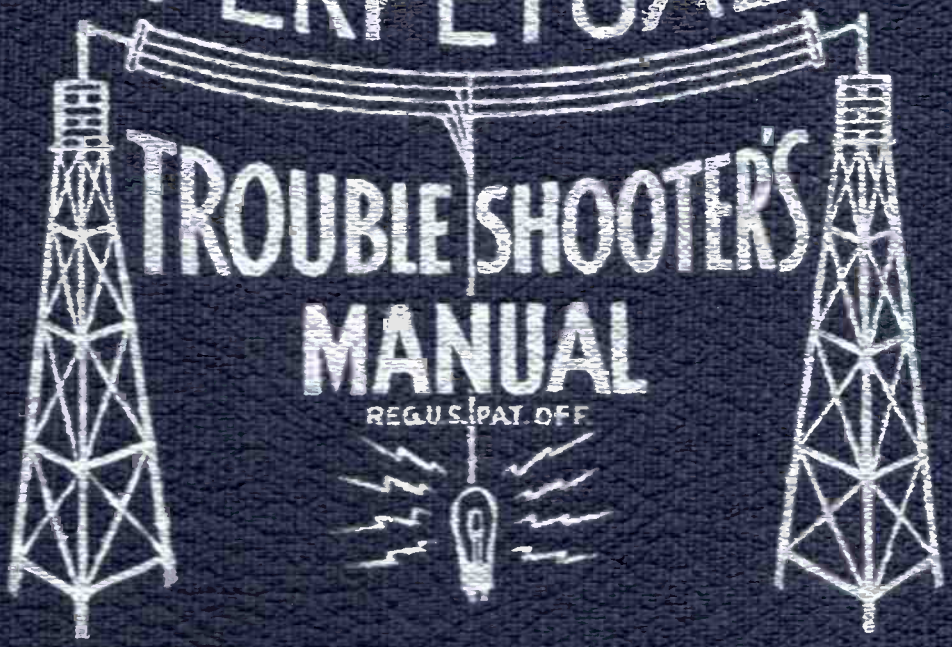
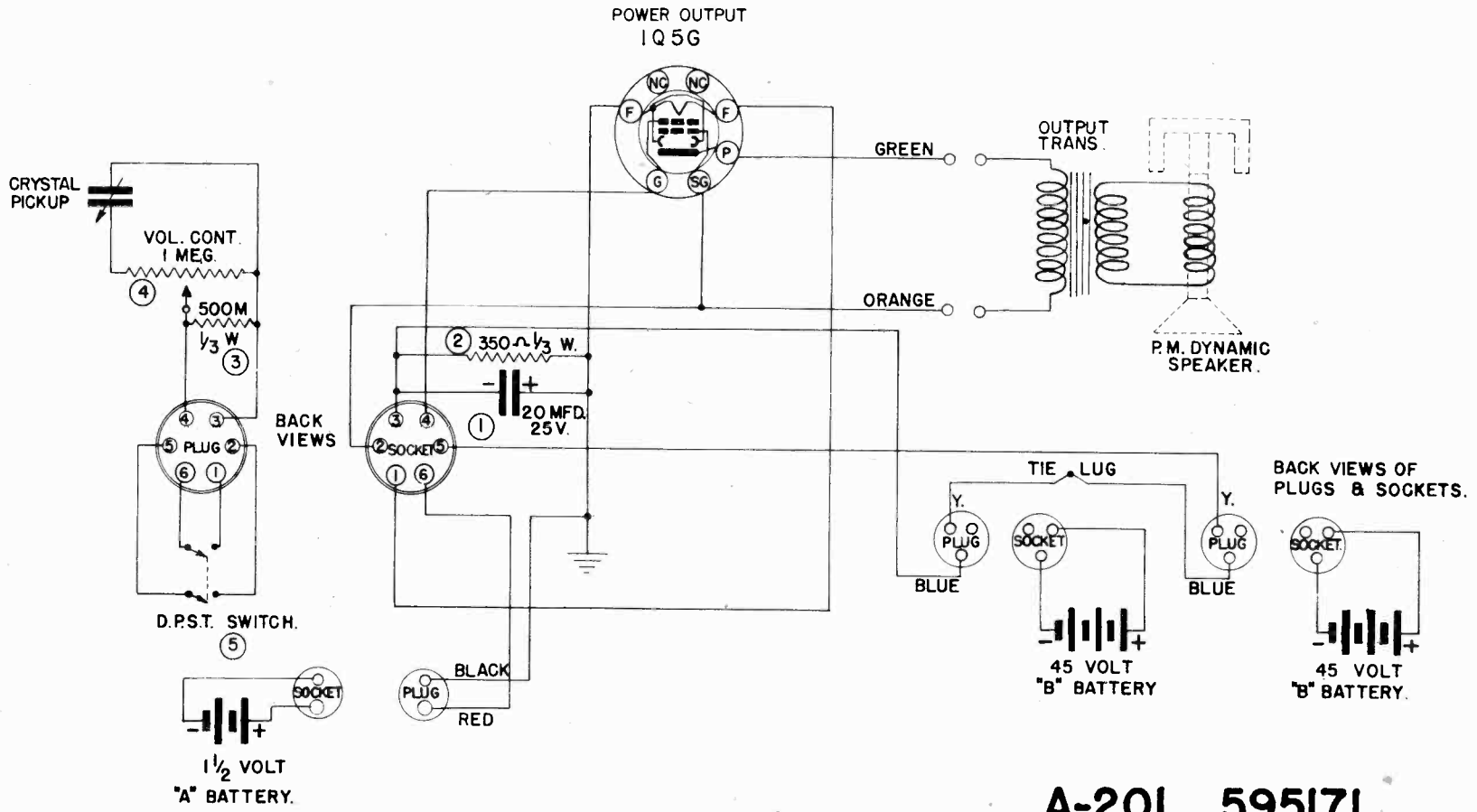
VOLUME XIV

PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER



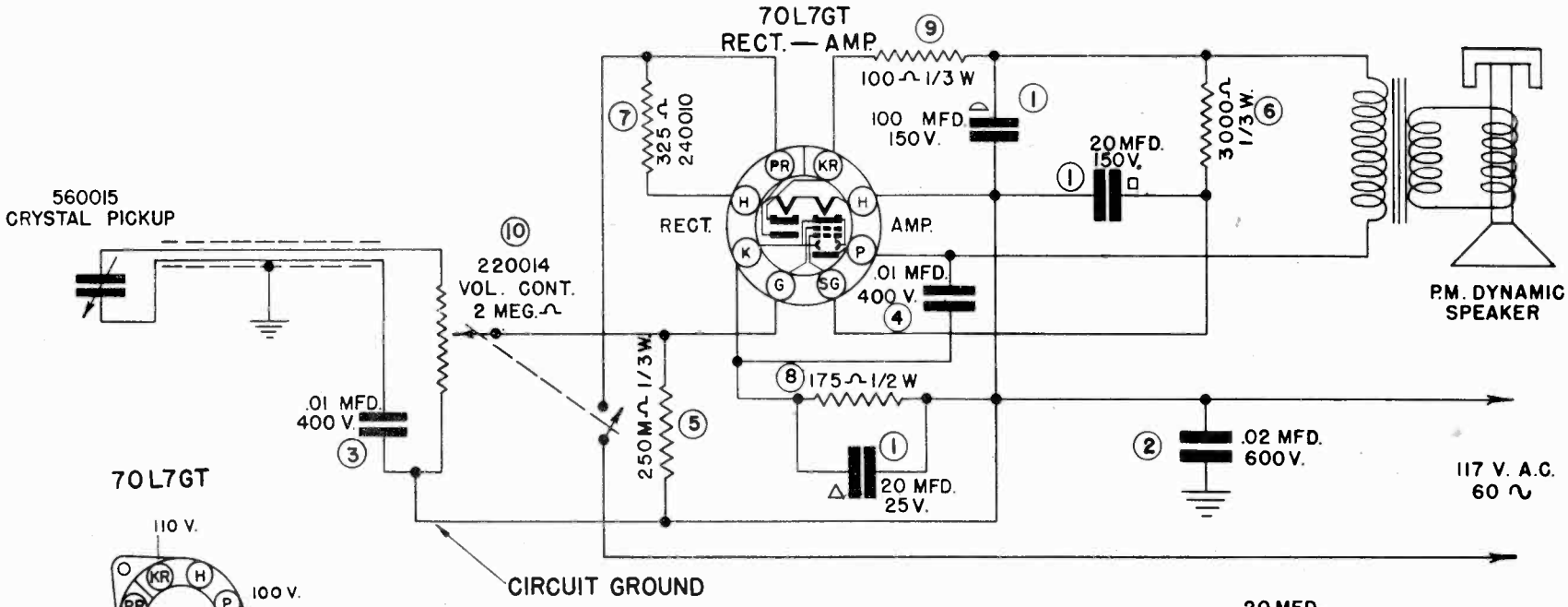
THE MAGNAVOX CO.

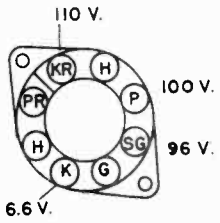
A-201 595171

SPECIFICATIONS

"A" Battery voltage.....1.5 volt;
"B" Battery voltage..... 90 volt;
"A" Battery drain..... .10 amp.;
"B" Battery drain..... .0111 amp.;
Power output..... .27 watt;
Type tube:..... 1Q5G;
Speaker transformer..... 8000 ohms;

Illus. No.	Part No.	Part Name	Description
1.	273611	Condenser	Molanode, 20 mfd. 25 V.
2.	230031	Resistor	Carbon, 350 ohm 1/3 W.
3.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
4.	220016	Control	Volume, 1 megohm
5.	160014	Switch	Off-on switch
	800009	Battery	Complete set of three batteries

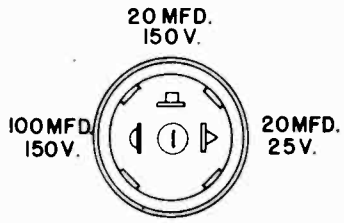




BOTTOM VIEW OF TUBE

VOLTAGE TABLE

MEASURE ALL D.C. VOLTAGES FROM SOCKET TERMINALS TO CIRCUIT GROUND (NOT CHASSIS) WITH A 1000 OHM PER VOLT VOLTMETER LINE VOLTAGE 117 V. A.C.— MEASURE THE CATHODES ON 30 VOLT SCALE ALL OTHERS ON 600 VOLT SCALE.

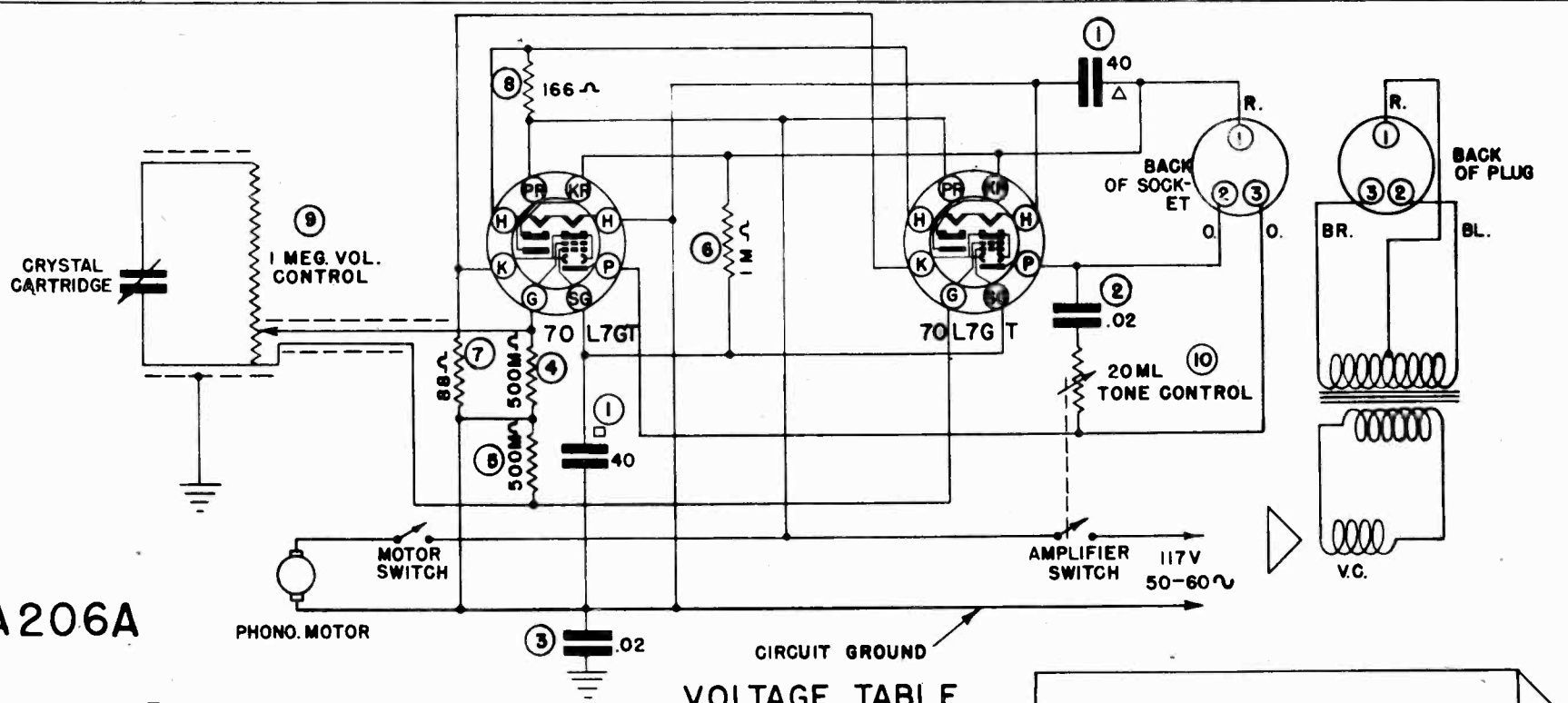


A-205

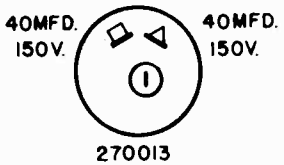
Illus. No.	Part No.	Part Name	Description
1.	270008	Condenser	Molanode, 100 mfd. 150 V. 20 mfd. 150 V., 20 mfd. 25 V.
2.	250056	Condenser	Moulded paper, .02 mfd. 600 V.
3.	250054	Condenser	Moulded paper, .01 mfd. 400 V.
4.	250054	Condenser	Moulded paper, .01 mfd. 400 V.
5.	230010	Resistor	Carbon, 250,000 ohm 1/3 W.
6.	230032	Resistor	Carbon, 3000 ohm 1/3 W.
7.	240010	Resistor	Wire wound, 325 ohm ± 10%
8.	230037	Resistor	Carbon, 175 ohm 1/2 W.
9.	239744	Resistor	Carbon, 100 ohm 1/3 W.
10.	220014	Control	Volume, 2 megohm, with power switch

SPECIFICATIONS

Primary voltage.....117 V. AC;
Power consumption..... 22 watts;
Power output..... 1½ watts;
Type tube..... 1 - 70L7GT;
Speaker:
Field Coil..... None;
Transformer.....3000 ohms;



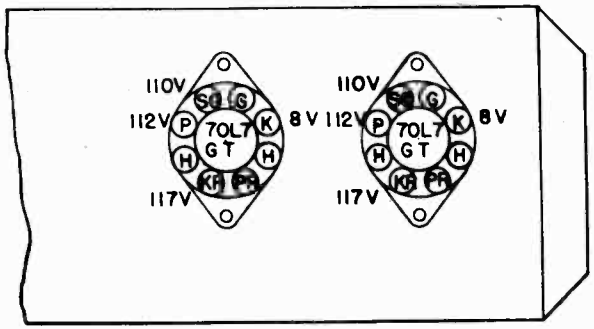
A206A



VOLTAGE TABLE

(BOTTOM VIEW OF CHASSIS)

MEASURE ALL D.C. VOLTAGES FROM SOCKET TERMINALS TO CIRCUIT GROUND (NOT CHASSIS) WITH 1000 OHM PER VOLT VOLTMETER.
LINE VOLTAGE 117 V. A.C.
MEASURE CATHODES ON 30 V. SCALE—ALL OTHERS ON 300V. SCALE.



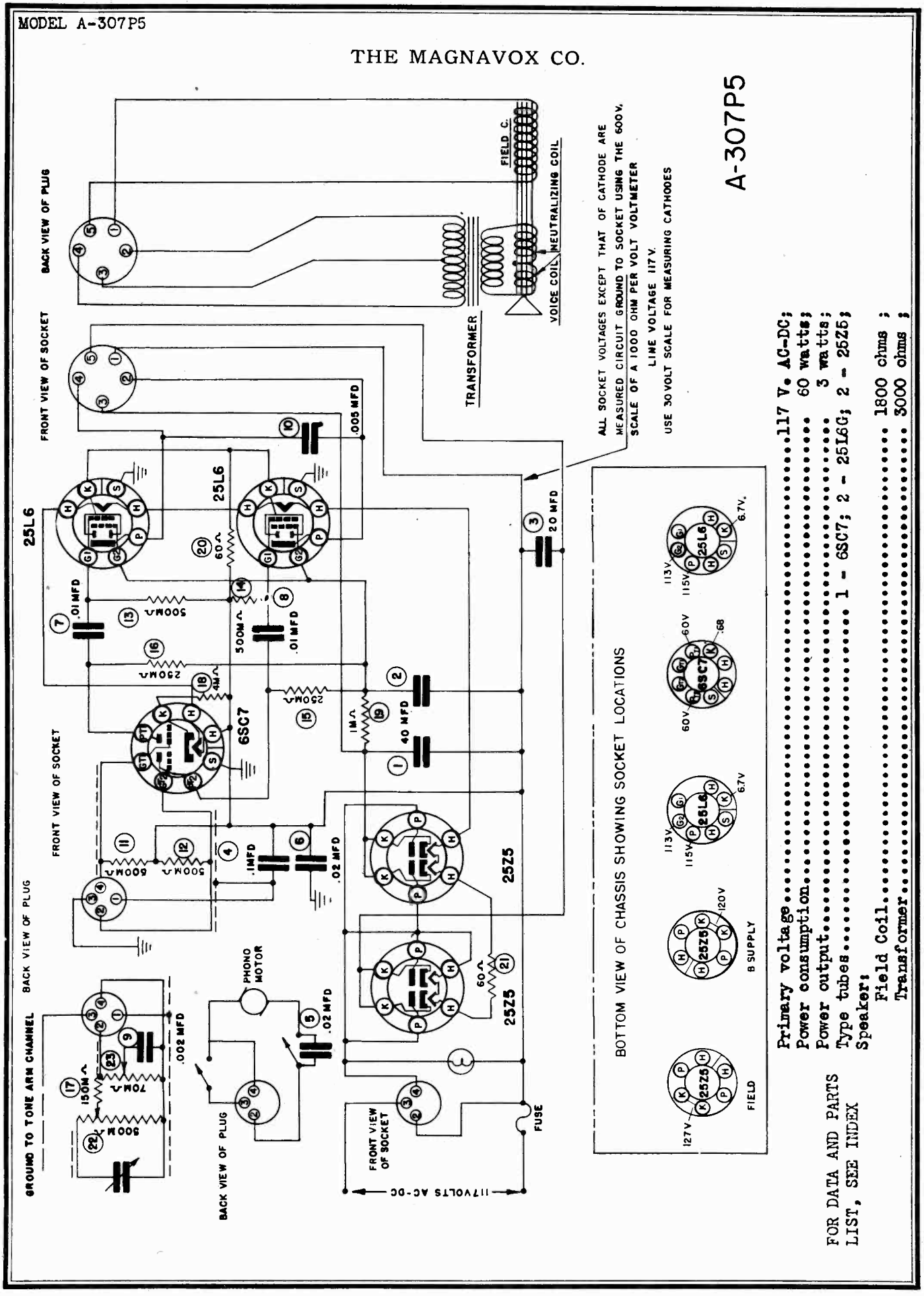
Illus. No.	Part No.	Part Name	Description
1.	270013	Condenser	Molanode, 40-40 mfd. 150 V.
2.	250056	Condenser	Moulded paper, .02 mfd. 600 V.
3.	250056	Condenser	Moulded paper, .02 mfd. 600 V.
4.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
5.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
6.	239745	Resistor	Carbon, 1000 ohm 1/3 W.
7.	230047	Resistor	Carbon, 88 ohm 1 W.
8.	240013	Resistor	Wire wound, 166 ohm
9.	222518	Control	Volume, 1 megohm
10.	220021	Control	Tone, 20,000 ohm, with power switch

SPECIFICATIONS

Primary voltage.....117 V. AC;
Power consumption..... 60 watts;
Power output..... 3 watts;
Type tubes..... 2 - 70L7GT;
Speaker:
Field coil..... None;
Transformer.....4000 ohms;

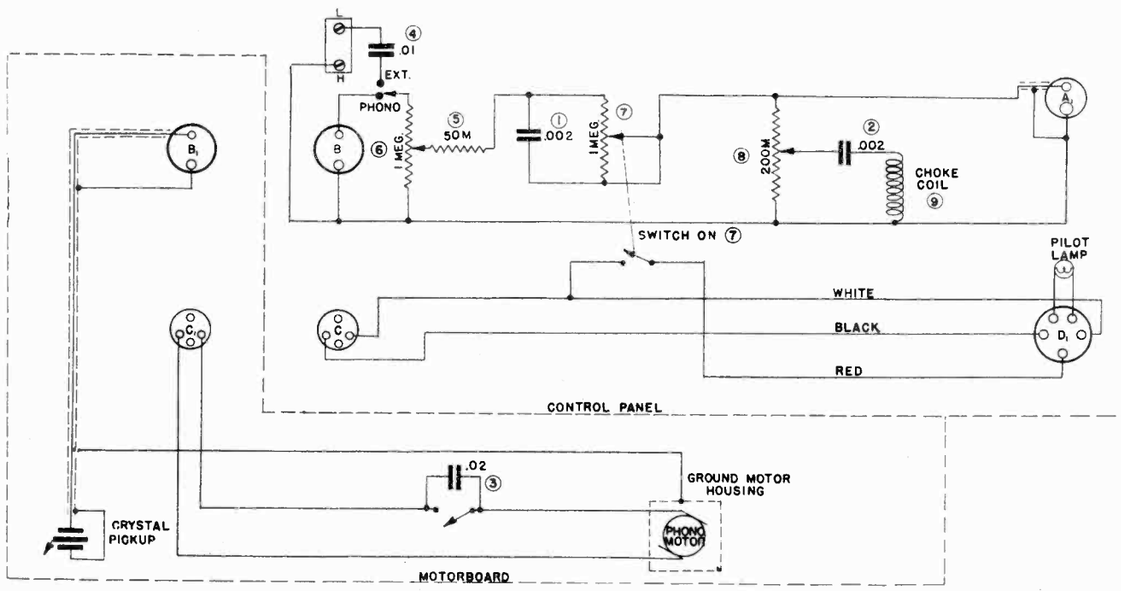
MODEL A-307P5

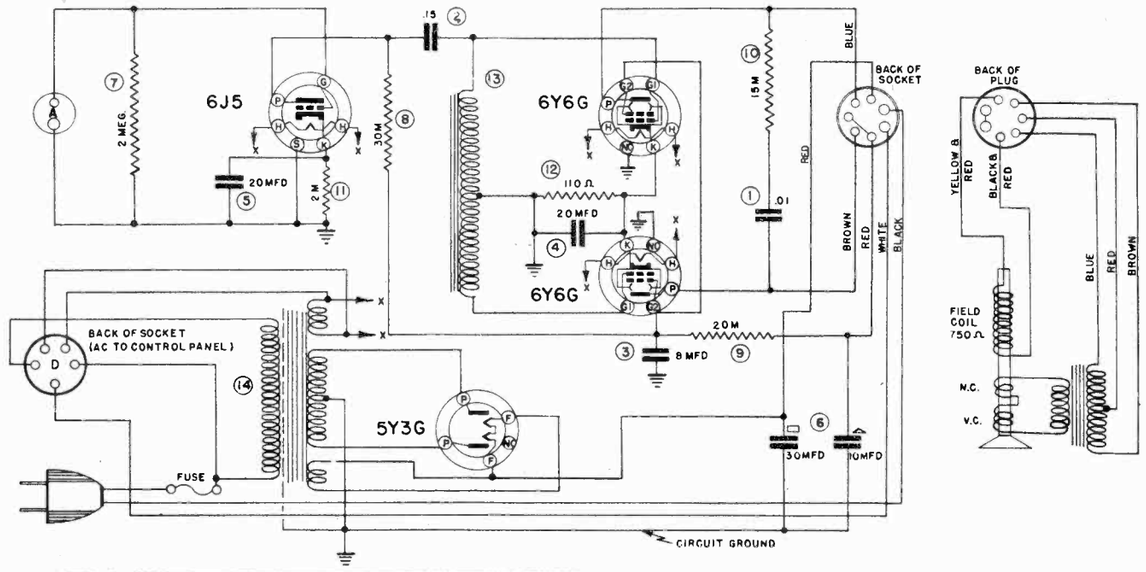
THE MAGNAVOX CO.

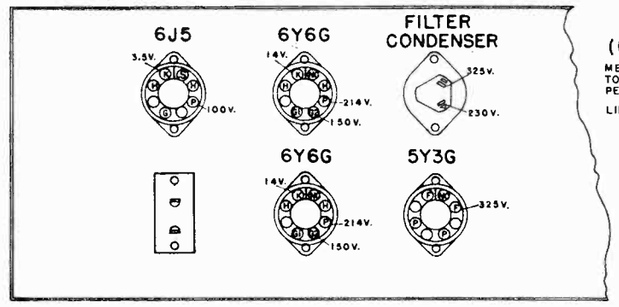


MODEL A-1101

THE MAGNAVOX CO.



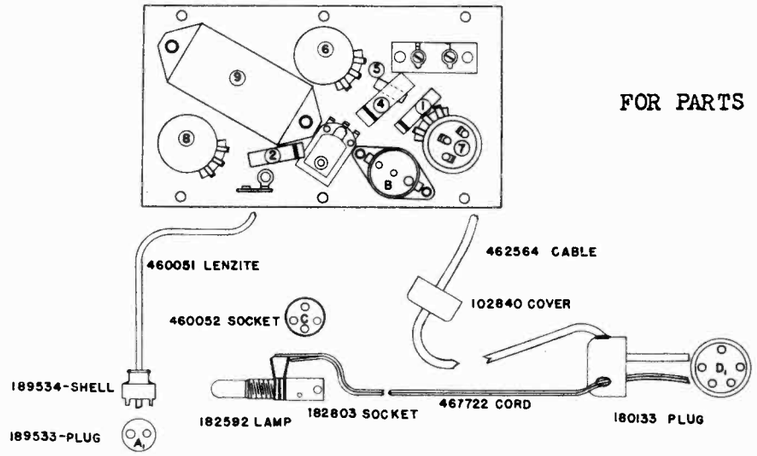




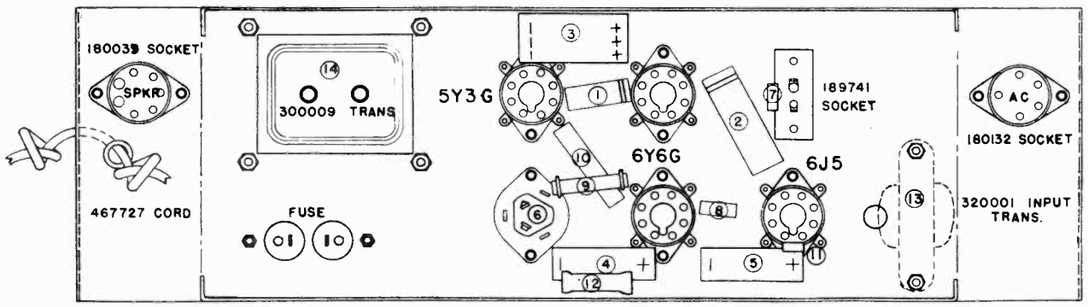
VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

MEASURE ALL D.C. VOLTAGES DIRECT TO CIRCUIT GROUND WITH A 1000 OHM PER VOLT VOLTMETER

LINE VOLTAGE 117 VOLTS AC



FOR PARTS LIST, SEE INDEX



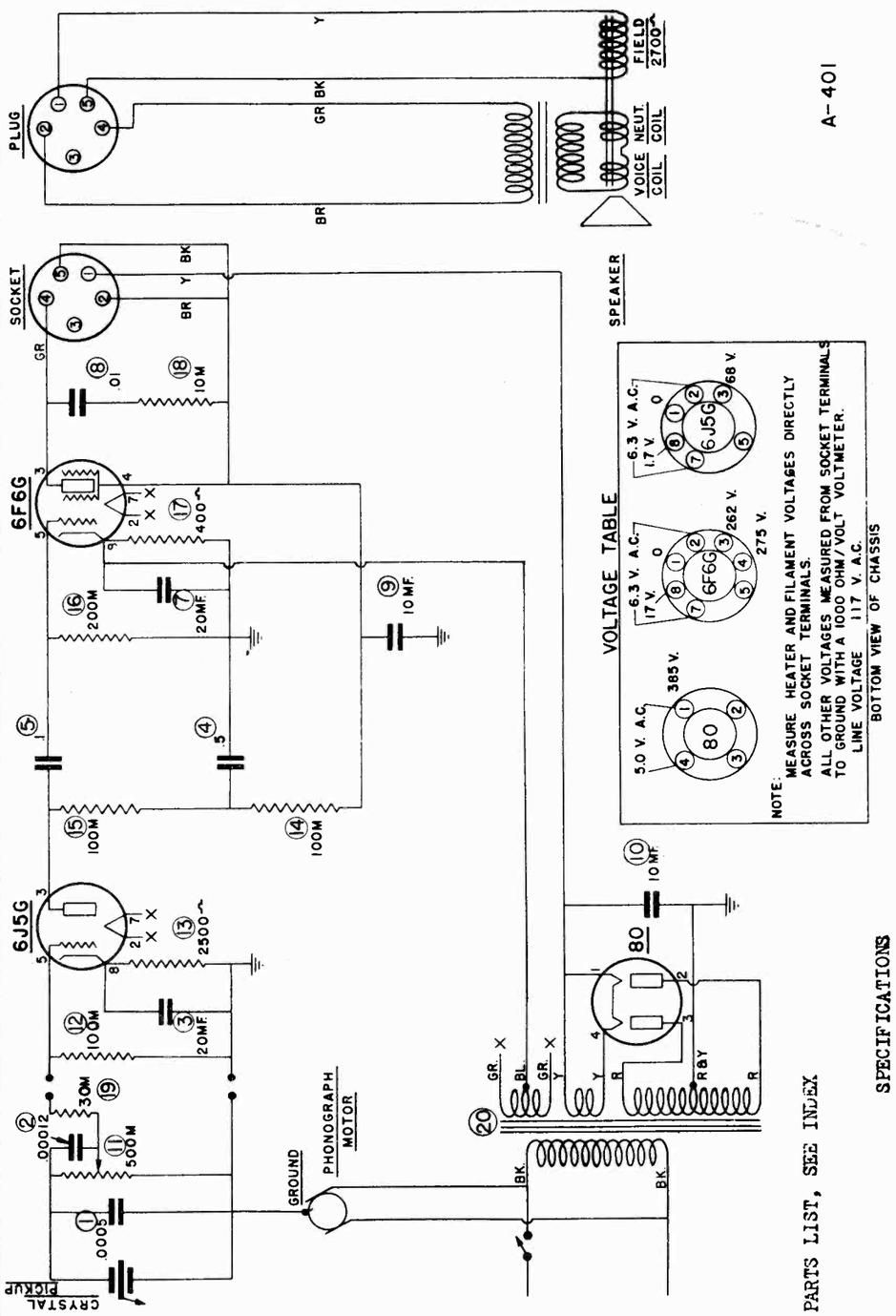
SPECIFICATIONS

Primary voltage.....117 V. AC;
Power consumption.....100 watts;
Power output..... 14 watts;
Type tubes:..... 1 - 6J5G; 2 - 6Y6G; 1 - 5Y3G;
Speaker:
Field coil..... 750 ohms;
Transformer.....5500 ohms;

A-1101

MODEL A-401

THE MAGNAVOX CO.



VOLTAGE TABLE

NOTE:
MEASURE HEATER AND FILAMENT VOLTAGES DIRECTLY ACROSS SOCKET TERMINALS.
ALL OTHER VOLTAGES MEASURED FROM SOCKET TERMINALS TO GROUND WITH A 1000 OHM/VOLT VOLTMETER.
LINE VOLTAGE 117 V. A.C.
BOTTOM VIEW OF CHASSIS

Several changes have been made in the values of parts used in this amplifier, since it was first released and it is suggested that the circuit of the amplifier requiring service be checked with the schematic shown in this bulletin and changes made if required.

FOR PARTS LIST, SEE INDEX

SPECIFICATIONS

Primary voltage.....117 V. AC;
Power consumption..... 45 watts;
Power output..... 3 watts;
Type tubes..... 1 - 6J5G, 1 - 6F6G, 1 - 80;
Speaker:
Field Coil..... 2700 ohms;
Transformer..... 7000 ohms;

MODEL A-307P5
MODEL A-401

THE MAGNAVOX CO.

Illus. No.	Part No.	Part Name	Description MODEL A-401
1.	259774	Condenser	Moulded mica, .0005 mfd.
2.	259470	Condenser	Tubular, .00012 mfd. 600 V.
3. 7.	279912	Condenser	Electrolytic, 20-20 mfd. 25 V.
4.	254147	Condenser	Tubular, .5 mfd. 400 V.
5.	254168	Condenser	Tubular, .1 mfd. 400 V.
8.	254158	Condenser	Tubular, .01 mfd. 400 V.
9. 10.	279911	Condenser	Electrolytic, 10-10 mfd. 450 V.
11.	223495	Control	Volume, 500,000 ohm
12.	234445	Resistor	Carbon, 100,000 ohm 1/2 W.
13.	234427	Resistor	Carbon, 2500 ohm 1/2 W.
14.	234445	Resistor	Carbon, 100,000 ohm 1/2 W.
15.	234445	Resistor	Carbon, 100,000 ohm 1/2 W.
16.	234447	Resistor	Carbon, 200,000 ohm 1/2 W.
17.	234509	Resistor	Carbon, 400 ohm 2 W.
18.	234473	Resistor	Carbon, 10,000 ohm 1 W.
19.	234437	Resistor	Carbon, 30,000 ohm 1/2 W.
20.	300139	Transformer	Power, 117 V. 60 cycle

MODEL A-307P5

If a high resistance A.C. voltmeter is connected between the chassis and ground, a reading will be obtained, however this does not indicate that the amplifier is "hot". This condition is caused by the fact that a .02 mfd. condenser is connected between the chassis and the supply line, therefore a low resistance voltmeter should be used to determine if the amplifier is actually "hot". If a slight shock is felt when the chassis is touched and the amplifier is operating, the supply plug should be reversed in the receptacle to correct this condition. This could happen only if the amplifier was connected to an alternating current supply.

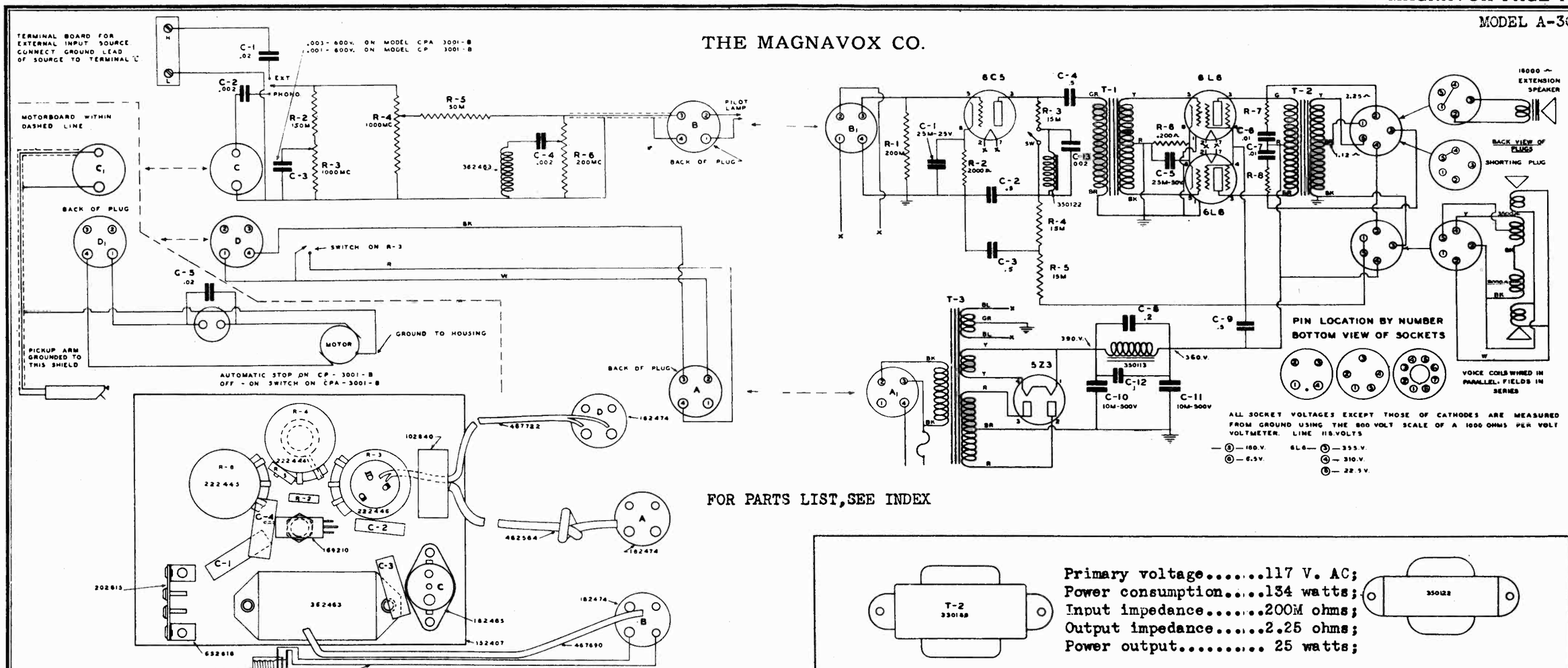
Low volume due to low plate voltage may be caused by an open fuse inside one of the 25Z5 tubes and can be checked by replacing the tubes.

Low output with distortion and hum, are most likely due to one or two defective 25L6 tubes.

Illus. No.	Part No.	Part Name	Description
1.	270014	Condenser	Molanode, 40 mfd. 150 V.
2.	270014	Condenser	Molanode, 40 mfd. 150 V.
3.	270017	Condenser	Molanode, 20 mfd. 150 V.
4.	254152	Condenser	Tubular, .1 mfd. 200 V.
5.	254127	Condenser	Tubular, .02 mfd. 600 V.
6.	254127	Condenser	Tubular, .02 mfd. 600 V.
7.	254153	Condenser	Tubular, .01 mfd. 600 V.
8.	254153	Condenser	Tubular, .01 mfd. 600 V.
9.	254161	Condenser	Tubular, .002 mfd. 600 V.
10.	254180	Condenser	Tubular, .005 mfd. 600 V.
11.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
12.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
13.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
14.	239755	Resistor	Carbon, 500,000 ohm 1/3 W.
15.	230010	Resistor	Carbon, 250,000 ohm 1/3 W.
16.	230010	Resistor	Carbon, 250,000 ohm 1/3 W.
17.	239785	Resistor	Carbon, 150,000 ohm 1/3 W.
18.	230024	Resistor	Carbon, 4000 ohm 1/3 W.
19.	239745	Resistor	Carbon, 1000 ohm 1/3 W.
20.	234537	Resistor	Carbon, 60 ohm 1 W.
21.	247852	Resistor	Wire wound, 60 ohm W.L.
22.	223086	Control	Volume, 500,000 ohm
23.	220024	Control	Tone, 70,000 ohm, with power switch

MODEL A-3001A

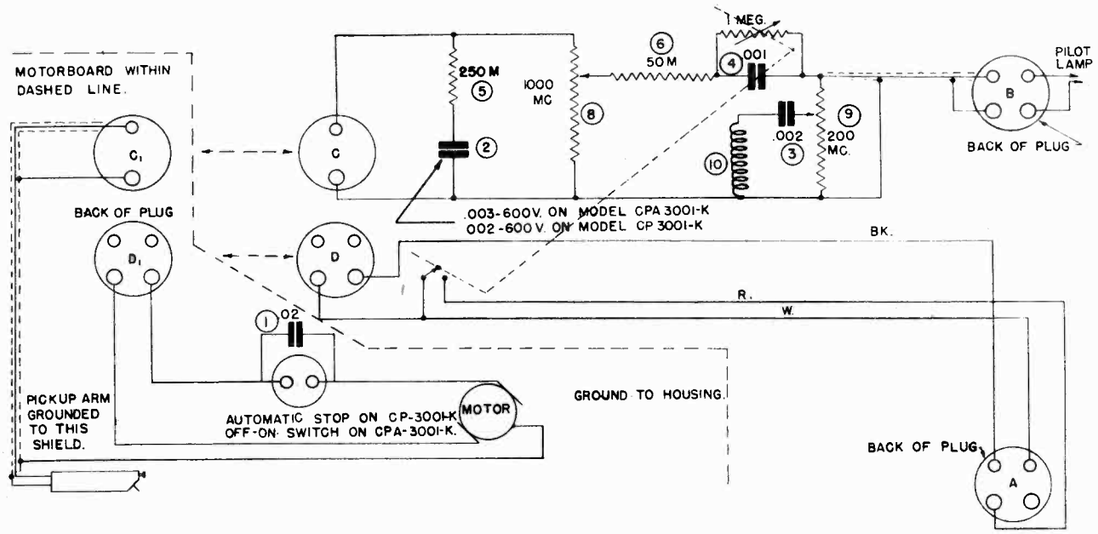
THE MAGNAVOX CO.

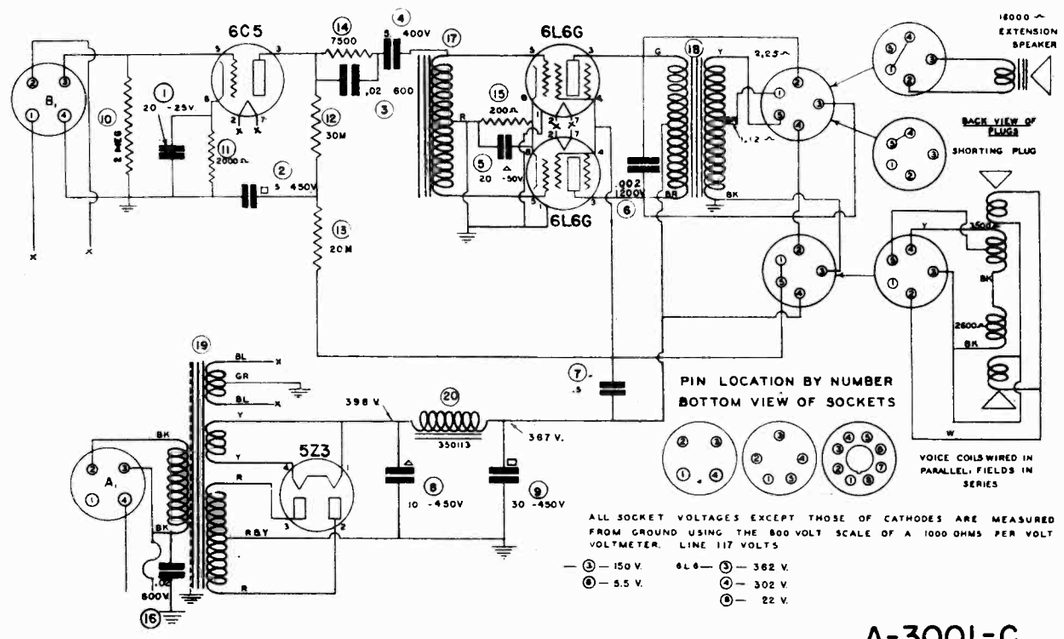


FOR PARTS LIST, SEE INDEX

MODEL A-3001C

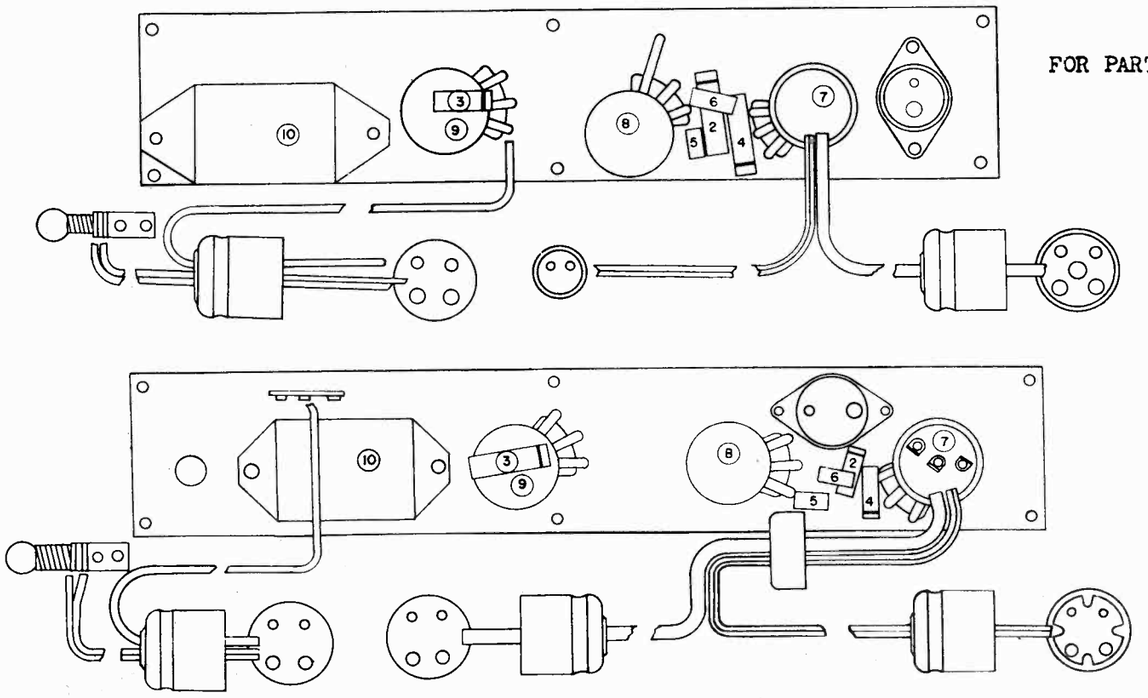
THE MAGNAVOX CO.





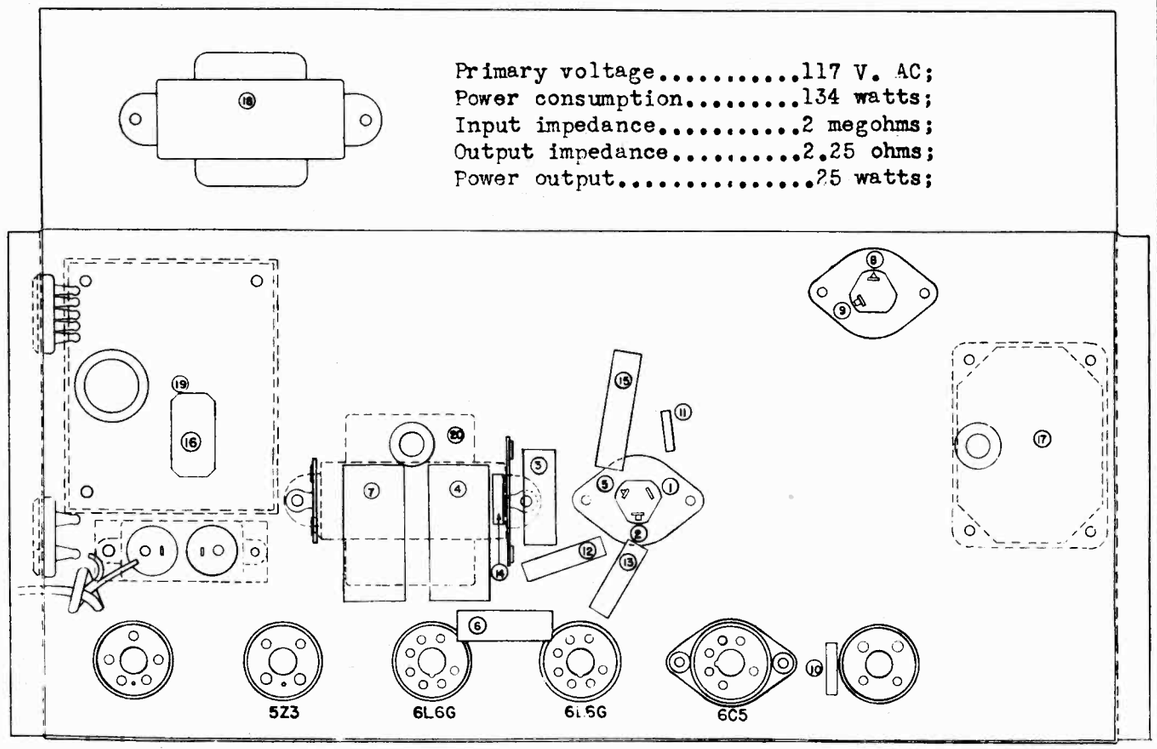
FOR PARTS LIST, SEE INDEX

A-3001-C



A pronounced hum in this amplifier may often be traced to an unbalance in 6L6G tubes. If substitution of new tubes fails to remedy the condition, the 6C5 tube should be replaced as a possible cure.

Primary voltage.....117 V. AC;
Power consumption.....134 watts;
Input impedance.....2 megohms;
Output impedance.....2.25 ohms;
Power output.....25 watts;



MODEL A-3001A

THE MAGNAVOX CO.

In the earlier models of this amplifier, the interstage transformer was wired in the circuit in such a way that a D.C. voltage was applied to the primary winding, and occasionally causing corrosion in the leads. This trouble was corrected by grounding the low side of the primary winding (brown lead). The condenser coupling the 6C5 plate to the transformer is replaced with a .5 Mfd. value.

The capacity of the tuning condenser across the filter choke should be checked and its value is .2 Mfd., it should be replaced with a .3 Mfd. condenser.

A pronounced hum in this amplifier may often be traced to an unbalance in 6L6G tubes. If substitution of new tubes fails to remedy the condition, the 6C5 tube should be replaced as a possible cure.

Illus. No.	Part No.	Part Name	Description
C1. C5.	274224	Condenser	Electrolytic, 25 mfd. 25 V. 25 mfd. 50 V.
C2.	254147	Condenser	Tubular, .5 mfd. 400 V.
C3.	254147	Condenser	Tubular, .5 mfd. 400 V.
C4.	254147	Condenser	Tubular, .5 mfd. 400 V.
C6.	254153	Condenser	Tubular, .01 mfd. 600 V.
C7.	254153	Condenser	Tubular, .01 mfd. 600 V.
C8.	254182	Condenser	Tubular, .2 mfd. 200 V.
C9.	254147	Condenser	Tubular, .5 mfd. 400 V.
C10.	274194	Condenser	Electrolytic, 10 mfd. 500 V.
C11.	274194	Condenser	Electrolytic, 10 mfd. 500 V.
C12.	254152	Condenser	Tubular, .1 mfd. 200 V.
C13.	254161	Condenser	Tubular, .002 mfd. 600 V.
R1.	234447	Resistor	Carbon, 200,000 ohm 1/2 W.
R2.	234426	Resistor	Carbon, 2000 ohm 1/2 W.
R3.	234434	Resistor	Carbon, 15,000 ohm 1/2 W.
R4.	234434	Resistor	Carbon, 15,000 ohm 1/2 W.
R5.	234434	Resistor	Carbon, 15,000 ohm 1/2 W.
R6.	242607	Resistor	Wire wound, 200 ohm W. L.
R7.	234518	Resistor	Carbon, 7500 ohm 2 W.
R8.	234518	Resistor	Carbon, 7500 ohm 2 W.
T1.	320187	Transformer	Input
T2.	330188	Transformer	Output
T3.	300106	Transformer	Power, 117 V. AC, 60 cycle
1.	350122	Choke	Tone filter choke
	350113	Choke	Filter choke

CONTROL PANEL

C1.	259228	Condenser	Tubular, .02 mfd. 600 V.
C2.	254161	Condenser	Tubular, .002 mfd. 600 V.
C3.	254142	Condenser	Tubular, .001 mfd. 600 V.
	254163	Condenser	Tubular, .003 mfd. 600 V.
C4.	254161	Condenser	Tubular, .002 mfd. 600 V.
C5.	259228	Condenser	Tubular, .02 mfd. 600 V.
R2.	234446	Resistor	Carbon, 150,000 ohm 1/2 W.
R3.	222446	Control	Bass, 1 megohm with switch
R4.	222444	Control	Volume, 1 megohm
R5.	234439	Resistor	Carbon, 50,000 ohm 1/2 W.
R6.	222445	Control	Treble, 200,000 ohm
	362463	Choke	Filter choke coil
	182465	Socket	Pickup receptacle

MODEL A-1101
MODEL A-3001C

THE MAGNAVOX CO.

MODEL A1101 AMPLIFIER

Illus. No.	Part No.	Part Name	Description
1.	254153	Condenser	Tubular, .01 mfd. 600 V.
2.	254136	Condenser	Tubular, .15 mfd. 400 V.
3.	270012	Condenser	Molanode, 8 mfd. 350 V.
4.	273611	Condenser	Molanode, 20 mfd. 25 V.
5.	273611	Condenser	Molanode, 20 mfd. 25 V.
6.	273610	Condenser	Molanode, 30-10 mfd. 450 V.
7.	239757	Resistor	Carbon, 2 megohm 1/3 W.
8.	234437	Resistor	Carbon, 30,000 ohm 1/2 W.
9.	234475	Resistor	Carbon, 20,000 ohm 1 W.
10.	234521	Resistor	Carbon, 15,000 ohm 2 W.
11.	230038	Resistor	Carbon, 2000 ohm 1/3 W.
12.	230057	Resistor	Carbon, 110 ohm 5 W.
13.	320001	Transformer	Input transformer
14.	300009	Transformer	Power, 117 V. 50-60 cycle
		CONTROL PANEL	
1.	254161	Condenser	Tubular, .002 mfd. 600 V.
2.	254161	Condenser	Tubular, .002 mfd. 600 V.
3.	259935	Condenser	Tubular, .02 mfd. 600 V.
4.	254153	Condenser	Tubular, .01 mfd. 600 V.
5.	239751	Resistor	Carbon, 50,000 ohm 1/3 W.
6.	222444	Control	Volume, 1 megohm
7.	222446	Control	Bass, 1 megohm, with power switch
8.	222445	Control	Treble, 200,000 ohm
9.	362463	Choke	Tone filter choke

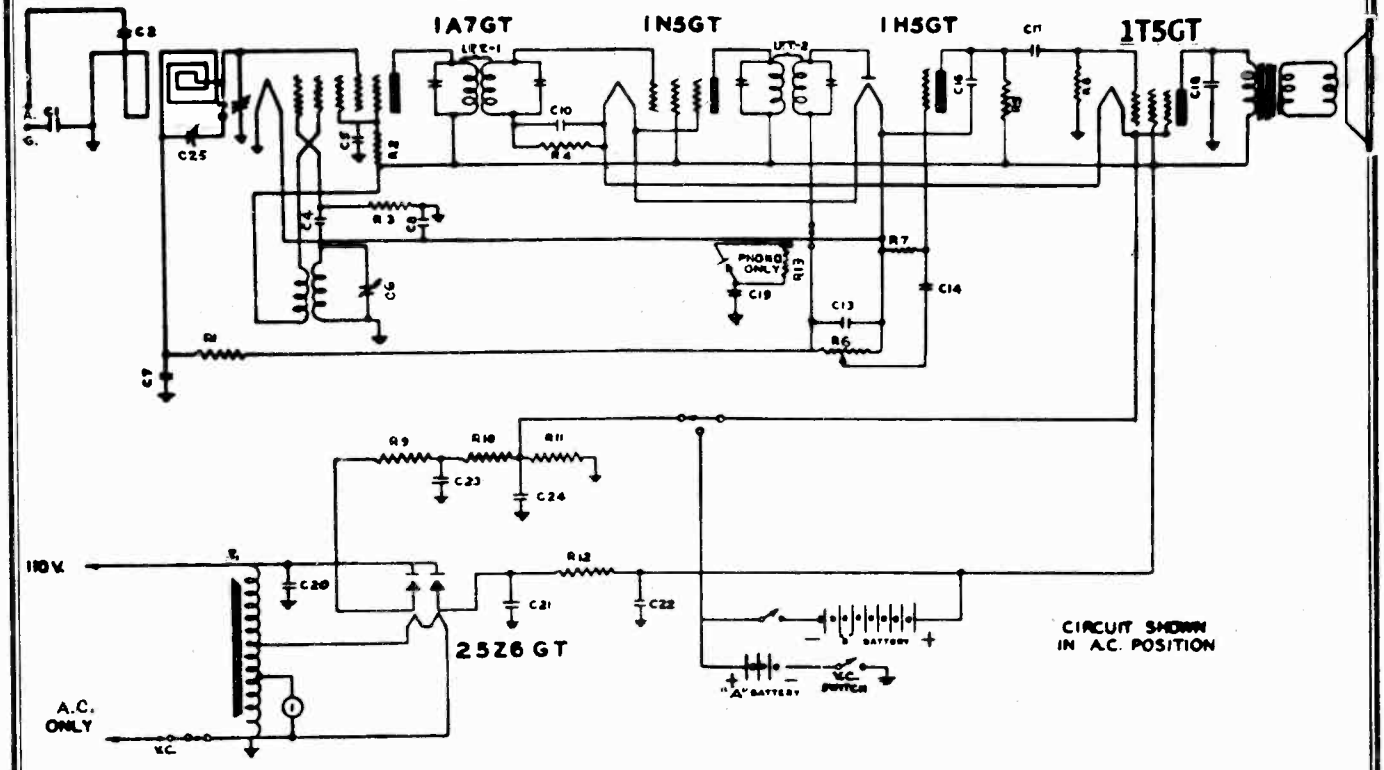
MODEL A3001C . AMPLIFIER

1, 2, 5.	270007	Condenser	Molanode, 20-20 mfd. 25V. 5mfd. 450 V.
3.	254127	Condenser	Tubular, .02 mfd. 600V.
4.	254147	Condenser	Tubular, .5 mfd. 400V.
6.	250064	Condenser	Tubular, .002 mfd. 1200V.
7.	254147	Condenser	Tubular, .5 mfd. 400V.
8, 9.	273610	Condenser	Molanode, 30-10 mfd. 450V.
10.	239757	Resistor	Carbon, 2 megohm 1/3 W.
11.	234426	Resistor	Carbon, 2000 ohm 1/2 W.
12.	234477	Resistor	Carbon, 30,000 ohm 1 W.
13.	234475	Resistor	Carbon, 20,000 ohm 1 W.
14.	239991	Resistor	Carbon, 7500 ohm 1/2 W.
15.	240009	Resistor	Wire wound 200 ohm, 5 W.
16.	259935	Condenser	Tubular, .02 mfd. 110 V. AC
17.	320240	Transformer	Input transformer
18.	330188	Transformer	Output transformer
19.	300106	Transformer	Power transformer
20.	350113	Choke	Filter choke
		CONTROL PANEL	
1.	259935	Condenser	Tubular, .02 mfd. 110 V. AC
2.	254163	Condenser	Tubular, .003 mfd. 600 V.
	254161	Condenser	Tubular, .002 mfd. 600 V.
3.	254161	Condenser	Tubular, .002 mfd. 600 V.
4.	254142	Condenser	Tubular, .001 mfd. 600 V.
5.	230019	Resistor	Carbon, 250,000 ohm 1/2 W.
6.	234439	Resistor	Carbon, 50,000 ohm 1/2 W.
7.	222446	Control	Bass, 1 megohm with switch
8.	222444	Control	Volume, 1 megohm
9.	222445	Control	Treble, 200,000 ohm
10.	362463	Choke	Tone filter choke

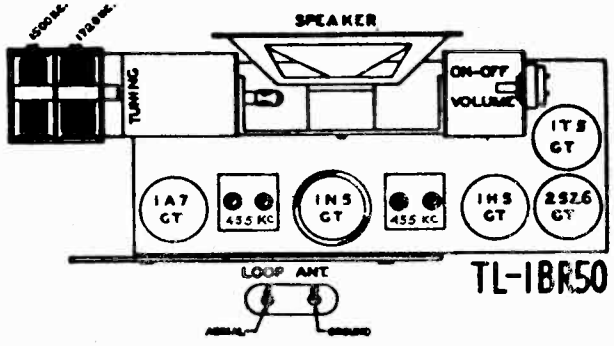
MODELS 1BR50, 1BR50-P

MAJESTIC RADIO & TELEV. CORP.

SCHEMATIC DIAGRAM-MODEL-1BR50-1BR50-P



TUBE LAYOUT MODELS-1BR50-1BR50P



The tube complement is as follows:

1-1A7GT Converter

1-1N5GT Intermediate Frequency Amplifier

1-1H5GT Diode Detector, Automatic Volume Control, and Audio Driver

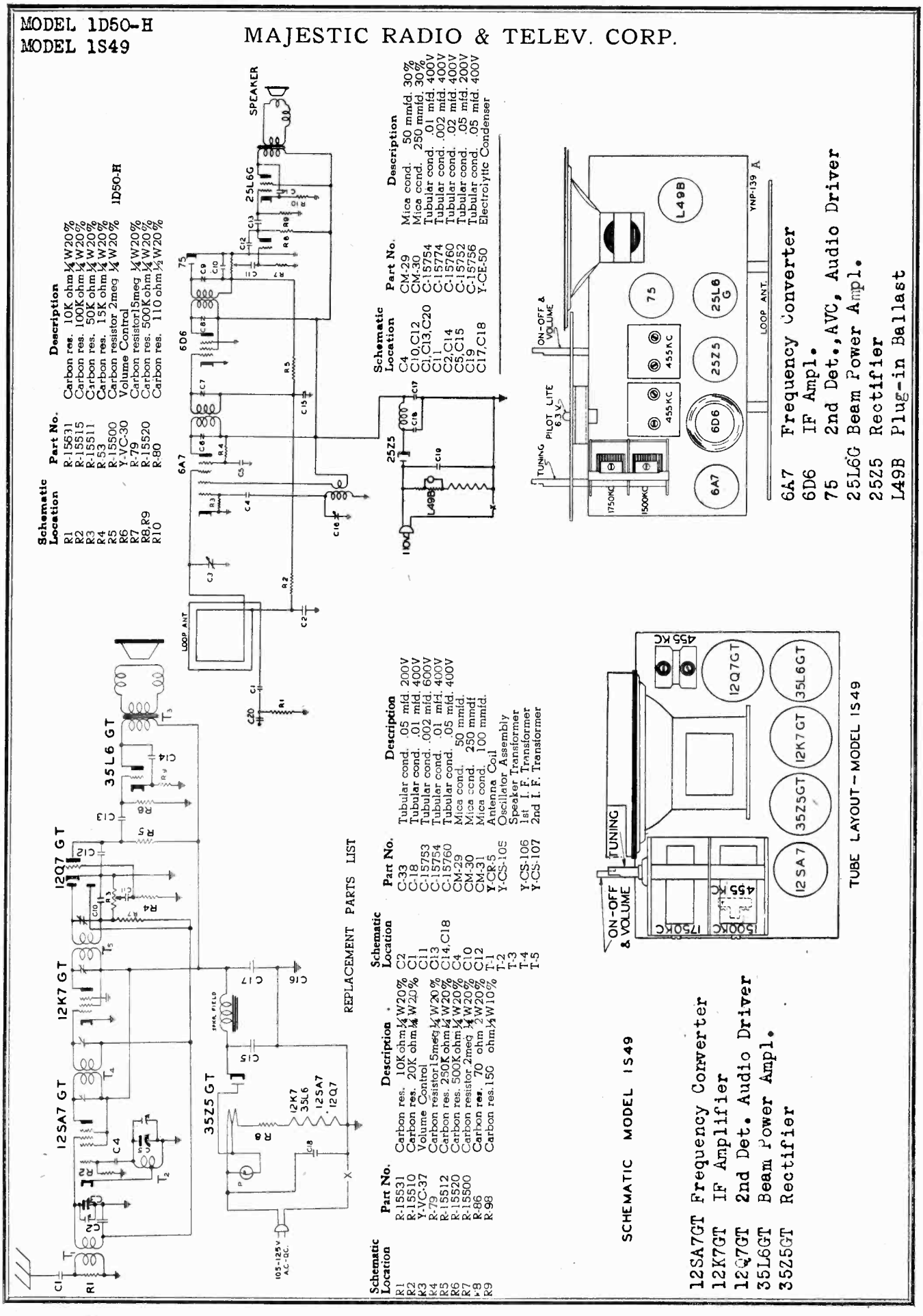
1-1T5GT Pentode Power Output Tube

1-25Z6G Half Wave Rectifier

Schematic	Part	Description	Schematic	Part	Description
C2,C1					
C10,C17	C-15754	.01 mf	R1,R4	R-15500	2 meg.
C3,C6	Y-CV-44	Var.Cond.	R2	R-15617	30K ohm
C13,C4,C16	CM-21	100 mmf	R3	R-15523	200K ohm
C5,C7	C-15752	.05 mf	R5	R-15520	500K ohm
C8	C-15761	.1 mf	R6	Y-VC-41	Vol.Cont.
C18,C14	C-15753	.002 mf	R7	R-15559	3 meg.
C19	C-15761	.1 mf	R8	R-15517	1 meg.
C20	C-15756	.05 mf	R9,R10,R11	Y-RC-10	Vol.Div. 350 800 300 ohm
C21,C22	Y-CE-47	8-16 mf			
C23,C24	Y-CE-57	40-100 mf	R12	R-16	8K ohm
T1	Y-TP-55	Pwr. Trans.	R13	R-15512	250K ohm
IFT-1	Y-C1-77	1st I.F.			
IFR-2	Y-C1-78	2nd I.F.			

MODEL 1D50-H
MODEL 1S49

MAJESTIC RADIO & TELEV. CORP.



Schematic Location	Part No.	Description
R1	R-15531	Carbon res. 10K ohm ½W 20%
R2	R-15515	Carbon res. 100K ohm ½W 20%
R3	R-15511	Carbon res. 50K ohm ½W 20%
R4	R 53	Carbon res. 15K ohm ½W 20%
R5	R-15500	Carbon resistor 2meg ½W 20%
R6	Y-VC-30	Volume Control
R7	R-79	Carbon resistor 15meg ½W 20%
R8,R9	R-15520	Carbon res. 500K ohm ½W 20%
R10	R-80	Carbon res. 110 ohm ½W 20%

1D50-H

Schematic Location	Part No.	Description
C4	CM-29	Mica cond. 50 mmfd. 30%
C10,C12	CM-30	Mica cond. 250 mmfd. 30%
C1,C13,C20	C-15754	Tubular cond. .01 mfd. 400V
C11	C-15774	Tubular cond. .002 mfd. 400V
C2,C14	C-15760	Tubular cond. .02 mfd. 400V
C5,C15	C-15752	Tubular cond. .05 mfd. 200V
C19	C-15756	Tubular cond. .05 mfd. 400V
C17,C18	Y-CE-50	Electrolytic Condenser

Schematic Location	Part No.	Description
R1	R-15531	Carbon res. 10K ohm ½W 20%
R2	R-15510	Carbon res. 20K ohm ½W 20%
R3	Y-VC-37	Volume Control
R4	R-79	Carbon resistor 15meg ½W 20%
R5	R-15512	Carbon res. 250K ohm ½W 20%
R6	R-15520	Carbon res. 500K ohm ½W 20%
R7	R-15500	Carbon resistor 2meg ½W 20%
R8	R-86	Carbon res. 70 ohm 2W 20%
R9	R-98	Carbon res. 150 ohm ½W 10%

REPLACEMENT PARTS LIST

Schematic Location	Part No.	Description
C2	C-33	Tubular cond. .05 mfd. 200V
C1	C-18	Tubular cond. .01 mfd. 400V
C11	C-15753	Tubular cond. .002 mfd. 600V
C13	C-15754	Tubular cond. .01 mfd. 400V
C14,C18	C-15760	Tubular cond. .05 mfd. 400V
C4	CM-29	Mica cond. 50 mmfd.
C10	CM-30	Mica cond. 250 mmfd.
C12	CM-31	Mica cond. 100 mmfd.
T-1	Y-CR-5	Antenna Coil
T-2	Y-CS-105	Oscillator Assembly
T-3		Speaker Transformer
T-4	Y-CS-106	1st I. F. Transformer
T-5	Y-CS-107	2nd I. F. Transformer

SCHEMATIC MODEL 1S49

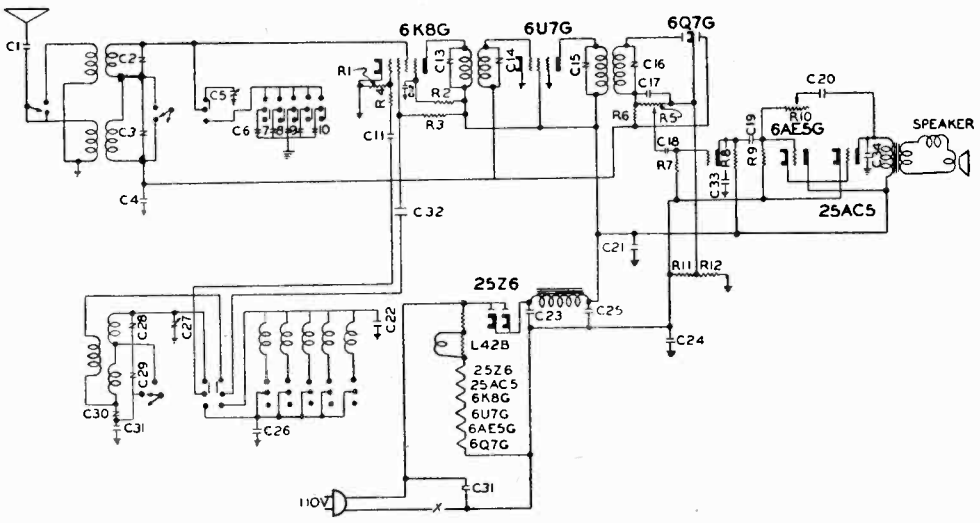
TUBE LAYOUT - MODEL 1S49

6A7 Frequency Converter
6D6 IF Ampl.
75 2nd Det., AVC, Audio Driver
25L6G Beam Power Ampl.
25Z5 Rectifier
L49B Plug-in Ballast

12SA7GT Frequency Converter
12K7GT IF Amplifier
12Q7GT 2nd Det. Audio Driver
35L6GT Beam Power Ampl.
35Z5GT Rectifier

MAJESTIC RADIO & TELEV. CORP.

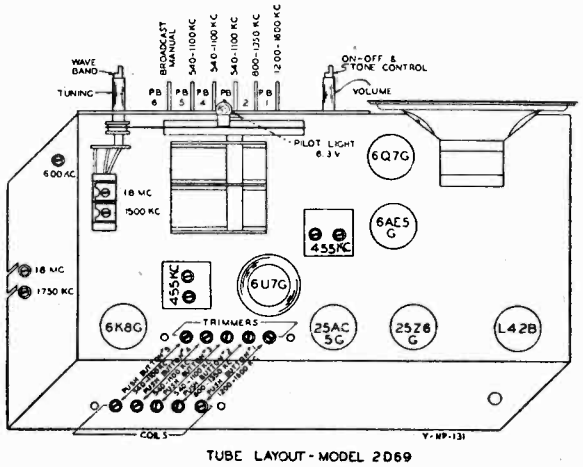
MODEL 2D69



PARTS LIST FOR MODEL 2D69

Schematic Location	Part No.	Description
R1	R-54	Carbon res. 50K ohm ½W20% (Insulated Type)
R2	R-53	Carbon res. 15K ohm ¼W20%
R3	R-15541	Carbon res. 5K ohm ¼W20%
R4	R-15601	Carbon res. 100 ohm ¼W20%
R5,R10	Y-VC-33	Volume and Tone Control
R6	R-15500	Carbon resistor 2meg. ¼W20%
R7,R9	R-15517	Carbon resistor 1meg. ¼W20%
R8	R-15512	Carbon res. 250K ohm ¼W20%
R11,R12	R-87	Carbon res. 70 ohm ¼W20%

Schematic Location	Part No.	Description
C1,C18,C19, C32,C34	C-15754	Tubular cond. .01 mfd. 400V
C4,C21	C-15752	Tubular cond. .05 mfd. 200V
C31	C-15756	Tubular cond. .05 mfd. 400V
C11	CM-29	Mica cond. 50 mmf 30%
C17,C33	CM-31	Mica cond. 100 mmf. 30%
C20	CM-30	Mica cond. 250 mmf. 30%
C22	CM-33	Mica cond. 250 mmf. 5% } Sil.
C26	CM-34	Mica cond. 150 mmf. 5% } cap.
C31	CM-9	Mica cond. 5500 mmf. 30%
C2,C3, C28,C29	Y-CT-24	} Antenna Trimmer } Oscillator Trimmer
C5,C27	Y-CV-33	2 Gang Condenser
C6,C7,C8, C9,C10	Y-CT-26	Trimmer Strip
C13,C14, C15,C16	Y-CT-1	I. F. Trimmer
C30	Y-CT-27	Padder Condenser
C23,C24,C25	Y-CE-46	Electrolytic Condenser



TUBE LAYOUT - MODEL 2D69
FIGURE 1

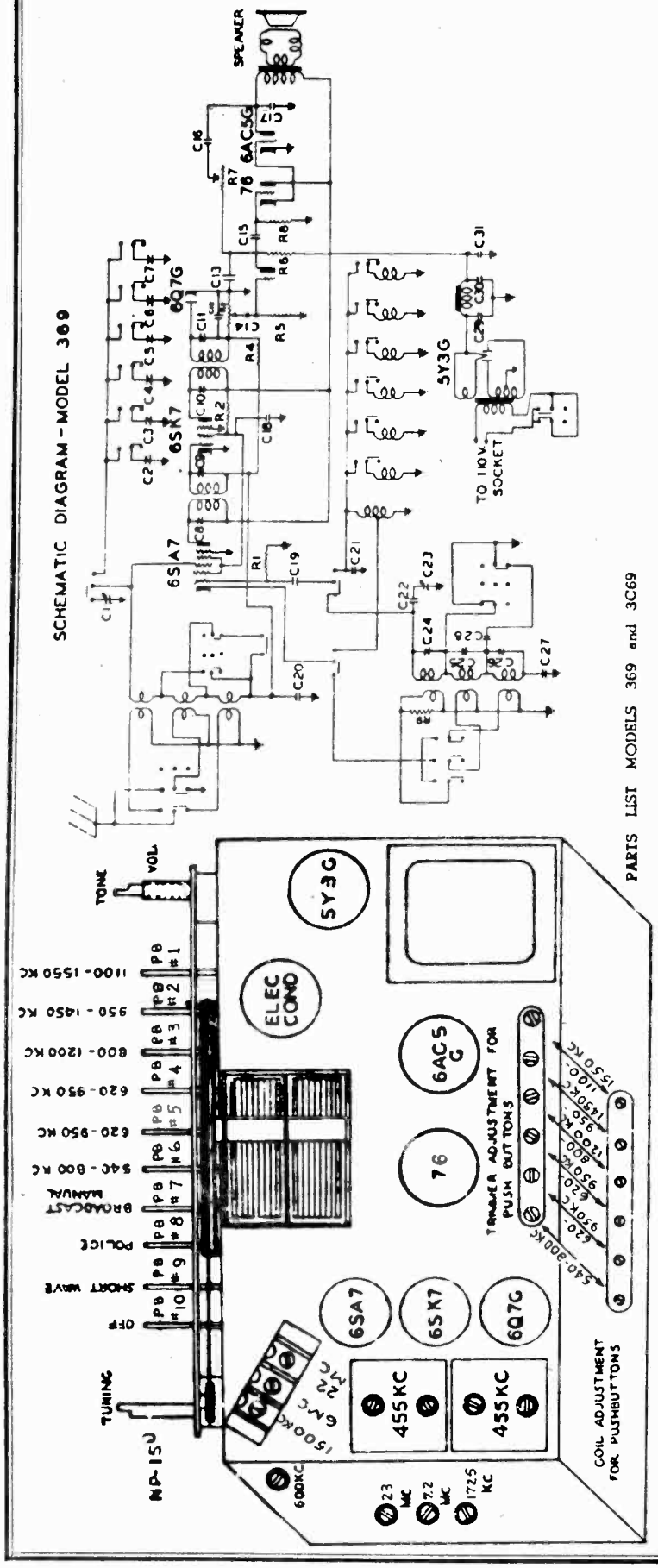
L42B Plug-in Ballast
6K8G Frequency Converter
6U7G IF Ampl.
6Q7G 2nd Det., AVC, AF Ampl.
6AE5G Driver
25Z6G Rectifier
25AC5G Power Output

PUSH BUTTON ADJUSTMENT:

Push button in of desired station. At rear of receiver, adjust corresponding coil of chosen button until desired is heard with maximum volume and best tone. Adjust trimmer corresponding to chosen button until that station is heard with maximum volume. Repeat for all push buttons.

MODELS 3C69, 369

MAJESTIC RADIO & TELEV. CORP.



TUBE LAYOUT - MODEL 369

Schematic Location	Part No.	Description
R3	Y-VC-35	Volume and tone control
R1	R-15510	Carbon res. 20K ohm ½ W 20%
R2	R-15511	Carbon res. 10K ohm ½ W 20%
R4, R5	R-15517	Carbon res. 1 meg. ½ W 20%
R6	R-79	Carbon res. 15 meg. ½ W 20%
R7	R-15512	Carbon res. 250K ohm ½ W 20%
R8	R-76	Carbon res. 400 ohm ½ W 20%

PARTS LIST MODELS 369 and 3C69

Schematic Location	Part No.	Description
C27	Y-CT-4	Padding Condenser
C29,C30	CE-52	Electrolytic
C20	C-15757	Tubular cond. .05 mfd. 200V
C15	C-15754	Tubular cond. .01 mfd. 400 V
C17	C-15759	Tubular cond. .006 mfd. 600V
C31	C-15757	Tubular cond. .1 mfd. 400V
C14	C-15774	Tubular cond. .002 mfd 400V
C18	C-15756	Tubular cond. .05 mfd 400V

Schematic Location	Part No.	Description
C12,C13,C19	CM-31	Mica cond. 100 mmf. 30%
C16	CM-30	Mica cond. 250 mmf. 30%
C22	CM-2	Mica cond. 4330 mmf. 5%
C28	CM-36	Mica cond 2770 mmf. 5%
C21	CM-13	Mica cond. 100 mmf. 5%
C1,C3,C4, C5,C6,C7	Y-SW-20	Push-Button Switch
	Y-CT-28	Trimmer strip

1. Select the stations that you wish to set up on the push-buttons.
2. Determine on which push-buttons these stations should be set up, according to above table.
3. Push the button on which you should set up a particular station.
4. Using a screw driver, adjust the coil corresponding to the proper push-button until the desired station is heard with maximum volume and best tone.
5. Adjust the trimmer condenser corresponding to the proper push-button until the desired station is heard with maximum volume.
6. Repeat for other push-buttons.

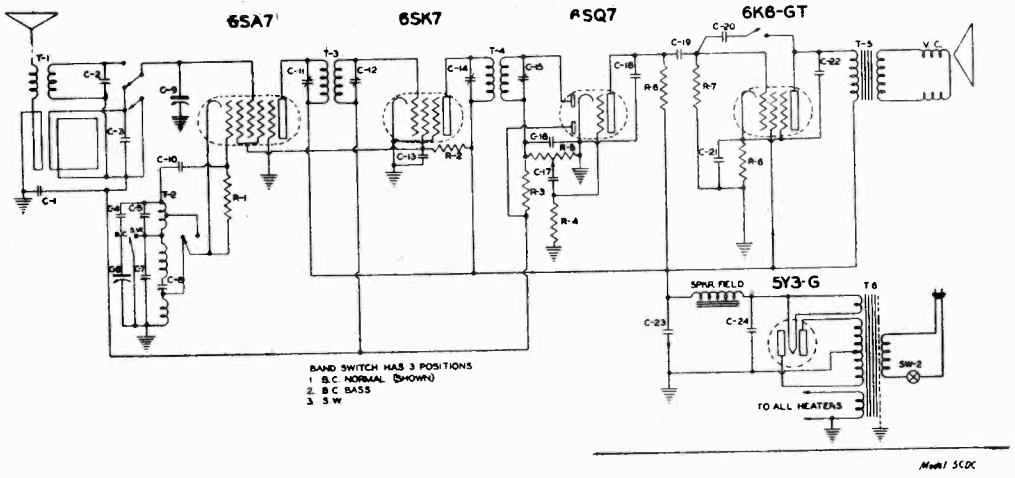
The receiver operates with the following tubes:

1-6SA7	Single ended frequency converter
1-6SK7	Single ended intermediate frequency amplifier
1-6Q7G	2nd detector, A. V. C. and A. F. driver
1-76	Output tube driver
1-6AC5G	Dynamically coupled output stage
1-5Y3G	Rectifier

MODELS 5CDC, 5CEC

MAJESTIC RADIO & TELEV. CORP.

SCHEMATIC DIAGRAM

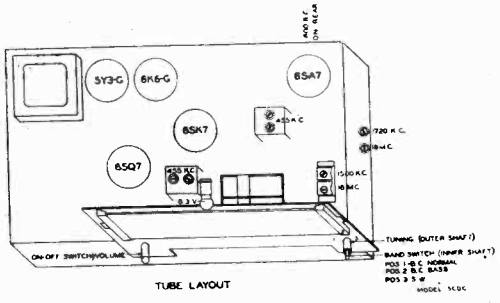


REPLACEMENT PARTS LIST

Schematic Location	Part No.	Description
C1	C-15752	Tubular cond. .05 mfd. 200V
C13	C-15756	Tubular cond. .05 mfd. 400V
C17,C22	C-31	Tubular cond. .004 mfd. 400V
C19	C-15754	Tubular cond. .01 mfd. 400V
C4	CM-9	Mica cond. 5500 mmfd. 5%
C10	CM-29	Mica cond. 50 mmfd.
C16,C18	CM-30	Mica cond. 250 mmfd
C20	CM-31	Mica cond. 100 mmfd.
C21,C23,C24	Y-CE-43	Elecrolytic Condenser

Schematic Location	Part No.	Description
R1	R-15510	Carbon res. 20K ohm ¼W 20%
R2	R-15544	Carbon res. 15K ohm 1W 20%
R3	R-15500	Carbon resistor 2meg ¼W 20%
R4	R-50	Carbon resistor 5meg ¼W 20%
R6	R-15512	Carbon res. 250K ohm ¼W 20%
R7	R-51	Carbon res. 500K ohm ¼W 20%
R8	R-126	Carbon res. 400 ohm ½W 20%
T1	Y-OS-96	Antenna Coil
T2	Y-OSA-13	Oscillator Coil
T3	Y-CI-44	2nd I. F. Assembly
T4	Y-IFA-100	1st I. F. Assembly

TUBE LOCATION CHART



6SA7GT Frequency Converter
6SK7GT IF Ampl.
6SQ7GT 2nd Det., AVC, AF Ampl.
6K6G Power Output
5Y3G Rectifier

MODEL 5CDC operates on 110 - 115 volts 60 Cycles

MODEL 5CEC operates on 110 - 115 volts 50 - 60 cycles

Frequency Ranges:-

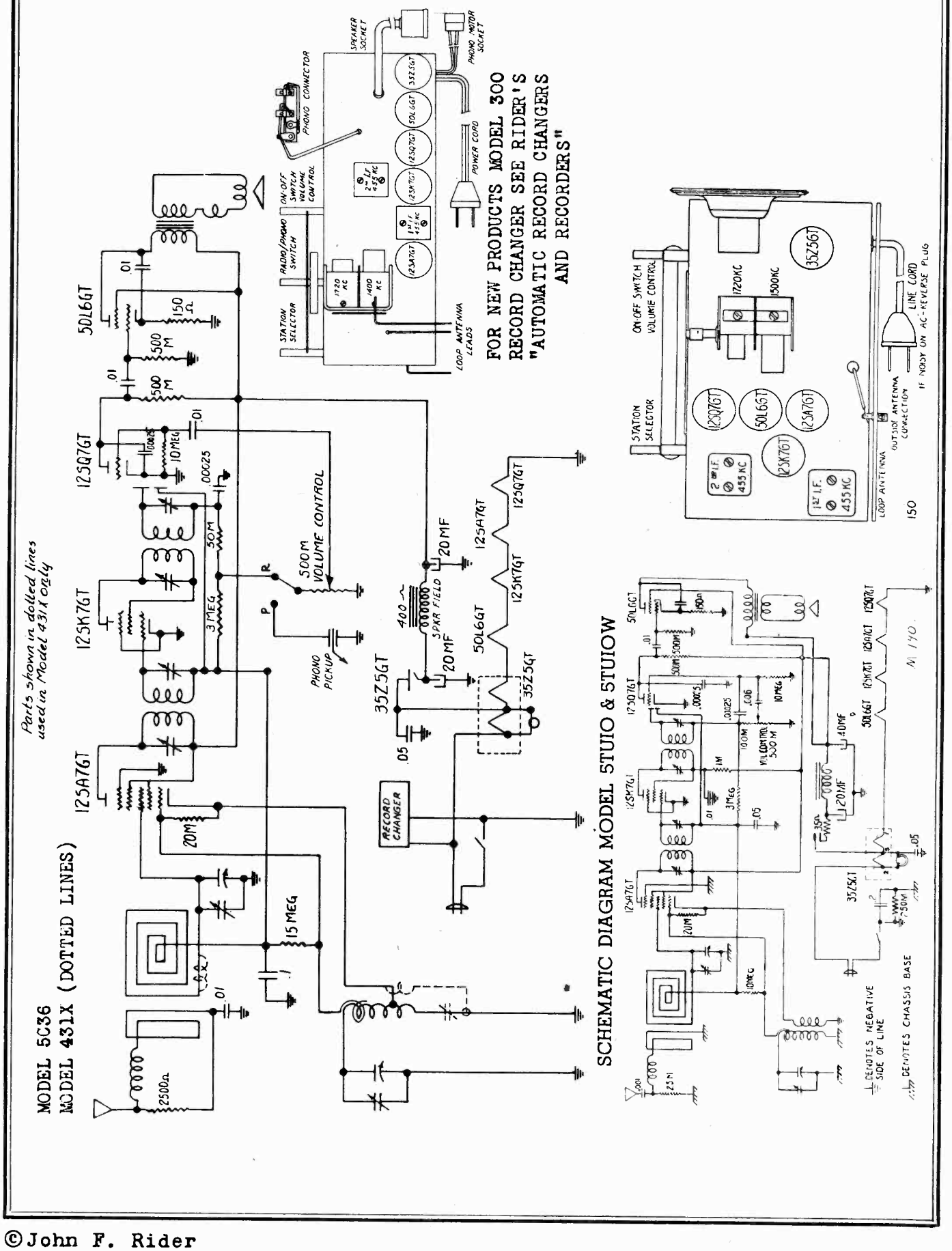
A - 538 to 1720 kilocycles - BC and some police calls

B - 5.8 to 18.6 megacycles - Foreign and Domestic Short Wave Bands

MODELS 5C36,
431X

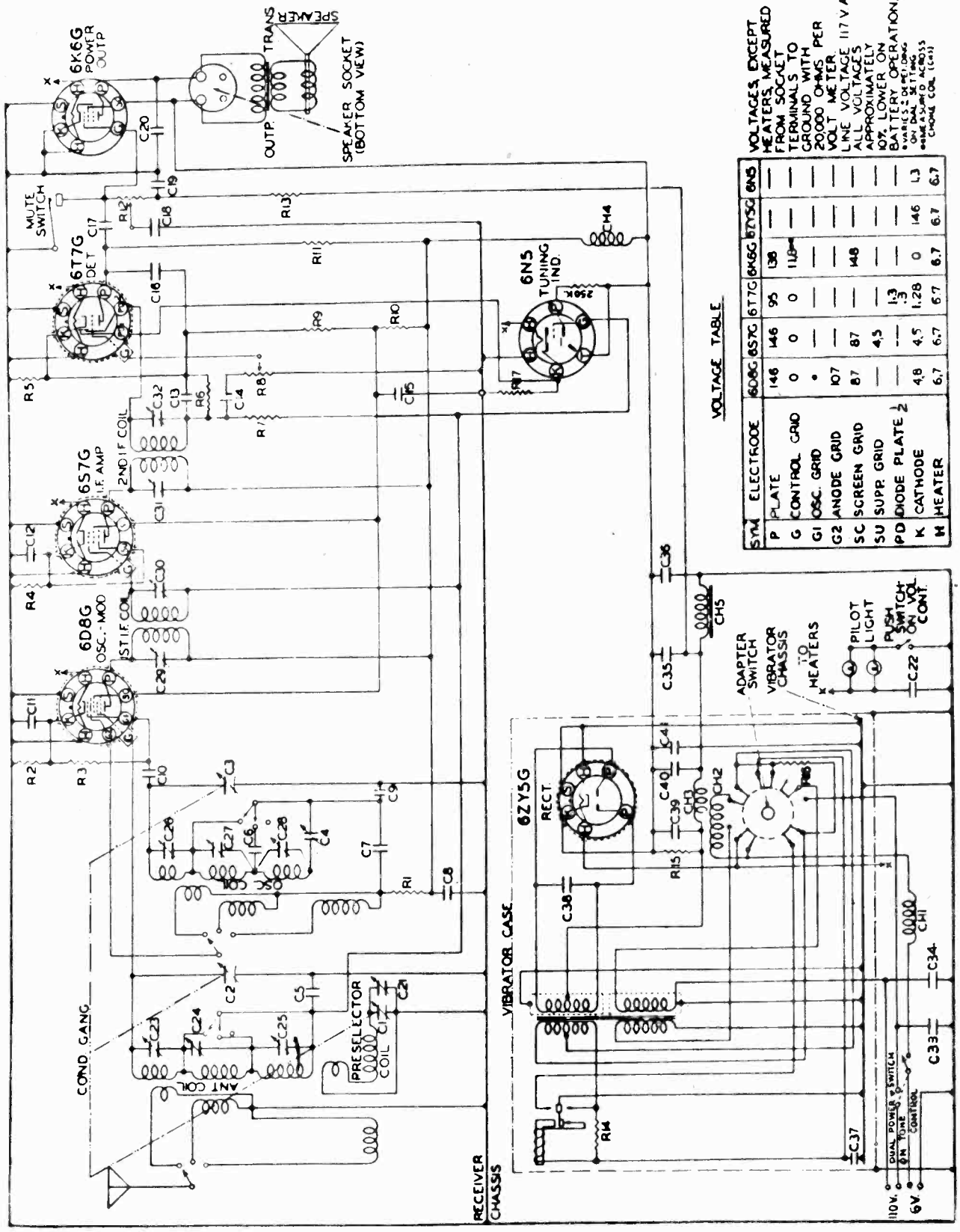
MODELS 5TUIO,
5TUIOW

MAJESTIC RADIO & TELEV. CORP.



MODELS 69, 690
Chassis 169

MAJESTIC RADIO & TELEV. CORP.



VOLTAGE TABLE

SYM	ELECTRODE	6D8G	6S7G	6T7G	6K6G	6Y5G	6N5
P	PLATE	146	146	95	138	—	—
G	CONTROL GRID	0	0	0	11.8	—	—
G1	OSC. GRID	*	—	—	—	—	—
G2	ANODE GRID	107	—	—	—	—	—
SC	SCREEN GRID	87	87	—	148	—	—
SU	SUPP. GRID	—	4.5	-1.3	—	—	—
PD	DIODE PLATE ½	—	—	.3	—	—	—
K	CATHODE	4.8	4.5	1.28	0	146	1.3
H	HEATER	6.7	6.7	6.7	6.7	6.7	6.7

VOLTAGES, EXCEPT HEATERS, MEASURED FROM SOCKET TERMINALS TO GROUND WITH 20,000 OHMS PER VOLT METER. LINE VOLTAGE 117 V AC. ALL VOLTAGES APPROXIMATELY 10% LOWER ON BATTERY OPERATION.
*VARIES WITH TUNING ON DIAL SETTING
**MEASURED ACROSS CHOKE COIL (CH1)

REPLACEMENTS PARTS LIST—CHASSIS 169

Schematic Location	Part No.	Description
C1, C2, C3	Y-CV-6	Cond. 3 Gang Variable
C11, C15, C39, C40	C-6	Cond. Tub. .05MF. 200V. (H.F.)
C41	C-13	Cond. Tub. .5MF. 180V. D.C.
C22, C37	C-14	Cond. Tub. .5MF. 120V. D.C.
C38	C-16	Cond. Tub. .007MF. 1500V.
C8	C-15751	Cond. Tub. .25MF. 200V.
C5, C12, C19	C-15761	Cond. Tub. .1MF. 200V.
C14, C17	C-15772	Cond. Tub. .02MF. 200V.
C18	C-7	Cond. Tub. .005MF. 600V.
C20	C-15753	Cond. Tub. .002MF. 600V.
C33, C34	C-5	Cond. Tub. .01MF. 400V. (H.F.)
C7	C-15754	Cond. Tub. .01MF. 400V.
C6	CM-1	Cond. Mica 2550MMF. 5%
C9	CM-2	Cond. Mica 4330 MMF. 5%
C16	CM-15918	Cond. Mica 100MMF. 20%
C10	CM-15929	Cond. Mica 50MMF. 20%
C13	CM-15928	Cond. Mica 250MMF. 20%
C35, C36	Y-CE-24	Cond. Elec. Dry 20MF. 250V.
C4	Y-CP-16472	Cond. Variable Padder 250-750MMF.
C21	Y-CP-16474	Cond. Preselector Trim. 1.5-15MMF.
C23, C24, C25 / C26, C27, C28	Y-CP-1	Cond. Ant. Trim. 3-30MMF. / Cond. Osc. Trim. 3-30MMF.
C29, C30 / C31, C32	Y-CT-2	Cond. 1st I.F. Trim. / Cond. 2nd I.F. Trim.
R15	R-35	Resistor Carbon 200K. ¼W. 10% (Insulated Type)
R3	R-15511	Resistor Carbon 50K. ¼W. 20%
R11	R-15605	Resistor Carbon 100K. ¼W. 10%
R13	R-15512	Resistor Carbon 250K. ¼W. 20%
R5	R-15537	Resistor Carbon 400 Ohms ¼W. 10%
R6	R-15520	Resistor Carbon 500K. ¼W. 20%
R7	R-15517	Resistor Carbon 1 MEG. ¼W. 20%
R4	R-15519	Resistor Carbon 700 Ohms. ¼W. 10%
R2	R-15533	Resistor Carbon 600 Ohms ¼W. 10%
R10	R-36	Resistor Carbon 7500 Ohms ½W. 10%
R9	R-15572	Resistor Carbon 30K. ½W. 10%
R1	R-6	Resistor Carbon 12K. ¼W. 20%
R14, R16	R-15536	Resistor Carbon 100 Ohms ¼W. 10%
R17	R-15571	Resistor Carbon 500 Ohms ¼W. 10%
R8	Y-VC-3	Volume Control 1 MEG. and Push Switch
R12	Y-TC-2	Tone Control ½ MEG. and Switch
CH1, CH2	Y-CK-1	"A" Choke Assembly
CH3, CH4	Y-CK-2	R.F. "B" Choke Assembly
CH5	Y-CK-6	Filter Choke 325 Ohms
	Y-CS-9	Ant. Coil Assembly
	Y-CS-10	Osc. Coil Assembly
	Y-CI-1	1st. I.F. Coil Assembly
	Y-CS-11	Preselector Coil Assembly
	Y-CI-2	2nd I.F. Coil Assembly
Model 69	Y-SP-7	Speaker 6" (per. mag.)
Model 69	SPA-22	Speaker Voice Coil and Cone
Model 69	SPA-30	Speaker Transformer
Model 690	Y-SP-3	Speaker 8" (per. mag.)
Model 690	SPA-23	Speaker Voice Coil and Cone
Model 690	SPA-31	Speaker Transformer
	Y-TP-21	Power Transformer
	Y-V-1	Vibrator

HOW TO INDEX AUTOMATIC TUNING ON MODEL 690A CONSOLE

For manual tuning, turn the center knob marked Manual Automatic on the front of the cabinet to the left. For automatic tuning, turn it to the right.

SETTING UP OF PUSH BUTTONS

1—PRELIMINARY

a—Determine the frequency of your desired stations in kilocycles. This can be found in your newspaper.

b—Determine on which push button each station should be logged by checking the frequency of each station with the allowed frequency coverage of each push button as shown on sketch.

2—PROCEDURE

a—Turn Automatic Manual knob in the center of cabinet to the left to manual position and tune in the desired station manually to identify its program.

b—Turn this same knob to the right to automatic position.

c—Push in proper push button to be set.

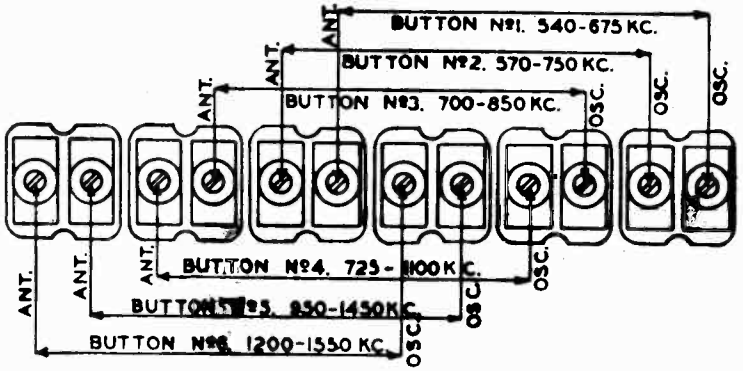
d—Using a screw driver, adjust the trimmer marked "Osc." corresponding to the proper push button until your station is heard with maximum volume and best quality. (See Sketch.)

e—Then adjust the corresponding antenna trimmer as marked in sketch to the maximum volume.

f—Repeat steps a, b, c, d, and e for other stations and push buttons.

Due to the changes of climatic conditions the trimmer condensers are apt to vary slightly. This can be overcome by slight readjustment with a screw driver on the respective trimmer condensers affected.

TRIMMER CONDENSERS VIEWED FROM BACK OF SET



Buttons are numbered in sequence from left to right when viewing the cabinet from the front. Thus No. 1 button is at the extreme left and No. 6 button is at the extreme right.

No. 1 BUTTON is used for stations operating between 540 and 675 KC's
No. 2 BUTTON is used for stations operating between 570 and 750 KC's
No. 3 BUTTON is used for stations operating between 700 and 850 KC's
No. 4 BUTTON is used for stations operating between 725 and 1100 KC's
No. 5 BUTTON is used for stations operating between 950 and 1450 KC's
No. 6 BUTTON is used for stations operating between 1200 and 1550 KC's

MODELS 69 AND 690
CHASSIS 169

DIAL LIGHTS

Two No. 44 pilot lights are mounted within the dial assembly. In the event of replacement, this can be effected by merely drawing the lamp socket back from the dial, replacing the defective light and inserting same back into dial.

ALIGNMENT PROCEDURE

Correct alignment is extremely important. The receiver is properly aligned at the factory and should not be disturbed unless it is absolutely necessary. The procedure is as follows: Turn wave change switch to broadcast position (full counter clockwise) and rotate variable condenser until it is about 50% engaged. Apply a 455 KC signal to the grid of 6A8G mixer tube through a tubular condenser on the order of .1 MFD. Referring to chassis layout, adjust C29, C30, C31 and C32 for maximum signal using of course some sort of indicating device such as an A.C. voltmeter or output meter across the voice coil of the speaker. It may be necessary to apply a very strong signal to "find" the signal until alignment is approached. It is advisable to maintain as low a signal imput as conveniently possible in order to minimize the possibility of misalignment resulting from A.V.C. and overload effects. If a squeal is heard while tuning, rotate the gang condenser slightly and it should disappear. Naturally, the ground side of the generator should be connected to the chassis either directly or through the .1 MFD. condenser.

SHORT WAVE BAND

Rotate the wave band switch to full clockwise position. Connect high side of generator output to antenna lead through a 400 ohm dummy antenna. Completely disengage variable condenser. Apply 18.5 meg. signal. Unscrew trimmer C26 to a minimum capacity, slowly turn the screw so that the trimmer capacity increases until the signal is heard. Apply 16 meg. signal, rotate gang condenser until this signal is heard. Adjust C23 for maximum response. It may be found advisable to "rock" generator frequency back and forth through signal to offset detuning effect from inter action between imput and oscillator circuits at high frequencies. Check alignment through medium of sensitivity at 11 meg. and 6 meg. respectively. When aligning at 16 megacycles, it is well to point out here that the trimmer C23 may indicate 2 maxima. The maxima obtained with the trimmer tighter, is the desired one. This can be checked by leaving the gang condenser set and shifting the generator to a higher frequency viz: 17 megacycles, where the image should appear. If it is properly aligned, it should require about 10 times the signal voltage for the image to give the same output as the real signal.

POLICE BAND

Shift waveband switch to middle position. Apply 5.7 meg. signal still using 400 ohm dummy antenna. Disengage variable condenser completely. Adjust trimmer C27 in the same manner as previous band until maximum signal is heard. Apply 6 Meg. signal, rotate gang condenser until same is heard. Adjust trimmer C24 until response is maximum. Check for image in the same manner as previous band. Check alignment at 3.5 and 2 megacycles respectively.

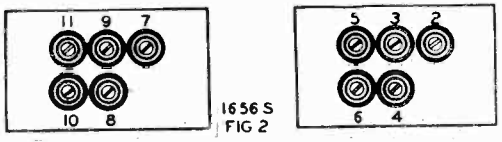
BROADCAST BAND

Use a 200 MMF. mica condenser for dummy antenna on this band. Shift wave change switch to full counter clockwise position. Adjust trimmer C21 and C25 to medium tight position.

Rotate gang until dial pointer indicates 600 KC. Apply 600 KC signal and adjust padder C4 for maximum signal. Disengage gang completely and apply 1750 KC signal; adjust C28 for same. Apply 1500 KC signal and rotate gang until this frequency is found. Adjust trimmers C21 and C25 for maximum response. Shift gang to 600 KC and apply 600 KC signal. "Rock" gang condenser and adjust C4 for maximum signal. Disengage gang and apply 1750 KC signal; if necessary adjust C28 to bring same in.

MODEL 1656-S

SETTING UP OF PUSH BUTTONS



1656 S
FIG 2

Model 1656-S has 12 push buttons. Number 12 push-button is used for the phonograph. Number one (1) push-button is used for distance reception.

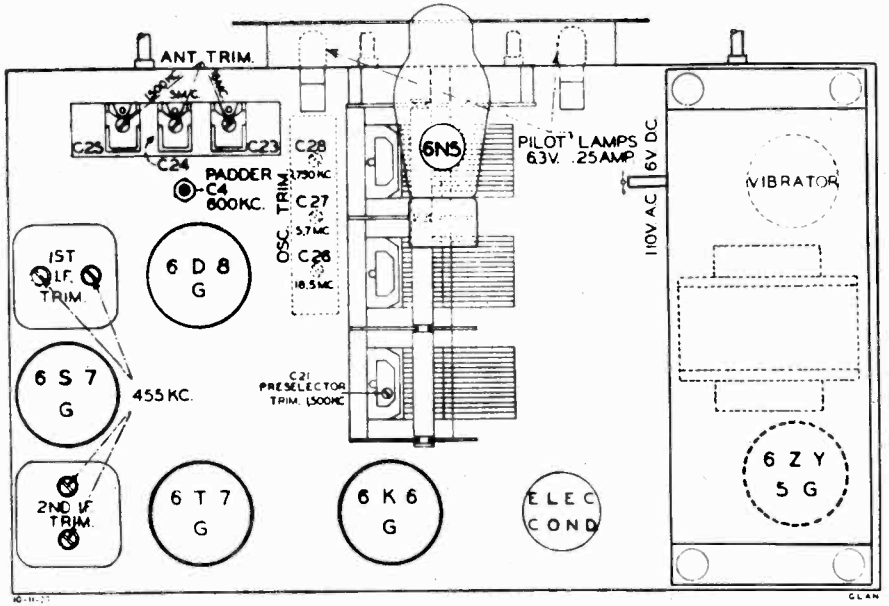
To adjust the push-buttons, turn the band switch knob, the second one from the left, all the way to the left. Select stations to be set up on the push-buttons.

Push the button you wish to set. Going to the back of the receiver, adjust the coil corresponding to the push-button (see figure 2) by turning the screw in the center of the coil by means of a screw driver, until the station you desire to hear is heard with maximum volume and best quality, and the tuning indicator closes the most.

When the buttons are set up and the wave band switch is turned all the way to the left, counter clockwise, pushing any one of the buttons will cause the receiver to receive the station set up on that particular button.

It is desirable to turn the tone control to high fidelity when listening on the push-buttons.

Only local or strong stations should be set up on the push-buttons.

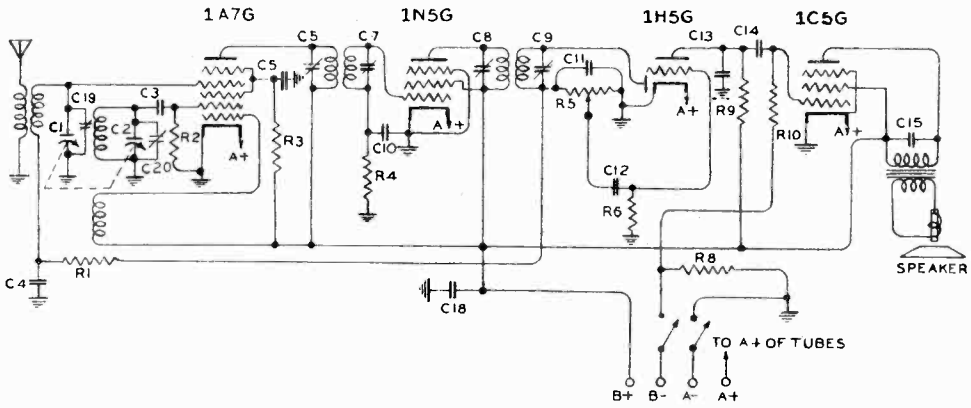


CHASSIS LAYOUT

MODELS 69 AND 690
Chassis 169

MODEL 410-A

MAJESTIC RADIO & TELEV. CORP.

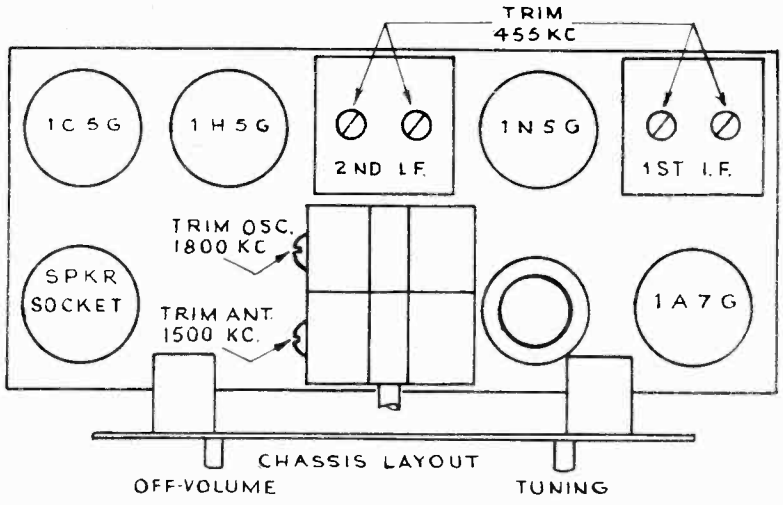


REPLACEMENT PARTS LIST

Schematic Location	Part No.	Description
C4,C5	C-15752	.05 mfd. 200V
C10,C12,C14	C-15763	.01 mfd. 200V
C15	C-25	.006 mfd. 400V
C3,C11,C13	CM-15918	100 mmf. Type "O" Mica
C1,C2	Y-CV-26	Variable Condenser
C6,C7,C8,C9	Y-CT-2	I. F. Trimmer condenser
C18	CE-35	8 mfd. 150V Electrolytic

Schematic Location	Part No.	Description
R9	R-15520	500K ¼W 20%
R10	R-15517	1 meg. ¼W 20%
R8	R-72	600 ohms ½W 20%
R2	R-15523	200K ¼W 20%
R6	R-15559	3 meg. ¼W 20%
R3	R-44	70K ¼W 10%
R1,R4	R-15500	2 meg. ¼W 20%
R5	Y-VC-26	Volume Control

TUBE LOCATION CHART



Batteries and battery packs recommended:

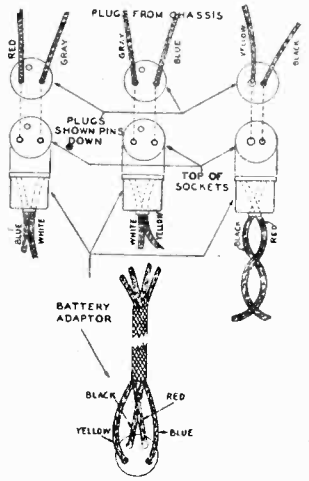
BATTERIES: 1-½ Volt "A" Battery
Eveready 742A
Ray-O-Vac P-94A or equivalent

45 Volt "B" Battery
Eveready 762
Ray-O-Vac P-5303 or equivalent

BATTERY PACKS: General No. 60A—4H or equivalent
Eveready No. 748 " "
Ray-O-Vac No. AB94 " "

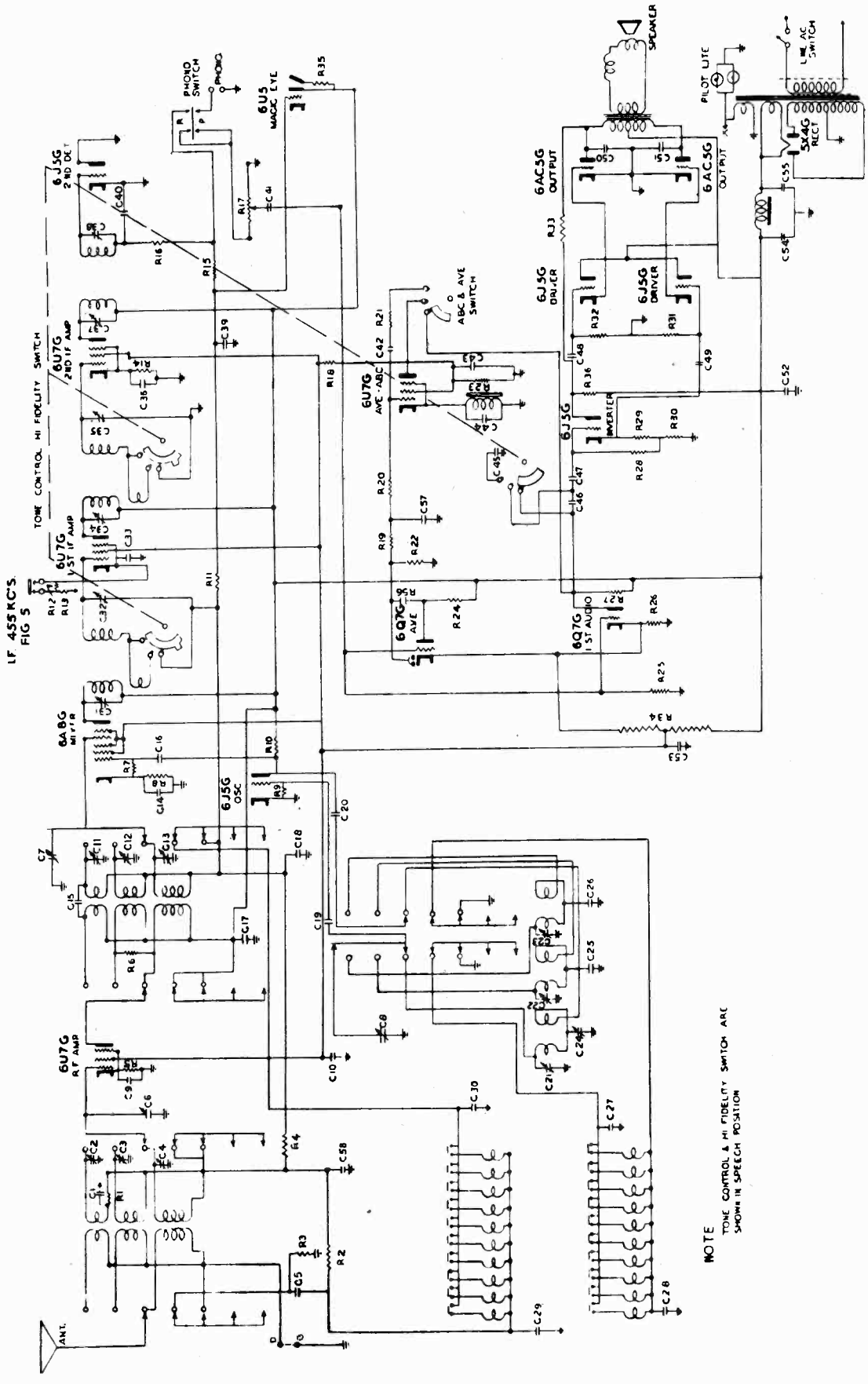
The battery adapter is supplied for such battery packs as:
Burgess No. 17GD60
Ray-O-Vac No. AB-82

Method of Connecting Adapter



MODEL 1656-S

MAJESTIC RADIO & TELEV. CORP.



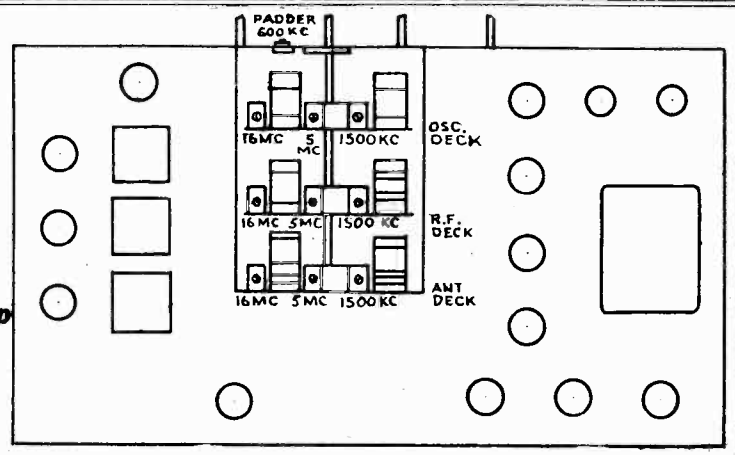


FIG 4 CHASSIS LAYOUT (BOTTOM VIEW)

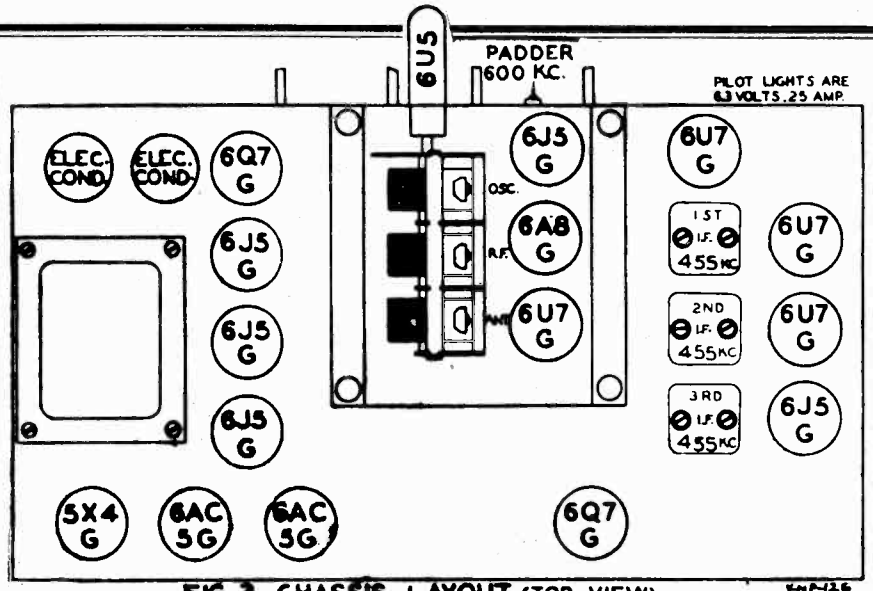


FIG 3 CHASSIS LAYOUT (TOP VIEW)

Schematic	Part	Description
R1,R2,R4,R16	R-15515	100K ohm
R3,R5	R-15542	1000 ohm
R6	R-15530	2500 ohm
R7,R9	R-15511	50K ohm
R8	R-92	500 ohm
R10	R-15501	25K ohm
R11,R20,R24,R31,R32	R-15512	250K ohm
R12	R-15510	10K ohm
R13	R-89	700 ohm
R14	R-15564	1500 ohm
R15,R19,R21,R22,R25,R28	R-15517	1 Megohm
R17	Y-VC-9	Vol.Cont.
R18	R-15544	15K ohm
R23	R-2	5000 ohm
R26	R-15601	100 ohm
R27	R-15520	500K ohm
R29	R-91	3000 ohm
R30	R-90	22K ohm
R33	R-15500	2 Megohm
R34	Y-RC-3	Candohm Res.
R35		2 Megohm
R36	R-93	25K ohm
C1,C9,C10,C14,C18,C58	C-6	.05 mfd.
C2,C3,C4	Y-CT-3	R.F.Trim.
C5,C17,C20	C-5	.01 mfd
C6) C7) C8)	Y-CV-7	3-Gang Var.
C11,C12,C13	Y-CT-3	Det.Trim.
C15	CM-32	10 mmf.
C16	CM-30	250 mmf.
C19	CM-29	50 mmf.
C21,C22,C23	Y-CT-3	Osc.Trim.
C24	Y-CT-4	600 KC
C25	CM-35	1330 mmf.
C26	CM-36	2770 mmf.
C27	CM-25	274 mmf.
C28	CM-26	710 mmf.
C29	CM-27	2000 mmf.
C30	CM-24	484 mmf.
C31,C32,C34,C35,C37,C38	Y-CT-2	I.F.Trim.
C33,C36,C39,C53	C-15752	.05 mfd.
C40	CM-31	100 mmf.
C41,C47	C-15760	.02 mfd.
C42	C-31	.004 mfd.
C43	C15761	.1 mfd
C44	C-9	.15 mfd.
C45,C56,C48,C49	C-15754	.01 mfd.
C46	C-30	.001 mfd.
C50,C51	C-32	.005 mfd.
C52	C-15750	.25 mfd.
C54	Y-CE-13	40 mfd.
C55	Y-CE-15	30 mfd.
C57	C-15770	.2 mfd.

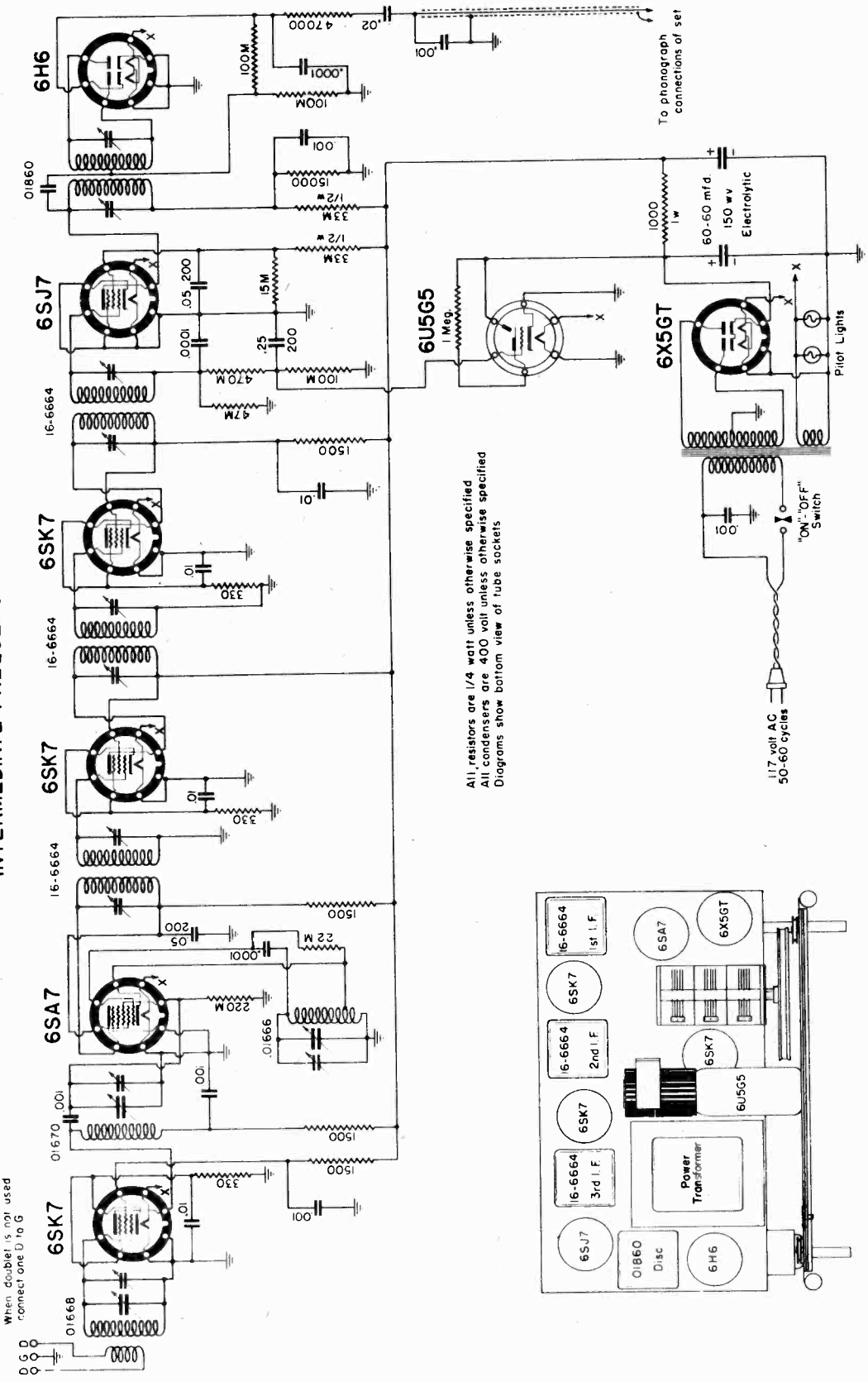
MODEL 9-1047A

MEISSNER MFG. CO.

8 TUBE AC RECEPTOR FOR FM

41.2 TO 50.4 MC

INTERMEDIATE FREQUENCY 4.3 MC



MODEL 9-1047A

MEISSNER MFG. CO.

CONNECTIONS TO AN AC-DC RECEIVER

This Receptor is not recommended for use with any AC-DC receiver because of the hazards to safety involved in connecting this unit to an AC-DC set having its chassis connected to the power line, and because of almost insurmountable hum troubles on sets having the chassis insulated from the power line.

ALIGNMENT

Alignment of the Receptor may be accomplished by any competent Serviceman having the equipment usually used in alignment of All-Wave receivers. Neither a Frequency Modulated oscillator nor a Cathode Ray oscilloscope is necessary.

DISCRIMINATOR ALIGNMENT

Connect the audio output leads of the Receptor to any convenient audio amplifier or "Phono" plug of any receiver, and connect on output meter (having a low range of 1 to 5 Volts) across the voice coil of the speaker. Temporarily increase the gain of the 6SJ7 limiter tube by shunting a 2,000-ohm resistor across the resistor thru which "B" voltage is supplied to the red wire of the discriminator transformer, No. 01860. Apply a 4.3-mc signal to the grid of the limiter tube through a .05-mfd coupling condenser.

When a Frequency Modulated signal is used for aligning the Discriminator, the adjustment is made for maximum output in much the same manner as the conventional alignment of a 456-KC (AM) I-F transformer on an AM signal, but if only an AM generator is available for alignment the Discriminator, the primary is aligned for maximum output and the secondary for balance or zero output, since one of the functions of the Discriminator is to eliminate amplitude modulated signals.

In tuning the secondary of the discriminator there are three places of **minimum** response; (1) out of resonance with the condenser too tight, (2) **CORRECT**, and (3) out of resonance, with the condenser too loose. The proper minimum has the characteristic that the signal rises very rapidly as the trimmer is turned **IN EITHER DIRECTION**. The other two minima mentioned above **DO NOT** have this characteristic and are incorrect. The trimmer farthest from the 6SJ7 tube tunes the secondary of the discriminator and by slowly rotating this trimmer the point of minimum audio response will be found and will indicate correct alignment of this trimmer. Now **MISTUNE** this trimmer as little as possible but enough to hear a signal and to obtain an output meter indication with which to align the primary trimmer for **MAXIMUM** response. Leaving the secondary trimmer mistuned, to assist in the I-F alignment, move the signal input to the grid of the second 6SK7 I-F amplifier tube, and align this stage, always reducing input as sensitivity increases so as to remain below the level at which the "Limiter" works. Unless this precaution is observed, the resonance indication is broadened. In the same way align the remaining I-F transformers finishing with the signal applied to the 6SA7 grid. The **SECONDARY** of the discriminator may now be retuned to **minimum** response and the 2000-ohm shunt resistor removed, completing the I-F alignment.

R. F. ALIGNMENT

For reasons of stability, the oscillator in the Receptor operates on the low side of the R-F signal. Because of the high intermediate frequency (4.3 mc) there is no possibility of aligning the oscallator on the image. If there is reason to believe that the trimmers are badly out of alignment, a very practical initial adjustment would be to adjust **ALL THREE TRIMMERS** to a position about one-fourth turn from maximum capacity. Then apply a 48mc signal (or equivalent harmonic of some lower frequency) to the antenna terminals of the Receptor through a dummy antenna of 200 to 400 ohms, set the pointer to 48MC and adjust the trimmer on the center (oscillator) section of the gang condenser to give the maximum response **OF THE TUNING EYE**. Align the antenna (front) and R-F (rear) trimmers for maximum response and check the sensitivity at various points within the band. When properly aligned the antenna and oscillator trimmers are about one-fourth turn from maximum capacity with the R-F trimmer about two turns from minimum.

SERVICE DATA (FOR PROFESSIONAL SERVICE MEN)

Power Consumption - - - - 45 Watts & 117 Volts A.C.
Intermediate Frequency - - - - - - - - 4.3 Megacycles
Tuning Range - - - - - - - - - - - 40.5—50.5 Mc.

VOLTAGES AT SOCKETS

The voltages that should be considered normal at each tube-socket terminal are indicated in the table below. All voltages indicated are measured between the socket terminal and ground (chassis). Readings shown are positive on the socket terminal with the chassis as the negative terminal except where a negative voltage reading is given in which case the chassis is positive. Readings marked "AC" indicate normal AC heater voltage and should not be read with a DC meter.

These voltages are read with a Line Voltage of 117 Volts and no signal being received.

Readings are taken with a 1000-ohm-per-volt meter. Plate and screen voltages are read on the 250-volt scale. All readings under 50 volts are read on the 50-volt scale.

VOLTAGE CHART

FUNCTION	TYPE	1	2	3	4	5	6	7	8
R. F. Amp.	6SK7	0	0	3.6	0	3.6	110	6.3AC	105
Mixer	6SA7	0	0	100	100	.....	0	6.3AC	0
1st IF	6SK7	0	0	3.6	0	3.6	110	6.3AC	110
2nd IF	6SK7	0	0	3.0	0	3.0	105	6.3AC	105
Limiter	6SJ7	0	0	0	0	0	38	6.3AC	26
Discr.	6H6	0	0	0	0	0	0	6.3AC	0
Tuning Eye	6U5	0	15	0	163	0	6.3AC	.....	.....
Rectifier	6x5GT	0	0	170 AC	NC	170AC	NC	6.3AC	170

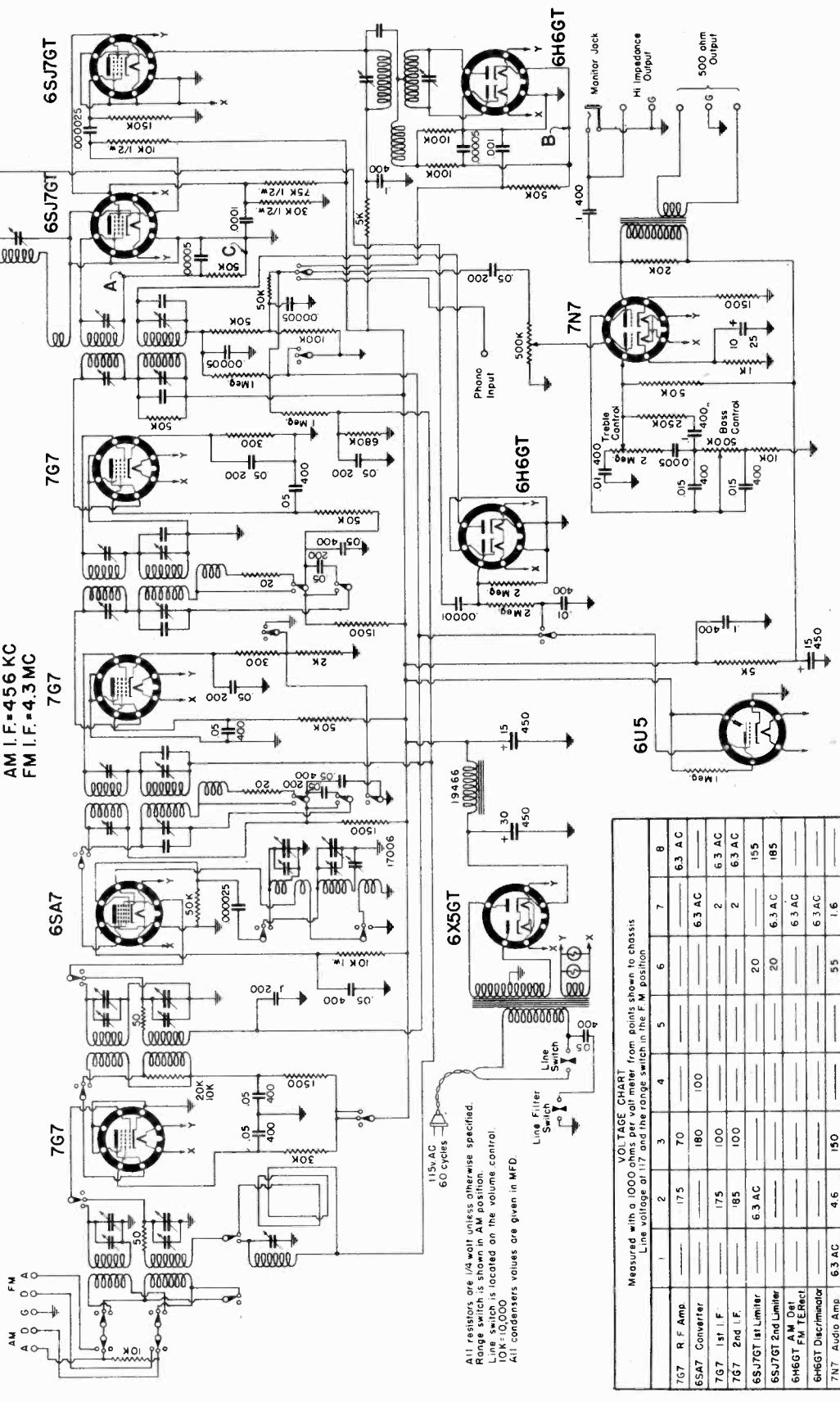
MODEL 9-1067

MEISSNER MFG. CO.

