so that it will lock in, then tune stations with the right-hand knob. The dial scale is read in kilocycles by adding one zero to the figures. Always tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality.

PUSH BUTTON TUNING. After push buttons have been set up, it is only necessary to push in the button (1, 2, 3, 4 or 5) that has been set to the desired station. Push the button far enough so that it will lock in. The dial pointer will indicate the frequency of the station being received.

TONE CONTROL. Tone can be varied by turning pendant tone knob which is located on the same shaft but behind the volume knob.

ALIGNMENT

EQUIPMENT REQUIRED

1. A special tool for adjusting the tuner cores. Use Alignment Tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 4. The 21" coaxial lead needed in its construction is the same type as used for lead-in on Motorola car antennas.

PROCEDURE

1. Remove the right and left housing covers. Also remove the chrome plated escutcheon from the front of the set. All adjustments are now exposed.
2. Connect a PM speaker (3.2 ohm VC) to VC and GND. terminals and connect the output meter across the voice coil.
3. Connect a 6 volt storage battery to chassis and BAT. terminals of receiver; turn receiver on and allow it to warm up for a few minutes. Push "M" button to place tuner in manual position. Set re-

ceiver volume control at maximum and tone control to treble (high) position.

4. Sensitivity Control. This control must be set to provide 2 ± 1/2 volts bias on the RF tubes before alignment is started. Measure this voltage between sensitivity control terminal and chassis.

5. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

6. IF ALIGNMENT

A. Connect high side of signal generator through .1 mf capacitor to 6BE6 grid (pin #7) and the low side to chassis. Set generator to 455 Kc and peak adjustments (1, 2, 3 & 4), in this order, for maximum output.

7. RF ALIGNMENT

A. Connect signal generator to antenna receptacle through special dummy antenna (60 mmf capacitor in series with 21" coax lead).

B. With the tuning knob, tune to the extreme high frequency position and screw coil cores out so that at least 1-1/8" of all three cores shall be outside of the coil shield can. Set signal generator to 1605 Kc and peak trimmers (5, 6 & 7), in this order.

C. Turn the tuning knob until carriage plate is spaced exactly 1-3/8" from coil shield plate. Set signal generator to 1425 Kc and adjust coil cores (8, 9 & 10), in this order, for maximum output.

D. Turn the tuning knob until the carriage plate is spaced approx. 17/32" from coil shield plate. Leave signal generator connected but turn signal generator power off. Peak oscillator padder core (11) for maximum noise. If the padder core must be moved more than 1/2 turn from its original position, the carriage plate should be moved to extreme high frequency position, the coil cores (8, 9 & 10) should be screwed out so that 1-1/8" of each core is exposed and steps 7A, B, C & D repeated until it is necessary to move the padder

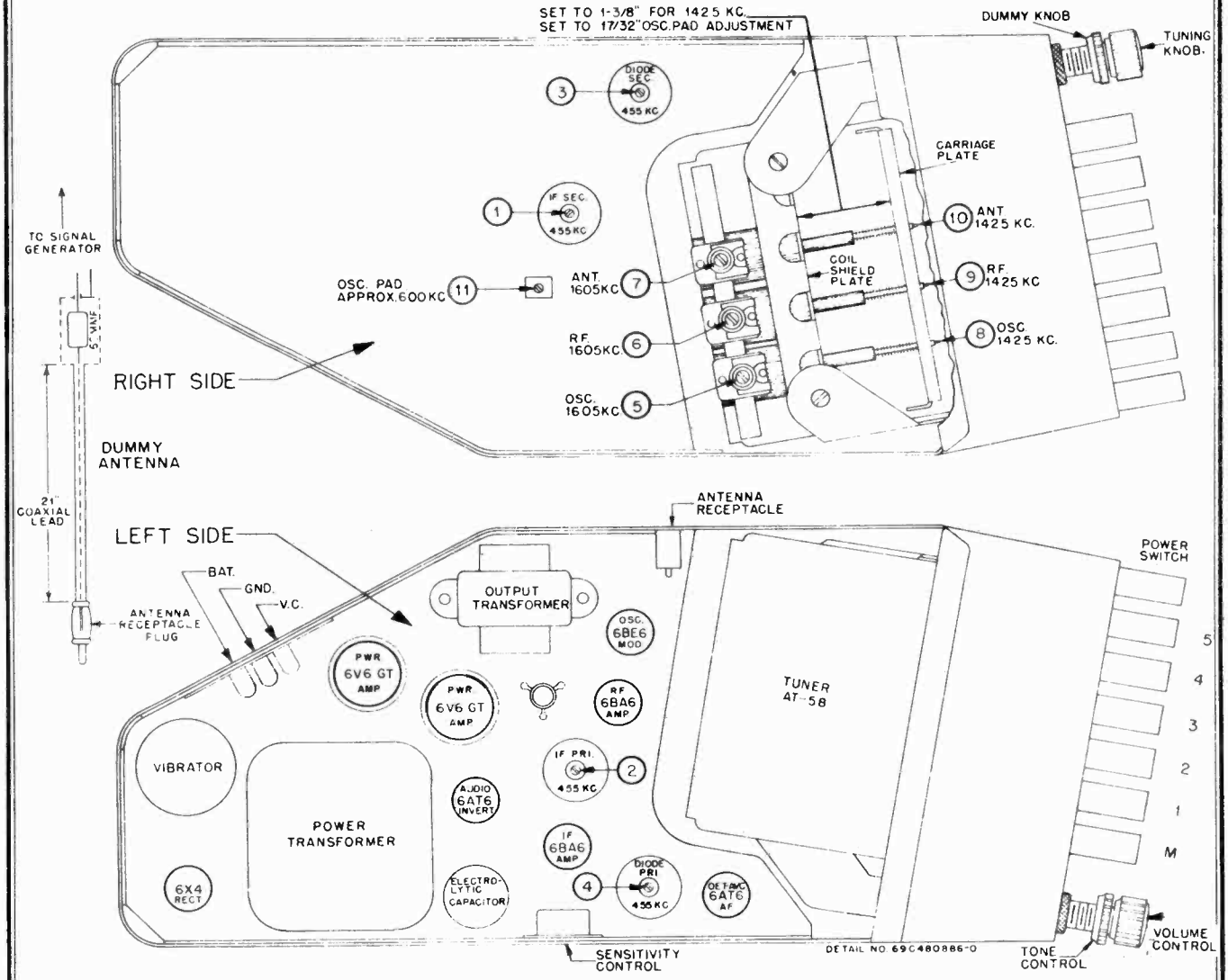


FIGURE 4. TUBE & TRIMMER LOCATIONS

core less than 1/2 turn in this step.

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

8. SETTING THE SENSITIVITY CONTROL. After alignment is completed, set signal generator to 600 Kc and adjust its output to 1.3 microvolts. Adjust the sensitivity control to provide 1 watt output (1 watt = 1.79 volts on output meter).

9. ANTENNA TRIMMER ADJUSTMENT. Once steps 7A, B, C, D & 8 have been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

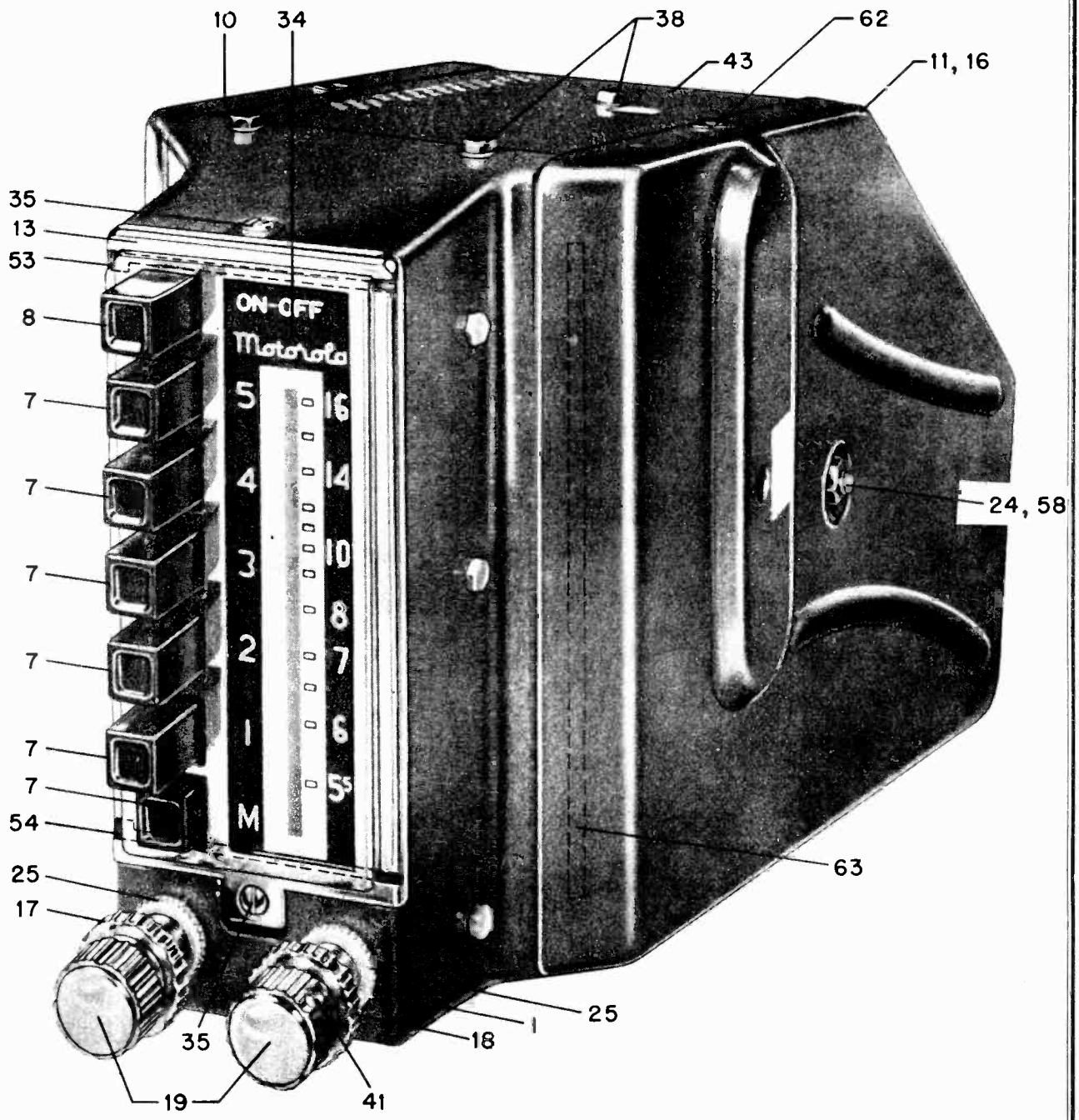


FIGURE 5. PARTS LOCATION - FRONT OF RECEIVER

MOTOROLA INC. MODEL CR8

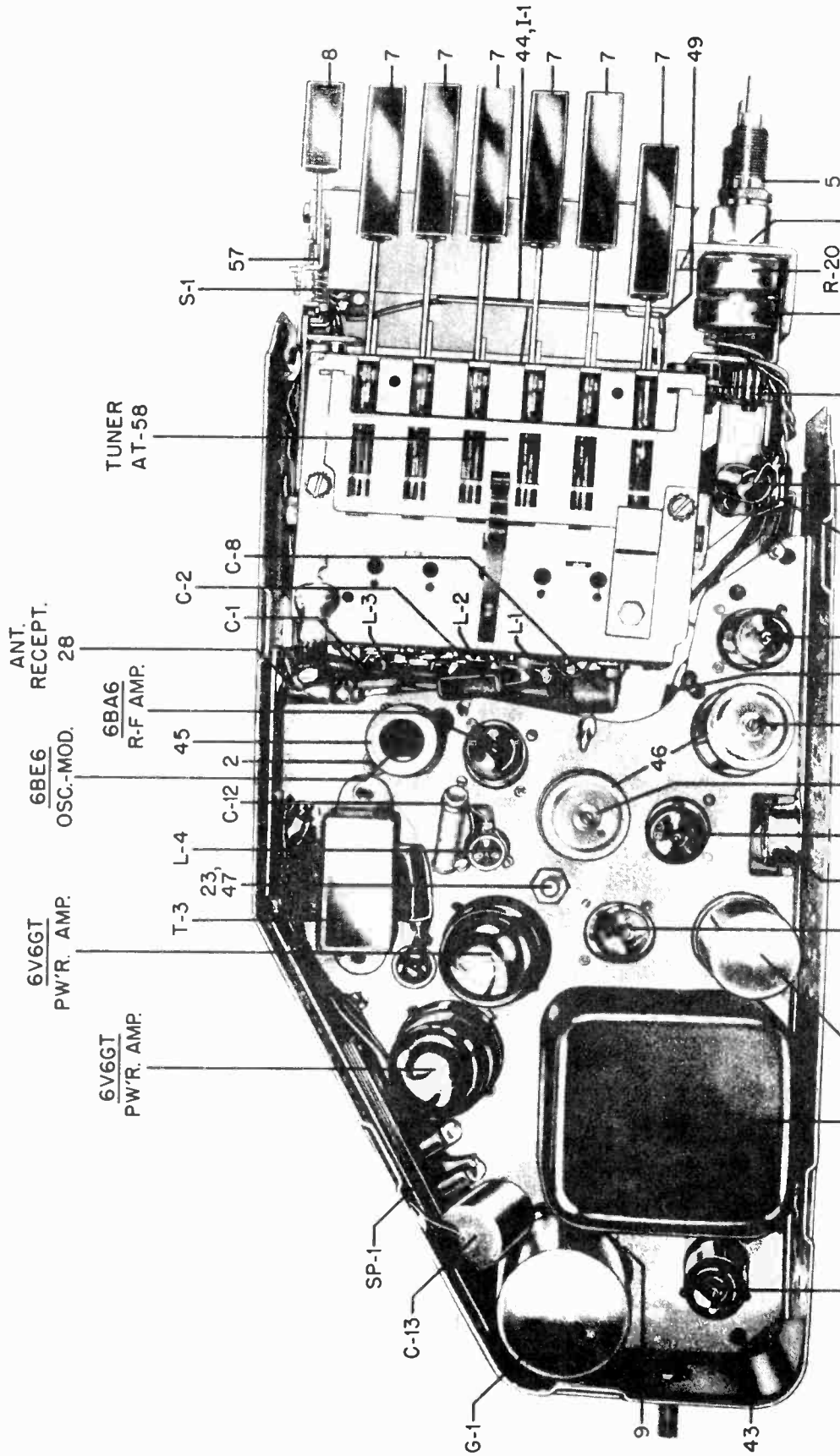


FIGURE 6. PARTS LOCATION - LEFT SIDE OF RECEIVER

MODEL CR8 MOTOROLA INC.

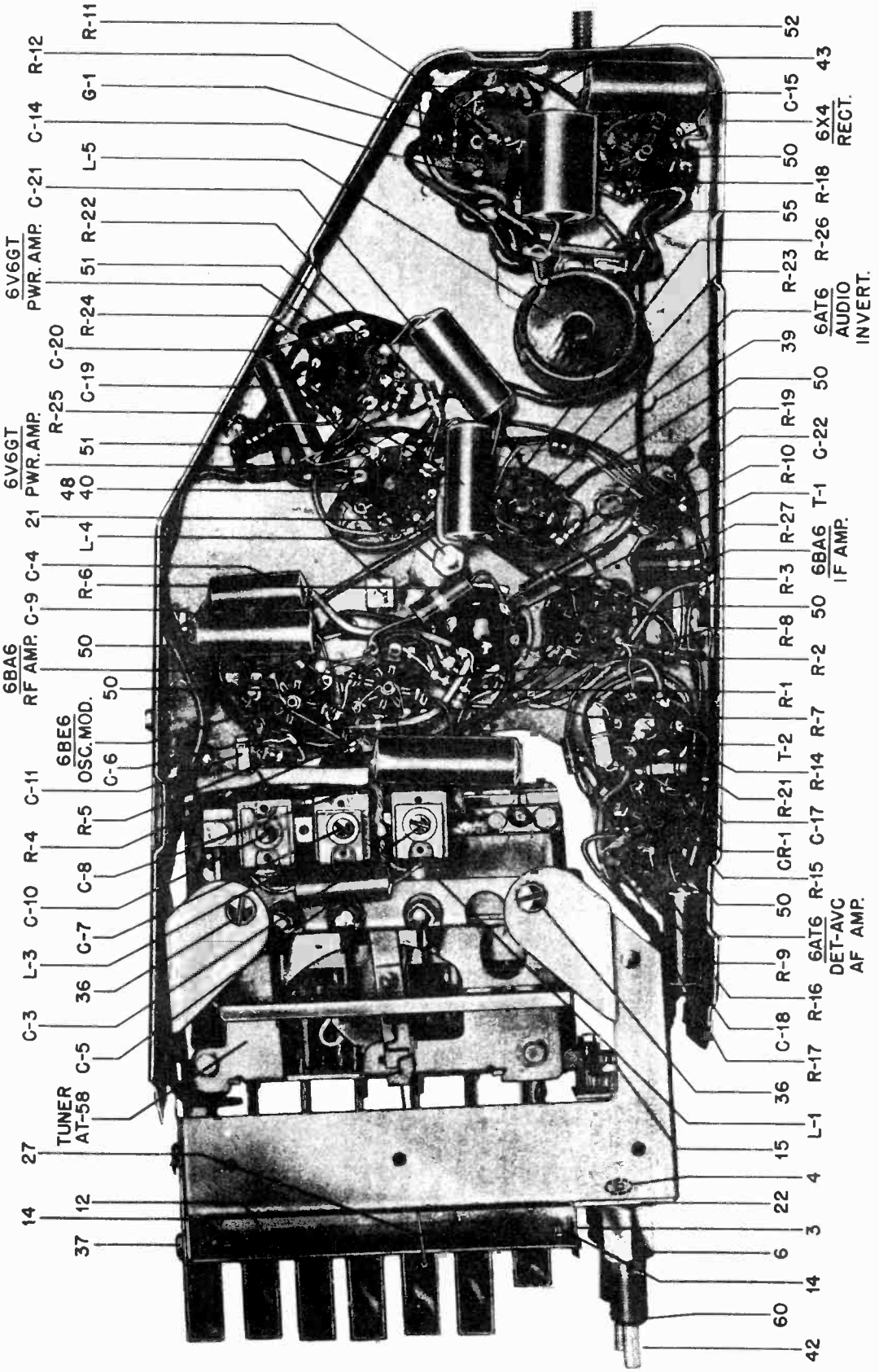


FIGURE 7. PARTS LOCATION - RIGHT SIDE OF RECEIVER

ELECTRICAL PARTS

CAPACITORS

C-1	21B77562	Ceramic: 100 mmf .....
C-2	8C4529	Paper: .006 mf 100V .....
C-3	20A480600	Trimmer, variable mica: 50 to 180 mmf; on same bracket as C-7 and C-10 .....
C-4	8A13514	Paper: .05 mf 100V .....
C-5	8A13514	Paper: .05 mf 100V .....
C-6	21K70720	Molded: 5 mmf .....
C-7	20A480600	Trimmer, variable mica: 50 to 180 mmf; on same bracket as C-3 and C-10 .....
C-8	8K13166	Paper: .1 mf 400V .....
C-9	8A14791	Paper: .05 mf 400V .....
C-10	20A480600	Trimmer, variable mica: 30 to 60 mmf; on same bracket as C-3 and C-7 .....
C-11	21R6513	Mica: 50 mmf 300V .....
or	21K74661	Ceramic: 50 mmf 300V .....
C-12	21A71872	Ceramic: 400 mmf .....
C-13	8A17028	Paper: .5 mf 100V .....
C-14	8A17028	Paper: .5 mf 100V .....
C-15	8K15166	Paper: .007 mf 1600V .....
C-16	8A13514	Paper: .05 mf 100V .....
C-17	21R6513	Mica: 50 mmf 300V .....
or	21K74661	Ceramic: 50 mmf 300V .....
C-18	8A71910	Paper: .006 mf 400V .....
C-19	8K71911	Paper: .03 mf 400V .....
C-20	8K13165	Paper: .003 mf 1000V .....
C-21	8K71911	Paper: .03 mf 400V .....
C-22	23A472570	Electrolytic: 20-30 mf/ 400-350V .....

CAPACITOR-RESISTOR

CR-1	21A472571	Capacitor-Resistor: 100 mmf - 47,000 ohms; 100 mmf .....

FUSE

F-1	65K4165	Fuse: 15 amp; type 3AG .....

VIBRATOR

G-1	48B3333	Vibrator: non-sync; 4 pin .....

PILOT LIGHT

I-1	65X10867	Bulb: 6.3V, .25A; bayonet base; clear ...

COILS

L-1,2	24B71881	RF and Antenna Coil (specify color of paint dot on old coil when ordering) ..
L-3	24B71879	Oscillator Coil (specify color of paint dot on old coil when ordering) .....
L-4	24B70227	Oscillator padder coil: complete with iron tuning core .....
L-5	24A473954	Choke, hash .....

RESISTORS

Note: All resistors are 1/2 watt, 20% carbon, insulated type unless otherwise specified.

R-1	6R6032	470,000 .....
R-2	6R3992	150 .....
R-3	18K77552	Sensitivity control: 700 ohms .....
R-4	6R6075	100,000 .....
R-5	6R6056	47,000 .....
R-6	6R476060	10,000 2W .....
R-7	6R3992	150 .....
R-8	6R6004	1 meg .....
R-9	6R6001	68,000 .....
R-10	6R6010	330 .....
R-11	6R5614	56 10% .....
R-12	6R5614	56 10% .....
R-13	18A472999	Volume Control: 500,000 ohms (dual -also includes tone control R-20) .....
R-14	6R6004	1 meg .....
R-15	6R6004	1 meg .....
R-16	6R2118	3.3 meg .....
R-17	6R6161	1500 .....
R-18	6R6054	10,000 .....
R-19	6R6069	2200 10% .....
R-20	18A472999	Tone control: 500,000 ohms (dual -also includes volume control R-13) .....
R-21	6R6015	220,000 .....
R-22	6R6015	220,000 .....
R-23	6R6015	220,000 .....
R-24	6R6015	220,000 .....
R-25	6R6389	220 10% 1W .....
R-26	6R6320	10,000 10% .....
R-27	6R476130	2200 2W .....

SWITCH

S-1	40B473204	Power switch: SPST; switch only .....

SPARK PLATE ASSEMBLY

SP-1	1X480604	Spark Plate Assembly: complete .....

TRANSFORMERS

T-1,2	24B76553	Diode or IF, 455 Kc: complete with padding capacitors and tuning cores, but less shield
T-3	25B472558	Output Transformer .....
T-4	25C472586	Power transformer .....

TUNER

	1X472770	AT-68 Automatic Tuner (See separate Service Manual -Motorola Part No. 54P480955 for complete breakdown)

MECHANICAL PARTS

1	13D472973	Base, escutcheon
2	26A473002	Base, tube shield mounting
3	7B473037	Bracket, dial background mtg
4	43A472869	Bushing, mounting (tuning shaft bushing mtg)
5	43K472992	Bushing, receiver mtg: with groove (volume shaft bushing)
6	43B472978	Bushing, receiver mounting: without groove (tuning shaft bushing)
7	1X473153	Button, push: includes clip (station selector)
8	1X473154	Button, push: includes clip (on-off button)
9	42A4215	Clip, vibrator grounding
10	1X473005	Cover Assembly, left-hand
11	1X473007	Cover Assembly, right-hand
12	1X473941	Dial Background and Strip Assembly
13	13C472961	Escutcheon, front plate: polished chrome finish; less dial scale
14	5S7805	Eyelet: .140 x .141 (dial backgrnd mtg).
15	44B472979	Gear, compound idler
16	14B480671	Insulator, guard (used on right-hand cover)
17	36B473120	Knob, pendant (tone control)
18	36K482504	Knob, pendant (dummy)
19	1X473155	Knob, control: includes setscrew
20	4S7651	Lockwasher: #8 internal; cad.pl. (tuner mounting)
21	4S7658	Lockwasher: #10 internal; cadmium plated (on cover mounting screw)
22	4S7655	Lockwasher: 3/8 internal; cadmium plated (vol. & tuning shaft bushing mtg)
23	2S7030	Nut: #10-24 x 3/8 hex; brass (cover screw mounting)
24	2S8351	Nut: #10-24 x 3/8 hex; copper oxide finish (cover mounting)
25	2K473140	Nut, mounting: round; knurled (receiver mounting)
26	2A17569	Nut, wing: 10-24 x 1-3/8; copper oxide finish (cover mounting)
27	1X473152	Pointer & Sleeve Assembly
28	1X70646	Receptacle, antenna
29	5S7771	Rivet: .088 x 3/16 steel; nickel plated (tube socket mtg)
30	5S7707	Rivet: .122 x 5/32 steel; nickel plated (tube socket mtg)
31	5S7706	Rivet: .122 x 1/8 steel; nickel plated (sensitivity control mtg, switch assembly mtg and terminal strip mtg)
32	5S7701	Rivet: .122 x 3/16; nickel plated (vibrator grounding clip and output trans. mtg)
33	5S7728	Rivet: .122 x 5/16 steel; nickel plated (spark plate mtg)
34	34B473122	Scale, dial: glass
35	3S8022	Screw: 4-40 x 1/4 slotted binder head machine screw; cadmium plated (escutcheon mtg)
36	3S7150	Screw: #8-32 x 3/16 slotted binder head machine screw; (tuner mtg)
37	3S7454	Screw: #8 x 1/4 PKZ slotted hex head sheet metal screw; cad. pl. (pilot light bracket, dial background mtg, etc.,)
38	3S7456	Screw: #8 x 1/4 PKA slotted acorn head sheet metal screw; antique copper finish (housing screws)
39	3S3397	Screw: #8 x 5/16 PKZ plain hex head sheet metal screw; cad. pl. (pwr. trans mtg).
40	3A17388	Screw, cover mtg: 10-24 thread, 4-3/8" long; has formed nut near one end
41	3S7104	Setscrew: 8-32 x 3/16 slotted headless machine screw; cad. pl.
42	1A472975	Shaft Assembly, tuning: consists of tuning shaft and gear
43	15D472967	Shell, housing
44	1X473150	Shield, pilot light
45	26A90301	Shield, tube
46	1A71049	Shield and Sleeve Assembly (for T-1 & T-2)
47	43K17389	Sleeve, cover spacer (long)
48	43K17390	Sleeve, cover spacer (short)
49	9A472905	Socket, pilot light and bracket
50	9A472534	Socket, tube: miniature; 7 prong
51	9A6788	Socket, tube: octal
52	9A70208	Socket, tube: 4 pin (for vibrator)
53	42K473148	Strap, dial scale mtg (top)
54	42K473149	Strap, dial scale mtg (bottom)
55	31A472573	Strip, terminal: 2 insulated lugs, #2 mtg
56	31A473004	Strip, terminal: 3 insulated lugs, end mtg
57	1X473142	Switch Assembly: complete; includes push arm, bracket and switch
58	4S7611	Washer: 1/2-7/32-.048; copper oxide finish (cover mtg)
59	4S7613	Washer: 3/4-.203-.027; copper oxide finish (cover mtg)
60	4A21577	Washer, "C" (tuning shaft and idler gear retainer)
61	4K481587	Washer, felt (used behind control knobs)
62	39A17383	Wiper, contact (cover grndng wiper)
63	39A17391	Wiper, housing: brass strip; 5/32 wide x 5/8 long

MOUNTING PARTS & ACCESSORIES

101	3A18008	Bolt, hex head: 5/16-18 x 2-1/4 long (bracket mtg) .....
102	7B24365	Bracket, receiver mounting .....
103	43K26242	Bushing, spacer: brass (speaker mtg) ...
104	8A4491	Capacitor, generator .....
105	9K473160	Lead Assembly, fuse: complete with 15 amp fuse
106	1X76859	Lead Assembly, speaker: 2 conductor: 36" long; pin terminals on one end .....
107	4S7660	Lockwasher: #8 external; phosphor bronze (speaker mtg) .....
108	4S7670	Lockwasher: 1/4 internal; cadmium plated (receiver mtg) .....
109	4S7678	Lockwasher: 1/4 external; cadmium plated (receiver mtg) .....
110	4S7674	Lockwasher: 5/16 internal; cadmium plated (receiver mtg) .....
111	2S7022	Nut: 1/4-20 x 7/16 hex; cadmium plated (receiver mtg) .....
112	2S2863	Nut: 5/16-18 x 9/16 hex; cadmium plated (receiver mtg) .....
113	2K74308	Nut, speaker mtg: 8-32 thread x 3/8 thk.
114	64B17583	Screen, speaker: includes gasket .....
115	1X17921	Screw, speaker mounting: includes bushing.
116	43K17931	Sleeve, receiver mounting .....
117	50B473253 or 50B473698 or 50B481519	Speaker: 7" PM; 3.2 ohm VC; less spkr lead Exchange
118	6X17117	Suppressor, distributor .....
119	29A76280	Terminal, pin: black (speaker lead) ....
120	29K76282	Terminal, pin: white (speaker lead) ....
121	29K76284	Terminal, pin: red (fuse lead) .....
122	4S7849	Washer: 1-5/16 x 11/32 x .067 thick; cadmium plated (receiver mounting) .....
123	4K472205	Washer, cup: plastic (for Plymouth installation only; used to conceal mtg bushing)
124	39A4205	Wiper, hood (hood grounding bond) .....

NOTES:

A VTVM WAS USED TO MAKE ALL MEASUREMENTS. MEASUREMENTS MADE FROM TUBE BASE PIN TERMINAL TO CHASSIS.

VOLUME CONTROL ON FULL.

TONE CONTROL IN 'HIGH' POSITION.

SENSITIVITY CONTROL SET TO MINIMUM RESISTANCE.

6.3 VOLTS INPUT AT SPARK PLATE.

ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.

VOLTAGE TOLERANCE ±10%.

RESISTANCE TOLERANCE ±20%.

* = TIE POINT.

N.C. = NO CONNECTION.

GND = GROUND TO CHASSIS.

K = 1000 (ONE THOUSAND) OHMS.

▭ = RESISTANCE MEASUREMENTS.

◡ = VOLTAGE MEASUREMENTS.

*=THESE READINGS WILL VARY WIDELY WITH SENSITIVITY CONTROL SETTING. READINGS NOTED ARE FOR AVERAGE SET.

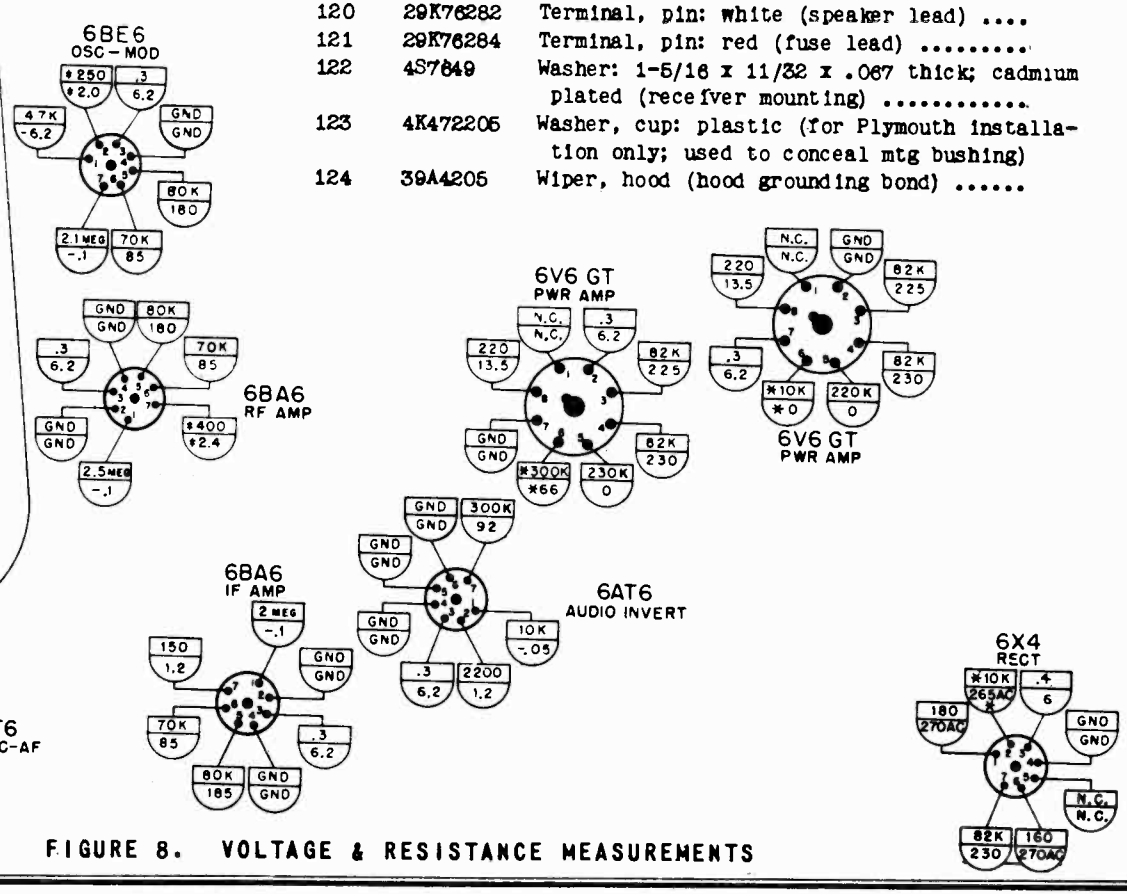


FIGURE 8. VOLTAGE & RESISTANCE MEASUREMENTS

MODEL CR8

MOTOROLA INC.

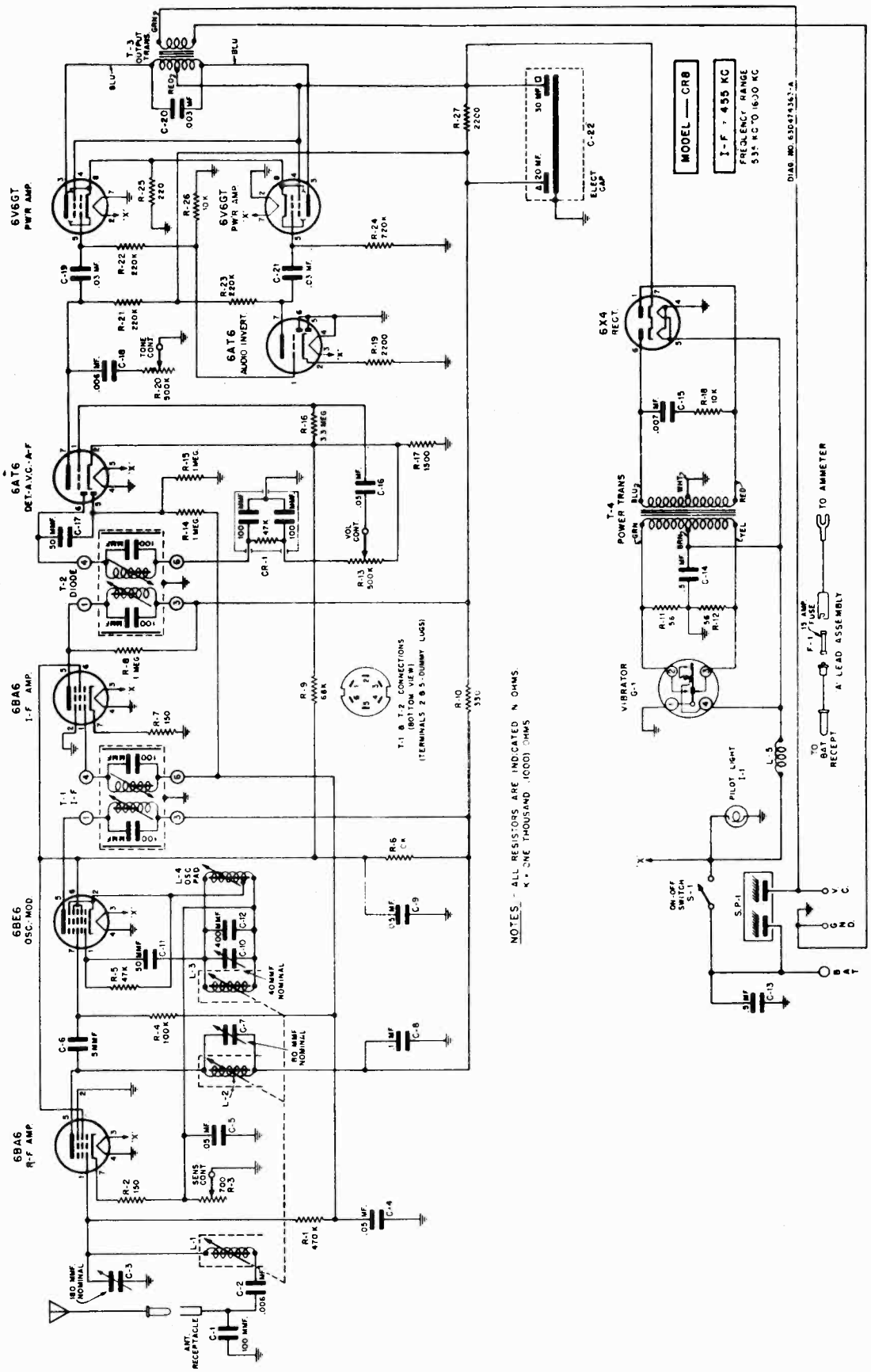
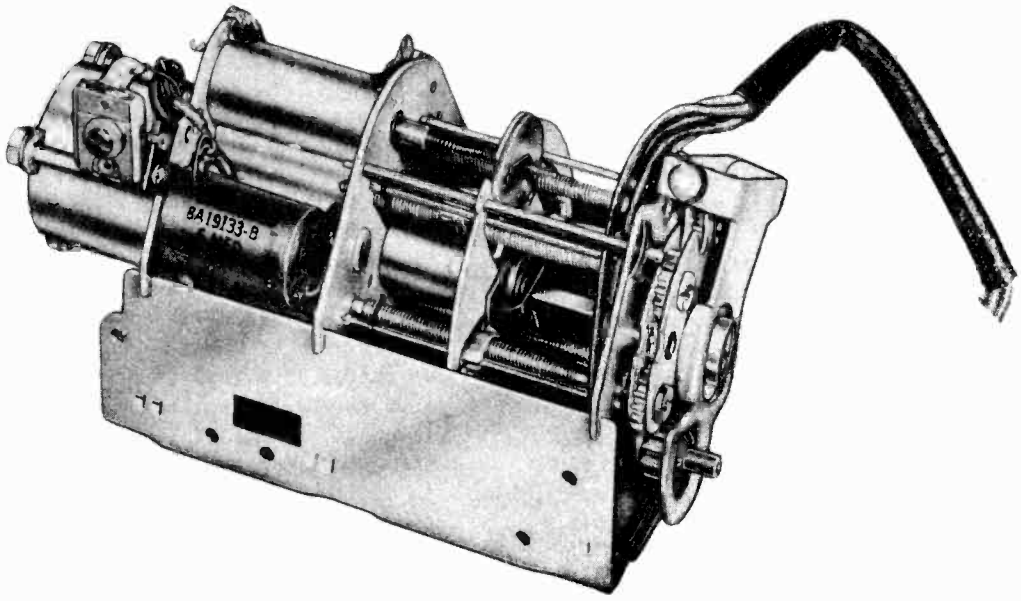


FIGURE 9. SCHEMATIC DIAGRAM

MOTOROLA INC.

MODEL ST-56



GENERAL

Solenoid Tuners ST-56 (ST-56 - CR6, ST-56 - FD6 etc.,) are used in 1946 and 1947 Motorola automatic tuning specific auto receivers.

Fundamentally, all ST-56 tuners are the same except for the manual tuning shaft, dial cord pulleys and pushbutton switch lead lengths. These variations are brought about by mechanical differences between the specific receivers in which this tuner is used. The receiver model number is included in the tuner model number to identify which specific receiver the tuner will fit, i.e., ST-56-CR7, ST-56-BK6 etc.

This is a 3 gang permeability type tuner operated by a solenoid. Five pre-set and one manual tuning positions are provided. The frequency range is 535 to 1600 kc. The pre-set positions can be set to any frequency within this range.

The tuner is designed to operate satisfactorily with 4-1/2 to 7.3 volts input. Before attempting any service work on a tuner that operates too slowly or one that doesn't operate at all, check the battery voltage directly at the receiver spark plate. Normally, this voltage is 6.3 volts. At the moment any pushbutton is pressed, the voltage at the spark plate should not drop to less than 4-1/2 volts. If the voltage is less than 4-1/2, it is an indication of poor wiring between the car battery and receiver or a defective car battery.

This tuner depends on "dash-pot" action between the plunger and the solenoid for proper operation. When the fit between the plunger and solenoid is too tight, the air can't get out fast enough. The result is a slow or sluggish operating tuner. All late production tuners have an adjustable air release in the solenoid end plate. Early production tuners that do not have this adjustable air release and operate sluggishly, due to dash-pot action, should have the solenoid end plate replaced with an end plate having the adjustable air release. Order part number 1X76556.

The tuner solenoid coil must be in a horizontal or near horizontal position or the tuner will not operate properly. If it is operated with the coil in a vertical position, the solenoid and carriage return spring may not be strong enough to operate tuner.

MODEL ST-56 MOTOROLA INC.

THEORY OF OPERATION

NOTE: Throughout this paragraph, it is suggested that constant reference be made to Figure 1.

When any push-button is pressed, current flows through the solenoid coil, causing the plunger to pull into the soil. Near the end of the plunger travel, through a ratchet mechanism inside the plunger, the selector switch shaft is rotated 60°, moving the selector switch and stop plate to their new position.

An instant later, the solenoid switch is opened breaking solenoid current and the carriage return spring then pulls the plunger out, closing the solenoid switch again. If the selector switch is now resting at the position selected by the push-button (cut away section of selector switch resting in front of contact selected by push-button), the solenoid plunger will continue to be pulled out until the stop plate is resting on the selected lead screw stop. In the event the selector switch is not resting in the position selected by the push button when the solenoid plunger is on its return trip, the moment the plunger moves out far enough to actuate the solenoid switch, current will again flow through solenoid causing the plunger to be pulled in again. The plungers inward motion again rotates the stop plate and selector switch through another 60°. This last operation is repeated automatically until the selector swtich comes to rest at the position selected by the push-button, at which time the solenoid circuit is opened and the plunger moves out until the stop plate is resting on the selected lead screw stop. The stops are adjusted to the desired positions during the station setting up procedure, through the set-up gear train assembly.

Refer to Figure 2 for mechanics behind station setting-up mechanism detail.

When the button on which a station is to be set up is first pressed, the tuner operates and the stop plate comes to rest against the selected lead screw stop. The pressure of the stop plate against the lead screw stop moves the lead screw forward until its shoulder rests against the tuner and plate. The square end of the lead screw does not engage in the square hole of the set-up gear until the set-up button is pushed in or the station set-up knob is turned (whichever is applicable). A latch on one end of the detent lever engages the gear lever, holding the set-up gear train in contact with the selected lead screw. Now the selected lead screw stop can be moved on its lead screw by turning the manual tuning shaft. None of the other lead screws turn because the stop plate is not resting against them. After the button is set up, pressing any other button will unlatch the gear lever and disengage the lead screw from the set-up gear. See Figure 2.

Since the coil tuning iron cores are attached to the carriage plate and move in unison with the plunger, the point at which they are brought to a stop (by means of the lead screw stop) determines the frequency to which the coils are tuned.

Dash-pot action between the plunger and the solenoid determines the tuner operating speed. The rate at which air is allowed to enter or escape through the adjustable air release determines the speed of the plunger. See Figure 1.

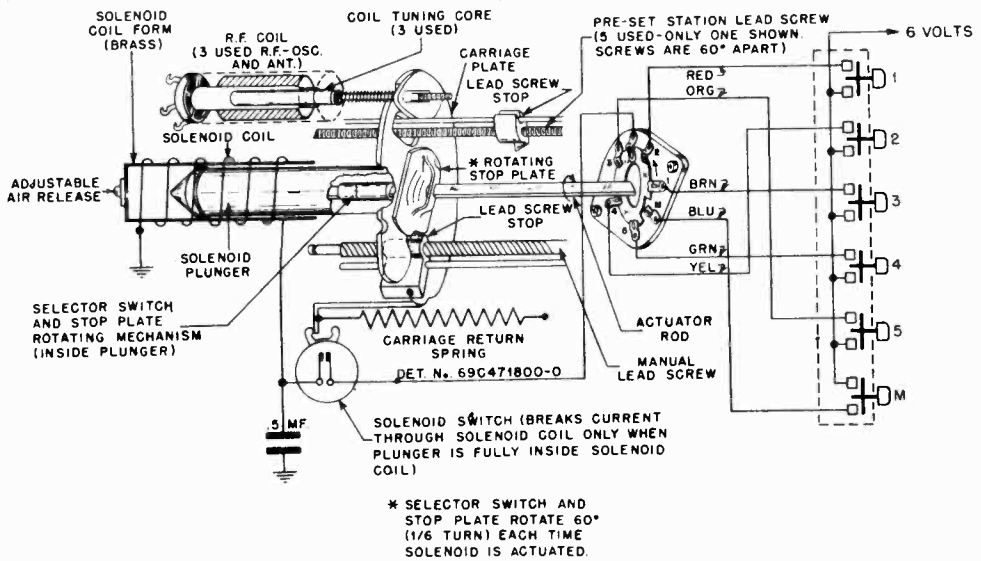


FIGURE 1. TUNER FUNCTIONAL DETAIL

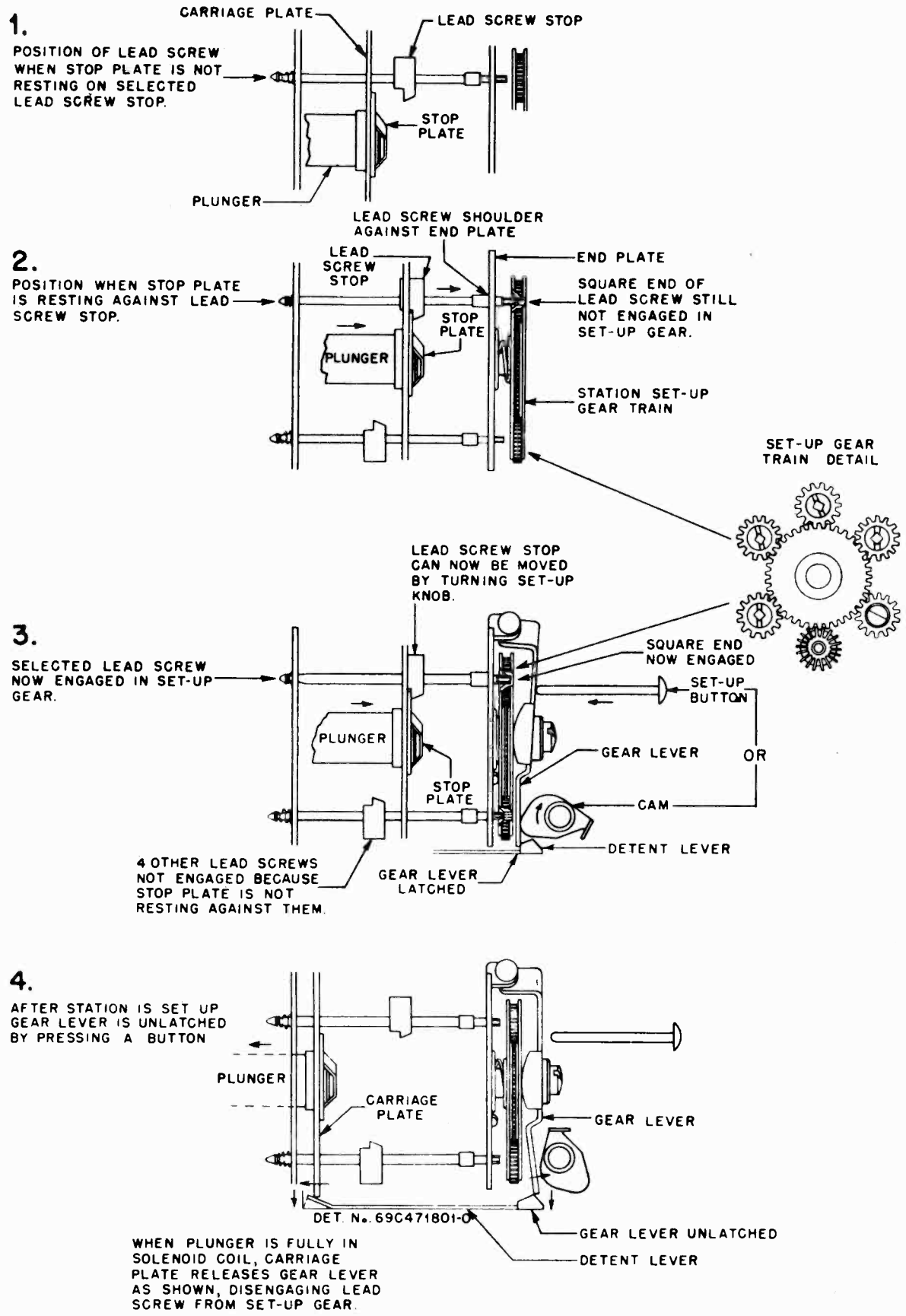


FIGURE 2 STATION SET-UP MECHANISM

TO REMOVE TUNER FROM CHASSIS

Should it become necessary to remove the solenoid tuner from the receiver chassis, proceed as follows:

1. Remove the covers from the set, completely exposing the chassis.
2. Mark all leads connecting tuner to receiver.
3. Disconnect all leads connecting tuner to receiver. Do not unsolder leads from the tuner selector switch; unsolder them at the push-switch. The .5 mf paper capacitor need not be removed.
4. The tuner is held to the chassis by self-tapping screws driven into the sides of the tuner. Do not remove any other screws.

ADJUSTMENTS

AIR RELEASE ADJUSTMENT

The speed at which the tuner operates is governed by dash-pot action of the solenoid plunger within the closed solenoid coil form. The rate at which air is allowed to enter or escape determines the speed of the plunger.

An adjustable air release is provided on all late production tuners. See Fig. 3. To adjust, loosen the screw and move the eccentric washer which covers the air release hole to expose or cover more of the air release hole as required. Early production tuners did not have a solenoid end plate with an adjustable air release. If such a tuner is slow or sluggish because of too much "dash-pot" action, replace the solenoid end plate with the adjustable air release type. Order part number 1X76556.

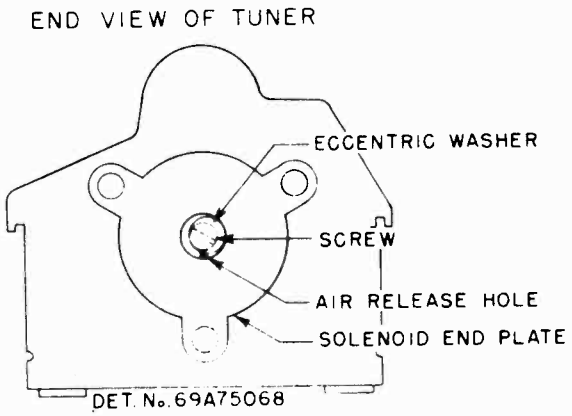


FIGURE 3. AIR RELEASE ADJUSTMENT

1. If tuner operates too slowly, open the air release hole. Open it only far enough to secure reliable operation. Too little "dash-pot" action (air release open too much) may cause the plunger to hammer and sometimes even to make the tuner operate continuously due to the selector switch rotor being turned so rapidly as to overshoot its contacts.
2. If the tuner operates too rapidly increase dash-pot action by closing the air release hole slightly. Close it only enough to eliminate hammering.

PLUNGER RATCHET ADJUSTMENT

The plunger ratchet mechanism in Figure 4. This mechanism rotates the actuator rod which, in turn, rotates the carriage stop plate and the selector switch 60° for each inward motion of the plunger.

If this adjustment is incorrect, tuner may operate continuously once current is applied.

Correct ratchet adjustment is indicated when 1/64 to 1/32" clearance is observed between selector switch contacts and the selector switch rotor as shown in Figure 5. Slowly work the plunger by hand and observe clearance at each contact position. If the average clearance is not 1/64 to 1/32", correction can be made by loosening ratchet adjustment setscrew and turning actuator rod by hand until correct clearance is observed.

Before ratchet adjustment setscrew is finally tightened, push fixed ratchet 1/32" back into plunger. This increases spring tension against rotating ratchet, thus insuring more positive operation.

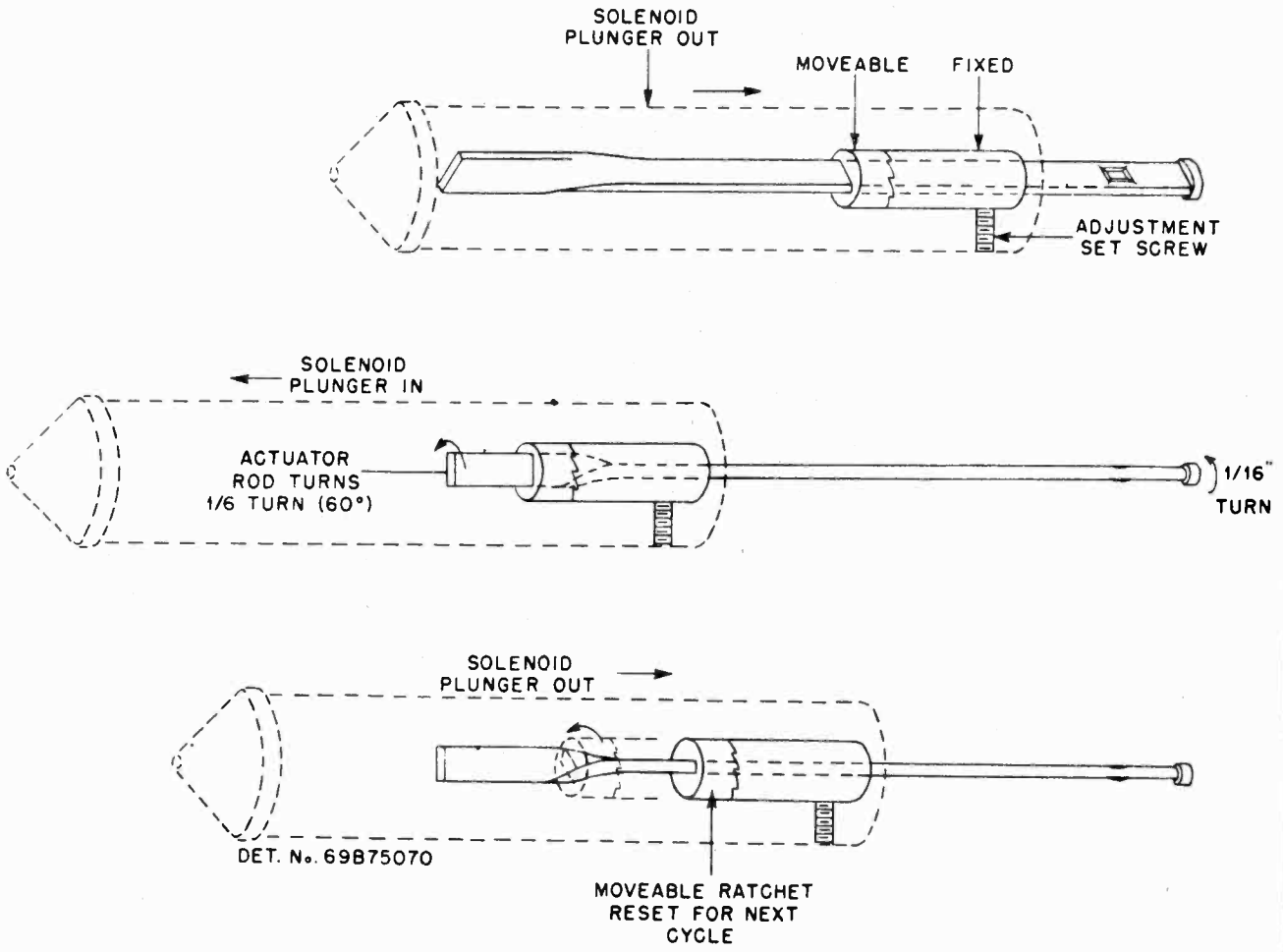


FIGURE 4. PLUNGER RATCHET MECHANISM

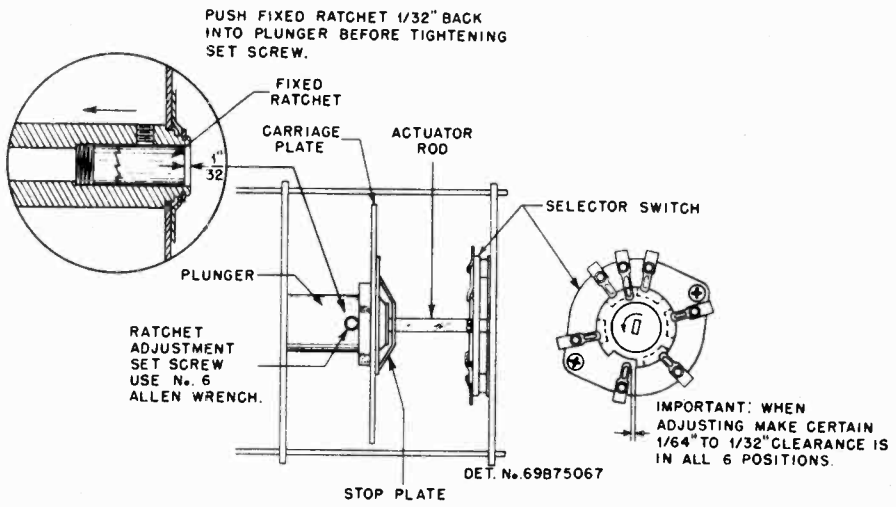


FIGURE 5. PLUNGER RATCHET ADJUSTMENT

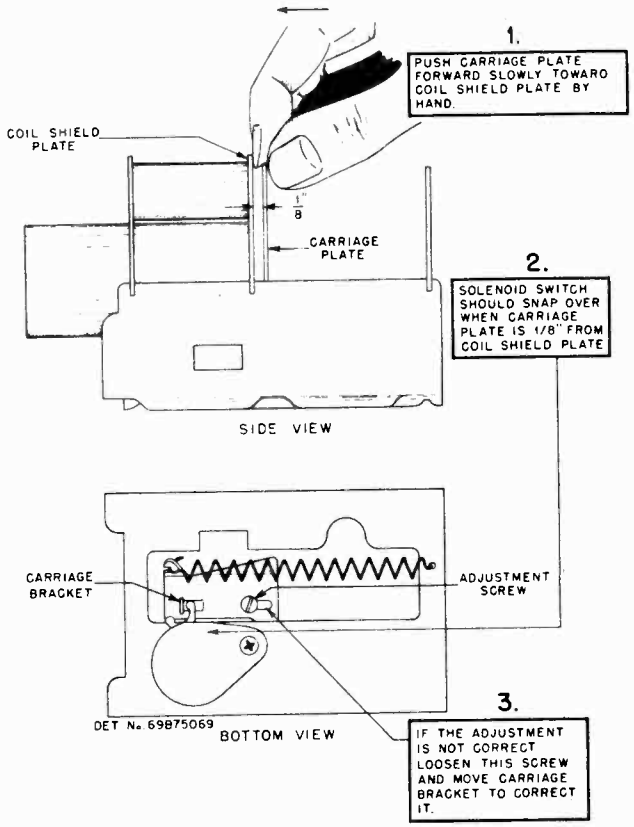


FIGURE 6. SOLENOID SWITCH ADJUSTMENT

SOLENOID SWITCH TRIP ADJUSTMENT

The solenoid switch tripping mechanism should be adjusted as shown in Figure 6.

If the solenoid switch is tripped too early, the ratchet mechanism may fail to operate; if it trips too late, the plunger may hammer violently or should the solenoid switch fail to trip, the plunger would be held within the solenoid.

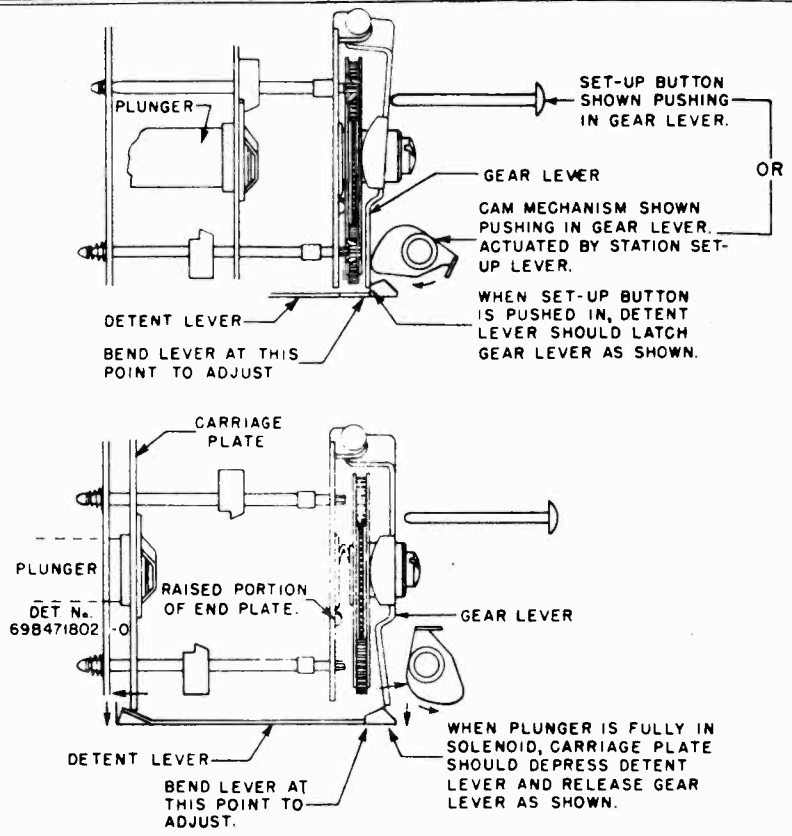


FIGURE 7. GEAR LEVER LATCH ADJUSTMENT

ADJUSTMENT OF GEAR LEVER LATCH

The gear lever latch holds the station set-up gear train in position while setting up stations. Failure of the latch to engage properly when the set-up button is pushed in or the station set-up knob is turned (whichever is applicable) would result in the inability to set up pre-set stations. Failure of the latch to disengage after station is set up would result in faulty automatic tuning because the lead screws might not seat themselves properly against the tuner end plate. Figure 7 above shows the latch detail and adjustment.

SERVICE NOTES

FAILURE OF SOME LEAD SCREW TO ENGAGE IN SET-UP GEARS

If some of the lead screws fail to engage in the set-up gears during station setting up procedure, check the gear lever to see if it is bent. When the set-up button is pushed in and the gear lever latches on the detent lever, the set-up gear train should be parallel with the tuner end plate and the bottom of the gear train should be resting on the raised portions of the tuner end plate.

LUBRICATION

Should lubrication ever be required, it is recommended that a very fine grease, commercially called Lubriplate, or its equivalent, be used.

Remove all old and sticky lubricant with a solvent such as carbon tetrachloride and then, very sparingly, lubricate only the following points:

1. Carriage guide rods.
2. Actuator rod.
3. Manual lead screw.

IMPORTANT

Do not lubricate or permit lubricant to get on Selector Switch contacts. The friction drag is required for proper operation of tuner.

LEAD DRESSING

Make sure that the selector switch and solenoid coil leads are dressed so that carriage plate does not rub against them. Leads rubbing against the carriage plate may cause the tuner to stick, especially at the high frequency end.

REPLACEMENT OF SOLENOID COIL OR SOLENOID PLUNGER

Should replacement of the solenoid coil or solenoid plunger be required, it will be necessary to replace the entire tuner. A close fit between solenoid plunger and solenoid coil form is required; a proper match can only be secured at the factory. When service of this kind is required, return the tuner to the factory for exchange.

ALIGNMENT

In the event that some part of the R.F. circuit has been changed or the adjustments shifted by mishandling, it is suggested that the receiver be realigned. Follow the alignment instructions found in the receiver service manual.

The tuner must be in good working order and assembled onto the chassis before attempting alignment of its tuned circuits.

TO REPLACE ANT. R.F., OR OSC. COILS

IMPORTANT: When ordering replacement coils, order by part number and also specify the color coding (paint dots) on old coil. THE REPLACEMENT COIL SHOULD CARRY THE SAME COLOR CODING AS THE ORIGINAL OR THE TUNER WILL NOT TRACK PROPERLY.

1. If coil is not readily accessible remove the tuner from the chassis as outlined under "TO REMOVE TUNER FROM CHASSIS."
2. Unsolder the two lugs holding the coil to the tuner plate.
3. Carefully remove the old coil. Save the thin paper washer that is found at the base of the coil.
4. Slip the paper washer over the replacement coil and slip coil into shield can.
5. Orient coil so its lugs are in same position as before and resolder to tuner plate.
6. Reassemble tuner and install in receiver.
7. Realign ANT., R.F. and OSC. stages per instructions found in the receiver service manual.

TO REPLACE ANT. R.F. OR OSC COIL TUNING CORES

IMPORTANT: When ordering coil tuning cores, order by part number and also specify the color coding (paint spot) on the old core. ALL 3 TUNING CORES MUST CARRY THE SAME COLOR CODING OR THE TUNER WILL NOT TRACK PROPERLY.

1. The core which tunes the top coil is readily accessible and presents no replacement problem. To reach the two bottom coil tuning cores, remove the tuner from the chassis base as outlined under "TO REMOVE TUNER FROM CHASSIS."
2. Remove the carriage return spring.
3. Move the carriage plate back as far as it can go. The tuning cores can now be screwed "out" or "in" by grasping the portion that sticks out the back of the coil.

When installing a new core, make sure that the insulating washer and adjustment clip are replaced properly. The insulating washer goes on the core side; the core adjustment clip has an ear on it and this ear must fit into a hole in the bakelite insulator on the carriage plate. Refer to Figure 8.

4. Replace the carriage return spring.
5. Install tuner in receiver.
6. Realign ANT., R.F. and OSC. stages following the instructions found in the receiver service manual.

PLUNGER RATCHET REMOVAL

The plunger ratchets are not removable from early production tuners. Late production tuners have removable plunger ratchets. To remove ratchets, proceed as follows: (Refer to Figure 8 for parts identification).

1. Remove gear plate mounting screw (49).
2. Pull out actuator rod (37). Don't lose washers (74), (68) & (67).
3. Remove stop plate bracket (89) by sliding it out of the retaining slots.
4. Loosen setscrew (45).
5. The large fixed ratchet (90), small floating ratchet (91) and ratchet spring (92) can now be removed.
6. Reassemble in reverse order.

TUNER HANGS UP

The beginning of this trouble is usually a condition where the tuner "runs wild" (fails to stop at a station). Eventually, the stop plate gets "hung up" by getting on the wrong side of the station stops (51). The cause of the trouble is that the selector switch (65) does not turn the correct amount with each dash of the plunger.

Since the actuator rod (37) determines the rotation of the selector switch, it is usually at fault. Check the twist in the actuator rod. It should be 82 degrees. Also check the fit between the "head" end of the actuator rod (37) and the rotary section of the selector switch (65). We have found that some sloppiness sometimes occurred at this point. If the fit is loose, replace the actuator rod (37). This can be easily done by removing gear plate mounting screw (49).

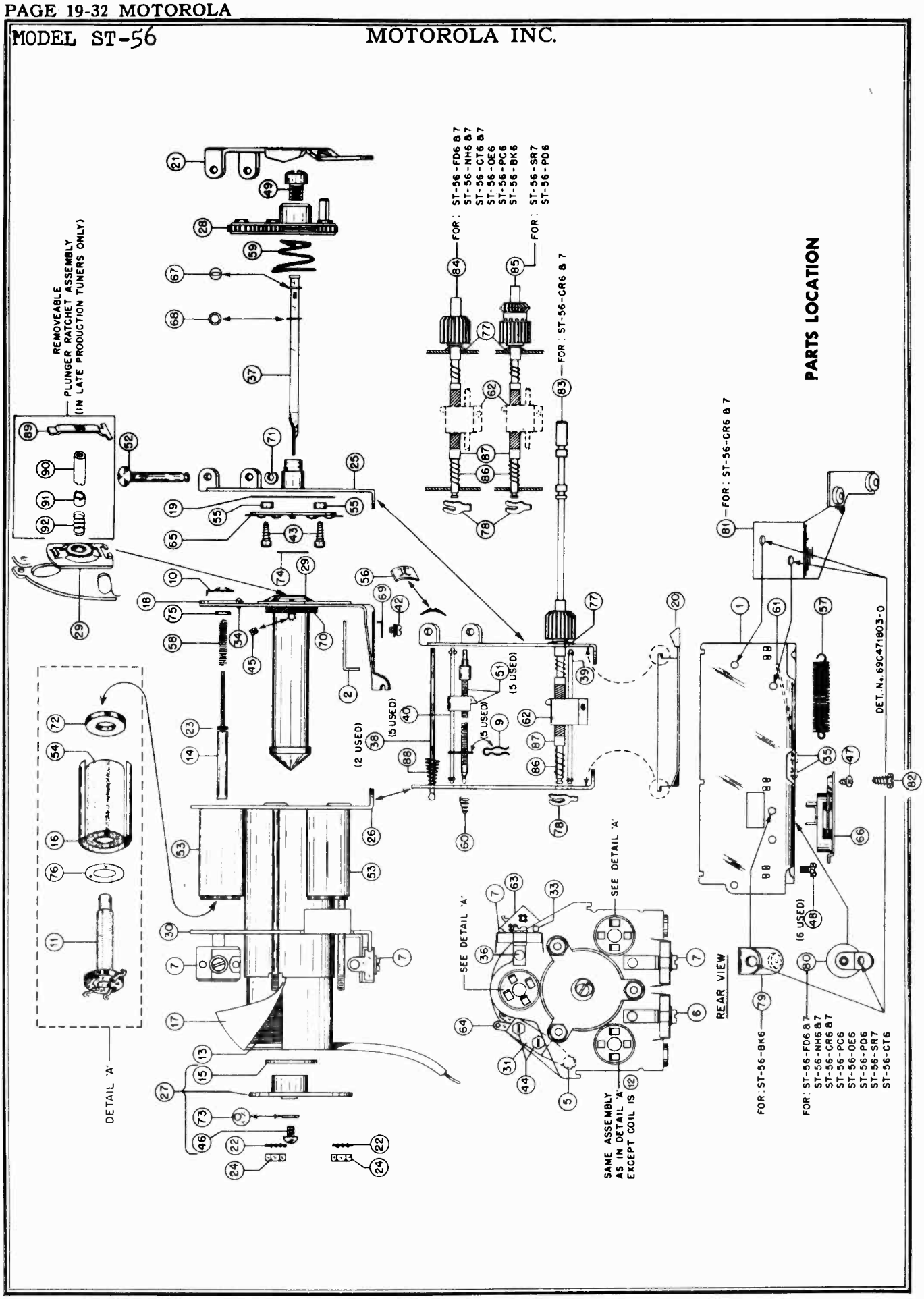
REF. NO.	PART NO.	DESCRIPTION
1	1X71358	Base & Spring Assembly
2	7A70928	Bracket, carriage
5	38A70954	Button, mute switch; fibre
6	20A70214	Capacitor, variable: mica; 30-60 mmf; with mounting bracket
7	20A70601	Capacitor, variable: mica; 50-180 mmf. with mounting bracket
8	8A19133	Capacitor, fixed: paper; .5 mf. 100 vdc
9	42A70980	Clip, lead screw
10	42A70184	Clip, core adjustment
11	34B71881	Coil, antenna or R.F. (specify color of paint dots on old coil when ordering)
12	34B71879	Coil, oscillator (specify color of paint dots on old coil when ordering)
13	59B70889	Coil, solenoid (RETURN entire tuner to factory for exchange when this part requires replacement)
14	46A70880	Core, powdered iron: with molded-in adj. screw (specify color of paint dot on old core when ordering)
15	32A70972	Gasket, solenoid
16	14A70876	Insulator, coil sleeve: armite
17	14A74198	Insulator, magnet winding: armite
18	14A70979	Insulator, slug: bakelite
19	14A70973	Insulator, switch: armite
20	45B70926	Lever, detent
21	45B70930	Lever, gear
22	4S7651	Lockwasher, steel: #8 internal; Cad. Pl.
23	2A76558	Nut, knurled (takes spring pressure off of iron core)
24	2S7003	Nut, Steel: 8-32 x 5/16 Hex; Cad. Pl.
25	1X73012	Plate, Bushing and Stud Assembly; stop end plate with actuator rod bushing and gear locating stud
26	1X73007	Plate & Coil Shields Assembly: consists of tuner plate, solenoid shield, 3 coil shields and 3 solenoid mtg. bolts
27	1X76556	Plate, end: solenoid end plate assembly; with gasket and adjustable air release
28	1X71359	Plate & Gears Assembly (station set-up gear train)
29	1X73008	Plate & Plunger Assembly: consists of carriage plate with 3 bakelite core screw insulators and solenoid plunger rod with ratchets & stop plate (RETURN entire tuner to factory for exchange when this part requires replacement)
30	1X71357	Plate & Trimmers Assembly: consists of coil end plate, 3 trimmers and terminal strip

MOTOROLA INC. MODEL ST-56

REF. NO.	PART NO.	DESCRIPTION
31	64A11647	Plate, switch mounting
32	9A13298	Receptacle, plug: 9 prong
33	5S8497	Rivet, steel: .088 x 1/8; Nkl. Pl.
34	5S7770	Rivet, steel: .088 x 5/32; Nkl. Pl (slug insulator mtg.)
35	5S7706	Rivet, steel: .122 x 1/8; Nkl. Pl. (lockup spring mtg.)
36	5S7707	Rivet, steel: .122 x 5/32 Nkl. Pl. (trimmer mtg.)
37	47A70976	Rod, actuator
38	47A472003	Rod, carriage guide
39	47A73787	Rod, manual stop guide
40	47A70921	Rod, stop guide
41	3S8175	Screw, steel: #4 x 3/16 PKZ S1. HH. Cad. Pl. (Holds lead screw stop brkt. to manual lead stop)
42	3S2950	Screw, steel: 4-40 x 1/4 S1. Lk. BHMS; Cad. Pl. (carriage brkt. mtg.)
43	3S2681	Screw, steel: #4 x 3/8 Ph Fil. Hd; Cad. Pl. (selector switch mtg.)
44	3S7327	Screw, steel: 5-40 x 3/8 S1 HH MS; Cad. Pl. (mute sw. mtg.)
45	3S7148	Setscrew; steel: 6-32 x 1/8 Allen Hd; Nkl. Pl. (ratchet setscrew in plunger)
46	3S7200	Screw, steel: 6-32 x 3/16 S1. Fil. Hd. MS; Cad. Pl. (air release adj. screw)
47	3S2684	Screw, steel: #6 x 1/4 Ph. Fit. Hd; Cad. Pl. (solenoid switch mtg.)
48	3S7205	Screw (lockscrew): 8-32 x 1/4 S1. HH; Cad. Pl. (base mtg.)
49	3A74390	Screw, special (gear plate mtg.)
51	1X73015	Screw & Stop Assembly; lead screw with carriage stop
52	47A70934	Shaft, lever
53	26A70878	Shield, Coil (Ant. R.F. & OSC. Coil Shield)
54	43A70881	Sleeve, Coil; powdered iron
55	43A70953	Spacer, selector switch; fibre
56	2S7988	Speednut, steel: for .093 dia. rod
57	41A70941	Spring, carriage
58	41A70958	Spring, coil iron core
59	41A70968	Spring, gear plate
60	41A70949	Spring, lead screw
61	41A70971	Spring, lockup
62	46A70983	Stop, manual lead
63	31A70948	Strip, Terminal Lug
64	40A70931	Switch, mute
65	40B70952	Switch, selector
66	1B70944	Switch, solenoid: with mtg. plate
67	4A70961	Washer, actuator rod: rectangular hole
68	4A70962	Washer, bearing (actuator rod)
69	4A75683	Washer, brass: special
70	4A73378	Washer, bumper
71	4A70015	Washer, "C" (lever shaft retainer)
72	47A70873	Washer, coil spacer: fibre
73	4A76542	Washer, eccentric (air release hole adjustable cover)
74	4A70974	Washer, insulator (actuator rod)
75	4A70956	Washer, iron core insulator: bakelite
76	4A74571	Washer, paper
77	4A73621	Washer, spring (manual lead screw)
78	4A70932	Washer, "C" spring (manual lead screw retainer)
79	1X75187	Pulley & Bracket Assembly
80	1X74114	Pulley & Bracket Assembly
81	1X74113	Pulley & Bracket Assembly
82	3S7454	Screw, steel: #8 x 1/4 PKZ
83	1A73374	Manual Tuning Shaft Assem. (CR6,7)
84	1X74262	Manual Tuning Shaft Assem. (FD6, NH6, CT6, OE6, PC6)
85	1X75408	Manual Tuning Shaft Assem. (PD6 & SR7)
86	41A73685	Spring, lead screw
87	43A77118	Sleeve, lead screw
88	41A472134	Spring, carriage balance
89	7A77585	Bracket, stop plate (stainless steel)
90	43A70905	Ratchet, fixed (large)
91	43A70904	Ratchet, floating (small)
92	41A70955	Spring, ratchet
	1X471070	STOCK SOLENOID TUNER. Use with adaptor kits listed below.
	1X471071	Kit #1 - Adapts Stock Tuner to fit Models 605 & 705
	1X471072	Kit #2 - Adapts Stock Tuner to fit Model BK6.
	1X471073	Kit #3 - Adapts Stock Tuner to fit Models FD6, FD7, NH6, CT6, OE6, CT7, and PC6.
	1X471074	Kit #4 - Adapts Stock Tuner to fit Models PD6 & SR7.
	1X471075	Kit #5 - Adapts Stock Tuner to fit Model CR6 & CR7.

MODEL ST-56

MOTOROLA INC.



MOTOROLA INC. MODELS 58A11, 58A12, CHASSIS HS-158

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt thruout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter).

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator through a .1 mf capacitor to B– instead of the receiver chassis.

Refer to Figure 1 for location of all adjustments.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Conv. grid*	455 Kc	1,2,3 & 4	Adjust for maximum.
RF ALIGNMENT						
2.	Gang fully opened	-	Radiation loop***	1620 Kc	5	Adjust for maximum. This sets osc. to dial scale**
3.	1400 Kc	-	Radiation loop***	1400 Kc	6	Tune signal for max. with receiver tuning knob, then peak trimmer 6.

* A convenient point is the stator of the antenna section of the tuning capacitor.

** With gang fully closed, pointer should be parallel with chassis; reset if necessary

*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of .05 watt (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

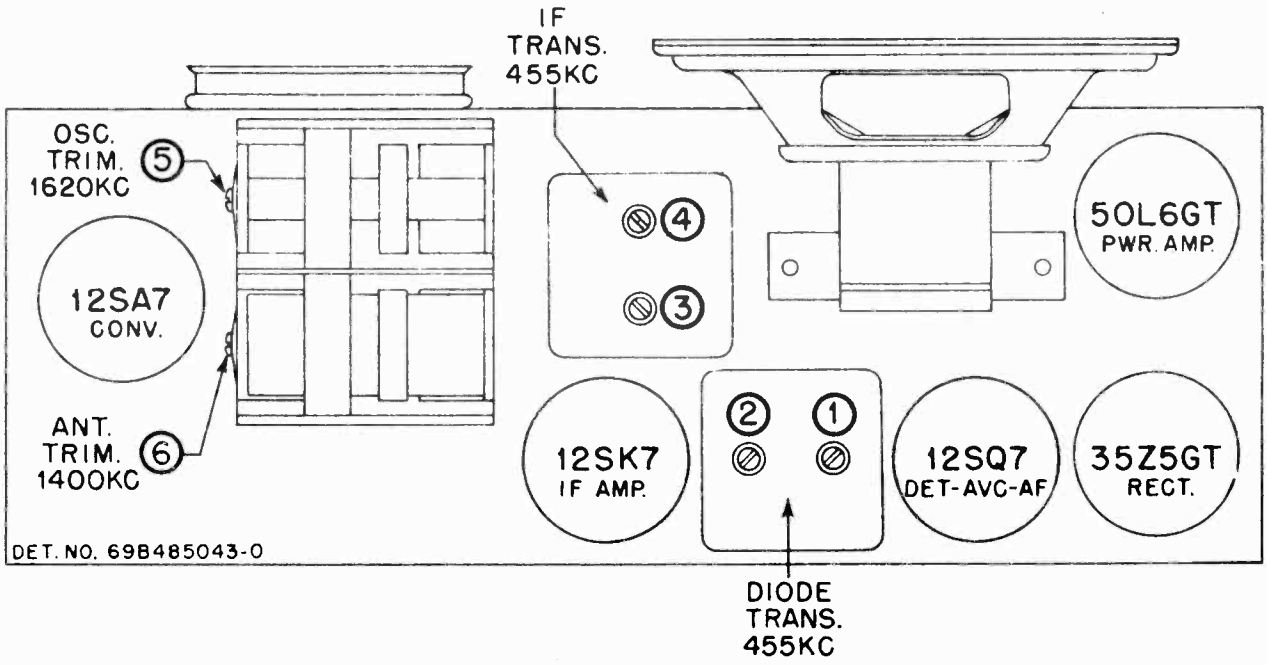
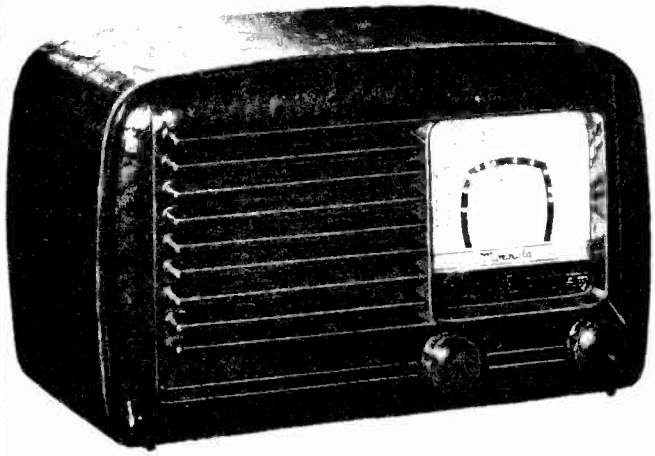


FIGURE 1. CHASSIS HS-158 TUBE & TRIMMER LOCATIONS

MODELS 58A11, 58A12,
CHASSIS HS-158

MOTOROLA INC.



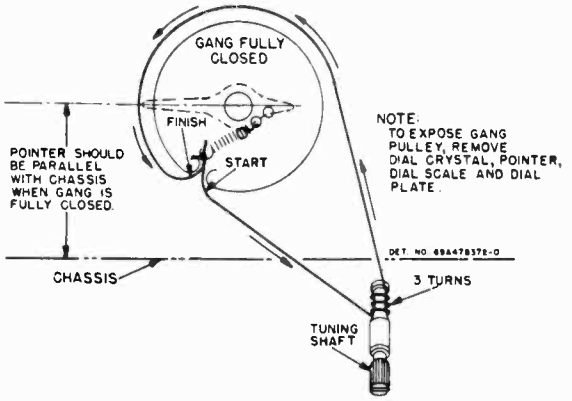
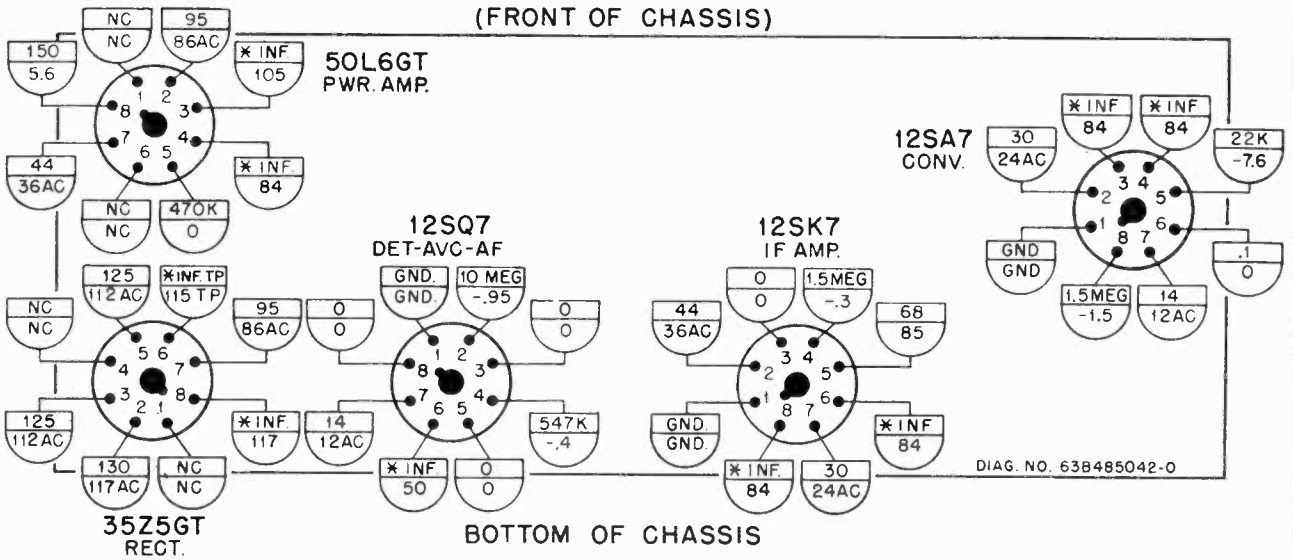


FIGURE 2. CHASSIS HS-158 STRING DRIVE DETAIL

CAUTION: Never connect antenna or chassis to water pipe, radiator or other ground.

POWER SUPPLY - 105-125V AC or DC, 35 watts



NOTES:
117 V. AC INPUT TO SET DURING MEASUREMENTS.
A VTVM WAS USED FOR ALL MEASUREMENTS.
MEASUREMENTS MADE FROM TUBE BASE PIN TERMINAL TO B-(⏚)
VOLUME CONTROL SET TO MINIMUM AND NO STATION TUNED IN.
VOLTAGE TOLERANCE ± 10%; RESISTANCE TOLERANCE ± 20%.
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.

▭ = RESISTANCE MEASUREMENTS.
◡ = VOLTAGE MEASUREMENTS.
* = MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITOR.
GND. = GROUND TO CHASSIS.
TP = LUG USED AS TIE POINT.
NC = NO CONNECTION.

FIGURE 3. CHASSIS HS-158 VOLTAGE & RESISTANCE DIAGRAM

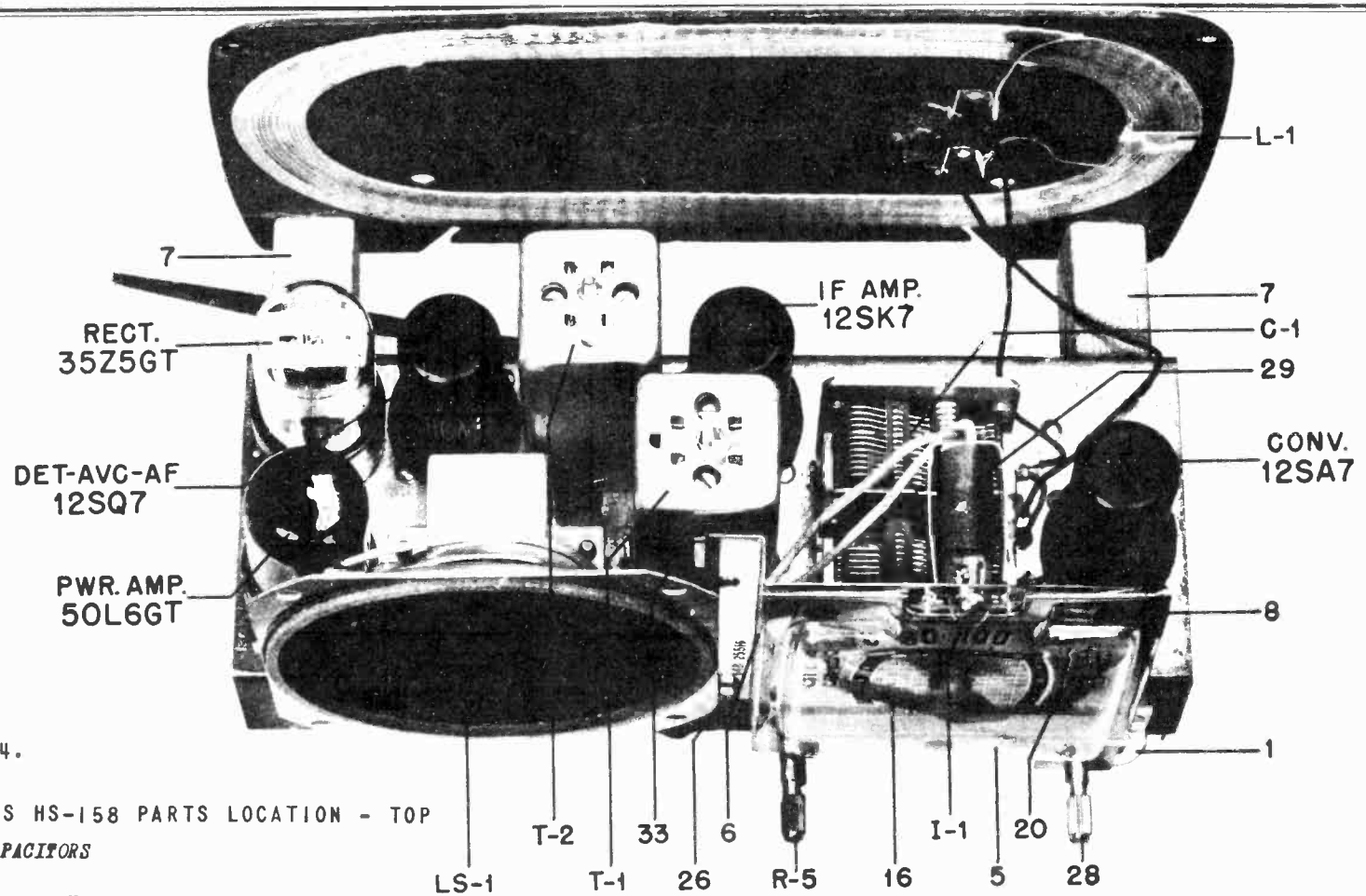


FIGURE 4.

CHASSIS HS-158 PARTS LOCATION - TOP

CAPACITORS

C-1	1X485137	Variable: 2 gang; with pulley .....
C-2	8S9816	Paper: .05 mf 400V .....
C-3	8S9816	Paper: .05 mf 400V .....
C-4	8A72686	Paper: .15 mf 200V .....
C-5A,B, C&D	21B482847	Multiple Ceramic: 220 mmf (C-5A); .002 mmf (C-5B); 220 mmf (C-5C); .005 mmf (C-5D)
C-6	8S9802	Paper: .02 mf 400V .....
C-7	23K485146	Electrolytic: 50-30 mf 150V .....

COILS

L-1	24C485151	Loop Antenna: complete .....
L-2	24A484251	Oscillator coil .....

PILOT LIGHT

I-1	65X11854	Bulb: 6.3V, .15 amp; tubular, clear, #47

SPEAKER

LS-1	50C485152	Speaker: 4" PM; 3.2 ohm voice coil .....

RESISTORS

Note: All resistors are 20% insulated carbon type, unless otherwise specified.

R-1	6R6028	22,000 1/2W .....
R-2	6R6015	220,000 1/2W .....
R-3	6R6007	68 1/2W .....
R-4	6R6004	1 meg 1/2W .....
R-5	18A14629 or 18A72888	Volume control: .5 meg; with SPST switch
R-6	6R6056	47,000 1/2W .....
R-7	6R2109	10 meg 1/2W .....

R-8	6R6032	470,000 1/2W .....
R-9	6R6032	470,000 1/2W .....
R-10	6R6373	150 10% 1/2W .....
R-11	6R5683	27 10% 1/2W .....
R-12	6R3953	1,000 1W .....

TRANSFORMERS

T-1	24B485171	IF,455 Kc: complete; includes shield ...
T-2	24B485172	Diode, 455 Kc: complete; includes shield
T-3	25K485148	Output Transformer .....

CHASSIS PARTS - MECHANICAL

1	7A14610	Bracket, tuning shaft .....
2	42A75825	Clip, electrolytic mounting .....
3	11M8944	Cord, dial: 18 lb; black .....
4	30A470651	Cord, line & plug: 2 conductor; 6 ft long
5	61B25515	Crystal, dial: clear plastic .....
6	1X25530	Dial Plate & Bracket Assembly .....
7	57A77084	Dowel, wood (back mtg) .....
8	5S7805	Eyelet, snap-in (dial scale and crystal mounting) .....
9	5A19658	Eyelet, spacer: .296 x .212; copper plated (gang mtg) .....
10	37A12691	Grommet, rubber (gang cushion) .....
11	32A24815	Lock, line cord: fibre .....
12	4S7650	Lockwasher: #6 internal; cadmium plated (IF & diode trans mtg) .....
13	29R5248	Lug, soldering: 6L; hot tinned .....
14	2S7005	Nut: 6-32 x 1/4 hex; cadmium plated (IF & diode trans mtg) .....
15	2S7051	Nut: 3/8-32 x 9/16 hex Palnut; cadmium plated (volume control mtg) .....
16	52B20520	Pointer: red plastic .....
17	5S7707	Rivet: .122 x 5/32 steel; nickel plated (term. strip, electrolytic mtg clip, tube socket mtg and output trans mtg)..
18	5S7701	Rivet: .122 x 3/16 steel; nickel plated (tuning shaft bracket mtg) .....
19	5S7708	Rivet: .122 x 9/32 steel; nickel plated (line cord lock mtg) .....
20	34B485147	Scale, dial .....
21	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (diode trans mtg) .....
22	3S2294	Screw: 6-32 x 1/2 plain hex head locking type machine screw; cadmium plated (gang mounting) .....
23	3S7339	Screw: 6-32 x 5/8 plain hex head machine screw; cadmium plated (osc coil mtg)...
24	3S7248	Screw: 8-32 x 1/8 plain hex head machine screw; cadmium plated (dial plate mtg).
25	3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw; cadmium plated (speaker mtg) .....
26	3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (dial plate mtg) .....
27	3S3383	Screw: #8 x 2" PKZ plain hex head sheet metal screw; cadmium plated (loop mtg).
28	47A14635	Shaft, tuning .....
29	60A25505	Socket, dial light, clip & leads .....
30	9A76209	Socket, tube: octal; plain type .....
31	9A485822	Socket, tube: octal; shielded type (for IF Amp) .....
32	41A14244	Spring, tension coil (drive cord spring)
33	37K20865	Strip, channel: rubber .....
34	31A15555	Strip, terminal: 2 insulated lugs, #3 mtg
35	4A70015	Washer, "C" (tuning shaft retainer) ....
36	4S1719	Washer: 3/8 x .140 x .030 thick, steel; cad pl (line cord lock mtg) .....
37	4S7597	Washer: 7/16 x .171 x .032 thick; cadmium plated (gang mtg) .....
38	4S7614	Washer: 11/16 x 11/64 x .036 thick; steel; cad pl (loop mtg) .....

CABINET PARTS

101	68D25502	Cabinet, table model: walnut plastic (58A11)
102	68K25540	Cabinet, table model: ivory plastic (58A12)
103	36A470443	Knob, control: walnut plastic (58A11) ..
104	36K485144	Knob, control: ivory plastic (58A12) ...
105	38A25507	Plug, split (holds cabinet back to cabinet) .....
106	3S476106	Screw: #8 x 1 PKA plain hex head sheet metal screw; cad pl (chassis mtg) .....
107	32K481494	Washer, paper: 3/8 x .171 x .020 thick; (chassis mtg) .....

MOTOROLA INC.

MODELS 58A11, 58A12,
CHASSIS HS-158

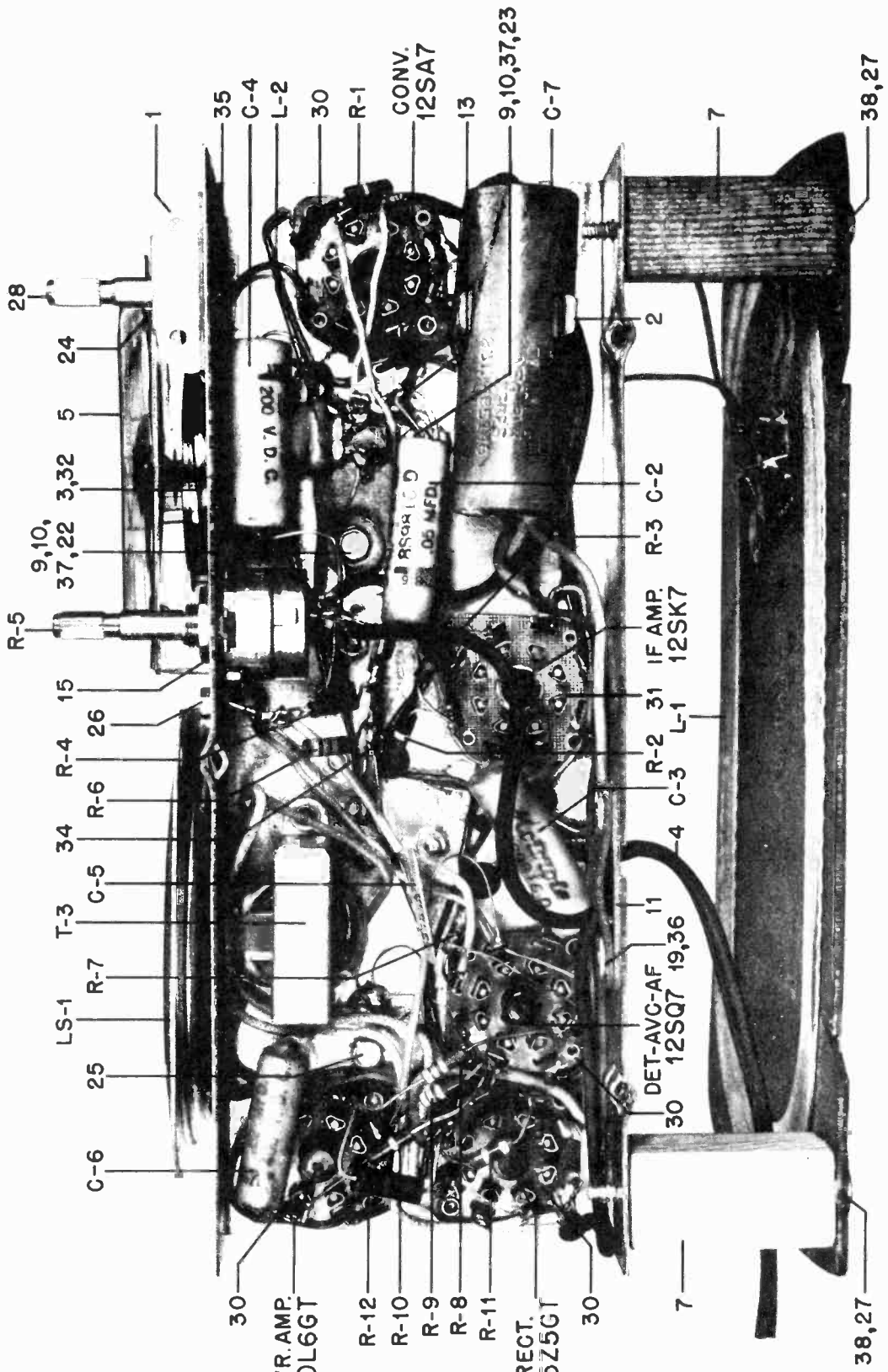


FIGURE 5. CHASSIS HS-158 PARTS LOCATION - BOTTOM

MODELS 58A11, 58A12,
CHASSIS HS-158

MOTOROLA INC.

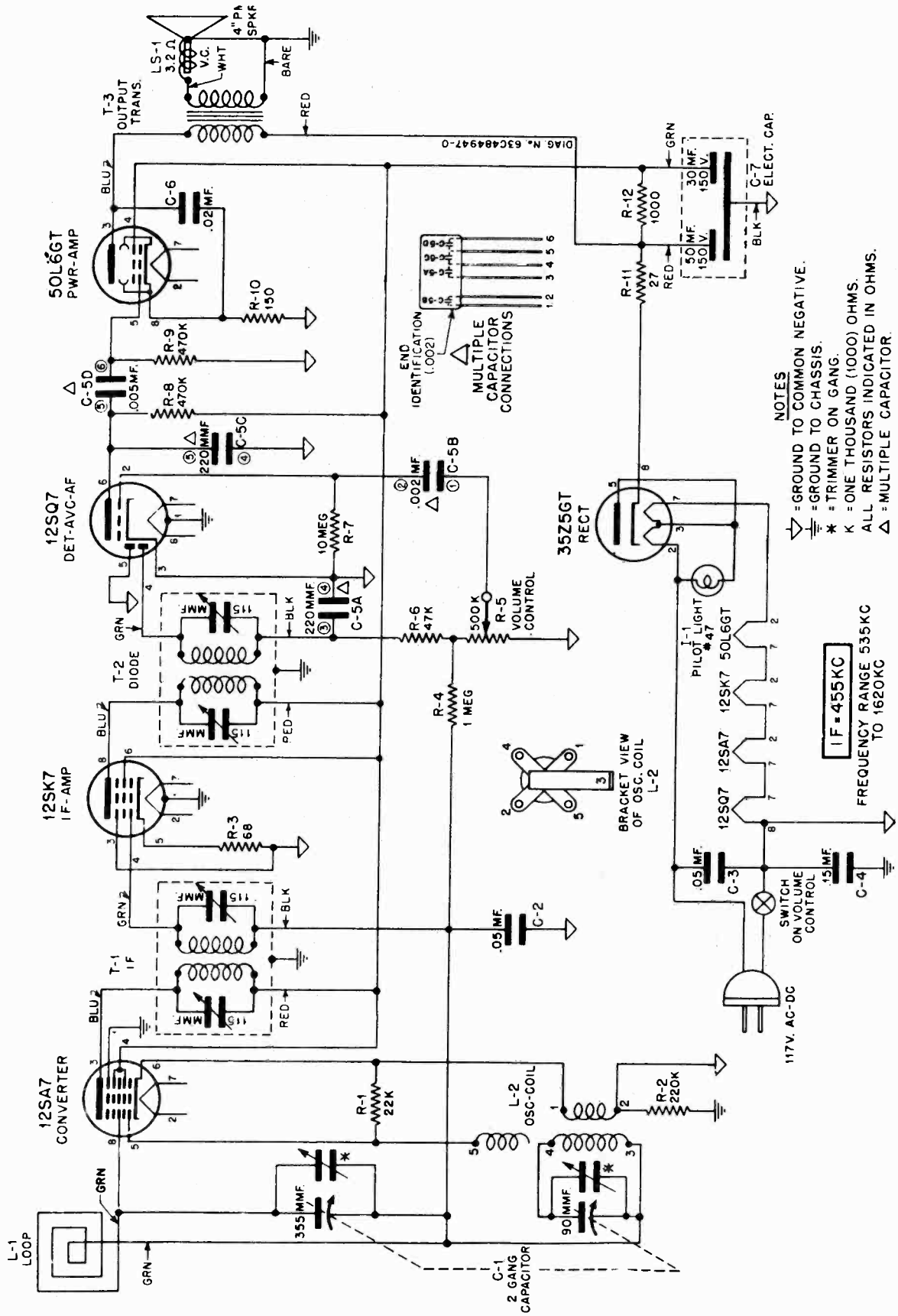


FIGURE 6. CHASSIS HS-158 SCHEMATIC DIAGRAM

MOTOROLA INC.

MODELS 58R11, 58R12, 58R13, 58R14, 58R15, 58R16, CHASSIS HS-116

SERVICE NOTE

The chassis of this receiver is connected directly to the power line. When operating chassis outside of its cabinet (from an AC power line) use an isolating transformer between power line and receiver to reduce possibility of electrical shock.

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected to the speaker voice coil terminal and receiver chassis. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

ALIGNMENT PROCEDURE

Refer to Figure 1 for location of all alignment trimmers and cores.

STEP	DIAL SET TO	DUMMY	SIG. GEN. CONNECTED TO	SIG. GEN. SET AT	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Converter Grid & chassis*	455 Kc	1,2,3 & 4	Adjust for maximum.
RF ALIGNMENT						
2.	Gang fully opened	.1 mf	Converter Grid & Chassis*	1620 Kc	5	This sets oscillator to dial scale.
3.	1400 Kc	None	Radiation loop**	1400 Kc	6	Tune signal in on receiver, then adjust loop trimmer (6) for maximum.

* A convenient point for this connection is the stator lug of the loop section of the tuning capacitor.

** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

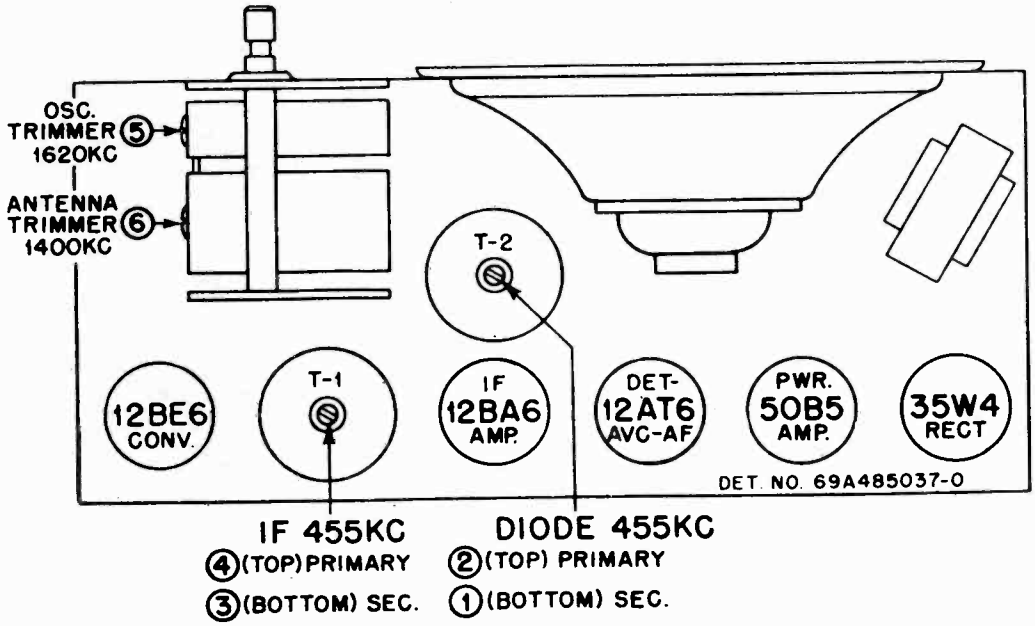


FIGURE 1. CHASSIS HS-116 TUBE & TRIMMER LOCATIONS

MODELS 58R11, 58R12, 58R13, 58R14, 58R15, 58R16, CHASSIS HS-116

MOTOROLA INC.

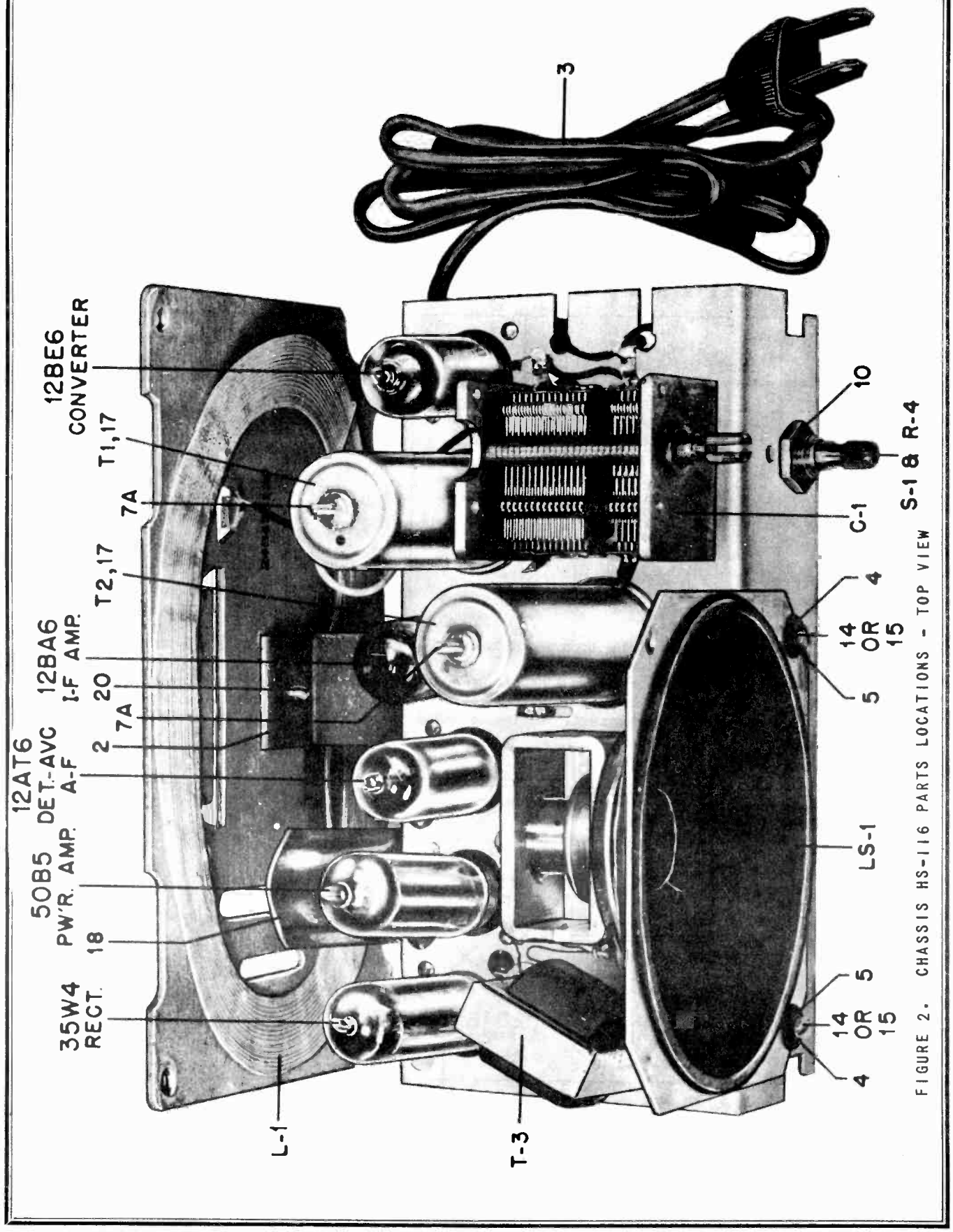


FIGURE 2. CHASSIS HS-116 PARTS LOCATIONS - TOP VIEW

MOTOROLA INC.

MODELS 58R11, 58R12, 58R13, 58R14, 58R15, 58R16, CHASSIS HS-116

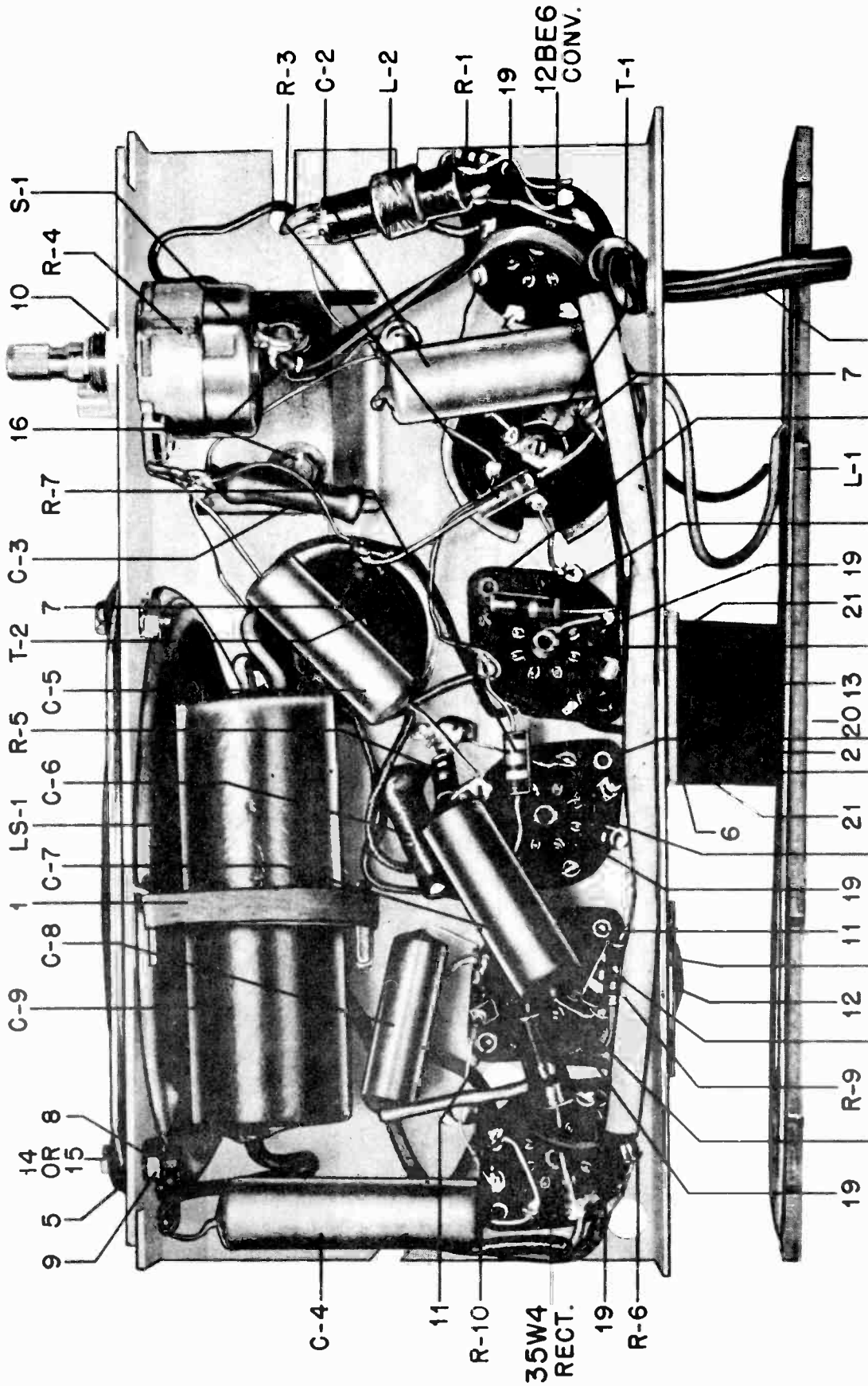


FIGURE 3. CHASSIS HS-116 PARTS LOCATIONS - BOTTOM VIEW

= RESISTANCE READINGS.