9-1067

AM-FM HI-FIDELITY PA TUNER

AM Range 540 to 1630 KC
FM Range 41 to 51 MC
AM I.F.=456 KC
FM I.F.=4.3 MC



VOLTAGE CHART
Measured with a 1000 ohms per volt meter from points shown to chassis
Line voltage of 117 and the range switch in the F.M position

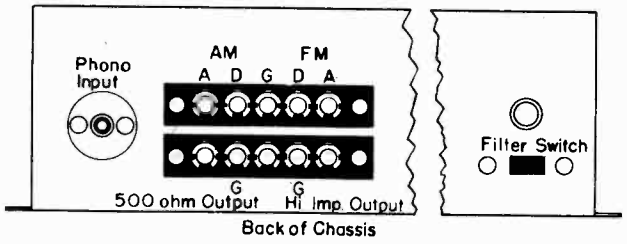
	1	2	3	4	5	6	7	8
7G7 R.F. Amp.	———	175	70	———	———	———	———	6.3 AC
6SA7 Converter	———	———	180	100	———	———	6.3 AC	———
7G7 1st I.F.	———	175	100	———	———	———	2	6.3 AC
7G7 2nd I.F.	———	185	100	———	———	———	2	6.3 AC
6SJ7GT 1st Limiter	———	6.3 AC	———	———	———	20	———	155
6SJ7GT 2nd Limiter	———	———	———	———	———	20	6.3 AC	185
6H6GT AM Det FM TERect	———	———	———	———	———	———	6.3 AC	———
6H6GT Discriminator	———	———	———	———	———	———	6.3 AC	———
7N7 Audio Amp	6.3 AC	4.6	150	———	———	55	1.6	———
6X5GT Rectifier	———	———	185 AC	———	185 AC	———	6.3 AC	210
6U5 Tuning Eye	Socket pins not accessible for easy measurements.							

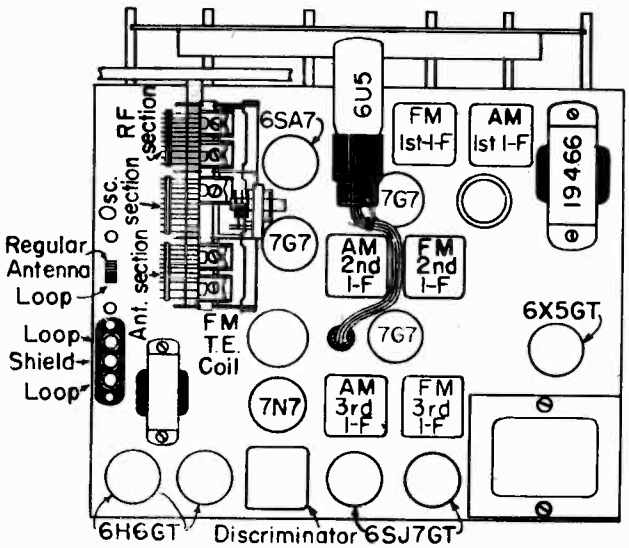
The unit is equipped with provision for phono input or other source of audio so that when used in a sound installation or when installed in a console for home use, the switching for external input to the amplifier is accomplished in the tuner, by turning the band switch to the third position, (extreme counter clockwise position).

Both high impedance output for feeding directly into the high impedance input of an amplifier, and balanced 500 ohm output for feeding into a transmission line, are provided, as well as a monitor jack on the front panel for feeding a monitor amplifier or headphones.

MODEL 9-1067

MEISSNER MFG. CO.





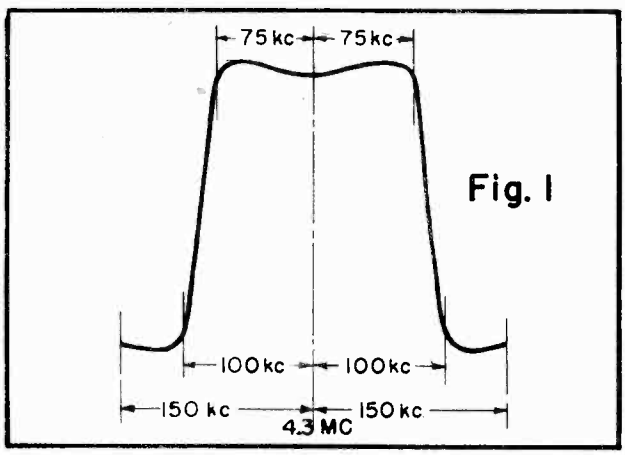


Fig. 1

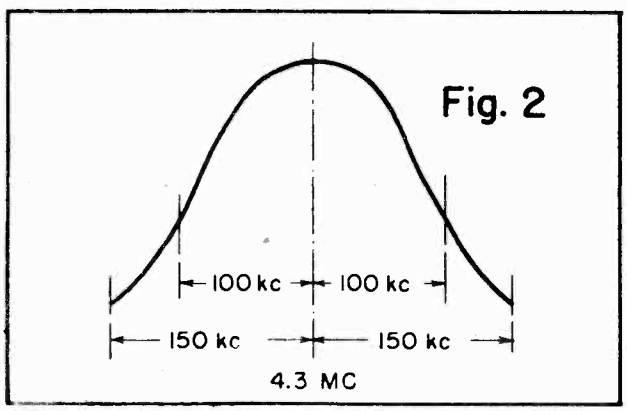


Fig. 2

The two tuning ranges cover the standard broadcast band 540 KC to 1630 and the F. M. band 42 to 50 MC. The dial is calibrated directly in kilocycles on the broadcast band. For the F. M. band, the dial is calibrated directly in the call letter number assigned to the F. M. broadcasting station. For instance, W67C, is assigned to a station in Chicago, Ill. that operates on a frequency of 46.7 MC. This station will be received on a dial setting of 67. By placing a 4 in front and adding the decimal point, you will have the frequency in megacycles, on which the station is transmitting.

ANTENNA CONNECTIONS

Two separate sets of antenna connections are provided for the broadcast and F. M. bands. These may be found on the back of the chassis, near the phono input jack (see Fig. 4). A third set of terminals and a switch, for a broadcast loop antenna, are located on the top of the chassis (see Fig 5).

A shielded loop may be used with this unit. If a loop is used the two leads are to be connected to the two outside terminals marked loop in Fig. 5. The shield is to be connected to the center terminal marked shield in Fig. 5. Note: The leads of this loop should not be shortened or lengthened.

Any antenna system having a single wire lead-in for Broadcast reception, is connected to the terminal marked "A" on the Broadcast side of the terminal strip shown in Fig. 4.

The terminal marked "D" is then connected to gnd. In like manner, any antenna system having a single wire lead-in for F. M. reception is connected to the terminal marked "A" on the F. M. side of the terminal strip, and its corresponding "D" terminal is also connected to gnd. If such an antenna system is to be used for both Broadcast and F. M. reception, the two "A" terminals are connceted together and both "D" terminals are connected to the gnd. terminal.

Any antenna system having a two wire lead-in for broadcast reception such as doublets and noise reducing antennas, has one of the lead-in wires connected to the terminal marked "A" on the Broadcast side of the terminal strip and the other lead-in wire connected to the terminal marked 'D" on the broadcast side of the terminal strip. Any antenna system having a two wire lead-in for F. M. reception is connected in a like manner. The one lead-in wire connected to the "A" terminal on the F. M. side of the terminal strip and the other to the "D" terminal. If such an antenna is used for both Broadcast and F. M. reception, the two "A" terminals are connected together and the two "D" terminals are connected together.

In case no loop is to be used, the loop switch shown in Fig. 5 is set in the regular antenna position (toward the front of the chassis) and left there. When a loop is used, the switch is set in the loop position (toward the rear of the chassis). If, at some time when using the loop, a stronger signal is desired, this switch may be moved to the regular Antenna position. This switch is operative only on Broadcast reception and its position in no way affects the F. M. reception.

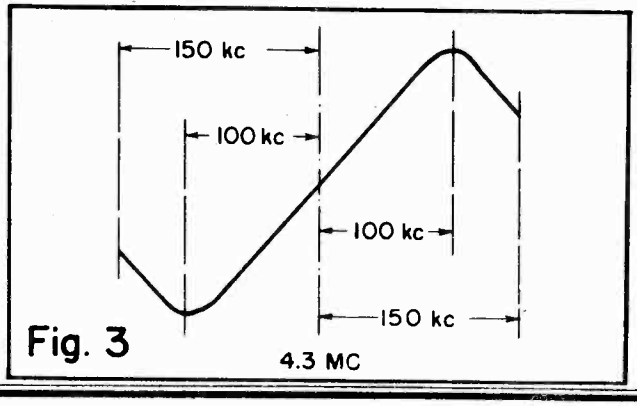


Fig. 3

MEISSNER MFG. CO.

SERVICE PRECAUTIONS

In replacing parts or making adjustments care should be exercised to see that all connections are made to points from which they were removed and that components and leads occupy their original positions. Lead lengths and ground return paths are quite critical in some parts of the F. M. circuits and trouble will be avoided by adhering strictly to the original placement of parts.

ALIGNMENT PROCEDURE

The minimum of equipment necessary for correctly aligning this tuner is listed below:

(1) A modulated service oscillator or signal generator capable of generating the frquencies 430 to 480 kilocycles, 600 kilocycles, 1400 kilocycles and 46 megacycles.
(2) An audio amplifier.
(3) An output meter.
(4) A O-200 Microampere meter.
(5) An oscilloscope with vertical and horizontal amplifiers.
(6) A wide band frequency modulated generator or "wobbulator" covering the intermediate frequency of 4.3 megacycles and with either 400 cycle or 60 cycle modulation. It should be capable of producing a deviation frequency of 150 kilocycles. (Total frequency swing of 300 kilocycles).

While this instruction sheet describes the use of a frequency-modulated generator which has 400 cycle audio voltage for application to the horizontal plates of the oscilloscope, it is also possible to use a generator having 60 cycle modulation and to use the 60 cycle sweep which is built into the oscilloscope instead of obtaining the sweep voltage from the generator. If the serviceman has been using such a generator for visual alignment, he will be familiar with his instrument and will be able to adopt it to his alignment.

Although it is possible to align the F. M. I. F. system of the tuner with a generator or "wobbulator" not having as great frequency deviation as 150 kilocycles, it will be difficult to obtain as satisfactory results as with a wide band generator.

A. M. ALIGNMENT

The broadcast alignment of this tuner should be carried out as follows: Turn the range switch to the broadcast position and the fidelity switch to the sharp position. Connect an audio amplifier to the output of the tuner and connect the output meter in the output circuit of the audio amplifier in any conventional manner. Connect the A. M. signal generator between the grid of the 7G7 second I. F. tube and ground using a .05 microfarad condenser in series with the "hot" lead of the generator. Set the signal generator to 456 kilocycles and adjust the input to a value that will give a suitable reading on the output meter. For this adjustment and for all following adjustments of the A. M. channel, the volume control of the tuner should be turned full on. Since the response characteristic of the output transformer is very broad, it will be necessary to take special steps to align it. First, detune the primary circuit by connecting a fixed mica condenser of .003 to .005 microfarads between the plate of the 7G7 second I. F. tube and ground. Now adjust the secondary trimmer of the output I. F. coil for maximum response. (The secondary trimmer is identified by a dot of green paint on the trimmer screw.) Remove the condenser from the plate of the 7G7 second I. F. tube and adjust the primary trimmer for maximum response. No further adjustment of the secondary trimmer should be made.

Connect the signal generator, still set at 456 kilocycles and still using the .05 microfarad dummy, to the signal grid of the 6SA7 Converter tube and adjust the four trimmers of the input and interstage transformers for maximum response. For this operation the fidelity switch should be set in the sharp position.

The response characteristic of the I. F. system should now be checked with the fidelity switch in the broad (clockwise) position. Swing the signal generator frequency over the range of 430 kilocycles to 480 kilocycles and by watching the output meter observe the shape of the response curve. If the alignment has been caarefully performed, the response curve should have two peaks at approximately 446 kilocycles and 464 kilocycles with a slight dip between them, and the peaks should both be of the sam amplitude. If this condition does not exist, the response curve may be corrected (within certain limits) by a very slight readjustment of the trimmers of the output transformer swinging the generator over the range of 430 to 480 kilocycles while making this adjustment to observe the effect on the response curve.

The RF alignment is made at 1400 kilocycles. The selectivity switch should be in the "sharp" position. If a loop antenna is to be used, it should be properly connected and the loop switch thrown to the position for loop operation. Connection should be made to the generator by wrapping a single turn of wire from the generator output around the loop housing. The oscillator, R. F. and antenna trimmers should be adjusted for maximum output. The padding operation is performed at 600 kilocycles. The dial should be rocked across the 600 kilocycle point while adjusting the padder to find the point of greatest response.

Now change the loop switch to the position for external antenna and connect the generator to the broadcast antenna terminal through a .0002 microfarad dummy antenna. The "D" terminal should be grounded.

With the generator and tuner set at 600 kilocycles, adjust the antenna padder condenser, located under the chassis, for maximum output.

If no loop antenna is used the above procedure is modified by setting the antenna padder at ¼ turn from maximum and aligning in the conventional manner.

F-M ALIGNMENT

The F-M alignment is made in three major steps: Namely, I. F. alignment, discriminator alignment and R. F. alignment.

For the first operation, I. F. alignment, connect the output of the frequency-modulated generator between the grid of the 7G7 second I. F. stage and chassis, using a .05 mfd. condenser in series with the high side of the generator output and connecting this condenser to the 7G7 grid. Leave the grid of the 7G7 tube connected. Now connect the synchronizing voltage output from the generator to the input of the horizontal amplifier of the oscilloscope. Note: The ground lead from the generator should always be connected to the chassis near the tube to whose grid the generator is connected to avoid spurious regeneration phenomena which change the shape of the I F. curve.

Now connect the input terminals of the oscilloscope vertical amplifier between chassis and the low potential end of the last I. F. transformer (point "A" in circuit diagram) using a 500,000 ohm resistor in series with the high side. This resistor should be located at the receiver end of the connecting wires and should be connected with a short lead to the point "A".

Having made the set-up, turn on the oscilloscope and the frequency-modulation generator. Turn down the receiver volume control. Set the generator to 4.3 MC and the devi-

ation frequency (if calibrated on the generator) to 150 KC. Turn the vertical gain control just high enough to give almost full-screen deflection of the horizontal pattern. Using just enough output from the generator to give good vertical deflection on the screen, adjust the trimmers of the last I. F. transformer for the greatest gain and to give a pattern that is centered on the screen and is symmetrical. This pattern should be similar to the one shown in Fig. 2.

Now without changing the generator frequency, remove the generator connection from the grid of the 7G7 second I. F. amplifier and place it on the grid of the 7G7 first I. F. amplifier, using the .05 mfd. condenser as before, and changing the position of the ground lead as described above. Again use only enough output from the generator to give good vertical deflection on the screen, and adjust the trimmers of the second I. F. transformer in the same manner as before. The curve shape should remain practically the same as it was before.

Now remove the generator connections (ground as well as "hot") from the 7G7 first I. F. amplifier and place them on the signal grid and ground of the 6SA7, again using the .05 mfd. condenser. Proceed as before, turning down the output from the generator until there is just enough for good vertical deflection on the oscilloscope screen. Adjust the trimmers of the first I. F. transformer for the greatest gain and to give a pattern similar to the one shown in Figure 1.

In all the foregoing adjustments, note that the oscilloscope vertical amplifier gain control has been turned well toward maximum gain, and that a low input from the generator has been used. The reason for this is that, as higher signal-input levels are used, the response curve of the I. F. amplifier stages will change shape. If the symmetry of the response curve is kept good at low input levels, then any dissymmetry occuring at high input levels will be unimportant, since at high input levels, the limiter tubes will level out the response before the signal reaches the discriminator.

Should the I. F. circuits for any reason be badly misaligned, the first 7G7 I. F. stage may oscillate when the input from the generator is placed on the grid of the 7G7 second I. F. tube, making it difficult to get a readable pattern on the oscilloscope screen. Should this condition occur, the remedy is to remove the 7G7 first I. F. tube from its socket until the last I. F. stage has been aligned.

This completes the alignment of the I. F. stages and the alignment of the discriminator comes next.

DISCRIMINATOR ALIGNMENT

Leaving the set-up as it was when the I. F. alignment was completed, adjust the generator frequency until the I. F. response pattern on the oscilloscope screen is centered and is symmetrical.

Now remove the connection to the low-potential side of the last I. F. coil, (point A) which is the lead containing the 500,000 ohm resistor, and move this connection to the 6H6 discriminator cathode marked "B" in the circuit diagram. The pattern on the oscilloscope screen may go off scale and the input from the generator will have to be decreased. If the generator leakage is bad and its output cannot be turned down to a sufficiently low level, the oscilloscope vertical amplifier gain control may be turned down. With the set-up made as described and with the generator deviation-frequency still set at 150 KC, adjust the trimmer on the primary side of the discriminator coil (the red trimmer screw) for greatest vertical deflection on the oscilloscope screen.

Next adjust the trimmer on the secondary side of this coil until a pattern similar to the one shown in Figure 3 is obtained. This adjustment is quite critical and should be made so that the pattern is as near symmetrical as possible. If the portion of the pattern in Figure 3 which appears straight, is not quite straight on the oscilloscope screen, it may be made so by a slight readjustment of the trimmer on the primary side of the coil.

ADJUSTMENT FOR F. M. TUNING INDICATOR

Decrease the modulation of the signal generator until only the straight part of the pattern of Figure 3 appears on the oscilloscope screen and adjust the frequency of the generator to exact resonance with the receiver. Now adjust the trimmer in the top of the tuning indicator coil can for minimum shadow angle on the tuning eye.

ANTENNA, R. F. AND OSCILLATOR

In order to align the R. F. Antenna and Oscillator circuits, an amplitude-modulated signal generator covering the range of 42-50 MC and a O-200 microampere meter may be used. The signal generator need not be modulated.

Connect the meter in series with the ground end of the grid resistor of the first 6SJ7 limiter tube, with the positive side of the meter to ground. This point is marked "C" in the circuit diagram. Now apply the output of the signal generator to the F. M. antenna terminal through a 100 ohm dummy antenna, grounding the "D" terminal. Set the receiver dial and the signal generator to 46 MC and adjust the oscillator trimmer, which is the air trimmer mounted on top of the middle section of the tuning condenser, for maximum deflection on the O-200 microampere meter. If two positions of the oscillator trimmer give almost equal deflection on the meter, select the point with the trimmer farthest in mesh, since the oscillator on this band operates below the signal frequency. Keep the generator output adjusted to such a value that about one quarter of full scale deflection is obtained on the meter. Next adjust the R. F. trimmer, mounted on the front section of the tuning condenser, for maximum deflection of the meter; then perform the same operation for the antenna trimmer, which is mounted on the back section of the tuning condenser. The adjustment of the R. F. trimmer affects the oscillator frequency slightly and the tuning condenser should be rocked back and forth when making this adjustment in order to keep the oscillator tuned to the signal frequency. If two points of response are found on the R. F. or antenna trimmers, the point which requires the least amount of capacity in these trimmers should be selected.

As a final check of antenna, R. F. and oscillator adjustment, signals from the generator should be tuned in at various points on the band to see that the sensitivity is equal over the band.

MONITOR CONNECTION

The monitor jack on the front panel is connected to the high impedance output of the tuner and any monitoring device may be plugged in provided it is of high input impedance.

LINE FILTER SWITCH

Because of the fact that some audio power amplifiers are equipped with a line by-pass condenser and some are not, a switch is provided on the rear of the chassis for switching in or out a power line filter in the tuner chassis. After the tuner has been connected to an amplifier, this switch should be set in the position which gives the quietest reception.

TONE CONTROLS

The tone controls are Bass "Boost-Attenuate" and Treble 'Boost-Attenuate" types and may be adjusted for the most pleasing results. They may be adjusted for flat response or may be adjusted to compensate the response characteristic of amplifier, speaker, phono pickup, etc.

FIDELITY SWITCH

The fidelity switch controls the width of pass-band in the broadcast I. F. channel and has two positions, "sharp" and "broad"; the "sharp" position being counter-clockwise. Accurate tuning of signals is difficult when the fidelity switch is in the broad position and it is recommended that signals be tuned in with the switch in the "sharp" position, after which it may be moved to "broad".

POWER SUPPLY

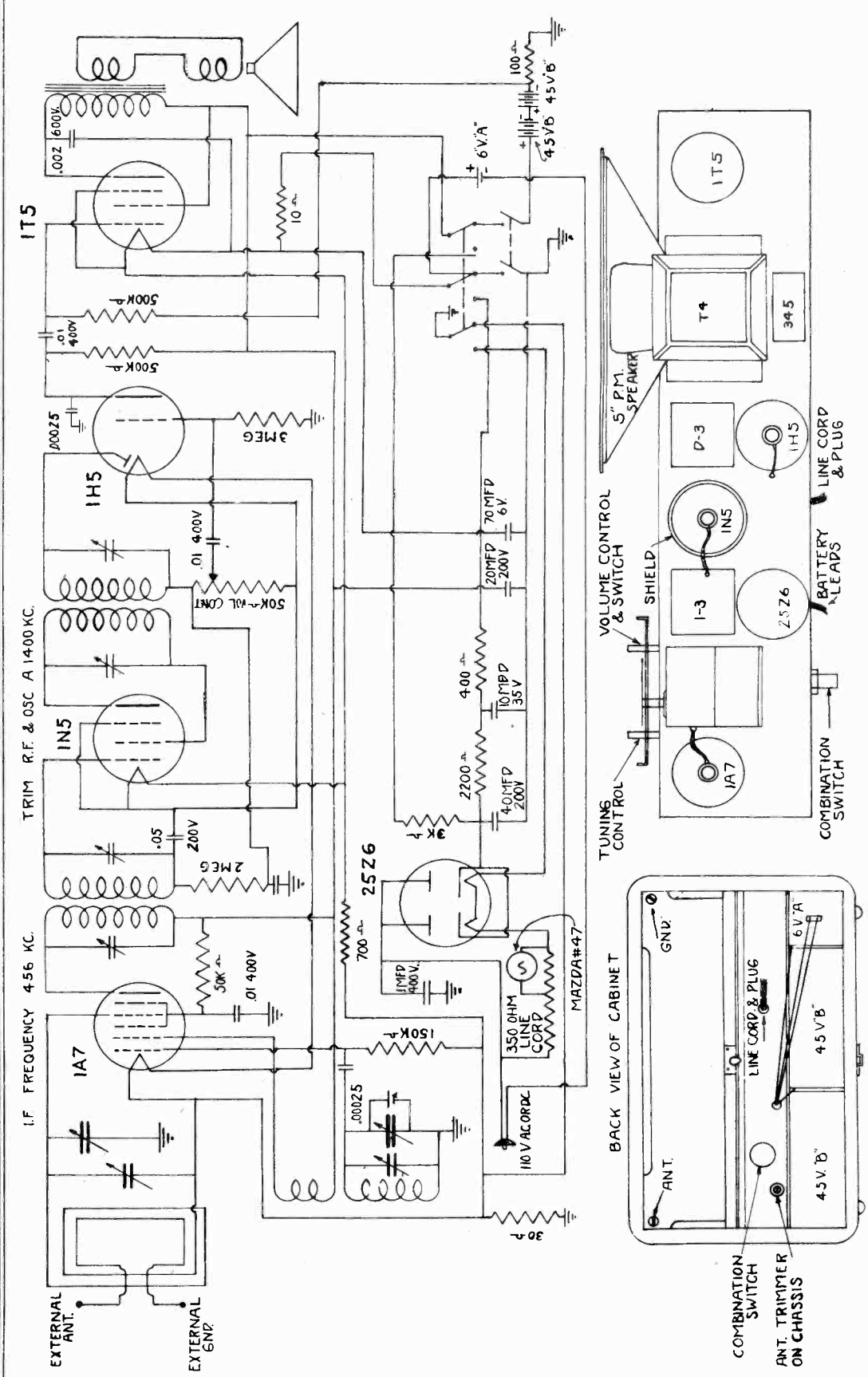
110-125 volts, 50-60 cycles.

INTERMEDIATE FREQUENCY

A. M. 456 kilocycles
F. M. 4.3 megacycles

MODEL P-5

MIDWEST RADIO CORP.



When set is initially equipped with batteries, the antenna trimmer (as shown on back view of cabinet drawing) is properly adjusted at the factory and no further adjustment is necessary. However, in changing batteries, or installing outside antenna, it may be necessary to adjust this antenna trimmer. If so, proceed as follows:

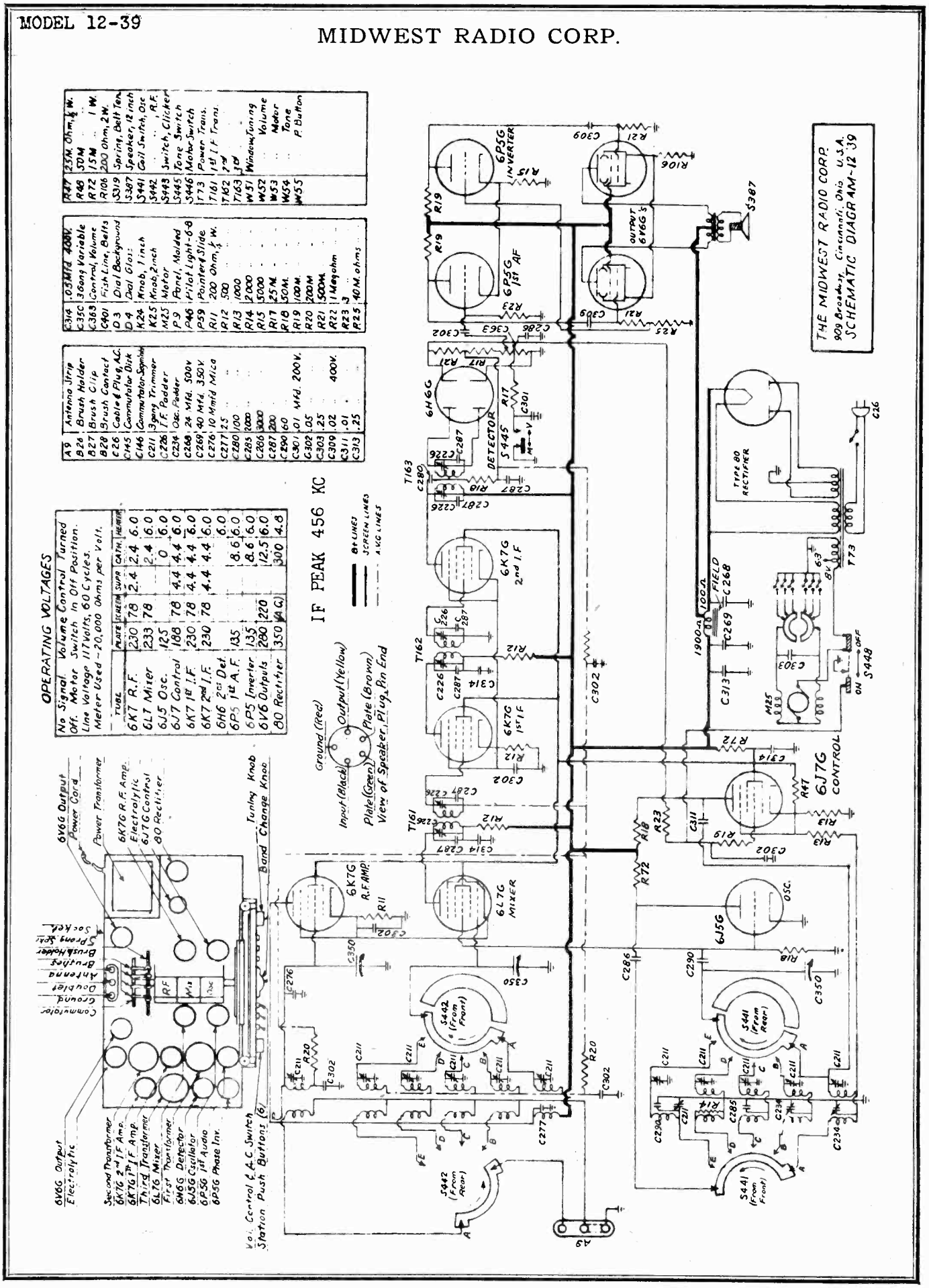
(1) Tune the receiver to a radio station somewhere near 1400 kilocycles, which is about 140 on the dial.

(2) Adjust antenna trimmer with a screw driver very slowly until this station is heard the loudest.

No other adjustments are necessary in this set.

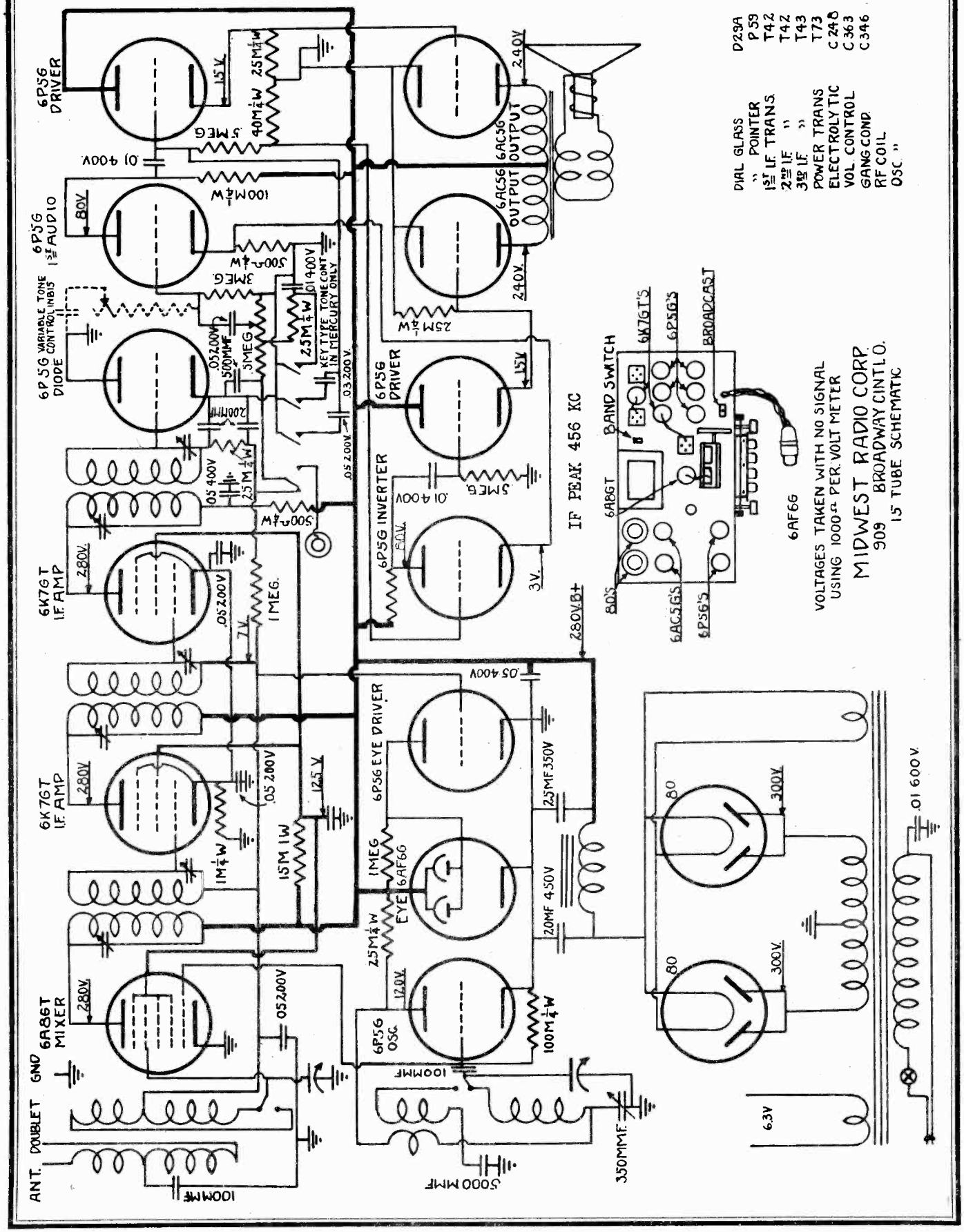
MODEL 12-39

MIDWEST RADIO CORP.



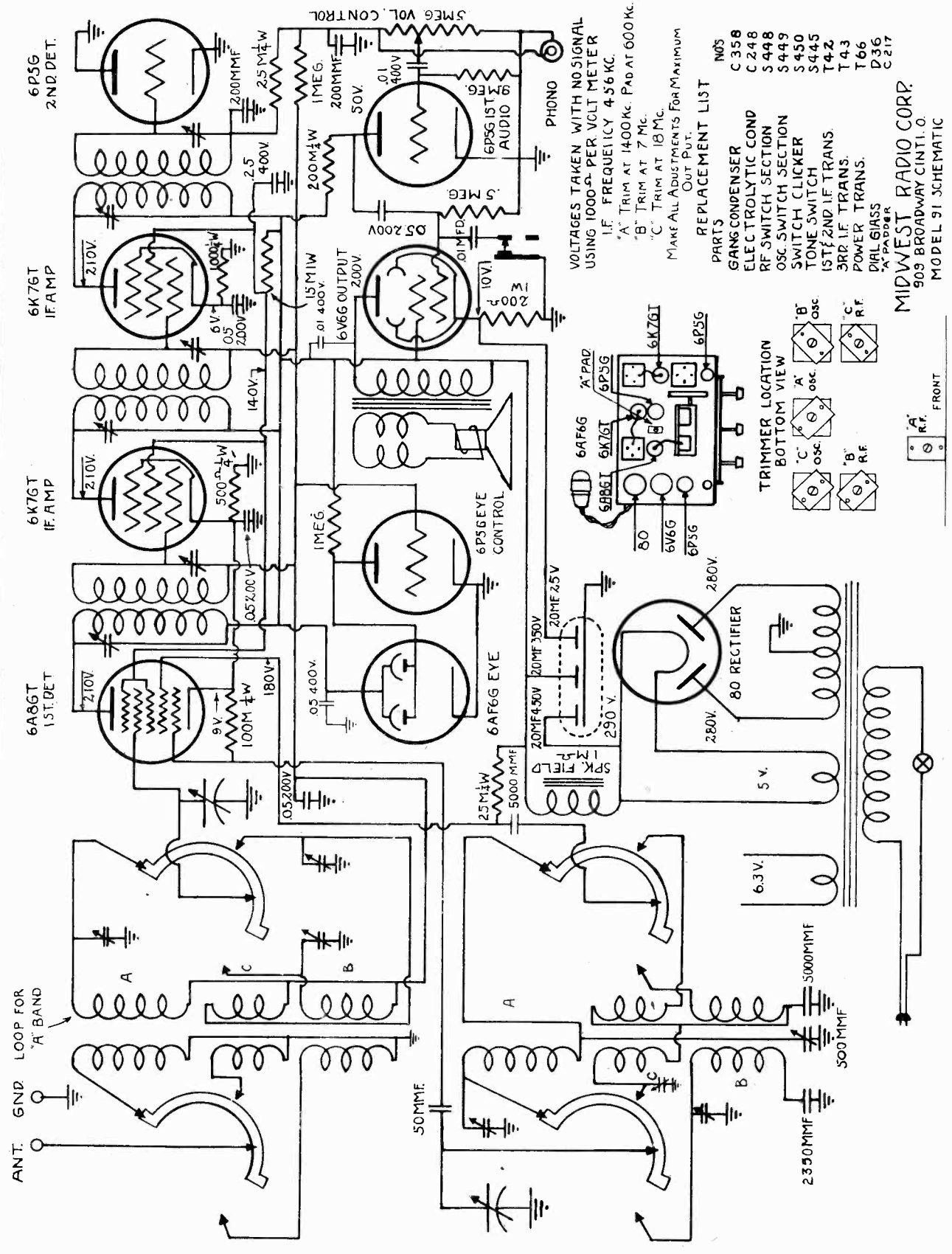
MODEL 15 Tube

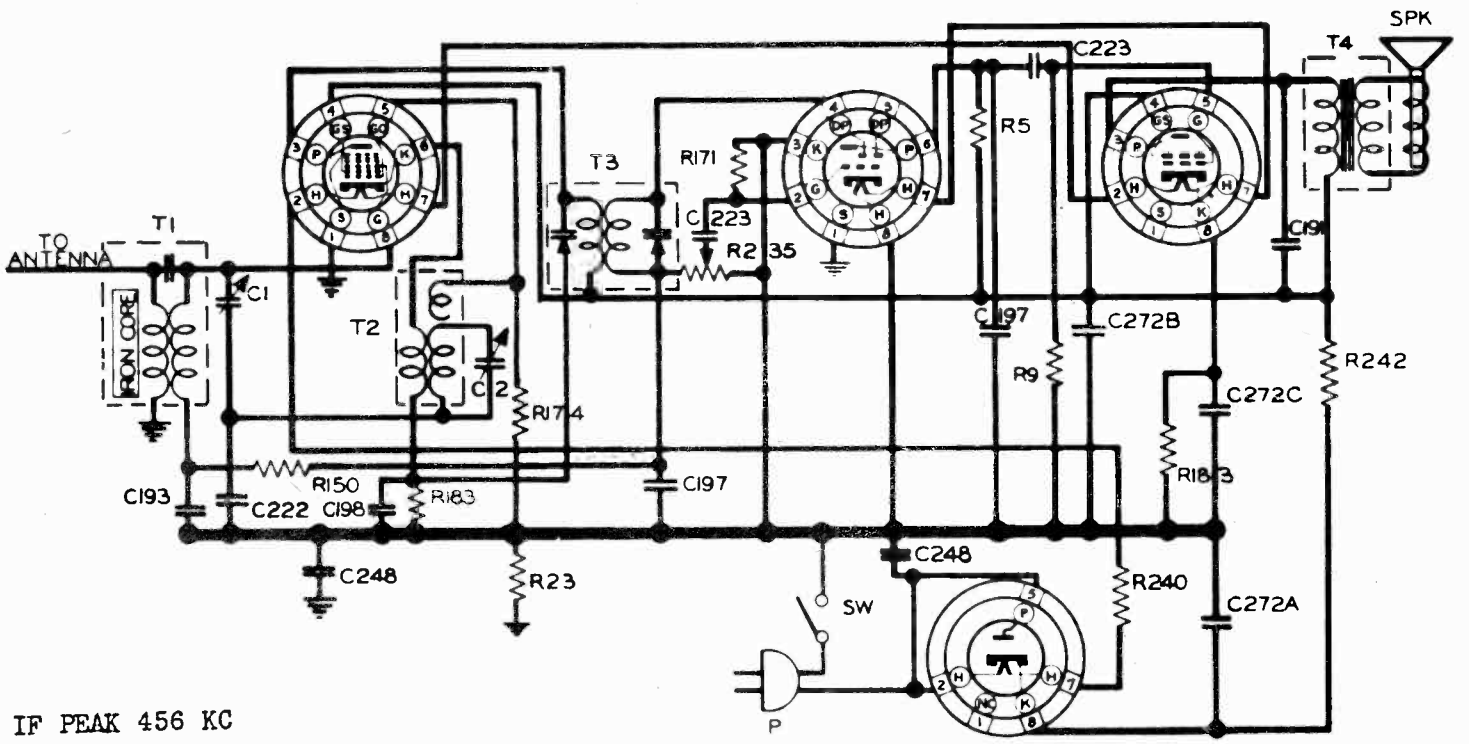
MIDWEST RADIO CORP.



MODEL 91

MIDWEST RADIO CORP.





IF PEAK 456 KC

35Z4GT OR 35Z5GT

RESISTORS

R	OHM	W	Part No.
174	20K	1/4	17-14291
9	1M.	1/4	17-2080
171	15M.	1/4	17-14288
5	500K	1/4	17-2070
183	150	1/4	17-14316
235	2M.	V.C.	17-17117
23	250K	1/4	17-3011
240	47	1	17-14397
150	5M.	1/4	17-14242
242	2000	1	17-14399

CONDENSERS

C	Capacity	Volt	Part No.
222	.2	400	17-14317
193	.05	200	17-14274
248	.05	400	17-14366
198	.005	400	17-14279
223	.002	400	17-14318
191	.01	400	17-14272
1	Two Gang) --------		17-17115
2	Variable)		
272A	40 MFD	150	
272B	20 MFD	150	17-14398
272C	20 MFD	25	
197	.0001	600	17-14278

MISCELLANEOUS UNITS

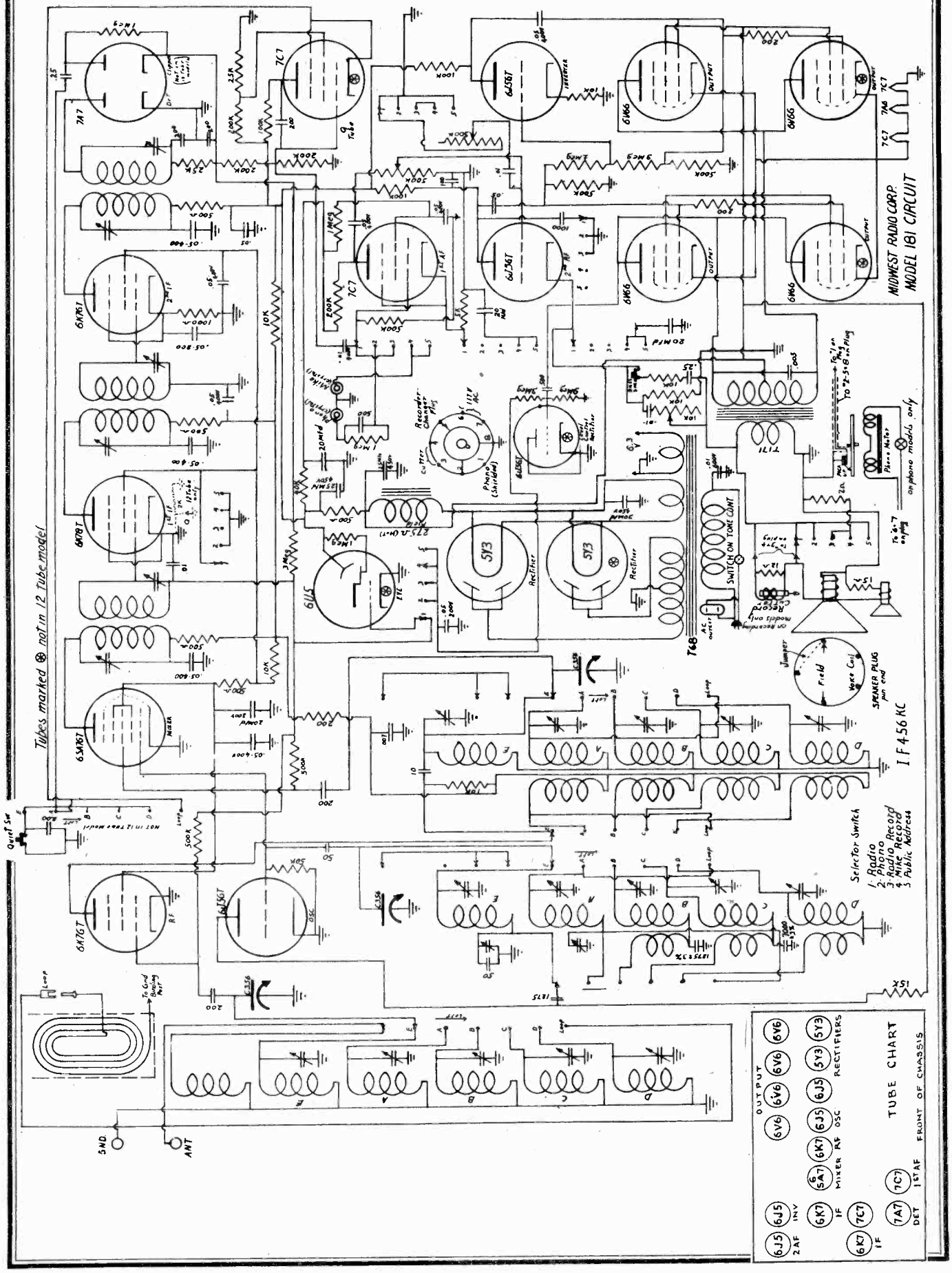
Symbol	Description	Part No.
T1	Antenna Coil	00-17130
T2	Oscillator Coil	00-17119
T3	I.F.Coil	00-17210
T4	Output Trans.	00-17131
SPK.	Speaker	17-17209

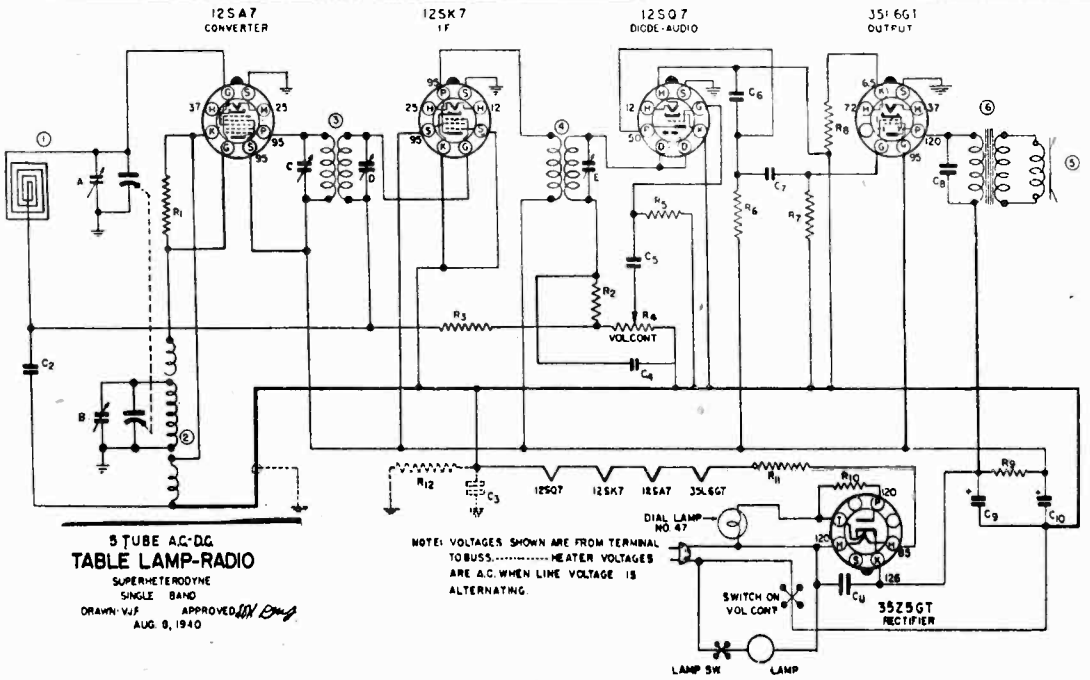
FREQUENCY RANGE

1750 to 540 KC

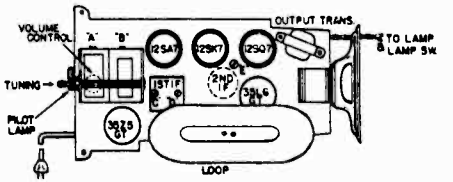
MODEL 181

MIDWEST RADIO CORP





DIAG NO.	PART NO.	DESCRIPTION	DIAG NO.	PART NO.	DESCRIPTION
R1	N-1627	20,000 OHM .5W 20%	1	N-3563	ANTENNA COIL LOOP
R2	N-1471	25,000 OHM .5W 20%	2	N-3298	OSCILLATOR COIL
R3	N-1262	1 MEGOHM .5W 20%	3	N-3565	1 ST. I.F. TRANSFORMER
R4	N-3307	.5 MEGOHM VOL. CONT.	4	N-2890	2 ND. I.F. TRANSFORMER
R5	N-1419	6 MEGOHM .5W 20%	5	N-3555	4" SPEAKER
R6	N-1261	250,000 OHM .5W 20%	6	N-3562	OUTPUT TRANSFORMER
R7	N-1264	500,000 OHM .5W 20%			
R8	N-1516	250 OHM .5W 10%			
R9	N-3341	1,000 OHM .5W 20%			
R10	N-1742	25 OHM .5W 20%			
R11	N-1498	80 OHM .5W 10%		N-3552	2 GANG CONDENSER
R12 *	N-1779	150,000 OHM .5W 10%			
C2	N-1345	.05 MFD. 200V.			
C3 *	N-3080	.22 MFD. 200V.			
C4	N-1374	100 MMFD.		*	R12 AND C3 USED ON KCU ONLY.
C5	N-2712	.004 MFD. 400V.			
C6	N-1447	.0005 MFD. 400V.			BUSS IS GROUNDED ON AC ONLY.
C7	N-1344	.01 MFD. 400V.			
C8	N-1344	.01 MFD. 400V.			
C9	N-3566	40 MFD. 150V. ELECT.			
C10		25 MFD. 50V.			
C11	N-1348	.05 MFD. 400V.			



TUBE AND TRIMMER LOCATIONS

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400 and 1720 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. Remove the chassis from the cabinet and set on a bench taking care that no iron or other metal is near the loop. (See section on replacement of tubes). Do not make this setup on a metal bench. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I. F. ALIGNMENT. With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the chassis ground. Align all three I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to a loop transmitter and couple to the loop antenna on the receiver. With the gang condenser set at minimum capacity, set the test oscillator at 1720 K.C. and adjust the oscillator (or 1720 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

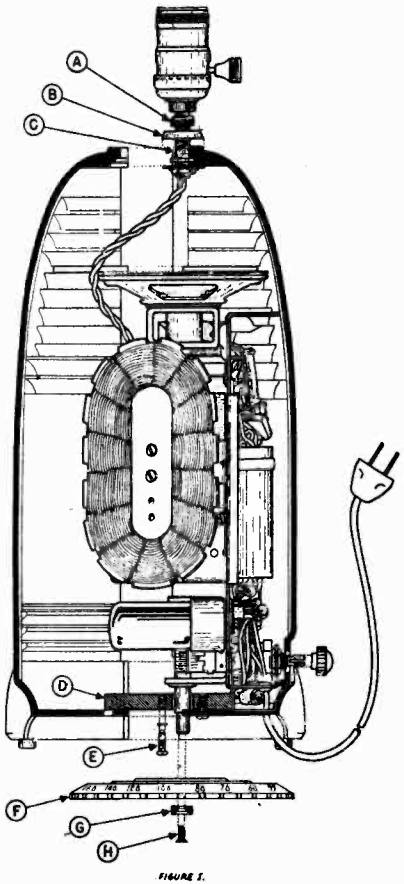


FIGURE 1.

This new Radio-Lamp of yours incorporates the latest developments and refinements that radio engineers have devised. In order to realize the advantages to the fullest extent you must thoroughly understand its operation and use. Therefore it is important that you read the following pages carefully. PLEASE READ THESE INSTRUCTIONS ALL THE WAY THROUGH BEFORE ATTEMPTING TO USE THE RECEIVER.

ASSEMBLY OF LAMP. Screw the small shade on the lamp socket and screw the lamp bulb in the socket. Then place the large shade on the small shade and the assembly is complete.

TYPE OF LAMP BULB REQUIRED. The lamp is designed to use a three light bulb. This type of bulb will give three intensities of light and comes in two sizes. For normal illumination use the 30, 70 and 100 watt size with a medium base. For better illumination use the 50, 100 and 150 watt size with a medium base. Standard 60 or 100 watt bulbs can be used successfully in the lamp, but only one intensity of light will be obtained.

TUBES USED. Five tubes are used. Their type numbers and locations are shown on the tube location diagram inside the base of the lamp. Before attempting to replace tubes see the section on ***replacement of tubes.***

ANTENNA AND GROUND. This radio lamp has a self contained loop antenna and requires no external antenna or ground. On weak stations the signal can be improved by rotating the lamp slightly.

TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.

CONNECTING THE RADIO-LAMP

Before connecting the radio-lamp be sure that your house is wired for the voltage and current for which the set is designed. If you are in doubt, call up your local power company for the necessary information. Connecting the set to a supply outlet furnishing the wrong type of current will result in improper operation or damage.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

SPECIAL INSTRUCTIONS FOR DC OPERATION. When operating from a DC (direct current) power supply, it may be necessary to reverse the power cord plug in the wall socket before the receiver will function, due to the polarity condition of a direct current supply. If the receiver fails to perform after being turned on one minute, simply reverse the power plug.

SMALL KNOB. (Manual Volume Control and "On-Off" Switch). Turn this knob to the extreme right. The switch will click and the dial will become illuminated with the volume wide open. Wait about a minute for the tubes to become heated. When signal comes in adjust volume as desired.

TUNING DIAL. (Station Selector)—Rotate the dial in the base of the lamp slowly over a narrow range of the dial at a point where the desired station is located, until the station is received with maximum volume; then readjust the volume control to the proper level. **Never** use the station selector to adjust volume as this practice results in distorted tone quality and deficient bass response. The Volume Control **only** is to be used for this purpose. For maximum clarity the indicator needle should be adjusted to the center of the area covered by the station being tuned.

CONTROLS AND OPERATION

LAMP SWITCH. The switch located in lamp socket must be turned in a clockwise direction to secure the three intensities of light if a three light bulb is used. If a standard single light bulb is used only one intensity of light will be obtained.

REPLACEMENT OF TUBES

(See Figure 1)

Remove the shades and lamp bulb to prevent damage. Next loosen screw H and slip off washer G and the dial F. Next unscrew E and the screw next to it. (These screws have red heads). At the top of lamp just below the lamp socket, will be found nut A which must be loosened sufficiently to allow collar B to be moved high enough to allow the two halves of the lamp base to be separated.

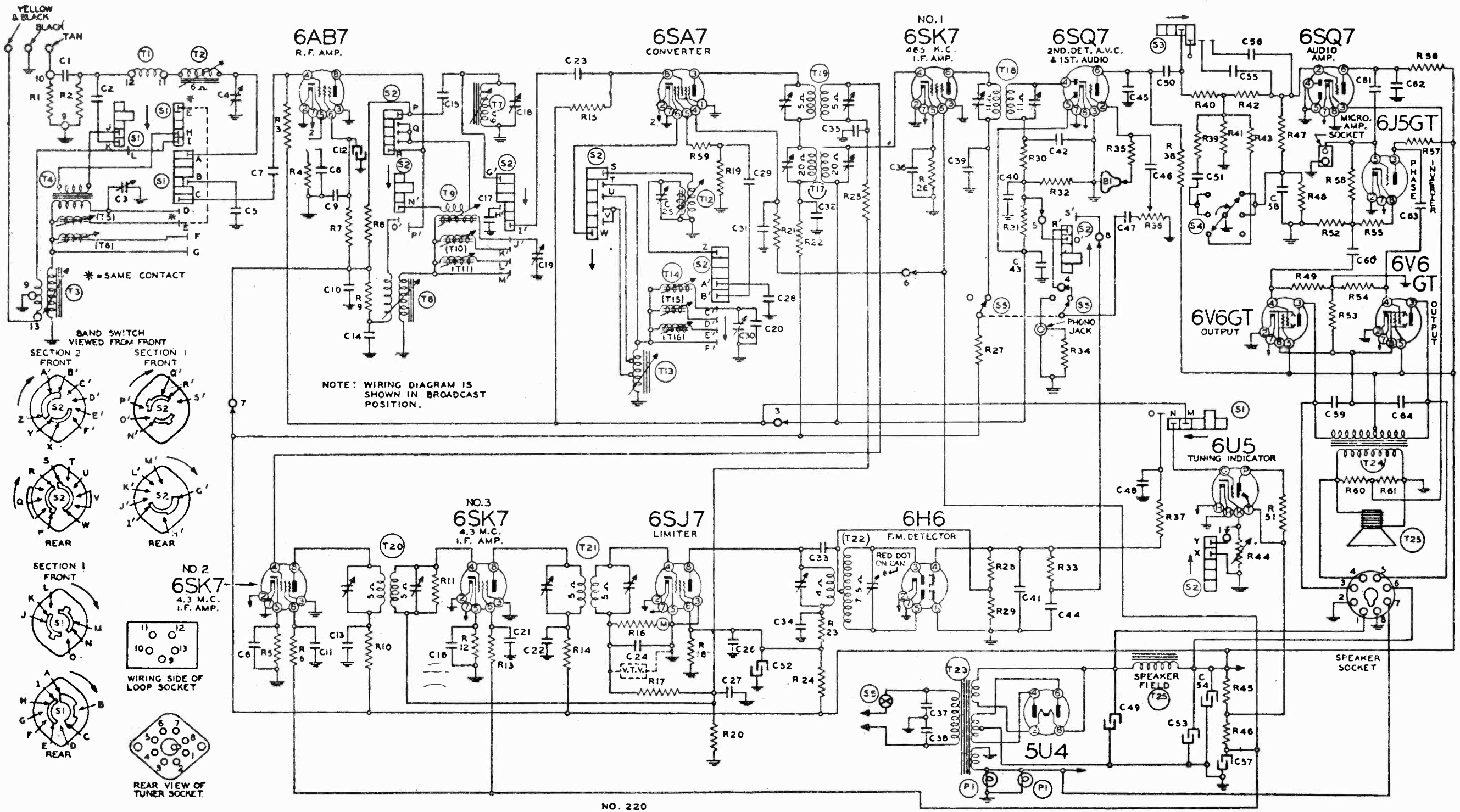
If tubes are removed from their sockets for test or replacement purposes, make certain that each tube is placed in its proper socket. (See tube layout diagram in the base of the lamp).

Failure to replace the tubes in their proper sockets may result in damage to the tube, or the receiver, or both.

MODEL 14BR-1400A IS THE SAME AS MODEL 24BR-1401B EXCEPT THAT THE FORMER HAS NO RECORD CHANGER. SEE ALSO CHANGES IN PARTS LIST

MONTGOMERY-WARD & CO.

MODEL 14BR-1400A
MODEL 24BR-1401B

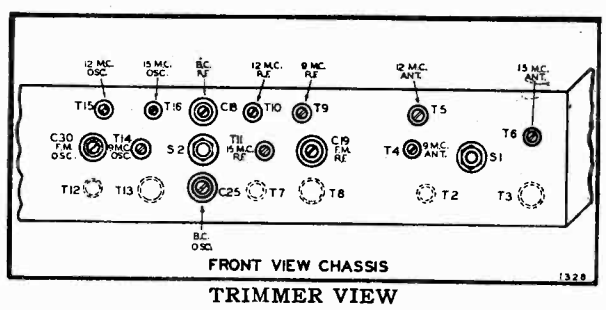


IF PEAKS: AM - 455 KC, FM - 4.3 MC

TECHNICAL DATA

POWER CONSUMPTION:
14BR-1400A....135 watts; 24BR-1401B....155 watts

Power Output - - - - - 10 Watts Undistorted
Sensitivity for 500 Milliwatt Output: 10 Microvolts Average
Selectivity - 27 KC Broad at 1000 Times Signal at 1000 KC
Tuning Frequency Range Broadcast Band - - 540 to 1600 KC
31M Band - - - 9.1 to 10 MC
25M Band - - 11.4 to 12.1 MC
19M Band - - 14.9 to 15.4 MC
F. M. Band - - 41.5 to 50.5 MC
Intermediate Frequency - - - - - - {455 KC / 4300 KC
Speaker - - - - 12 in. Electro Dynamic



TRIMMER VIEW

Broadcast and Short Wave Bands Alignment

- Tone control—Treble
- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- 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., 200 mmf., and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted in Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 No. 1	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top of T18	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top of T17	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C25 (See Trimmer View) C18 (See Trimmer on Top) C4	Osc. R. F. Ant.	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T7 Rotate Core T2 (See Iron Core Adjustment View)	R. F. Ant.	Adjust to maximum output

NOTE: The F. M., I. F. and R. F. band **MUST** be aligned before the three standard short wave bands can be properly aligned. The osc. and R. F. adjustments must be done simultaneously for each of the standard short wave bands.

31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) T14 (See Trimmer View) T9 (See Trimmer on Top) T4	Osc. R. F. Ant.	Adjust to maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15 (See Trimmer View) T10 (See Trimmer View) T5	Osc. R. F. Ant.	Adjust to maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16 (See Trimmer View) T11 (See Trimmer View) T6	Osc. R. F. Ant.	Adjust to maximum output

F. M.—I. F.—R. F.—Alignment

CAUTION: A D.C. reading vacuum tube voltmeter must be used to make the following adjustments.

- Volume control—Minimum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output 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 unmodulated signal at the test frequencies as listed.
- Vacuum Tube Voltmeter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf. and 100 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted in Order Shown	Trimmer Function	Adjustment
F. M. I. F.	4.3 Mc.	.1 MFD.	Grid of 6SK7 No. 3	F.M.	45 Mc.	Two Trimmers on Top of T21	Limiter I. F. Coil	Adjust to Maximum Voltage (See Note "A")
	4.3 Mc.	.1 MFD.	Grid of 6SA7	F.M.	45 Mc.	Two Trimmers on Top of T19	Input I. F. Coil	Adjust to Maximum Voltage (See Note "A" and "B")
	4.3 Mc.	.1 MFD.	Grid of 6SK7 No. 2	F.M.	45 Mc.	Two Trimmers on Top of T20	2nd I. F. Coil	Adjust to Maximum Voltage (See Note "A" and "C")
	4.3 Mc.	.1 MFD.	Grid of 6SJ7	F.M.	45 Mc.	Trimmer with red dot on top of T22	Disc. I. F. Coil	Adjust to zero voltage (See Note "D")
	4225 and 4375 K.C.	.1 MFD.	Grid of 6SJ7	F.M.	45 Mc.	Trimmer without red dot on top of T22	Disc. I. F. Coil	See Notes "D" and "E"
F. M. R. F.	50.5 Mc.	100 ohms	Doublet Antenna Lead	F.M.	50.5 Mc.	(See Trimmer View) C30 (See Trimmer View) C19 (See Trimmer View) C3	Osc. R. F. Ant.	Adjust to Maximum Voltage (See Note "A")

NOTE "A". Connect a D.C. reading vacuum tube voltmeter in parallel with C24. Use only enough signal to get a medium scale deflection.

NOTE "B". Before aligning this stage, one trimmer of T20 must be adjusted to maximum capacity and the other adjusted to minimum capacity.

NOTE "C". Do not realign or "Go over" the I.F. adjustments after the above procedure has been followed or an unsymmetrical wave shape will result.

NOTE "D". Connect across prongs 4 and 8 of 6H6 socket, a D.C. reading vacuum tube voltmeter.

NOTE "E". Adjust trimmer so that the same voltage reading will be obtained with the signal generator set at both 4225 K.C. and 4375 K.C. One of these frequencies will produce a negative voltage and the voltmeter leads must be reversed if a zero-center meter is not available.

FREQUENCY MODULATION (F.M.) BAND

F.M. stations are not operating in all communities as yet and since their transmitting range is seldom more than 50 miles you will not hear stations on this band unless you are near a transmitter.

OPERATING THE F.M. BAND

Turn the radio on in the usual manner and turn the band switch knob to the F.M. band—Tune the pointer slowly over the F.M. dial scale. If you hear a station tune it in correctly with the tuning eye.

TUNING EYE—F.M. BAND

The tuning eye is normally almost closed on the F.M. Band when not tuned to a station.

When tuning an F.M. station the eye will overlap as the pointer approaches the station from one side and will open when approaching from the other side. Midway between these two points the station will be tuned correctly and the eye will be nearly closed just as it is when not tuned to a station.

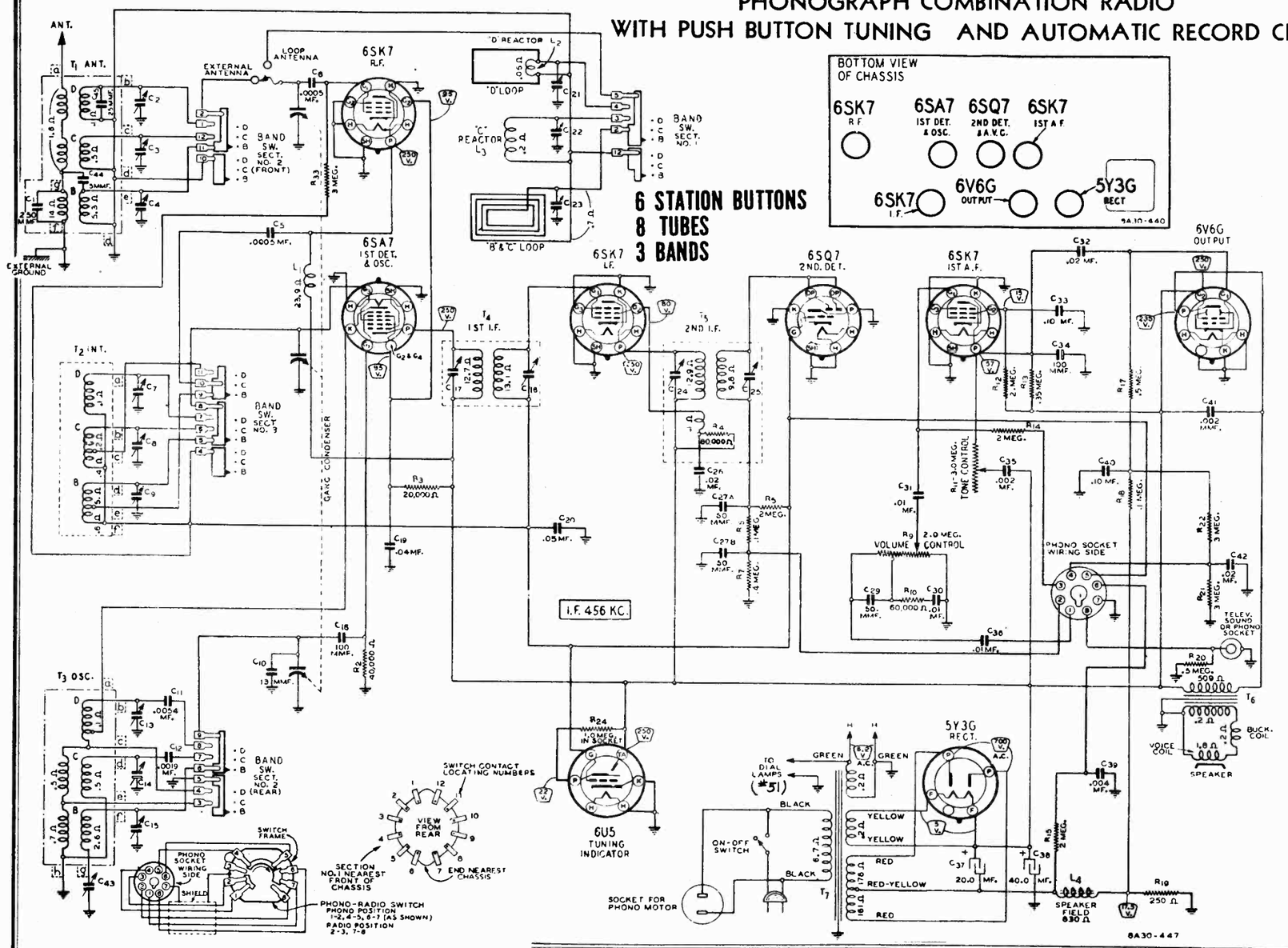
TUNING EYE ADJUSTMENT SCREW

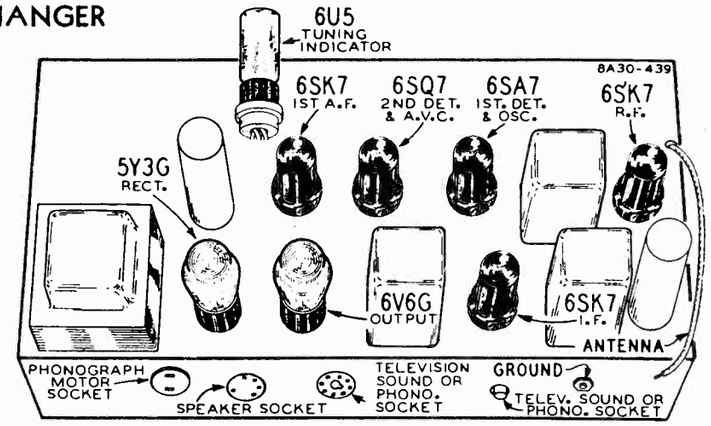
The tuning eye is adjusted for proper operation at the factory, however, if the eye tube is ever replaced it may require readjustment. With the radio tuned to the F.M. band but not on a station, turn the adjustment screw on top of the chassis until the eye almost closes. This adjustment must be made with the 6SJ7 tube out of its socket.

MODEL 04WG-804

MONTGOMERY-WARD & CO.
PHONOGRAPH COMBINATION RADIO
WITH PUSH BUTTON TUNING AND AUTOMATIC RECORD CHANGER

6 STATION BUTTONS
8 TUBES
3 BANDS





Antenna and Ground

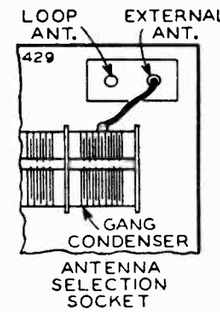
Two loop antennas are incorporated in the speaker chamber and may be used for broadcast band and short wave reception. For the reception of local or nearby stations, an outside antenna is usually not required. The use of the loop antenna may, in some locations, provide best broadcast band operation.

In general, however, more stations will be heard and noise will sometimes be reduced by using an outside antenna.

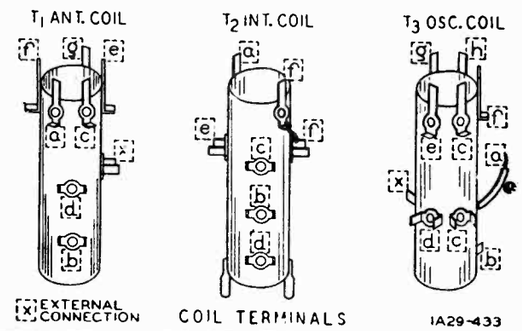
For best reception of short wave stations, an outside antenna is recommended.

A white wire will be found coming out of the chassis. Connect this wire to the outside antenna lead.

On the back panel of the chassis base is a screw (marked GND) under which the ground wire should be fastened.



ANTENNA SELECTION SOCKET—At the right front corner of the chassis base (from back of cabinet) is a 2 hole pin tip socket—See illustration. If it is desired to operate the radio using the loop antennas, the pin tip should be inserted in the hole farthest from the side of the chassis. If it is desired to operate the radio using an external antenna, insert the pin tip in the hole nearest the side of the chassis. The socket may be reached after removing the four wing nuts holding the cover over the opening in the cabinet back.



SPECIFICATIONS

Power Consumption — 71 Watts (At 117 volts 60 cycles) 88 Watts (Phonograph Operating)

Power Output — 4.0 Watts Undistorted 5.0 Watts Maximum

Selectivity — 30 KC Broad at 1000 times Signal

Intermediate Frequency — 456 KC

Speaker — 10" Electro-Dynamic

Receivers of this model which are to be used on 25 cycle, 230 volt, or other service are so marked on label.

Tuning Frequency Range

B Range	528 to 1730 KC
C Range	2200 to 7000 KC
D Range	7000 to 22000 KC

Sensitivity (For 0.5 Watt output)

B Range	1.0 Microvolt Average
C Range	1.0 Microvolt Average
D Range	3.0 Microvolts Average

Important—A good antenna and ground are essential for best operation of this radio. Connections should be clean and tight. Do not use an old outside antenna as in most cases it will be unsatisfactory.

Voltages at Sockets

Line Voltage—117.

Volume Control—Maximum.

Antenna Shorted to Ground.

Readings taken with 1000 ohm-per-volt meter. Plate and screen voltages are read on 500 volt scale.

MODEL 04WG-804

MONTGOMERY-WARD & CO.

ALIGNMENT PROCEDURE

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					1A29 ONLY { 1st I.F. (C19) & (C20); 2nd I.F. (C24) & (C25); 3rd I.F. (C28) & (C29); 1st I.F. (C17) & (C18); 2nd I.F. (C24) & (C25)
456 KC	Grid of 1st Det.	.1 mf.	B Range See Note A	Turn Rotor to Full Open	
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C15)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note B	Ant. Range B (C4) Int. Range B (C9)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C43) (C16 on 1A29) Rock Rotor—See Note C
RANGE C					
7000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C14)
6000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Max. Output	Antenna Range C (C3) Int. Range C (C8)
RANGE D					
22.000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
21,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C2) Int. Range D (C7) Rock Rotor—See Note C
LOOP RANGE B					
1500 KC See Note D	None—See Note D		B Range	Turn Rotor to Max. Output	Loop Trimmer (C23) See Note E
LOOP RANGE C					
6000 KC See Note D	None—See Note D		C Range	Turn Rotor to Max. Output	Loop Trimmer (C22) See Note E
LOOP RANGE D					
21,000 KC See Note D	None—See Note D		D Range	Turn Rotor to Max. Output	Loop Trimmer (C21) Rock Rotor—See Note C

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—For all adjustments, with the exception of the 3 loop range adjustments, the pin tip should be in the external antenna hole of the Antenna Selection Socket—See illustration on page one.

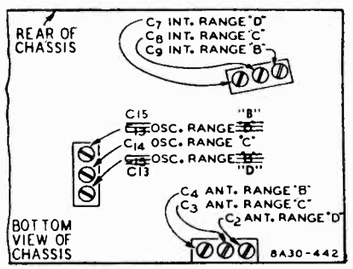
NOTE B—If the pointer is not at 1500 KC on the dial remove pointer from drive cord. Tune in a 1500 KC signal. Set pointer at the 1500 KC mark on the dial scale. Attach pointer to drive cord.

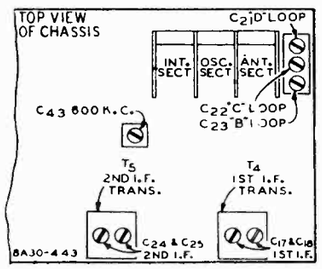
NOTE C—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

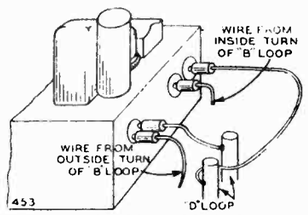
NOTE D—Re-install set in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place signal generator so that this loop is between 3 and 10 feet from loop in cabinet. Insert pin tip in loop antenna hole of Antenna Selection Socket—See illustration on schematic page.

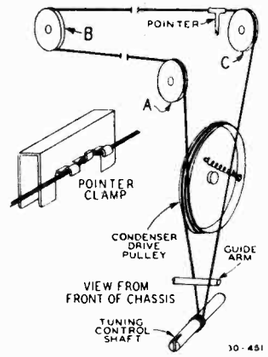
Note E (CONSOLE MODELS)—Turn knob of loop until output is maximum.

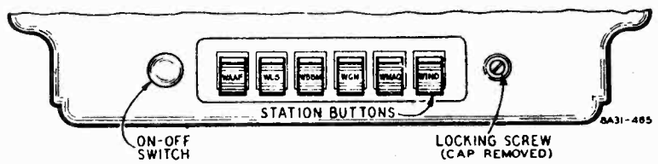
CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC. or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.







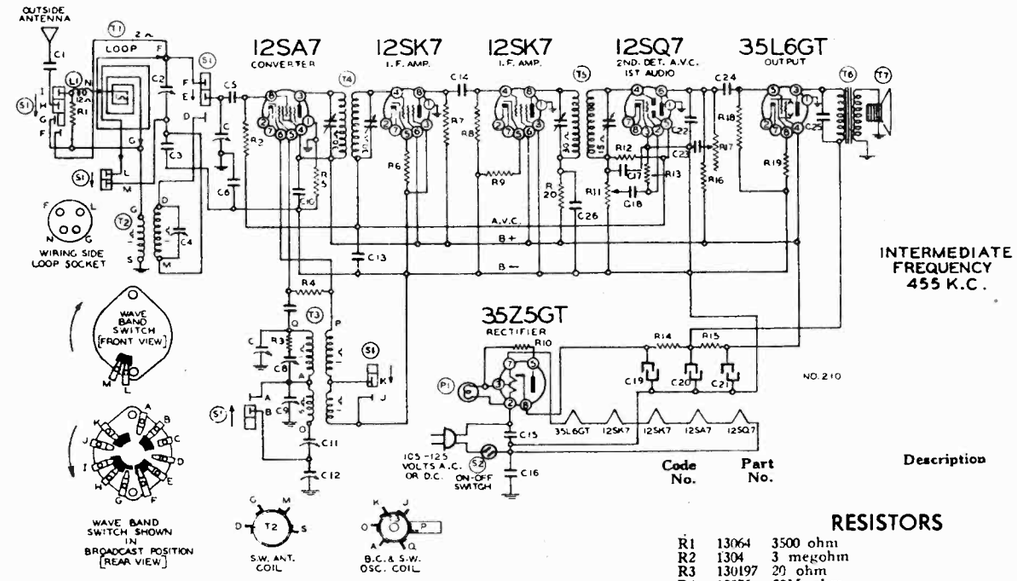


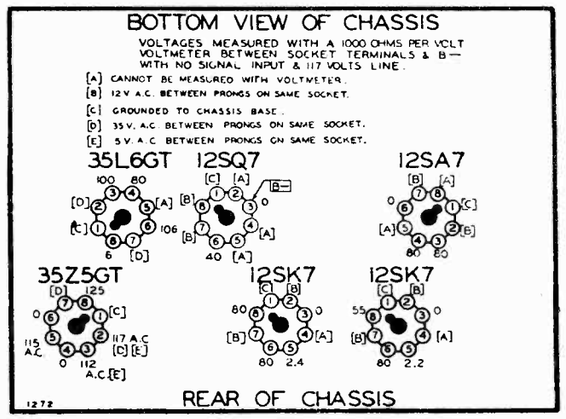


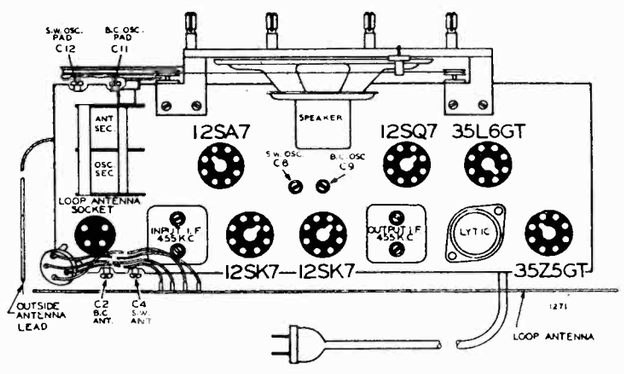
CONVENTIONAL PUSH BUTTON ADJUSTMENTS

MODEL 14BR-695

MONTGOMERY-WARD & CO.







FOR OTHER DATA SEE INDEX

RESISTORS

	Code No.	Description
R1	13064	3500 ohm
R2	1304	3 megohm
R3	130197	20 ohm
R4	13076	30M ohm
R5	130100	150M ohm
R6	13097	200 ohm—½ w.
R7	13082	10M ohm—½ w.
R8	13019	1 megohm
R9	13083	300 ohm
R10	130215	25 ohm
R11	101215	1 megohm volume control
R12	1304	3 megohm
R13	130257	5 megohm
R14	130296	200 ohm—1 w.
R15	130287	1200 ohm—1 w.
R16	13011	250M ohm
R17	101216	1 megohm tone control
R18	1303	500M ohm
R19	130166	150 ohm
R20	13022	5M ohm—½ w.

CONDENSERS

	Code No.	Description
C	102139	2 gang variable condenser
C1	10092	.001 x 600 v.
C2	124152	B.C. Antenna Trimmer
C3	1009	.05 x 200 v.
C4	124152	S.W. Antenna Trimmer
C5	1292	.0005 mica
C6	1001	.1 x 400 v.
C7	12960	.00015 mica
C8	124142	S.W. Oscillator trimmer
C9	124142	B.C. Oscillator trimmer
C10	1001	.1 x 400 v.
C11	124153	B.C. Oscillator pad
C12	124153	S.W. Oscillator pad
C13	1009	.05 x 200 v.
C14	1292	.0005 mica
C15	1001	.1 x 400 v.
C16	1001	.1 x 400 v.
C17	129158	.0002 mica
C18	10012	.003 x 600 v.
C19	11994	40 mfd. x 150 v. lytic
C20	11994	20 mfd. x 150 v. lytic
C21	11994	20 mfd. x 150 v. lytic
C22	1295	.0001 mica
C23	1007	.005 x 600 v.
C24	10011	.01 x 400 v.
C25	10026	.02 x 400 v.
C26	10013	.05 x 400 v.

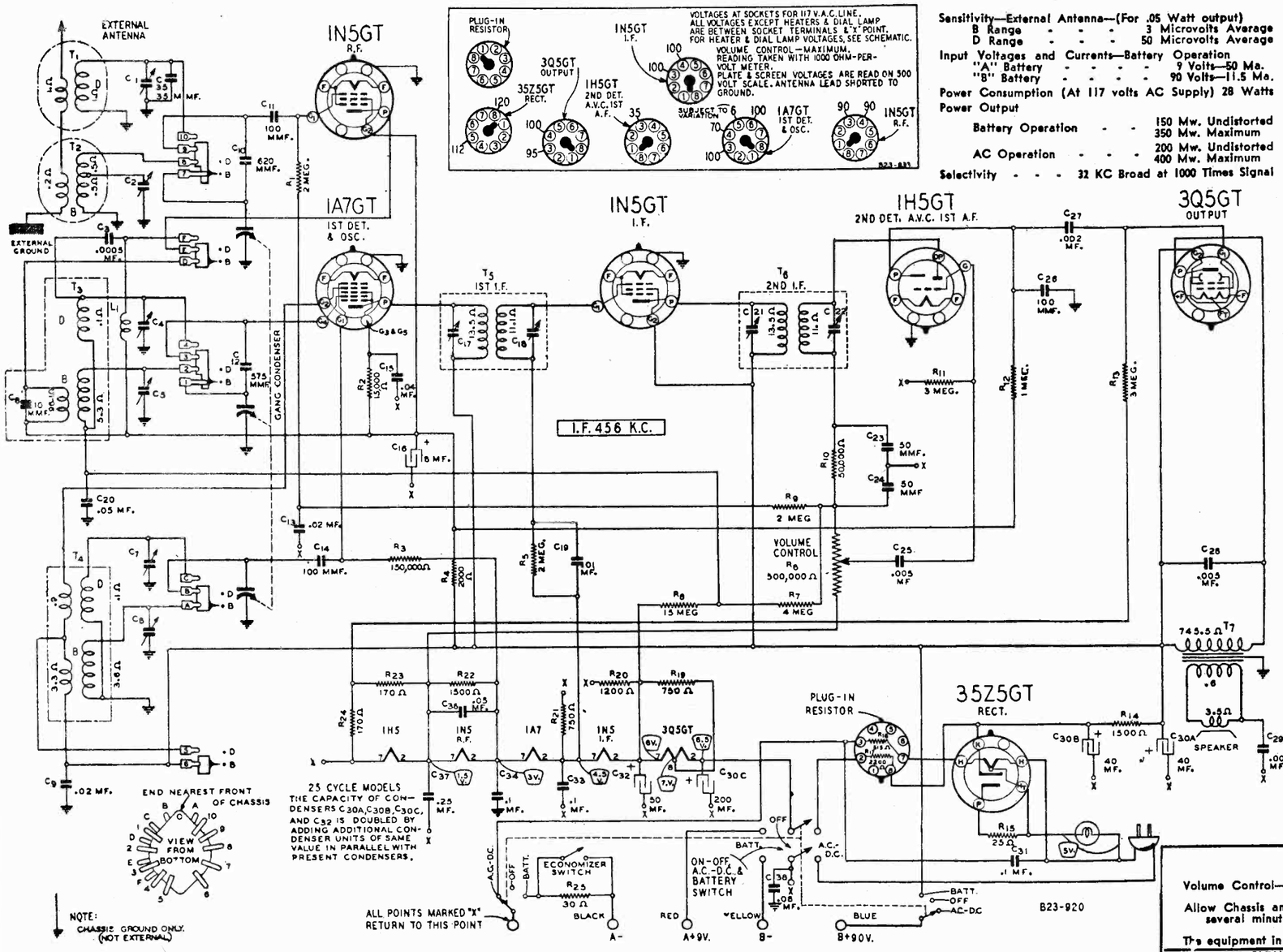
C2 and C4 are in same unit C8 and C9 in same unit
C11 and C12 in same unit
C19, C20 and C21 in same unit

PARTS

	Code No.	Description
T1	111217	Loop Antenna Assembly
T2	111219	S.W. Antenna coil
T3	110169	B.C. S.W. Oscillator Coil
T4	108169F	Input I.F. Coil—455 kc.
T5	108130F	Output I.F. Coil—455 kc.
T6	105104C	Output Transformer
T7	114224	5" P.M. Speaker
L1	1239	R.F. Choke coil
S1	125139	Wave band switch
S2		Switch on volume control
P1	107249	Pilot light

MODEL 14WG-683A

MONTGOMERY-WARD & CO.



Sensitivity—External Antenna—(For .05 Watt output)

B Range	3 Microvolts Average
D Range	50 Microvolts Average

Input Voltages and Currents—Battery Operation

"A" Battery	9 Volts—50 Ma.
"B" Battery	90 Volts—11.5 Ma.

Power Consumption (At 117 volts AC Supply) 28 Watts

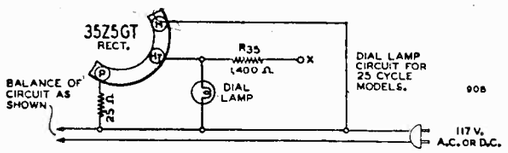
Power Output

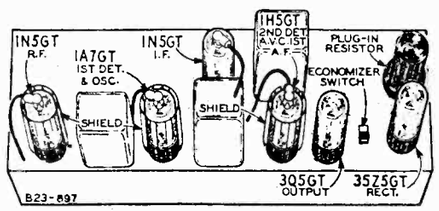
Battery Operation	150 Mw. Undistorted 350 Mw. Maximum
AC Operation	200 Mw. Undistorted 400 Mw. Maximum

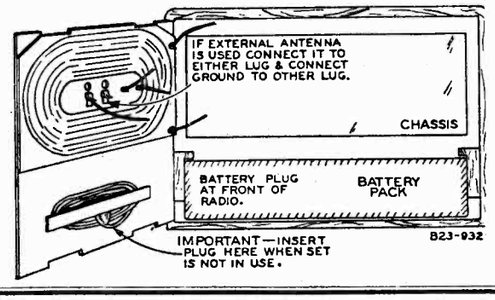
Selectivity - - - 32 KC Broad at 1000 Times Signal

Tuning Frequency Range

B Range	535 to 1610 KC
D Range	9000 to 18300 KC





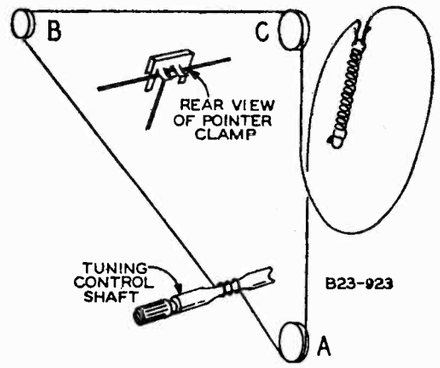


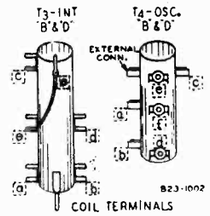
DRIVE CORD REPLACEMENT

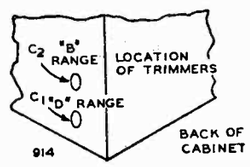
Turn gang condenser to full open position —See illustration. Using a new drive cord 33" in length, tie one end to tension spring. Pass the other end through hole in rim of drive pulley. Pull spring flush against inside of pulley rim. Wind cord ¼ turn around drive pulley toward front of chassis. Continue cord under chassis idler pulley "A." Wind 3 turns clockwise (from front of chassis) around tuning control shaft. Turns should progress away from chassis.

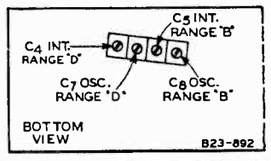
Pass cord around idler pulleys "B" and "C" as shown in illustration.

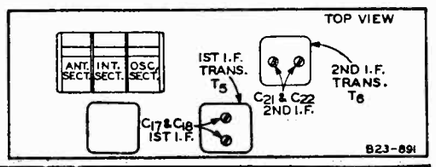
Continue cord ¾ turn counter-clockwise (from gang end of chassis) around drive pulley. Turn should be on right side of pulley groove (from front of chassis). Pass cord through hole in pulley rim and tie to end of tension spring. Secure free end of tension spring to hook on pulley.











ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

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

This equipment in column at right 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., 100 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR ANTENNA CONNECTION	SIGNAL GENERATOR GROUND CONNECTION	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER OR DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM
Remove chassis from cabinet—disconnect the 3 loop leads at terminal strip on chassis.						
I.F. 456 KC	Top Grid 1A7GT 1st Det.	Point "X" {1H5GT—2nd Det. Prong No. 7}	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C21) & (C22) 1st I.F. (C17) & (C18)
RANGE B 1610 KC	Top Grid 1N5GT RF Tube	Same as Above	.1 mf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C8)
1400 KC	Same as Above	Same as Above	.1 mf.	B Range	Turn Rotor to Max. Output Set Indicator to 1400 KC—See Note A	Int. Range B (C5)
RANGE D 18,300 KC	Same as Above	Same as Above	.1 mf.	D Range	Turn Rotor to Full Open	Oscillator Range D (C7)
17,500 KC	Same as Above	Same as Above	.1 mf.	D Range	Turn Rotor to Max. Output	Int. Range D (C4) Rock Rotor—See Note B
Reassemble chassis in the cabinet. Resolder loop leads. Both antenna terminals are reached through openings in the side of cabinet.						
LOOP RANGE B 1400 KC	External Antenna Clip	External Ground Clip	100 mmf.	B Range	Turn Rotor to Max. Output	Ant. Range B (C2)
LOOP RANGE D 17,500 KC	External Antenna Clip	External Ground Clip	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1)

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

NOTE A—If the pointer is not at 1400 KC, set it 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 & CO.

MODEL 14WG-683A
MODEL 14WG-683B

MODEL 14WG-683B

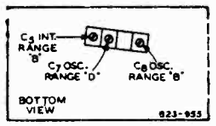
In the issue "B" chassis, a loading coil with an adjustable iron core is connected across the secondary winding of the shortwave loop aerial—See partial schematic circuit diagram below.

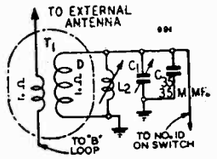
The interstage range "D" and interstage range "B" trimmers have been relocated—See trimmer illustrations below.

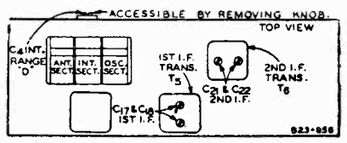
ADDITIONAL ALIGNMENT PROCEDURE

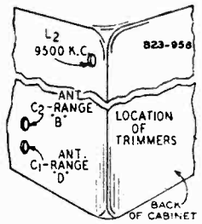
FIRST COMPLETE THE ALIGNMENT PROCEDURE THROUGH LOOP RANGE "B", AS GIVEN IN THE ALIGNMENT PROCEDURE ON THE OTHER SIDE OF THIS PAGE. THEN MAKE THE FOLLOWING ADJUSTMENTS:

SIGNAL GENERATOR FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER OR DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM
LOOP RANGE D 17,500 KC	External Antenna Clip	External Ground Clip	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Int. Range D (C4) Rock Rotor—See Note B
9,500 KC	Same as Above	Same as Above	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D Loading Coil









Supplement to Schematic

The following NEW PARTS are used in issue "B" models:

Part No.	Description	Selling Price
9A1437	L2 Loading Coil Assembly	$0.36
17A116	C4 Trimmer Condenser	.10

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 14WG-683A,B

GENERAL INFORMATION

ANTENNA

This radio is equipped with 2 built-in Airwave Loop Aerials. One of these is used for Broadcast Band reception. The other is used for reception on the Short Wave Band. For reception of local or powerful nearby stations, no other antenna or ground is usually required. Directional effects are obtained when using the Broadcast Band loop aerial. Rotate the radio until signal pickup is at a maximum and there is least interference from nearby stations.

More stations will be heard and noise will often be reduced by using an outside antenna and a good ground.

For locations in the city or close to broadcasting stations, the antenna should be 20 to 35 feet in length while for locations in the country or at a distance from the broadcasting stations, use a 35 to 60 foot antenna.

A GROUND CONNECTION IS REQUIRED if an external antenna is used. A ground connection may be obtained by connecting to a water pipe, radiator, or pipe driven into the ground.

The antenna and ground connections are made at the clips on the loop antenna. Pass the antenna and ground leads through the holes in the cabinet back. Connect the antenna lead to either clip and the ground lead to the other clip—See illustration.

TUBES AND DIAL LAMP

The tube types and position of the tubes and tube shields are shown in the illustration. All tubes must be in the sockets to operate the radio.

AC-DC Operation—The dial lamp must be in its socket to operate the radio.

CAUTION—If the dial lamp burns out, it should be replaced at once. Use ONLY a No. 47 dial lamp.

MODEL 14WG-683A

MONTGOMERY-WARD & CO.

BATTERY OPERATION

The following battery pack is required:

Battery Pack Catalog No. 62-5015

Note the position of the prongs on the battery cable plug and the holes in the socket on the battery. Then insert the plug in the socket. Place the pack in the cabinet with the socket facing toward the front of the cabinet.

Wind the line cord around the reel on the back cover of the cabinet. Insert the line cord plug in the hole in the bottom of the reel.

Economizer Switch — When the battery pack is new, push the Economizer Switch on top of the chassis toward the front of the chassis.

When the battery pack has been in use for approximately 100 hours and reception becomes weak, push the Economizer Switch toward the back of the chassis.

The position of the Economizer Switch does not affect the radio when operating on AC or DC.

AC-DC OPERATION

Unwind power line cord from reel and pass cord through opening at lower right hand corner of back.

Check Your Line Voltage—Unless otherwise marked, this radio must be operated on a power supply of 105-125 volts AC, 50 to 60 cycles only, or 105-125 volts DC.

Radios for 25 cycle AC operation are so marked.

When using the radio on AC, if there appears to be excessive hum, reverse the plug. Leave the plug inserted the way which gives the least hum.

110 Volt DC Operation—Insert plug so that prong on same side as *ribbed* side of cord is on the positive side of the line. *CAUTION*—If polarity of line is not known, insert plug; if set does not operate after one minute, reverse plug.

REMOVING CHASSIS FROM CABINET

Pull off the 3 control knobs. Remove the spring nut from the band switch shaft. With the band switch in the "BC" position, lift the band switch lever off the shaft. Unscrew the 2 nuts at the back of the chassis and the bolt from the front. CAUTION—Do not push on bolts while unscrewing nuts, as they will tear cabinet covering. Disconnect chassis leads and pull chassis out of the cabinet.

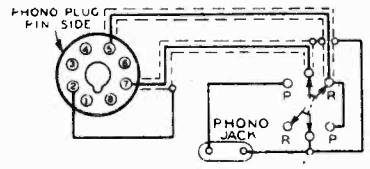
REPLACEMENT PARTS LIST

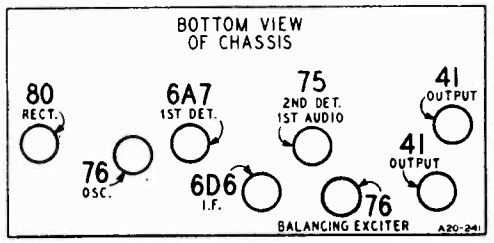
Part No.	Description	Selling Price
	MISCELLANEOUS	
12A395	5¼" P.M. Dynamic Speaker complete with Output Transformer	$2.98
	Cone and Voice Coil Assembly (Specify part number and letters stamped on the above speaker)	1.06
	Output Transformer for above Speaker	1.06
14X286	Grille Cloth for Speaker	.10
10A382	Knob (Off Switch—AC-DC—Battery Switch)	.06
10A383	Knob (Tuning Control)	.06
10A384	Knob (Volume Control)	.06
3A303	Tube or Resistor Socket—Octal (8 Prong)	.06
30X44	Grid Caps	Doz. .06
32X174	Tube Shield	.06
13X328	Line Cord and Plug Assembly	.18
2A204	Off Switch—AC-DC—Battery Switch	.46
2A205	Band Change Switch	.46
2A175	Economizer Switch	.10
28X265	Phosphor Bronze Ground Plate (Under 2nd I.F. Can)	.06
13X430	"A" and "B" Battery Cable and Plug Assembly	.22
28X286	Plug Button	Ea. .06
	TRANSFORMERS AND COILS	
9A1431	T1 Loop Aerial Assembly (Short Wave Band)	$0.36
9A1435	T2 Loop Aerial Assembly (Broadcast Band)	.60
9A1440	T3 R.F. Interstage Transformer and Can Assembly complete with 10 mmf. Condenser	.78
9A1436	T4 Oscillator Coil Assembly	.66
9A1438	T5 1st I.F. Transformer and Can Assembly	.58
9A1439	T6 2nd I.F. Transformer and Can Assembly	.58
	T7 Output Transformer (See "Miscellaneous")	
9A1115	L1 Plate Reactor	.58
	CONDENSERS	
17A132	C1, C2 2-25 mmf. Loop Range "D" / "B" Trimmer	$0.12
B66501	C3 .0005 mf. 200 Volts Tubular	.06
17A171	C4, C5, C7, C8 2.5-25 mmf. Interstage Range "D" / "B" / Oscillator Range "D" / "B" Trimmer	.30
47X111	C6 10 mmf. Molded	.06
D66203	C9 .02 mf. 400 Volts Tubular	.06
46X337	C10 620 mmf. Polystyrene	.12
47X57	C11, C14, C26 100 mmf. Molded	.06
46X336	C12 575 mmf. Polystyrene	.12
B66203	C13 .02 mf. 200 Volts Tubular	.06
B66403	C15 .04 mf. 200 Volts Tubular	.06
45X293	C16 8 mf. 200 Volts Dry Electrolytic	.22
	C17, C18 Part of 1st I.F. Assembly	
B66103	C19 .01 mf. 200 Volts Tubular	.06
B66503	C20, C36 .05 mf. 200 Volts Tubular	.06
	C21, C22 Part of 2nd I.F. Assembly	
47X56	C23, C24 50 mmf. Molded	.06
B66502	C25, C29 .005 mf. 200 Volts Tubular	.06
B66202	C27 .002 mf. 200 Volts Tubular	.06
D66502	C28 .005 mf. 400 Volts Tubular	.06
45X307	C30A 40 mf. 150 Volts / C30B 40 mf. 150 Volts / C30C 200 mf. 35 Volts Dry Electrolytic (2 USED ON 25 CYCLE MODELS)	.58
D66104	C31, C34 .10 mf. 400 Volts Tubular	.10
45X244	C32 50 mf. 30 Volts Dry Electrolytic (2 USED ON 25 CYCLE MODELS)	.28
B66104	C33 .10 mf. 200 Volts Tubular	.06
47X53	C35 35 mmf. Molded	.06
B66254	C37 .25 mf. 200 Volts Tubular	.10
D66803	C38 .08 mf. 400 Volts Tubular	.06
14A147	3 Section Gang Condenser complete with Drive Pulley	1.56
	RESISTORS	
B95205	R1, R5, R9 2.0 Megohm 0.5 Watt Carbon	$0.06
B95153	R2 15,000 Ohm 0.5 Watt Carbon	.06
B95154	R3 150,000 Ohm 0.5 Watt Carbon	.06
B95202	R4 2,000 Ohm 0.5 Watt Carbon	.06
B95156	R6 15.0 Megohm 0.5 Watt Carbon	.06
B95405	R7 4.0 Megohm 0.5 Watt Carbon	.06
36X308	R8 500,000 Ohm Volume Control	.30
B95503	R10 50,000 Ohm 0.5 Watt Carbon	.06
B95305	R11, R13 3.0 Megohm 0.5 Watt Carbon	.06
B95105	R12 1.0 Megohm 0.5 Watt Carbon	.06
B95152	R14 1,500 Ohm 0.5 Watt Carbon	.06
B95250	R15 25 Ohm 0.5 Watt Carbon	.06
43X114	R16 515 Ohm 12 Watt / R17 2,200 Ohm 5 Watt Wire Wound	.34
B94751	R19, R21 750 Ohm 0.5 Watt Carbon	.08
B94122	R20 1,200 Ohm 0.5 Watt Carbon	.08
B94152	R22 1,500 Ohm 0.5 Watt Carbon	.08
B94171	R23, R24 170 Ohm 0.5 Watt Carbon	.08
B94300	R25 30 Ohm 0.5 Watt Carbon	.08
43X104	R35 1,400 Ohm 12 Watt Wire Wound (25 CYCLE MODELS ONLY)	.36
	DIAL AND DRIVE ASSEMBLY	
26A309	Dial Mounting Plate Assembly complete with Idler Studs and Pulleys less Dial Scale	.36
58X535	Dial Scale	.06
17X64	Celluloid Crystal	.10
28X56	Clamp Buttons (To Mount Dial Scale)	Doz. .06
4X620	Escutcheon for Dial	.60
15X192	Pointer for Dial Scale	.10
	33" Drive Cord (18 lb. test)	.04
28X95	Tension Spring for Drive Cord	Doz. .16
26X359	Tuning Control Shaft	.06
25X833	Bracket for Above Shaft	.04
19X192	"C" Washers for above Shaft	.06
26A310	Lever Assembly for Band Switch	.22
4X622	Escutcheon for Band Switch	.16
7A140	Dial Lamp Socket and Cable Assembly	.12
7A103	Dial Lamp (No. 47)	.10

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 62-910

MONTGOMERY-WARD & CO.

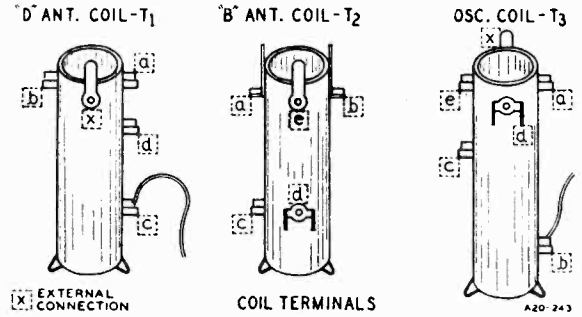




Power Consumption -- 65 Watts (At 117 volts 60 cycles)

Power Output - - - - - - - 3.0 Watts Undistorted, 4.0 Watts Maximum

Selectivity - - 40 KC Broad at 1000 times Signal



Sensitivity (For 0.5 watt output)

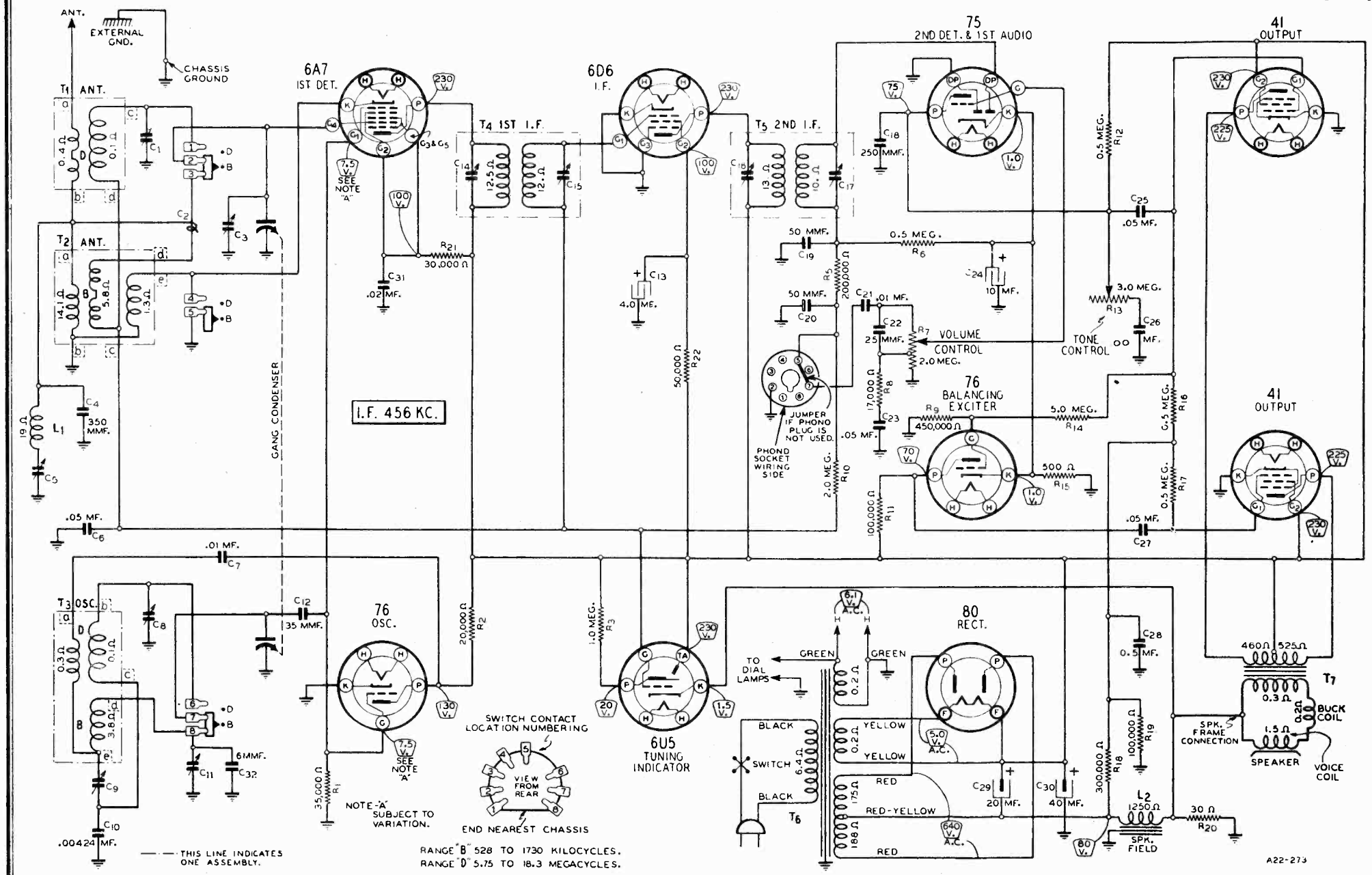
B Range..... .....25 Microvolts Average

D Range..... .....40 Microvolts Average

Tuning Frequency Range

B Range..... 528 to 1730 KC (Kilocycles)

D Range.....5750 to 18300 KC (Kilocycles)



Drive Cord Replacement

Tie a knot with a small loop at one end of the new drive cord. Tie the other end to the tension spring, leaving a distance of 64⅛ inches between the knots.

Turn the gang condenser to the full open position. Secure the free end of the spring over hook A—See Fig. 4. Turn the gang condenser to the completely closed position.

Pass the cord through slot B and, guiding the cord in the groove of the drive drum, turn the gang condenser to the full open position. Hook the cord in slot B and turn the gang condenser to the completely closed position. Unhook the cord from slot B and pass over pulleys C, D, and E as shown. Pass the cord in front of idler pulley F. Wind 2½ turns counter-clockwise (from front of chassis) around the drive shaft spool, progressing away from the chassis. Pass cord up and over the drive drum. Guiding the cord in the groove of the drive drum, turn the gang condenser to the full open position. If necessary, stretch the tension spring and pull the drive cord taut. Pass drive cord through slot B and secure the loop to the tension spring at point G.

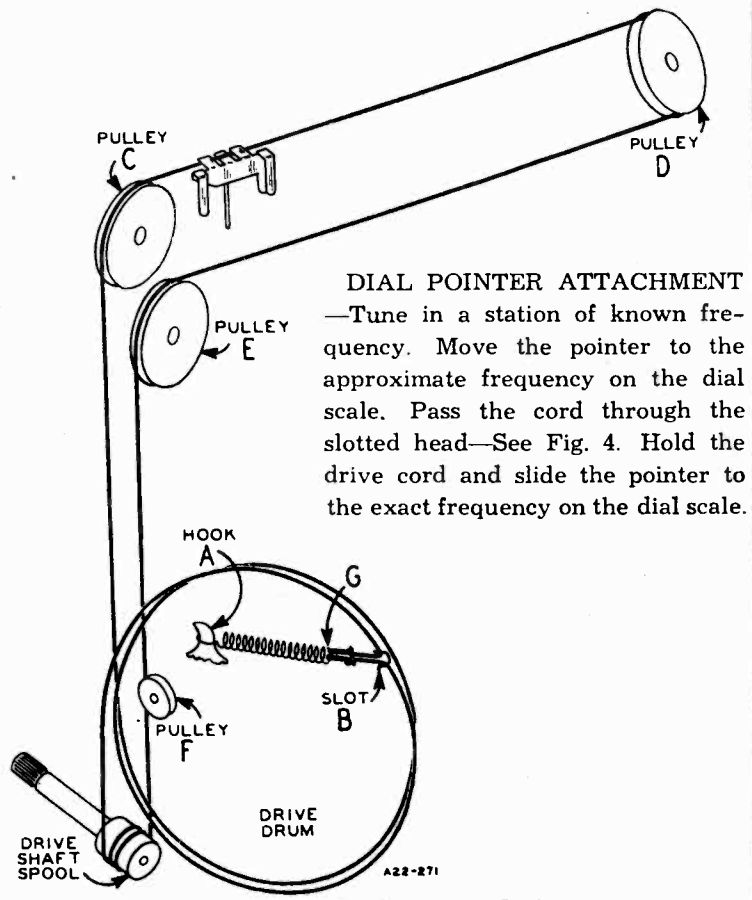


Fig. 4—Drive Cord Replacement

DIAL POINTER ATTACHMENT—Tune in a station of known frequency. Move the pointer to the approximate frequency on the dial scale. Pass the cord through the slotted head—See Fig. 4. Hold the drive cord and slide the pointer to the exact frequency on the dial scale.

MONTGOMERY-WARD & CO.

MODEL 62-910

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.

IMPORTANT—Follow procedure in the order shown.

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., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER OR DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F. 456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C16) & (C17) 1st I.F. (C14) & (C15)
WAVE TRAP 456 KC	Antenna Lead	200 mmf.	B Range	600 KC	Wave Trap (C5) Adjust for MINIMUM Output
RANGE B				Turn Rotor to Full Closed Position. Pointer should be at low frequency end mark on scale—See Note A.	
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor until dial pointer is at 1500 KC	Oscillator Range B (C11)
1500 KC	Antenna Lead	200 mmf.	B Range	Leave Rotor at above setting	Ant. Range B (C3)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
RANGE D 18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C8)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Rock Rotor—See Note B

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—The low frequency end mark is a small dot at the left side of the short wave scale under the "5." of the number 5.8 and to the right of the "C" of the letters MC. If the pointer is not at this mark on the dial, move the pointer to this mark.

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

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC on the dial. It may be necessary to increase the input signal to hear the image.

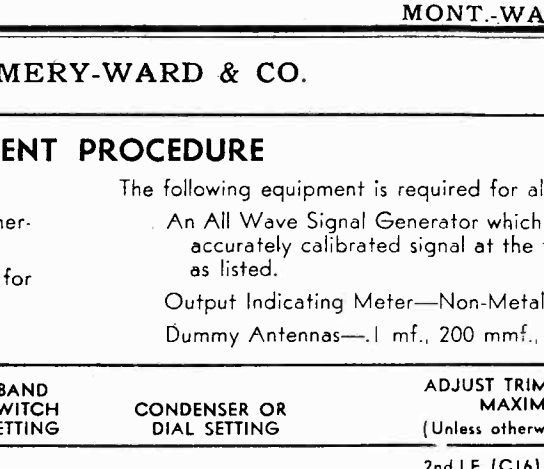


Fig. 2—Location of Trimmers

Rack and Pinion Assembly

If it is ever necessary to re-assemble the automatic tuning unit, proceed as follows: The pinion gear shaft should be held in such a position that the flat portion is vertical or turned slightly counter-clockwise from the vertical as shown in Fig. 5.

The lower rack should be meshed with the pinion gear so that the 8th tooth from the front on each side of the rack is in line with the axis of the pinion gear shaft—See Fig. 5. The upper rack should then be lined up with the lower rack and meshed with the pinion gear. The 8th tooth from the front on each side of the upper rack will then line up with the axis of the pinion gear shaft.

The rear and side brackets can then be mounted on the rack and pinion assembly.

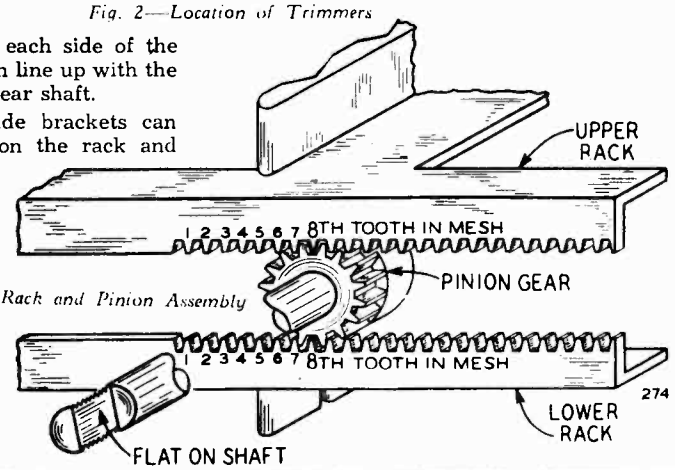


Fig. 5—Rack and Pinion Assembly

MODEL 62-910

MONTGOMERY-WARD & CO.

GENERAL

32X110	Tube Shield		.10
32X111	Tube Shield Base		.10
2X289	Felt Washers (Used behind knob.)	Doz.	.10
8X73	Rubber Cushions (Chassis Mounting)	Ea.	.10
30X14	Grid Clip only	Doz.	.10
4A92	Terminal Strip (3 Lugs Insulated—1 Mounting Foot)		.10
4A89	Terminal Strip (1 Lug Insulated—1 Mounting Foot)		.10
4A98	Terminal Strip (6 Lugs—4 Lugs Insulated)		.10
4A99	Terminal Strip (2 Lugs—1 Lug Insulated)		.10
13X80	Line Cord and Plug Assembly		.50
2A138	Band Change Switch		.60

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
9A1033	T1	Antenna Transformer Assembly—"D" Range	$0.45
9A1032	T2	Antenna Transformer Assembly—"B" Range	.75
9A1034	T3	Oscillator Coil Assembly	.75
9A1026	T4	1st I.F. Transformer and Can Assembly	1.25
9A1027	T5	2nd I.F. Transformer and Can Assembly	1.20
53X193	T6	117 Volt, 60 Cycle, Standard Power Transformer	3.55
53X194	T6	117 Volt, 25 Cycle, Standard Power Transformer	5.95
53X195	T6	117-234 Volt, 40-60 Cycle, Universal Power Transformer	4.60
	T7	Output Transformer (See "Speakers")	
9A1028	L1	Wave Trap Coil Assembly	.30

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
46X80	C6, C23	.05 mf.	180	$0.15
46X124	C7, C21	.01 mf.	180	.15
46X236	C10	.00424 mf.	180	.30
46X103	C25, C27	.05 mf.	240	.15
46X114	C26	.004 mf.	600	.15
46X206	C28	.50 mf.	180	.25
46X223	C31	.02 mf.	240	.10

ELECTROLYTIC

45X247	C13	4 mf.	250 Dry	.40
45X239	C24	10 mf.	25 Dry	.30
44X41	C29	20 mf.	350 Wet	.75
44X42	C30	40 mf.	250 Wet	.80

MOLDED

47X95	C4	350 mmf.	.10
47X53	C12	35 mmf.	.10
47X65	C18	250 mmf.	.15
47X72	C22	25 mmf.	.10

TRIMMER

17A99	C1	2-25 mmf.	Antenna Range "D"	.25
	C8	2-25 mmf.	Oscillator Range "D"	
	C11	2-25 mmf.	Oscillator Range "B"	
Part of Gang Condenser	C3		Antenna Range "B"	
17A95	C5	75-125 mmf.	Wave Trap	.25
17A81	C9	300-600 mmf.	600 KC Padder	.30
17A57	C14	50-120 mmf.	1st I.F.	.35
	C15	50-120 mmf.		
17A80	C16	50-120 mmf.	2nd I.F.	.30
	C17	85-185 mmf.		

MISCELLANEOUS

17X112	C19	50 mmf.	Mica—Dual Condenser .10
	C20	50 mmf.	
17A103	C32	6 mmf.	Compensating Capacitor .25
14A97		2 Section Gang Condenser less Dial and Drive Assembly	2.00

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
A84353	R1	35,000 Ohm	0.2	$0.15
B84203	R2	20,000 Ohm	0.5	.15
	R3	1 Megohm	(See "Sockets")	
A85204	R5	200,000 Ohm	0.2	.10
A84504	R6	500,000 Ohm	0.2	.15
A84173	R8	17,000 Ohm	0.2	.15
A83454	R9	450,000 Ohm	0.2	.20
A84205	R10	2 Megohm	0.2	.15
A85104	R11	100,000 Ohm	0.2	.10
A85504	R12, R16, R17	500,000 Ohm	0.2	.10
A83505	R14	5 Megohm	0.2	.20
A84501	R15	500 Ohm	0.2	.15
A84304	R18	300,000 Ohm	0.2	.15
A84104	R19	100,000 Ohm	0.2	.15
A84300	R20	30 Ohm	0.2	.15
B84303	R21	30,000 Ohm	0.5	.15
A84503	R22	50,000 Ohm	0.2	.15

VARIABLE

36X255	R7	2 Megohm	On-Off Switch and Volume Control	.80
40X235	R13	3 Megohm	Tone Control	.50

MISCELLANEOUS

SOCKETS

Part No.	Description	List Price
3A288	Tube Socket (7 prong)	$0.15
3A284	Tube or Speaker Socket (6 prong)	.10
3A283	Tube Socket (5 prong)	.10
3A282	Tube Socket (4 prong)	.10
3A289	Tube Socket (5 prong) for 76 Osc. Tube	.10
3A290	Phono Socket (3 prong)	.10
13X348	Tuning Eye Tube Socket and Cable Assembly complete with 1.0 Megohm Resistor—R3	.45

SPEAKER

When ordering parts for speakers, specify part number of speaker and letters preceding part number stamped on the speaker.

12A321	10" Electro-Dynamic Speaker complete with Output Transformer (T7)	5.50
	Cone and Voice Coil Assembly for above Speaker	2.40
	Field Coil for above Speaker	1.60
	Output Transformer only (T7)	1.80

KNOBS

Specify Name of Knob and Name and Chassis No. of Radio 10A199

	On-Off Switch and Volume Control Knob	.10
	Tone Control Knob	.10
	Tuning Control Knob	.10
	Band Switch Knob	.10
	Station Buttons Ea.	.10

AUTOMATIC TUNING ASSEMBLY

Part No.	Description	List Price
25A340	Automatic Tuning Push Button Assembly complete less Gang Condenser, Drive Drum, Dial Mounting Plate, and Push Buttons	$4.15
25A356	Side Bracket for Tuning Assembly complete with Idler Pulley and Shaft	.20
24X353	Idler Pulley for above Shaft	.10
28X168	Hair Pin Spring for above Pulley Doz.	.10
25A344	Side Bracket for Tuning Assembly complete with Support Stud for Gang Condenser	.15
25X583	Support Bracket for Gang Condenser	.10
25X579	Front Bracket for Tuning Assembly	.25
25X578	Rear Bracket for Tuning Assembly	.10
25A341	Station Button Plunger complete with Setting Screw and Rubber Bumper	.35
20X296	Setting Screw for above Station Button Plunger	.10
8X64	Rubber Bumper for above Station Button Plunger Doz.	.10
28X149	Tension Spring for above Station Button Plunger Doz.	.45
24X372	Upper Rack Casting	.15
25A343	Lower Rack Casting complete with Tension Springs	.25
25A345	Gear Shaft complete with 2 Gears	.40
24X376	Coupling Sleeve for Gang Condenser	.10
26A98	Call Letter Sheets and Celluloid Tabs	.20

DIAL AND DRIVE ASSEMBLY

No. 10 DIAL—Models using this dial may be identified by the felt dial background.
No. 11 DIAL—Models using this dial may be identified by the paper dial background.
The following parts are common to No. 10 and 11 dials unless otherwise indicated.

Part No.	Description	List Price
26A164	Dial Mounting Plate complete with 3 Idler Pulleys, Tuning Eye Tube Clamp, and Brace (No. 10 Dial)	$1.05
26A142	Dial Mounting Plate complete with 3 Idler Pulleys, Tuning Eye Tube Clamp, and Brace (No. 11 Dial)	.95
26X301	Tuning Knob Shaft only	.10
24X377	Wooden Spool for above Shaft	.10
19X67	Horse Shoe Washers for above Shaft and Drive Drum Doz.	.10
19X62	Flat Washer for above Shaft Doz.	.10
25X580	Bracket for above Shaft	.10
24X374	Drive Drum for Gang Condenser	.10
19X153	Washers for Drive Drum (With "D" Shaped Hole) Doz.	.15
	70" Drive Cord	.10
28X174	Tension Spring for Drive Cord Doz.	.25
	Dial Glass (Specify Name and Chassis Number of Radio)	.30
7X23	Felt Dial Background (No. 10 Dial)	.10
58X369	Paper Dial Background (No. 11 Dial)	.10
17X30	Plain Glass Crystal	.10
30X108	Clamp for Dial Glass (Right)	.10
30X109	Clamp for Dial Glass (Left)	.10
15X135	Dial Pointer	.20
7A82	Dial Lamp Socket Assembly (2 Sockets with Wire)	.20
	Dial Lamp (No. 51)	.20

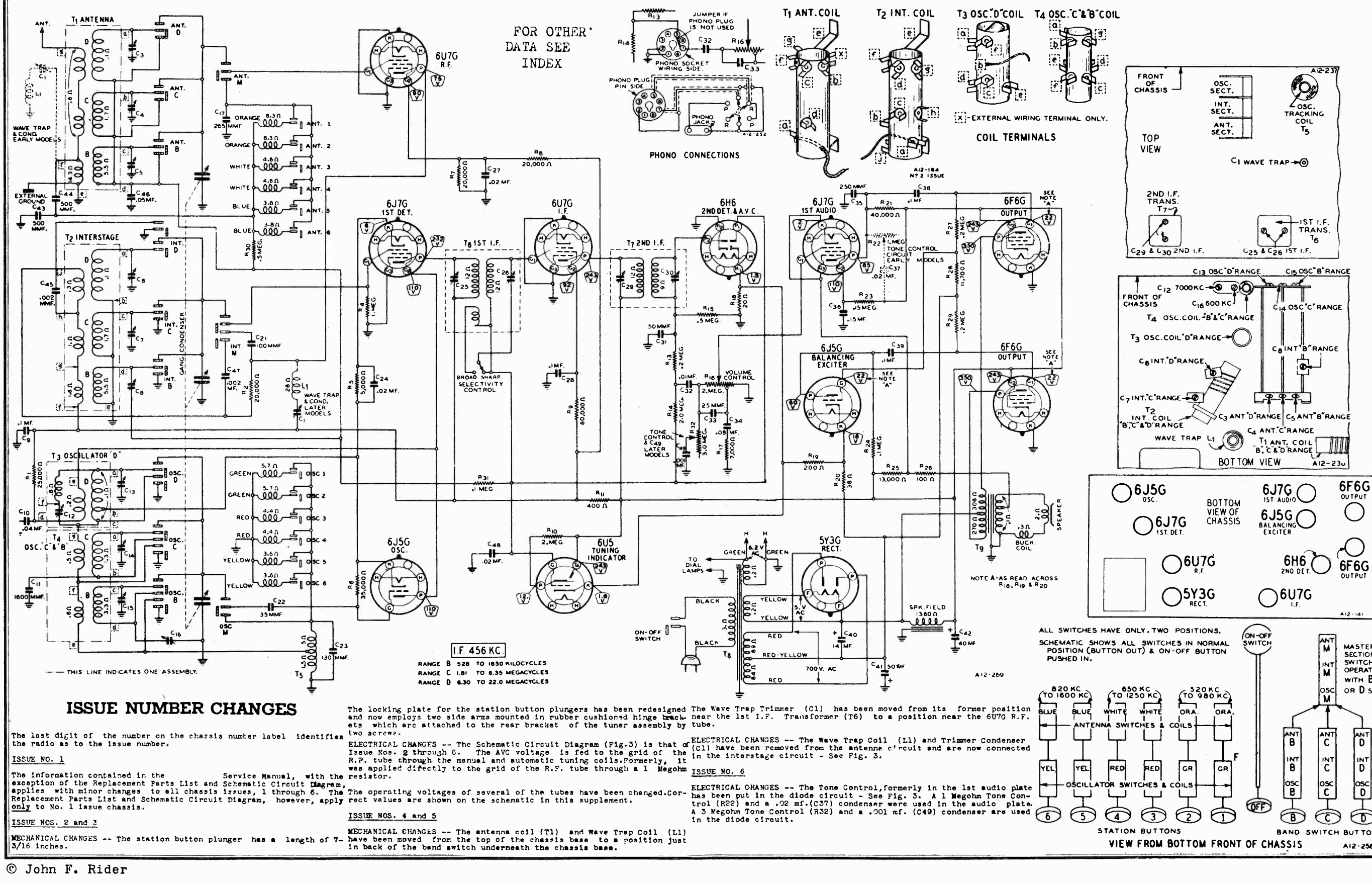
PHONO ATTACHMENT PARTS

Part No.	Description	List Price
13X298	30" Phono Cable Assembly Complete (Includes Plug, Double-Tip Phono Jack, Switch, and Knob)	$2.70
6A218	Plug (8 Prong) Only of Phono Cable	.15
3A12	Phono Jack Only of Phono Cable	.10
2A50	Phono Switch Only of Phono Cable	.70
10A90	Knob Only of Phono Cable	.20

Prices Subject to Change Without Notice.

MODELS 93WG-1102,
93WG-1110

MONTGOMERY-WARD & CO.



ISSUE NUMBER CHANGES

The last digit of the number on the chassis number label identifies the radio as to the issue number.

ISSUE NO. 1

The information contained in the Service Manual, with the exception of the Replacement Parts List and Schematic Circuit Diagram, applies with minor changes to all chassis issues, 1 through 6. The Replacement Parts List and Schematic Circuit Diagram, however, apply only to No. 1 issue chassis.

ISSUE NOS. 2 and 3

MECHANICAL CHANGES -- The station button plunger has a length of 7-3/16 inches.

The locking plate for the station button plungers has been redesigned and now employs two side arms mounted in rubber cushions and hinge brackets which are attached to the rear bracket of the tuner assembly by two screws.

ELECTRICAL CHANGES -- The Schematic Circuit Diagram (Fig.3) is that of Issue Nos. 2 through 6. The AVC voltage is fed to the grid of the R.F. tube through the manual and automatic tuning coils. Formerly, it was applied directly to the grid of the R.F. tube through a 1 Megohm resistor.

The operating voltages of several of the tubes have been changed. Correct values are shown on the schematic in this supplement.

ISSUE NOS. 4 and 5

MECHANICAL CHANGES -- The antenna coil (T1) and Wave Trap Coil (L1) have been moved from the top of the chassis base to a position just in back of the band switch underneath the chassis base.

The Wave Trap Trimmer (C1) has been moved from its former position near the 1st I.F. Transformer (T6) to a position near the 6U7G R.F. tube.

ELECTRICAL CHANGES -- The Wave Trap Coil (L1) and Trimmer Condenser (C1) have been removed from the antenna circuit and are now connected in the interstage circuit - See Fig. 3.

ISSUE NO. 6

ELECTRICAL CHANGES -- The Tone Control, formerly in the 1st audio plate has been put in the diode circuit - See Fig. 3. A 1 Megohm Tone Control (R22) and a .02 mf. (C37) condenser were used in the audio plate. A 3 Megohm Tone Control (R32) and a .001 mf. (C49) condenser are used in the diode circuit.

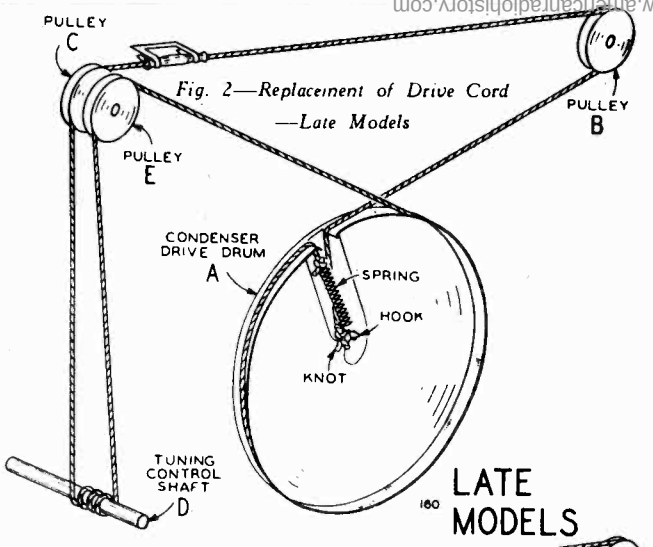


Fig. 2—Replacement of Drive Cord —Late Models

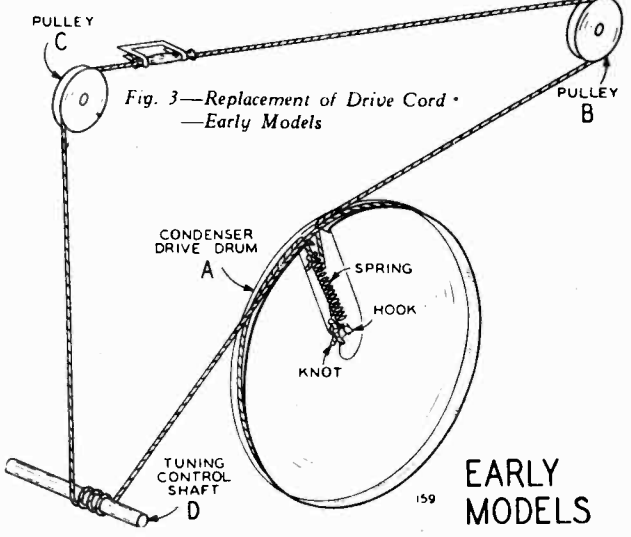


Fig. 3—Replacement of Drive Cord —Early Models

Drive Cord Replacement

LATE MODELS—Tie a knot with a small loop at one end of the new drive cord. Slide a 1¾ inch length of fabric tubing on the cord. The free end of the drive cord should be tied to the tension spring in such a manner that there is a distance of 56⅜ inches between the knots.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See Fig. 2. Bring the cord up through the slot in the drum rim and pass to the right (from back of chassis) and around pulley B. Then bring the cord to the left and over pulley C. See that the fabric tubing is now between pulleys B and C. Continue cord down to control shaft D and wind 3½ turns counter-clockwise (from back of chassis) on shaft D. Bring cord up to and over pulley E. Bring cord down to top of drive drum A and wind one turn clockwise around the drum rim.

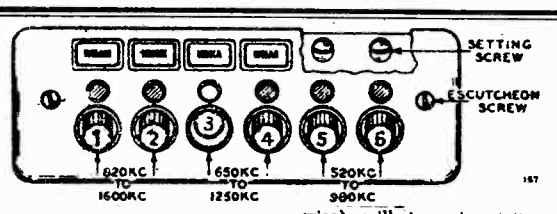
Pass the remaining drive cord and tension spring through the slot in the drum. Place free end of spring over the hook on the condenser drive drum.

EARLY MODELS—The procedure is the same as for the late models with the following exceptions:

The distance between the knots on the drive cord should be 49¼ inches.

Leaving shaft D (Fig. 3), the drive cord is brought directly to the top of drive drum A and then continued as in late models.

ATTACHING DIAL POINTER—Tune in a 1500 KC signal. Move the pointer to the 1500 KC mark on the dial and clamp it tightly over the fabric tubing on the cord.



Frequencies Covered by Each Button

The frequency range of each station button is shown in Fig. 2. Any station within the range of a button may be set. Although, in some cases, it may be possible to set a certain station on several buttons, it is better to set the stations so that the kilocycle numbers decrease from buttons 1 to 6.

Setting a Station Button

Select a station from the list you have prepared, preferably the station with the highest kilocycle number, and tune in this station with the tuning knob in the usual way. Determine what program is being broadcast.

At each side of the escutcheon plate is an escutcheon screw—See Fig. 2. Remove the escutcheon plate by unscrewing these two screws. Be careful to avoid scratching the plate.

When this is done, the setting screws above the six buttons will be exposed.

Turn the band switch knob to the PUSH BUTTON TUNING position —See Fig. 2. The station tuned in previously will probably disappear.

If the kilocycle number of the station tuned in is within the range of button No. 1, push this button in. The same station or a different station may be heard.

With a small screw driver, slowly turn the setting screw above button No. 1 in or out until the desired station (the one previously tuned in) is heard. Turning the screw in (clockwise) will tune in stations with higher kilocycle numbers while turning the screw out (counter-clockwise) will tune in stations with lower kilocycle numbers. Be sure not to tune in some other station broadcasting the same program. Using the tuning eye as a guide, accurately tune in this station. The station is now set on this button.

To determine whether the correct station has been set, turn the band switch knob back to the BROADCAST position. The same station should be heard (provided the tuning knob has not been turned). If it is not, turn the band switch knob to the PUSH BUTTON TUNING position again and retune with the setting screw.

Remove the station call letter tab from the sheets provided and push the tab all the way to the bottom of the rectangular space above the correct station button opening in the escutcheon plate. Then cover the call letter tab with one of the clear celluloid tabs.

Proceed in the same manner to set stations on any of the remaining buttons. Use blank tabs above buttons on which stations are not set.

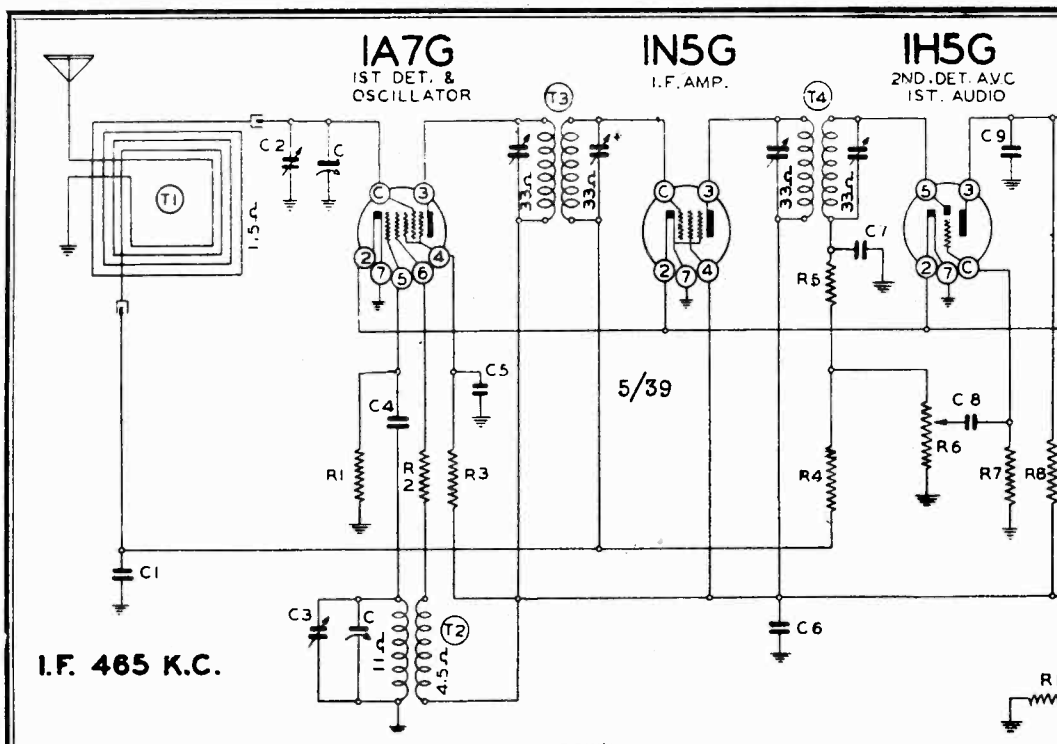
After all of the stations have been set, carefully replace the escutcheon plate.

If at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons. The old call letter tab may be removed by sticking a pin through the notch in the celluloid tab and through the call letter tab.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram. On the back panel of the chassis base is a round knockout 1⁹⁄₆₄ inches in diameter. An octal base socket is then mounted in this knockout opening. In the case of the early models a 1⁹⁄₆₄ inch hole must be drilled in the back panel.

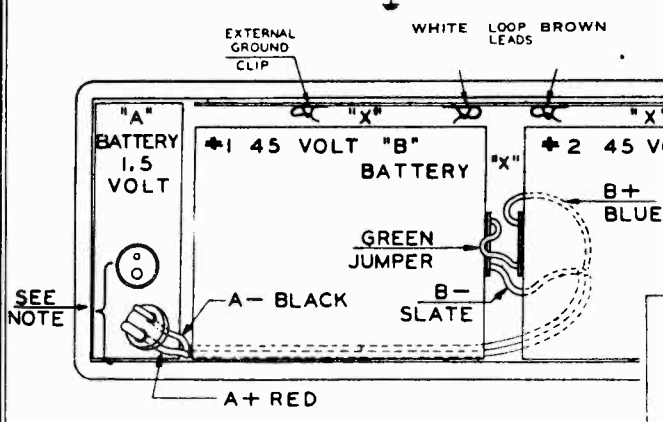
A phono cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.



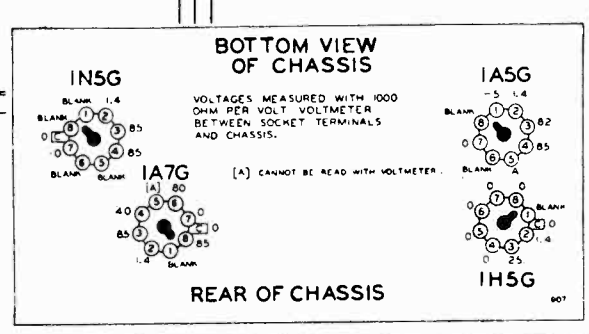
RESISTORS		
R1	1309	200M ohm—⅓ w. 20%
R2	13018	4M ohm—⅓ w. 20%
R3	130268	40M ohm—⅓ w. 20%
R4	13038	2 megohm—⅓ w. 20%
R5	13020	100M ohm—⅓ w. 20%
R6	101173	1 megohm volume control
R7	130257	5. megohm—⅓ w. 25%
R8	13037	750M ohm—⅓ w. 20%
R9	13038	2 megohm—⅓ w. 20%
R10	13070	500 ohm—⅓ w. 10%

CONDENSERS		
C	102108	2 gang variable condenser
C1	10022	.05 x 200 v. 25%
C2		R. F. Trimmer on Gang
C3		Oscillator Trimmer on Gang
C4	12912	.00025 mica—20%
C5	1009	.05 x 200 v. 25%
C6	1006	.25 x 200 v. 20%
C7	12912	.00025 Mica 20%
C8	10025	.002 x 600 v. 25%
C9	12912	.00025 Mica 20%
C10	10078	.01 x 200 v. 25%
C11	11975	10 mfd. x 25 w. v. lytic
C12	10025	.002 x 600 v. 25%

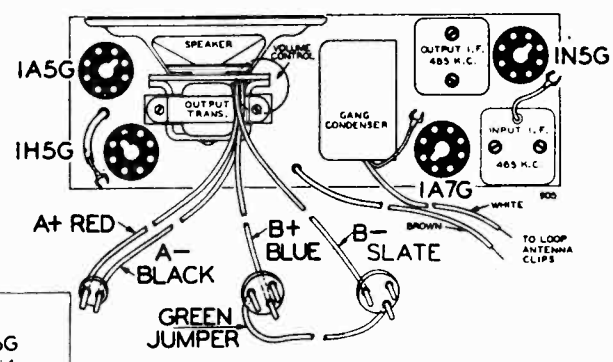
PARTS	
T1	Loop Antenna Complete
T2	B. C. Oscillator Coil
T3	Input I. F. Coil
T4	Output I. F. Coil
T5	5" Speaker with output transformer
S1	D.P.S.T. On-off switch on volume cont



NOTE: The "A" battery should be placed in the cabinet so that the plug-in socket on the top of the battery is nearer to the side of the cabinet which is faced down than to the side of the cabinet which is facing up. Also, the "A" battery should be pushed all the way into the cabinet so that it fits between the left end of the radio chassis and the side of the cabinet.



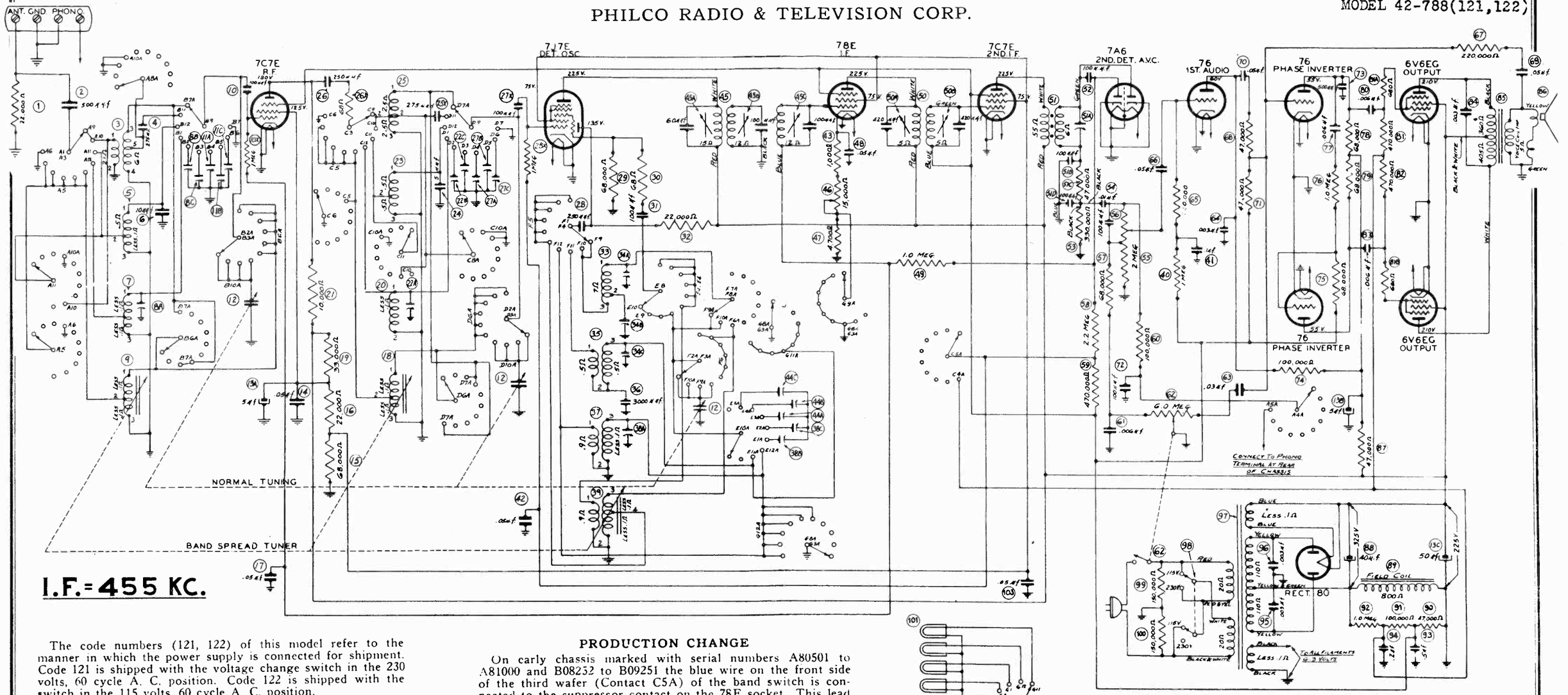
At right-Top View of Chassis



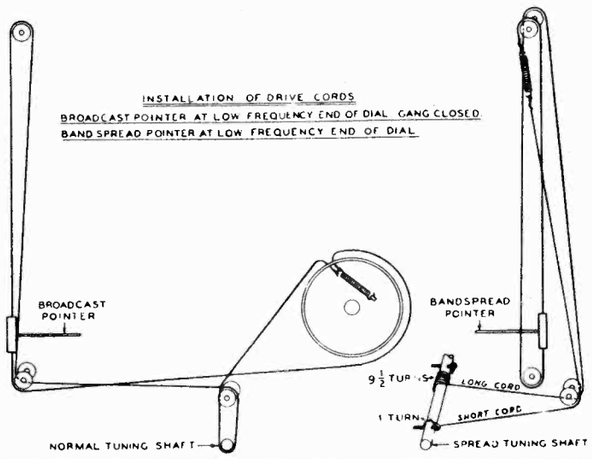
When aligning IF and Osc. - disconnect loop and connect 1 meg. resistor bet. loop leads from chassis. Trim osc. at 1650 Kc- To align loop, reconnect same and remove 1 meg. resistor. Trim at 1400 KC.

PHILCO RADIO & TELEVISION CORP.

MODEL 42-788(121,122)



The code numbers (121, 122) of this model refer to the manner in which the power supply is connected for shipment. Code 121 is shipped with the voltage change switch in the 230 volts, 60 cycle A. C. position. Code 122 is shipped with the switch in the 115 volts, 60 cycle A. C. position.

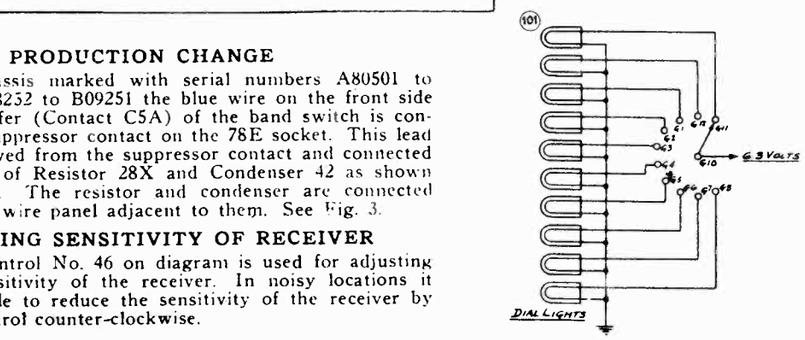


PRODUCTION CHANGE

On early chassis marked with serial numbers A80501 to A81000 and B08232 to B09251 the blue wire on the front side of the third wafer (Contact C5A) of the band switch is connected to the suppressor contact on the 78E socket. This lead should be removed from the suppressor contact and connected to the junction of Resistor 28X and Condenser 42 as shown in the diagram. The resistor and condenser are connected to a lug on the wire panel adjacent to them. See Fig. 3.

ADJUSTING SENSITIVITY OF RECEIVER

Sensitivity control No. 46 on diagram is used for adjusting the overall sensitivity of the receiver. In noisy locations it may be desirable to reduce the sensitivity of the receiver by turning the control counter-clockwise.



FOR OTHER CHANGES SEE INDEX

NOTE SWITCHES SHOWN FROM REAR BOTTOM VIEW OF CHASSIS, IN POSITION NO.1 BROADCAST. SHADED ROTOR IS AT FRONT OF SWITCH WAFER. UNSHADED ROTOR IS AT REAR OF SWITCH WAFER. LETTER INDICATES POSITION OF SWITCH WAFERS FROM FRONT OF CHASSIS

Power Supply: 115 or 230 volts A. C., 50 to 60 cycle, 90 watts.

TUNING RANGES:

Standard Tuning—540 to 1720 K. C.; 1.45 to 2.6 M. C.; 2.3 to 7.3 M. C.; 7.2 to 22 M. C.

Spread Band Tuning—9.34 to 9.9 M. C.; 11.34 to 12 M. C. 14.78 to 15.6 M. C.; 17.38 to 18.2 M. C.; 21.14 to 21.8 M. C.

Audio Output—8.2 watts.

PHILCO RADIO & TELEVISION CORP.

Model 42-788T is a special service eleven (11) tube A. C. operated super-heterodyne radio employing nine (9) tuning bands. Four standard scales are mounted on the left of the grille. These cover the complete radio spectrum from 540 K. C. to 22 megacycles. The standard scales are tuned by a variable condenser which has tuning ratios of 80 to 1 for vernier tuning and 16 to 1 for coarse tuning. Five spread band scales on the right of the grille are designed to spread the short wave frequencies more than 20 times farther apart. This spread band tuning section of the radio is tuned by a three (3) gang permeability tuner with shunt aligning compensators for each spread band.

ALIGNING R. F. AND I. F. COMPENSATING CONDENSERS

EQUIPMENT REQUIRED

Signal Generator: In order to properly adjust the various R. F. and I. F. padders of this receiver, a calibrated signal generator such as Philco Model 070 is required. The signal generator covers the frequencies necessary for adjusting the radio.

Aligning Indicating Device: A Vacuum Tube Voltmeter or Audio Output Meter, such as Philco Models 027 and 028, is required. Procedures for connecting these instruments are listed below.

Aligning Tools: Fiber handle screwdriver, Philco Part No. 45-2610 and Aligning Wrench, Part No. 7696.

CONNECTING ALIGNING INSTRUMENTS

Signal Generator: The signal generator is connected to the receiver as indicated in the tabulations below under "output connections to receiver." A Dummy Antenna is also required. This is listed under column, "Dummy Antenna, Note A."

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A. V. C. circuit as follows:

1. Connect the negative (—) terminal of the voltmeter through a 2 meg. resistor to any grid return connection in the A. V. C. circuit.

2. Connect the positive (+) terminal to the chassis ground terminal.

Audio Output Meter: If this type of meter is used as an aligning indicator, it should be connected to the plate and screen terminals of one of the 6V6EG tubes. Adjust the meter to the 0 to 30 volt A. C. scale.

After connecting the aligning meters, adjust the compensators in the order shown in the tabulation below. Locations of the compensators are shown in the schematic diagram. If the aligning meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

ADJUSTING NORMAL TUNING RANGES

Operations in Order	SIGNAL GENERATOR			RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections to Receiver	Dummy Antenna Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators	
1	Tuning Condenser Stator Lug Middle Section	.1 mfd.	455 K. C.	580 K. C.	Vol. Max. Band Selector "Brdcst"	45A, 45C, 50A, 50B, 51A	Note D
2	Antenna and Ground	200 mmfd.	1500 K. C.	1500 K. C.	Vol. Max. Band Selector "Brdcst"	34A	Note B Roll Gang
3	Antenna and Ground	200 mmfd.	580 K. C.	580 K. C.	Vol. Max.	34B	Roll Gang
4	Antenna and Ground	200 mmfd.	1500 K. C.	1500 K. C.	Vol. Max.	34A	Roll Gang
5	Antenna and Ground	400 ohms	6.0 M. C.	6.0 M. C.	Vol. Max. Band Selector "S.W.2"	34C	Roll Gang
6	Antenna and Ground	400 ohms	20 M. C.	20 M. C.	Vol. Max. Band Selector "S.W.3"	38A, 22A, 8A	Note C

NOTE—S.W.1 Tuning Band requires no adjustment.

ADJUSTING BAND SPREAD TUNING RANGES

Mechanical Adjustments: Before the padders of the band spread tuning ranges are adjusted, the iron cores of the antenna, R. F. and oscillator transformers must be mechanically set as follows:

1. Turn the band spread tuning control to the extreme counterclockwise position (lowest frequency).

2. Adjust location of "OSC" iron cores so that the end of the iron core is flush with the end of the transformer. With the "OSC" iron core in this position the antenna R. F. cores will be correctly located.

3. When installing a new oscillator transformer or core, make sure that the iron core slides freely in the transformer. It is important to do this to eliminate backlash in the tuning mechanism. If adjustment is necessary slightly move transformer in the direction required.

After mechanically setting the transformers and iron cores, adjust the padders as given in the following tabulation:

Operations in Order	SIGNAL GENERATOR			RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections to Receiver	Dummy Antenna Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators	
1	Antenna and Ground	400 ohms	9.7 M. C.	9.7 M. C.	Band Selector Position "31M" on Dial	38B, 22B, 8B	Note E—Note F
2	Antenna and Ground	400 ohms	11.7 M. C.	11.7 M. C.	Band Selector Position "25M" on Dial	38C, 22C, 8C	Note F
3	Antenna and Ground	400 ohms	15.2 M. C.	15.2 M. C.	Band Selector Position "19M" on Dial	44A, 27A, 11A	Note F
4	Antenna and Ground	400 ohms	17.8 M. C.	17.8 M. C.	Band Selector Position "16M" on Dial	44B, 27B, 11B	Note F
5	Antenna and Ground	400 ohms	21.5 M. C.	21.5 M. C.	Band Selector Position "13M" on Dial	44C, 27C, 11C	Note F

NOTE A—The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

NOTE B—DIAL CALIBRATION: In order to adjust the receiver correctly the dial must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity) set the dial pointer on the first mark on the left edge (low frequency end) of the broadcast scale.

NOTE C—When adjusting "OSC" compensator be sure to tune in the fundamental signal (20 MC) instead of the image signal. If the compensator is correctly adjusted, the image signal will be found by turning the signal generator dial 910 KC above the fundamental signal, which will be 20.910 MC.

NOTE D—Before adjusting padders 45A, 45C, 50A, 50B, 51A, turn padder 45B to full clockwise position (all the way out). After the padders are adjusted to maximum, then adjust padder 45B for maximum.

NOTE E—Before adjusting padders, turn the band spread tuning knob to its extreme counter-clockwise position. Set the band spread dial pointer on the first MARK on the left edge (low frequency end) of the 31 meter scale.

NOTE F—To make sure that the dial reads properly after adjusting the compensator with the signal generator as outlined above, a known station on each band near the adjusting frequency should be tuned in with the spread band tuning control. If the dial reading is incorrect, adjust the oscillator compensators on each band until the stations are heard at the correct points on the dial. After adjusting the oscillator compensators to the correct frequency of the known station, the "antenna" and "R. F." compensators should be adjusted to maximum signal.

ALTERNATIVE METHOD—Locate a known station near the center of each spread band and "Zero Beat" the signal generator with it at the time of aligning band. This makes available a signal of adjustable strength and known frequency. This method will be found to be simpler when conditions make its use possible because it is much easier to align a receiver to a strong signal.

PHILCO RADIO & TELEVISION CORP.

MECHANICAL ADJUSTMENTS—BAND SPREAD TUNING MECHANISM

1. **Adjustment of Tuning Shaft**
   End play can be removed by adjusting the rear bearing No. (A), Fig. (1). Care should be taken when adjusting the screw so that shaft does not turn too tightly. In making this adjustment, the screw driver can be inserted in the chassis in line with shaft.

2. **Removing Tuning Shaft**
   (a) Remove tuning knob shaft and coupling.
   (b) Loosen lock nut on rear bearing and remove adjusting screw and ball bearing.
   (c) Remove cotter pin from stop assembly.
   (d) Unscrew carriage as shaft is pulled out through front of R. F. tuner and chassis.
   (e) When installing new shaft (B) adjust positions of stop assembly and carriage, before inserting cotter pin, so that the carriage (C) is approximately 5 turns from the stop assembly (D) with shaft in extreme counterclockwise position from front. The stop assembly is rotated until all washers are in contact. The bottom washer should be located between the stops nearest together.

3. **Adjusting Band Spread Tuning Core Assembly**
   (a) Cores are correctly located when the rear of the oscillator core (blue identification) is flush with the rear of oscillator transformer and the tuning shaft is in extreme counterclockwise position.
   (b) The carriage clamp (E) must not be tightened excessively as this will bend the tuning core rod (F) and cause backlash.

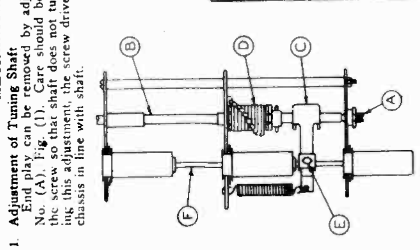
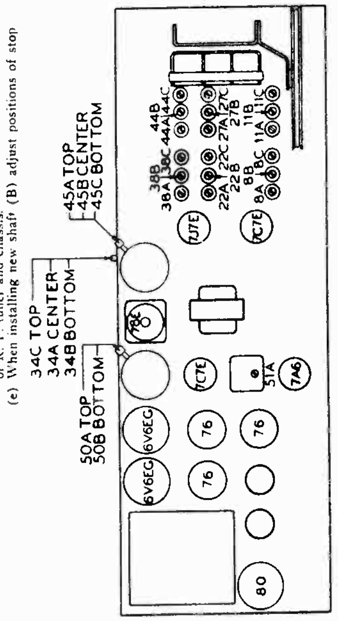


FIG. 1—BAND SPREAD TUNING MECHANISM



TUBE AND COMPENSATOR LOCATIONS—TOP OF CHASSIS

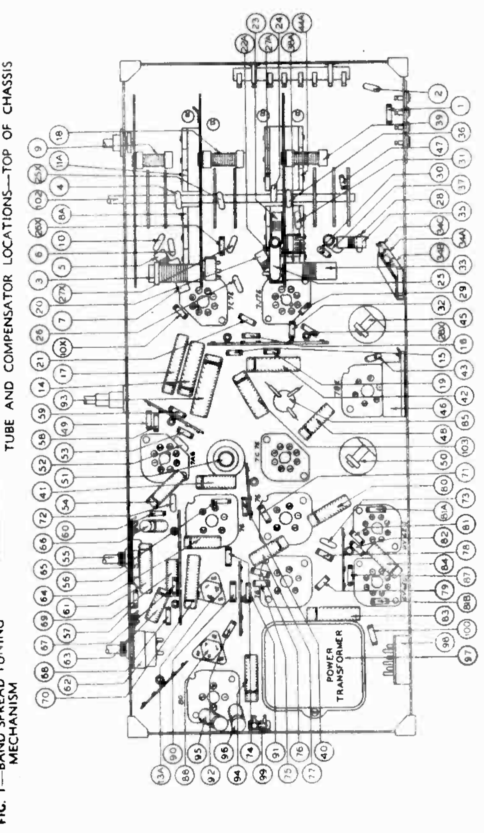


FIG. 3—PART LOCATIONS, UNDERSIDE OF CHASSIS

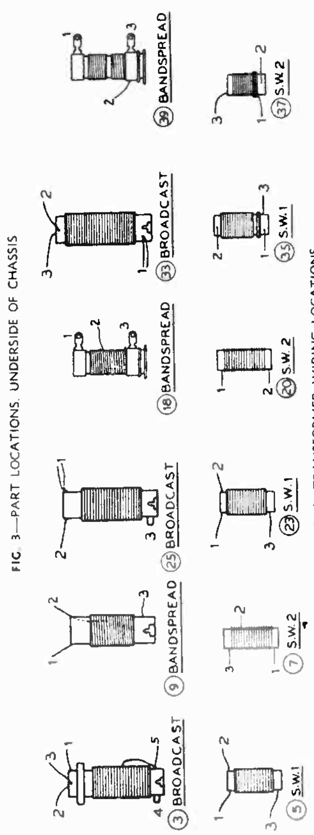


FIG. 4—R F TRANSFORMER WIRING LOCATIONS

REPLACEMENT PARTS—MODEL 42-788

Sch. No.	Description	Part No.
1.	Resistor (22,000 ohms)	33-322339
2.	Mica Condenser (500 mmfd)	60-150257
3.	Aerial Transformer (Broadcast, SW1)	32-3677
4.	Mica Condenser (275 mmfd)	20-027511
5.	Aerial Transformer (SW-2)	32-3679
6.	Mica Condenser (10 mmfd)	60-010337
7.	Aerial Transformer (SW-3)	32-3682
8A.	Compensator (Short Wave—Aerial)	31-6356
8B.	Compensator (Aerial—31M Band), Part of 8A	
8C.	Compensator (Aerial—25M Band), Part of 8A	
9.	Band Spread Aerial Transformer	32-3670
	Mtg. Clip	57-0985
	Iron Core Assembly	76-1281
10.	Mica Condenser (100 mmfd)	60-110457
10X.	Resistor (1 megohm)	
11A.	Compensator (Aerial—19M Band)	31-6357
11B.	Compensator (Aerial—16M Band), Part of 11A	
11C.	Compensator (Aerial—13M Band), Part of 11A	
12.	Tuning Condenser	31-2466
	Coupling Assembly	31-2291
	Drive Cord (Tuning Cond.)	31-2468
	Spring	28-8913
	Drive Drum	31-2453
	Rubber Grommet (Mtg. Cond.)	27-4596
	Vernier Tuning Shaft	31-2467
	Mtg. Screw	W-2196
13A.	Electrolytic Condenser (5 mfd)	30-2512
13B.	Electrolytic Condenser (5 mfd), Part of 13A	
13C.	Electrolytic Condenser (50 mfd), Part of 13A	
	Mtg. Plate	56-1643
14.	Condenser (.05 mfd, 400 volts)	30-4518
15.	Resistor (68,000 ohms)	33-368339
16.	Resistor (22,000 ohms)	33-322339
17.	Condenser (.05 mfds, 200 volts)	30-4609
18.	Band Spread R. F. Transformer	32-3671
	Mtg. Clip	57-0985
	Tuning Cores	76-1281
19.	Resistor (33,000 ohms)	33-333339
20.	R. F. Transformer (S. W. 3)	32-3683
21.	Resistor (10,000 ohms)	33-310339
22A.	Compensator (R. F.—Short Wave 3)	31-6356
22B.	Compensator (R. F.—31M Band), Part of 22A	
22C.	Compensator (R. F.—25M Band), Part of 22A	
23.	R. F. Transformer (S. W. 2)	32-3680
24.	Mica Condenser (5 mmfd)	60-005357
25.	R. F. Transformer (Broadcast—S. W. 1)	32-3678
25X.	Mica Condenser (275 mmfd)	20-027511
26.	Mica Condenser (250 mmfd)	60-125457
26X.	Resistor (68 ohms)	33-068339
27A.	Compensator (R. F.—19M Band)	31-6357
27B.	Compensator (R. F.—16M Band), Part of 27A	
27C.	Compensator (R. F.—13M Band), Part of 27A	
27X	Mica Condenser (100 mmfd)	60-110457
28.	Mica Condenser (250 mmfd).	60-125457
28X.	Resistor (1 megohm)	33-510339
29.	Resistor (68,000 ohms)	33-368339
30.	Resistor (68 ohms)	33-068339
31.	Mica Condenser (100 mmfd)	60-110457
32.	Resistor (22,000 ohms)	33-322339
33.	Oscillator Transformer (Broadcast S. W. 1)	32-3663
34A.	Compensator (OSC. Broadcast)	31-6350
34B.	Compensator (OSC. 580 KC Broadcast), Part of 34A	
34C.	Compensator (OSC. S. W. 2), Part of 34A	
35.	Oscillator Transformer (S. W. 2)	32-3681
36.	Mica Condenser (3,000 mmfd)	60-230124
37.	Oscillator Transformer (S. W. 3)	32-3684
38A.	Compensator (OSC. S. W. 3)	31-6419
38B.	Compensator (OSC. 31M Band), Part of 38A	
38C.	Compensator (OSC. 25M Band), Part of 38A	
39.	Oscillator Transformer (Band Spread)	32-3676
	Mtg. Clip	57-0985
	Tuning Core	76-1281
40.	Resistor (220,000 ohms)	33-422339
41.	Condenser (.1 mfd, 400 volts)	30-4527
42.	Condenser (.05 mfd, 200 volts)	30-4609
43.	Resistor (1000 ohms)	33-210339
44A.	Compensator (OSC. 19M Band)	31-6420
44B.	Compensator (OSC. 16M Band), Part of 44A	
44C.	Compensator (OSC. 13M Band), Part of 44A	
45.	1st I. F. Transformer	32-3443
45A.	Primary Compensator (Iron Core—Part of 45)	
45B.	Secondary Compensator (Iron Core—Part of 45)	
45C.	Tertiary Compensator (Iron Core—Part of 45)	
46.	Sensitivity Control	33-5401
	Mtg. Nut	W-2157
47.	Resistor (4700 ohms)	33-247339
48.	Condenser (.05 mfd, 200 volts)	30-4519
49.	Resistor (1 megohm)	33-510339
50.	2nd I. F. Transformer	32-3444
50A.	Primary Compensator (Iron Core—Part of 50)	
50B.	Secondary Compensator (Iron Core—Part of 50)	
51.	3rd I. F. Transformer	32-3445
51A	Secondary Compensator, Part of 51	
51B.	Condenser (100 mmfd), Part of 51A	
51C.	Resistor (47,000 ohms), Part of 51	
51D	Condenser (100 mmfd), Part of 51A	
52.	Mica Condenser (100 mmfd)	60-110457
53.	Resistor (330,000 ohms)	33-433339
54.	Condenser (.01 mfd, 400 volts)	30-4572

Sch. No.	Description	Part No.
55.	Volume Control	33-5399
	Mtg. Nut	W-2157
56.	Mica Condenser (100 mmfd)	60-110457
57.	Resistor (68,000 ohms)	33-368339
58.	Resistor (2.2 megohms)	33-522339
59.	Resistor (470,000 ohms)	33-447339
60.	Resistor (100,000 ohms)	33-410339
61.	Condenser (.006 mfd, 400 volts)	30-4591
62.	Tone Control and Power Switch	33-5400
	Mtg. Nut	W-2157
63.	Condenser (.03 mfd, 400 volts)	30-4517
64.	Condenser (.003 mfd, 600 volts)	30-4582
65.	Resistor (220,000 ohms)	33-422339
66.	Condenser (.05 mfd, 200 volts)	30-4519
67.	Resistor (220,000 ohms)	33-422339
68.	Resistor (47,000 ohms)	33-347339
69.	Condenser (.05 mfd, 200 volts)	30-4519
70.	Condenser (.05 mfd, 200 volts)	30-4609
71.	Resistor (47,000 ohms)	33-347339
72.	Mica Condenser (100 mmfd)	60-110457
73.	Mica Condenser (500 mmfd)	60-150257
74.	Resistor (100,000 ohms)	33-410339
75.	Resistor (68,000 ohms)	33-368339
76.	Resistor (1 megohm)	33-510339
77.	Condenser (.006 mfd, 400 volts)	30-4610
78.	Resistor (68,000 ohms)	33-368339
79.	Resistor (68,000 ohms)	33-368339
80.	Condenser (.006 mfd, 400 volts)	30-4610
81.	Resistor (470,000 ohms)	33-447339
81A.	Resistor (680 ohms)	33-168339
81B.	Resistor (680 ohms)	33-168339
82.	Resistor (470,000 ohms)	33-447339
83.	Condenser (.006 mfd, 400 volts)	30-4610
84.	Condenser (.003 mfd, 600 volts)	30-4582
85.	Output Transformer	32-8111
86.	Speaker	36-1459
	Cone Assembly (For Speaker 36-1459)	36-4106
	Cable	41-3535
87.	Resistor (47,000 ohms)	33-347339
88.	Electrolytic Condenser (40 mfd)	30-2511
	Cardboard Tube	27-9506
	Mtg. Plate	27-9508
89.	Field Coil (Replace Speaker 36-1459)	
90.	Resistor (47,000 ohms)	33-347339
91.	Resistor (100,000 ohms)	33-410339
92.	Resistor (1. megohms)	33-510339
93.	Condenser (.5 mfd, 100 volts)	61-0137
94.	Condenser (.2 mfd, 200 volts)	30-4587
95.	Condenser (.003 mfd, 1500 volts)	30-4608
96.	Condenser (.003 mfd, 1500 volts)	30-4608
97.	Power Transformer (115-230 volts, 60 cycle)	32-8109
	Power Transformer (115 volts, 25 cycles)	32-8031
98.	Power Changeover Switch	42-1569
99.	Resistor (150,000 ohms)	33-415339
100.	Resistor (150,000 ohms)	33-415339
101.	Dial Lamps	34-2064
	Socket Assembly	76-1414
102.	Band Switch Assembly	42-1661
103.	Condenser (.05 mfd, 400 volts)	30-4518
	Cable (Power)	L-3274
	Cabinet	10479B
	Cabinet Back	27-9655
	Mtg. Screw	W-2076
	Dial Assembly (Standard Tuning)	76-1253
	Dial Assembly (Band Spread)	76-1252
	Dial Clamp	56-1795
	Dial Pointer	56-1804
	Mtg. Screw	W-333
	Knob (Tuning)	27-4862
	Knob (Tuning)	27-4330
	Knob (Volume—Band Switch)	27-4332
	Plug (Power)	L-3275
	Rubber Grommet (Chassis Mtg.)	27-4564
	Rubber Washer (Chassis Mtg.)	27-4571
	Screw (Chassis Mtg.)	W-1345
	Socket (76 Tube)	27-6035
	Socket (78E Tube)	27-6036
	Socket (80 Tube)	27-6044
	Socket (6V6EG Tube)	27-6058
	Socket (7J7E Tube)	27-6129
	Socket (7C7E, 7A6 Tube)	27-6158-2
	Mtg. Eyelets	W-1650
	Tuning Drive Shaft (Band Spread—Outside Chassis)	76-1248
	Rubber Disc	27-4272
	Mtg. Screw	W-2295
	Tuning Drive Shaft (Band Spread—Inside R. F. Unit)	76-1241
	Shaft Bushing (Threaded)	56-2152
	Carriage (Tuning Cores)	56-2145
	Core Clamp	56-2151
	Screw	97-0054
	Cotter Pin	W-2196
	Drive Cord (Band Spread—Short Section)	31-2469
	Drive Cord (Band Spread—Long Section)	31-2470
	Spring	28-8751
	Tube Shield Base	28-2726
	Tube Shield (78E Tube)	28-2725
	Wire Panel (4 lug)	38-9809
	Wire Panel (2 lug)	38-9777
	Wire Panel (8 lug)	38-9817
	Wire Panel (6 lug)	38-9929

MONTGOMERY-WARD & CO.

Crystal Pickup Cartridge Data

TYPES OF CRYSTAL PICKUP CARTRIDGES USED ON AIRLINE RADIO-PHONOGRAPH COMBINATIONS.

In the past, substitutions have been made for crystal pickup cartridges on the basis of whether one crystal cartridge looked like another type, and whether it would fit in the pickup arm. This type of substitution usually causes trouble either in the operation of the record changer or by damaging the records because of improper needle pressure. (Needle pressure is the term used to describe the amount of pressure exerted upon a record by the point of the needle, and is equal to the weight of the pickup arm as weighed with a pencil scale while the pickup arm is in playing position.)

Since it is impossible to identify the pickup cartridge by the radio manufacturer's part number for this part, the attached list has been prepared to make identification easy and to enable you to replace any defective crystal pickup cartridge with the type which was originally intended to be used in the record player or record changer. Nearly all crystal pickup cartridges have the crystal pickup cartridge manufacturer's part number stamped on them. For instance, the permanent needle type which was used on the Model 912 Radio has a sticker on the cartridge with the number LP-6 stamped on the sticker. The radio manufacturer's part number for this crystal is J-22404, which does not appear on the cartridge in any place. To identify this cartridge would be rather difficult if you did not have a cross reference between the crystal cartridge manufacturer's part number and the radio manufacturer's part number. This list will give you that information and also the information as to what type of cartridge is used on each model radio.

In Columns 1, 2 and 3 are listed the radio model numbers, the part number assigned to the crystal cartridge by the radio manufacturer, and the part number assigned to the crystal cartridge by the crystal cartridge manufacturer. In columns 4, 5 and 6 are listed any information regarding the interchangeability of crystals, the output voltage of the crystal, and the recommended needle pressure at which the crystal cartridge should operate on the type of changer or record player with which it is used.

There are some cases in which two or more crystal cartridges were used on the same record changer or player, and on the same model radio. For example, refer to Model 732 and you will notice that a B-1, L-26 and an X-82CHZ crystal cartridge was used. Under the "Remarks" column, the notation is made that the B-1 is not interchangeable with the L-26 or the X-82CHZ, however, the X-82CHZ and L-26 could be interchanged if necessary. This same thing is true of the Model 906, which, also uses a B-1 type cartridge, an L-26 type cartridge and an X-82CHZ type cartridge.

One of the most important things to remember, when replacing crystal cartridges on record players or record changers, is that the output voltage of the crystal should coincide with the crystal that it is replacing, and if the needle pressure is not correct, changes in spring tension should be made until the pressure is suitable for the type crystal cartridge involved. For instance, some cases have come up where an LP-6 crystal cartridge has been used to replace an L-26 or an X-82CHZ. One of the first things that you will notice, after this type of replacement is made, is a fine black dust collecting on the records. This dust is actually part of the record itself which is being cut away by the sapphire point on the LP-6 cartridge. This cutting action is caused by an incorrect needle pressure, since the X-82CHZ cartridge requires from two to two and one-half ounces of needle pressure and the LP-6 requires only one to one and one-quarter ounces. Of course there are other factors which would cause the LP-6 cartridge to cut into a record, one of the main factors being a chipped sapphire needle point. Crystal cartridges cannot be interchanged indiscriminately, since some of the older type record changers required a needle pressure of two to two and one-half ounces in order to work the ratchet mechanism for tripping the record changer or due to friction in the changer arm.

If a crystal cartridge is used which requires only an ounce to an ounce and a quarter pressure, and the pressure on the needle is reduced to one or one and one-quarter ounces, in many cases the needle will not follow the grooves of the record and will jump grooves. This is caused by too light a needle pressure for that type of changer, providing the mechanism of the changer itself is not binding or jammed. When this happens, the LP-6 cartridge should not be used, as the maximum pressure should not exceed one and one-quarter ounces if any life is to be expected from the records.

Another factor to be considered when substituting crystal pickup cartridges is the amount of force with which the needle hits the record when the changer starts the cycle. That is, the amount of impact when the tone arm drops to the record in the outer groove. Some changers using replaceable needles were not too critical about this impact force; however, with a crystal cartridge using a sapphire needle, chipping might result if the needle comes in contact with the record at too great a force. On some changers it is possible to make adjustments so that the tone arm lowers at a lesser speed, thus decreasing the force of impact, but on other changers no adjustment can be made.

It is of utmost importance to consider all of the information given here before attempting to make substitutions other than those recommended by the record player or changer manufacturer. If you find any record players or record changers which have been altered, you should check to make sure that the substitute crystal cartridge is correct and will not cause trouble for the customer.

Crystal Pickup Cartridge Data

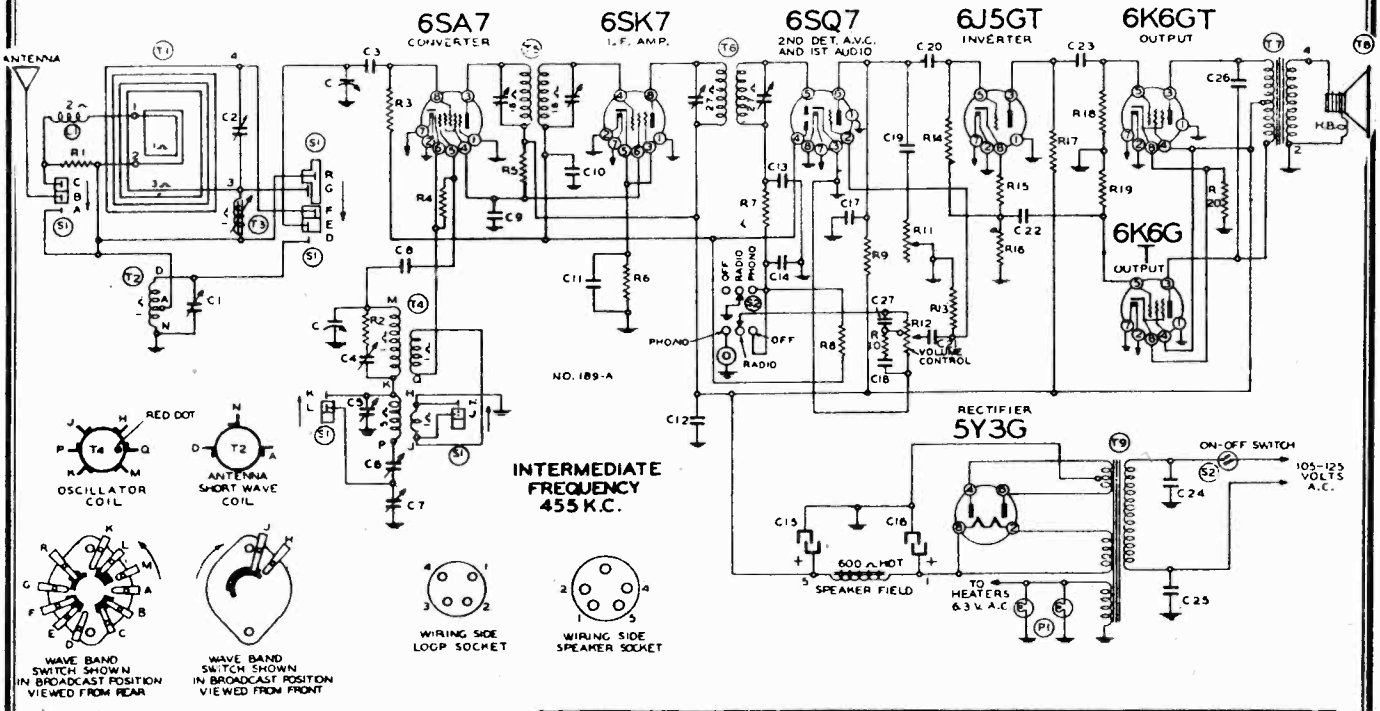
MONTGOMERY-WARD & CO.

RADIO MODEL NO.	CRYSTAL PICKUP PART NO. (RADIO MFGR.)	CRYSTAL PICKUP PART NO. (CHYSTAL MFGR.)	REMARKS	CRYSTAL OUTPUT VOLTAGE	RECOMMENDED NEEDLE PRESSURE
362	114120	L-26A	114120 is complete tone arm	1.4	2¼-23/4 Oz.
398	B-1	B-1	B-1 not interchangeable with	2.5	2-2⅛ Oz.
	J-22125	L-26	L-26 or X-82CHZ	1.4	2-2⅜ Oz.
	J-22202	X-82CHZ		1.0-1.25	2-2⅛ Oz.
399	J-22202	X-82CHZ		1.0-1.25	2-2½ Oz.
499	W21A158	L-40		.60	1¼-1½ Oz.
500	114100*	305	114100 is complete tone arm		
510	28A10	L-22A	28A10 is complete tone arm	1.75	2-3/4 Oz.
515	114194	L-26A	114194 is complete tone arm	1.4	2-3/4 Oz.
523	BE-B-27099	N-1		.7 - .9	1⅛-1⅜ Oz.
614	28A25*	PE-212	28A25 is complete tone arm		
615	BE-G-12114	L-26A		1.4	2-2⅛ Oz.
620	J-22125	L-26A		1.4	2-2½ Oz.
623	28A25*	PE-212	28A25 is complete tone arm		
629	BE-G-12114	L-26		1.4	2-2⅛ Oz.
717	114120	L-26A	114120 is complete tone arm	1.4	2-3/4 Oz.
719	114120	L-26A	114120 is complete tone arm	1.4	2-3/4 Oz.
728	B	B		2.5	2½-3 Oz.
732	B-1	B-1	B-1 not interchangeable with	2.5	2-2⅛ Oz.
	SJ-22202	X-82CHZ		1.0-1.25	2-2⅜ Oz.
	SJ-22125	L-26	L-26 or X82CHZ	1.4	2-2⅛ Oz.
733	J-22202	X-82CHZ		1.0-1.25	2-2½ Oz.
739-A	SB-27099	N-1		.7 - .9	1¼-1½ Oz.
740-A	0-4426-9	N-1		.7 - .9	1¼-1½ Oz.
741	J-22202	X-82CHZ		1.0-1.25	2-2½ Oz.
804	B	B		2.5	2½-3 Oz.
805	B	B		2.5	2½-3 Oz.
808	SJ-22404	LP-6		.85	1-1¼ Oz.
902	B-1	B-1		2.5	-2⅛ oz.
904	B-1	B-1	B-1 not interchangeable with	2.5	2-2⅛ Oz.
	J-22125	L-26	L-26 or X82CHZ	1.4	2-2⅜ Oz.
	J-22202	X82CHZ		1.0-1.25	2-2⅛ Oz.
906	B-1	B-1	B-1 not interchangeable with	2.5	2-2⅛ Oz.
	J-22125	L-26	L-26 or X-82CHZ	1.4	2-2⅜ Oz.
	J-22202	X-82CHZ		1.0-1.25	2-2⅛ Oz.
908	J-22202	X-82CHZ		1.0-1.25	2-2⅛ Oz.
909	J-22202	X-82CHZ		1.0-1.25	2-2⅛ Oz.
912	J-22404	LP-6		.85	1-1¼ Oz.
914	4426-10	LP-6		.85	1-1¼ Oz.
1106	B-1	B-1	B-1 not interchangeable with	2.5	2-2⅛ Oz.
	J-22125	L-26	L-26 or X-82CHZ	1.4	2-2⅜ Oz.
	J-22202	X82CHZ		1.0-1.25	2-2⅛ Oz.
1107	J-22202	X82CHZ		1.0-1.25	2-2⅛ Oz.
1112	BE-4426-9	N-1		.7 - .9	1¼-1⅜ Oz.
1113	J22125	L-26		1.4	2-2⅛ Oz.
1203	SJ-22404	LP-6		.85	1-1¼ oz.
1401	J-22404	LP-6		.85	1-1¼ Oz.
2208	28A10	L-22A	28A10 is complete tone arm	1.75	2-1/4-2-3/4 Oz.

* No information available

MODEL 04BR-729

MONTGOMERY-WARD & CO.

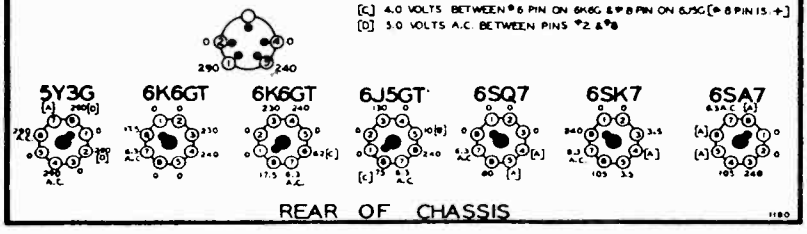


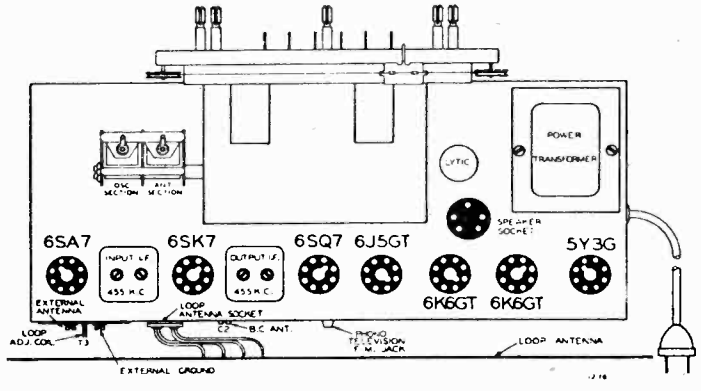
BOTTOM VIEW OF CHASSIS

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER BETWEEN SOCKET TERMINALS AND CHASSIS. LOOP CONNECTED, RECEIVER OFF CARRIER.

SPEAKER SOCKET

[A] CANNOT BE MEASURED WITH VOLTMETER.
[B] ON 250 VOLT SCALE
[C] 4.0 VOLTS BETWEEN #6 PIN ON 6K6G & #8 PIN ON 6J5G (= 8 PINS +)
[D] 5.0 VOLTS A.C. BETWEEN PINS #2 & #8





Schematic Diagram Ref. No. | **Part No.** | **Description**

RESISTORS

R1	130164	3500 ohm—½ w.
R2	130276	10 ohm—½ w.
R3	1304	3 megohm—⅓ w.
R4	130236	30M ohm—⅓ w.
R5	130307	15M ohm—1 w.
R6	13083	300 ohm—½ w.
R7	13012	50M ohm—½ w.
R8	13038	2 megohm—½ w.
R9	13011	250M ohm—½ w.
R10	130149	15M ohm—⅓ w.
R11	101223	Tone control—1 megohm
R12	101224	Volume Control—½ megohm
R13	130257	5 megohm—½ w.
R14	1303	500M ohm—½ w.
R15	130218	5M ohm—⅓ w.
R16	130103	100M ohm—⅓ w.
R17	130103	100M ohm—⅓ w.
R18	1303	500M ohm—⅓ w.
R19	1303	500M ohm—⅓ w.
R20	130320	320 ohm—1 watt

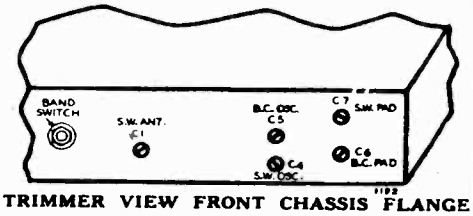
CONDENSERS

C	102133	2 gang variable condenser
C1	124116	Short wave antenna trimmer
C2	124141	B.C. antenna trimmer
C3	1292	.0005 mica
C4	124142	Dual adj. trimmer—S.W. osc. trimmer
C5	124142	Dual adj. trimmer—B.C. osc. trimmer
C6	124140	Dual adj. condenser—B.C. pad
C7	124140	Dual adj. condenser—S.W. pad
C8	12960	.00015 mica
C9	10013	.05 x 400 v.
C10	1009	.05 x 200 v.
C11	1009	.05 x 200 v.
C12	1001	.1 x 400 v.
C13	129161	Dual—.0001 mica
C14	129161	Dual—.0001 mica
C15	119108	16 mfd. x 450 w.v. lytic condenser
C16	119108	16 mfd. x 450 w.v. lytic condenser
C17	1295	.0001 mica
C18	100120	.035 x 200 v.
C19	10019	.006 x 600 v.
C20	10026	.02 x 400 v.
C21	10019	.006 x 600 v.
C22	10013	.05 x 400 v.
C23	10013	.05 x 400 v.
C24	10061	.02 x 600 v.
C25	10061	.02 x 600 v.
C26	10019	.006 x 600 v.
C27	129169	.00025 mica

C4 and C5, C6 and C7, and C13 and C14 are in the same units

PARTS

T1	111220	Loop antenna assembly
T2	111184	Short wave antenna coil
T3	111183	Loop adjustable coil
T4	110154	B.C.—S.W. oscillator coil
T5	108178	Input I.F. coil—455 kc.
T6	108179	Output I.F. coil—455 kc.
T7	105112	Output transformer
T8	114226	6" Dynamic Speaker
T9	104212	Power transformer
L1	12312	R.F. Choke coil
S1	125119	Wave band switch
S2	125120	Radio-phono On-off switch
P1	10794	(2) Pilot light bulbs T-44



TRIMMER VIEW FRONT CHASSIS FLANGE

Phonograph-Television or FM. Jack

Should you wish to use an external phonograph it should be plugged into the phono-jack shown in the top view—The on-off radio-phono knob on the front panel will then switch from radio to phono operation.

If television or frequency modulation (FM) programs ever become available in your community this radio may still be used in conjunction with the necessary converters.

The jack marked phono-television-FM in the top view will accommodate either the Phono or a television or FM converter.

Power Consumption - - - - - 75 Watts

Power Output - - - 3 Watts Undistorted

Sensitivity for 500 Milliwatt Output:
20 Microvolts Average

Selectivity - 45 KC Broad at 1000 Times Signal at 1000 KC

Tuning Frequency Range Broadcast - - 535 to 1600 KC
Shortwave - 5.4 to 18.4 MC

Intermediate Frequency - - - - - - 455 KC

Speaker - - - - - - - 6 in. Electro Dynamic

Pushbutton Tuning

Make a list of your 6 favorite stations. Push out the call letters of these stations from the call letter sheets supplied. Insert a call letter in the slot on top of each pushbutton.

Next pull one of the pushbuttons all the way out as far as it will come (pull, with fingers on top and bottom of button). Now tune in the station you want with the tuning knob—Tune back and forth until the station is clear and distinct. Now push the button hard all the way in to lock the station in place (push directly on front of button). Continue setting each pushbutton in the same way. Pressing the proper button will now tune the station you want. If it does not do so you did not push the button hard enough to lock it in place when setting up the station.

To change stations simply repeat the procedure above.

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio ground to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- 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., 200 mmf., 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	SIGNAL GENERATOR Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 I. F.	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Top View)	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Top View)	Input I. F.	Adjust to maximum output
SHORT WAVE BAND (See Note A)	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C4	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C1	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 6 Mc.	Trimmer C7	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "C")
BROAD-CAST BAND (See Note A)	1600 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Rotor full open (Plates out of mesh)	Trimmer C5	Broadcast oscillator	Adjust to maximum output
	535 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Set Dial at 535 Kc.	Trimmer C6	Broadcast oscillator series pad	Adjust to maximum output
LOOP ALIGN-MENT (See Note B)	1400 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 1400 Kc.	Trimmer C2 (See Top View)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 600 Kc.	Trimmer T3 (See Top View)	Iron Core Tracking Coil	Adjust to maximum output

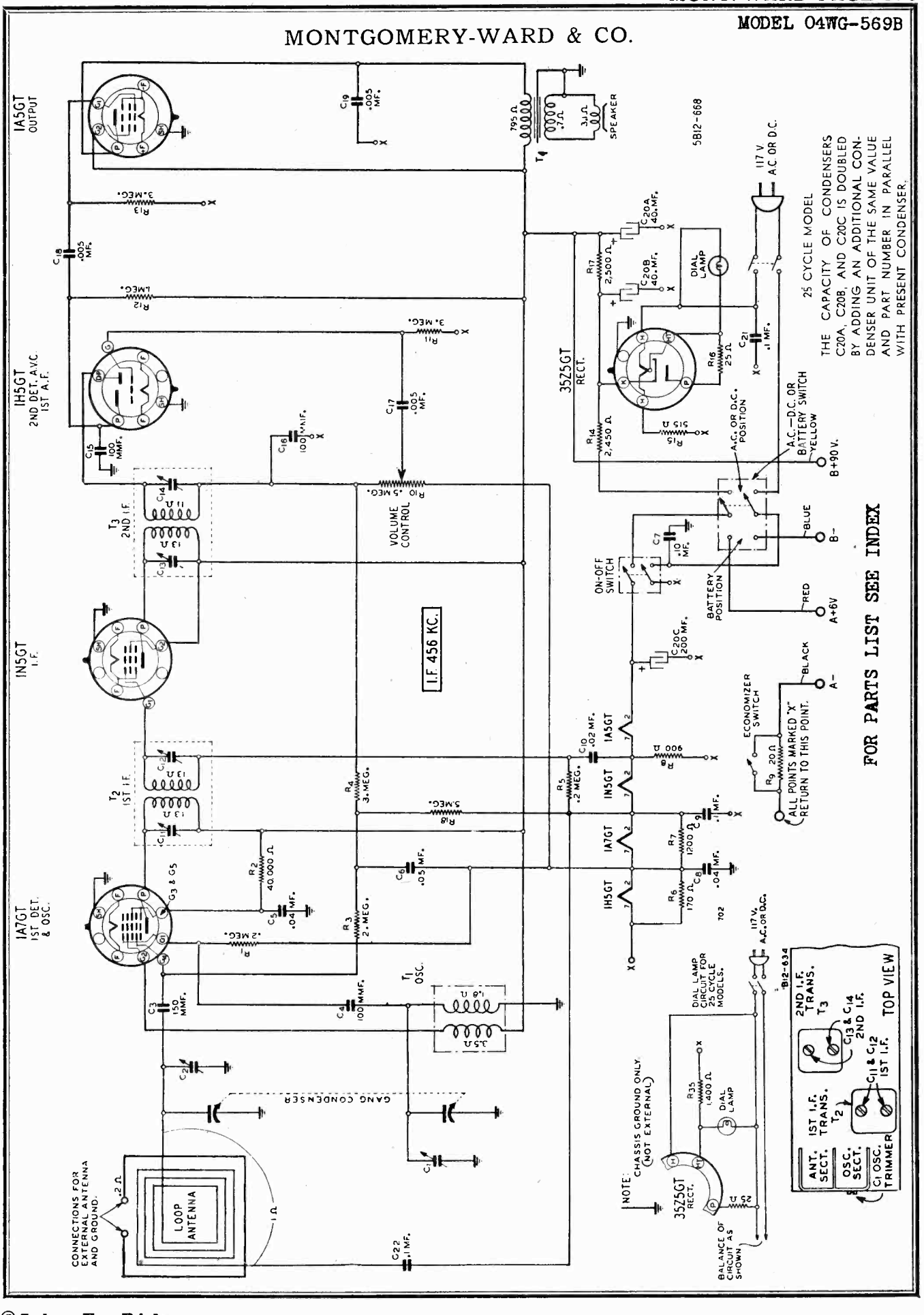
NOTE "A"—The signal generator is connected to the "ANT." and "GND." terminals on the rear of the chassis when aligning the Short Wave Band and to the grid of the 6SA7 tube and ground terminal when setting the Broadcast Band oscillator end frequencies, (1600 and 535 K. C.).

The loop antenna should be connected to the radio when making these adjustments.

NOTE "B"—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected. The signal generator is connected to the "ANT." and "GND." terminals.

NOTE "C"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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



MODEL 04WG-569B

MONTGOMERY-WARD & CO.

DRIVE CORD REPLACEMENT

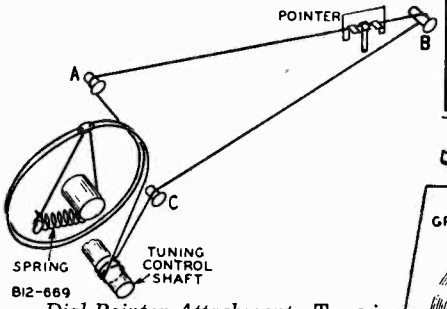
Tie a knot with a small loop at each end of new drive cord. The distance between knots should be 29¼ inches.

Thread one end of drive cord down through hole in groove of drive pulley. Place loop on hook on pulley. Turn gang condenser to completely closed position—See illustration.

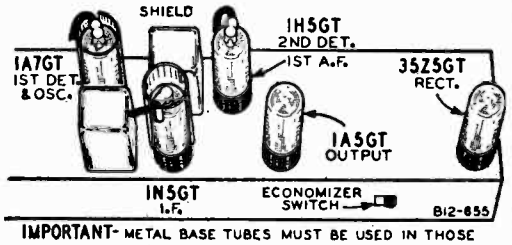
Wind cord one complete turn counter-clockwise (from back of chassis) around drive pulley. Then pass cord over idler studs A, B, & C as shown.

Wind 3½ turns clockwise (from back of chassis) around tuning control shaft. These turns should progress toward chassis.

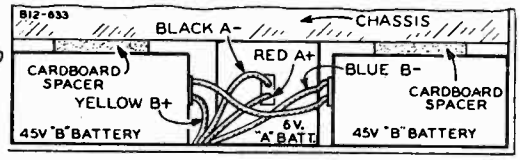
Wind 1¼ turns counter-clockwise (from back of chassis) around drive pulley. These turns should be on right side (from gang condenser side of chassis) of pulley groove and should progress toward dial mounting plate. Thread cord through hole in groove of drive pulley. Hook loop on tension spring. Wind cord around drive pulley shaft—See illustration. Fasten free end of spring to hook on pulley.

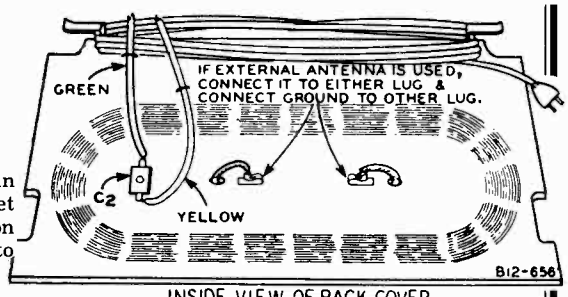


Dial Pointer Attachment—Tune in a signal of known frequency. Set pointer at this frequency mark on the dial scale. Fasten pointer to drive cord—See illustration.



IMPORTANT- METAL BASE TUBES MUST BE USED IN THOSE SOCKETS AT WHICH SHIELDS ARE SHOWN.





INSIDE VIEW OF BACK COVER

SPECIFICATIONS

Input Voltages and Currents—Battery Operation

"A" Battery ..... 6 Volts—50 Ma.
"B" Batteries .....90 Volts—9.5 Ma.

Power Consumption (At 117 volts AC Supply) 28 Watts

Power Output

Battery Operation	70 Mw. Undistorted	160 Mw. Maximum
AC Operation	70 Mw. Undistorted	160 Mw. Maximum

Selectivity - 50 KC Broad at 1000 Times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - - 5" P.M. Dynamic

Tuning Frequency Range - - - 540 to 1600 KC

Sensitivity (For .05 Watt Output)

External Antenna - - - - - 50 Microvolts Average

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Allow 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.

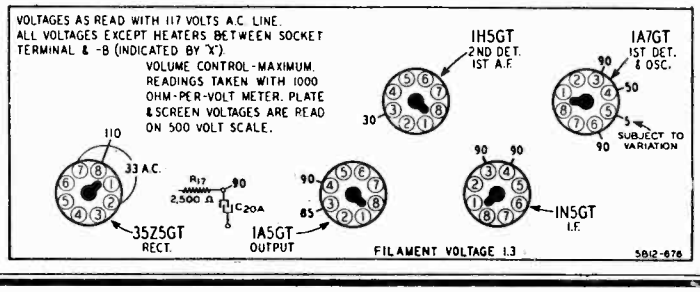
Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antenna—.1 mf.

SIGNAL GENERATOR					
FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration below and Illustration of Back—Page 2)
456 KC	Signal Grid of 1st Det. (Top Cap)	Point "X" Prong No. 7 1H5GT—2nd Det.	.1 mf.	Turn Rotor to full open	1st I.F. (C11) & (C12) 2nd I.F. (C13) & (C14)
1600 KC	Signal Grid of 1st Det.	Same as Above	.1 mf.	Turn Rotor to full open	Oscillator (C1)
1400 KC	None— See Note A			Turn Rotor to max. output	Antenna (C2)

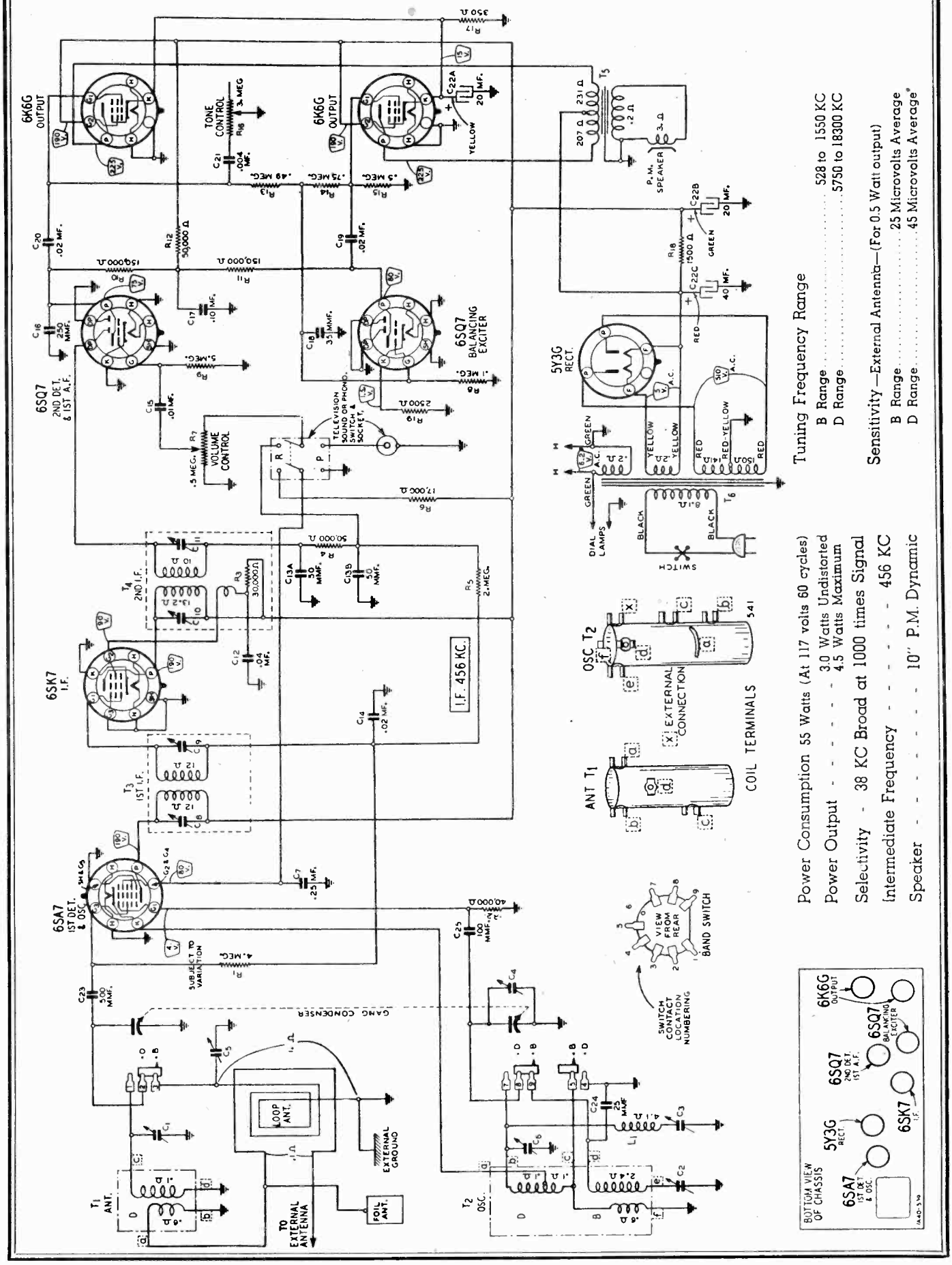
NOTE A—Chassis must be in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. The back of the cabinet must be in place. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

CALIBRATION—Tune in an 800 KC signal. If the pointer is not at 800 KC on the dial, set pointer at the 800 KC mark on the dial scale.



MONTGOMERY-WARD & CO.

MODEL 04WG-727



Power Consumption 55 Watts (At 117 volts 60 cycles)

Power Output - - - - - - 3.0 Watts Undistorted
4.5 Watts Maximum

Selectivity - 38 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - 10" P.M. Dynamic

Tuning Frequency Range

B Range ..... 528 to 1550 KC
D Range ..... 5750 to 18300 KC

Sensitivity—External Antenna—(For 0.5 Watt output)

B Range ..... 25 Microvolts Average
D Range ..... 45 Microvolts Average*

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.

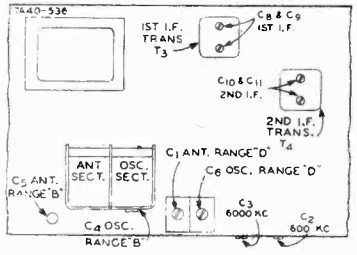
The following equipment is required for aligning:

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., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C8) & (C9) 2nd I.F. (C10) & (C11)
RANGE B					
1550 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C4)
1400 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1400 KC—See Note A	Ant. Range B (C5)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C2) Rock Rotor—See Note B
RANGE D					
18 300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C6)
17,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Rock Rotor—See Note B
6000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	6000 KC (C3) Rock Rotor—See Note B
LOOP RANGE B					
1400 KC See Note C	None See Note C		B Range	Turn Rotor to Max. Output	Ant. Range B (C5)



Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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, remove pointer from drive cord. Tune in a 1400 KC signal. Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

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

NOTE C—Reinstall set in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place signal generator so that this loop is between 3 and 10 feet from loop in cabinet.

CAUTION—When aligning the short wave band, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC or 14,088 KC on the dial. It may be necessary to increase the input signal to hear the image.

Television Sound or Phonograph Connections

On the back panel of the chassis base is a switch and a socket for a single shielded pin tip at which connections are made. The connector on the cable from a television receiver or from a phono pickup can be inserted in the socket. (The cable connector must be a single shielded pin tip type.

If Television programs ever become available in your community, the audio amplifier and speaker of this radio may be used to reproduce Television sound in conjunction with any "Television Picture Receiver and Sound Converter." Phonograph records may also be played through the radio.

When phonograph or television sound reproduction is desired, the knob should be moved to the "Television Sound or Phonograph" position. For radio reception, the knob should be in the "Radio" position.

Procedure for Setting the Station Buttons

Setting a Station Button

Turn the manual tuning knob so that the dial pointer moves toward 1550 KC until the stop is reached.

At the right side of the escutcheon (from the front) will be seen a cap which covers a hole in the escutcheon—See illustration. Pull off this cap.

At the end of the tube in back of the hole in the escutcheon is the locking screw. Using a small handled screwdriver, unlock the mechanism by turning this screw in a counter-clockwise direction several turns.

TO SET STATIONS ACCURATELY, DO NOT JAR THE RADIO OR BUTTONS WHILE THE MECHANISM IS UNLOCKED.

Select the first station from the list you have prepared, and carefully tune in this station by means of the manual tuning knob.

With one hand, hold the manual tuning knob to prevent it from turning and with the other hand, push one of the station buttons shown in the illustration *all the way in*. It is better to start with button No. 1.

Hold this button all the way in. With the other hand, see whether or not this station is still accurately tuned in by turning the tuning knob a slight amount back and forth. *Be sure to hold the button all the way in.*

Release the button slowly after the station is tuned in.

CAUTION — Do not touch this button again while the mechanism is unlocked as the setting may be altered.

Carefully tune in the second station on your list. Then hold the tuning knob and push the second button slowly and firmly all the way in. Check for accurate tuning.

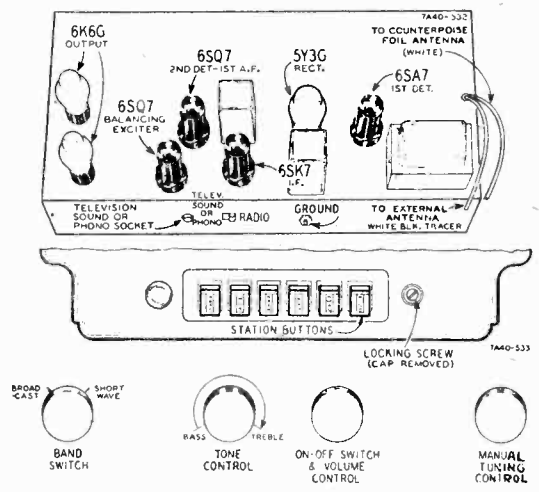
Proceed in the same manner to set any additional stations on your list on the remaining station buttons.

After all the stations are set, it will be necessary to lock the mechanism so that the settings will not change. Turn the manual tuning knob so that the dial pointer moves toward 1550 KC until the stop is reached. Then, with a SMALL HANDLED screwdriver, turn the locking screw in a clockwise direction until it is tight. Tighten the locking screw firmly but not excessively to avoid stripping the threads. Replace the cap over the hole.

Remove the correct station call letter tabs from the sheets supplied by bending the sheet back and forth at the score mark until the tab can be broken off. Press the tab all the way to the bottom of the space provided in the button. Cover the call letter tab with a celluloid tab, pressing this in until it snaps into place.

If at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons.

Any button may be used for any station you can receive, although it will be more convenient to set the stations so that the kilocycle numbers decrease from left to right.



Drive Cord Replacement

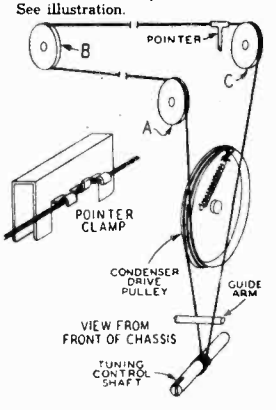
Tie one end of the new drive cord (approximately 70 inches in length) to tension spring. Turn gang condenser to full open position. Thread free end of drive cord up through hole in rim of condenser drive pulley and pull spring flush against pulley rim.

Wind one turn counter-clockwise (from condenser drive pulley side of chassis) around drive pulley. This turn should progress to the left (from front of chassis). Pass cord in back of guide arm—see illustration. Then wind drive cord 3½ turns counter-clockwise (from front of chassis) around tuning control shaft. Turns should progress away from the chassis.

Pass cord around pulleys C, B, and A as shown in illustration. Then wind cord ¾ turn counter-clockwise (from condenser drive pulley side of chassis) around drive pulley. The turn should be at right side (from front of chassis) of pulley groove.

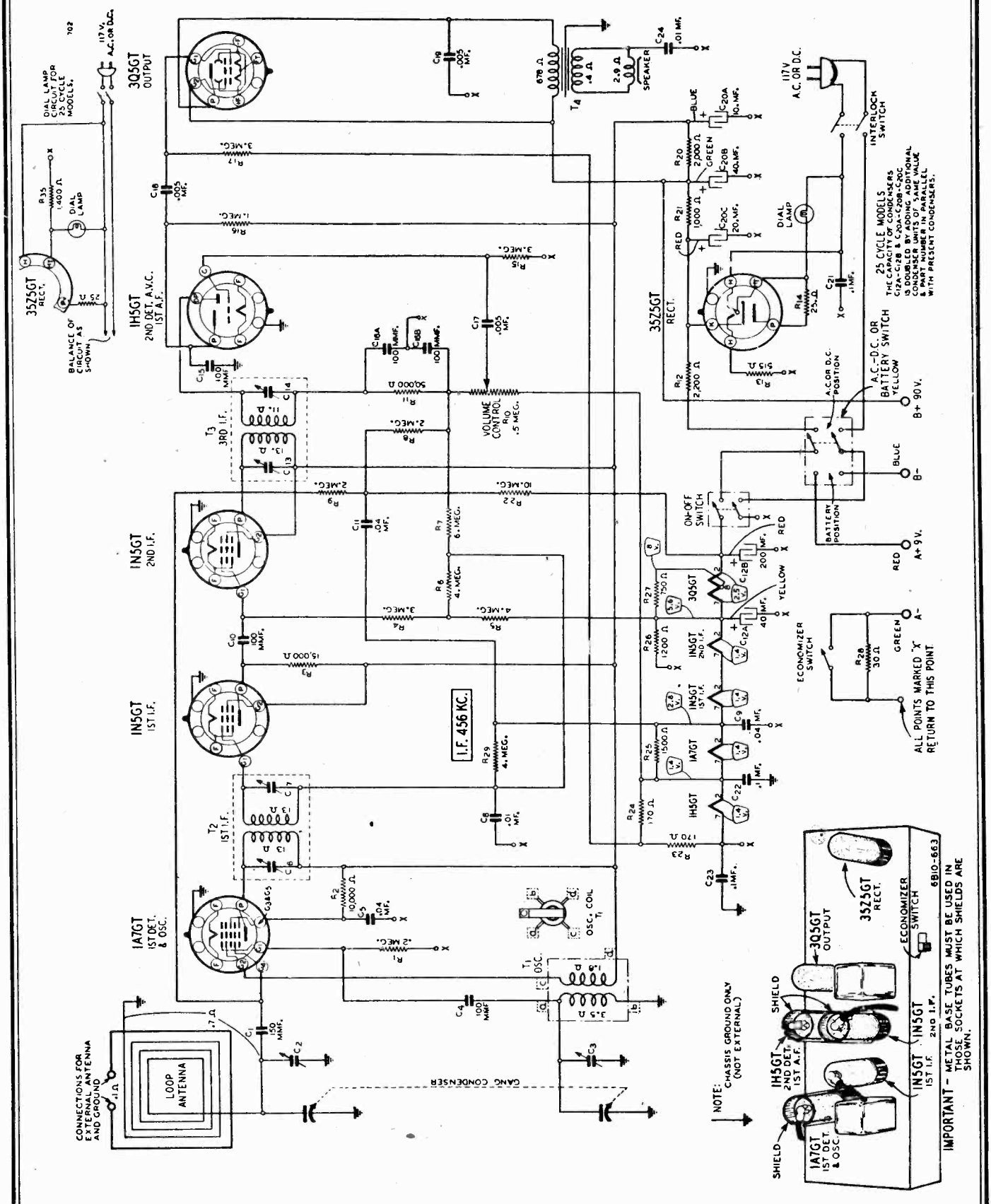
Thread cord through hole in pulley groove and knot securely to spring. Stretch spring and secure free end to hook on drive pulley.

Dial Pointer Attachment—Tune in a signal of known frequency. Set the pointer at this frequency on the dial scale. Secure pointer to cord—See illustration.



MODEL 04WG-2672

MONTGOMERY-WARD & CO.



ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

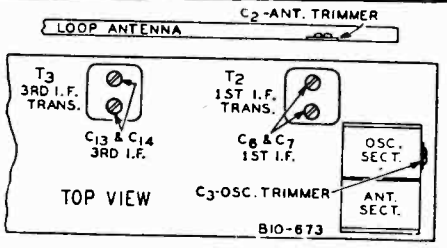
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

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 Screwdriver.
Dummy Antennas—.1 mf., 50 mmf.

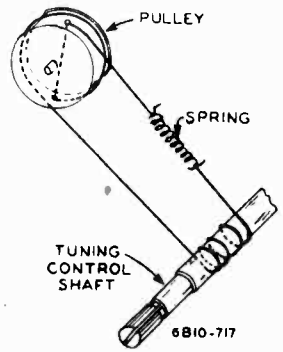
SIGNAL GENERATOR					
FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration below)
456 KC	External Antenna Clip on Loop	External Ground Clip on Loop	.1 mf.	Turn Rotor to full open	1st I.F. (C6) & (C7) 3rd I.F. (C13) & (C14)
1600 KC	External Antenna Clip	External Ground Clip	.1 mf.	Turn Rotor to full open	Oscillator (C3)
1400 KC	External Antenna Clip See Note A	External Ground Clip	50 mmf.	Turn Rotor to max. output	Antenna (C2)

NOTE A—Re-assemble chassis in cabinet. Close back on cabinet.

CALIBRATION—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, loosen pointer set screw and set the pointer at the 800 KC mark. Retighten set screw.



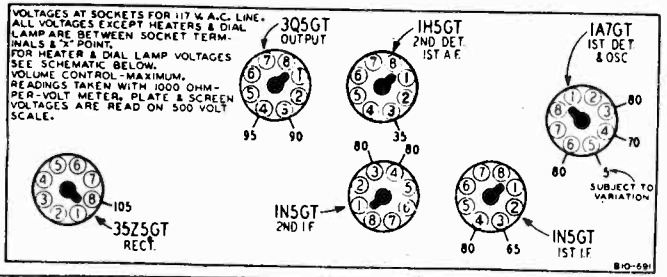
DRIVE CORD REPLACEMENT



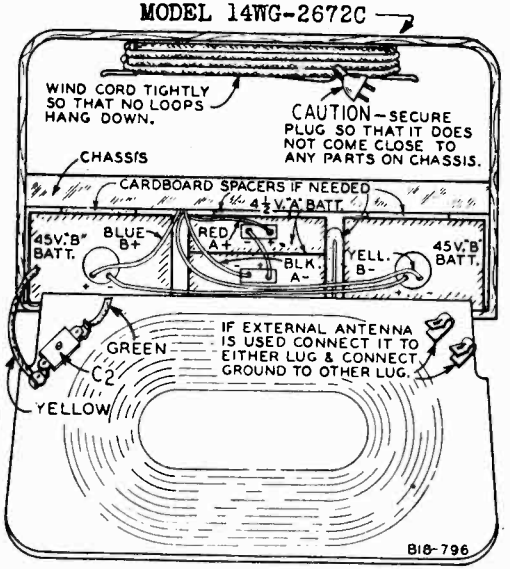
GANG CONDENSER IN CLOSED POSITION

CAUTION

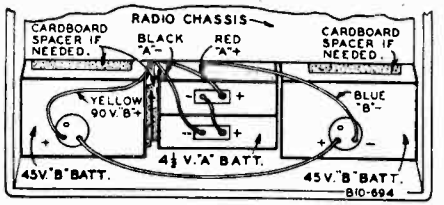
The metal chassis is connected to one side of the line through .20 mfd. Both AC and DC power lines are generally grounded on one side. If the side of the line not connected to the metal chassis through this capacity is grounded and the metal chassis comes in contact with an external ground, this capacity will be connected across the line and there will be an increase in hum.



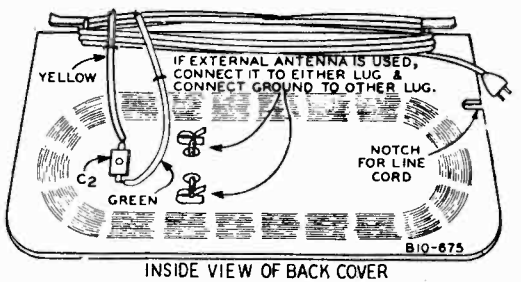
MODEL 14WG-2672C



MODEL 04WG-2672



MODEL 04WG-2672



INSIDE VIEW OF BACK COVER

SPECIFICATIONS

Input Voltages and Currents—Battery Operation
"A" Batteries..... 9 Volts—50 Ma.
"B" Batteries.....90 Volts—11.5 Ma.

Power Consumption (At 117 volts AC Supply) 28 Watts

Power Output
Battery Operation - - - - 150 Mw. Undistorted, 350 Mw. Maximum
AC Operation - - - - - 200 Mw. Undistorted, 400 Mw. Maximum

Selectivity - 50 KC Broad at 1000 Times Signal

Intermediate Frequency - - - - - - 456 KC

Speaker - - - - - - - - - 6" P.M. Dynamic

Tuning Frequency Range - - 540 to 1600 KC

Sensitivity (For .05 Watt Output)
External Antenna - - - 10 Microvolts Average

MONTGOMERY-WARD & CO.

MODELS 14BK-474, 14BR-1474

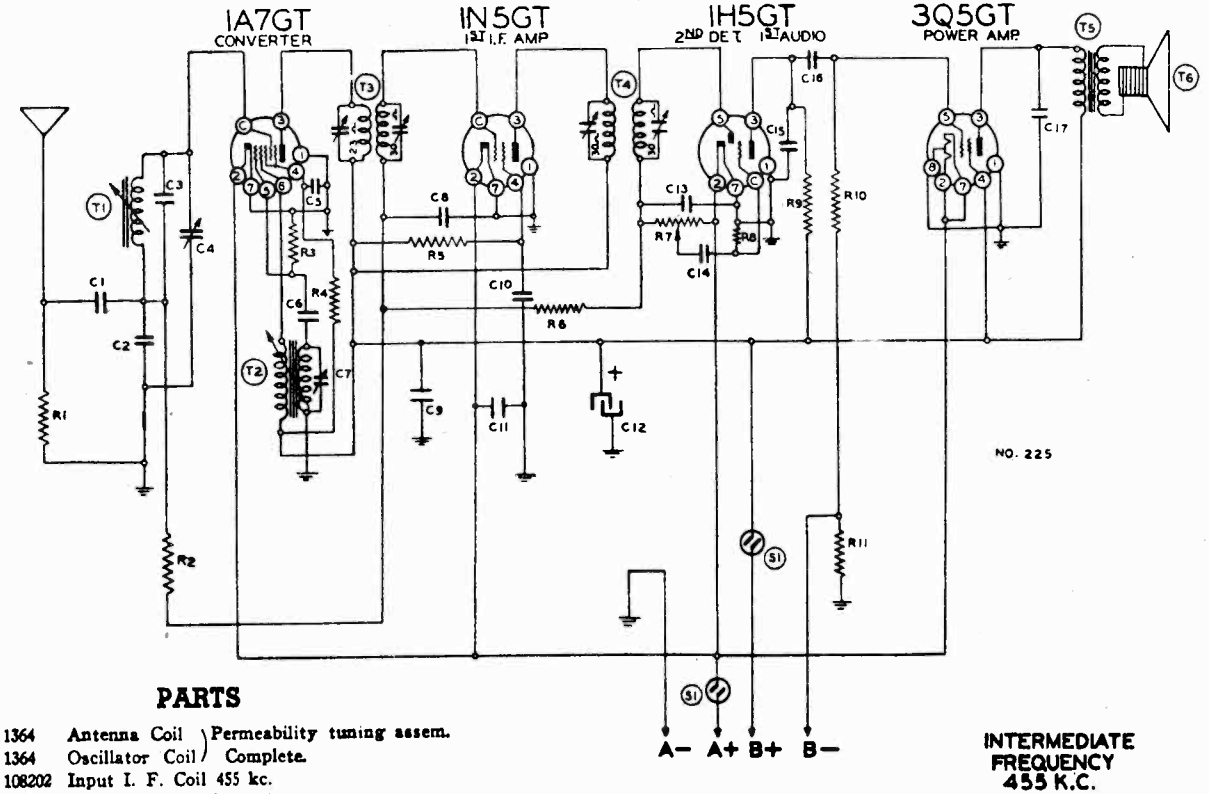
Code No.	Part No.	Description

RESISTORS

R1	13017	10M ohm—⅓ w.
R2	1304	3 megohm—⅓ w.
R3	1309	200M ohm—⅓ w.
R4	130194	35M ohm—⅓ w.
R5	13094	50M ohm—⅓ w.
R6	1304	3 megohm—⅓ w.
R7	101250	1 megohm—Volume control and switch—⅓ w.
R8	130257	5 megohm—⅓ w
R9	13019	1 megohm—⅓ w.
R10	130146	2 megohm—⅓ w.
R11	13079	400 ohm—⅓ w.

CONDENSERS

C1	12936	.0003 mica
C2	100112	.001 x 200 v.
C3	129177	.000045—Ceramicon
C4	124165	Antenna trimmer
C5	1009	.05 x 200 v.—Condenser
C6	12912	.00025 mica
C7	124165	Oscillator trimmer
C8	1009	.05 x 200 v. Condenser
C9	1006	.25 x 200 v. Condenser
C10	10020	.1 x 200 v.
C11	10017	.5 x 120 v.
C12	119117B	10 mfd. x 150 v. Lytic
C13	1295	.0001 mica
C14	10012	.003 x 600 v. Condenser
C15	1295	.0001 mica
C16	10026	.02 x 400 v. Condenser
C17	1007	.005 x 600 v.
		C4 and C7 are in same unit.

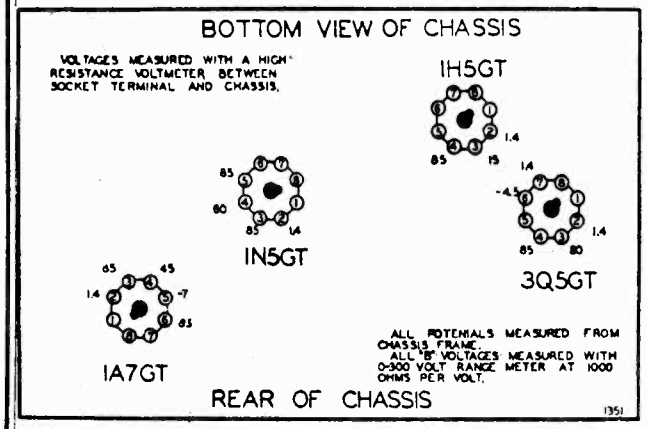


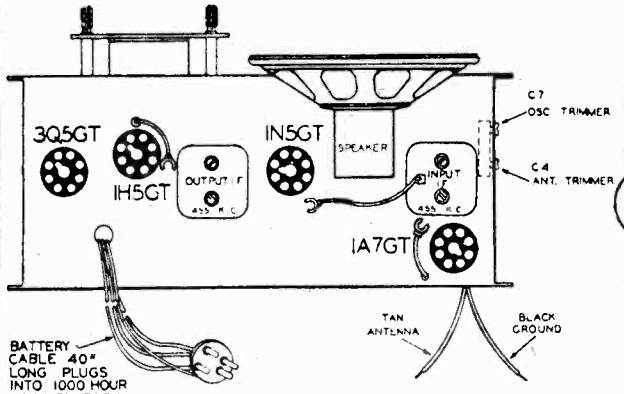
PARTS

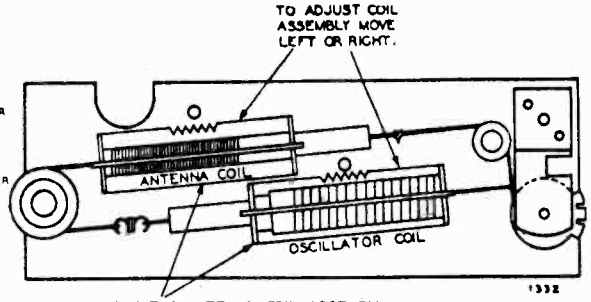
T1	1364	Antenna Coil) Permeability tuning assem.
T2	1364	Oscillator Coil) Complete.
T3	108202	Input I. F. Coil 455 kc.
T4	108153B	Output I. F. Coil 455 kc.
T5	10591B	Output transformer
T6	114238	5" P.M. speaker
S1		Switch-on Volume control

INTERMEDIATE FREQUENCY 455 K.C.

February 1941







NOTE: THE ANTENNA COIL ASSEMBLY IS MADE SO THAT IT IS MOVABLE LEFT OR RIGHT. WHEN MAKING THE ADJUSTMENT AS GIVEN IN THE ALIGNMENT PROCEDURE MOVE COIL ASSEMBLY VERY SLOWLY

COIL ASSEMBLY VIEW

ALIGNMENT PROCEDURE

MODEL 14BR-474

MODEL 14BR-474

The following equipment is required for aligning:

Dummy antenna .1mfd. and 200 mmf.

Vol. control- Max.all adjs.

Conn. grd. lead of radio chassis to grd. post of signal generator.

FOR OTHER DATA SEE INDEX

Power Consumption - - - A—.250 Amp. B .014 Amps.
Power Output - - - - - - - 160 Milliwatts Undistorted

Sensitivity for 50 Milliwatt Output: 45 Microvolts Average
Selectivity - 48 KC at 1000 Times Signal at 1000 KC
Tuning Frequency Range - - - - - 540 to 1700 KC

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Iron Cores (Dial Setting)	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
455 Kc. I. F.	455 Kc.	.1 MFD.	Connect to Grid of 1A7	Iron Cores All the way out	Two trimmers on top of output I. F. can	Output I. F.	maximum output
	455 Kc.	.1 MFD.	Connect to Grid of 1A7	Iron Cores All the way out	Two trimmers on top of input I. F. can	Input I. F.	maximum output
BROAD-CAST BAND	1700 Kc.	.1 MFD.	Connect to Grid of 1A7	Iron Cores All the way out	Trimmer (C7) (See chassis view)	Oscillator	maximum output
	1700 Kc.	200 MMF.	Connect to Antenna Clip	Iron Cores All the way out	Trimmer (C4) (See chassis view)	Antenna	maximum output
	1400 Kc.	200 MMF.	Connect to Antenna Clip	Turn Dial to 1400 Kc.	Adjust position of antenna coil (See coil assembly view)	Antenna Coil Adjustment	maximum output (See Note "A")
	1700 Kc.	200 MMF.	Connect to Antenna Clip	Turn Dial to 1700 Kc.	Adjust trimmer (C4) (See chassis view)	Antenna	Check for tracking (See Note "B")

NOTE "A"—The antenna coil assembly is made so that it is movable. When making the adjustment as given in the alignment procedure move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

NOTE "B"—After the antenna coil has been tracked at 1400 Kc. it is necessary to check the antenna trimmer (C4) adjustment again at 1700 Kc. If no appreciable change in trimmer adjustment is made the coil is in track, if the trimmer requires considerable change it will be necessary to again adjust the position of the antenna coil at 1400 Kc. These two adjustments should be tried several times until no change of trimmer adjustment is required at 1700 Kc.

MODEL 14BR-695

Power Consumption - - - - - - - 35 Watts
Power Output - - - 900 Milliwatts Undistorted
Sensitivity for 50 Milliwatt Output - 15 Microvolts Average
Selectivity - 46 KC Broad at 1000 Times Signal at 1000 KC

Tuning Frequency Range
Broadcast - - - 540 to 1600 KC
Shortwave - - - 5.6 to 18.3 MC
Intermediate Frequency - - - - - - 455 KC
Speaker - - - - - - - - 5 in. P.M. Dynamic

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 12SK7 I. F.	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Top View)	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 12SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Top View)	Input I. F.	Adjust to maximum output
SHORT WAVE BAND	17 Mc.	400 Ohms	External Antenna and B—	Short Wave	Set Dial at 17 Mc.	Trimmer C8	Short Wave oscillator	Adjust to signal
	17 Mc.	400 Ohms	External Antenna and B—	Short Wave	Set Dial at 17 Mc.	Trimmer C4	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 Ohms	External Antenna and B—	Short Wave	Set Dial at 6 Mc.	Trimmer C12	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "A")
BROAD-CAST BAND	1600 Kc.	.1 mmf.	Grid of 12SA7	Broadcast	Rotor full open (Plates out of mesh)	Trimmer C9	Broadcast oscillator	Adjust to signal
	1400 Kc.	200 mmf.	External Antenna and B—	Broadcast	Set Dial at 1400 K. C.	Trimmer C2 (See Top View)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	External Antenna and B—	Broadcast	Set Dial at 600 K. C.	Trimmer C11 (See Top View)	Broadcast Series Pad	Adjust to maximum output (See Note "A")

The loop antenna should be connected to the radio when making all adjustments—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected.

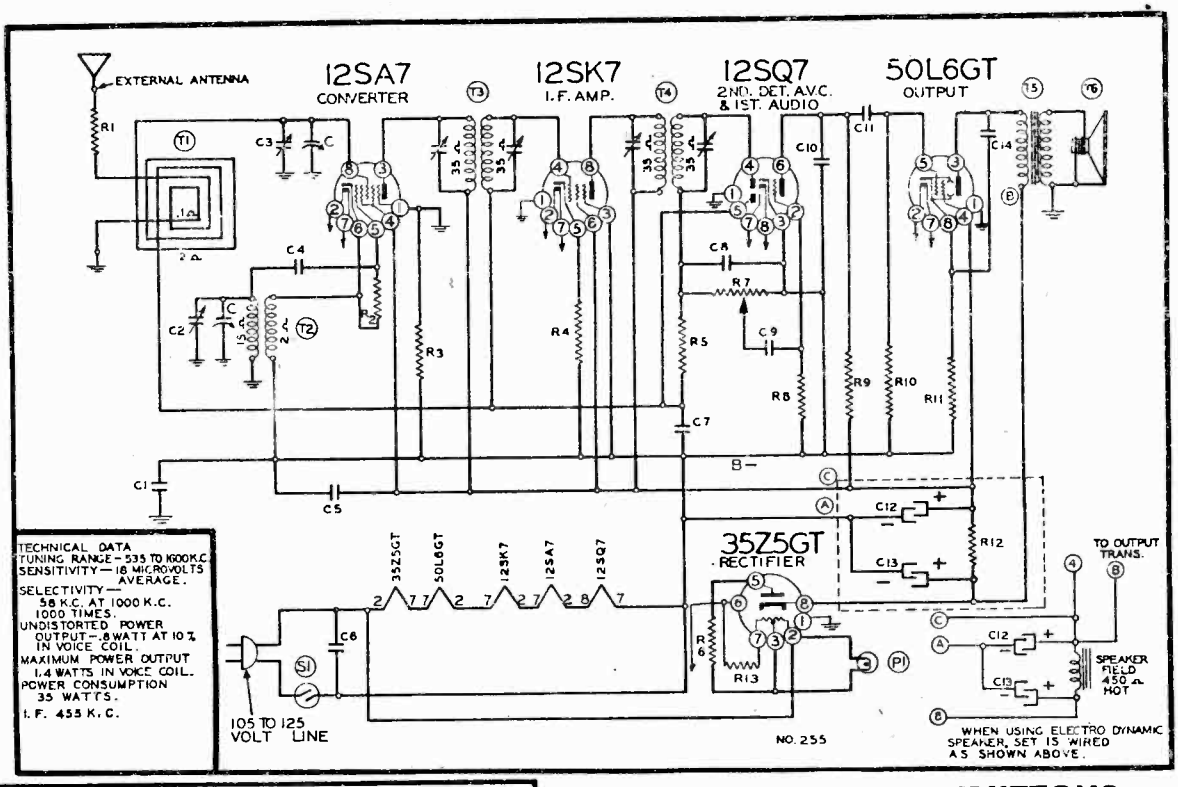
NOTE "A"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

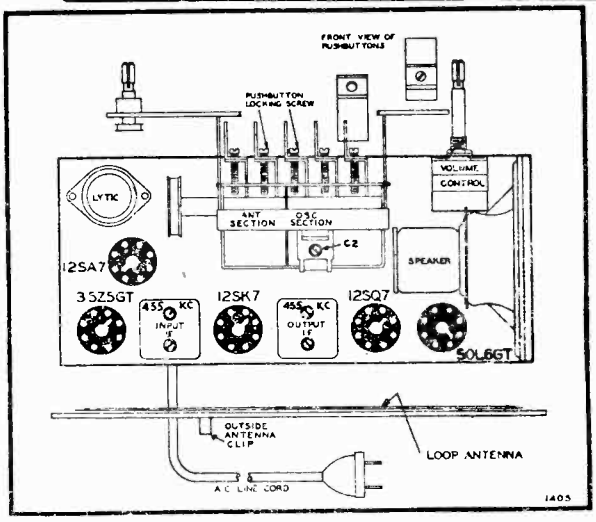
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

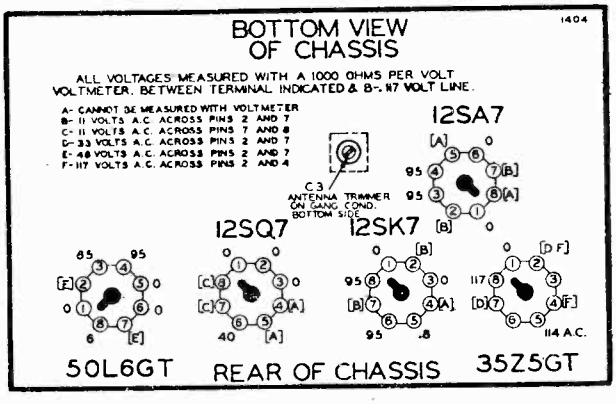
MONTGOMERY-WARD & CO.

MODELS 14BR-530A, 14BR-531A





Chassis View, showing Tube Location and the Outside Antenna Clip.



Voltage Chart

SETTING THE PUSHBUTTONS

Make a list of your 5 favorite stations—push out the call letters of these stations from the call letter sheets supplied. Next insert a long slim screw driver into the hole in front of one of the pushbuttons and unscrew the pushbutton locking screw (to the left) several turns. Now with the screw driver still engaged in the locking screw slot push it all the way in. Hold it in this position and tune in the station you want with the tuning knob. Now tighten up the pushbutton locking screw by turning it to the right. Tighten firmly. Continue setting each button in the same way. When you have set your stations insert the call letter of each station in the front of the proper button and put one of the celluloid tabs over the station call letter.

To change stations simply repeat the above procedure.

If you are unable to set a station on any particular button it is probably because the pushbutton locking screw has not been unloosened (turned to the left).

ANTENNA

For best results, however, an outside antenna approximately 50 to 75 feet long including lead-in is recommended. It should be erected as high as possible and as far from surrounding objects as practical. For minimum interference it should be at right angles to street car lines, incoming power lines and other electrical apparatus which may be in the vicinity. A ground is not required.

Periodic inspection of the antenna system is recommended to be sure that all connections are clean and tight, and that the antenna is well insulated from the ground at all points.

MODELS 14BR-530A,
14BR-531A

MONTGOMERY-WARD & CO.

REPLACEMENT PARTS LIST

In ordering parts refer to model number on chassis label.

Use Only Genuine Factory Replacement Parts.

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
CONDENSERS				
BE10026	C14	.02 x 400 Volt Tubular Condenser	1	.12
BE100106	C11	.004 x 600 Volt Tubular Condenser	1	.12
BE1009	C5, C7	.05 x 200 Volt Tubular Condenser	2	.12
BE100110	C1	.2 x 400 Volt Tubular Condenser	1	.12
BE1001	C6	.1 x 400 Volt Tubular Condenser	1	.12
BE10025	C9	.002 x 600 Volt Tubular Condenser	1	.12
BE11992	C12, C13	Electrolytic Filter Condenser. 50 to 60 Cycles. 20 Mfd.-40 Mfd. x 150 Volts. NOTE: BE11992 can be used on 25 to 60 cycles if set uses Electrodynamic Speaker.	1	.74
BE11993	C12, C13	Electrolytic Filter Condenser. 25 Cycles. 40 Mfd.-60 Mfd. x 150 Volts		1.24
BE1295	C8	.0001-Mica Type Condenser—20%	1	.12
BE12912	C10	.00025 Mica Type Condenser—20%	1	.12
BE12921	C4	.0002 Mica Type Condenser—20%	1	.12
RESISTORS				
BE13026	R1	1M Ohm—½ Watt Resistor—20%	1	.10
BE1303	R9	500M Ohm—½ Watt Resistor—20%	1	.10
BE130166	R11	150 Ohm—½ Watt Resistor—10%	1	.10
BE1309	R3	200M Ohm—½ Watt Resistor—20%	1	.10
BE130257	R8	5 Megohm—½ Watt Resistor—25%	1	.10
BE1304	R5	3 Megohm—½ Watt Resistor—20%	1	.10
BE130174	R4	50 Ohm—½ Watt Resistor—10%	1	.10
BE13094	R2	50M Ohm—½ Watt Resistor—10%	1	.10
BE130287	R12	1200 Ohm—1 Watt Resistor—10%	1	.10
BE130215	R6	25 Ohm—½ Watt Resistor—10%	1	.10
BE13037	R10	750M Ohm—½ Watt Resistor—20%	1	.10
BE130293	R13	30 Ohm—1 Watt Resistor—20%	1	.10
COILS				
BE108140K	T3	Input I.F. Coil Complete in Can	1	.62
BE108141F	T4	Output I.F. Coil Complete in Can	1	.62
BE110145	T2	Oscillator Coil	1	.36
BE111252C	T1	Loop Antenna Only (Less Back)	1	.80
BE128793		Back Only for Loop	1	
SPEAKER				
BE114256	T6	Five Inch Electrodynamic Speaker (Less Output Transformer)	1	2.50
BE114248	T6	Five Inch P.M. Dynamic Speaker (Less Output Transformer)	1	2.50
BE105108B	T5	Output Transformer for 114248 Speaker	1	.78

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
MISCELLANEOUS				
BE101265	R7, S1	Volume Control and Switch (1 Megohm)	1	.62
BE102142B	C, C2, C3	Two Gang Variable Condenser with 5 Button Automatic Tuner Assembly	1	3.80
BE10798		Line Cord and Plug	1	.30
BE121210		Eight Prong Octal Socket	5	.10
BE107249	P1	6-8 Volt Pilot Lite Bulb. Type T-47	1	.10
BE107358		Socket Assembly for Pilot Lite	1	.10
BE132264		No. 8-18 x ¼ Chassis Mounting Screws	3	.02
BE134123		Rubber Bumper for Bottom of Cabinet	4	.02
BE128655-36		Bakelite Cabinet—Walnut	1	2.40
BE128655-9		Bakelite Cabinet—Ivory Color	1	3.00
DIAL AND TUNING PARTS				
BE112945B		Dial Plate	1	.12
BE1121022		Dial Scale	1	.24
BE112964		Pointer	1	.06
BE112969		Crystal for Dial	1	.28
BE131211		Snap-in Rivet to Fasten Dial Scale	2	.02
BE120375		String for Dial	Yd.	.12
BE120372		Coiled Tension Spring for Dial String	1	.02
BE112959		Pulley for Dial	1	.06
BE117910		Pointer Shaft	1	.06
BE117906		Tuning Shaft	1	.14
BE128699-36		Pushbutton—Walnut—Left	2	.08
BE128700-36		Pushbutton—Walnut—Right	3	.08
BE112973		Set of Station Call Letters	1	.12
BE112979		Set of Celluloid Tabs 1	Set.	.06
BE128686-37		Knob—Walnut—"Volume"	1	.12
BE128687-37		Knob—Walnut—"Tuning"	1	.12
BE128686-8		Knob—Ivory—"Volume"	1	.12
BE128687-8		Knob—Ivory—"Tuning"	1	.12
BE131383		Screw Driver	1	.06

NOTICE—There is a model number label on the chassis

This model number identifies the radio as to year, manufacturer, chassis and issue number or letter. When ordering parts or writing, be sure to mention the complete model number.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect B—of radio chassis to ground post of signal generator through .1 Mfd. condenser.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted to Maximum
I. F.	455 Kc.	.1 MFD.	Grid of 12SK7 I. F.	Rotor full open (Plates out of mesh)	Two trimmers on top of Output I. F.
	455 Kc.	.1 MFD.	Grid of 12SA7 Mixer	Rotor full open (Plates out of mesh)	Two trimmers on top of Input I. F.
BROAD-CAST BAND	1600 Kc.	.1 mmf.	Grid of 12SA7	Rotor full open (Plates out of mesh)	B.C. Osc. trimmer C2 on Gang
	1400 Kc.	200 mmf.	External Antenna and B—	Set Dial at 1400 K. C.	B.C. Ant. trimmer C3 under Gang

The loop antenna should be connected to the radio and in its proper position whenmaking all adjustments.

5 TUBE AC-DC PUSHBUTTON TUNING

NOVEMBER 1941

DIAL PILOT LIGHT

If at any time the dial pilot lite should burn out, replace it as soon as you conveniently can.

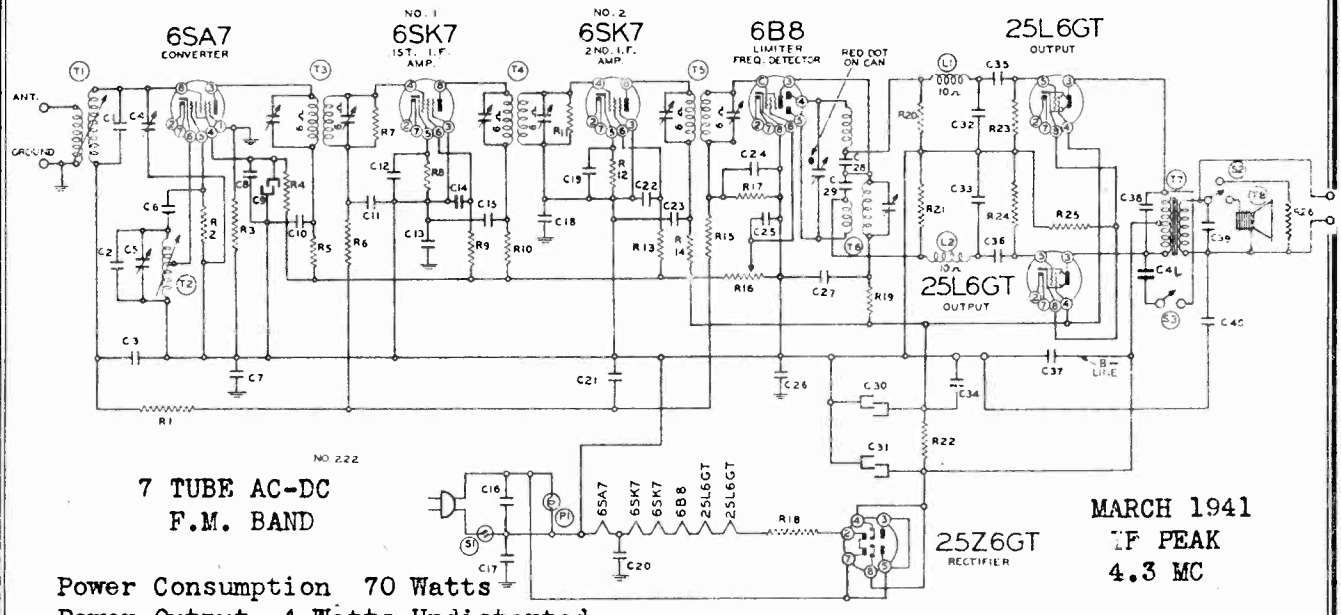
Prolonged use of the radio with the pilot lite not working may shorten the life of the 35Z5GT rectifier tube.

MODEL 14BR-530A
MODEL 14BR-531A

MODEL 14BR-613A

MONTGOMERY-WARD & CO.

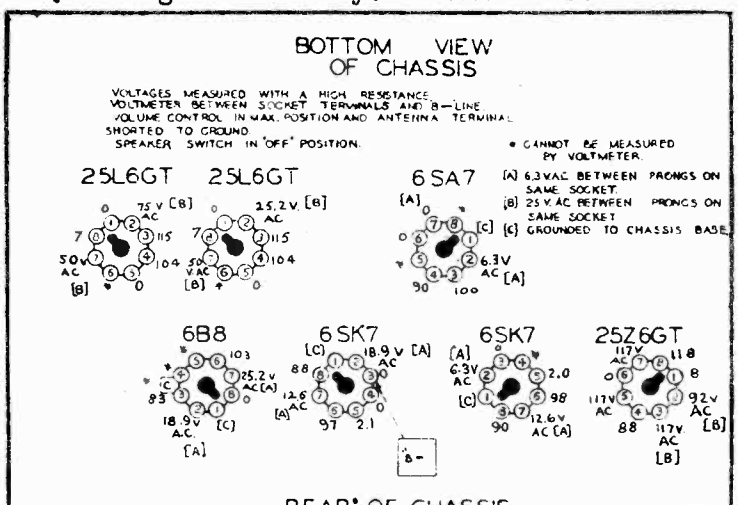
FREQUENCY MODULATION RECEIVER AND CONVERTER

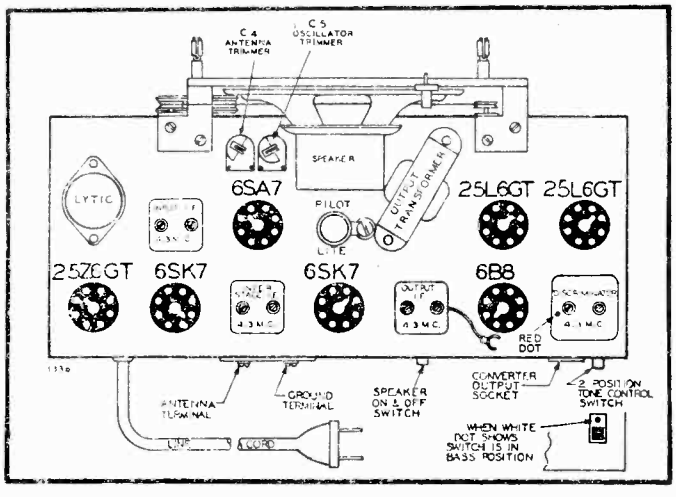


7 TUBE AC-DC
F.M. BAND

MARCH 1941
IF PEAK
4.3 MC

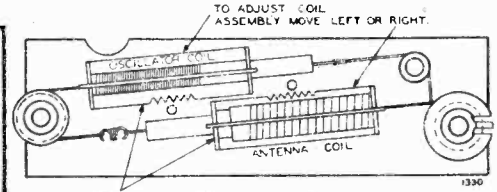
Power Consumption 70 Watts
Power Output 4 Watts Undistorted
Quieting Sensitivity: 30 Microvolts





CHASSIS TOP VIEW

VIEW LOOKING AT BOTTOM OF CHASSIS



COIL ASSEMBLY VIEW

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with volume control at minimum, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volt 60 cycle A.C. line.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

ALIGNMENT PROCEDURE

CAUTION: A—D.C. reading vacuum tube voltmeter must be used to make some of the following adjustments.

- Volume control—Minimum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output 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.
- Vacuum tube voltmeter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 400 ohms.

Speaker - - 5 in. P.M. Speaker

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Dial Pointer Setting	Trimmers Adjusted in Order Shown	Trimmer Function	Adjustment
I. F.	4.3 Mc.	.1 MFD.	Grid of 6SK7 No. 2	45 Mc.	Two trimmers on top of T5	Limiter I. F.	Adjust to maximum voltage (See Note "A")
	4.3 Mc.	.1 MFD.	Grid of 6SA7	45 Mc.	Two trimmers on top of T3	Input I. F.	Adjust to maximum voltage (See Notes "A" and "B")
	4.3 Mc.	.1 MFD.	Grid of 6SK7 No. 1	45 Mc.	Two trimmers on top of T4	2nd I. F.	Adjust to maximum voltage (See Notes "A" and "C")
	4.3 Mc.	.1 MFD.	Grid of 6B8	45 Mc.	Trimmer with red dot on top of T6	Disc. I. F.	Adjust to zero signal (See Note "D")
	4225 Kc. and 4375 Kc.	.1 MFD.	Grid of 6B8	45 Mc.	Trimmer without red dot on top of T6	Disc. I. F.	See Notes "D" and "E"
R. F.	50.5 Mc.	400 Ohms	Antenna Lead	50.5 Mc.	C5 C4	Osc. Ant.	Adjust to maximum voltage (See Note "A")

NOTE "A". Connect a D.C. reading vacuum tube voltmeter in parallel with C24. Use only enough signal to obtain a medium scale deflection. Use an unmodulated signal.

NOTE "B". Before aligning this stage one trimmer of T4 must be adjusted to maximum capacity and the other adjusted to minimum capacity.

NOTE "C". Do not realign or "Go Over" the I.F. adjustments after the above procedure has been followed or unsymmetrical wave shape will result.

NOTE "D". Connect an output meter across the speaker voice coil. Use a modulated signal.

NOTE "E". Adjust trimmer so that the same output reading will be obtained with the signal generator set at both 4225 K.C. and 4375 K.C., that is, 75 K.C. each side of the I.F. frequency. Check adjustment of trimmer with red dot after this adjustment.

REPLACEMENT PARTS LIST

CONDENSERS

Part No.	Schematic Diagram Reference	Description	No. Used In Set
BE10026	C41	.02 x 400 Volt Tubular Condenser	1
BE1001	C16	.1 x 400 Volt Tubular Condenser	1
BE10078	C3, C8, C10, C11, C12, C14, C15, C19, C22, C23, C27, C34, C35, C36, C39, C40 .01 x 200 Volt Tubular Condenser		16
BE10093	C7, C13, C17, C18, C20, C26, C27 .05 x 200 Volt Tubular Condenser		7
BE10020	C21, C25	.1 x 200 Volt Tubular Condenser	2
BE10011	C38	.01 x 400 Volt Tubular Condenser	1
BE119121	C31, C30	Electrolytic Filter Condenser 40 Mfd. x 150 Volts—60 Mfd. x 150 Volts	1
BE119122	C9	Electrolytic Filter Condenser 10 Mfd. x 150 Volts	1
BE124164	C4, C5	Ant. and Osc. Adjustable Trimmer Condensers	2
BE12921	C28, C29	.0002 Mica Type Condenser—20%	2
BE1295	C6, C24, C32, C33	.0001 Mica Type Condenser—20%	4
BE129173	C2	.000035 Ceramicon Condenser—5%	1
BE129174	C1	.00001 Ceramicon Condenser—5%	1

RESISTORS

BE1301	R2	25M Ohm—⅓ Watt Resistor—20%	1
BE13020	R1, R6	100M Ohm—⅓ Watt Resistor—20%	2
BE13023	R4, R5, R9, R10, R13, R14, R19	2M Ohm—⅓ Watt Resistor—20%	7
BE13019	R15	1 Megohm—⅓ Watt Resistor—20%	1
BE130100	R3	150M Ohm—⅓ Watt Resistor—20%	1
BE130239	R8, R12	250 Ohm—⅓ Watt Resistor—20%	2
BE130102	R20, R21, R23, R24	500M Ohm—⅓ Watt Resistor—10%	4
BE130338	R11	175M Ohm—⅓ Watt Resistor—5%	1
BE130341	R17	200M Ohm—⅓ Watt Resistor—5%	1
BE130337	R7	110M Ohm—⅓ Watt Resistor—5%	1
BE130336	R25	75 Ohm—1 Watt Resistor—10%	1
BE130335	R22	350 Ohm—1 Watt Resistor—20%	1
BE10664	R18	60 Ohm—6 Watt Wire Wound Resistor—10%	1
BE10665	R26	3 Ohm—1 Watt Wire Wound Resistor—10%	1

COILS

BE108189	T3	Input I.F. Coil Complete in Can 4.3 Mc.	1
BE108190	T4	2nd I.F. Coil Complete in Can 4.3 Mc.	1
BE108191	T5	Limiter I.F. Coil Complete in Can 4.3 Mc.	1
BE108192	T6	Discriminator I.F. Coil Complete in Can 4.3 Mc.	1
BE1365	T1, T2	Ant. and Osc. Coil Permeability Tuning Unit Complete	1
BE12312	L1, L2	R.F. Choke Coil	2

SOCKETS

BE121211		Eight Prong Wafer Octal Socket—"6SA7"	1
BE121313		Eight Prong Wafer Octal Socket—"6B8"	1
BE121314		Eight Prong Wafer Octal Socket—"25L6"	2
BE121315		Eight Prong Wafer Octal Socket—"25Z6"	1
BE121298		Eight Prong Wafer Octal Socket—"6SK7"—With Shield for Tube Guide Pin	2
BE121216		Bakelite Socket Base for Filter Condenser	1

SPEAKER

BE114235	T8	Five Inch P.M. Dynamic Speaker—Less Output Transformer	1
BE105126	T7	Output Transformer for Speaker	1

Tuning Frequency Range - - 42 to 50 MC

Intermediate Frequency - - - 4.3 MC

MISCELLANEOUS

BE101247	R16, S1	Volume Control and Switch	1
BE1075		Line Cord and Plug	1
BE107288		Socket Assembly for Pilot Lite	1
BE107290	P1	Pilot Lite Bulb 110 V. 7.5 Watts	1
BE12561	S2	Speaker Switch	1
BE13262		No. 10—32 x ¾ Inch Chassis Mounting Bolts	4
BE128230-1		Bakelite Knob—"Volume"	1
BE128233-1		Bakelite Knob—"Tuning"	1
BE107357		Convertor Connection Cable Assembly	1
BE12588B	S3	Tone Control Switch	1

DIAL PARTS

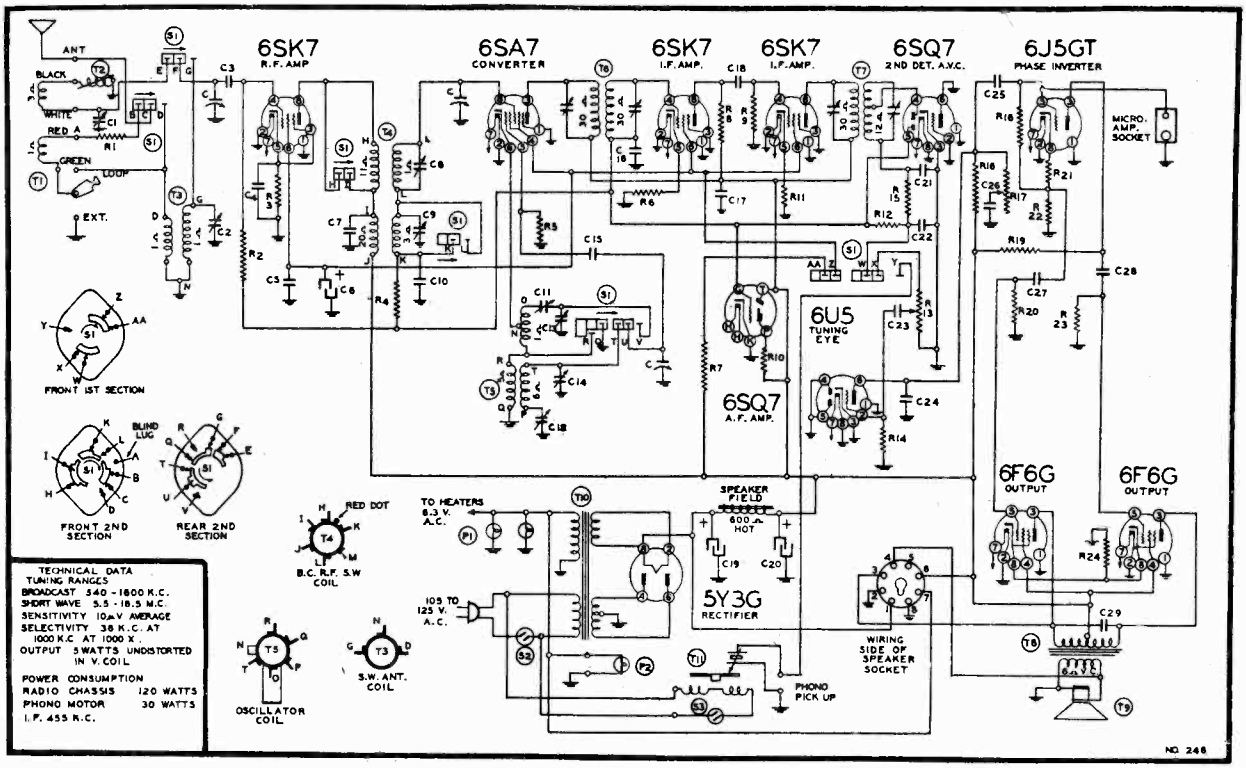
BE112875	Glass Crystal for Dial	1
BE115674	Dial Bracket with Pulley	2
BE112905	Dial Scale	1
BE131211	Snap-in Rivets to Fasten Dial Scale	4
BE112683	Drive Pulley with Bushing	1
BE1209	String for Dial	3' Yd.
BE120285	Coiled Tension Spring for Dial String	1
BE112680E	Pointer	1

NOTICE—There is a model number on the chassis. This model number identifies the radio as to year, manufacturer, chassis and issue number or letter. When ordering parts or writing, be sure to mention the complete model number.

MONTGOMERY-WARD & CO.

MODEL 14BR-1112A

MONTGOMERY-WARD & CO.



ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect dummy antenna value in series with generator output lead.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted to Maximum (in Order Shown)
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 I. F.	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top Output I. F.
	455 Kc.	.1 MFD.	Grid of 6SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top Input I. F.
SHORT WAVE BAND	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	C13, S.W. Osc.
	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	C8, S.W. R.F., C2 S.W. Antenna
	6 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 6 Mc.	C11 S.W. Osc. Series Pad See Note "A"
BROAD-CAST BAND	1580 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Rotor full open (Plates out of mesh)	C14 B.C. Osc.
	540 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Set Dial at 540 Kc. (Plates in Mesh)	C12 B.C. Osc. Series Pad
	1400 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Set Dial at 1400 Kc.	C9 B.C. R.F.
LOOP ALIGN-MENT	1400 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 1400 Kc.	C1 B.C. Ant.
	600 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 600 Kc.	T2 Iron Core Tracking Coil

NOTE "A"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

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

FOR OAK RC-1 RECORD CHANGER
SEE RIDER'S
"AUTOMATIC RECORD CHANGERS AND RECORDERS"

MODEL 14BR-1112A

MONTGOMERY-WARD & CO.

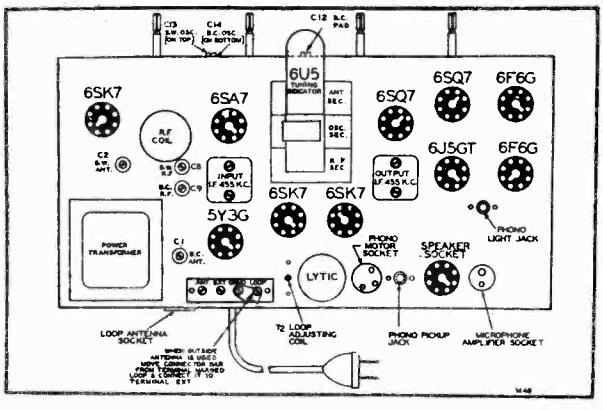
REPLACEMENT PARTS LIST

In ordering parts refer to model number on chassis label

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
CONDENSERS				
BE102152	C	Three Gang Variable Condenser	1	3.00
BE10020	C4	.1 x 200 Volt Tubular Condenser	1	.10
BE10026	C10, C16, C25	.02 x 400 Volt Tubular Condenser	3	.10
BE10025	C23	.002 x 600 Volt Tubular Condenser	1	.10
BE1009	C27	.05 x 200 Volt Tubular Condenser	1	.10
BE10013	C28	.05 x 400 Volt Tubular Condenser	1	.10
BE10011	C26	.01 x 400 Volt Tubular Condenser	1	.10
BE10071	C29	.004 x 600 Volt Tubular Condenser	1	.10
BE100117	C5, C17	.25 x 400 Volt Tubular Condenser	2	.20
BE119124	C6, C19, C20	Electrolytic Filter Condenser—10 Mfd. x 350 V.; 25 Mfd. x 450 V.; 25 Mfd. x 450 V.	1	.90
BE124180	C2	S.W. Antenna Trimmer	1	.44
BE124179	C8, C9	S.W. and B.C. R.F. Trimmer—Dual	1	.36
BE124181	C13, C14	S.W. and B.C. Osc. Trimmer—Dual	1	.24
BE124182	C1	B.C. Antenna Trimmer	1	.12
BE129157	C12	.000525 Compression Cond.—B.C. Pad	1	.22
BE1292	C3, C18	.0005 Mica Type Condenser—20%	2	.12
BE129160	C7	.0004 Mica Type Condenser—20%	1	.12
BE12939	C15	.00005 Mica Type Condenser—20%	1	.12
BE1295\	C21, C22	.0001 Mica Type Condenser—20%	2	.12
BE129156	C11	.0024 Compression Mica Condenser	1	.30
BE12912	C24	.00025 Mica Type Condenser—20%	1	.12
RESISTORS				
BE101270	R13, S2	Volume Control and Switch (500M Ohms)	1	.62
BE101271	R17	Tone Control (1 Megohm)	1	.50
BE13019	R2, R18	1 Megohm—½ Watt Resistor—20%	2	.10
BE1305	R4	300M Ohm—½ Watt Resistor—20%	1	.12
BE130208	R5	40M Ohm—½ Watt Resistor—20%	1	.10
BE13054	R6, R11	500 Ohm—½ Watt Resistor—20%	2	.10
BE130263	R8	12M Ohm—½ Watt Resistor—20%	1	.10
BE13020	R9, R19, R22	100M Ohm—½ Watt Resistor—20%	3	.10
BE130304	R7	12M Ohm—2 Watt Resistor—10%	1	.10
BE13012	R15	50M Ohm—½ Watt Resistor—20%	1	.10
BE130170	R12	3 Megohm—½ Watt Resistor—25%	1	.10
BE130225	R14	15 Megohm—½ Watt Resistor—30%	1	.10
BE13043	R21	2500 Ohm—½ Watt Resistor—20%	1	.10
BE1303	R20, R23	500M Ohm—½ Watt Resistor—20%	2	.10
BE13011	R16	250M Ohm—½ Watt Resistor—20%	1	.10
BE130311	R24	300 Ohm—1 Watt Resistor—20%	1	.10
BE13099	R3	300 Ohm—½ Watt Resistor—20%	1	.10
BE13024	R1	400 Ohm—½ Watt Resistor—20%	1	.10
	R10	1 Megohm—In Eye Socket	1	.10
COILS				
BE108169J	T6	Input I.F. Coil Complete in Can	1	.76
BE108130C	T7	Output I.F. Coil Complete in Can	1	.76
BE10957	T4	B.C.—S.W. R.F. Coil Complete in Can	1	.70
BE110149	T5	B.C.—S.W. Oscillator Coil	1	.50
BE111176	T3	S.W. Antenna Coil	1	.30
BE111153	T2	Loop Adjusting Coil With Iron Slug	1	.30
BE111257	T1	Loop Antenna Assembly	1	1.20
SPEAKER				
BE114261	T9	Ten Inch Electrodynamic Speaker (Less Output Transformer)	1	4.00

NOTICE—There is a model number label on the chassis. This model number identifies the radio as to year, manufacturer, chassis and issue number or letter. When ordering parts or writing, be sure to mention the complete model number.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE



CHASSIS VIEW

ANTENNA AND GROUND TERMINALS

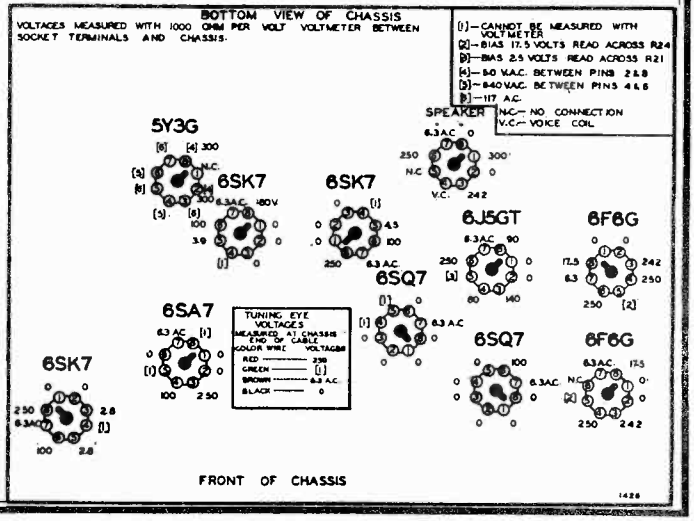
When using an external antenna and ground, move the metal strap (connector bar) from terminal marked LOOP and connect it to terminal marked EXT.