= VOLTAGE READINGS.

GND. = GROUND CONNECTIONS TO CHASSIS.

NC = NO CONNECTION.

* = MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITOR.

\# = TIE POINT.

K = ONE THOUSAND (1000) OHMS.

NOTE: A VTVM WAS USED TO TAKE VOLTAGE MEASUREMENTS. VOLUME CONTROL SET AT MINIMUM & NO SIGNAL TUNED IN.
MEASUREMENTS TAKEN FROM TUBE SOCKET TERMINALS TO CHASSIS.
ALL VOLTAGE MEASUREMENTS TAKEN WITH 117 V. AC INPUT TO SET.
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.
VOLTAGE MEASUREMENTS ± 10%.
RESISTANCE MEASUREMENTS ± 20%.

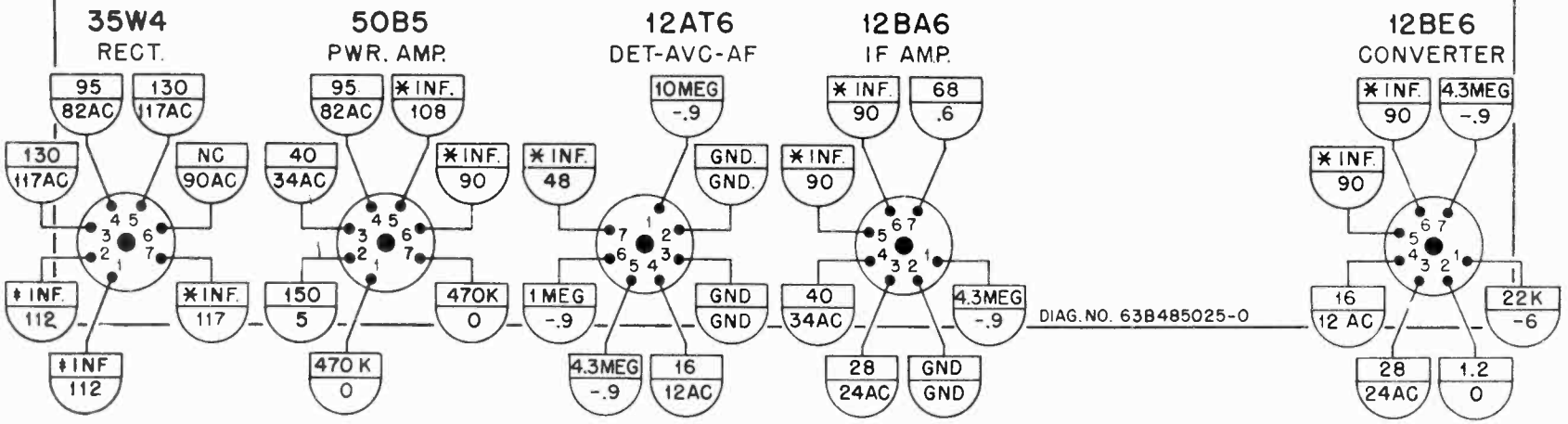
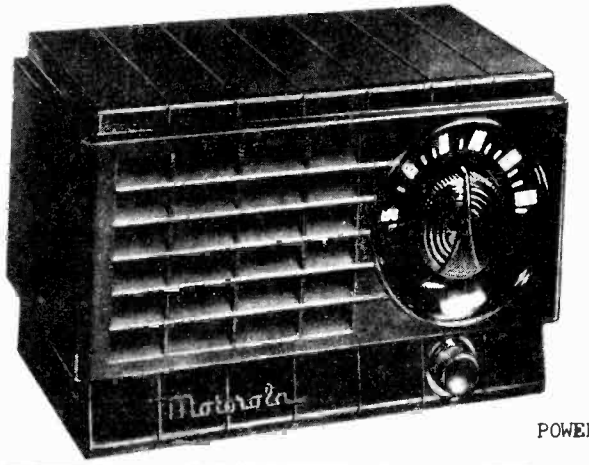


FIGURE 4. CHASSIS HS-116 VOLTAGE & RESISTANCE DIAGRAM



POWER SUPPLY - Operates from 105-125 volts AC or DC, 50 to 60 cycles, 35 watts

MOTOROLA INC. MODELS 58R11, 58R12, 58R13, 58R14, 58R15, 58R16, CHASSIS HS-116

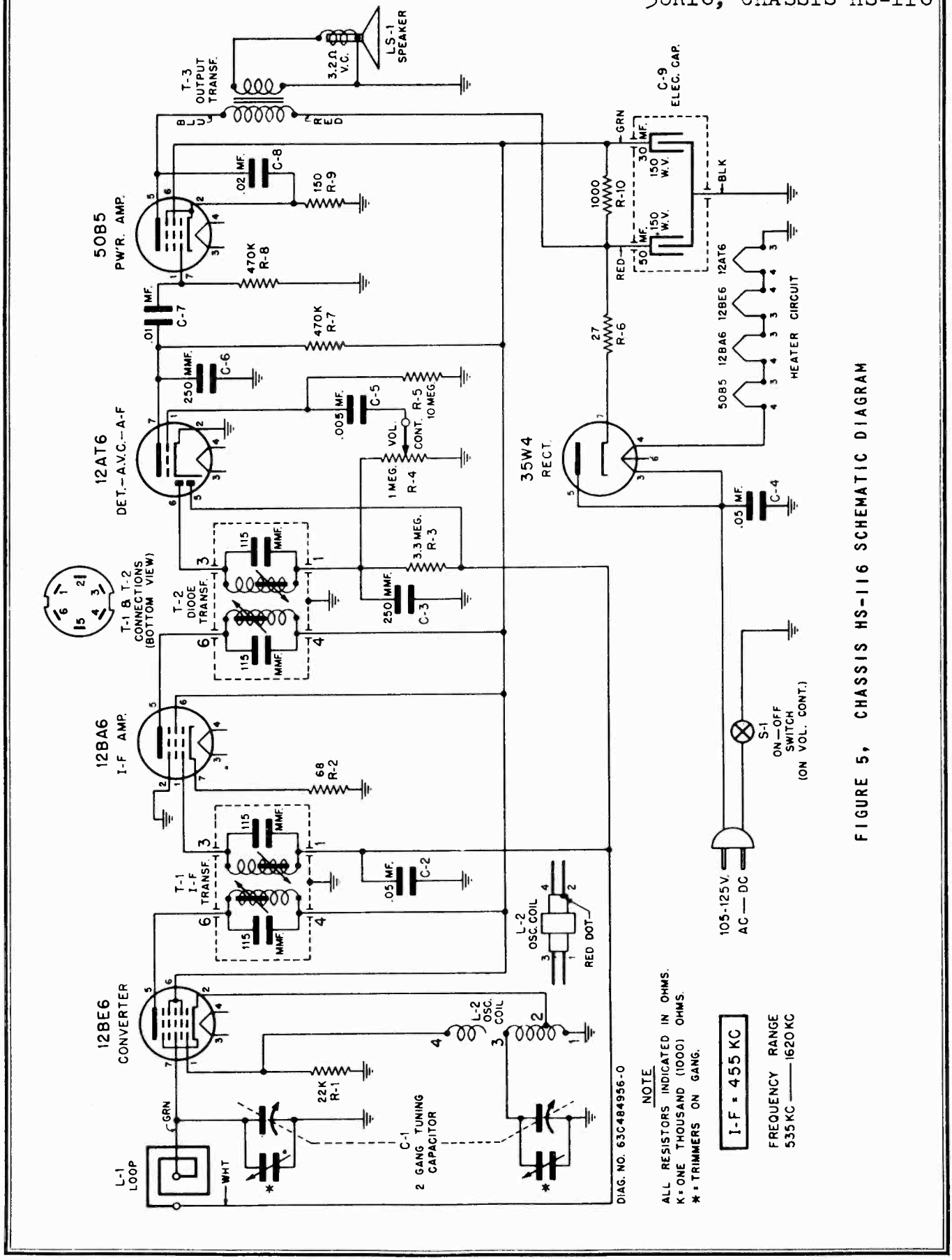


FIGURE 5, CHASSIS HS-116 SCHEMATIC DIAGRAM

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	19B478128	Variable: 2 gang .....
C-2	8S9821	Paper: .05 mf 200V .....
C-3	21K77375	Ceramic: 250 mmf .....
C-4	8S9816	Paper: .05 mf 400V .....
C-5	8S9813	Paper: .005 mf 600V .....
C-6	21K77375	Ceramic: 250 mmf .....
C-7	8S9809	Paper: .01 mf 400V .....
C-8	8S9802	Paper: .02 mf 400V .....
C-9	23B478135	Electrolytic: 50-30 mf 150V .....

COILS

L-1	24B478139	Loop Antenna: includes panel ....
L-2	24A478129	BC Oscillator .....

SPEAKER

LS-1	50C478138	Speaker: 4" PM; 3.2 ohm VC .....

TRANSFORMERS

T-1,2	24B478123	IF & Diode, 455 Kc: complete with tuning cores but less shield .....
T-3	25B478121	Output Transformer .....

RESISTORS

Note: All resistors are insulated carbon type, 20%, 1/2W, unless otherwise specified.

R-1	6R6028	22,000 .....
R-2	6R6007	68 .....
R-3	6R2118	3.3 meg .....
R-4	18A478122	Volume control: 1 meg; with SPST switch
R-5	6R2109	10 meg .....
R-6	6R5683	27 10% .....
R-7	6R6032	470,000 .....
R-8	6R6032	470,000 .....
R-9	6R3992	150 .....
R-10	6R3953	1,000 1 watt .....

CHASSIS PARTS - MECHANICAL

1	37A27142	Band, rubber (capacitor mtg) .....
2	7A478118	Bracket, loop mtg .....
3	30K478137	Cord, line, and plug: 6 ft long .....
4	5S7946	Eyelet, speaker mtg .....
5	5A484268	Grommet, speaker mtg: rubber .....
6	14A478119	Insulator, loop mtg .....
7	1X71048	Iron Core & Clip Assembly (IF & Diode trans. bottom core) .....
7A	1X71047	Iron Core & Palnut Assembly (IF & diode trans. top core) .....
8	4S7686	Lockwasher: #5 ext (speaker mtg - use with 3S7324 mounting screw only) .....
9	2S7010	Nut: #5 - 40 x 1/4 hex; steel; cad plated (speaker mtg -use with 3S7327 mtg screw only) .....
10	2S7051	Nut: 3/8-32 x 9/16 hex; steel; cad plated; Palnut (vol. cont. mtg).....
11	5S7771	Rivet: .088 x 3/16; steel; nickel plated (tube socket mtg) .....
12	5S7707	Rivet: .122 x 5/32; steel; nickel plated (electrostatic shield mtg and output transformer mtg) .....
13	5S7703	Rivet: .122 x 7/32; steel; nickel plated (antenna bracket mtg) .....
14	3S3367	Screw: #5 x 3/8 PKA plain hex head sheet metal screw; black parkerized (speaker mtg-late production sets only) .....
	or	
15	3S7327	Screw: 5-40 x 3/8 plain hex head machine screw; cad pl (speaker mtg-used in early production sets) .....
16	3S7247	Screw: 6-32 x 3/16; slotted hex head machine screw; steel cad plated; lock-screw (gang mtg) .....
17	24B70107	Shield, coil: for IF and diode trans-formers .....
18	26A478117	Shield, electrostatic .....
19	9A472534	Socket, tube: miniature .....
20	46A478145	Stud, tri-mount (antenna mtg) .....
21	14A11493	Washer, fibre: insulating (antenna bracket mtg) .....

CABINET PARTS

101	16D478088	Cabinet, plastic: brown (58R11) ....
102	16K484338	Cabinet, plastic: white (58R12) ....
103	16K484340	Cabinet, plastic: red (58R13) .....
104	16K485161	Cabinet, plastic: gray (58R14) .....
105	16K485162	Cabinet, plastic: green (58R15) ....
106	16K485163	Cabinet, plastic: yellow (58R16) ...
107	36B478147	Knob, tuning (58R11) .....
108	36A478148	Knob, volume control (58R11) .....
109	36K484377	Knob, tuning: ivory (58R12 & 58R13)
110	36K484375	Knob, volume control: ivory (58R12 & 58R13) .....
111	36K485157	Knob, tuning: gold (58R14, 58R15 & 58R16)
112	36K485156	Knob, volume control; gold (58R14, 58R15 & 58R16) .....
113	38A25507	Plug, split: copper oxide finish (mounts loop panel to cabinet) .....
114	3S476083	Screw: 6-32 x 5/16 slotted hex head; steel, cad plated; lockscrew (chassis mounting) .....
115	11M476113	Tape, aluminum foil: 3-1/2" wide x 7" long (heat shield) .....

MOTOROLA INC. MODELS 58X11, 58X12, CHASSIS HS-125

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt thruout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter).

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line.

If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator through a .1 mf capacitor to B- instead of the receiver chassis.

NOTE: Two types of IF & diode transformers are used in this chassis. One type has cores with slotted brass adjustment screws; the other type has threaded cores that move inside a threaded coil form. To adjust the latter type, use a small fibre screwdriver and do not use undue pressure as damage to the core or coil form may result.

Refer to Figure 1 for location of all adjustments.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Converter grid*	455 Kc	1;2,3 & 4	Adjust for maximum.
RF ALIGNMENT						
2.	1600 Kc**	-	Radiation loop***	1600 Kc	5	Adjust for maximum. This sets osc. to dial scale.
3.	1400 Kc	-	Radiation loop***	1400 Kc	6	Tune signal for maximum with receiver tuning knob, then peak trimmer 6.

* A convenient point is the stator of the antenna section of the tuning capacitor.

** First close gang fully and set pointer to calibration mark at left hand side of dial background; then set pointer to 1600 Kc. by turning knob till pointer lines up with right-hand calibration mark.

*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of .05 watt (.40V on output meter). Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

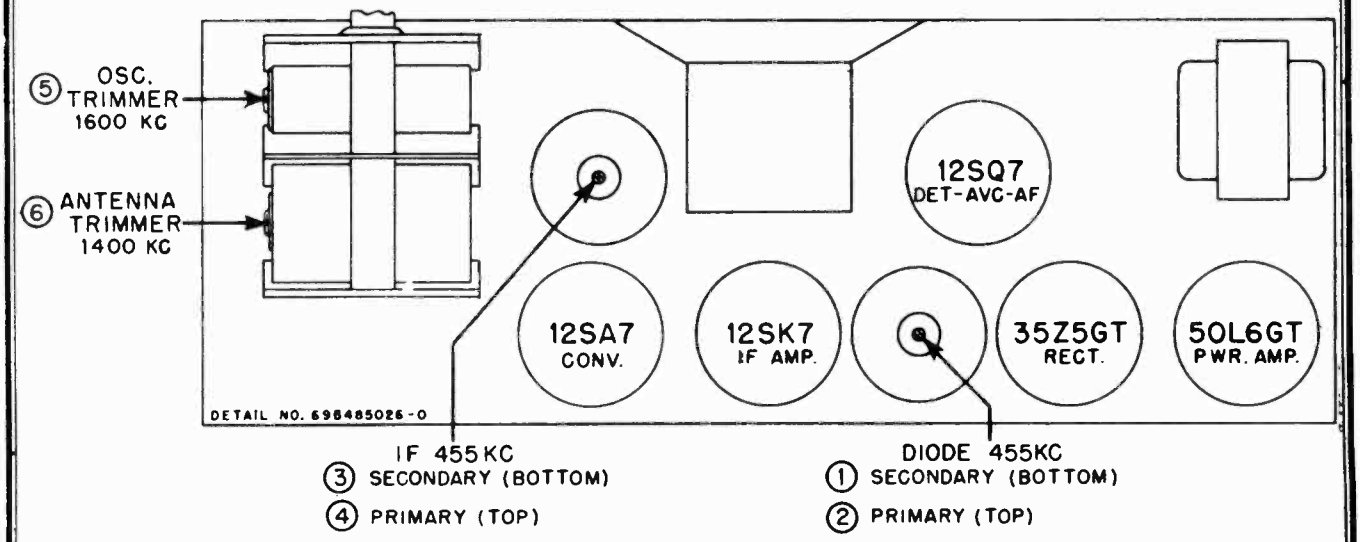


FIGURE 1. CHASSIS HS-125 TUBE & TRIMMER LOCATIONS

MODELS 58X11, 58X12, CHASSIS HS-125

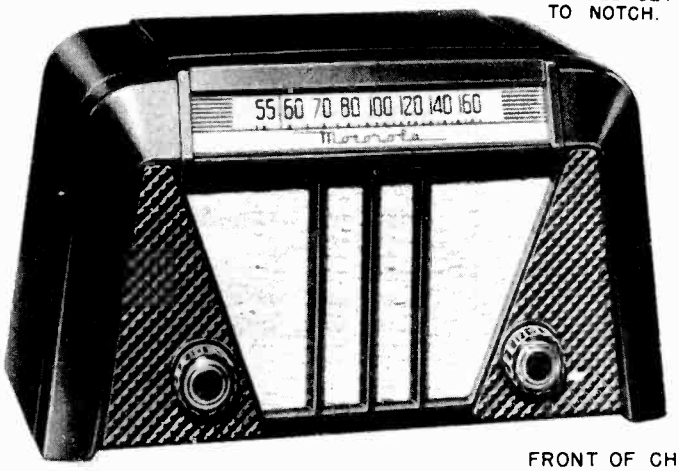
MOTOROLA INC.

SERVICE NOTE

Two types of IF & Diode transformers are being used in this model. One type has iron cores that are tuned by means of slotted brass screws. These transformers must be used with shields having an internal iron core sleeve.

The other type of transformers have threaded cores moving inside of a threaded coil form. These transformers must be used with plain shields.

Replacement transformer should always be of the same type as the original.



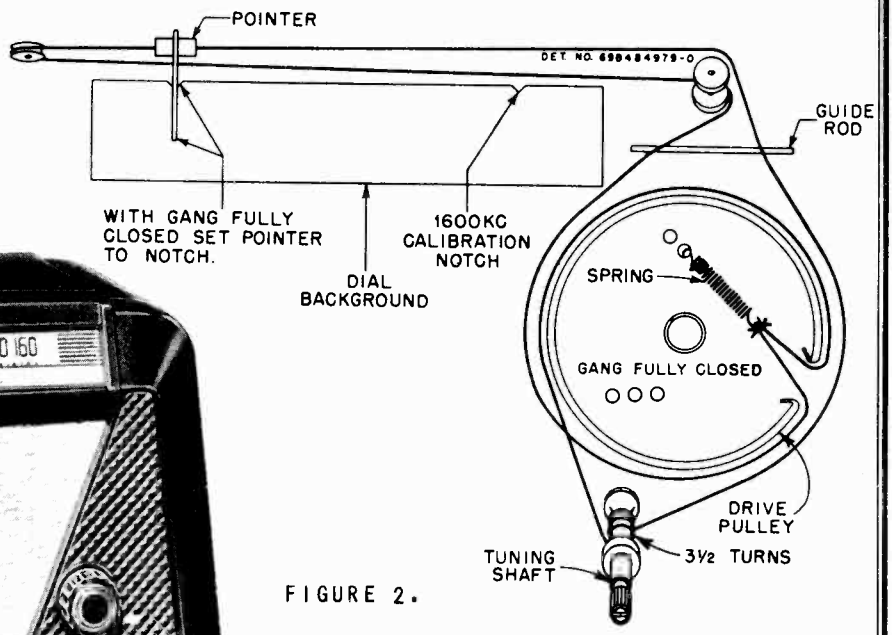
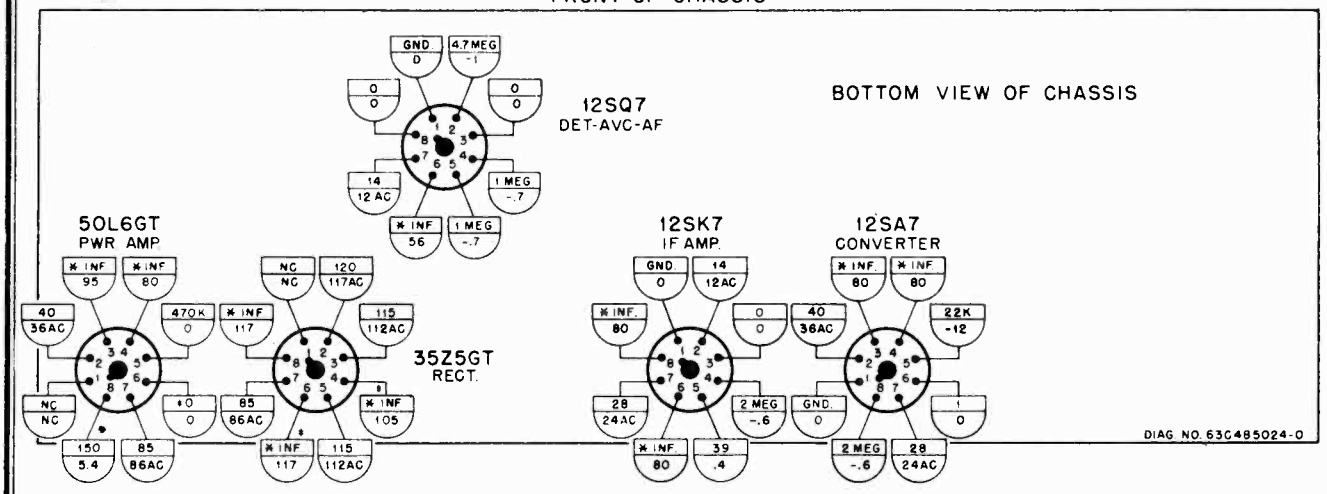


FIGURE 2. CHASSIS HS-125 STRING DRIVE DETAIL

FRONT OF CHASSIS



▭ = RESISTANCE MEASUREMENTS.
◡ = VOLTAGE MEASUREMENTS.
‡ = TIE POINT.
* = MEASUREMENT MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITOR.
GND = GROUND TO CHASSIS.
NC = NO CONNECTION.
K = 1000 (ONE THOUSAND) OHMS

VOLTAGE TOLERANCE ±10%.
RESISTANCE TOLERANCE ±20%.
VOLUME CONTROL AT MINIMUM AND NO STATION TUNED IN.
117 V. AC INPUT TO SET DURING MEASUREMENTS.
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.
MEASUREMENTS TAKEN WITH A VTVM.
MEASUREMENTS MADE FROM TUBE BASE PIN TERMINALS TO B-(⏚)

FIGURE 3. CHASSIS HS-125 VOLTAGE & RESISTANCE DIAGRAM

MOTOROLA INC. MODELS 58X11, 58X12, CHASSIS HS-125

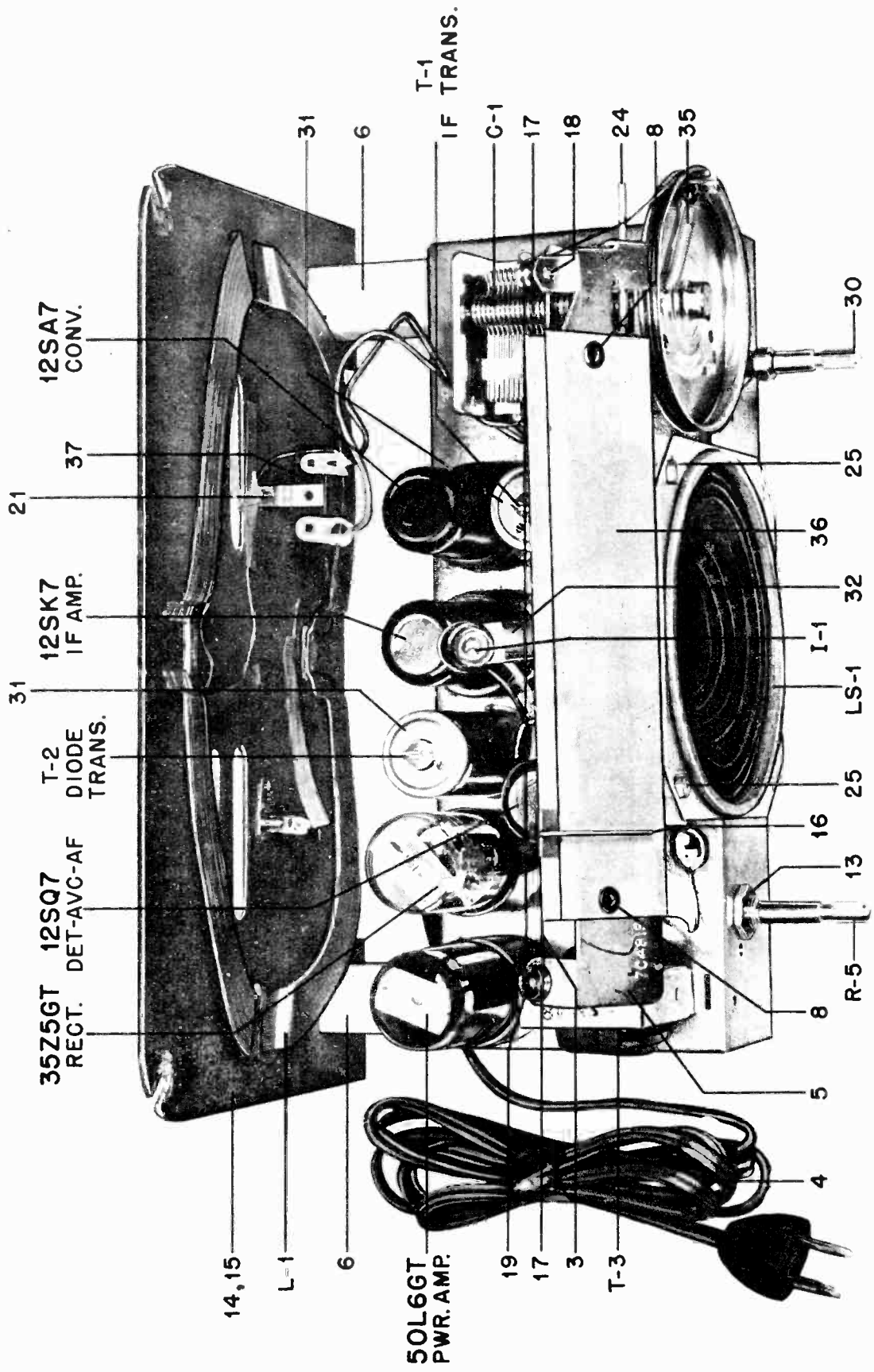


FIGURE 4. CHASSIS HS-125 PARTS LOCATION - TOP VIEW

MODELS 58X11, 58X12,
CHASSIS HS-125

MOTOROLA INC.

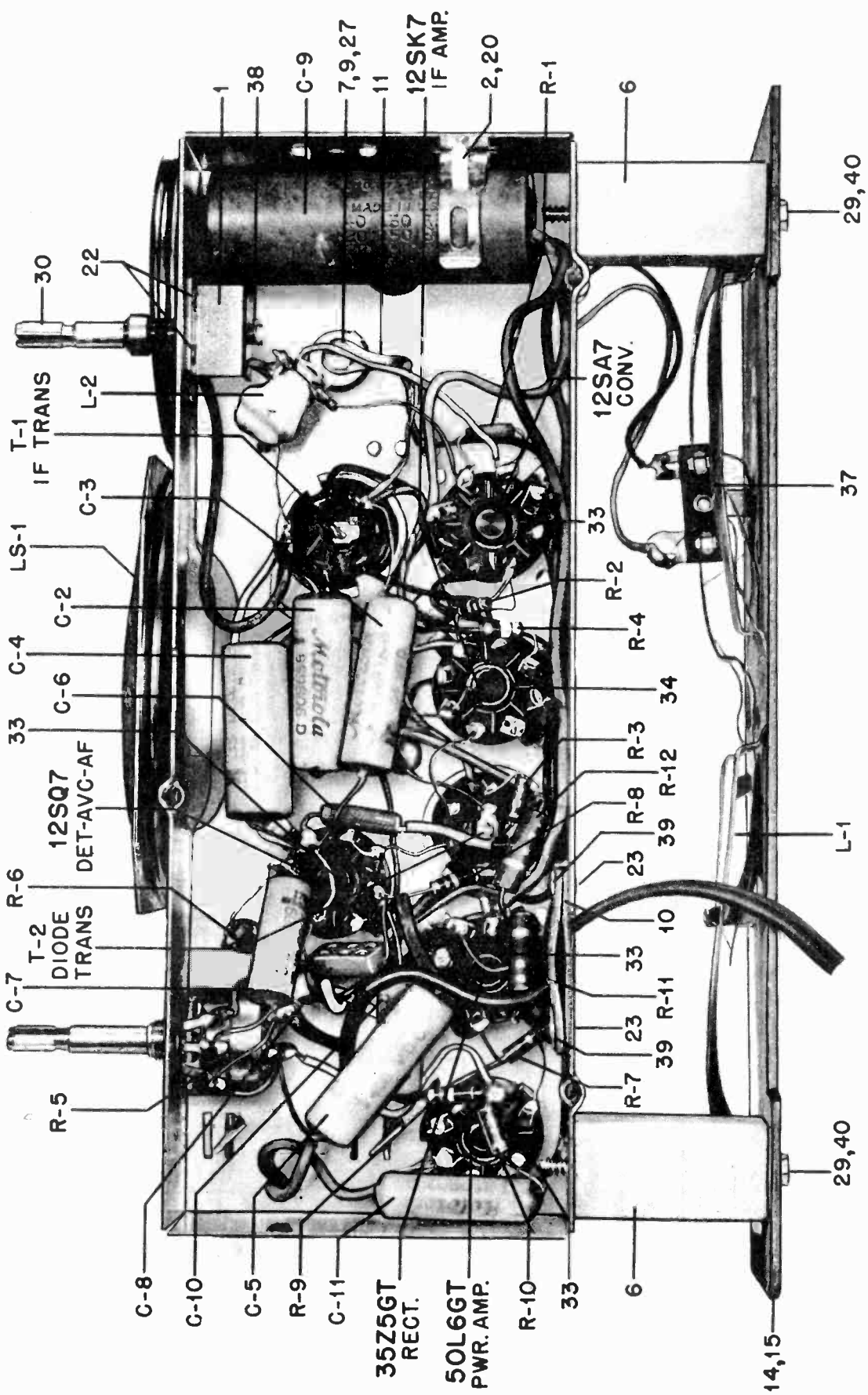


FIGURE 5. CHASSIS HS-125 PARTS LOCATION - BOTTOM VIEW

MOTOROLA INC. MODELS 58X11, 58X12, CHASSIS HS-125

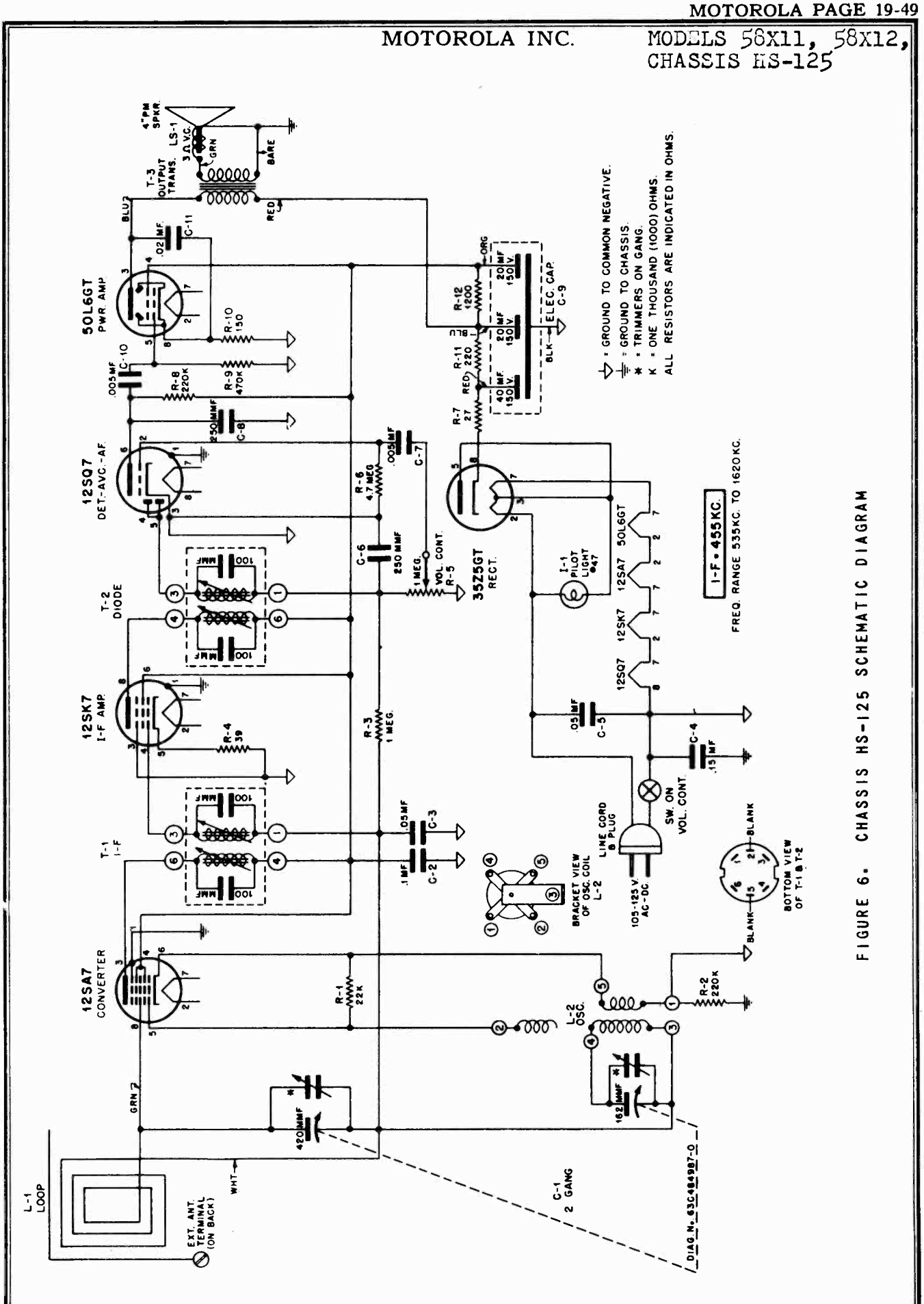


FIGURE 6. CHASSIS HS-125 SCHEMATIC DIAGRAM

MODELS 58X11, 58X12, CHASSIS HS-125 — MOTOROLA INC.

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	1X77204	Variable: 2 gang; cut oscillator plates; includes pulley
C-2	8S9806	Paper: .1 mf 200V
C-3	8S9816	Paper: .05 mf 400V
C-4	8A72686	Paper: .15 mf 200V
C-5	8S9816	Paper: .05 mf 400V
C-6	21R6640	Mica: 250 mmf 500V
C-7	8S9813	Paper: .005 mf 600V
C-8	21R6648	Mica: 250 mmf 500V
C-9	23B75808	Electrolytic: 40-20-20 mf 150V
C-10	8S9813	Paper: .005 mf 600V
C-11	8S9802	Paper: .02 mf 400V

DIAL LIGHT

I-1	65X11854	Bulb, pilot: 6.3V, .15A; tubular, bayonet base; #47

COILS

L-1	24K77096	Loop Winding only - less cabinet back
L-2	24A74616	Oscillator

RESISTORS

NOTE: All resistors are insulated carbon type, 20% unless otherwise specified.

R-1	6R6028	22,000 1/2W
R-2	6R6015	220,000 1/2W
R-3	6R6004	1 meg 1/2W
R-4	6R2085	39 10% 1/2W
R-5	18A70032	Volume Control: 1 meg; includes switch
R-6	6R2122	4.7 meg 1/2W
R-7	6R5683	27 10% 1/2W
R-8	6R6015	220,000 1/2W
R-9	6R6032	470,000 1/2W
R-10	6R6373	150 10% 1/2W
R-11	6R6152	220 1W N.I.
R-12	6R3972	1200 10% 1W N.I.

SPEAKER

LS-1	50K482754	Speaker: 4" PM; 3.2 ohms VC

TRANSFORMERS

T-1	24B70531	IF, 455 Kc: complete with iron cores and padding capacitors, but less shield (use with shield & sleeve 1A71049)
or	24B482863	IF, 455 Kc: complete with iron cores and padding capacitors, but less shield (use with shield 26K485936)
T-2	24B70533	Diode, 455 Kc: complete with iron cores and padding capacitors, but less shield (use with shield & sleeve 1A71049)
or	24B482865	Diode, 455 Kc: complete with iron cores and padding capacitors, but less shield (use with shield 26K485936)
T-3	25B76117	Output Transformer

CHASSIS PARTS - MECHANICAL

1	7A77337	Bracket, tuning shaft
2	42K75826	Clip, electrolytic mtg
3	11M8944	Cord, dial: 18 lb black
4	30A470651	Cord, line: 6 ft lg; with plug
5	1X481466	Dial Background Bracket & Pulley Assembly: background bracket with 3 cord pulleys and cord guide rod
6	57A77084	Dowel, wood (cabinet back mtg)
7	5A19658	Eyelet, spacer: 19/64 x .212 ID x 1/2 (gang mtg)
8	5S7805	Eyelet, snap-in (dial background strip mounting)
9	5A70404	Grommet, rubber (gang cushion)
10	32A24815	Lock, line cord: fibre
11	29R5235	Lug, soldering: #6
12	29R5348	Lug, soldering: #8
13	2S7051	Nut: 3/8-32 x 9/16 hex, cad pl (volume control mtg)
14	1X485924	Panel Assembly, cabinet back: less loop; includes terminal strip and antenna connector
15	24K481389	Panel and Loop Assembly: complete cabinet back panel; includes loop winding
16	52A481378	Pointer, dial
17	49A23960	Pulley, cord: 1/4" groove
18	5K74560	Rivet, shoulder: .312 shoulder; nkl pl (cord pulley mtg)
19	5A12814	Rivet, shoulder: .156 shoulder; nkl pl (cord pulley mtg)
20	5S7706	Rivet: .122 x 1/8; steel; nkl pl (electrolytic mtg clip mtg)
21	5S7707	Rivet: .122 x 5/32; steel; nkl pl (terminal strip mtg)
22	5S7701	Rivet: .122 x 3/16; steel; nkl pl (tuning shaft bracket mtg)
23	5S7708	Rivet: .122 x 9/32; steel; nkl pl (line cord lock mtg)
24	47A481382	Rod, cord guide
25	3S2695	Screw: #6 x 3/16 PKZ slotted hex head sheet metal screw; cad pl (dial background bracket mtg)
26	3S2294	Screw: 6-32 x 1/2 plain hex head locking type machine screw; cad pl (gang mtg)
27	3S1925	Screw: 6-32 x 5/8 slotted hex head machine screw; cad pl (oscillator coil mtg)
28	3S7205	Screw: 8-32 x 1/4; slotted hex head locking type machine screw; cad pl (spkr mounting)
29	3S3383	Screw: #8 x 2" PKZ slotted hex head sheet metal screw; cad pl (cabinet back mtg)
30	1X484556	Shaft, tuning
31	1A71049	Shield and Iron Core Sleeve Assembly (for T-1 and T-2; used only with 24B70531 IF & 24B70533 Diode Trans)
or	2K485936	Shield, coil (for T-1 and T-2 -used only with 24B482863 IF & 24B482865 Diode trans)
32	9A482746	Socket, pilot light: with bracket and leads
33	9A6790	Socket, tube: octal; plain type
or	9A6788	Socket, tube (replacement) molded octal plain type (to be used in place of 9A6790 when mounting lugs on chassis break off)
34	9A6792	Socket, tube: octal; with center shield (for IF amp)
or	9A70165	Socket (replacement) octal; with center shield (to be used in place of 9A6792 when mounting lugs on chassis break off)
35	41A14244	Spring, tension coil(drive cord)
36	35A481384	Strip, dial background: tan plastic
37	31K86126	Strip, terminal: 2 insulated lugs, #2 mtg (on loop antenna panel)
38	4A70015	Washer, "C" (tuning shaft retainer)
39	4S1719	Washer: 3/8 x .140 x .030 thick; steel; cad pl (line cord lock mtg)
40	4S7563	Washer: 5/8 x .203 x .033 thick; steel; cad pl (cabinet back mtg)

CABINET PARTS

101	35K481468	Baffle & Grille Cloth Assembly
102	37K70069	Band, rubber (on dial scale)
103	16E480031	Cabinet: plastic; walnut (58X11)
104	16K481445	Cabinet: plastic; white (58X12)
105	36B77213	Knob, control: walnut plastic (58X11)
106	36K77214	Knob, control: ivory plastic (58X12)
107	38A25507	Plug, split: 5/8 long; for 1/8 hole (mounts cabinet back to cabinet)
108	34B481438	Scale, dial
109	3S3365	Screw: #8 x 1" PKA slotted hex head sheet metal screw; parkerized finish (chassis mounting)
110	2S7089	Speednut: for .187 round (baffle & grille cloth assembly mtg)
111	2A481437	Speednut (dial scale mtg)
112	4K19943	Washer, paper: 11/16 x 17/64 x 1/32 thick (under knobs)
113	4S7633	Washer, steel: 9/16 x 11/64 x .033 thick; cad pl (chassis mtg)

MOTOROLA INC.

MODEL 67F14,
CHASSIS HS-122

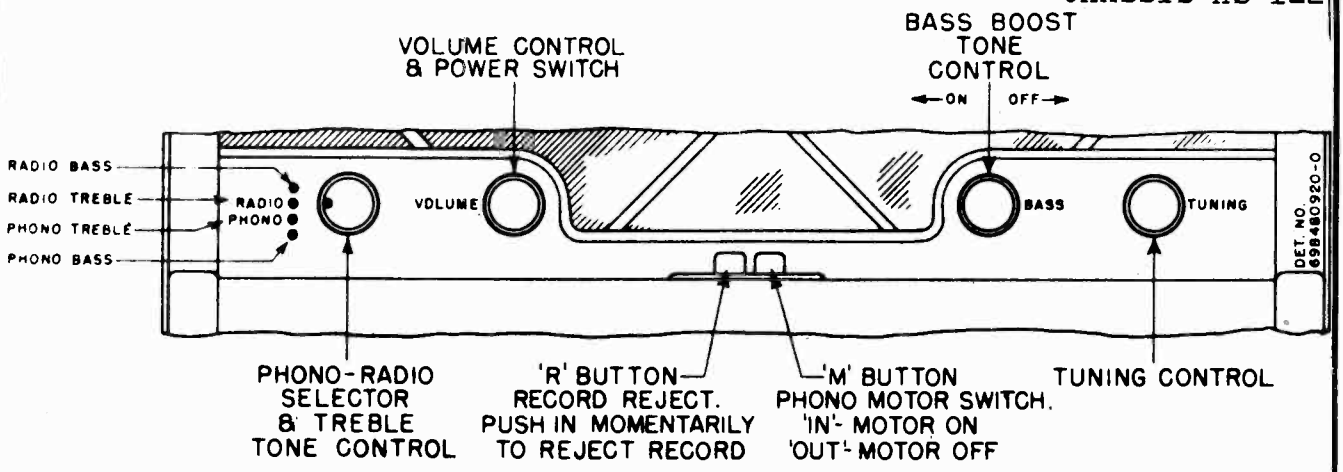


FIGURE 1. FRONT PANEL CONTROLS

TUNING RANGE.- 535 to 1620 Kc

ALIGNMENT

IF FREQUENCY - 455 Kc

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt thruout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter).

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator through a .1 mf capacitor to B- instead of the receiver chassis.

Refer to Figure 2 for location of all adjustments.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	RF Amp. grid*	455 Kc	1,2,3 & 4	Adjust for maximum output.
WAVE TRAP ADJUSTMENT						
2.	Gang fully opened	.1 mf	RF Amp. grid	455 Kc	5	Adjust for minimum response.
RF ALIGNMENT						
3.**	Gang fully opened	.1 mf	RF Amp. grid*	1620 Kc	6	Adjust for maximum output; this sets osc. to dial scale
4.	1400 Kc	—	Radiation loop***	1400 Kc	7	Tune signal for max. with receiver tuning knob, then peak trimmer 7.

* A convenient point for this connection is the stator of the RF section of the tuning capacitor.

** First close gang fully and set pointer to calibration mark as shown in Figure 3, then proceed with Step 3.

*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring close enough to receiver loop to obtain output of 50 milliwatts (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

MODEL 67F14,
CHASSIS HS-122

MOTOROLA INC.

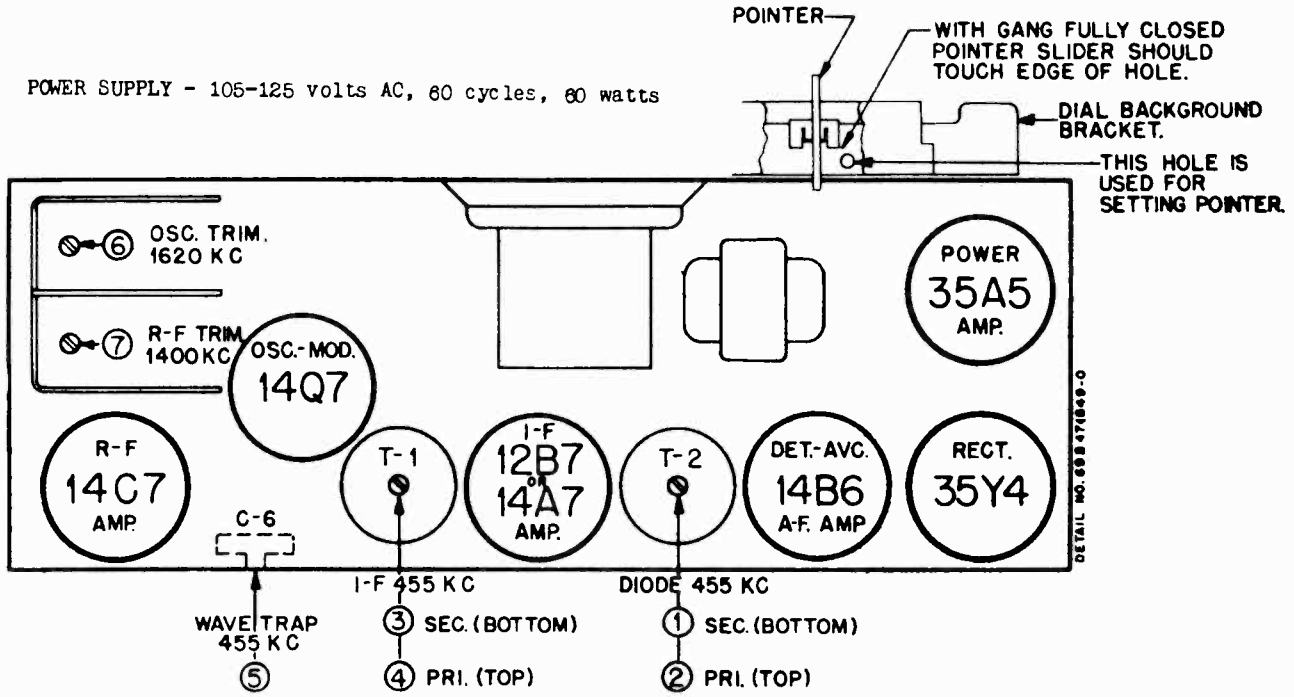


FIGURE 2. CHASSIS HS-122 TUBE & TRIMMER LOCATIONS

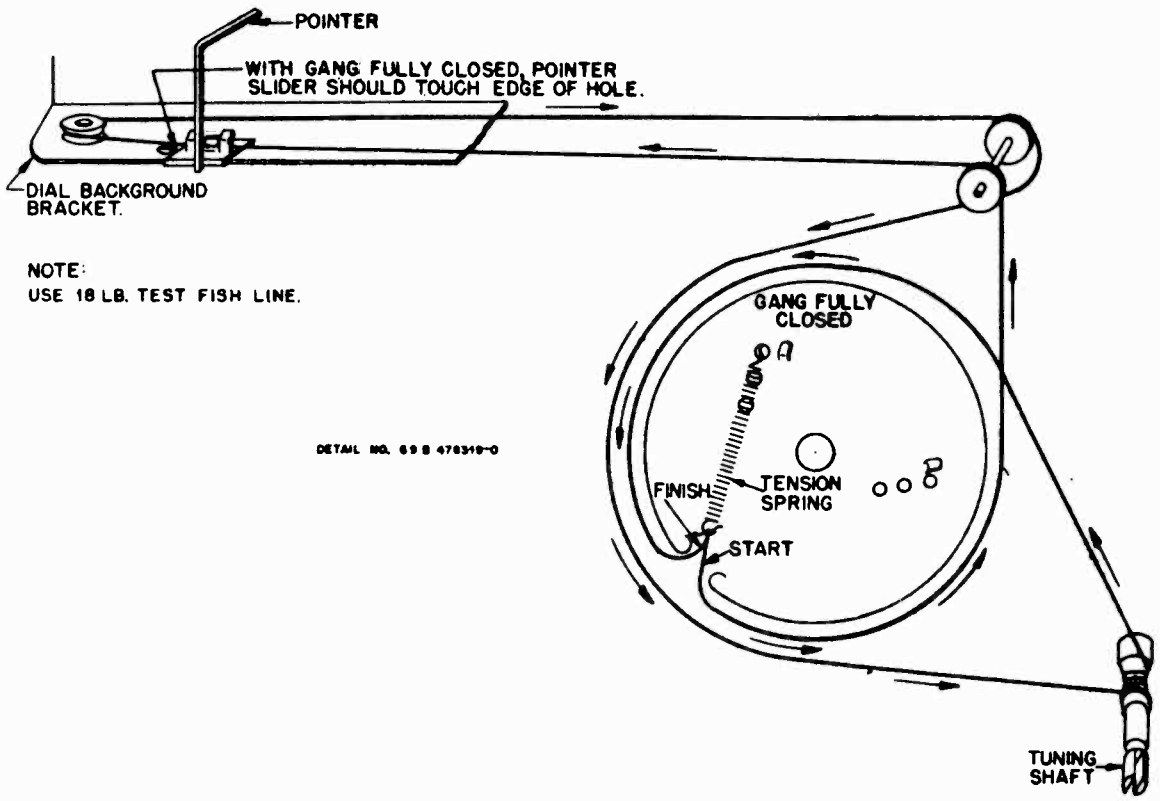
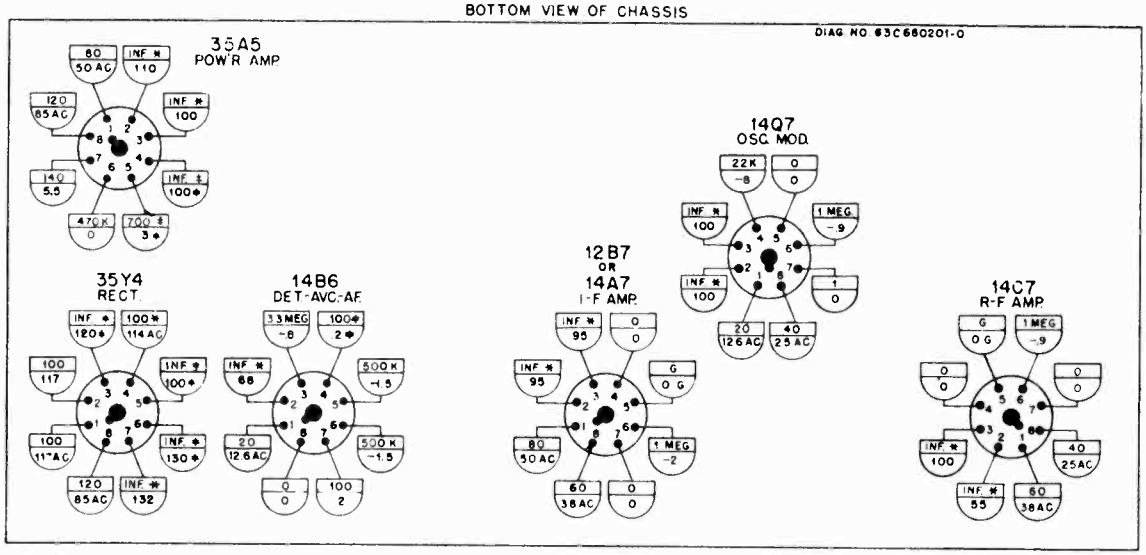


FIGURE 3. CHASSIS HS-122 STRING DRIVE DETAIL

MOTOROLA INC.

MODEL 67F14,
CHASSIS HS-122

BOTTOM VIEW OF CHASSIS



▭ = RESISTANCE READINGS.

◡ = VOLTAGE READINGS.

G = GROUND TO CHASSIS.

* = MAY VARY, DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITORS.
\+ = TIE POINT.
K = ONE THOUSAND (1000) OHMS.

NOTE: A VTVM WAS USED TO MAKE VOLTAGE MEASUREMENTS.
VOLUME CONTROL SET AT MINIMUM AND NO SIGNAL TUNED IN.
MEASUREMENTS TAKEN FROM TUBE SOCKET TERMINALS INDICATED TO B-(▽).
ALL VOLTAGE MEASUREMENTS TAKEN WITH 117 V. AC INPUT TO SET.
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.
ALL MEASUREMENTS ±10%.
PHONO-RADIO-TONE SWITCH IN RADIO-BASS POSITION.
BASS BOOST CONTROL IN 'ON' POSITION.

FIGURE 4. CHASSIS HS-122 VOLTAGE & RESISTANCE DIAGRAM

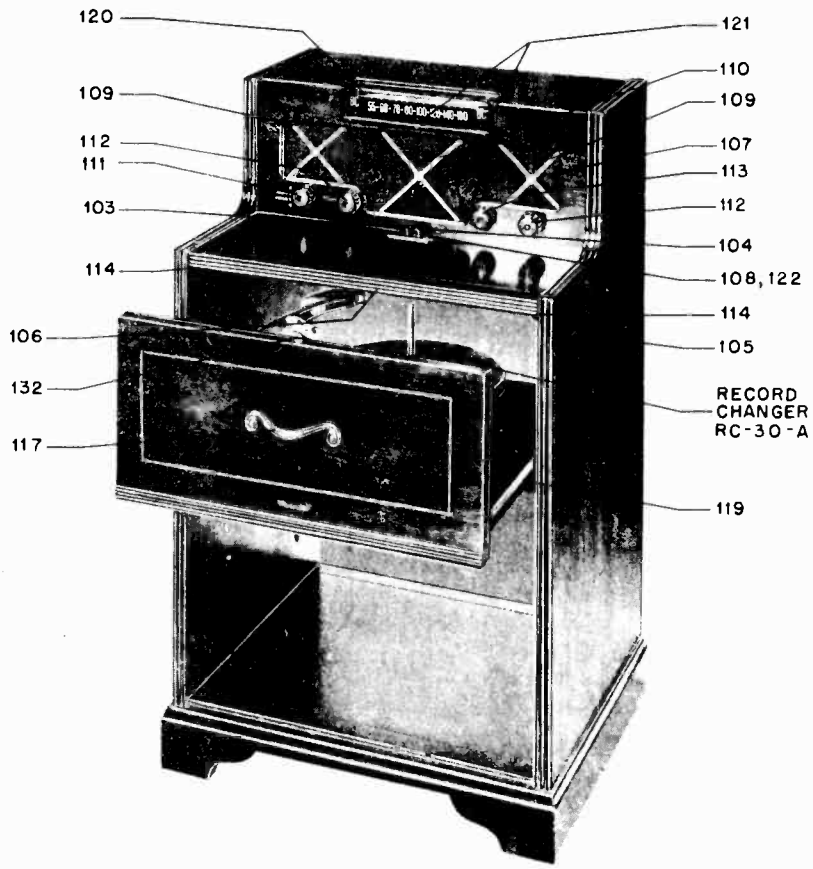


FIGURE 5. MODEL 67F14 CABINET PARTS LOCATIONS

MODEL 67F14,
CHASSIS HS-122

MOTOROLA INC.

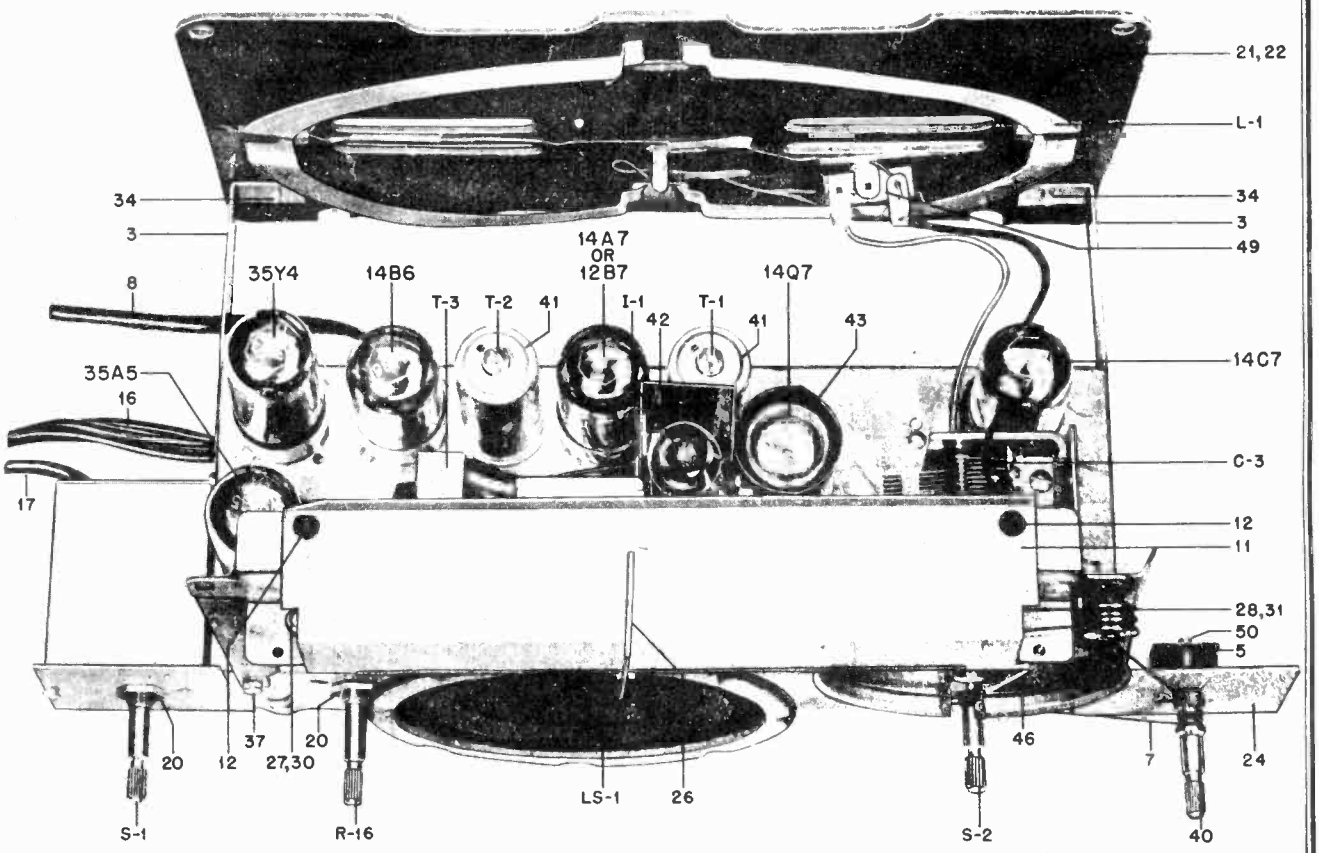


FIGURE 6. CHASSIS HS-122 PARTS LOCATIONS - TOP VIEW

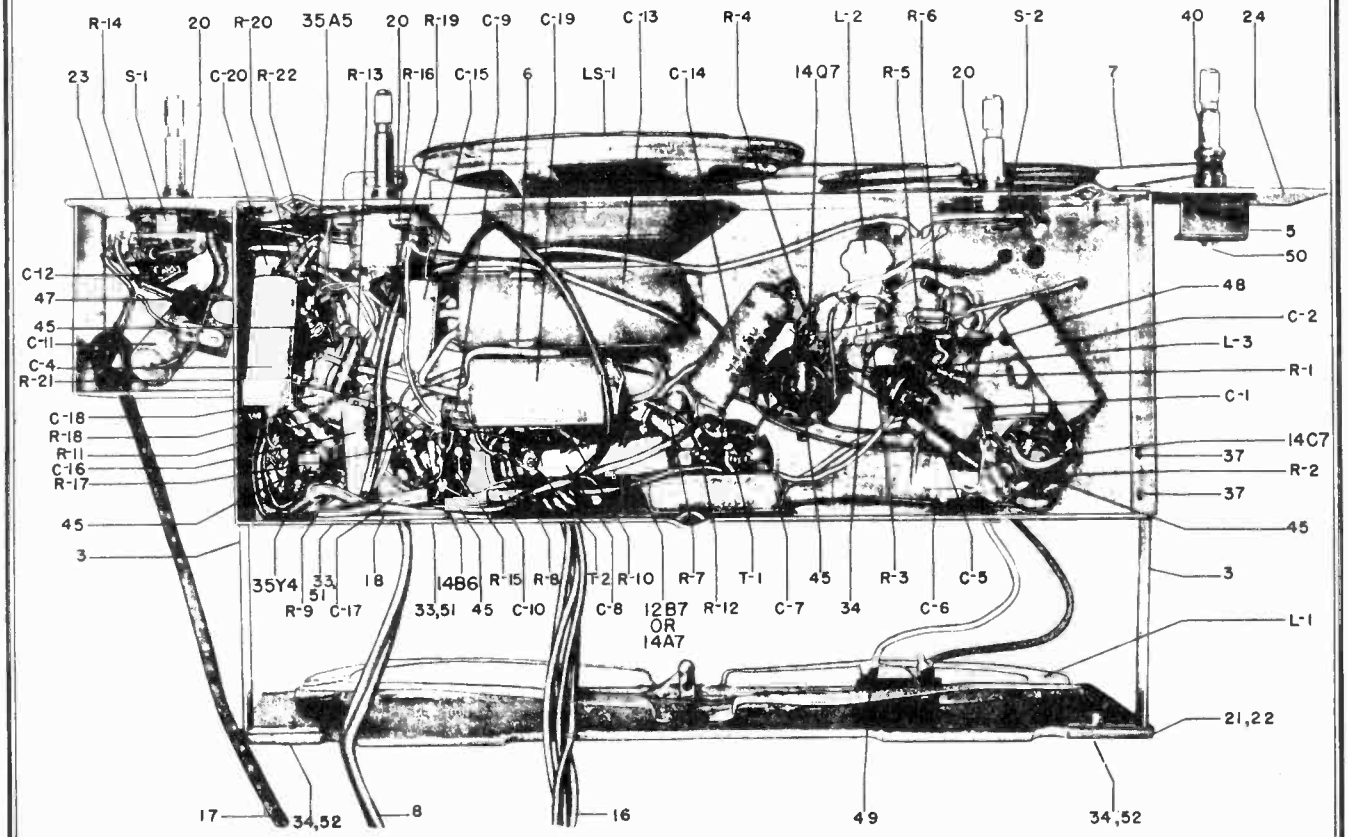


FIGURE 7. CHASSIS HS-122 PARTS LOCATIONS - BOTTOM VIEW

MOTOROLA INC.

MODEL 67F14,
CHASSIS HS-122

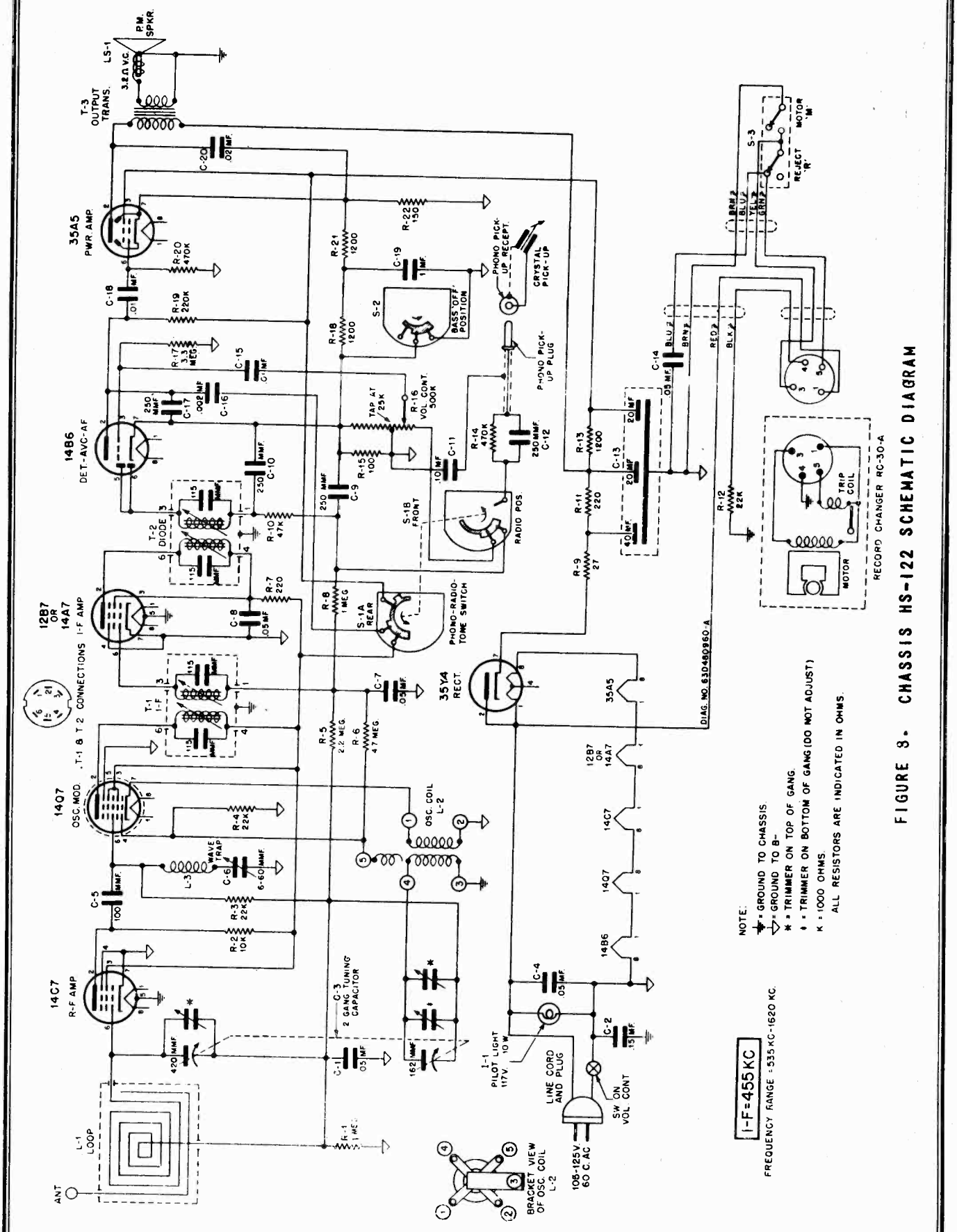


FIGURE 3. CHASSIS HS-122 SCHEMATIC DIAGRAM

MODEL 67F14,
CHASSIS HS-122

MOTOROLA INC.

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
CHASSIS PARTS - ELECTRICAL		
CAPACITORS		
C-1	8S9816	Paper: .05 mf 400V
C-2	8A72686	Paper: .15 mf 200V
C-3	1X77339	Variable: 2 gang; with pulley
C-4	8S9816	Paper: .05 mf 400V
C-5	21R6641	Mica; 100 mmf 500V
C-6	20A26941	Variable, mica: 6-60 mmf; includes bracket
C-7	8S9816	Paper: .05 mf 400V
C-8	8S9816	Paper: .05 mf 400V
C-9	21R6648	Mica: 250 mmf 500V
C-10	21R6648	Mica: 250 mmf 500V
C-11	8S9807	Paper: .1 mf 400V
C-12	21R6648	Mica: 250 mmf 500V
C-13	23B75808	Electrolytic: 40-20-20 mf 150V
C-14	8S9816	Paper: .05 mf 400V
C-15	8S9809	Paper: .01 mf 400V
C-16	8S9824	Paper: .002 mf 400V
C-17	21R6648	Mica: 250 mmf 500V
C-18	8S9809	Paper: .01 mf 400V
C-19	8S9839	Paper: 1 mf 100V
C-20	8S9802	Paper: .02 mf 400V
RESISTORS		
Note:		All resistors are insulated carbon type, unless otherwise specified.
R-1	6R6004	1 meg 20% 1/2W
R-2	6R6054	10,000 20% 1/2W
R-3	6R6028	22,000 20% 1/2W
R-4	6R6028	22,000 20% 1/2W
R-5	6R3927	2.2 meg 20% 1/2W
R-6	6R2122	4.7 meg 20% 1/2W
R-7	6R3933	220 20% 1/2W
R-8	6R6004	1 meg 20% 1/2W
R-9	6R5683	27 10% 1/2W
R-10	6R6056	47,000 20% 1/2W
R-11	6R6389	220 10% 1W
R-12	6R6028	22,000 20% 1/2W
R-13	6R5770	1200 10% 1W
R-14	6R6032	470,000 20% 1/2W
R-15	6R6326	100 10% 1/2W
R-16	18A76191	Volume Control: 500,000 ohms; tapped at 25,000 ohms; with SPST switch
R-17	6R2118	3.3 meg 20% 1/2W
R-18	6R6393	1200 10% 1/2W
R-19	6R6015	220,000 20% 1/2W
R-20	6R6032	470,000 20% 1/2W
R-21	6R6393	1200 10% 1/2W
R-22	6R6373	150 10% 1/2W
COILS		
L-1	24K77323	Antenna Loop: winding only
L-2	24A76192	BC Oscillator coil
L-3	24A77336	Wavetrap
SPEAKER		
LS-1	50C470684	Speaker: 5" PM; 3.2 ohm VC
SWITCHES		
S-1A,B	40K470676	Phono-Radio & Tone
S-2	40A30444	Bass: SPST
S-3	40K471447	Pushswitch, dual (phono motor ON-OFF & REJECT)
TRANSFORMERS		
T-1	24B470038	IF, 455 Kc: includes tuning cores & padding capacitors but less shield
T-2	24B75487	Diode, 455 Kc: includes tuning cores & padding capacitors but less shield
T-3	25B76117	Output Transformer
PILOT LIGHT		
I-1	65A470930	Lamp, incandescent; 117V-10W, clear
CHASSIS PARTS - MECHANICAL		
1	1X478177	Background Bracket, Support & Pullies Assem.
2	7B18748	Bracket, gang mtg
3	7A482882	Bracket, loop support
4	7K470917	Bracket, pilot light mounting
5	7A77337	Bracket, tuning shaft
6	42K75826	Clip, electrolytic mtg
7	11M8944	Cord, dial: 18 lb black
8	3A470651	Cord, line & plug: 6 ft long
9	15A471444	Cover, pushswitch
10	15B470677	Cover, switch (on chassis)
11	35B77311	Dial Background: tan plastic; with reinforcing strip
12	8S7805	Eyelet, snap-in (dial background mtg)
13	5A19658	Eyelet, spacer (gang bracket mtg)
14	37A12891	Grommet, rubber (gang bracket mtg)
15	14A471446	Insulator, pushswitch cover: armite
16	1X484205	Lead Assembly, phono: with 4 pin receptacle & dual push switch
17	1X471449	Lead Assembly, phono pickup: single shielded conductor with one pin plug 43" long
18	32A24815	Lock, line cord: fibre
19	29P5227	Lug, soldering: 6L
20	2S7051	Nut: 3/8-32 x 9/16 hex; Palnut; cad pl (volume control, phono-radio-tone sw. & bass sw. mtg)
21	1X484247	Panel Assembly, cabinet back: less loop winding
22	24C77322	Panel Assembly, cabinet back: complete including loop
23	64A470680	Plate, switch mounting

MOTOROLA INC.

MODEL 67F14,
CHASSIS HS-122

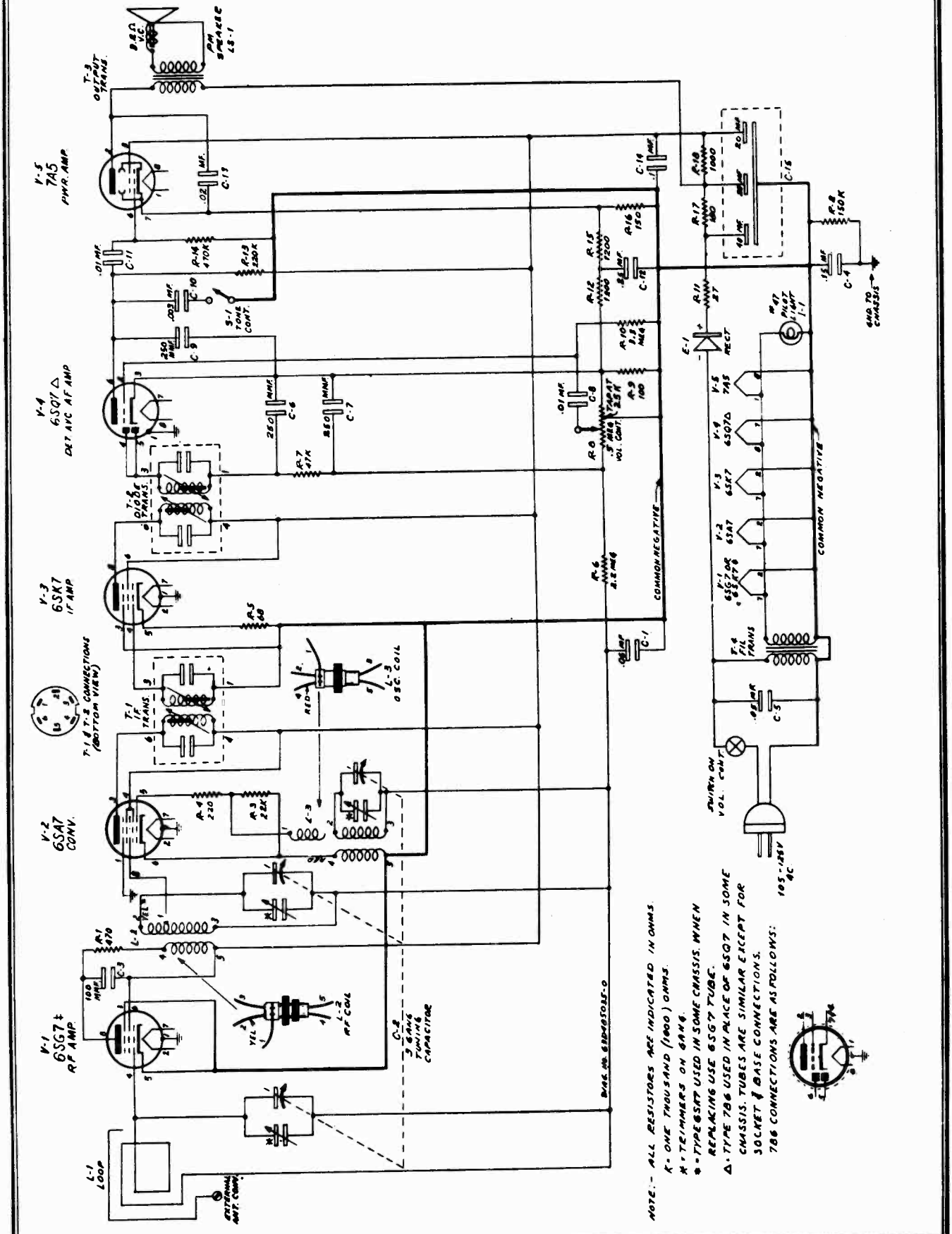
REF. NO.	PART NO.	DESCRIPTION
24	64A470681	Plate, tuning shaft mounting
25	28K71775	Plug: 1 pin (phono pickup lead)
26	52A77307	Pointer & Slider Assembly
27	49A12646	Pulley, cord: 1/4 groove
28	49A21552	Pulley, cord: 1/2 groove
29	9K470402	Receptacle: 4 prong(phono receptacle)
30	5A71246	Rivet, shoulder: .187 long (cord pulley mtg)
31	5A15045	Rivet, shoulder: .437 long (cord pulley mounting)
32	5S7707	Rivet: .122 x 5/32 ; steel; nkl pl (replacement socket mtg, etc)
33	5S7708	Rivet: .122 x 9/32 steel; nkl pl (line cord lock mtg)
34	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw (osc coil mtg and back mtg)
35	3S7152	Screw: 6-32 x 1/4 slotted hex head machine screw; steel; cad pl (gang mtg)
36	3S7350	Screw: 6-32 x 1/4 slotted hex head locking type machine screw; steel; cad pl (gang mtg)
37	3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cad pl (switch cover mounting, loop bracket mtg and background bracket assembly mtg)
38	3S7507	Screw: #8 x 5/8 PKZ plain hex head sheet metal screw; cad pl (gang mtg)
39	3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw; steel; cad pl (spkr mounting)
40	1K77694	Shaft & Pulley Assembly (tuning shaft)
41	1A71049	Shield & Sleeve Assembly (for T-1 & T-2)
42	26A478109	Shield, light & static
43	26A72635	Shield, tube
44	9A470407	Socket, dial light & bracket
45	9A76185	Socket, tube: loctal
or	9A72549	Socket, tube (replacement) use in place of 9A76185 when mounting lugs on chassis are broken
46	41A14244	Spring, tension coil (drive cord tension)
47	31K85348	Strip, terminal: 1 insulated lug, #2 mtg
48	31K76184	Strip, terminal: 2 insulated lugs, #1 gnd
49	31K86126	Strip, terminal: 2 insulated lugs, #2 mtg (on rear panel)
50	4A70015	Washer, "C" (tuning shaft retainer,
51	4S1719	Washer: 3/8 x .140 x .030 thick; steel; cad pl (line cord lock mtg)
52	4S7563	Washer: 5/8 x .203 x .033 thick; steel; cad pl (back panel mtg)

CABINET PARTS

REF. NO.	PART NO.	DESCRIPTION
101	7A471456	Bracket, switch mounting (phono motor & reject sw mtg)
102	38K470830	Button, plug: for 1/4" hole; green (for concealing shipping screw holes in record changer base)
103	38B471506	Button, push: "M"
104	38K471507	Button, push: "R"
105	16K484213	Cabinet, consolette model: wood; mahogany
106	55A72307	Catch, bullet
107	13K478036	Cloth, grille
108	3A471458	Escutcheon, push button
109	13A478037	Grille, cabinet: painted; 3-5/8"
110	13K478039	Grille, cabinet: painted; 4-7/8"
111	36K478403	Knob, control: mahogany plastic; branded; 7/16" shank (tone-phono-radio)
112	36K478402	Knob, control: mahogany plastic; plain; 7/16" shank (volume & tuning)
113	36K484200	Knob, control: mahogany plastic; plain; 9/16" shank (BASS)
114	35K470657	Pad, felt: 1/2 diameter x 1-16 thick (drawer stop)
115	64K478063	Panel, cabinet rear: wood; mahogany finish
116	38A25507	Plug, split: 5/8 long; for 1/8 hole; copper oxide finish (holds loop panel to cabinet)
117	55K481403	Pull, drawer: statuary bronze
118	55K74786	Rail, support: right-hand (phono drawer rail)
119	55K74787	Rail, support: left-hand (phono drawer rail)
120	1X484215	Scale, dial & escutcheon
121	3S7401	Screw: #2 x 3/8 Phillips oval head wood screw; antique copper finish (dial scale mounting)
122	3S1343	Screw: #4 x 3/8 Phillips oval head wood screw; brass finish (pushbutton escutcheon mounting)
123	3S7156	Screw: 6-32 x 3/16 slotted binderhead machine screw; cad pl (phono motor-reject switch mtg)
124	3S1314	Screw: #6 x 3/4 round head wood screw (drawer rail mtg)
125	3S7526	Screw: #8 x 1-1/8 PKA slotted hex head sheet metal screw; cad pl (chassis mtg)
126	3S7396	Screw: 10-32 x 2" slotted hex head machine screw; copper plated (record changer mounting)
127	36K481398	Screw: washer head: statuary bronze finish (pull mtg)
128	41A21807	Spring, cushion: bottom (record changer cushion)
129	41A28190	Spring, cushion: top (record changer cushion)
130	41A478162	Spring, push button insert
131	22S7905	Staple, insulated
132	55K72308	Strike, bullet: (includes 1/2" nail)
133	4S8214	Washer: 7/8 x .203 x .067 thick; cad pl (chassis mtg)
134	4S7611	Washer: 1/2 x 7/32 x .048 thick; antique copper finish (record changer mtg)

MODEL 68T11,
CHASSIS HS-144

MOTOROLA INC.



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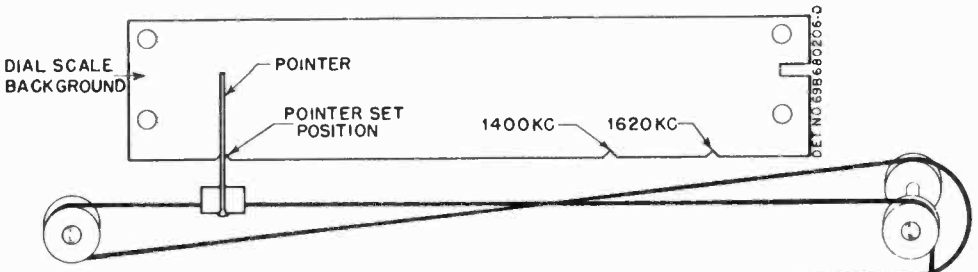
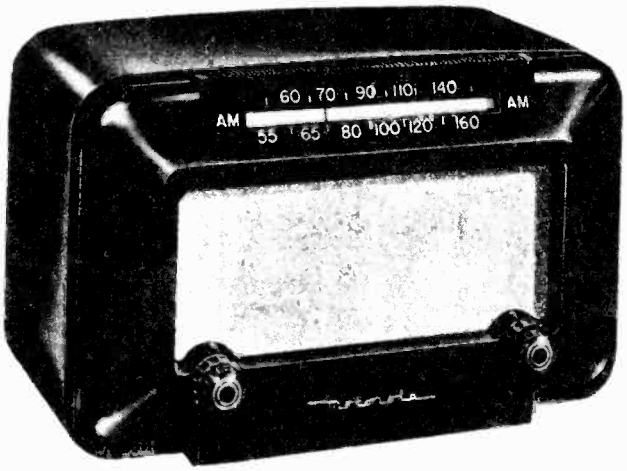
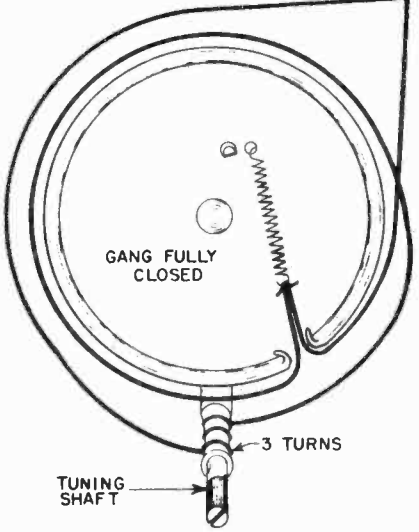
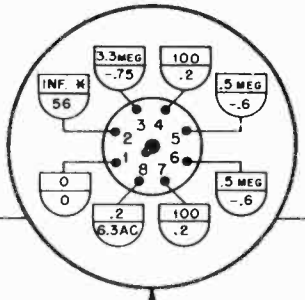
MODEL 68T11,
CHASSIS HS-144









= RESISTANCE MEASUREMENTS

= VOLTAGE MEASUREMENTS.

‡ = TIE POINT.

* = RESISTANCE WILL VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITOR.

K = 1000 (ONE THOUSAND) OHMS.

VOLTAGE MEASUREMENTS ± 10%.
RESISTANCE MEASUREMENTS ± 20%.

117V. AC INPUT TO SET DURING MEASUREMENTS.

MEASUREMENTS MADE FROM TUBE SOCKET PIN TERMINALS TO COMMON NEGATIVE.

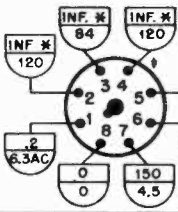
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.

VOLUME CONTROL SET TO MINIMUM, AND NO STATION TUNED IN.

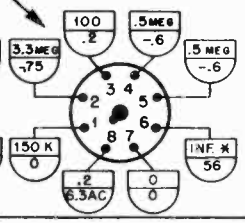
BOTTOM VIEW OF CHASSIS

7B6
OR
6SQ7

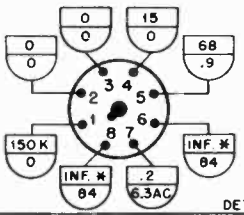
V-5
7A5
PWR. AMP.



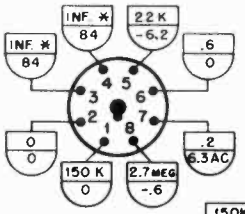
V-4
DET-AVC-AF AMP.



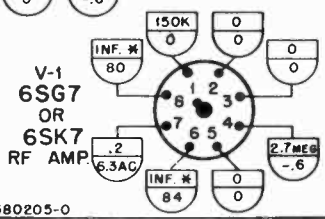
V-3
6SK7
IF AMP.



V-2
6SA7
CONV.



V-1
6SG7
OR
6SK7
RF AMP.



DET. NO. 638680205-0

MODEL 68T11,
CHASSIS HS-144

MOTOROLA INC.

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A suitable output meter should be connected across the speaker voice coil. Set receiver volume control at maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing signal generator output (not receiver volume control) as stages are brought into alignment. Use a fibre screwdriver for aligning the IF & diode transformers.

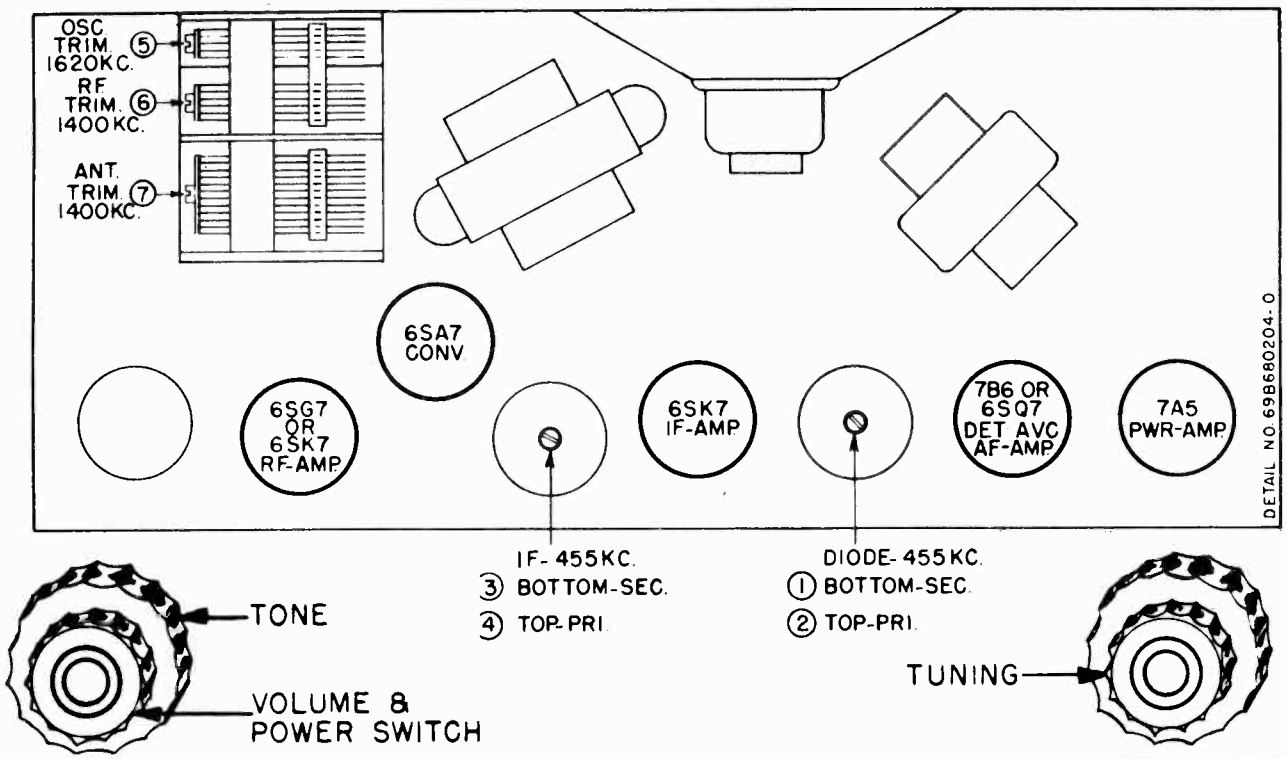
It is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is available and hum is encountered during alignment, connect the ground side of the signal generator through a .1 mf capacitor to receiver B- instead of the chassis.

Refer to Figure 2 for location of all alignment trimmers and cores.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	6SA7 (conv.) grid*	455 Kc	1,2,3 & 4	Adjust for maximum.
RF ALIGNMENT						
2.	Gang fully opened	-	Radiation loop**	1620 Kc	5	Adjust for maximum output. This sets osc. to dial scale.
3.	1400 Kc	-	Radiation loop**	1400 Kc	6 & 7	Tune signal for maximum with receiver tuning knob, then peak trimmers 6 & 7.

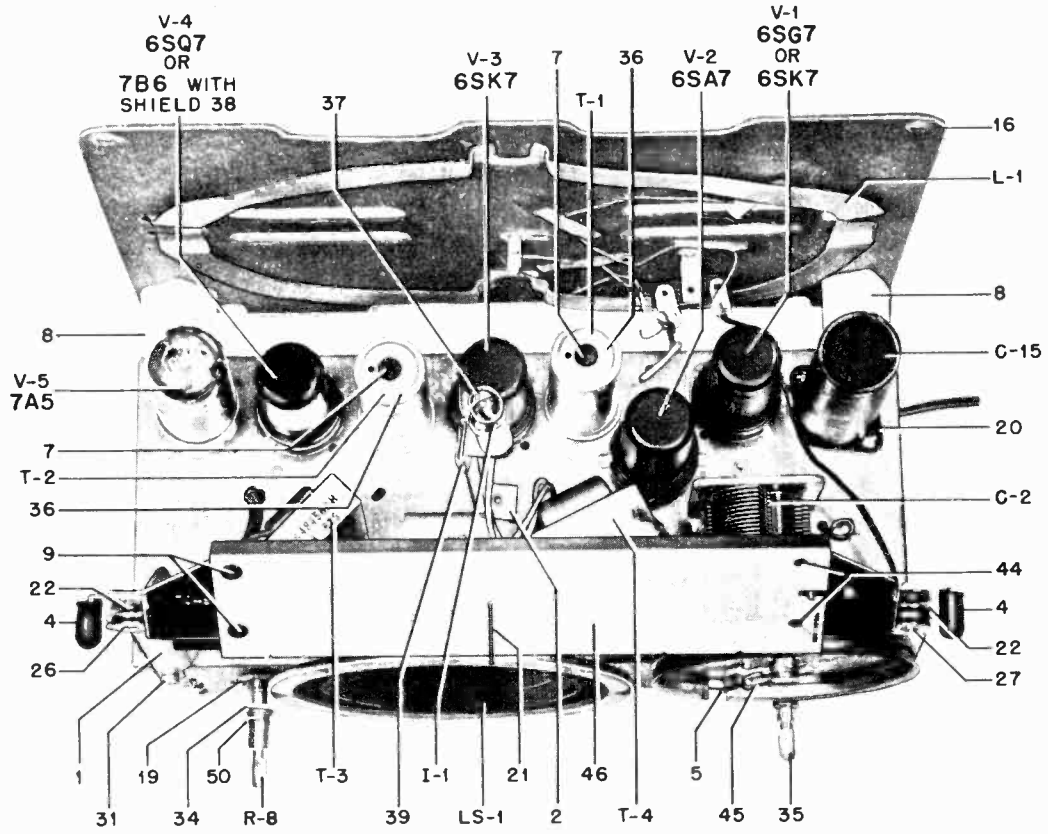
* A convenient point is center stator of the tuning capacitor.

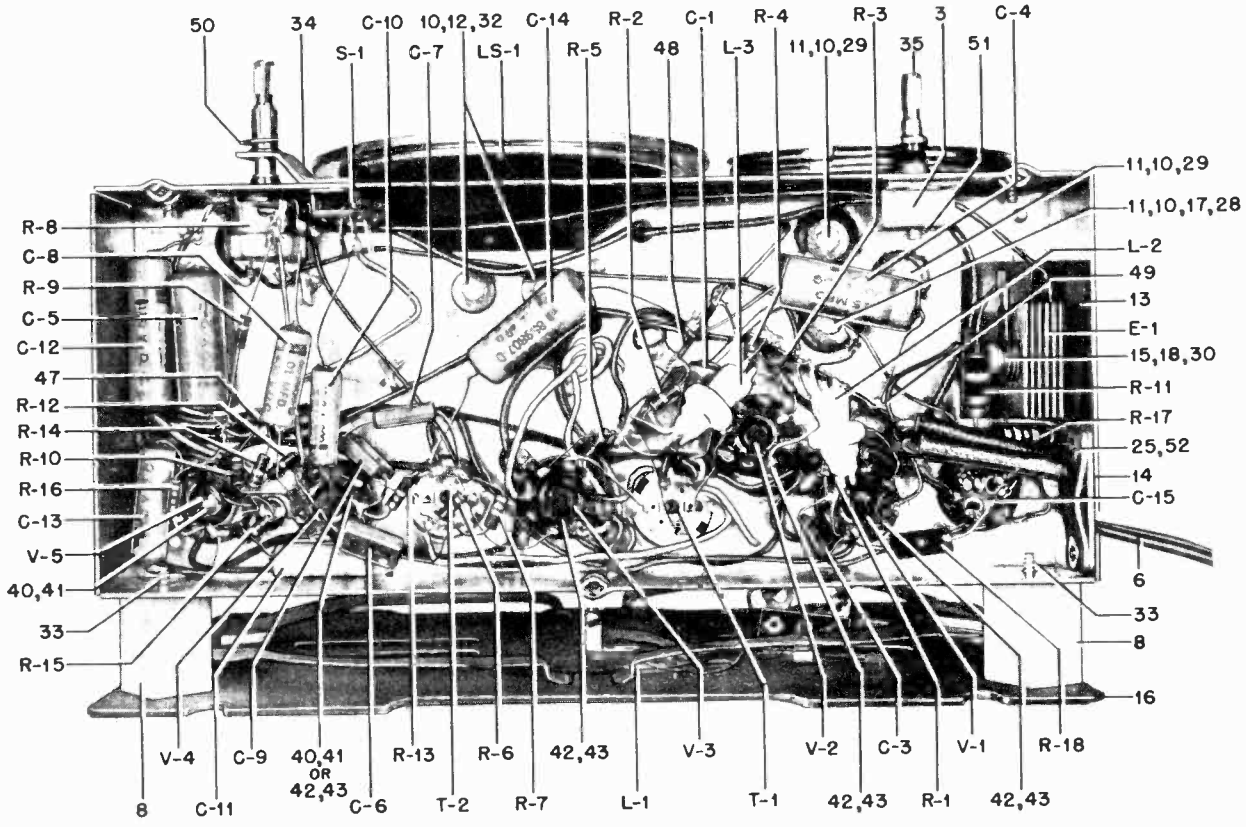
** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of .05 watts (.40 volt) on output meter. Vary distance between loops to maintain this output during alignment. Distance between loops should never be less than 12".



MOTOROLA INC.

MODEL 68T11,
CHASSIS HS-144





REF. NO.	PART NO.	DESCRIPTION
CHASSIS PARTS - ELECTRICAL		
CAPACITORS		
C-1	8A71213	Paper: .05 mf 100V .....
C-2	1X485124	Variable, 3 gang: includes trimmers and drive pulley .....
C-3	21R6631	Mica: 100 mmf 300V .....
C-4	8A75566	Paper: .15 mf 400V .....
C-5	889816	Paper: .05 mf 400V .....
C-6	21R6648	Mica: 250 mmf 500V .....
C-7	21R6648	Mica: 250 mmf 500V .....
C-8	889809	Paper: .01 mf 400V .....
C-9	21R6648	Mica: 250 mmf 500V .....
C-10	889835	Paper: .003 mf 600V .....
C-11	889809	Paper: .01 mf 400V .....
C-12	889810	Paper: .25 mf 100V .....
C-13	889802	Paper: .02 mf 400V .....
C-14	889807	Paper: .1 mf 400V .....
C-15	23B470429	Electrolytic: 40 mf/200V, 20-20 mf/150V
RECTIFIER		
E-1	48B90140	Rectifier, selenium type: half-wave ....
DIAL LIGHT		
I-1	65X11854	Bulb: 6.3V .15A; tubular bayonet base; clear; #47 .....
COILS		
L-1	24K77323	Loop Antenna: winding only .....
L-2	24B484512	RF Coil .....
L-3	24B484511	BC Oscillator Coil .....
SPEAKER		
LS-1	50B485935	Speaker: 5" PM; 3.2 ohm VC ..... Exchange
RESISTORS		
Note:		All resistors are insulated, carbon type, unless other specified.
R-1	6R3949	470 20% 1/2W .....doz
R-2	6R6182	150,000 20% 1/2W .....doz
R-3	6R6028	22,000 20% 1/2W .....doz
R-4	6R3933	220 20% 1/2W .....doz
R-5	6R6007	68 20% 1/2W .....doz
R-6	6R3927	2.2 Meg 20% 1/2W .....doz
R-7	6R6056	47,000 20% 1/2W .....doz
R-8	18K482778	Volume Control: .5 meg; tapped at 25,000 ohms; includes SPST switch .....
R-9	6R6326	100 10% 1/2W .....
R-10	6R2118	3.3 meg 20% 1/2W .....doz
R-11	6R3994	27 10% 2W .....
R-12	6R6383	1200 10% 1/2W .....doz
R-13	6R6015	220,000 20% 1/2W .....doz
R-14	6R6032	470,000 20% 1/2W .....doz
R-15	6R6396	1200 10% 1/2W .....doz
R-16	6R6373	150 10% 1/2W .....doz
R-17	6R3968	180 10% 2W .....
R-18	6R476004	1000 20% 2W .....
SWITCHES		
S-1	40K21758	Slider Switch: SPDT (tone control) .....
TRANSFORMERS		
T-1	24B482863	IF, 455 Kc: complete with tuning cores and padding capacitors, but less shield ..
T-2	24B482865	Diode, 455 Kc: complete with tuning cores and padding capacitors, but less shield.
T-3	25K484589	Output Transformer .....
T-4	25B484582	Filament Transformer .....
CHASSIS PARTS - MECHANICAL		
1	1X481358	Background Bracket, Support and Pulley Assembly: less dial background strip, pointer & rubber bumpers .....
2	7A77303	Bracket, pilot light mtg .....doz
3	7A77337	Bracket, tuning shaft .....
4	35A481328	Bumper, rubber (background support brkt)doz
5	11M8944	Cord, dial: 18 lb black .....yd
6	30A470651	Cord, line and plug: 6 ft long .....
7	46A470885	Core, iron: threaded (for T-1 & T-2 pri. & sec. tuning) .....
8	57K470568	Dowel, back mounting: wood .....
9	5S7805	Eyelet, snap-in (dial background mtg) .doz
10	5A70098	Eyelet, spacer (gang & spkr mtg) .....doz
11	37K15125	Grommet, rubber (gang mtg) .....doz
12	5A70404	Grommet, rubber (spkr mtg) .....doz
13	14A470428	Insulator, rectifier .....doz

REF. NO.	PART NO.	DESCRIPTION
14	32A24815	Lock, line cord .....doz
15	4S7650	Lockwasher: #8 internal (rect. mtg) ....per/c
16	24K484591	Loop & Panel Assembly .....
17	29R5227	Lug, soldering: #6L .....per/c
18	2S7002	Nut: 6-32 x 5/16; hex; steel; cad pl (rectifier mtg) .....per/c
19	2S7051	Nut: 3/8-32 x 9/16; steel; cad pl (vol. control mtg) .....doz
20	9A12705	Plate, electrolytic mtg .....doz
21	52A480258	Pointer, dial .....
22	49A21552	Pulley, cord: 1/2" groove .....doz
23	5S7707	Rivet: .122 x 5/32; steel; nkl pl (tube socket, slider switch, pilot light bracket, terminal strip & filament transformer mounting) .....per/c
24	5S7701	Rivet: .122 x 3/16; steel; nkl pl (tuning shaft bracket & electrolytic plate mtg)per/c
25	5S7708	Rivet: .122 x 9/32; steel; nkl pl (line cord lock mtg) .....per/c
26	5A71246	Rivet, shoulder: .187" lg (cord pulley mounting) .....doz
27	5A481770	Rivet, shoulder: .484" lg (cord pulley mounting) .....doz
28	3S2999	Screw: 6-32 x 5/8 plain hex head machine screw; steel; cad pl (gang mtg) .....doz
29	3S7339	Screw: 6-32 x 5/8 plain hex head locking type machine screw; steel; cad pl (gang mounting) .....per/c
30	3S2927	Screw: 6-32 x 7/8; plain hex head machine screw; steel, cad pl (rectifier mtg) ..doz
31	3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cad pl (background bracket support assembly mtg) .....per/c
32	4S488011	Screw: 8-32 x 5/8; plain hex head locking type machine screw; steel; cad pl (speaker mtg) .....doz
33	3S7530	Screw: #8 x 1-1/2; PKZ plain hex head sheet metal screw; cad pl (back mtg) .....doz
34	1X482789	Shaft and Arm Assembly (tone control) ..
35	1K485122	Shaft and Pulley Assembly, tuning .....
36	26K485936	Shield, coil (for T-1 and T-2) .....
37	26A470013	Shield, light and static .....
38	26A72635	Shield, tube (for 7B6) .....
39	9A77306	Socket, dial light: includes bracket ...
40	9A76185	Socket, tube: loctal .....
41	9A72549	Socket, tube (replacement -use in place of 9A76185 when mounting lugs on chassis break off) .....
42	9A6790	Socket, tube: octal .....
43	9A6788	Socket, tube (replacement -use in place of 9A6790 when mounting lugs on chassis break off) .....
44	41A481325	Spring, dial background mtg .....
45	41A14244	Spring, tension coil .(drive cord) .....doz
46	35K481323	Strip, dial background: tan plastic ....
47	31K71393	Strip. terminal: 2 insulated lugs, #3 mtg
48	31K22190	Strip, terminal: 4 insulated lugs, #3 ground .....doz
49	31K471589	Strip, terminal: 5 insulated lugs, #4 gnd
50	4A73639	Washer "C" (tone control shaft retainer)doz
51	4A70015	Washer "C" (tuning shaft retainer) .....per/c
52	4S1719	Washer: 3/8 x .140 x .030 thick; steel; cad pl (line cord lock mtg) .....per/c
53	4S7613	Washer: 3/4 x 13/64 x .027 thick; antique copper finish (back mtg) .....doz

CABINET PARTS

101	16K481452	Baffle and grille cloth .....
102	16K485119	Cabinet, table model: molded .....
103	14C481435	Cover, chassis bottom: metal .....
104	36K482767	Knob, control: tone .....
105	36K482765	Knob, control: volume .....
106	36K485133	Knob, control: tuning .....
107	38A25507	Plug, split (back mtg) .....doz
108	2S7089	Speednut, (baffle and grille cloth mtg).doz
109	3S7534	Screw: #8 x 1-3/8 PKA plain hex head sheet metal screw; cad pl (chassis mtg) .....doz
110	4S7582	Washer: 1/2 x .195 x .033 thick; steel; cad pl (chassis mtg) .....per/c

MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97

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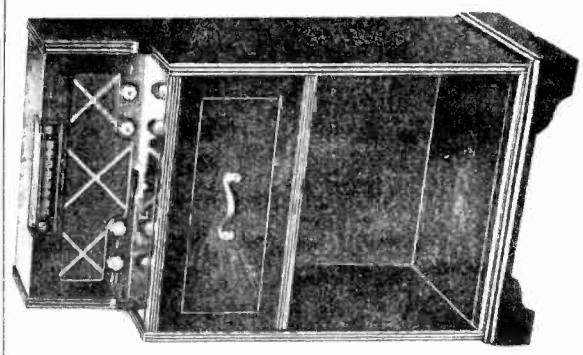
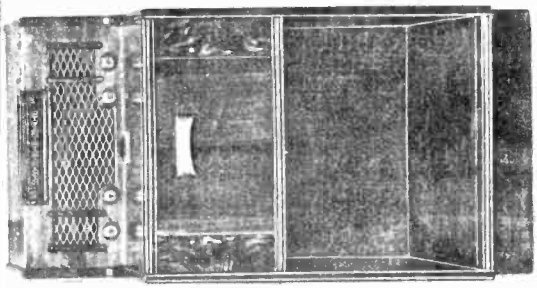
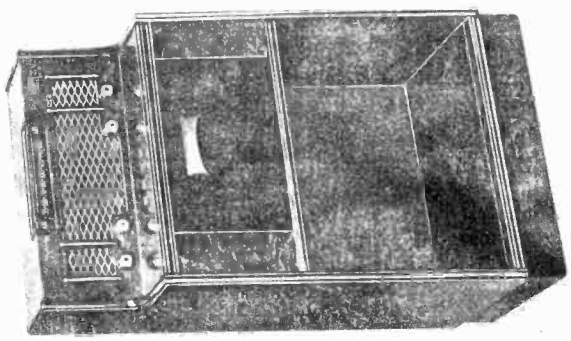


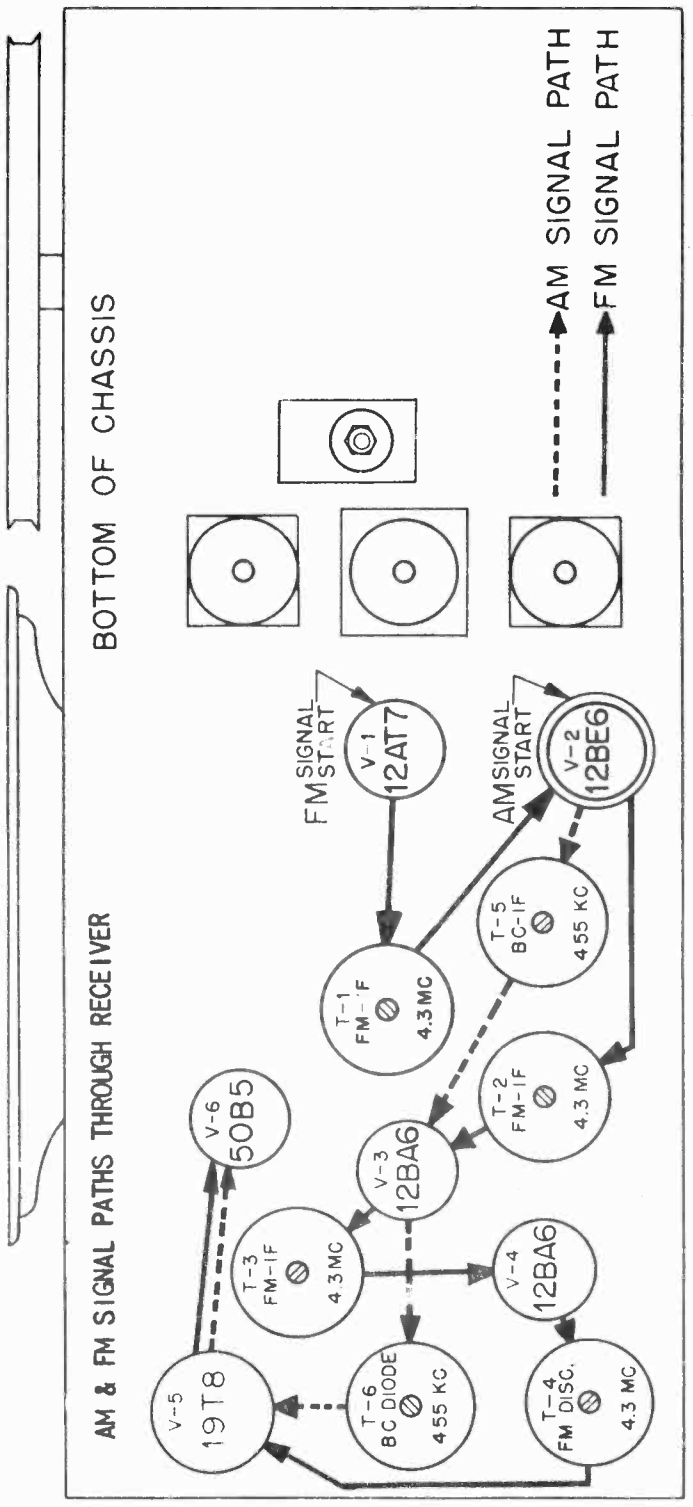
MODEL 77FM23



MODEL 77FM22, 22M & 22WM



MODEL 77FM21



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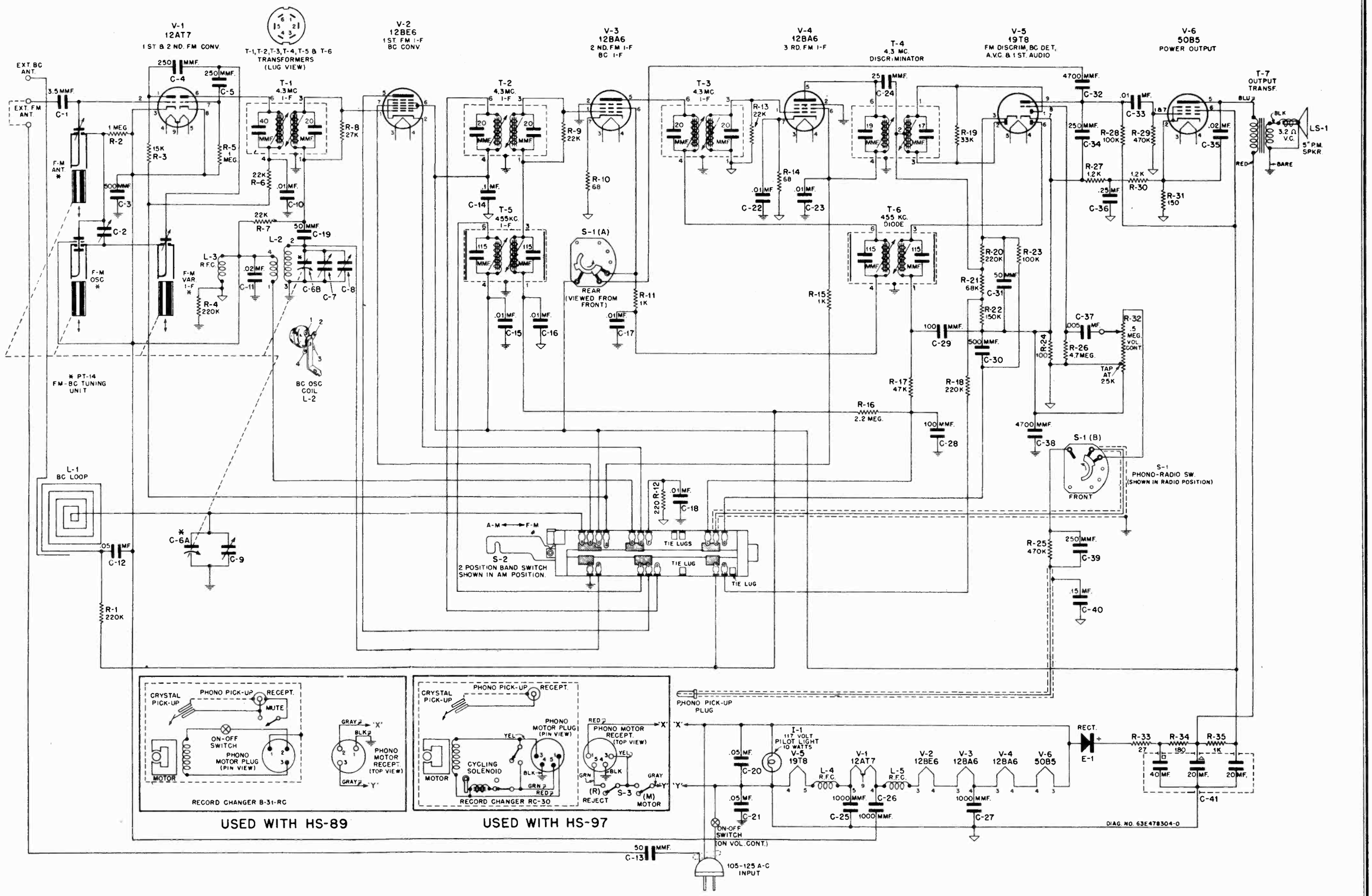
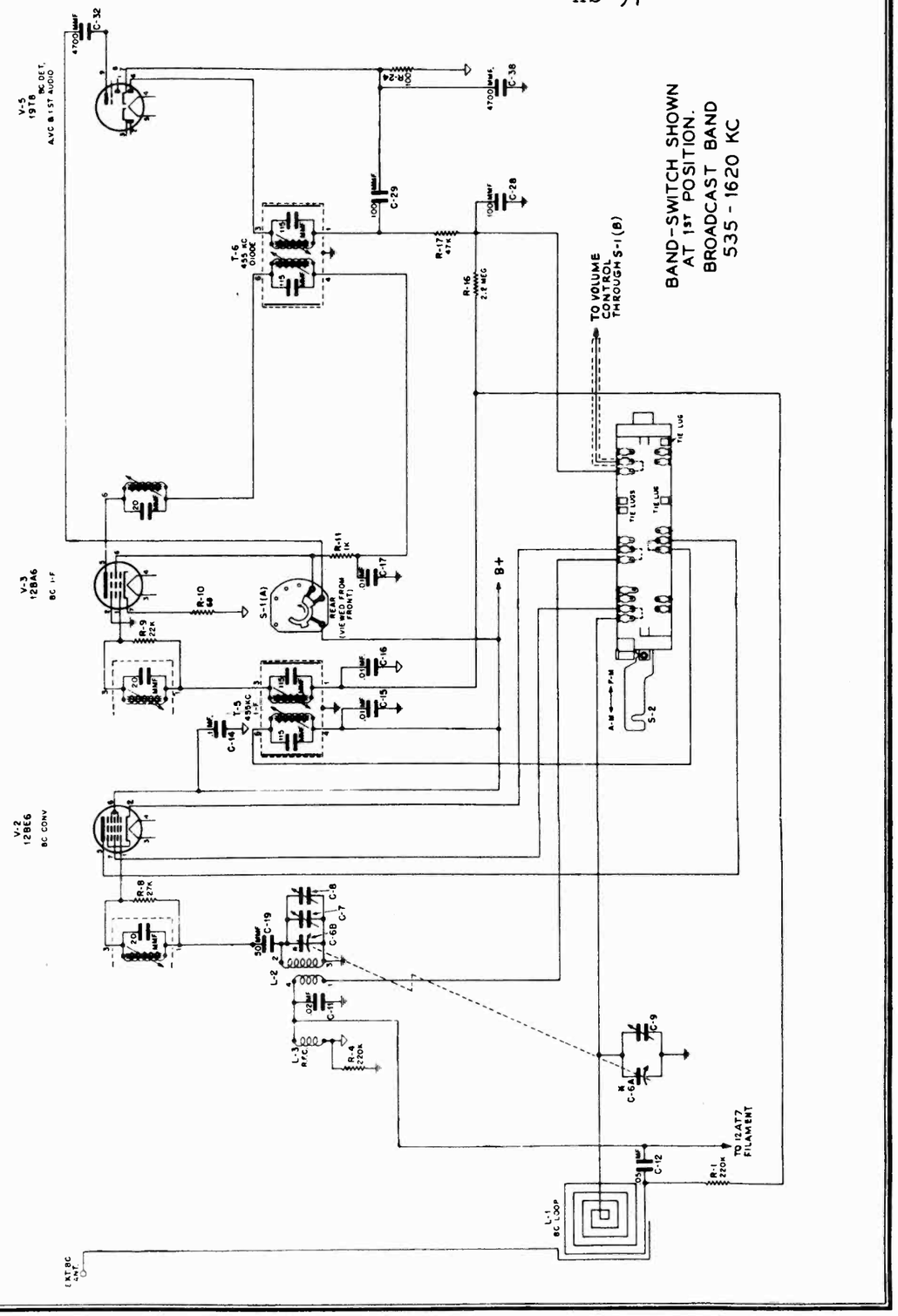
MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97



RECORD CHANGERS: Model RC-30-A, RCD.CH. 19-1; Model B-31-RC, RCD.CH. 18-1

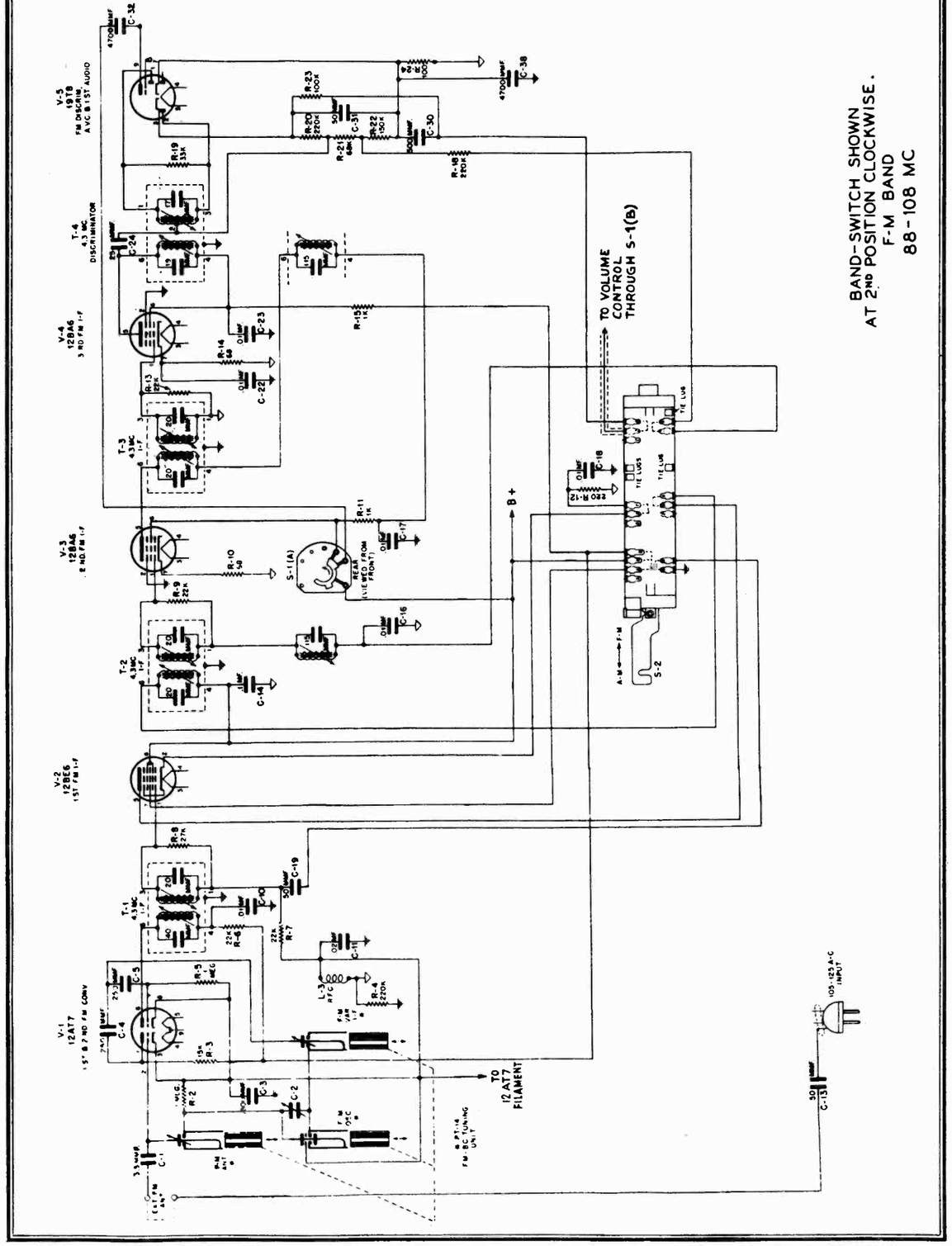
MOTOROLA INC.

MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97



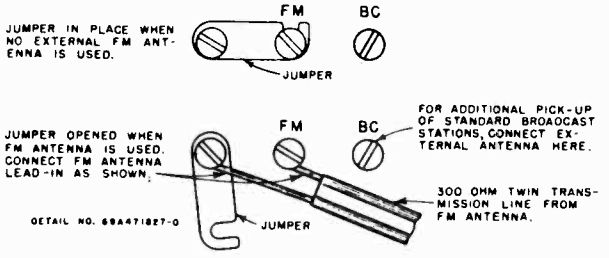
MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97

MOTOROLA INC.

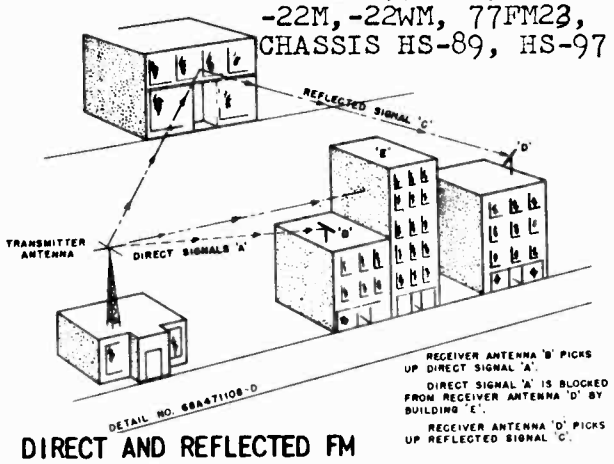


MOTOROLA INC.

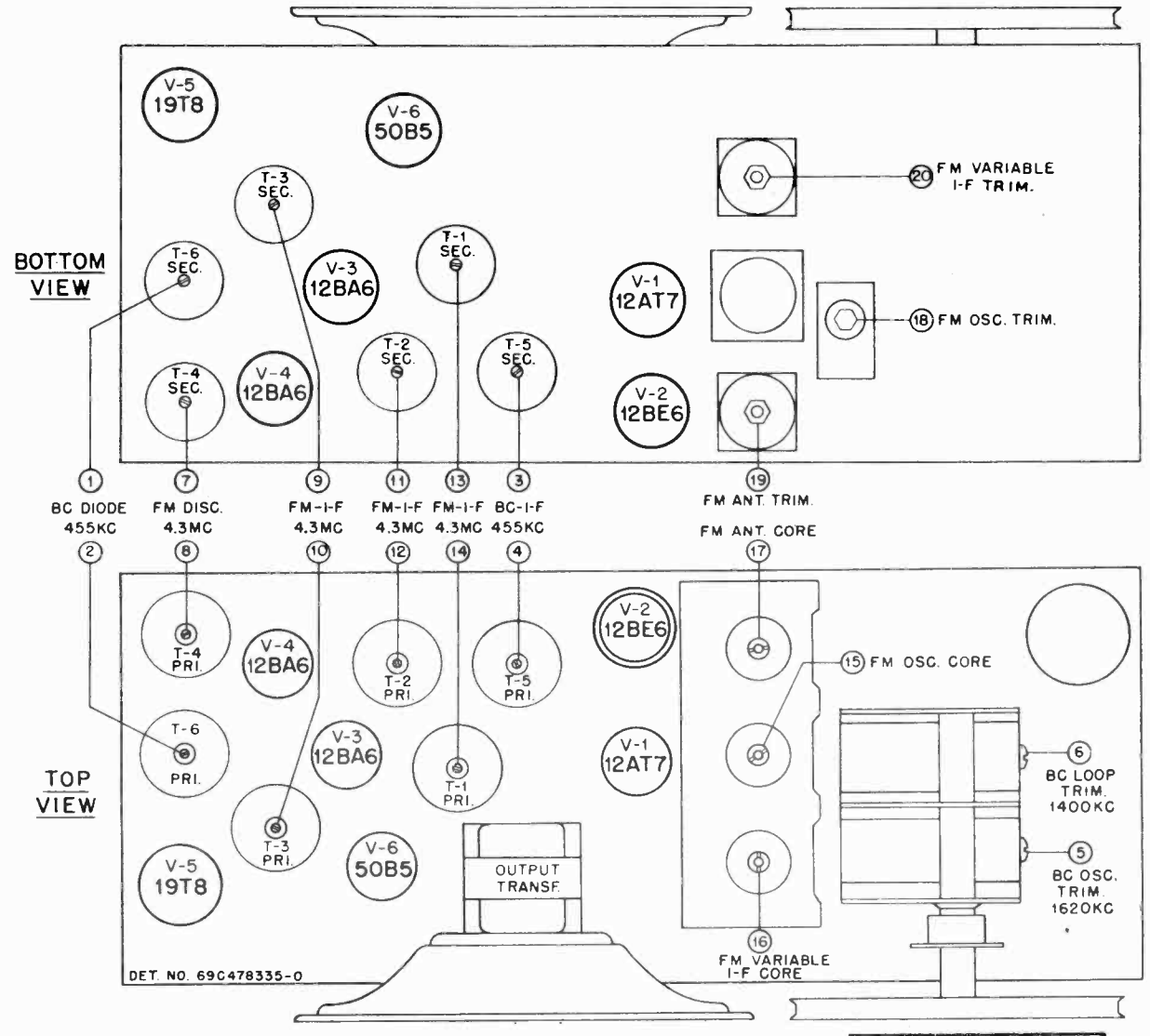
MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97



EXTERNAL ANTENNA TERMINALS



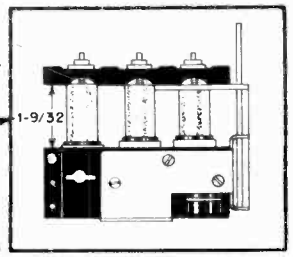
DIRECT AND REFLECTED FM RECEPTION PATHS



TUBE & TRIMMER LOCATION

METHOD OF SETTING TUNER TO 98MC.

TURN TUNING SHAFT UNTIL DISTANCE BETWEEN BAKELITE PIECES IS 1-9/32" AS SHOWN IN ILLUSTRATION.



MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97

MOTOROLA INC.

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment.

It is suggested that an isolation transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator output to B- instead of the receiver chassis.

If set oscillates when aligning the broadcast band, connect receiver B- to receiver chassis. CAUTION: Don't forget to disconnect B- from receiver chassis after alignment!

An AM (amplitude modulated) signal generator covering the frequencies shown in alignment chart, is used to align the broadcast and FM bands. A low range output meter, connected across the speaker voice coil, is used as an output indicator.

The broadcast alignment is conventional; full instructions are given in the following alignment chart.

The FM band alignment can be satisfactorily performed by following the instructions in the chart. When properly aligned, the discriminator does not respond to amplitude modulation and since an AM type signal generator is used for aligning the FM circuits, it is necessary to detune the discriminator secondary and leave it that way until all of the FM circuits have been aligned. After completing the alignment of the FM circuits, proceed to align the discriminator secondary by applying a 4.3 Mc AM signal to the control grid (pin #7) of the 2nd FM converter tube and adjusting the discriminator secondary core for minimum audio output. No adjustment of the FM circuits should be attempted with AM after the discriminator secondary has been properly aligned.

Use a 30% AM (amplitude modulated) signal throughout entire alignment procedure.

Use an insulated wrench when adjusting the FM tuner trimmers. Order Motorola FM Alignment wrench, part number 66A471864.

A special wrench for adjusting the slotted nuts on the tuner cores will be required also. You can easily fabricate one from a Motorola auto set Volume Control Shaft and Coupling Assembly (Part Number 1B70847, $.30 list) by simply spreading out the forked ends and filing to fit. Solder the assembly together to make it rigid.

ALIGNMENT PROCEDURE WHEN USING AM MODULATED SIGNAL GENERATOR AND STANDARD OUTPUT METER FOR COMPLETE RECEIVER ALIGNMENT

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
455 Kc IF CHANNEL ALIGNMENT							
1.	1620 Kc	BC	.1 mf	12BE6, (V-2) BC Conv. Grid (Pin #1)	455 Kc	1,2,3 & 4	Adjust for maximum output.
BROADCAST BAND ALIGNMENT							
2.	1620 Kc (gang fully opened)	BC	.1 mf	12BE6 (V-2) BC Conv. Grid (Pin #1)	1620 Kc	5	This sets oscillator to dial. (Calibrate pointer by fully closing gang and noting position of pointer slider. Pointer slider should be in line with right hand hole in dial background bracket as shown in Figure 12.)
3.	1400 Kc	BC	None	Radiation loop*	1400 Kc	6	Tune in signal with receiver tuning knob, then peak trimmer 6.
4.3 Mc IF CHANNEL ALIGNMENT							
4.	-	-	-	-	-	7	Detune discriminator secondary by screwing core out as far as it will go.
5.	(extreme high frequency end)	FM	.001 mf	12AT7 (V-1) 2nd FM Converter Grid (#7 pin)	4.3 Mc.	8,9,10, 11, 12, 13 & 14	Adjust for maximum output.
FM BAND ALIGNMENT							
6.	-	-	-	-	-	15	Check the position of the FM Osc. tuning core 15. Set spacing between the core and bakelite piece to which it is mounted, to two turns from tight by turning tuning core slotted nut.

MOTOROLA INC.

MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97

(Alignment continued)

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
7.	98 Mc	FM	None	FM Ant. terminal	98 Mc	18	Tuner is set to 98 Mc by moving cores out with tuning shaft until spacing between bakelite pieces is 1-9/32". See Figure 9. Peak 18 for maximum output.
8.	90 Mc	FM	None	FM Ant. terminal	90 Mc	19 & 20	Tune in signal with receiver tuning knob, then adjust 19 & 20 for maximum output.
9.	105 Mc	FM	None	FM Ant. terminal	105 Mc	16 & 17	Tune in signal with receiver tuning knob, then adjust 16 & 17 for maximum output.
10.	-	-	-	-	-	-	Repeat Steps 8 & 9 several times until further adjustment does not increase the output. Make the final trimmer adjustment at 105 Mc. (i.e., trimmers 19 & 20 at 105 Mc).
11.	105 Mc	FM	None	Radiate signal (or use station after performing Step 12)	105 Mc	19	Adjust for maximum output with built-in antenna connected.
ALIGN DISCRIMINATOR SECONDARY							
12.	-	FM	.001 mf	12AT7 (V-1) 2nd FM Converter Grid (Pin #7)	4.3 Mc	7	Adjust discriminator secondary for minimum response. The correct adjustment is sharply defined minimum response point between the two peaks.

* Connect output of signal generator to a 5" diameter, 3 turn loop and radiate signal into receiver loop. Minimum distance between loops should never be less than 12".

ALIGNMENT PROCEDURE WHEN USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

STEP **OPERATION**

455 Kc IF Channel Alignment

1. Same as Step 1 in Chart I (Use AM signal generator)

Broadcast Band Alignment

2. Same as steps 2 & 3 in Chart I (Use AM signal generator)

4.3 Mc IF Channel Alignment Use FM Signal Generator & Oscilloscope

3. (A) Discriminator

1. Connect the input terminals of the oscilloscope vertical amplifier to the high side of the receiver volume control and B-.

2. Connect the FM generator synchronizing voltage output terminals to a phase shifting network, consisting of a variable 1/2 megohm resistor in series with a .002 mf capacitor. The input to the oscilloscope horizontal amplifier is connected across the .002 mf capacitor. See Figure 10. (This phase shifting network may not work with every oscilloscope. Different values of R & C may be required.)

3. Apply an FM 4.3 Mc signal (125 Kc deviation) through a .001 mf capacitor to the control grid (pin #1) of tube V-4 in the third FM IF Amplifier stage.

4. Adjust discriminator primary (8) for maximum amplitude. The phase shifting network resistor is adjusted to give only one trace.

5. Adjust discriminator secondary (7) until a symmetrical pattern is obtained, with peaks occurring at about 100 Kc above and below 4.3 Mc and is substantially linear between peaks. The trace should pass through the intersection of the vertical and horizontal axis. The phase shifting network should be adjusted to give only a single pattern at all times. See Figure 11. It will be necessary to go over discriminator primary (8) and secondary (7) adjustments several times before a pattern of maximum amplitude and correct symmetry is obtained.

(B) 4.3 Mc IF Amplifiers

1. Apply an FM 4.3 Mc signal (100 Kc deviation) to the control grid (pin #1) of tube V-3 in the 2nd FM IF amplifier stage, through a .001 mmf capacitor and adjust both primary and secondary cores (9 & 10) to get a symmetrical pattern as before, with peaks occurring at a slightly lower deviation.

2. Apply an FM 4.3 Mc signal (100 Kc deviation) to the control grid (pin #1) of tube V-2 and adjust both primary and secondary cores (11 & 12) until a symmetrical pattern substantially linear between peaks, is obtained.

3. Apply an FM 4.3 Mc signal (100 Kc deviation) to the FM antenna terminal and adjust both primary and secondary cores (13 & 14) until a symmetrical pattern substantially linear between peaks, is obtained.

FM Band Alignment - Use FM Signal Generator & Output Meter

4. Check the position of the FM oscillator tuning core (15). Set the spacing between the core and the bakelite piece to two turns from tight by turning tuning core slotted nut.

5. Connect generator output directly to the receiver FM antenna terminal.

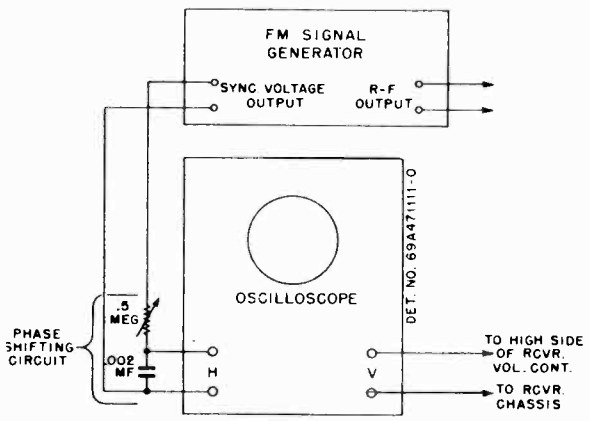
6. Set receiver tuner to 98 Mc by moving cores out with tuning shaft until spacing between bakelite pieces is 1-9/32". See Figure 9. Also set FM signal generator to 98 Mc (22-1/2 Kc deviation). Adjust FM oscillator trimmer (18) for maximum output.

7. Set FM signal generator to 90 Mc (22-1/2 Kc deviation). Tune in signal with receiver tuning knob and then adjust FM variable IF & FM antenna trimmers (19 & 20) for maximum output.

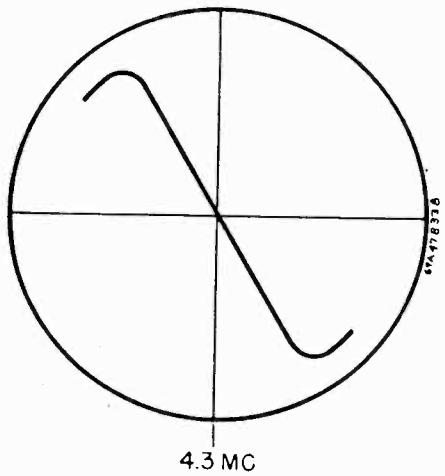
8. Set FM signal generator to 105 Mc (22-1/2 Kc deviation). Tune in signal with receiver tuning knob and then adjust variable IF and antenna cores (16 & 17) for maximum indication on output meter.

Repeat steps 7 & 8 several times until further adjustment does not increase the output. Make the final trimmer adjustment at 105 Mc. (i.e., trimmers 19 & 20 at 105 Mc.)

9. Close FM antenna link on loop panel. Radiate an FM 105 Mc (22-1/2 Kc deviation) signal into FM antenna (line cord). Tune in signal with receiver tuning knob and then repeak FM antenna trimmer (19).

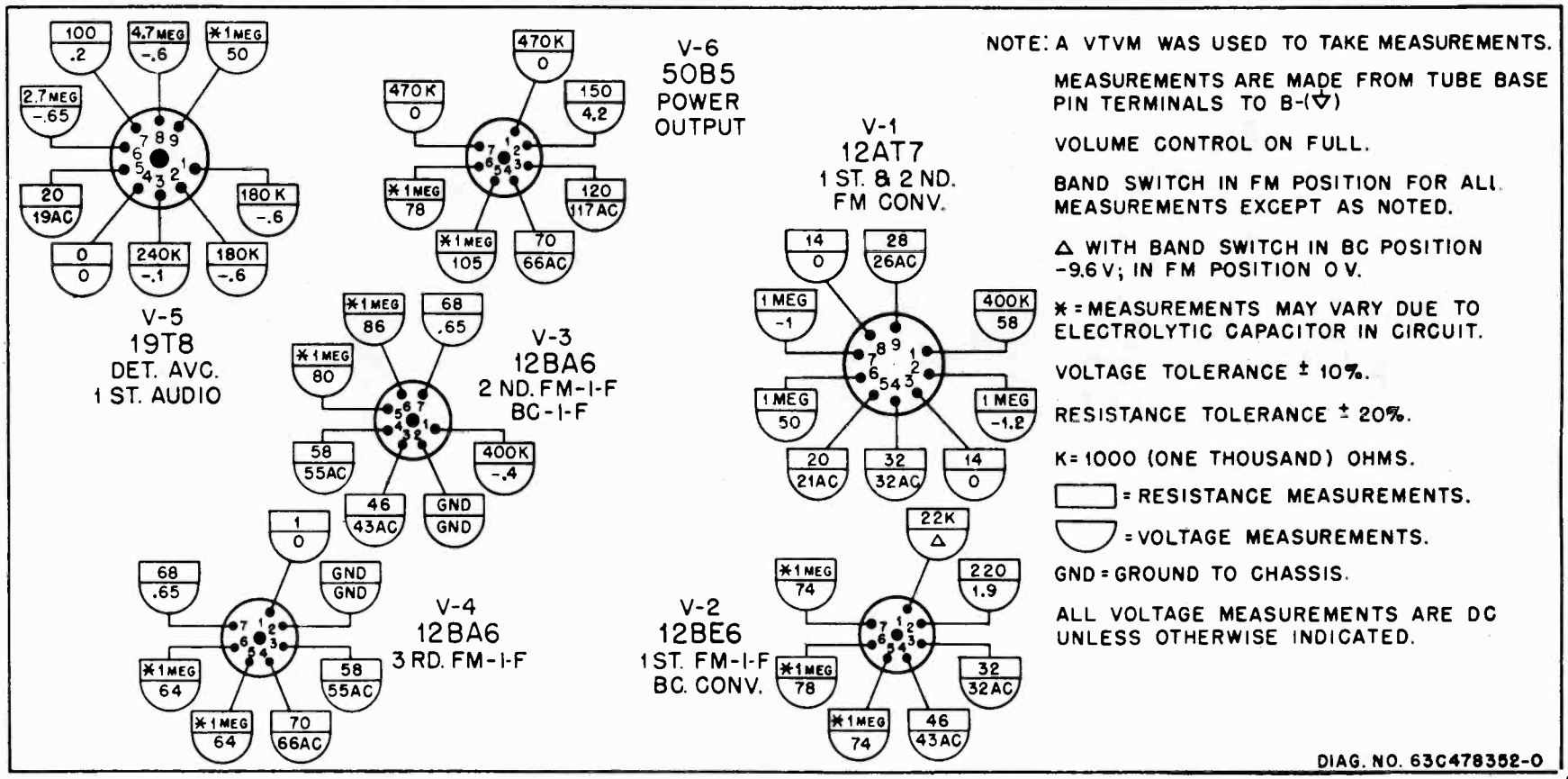


SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP



OSCILLOSCOPE PATTERN

(FRONT OF CHASSIS)



NOTE: A VTVM WAS USED TO TAKE MEASUREMENTS.

MEASUREMENTS ARE MADE FROM TUBE BASE PIN TERMINALS TO B-(▽)

VOLUME CONTROL ON FULL.

BAND SWITCH IN FM POSITION FOR ALL MEASUREMENTS EXCEPT AS NOTED.

△ WITH BAND SWITCH IN BC POSITION -9.6 V; IN FM POSITION 0 V.

* = MEASUREMENTS MAY VARY DUE TO ELECTROLYTIC CAPACITOR IN CIRCUIT.

VOLTAGE TOLERANCE ± 10%.

RESISTANCE TOLERANCE ± 20%.

K = 1000 (ONE THOUSAND) OHMS.

▭ = RESISTANCE MEASUREMENTS.

◡ = VOLTAGE MEASUREMENTS.

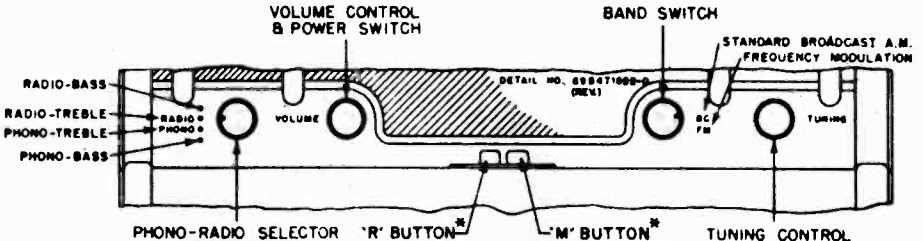
GND = GROUND TO CHASSIS.

ALL VOLTAGE MEASUREMENTS ARE DC UNLESS OTHERWISE INDICATED.

DIAG. NO. 63C478352-O

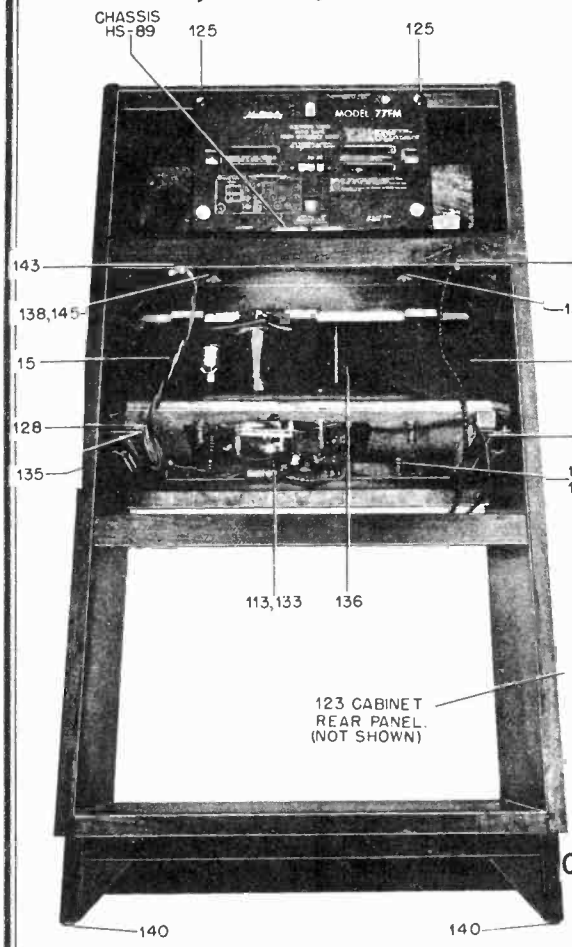
BOTTOM VIEW OF CHASSIS

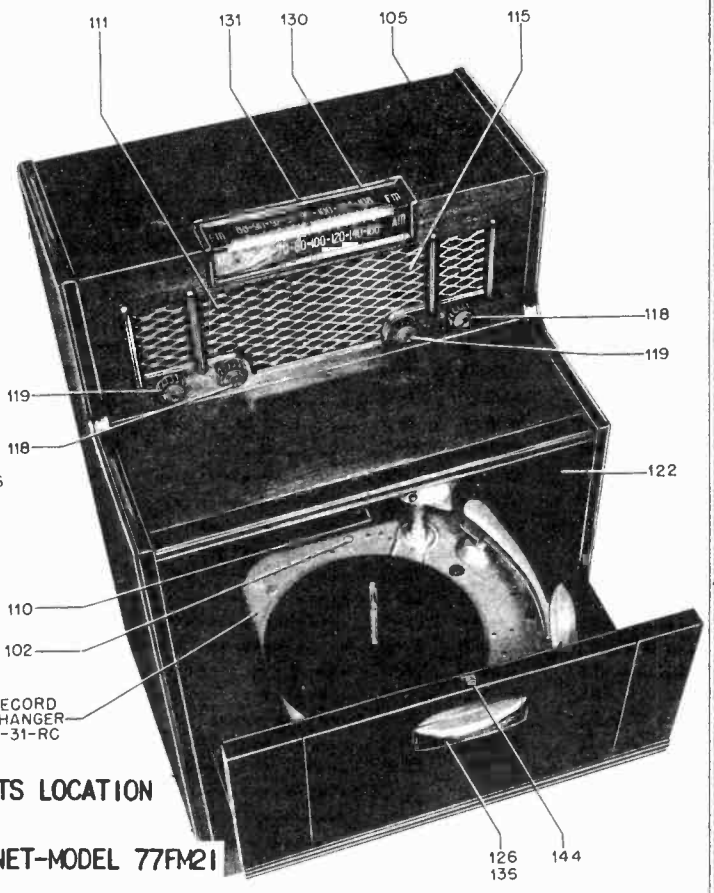
VOLTAGE & RESISTANCE DIAGRAM



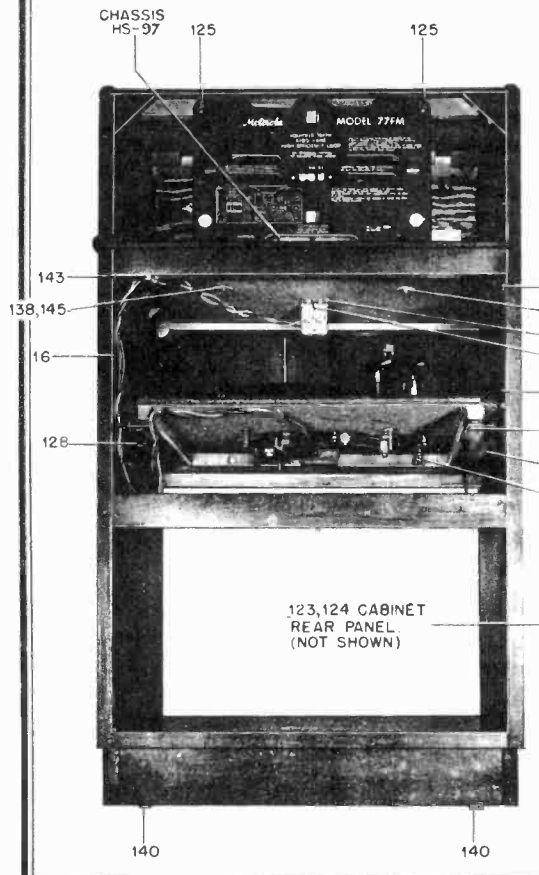
POWER SUPPLY - 117 Volts AC, 60 cycles, 85 watts

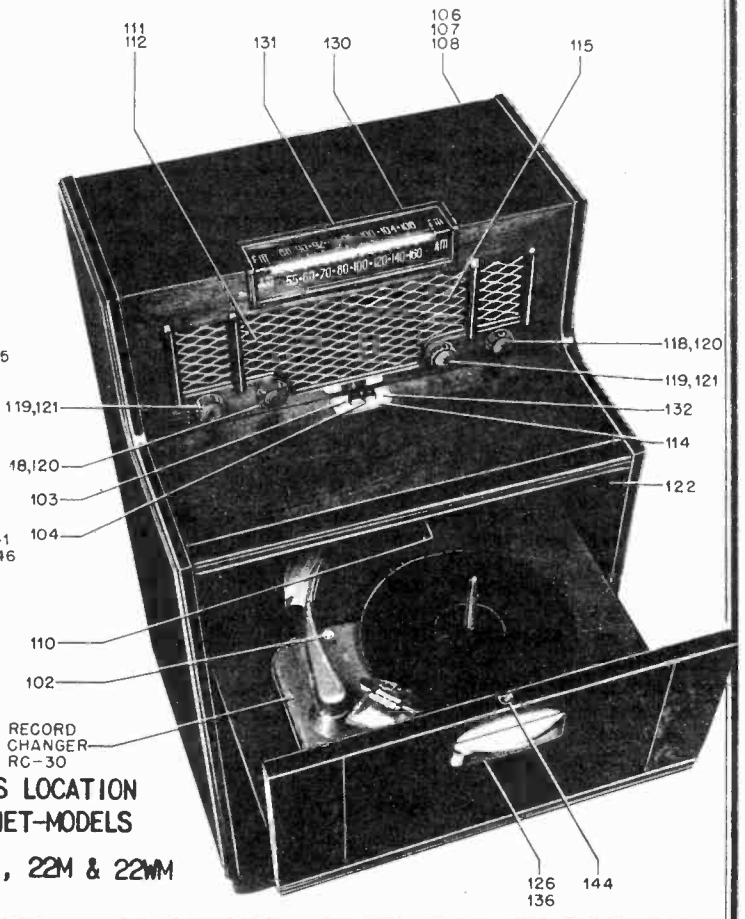
MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23 — MOTOROLA INC. — CHASSIS HS-89, HS-97





PARTS LOCATION
CABINET-MODEL 77FM21

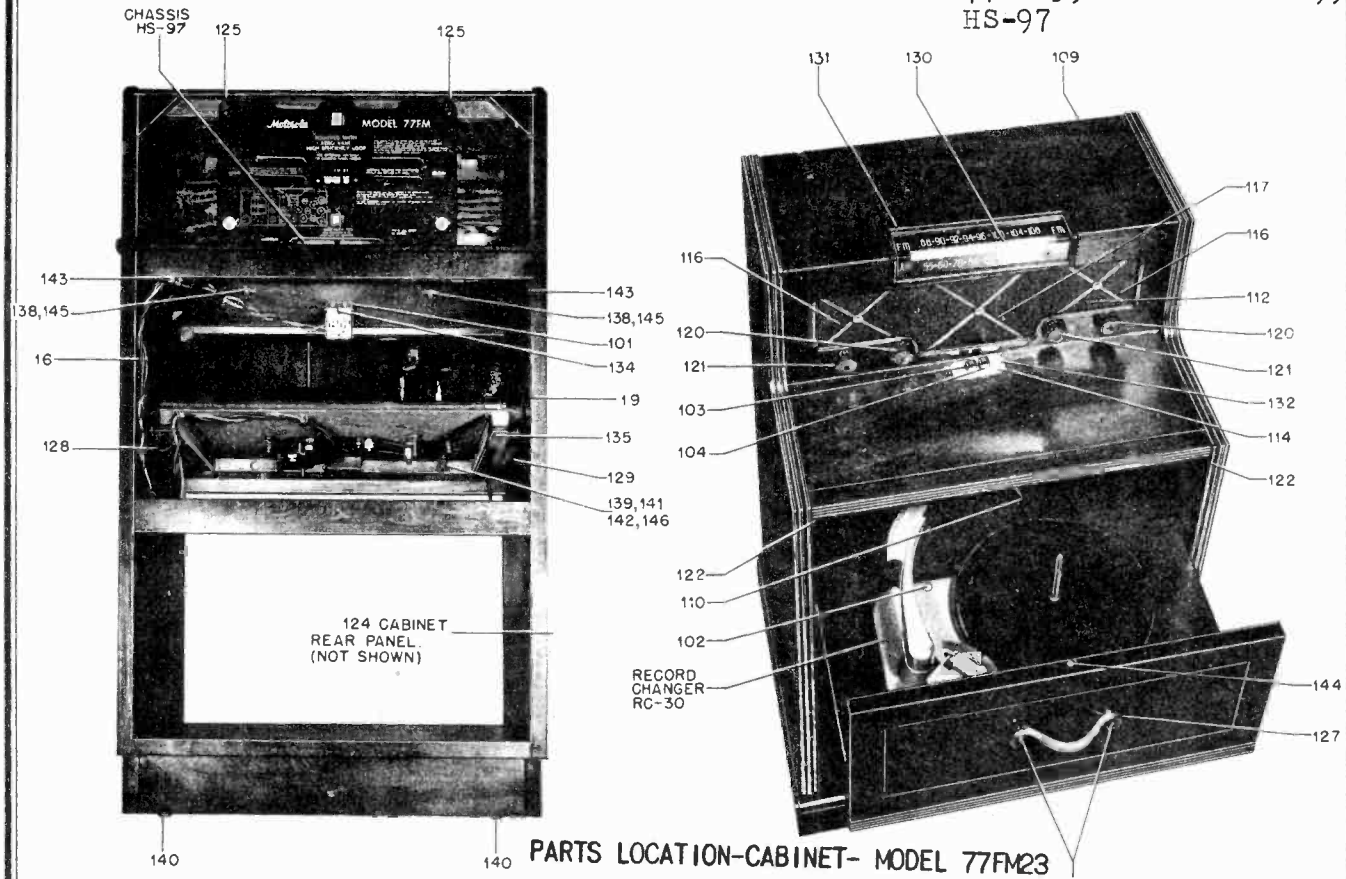




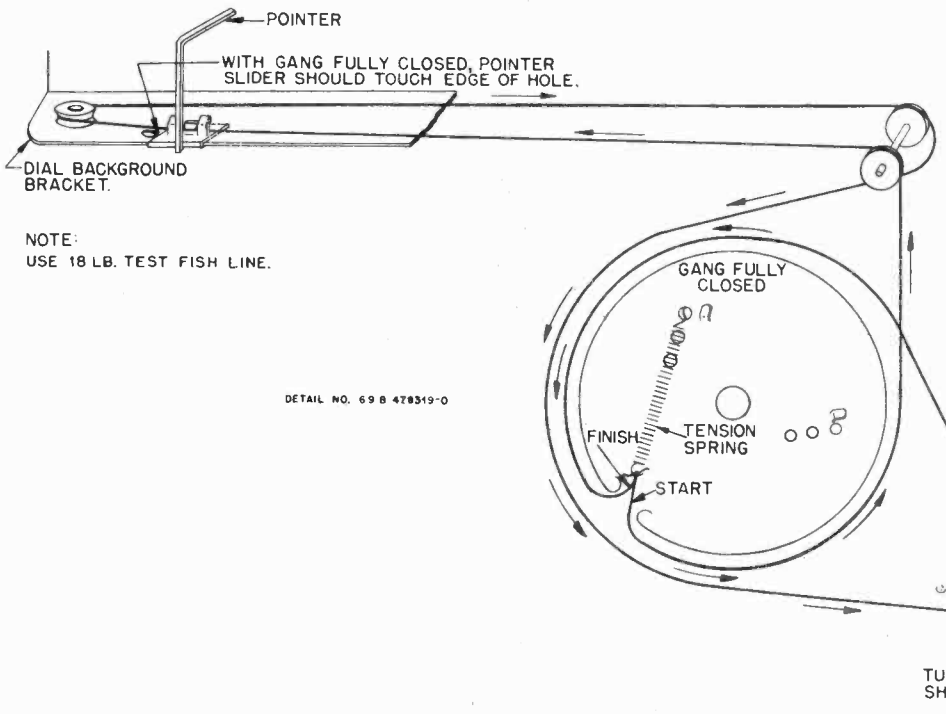
PARTS LOCATION
CABINET-MODELS
77FM22, 22M & 22WM

MOTOROLA INC.

MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97



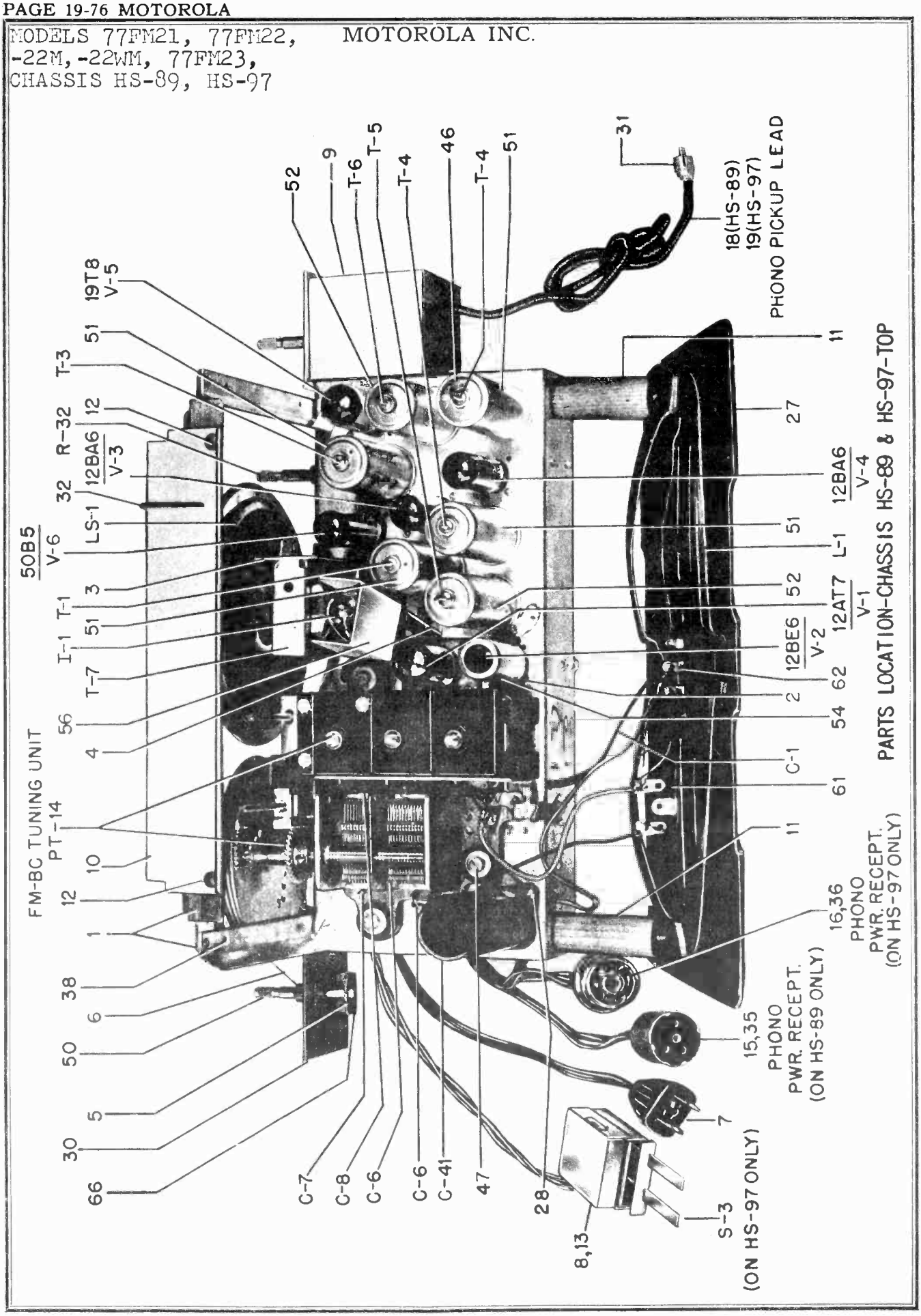
PARTS LOCATION-CABINET- MODEL 77FM23



STRING DRIVE

MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97

MOTOROLA INC.



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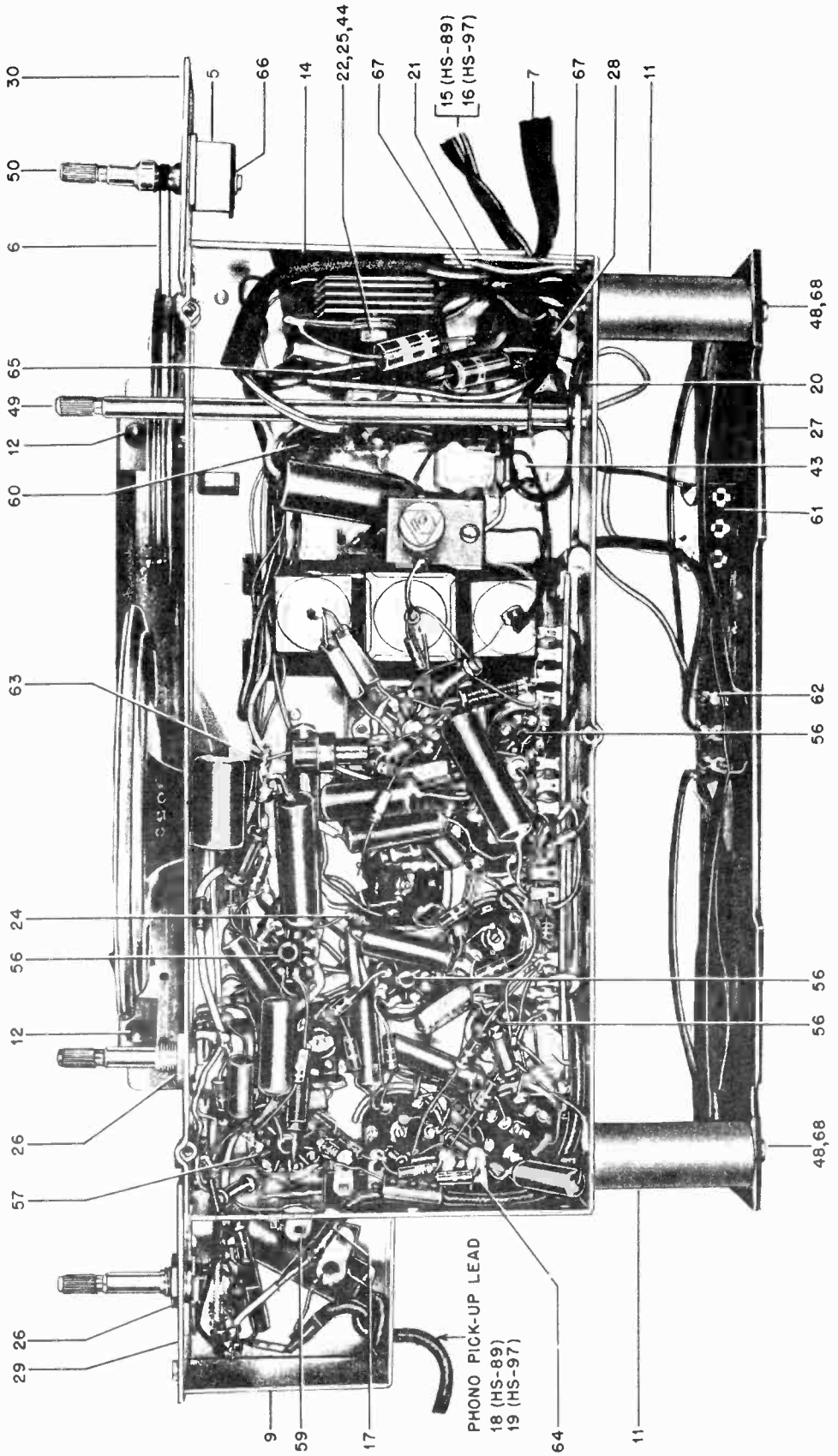
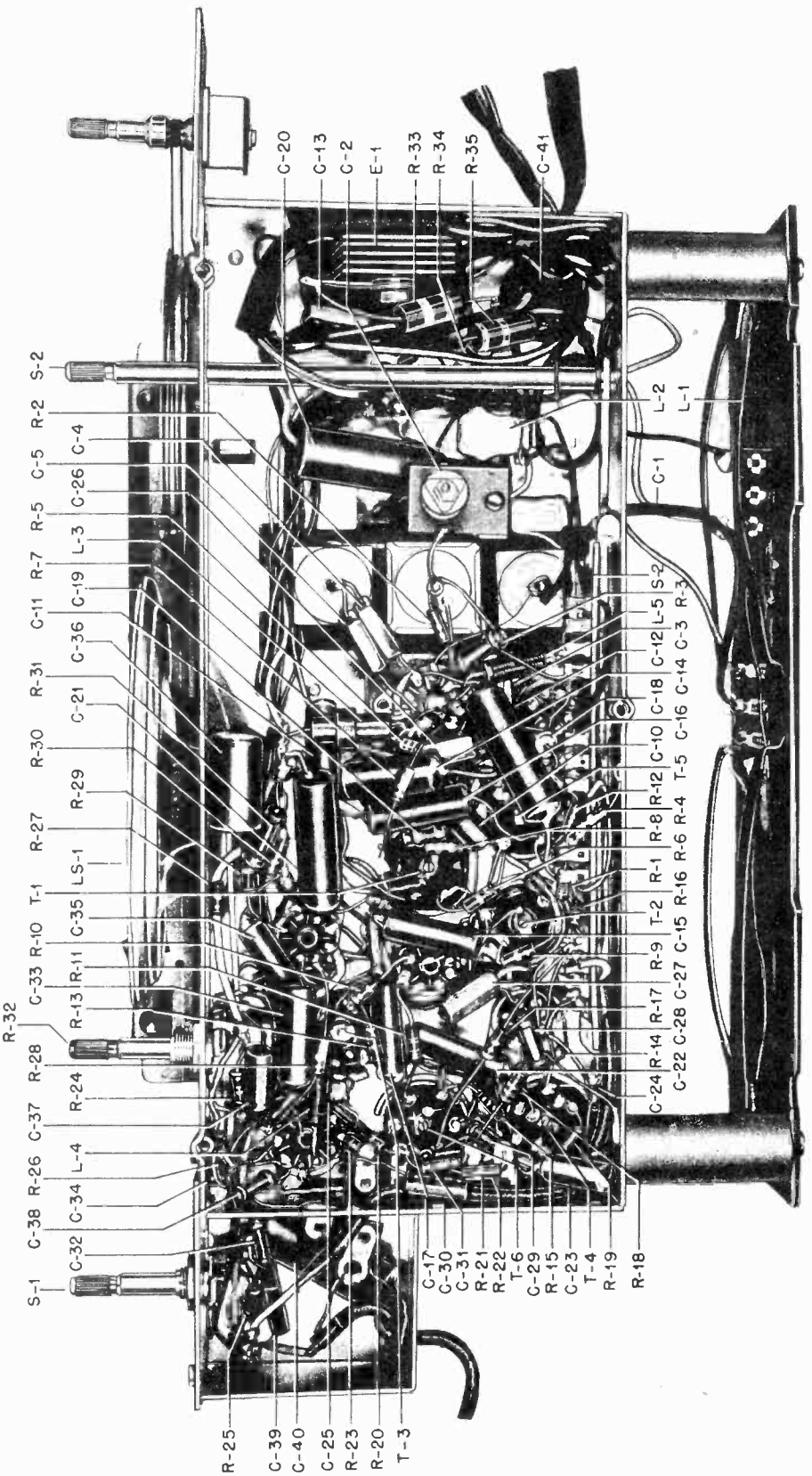
MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97



PARTS LOCATION-CHASSIS HS-89 & HS-97-BOTTOM (MISCELLANEOUS PARTS)

MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97

MOTOROLA INC.



PARTS LOCATION-CHASSIS HS-89 & HS-97-BOTTOM (CAPACITORS, RESISTORS, COILS, TRANSFORMERS, SWITCHES)

Model	Chassis	Record Changer	Cabinet
77FM21	HS-89	B31RC	Consolette - walnut
77FM22	HS-97	RC-30	Consolette - walnut
77FM22M	HS-97	RC-30	Consolette - mahogany
77FM22WM	HS-97	RC-30	Consolette - walnut, mahogany finished
77FM23	HS-97	RC-30	Consolette - mahogany finish

The standard broadcast dial scale is read in kilocycles by adding one "0" to figures. The FM band dial scale is read in megacycles (88 to 108). NOTE: When tuning, tune carefully until you are exactly ON the station. Tuning to either side of it will result in poor tone quality and excessive noise. Tuning of FM stations should be done very carefully, as 3 peaks are present; the center peak is the correct one; distortion and low volume are characteristic of the other two peaks.

MOTOROLA INC.

MODELS 77FM21, 77FM22, 77FM22M, 77FM22WM, 77FM23, CHASSIS HS-89, HS-97

CHASSIS PARTS - HS-89 & HS-97

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION
C-1	21K470578	Special: fixed: 3.5 mmf
C-2	19A470426	Trimmer: variable air; 2.5 mmf to 30 mmf
C-3	21R2730	Silver mica: 500 mmf 500V
C-4	21R2729	Silver mica: 250 mmf 500V
C-5	21R2729	Silver mica: 250 mmf 500V
C-6	19K75415	Variable: 2 gang; cut oscillator plates; with trimmers C-7, C-8 & C-9
C-7	-	Trimmer: part of gang capacitor C-6
C-8	-	Trimmer: part of gang capacitor C-6
C-9	-	Trimmer: part of gang capacitor C-6
C-10	8S9825	Paper: .01 mf 200 V
C-11	8S9802	Paper: .02 mf 400 V
C-12	8K471635	Paper: .05 mf 400 V
C-13	21R6642	Mica: 50 mmf 500 V
C-14	8K471636	Paper: .1 mf 200 V
C-15	8S9825	Paper: .01 mf 200V
C-16	8S9801	Paper: .01 mf 100V
C-17	8S9825	Paper: .01 mf 200V
C-18	8S9801	Paper: .01 mf 100V
C-19	21K77373	Ceramic: 50 mmf 500V
C-20	8S9816	Paper: .05 mf 400V
C-21	8A471623	Paper: .05 mf 200V
C-22	8S9801	Paper: .01 mf 100V
C-23	8S9825	Paper: .01 mf 200V
C-24	21K28816	Ceramic: 25 mmf 500V
C-25	21R6638	Mica: 1000 mmf 500V
C-26	21R6638	Mica: 1000 mmf 500V
C-27	21R6638	Mica: 1000 mmf 500V
C-28	21B77286	Ceramic: 100 mmf 500V
C-29	21B77286	Ceramic: 100 mmf 500V
C-30	21R6639	Mica: 500 mmf 500V
C-31	21K77373	Ceramic: 50 mmf 500V
C-32	21B470567	Ceramic: 4700 mmf 500V
C-33	8S9809	Paper: .01 mf 400V
C-34	21K77375	Ceramic: 250 mmf 500V
C-35	8A471019	Paper: .02 mf 400V
C-36	8A470504	Paper: .25 mf 50V
C-37	8A24966	Paper: .005 mf 100V
C-38	21B470567	Ceramic: 4700 mmf 500V
C-39	21R2729	Silver mica: 250 mmf 500V
C-40	8A72686	Paper: .15 mf 200V
C-41	23B470429	Electrolytic: 40 mf-200V, 20-20 mf 150V. includes insulating tube

RECTIFIER

E-1	48B90140	Selenium type: half-wave

DIAL LIGHT

I-1	65A470930	Lamp, incandescent: 117V, 10 watt; clear

COILS

L-1	24K470674	Loop Antenna: winding only
L-2	24A470556	BC Oscillator
L-3	24A470505	RF Choke
L-4	24A74989	Filament choke
L-5	24A74989	Filament choke

SPEAKER

LS-1	50C470684	5" PM; 3.2 ohm voice coil

RESISTORS

Note: All resistors are insulated, carbon type, 1/2 watt, 20% unless otherwise specified.

REF. NO.	PART NO.	DESCRIPTION
R-1	6R6015	220,000
R-2	6R6004	1 meg
R-3	6R3996	15,000; not insulated
R-4	6R6015	220,000
R-5	6R6046	1 meg 10%
R-6	6R6028	22,000
R-7	6R6028	22,000
R-8	6R6434	27,000 10%
R-9	6R6028	22,000
R-10	6R2039	68 10%
R-11	6R6301	1000
R-12	6R3933	220
R-13	6R6028	22,000
R-14	6R2039	68 10%
R-15	6R6301	1000
R-16	6R3927	2.2 meg
R-17	6R6056	47,000
R-18	6R6015	220,000
R-19	6R6410	33,000 10%
R-20	6R6015	220,000
R-21	6R6001	68,000
R-22	6R6182	150,000
R-23	6R6075	100,000
R-24	6R6018	100
R-25	6R6032	470,000
R-26	6R2122	4.7 meg
R-27	6R6393	1200 10%
R-28	6R6075	100,000
R-29	6R6032	470,000
R-30	6R6393	1200 10%
R-31	6R6293	150; not insulated
R-32	18A76191	Volume Control: .5 megohm; tapped at 25,000 ohms, with SPST switch
R-33	6R3994	27 10% 2 watt
R-34	6R3968	180 10% 2 watt
R-35	6R476004	1000 2 watt

SWITCHES

S-1	40K470676	Phono-radio & tone switch
S-2	40B470432	Bandswitch
S-3	40K471447	Pushswitch: dual; with switch cover and insulator (phono ON-OFF & phono reject) HS-97)

TRANSFORMERS

T-1	24B471668	1st IF, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-2	24B471670	2nd IF, 4.3 Mc: complete with iron cores and padding capacitors, but less shield.
T-3	24B471672	3rd IF, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-4	24B471674	Discriminator, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-5	24B75487	IF, 455 Kc: complete with iron cores and padding capacitors, but less shield....
T-6	24B471666	Diode: 455 Kc; complete with iron cores and padding capacitors, but less shield
T-7	25K471947	Output

MODELS 77FM21, 77FM22, -22M, -22WM, 77FM23, CHASSIS HS-89, HS-97

MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
1	1X77345	Background Support & Pullies Assembly ..
2	26A24869	Base, tube shield .....
3	7K471005	Bracket, output transformer mounting ...
4	7K470917	Bracket, pilot light mounting .....
5	7A77337	Bracket, tuning shaft .....
6	11M8944	Cord, dial: 18 lb. black .....
7	30K31258	Cord, line & plug: 3 conductor .....
8	15A471444	Cover, pushswitch .....
9	15B470677	Cover, switch (on chassis) .....
10	35B77311	Dial Background: tan plastic; with reinforcing strip .....
11	57K77085	Dowel, back panel mounting: wood; 1-7/8" long .....
12	5S7805	Eyelet, snap-in (dial background mtg) ..
13	14A471446	Insulator, pushswitch cover: armite ....
14	14A470428	Insulator, rectifier: armite paper .....
15	1X470698	Lead Assembly, phono-motor: with 3 pin receptacle; 3 leads (for Chassis HS-89)
16	1X471448	Lead Assembly, phono: with 4 pin receptacle & dual push switch (for HS-97 Chassis)
17	1X470696	Lead Assembly, shielded: 8" long (audio lead) .....
18	1X470697	Lead Assembly, phono pick-up: single shielded conductor with one pin plug; 35" long (HS-89) .....
19	1X471449	Lead Assembly, phono pick-up: single shielded conductor with one pin plug; 43" long (HS-97) .....
20	1X470545	Lever & Rivet Assembly (on band switch shaft) .....
21	32K31259	Lock, line cord: fibre .....
22	4S7650	Lockwasher: #6 internal (rectifier mtg).
23	4S7657	Lockwasher: #8 external (speaker mtg) ..
24	29R5227	Lug, soldering: #6L .....
25	2S7002	Nut: 6-32 x 5/16 hex; cadmium plated (rectifier mtg) .....
26	2S7051	Nut: 3/8-32 x 9/16 hex; Palnut; cadmium plated (volume control & phono-radio sw. mtg).....
27	1X470669	Panel Assembly, cabinet back: less loop winding but includes 3 screw terminal strip and 2 lug terminal strip .....
28	9A12705	Plate, electrolytic mounting: bakelite..
29	64A470680	Plate, switch mounting .....
30	64A470681	Plate, tuning shaft mounting .....
31	28K71775	Plug: 1 pin (phono pickup lead) .....
32	52A77307	Pointer & Slider Assembly .....
33	49A12646	Pulley, cord: 1/4 groove .....
34	49A21552	Pulley, cord: 1/2 groove .....
35	9A30680	Receptacle: 3 prong; with shell (chassis HS-89 phono motor receptacle) .....
36	9K470402	Receptacle: 4 prong (Chassis HS-97 phonc receptacle) .....
37	5A71246	Rivet, shoulder: (.187 long) (cord pulley mtg) .....
38	5A15045	Rivet, shoulder: .437 long (cord pulley mounting) .....
39	5S8497	Rivet: .088 x 1/8; steel; nickel plated (tube socket mtg) .....
40	5S7707	Rivet: .122 x 5/32; steel; nickel plated) .....
41	5S7701	Rivet: .122 x 3/16 steel; nickel plated (electrolytic mtg) .....
42	5S7708	Rivet: .122 x 9/32 steel; nickel plated (line cord lock mtg) .....
43	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw (BC osc coil mtg) .....
44	3S2927	Screw: 6-32 x 7/8 slotted hex head machine screw; cadmium plated (rectifier mtg) .....
45	3S7163	Screw: 8-32 x 1/4 slotted hex head machine screw; cadmium plated (speaker & output transformer brkt mtg) .....
46	3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (switch cover mounting) .....
47	3S7481	Screw: #8 x 3/4 PKZ slotted hex head sheet metal screw; cadmium plated (tuner mtg) .....
48	3S3384	Screw: #8 x 2-1/4 PKZ slotted hex head sheet metal screw; cadmium plated (back panel mtg) .....
49	47A470682	Shaft, band switch .....
50	1A77694	Shaft & Pulley Assembly (tuning shaft) .
51	26B70107	Shield, coil (shield for T-1, T-2, T-3 & T-4) .....
52	1A71049	Shield & Sleeve Assembly (shield for T-5 & T-6) .....
53	26A478087	Shield, light (used behind dial light) .
54	26A24970	Shield, tube .....
55	9A470407	Socket, dial light & bracket .....
56	9A470506	Socket, tube: miniature 7 prong; black bakelite .....
57	9K470425	Socket, tube; noval 9 prong; black bakelite .....
58	41A14244	Spring, tension coil (drive cord tension) .....
59	31K85348	Strip, terminal; 1 insulated lug, #2 mtg
60	31K83993	Strip, terminal; 2 insulated lugs, #1 mtg
61	31K86126	Strip, terminal; 2 insulated lugs, #2 mtg (on rear panel) .....
62	31A470403	Strip, terminal; 3 screw with jumper (Ext Ant terminals) .....
63	31A471913	Strip, terminal; 4 insulated lugs, #2 gnd
64	31K76232	Strip, terminal; 4 insulated lugs, #3 mtg
65	31K22174	Strip, terminal; 4 insulated lugs, #4 mtg
66	4A70015	Washer, "C" (band sw shaft & tuning shaft retainer) .....
67	4S1719	Washer: 3/8 x .140 x .030 thick; steel; cadmium plated (line cord lock mtg) ...
68	4S7563	Washer: 5/8 x .203 x .033 thick; steel; cadmium plated (back panel mtg) .....

CABINET PARTS - MODELS 77FM21, 22, 22M, 22WM & 23

101	7A471456	Bracket, switch mounting (phono motor & reject sw. mtg) .....
102	38K470830	Button, plug: for 1/4" hole; green (for concealing shipping screw holes in record changer base) .....
103	38B471506	Button, push: M .....
104	38K471507	Button, push: R .....
105	16E470802	Cabinet, consolette model: wood; walnut (77FM21) .....
106	16F471531	Cabinet, consolette model: wood; walnut (77FM22) .....
107	16K478056	Cabinet, consolette model: wood; mahogany (77FM22M) .....

REF. NO.	PART NO.	DESCRIPTION
108	16K478055	Cabinet, consolette model: wood; walnut-mahogany finished (77FM22WM) .....
109	16E478043	Cabinet, consolette model: wood; mahogany (77FM23) .....
110	55A72307	Catch, bullet .....
111	13K470803	Cloth, grille (77FM21 & 22) .....
112	13K478036	Cloth, grille (77FM22M & WM & 77FM23) ..
113	42A75825	Clip, mounting (phono power connector mtg) 77FM21 .....
114	3A471458	Escutcheon, push button: brushed brass finish .....
115	13C470840	Grille, cabinet: metal; brass plated (77FM21, 22, 22M & 22WM) .....
116	13A478037	Grille, cabinet: painted; 3-5/8" (77FM23 only) .....
117	13K478039	Grille, cabinet: painted; 4-7/8" (77FM23 only) .....
118	36K470646	Knob, control: walnut plastic; plain (77FM21 & 22) .....
119	36K471695	Knob, control: walnut plastic; branded (77FM21 & 22) .....
120	36K478064	Knob, control: mahogany plastic; plain (77FM22M, 22WM & 23) .....
121	36K478065	Knob, control: mahogany plastic; branded (77FM22M, 22WM & 23) .....
122	35K470657	Pad, felt: 1/2 diameter x 1/16 thick (drawer stop) .....
123	64B470847	Panel, cabinet rear: wood; walnut finish (77FM21 & 22) .....
124	64K478063	Panel, cabinet rear: wood; mahogany finish (77FM22M, 22WM & 23) .....
125	38A25507	Plug, split: 5/8 long; for 1/8 hole; copper oxide finish (holds loop panel to cabinet) .....
126	55B470846	Pull, drawer: Old English finish (77FM21 & 22, 22M & 22WM) .....
127	55B471551	Pull, drawer: antique copper finish (77FM23 only) .....
128	55K74786	Rail, support: right hand (phono drawer rail) .....
129	55K74787	Rail, support: left hand (phono drawer rail) .....
130	34K470863	Scale, dial & escutcheon .....
131	3S7401	Screw: #2 x 3/8 Phillips oval head wood screw; antique copper finish (dial scale mtg) .....
132	3S1343	Screw: #4 x 3/8 Phillips oval head wood screw; brass finish (pushbutton escutcheon mounting) .....
133	3S3367	Screw: #5 x 3/8 PKA slotted hex head sheet metal screw; black parkerized finish (77FM21 pwr conn. mtg) .....
134	3S7156	Screw: 6-32 x 3/16 slotted binderhead machine screw; cadmium plated (phono motor-reject switch mtg) .....
135	3S1314	Screw: #6 x 3/4 round head wood screw (drawer rail mtg) .....
136	3K471952	Screw: 8-32 x 15/16 washer head machine screw; antique copper finish (drawer pull mtg 77FM21, 22, 22M & 22WM) .....
137	3A471791	Screw: tri-slot head; statuary bronze finish (77FM23 drawer pull mtg) .....
138	3S7526	Screw: #8 x 1-1/8 PKA slotted hex head sheet metal screw; cadmium plated (chassis mtg) .....
139	3S7396	Screw: 10-32 x 2" slotted hex head machine screw; copper plated (record changer mtg) .....
140	55X11497	Silencer, dome .....
141	41A21807	Spring, cushion: bottom (record changer cushion) .....
142	41A28190	Spring, cushion: top (record changer cushion) .....
143	22S7905	Staple, insulated .....
144	55K72308	Strike, bullet (includes 1/2" nail) ....
145	4S8214	Washer: 7/8 x .203 x .067 thick; cadmium plated (chassis mtg) .....
146	4S7611	Washer: 1/2 x 7/32 x .048 thick; antique copper finish (record changer mtg) ....

MODELS 78F11, 78F11-M, 78F12-M

MOTOROLA INC.

GENERAL INFORMATION

TYPE - BC radio-phonograph combination with loop antenna. A selenium rectifier is used in the power supply. Chassis HS-150 & HS-155 are identical except for dial arrangements.

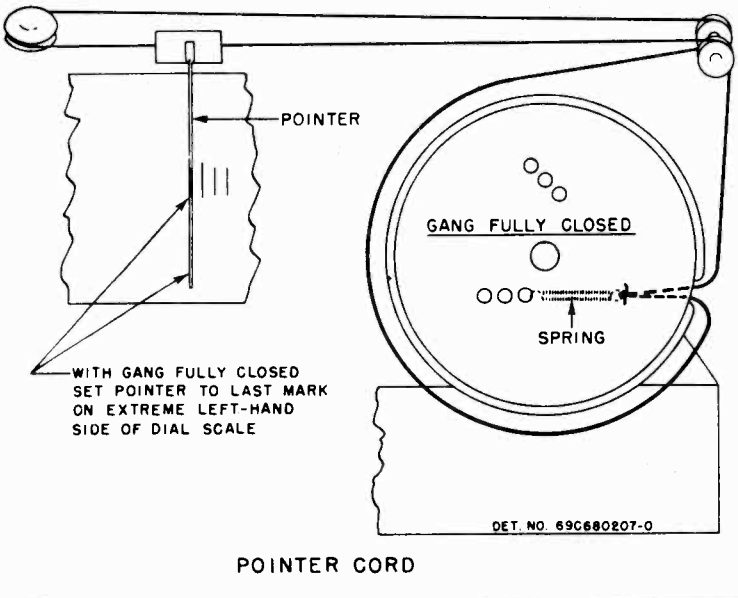
TUNING RANGE - 535 to 1620 Kc

IF FREQUENCY - 455 Kc

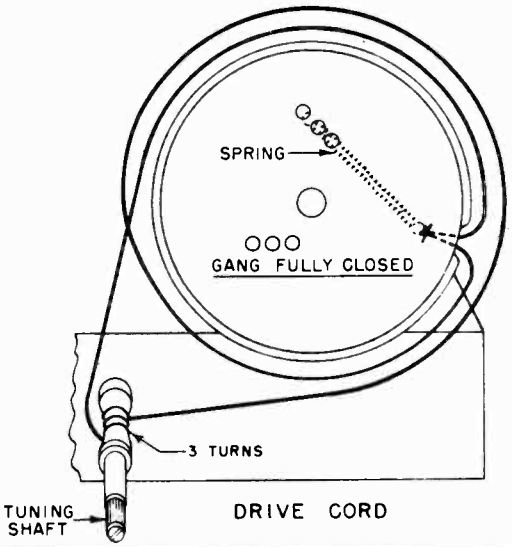
TUBE COMPLEMENT - 6BK7 - RF Amplifier
6SA7 - Converter
6SK7 - IF Amplifier
12SQ7 - Detector, AVC & 1st AF Amp
2- 50L6 - Power Amplifiers
Rectifier - Selenium type

POWER SUPPLY - 105-125 volts AC, 60 cycles, 75 watts

RECORD CHANGER - Model RC-34. Refer to Motorola Model RC-34 Service Manual, Part No. 54P484953, for record changer service information and operating instructions.



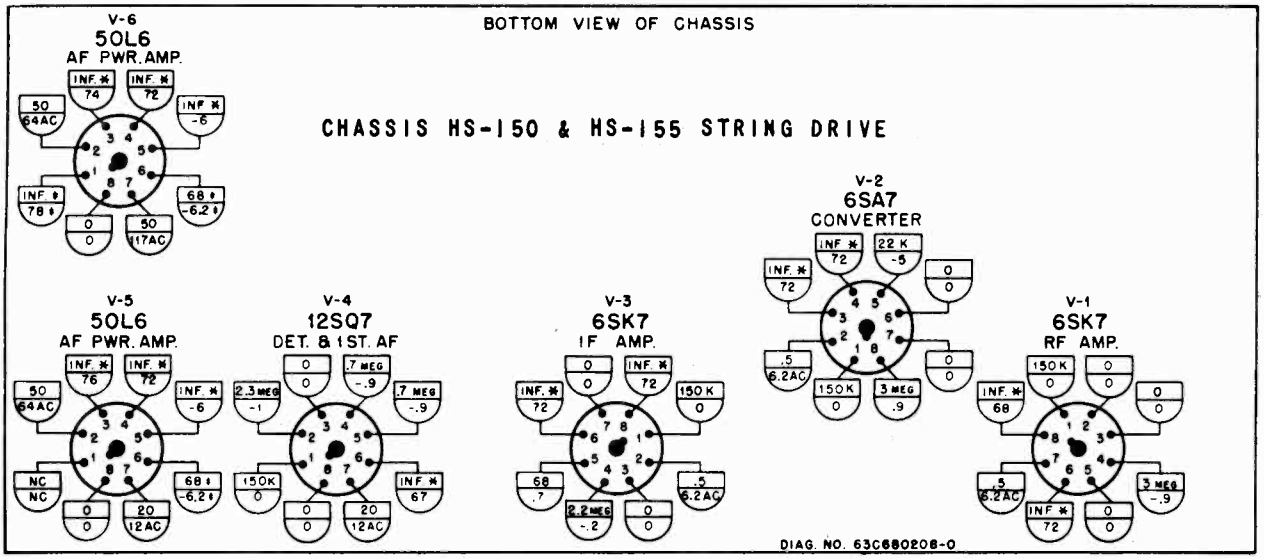
POINTER CORD



DRIVE CORD

BOTTOM VIEW OF CHASSIS

CHASSIS HS-150 & HS-155 STRING DRIVE



▭ = RESISTANCE MEASUREMENTS.

▽ = VOLTAGE MEASUREMENTS.

* = MEASUREMENTS MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC IN CIRCUIT.

K = 1000 (ONE THOUSAND) OHMS.

‡ = LUG USED AS TIE POINT.

NC = NO CONNECTION.

NOTES:
A VTVM WAS USED FOR ALL MEASUREMENTS.

ALL MEASUREMENTS, EXCEPT FILAMENTS, MADE FROM TUBE BASE PIN TERMINAL TO COMMON NEGATIVE. (SEE SCHEMATIC DIAGRAM)

FILAMENT MEASUREMENTS MADE FROM TUBE BASE TERMINAL TO MINUS SIDE OF LINE INPUT.

ALL VOLTAGES DC UNLESS OTHERWISE SPECIFIED.

INPUT TO SET 117 V. AC.

VOLTAGE TOLERANCE ±10%; RESISTANCE TOLERANCE ±20%.

VOLUME CONTROL AT MINIMUM AND NO STATION TUNED IN.

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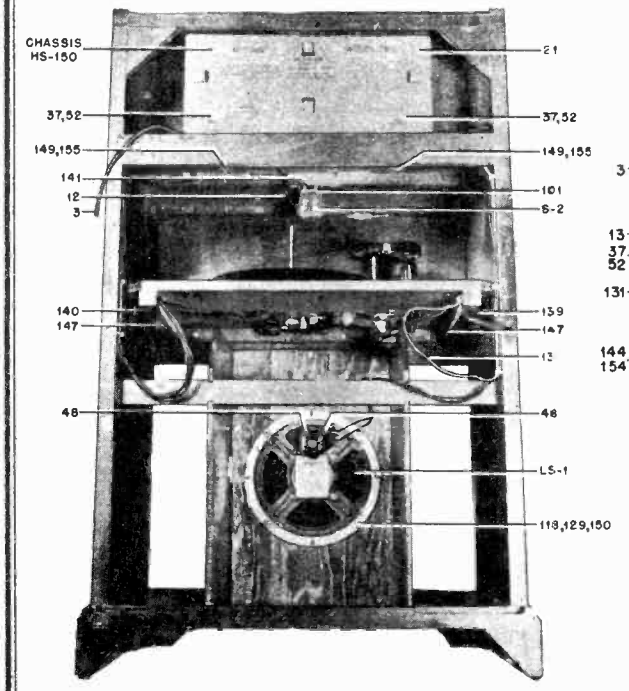
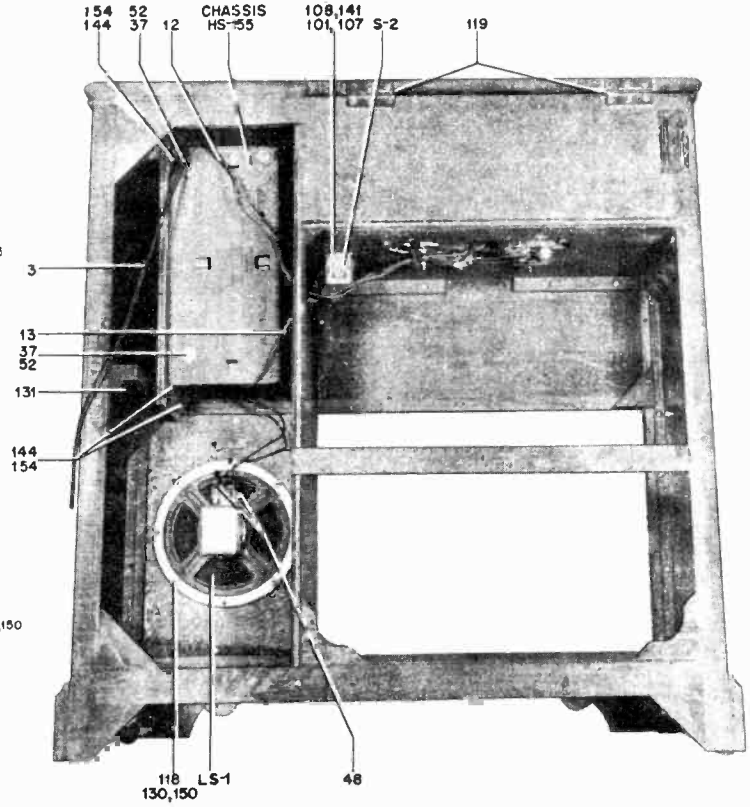
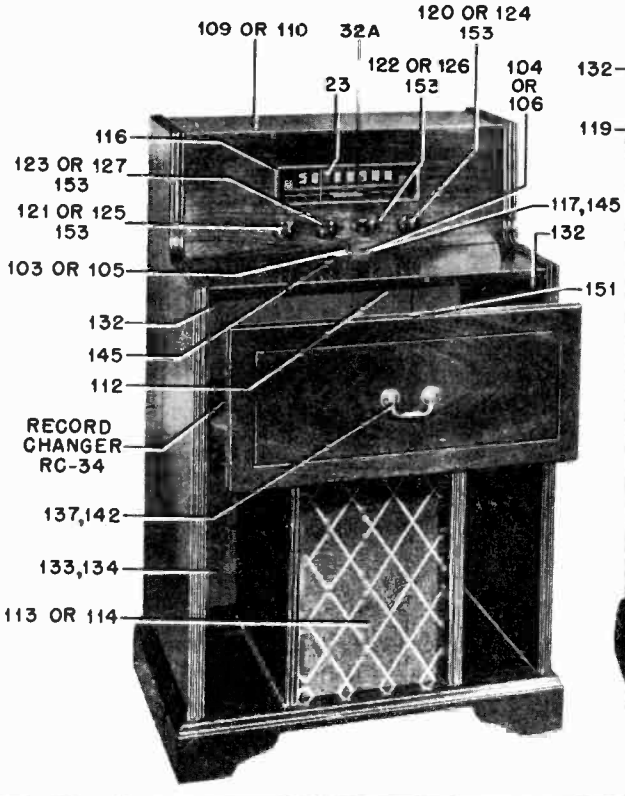
MODELS 78F11, 78F11-M, 78F12-M

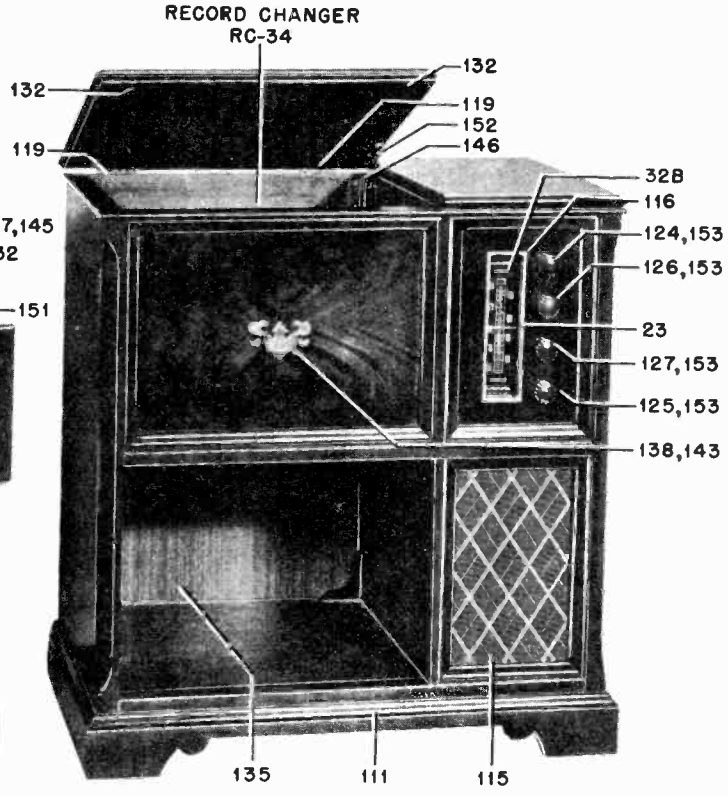
CABINET FRONT & REAR VIEWS





PARTS LOCATIONS





MODELS 78F11, 78F11-M, 78F12-M

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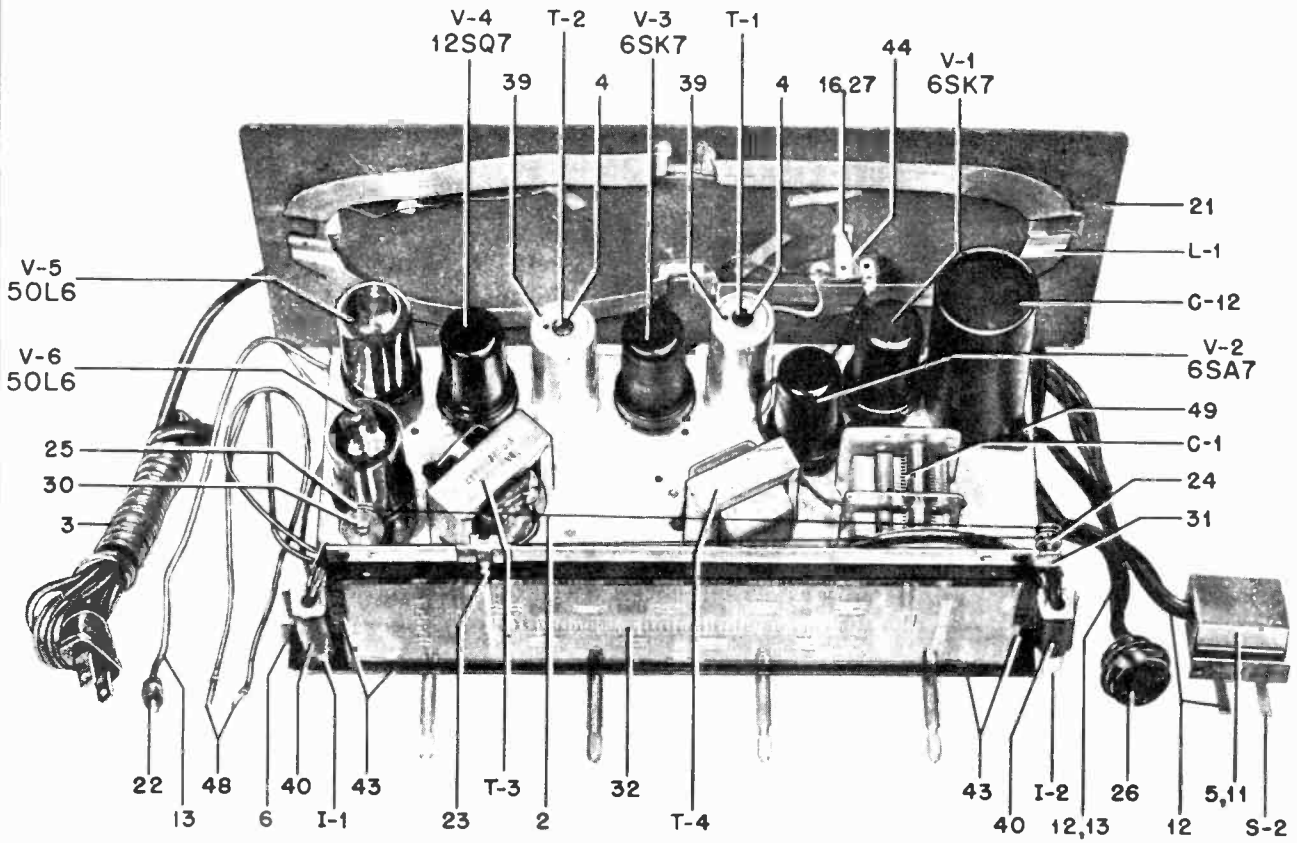
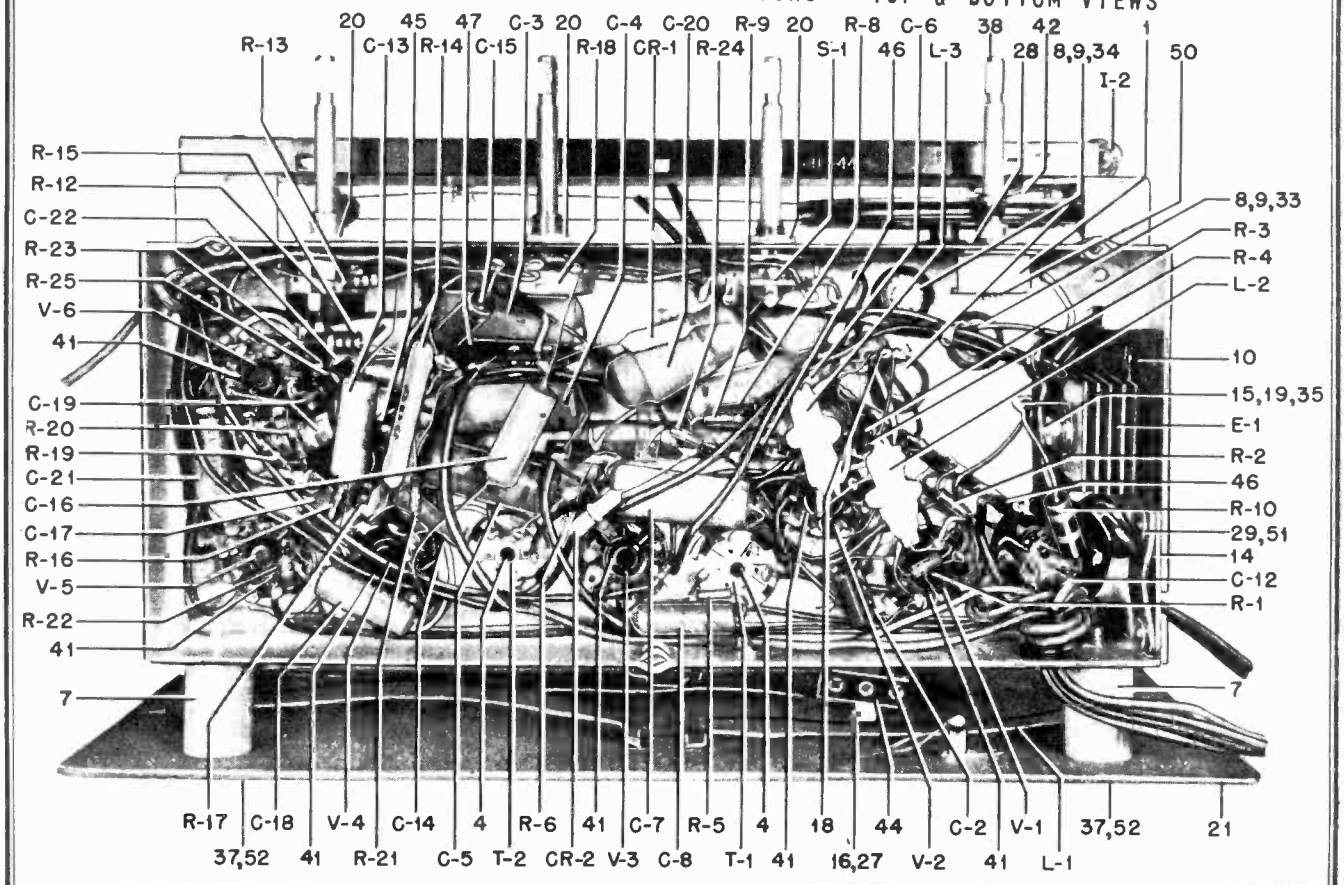


CHASSIS HS-150 & HS-155 PARTS LOCATIONS - TOP & BOTTOM VIEWS



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MODELS 78F11, 78F11-M, 78F12-M

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt thruout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter).

It is suggested that an isolation transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator through a .1 mf capacitor to receiver common negative (see schematic diagram) instead of the receiver chassis.

Refer to Figure 2 for location of all adjustments.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Conv. grid (pin #8)	455 Kc	1,2,3 & 4	Adjust for maximum output.
RF ALIGNMENT						
2.	Gang fully opened	-	Radiation loop**	1620 Kc	5	Adjust for maximum. This sets osc. to dial scale*
3.	1400 Kc	-	Radiation loop**	1400 Kc	6 & 7	Tune signal for max. with receiver tuning knob, then peak trimmers 6 and 7.

* With gang fully closed, pointer should be in line with mark on extreme left hand side of dial scale.

** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of .05 watt (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

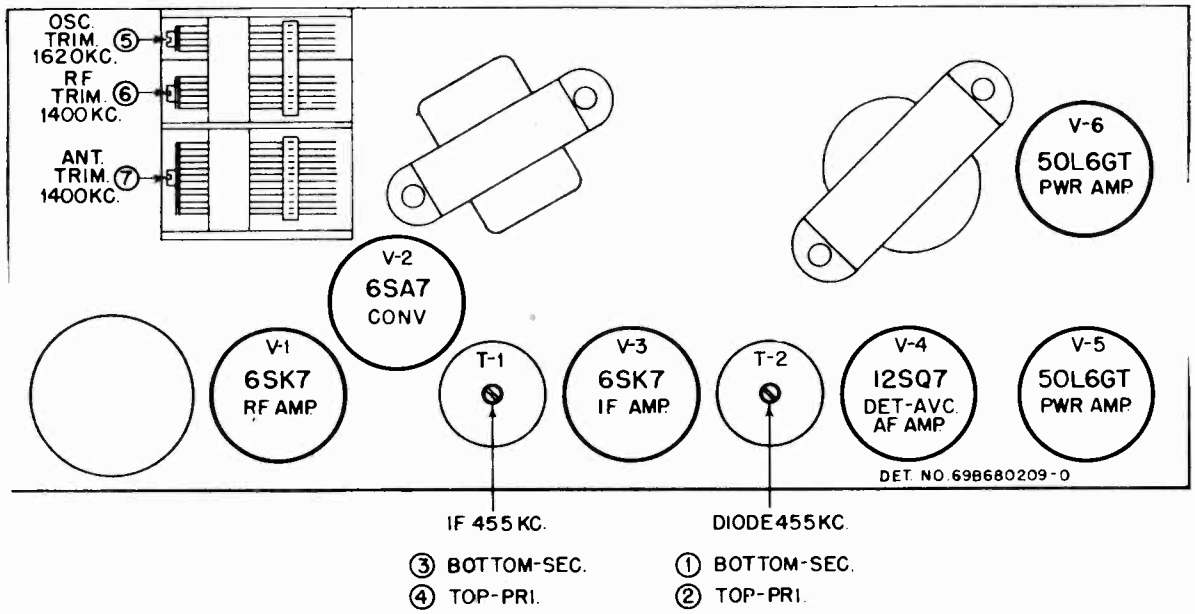
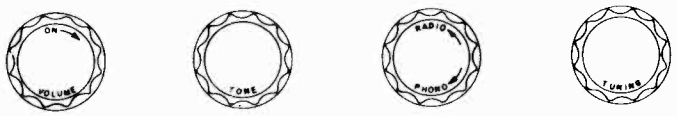


FIGURE 2. CHASSIS HS-150 & HS-155 TUBE & TRIMMER LOCATIONS



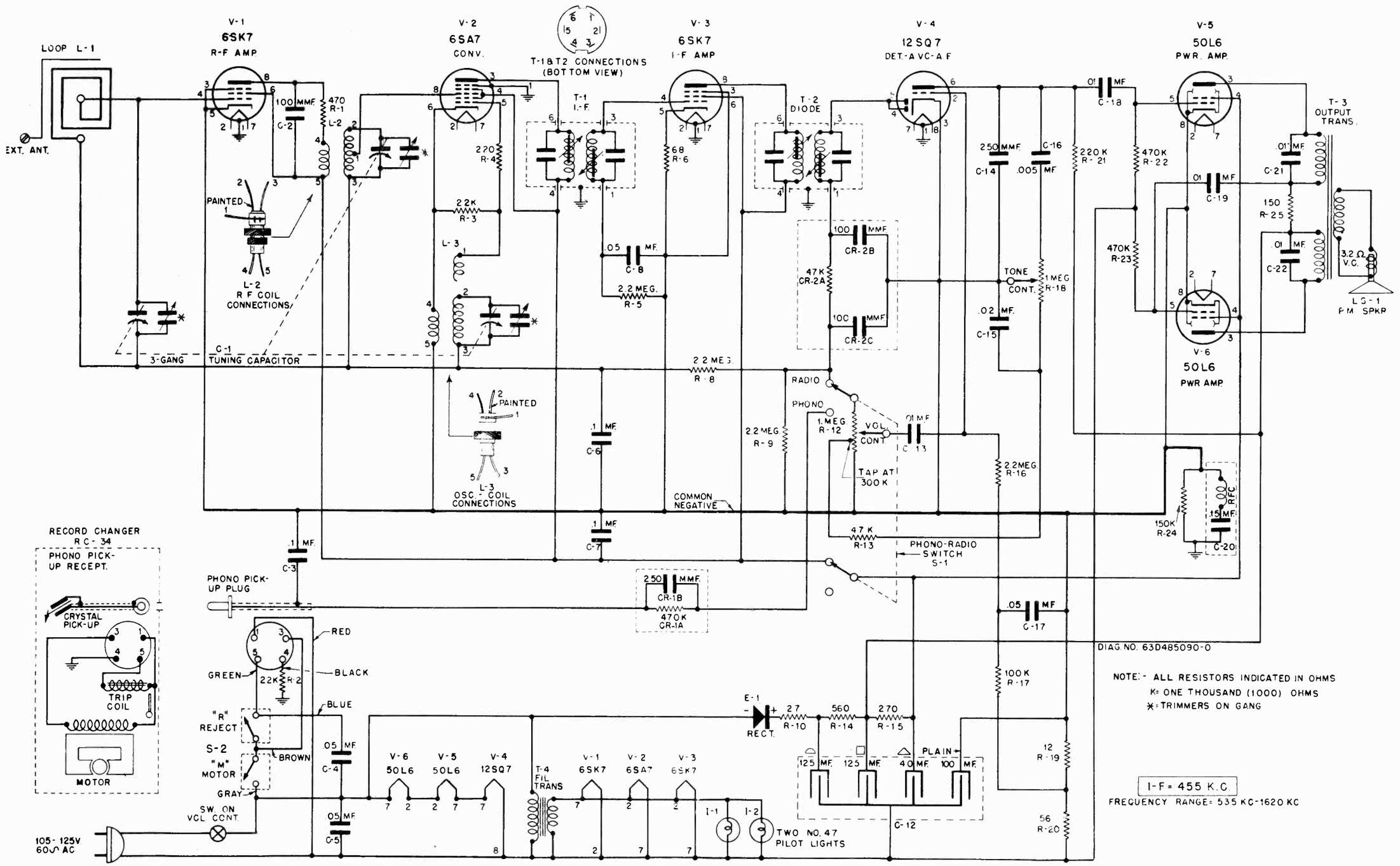
CHASSIS PARTS - ELECTRICAL

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	1X484546	Variable, 3 gang: includes pulley .....
C-2	21R6641	Mica: 100 mmf 500V .....
C-3	8S9807	Paper: .1 mf 400V .....
C-4	8S9816	Paper: .05 mf 400V .....
C-5	8S9816	Paper: .05 mf 400V .....
C-6	8S9807	Paper: .1 mf 400V .....
C-7	8S9807	Paper: .1 mf 400V .....
C-8	8A71213	Paper: .05 mf 100V .....
C-12	23B482811	Electrolytic: 125-125-40 mf/150V, 100 mf/25V
C-13	8S9809	Paper: .01 mf 400V .....
C-14	21K77375	Ceramic: 250 mmf 500V .....
C-15	8K471628	Paper: .02 mf 100V .....
C-16	8S9813	Paper: .005 mf 600V .....
C-17	8A71213	Paper: .05 mf 100V .....
C-18	8S9809	Paper: .01 mf 400V .....
C-19	8S9809	Paper: .01 mf 400V .....
C-20	1A77283	Paper: .15 mf 200V; includes 10 turns of #24 wire .....
C-21	8S9809	Paper: .01 mf 400V .....
C-22	8S9809	Paper: .01 mf 400V .....
CAPACITOR-RESISTOR		
CR-1A, B,	21K481868	Capacitor-Resistor: consists of 250 mmf capacitor and 470,000 ohm resistor as one unit .....
CR-2A, B & C	21A473040	Capacitor-Resistor: consists of two 100 mmf capacitors and one 47,000 ohm resistor as one unit .....
RECTIFIER		
E-1	48B482807	Selenium type: 150 ma; half-wave .....
PILOT LIGHTS		
I-1,2	65X11854	Bulb: 6-8V; clear; bayonet base; #47 ...

RESISTORS		
Note:		All resistors are insulated carbon type unless otherwise specified.
R-1	6R3949	470 20% 1/2W .....
R-2	6R6028	22,000 20% 1/2W .....
R-3	6R6028	22,000 20% 1/2W .....
R-4	6R3933	220 20% 1/2W .....
R-5	6R3927	2.2 meg 20% 1/2W .....
R-6	6R6007	68 20% 1/2W .....
R-8	6R3927	2.2 meg 20% 1/2W .....
R-9	6R3927	2.2 meg 20% 1/2W .....
R-10	6R3994	27 10% 2W wirewound .....
R-12	18K471518	Volume Control: 1 meg; tapped at 300,000 ohms, includes power switch .....
R-13	6R6056	47,000 20% 1/2W .....
R-14	17K484399	560 10% 5W wirewound; coated .....
R-15	6R6336	270 10% 1W .....
R-16	6R3927	2.2 meg 20% 1/2W .....
R-17	6R6075	100,000 20% 1/2W .....
R-18	18K484386	Tone control: 1 meg .....
R-19	6R2030	12 10% 1/2W .....
R-20	6R5614	56 10% 1/2W .....
R-21	6R6015	220,000 20% 1/2W .....
R-22	6R6032	470,000 20% 1/2W .....
R-23	6R6032	470,000 20% 1/2W .....
R-24	6R6182	150,000 20% 1/2W .....
R-25	6R6330	150 10% 1W .....
SWITCH		
S-1	40A484381	Phono-Radio Switch .....
S-2	40K471447	Pushswitch: dual (Motor-Reject) .....
TRANSFORMERS		
T-1	24B482863	IF, 455 Kc: complete with iron tuning cores and padding capacitors but less shield.
COILS		
L-1	24K484516	Loop Antenna; winding only .....
L-2	24B484512	RF coil .....
L-3	24B484511	Oscillator coil .....
SPEAKER		
LS-1	50C680010	Speaker: 8" PM; 3.2 ohm voice coil .....

MOTOROLA INC.

MODELS 78F11, 78F11-M, 78F12-M, CHASSIS HS-150, HS-155



NOTE:- ALL RESISTORS INDICATED IN OHMS
K= ONE THOUSAND (1000) OHMS
✳= TRIMMERS ON GANG

I-F = 455 K.C.
FREQUENCY RANGE= 535 KC-1620 KC

CHASSIS PARTS - MECHANICAL

1	7A77337	Bracket, tuning shaft
2	11M8944	Cord, dial: 18 lb black
3	30K21859	Cord, line and plug: 9 ft long
4	46A470885	Core, iron: threaded (for tuning T-1 & T-2 primary and secondary)
5	15A471444	Cover, switch (for S-2)
6	1X471776	Dial Plate, Brackets and Pulleys Assembly: complete except for dial scale & rubber scale mtg channels
7	57K470568	Dowel, back mtg: wood
8	5A70098	Eyelet, spacer (gang mtg)
9	37K15125	Grommet, gang mtg
10	14A470428	Insulator, rectifier mtg: fiber
11	14A471446	Insulator, switch cover (for S-2)
12	1X484553	Lead Assembly, phono-motor: includes leads, receptacle, pushswitch, cover and insulator; 35" long (HS-150 only)
	1X485104	Lead Assembly, phono-motor: includes leads, receptacle, pushswitch, cover and insulator; 55" long (HS-155 only).
13	1X484552	Lead Assembly, phono pick-up; includes 1-pin plug; 49" long (HS-150 only)
	1X76356	Lead Assembly, phono pick-up: includes 1-pin plug; 32" long (HS-155 only) .
14	32A24815	Lock, line cord
15	4S7650	Lockwasher: #6 internal (rectifier
16	4S7666	Lockwasher: #6 external; cad plated (terminal strip mtg)
17	29R5227	Lug, soldering: #6L; hot-tinned
18	29R5209	Lug, soldering: #8D; hot-tinned
19	2S7002	Nut: 6-32 x 5/16; steel; cad plated (rectifier mtg)
20	2S7051	Nut: 3/8-32 x 9/16; steel; cad pl; Palnut (volume control, tone control and phono-radio switch mtg)
21	24C484513	Panel & Loop Assembly: includes back panel and loop antenna
22	28K71775	Plug, insulated: 1-pin (phono pickup)
23	52B481704	Pointer, dial
24	49A23960	Pulley, cord: 1/4" groove
25	49A21552	Pulley, cord: 1/2" groove
26	9K470402	Receptacle, phono-motor
27	5S7707	Rivet: .122 x 5/32 steel; nickel plated (terminal strip, trans and soldering lug mounting)
28	5S7701	Rivet: .122 x 3/16 steel; nkl pl (tuning shaft bracket and electrolytic wafer mounting)
29	5S7708	Rivet: .122 x 9/32 steel; nkl pl (line cord lock mtg)
30	5A71246	Rivet, shoulder: .187" lg (pulley mtg).
31	5A71735	Rivet, shoulder: 1/2" lg (pulley mtg)
32A	34C484382	Scale, dial: glass (HS-150 only)
32B	34C484517	Scale, dial: glass (HS-155 only)
33	3S7339	Screw: 6-32 x 5/8 plain hex head machine screw; steel; cad pl (gang mtg)
34	3S2999	Screw: 6-32 x 5/8 slotted locking type machine screw; steel; cad pl (gang mtg).
35	3S2977	Screw: 6-32 x 1-1/8 plain hex head machine screw; steel; cad pl (rectifier mtg)
36	3S7454	Screw: #8 x 1/4 PKZ plain hex head machine screw; steel; cad pl (dial assembly mounting)
37	3S7530	Screw: #8 x 1-1/2 PKZ plain hex head machine screw; steel; cad pl (back mtg).
38	1K471779	Shaft and Pulley Assembly, tuning
39	26K485936	Shield, coil (for T-1 & T-2)
40	9A482889	Socket, dial light and bracket
41	9A6790	Socket, tube: molded, octal
or	9A6788	Socket, tube: replacement type; used in place of 9A6790 when mounting ears on chassis break off
42	41A14244	Spring, tension coil (pointer & drive cord tension)
43	37K21114	Strip, channel: rubber; (dial scale mtg)
44	31K86126	Strip, terminal: 2 insulated lugs, #2 (on loop panel assembly)
45	31K470746	Strip, terminal: 3 insulated lugs, #2
46	31K471589	Strip, terminal: 5 insulated lugs, #4
47	31K471562	Strip, terminal: 5 insulated lugs, #4
48	29A5400	Terminal, plain pin (speaker terminal)
49	9A22056	Wafer, electrolytic mtg: bakelite
50	4A70015	Washer "C" (tuning shaft retainer)
51	4S1719	Washer: 3/8 x .140 x .030 thick; steel; cad pl (line cord lock mtg)
52	4S7613	Washer: 3/4 x 13/64 x .027 thick; copper oxide finish (back mtg)

CABINET PARTS

101	7A481713	Bracket, push switch mtg
102	38K482819	Button, plug: 1/4"; red mahogany finish (for concealing shipping screw holes in record changer)
103	1X485913	Button, push: "M";walnut (78F11)
104	1X485914	Button, push: "R";walnut (78F11)
105	1X485195	Button, push: "M"; mahogany (78F11M)
106	1X485196	Button, push: "R"; mahogany (78F11M)

REF. NO.	PART NO.	DESCRIPTION
107	1X485915	Button, push: "M"; mahogany (78F12M)
108	1X485916	Button, push: "M"; mahogany (78F12M)
109	16K482799	Cabinet, spinet combination; brown mahogany (78F11)
110	16F481718	Cabinet, spinet combination: red mahogany (78F11M)
111	16F481758	Cabinet, console combination: red mahogany (78F12M)
112	55B72307	Catch, bullet
113	13K482798	Cloth, grille: brown mahogany (78F11)
114	13K481719	Cloth, grille: red mahogany (78F11M)
115	13K481763	Cloth, grille: red mahogany (78F12M)
116	13K482138	Escutcheon, dial: antique brass finish
117	13A471458	Escutcheon, push button: statuary bronze finish
118	5A12691	Grommet, rubber (speaker cushion)
119	55A471394	Hinge, lid mtg (78F12M)
120	36K484526	Knob, control: walnut plastic; "TUNING" (78F11)
121	36K484528	Knob, control: walnut plastic; "ON-VOLUME" (78F11)
122	36K484525	Knob, control: walnut plastic; "RADIO-PHONO" (78F11)
123	36K484527	Knob, control: walnut plastic; "TONE" (78F11)
124	36K484522	Knob, control: mahogany plastic; "TUNING" (78F11M and 78F12M)
125	36K484524	Knob, control: mahogany plastic; "ON-VOLUME" (78F11M & 78F12M)
126	36K484521	Knob, control: mahogany plastic; "RADIO-PHONO" (78F11M & 78F12M)
127	36K484523	Knob, control: mahogany plastic; "TONE" (78F11M & 78F12M)
128	22S1647	Nail, furniture: #42; antique brass (rear panel mtg)
129	2K38759	Nut, self-locking (speaker mtg -78F11 and 78F11M)
130	2B680009	Nut, self-locking (speaker mtg -78F12M)
131	2A72610	Nut, tee: 8-32 thread (on cabinet-chassis mounting)
132	35K470657	Pad, felt
133	64K484557	Panel, cabinet rear; walnut (78F11)
134	64K481724	Panel, cabinet rear: mahogany (78F11M)
135	64K481725	Panel, cabinet rear: mahogany (78F12M)
136	64C482829	Panel, record changer cover (78F11 & 11M)
137	55A481715	Pull, drawer: English antique finish (78F11 and 78F11M)
138	55A481759	Pull, drawer: dummy (78F12M)
139	55C74786	Rail, support: right-hand
140	55K74787	Rail, support: left-hand
141	3S7156	Screw: 6-32 x 3/16 slotted binder head machine screw; steel; cad pl (push switch mounting)
142	3K481722	Screw: 8-30 x 7/8 washerhead machine screw; antique copper finish (drawer pull mtg - 78F11 & 78F11M)
143	3K481761	Screw: 8-32 x 1/4 washerhead machine screw statuary bronze (drawer pull mtg - 78F12M)
144	3S2963	Screw: 8-32 x 1-3/4; slotted hex head machine screw; steel; cad pl (chassis mounting - 78F12M)
145	3S488129	Screw: #4 x 5/8 Phillips oval head machine screw; statuary bronze finish (push button escutcheon mtg)
146	3S7436	Screw: #6 x 1/2 slotted round head machine screw; antique copper finish (lid support mtg - 78F12M)
147	3S1314	Screw: #6 x 3/4 slotted round head wood screw; statuary bronze finish (support rail mtg)
148	3S476106	Screw: #8 x 1 PKA slotted hex head sheet metal screw; steel; cad pl (chassis mtg-78F12M) ....doz
149	3S3396	Screw: #8 x 1-1/4 PKA plain hex head sheet metal screw; steel; cad pl (chassis mtg-78F11 and 78F11M)
150	3K653	Screw, speaker mounting ....doz
151	55K72308	Strike, bullet: includes nail
152	55B482802	Support, lid: statuary bronze finish (78F12M)
153	4K485917	Washer, felt: used behind control knobs.doz
154	4S7630	Washer: 1/2 x 7/32 x .033 thick; steel; cad pl (chassis mtg -78F12M) ....doz
155	4S8214	Washer: 7/8 x .203 x .067 thick; steel; cad pl (chassis mtg) ....doz
T-2	24B482865	Diode. 455 Kc: complete with iron tuning cores and padding capacitors but less shield
T-3	25B482808	Output Transformer
T-4	25B482810	Filament Transformer

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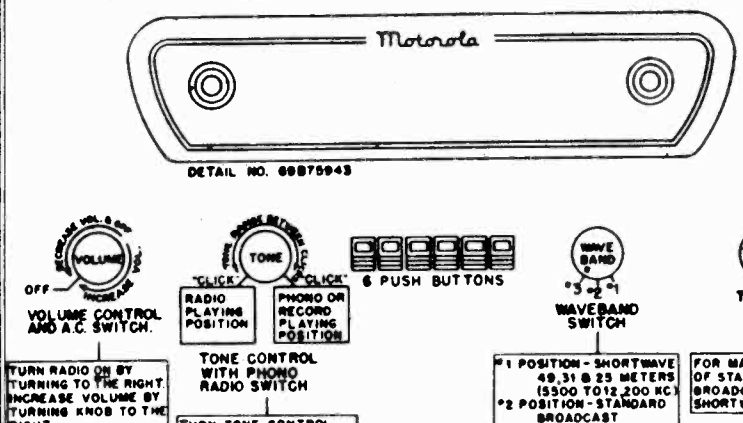
FIGURE 3. CONTROLS



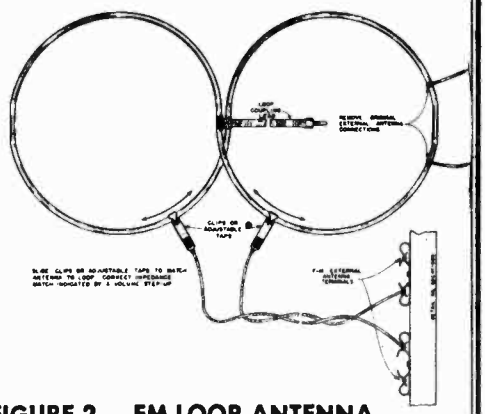


FIGURE 2. FM LOOP ANTENNA

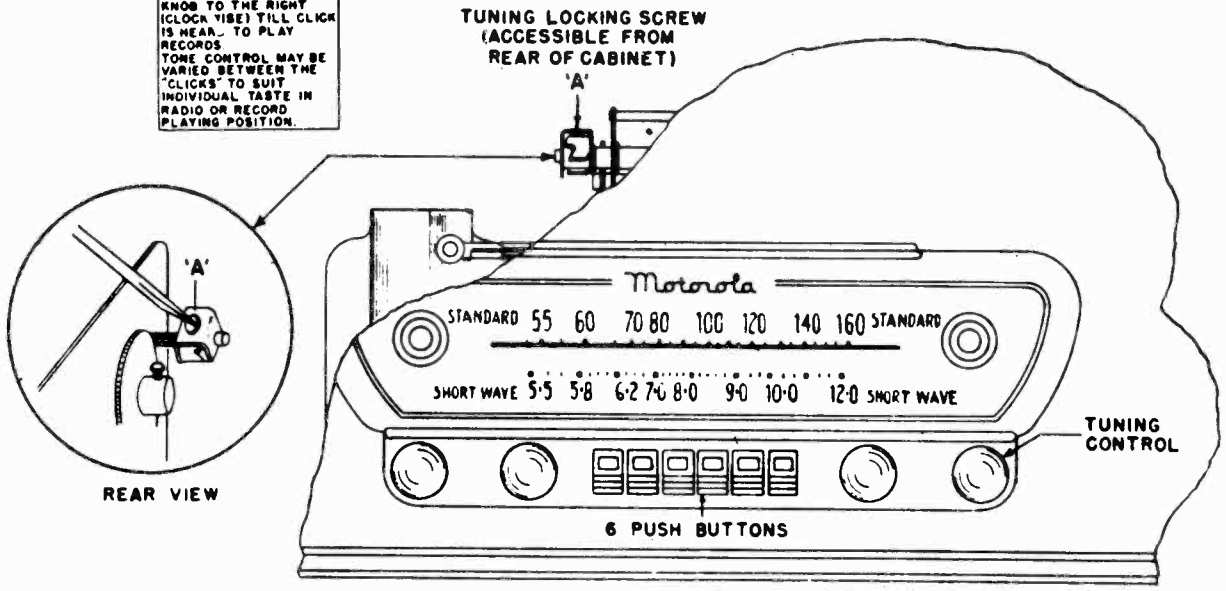


FIGURE 4. TUNER LOCKING SCREW LOCATION

INSTRUCTIONS FOR SETTING AUTOMATIC TUNER PUSH BUTTONS

1. Turn the radio ON and allow it to warm up for a period of at least fifteen minutes.
2. While waiting for the radio to warm up, loosen the tuner locking screw (A) all the way. The locking screw is accessible from the rear of the cabinet. (See Figure 4).
3. Make a list of the frequencies of the local stations you wish to tune in automatically. It is recommended that you select the most powerful stations only.
4. Turn the band switch to FM or BC position, depending on the station being setup, and carefully tune in the first station.