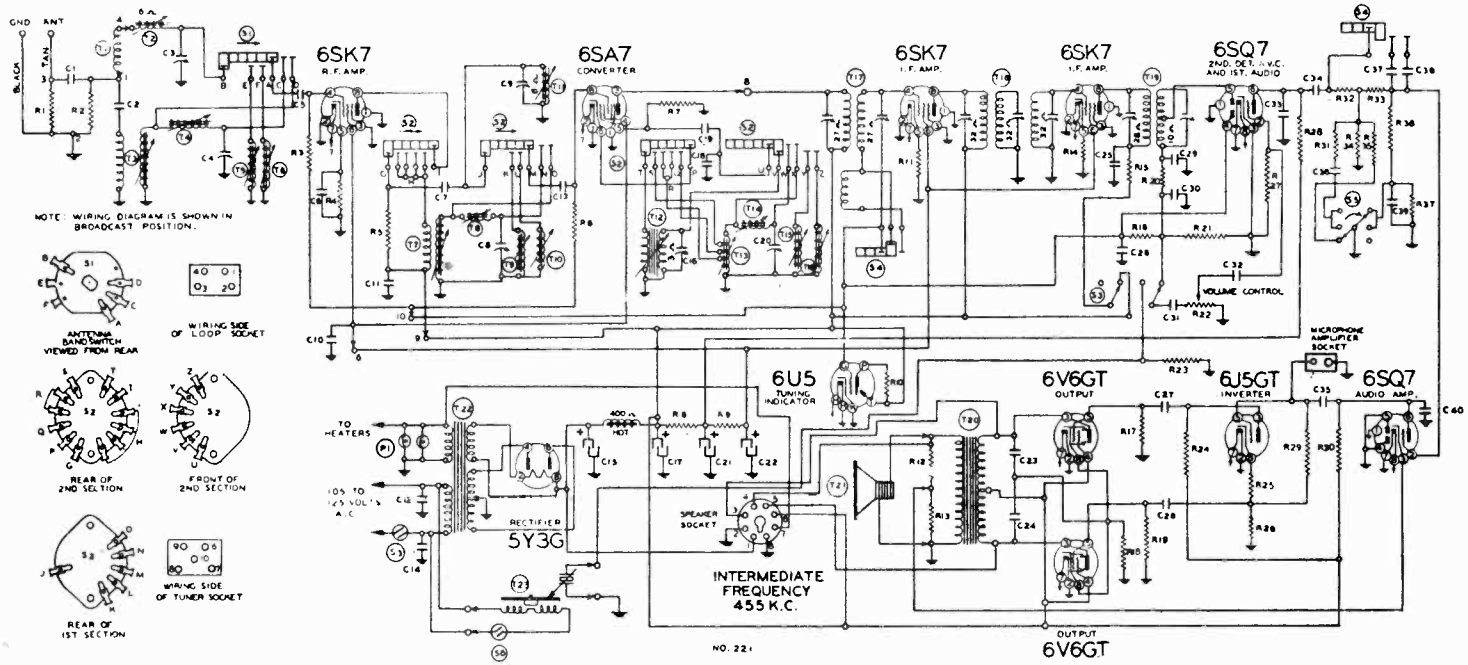
The antenna and ground wires should then be connected to the terminals marked "Ant."—"Gnd."

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
TRANSFORMERS				
BE10554F	T8	Output Transformer for Speaker	1	1.00
BE104202C	T10	Power Transformer. 50 to 60 Cycles 105-125 Volt Primary	1	3.00
BE104203C		Power Transformer 25 to 60 Cycles 105-125 Volt Primary		
BANDSWITCH				
BE125179	S1	Band switch Complete	1	.90
MISCELLANEOUS				
BE107266		Line Cord and Plug	1	.30
BE13489		Rubber Cushions to Float Chassis	4	.06
BE121308		Eight Prong Octal Molded Socket for Speaker	1	.10
BE121210		Eight Prong Octal Molded Socket	10	.10
BE107169		Socket and Cable Assembly for Tuning Eye	1	.50
BE10794	P1	6-8 Volt Pilot Lite Bulb Type T-44	2	.10
BE107387C		Socket Assembly for Pilot Lite	2	.10
BE11757A		Bracket for Tuning Eye	1	.08
BE11757B		Clamp for Tuning Eye	1	.08
BE11757C		Wing Bolt for Above	1	.04
DIAL AND TUNING PARTS				
BE112992		Dial Scale	1	.48
BE112530		Clips to Fasten Dial Scale 4	Dz.	.06
BE112967-38		Escutcheon for Dial	1	.70
BE112966		Light Rod for Dial	1	.36
BE112957		Pointer	1	.14
BE128686B-38		Knob—"Volume"	1	.12
BE128687-38		Knob—"Tuning"	1	.12
BE128688B-38		Knob—"Tone"	1	.12
BE128683-38		Knob—"Band"	1	.12
BE117918		Tuning Shaft	1	.06
BE115688		Bracket for Tuning Shaft	1	.06
BE131142		"C" Washer for Tuning Shaft 2	Dz.	.08
BE112826		Pulley with Bushing	1	.16
BE1209		String for Dial	Yd.	.12
BE120197		Coiled Tension Spring for Dial String	1	04
BE115759		Dial Plate Assembly Complete with Pulleys and Brackets	1	.30
RECORD CHANGER COMPARTMENT				
BE104267		Automatic Record Changer Complete. 115 Volts A.C. 60 Cycles	1	
BE104276		Automatic Record Changer Complete. 115 Volts A.C. 25 Cycles		
BE104277		Automatic Record Changer Complete. 115 Volts A.C. 50 Cycles		
BE10794	P2	Indicator Light Bulb	1	.10
BE107388		Socket Assembly for Pilot Lite	1	.26
BE1121007		Amber Jewel Indicator	1	.12

RECORD CHANGER PARTS LIST

BE4316	Motor, 60 Cycle 115 Volt
BE4422	Motor Mounting Kit consists of rubber grommets, screws, sleeves, washers, and nuts
BE4233	Motor Mounting Grommet
BE3231	Motor On-Off Switch
BE4406	Line Cord and Plug
BE4425	Rubber Idler Wheel with Spring Clip
BE0-4324	Idler Wheel Tension Spring
BE0-4319	Turntable
BE4423	Upper and Lower Shelf Blade Assembly
BE4426	Pickup Cartridge (N1 or L40) with screws
BE4428	Pickup Arm Assembly complete less cartridge
BE4292	Rubber Pickup Rest Bumper
BE4262	Reject Return Spring
BE4427	Reject, 10"-12", or Auto-Man Buttons with screws
BE4424	Needle Screw





FOR SEEBURG J RECORD CHANGER, SEE RIDER'S "AUTOMATIC RECORD CHANGERS AND RECORDERS"

Code No.	Part No.	Description
		RESISTORS
R1	130232	25M ohm—⅓ w.
R2	130232	25M ohm—⅓ w.
R3	13019	1 megohm—⅓ w.
R4	130239	250 ohm—⅓ w.
R5	130218	5M ohm—⅓ w.
R6	13019	1 megohm—⅓ w.
R7	130232	25M ohm—⅓ w.
R8	130318	6M ohm—2 w.
R9	130319	10M ohm—2 w.
R10		1 megohm in tuning indicator cable
R11	13016	900 ohm—⅓ w.
R12	13082	10M ohm—⅓ w.
R13	130235	1500 ohm—⅓ w.
R14	130192	2M ohm—⅓ w.
R15	130192	2M ohm—⅓ w.
R16	13019	1 megohm—⅓ w.
R17	1303	500M ohm—⅓ w.
R18	130317	250 ohm—2 w.
R19	1303	500M ohm—⅓ w.
R20	13094	50M ohm—⅓ w.
R21	130316	120M ohm—⅓ w.
R22	101229	500M ohm volume control
R23	1303	500M ohm—⅓ w.
R24	13094	50M ohm—⅓ w.
R25	130218	5M ohm—⅓ w.
R26	13094	50M ohm—⅓ w.
R27	130257	5 Megohm—⅓ w.
R28	130172	250M ohm—⅓ w.
R29	1303	500M ohm—⅓ w.
R30	130172	250M ohm—⅓ w.
R31	130232	25M ohm—⅓ w.
R32	13080	150M ohm—⅓ w.
R33	130309	350M ohm—⅓ w.
R34	130172	250M ohm—⅓ w.
R35	13066	75M ohm—⅓ w.
R36	13080	150M ohm—⅓ w.
		CONDENSERS
C1	1292	.0005 mica
C2	10047	.002 x 600 v.
C3	124143	B.C. antenna trimmer
C4	124143	9 mc. antenna trimmer
C5	1292	.0005 mica
C6	10020	.1 x 200 v. tubular
C7	129168	.00001 mica
C8	124138	9 mc. R.F. trimmer
C9	124139	B.C. R.F. trimmer
C10	10074	.1 x 400 v.
C11	10074	.1 x 400 v.
C12	10061	.02 x 600 v.
C13	1292	.0005 mica
C14	10061	.02 x 600 v.
C15	119112	30.0 mfd. lytic
C16	124144	B.C. oscillator trimmer
C17	119112	30.0 mfd. lytic x 450 w.v.
C18	129167	.0002 silver mica
C19	129165	.00005 mica
C20	124145	9 mc. oscillator trimmer
C21	119112	10.0 mfd. lytic
C22	11969	.16 mfd. x 350 w.v.
C23	10065	.015 x 600 v.
C24	10065	.015 x 600 v.
C25	1001	.1 x 400 v.
C26	10020	.1 x 200 v.
C27	10013	.05 x 400 v.
C28	1009	.5 x 200 v.
C29	1295	.0001 mica
C30	1295	.0001 mica
C31	10020	.1 x 200 v.
C32	10019	.006 x 600 v.
C33	12912	.00025 mica
C34	1001	.1 x 400 v.
C35	10013	.05 x 400 v.
C36	100118	.008 x 600 v.
C37	12938	.00005 mica
C38	129166	.000125 mica
C39	10037	.003 x 600 v.
C40	12912	.00025 mica

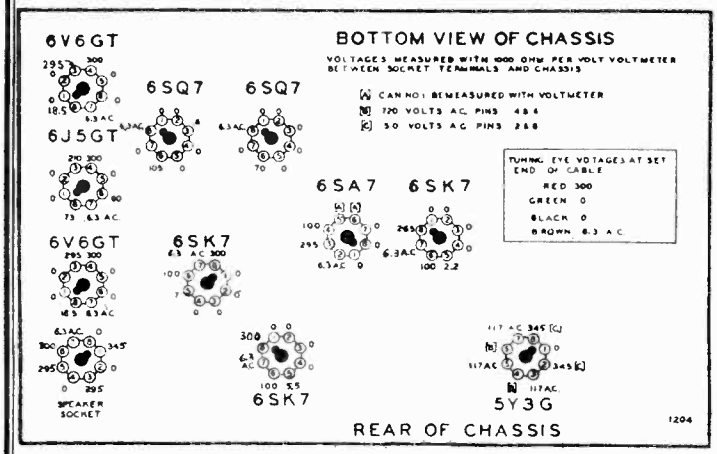
C3 and C4 in same unit
C15, C17 and C21 in same unit

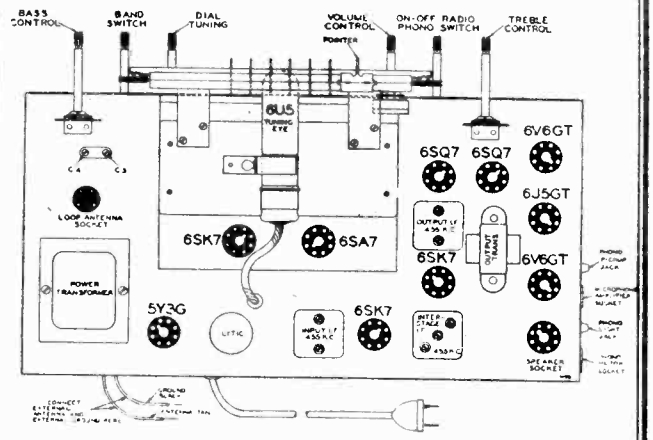
		PARTS
T1	111237	Loop antenna assembly
T2	111195	B.C. antenna coil
T3	111190	9 mc. antenna coil
T4	111189	6 mc. antenna coil
T5	111191	12 mc. antenna coil
T6	111192	15 mc. antenna coil
T7	10959	9 mc. R.F. coil
T8	10958	6 mc. R.F. coil
T9	10960	12 mc. R.F. coil
T10	10961	15 mc. R.F. coil
T11	10962	B.C. R.F. coil
T12	110161	B.C. oscillator coil
T13	110157	9 mc. oscillator coil
T14	110156	6 mc. oscillator coil
T15	110158	12 mc. oscillator coil
T16	110159	15 mc. oscillator coil
T17	108181	Input I.F. coil—455 kc.
T18	108155B	Interstage I.F. coil
T19	108182	Output I.F. coil—455 kc.
T20	105115	Output Transformer
T21	114209	12" dynamic speaker
T22	104217	Power transformer—50/60 cycles
	104218	Power transformer—25 cycle
T23	104258	Automatic record changer, Seeburg 50 cycle completed with turntable
	104257	Automatic record changer, complete—25 cycle Seeburg—with turntable
	104252	Automatic record changer—Seeburg—60 cycle complete with turntable
S1	125154	Antenna bandswitch
S2	125122	R.F.—oscillator bandswitch
S3	125150	On-off radio phono switch
S4	125151	Treble switch
S5	125152	Bass switch
S6		Switch on record changer
P1	10794	2 6-8 volts pilot light T44

MODEL 14BR-1113

MONTGOMERY-WARD & CO.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted in Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 (I.F.)	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Output I. F.	Adjust to Maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Input I. F.	Adjust to Maximum output
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C20 (See Trimmer View) C8 (See Trimmer on Top) C4	Osc. R. F. Ant.	Adjust to Maximum output
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T14 (See Trimmer View) T8 (See Trimmer View) T4	Osc. R. F. Ant.	Adjust to Maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15 (See Trimmer View) T9 (See Trimmer View) T5	Osc. R. F. Ant.	Adjust to Maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16 (See Trimmer View) T10 (See Trimmer View) T6	Osc. R. F. Ant.	Adjust to Maximum output
BROADCAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C16 (See Trimmer View) C9 (See Trimmer on Top) C3	Osc. R. F. Ant.	Adjust to Maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T11 Rotate Core T2 (See Iron Core Adjustment View)	R. F. Ant.	Adjust to Maximum output





Power Consumption
Radio Only - - - - 120 Watts

Power Output - - - 10 Watts
Undistorted

Sensitivity for 500 Milliwatt Output: - 10 Microvolts Average

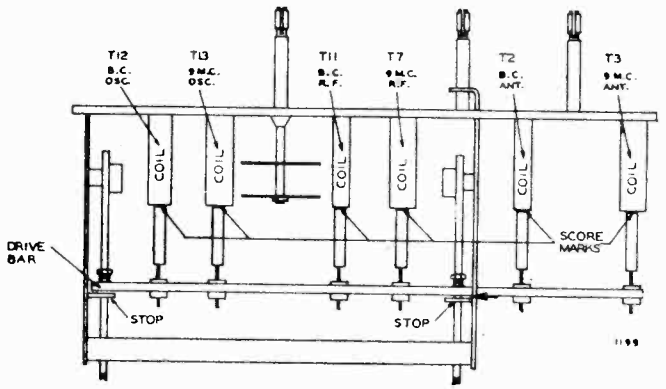
Selectivity - 27 KC Broad at 1000 Times Signal at 1000 KC

Tuning Frequency Range Broadcast Band - - 540 to 1600 KC

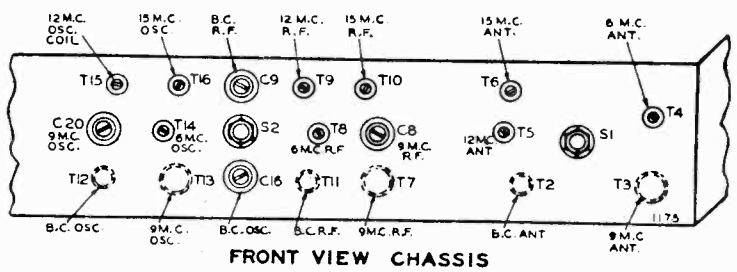
49M Band - 5.9 to 6.1 MC
31M Band - 9.1 to 10 MC
25M Band -11.4 to 12.1 MC
19M Band -14.9 to 15.4 MC

Intermediate Frequency - - - 455 KC

Speaker - - 12 in. Electro Dynamic



IRON CORE ADJUSTMENT VIEW



FRONT VIEW CHASSIS

MODEL 14BR-1400A
MODEL 24BR-1401B

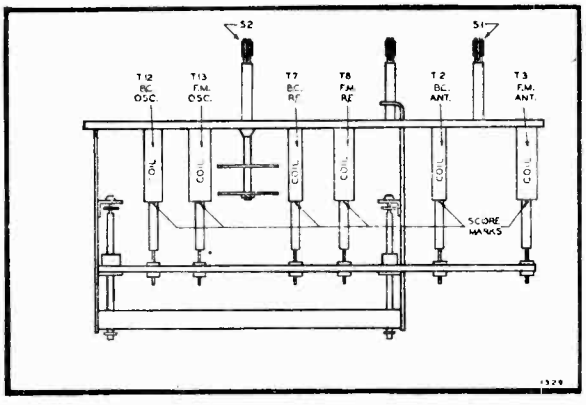
ALIGNING INSTRUCTIONS

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltage, defective tubes, condensers and resistors. In order to properly align this radio, the chassis should be removed from the cabinet. Although the short wave bands on this radio are of the band spread type the Alignment Procedure is not difficult. However because each short wave scale covers only a small portion of the short wave spectrum you must do the work carefully and your oscillator must be accurate.

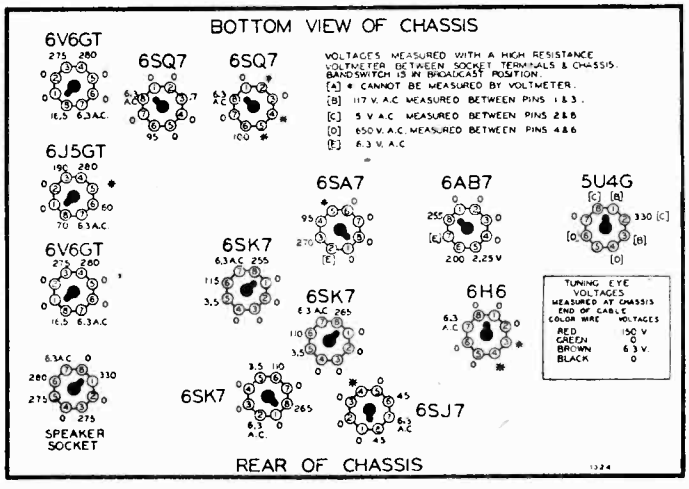
Do not realign the band spread scales unless you are positive they are out of adjustment. When adjustment is necessary proceed as follows.

Rotate each iron core until the fine score marks are even with the edge of the coil forms.

You are now ready to continue with the trimmer adjustments as shown on the alignment chart.



IRON CORE ADJUSTMENT VIEW



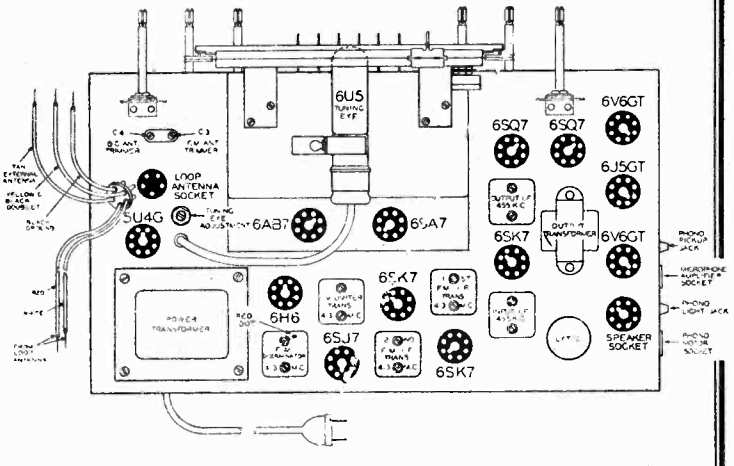
VOLTAGE CHART

SETTING PUSHBUTTONS

Make a list of your 6 favorite stations. Push out the call letters of these stations from the call letter sheets supplied. Insert a call letter in the slot on top of each pushbutton.

Next pull one of the pushbuttons all the way out as far as it will come (pull, with fingers on top and bottom of button). Now tune in the station you want with the tuning knob—Tune back and forth until the station is clear and distinct. Now push the button hard all the way in to lock the station in place. (push directly on front of button) Continue setting each pushbutton in the same way. Pressing the proper button will now tune the station you want. If it does not do so you did not push the button hard enough to lock in place when setting up the station.

To change stations simply repeat the procedure above.



CHASSIS TOP VIEW

FOR SEEBURG MODEL B AUTOMATIC RECORD CHANGER, SEE RIDER'S "AUTOMATIC RECORD CHANGERS AND RECORDERS".

MODEL 14BR-1400A
MODEL 24BR-1401B

MONTGOMERY-WARD & CO.

MODEL 42BR-1401B REPLACEMENT PARTS LIST

In ordering parts refer to model number on chassis label

Use Only Genuine Factory Replacement Parts

MAIN CHASSIS PARTS LIST

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
		CONDENSERS		
BE1001	C39, C50	.1 x 400 Volt Tubular Condenser	2	.12
BE1009	C27, C48, C60	.05 x 200 Volt Tubular Condenser	3	.12
BE10011	C11, C13, C21, C22, C32	.01 x 400 Volt Tubular Condenser	5	.12
BE10013	C61, C63	.05 x 400 Volt Tubular Condenser	2	.12
BE10012	C58	.003 x 600 Volt Tubular Condenser	1	.12
BE10019	C46	.006 x 600 Volt Tubular Condenser	1	.12
BE10020	C26, C36, C43, C47	.1 x 200 Volt Tubular Condenser	4	.12
BE10061	C37, C38	.02 x 600 Volt Bakelite Condenser	2	.16
BE10065	C59, C64	.015 x 600 Volt Tubular Condenser	2	.12
BE10078	C6, C16	.01 x 200 Volt Tubular Condenser	2	.12
BE100118	C51	.008 x 600 Volt Tubular Condenser	1	.12
BE100123	C34, C35	.02 x 200 Volt Tubular Condenser	2	.12
BE11973B	C54	16 Mfd. x 400 Volt Electrolytic filter Cond.	1	.60
BE11969	C12	16 Mfd. Electrolytic Filter Condenser 350 Volts	1	.74
BE119112	C49, C52, C53	30 Mfd.—30 Mfd.—10 Mfd.—450 Volts Electrolytic Filter Condenser	1	1.30
BE1292	C1	.0005 Mica Type Condenser—20%	1	.12
BE1295	C33, C41, C44	.0001 Mica Type Condenser—20%	3	.12
BE12912	C45, C62	.00025 Mica Type Condenser—20%	2	.12
BE12938	C24, C55	.00005 Mica Type Condenser—10%	2	.12
BE129166	C56	.000125 Mica Type Condenser—10%	1	.12
BE129161	C40, C42	.0001 Dual Mica Type Condenser—10%	1	.14
		RESISTORS		
BE13026	R23	1M Ohm—½ Watt Resistor—20%	1	.10
BE130163	R28, R29	400M Ohm—½ Watt Resistor—10%	2	.10
BE1304	R37	3 Megohm—½ Watt Resistor—20%	1	.10
BE13023	R6, R10, R13, R14, R22, R27	2M Ohm—½ Watt Resistor—20%	6	.10
BE130291	R24	50M Ohm—1 Watt Resistor—10%	1	.10
BE1303	R49, R54, R58	500M Ohm—½ Watt Resistor—20%	3	.10
BE130149	R18	15M Ohm—½ Watt Resistor—20%	1	.10
BE13019	R17, R31, R33, R35	1 Megohm—½ Watt Resistor—20%	4	.10
BE13020	R20	100M Ohm—½ Watt Resistor—20%	1	.10
BE130232	R1, R2, R39	25M Ohm—½ Watt Resistor—10%	3	.10
BE130319	R45	10M Ohm—2 Watt Resistor—10%	1	.10
BE130199	R46	1500 Ohm—1 Watt Resistor—10%	1	.10
BE130172	R16, R25, R38, R32, R41, R56	250M Ohm—½ Watt Resistor—10%	6	.10
BE130235	R61	1500 Ohm—½ Watt Resistor—10%	1	.10
BE13082	R60	10M Ohm—½ Watt Resistor—10%	1	.10
BE130317	R53	250 Ohm—2 Watt Resistor—10%	1	.10
BE13081	R26	250 Ohm—½ Watt Resistor—20%	1	.10
BE130218	R55	5M Ohm—½ Watt Resistor—10%	1	.10
BE13094	R30, R52, R57	50M Ohm—½ Watt Resistor—10%	3	.10
BE130146	R48	2 Megohm—½ Watt Resistor—10%	1	.10
BE130342	R11	350M Ohm—½ Watt Resistor—5%	1	.10
BE13080	R40, R47	150M Ohm—½ Watt Resistor—10%	2	.10
BE130339	R5, R12	350 Ohm—½ Watt Resistor—20%	2	.10
BE130309	R42	350M Ohm—½ Watt Resistor—10%	1	.10
BE13066	R43	75M Ohm—½ Watt Resistor—10%	1	.10
BE130172	R34	250M Ohm—½ Watt Resistor—10%	1	.10
		COILS		
BE108177D	T17	Input I.F. Coil Complete in Can—455 Kc.	1	.76
BE108176B	T18	Output I.F. Coil Complete in Can—455 Kc.	1	.76
BE108197	T19	First F.M. I.F. Coil Complete in Can—4.3 Mc.	1	.86
BE108198	T20	Second F.M. I.F. Coil Complete in Can—4.3 Mc.	1	.86
BE108197B	T21	Limiter F.M., I.F. Coil Complete in Can 4.3 Mc.	1	.86
BE108199	T22	Discriminator F.M. I.F. Coil Complete in Can—4.3 Mc.	1	.86
BE111267	T1	Loop Antenna Assembly	1	1.90
		TRANSFORMERS		
BE104262	T23	Power Transformer 50 to 60 Cycles 105-125 Volt Primary	1	4.80
BE105115	T24	Output Transformer for Speaker	1	1.00
		SPEAKER		
BE114237	T25	Twelve Inch Electrodynamic Speaker—Less Output Transformer	1	6.90
BE105115	T24	Output Transformer for Speaker	1	1.00
		MISCELLANEOUS		
BE101249	R36	Volume Control—1 Megohm	1	.50
BE101248	R44	Control for Tuning Eye 25M Ohms	1	.40
BE125125	S5	Phono-On-Off Switch	1	.70
BE125123	S4	Tone Switch—Base	1	.50
BE125149	S3	Tone Switch—Treble	1	.50
BE11622	B1	Bias Cell—1.25 Volt Potential	1	.16
BE11627		Clip for Bias Cell	1	.10
BE107359	R51	Tuning Eye Socket and Cable Assembly 1 Meg. Resistor in Socket	1	.38
BE10794	P1	Pilot Lite Bulb—6 Volt—Type T-44	2	.10
BE107329		Pilot Lite Socket Assembly—Right	1	.08
BE107330		Pilot Lite Socket Assembly—Left	1	.08
BE107259		Shield for Pilot Lites	2	.02
BE1075		Line Cord and Plug	1	.30
BE115589		Link for Band Switches	1	.10
BE11712		Switch Arm—With Bushing and Set Screws	2	.08
BE13130		Spring Washer for Above	2	.02
BE112782-35		Escutcheon—Complete With Crystal	1	1.70
BE112810		Crystal Only for Escutcheon	1	.32
BE128506-28		Tenite Knob—Plain	4	.12
BE128520-28		Tenite Knob—"Volume"	1	.12
BE128521-28		Tenite Knob—"Tuning"	1	.12
BE115676		Compensator Slug—For Slot in Band Switch Shaft Only	1	
BE128504-29		Transparent Pushbuttons for Lever Sleeves	6	.08
BE128505-28		Bakelite Pushbutton Sleeves for Levers	6	.10
BE112808		Set of Station Call Letters	1	.20

TUNER CHASSIS PARTS LIST

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
		CONDENSERS		
BE1001	C9	.1 x 400 Volt Tubular Condenser	1	.12
BE10020	C8	.1 x 200 Volt Tubular Condenser	1	.12
BE10026	C14	.02 x 400 Volt Tubular Condenser	1	.12
BE10047	C2	.002 x 600 Volt Tubular Condenser	1	.12
BE10074	C10, C31	.1 x 400 Volt Tubular Condenser—With Bracket	2	.20
BE124162	C19	F.M. Band R.F. Trimmer	1	.12
BE124139	C18	B.C. Band R.F. Trimmer	1	16
BE124161	C25	B.C. Band Osc. Trimmer	1	.12
BE124145	C30	F.M. Band Osc. Trimmer	1	.24
BE124163	C3, C4	F.M. and B.C. Dual Antenna Trimmer	1	.24
BE1292	C7, C23	.0005 Mica Type Condenser —20%	2	.12
BE11969	C57	16 Mfd. Electrolytic Condenser—350 Volts	1	.74
BE1295	C29	.0001 Mica Type Condenser—20%	1	.12
BE129167	C5, C17	.0002 Silver Mica Type Condenser—3%	2	.16
BE129168	C15	.00001 Mica Type Condenser—20%	1	.12
BE129175	C28	.000135 Silver Mica Type Condenser—3%	1	.16
BE129182	C20	.000008 Liquid Condenser	1	24
		RESISTORS		
BE13019	R3, R15	1 Megohm—½ Watt Resistor—20%	2	.10
BE13023	R9, R21	2M Ohm—½ Watt Resistor—20%	2	.10
BE13076	R7	30M Ohm—½ Watt Resistor—20%	1	.10
BE130215	R59	25 Ohm—½ Watt Resistor—10%	1	10
BE130232	R19	25M Ohm—½ Watt Resistor—10%	1	.10
BE130235	R8	1500 Ohm—½ Watt Resistor—10%	1	.10
BE13084	R4	200 Ohm—½ Watt Resistor—10%	1	.10
		MISCELLANEOUS		
BE120373		Spring Clip Washer for Coils	9	.02
BE131316B		"C" Washer for Coils	3	.02
BE125148	S1	Antenna Band Switch	1	.60
BE125147	S2	R.F.—Osc.—Audio Switch	1	1.00
BE11757A		Bracket for Tuning Eye	1	.08
BE11757B		Clamp for Tuning Eye	1	.08
BE11757C		Wing Bolt for Bracket and Clamp	1	.04
BE112907		Dial Scale	1	.86
		COILS		
BE10962	T7	B.C. R.F. Coil—With Slug		.70
BE10964	T9	9 Mc. R.F. Coil—With Adjusting Slug		.56
BE10966	T10	12 Mc. R.F. Coil—With Adjusting Slug		.20
BE10965	T11	15 Mc. R.F. Coil—With Adjusting Slug		.16
BE10967	T8	F.M. Band R.F. Coil—With Slug		.70
BE110161	T12	B.C. Osc. Coil		.64
BE110175	T14	9 Mc. Osc. Coil		.64
BE110177	T15	12Mc. Osc. Coil		.20
BE110176	T16	15 Mc. Osc. Coil		.16
BE110178	T13	F.M. Band Osc. Coil		.70
BE111195	T2	B.C. Ant. Coil		.70
BE111233	T4	9 Mc. Ant. Coil		.56
BE111234	T5	12 Mc. Ant. Coil		.20
BE111235	T6	15 Mc. Ant. Coil		.16
BE111232	T3	F.M. Band Ant. Coil		.70
		TUNER MECHANICAL PARTS		
BE115680		Right Drive Link—With Studs	1	.06
BE115680B		Left Drive Link—With Studs	1	.06
BE115682		Connecting Link for Both Right and Left Drive Links	2	.02
BE120393		Spring for Intermediate Link	1	.06
BE120394		Spring for Arms	3	.02
BE115582		Slug Tuning Bar	1	12
BE117844		Drive Rod—With Ball on End	2	.10
BE115683		Ball Retainer Spring	2	.02
BE134136		Rubber Bushings for Tuning Bar	2	.02
BE131251		"C" Washer for Drive Rod	4	.03 Dz.
BE120392		Spring Washer for Drive Rod	2	.04 Dz.
BE134134		Core Mounting Grommet—With Insert	6	.02
BE115611		Pointer Bar	1	.08
BE115685		Retainer Spring for Cam Locking Spring	6	.02
BE120214		Pointer String—Silk Line	12	Yd.
BE115572		Pushrod Carriage—With Cam	6	.16
BE115573		Pushrod for tuner	6	.12
BE115569		Cam Locking Spring	6	.02
BE120366		Coiled Return Spring for Pushrods	6	.02
BE112801		Drive Pulley (With Bushing)	1	.16
BE112865		Pointer	1	.14
BE120372		Coiled Tension Spring for Pointer String	1	.02
BE117788		Tuning Shaft	1	.12
BE117798		Pinion Gear	1	.12
BE131210		"C" Washer for Tuning Shaft	1	.04 Dz.
BE115564		Treadle Bar Complete with Link Arms, Trunnions, and Gear Segment	1	.48
42BR-1401B ONLY		**RECORD CHANGER SECTION**		
104300		Record Changer—Seeburg "B"—With LP6 Sapphire Needle Crystal Cartridge		
J22404		LP6 Sapphire Point Crystal Cartridge Only—Less Pickup Arm		5.76
10794		Indicator Light Bulb T-44. 6-8 Volt		.10

MODEL 14BR-1400A SAME AS ABOVE WITH THE FOLLOWING EXCEPTIONS:

R34 - BE1303 - 500M ohms, 0.5 watt resistor
T1 - BE111236 - Loop antenna assembly
C20 - BE129168 - .00001 mf mica condenser - 20%

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 14WG-499

MONTGOMERY-WARD & CO.

MODEL 14WG-499

WARDS AIRLINE RECORD-MAKER

PHONOGRAPH RECORD PLAYER
PUBLIC ADDRESS SYSTEM

Instructions for Installation, Operation, and Service

SHOULD IT BE NECESSARY TO WRITE US OR ORDER ANY REPAIR PARTS, ALWAYS SPECIFY COMPLETE MODEL NUMBER WHICH APPEARS ON LABEL ON COVER

CHECK YOUR LINE VOLTAGE

Unless otherwise marked, this recorder must be operated on 105 to 125 volt, 60 cycle AC supply only. If there is any doubt, consult the local power company before inserting the plug. Recorders of this model which are to be used on 50 cycle, 230 volt, or other service are so marked.

REPLACEMENT PARTS LIST

PRE-AMPLIFIER UNIT PARTS

MISCELLANEOUS

Part No.	Description	Selling Price
7A119	Neon Lamp for Rec Volume Indicator	.28
15X175	Neon Catholoid Indicator	Doz. .12
1A107	Tube Socket—Octal (8 Prong)	Ea. .05
1A105	Microphone Socket—Single Pin Tip	Ea. .06
1A108	Cutter Socket	.05
7A175	P-A Record Switch	.10
7A215	Record Cutter Changeover Switch	.30
17X154	Trip Arm and Hub Assembly for Changeover Switch	.10
29X141	Ring Collar on Changeover Switch	.10
51X101	Record Cutter Transformer	.75
10A214	Knob for Microphone Volume Control	.06

CONDENSERS

D46104	C1,C3	.1 mf	400 V	Tubular	$0.10
B56403	C2	.004 mf	300 V	Tubular	.08
45X187	C3A	10 mf	400 V	Dry	
45X188	C3B	20 mf	25 V.	Electrolytic	.35
45X116	C4	4 mf	25 V.	Dry	
D46503	C5	.05 mf	400 V.	Tubular	.04

RESISTORS

B61205	R1	2 Megohm	0.5 W	Carbon .06
B54105	R2	1 Megohm	0.5 W	Carbon .06
B54505	R3	5 Megohm	0.5 W	Carbon .06
36X292	R4	Microphone Volume Control and Switch		.42
B61254	R5	250,000 Ohm	0.5 W	Carbon .10
B61504	R6	500,000 Ohm	0.5 W	Carbon .10
B64502	R7	5000 Ohm	2.0 W	Carbon .16
B61580	R8	30 Ohm	0.5 W	Carbon .04
B63402	R9	5,000 Ohm	0.5 W	Carbon .06
B64404	R10	400,000 Ohm	0.5 W	Carbon .08
B61104	R11	100,000 Ohm	0.5 W	Carbon .06
B64102	R12	1000 Ohm	0.5 W	Carbon .04
B64104	R13	100,000 Ohm	0.5 W	Carbon .06
43X118	R14	15 Ohm	Wire Wound	.18

JUNCTION BOX PARTS

1A303	Speaker or Recorder Cable Socket—Octal (8 Prong)	Ea.	.06
1A105	Phono Socket—Single Pin Tip	Ea.	.06
2A175	Junction Box Switch		.10

W-38A74 RECORDER UNIT PARTS

26A733	Recorder Arm Swivel Head Clamp, Sleeve and Screw Assembly		$0.12
26A314	Recorder Arm Height Adjusting Screw and Nut Assembly		.20
W-31A848	Cartridge Spring	Doz.	.32
W-21A958	Cutter Cartridge (Crystal Type X-26)		13.00
W-21A978	Recorder Arm Only		1.92
W-21A932	Recorder Arm Post Only		
W-21A928	Cork Friction Washer for above Gear	Doz.	.18
W-25A922	Felt Washer for above Gear		
W-26A177	Needle Screw for Recorder Arm or Yoke		
	Arm		.10
W-15B934	Motor 60 cycle—115 Volt		7.00
W-17B192	Turntable		2.24
W-17A1768	Rubber Idler Wheel		.40
W-17A185	Spring Clip for Above	Doz.	.16
W-25A638	Felt Washer for above	Doz.	.06
W-25A848	Felt Power Washer for above	Doz.	.06
W-21A976	Pick Up Arm Only		4.56
W-21A938	Crystal Cartridge for Tone Arm L 40		4.32
W-32A616	AC Switch		

MICROPHONE AND CABLES

28A75	Recording Microphone complete with stand and cable	$3.15
11X440	Recorder Cable with Molded Octal Plug and Single Pin Tip Jack	0.24
13X442	Phono Cable with Single Pin Tip Jack	.40
13X443	Pre-Amplifier Cable complete with 3 Prong Plug	.34
13X441	Speaker Socket Cable complete, with Octal Plug	.40

Prices Subject to Change Without Notice.

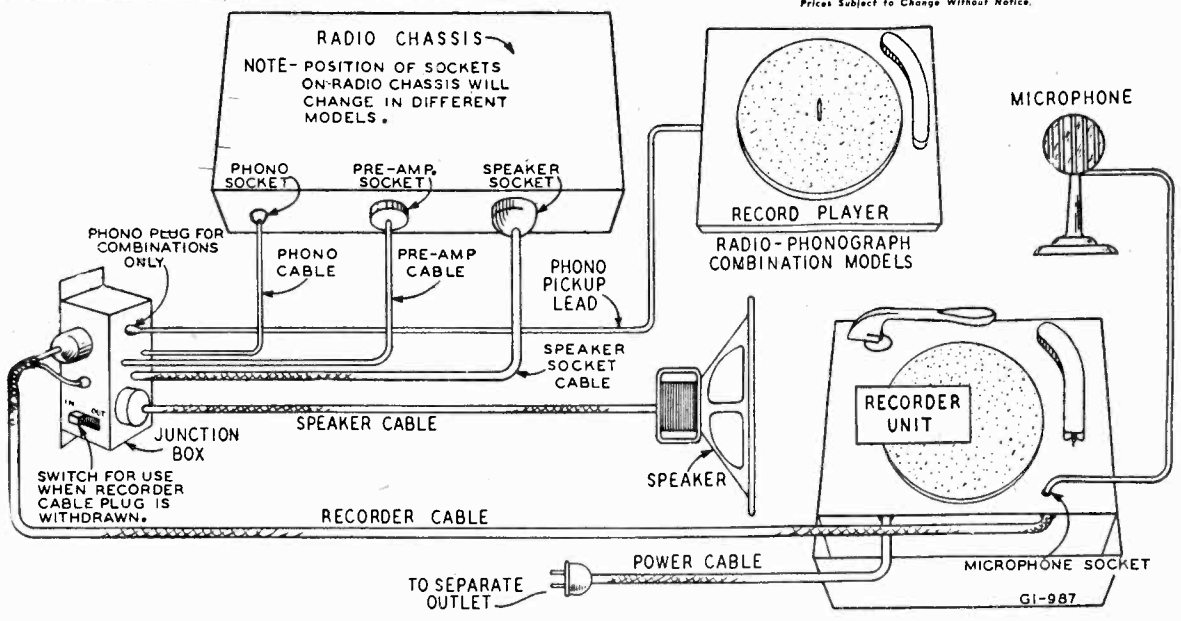


Fig. 6—Cable Connections

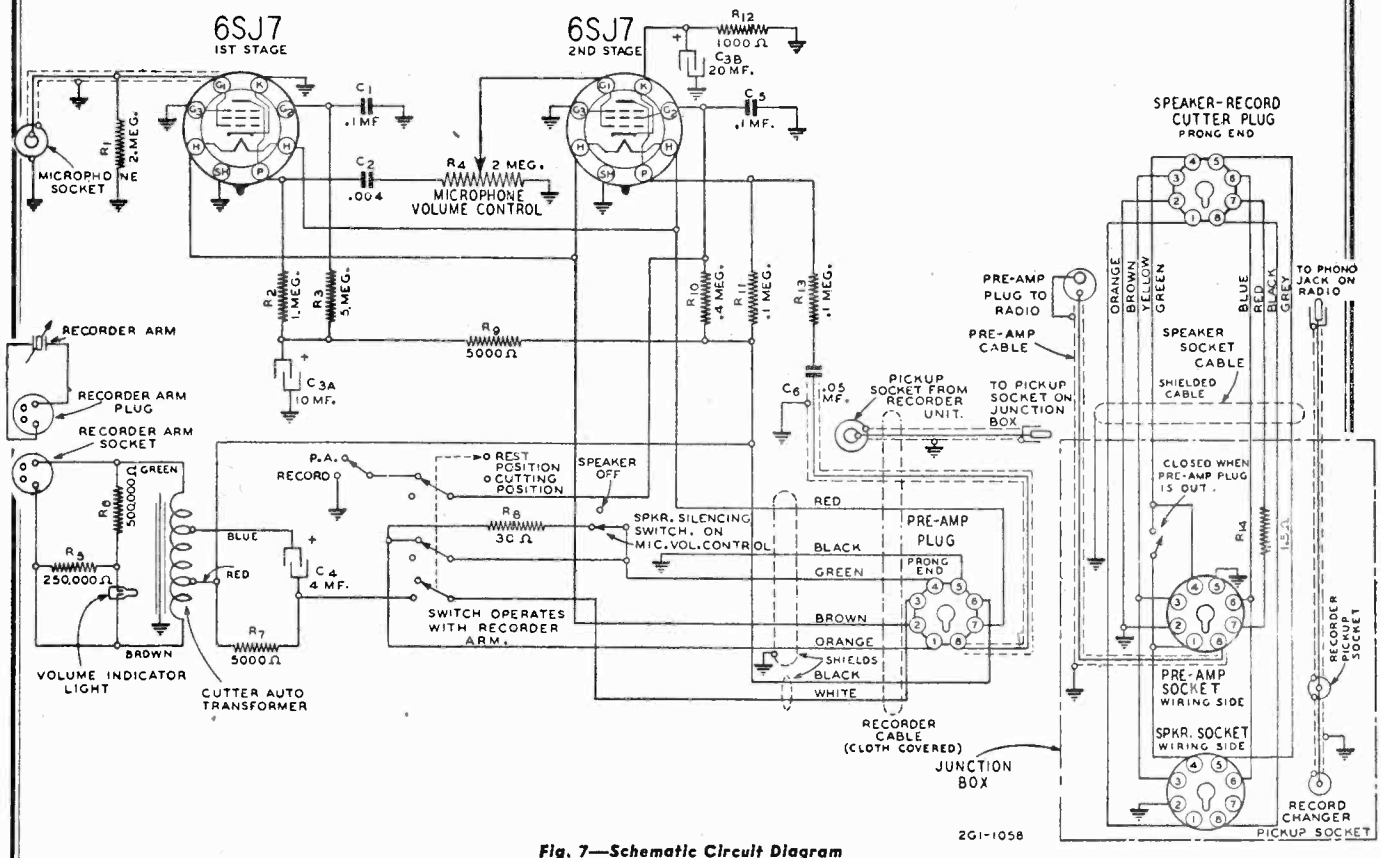


Fig. 7—Schematic Circuit Diagram

MODEL 14WG-499

MONTGOMERY-WARD & CO.

ATTACHING THE RECORD-MAKER TO THE RADIO

The Airline Record-Maker may be used with a number of Airline radios and radio-phonograph combinations in which the radio chassis has been suitably wired and has the necessary sockets for proper cable connections.

First, mount the Junction Box. This is generally mounted at the back edge of the cabinet near the radio chassis. Several locations are shown in **Fig. 1**. In some models a wood block will be seen at the back of the cabinet on which the Junction Box may be mounted. In other models there is room on the chassis shelf for the Junction Box. In cabinets with a side and top rail at the back, mount the Junction Box to the rail even though only two screws, one on each flange, can be used. If there is a built-in loop aerial, keep it as far away from this aerial as possible.

After the Junction Box is secured to the cabinet with the wood screws provided, complete the cable connections between the radio and the Junction Box as shown in Fig. 6. If there is a record player with the radio, the pickup lead should be connected as shown.

The Record-Maker may be placed on a table, stand, or on top of the radio, whichever is most convenient. The cable to the Junction Box is connected as illustrated in Fig. 6. The cover of the Record-Maker may be removed by tipping it back and lifting up.

The Record-Maker may be disconnected after being used by withdrawing the plugs on the end of the recorder cable from the Junction Box (See Fig. 6) and pushing the switch below to "out" position.

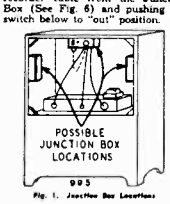


Fig. 1. Junction Box Locations

SET RECORDER ARM BEFORE MAKING FIRST RECORD

When this record-maker is to be operated for the first time to make a record, adjust the recorder arm as follows:

Place a blank record disc on the turntable. Lift up the recorder arm and move it toward the center of the turntable until the cutting needle is at the outer edge of the paper label or 1½ inches from center of record.

Do not set the recorder arm down on the record. Then move the recorder arm back to its rest position on the recorder arm post, making certain that the recorder arm sets securely upon the post as shown in Fig. 3. Do not move the recorder arm past the post.

A record may now be made according to the instructions given in this manual.

No harm will be done if the recorder arm is moved beyond its rest position on the post. However, if this is done, it will be necessary to reset the recorder arm in the same manner as given above.

1. TO MAKE A RECORD FROM A RADIO PROGRAM

A—Recorder arm in rest position—See Fig. 3.

B—Tone arm in rest position—See Fig. 2.

C—Microphone Volume Control in OFF position—See Fig. 2.

D—P.A.-Record Switch in RECORD position.

E—Phono-Radio Knob (On radio panel) in RADIO position.

F—Tune in the desired radio program carefully to room volume.

G—Place a blank record disc on the turntable with the small pin in the turntable extending through the hole in the disc.

H—The Tone Control on the radio panel should, for most recordings, be in the TREBLE position.

I—Lift up the cutting end of the recorder arm, see that the cutting needle is properly in place (See article "Recording Needles," page 4), move this arm over to the intermediate position and set it down gently—See Fig. 3. The volume of the radio program will be reduced. Bring the volume up with the Radio Volume Control until the red indicator light just flashes on loud passages. Then back the volume down a slight amount so that the red indicator light does not flicker.

J—Push the Motor Switch Knob to the ON position (Fig. 2) and allow the turntable to come up to full speed.

K—Lift up the recorder arm and carefully let it down with the needle point about ¼ inch from the outside edge of the blank record.

L—Watch the volume indicator light as the recording is being made. It is not necessary to continuously adjust the position of the Radio Volume Control—merely make sure that the red light does not flicker. A slight flicker on very loud passages only will not be harmful.

M—The thread which forms at the cutting needle may be pushed gently toward the center with a soft brush while the record is being cut. Considerable care must be taken that the operator does not tangle this thread around the cutting needle or that he does not slow up the turntable by touching it with his hands, as either condition will cause poor recordings. After the recording is completed, remove the thread from the record.

N—The record can be cut until the cutting needle is about 1½ inches from the center of the record or until a short distance before the paper label is reached. Shortly before the needle reaches its final position, reduce the volume to zero with the Radio Volume Control (without turning the knob to the OFF position on those models which have a combined Switch and Volume Control) and cut 3 to 5 blank grooves on the record. Then lift off the recorder arm and return it to the rest position. Push the Motor Switch Knob to the OFF position.

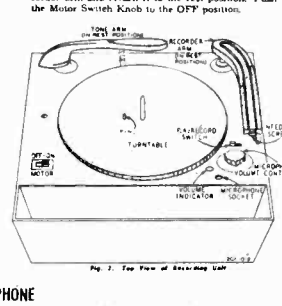


Fig. 2. Top View of Electric Unit

2. TO MAKE A RECORD USING THE MICROPHONE

Voice or music that can be picked up by the microphone with sufficient volume can be recorded. Keep the room quiet, as all extraneous noises picked up by the microphone will be on the record.

A—Recorder arm in rest position—See Fig. 3.

B—Tone arm in rest position—See Fig. 2.

C—Microphone Volume Control in OFF position—See Fig. 2.

D—P.A.-Record Switch in RECORD position.

E—Phono-Radio Knob (On radio panel) in PHONO position.

F—Insert the plug on the end of the microphone cord in the microphone socket (Fig. 2) on the motor panel and push this plug all the way down.

G—Turn the radio On-Off Switch (On the radio panel) to the ON position.

H—Place a blank record disc on the turntable with the small pin in the turntable extending through the hole in the disc.

I—The Tone Control on the radio panel should, for most recordings, be in the TREBLE position.

J—Keep the microphone at least one yard away from the radio loudspeaker at all times. If the recording is to be speech, keep the lips about 6 inches (for cutting) away from the microphone. If the recording is to be music or other sound, place the microphone near the musical source, moving it closer or further away as the volume requires.

K—Lift up the cutting end of the recorder arm, see that the cutting needle is properly in place (See article "Recording Needles," page 4), move this arm over to the intermediate position and set it down gently—See Fig. 3.

Turn the Microphone Volume Control past the point at which the speaker silencing switch is felt to operate. This switch is at about the half-way mark on the control. Speak or start the music or sound into the microphone.

After the Microphone Volume Control knob has been turned past the point at which the switch is thrown, the sound can no longer be heard through the radio speaker but the sound intensity will be shown by the red indicator light. Turn the Microphone Volume Control until the speech or sound picked up by the microphone causes the red indicator light to flicker. Then turn the Microphone Volume Control down slowly until the red light just disappears.

If in reducing the microphone volume, the knob is turned below the point at which the switch is felt to operate, the sound will again be heard through the radio speaker. The recording continues and no harm will result if the microphone is kept at least one yard from the radio speaker. If brought closer, a howl may occur.

L—Push the Motor Switch Knob to the ON position (Fig. 2) and allow the turntable to come up to full speed.

M—Lift up the recorder arm and carefully let it down with the needle point about ¼ inch from the outside edge of the blank record.

N—After 1 or 2 blank grooves have been cut in the record, start the speech, music, or sound into the microphone. Watch the volume indicator light as the recording is being made. It is not necessary to continuously adjust the position of the Microphone Volume Control—merely make sure that the red light does not flicker. A slight flicker on very loud passages only will not be harmful.

O—Remove thread as explained in Article 1, Step M.

P—The record can be cut until the cutting needle is about 1½ inches from the center of the record or until a short distance before the paper label is reached. Shortly before the needle reaches its final position, reduce the volume to zero with the Microphone Volume Control and cut 3 to 5 blank grooves on the record. Then lift off the recorder arm and return it to the rest position. Push the Motor Switch Knob to the OFF position.

3. TO PLAY BACK THE HOME RECORDING; TO PLAY ORDINARY PHONOGRAPH RECORDS

The record made in Articles 1 and 2 may be played back immediately.

Also, ordinary commercial records may be played in the following manner:

A—Recorder arm in rest position—See Fig. 3.

B—Turn Phono-Radio Knob on radio panel to PHONO position.

C—Push Motor Switch Knob to ON position.

D—Lift tone arm, see that the needle is in place, and set arm down gently with needle in outside groove of record. See article on Home Recording and Ordinary Phonograph Needles, page 4.

E—Adjust volume by means of Radio Volume Control to desired intensity.

F—Adjust tone by means of Radio Tone Control to desired quality.

G—Lift up tone arm at end of recording, set it in its rest position, and push Motor Switch Knob to OFF position.

TO PLAY 12 INCH COMMERCIAL RECORDS, lift tone arm off rest and bend the tone arm rest over to a horizontal position.

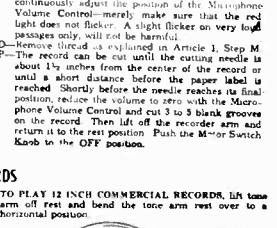


Fig. 3—Positions of Recorder Arm

4. TO USE MICROPHONE AND RADIO AS A PUBLIC ADDRESS SYSTEM

A—Recorder arm in rest position—See Fig. 3.

B—Tone arm in rest position—See Fig. 2.

C—Microphone Volume Control in OFF position—See Fig. 2.

D—P.A.-Record Switch in P.A. position.

E—Phono-Radio Knob (On radio panel) in PHONO position.

F—Insert the plug on the end of the microphone cord in the microphone socket (Fig. 2) on the motor panel and push this plug all the way down.

G—Turn the Radio On-Off Switch (On the radio panel) to the ON position.

H—Turn the Microphone Volume Control to about the half-way mark. The speaker silencing switch at about the mid-point of the Microphone Volume Control is not effective when the recorder arm is in the rest position.

Keep the microphone at least one yard away from the radio speaker at all times. The lips should be about 2 inches (for public address) away from the microphone.

I—Speak into the microphone and adjust the volume by means of the Microphone Volume Control to the proper intensity. If this control is turned too high, a howl may result. Should this happen, turn down the microphone volume slightly, move the lips closer to the microphone and move the microphone farther away from the radio speaker.

5. TO USE THE MICROPHONE FOR MAKING ANNOUNCEMENTS WHEN PLAYING THE RADIO OR PHONOGRAPH

Follow all of the steps as given in Article 4 except that for radio reception the Phono-Radio Knob is in RADIO position.

Reduce the radio or phonograph volume by means of the Radio Volume Control when making an announcement.

6. TO USE THE MICROPHONE FOR SUPERIMPOSING AN ANNOUNCEMENT OR ACCOMPANYING THE PROGRAM WHEN MAKING A RECORD OF A RADIO PROGRAM

The microphone can be used for superimposing an announcement on the record at any time when making a record of a radio program.

A musical instrument or a singing voice may be used to accompany a radio program while recording it.

A—Instructions for cutting the record are given in Article 1. Be sure P.A.-Record Switch is in RECORD position.

B—Insert the plug on the end of the microphone cord in the microphone socket (Fig. 2) on the motor panel and push this plug all the way down.

C—Keep the microphone at least one yard away from the radio speaker at all times. The lips should be about 6 inches away from the microphone.

D—If an announcement or title is to be inserted, reduce the volume of the radio program with the Radio Volume Control to any desired level, just before the announcement is to be made or the title is to be put in.

If a musical instrument or singing voice is to be used to accompany the radio program, the latter may be reduced with the Radio Volume Control or may be left at normal volume.

E—Turn the Microphone Volume Control up to just below the point at which the speaker silencing switch is felt to operate. This switch is at about the half-way mark on the control. (Continuing to turn this knob in a clockwise direction would throw the switch, and the sound could no longer be heard through the radio speaker but the recording would continue.)

F—Speak, or start the sound into the microphone and observe the indicator light. To increase volume, speak louder and get closer to the microphone. To decrease volume, of course, reverse these procedures and turn down the Microphone Volume Control. Keep volume just below point at which red indicator light flickers.

G—When the announcement or accompaniment is completed, turn the Microphone Volume Control to the OFF position and if additional radio program recording is wanted, turn up the Radio Volume Control to just below the point at which the red indicator light flickers.

7. TO MAKE A RECORD FROM ANOTHER RECORD

WITH A RADIO-PHONOGRAPH COMBINATION

If you have a radio-phono combination, play the record to be copied on the phonograph.

Follow all of the instructions as given in Article 1 except that the Radio-Phono Switch on the radio should be in the PHONO position.

WITH A SEPARATE ELECTRIC PHONOGRAPH

If you have or can borrow a small phonograph of the electric type, play the record to be copied on this phonograph. Place the recorder microphone about 12 inches away, then proceed to make the new record in the usual manner with the microphone—See Article 2.

ADDITIONAL INFORMATION

RECORDING NEEDLES

Two recording needles are supplied with the recording unit.

Use Wards Article No. 62-3296 needles when reordering.

Handle recording needles carefully. They are very sharp and can be easily damaged. Every precaution must be taken to protect the cutting point at all times; in cutting, the arm should be lowered gently on the blank with the turntable running.

Note that these needles have a long "flat" on one side of the shank. To install a recording needle, first loosen the needle screw—See Fig. 2. Place the recording needle all the way in the hole on the underside of recorder arm, with the flat portion of the needle shank toward the needle screw. Tighten the needle screw firmly. If the needle is in backward or at a wrong angle, it will not cut properly, and will damage the record and the needle.

A recording needle is considered worn when the background hiss becomes objectionable or when the thread becomes ragged. In general, the ordinary steel recording needle will have a satisfactory life of from ½ to 1½ hours, depending upon the original quality of the needle and the type of blank used.

Important: After a recording needle has been used for a short time, it may become loose in the cutting head; it is good practice to retighten after each record.

HOME RECORDING NEEDLES—ORDINARY PHONOGRAPH RECORD NEEDLES

Fifty tone arm needles are supplied with this recorder unit. These may be used both to play back home recordings and to play ordinary commercial records on the recorder unit.

Needles which are used on home recordings may be used for ordinary commercial records, but those used on commercial records cannot be used for home recordings, as the latter would be ruined.

Change tone arm needles often so that records are not damaged and the quality of the music is not impaired.

When reordering tone arm needles, we recommend Article No. 62-3297.

RECORD BLANKS

We recommend Wards recording blanks. A selection of these is available at Wards Retail outlets or through the Mail Order Catalog. Ten inch is the largest size record blank that can be used.

TIMING YOUR RECORDS

The following is the approximate maximum time for each record:

6" size..Each side 1½ min.
8" size..Each side 3 min.
10" size..Each side 4½ min.

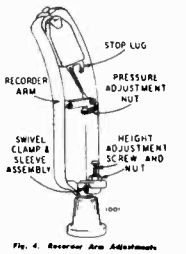


Fig. 4. Recorder Arm Adjustments

For best results, you should rehearse your selection and time it for recording. This will permit you to space your selection nicely on the record and also insure against using up the record before your selection is finished. After your selection is finished, do not lift the needle at once but allow it to cut several extra grooves while you remain silent.

ADJUSTING THICKNESS OF THREAD (PRESSURE ADJUSTMENT)

The pressure on the cutting needle can be varied by the adjusting nut shown in Fig. 4. This pressure determines the thickness of the thread cut from the blank record.

All recorders are adjusted at the factory to cut grooves approximately .0015 inches deep. When cut at this depth, the thread will be approximately as thick as a human hair.

You can get a fairly good idea of the depth of the cut by examining the record with a magnifying glass. The width of the groove should be about equal to the space between grooves if the cutting needle is sharp and the cutting head is correctly adjusted.

The thickness of the thread is increased by rotating the pressure adjusting nut in a counterclockwise direction. Turning this nut clockwise will decrease the thickness of the thread. Before making any pressure adjustment, be sure that a good cutting needle is used and that it is properly inserted.

ADJUSTING HEIGHT OF RECORDER ARM

In Fig. 4 is shown the screw and locking nut for adjusting the height of the recorder arm above the turntable. This height is adjusted at the factory and ordinarily does not require readjustment.

To check for proper height, grasp the needle screw and lift it until the cartridge assembly is felt to touch the recorder arm. The needle point will then be approximately ⅛ inch above the record surface.

If, due to variations in recording needle length, the height must be adjusted, loosen the locking nut, adjust the screw to the proper height and retighten the nut.

RECORDING TECHNIQUE

Making records has been likened to popular photography. It takes time to master the essentials of the art and learn how to do a real good job. The Airline Record-Maker has been so simplified that any one can start making satisfactory records right away, but to make the best, it is necessary to learn more of the technique of the art.

Follow the step-by-step instructions as given in this booklet, slowly and carefully.

RECORDER UNIT SERVICE NOTES

OILING

Oil the two bearings, one at either end of the worm shaft, fibre gear bearing, recorder arm hinge pivot and recorder arm shaft once a year.

CAUTION: Never oil the friction clutch or the felt washers on the rubber idler wheels. (The purpose of the felt washers is to silence the operation of the idler wheels and not to lubricate.)

HIGH PITCH ON PLAY BACK

If the pitch when a home recording is played back appears to be too high, it may be due to excessive depth of cut. This causes too great a load on the motor, slowing it down. The remedy, of course, is to reduce cutting needle pressure.

SAPPHIRE NEEDLE

If a sapphire cutting needle is used in place of a steel cutting needle, the needle pressure must be increased to maintain .0015" depth of cut.

CUTTER CARTRIDGE VERTICAL STOP

With the cutting needle resting on a record, raise the cutting arm slowly. There should be from 1/16" to 3/16" of motion of the cutting arm before the cutting needle lifts from the record. This will allow free vertical movement of the cutter cartridge and compensate for any slight wobble of the turntable or record. To get slightly more or less movement, bend stop lug on male pivot which bears against cutting arm, down or up—see Fig. 4.

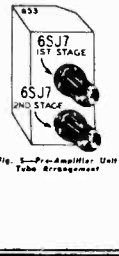
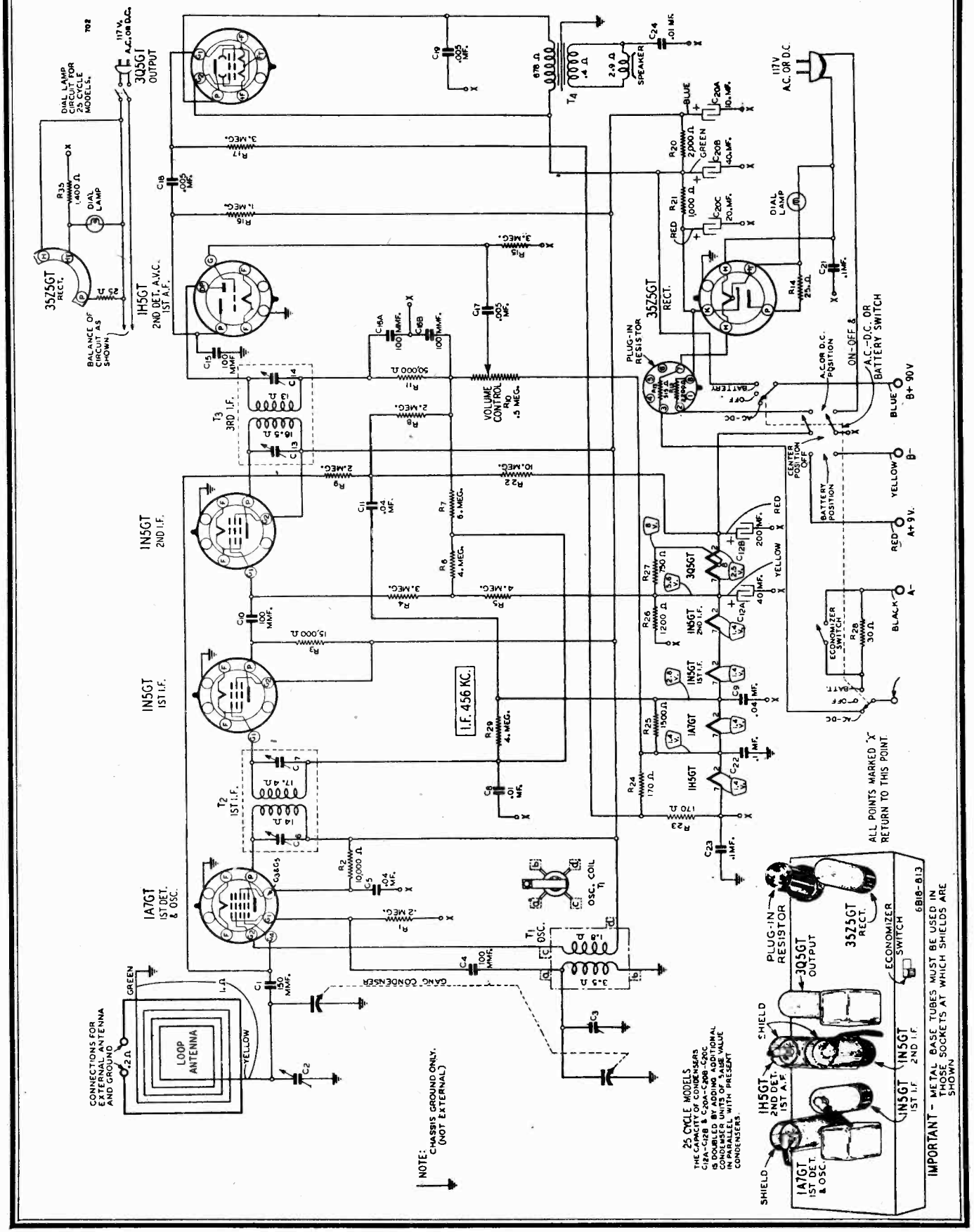


Fig. 5—Pre-Amplifier Unit Tube Arrangement

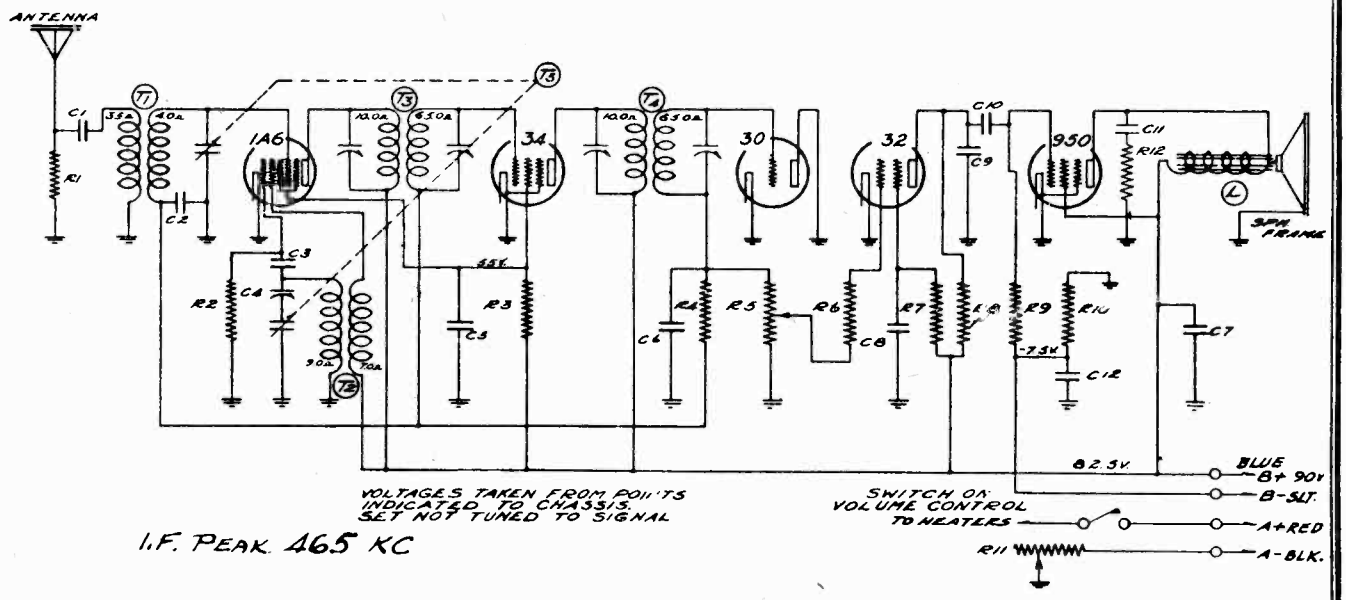
MODEL 14WG-2672C

MONTGOMERY-WARD & CO.

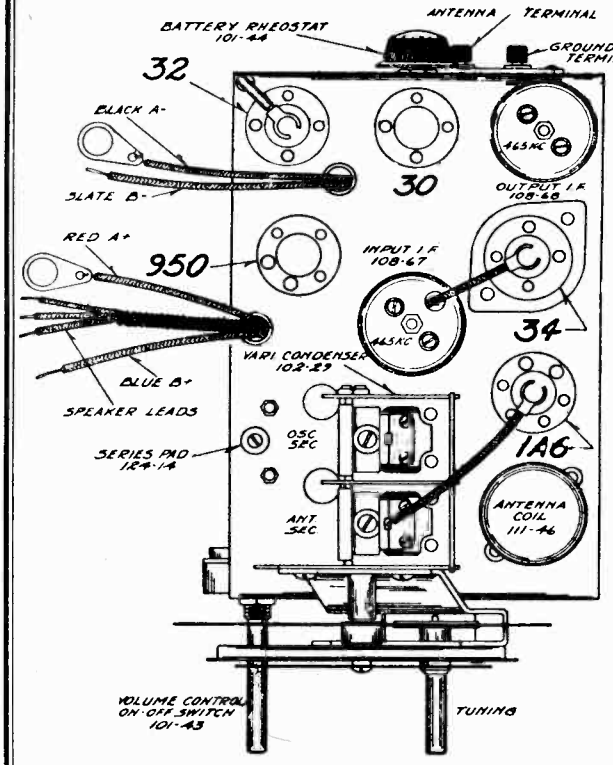


MODEL 62-240

MONTGOMERY-WARD & CO.



No.	Part No.	Description
		RESISTORS
R1	130-17	10M Ohm - ⅛ Watt - 20% - 20 Volt - Carbon
R2	130-52	50M Ohm - ⅛ Watt - 20% - 10 Volt - Carbon
R3	130-17	10M Ohm - ⅛ Watt - 20% - 20 Volt - Carbon
R4	130-38	2 Meg Ohm - ⅛ Watt - 20% 100 Volt - Carbon
R5	101-43	1 Meg Ohm Volume Control and Switch
R6	130-52	50M Ohm - ⅛ Watt - 20% 10 Volt - Carbon
R7	130-19	1 Meg Ohm - ⅛ Watt - 20% 100 Volt - Carbon
R8	130-9	200M Ohm - ⅛ Watt - 20% - 20 Volt - Carbon
R9	130-19	1 Meg Ohm - ⅛ Watt - 20% 100 Volt - Carbon
R10	130-93	450 Ohm - ⅛ Watt - 10% 10 Volt - Carbon
R11	101-44	4.75 Ohms - Rheostat
R12	130-52	50M Ohm - ⅛ Watt - 20% 10 Volt - Carbon
		CONDENSERS
C1	100-11	.01 x 400 Volt - 25%
C2	100-22	.05 x 200 Volt - 25%
C3	129-12	.00025 Mica - MT - 20%
C4	124-14	Series Pad
C5	100-9	.05 x 200 Volt - 25%
C6	129-5	.0001 Mica - MT - 20%
C7	100-6	.25 x 200 Volt
C8	100-9	.05 x 200 Volt - 25%
C9	129-2	.0005 Mica - MT - 20%
C10	100-11	.01 x 400 Volt - 25%
C11	100-11	.01 x 400 Volt - 25%
C12	119-22	10.0 Mfd. x 25 Volts - Working Voltage
		PARTS
T1	111-46	Antenna Coil
T2	110-36	Oscillator Coil
T3	108-67	Input I.F. Coil 465 K.C.
T4	108-68	Output I.F. Coil 465 K.C.
T5	102-29	Two Gang Condenser
L	114-19	Six Inch Magnetic Speaker



ALIGNING I.F. TRANSFORMERS: (465 K.C.)

1. With volume control full on and with variable condenser at its minimum capacity position, plates entirely out of mesh, and with external oscillator set at 465 K.C. connected in series with a .1 mfd. condenser, to the grid of the 1A6 tube (cap at top of tube), adjust I.F. transformers, parts number 108-67 and 108-68, to resonance. Both of these transformers have two (2) adjustments each, they are accessible from the tops of the cans (for location see top view).

Use as a resonance indicator an output meter connected across the outside terminals of the speaker or by means of an adapter to the plate and screen of the type 950 output tube. Maximum deflection of the volt meter indicates resonance.

Use only enough signal to get a readily readable output.

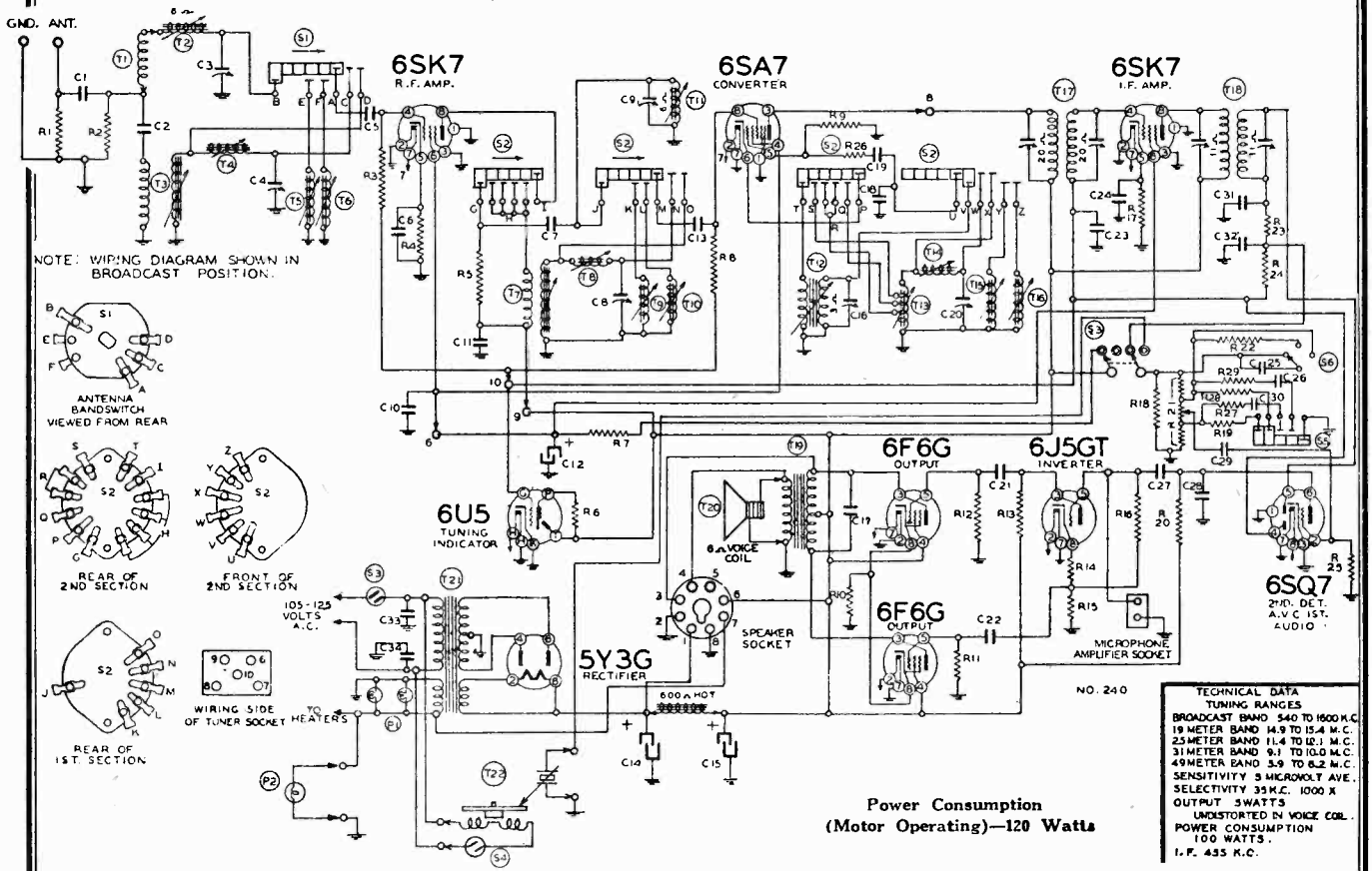
A low range output meter or the low scale of a multi-range meter should be used.

BROADCAST BAND ALIGNMENT:

1. Set external oscillator to 1720 K.C. and connect it in series with a 200 mmfd. condenser to the antenna and ground posts.
   (a) With variable condenser in its minimum capacity position, plates entirely out of mesh, adjust oscillator trimmer (rear section of variable condenser) to resonance.
   (b) Re-set external oscillator to 1400 K.C. Rotate variable condenser, pick up signal and adjust antenna trimmer (front section of variable condenser) to resonance.
   (c) Re-set external oscillator to 600 K.C., move dial pointer to 600 K.C., and adjust series pad, part number 124-14 (see top view), to resonance. While making this adjustment, slowly rock variable condenser to and fro until maximum output is obtained.
   (d) Check for sensitivity at 1400, 1000, 600 K.C. DO NOT BEND PLATES.

MODEL 245R-914A

MONTGOMERY-WARD & CO.

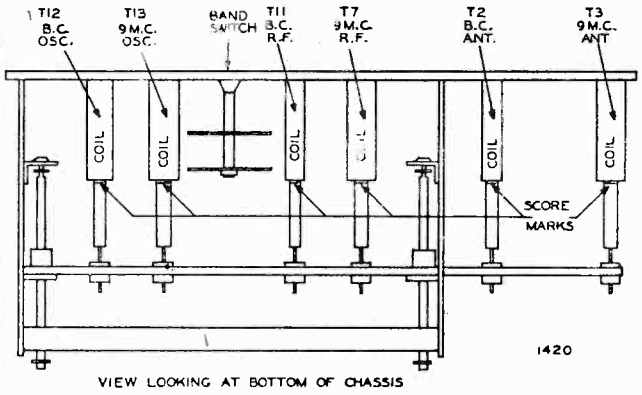


Power Consumption (Motor Operating)—120 Watts

TECHNICAL DATA

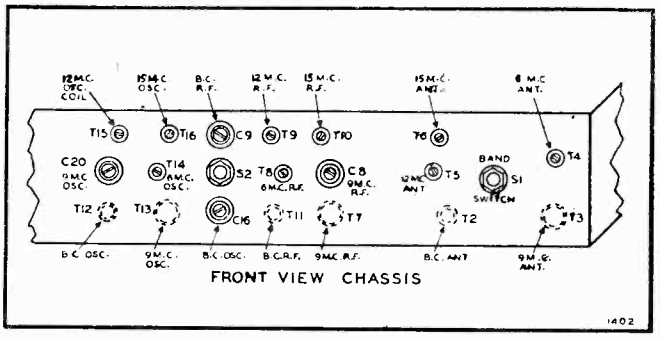
TUNING RANGES

BROADCAST BAND 540 TO 1600 K.C.
19 METER BAND 14.9 TO 15.4 M.C.
25 METER BAND 11.4 TO 12.1 M.C.
31 METER BAND 9.1 TO 10.0 M.C.
49 METER BAND 5.9 TO 6.2 M.C.
SENSITIVITY 3 MICROVOLT AVE.
SELECTIVITY 35 K.C. 1000 X
OUTPUT 5 WATTS UNDISTORTED IN VOICE COIL.
POWER CONSUMPTION 100 WATTS.
I.F. 455 K.C.



VIEW LOOKING AT BOTTOM OF CHASSIS

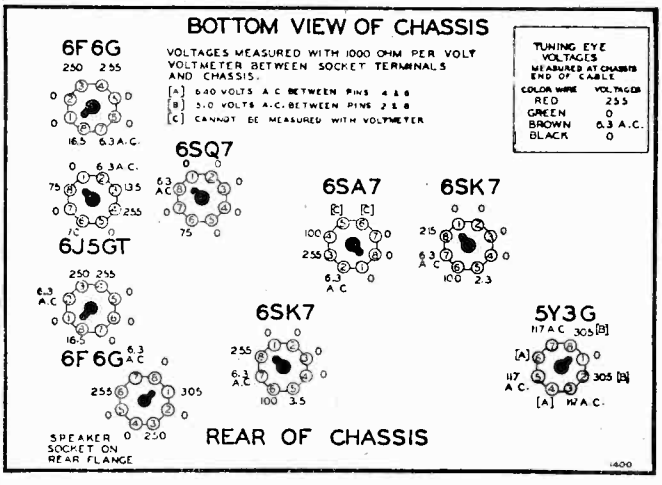
IRON CORE ADJUSTMENT VIEW



FRONT VIEW CHASSIS

TRIMMER VIEW

BOTTOM VIEW OF CHASSIS



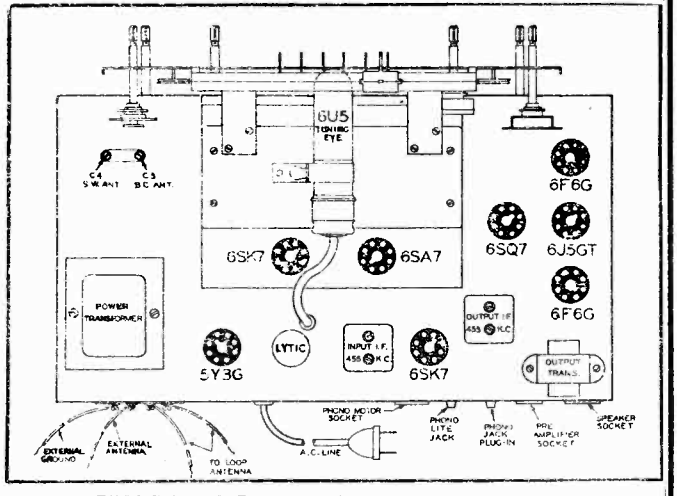
VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER BETWEEN SOCKET TERMINALS AND CHASSIS.

[A] 640 VOLTS A.C. BETWEEN PINS 4 & 8
[B] 310 VOLTS A.C. BETWEEN PINS 2 & 8
[C] CANNOT BE MEASURED WITH VOLTMETER

TUNING EYE VOLTAGES MEASURED AT CHASSIS END OF CABLE

COLOR WIRE	VOLTAGE
RED	255
GREEN	0
BROWN	6.3 A.C.
BLACK	0

VOLTAGE CHART



CHASSIS VIEW. Showing Tube Location
Note: Antenna and Ground Terminals at Back of Chassis

ALIGNMENT PROCEDURE

- Tone control—Treble.
- Volume control—Maximum all adjustments.
- Connect dummy antenna value in series with generator output lead.
- Use an all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted To Maximum in Order Shown
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 (I.F.)	Broadcast	Set Dial at 1600 Kc.	On Top of Output I.F.
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	On Top of Input I.F.
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C20—Osc. (See Trimmer View) C8—R.F. (See Chassis View) C6—Ant.
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T16—Osc. (See Trimmer View) T8—R.F. (See Trimmer View) T4—Ant.
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15—Osc. (See Trimmer View) T9—R.F. (See Trimmer View) T5—Ant.
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16—Osc. (See Trimmer View) T10—R.F. (See Trimmer View) T6—Ant.
BROADCAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C16—Osc. (See Trimmer View) C9—R.F. (See Chassis View) C3—Ant.
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T11—R.F. Rotate Core T2—Ant. (See Iron Core Adjustment View)

REPLACEMENT PARTS LIST

In ordering parts refer to model number on chassis label

MAIN CHASSIS PARTS LIST

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
CONDENSERS				
BE100139	C30	.0015 x 200 Volt Tubular Condenser	1	.12
BE1009	C22	.05 x 200 Volt Tubular Condenser	1	.12
BE10013	C21	.05 x 400 Volt Tubular Condenser	1	.12
BE10019	C29	.006 x 600 Volt Tubular Condenser	1	.12
BE10020	C24	.1 x 200 Volt Tubular Condenser	1	.12
BE10026	C23, C27	.02 x 400 Volt Tubular Condenser	2	.12
BE10061	C33, C34	.02 x 600 Volt Bakelite Condenser	2	.16
BE10021	C17	.004 x 600 Volt Tubular Condenser	1	.12
BE1002	C26	.003 x 300 Volt Tubular Condenser	1	.12
BE1292	C1	.0005 Mica Type Condenser—20%	1	.12
BE12921	C28	.0002 Mica Type Condenser—20%	1	.12
BE12951	C25	.000125 Mica Type Condenser—20%	1	.12
BE129165	C31, C32	Dual .00005 Mica Type Condenser—20%	1	.12
BE119109	C12, C14, C15	Electrolytic Filter Condenser—10 Mfd. x 350 V.; 15 Mfd. x 450.; 15 Mfd. x 450 V.	1	1.20
	—or—			
BE119109B	C12, C14, C15	Electrolytic Filter Condenser—10 Mfd. x 350 V.; 15 Mfd. x 450 V.; 15 Mfd. x 450 V.	1	1.20
RESISTORS				
BE1307	R27	40M Ohm—½ Watt Resistor—10%	1	.10
BE1301	R1, R2	25M Ohm—½ Watt Resistor—20%	2	.12
BE1303	R11, R12, R18, R19	500M Ohm—½ Watt Resistor—20%	4	.10
BE1304	R24	3 Megohm—½ Watt Resistor—20%	1	.10
BE13011	R20	250M Ohm—½ Watt Resistor—20%	1	.10
BE13012	R23	50M Ohm—½ Watt Resistor—20%	1	.10
BE13019	R16	1 Megohm—½ Watt Resistor—20%	1	.10
BE130351	R29	80M Ohm—½ Watt Resistor—10%	1	.10
BE130352	R28	150M Ohm—½ Watt Resistor—10%	1	.10
BE13070	R17	500 Ohm—½ Watt Resistor—10%	1	.10
BE130103	R13, R15	100M Ohm—½ Watt Resistor—10%	2	.10
BE130218	R14	5M Ohm—½ Watt Resistor—10%	1	.10
BE130220	R10	300 Ohm—½ Watt Resistor—10%	1	.10
BE130257	R25	5 Megohm—½ Watt Resistor—25%	1	.10
BE10662	R7	12,500 Ohm—3 Watt Resistor Strip	1	.26
BE130191	R22	1.5 Megohm—½ Watt Resistor—20%	1	.10
COILS				
BE108176	T18	Output I.F. Coil Complete in Can	1	.76
BE108177	T17	Input I.F. Coil Complete in Can	1	.76
BE111256B	T1	Loop Antenna Assembly	1	1.64
TRANSFORMERS				
BE104202B	T21	Power Transformer. 50 to 60 Cycles 105-125 Volt Primary	1	3.00
BE104203B		Power Transformer. 25 to 60 Cycles 105-125 Volt Primary		
BE105111C		Output Transformer for Speaker	1	.98
SOCKETS				
BE121171		Eight Prong Octal Wafer Socket	1	.10
BE121210		Eight Prong Octal Molded Socket	5	.10
BE121273		Eight Prong Octal Wafer Socket—with Shield for Guide Pin	1	.10
BE107387		Socket for Pilot Lite	2	.10

Part No.	Schematic Diagram Reference	Description	No. Used In Set	Selling Price Each
BE128687-14		Knob—Mottled Brown—"Tuning"	1	.12
BE128682-14		Knob—Mottled Brown—Radio-Phono—"Control"	1	.12
BE128683-14		Knob—Mottled Brown—"Band"	1	.12

TUNER CHASSIS PARTS LIST

CONDENSERS				
BE10020	C6	.1 x 200 Volt Tubular Condenser	1	.12
BE10047	C2	.002 x 600 Volt Tubular Condenser	1	.12
BE10024	C10, C11	.1 x 400 Volt Tubular Condenser	2	.20
BE124138	C8	9 MC., R.F. Adjustable Trimmer Condenser	1	.12
BE124139	C9	B.C., R.F. Adjustable Trimmer Condenser	1	.16
BE124143	C3, C4	B.C. and 9 MC. Dual Adjustable Antenna Trimmer Condenser	1	.20
BE124144	C16	B.C. Oscillator Adjustable Trimmer Condenser	1	.12
BE124145	C20	9 MC. Oscillator Adjustable Trimmer Condenser	1	.24
BE1292	C5, C13	.0005 Mica Type Condenser—20%	2	.12
BE12938	C19	.00005 Mica Type Condenser—10%	1	.12
BE129168	C7	.00001 Mica Type Condenser—20%	1	.12
BE129167	C18	.0002 Silver Mica Type Condenser—3%	1	.16
RESISTORS				
BE13019	R3, R8	1 Megohm—½ Watt Resistor—20%	2	.10
BE130218	R5	5M Ohm—½ Watt Resistor—10%	1	.10
BE130232	R9	25M Ohm—½ Watt Resistor—10%	1	.10
BE130239	R4	250 Ohm—½ Watt Resistor—10%	1	.10
	R6	1 Megohm—In Tuning Eye Cable	1	.10
BE130174	R26	50 Ohm—½ Watt Resistor—10%	1	.10
COILS				
BE10962	T11	B.C., R.F. Coil with Iron Slug	1	.70
BE10958	T8	6 MC. R.F. Coil with Iron Slug	1	.30
BE10959	T7	9 MC. R.F. Coil with Iron Slug	1	.56
BE10960	T9	12 MC. R.F. Coil with Adjusting Screw	1	.20
BE10961	T10	15 MC. R.F. Coil with Adjusting Screw	1	.16
BE110161	T12	B.C. Osc. Coil with Iron Slug	1	.64
BE110156	T14	6 MC. Osc. Coil with Adjusting Screw	1	.20
BE110157	T13	9 MC. Osc. Coil with Iron Slug	1	.64
BE110158	T15	12 MC. Osc. Coil with Adjusting Screw	1	.20
BE110159	T16	15 MC. Osc. Coil with Adjusting Screw	1	.16
BE111195	T2	B.C. Ant. Coil with Iron Slug	1	.70
BE111189	T4	6 MC. Ant. Coil with Iron Slug	1	.30
BE111190	T3	9 MC. Ant. Coil with Iron Slug	1	.56
BE111191	T5	12 MC. Ant. Coil with Adjusting Screw	1	.20
BE111192	T6	15 MC. Ant. Coil with Adjusting Screw	1	.16
MISCELLANEOUS				
BE120373		Spring Washer for Coils	9	.02
BE131316B		"C" Washer for Coils	3	.02
BE125122	S2	R.F. and Oscillator Band Switch	1	.80
BE125178	S1	Antenna Band Switch	1	.50
BE11757A		Bracket for Tuning Eye	1	.08
BE11757B		Clamp for Tuning Eye	1	.08
BE11757C		Wing Bolt for Bracket and Clamp	1	.04
BE115589		Link for Band Switches	1	.10
BE11712		Switch Arm with Bushing for Band Switches	2	.08

SPEAKER

BE114208	T20	Ten Inch Electrodynamic Speaker—Less Output Transformer	1	4.00
BE105111C	T19	Output Transformer for Speaker	1	.98

MISCELLANEOUS

BE101267	R21	Volume Control (2.8 Megohm)	1	.50
BE125176	S6	Treble Tone Switch	1	.50
BE125175	S5	Bass Tone Switch	1	.50
BE107266		Line Cord and Plug	1	.30
BE10794	P1	6-8 Volt Pilot Lite Bulb—Type T-44	2	.10
BE107331		Cable Assembly for Tuning Eye	1	.38
BE125177	S3	Phono-Radio Switch	1	.70
BE13244		10—32 x 1¼ Chassis Mounting Bolts	6	.02
BE131145		Steel Washers for Mounting Bolts 6	Dz.	.10
BE131356		Snap-in Split Pins to Mount Loop to Cabinet	Dz.	.10

DIAL AND TUNING PARTS

BE112987		Dial Scale	1	.50
BE112966		Light Rod for Dial	1	.36
BE112967-41		Escutcheon for Dial—Mahogany	1	.70
BE112967-14		Escutcheon for Dial—Mottled Brown	1	.70
BE112530		Clips to Fasten Dial Scale 4	Dz.	.06
BE112968-41		Escutcheon for Buttons—Mahogany	1	.70
BE112968-14		Escutcheon for Buttons—Mottled Brown	1	.70
BE128678-41		Pushbuttons—Mahogany	6	.12
BE128678-14		Pushbuttons—Mottled Brown	6	.12
BE112961		Set of Station Call Letters	1	.12
BE128684-41		Knob—Mahogany—"Bass"	1	.12
BE128685-41		Knob—Mahogany—"Treble"	1	.12
BE128686-41		Knob—Mahogany—"Volume"	1	.12
BE128687-41		Knob—Mahogany—"Tuning"	1	.12
BE128682-41		Knob—Mahogany—"Control"	1	.12
BE128683-41		Knob—Mahogany—"Band"	1	.12
BE128684-14		Knob—Mottled Brown—"Bass"	1	.12
BE128685-14		Knob—Mottled Brown—"Treble"	1	.12
BE128686-14		Knob—Mottled Brown—"Volume"	1	.12

TUNER MECHANICAL PARTS

BE115680		Right Drive Link—With Studs	1	.06
BE115680B		Left Drive Link—With Studs	1	.06
BE115682		Connecting Link for Both Right and Left Drive Links	2	.02
BE120393		Spring for Intermediate Link	1	.06
BE120394		Spring for Arms	3	.02
BE115582		Slug Tuning Bar	1	.12
BE117844		Drive Rod—With Ball on End	2	.10
BE115683		Ball Retainer Spring	2	.02
BE134136		Rubber Bushings for Tuning Bar	2	.02
BE131251		"C" Washer for Drive Rod 4	Dz.	.03
BE120392		Spring Washer for Drive Rod 2	Dz.	.04
BE134134		Core Mounting Grommet—With Insert	6	.02
BE115685		Retainer Spring for Cam Locking Spring	6	.02
BE120214		Pointer String—Silk Line	Yd.	.12
BE115572		Pushrod Carriage—With Cam	6	.16
BE115573B		Pushrod for tuner	6	.12
BE115569		Cam Locking Spring	6	.02
BE120366		Coiled Return Spring for Pushrods	6	.02
BE112801		Drive Pulley (With Bushing)	1	.16
BE112957		Pointer	1	.14
BE120372		Coiled Tension Spring for Pointer String	1	.02
BE117907		Tuning Shaft	1	.12
BE117798		Pinion Gear	1	.12
BE115564		Treadle Bar Complete with Link Arms, Trunnions, and Gear Segment	1	.48

RECORD CHANGER COMPARTMENT

BE104311	T22, S4	Automatic Record Changer Complete. 60 Cycles Only. With LP6 Cartridge	1	
BE104328		Automatic Record Changer Complete. 25 Cycles Only, with LP6 Cartridge		
BE10794	P2	6-8 Volt Indicator Light Bulb. Type T-44	1	.10
BE107388		Socket and Cable Assembly for Indicator Light	1	.26

NOTICE—There is a model number label on the chassis. This model number identifies the radio as to year, manufacturer, chassis and issue number or letter. When ordering parts or writing, be sure to mention the complete model number.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

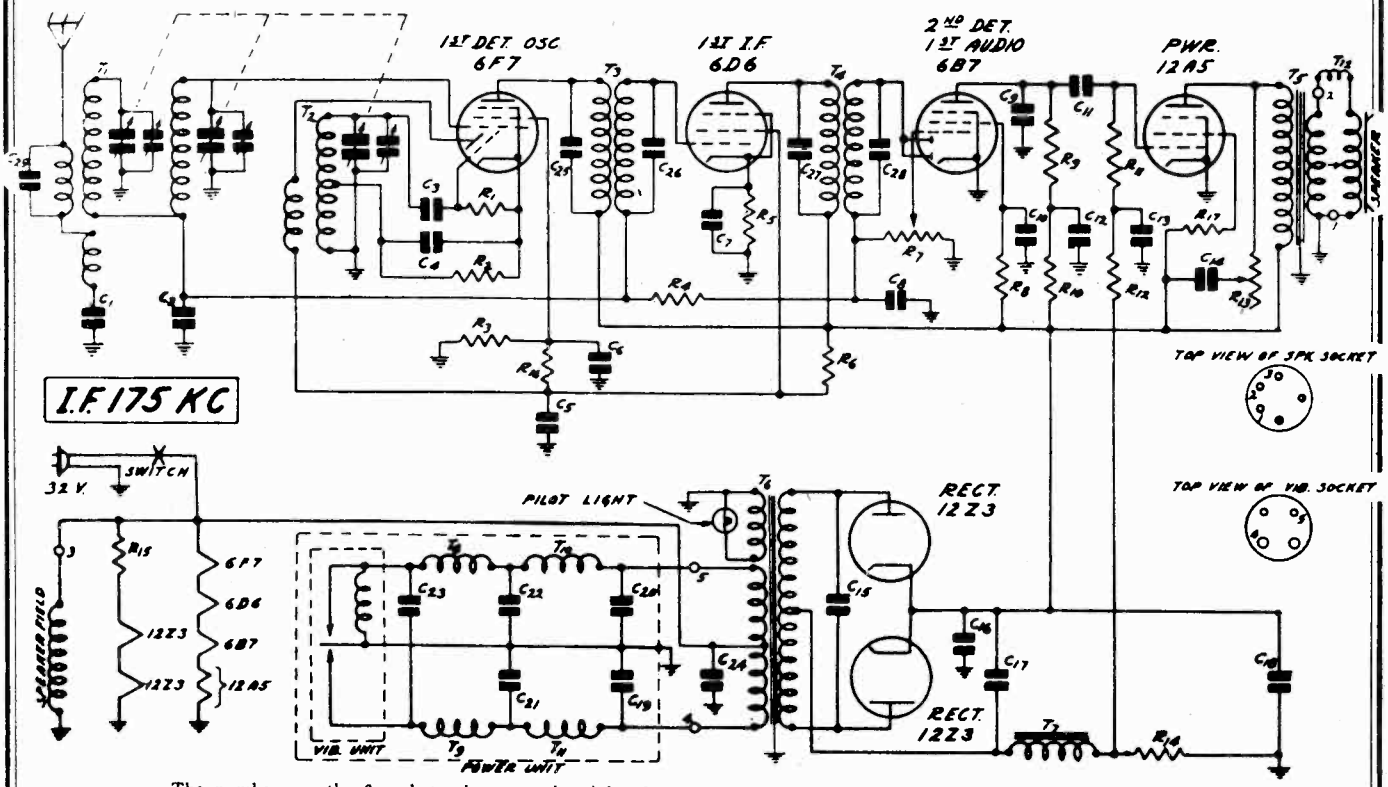
For Oak RC-1 Record Changer
See Rider's book,
"Automatic Record Changers
and Recorders"

Push Button Data the same
as Model 14BR-1400-A

Date 3/42

MODELS 62-231, 62-243

MONTGOMERY-WARD & CO.



The numbers on the 2 sockets shown at the right above, correspond with the numbers as shown in the circuit.

Oct, 1934

Fig. 1--Schematic Circuit Diagram

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-80862	C1	.05 Mf.	200V	Tubular
P-80862	C2	.05 Mf.	200V	"
P-81801	C3	35 Mmf.		Wire Capacitor Part of Osc. Assem
P-80862	C4	.05 Mf.	200V	Tubular
P-80888	C5	.25 Mf.	200V	"
P-81049	C6	.05 Mf.	200V	"
	C7	.05 Mf.	200V	"
P-81811	C8	100 Mmf.		Wire Capacitor
P-81051	C9	.002 Mf.	600V	Tubular
P-80888	C10	.25 Mf.	200V	"
P-80872	C11	.01 Mf.	600V	"
P-80888	C12	.25 Mf.	200V	"
P-81062	C13	.01 Mf.	140V	"
P-81055	C14	.05 Mf.	400V	"
P-81052	C15	.015 Mf.	1600V	"
P-80887	C16	.10 Mf.	400V	"
P-81016	C17	8.0 Mf.	300V	Electrolytic Block
	C18	8.0 Mf.	300V	
P-80993	C24	.5 Mf.	140V	Tubular
P-81806	C25	70 Mmf.		Wire Capac. Part of 1st I.F.Assem.
P-81804	C26	45 Mmf.		Wire Capac. Part of 1st I.F.Assem.
P-81808	C27	90 Mmf.		Wire Capac. Part of 2nd I.F.Assem.
P-81810	C28	100 Mmf.		Wire Capac. Part of 2nd I.F.Assem
P-81812	C29	200 Mmf.		Wire Capac. Part of Ant. Assem.
P-81015				Three Gang Condenser

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-A95104	R1	100,000 Ohm	.2	Carbon
P-A95152	R2	1,500 Ohm	.2	Carbon
P-B94303	R3	30,000 Ohm	.5	Carbon
P-A98275	R4	2 Megohm	.2	Carbon
P- 98021	R5	400 Ohm	.2	Wire Wound
P-C93702	R6	7,000 Ohm	1.0	Carbon
P- 96014	R7	500,000 Ohm		Volume Control
P-B94204	R8	200,000 Ohm	.5	Carbon
P-B94603	R9	60,000 Ohm	.5	Carbon
P-A95203	R10	20,000 Ohm	.2	Carbon
P-A95504	R11	500,000 Ohm	.2	Carbon
P-A94104	R12	100,000 Ohm	.2	Carbon
P- 97011	R13	150,000 Ohm		Tone Control
P- 98035	R14	450 Ohm	2.0	Wire Wound
P- 98034	R15	25 Ohm	3.0	Wire Wound
P-B95602	R16	6,000 Ohm	.5	Carbon

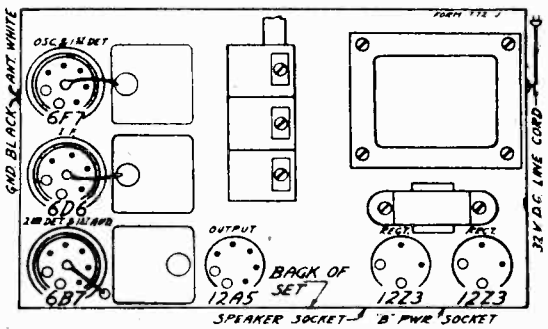


Fig. 2—Arrangement of Tubes

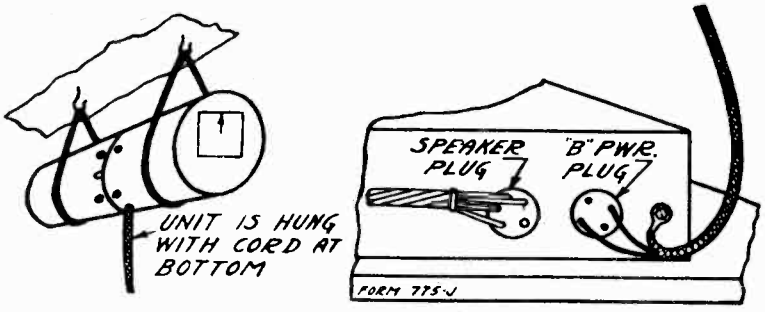


Fig. 3—Method of Installing "B" Power Unit

MODELS 62-231, 62-243

MONTGOMERY-WARD & CO.

Circuit

This receiver is designed to operate from a power supply source of 32 volts D. C. Six and twelve volt tubes are used. The heaters of these tubes are connected in series across the 32 volt line as shown in Fig. 1. As shown in this illustration, the heaters of the 6F7, 6D6, 6B7 and 12A5 tubes are in one series while the heaters of the two 12Z3 tubes and a 25 ohm resistor are in another series across the 32 volt line. A third connection across the line consists of the speaker field winding. A vibrator unit is used to provide the necessary high voltage which is rectified by the two 12Z3 tubes and then filtered for use in the plate and screen circuits.

The receiver uses 1.56 amps. at 32 volts input. The maximum undistorted power output is 1.5 watts, measured with a load impedance of 4000 ohms.

Sensitivity

600 K. C.—25 microvolts absolute.
1500 K. C.—15 microvolts absolute.

D. C. RESISTANCE OF WINDINGS

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Item	Code	D. C. Resistance in Ohms
P-5300	Primaries of Antenna Trans. in Series	T1	Small
	1st Secondary of Antenna Transformer	T1	3.2
	2nd Secondary of Antenna Transformer	T1	2.4
P-5202	Oscillator Plate Coil	T2	2.0
	Oscillator Grid Coil	T2	3.5
P-5221	1st I. F. Transformer Primary	T3	67
	1st I. F. Transformer Secondary	T3	93
P-5203	2nd I. F. Transformer Primary	T4	63
	2nd I. F. Transformer Secondary	T4	63
P-50624	Output Transformer Primary	T5	243
	Output Transformer Secondary and Bucking Coil in Series	T5 & L12	Small
P-50637	"B" Filter Reactor	T7	300
P-2147	Speaker Field		97
P-2173	Speaker Voice Coil		Small
P-50626	Power Transformer Primary	T6	
	Center Tap to Inside	T6	3.6
	Center Tap to Outside	T6	4.4
	Power Transformer H. V. Secondary	T6	
	Center Tap to Inside	T6	322
	Center Tap to Outside	T6	350
	Power Transformer Pilot Lamp Sec.	T6	.3
P-2153	Vibrator Unit Magnetizing Coil		1025
	Vibrator Unit Filter Chokes		3.0

VOLTAGES AT SOCKETS

Input 32 Volts—Antenna Shorted to Ground

Type of Tube	Function	Across Filament	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M.A.
6F7	1st Det. & Osc.	6.3	167(1)	90	2.6	7.0(1)
			117(2)		0	2.8(2)
6D6	I. F.	6.3	172	120	3.2	8.2
6B7	2nd Det.	6.3	25	25	7.25	2.0
12A5	Output	12.6	180	180	25	32
12Z3	Rectifier	12.6	225			25

(1) Pentode Section of Tube

(2) Triode Section of Tube

Eliminating Ignition and Generator Noise

After the receiver is in working order, the following procedure must be followed in practically all cases to eliminate ignition and generator noise caused by the charging plant. If the charging plant causes no noise, then of course, these steps do not have to be taken.

One spark plug suppressor must be placed on each spark plug of the engine. One spark plug suppressor for example would be required on a one-cylinder engine and four must be used on a four-cylinder engine. To connect the spark plug suppressor, remove the wire from the top of the plug, put the suppressor on and attach the wire to the other end of the suppressor.

The generator condenser consists of two .5 mfd. sections in one unit. The two sections have one side grounded to the metal case of the condenser. Mount the condenser on the frame of charging plant. This will ground it. Then connect the two leads to the charging switch, one on each side of the line.

In some large installations, where the charging unit is on only two or three times a week, the above steps do not have to be taken, as interference is only caused when the generating plant is in operation.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

First set the signal generator for 1730 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator adjustment is connected to the antenna lead of the receiver. Adjust the trimmer of the oscillator section of the 3 gang condenser until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Now set the signal generator for 1400 K. C. and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To obtain dial scale calibration tune in an 800 K. C. signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

The use of the cut plate type of condenser eliminates the necessity of a 600 K. C. padder and no adjustment at this frequency, therefore, is required.

32 Volt Power Supply

This receiver is designed for use on farms and in those places where the power supply consists of a 32 volt direct current generating plant. The receiver may not be satisfactory on plants which do not use storage batteries.

Line Voltage Range

The receiver will operate satisfactorily within a line voltage range of 27 to 38 volts. If the line voltage runs higher, it will have to be cut down and one method of doing this is to use a series resistor.

Series Resistor

Let us say the line voltage is 40. The receiver uses 1.56 amps. at 32 volts. A resistance of 5.13 ohms, therefore, capable of dissipating 12.5 watts will be required in the receiver line to cut the voltage down to 32. If the line voltage varies a variable resistor may be required.

Starting Current

When first turned on the drain for a few seconds is slightly higher than normal until the tubes heat up. Some automatic plants are adjusted to start under a load of 200 to 300 watts. If a number of devices such as lights or motors are being used and the radio set is turned on the total drain may be sufficient to start the plant.

No Polarity

When inserting the line plug no attention need be paid to polarity.

Servicing Power Unit

Vibrator Unit

The vibrator is mounted inside the "B" power unit. Normally the vibrator will last upward of 1000 hours. However, in the same manner as a tube it may become defective in less time and require replacement.

If the tubes light and by touching the power unit case, no vibration is felt, then the vibrator unit is probably not operating. If the pilot lamp is not lighted this will be a further indication of the same fact.

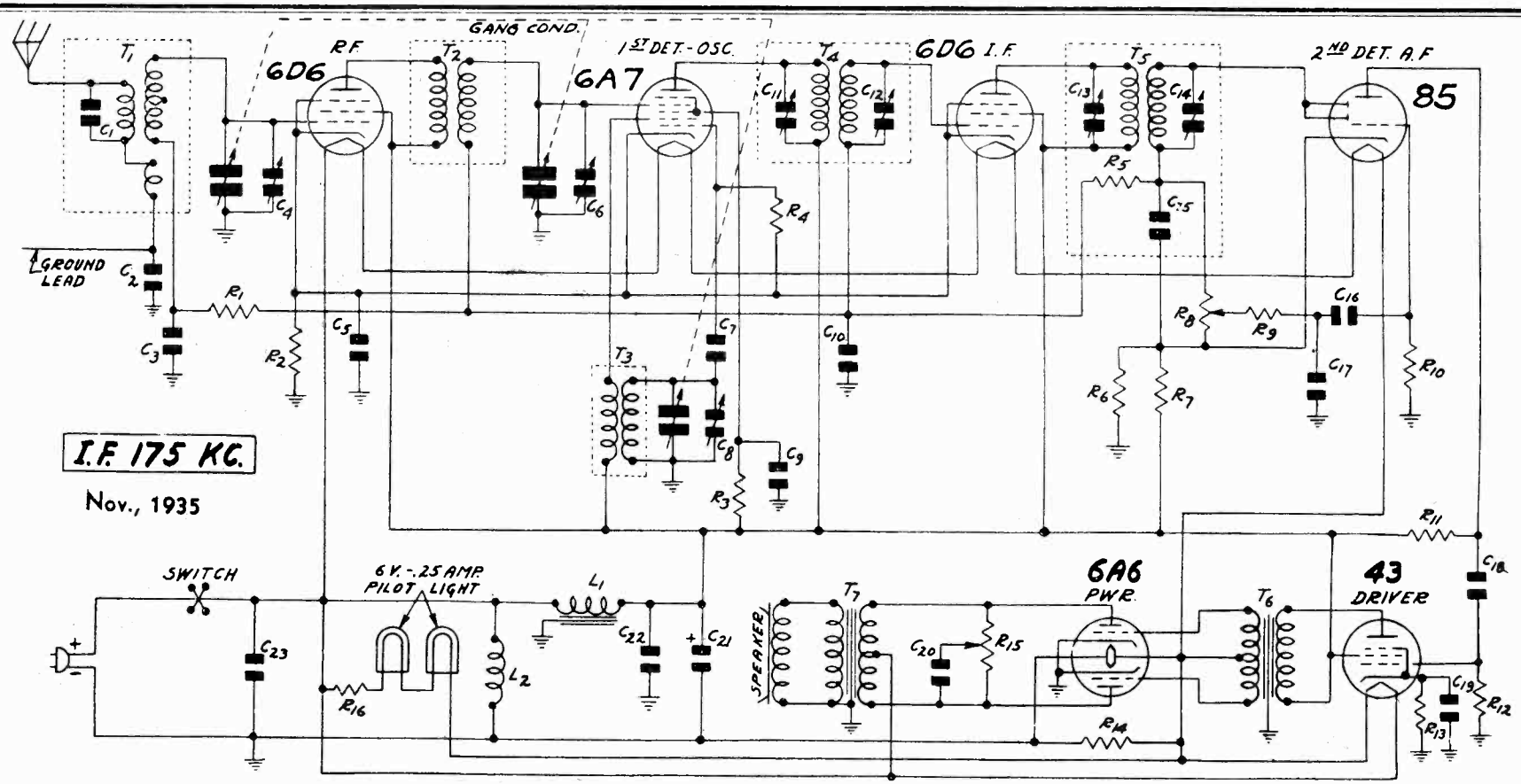
To replace the vibrator unit in the power supply remove the end of the case on which the label is placed by taking out the four screws which hold the vibrator shield can to the framework. The old vibrator may then be withdrawn and a new unit inserted in the same manner as a tube.

One or more of the vibrator units should be kept on hand for replacement purposes. It is advisable when servicing the receiver, to try one out in the same manner as a new set of tubes would be tried.

Filter Unit

The other side of the power unit case contains the filter unit which is made up of several chokes and condensers as shown in Fig. 1. The purpose of this filter is to prevent high frequency currents from getting out of the power unit case.

Failure in the unit may affect the voltage supply to the power transformer or it may result in radio frequency noise. The chokes and condensers should be tested and replaced, if necessary. A resistance continuity test should be made of the wiring in the unit and to the chassis, using the circuit diagram as a guide.



GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.

C_1	250 MMf MOULDED	C_{21}	30 Mf 50V. WET ELECTROLYTIC (P-44X25)
C_2	.05 Mf 180V.	C_{22}	.25 Mf 180V.
C_3	.05 Mf 180V.	C_{23}	25 Mf 180V.
C_4	GANG TRIMMER		
C_5	.05 Mf 180V.		
C_6	GANG TRIMMER		
C_7	35 MMf MOULDED		
C_8	GANG TRIMMER		
C_9	.05 Mf 180V.		
C_{10}	.05 Mf 180V.		
C_{11}	40-100 MMf } DUAL		
C_{12}	40-100 MMf } P-17A39		
C_{13}	40-100 MMf } DUAL		
C_{14}	40-100 MMf } P-17A39		
C_{15}	100 MMf MOULDED		
C_{16}	.01 Mf 180V.		
C_{17}	50 MMf MOULDED		
C_{18}	.01 Mf 180V.		
C_{19}	12. Mf 25V. DRY ELECTROLYTIC (P-45X207)		
C_{20}	.10 Mf 180V.		

R_1	100 000 OHM .2 W	R_{14}	180 OHM 1.0 W.
R_2	450 OHM .2 W.	R_{15}	75000 OHM TONE CONTROL
R_3	30 000 OHM .2 W.	R_{16}	67 OHM 4.0 W ARMORED WIRE WOUND
R_4	100 000 OHM .2 W.		
R_5	1.0 MEGOHM .2 W.		
R_6	350 OHM .2 W.		
R_7	6 000 OHM .2 W.		
R_8	.50 MEGOHM VOL. CONTROL (P-36X213)		
R_9	50 000 OHM .2 W.		
R_{10}	2.0 MEGOHM .2 W		
R_{11}	80000 OHM .2 W.		
R_{12}	1.0 MEGOHM .2 W.		
R_{13}	400 OHM 2 W.		

T_1 ANTENNA INTERSTAGE TRANS. P-9A452
T_2 INTERSTAGE R.F. TRANS P-9A453

I-f. peak 175 kc.
Osc. adj. 1750 kc.
with cond. rotor
full open.
R-f. adj. 1500 kc.

Power Consumption	1.2 Amperes at 32 Volts DC
Power Output	.25 Watts Undistorted
Selectivity	29 KC Broad at 1000 times Signal
Sensitivity	10 Microvolts Absolute
Tuning Range	530 to 1750 KC
Speaker	6" Dynamic

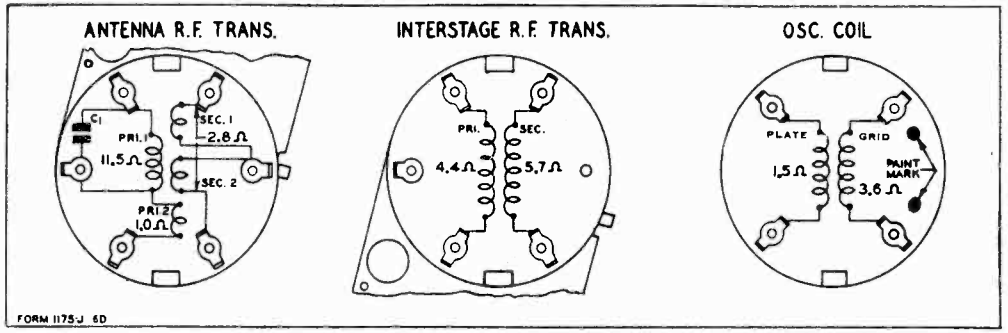


Fig. 3—R.F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

Refer to Fig. 3

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A452	Antenna R.F. Transformer	T1	
	Primary No. 1		11.5
	Primary No. 2		1.0
	Secondary Windings in Series		2.8
P-9A453	Interstage R.F. Transformer	T2	
	Primary Winding		4.4
	Secondary Winding		5.7
P-9A454	Oscillator Coil	T3	
	Grid Coil		3.6
	Plate Coil		1.5
P-9A455	1st I.F. Transformer	T4	
	Primary Winding		102.0
	Secondary Winding		99.
P-9A456	2nd I.F. Transformer	T5	
	Primary Winding		101.
	Secondary Winding		102.
P-50X22	Audio Input Transformer	T6	
	Primary Winding		380.
	Secondary Winding		
	Center Tap to Inside		85.
	Center Tap to Outside		95.
P-12A219	Dynamic Speaker		
	Speaker Field	L2	100.
	Speaker Voice Coil		3.1
	Audio Output Transformer (51X23)	T7	
	Primary Winding		
	Center Tap to Inside		152.
	Center Tap to Outside		176.
	Secondary Winding		1.4
P-52X33	Filter Choke	L1	50.

Replacing Drive Cord

Take off the station pointer by removing the screw at the center of the dial.

Remove the pilot lamp assembly by pulling the socket clips upward off the dial assembly.

Loosen the dial assembly by removing the two screws which secure this assembly to the chassis brackets.

Then lay the complete dial assembly face down in front of the chassis. It is not necessary to remove the volume control and tone control collars which hold the indicator cords of these two controls in position.

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 6.

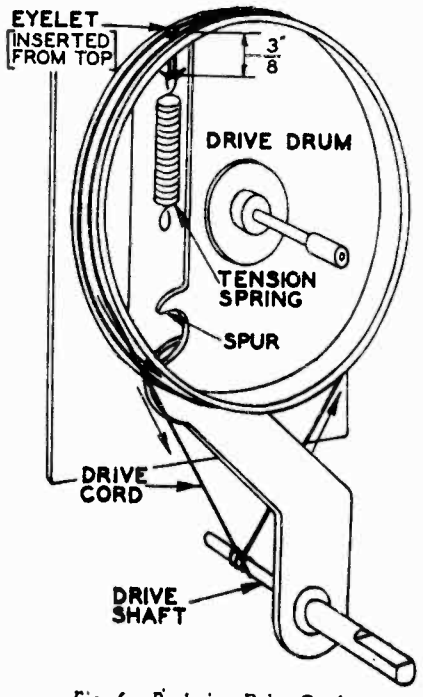


Fig. 6—Replacing Drive Cord

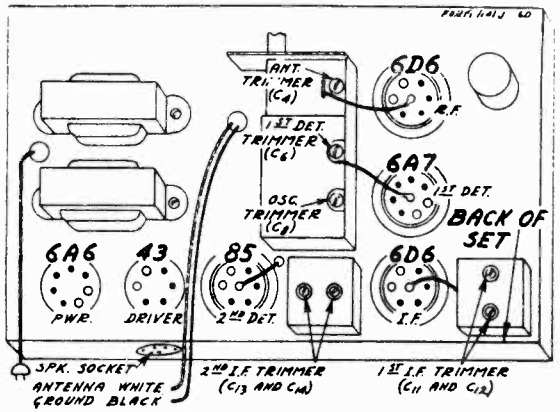


Fig. 4—Tube Arrangement

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 6. Insert one end of the new drive cord from the outside through this eyelet in the drive drum.

Tie the end of the cord which has been inserted through the eyelet to one end of the tension spring.

Wrap the cord in a counter clockwise direction (facing front of chassis) around the drive drum approximately one and one-quarter turns progressing toward the front.

Volume Control at Maximum — Antenna Connected to Ground LEAD

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Normal Plate MA.
6D6	R.F.	6.4	31	31	2	1.5
6A7	1st Det. & Osc.	6.4	31 31(1)	18	2	.2 .65(1)
6D6	I.F.	6.4	31	31	2	1.5
85	2nd Det.	6.4	12.5		18	.20
43	1st Audio	25.6	28	31	3.5	7
6A6	Output	6.4	31		0	11 (per plate)

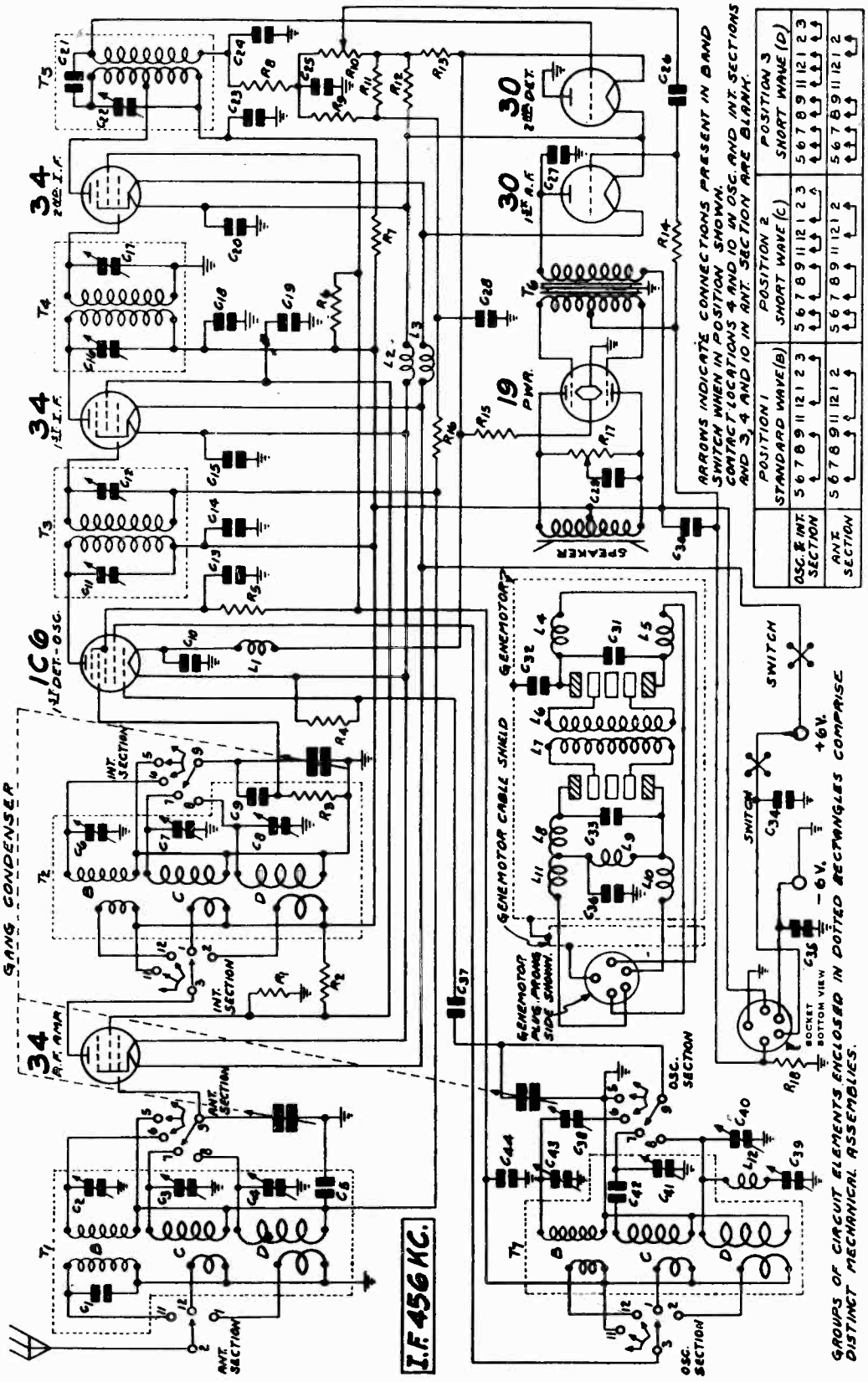
(1) Anode Grid

MODELS 62-241, 62-244, 62-245, 62-252

MONTGOMERY-WARD & CO.

Power Consumption - 1.8 Amperes at 6.3 Volts
Power Output - - - - - - - 1 Watt Undistorted

Tuning Frequency Range
B Range - - - - - - - - - - 535 to 1730 KC.
C Range - - - - - - - - - - 1680 to 4800 KC.
D Range - - - - - - - - - - 5650 to 16000 KC.



ARROWS INDICATE CONNECTIONS PRESENT IN BAND SWITCH WHEN IN POSITION SHOWN. CONTACT LOCATIONS 4 AND 10 IN OSC. AND INT. SECTIONS AND 3, 4 AND 10 IN ANT. SECTION ARE BLANK.

	POSITION 1 STANDARD WAVE (B)	POSITION 2 SHORT WAVE (C)	POSITION 3 SHORT WAVE (D)
OSC. & INT. SECTION	5 6 7 8 9 10 11 12 1 2 3	5 6 7 8 9 10 11 12 1 2 3	5 6 7 8 9 10 11 12 1 2 3
ANT. SECTION	5 6 7 8 9 10 11 12 1 2	5 6 7 8 9 10 11 12 1 2	5 6 7 8 9 10 11 12 1 2

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.

C1 .250 mmf.
C2 2-25 mmf.
C3 2-25 mmf.
C4 2-25 mmf.
C5 .05 mf. 180 V.
C6 2-25 mmf.
C7 2-25 mmf.
C8 2-25 mmf.
C9 .35 mmf.
C10 .25 mf. 180 V.
C11 70-150 mmf. } ONE
C12 70-150 mmf. } UNIT
C13 .05 mf. 180 V.
C14 20.0 mf. 150 V. Electrolytic
C15 .25 mf. 180 V.
C16 70-150 mmf. } ONE
C17 70-150 mmf. } UNIT
C18 .50 mf. 180 V.
C19 .85 mf. 180 V.
C20 .05 mf. 180 V.
C21 50 mmf.
C22 40-100 mmf.
C23 .05 mf. 180 V.
C24 100 mmf.
C25 50 mmf.
C26 .002 mf. 600 V.
C27 250 mmf.
C28 .01 mf. 180 V.
C29 .05 mf. 240 V.
C30 20.0 mf. 150 V. Electrolytic
C31 .25 mf. 180 V.
C32 .05 mf. 180 V.
C33 .25 mf. 180 V.
C34 .25 mf. 180 V.
C35 .25 mf. 180 V.
C36 .50 mf. 180 V.
C37 .35 mmf.
C38 300-600 mmf. } ONE
C39 40-100 mmf. } UNIT
C40 2-25 mmf.
C41 2-25 mmf.
C42 1400 mmf.
C43 2-25 mmf.
C44 .25 mf. 18 V.
R 1 100,000 ohm .2 W.
R 2 60,000 ohm .2 W.
R 3 1 megohm .2 W.
R 4 100,000 ohm .2 W.
R 5 5,000 ohm .2 W.
R 6 10,000 ohm .5 W.
R 7 1,000 ohm .2 W.
R 8 60,000 ohm .2 W.
R 9 3 megohm .2 W.
R10 1 megohm Vol. Control
R11 1 megohm .2 W.
R14 3 megohm .2 W.
R16 500,000 ohm .2 W.
R17 150,000 ohm Tone Control
R12 12.5 ohm 1.0 W. } ARMORED
R13 12.5 ohm 1.0 W. } WIRE-WOUND
R15 70 ohm .50 W. } RESISTOR
R18 150 ohm 2.0 W. } RESISTOR
T 1 Ant. R. F. Trans.
T 2 Interstage R. F. Trans.
T 3 1st I. F. Trans.
T 4 2nd I. F. Trans.
T 5 3rd I. F. Trans.
T 6 Push Pull Input Trans.
T 7 Osc. Inductors
L 1 Single Filament Reactor
L 2 | Double Filament
L 3 | Reactor
L 4 "B" Choke
L 5 "B" Choke
L6, L7, L8 & L9 Genemotor Windings
L10 "A" Choke
L11 "A" Choke
L12 Osc. Tracking Coil

Nov., 1935

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 4800, 4200, 16,000, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I.F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a 0.1 mf. condenser to the switch end of condenser C9—see Fig. 2. There is a lead which goes to the lug on the top of the center stator section of the tuning condenser—see Fig. 4. The connection can be made at this lug.

Connect the ground lead of the receiver to the ground post of the signal generator

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A.V.C.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 4.

RANGE B ALIGNMENT

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C43) until maximum output is obtained. The location of this trimmer is shown in Fig. 5.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

Adjust the interstage Range B trimmer (C6) and antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of the greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Be sure to use a non-metallic screwdriver for this adjustment.

RANGE C ALIGNMENT

4800 KC Adjustment

Set the signal generator for 4800 KC.

Connect the antenna lead of the receiver through a 400-ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position (1st short wave band — green dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range C trimmer (C41) until maximum output is obtained. See Fig. 3 for location of this trimmer.

4200 KC Adjustment

Set the signal generator for 4200 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range C trimmer (C7) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

RANGE D ALIGNMENT

16,000 KC Adjustment

Set the signal generator for 16,000 KC.

Keep the antenna lead of the receiver connected through the 400-ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range D trimmer (C40) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C8) and antenna Range D trimmer (C4) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of the greatest intensity is obtained.

Then go back and repeat the procedure as given for the 16,000 KC adjustment. If it is found necessary to make any appreciable change in the settings of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

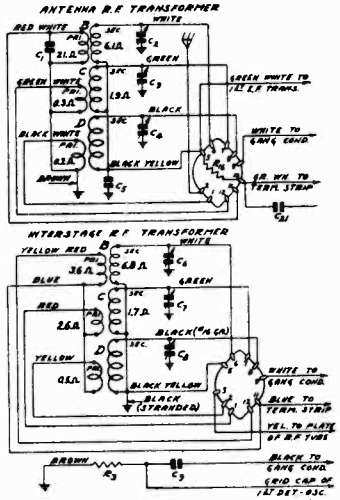
Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.



REPLACING DRIVE CORD

Remove the chassis from the cabinet. Take off the station pointer by removing the screw at the center of dial. Loosen the two set screws in the collar on the band selector switch shaft. Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis and one screw at the top which secures this assembly to the bracket. Pull the dial assembly forward until the collar is free of the band selector shaft; and lay the assembly face downward in front of the chassis.

Turn the dial drum until the opening in this drum is approximately vertical and with the hole at the top. Remove the tension spring and the old drive cord. When replacing this drive cord a 30 pound test cord as regularly supplied by the factory should be used .

See that the eyelet is in the hole in the drive drum. Insert one end of the new drive cord from the outside through the hole in the eyelet in the drive drum. Tie the end of the cord, which has been inserted through the hole, to one end of the tension spring. Now wrap the cord in a counter clock-wise direction (facing the front of the chassis) around the drive drum for approximately one and one half turns, progressing towards the front. Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one half times around this shaft, progressing toward the back of the chassis. Wrap the cord on directly in line with the drive drum above. Then bring this cord up to the drive drum until it is up to the eyelet in the drive drum .

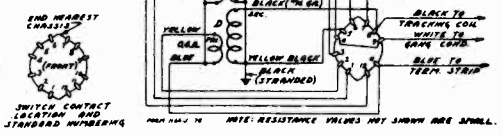
Now insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring when hanging free and with the slack taken out of the drive cord should be three eights or less from the flang of the drum. Cut off the surplus length of the cord after it has been knotted.

Now secure the other end of the tension spring over the spur on the drive drum. Turn the drive shaft back and forth several times.

Replace the dial assembly and pointer.

Replace the chassis in the cabinet.

Fig. 5—Color Coding of Coil Wires and D. C. Resistance of Windings. (Also see complete D. C. Resistance List Below)



MODELS 62-241, 62-244, 62-245, 62-252

MONTGOMERY-WARD & CO.

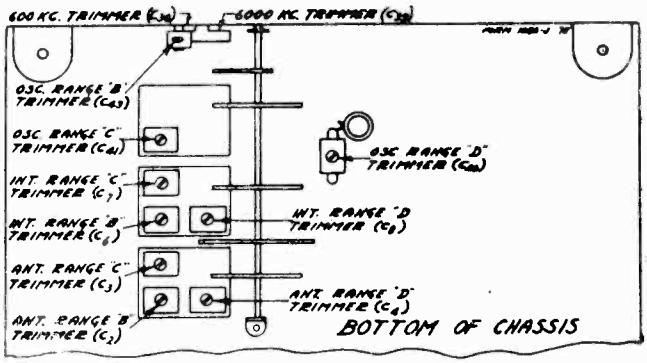


Fig. 3—Arrangement of Trimmers

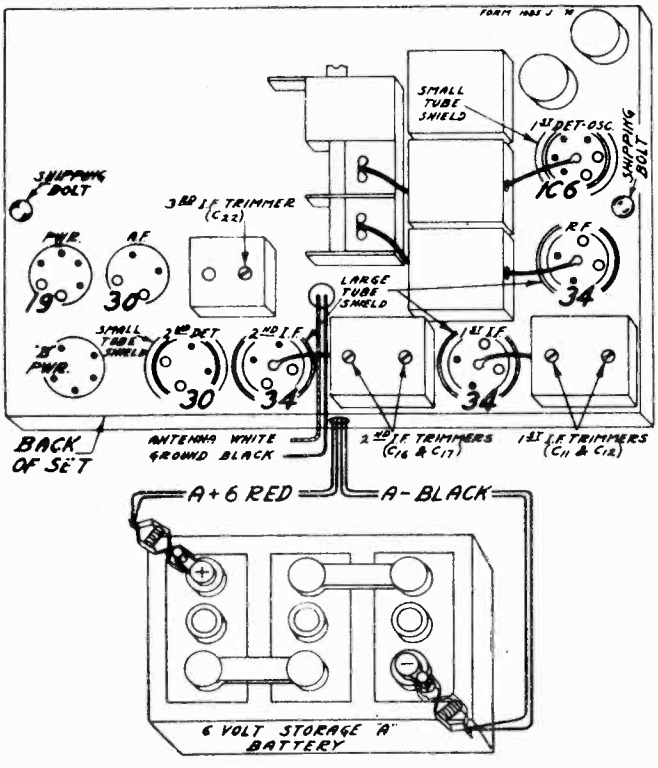


Fig. 4—Tube Arrangement and Battery Connections

VOLTAGES AT SOCKETS

Antenna Shorted to Ground—Battery 6 Volts under load
Volume Control at Maximum

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Bias Voltage (see Notes)	Normal Plate M. A.
34	R. F.	2.0	135	45	1.5(1)	1.7
1C6	1st Det.	2.0	135 80(2)	70	2.0(3)	3.2 1.7(2)
34	1st I. F.	2.0	135	45	1.5(1)	1.7
34	2nd I. F.	2.0	135	80	4.0(3)	3.2
30	2nd Det.	2.0				
30	1st A. F.	2.0	135		8.0(4)	2.3
19	Power	2.0	135		3.9(5)	2.3 (per plate)

(1) As read from negative filament leg to low potential end of resistor R12.
(2) Anode Grid
(3) As read from negative filament leg to ground.
(4) Total voltage drop from negative filament leg to ground and across R18.
(5) As read across R18.

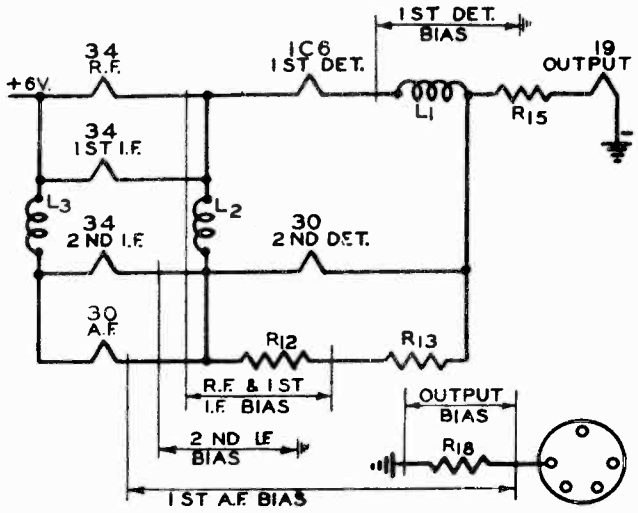


Fig. 6—Abridged Wiring Diagram showing Filament Wiring System and Points at which No-Signal Bias Voltages are obtained.

D. C. Resistance of Windings

Refer to Figs. 5 & 2

Following are the D. C. resistances of the various coil windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A419	Antenna R. F. Transformer	T1	
	Range B Primary Winding		21.0
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		1.9
	Range D Secondary Winding		Small
P-9A420	Interstage R. F. Transformer	T2	
	Range B Primary Winding		3.6
	Range C Primary Winding		2.6
	Range D Primary Winding		0.5
	Range B Secondary Winding		6.8
	Range C Secondary Winding		1.7
	Range D Secondary Winding		Small
P-9A421	Oscillator Coils	T	
	Range B Plate Coil		1.1
	Range C Plate Coil		1.0
	Range D Plate Coil		0.4
	Range B Grid Coil		3.8
	Range C Grid Coil		0.9
	Range D Grid Coil		Small
P-9A422	1st I. F. Transformer	T3	
	Primary Winding		11.4
	Secondary Winding		11.4
P-9A423	2nd I. F. Transformer	T4	
	Primary Winding		11.4
	Secondary Winding		11.4
P-9A424	3rd I. F. Transformer	T5	
	Primary Winding (either section)		8.4
	Secondary Winding		130.8
P-50X11	Audio Input Transformer	T6	
	Primary Winding		1005.0
	Secondary Winding		
	Center Tap to Inside		580.0
	Center Tap to Outside		630.0
*P-12A218	8 Inch Magnetic Speaker		
	Speaker Coil		
	Center Tap to Inside		275.0
	Center Tap to Outside		300.0
P-9A403	Single Filament Reactor	L1	.65
P-9A404	Double Filament Reactor (either section)	L2 & L3	.65
P-9A391	High Frequency Oscillator Tracking Coil	L12	0.7

*Speakers with other part numbers may have slightly different values of D. C. Resistance.

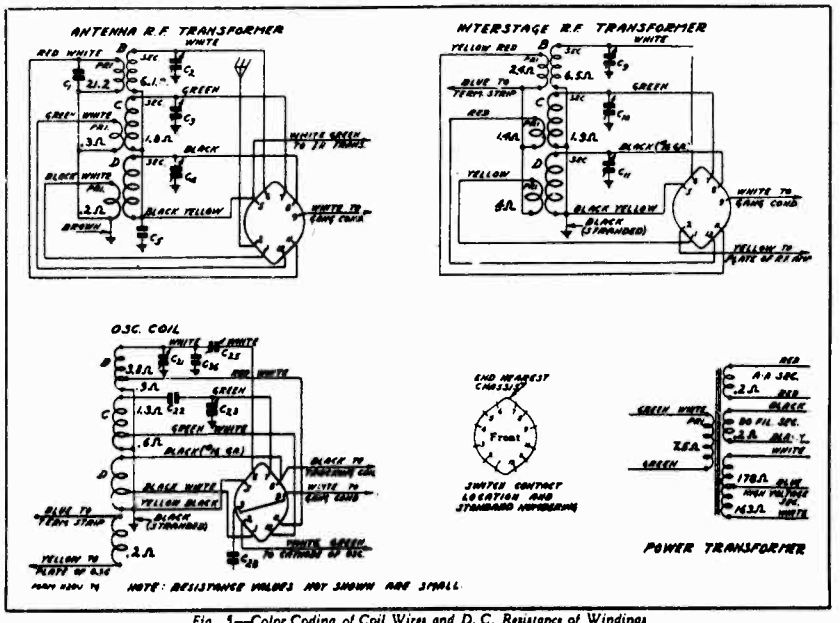


Fig. 5—Color Coding of Coil Wires and D. C. Resistance of Windings
(Also see complete D. C. Resistance List in this Manual)

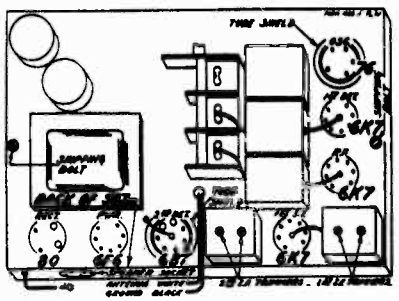


Fig. 6—Location of Tubes

VOLTAGES AT SOCKETS
Line Voltage, 115 - Volume Control at Maximum
Antenna Shorted to Ground

Type of Tube	Function	Heater or Filam't	Plate to Ground	Screen to Ground	Cathode to Ground	Plate M. A.
6K7 (6D6)	R. F.	6.1	230	95	3.0	6.4
6K7 (6D6)	1st Det.	6.1	230	100	9.0	3.2
76	Osc.	6.1	100			5.2
6K7 (6D6)	I. F.	6.1	230	120	3.0	9.
6B7	2nd Det.	6.1	55(1)	40		2.3
6F6 (42)	Power	6.1	215	230	17(2)	30.0
80	Rectifier	4.7				34. per plate

(1) As read with 500,000 ohm meter
(2) As read across R16

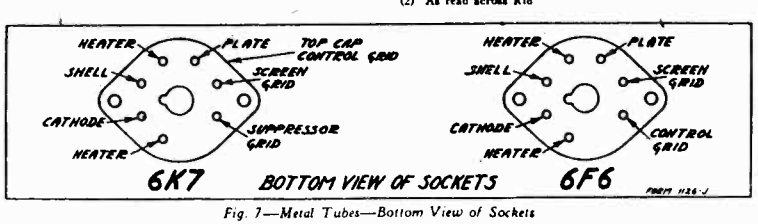


Fig. 7—Metal Tubes—Bottom View of Sockets

Servicing R. F. Coil Assemblies

The R. F. transformers and oscillator coil assemblies in this receiver are sold complete with can. This is due to the fact that the trimmers are soldered to the can, and cannot be easily disassembled.

The lead colors and resistances of the various windings in each assembly are shown in Fig. 5.

If it is ever necessary to remove one of coil assemblies from the can, proceed as follows: First remove the nuts from the screws at the top of the can. The outside lug on the trimmer condenser is inserted in a slot in the coil can, and this lug is soldered into position.

Apply a soldering iron to the can at the point of the soldered connection. Then with a screw driver lift up on the outside edge of the trimmer (edge soldered to can) until the trimmer is clear of the can. After the trimmers are all unsoldered, the coil can be taken out.

Tuning Frequency Range

B Range	535 to 1730 KC.
C Range	1715 to 5800 KC.
D Range	5750 to 18300 KC.

Sensitivity

B Range Average	0.5 Microvolts Absolute
C Range Average	1.0 Microvolts Absolute
D Range Average	2.0 Microvolts Absolute

Power Consumption 68 Watts (At 115 volts 60 cycles)

Power Output - - - - - - 3 Watts Undistorted

Selectivity - 28 KC Broad at 1000 times Signal (Sharp)

Intermediate Frequency - - - - - - - 456 KC.

Speaker - - - - - - - - - 6" and 8" Dynamic

A standard arrangement for switch contact location numbering has been adopted. This numbering is illustrated in Fig. 5. In contact locations not used, the number applying to that particular location is not employed.

Changes in Early Models

In the early models of this receiver, the antenna transformer (T1) had two Range B Primary windings as shown in Fig. 8.

The oscillator Range B and C trimmer locations varied in the early and intermediate models of this receiver as shown in Figs. 3 and 4.

Referring to Fig. 2, in the early models of this receiver, contact No. 4 in the interstage section of the band selector was not used. The purpose of this contact arrangement is to short out variable resistor R2 in the second short wave position. In these models the relative positions of resistors R1 and R2 were reversed. The common connection from the suppressor grid and cathodes of the R. F. and I. F. amplifier tubes was connected to the control arm of variable resistor R2. The latter was connected to resistor R1 which was grounded at the other end. The by-pass condenser C6 remains connected as before, to the cathode and suppressor grid connection.

The type 6K7 and 6F6 metal tubes replace the types 6D6 and 42 glass tubes respectively which were used in the early models.

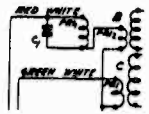


Fig. 8—Antenna Transformer in Early Models

Phonograph Connections

Phonograph connections can be made as shown in Fig. 9. The parts required are shown in the parts list. Knockouts are provided in the back panel of the chassis for mounting the phono jack and phono switch—See Fig. 10.

For mounting the 12 mfd. 25 volt dry electrolytic condenser, two No. 27 drill holes should be drilled in the side of the chassis directly below the wet electrolytic condensers. These holes are 1¼" from the bottom, ⅞" and 3¼" from the front of chassis. The ground lug which extends out from the side of the chassis should be bent back into the chassis wall.

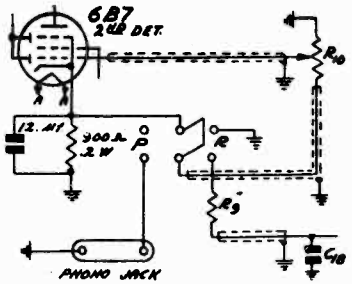


Fig. 9—Phonograph Connections

Replace the single lug insulated terminal strip (located on the rear panel, directly in back of the band selector switch) with (P-4A39) double lug insulated terminal strip with ground lug. Be sure to solder back to this new terminal strip any leads that were connected to the other terminal strip.

The connections are made by opening the diode return circuit at the volume control. Unsolder the 50,000 ohm resistor R9 (covered with saturated sleeving in early models) from the lug at the volume control and from the shielded lead which runs from the I. F. transformer. Cut this shielded lead to length and connect to the open lug on the new terminal strip. Connect one side of the 50,000 ohm resistor R9 to the same lug and the other side to the phono switch—see Fig. 9. Ground the shield to the ground lug of the terminal strip.

The extra shielded lead which is provided should be inserted into a piece of saturated sleeving.

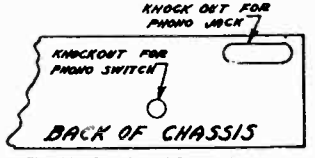
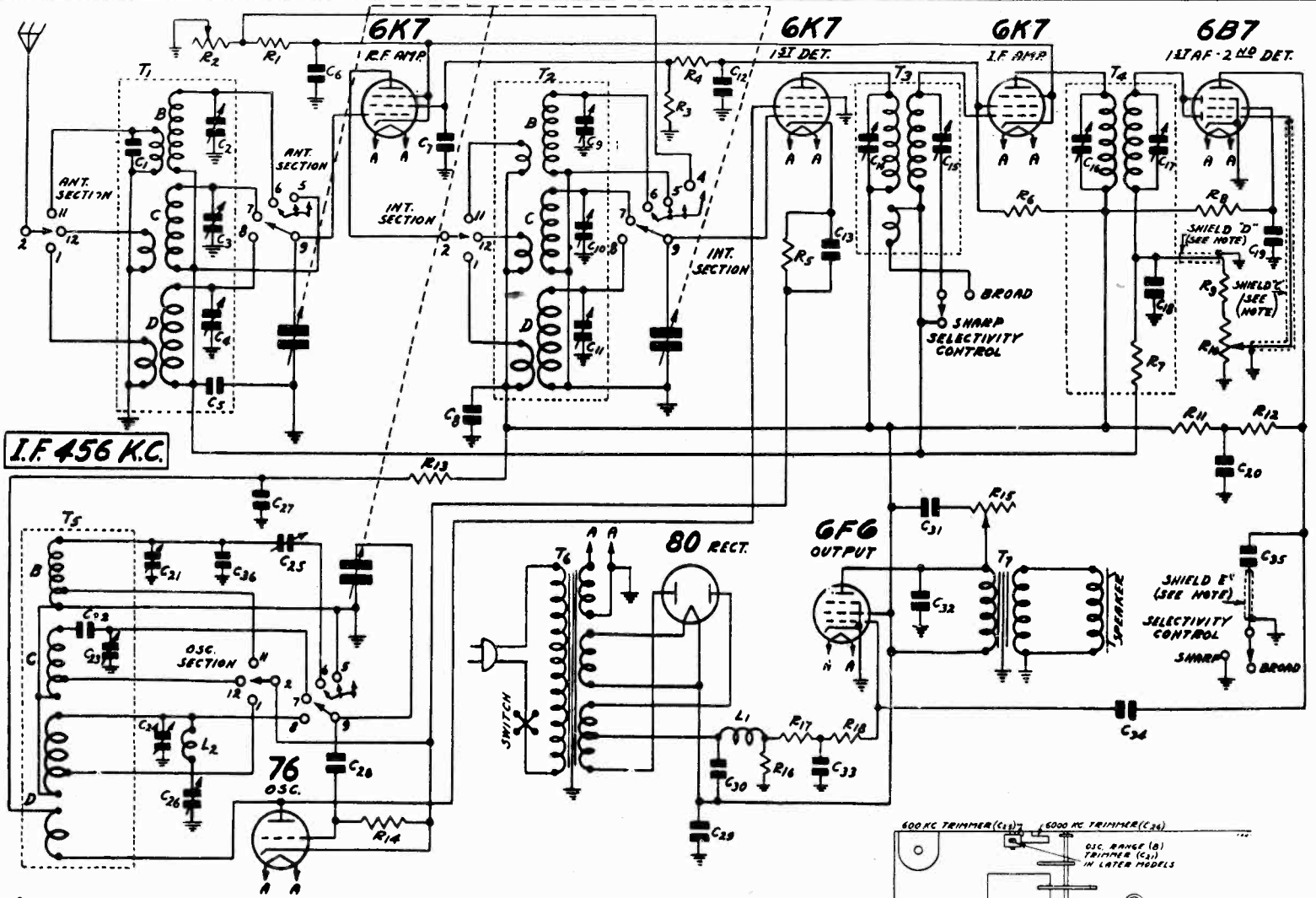


Fig. 10—Location of Phono Knockouts

C 1	250 mmf.
C 2	2-25 mmf.
C 3	2-25 mmf.
C 4	2-25 mmf.
C 5	.05 mf. 180 V.
C 6	.25 mf. 180 V.
C 7	.05 mf. 240 V.
C 8	.10 mf. 360 V.
C 9	2-25 mmf.
C10	2-25 mmf.
C11	2-25 mmf.
C12	.25 mf. 240 V.
C13	.05 mf. 180 V.
C14	70-150 mmf. } ONE
C15	70-150 mmf. } UNIT
C16	70-150 mmf. } ONE
C17	150-250 mmf. } UNIT
C18	50 mmf.
C19	.25 mf. 360 V.
C20	.25 mf. 360 V.
C21	2-25 mmf.
C22	1400 mmf.
C23	2-25 mmf.
C24	2-25 mmf.
C25	300-600 mmf. } ONE
C26	40-100 mmf. } UNIT
C27	.10 mf. 360 V.
C28	35 mmf.
C29	18 mf. 300 V.
C30	14 mf. 400 V.
C31	.05 mf. 600 V.
C32	.002 mf. 600 V.
C33	.03 mf. 180 V.
C34	.01 mf. 480 V.
C35	.004 mf. 600 V.
R 1	150 ohm .2 W.
R 2	2500 ohm } Dual Vol.
R10	500000 ohm } Control
R 3	30000 ohm .5 W.
R 4	6000 ohm .5 W.
R 5	2500 ohm .2 W.
R 6	16000 ohm 2.0 W.
R 7	2.0 Megohm .2 W.
R 8	300000 ohm .5 W.
R 9	50000 ohm .2 W.
R11	20000 ohm .2 W.
R12	60000 ohm .5 W.
R13	25000 ohm 1.0 W.
R14	80000 ohm .2 W.
R15	150000 Tone Cont.
R16	235 ohm 2.0 W.
R17	100000 ohm .2 W.
R18	500000 ohm .2 W.
T 1	Antenna R.F. Trans.
T 2	Interstage R.F. Trans
T 3	1st. I.F. Trans.
T 4	2nd I.F. Trans.
T 5	Osc. Inductors
T 6	Power Trans.
T 7	Output Trans.
L 1	Speaker Field
L 2	Osc. Tracking Coil



GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.

THE CAPACITY OF SHIELD "C" "D" AND "E" IS 50 MMF EACH.

ARROWS INDICATE CONNECTIONS PRESENT IN BAND SWITCH WHEN IN POSITION SHOWN.

	POSITION 1 STANDARD WAVE (B)	POSITION 2 SHORT WAVE (C)	POSITION 3 SHORT WAVE (D)
ANT. & OSC. SECTION	5 6 7 8 9 11 12 1 2	5 6 7 8 9 11 12 1 2	5 6 7 8 9 11 12 1 2
INT. SECTION	4 5 6 7 8 9 11 12 1 2	4 5 6 7 8 9 11 12 1 2	4 5 6 7 8 9 11 12 1 2

CONTACT LOCATIONS 3, 4 AND 10 IN ANT. AND OSC. SECTIONS AND 3 AND 10 IN INT. SECTION ARE BLANK.

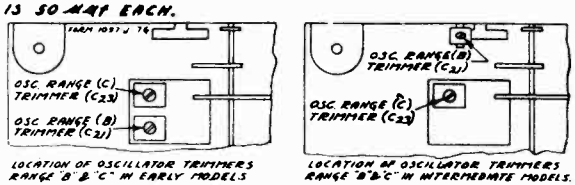


Fig. 4—Oscillator Trimmer Location

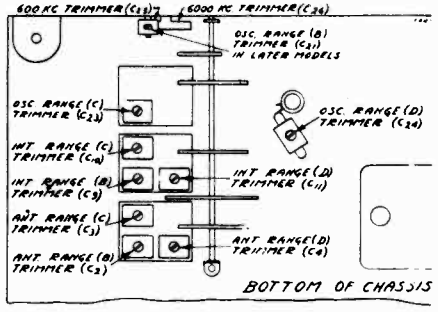


Fig. 3—Location of Trimmers (Latest Models)

Circuit

This model is a three band receiver with a tuning range in each band as shown in the specifications above. Three band coverage is accomplished by means of three sets of R. F. and oscillator coils and a three section triple throw switch.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R. F. transformer assemblies and T5 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively. The three sections of the band switch are designated in the schematic as the antenna, interstage and oscillator sections.

The band switch completes connections to the coils in use. It also short circuits the R. F. transformer secondary and oscillator coil of lower frequency not in use.

The antenna transformer with tuned secondary feeds into a type 6K7 R. F. amplifier tube. The output of this tube is fed through the interstage R. F. transformer with tuned secondary into another 6K7 tube which functions as the 1st detector.

A separate type 76 tube is employed in the oscillator circuit. Referring to the oscillator assembly T5, Fig. 2, B, C and D refer to the standard wave, 1st short wave and 2nd short wave oscillator coils respectively. The oscillating circuit is always resonant at 456 KC above the frequency to which the R. F. amplifier is tuned.

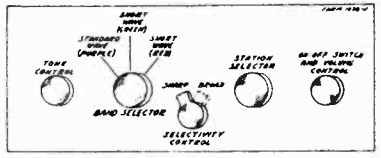


Fig. 1—Arrangement of Controls

The oscillator potential is fed into the cathode circuit of the 6K7 first detector tube. This results in the intermediate or beat frequency of 456 KC being present in the plate circuit of this tube.

One stage of I. F. amplification is employed using a 6K7 tube. The primaries and secondaries of the first and second I. F. transformers are tuned by small trimmer condensers.

Selectivity Control—Referring to the 1st I. F. transformer T3 in Fig. 2, it will be noted that there is a coupling winding shown in the illustration below the primary. Refer also to the by-pass arrangement in the pentode plate circuit of the 6B7.

When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and secondary of this transformer results in high selectivity. High audio frequencies are by-passed to ground through condenser C35.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

In order to allow passage of the higher audio frequencies in the broad position, the capacity of the by-pass condenser to ground is greatly reduced (C35 and the capacity of shield E in series).

Dual Volume Control—A dual manual volume control is employed. In one section the audio voltage applied to the 1st audio section of the 6B7 tube is varied (R10). In the other section the R. F. and I. F. bias is varied (R2). The purpose of the latter section is to reduce the sensitivity of the receiver at low volume settings in order to cut down noise pick-up between stations. The variable section R2 is shorted out through contact No. 4 of the interstage section of the band selector when in the 2nd short wave position.

A type 6B7 duo diode pentode tube functions as the second detector and a one stage audio amplifier. The two diode plates are connected together. AVC voltage is applied through isolating resistors to the control grid circuits of the R. F. and I. F. tubes. The audio voltage developed across volume control resistor R10 is applied through the movable arm to the control grid of the 6B7 tube. Resistance coupling is used between the first audio stage and the output stage which employs a type 6F6 output pentode tube. A type 80 full wave rectifier tube is used in the power unit.

Alignment and Calibration

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the selectivity switch to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A.V.C.

Then adjust the four I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 6.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C21) until maximum output is obtained. The location of this trimmer is shown in Figs. 3 and 4.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

There is a lever arm in front of the large gear on the tuning condenser shaft by means of which the position of the station pointer may be adjusted. Set the station pointer at the 1500 KC mark on the dial scale by adjusting this lever arm.

Adjust the interstage Range B trimmer (C9) and antenna Range B trimmer (C2) to maximum.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position (1st short wave band—green dial color).

Adjust the oscillator Range C trimmer (C23) until maximum output is obtained. See Figs. 3 and 4 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range C trimmer (C10) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

Adjust the oscillator Range D trimmer (C24) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C11) and antenna Range D trimmer (C4) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

General Service Data

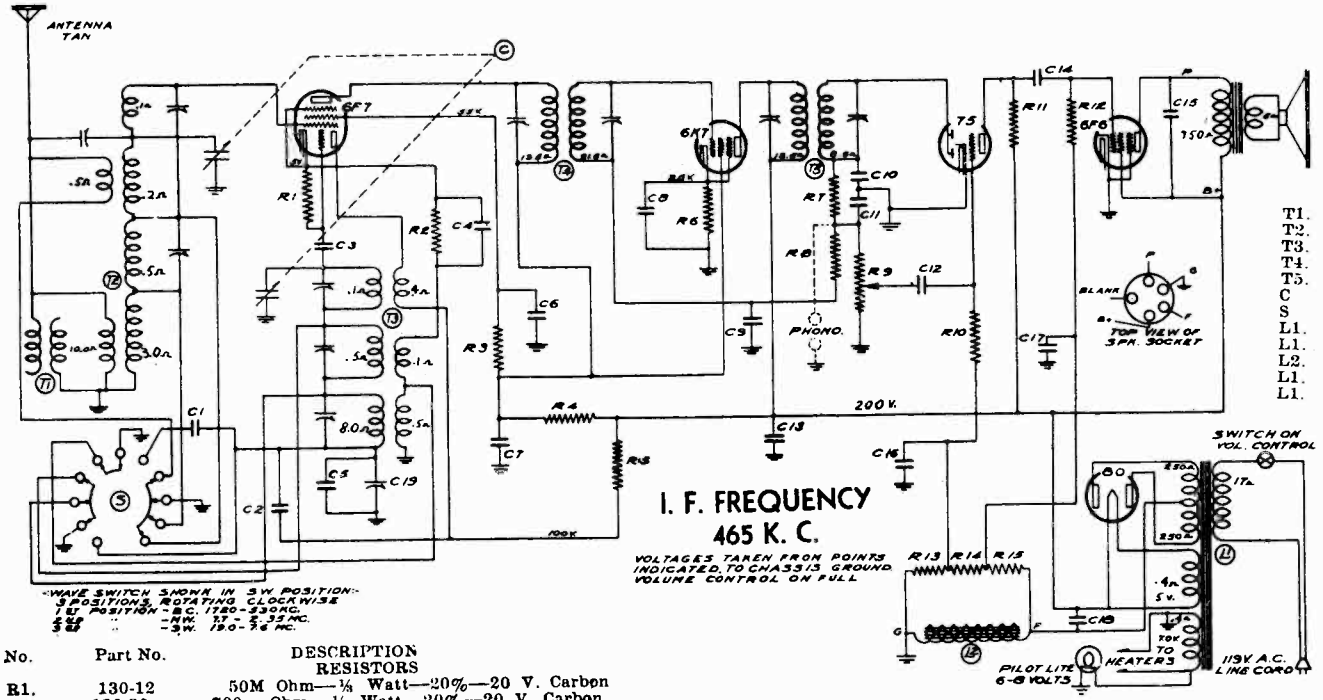
D. C. Resistance of Windings

Refer to Fig. 5.

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Item	Code	D. C. Resistance in Ohms
9A376	Antenna Transformer	T1	
	Range B Primary Winding		21.2
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
9A377	R. F. Inter-stage Transformer	T2	
	Range B Primary Winding		2.4
	Range C Primary Winding		1.4
	Range D Primary Winding		0.7
	Range B Secondary Winding		6.0
	Range C Secondary Winding		1.9
	Range D Secondary Winding		Small
9A378	Oscillator Coils	T5	
	Range B Grid Coil		
	Red White Tap to White		3.8
	Red White Tap to Ground		0.9
	Range C Grid Coil		
	Green White Tap to Green		1.3
	Green White Tap to Ground		0.6
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
	Oscillator Plate Coil		0.2
9A379	1st I. F. Transformer	T3	
	Primary Winding		11.6
	Secondary Winding		
	Long Portion		11.4
	Short Portion		0.5
9A380	2nd I. F. Transformer	T4	
	Primary Winding		14.3
	Secondary Winding		4.4
*12A223	Dynamic Speaker (8")	L1	
	Output Transformer Primary Winding	T7	510.
	Output Transformer Sec. Winding	T7	1.0
	Speaker Field		1025.
	Speaker Voice Coil		4.1
	Speaker Bucking Coil		0.2
53X91	115 Volt 60 Cycle Power Transformer	T6	
	Primary Winding		7.5
	Tube Filament Winding (A-A)		0.2
	80 Filament Secondary		0.2
	High Voltage Secondary Winding		
	Center Tap to Inside		163.
	Center Tap to Outside		178.
9A391	High Frequency Oscillator Tracking Coil	L2	1.1

*Speakers with other part numbers may have slightly different values of D. C. resistance.



MISCELLANEOUS

T1.	Antenna Choke Coil
T2.	Antenna Coil
T3.	Oscillator Coil
T4.	Input I.F. Transformer
T5.	Output I.F. Transformer
C	Two Gang Variable Cond.
S	Wave Change Switch
L1.	Power Transformer 50/60 Cycle
L1.	Power Transformer 25 Cycle
L2.	Speaker—Field Resistance 1550 Ohms
L1.	Power Trans. Universal 50/60 Cycle
L1.	Power Trans. Universal 25 Cycle.

No.	Part No.	DESCRIPTION
		RESISTORS
R1.	130-12	50M Ohm—⅛ Watt—20%—20 V. Carbon
R2.	130-39	700 Ohm—⅛ Watt—20%—20 V. Carbon
R3.	130-20	100M Ohm—⅛ Watt—20%—50 V. Carbon
R4.	130-44	25M Ohm—½ Watt—20%—150 V. Carbon
R5.	130-42	20M Ohm—½ Watt—20%—100 V. Carbon
R6.	130-32	250 Ohm—⅛ Watt—20%—10 V. Wire Wound
R7.	130-12	50M Ohm—⅛ Watt—20%—20 V. Carbon
R8.	130-3	500M Ohm—⅛ Watt—20%—100 V. Carbon
R9.	101-18	500M Ohm Volume Control
R10.	130-19	1 meg Ohm—⅛ Watt—20%—100 V. Carbon
R11.	130-11	250M Ohm—⅛ Watt—10%—100 V. Carbon
R12.	130-11	250M Ohm—⅛ Watt—10%—100 V. Carbon
R13.	130-48	15M Ohm—⅛ Watt—10%—20 V. Carbon
R14.	130-47	180M Ohm—⅛ Watt—10%—100 V. Carbon
R15.	130-46	800M Ohm—⅛ Watt—10%—100 V. Carbon
		CONDENSERS
C1.	129-23	.002 Mica—MW—5%
C2.	100-20	.1 x 120 V.—25%
C3.	129-5	.0001 Mica—MT—20%
C4.	100-20	.1 x 200 V.—25%
C5.	129-24	.00038—MT—5%
C6.	118-1	.1x 200 V.—Dual Plus 50%; Minus 10%
C7.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C8.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C9	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C10.	129-51	.000125—Mica MT—20%
C11.	129-51	.000125—Mica MT—20%
C12.	100-22	.05 x 200 V.—25%
C13.	103-7	.8 mfd. x 300 V. Electrolytic
C14.	100-11	.01 x 400 V.—25%
C15.	100-19	.006 x 600 V.—25%
C16.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C17.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C18.	103-6	.8 mfd. x 350 V. Electrolytic
C19.	124-5	B. C. Series Pad J-3-S.

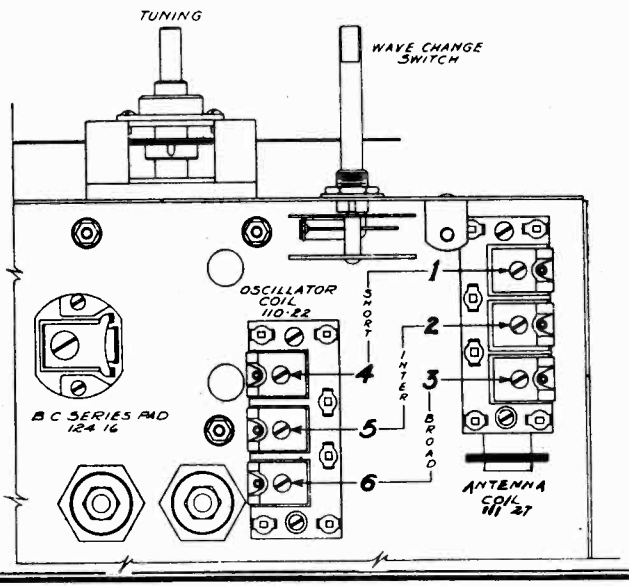
TUNING RANGE—

Standard Broadcast Band
530-1720 Kilocycles.

Intermediate Band
2350-7700 Kilocycles.

Short Wave Band
7.6-19.0 Megacycles.

BOTTOM VIEW OF CHASSIS



DESCRIPTION

The Tube complement of this chassis is as follows:

1 Type 6K7—triode pentode as oscillator and first detector.
1 Type 6K7—remote cut-off pentode as I.F. amplifier.
1 Type 75—duplex diode triode as diode detector, A.V.C. and A.F.
1 Type 6F6—pentode output tube.
1 Type 80—high vacuum rectifier.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 40 and 60 cycles and with primary taps for 108, 125, 150, 220 and 250 volts (see instructions) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagrams.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 119 volts on the primary of the power transformer.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

ALIGNING INSTRUCTIONS

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the three bolts by which it is fastened and the speaker plug which you will find on the front flange of the chassis panel.

Aligning I. F. Transformers

1. With volume control full on, the extreme right of its rotation, and with wave changing switch in the broadcast position, extreme left of its rotation, and with variable condenser at its minimum capacity position, plates entirely out of mesh, adjust the I.F. transformers (two adjustments at the top of parts number 108-38 and 108-40—see top view).
   (a) Connect external oscillator which has been adjusted to 455 kilocycles in series with I.F. dummy antenna, to the control grid cap of the type 6K7 tube and chassis ground. Adjust output I.F. transformer, part number 108-40, to resonance.
   (b) Move generator output clip from grid of 6K7 to grid cap of type 6F7 tube and align input I.F. transformer, part number 108-38.
   (c) With generator connected to grid of type 6F7 tube, readjust output I.F. transformer, part number 108-40, to resonance.

Broadcast Band Alignment—
(540 - 1720 Kilocycles)

1. With wave changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with broadcast dummy antenna to tan antenna and black ground leads and make the following adjustments:
   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance, for location of this adjustment, number 6, see diagram.
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. For location of this adjustment, number 3, see diagram.

5-Tube 3-Band Superheterodyne with Avc.

   (c) Re-set external oscillator to 600 kilocycles and adjust series pad to resonance, rotate condenser and move dial pointer to 600 kilocycles by gently rocking condenser to and fro. Pick up oscillator signal while adjusting series pad to resonance, maximum deflection on an output meter. This adjustment is accessible from the top of the chassis and is located between variable condenser and power transformer, see top view—part number 124-16.
   (d) Check for tracking and sensitivity at 1000 kilocycles.

NOTE (Series "B", "C" and "D" only)
25 Cycle Chassis differ only from 60 cycle chassis in that part number 104-18 transformer is used in place of 50/60 cycle transformer, part number 104-14.

Short Wave Band Alignment—
(7.6 - 19.0 Megacycles)

1. This band is aligned after the I.F. adjustments have been completed. Set wave changing switch to short wave position, extreme right of its rotation, set dial pointer to 18 megacycles.
   (a) With external oscillator adjusted to 18 megacycles and connected in series with short wave dummy antenna to tan antenna and black ground leads, adjust the oscillator short wave trimmer until generator signal is picked up. For location of this adjustment, number 4, see diagram.
   (b) Adjust short wave antenna trimmer to resonance. For location of this adjustment, number 1, see diagram.
   (c) Re-set external oscillator to 9 megacycles, rotate condenser, move dial pointer to 9 megacycles and check for tracking and sensitivity. Do not bend plates. NOTE: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Intermediate Band Alignment—
(2.35 - 7.7 Megacycles)

1. With wave changing switch in center position, and with dial pointer set to 7 megacycles, make the following adjustments:
   (a) With external oscillator set at 7 megacycles and connected in series with short wave dummy antenna, as for short wave adjustments, adjust trimmer of oscillator coil, part number 110-22 until 7 megacycle signal is picked up. For location of this adjustment, number 5, see diagram.
   (b) Adjust antenna trimmer to resonance, adjustment number 2, see diagram.
   (c) Re-set external oscillator to 2.5 megacycles (2500 kilocycles), rotate variable condenser, move pointer, pick up oscillator signal and check for tracking and sensitivity. NOTE: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

LIST OF REPAIR PARTS

Parts Used in Ser. A	Parts Used in Ser. B	Parts Used in Ser. C-D	DESCRIPTION	Not Used in Set	List Price Each
			CONDENSERS		
100-11	100-11	100-11	.01 x 400V—25%	1	$0.25
100-15	100-15	100-15	.015 x 400V—Plus 10%; Minus 20%	1	.25
100-19	100-19	100-19	.006 x 600V—25%	1	.25
100-20	100-20	100-20	.1 x 120V—25%	4	.25
Not Used	100-22	100-22	.05 x 200—25%	1	.25
Not Used	103-6	103-6	8 Mfd. x 450V Electrolytic	1	.85
Not Used	103-7	103-7	8 Mfd. x 300V Electrolytic	1	.75
118-1	118-1	118-1	Dual .1 x 200V—Plus 50%; Minus 10% (Series B & C use 3 per set)	1	.50
119-11	Not Used	Not Used	4-8-4 Mfd. Electrolytic	1	2.00
119-13	Not Used	Not Used	8-8-4 Mfd. Electrolytic (For 25 Cy. Only	1	2.50
120-2	120-2	120-2	.0005 Mica—MT—20%	2	.25
120-5	120-5	120-5	.0001 Mica—MT—20%	1	.25
120-15	120-15	Not Used	.00035 Mica—MT—5%	1	.35
120-16	120-16	Not Used	.002N7 Mica—MW—5%	1	.35
Not Used	Not Used	120-23	.002 Mica—MW—5%	1	.35
Not Used	Not Used	120-24	.000425 Mica—MT—5%	1	.25
			RESISTORS		
130-3	130-3	130-3	500M Ohm—1/3 Watt—20%—100V—Carbon	1	.20
130-11	130-11	130-11	250M Ohm 1/3 Watt—20%—30V—Carbon	1	.20
130-12	130-12	130-12	50M Ohm—1/3 Watt—20%—20V—Carbon	1	.20
130-19	130-19	130-19	1 Meg Ohm—1/3Watt—20%—100V—Carbon	1	.20
130-20	130-20	130-20	100M Ohm—1/3 Watt—20%—30V—Carbon	1	.20
Not Used	130-32	130-32	250 Ohm—1/3 Watt—20%—10V—Wire W.	1	.20
130-38	Not Used	Not Used	2 Meg Ohm—1/3 Watt—20%—20V—Carbon	1	.20
130-39	130-39	130-39	700 Ohm—1/3 Watt—20%—20V—Carbon	1	.20
130-40	Not Used	Not Used	19M Ohm—1/2 Watt—20%—150V—Carbon	1	.20
130-41	Not Used	Not Used	800 Ohm—1/3 Watt—20%—20V—Carbon	1	.20
130-42	130-42	130-42	20M Ohm—1/2 Watt—20%—100V—Carbon	1	.20
Not Used	130-44	130-44	25M Ohm—1/2 Watt—20%—150V—Carbon	1	.20
Not Used	130-46	130-46	800M Ohm—1/5 Watt—10%—100V—Carbon	1	.20
Not Used	130-47	130-47	180M Ohm—1/5 Watt—10%—100V—Carbon	1	.20
Not Used	130-48	130-48	15M Ohm—1/5 Watt—10%—20V—Carbon	1	.20
			POWER TRANSFORMERS		
104-14	104-14	104-14	50/60 Cycle Power Transformer	1	3.00
104-17	104-17	104-17	Universal Power Trans.—40 Cy. Primary	1	5.00
104-18	104-18	104-18	25 Cycle Power Transformer	1	4.00

			COILS		
Not Used	105-9	Not Used	Antenna Choke Coil	1	.50
Not Used	Not Used	105-10	Antenna Choke Coil	1	.50
108-26	108-26	Not Used	Input I. F. Transformer Complete	1	1.50
108-27	Not Used	Not Used	Output I. F. Transformer Complete	1	1.50
Not Used	108-28	Not Used	Output I. F. Transformer Complete	1	1.50
Not Used	Not Used	108-38	Input I. F. Transformer Complete	1	1.50
Not Used	Not Used	108-40	Output I. F. Transformer Complete	1	1.50
110-13	Not Used	Not Used	Oscillator Coil Complete	1	2.50
Not Used	110-14	Not Used	Oscillator Coil Complete	1	2.50
Not Used	Not Used	110-22	Oscillator Coil Complete	1	2.50
111-17	Not Used	Not Used	Antenna Coil Complete	1	2.25
Not Used	111-18	Not Used	Antenna Coil Complete	1	2.25
Not Used	Not Used	111-27	Antenna Coil Complete	1	2.25
			SOCKETS		
121	121	121	Four Prong Socket—Type 80	1	.10
121	121	121	Five Prong Socket—Speaker	1	.10
121	121	121	Six Prong Socket—Type 42	1	.10
121	121	121	Six Prong Socket—Type 75	1	.10
121	121	121	Six Prong Socket—Type 6D6	1	.10
121	121	121	Seven Prong Socket—Type 6F7	1	.10
			MISCELLANEOUS		
101-18	101-18	101-18	Volume Control	1	1.35
102-12	102-12	102-12	Two Gang Variable Condenser	1	3.00
106-18	Not Used	Not Used	Metal Clad Resistor	1	.50
107-5	107-5	107-5	Line Cord	1	.50
112-15	112-15	112-15	Crystal	1	.12
112-16	112-16	112-16	Pointer	1	.06
112-19	112-19	112-19	Drive Disc Complete	1	.40
112-26	112-26	112-26	Planetary Drive Complete	1	1.25
112-31	112-31	112-31	Compression Spring	1	.05
112-40	112-40	112-40	Pilot Light Bracket	1	.10
112-62	112-62	112-62	Drive Bracket Assembly	1	.50
112-66	112-66	112-66	Bakelite Escutcheon with Glass	1	.60
112-64	Not Used	Not Used	Dial Scale	1	.25
Not Used	112-64B	112-64B	Dial Scale	1	.25
115-22	115-22	115-22	Tube Shield	2	.15
116-5	116-5	116-5	Pilot Light Bulb—6-8 Volt—T50	1	.10
124-16	124-16	124-16	Type J-2-S Padder	1	.25
125-6	125-6	125-6	Wave Change Switch	1	.75
131-2	131-2	131-2	Bakelite Knobs	2	.15
131-10	131-10	131-10	Bakelite Knob (3 Dots)	1	.20
114-15	Not Used	Not Used	Six Inch Speaker	1	6.00
Not Used	114-15	114-15	Six Inch Speaker Midget Cabinet	1	6.00 5.00

All resistors are RMA color coded—specify value and/or resistor number (per schematic diagram) and model number.

When ordering condensers, specify part number, model number and/or capacitor (per schematic diagram) and model number.

All prices quoted are list and are subject to the usual trade discounts. Prices subject to change without notice.

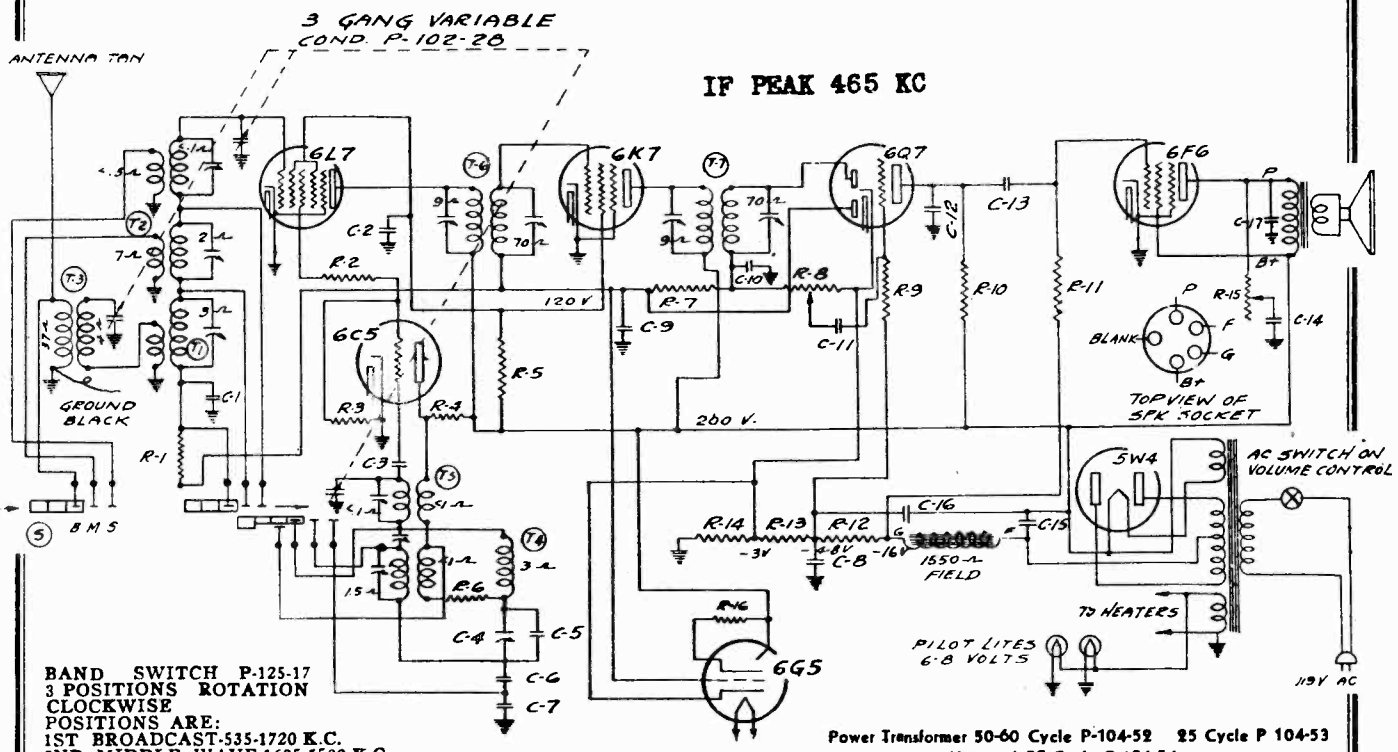
Shipments are F.O.B. our Factory. When remitting in advance, please include postage.

We cannot supply speaker cones only. We can replace a speaker on which the cone has been damaged for $1.50, if defective speaker is returned.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MONTGOMERY-WARD & CO.

MODELS 62-249, 62-317



BAND SWITCH P-125-17
3 POSITIONS ROTATION CLOCKWISE
POSITIONS ARE:
1ST BROADCAST-535-1720 K.C.
2ND MIDDLE WAVE-1695-5500 K.C.
3RD SHORT WAVE-5.2M.C.-18.3M.C.

Power Transformer 50-60 Cycle P-104-52 25 Cycle P 104-53
Universal 25 Cycle P-104-54
Universal 40 Cycle P-104-55

BAND	DIAL SCALE	FREQUENCY RANGE
Broadcast	Outer Scale —Blue	535 to 1720 K.C. (Kilocycles)
Middle Wave	Center Scale—Green	1695 to 5500 K.C. (Kilocycles)
Short Wave	Inner Scale —Buff	5.2 to 18.3 M.C. (Megacycles)

LIST OF REPAIR PARTS (Serial No. 6E249976 and up)

Use Only Genuine Factory Replacement Parts

Part No.	Schematic Reference	Description	No. Used In Set
		CONDENSERS	
BE 100-1	C-2	.1 x 400 Volt Tubular	1
BE 100-11	C-11: C-13	.01 x 400 Volt Tubular	2
BE 100-20	C-8	.1 x 200 Volt Tubular	1
BE 100-22	C-1: C-9	.05 x 200 Volt Tubular	2
BE 100-25	C-17	.002 x 600 Volt Tubular	1
BE 100-27	C-14	.025 x 600 Volt Tubular	1
BE 103-6	C-15	8 Mfd. x 350 Volt Electrolytic	1
BE 103-7	C-16	8 Mfd. x 300 Volt Electrolytic	1
BE 129-3	C-12	.0005 Mica—Type MT—20%	1
BE 129-12	C-10	.00025 Mica—Type MT—20%	1
BE 129-39	C-3	.00005 Mica—Type MT—20%	1
BE 129-54	C-7	.003 Mica—Type MW—2½%	1
BE 129-55	C-6	.0034 Mica—Type MW—2½%	1
BE 129-56	C-5	.00055 Mica—Type MT—10%	1
		RESISTORS	
BE 106-26	R-13: R-18: R-14	(R-12, 220 Ohm) (R-13, 82 Ohm) (R-14, 52 Ohm) Metal Clad Resistor	1
BE 130-4	R-9	3 Meg Ohm—½ Watt—20%—100 Volt Carbon	1
BE 130-12	R-8	50M Ohm—½ Watt—20%— 20 Volt Carbon	1
BE 130-19	R-7	1 Meg Ohm—½ Watt—20%—100 Volt Carbon	1
BE 130-20	R-1	100M Ohm—½ Watt—20%— 50 Volt Carbon	1
BE 130-27	R-6	50 Ohm—½ Watt—20%— 3 Volt Carbon	1
BE 130-102	R-11	500M Ohm—½ Watt—10%— 50 Volt Carbon	1
BE 130-103	R-10	100M Ohm—½ Watt—10%— 50 Volt Carbon	1
BE 130-104	R-4: R-5	9M Ohm— 1 Watt—20%—100 Volt Carbon	2
BE 130-105	R-3	150 Ohm—½ Watt—20%— 10 Volt Carbon	1
BE 130-110	R-16	1 Meg Ohm—1/10 Watt—10%—100 Volt Carbon	1
		COILS	
BE 108-73	T-7	Output I.F. Coil Assem. Comp. with Can.	1
BE 108-74	T-6	Input I.F. Coil Assem. Comp. with Can.	1
BE 110-83	T-4	Broadcast Oscillator Coil Assem. Comp. with Can.	1
BE 110-89	T-5	Mid Wave and Short Wave Oscillator Assem. less Can.	1
BE 111-49	T-1	Broadcast Antenna Coil Assem. Comp. with Can.	1
BE 111-50	T-2	Mid Wave and Short Wave Antenna Coil Assem. less Can.	1
BE 111-51	T-3	Broadcast Preselector Coil Assembly	1
		SOCKETS	
BE 121-8		Five Prong Socket—Marked "SPKR"	1
BE 121-12		Seven Prong Socket—Marked "6K7"	1
BE 121-14		Seven Prong Socket—Marked "6F6"	1
BE 121-15		Five Prong Socket—Marked "5W4"	1
BE 121-17		Six Prong Socket—Marked "6C5"	1
BE 121-18		Seven Prong Socket—Marked "6L7"	1
BE 121-26		Seven Prong Socket—Marked "6Q7"	1
		SPEAKER	
E 114-15		Six Inch Dynamic	1

Part No.	Schematic Reference	Description	No. Used In Set
		TRANSFORMERS	
BE 104-52		Power Transformer, 50/60 Cycle	1
BE 104-53		Power Transformer, 25 Cycle	1
BE 104-54		Universal Power Transformer, 25 Cycle Primary	1
BE 104-55		Universal Power Transformer, 40 Cycle Primary	1
		MISCELLANEOUS	
BE 101-46	R-8	Volume Control and Switch (1 Meg Ohm)	1
BE 101-53	R-15	Tone Control 50M Ohm	1
BE 102-23		Three Gang Variable Condenser	1
BE 107-5		Line Cord and Plug	1
BE 115-35		Antenna, Oscillator, Shield	2
BE 124-23	C-4	J-S Series Pad 3 Pf. (80-225)	1
BE 125-17	S	Band Switch	1
BE 128-44		"Volume" Knob with Spring	1
BE 128-46		"Band Switch" Knob with Spring	1
BE 128-47		"Tuning" Knob with Spring	1
BE 128-45		"Tone" Knob with Spring	1

CATHODE RAY TUNING INDICATOR PARTS

BE 107-25		Cable and Socket Assembly 1
BE 112-158		Metal Oval Escutcheon 1
BE 117-57		Holder and Clamp 1
BE 130-110		1 Meg Ohm—1/10 Watt—10%—100 Volt Carbon 1

DIAL PARTS LIST

		ASSEMBLIES
BE 117-41		Drive Bracket including: 1
		1—No. 117-19—Tuning Shaft Bushing
BE 117-66		Switch Disc and Link Assembly, including: 1
		1—No. 117-12 —Switch Arm
		1—No. 117-35 —Bushing with Screws
		1—No. 117-40B—Switch Link
		3—No 151-26 —Spring Washers
		3—No. 162-5 —Rivets
		1—No. 112-144—Switch Disc—Inc. Red Tape
		DIAL PARTS ONLY
BE 112-125		Drive Belt 1
BE 112-143		Oval Escutcheon complete with Celluloid Crystal 1
BE 112-143A		Dial Scale complete with Fastener, Pointer Disc, and Screw 1
BE 112-147		Tuning Shaft 1
BE 112-151		Pointer complete with Screw 1
BE 112-156		Pilot Light Assembly 2
BE 116-13		6.8 Volt T-51 Pilot Light 2
BE 117-20A		Tuning Shaft Pulley 1
BE 117-38		Stud, for take-up Spring 1
BE 117-39		Pulley, for take-up Spring 1
BE 120-14		Take-up Spring 1
BE 134-9		Horse Shoe Washer 1
BE 134-40		Rubber Grommet 2

Note: Speakers cannot be ordered, defective speakers must be repaired.

MODELS 62-249, 62-317

MONTGOMERY-WARD & CO.

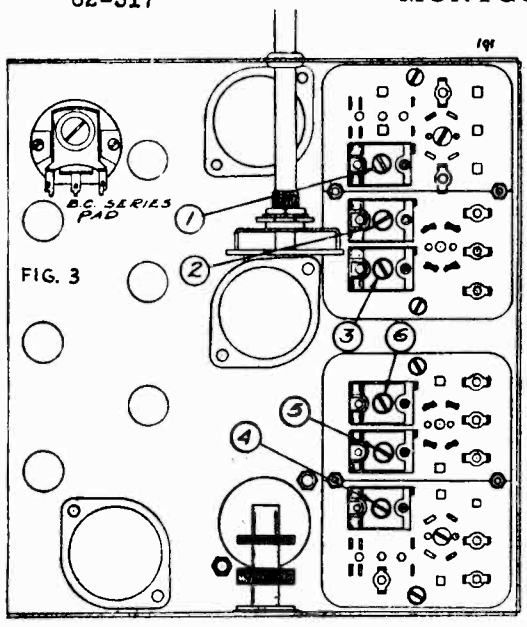


FIG. 3

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-73 Output I.F. Transformer
Part No. 108-74 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-73) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer (No. 108-74) to resonance.
   (c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-73) if necessary.

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with 'Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance (Adjustment number 1; see bottom view of coil assembly, Fig. 3
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis; Fig. 1, for location of this adjustment).
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. Under no circumstances bend plates of variable condenser sections to correct tracking.

SHORT WAVE BAND ALIGNMENT:

5.2 to 18.3 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.3 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 18.3 megacycle can be tuned in not only at 18.3 on the dial, but also at approximately 17.4 megacycles.

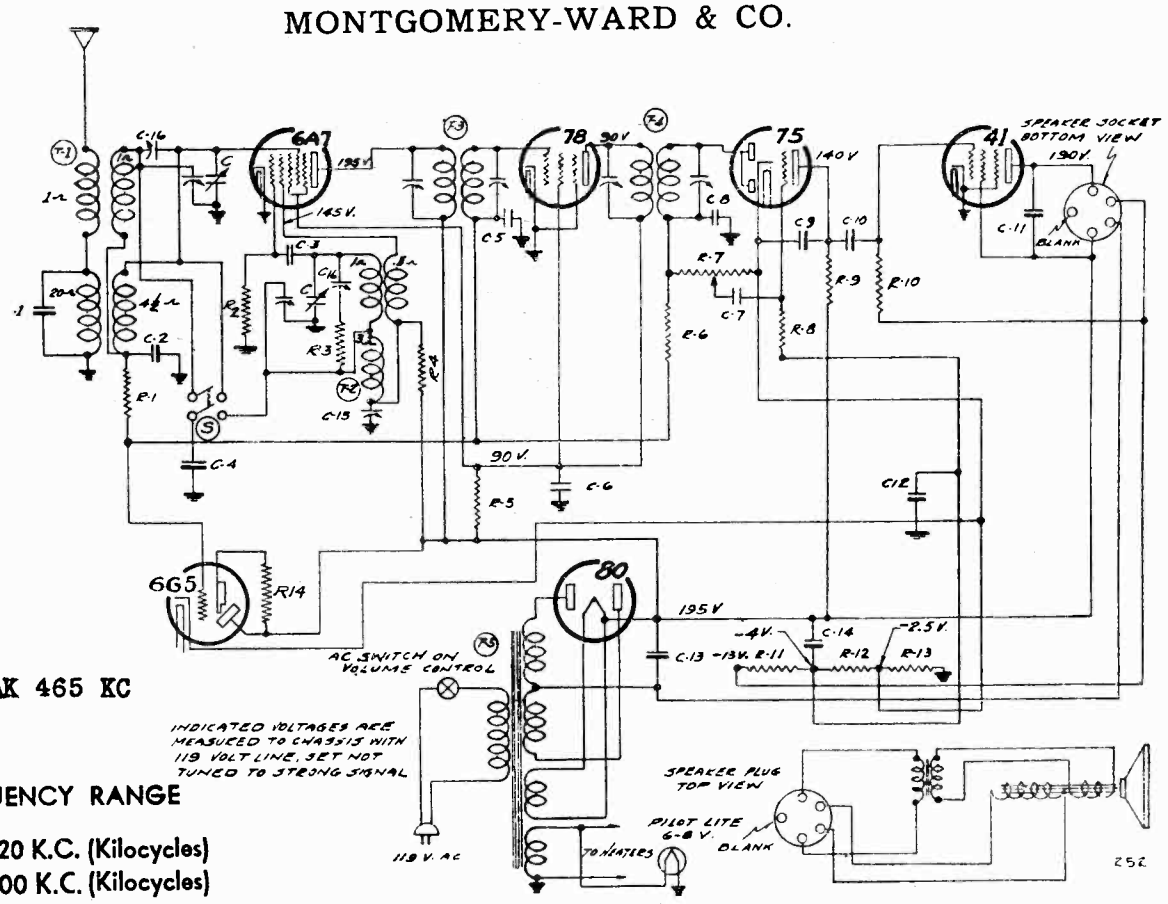
MIDDLE WAVE BAND ALIGNMENT:

1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (adjustment number 2) and middle wave antenna (adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5400 kilocycles and 1700 kilocycles for band coverage.

MODEL 62-256

MONTGOMERY-WARD & CO.



IF PEAK 465 KC

FREQUENCY RANGE

535 to 1720 K.C. (Kilocycles)
2280 to 6600 K.C. (Kilocycles)

No.	Part No.	Description
		RESISTORS
R1	130-111	100M Ohms 1/10 Watt—20%—50 Volt Carbon
R2	130-12	50M Ohms 1/3 Watt—20%—20 Volt Carbon
R3	130-112	100 Ohms 1/10 Watt—20%—10 Volt Carbon
R4	130-22	5M Ohms 1/3 Watt—20%—10 Volt Carbon
R5	130-77	10M Ohms 1 Watt—20%—100 Volt Carbon
R6	130-110	1 Meg Ohm 1/10 Watt—10%—100 Volt Carbon
R7	101-49	1 Meg Ohm Volume Control
R8	130-113	2 Meg Ohm 1/10 Watt—20%—100 Volt Carbon
R9	130-20	100M Ohms 1/3 Watt—20%—50 Volt Carbon
R10	130-100	150M Ohms 1/3 Watt—20%—50 Volt Carbon
R11	106-26	220 Ohms
R12	106-26	33 Ohms
R13	106-26	52 Ohms
R14	130-110	1 Meg Ohm 1/10 Watt—10%—100 Volt Carbon
		NOTE: R11, R12, and R13 in one unit—106-26
		CONDENSERS
C1	129-63	.0004 Mica—W—10%
C2	100-26	.02 x 400 Volt—25%
C3	129-62	.00003 Mica—O—10%
C4	129-61	.0017 Mica—W—2½%
C5	100-9	.05 x 200 Volt—25%
C6	100-6	.25 x 200 Volt—25%
C7	100-11	.01 x 400 Volt—25%
C8	129-12	.00025 Mica—O—20%
C9	129-5	.0001 Mica—O—20%
C10	100-11	.01 x 400 Volt—25%
C11	100-19	.006 x 600 Volt—25%
C12	100-6	.25 x 200 Volt—25%
C13	103-6	8 mfd. x 350 Volt Electrolytic
C14	103-7	8 mfd. x 300 Volt Electrolytic
C15	124-29	Adjustable condenser 390 mmf. working capacity
C16	124-30	Adjustable Dual Condenser
		MISCELLANEOUS PARTS
T1	111-56	Antenna Coil
T2	110-44	Oscillator Coil
T3	108-75	Input I.F. 465 kc.
T4	108-76	Output I.F. 465 kc.
T5	104-56	Power Transformer—60 Cycles
S	125-19	Band Switch
C	102-31	One Section of Two Gang Condenser

LIST OF REPAIR PARTS (Serial No. 6H369775 and up)

Use Only Genuine Factory Replacement Parts

Part No.	Schematic Reference	Description	No. Used In Set
		CONDENSERS	
BE 100-6	C-12; C-6	.25 x 200 Volt Tubular—Without Bracket	2
BE 100-9	C-5	.05 x 200 Volt Tubular	1
BE 100-11	C-10; C-7	.01 x 400 Volt Tubular	2
BE 100-19	C-11	.006 x 600 Volt Tubular	1
BE 100-26	C-2	.02 x 400 Volt	1
BE 103-6	C-13	8 Mfd. x 350 Volt Electrolytic	1
BE 103-7	C-14	8 Mfd. x 300 Volt Electrolytic	1
BE 129-5	C-9	.0001 Mica—Type O—20%	1
BE 129-12	C-8	.00025 Mica—Type O—20%	1
BE 129-61	C-4	.0017 Mica—Type W—2½%	1
BE 129-62	C-3	.00003 Mica—Type O—10%	1
BE 129-63	C-1	.0004 Mica—Type W—10%	1
		RESISTORS	
BE 106-26	R-11; R-12; R-13	220 Ohm (R-11), 33 Ohm (R-12), 52 Ohm (R-13), Metal Clad Resistor	1
BE 130-12	R-2	50M Ohm— ½ Watt—20%— 20 Volt—Carbon	1
BE 130-20	R-9	100M Ohm— ½ Watt—20%— 50 Volt—Carbon	1
BE 130-22	R-4	5M Ohm— ½ Watt—20%— 10 Volt—Carbon	1
BE 130-77	R-5	10M Ohm— 1 Watt—20%—100 Volt—Carbon	1
BE 130-100	R-10	150M Ohm— ½ Watt—20%— 50 Volt—Carbon	1
BE 130-110	R-6; R-14	1 Meg Ohm—1/10 Watt—10%—100 Volt—Carbon	2
BE 130-111	R-1	100M Ohm—1/10 Watt—20%— 50 Volt—Carbon	1
BE 130-112	R-3	100 Ohm—1/10 Watt—20%— 10 Volt—Carbon	1
BE 130-113	R-8	2 Meg Ohm—1/10 Watt—20%—100 Volt—Carbon	1
		COILS	
BE 108-75	T-3	465 K.C. Input I.F. Coil Assembly Complete with Can	1
BE 108-76	T-4	465 K.C. Output I.F. Coil Assembly Complete with Can	1
BE 110-44	T-2	Oscillator Coil Assembly Complete with Can	1
BE 111-56	T-1	Antenna Coil Assembly Complete with Can	1
		SOCKETS	
BE 121-6		Six Prong Socket—Marked "75"	1
BE 121-6		Six Prong Socket—Marked "75"	1
BE 121-6		Six Prong Sock —Marked "41"	1
BE 121-7		Seven Prong Socket—Marked "6A7"	1
BE 121-8		Five Prong Socket—Marked "SI'KR"	1
BE 121-9		Four Prong Socket—Marked "80"	1
BE 104-58		25 Cycle—110 Volt Power Transformer	
BE 104-59		40 Cycle Primary—Universal Power Transformer	
		CATHODE-RAY TUNING INDICATOR PARTS	
BE 107-52		Cable and Socket Assembly	1
BE 112-158		Metal Oval Escutcheon	1
BE 117-57		Holder and Clamp	1
BE 130-110		1 Meg Ohm—1/10 Watt—10%—100 Volt Carbon	1
		MISCELLANEOUS	
BE 101-49	R-7	Volume Control & A. C. Switch (1 Meg Ohm)	1
BE 102-31	C	Two Gang Variable Condenser	1
BE 107-5		Line Cord & Plug	1
BE 112-15		Dial Crystal Only—Less Escutcheon	1
BE 112-131		Bakelite Escutcheon Complete with Crystal	1
BE 112-156		Pilot Light Assembly	1
BE 112-159		Dial Scale	1
BE 112-160		Dial Pointer Complete with Screw	1
BE 115-22		Tube Shield	2
BE 116-13		6-8 Volt, T-51 Pilot Light Bulb	1
BE 117-58		Dial Housing	1
BE 117-59		Pointer Stud	1
BE 117-60		Pointer Bushing Assembly	1
BE 117-61		Drive Pulley	1
RE 120-7		Belt Tension Spring	1
BE 124-29	C-15	Type TU5 Series Pad	1
BE 124-30	C-16	Dual Ceramic Padder	1
BE 125-19	S	Band Switch	1
BE 131-2		Bakelite Knob	3
BE 131-43		Cinch Button for Fastening Dial Scale	5
BE 131-49		Drive Belt	1
BE 134-9		Compression Spring	1
		SPEAKER	
BE 114-16		Five Inch Dynamic Speaker	1
		TRANSFORMERS	
BE 104-56	T-5	60 Cycle—110 Volt Power Transformer	1
BE 104-57		40 Cycle—110 Volt Power Transformer	

MODEL 62-256

MONTGOMERY-WARD & CO.

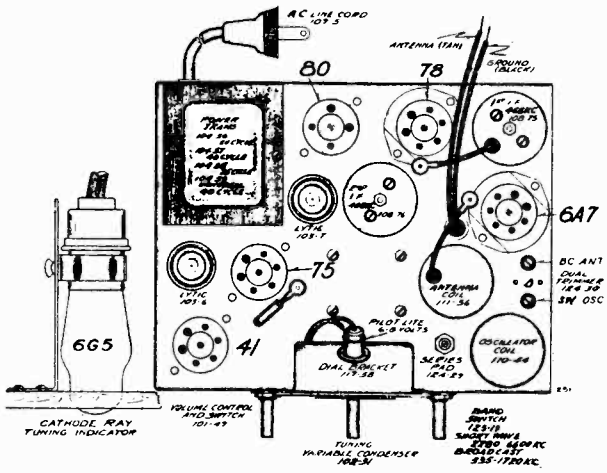


FIG. 1—TOP VIEW

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-76 Output I.F. Transformer
Part No. 108-75 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 78 tube, and adjust the output I.F. transformer (No. 108-76) to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 78 to grid cap to 6A7 and adjust input I.F. transformer (No. 108-75) to resonance.

   (c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-76) if necessary.

BROADCAST AND SHORT WAVE BAND ALIGNMENT

Broadcast Band:—535 to 1720 Kilocycles.
Short Wave Band:—2280 to 6600 Kilocycles.

Important:—These adjustments must be made in the following order:

SHORT WAVE OSCILLATOR ADJUSTMENT:

1. With band switch in the short wave band position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with the external oscillator connected in series with "Dummy 1" to grid cap of the 6A7 tube, make the following adjustment:

   (a) Set external oscillator to 6.6 megacycles and adjust short wave oscillator trimmer to resonance. This adjustment is marked "S.W. Osc." (see top view of chassis, Fig. 1, for location of this adjustment).

NOTE: Make certain that the fundamental 6.6 megacycles signal has been tuned in and not the image frequency, noting that the image appears when the tuning knob is moved to approximately 5.7 megacycles.

BROADCAST BAND OSCILLATOR ADJUSTMENT:

1. With band switch in the broadcast position, extreme left of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 1" to grid cap of the 6A7 tube, make the following adjustment:

   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. This adjustment is the trimmer mounted on the front section of the variable gang condenser.

BROADCAST BAND ANTENNA ADJUSTMENT:

1. With the band switch still in the broadcast position, move the external oscillator from the grid cap of the 6A7 tube to the tan antenna lead and black ground lead, in series with "Dummy 2" and make the following adjustments:

   (a) Set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer to resonance. This adjustment is marked "B.C. Ant." (See top view of chassis, Fig 1, for location of this adjustment.)

   (b) Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until, by adjusting series pad, maximum output is attained. This adjustment is located on the top of the chassis directly in front of the antenna coil. (See top view of chassis, Fig. 1).

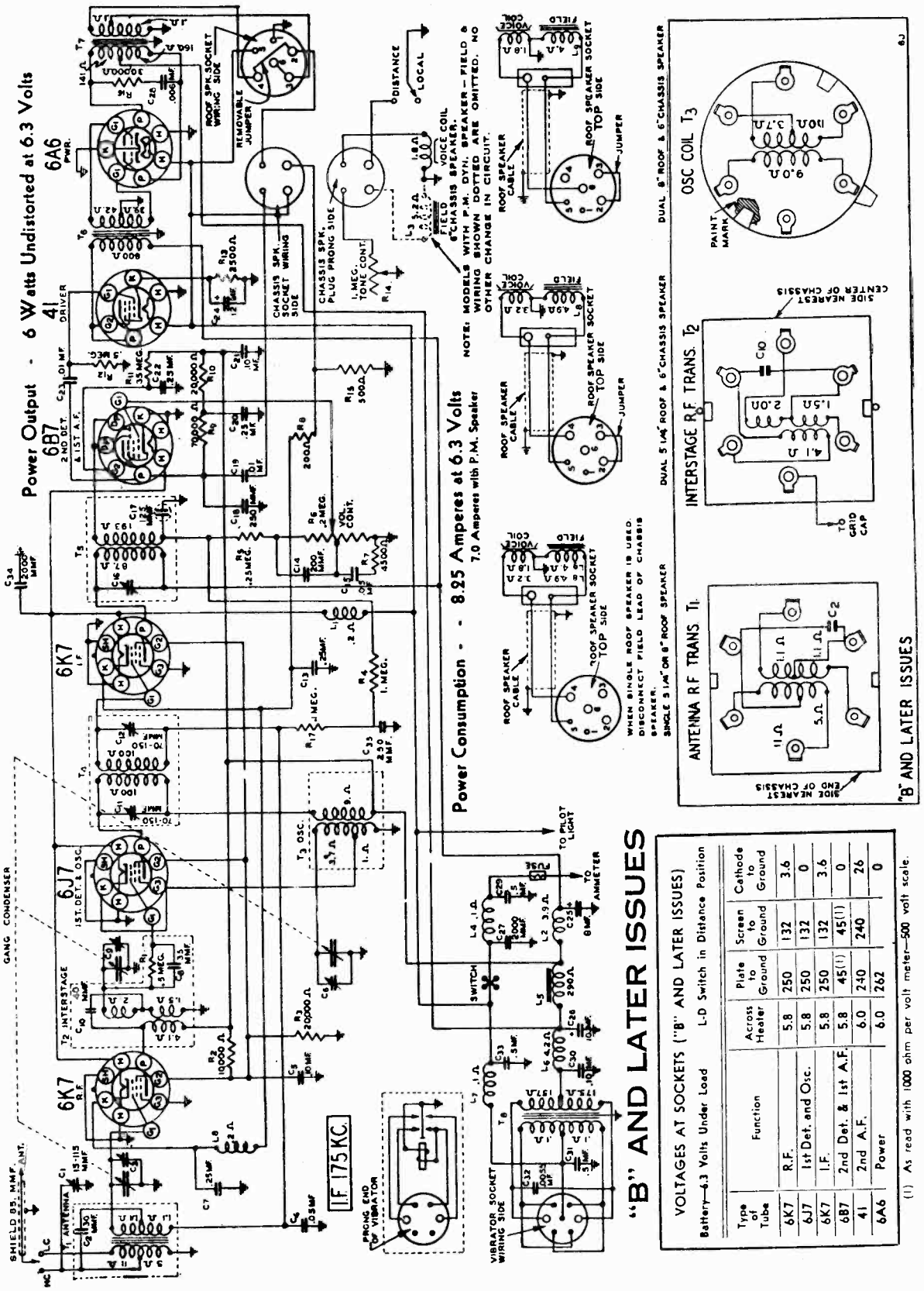
   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

SHORT WAVE BAND ANTENNA ADJUSTMENT:

1. With the band switch in the short wave position, and with external oscillator connected in series with "Dummy 3," to the tan antenna lead and black ground lead, make following adjustment:

   (a) Set external oscillator to 6 megacycles and adjust the short-wave antenna trimmer to resonance. This adjustment is the trimmer mounted on the rear section of the variable gang condenser.

MONTGOMERY-WARD & CO.



"B" AND LATER ISSUES

VOLTAGES AT SOCKETS ("B" AND LATER ISSUES)

Battery—6.3 Volts Under Load L-D Switch in Distance Position

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground
6K7	R.F.	5.8	250	132	3.6
6J7	1st Det. and Osc.	5.8	250	132	0
6K7	I.F.	5.8	250	132	3.6
6B7	2nd Det. & 1st A.F.	5.8	45(1)	45(1)	0
41	2nd A.F.	6.0	240	240	26
6A6	Power	6.0	262		0

(1) As read with 1000 ohm per volt meter—500 volt scale.

CHANGES IN LATER MODELS

June, 1937

Later models of the Series have changes incorporated in them which are explained below. The models which have these changes may be identified by the issue letter which is a large letter stamped on top of the chassis base. The tube arrangement label on the chassis case cover also shows this issue letter.

When ordering parts, it is important that the issue letter be noted and the correct part number, as shown in the parts list, be specified.

The "D" issue Series is different from the "B" and "C" The gang condenser used in the "D" issue radios does not have the cut plate oscillator section. A padding condenser (600 KC) was added in series with the oscillator section of this gang condenser and the oscillator coil. The padding condenser is a part of the 2nd I. F. trimmer unit and is mounted in the 2nd I. F. coil can.

The capacity (C17) shown within a dotted circle in the 2nd I.F. coil assembly on the schematic has been changed to an actual part as shown in the supplementary parts list.

The antenna, R.F. Interstage, oscillator, and 2nd I.F. coil assemblies have been changed and have been given new part numbers as shown in the supplementary parts list.

SUPPLEMENTARY REPLACEMENT PARTS

The PARTS of the Series are used on the Series "D" issue Radio with the following EXCEPTIONS: PRICES ARE SUBJECT TO CHANGE
THE FOLLOWING NEW PARTS ARE USED: WITHOUT NOTICE

No.	Code	Description	List Price
9A859	T1	Antenna Transformer and Can Assembly.....	$1.65
9A861	T2	R. F. Interstage Transformer and Can Assembly.....	1.75
9A862	T3	Oscillator Coil and Can Assembly.....	.95
9A858	T5	2nd I. F. Transformer and Can Assembly.....	2.35
47X57	C17	100 mmf. Molded Condenser.....	.10
17A79	(C16 (	30-100 mmf. 2nd I.F. Trimmer) 900-1300 mmf. Oscillator 600 KC Padder)...	.45
14A77		3 Section Gang Condenser Complete with Drive Gears.....	5.05

THE FOLLOWING PARTS OF THE SERIES ARE NOT USED ON THE SERIES "D" ISSUE RADIO:

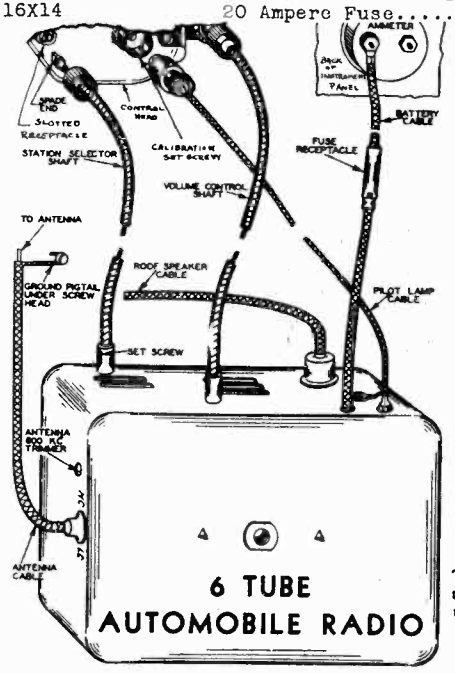
9A740) 9A771)	or T1	Antenna Transformer and Can Assembly.....	$1.65
9A741) 9A765)	or T2	R.F. Interstage Transformer and Can Assembly.....	1.70
9A742) 9A772)	or T3	Oscillator Coil and Can Assembly.....	.85
9A744	T5	2nd I.F. Coil and Can Assembly.....	1.60
17A65	C16	30-100 mmf. 2nd I.F. Trimmer.....	.20
14A65		3 Section Gang Condenser Complete with Drive Gears.....	5.85

The Following Changes apply to all Issues of the Series
THE FOLLOWING NEW PARTS ARE USED:

46X213	C29	.5 mf. 180 volt Tubular Condenser.....	$0.30
16X16		15 Ampere Fuse.....	.10

THE FOLLOWING PARTS ARE NOT USED:

46X207	C29	.5 mf. 180 volt Tubular Condenser.....	$0.30
16X14		20 Ampere Fuse.....	.10



General Installation View

Alignment Procedure

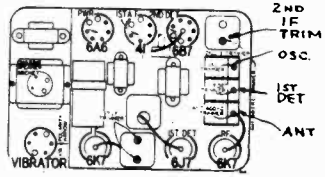
Set the signal generator for 175 KC and connect the output of the signal generator through a .05 mf. condenser to the stator of the 1st detector section of the tuning condenser. Set the volume control at the maximum position and attenuate the signal from the signal generator to prevent the levelling off action of the AVC. Then adjust the three IF trimmers until maximum output is obtained

Set the signal generator for 1581 KC. Turn the rotor of the tuning condenser to the full open position. Insert the antenna plug with the mark on the high capacity (HC) side. Connect the shielded antenna lead from the chassis through a 120 mmf. condenser to the antenna post of the signal generator. Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained.

Set the signal generator for 1400 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Adjust the 1st detector and antenna 1400 KC trimmers for maximum output. Do not change the setting of the oscillator trimmer.

Then set the signal generator for 600 KC and adjust the 600 KC antenna trimmer to maximum (see Fig. 10 for location of this trimmer).

After the alignment procedure is completed, the antenna plug may be withdrawn and reinserted on the LC side if a low capacity (70 mmf.) car antenna is used.



Location of Tubes and Vibrator

Adjusting Antenna 600 KC Trimmer

Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 9 for location of this trimmer.

Antenna

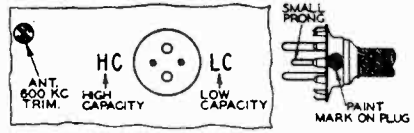


Fig. 9—Antenna Plug Insertion

IMPORTANT—The antenna plug can be inserted in two ways depending on whether the antenna is of high or low capacity.

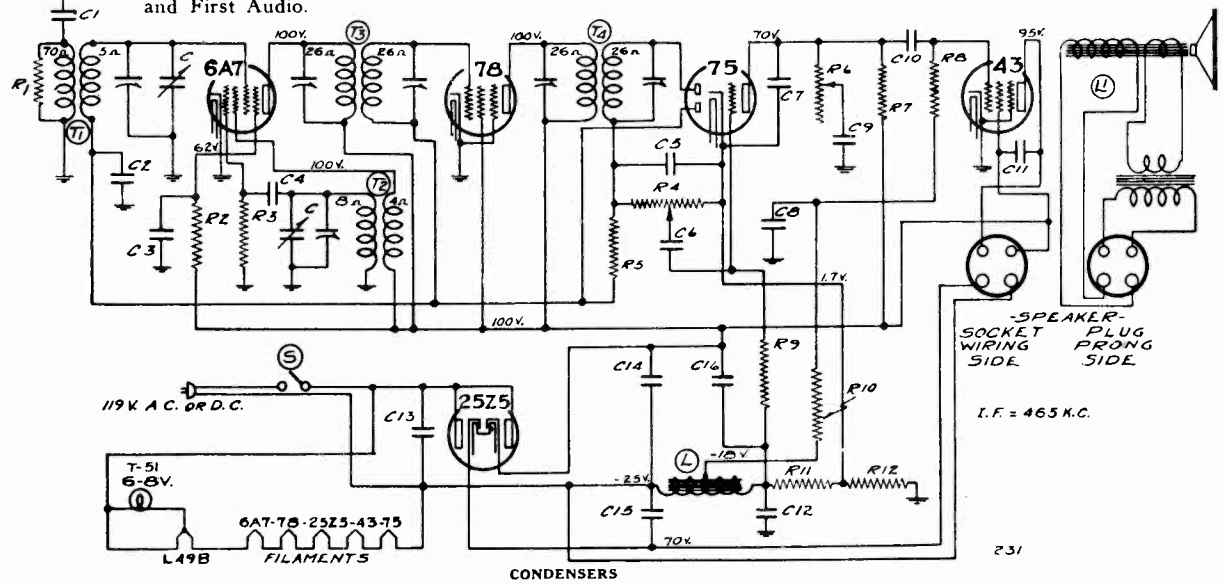
If the total capacity of the antenna and shielded lead is approximately 200 mmf., which would be the case in a running board or ordinary roof antenna (not metal roof), insert the antenna plug with the mark on the HC side—See Fig. 9.

If the total capacity of the antenna and shielded lead is approximately 70 mmf., such as is the case if a "fish pole" antenna is used, insert the antenna plug with the mark on the LC side.

MODEL 62-260

MONTGOMERY-WARD & CO.

Type 6A7 Pentagrid Mixer, First Detector-oscillator
Type 78 Remote Cut-Off Pentode, I.F. Amplifier (465 K.C.)
Type 75 Duplex Diode Triode Second Detector, A.V.C. and First Audio.
Type 43 Pentode Output Amplifier
Type 25Z5 High Vacuum Rectifier.
Type L49B Ballast Tube.



RESISTORS

No.	Part No.		Description
R1	130-12	50M	Ohm—½W—20%— 20V—Carbon
R2	130-21	20M	Ohm—½W—20%— 20V—Carbon
R3	130-12	50M	Ohm—½W—20%— 20V—Carbon
R4	101-54	1 meg	Ohm—Volume Control
R5	130-119	3 meg	Ohm—½W—20%—100V—Carbon
R6	101-55	1 meg	Ohm—Tone Control
R7	130-120	100M	Ohm—½W—20%— 50V—Carbon
R8	130-5	300M	Ohm—½W—20%—100V—Carbon
R9	130-38	2 meg	Ohm—½W—20%—100V—Carbon
R10	130-9	200M	Ohm—½W—20%— 20V—Carbon
R11	106-28	35	Ohm—Muter Strip
R12	106-28	50	Ohm—Muter Strip

NOTE: R11 and R12 in one unit—No. 106-28.

CONDENSERS

C1	100-29	.002 x600 Volt—25%
C2	100-22	.05 x200 Volt—25%
C3	100-22	.05 x200 Volt—25%
C4	129-12	.00025 Mica—MT—20%
C5	129-12	.00025 Mica—MT—20%
C6	100-11	.01 x400 Volt—20%
C7	129-2	.0005 Mica—MT—20%
C8	100-20	.1 x200 Volt—25%
C9	100-11	.01 x400 Volt—25%
C10	100-11	.01 x400 Volt—25%
C11	100-25	.002 x600 Volt—25%
C12	100-6	.25 x200 Volt—20%
C13	100-39	.1 x400 Volt—20%
C14	119-25	16 mfd.x100 Volt—Working Voltage
C15	119-25	5 mfd.x100 Volt—Working Voltage
C16	119-25	8 mfd.x100 Volt—Working Voltage

NOTE: C14, C15, and C16 in one unit—No. 119-25

C	102-33	One section of two gang condenser
T1	111-57	Antenna Coil
T2	110-46	Oscillator Coil
T3	108-82	Input I.F. Coil—465 Kc.
T4	108-83	Output I.F. Coil—465 Kc.
L	105-29	Filter Choke (Resistance 600 Ohms)
LI	114-43	Five Inch Speaker (Field resistance 3000 Ohms)
S	101-54	On and off switch on Volume Control

TUNING RANGE—
Standard Broadcast Band
535-1720 Kilocycles

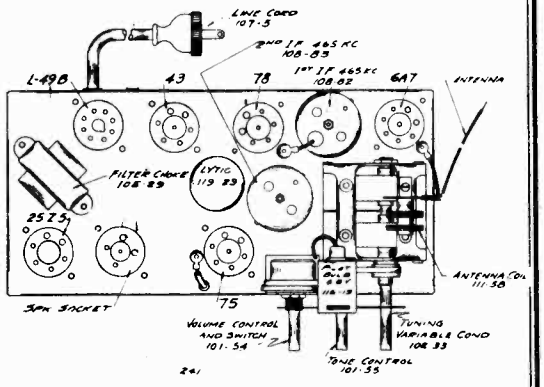


FIG. 2—TOP VIEW

SERIES B is the same as Series A, except for the following changes:-
1 - The C15 condenser was eliminated.
2 - The C14 condenser was replaced by a C15 (Part #119-29) 30 mfd. capacity, and the C16 was replaced by a C14 (Part #119-29) 5 mfd. capacity.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-83 Output I.F. Transformer
Part No. 108-82 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 78 tube, and adjust the output I.F. transformer (No. 108-83) to resonance.

   (b) Move oscillator output clip from grid of 78 grid cap of 6A7 and adjust input I.F. transformer (No. 108-82) to resonance.

   (c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-83) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. Unsolder the antenna wire from its terminal on the antenna coil and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 50 mmf. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

   (b) Re-set external oscillator to 1550 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.

MODEL 62-262

MONTGOMERY-WARD & CO.

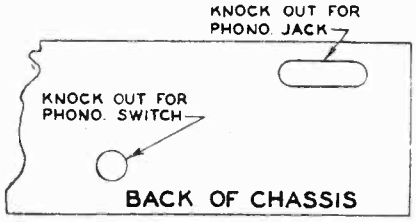


Fig. 8—Location of Phono Knockouts

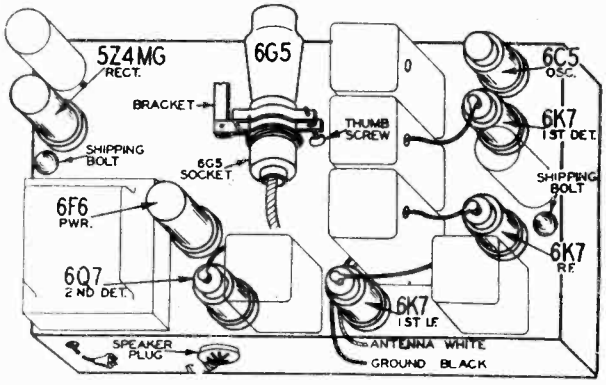


Fig. 6—Location of Tubes

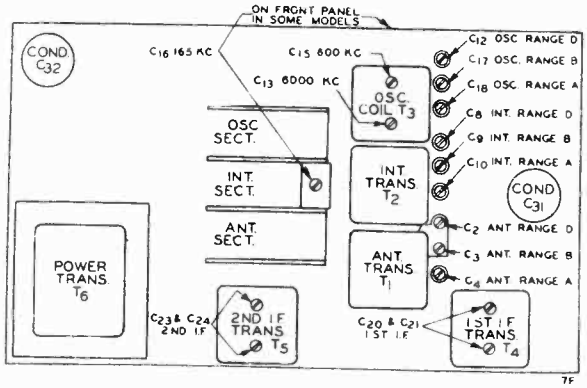


Fig. 3—Location of Trimmers

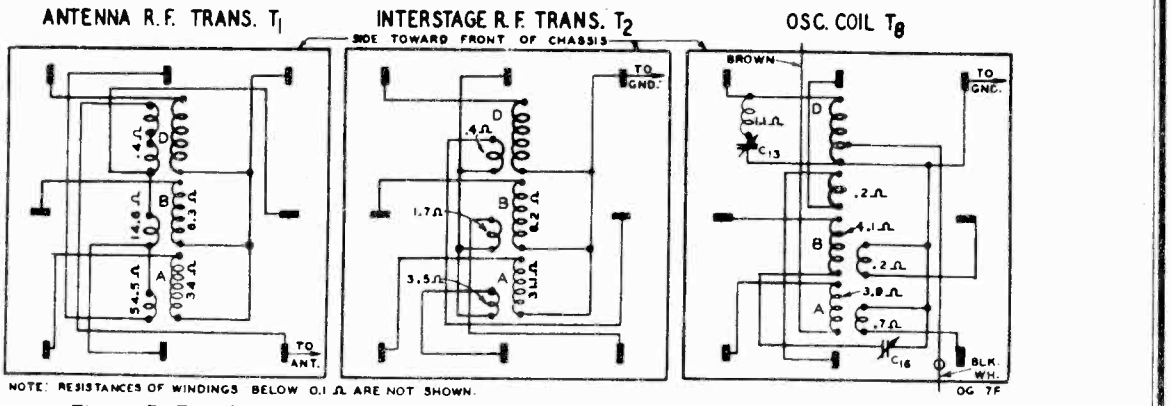


Fig. 4—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

Line Voltage: 115
Volume Control: Maximum

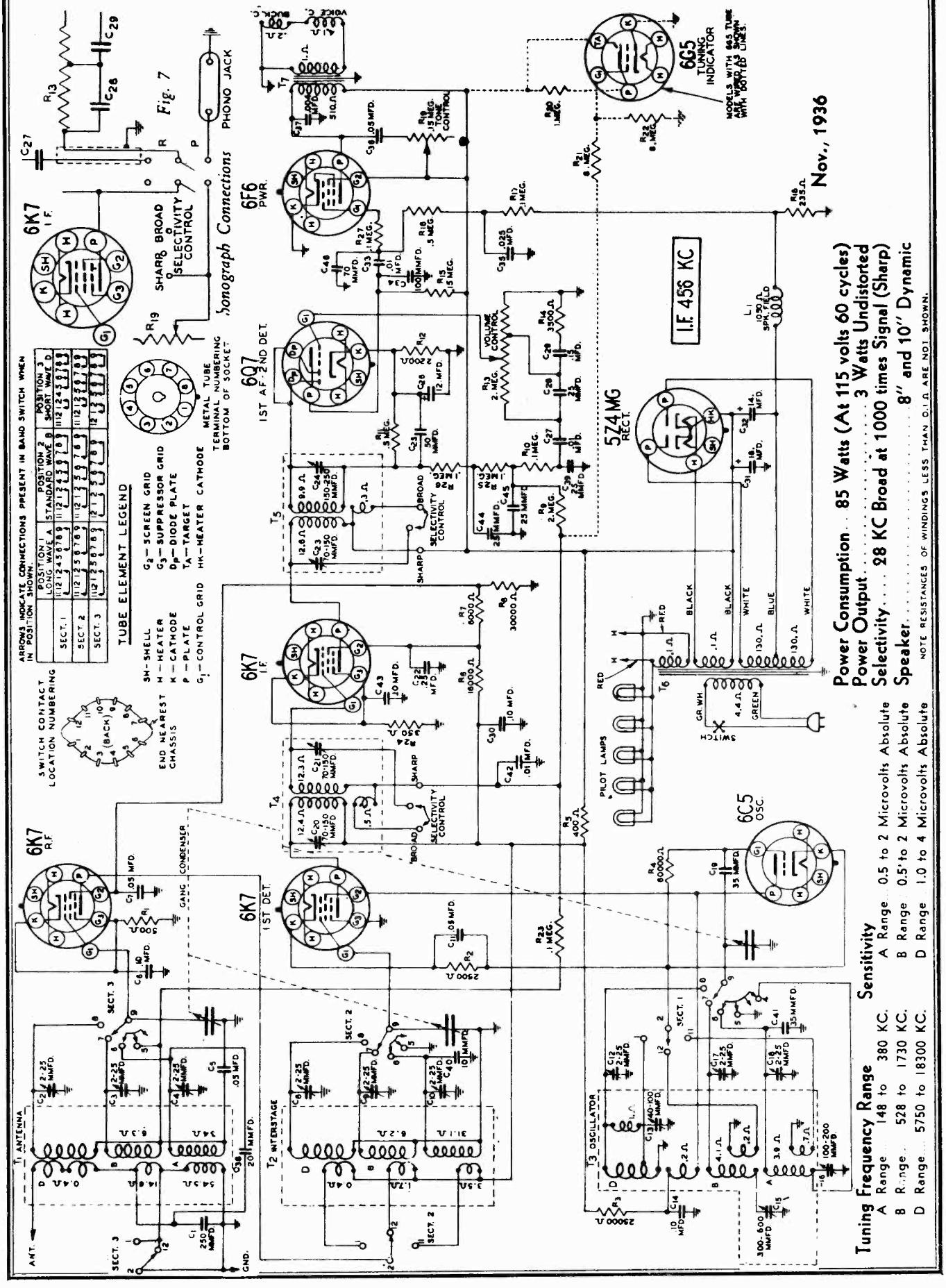
Antenna Shorted to Ground
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONGS AND GROUND (Unless otherwise indicated)							
		Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
6K7	R.F.	0	6.1(1)	260	100	4.0		6.1(1)	4.0
6K7	1st Det.	0	6.1(1)	260	118	0		6.1(1)	9.0
6C5	Osc.	0	6.1(1)	120		0		6.1(1)	0
6K7	I.F.	0	6.1(1)	260	138	4.0		6.1(1)	4.0
6Q7	1st A.F.—2nd Det.	0	6.1(1)	105	0	0		6.1(1)	1.4
6F6	Power Amp.	0	6.1(1)	238	260	18		6.1(1)	0
5Z4MG	Rect.	0	4.9(2)		680(3)		680(3)		4.9(2)
6G5	Tuning Indicator	Plate to Ground 30(4)		Target to Ground 270		Cathode to Ground 0		Across Heater 6.1 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) A.C. voltage as read across heater terminals 2 and 8.
(3) A.C. voltage as read across terminals 4 and 6.
(4) As read with 500,000 ohm meter.

MODEL 62-262

MONTGOMERY-WARD & CO.



I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a 1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the radio to the ground post of the signal generator.

Turn the band switch to the Range B position (medium wave band)

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the four I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 3.

Range A Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

380 KC Adjustment

Set the signal generator for 380 KC.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range A position (long wave band).

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and *all* subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range A trimmer (C18) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

350 KC Adjustment

Set the signal generator for 350 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range A trimmer (C10) and antenna Range A trimmer (C4) to maximum.

Do not change the setting of the oscillator Range A trimmer.

165 KC Adjustment

Set the signal generator for 165 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 165 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range B position (medium wave band).

Keep the antenna lead of the receiver connected through the 200 mmf. condenser to the output of the signal generator.

Adjust the oscillator Range B trimmer (C17) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

In sets using pointers, loosen the screw of the large pointer and set the pointer at the 1500 KC mark on the standard wave band scale. Re-tighten the screw.

In sets using the moving beam of light, there is a moving light assembly held to the front of the drive drum by means of a screw. Loosen this screw and move the light assembly until it is at the 1500 KC mark on the dial. Re-tighten the screw.

Adjust the interstage Range B trimmer (C9) and antenna Range B trimmer (C3) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth, at the same time adjusting the 600 KC trimmer, until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range D Alignment

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC. It may be necessary to increase the input signal to hear the image.

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Connect the antenna lead of the radio through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (short wave band).

Adjust the oscillator Range D trimmer (C12) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C8) and antenna Range D trimmer (C2) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained

Do not change the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

A 115-230 volt, 40 to 60 cycle as well as other power transformers with special power ratings are also available for this model.

Phonograph Connections

Switch on Back Panel of Chassis

Phonograph connections can be made as shown in Fig. 7. The parts required are shown in the parts list. Knockouts are provided in the back panel of the chassis for mounting the phono jack and phono switch —See Fig 8.

The phono switch must be mounted with one set of terminals nearest the bottom of the chassis base.

The connections are made by opening the diode return circuit at the volume control. Unsolder the .01 mf. condenser C27 from the volume control.

Strip about 2¾ inches of the shielding from each end of the cable furnished with the phono attachment parts. Connect one lead of the cable to the terminal on the volume control from which condenser C27 was removed. The other end of this lead is connected to the phono switch as shown in Fig. 7. The second cable lead is connected to the open end of condenser C27. Then connect the other end of this lead to the phono switch as shown in Fig. 7. Both of the shielded cable leads connected to the phono switch are connected to the switch terminals nearest the chassis base. Before connecting the cable leads to the phono switch, it will be necessary to slip a piece of varnished tubing over the portion of the cable that passes near the 6K7 1st I.F. tube socket.

Now ground the shielding by soldering it to the lugs on the chassis base. One of these lugs is located just below the planetary drive; the other is near the rear mounting foot of the gang condenser.

Complete the other connections as illustrated in Fig. 7. The lead between the tone control and the .05 mf. tubular condenser C36 mounted on the back of the chassis base, should be covered with a piece of varnished tubing.

The tin plate shield is soldered to the tone control mounting bracket in such a way that when it is bent down toward the bottom and back of the chassis it will shield the lower leads of the phono switch and the lead between the tone control and tubular condenser C36.

After making the phono connections, the I.F. stages should be realigned.

Switch Mounted Externally

The procedure for making the connections for this arrangement is the same as explained previously with the following exceptions: The switch being mounted externally, it is unnecessary to mount it with the terminals in a particular position.

The single unshielded flexible wire is run through a small hole which must be drilled in the back of the chassis base near the phono jack and is then connected to one terminal of this jack. The other end of this wire is connected to the phono switch as shown in Fig. 7.

Important—Instead of connecting the center terminal of the switch to the plate of the 6K7 I.F. tube as shown, this switch terminal is connected to the braided shielding of the cable. The switch terminal shown connected to the tone control R19 in Fig. 7, should be connected to the switch terminal which connects to the .01 condenser C27.

The braided shielding is run through the hole in the chassis base which is provided by the phono switch knockout. The shield is soldered to the base at this point and also to the bottom of the base at the lugs located just beneath the gang condenser. The tin plate mentioned previously is not used.

Trimmer Replacement

If one trimmer of the gang trimmer strip should become defective, it is not necessary to replace the entire strip. A single trimmer P-17A36, as shown in the replacement parts list, may be used. Disconnect the lead from the coil side (side not grounded) of the defective trimmer in the strip. This connection is then made to the single trimmer. Connect it to the side of the trimmer not in contact with the adjusting screw. The other side of the single trimmer is then connected to a good ground, using a piece of heavy wire in order to support the trimmer adequately. In replacing a trimmer, be sure to keep both leads as short as possible and keep the ungrounded lead as far from ground as possible.

Across the volume control resistor R13 is a filter composed of condensers C28 and C29 and resistor R14. A tap connection near the low potential end of the volume control is connected between the two condensers. At high volume settings, the filter is not effective. At the low volume settings, as the pointer approaches the tap, the higher frequencies are bypassed through condenser C29. Very high frequencies are transmitted through condenser C28 to compensate for the reduction of these frequencies. At low volume settings the low frequency amplitudes are increased as a result.

Replacement Parts

NOTICE—There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts, please be sure to mention the series number and this large letter.

MISCELLANEOUS

SOCKETS

Part No.	Description	List Price
3A240	7 Prong Tube Socket	38.15
3A243	6 Prong Tube Socket	.15
3A264	7 Prong Octal Base Tube Socket	.15
3A88	5 Prong Speaker Socket	.10
13X286	Tuning Indicator Tube Socket and Cable Assembly	.65

SPEAKERS

12A211	6" Dynamic Speaker Compl. with Output Transformer (T7)	5.95
12A221	10" Dynamic Speaker Compl. with Output Transformer (T7)	6.45
12A247	12" Dynamic Speaker Compl. with Output Transformer (T7)	6.95

KNOBS

Specify Name of Knob and Model of Radio		
	Tone Control—Small Push-On Type	.15
	Volume Control—Small Push-On Type	.15
	Tuning Control—Large Push-On Type	.15
	Band Switch—Large Set Screw Type	.30

GENERAL

2X30	Felt Washers (Used Behind Knobs)	doz.	.10
8X23	Rubber Chassis Mounting Cushions	ea.	.10
4A18	Terminal Strip—Two Insulated Lugs		.10
4A49	Terminal Strip—Single Lug Insulated (With Mounting Hole at One End)		.10
4A58	Terminal Strip—Two Lugs Insulated (With Mounting Hole in Center)		.10
302X64	Grid Clip Only	doz.	.10
7A66	3 Section, 3 Position, Band Change Switch		1.00
13X81	Line Cord and Plug		.25
13X216	Antenna and Ground Lead Assembly		.30
27X69	Tube Shield (Tuning Eye)		.15
27X70	Tube Shield Base (Tuning Eye)		.10
75X231	Front Chassis Mounting Foot	ea.	.10
75X233	Rear Chassis Mounting Foot	ea.	.10

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
9A678	T1	Antenna Transformer and Can Assembly	$2.40
9A671	T2	R.F. Interstage Transformer and Can Assembly	2.15
9A672	T3	Oscillator Coil and Can Assembly	2.40
9A673	T4	1st I.F. Transformer and Can Assembly	1.60
9A674	T5	2nd I.F. Transformer and Can Assembly	1.60
53X111	T6	115-230 Volt 40-60 Cycle Power Transformer	4.80
51X31	T7	Output Transformer (Part of Speaker Assembly)	2.45

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
46X208	C5	.05 mf.	180	$0.15
46X209	C26	.10 mf.	180	.20
46X123	C21	.02 mf.	180	.15
46X82	C11	.03 mf.	180	.15
46X185	C14	.04 mf.	360	.20
46X186	C22	.06 mf.	360	.25
46X139	C27	.01 mf.	360	.15
46X178	C29	.15 mf.	180	.20
46X105	C28	.15 mf.	360	.30
46X129	C23	.01 mf.	360	.15
46X173	C30	.025 mf.	600	.15
46X188	C24	.05 mf.	600	.20
46X116	C37	.004 mf.	600	.20
46X56	C42	.01 mf.	180	.15
46X98	C43	.10 mf.	180	.20

ELECTROLYTIC

45X209	C26	12 mf.	75	Dry	.65
60X11	C31	10 mf.	200	Wet	1.10
60X10	C32	16 mf.	400	Wet	1.25

MOLDED

47X59	C41	250 mmf.	.15
47X53	C19	35 mmf.	.10
47X56	C35	50 mmf.	.10
47X71	C38	25 mmf.	.15
47X57	C39	100 mmf.	.10
47X66	C36	20 mmf.	.10
47X72	C25	25 mmf.	.10
47X61	C40	10 mmf.	.15
47X63	C44	35 mmf.	.10
47X72	C45	25 mmf.	.10
47X73	C46	35 mmf.	.10
47X62	C47	70 mmf.	.10

TRIMMER

17A95 Trimmer Strip	C2	3-25 mmf.	Range "D" Antenna Trimmer	.95
	C3	3-25 mmf.	Range "B" Antenna Trimmer	
	C4	3-25 mmf.	Range "A" Antenna Trimmer	
	C8	3-25 mmf.	Range "D" Interstage Trimmer	
	C9	3-25 mmf.	Range "B" Interstage Trimmer	
	C10	3-25 mmf.	Range "A" Interstage Trimmer	
	C12	3-25 mmf.	Range "D" Oscillator Trimmer	
	C17	3-25 mmf.	Range "B" Oscillator Trimmer	
	C18	3-25 mmf.	Range "A" Oscillator Trimmer	

See Part Number 17A36 for replacement of any one section

17A35	C12	40-100 mmf.	Range "D" Oscillator Padding Condenser	.40
	C16	300-600 mmf.	Range "B" Oscillator Padding Condenser	
17A42	C16	100-200 mmf.	Range "A" Oscillator Padding Condenser	.35
17A33	C28	75-150 mmf.	1st I.F. Trimmer Condenser	.40
	C31	75-150 mmf.		
	C33	75-150 mmf.		
17A34	C34	150-300 mmf.	2nd I.F. Trimmer Condensers	.40

MISCELLANEOUS

17A52	3 Gang Condenser less Dial and Drive Assembly	3.60
17A36	2.25 mmf. (To be used for replacement of any one section of Trimmer Strip 17A48)	.10

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
A9468	R1	500 Ohm	0.2	$0.15
A9482	R2	2,500 Ohm	0.2	.15
C9253	R3	25,000 Ohm	0.2	.15
A9488	R4	50,000 Ohm	0.2	.15
A9481	R5	400 Ohm	0.2	.15
D9316	R6	16,000 Ohm	2.0	.40
B9482	R7	6,000 Ohm	0.5	.15
B9483	R8	30,000 Ohm	0.5	.15
A9528	R9	2 Megohm	0.2	.10
A9189	R10	100,000 Ohm	0.2	.10
A9484	R11	900,000 Ohm	0.2	.10
A9472	R12	1,200 Ohm	0.2	.15
A9483	R14	3,600 Ohm	0.2	.15
A9184	R15	150,000 Ohm	0.2	.10
A9484	R16	900,000 Ohm	0.2	.10
A9189	R17	100,000 Ohm	0.2	.10
A9185	R20	1 Megohm	0.2	.10
A9488	R21	5 Megohm	0.2	.10
A9489	R22	8 Megohm	0.2	.10
A9184	R23	150,000 Ohm	0.2	.10
A9481	R24	500 Ohm	0.2	.15
A9184	R25	150,000 Ohm	0.2	.10
A9184	R26	150,000 Ohm	0.2	.10
A9184	R27	150,000 Ohm	0.2	.10

WIRE WOUND

43X42	R18	235 Ohm	2.0	.25

VARIABLE

56X215	R13	2.0 Megohm	Tapped Volume Control and On-Off Switch	1.05
48X211	R19	.15 Megohm	Tone Control and Selectivity Switch	1.15

PHONO ATTACHMENT PARTS

WITH SWITCH MOUNTED ON CHASSIS

Part No.	Description	List Price
2A31	Phono Switch (Double Pole Double Throw Switch)	$0.60
2A13	Phono Jack	.10
18A34	Switch Knob	.10
27X77	Shield Plate 2" x 1½" x .015"	.10
	11½" of No. 74 S Shielded Cable	.10
	1" No. 6 Varnished Tubing	.10
	1" No. 2 Varnished Tubing	.10

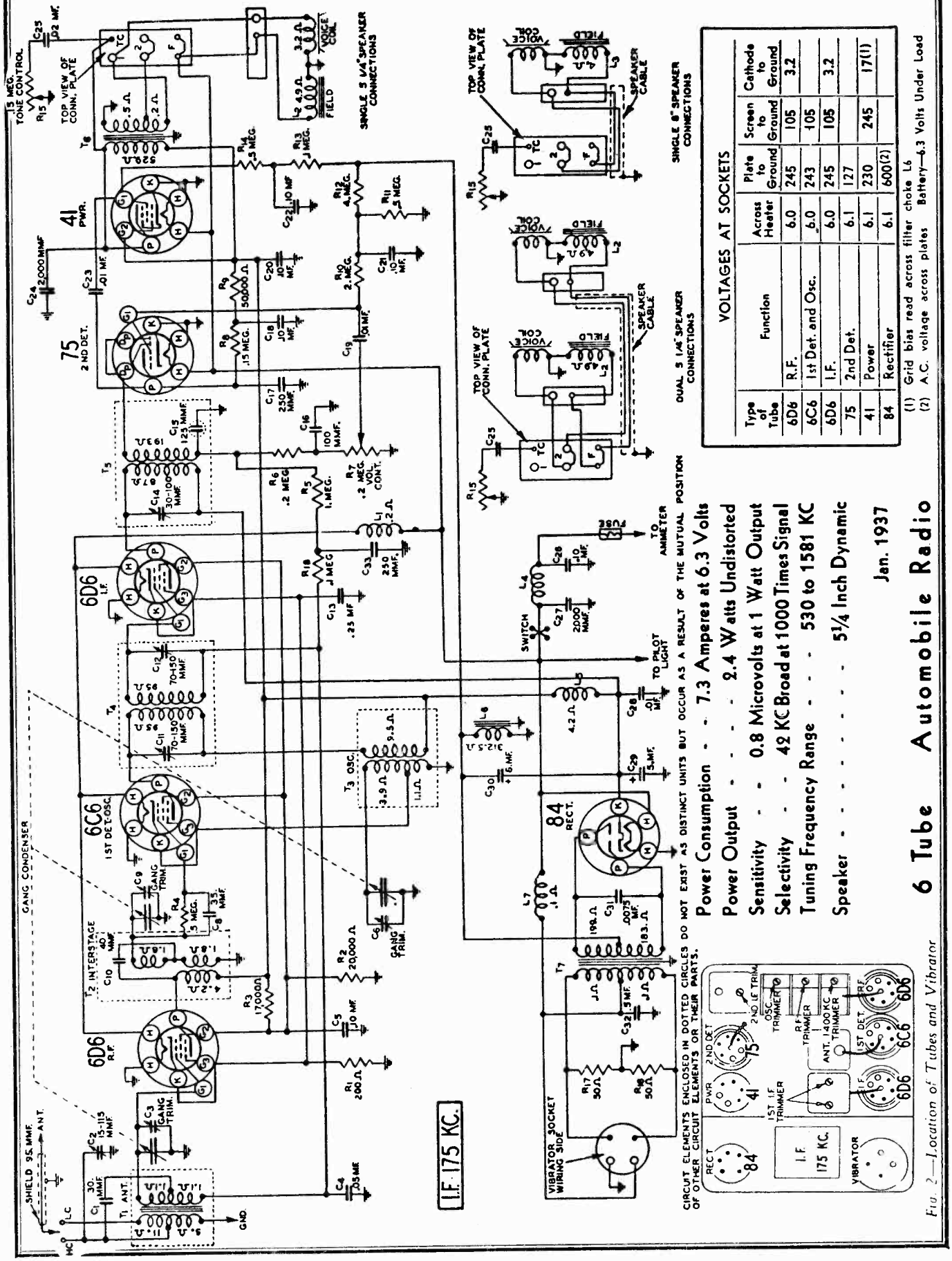
WITH SWITCH MOUNTED EXTERNALLY

2A58	Phono Switch	.70
2A13	Phono Jack	.10
18A180	Switch Knob	.10
4X169	One Set of "P" and "R" Stickers	.10
	21" 8st-G Shielded Steering 5/16" Inside Diameter	.65
	72" 749-S No. 22 Solid Wire (Red-White)	.10
	48" 749-S No. 22 Solid Wire (White)	.10
	48" 749-S No. 20 Stranded Wire (Black)	.10

Prices Subject to Change Without Notice

MODEL 62-263

MONTGOMERY-WARD & CO.



CIRCUIT ELEMENTS ENCLOSED IN DOTTED CIRCLES DO NOT EXIST AS DISTINCT UNITS BUT OCCUR AS A RESULT OF THE MUTUAL POSITION OF OTHER CIRCUIT ELEMENTS OR THEIR PARTS.

VOLTAGES AT SOCKETS

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground
6D6	R.F.	6.0	245	105	3.2
6C6	1st Det. and Osc.	6.0	243	105	
6D6	I.F.	6.0	245	105	3.2
75	2nd Det.	6.1	127		
41	Power	6.1	230	245	17(1)
84	Rectifier	6.1	600(2)		

(1) Grid bias read across filter choke L6
(2) A.C. voltage across plates Battery—6.3 Volts Under Load

Fig. 2—Location of Tubes and Vibrator

MODEL 62-263

MONTGOMERY-WARD & CO.

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

Connect the output of the signal generator through a .05 mf. condenser to the stator of the R.F. interstage section of the tuning condenser. (See Fig. 2 for location of this section.)

Connect the ground lead of the signal generator to the chassis. The chassis should be in the case.

Set the volume control at the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the three I.F. trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1581 KC Adjustment

Set the signal generator for 1581 KC.

Turn the rotor of the tuning condenser to the full open position.

Insert the antenna plug with the mark on the high capacity (HC) side. Connect the shielded antenna lead from the chassis through a 120 mmf. condenser to the antenna post of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained—see Fig. 2 for location of this trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the R.F. interstage and antenna 1400 KC trimmers for maximum output.

Do not change the setting of the oscillator trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Tune in this signal and adjust the 600 KC antenna trimmer to maximum (See Fig. 3 for location of this trimmer).

After the alignment procedure is completed, the antenna plug may be withdrawn and reinserted on the LC side if a low capacity (70 mmf.) car antenna is used.

Adjusting Antenna 600 KC Trimmer

After the radio is installed and the car antenna is connected, it will be necessary to readjust the antenna trimmer. Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 3 for location of this trimmer.

Calibrating the Radio

To calibrate the radio, tune in a station of known frequency. At the back of the control head is the calibration screw. Remove the pilot lamp assembly. Hold the tuning knob. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received.

A very short insulated screwdriver will be helpful.

Inserting Antenna Plug

IMPORTANT—The antenna plug can be inserted in two ways depending on whether the antenna is of high or low capacity.

If the total capacity of the antenna and shielded lead is approximately 200 mmf., which would be the case in a running board or ordinary roof antenna (not metal roof), insert the antenna plug with the mark on the HC side—See Fig. 3.

If the total capacity of the antenna and shielded lead is approximately 70 mmf., such as may be the case if a "fish pole" antenna is used, insert the antenna plug with the mark on the LC side.

The 1936 Chrysler Motors cars (except Plymouth—but including Chrysler, Dodge and DeSoto) have a steel roof, separated from the body proper, which is used as an antenna. The capacity of these antennas is about 1500 mmf. If this radio is installed in these cars, it will be necessary to use a running board or "fish pole" antenna.

Most 1937 General Motors cars are equipped with an antenna built into the running board which is insulated from the body proper.

If a running board or under-car antenna is used, it must be one which is covered with a suitable insulation, to prevent short circuiting in wet weather.

The "B" issue of this series of auto radio receivers has several changes incorporated in it and its data differ

This issue can be identified by the issue letter which is stamped on the top of the chassis base and on the tube layout label on the chassis case cover. Specify this letter if parts be ordered.

The gang condenser used in the new issue does not have the cut-plate oscillator section. The new part number for the gang condenser is 14A77. A padding condenser (600 kc) was added in series with the oscillator section of this gang condenser and the oscillator coil. The padder is a part of the 2nd i-f trimmer unit and is mounted in the coil can. In other words, the 30-100 mmf condenser, C-14, and the new 900-1300-mmf condenser are mounted in the same can and have a part number 17A79.

The capacity C-15 shown within a dotted circle on the schematic in the 2nd i-f coil assembly, has been changed to an actual part and has a part number 47X57.

The following parts have been changed in the late issue and below will be found the new parts numbers:

T1 Antenna Transformer and Can Assembly 9A859
T2 R-f Transformer and Can Assembly 9A860
T3 Oscillator Coil and Can Assembly 9A862
T5 2nd I-F Transformer and Can Assembly 9A858

The 2000-mmf molded condenser in the plate circuit of the 41 output tube has been changed, to a 0.002-mf, 1000-volt tubular condenser, Part No. 46X-219. A 15-ampere fuse is now used instead of one rated at 20 amperes. The 25-inch volume or tuning control flexible drive shaft has been changed, the Part No. now being 18A49. The changes in this last paragraph apply to all issues receivers; not just the "B" issue like those above.

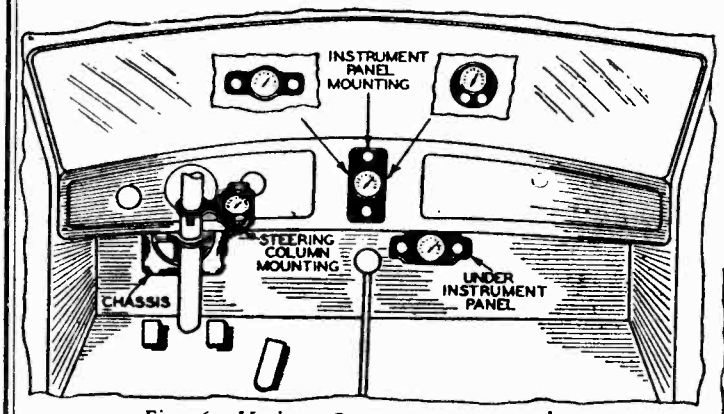


Fig. 6—Various Control Head Mountings

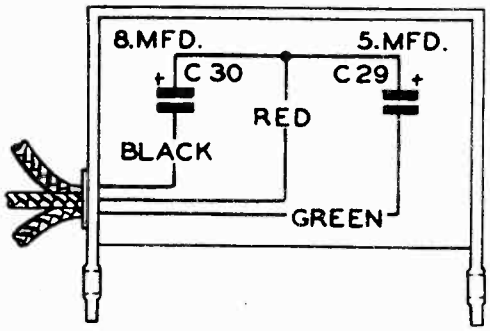


Fig. 5—Condenser Block—Internal Wiring

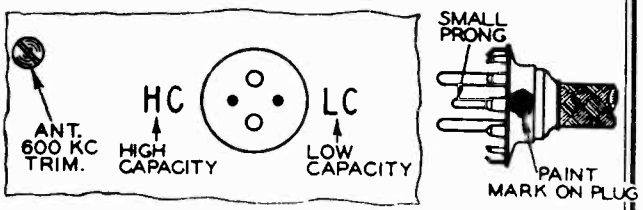


Fig. 3—Antenna Plug Insertion

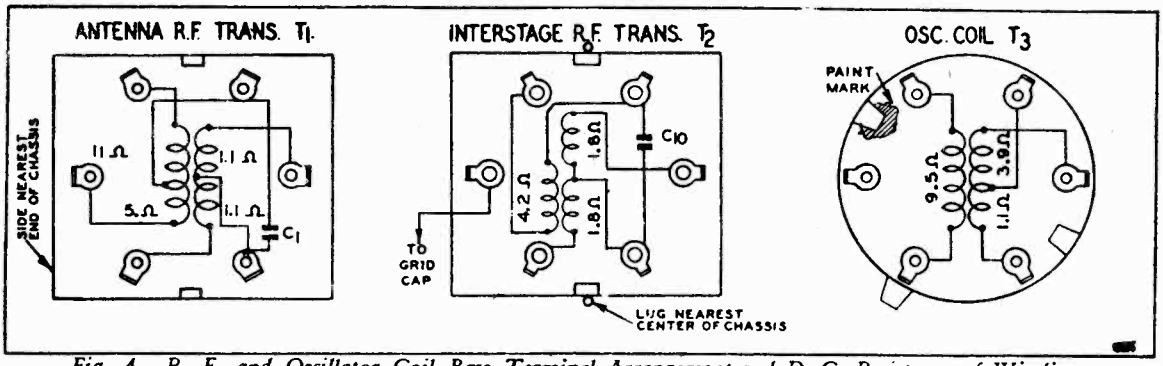
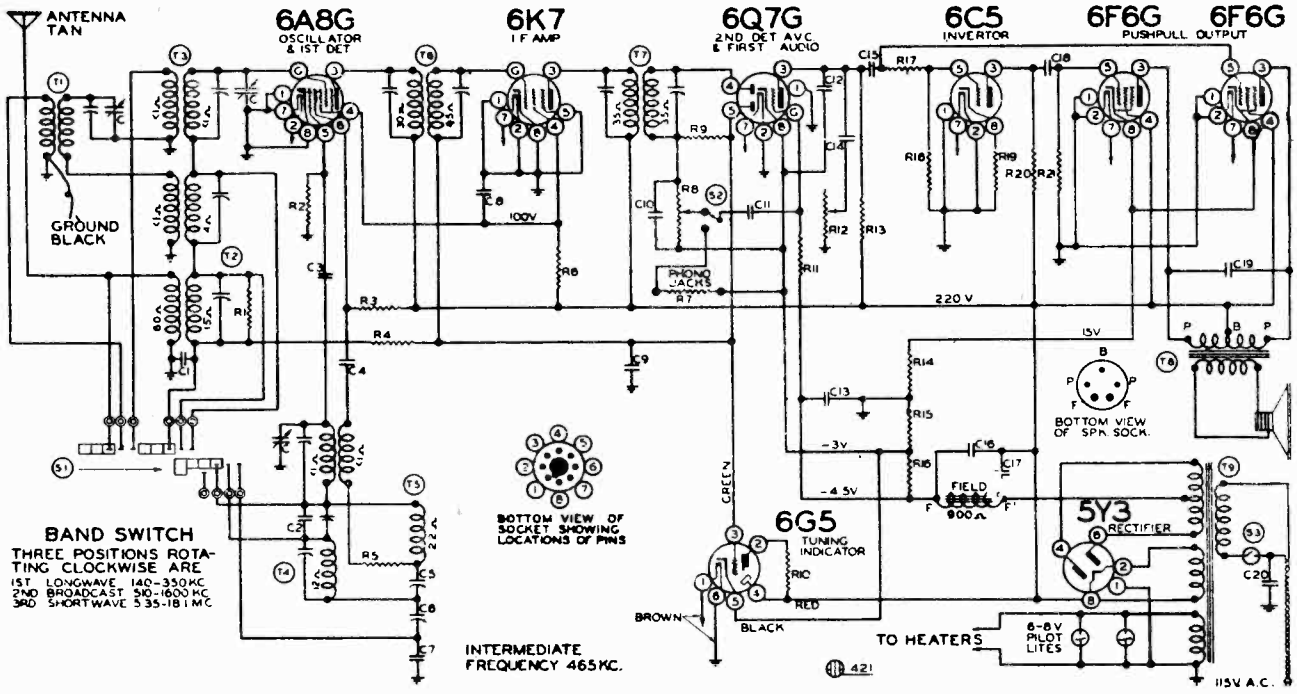


Fig. 4—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

MONTGOMERY-WARD & CO.



PARTS

R-1	130-3		500M Ohm
R-2	130-12		50M Ohm
R-3	130-48		15M Ohm
R-4	130-103		100M Ohm
R-5	130-27		50 Ohm
R-6	130-96		25M Ohm
R-7	130-103		100M Ohm
R-8	101-74	Volume Control	1 meg Ohm
R-9	130-4		3 meg Ohm
R-10	130-110	In Tuning Indicator Socket	1 meg Ohm
R-11	130-4		3 meg Ohm
R-12	101-75	Tone Control	300M Ohm
R-13	130-103		100M Ohm
R-14	106-37	Resistor Strip	250 Ohm
R-15	106-37	Resistor Strip	42 Ohm
R-16	106-37	Resistor Strip	20 Ohm
R-17	130-163		400M Ohm
R-18	130-103		100M Ohm
R-19	130-22		5M Ohm
R-20	130-12		50M Ohm
R-21	130-100		150M Ohm

NOTE—R-14, R-15, and R-16 in one unit, part 106-37

C	102-47	3 Gang Variable	
C-1	100-22		.05
C-2	129-67	Mica	.00004
C-3	129-39	Mica	.00005
C-4	100-12		.003
C-5	124-31	Adj. Padder	300 mmf.
C-6	124-32	Adj. Padder	565 mmf.
C-7	129-54	Mica	.003
C-8	100-39		.1
C-9	100-22		.05
C-10	129-5	Mica	.0001
C-11	100-11		.01
C-12	129-2	Mica	.0005
C-13	100-20		.1
C-14	100-57		.006
C-15	100-26		.02
C-16	103-14	Lytic Filter	16 mfd.
C-17	103-6	Lytic Filter	8 mfd.
C-18	100-26		.02
C-19	100-12		.003
C-20	100-61	(Bakelite Case, Type)	.02

T-1	111-62	B.C. Pre Selector
T-2	111-61	L.W. Ant. Coil Assembly
T-3	111-64	B.C. S.W. Ant. Coil Assembly.
T-4	110-49	B.C. S.W. Osc. Coil Assembly
T-5	110-47	L.W. Osc. Coil Assembly
T-6	108-105	Input I.F. — 465 K.c.
T-7	108-106	Output I.F. — 465 K.c.
T-8	114-66	6" Dynamic Speaker (900 Ohm Field)
T-9	104-96	Power Transformer 40 Cycle—Universal
S-1	125-17	Band Switch
S-2	125-22	Phono Switch
S-3		On-Off Switch on Volume Control

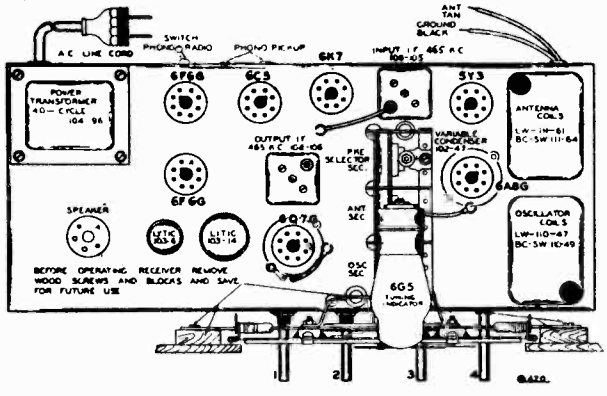


FIG. 1—TOP VIEW

MODEL 62-266

MONTGOMERY-WARD & CO.

BAND	DIAL SCALE	FREQUENCY RANGE
Long Wave	Outer Scale	350 to 140 K.C. (Kilocycles) 860-2150 Meters
Medium Wave	Center Scale	1600 to 510 K.C. (Kilocycles) 187-588 Meters
Short Wave	Inner Scale	18.1 to 5.35 M.C. (Megacycles) 16.5-56.5 Meters

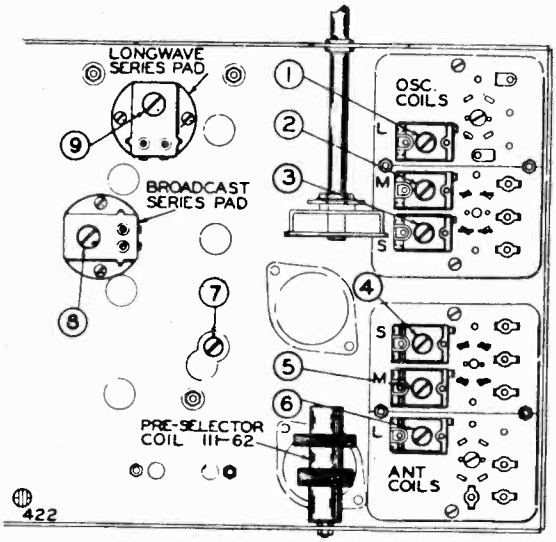


FIG. 3—BOTTOM VIEW SHOWING TRIMMERS

DUMMY ANTENNAS:

The following dummy antennas are used in aligning the receiver, and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Medium and long wave) — Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.) (645.1 METERS)

Part No. 108-106 Output I.F. Transformer
Part No. 108-105 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the medium position, (center of its rotation), and with the variable condenser set to minimum capacity make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with 'Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-106) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6A8G and adjust input I.F. transformer (No. 108-105) to resonance.

SHORT WAVE BAND ALIGNMENT:

16.5 Meters (18.1 Mc) to 56.5 Meters (5.35 Mc).

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles (17.6 meters) and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles (17.6 meters) and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 4) to resonance.
   (b) Re-set external oscillator to 6 megacycles (50 meters) and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles (16.5 meters) and 5.3 megacycles (56.5 meters) for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 17 megacycle signal appears near 16.1 megacycles.

MEDIUM BAND ALIGNMENT:

588 Meters (510 K.C.) to 187 Meters (1600 K.C.)

1. With band changing switch in the medium wave position, center of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments.
   (a) Set external oscillator to 187 meters (1600 K.C.) and adjust medium wave oscillator trimmer to resonance (adjustment number 2; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 214 meters (1400 K.C.), rotate variable gang condenser and pick up signal. Adjust medium wave antenna trimmer (Adjustment number 5) to resonance; also adjust preselector trimmer condenser to resonance, (Adjustment number 7; see Bottom View, Fig. 3).
   (c) Re-set external oscillator to 500 meters (600 K.C.), and adjust medium wave series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3, Adjustment 8).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 300 meters (1000 K.C.) **Under no circumstances bend plates of variable condenser sections to correct tracking.**

IMPORTANT: This band must be completely rechecked after the long wave band has been adjusted.