   NOTE: The buttons may be used on either BC, FM, or any combination of AM and FM. BE SURE TO SET THE BAND SWITCH ON THE PROPER BAND!

5. Adjust a signal generator to zero beat with the AM station.

   NOTE: While it is advisable to use a signal generator for accuracy, it is not an absolute necessity. The station signal may be used.

6. Tune to the desired station or to the signal generator, with the tuning knob (right hand control).
7. Holding the tuning knob, push the selected button and HOLD IN UNTIL THE MOTOR STOPS.
8. Repeat steps 6 and 7 for each of the buttons.
9. Carefully tighten the tuner locking screw (A).
10. Check the setting of the button by tuning in the station manually, then push the button set for that station; no effect on volume or tone should be noticed. If not correctly set, readjust--following steps 4 through 9.

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FM SERVICE NOTES

In some cases, people are not tuning FM sets properly. FM is more difficult to tune than AM, although Motorola receivers are easier than most. There are three peaks present; the center peak, which is the correct one, is hard to locate. The peaks on either side of the center are slightly distorted. If you get a distorted peak on only one side of the center, the discriminator is probably out of alignment.

Some people expect too much of FM. You cannot expect great distance. The horizon, as viewed from the transmitting antenna, is the normal service area. Many FM stations are now operating on the low power, waiting for new equipment. Reception will improve greatly when power is increased. Most of the bad reports have come from the fringe areas. In many cases reception can be improved by using a dipole antenna, mounted as high above the roof as possible, and aimed directly at the station.

Location of the radio is important when it is operated on its built-in loop antenna. Moving the set even a few feet away from its present location may increase or reduce signal strength by more than 50% because a stronger signal may exist at one location than another. Therefore, in homes where reception is poor, you may be able to improve it by placing the set against another wall. The Motorola figure 8 loop antenna is omnidirectional.

Motorola FM sets use a relatively new circuit known as the Ratio Detector, instead of the usual limiters. The following paragraph of explanation is quoted from the R.C.A. License Laboratory Bulletin:

"Since a circuit of this type is relatively immune to amplitude modulation, it is unnecessary to precede it by a limiter stage. Also, since its immunity is not a direct function of the signal strength, there is no threshold action of the type encountered where limiters are employed."

It has been thought, erroneously, that the use of limiters in an FM receiver is imperative for proper reception. This is not the case. In this connection, it is important to understand that a limiter requires several volts at its grid to become effective. If the received signal strength is too weak to provide the required voltage at the limiter grid, the limiters do not function. This means that below a certain threshold of signal level, the limiters do not work and as a result do not contribute to amplitude (noise) rejection. Furthermore, noise voltages are not purely amplitude modulated, but contain frequency modulated components against which no amplitude rejection device will discriminate.

From the above comparison, you can see that there is little, if any, difference between the two circuits insofar as noise reception is concerned. In either case, low signal levels from the FM stations will result in noise reception, if there is any noise in the neighborhood.

The main advantages of ratio detection, as used in Motorola FM are, first, very little between station noise, and second, easier tuning because the side peaks are slightly subdued (as compared to the limiter type of receiver), making it easier to find the center peak.

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ALIGNMENT

ALIGNMENT PROCEDURE WHEN USING AM MODULATED SIGNAL GENERATOR AND STANDARD OUTPUT METER FOR COMPLETE RECEIVER ALIGNMENT.

An AM (amplitude modulated) signal generator covering the frequencies shown in alignment chart, is used to align the broadcast, short wave and FM bands. A low range output meter, connected across the speaker voice coil is used as an output indicator.

The broadcast and short wave alignment is conventional; full instructions are given in the following alignment chart.

The FM band alignment can be satisfactorily performed by following the instructions in the chart. When properly aligned, the discriminator does not respond to amplitude modulation and since an AM type signal generator is used for aligning the FM circuits, it is necessary to detune the discriminator secondary and leave it that way until all of the FM circuits have been aligned. After completing the alignment of the FM circuits, proceed to align the discriminator secondary by applying a 4.3 Mc AM signal to the control grid of the 7F8 2nd FM converter tube and adjusting the discriminator secondary core for minimum audio output. No adjustment of the FM circuits should be attempted with AM after the discriminator secondary has been properly aligned.

Use a 30% AM (amplitude modulated) signal throughout entire alignment procedure.

A dial scale should be temporarily mounted or held in position on Chassis HS-38 to facilitate calibration.

Use an insulated screwdriver when adjusting the FM tuner trimmers.

A special wrench for adjusting the slotted nuts on the tuner cores will be required. You can easily fabricate one from a Motorola auto set Volume Control Shaft and Coupling Assembly (Part No. 1B70847, $.30 list) by simply spreading out the forked ends and filing to fit. Solder the assembly together to make it rigid.

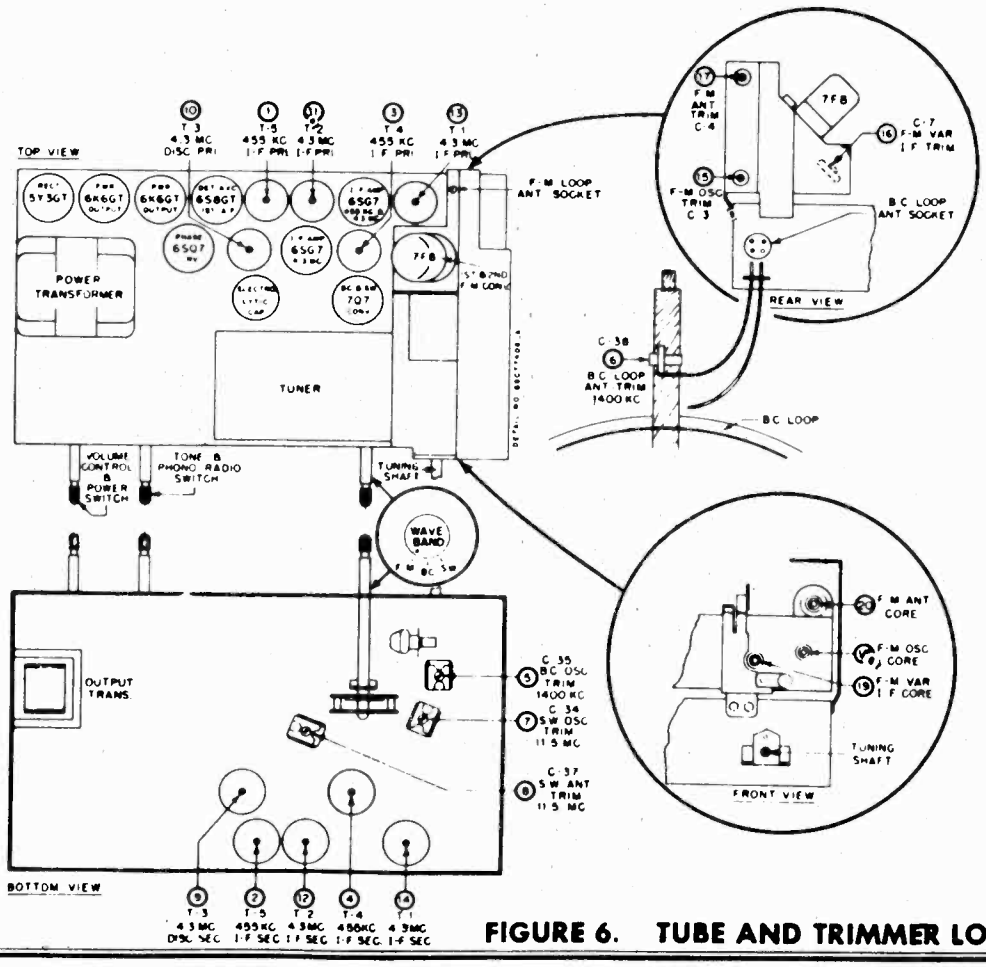

FIGURE 6. TUBE AND TRIMMER LOCATIONS

CHART I. ALIGNMENT PROCEDURE WHEN USING AM MODULATED SIGNAL GENERATOR AND STANDARD OUTPUT METER FOR COMPLETE RECEIVER ALIGNMENT.

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
455 Kc I.F. CHANNEL ALIGNMENT							
1.	1620 KC	B.C.	.1 MF.	707 B.C. & S.W. CONV. GRID (PIN #4) & CHASSIS	455 KC	1, 2, 3 & 4	ADJUST FOR MAXIMUM OUTPUT
BROADCAST BAND ALIGNMENT							
2.	1400 KC	B.C.	.1 MF.	707 B.C. & S.W. CONV. GRID (PIN #4) & CHASSIS	1400 KC	5(B.C. OSC. TRIM)	SET OSCILLATOR TO DIAL. (ON CHASSIS HS-38, MOUNT OR HOLD DIAL SCALE TEMPORARILY ON CHASSIS WITH GANG FULLY MESHED, POINTER SHOULD BE AT LAST MARK ON DIAL. THEN SET TO 1400 KC. AND SET OSCILLATOR.)
3.	1400 KC	B.C.	NONE	RADIATION LOOP*	1400 KC	6(B.C. LOOP ANTENNA TRIM.)	ADJUST FOR MAXIMUM OUTPUT
SW. BAND ALIGNMENT							
4.	11.5 MC	S.W.	.1 MF	707 B.C. & S.W. CONV. GRID (PIN #4) & CHASSIS	11.5 MC	7(S.W. OSC. TRIM)	SET OSC. TO DIAL. MAKE SURE OSC. IS HIGHER IN FREQUENCY THAN THE SIGNAL BY CHECKING IMAGE RESPONSE WHICH SHOULD OCCUR WITH THE INPUT SIGNAL AT 12.41 MC.
5.	11.5 MC	S.W.	50 MMF	S.W. ANT. TERMINAL AND CHASSIS.	11.5 MC	8(S.W. ANT. COIL TRIM)	B.C. LOOP PLUG SHOULD BE DISCONNECTED. ADJ. FOR MAXIMUM OUTPUT
9.9 Mc I.F. CHANNEL ALIGNMENT							
6.						9(DISC. SEC.)	DETUNE DISCRIMINATOR SECONDARY BY SCREWING CORE OUT AS FAR AS IT WILL GO.
7.	112 MC	FM	.001 MF	7F8 2ND FM CONVERTOR GRID (#1 PIN) & CHASSIS	4.3 MC	10, 11, 12, 13 & 14 (4.3 MC I.F.)	ADJUST FOR MAXIMUM OUTPUT
FM BAND ALIGNMENT							
8.						18 (FM OSC. CORE)	CHECK THE POSITION OF THE FM OSC. TUNING CORE 18. SET SPACING BETWEEN THE CORE AND BAKELITE PIECE TO WHICH IT IS MOUNTED, TO 1/32" BY TURNING TUNING CORE SLOTTED NUT.
9.	90 MC	FM	NONE	FM LOOP ANTENNA RECEPTACLE & CHASSIS REMOVE FM LOOP.	90 MC	15, 16 & 17 (FM OSC., ANT. & VARIABLE I.F. TRIM)	ADJUST FOR MAXIMUM OUTPUT
10.	105 MC	FM	NONE	FM LOOP ANTENNA RECEPTACLE & CHASSIS REMOVE FM LOOP.	105 MC	18, 19 & 20 (FM OSC., ANT. & VARIABLE I.F. CORES)	ADJUST FOR MAXIMUM OUTPUT
11.							REPEAT STEPS 9 AND 10 SEVERAL TIMES UNTIL FURTHER ADJUSTMENT DOES NOT INCREASE THE OUTPUT. MAKE THE FINAL TRIMMER ADJUSTMENT AT 105 MC. (I.E TRIMMERS 15, 16 AND 17 AT 105 MC).
12.	105 MC	FM	NONE	RADIATION LOOP *	105 MC	17 (FM ANT. TRIMMER)	ADJUST FOR MAXIMUM OUTPUT WITH FM LOOP ANTENNA CONNECTED.
ALIGN DISCRIMINATOR SECONDARY							
13.		FM	.001 MF	7F8 2ND FM CONVERTOR GRID (#1 PIN) & CHASSIS	4.3 MC	9(DISC. SEC.)	ADJUST DISCRIMINATOR SECONDARY FOR MINIMUM RESPONSE. THE CORRECT ADJUSTMENT IS THE SHARPLY DEFINED MINIMUM RESPONSE POINT BETWEEN THE TWO PEAKS.

* CONNECT OUTPUT OF SIGNAL GENERATOR TO A 5" DIAMETER, 3 TURN LOOP & RADIATE SIGNAL INTO RECEIVER LOOP. MINIMUM DISTANCE BETWEEN LOOPS SHOULD NEVER BE LESS THAN 12".

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CHART II. ALIGNMENT PROCEDURE WHEN USING FM SIGNAL GENERATOR AND OSCILLOSCOPE.

STEP	OPERATION
	455 Kc. I.F. Channel Alignment
1.	Same as step 1 in Chart I (Use AM signal generator)
	Broadcast Band Alignment
2.	Same as steps 2 & 3 in Chart I (Use AM signal generator)
	S. W. Band Alignment
3.	Same as steps 4 & 5 in Chart I (Use AM signal generator)
	4.3 Mc I.F. Channel Alignment Using FM Signal Generator & Oscilloscope
4.	(A) Discriminator -
	1. Connect the input terminals of the oscilloscope vertical amplifier to the high side of the receiver volume control and the chassis.
	2. Connect the FM generator synchronizing voltage output terminals to a phase shifting network, consisting of a variable 1/2 megohm resistor in series with a .002 mf capacitor. The input to the oscilloscope horizontal amplifier is connected across the .002 mf capacitor. See Figure 7. (This phase shifting network may not work with every oscilloscope. Different values of R & C may be required).
	3. Apply an FM 4.3 Mc Signal (125 Kc deviation) through a .01 mf capacitor to the control grid (pin #4) of the 6SG7 tube in the second I.F. amplifier stage.
	4. Screw discriminator secondary core (9) out as far as it will go.
	5. Adjust discriminator primary until the pattern obtained on the scope is symmetrical about the vertical axis. The phase shifting network resistor is adjusted to give only one trace. The pattern obtained is the resonance curve of the primary, whose maximum response should be at exactly 4.3 Mc. (See Figure 8).
	6. Adjust discriminator secondary until a symmetrical pattern is obtained, with peaks occurring at about 100 Kc above and below 4.3 Mc and is substantially linear between peaks. The trace should pass through the intersection of the vertical and horizontal axis. The phase shifting network should be adjusted to give only a single pattern at all times. (See Figure 9).
	(B) 4.3 Mc I.F. Amplifiers -
	1. Apply an FM 4.3 signal (100 Kc deviation) to the control grid (pin #4) of the 6SG7 tube in the 1st I.F. amplifier stage, through a .001 mf capacitor and adjust both primary and secondary cores (11 & 12) to get a symmetrical pattern as before, with peaks occurring at a slightly lower deviation.
	2. Apply an FM 4.3 Mc signal (100 Kc deviation) to the control grid (pin #1) of the 7F8 tube, and adjust both primary and secondary cores (13 & 14) until a symmetrical pattern substantially linear between peaks, is obtained.
	FM Band Alignment
5.	Check the position of the FM oscillator tuning core (18). Set the spacing between the core and the bakelite piece to which it is mounted, to 1/32" by turning tuning core slotted nut.

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OPERATION

STEP

6. Remove the FM loop and connect generator output directly to the receiver FM loop receptacle.

7. Set receiver dial to 90 Mc and also FM signal generator to 90 Mc. (22-1/2 Kc deviation). Adjust FM oscillator, antenna & variable I.F. trimmers (15, 16 & 17) for maximum indication on output meter. (Output meter should be connected across speaker voice coil).

8. Set receiver dial to 105 Mc and also FM signal generator to 105 Mc (22-1/2 Kc deviation). Adjust FM oscillator, antenna and variable I.F. Cores (18, 19 & 20) for maximum indication on output meter.

9. Repeat steps 7 & 8 several times until further adjustment does not increase the output. Make the final trimmer adjustment at 105 Mc. (i.e. trimmers 15, 16 and 17 at 105 Mc.).

10. Connect FM loop antenna to receiver receptacle. Radiate an FM 105 Mc (22-1/2 Kc deviation) signal into FM loop. Set receiver dial to 105 Mc and adjust trimmer (17) for maximum.

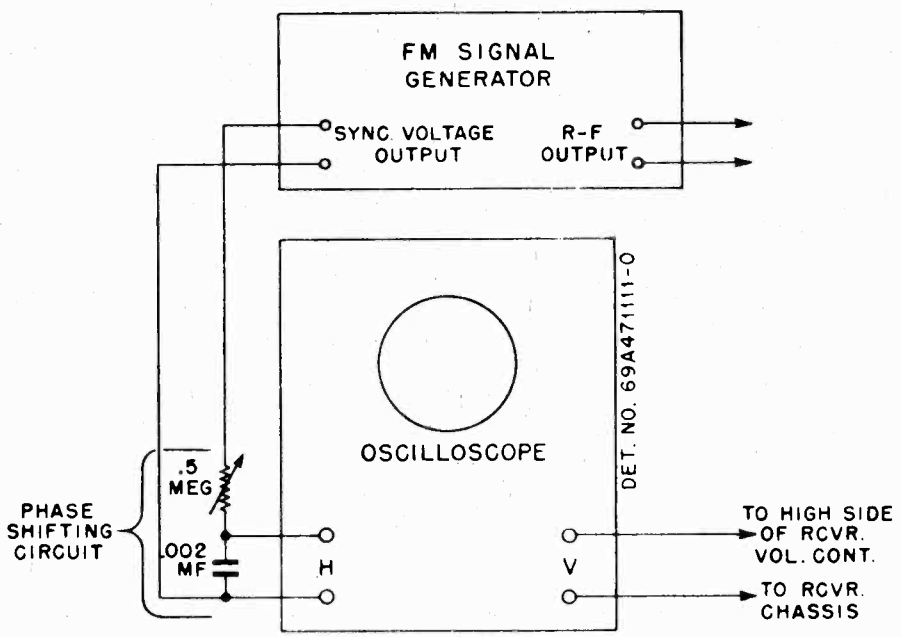
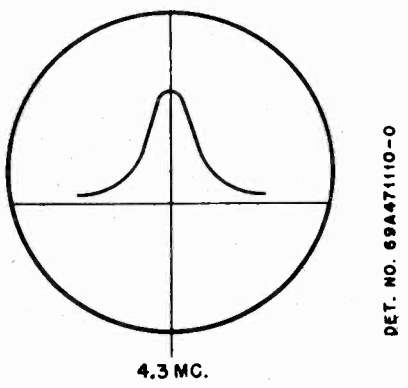
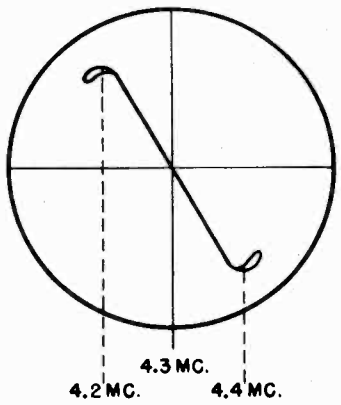


FIGURE 7. SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP



PATTERN WITH DISCRIMINATOR PRIMARY (10) CORRECTLY ADJUSTED.

FIGURE 8.



PATTERN WITH DISCRIMINATOR SECONDARY (9) CORRECTLY ADJUSTED.

FIGURE 9.

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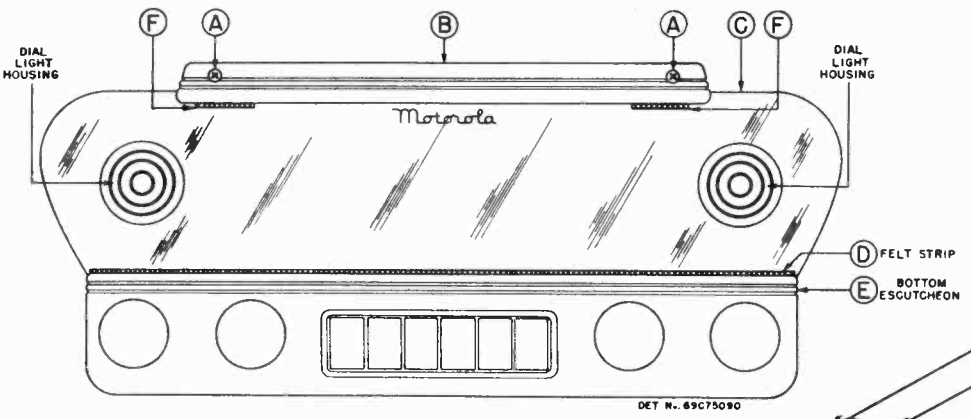

TO SERVICE LONG LIFE PILOT LIGHTS, PROCEED AS FOLLOWS:

1- UNSCREW THE TWO SCREWS MARKED 'A' AND REMOVE BAKELITE ESCUTCHEON 'B'.

2- PULL TOP OF GLASS DIAL SCALE 'C' FORWARD UNTIL DIAL LIGHT HOUSINGS CLEAR CABINET, THEN LIFT GLASS DIAL SCALE CLEAR OF CABINET.

3- REPLACE DEFECTIVE PILOT LIGHT. USE #51 BULBS ONLY.

4- BEFORE REPLACING DIAL SCALE, REMOVE FELT STRIP 'D' FROM BOTTOM ESCUTCHEON 'E'. FLATTEN FELT AND LAY OVER GROOVE IN ESCUTCHEON 'E'.

5- REPLACE DIAL SCALE BY LAYING LOWER EDGE ON FELT IN BOTTOM ESCUTCHEON 'E' AND PRESSING DIAL SCALE DOWN UNTIL PILOT LIGHT HOUSINGS SNAP INTO PLACE.

6- REPLACE UPPER ESCUTCHEON 'B'. MAKE CERTAIN THE TWO FELT STRIPS 'F' ARE PROPERLY PLACED BEFORE FASTENING ESCUTCHEON.

FIGURE 11. DIAL LIGHT REPLACEMENT DETAIL (95F33 ONLY)

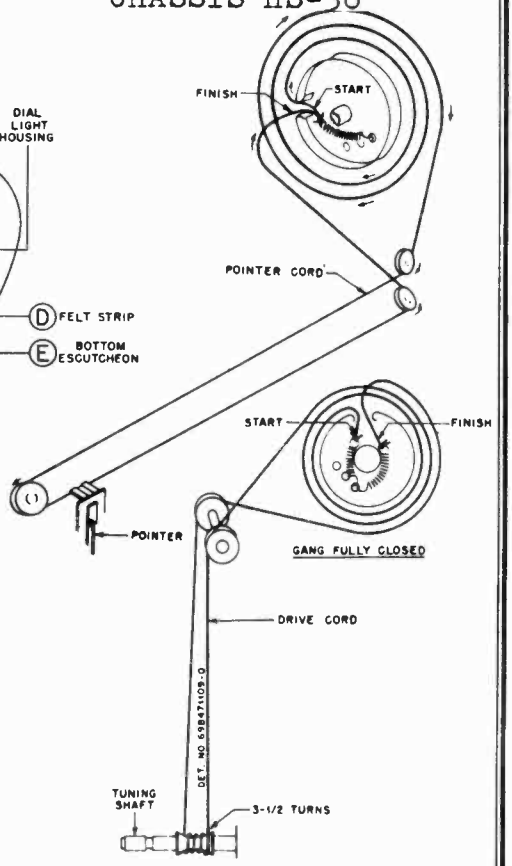

FIGURE 10. POINTER AND DRIVE CORD DETAIL

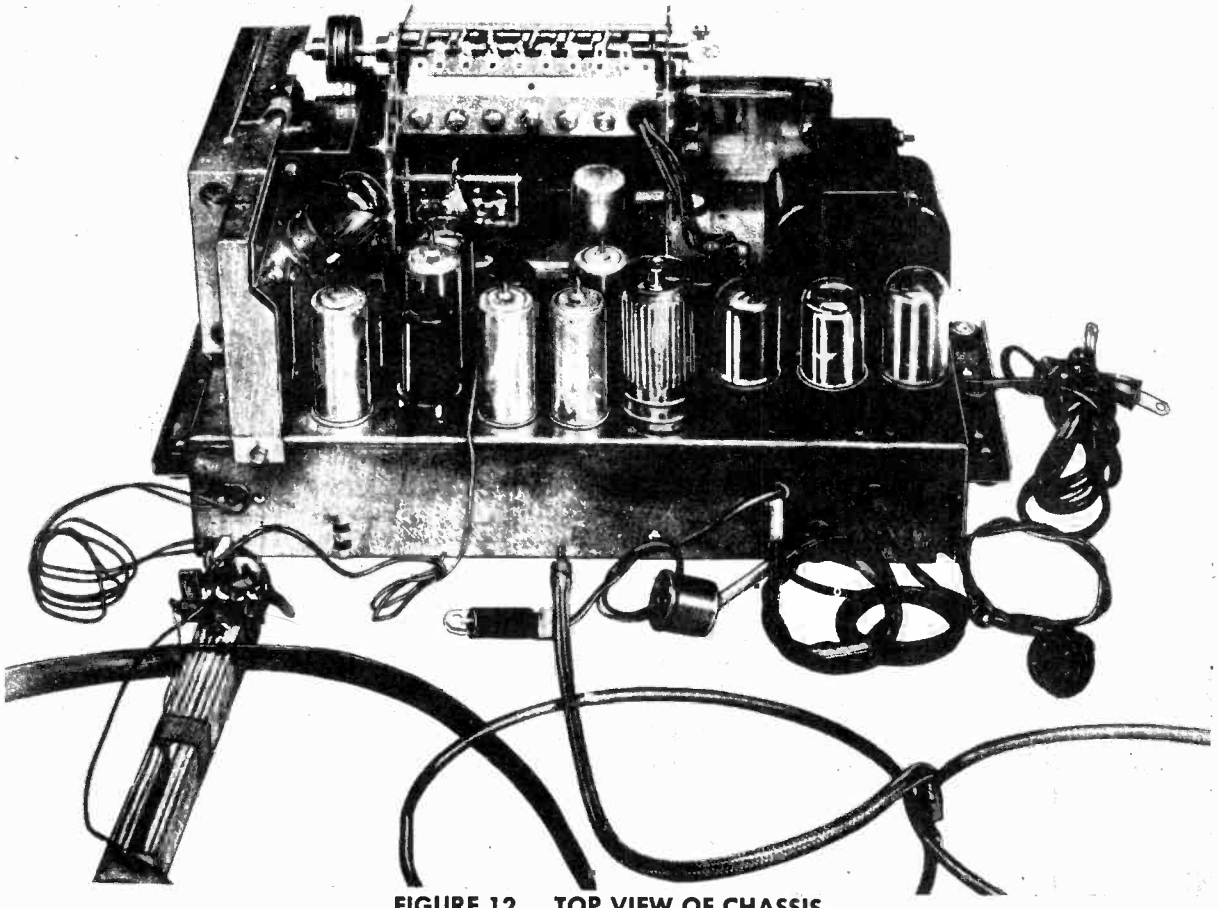

FIGURE 12. TOP VIEW OF CHASSIS

MODELS 95F31, 95F33, CHASSIS HS-38; 95F31B, 95F31M, CHASSIS HS-39

MOTOROLA INC.

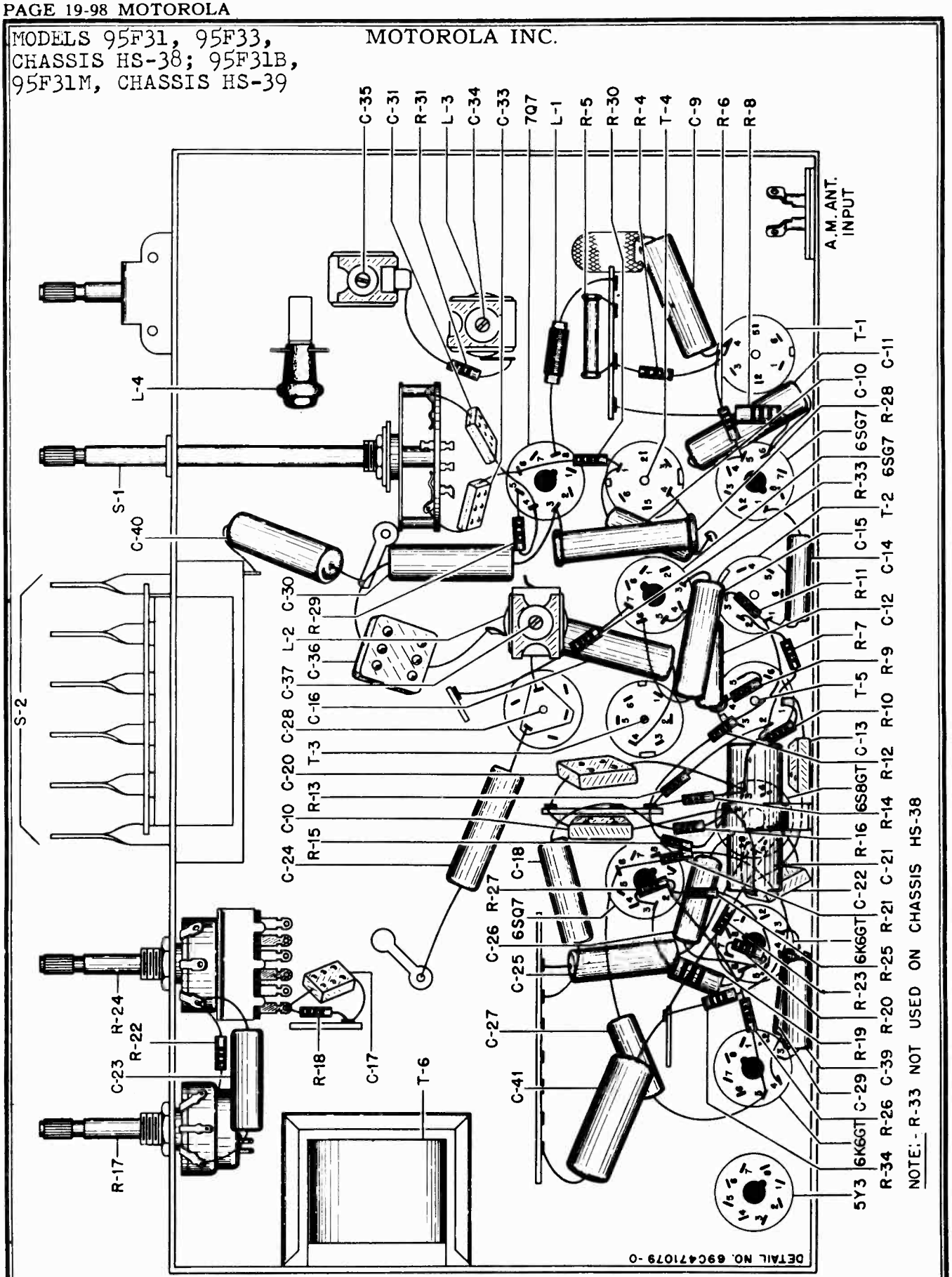

FIGURE 13. BOTTOM VIEW OF CHASSIS

CAPACITORS:

C-1	21A75479	Special: 1.3 mmf
C-2	21A112247	Silver mica: 250 mmf
C-3	20K74940	Variable ceramic: 7-45 mmf
C-4	20A74939	Variable ceramic: 5-25 mmf
C-5	21R2729	Mica: 250 mmf 500V
C-6	21A76320	Ceramic: 16 mmf
C-7	20K74940	Variable ceramic: 7-45 mmf
C-8	21R2730	Mica: 500 mmf 500V
C-9	8S9801	Paper: .05 mf 100V
C-10	8S9809	Paper: .01 mf 400V
C-11	8S9816	Paper: .05 mf 400V
C-12	8S9809	Paper: .01 mf 400V
C-13	21R6648	Mica: 250 mmf 500V
C-14	8S9801	Paper: .01 mf 100V
C-15	8S9816	Paper: .05 mf 400V
C-16	8S9816	Paper: .05 mf 400V
C-17	21R6641	Mica: 100 mmf 500V
C-18	8S9813	Paper: .005 mf 600V
C-19	21R6661	Mica: .004 mf 10% 300V
C-20	21R6661	Mica: .004 mf 10% 300V
C-21	23K77635	Electrolytic: 10 mf 100V
C-22	21R6648	Mica: 250 mmf 500V
C-23	8S9813	Paper: .005 mf 600V
C-24	8S9816	Paper: .05 mf 400V
C-25	8S9813	Paper: .005 mf 600V
C-26	8S9809	Paper: .01 mf 400V
C-27	8S9809	Paper: .01 mf 400V
C-28	23A27718	Electrolytic: 30-30-20 mf/350-300-25V
C-29	8S9813	Paper: .005 mf 600V
C-30	8S9816	Paper: .05 mf 400V
C-31	21R6642	Mica: 50 mmf 500V
C-32	19B72560	Variable: 2 gang
C-33	21R6642	Mica: 50 mmf 500V
C-34	20A71141	Mica Trimmer: 10-80 mmf
C-35	20A75234	Mica Trimmer: 10-80 mmf: with mounting bracket
C-36	21R2724	Mica: 1000 mmf 5% 300V
C-37	20A71141	Mica trimmer: 10-80 mmf
C-38	20A71226	Mica trimmer: 2-12 mmf: with mounting bracket
C-39	8S9813	Paper: .005 mf 600V
C-40	8S9806	Paper: .1 mf 200V
C-41	8S9807	Paper: .1 mf 400V
C-42	21A112247	Silver mica: 250 mmf

RESISTORS:

R-1	6R2109	10 meg 1/2w
R-2		
R-3	6R6013	1.5 meg 1/2w
R-4	6R6477	15,000 10% 1/2w
R-5	6R6313	22,000 10% 1w not Ins.
R-6	6R6410	33,000 10% 1/2w
R-7	6R6433	2.2 meg 10% 1/2w
R-8	6R5588	39,000 10% 1w
R-9	6R6301	1000 1/2w
R-10	6R6056	47,000 1/2w
R-11	6R6398	150,000 10% 1/2w
R-12	6R6397	22,000 10% 1/2w
R-13	6R6004	1 meg 1/2w
R-14	6R6397	22,000 10% 1/2w
R-15	6R6320	10,000 10% 1/2w
R-16	6R6446	4.7 meg 10% 1/2w
R-17	18K74891	Volume control & switch: 1 meg; tapped at 300K
R-18	6R6046	1 meg 10% 1/2w
R-19	6R3968	180 10% 2W
R-20	6R5621	10 10% 1/2w
R-21	6R6015	220,000 1/2w
R-22	6R6410	33,000 10% 1/2w
R-23	6R6000	68,000 1/2w
R-24	18A28062	Tone Control & Phono-Radio Switch;
R-25	6R6032	470,000 1/2w
R-26	6R6032	47,000 1/2w
R-27	6R6075	100,000 1/2w
R-28	6R3967	12,000 10% 3w Not Ins.
R-29	6R6028	22,000 1/2w
R-30	6R6032	470,000 1/2w
R-31		220 1/2w
R-32	6R6013	15,000 1w Not Ins.
R-33	17K77634	Wire wound: 2.7 1/2w
R-34	6R6075	100,000-1/2w

SWITCHES:

S-1	40B74864	Switch, band: 3 position
S-2	1X75820	Switch, push button: 6 button; with muting switch

COILS:

L-1	24A74989	Filament choke
L-2	24A74822	S. W. Antenna
L-3	24A74820	S. W. oscillater
L-4	24A74821	B. C. oscillator
L-5	1X76326	Loop Assembly, FM Band: with leads
	14A75142	Insulator, FM loop mtg: bakelite
L-6	24C75532	Loop Assembly, BC band: complete with leads and trimmer (95F33)
	24K76103	Same as above except for (95F31, 95F31B & 95F31M)
	29K19871	Plug, 4 pin (loop plug)

TRANSFORMERS:

T-1	24B75481	1st I.F.: 4.3 Mc; complete with iron cores and padding, capacitors, but less shield
T-2	24B75473	2nd I.F.: 4.3 Mc; complete with iron cores and padding capacitors but less shield
T-3	24B75456	Discriminator: 4.3 Mc; complete with iron cores and padding capacitors but less shield.
	26B70107	Shield, coil (for T-1, T-2, & T-3)
T-4	24B75487	I.F.: 455 Kc; complete with iron cores and padding capacitors but less shield
T-5	24B70537	Diode: 455 Kc; complete with iron cores and padding capacitors but less shield
	1A71049	Shield & Iron Core Sleeve Assembly (for T-4 & T-5)
T-6	25K74706	Output
T-7	25C75489	Power

SPEAKER:

	50B72379	Electrodynamic: 10"; 800 ohm field; 3.2 ohms V.C.

CHASSIS PARTS (HS-38 & HS-39)

	7A14684	Bracket, tuning shaft
	65X11854	Bulb: 6-8V, bayonet base; tubular; #47
	65X4151	Bulb: 6-8V, bayonet base; round; #51
	11M8944	Cord, dial: 18 lb; black yard
	30K21859	Cord, line: 9 ft. long; with plug
	1X76406	Dial Assembly: includes pointer rail with slider, 2 mtg. brackets, 5 cord pullies and 2 pilot light sockets (HS-38 chassis)
	1X76370	Dial Plate, Brackets & Pulleys Assembly: complete dial assembly, but less pointer, glass dial scale and dial scale rubber channel strips (HS-39 chassis)
	1X76402	Lead Assembly, phono pick up; with 1 pin plug; 42" long
	1X76366	Lead Assembly, speaker: includes receptacle
	32A24815	Lock, line cord: fibre
	9A12705	Plate, electrolytic capacitor mtg: bakelite
	28K71775	Plug, 1 pin (phono pick-up)
	52B71280	Pointer, dial (HS-38)
	52B74418	Pointer, dial (HS-39)
	1X76393	Pulley Assembly: two 1-5/16" pulleys on brass bushing (tuner shaft)
	49A23960	Pulley, cord: 1/4 groove (cord guide)
	49A21552	Pulley, cord: 1/2 groove (cord guide)
	49A21741	Pulley, cord: 3/8 groove (cord guide)
	9A30680	Receptacle, 3 prong (on phono power cord)
	9K28049	Receptacle, 4 prong (loop receptacle)
	34C77423	Scale, dial: glass (HS-39 chassis)
	1X76352	Shaft Assembly, tuning
	26A26283	Shield, tube
	9A74416	Socket, pilot light (HS-38 chassis)
	9A72747	Socket, pilot light (HS-39 chassis)
	60K75432	Socket, pilot light: with clip & leads (HS-39-on cabinet)
	9A6788	Socket, tube: molded octal; plain type
	9A70165	Socket, tube: molded octal; shielded type
	9A72519	Socket, tube: molded loctal
	41A21332	Spring, tension coil (string drive)
	37K21114	Strip, channel: rubber; 1" long (dial scale mtg. on chassis HS-39)
	32A27678	Strip, shaft bearing: fibre (for band sw.)
	31A14424	Strip, terminal: 1 insulated lug, #2 mtg.
	31A15433	Strip, terminal: 1 large insulated lug, #2 mtg.

31A14656	Strip, terminal: 3 insulated lugs, #3 mtg.	
31A75232	Strip, terminal: 4 insulated lugs, #3 mtg.	
31A75233	Strip, terminal: 7 insulated lugs, #1 & 9 mtg.	
39A24624	Wiper, tube base grounding	

MISC. CHASSIS HARDWARE:

42A5480	Clip, grid: small
4S7655	Lockwasher: 3/8 internal; cadmium plated (band switch mounting)
2S7018	Nut: 3/8-32 x 1/2 hex; cadium plated (band switch mtg.)
2S7051	Nut: 3/8-32 x 9/16; hex palnut; cadmium plated (volume & tone control mtg.)
5A12814	Rivet, shoulder: 5/32 long (cord pulley mtg.)
5K74560	Rivet, shoulder: 5/16 long (cord pulley mtg.)
5A71246	Rivet, shoulder; 3/16 long (cord pulley mtg.)
3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (coil mtg.)
3S7454	Screw: #8 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (general mtg.)
3S7467	Screw: #8 x 3/8 PKZ plain hex head sheet metal screw (trans. mtg.)
3S7481	Screw: #8 x 3/4 PKZ slotted hex head sheet metal screw: cadmium plated (tuner mtg.)

NOTE :- A V.T.V.M. WAS USED TO MAKE MEASUREMENTS. IF A 20,000 OHM PER VOLT METER IS USED ALL GRID & AVC VOLTAGES WILL READ LOWER.

MEASUREMENTS ARE MADE FROM TUBE BASE PIN TERMINALS TO CHASSIS.

VOLUME CONTROL ON FULL.

VOLTAGE TOLERANCE ± 10%.

RESISTANCE TOLERANCE ± 20%.

△ BAND SWITCH IN BC POSITION; BAND SWITCH IN F.M. POSITION FOR ALL OTHER MEASUREMENTS.

PHONO RADIO SWITCH IN RADIO POSITION.

* = MEASUREMENTS MAY VARY DUE TO ELECTROLYTIC CAPACITOR IN CIRCUITS.

K = 1000 (ONE THOUSAND) OHMS.

▭ = RESISTANCE MEASUREMENTS.

◗ = VOLTAGE MEASUREMENTS.

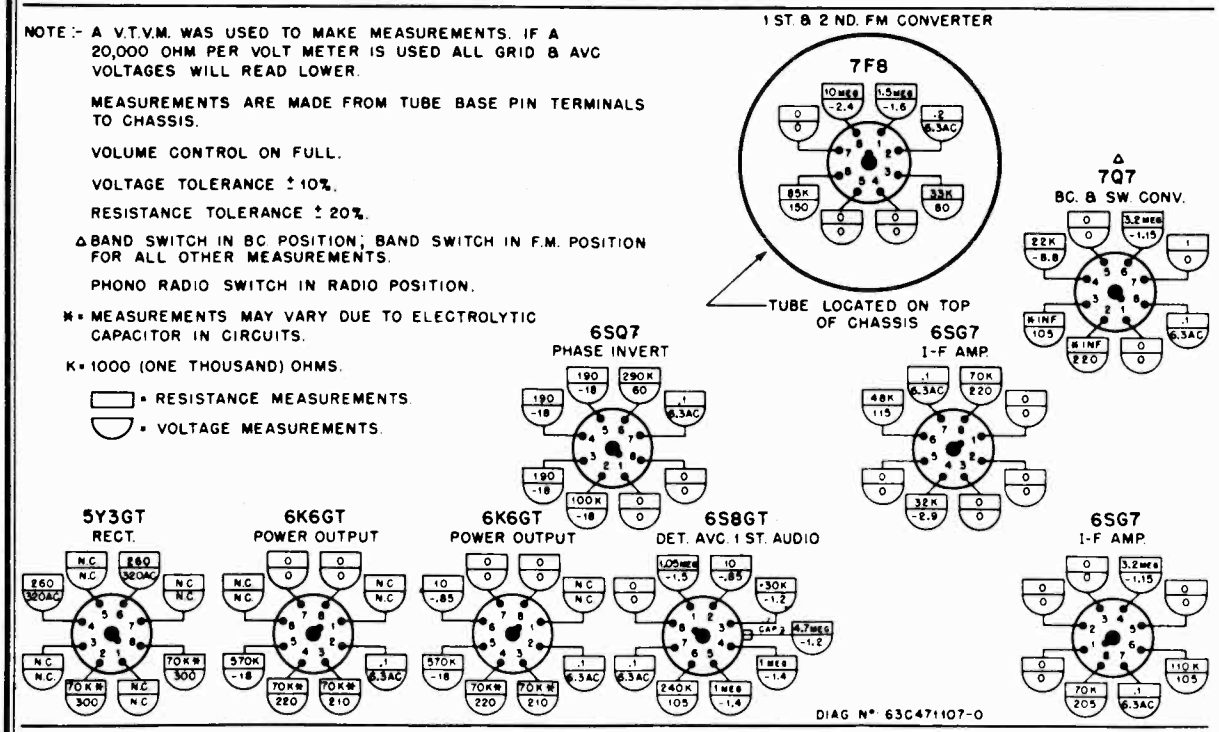

FIGURE 14. VOLTAGE AND RESISTANCE DIAGRAM

BLOCK DIAGRAMS OF RECEIVER FUNCTIONS

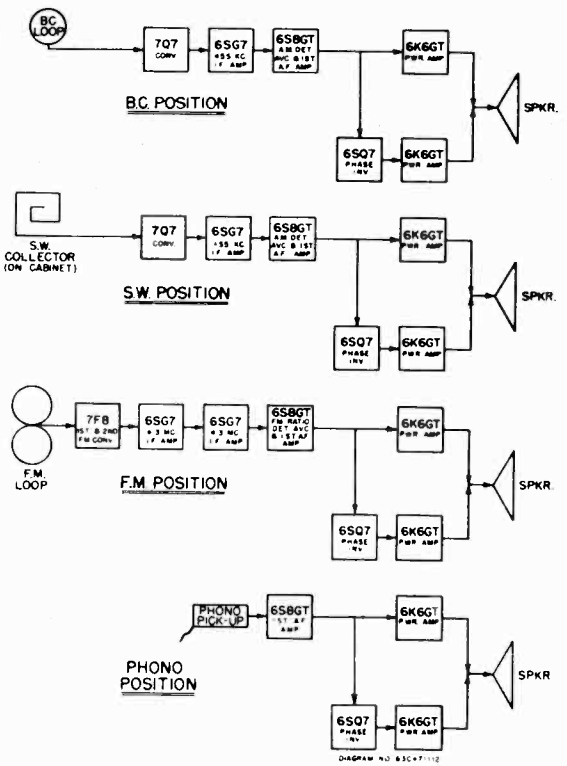

FIGURE 15 BLOCK DIAGRAMS

MODELS 95F31, 95F33,
CHASSIS HS-38; 95F31B,
95F31M, CHASSIS HS-39

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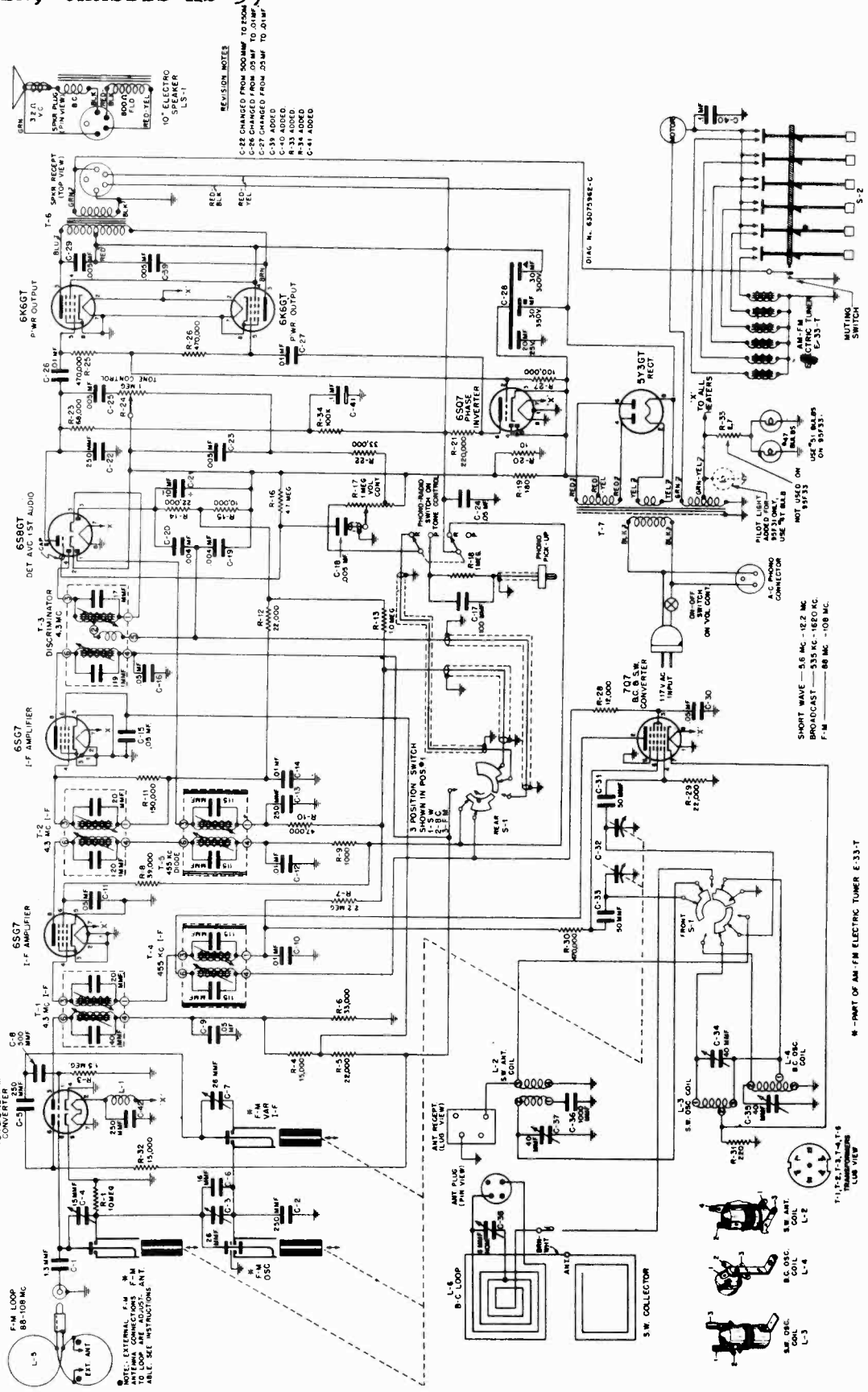
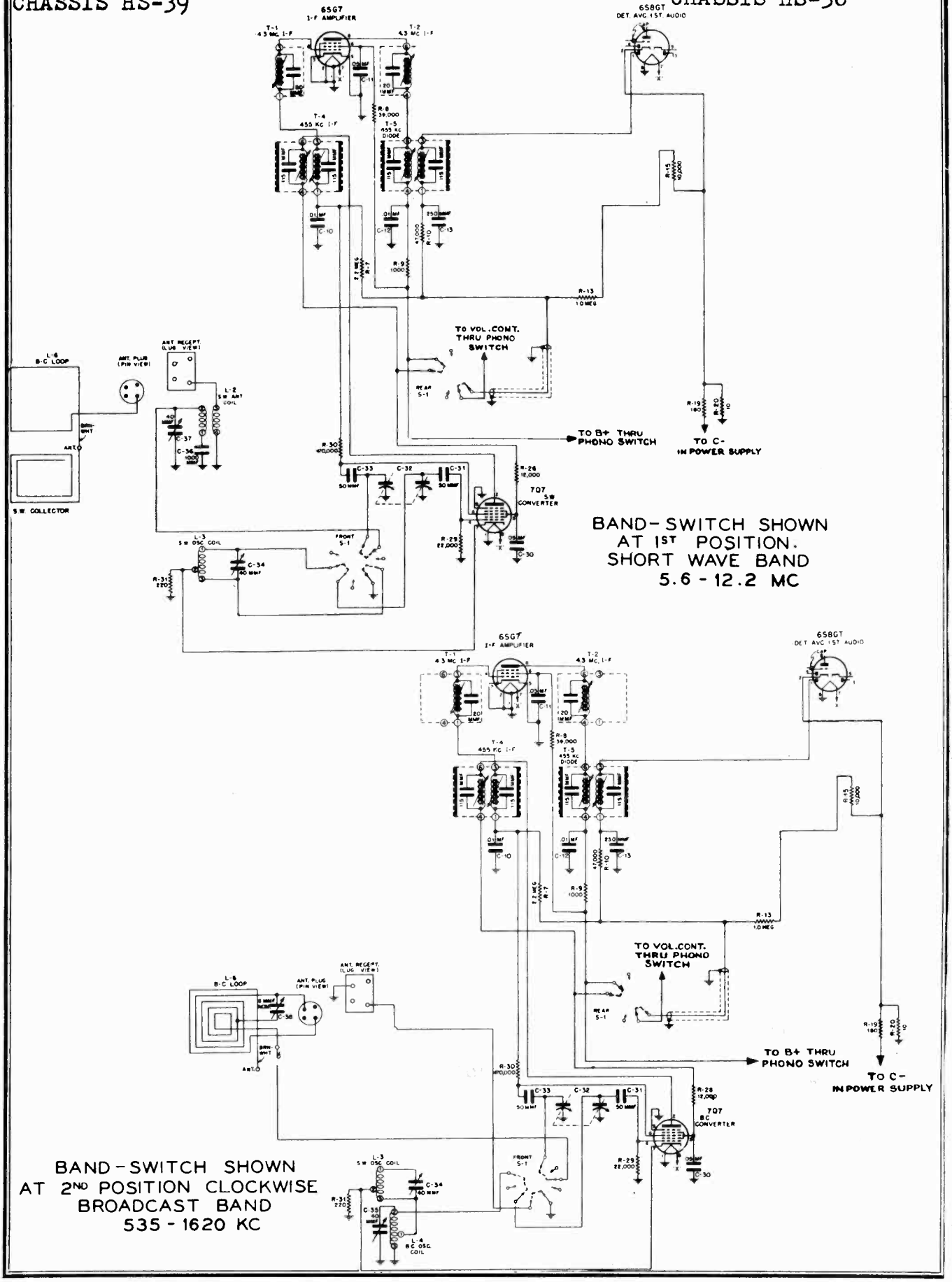


FIGURE 16. COMPLETE SCHEMATIC DIAGRAM

MODELS 95F31B, 95F31M, CHASSIS HS-39

MOTOROLA INC.

MODELS 95F31, 95F33, CHASSIS HS-38



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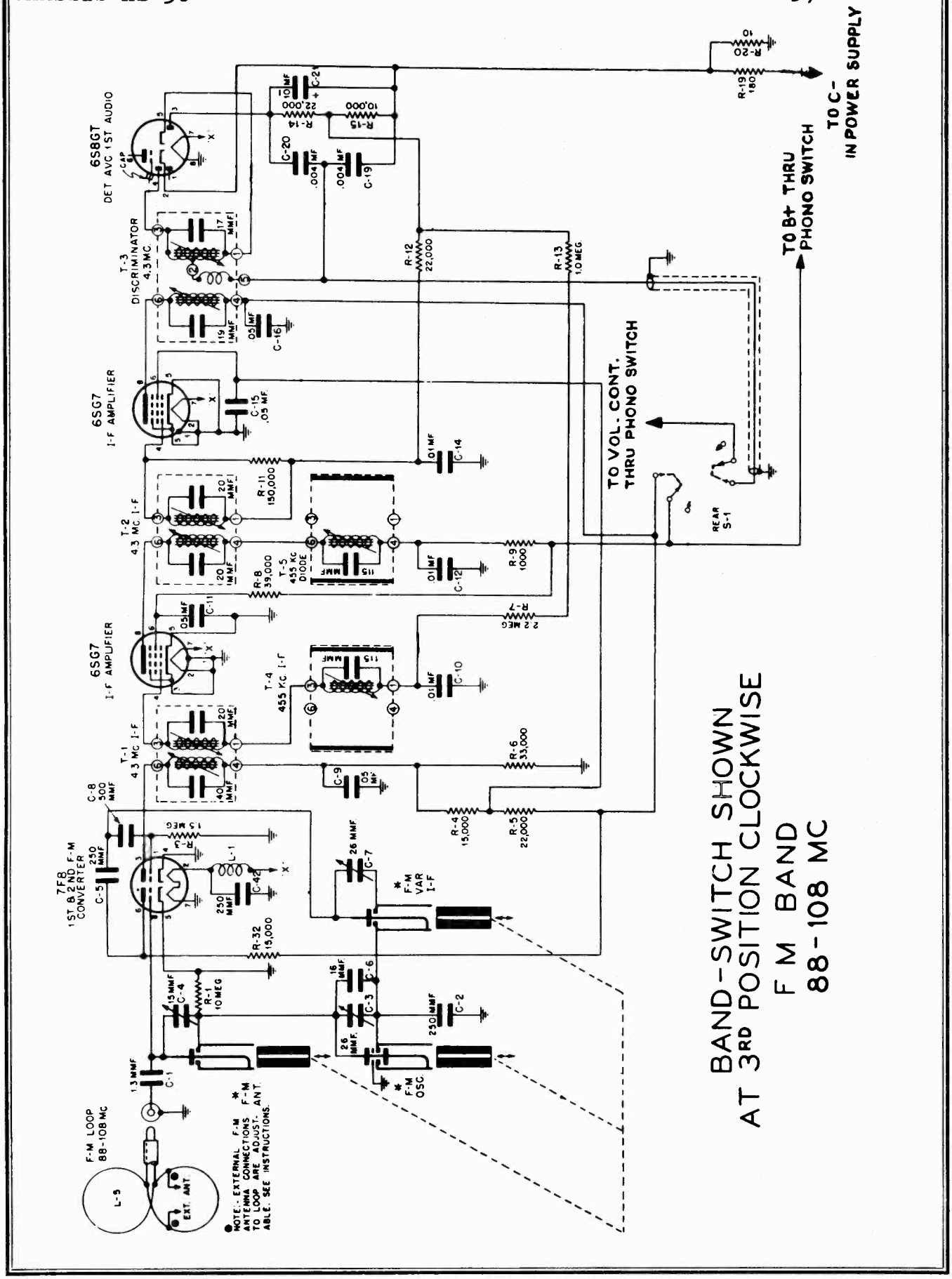
MODELS 95F31, 95F33, CHASSIS HS-38

MOTOROLA INC.

MODELS 95F31B, 95F31M, CHASSIS HS-39



MODEL E-33-T AM-FM TUNER

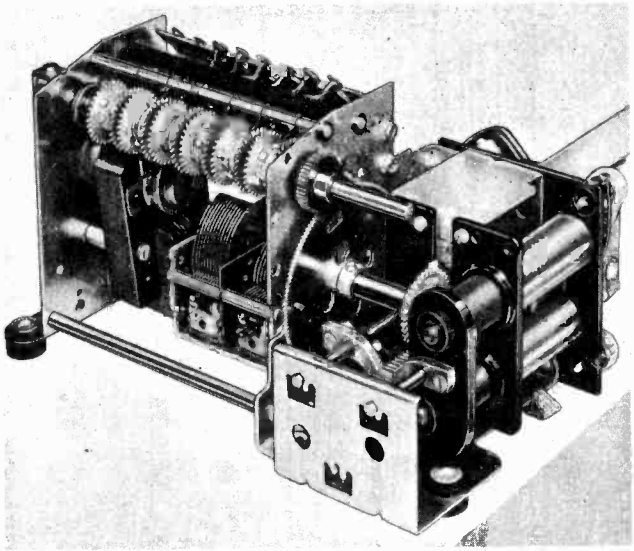


FIGURE 17. MODEL E-33-T FM-AM TUNER

Figure 17 shows the complete AM-FM Tuner E-33-T.

THEORY OF THE FM TUNER

Referring to the functional schematic diagram in Fig. 18, the triode T1 serves both as an oscillator and first converter, and triode T2 serves as the second converter. Oscillator voltage injection for the second converter is obtained through the coupling capacitor from the plate of T_1. T_1 and T_2 are sections of the 7F8 twin-triode tube.

The frequency relationships are given in Fig. 18. The oscillator F_0 beats with the incoming signal F_s to produce the first intermediate frequency F_1, which is variable. F_1 then beats with the same oscillator frequency F_0 in the second converter to produce the second intermediate frequency F_2 which is 4.3 mc. With a 100 mc signal the oscillator frequency is 47.85 mc and the variable intermediate frequency is 52.15 mc.

This system of reception permits the oscillator to be resonated with a high capacitance, 250 micromicrofarads in this case. Consequently, changes in the tube characteristics during warm-up do not produce objectionable changes in oscillator frequency. This contributes materially to the stability of the system.

The actual FM tuner schematic is shown in Figure 19.

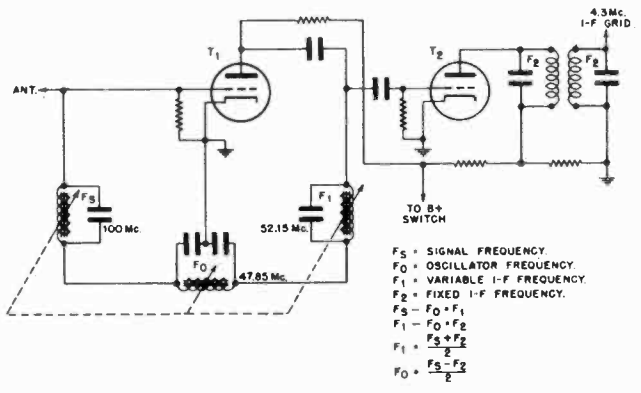


FIGURE 18. FUNCTIONAL SCHEMATIC DIAGRAM OF FM TUNER

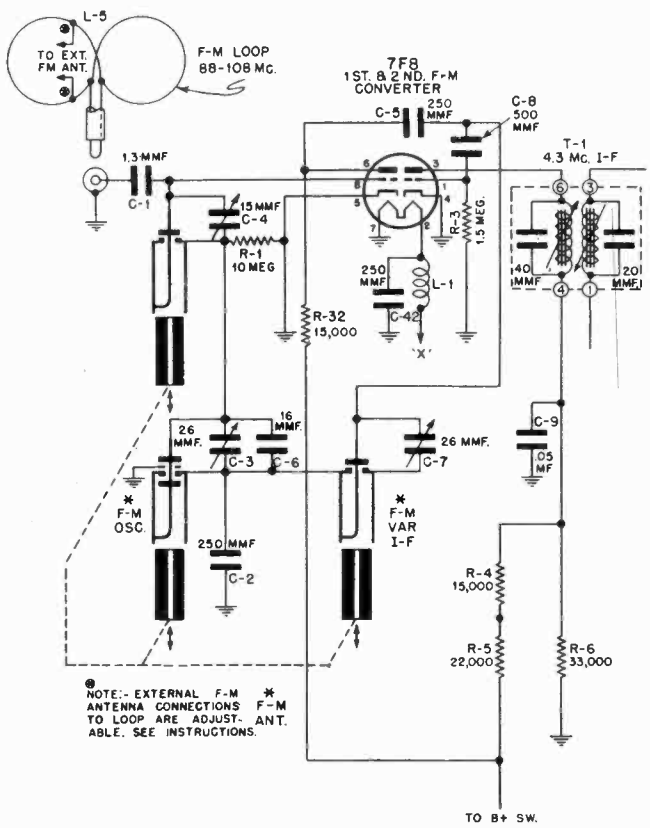


FIGURE 19. SCHEMATIC DIAGRAM OF COMPLETE FM TUNER

E-33-T MOTOROLA INC. MODELS 95F31, 95F33, CHASSIS HS 38; 95F31B, 95F31M, CHASSIS HS-39

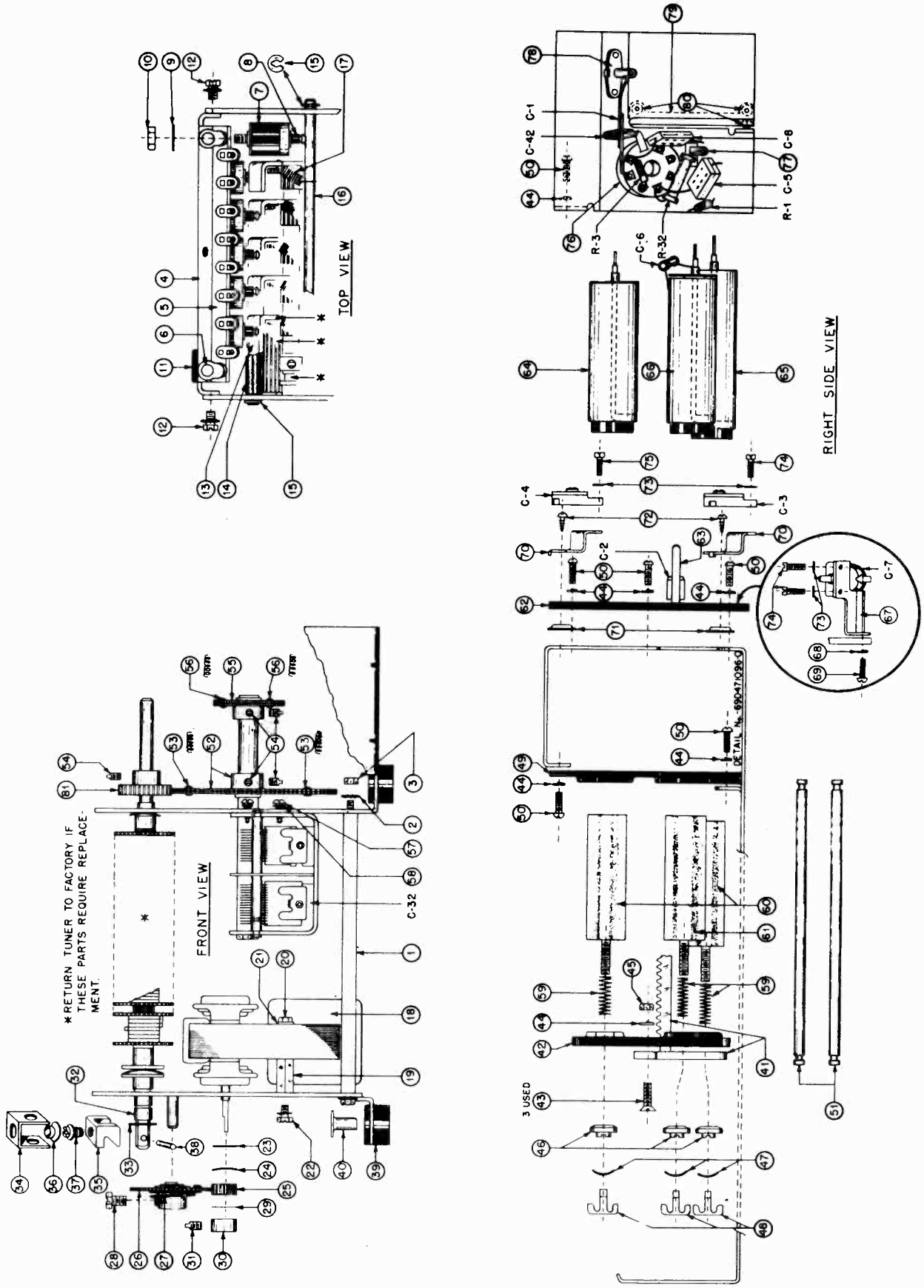


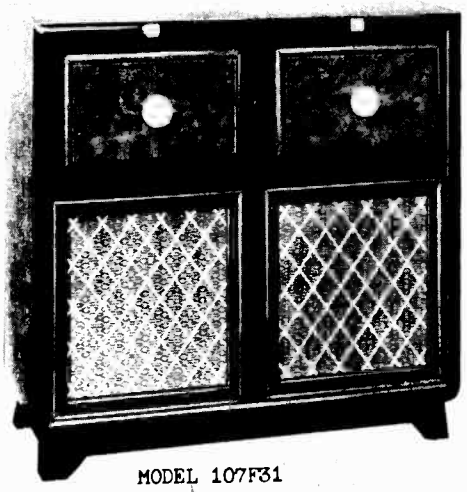
FIGURE 20. MODEL E-33-T FM-AM TUNER PARTS LOCATION

MODELS 95F31, 95F31B, 95F31M, 95F33 — MOTOROLA INC. — E-33-T

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS:		
C-1	21A75479	Special: 1.3 mmf.
C-2	21A112247	Silver mica: 250 mmf.
C-3	20K74940	Variable ceramic: 7-45 mmf.
C-4	20A74939	Variable ceramic: 5-25 mmf.
C-5	21R2729	Mica: 250 mmf 500V
C-6	21A76320	Ceramic: 16 mmf.
C-7	20K74940	Variable ceramic: 7-45 mmf.
C-8	21R2730	Mica: 500 mmf 500V
C-32	19B72560	Variable; 2 gang
C-42	21A112247	Silver mica: 250 mmf.
RESISTORS:		
R-1	6R2109	10 meg 1/2w Ins.
R-3	6R3966	1.5 meg 1/2w Ins.
R-32	6R6013	15,000 1w N.I.
1	45A21419	Rod, tie: threaded
2	4S7651	Lockwasher: #8 internal
3	2S7007	Nut: 8-32 x 1/4 hex.
4	1X76383	Magnet Assembly: 6 electromagnets mounted on channel; with terminal
5	31A74480	Strip, terminal: 8 insulated lugs, #1 & 10 mtg.
6	5S7707	Rivet: .122 x 5/32 steel
7	1K75593	Magnet Assembly: single electromagnet
8	37A22059	Bumper, armature: rubber
9	4S7562	Washer: 7/16 x .187 x .033 thick
10	2S7009	Nut: 10-32 x 3/8 hex.
11	37A22664	Grommet: for 7/16" hole
12	3S7205	Lockscrew: 8-32 x 1/4 slotted hex head
13	46K75519	Rod, stop
14	11M9504	Sleeving: #4 black
15	4A21577	Washer, "C" spring
16	46A21765	Rod, stop: grooved
17	41A22507	Spring, armature
18	59B75421	Motor, tuner
19	2K75462	Nut: hex; .594 long; 6-32 thread (motor spacer)
20	3S2927	Screws: 6-32 x 7/8 slotted hex head machine screw
21	4S7650	Lockwasher: #6 internal
22	3S7350	Lockscrew: 6-32 x 1/4 slotted hex head
23	4A21409	Washer (clutch)
24	4A21408	Washer, spring (clutch)
25	44A21417	Pinion, clutch
26	1X21576	Gear & Hub Assembly
27	41A22471	Spring, cushion
28	3S7163	Screw: 8-32 x 1/4 slotted hex head machine screw
29	14A21424	Washer, fibre: 7/16 x .130 x .010 thick
30	43A21407	Bushing, clutch retaining
31	3S7114	Setscrew: 8-32 x 3/8 slab head
32	43K21412	Bushing, spacer
33		Washer
34	42A10982	Yoke, retainer
35	42A10981	Yoke, cam
36	5S7818	Eyelet: .135 x .288
37	3A10990	Screw, yoke lock
38	47A11004	Pin, drive shaft
39	37K15125	Grommet, tuner mounting
40	5A12105	Eyelet, mounting
41	44B72706	Rack, drive gear: die cast
42	64B72707	Plate, core mounting: bakelite
43	3S7184	Screw: 6-32 x 1/2 slotted flat head machine screw
44	4S2619	Lockwasher: #6 split
45	2S7005	Nut: 6-32 x 1/4 hex
46	2A72726	Nut, swivel
47	4A74936	Washer, spring
48	42A72725	Clip, swivel nut
49	64B72704	Plate, front mounting: bakelite
50	3S7185	Screw: 6-32 x 3/8 slotted round head machine screw
51	47B72712	Rod, guide
52	1X76389	Split Gear & Bushing Assembly (large)
53	41A4547	Spring, coil
54	3S7100	Setscrew: 8-32 x 5/16 slabhead
55	1X76390	Split Gear & Bushing Assembly (small)
56	41A76498	Spring, coil
57	3S7156	Screw: 6-32 x 3/16 slotted binder head machine screw
58	4S7666	Lockwasher: #6 external
59	41A74880	Spring, core tension
60	46A71749	Core, iron (ant. & Var.I.F.)
61	46K76172	Core, iron (with paint dot) (osc.)
62	1X76388	Rear Mounting Plate & Lug Assembly: bakelite plate with soldering lug
63	29R3005	Lug, soldering
64	24C75492	Inductor, VHF (Ant.): 2-1/2" long
65	24K75494	Inductor, VHF (I.F.): 2-3/4" long
66	24K75496	Inductor, VHF (Osc.): 2-5/8" long
67	7A74712	Bracket, trimmer mounting
68	4S8412	Lockwasher: #4 split
69	3S1937	Screw: 4-40 x 5/16 slotted round head machine screw
70	7A74711	Bracket, trimmer mounting
71	2A74710	Nut, Tinnerman (#4 PKZ)
72	3S3356	Screw: #4 x 5/16 PKZ slotted round head sheet metal screw
73	4A74884	Washer, trimmer: fibre
74	3S1525	Screw: 3-48 x 3/8 slotted fillister head machine screw
75	3S2975	Screw: 3-48 x 5/16 slotted fillister head machine screw
76	9K75544	Socket, tube: loctal
77	31A81399	Strip, terminal: 1 insulated lug; #1 mtg.
78	9A54664	Receptacle, ferrule: 1 prong
79	15A74714	Cover, tuner (rear)
80	3S8175	Screw: #4 x 3/16 PKZ slotted hex head sheet metal screw
81	44A21873	Pinion: gang drive

MODELS 107F31, 107F31B, CHASSIS HS-87

MOTOROLA INC.



MODEL 107F31

MODEL 107F31B

IF FREQUENCY - 4.3 Mc (FM)
455 Kc (BC & SW)

TUNING RANGE - BC - 535 to 1620 Kc
SW - 5.6 to 12.2 Mc
FM - 88 to 108 Mc

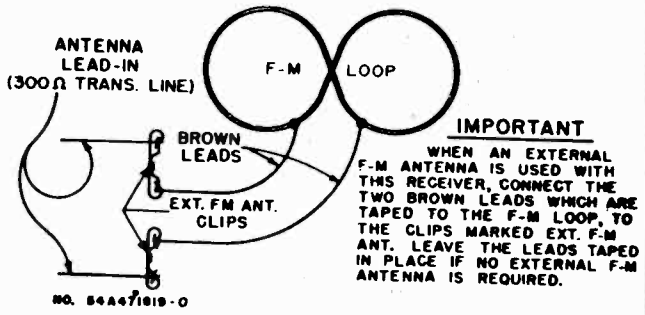


FIGURE 1. FM LOOP ANTENNA

POWER SUPPLY - 117 Volts, 60 cycles, 130 watts (with record changer)

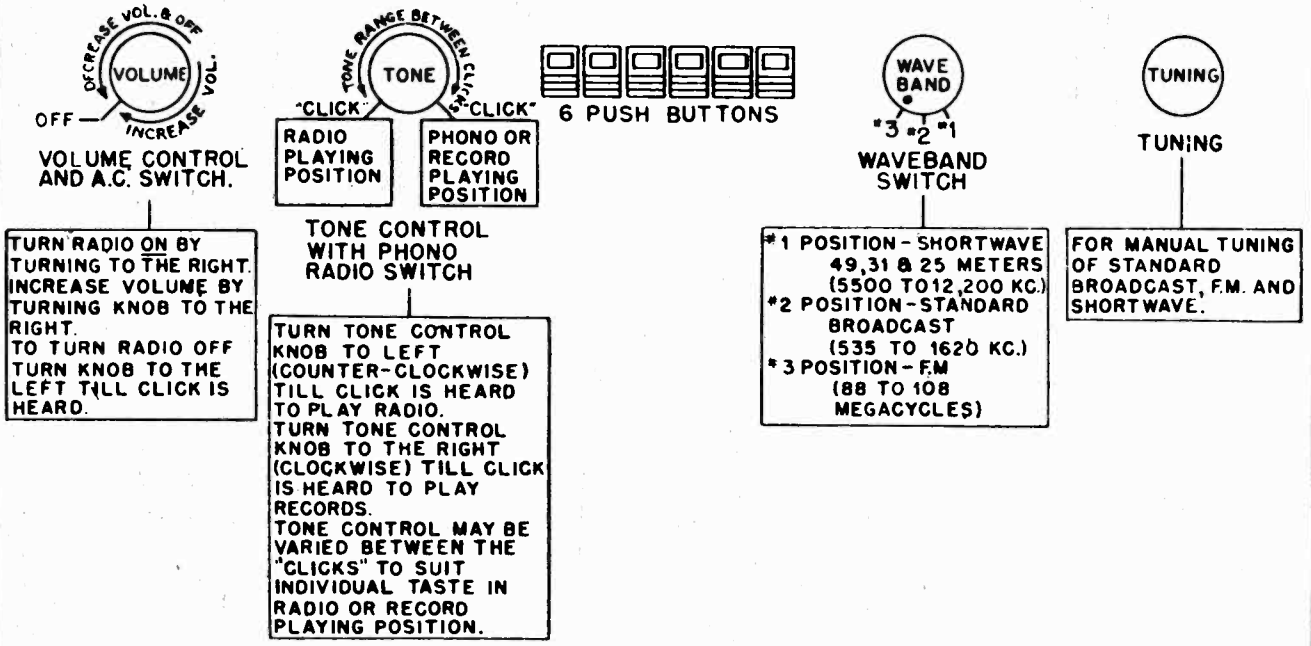


FIGURE 3. CONTROLS

MOTOROLA INC. MODELS 107F31, 107F31B, CHASSIS HS-87

INSTRUCTIONS FOR SETTING AUTOMATIC TUNER PUSH BUTTONS

1. Turn the radio ON and allow it to warm up for a period of at least fifteen minutes.

2. While waiting for the radio to warm up, loosen the tuner locking screw (A) all the way. The locking screw is accessible from the rear of the cabinet. (See Figure 12.)

3. Make a list of the frequencies of the local stations you wish to tune in automatically. It is recommended that you select the most powerful stations only.

4. Turn the band switch to FM or BC position, depending on the station being set up, and carefully tune in the first station.

NOTE: The buttons may be used on either BC, FM or any combination of AM and FM. BE SURE TO SET THE BAND SWITCH ON THE PROPER BAND!

5. Adjust a signal generator to zero beat with the station.

NOTE: While it is advisable to use a signal generator for accuracy, it is not an absolute necessity. The station signal may be used.

6. Tune to the desired station or to the signal generator, with the tuning knob.

7. Holding the tuning knob, push the selected button and HOLD IN UNTIL THE MOTOR STOPS.

8. Repeat Steps 6 and 7 for each of the buttons.

9. Carefully tighten the tuner locking screw (A).

10. Check the setting of the button by tuning in the station manually, then push the button set for that station; no effect on volume or tone should be noticed. If not correctly set, readjust--following Steps 4 through 9.

FM SERVICE NOTES

In some cases, people are not tuning FM sets properly. FM is more difficult to tune than AM, although Motorola receivers are easier than most. There are three peaks present; the center peak, which is the correct one, is hard to locate. The peaks on either side of the center are slightly distorted. If you get a distorted peak on only one side of the center, the discriminator is probably out of alignment.

Some people expect too much of FM. You cannot expect great distance. The horizon, as viewed from the transmitting antenna, is the normal service area. Many FM stations are now operating on low power, waiting for new equipment. Reception will improve greatly when power is increased. Most of the bad reports have come from the fringe areas. In many cases, reception can be improved by using a dipole antenna, mounted as high above the roof as possible, and aimed directly at the station.

Location of the radio is important when it is operated on its built-in loop antenna. Moving the set even a few feet away from its present location may increase or reduce signal strength by more than 50% because a stronger signal may exist at one location than another. Therefore, in homes where reception is poor, you may be able to improve it by placing the set against another wall. The Motorola figure 8 loop antenna is omnidirectional.

Motorola FM sets use a relatively new circuit known as the Ratio Detector, instead of the usual limiters. The following paragraph of explanation is quoted from the R.C.A. License Laboratory Bulletin:

"Since a circuit of this type is relatively immune to amplitude modulation, it is unnecessary to precede it by a limiter stage. Also, since its immunity is not a direct function of the signal strength, there is no threshold action of the type encountered where limiters are employed."

It has been thought, erroneously, that the use of limiters in an FM receiver is imperative for proper reception. This is not the case. In this connection, it is important to understand that a limiter requires several volts at its grid to become effective. If the received signal strength is too weak to provide the required voltage at the limiter grid, the limiters do not function. This means that below a certain threshold of signal level, the limiters do not work and, as a result, do not contribute to amplitude (noise) rejection. Furthermore, noise voltages are not purely amplitude modulated, but contain frequency modulated components against which no amplitude rejection device will discriminate.

From the above comparison, you can see that there is little, if any, difference between the two circuits, insofar as noise reception is concerned. In either case, low signal levels from the FM stations will result in noise reception, if there is any noise in the neighborhood.

The main advantages of ratio detection, as used in Motorola FM are, first, very little in-between station noise, and second, easier tuning because the side peaks are slightly subdued (as compared to the limiter type of receiver), making it easier to find the center peak.

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ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment.

Use an insulated screwdriver when adjusting the FM tuner trimmers.

A special wrench for adjusting the slotted nuts on the tuner cores will be required. You can easily fabricate one from a Motorola auto set Volume Control Shaft and Coupling Assembly (Part Number 1870847, $.30 list) by simply spreading out the forked ends and filing to fit. Solder the assembly together to make it rigid.

An AM (30% amplitude modulated) signal generator covering the frequencies shown in Alignment Chart I, is used to align the broadcast and short wave and FM bands. A low range output meter, connected across the speaker voice coil, is used as an output indicator.

The broadcast and short wave band alignment is conventional; instructions are given in the following alignment chart.

The FM band alignment can be satisfactorily performed by following the instructions in the chart. When properly aligned, the discriminator does not respond to amplitude modulation and since an AM type signal generator is used for aligning the FM circuits, it is necessary to detune the discriminator secondary and leave it that way until all of the FM circuits have been aligned. After completing the alignment of the FM circuits, proceed to align the discriminator secondary by applying a 4.3 Mc AM signal to the control grid of the 2nd FM converter tube and adjusting the discriminator secondary core for minimum audio output. No adjustment of the FM circuits should be attempted with AM after the discriminator secondary has been properly aligned.

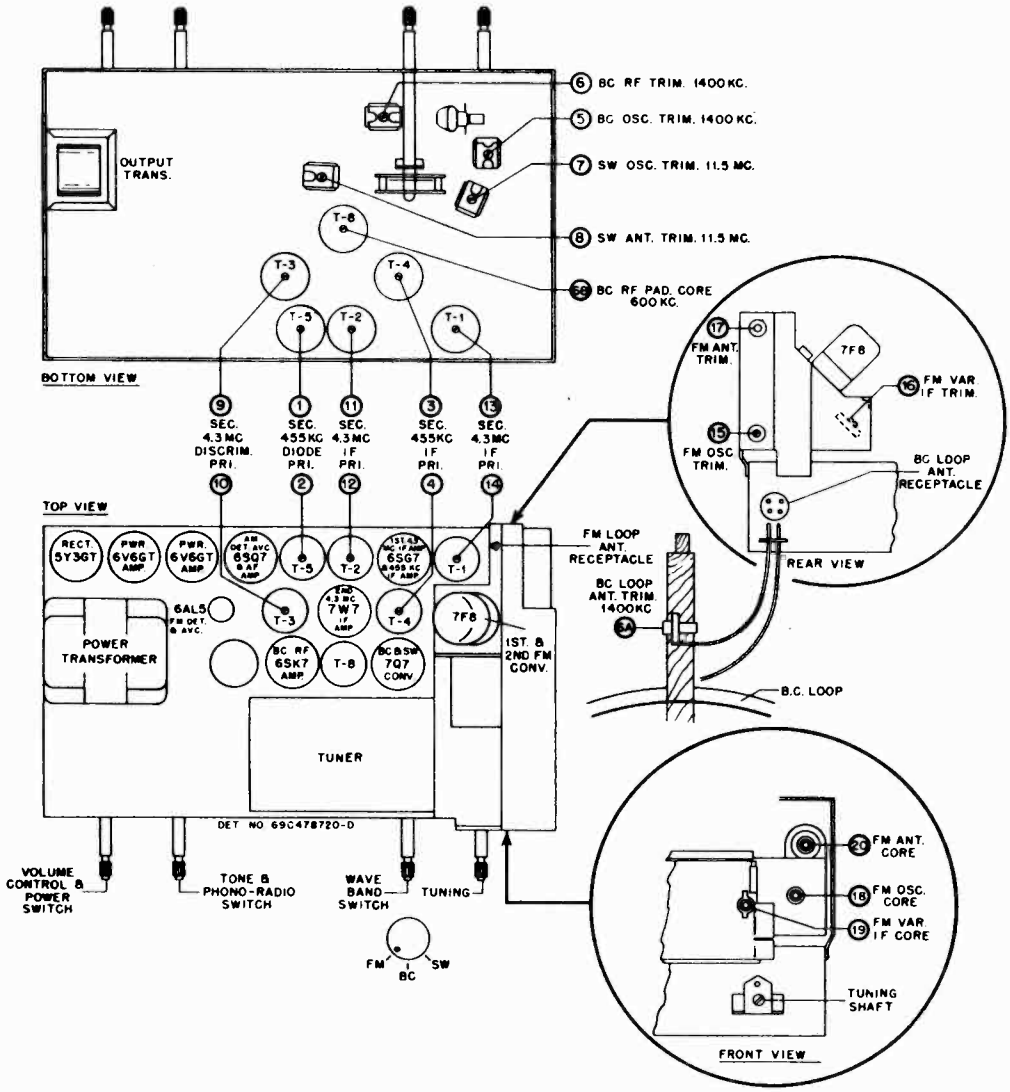

FIGURE 7. TUBE & TRIMMER LOCATIONS

CHART 1. ALIGNMENT PROCEDURE WHEN USING AM MODULATED SIGNAL GENERATOR AND STANDARD OUTPUT METER FOR COMPLETE ALIGNMENT

Refer to Figure 7 for location of all adjustment trimmers and cores.

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
455 Kc IF CHANNEL ALIGNMENT							
1.	1620 Kc (gang fully opened)	BC	.1 mf	7Q7 BC & SW Conv. Grid (Pin #4) & Chassis	455 Kc	1,2,3 & 4	Adjust for maximum output.
BROADCAST BAND ALIGNMENT							
2.	1400 Kc	BC	.1 mf	7Q7 BC & SW Conv. Grid (Pin #4) & Chassis	1400 Kc	5(BC Osc. Trim)	This sets oscillator to dial. With gang fully meshed, pointer should be at last mark on dial; then set to 1400 Kc and set oscillator.
3.	1400 Kc	BC	None	Radiation Loop *	1400 Kc	6 & 6A (BC RF & Loop Antenna Trimmers)	Adjust for maximum output.
3A	NOTE: The inductance of the BC RF transformer (T-6) is set at time of manufacture by adjusting iron core (6B). No resetting of this core should be made unless it has been tampered with. If so, readjustment can be made as follows: Tune in 600 Kc signal and peak RF pad core (6B). Next tune in 1400 Kc signal and peak trimmer (6). Repeat both adjustments until maximum response is obtained at both ends; the last adjustment should be trimmer (6).						
SW. BAND ALIGNMENT							
4.	11.5 Mc	SW	.1 mf	7Q7 BC & SW Conv. Grid (Pin #4) & Chassis	11.5 Mc	7(SW Osc. Trim)	This sets osc. to dial. Make sure osc. is higher in frequency than the signal by checking image response which should occur with the input signal at 12.41 Mc.
5.	11.5 Mc	SW	50 mmf	SW Ant. Terminal and Chassis	11.5 Mc	8(SW Ant. Coil Trim)	BC loop plug should be disconnected. Adj. for maximum output.
4.3 Mc IF CHANNEL ALIGNMENT							
6.						9(Disc. Sec.)	Detune discriminator secondary by screwing core out as far as it will go.
7.	Extreme high freq. end.	FM	.001 mf	7F8 2nd FM Converter Grid (#1 Pin) & Chassis	4.3 Mc	10, 11, 12, 13 & 14 (4.3 Mc IF)	Adjust for maximum output.
FM BAND ALIGNMENT							
8.						18 (FM Osc. Core)	Check the position of the FM Osc. tuning core 18. Set spacing between the core and bakelite piece to which it is mounted, to 1/32" by turning tuning core slotted nut.
9.	90 Mc	FM	None	FM loop antenna receptacle and chassis; remove FM loop.	90 Mc	15,16 & 17 (FM Osc., Ant. & Variable IF Trim)	Adjust for maximum output.
10.	105 Mc	FM	None	FM loop antenna receptacle and chassis; remove FM loop	105 Mc	18,19 & 20 (FM Osc., Ant. & Variable IF cores)	Adjust for maximum output
11.							Repeat steps 9 and 10 several times until further adjustment does not increase the output. Make the final trimmer adjustment at 106 Mc (i.e., trimmers 15, 16 and 17 at 106 Mc.)
12.	105 Mc	FM	None	Radiation Loop *	105 Mc	17 (FM Ant. Trim)	Adjust for maximum output with FM loop antenna connected.
ALIGN DISCRIMINATOR SECONDARY							
13.		FM	.001 mf	7F8 2nd FM Converter Grid (#1 Pin) & Chassis	4.3 Mc	9 (Disc. Sec.)	Adjust discriminator secondary for minimum response. The correct adjustment is the sharply defined minimum response point between the two peaks.

* Connect output of signal generator to a 6" diameter, 3 turn loop & radiate signal into receiver loop. Minimum distance between loops should never be less than 12".

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CHART II. ALIGNMENT PROCEDURE WHEN USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Refer to Figure 7 for location of all adjustment trimmers and cores.

STEP OPERATION

455 Kc IF Channel Alignment

1. Same as Step 1 in Chart I (Use AM signal generator)

Broadcast Band Alignment

2. Same as Steps 2, 3 & 3A in Chart I (Use AM signal generator)

SW Band Alignment

3. Same as Steps 4 & 5 in Chart I (Use AM signal generator)

4.3 Mc IF Channel Alignment Using FM Signal Generator & Oscilloscope

4. (A) Discriminator -
   1. Connect the input terminals of the oscilloscope vertical amplifier to the high side of the receiver volume control and the chassis.
   2. Connect the FM generator synchronizing voltage output terminals to a phase shifting network, consisting of a variable 1/2 megohm resistor in series with a .002 mf capacitor. The input to the oscilloscope horizontal amplifier is connected across the .002 mf capacitor. See Figure 8. (This phase shifting network may not work with every oscilloscope. Different values of R & C may be required.
   3. Apply an FM 4.3 Mc signal (125 Kc deviation) through a .01 mf capacitor to the control grid (pin #4) of the 7W7 tube in the second IF amplifier stage.
   4. Screw discriminator secondary core (9) out as far as it will go.
   5. Adjust discriminator primary (10) until the pattern obtained on the scope is symmetrical about the vertical axis. The phase shifting network resistor is adjusted to give only one trace. The pattern obtained is the resonance curve of the primary, whose maximum response should be at exactly 4.3 Mc. (See Figure 9).
   6. Adjust discriminator secondary (9) until a symmetrical pattern is obtained, with peaks occurring at about 100 Kc above and below 4.3 Mc and is substantially linear between peaks. The trace should pass through the intersection of the vertical and horizontal axis. The phase shifting network should be adjusted to give only a single pattern at all times. (See Figure 10).

   (B) 4.3 Mc IF Amplifiers -
   1. Apply an FM 4.3 signal (100 Kc deviation) to the control grid (pin #4) of the 6SG7 tube in the 1st IF amplifier stage, through a .001 mf capacitor and adjust both primary and secondary cores (11 & 12) to get a symmetrical pattern as before, with peaks occurring at a slightly lower deviation.
   2. Apply an FM 4.3 signal (100 Kc deviation) to the control grid (pin #1) of the 7F8 tube, and adjust both primary and secondary cores (13 & 14) until a symmetrical pattern substantially linear between peaks, is obtained.

FM Band Alignment

5. Check the position of the FM oscillator tuning core (18). Set the spacing between the core and the bakelite piece to which it is mounted, to 1/32" by turning tuning core slotted nut.

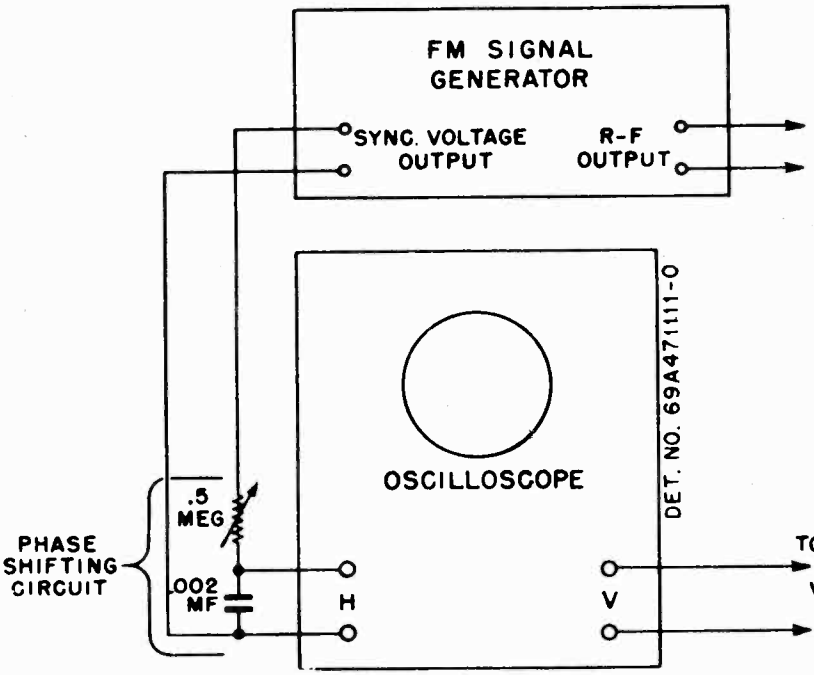
6. Remove the FM loop and connect generator output directly to the receiver FM loop receptacle.

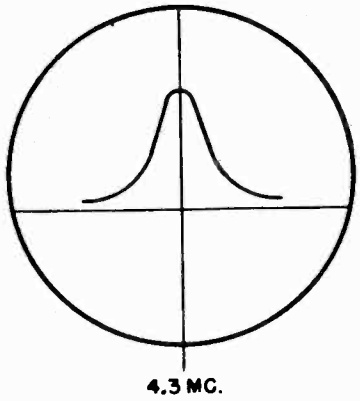
7. Set receiver dial to 90 Mc and also FM signal generator to 90 Mc (22-1/2 Kc deviation). Adjust FM oscillator, antenna and variable IF trimmers (15, 16 & 17) for maximum indication on output meter. (Output meter should be connected across speaker voice coil.)

8. Set receiver dial to 105 Mc and also FM signal generator to 105 Mc (22-1/2 Kc deviation). Adjust FM oscillator, antenna and variable IF cores (18, 19 & 20) for maximum indication on output meter.

9. Repeat Steps 7 and 8 several times until further adjustment does not increase the output. Make the final trimmer adjustment at 105 Mc. (i.e., trimmers 15, 16 & 17 at 105 Mc).

10. Connect FM loop antenna to receiver receptacle. Radiate an FM 105 Mc (22-1/2 Kc deviation) signal into FM loop. Set receiver dial to 105 Mc and adjust trimmer (17) for maximum.

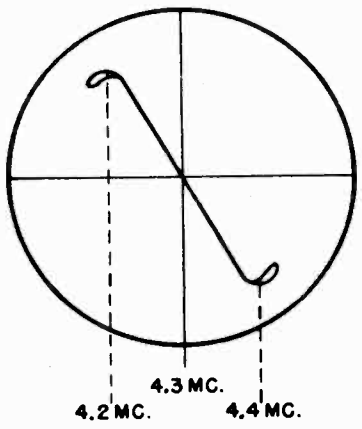




PATTERN WITH DISCRIMINATOR PRIMARY (10) CORRECTLY ADJUSTED

FIGURE 9

FIGURE 8. SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP



PATTERN WITH DISCRIMINATOR SECONDARY (9) CORRECTLY ADJUSTED.

FIGURE 10

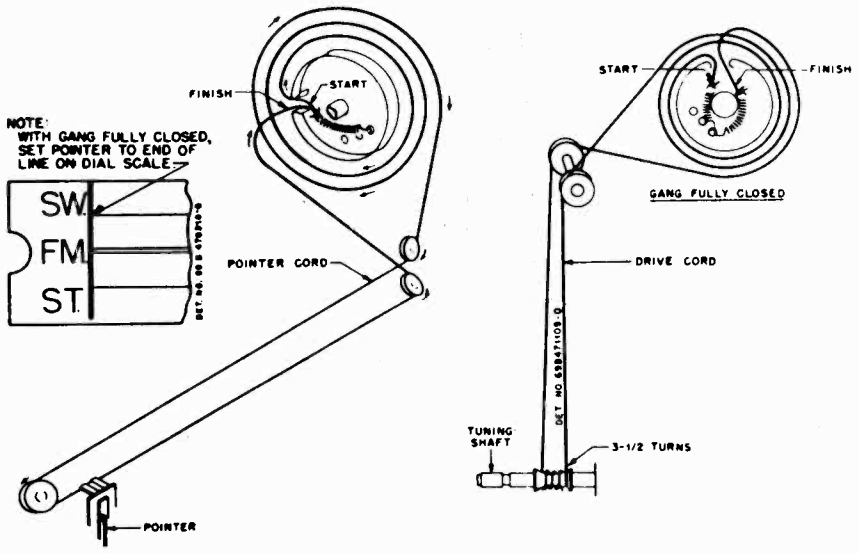


FIGURE 11. POINTER AND DRIVE CORD DETAIL

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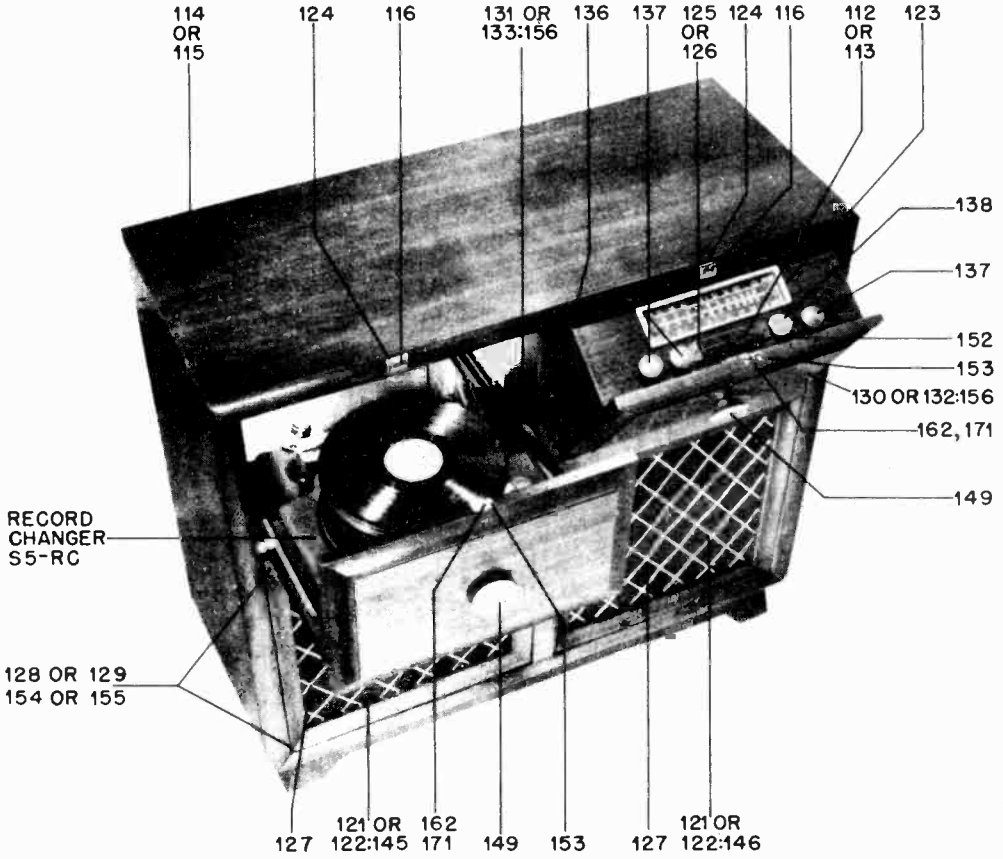

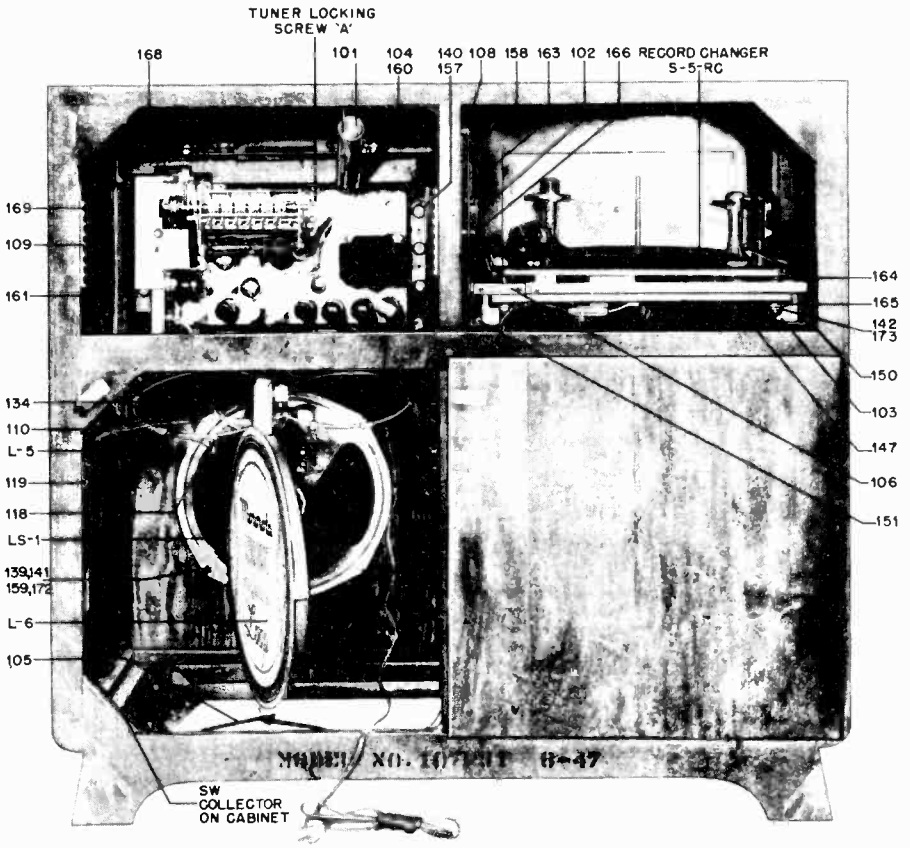

FIGURE 12. PARTS LOCATION - CABINET - MODELS 107F31 & 107F31B

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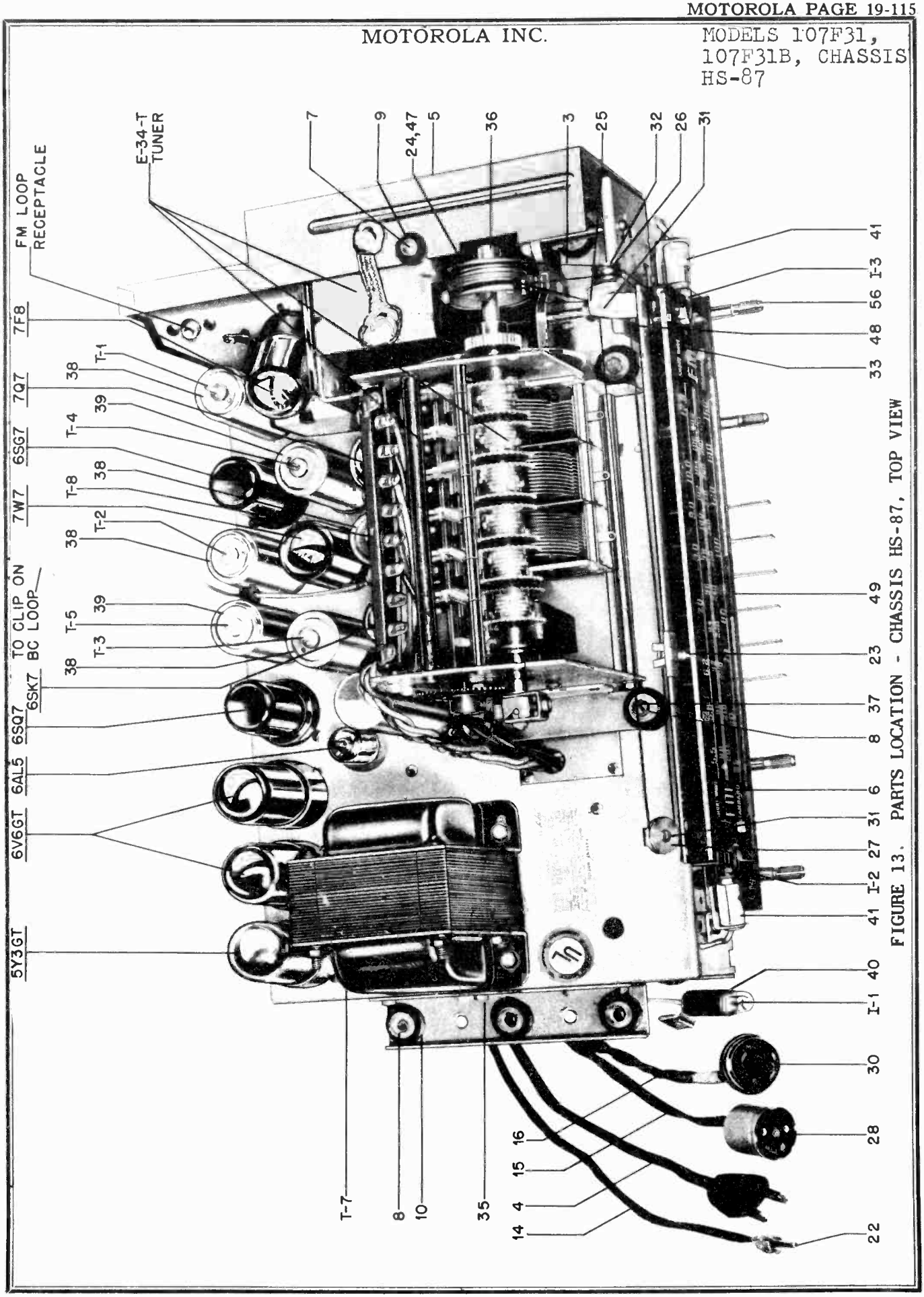

FIGURE 13. PARTS LOCATION - CHASSIS HS-87, TOP VIEW

MODELS 107F31, 107F31B, CHASSIS HD-87

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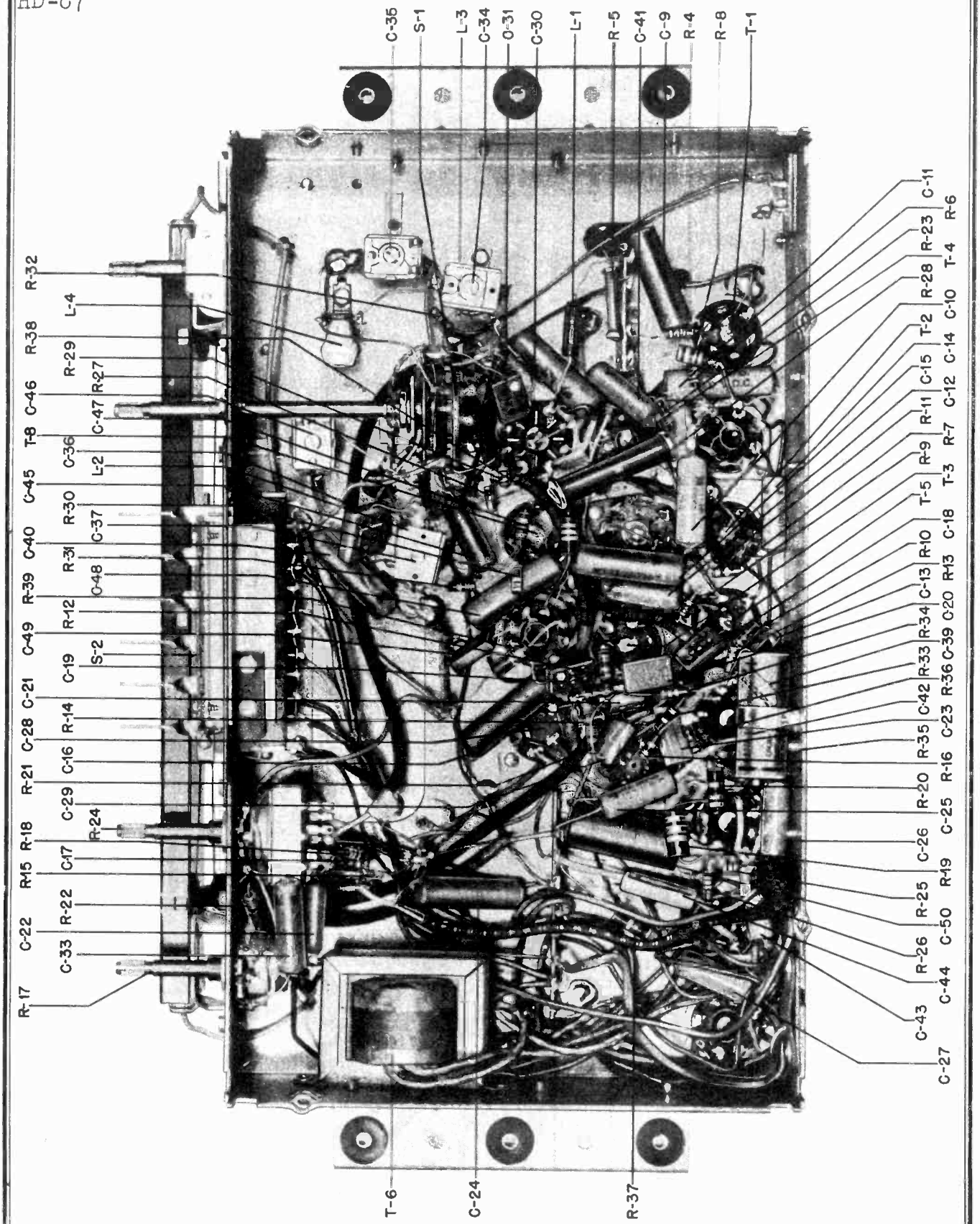

FIGURE 14. PARTS LOCATION - CHASSIS HS-87, BOTTOM VIEW ELECTRICAL PARTS

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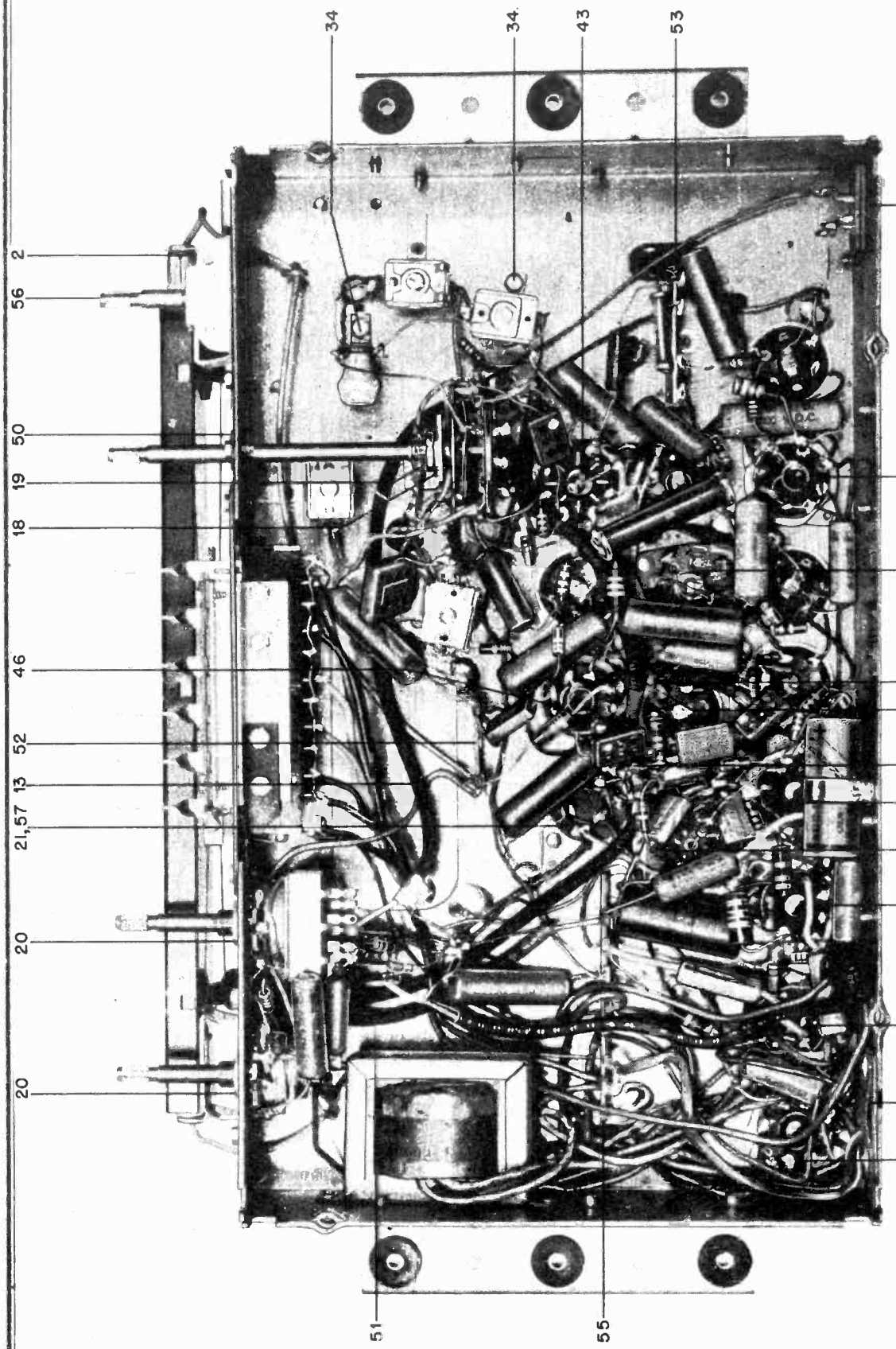

FIGURE 15. PARTS LOCATION - CHASSIS HS-87, BOTTOM VIEW - MECHANICAL PARTS

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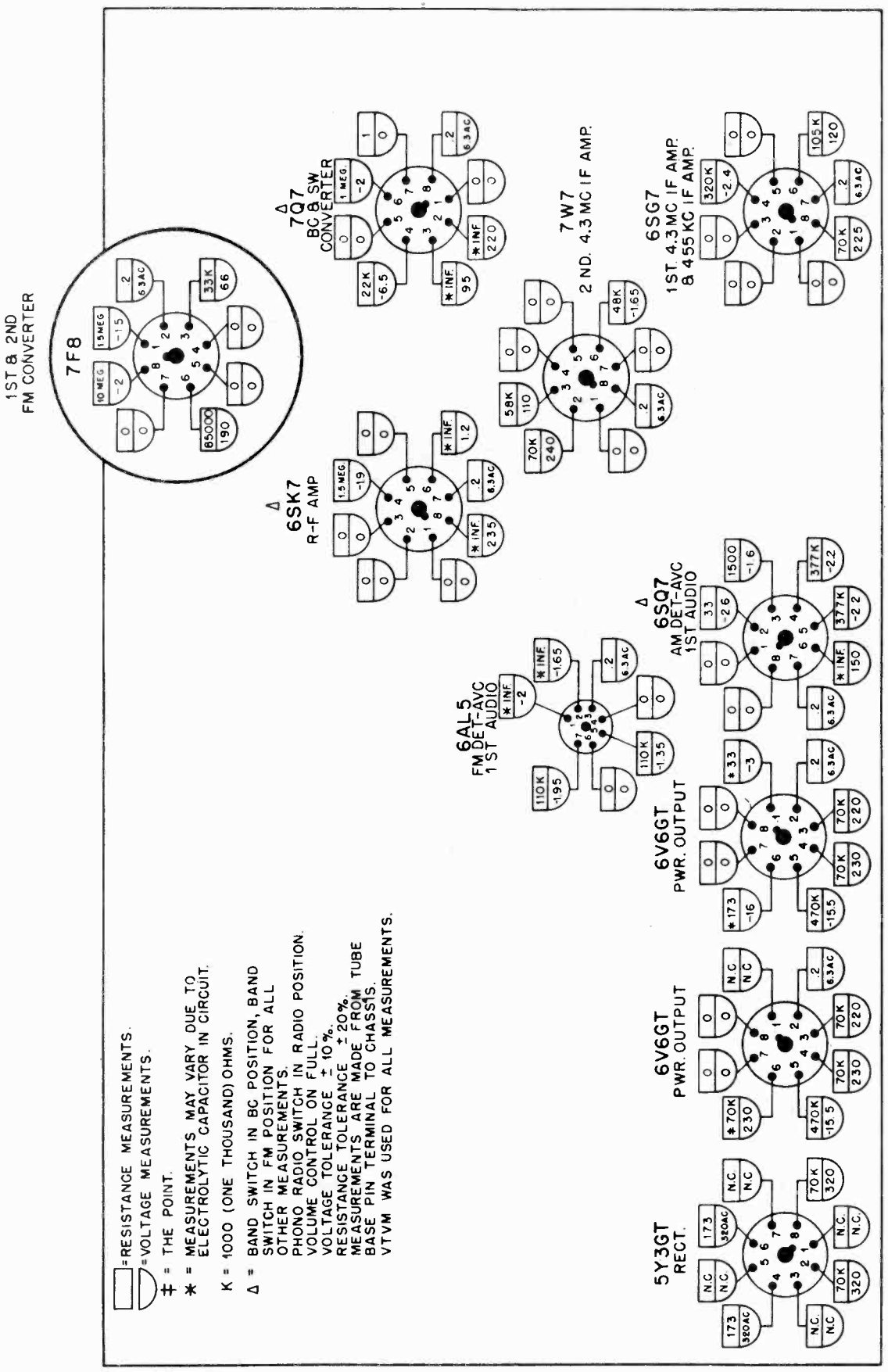

FIGURE 16. VOLTAGE & RESISTANCE DIAGRAM

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CAPACITORS

*C-1	21A75479	Special: 1.3 mmf
*C-2	21A112247	Silver Mica: 250 mmf
*C-3	20K74940	Trimmer, ceramic: 7-45 mmf
*C-4	20A74939	Trimmer, ceramic: 5-25 mmf
*C-5	21R2729	Mica: 250 mmf 500V
*C-6	21A76320	Ceramic: 16 mmf
*C-7	20K74940	Trimmer, ceramic: 7-45 mmf
*C-8	21R2730	Mica: 500 mmf 500V
C-9	8S9816	Paper: .05 mf 400 V
C-10	8S9805	Paper: .01 mf 100V
C-11	8S9816	Paper: .05 mf 400V
C-12	8S9809	Paper: .01 mf 400V
C-13	21R6506	Mica: 150 mmf 500V
C-14	8S9801	Paper: .01 mf 100V
C-15	8S9816	Paper: .05 mf 400V
C-16	8S9816	Paper: .05 mf 400V
C-17	21R6648	Mica: 250 mmf 500V
C-18	21R6506	Mica: 150 mmf 500V
C-19	21R6641	Mica: 100 mmf 500V
C-20	21R6639	Mica: 500 mmf 500V
C-21	21R6638	Mica: 1000 mmf 500V
C-22	8S9824	Paper: .002 mf 400V
C-23	21R6638	Mica: 1000 mmf 500V
C-24	8S9816	Paper: .05 mf 400V
C-25	8S9809	Paper: .01 mf 400V
C-26	8S9834	Paper: .01 mf 600V
C-27	8S9834	Paper: .01 mf 600V
C-28	23A27718	Electrolytic: 20-30-30 mf/25-350-300V
C-29	21R6638	Mica: 1000 mmf 500V
C-30	8S9816	Paper: .05 mf 500V
C-31	21R6642	Mica: 50 mmf 500V
*C-32	19C77717	Tuning, 3 gang :
C-33	8S9813	Paper: .006 mf 600V
C-34	20A71141	Trimmer, mica: 10-80 mmf
C-35	20A75234	Trimmer, mica: 10-80 mmf; with mtg bracket
C-36	21R2724	Mica: 1000 mmf 5% 300V
C-37	20A71141	Trimmer, mica: 10-80 mmf
C-38	20A71226	Trimmer, mica: 2-12 mmf; includes mtg bracket; part of loop antenna
C-39	21R6641	Mica: 100 mmf 500V
C-40	8S9806	Paper: .1 mf 200V
C-41	8S9809	Paper: .01 mf 400V
C-42	23K77635	Electrolytic: 10 mf 100V
C-43	8S9824	Paper: .002 mf 400V
C-44	8S9824	Paper: .002 mf 400V
C-45	8S9801	Paper: .01 mf 100V
C-46	20A75234	Trimmer, mica: 10-80 mmf; with mtg bracket
C-47	21K471665	Ceramic: .68 mmf
C-48	8S9816	Paper: .05 mf 400V
C-49	21R6642	Mica: 50 mmf 500V
C-50	23K77635	Electrolytic: 10 mf 100V
*C-51	21A112247	Silver mica: 250 mmf

PILOT LIGHTS

I-1, 2 & 3	65X11854	Bulb: 6.5V .15A tubular bayonet base; clear; #47

COILS

L-1	24A74939	Choke, filament
L-2	24B74822	Shortwave antenna
L-3	24A74820	Shortwave oscillator
L-4	24A74821	Broadcast oscillator
L-5	1X76326	FM loop antenna: with leads
L-6	24K476044	BC loop antenna

SPEAKER

LS-1	50B77716	Electrodynamic: 12"; 3.2 ohm VC; 800 ohm field

RESISTORS

Note: All resistors are 1/2W 20% insulated carbon type unless otherwise specified.