LONG WAVE BAND ALIGNMENT:

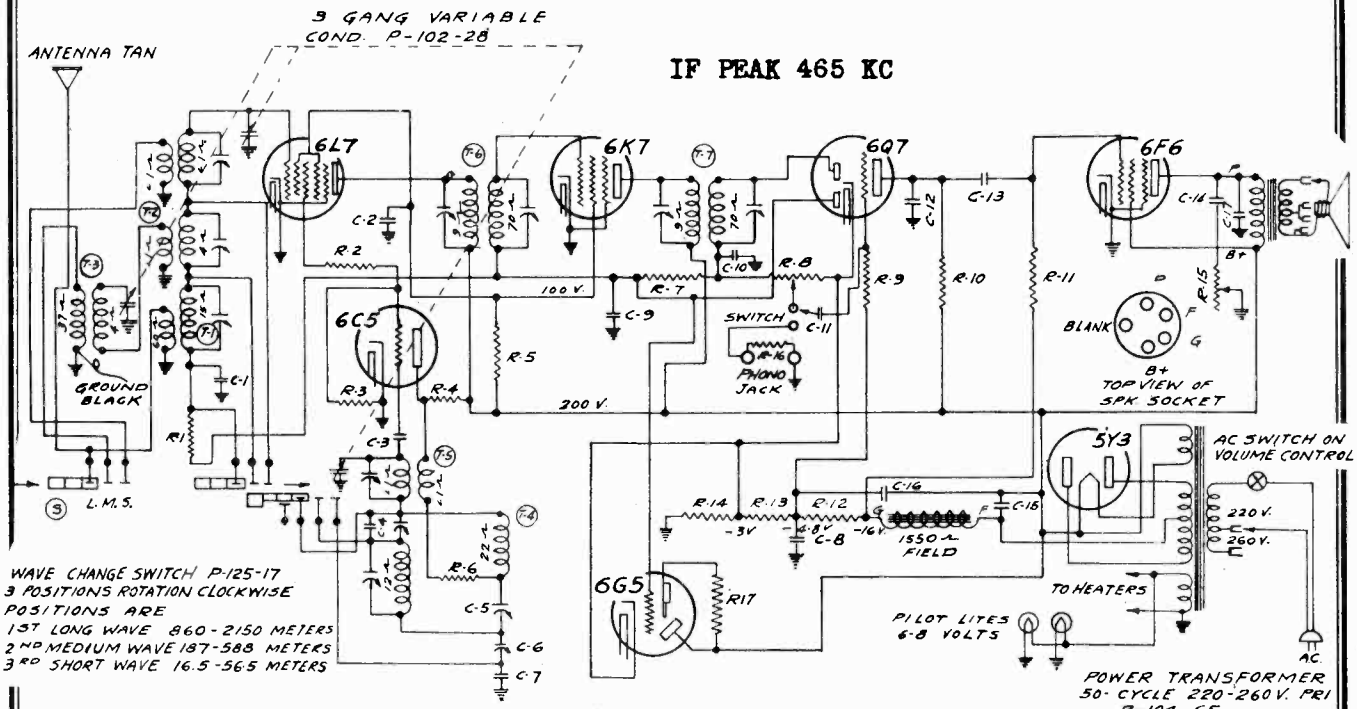
860 Meters (350 K.C.) to 2150 Meters (140 K.C.)

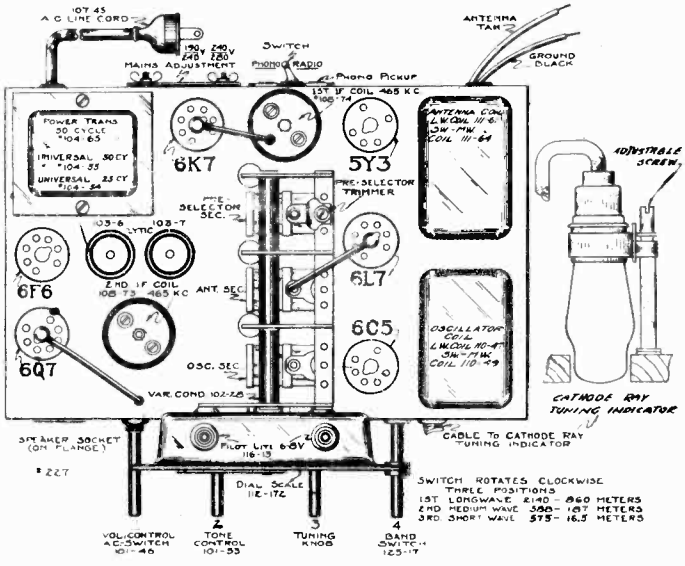
1. With band changing switch in the long wave position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 860 meters (350 K.C.), and adjust long wave oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 925 meters (325 K.C.), rotate variable gang condenser and pick up signal. Adjust long wave antenna trimmer (Adjustment number 6) to resonance.
   (c) Re-set external oscillator to 2000 meters (150 K.C.), and adjust long wave series pad to resonance by rotating condenser to approximately 2000 meters, rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3, Adjustment 9).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

IMPORTANT: This band must be completely rechecked after the medium wave band has been rechecked.

MONTGOMERY-WARD & CO.

MODEL 62-269





TOP VIEW—FIG. 1

DIAL PARTS LIST

ASSEMBLIES

117-41 Drive Bracket including:
1—No. 117-19—Tuning Shaft Bushing

117-66 Switch Disc and Link Assembly, including:
1—No. 117-12 —Switch Arm
1—No. 117-35 —Bushing with Screws
1—No. 117-40B—Switch Link
3—No. 131-26 —Spring Washers
3—No. 162-5 —Rivets
1—No. 112-144 —Switch Dis.—Inc. Red Tape

DIAL PARTS ONLY

112-125 Drive Belt
112-143 Oval Escutcheon complete with Celluloid Crystal
112-172 Dial Scale comp. with Fastener, Pointer Disc, & Screw
112-147 Tuning Shaft
112-151 Pointer complete with Screw
112-156 Pilot Light Assembly
116-13 6.8 Volt T-51 Pilot Light
117-20A Tuning Shaft Pulley
117-38 Stud, for take-up Spring
117-39 Pulley, for take-up Spring
120-14 Take-up Spring
134-9 Horse Shoe Washer
134-40 Rubber Grommet

233

No.	Part No.	Description
		RESISTORS
R1	130-103	100M Ohm—½W—10%— 50V—Carbon
R2	130-105	150. Ohm—½W—20%— 10V—Carbon
R3	130-117	50M Ohm—1/10W—20%— 20V—Carbon
R4	130-104	9M Ohm— 1W—20%—100V—Carbon
R5	130-34	19M Ohm— 1W—20%—100V—Carbon
R6	130-27	50 Ohm—½W—20%— 3V—Carbon
R7	130-19	1 meg Ohm—½W—20%—100V—Carbon
R8	101-46	1 meg Ohm—Volume Control
R9	130-4	3 meg Ohm—½W—20%—100V—Carbon
R10	130-103	100M Ohm—½W—10%— 50V—Carbon
R11	130-102	500M Ohm—½W—10%— 50V—Carbon
R12	106-26	220 Ohm—Muter Strip
R13	106-26	33 Ohm—Muter Strip
R14	106-26	52 Ohm—Muter Strip
R15	101-53	Tone Control (50M Ohms)
R16	130-103	100M Ohm—½W—10%— 50V—Carbon
R17	130-110	1 meg Ohm—1/10W—20%—100V—Carb.

NOTE: R12, R13, and R14 in one unit—part No. 106-26

CONDENSERS

C1	100-22	.05 x 200 Volt—25%
C2	100-20	.1 x 200 Volt—25%
C3	129-39	.00005 Mica—MT—O—20%
C4	129-67	.00004 Mica—MT—O—10%
C5	124-31	Series Pad 300 mmf. Working Cap'y.
C6	124-32	Series Pad 565 mmf. Working Cap'y.
C7	129-54	.003 Mica—MW—W—2½%
C8	100-20	.1 x 200 Volt—25%
C9	100-22	.05 x 200 Volt—25%
C10	129-12	.00025 Mica—MT—O—20%
C11	100-11	.01 x 400 Volt—25%
C12	129-12	.00025 Mica—MT—O—20%
C13	100-11	.01 x 400 Volt—25%
C14	100-27	.025 x 600 Volt—25%
C15	103-6	8 mfd. x 350 Volt Electrolytic
C16	103-7	8 mfd. x 300 Volt Electrolytic
C17	100-25	.002 x 600 Volt—20%

MISCELLANEOUS PARTS

T1	111-61	Long Wave Antenna Coil
T2	111-64	Medium Wave & Short Wave An. Coil
T3	111-62	Antenna Preselector Coil
T4	110-47	Long Wave Oscillator Coil
T5	110-49	Med. Wave & Short Wave Osc. Coil
T6	108-74	Input I.F.—465 Kc.
T7	108-73	Output I.F.—465 Kc.
S	125-17	Band Switch

TUNING RANGE—

Long Wave Band
860-2150 Meters
350-140 Kilocycles

Medium Wave Band
187-588 Meters
1600-510 Kilocycles

Short Wave Band
16.5-56.5 Meters
18.2-5.3 Megacycles

MODEL 62-269

MONTGOMERY-WARD & CO.

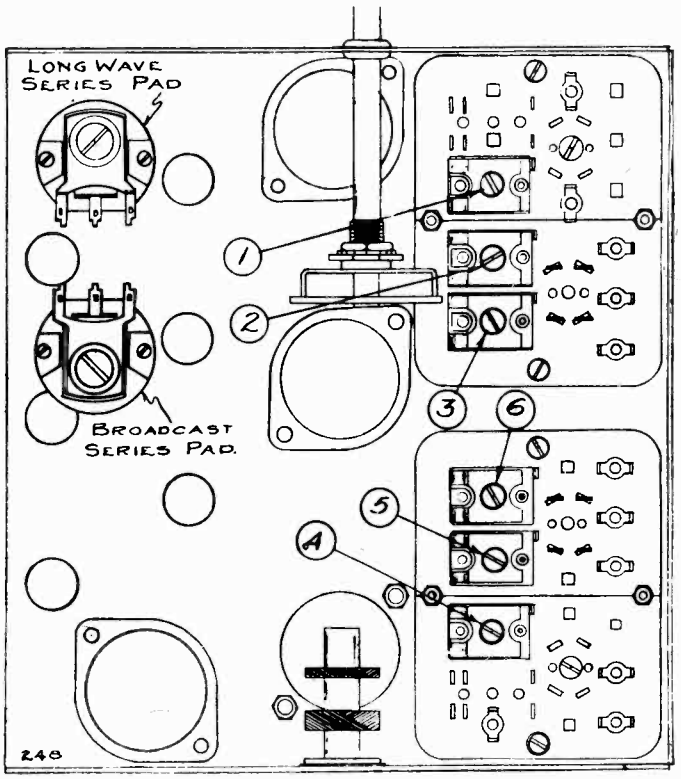


FIG. 2—BOTTOM VIEW (Showing Trimmers)

7-Tube Including Cathode-Ray Tuning Indicator 3-Band A. C. Superheterodyne Receiver

190-280 Volts 50 Cycles A. C.

POWER SUPPLY:

This receiver is normally supplied with a transformer for operation on 50 cycles (may be higher in frequency, not lower) and with a primary designed for operation on 190-280 volts.

Mains transformer is provided with two taps, one for voltages 190-240 volts another for voltages 240-280 volts. These taps are accessible upon removing plate fastened with two wing nuts to back of chassis.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 25 and 50 cycles and with primary taps for 108, 127, 150, 225 and 260 volts (see illustrations).

Should the receiver be equipped with a special transformer, connect primary tap on voltage terminal which corresponds as nearly as possible to the actual mains voltage.

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 220 volts on the primary of the power transformer.

With special transformers select primary tap nearest to actual mains voltage at time voltage measurements are to be made.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

ALIGNING INSTRUCTIONS
Dummy Antennas

The following dummy antennas are used in aligning the receiver, and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast and long wave)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

TEST FREQUENCIES USED

	Kilocycles	Meters
I. F.	465	645.1
Long Wave	150	2000
	350	860
	325	925
Broadcast	600	500
	1400	214
	1600	187
Short Wave	6000	50.0
	17000	17.6
	18200	16.5

Resonance Indicator:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 6F6 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

CAUTION:

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the four bolts by which it is fastened.

ALIGNING I.F. TRANSFORMERS
(465 K.C.) (645.1 Meters)

Part No. 108-73 Output I.F. Transformer.
Part No. 108-74 Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (center of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-73) to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer (No. 108-74) to resonance.

   (c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-73) if necessary.

ALIGNMENT PROCEDURE

The following adjustments to be made after the I.F.'s ave been aligned as explained above.

SHORT WAVE BAND ALIGNMENT:
16.5 Meters (18.2 Mc.) to 56.5 Meters (5.3 Mc.)

With band changing switch in the short wave position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:

(a) Set external oscillator to 16.5 meters (18.2 Mc.) and adjust short wave oscillator trimmer (adjustment number 3, see Fig. 2) to resonance.

(b) Re-set external oscillator to 17.6 meters (17.0 Mc.) and pick up signal by rotating gang condenser. Adjust short wave antenna trimmer (adjustment number 6) to resonance.

(c) Re-set external oscillator to 50 meters (6.0 Mc.) and check for sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 18.3 megacycle signal appears near 17.4 megacycles.

MEDIUM OR BROADCAST BAND ALIGNMENT:
188 Meters (510 K.C.) to 187 Meters (1600 K.C.)

With band changing switch in the medium wave position, center of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:

(a) Set external oscillator to 187 meters (1600 K.C.) and adjust medium wave oscillator trimmer to resonance (adjustment number 2, see bottom view of coil assembly. Fig. 2.)

(b) Re-set external oscillator to 214 meters (1400 K.C.), rotate variable gang condenser and pick up signal. Adjust medium wave antenna trimmer (Adjustment number 5) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)

(c) Re-set external oscillator to 500 meters (600 K.C.), and adjust medium wave series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 2.)

(d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

(e) Check for tracking and sensitivity at 300 meters (1000 K.C.) Under no circumstances bend plates of variable condenser sections to correct tracking.

IMPORTANT: This band must be completely rechecked after the long wave band has been adjusted.

LONG WAVE BAND ALIGNMENT:
860 Meters (350 K.C.) to 2150 Meters (140 K.C.)

With band changing switch in the long wave position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:

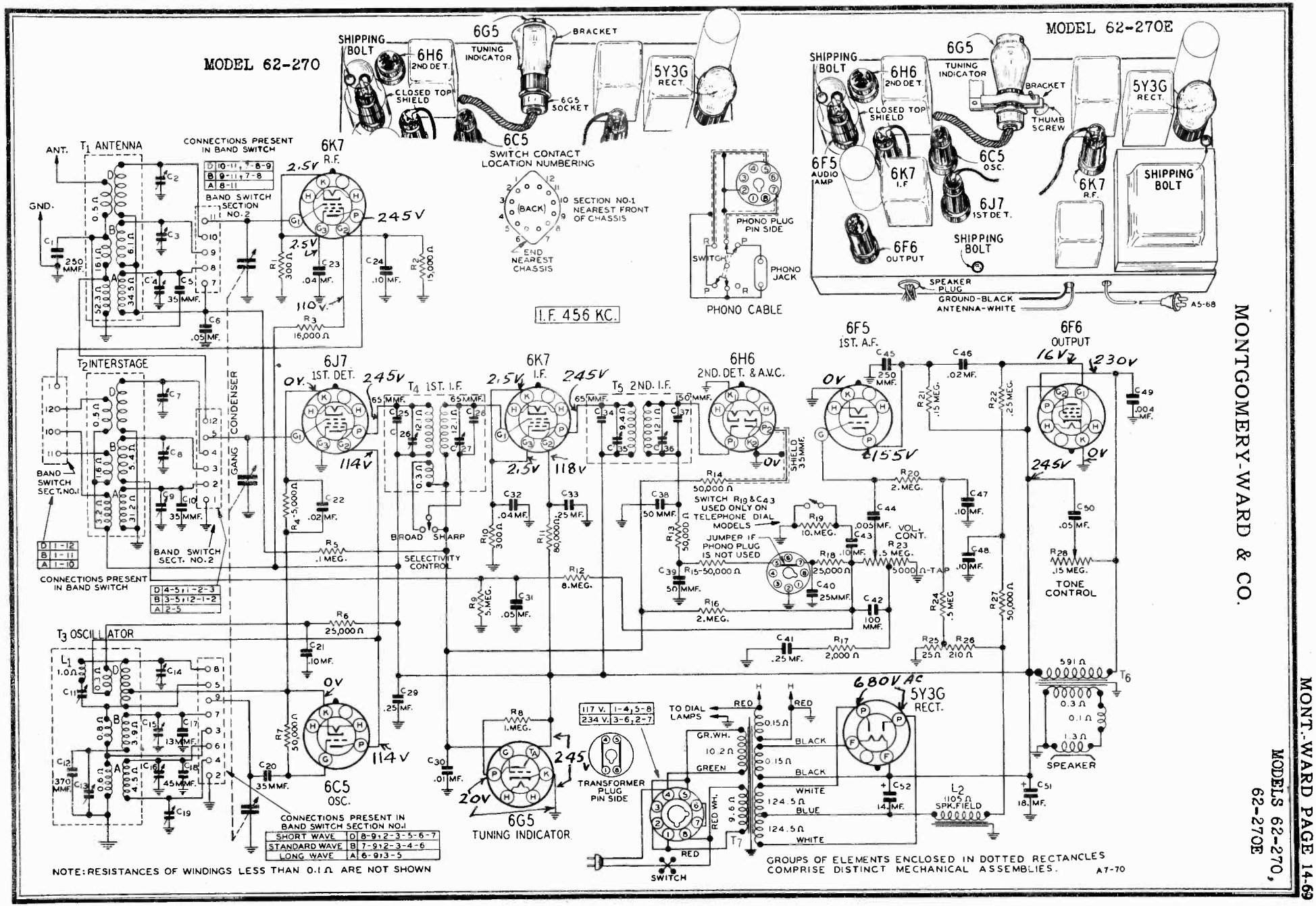
(a) Set external oscillator to 860 meters (350 K.C.), and adjust long wave oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly. Fig. 2.)

(b) Re-set external oscillator to 925 meters (325 K.C.), rotate variable gang condenser and pick up signal. Adjust long wave antenna trimmer (Adjustment number 4) to resonance.

(c) Re-set external oscillator to 2000 meters (150 K.C.), and adjust long wave series pad to resonance by rotating condenser to approximately 2000 meters, rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 2.)

(d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

IMPORTANT: This band must be completely rechecked after the medium wave band has been rechecked.



MODELS 62-270, 62-270E ALIGNMENT

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position 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.

NOTE A—In sets using the telephone dial tuning, there will be seen inside the telephone dial button ring an escutcheon plate held in place by four screws. Loosen the 2 screws nearest the pointer. An extension of the pointer will be seen protruding over the edge of this escutcheon plate. Move the pointer to the 1500 KC mark on the dial and then tighten the 2 escutcheon screws. (Do not tighten these screws too much.)

In sets using a pointer or any other type of dial mechanism, it will be necessary to adjust the position of the indicator until it is at the 1500 KC mark

THIS NOTE "A" APPLIES TO MODEL 62-270

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I.F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C35) & (C36)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C26) & (C27)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE A							
380 KC	Range A	200 mmf.	380 KC	Antenna Lead	Oscillator Range A (C16)	Turn Rotor to Full Open	Adjust to Maximum Output
350 KC	Range A	200 mmf.	350 KC	Antenna Lead	Int. Range A (C9) Antenna Range A (C4)	Turn Rotor to Max. Output	Adjust to Maximum Output
165 KC	Range A	200 mmf.	165 KC	Antenna Lead	165 KC (C19)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C15)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	Ant. Range B (C3) Int. Range B (C8)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C13)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE D							
19,800 KC	Range D	400 Ohm	19,800 KC	Antenna Lead	Oscillator Range D (C14)	Turn Rotor to Full Open	Adjust to Maximum Output
16,000 KC	Range D	400 Ohm	16,000 KC	Antenna Lead	Ant. Range D (C2) Int. Range D (C7)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
6000 KC	Range D	400 Ohm	6000 KC	Antenna Lead	6000 KC (C11)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—Loosen the two set screws in the hub of the film drum assembly pulley. Turn the film drum until it is at the 1500 KC mark on the dial and then tighten the two pulley set screws. (On later models, the film drum can be turned without loosening the set screws.)

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

Special Note on Calibration—Movie Dial Sets

If, after following the above procedure, the red line on the screen does not intersect the proper call letters when a station is tuned in, proceed as follows:

(1) Tune in any station between 530 KC and approximately 900 KC on the dial. After the station is tuned in, adjust the position of the film drum, as explained above under Note A, until the line on the screen crosses the call letters of the station tuned in. Modify this adjustment if necessary until all stations between *530 KC and approximately 900 KC* are tuned in with some part of their call letters touching the vertical line on the screen.

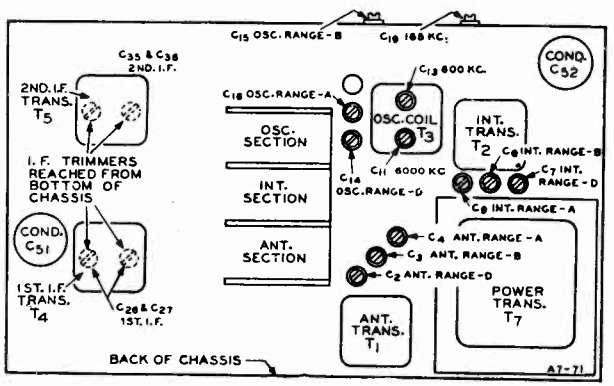
(2) Set the signal generator for exactly 1500 KC. Turn the tuning knob until the line on the screen is at the 1500 KC mark. Then adjust the oscillator Range B trimmer until the signal is tuned in to maximum output.

(3) Adjust the antenna and interstage Range B trimmers to maximum output at 1500 KC.

(4) Check the 600 KC adjustment for maximum output.

Calibration should now be substantially correct over the entire dial. If it is not, repeat the above procedure.

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC on the dial. It may be necessary to increase the input signal to hear the image.



Replacing and Positioning the Dial Lamp

Caution—If a new lamp is required, use only a No. 81 lamp, Wards catalogue No. 61-8204.

Turn the radio off and turn the band switch to the standard wave position.

Remove the lamp housing by unscrewing and removing the two screws which hold this housing in place—See Fig. 1.

Remove the old lamp from the housing. It will be necessary to depress the contact plug retaining spring which will be seen in the narrow slot near the upper end of the housing and pull the plug out a slight amount from the housing, in order to remove the lamp. Replace the lamp and push the plug down until the locking spring snaps into place.

Replace the lamp housing by means of the two screws, but do not tighten these screws yet.

Turn the radio on.

Then grasp the top of the lamp housing assembly and move it up or down until the image on the screen is clearest and the lines are horizontal. The effect of having the lamp assembly too high or low is shown in the illustration in the instruction book. Tighten the two screws.

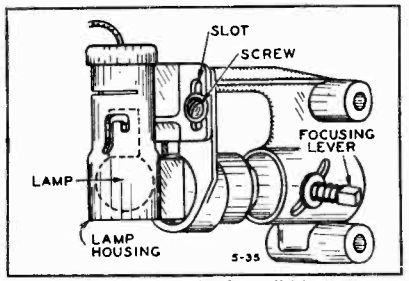


Fig. 1—Adjusting Lamp Height

Calibrating the Radio

To calibrate the movie dial radios, tune in a station of known frequency between 530 and 900 KC. In the early models loosen the two set screws in the hub of the film drum pulley. Turn the film drum until it is at the correct kilocycle mark on the dial scale and then tighten the pulley set screws.

In the case of later models, the film drum is held in position by a friction washer which will be seen under the drum. In these models, the film drum can be turned without loosening the set screws.

Replacing Film

Turn the band switch to the standard wave position. Then remove the lamp housing (See article "Replacing and Positioning the Dial Lamp").

Unscrew and take out the six screws spaced around the edge of the film drum casting. Then carefully lift the edge of the film nearest the back of the chassis. At the same time, lower the opposite edge of the film and slide it in toward the center of the film drum casting. (On two band radios, it will be necessary to lift the lens assembly as high as it will go while removing the film.) When the film clears the lens, it may be lifted out.

To replace the film, reverse the above procedure. Make certain that the entire lower edge of the film rests on the shoulder near the bottom inside the film drum. The radio is calibrated as described in the article under that name in this manual.

Adjusting Height of Image on Screen

The image height should be so adjusted that the complete image for each band will appear on the screen.

If any portion of the image on any band is cut off, turn the radio on and turn the band switch to the 2nd short wave (green) position. Loosen the two set screws of the lever arm on the band switch shaft. This lever arm is connected to the bakelite strip which in turn moves the lamp assembly height mechanism.

Turn the tuning knob until the high frequency end (22.0 MC) of the band is reached. Move the lever arm until the megacycle line is lined up with the letter "W" of the word "West" at either side of the glass screen. Tighten the set screws.

The image height should then be correct for the other two bands.

Replacing Film Drum Cable

Remove the screen panel as follows: Unhook spring on end of cord from condenser drive drum. This can be done with a pair of long nose pliers. Then remove the cord from the drive drum and drive shaft. The other end of the cord may be left fastened to the drive drum. Take out the glass screen by loosening the two screws which hold it in place. Then remove the four screws which hold the panel in place. There are two at the bottom and two under the projector compartment. The panel may now be taken off. It is not necessary to remove the tone and volume indicator cords or collars.

Remove the old film drum cable, unsoldering it from pulley "F" at point "S" on early models, or from the pin on later models—See Fig. 2.

Close the gang condenser completely and arrange to hold it in this position while replacing the cable.

Now insert one end of the new cable in hole "B" of condenser drive drum "A" which will be in the position shown in Fig. 2. Bring the cable down and around ½ turn in the film cable groove in the drum, progressing in a clockwise direction, passing it over pulley "C."

Extend the cable horizontally toward the back of the chassis passing it through the groove on the left side of pulley "D" and through the groove on the right side of pulley "E." (See Fig. 2 view from front.)

Place pulley "F" in the position shown in the back view in Fig. 2, with the slot "H" nearly parallel with the back of the chassis. Continue the cable from pulley "E" to the slot on the right side (from back) of pulley "F" keeping the cable in the upper part of the groove in the pulley. The cable should rest on about ⅛ inch of the pulley surface before entering slot "G."

Insert the cable in slot "G" and continue down and out through slot "H" at point "K." If pulley "F" is the later type, wrap the cable once around the pin as shown at "J" in Fig. 2.

Wind the cable one complete turn around pulley "F" keeping it below the cable on the right side and above the cable on the left side. Now extend the cable horizontally to pulley "L" and down to the film cable groove in condenser drive drum "A." To provide slack in cable, remove it from pulley "D" and then insert end of cable in slot "M." Replace cable on pulley "D." Care should be taken not to nick or make a sharp bend in the cable as it may be damaged.

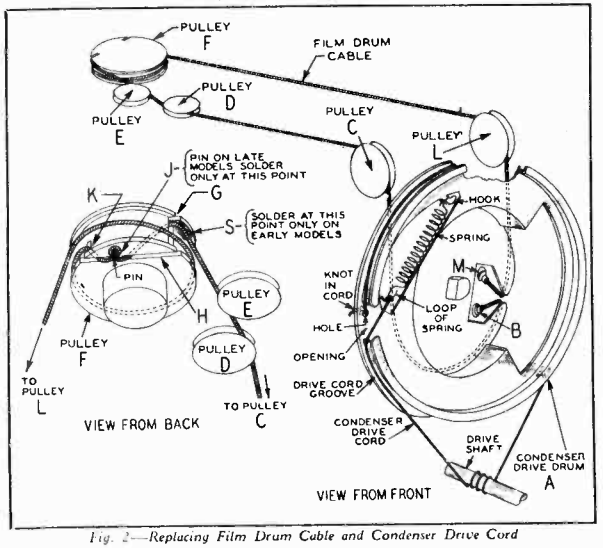


Fig. 2—Replacing Film Drum Cable and Condenser Drive Cord

FOR FURTHER DATA ON MOVIE DIAL DRIVE, SEE VOL. VIII

Now solder the cable to the pin on pulley "F" on late models, or solder the cable to the pulley at point "S" on early models.

Replace the screen panel on the chassis. Also replace the drive cord according to the steps given in the article "Replacing Condenser Drive Cord," and calibrate the dial as explained in the article "Calibrating the Radio."

Replacing Condenser Drive Cord

Remove the old cord and spring. Tie one end of the new cord to the spring. Turn the gang condenser until it is completely closed. This will bring the opening in the groove of the condenser drive drum to the left side (from front).

Insert the other end of the cord through the small hole on the edge of the drum near the opening in the groove—See Fig. 2. Tie a knot in the cord on the back side of the drum as illustrated. This knot should be tied so that the length of the cord from the hole in the drum to the point at which the cord is tied to the spring will be $16\frac{3}{16}$ inches.

Now open the gang condenser about ¾ of the way. (The illustration shows the position of the condenser drive drum with the gang condenser completely closed.). Stand the chassis on end so that the right side (from front) is up. Place the cord in the groove of the drum and bring the spring end of the cord down to the right side of the drive shaft. Wind the cord 3½ turns on the drive shaft progressing toward the back of the chassis—See Fig. 2.

Bring the cord up to the drive drum and place it in the groove of the drum. Wind the cord approximately ½ turn around the drum, up to the opening in the groove. Using a pair of long nose pliers, place the loop on the spring over the hook in the drum.

The cord wound on the drive shaft should be in line with the condenser drive drum when the condenser is half open.

MODELS 62-354, 62-524

MONTGOMERY-WARD & CO.

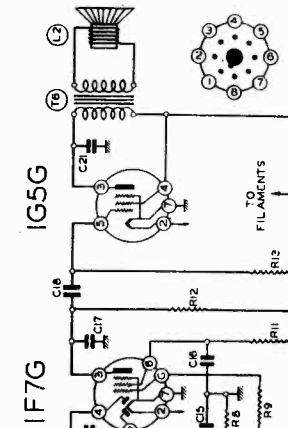


FIG. 1—TOP VIEW

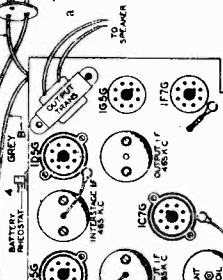


FIG. 3—BOTTOM VIEW SHOWING TRIMMERS

PARTS

T1	111-99	BC - SW Antenna coil complete
T2	110-80	BC - SW Oscillator coil complete
T3	108-116	Input I.F. Complete - 465 kc.
T4	108-78C	Interstage I.F. Complete - 465 kc.
T5	108-79C	Output I.F. Complete
T6	105-69	Output Transformer
L1	123-3	R.F. "p" Choke
		RESISTORS
R1	130-20	100M ohm - 1/3 w. 20%
R2	130-20	100M ohm - 1/3 w. 20%
R3	130-19	1 megohm - 1/3 w. 20%
R4	130-167	7500 ohm - 1/3 w. 20%
R5	130-85	3000 ohm - 1/3 w. 20%
R6	130-19	1 megohm - 1/3 w. 20%
R7	130-83	300 ohm - 1/3 w. 10%
R8	101-111	250M ohm - volume control
R9	130-72	50M ohm - 1/3 w. 20%
R10	130-168	100 ohm - 1/3 w. 10%
R11	130-19	1 megohm - 1/3 w. 20%
R12	130-11	250M ohm - 1/3 w. 20%
R13	130-19	1 megohm - 1/3 w. 20%
R14	101-112	3.2 ohm - Filament Rheostat
R15	130-19	1 megohm - 1/3 w. 20%
		CONDENSERS
C	102-70	2 gang variable condenser
C1	129-40	.0001 mica 10%
C2	100-22	.05 x 200 v. 25%
C3	129-39	2-20 mmf. Adj. Cond.
C4	129-39	2-20 mmf. Adj. Cond.
C5	129-38	.00005 Mica 10%
C6	100-25	.002 x 600 v. 25%
C7	124-38	580 mmf. Working Capacity Series Pad
C8	128-94	.003 minimum 2-1/2%
C9	100-50	.25 x 200 v. 20%
C10	100-86	.02 x 400 v. 25%
C11	100-59	.05 x 200 v. 25%
C12	100-50	.25 x 200 v. 20%
C13	100-20	.1 x 200 v. 25%
C14	129-3	.00002 Mica 20%
C15	129-60	.00015 Mica 20%
C16	100-20	.1 x 200 v. 25%
C17	129-21	.0005 Mica 20%
C18	100-11	.01 x 400 v. 25%
C19	119-52	25-0 mfd. 25 w.v.
C20	100-50	.25 x 200 v. 20%
C21	100-71	.004 x 600 v. 25%
C22	120-175	.00004 Coupling Capacity
L2	114-115	6" P.M. Speaker
S1	125-48	Band Switch
S2		Off-on switch on volume control - (D.P.D.T.)

All voltages as indicated on diagram, are measured with a new set of batteries.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I. F. TRANSFORMERS: (465 K.C.):

Part No. 108-79C Output I. F. Transformer
Part No. 108-78C Interstage I. F. Transformer
Part No. 108-116 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1 Top View).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to minimum capacity (plates out of mesh), make the following adjustments:

(a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 1D5G 2nd. I.F. Tube and adjust the output I.F. transformer (No. 108-79C) to resonance.

(b) With "Dummy 1" still connected, move oscillator output clip from grid of 1D5G 2nd. I.F. Tube to grid cap of 1D5G 1st. I.F. Tube and adjust interstage I.F. transformer (No. 108-78C) to resonance.

(c) Move oscillator to grid cap of 1C7G and adjust input I.F. transformer (No. 108-116).

SHORT WAVE BAND ALIGNMENT:

5.5 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:

(a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer to resonance.

This adjustment is the trimmer mounted on the top of front section of the variable gang condenser (see Fig. 1, top view).

(b) Adjust short wave antenna trimmer (Adjustment "Z"), to resonance (see Fig. 3, bottom view).

BROADCAST BAND ALIGNMENT:

535 to 1750 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:

(a) Set external oscillator and dial on radio to 1400 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment "Y"), (see bottom view of Chassis, Fig. 3). Tune gang condenser slowly back and forth while making this adjustment.

(b) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment "X") to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the front flange of the chassis. (See bottom view of chassis, Fig. 3)

(c) Repeat adjustment "a" and "b" until sensitivity is at its maximum, also check to see that radio tunes to 1750 K.C.

(d) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are six levers on the dial by means of which six stations may be selected,

Press down any one of the six levers. Holding it down, tune in by means of tuning knob No. 3 any one of your favorite stations. Turn the tuning knob very slowly back and forth until signal is clearest. The station will then be accurately tuned in. Adjust the volume by means of the volume control knob to the desired intensity.

Release this lever and press down any other lever. Hold this lever down and tune in by means of knob No. 3 another favorite station.

Follow this procedure until stations have been set on all the levers.

Rotate the tuning knob (No. 3) to the right (clockwise) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the reset locking adjustment screw "5", (see Fig. 1). It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the levers. (Note: Reset Lock Screw "5" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the reset locking screw "5" four or five complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the locking screw being too tight. Loosen the reset locking screw "5" until the dial mechanism works freely with the tuner lever pressed down).

BE SURE TO RETIGHTEN THE RESET LOCK SCREW, otherwise the stations will not stay adjusted to the levers.

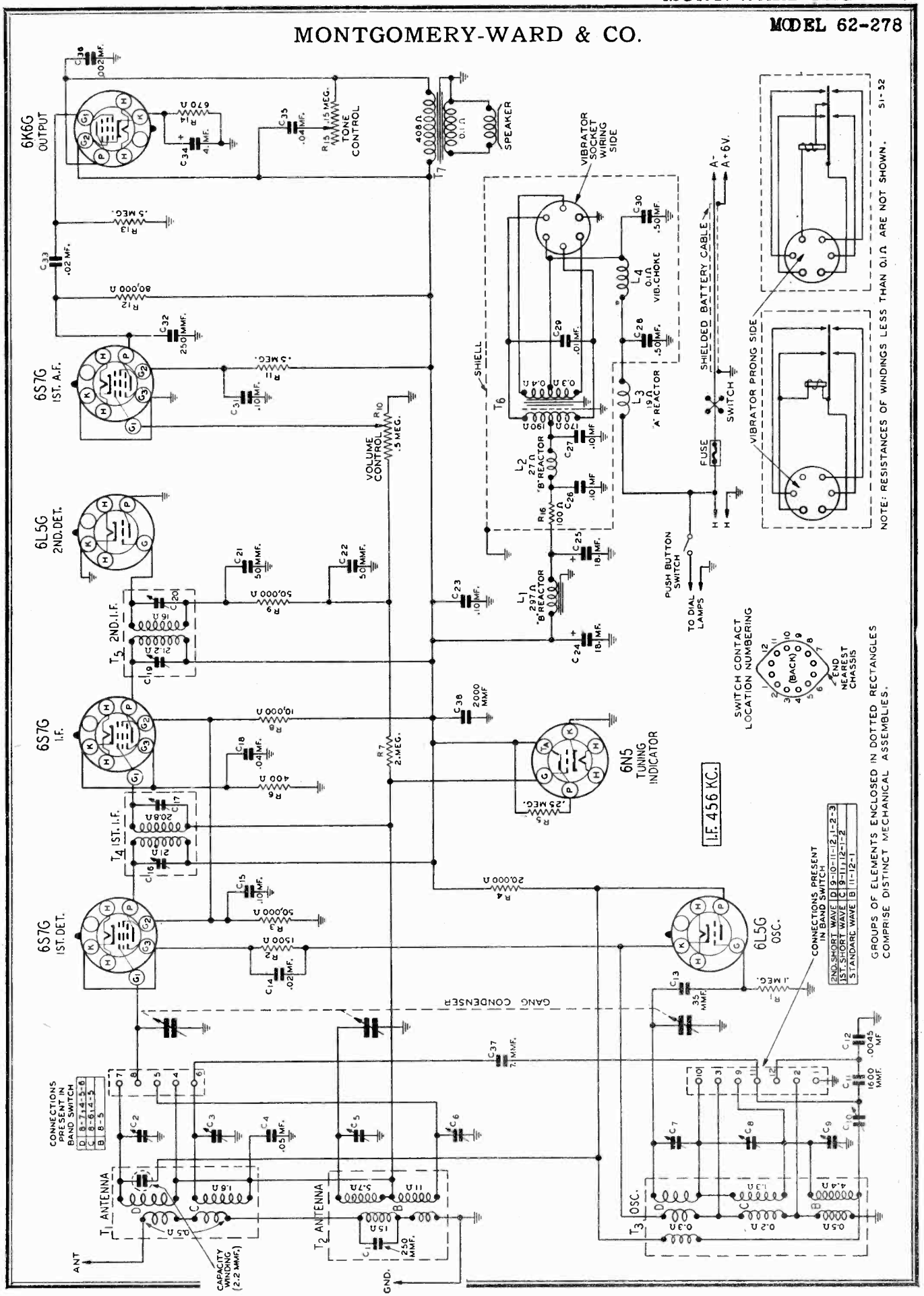
DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

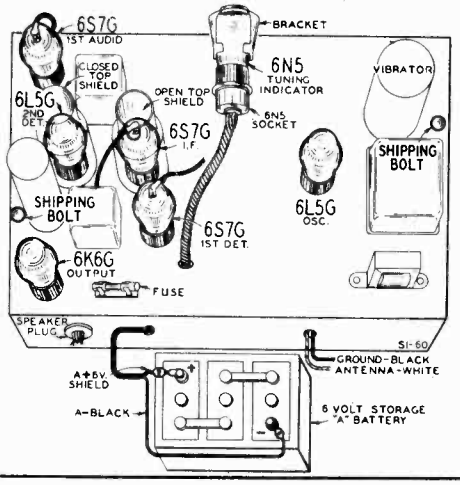
MONTGOMERY-WARD & CO.

MODEL 62-278



MODEL 62-278

MONTGOMERY-WARD & CO.



VOLTAGES AT SOCKETS

Volume and Tone Control: Maximum
Battery: 6.3 volts at battery.
Readings taken with 1000 Ohms-per-volt meter, 500 volt scale.
Antenna Shorted to Ground.
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG AND GROUND (Unless Otherwise Indicated). PRONG No. 1	PRONG No. 2	PRONG No. 3	PRONG No. 4	PRONG No. 5	PRONG No. 6	PRONG No. 7	PRONG No. 8
6S7G	1st Det.....		6.1(1)	150	105	7		6.1(1)	7
6L5G	Osc.....		6.1(1)	80				6.1(1)	
6S7G	I.F.....		6.1(1)	150	105	2.5		6.1(1)	2.5
6L5G	2nd Det.....		6.1(1)					6.1(1)	
6S7G	Audio.....		6.1(1)	50	20			6.1(1)	
6K6G	Power.....		6.1(1)	145	150			6.1(1)	11
6N5	Tuning Indicator....	Plate to Ground 25		Target to Ground 150		Cathode to Ground 0		Across Heater 6.1	

(1) As read between terminals 2 and 7.

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., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C19) & (C20)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C16) & (C17)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C7)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Antenna Range D (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C8)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C5) 2nd Ant. Range B (C6)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C10)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

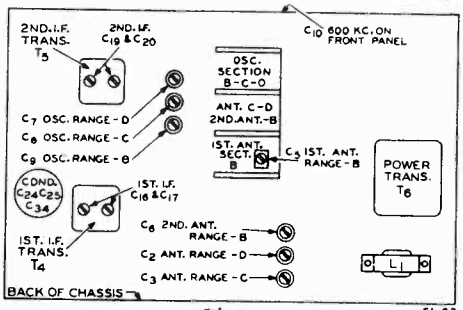
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—Loosen the pointer set screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

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

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image



SI-83

RESISTORS

Carbon

Part No.	Code	Resistance	Wattage
A94104	R1	100,000 ohm	0.2
A94152	R2	1,500 ohm	0.2
B94503	R3	50,000 ohm	0.5
A94803	R4	20,000 ohm	0.2
A95254	R5	250,000 ohm	0.2
A94401	R6	400 ohm	0.2
A95205	R7	2 megohm	0.2
B94103	R8	10,000 ohm	0.5
A95803	R9	50,000 ohm	0.2
A94504	R11	500,000 ohm	0.2
A94903	R12	80,000 ohm	0.2
A95504	R13	500,000 ohm	0.2
A94671	R14	670 ohm	0.2
A95101	R16	100 ohm	0.2

Variable

56X240	R10	.5 megohm	Volume Control and Switch
40X203	R15	.15 megohm	Tone Control

CONDENSERS

Tubular

Part No.	Code	Capacitance	Voltage
46X80	C4	.05 mf.	180
46X220	C12	.00424 mf.	180
46X187	C14	.02 mf.	180
46X195	C15	.1 mf.	180
46X211	C18	.04 mf.	180
46X98	C23	.10 mf.	180
46X98	C26	.10 mf.	180
46X98	C27	.10 mf.	180
46X224	C28	.5 mf.	180
46X201	C29	.01 mf.	1000
46X135	C30	.5 mf.	180
46X98	C31	.10 mf.	180
46X187	C33	.02 mf.	180
46X212	C35	.04 mf.	360
46X111	C36	.002 mf.	300

Molded

47X69	C1	250 mmf.	
47X90	C4	1600 mmf.	
47X53	C13	35 mmf.	
47X56	C21	50 mmf.	
47X56	C22	50 mmf.	
47X65	C32	250 mmf.	
47X49	C37	7 mmf.	
47X41	C38	2000 mmf.	

Trimmer

17A73	(C2	2-25 mmf.	Antenna Range "D")
	(C3	2-25 mmf.	Antenna Range "C")
	(C5	2-25 mmf.	2nd Antenna Range "B")
	C5		1st Antenna Range "B" (Part of Gang Condenser)
	(C7	2-25 mmf.	Oscillator Range "D")
17A82	(C8	2-25 mmf.	Oscillator Range "C")
	(C9	2-25 mmf.	Oscillator Range "B")
17A81	C10	500-600 mmf.	600 KC Padder
17A57	(C16	50-120 mmf.)	1st I.F. Trimmers
	(C17	50-120 mmf.)	
17A80	(C19	50-120 mmf.)	2nd I.F. Trimmers
	(C20	88-185 mmf.)	

Electrolytic

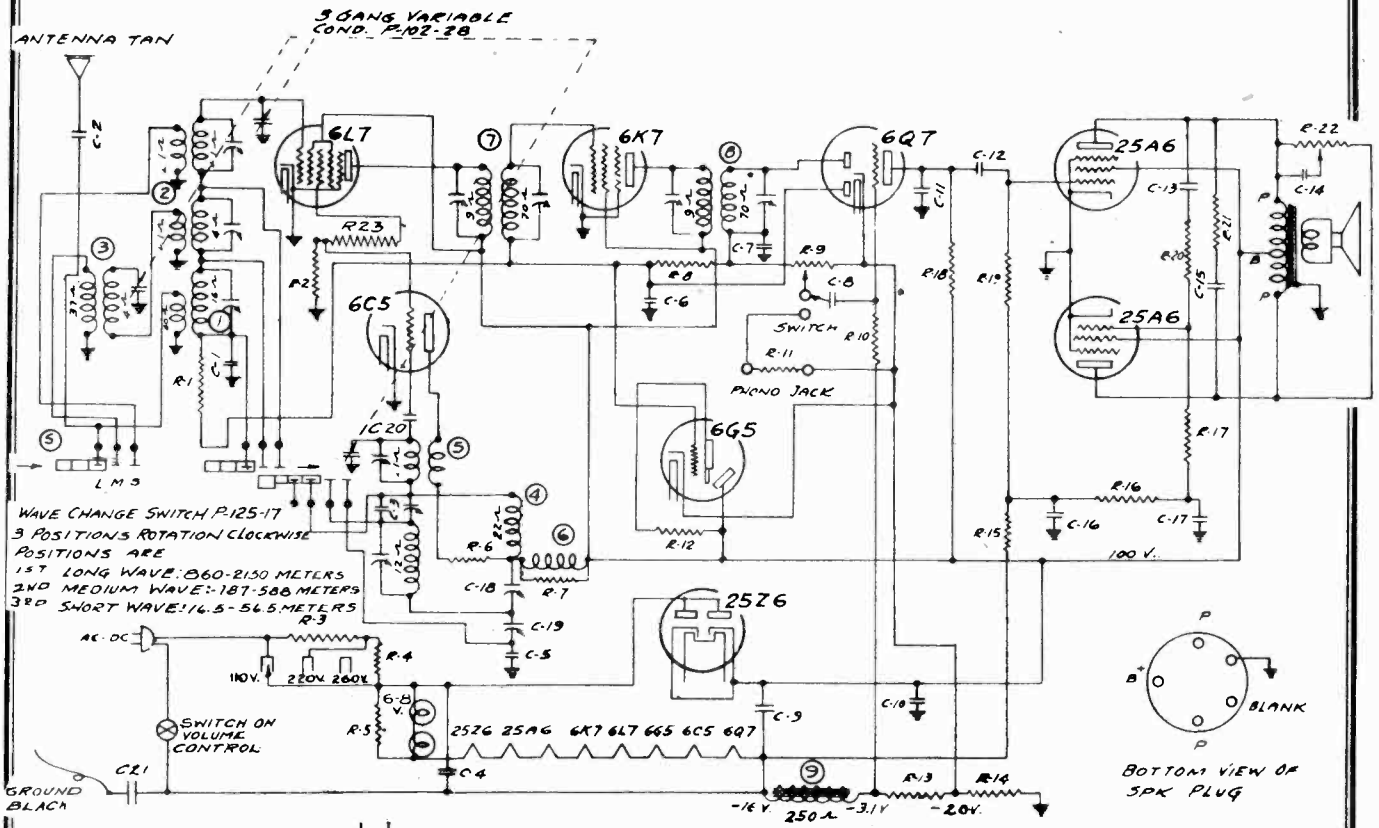
45X229	(C24	18 mf.	150) Dry
	(C25	18 mf.	150)
	(C34	4.0 mf.	25)

Miscellaneous

14A78	3 Section Gang Condenser less Dial and Drive Assembly

MODEL 62-281

MONTGOMERY-WARD & CO.



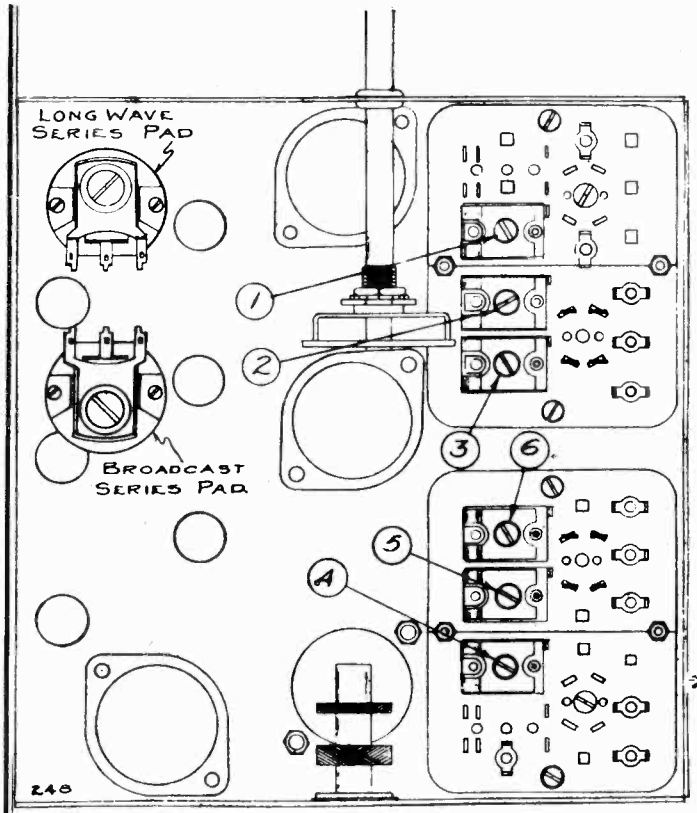
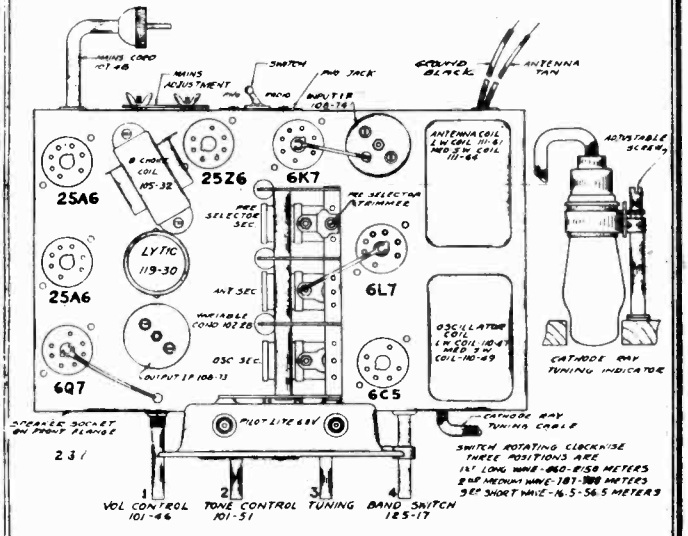


FIG. 2—BOTTOM VIEW (Showing Trimmers)

I. F. FREQUENCY
465 K. C. (645 1 Meters)



TOP VIEW—FIG. 1

MODEL 62-281

MONTGOMERY-WARD & CO.

8-Tube Including Cathode-Ray Tuning Indicator 3-Band A. C.-D. C. Superheterodyne Receiver

110-220-260 Volts A. C. (Any Cycles) or D. C.

TUBES:

The tube complement of this chassis consists of the latest metal type tubes, which are interchangeable with "metal-glass" types, or glass tubes with octal bases.

The type and function of each tube is as follows:

1—Type 6L7 Pentagrid Mixer, First Detector.
1—Type 6C5 Oscillator.
1—Type 6K7 Remote Cut-Off Pentode, I. F. Amplifier (465 K.C.)
1—Type 6Q7 Duplex Diode Triode Second Detector, A.V.C. and First Audio.
2—Type 25A6 Output Pentodes in Push Pull.
1—Type 25Z6 High Vacuum Rectifier.
1—Type 6G5 Cathode-Ray Tuning Indicator.
(Note:—6G5 available in all glass only.)

POWER SUPPLY:

This receiver is supplied for operation on 110-220-260 volts A.C. (any cycle) or D.C.

Three taps are provided for mains voltages. These taps are accessible upon removing the plate fastened with two wing nuts to back of chassis.

Set the tap at the voltage supplied by the local power company.

This is important.

NOTE:

If set does not operate in one minute on Direct Current reverse plug in receptacle.

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages as indicated on diagram are measured with 119 volt A.C. or D.C. mains.

With special mains voltages select tap nearest to actual mains voltage at time voltage measurements are to be made.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

ALIGNING INSTRUCTIONS
Dummy Antennas

The following dummy antennas are used in aligning the receiver, and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast and long wave)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

TEST FREQUENCIES USED

	Kilocycles	Meters
I. F.	465	645.1
Long Wave	150	2000
	350	860
	325	925
Broadcast	600	500
	1400	214
	1600	187
Short Wave	6000	50.0
	17000	17.6
	18200	16.5

Resonance Indicator:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

CAUTION:

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the four bolts by which it is fastened.

ALIGNING I.F. TRANSFORMERS
(465 K.C.) (645.1 Meters)

Part No. 108-73 Output I.F. Transformer.

Part No. 108-74 Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (center of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-73) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer (No. 108-74) to resonance.
   (c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-73) if necessary.

ALIGNMENT PROCEDURE

The following adjustments to be made after the I.F.'s have been aligned as explained above.

SHORT WAVE BAND ALIGNMENT:
16.5 Meters (18.2 Mc.) to 56.5 Meters (5.3 Mc.)

1. With band changing switch in the short wave position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Set external oscillator to 16.5 meters (18.2 Mc.) and adjust short wave oscillator trimmer (adjustment number 3, see Fig. 2) to resonance.
   (b) Re-set external oscillator to 17.6 meters (17.0 Mc.) and pick up signal by rotating gang condenser. Adjust short wave antenna trimmer (adjustment number 6) to resonance.
   (c) Re-set external oscillator to 50 meters (6.0 Mc.) and check for sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 18.3 megacycle signal appears near 17.4 megacycles.

MEDIUM OR BROADCAST BAND ALIGNMENT:
588 Meters (510 K.C.) to 187 Meters (1600 K.C.)

1. With band changing switch in the medium wave position, center of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 187 meters (1600 K.C.) and adjust medium wave oscillator trimmer to resonance (adjustment number 2; see bottom view of coil assembly, Fig. 2.)
   (b) Re-set external oscillator to 214 meters (1400 K.C.), rotate variable gang condenser and pick up signal. Adjust medium wave antenna trimmer (Adjustment number 5) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 500 meters (600 K.C.), and adjust medium wave series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 2.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 300 meters (1000 K.C.) Under no circumstances bend plates of variable condenser sections to correct tracking.

IMPORTANT: This band must be completely rechecked after the long wave band has been adjusted.

LONG WAVE BAND ALIGNMENT:
860 Meters (350 K.C.) to 2150 Meters (140 K.C.)

1. With band changing switch in the long wave position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 860 meters (350 K.C.), and adjust long wave oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly, Fig. 2.)
   (b) Re-set external oscillator to 925 meters (325 K.C.), rotate variable gang condenser and pick up signal. Adjust long wave antenna trimmer (Adjustment number 4) to resonance.
   (c) Re-set external oscillator to 2000 meters (150 K.C.), and adjust long wave series pad to resonance by rotating condenser to approximately 2000 meters, rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 2.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

IMPORTANT: This band must be completely rechecked after the medium wave band has been rechecked.

LIST OF REPAIR PARTS

Part No.	Description	Circuit Diagram Reference
	CONDENSERS	
100-11	.01 x 400 Volt Tubular	C2, C8, C12, C13, C14
100-20	.1 x 200 Volt Tubular	C17
100-22	.05 x 200 Volt Tubular	C1
100-26	.02 x 400 Volt Tubular	C6
100-36	.01 x 1400 Volt Tubular (bare leads)	C21
100-39	.1 x 400 Volt Tubular (with bracket)	C4
100-43	.25 x 200 Volt Tubular (with bracket)	C16
100-44	.003 x 600 Volt Tubular	C15
119-30	Dual 26 mfd. Electrolytic Filter	C9, C10
129-12	.00025 Mica—Type MT—20%	C7, C11
129-39	.00005 Mica—Type MT—20%	C20
129-54	.003 Mica—Type MW—2½%	C5
129-67	.00004 Mica—Type MT—10%	C3
	RESISTORS	
106-30	100 ohm (R4), 40 ohm (R5) Metal Clad	R4, R5
130-4	3 Megohm—1/3W—20%—100V Carbon	R8, R10
130-11	250 M ohm—1/3W—20%—50V Carbon	R15, R16
130-12	" M ohm—1/3W—20%—20V Carbon	R2, R7
130-1"	.u M ohm—1/3W—20%—20V Carbon	R21
130-20	100 M ohm—1/3W—10%—50V Carbon	R1, R11
130-27	50 ohm—1/3W—20%—3V Carbon	R6, R14
130-56	100 ohm—1/3W—20%—10V Carbon	R23
130-66	75 M ohm—1/3W—10%—50V Carbon	R17
130-100	150 M ohm—1/3W—20%—50V Carbon	R18
130-102	500 M ohm—1/3W—10%—50V Carbon	R19, R20
130-110	1 Megohm—1/10W—10%—100V Carbon	R12
130-128	20 ohm—1/3W—20%—10V Carbon	R13
	COILS	
108-73	Output I.F. Coil Assembly complete with can	8
108-88	Input I.F. Coil Assembly complete with can	7
110-46	Oscillator Choke coil	6
110-47	Long Wave Oscillator Coil Assembly, less can	4
110-49	Broadcast and Short Wave Oscillator Coil Assembly, less can	5
111-61	Long Wave Antenna Coil Assembly, less can	1
111-62	Antenna Preselector Coil Assembly	3
111-64	Broadcast and Short Wave Antenna Coil Assembly, less can	2
	SOCKETS	
121-8	Five Prong Socket—Marked "Spkr"	
121-12	Seven Prong Socket—Marked "6K7"	
121-17	Six Prong Socket—Marked "6C5"	
121-18	Seven Prong Socket—Marked "6L7"	
121-26	Seven Prong Socket—Marked "6Q7"	
121-31	Seven Prong Socket—Marked "25Z6"	
121-32	Seven Prong Socket—Marked "25A6"	
	SPEAKER	
114-49	Six Inch Permanent Magnet Dynamic	
	MISCELLANEOUS	
101-46	Volume Control and Switch (1 megohm)	R9
101-51	Tone Control (300 M ohm)	R22
102-28	Three Gang Variable Condenser	
105-32	250 ohm Filter Choke	
107-48	250 ohm Special Line Cord	R3
112-169	Phono-Radio Indicator Plate	
115-35	Antenna, Oscillator Shield	
115-54	Mains Cover Plate	
121-30	Three Prong Socket Assembly for Mains	
124-31	J. S. Long Wave Series Pad—300 mmf	C18
124-32	J. S. Broadcast Series Pad—565 mmf	C19
125-17	Band Switch	S
125-22	Phono-Radio Toggle Switch	
128-51	Small Wood Knob (with spring)	
133-24	Wing Nut for Mains Cover Plate (115-54)	
171-2	Phono Jack Assembly	

CATHODE RAY TUNING INDICATOR PARTS

107-49	Cable and Socket Assembly
112-158	Metal Oval Escutcheon
117-57	Holder and Clamp
180-110	1 Meg. Ohm—1/10 Watt—10%—100 Volt Carbon

DIAL PARTS LIST

ASSEMBLIES

117-41 Drive Bracket including:
  1—No. 117-19—Tuning Shaft Bushing
117-66 Switch Disc and Link Assembly, including:
  1—No. 117-12 —Switch Arm
  1—No. 117-35 —Bushing with Screws
  1—No. 117-40B—Switch Link
  3—No. 181-26 —Spring Washers
  3—No. 162-5 —Rivets
  1—No. 112-144—Switch Dis.—Inc. Red Tape

DIAL PARTS ONLY

112-125	Drive Belt
112-143	Oval Escutcheon complete with Celluloid Crystal
112-172	Dial Scale comp. with Fastener, Pointer Disc, & Screw
112-147	Tuning Shaft
113-151	Pointer complete with Screw
112-156	Pilot Light Assembly
116-12	6.8 Volt T-51 Pilot Light
117-20A	Tuning Shaft Pulley
117-38	Stud, for take-up Spring
117-39	Pulley, for take-up Spring
120-14	Take-up Spring
134-9	Horse Shoe Washer
184-40	Rubber Grommet

MODELS 62-286, 62-429, 62-436, 62-439

MONTGOMERY-WARD & CO.

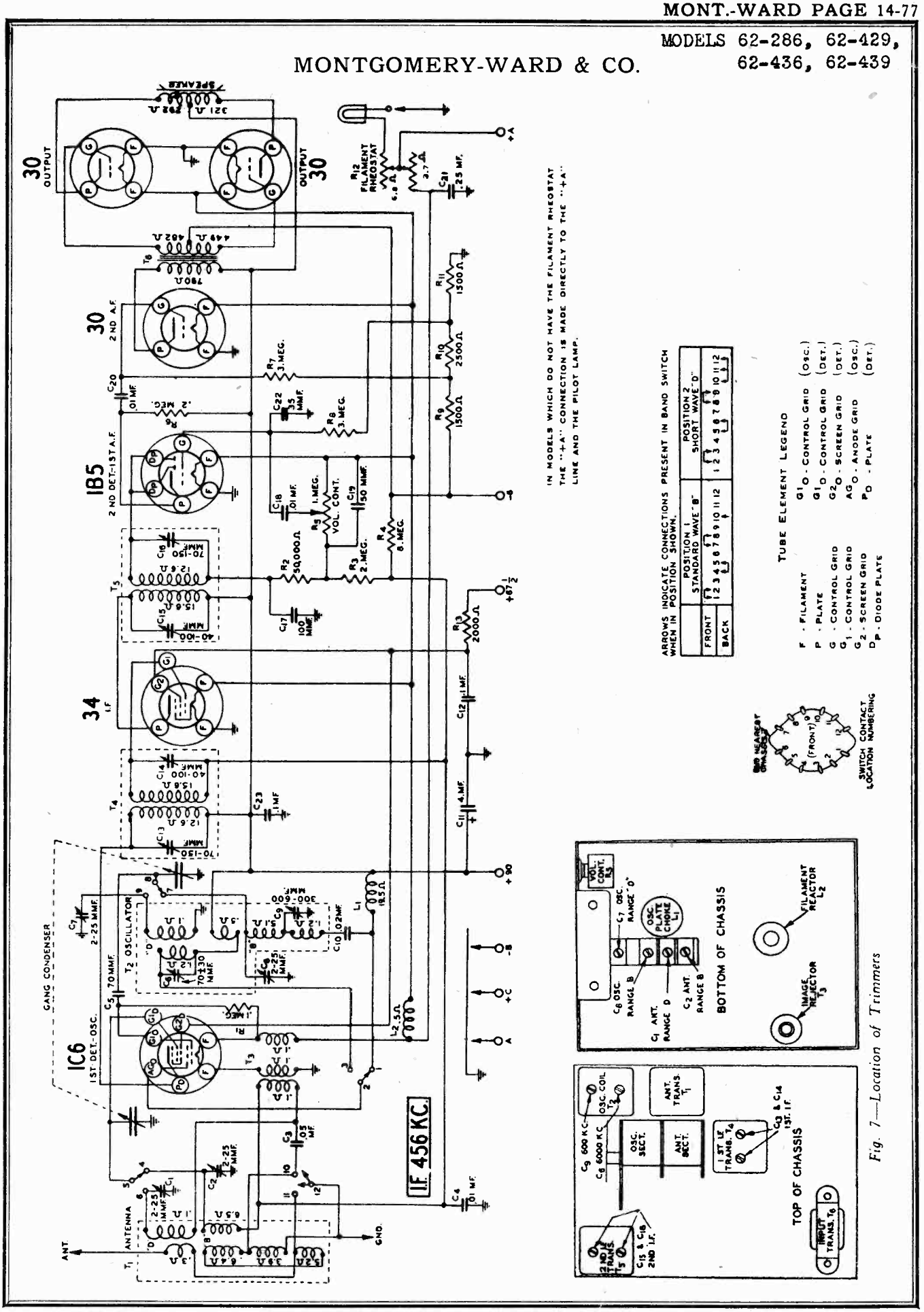


Fig. 7—Location of Trimmers

MODELS 62-286, 62-429,
62-436, 62-439

MONTGOMERY-WARD & CO.

Standard and Short Wave Battery Radio

July 1936

6 Tube - 2 Band

Tubes

The tubes used in this receiver are of the 2 volt series. All of them are of the filament or directly heated types. All of them have a 2 volt filament and should not be connected to a power supply not intended for this type of tube. **Maximum filament voltage range is 1.8 to 2.0 volts. Operation of the tubes at under or over this value will be injurious to the tubes and may affect operation of the receiver.**

VOLTAGES AT SOCKETS
Volume Control at Maximum — Antenna Shorted to Ground
Band Switch in Standard Wave Position

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Grid to Ground
1C6	1st Det.-Osc.	2.0	90 90(1)	60	6(2)
34	I.F.	2.0	90	60	6(2)
1B5	2nd Det.-1st A.F.	2.0	30(3)		1.5(4)
30	2nd A.F.	2.0	90		4.0(5)
30	Power	2.0	90		6

(1) Anode Grid to ground.
(2) As read at "C" Battery.
(3) As read with 500,000 ohm meter.
(4) As read from negative end of R11 to ground.
(5) As read from negative end of R10 to ground.

Alignment Procedure

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and re-alignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 16,000, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the radio to the ground post of the signal generator

Turn the band switch to the Range B position (standard wave band).

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the four I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 7.

Range B Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band switch in the standard wave position.

Connect the antenna lead of the radio through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range B trimmer (C8) until maximum output is obtained. The location of this trimmer is shown in Fig. 7.

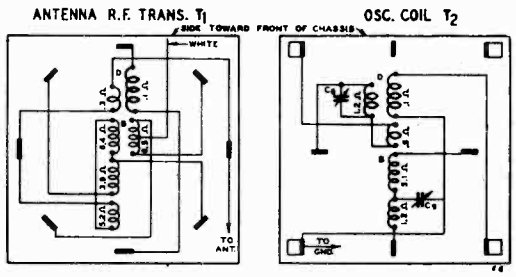


Fig. 8—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings

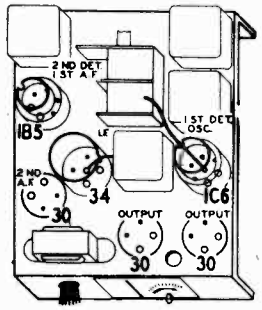


Fig. 9—Tube Arrangement

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw.

Adjust the antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer (C9) until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.

Range D Alignment

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC. It may be necessary to increase the input signal to hear the image.

16,000 KC Adjustment

Set the signal generator for 16,000 KC.

Connect the antenna lead of the radio through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (short wave band).

Adjust the oscillator Range D trimmer (C7) until maximum output is obtained. See Fig. 7 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the antenna Range D trimmer (C1) to maximum. When adjusting this trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC (C6) trimmer until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.

Replacement Parts

NOTICE—There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts, please be sure to mention the series number and this large letter.

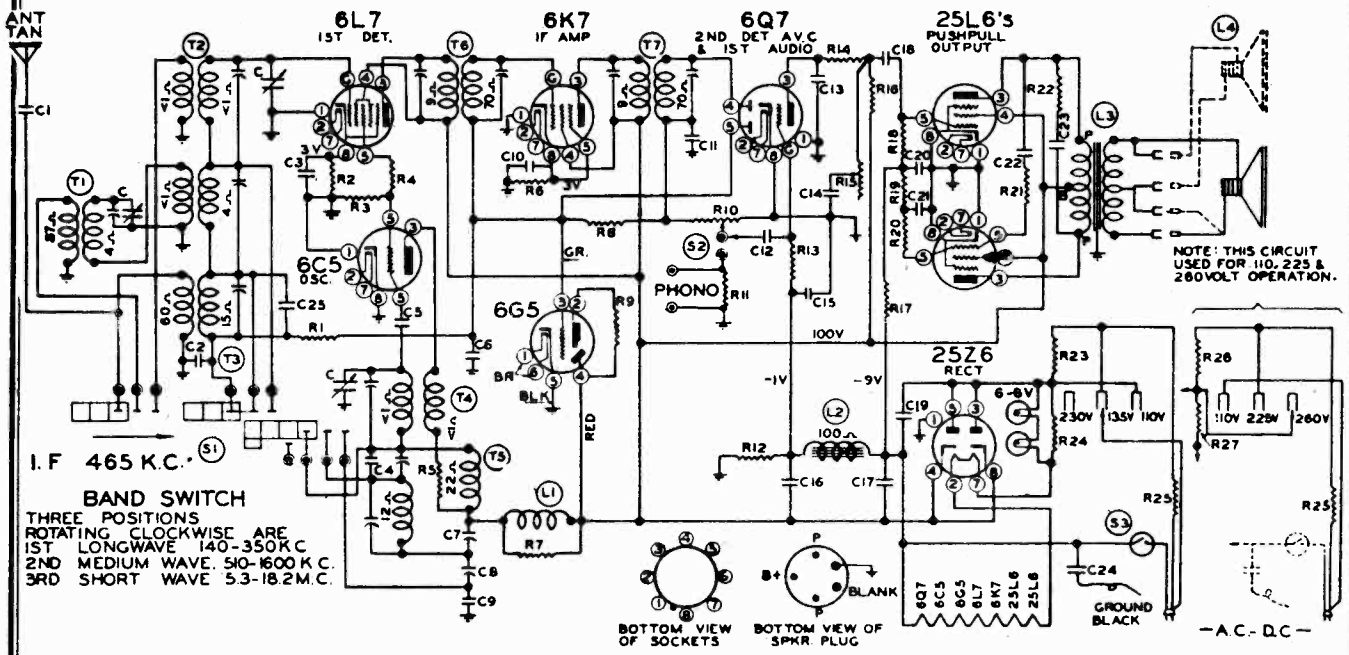
Part No.		Description	List Price
		ELECTROLYTIC	
P-46X212	C11	4.8 mf. 100 Dry	.65
		MOLDED	
P-47X62	C5	70 mmf.	.10
P-47X87	C17	100 mmf.	.10
P-47X86	C19	50 mmf.	.10
P-47X83	C22	35 mmf.	.10
		TRIMMER	
P-17A52	C1	2-25 mmf. Range "D" Antenna Trimmer	.45
	C2	2-25 mmf. Range "B" Antenna Trimmer	
	C7	2-25 mmf. Range "D" Oscillator Trimmer	
	C8	2-25 mmf. Range "B" Oscillator Trimmer	
P-17A35	C6	40-100 mmf. 6000 KC Trimmer	.45
	C9	300-600 mmf. 600 KC Trimmer	
P-17A51	C13	70-150 mmf. 1st I. F. Trimmer	.35
	C14	40-100 mmf.	
P-17A51	C15	70-150 mmf. 2nd I. F. Trimmer	.35
	C16	40-100 mmf.	
		MISCELLANEOUS	
P-14A54		2 Gang Condenser less Drive Drum and Dial Assembly	$2.50
P-A95104	R1	100,000 Ohm 0.2	$0.10
P-A95503	R2	50,000 Ohm 0.2	.10
P-A94205	R3	2.0 Megohm 0.2	.15
P-A94805	R4	8.0 Megohm 0.2	.15
P-A95204	R6	200,000 Ohm 0.2	.10
P-A95305	R7	3.0 Megohm 0.2	.10
P-A95305	R8	3.0 Megohm 0.2	.10
P-A94152	R9	1,500 Ohm 0.2	.15
P-A94252	R10	2,500 Ohm 0.2	.15
P-A94152	R11	1,500 Ohm 0.2	.15
P-A95202	R13	2,000 Ohm 0.2	.10
P-46X80	C3	.05 mf. 180	$0.15
P-46X188	C4	.01 mf. 180	.15
P-46X187	C10	.02 mf. 180	.15
P-46X98	C12	.1 mf. 180	.20
P-46X124	C18	.01 mf. 180	.15
P-46X124	C20	.01 mf. 180	.15
P-46X197	C21	.25 mf. 180	.25
P-46X98	C23	.1 mf. 180	.20
P-5A32		Drive Bracket Assembly, less Drive Drum and Pointer Shaft	$0.30
P-24X235		Drive Drum and Pointer Shaft (Mounted on Tuning Condenser Shaft)	.45
P-28X27		20" Black Tuning Drive Cord doz.	.45
		Tuning Drive Cord Tension Spring	.10
		8" On-Off Indicator Drive Cord doz.	.20
P-29X20		Brass Collar with Set Screw for Securing above Cord to Shaft	.10
P-28X44		On-Off Indicator Cord Tension Spring	.10
P-36X218	R5	1.0 Megohm Volume Control and On-Off Switch	1.05
*P-43X55	R12	3.7 Ohm / 6.8 Ohm Filament Rheostat	.50
P-3A64	30	Tube Socket	$0.10
P-3A65	34	Tube Socket	.10
P-3A230	1B5	Tube Socket	.10
P-3A203	1C6	Tube Socket	.10
		SPEAKERS	
P-12A217	6"	Magnetic Speaker	4.35
P-12A218	8"	Magnetic Speaker	4.90
P-13X212		Speaker Cable and Socket Assembly	.60
		KNOBS	
Specify Name and Model of Receiver		Volume Control Knob / Tuning Control Knob / Band Switch Knob	.15
		GENERAL	
P-8X23		Rubber Chassis Mounting Cushions	.10
P-32X49		Tube Shield—Large	.20
P-32X32		Tube Shield—Small	.15
P-32X18		Tube Shield Base—Large	.10
P-32X30		Tube Shield Base—Small	.10
P-22X38		Felt Washers (Used behind Knobs) ea.	.10
P-17X16		Glass Dial Crystal	.20
P-28X67		Crystal Retaining Ring	.10
P-3A55		1 Section, 2 Position, Band Change Switch	.75
P-4A49		Single Lug Terminal Strip (Mounting Hole Used)	.10
P-30X14		Grid Clip only	.10
P-13X214		Antenna and Ground Lead Assembly	.30
P-13X266		A, B and C Battery Cable	1.05
P-9A648	T1	Antenna Trans. and Can Assembly	$2.05
P-9A641	T2	Oscillator Coil and Can Assembly	2.45
P-9A898	T3	Image Rejector	.35
P-9A642	T4	1st I. F. Trans. and Can Assembly	1.40
P-9A643	T5	2nd I. F. Trans and Can Assembly	1.40
P-50X33	T6	Input Transformer	1.40
P-9A547	L1	Oscillator Plate Choke	.35
P-9A612	L2	Filament Choke Coil	.20
P-15A75		Dial Bracket Assembly, Less Pilot Lamp, Pilot Light Socket and Spring Clip, Pointer, and On-Off Indicator Assembly	$1.45
P-15X48		Pointer	.10
P-25A77		On-Off Indicator Disc Assembly	.15
P-7A40		Pilot Lamp	.10
P-7A8		Pilot Light Socket and Spring Clip	.10
P-25A94		Pilot Light Spring Contact Assembly (on drive shaft)	.20

*Used only on models with filament rheostat.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODELS 62-291, 62-371

MONTGOMERY-WARD & CO.



CONDENSERS

C	102-47	3 gang variable condenser	
C1	100-11	.01 x 400	25%
C2	100-22	.05 x 200	25%
C3	100-22	.05 x 200	25%
C4	129-67	.00004 Mica	10%
C5	129-39	.00005 Mica	20%
C6	100-26	.02 x 400	25%
C7	124-31	Adj. Cond.—300 mmf. W.C.	
C8	124-32	Adj. Cond.—565 mmf. W.C.	
C9	129-54	.003 Mica	2½%
C10	100-9	.05 x 200	25%
C11	129-21	.0002 Mica	20%
C12	100-9	.05 x 200	25%
C13	129-2	.0005 Mica	20%
C14	100-19	.006 x 600	25%
C15	100-6	.25 x 200	20%
C16	119-30	26 mfd.—100 w.v.	
C17	119-30	26 mfd.—100 w.v.	
C18	100-11	.01 x 400	25%
C19	100-39	.1 x 400	20%
C20	100-43	.25 x 200	25%
C21	100-20	.1 x 200	25%
C22	100-19	.006 x 600	25%
C23	100-19	.006 x 600	25%
C24	100-36	.01 x 1400	10%
C25	129-3	.00002 Mica	20%

C16 and C17 in same unit

RESISTORS

R1	130-20	100M ohm—1/3 w.	20%
R2	130-54	500 ohm—1/3 w.	20%
R3	130-12	50M ohm—1/3 w.	20%
R4	130-60	100 ohm—1/3 w.	20%
R5	130-27	50 ohm—1/3 w.	20%
R6	130-54	500 ohm—1/3 w.	20%
R7	130-12	50M ohm—1/3 w.	20%
R8	130-4	3 megohm—1/3 w.	20%
R9		250M—1/10 w. in Tuning indicator socket	
R10	101-46	Volume Control (1 meg. ohm)	
R11	130-20	100M ohm—1/3 w.	20%
R12	130-169	12 ohm—Wire wound	
R13	130-19	1 megohm—1/3 w.	20%
R14	130-66	75M ohm—1/3 w.	10%
R15	101-51	Tone Control (300M ohm)	
R16	130-100	150M—1/3 w.	20%
R17	130-102	500M ohm—1/3 w.	10%
R18	130-11	250M ohm—1/3 w.	20%
R19	130-11	250M ohm—1/3 w.	20%
R20	130-7	40M ohm—1/3 w.	10%
R21	130-102	500M ohm—1/3 w.	10%
R22	130-22	5M ohm—1/3 w.	20%
R23	106-41	65 ohm	
R24	106-41	40 ohm	
R25	107-48	250 ohm line cord	
R26	106-30	100 ohm	
R27	106-30	40 ohm	

R26 and R27 in one unit (110-225-260 volt operation)

R23 and R24 in one unit (110-135-230 volt operation)

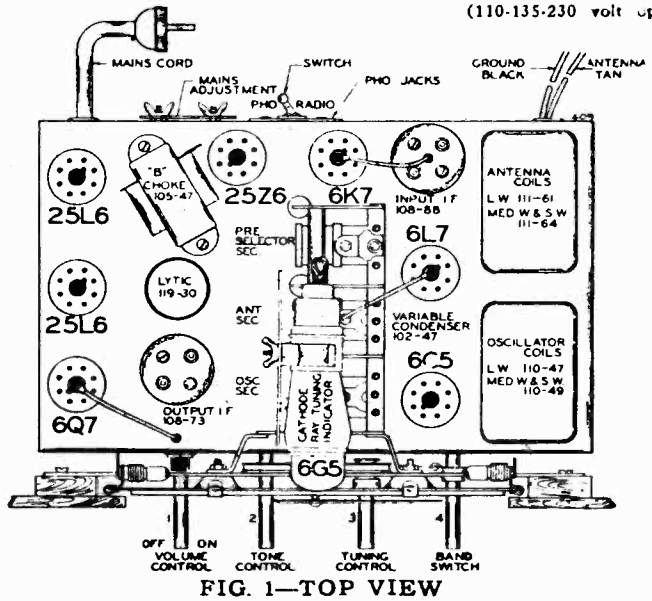


FIG. 1—TOP VIEW

T1	111-62	Pre-selector Coil Complete
T2	111-64	S.W. M.W. Antenna Coil Complete
T3	111-61	L.W. Antenna Coil Complete
T4	110-49	S.W. M.W. Oscillator Coil Complete
T5	110-47	L.W. Oscillator Coil Complete
T6	108-88	Input I.F. Coil Complete
T7	108-73	Output I.F. Coil Complete
L1	123-3	R.F. "B" Choke
L2	105-47	100 ohm Filter Choke
L3	114-83	8" P.M. Speaker
S1	125-17	Band Switch
S2	125-22	Phono Switch
S3		On-Off Switch on Volume Control
L4	114-84	Extension Speaker—6 ohm voice coil 8" P.M.

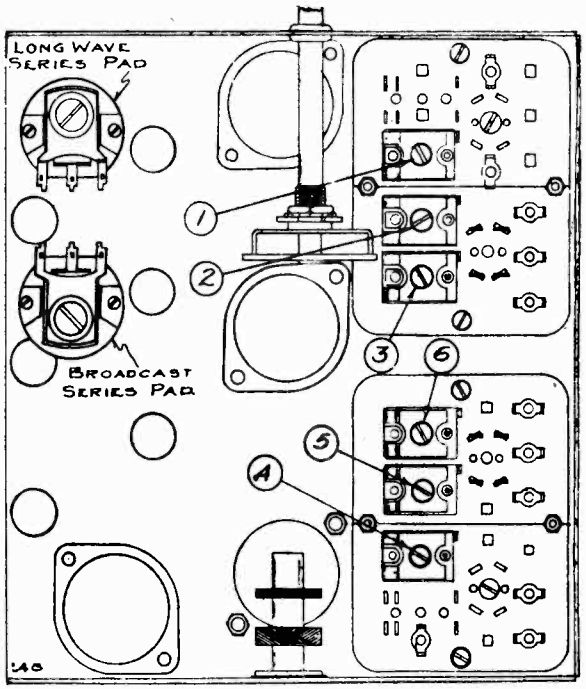


FIG. 3—BOTTOM VIEW (Showing Trimmers)

ALIGNING INSTRUCTIONS:

Dummy Antennas:

The following dummy antennas are used in aligning the receiver, and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Medium and long wave) — Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscil-

TEST FREQUENCIES USED:

	Kilocycles	Meters
I. F.	465	645.1
Long Wave	150	2000
	350	860
	325	925
Medium Wave	600	500
	1400	214
	1600	187
Short Wave	6000	50.0
	17000	17.6
	18200	16.5

Resonance Indicator:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

CAUTION:

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the four bolts by which it is fastened.

ALIGNING I.F. TRANSFORMERS:

(465 K.C.) (645.1 Meters)

Part No. 108-73 Output I. F. Transformer.
Part No. 108-88 Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view)

1. With volume control full on (the extreme right of its rotation), the band changing switch in the medium wave position, (center of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-73) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer (No. 108-88) to resonance.
   (c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-73) if necessary.

ALIGNMENT PROCEDURE:

The following adjustments to be made after the I.F.'s have been aligned as explained above.

SHORT WAVE BAND ALIGNMENT:

16.5 Meters (18.2 Mc.) to 56.5 Meters (5.3 Mc.)

1. With band changing switch in the short wave position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Set external oscillator to 16.5 meters (18.2 Mc.) and adjust short wave oscillator trimmer (adjustment number 3, see Fig. 3) to resonance.
   (b) Re-set external oscillator to 17.6 meters (17.0 Mc.) and pick up signal by rotating gang condenser. Adjust short wave antenna trimmer (adjustment number 6) to resonance.
   (c) Re-set external oscillator to 50 meters (6.0 Mc.) and check for sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 18.3 megacycle signal appears near 17.4 megacycles.

MEDIUM BAND ALIGNMENT:

588 Meters (510 K.C.) to 187 Meters (1600 K.C.)

1. With band changing switch in the medium wave position, center of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 187 meters (1600 K.C.) and adjust medium wave oscillator trimmer to resonance (adjustment number 2; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 214 meters (1400 K.C.), rotate variable gang condenser and pick up signal. Adjust medium wave antenna trimmer (Adjustment number 5) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 500 meters (600 K.C.), and adjust medium wave series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 300 meters (1000 K.C.) **Under no circumstances bend plates of variable condenser sections to correct tracking.**

IMPORTANT: This band must be completely rechecked after the long wave band has been adjusted.

LONG WAVE BAND ALIGNMENT:

860 Meters (350 K.C.) to 2150 Meters (140 K.C.)

1. With band changing switch in the long wave position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 860 meters (350 K.C.), and adjust long wave oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 925 meters (325 K.C.), rotate variable gang condenser and pick up signal. Adjust long wave antenna trimmer (Adjustment number 4) to resonance.
   (c) Re-set external oscillator to 2000 meters (150 K.C.), and adjust long wave series pad to resonance by rotating condenser to approximately 2000 meters, rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

IMPORTANT: This band must be completely rechecked after the medium wave band has been rechecked.

FREQUENCY RANGE

350 to 140 K.C. (Kilocycles)	860-2150 Meters
1600 to 510 K.C. (Kilocycles)	187- 588 Meters
18.2 to 5.3 M.C. (Megacycles)	16.5-56.5 Meters

MODEL 62-293

MONTGOMERY-WARD & CO.

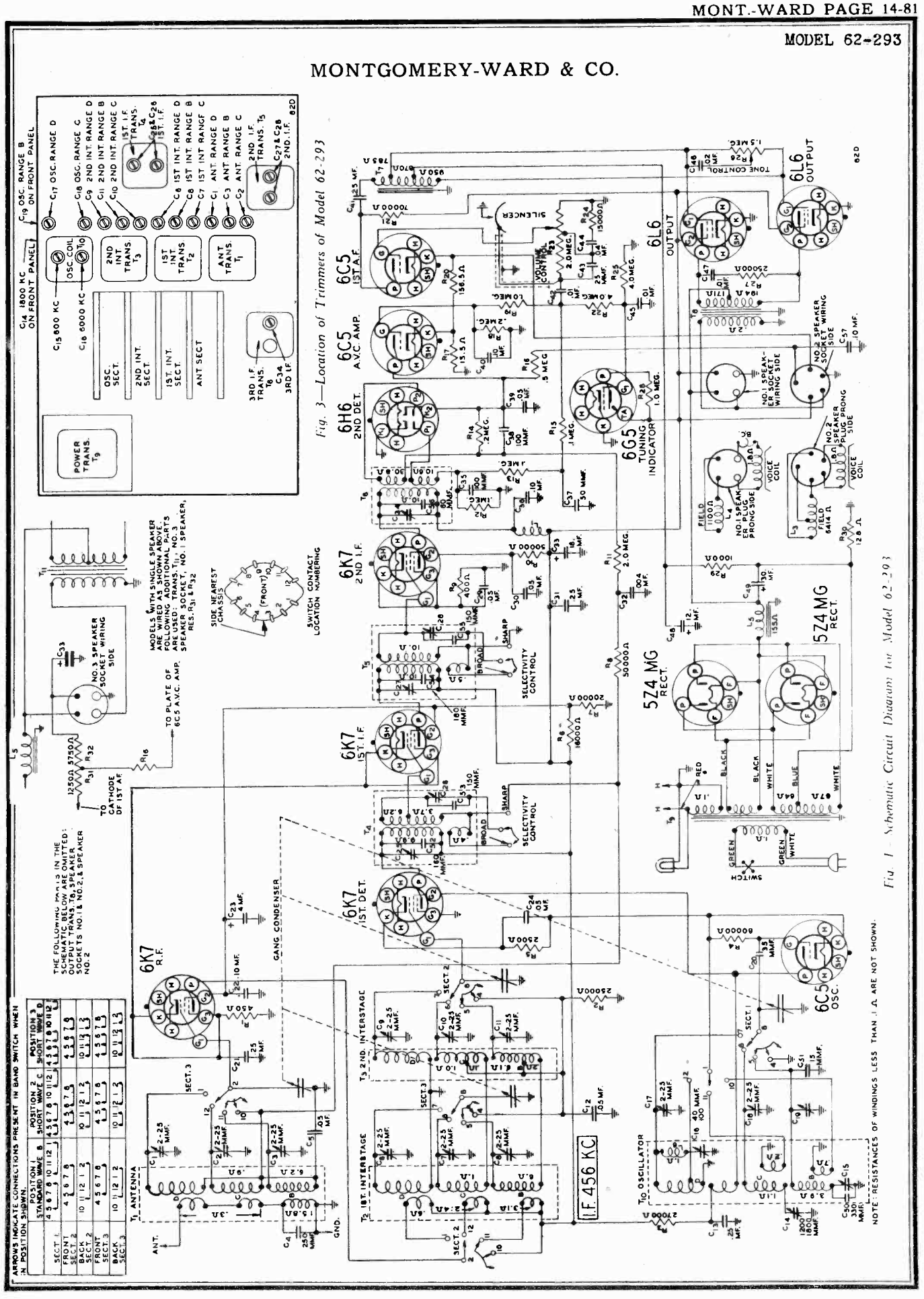


Fig. 3—Location of Trimmers of Model 62-293

Fig. 1—Schematic Circuit Diagram for Model 62-293

MODEL 62-271

MONTGOMERY-WARD & CO.

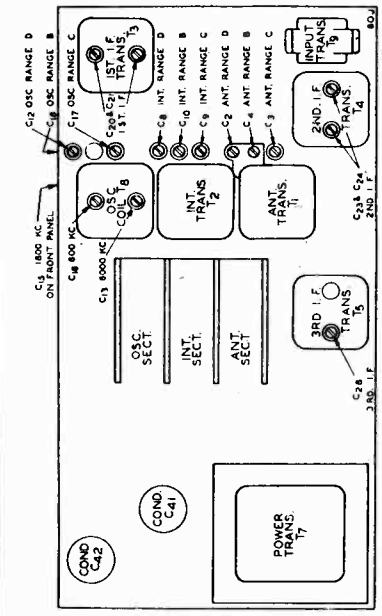


Fig. 4—Location of Trimmers of Model 62-271

Fig. 2—Schematic Circuit Diagram for Model 62-271

ARROWS INDICATE CONNECTIONS PRESENT IN BAND SWITCH WHEN IN POSITION SHOWN.

	POSITION 1 STANDARD WAVE B	POSITION 2 SHORT WAVE C	POSITION 3 SHORT WAVE D
FRONT SECT. 1	9 10 11 12 4 5 6 7 8	9 10 11 12 4 5 6 7 8	9 10 11 12 4 5 6 7 8
BACK SECT. 1	11 1 2 3	11 1 2 3	11 1 2 3
FRONT SECT. 2	4 5 6 7 8	4 5 6 7 8	4 5 6 7 8
BACK SECT. 2	10 11 12 1 2	10 11 12 1 2	10 11 12 1 2

END NEAREST CHASSIS

SWITCH CONTACT LOCATION NUMBERING

METAL TUBE TERMINAL NUMBERING BOTTOM OF SOCKET

TUBE ELEMENT LEGEND

SH - SHELL
K — HEATER
K — CATHODE
P — PLATE
G1 — CONTROL GRID
G2 — SCREEN GRID
G3 — SUPPRESSOR GRID
T — TARGET
F — FILAMENT

NOTE: RESISTANCE VALUES NOT SHOWN ARE SMALL.

Telephone Dial Assembly

The telephone dial assembly provides a means of pre-setting a number of broadcasting stations and tuning in these stations at any time by depressing a button and rotating the dial to a stop position.

The apparatus is mounted on a panel attached at the front of the chassis. An examination of this panel will clearly show the method of operation.

Silencer Circuit—A silencer circuit is provided which results in silent tuning between stations when using the telephone dial buttons.

When a telephone dial button is depressed, a connection is established between the ungrounded end of the volume control and the chassis ground. Referring to Fig. 5 it will be noted that contact is made between the line from the volume control, contact ring, contact washer arm (when button is depressed), spring and ring gear stud. Since the ring gear is at ground potential, this grounds the audio voltage and no signal will be heard until the button is released to break the contact.

It should be noted that the contact ring is part of the ring gear assembly, but is insulated from it.

Differences between Model 62-293, Telephone Movie Dial Radio and Models 62-313 and 62-413, Standard Movie Dial Radios.

The information contained in Vol.VIII covering Model 62-313 and the Movie Dial Drive, applies to the Telephone Movie Dial Radio, Model 62-293 with the following exceptions:

A silencer circuit which is described in the first article of this manual, has been added.

The location of the "B" range oscillator trimmer, has been changed to the front panel—See Fig. 3 of this manual.

Additional condensers have been added to the oscillator and I.F. coil assemblies.

The correct schematic circuit diagram is shown in Fig. 1 of this manual.

A planetary (two-speed) drive is not used.

A supplementary parts list appears in this manual.

Other differences between the telephone movie dial radios and the standard movie dial radios are:

The telephone dial assembly has been added as described

The band switch has been changed to take care of the new elevator assembly.

The selectivity control (high fidelity switch) has been separated from the tone control.

Differences between Model 62-271, Telephone Movie Dial Radio and Models 62-261, 62-311 and 62-411, Standard Movie Dial Radios.

All of the differences as described for the 13-tube set, Model 62-293, apply to the 11-tube set, Model 62-271, except that the data covering Model 62-261 will be found in Vol.IX, but the data covering the Movie Dial Drive will be found in Vol.VIII.

The correct schematic for Model 62-271 is shown in Fig. 2 and the correct trimmer locations in Fig. 4 on the same page.

Adjustments and Service Data

MODELS 62-271 AND 62-293

Noise When Tuning in a Signal with a Telephone Dial Button

As explained in the article on "Silencer Circuit" in this manual, no noise or signal should be heard when tuning in a signal with a telephone dial button until the button is released. If noise is heard while tuning

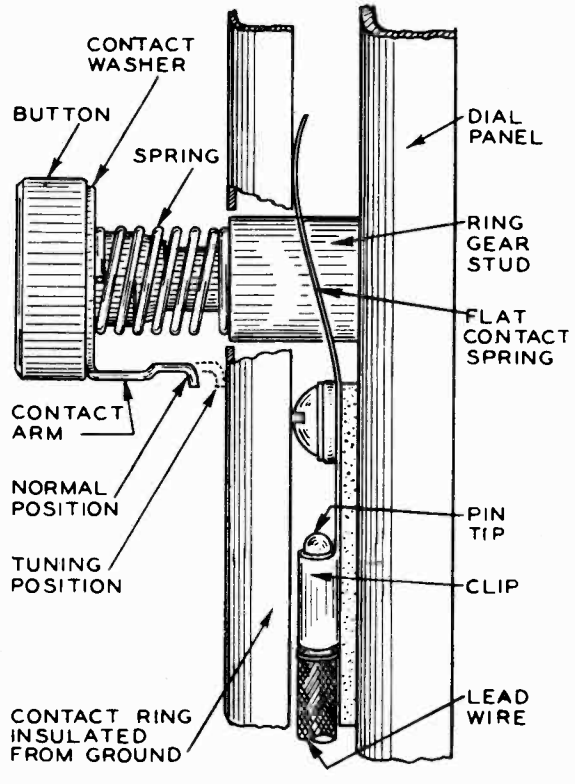


Fig. 5—Silencer Assembly

MODEL 62-271
MODEL 62-293

MONTGOMERY-WARD & CO.

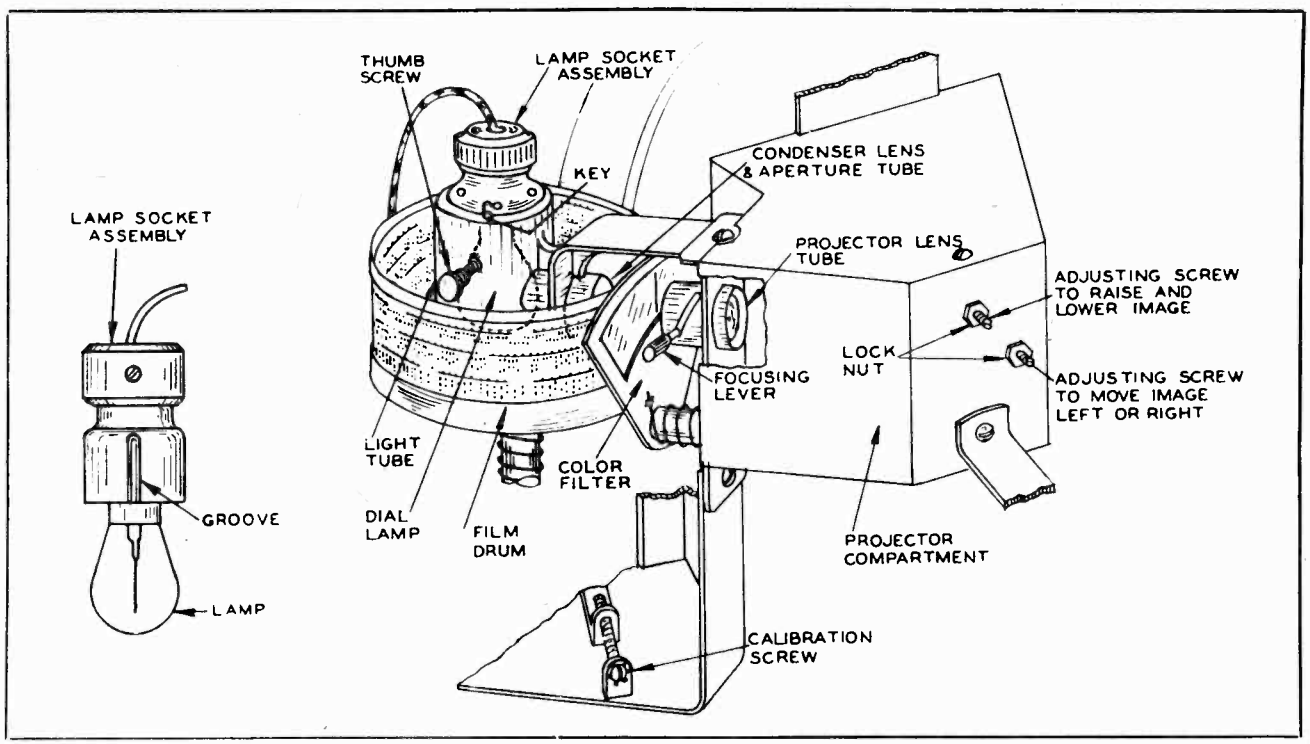


Fig. 6—Details of Movie Dial

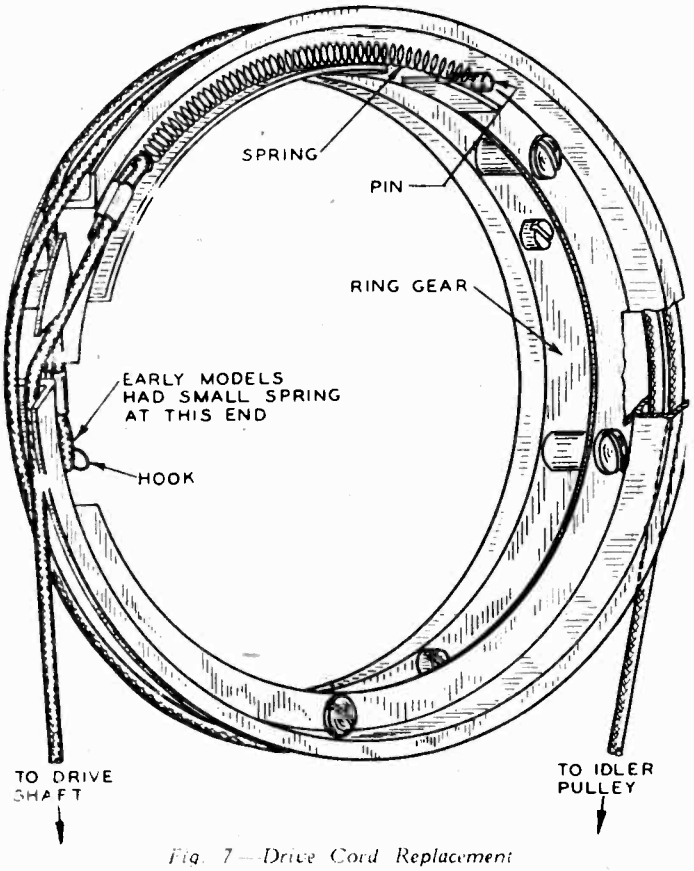


Fig. 7—Drive Cord Replacement

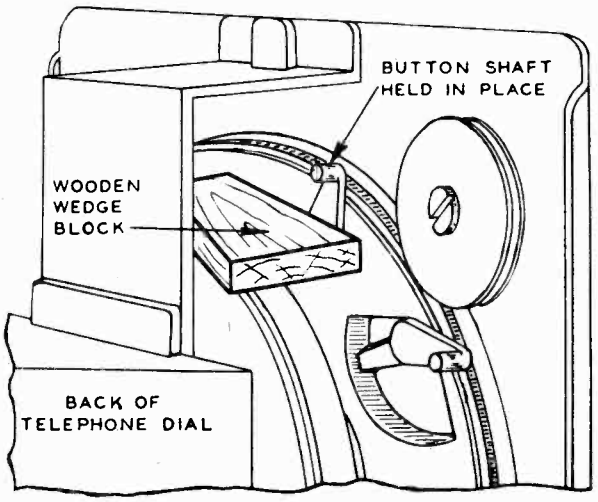


Fig. 8—Holding a Push Button Shaft in Place

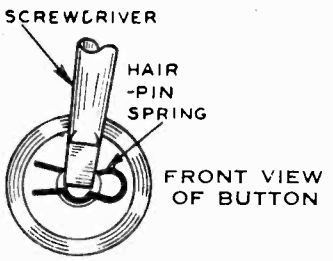


Fig. 9—Putting a Hairpin Spring on a Push Button Shaft

in a signal with one of these buttons, it can be corrected as follows:

If Noise Occurs on All Buttons—This is probably due to a poor contact between the flat contact spring and the contact ring—See Fig. 5. Clean the flat contact spring and contact ring to insure a good electrical connection. Ordinary cleaning fluid may be used and will be effective in most cases in cleaning the surface without affecting the plating. If the contact is still not satisfactory, a piece of fine emery cloth may be used.

If Noise Occurs on One Button Only—This is due to a poor contact between the ring gear stud, spring, contact washer and contact ring—See Fig. 5. Clean all of these items of the particular button to provide a good electrical connection in the same manner as mentioned above.

Telephone Dial Drive Cord Slipping

If the telephone dial drive cord slips on the drive shaft pulley, rub some rosin on this cord. This will remedy the condition in practically all cases.

Position of Stop Pin

When the telephone dial panel is assembled to the chassis, the gang condenser rotor should not completely open or close. The travel of the rotor in this respect is controlled by the gang stop pin on the ring gear—See Fig. 10. This is necessary to protect the gang condenser in case the telephone dial is swung rapidly to either of the extreme positions. When the gang stop pin is properly set, it will serve as the stop at both extreme positions. If the rotor is seen to open completely or close completely, the stop pin should be pulled back and re-set to overcome this condition.

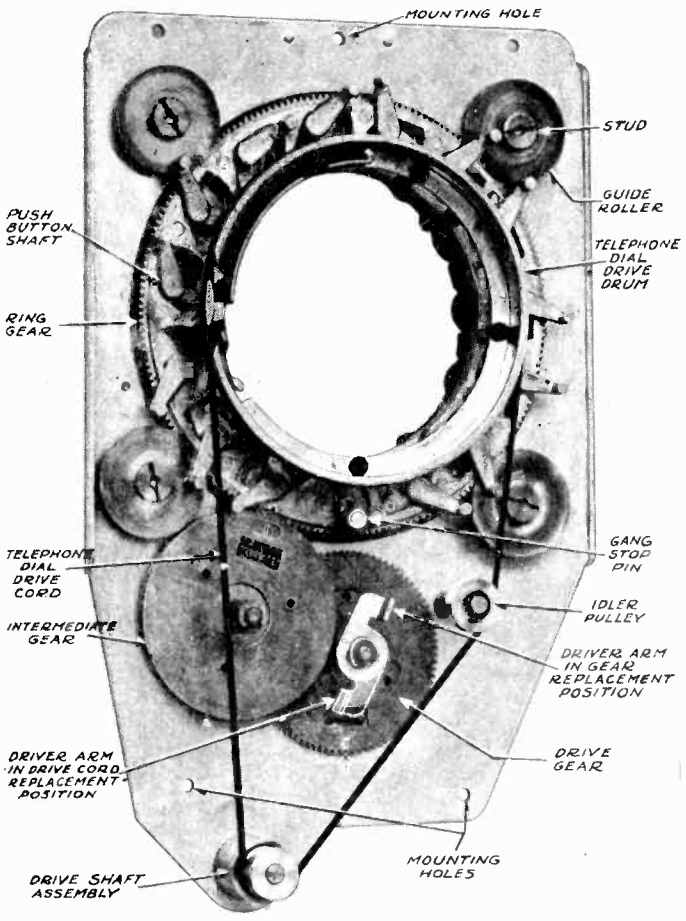


Fig. 10—Telephone Dial Panel Assembly

Greasing and Oiling

After a period of time, put some light grease on the teeth of the ring gear and the teeth of the intermediate gear—See Fig. 10. Also use some light grease on the film drum shaft at the point where it passes through the film pulley (See Fig. 7, Manual No. 108). Use a light oil in the drive shaft assembly bearing (See Fig. 10), care being taken not to get any on the drive cord.

Backlash Between Driver Arm and Spring Clamp on Condenser Drive Drum

If the telephone dial assembly turns an appreciable amount before the figures on the screen move, the driver arm (See Fig. 10) does not fit tightly in the spring clamp on the condenser drive drum. To remedy this condition, remove the telephone dial panel and bend the spring on the condenser drive drum so that the driver arm will fit tightly when pushed in. This spring can be bent by inserting the blade of a heavy screwdriver.

Replacing Parts

Replacing Telephone Dial Panel Assembly

Remove the chassis from the cabinet. Remove the escutcheon, glass screen and rubber gasket by taking out the 2 screws which hold this assembly in place.

Remove the silencer cable from the silencer contact spring assembly. Take out the 2 screws from the bottom of the telephone dial panel and the screw, lockwashers and rubber washer from the top of the telephone dial panel. **Caution—do not loosen any of the 4 guide roller screws.** Take off the telephone dial panel by pulling it away from the front of the chassis.

To replace this assembly, turn the condenser rotor so that the spring clamp of the condenser drive drum is at the top.

Turn the telephone dial assembly counter-clockwise (from front) until it no longer turns easily. Then

...n the telephone dial assembly clockwise until the wide spacer has gone slightly past the bottom of the dial.

Place the telephone dial panel assembly in position over the metal projector compartment. Insert the screw, 2 lockwashers and rubber washer in the center top hole of the telephone dial panel so that this screw goes in the tapped hole of the bracket of the metal projector compartment. Do not tighten this screw. Rotate the telephone dial slightly one way or the other until the driver arm of the drive gear (See Fig. 10) and the spring clip of the gang condenser drive drum line up properly. Push the telephone dial panel assembly into position so that the driver arm goes into the spring clip. This operation should be done carefully.

Replace the 2 screws at the bottom of the telephone dial panel. Tighten these screws and also the screw at the top. Insert the tip of the silencer cable in the clamp of the silencer contact spring assembly.

Replace the rubber gasket, glass screen and escutcheon assembly.

Replacing Telephone Dial Drive Cord

Remove the telephone dial panel assembly from the chassis in accordance with the instructions in the article in this manual on that subject.

Remove the old drive cord and drive cord tension spring. Turn the telephone dial until the notch on the ring gear lines up with the mark on the intermediate gear at the same time that the mark on the drive gear lines up with the arrow on the panel as shown in Fig. 10.

If, owing to the fact that the telephone dial has been rotated with the telephone dial drive cord off and with the panel removed from the chassis, these four marks do not line up readily, then it will be necessary to proceed as follows:

Turn the telephone dial until the mark on the drive gear and the arrow on the panel are in line and note the exact position of the notch of the ring gear. Then rotate the telephone dial several revolutions in a clockwise direction (from back of panel). Each time that the arrow on the panel and the mark on the drive gear are in line, the notch on the ring gear will have moved a very slight distance in respect to its previous position. Note these new positions of the notch on the ring gear each time that the arrow on the panel and the mark on the drive gear line up.

If (when the arrow on the panel and the mark on the drive gear line up) the notch on the ring gear is approaching the intermediate gear, continue to rotate the telephone dial in a clockwise direction until the notch on the ring gear lines up with the mark on the intermediate gear at the same time that the arrow on the panel and the mark on the drive gear are in line, as shown in Fig. 10.

If it is seen that the notch on the ring gear is going away from the intermediate gear (when the arrow on the panel and the mark on the drive gear are lined up), then rotate the telephone dial in a counter-clockwise direction until the notch on the ring gear lines up with the mark on the intermediate gear at the same time that the arrow on the panel lines up with the mark on the drive gear as shown in Fig. 10.

Then, after the gears have been lined up correctly as described above, rotate the telephone dial one complete revolution in a counter-clockwise direction (from back of panel). The driver arm of the drive gear will then be in the drive cord replacement position shown in Fig. 10.

Place one end of the drive cord on the hook which is inside the telephone dial drum—See Fig. 7. Bring the cord out through the upper opening in the drum. Wind the cord in a clockwise direction one and one-half turns around the drum progressing toward the back of the panel. Bring the cord over the drive shaft pulley (not over idler pulley at this time). Attach the spring to the free end of the cord and slip the loop of the spring over the pin in the slot of the telephone dial drum. Working back from the pin, lay this spring and cord in the slot and bring the cord out through the lower opening in the flange of the drum—See Fig. 7. Then place the cord over the idler pulley.

Replacing Film Drum Drive Cord

Remove the telephone dial panel assembly. Then follow the procedure indicated in the article, "Replacing Film Drum Drive Cord" in Movie Dial Manual No. 108, omitting paragraphs 1 and 10 of that article. Refer to Fig. 7 in that manual.

Replacing Gates

After a great amount of use one or both of the stop gates may be worn down and must be replaced. The old gates cannot be filed down. These gates are located on the front of the metal projector compartment below the opening for the glass screen. To take out the old gate, first remove the telephone dial panel. Take out the two pins which hold the gate in position. Disconnect the spring. After the spring has been attached to the new gate, put the new gate and pins in place and spread the pins. After this is done, be sure that the gate swings freely and that the spring still has sufficient tension to hold the gates definitely against their stop.

Replacing the Color Filter Semaphore

Follow the procedure indicated in the article, "Replacing Color Filter Semaphore" of Movie Dial Manual No. 108, omitting the 3rd and 10th paragraphs of that article.

Replacing a Telephone Dial Button or Button Shaft

A telephone dial button or button shaft may be put on or replaced without removing the chassis from the cabinet. Take out the celluloid disc and the station disc from the push button. Remove the hairpin spring which holds the button shaft in place at the front of the button. If the button shaft is broken, the old one should be removed and replaced at this time. Rotate the dial until the button shaft in question is approximately in the position shown in Fig. 8. This shaft must be held in place. This is done from the back of the cabinet with a wooden wedge block as shown.

Lay the cabinet back down against a chair so that it will be about 30 degrees from the vertical position.

Put the coil spring over the button shank and place this spring over the button shaft (from front of the radio). The adjusting tab should point toward the glass screen.

Hold the tab and rotate the button until the flat in the shank coincides with the flat on the shaft. Push the button all the way on.

Put the hairpin spring in place, as shown in Fig. 9, with the upper part in the slot near the end of the button shaft and the lower part over the end of the shaft. Place the blade of a screwdriver at the center of the lower part of the spring and push down until the spring snaps into place in the slot on the shaft. Remove the wedge block.

CAUTION—The different push button shafts must not be interchanged. If it is necessary to remove more than one push button, be sure to label each push button shaft so that it may be returned to its proper place.

Gear Assembly

The assembly of the ring gear, intermediate gear and drive gear (See Fig. 10) on the telephone dial panel is an involved procedure and, as a rule, can be accomplished successfully only by a man skilled in mechanical assembly.

In case one or more of the gears on this assembly becomes defective, it is suggested that the entire panel assembly be returned to the Repair Service Departments at Chicago or Oakland for reconditioning. However, for completeness, the following procedure is given for replacing these gears.

Replacing the Ring Gear

Remove the telephone dial panel assembly from the chassis (See "Replacing Telephone Dial Panel"). Take off the telephone dial drive cord. Take off the spreader spring of the intermediate gear (this spring eliminates lost motion or "back-lash" between the intermediate gear and the ring gear).

Label and number from 1 to 14 each push button shaft in a counter-clockwise direction starting with the shaft to the right of the gang stop pin (when the gang stop pin is at the bottom of the dial). Remove each push button, spring, and push button shaft —See Fig. 5. Unscrew the five screws which secure the telephone dial drive drum and take off this drum. Unscrew the four brass screws which hold the button spacer ring and contact ring assembly to the ring gear and remove the complete button spacer ring and contact ring assembly (it is not necessary to take off the contact ring from the button spacer ring).

Remove the two upper guide rollers (IMPORTANT—Be sure to exactly follow the instructions given in the article, "Replacing a Guide Roller"). The ring gear may then be removed.

CAUTION: Do not move the movable gear of the intermediate gear assembly in relation to the fixed gear.

Put the new ring gear in place observing ALL of the following items: Be sure that the arrow on the panel and the mark on the drive gear are in line. At the same time be sure that the mark on the intermediate gear and the notch in the ring gear are in line as shown in Fig. 10.

Replace the two upper guide rollers following exactly the procedure given in the article, "Removing and Replacing a Guide Roller." Reassemble the items to the ring gear assembly which were removed from it, care being taken that each push button shaft is put back in the same opening from which it was removed. Put on the spreader spring of the intermediate gear. Reassemble the drive cord and attach the telephone dial panel to the chassis.

Replacing the Intermediate and Drive Gears

Remove the telephone dial panel assembly from the chassis and take off the drive cord. Remove the spreader springs from both the intermediate and drive gears. Remove the two upper guide rollers following exactly the procedure given in the article, "Removing a Guide Roller." The complete telephone dial assembly with the ring gear may then be disengaged from the intermediate gear.

Take off the horseshoe washers from the shafts of the intermediate and drive gears. These gears may then be removed.

Before replacing the gears on the shafts, rotate the movable gear of the intermediate gear assembly in relation to the fixed gear, until the rectangular spring opening is at a maximum. Then turn the movable gear (in relation to the fixed gear) an amount equal to one tooth on the gear in such a direction that the two spring holders move toward each other and thus reduce the rectangular spring opening. Follow the same procedure for the two gears of the drive gear assembly.

It will be necessary to put on both the intermediate and drive gears at the same time. After they are both on their shafts, turn the drive gear so that the mark on the gear and the arrow on the panel are in line. Then raise the intermediate gear on its shaft and rotate it until the mark on the intermediate gear is in line with the center of the ring gear (when the ring gear is in its proper position). Replace the horseshoe washers.

Then re-engage the ring gear (being sure that the notch on the ring gear is in line with the mark on

Continued on next page

GEAR ASSEMBLY (Continued)

the intermediate gear at the same time that the arrow on the panel is in line with the mark on the drive gear). Replace the two upper guide rollers (as described in the article, "Replacing a Guide Roller"). Then put the spreader springs on the drive and intermediate gears. Replace the telephone dial drive cord and attach the telephone dial panel to the chassis.

Removing and Replacing a Guide Roller

If it is ever necessary to remove and replace any of the guide rollers, the following procedure should be used after the telephone dial panel, telephone dial drive cord and spreader spring for the intermediate gear have been removed.

Loosen the screw which holds the guide roller and stud to the telephone dial panel—See Fig. 10.

With the telephone dial panel face up, hold the stud of the guide roller so that it will not turn. Take out the screw. Remove the stud and the guide roller together, so that none of the twelve roller bearings which are between the stud and the guide roller will fall out.

In replacing the guide roller, first be sure that the stud and the twelve roller bearings are within the guide roller and that the head of the stud is against the flat side (not the side with the flange) of the guide roller. Then be sure that the notch in the ring gear is in line with the mark on the intermediate gear at the same time that the arrow on the panel is in line with the mark on the drive gear as shown in Fig. 10. Replace the stud and guide roller in the panel (panel face up) and replace the screw.

Put the spreader spring on the intermediate gear. Put on the telephone dial drive cord and attach the telephone dial panel to the chassis.

Model 62-271 Supplementary Parts List (Less Dial Assembly)

Parts listed in VOL. IX (Models 62-261, 62-311, 62-411) are used in Model 62-271 radios with the following changes:

The Following NEW PARTS are USED:

MISCELLANEOUS

Bin No.	Part No.	Description	Selling Price
	3A258	7 Prong Octal Base Socket (for 6K7, 6C5, 6F6)	$0.06
	3A259	5 Prong Octal Base Socket (for 5Z4MG)	.06
	*12A235	12" Dynamic Speaker Complete with Output Transformer (T8)	4.92
11538	10A103	Selectivity (Broad-Sharp) Control Knob	.20
	2A75	Selectivity (High Fidelity) Switch	.20
	2A76	2 Section, 3 Position Band Change Switch	.94
	4A67	Terminal Strip—2 Lug Insulated	.04

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A751	T3	1st I.F. Transformer and Can Assembly	$1.32
	9A752	T4	2nd I.F. Transformer and Can Assembly	1.30
	9A753	T5	3rd I.F. Transformer and Can Assembly	.96
	9A750	T8	Oscillator Coil and Can Assembly	1.62

CONDENSERS

Bin No.	Part No.	Code	Description	Selling Price
	44X30	C42	14 mf. 450 Volt Wet Electrolytic Condenser	$0.46
10965	47X81	C19	35 mmf. Molded	.12
	47X83	C43	150 mmf. Molded	.18
	47X84	C44	160 mmf. Molded	.18
	47X83	C45	150 mmf. Molded	.18
	47X84	C46	160 mmf. Molded	.18
	47X82	C47	330 mmf. Molded	.16
	47X87	C49	75 mmf. Molded Condenser	.16
	17A69	C13	40-120 mmf. Oscillator Padding Condenser (6000 KC Adjust.)	
		C16	40-100 mmf. Oscillator Padding Condenser (600 KC Adjust.)	
	17A68	C18	1-12 mmf. "B" Range Oscillator Trimmer	.10
	17A70	C20	15-55 mmf. 1st I.F. Trimmers	.20
		C21	15-55 mmf.	
	17A70	C23	15-55 mmf. 2nd I.F. Trimmers	.20
		C24	15-55 mmf.	
	17A71	C28	15-55 mmf. 3rd I.F. Trimmer	.12
	47X80	C48	18 mmf. Compensating Capacitor	.24
	14A69		3 Gang Condenser less Dial and Drive Assembly	1.78

RESISTORS

Bin No.	Part No.	Code	Description	Selling Price
	40X222	R19	1.5 Megohm Tone Control	$0.32

NOTE: C38 as listed in Manual No. 101 should be 46X202, .02 mf., 360 volt Tubular Condenser.

*This speaker may be used in place of 12A239 which is listed in Manual No. 101.

NOTE: The capacity of condenser C18 has been changed. This condenser is no longer a part of trimmer strip 17A45, but has been replaced by 17A68.

The Following Parts Shown in VOL. IX (Models 62-261, 62-311, 62-411) are NOT USED on the Model 62-271.

MISCELLANEOUS

Bin No.	Part No.	Description	Selling Price
	3A211	6K7 Tube Socket	$0.08
	3A221	6C5 Tube Socket	.08
	3A210	6F6 Tube Socket	.08
	3A222	5Z4MG Tube Socket	.08
	2A52	2 Section, 3 Position Band Change Switch	.74

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A493	T3	1st I.F. Transformer and Can Assembly	$0.94
	9A494	T4	2nd I.F. Transformer and Can Assembly	.94
	9A495	T5	3rd I.F. Transformer and Can Assembly	.76
	9A492	T8	Oscillator Coil and Can Assembly	1.42

CONDENSERS

Bin No.	Part No.	Code	Description	Selling Price
	44X10	C42	14 mf. 400 Volt Wet Electrolytic Condenser	$0.60
	17A35	C13	40-100 mmf. Range "B" Oscillator Padding Condensers	.22
		C16	300-600 mmf.	
	47X53	C19	35 mmf. Molded	.06
	17A30	C20	150-250 mmf. 1st I.F. Trimmers	.22
		C21	150-250 mmf.	
	17A30	C23	150-250 mmf. 2nd I.F. Trimmers	.22
		C24	150-250 mmf.	
	17A40	C28	70-150 mmf. 3rd I.F. Trimmers	.14
	47X72	C31	25 mmf. Molded	.06
	14A52		3 Gang Condenser less Dial and Drive Assembly	1.74

RESISTORS

Bin No.	Part No.	Code	Description	Selling Price
	40X213	R18	1.5 Megohm Tone Control and Selectivity Switch	$0.62

Model 62-293 Supplementary Parts List (Less Dial Assembly)

Parts listed in VOL. VIII (Models 62-313 and 62-413) are used in Model 62-293 radios with the following changes:

The Following NEW PARTS are USED:

MISCELLANEOUS

Bin No.	Part No.	Description	Selling Price
	3A258	7 Prong Octal Base Socket (for 6K7, 6H6, 6C5, 6L6)	$0.06

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A729	T4	1st I.F. Transformer and Can Assembly	$1.32
	9A730	T5	2nd I.F. Transformer and Can Assembly	1.20
	9A731	T6	3rd I.F. Transformer and Can Assembly	1.16
	9A732	T10	Oscillator Coil and Can Assembly	1.66

CONDENSERS

Bin No.	Part No.	Code	Description	Selling Price
10979	46X98	C57	.10 mf. 180 Volts Tubular	$0.10
10965	47X81	C20	35 mmf. Molded	.12
	47X82	C50	330 mmf. Molded	.16
	47X84	C52	160 mmf. Molded	.18
	47X83	C53	150 mmf. Molded	.18
	47X84	C54	160 mmf. Molded	.18
	47X83	C55	150 mmf. Molded	.18
	47X85	C56	60 mmf. Molded	.16
	17A69	C15	40-120 mmf. Oscillator Padding Condenser (600 KC Adjust.)	.20
		C16	40-100 mmf. Oscillator Padding Condenser (6000 KC Adjust.)	
	17A68	C19	1-12 mmf. Range "B" Oscillator Trimmer	.10
	17A70	C25	15-55 mmf. 1st I.F. Trimmer	.20
		C26	15-55 mmf.	
	17A70	C27	15-55 mmf. 2nd I.F. Trimmers	.20
		C28	15-55 mmf.	
	17A71	C34	15-55 mmf. 3rd I.F. Trimmer	.12
	47X80	C51	15 mmf. Compensating Capacitor	.24
	14A67		4 Gang Condenser less Dial and Drive Assembly	2.38

RESISTORS

Bin No.	Part No.	Code	Description	Selling Price
11540	40X221	R26	1.5 Megohm Tone Control	$0.36

NOTE: The capacity of condenser C19 has been changed. This condenser is no longer a part of trimmer strip 17A53, but has been replaced by 17A68 as shown in "New Parts Used."

MISCELLANEOUS (Continued)

Bin No.	Part No.	Description	Selling Price
	3A259	5 Prong Octal Base Socket (for 5Z4MG)	.06
11538	10A103	Selectivity (Broad-Sharp) Control Knob	$0.20
	2A74	3 Section, 3 Position Band Change Switch	1.06
	2A75	Selectivity (High Fidelity) Switch	.20
	26A54	Complete Set of Rubber Mounting Cushions for Gang Condenser	.06
	4A67	Terminal Strip (Single Insulated Lug—with mounting strap)	.04
10887	4A18	Terminal Strip (2 Lugs Insulated—with mounting strap)	.04

The Following Parts Shown in VOL. VIII (Models 62-313, 62-413) are NOT USED on the Model 62-293.

MISCELLANEOUS

Bin No.	Part No.	Description	Selling Price
	3A233	6L6 Tube Socket	$0.08
	3A232	6H6 Tube Socket	.08
	3A221	6C5 Tube Socket	.08
	3A211	6K7 Tube Socket	.08
	3A222	5Z4 Tube Socket	.08
	2A57	3 Section, 3 Position Band Change Switch	.92

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A515	T4	1st I.F. Transformer and Can Assembly	$0.92
	9A516	T5	2nd I.F. Transformer and Can Assembly	.82
	9A517	T6	3rd I.F. Transformer and Can Assembly	1.02
	9A514	T10	Oscillator Coil and Can Assembly	1.44

CONDENSERS

Bin No.	Part No.	Code	Description	Selling Price
	17A35	C15	300-600 mmf. Oscillator Padding Condenser	$0.22
		C16	40-100 mmf.	
	47X53	C20	35 mmf. Molded	.06
	17A30	C25	150-250 mmf. 1st I.F. Trimmers	.22
		C26	150-250 mmf.	
	17A30	C27	150-250 mmf. 2nd I.F. Trimmers	.22
		C28	150-250 mmf.	
	17A40	C34	40-150 mmf. 3rd I.F. Trimmer	.14
	14A50		4 Gang Condenser less Dial and Drive Assembly	2.30

RESISTORS

Bin No.	Part No.	Code	Description	Selling Price
	40X214	R26	1.5 Megohm Tone Control and Selectivity Switch	$0.62

Models 62-271 and 62-293 Telephone Movie Dial Replacement Parts (Complete List)

Bin No.	Part No.	Description	Selling Price
	4X156	Escutcheon for Glass Screen	$0.20
11542	58X175	Glass Screen	.10
11364	8X52	Rubber Gasket for Glass Screen	.08
	26A52	Telephone Dial and Drive Panel Assembly Complete (does not include any Movie Dial parts)	8.72
		The following items are included in the above Assembly but may be ordered separately:	
11543	25A133	Push Button and Tab ea.	.12
11544	28X109	Springs for Push Buttons doz.	.14
11545	28X111	Hair Pin Springs for Push Buttons doz.	.06
	26X238	Push Button Shafts ea.	.08
	25A124	Button Spacer Ring and Silencer Ring Assembly	.82
	24X252	Ring Gear Only (does not include Push Button Shafts)	.44
	24X264	Telephone Dial Drive Drum	.19
	26X244	Stop Pin (behind Wide Spacer)	.12
	28X112	Spring for Stop Pin doz.	.06
	24X257	Guide Roller Only (Upper) ea.	.18
	24X266	Guide Roller Only (Lower) ea.	.18
	20X140	Stud (1 required for each Guide Roller) ea.	.06
	20X147	Roller Bearings (12 required for each Guide Roller) doz.	.06
	10X20	Telephone Dial Drive Cord Only (Black)	.24
	28X114	Tension Spring for Telephone Dial Drive Cord	.04
	25A112	Gear and Driver Arm Assembly less Spreader Spring	.24
	25A122	Intermediate Gear Assembly less Spreader Spring	.36
	28X102	Spreader Springs for Above Gears doz.	.10
	24X263	Drive Cord Idler Pulley	.06
	19X67	Horse Shoe Washers doz.	.08
	26X243	Tuning Knob Shaft Only	.06
	20X151	Eight Ball Bearings in Retainer (Two sets used on above Shaft) ea.	.06
	29X74	Front Brass Bearing Race	.04
	29X73	Rear Brass Bearing Race and Drive Pulley	.08
	25X347	Telephone Dial Panel, Shafts and Bearing Housing Only (less Button Spacer and Ring Gear Assembly, Guide Rollers, Tuning Shaft Assembly and Drive Gears)	.58
	26A51	Silencer Contact Spring Assembly	.06
	25A120	Dial Bracket and Metal Projector Compartment Assembly Complete with Stop Gates and Spring	$1.06
	25X357	Left Stop Gate Complete with Pins (included in above Assembly)	.12
	25X358	Right Stop Gate Complete with Pins (included in above Assembly)	.12
	28X113	Spring for Stop Gates (included in above Assembly) doz.	.14
	25A114	Condenser Drive Drum Assembly	.24
	10X19	Film Drum Drive Cord Only (Phosphor-bronze)	.06
	28X104	Tension Spring for Film Drum Drive Cord	.04
	25A115	Film Drum Support Bracket and Pulley Assembly (does not include Film Drum Shaft)	.80
	26X242	Film Drum Shaft Assembly less Spring	.22
	28X110	Spring for Film Drum Shaft Assembly	.04
9382	12X57	Film Drum Assembly Including Clamping Plate	.56
	62-5517	Dial Lamp	.18
	7A42	Socket for Dial Lamp	.32
	25X295L	Lens, Light and Aperture Bracket less Aperture Cap	.46
	12X54	Aperture Cap	.06
10480	12X45	Condenser Lens	.50
	12X66	Projector Lens	.44
	29X77	Focusing Lever Assembly for Projector Lens	.06
11073	25A75	Color Filter Semaphore less Spring	.24
11526	28X42	Spring for Color Filter Semaphore	.04
	32X81B	Cardboard Projector Compartment	.06
	32X82	Cardboard Projector Compartment Shield	.04
	25X353	Mirror Support Bracket	.18
	26A53	Mirror Assembly	.20
10262	41X138	Mirror Only	.04
	25X354	Front Mounting Bracket for Gang Condenser	.30
	25A116	Drum Elevator Assembly complete less Ball Bearing	.30
11505	20X120B	Ball Bearing for Elevator	.10
11546	26A55	Complete Set of Station Call Letter Discs with 20 Celluloid Discs	.20

Prices Subject To Change Without Notice.

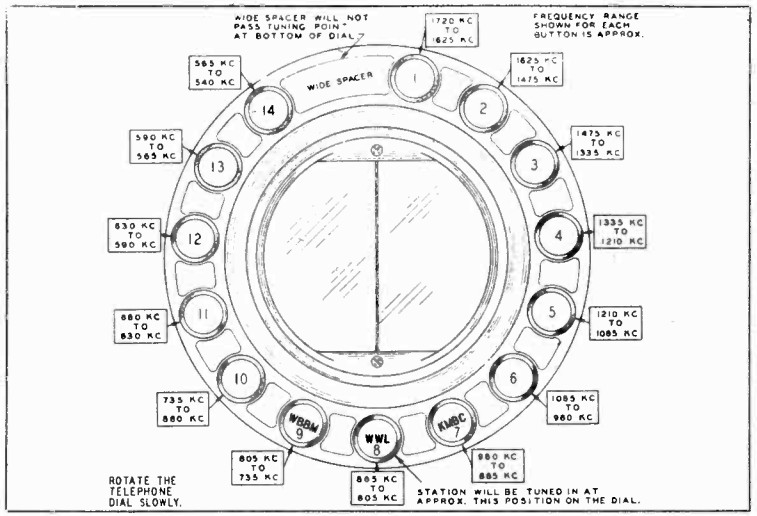


Fig. 11—Telephone Dial Station Buttons

Setting the Telephone Dial Stations

Selecting the Stations to be Set

There are 14 buttons on the telephone dial by means of which 14 stations may be set.

Make a list of your favorite stations, those which you tune in regularly. Put down the frequencies of these stations. There may be 3, 5, 8 or any number up to and including 14 in this list.

If 2 (or more) of the stations in the list you have selected fall within the frequency range of one button, only one of them may be set on the telephone dial. The other station must be tuned in with the regular tuning knob.

Frequencies Covered by Each Button

In Fig. 11 are shown the telephone dial buttons. Each one is given a number so that it may be readily referred to.

The ***approximate*** frequency range of each button is shown in the rectangle. By approximate is meant that the range of the button may, on occasion, be 10 KC or 20 KC greater or less than the limits as shown. Any station within the *actual* range of a button may be set. Station WBBM, for example, with a frequency of 770 KC, falls within the frequency range of button No. 9 and can, therefore, be set on this button.

Although one frequency, for example 980 KC, is shown as the end of the range of two adjacent buttons, in this case 6 and 7, as a rule, it is possible to tune in a station of this frequency only on one of the two buttons. The proper button to use must be determined by trying both of them.

Procedure for Setting the Telephone Dial Buttons

COMPLETE PROCEDURE	CONDENSED PROCEDURE
1 — The selectivity control should be in the sharp position.	— Turn selectivity control to sharp.
2 — Select one of the stations from the list you have made out and carefully tune in this station with the tuning knob in the usual way using the tuning eye as a guide.	— Tune in station to be set.
3 — The button nearest the bottom center of the dial will be the proper one for the station which is tuned in. In Fig. 11 button No. 8 is the correct one for station WWL.	— Determine the proper button.
4 — The procedure necessary to set a button is simple and the steps are illustrated in Figs. 12 to 15. The normal position of the button and tab is shown in Fig. 12. Depress the button with the finger to the locked position, or until the tab is level with the shoulder of the spacer—See Fig. 13. While the button is thus depressed the tab may be easily moved to the right either with the fingers or with the point of a hard lead pencil inserted in the hole in the tab. It is then in the unlocked position—See Fig. 14. If the tab does not move to the right easily, push the button in or out slightly from the position shown until the groove is found.	— Push button to locked position and move tab to the right.
5 — IMPORTANT—The dial must not be turned during steps 4, 5 and 6, otherwise the station will be detuned. Hold the tuning knob with the hand not used for setting the button, to be sure the dial does not turn and then proceed with the instructions in the next paragraph. After the tab is to the right, the button should be grasped with the thumb and forefinger as shown in Fig. 15. Push the button all of the way in to the setting position and turn the button in either direction until it locks into place. A click will be heard and (with the button still pushed in) it will be impossible to turn the button further in either direction without turning the dial. After the click is heard, the button should be slowly released. When new, the buttons may be stiff and may not turn easily. NOTE: Occasionally one or more of the buttons on the dial may be set at the right point for a station when the radio is shipped from the factory. If this is the case, the click will not be heard and the button cannot be turned after it is pushed in to the setting position, indicating that it is already correctly locked in place.	— Push button to setting position and turn button until it locks in place. Release button slowly.
6 — Push the button one-half way in. It will then be in *the unlocked position*—See Fig. 14. (Do not push it all the way in to the setting position). Move the tab to the left with finger or pencil to the locked position—See Fig. 13. Then release the button; it will return to the normal position—See Fig. 12.	— Push button to unlocked position and move tab to the left. Release button.
7 — Punch the correct station disc from the sheet supplied and push the disc into the bottom of the button. It will fit into place at the bottom. It should be so pushed in that when the button is at the bottom of the dial the wording will be horizontal—See Fig. 11.	— Insert correct station disc.
8 — Push one of the clear celluloid discs into the bottom of the button over the station disc.	— Insert clear celluloid disc.