*R-1	6R2109	10 meg
*R-2	6R6015	15,000 1W N.I.
*R-3	6R5966	1.5 meg
R-4	6R6477	15,000 10%
R-5	6R6513	22,000 10% 1W N.I.
R-6	6R6410	33,000 10%
R-7	6R6015	220,000
R-8	6R5568	39,000 10% 1W
R-9	6R6501	1000
R-10	6R6056	47,000
R-11	6R6398	150,000 10%
R-12	6R6010	330
R-13	6R6014	330,000
R-14	6R6028	22,000
R-15	6R6014	330,000
R-16	6R6054	10,000
R-17	18K74891	Volume Control: 1 Meg; tapped at 300,000 ohms; includes power switch
R-18	6R6046	1 meg 10%
R-19	6R3991	150 10% 2W
R-20	6R476075	33 10% 1W
R-21	6R6015	220,000
R-22	6R6410	33,000 10%
R-23	6R6301	1000
R-24	18A28062	Tone Control: 1 meg; includes Phono-Radio switch
R-25	6R6032	470,000
R-26	6R6032	470,000
R-27	6R6228	680,000
R-28	6R3967	12,000 10% 3W N.I.
R-29	6R6028	22,000
R-30	6R6052	470,000
R-31	6R6015	220,000
R-32	6R6270	220 10%
R-33	6R6054	10,000
R-34	6R6056	47,000
R-35	6R6075	100,000
R-36	6R6161	1500
R-37	6R6863	300 10% 1W
R-38	6R6341	22,000 10% 1W
R-39	1K77654	2.7 Wirewound

SWITCHES

S-1	40B74864	Bandswitch, 3 position
S-2	1X75820	Pushbutton switch: 6 button; with muting switch (complete)

TRANSFORMERS

T-1	24B75481	1st IF, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-2	24B75473	2nd IF, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-3	24B77714	Discriminator, 4.3 Mc: complete with iron cores and padding capacitors, but less shield
T-4	24B75487	IF, 455 Kc: complete with iron cores and padding capacitors, but less shield
T-5	24B77712	Diode, 455 Kc: complete with iron cores and padding capacitors, but less shield
T-6	25B77709	Output
T-7	25C75489	Power
T-8	24B77710	RF Broadcast: complete with iron cores but less shield

MISCELLANEOUS CHASSIS PARTS

1	1X77631	Bracket, chassis mtg: includes rubber grommets and eyelets
2	7A14684	Bracket, tuning shaft
3	11M8944	Cord, dial: 18 lb black
4	80K21859	Cord, line and plug: 2 conductor, rubber; 9 ft long
5	15C74825	Cover, tuner
6	1X76370	Dial Plate, Brackets and Pullies Assembly: less dial scale, rubber channel strips and pointer
7	6S1615	Eyelet: .205 x .184; brass (tuner cover mtg)
8	5A12105	Eyelet, mounting (chassis & tuner mtg)
9	37A4163	Grommet, rubber (tuner cover mtg)
10	37K15125	Grommet, mounting; rubber (chassis cushions)
11	1X76367	Lead Assembly: single conductor; shielded; 7" long
12	1X76368	Lead Assembly: single conductor; shielded 8" long
13	1X76369	Lead Assembly: single conductor; shielded; 10" long
14	1X470488	Lead & Plug Assembly (phono pickup connector)
15	1X77730	Leads & Phono Motor Receptacle Assembly
16	1X77732	Leads & Speaker Receptacle Assembly
17	32A24815	Lock, line cord: fibre
18	4S7655	Lockwasher: 3/8 internal; cadmium plated (bandswitch mtg)

* Part of E-34-T Tuner

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19	2S7018	Nut: 3/8-32 x 1/2 hex; cadmium plated (bandswitch mtg)
20	2S7061	Nut: 3/8-32 x 9/16 Palnut; cadmium plated (volume and tone control mtg)
21	9A12705	Plate, electrolytic capacitor mtg: bakelite
22	28K22183	Plug, insulated: 1 pin (on phono pickup lead)
23	52B74418	Pointer, dial
24	1X76593	Pulley Assembly: two 1-5/16" pullies on brass bushing
25	49A23960	Pulley, cord: 1/4 groove
26	49A21741	Pulley, cord: 3/8 groove
27	49A21552	Pulley, cord: 1/2 groove
28	9A30680	Receptacle: 3 prong (phono motor recept)
29	9K28049	Receptacle, 4 prong (BC loop ant. recept)
30	9A22367	Receptacle: 5 prong (speaker recept)
31	5A71246	Rivet, shoulder: .187 shoulder (cord pulley mtg)
32	5K74580	Rivet, shoulder: .312 shoulder (cord pulley mtg)
33	34C74423	Scale, dial: glass
34	3S7506	Screw: #6 x 1/4 PHZ plain hex head sheet metal screw; cadmium plated (BC osc. coil mtg and SW osc. coil mtg)
35	3S7454	Screw: #8 x 1/4 PHZ plain hex head sheet metal screw; cadmium plated (general mounting)
36	3S7100	Setscrew: 8-32 x 5/16 slabhead; cadmium plated
37	3S7481	Screw: #8 x 3/4 PHZ slotted hex head sheet metal screw (tuner mtg)
38	26B70107	Shield, coil (for T-1, T-2, T-3 & T-8)..
39	1A71049	Shield & Iron Core Sleeve Assembly (for T-4 and T-5)
40	60E76432	Socket, Clip & Leads
41	9A72747	Socket, dial light
42	9A471661	Socket, tube: miniature 7 prong; 1-5/16 mounting centers
43	9A72519	Socket, tube: molded, loctal
44	9A471015	Socket, tube: wafer; loctal
45	9A6788	Socket, tube: molded, octal; plain type
46	9A70165	Socket, tube: molded, octal; shielded type
47	41A21352	Spring, tension coil
48	36A75262	Strip, channel: rubber; 7/8 long (dial plate bumper)
49	37K21114	Strip, channel: rubber; 1" long (dial scale mtg)
50	32A27678	Strip, shaft bearing: fibre
51	31A15433	Strip, terminal: 1 large insulated lug, #2 mtg
52	31K15026	Strip, terminal: 2 insulated lugs, #2 mtg
53	31A75232	Strip, terminal: 4 insulated lugs, #3 mtg
54	31K22174	Strip, terminal: 4 insulated lugs, #4 mtg
55	31A75233	Strip, terminal: 7 insulated lugs, #1 & #9 mounting
56	1X76352	Tuning Shaft & Pulley Assembly
57	9K14906	Wafer, insulating: fibre (insulates electrolytic capacitor from mtg rivets)
58	37A14888	Washer, compression: sponge rubber

CABINET PARTS - MODELS 107F31 & 107F31B

101	55B74771	Air check, tilt panel
102	45B471744	Arm, phono shelf-actuating
103	57A476151	Block, panel mounting: wood
104	7A74776	Bracket, air check mtg
105	7K71220	Bracket, loop support
106	7A471733	Bracket, phono shelf
107	7A76156	Bracket, pilot light
108	45A471739	Bushing, spacer (phono shelf actuating arm mtg)
109	7A471736	Bracket, spring anchor
110	7A74782	Bracket, tilt panel spring
111	45A471743	Bumper, rubber
112	1X477001	Button & Spring Assembly: walnut push-button with insert spring (107F31)
113	1X477002	Button & Spring Assembly: tan pushbutton with insert spring (107F31B)
114	16E471749	Cabinet, console: walnut (107F31)
115	16K471750	Cabinet, console: blonde (107F31B)
116	1X76552	Catch Assembly (panel catch)
117	55A72507	Catch, bullet
118	42K76724	Clamp, cable (FM loop adj. taps & lead mtg)
119	42K5626	Clip, Fahnestock: double
120	42A76825	Clip, mounting (phono connector mtg)
121	35K471756	Cloth, grille: walnut (107F31)
122	35K471762	Cloth, grille: blonde (107F31B)
123	13B72750	Escutcheon, dial: brass; 9" x 2-3/8"
124	13A75551	Escutcheon, panel catch push button: brass; 1" x 1-1/8"
125	13B70494	Escutcheon, push button: brown plastic; gold stripes (107F31)
126	13K76133	Escutcheon, push button: tan plastic; gold stripes (107F31B)
127	13B76158	Grille, cabinet: brushed brass finish
128	55K471693	Hinge, door (Universal): statuary bronze finish (compartment door - 107F31)
129	55K471692	Hinge, door (Universal): brass (compartment door - 107F31B)
130	55K76149	Hinge, radio door: right hand; statuary bronze finish (107F31)
131	55K76150	Hinge, radio door: left hand; statuary bronze finish (107F31)
132	55B76145	Hinge, radio door: right hand; brass (107F31B)
133	55K76146	Hinge, radio door: left hand; brass (107F31B)
134	14A76142	Insulator, FM loop mounting
135	14A76554	Insulator, light: fibre
136	60A28520	Jewel, light: amber
137	36K70511	Knob, control: plastic; plain
138	36K70513	Knob, control: plastic; with red dot
139	4S7657	Lockwasher: #8 external; cadmium plated (speaker mtg)
140	2A72610	Nut, tee: 8-32 thread (chassis mtg)
141	2S7003	Nut: 8-32 x 5/16 hex; cadmium plated (speaker mtg)
142	2S7022	Nut: 1/4-20 x 7/16 hex; cadmium plated (record changer mtg)
143	35K471751	Pad, felt: 3/4 x 3/4 x 1/8
144	35K471748	Pad, felt: 1 x 1/2 x 1/8
145	35K76174	Pad, grille (compartment door)
146	35B76173	Pad, grille (speaker panel)
147	64C476076	Panel, record changer bottom cover
148	28K19871	Plug: 4 pin (BC loop connector)
149	55A76151	Pull, door: brushed brass finish; includes mtg screw
150	55K471731	Rail, guide: left hand
151	55C471730	Rail, support: right hand
152	3S1328	Screw: #2 x 3/8 Phillips oval head wood screw; brass plated (push button escutcheon mtg)
153	3S1327	Screw; #4 x 1/2 slotted flat head wood screw; brass (panel catch & trigger plate mtg)
154	3S7441	Screw: #5 x 5/8 slotted flat head wood screw; statuary bronze finish (compartment door hinge mtg - 107F31)
155	3S1331	Screw: #5 x 5/8 slotted flat head wood screw; brass (compartment door hinge mtg-107F31B)
156	3S1346	Screw: #6 x 3/4 slotted flat head wood screw; statuary bronze finish (radio door hinge mtg)
157	3S2965	Screw: 8-32 x 1" slotted hex head machine screw; cadmium plated (chassis mtg)
158	3A75140	Screw, hook-eye
159	3K653	Screw, speaker mounting
160	2S7990	Speednut: for 3/16 diameter rod (air check rod retainer)
161	41A74775	Spring, chassis shelf
162	41A72780	Spring, coil (trigger)
163	41A471741	Spring, phono shelf actuating
164	41K72515	Spring, support-upper (record changer cushion)
165	41K72516	Spring, support-lower (record changer cushion)
166	46A471742	Stop, lever: wood; 3/4" long
167	55K72306	Strike, bullet: includes one 1/2" nail..
168	35K471753	Strip, felt: 8-3/8 x 1 x 1/8
169	35K471752	Strip, felt: 11 x 1/2 x 1/8
170	38C75526	Tabs, AM & FM Call Letters & Instructions
171	1X76553	Trigger & Plate Assembly: brushed brass finish (on phono & radio doors)
172	4S7629	Washer: 1/2 x 5/16 x .046 thick; cadmium plated (speaker mtg)
173	4S8263	Washer: 1 x 5/16 x .055 thick; cadmium plated (record changer mtg)

MOTOROLA INC.

MODELS 107F31, 107F31B,
CHASSIS HS-87

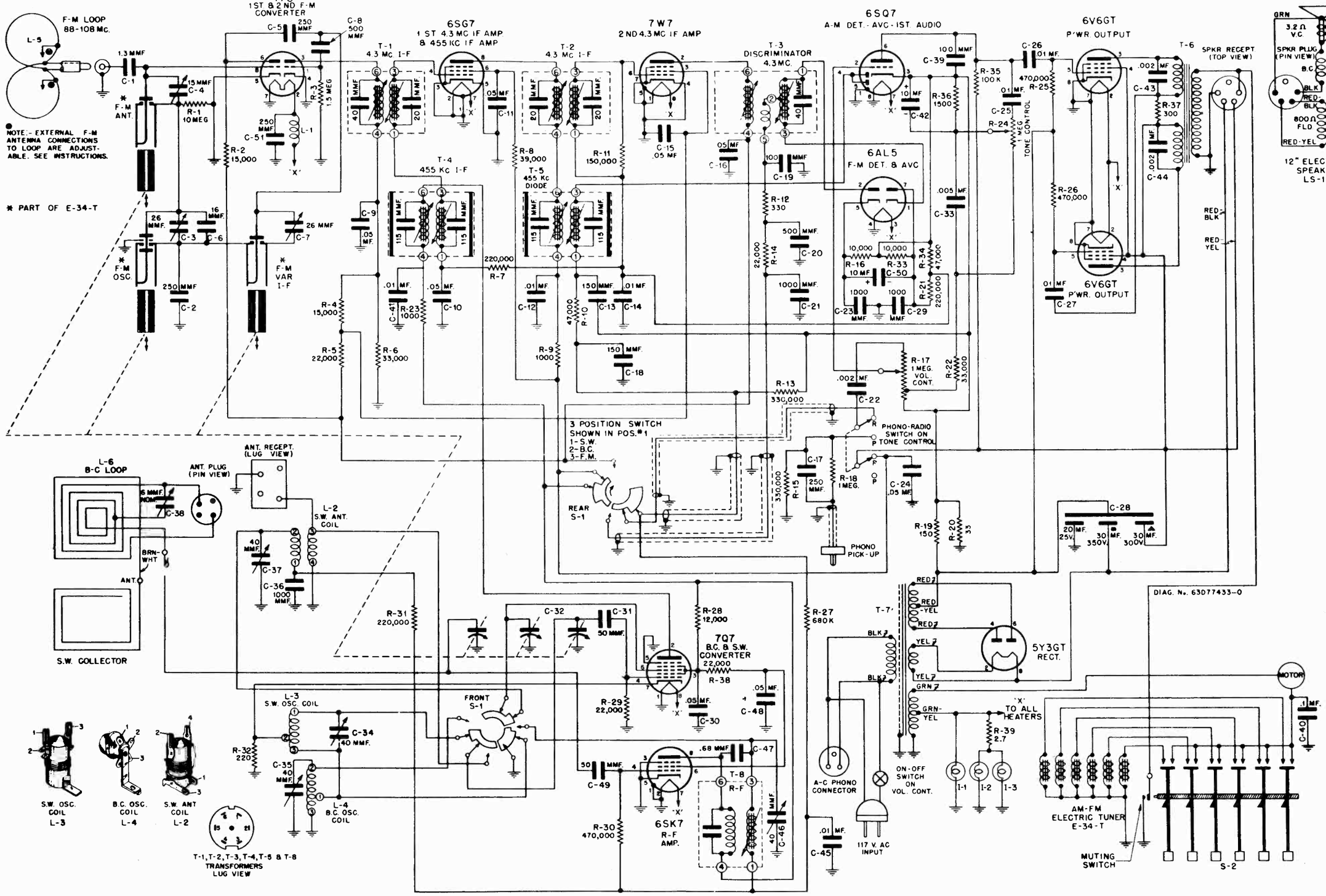
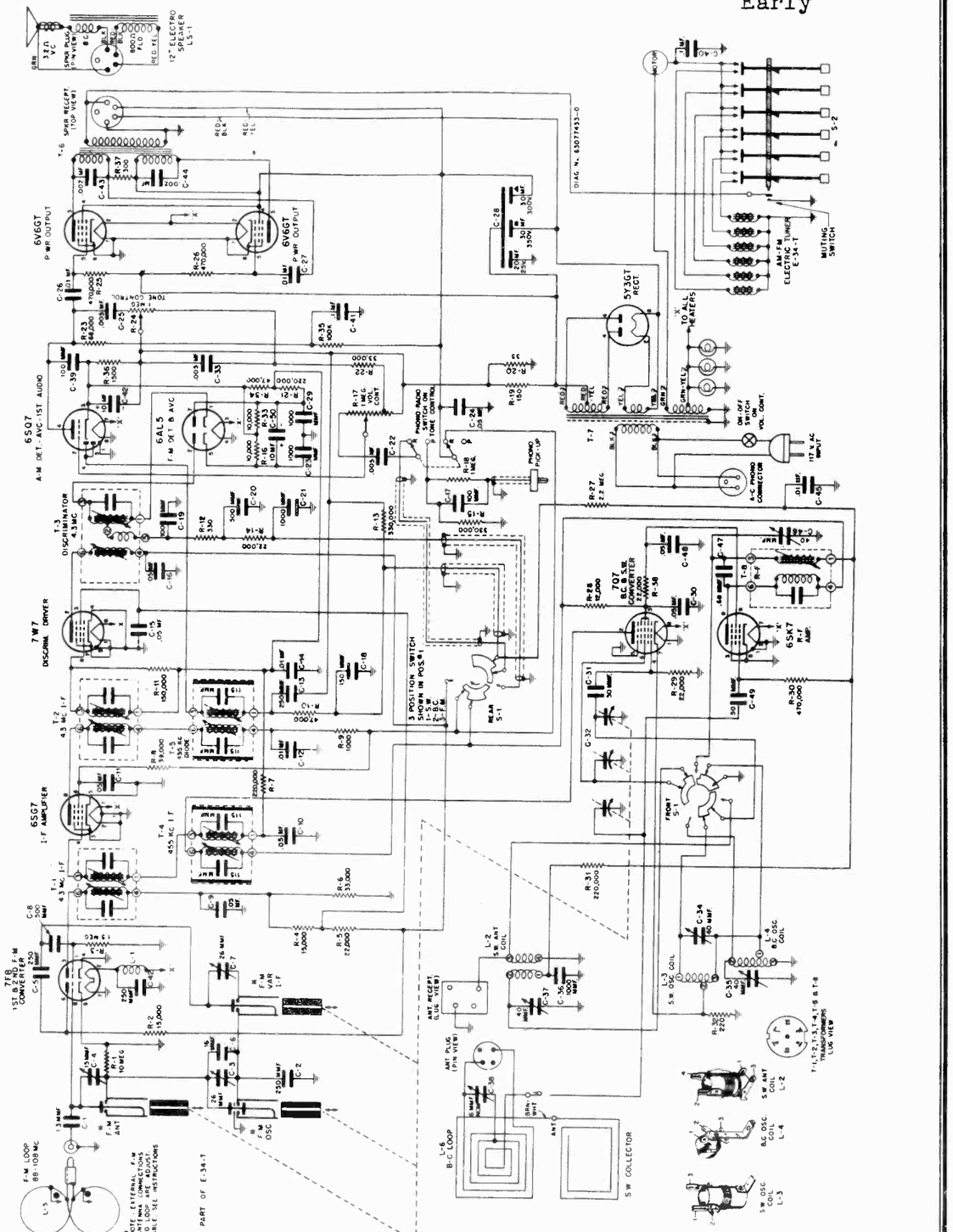


FIGURE 20. SCHEMATIC DIAGRAM -CHASSIS HS-87

MOTOROLA INC.

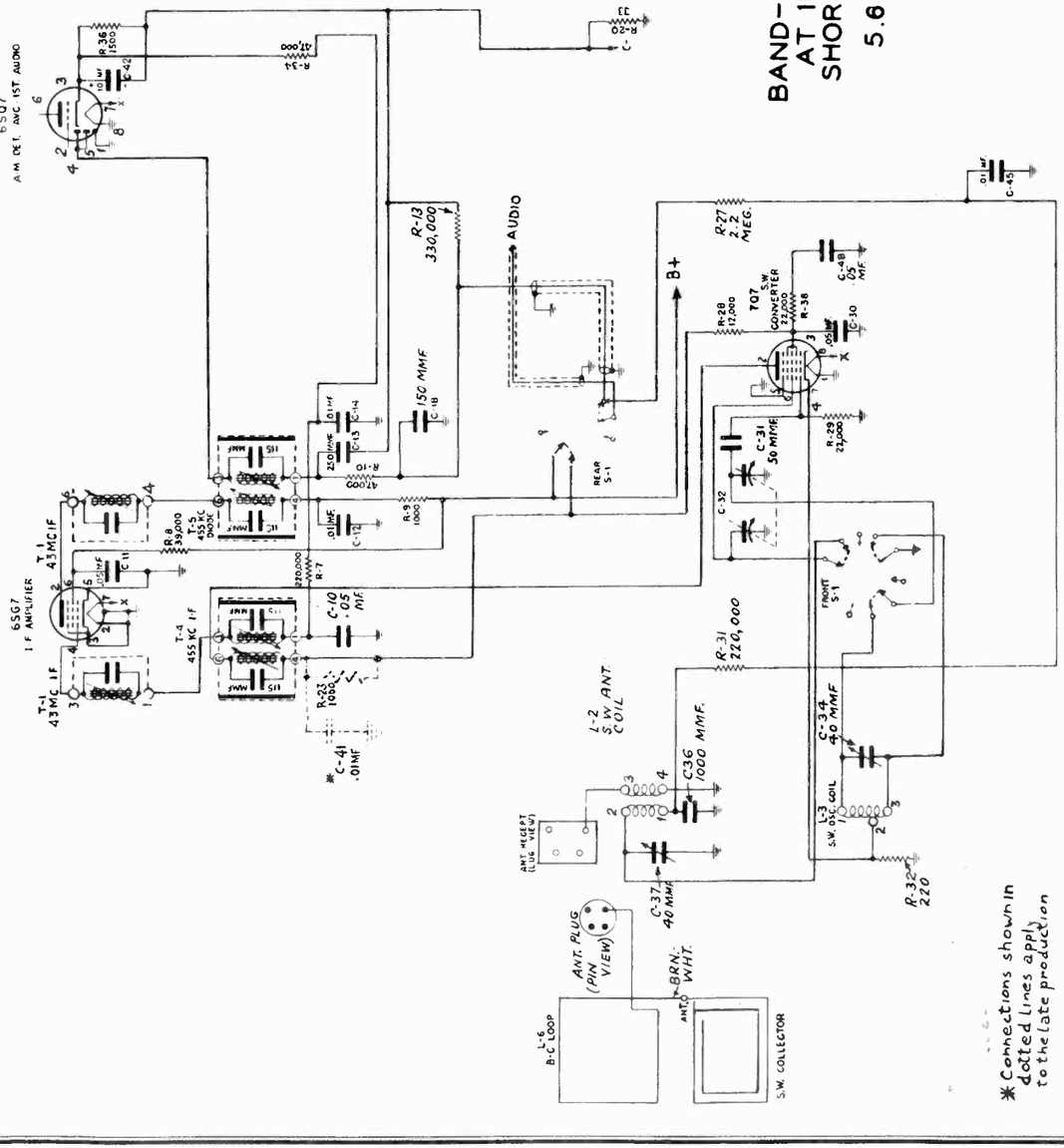
MODEL 107F31,
CHASSIS HS-87,
Early



MODEL 107F31,
CHASSIS HS-87

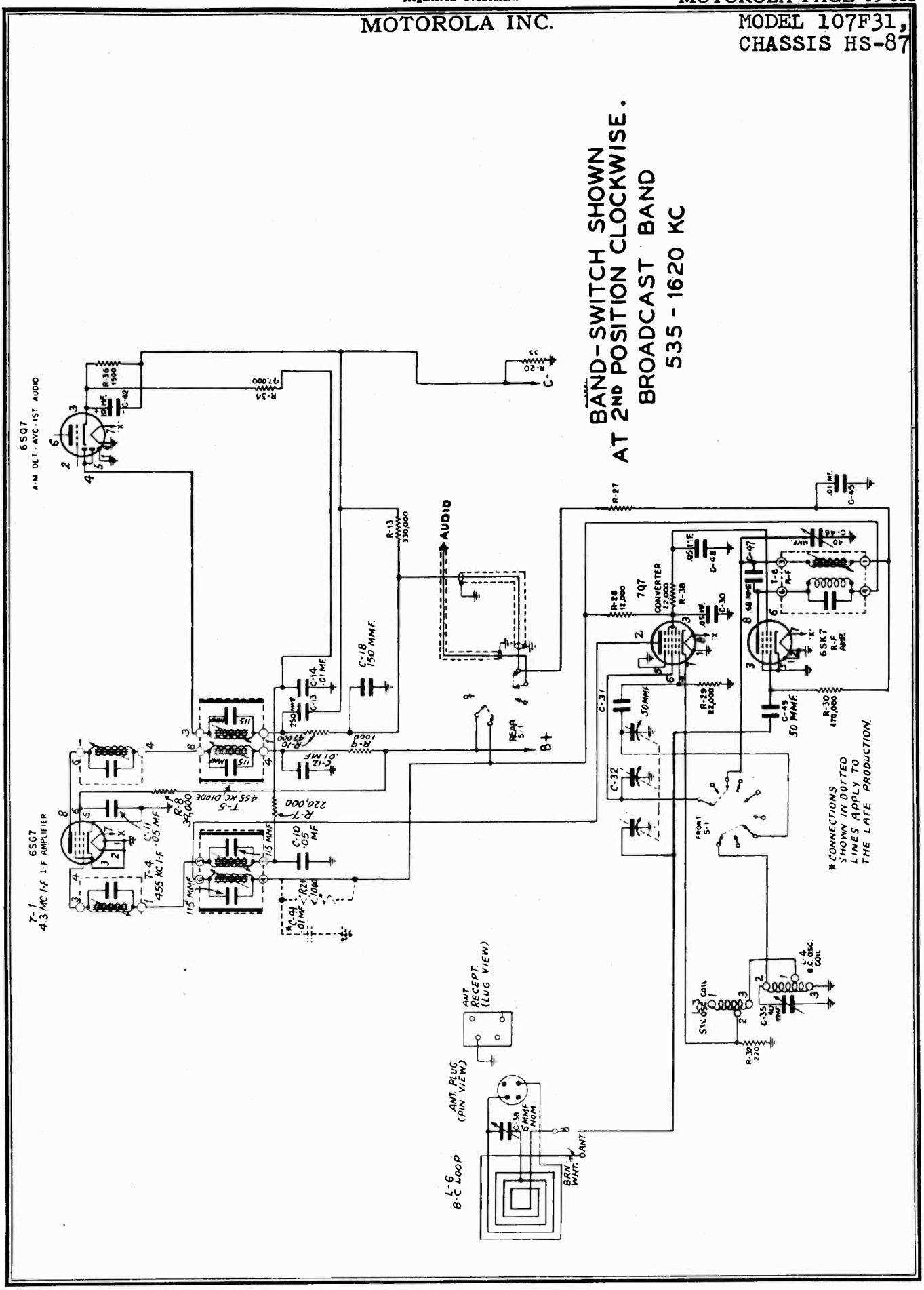
MOTOROLA INC.

BAND-SWITCH SHOWN AT 1ST POSITION.
SHORT WAVE BAND
5.6 - 12.2 MC



MOTOROLA INC.

MODEL 107F31,
CHASSIS HS-87



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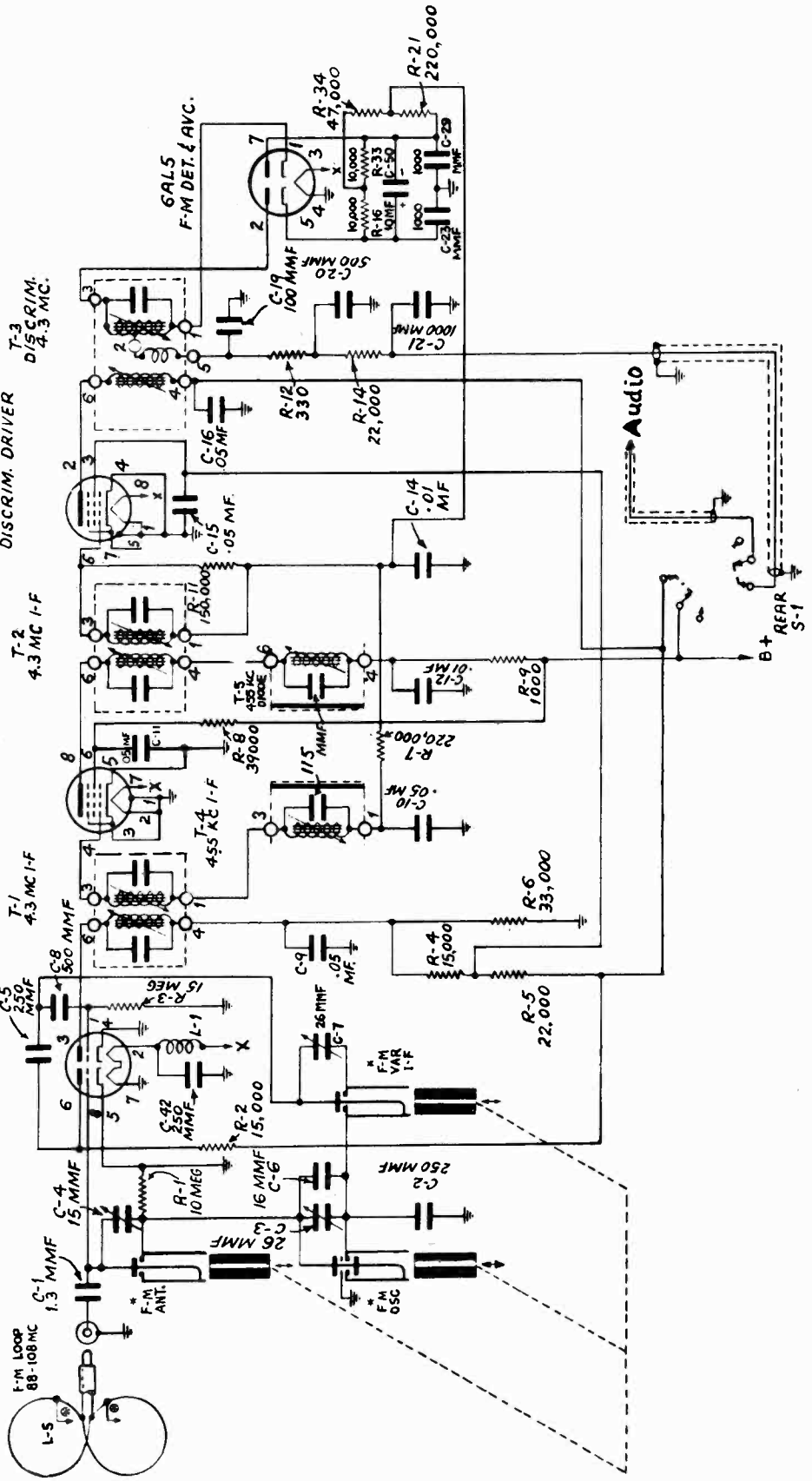
MODEL 107F31,
CHASSIS HS-87

MOTOROLA INC.



BAND-SWITCH SHOWN
AT 3ND POSITION CLOCKWISE.
F M BAND
88-108 MC

MODELS 107F31, 107F31B, CHASSIS HS-87

MOTOROLA INC.

MODEL E-34-T

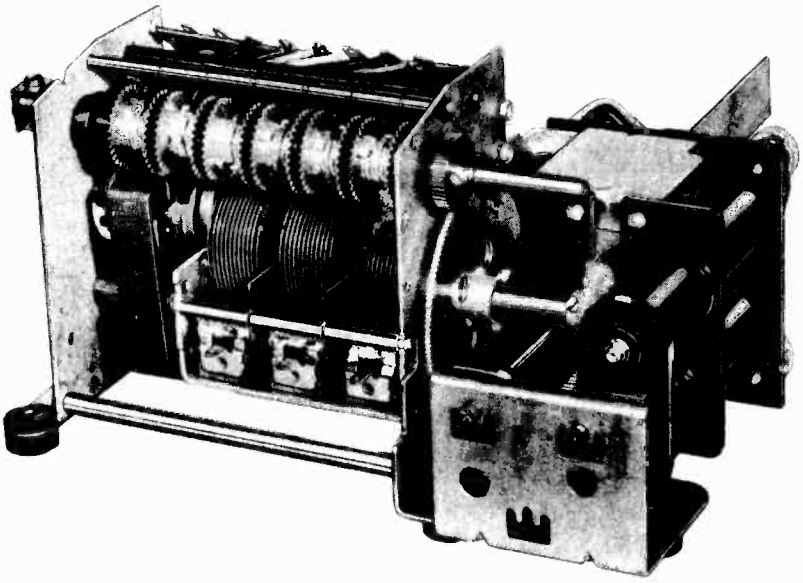


FIGURE 17. MODEL E-34-T AM-FM TUNER

THEORY OF THE FM TUNER

Referring to the functional schematic diagram in Figure 18, the triode T_1 serves both as an oscillator and first converter, and triode T_2 serves as the second converter. Oscillator voltage injection for the second converter is obtained through the coupling capacitor from the plate of T_1. T_1 and T_2 are sections of the 7F8 twin-triode tube.

The frequency relationships are given in Figure 18. The oscillator F_0 beats with the incoming signal F_s to produce the first intermediate frequency F_1, which is variable. F_1 then beats with the same oscillator frequency F_0 in the second converter to produce the second intermediate frequency F_2 which is 4.3 mc. With a 100 mc signal the oscillator frequency is 47.85 mc and the variable intermediate frequency is 52.15 mc.

This system of reception permits the oscillator to be resonated with a high capacitance, 250 micromicrofarads in this case. Consequently, changes in the tube characteristics during warm-up do not produce objectionable changes in oscillator frequency. This contributes materially to the stability of the system.

The actual FM tuner schematic is shown in Figure 20.

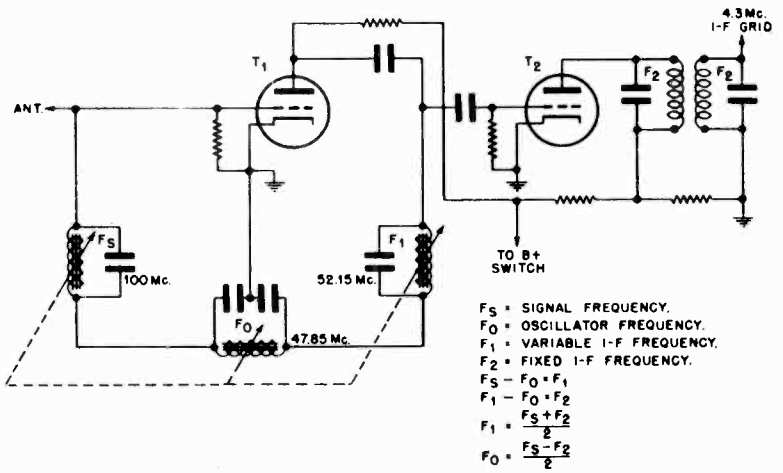


FIGURE 18. FUNCTIONAL SCHEMATIC DIAGRAM OF FM TUNER

Model E-34-T

MOTOROLA INC.

MODELS 107F31, 107F31B, CHASSIS HS-87

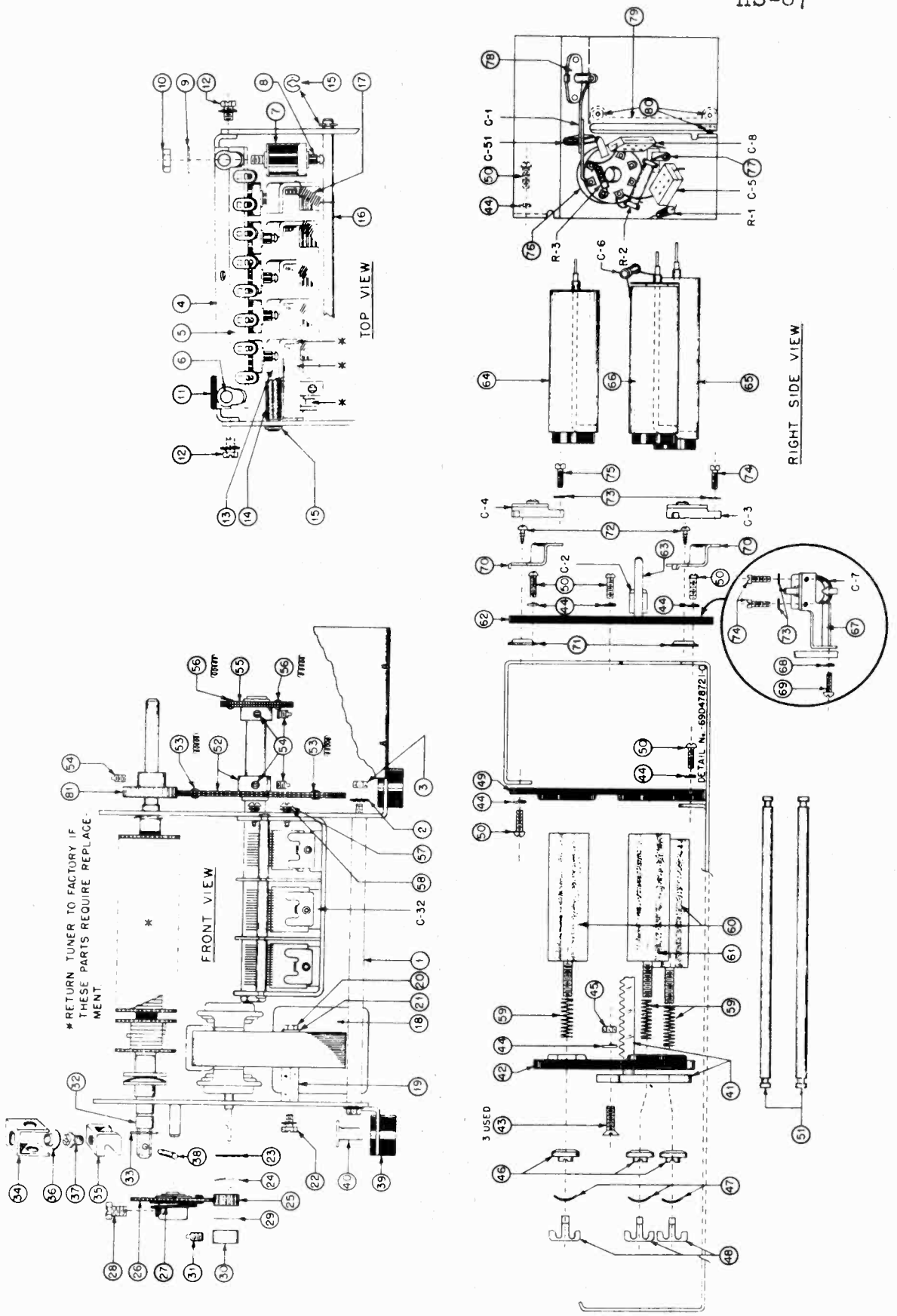


FIGURE 19. MODEL E-34-T AM-FM TUNER PARTS LOCATION

MODELS 107F31, 107F31B, CHASSIS HS-87

MOTOROLA INC.

MODEL E-34-T

PARTS LIST
MODEL E-34-T AM-FM TUNER

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	21A75479	Special: 1.3 mmf
C-2	21A112247	Silver mica: 250 mmf
C-3	20K74940	Variable ceramic: 7-45 mmf
C-4	20A74939	Variable ceramic: 5-25 mmf
C-6	21R2729	Mica: 250 mmf 500V
C-6	21A76320	Ceramic: 16 mmf
C-7	20K74940	Variable ceramic: 7-45 mmf
C-8	21R2730	Mica: 500 mmf 500V
C-32	19C77717	Variable: 3 gang
C-51	21A112247	Silver mica: 250 mmf
RESISTORS		
R-1	6R2109	10 meg 1/2W Ins
R-2	6R6013	15,000 1W N.I.
R-3	6R3966	1.5 meg 1/2W Ins
1	45A21419	Rod, tie: threaded
2	4S7651	Lockwasher: #8 internal
3	2S7007	Nut: 8-32 x 1/4 hex
4	1X76383	Magnet Assembly: 6 electromagnets mounted on channel; with terminal strip
5	31A74480	Strip, terminal: 8 insulated lugs, #1 and 10 mtg.
6	5S7707	Rivet: .122 x 5/32 steel
7	1K75593	Magnet Assembly: single electromagnet...
8	37A22059	Bumper, armature: rubber
9	4S7562	Washer: 7/16 x .187 x .033 thick
10	2S7009	Nut: 10-32 x 3/8 hex
11	37A22664	Grommet: for 7/16" hole
12	3S7205	Lockscrew: 8-32 x 1/4 slotted hex head
13	46K75519	Rod, stop
14	11M9504	Sleeving: #4 black
15	4A21577	Washer, "C" spring
16	46A21765	Rod, stop: grooved
17	41A22507	Spring, armature
18	59B75421	Motor, tuner
19	2K75462	Nut: hex; .594 long; 6-32 thread (motor spacer)
20	3S2927	Screws: 6-32 x 7/8 slotted hex head machine screw
21	4S7650	Lockwasher: #6 internal
22	3S7350	Lockscrew: 6-32 x 1/4 slotted hex head
23	4A21409	Washer (clutch)
24	4A21408	Washer, spring (clutch)
25	44A21417	Pinion, clutch; 1/4 P.D.
26	1X21576	Gear & Hub Assembly; 1-5/8 P.D.
27	41A22471	Spring, cushion
28	3S7163	Screw: 8-32 x 1/4 slotted hex head machine screw
29	14A21424	Washer, fibre: 7/16 x .130 x .010 thick.
30	43A21407	Bushing, clutch retaining
31	3S7114	Setscrew: 8-32 x 3/8 slabhead
32	43K21412	Bushing, spacer
33		Washer
34	42A10982	Yoke, retainer
35	42A10981	Yoke, cam
36	5S7818	Eyelet: .135 x .268
37	3A10990	Screw, yoke lock
38	47A11004	Pin, drive shaft
39	37K15125	Grommet, tuner mounting
40	5A12105	Eyelet, mounting
41	44B72706	Rack, drive gear: die cast
42	64B72707	Plate, core mounting: bakelite
43	3S7184	Screw: 6-32 x 1/2 slotted flat head machine screw
44	4S2619	Lockwasher: #6 split
45	2S7005	Nut: 6-32 x 1/4 hex
46	2A72726	Nut, swivel
47	4A74936	Washer, spring
48	42A72725	Clip, swivel nut
49	64B72704	Plate, front mounting: bakelite
50	3S7185	Screw: 6-32 x 3/8 slotted round head machine screw
51	47B72712	Rod, guide
52	1X76389	Split Gear & Bushing Assembly (large)
53	41A4547	Spring, coil
54	3S7100	Setscrew: 8-32 x 5/16 slabhead
55	1X76390	Split Gear & Bushing Assembly (small)
56	41A76498	Spring, coil
57	3S7156	Screw: 6-32 x 3/16 slotted binder head machine screw
58	4S7666	Lockwasher: #6 external
59	41A74880	Spring, core tension
60	46A71749	Core, Iron (ant. & var. IF)
61	46K76172	Core, iron (with paint dot) (osc)
62	1X76388	Rear Mounting Plate & Lug Assembly: bakelite plate with soldering lug
63	29R3005	Lug, soldering
64	24C75492	Inductor, VHF (Ant.): 2-1/2" long
65	24K75494	Inductor, VHF (IF): 2-3/4" long
66	24K75496	Inductor, VHF (Osc): 2-5/8" long
67	7A74712	Bracket, trimmer mounting
68	4S8412	Lockwasher: #4 split
69	3S1937	Screw: 4-40 x 5/16 slotted round head machine screw
70	7A74711	Bracket, trimmer mounting
71	2A74710	Nut, Tinnerman (#4 PKZ)
72	3S3356	Screw: #4 x 5/16 PKZ slotted round head sheet metal screw
73	4A74884	Washer, trimmer: fibre
74	3S1525	Screw: 3-48 x 3/8 slotted fillister head machine screw
75	3S2975	Screw: 3-48 x 5/16 slotted fillister head machine screw
76	9K75544	Socket, tube: loctal
77	31A81399	Strip, terminal: 1 insulated lug; #1 mounting
78	9A54664	Receptacle, ferrule: 1 prong
79	15A74714	Cover, tuner (rear)
80	3S8175	Screw: #4 x 3/16 PKZ slotted hex head sheet metal screw
81	44A21873	Pinion: gang drive

MODEL 409

MOTOROLA INC.

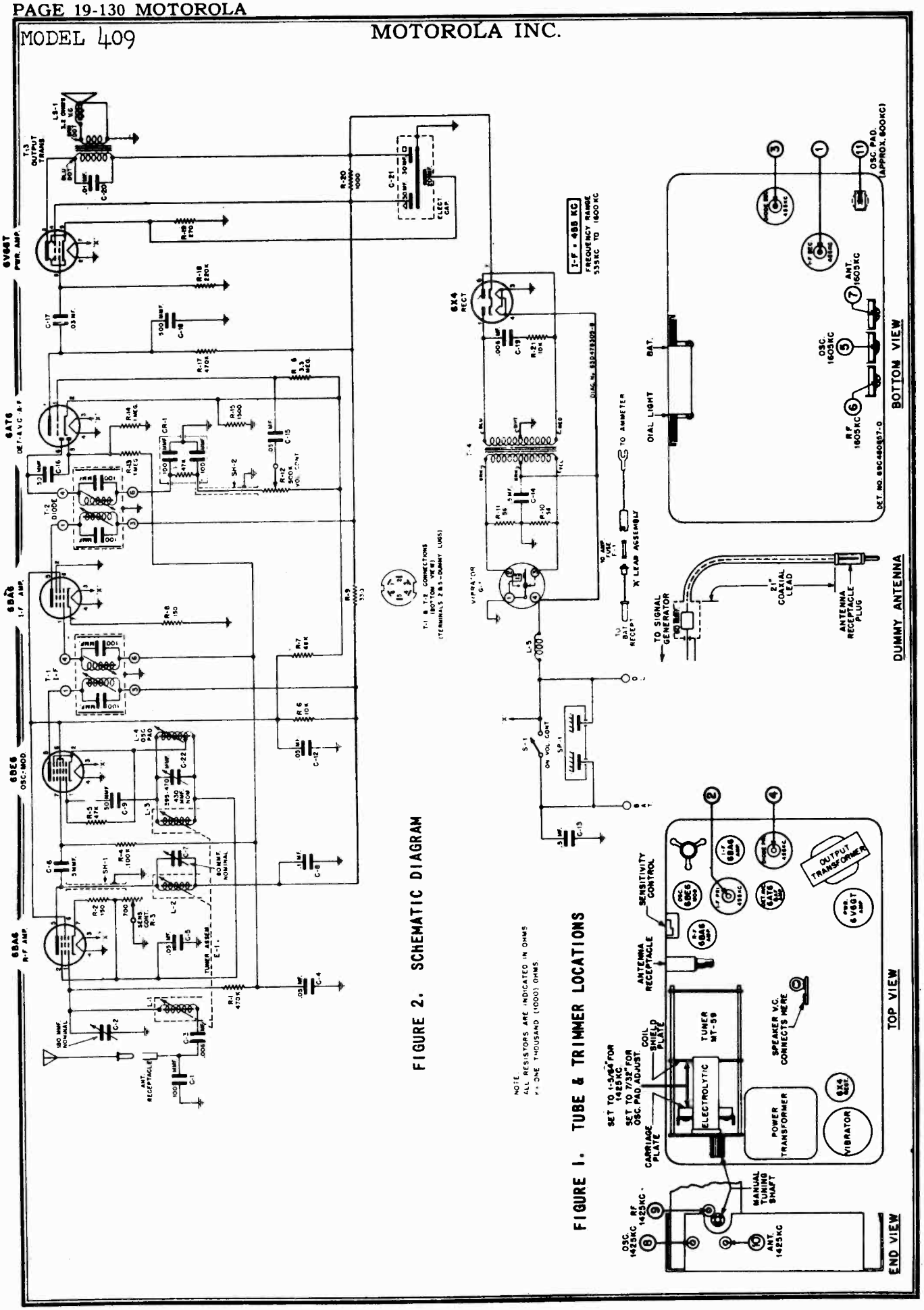
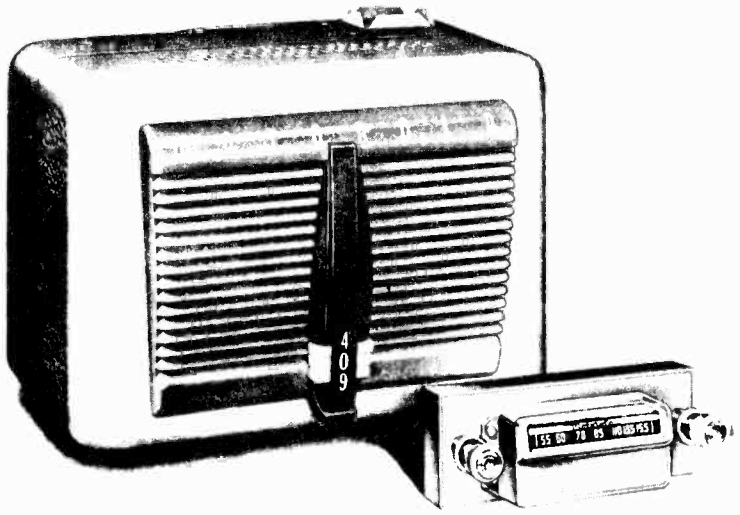


FIGURE 1. TUBE & TRIMMER LOCATIONS

FIGURE 2. SCHEMATIC DIAGRAM

MOTOROLA INC. MODEL 409



ALIGNMENT

EQUIPMENT REQUIRED

1. A special tool for adjusting the tuner cores. Use Alignment Tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1. The 21" coaxial lead needed in its construction is the same type as used for lead-in on Motorola car antenna.

PROCEDURE

1. Remove the front and rear housings. All adjustments are now exposed.
2. Connect a PM speaker (3.2 ohm VC) to VC terminal and chassis of receiver and connect the output meter across the voice coil. If the receiver internal speaker is used, ground receiver front housing to chassis.
3. Connect a 6 volt storage battery to chassis and BATT terminal of receiver; turn receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum.
4. SENSITIVITY CONTROL. This control must be set to provide 2 ± 1/2 volts bias on the RF tubes before alignment is started. Measure this voltage between sensitivity control terminal and chassis.
5. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.
6. IF ALIGNMENT
   A. Connect high side of signal generator through .1 mf capacitor to 6BE6 grid (pin #7) and the low side to chassis. Set generator to 455 Kc and peak adjustments (1, 2, 3 & 4), in this order, for maximum output.
   B. Check alignment by repeating procedure.
7. RF ALIGNMENT
   A. Connect signal generator to antenna receptacle through special dummy antenna (60 mmf capacitor in series with 21" coax lead).
   B. Move carriage plate (by turning manual tuning shaft) to extreme high frequency position and screw coil cores out so that at least 1-1/8" of all three cores shall be outside of the coil shield can. Set signal generator to 1605 Kc and peak trimmers (5, 6 and 7), in this order.
   C. Move the carriage plate (by turning manual shaft) so carriage plate is spaced exactly 1-5/64" from coil shield plate. Set signal generator to 1425 Kc and adjust coil cores (8, 9 & 10), in this order, for maximum output.
   D. Move carriage plate (by turning manual tuning shaft) so carriage plate is spaced approximately 7/32" from coil shield plate. Leave signal generator connected but turn signal generator power off. Peak oscillator padder core (11) for maximum noise. If the padder core must be moved more than 1/2 turn from its original position, the carriage plate should be moved to extreme high frequency position, the coil cores (8, 9 & 10) should be screwed out so that 1-1/8" of each core is exposed and steps 7A, B, C & D repeated until it is necessary to move the padder core less than 1/2 turn in this step.

   IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.
8. SETTING THE SENSITIVITY CONTROL. After alignment is completed, set signal generator to 600 Kc and adjust its output to 1.3 microvolts. Adjust the sensitivity control to provide 1 watt output (1 watt = 1.79 volts on output meter).
9. ANTENNA TRIMMER ADJUSTMENT. Once steps 7A, B, C, D & 8 have been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
		CHASSIS PARTS - ELECTRICAL
		CAPACITORS
C-1	21B77562	Ceramic: 100 mmf 500V
C-2	20K485811	Trimmer, variable mica: range 50 to 180 mmf (on same bracket as C-7 & C-22 and sold only as assembly)
C-3	8A4529	Paper: .006 mf 100V
C-4	8A13514	Paper: .05 mf 100V
C-5	8A13514	Paper: .05 mf 100V
C-6	21K70720	Molded: 5 mmf 500V
C-7	20K485811	Trimmer, variable mica: range 50 to 180 mmf (on same bracket as C-2 & C-22 and sold only as assembly)
C-8	8K13166	Paper: .1 mf 400V
C-9	21R6513	Mica: 50 mmf 300V
or	21K74661	Ceramic: 50 mmf 300V
C-12	8A14791	Paper: .05 mf 400V
C-13	8A17028	Paper: .5 mf 100V
C-14	8A19133	Paper: .5 mf 100V
C-15	8A13514	Paper: .05 mf 100V
C-16	21R6513	Mica: 50 mmf 300V
or	21K74661	Ceramic: 50 mmf 300V
C-17	8A71911	Paper: .03 mf 400V
C-18	21R6639	Mica: 500 mmf 500V
C-19	8A12840	Paper: .006 mf 1600V
C-20	8K23690	Paper: .01 mf 400V
C-21	23A473015	Electrolytic: 30-30-20 mf/ 350-300-25V
C-22	20K485811	Trimmer, variable mica: range 395 to 470 mmf (on same bracket as C-2 & C-7 and sold only as assembly)
		CAPACITOR-RESISTOR
CR-1	21A473040	Capacitor-Resistor: 100 mmf 47,000 ohms, 100 mmf
		FUSE
F-1	65A10266	10 Amp (3AG)
		VIBRATOR
G-1	48B3333	Non-sync: 4-pin
		COILS
L-1 &		
L-2*	24B71881	RF & Antenna Coil: (Specify color of paint dots on old coil when ordering)
L-3*	24B71879	Oscillator Coil (Specify color of paint dots on old coil when ordering)
L-4	24B70227	Oscillator padder coil: complete with iron tuning core
L-5	24A472535	Choke, hash
		SPEAKER
LS-1	50B76582 or 50B473955	5-1/4" PM: 3.2 ohm VC
		RESISTORS
		Note: All resistors are 1/2W, 20% insulated carbon type, unless otherwise specified.
R-1	6R6032	470,000

*Part of Tuner MT-59

REF. NO.	PART NO.	DESCRIPTION
R-2	6R3992	150
R-3	18K77552	Sensitivity Control: 700 ohms
R-4	6R6075	100,000
R-5	6R6056	47,000
R-6	6R476060	10,000 2W
R-7	6R6001	68,000
R-8	6R3992	150
R-9	6R6010	330
R-10	6R5614	56 10%
R-11	6R5614	56 10%
R-12	18A480773	Volume Control: 500,000; with SPST switch
R-13	6R6004	1 Meg
R-14	6R6004	1 Meg
R-15	6R6161	1500
R-16	6R2118	3.3 Meg
R-17	6R6032	470,000
R-18	6R6015	220,000
R-19	6R6336	270 10% 1W
R-20	6R476004	1000 2W
R-21	6R6054	10,000
		SWITCHES
S-1		Power Switch (Part of volume control)
		SHIELD
SH-1 &		
SH-2	30K472998	Cable, shielded: 5" long, single conductor
		SPARK PLATE
SP-1	1X472741	Spark Plate Assembly
		TRANSFORMERS
T-1 &		
T-2	24B76553	Diode or IF, 455 Kc: complete with padding capacitors and tuning iron cores, but less shield
T-3	25B70171	Output
T-4	25B472533	Power
		TUNER
	1X472702	Manual Tuner MT-59
		CHASSIS PARTS - MECHANICAL
	42A4215	Clip, vibrator grounding
	58A480774	Coupling, tinnerman shaft (on volume control)
	1X70646	Receptacle, antenna
	5S7771	Rivet: .088 x 3/16 steel; nkl pl (tube socket mtg)
	5S7706	Rivet: .122 x 1/8 steel; nkl pl (terminal strip mtg and sensitivity control mtg)
	5S7707	Rivet: .122 x 5/32 steel; nkl pl (tube socket mtg)
	5S7701	Rivet: .122 x 3/16 steel; nkl pl (vibrator grounding clip mtg and output trans mtg)
	3S8140	Screw, sheet metal: #8 x 3/16 PKZ plain hex head; cad pl (tuner mtg)
	3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head;cad pl (spark plate assembly & capacitor assembly mtg)
	3S3397	Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl (pwr trans mtg)
	26A472747	Shield, hash
	1A71049	Shield & Sleeve Assembly (for T-1 & T-2)
	9A70208	Socket, tube: 6 prong (for vibrator)
	9A472534	Socket, tube: miniature; 7 prong
	9A6788	Socket, tube: octal
	31K37504	Strip, terminal: 1 insulated lug, #1 mtg
	31K86126	Strip, terminal: 2 insulated lugs, #2 mtg
	31A472573	Strip, terminal: 2 insulated lugs, #2 mtg
	7A472614	Support, vol. cont. shaft alignment
	4S7555	Washer, flat: 1/4 x .128 x .033 thick; cad pl (output trans mtg)
		HOUSING PARTS
	13K580617	Escutcheon (complete)
	1X580718	Housing, front: includes 2 grounding wipers; less escutcheon
	15K5R0640	Housing, rear
	5S7730	Rivet: .122 x 1/8 steel; antique copper finish (grounding wiper mtg)
	3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (escutcheon mtg)
	3S7456	Screw, sheet metal: #8 x 1/4 PKA slotted acorn head; antique copper finish (housing screws)
	3S2696	Screw, sheet metal: #10 x 3/8 PKA plain hex washer head; cad pl (spkr mtg)
	39K470032	Wiper, grounding
		ACCESSORIES
	3A51494	Bolt, 'J' (receiver mtg)
	8A4491	Capacitor, generator
	1X74340	Lead Assembly, dial light: complete with bulb
	9B473111	Lead Assembly, fuse: complete with 10 Amp fuse
	4S7653	Lockwasher: 5/16 int-ext; cad pl (receiver mtg)
	3S2863	Nut; hex: 5/16-18 x 9/16 cad pl (receiver mtg)
	1K75148	Shaft, flexible: with hang; 24" long
	6X4141	Suppressor, distributor

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MODELS NC-108R, NC-108T

SECTION 1. INSTALLATION

1-1. Installation Procedure

After the NC-108 has been removed from its packing crate proceed as follows:

1. Connect a good external ground (water pipe or radiator) to the G terminal on the antenna terminal strip at the rear of the Receiver. This connection is not absolutely required but, in certain localities, better reception can be achieved by such a connection.

2. Connect the antenna as recommended in Section 1-2.

3. Connect the external audio amplifier, if one is used, as follows: connect the input terminals of the amplifier to the output terminals, X-2, at the rear of the NC-108, terminal 2 is the ground connection. The A.C. line plug of the amplifier may be connected to the A.C. socket, X-1, at the rear of the NC-108. With such a connection both units will receive their power from the same A.C. power source and the A.C. line switch on the NC-108 can be used to turn both units on and off.

4. Connect the power cord, P-1, to a 110/125 volt, 50/60 cycle, A.C. source of supply.

5. Set controls as recommended in Section 2 for the reception of stations.

1-2. Antenna Recommendations

The antenna input circuit of the NC-108 is arranged for operation from either a single-wire type, doublet type antenna or other types having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms.

The use of an efficient antenna with the NC-108 is strongly recommended if optimum results are to be obtained. Although, if the Receiver is to be operated in localities relatively close to F.M. transmitting stations, a single-wire antenna of from 2 to 10 feet may prove very satisfactory. The two types of antennae shown on Figure No. 2 have proven to be highly efficient. The drawing shows sufficient detail so that either one or the other type of antenna can

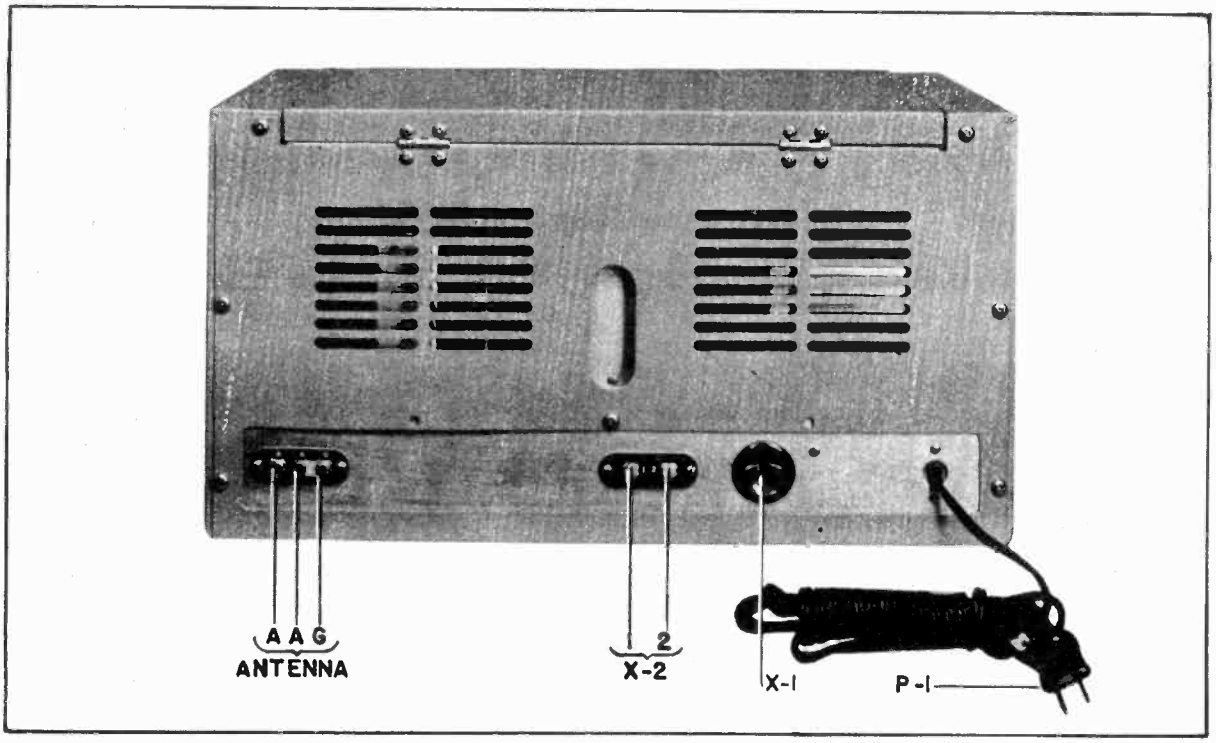

Figure No. 1. Rear View of Receiver

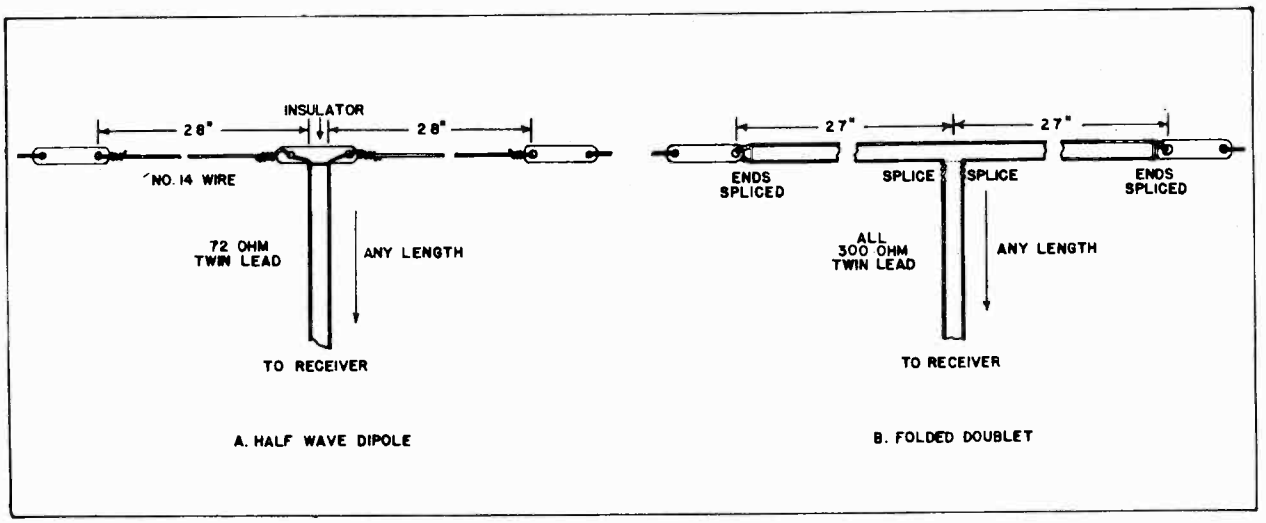

Figure No. 2. Typical Antenna Types

be easily assembled. It will be found that these types of antennae are directional, that is, best results are obtained with the antenna parallel to the transmitting antenna. Only by trial, of course, can the best position for the antenna be determined. There are also available various types of commercial antennae which are very satisfactory. Some of these are directional, while others are designed to give good results no matter what the position of the antenna is, relative to the transmitting antenna. Regardless of which type of antenna is employed, better reception will be obtained if the antenna is mounted in an area free of obstructions. Atop the roof usually proves a good mounting place.

The method of connecting the various types of antennae to the antenna terminal strip at the rear of the Receiver is as follows:

1. Single-wire type--Connect antenna to terminal A at the left of the strip.

2. Doublet type--Connect the antenna feeders to the two terminals marked A.

For either of the above type of connections attaching the metal link on the G terminal to the adjacent A terminal should be tried and left in the position giving the best reception.

SECTION 2. OPERATION

2-1. *Operating Instructions*

After the NC-108 is properly installed, as outlined in Section 2-1, it is placed in operation by adjusting the receiver controls in the following manner:

1. Set the MONITOR switch at On. This switch silences the loud-speaker on the NC-108 when it is in the Off position. The MONITOR switch positions do not effect the external amplifier-loud-speaker system connected to the NC-108.

2. Turn the VOLUME control to approximately 5. This control adjusts receiver volume from a minimum at zero to a maximum at 10.

3. Turn the TONE control from A.C. Off to zero thus turning On the Receiver and the external audio system, if the A.C. socket, X-1, is used as the power source for the external system. The Tone control progressively adjusts the tonal output of the NC-108 from normal receiver reproduction at 10 to an output at zero, in which the higher tones are subdued, emphasizing the lower tones.

4. Tune in the desired station by means of the Main Tuning knob. The dial scale is calibrated directly in megacycles and also is marked with channel indicating numbers. The correct dial setting for any specific station will be indicated as

follows:

a. NC-108T--maximum closing of the Tuning Eye.

b. NC-108R--maximum deflection of the Tuning Meter pointer.

After the four steps above have been completed, the operator may readjust the VOLUME and TONE controls to achieve the desired output characteristics of volume and tone, respectively.

2-2.. *Operation with an External Audio System*

After the external amplifier-loudspeaker system, to be used with the NC-108, has been installed as outlined in Section 2-1, operation of both units is accomplished as follows:

1. Initial adjustment of the NC-108 is the same as though it were to be used alone, and the procedure in Section 2-1 should be followed.

2. After the desired station has been properly tuned in on the NC-108, set the MONITOR switch at Off and adjust the external amplifier controls (volume and tone) for the desired output from the external loud-speaker.

It is important that the control adjustments of the NC-108 are accomplished before those of the external amplifier.

It should be noted that use of the A.C. socket, X-1, as the power source for the external audio system will permit extreme flexibility in the placement of units. After the completion of the initial adjustments, the NC-108 may be located at the operating position and the external audio system may be placed at a remote position.

SECTION 3. ALIGNMENT DATA

3-1. *General*

The alignment of the NC-108 may be divided into two steps:

1. Intermediate Frequency Amplifier Alignment.

2. R.F. Amplifier Alignment
   a. H.F. Oscillator
   b. Mixer and R.F. Amplifier

The necessity for any realignment may be determined by checking the performance of the NC-108 against its normal operation, as outlined in Section 2, and the dial calibration. It is recommended that any indicated realignment be accomplished by experienced personnel.

3-2. *I.F. Amplifier Alignment*

The intermediate frequency of the NC-108 is 10.7 megacycles. The three I.F. transformers and the ratio detector transformer have permeability tuned iron-core inductors with screw adjustments for alignment purposes. The inductor adjustments L-3, L-5, L-7 and L-11 are accessible from the top inside of the cabinet and the inductor adjustments L-4, L-6, L-8 and L-10 from the bottom inside of the cabinet. See Figure Nos. 3 and 4.

The alignment procedure is as follows:

1. Connect the "high" output lead of an accurately calibrated signal generator to the stator of the mixer portion, C-2C, of the main tuning capacitor and the ground lead to any convenient grounded point on the chassis. Set the signal generator at 10.7 megacycles and turn the modulation off.

2. Connect the D.C. volt probe of a high-impedance vacuum tube voltmeter to the junction of R-27 and C-36 (diode load) and the common lead to chassis. Use the 10 volt scale of the meter.

3. Connect the power cord of the NC-108 to a 110/125 volt, 50/60 cycle, A.C. source of supply.

4. Set the VOLUME control at zero.

5. Set the MONITOR switch at OFF.

6. Set the TONE control at zero.

7. Adjust the attenuator of the signal generator for a reading of approximately 3 volts on the voltmeter. (The diode load voltage is negative with respect to chassis.)

8. Adjust the I.F. inductors L-3 thru L-8 and L-10 for maximum, as indicated on the voltmeter, retarding the attenuator as necessary to maintain a low reading in the

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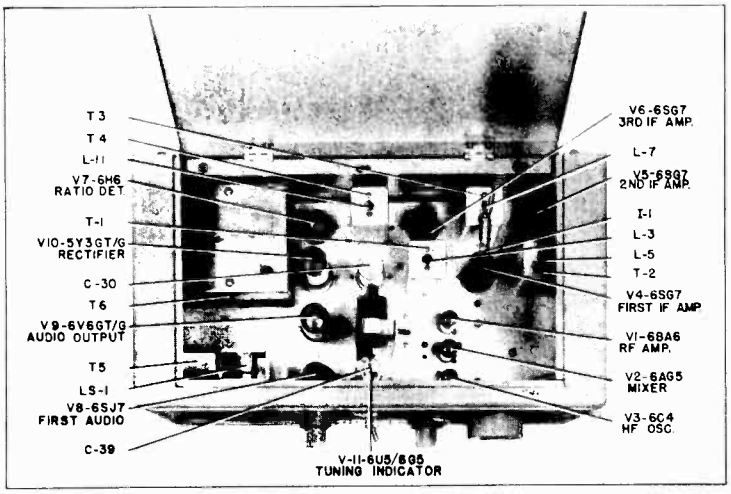


Figure No. 3. Top View of Receiver

vicinity of 3 volts on the voltmeter. The maintenance of a low meter reading is recommended to assure proper alignment.

9. Increase the attenuator of the signal generator until a reading of 10 volts is obtained on the voltmeter.

10. Connect the D.C. volt probe of the voltmeter to the junction of R-29 and C-37. Adjust the secondary inductor L-11 for a reading of 5 volts on the voltmeter without disturbing the setting of the attenuator of the signal generator.

11. Check the voltmeter reading with the voltmeter probe connected to R-27 and C-36. Repeat the adjustments of L-10 and L-11, as necessary, until the voltmeter reading obtained at R-29 and C-37 is one-half the reading at R-27 and C-36.

3-2. R.F. Amplifier Alignment

The R.F. amplifier, mixer and H.F. oscillator stages have variable trimmer capacitors, C-1, C-9 and C-5 respectively, for alignment adjustments. See Figure No. 4. Alignment is accomplished using an accurate test signal of 108 megacycles. The signal source may be a signal generator, crystal oscillator or an F.M. broadcast station of known frequency near the upper frequency limit of the NC-108. The alignment procedure is as follows:

1. Connect the signal source to the two A antenna terminals; disconnect the metal link. In the case where a signal generator is used, make the connection through a 300 ohm dummy antenna. In the case where the signal from an F.M. broadcast station is used, connect the antenna to the antenna terminals.

2. Connect the power cord of the NC-108 to a 110/125 volt, 50/60 cycle, A.C. source of supply.

3. Set the MONITOR switch at On.

4. Set the VOLUME control at approximately 5.

5. Set the TONE control at 10.

6. Set the main tuning dial pointer to the exact frequency of the test signal.

7. Adjust the H.F. oscillator trimmer capacitor, C-5, to receive the test signal.

8. Adjust trimmers C-1 and C-9 for maximum gain as observed on the visual tuning indicator.

9. Check step 7 and repeat steps 7 and 8 as necessary.

SECTION 4. MAINTENANCE AND TEST DATA

4-1. Circuit

A stage outline of the circuit employed in the NC-108 is given below together with the tube associated with each stage:

R.F. Amplifier	6BA6
Mixer	6AG5
H.F. Oscillator	6C4
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Third I.F. Amplifier	6SG7

Ratio Detector.....6H6
First Audio.....6SJ7
Audio Output.....6V6GT/G
Rectifier.....5Y3GT/G
Tuning Indicator.....6U5/6G5

The tuning indicator tube, 6U5/6G5, is used on the NC-108T only.

4-2. *General Maintenance Data*

The NC-108 is designed and constructed to assure a long period of uninterrupted service. A few service hints are given below to aid in locating individual components which, due to age or weakness, cause abnormal operation of the NC-108.

Vacuum tube failure may be evidenced by reduction in sensitivity, intermittent operation or an inoperative Receiver. Tubes may be checked in suitable tube testing equipment, or by replacement with tubes of proven quality. Care must be taken that tubes removed for checking are returned to their original sockets. Tubes of the same type will vary slightly in their individual characteristics and selection of a new tube that closely approximates the replaced tube will reduce the necessity of realignment.

Bypass or filter capacitors which become open may cause decreased sensitivity, oscillation, or complete failure of the Receiver. The defective unit can be located by temporarily connecting a good capacitor in parallel with each suspected capacitor. Leaky or short-circuited capacitors can be detected by an ohmmeter check; a zero resistance reading of the ohmmeter will indicate a shorted capacitor.

Defective resistors, sometimes caused by capacitor failure in associated circuits, can be definitely located by measuring the resistance of each resistor. The Schematic Diagram should be consulted to ascertain that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement. An overloaded resistor may be located by visual inspection if the resistor becomes scorched due to excessive heating.

4-3. *Voltage Tabulation*

The measurements of voltage shown on the following table are tabulated using a high-impedance vacuum tube voltmeter with a line voltage of 115 volts and the antenna disconnected. The control settings to be observed are as follows:

1. VOLUME control at zero.
2. Main tuning dial pointer at low frequency limit.
3. TONE control at zero.
4. MONITOR switch at On.

All voltages are measured between specified terminal and chassis.

TUBE TERMINAL	PIN	VOLTS ±15%
R.F. Amp. Grid	1	-.76
R.F. Amp. Plate	5	208
R.F. Amp. Screen	6	90
R.F. Amp. Cathode	2-7	0
Mixer Grid	1	0
Mixer Plate	5	203
Mixer Screen	6	173
Mixer Cathode	2-7	3.7
H.F. Osc. Plate	1	90
H.F. Osc. Grid	6	-6
H.F. Osc. Cathode	7	0
First I.F. Amp. Cathode	3-5	0
First I.F. Amp. Grid	4	-.76
First I.F. Amp. Screen	6	103
First I.F. Amp. Plate	8	187
Second I.F. Amp. Cathode	3-5	0
Second I.F. Amp. Grid	4	-.8
Second I.F. Amp. Screen	6	100
Second I.F. Amp. Plate	8	190
Third I.F. Amp. Cathode	3-5	0
Third I.F. Amp. Grid	4	0
Third I.F. Amp. Screen	6	110
Third I.F. Amp. Plate	8	175
Ratio Det. Plate No. 2	3	-.45
Ratio Det. Plate No. 1	5	-.1
Ratio Det. Cathode No. 2	4	-.1
Ratio Det. Cathode No. 1	8	0
First Audio Grid	4	0
First Audio Cathode	5	1.35
First Audio Screen	6	36
First Audio Plate	8	73
Audio Output Plate	3	201
Audio Output Screen	4	208
Audio Output Grid	5	0
Audio Output Cathode	8	10.5
Tuning Indicator Plate	2	12*
Tuning Indicator Grid	3	-.1*
Tuning Indicator Target	4	208*
Tuning Indicator Cathode	5	0*
Rectifier Filament	2	235
Rectifier Plate No. 2	4	275 A.C.
Rectifier Plate No. 1	6	275 A.C.
Rectifier Filament	8	235

* Used on NC-108T only.

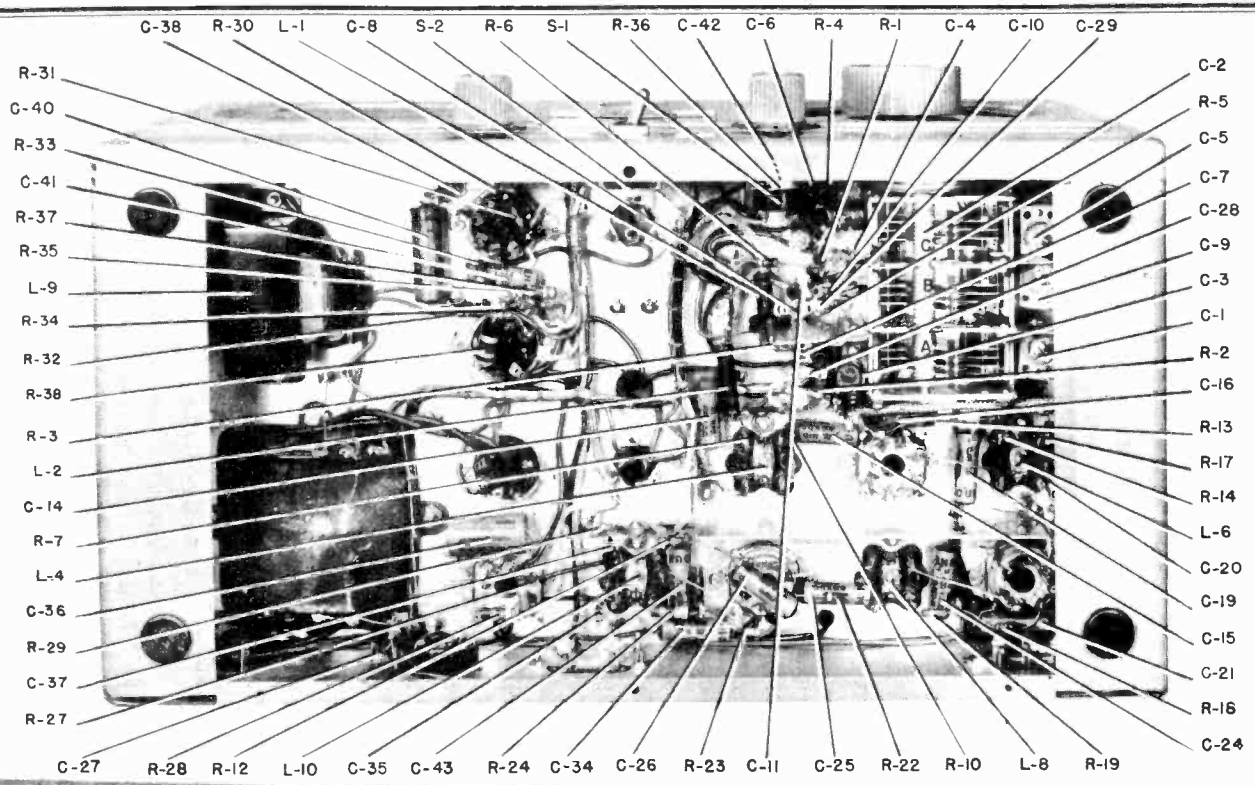
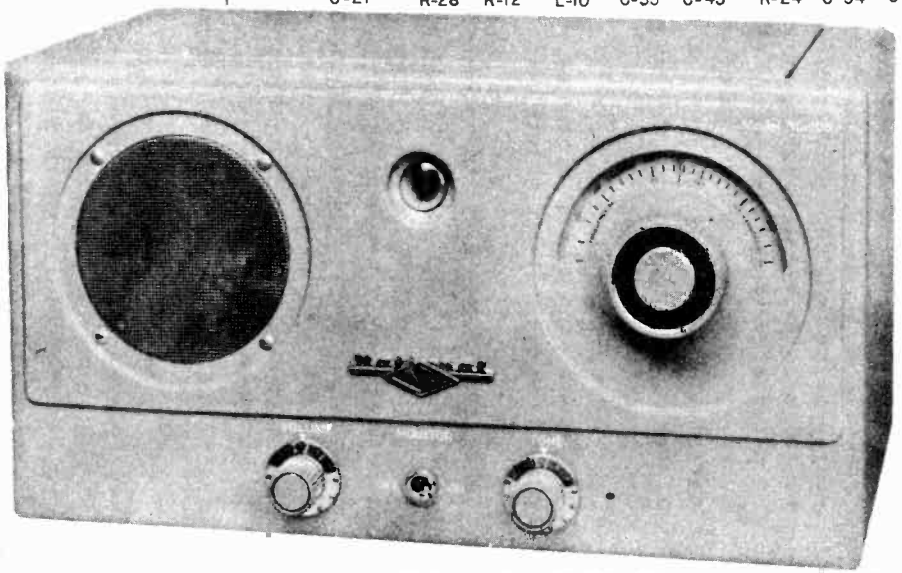


Figure No. 4. Bottom View of Receiver



The only electrical difference between the NC-108T, table model, and the NC-108R, rack model, is in the type of tuning indicator circuit used. The NC-108T employs a tuning eye tube, and the NC-108R employs a milliameter, for use as a visual tuning indicator.

The milliameter pointer on the NC-108R should be at the first scale marker with the Receiver turned on and with no signal input. If correction is required it is made by the screw-adjustment on the bezel of the meter.

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SECTION 5. PARTS LIST

Symbol	Function	Rating
	CAPACITORS	
C-1	R.F. Amp. Trimmer	Ceramic, Var. 5-20 mmf.
C-2	Main Tuning	Air, Var. 3 Sec. Ganged
C-2A	R.F. Amp. Tuning	4-24 mmf., Part of C-2
C-2B	H.F. Osc. Tuning	4-24 mmf., Part of C-2
C-2C	Mixer Tuning	4-24 mmf., Part of C-2
C-3	R.F. Amp. Grid Coupling	Ceramic, 50 mmf. 500 vdcw
C-4	H.F. Osc. Plate Fil.	Ceramic, 100 mmf. 500 vdcw
C-5	H.F. Osc. Trimmer	Ceramic, Var. 5-20 mmf.
C-6	H.F. Osc. Grid Coupling	Ceramic, 100 mmf. 500 vdcw
C-7	R.F. Amp. Screen Bypass	Ceramic, 100 mmf. 500 vdcw
C-8	Mixer Grid Coupling	Ceramic, 100 mmf. 500 vdcw
C-9	Mixer Trimmer	Ceramic, Var, 5-20 mmf.
C-10	Mixer Cathode Bypass	Ceramic, .001 mfd 500 vdcw
C-11	Mixer Screen Bypass	Ceramic, 100 mmf. 500 vdcw
C-12	T-1 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-13	T-1 Sec. Tuning	Ceramic, 100 mmf. 500 vdcw
C-14	Mixer Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-15	1st. I.F. Amp. Grid	Paper, 0.01 mfd. 400 vdcw
C-16	1st. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-17	T-2 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-18	T-2 Secondary Tuning	Ceramic, 100 mmf. 500 vdcw
C-19	1st. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-20	2nd. I.F. Amp. Grid Fil.	Paper, 0.01 mfd. 400 vdcw
C-21	2nd. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-22	T-3 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-23	T-3 Secondary Tuning	Ceramic, 100 mmf. 500 vdcw
C-24	2nd. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-25	3rd. I.F. Amp. Cathode Bypass	Paper, 0.01 mfd. 400 vdcw
C-26	3rd. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-27	A.C. Line Bypass	Paper, 0.01 mfd. 400 vdcw
C-28	R.F. Amp. Filament Bypass	Ceramic, 100 mmf. 500 vdcw
C-29	Mixer Filament Bypass	Ceramic, 100 mmf. 500 vdcw
C-30		Elect, 10+10 mfd 450 vdcw
C-30A	Power Supply Filter	Part of C-30
C-30B	Power Supply Filter	Part of C-30
C-31	T-4 Primary Tuning	Mica, 100 mmf. 500 vdcw
C-32	T-4 Secondary Tuning	Mica, 200 mmf. 500 vdcw
C-33	T-4 Secondary Tuning	Mica, 200 mmf. 500 vdcw
C-34	3rd. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw

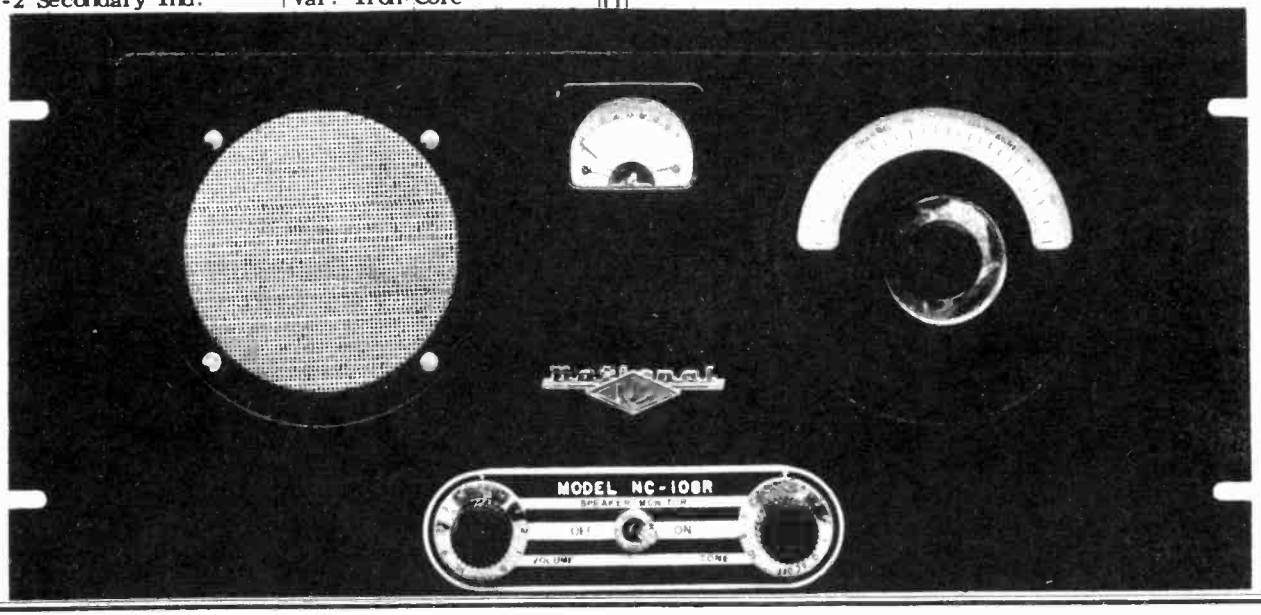
Symbol	Function	Rating
	CAPACITORS (*Continued*)	
C-35	Ratio Det. Load	Ceramic, 0.001 mfd 500 vdcw
C-36	Ratio Det. Load	Elect, 10 mfd 50 vdcw
C-37	De-emphasis	Ceramic, 0.001 mfd 500 vdcw
C-38	Audio Coupling	Paper, 0.01 mfd. 400 vdcw
C-39		Elect, 25+25+8 mfd
C-39A	1st. Audio Cathode Bypass	25 mfd, 50 vdcw
C-39B	1st. Audio Plate Fil.	8 mfd, 450 vdcw
C-39C	Audio Output Cathode Bypass	25 mfd, 50 vdcw
C-40	1st. Audio Screen Bypass	Paper, 0.1 mfd. 400 vdcw
C-41	Audio Output Coupling	Paper, 0.01 mfd. 400 vdcw
C-42	Tone	Paper, 0.005 mfd, 500 vdcw
C-43	B Plus Bypass	Paper, 0.01 mfd. 400 vdcw
	RESISTORS	
R-1	H.F. Osc. Plate Fil.	Fixed, 33,000 ohms 1 W
R-2	R.F. Amp. Grid	Fixed, 100,000 ohms 1/2 W
R-3	R.F. Amp. Screen Fil.	Fixed, 47,000 ohms 1/2 W
R-4	H.F. Osc. Grid	Fixed, 47,000 ohms 1/2 W
R-5	Mixer Cathode	Fixed, 2,200 ohms 1/2 W
R-6	Mixer Screen Fil.	Fixed, 100,000 ohms 1/2 W
R-7	Mixer Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-8	T-1 Primary Load	Fixed, 47,000 ohms 1/2 W
R-9	T-1 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-10	1st. I.F. Amp. Grid	Fixed, 220,000 ohms 1/2 W
R-11*	Tun. Indicator Plate Load	Fixed, 1,000,000 ohms 1/2W
R-12	A.V.C. Fil.	Fixed, 2,200,000 ohms 1/2W
R-13	1st. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-14	1st. I.F. Amp. Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-15	T-2 Primary Load	Fixed, 47,000 ohms 1/2 W
R-16	T-2 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-17	2nd. I.F. Amp. Grid	Fixed, 220,000 ohms 1/2 W
R-18	2nd. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-19	2nd. I.F. Amp. Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-20	T-3 Primary Load	Fixed, 47,000 ohms 1/2 W
R-21	T-3 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-22	3rd. I.F. Amp. Cathode	Fixed, 100 ohms 1/2 W
R-23	3rd. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-24	3rd. I.F. Amp. Plate Fil.	Fixed, 4,700 ohms 1/2 W
R-25	Ratio Det. Output	Fixed, 47,000 ohms 1/2 W
R-26	Ratio Det. Output	Fixed, 47,000 ohms 1/2 W
R-27	Diode Load	Fixed, 15,000 ohms 1/2 W
R-28*	Diode Load	Fixed, 4,700 ohms 1/2 W
R-28**	Diode Load	Fixed, 10,000 ohms 1/2 W

RESISTORS (Continued)		
R-29	De-emphasis	Fixed, 33,000 ohms 1/2 W
R-30	Volume Control	Variable, 500,000 ohms
R-31	1st. Audio Cathode	Fixed, 2,200 ohms 1/2 W
R-32	1st. Audio Screen Fil.	Fixed, 1,000,000 ohms 1/2W
R-33	1st. Audio Plate Load	Fixed, 220,000 ohms 1/2 W
R-34	1st. Audio Screen and Plate Fil.	Fixed, 22,000 ohms 1/2 W
R-35	Audio Output Grid	Fixed, 470,000 ohms 1/2 W
R-36	Tone Control	Variable, 500,000 ohms
R-37	Audio Output Grid Series	Fixed, 470,000 ohms 1/2 W
R-38	Audio Output Cathode	Fixed, 330 ohms 2 W
R-39**	Meter Adjusting	Fixed, 8,200 ohms 1/2 W

MISCELLANEOUS		
I-1	Dial Lamp	6-8 V., 0.15 Amp.
I-2**	Meter Lamp	6-8 V., 0.15 Amp.
L-1	R.F. Amp. Plate Load	Choke, 4 microhenries
L-2	B Plus Fil.	Choke, 4 microhenries
L-3	T-1 Primary Ind.	Var. Iron-Core
L-4	T-1 Secondary Ind.	Var. Iron-Core
L-5	T-2 Primary Ind.	Var. Iron-Core
L-6	T-2 Secondary Ind.	Var. Iron-Core

MISCELLANEOUS (Continued)		
L-7	T-3 Primary Ind.	Var. Iron-Core
L-8	T-3 Secondary Ind.	Var. Iron-Core
L-9	Fil. Choke	10 Henries, 100 ma.
L-10	T-4 Primary Ind.	Var. Iron-Core
L-11	T-4 Secondary Ind.	Var. Iron-Core
M-1**	Tun. Meter	0-1 Ma.
P-1	A.C. Power Plug	2 Contacts
S-1	A.C. Line Switch	D.P.D.T.
S-2	Monitor Switch	Toggle, S.P.D.T.
T-1	1st. I.F. Trans.	10.7 Mc.
T-2	2nd. I.F. Trans.	10.7 Mc.
T-3	3rd. I.F. Trans.	10.7 Mc.
T-4	Ratio Det. Trans.	10.7 Mc.
T-5	Audio Output Trans.	5,000/4 Ohms
T-6	Power Trans.	115 V., 50/60 cycles
X-1	A.C. Connector	2 Pole
X-2	Amplifier Connector	2 Terminals
LS-1	Loud-speaker	5" P.M.

* Used on NC-108 T only.
** Used on NC-108 R only.



NATIONAL COMPANY, INC.

MODELS NC-108R, NC-108T

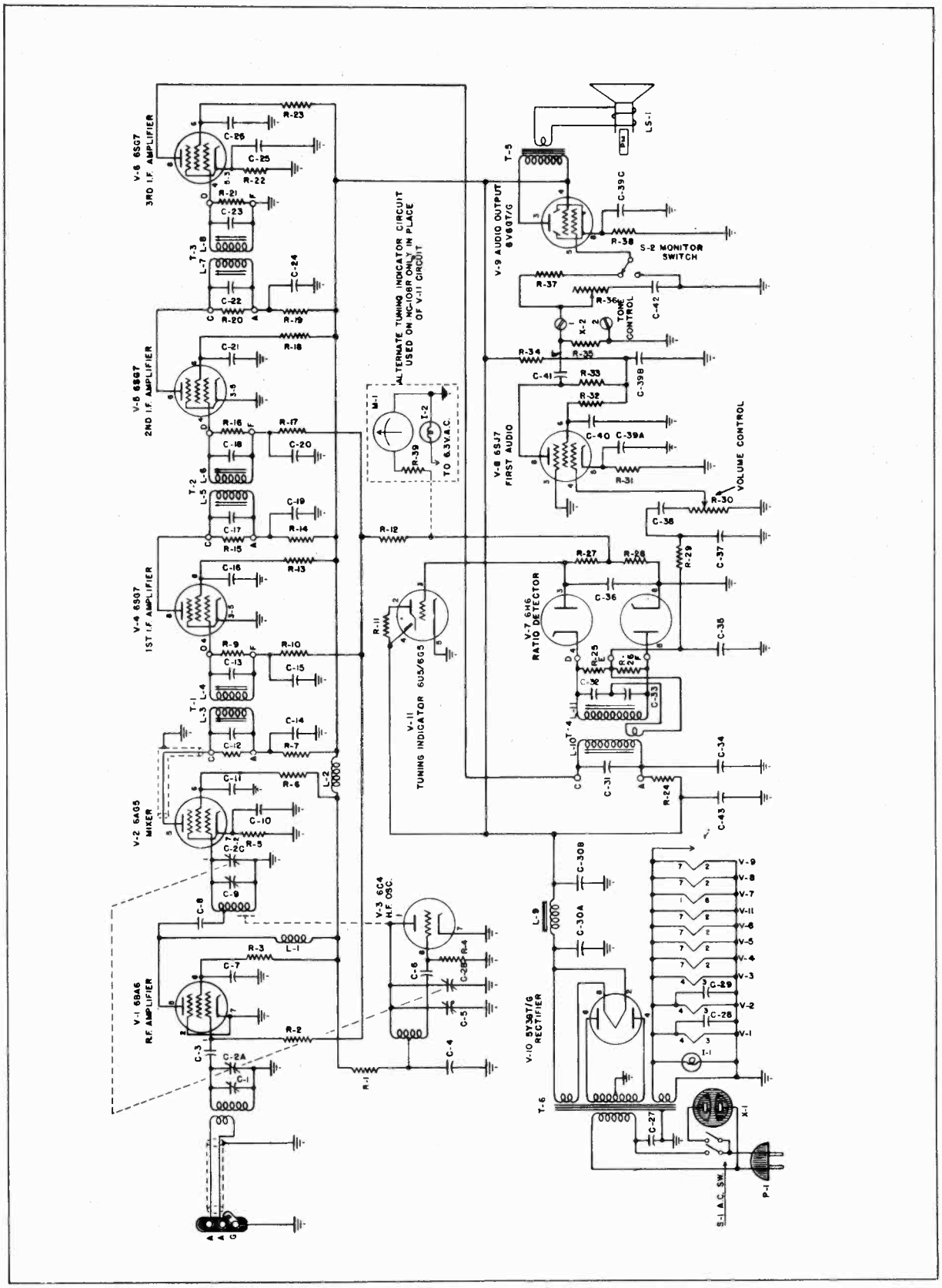


Figure No. 5. Schematic Diagram NC-108 Receiver

MODELS NC-108R,
NC-108T

NATIONAL COMPANY, INC.

ADDENDA
NC-108 Receiver

1. A DE-EMPHASIS switch is mounted on the top side of the receiver chassis to the right of the power transformer. In the ON position, the de-emphasis circuit, R-29 and C-37, in the NC-108 functions in a manner to remove from the incoming signal the pre-emphasis (over-emphasis of the higher frequency tones) that is ordinarily imposed on the signal at the transmitter. The listener will, therefore, enjoy reproduction approaching "live" programs. In the OFF position, the DE-EMPHASIS switch alters the de-emphasis circuit in the NC-108 and the pre-emphasis on the signal is, for the most part, retained resulting in reproduction in which the higher frequency tones are over-emphasized.

In operation of the NC-108 the listener should select the position of the DE-EMPHASIS switch which provides, for him, the most enjoyable range of frequency tones. For example, if the NC-108 is used with an external amplifier-loud-speaker, either of which has a tendency to subdue the higher frequency tones, setting the DE-EMPHASIS switch at OFF will result in more realistic reproduction. The action of the TONE control is the same as described in paragraph 2-1 of Section 2, except that the range of the control will depend on the setting of the DE-EMPHASIS switch.

Schematically, the DE-EMPHASIS switch is an S.P.S.T. type and is connected between the ground side of capacitor, C-37, and chassis.

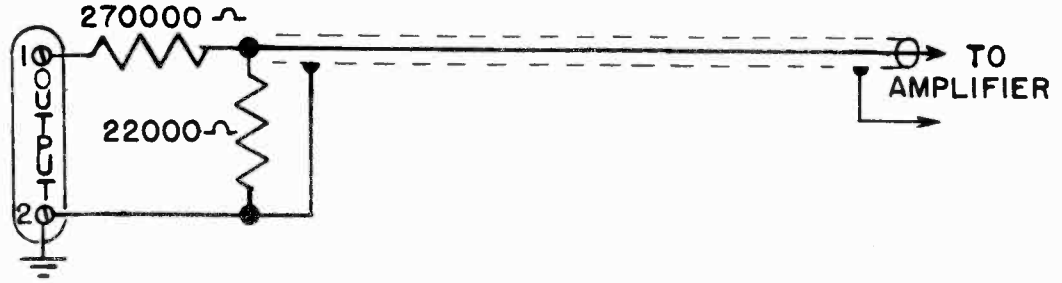
2. The coupling capacitor, C-8, is connected directly to the grid of the mixer tube instead of to the tap on the mixer coil as shown on the Schematic Diagram.

3. The output impedance of the NC-108 is approximately 150,000 ohms and approximately 11 volts, maximum, of undistorted output is available at the output terminals. Most amplifiers have high-impedance input circuits so that the NC-108 will work efficiently with such an amplifier without the use of a matching transformer. The 11 volts of output is more than ample, as the average amplifier requires approximately one volt for operation.

When using the NC-108 with an external amplifier, it is recommended that the interconnection be made using a low-loss shielded cable with a length not exceeding 10 feet and preferably as short as possible. This recommendation is made to prevent the attenuation of high frequency tones due to the capacity of the interconnecting cable.

However, if the NC-108 is to be used in an installation requiring a cable longer than 10 feet, a voltage divider network connected across the output terminals of the NC-108 will compensate for the resulting loss of high-frequency tones due to the longer cable. This network will result in an output with less gain at the NC-108 but this loss in gain can be tolerated when using a high gain amplifier.

The following drawing illustrates the method and components used to install the voltage divider network.



1. *Operating Instructions*

Operating instructions for the NC-183 Receiver are presented here in a non-technical manner to enable those persons not familiar with a communications-type Receiver to operate the NC-183 efficiently with a minimum of effort. To obtain the maximum in listening pleasure it is recommended that these two pages are thoroughly read before operation of the NC-183 is attempted, although no damage to the Receiver can result through improper adjustment of controls. Installation instructions have been intentionally omitted here because it is recommended that an experienced technician install the NC-183. However, in the event that an inexperienced person must, of necessity, install the Receiver, adhering to the instructions given in Section 2-3 of this Instruction Manual will enable him to do so.

The illustration on this page, identifying and locating Receiver controls, shows the operating procedure to follow in the proper sequence. This same procedure follows with a brief explanation of what each control does. The reader should refer to Section 3 of the Instruction Manual if more detailed and technical information is desired. To tune the Broadcast and Short Wave bands the operating instructions are as follows:

1. Set the SEND-RECEIVE switch at RECEIVE. The SEND position of this switch silences the Receiver for a period of time after which immediate resumption of reception may be had by setting the switch at RECEIVE.

2. Set the A.V.C.-M.V.C. switch at A.V.C. Automatic Volume Control is provided when this switch is in the A.V.C. position to compensate for fluctuating volume due to fading.

3. Set the RADIO-PHONO switch at RADIO. The PHONO position of this switch is used when a record player or similar device is connected to the Phono Input jack at the rear of the Receiver.

4. Turn A.F. GAIN control to 5. Adjustment of the audio volume is made with this control from a minimum at 0 to a maximum at 10. The setting given here is for average volume and should be adjusted to suit the listener.

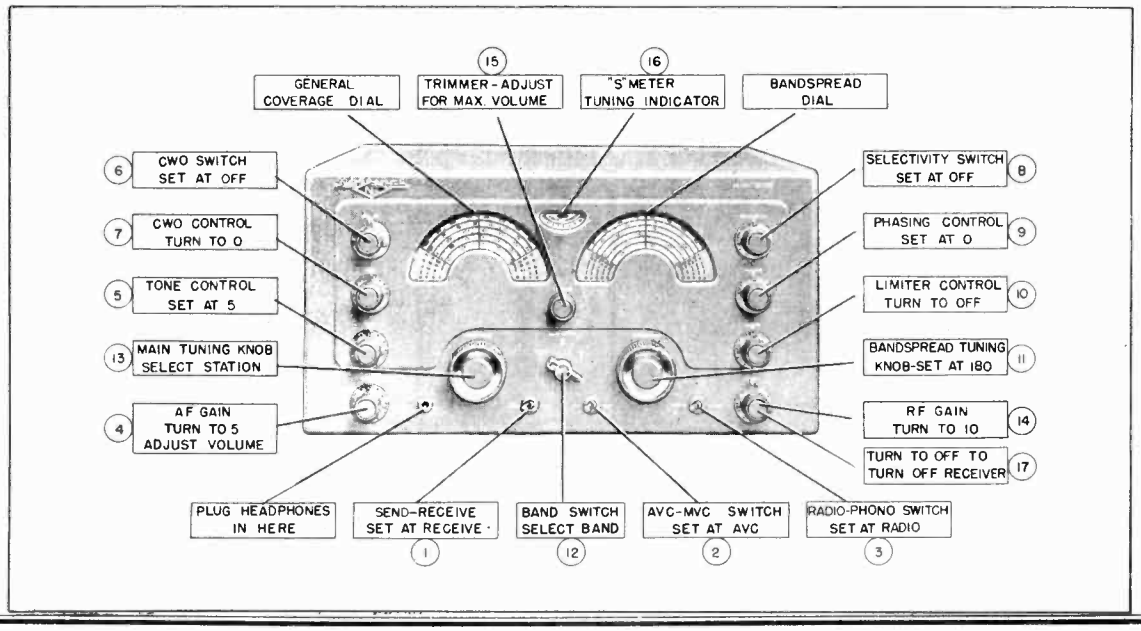
5. Set the TONE control at 5. A variable selection of tonal output from a bass tone at 0 to a tone at 10 in which the highs are predominant is provided by this control. The setting recommended here will give a normal tonal output but may be changed for different types of programs.

6. Set the C.W.O. switch at OFF. This switch is used only for the reception of code signals.

7. Turn the C.W.O. control to 0. This control is used only for the reception of code signals and does not effect receiver performance with the C.W.O. switch at OFF.

8. Set the SELECTIVITY switch at OFF. This switch is generally used only when interference by other stations is encountered. Its operation is somewhat complex and is not recommended for the inexperienced operator. See Section 3 for detailed instructions.

9. Turn the PHASING control to 0. The PHASING control is used in conjunction with the



SELECTIVITY switch.

10. Turn the LIMITER control to OFF. Reduction of interference caused by static, automobile ignition, etc., can be effected by turning on the LIMITER. Its action is increasingly effective as the control is turned towards 10.

11. Turn the BANDSPREAD tuning dial knob to the set mark at 180 on the linear scale of the BANDSPREAD dial. The BANDSPREAD dial knob and scale should be kept at the above setting when the MAIN TUNING dial knob and scale are used. However, the BANDSPREAD dial may be rotated to either side of the set mark if fine tuning is preferred for Short Wave or Amateur bands.

-NOTE-

The operator is now ready to adjust the tuning controls to select the desired station. Let us, for example, suppose that the desired station is one on the Broadcast band at 1,000 kilocycles.

12. Set the BAND SWITCH at E. The BAND SWITCH selects the band of frequencies to be tuned and is marked with designating letters which correspond to the markings at the edges and throughout the dial scales.

13. Turn the MAIN TUNING dial knob to set the pointer on the GENERAL COVERAGE dial at 1.0 on the E band. Stations on the GENERAL COVERAGE dial scale are selected by means of this control.

14. Turn R.F. GAIN control to 10. This is a dual-purpose control; when turned from A.C. OFF to ON the Receiver is turned on; when turned from 0 to 10 the sensitivity (ability to receive weak and distant stations) is progressively increased to a maximum at 10.

15. Adjust the TRIMMER control for maximum volume. After a station has been tuned in, adjust this control for best reception.

16. S-METER. Maximum deflection of the meter pointer indicates the dial and TRIMMER control setting for optimum tuning.

17. Shutting off the Receiver. To shut off the Receiver, turn the R.F. GAIN control to OFF. This is the only adjustment which completely shuts off the Receiver and the only one which need be made.

2. *Frequency Coverage*

The GENERAL COVERAGE dial has five scales; four of which are calibrated directly in megacycles and the other has a linear scale numbered 0 to 200. All markings of the Standard Broadcast Band, E, are bright red for clear identification. The other three scales have red letters throughout their range for band identification plus heavy black underlines locating short-wave features marked F, A, and P indicating Foreign, Amateur and Police bands, respectively. The BAND SWITCH positions are also marked with band letter designations to correspond to the markings at the edges and throughout the dial scales. Newspapers and other publications sometimes give the frequency of stations in kilocycles, and as the dial scales of the NC-183 are calibrated in megacycles conversion from kilocycles to megacycles will facilitate location of the station on the Receiver dial. This is done by pointing off three places to the left of the decimal point on the kilocycle figure, i.e., 1,000. kilocycles becomes 1.0 megacycles.

The following table lists each band by its designating letter and the frequency coverage of that band. The frequencies are listed in both megacycles and kilocycles. Also listed are the frequencies of short-wave features to be found on the various bands.

BAND	FREQUENCY COVERAGE		POLICE	INT. B'DCAST	AMATEUR
	Megacycles	Kilocycles	Megacycles	Megacycles	Megacycles
B	12.0 - 31.0	12,000 - 31,000		15.1 - 15.3 17.7 - 17.9 21.5 - 21.7	14.0 - 14.4 21.0 - 21.5 27.160 - 27.430 28.0 - 29.7
C	4.3 - 12.0	4,300 - 12,000		6.0 - 6.2 9.5 - 9.7 11.7 - 11.9	7.0 - 7.3
D	1.6 - 4.3	1,600 - 4,300	1.6 - 1.8 2.25 - 2.5 2.7 - 2.85		3.5 - 4.0
E	0.54- 1.6	540 - 1,600			

SECTION 1. DESCRIPTION

1-1. *General*

The new NC-183 is a deluxe Radio Receiver featuring performance and versatility "plus". Two R.F. stages give the NC-183 that extra measure of sensitivity and image rejection so often needed to insure uninterrupted reception. A double-diode noise limiter, effective on both phone and code reception, minimizes interference caused by external noise pulses. The selectivity characteristic of the NC-183 is adjustable over a wide range from broadband broadcast requirements to sharp amateur single-signal reception. Voltage regulated high-frequency and beat frequency oscillator circuits assures a minimum of frequency drift for both phone and code reception. Other highlights are an accessory connector socket, a push-pull audio output stage and an S-Meter, with a semi-permanent sensitivity adjustment, for signal strength readings of both phone and code signals.

The NC-183 provides reception of phone and code signals over its entire frequency range of 540 kcs. to 31 mcs. and 48 to 56 mcs. Calibrated bandspread tuning is furnished for the main amateur bands i.e., 6, 10-11, 20, 40 and 80 meters. Separate directly-calibrated dial scales with associated controls are used for general coverage and bandspread tuning.

1-2. *Circuit*

The NC-183 utilizes 14 tubes, plus a voltage regulator and rectifier, in a superhetrodyne circuit featuring circuit refinements such as two R.F. amplifier stages, a separate A.V.C. amplifier, a double-diode noise limiter and a push-pull audio output stage.

The circuit employed on all bands consists of two stages of radio frequency amplification, a first detector and separate stabilized high frequency oscillator, two intermediate frequency amplifier stages, a diode type second detector, an audio limiter, a high gain audio stage, a phase inverter and a push-pull audio output stage. The remainder of the Receiver includes automatic volume control, beat frequency oscillator, voltage regulator and rectifier circuits. The crystal filter is connected between the first detector and first I.F. stages.

1-3. *Tube Complement*

The NC-183 is supplied complete with tubes which are tested in the Peceiver at the time of alignment.

The tubes employed are as follows:

First R.F. Amplifier	6SG7
Second R.F. Amplifier	6SG7
First Detector	6SA7
H.F. Oscillator	6J5
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Second Detector-A.V.C. Detector	6H6
A.V.C. Amplifier	6AC7
Beat Frequency Oscillator	6SJ7
Noise Limiter	6H6
First Audio	6SJ7
Phase Inverter	6J5
Audio Output (2)	6V6GT/G
Voltage Regulator	OD3/VR-150
Rectifier	5U4G

1-4. *Tuning System*

The main tuning capacitor C-3 and the bandspread tuning capacitor C-4 are connected in parallel on all bands. Separate knobs with associated dial scales are used to operate these two capacitors to tune the frequency range of the Receiver in five bands as follows:

BAND	GENERAL COVERAGE	BANDSPREAD
A		48 - 56 Mc.
B	12 - 31 Mc.	27 - 30 Mc.
		14.0- 14.4 Mc.
C	4.3 - 12 Mc.	7.0- 7.3 Mc.
D	1.6 - 4.3 Mc.	3.5- 4.0 Mc.
E	0.54 - 1.6 Mc.	

As will be noted from the above table calibrated bandspread tuning is provided for the 6, 10-11, 20, 40 and 80 meter ama-

teur bands. This tuning system is extremely flexible, in that bandspread tuning may be employed to tune any portion of any band in the 540 kcs. to 31 mc. range.

Band changing is accomplished by means of a highly efficient bandswitch.

Tuning of the first R.F. stage on all bands can be readily adjusted to compensate for a wide range of antenna loading conditions by means of the front panel mounted antenna compensating capacitor.

1-5. *Noise Limiter*

A new concept in noise limiter design is employed in the NC-183 Receiver. This new limiter could be termed "double action plus" and the noise limiting action is equally effective whether receiving phone or code signals (C.W. oscillator On or Off). A threshold control on the front panel permits adjustments of the level at which limiting action starts.

1-6. *Crystal Filter*

The selectivity characteristic of the NC-183 is made adjustable by means of a crystal filter. This crystal filter is newly designed and incorporates features which make it highly flexible in its adjustments and superior in performance. The crystal filter provides uniform selectivity variation from the broad off position to the sharp number 5 position as well as phasing action for the attenuation of interfering signals.

1-7. *Signal Strength Meter*

An S-Meter for signal strength readings is associated with the A.V.C. circuit. The S-Meter scale is calibrated in S units from 1 to 9 with approximately 5 db per S unit and in db above S9 from 0 to 40 db. An adjustment is provided to enable the operator to change the above calibration if he so desires. For the purpose of comparing strong signals, which cause the S-Meter to read off-scale, with other weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. GAIN control. The "no signal" S-Meter reading does not require adjustment.

1-8. *Accessory Connector Socket*

A standard octal socket is mounted on the receiver chassis wired in a manner to permit connection of various accessories such as a narrow-band F.M. adaptor, crystal calibrator, etc. The drawing of the Accessory Connector Socket on the Schematic Diagram shows the various connections made to the pins of this socket and the voltages available. It will be noted that B+ and filament voltages are made available at this socket.

1-9. *Tone Control*

The tonal output of the NC-183 Receiver may be varied to suit the listener by means of the TONE Control. This control is helpful when receiving weak signals through interference.

1-10. *Antenna Input*

Antenna input terminals are provided at the rear of the Receiver. The input circuit is suitable for use with a single wire antenna, a balanced feed line or a low impedance (70 ohm) concentric transmission line. The average input circuit impedance is approximately 300 ohms.

1-11. *Audio Output*

Two audio output circuits are provided:

(1) The audio output leads are brought to the 3 prong output socket, at the rear of the Receiver, having both 8 and 500 ohm terminals and a common ground terminal. The loud-speaker furnished with the NC-183 is fitted with a cable and plug to connect to the 8 ohm terminal on the output socket, the 500 ohm terminal being available for connection to a 500 ohm line. Approximately 8 watts of undistorted audio output power is available at the output socket while the maximum power is 11 watts.

(2) A headphone jack is front-panel mounted and is wired so as to silence the loud-speaker on the insertion of a phone plug. The headphone load impedance is not critical allowing a wide range of headphone types to be used. If greater audio output is desired the headphone jack connection at terminal No. 2 on the audio output transformer (the 8 ohm tap) may be connected to terminal No. 3 (the 500 ohm tap).

1-12. *Phono Input Jack*

A phono input jack is mounted at the rear of the Receiver and can be used to

connect auxiliary apparatus, such as a record player, to the audio system of the Receiver. This input circuit is high impedance and feeds into the 6SJ7 first audio amplifier stage.. The RADIO-PHONO switch on the front panel must be at the Phono position when the phono input jack is used. The AUDIO GAIN and TONE controls are operative with this connection.

Most record players are terminated in a single shielded wire. The phono input jack on the NC-183 is the type that accomodates a phono tip plug and if the record player to be used is not fitted with such a plug one can be easily attached. If the output circuit of the record player is low impedance (less than 100,000 ohms) better results will be obtained if a suitable resistor, with a value as specified for the particular record player, is connected across the phono tip plug to properly load the record player output circuit.

1-13. *Power Supply*

The NC-183 Receiver is designed for operation from a 110/120 volt or 220/240 volt 50/60 cycle power source. The Receiver is shipped from the factory with the power transformer wired for 110/120 volt operation only. A few simple wiring changes in the dual primary circuit of the power transformer are necessary to change the NC-183 for 220/240 volt operation. These changes are made directly on the power transformer terminal lugs and are as follows:

(a) Remove the jumper between terminals 4 and 6 and between 5 and 7.

(b) Connect a jumper between terminals 5 and 6. A drawing of both possible primary circuits is shown on the Schematic Diagram.

Normal power consumption is approximately 125 watts. The built-in power unit supplies all voltages required by the heater and B supply circuits--130 milliamperes at 280 volts and 5.1 amperes at 6.3 volts, respectively. A 2 ampere fuse is connected in one side of the A.C. input line to protect the receiver circuits against any voltage surges in the power line or short circuits in the Receiver. This fuse is mounted in an extractor post at the rear of the Receiver and is easily removed for examination or replacement.

1-14. *Loud-Speaker*

The loud-speaker supplied with the NC-183 is a 10 inch permanent magnet field type and is mounted in a cabinet finished to match the Receiver. The loud-speaker impedance is 8 ohms and the attached plug connects to the 8 ohm Receiver output circuit.

SECTION 2. INSTALLATION

2-1. *Arrangement*

The Receiver and loud-speaker may be arranged in any desired position although it is not recommended that the loud-speaker be placed on top of the Receiver as undesirable "microphonics" may result.

2-2. *Antenna Recommendations*

The antenna input circuit of the Receiver is arranged for operation from either a single-wire antenna, a doublet antenna or other types having impedances of 70 ohms or more. The antenna terminal strip, at the rear of the Receiver, has three terminals, two are for antenna connections and the other for a ground. The ground terminal has connected to it a metal link which is used to ground one antenna lead as necessary. With balanced antenna systems, such as the doublet type, the metal link is not used. With an unbalanced system, such as the single-wire antenna, it is desirable to ground the unused antenna terminal by means of the metal link. For an unbalanced system of the concentric transmission line type, it is recommended that the outside of the concentric line be grounded directly to the ground lug below the antenna terminal strip. The external ground connection to the ground lug below the antenna terminal strip should be maintained at all times.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single wire type. An antenna length of from 50 to 100 feet is recommended. The

antenna lead-in should be connected to one antenna terminal and the metal link used to ground the other terminal.

For best impedance matching to the antenna input circuit, an antenna with a 70 to 300 ohm transmission line is recommended. If a doublet type with a 70 to 300 ohm balanced transmission line is used the metal grounding link should not be used. For optimum results the antenna should be cut to the proper length corresponding to the desired operating frequency. See Fig. No. 1. It must be remembered that an antenna installation of this type will have maximum efficiency over a narrow band of frequencies near the frequency for which the antenna was designed and will be most useful in installations where the Receiver is tuned to one frequency or narrow band of frequencies. For other frequencies it would be desirable to connect the two transmission line leads together at one antenna terminal and the metal link used to ground the other terminal. The antenna is thus utilized as a single wire type.

In an installation where the Receiver is to be used as the receiving unit in a transmitting station, the most efficient operation will usually result from use of the transmitting antenna as a receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type as the same antenna gain is available for both receiving and transmitting--a very desirable condition. For switching the antenna from transmitter to receiver, an antenna change-over relay with good high-frequency insulation is recommended. A second relay for controlling the transmitter plate supply and the Re-

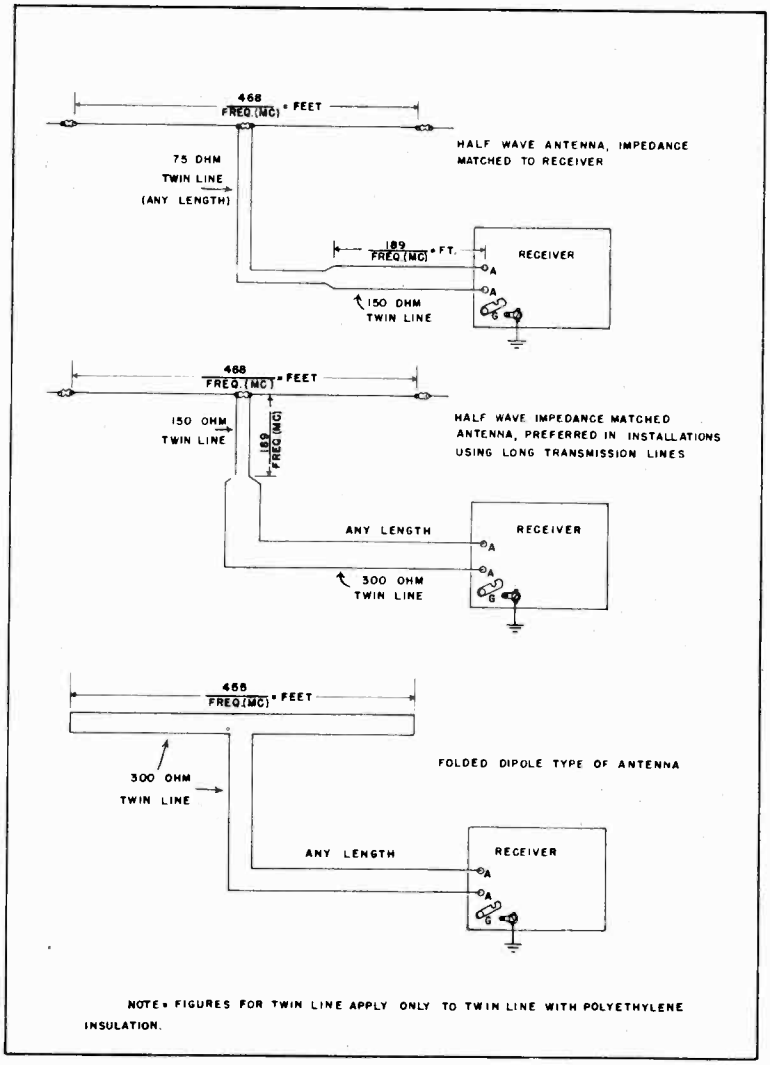


Figure No. 1. Typical Antenna Installations

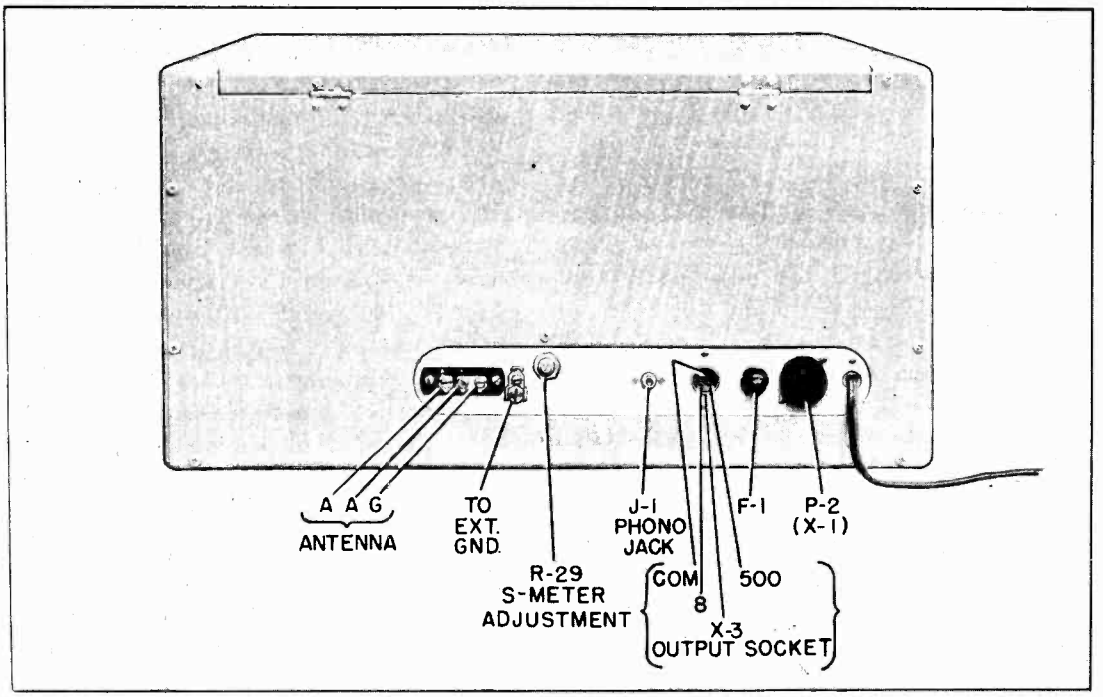


Figure No. 2. Rear View of Receiver

ceiver B+circuit may be used to achieve single-switch control of the station. This second relay should be a double pole, single throw type having one normally open pair of contacts and one normally closed pair of contacts.

2-3. *Installation Procedure*

After unpacking the Receiver and Speaker procede as follows:

(1) Seat A.C. jumper plug and all tubes firmly in their sockets.

(2) Insert the loud-speaker plug into the three pin output socket at the rear of the Receiver.

(3) Connect a good external ground to the screw-type lug located at the rear of the Receiver below the antenna terminal strip.

(4) Connect the antenna as recommended in paragraph 2-2.

(5) Connect the power cord to a 115 volt, 50/60 cycle AC source of supply.

(6) Set controls as recommended in Section 3 for reception of signals.

-NOTE-

Where the Receiver is located in the field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the Receiver antenna coil. If a separate receiving antenna is used, a means for disconnecting or grounding the antenna during transmission periods should be provided.

2-4. *Battery Operation*

The NC-183 may be operated in portable or emergency service by connecting batteries to the terminals of the power socket located at the rear of the Receiver. An octal plug, similar to the A.C. jumper plug, may be wired and used for interconnection between batteries and Receiver. The battery plug used must be wired in accordance with the drawing shown on the Schematic Diagram. A 6 volt heater supply (storage battery) should be connected to terminals 3 and 5 and 135 to 250 volt "B" supply connected to terminals 4 and 8. The recommended "B" voltage supply for battery economy is between 135 and 180 volts. At voltages between 135 and 150 the voltage regulator tube will not ignite affecting a further battery economy. For stand-by operation in all cases it is recommended that a switch be placed in the battery B+ lead for increased battery economy as the "B" switch on the Receiver does not open the B supply circuit to the H.F. oscillator, voltage regulator, and push-pull audio output tubes. A suggested refinement is to include a switch in the A+ lead so that the tube heaters may be turned off when the Receiver is not in use without the necessity of removing the battery plug from the battery socket.

SECTION 3. OPERATION

3-1. *Controls*

All controls are identified by front panel markings for ease of identification. The controls are located in a symmetrical manner and are arranged for ease of operation.

The five positions of the BAND SWITCH are marked with identifying band letters plus numerical identification of the Amateur bands covered on the BANDSPREAD dial scale. These identifying markers correspond to the markers on the dial scale escutcheons. The BAND SWITCH does not have any limit stops so that band changing may be accomplished with a minimum of BAND SWITCH turning.

The GENERAL COVERAGE dial knob operates the main tuning capacitor and turns the main dial scale through a combination pinch drive and anti-backlash gear train. The main dial has five scales; four of which are calibrated directly in frequency, the other having a 0-200 linear scale for auxiliary logging purposes. The main dial escutcheon is marked with frequency limits in megacycles and band letter designations identifying each scale on the dial.

The BANDSPREAD tuning dial knob operates the bandspread tuning capacitor and turns the bandspread dial scale through a combination pinch drive and anti-backlash gear train which is similar to that used for general coverage tuning. The bandspread dial has six scales; five of which are calibrated in frequency for the 6, 10-11, 20, 40 and 80 meter Amateur bands, the other having a 0-200 linear scale for bandspread logging on other than the frequency calibrated bandspread frequencies. The bandspread dial escutcheon is marked with identifying band letters and amateur band designation for each scale.

The TRIMMER control operates a tuning capacitor which is connected across the first R.F. amplifier section of the main tuning capacitor. The TRIMMER control is used to tune the first R.F. amplifier stage properly under a wide variety of antenna loading conditions.

The R.F. GAIN control adjusts the amplification of the R.F. and I.F. amplifier stages. Clockwise rotation of the control (towards 10) increases Receiver gain. The A.C. POWER switch is associated with the R.F. GAIN control and A.C. power is turned ON as the R.F. GAIN control is advanced from A.C. OFF to 0 on the scale.

The A.F. GAIN control adjusts the

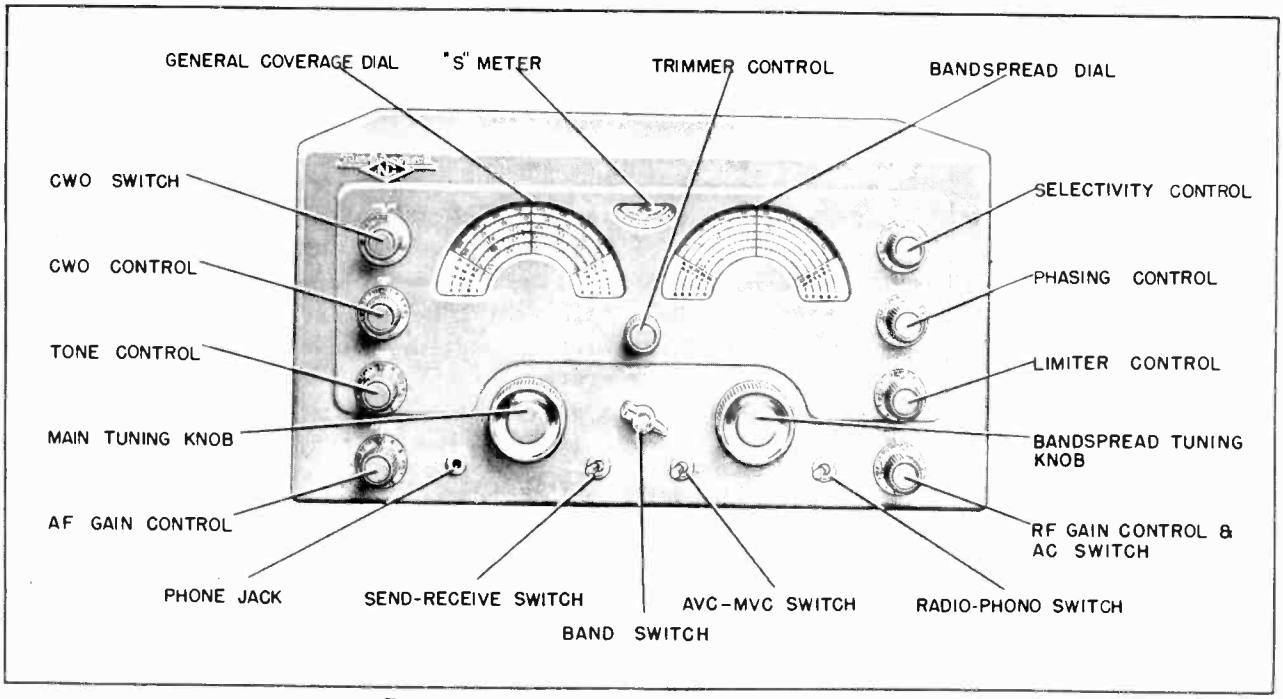


Figure No. 3. Front View of Receiver

amount of audio voltage applied to the first audio tube. Clockwise rotation of the control (towards 10) increases the audio output power of the Receiver. The A.F. GAIN control is operative when an audio signal is applied to the PHONO input jack.

The LIMITER control is used to switch the limiter into the circuit and also to adjust the threshold at which limiting action starts. The limiter is turned ON as the LIMITER control is advanced from OFF to 0 and the threshold is lowered as the control is advanced towards 10. Any noise peak voltages in excess of this adjustable threshold are prevented from reaching the audio amplifier. The limiter circuit is the double-diode type and is equally effective for both phone or code reception.

The TONE control is used to vary the frequency characteristic of the audio output of the Receiver. Turning this control towards 0 on its scale increasingly attenuates the higher frequencies.

The C.W.O. SWITCH and C.W.O. control are only used for the reception of radiotelegraph code signals. The C.W.O. SWITCH is used to turn the C.W. oscillator ON and the C.W.O. control is used to adjust the pitch of the C.W. note. At zero on the C.W.O. scale the C.W. oscillator is tuned to the intermediate frequency of the Receiver.

The PHASING and SELECTIVITY controls adjust the operation of the crystal filter. Receiver selectivity is made progressively sharper as the SELECTIVITY control is turned from OFF towards 5 on its scale. The PHASING control is inoperative with the SELECTIVITY control in the OFF position. The PHASING control is used to attenuate interfering signals and is connected in a bridge circuit so that the bridge can be balanced to reject the undesired signal.

The SEND-RECEIVE switch is used to quiet the Receiver during transmission periods or other times when it is desirable to resume reception immediately (not having to wait for the tubes to warm up). The SEND-RECEIVE switch is connected in the B circuit. See Section 2-4 for use of this switch in battery operation. The SEND-RECEIVE switch should not be used to silence the Receiver after the completion of an operating period.

External (remote) stand-by control of the Receiver may be accomplished by connecting a switch or relay to terminals 1 and 4 of the A.C. jumper plug as shown on the Schematic Diagram. This is a parallel arrangement permitting the SEND-RECEIVE switch to remain operative with the external switch or relay in the circuit.

The A.V.C.-M.V.C. switch is used to adjust the Receiver for either Automatic Volume Control or Manual Volume Control operation. Automatic Volume Control can be used for either phone or code reception. The A.V.C. time constants have been adjusted so that receiver gain does not change appreciably during average code speed reception.

The RADIO-PHONO switch is set at the Phono position when it is desired to use the audio system of the NC-183 in the event a record player or similar apparatus is connected to the Phono Input jack. In the Phono position all receiver circuits but the audio are rendered inoperative; the AUDIO GAIN and TONE controls remain operative. If it is so desired the record player may remain connected to the Receiver and normal receiver operation resumed by setting the RADIO-PHONO switch at Radio.

The screw-type adjustment at the rear of the Receiver is provided to allow the operator to adjust the sensitivity of the S-Meter. The S-Meter is calibrated at National laboratories so that approximately 50 microvolts equals S-9 and roughly 5,000 microvolts equals 40 db above S-9.

3-2. *Phone Reception*

After the equipment is properly installed, as outlined in Section 2, it is placed in operation for the reception of phone signals by adjusting the receiver controls as follows:

1. Set the SEND-RECEIVE at Receive.
2. Set the RADIO-PHONO switch at Radio.
3. Set the A.V.C.-M.V.C. switch at A.V.C.
4. Turn the C.W.O. switch to OFF.
5. Set the SELECTIVITY control at OFF.

6. Set the PHASING control at 0.

7. Set the LIMITER control at OFF.

8. Advance the R.F. GAIN control to a point between 8 and 10.

9. Set the A.F. GAIN control at the point providing the desired audio volume.

10. Adjust the TONE control to give the desired audio characteristic.

The Receiver is now adjusted for the reception of phone signals and will tune to the frequency indicated by the tuning dial and band switch settings. Set the TRIMMER control for maximum S-Meter reading after the desired station has been selected, or alternately in the absence of a signal the TRIMMER may be set for maximum receiver background noise.

The tuning system in the NC-183 is arranged for ease of operation and accuracy of calibration. However, it is necessary that the proper settings of the GENERAL COVERAGE and BANDSPREAD dials be observed to maintain accuracy of calibration. For all general coverage tuning the BANDSPREAD dial must be at the "Set" mark appearing at approximately 180 on the linear scale. For bandspread tuning the GENERAL COVERAGE dial must be set at the proper point corresponding to the Amateur band being tuned. The various "set points" are marked directly on the GENERAL COVERAGE dial scale and are clearly indicated by a circular marker containing the Amateur band designation. The following table lists the location of the GENERAL COVERAGE dial settings for bandspread tuning of the Amateur bands:

AMATEUR BAND	GENERAL COVERAGE DIAL SETTING
6	198 on linear scale
10-11	30.0 Mc.
20	14.4 Mc.
40	7.3 Mc.
80	4.0 Mc.

Tuning of the 6 meter band is accomplished by use of the BANDSPREAD dial only.

The BAND SWITCH setting determines the band of frequencies which the Receiver will tune at any one time.

With the A.V.C-M.V.C. switch set at the A.V.C. position, the R.F. GAIN control should be advanced as far as receiving conditions permit. However, if background noise proves objectionable, the R.F. GAIN control may be retarded to approximately 6 or 7 to reduce the level of background noise. The operator must remember that automatic volume control action will be restricted unless the R.F. GAIN control is fully advanced. Audio output should be adjusted entirely by means of the A.F. GAIN control.

The A.V.C.-M.V.C. switch may be set at the M.V.C. position to provide increased sensitivity in some cases. With such a setting the operator must be careful not to advance the R.F. GAIN control to a point where I.F. or audio amplifier overload occurs. Such overload is indicated by distortion. In general, the A.F. GAIN control may be set at a fixed position, approximately 5, and the R.F. GAIN control used to adjust the audio volume.

If a signal is weak and partically obscured by background noise and static, best signal-to-noise ratio will be obtained by turning the TONE control toward 0 on its scale. The most effective setting must be determined by trial as too much attenuation of the higher audio frequencies may not prove desirable.

When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best signal-to-noise ratio will be obtained by turning the LIMITER control ON and advancing it as necessary. The optimum setting can only be determined by trial as too much limiter action may impair the audio quality.

The selectivity of the Receiver is adjusted by means of the crystal filter SELECTIVITY control. The normal setting of the SELECTIVITY control in phone reception is at one of the positions affording broad selectivity. Positions marked OFF, 1 or 2 are recommended. Selectivity may be progressively increased by turning the SELECTIVITY control to positions 3, 4 or 5. The evidences of increasing selectivity will be the attenuation of the higher frequency audio tones of the signal as well as sharper tuning. Increasing selectivity too much will attenuate these higher tones to such an extent that phone signals may become unintelligible.

The PHASING control is part of the crystal filter and is used to eliminate

or attenuate interfering heterodynes. The PHASING control is inoperative with the SELECTIVITY control in the OFF position but is operative at all other SELECTIVITY control settings. The normal setting of the PHASING control, with the crystal filter ON (SELECTIVITY control at 1,2,3,4 or 5), in phone reception is at 0 on the scale. If, after a signal has been tuned in, an interfering signal causes a heterodyne or whistle the PHASING control should be adjusted until interference is reduced to a minimum. The setting of the PHASING control which provides maximum attenuation of the heterodyne will depend on the pitch of the heterodyne whistle. If the heterodyne is below 1,000 cycles, the optimum PHASING control setting will be near one end of the scale or the other, depending upon whether the interfering signal has a higher or lower frequency than the desired signal.

3-3. *C.W. Reception*

The Receiver is placed in operation for the reception of C.W. signals in the same manner as that outlined for phone reception (Section 3-2) except that the C.W.O. switch should be set at ON and the C.W.O. control set at mid-scale. The C.W. code characters are made audible by the heterodyning action of the C.W. oscillator with the incoming signal. The frequency of the C.W. oscillator can be varied by rotation of the C.W.O. control.

The sensitivity of the Receiver should be adjusted by means of the R.F. GAIN control and the audio volume by means of the A.F. GAIN control. When receiving C.W. characters with slow keying or long pauses during keying it may be desirable to set the A.V.C.-M.V.C. switch at M.V.C. so that the receiver gain does not change during keying pauses. In this case, the A.F. GAIN control should be set at a fixed position, approximately 5, and the audio volume adjusted by means of the R.F. GAIN control. In either of the above cases care should be taken not to advance the R.F. GAIN control to a point where I.F. or audio amplifier overload occurs.

The action of the TONE and LIMITER controls will be similar to that described in Section 3-2. However, in C.W. reception it will be possible to advance these controls considerably further than is desirable in phone reception since any impairing of audio quality is relatively unimportant.

Turning the C.W.O. control to either side of zero will change the characteristic pitch of the receiver background noise thus providing a means of adjusting the audio beat note to the operator's preference. The pitch will become higher as the C.W.O. oscillator is detuned from the I.F. amplifier.

Crystal filter operation for C.W. reception is similar to that described for phone reception (Section 3-2) with the exception that it is possible to utilize maximum selectivity without the loss of audio quality experienced in phone reception. When maximum selectivity is employed, i.e., SELECTIVITY control at 5, tuning is very critical and care must be taken to assure proper tuning. When tuning across the carrier of a received signal the audio beat note is very sharply peaked at a definite audio frequency. The maximum response indicates the proper dial setting. The pitch of the beat note peak may be adjusted by use of the C.W.O. control to provide an audio tone pleasing to copy. With the Receiver tuned to "crystal peak" an interfering signal may be attenuated by proper setting of the PHASING control since this control does not appreciably affect the desired signal.

A distinct advantage in the reception of weak C.W. signals through interference can be realized by use of the "single-signal" properties of the NC-183 Receiver. The C.W. oscillator should be detuned until the pitch of the receiver background noise is roughly 2,000 cycles. Under this condition the audio beat note of any C.W. code signal will show a broad peak in output at approximately 2,000 cycles. This peak is easily found by rotating the tuning dial slowly through the carrier of a received signal. This peak will appear on one side of "zero beat" only and on the other side of "zero beat" the 2,000 cycle note will be considerably weaker. It should be noted that depending on the frequency of the interfering signal better receiving conditions will be obtained by detuning the C.W.O. on one side of zero rather than on the other. The best setting of the C.W.O. con-

trol can only be determined by trial settings on either side of zero until optimum results are obtained.

3-4. *Measurement of Signal Strength*

The S-Meter in the NC-183 Receiver furnishes a means for the measurement of signal strength of incoming phone or code signals. To utilize the S-Meter the following control settings must be observed: R.F. GAIN at 10, A.V.C.-M.V.C. at A.V.C. and SELECTIVITY at OFF. The TRIMMER control should be adjusted for maximum S-Meter reading after a signal has been tuned in. All other control settings will not affect the S-Meter readings.

In instances where a strong signal causes the S-Meter to read off-scale the S-Meter sensitivity may be lowered by retarding the R.F. GAIN control until an on-scale reading is obtained. Without disturbing the setting of the R.F. GAIN control the comparative strength of this strong signal may be compared with other signals.

The sensitivity of the S-Meter is adjusted as outlined in Section 1-7, to meet average operating conditions. The S-Meter sensitivity adjustment at the rear of the Receiver enables the operator to change the sensitivity to meet the needs of his own particular installation.

SECTION 4. SERVICE AND TEST DATA

4-1. *Tube Failures*

The partial or complete failure of a vacuum tube in the Receiver may reduce the sensitivity, produce intermittent operation, or cause the equipment to be completely inoperative. If tube failure is suspected all tubes should be checked in suitable tube testing equipment, or by replacement with tubes of proven quality. Care should be taken that any tubes removed for checking purposes be returned to their original sockets thereby reducing the necessity for realignment.

Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind when replacements become necessary. The high frequency oscillator and I.F. tubes should be chosen with care to select a replacement which most nearly approaches the characteristics of the original tube. A replacement high frequency oscillator tube can be readily checked by noting any change in dial calibration, particularly in the amateur bandspread bands. Substitution of new I.F. amplifier tubes may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in Section 6-2.

4-2. *Circuit Failures*

All components parts in the NC-183 Receiver have been carefully selected to assure an ample factor of safety. Failure may occur in individual cases and the most common, excluding tubes, will probably be due to breakdown of a capacitor or resistor. Measurement of voltages in accordance with Section 4-4 will most likely indicate where failure has occurred. A bypass capacitor which has failed may cause overload of associated resistors. These resistors should be checked for any change in resistance value. An overloaded or shorted resistor will sometimes be evidenced by scorching or discoloration on the surface of the resistor. An open capacitor, often the cause of oscillation or loss of sensitivity, may be checked by temporarily connecting a good capacitor across it. Intermittently poor connections can usually be located by lightly tapping each part with a piece of insulating material.

4-3. *Stage Gain Measurements*

The sensitivity measurements listed below are made with the Receiver set up as specified in Section 3-2 except that the A.V.C.-M.V.C. switch must be set at M.V.C. and the A.F. GAIN control at 10. An output meter with an impedance to match the Receiver output circuit (8 or 500 ohms) should be connected to the output socket in place of the loud-speaker. A three-prong plug, similar to the loud-speaker plug, can be wired for connection of the output meter to the Receiver. It is important that the

proper output impedance matching be observed, i.e., 8 or 500 ohms depending upon which terminals of the output socket are used.

The high output lead of a signal generator should be connected through a 0.001 capacitor to the pin of the tube as specified in the following table and the ground lead connected to the receiver chassis. The signal generator should be adjusted to deliver a test signal of 455 Kc. plus or minus 2 Kc. either modulated or unmodulated.

The BAND SWITCH must be set at the mid-position between the A and E bands.

With 1 watt output at the audio output socket the test signal should be within the limits specified below:

TERMINAL	TEST SIGNAL
Mixer Grid	13± 3 Microvolts
First IF Grid	170± 30 Microvolts
Sec. Det. Grid	33,000± 6,000 Microvolts

4-4. *Voltage Tabulation*

All voltage measurements should be made using a high-impedance vacuum tube volt-meter. Readings taken with any other type of instrument will differ greatly from those shown on Figure No. 4. The control settings to be observed are shown on Figure No. 4. All voltages are measured between specified terminal and chassis.

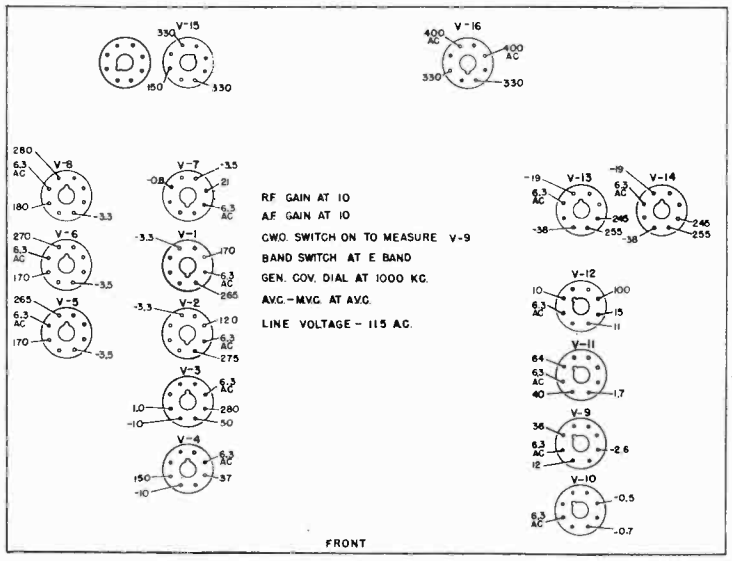


Figure No. 4. Tube Socket Voltages

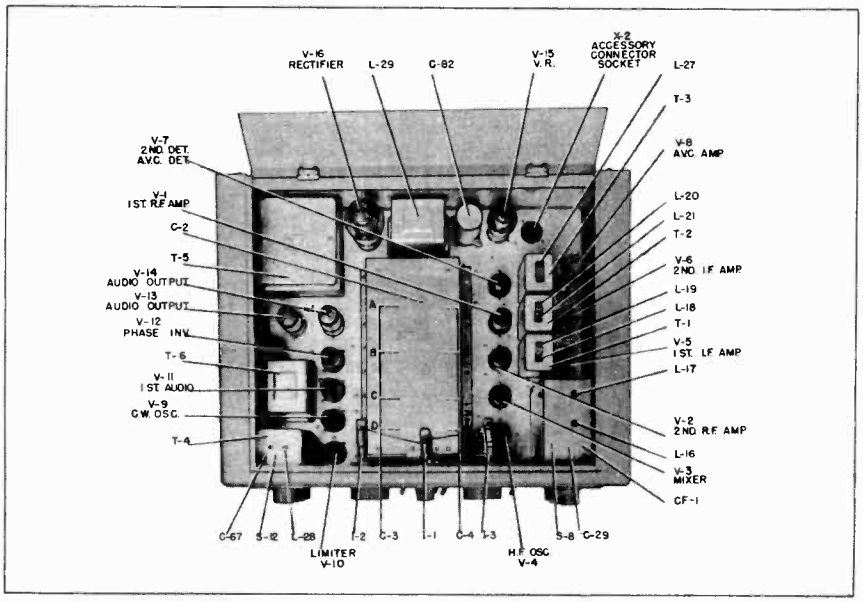


Figure No. 5. Top View of Receiver

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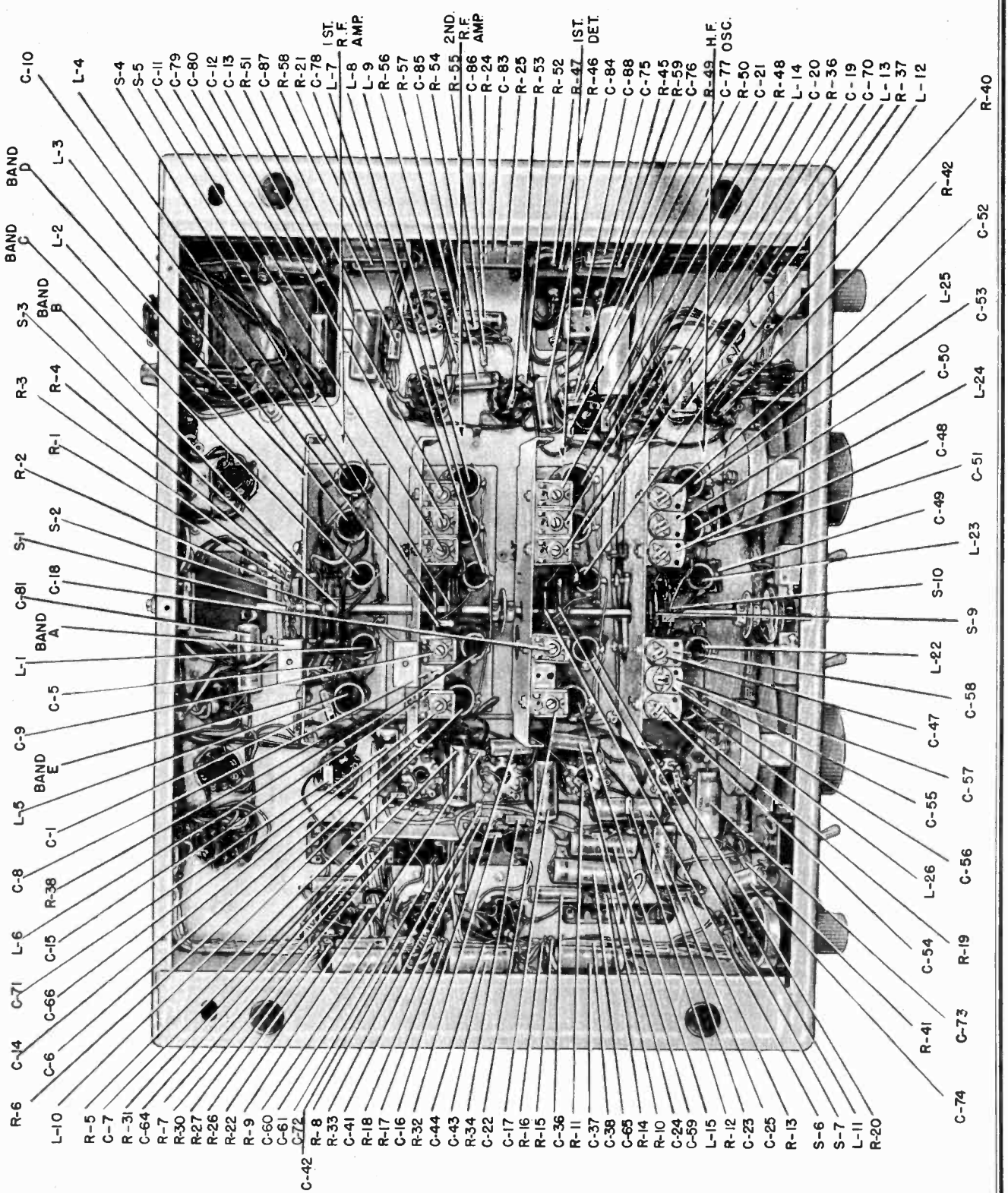

Figure No. 7. Bottom View of Receiver (Coil Compartment Side Plates Removed)

NATIONAL COMPANY, INC. MODEL NC-183

PARTS LIST (Continued)

Symbol	*Function*	*Type*	*Rating*
	CAPACITORS (Continued)		
C-79	A.C. Line Bypass	Paper	0.01 Mfd., 600 VDCW
C-80	A.C. Line Bypass	Paper	0.01 Mfd., 600 VDCW
C-81	B plus Filter	Paper	.1 Mfd., 400 VDCW
C-82		Elect.	10+10 Mfd., 475 VDCW
C-82A	Power Supply Filter	Elect.	Part of C-82
C-82B	Power Supply Filter	Elect.	Part of C-82
C-83	B Minus Bypass	Elect.	25 Mfd., 50 VDCW
C-84	1st. Audio Coupling	Paper	.01 Mfd., 600 VDCW
C-85	2nd. Audio Input Coupling	Paper	.01 Mfd., 600 VDCW
C-86	2nd. Audio Input Coupling	Paper	.01 Mfd., 600 VDCW
C-87	V-13, V-14, Cathode Bypass	Elect.	25 Mfd., 50 VDCW
C-88	Audio Compensating	Mica	.001 Mfd., 500 VDCW
	RESISTORS		
R-1	Voltage Divider	Fixed	330 Ohms, 1/2 W.
R-2	Voltage Divider	Fixed	680 Ohms, 1/2 W.
R-3	Voltage Divider	Fixed	470 Ohms, 1/2 W.
R-4	S-Meter Adjusting	Fixed	220,000 Ohms, 1/2 W.
R-5	1st. R.F. Amp. Grid	Fixed	100,000 Ohms, 1/2 W.
R-6	1st. R.F. Amp. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-7	1st. R.F. Amp. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-8	2nd. R.F. Amp. Grid	Fixed	100,000 Ohms, 1/2 W.
R-9	2nd. R.F. Amp. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-10	2nd. R.F. Amp. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-11	Mixer Cathode	Fixed	220 Ohms, 1/2 W.
R-12	Mixer Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-13	Mixer Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-14	1st. I.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-15	1st. I.F. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-16	1st. I.F. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-17	2nd. I.F. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-18	2nd. I.F. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-19	H.F. Osc. Grid	Fixed	22,000 Ohms, 1/2 W.
R-20	H.F. Osc. Plate	Fixed	47,000 Ohms, 1/2 W.
R-21	V.R. Dropping	Fixed	5,000 Ohms, 10 W.
R-22	A.V.C. Amp. Grid	Fixed	470,000 Ohms, 1/2 W.
R-23	R.F. Gain Control	Variable	10,000 Ohms, 1 ½ W.
R-24	Voltage Divider	Fixed	1,000 Ohms, 2 W.
R-25	Voltage Divider	Fixed	1,000 Ohms, 2 W.
R-26	A.V.C. Amp. Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-27	A.V.C. Amp. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-28	A.V.C. Load	Fixed	33,000 Ohms, 1/2 W.
R-29	S-Meter Adjustment	Variable	2,000,000 Ohms,

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PARTS LIST (Continued)

Symbol	*Function*	*Type*	*Rating*
	RESISTORS (Continued)		
R-30	S-Meter Adjusting	Fixed	150,000 Ohms, 1/2 W.
R-31	A.V.C. Voltage Divider	Fixed	470,000 Ohms, 1/2 W.
R-32	A.V.C. Voltage Divider	Fixed	470,000 Ohms, 1/2 W.
R-33	A.V.C. Voltage Divider	Fixed	270,000 Ohms, 1/2 W.
R-34	A.V.C. Voltage Divider	Fixed	220,000 Ohms, 1/2 W.
R-35	C.W. Osc. Grid Bias	Fixed	47,000 Ohms, 1/2 W.
R-36	C.W. Osc. Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-37	C.W. Osc. Screen Bleeder	Fixed	100,000 Ohms, 1/2 W.
R-38	C.W. Osc. Plate	Fixed	220,000 Ohms, 1/2 W.
R-39	Limiter Control	Variable	100,000 Ohms,
R-40	2nd. Det. Load	Fixed	68,000 Ohms, 1/2 W.
R-41	Limiter Plate Filter	Fixed	270,000 Ohms, 1/2 W.
R-42	Limiter Load	Fixed	270,000 Ohms, 1/2 W.
R-43	Tone Control	Variable	500,000 Ohms,
R-44	Audio Gain Control	Variable	500,000 Ohms,
R-45	1st. Audio Cathode	Fixed	2,200 Ohms, 1/2 W.
R-46	Inverse Feedback Voltage Divider	Fixed	100 Ohms, 1/2 W.
R-47	Inverse Feedback Voltage Divider	Fixed	4,700 Ohms, 1/2 W.
R-48	1st. Audio Screen Filter	Fixed	1,000,000 Ohms, 1/2 W.
R-49	1st. Audio Screen Bleeder	Fixed	470,000 Ohms, 1/2 W.
R-50	1st. Audio Plate Load	Fixed	100,000 Ohms, 1/2 W.
R-51	1st. Audio Plate Filter	Fixed	47,000 Ohms, 1/2 W.
R-52	Phase Inverter Grid	Fixed	470,000 Ohms, 1/2 W.
R-53	Phase Inverter Cathode Bias	Fixed	4,700 Ohms, 1/2 W.
R-54	Phase Inverter Cathode Load	Fixed	47,000 Ohms, 1/2 W.
R-55	Phase Inverter Plate Load	Fixed	47,000 Ohms, 1/2 W.
R-56	V-14 Grid	Fixed	270,000 Ohms, 1/2 W.
R-57	V-13 Grid	Fixed	270,000 Ohms, 1/2 W.
R-58	V-13 & V-14 Cathode Bias	Fixed	330 Ohms, 2 W.
R-59	Headphone Load	Fixed	470 Ohms, 2 W.
	MISCELLANEOUS		
CF-1	Crystal Filter		455 Kc.
F-1	A.C. Line Fuse		2 Amp., 250 Volts
I-1	S-Meter Lamp	No. 47	0.15 Amp., 6-8 Volts
I-2	Dial Lamp	No. 47	0.15 Amp., 6-8 Volts
I-3	Dial Lamp	No. 47	0.15 Amp., 6-8 Volts
J-1	Phono Jack		Single-Circuit
J-2	Phones Jack		Multi-Circuit
L-1	1st. R.F. Amp. Inductor	A Band	
L-2	1st. R.F. Amp. Inductor	B Band	
L-3	1st. R.F. Amp. Inductor	C Band	
L-4	1st. R.F. Amp. Inductor	D Band	

PARTS LIST (Continued)

Symbol	*Function*	*Type*	*Rating*
	MISCELLANEOUS (Continued)		
L-5	1st. R.F. Amp. Inductor	E Band	
L-6	2nd. R.F. Amp. Inductor	A Band	
L-7	2nd. R.F. Amp. Inductor	B Band	
L-8	2nd. R.F. Amp. Inductor	C Band	
L-9	2nd. R.F. Amp. Inductor	D Band	
L-10	2nd. R.F. Amp. Inductor	E Band	
L-11	1st. Det. Inductor	A Band	
L-12	1st. Det. Inductor	B Band	
L-13	1st. Det. Inductor	C Band	
L-14	1st. Det. Inductor	D Band	
L-15	1st. Det. Inductor	E Band	
L-16	CF-1 Input Tuning	Variable	Iron-Core Inductor
L-17	CF-1 Output Tuning	Variable	Iron-Core Inductor
L-18	T-1 Input Tuning	Variable	Iron-Core Inductor
L-19	T-1 Output Tuning	Variable	Iron-Core Inductor
L-20	T-2 Input Tuning	Variable	Iron-Core Inductor
L-21	T-2 Output Tuning	Variable	Iron-Core Inductor
L-22	H.F. Osc. Inductor	A Band	
L-23	H.F. Osc. Inductor	B Band	
L-24	H.F. Osc. Inductor	C Band	
L-25	H.F. Osc. Inductor	D Band	
L-26	H.F. Osc. Inductor	E Band	
L-27	T-3 Tuning	Variable	Iron-Core Inductor
L-28	T-4 Tuning	Variable	Iron-Core Inductor
L-29	Filter Choke	No. 80	17 Henries
M-1	Signal Strength Meter	S-Meter	
P-1	A.C. Line Cord and Plug		2 Contact
P-2	A.C. Jumper Plug	Octal	
S-1		Rotary	D.P. 5 Position
S-1A	Gain Adjustment		S.P. 5 Position
S-1B	S-Meter Adjustment		S.P. 5 Position
S-2	1st. R.F. Transformer Band Switch	Rotary	D.P. 5 Position
S-2A			S.P. 5 Position
S-2B			S.P. 5 Position
S-3	1st. R.F. Transformer Band Switch	Rotary	D.P. 5 Position
S-3A			S.P. 5 Position
S-3B			S.P. 5 Position
S-4	2nd. R.F. Transformer Band Switch	Rotary	D.P. 5 Position
S-4A			S.P. 5 Position
S-4B			S.P. 5 Position
S-5	2nd. R.F. Transformer Band Switch	Rotary	D.P. 5 Position
S-5A			S.P. 5 Position
S-5B			S.P. 5 Position

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PARTS LIST (Continued)

Symbol	*Function*	*Type*	*Rating*
	MISCELLANEOUS (Continued)		
S-6	1st. Det. Trans. Band Switch	Rotary	D.P. 5 Position
S-6A			S.P. 5 Position
S-6B			S.P. 5 Position
S-7	1st. Det. Trans. Band Switch	Rotary	D.P. 5 Position
S-7A			S.P. 5 Position
S-7B			S.P. 5 Position
S-8	Selectivity Control Switch	Rotary	D.P. 6 Position
S-9	H.F. Osc. Band Switch	Rotary	D.P. 5 Position
S-9A			S.P. 5 Position
S-9B			S.P. 5 Position
S-10	H.F. Osc. Band Switch	Rotary	D.P. 5 Position
S-10A			S.P. 5 Position
S-10B			S.P. 5 Position
S-11	A.V.C. Switch	Toggle	S.P.S.T.
S-12	C.W. Osc. Switch	Rotary	S.P.D.T.
S-13	Limiter Switch		S.P.D.T.
S-14	Radio-Phono Switch	Toggle	D.P.D.T.
S-15	A.C. Line Switch		S.P.S.T.
S-16	Send-Receive Switch	Toggle	S.P.S.T.
T-1	2nd. I.F. Transformer		455 Kc.
T-2	Det. Input Transformer		455 Kc.
T-3	A.V.C. Amp. Transformer		
T-4	C.W. Osc. Transformer		455 Kc.
T-5	Power Transformer		
T-6	Audio Output Transformer		
V-1	1st. R.F. Amp.	6SG7	
V-2	2nd. R.F. Amp.	6SG7	
V-3	Mixer	6SA7	
V-4	H.F. Osc.	6J5	
V-5	1st. I.F. Amp.	6SG7	
V-6	2nd. I.F. Amp.	6SG7	
V-7	2nd. Det.-A.V.C. Det.	6H6	
V-8	A.V.C. Amp.	6AC7	
V-9	C.W. Osc.	6SJ7	
V-10	Noise Limiter	6H6	
V-11	First Audio	6SJ7	
V-12	Phase Inverter	6J5	
V-13	Audio Output	6V6GT/G	
V-14	Audio Output	6V6GT/G	
V-15	Voltage Regulator	OD3/VR-150	
V-16	Rectifier	5U4G	
X-1	Battery Socket	Octal	
X-2	Accessory Connector Socket	Octal	
X-3	Output Socket	Three Pin	
Y-1	Crystal Resonator		455 Kc.

SECTION 6. ALIGNMENT DATA

6-1. *General*

All circuits in the NC-183 Receiver are carefully aligned, before shipment, using precision test equipment insuring close conformability to the alignment frequency. No realignment of the various adjustments will be required, therefore, unless the Receiver is tampered with or damaged in transit.

The necessity for any realignment can be determined by checking the performance of the Receiver against its normal operation as outlined in Section 3. In no case should realignment be attempted unless tests indicate that such realignment is necessary. Even then, it must be remembered that the NC-183 is a communications Receiver and should not be serviced or realigned by any individual who does not have a complete understanding of the functioning of the equipment and who has not had previous experience adjusting a similar type of Receiver.

Before proceding with the alignment of any circuit in the Receiver, the equipment must be set up as specified in Section 2-3, except that the antenna lead-in and loudspeaker must be disconnected. An output meter having an 8 or 500 ohm resistive load should be connected to the matching terminal on the Receiver's output socket. If it is so desired a high-impedance A.C. voltmeter may be connected to the phone output jack and used in place of the output meter.

Alignment of the equipment may be divided into two major steps:

(1) I.F. and A.V.C. Amplifier Alignment.

(2) General Coverage and Bandspread Alignment.

(a) H.F. Oscillator

(b) First Detector and R.F. Amplifiers

The circuits must be tuned in the above order when complete alignment is required.

6-2. *I.F. and A.V.C. Amplifier Alignment*

The intermediate frequency of the NC-183 Receiver is 455 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator Y-1.

The I.F. transformers, crystal filter, A.V.C. amplifier and C.W. oscillator transformers all have individual permeability-tuned iron core inductors with screw-type adjustments for alignment purposes. These adjustments are located on Figure No. 5.

The preliminary alignment procedure is as follows:

(1) Connect the high output lead of an accurately calibrated signal generator to the stator portion of the detector section of the main tuning capacitor C-3C and the grounded lead to any convenient grounded point on the chassis. This is a direct connection, no dummy antenna being required.

(2) Set the C.W.O. switch at ON.

(3) Set the A.V.C. switch at M.V.C.

(4) Set the PHASING control at 0.

(5) Set the SELECTIVITY control at 5.

(6) Set the A.F. GAIN control at 10.

(7) Set the R.F. GAIN control at 10.

(8) Turn the modulation of the signal generator off to provide a steady C.W. test

signal.

Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts and vary the tuning control of the signal generator slowly between the frequencies of 453 and 457 kilocycles. At some frequency between these limits the I.F. amplifier of the Receiver will show a very sharply peaked response, as indicated on the output meter. This frequency is that of the crystal, Y-1, and I.F. alignment, as outlined below, is made to this frequency. The C.W.O. control must be set to provide an audible beat note; the presence of this beat note can readily be determined by temporarily connecting headphones or a loud-speaker to the Receiver.

While making I.F. amplifier adjustments, it will be necessary to retard the attenuator of the signal generator if I.F. amplifier gain increases to a point where overload occurs. Without altering the frequency setting of the signal generator set the SELECTIVITY and C.W.O. switches at OFF, and turn the modulation of the signal generator ON. The I.F. tuned inductors L-16 through L-21 should, at this point, each be carefully adjusted to give a maximum reading on the output meter. The order in which these adjustments are made is not important.

To align the A.V.C. amplifier turn the A.V.C.-M.V.C. switch to A.V.C. Adjust L-27 of transformer T-3 until a well-defined dip is observed in the output meter readings. The setting of L-27 where this dip occurs will provide maximum A.V.C. action.

Turn the modulation of the signal generator OFF and turn the C.W.O. switch ON and set the C.W.O. control at 0 at which setting the C.W. oscillator should be at zero beat with the test signal. If zero beat does not occur at 0, readjust the tuneable inductor L-28, of transformer T-4 until zero beat does occur with the C.W.O. control set at 0.

6-3. *General Coverage and Bandspread Alignment*

The data given in this section applies to the alignment of the H.F. oscillator, first detector and R.F. amplifier stages. Since the main tuning capacitor and bandspread capacitor are connected in parallel on all bands General Coverage and Bandspread alignment are accomplished simultaneously. The 6 meter band, A, is tuneable by Bandspread tuning only.

The original alignment at National Laboratories is accomplished by the use of precision crystal-controlled test oscillators. No realignment of bands B, C, D and E should be attempted unless a test signal source with an accuracy of better than 1% is available. For band A, 6 meters, the test signal source must have the accuracy of precision calibrated crystals.

The need for realignment of the H.F. oscillator of bands B, C, D or E is indicated when the frequency calibration of the Receiver is in error by more than 2% at the high frequency end of any one band. Realignment of the H.F. oscillator of band A is indicated by a calibration error of 0.01%. Particular care should be taken when adjusting the high frequency oscillator trimmers. It is imperative that the high frequency oscillator is set to operate at a frequency above the first detector and R.F. amplifier frequency and not below. This can be checked by tuning in the image signal which should appear 910 kilocycles lower on the receiver dial. If it is found that the image signal does not appear at this setting the H.F. oscillator is incorrectly adjusted and the capacity of the H.F. oscillator trimmer must be decreased until the image and fundamental signals appear at the correct setting. Bands B, C and D each have an inductance adjustment, L-23, L-24, L-25, and Band E has a variable capacitor, C-56, for H.F. Oscillator alignment at the low frequency check point of these bands. After the H.F. oscillator is correctly calibrated the first detector and R.F. amplifier trimmers should be adjusted for maximum receiver gain as indicated on the output meter.

Correction of tracking errors of the first detector and R.F. amplifier stages at the low frequency check point of bands B, C and D is accomplished by the adjustments listed on the Alignment Chart. The tracking of the first detector and second R.F. amplifier stages may be checked by inserting a tuning wand into the opening of the coil form under test. Receiver gain should decrease the same amount on insertion of the iron or brass end of the tuning wand.

The tracking of the first R.F. amplifier stage of bands B, C and D may be checked by rotating the TRIMMER control, C-2. If two definite peaks in output are observed, while rotating the TRIMMER control, the first R.F. amplifier stage is tracking correctly and the TRIMMER setting at either peak is correct. The lack of a peak in output or the presence of only one peak indicates the stage is not tracking properly and correction should be made.

The locations of the adjustments referred to on the Alignment Chart are shown on Figure No. 7.

The control settings used for alignment are as outlined in Section 3-2 except that the A.V.C.-M.V.C. switch should be at M.V.C. The following Alignment Chart gives the step by step procedure to follow in effecting alignment of each band. It is important that the chart of adjustments is adhered to in the order shown for each band.

ALIGNMENT CHART

Step	Band	Adjust Signal Source To:	Set Gen. Cov. Dial At:	Set Bandspread Dial At:	Adjust To Receive Test Signal	Adjust For Maximum Output
1	A	56 Mc.	⑥ (at 198 on linear scale)	56 Mc.	C-47	C-18, C-9, C-2
1	B	30.0 Mc.	30.0 Mc.	Set Mark	C-48	C-19, C-11, C-2
2	B	14.0 Mc.	14.0 Mc.	Set Mark	L-23	L-12, L-7, L-2
3	B	30.0 Mc.	30.0 Mc.	Set Mark	C-48	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	C	11.0 Mc.	11.0 Mc.	Set Mark	C-50	C-20, C-12, C-2
2	C	5.0 Mc.	5.0 Mc.	Set Mark	L-24	L-13, L-8, L-3
3	C	11.0 Mc.	11.0 Mc.	Set Mark	C-50	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	D	4.0 Mc.	4.0 Mc.	Set Mark	C-52	C-21, C-13, C-2
2	D	1.8 Mc.	1.8 Mc.	Set Mark	L-25	L-14, L-9, L-4
3	D	4.0 Mc.	4.0 Mc.	Set Mark	C-52	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	E	1.5 Mc.	1.5 Mc.	Set Mark	C-54	C-22, C-14, C-2
2	E	0.6 Mc.	0.6 Mc.	Set Mark	C-56	
3	E	1.5 Mc.	1.5 Mc.	Set Mark	C-54	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.

NOTE: Inductance adjustments (indicated by "L-") consist of a loop of wire inside coil form--bending the loop one way or the other adds or subtracts to the inductance.

The Set Mark referred to above is located at 180 on the linear scale.

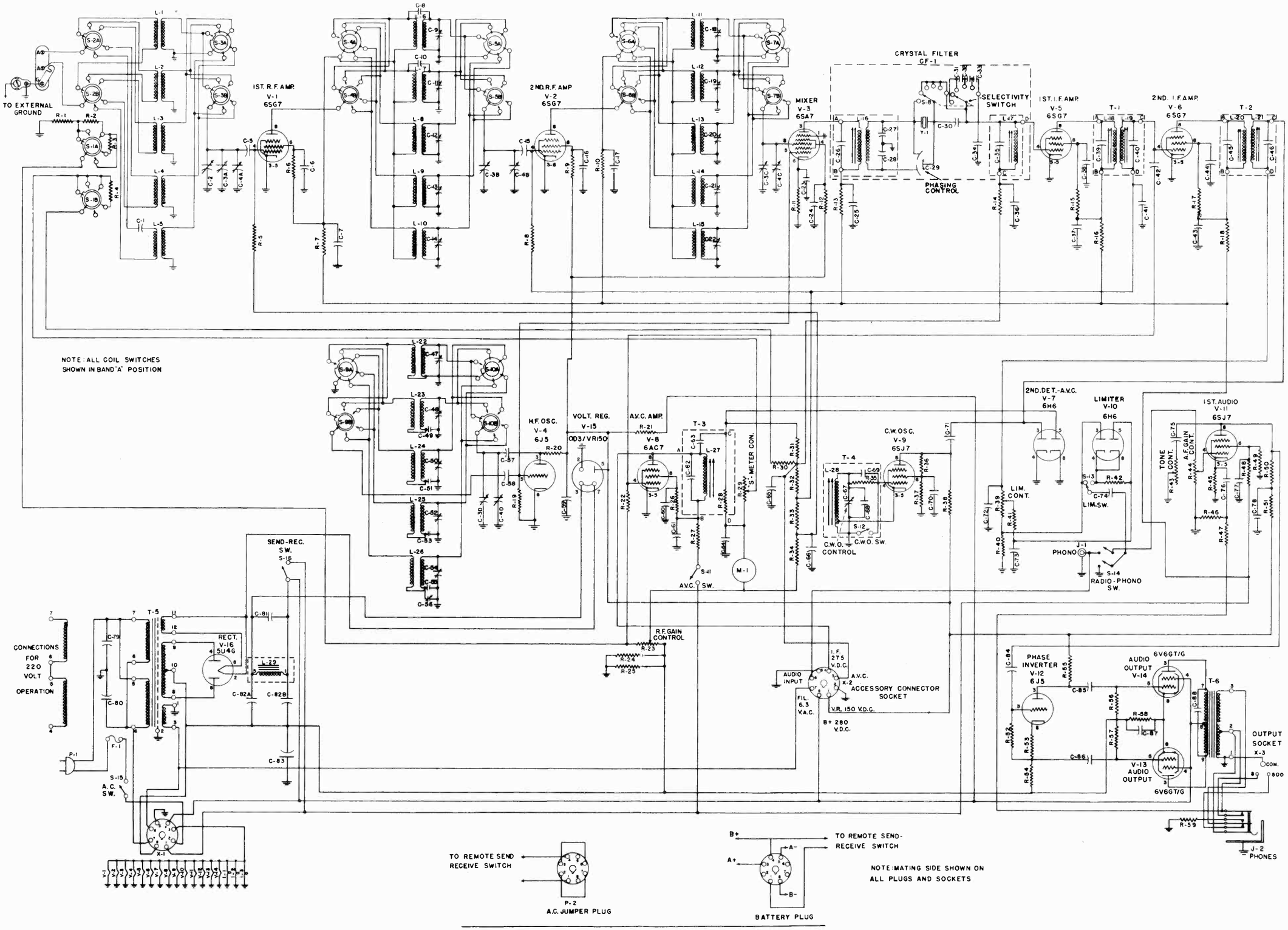


Figure No. 6. NC-183 Receiver Schematic Diagram

NATIONAL COMPANY, INC. MODEL NC-183

SECTION 5. **PARTS LIST**

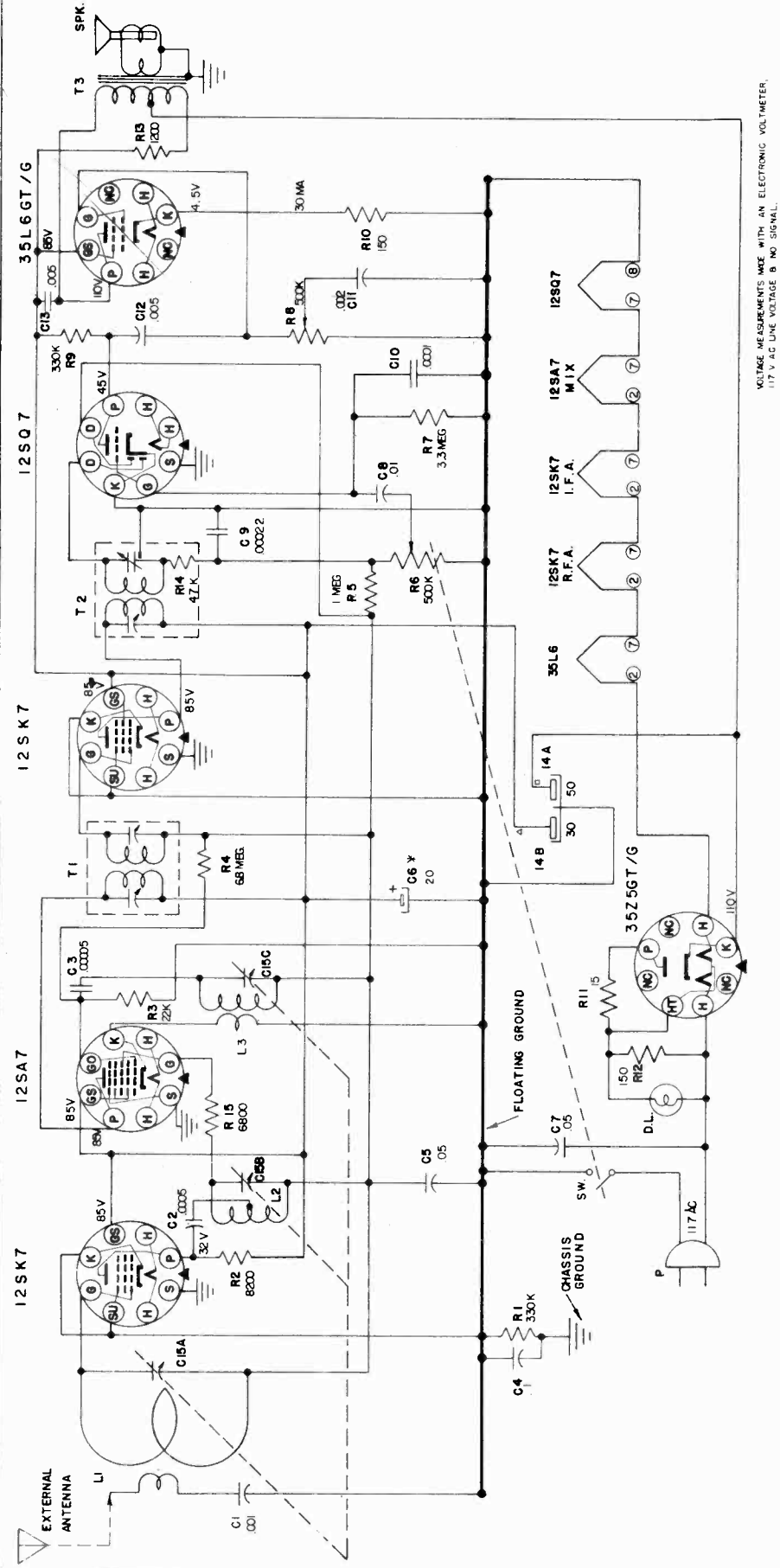
Symbol	*Function*	*Type*	*Rating*
	CAPACITORS		
C-1	Ant. Coupling	Ceramic	250 Mmf., 500 VDCW
C-2	Trimmer Control	Air	Variable
C-3	Main Tuning	Air	Variable
C-3A	1st. R.F. Amp. Tuning	Air	Part of C-3
C-3B	2nd. R.F. Amp. Tuning	Air	Part of C-3
C-3C	1st. Det. Tuning	Air	Part of C-3
C-3D	H.F. Osc. Tuning	Air	Part of C-3
C-4	Bandspread Tuning	Air	Variable
C-4A	1st. R.F. Bandspread Tuning	Air	Part of C-4
C-4B	2nd. R.F. Bandspread Tuning	Air	Part of C-4
C-4C	1st. Det. Bandspread Tuning	Air	Part of C-4
C-4D	H.F. Osc. Bandspread Tuning	Air	Part of C-4
C-5	1st. R.F. Amp. Grid Coupling	Mica	0.001 Mfd., 300 VDCW
C-6	1st. R.F. Screen Bypass	Paper	0.01 Mfd., 600 VDCW
C-7	1st. R.F. Amp. Plate Filter	Paper	0.05 Mfd., 600 VDCW
C-8	A Band 2nd. R.F. Coupling	Ceramic	10 Mmf., 500 VDCW
C-9	A Band 2nd. R.F. Trimmer	Mica	Variable
C-10	B Band 2nd. R.F. Coupling	Ceramic	5 Mmf., 500 VDCW
C-11	B Band 2nd. R.F. Trimmer	Mica	Variable
C-12	C Band 2nd. R.F. Trimmer	Mica	Variable
C-13	D Band 2nd. R.F. Trimmer	Mica	Variable
C-14	E Band 2nd. R.F. Trimmer	Mica	Variable
C-15	2nd. R.F. Amp. Grid Coupling	Mica	0.001 Mfd., 300 VDCW
C-16	2nd. R.F. Screen Bypass	Paper	0.01 Mfd., 600 VDCW
C-17	2nd. R.F. Plate Filter	Paper	0.05 Mfd., 600 VDCW
C-18	A Band 1st. Det. Trimmer	Mica	Variable
C-19	B Band 1st. Det. Trimmer	Mica	Variable
C-20	C Band 1st. Det. Trimmer	Mica	Variable
C-21	D Band 1st. Det. Trimmer	Mica	Variable
C-22	E Band 1st. Det. Trimmer	Mica	Variable
C-23	Mixer Cathode Bypass	Paper	0.1 Mfd., 400 VDCW
C-24	Mixer Screen Bypass	Paper	0.01 Mfd., 600 VDCW
C-25	Mixer Plate Filter	Paper	0.05 Mfd., 600 VDCW
C-26	Crystal Filter Input Tuning	Mica	510 Mmf., 500 VDCW
C-27	Crystal Filter Bridge	Ceramic	85 Mmf., 500 VDCW
C-28	Crystal Filter Bridge	Ceramic	50 Mmf., 500 VDCW
C-29	Crystal Filter Phasing	Air	Variable
C-30	Crystal Filter Coupling	Ceramic	10 Mmf., 500 VDCW
C-31	Selectivity Adjusting	Ceramic	25 Mmf., 500 VDCW
C-32	Selectivity Adjusting	Ceramic	100 Mmf., 500 VDCW
C-33	Selectivity Adjusting	Ceramic	100 Mmf., 500 VDCW
C-34	Selectivity Adjusting	Ceramic	50 Mmf., 500 VDCW
C-35	Crystal Filter Output Tuning	Mica	510 Mmf., 500 VDCW

MODEL NC-183 NATIONAL COMPANY, INC.

PARTS LIST (Continued)

Symbol	*Function*	*Type*	*Rating*
	CAPACITORS (Continued)		
C-36	1st. I.F. Grid Filter	Paper	0.01 Mfd., 600 VDCW
C-37	1st. I.F. Plate Filter	Paper	0.05 Mfd., 600 VDCW
C-38	1st. I.F. Screen Bypass	Paper	0.01 Mfd., 600 VDCW
C-39	T-1 Primary Tuning	Mica	510 Mmf., 500 VDCW
C-40	T-1 Secondary Tuning	Mica	510 Mmf., 500 VDCW
C-41	2nd. I.F. Grid Filter	Paper	0.01 Mfd., 600 VDCW
C-42	2nd. I.F. Grid to A.V.C. Grid Coupling	Ceramic	47 Mmf.
C-43	2nd. I.F. Plate Filter	Paper	0.05 Mfd., 600 VDCW
C-44	2nd. I.F. Screen Bypass	Paper	0.01 Mfd., 600 VDCW
C-45	T-2 Primary Tuning	Mica	510 Mmf., 500 VDCW
C-46	T-2 Secondary Tuning	Mica	510 Mmf., 500 VDCW
C-47	A Band H.F. Osc. Trimmer	Ceramic	Variable
C-48	B Band H.F. Osc. Trimmer	Ceramic	Variable
C-49	B Band H.F. Osc. Padder	Mica	.0085 Mfd., 300 VDCW
C-50	C Band H.F. Osc. Trimmer	Ceramic	Variable
C-51	C Band H.F. Osc. Padder	Mica	.0042 Mfd., 300 VDCW
C-52	D Band H.F. Osc. Trimmer	Ceramic	Variable
C-53	D Band H.F. Osc. Padder	Mica	1250 Mmf., 500 VDCW
C-54	E Band H.F. Osc. Trimmer	Ceramic	Variable
C-55	E Band H.F. Osc. Padder	Mica	420 Mmf., 500 VDCW
C-56	E Band H.F. Osc. Padder	Ceramic	Variable
C-57	H.F. Osc. Plate Coupling	Mica	.001 Mfd., 300 VDCW
C-58	H.F. Osc. Grid Coupling	Ceramic	100 Mmf., 500 VDCW
C-59	B Supply Filter	Paper	.1 Mfd., 400 VDCW
C-60	A.V.C. Amp. Screen Bypass	Paper	.01 Mfd., 600 VDCW
C-61	A.V.C. Amp. Plate Filter	Paper	.05 Mfd., 600 VDCW
C-62	T-3 Tuning	Mica	510 Mmf., 500 VDCW
C-63	A.V.C. Amp. to A.V.C. Rectifier Coupling	Mica	.001 Mfd., 300 VDCW
C-64	S-Meter Bypass	Paper	.01 Mfd., 600 VDCW
C-65	A.V.C. Filter	Paper	.1 Mfd., 400 VDCW
C-66	A.V.C. Filter	Paper	.1 Mfd., 400 VDCW
C-67	C.W.O. Tuning	Air	Variable
C-68	C.W.O. Tuning	Mica	270 Mmf., 500 VDCW
C-69	C.W.O. Grid Coupling	Mica	270 Mmf., 500 VDCW
C-70	C.W.O. Screen Bypass	Paper	.1 Mfd., 400 VDCW
C-71	Det. Plate to C.W.O. Plate Coupling	Ceramic	10 Mmf.,
C-72	2nd. Det. Load	Mica	270 Mmf., 500 VDCW
C-73	Limiter Plate Filter	Paper	.1 Mfd., 400 VDCW
C-74	Audio Coupling	Paper	.1 Mfd., 400 VDCW
C-75	Tone Adjusting	Paper	.005 Mfd., 500 VDCW
C-76	1st. Audio Cathode Bypass	Elect.	10 Mfd., 50 VDCW
C-77	1st. Audio Screen Bypass	Paper	.25 Mfd., 400 VDCW
C-78	1st. Audio Plate Filter	Paper	.1 Mfd., 400 VDCW

NOBLITT-SPARKS INDUSTRIES, INC. MODEL 160T, 161T, CHASSIS RE-232



*Used only on sets with 50-30 uf. Electrolytic Condenser.

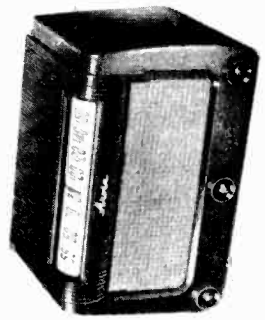
SPECIFICATIONS

FREQUENCY RANGE
Broadcast ---------- 540-1600 kc
IF ---------- 455 kc

TUBES AND FUNCTIONS
12SK7 ---------- RF Amp.
12SA7 ---------- Mixer-oscillator
12SK7 ---------- IF Amp.
12SQ7 ---------- DET-AVC AF Amp.
35L6 ---------- Output
35Z5GT ---------- Rectifier

LOUD SPEAKER
Type: Permanent magnet, 2.15 oz. Alnico 5
Size: 5¼ Inch
Voice coil impedance ---------- 3.2 Ohms

POWER OUTPUT
Undistorted ---------- .8 Watts
Maximum ---------- 1.1 Watts
Plate load ---------- 2000 Ohms



MODEL 160T, 161T,
CHASSIS RE-232

NOBLITT-SPARKS INDUSTRIES, INC.

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 mw (standard output)	.8 volts
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cyclees
Position of volume control	Fully clockwise
Position of dial pointer with variable fully closed	Last mark at left end of dial

1. Connect signal generator lead through a .05 uf. condenser to converter grid. Open tuning condenser. Set signal generator to 455 Kc. Tune I. F. Transformers for maximum output.

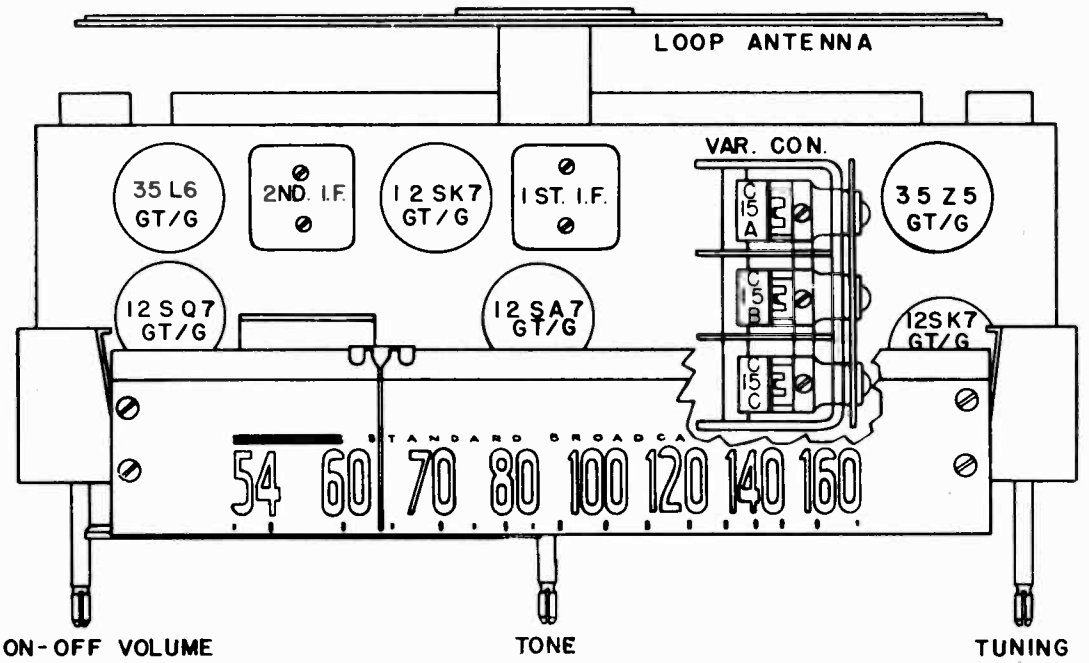
2. Close tuning condenser and set pointer at end mark of dial. Open tuning condenser. Connect signal generator to test loop or to blue lead on set loop. Set signal generator to 1620 Kc. Tune trimmer on (C15C) oscillator section of tuning condenser for maximum output.

3. Set signal generator to 1400 Kc. Adjust tuning shaft until maximum output is abtained. Tune R. F. trimmer (C15B) and antenna trimmer (C15A) on tuning condenser for greatest output. Reset tuning shaft until output is again a maximum. Retune R. F. and antenna trimmers. Repeat this cycle of operations at 1400 Kc until no further increase of output can be obtained. Keep generator output at a low value to prevent detuning by A. V. C. action.

4. Set signal generator to 600 Kc. Adjust tuning shaft for maximum output. Adjust tuning condenser plates for maximum output.

Approximate stage by stage sensitivities with 117V. AC line voltage and .8 V. output across voice coil, should be: I. F. grid, 455 Kc – 10,000 uv., Mixer grid, 455 Kc – 150 uv., Mixer grid, 1000 Kc – 170 uv; Antenna, 1400 Kc – 100 uv/m.

TUBE LAYOUT



NOBLITT-SPARKS INDUSTRIES, INC.

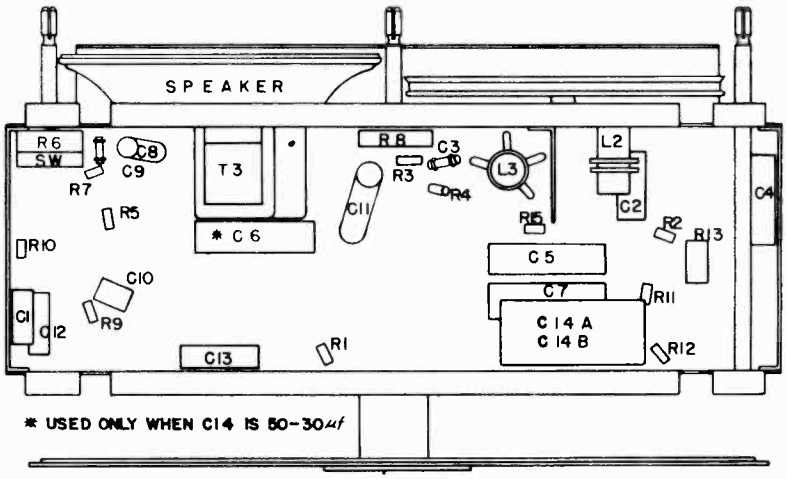
MODEL 160T, 161T,
CHASSIS RE-232

PARTS LIST

Schematic Location	Part No.	Description
R1, 9	C20060-334	Resistor, 330,000 Ohms, 1/4 W
R2	C20120-822	Resistor, 8200 Ohms, 1/4 W
R3	C20060-223	Resistor, 22,000 Ohms, 1/4 W
R4	C20060-685	Resistor, 6.8 Megohm, 1/4 W
R5	C20060-105	Resistor, 1 Megohm, 1/4 W
R6	C21554	Volume Control, 500,000 Ohms
R7	C20060-335	Resistor, 3.3 Megohm, 1/4 W
R8	C21553	Tone Control & Switch, 500,000 Ohms
R10, 12	C20060-151	Resistor, 150 Ohms, 1/4 W
R11		
R13	C20223-122	Resistor, 1200 Ohms, 2 W
R14	C200601473	Resistor, 47,000 Ohms, 1/4 W
R15	C20060-473	Resistor, 6800 Ohms, 1/4 W
C1	C20067-102	Condenser, .001 uf., 200 V., P. T.
C2	C20069-501	Condenser, .0005 uf., 600 V., P. T.
C3	C20204-500	Condenser, .00005 uf., 500 V., Ceramic
C4	C20067-104	Condenser, .1 uf., 200 V., P. T.
C5	C20067-503	Condenser, .05 uf., 200 V., P. T.
°C6	A22110	Condenser, 20 uf., 150 V. Elect.
C7	C20068-503	Condenser, .05 uf., 400 V., P. T.
C8	C20068-103	Condenser, .01 uf., 400 V., P. T.
C9	C20226-221	Condenser, .00022 uf., 350 V., Ceramic
C10	C20065-101	Condenser, .0001 uf., 500 V., Mica
C11	C20068-202	Condenser, .002 uf., 400 V., P. T.
C12, 13	C20068-502	Condenser, .005 uf., 400 V., P. T.
*C14A, B	A21578	Electrolytic Condenser, 50 uf., 150 V., 30 uf., 150 V.
°°C14A, B	C22111	Electrolytic Condenser, 50 uf., 150 V. 50 uf., 150 V.
C15A, B, C	AD21569-1	Variable Condenser & Pulley Assy.
L1	AD21576-1	Antenna Loop Assembly
L2	AC21575-I	R. F. Coil Assembly
L3	AC21576-1	Oscillator Coil Assembly
T1	AC21572-1	1st I. F. Coil Assembly
T2	AC21573-1	2nd I. F. Coil Assembly
T3	AC21577-1	Output Transformer Assembly
Spk.	C21570-1	Speaker, 5-1/4" P. M.
P	A18254-1	Socket, Wafer, Plain

Schematic Location	Part No.	Description
	A19124	Snap-on Button for Mtg. Rear Cover to Cabinet
	A19132	Dial Drive Cord
	A20149-8	
	A19138-1	Spacer Eyelet for Mtg. Variable Condenser
	A19205-3	Capacitor Mtg. Clip, for Mtg. Electrolytic Condenser
	A19233-1	Socket, Wafer, Center Pin Shielded
	A19344-2	Idler Pulley
	A19351	Dial Light Bulb, Mazda C47
	A19361	Hair Pin Clip
	A20040-9	Washer, Brown Felt behind knobs (Model 160-T) (10)
	A20040-14	Washer, White Felt behind Knobs (Model 161-T) (10)
	A20077-3	Grommet, Rubber for Mtg. Variable Condenser
	A20216-1B	Speed Nut for Mtg. Name Plate (10)
	A20228-1B	Speed Nut for Mtg. Name Plate (10)
	A20229-1B	Speed Nut for Mtg. Speaker Baffle (10)
	A21330	Name Plate
	A21346-2	Socket, Dial Light
	E21536-1	Cabinet, Walnut (160-T)
	E21536-2	Cabinet, Ivory (161-T)
	C21559	Dial Crystal
	C21561	Grille
	C21562	Speaker Baffle
	C21564	Dial Pointer
	A21568	Tuning Shaft
	C21579	Felt Baffle
	A21607	Carton, Complete with Fillers
	A21737-1	Knob, Walnut (160-T)
	A21737-2	Knob, Ivory 0(161-T)
	A21979	Cabinet, Rear Cover Assembly, Walnut (160-T)
	A21980	Cabinet, Rear Cover Assembly, Ivory (161-T)
	A21981	Dial Scale & Backing Plate Assembly

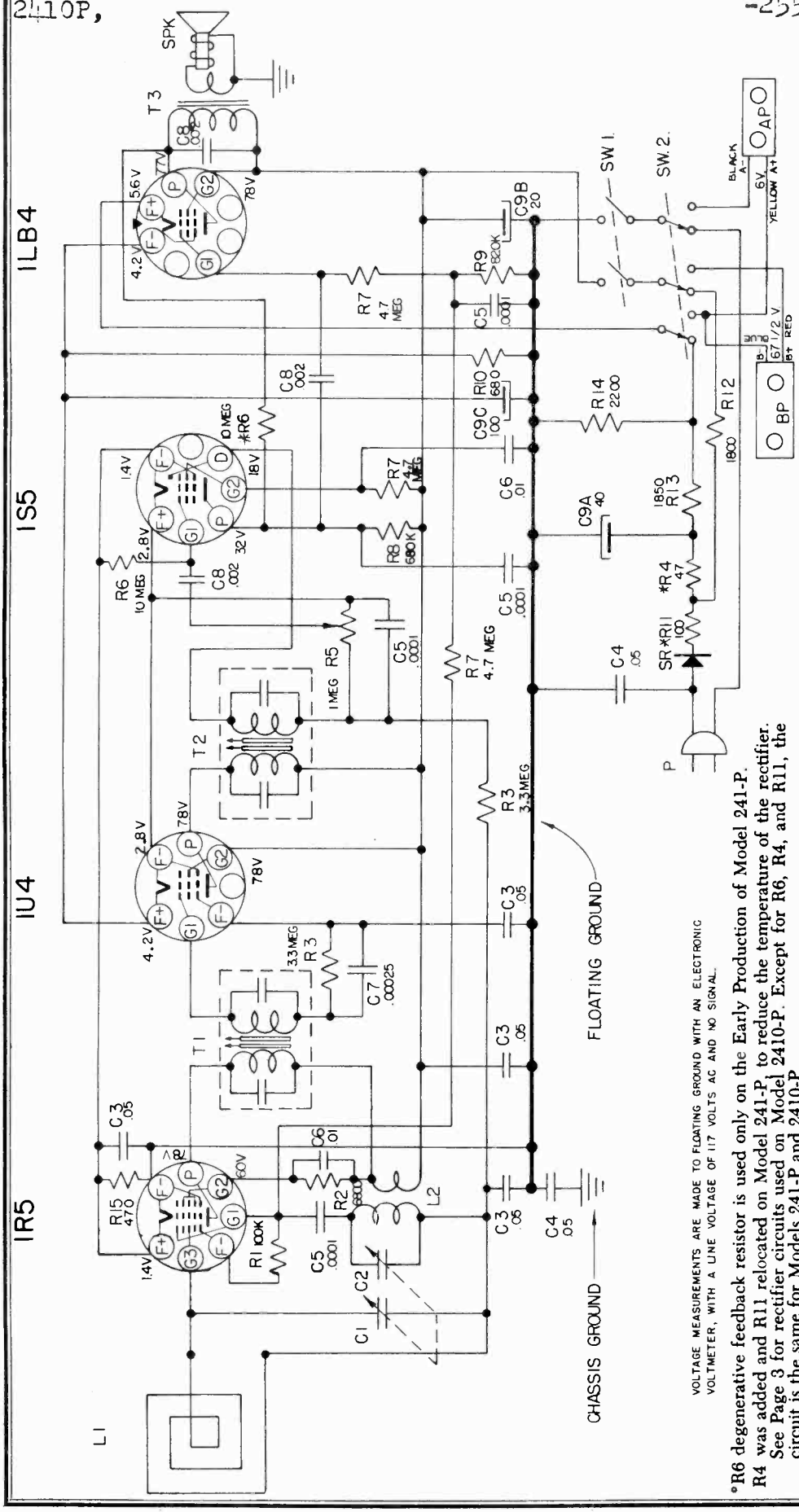
° used on first 18000 sets produced.
°° used on sets Produced after first 18,000.



LOCATION OF PARTS UNDER CHASSIS

Models 160T is in a walnut cabinet. Model 161T is in an ivory cabinet. The Chassis is the same in both models.

MODELS 241P, 244P, 2410P, NOBLITT-SPARKS INDUSTRIES, INC. CHASSIS RE-244, -255, -256, -259, -254



VOLTAGE MEASUREMENTS ARE MADE TO FLOATING GROUND WITH AN ELECTRONIC VOLTMETER, WITH A LINE VOLTAGE OF 117 VOLTS AC AND NO SIGNAL.

*R6 degenerative feedback resistor is used only on the Early Production of Model 241-P. R4 was added and R11 relocated on Model 241-P, to reduce the temperature of the rectifier. See Page 3 for rectifier circuits used on Model 2410-P. Except for R6, R4, and R11, the circuit is the same for Models 241-P and 2410-P.

SPECIFICATIONS

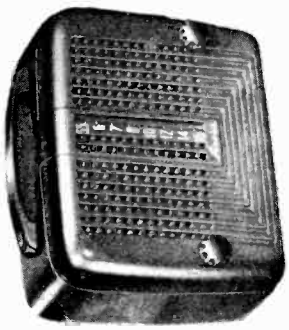
FREQUENCY RANGE
Broadcast ---------- 540-1600 kc
IF ---------- 455 kc

TUBES AND FUNCTIONS
1R5 ---------- Mixer-oscillator
1U4 ---------- IF Amp.
1S5 ---------- DET-AVC AF Amp.
1LB4 ---------- Output

POWER SUPPLY
1. 67½ V. B Battery, Eveready Minimax, No. 467 or Equal.
4. 1½ V. D Size Flishlight Cells, 6 Volts total

LOUD SPEAKER
Type: Permanent magnet
Size: 4 Inch
Voice coil impedance ---------- 3.2 Ohms

POWER OUTPUT
Undistorted ---------- .05 Watt
Maximum ---------- .1 Watt
Plate Load ---------- 14,000 ohms



NOBLITT-SPARKS INDUSTRIES, INC. MODELS 241P, 244P, 2410P, CHASSIS RE-244, -255, -256, -259, -254

ALIGNMENT PROCEDURE

PRELIMINARY:

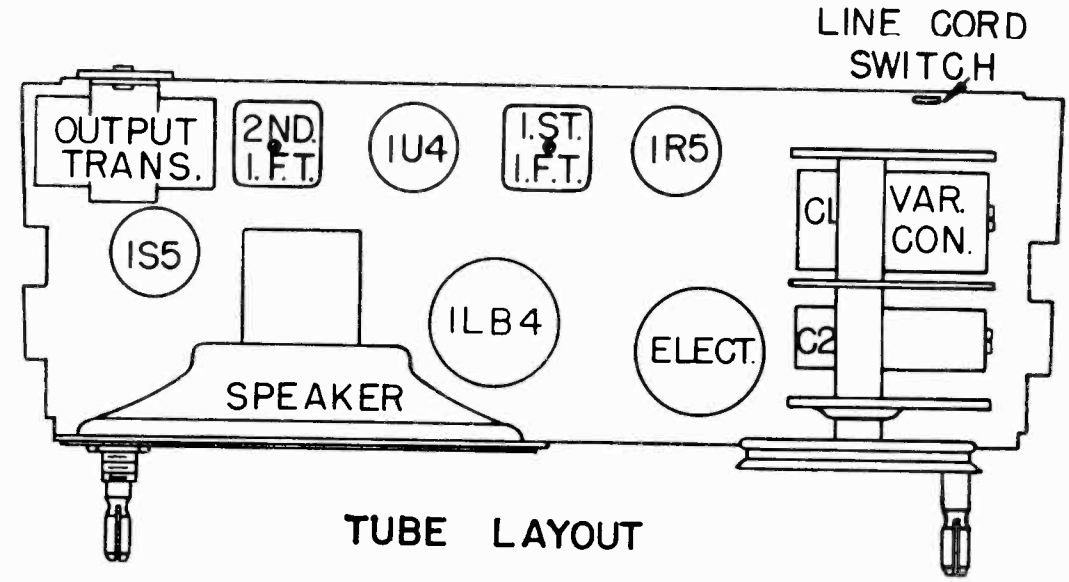
Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 50 MW (Standard Output)	.4 volts
Dummy antenna value to be used in series with generator output	See chart below
Connection of generator output lead	See chart below
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cycles
Position of volume control	Fully clockwise

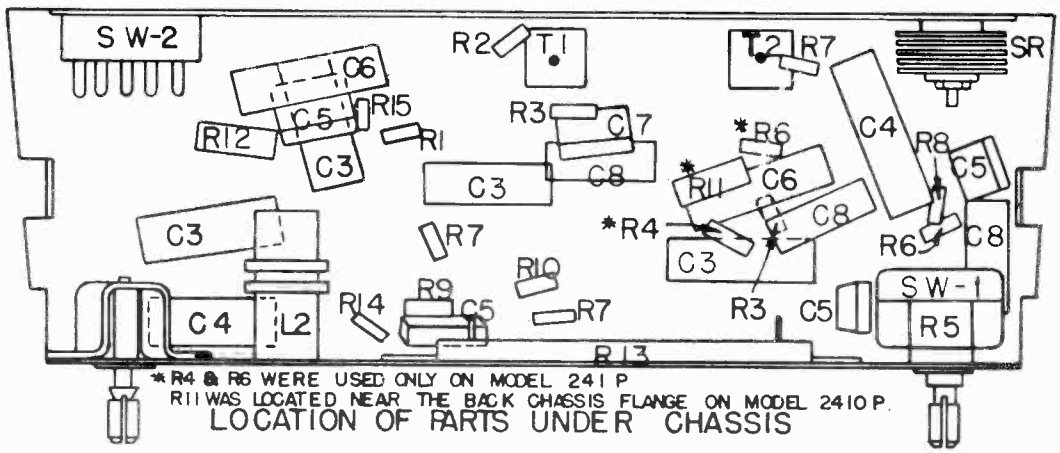
With variable condester closed, place top edge of pointer across center of top hole on dial backing plate.
When adjusting C1, place the set loop the same distance from and in the same position with respect to the chassis and batteries, as it would be when mounted in the cabinet.

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455	.05 mfd.	1R5 Grid (Stator of C1)	Top & Bottom of IF Trans. T2 & T1.	IF
1400	1400		°Test Loop	C2; C1, Trimmers on Variable Condenser	Oscillator Antenna
600	600		°Test Loop	°°Check Point	

° Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" diameter, placed about one foot from the set loop.
°°If weak, adjust variable condenser plates for maximum output.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





* R4 & R6 WERE USED ONLY ON MODEL 241P
R11 WAS LOCATED NEAR THE BACK CHASSIS FLANGE ON MODEL 2410P.
LOCATION OF PARTS UNDER CHASSIS

MODELS 241P, 244P, 2410P, CHASSIS RE-244, -255, -256, -259, -254

NOBLITT-SPARKS INDUSTRIES, INC.

241P, 244P & 2410P PARTS LIST

Schematic Location	Part No.	Description
R1	C20060-104	Resistor, 100,000 Ohm, 1/4 Watt
R2	C20060-682	Resistor, 6800 Ohm, 1/4 Watt
R3	C20060-335	Resistor, 3.3 Megohm, 1/4 Watt
R4 241 only	C20060-470	Resitor, 47 Ohm, 1/4 Watt
R4 2410-P o	C20060-680	Resistor, 68 Ohms 1/4 Watt
R5	C21782	Volume Control & Switch, 1 Megohm
R6	C20060-106	Resistor, 10 Megohm, 1/4 Watt
R7	C20060-475	Resistor, 4.7 Megohm, 1/4 Watt
R8	C20060-684	Resistor, 680,000 Ohm, 1/4 Watt
R9	C20120-824	Resistor, 820,000 Ohm, 1/4 Watt, + or − 10%
R10	C20060-681	Resistor, 680 Ohm, 1/4 Watt
R11	C20070-101	Resistor, 100 Ohm, I Watt, + or − 10%
R12	C20070-182	Resistor, 1800 Ohms, 1 Watt, + or − 10%
R13	A21816	Resistor, 1850 Ohms, 10 Watt, + or − 10%
R14	C20060-222	Resistor, 2200 Ohms, 1/4 Watt
R15	C20060-471	Resistor, 470 Ohms, 1/4 Watt
C1, C2	C19822	Condenser, Variable
C3	C20067-503	Condenser, .05 uf., 200 Volts, P. T.
C4	C20068-503	Condenser, .05 uf., 400 Volts, P. T.
C5	C20065-101	Condenser, .0001 uf., 500 Volts, Mica
C6	C20068-103	Condenser, .01 uf., 400 Volts, P. T.
C7	C20065-251	Condenser, .00025 uf., 500 Volts, Mica
C8	C20069-202	Condenser, .002 uf., 600 Volts, P. T.
C9	A21815	Condenser, Electrolytic, 40-20 uf., 150 Volts, 100 uf., 10 Volts
L1	°AC21795-( )	Antenna Loop & Cabinet Back Assy.
L2	AC21796-1	Oscillator Coil Assy.

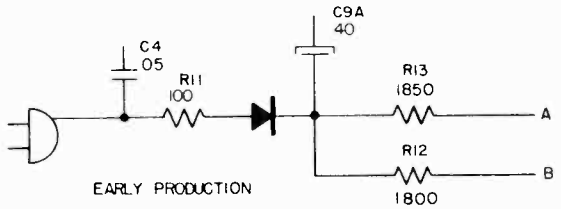
Schematic Location	Part No.	Description
T1	C21797-1	1st I. F. Coil Assy.
T2	C21797-2	2nd I. F. Coil Assy.
T3	AC21799-1	Output Transformer Assy.
SR	A20207-1	Selenium Rectifier, 75 Ma., Federal
or	A20207-2	Selenium Rectifier, 100 Ma., Radio Receptor
Spk	C21768	Speaker, 4" P. M.
Sw-2	A21051	Slide Switch
AP	A21861	"A" Battery Cable & Terminal Strip
BP	A21842	"B" Battery Cable & Terminal Strip
P	B20246-1	Line Cord & Plug Assy.
	°AA21957-( )	Cabinet Assy., Front Sec., with Grill Cloth & Latch
	°C21766-( )	Handle
	°A21764-( )	Knob
	A21801	Line Cord Hook
	A21802	Spring, Hinge (Set of two)
	A21803	Mtg. Stud for Handle
	A21241-1A	Speed Nut for Mtg. Handle (Set of two)
	A21838	Carton (Complete with Fillers)
	A21785	Tuning Shaft
	A20077-3	Grommet, Variable Con. Mtg.
	A19138-1	Eyelet, Spacer, Variable Condenser Mtg.
	A19361	Hair Pin Clip for Tuning Shaft
	A19132	Dial Drive Cord
	°A21783-( )	Pointer
	A21792	Spring Clip, IF Coil Mtg.
	A19133	Spring, Dial Cord
	A20243-3	Socket, Miniature, Shielded
	A20243-1	Socket, Miniature, Unshielded
	A21851-1	Socket, Loctal Molded
	A21852	Electrolytic Mtg. Wafer
	AC21858-1	Battery Clip Assy.
	C21767-1	Spring Latch

° When ordering these parts use the following dash numbers as suffixes to the Part numbers.
Ivory − 1 for handle, 3 for all other Cabinet Parts; Red − 1 for all Colored Parts;
Tan − 1 for Pointer & handle − 3 for knobs, − 4 for Cabinet parts;
Green − 1 for Pointed, − 5 for knobs Cabinet parts & handle.

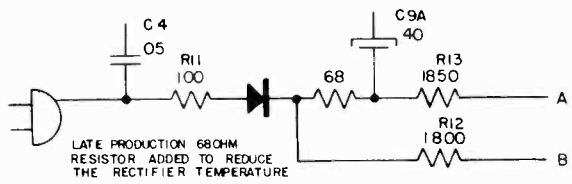
Model Number & Chassis Number Combinations.

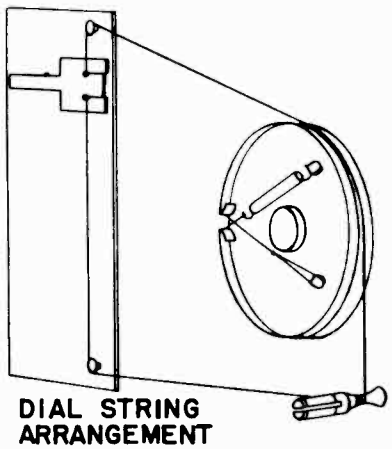
Model	Chassis	Model	Chassis
241P Ivory	Re-244	241P Red	RE-245
241P Tan	RE-255	244P Green	RE-259

The above Chassis are identical except for Colored parts Model 2410 P − Chassis RE-254 was produced in Red, Ivory & Tan, all using the same Chassis Number. It has Certain Circuit Variations which are covered in this bulletin.



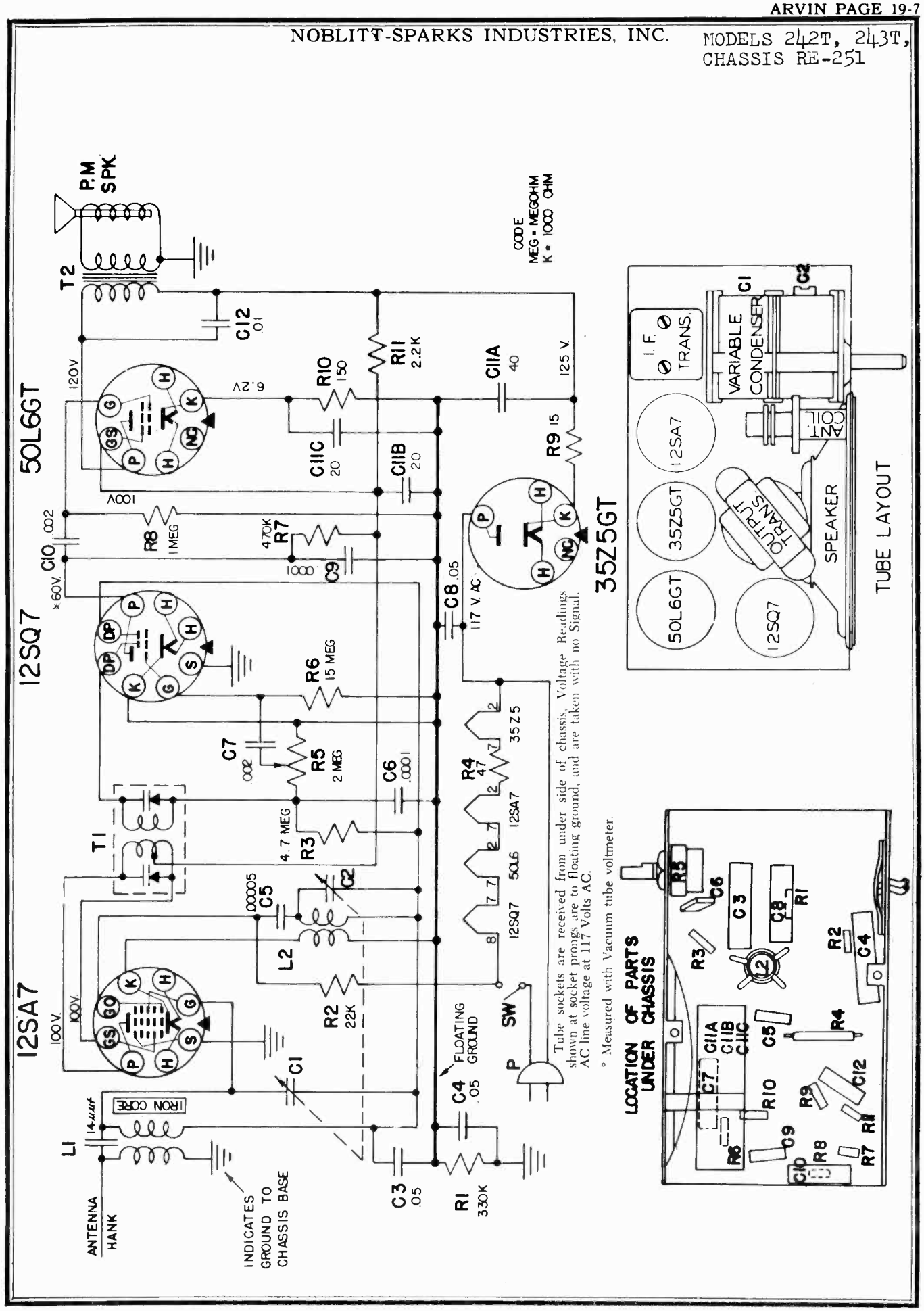
2410 P





DIAL STRING ARRANGEMENT

NOBLITT-SPARKS INDUSTRIES, INC. MODELS 242T, 243T, CHASSIS RE-251



MODELS 242T, 243T, NOBLITT-SPARKS INDUSTRIES, INC.
CHASSIS RE-251

ALIGNMENT PROCEDURE

PRELIMINARY.

Output meter connection ---------- Across loudspeaker voice coil
Output meter reading to indicate 200 milliwatts (standard output) ---------- 0.8 volts
Dummy antenna to be in series with signal generator output ---------- See chart below
Connection of generator ground lead ---------- Floating ground
Generator modulation ---------- 30% 400 cycles
Position of Volume Control ---------- Fully clockwise
Position of pointer with variable fully closed ---------- 55 on dial

Position of Variable	Generator Frequency	Dummy Antenna	Generator Output Connection	Trimmers Adjusted	Trimmer Function	Approximate Sensitivity
Open	455 Kc	.05 uf.	12SA7 Grid (Stator of C-1)	2 trimmers on IF. Trans.	IF	3000 uv.
1400 Kc	1400Kc	.00005 uf.	Antenna Lug with Hank Removed	°°C-2	Oscillator	360 uv.

°°Since the antenna section of the variable has no trimmer, the rotor of the variable should be rocked back and forth on both sides of 1400 Kc while adjusting the oscillator trimmer for maximum output. This is to obtain the combination of rotor and trimmer setting to give perfect tracking of the two sections of the variable condenser and consequently give maximum output.

Check sensitivity at 600 Kc. If weak, adjust antenna section plates for maximum output at 600 Kc. Tracking of the condenser at points other than 1400 Kc is accomplished by bending the outside plates on the variable condenser rotor, which are cut for this purpose. When bending plates to track the condenser at any given frequency, keep in mind the fact that this will effect the tracking at all frequencies below that point. A tuning wand is very helpful in checking the tracking of this condenser, to indicate whether more or less capacity is needed.

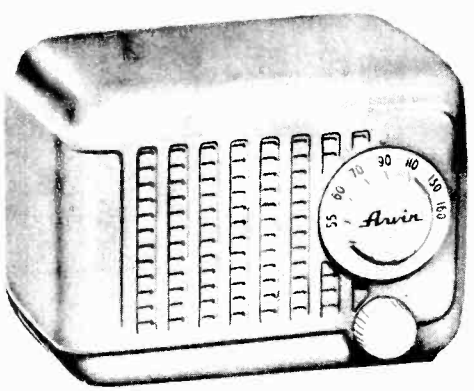
The alignment procedure should be repeated stage by stage in the original order for greatest accuracy.

Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

REF. NO.		DESCRIPTION
R1	C20060-334	Resistor, 330,000 Ohms, ¼ W.
R2	C20060-223	Resistor, 22,000 Ohms, ¼ W.
R3	C20060-475	Resistor, 4.7 Megohms, ¼ W.
R4	A19177	Resistor, 47 Ohms, 1 W.
R5	C21630	Resistor, 2 Megohms, volume control and switch
R6	C20060-156	Resistor, 15 Megohms, ¼ W.
R7	C20060-474	Resistor, 470,000 Ohms, ¼ W.
R8	C20060-105	Resistor, 1 Megohm, ¼ W.
R9	C20060-150	Resistor, 15 Ohms, ¼ W.
R10	C20060-151	Resistor, 150 Ohms, ¼ W.
R11	C20070-222	Resistor, 2,200 Ohms, 1 W.
C1, C2	C22047	Condenser, variable
C3	C20067-503	Condenser, .05 uf., 200 V.
C4, C8	C20068-503	Condenser, .05 uf., 400 V.
C5	C20065-500	Condenser, .00005 uf., 500 V.
C6, C9	C20065-101	Condenser, .0001 uf., 500 V.
C7, C10	C20069-202	Condenser, .002 uf., 500 V.
C11A		Condenser, 40 uf., 150 V.
C11B	A19176	Condenser, 20 uf., 150 V.
C11C		Condenser, 20 uf., 25 V.
C12	C20068-103	Condenser, .01 uf., 400 V.
L1	AC18255-1	Coil, antenna
L2	AC18256-1	Coil, oscillator
T1	AC18257-1	Coil, i. f.
T2	AC18258-1	Output transformer
	°E22029-( )	Cabinet
	°C19560-( )	Cabinet back cover
	°C22028-( )	Knob, tuning
	°C22049-( )	Knob, volume
Spk.	C21626	Speaker
P	B20257-1	Line cord and plug assembly

°Be sure to use the dash number as outlined in the chart below when ordering colored parts:

MODEL	CABINET	REAR COVER	VOL. KNOB	TUN. KNOB
242T	E22029-2	C19560-2	A22049-1	C22028-1
Ivory	Ivory	Ivory	Light Tan	Light Tan
243T	E22029-3	C19560-3	A22049-2	C22028-2
Yellow	Yellow	Yellow	Lt. Blue	Lt. Blue
243T	E22029-5	C19560-5	A22049-5	C22028-5
Green	Green	Green	Banana Yellow	Banana Yellow
243T	E22029-6	C19560-6	A22049-3	C22028-3
Red	Red	Red	Pale Yellow	Pale Yellow



SPECIFICATIONS

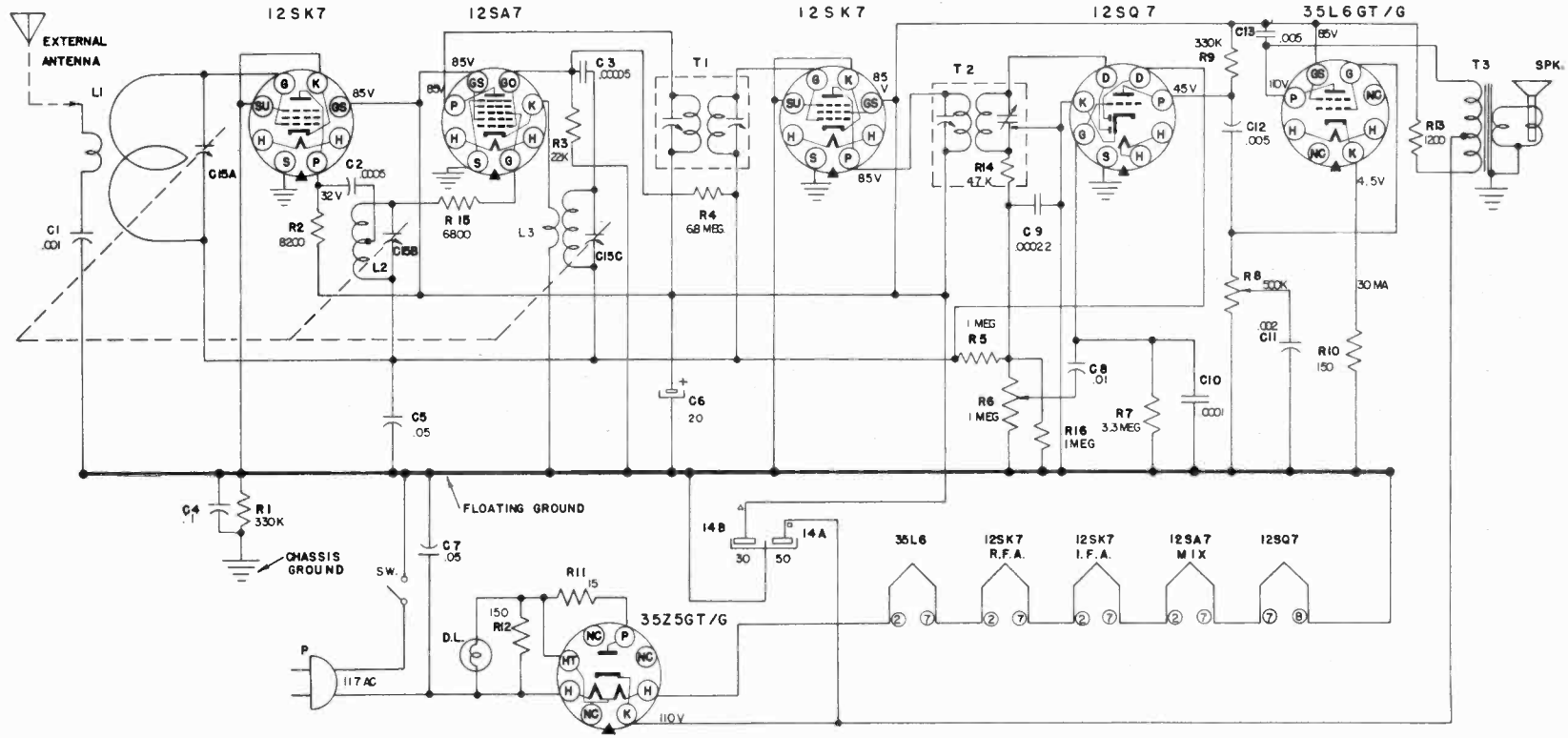
FREQUENCY RANGE
Broadcast ---------- 540-1600 kc
IF ---------- 455 kc

TUBES AND FUNCTIONS
12SA7 ---------- Mixer-oscillator
12SQ7 ---------- Detector — AVC-AF.
50L6GT ---------- Output
35Z5GT ---------- Rectifier

POWER SUPPLY
105-125 Volts, AC-DC, 30 Watts

POWER OUTPUT
Type: Beam tube
Undistorted ---------- .8 Watts
Maximum ---------- 2.5 Watts
Plate Load ---------- 2000 Ohms

LOUD SPEAKER
Type: Permanent magnet
Size: 4 inch
Voice coil impedance ---------- 3.2 Ohms



VOLTAGE MEASUREMENTS MADE WITH AN ELECTRONIC VOLTMETER, 117 V AC LINE VOLTAGE & NO SIGNAL.

K = 1000 OHM
MEG. = MEGOHM

NOTE: TUBULAR PAPER CAPACITORS CURVED LINE INDICATES OUTSIDE FOIL.

SPECIFICATIONS

FREQUENCY RANGE

Broadcast	540-1600 kc
IF	455 kc

TUBES AND FUNCTIONS

12SK7	RF Amp.
12SA7	Mixer-oscillator
12SK7	IF Amp.
12SQ7	DET-AVC AF Amp.
35L6	Output
35Z5GT	Rectiier

POWER OUTPUT

Undistorted	.8 Watts
Maximum	1.1 Watts
Plate load	2000 Ohms

LOUD SPEAKER

Type: Permanent magnet, 1.47 oz. Alnico 5
Size: 5¼ Inch

Voice coil impedance	3.2 Ohms

CHASSIS FEATURES

Automatic Volume Control
Built-in Loop
Tuned RF Stage

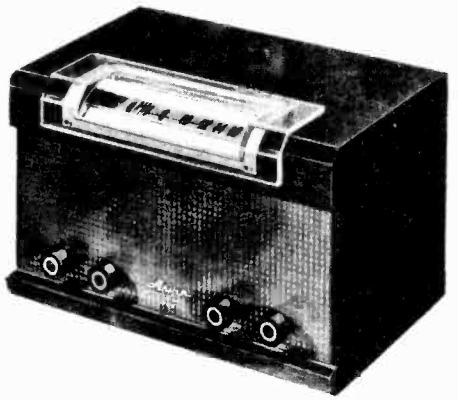
OPERATING CONTROLS

1. Left knob	Volume
2. Left Center knob	Tone
3. Right Center knob	ON-OFF Switch
4. Right	Tuning

PHYSICAL DIMENSIONS

Length	14 inches
Height	8 1/2 inches
Depth	8 5/16 inches

Models 264T is in a Mahogany cabinet. Model 265T is in a Bleached Mahogany cabinet. The Chassis is the same in both models.



MODELS 264T, 265T, NOBLITT-SPARKS INDUSTRIES, INC.
CHASSIS RE-265

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 mw (standard output)	.8 volts
Connection of generator ground lead	Floating ground
Generator modulation.	30% 400 cyclees
Position of volume control	Fully clockwise
Position of dial pointer with variable fully closed	Last mark at left end of dial

1. Connect signal generator lead through a .05 uf. condenser to converter grid. Open tuning condenser. Set signal generator to 455 Kc. Tune I. F. Transformers for maximum output.

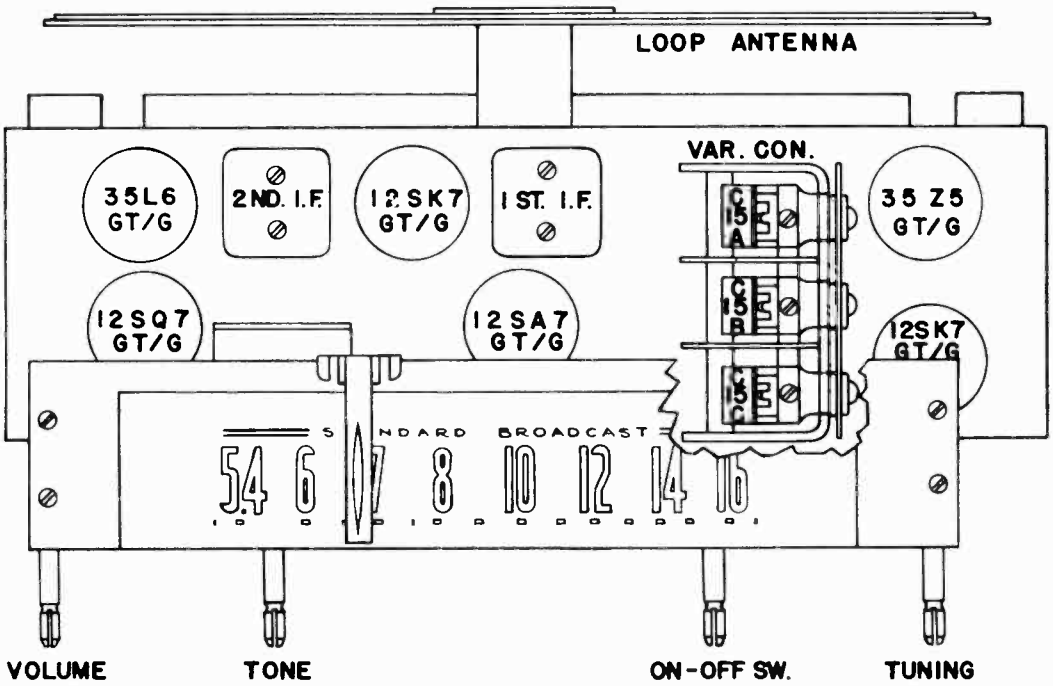
2. Close tuning condenser and set pointer at end mark of dial. Open tuning condenser. Connect signal generator to test loop or to blue lead on set loop. Set signal generator to 1620 Kc. Tune trimmer on (C15C) oscillator section of tuning condenser for maximum output.

3. Set signal generator to 1400 Kc. Adjust tuning shaft until maximum output is abtained. Tune R. F. trimmer (C15B) and antenna trimmer (C15A) on tuning condenser for greatest output. Reset tuning shaft until output is again a maximum. Retune R. F. and antenna trimmers. Repeat this cycle of operations at 1400 Kc until no further increase of output can be obtained. Keep generator output at a low value to prevent detuning by A. V. C. action.

4. Set signal generator to 600 Kc. Adjust tuning shaft for maximum output. Adjust tuning condenser plates for maximum output.

Approximate stage by stage sensitivities with 117V. AC line voltage and .8 V. output across voice coil, should be: I. F. grid, 455 Kc – 10,000 uv., Mixer grid, 455 Kc – 150 uv., Mixer grid, 1000 Kc – 170 uv; Antenna, 1400 Kc – 100 uv/m.

TUBE LAYOUT



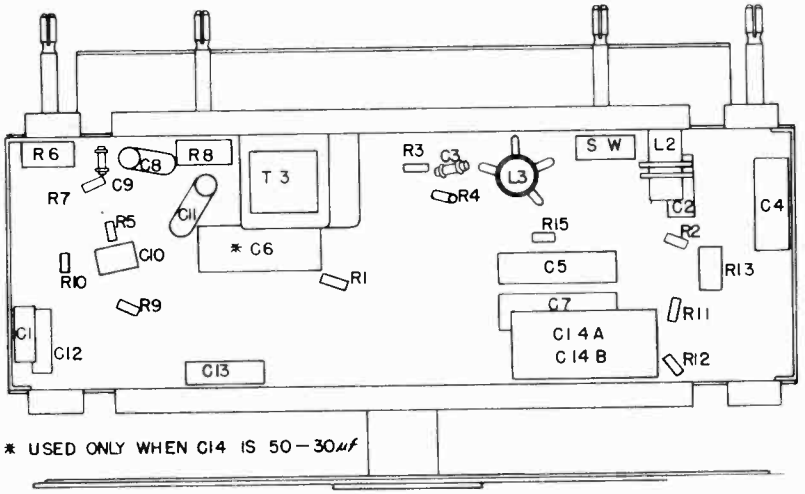
NOBLITT-SPARKS INDUSTRIES, INC. MODELS 264T, 265T, CHASSIS RE-265

PARTS LIST

Schematic Location	Part No.	Description
R1, 9	C20060-334	Resistor, 330,000 Ohms, ¼ W
R2	C20120-822	Resistor, 8200 Ohms, ¼ W
R3	C20060-223	Resistor, 22,000 Ohms, ¼ W
R4	C20060-685	Resistor, 6.8 Megohm, ¼ W
R5, R16	C20060-105	Resistor, 1 Megohm, ¼ W
R6	C21404-1	Volume Control, 1 Megohm
R7	C20060-335	Resistor, 3.3 Megohm, ¼ W
R8	C21405-1	Tone Control & Switch, 500,000 Ohms
R10, 12	C20060-151	Resistor, 150 Ohms, ¼ W
R11	C20060-150	Resistor, 15 Ohms, ¼ W
R13	C20223-122	Resistor, 1200 Ohms, 2 W
R14	C20060-473	Resistor, 47,000 Ohms, ¼ W
R15	C20060-682	Resistor, 6800 Ohms, ¼ W
C1	C20067-102	Condenser, .001 uf., 200 V., P. T.
C2	C20069-501	Condenser, .0005 uf., 600 V., P. T.
C3	C20204-500	Condenser, .00005 uf., 500 V., Ceramic
C4	C20067-104	Condenser, .1 uf., 200 V., P. T.
C5	C20067-503	Condenser, .05 uf., 200 V., P. T.
°C6	A22110	Condenser, .20 uf., 150 V. Elect.
C7	C20068-503	Condenser, .05 uf., 400 V., P. T.
C8	C20068-103	Condenser, .01 uf., 400 V., P. T.
C9	C20226-221	Condenser, .00022 uf., 350 V., Ceramic
C10	C20065-101	Condenser, .0001 uf., 500 V., Mica
C11	C20068-202	Condenser, .002 uf., 400 V., P. T.
C12, 13	C20068-502	Condenser, .005 uf., 400 V., P. T.
°C14A, B	A21578	Electrolytic Condenser, 50 uf., 150 V., 30 uf., 150 V.
C14A, B	C22111	Electrolytic Condenser, 50 uf., 150 V. 50 uf., 150 V.
C15A, B, C	AD22154-1	Variable Condenser & Pulley Assy.
L1	AD21574-1	Antenna Loop Assembly
L2	AC21575-1	R. F. Coil Assembly
L3	AC21576-1	Oscillator Coil Assembly
T1	AC21572-1	1st I. F. Coil Assembly
T2	AC21573-1	2nd I. F. Coil Assembly
T3	AC21577-1	Output Transformer Assembly

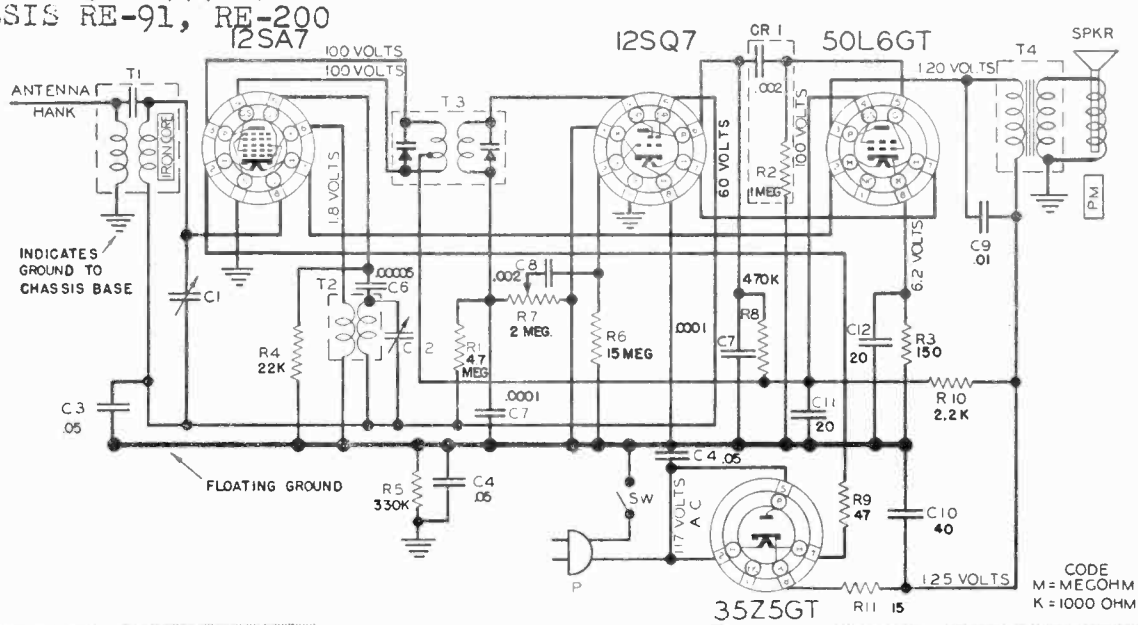
Schematic Location	Part No.	Description
Spk.	C21331	Speaker, 5-1/4" P. M.
DL	A19351	Dial Light Bulb
P	B20138-12	Line Cord and Plug Assembly.
SW	C22157	Switch On-Off
	R21379-3	Cabinet Mahogany 264-T
	R21379-4	Cabinet Bleached Mahogany 265-T
	A21700	Carton Complete with Fillers
	A19361	Clip, Hairpin for Tuning Shaft
	A19205-3	Clip, Electrolytic Condenser Mounting
	A19132	Cord, Dial Drive
	AC21377-1	Dial Pointer
	D22152	Dial Scale
	D21365	Escutcheon Clear Lucite
	C21426	Grille, Cabinet Front
	C21498	Grille Felt
	A20077-3	Grommet, Rubber under Variable Condenser
	A20202-2	Idler Pulley (Quantity of 5)
	C21427	Knob, Volume
	C21428	Knob, Tuning
	C22150	Knob, On-Off
	C22151	Knob, Tone
	A21330	Name Plate
	D21434	Rear Cover
	A20196-2	Rivet, Tubular, Shoulder (For Mtg. Idler Pulley Qty. of 5)
	A20196-4	Rivet, Tubular, Shoulder (For Mtg. Idler Pulley Qty. of 5)
	A21442	Shaft, Tuning
	A21346-2	Socket, Dial Light
	A19233-1	Socket, Tube, Wafer Center Pin Shielded
	A18254-1	Socket, Tube, Wafer Plain
	A19579	Socket, Speaker
	A19138-1	Spacer Eyelet, Variable Condenser Mounting
	A19295	Spring, Dial Drive Cord
	A20040-9	Washers, Brown Felt, Behind Knobs (Qty. of 10)

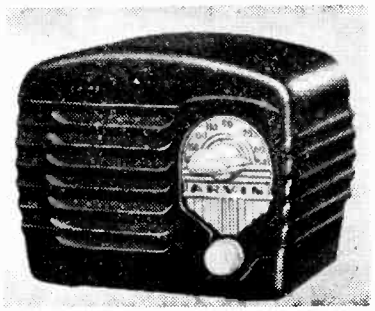
°C6 Part C22110 was used only on sets where C14 was Part 21578 50-30 mfd. Part 21578 was replaced by Part 22111, 50-50 mfd. in later production.

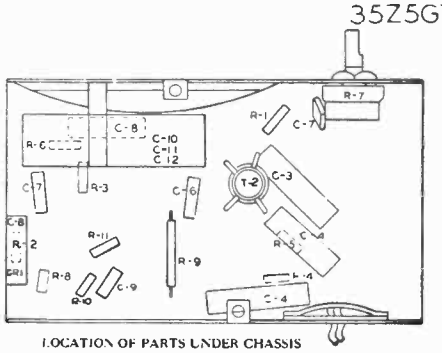


LOCATION OF PARTS UNDER CHASSIS

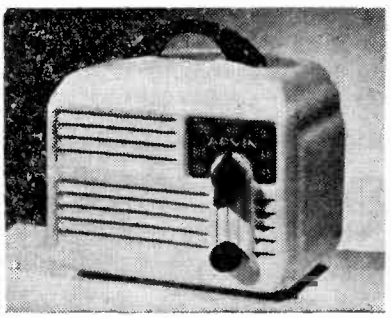
MODELS 442, 444AH, NOBLITT-SPARKS INDUSTRIES, INC.
CHASSIS RE-91, RE-200







LOCATION OF PARTS UNDER CHASSIS



Model 444-AH is the same as Model 444 except for the handle and cabinet.

Model 442 is wired from the same Schematic Diagram as the Model 444 and 444-AH but has different components as indicated in the Parts List.

Some of the first Model 442 chassis had the same components as the Model 444 chassis except for the chassis base.

The symbol CR1 on the Schematic Diagram represents a capristor which contains a .002 condenser and a 1 megohm resistor in one unit. This is used only on the Model 442.

FREQUENCY RANGE
- Broadcast ..... 540-1600 kc
- IF ..... 455 kc

TUBES AND FUNCTIONS
- 12SA7 ..... Mixer-oscillator
- 12SQ7 ..... Detector-AVC-AF
- 50L6GT ..... Output
- 35Z5GT ..... Rectifier

POWER SUPPLY
- 105-125 Volts AC-DC, 35 Watts

POWER OUTPUT
- Type: Beam tube
- Undistorted ..... .8 Watts
- Maximum ..... 2.5 Watts
- Plate load ..... 2000 ohms

LOUD SPEAKER
- Type: Permanent magnet
- Size: 4 inch
- Voice coil impedance ..... 3.2 ohms

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
R1	C20060-475	Resistor, 4.7 megohms, ¼ watt
*R2	Part of A21642	Resistor, 1 megohm
**R2	C20060-105	Resistor, 1 megohm, ¼ watt
R3	C20060-151	Resistor, 150 ohms, ¼ watt
R4	C20060-223	Resistor, 22,000 ohms, ¼ watt
R5	C20060-334	Resistor, 330,000 ohms, ¼ watt
R6	C20060-156	Resistor, 15 megohms, ¼ watt
R7	C21630	Resistor, 2 megohms, Vol. control & sw.
R8	C20060-474	Resistor, 470,000 ohms, ¼ watt
R9	A19177	Resistor, 47 ohms, 1 watt
R10	C20070-222	Resistor, 2,200 ohms, 1 watt
R11	C20060-150	Resistor, 15 ohms, ¼ watt
C1, C2	B17115	Condenser, variable
C3	C20067-503	Condenser, .05 mfd., 200 volt
C4	C20068-503	Condenser, .05 mfd., 400 volt
*C6	A21643	Condenser, .00005 mfd
**C6	C20065-500	Condenser, .00005 mfd., 500 volt
*C7	A21645	Condenser, .0001 mfd.
**C7	C20065-101	Condenser, .0001 mfd., 500 volt
*C8	C20068-202	Condenser, .002 mfd., 400 volt
**C8	C20069-202	Condenser, .002 mfd., 500 volt
*C9	C20203-103	Condenser, .01 mfd., 350 volt, ceramic
**C9	C20068-103	Condenser, .01 mfd., 400 volt
C10)		Condenser, 40 mfd., 150 volt
C11)	A19176	Condenser, 20 mfd., 150 volt
C12)		Condenser, 20 mfd., 25 volt
T1	AC18255-1	Coil, Antenna
T2	AC18256-1	Coil, Oscillator
T3	AC18257-1	Coil, I. F.
T4	AC18258-1	Output Transformer
	A18263	Dial Scale Emblem
	*D16511-2	Cabinet, Black
	**E18124-3	Cabinet, Ivory
	*A18592-2	Knob, Tuning, Ivory
	**A18261-3	Knob, Tuning, Ivory
	*A21632	Knob, Volume, Ivory
	**A18262-3	Knob, Volume, Ivory
*Spk.	C21626	Speaker
**Spk.	B17209	Speaker
C5	C20068-502	Condenser, .005 mfd., 400 volt
*CR-1	A21642	Capristor, 002 uf., condenser and 1 megohm Resistor
	**A17010	Handle
	A21635	Carton with Fillers
	**A21666	Carton with Fillers
	B20237-1	Line Cord and Plug Assembly

*Used on Model 442 only.
**Used on Model 444AH only.

MODELS 547, 547A, CHASSIS RE-242

NOBLITT-SPARKS INDUSTRIES, INC.

MODELS 442, 444AH, CHASSIS RE-91, RE-200

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 milliwatts (standard output)	0.8 volts
Dummy antenna to be in series with signal generator output	See chart below
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cycles
Position of Volume Control	Fully clockwise
Position of pointer with variable fully closed	54 on dial

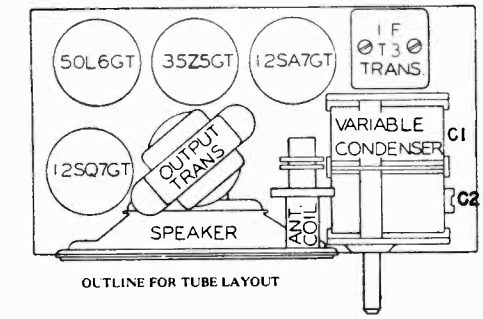
Position of Variable	Generator Frequency	Dummy Antenna	Generator Output Connection	Trimmers Adjuster	Trimmer Function	Approximate Sensitivity
Open	455 Kc	.05 uf	12SA7 Grid (Stator of C-1)	2 trimmers on top of T-3	IF	3000 uv
1400 Kc	1400 Kc	.00005 uf	Antenna lug with Ant. Removed	**C-2	Oscillator	360 uv

**Since the antenna section of the variable has no trimmer, the rotor of the variable should be rocked back and forth on both sides of 1400 Kc while adjusting the oscillator trimmer for maximum output. This is to obtain the combination of rotor and trimmer setting to give perfect tracking of the two sections of the variable condenser and consequently give maximum output.

Check sensitivity at 600 Kc. If weak, adjust antenna section plates for maximum output at 600 Kc. Tracking of the condenser at points other than 1400 Kc is accomplished by bending the outside plates on the variable condenser rotor, which are cut for this purpose. When bending plates to track the condenser at any given frequency, keep in mind the fact that this will affect the tracking at all frequencies below the point where the plates are bent. A tuning wand is very helpful in checking the tracking of this condenser, to indicate whether more or less capacity is needed.

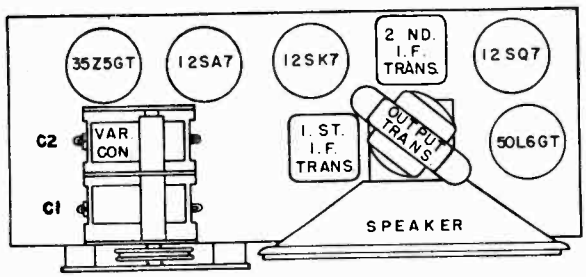
The alignment procedure should be repeated stage by stage in the original order for greatest accuracy.

Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.



OUTLINE FOR TUBE LAYOUT

MODELS 442, 444AH, CHASSIS RE-91, RE-200



OUTLINE FOR TUBE LAYOUT

MODELS 547, 547A, CHASSIS RE-242

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 milliwatts (standard output)	0.8 volts
Dummy antenna to be used in series with generator output	See chart below
Connection of generator output lead	See chart below
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cycles
Position of Volume Control	Fully clockwise
Position of dial pointer with variable fully closed	Horizontal

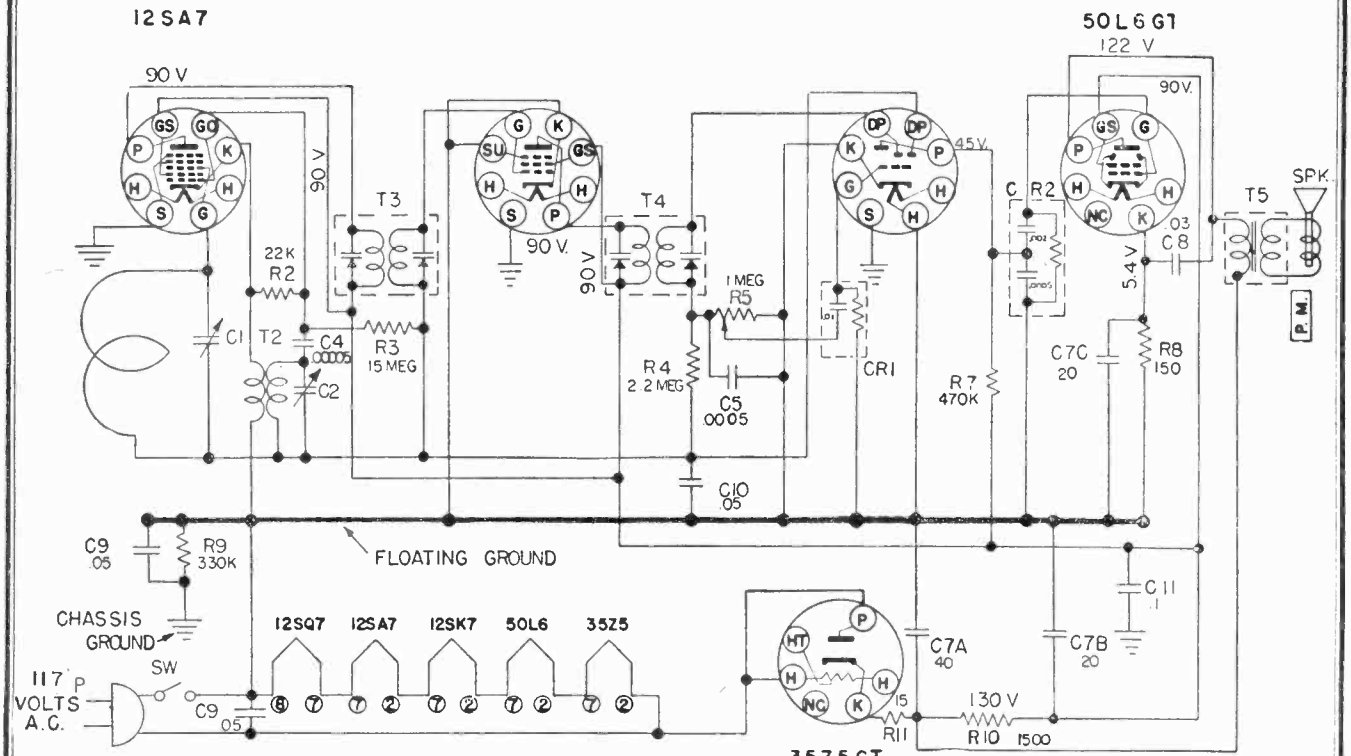
Place the set loop in the same position with respect to the rear of the chassis, and the same distance from the chassis, as it would be with the set mounted in the cabinet.

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted In Order Shown For Maximum Output	Function of Trimmer
Open	455	.05 mfd.	12SA7 Grid (Stator of C-1)	Top of 2nd & 1st IF trans. T2 & T1	IF
1400	1400		*Test Loop	C2; C1, Trimmers on Variable Condenser	Osc. Ant.
600	600		*Test Loop	Check Point (If weak, adjust variable plates for maximum output.)	

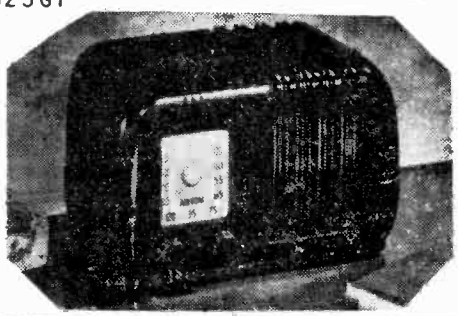
*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter, placed about one foot from the set loop.

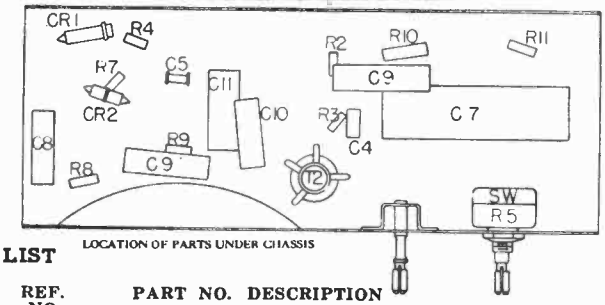
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

CHASSIS RE-242 NOBLITT-SPARKS INDUSTRIES, INC. MODELS 547, 547A,



NOTE: TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO FLOATING GROUND AND ARE TAKEN WITH NO SIGNAL. A.C. LINE VOLTAGE AT 117 VOLTS. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ.





LOCATION OF PARTS UNDER CHASSIS

LOUD SPEAKER
- Type: Permanent magnet
- Size: 4 inch
- Voice coil impedance ..... 3.2 ohms

FREQUENCY RANGE
- Broadcast ..... 540-1600 kc
- IF ..... 455 kc

TUBES AND FUNCTIONS
- 12SA7 ..... Mixer-oscillator
- 12SK7 ..... IF Amp.
- 12SQ7GT ..... DET-AVC-AF
- 50L6GT ..... Output
- 35Z5GT ..... Rectifier

POWER SUPPLY
105-125 Volts AC-DC, 35 Watts

POWER OUTPUT
- Undistorted ..... .8 Watts
- Maximum ..... 2.5 Watts
- Plate load ..... 2000 ohms

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
R2	C20060-223	Resistor, 22,000 ohm, ¼ w
R3	C20060-156	Resistor, 15 megohm, ¼ w
R4	C20060-225	Resistor, 2.2 megohm, ¼ w
R5	B17291	Volume control & sw., 1 megohm
R7	C20060-474	Resistor, 470,000 ohm, ¼ w
R8	C20060-151	Resistor, 150 ohm, ¼ w
R9	C20060-334	Resistor, 330,000 ohm, ¼ w
R10	C20070-152	Resistor, 1,500 ohm 1 w
R11	C20060-150	Resistor, 15 ohm, ¼ w
C1, C2	B18869	Variable condenser
C4	A21643	Condenser, .00005 mfd., molded
C5	C20203-501	Condenser, .0005 mfd., 300 volt ceramic
C7	A19136	Condenser, elect., 40-20 mfd., 150 V, 20 mfd. - 25 V
C8	C20068-303	Condenser, .03 mfd., 400 volt P. T.
C9	C20068-503	Condenser, .05 mfd., 400 volt, P. T.
C10	C20067-503	Condenser, .05 mfd., 200 volt, P. T.
C11	C20068-104	Condenser, .1 mfd., 400 volt, P. T.
CR1	A21660	Capristor, 4.7 meg. resistor, .01 ufd. condenser
CR2	A21659	Capristor, 470 K resistor, .002 ufd. and .0005 ufd. condenser
T1	AC21647-1	Antenna Loop Assembly
T2	AC18646-1	Oscillator Coil
T3	AC18908-1	1st I. F. Coil
T4	AC18909-1	2nd I. F. Coil
T5	AC18647-1	Output Transformer
Spk.	C21657	Speaker
	E17232-3	Cabinet, Black
	E17232-2	Cabinet, Ivory
	A17304	Dial Crystal
	A19474	Knobs
	A19125	Grille Cloth
	A17296	Tuning Shaft
	A18640-1	Dial Scale
	A19132	Dial Drive Cord
	A19133	Spring
	A19205-3	Cap. Mtg. Clip
	A19233-1	Socket, Tube Shielded
	A18254-1	Socket, Tube Plain
	A16482	Tube Shield
	B20138-1	Line Cord and Plug Assembly
	A19473-1	Dial Pointer
	A19141	Terminal Strip
	A19547	Two Conductor Shielded Leads
	A21945	Speaker and Transformer Assembly
	A21651	Shipping Carton
	A19124	Snap on Button (10)

Models 547 and 547A are identical except for cabinets. Model 547 is in a walnut cabinet. Model 547A is in an ivory cabinet.

NORTHERN RADIO CO.

TYPES N600, N602, MODELS A, B, C, D, DQ, DQT, DT, E, ED

TYPE N600 TWO BAND COMMUNICATIONS RECEIVERS
TYPE N602 THREE BAND COMMUNICATIONS RECEIVERS

DESCRIPTION OF EQUIPMENT

The latest Type N600 and N602 Receivers are available in six different models for either direct or alternating current operation. Model A - 6 Volt DC and Model B - 12 Volt DC Receivers are designed for operation from 6 and 12 volt storage batteries, where other sources of power are not available. Model C - 32 Volt DC and Model D -115 Volt DC Receivers are designed especially for marine installations and operate directly from the ship's battery without the use of a built-in power supply. Model E - 115 Volt AC Receiver is primarily designed for land stations and operated from a 115 Volt 50 - 60 cycle a.c. source. Model ED - 115 Volt AC-DC Receiver operates from either source, as implied, and is equally suited for marine or land installations.

The characteristics of the six models are essentially similar, with the exception of the audio frequency amplifier and power supply. The radio frequency components and controls are identical, thus the operation, alignment, servicing, etc., are the same. The following data is pertinent to the six models, describing them collectively where they are similar and individually where they are at variance.

One radio frequency stage of amplification employing a 6K7 eliminates the image frequency signal and insures an effective signal to noise ratio.

A separate oscillator employing a 6J5 reduces frequency drift to a minimum and improves the general stability of the receiver.

A 6L7 mixer converts the incoming signal to the intermediate frequency, where it is amplified by a second 6K7. By the use of iron core intermediate transformers sufficient gain and selectivity are obtained with a single stage. This permits the use of the other 6K7 as a radio frequency amplifier where it is considerably more effective as well as increasing the stability of the receiver.

Detection is accomplished by means of the diode in a type 6Q7. The rectified voltage is filtered and applied to the grids of the previous stages to provide automatic volume control.

When provision is made for c.w. reception, a 6J5 beat frequency oscillator is added. This is coupled into the diode detector to produce an audible tone when beating with the intermediate frequency. Receivers so equipped, are designated by the letter T following the model letter.

The triode section of the 6Q7 amplifies the diode output, functioning as the first audio stage. In the Model A - 6 Volt DC Receiver, the Model B - 12 Volt DC Receiver and the Model E - 115 Volt AC Receiver the power amplifier is a 6F6G, which is driven directly by the first audio stage. The Model C - 32 Volt DC Receiver incorporates a 25L6G Driver stage. This Driver is excited by the first audio stage and, in turn, excites the power amplifier which consists of four 25L6G's connected in push-pull parallel. A single 25L6G power amplifier driven by the first audio stage, is used in the Model D - 115 Volt DC Receiver and the Model ED - 115 Volt AC-DC Receiver.

In receivers equipped with an inter-carrier squelch circuit, the triode section of the 6Q7 functions as the squelch control and a 6F5 is added for the first audio stage. The 6F5 then feeds the respective power amplifiers as described in the preceding paragraph. Receivers so equipped, are designated by the letter Q following the model letter.

An output power of approximately 2½ watts is obtained from the 6F6G power amplifier in the Model A - 6 Volt DC Receiver, Model B - 12 Volt DC Receiver and Model E - 115 Volt AC Receiver. The 25L6G push-pull parallel power amplifier in the Model C - 32 Volt DC Receiver has an output of approximately ½ watt, which provides ample volume from the built-in speaker. In the Model D - 115 Volt DC Receiver and the Model ED - 115 Volt AC-DC Receiver, an output of approximately 2 watts is obtained from the 25L6G power amplifier. The built-in speaker is of the permanent magnet dynamic type.

Plate power for the Model A - 6 Volt DC Receiver and the Model B - 12 Volt DC Receiver is obtained from a built-in power supply of the vibrator type. The Model C - 32 Volt DC Receiver and the Model D - 115 Volt DC Receiver have no built-in power supply, all power being obtained directly from the ship's battery. Plate power for the Model E - 115 Volt AC Receiver is provided by a conventional rectifier-filter system using an 80 tube. In the Model ED - 115 Volt AC-DC Receiver, plate power is obtained from a half-wave rectifier-filter system using a 25Z6GT tube.

TYPES N600, N602,
MODELS A,B,C,D,DQ,
DQT,DT,E,ED

NORTHERN RADIO CO.

Controls

(1) Power switch marked "POWER". This switch functions as the Off-On control for the receiver.

(2) FOR TYPE N600 ONLY

Band Switch marked "BAND A-B". In position "A" the receiver is tuneable over the range between 1550 and 4200 kilocycles. In position "B" the receiver is tuneable between 550 and 1600 kilocycles.

(2) FOR TYPE N602 ONLY

Band Switch marked "BAND A-B-C". In position "A" the receiver is tuneable over the range between 540 and 1680 kilocycles, in position "B" between 1660 and 5350 kilocycles and in position "C" between 5.35 and 15.8 megacycles.

(3) FOR TYPE N600 ONLY

Receiver tuning. A semi-circular dial with a five-to-one reduction drive mechanism is employed as the tuning control. The band A scale is calibrated in kilocycles and the band B scale in megacycles. The dial is illuminated from the rear. A vernier dial with 100 divisions is provided for accurate station logging.

(3) FOR TYPE N602 ONLY

Receiver tuning. A semi-circular dial with a 33 to 1 reduction drive mechanism is employed as the tuning control. The band A and band B scales are calibrated in kilocycles and the band C scale in megacycles. Translucent material is used for the dial to permit illumination from the rear.

(4) Radio frequency gain control marked "SENSITIVITY". This control serves to limit the maximum sensitivity of the receiver.

(5) Audio frequency gain control marked "VOLUME". This controls the audio amplification after detection and functions as the volume control for the receiver.

(6) Tone control marked "TONE". This control reduces the high frequency response of the audio system and is used in receiving thru sharp high-pitched noise.

(7) Inter-carrier squelch control marked "SQUELCH". This control, if incorporated, determines the signal level at which the squelch tube functions to block the first audio grid and silence the receiver.

(8) Speaker - handset switch marked "SPEAKER" and "HANDSET". This switch connects the audio output of the receiver to the built-in speaker or to the receiver portion of the handset, as indicated.

(9) Headphone jack marked "PHONES". When the phones are plugged into the jack, the built-in speaker is disconnected from the circuit.

(10) Remote speaker jack marked "REM. SPKR.". This jack is connected directly across the audio output of the receiver to permit the use of a remote speaker in addition to the built-in speaker.

(11) Dial light switch marked "LIGHTS". This switch functions as the Off-On control for the dial lights, and is provided so that the lights may be turned off when it is necessary to darken the pilot house.

(12) Beat frequency oscillator switch marked "B.F.O.". This switch, if provided, functions as the Off-On control for the beat frequency oscillator, which is used for the reception of code signals.

(13) Beat frequency oscillator pitch control marked "PITCH". This control, if provided, varies the oscillator frequency over a narrow range to permit adjustment of the resultant audio tone.

INSTALLATION

The receiver is usually mounted in the transmitter cabinet, or housed in a separate cabinet which is bolted to the transmitter to form a compact communication unit. When separately housed, the receiver may be mounted in any desired location.

Connections

(1) Power & Control. Power for the receiver is obtained thru the cable or cables at the rear of the chassis. When used in conjunction with a transmitter the proper cables are provided for connection to the power and receiver control circuits in that particular transmitter. If the receiver is used separately, wires may be connected to the cable terminal points for power and external control. If external control is not required, the plate supply line "B break" circuit must be closed and the voice coil line returned to ground on the panel. Refer to drawings for circuit data.

(2) Ground. The receiver is grounded in the usual installation thru connection to the transmitter and between cabinets. If used separately the ground

should be connected to the cabinet. The receiver chassis is insulated from the panel and cabinet to permit a positive or negative ground in the D.C. Models, consequently a direct ground must not be connected to the chassis.

(3) Antenna. The regular receiver antenna connection is made thru the control cable and transmitter. If the receiver is used separately, connection may be made to the cable terminal marked "ANT". Refer to drawings for circuit data.

OPERATION

The operation of the receiver is similar to any regular communications receiver with similar capabilities. The following suggestions will aid in obtaining the most satisfactory results.

Place the receiver in operating condition as follows: Throw the POWER switch to the ON (up) position. Set the BAND switch to the band in which the desired frequency is located. Throw the SPEAKER - HANDSET switch to the SPEAKER position. Throw the LIGHTS switch to the On (up) position. Set the SENSITIVITY control to the point of maximum sensitivity by tuning in a clockwise direction to the end of the 270 degree rotation. If a Squelch Circuit is incorporated, set the SQUELCH control to the non-operating point by turning in a clockwise direction, to the end of the 270 degree rotation until the switch clicks. Then adjust the VOLUME control until some noise is heard. The receiver is now ready for the reception of phone signals. If a Beat Frequency Oscillator is provided, code signals may be received as described in the last paragraph under "General Procedure".

General Procedure

When tuning for a station it is necessary to tune slowly past the point where the station is expected. After having found the station tune on both sides of the best point in order to make sure its location. Operation to one side of the correct spot will result in distorted signals.

During periods when no phone signals are being received the AVC (Automatic Volume Control) will increase the volume to maximum (if the SENSITIVITY control is full on) and some noise will result. The incoming signal, however, reduces the amplification through the AVC action and consequently the noise level. If the prevailing noise level is high the SENSITIVITY control may be turned down to limit the maximum sensitivity of the receiver, or it may be similarly used to prevent very strong local signals from blocking the receiver.

The control to use for setting the signal volume at a comfortable room level is the VOLUME control. If the SENSITIVITY control is used for this purpose the AVC will not function properly.

If a squelch circuit is incorporated, the SQUELCH control should be adjusted for as low a signal level as possible to permit the reception of weak signals. Never adjust beyond the point where average noise drops out, or where only an occasional noise peak is heard. Refer to paragraph 8 under "Alignment" for further data.

If a beat frequency oscillator is provided code signals may be received as follows: Throw the B.F.O. switch to the On (up) position. Set the PITCH control so that the white dot on the knob is up. Tune in the station and adjust to approximately zero beat. Next adjust the PITCH control to obtain the desired beat note, and the SENSITIVITY control to set the r.f. signal at a level which produces a clear tone, as evidenced by a smooth pitch adjustment down to approximately zero beat. Then adjust the VOLUME control to set the signal volume at a comfortable level.

Note: Data relative to the operation of any controls not mentioned in this section will be found under "Controls".

MAINTENANCE

Receiver Alignment

(1) Before proceeding with the alignment, the #6 pin on the 7 prong control cable socket or plug must be connected to the panel to complete the voice coil circuit. It will also be necessary to provide a connection between the #4 and #5 pins to close the B break circuit.

(2) A signal generator set to 456 kilocycles should be used in aligning the intermediate frequency amplifier. Remove the grid clip from the 6L7 and connect the signal generator between grid and ground. If a signal generator is not available, tune in some convenient signal that is not too strong.

TYPES N600, N602, MODELS A, B, C. D — NORTHERN RADIO CO. — MODELS DQ, DQT, DT, E, ED

(3) For indication of correct tuning, an output meter or high resistance a.c. voltmeter should be connected between the power amplifier plate and chassis. A blocking condenser (.1 uf. or more) must be connected in series with the hot lead to the plate. If a low range meter (15 v. or less) is available, it may be plugged into the phone jack.

(4) Tune the trimmers on top of the I.F. transformers for maximum output meter deflection. It will be found best to experiment with the input level which gives the best indication.

(5) FOR TYPE N600 ONLY

After having tuned the intermediate amplifier, the grid clip should be replaced on the 6L7, the band switch set for band A and a signal of approximately 3500 kilocycles applied to the antenna input. This can be the signal from a distant station or a standard signal generator. Adjust the oscillator trimmer (top right hole in osc. shield can) so the signal is properly tuned in. Then adjust the R.F. and Detector trimmers for maximum signal. These are accessible through the top right holes in the next two shield cans. Refer to drawings for parts location.

(5) FOR TYPE N602 ONLY

After having tuned the intermediate amplifier, the grid clip should be replaced on the 6L7, the band switch set for band A and a signal of approximately 1400 kilocycles applied to the antenna input. This can be the signal from a distant station or a standard signal generator. Adjust the oscillator trimmer (top hole in left side of osc. shield can) so the signal is properly tuned in. Then adjust the R.F. and Detector trimmers for maximum signal. These are accessible through the top holes in the left side of the next two shield cans. Refer to drawings for parts location.

(6) FOR TYPE N600 ONLY

The above procedure should be followed with the band switch set for band B and an input signal of 1400 kilocycles applied to the antenna input. The trimmers for this band are accessible through the top left holes in the three shield cans, directly opposite the band A trimmers.

(6) FOR TYPE N602 ONLY

The above procedure should be followed for bands B and C. Set the band switch to band B, apply a signal of 4000 kilocycles to the antenna input and adjust the band B trimmers, accessible through the center holes in the left side of the shield cans. Then set the band switch to band C, apply a signal of 14 megacycles and adjust the band C trimmers, accessible through the bottom holes in the shield cans.

(7) FOR TYPE N600 ONLY

The signal should now be set to 1800 kilocycles for band A or 600 kilocycles for band B and the receiver tuned to this frequency. The padding condenser for the band being aligned should be adjusted to give maximum output while rocking the tuning condenser slightly to locate the most favorable position. It is advisable to return to the aligning point and repeat the adjustments given for best results. Refer to drawings for parts location.

(7) FOR TYPE N602 ONLY

The signal should now be set to 600 kilocycles for band A or 1800 kilocycles for band B and the receiver tuned to this frequency. The padding condenser for the band being aligned should be adjusted to give maximum output while rocking the tuning condenser slightly to locate the most favorable position. It is advisable to return to the aligning (trimming) point and repeat the adjustments given for best results. No padding adjustment is required for band C. Refer to drawings for parts location.

(8) If a squelch circuit is incorporated, it should be checked for normal operation. Rotating the SQUELCH control in a clockwise direction, decreases the signal level required to overcome the blocking bias and consequently increases the apparent sensitivity of the receiver. At the end of the clockwise rotation, a switch operates to short out the 6Q7 plate - 6F5 grid bias resistor and make the squelch inoperative. If operating properly, the squelch circuit should easily discriminate between signal levels differing by a voltage ratio of 2 to 1, that is, when adjusted so that a nominal signal input of 5 microvolts just drops out, increasing the input to 10 microvolts should bring the signal in again. This operation should hold down to an input of 2 microvolts, or less. If the operation is not normal, check the 6Q7 and 6F5 tubes, and the 6F5 grid bias, cathode and plate voltages. Refer to Test Readings and drawings.

(9) The beat frequency oscillator, if provided, should now be adjusted as follows: Set the receiver tuning dial pointer at about center scale on band A, introduce a modulated signal from the generator, carefully adjust the generator to resonance and cut off the modulation. Then throw the B.F.O. Switch to the On (up) position, set the PITCH Control so that the white dot on the knob is up and adjust the Trimmer on top of the B.F.O. Coil shield until resonance (zero beat) is obtained.

NORTHERN RADIO CO.

TYPES N600, N602, MODELS A, B, C, D, DQ, DQT, DT, E, ED

Servicing

When the receiver has been removed from the cabinet for servicing, the #6 pin on the 7 pin control cable socket or plug must be connected to the panel to complete the voice coil circuit. It will also be necessary to provide a connection between the #4 and #5 pins to close the B break circuit.

First the power source should be checked to make sure that all tubes are receiving correct filament and plate voltages, then the tubes should be suspected and replaced with the spares, one at a time, as a check on their operation.

After checking tubes, testing should progress from the receiver output to the input stage by stage eliminating each as it is found to operate properly. Listening in the loud speaker while testing will help greatly. The usual voltmeter and/or ohmmeter tests should be used in isolating the trouble. It is always best to test each stage in a logical definite order, in order to determine the location of the defect. After having found the location of the trouble, it can be quickly eliminated.

CAUTION: The negative side of the power line is common to the chassis in the D.C. Models, but the chassis is insulated from ground (panel and cabinet) to permit operation from a power source with either a negative or positive ground. Consequently, if the positive side of the power line is grounded, the chassis becomes Hot to ground and care must be used when removing same to avoid contact with the cabinet or a blown receiver fuse (F1) will result. Opening both sides of the incoming power line before removing the chassis will prevent this. In this connection it should be noted that all control shafts have an insulating washer between shaft, knob and panel which must not be removed in the event of knob replacement. If the negative side of the power line is grounded, no care need be used. Refer to drawings for circuit data.

Type N600 Receivers
and Type N602 Receivers

Model C & CT - 32 Volts, DC

Test Readings

The following test readings indicate average normal operating conditions:

Models	Stage	Tubes	Plate Volts	Screen Volts	Grid Volts	Cath. Volts	°Fil. Volts
C & CT	R.F.A.	6K7	30.0	30.0	*Var.	0.6	6
C & CT	Mixer	6L7	29.5	30.0	x1.5 av.	0.1	6
C & CT	Osc.	6J5	30.0	--	x2.8 av.	0	6
C & CT	I.F.A.	6K7	29.5	30.0	*Var.	0.6	6
C & CT	Det. &	6Q7	*Var.	--	--	0	6
C & CT	1st A.F.	Same	5.5	--	0	0	Same
C & CT	2nd A.F.	25L6GT	22.5	30.5	0	3.0	24
C & CT	A.F.P.A.	4-25L6GT	30.5	32.0	0	2.8	24
CT	B.F.O.	6J5	12.5	--	--	0	6

Input voltage during test - 32 Volts.
Total filament current - Mdl. C, 1.7 Amps. - Mdl. CT, 2 Amps.
Total plate current - 36 Ma.

*Variable - dependent on signal and avc voltage. This also applies to the mixer (detector) control grid not listed above.

xAverage - mixer injection and oscillator grid voltages read with a VTVM having a d.c. input resistance of 11 megohms. These voltages vary over the frequency range.

°Filament voltage readings taken with dropping resistor R23 adjusted for 30 volts across the series-parallel filament circuit.

Note: Normal readings may vary plus or minus 6% from the values given. The maximum variation should not exceed 10%. Readings are taken with the SENSITIVITY (r.f. gain) control set at maximum. All voltages, except filament, are read between the circuit points and chassis. The meter should have a resistance of 1000 ohms per volt and a 50 or 60 volt scale should be used, if comparative readings are to be obtained. Current values may be computed by dividing the voltage across resistors by their resistance. Refer to drawings and "Parts List" for data.

PARTS LIST N600C

Type N600 Receivers
Models C & CT - 32 Volts, DC

Condensers:

C1	Antenna isolating	C-D 1W-3D5 .005 uf. 300 v.
C2.1	R.F. Amp. tuning	RCC Type RC Mdl 317 3 gang 365 uuf.
C2.2	Detector tuning	Part of C2.1 assembly - 365 uuf.
C2.3	Oscillator tuning	Part of C2.1 assembly - 365 uuf.
C3.1	Ant. trimmer - band A	Part of L1.1 assembly
C3.2	Ant. trimmer - band B	Part of L1.2 assembly
C4	R.F. Amp. grid filter	C-D DT-4S5 .05 uf. 400 v.
C5	R.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C6.1	R.F. trimmer - band A	Part of L2.1 assembly
C6.2	R.F. trimmer - band B	Part of L2.2 assembly
C7	Det. grid filter	C-D DT-4S5 .05 uf. 400 v.
C8	Mixer cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C9.1	Osc. trimmer - band A	Part of L3.1 assembly
C9.2	Osc. trimmer - band B	Part of L3.2 assembly
C10.1	Osc. padding - band A	Miller #160A 360 - 1000 uuf.
C10.2	Osc. padding - band A	C-D 5W-5T5 .0005 uf. 500 v.
C10.3	Osc. padding - band B	Miller #160A 360 - 1000 uuf.
C11	Osc. grid blocking	C-D 5W-5Q5 .00005 uf. 500 v.
C12	Osc. - Mixer coupling	C-D 5W-5T1 .0001 uf. 500 v.
C13	Plate & screen bypass	C-D DT-4P1 .1 uf. 400 v.
C14.1	First I.F.T. pri. tuning	Part of T1 assembly
C14.2	First I.F.T. sec. tuning	Part of T1 assembly
C15	I.F. Amp. grid filter	C-D DT-4P1 .1 uf. 400 v.
C16	I.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C17.1	Second I.F.T. pri. tuning	Part of T2 assembly
C17.2	Second I.F.T. sec. tuning	Part of T2 assembly
C18	Diode Det. r.f. bypass	C-D 5W-5T2 .0002 uf. 500 v.
C19	Diode Det. r.f. filter	C-D 5W-5T2 .0002 uf. 500 v.
C20	A.V.C. filter	C-D DT-4P1 .1 uf. 400 v.
C21	R13 A.F. coupling	C-D DT 4S5 .05 uf. 400 v.
C22	First A.F. grid coupling	C-D DT-4S5 .05 uf. 400 v.
C23	Second A.F. grid coupling	C-D DT-4S5 .05 uf. 400 v.
C24	Second A.F. cath. bypass	C-D BR-102A 10 uf. 25 v.
C25	Tone control	C-D DT-4S5 .05 uf. 400 v.
C26	A.F. Pwr. Amp. grid bypass	C-D 1W-5D1 .001 uf. 500 v.
C27	Plate power filter - out.	Mallory WB-39 50 uf. 50 v.
C28	Plate power filter - in.	C-D DT-4W1 1 uf. 400 v.
C29	32 Volt line bypass	C-D DT-4P1 .1 uf. 400 v.
C30	A.F. Pwr. Amp. plate bypass	C-D DT-4S1 .01uf. 400V

Condensers - Mdl. CT:

C30	B.F. Osc. tuning	Part of L7 assembly
C31	B.F. Osc. pitch control	Bud LC-1641 15 uuf.
C32	B.F. Osc. grid blocking	C-D 5W-5T2 .0002 uf. 500 v.
C33	B.F. Osc. - Diode coupling	C-D 5W-5Q1 .00001 uf. 500 v.

Inductances:

L1.1	Ant. coil - band A	Miller #3996 ANT.
L1.2	Ant. coil - band B	Part of L1.1 assembly
L2.1	R.F. coil - band A	Miller #3996 R.F.
L2.2	R.F. coil - band B	Part of L2.1 assembly
L3.1	Osc. coil - band A	Miller #3996 OSC.
L3.2	Osc. coil - band B	Part of L3.1 assembly
L4	Plate power filter	Thermador D-9 2H. 125 Ma.

Inductances - Mdl. CT:

L5	B.F. Osc. coil	Miller #512-C-5 B.F.O. unit

Resistors:

R1	Sensitivity (R.F.) control	Centralab AF-110 10000 ohm pot.
R2	R.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R3	R.F. Amp. cathode bias	IRC BW½ 100 ohms ½ w.
R4	Det. grid filter	IRC BT½ .1 megohm ½ w.
R5	Mixer cathode bias	IRC BW½ 100 ohms ½ w.
R6	Mixer grid leak	IRC BT½ 50000 ohms ½ w.
R7	Osc. grid leak	IRC BT½ 50000 ohms ½ w.
R8	I.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R9	I.F. Amp. cath. bias	IRC BW½ 100 ohms ½ w.
R10	A.V.C. filter	IRC BT½ .5 megohm ½ w.
R11	A.V.C. load	IRC BT½ .5 megohm ½ w.
R12	Diode Det. r.f. filter	IRC BT½ 30000 ohms ½ w.
R13	Volume (A.F.) control	Centralab A-130 .5 meg. pot.
R14	First A.F. grid coupling	IRC BT½ 1. megohm ½ w.
R15	First A.F. plate coupling	IRC BT½ .25 megohm ½ w.
R16	Second A.F. grid coupling	IRC BT½ .4 megohm ½ w.
R17	Second A.F. cathode bias	IRC BT½ 600 ohms ½ w.
R18	Tone control	Centralab AF-115 25000 ohm pot.
R19.1	A.F. Pwr. grid stabilizer	IRC BT½ 600 ohms ½ w.
R19.2	A.F. Pwr. grid stabilizer	IRC BT½ 600 ohms ½ w.
R20	A.F. Pwr. cathode bias	IRC BW1 100 ohms 1 w.
R21	Handset-receiver shunt	IRC BW1 10 ohms 1w.
R22	Headphone shunt	IRC BW1 10 ohms 1w.
R23	Filament dropping	Ohmite #0361 3 ohms 25 w.
R24	Plate power filter	IRC BW1 150 ohms 1 w.
R25	Dial light dropping	Ohmite BD 250 ohms 10 w.

Resistors - Mdl. CT:

R26	B.F. Osc. grid leak	IRC BT½ .1 megohm ½ w.
R27	B.F. Osc. plate coup.	IRC BW½ 500 ohms ½ w.
R28	B.F. Osc. plate drop.	IRC BT½ 30000 ohms ½ w.
R29	B.F. Osc. fil. drop.	Ohmite #0368 100 ohms 25 w.

Switches:

S1.1	Ant. coils - primary	Centralab Part D 3P. 3 position
S1.2	Ant. coils - secondary	Part of S1.1 assembly
S2.1	R.F. coils - primary	Centralab Part D 3P. 3 position
S2.2	R.F. coils - secondary	Part of S2.1 assembly
S3.1	Osc. coils - plate	Centralab Part D 3P. 3 position
S3.2	Osc. coils - grid	Part of S3.1 assembly
S4	Power - 32 V. line	H&H #20902 D.P.S.T. 3A. tog.
S5	Speaker - Handset	H&H #21189 S.P.D.T. 3A. tog.
S6	Lights - Dial	H&H #20992 S.P.S.T. 3A. tog.

Switches - Mdl. CT:

S7	B.F. Osc. control	H&H #20902 D.P.S.T. 3A. tog.

Transformers:

T1	I.F. Amp. input	Miller #612-C1 input
T2	I.F. Amp. output	Miller #612-C4 output - diode
T3	A.F. Pwr. Amp. input	Thermador G-26 driver 1.33:1
T4	A.F. Pwr. Amp. output	NRC #600C-10-1 output 23:1

Tubes:

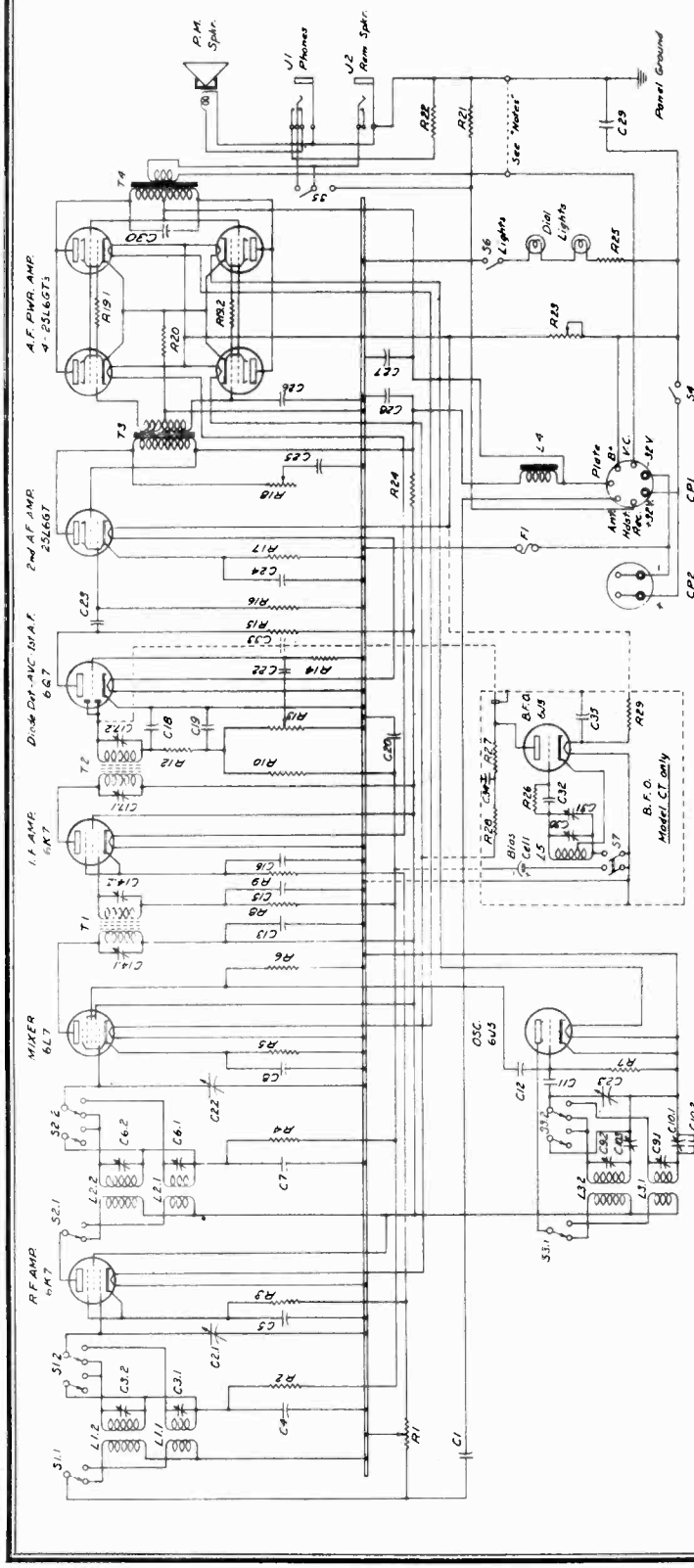
6K7	R.F. Amplifier	Sylvania or equiv. type 6K7
6L7	Mixer	Sylvania or equiv. type 6L7
6J5	Oscillator	Sylvania or equiv. type 6J5
6K7	I.F. Amplifier	Sylvania or equiv. type 6K7
6Q7	Diode Det.- AVC.-First A.F.	Sylvania or equiv. type 6Q7
25L6GT	Second A.F. Amplifier	Sylvania or equiv. type 25L6GT
25L6GT	A.F. Power Amplifier	Sylvania or equiv. type 25L6GT
		See "Note" re metal tubes

Tubes - Mdl. CT:

6J5	B.F. Oscillator	Sylvania or equiv. type 6J5

NORTHERN RADIO CO.

TYPE N600, MODEL C, CT



PARTS LIST N600C

Miscellaneous:

Dynamic Speaker	Jensen ST-445 or Utah 6P 6" PM
Dial lights	Sylvania 347 6-8 V.150 Ma. m.b.b.
Dial light sockets	Drake #206CS dial light bkt.
32 Volt line fuse F1	Killark or equiv. 3AG 5 amp.
Fuse holder	Littelfuse #341001 extractor post
Headphone jack J1	Mallory #703A Junior
Remote speaker jack J2	Carter #2A single closed cir.
Control cable plug CP1	Amphenol #61-CP7S 7 prong
*Power cable plug CP2	Amphenol #61-CP4 4 prong
Tube sockets	Amphenol 8S 8 prong
Tuning dial mechanism	Bud D-1729 vernier dial
Tuning dial scale	NRC #915-10 Std. 2 band

Miscellaneous - Mdl. CT:

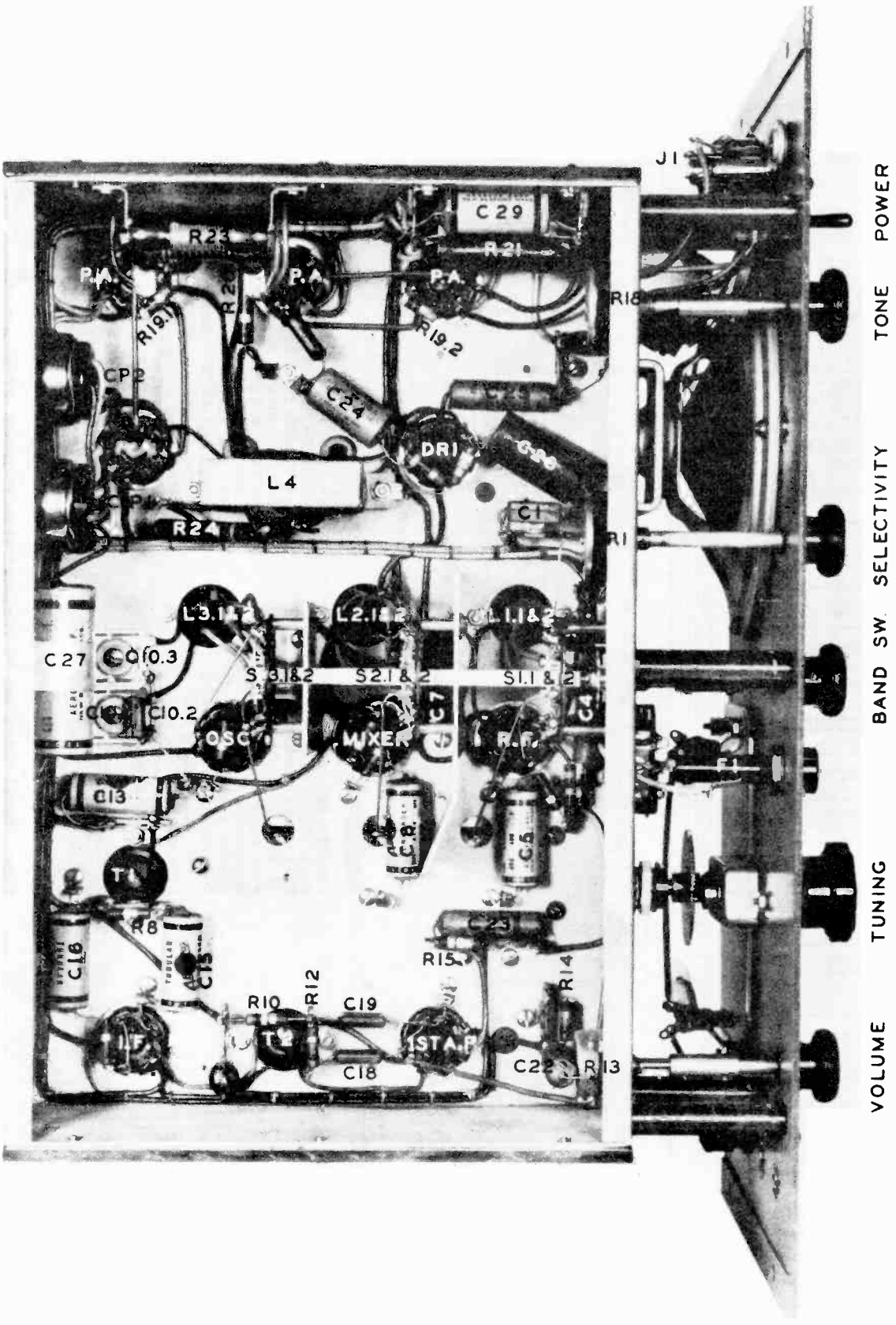
R.F. - I.F. fixed bias	Mallory 1½ V. grid bias cell

*Used only where power is not obtained thru the control cable.

Note: Metal tubes may be replaced with GT tubes, if necessary

TYPE N600,
MODEL C

NORTHERN RADIO CO.

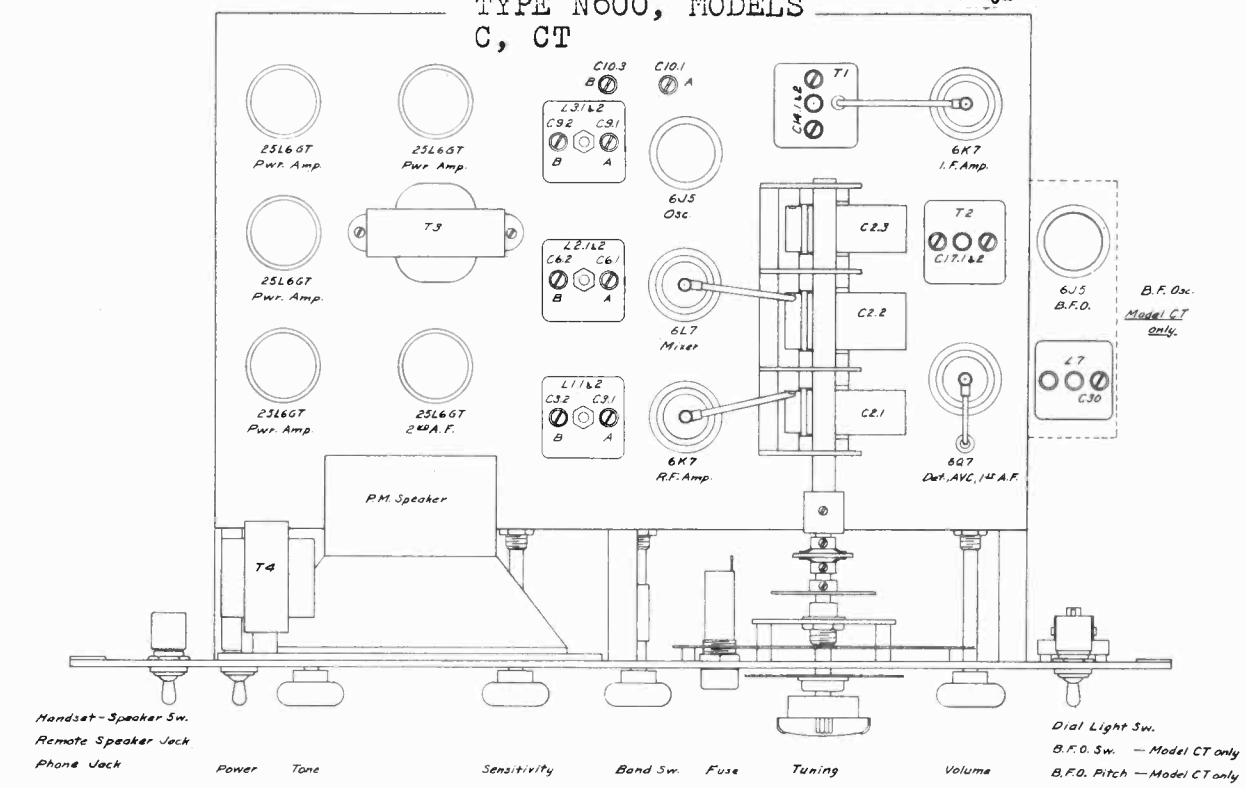


600C RECEIVER
BOTTOM VIEW

NORTHERN RADIO CO.

TYPE N600, MODELS C, CT, D, DQ, DT, DQT

TYPE N600, MODELS C, CT



Type N600 Receivers

Models D, DQ, DT & DQT - 115 Volts, DC

TYPE N600, MODELS D, DQ, DT, DQT

Test Readings

The following test readings indicate average normal operating conditions:

Models	Stage	Tubes	Plate Volts	Screen Volts	Grid Volts	Cath. Volts	Fil. Volts
All	R.F.A.	6K7	106.5	68.5	*Var.	1.6	6
All	Mixer	6L7	105.5	68.5	x4.0 av.	1.7	6
All	Osc.	6J5	106.5	--	x9.8 av.	0	6
All	I.F.A.	6K7	95.5	68.5	*Var.	1.5	6
D & DT	Det. &	6Q7	*Var.	--	--	0	6
D & DT	1st A.F.	Same	53.0	--	0	0	Same
All	A.F.P.A.	25L6GT	86.5	106.5	0	6.5	24
DQ & DQT	Det. &	6Q7	*Var.	--	--	0	6
DQ & DQT	Squelch	Same	10.0(Sq.off)	--	*Var.	0	Same
DQ & DQT	1st A.F.	6F5	62.5	--	1.0	10.4	6
DT & DQT	B.F.O.	6J5	25.0	--	--	0	6

Input voltage during test - 115 volts.
Total filament current - .44 Amp.
Total plate current - 65 Ma.

*Variable - dependent on signal and avc voltage. This also applies to the mixer (detector) control grid not listed above.

xAverage - mixer injection and oscillator grid voltages read with a VTVM having a d.c. input resistance of 11 megohms. These voltages vary over the frequency range.

Note: Normal readings may vary plus or minus 6% from the values given. The maximum variation should not exceed 10%. Readings are taken with the SENSITIVITY (r.f. gain) control set at maximum. All voltages are read between the circuit points and chassis, except the filaments and 6F5 grid. The latter is read between the cathode and grid taps on the squelch voltage divider. The meter should have a resistance of 1000 ohms per volt and a 300 volt (or higher) scale should be used where there is much resistance in the circuit, if comparative readings are to be obtained. Current values may be computed by dividing the voltage across resistors by their resistance. Refer to drawings and "Parts List" for data.

PARTS LIST N600D

Type N600 Receivers
Model D, DQ, DT & DQT - 115 Volts, D.C.

Condensers:

C1	Antenna isolating	C-D 1W-3D5 .005 uf. 300 v.
C2.1	R.F. Amp. tuning	RCC Type RC Mdl 317 3 gang 365 uuf
C2.2	Detector tuning	Part of C2.1 assembly - 365 uuf.
C2.3	Oscillator tuning	Part of C2.1 assembly - 365 uuf.
C3.1	Ant. trimmer - band A	Part of L1.1 assembly
C3.2	Ant. trimmer - band B	Part of L1.2 assembly
C4	R.F. Amp. grid filter	C-D DT-4S5 .05 uf. 400 v.
C5	R.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C6	Screen bypass	C-D DT-4P25 .25 uf. 400 v.
C7.1	R.F. trimmer - band A	Part of L2.1 assembly
C7.2	R.F. trimmer - band B	Part of L2.2 assembly
C8	Det. grid filter	C-D DT-4S5 .05 uf. 400 v.
C9	Mixer cathode bypass	C-D DT 4P1 .1 uf. 400 v.
C10	Plate bypass	C-D DT-4P1 .1 uf. 400 v.
C11.1	Osc. trimmer - band A	Part of L3.1 assembly
C11.2	Osc. trimmer - band B	Part of L3.2 assembly
C12.1	Osc. padding - band A	Miller #160A 360 - 1000 uuf.
C12.2	Osc. padding - band A	C-D 5W-5T5 .0005 uf. 500 v.
C12.3	Osc. padding - band B	Miller #160A 360 - 1000 uuf.
C13	Osc. grid blocking	C-D 5W-5Q5 .00005 uf. 500 v.
C14	Osc.- Mixer coupling	C-D 5W-5T1 .0001 uf. 500 v.
C15.1	First I.F.T. pri. tuning	Part of T1 assembly
C15.2	First I.F.T. sec. tuning	Part of T1 assembly
C16	I.F. Amp. grid filter	C-D DT-4P1 .1 uf. 400 v.
C17	I.F. Amp cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C18	I.F. Amp. plate filter	C-D DT-4P1 .1 uf. 400 v.
C19.1	Second I.F.T. pri. tuning	Part of T2 assembly
C19.2	Second I.F.T. sec. tuning	Part of T2 assembly
C20	Diode Det r.f. bypass	C-D 5W-5T2 .0002 uf. 500 v.
C21	Diode Det. r.f. filter	C-D 5W-5T2, .0002 uf. 500 v.
C22	A.V.C. filter	C-D DT-4P1 .1 uf. 400 v.
C23	R15 A.F. coupling	C-D DT-4S5 .05 uf. 400 v.
C24	First A.F. grid coupling	C-D DT-4S2 .02 uf. 400 v.
C25	Pwr. Amp. grid coupling	C-D DT-4S2 .02 uf. 400 v.
C26	Pwr. Amp. cath. bypass	C-D BR-102A 10 uf. 25 v.
C27	Tone control	C-D DT-4S5 .05 uf. 400 v.
C28	Plate Pwr. filter - out.	C-D BR-825 8 uf. 250 v.
C29	Plate Pwr. filter - in	C-D BR-825 8 uf. 250 v.
C30	115 V. line bypass - panel	C-D DT-4P1 .1 uf. 400 v.
C31	115 V. line bypass	C-D DT-4S5 .05 uf. 400 v.
C32	Pwr. Amp. plate bypass	C-D 1D-5D6 .006uf 500v

Condensers - Mdl. DQ:

C22	First A.F. cath. bypass	C-D BR-102A 10 uf. 25 v.

Condensers - Mdls. DT & DQT:

C32	B.F. Osc. tuning	Part of L5 assembly
C33	B.F. Osc. pitch control	Bud LC-1641 15 uuf.
C34	B.F. Osc. grid blocking	C-D 5W-5T2 .0002 uf. 500 v.
C35	B.F. Osc. - diode coup.	C-D 5W-5Q1 .00001 uf. 500 v.
C36	B.F. Osc. plate filter	C-D DT-4S5 .05 uf. 400 v.
C37	B.F. Osc. filament bypass	C-D DT-4S1 .01 uf. 400 v.

Inductances:

L1.1	Ant. coil - band A	Miller #3996 ANT.
L1.2	Ant. coil - band B	Part of L1.1 assembly
L2.1	R.F. coil - band A	Miller #3996 R.F.
L2.2	R.F. coil - band B	Part of L2.1 assembly
L3.1	Osc. coil - band A	Miller #3996 OSC.
L3.2	Osc. coil - band B	Part of L3.1 assembly
L4	Plate power filter ch.	Thermador D9 2H. 125 Ma.

Inductances - Mdls. DR & DQT:

L5	B.F. Osc. coil	Miller #512-C-5 B.F.O. unit

Resistors:

R1	Sensitivity (R.F.) control	Centralab AF-110 10000 ohm pot
R2	R.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R3	R.F. Amp. cathode bias	IRC BW½ 350 ohms ½ w.
R4	Detector grid filter	IRC BT½ .1 megohm ½ w.
R5	Mixer cathode bias	IRC BW½ 350 ohms ½ w.
R6	Mixer grid leak	IRC BT½ 50000 ohms ½ w.
R7	Oscillator grid leak	IRC BT½ 50000 ohms ½ w.
R8	I.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R9	I.F. Amp. cathode bias	IRC BW½ 350 ohms ½ w.
R10	I.F. Amp. plate filter	IRC BT½ 3000 ohms ½ w.
R11	Screen dropping	IRC BT1 7500 ohms 1 w.
R12	Diode Det. r.f. filter	IRC BT½ 30000 ohms ½ w.
R13	A.V.C. filter	IRC BT½ .5 megohm ½ w.
R14	A.V.C. load	IRC BT½ .5 megohm ½ w.
R15	Volume (A.F.) control	Centralab A-130 .5 meg. pot.
R16	First A.F. grid coupling	IRC BT½ 1. megohm ½ w.
R17	First A.F. plate coupling	IRC BT½ .25 megohm ½ w.
R18	Pwr. Amp. grid coup.	IRC BT½ .4 megohm ½ w.
R19	Pwr. Amp. cathode bias	IRC BT1 150 ohms 1 w.
R20	Tone control	Centralab AF-115 25000 ohm pot
R21	Handset - receiver shunt	IRC BW1 10 ohms 1w.
R22	Headphone shunt	IRC BW1 10 ohms 1w.
R23	Fil. voltage dropping	Ohmite #0567 200 ohms 50 w.
R24	Dial light voltage drop.	Ohmite #0375 1000 ohms 25 w.

Resistors - Mdl. DQ:

R14	Squelch control	Centralab A-128 .5 meg. pot.
R15	Volume (A.F.) control	Centralab A-132 1. meg. pot.
R16	First A.F. grid coupling	IRC BT½ 1. megohm ½ w.
R25	6Q7 plate - 6F5 block. bias	IRC BT½ 1. megohm ½ w.
R26	Squelch voltage divider	IRC BT1 2000 ohms 1 w.
R27	Squelch voltage divider	IRC BW1/2 200 ohms 1/2w
R28	Squelch voltage dropping	IRC BT2 20000 ohms 2 w.

Resistors - Mdls. DT & DQT:

R29	B.F. Osc. grid leak	IRC BT½ .1 megohm ½ w.
R30	B.F. Osc. plate coup.	IRC BW½ 500 ohms ½ w.
R31	B.F. Osc. plate drop.	IRC BT½ .1 megohm ½ w.

Switches:

S1.1	Ant. coils - primary	Centralab Part D 3P. 3 pos.
S1.2	Ant. coils - secondary	Part of S1.1 assembly
S2.1	R.F. coils - primary	Centralab Part D 3P. 3 pos.
S2.2	R.F. coils - secondary	Part of S2.1 assembly
S3.1	Osc. coils - plate	Centralab Part D 3P. 3 pos.
S3.2	Osc. coils - grid	Part of S3.1 assembly
S4	Power - 115 V. line	H&H #20902-Z D.P.S.T. 3A. tog.
S5	Speaker - Handset	H&H #21189 S.P.D.T. 3A. tog.
S6	Lights - dial	H&H #20992 S.P.S.T. 3A. tog.

Switches - Mdl. DQ:

S7	Squelch Off - On control	Centralab K-16 switch cover Part of R14 assembly

Switches - Mdls. DT & DQT:

S8	B.F. Osc. Off - On control	H&H #20902-Z D.P.S.T. 3A. tog.

NORTHERN RADIO CO. TYPE N600, MODELS D, DQ, DT, DQT

PARTS LIST N600D

Transformers:

T1	I.F. Amp. input	Miller #612-C1 input
T2	I.F. Amp. output	Miller #612-C4 output - diode
T3	A.F. Pwr. Amp. output	NRC #600C-10-1 output

Tubes:

6K7	R.F. Amplifier	Sylvania or equiv. type 6K7
6L7	Mixer	Sylvania or equiv. type 6L7
6J5	Oscillator	Sylvania or equiv. type 6J5
6K7	I.F. Amplifier	Sylvania or equiv. type 6K7
6Q7	Diode Det.- AVC - First A.F.	Sylvania or equiv. type 6Q7
25L6GT	A.F. Power Amplifier	Sylvania or equiv. type 25L6GT See "Note" re metal tubes

Tubes - Mdl. DQ:

6Q7	Diode Det.- AVC - Squelch	Same as above
6F5	First A.F. Amplifier	Sylvania or equiv. type 6F5

Tubes - Mdls. DT & DQT:

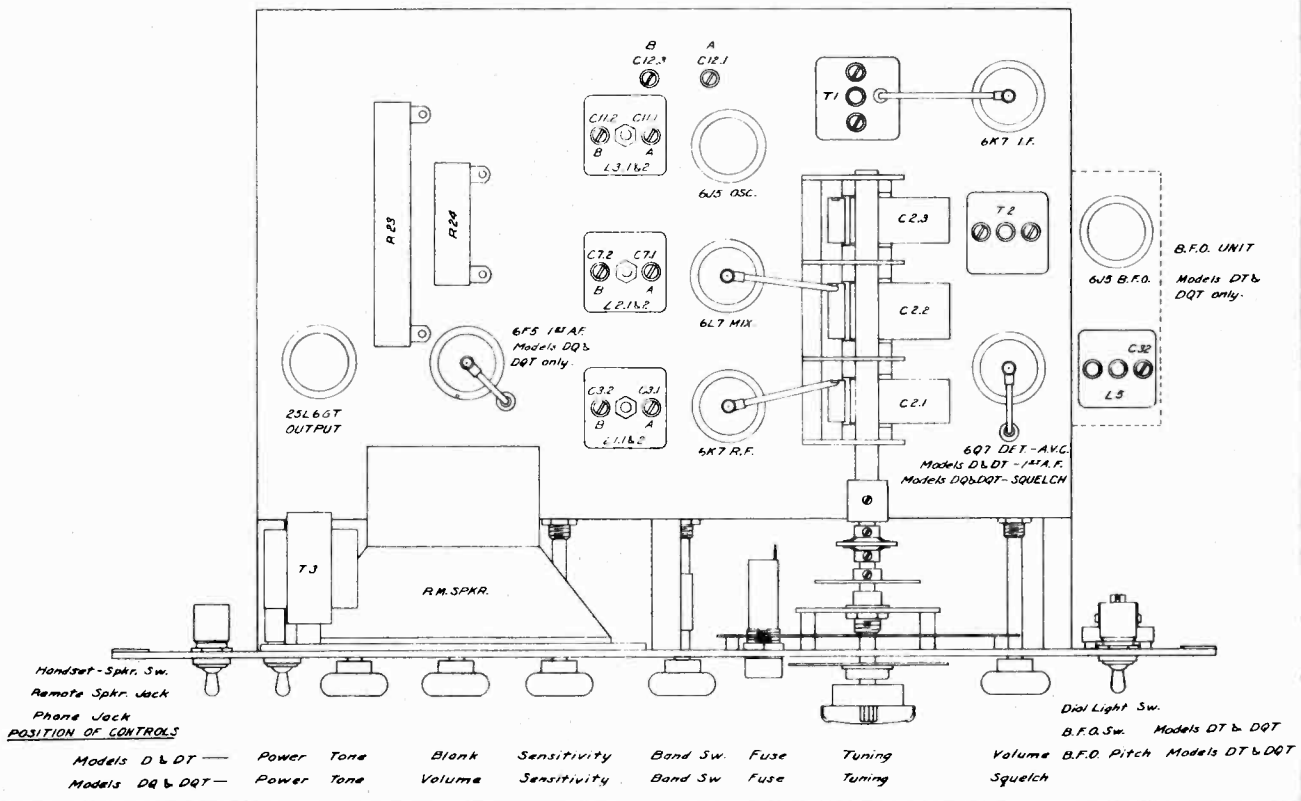
6J5	B.F. Oscillator	Sylvania or equiv. type 6J5

Miscellaneous:

Dynamic speaker	Jensen ST-445 or Utah 6P 6" PM
Dial lights	Sylvania S-47 6-8 v. 150 Ma. m.b.b.
Dial light sockets	Drake #206CE dial lig. bkts.
115 V. line fuse F1	Killark or equiv. 3AG 3Amp.
Fuse holder	Littelfuse #341001 extractor post
Headphone jack J1	Mallory #703A Junior
Remote spkr. jack J2	Carter #2A single closed cir.
Band switch knob	Crowe #6144 1-1/8" rd. blk. pointer
Control knobs	Crowe #6132 1-1/8" rd. blk.
Control cable plug CP1	Amphenol #61-CP7S 7 prong
Control cable plugs	Amphenol PF7S & PM7S 7 prong
*Power cable plug CP2	Amphenol #61-CP4 4 prong
Tube sockets	Amphenol S8 8 prong
Tuning dial mechanism	Bud D-1729 vernier dial
Tuning dial scale	NRC #915-10 std. 2 band

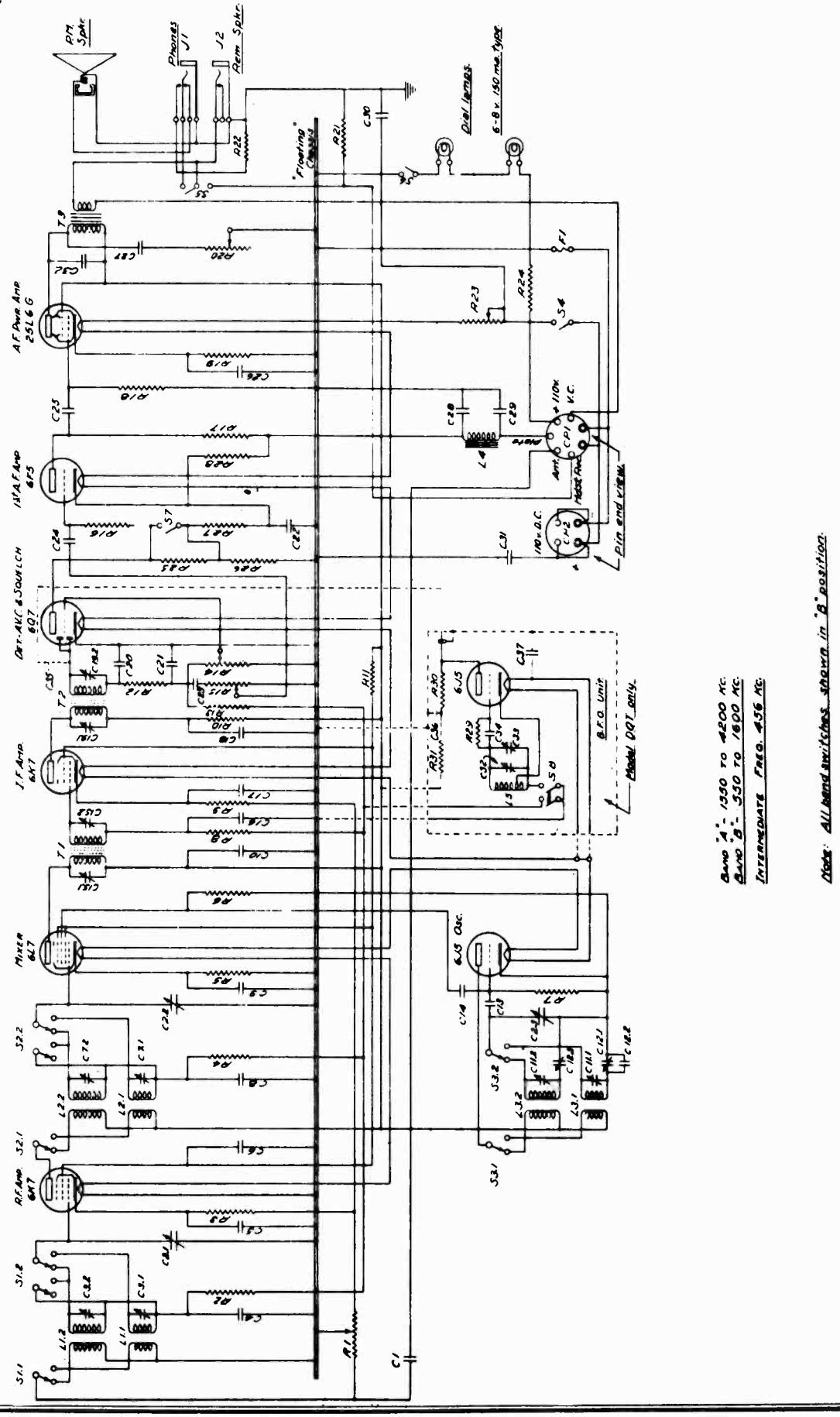
*Used only where power is not obtained thru the control cable.

Note: Metal tubes may be replaced with GT tubes, if necessary



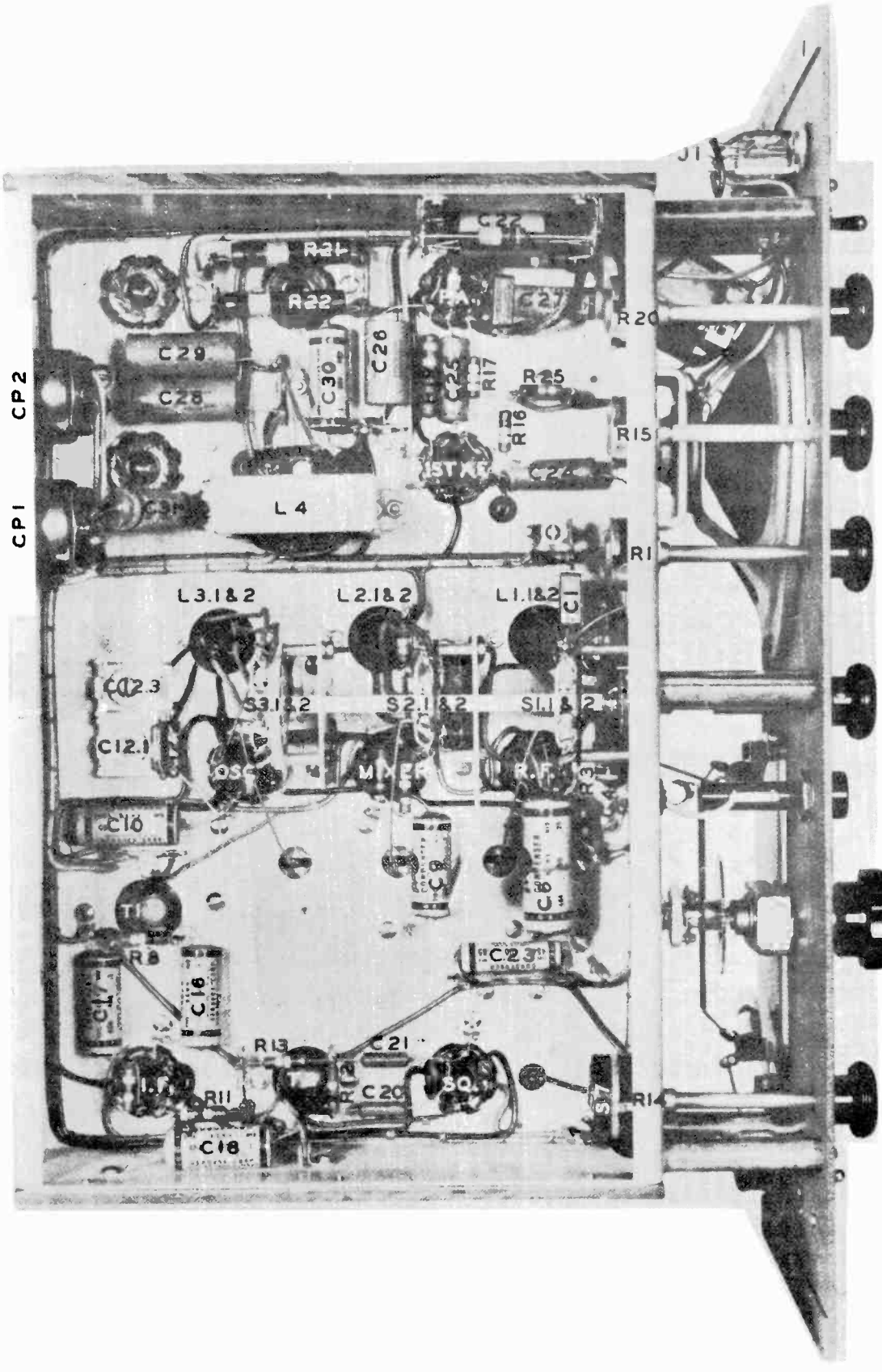
TYPE N600,
MODEL DQ

NORTHERN RADIO CO.



NORTHERN RADIO CO.

TYPE N600,
MODEL DQ



600DQ RECEIVER
BOTTOM VIEW

PARTS LIST N602C
Type N602 Receivers
Models C & CT - 32 Volts, DC

Condensers - Models C & CT:

C1	Antenna isolating	C-D 1W-3D5 .005 uf. 300 v.
C2.1	R.F. Amp. tuning	RC #817092 3 gang 365 uuf.
C2.2	Detector tuning	Part of C2.1 assembly - 365 uuf.
C2.3	Oscillator tuning	Part of C2.1 assembly - 365 uuf.
C3.1	Ant. trimmer - band A	Part of L1.1 assembly
C3.2	Ant. trimmer - band B	Part of L1.2 assembly
C3.3	Ant. trimmer - band C	Part of L1.3 assembly
C4	R.F. Amp. grid filter	C-D DT-4S5 .05 uf. 400 v.
C5	R.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C6.1	R.F. trimmer - band A	Part of L2.1 assembly
C6.2	R.F. trimmer - band B	Part of L2.2 assembly
C6.3	R.F. trimmer - band C	Part of L2.3 assembly
C7	Det. grid filter	C-D DT-4S5 .05 uf. 400 v.
C8	Mixer cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C9.1	Osc. trimmer - band A	Part of L3.1 assembly
C9.2	Osc. trimmer - band B	Part of L3.2 assembly
C9.3	Osc. trimmer - band C	Part of L3.3 assembly
C10.1	Osc. padding - band A	NRC #602C-10-2 290-800 uuf.
C10.2	Osc. padding - band B	Miller #160A 360-1000 uuf.
C10.3	Osc. padding - band B	C-D 1W-5D1 .001 uf. 500 v.
C10.4	Osc. padding - band C	C-D 1D-5D5 .005 uf. 500 v.
C11	Osc. grid blocking	C-D 5W-5Q5 .00005 uf. 500 v.
C12	Osc. - Mixer coupling	C-D 5W-5T1 .0001 uf. 500 v.
C13	Plate & screen bypass	C-D DT-4P1 .1 uf. 400 v.
C14.1	First I.F.T. pri. tuning	Part of T1 assembly
C14.2	First I.F.T. sec. tuning	Part of T1 assembly
C15	I.F. Amp. grid filter	C-D DT-4P1 .1 uf. 400 v.
C16	I.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C17.1	Second I.F.T. pri. tuning	Part of T2 assembly
C17.2	Second I.F.T. sec. tuning	Part of T2 assembly
C18	Diode Det. r.f. bypass	C-D 5W-5T2 .0002 uf. 500 v.
C19	Diode Det. r.f. filter	C-D 5W-5T2 .0002 uf. 500 v.
C20	Not used	
C21	First A.F. grid coupling	C-D DT-4S5 .05 uf. 400 v.
C22	Second A.F. grid coupling	C-D DT-4S5 .05 uf. 400 v.
C23	Second A.F. cath. bypass	C-D BR-102A 10 uf. 25 v.
C24	Tone control	C-D DT-4S5 .05 uf. 400 v.
C25	A.F. Pwr. Amp. plate bypass	C-D DT-4S1 .01 uf. 400 v.
C26	Plate power filter - out.	Mallory WB-39 50 uf. 50 v.
C27	Plate power filter - in.	C-D DT-4W1 1. uf. 400 v.
C28	32 Volt line bypass	C-D DT-4P1 .1 uf. 400 v.

Condensers - Model CT:

C29	B.F. Osc. tuning	Part of L7 assembly
C30	B.F. Osc. pitch control	Bud LC-1641 15 uuf.
C31	B.F. Osc. grid blocking	C-D 5W-5T2 .0002 uf. 500 v.
C32	B.F. Osc. - Diode coupling	C-D 5W-5Q1 .00001 uf. 500 v.
C33	B.F. Osc. plate filter	C-D DT-4S5 .05 uf. 400 v.
C34	B.F. Osc. fil. bypass	C-D DT-4S1 .01 uf. 400 v.

Inductances - Model C & CT:

L1.1	Ant. coil - band A	Miller #626-A 3 band
L1.2	Ant. coil - band B	Part of L1.1 assembly
L1.3	Ant. coil - band C	Part of L1.1 assembly
L2.1	R.F. coil - band A	Miller #626-RF 3 band
L2.2	R.F. coil - band B	Part of L2.1 assembly
L2.3	R.F. coil - band C	Part of L2.1 assembly
L3.1	Osc. coil - band A	NRC #602C-10-3 3 band
L3.2	Osc. coil - band B	Part of L3.1 assembly
L3.3	Osc. coil - band C	Part of L3.1 assembly
L4	Plate power filter	Thermador D-9 2H. 125 Ma.

Inductances - Model CT:

L5	B.F. Osc. coil	Miller #512-C-5 B.F.O. unit

Resistors - Models C & CT:

R1	Sensitivity (R.F.) control	Centralab AF-110 10000 ohm pot.
R2	R.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R3	R.F. Amp. cathode bias	IRC BW½ 100 ohms ½ w.
R4	Det. grid filter	IRC BT½ .1 megohm ½ w.
R5	Mixer cathode bias	IRC BW½ 100 ohms ½ w.
R6	Mixer grid leak	IRC BT½ 51000 ohms ½ w.
R7	L3.3 primary shunt	IRC BT½ 1200 ohms ½ w.
R8	Osc. grid leak	IRC BT½ 51000 ohms ½ w.
R9	I.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R10	I.F. Amp. cath. bias	IRC BW½ 100 ohms ½ w.
R11	A.V.C. filter	IRC BT½ .51 megohm ½ w.
R12	Diode Det. r.f. filter	IRC BT½ 30000 ohms ½ w.
R13	Volume control & AVC load	Centralab A-130 .5 meg. pot.
R14	First A.F. grid coupling	IRC BT½ 1. megohm ½ w.
R15	First A.F. plate coupling	IRC BT½ .25 megohm ½ w.
R16	Second A.F. grid coupling	IRC BT½ .39 megohm ½ w.
R17	Second A.F. cathode bias	IRC BT½ 620 ohms ½ w.
R18	Tone control	Centralab AF-115 25000 ohm pot.
R19.1	A.F. Pwr. grid stabilizer	IRC BT½ 620 ohms ½ w.
R19.2	A.F. Pwr. grid stabilizer	IRC BT½ 620 ohms ½ w.
R20	A.F. Pwr. cathode bias	IRC BW1 100 ohms 1 w.
R21	Handset-receiver shunt	IRC BW1 10 ohms 1w.
R22	Headphone shunt	IRC BW1 10 ohms 1w.
R23	Filament dropping	Ohmite #0361 3 ohms 25 w.
R24	Plate power filter	IRC BW1 150 ohms 1 w.
R25	Dial light dropping	Ohmite BD 250 ohms 10 w.

Resistors - Model CT:

R26	B.F. Osc. grid leak	IRC BT½ .1 megohm ½ w.
R27	B.F. Osc. plate coup.	IRC BW½ 510 ohms ½ w.
R28	B.F. Osc. plate drop.	IRC BT½ 30000 ohms ½ w.
R29	B.F. Osc. fil. drop.	Ohmite #0368 100 ohms 25 w.

Switches - Models C & CT:

S1.1	Ant. coils - primary	Centralab Part D 3P. 3 position
S1.2	Ant. coils - secondary	Part of S1.1 assembly
S1.3	Ant. coils - secondary short.	Part of S1.1 assembly
S2.1	R.F. coils - primary	Centralab Part D 3P. 3 position
S2.2	R.F. coils - secondary	Part of S2.1 assembly
S2.3	R.F. coils - secondary short.	Part of S2.1 assembly
S3.1	Osc. coils - plate	Centralab Part D 3P. 3 position
S3.2	Osc. coils - grid	Part of S3.1 assembly
S3.3	Osc. coils - grid shorting	Part of S3.1 assembly
S4	Power - 32 V. line	H&H #20902 D.P.S.T. 3A. tog.
S5	Speaker - Handset	H&H #21189 S.P.D.T. 3A. tog.
S6	Lights - Dial	H&H #20992 S.P.S.T. 3A. tog.

Switches - Model CT:

S7	B.F. Osc. control	H&H #20902 D.P.S.T. 3A. tog.

Transformers - Models C & CT:

T1	I.F. Amp. input	Miller #612-C1 input
T2	I.F. Amp. output	Miller #612-C4 output - diode
T3	A.F. Pwr. Amp. input	Thermador G-26 driver 1.33:1
T4	A.F. Pwr. Amp. output	NRC #602C-10-1 output 23:1

Tubes - Models C & CT:

6K7	R.F. Amplifier	Sylvania or equiv. type 6K7
6L7	Mixer	Sylvania or equiv. type 6L7

NORTHERN RADIO CO.

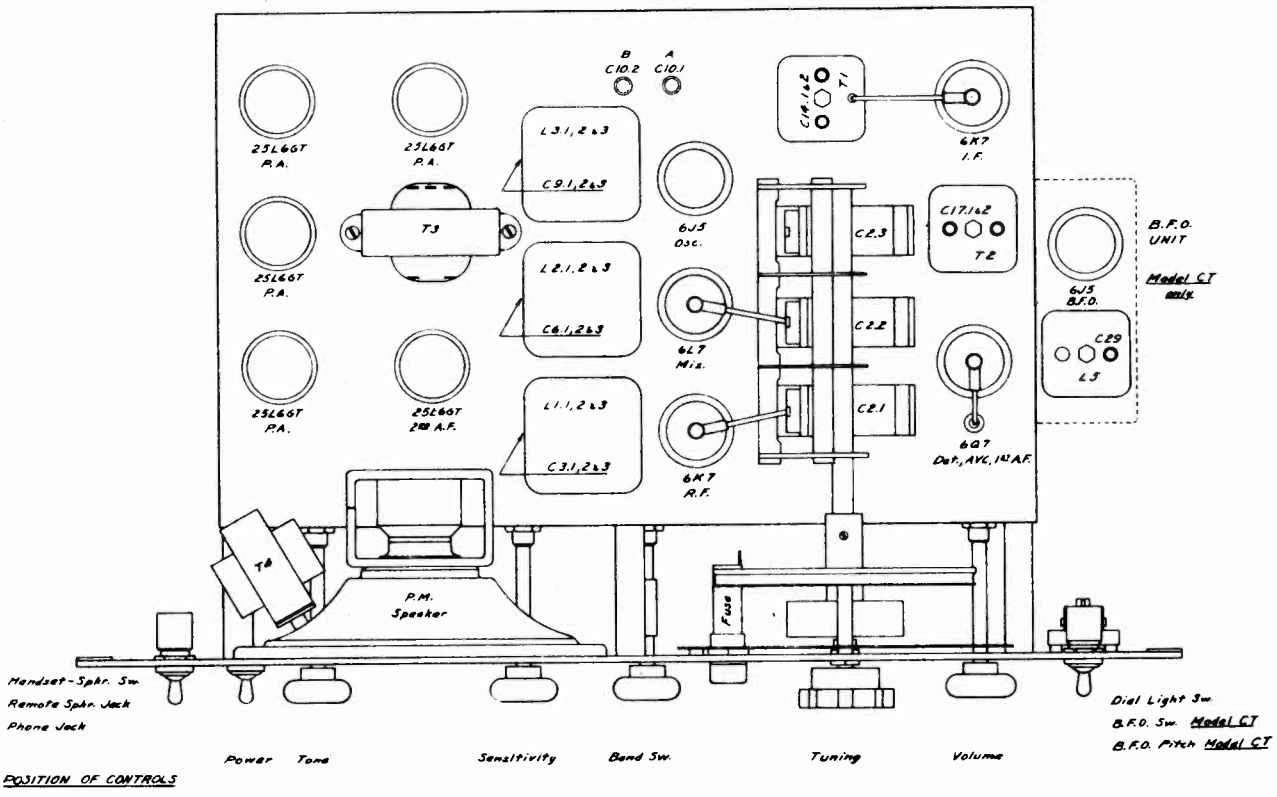
TYPE N602, MODELS C, CT

PARTS LIST N602C

	Tubes - Models C & CT:	
6J5	Oscillator	Sylvania or equiv. type 6J5
6K7	I.F. Amplifier	Sylvania or equiv. type 6K7
6Q7	Diode Det.- AVC. - First A.F.	Sylvania or equiv. type 6Q7
25L6GT	Second A.F. Amplifier	Sylvania or equiv. type 25L6GT
25L6GT	A.F. Power Amplifier	Sylvania or equiv. type 25L6GT (4)
		See "Note" re metal tubes
	Tubes - Model CT:	
6J5	B.F. Oscillator	Sylvania or equiv. type 6J5
	Miscellaneous - Models C & CT:	
	Dynamic Speaker	Jensen ST-445 or Utah 6P 6" PM
	Dial lights	Sylvania S47 6-8 V. 150 Ma. m.b.b.
	Dial light sockets	Drake #206CE dial light bkt.
F1	32 Volt line fuse	Killark or equiv. 3AG 5 amp.
	Fuse holder	Littelfuse #341001 extractor post
J1	Headphone jack	Mallory #703A Junior
J2	Remote speaker jack	Carter #2A single closed cir.
	Control cable plugs	Amphenol PF7S & PM7S 7 prong
CP1	Control cable plug-chassis	Amphenol #61-CP7S 7 prong
CP2	*Power cable plug-chassis	Amphenol #61-CP4 4 prong
	Band switch knob	Crowe #6144 1-1/8" rd. blk. pointer
	Control knobs	Crowe #6132 1-1/8" rd. blk.
	Tube sockets	Amphenol S8 8 prong
	Tuning dial mechanism	NRC #602C-11-1 33:1
	Tuning dial scale	NRC #915-11 std. 3 band
	Miscellaneous - Model CT:	
B1	R.F. - I.F. fixed bias	Mallory 1½ V. grid bias cell

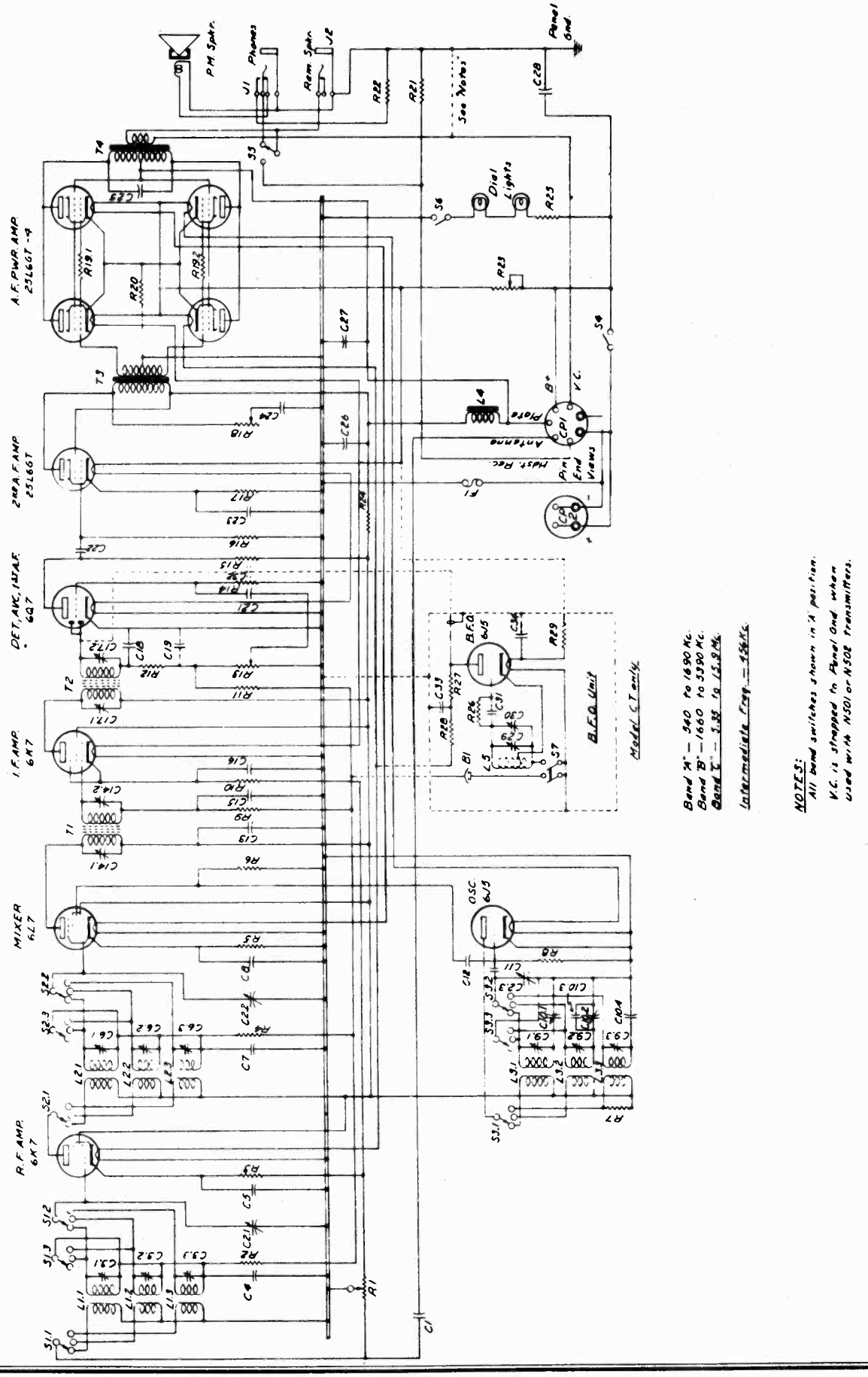
*Used only where power is not obtained thru the control cable.