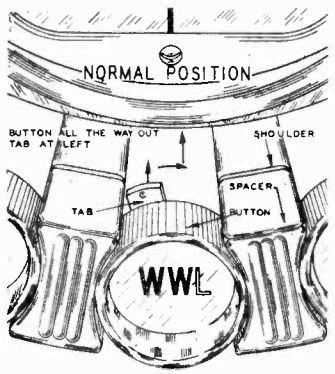


Fig. 12—Button and Tab in Normal Position

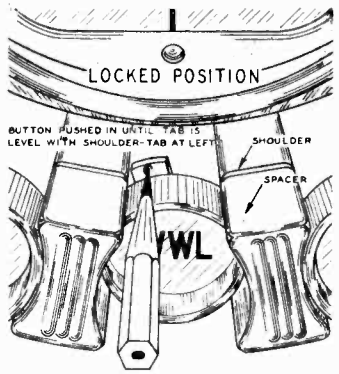


Fig. 13—Button and Tab in Locked Position

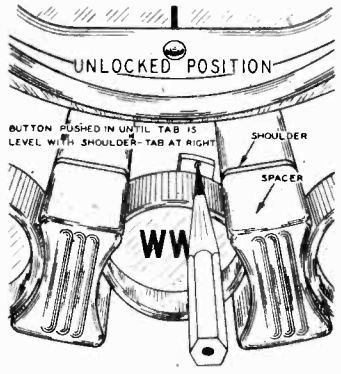


Fig. 14—Button and Tab in Unlocked Position

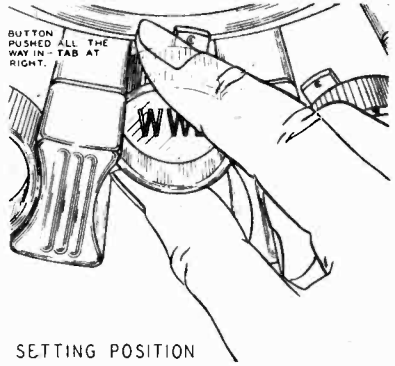
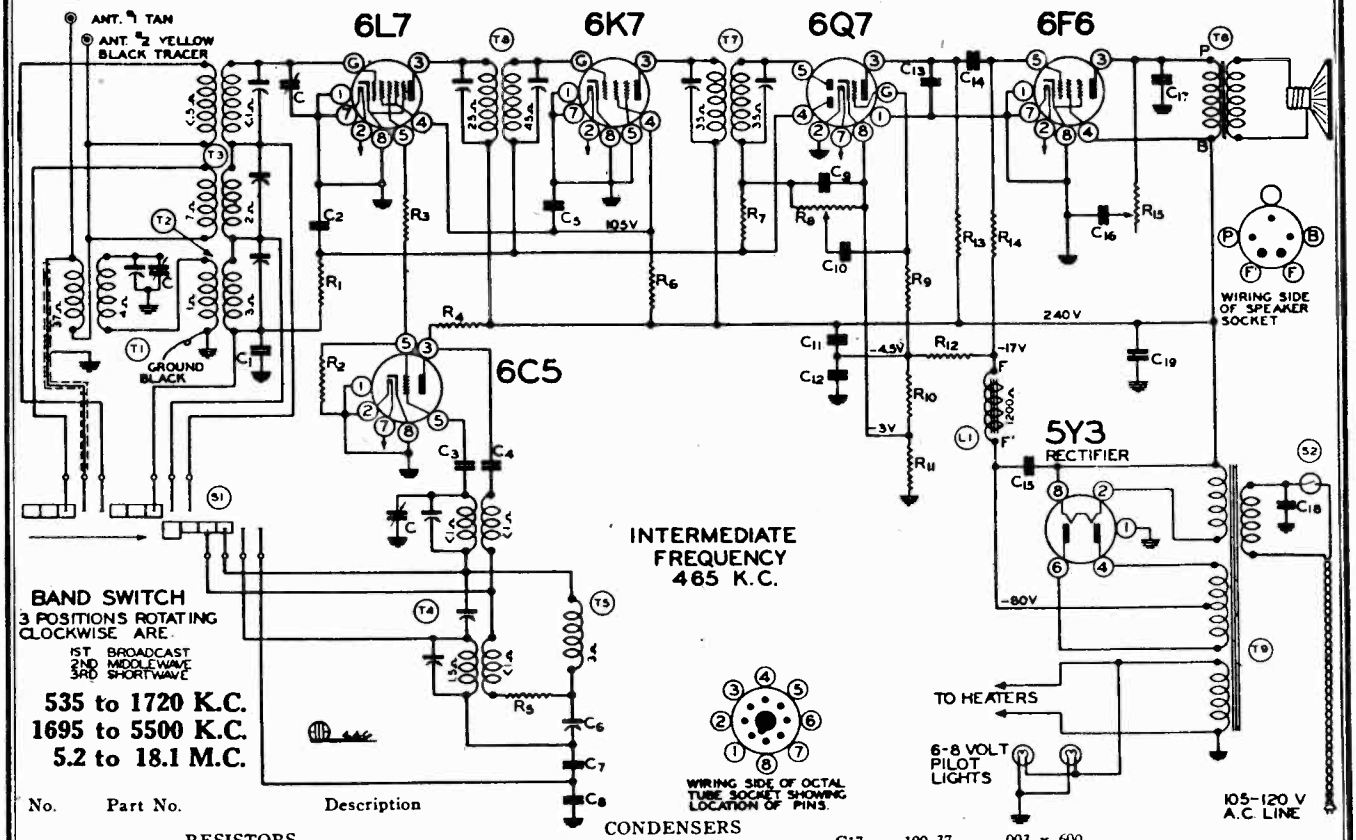


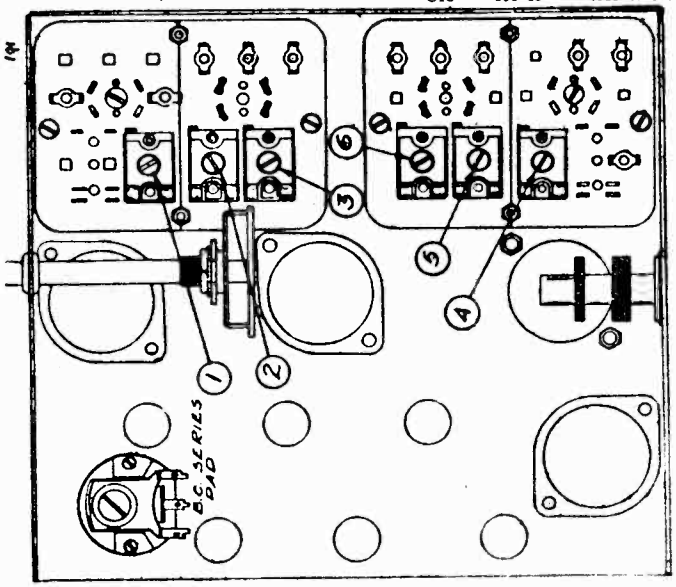
Fig. 15—Button and Tab in Setting Position

MODEL 62-296

MONTGOMERY-WARD & CO.



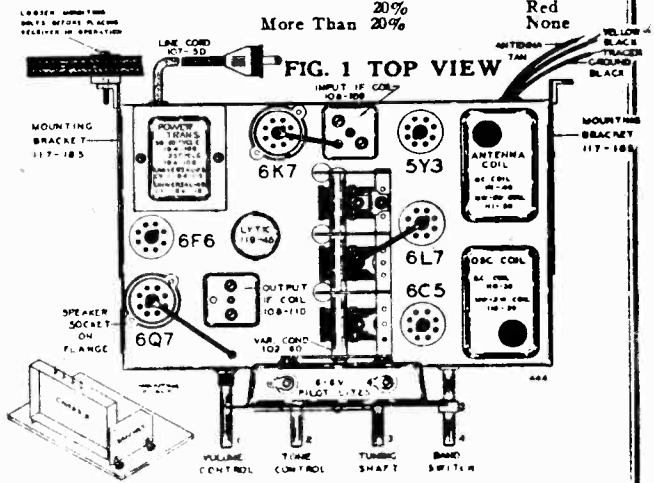
No.	Part No.	Description
		RESISTORS
R1	130-103	100M ohm - 1/3 w.
R2	130-12	50M ohm - 1/3 w.
R3	130-105	150 ohm - 1/3 w.
R4	130-77	10M ohm - 1 watt
R5	130-27	50 ohm - 1/3 w.
R6	130-34	19M ohm - 1 watt
R7	130-4	3 meg - 1/3 w.
R8	101-93	1 meg volume control
R9	130-4	3 meg - 1/3 w.
R10	106-26	32 ohm - resistor strip
R11	106-26	52 ohm - resistor strip
R12	106-26	220 ohm - resistor strip
R13	130-103	100M ohm - 1/3 w.
R14	130-102	500M ohm - 1/3 w.
R15	101-92	50M ohm - tone control
		R10, R11 and R12 in same unit
		CONDENSERS
C	102-60	3 gang variable
C1	100-22	.05 x 200
C2	100-26	.02 x 400
C3	129-39	.00005 Mica
C4	100-37	.003 x 600
C5	100-1	.1 x 400
C6	124-40	.000715 W.C. Series Pad
C7	129-55	.0034 Mica
C8	129-54	.003 Mica
C9	129-5	.0001 Mica
C10	100-26	.02 x 400
C11	119-45	8 mfd. - 400 w. v. lytic
C12	100-20	.1 x 200
C13	129-2	.0005 Mica
C14	100-11	.01 x 400
C15	119-45	8 mfd. 400 w. v. lytic
C16	100-65	.015 x 600
C17	100-37	.003 x 600
C18	100-61	.02 x 600
C19	100-11	.01 x 400
		C11 and C15 in same unit
		PARTS
T1	111-51	Preselector Coil
T2	111-49	B. C. Antenna Coil Complete
T3	111-50	S.W. M.W. Antenna Coil complete
T4	110-39	S.W. M.W. Oscillator Coil complete
T5	110-38	B.C. Oscillator Coil complete
T6	108-109	Input I.F. Coil complete 465 kc.
T7	108-110	Output I.F. Coil complete 465 kc.
T8	114-85B	6" dynamic Speaker
T9	104-106	Power Transformer
L1		Speaker field 1200 ohm
S1	125-40	Wave band switch
S2		Off-On Switch on Volume Control



The power consumption of this receiver is 75 watts.

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance percent	Color of Dot
2½ %	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More Than 20%	None



DUMMY ANTENNAS: MODEL 62-296

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-110 Output I.F. Transformer
Part No. 108-109 Input I.F. Transformer
These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-110) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6L7 and adjust input I.F. transformer (No. 108-109) to resonance.

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly, Fig. 3.)
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:
5.2 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.2 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 17 megacycle signal appears near 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments.
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment number 2) and middle wave antenna (Adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5500 kilocycles and 1695 kilocycles for band coverage.
   (d) Recheck broadcast band alignment.

CHASSIS MODEL 62-503

DUMMY ANTENNAS: (Serial No. 8A977900 and up)

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-112B Output I.F. Transformer
Part No. 108-111B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with variable condenser in its minimum capacity position, plates entirely out of mesh, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-112B) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6A8G and adjust input I.F. transformer (No. 108-111B) to resonance.

SHORT WAVE BAND ALIGNMENT:
5.45 to 18.3 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 16 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:
   (a) Move dial pointer to 16 megacycles and adjust short wave oscillator trimmer to resonance.
   This adjustment is the trimmer mounted on the top of rear section of the variable gang condenser (see Fig. 1, top view, adjustment number 7).
   (b) Adjust short wave antenna trimmer (Adjustment Number 3), to resonance (see Fig. 3, bottom view).

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 1, see bottom view of chassis, Fig. 3).
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (adjustment number 2), to resonance.
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 4), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "c" until sensitivity is at its maximum.
   (e) Set external oscillator to 2100 K.C. (Image of 1170 K.C.) and tune in the signal at 1170 K.C. on the dial. Adjust the wire capacitor, (Adjustment number 6) by twisting the two wires until a **Minimum** output is obtained on output meter.
   (f) Set external oscillator to 2630 K.C. (Image of 1700 K.C.) and tune in the signal at 1700 K.C. on the dial. Adjust the wire capacitor (Adjustment number 5), by moving the wire either toward or away from the coil winding until a **Minimum** output is obtained on output meter.
   (g) Repeat adjustments (e) and (f) until the sensitivity is at a **Minimum.**
   (h) Recheck the broadcast antenna trimmer (Adjustment number 2).
   (i) Recheck the short wave antenna trimmer (Adjustment number 3).

FOR OTHER DATA SEE INDEX

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

Press down any one of the automatic tuner levers. Hold it down, and by means of the tuning knob No. 3, tune in very carefully the station you have selected for this lever. Turn the tuning knob very slowly back and forth until the signal is clearest. The station will then be accurately tuned in.

Release the lever and press down another automatic tuner lever. Hold it down and carefully tune-in the station indicated on the station call letter tab above this lever.

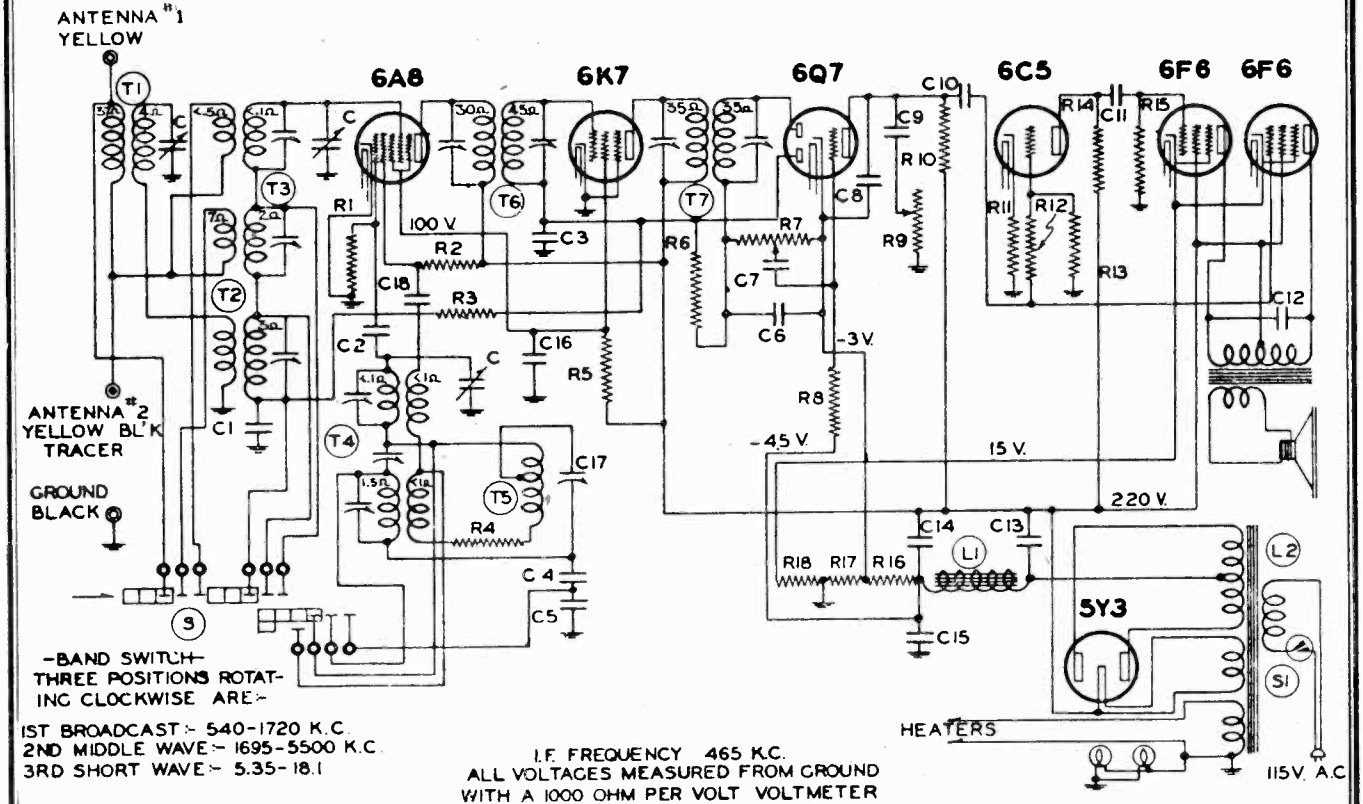
Follow this procedure until you have selected all of your favorite stations. Hold tuning knob securely with left hand to prevent it from turning and with a coin (half dollar), tighten the special locking screw ("C") in the center of the tuning knob, (See Fig. 1).

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, hold the tuning knob No. 3 securely and with a coin loosen the locking screw "C" one or two turns; select the new station as explained. **Be sure to retighten the locking screw,** otherwise the stations you have selected will not stay adjusted to the levers.

MODELS 62-300, 62-627

MONTGOMERY-WARD & CO.



I.F. FREQUENCY 465 K.C.
ALL VOLTAGES MEASURED FROM GROUND WITH A 1000 OHM PER VOLT VOLTMETER

No.	Part No.	Description
		RESISTORS
R1	130-12	50M ohms - 1/3 w.
R2	130-48	15M ohms - 1/3 w.
R3	130-103	100M ohms - 1/3 w.
R4	130-27	50 ohms - 1/3 w.
R5	130-96	25M ohms - 1/2 w.
R6	130-4	3 megohm - 1/3 w.
R7	101-74	1 megohm - Volume Control
R8	130-4	3 megohm - 1/3 w.
R9	101-75	300M ohms - Tone Control
R10	130-100	150M ohms - 1/3 w.
R11	130-22	5M ohms - 1/3 w.
R12	130-163	400M ohms - 1/3 w.
R13	130-103	100M ohms - 1/3 w.
R14	130-12	50M ohms - 1/3 w.
R15	130-100	150M ohms - 1/3 w.
R16	106-37	20 ohms - Muter
R17	106-37	42 ohms - Muter
R18	106-37	250 ohms - Muter

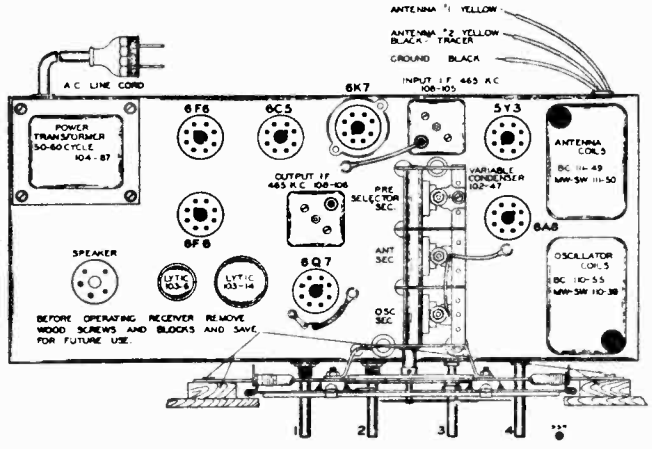
NOTE: R16, R17 and R18 in one unit, No. 106-37

		CONDENSERS
C1	100-22	.05 x 200 v.
C2	129-39	.00005 Mica
C3	100-22	.05 x 200 v.
C4	129-55	.0034 Mica
C5	129-54	.003 Mica
C6	129-5	.0001 Mica
C7	100-11	.01 x 400 v.
C8	129-2	.0005 Mica
C9	100-57	.006 x 600 v.
C10	100-26	.02 x 400 v.
C11	100-26	.02 x 400 v.
C12	100-12	.003 x 600 v.
C13	103-6	8 mfd. x 350 v.
C14	103-14	16 mfd. x 250 v.
C15	100-20	.1 x 200 v.
C16	100-39	.1 x 400 v.
C17	124-35	Adjustable Padder - Working Capacity 740 mmf.
C18	100-12	.003 x 600 v.

PARTS

C	102-47	One section of three gang condenser
T1	111-51	B.C. Pre-Selector
T2	111-49	B.C. Antenna Coil Assembly
T3	111-50	MW - SW Antenna Coil Assembly
T4	110-39	MW - SW Oscillator Coil Assembly
T5	110-55	B.C. Oscillator Coil Assembly
T6	108-105	Input I.F. - 465 kc.
T7	108-106	Output I.F. - 465 kc.
L1	114-66	6" Speaker (Field Resistance 900 ohms)
L2	104-87	Power Transformer (60 cycle) 115 volts
S	125-17	Band Switch
S1	101-74	On-off Switch on volume control.

1—Type 6A8G—Pentagrid mixer, first detector and oscillator.
1—Type 6K7 Remote cut-off pentode I.F. amplifier (465 K.C.)
1—Type 6Q7G duplex diode triode second detector, A.V.C. and audio.
1—Type 6C5 Inverter stage.
2—Type 6F6G—pentode push-pull output amplifier.
1—Type 5Y3G high vacuum rectifier.



Vol. Control On-Off Switch | Tone Control | Tuning Control | Band Switch

MODELS 62-300,
62-627

MONTGOMERY-WARD & CO.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to measured with 115 volts on the primary of the power transformer.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-106 Output I.F. Transformer
Part No. 108-105 Input I.F Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis, (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-106) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6A8G and adjust input I.F. transformer (No. 108-105) to resonance.

BROADCAST BAND ALIGNMENT:

540 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:

5.35 to 18.1 Megacycles

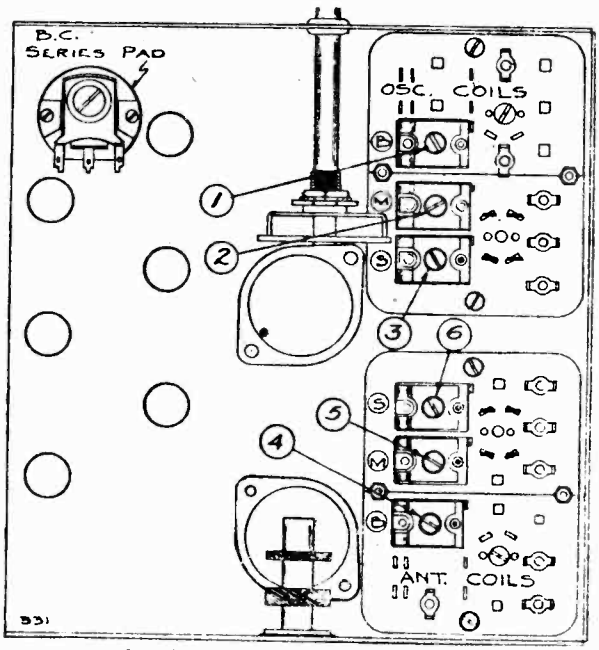
1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.3 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 18.3 megacycle signal appears near 17.4 megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1690 to 5500 Kilocycles

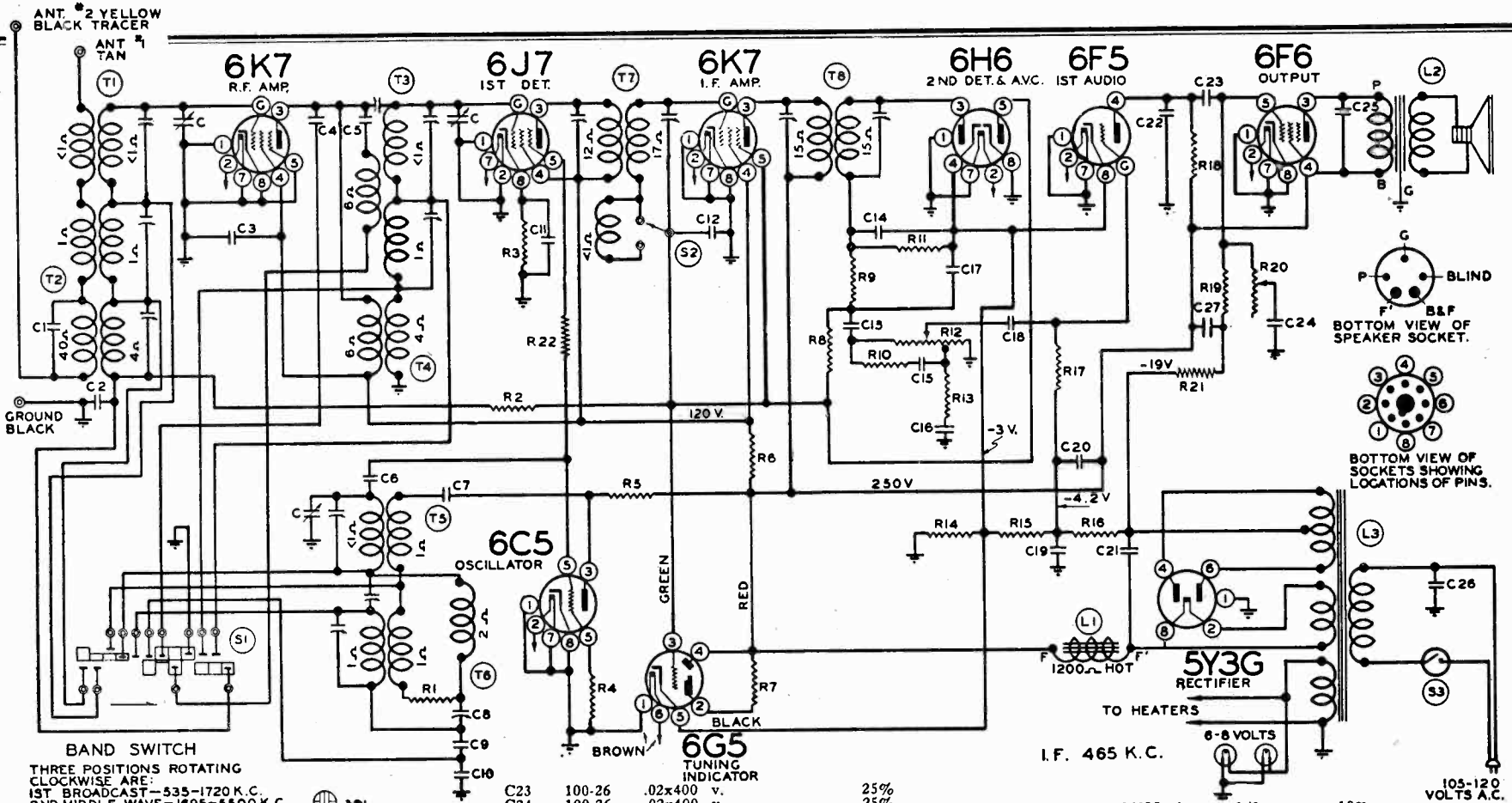
1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment number 2) and middle wave antenna (Adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5400 kilocycles and 1700 kilocycles for band coverage.
   (d) Recheck broadcast band alignment.



BOTTOM VIEW SHOWING TRIMMERS

MONTGOMERY-WARD & CO.

MODELS 62-319, 62-329, 62-409, 62-419
Above Serial 7F69620



C	102-40	3 gang variable condenser	
C1	129-40	.0001 Mica	10%
C2	100-9	.05x200 v.	25%
C3	100-53	.25x400 v.	20%
C4	129-59	.0003 Mica	5%
C5	129-38	.00005 Mica	10%
C6	129-67	.00004 Mica	10%
C7	100-25	.002x600 v.	25%
C8	124-35	Series Pad—740 mmf. w. c.	
C9	129-70	.004 Mica	2½%
C10	129-71	.002 Mica	2½%
C11	100-20	.1x200 v.	25%
C12	100-26	.02x400 v.	25%
C13	100-9	.05x200 v.	25%
C14	129-39	.00005 Ceramicon	20%
C15	129-12	.00025 Mica	20%
C16	100-9	.05x200 v.	25%
C17	129-38	.00005 Mica	10%
C18	100-22	.05x200 v.	25%
C19	100-20	.1x200 v.	25%
C20	103-12	8. x 275 w.v. Regulating lytic	
C21	103-13	8. x 400 w.v. lytic	
C22	129-60	.00015 Mica	20%
C23	100-26	.02x400 v.	25%
C24	100-26	.02x400 v.	25%
C25	100-25	.002x600 v.	25%
C26	100-61	.02x600 v. Bakelite	
C27	100-1	.1x400 v.	20%

RESISTORS

R1	130-105	150 ohm — 1/3 w.	20%
R2	130-20	100M ohm — 1/3 w.	20%
R3	130-159	2500 ohm — 1/3 w.	10%
R4	130-52	50M ohm — 1/3 w.	20%
R5	130-77	10M ohm — 1 w.	20%
R6	130-160	10M ohm — 2 w. Wire Wound	10%
R7		1 megohm — 1/10 w. in tuning indicator socket	
R8	130-4	3 megohm — 1/3 w.	20%
R9	130-111	100M ohm — 1/10 w.	20%
R10	130-52	50M ohm — 1/3 w.	20%
R11	130-171	500M ohm — 1/10 w.	20%
R12	101-60	1 megohm Volume Control	
R13	130-167	7500 ohm — 1/3 w.	20%
R14	106-42	55 ohm	
R15	106-42	20 ohm	
R16	106-42	240 ohm	
R17	130-19	1 megohm — 1/3 w.	20%
R18	130-172	250M ohm — 1/3 w.	10%
R19	130-172	250M ohm — 1/3 w.	10%
R20	101-61	100M ohm — Tone Control	
R21	130-172	250M ohm — 1/3 w.	10%
R22	130-60	100 ohm — 1/3 w.	20%

R11, R9 and C14 are in output I.F. Can
R14, R15 and R16 in same unit.

PARTS

T1	111-67	M.W. S.W. Antenna Coil Assembly
T2	111-68	B.C. Antenna Coil Assembly
T3	109-32	M.W. S.W. R.F. Coil assembly
T4	109-33	B.C. R.F. Coil Assembly
T5	110-53	M.W. S.W. Oscillator Coil Assembly
T6	110-52	B.C. Oscillator Coil Assembly
T7	—108-107	Input I.F. Coil assembly—465 kc.
T8	—108-108	Output I.F. Coil Assembly—465 kc.
L1		1200 ohm speaker field
L2	114-87	10" Dynamic Speaker—20" Cord
	114-79	8" Dynamic Speaker — 12" Cord
	114-80	6" Dynamic Speaker — 12" Cord
L3	—104-80	Power Transformer
S1	125-25	Band Switch
S2	—	Hi-Fi Switch on tone control
S3	—	On-Off switch on volume control

MODELS 62-319,62-329, 62-409,62-419

MONTGOMERY-WARD & CO.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-108 Output I.F. Transformer
Part No. 108-107 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis

1. With volume control full on, (the extreme right of its rotation), the wave changing switch in the broadcast position, (extreme left of its rotation), the tone control in the sharp position (as much right rotation as possible without operating the Hi Fidelity switch), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-108) to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6J7 and adjust input I.F. transformer (No. 108-107) to resonance.

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:

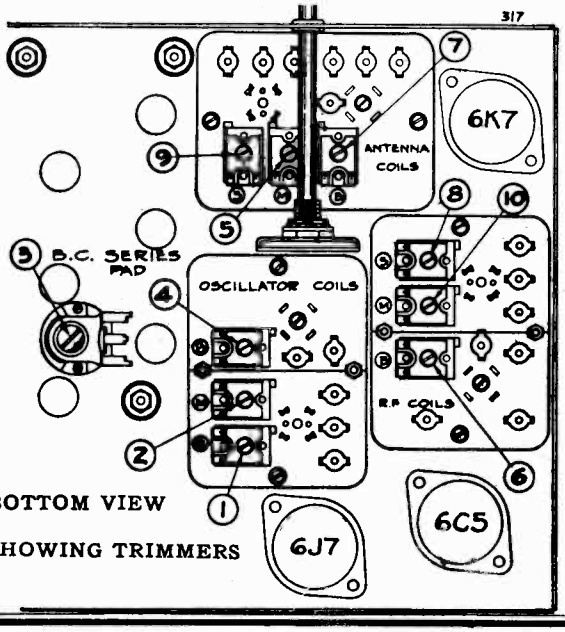
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 4; see bottom view of coil assembly, Fig. 3.)

   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast R.F. trimmer (adjustment number 6) and broadcast antenna trimmer (adjustment number 7), to resonance.

   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 3), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)

   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**



BOTTOM VIEW
SHOWING TRIMMERS

SHORT WAVE BAND ALIGNMENT:
5.35 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:

   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer (adjustment number 1) to resonance.

   (b) Adjust short wave R.F. trimmer (adjustment number 8), and short wave antenna trimmer (adjustment number 9), to resonance.

   (c) Re-set external oscillator and check set at 18.1 megacycles and 6 megacycles for band coverage and sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 17 megacycle signal can be tuned in not only at 17 on the dial but also at approximately 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5 megacycles and connected in series with "Dummy 3" to the antenna and ground leads make the following adjustments:

   (a) Move dial pointer to 5 megacycles and adjust middle wave oscillator trimmer (adjustment number 2) to resonance.

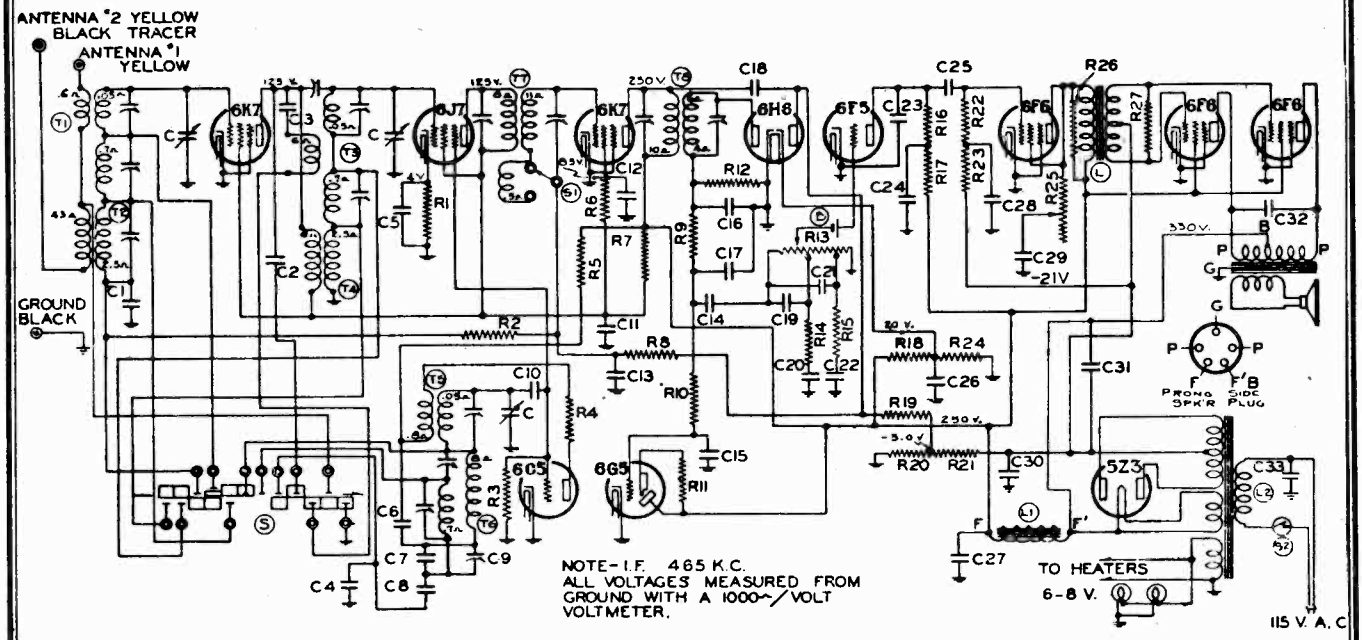
   (b) Adjust middle wave R.F. trimmer (adjustment number 10), and middle wave antenna trimmer (adjustment number 5), to resonance.

   (c) Re-set external oscillator and check sensitivity at 1800 kilocycles.

   (d) Recheck broadcast band alignment.

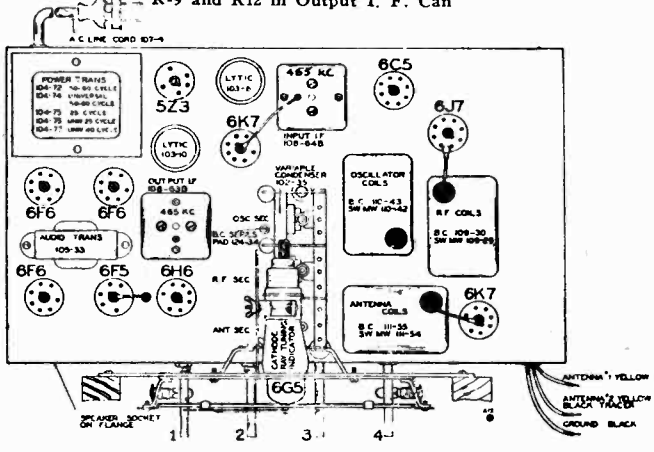
MODEL 62-341

MONTGOMERY-WARD & CO.



R1	130-129	2500 Ohm—1/3 Watt—10%—Carbon
R2	130-20	100M Ohm—1/3 Watt—20%—Carbon
R3	130-12	50M Obm—1/3 Watt—20%—Carbon
R4	130-60	100 Ohm—1/3 Watt—20%—Carbon
R5	130-77	10M Ohm—1 Watt—20%—Carbon
R6	130-76	30M Ohm—1/3 Watt—20%—Carbon
R7	130-88	10M Ohm—2 Watt—20%—Wire Wound
R8	130-19	1 Megohm—1/3 Watt—20%—Carbon
R9	130-111	100M Ohm—1/3 Watt—20%—Carbon
R10	130-4	3 Megohm—1/3 Watt—20%—Carbon
R11	130-110	1 Megohm—1/10 Watt—10%—Carbon
R12	130-186	250M Ohm—1/10 Watt—20%—Carbon
R13	101-36	1 Megohm—Volume Control
R14	130-22	5M Ohm—1/3 Watt—20%—Carbon
R15	130-85	3M Ohm—1/3 Watt—20%—Carbon
R16	130-20	100M Ohm—1/3 Watt—20%—Carbon
R17	130-20	100M Ohm—1/3 Watt—20%—Carbon
R18	130-130	100M Ohm—½ Watt—10%—Carbon
R19	130-3	500M Ohm—1/3 Watt—20%—Carbon
R20	106-31	30 Ohm—Muter
R21	106-31	175 Ohm—Muter
R22	130-45	250M Ohm—1/3 Watt—20%—Carbon
R23	130-45	250M Ohm—1/3 Watt—20%—Carbon
R24	130-82	10M Ohm—1/3 Watt—10%—Carbon
R25	101-40	5000 Ohm—Tone Control
R26	130-131	20M Ohm—½ Watt—10%—Carbon
R27	130-21	20M Ohm—1/3 Watt—20%—Carbon

Note—R-20 and R21 in one unit No. 106-31.
R-9 and R12 in Output I. F. Can



Vol. Control On-Off Switch | Tone Control and High Fidelity Sw. | Tuning Control | Band Switch

FIG. 1—TOP VIEW

C1	100-9	.05x200 Volt—25%
C2	129-59	.0003 Mica—5%—MT-O
C3	129-39	.00005 Mica—20%—MT-O
C4	129-69	.0023 Mica—2½%—MT-O
C5	100-9	.05x200 Volt—25%
C6	100-13	.05x400 Volt—25%
C7	129-57	.0005 Mica—5%—MT-O
C8	129-55	.0034 Mica—2½%—MT-O
C9	124-34	200 Mmf. Working Cap. Adjustable
C10	129-31	.000025 Mica—15%—MT-O Pad.
C11	100-41	.25x400 Volt—20%
C12	100-11	.01x400 Volt—25%
C13	100-9	.05x200 Volt—25%
C14	100-22	.05x200 Volt—25%
C15	100-11	.01x400 Volt—25%
C16	129-39	.00005 Ceramicon—20%
C17	129-60	.00015 Mica—20%—MT-O
C18	129-3	.00002 Mica—20%—MT-O
C19	129-2	.0005 Mica—20%—MT-O
C20	100-22	.05x200 Volt—25%
C21	129-60	.00015 Mica—20%—MT-O
C22	100-22	.05x200 Volt—25%
C23	129.5	.0001 Mica—20%—MT-O
C24	100-1	.1x400 Volt—25%
C25	100-13	.05x400 Volt—25%
C26	100-19	.006x600 Volt—25%
C27	103-8	14 Mfd.—400 Volt—Elecrolytic
C28	100-20	.1x200 Volt—25%
C29	100-45	.1x600 Volt—25%
C30	100-20	.1x200 Volt—25%
C31	103-10	30 Mfd. — 450 Volt — Electrolytic
C32	100-32	.0005x1000 Volt—20%
C33	100-61	.02x600 Volt—Bakelite Micamold

Note—C16 in Output I. F. Can.

B1	116-22	Bias Cell
C	102-35	One Section of Three Gang Condenser
T1	111-54	MW and SW Antenna Coil Assem.
T2	111-55	Broadcast Antenna Coil Assem.
T3	109-29	MW and SW R.F. Coil Assem.
T4	109-30	Broadcast R.F. Coil
T5	110-42	MW and SW Osc. Coil Assem.
T6	110-43	Broadcast Osc. Coil Assem.
T7	108-64B	Input I. F. Coil—465 KC.
T8	108-63B	Output I. F. Coil—465 KC.
L	105-33	Andio Transformer
L1	114-47	Speaker (Field Resistance 1225 Ohm)
L2	104-72	Power Transformer (50-60 Cycle)
S	125-18	Band Switch
S1		Fidelity Switch on Tone Control
S2		On-Off Switch on Volume Control

MODEL 62-341

MONTGOMERY-WARD & CO.

BAND	DIAL SCALE	FREQUENCY RANGE
Broadcast	Outer Scale	535 to 1720 K.C. (Kilocycles)
Middle Wave	Center Scale	1690 to 5300 K.C. (Kilocycles)
Short Wave	Inner Scale	5.3 to 18.1 M.C. (Megacycles)

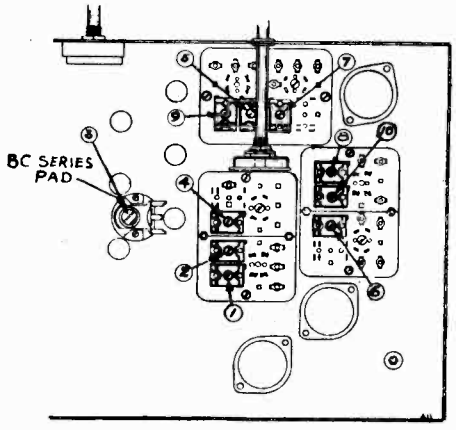


FIG. 3.—BOTTOM VIEW SHOWING TRIMMERS

ALIGNING INSTRUCTIONS:

CAUTION:

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the four bolts by which it is fastened.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of the multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS (465 K.C.)

Part No. 108-63B Output I. F. Transformer
Part No. 108-64B Input I. F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view Fig. 1).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), the tone control on "Hi" part of the sharp position (as much right rotation as possible without operating the Hi Fidelity switch), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, located between the two I.F. transformers, and adjust the output I.F. transformer 108-63B to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6J7 and adjust input I.F. transformer (108-64B) to resonance.

   (c) With oscillator still connected to 6J7, re-adjust output I.F. transformer if necessary.

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with external oscillator set at 600 kilocycles and connected in series with "Dummy 2" to the tan antenna and black ground lead, make the following adjustments:

   (a) Adjust broadcast series pad (adjustment number 3) to resonance with oscillator. Keep set in tune with oscillator by slowly rocking to and fro the variable condenser until maximum output is obtained. Note: This adjustment is accessible from the top of the chassis and is located between the variable condenser and the 108-63 output I.F. transformer. See top view, Fig. 1.

   (b) Re-set external oscillator to 1400 K.C., move dial pointer to 1400 K.C. and adjust oscillator (adjustment number 4), R.F. (adjustment number 6) and antenna (adjustment number 7) to resonance. See bottom view for location of these adjustments, Fig. 3.

   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

   (d) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser to correct tracking.**

SHORT WAVE BAND ALIGNMENT:

5.3 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:

   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (adjustment number 1), short wave R.F. (adjustment number 8) and short wave antenna (adjustment number 9) to resonance.

   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check for sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 18.3 megacycle can be tuned in not only at 18.3 on the dial, but also at approximately 17.4 megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1690 to 5300 Kilocycles

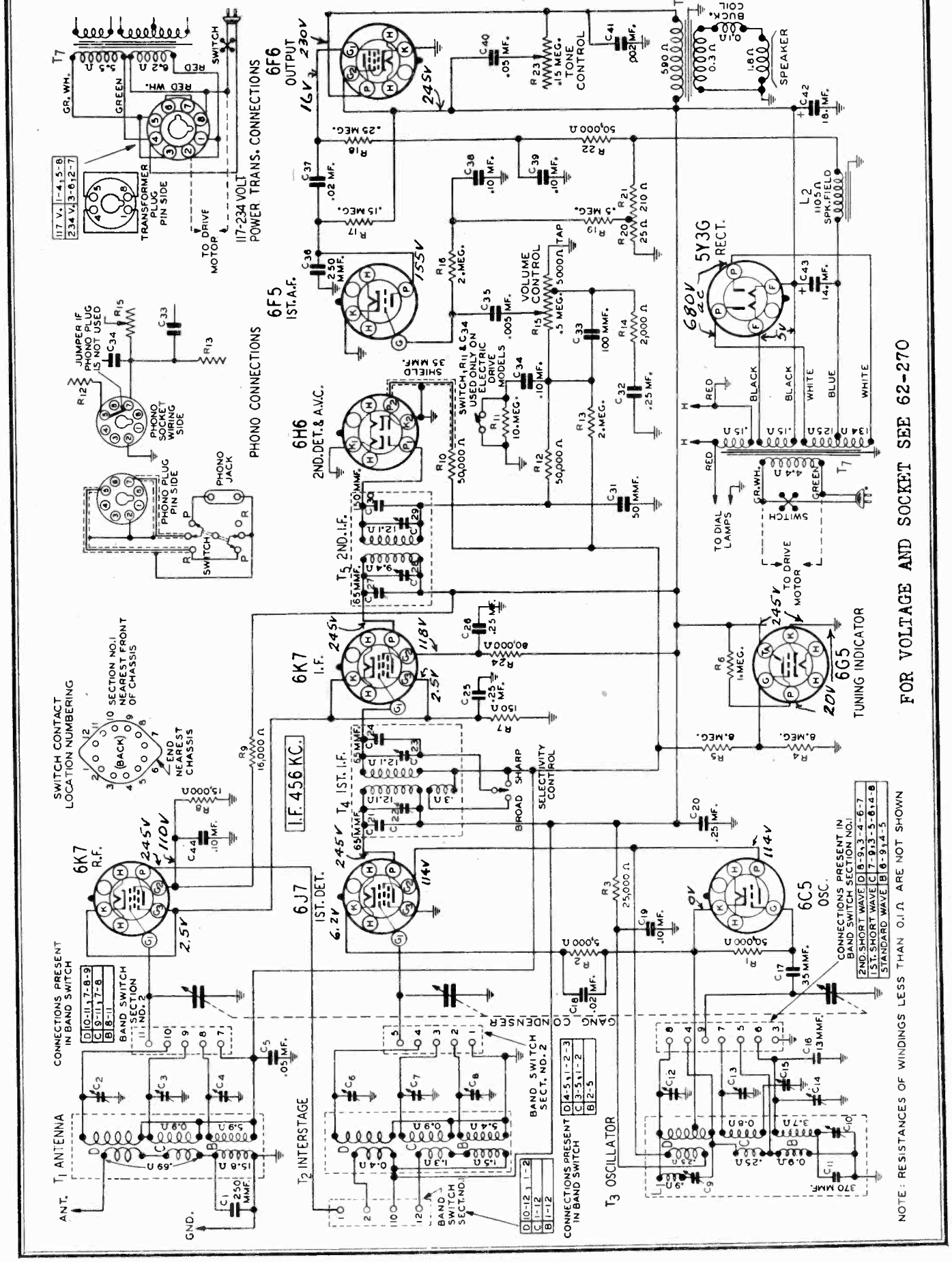
1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5 M.C. and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:

   (a) Rotate condenser, pick up signal and adjust middle wave R.F. (adjustment number 10), middle wave antenna (adjustment number 5) and middle wave oscillator (adjustment number 2) to resonance.

   (b) Re-check broadcast alignment and if it is found necessary to re-adjust either R.F. or antenna trimmers, repeat the 17 M.C. short wave and 5 M.C. middle wave adjustments.

MODEL 62-349

MONTGOMERY-WARD & CO.



ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position 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., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR		TRIMMERS ADJUSTED See Illustration	PROCEDURE	
			FREQUENCY SETTING	CONNECTION AT RADIO		INITIAL STEPS	ADJUSTMENT
I.F.		•					
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C28) & (C29)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C22) & (C23)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C14)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	Ant. Range B (C4) Int. Range B (C8)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C10)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C13)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3) Int. Range C (C7)	Turn Rotor to Max. Output	Adjust to Maximum Output
2000 KC	Range C	400 Ohm	2000 KC	Antenna Lead	2000 KC (C15)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C12)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Ant. Range D (C2) Int. Range D (C6)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
7000 KC	Range D	400 Ohm	7000 KC	Antenna Lead	7000 KC (C9)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—In sets using the telephone dial tuning, there will be seen inside the telephone dial button ring an escutcheon plate held in place by four screws. Loosen the 2 screws nearest the pointer. An extension of the pointer will be seen protruding over the edge of this escutcheon plate. Move the pointer to the 1500 KC mark on the dial and then tighten the 2 escutcheon screws. (Do not tighten these screws too much.)

In sets using the moving beam of light indicator, there is a moving light assembly held to the front of the drive drum by means of a screw. Loosen this screw and move the light assembly until the beam is at the 1500 KC mark on the dial. Retighten the screw.

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

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

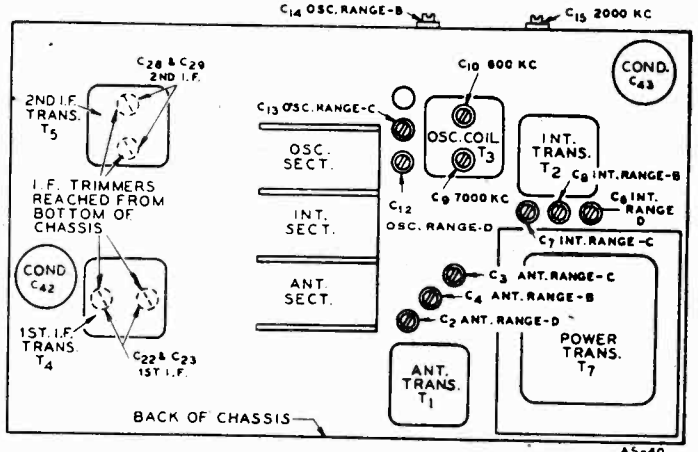
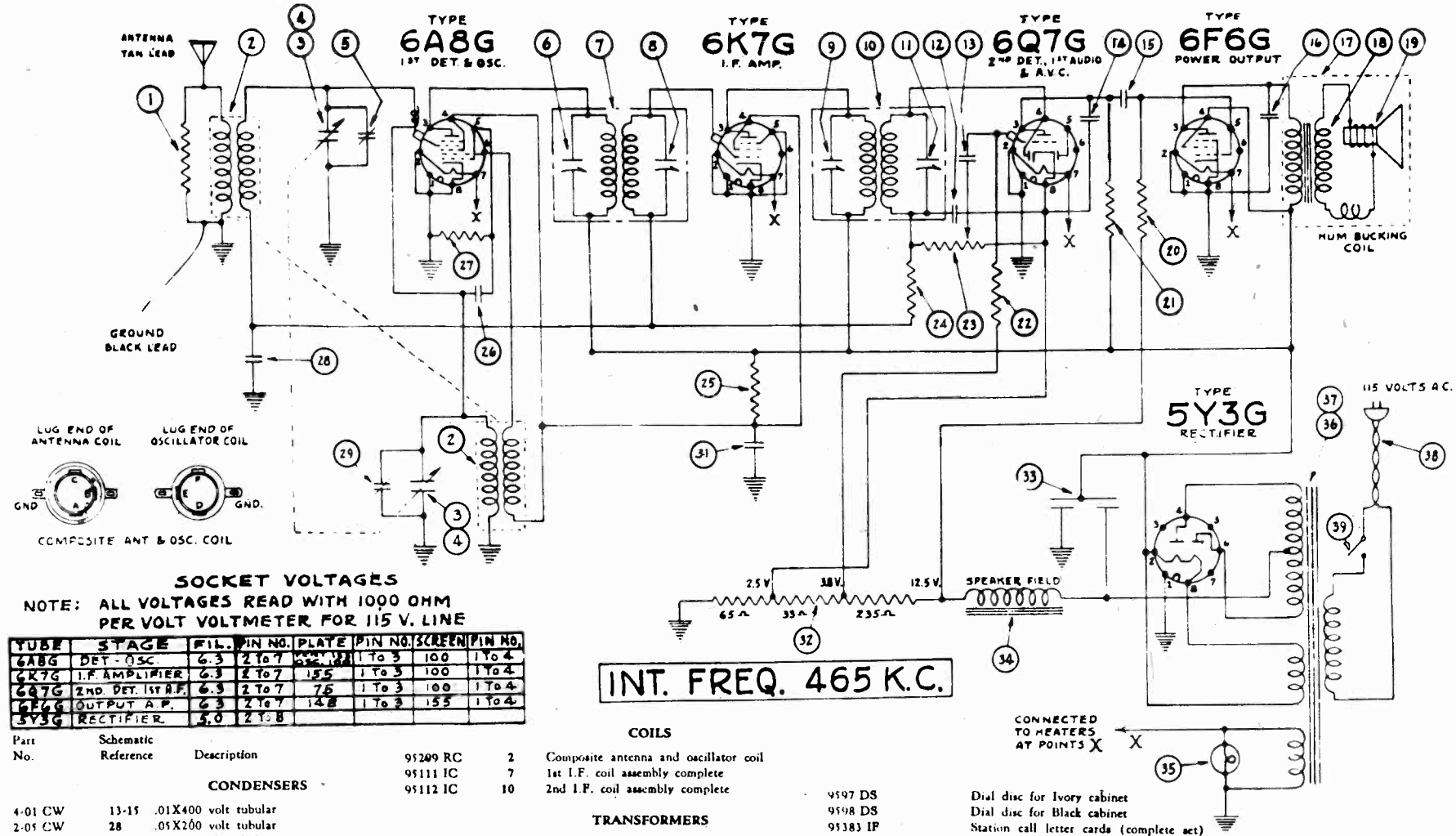


Fig. 3—Location of Trimmers



SOCKET VOLTAGES

NOTE: ALL VOLTAGES READ WITH 1000 OHM PER VOLT VOLTMETER FOR 115 V. LINE

TUBE	STAGE	FIL.	PIN NO.	PLATE	PIN NO.	SCREEN	PIN NO.
6A8G	DET - OSC.	6.3	2 To 7	250 100	1 To 3	100	1 To 4
6K7G	I.F. AMPLIFIER	6.3	2 To 7	155	1 To 3	100	1 To 4
6Q7G	2ND DET. 1ST A.F.	6.3	2 To 7	76	1 To 3	100	1 To 4
6F6G	OUTPUT A.P.	6.3	2 To 7	148	1 To 3	155	1 To 4
5Y3G	RECTIFIER	5.0	2 To 8				

Part No.	Schematic Reference	Description
		CONDENSERS
4-01 CW	13-15	.01X400 volt tubular
2-05 CW	28	.05X200 volt tubular
2-10 CW	31	.1X200 volt tubular
6-005 CW	16	.005X600 volt tubular
9542 CM	12-26	.00025 mica
9513 CM	14	.0001 mica
9567 CE	33	5.X250 volt-dual electrolytic
		RESISTORS
1033 RE	1	10 M ohm—½ watt—10% carbon
4743 RE	20	470 M ohm—½ watt—10% carbon
2243 RE	21	220 M ohm—½ watt—10% carbon
3353 RE	22-24	3300 M ohm—½ watt—10% carbon
4723 RE	25	4.7 M ohm—½ watt—10% carbon
4733 RE	27	47 M ohm—½ watt—10% carbon
95140 RE	32	65 ohm, 33 ohm, 235 ohm metal clad resistor
		COILS
95209 RC	2	Composite antenna and oscillator coil
95111 IC	7	1st I.F. coil assembly complete
95112 IC	10	2nd I.F. coil assembly complete
		TRANSFORMERS
95113 TR	36	Power transformer 105-120 volts, 50-60 cycles
95142 TR	37	Power transformer 105-120 volts, 25 cycles
		SPEAKER
9568 SK	17	Speaker assembly (1700 ohm field)
		MISCELLANEOUS
9550 VR	23-39	1 meg. volume control and switch
9563 CG	3	Two gang variable condenser
95148 CB	38	Line cord and plug
9510 LP	35	6-8 volt dial light
9596 DS		Dial disc for Walnut cabinet
9597 DS		Dial disc for Ivory cabinet
9598 DS		Dial disc for Black cabinet
95383 IF		Station call letter cards (complete set)
95216 IS		Dial drive and mounting bushings
9584 KA		Cabinet (Black)
9585 KA		Cabinet (Walnut)
9586 KA		Cabinet (Ivory)
95137 KN		Knob for Black cabinet
95138 KN		Knob for Walnut cabinet
95139 KN		Knob for Ivory cabinet
95121 PL		Bottom plate
97160 PR		Dial drive cord (sold by the yard)
9539 SP		Dial drive cord spring
954 WN		Dial disc celluloid window (per dozen)
9531 PU		Dial drive pulley
956 SO		Octal base tube socket
9533 SO		Dial lamp socket assembly

CONVENTIONAL ALIGNMENT. SEE SPECIAL SECTION OF RIDER'S VOL. VIII.

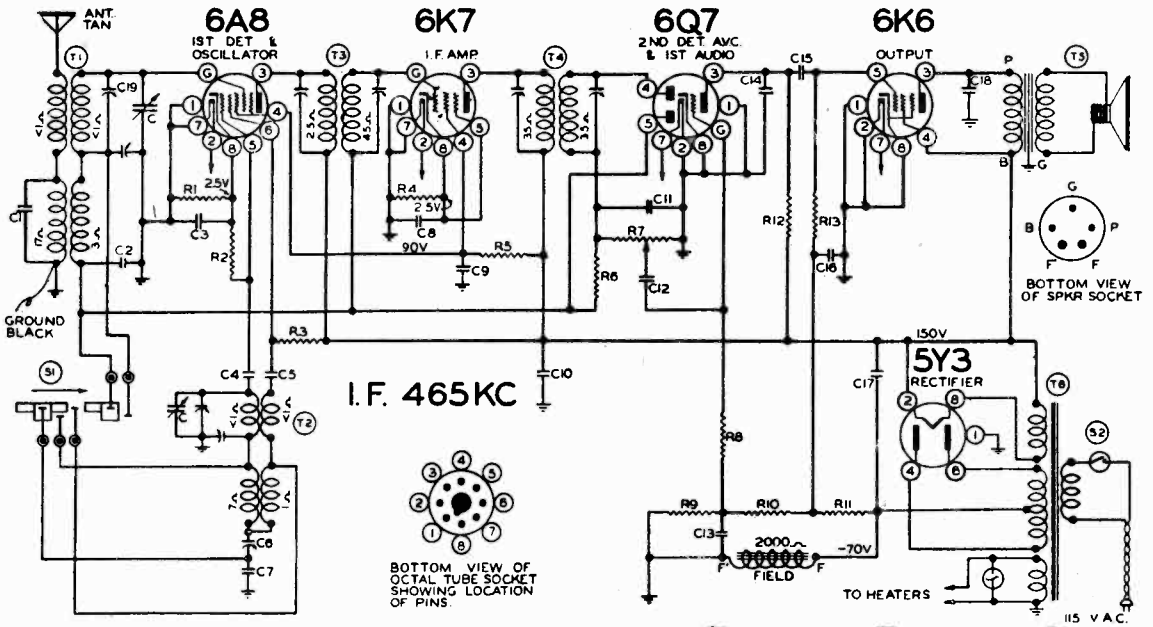
MONTGOMERY-WARD & CO.

MODELS 62-355, 62-365, 62-375

MODELS 62-380, 62-383

MONTGOMERY-WARD & CO.

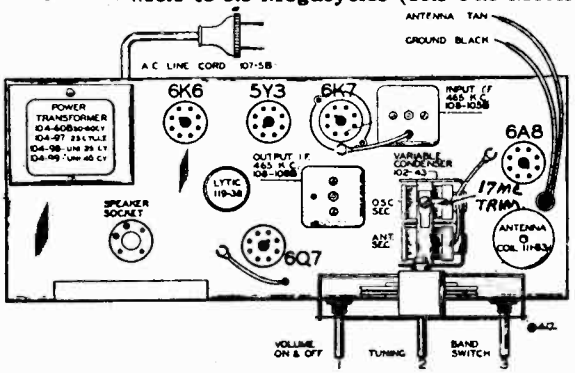
CONVENTIONAL ALIGNMENT - SEE SPECIAL SECTION



BAND **FREQUENCY RANGE**

Broadcast.....1720 to 535 Kilocycles (174-560 Meters)

Short Wave...18.1 to 5.5 Megacycles (16.5-54.5 Meters)



Vol. Control On-Off Switch — Tuning Control — Band Switch

FIG. 1—TOP VIEW

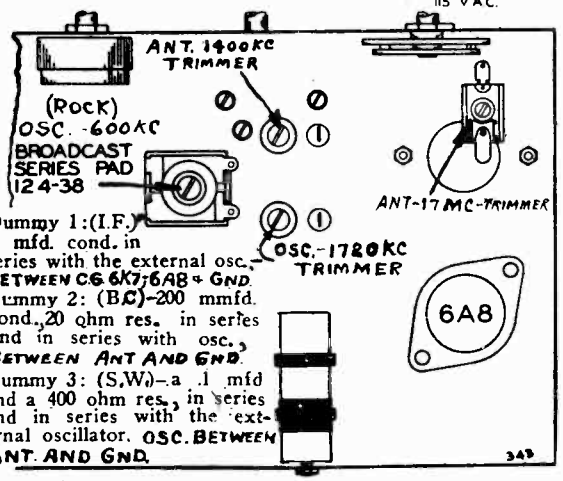


FIG. 3.—BOTTOM VIEW SHOWING TRIMMERS

RESISTORS

R1	130-83	300 ohm - 1/3 w. 10%
R2	130-12	50M ohm - 1/3 w. 20%
R3	130-17	10M ohm - 1/3 w. 20%
R4	130-93	450 ohm - 1/3 w. 10%
R5	130-49	15M ohm - 1/3 w. 20%
R6	130-4	3 megohm - 1/3 w. 20%
R7	101-71	1 megohm Volume control
R8	130-4	3 megohm - 1/3 w. 20%
R9	130-176	20M ohm - 1/3 w. 10%
R10	130-80	150M ohm - 1/3 w. 10%
R11	130-46	800M ohm - 1/3 w. 10%
R12	130-9	200M ohm - 1/3 w. 20%
R13	130-3	500M ohm - 1/3 w. 20%

CONDENSERS

C	102-43	2 gang variable Condenser
C1	129-5	.0001 Mica
C2	100-22	.05 x 200 v. - 25%
C3	100-20	.1 x 200 v. - 25%
C4	129-39	.00005 - 20% - Mica
C5	100-23	.002 x 600 v. - 20%
C6	124-38	600 mmf. Series Pad. Adj.
C7	129-54	.003 - 2½% Mica
C8	100-20	.1 x 200 v. - 25%
C9	100-1	.1 x 400 v. - 50 - 10%
C10	119-38	5.0 mfd. - 250 w. v. 'Lytic
C11	129-5	.0001 - 20% Mica
C12	100-11	.01 x 400 v. - 25%
C13	100-20	.1 x 200 v. - 25%
C14	129-2	.0005 - 20% Mica
C15	100-26	.02 x 400 v. - 25%
C16	100-20	.1 x 200 v. - 25%
C17	119-38	5.0 mfd. - 250 w.v. 'Lytic
C18	100-37	.003 x 600 v. - 10%
C19	124-39B	2 - 25 mmf. Adj. Cond.

PARTS

T1	111-83	Ant. Coil
T2	110-66	Osc. Coil
T3	108-105B	Input I.F. - 465 kc.
T4	108-106B	Output I.F. - 465 kc.
T5	114-61	6" Dynamic speaker
T6	104-60B	Power Transformer
S1	125-37	Wave Band Switch
S2		On-off switch on volume control

The Issue "B" of this chassis has a 0.05-mf, 400-volt condenser in parallel with the 5-mf condenser, C-10. This new condenser has a Part No. 100-13 and is identified as C-20.

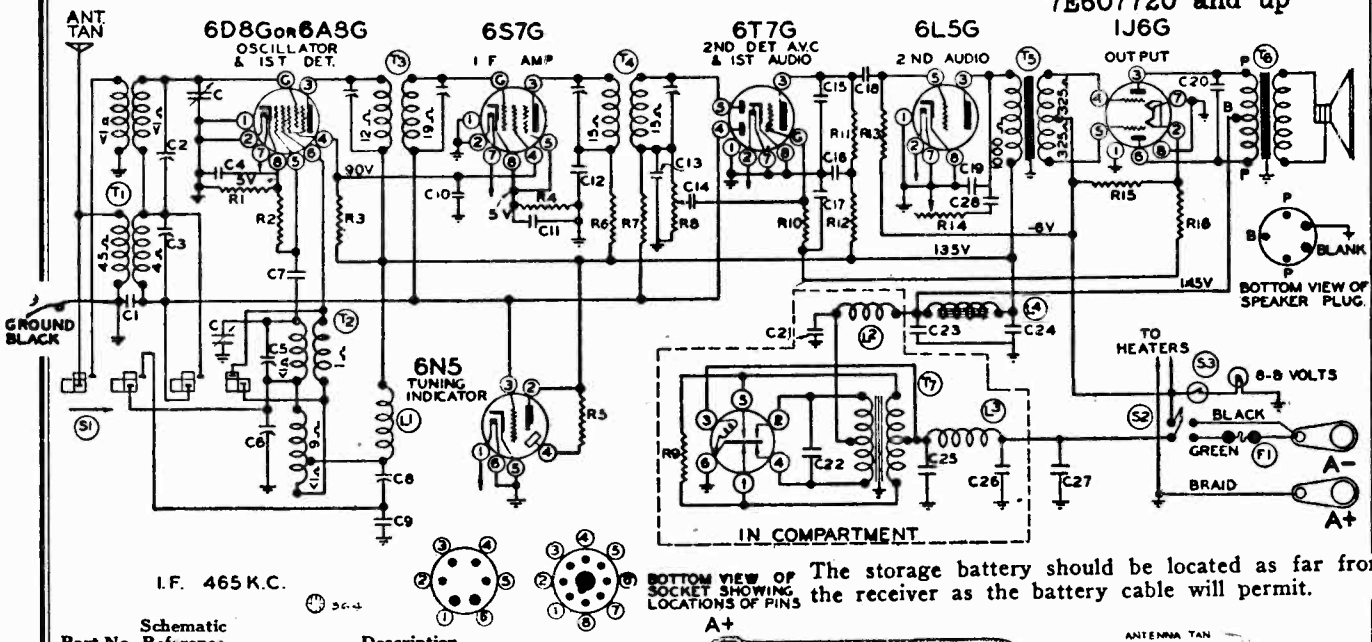
The unidentified trimmer condenser connected between the lower end of the secondary of T-1 and ground has been given a schematic number, C-21. The unidentified trimmer between the lower end of the oscillator primary (T-2) and ground is C-22. C-21 has a range from 1 to 10 mmf and C-22 from 2 to 20 mmf. Both these condensers are in the same unit, the part number of which is 124-30C.

These two trimmers being in the same unit change the bottom layout of the chassis shown The adjustment nearer the trimmer marked "ANT-17 MC-TRIMMER" in the layout is the 1400-kc antenna trimmer, C-21, and the one nearer the broadcast series padder is the 1720-kc oscillator trimmer, C-22.

These changes apply to receivers having a serial number above 8E-189200.

MONTGOMERY-WARD & CO.

MODELS 62-356, 62-446, 62-466, Serial No. 7E607720 and up



I.F. 465 K.C.

The storage battery should be located as far from the receiver as the battery cable will permit.

Part No.	Schematic Reference	Description
		CONDENSERS
BE100-11	C14, C17	.01 x 400 Volt Tubular
BE100-14	C21	.1 x 200 Volt Tubular
BE100-20	C1, C4, C10, C11, C12, C16 C27	.1 x 200 Volt Tubular
BE100-25	C19, C20	.002 x 600 Volt Tubular
BE100-26	C18, C28	.02 x 400 Volt Tubular
BE100-34	C22	.005 x 1200 Volt Tubular
BE100-35	C25, C26	.5 x 200 Volt (Oval Type)
BE119-41	C23, C24	8-4 MFD. 200 W. V. Lytic Filter
BE124-32	C8 C5, C6	Series Padder Condenser
BE124-30	C2, C3	Dual Ceramic Padder Condenser
BE129-5	C13	.0001 Mica — Type MT — 20%
BE129-12	C15	.00025 Mica — Type MT — 20%
BE129-39	C7	.00005 Mica — Type MT — 20%
BE129-54	C9	.003 Mica — Type MW — 2½%
		RESISTORS
BE130-12	R2	50M Ohm—1/3 Watt—20%—Carbon
BE130-19	R10, R16	1 Meg Ohm—1/3 Watt—20%—Carbon
BE130-20	R11, R12	100M Ohm—1/3 Watt—20%—Carbon
BE130-31	R4, R6	1500 Ohm—1/3 Watt—20%—Carbon
BE130-38	R7, R13	2 Megohm—1/3 Watt—20%—Carbon
BE130-54	R1	500 Ohm—1/3 Watt—20%—Carbon
BE130-84	R9	200 Ohm—1/3 Watt—20%—Carbon
BE130-149	R3	15M Ohm—1/3 Watt—20%—Carbon
BE130-158	R15	16 Ohm—1 Watt—5% Wire Wound
		COILS
BE B-108-92B	T4	Output I. F. Coil Assembly complete with can
BE B-108-93B	T3	Input I. F. Coil Assembly complete with can
BE B-110-61	T2	Broadcast and Short-wave Oscillator Coil Assembly complete with can
BE B-111-77	T1	Broadcast and Short-wave Antenna Coil Assembly complete with can
		CHOKE COILS
BE105-19	L3	"A" Choke Coil
BE B-105-30D	L4	Filter Choke (400 Ohms)
BE105-35	L1, L2	R. F. "B" Choke Coil
		TRANSFORMERS
BE B-104-62C	T7	Power Transformer for Vibrator
BE B-105-36B	T5	Input Audio Transformer
		SOCKETS
BE121-6		Six Prong Socket Marked "V1B"
BE121-8		Five Prong Socket Marked "SPKR"
BE121-43		Seven Prong Octal Socket Marked "6S7"
BE121-44		Eight Prong Octal Socket Marked "6D8"
BE121-45		Seven Prong Octal Socket Marked "6L5"
BE121-46		Eight Prong Octal Socket Marked "6T7"
BE121-64		Eight Prong Socket Marked "1J6"
		SPEAKER
BE114-64	T6	Eight inch P. M. Dynamic Speaker
		MISCELLANEOUS
BE101-81	R8, S2	Volume Control and Switch (500M Ohm)
BE101-82	R14	Tone Control (100M Ohm)
BE102-50BC		Two Gang Variable Condenser
BE107-61		28 in. Battery Cable (less fuse receptacle)
BE107-62C		4 in. Battery Cable (with fuse receptacle)
BE115-49		Goat Type Tube Shield with Clamp
BE115-74		Shield Can for 119-41 Filter Condenser

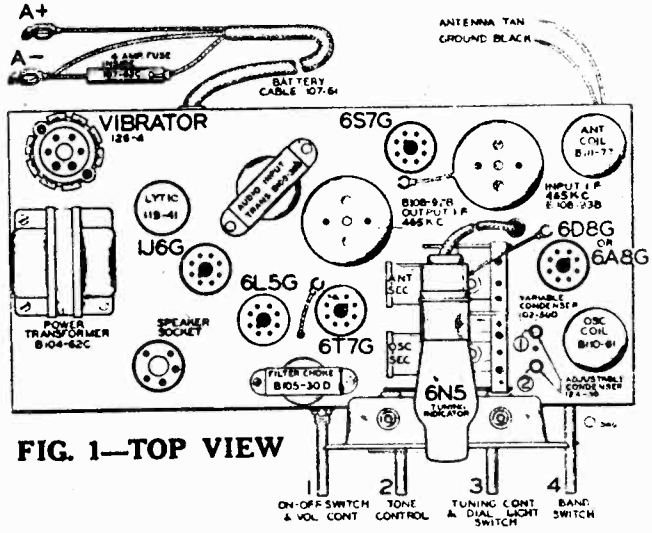


FIG. 1—TOP VIEW

FOR ALIGNMENT SEE INDEX

BE112-288 (S3) Dial Drive Housing and Pilot Light Switch Assembly including:
- 1—No. 117-41A Dial Housing
- 1—No. 117-19 Tuning Shaft Bushing
- 1—No. 112-162 Tuning Shaft
- 1—No. 117-86 Drive Pulley
- 1—No. 127-29 Extruded Washer
- 1—No. 131 56 Steel Washer
- 1—No. 127-28 Insulated Washer
- 1—No. 131-55 Spring Washer
- 2—No. 127-30 Contact Insulated Washers
- 2—No. 127-5 Fibre Bushings
- 2—No. 131-87 S-90 Rivets
- 2—No. 131-57 No. 6200 Lugs.

BE107-38 Pilot Light Socket Complete
BE107-97 6-8 Volt Pilot Light (Bayonet Base)
BE112-151 Dial Pointer with 132-19 Screw and 117-62 Washer

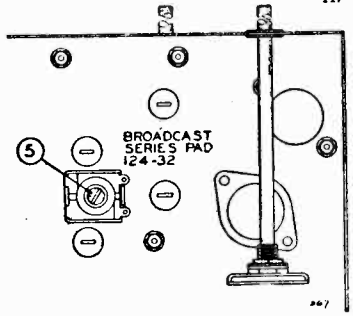


FIG. 3—BOTTOM VIEW

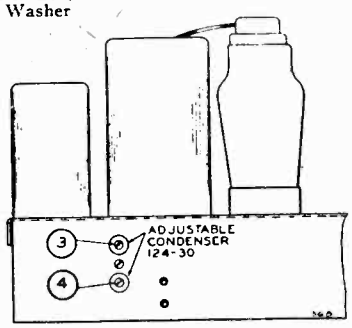


FIG. 4—REAR VIEW

MODELS 62-356,62-446,62-466

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.)

Part No. B108-92B Output I.F. Transformer
Part No. B108-93B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view—Fig. 1, page 2).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser in its minimum capacity position, plates entirely out of mesh, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer No. B-108-92B to resonance.
   (b) Move oscillator output clip from grid of 6S7G to grid cap of 6A8G and adjust input I.F. transformer (No. B-108-93B to resonance.
   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (B-108-92B) if necessary.

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 2; see top view of chassis, Fig. 1).
   (b) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 5), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis; Fig. 3).
   (c) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; (See rear view of chassis; Fig. 4, for location of this adjustment).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. Under no circumstances bend plates of variable condenser sections to correct tracking.

SHORT WAVE BAND ALIGNMENT:

5.6 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer (Adjustment number 1), to resonance; (see Fig. 1, top view).
   (b) Adjust short wave antenna trimmer (Adjustment Number 3), to resonance; (see Fig. 4 rear view).
   (c) Check for tracking and sensitivity at 10 megacycles and 6 megacycles.

MODEL 04WG-569B

SPEAKER

When ordering parts for speakers, specify part number of speaker and letters preceding part number stamped on the speaker.

Bin No.	Part No.	Description	Selling Price
	12A356	5" P.M. Dynamic Speaker	$2.30
		Cone & Voice Coil Assembly for above Speaker	.76
		Output Transformer for above Speaker	.76
	14X262	Screen for above Speaker	.06

GENERAL

	10A312	Tuning Control Knob	.06
	10A313	Volume Control Knob	.06
	4X383	Escutcheon for Tuning Control Knob	.10
	4X384	Escutcheon for Volume Control Knob	.10
	3A303	Tube Socket—Octal (8 prong)	.06
10063	30X44	Grid Clip Doz.	.06
	32X174	Tube Shield	.06
	13X401	"A" Battery Cable and Plug Assembly	.06
	13X386	"B" Battery Cable and Plug Assembly	.14
	13X328	Line Cord and Plug Assembly	.18
	2A183	AC-DC—Battery Switch	.16
	4X382	Escutcheon for AC-DC—Battery Switch	.06
	2A181	AC-DC Automatic Line Switch	.20
	2A175	Economizer Switch	.10
	28X265	Phosphor Bronze Ground Plate (for 2nd I.F. Can)	.06
	28X56	Clamp Buttons (To hold Bottom Plate to Chassis) Doz.	.06
	37X192	Trip Lever for AC-DC Automatic Line Switch	.06

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A1277		Loop Aerial Assembly less Trimmer Condenser	$0.40
	9A1278	T1	Oscillator Coil Assembly	.22
	9A1279	T2	1st I.F. Transformer and Can Assembly	.82
	9A1280	T3	2nd I.F. Transformer and Can Assembly	.72
		T4	Output Transformer (See "Speaker")	

CONDENSERS

TUBULAR

Bin No.	Part No.	Code	Capacitance	Voltage	Selling Price
	46X269	C5	.04 mf.	360	$0.06
	46X253	C6	.05 mf.	180	.06
	46X257	C7	.10 mf.	240	.06
	46X299	C8	.04 mf.	240	.06
10979	46X254	C9,C22	.10 mf.	180	.06
	46X267	C10	.02 mf.	180	.06
	46X273	C17,C18	.005 mf.	180	.06
	46X274	C19	.005 mf.	360	.06
	46X307	C21	.10 mf.	300	.10

MISCELLANEOUS

	C1	Part of Gang Condenser		
17A110	C2	1-12 mmf.	Trimmer	.06
47X142	C3	150 mmf.	Molded	.06
47X57	C4,C15,C16	100 mmf.	Molded	.06
17A146	C11	70-150 mmf.	1st I.F. Trimmer	.16
	C12	40-100 mmf.		
17A137	C13	50-120 mmf.	2nd I.F. Trimmer	.18
	C14	85-185 mmf.		
	C20A	40 mf.	(150) Dry Electrolytic	.60
45X280	C20B	40 mf.	(150) (2 used on 25 Cycle	
	C20C	200 mf.	(35) Models)	
14A124		2 Section Gang Condenser complete with Drive Pulley		$1.06

RESISTORS

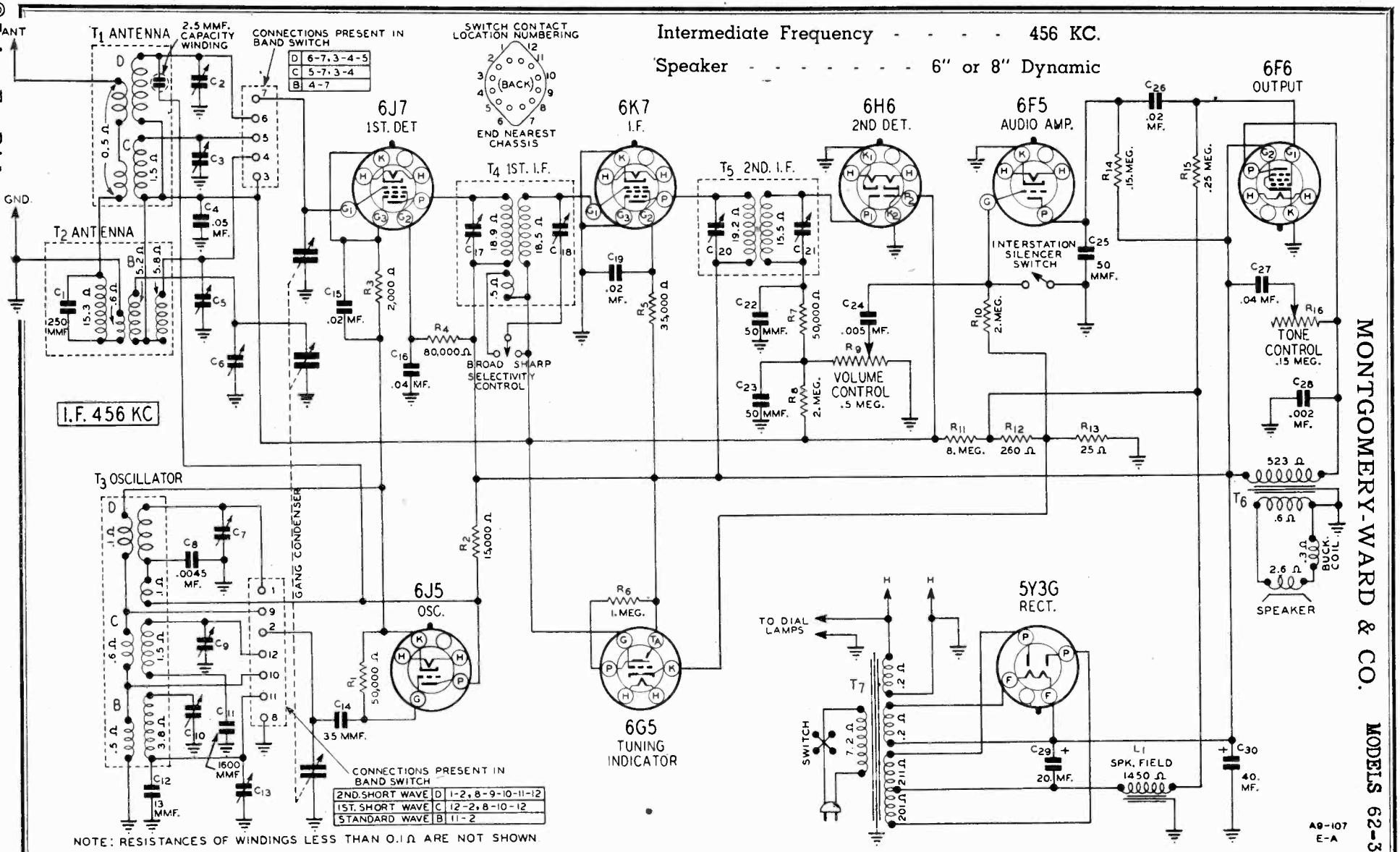
CARBON

Bin No.	Part No.	Code	Resistance	Wattage	Selling Price
10425	B85204	R1,R5	200,000 Ohm	0.5	$0.04
	B85403	R2	40,000 Ohm	0.5	.04
	B85205	R3	2 Megohm	0.5	.04
11116	B85305	R4,R11,R13	3 Megohm	0.5	.04
	B84171	R6	170 Ohm	0.5	.08
	B84122	R7	1,200 Ohm	0.5	.08
	B84901	R8	900 Ohm	0.5	.08
	B85200	R9	20 Ohm	0.5	.04
11037	B85105	R12	1 Megohm	0.5	.04
10081	B85250	R16	25 Ohm	0.5	.04
11222	B85252	R17	2,500 Ohm	0.5	.04
	B85505	R18	5 Megohm	0.5	.04

MISCELLANEOUS

36X284	R10	500,000 Ohm	Volume Control and On-Off Switch	.44
43X102	R14	2,450 Ohm	5 Wire Wound	.24
43X93	R15	515 Ohm	12 Wire Wound	.26
43X104	R20	1,400 Ohm	12 Wire Wound (25 Cycle Models only)	.30

Prices Subject to Change Without Notice.



Power Consumption - 60 Watts (At 117 volts 60 cycles)

Power Output - - - 1.0 Watts Undistorted, 2.0 Watts Maximum

Selectivity (Sharp) - - 38 KC at 1000 times Signal

Tuning Frequency Range

B Range	528	to 1830 KC.
C Range	1810	to 6350 KC.
D Range	6300	to 22000 KC.

Sensitivity

B Range	12 Microvolts Average
C Range	15 Microvolts Average
D Range	20 Microvolts Average

MONTGOMERY-WARD & CO. MODELS 62-358, 62-368, 62-448, 62-458

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position 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., 200 mmf., and 400 ohms.

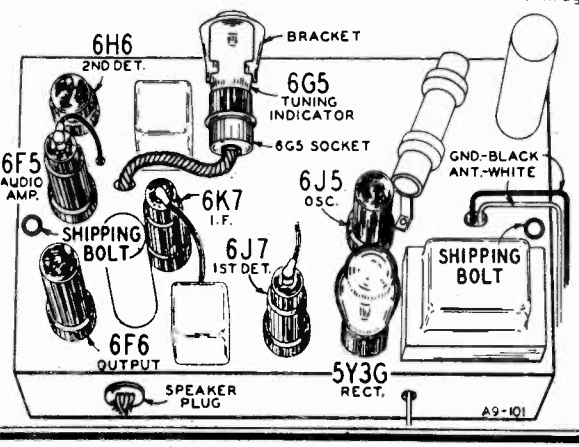
STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C20) & (C21)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C17) & (C18)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C13)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C6) 2nd Ant. Range B (C5)	Turn Rotor to Max. Output	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C10)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note A
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C7)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Antenna Range D (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note A

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

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

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.



Replacing Drive Belt

If the old belt is not broken, it may be cut before removing. Withdraw the six small rivets spaced around the edge of the celluloid dial cover by pushing them out with a flat, hard object from the back of the dial, being careful not to bend the dial frame. Take off the celluloid cover.

Turn the push button assembly so that the pointer is at the top of the dial. Hold the new belt flat and loop it over the pointer. Then pass the portion of the belt that is behind the pointer under the inside edge of the dial scale. CAUTION—Do not scratch or fingermark the dial scale. Continue pulling the belt through toward the back of the dial scale around the entire dial until the belt is completely behind the dial scale. Loop the belt around the large drive drum keeping it in the groove nearest the back edge of the drum.

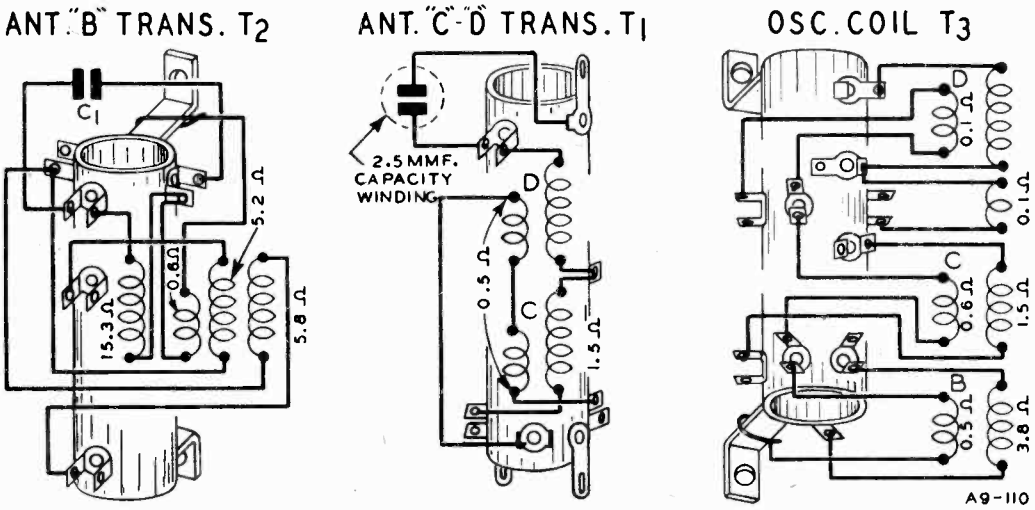
Place the chassis on its back. Loosen the two set screws in the small pulley on the tuning knob shaft. Pull the shaft in toward the inside of the chassis far enough so that it does not extend beyond the edge of the small pulley. Tighten one of the set screws in the pulley temporarily. Start the belt on the pulley and by turning the shaft slightly and pushing on the belt where it contacts the pulley, the belt will fall into the groove properly. Loosen the set screw which had been temporarily tightened, pull the shaft all the way toward the front of the chassis, and tighten both set screws. To prevent end play of the shaft, be sure the pulley fits flush against the back of the tuning knob shaft bracket.

With a small screw driver and a long nose pliers, pull the belt tension pulley toward the right (from front of chassis) until the spring pushes the pulley against the outer edge (or right side) of the belt.

Replace the dial scale, celluloid cover, and rivets.

MODELS 62-358, 62-368, 62-448, 62-458

MONTGOMERY-WARD & CO.



NOTE: RESISTANCES OF WINDINGS LESS THAN .1 Ω ARE NOT SHOWN.

Fig. 4—Coil Terminal Arrangement and D.C. Resistance of Windings

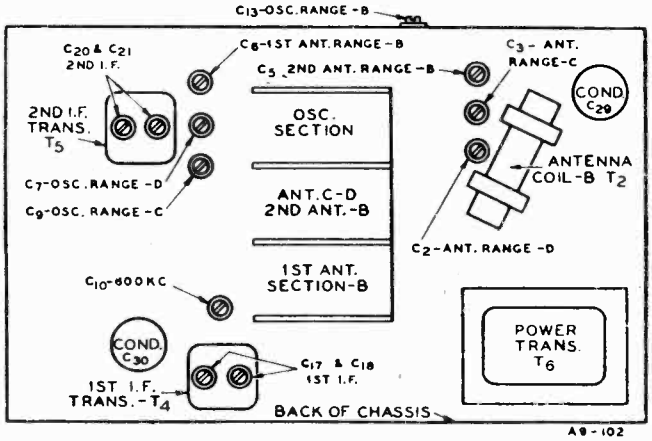


Fig. 3—Location of Trimmers

Twenty-Five Cycle Models

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

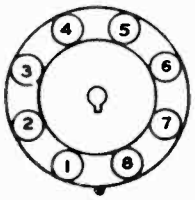


Fig. 6—Octal Tube Terminal Numbering (bottom of socket).

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum — Antenna Shorted to Ground
Readings taken with a 1000 Ohm-per-volt meter — Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG AND GROUND (Unless otherwise indicated)							
		Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
6J7	1st Det.	0	6.1(1)	168	125	3.5		6.1(1)	3.5
6J5	Osc.	0	6.1(1)	100				6.1(1)	
6K7	I.F.	0	6.1(1)	168	100	0		6.1(1)	0
6H6	2nd Det.	0	6.1(1)		0			6.1(1)	0
6F5	Audio	0	6.1(1)		90			6.1(1)	0(2)
6F6	Power	0	6.1(1)	155	170	12(3)		6.1(1)	0
5Y3G	Rectifier	0	4.8(4)						4.8(4)
6G5	Tuning Indicator	Plate to Ground 20		Target to Ground 170		Cathode to Ground 1.3		Across Heater 6.1 A.C.	

(1) A.C. voltages read across heater terminals 2 and 7.
(2) Bias (1.3 volts) as read across R13.
(3) Bias as read across R12 and R13.
(4) A.C. voltage as read across filament terminals 2 and 8.

MODEL 62-270E Replacement Parts List

RETAIL STORES: Order any parts from Repair Service Department at Chicago or Oakland, on Repair Parts Order Form No. 19567. Order by part number and description.

Return defective parts to Repair Service Department only.

There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts please be sure to mention the model number and this large letter.

MISCELLANEOUS

SOCKETS

Part No.	Description	Selling Price
3A263	Tube Socket—Octal (8 prong)	$0.08
3A256	Tube Socket—Octal (7 prong)	.08
3A261	Tube Socket—Octal (5 prong)	.06
3A262	Speaker Socket	.08
3A266	Phono Socket—Octal (4 prong)	.06
3A252	Dual Keyway Socket (8 prong)—Universal Transformer Connections	.08
6A214	Plug (4 prong) used with above Socket	.12
13X295	Tuning Eye Tube Socket and Cable Assembly	.26

SPEAKERS

When ordering parts for speakers, specify part number of speaker, and letter preceding part number stamped on the speaker.

12A290	10" Dynamic Speaker Complete with Output Trans. (T6)	4.30
	Cone and Voice Coil for above Speaker	2.26
	Output Transformer only (T6)	1.18
12A285	8" Dynamic Speaker Complete with Output Trans. (T6)	3.70
	Cone and Voice Coil for above Speaker	1.84
	Output Transformer only (T6)	1.18

KNOBS

10A112	Selectivity Control Knob	.10
10A78	Tone Control Knob	.08
10A77	Volume Control Knob	.08
10A76	Band Switch Knob	.10
10A75	Tuning Control Knob	.08

GENERAL

8X23	Rubber Cushions (Chassis Mounting)		.04
2X38	Felt Washers (Used behind Knobs)	Doz.	.04
32X50	Tube Shield (Closed Top)		.06
32X51	Tube Shield Base		.04
30X44	Grid Clip only	Doz.	.06
2A93	Band Change Switch		.80
2A78	Selectivity Switch		.20
4A53	Terminal Strip (3 Lugs Insulated—Mounting Hole used)		.04
13X80	Line Cord & Plug Assembly		.28
13X214	Antenna and Ground Lead Assembly		.14
4A68	Terminal Strip (3 Lugs Insulated—Mounting foot used)		.04
25A71	Tuning Eye Tube Clamp Assembly		.20

TRANSFORMERS AND COILS

Part No.	Code	Description	Selling Price
9A863	T1	Antenna Transformer and Can Assembly	$1.20
9A864	T2	Interstage Transformer and Can Assembly	1.16
9A865	T3	Oscillator Coil and Can Assembly	1.98
9A782	T4	1st I.F. Transformer and Can Assembly	1.16
9A777	T5	2nd I.F. Transformer and Can Assembly	1.12
	T6	Output Transformer only (See "Speakers")	
53X161	T7	117-234 Volt, 40-60 Cycle, Universal Power Trans.	3.90
53X160	T7	117 Volt, 25 Cycle Power Transformer	4.06
53X159	T7	117 Volt, 60 Cycle Power Transformer	2.40

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	Selling Price
46X80	C6	.05 mf.	180	$0.08
46X105	C21	.10 mf.	360	.10
46X187	C22	.02 mf.	180	.08
46X211	C23	.04 mf.	180	.08
46X181	C24	.10 mf.	240	.08
46X121	C29	.25 mf.	360	.14
46X124	C30	.01 mf.	180	.08
46X80	C31	.05 mf.	180	.08
46X211	C32	.04 mf.	180	.06
46X121	C33	.25 mf.	360	.14
46X197	C41	.25 mf.	180	.12
46X147	C44	.005 mf.	360	.08
46X202	C46	.02 mf.	360	.08
46X98	C47	.10 mf.	180	.10
46X98	C48	.10 mf.	180	.10
46X114	C49	.004 mf.	600	.08
46X108	C50	.05 mf.	600	.10

ELECTROLYTIC

44X11	C51	18 mf.	300		.52
44X10	C52	14 mf.	400		.60

MOLDED

Part No.	Code	Capacitance	Selling Price
47X69	C1	250 mmf.	$0.08
47X93	C5	35 mmf.	.08
47X93	C10	35 mmf.	.08
47X94	C18	45 mmf.	.08
47X56	C38	50 mmf.	.06
47X56	C39	50 mmf.	.06
47X72	C40	25 mmf.	.06
47X57	C42	100 mmf.	.06
47X65	C45	250 mmf.	.08

TRIMMER

17A73	C2	2-25 mmf.	Antenna Range "D"	.16
	C3	2-25 mmf.	Antenna Range "B"	
	C4	2-25 mmf.	Antenna Range "A"	
17A73	C7	2-25 mmf.	Interstage Range "D"	.16
	C8	2-25 mmf.	Interstage Range "B"	
	C9	2-25 mmf.	Interstage Range "A"	
17A69	C11	40-100 mmf.	Oscillator 6000 KC	.20
	C13	40-120 mmf.	Oscillator 600 KC	
17A76	C14	2-25 mmf.	Oscillator Range "D"	.12
	C16	2-25 mmf.	Oscillator Range "A"	
17A68	C15	1-12 mmf.	Oscillator Range "B"	.10
17A46	C19	100-200 mmf.	165 KC Padder	.12
17A70	C26	15-55 mmf.	1st I.F. Trimmers	.20
	C27	15-55 mmf.		
17A70	C35	15-55 mmf.	2nd I.F. Trimmers	.20
	C36	15-55 mmf.		

MISCELLANEOUS

47X89	C12	370 mmf.	Iron Clad	.14
47X80	C17	13 mmf.	Compensating Capacitor	.24
47X81	C20	35 mmf.	Iron Clad	.12
47X91	C25	65 mmf.	Iron Clad	.12
47X91	C28	65 mmf.	Iron Clad	.12
47X91	C34	65 mmf.	Iron Clad	.12
47X83	C37	150 mmf.	Iron Clad	.18
14A70	3 Section Gang Condenser less Dial and Drive Assembly			2.18

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	Selling Price
A94301	R1	300 Ohm	0.2	$0.08
C94153	R2	15,000 Ohm	1.0	.08
D94163	R3	16,000 Ohm	2.0	.16
A94502	R4	5,000 Ohm	0.2	.08
A95104	R5	100,000 Ohm	0.2	.06
C94253	R6	25,000 Ohm	1.0	.08
A94503	R7	50,000 Ohm	0.2	.08
A95105	R8	.1 Megohm	0.2	.06
A94505	R9	.5 Megohm	0.2	.08
A94301	R10	300 Ohm	0.2	.08
B95803	R11	80,000 Ohm	0.5	.06
A94805	R12	.8 Megohm	0.2	.08
A95503	R13	50,000 Ohm	0.2	.06
A95503	R14	50,000 Ohm	0.2	.06
A95503	R15	50,000 Ohm	0.2	.06
A95205	R16	2 Megohm	0.2	.06
A94202	R17	2,000 Ohm	0.2	.08
A95253	R18	25,000 Ohm	0.2	.06
A95205	R20	2 Megohm	0.2	.06
A95154	R21	150,000 Ohm	0.2	.06
A95254	R22	250,000 Ohm	0.2	.06
A95504	R24	500,000 Ohm	0.2	.06
A95503	R27	50,000 Ohm	0.2	.06

WIRE WOUND

43X83	R25	25 Ohm	0.25	.16
	R26	210 Ohm	2.0	

VARIABLE

36X236	R23	.5 Megohm	Volume Control and On-Off Switch .48
40X223	R28	.15 Megohm	Tone Control .32

PHONO ATTACHMENT PARTS

Part No.	Description	Selling Price
f3X298	30" Phono Cable Assembly Complete (Includes Plug, Double-tip Phono Jack, Switch, and Knob)	$1.22
6A218	Plug (8 Prong) only of Phono Cable	.08
3A12	Phono Jack only of Phono Cable	.06
2A50	Phono Switch only of Phono Cable	.34
10A90	Knob only of Phono Cable	.10

DIAL AND DRIVE ASSEMBLY

DIAL AND DRIVE PARTS WILL BE FOUND IN SPECIAL MOVIE DIAL AND DRIVE DATA. SEE INDEX

Prices Subject to Change Without Notice.

MODELS 62-358, 62-368, 62-448, 62-458 Replacement Parts List

MISCELLANEOUS

SOCKETS

Bin No.	Part No.	Description	Selling Price
	3A261	Tube Socket—Octal (5 prong)	$0.06
	3A256	Tube Socket—Octal (7 prong)	.08
	3A263	Tube Socket—Octal (8 prong)	.08
	3A262	Speaker Socket (6 prong)	.08
	13X319	Tuning Eye Tube Socket and Cable Assembly	.22

SPEAKERS

When ordering parts for speakers, specify part number of speaker and letter preceding part number stamped on speaker.

	12A303	6" Dynamic Speaker complete with Output Transformer (T6)	2.36
		Cone and Voice Coil Assembly for above Speaker	.66
		Output Transformer only (T6)	.60
	12A302	8" Dynamic Speaker complete with Output Transformer (T6)	2.78
		Cone and Voice Coil Assembly for above Speaker	.66
		Output Transformer only (T6)	.60

KNOBS

11381	10A77	Volume Control Knob	.08
11382	10A78	Tone Control Knob	.08
11384	10A75	Tuning Control Knob	.08
11385	10A76	Band Switch Knob	.10
11048	10A112	Selectivity Control Knob	.10

RESISTORS

CARBON

Bin No.	Part No.	Code	Resistance	Wattage	Selling Price
11068	A94503	R1	50,000 Ohm	0.2	$0.08
11054	894153	R2	15,000 Ohm	0.5	.08
11027	A94202	R3	2,000 Ohm	0.2	$0.08
11549	A94803	R4	80,000 Ohm	0.2	.08
11189	A94353	R5	35,000 Ohm	0.2	.08
11188	A95105	R6	1 Megohm	0.2	.06
11068	A95503	R7	50,000 Ohm	0.2	.06
11086	A94205	R8	2 Megohm	0.2	.08
11086	A95205	R10	2 Megohm	0.2	.06
11277	A94805	R11	8 Megohm	0.2	.08
	C94261	R12	260 Ohm	1.0	.08
11331	A94250	R13	25 Ohm	0.2	.08
11050	A95154	R14	150,000 Ohm	0.2	.06
10971	A95254	R15	250,000 Ohm	0.2	.06

VARIABLE

10900	36X235	R9	.5 Megohm	Volume Control .44
10905	40X223	R16	.15 Megohm	Tone Control .32

DIAL AND DRIVE ASSEMBLY

Bin No.	Part No.	Description	Selling Price
	15A115	Telephone Dial Assembly Complete less Dial Lamps and Sockets, Gang Condenser, Gang Condenser and Dial Assembly Mounting Bracket	$4.02
10716	8X62	Drive Belt	.12
	25X442	Mounting Bracket for Gang Condenser and Dial Assembly	.16
	20X39	Hex Shoulder Stud to Mount Above Bracket to Chassis	.04
	20X201	Stud for Mounting Dial Assembly to Front of Chassis Doz.	.12
	6X8	Rubber Grommets (Used with above Studs) Doz.	.08
		Dial Lamp—No. 51 Mazda	.10
	7A59	Dial Lamp Socket (Upper Mounting)	.06
	7A66	Dial Lamp Socket (Lower Mounting)	.06
	26A56	Station Call Letter Discs and 25 Celluloid Discs	.16

GENERAL

Bin No.	Part No.	Description	Selling Price
	4A68	Terminal Strip (3 lugs insulated)	$0.04
	2A104	Selectivity Switch	.24
	2A103	Band Change Switch	.44
	25X378	Clamp Bracket for Tuning Eye Tube	.04
10565	8X23	Rubber Cushion (Chassis Mounting)	.04
	25X414	Chassis Mounting Foot (Rear)	.04
	25X375	Chassis Mounting Foot (Front)	.04
10003	30X44	Grid Clip only Doz.	.04
10526	13X214	Antenna and Ground Lead Assembly	.14
	13X80	Line Cord and Plug Assembly	.28
10884	2X38	Felt Washers (Used behind Knobs) Doz.	.04

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A900	T1	Antenna Transformer Assembly "C" and "D" Range	$0.52
	9A899	T2	Antenna Coil Assembly "B" Range	.92
	9A901	T3	Oscillator Coil Assembly	1.00
	9A902	T4	1st I.F. Transformer and Can Assembly	.80
	9A903	T5	2nd I.F. Transformer and Can Assembly	.66
		T6	Output Transformer only (See "Speakers")	
	53X170	T7	117 Volt, 60 Cycle Power Transformer	1.74
	53X171	T7	117 Volt, 25 Cycle Power Transformer	3.08

CONDENSERS

TUBULAR

Bin No.	Part No.	Code	Capacitance	Voltage	Selling Price
11387	46X80	C4	.05 mf.	180	$0.08
	46X220	C8	.0045 mf.	180	.08
10927	46X187	C15	.02 mf.	180	.08
10943	46X222	C16	.04 mf.	240	.08
11490	46X223	C17	.02 mf.	240	.06
10890	46X147	C24	.005 mf.	360	.08
10927	46X202	C26	.02 mf.	360	.08
10943	46X212	C27	.04 mf.	360	.08
10934	46X100	C28	.002 mf.	600	.08

ELECTROLYTIC

10044	44X37	C29	20 mf.	290	Wet	.36
10045	44X38	C30	40 mf.	200	Wet	.34

MOLDED

Bin No.	Part No.	Code	Capacitance	Voltage	Selling Price
10928	47X69	C1	250 mmf.		$0.08
	47X90	C11	1600 mmf.		.10
10049	47X53	C14	35 mmf.		.06
10625	47X56	C22	50 mmf.		.06
10625	47X56	C23	50 mmf.		.06
10625	47X56	C25	50 mmf.		.06

TRIMMER

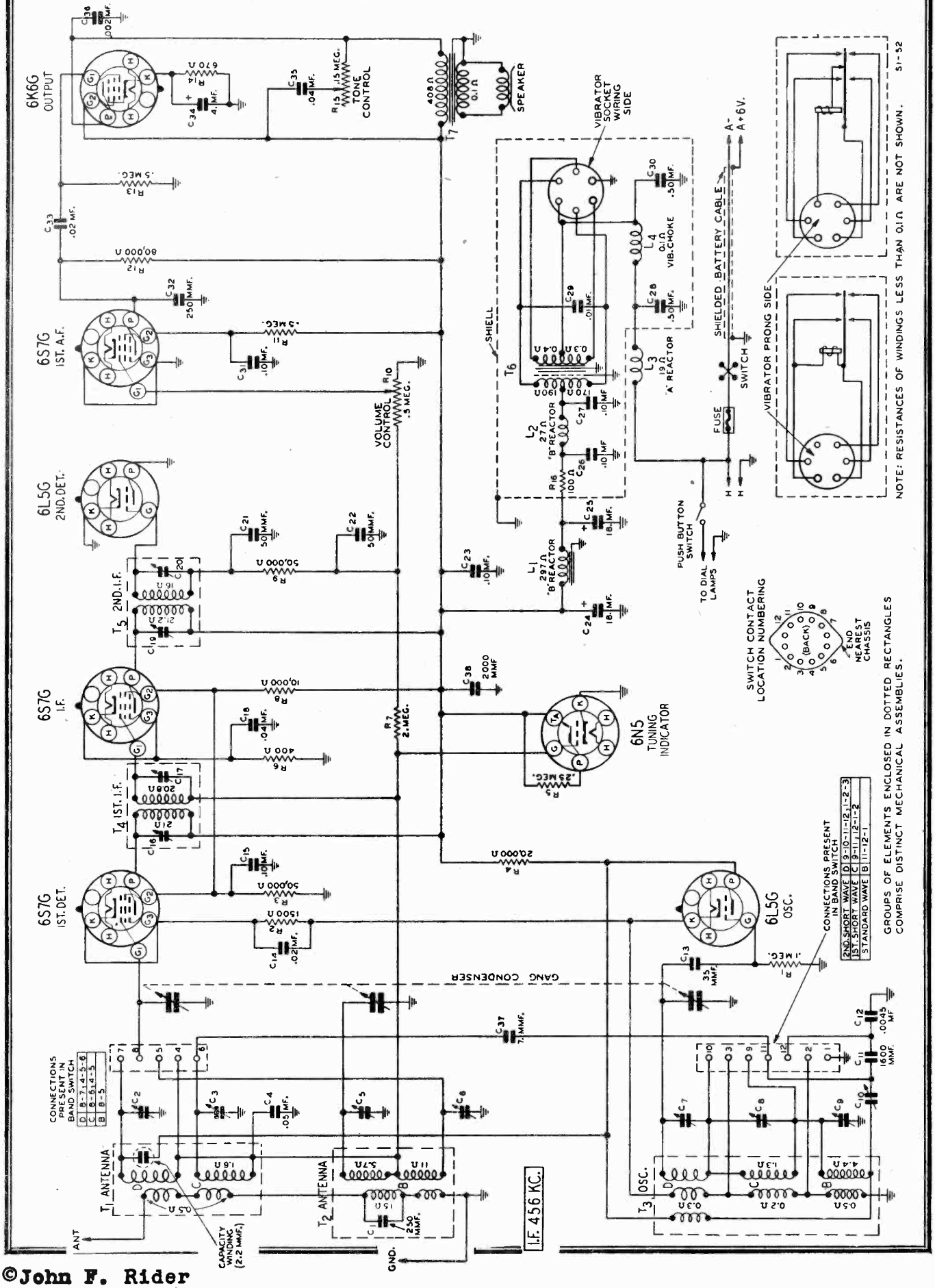
17A73	C2	2-25 mmf.	Antenna Range "D"	.16
	C3	2-25 mmf.	Antenna Range "C"	
	C5	2-25 mmf.	2nd Antenna Range "B"	
17A73	C6	2-25 mmf.	1st Antenna Range "B"	.16
	C7	2-25 mmf.	Oscillator Range "D"	
	C9	2-25 mmf.	Oscillator Range "C"	
17A81	C10	300-600 mmf.	600 KC Padder	.14
17A68	C13	1-12 mmf.	Oscillator Range "B"	.10
17A57	C17	50-120 mmf.	1st I.F. Trimmers	.18
	C18	50-120 mmf.		
17A80	C20	50-120 mmf.	2nd I.F. Trimmers	.14
	C21	85-185 mmf.		

MISCELLANEOUS

47X80	C12	13 mmf.	Compensating Capacitor	.24
14A82	3 Section Gang Condenser less Dial and Drive Assembly			1.74

MODEL 62-359

MONTGOMERY-WARD & CO.



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., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR		TRIMMERS ADJUSTED See Illustration	PROCEDURE	
			FREQUENCY SETTING	CONNECTION AT RADIO		INITIAL STEPS	ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C19) & (C20)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C16) & (C17)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C7)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Antenna Range D (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C8)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C5) 2nd Ant. Range B (C6)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C10)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

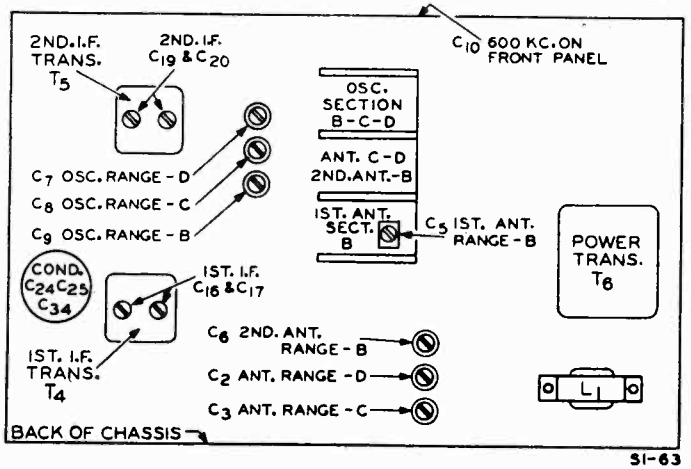
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

NOTE A—Loosen the pointer set screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

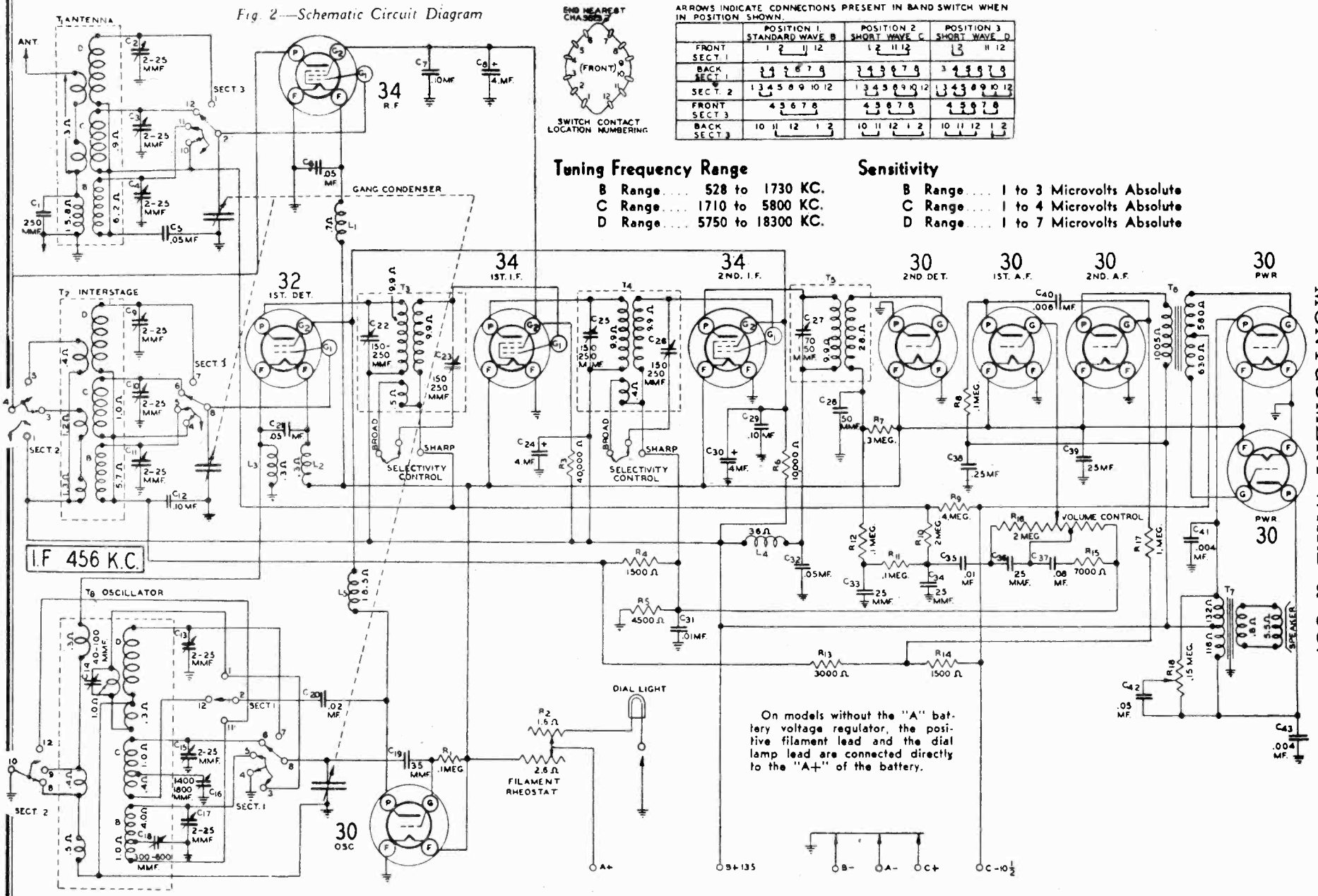
NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.



SI-63

Fig. 2—Schematic Circuit Diagram



END NEAREST CHASSIS

SWITCH CONTACT LOCATION NUMBERING

ARROWS INDICATE CONNECTIONS PRESENT IN BAND SWITCH WHEN IN POSITION SHOWN.

	POSITION 1 STANDARD WAVE B	POSITION 2 SHORT WAVE C	POSITION 3 SHORT WAVE D
FRONT SECT 1	1 2 11 12	1 2 11 12	3 11 12
BACK SECT 1	3 4 5 6 7 8	3 4 5 6 7 8	3 4 5 6 7 8
SECT. 2	1 3 4 5 8 9 10 12	1 3 4 5 8 9 10 12	1 3 4 5 8 9 10 12
FRONT SECT 3	4 5 6 7 8	4 5 8 7 8	4 5 8 7 8
BACK SECT 3	10 11 12 1 2	10 11 12 1 2	10 11 12 1 2

Tuning Frequency Range

B Range.... 528 to 1730 KC.
C Range.... 1710 to 5800 KC.
D Range.... 5750 to 18300 KC.

Sensitivity

B Range.... 1 to 3 Microvolts Absolute
C Range.... 1 to 4 Microvolts Absolute
D Range.... 1 to 7 Microvolts Absolute

On models without the "A" battery voltage regulator, the positive filament lead and the dial lamp lead are connected directly to the "A+" of the battery.

NOTE: RESISTANCES OF WINDINGS LESS THAN .1 OHM ARE NOT SHOWN.

September, 1936

MONTGOMERY-WARD & CO.

MODEL 62-412

MODEL 62-412

MONTGOMERY-WARD & CO.

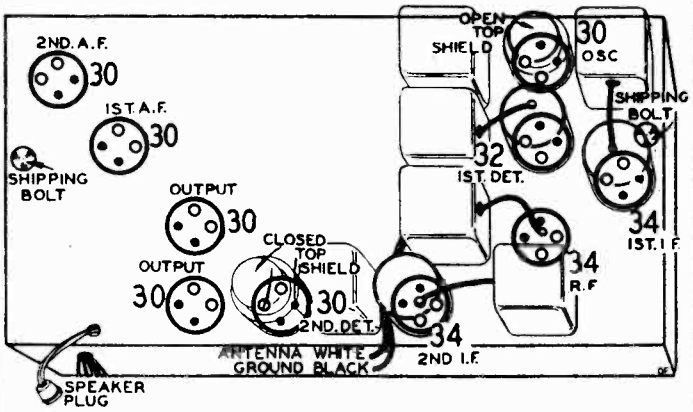


Fig. 7—Location of Tubes

VOLTAGES AT SOCKETS

Volume Control at Maximum — Antenna Shorted to Ground
Band Switch in Standard Wave Position

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Control Grid to Ground
34	R. F.	2.0	135	65	
32	1st Det.	2.0	135	90	6
30	Osc.	2.0	90		
34	1st I. F.	2.0	135	65	
34	2nd I. F.	2.0	135	90	4.5
30	2nd Det.	2.0			
30	1st A. F.	2.0	75		4.5(1)
30	2nd A. F.	2.0	132		9 (2)
30	Power	2.0	135		10.5

(1) Volume control at minimum setting.
(2) As read from connection between R13 and R14, and ground.

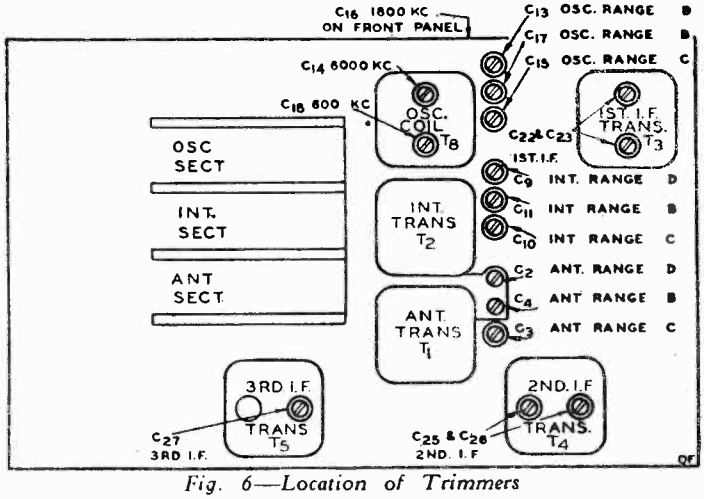


Fig. 6—Location of Trimmers

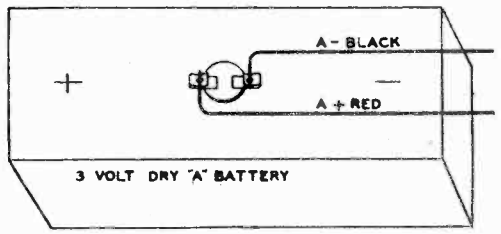


Fig. 4—3 V. Dry "A" Battery Connections

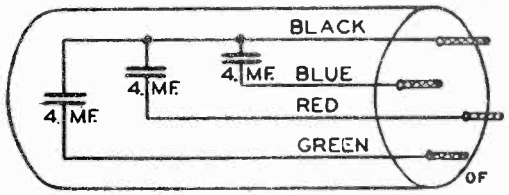


Fig. 9—Electrolytic Condenser Internal Connections

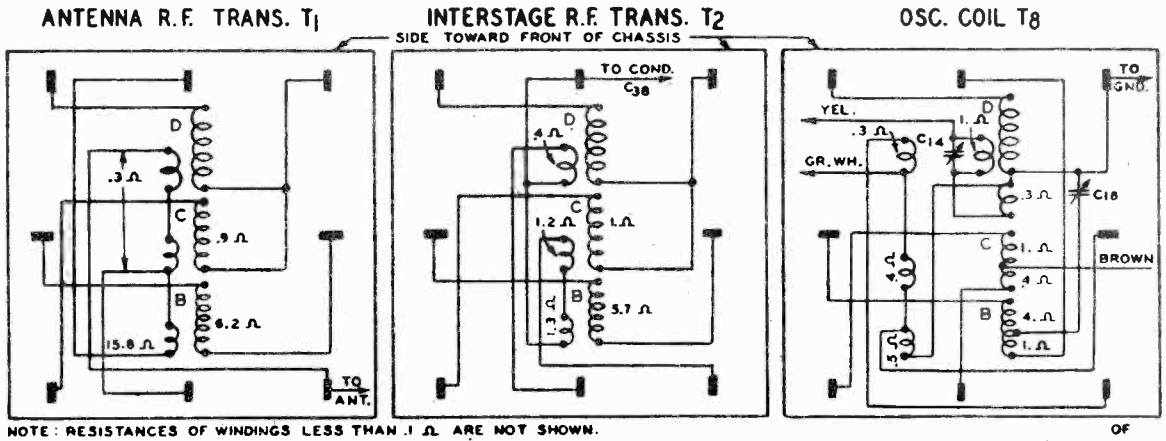


Fig. 8—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

Trimmer Replacement

If one trimmer of the gang trimmer strip should become defective, it is not necessary to replace the entire strip. A single trimmer P-17A36, as shown in the replacement parts list, may be used. Disconnect the lead from the coil side (side not grounded) of the defective trimmer in the strip. This connection is then made to the single trimmer. Connect it to the side of the trimmer not in contact with the adjusting screw. The other side of the single trimmer is then connected to a good ground, using a piece of heavy wire in order to support the trimmer adequately. In replacing a trimmer, be sure to keep both leads as short as possible and keep the ungrounded lead as far from ground as possible.

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band switch to the Range B position (standard wave band).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis and the location is shown in Fig. 6.

Range B Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band switch in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range B trimmer (C17) until maximum output is obtained. The location of this trimmer is shown in Fig. 6.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw.

Adjust the interstage Range B trimmer (C11) and antenna Range B trimmer (C4) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth, at the same time adjusting the 600 KC trimmer, until the peak of greatest intensity is obtained. See Fig. 6 for location of this trimmer.

Range C Alignment

CAUTION: When aligning the short wave bands be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC. It may be necessary to increase the input signal to hear the image.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth, at the same time adjusting the 6000 KC trimmer, until the peak of greatest intensity is obtained. See Fig. 6 for location of this trimmer.

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range C position (first short wave band).

Adjust the oscillator Range C trimmer (C15) until maximum output is obtained. See Fig. 6 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range C trimmer (C10) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

1800 KC Adjustment

Set the signal generator for 1800 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth, at the same time adjusting the 1800 KC trimmer, until the peak of greatest intensity is obtained. See Fig. 6 for location of this trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (second short wave band).

Adjust the oscillator Range D trimmer (C13) until maximum output is obtained. See Fig. 6 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C9) and antenna Range D trimmer (C2) to maximum.

When adjusting the interstage and antenna Range D trimmers, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer.

Planetary Drive Assembly

The planetary assembly is the unit that is integral with the tuning shaft.

If the nut on the back end of this assembly is too tight, the drive will be jerky and will turn hard in high speed. If this condition exists, back off this nut one or two turns and note the effect.

If this nut is too loose, the drive will slip in slow speed. The remedy in this case, of course, is to tighten the nut.

Should the condenser drive cord slip when the planetary pulley is turning, inspect the tuning condenser, drive drum and gears to see if they are turning properly or if they are being obstructed in some way.

If the drive turns unevenly (rough in spots), this may mean that the planetary assembly is defective or damaged internally and a new unit will be required.

MISCELLANEOUS

Referring to the 1st and 2nd I. F. transformers T3 and T4 in Fig. 2, it will be noted that there are coupling windings shown below the primaries in the illustration.

When the selectivity control is in the sharp position, the coupling windings are open circuited and the loose coupling which exists between the primary and secondary of these transformers results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

Across the volume control resistor R16 is a filter composed of condensers C36 and C37 and resistor R15. A tap connection near the low potential end of the volume control is connected between the two condensers. At high volume settings, the filter is not effective. At the low volume settings, as the movable arm approaches the tap, the higher frequencies are by-passed through condenser C37. Very high frequencies are transmitted through condenser C36 to compensate for the reduction of these frequencies. At low volume settings the low frequency amplitudes are increased as a result.

Models with the filament rheostat are connected as shown in Fig. 2. This rheostat permits the use of a 3 volt "A" battery. As shown in Fig. 2, there are two separate variable resistors one of which controls the filament voltage and the other the dial lamp voltage. In models which do not have the filament rheostat the "+A" connection is made directly to the "+A" line and the dial lamps.

Replacement Parts

SOCKETS

Part No.	Description	List Price
P-2A264	4 Prong Tube Socket (All Types)	$0.10

SPEAKERS

P-12A263	8" P.M. Dynamic Speaker complete with Output Trans.	6.00
P-11X268	Speaker Cable and Socket Assembly	.45

KNOBS

Specify Name of Knob and Name and Model of Radio		
	Tone Control—Small Push-on Type	.15
	Volume Control—Small Push-on Type	.15
	Tuning Control—Large Push-on Type	.15
	Band Switch—Large Set-screw Type	.20

GENERAL

P-2X38	Felt Washers (Used behind Knobs)	ea.	.10
P-8X33	Rubber Chassis Mounting Cushions	ea.	.10
P-1A38	Terminal Strip (Single Lug Insulated—mounting foot to left of lug)		.10
P-4A42	Terminal Strip (Two Lugs Insulated—mounting hole in center)		.10
P-4A54	Terminal Strip (Five Lugs Insulated—Two Lugs Grounded)		.10
P-2A86	3 Section, 3 Position, Band Change Switch		1.75
P-10X14	Grid Clip Only		.10
P-13X219	"A" "B" and "C" Battery Cable		1.15
P-13X214	Antenna and Ground Lead Assembly		.30
P-12X63	Tube Shield (Large)		.20
P-12X32	Tube Shield (Small—Open Top)		.15
P-12X33	Tube Shield (Small—Closed Top)		.10
P-13X18	Tube Shield Base (Large)		.10
P-13X30	Tube Shield Base (Small)		.10
P-25X229	Chassis Mounting Feet	ea.	.10
P-8X43	Rubber Mounting Cushions for Gang Condenser (front)	ea.	.10
P-8X44	Rubber Mounting Cushion for Gang Condenser (rear)		.10
P-8X45	Rubber Mounting Cushion for Gang Condenser (rear—under chassis base)		.10

TRANSFORMERS AND COILS

P-9A628	T1 Antenna Transformer and Can Assembly	$1.95
P-9A629	T2 R. F. Interstage Transformer and Can Assembly	1.95
P-9A631	T3 1st I.F. Transformer and Can Assembly	1.70
P-9A632	T4 2nd I.F. Transformer and Can Assembly	1.70
P-9A633	T5 3rd I.F. Transformer and Can Assembly	1.55
P-9A711	T6 Input Transformer	2.10
P-9A712	T7 Output Transformer (Part of Speaker Assembly)	1.30
P-9A630	T8 Oscillator Coil and Can Assembly	3.25
P-9A599	L1 Filament Reactor (Part of "B" Reactor) / L5 "B" Reactor — One Assembly	.40
P-9A610	L2 Double Filament Reactor	.30
P-9A598	L3 2nd I.F. Plate Isolating Reactor	.70

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
P-45X280	C5	.05 mf.	180	$0.15
P-46X80	C6	.05 mf.	180	.15
P-46X98	C7	.1 mf.	180	.20
P-46X198	C12	.1 mf.	180	.15
P-46X187	C20	.02 mf.	180	.15
P-46X80	C21	.05 mf.	180	.20
P-46X98	C28	.1 mf.	180	.15
P-46X124	C31	.01 mf.	180	.15
P-46X90	C32	.05 mf.	180	.15
P-46X120	C35	.01 mf.	360	.15
P-46X176	C37	.08 mf.	180	.25
P-46X117	C38	.25 mf.	180	.35
P-46X117	C39	.25 mf.	180	.35
P-46X101	C40	.004 mf.	600	.15
P-46X114	C41	.004 mf.	600	.15
P-46X119	C42	.05 mf.	360	.20
P-46X114	C43	.004 mf.	600	.15

ELECTROLYTIC

P-45X214	C8	4 mf.	180 Dry		1.15
	C24	4 mf.			
	C30	4 mf.			

MOLDED

Part No.	Code	Capacitance	Voltage	List Price
P-47X69	C1	250 mmf.		.15
P-47X63	C19	35 mmf.		.10
P-47X84	C22	50 mmf.		.10
P-47X72	C33	25 mmf.		.10
P-47X72	C34	25 mmf.		.10
P-47X72	C36	25 mmf.		.10

TRIMMER

P-17A45 Trimmer Strip	C2	2-25 mmf.	Range "D" Antenna Trimmer	.95
	C3	2-25 mmf.	Range "C" Antenna Trimmer	
	C4	2-25 mmf.	Range "B" Antenna Trimmer	
	C9	2-25 mmf.	Range "D" Interstage Trimmer	
	C10	2-25 mmf.	Range "C" Interstage Trimmer	
	C11	2-25 mmf.	Range "B" Interstage Trimmer	
	C13	2-25 mmf.	Range "D" Oscillator Trimmer	
	C15	2-25 mmf.	Range "C" Oscillator Trimmer	
	C17	2-25 mmf.	Range "B" Oscillator Trimmer	

See Part Number P-17A36 for replacement of any one section

P-17A35	C14	40-180 mmf.	4000 KC Oscillator Padding Condenser	.45
	C18	300-680 mmf.	600 KC Oscillator Padding Condenser	
P-17A47	C16	1400-1800 mmf.	1800 KC Oscillator Padding Condenser	.45
P-17A38	C23	150-250 mmf.	1st I.F. Trimmer Condenser	.45
	C25	150-250 mmf.	1st I.F. Trimmer Condenser	
P-17A38	C26	150-250 mmf.	2nd I.F. Trimmer Condenser	.45
	C28	150-250 mmf.	2nd I.F. Trimmer Condenser	
P-17A40	C27	70-150 mmf.	3rd I.F. Trimmer Condenser	.30
P-17A34	(To be used for replacement of any one section of Trimmer Strip P-17A45)			.10

MISCELLANEOUS

P-14A53	3 Gang Condenser Only (less Drive Mechanism and Dial Assembly)		3.60

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
P-A94104	R1	.1 Megohm	.2	$0.15
P-A94403	R3	40,000 Ohm	.2	.15
P-A94152	R4	1,500 Ohm	.2	.15
P-A94153	R5	4,500 Ohm	.2	.15
P-A94103	R6	10,000 Ohm	.5	.15
P-A94304	R7	.3 Megohm	.2	.15
P-A94104	R8	.1 Megohm	.2	.10
P-A94405	R9	4 Megohm	.2	.15
P-A94206	R10	2 Megohm	.2	.15
P-A95106	R11	.1 Megohm	.2	.10
P-A95104	R12	.1 Megohm	.2	.10
P-A94102	R13	1,000 Ohm	.2	.15
P-A94152	R14	1,500 Ohm	.2	.15
P-A94702	R15	7,000 Ohm	.2	.15
P-A95108	R17	1 Megohm	.2	.10

VARIABLE

Part No.	Code	Resistance	List Price
P-36X320	R16	7 Megohm Tapped Volume Control and Switch	1.05
P-40X211	R18	.15 Megohm Tone Control and Selectivity Switch	1.15

DIAL AND DRIVE ASSEMBLY

DIAL ASSEMBLY

Part No.	Specify Name and Model of Radio	Description	List Price
		Dial Assembly Complete with Dial Glass; Dial Plate, Small Pointers; Reflectors; Small Pointer Cords, Springs, Pulleys and Collars; and Band Indicator Less Large Station Pointer and Micrometer Pointer	3.95
See above		Dial Glass Only	1.45
P-25A126		Dial Assembly Mounting Plate, Includes Small Pointer Shafts and Pulleys, and Band Indicator Assembly	1.45
25X297		Dial Assembly Support Brackets (Attached to Gang Condenser) ea.	.10
P-15X31		Large Station Pointer	.25
P-15X66		Micrometer Pointer ea.	.10
P-15X57		Small Volume or Tone Control Pointer ea.	.10
P-9X16		Dial Cardboard	.10
P-11X41		Fibre Strip (At Bottom of Dial Glass)	.10
P-41X12		Dial Lamp Reflectors (At each side of Dial Plate) ea.	.10
P-7A27		Dial Lamp Sockets ea.	.10
P-7A40		Dial Lamps ea.	.40
P-29X20		10" Black Cord for Small Pointers doz. Brass Collars with Set Screws for Securing Small Pointer Cords to Shafts ea.	.40 .10
P-28X44		Tension Springs for Small Pointer Cords ea.	.10
P-26X229		Small Pointer Shafts and Pulleys ea.	.10
P-17X15		Glass Dial Crystal	.25
P-28X56		Crystal Retaining Ring	.15
P-7A60		Dial Lamp Push Button Switch Assembly	.50

DRIVE ASSEMBLY

P-5A34	Planetary Assembly Complete with Hex Nut and Lock-washer (This is the unit mounted at the front of the chassis base. It is integral with the tuning shaft)	1.25
P-10X14	Black Tuning Drive Cord Only	.30
P-28X69	Tension Spring for Tuning Drive Cord	.10
P-25X269	Drive Assembly Bracket Only (Mounted on Gang Condenser)	.25
P-25X283	Rear Mounting Foot for Gang Condenser	.10
P-24X239	Drive Drum Assembly Complete with Gears, Micrometer and Main Pointer Shaft	1.35
P-28X84	Spreader Spring for Rotary Gear (Part of Above Assembly)	.10
P-28X83	Spreader Spring for Stationary Gear (Part of Above Assembly)	.10

NOTICE—There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts, please be sure to mention the series number and this large letter.