Note: Metal tubes may be replaced with GT tubes, if necessary



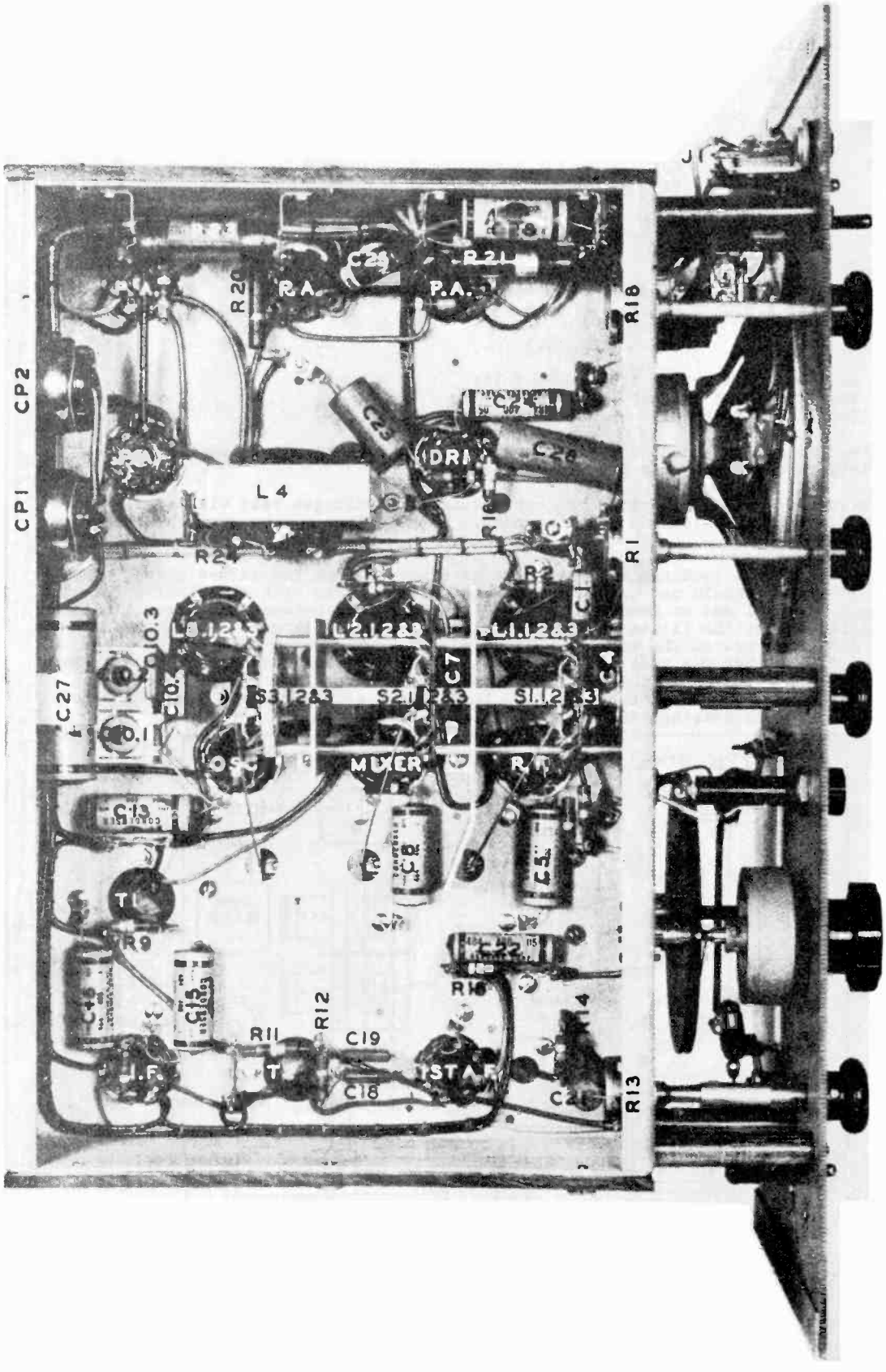
TYPE N602,
MODEL C

NORTHERN RADIO CO.



NORTHERN RADIO CO.

TYPE N602,
MODEL C



NORTHERN RADIO CO.

TYPE N602, MODELS D, DQ, DQT, DT

Test Readings

The following test readings indicate average normal operating conditions:

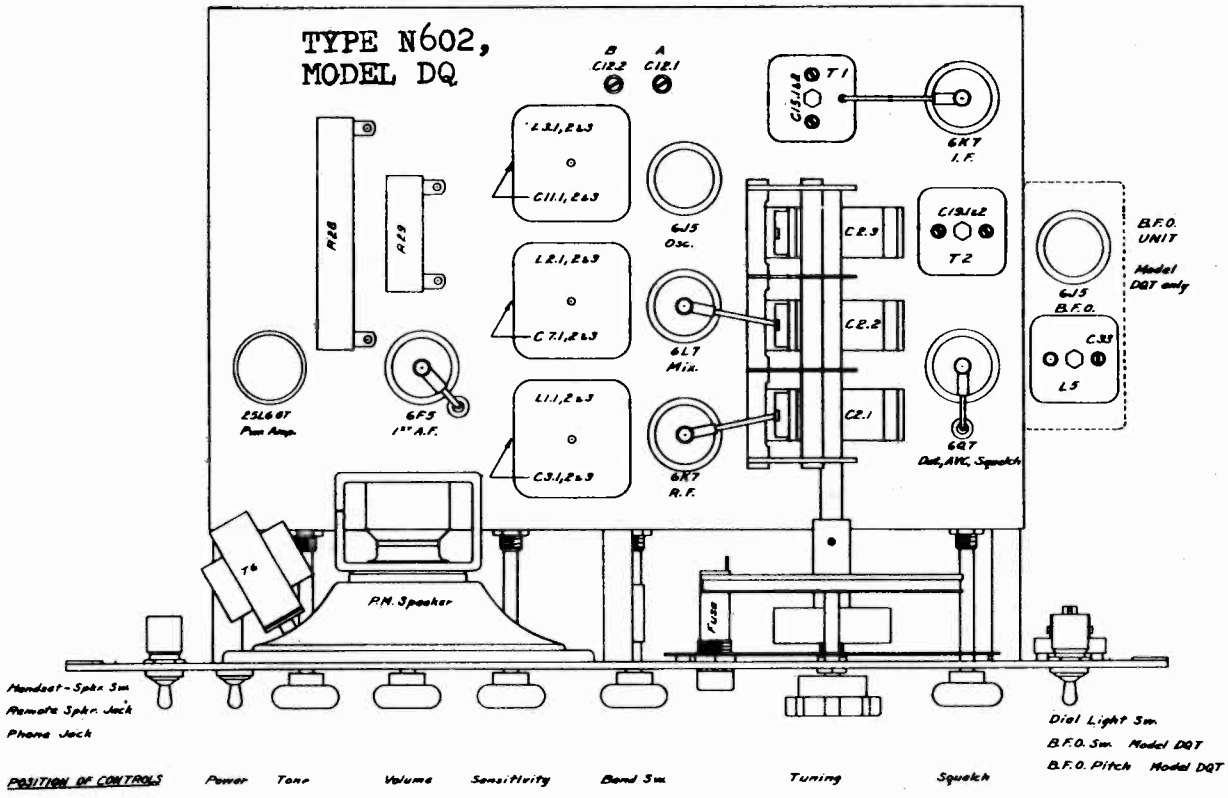
Models	Stage	Tubes	Plate Volts	Screen Volts	Grid Volts	Cath. Volts	Fil. Volts
All	R.F.A.	6K7	111.8	71.1	*Var.	1.5	6
All	Mixer	6L7	110.7	71.1	x4.0 av.	1.8	6
All	Osc.	6J5	111.8	--	x9.8 av.	0	6
All	I.F.A.	6K7	101.3	71.1	*Var.	1.4	6
D & DT	Det. &	6Q7	*Var.	--	--	0	6
D & DT	1st A.F.	Same	55.4	--	0	0	Same
All	A.F.P.A.	25L6GT	107.7	111.8	0	7.3	24
DQ & DQT	Det. &	6Q7	*Var.	--	--	0	6
DQ & DQT	Squelch	Same	9.4(Sq.off)	--	*Var.	0	Same
DQ & DQT	1st A.F.	6F5	60.6	--	1.0	10.4	6
DT & DQT	B.F.O.	6J5	26.1	--	--	0	6

Input voltage during test - 115 volts.
Total filament current - .44 Amp.
Total plate current - 75 Ma.

*Variable - dependent on signal and avc voltage. This also applies to the mixer (detector) control grid not listed above.

xAverage - mixer injection and oscillator grid voltages read with a VTVM having a d.c. input resistance of 11 megohms. These voltages vary over the frequency range.

Note: Normal readings may vary plus or minus 6% from the values given. The maximum variation should not exceed 10%. Readings are taken with the SENSITIVITY (r.f. gain) control set at maximum. All voltages are read between the circuit points and chassis, except the filaments and 6F5 grid. The latter is read between the cathode and grid taps on the squelch voltage divider. The meter should have a resistance of 1000 ohms per volt and a 300 volt (or higher) scale should be used where there is much resistance in the circuit, if comparative readings are to be obtained. Current values may be computed by dividing the voltage across resistors by their resistance. Refer to drawings and "Parts List" for data.



PARTS LIST N602D
Type N602 Receivers
Models D, DQ, DT & DQT - 115 Volts, D.C.

Condensers - All Models:

C1	Antenna isolating	C-D 1D-5D5 .005 uf. 500 v.
C2.1	R.F. Amp. tuning	RC #817092 3 gang 365 uuf.
C2.2	Detector tuning	Part of C2.1 assembly - 365 uuf.
C2.3	Oscillator tuning	Part of C2.1 assembly - 365 uuf.
C3.1	Ant. trimmer - band A	Part of L1.1 assembly
C3.2	Ant. trimmer - band B	Part of L1.2 assembly
C3.3	Ant. trimmer - band C	Part of L1.3 assembly
C4	R.F. Amp. grid filter	C-D DT-4S5 .05 uf. 400 v.
C5	R.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C6	Screen bypass	C-D DT-4P25 .25 uf. 400 v.
C7.1	R.F. trimmer - band A	Part of L2.1 assembly
C7.2	R.F. trimmer - band B	Part of L2.2 assembly
C7.3	R F. trimmer - band C	Part of L2.3 assembly
C8	Det. grid filter	C-D DT-4S5 .05 uf. 400 v.
C9	Mixer cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C10	Plate bypass	C-D DT-4P1 .1 uf. 400 v.
C11.1	Osc. trimmer - band A	Part of L3.1 assembly
C11.2	Osc. trimmer - band B	Part of L3.2 assembly
C11.3	Osc. trimmer - band C	Part of L3.3 assembly
C12.1	Osc. padding - band A	NRC #602D-10-2 290-800 uuf.
C12.2	Osc. padding - band B	Miller #160A 360-1000 uuf.
C12.3	Osc. padding - band B	C-D 1W-5D1 .001 uf. 500 v.
C12.4	Osc. padding - band C	C-D 1D-5D5 .005 uf. 500 v.
C13	Osc. grid blocking	C-D 5W-5Q5 .00005 uf. 500 v.
C14	Osc. - Mixer coupling	C-D 5W-5T1 .0001 uf. 500 v.
C15.1	First I.F.T. pri. tuning	Part of T1 assembly
C15.2	First I.F.T. sec. tuning	Part of T1 assembly
C16	I.F. Amp. grid filter	C-D DT-4P1 .1 uf. 400 v.
C17	I.F. Amp. cathode bypass	C-D DT-4P1 .1 uf. 400 v.
C18	I.F. Amp. plate filter	C-D DT-4P1 .1 uf. 400 v.
C19.1	Second I.F.T. pri. tuning	Part of T2 assembly
C19.2	Second I.F.T. sec. tuning	Part of T2 assembly
C20	Diode Det. R.F. bypass	C-D 5W-5T2 .0002 uf. 500 v.
C21	Diode Det. r.f. filter	C-D 5W-5T2 .0002 uf. 500 v.
C23	First A.F. grid coupling	C-D DT-4S2 .02 uf. 400 v.
C25	Pwr. Amp. grid coupling	C-D DT-4S2 .02 uf. 400 v.
C26	Pwr. Amp. cathode bypass	C-D BR-102A 10 uf. 25 v.
C27	Tone control	C-D DT-4S5 .05 uf. 400 v.
C28	Pwr. Amp. plate bypass	C-D 1D-5D6 .006 uf. 500 v.
C29	Plate power filter - RF & AF	C-D BR-825 8 uf. 250 v.
C30	Plate power filter - Pwr. Amp.	C-D BR-825 8 uf. 250 v.
C31	115 V. line bypass - panel	C-D DT-4P1 .1 uf. 400 v.
C32	115 V. line bypass - chassis	C-D DT-4S5 .05 uf. 400 v.

Condensers - Models DQ & DQT:

C22	R16 A.F. coupling	C-D DT-4S5 .05 uf. 400 v.
C24	First A.F. cathode bypass	C-D BR-102A 10 uf. 25 v.

Condensers - Models DT & DQT:

C33	B.F. Osc. tuning	Part of L5 assembly
C34	B.F. Osc. pitch control	Bud LC-1641 15 uuf.
C35	B.F. Osc. grid blocking	C-D 5W-5T2 .0002 uf. 500 v.
C36	B.F. Osc. - Diode coupling	C-D 5W-5Q1 .00001 uf. 500 v.
C37	B.F. Osc. plate filter	C-D DT-4S5 .05 uf. 400 v.
C38	B.F. Osc. filament bypass	C-D DT-4S1 .01 uf. 400 v.

Inductances - All Models:

L1.1	Ant. coil - band A	Miller #626-A 3 band
L1.2	Ant. coil - band B	Part of L1.1 assembly
L1.3	Ant. coil - band C	Part of L1.1 assembly
L2.1	R.F. coil - band A	Miller #626-RF 3 band
L2.2	R.F. coil - band B	Part of L2.1 assembly
L2.3	R.F. coil - band C	Part of L2.1 assembly
L3.1	Osc. coil - band A	NRC #602D-10-3 3 band
L3.2	Osc. coil - band B	Part of L3.1 assembly
L3.3	Osc. coil - band C	Part of L3.1 assembly
L4	Plate power filter choke	Thermador D-9 2H. 125 Ma.

Inductances - Models DT & DQT:

L5	B.F. Osc. coil	Miller #512-C-5 B.F.O. unit

Resistors - All Models:

R1	Sensitivity (R.F.) control	Centralab AF-110 10000 ohm pot.
R2	R.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R3	R.F. Amp. cathode bias	IRC BW½ 360 ohms ½ w.
R4	Detector grid filter	IRC BT½ .1 megohm ½ w.
R5	Mixer cathode bias	IRC BW½ 360 ohms ½ w.
R6	Mixer grid leak	IRC BT½ 51000 ohms ½ w.
R7	L3.3 primary shunt	IRC BT½ 1200 ohms ½ w.
R8	Osc. grid leak	IRC BT½ 51000 ohms ½ w.
R9	I.F. Amp. grid filter	IRC BT½ .1 megohm ½ w.
R10	I.F. Amp. cathode bias	IRC BW½ 360 ohms ½ w.
R11	I.F. Amp. plate filter	IRC BT½ 3000 ohms ½ w.
R12	Screen dropping	IRC BT1 7500 ohms 1 w.
R13	Diode Det. r.f. filter	IRC BT½ 30000 ohms ½ w.
R14	A.V.C. filter	IRC BT½ .51 megohm ½ w.
R21	First A.F. grid coupling	IRC BT½ 1. megohm ½ w.
R22	First A.F. plate coupling	IRC BT½ .25 megohm ½ w.
R23	Pwr. Amp. grid coupling	IRC BT½ .39 megohm ½ w.
R24	Pwr. Amp. cathode bias	IRC BT1 150 ohms 1 w.
R25	Tone control	Centralab AF-115 25000 ohm pot.
R26	Headphone shunt	IRC BW1 10 ohms 1w.
R27	Handset-receiver shunt	IRC BW1 10 ohms 1w.
R28	Fil. voltage dropping	Ohmite #0567 200 ohms 50 w.
R29	Dial light voltage drop.	Ohmite #0375 1000 ohms 25 w.
R30	Pwr. Amp. plate filter	IRC BW1 51 ohms 1 w.

Resistors - Models D & DT:

R16	Volume control & AVC load	Centralab A-130 .5 meg. pot.

Resistors - Models DQ & DQT:

R15	Squelch control - A.V.C. load	Centralab A-128 .5 meg. pot.
R16	Volume (A.F.) control	Centralab A-132 1. meg. pot.
R17	Squelch voltage divider	IRC BT1 2000 ohms 1 w.
R18	Squelch voltage divider	IRC BW½ 200 ohms ½ w.
R19	Squelch voltage dropping	IRC BT2 20000 ohms 2 w.
R20	6Q7 plate - 6P5 block. bias	IRC BT½ 1. megohm ½ w.

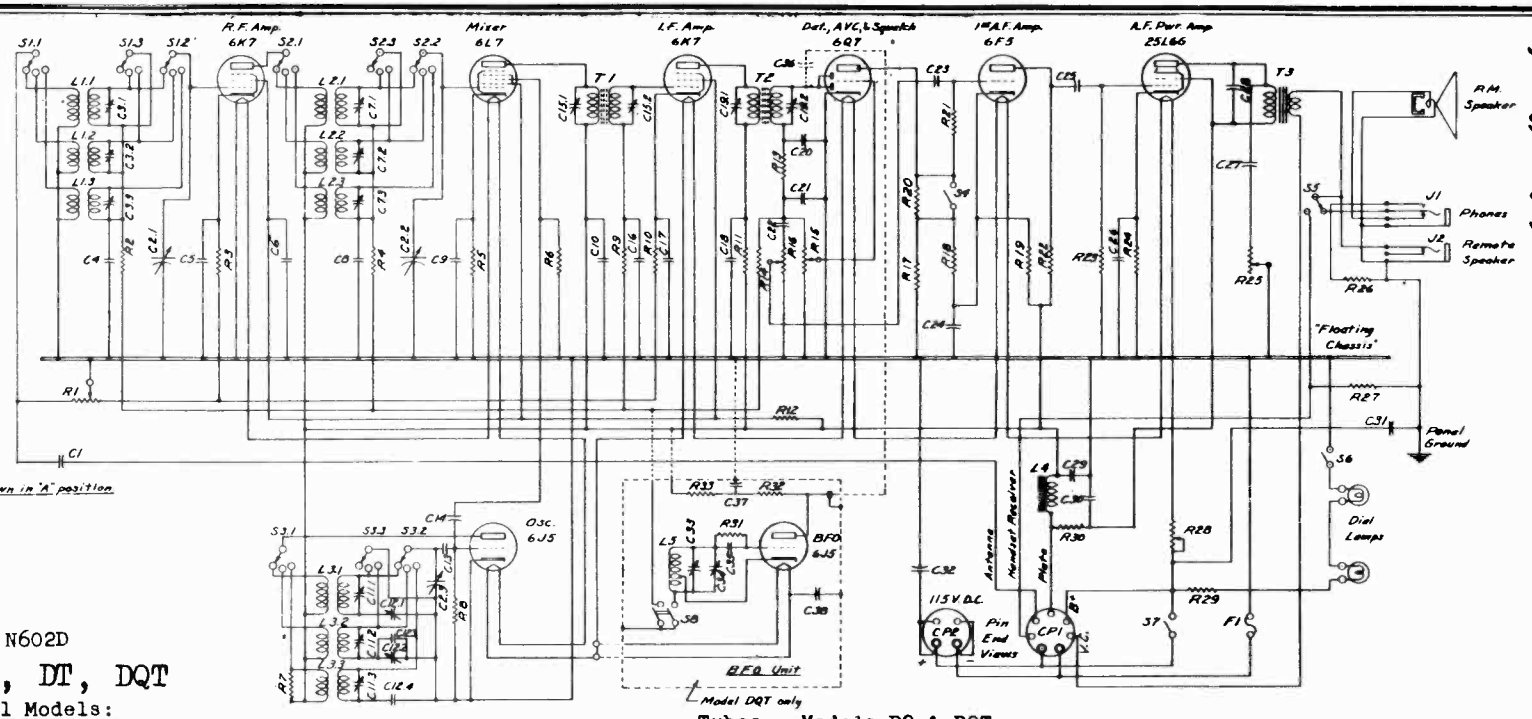
Resistors - Models DT & DQT:

R31	B.F. Osc. grid leak	IRC BT½ .1 megohm ½ w.
R32	B.F. Osc. plate coupling	IRC BW½ 510 ohms ½ w.
R33	B.F. Osc. plate dropping	IRC BT½ .1 megohm ½ w.

Switches - All Models:

S1.1	Ant. coils - primary	Centralab Part D 3P. 3 position
S1.2	Ant. coils - secondary	Part of S1.1 assembly
S1.3	Ant. coils - secondary short.	Part of S1.1 assembly
S2.1	R.F. coils - primary	Centralab Part D 3P. 3 position
S2.2	R.F. coils - secondary	Part of S2.1 assembly
S2.3	R.F. coils - secondary short.	Part of S2.1 assembly
S3.1	Osc. coils - plate	Centralab Part D 3P. 3 position
S3.2	Osc. coils - grid	Part of S3.1 assembly

SCHEMATIC MODEL DQ



PARTS LIST N602D

MODELS D, DQ, DT, DQT

Switches - All Models:

S3.3	Osc. coils - grid shorting	Part of S3.1 assembly
S5	Speaker-Handset	H&H #21189 S.P.D.T. 3A. tog.
S6	Lights - dial	H&H #20992 S.P.S.T. 3A. tog.
S7	Power - 115 V. line	H&H #20902-Z D.P.S.T. 3A. tog.

Switches - Models DQ & DQT:

S4	Squelch Off-On control	Centralab K-16 switch cover

Switches - Models DT & DQT:

S8	B.F. Osc. Off-On control	H&H #20902-Z D.P.S.T. 3A. tog.

Transformers - All Models:

T1	I.F. Amp. input	Miller #612-C1 input
T2	I.F. Amp. output	Miller #612-C4 output - diode
T3	A.F. Pwr. Amp. output	NRC #602D-10-1 output 23:1

Tubes - All Models:

6K7	R.F. Amplifier	Sylvania or equiv. type 6K7
6L7	Mixer	Sylvania or equiv. type 6L7
6J5	Oscillator	Sylvania or equiv. type 6J5
6K7	I.F. Amplifier	Sylvania or equiv. type 6K7
25L6GT	A.F. Power Amplifier	Sylvania or equiv. type 25L6GT

Tubes - Models D & DT:

6Q7	Diode Det. - AVC - First A.F.	Sylvania or equiv. type 6Q7

See "Note" re metal tubes

Tubes - Models DQ & DQT:

6Q7	Diode Det. - AVC - Squelch	Sylvania or equiv. type 6Q7
6F5	First A.F. Amplifier	Sylvania or equiv. type 6F5

Tubes - Models DT & DQT:

6J5	B.F. Oscillator	Sylvania or equiv. type 6J5

Miscellaneous:

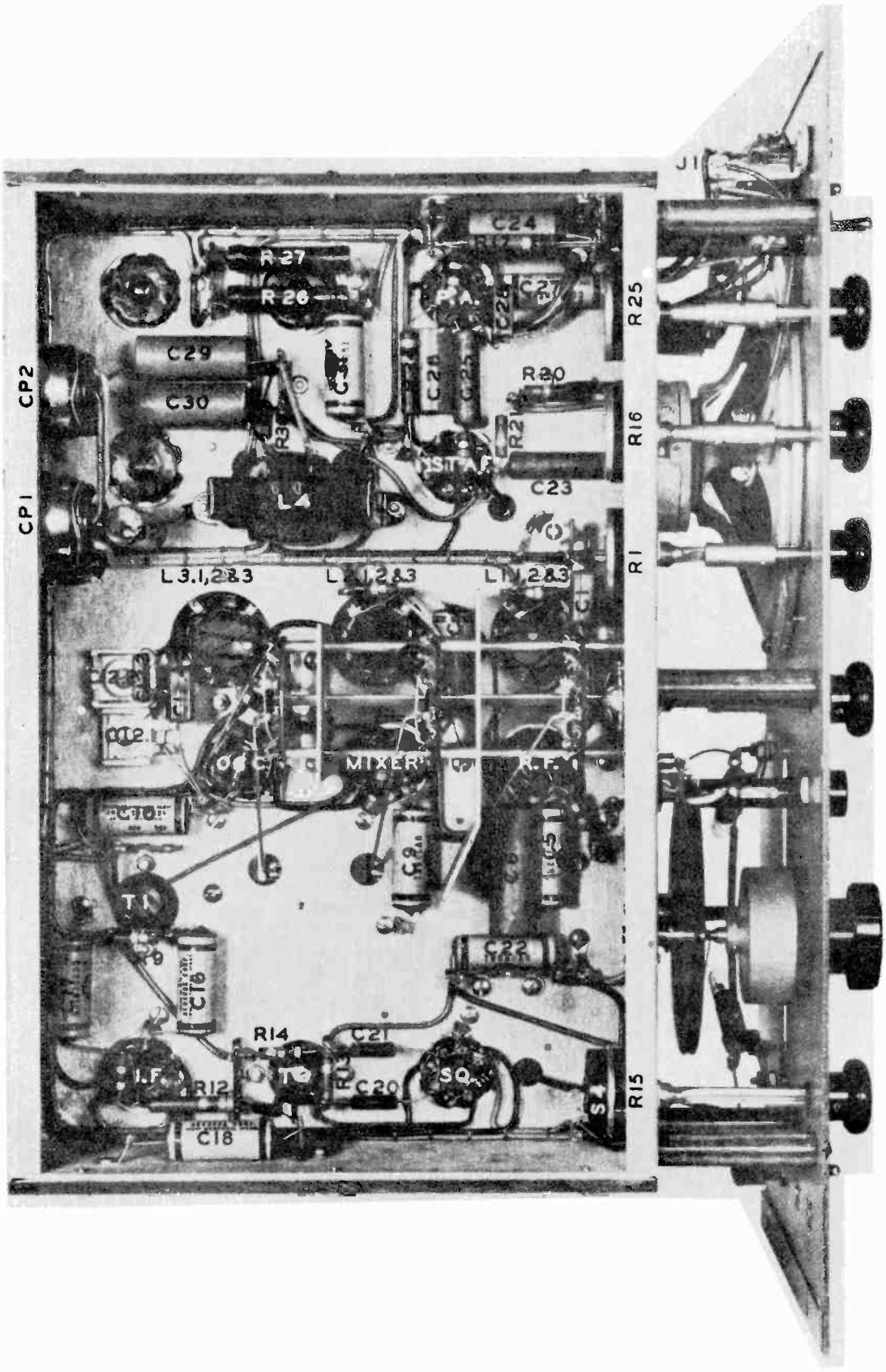
	Dynamic speaker	Jensen ST-445 or Utah 6P 6" PM
	Dial lamps	Sylvania S-47 6-8 V. 150 Ma. m.b.b.
	Dial lamp sockets	Drake #206CE dial light bkts.
F1	115 Volt line fuse	Killark or equiv. 3AG 3 Amp.
	Fuse holder	Littelfuse #341001 extractor post
J1	Headphone jack	Mallory #703A Junior
J2	Remote speaker jack	Carter #2A single closed circuit
	Control cable plugs	Amphenol PF7S & PM7S 7 prong
CP1	Control cable plug - chassis	Amphenol #61-CP7S 7 prong
CP2	*Power cable plug - chassis	Amphenol #61-CP4 4 prong
	Band switch knob	Crowe #6144 1-1/8" rd. blk. pointer
	Control knobs	Crowe #6132 1-1/8" rd. black
	Tube sockets	Amphenol S8 8 prong
	Tuning dial mechanism	NRC #602D-11-1 33:1
	Tuning dial scale	NRC #915-11 std. 3 band

*Used only where power is not obtained thru the control cable.

Note: Metal tubes may be replaced with GT tubes, if necessary.

NORTHERN RADIO CO.

TYPE N602,
MODEL DQ



602DQ RECEIVER
BOTTOM VIEW

OLYMPIC RADIO & TELEV. INC.

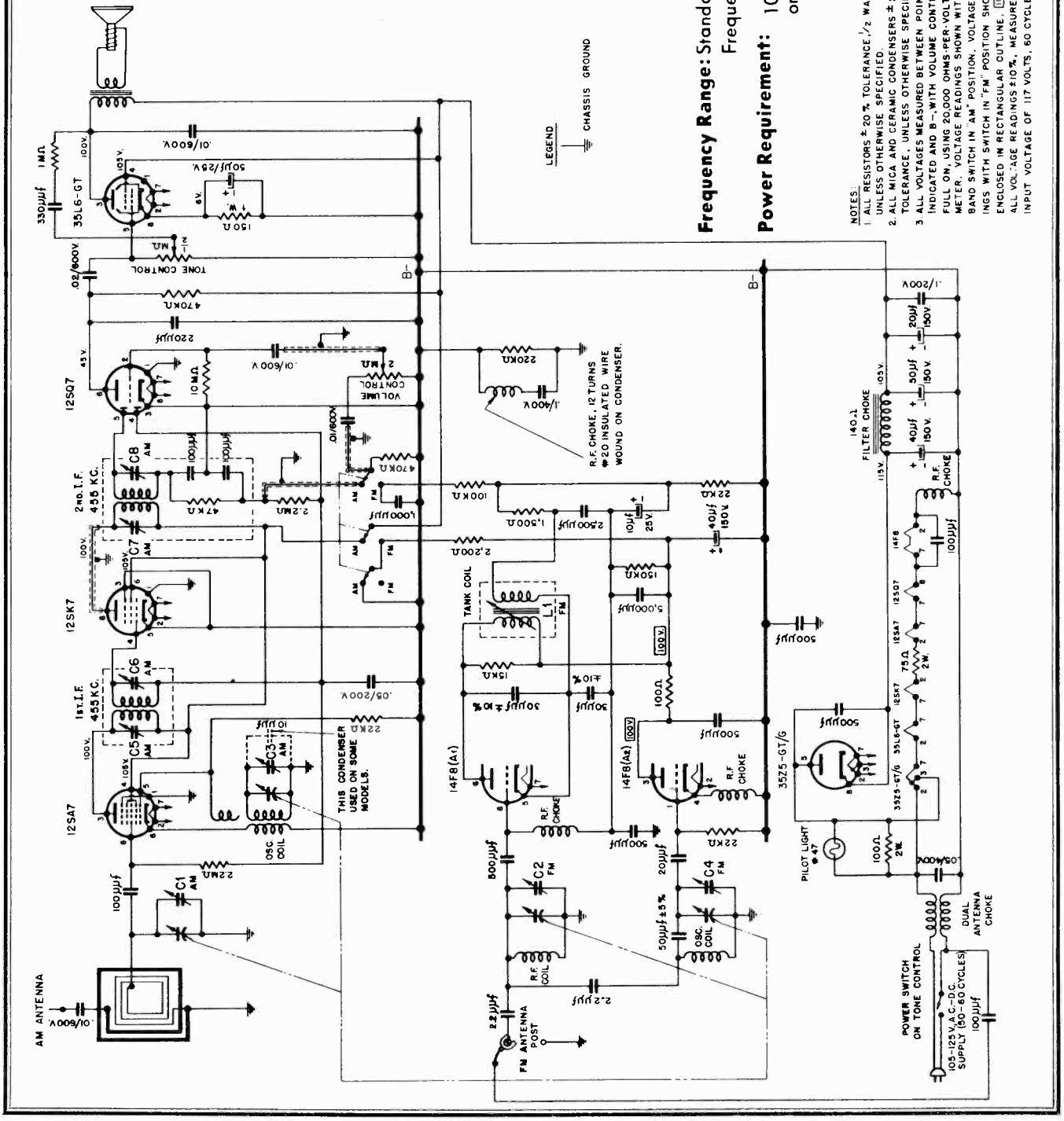
MODELS 7-532V, 7-532W

Model 7-532W Walnut

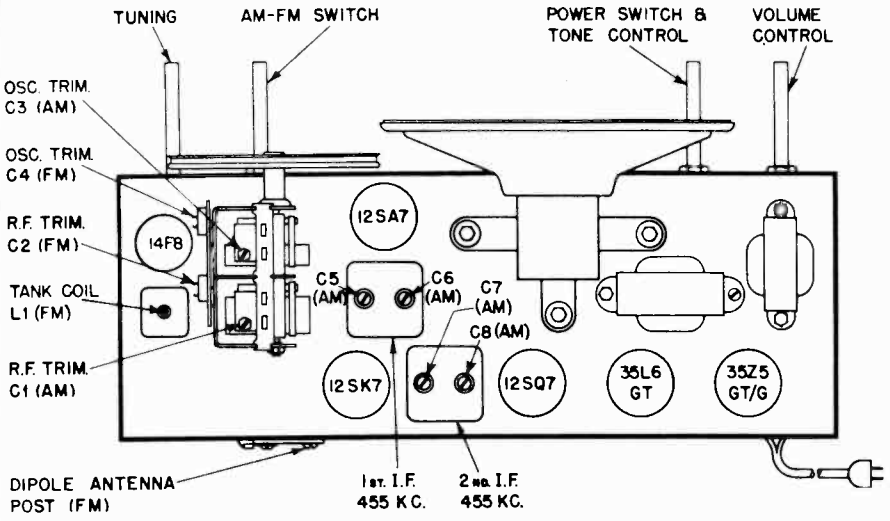
Model 7-532V Ivory

Frequency Range: Standard Broadcast 530-1700 kc.
Frequency Modulation (FM) 88-108 MC

Power Requirement: 105-125 volts a-c 50-60 cycles
or 105-125 volts d-c



TUBE & TRIMMER LAYOUT



ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO—	SET SIGNAL GENERATOR TO—	TURN POINTER DIAL TO—	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
1	A M	R.F. SECTION OF VARIABLE CONDENSER OR PIN 4 OF THE 12SK7 TUBE IN SERIES WITH A .1 MFD. 400 VOLT CONDENSER	455 KC	EXTREME RIGHT HAND POSITION (CONDENSER PLATES FULLY OPEN)	C8 AND C7 (2nd. I.F. TRANSFORMER)
2	A M	R.F. SECTION OF VARIABLE CONDENSER OR PIN 8 OF THE 12SA7 TUBE IN SERIES WITH A .1 MFD. 400 VOLT CONDENSER	455 KC	EXTREME RIGHT HAND POSITION (CONDENSER PLATES FULLY OPEN)	C6 AND C5 (1st. I.F. TRANSFORMER)
3	A M	REPEAT STEPS 1 AND 2			
4	A M	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP)	1700 KC.	1700 KC. CALIBRATION POINT ON DIFFUSER PLATE.	C 3 (OSCILLATOR TRIMMER)
5	A M		1400 KC.	RESONANCE APPROXIMATELY 1400 KC. CALIBRATION POINT ON DIFFUSER PLATE.	C 1 (ANTENNA TRIMMER)

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO—	SET SIGNAL GENERATOR TO—	TURN POINTER DIAL TO—	ADJUST THE FOLLOWING FOR MINIMUM NOISE USING AN UNMODULATED SIGNAL (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
6	F M	FM ANTENNA POST IN SERIES WITH A 300 OHM RESISTOR	21.75 MC.	EXTREME RIGHT HAND POSITION (CONDENSER PLATES FULLY OPEN).	L 1 (TUNING SLUG ON TANK COIL)
7	F M		107 MC.	107 MC. CALIBRATION POINT ON DIFFUSER PLATE.	C 4 (OSCILLATOR TRIMMER)
8	F M		103 MC.	RESONANCE, APPROXIMATELY 103 MC. CALIBRATION POINT ON DIFFUSER PLATE.	C 2 (ANTENNA TRIMMER) ROCK VARIABLE FOR MAXIMUM SIGNAL

Note: All tubes and the pilot light may be replaced without removing chassis from cabinet. Remove the cardboard back, and the screw holding the loop to the mounting bracket, then lift loop carefully off the bracket so as to avoid breaking of the wires connecting the loop to the chassis.

SERVICE AND ALIGNMENT INSTRUCTIONS

This receiver has been carefully aligned in the factory and the circuit is unusually stable. Realigning should only be attempted when necessary and only with a proper signal generator and in accordance with the service instructions. The receiver cannot be aligned on modulated signals. To insure proper broadcast alignment it is recommended to use a radiated signal. To radiate the signal connect a loop of about 6" to 8" diameter 1 turn of #14 or #12 wire across the output of the signal generator and place this loop parallel to the loop of the receiver to be aligned at a distance of 8" or 10". For complete alignment instructions on AM and FM Bands see alignment chart.

ALIGNMENT Equipment required: Modulated r-f signal generator, output meter, insulated screw driver, two .1 mfd. 400 volt condensers, one 300 ohm resistor. An FM signal generator is not required for the alignment of this receiver.

With the receiver removed from the cabinet connect output meter across voice coil. Connect ground side of the signal generator in series with a .1/400 volt condenser to the common B—; turn volume control fully on, and keeping the output of the signal generator as low as possible, proceed in the sequence as shown on the alignment chart.

To facilitate alignment of the receiver when removed from cabinet, calibration points are provided on the light diffuser plate, which is mounted to the chassis.

CAUTION: The diffuser strip is assembled to the chassis with 2 PK screws. The one at the left is fastened down tight. The one on the right should be backed off about 2 turns from tight position in order to permit free expansion of the strip and thereby avoid warpage which will interfere with proper movement of the pointer.

Before aligning, close the variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the reference dot (extreme left dot) on the diffuser plate.

MODELS 7-532V, 7-532W

OLYMPIC RADIO & TELEV. INC.

MODELS 7-532W, 7-532V, MODELS 7-537W, 7-537V

REPLACEMENT PARTS LIST

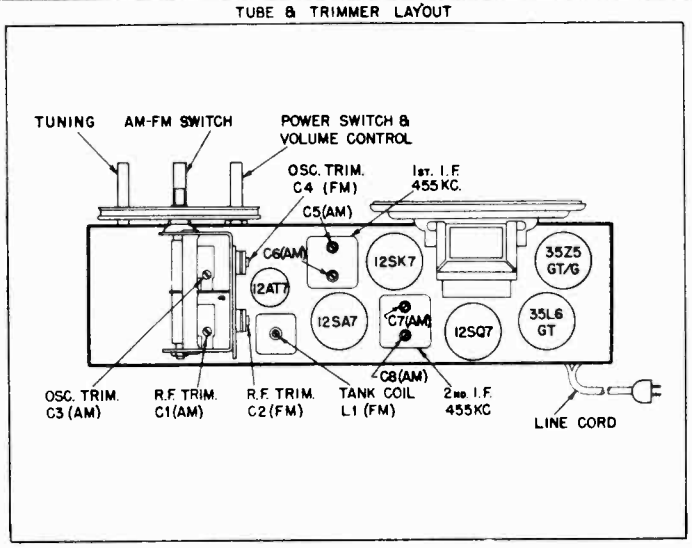
Part No.	Description
BU-187	Bulb—#47 Mazda pilot light bulb
CA-154-IW	Cabinet—walnut bakelite cabinet
CA-154-IV	Cabinet—ivory bakelite cabinet
CCA-101M	Condenser—100 mmfd. ±20% ceramic condenser
CCA-102M	Condenser—1000 mmfd. ±20% ceramic condenser
CCA-200M	Condenser—20mmfd. ±20% ceramic condenser
CCA-501M	Condenser—500 mmfd. ±20% ceramic condenser
CCA-L300K	Condenser—30 mmfd. ±10% ceramic condenser (negative 080)
CCA-U500J	Condenser—50 mmfd. ±5% ceramic condenser (negative 750)
CCD-502X	Condenser—5000 mmfd. disc condenser
CCR-252M	Condenser—2500 mmfd. ±20% ceramic condenser
CK-114	Choke—140 ohms 85 mils filter choke
CK-1109	Choke—dual antenna choke
CK-1127	Choke—r-f choke
CL-1111	Coil—F.M. r-f coil
CL-1113	Coil—F.M. oscillator coil
CL-1129	Coil—broadcast oscillator coil
CO-791	Condenser—50 + 20 + 40/150 W.V. electrolytic condenser
CO-808	Condenser—50 mfd. 25 W.V. electrolytic condenser
CO-1112	Condenser—2.2 mmfd. ±20% fixed condenser
CO-1133	Condenser—10 mfd. 25 W.V. electrolytic condenser
CO-1248	Condenser—40 mfd. 150 W.V. electrolytic condenser
CT-1114	Condenser—3-12 mmfd. ceramic trimmer condenser
CV-841	Condenser—2 gang variable condenser
DL-1115	Dial—glass dial scale
KN-671	Knob—walnut knob marked "Volume"
KN-672	Knob—walnut knob marked "Off-On Tone"
KN-673	Knob—walnut knob marked "Tuning"
KN-1117	Knob—walnut knob marked "AM-FM"
KN-675	Knob—ivory knob marked "Volume"
KN-676	Knob—ivory knob marked "Off-On Tone"
KN-677	Knob—ivory knob marked "Tuning"
KN-1118	Knob—ivory knob marked "AM-FM"
LP-1122	Loop—loop antenna
PO-334	Pointer—dial pointer
PT-105	Control—2 megohms volume control
PT-106	Control—½ megohm tone control with S.P.S.T. switch
RCM20A100M	Condenser—10 mmf. ±20% mica condenser
RCM20A221M	Condenser—220 mmf. ±20% mica condenser
RCM20A331M	Condenser—330 mmf. ±20% mica condenser
RCP10W2104A	Condenser—.1/200 W.V. tubular paper condenser
RCP10W2503A	Condenser—.05/200 W.V. tubular paper condenser
RCP10W4104L	Condenser—.1/400 W.V. tubular paper condenser*
RCP10W4503A	Condenser—.05/400 W.V. tubular paper condenser
RCP10W6103A	Condenser—.01/600 W.V. tubular paper condenser
RCP10W6203A	Condenser—.02/600 W.V. tubular paper condenser
REB-101M	Resistor—100 ohms ±20% ½ watt resistor
REB-104M	Resistor—100,000 ohms ±20% ½ watt resistor
REB-105M	Resistor—1 megohm ±20% ½ watt resistor
REB-106M	Resistor—10 megohms ±20% ½ watt resistor
REB-152M	Resistor—1500 ohms ±20% ½ watt resistor
REB-153M	Resistor—15,000 ohms ±20% ½ watt resistor
REB-154M	Resistor—150,00 ohms ±20% ½ watt resistor
REB-222M	Resistor—2200 ohms ±20% ½ watt resistor
REB-223M	Resistor—22,000 ohms ±20% ½ watt resistor
REB-224M	Resistor—220,000 ohms ±20% ½ watt resistor
REB-225M	Resistor—2.2 megohms ±20% ½ watt resistor
REB-474M	Resistor—470,000 ohms ±20% ½ watt resistor
REC-151M	Resistor—150 ohms ±20% 1 watt resistor
RED-101M	Resistor—100 ohms ±20% 2 watt resistor
SK-792	Speaker—6" p.m. speaker
SP-191	Spring—drive shaft retaining spring
SP-218	Spring—dial drive spring
ST-412	Back—printed cardboard back
ST-1120	Diffuser—light diffuser plate with calibration marks
SW-1121	Switch—3 pole double throw switch
TR-781	Transformer—455 kc I.F. input transformer
TR-782	Transformer—455 kc I.F. output transformer
TR-904	Transformer—output transformer for 35L6
TR-1123	Coil—tank coil

* When ordering specify "with r-f choke"

MODELS 7-537V, 7-537W

PART NUMBER	DESCRIPTION
BU 187	Bulb—#47 Mazda pilot light bulb
CA 327W	Cabinet—walnut bakelite cabinet
CA 327V	Cabinet—ivory bakelite cabinet
CA 327X	Cabinet—black bakelite cabinet
CCA 101M	Condenser—100 mmfd ±20% ceramic condenser
CCA 102M	Condenser—1000 mmfd ±20% ceramic condenser
CCA 200M	Condenser—20 mmfd ± 20% ceramic condenser
CCA 501M	Condenser—500 mmfd ±20% ceramic condenser
CCA L300K	Condenser—30 mmfd ±10% ceramic condenser (negative 080
CCA U500J	Condenser—50 mmfd ±5% ceramic condenser (negative 750)
CCD 502X	Condenser—5000 mmfd disc type condenser
CCR 252M	Condenser—2500 mmfd ±20% ceramic condenser
CK 1109	Choke—dual antenna choke
CK 1127	Choke—r-f choke (F.M.)
CL 1111	Coil—F. M. r-f coil
CL 1113	Coil—F.M. oscillator coil
CL 1129	Coil—B.C. oscillator coil
CO 111	Condenser—40+40/150 W.V. & 50/25 W.V. electrolytic condenser
CO 1112	Condenser—2.2 mmfd ±20% fixed condenser
CO 1133	Condenser—10 mfd 25 W.V. electrolytic condenser
CO 1222	Condenser—10 mfd 150 W.V. electrolytic condenser
CR 169	Crystal—round dial crystal
CT 1114	Condenser—3-12 mmfd zero temperature coefficient trimmer condenser
CV 1141	Condenser—2 gang variable a-m; f-m condenser
DL 1144	Dial—plastic dial
KN 1077	Knob—walnut knob marked "Off-On Volume"
KN 1078	Knob—Walnut knob marked "Tuning"
KN 1224	Knob—walnut knob marked "AM-FM"
KN 1103	Knob—ivory knob marked "Off-On Volume"
KN 1104	Knob—ivory knob marked "Tuning"
KN 1225	Knob—ivory knob marked "AM-FM"
LP 1268	Loop—loop-antenna
PO 259W	Pointer—molded walnut pointer
PO 259V	Pointer—molded ivory pointer
PT 102	Control—½ megohm volume control with s.p.s.t. switch
RCM20A 100M	Condenser—10 mmfd ±20% mica condenser
RCM20A 221M	Condenser—220 mmfd ±20% mica condenser
RCP10W 2104A	Condenser—.1/200 W.V. tubular paper condenser
RCP10W 2503A	Condenser—.05/200 W.V. tubular paper condenser
RCP10W 4203A	Condenser—.02/400 W.V. tubular paper condenser
RCP10W 4503A	Condenser—.05/400 W.V. tubular paper condenser
RCP10W 6103A	Condenser—.01/600 W.V. tubular paper condenser
RCP10W 6502A	Condenser—.005/600 W.V. tubular paper condenser
REB 101M	Resistor—100 ohms ±20% ½ watt resistor
REB 104M	Resistor—100,000 ohms ±20% ½ watt resistor
REB 106M	Resistor—10 megohms ±20% ½ watt resistor
REB 152M	Resistor—1500 ohms ±20% ½ watt resistor
REB 153M	Resistor—15,000 ohms ±20% ½ watt resistor
REB 154M	Resistor—150,000 ohms ±20% ½ watt resistor
REB 222M	Resistor—2200 ohms ±20% ½ watt resistor
REB 223M	Resistor—22,000 ohms ±20% ½ watt resistor
REB 225M	Resistor—2.2 megohms ±20% ½ watt resistor
REB 474M	Resistor—470,000 ohms ±20% ½ watt resistor
REC 151M	Resistor—150 ohms ±20% 1 watt resistor
REC 221K	Resistor—220 ohms ±10% 1 watt resistor
RED 102M	Resistor—1000 ohms ±20% 2 watt resistor
RED 750M	Resistor—75 ohms ±20% 2 watt resistor
SK 1128	Speaker—5" permanent magnet speaker
SO 1260	Socket—pilot light socket assembly
SP 191	Spring—drive shaft retaining spring
SP 218	Spring—pointer drive spring
ST 255-1	Back—cardboard back
SW 1158	Switch—T.P.D.T. band switch
TR 707	Transformer—455 k.c. input I.F. transformer
TR 708	Transformer—455 k.c. output I.F. transformer
TR 1123	Transformer—f.m. tank coil

TUBE & TRIMMER LAYOUT



ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO—	SET SIGNAL GENERATOR TO—	TURN RECEIVER DIAL TO—	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
1	A.M.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 4 OF THE 12SK7 TUBE IN SERIES WITH A .1 MFD. 400 VOLT CONDENSER.	455 KC.	FULL CLOCKWISE POSITION (CONDENSER PLATES FULLY OPEN).	C8 AND C7 (2nd. I.F. TRANSFORMER)
2	A.M.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 8 OF THE 12SA7 TUBE IN SERIES WITH A .1 MFD. 400 VOLT CONDENSER.	455 KC.	FULL CLOCKWISE POSITION (CONDENSER PLATES FULLY OPEN).	C6 AND C5 (1st. I.F. TRANSFORMER)
3	A.M.	REPEAT STEPS 1 AND 2			
4	A.M.	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP).	1700 KC	1700 K.C. (170 ON DIAL)	C3 (OSCILLATOR TRIMMER)
5	A.M.		1400 KC	RESONANCE (APPROX. 140 ON DIAL)	C1 (ANTENNA TRIMMER)

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO—	SET SIGNAL GENERATOR TO—	TURN RECEIVER DIAL TO—	ADJUST THE FOLLOWING FOR MINIMUM NOISE, AS INDICATED ON OUTPUT METER, USING AN UNMODULATED SIGNAL. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
6	F.M.	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH A 300 OHM RESISTOR.	21.75 MC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN).	L1 (TUNING SLUG ON TANK COIL)
7	F.M.		107 MC.	107 MC. (APPROX. 107 ON DIAL).	C4 (OSCILLATOR TRIMMER)
8	F.M.		103 MC.	RESONANCE (APPROX. 103 ON DIAL).	C2 (ANTENNA TRIMMER) ROCK VARIABLE FOR MAXIMUM SIGNAL

SERVICE AND ALIGNMENT INSTRUCTIONS

This receiver has been carefully aligned in the factory and the circuit is unusually stable. Realigning should only be attempted when necessary and only with a proper signal generator and in accordance with the service instructions. The receiver cannot be aligned on modulated signals. To insure proper broadcast alignment it is recommended to use a radiated signal. To radiate the signal connect a loop of about 6" to 8" diameter 1 turn of #14 or #12 wire across the output of the signal generator and place this loop parallel to the loop of the receiver to be aligned at a distance of 8" or 10". For complete alignment instructions on AM and FM Bands see alignment chart.

ALIGNMENT

Equipment required: Modulated r-f signal generator, output meter, insulated screw driver, two .1 mfd. 400 volt condensers, one 300 ohm resistor. An FM signal generator is not required for the alignment of this receiver.

With the receiver removed from the cabinet connect output meter across voice coil. Connect ground side of the signal generator in series with a .1/400 volt condenser to the common B—; turn volume control fully on, and keeping the output of the signal generator as low as possible, proceed in the sequence as shown on the alignment chart.

Before aligning, close the variable condenser fully counter clockwise (plates fully closed) and check that pointer coincides with the reference line. (horizontal line running through center of dial).

OLYMPIC RADIO & TELEV. INC.

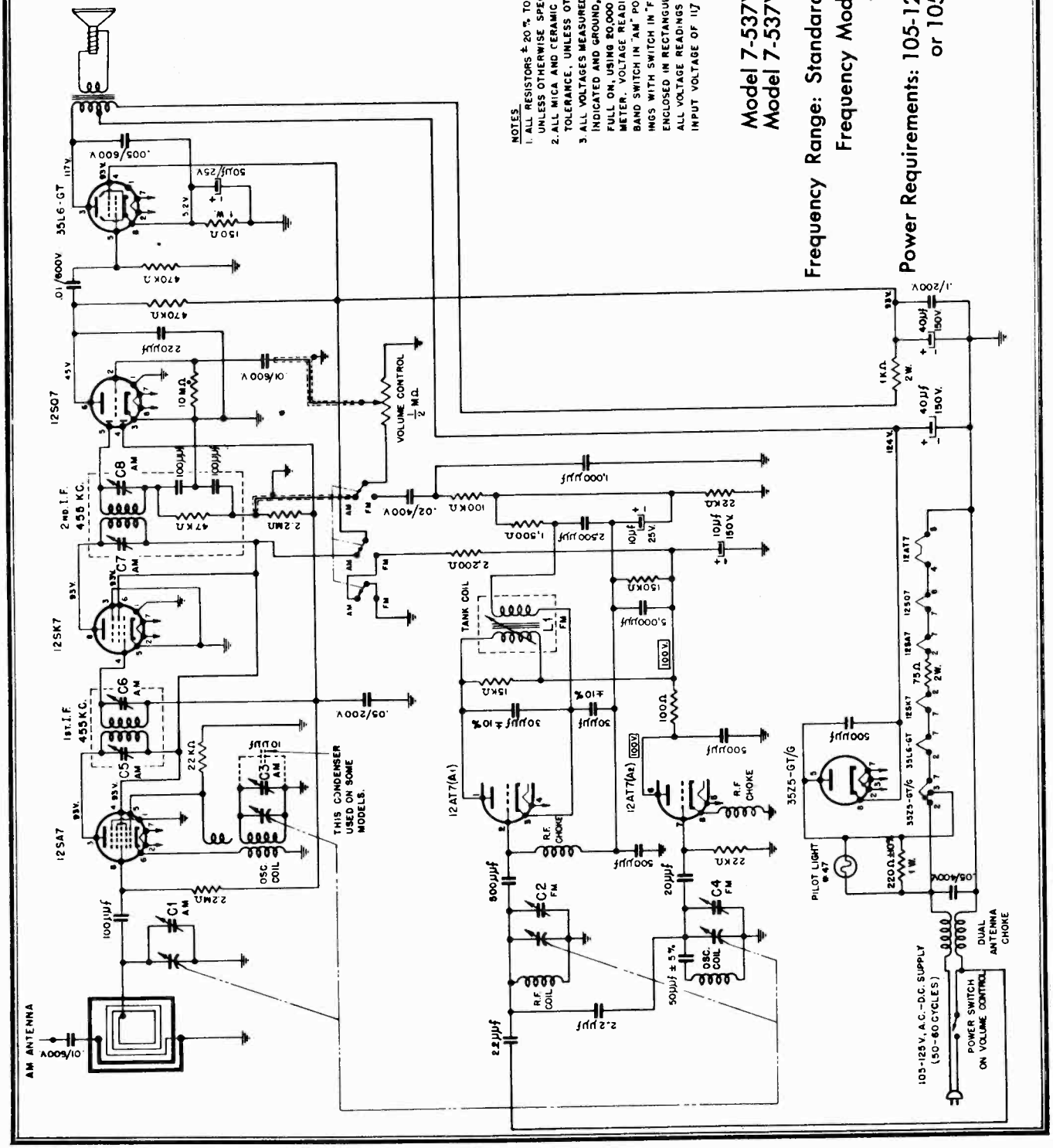
MODELS 7-537V, 7-537W

Model 7-537W Walnut
Model 7-537V Ivory

Frequency Range: Standard Broadcast 535-1700 kc.
Frequency Modulation (FM) 88-108 MC

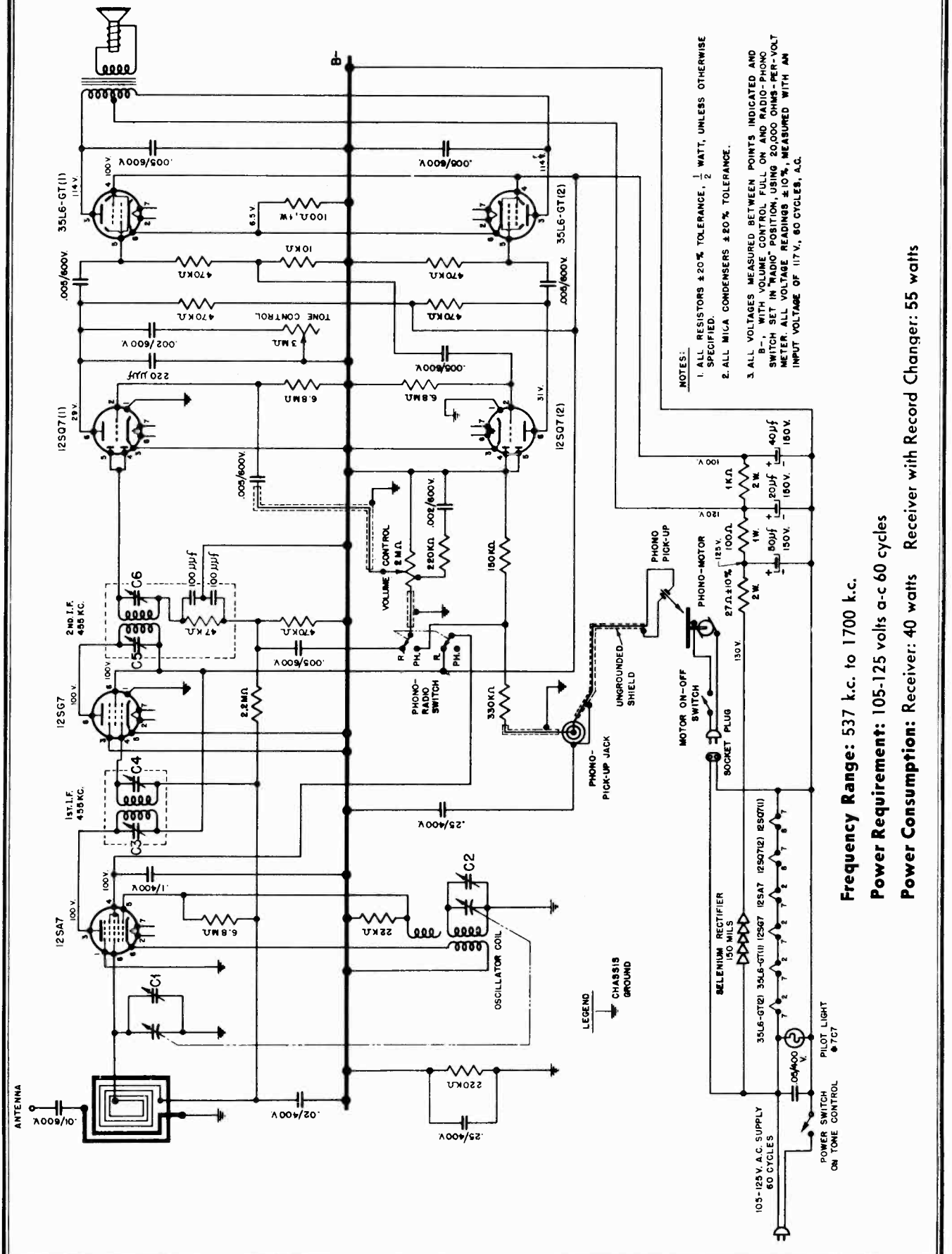
Power Requirements: 105-125 volts a-c 50-60 cycles
or 105-125 volts d-c

NOTES
1. ALL RESISTORS ± 20 % TOLERANCE. 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA AND CERAMIC CONDENSERS ± 20 % TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON, USING 20,000 OHMS-PER-VOLT METER. VOLTAGE READINGS SHOWN WITH BAND SWITCH IN "AM" POSITION. VOLTAGE READINGS WITH SWITCH IN "FM" POSITION SHOWN ENCLOSED IN RECTANGULAR OUTLINE. 100 V.
ALL VOLTAGE READINGS ±10 %, MEASURED WITH INPUT VOLTAGE OF 117 VOLTS, 60 CYCLES, A.C.



MODELS 7-622, 7-638

OLYMPIC RADIO & TELEV. INC.



RECORD CHANGERS: Gen. Inst. Model 700 Series, RCD.CH.19-1; V-M Model 800, RCD.CH.17-1

SERVICE AND ALIGNMENT INSTRUCTIONS

For tube replacement it is not necessary to remove the chassis from its cabinet. Tilt cabinet forward and the tubes will be accessible through the opening in the cabinet bottom. To service this receiver it is necessary to remove the motorboard first and then remove the chassis through the top opening of the cabinet. To do this unfasten the screws holding the motorboard in place, lift the entire motorboard with the record changer, disconnect motor and pick-up plugs from chassis and remove motorboard. Now unsolder the leads from the chassis on the loop, or remove the screw holding the loop to the cabinet side to permit removal of the loop with the chassis. The chassis can now be removed by unfastening the two (2) screws holding it to the base plate. WHEN REMOVING THE CHANGER BE SURE TO PLACE IT IN A POSITION WHEREBY THE CHANGER MECHANISM WILL NOT BE DAMAGED.

To insure proper alignment it is suggested to use a radiated signal. To radiate a signal connect a loop of about 6" to 8" diameter, (one turn of #14 or #12 wire) across the output of the signal generator and place this loop parallel to the loop of the receiver to be aligned, at a distance of about 8" or 10". While aligning keep the distance between the receiver loop and the chassis approximately equal to their distance when assembled in their cabinet.

ALIGNMENT:

Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; one .1 mfd 400 volts and one 50 mmfd 400 volts condenser; one radiation loop.

With the receiver removed from the cabinet, connect output meter across voice coil. Turn volume control fully on, and keeping the output of the signal generator as low as possible, proceed in the sequence as shown on the alignment chart.

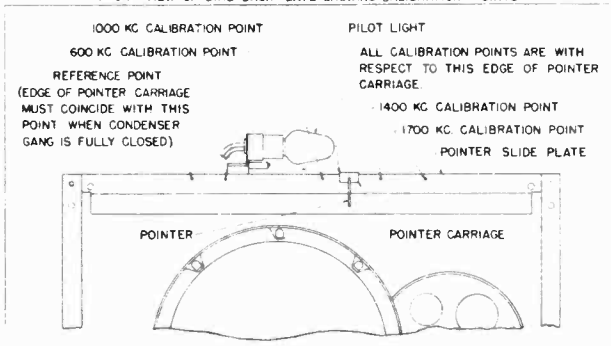
To facilitate alignment of the receiver when removed from cabinet, calibration points are provided on the pointer slide bar (see drawing).

Before aligning, close the variable condenser fully counterclockwise (plates fully closed) and check that edge of pointer carriage coincides with the "reference line" on the pointer slidebar.

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET EDGE OF POINTER CARRIAGE TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
1	R.F SECTION OF VARIABLE CONDENSER IN SERIES WITH A .1 MFD, 400 VOLT CONDENSER.	455 KC.	EXTREME RIGHTHAND POSITION. (CONDENSER PLATES FULLY OPEN.)	C6, C5, C4, C3 AND REPEAT IN SAME ORDER. (1ST. AND 2ND I.F. TRANSFORMERS)
2	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP)	1400 KC.	1400 KC. CALIBRATION POINT.	C2 AND C1 OSCILLATOR AND R.F. TRIMMERS
3		600 KC.	RESONANCE (APPROXIMATELY 600KC. CALIBRATION POINT.)	CHECK THAT EDGE OF POINTER CARRIAGE (AT RESONANCE) COINCIDES WITH 600 KC. CALIBRATION POINT.

FRONT VIEW OF DIAL BACK-PLATE SHOWING CALIBRATION POINTS

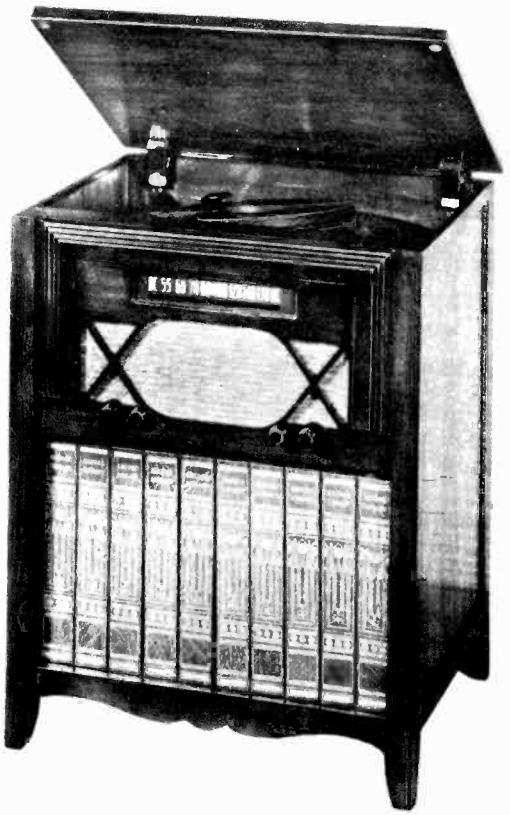


The pick-up is of the low pressure crystal type and is equipped with a permanent type needle which will give about 4,000 playings before requiring replacement. When first used a pronounced needle scratch will be heard which will be greatly reduced after about twenty playings. This "breaking-in-period" is essential on all needles of the permanent type in order to permit the point to become polished.

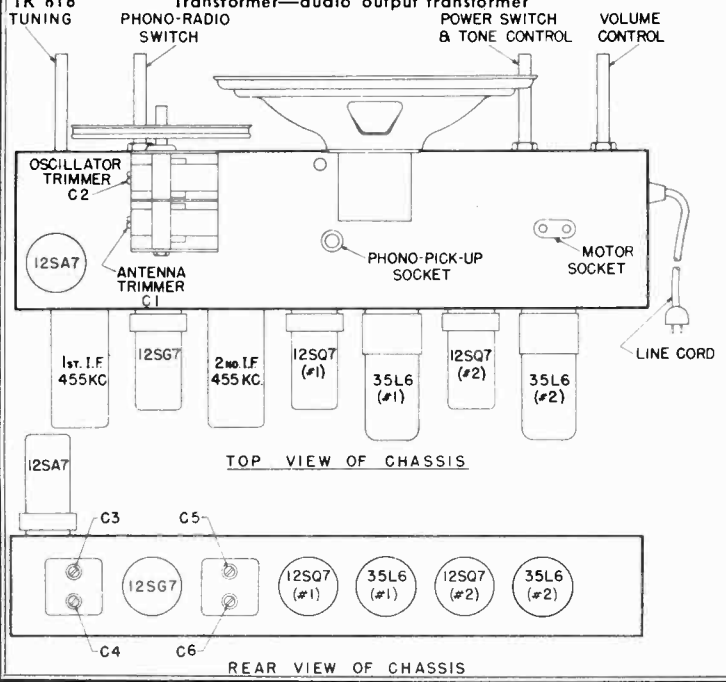
MODELS 7-622, 7-638

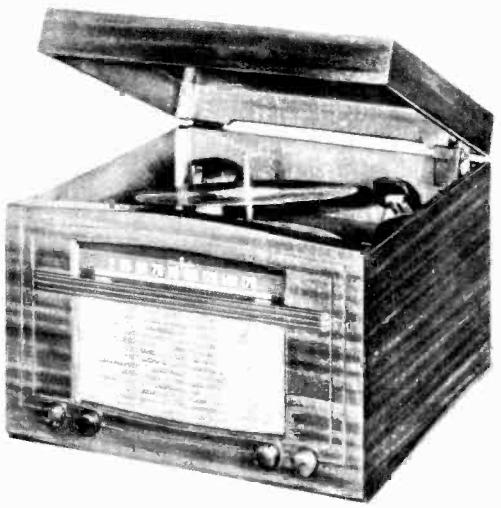
OLYMPIC RADIO & TELEV. INC.

Part No.	Description
BU 910	Bulb—110 Volt pilot light bulb
CA 845	Cabinet—wood cabinet (for model 7-622 only)
CA 1098	Cabinet—wood cabinet (for model 7-638 only)
CL 869	Coil—oscillator coil
CO 791	Condenser—50/20 and 40/150 W.V. electrolytic cond.
CV 769	Condenser—2 gang variable condenser
DL 913	Dial—glass dial scale
KN 671	Knob—walnut knob marked "Volume"
KN 672	Knob—walnut knob marked "Off-On-Tone"
KN 673	Knob—walnut knob marked "Tuning"
KN 919	Knob—walnut knob marked "Phono-Radio"
LP 951	Loop—loop antenna
PO 959	Pointer—dial pointer
PT 793	Control—2 megohm tapped volume control
PT 794	Control—3 megohm tone control with Off-On Switch
RCM20A221M	Condenser—220 mmfd ±20% mica condenser
RCP10W4104L	Condenser—.1/400 W.V. tubular paper condenser
RCP10W4203A	Condenser—.02/400 W.V. tubular paper condenser
RCP10W4254A	Condenser—.25/400 W.V. tubular paper condenser
RCP10W4503A	Condenser—.05/400 W.V. tubular paper condenser
RCP10W6103A	Condenser—.01/600 W.V. tubular paper condenser
RCP10W6202M	Condenser—.002/600 W.V. tubular paper condenser
RCP10W6502A	Condenser—.005/600 W.V. tubular paper condenser
REB 103M	Resistor—10,000 ohms ±20% 1/2 watt resistor
REB 154M	Resistor—150,000 ohms ±20% 1/2 watt resistor
REB 223M	Resistor—22,000 ohms ±20% 1/2 watt resistor
REB 224M	Resistor—220,000 ohms ±20% 1/2 watt resistor
REB 225M	Resistor—2.2 megohms ±20% 1/2 watt resistor
REB 334M	Resistor—330,000 ohms ±20% 1/2 watt resistor
REB 474M	Resistor—470,000 ohms ±20% 1/2 watt resistor
REB 685M	Resistor—6.8 megohms ±20% 1/2 watt resistor
REC 101M	Resistor—100 ohms ±20% 1 watt resistor
RED 102M	Resistor—1000 ohms ±20% 2 watt resistor
RED 270K	Resistor 27 ohms ±10% 2 watt resistor
RF 849	Rectifier—150 mil. selenium rectifier
SK 792	Speaker—6 inch permanent magnet speaker
SP 191	Spring—dial drive lock spring
SP 218	Spring—pointer drive spring
SW 141	Switch—phono-radio switch
TR 707	Transformer—455 K.C. I.F. input transformer
TR 708	Transformer—455 K.C. I.F. output transformer
TR 818	Transformer—audio output transformer



MODEL 7-638

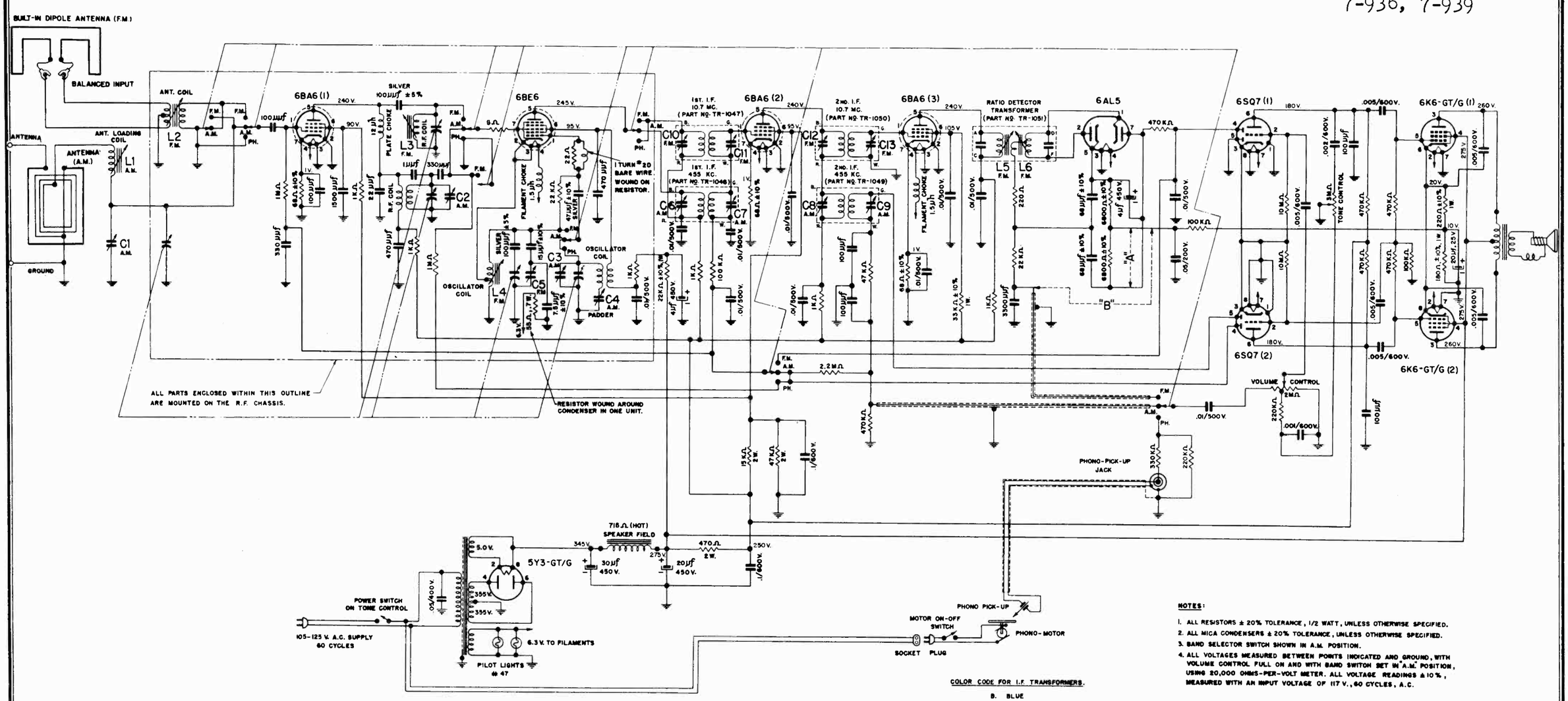




MODEL 7-622

OLYMPIC RADIO & TELEV. INC.

MODELS 7-925, 7-934, 7-936, 7-939



NOTES:

1. ALL RESISTORS ± 20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SHOWN IN A.M. POSITION.
4. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON AND WITH BAND SWITCH SET IN "A.M." POSITION, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ± 10%, MEASURED WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.

COLOR CODE FOR I.F. TRANSFORMERS.

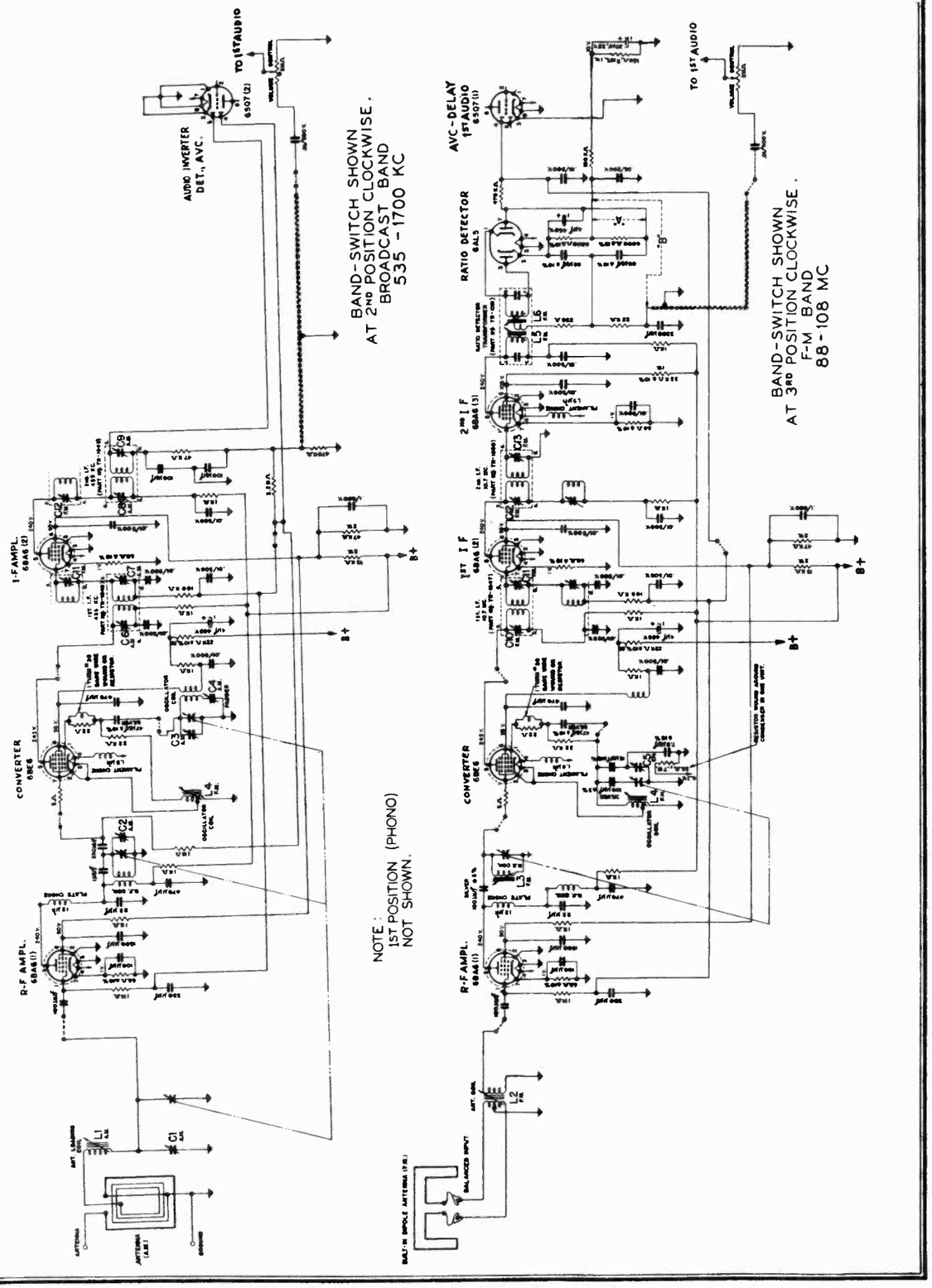
B. BLUE
G. GREEN
R. RED
W. WHITE

REPLACEMENT PARTS

Part No.	Description
CA-846	Cabinet—console used for model #7-934
CA-847	Cabinet—console used for model #7-925
CA-907	Cabinet—console used for model #7-936
CA-1101	Cabinet—console used for model #7-939
CCA-332M	Condenser—3300 mmfd. ±20% Hi K ceramicon
CCA-U150K	Condenser—15 mmfd. ±10% (N750) ceramicon
CCR-152M	Condenser—1500 mmfd. ±20% Hi K ceramicon
CK-1057	Choke—12 μh plate choke
CK-1058	Choke—1.5 μh filament choke
CL-998	Coil—broadcast antenna loading coil
CL-1025	Coil—broadcast oscillator coil
CL-1026	Coil—broadcast r-f coil
CL-1031	Coil—F.M. antenna coil
CL-1032	Coil—F.M. r-f coil
CL-1033	Coil—F.M. oscillator coil
CO-311	Condenser—1 mmfd. ±20% fixed condenser (gimmick)
CO-715	Condenser—.05/400 W.V. molded paper condenser
CO-768	Condenser—30/20/450 W.V. & 20/25 W.V. electrolytic condenser
CO-890	Condenser—7.5 mmfd. ±10% (N750) ceramic condenser with 55 ohm heater
CO-1056	Condenser—4 mfd. 450 W.V. electrolytic condenser
CO-M-5103	Condenser—.01/500 W.V. midget tubular paper condenser
CT-388	Condenser—220-680 mmfd. padder
CT-939	Condenser—3-35 mmfd. trimmer
CT-1002	Condenser—1.6-18 mmfd. trimmer
CT-1036	Condenser—3-12 mmfd. F.M. trimmer
CV-1053	Condenser—3 gang variable condenser
DL-1070	Dial—glass dial scale
IC-1015	Core—iron core for CL-998
IC-1088	Core—iron core for CL-1031
KN-422	Knob—walnut knob marked "Volume"
KN-423	Knob—walnut knob marked "Off-On-Tone"
KN-425	Knob—walnut knob marked "Tuning"
KN-1074	Knob—walnut knob marked "FM-AM-Phono"
LP-1008	Loop—loop antenna
PO-1011	Pointer
PT-567	Control—2 megohm tapped volume control
PT-568	Control—3 megohm tone control with S.P.S.T. switch
RCM20A101M	Condenser—100 mmfd. ±20% mica condenser
RCM20A220M	Condenser—22 mmfd. ±20% mica condenser
RCM20A331M	Condenser—330 mmfd. ±20% mica condenser
RCM20A471M	Condenser—470 mmfd. ±20% mica condenser
RCM20A680K	Condenser—68 mmfd. ±10% mica condenser
RCM20CX101J	Condenser—100 mmfd. ±5% silver mica
RCM20CX470K	Condenser—47 mmfd. ±10% silver mica
RCP10W2503A	Condenser—.05/200 W.V. paper tub. condenser
RCP10W6102A	Condenser—.001/600 W.V. paper tub. condenser
RCP10W6103A	Condenser—.01/600 W.V. paper tub. condenser
RCP10W6104A	Condenser—.1/600 W.V. paper tub. condenser
RCP10W6202M	Condenser—.002/600 W.V. paper tub. condenser
RCP10W6502A	Condenser—.005/600 W.V. paper tub. condenser
REB 100M	Resistor—10 ohms ±20% 1/2W. resistor
REB 102M	Resistor—1000 ohms ±20% 1/2W. resistor
REB 104M	Resistor—100,000 ohms ±20% 1/2W. resistor
REB 105M	Resistor—1 megohm ±20% 1/2W. resistor
REB 106M	Resistor—10 megohms ±20% 1/2W. resistor
REB 220M	Resistor—22 ohms ±20% 1/2W. resistor
REB 221M	Resistor—220 ohms ±20% 1/2W. resistor
REB 223M	Resistor—22,000 ohms ±20% 1/2W. resistor
REB 224M	Resistor—220,000 ohms ±20% 1/2W. resistor
REB 225M	Resistor—2.2 megohms ±20% 1/2W. resistor
REB 334M	Resistor—330,000 ohms ±20% 1/2W. resistor
REB 473M	Resistor—47,000 ohms ±20% 1/2W. resistor
REB 474M	Resistor—470,000 ohms ±20% 1/2W. resistor
REB 680K	Resistor—68 ohms ±10% 1/2W. resistor
REB 682K	Resistor—6800 ohms ±10% 1/2W. resistor
REC 181K	Resistor—180 ohms ±10% 1W. resistor
REC 221K	Resistor—220 ohms ±10% 1W. resistor
REC 223K	Resistor—22,000 ohms ±10% 1W. resistor
REC 333K	Resistor—33,000 ohms ±10% 1W. resistor
RED 153M	Resistor—15,000 ohms ±20% 2W. resistor
RED 471M	Resistor—470 ohms ±20% 2W. resistor
RED 473M	Resistor—47,000 ohms ±20% 2W. resistor
RX-844	Automatic record changer for model 7-925 only
RX-227-1	Automatic record changer for models 7-934 and 7-936
RX-524	Automatic record changer for model 7-939
SK-384	Speaker—12" dynamic speaker (715 ohms)
SP-191	Spring—dial drive lock spring
SP-218	Spring—pointer drive spring
SW-843	Switch—band switch
TR-1047	Transformer—10.7 mc first F.M. I.F. transformer
TR-1048	Transformer—455 kc first A.M. I.F. transformer
TR-1049	Transformer—455 kc second A.M. I.F. transformer
TR-1050	Transformer—10.7 mc second F.M. I.F. transformer
TR-1051	Transformer—ratio detector transformer
TR-1052	Transformer—power transformer (110 mA.)
WI-1018	Wire—3 conductor parallel cable
WI-1079	Wire—300 ohms transmission line

RECORD CHANGERS: For 7-925, Webster Model 56, RCD.CH. 15-10; For 7-934, Seeburg Model K, RCD.CH. 15-2

OLYMPIC RADIO & TELEV. INC. MODELS 7-925, 7-934, 7-936, 7-939

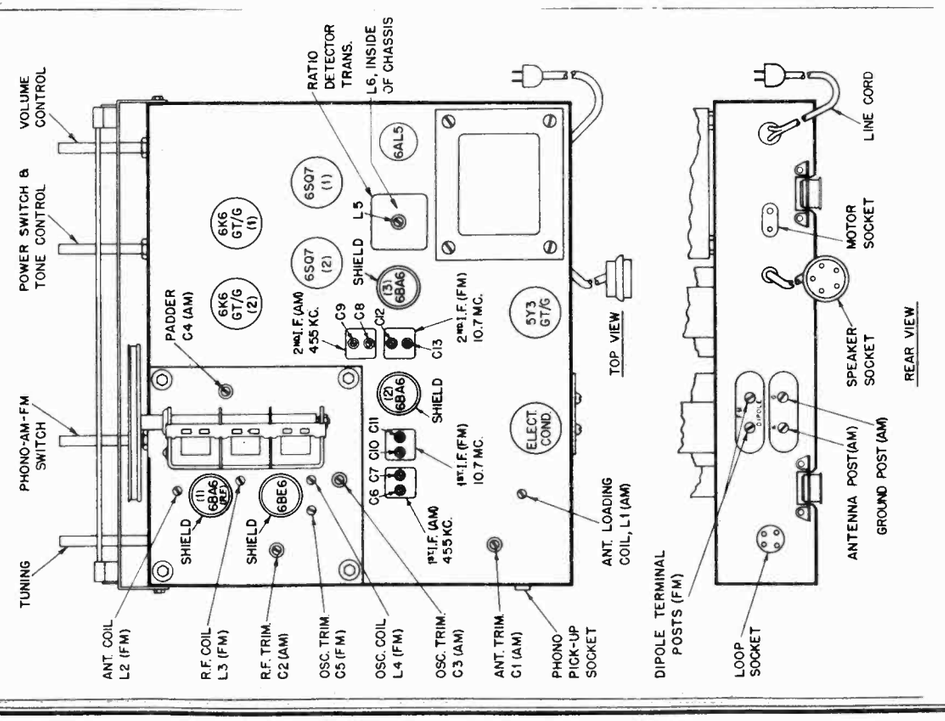


MODELS 7-925, 7-934, 7-936, 7-939 OLYMPIC RADIO & TELEV. INC.

MODEL 7-936

Frequency Range: A.M. 535-1700 kc. and F.M. 88-108 mc
Power Requirement: 105-125 Volts a-c 60 cycles
Power Consumption: Receiver on a-m: 103 watts
Receiver with Record Changer: 120 watts

TUBE & TRIMMER LAYOUT



OLYMPIC RADIO & TELEV. INC. MODELS 7-925, 7-934, 7-936, 7-939

ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON-	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN POINTER TO-	READ OUTPUT ON-	ADJUST THE FOLLOWING- (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE).
1	F.M.	PIN 1 OF 6BA6 (3) TUBE FOR .1 VOLT SIGNAL.	10.7 MC. UNMODULATED SIGNAL.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN).	VACUUM TUBE VOLTMETER ACROSS 6800 OHM RESISTOR (SEE "A" ON CIRCUIT DIAGRAM).	L5 (RATIO DETECTOR) FOR MAXIMUM READING.
					VACUUM TUBE VOLTMETER ACROSS "B" ON CIRCUIT DIAGRAM.	L6 (RATIO DETECTOR) FOR ZERO READING.
2	F.M.	PIN 7 OF 6BE6 TUBE IN SERIES WITH A .1MFD., 400 VOLT CONDENSER.			VACUUM TUBE VOLTMETER ACROSS 6800 OHM RESISTOR (SEE "A" ON CIRCUIT DIAGRAM).	C13 AND C12 (2nd. I.F. TRANSFORMER) FOR MAXIMUM READING.
3	F.M.					C11 AND C10 (1st. I.F. TRANSFORMER) FOR MAXIMUM READING.
4	A.M.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 7 OF THE 6BE6 TUBE IN SERIES WITH A .1MFD., 400 VOLT CONDENSER.	455 KC.		OUTPUT METER ACROSS SPEAKER VOICE COIL.	C9 AND C8 (2nd. I.F. TRANSFORMER) FOR MAXIMUM OUTPUT.
5	A.M.					C7 AND C6 (1st. I.F. TRANSFORMER) FOR MAXIMUM OUTPUT.
6	F.M.	REPEAT STEPS 2 AND 3.				
7	A.M.	ANTENNA SECTION OF VARIABLE CONDENSER OR PIN 1 OF THE 6BA6 TUBE IN SERIES WITH A .1MFD., 400 VOLT CONDENSER.	1700 KC.	1700 KC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	C3 (OSCILLATOR TRIMMER) FOR MAXIMUM OUTPUT.
8	A.M.		1500 KC.	RESONANCE, APPROXIMATELY 1500 KC. ON DIAL.		C2 (R.F. TRIMMER) FOR MAXIMUM OUTPUT.
9	A.M.		600 KC.	RESONANCE, APPROXIMATELY 600 KC. ON DIAL.		C4 (PADDER) ROCK VARIABLE FOR MAXIMUM SIGNAL.
10	A.M.	REPEAT STEPS 7, 8 AND 9.				
11	A.M.	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP).	600 KC.	RESONANCE, APPROXIMATELY 600 KC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	L1 (ANTENNA LOADING COIL) ROCK VARIABLE FOR MAXIMUM SIGNAL.
12	A.M.		1500 KC.	RESONANCE, APPROXIMATELY 1500 KC. ON DIAL.		C1 (ANTENNA TRIMMER) FOR MAXIMUM OUTPUT.
13	A.M.	REPEAT STEPS 11 AND 12.				
14	F.M.	CONNECT F.M. SIGNAL GENERATOR TO DIPOLE TERMINAL POSTS WITH A 150 OHM RESISTOR IN SERIES WITH EACH SIDE. 30% MODULATED SIGNAL.	108 MC.	108 MC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	C5 (OSCILLATOR TRIMMER) FOR MAXIMUM OUTPUT.
15	F.M.		88 MC.	88 MC. ON DIAL. (CHECK IMAGE AT 109.4 MC.).		L4 (OSCILLATOR COIL) FOR MAXIMUM OUTPUT.
16	F.M.	REPEAT STEPS 14 AND 15.				
17	F.M.		102 MC.	102 MC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	L3 (R.F. COIL) FOR MAXIMUM OUTPUT.
						L2 (ANTENNA COIL) FOR MAXIMUM OUTPUT.

The pick-up is of the low-pressure crystal type and is equipped with a permanent needle which will give about 4,000 playings before requiring replacement. When first used a pronounced needle scratch will be heard which will be greatly reduced after about twenty playings. This "breaking in" period is essential on all needles of the permanent type in order to permit the point to become polished.

This instrument is equipped with a sensitive 9 tube plus rectifier superheterodyne receiver. The rotatable built-in loop antenna will provide satisfactory reception under all normal operating conditions. The loop is mounted between springs, so that it can be freely rotated to the best position for reception. Once this position is established it is no longer necessary to make any further loop adjustments. The directional characteristic of the loop is particularly useful for the elimination of elevator noises or other local electrical disturbances.

SERVICE AND ALIGNMENT INSTRUCTIONS

To remove the chassis from the console, it is first necessary to disconnect the loop connector plug, the female connector plug on the speaker, the phono input plug, the motor plug and the two F.M. lugs on the F.M. antenna terminal post. Then remove the four knobs and the four screws holding the chassis to its mounting panel.

CAUTION: WHEN REMOVING THE CHANGER BE SURE TO PLACE IT IN A POSITION IN WHICH THE CHANGER MECHANISM WILL NOT BE DAMAGED.

ALIGNMENT

Equipment Required: Modulated a-m, r-f signal generator; modulated f-m signal generator covering the range from 88 to 108 megacycles; vacuum tube voltmeter; output meter; insulated screw driver; radiation loop (1 turn of about 6" to 8" diameter of #12 or #14 wire connected across output of signal generator and placed parallel to receiver loop about 8" or 10" away); one .1 mfd 400 volt condenser; two 150 ohm resistors.

With the receiver removed from the cabinet, connect output meter, or vacuum tube voltmeter and signal generator as indicated in the alignment procedure chart and keeping the output of the generator as low as possible, proceed exactly in the sequence as shown on the chart.

Before aligning, close the variable condenser fully counter clockwise (plates fully closed) and check that pointer coincides with the reference line on the dial.

ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON-	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN POINTER TO-	READ OUTPUT ON-	ADJUST THE FOLLOWING- (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE).
1	F.M.	PIN 1 OF 6BA6 (3) TUBE FOR .1 VOLT SIGNAL.	10.7 MC. UNMODULATED SIGNAL.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN).	VACUUM TUBE VOLTMETER ACROSS 6800 OHM RESISTOR (SEE "A" ON CIRCUIT DIAGRAM).	L5 (RATIO DETECTOR) FOR MAXIMUM READING.
					VACUUM TUBE VOLTMETER ACROSS "B" ON CIRCUIT DIAGRAM.	L6 (RATIO DETECTOR) FOR ZERO READING.
2	F.M.	PIN 7 OF 6BE6 TUBE IN SERIES WITH A .1MFD., 400 VOLT CONDENSER.			VACUUM TUBE VOLTMETER ACROSS 6800 OHM RESISTOR (SEE "A" ON CIRCUIT DIAGRAM).	C13 AND C12 (2ND I.F. TRANSFORMER) FOR MAXIMUM READING.
3	F.M.					C11 AND C10 (1ST I.F. TRANSFORMER) FOR MAXIMUM READING.
4	A.M.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 7 OF THE 6BE6 TUBE IN SERIES WITH A .1 MFD., 400 VOLT CONDENSER.	455 KC.		OUTPUT METER ACROSS SPEAKER VOICE COIL.	C9 AND C8 (2ND I.F. TRANSFORMER) FOR MAXIMUM OUTPUT.
5	A.M.					C7 AND C6 (1ST I.F. TRANSFORMER) FOR MAXIMUM OUTPUT.
6	F.M.	REPEAT STEPS 2 AND 3.				
7	A.M.	ANTENNA SECTION OF VARIABLE CONDENSER OR PIN 1 OF THE 6BA6 TUBE IN SERIES WITH A .1MFD., 400 VOLT CONDENSER.	1700 KC.	1700 KC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	C3 (OSCILLATOR TRIMMER) FOR MAXIMUM OUTPUT.
8	A.M.		1500 KC.	RESONANCE, APPROXIMATELY 1500 KC. ON DIAL.		C2 (R.F. TRIMMER) FOR MAXIMUM OUTPUT.
9	A.M.		600 KC.	RESONANCE, APPROXIMATELY 600 KC. ON DIAL.		C4 (PADDER) ROCK VARIABLE FOR MAXIMUM SIGNAL.
10	A.M.	REPEAT STEPS 7, 8 AND 9.				
11	A.M.	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP).	600 KC.	RESONANCE, APPROXIMATELY 600 KC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	L1 (ANTENNA LOADING COIL) ROCK VARIABLE FOR MAXIMUM SIGNAL.
12	A.M.		1500 KC.	RESONANCE, APPROXIMATELY 1500 KC. ON DIAL.		C1 (ANTENNA TRIMMER) FOR MAXIMUM OUTPUT.
13	A.M.	REPEAT STEPS 11 AND 12.				
14	F.M.	CONNECT LOW SIDE OF F.M. SIGNAL GENERATOR TO DIPOLE TERMINAL POST DIRECTLY ABOVE "G" POST OF A.M. STRIP, AND CONNECT HIGH SIDE OF F.M. GENERATOR IN SERIES WITH A 300 OHM RESISTOR TO OTHER DIPOLE TERMINAL. USE 30% MODULATED F.M. SIGNAL.	108 MC.	108 MC. ON DIAL.	OUTPUT METER ACROSS SPEAKER VOICE COIL.	C5 (OSCILLATOR TRIMMER) FOR MAXIMUM OUTPUT.
15	F.M.		88 MC.	88 MC. ON DIAL. (CHECK IMAGE AT 109.4 MC.).		L4 (OSCILLATOR COIL) FOR MAXIMUM OUTPUT.
16	F.M.		REPEAT STEPS 14 AND 15.			
17	F.M.		102 MC.	RESONANCE, APPROXIMATELY 102 MC. ON DIAL	OUTPUT METER ACROSS SPEAKER VOICE COIL.	L3 (R.F. COIL) FOR MAXIMUM OUTPUT.
			108 MC.	108 MC. ON DIAL		C14 (ANTENNA TRIMMER) FOR MAXIMUM OUTPUT.

Frequency Range: A.M. 535-1700 kc. and F.M. 88-108 mc

Power Requirement: 105-125 Volts a-c 60 cycles

Power Consumption: Receiver on a-m: 103 watts
Receiver with Record Changer: 120 watts

To remove the chassis from the console, it is first necessary to disconnect the loop connector plug, the female connector plug on the speaker, the phono input plug, the motor plug and the two F.M. lugs on the F.M. antenna terminal post. Then remove the four knobs and the four screws holding the chassis to its mounting panel.

CAUTION: WHEN REMOVING THE CHANGER BE SURE TO PLACE IT IN A POSITION IN WHICH THE CHANGER MECHANISM WILL NOT BE DAMAGED.

ALIGNMENT

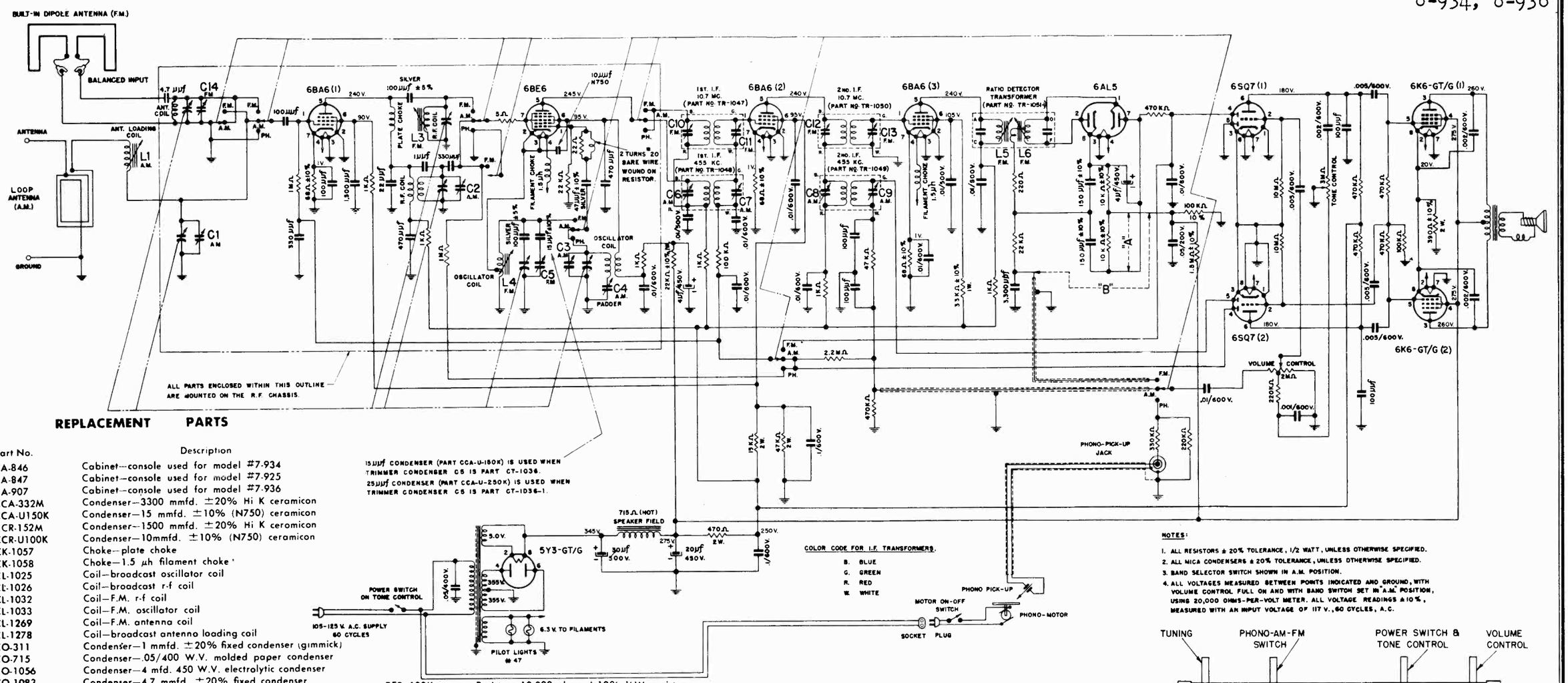
Equipment Required: Modulated a-m, r-f signal generator; modulated f-m signal generator covering the range from 88 to 108 megacycles; vacuum tube voltmeter; output meter; insulated screw driver; radiation loop (1 turn of about 6" to 8" diameter of #12 or #14 wire connected across output of signal generator and placed parallel to receiver loop about 8" or 10" away); one .1 mfd 400 volt condenser; two 150 ohm resistors.

With the receiver removed from the cabinet, connect output meter, or vacuum tube voltmeter and signal generator as indicated in the alignment procedure chart and keeping the output of the generator as low as possible, proceed exactly in the sequence as shown on the chart.

Before aligning, close the variable condenser fully counter clockwise (plates fully closed) and check that pointer coincides with the reference line on the dial.

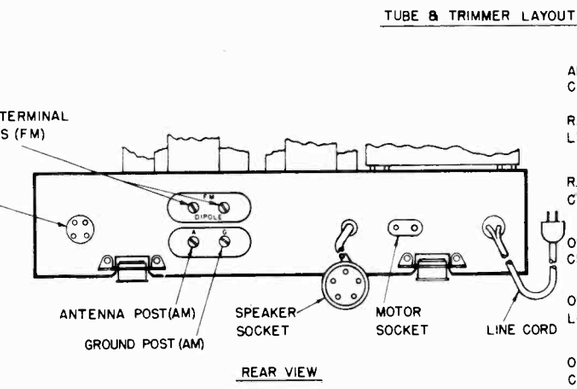
OLYMPIC RADIO & TELEV. INC.

MODELS 8-925, 8-934, 8-936

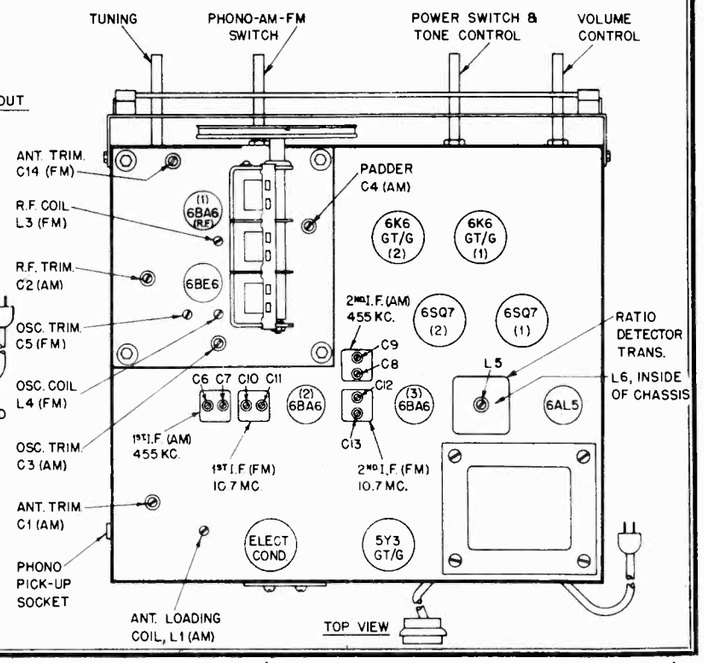


REPLACEMENT PARTS

Part No.	Description
CA-846	Cabinet—console used for model #7-934
CA-847	Cabinet—console used for model #7-925
CA-907	Cabinet—console used for model #7-936
CCA-332M	Condenser—3300 mmfd. ±20% Hi K ceramicon
CCA-U150K	Condenser—15 mmfd. ±10% (N750) ceramicon
CCR-152M	Condenser—1500 mmfd. ±20% Hi K ceromicon
CCR-U100K	Condenser—10mmfd. ±10% (N750) ceramicon
CK-1057	Choke—plate choke
CK-1058	Choke—1.5 μh filament choke
CL-1025	Coil—broadcast oscillator coil
CL-1026	Coil—broadcast r-f coil
CL-1032	Coil—F.M. r-f coil
CL-1033	Coil—F.M. oscillator coil
CL-1269	Coil—F.M. antenna coil
CL-1278	Coil—broadcast antenno loading coil
CO-311	Condenser—1 mmfd. ±20% fixed condenser (gimmick)
CO-715	Condenser—.05/400 W.V. molded paper condenser
CO-1056	Condenser—4 mfd. 450 W.V. electrolytic condenser
CO-1083	Condenser—4.7 mmfd. ±20% fixed condenser
CO-1270	Condenser—30/500 W.V. & 20+4/450 W.V. electrolytic condenser
CO-M-5103	Condenser—.01/500 W.V. midget tubular paper condenser
CT-388	Condenser—220-680 mmfd. padder
CT-939	Condenser—3-35 mmfd. trimmer
CT-1002	Condenser—1.6-18 mmfd. trimmer
CT-1036	Condenser—3-12 mmfd. F.M. trimmer
CV-1053	Condenser—3 gang variable condenser
DL-1070-1	Dial—glass dial scale
IC-1015	Core—iron core for CL-1278
KN-422	Knob—walnut knob marked "Volume"
KN-423	Knob—walnut knob marked "Off-On-Tone"
KN-425	Knob—walnut knob marked "Tuning"
KN-1074	Knob—walnut knob marked "FM-AM-Phono"
PO-1011	Pointer
PT-567	Control—2 megohm tapped volume control
PT-568	Control—3 megohm tone control with S.P.S.T. switch
RCM20A101M	Condenser—100 mmfd. ±20% mica condenser
RCM20A151K	Condenser—150 mmfd. ±10% mica condenser
RCM20A220M	Condenser—22 mmfd. ±20% mica condenser
RCM20A331M	Condenser—330 mmfd. ±20% mica condenser
RCM20A471M	Condenser—470 mmfd. ±20% mica condenser
RCM20CX101J	Condenser—100 mmfd. ±5% silver mica
RCM20CX470K	Condenser—47 mmfd. ±10% silver mica
RCP10W2503A	Condenser—.05/200 W.V. paper tub. condenser
RCP10W6102A	Condenser—.001/600 W.V. paper tub. condenser
RCP10W6103A	Condenser—.01/600 W.V. paper tub. condenser
RCP10W6104A	Condenser—.1/600 W.V. paper tub. condenser
RCP10W6202M	Condenser—.002/600 W.V. paper tub. condenser
RCP10W6502A	Condenser—.005/600 W.V. paper tub. condenser
REB 100M	Resistor—10 ohms ±20% ½W. resistor
REB 102M	Resistor—1000 ohms ±20% ½W. resistor
REB 103K	Resistor—10,000 ohms ±10% ½W. resistor
REB 104K	Resistor—100,000 ohms ±10% ½W. resistor
REB 104M	Resistor—100,000 ohms ±20% ½W. resistor
REB 105M	Resistor—1 megohm ±20% ½W. resistor
REB 106M	Resistor—10 megohms ±20% ½W. resistor
REB 155K	Resistor—1.5 megohms ±10% ½W. resistor
REB 220M	Resistor—22 ohms ±20% ½W. resistor
REB 221M	Resistor—220 ohms ±20% ½W. resistor
REB 223M	Resistor—22,000 ohms ±20% ½W. resistor
REB 224M	Resistor—220,000 ohms ±20% ½W. resistor
REB 225M	Resistor—2.2 megohms ± 20% ½W. resistor
REB 334M	Resistor—330,000 ohms ±20% ½W. resistor
REB 473M	Resistor—47,000 ohms ±20% ½W. resistor
REB 474M	Resistor—470,000 ohms ±20% ½W. resistor
REB 680K	Resistor—68 ohms ±10% ½W. resistor
REC 223K	Resistor—22,000 ohms ±10% 1W. resistor
REC 333K	Resistor—33,000 ohms ±10% 1W. resistor
RED 153M	Resistor—15,000 ohms ±20% 2W. resistor
RED 391M	Resistor—390 ohms ±20% 2W. resistor
RED 471M	Resistor—470 ohms ±20% 2W. resistor
RED 473M	Resistor—47,000 ohms ±20% 2W. resistor
SK-384	Speaker—12" dynamic speaker (715 ohms)
SP-191	Spring—dial drive lock spring
SP-218	Spring—pointer drive spring
SW-843	Switch—band switch
TR-1047	Transformer—10.7 mc first F.M. I.F. transformer
TR-1048	Transformer—455 kc first A.M. I.F. transformer
TR-1049	Tronsformer—455 kc second A.M. I.F. transformer
TR-1050	Transformer—10.7 mc second F.M. I.F. transformer
TR-1051-1	Transformer—ratio detector tronsformer
TR-1052	Transformer—power transformer (110 mA.)
WL-1079	Wire—300 ohms transmission line



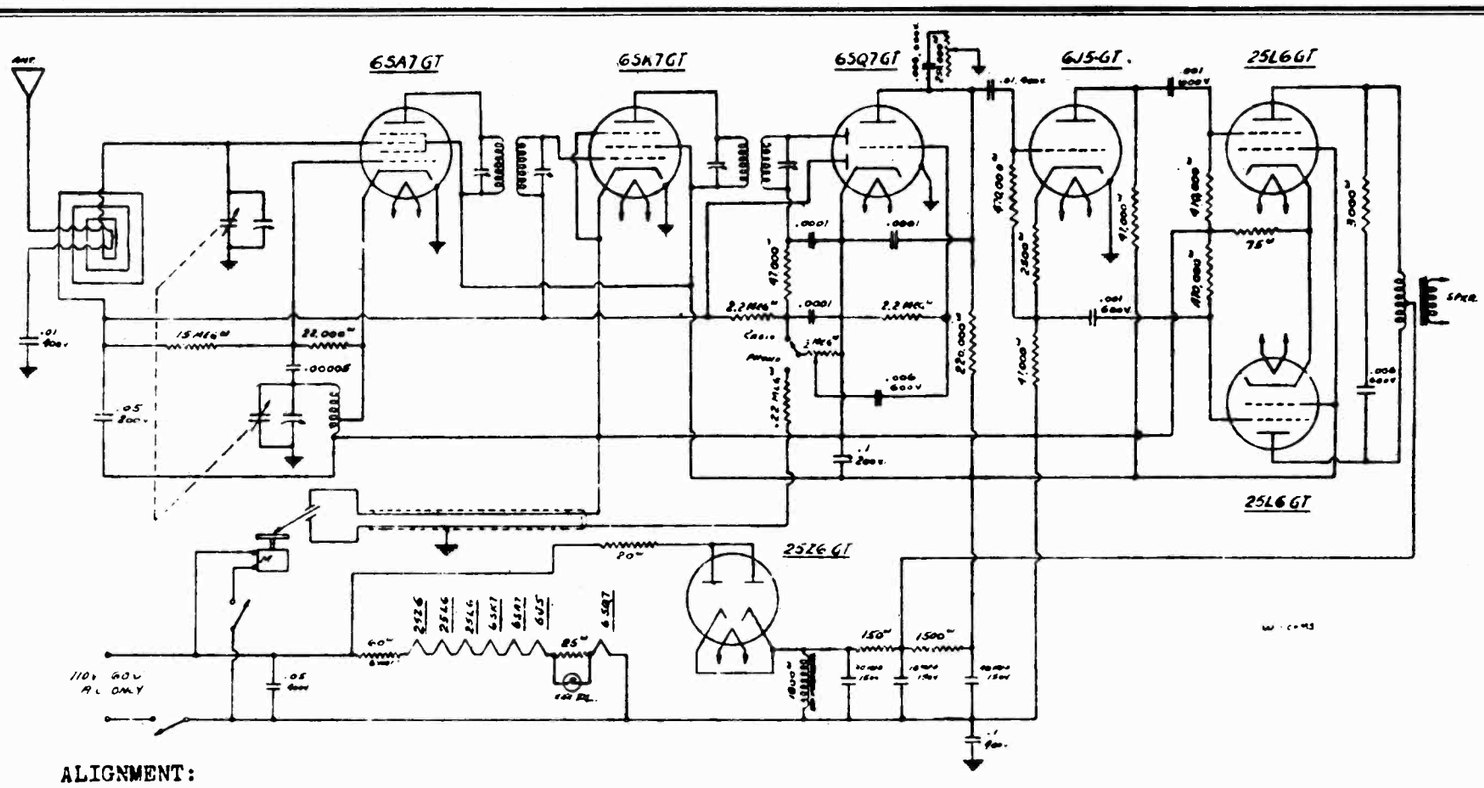
TUBE & TRIMMER LAYOUT



NOTES:

1. ALL RESISTORS ± 20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SHOWN IN A.M. POSITION.
4. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON AND WITH BAND SWITCH SET IN A.M. POSITION, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, MEASURED WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.

RECORD CHANGERS: For 8-925, Webster Model 156, RCD.CH. 19-1; For 8-934, 8-936, Seeburg Model K, RCD.CH. 15-2



ALIGNMENT:

Should it be necessary to re-align the receiver, proceed in the usual manner by first adjusting the I.F. transformers for maximum output as indicated by an output meter connected across the plate and B-bus through a series condenser.

NOTE:---This chassis is wired with a common negative bus instead of grounding directly to the chassis and therefore all negative connections are to be made to the B-bus instead of the chassis. In connecting the signal generator connect the high side to the antenna section of the tuning condenser and the low side to the B-bus. Now rotate the dial to 1500 K.C. and with a 1500 K.C. signal radiating from a dummy loop of the signal generator first adjust the oscillator trimmer for maximum output and follow with an adjustment of the antenna trimmer for maximum output. No further adjustments are required.