Prices subject to change without notice

"A" Battery (Models with Voltage Regulator)

Models equipped with the voltage regulator on the back panel of the chassis may use any type of "A" battery delivering from 2 to 3 volts.

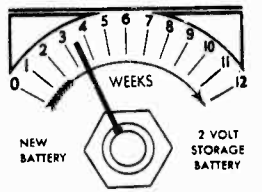


Fig. 5—"A" Battery Voltage Regulator

Batteries

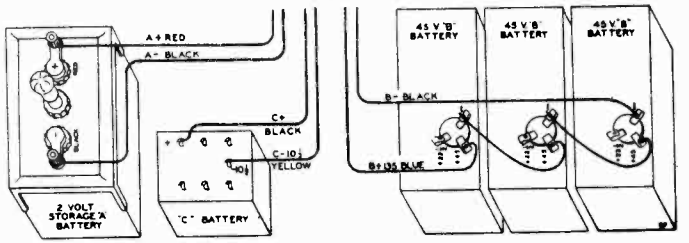


Fig. 3—"A", "B" and "C" Battery Connections

MONTGOMERY-WARD & CO.

MONT.-WARD PAGE 14-111

MODEL 62-412

MODEL 62-432

MONTGOMERY-WARD & CO.

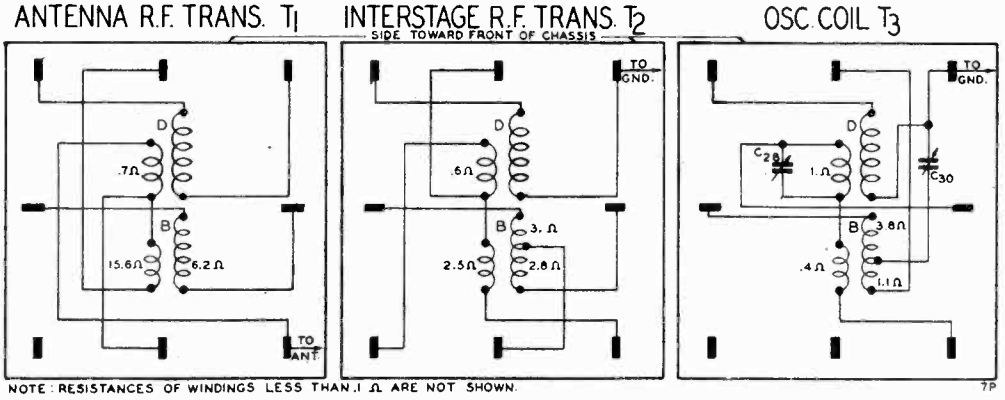


Fig. 4—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings

32 Volt Power Supply

This radio is designed for use on farms and in those places where the power supply consists of a 32 volt direct current generating plant.

Polarity of Power Supply

There is a red mark on the plug at the end of the power supply cord of the radio. The prong of the plug at which the red mark is placed must be plugged into the positive side of the line.

Use a receptacle on the 32 volt line from which the plug will not have to be removed after it has once been inserted correctly.

If the polarity of the line is not known, that is, if it is not known which side of the line is positive, a meter may be used to indicate the polarity. A voltmeter of 50 volt range or up is used. Connect the meter across the line. If the pointer deflects correctly, then the positive post of the meter is connected to the positive side of the line.

If the polarity of the line is not known and there is no way of determining it, insert the power supply plug, turn on the set, advance the volume control and proceed to tune the radio. If no sounds are heard from the speaker after the plug has been in two minutes, withdraw the plug, turn it around and re-insert it. This time sounds should be heard after the tubes have been heated.

Caution

If used on any other type of power supply than 32 volt DC, severe damage may be done to the receiver.

Do not turn the radio on unless all of the tubes and the dial lamps are in the proper sockets. Use only No. 51 bayonet pin base lamps.

Do not leave the plug inserted for more than five minutes if it is found that the radio does not operate.

Line Voltage Range

The radio will operate satisfactorily within a line voltage range of 25 to 42 volts.

Series Resistor

If the line voltage is higher than 42, it will be necessary to use a series resistor to cut it down. If the voltage varies, a variable resistor may be required.

Starting Current

When first turned on, the drain for a few seconds is slightly higher than normal until the tubes heat up. Some automatic plants are adjusted to start under a load of 200 to 300 watts. If a number of devices such as lights or motors are being used and the radio set is turned on the total drain may be sufficient to start the plant.

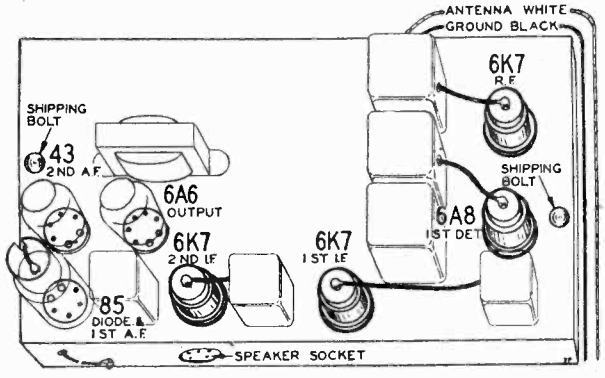


Fig. 6—Tube Arrangement

Dial Lamps

For the dial lamps, No. 51 bayonet pin base lamps must be used. These lamps are part of one section of the tube heater circuit (See Fig. 7) and any other lamps having a different current drain would upset the voltage system of this section.

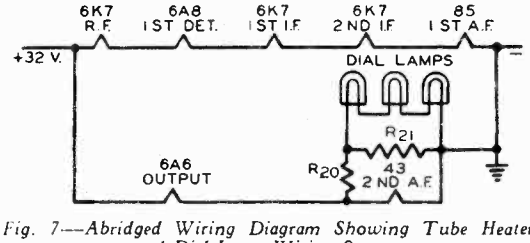
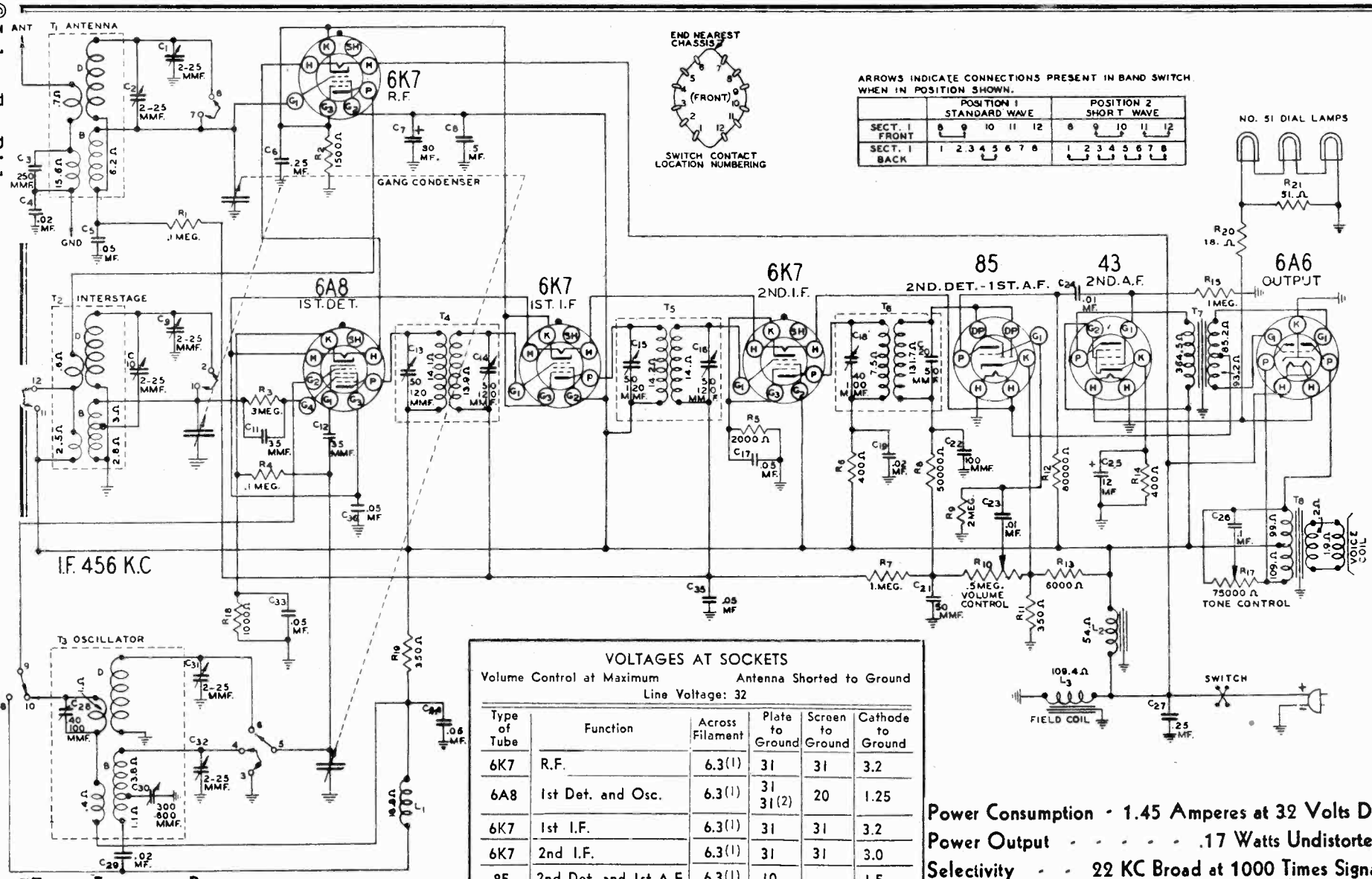


Fig. 7—Abridged Wiring Diagram Showing Tube Heater and Dial Lamp Wiring System



VOLTAGES AT SOCKETS

Volume Control at Maximum — Antenna Shorted to Ground

Line Voltage: 32

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Cathode to Ground
6K7	R.F.	6.3(1)	31	31	3.2
6A8	1st Det. and Osc.	6.3(1)	31 31(2)	20	1.25
6K7	1st I.F.	6.3(1)	31	31	3.2
6K7	2nd I.F.	6.3(1)	31	31	3.0
85	2nd Det. and 1st A.F.	6.3(1)	10		1.5
43	2nd A.F.	26.0(1)	28.2	31	3.2
6A6	Output	6.0(1)	31		6.4(3)

(1) Subject to Variation
(2) Anode Grid to Ground
(3) Center Tap of Output Transformer to Ground

Tuning Frequency Range

B Range ..... 528 to 1730 KC
D Range ..... 5650 to 16000 KC

Sensitivity

B Range ..... 4 Microvolts Absolute
D Range ..... 6 Microvolts Absolute

Power Consumption - 1.45 Amperes at 32 Volts DC
Power Output - - - - - .17 Watts Undistorted
Selectivity - - 22 KC Broad at 1000 Times Signal
Intermediate Frequency - - - - - - - 456 KC
Speaker - - - - - - - - - 8 inch Dynamic

MONTGOMERY-WARD & CO.

MONT.-WARD PAGE 14-113

MODEL 62-432

MONTGOMERY-WARD & CO.

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector (G_4).

Connect the ground lead of the radio to the ground post of the signal generator.

Turn the band switch to the Range B position (standard wave band).

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 3.

Range B Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band switch in the standard wave position.

Connect the antenna lead of the radio through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range B trimmer (C32) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw.

Adjust the interstage Range B trimmer (C10) and antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

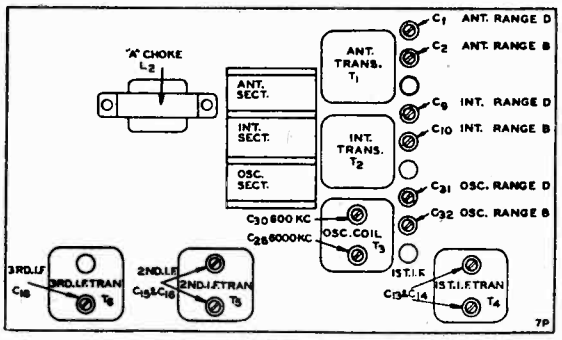


Fig. 3—Location of Trimmers

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer (C30) until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range D Alignment

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC. It may be necessary to increase the input signal to hear the image.

16,000 KC Adjustment

Set the signal generator for 16,000 KC.

Connect the antenna lead of the radio through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (short wave band).

Adjust the oscillator Range D trimmer (C31) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C9) and antenna Range D trimmer (C1) to maximum. When adjusting these trimmers, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer.

6000 KC Adjustment

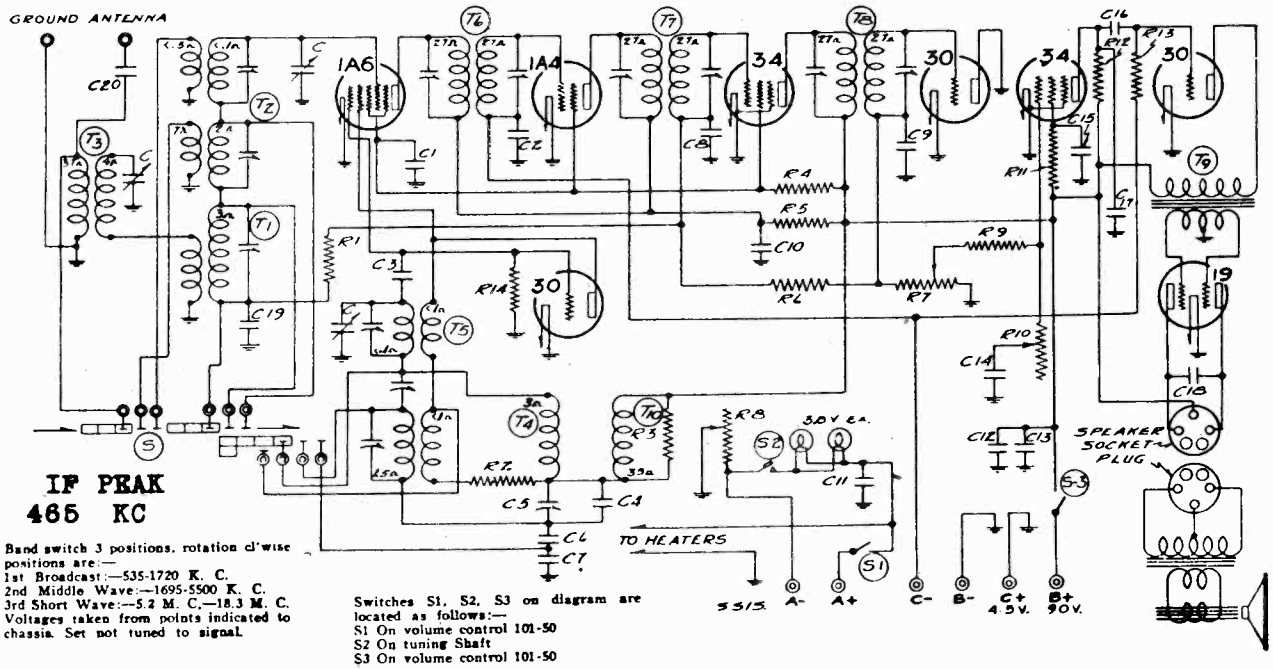
Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC (C28) trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

MODEL 62-430

MONTGOMERY-WARD & CO.



Band switch 3 positions, rotation cl'wise positions are:—
1st Broadcast:—535-1720 K. C.
2nd Middle Wave:—1695-5500 K. C.
3rd Short Wave:—5.2 M. C.—18.3 M. C.
Voltages taken from points indicated to chassis. Set not tuned to signal.

Switches S1, S2, S3 on diagram are located as follows:—
S1 On volume control 101-50
S2 On tuning Shaft
S3 On volume control 101-50

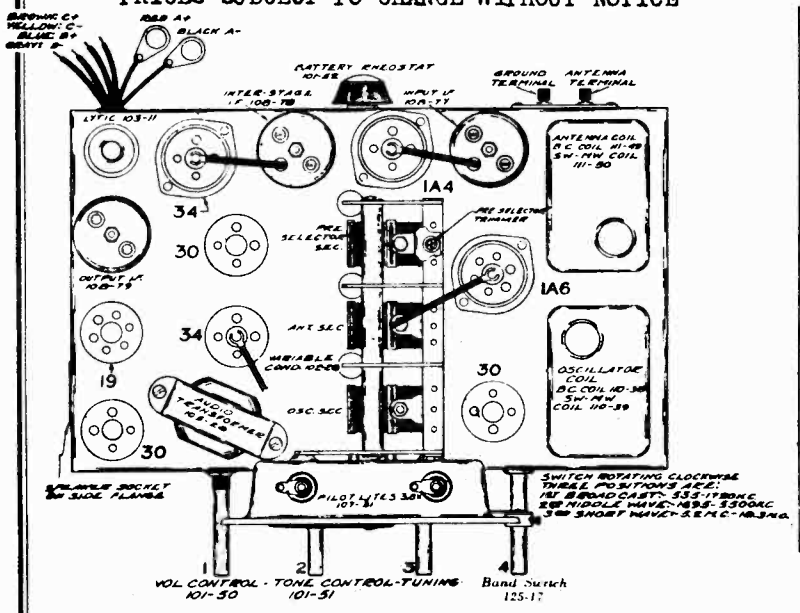
LIST OF REPAIR PARTS

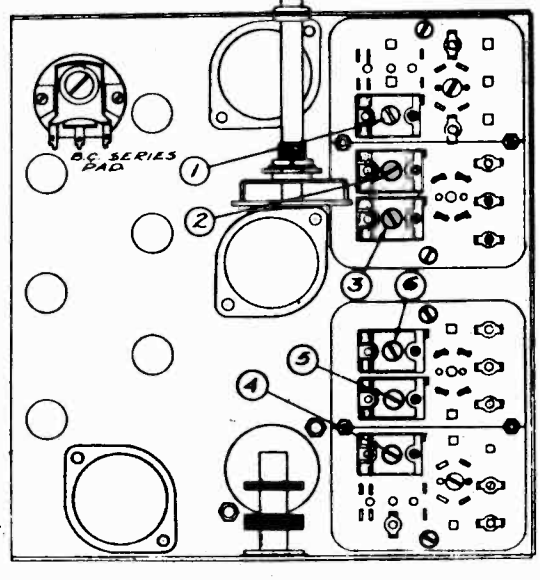
Use Only Genuine Factory Replacement Parts

Part No.	Circuit Diagram Reference	Description	No. Used in Set	List Price Each
		CONDENSERS		
100-5B	C11	1.0 x 120 Volt Tubular with Bracket	1	.50
100-6	C1	.25 x 200 Volt Tubular less Bracket	1	.35
100-6B	C13	.25 x 200 Volt Tubular with Bracket	1	.35
100-11	C14, C16, C20	.01 x 400 Volt Tubular	3	.25
100-20	C10	.1 x 200 Volt Tubular	1	.25
100-22	C2, C8, C15, C19	.05 x 200 Volt Tubular	4	.25
100-25	C18	.002 x 600 Volt Tubular	1	.25
103-11	C12	8 Mfd. x 200 Volt Electrolytic	1	.75
129-5	C17	.0001 Mica—Type MT—20%	1	.25
129-12	C9	.00025 Mica—Type MT—20%	1	.25
129-50	C3	.00004 Mica—Type MT—30%	1	.25
129-54	C7	.003 Mica—Type MW—2½%	1	.35
129-55	C6	.0034 Mica—Type MW—2½%	1	.35
129-65	C4	.00055 Mica—Type MT—5%	1	.25
			1	6.00
		MISCELLANEOUS		
101-50	R7	Volume Control and Switch (250 M ohm)	1	1.25
101-51	R10	Tone Control (300 M ohm)	1	.70
101-52	R8	Filament Rheostat (2 ohm)	1	.50
102-28	C	Three Gang Variable Condenser	1	4.00
105-28	T9	Audio Input Transformer	1	1.75

Part No.		Description	No. Used in Set	List Price Each
125-17	S	Band Switch	1	.85
128-51		Wood Knob with Spring	3	.15
128-52		"Tuning" Knob with Set Screw—Wood	1	.15
131-12		Bakelite Knob with Arrow	1	.15
		RESISTORS		
130-11	R12	250M Ohm—⅓ Watt—20%—50 Volt Carbon	1	.20
130-12	R3, R9, R14	50M Ohm—⅓ Watt—20%—20 Volt Carbon	3	.20
130-19	R6, R11, R13	1 Meg Ohm—⅓ Watt—20%—100 Volt Car.	3	.20
130-20	R1	100M Ohm—⅓ Watt—20%—50 Volt Carbon	1	.20
130-27	R2	50 Ohm—⅓ Watt—20%—3 Volt Carbon	1	.20
130-31	R5	1500 Ohm—⅓ Watt—20%—10 Volt Carbon	1	.20
130-109	R4	7500 Ohm—⅓ Watt—20%—50 Volt Carbon	1	.20
		COILS		
108-77	T6	Input I.F. complete with Can	1	1.25
108-78	T7	Interstage I.F. complete with Can	1	1.25
108-79	T8	Output I.F. complete with Can	1	1.25
110-38	T4	Broadcast Oscillator Coil Complete	1	.50
110-39	T5	Mid-Wave & Short Wave Oscillator Coil Com.	1	1.50
111-49	T1	Broadcast Antenna Coil Assembly Complete	1	.75
111-50	T2	Mid-Wave & Short Wave Antenna Coil Assem. Complete	1	1.50
111-51	T3	Broadcast Preselector Coil	1	.75
123-3	T10	R.F. Choke Coil	1	.35

PRICES SUBJECT TO CHANGE WITHOUT NOTICE





BOTTOM VIEW SHOWING TRIMMERS

MODEL 62-430

MONTGOMERY-WARD & CO.

BATTERIES REQUIRED:

The following batteries are required:

2—45 Volt "B" Batteries.
1—4½ Volt "C" Battery.
1—3 Volt Dry "A" Battery or 2 Volt Storage Battery.

TUBES:

The tube complement of this chassis is as follows:

1—Type 1A6 Pentagrid Mixer, First Detector.
1—Type 1A4 Tetrode First I.F. Amplifier (465 K.C.)
1—Type 34 Remote Cut-Off Pentode, 2nd I.F. Amplifier (465 K.C.)
1—Type 30 Oscillator.
1—Type 30 Second Detector and A. V. C.
1—Type 34 A.F. Amplifier.
1—Type 30 Driver Amplifier.
1—Type 19 Class "B" Push-Pull Output Amplifier.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram, are measured with a new set of batteries.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

The approximate current consumption is as follows:
"A"—660 ma., "B"—18 to 24 ma.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the two plate terminals of the type 19 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-79 Output I.F. Transformer
Part No. 108-78 Interstage I.F. Transformer
Part No. 108-77 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 34 tube, and adjust the output I.F. transformer (No. 108-79) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 34 to grid cap to 1A4 and adjust interstage I.F. transformer (No. 108-78) to resonance.
   (c) Move oscillator to grid cap of 1A6 and adjust input I.F. transformer (No. 108-77).

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground posts, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 1; see bottom view of coil assembly, Fig. 3)
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment).
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. Under no circumstances bend plates of variable condenser sections to correct tracking.

SHORT WAVE BAND ALIGNMENT:

5.2 to 18.3 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground posts, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (adjustment number 3) and short wave antenna (adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.3 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 18.3 megacycle signal can be tuned in not only at 18.3 on the dial but also at approximately 17.4 megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the antenna and ground posts make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (adjustment number 2) and middle wave antenna (adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5400 kilocycles and 1700 kilocycles for band coverage.

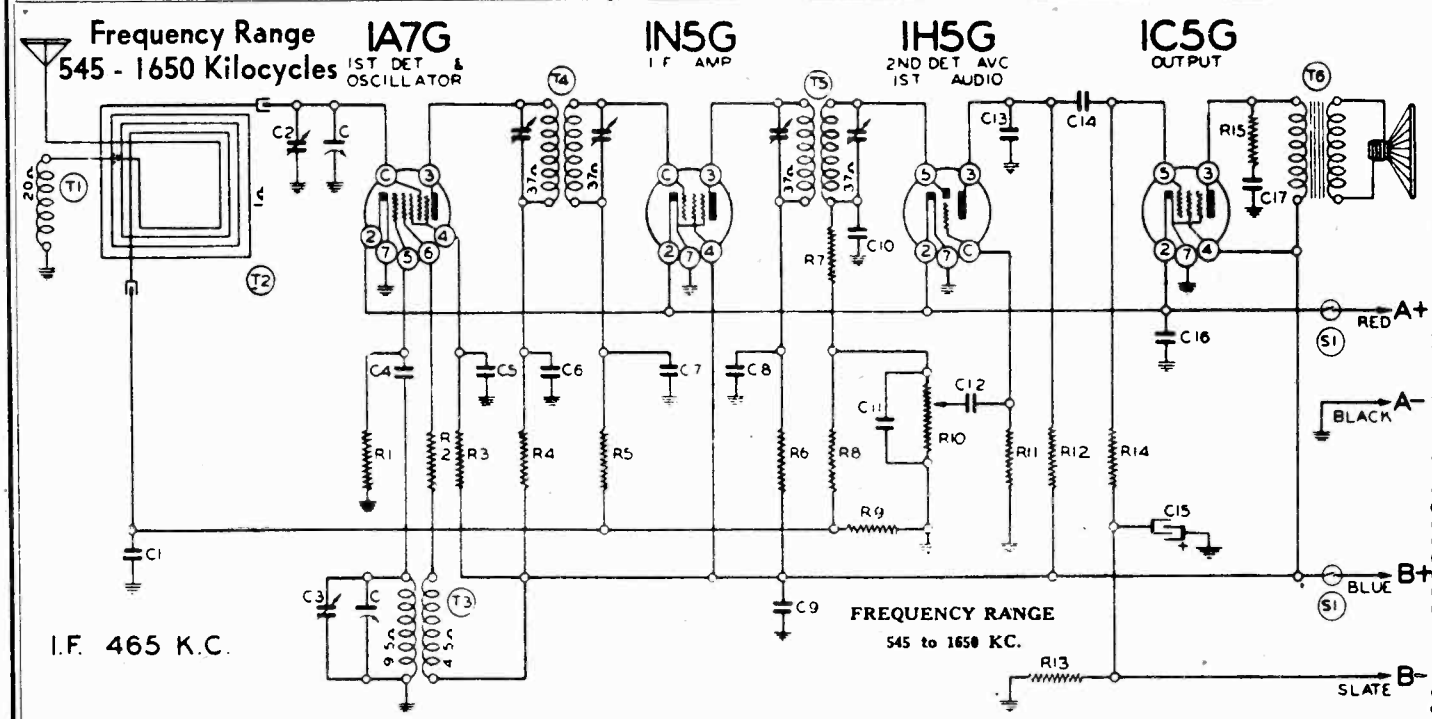
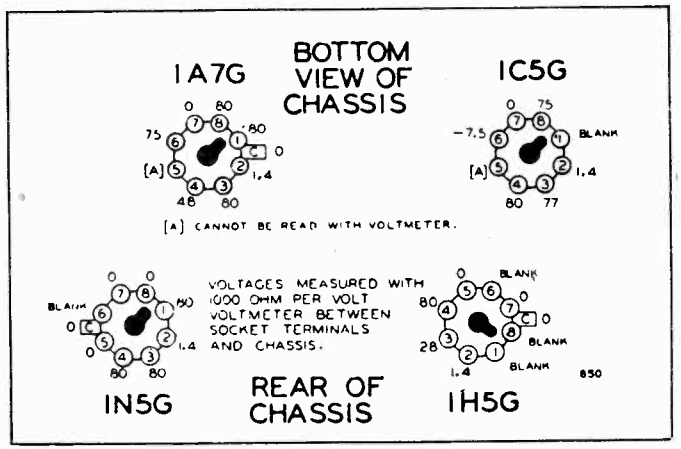


Diagram Ref. No.	Part No.	Description
		RESISTORS
R1	1309	200M ohm—⅓ w.
R2	13071	4M ohm—⅓ w.
R3	130208	40M ohm—⅓ w.
R4	13026	1000 ohm—⅓ w.
R5	13020	100M ohm—⅓ w.
R6	13026	1000 ohm—⅓ w.
R7	13040	19M ohm—⅓ w.
R8	13038	2 megohm—⅓ w.
R9	13038	2 megohm—⅓ w.
R10	101163	1 megohm volume control
R11	13019	1 megohm—⅓ w.
R12	1303	500M ohm—⅓ w.
R13	130283	750 ohm—⅓ w.
R14	13038	2 megohm—⅓ w.
R15	130218	5M ohm—⅓ w.
		CONDENSERS
C	102103	2 gang variable condenser
C1	10022	.05 x 200 v.
C2		Loop ant. trimmer on gang
C3		Oscillator trimmer on gang
C4	12912	.00025 mica
C5	10022	.05 x 200 v.
C6	10078	.01 x 200 v.
C7	10078	.01 x 200 v.
C8	10078	.01 x 200 v.
C9	10064	.25 x 200 v.
C10	1295	.0001 mica
C11	1295	.0001 mica
C12	10078	.01 x 200 v.
C13	12912	.00025 mica
C14	10078	.01 x 200 v.
C15	11935	.25 mfd. 25 w. v. lytic
C16	10056	.5 x 200 v.
C17	10012	.003 x 600 v.

PARTS

T1	1236	Antenna load coil (on loop)
T2	120257	Loop antenna coil (complete)
T3	110110	Oscillator coil
T4	108142	Input I.F. coil
T5	108143	Output I.F. coil
T6	114158	5" P.M. Speaker
S1		Off-on switch D.P.S.T. on vol. control



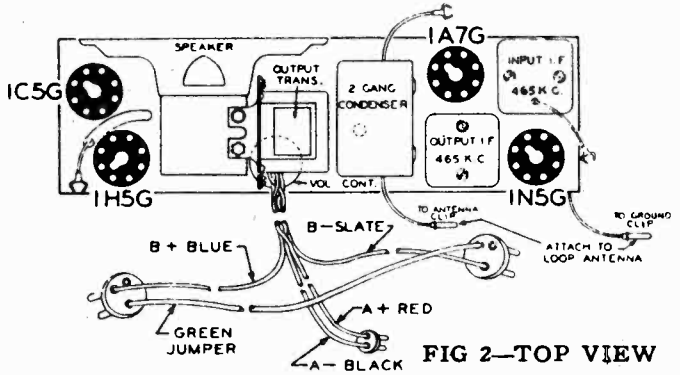


FIG 2—TOP VIEW

Power Output.....200 Milliwatts Undistorted, 300 Milliwatts Maximum

Slight adjustments to the oscillator and antenna circuits can be made without removing the chassis from the cabinet through two holes on the front of the radio cabinet under the nameplate

A ground is essential when an outside antenna is employed.

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect —B of radio chassis to ground post of signal generator through .1 Mfd. Condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- 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.

MODEL 93BR-571 (Serial No. 189300 and up)

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Iron Cores (Dial Setting)	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Connect to Terminal "B" (See Fig. 4)	Iron Cores All the way out	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Connect to Terminal "B" (See Fig. 4)	Iron Cores All the way out	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1720 Kc.	.1 MFD.	Connect to Terminal "B" (See Fig. 4)	Iron Cores All the way out	Trimmer (C5) (See bottom of Radio, Fig. 3)	Oscillator	Adjust to maximum output
	1720 Kc.	200 MMF.	Connect to Terminal "A" (See Fig. 4)	Iron Cores All the way out	Trimmer (C2) (See bottom of Radio, Fig. 3)	Antenna	Adjust to maximum output
	1400 Kc.	200 MMF.	Connect to Terminal "A" (See Fig. 4)	Turn Dial to 1400 Kc.	Adjust position of antenna coil up or down (see Fig. 4)	Antenna Coil Adjustment	Adjust to maximum output (See Note "A")
	1720 Kc.	200 MMF.	Connect to Terminal "A" (See Fig. 4)	Turn Dial to 1720 Kc.	Adjust trimmer (C2) (See Fig. 3)	Antenna	Check for tracking (See Note "B")

NOTE "A"—The antenna coil assembly is made so that it is movable up or down. When making the adjustment as given in the alignment procedure move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

NOTE "B"—After the antenna coil has been tracked at 1400 Kc. it is necessary to check the antenna trimmer (C2) adjustment again at 1720 Kc. If no appreciable change in trimmer adjustment is made the coil is in track; if the trimmer requires considerable change, it will be necessary to again adjust the position of the antenna coil at 1400 Kc. These two adjustments should be tried several times until no change of trimmer adjustment is required at 1720 Kc.

FOR OTHER DATA SEE INDEX

MODEL 62-454

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 1N5G I. F. Tube	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 1A7G	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1735 Kc.	200 mmf.	Antenna lead	Rotor full open (Plates out of mesh)	Trimmer—Top of rear section of gang (See Fig. 1)	Broadcast Oscillator	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Set dial at 1400 Kc.	Trimmer—Top of front section of gang (See Fig. 1)	Antenna Broadcast	Adjust to maximum output

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 1A7G Tube	Rotor full open (Plates out of mesh)	Four trimmers on top (See Fig. 1)	Output and input I. F.	(See Note "A") Adjust to maximum output
BROAD-CAST BAND	1650 Kc.	200 mmf.	Grid of 1A7G Tube	Rotor full open (Plates out of mesh)	Trimmer (C3) front section of gang (See Fig. 4)	Oscillator	(See Note "A") Adjust to maximum output
	1400 Kc.		See Note "C"	Set dial at 1400 Kc.	Trimmer (C2) rear section of gang (See Fig. 4)	Antenna	(See Note "B") Adjust to maximum output

NOTE "A" — A 1 megohm resistor must be connected between the two loop antenna leads from the chassis when aligning the I. F. transformers and setting the oscillator trimmer, (C3). The loop antenna must be disconnected from the chassis.

NOTE "B" — Remove the 1 megohm resistor from the loop antenna leads; mount the chassis and the loop antenna in the cabinet, connect the loop antenna to the chassis. Adjust trimmer (C2). (See note "C.")

NOTE "C" — Lay the output lead from the signal generator in back of the loop antenna. Turn up the output of the generator, picking up the energy in the loop antenna without any electrical connection from the signal generator.

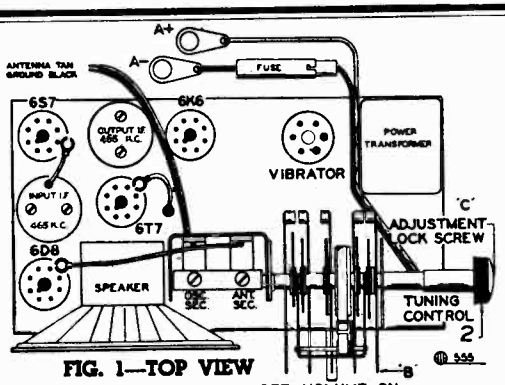
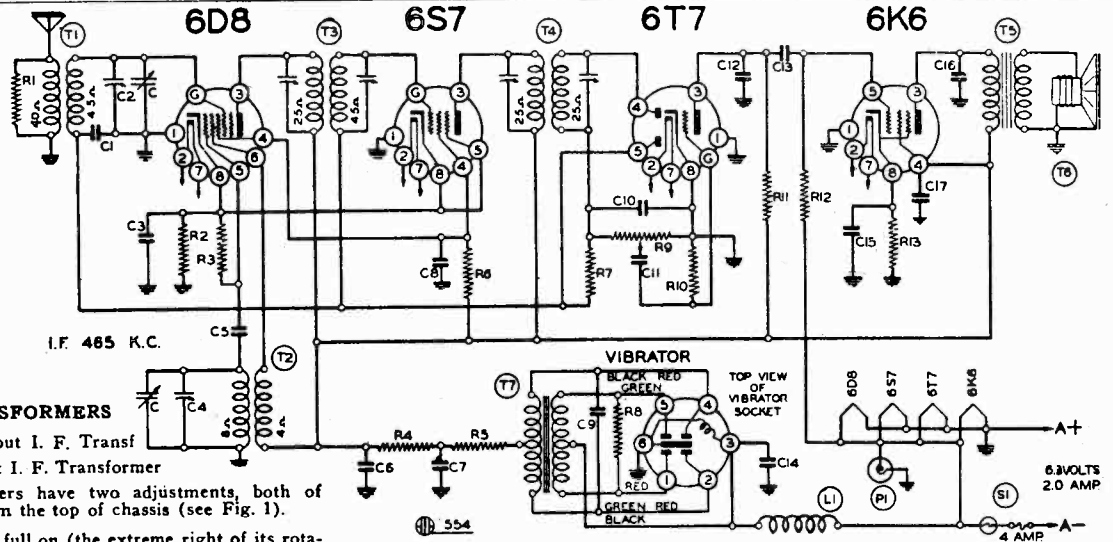


FIG. 1—TOP VIEW



6-Volt Storage Battery Operated

Type 3AG fuse (Part No. 13179)

Code No.	Part No.	Description
		RESISTORS
R1	13021	20M ohm—½ w.
R2	13081	250 ohm—½ w.
R3	13012	50M ohm—½ w.
R4	13084	200 ohm—½ w.
R5	13084	200 ohm—½ w.
R6	130149	15M ohm—½ w.
R7	130170	3 megohm—½ w.
R8	13084	200 ohm—½ w.
R9	101107	500M ohm Volume control
R10	130225	15 megohm—½ w.
R11	1309	200M ohm—½ w.
R12	1303	500M ohm—½ w.
R13	13024	400 ohm—½ w.
		CONDENSERS
C	10267B	2 gang variable condenser
C1	1009	.05 x 200 v.
C2		Antenna Trimmer on gang
C3	10022	.05 x 200 v.
C4		Oscillator trimmer—on gang
C5	12912	.00025—mica
C6	11957	15 mfd.—150 w. v.
C7	11958	30 mfd.—150 w. v.
C8	10022	.05 x 200 v.
C9	10068	.003 x 1400
C10	12912	.00025—Mica
C11	10011	.01 x 400 v.
C12	1292	.0005—Mica
C13	10011	.01 x 400 v.
C14	10031	.5 x 120 w. v.
C15	11957	15 mfd.—25 w. v.
C16	10019	.006 x 600 v.
C17	10020	.1 x 200 v.
		C6 and C 15 in same unit

ALIGNING I.F. TRANSFORMERS

Part No. 10895D Output I. F. Transf

Part No. 10896E Input I. F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 10895D) to resonance.

   (b) Move oscillator output clip from grid of 6S7G to grid of 6D8G and adjust input I.F. transformer (No. 10896E) to resonance.

   (c) With oscillator still connected to 6D8G, readjust output I.F. transformer (10895D) if necessary.

R.F. ALIGNMENT: (535-1720 K. C.)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 100 mmf. condenser to the antenna lead and chassis ground and make the following adjustments:

   (a) with external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).

   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser.

   (c) Check sensitivity at 600 and 1000 kilocycles.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are five levers on the dial by means of which five stations may be selected,

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now hold tuning knob securely with left hand to prevent it from turning, or Rotate the tuning knob (No. 2) to the right (clockwise) as far as it will turn, and with a coin (half dollar), tighten the special locking screw ("C") in the center of the tuning knob, (See Fig. 1).

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, hold the tuning knob No. 2 securely and with a coin loosen the locking screw "C" one or two turns; select the new station as explained. **Be sure to retighten the locking screw,** otherwise the stations you have selected will not stay adjusted to the levers.

VOLTAGES AT SOCKETS

Voltage taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. Antenna Shorted to Ground

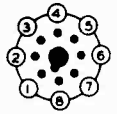
TUBE	FUNCTION	Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
			(1)					(1)	
6D8	Converter	0	6.25	137	80		137	6.25	3.0
6S7	I. F. Amplifier	0	6.25	137	80	3.0		6.25	3.0
6T7	Diode—Triode	0	6.25	57				6.25	0
6K6	Output	0	6.25	130	137			6.25	5.4 (2)

(1) DC voltage as read across heater terminals 2 and 7.

(2) Bias (11.6 volts) as read across terminals 8 to 7.

Supply Voltage 6.3 DC—Volume Control: Maximum

Readings taken with 1000 ohm-per-volt meter

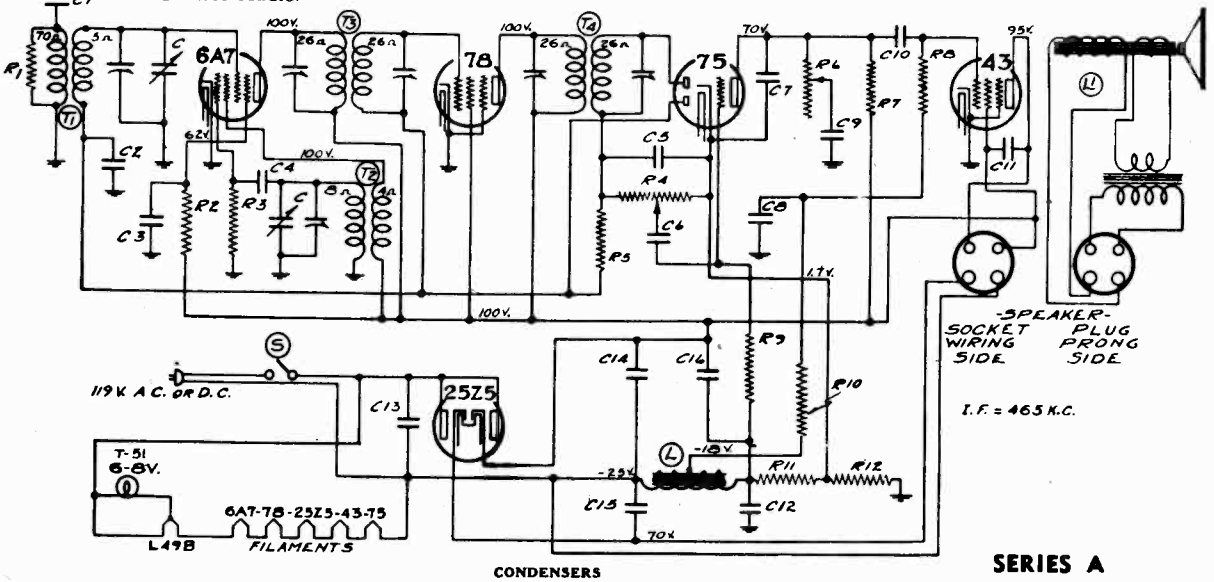


WIRING SIDE OF OCTAL TUBE SOCKET SHOWING LOCATIONS OF PINS

MODELS 62-601,
93BR-601

MONTGOMERY-WARD & CO.

Type 6A7 Pentagrid Mixer, First Detector-oscillator
Type 78 Remote Cut-Off Pentode, I.F. Amplifier (465 K.C.)
Type 75 Duplex Diode Triode Second Detector, A.V.C. and First Audio.
Type 43 Pentode Output Amplifier
Type 25Z5 High Vacuum Rectifier.
Type L49B Ballast Tube.



SERIES A

RESISTORS

No.	Part No.		Description
R1	130-12	50M	Ohm—½W—20%— 20V—Carbon
R2	130-21	20M	Ohm—½W—20%— 20V—Carbon
R3	130-12	50M	Ohm—½W—20%— 20V—Carbon
R4	101-54	1 meg	Ohm—Volume Control
R5	130-119	3 meg	Ohm—½W—20%—100V—Carbon
R6	101-55	1 meg	Ohm—Tone Control
R7	130-120	100M	Ohm—½W—20%— 50V—Carbon
R8	130-5	300M	Ohm—½W—20%—100V—Carbon
R9	130-38	2 meg	Ohm—½W—20%—100V—Carbon
R10	130-9	200M	Ohm—½W—20%— 20V—Carbon
R11	106-28	35	Ohm—Muter Strip
R12	106-28	50	Ohm—Muter Strip

NOTE: R11 and R12 in one unit—No. 106-28.

CONDENSERS

C1	100-29	.002 x600 Volt—25%
C2	100-22	.05 x200 Volt—25%
C3	100-22	.05 x200 Volt—25%
C4	129-12	.00025 Mica—MT—20%
C5	129-12	.00025 Mica—MT—20%
C6	100-11	.01 x400 Volt—20%
C7	129-2	.0005 Mica—MT—20%
C8	100-20	.1 x200 Volt—25%
C9	100-11	.01 x400 Volt—25%
C10	100-11	.01 x400 Volt—25%
C11	100-25	.002 x600 Volt—25%
C12	100-6	.25 x200 Volt—20%
C13	100-39	.1 x400 Volt—20%
C14	119-25	16 mfd.x100 Volt—Working Voltage
C15	119-25	5 mfd.x100 Volt—Working Voltage
C16	119-25	8 mfd.x100 Volt—Working Voltage

NOTE: C14, C15, and C16 in one unit—No. 119-25

C	102-33	One section of two gang condenser
T1	111-57	Antenna Coil
T2	110-46	Oscillator Coil
T3	108-82	Input I.F. Coil—465 Kc.
T4	108-83	Output I.F. Coil—465 Kc.
L	105-29	Filter Choke (Resistance 600 Ohms)
L1	114-43	Five Inch Speaker (Field resistance 3000 Ohms)
S	101-54	On and off switch on Volume Control

TUNING RANGE—
Standard Broadcast Band
535-1720 Kilocycles

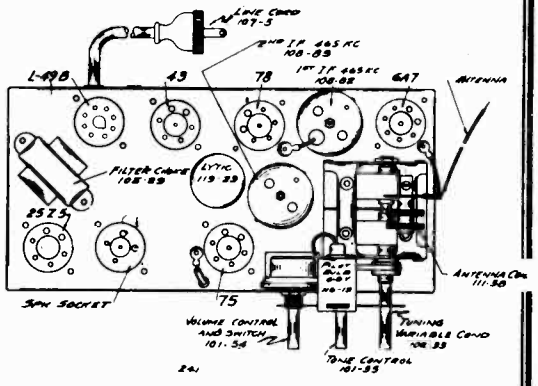


FIG. 2—TOP VIEW

SERIES B is the same as Series A, except for the following changes:-
1 - The C15 condenser was eliminated.
2 - The C14 condenser was replaced by a C15 (Part #119-29) 30 mfd. capacity, and the C16 was replaced by a C14 (Part #119-29) 5 mfd. capacity.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-83 Output I.F. Transformer
Part No. 108-82 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 78 tube, and adjust the output I.F. transformer (No. 108-83) to resonance.

   (b) Move oscillator output clip from grid of 78 grid cap of 6A7 and adjust input I.F. transformer (No. 108-82) to resonance.

   (c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-83) if necessary.

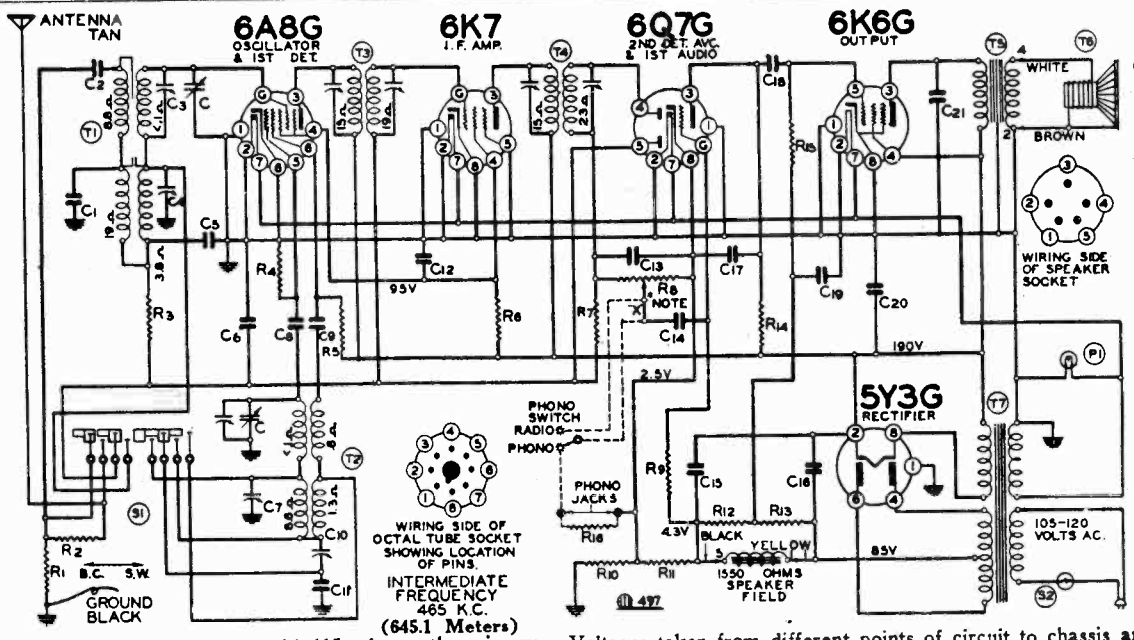
R.F. ALIGNMENT: (535-1720 K.C.)

1. Unsolder the antenna wire from its terminal on the antenna coil and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 50 mmf. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

   (b) Re-set external oscillator to 1550 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.



All voltages are to be measured with 115 volts on the primary of the power transformer.

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

FREQUENCY RANGE 535 to 1720 K.C. (Kilocycles)
5.45 to 18.3 M.C. (Megacycles)

2-Band A. C. Superheterodyne Receiver

CHASSIS MODEL 583 SERIES "A" (Serial No. 8A977900 and up)

Code No.	Part No.	Description	Code No.	Part No.	Description
		RESISTORS	C8	129-39	.00005 mica 20%
R1	130-36	10M ohm - 1/3 w. 20%	C9	100-25	.002 x 600 v. 25%
R2	130-41	800 ohm - 1/3 w. 20%	C10	124-36	350 mmf. w. capacity - Series pad
R3	130-20	100M ohm - 1/3 w. 20%	C11	129-93	.00348 - 2-1/2% Comp. Type
R4	130-12	50M ohm - 1/3 w. 20%	C12	100-24	.25 x 400 v. 25%
R5	130-36	10M ohm - 1/3 w. 20%	C13	129-5	.0001 Mica 20%
R6	130-42	20M ohm - 1/2 w. 20%	C14	100-11	.01 x 400 v. 25%
R7	130-4	3 megohm - 1/3 w. 20%	C15	119-48	8.0 mfd. 350 w.v. lytic
R8	101-100	1 megohm volume control	C16	119-48	4.0 mfd. 350 w.v. lytic
R9	130-4	3 megohm - 1/3 w. 20%	C17	129-2	.0005 mica 20%
R10	130-204	55 ohm - 1/3 w. 10%	C18	100-16	.01 x 400 v. 10%
R11	130-203	40 ohm - 1/3 w. 10%	C19	100-4	.1 x 200 v. 10%
R12	130-205	100M ohm - 1/3 w. 10%	C20	100-13	.05 x 400 v. 25%
R13	130-46	800M ohm - 1/3 w. 10%	C21	100-19	.006 x 600 v. 25%
R14	130-9	200M ohm - 1/3 w. 20%			C4 and C7 in same unit
R15	130-102	500M ohm - 1/3 w. 10%			C15 and C16 in same unit
R16	130-57	35M ohm - 1/3 w. 20% (For Phono Connection)			**PARTS**
		CONDENSERS	T1	111-93	Antenna coil complete
C	102-68	2 gang variable condenser	T2	110-74	Oscillator coil complete
C1	129-49	.00009 mica 5%	T3	108-111B	Input I.F. Complete 465 kc.
C2	129-87	.000105 mica 10%	T4	108-112B	Output I.F. Complete 465 kc.
C3	124-39C	2-25 mmf. Adj. Cond.	T5	105-57	Output Transformer
C4	124-30B	2-20 mmf. Adj. Cond.	T6	114-110	6" Dynamic Speaker (1550 Ohm Field)
C5	100-37	.003 x 600 v. 10%	T7	104-124	Power Transformer
C6	100-22	.05 x 200 v. 25%		104-127	Power Transformer - Universal
C7	124-30B	2-20 mmf. Adj. Cond.	S1	125-46	Band Switch
			S2		Off-on switch on volume control
			P1	107-94	Pilot Light

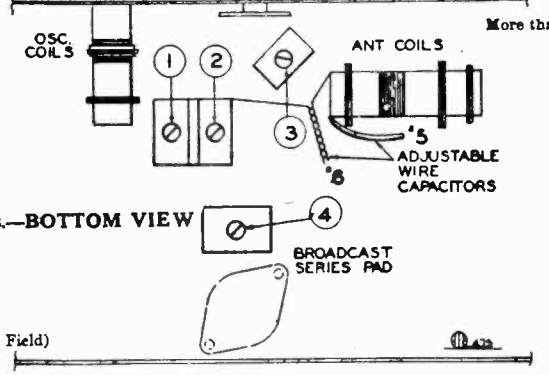


FIG. 3.—BOTTOM VIEW

*NOTE:—When phono connections are made, wire marked "X" should be cut and phono connections made as indicated by dotted lines. Resistor R16 and phono jacks should be added.

POWER SUPPLY:

Receivers of this model which are to be used on voltages or frequencies other than 110-130-230 volts, 40-60 cycles are so marked. (Standard chassis is equipped with regular 105-115 volt 50/60 cycle Power Transformer). The power consumption of this receiver is 55 watts. (See taps on top of power transformer.)

110 Tap: For line voltages of 100 to 125 volts.
130 Tap: For line voltages of 125 to 145 volts.
230 Tap: For line voltages of 210 to 250 volts.

To remove the chassis from the cabinet, remove the four bolts which are used to fasten the chassis to the cabinet bottom; remove the special locking screw in the center of the tuning knob on the side of the cabinet; pull the knobs off their shafts and pull off the six button lever keys on front of dial.

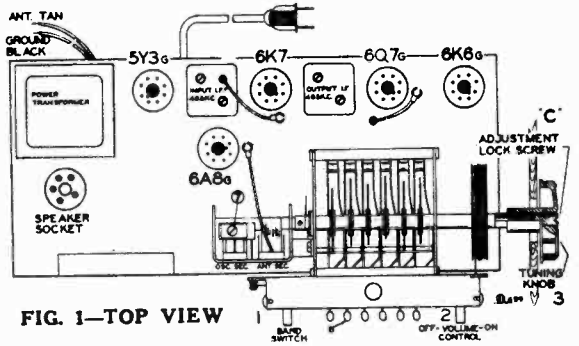


FIG. 1—TOP VIEW

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance Percent	Color of Dot
2½ %	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More than 20%	None.

FOR OTHER DATA SEE INDEX

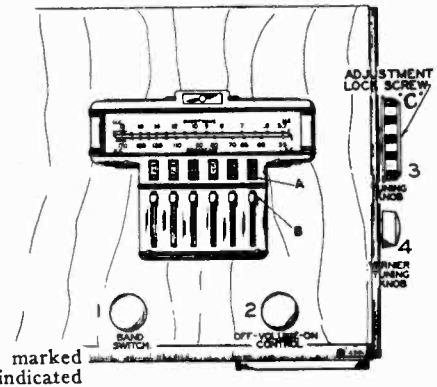
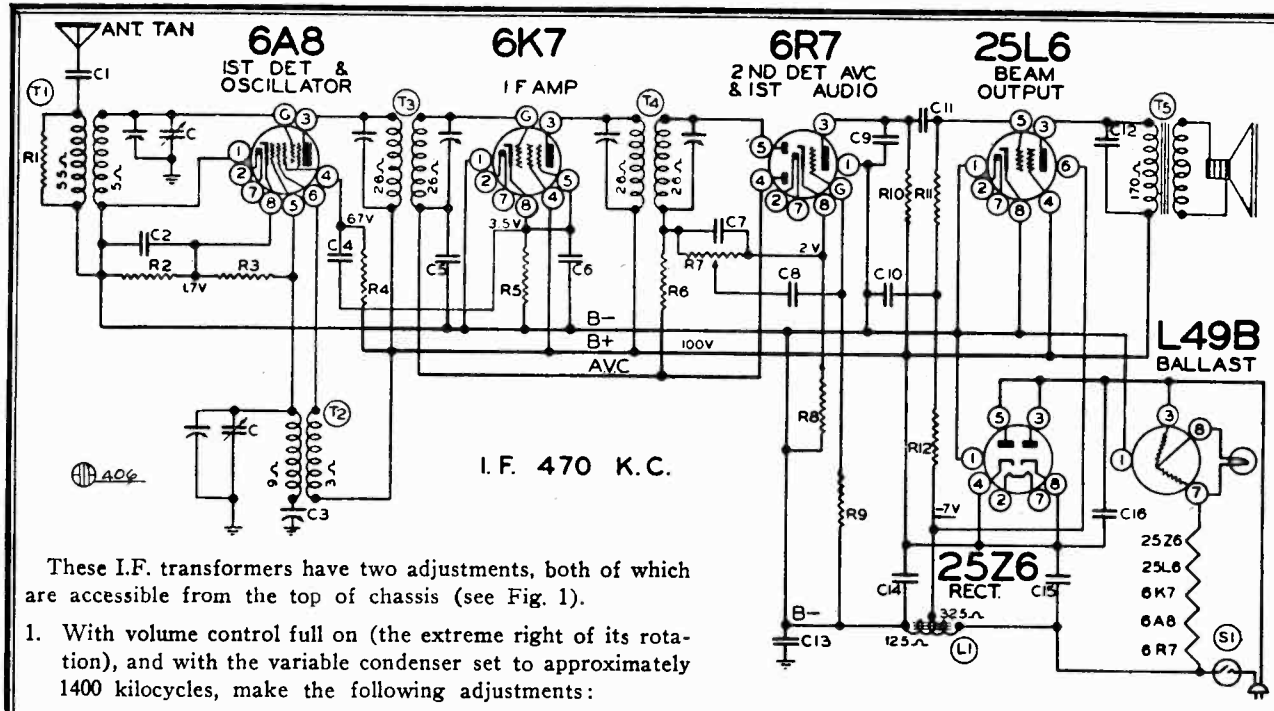


FIG. 2—FRONT VIEW



These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 470 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6K7G tube, and adjust the output I.F. transformer (No. 108-83B) to resonance.

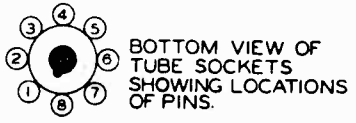
   (b) Move oscillator output clip from grid of 6K7G to grid of 6A8G and adjust input I.F. transformer (No. 108-82B) to resonance.

   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-83B) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. Unsolder the antenna wire from its terminal on the antenna coil and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 50 mmf. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).



No.	Part No.	Description	
		CONDENSERS	
C	102-55	2 Gang Variable Condenser	
C1	100-25	.002 x 600	25%
C2	100-9	.05 x 200	25%
C3	129-75	.0003386 Compression Type Condenser 1%	
C4	100-22	.05 x 200	25%
C5	100-22	.05 x 200	25%
C6	100-20	.1 x 200	25%
C7	129-21	.0002 Mica	20%
C8	100-11	.01 x 400	25%
C9	129-2	.0005 Mica	20%
C10	100-75	.22 x 200	10%
C11	100-10	.05 x 200	10%
C12	100-67	.025 x 400	25%
C13	100-53	.25 x 400	20%
C14	119-42	5. mfd. lytic 100 w. v.	
C15	119-42	20. mfd. lytic 100 w. v.	
C16	100-39	.1 x 400	20%
		RESISTORS	
R1	130-17	10M ohm — 1/3 w.	20%
R2	130-97	200 ohm — 1/3 w.	10%
R3	130-12	50M ohm — 1/3 w.	20%
R4	130-149	15M ohm — 1/3 w.	20%
R5	130-54	500 ohm — 1/3 w.	20%
R6	130-4	3 megohm — 1/3 w.	20%
R7	101-77	Volume Control (1 meg)	
R8	130-193	3M ohm — 1/3 w.	10%
R9	130-19	1 megohm — 1/3 w.	20%
R10	130-94	50M ohm — 1/3 w.	10%
R11	130-103	100M ohm — 1/3 w.	10%
R12	130-194	35M ohm — 1/3 w.	10%
		PARTS	
T1	111-79	Antenna Coil Complete	
T2	110-62	Oscillator Coil Complete	
T3	108-82B	Input I. F. Complete	
T4	108-83B	Output I. F. Complete	
T5	114-88	5" Dynamic Speaker	
L1		Speaker field 450 ohm— total tapped 125 ohm	
S1		Switch on volume control	

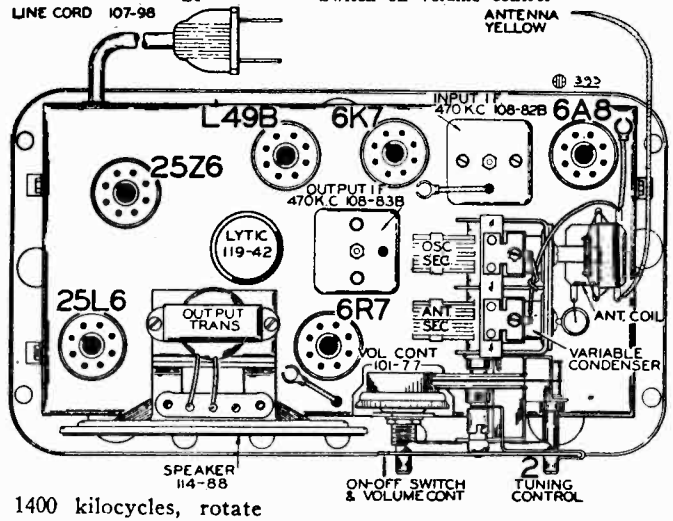
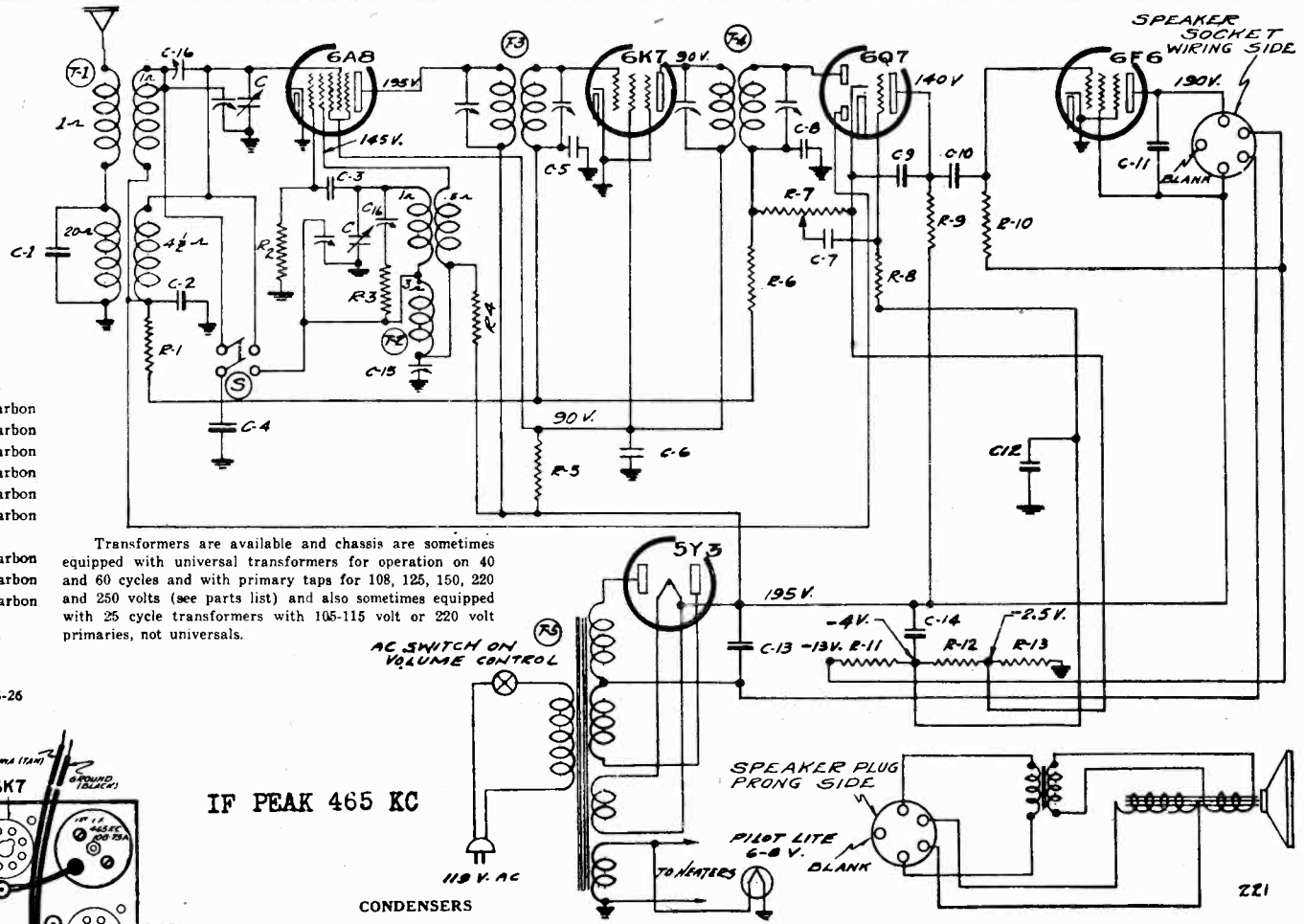


FIG. 1—TOP VIEW

(b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).

(c) Check sensitivity at 600 and 1000 kilocycles.



Transformers are available and chassis are sometimes equipped with universal transformers for operation on 40 and 60 cycles and with primary taps for 108, 125, 150, 220 and 250 volts (see parts list) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

RESISTORS

No.	Part No.		Description
R1	130-111	100M	Ohms 1/10W—20%—50V Carbon
R2	130-12	50M	Ohms 1/3 W—20%—20V Carbon
R3	130-112	100	Ohms 1/10W—20%—10V Carbon
R4	130-22	5M	Ohms 1/3 W—20%—10V Carbon
R5	130-77	10M	Ohms 1 W—20%—100V Carbon
R6	130-110	1 meg	Ohm 1/10W—10%—100V Carbon
R7	101-49	1 meg	Ohm Volume Control
R8	130-113	2 meg	Ohm 1/10W—20%—100V Carbon
R9	130-20	100M	Ohms 1/3W—20%— 50V Carbon
R10	130-100	150M	Ohms 1/3W—20%— 50V Carbon
R11	106-26	220	Ohms
R12	106-26	33	Ohms
R13	106-26	52	Ohms

NOTE: R11, R12, and R13 in one unit—106-26

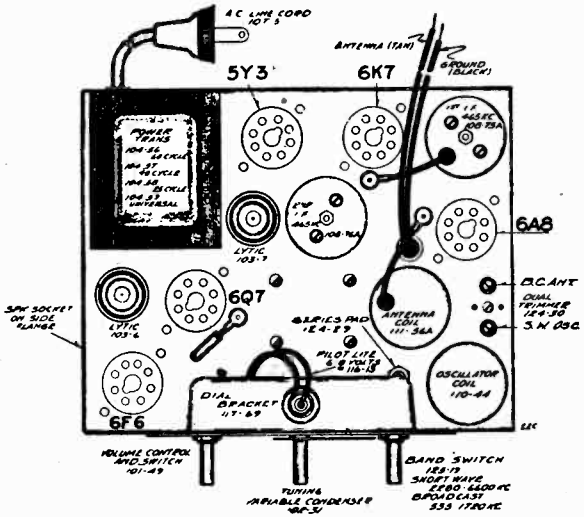


FIG. 1—TOP VIEW

IF PEAK 465 KC

CONDENSERS

C1	129-63	.0004 Mica—W—10%
C2	100-26	.02 x 400 Volt—25%
C3	129-62	.00003 Mica—0—10%
C4	129-61	.0017 Mica—W—2½%
C5	100-9	.05 x 200 Volt—25%
C6	100-6	.25 x 200 Volt—25%
C7	100-11	.01 x 400 Volt—25%
C8	129-12	.00025 Mica—0—20%
C9	129-12	.00025 Mica—0—20%
C10	100-11	.01 x 400 Volt—25%
C11	100-19	.006 x 600 Volt—25%
C12	100-6	.25 x 200 Volt—25%
C13	103-6	8 mfd. x 350 Volt Electrolytic
C14	103-7	8 mfd. x 300 Volt Electrolytic
C15	124-29	Adjustable condenser 390 mmf. working capacity
C16	124-30	Adjustable Dual Condenser

MISCELLANEOUS PARTS

T1	111-56A	Antenna Coil
T2	110-44	Oscillator Coil
T3	108-75A	Input I.F. 465 Kc.
T4	108-76A	Output I.F. 465 Kc.
T5	104-56	Power Transformer—60 Cycles
S	125-19	Band Switch
C	102-31	One Section of Two Gang Condenser

1—Type 6A8 Pentagrid Mixer, First Detector-oscillator

1—Type 6K7 Remote Cut-Off Pentode, I. F. Amplifier (465 K.C.)

1—Type 6Q7-G Duplex Diode Triode Second Detector, A.V.C. and First Audio.

1—Type 6F6-G Pentode Output Amplifier.

1—Type 5Y3 High Vacuum Rectifier.

MODEL 62-587 ALIGNMENT

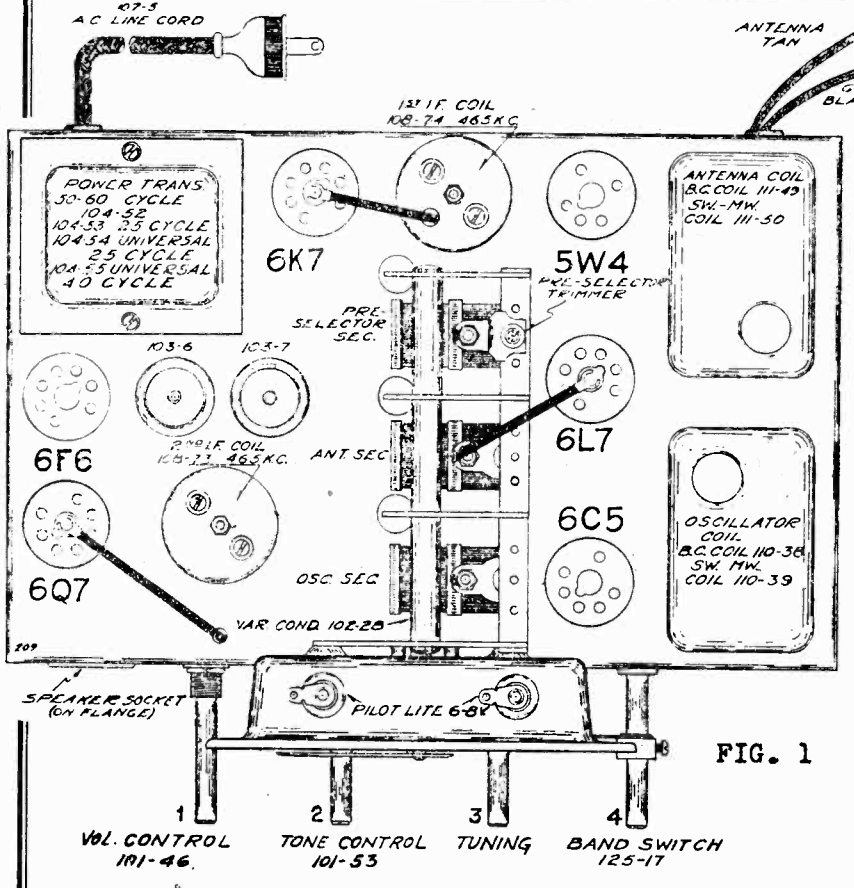
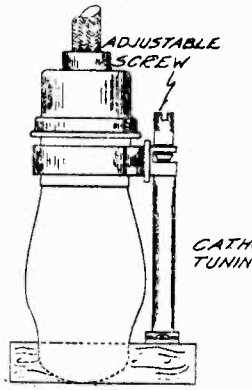


FIG. 1



SWITCH ROTATING CLOCKWISE THREE POSITION ARE:
1ST BROADCAST:- 535-1720 K.C.
2ND MIDDLE WAVE:- 1695-5500 K.C.
3RD SHORT WAVE:- 5.2 M.C.-18.3 M.C.

MODEL 62-249
62-317

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 6F6-G output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-76A Output I.F. Transformer
Part No. 108-75A Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-76A) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6A8 and adjust input I.F transformer (No. 108-75A) to resonance.
   (c) With oscillator still connected to 6A8, readjust output I.F. transformer (108-76A) if necessary.

BROADCAST AND SHORT WAVE BAND ALIGNMENT

Broadcast Band:—535 to 1720 Kilocycles.
Short Wave Band:—2280 to 6600 Kilocycles.

Important:—These adjustments must be made in the following order:

SHORT WAVE OSCILLATOR ADJUSTMENT:

1. With band switch in the short wave band position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with the external oscillator connected in series with "Dummy 1" to grid cap of the 6A8 tube, make the following adjustment:
   (a) Set external oscillator to 6.6 megacycles and adjust short wave oscillator trimmer to resonance. This adjustment is marked "S.W. Osc." (see top view of chassis, Fig. 1, for location of this adjustment).

NOTE: Make certain that the fundamental 6.6 megacycles signal has been tuned in and not the image frequency, noting that the image appears when the tuning knob is moved to approximately 5.7 megacycles.

BROADCAST BAND OSCILLATOR ADJUSTMENT:

1. With band switch in the broadcast position, extreme left of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 1" to grid cap of the 6A8 tube, make the following adjustment:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. This adjustment is the trimmer mounted on the front section of the variable gang condenser.

BROADCAST BAND ANTENNA ADJUSTMENT:

1. With the band switch still in the broadcast position, move the external oscillator from the grid cap of the 6A8 tube to the tan antenna lead and black ground lead, in series with "Dummy 2" and make the following adjustments:
   (a) Set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer to resonance. This adjustment is marked "B.C. Ant." (See top view of chassis, Fig. 1, for location of this adjustment.)
   (b) Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until, by adjusting series pad, maximum output is attained. This adjustment is located on the top of the chassis directly in front of the antenna coil. (See top view of chassis, Fig. 1).
   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

SHORT WAVE BAND ANTENNA ADJUSTMENT:

1. With the band switch in the short wave position, and with external oscillator connected in series with "Dummy 3," to the tan antenna lead and black ground lead, make following adjustment:
   (a) Set external oscillator to 6 megacycles and adjust the short-wave antenna trimmer to resonance. This adjustment is the trimmer mounted on the rear section of the variable gang condenser.

MODELS 62-752, 62-753

MONTGOMERY-WARD & CO.

Power Consumption - 1.45 Amperes at 32 Volts DC **Intermediate Frequency** - - - - - - - - 456 KC

Power Output - - - - - - - .17 Watts Undistorted .40 Watts Maximum **Speaker** - - - - - 6" or 8" Electro-Dynamic

Selectivity - - 30 KC Broad at 1000 times Signal **Tuning Frequency Range**

Sensitivity (For .05 watt output)

B Range	6.0 Microvolts Average	B Range	528 to 1730 KC (Kilocycles)
D Range	6.0 Microvolts Average	D Range	5750 to 18300 KC (Kilocycles)

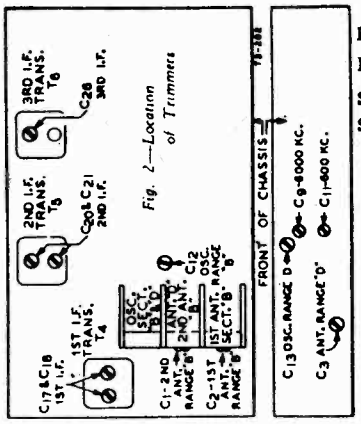


Fig. 2—Location of Trimmers

Line Voltage Range

The radio will operate satisfactorily within a line voltage range of 25 to 42 volts. If the line voltage is higher than 42, it will be necessary to use a series resistor to cut it down. If the voltage varies, a variable resistor may be required.

Starting Current

When first turned on for a few seconds the drain is slightly higher than normal until the tubes heat up. Some automatic plants are adjusted to start under a load of 200 to 300 watts. If a number of devices such as lights or motors are being used and the radio set is turned on the total drain may be sufficient to start the plant.

This radio is designed for use on farms and in those places where the power supply consists of a 32 volt direct current generating plant.

Polarity of Power Supply

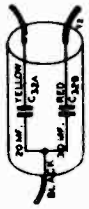
There is a red mark on the plug at the end of the power supply cord of the radio. The prong of the plug at which the red mark is placed must be plugged into the positive side of the line.

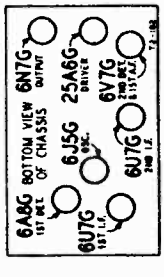
Caution

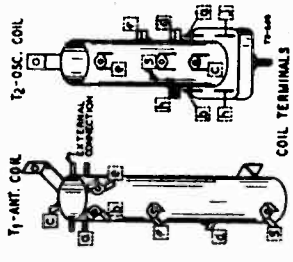
If used on any other type of power supply than 32 volt DC, severe damage may be done to the receiver.

Do not turn the radio on unless all of the tubes and the dial lamps are in the proper sockets. Use only No. 51 dial lamps.

32 Volt Power Supply







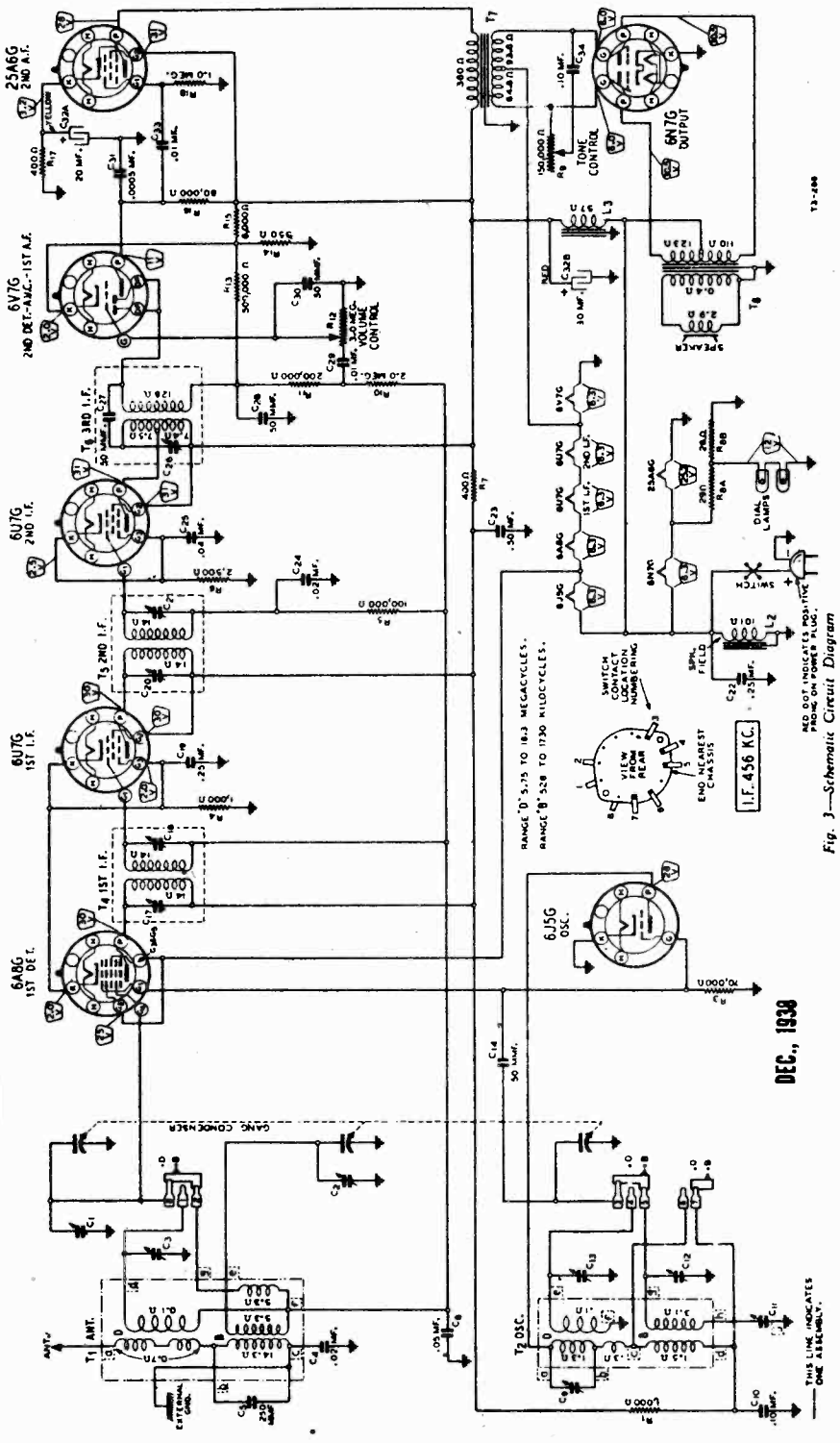


Fig. 3—Schematic Circuit Diagram

DEC., 1938

MODELS 62-752, 62-753

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., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					1st I.F. (C17) & (C18) 2nd I.F. (C20) & (C21) 3rd I.F. (C26)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C12)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	1st Ant. Range B (C2) 2nd Ant. Range B (C1)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C11) Rock Rotor—See Note B
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
6000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	6000 KC (C9) Rock Rotor—See Note B

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

CAUTION—When aligning the short wave band, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker will be heard at 15,000 less 912 KC, or 14,088 KC on the dial. It may be necessary to increase the input signal to hear the image.

NOTE A—If the pointer is not at 1500 KC on the dial, hold the drive cord and move the pointer to this mark.

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

Dial Pointer Attachment—Tune in a station of known frequency. Move the pointer to the approximate frequency on the dial scale. Pass the cord through the slotted head—See Fig. 4. Hold the drive cord and slide the pointer to the exact frequency on the dial scale.

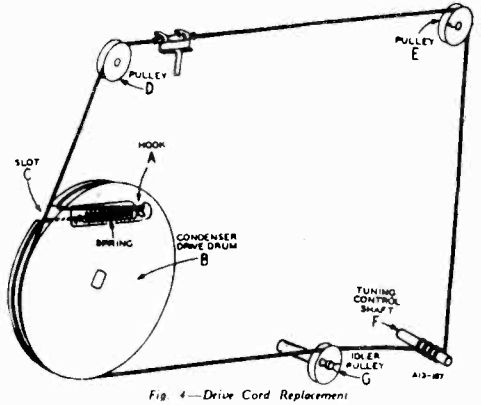


Fig. 4—Drive Cord Replacement

Drive Cord Replacement

Tie a knot with a small loop at one end of the new drive cord. Tie the free end of the drive cord to the tension spring. The distance between knots should be 49¾ inches.

Arrange to keep the gang condenser in the completely closed position.

Place the looped end of the drive cord over hook A on condenser drive drum B (See Fig. 4). Pass the cord through slot C in the drum rim and wind one turn in a clockwise direction (from front of chassis) on condenser drive drum. Pass drive cord over pulleys D and E as shown. Continue cord down to shaft F and wind 4 turns clockwise, progressing towards the chassis. Bring cord over pulley G to bottom of condenser drive drum B as shown. Wind drive cord clockwise (from front of chassis) around condenser drive drum B to slot C. See that the drive cord does not cross in groove of condenser drive drum. Pass the remaining drive cord and tension spring through slot C and secure the free end of the spring on hook A.

MODELS 93WG-1102, 93WG-1110

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Selectivity Control—Sharp Position 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., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BUTTON DEPRESSED	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					
456 KC	Grid of I.F. Tube	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C29) & (C30)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C25) & (C26)
RANGE B					
1830 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C15)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C5) Int. Range B (C8)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C16) Rock Rotor—See Note B
WAVE TRAP					
456 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to 600 KC Adjust Sig. Gen.—See Note C	Wave Trap (C1) Adjust for MINIMUM Output
RANGE C					
6350 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C14)
6000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Max. Output	Antenna Range C (C4) Int. Range C (C7)
RANGE D					
22,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
20,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Int. Range D (C6) Rock Rotor—See Note B
7000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	7000 KC (C12) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT				TURN SETTING SCREW TO MAXIMUM OUTPUT—See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT—See Note D
700 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
700 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
1100 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
1100 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

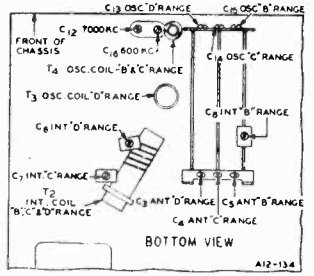
After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

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

NOTE C—Leave condenser rotor at the 600 KC setting and adjust the signal generator until maximum output is obtained at or near 456 KC.

NOTE D—At the bottom of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.



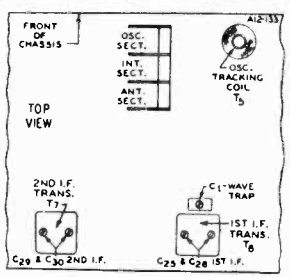
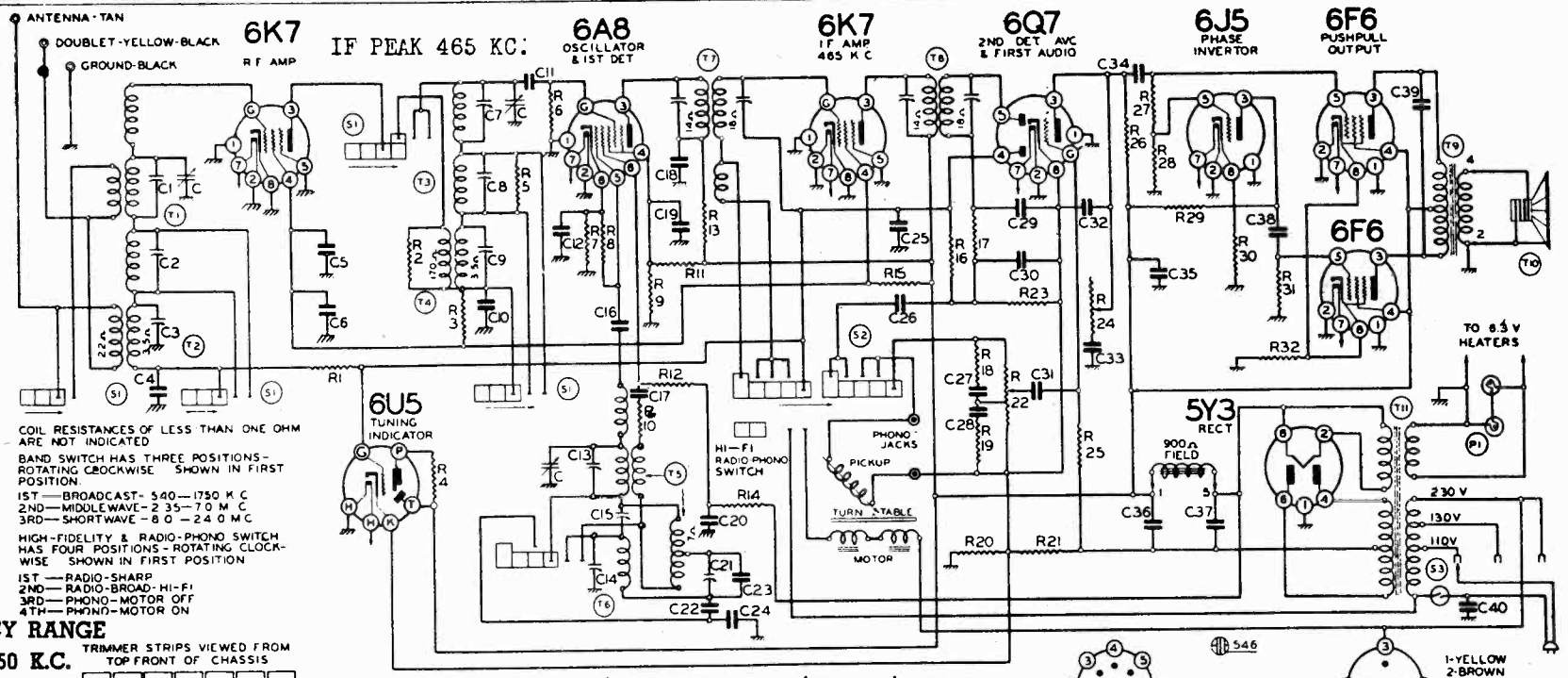


Fig. 1—Location of Trimmers

CAUTION—When aligning the short wave bands be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

FOR OTHER DATA SEE INDEX



FREQUENCY RANGE

540 to 1750 K.C.
2.35 to 7.0 M.C.
8.0 to 24.0 M.C.

TRIMMER STRIPS VIEWED FROM TOP FRONT OF CHASSIS

C14 | C15 | C21 | C13 | C9 | C8 | C7

C1 | C2 | C3

For conventional types of antennas connect the tan wire to the antenna lead and the yellow with black tracer and the black wire together to the ground lead.

When a doublet antenna is used connect the tan wire and the yellow with black tracer wire to the doublet antenna and the solid black wire to the ground lead. (See Fig. 1).

Part No.	Circuit Diagram Reference	Description	
		CONDENSERS	
10013	C18	.05x400 Volt Tubular Condenser	1
10019	C33	.006x600 Volt Tubular Condenser	1
10020	C12, C19	.1x200 Volt Tubular Condenser	2
10025	C17, C39	.002x600 Volt Tubular Condenser	2
10026	C25, C31, C34, C38	.02x400 Volt Tubular Condenser	4
10061	C40	.02x600 Volt (Bakelite Case Type)	1
10074	C5, C35	.1x400 Volt Tubular Condenser (with Bracket)	2
10076	C26	.02x400 Volt Tubular Condenser (with Bracket)	1
10078	C28	.01x200 Volt Tubular Condenser	1
10090	C4, C10	.02x400 Volt Condenser (Braided Leads)	2
11955	C36, C37	Dual 15 Mfd Electrolytic Condenser, 450 w. v.	1
11956	C6, C20	Dual 15 Mfd Electrolytic Condenser, 350 w. v.	1
12449	C1, C2, C3	Adjustable Trimmer Strip (3 Gang)	1
12450	C7, C8, C9, C13 C14, C15, C21	Adjustable Trimmer Strip (7 Gang)	1
1295	C29, C32	.0001 Mica Type Condenser—20%	2
12912	C11	.00025 Mica Type Condenser—20%	1
12939	C30	.00005 Mica Type Condenser—20%	1
12962	C16	.00003 Mica Type Condenser—10%	1
129103	C22	.005 Mica Type Condenser—2½%	1
129104	C23	.00045 Mica Type Condenser—5%	1
129105	C24	.0035 Compression Type Condenser—2½%	1
129106	C27	.000155 Mica Type Condenser—20%	1
		RESISTORS	
1304	R16, R25	3 Meg Ohm—½ Watt Resistor—20%	2
13011	R26	250 M Ohm—½ Watt Resistor—20%	1
13021	R19	20 M Ohm—½ Watt Resistor—20%	1
13043	R13	2500 Ohm—½ Watt Resistor—20%	1
13045	R1	250 M Ohm—½ Watt Resistor—20%	1
13048	R12, R14	15 M Ohm—½ Watt Resistor—10%	2
13079	R7	400 Ohm—½ Watt Resistor—10%	1
13094	R8, R9, R18, R29	50 M Ohm—½ Watt Resistor 10%	4
130102	R31	500 M Ohm—½ Watt Resistor—10%	1
130103	R28	100 M Ohm—½ Watt Resistor—10%	1
130117	R17	50 M Ohm—1/10 Watt Resistor—20%	1
130163	R27	400 M Ohm—½ Watt Resistor—10%	1
130171	R6, R23	500 M Ohm—1/10 Watt Resistor—20%	2
130174	R10	50 Ohm—½ Watt Resistor—10%	1
130197	R21	20 Ohm—½ Watt Resistor—10%	1
130201	R5	25 M Ohm—1/10 Watt Resistor—20%	1
130203	R20	40 Ohm—½ Watt Resistor—10%	1
130216	R2	10 M Ohm—1/10 Watt Resistor—10%	1
130217	R3	2 M Ohm—1/10 Watt Resistor—10%	1
130218	R30	5 M Ohm—½ Watt Resistor—10%	1
130219	R15	20 M Ohm—1 Watt Resistor—10%	1
130220	R32	300 Ohm—1 Watt Resistor—10%	1
130221	R11	25 M Ohm—1 Watt Resistor—10%	1
		COILS	
108118	T7	Input I. F. Coil Assembly Complete with Can	1
108119	T8	Output I. F. Coil Assembly Complete with Can	1
10941	T4	Broadcast R. F. Coil Assembly, Complete	
10942	T3	Short Wave and Middle Wave R. F. Coil Assembly, Complete	1
11078	T6	Middle Wave Oscillator Coil Assembly, Complete	1
11079	T5	Broadcast and Short Wave Oscillator Coil Assembly, Complete	1
11197	T2	Broadcast Antenna Coil Assembly Complete	1
11198	T1	Short Wave and Middle Wave Antenna Coil Assembly, Complete	1

WIRING SIDE OF OCTAL TUBE SOCKET SHOWING LOCATIONS OF PINS

546

WIRING SIDE OF SPEAKER SOCKET

1-YELLOW
2-BROWN
3-TIE POINT
4-WHITE
5-BLACK

104136	T11	Universal Transformer—40/60 Cycle Primary	1
104		Universal Transformer—25/60 Cycle Primary Note: Universal 25/60 Cycle Transformer available on special order only.	
10554	T9	Output Transformer for Speaker	1
		SPEAKERS	
114102		Eight Inch Dynamic Speaker with 15 Inch Connector Cord and Plug (Field Resis. 900 Ohms)	1
11499	T10	Ten Inch Dynamic Speaker with 20 Inch Connector Cord and Plug (Field Resis. 900 Ohms)	1
10554	T9	Output Transformer for Speaker	1
		MISCELLANEOUS	
101114	R22	Volume Control Complete (1 Meg Ohms)	1
101115	R24, S3	Tone Control and Power Switch (300 M Ohms)	1
10272	C	Three Gang Variable Condenser	1
12551	S2	High Fidelity and Phono-Radio Switch	1
12552	S1	Band Change Switch	1

PHONOGRAPH MOTOR:

On the underside of the chassis a terminal strip is provided for 220 volt phonograph motor connections.

Connect the supply cord from the phonograph motor to the terminal strip through the hole on top of the chassis provided for this purpose. (See Fig. 1).

Connections to the terminal strip are controlled by the radio-phono switch, knob no. 3 located on the front of the radio.

Only a 220 volt motor can be operated from the terminal strip connections.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3".

Dummy 1: (I.F.)—Consists of a .1 mfd. condenser connected in series with the external oscillator.

Dummy 2: (Broadcast)—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave)—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMERS (465 K.C.)

Part No. 108119 Output I.F. Transformer

Part No. 108118 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 3).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), the tone control turned to treble position, the phono switch in number 1 position sharp, (counter clockwise), and with the variable condenser set to minimum capacity (plates entirely out of mesh), make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 I.F. tube and adjust the output I.F. transformer 108119 to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6A8 and adjust input I.F. transformer (108118) to resonance.

SHORT WAVE BAND ALIGNMENT:

8.0 to 24.0 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 22 Megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments: (See Fig. 3).
   (a) Move dial pointer to 22 Megacycles and adjust short wave oscillator (adjustment C13), short wave R.F. (adjustment C7) and short wave antenna (adjustment C1) to resonance.
   (b) Re-set external oscillator to 9 Megacycles and pick up signal by rotating variable condenser and check for sensitivity.

   NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. As an example of this a fundamental 22 megacycle signal can be tuned in not only at 22 on the dial, but also at approximately 21 megacycles.

MIDDLE WAVE ALIGNMENT:

2.35 to 7.0 Megacycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 6 Megacycles connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments. (See Fig. 3).
   (a) Rotate condenser, pick up signal and adjust middle wave oscillator (adjustment C14), middle wave R.F. (adjustment C8) middle wave antenna (adjustment C2) to resonance.
   (b) Re-set external oscillator to 2.5 megacycles and pick up signal by rotating variable condenser and check sensitivity.

BROADCAST BAND ALIGNMENT:

540 to 1750 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with external oscillator set at 1750 Kilocycles and connected in series with "Dummy 2" to the tan antenna and black ground lead, make the following adjustments. (See Fig. 3).
   (a) Move dial pointer to 1750 Kilocycles and adjust broadcast oscillator trimmer (adjustment C15) to resonance.
   (b) Re-set external oscillator to 1400 Kilocycles, move dial pointer to 1400 Kilocycles and adjust broadcast antenna trimmer, (adjustment C3) and broadcast R.F. trimmer (adjustment C9) to resonance.
   (c) With external oscillator set at 600 K.C. adjust broadcast series pad (adjustment C21) to resonance with oscillator. Keep set in tune with oscillator by slowly rocking to and fro the variable condenser until maximum output is obtained.
   (d) Repeat adjustments (a) and (c) until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 Kilocycles.

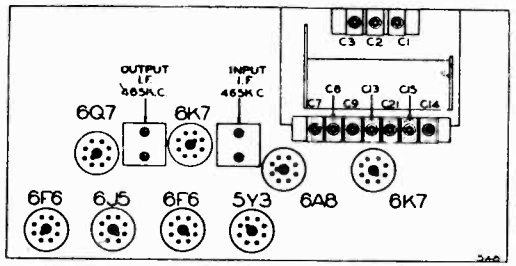


FIG. 3—VIEW SHOWING TRIMMERS

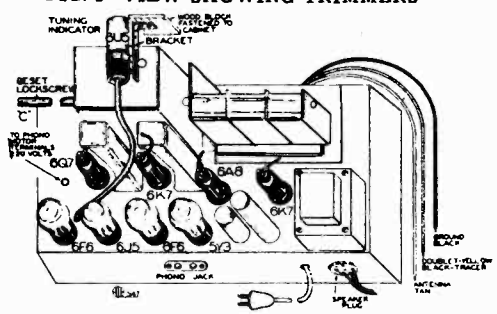


FIG. 1—TOP VIEW

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob No. 5 the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position), noting the width of the shadow indicated on the screen of the cathode-ray tuning eye. Minimum width on the eye indicates the ideal tuning position (resonance). The station will then be clearest and accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Rotate the tuning knob No. 5 to the right (clockwise) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the locking adjustment screw "C". It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT. If a screw driver is not available, the locking screw can be tightened by reaching in from the back of the cabinet, rotate the locking screw shaft to the right (clockwise) until thoroughly tight.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" four or five complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the locking screw being too tight. Loosen the locking screw "C" until the dial mechanism works freely with the tuner lever pressed down.)

BE SURE TO RETIGHTEN THE LOCKING SCREW; otherwise the stations you have selected will not stay adjusted to the levers.

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a voltmeter having a resistance of 1000 ohms per volt.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

VOLTAGES AT SOCKETS

LINE VOLTAGE: 110 — Volume Control: Maximum
Readings taken with 1000 ohm-per-volt meter

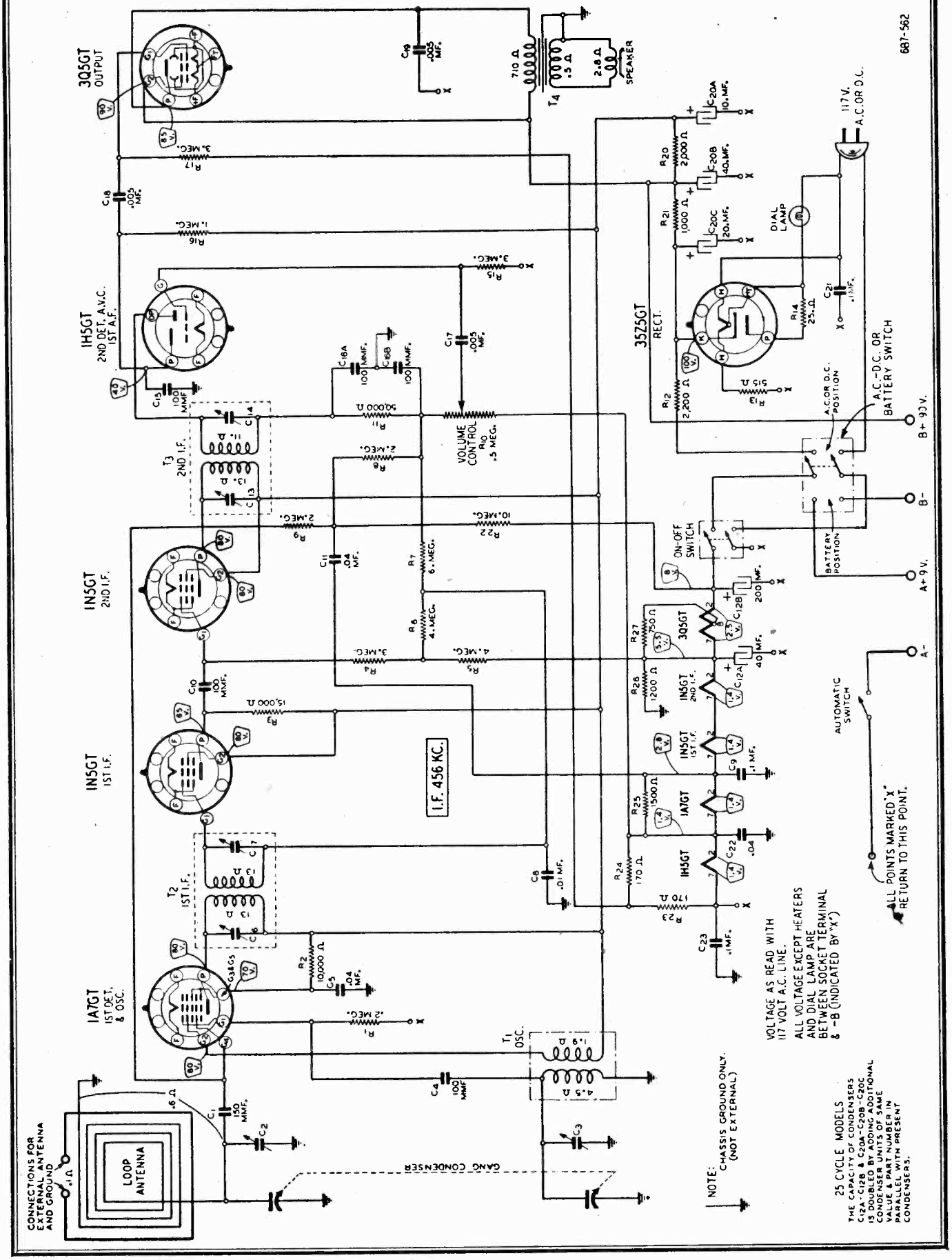
Antenna Shorted to Ground
Band Switch in B. C. Position

TUBE	FUNCTION	Voltage Between Socket Prong and Ground							
		Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
6K7	R. F. Amplifier	0	6.3 (1)	85	95	0	220	6.3 (1)	0 (2)
6A8	Oscillator and First Detector	0	6.3 (1)	220	95		140	6.3 (1)	4
6K7	465 kc. I. F. Amplifier	0	6.3 (1)	220	95	0	220	6.3 (1)	0 (2)
6Q7	2nd detector AVC and First Audio	0	6.3 (1)	90			0	6.3 (1)	(3)
6J5	Phase Inverter	0	6.3 (1)	135	220	0		6.3 (1)	6.9
6F6	Push pull Output	0	6.3 (1)	215	220	0		6.3 (1)	15
6F6	Push pull Output	0	6.3 (1)	215	220	0	215	6.3 (1)	15
5Y3	Rectifier	0	5 (4)		600 (5)		600 (5)		5 (4)
6U5	Tuning Indicator	Plate to Ground 15			Target to Ground 220		Cathode to Ground —3		Across Heaters 6.3 AC

(1) AC voltage as read across heater terminals 2 and 7
(2) Bias (—3.0 volts) as read across Resistor R20
(3) Bias (—1.5 volt) as read across Resistor R21
(4) AC voltage as read across heater terminals 2 and 8
(5) AC voltage as read across terminals 4 and 6

MONTGOMERY-WARD & CO.

MODELS 62-2663, 62-2668,
93WG-2663, 93WG-2668



MODELS 62-2663, 62-2668, 93WG-2663, 93WG-2668

MONTGOMERY-WARD & CO.

Input Voltages and Currents—Battery Operation

"A" Battery ..... 9 Volts—50 Ma.
"B" Battery ..... 90 Volts—11.5 Ma.

Power Consumption (At 117 volts AC Supply) 28 Watts

Power Output

Battery Operation - - - - 150 Mw. Undistorted, 350 Mw. Maximum
AC Operation - - - - - 200 Mw. Undistorted, 400 Mw. Maximum

Selectivity - 50 KC Broad at 1000 Times Signal

Intermediate Frequency - - - - - - 456 KC

Speaker - - - - - - - - - 6" P.M. Dynamic

Tuning Frequency Range - - 540 to 1600 KC

Sensitivity (For .05 Watt Output)
External Antenna - - - 10 Microvolts Average

Removing Chassis from Cabinet

Take out the 2 screws, one at each rear corner of the chassis shelf. On some models, it will be necessary to remove the nut holding the automatic "A" battery switch to the front panel of the radio. Grasp the chassis shelf at each rear corner and edge it away from the cabinet front until the chassis shelf and chassis slide easily out of the cabinet.

To remove the shelf from the chassis, take out the bolt and the 2 screws at the bottom of the shelf.

Caution

The metal chassis is connected to one side of the line through a .10 mfd. condenser. Both AC and DC power lines are generally grounded on one side. If the side of the line not connected to the metal chassis through this condenser is grounded and the metal chassis comes in contact with an external ground, this condenser will be connected across the line and there will be an increase in hum.

Therefore, in any service work on the chassis, keep it on a wood or other insulated surface to avoid contacts with ground. The person working on the set should avoid getting in contact with any ground.

CAUTION—If the dial lamp burns out, it should be replaced at once. Use ONLY a No. 51 dial lamp.

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:

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

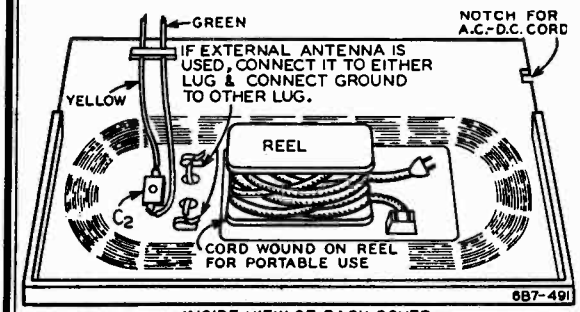
Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antenna—.1 mf.

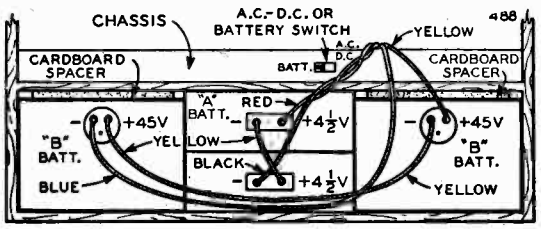
SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration below and Illustration of Back—Page 1)
456 KC	Signal Grid of 1st Det. (Top Cap)	.1 mf.	Turn Rotor to full open	1st I.F. (C6) & (C7) 2nd I.F. (C13) & (C14)
1600 KC	Signal Grid of 1st Det.	.1 mf.	Turn Rotor to full open	Oscillator (C3)
1500 KC	None—See Note A		Turn Rotor to max. output	Antenna (C2)

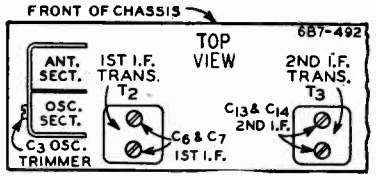
NOTE A—Chassis must be in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. The back of the cabinet must be in place. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

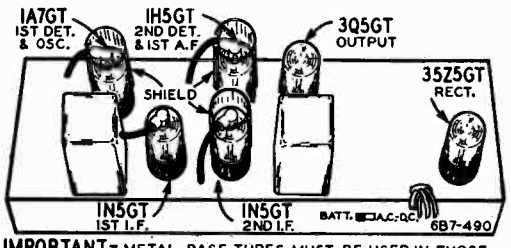
CALIBRATION (For models with pointer in front of dial scale)—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, hold the pulley at the back of the dial and loosen the pointer screw. Set the pointer at the 800 KC mark. Hold the pointer and retighten the pointer screw.



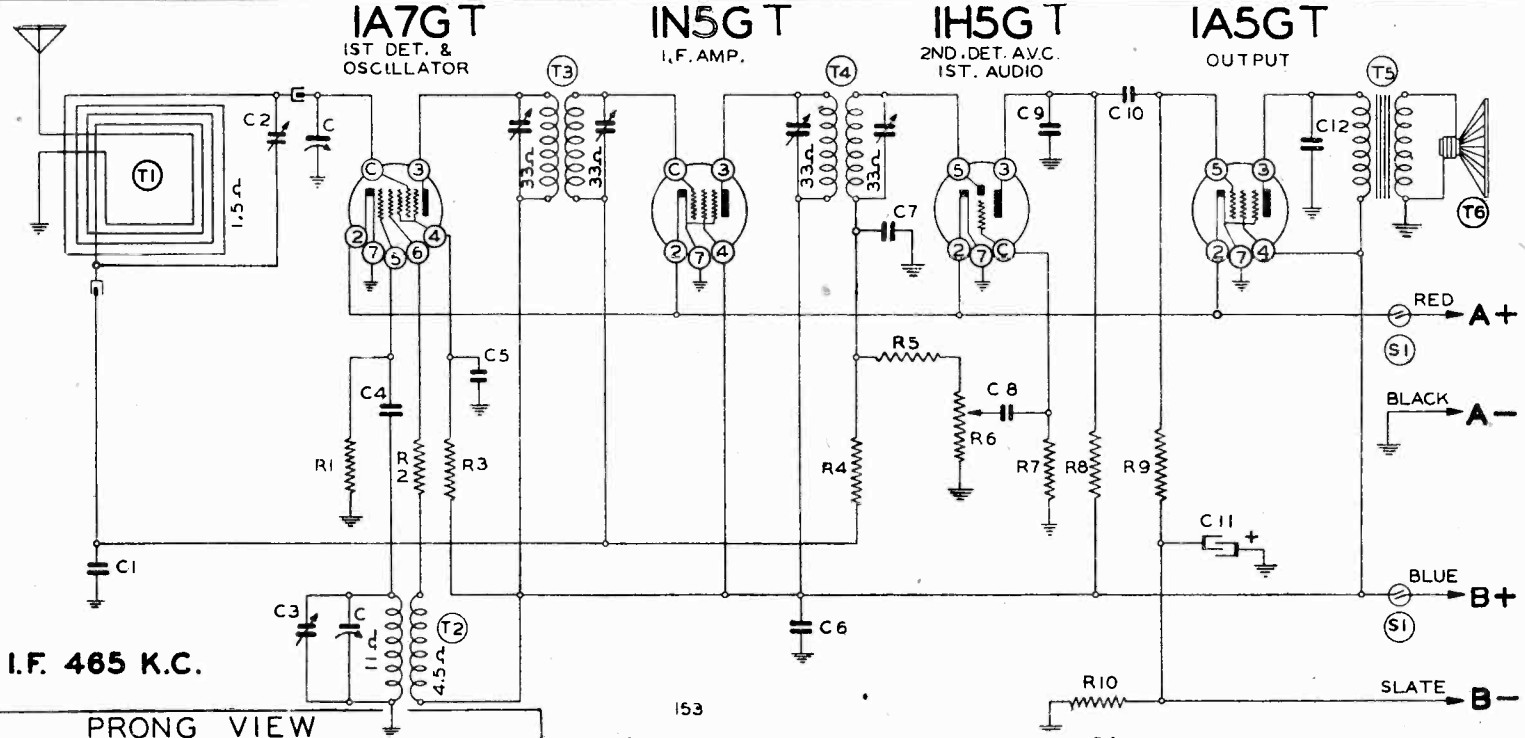
INSIDE VIEW OF BACK COVER

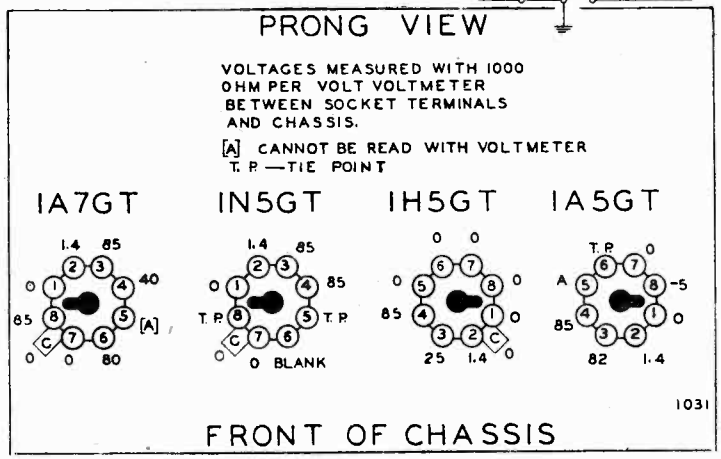






IMPORTANT- METAL BASE TUBES MUST BE USED IN THOSE SOCKETS AT WHICH SHIELDS ARE SHOWN.





Schematic Ref. No.	Part No.	Description
		RESISTORS
R1	BE1309	200M ohm - ⅓ w. - 20%
R2	BE13018	4M ohm - ⅓ w. - 20%
R3	BE13012	50M ohm - ⅓ w. - 20%
R4	BE1304	3 megohm - ⅓ w. - 20%
R5	BE13020	100M ohm - ⅓ w. - 20%
R6	BE101204	1 megohm - volume control
R7	BE130257	5. megohm - ⅓ w. 25%
R8	BE13037	750M ohm - ⅓ w. 20%
R9	BE13038	2 megohm - ⅓ w. - 20%
R10	BE13070	500 ohm - ⅓ w. - 10%
		CONDENSERS
C	BE102120	2 gang variable condenser
C1	BE1009	.05 x 200 v. - 25%
C2	BE124115	R. F. Trimmer on loop
C3		Oscillator Trimmer on Gang
C4	BE12921	.0002 mica - 20%
C5	BE1009	.05 x 200 v. - 25%
C6	BE1006	.25 x 200 v. - 20%
C7	BE1295	.0001 mica - 20%
C8	BE10012	.003 x 600 v. - 25%
C9	BE12912	.00025 mica - 20%
C10	BE10078	.01 x 200 v. - 25%
C11	BE11975	10 mfd. x 25 w. v. lytic
C12	BE10012	.003 x 600 w. - 25%
		PARTS
T1	BE111159	Loop Antenna Complete
T2	BE110139	Oscillator Coil
T3	BE108167	Input I. F. Coil
T4	BE108168	Output I. F. Coil
T5	BE105100	Output Transformer
T6	BE114183	4" P. M. Speaker
S1	BE12597	On-Off Switch
		No. 153

Power Consumption - - - "A" Battery 200 MA; "B" Battery 8 MA.

Power Output - - - - - - - - - - - 100 Milliwatts, Undistorted

Sensitivity (for .05 Watts) - - - - - - - - 75 Microvolts Average

Selectivity - - - 50 Kc. Broad at 1000 Times Signal at 1000 Kc.

Tuning Range - - - - - - - - - - - 540 to 1650 Kc.

Intermediate Frequency - - - - - - - - - - 465 Kc.

Speaker - - - - - - - - - - - 4 in. P. M. Dynamic

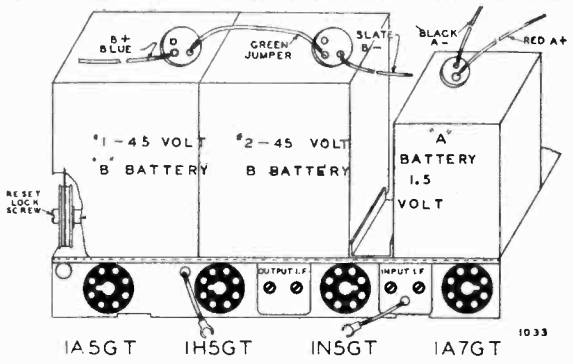


FIG. 1.—TOP VIEW

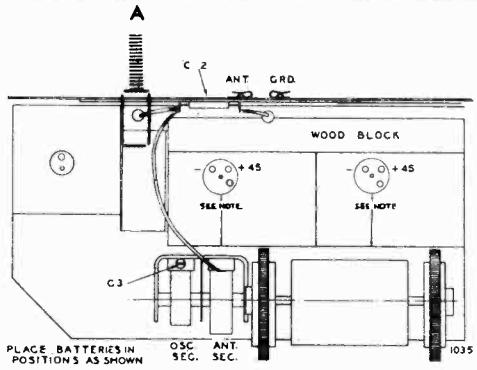


FIG. 2.—REAR VIEW

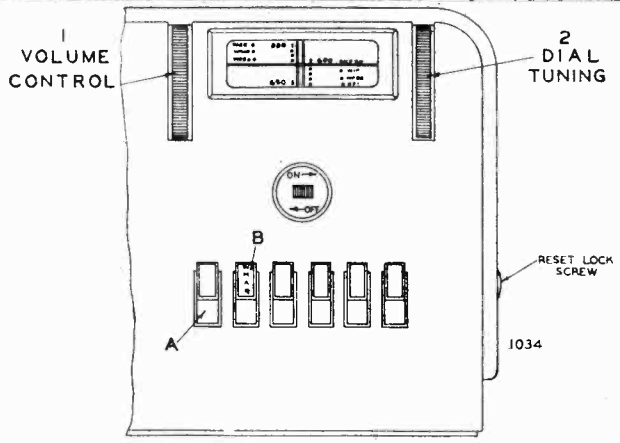


FIG. 3—FRONT VIEW

ADJUSTING THE ANTENNA:

IMPORTANT:

After the batteries have been installed and the radio placed in operation, tune in a weak station around 1400 Kc. on the dial.

On the back of the cabinet a small adjustment screw is provided, (see C2, Fig. 2).

Very carefully turn this adjustment screw in or out until the station is as clear and loud as it can be made.

This adjustment should be made in any case whether the radio is used with an outside antenna and ground or whether only the built-in loop antenna is used.

NEXT:—Tune in a station around 600 Kc. on the dial and adjust adjustment screw (See A, Fig. 2). Both these adjustments are very important for best reception.

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up' for several minutes.

The following equipment is required for alignnig.

- 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.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 1N5GT I. F. Tube	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Output I. F.	(See Note "A") Adjust to maximum output
	465 Kc	.1 MFD.	Grid of 1A7GT	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Input I. F.	(See Note "A") Adjust to maximum output
BROAD CAST BAND	1650 Kc.	.1 MFD.	Grid of 1A7GT	Rotor full open (Plates out of mesh)	Trimmer—(C3) on Gang (See Fig. 2)	Oscillator	(See Note "A") Adjust to maximum output
	1400 Kc.	200 mmf.	Ant. and Gnd. Clips	Set dial at 1400 Kc.	Trimmer—(C2) on back of radio (See Fig. 2)	Antenna	(See Note "B") Adjust to maximum output

NOTE "A" — A 1 megohm resistor must be connected between the two loop antenna leads from the chassis when aligning the I. F. transformers and setting the oscillator trimmer. The loop antenna must be disconnected from the chassis.

NOTE "B" — Remove the 1 megohm resistor from the loop antenna leads; mount the chassis and the loop antenna in the cabinet, connect the loop antenna to the chassis. Adjust the antenna trimmer (C2) on back of radio.

MODEL 93BR-462A

MONTGOMERY-WARD & CO.

Procedure for Setting the Automatic Tuner Push Buttons

There are six push buttons on the front of the radio by means of which six stations may be selected, (see "A" Fig. 3).

1. Make a list of local stations you tune in regularly; any number up to and including six.

2. Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

3. On the front of each automatic tuner button an opening is provided for inserting the call letter tabs. (See "B" Fig. 3).

4. Insert the call letter tabs in the rectangular openings in each of the automatic tuner push buttons. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

5. Press in ALL THE WAY any one of the automatic tuner push buttons. Holding it in FIRMLY, tune in by means of the tuning knob (No. 2) the station you have assigned to this push button. Move the tuning knob very slowly up and down (while still holding button in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the push button.

6. Press in another automatic tuner push button. Holding it in FIRMLY, carefully tune in the station assigned to this push button. Release this push button.

7. Follow this procedure until you have selected all of your favorite stations.

8. Move the tuning control (No. 2) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the reset locking screw (see Fig. 3). It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the push buttons. (Note: **Reset Lock Screw is loose when radio is shipped from factory.**

If you should desire to change any station you selected to another, loosen the reset locking screw two or three complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner push buttons, it is due to the locking screw being too tight. Loosen the reset locking screw until the dial mechanism works freely with the tuner push button pressed in).

BE SURE TO RETIGHTEN THE RESET LOCK SCREW, otherwise the stations will not stay adjusted to the push buttons.

The automatic dial is now set up for quick tuning.

Replacement Parts List

MODEL 93BR-462A (SERIAL No. 939800 and UP)

In ordering parts refer to model number on chassis label.

Use Only Genuine Factory Replacement Parts

Part No.	Schematic Ref. No.	Description	No. Used In Set	Selling Price Each
		CONDENSERS		
BE1006	C6	.25 x 200 Volt Tubular Condenser	1	.12
BE1009	C1, C5	.05 x 200 Volt Tubular Condenser	2	.12
BE10012	C8, C12	.003 x 600 Volt Tubular Condenser	2	.12
BE10078	C10	.01 x 200 Volt Tubular Condenser	1	.12
BE11975	C11	10 Mfd. x 25 W.V. Electrolytic Condenser	1	.12
BE12912	C9	.00025 Mica Type Condenser—20%	1	.12
BE1295	C7	.0001 Mica Type Condenser—20%	1	.12
BE12921	C4	.0002 Mica Type Condenser—20%	1	.12
BE124115	C2	Adjustable Trimmer (Loop Antenna)	1	.12
		RESISTORS		
BE13070	R10	500 Ohm—½ Watt Resistor—10%	1	.10
BE1304	R4	3 Megohm—½ Watt Resistor—20%	1	.10
BE1309	R1	200M Ohm—½ Watt Resistor—20%	1	.10
BE13012	R3	50M Ohm—½ Watt Resistor—20%	1	.10
BE13018	R2	4M Ohm—½ Watt Resistor—20%	1	.10
BE13038	R9	2 Megohm—½ Watt Resistor—20%	1	.10
BE13037	R8	750M Ohm—½ Watt Resistor—20%	1	.10
BE130257	R7	5 Megohm—½ Watt Resistor—25%	1	.10
BE13020	R5	100M Ohm—½ Watt Resistor—20%	1	.10
		COILS		
BE108167	T3	Input I.F. Coil Assembly Complete	1	.86
BE108168	T4	Output I.F. Coil Assembly Complete	1	.76
BE110139	T2	Oscillator Coil Assembly Complete	1	.36
BE111159	T1	Loop Antenna Complete with 128396 Back	1	.86
		SOCKETS		
BE121210		Eight Prong Octal Sockets	4	.10
		SPEAKER		
BE114183	T6	4 Inch P.M. Dynamic Speaker	1	2.24
BE105100	T5	Output Transformer for Speaker	1	.62
		MISCELLANEOUS		
BE101204	R6	Volume Control (1 Megohm)	1	.50
BE102120	C, C3	Two Gang Variable Condenser	1	1.88
BE115485		Mounting Bracket for Gang Condenser	1	.08
BE115500		Mounting Bracket for Volume Control	1	.08
BE12597	S1	On-Off Switch	1	.24
BE121128		Two Prong Plug for "A" Battery	1	.05
BE121198		Three Prong Plug for "B" Battery	2	.07
BE128396		Cardboard Back for Cabinet (Less Loop Antenna)	1	.10

Part No.	Schematic Ref. No.	Description	No. Used In Set	Selling Price Each
BE132108		No. 6 x ⅛ Hex. Head Screws (Mount Back to Cabinet)	4 Doz.	.10
BE13155		Spring Washers (Mount Back to Cabinet)	4	.01
BE13276		No. 6—32 x ⅝ Chassis Mounting Screws	4 Doz.	.06
BE134104		Rubber Bumpers (For Chassis Mounting)	4	.03
BE128382-18		Bakelite Cabinet Complete Less Back (Dark Walnut)	1	2.40
		DIAL PARTS LIST		
BE112691		Six Lever Automatic Tuner Mechanism Complete with Dial Scale Less Knobs, Gang Condenser and Push Buttons	1	4.00
BE112694		Dial Scale	1	.24
BE112695		Crystal for Dial	1	.12
BE128394-18		Bakelite Knob for Tuning and Volume Control	2	.10
BE128395-18		Bakelite Pulleys for Tuning and Volume Control Knobs	2	.08
BE128292-17		Push Buttons	6	.08
BE112605		Set of Two Sheets Station Call Letters	1	.12
BE112606		Clear Celluloid Tabs for Call Letters	6 Doz.	.06
BE112707		Dial Drive Drum (Mounted on End of Cam Shaft)	1	.12
BE1209		Drive String (2 Ft. Used)	1 Yd.	.12
BE120197		Tension Spring for Drive String	1	.03
BE117684		Locking Screw (End of Cam Shaft)	1	.12

All resistors and mica condensers are RMA color coded—specify value and/or resistor or condenser (per schematic diagram) and model number.

Mica condensers are coded with an additional dot indicating tolerance.

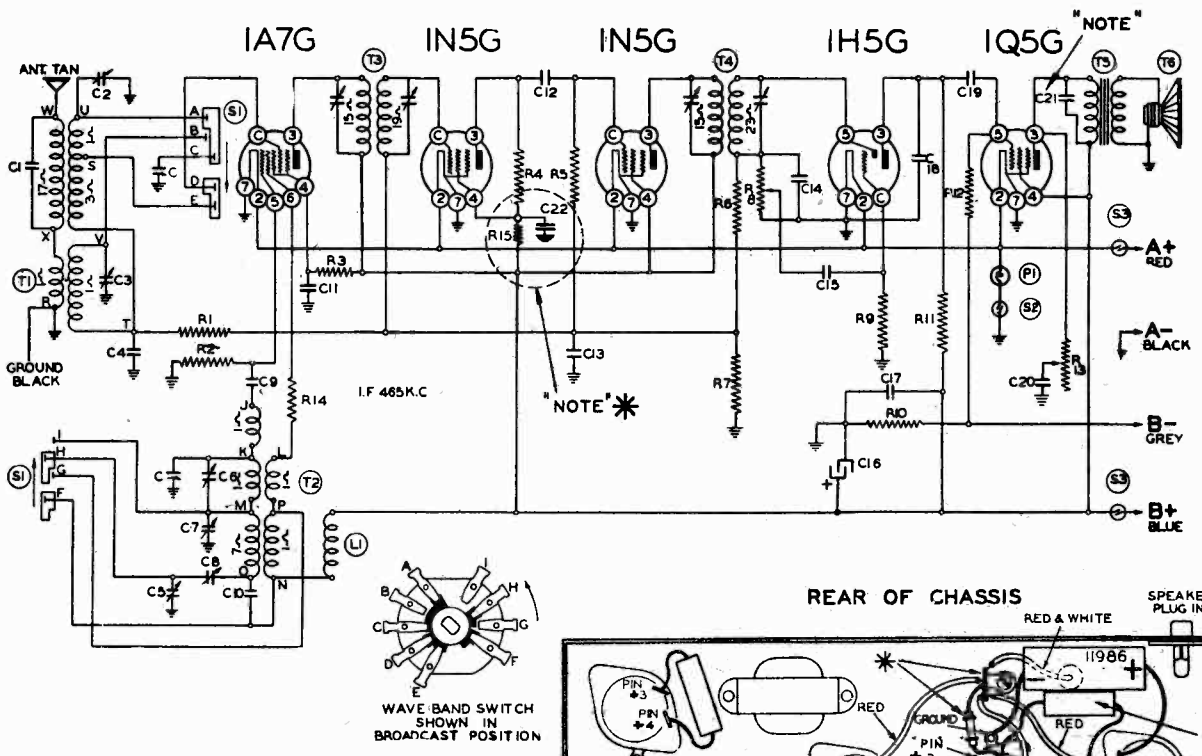
Tolerance Percent	Color of Dot
2½%	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More than—20%	None

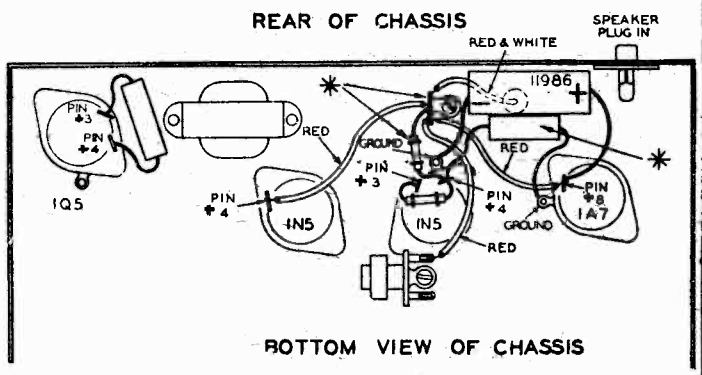
NOTICE—There is a model number label on the chassis. This model number identifies the radio as to year, manufacturer, chassis and issue number or letter. When ordering parts or writing, be sure to mention the complete model number.

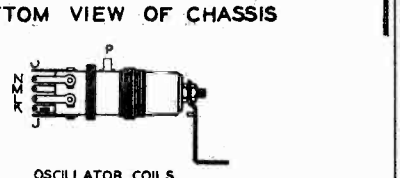
PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

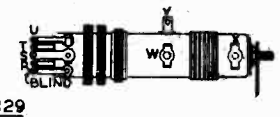
MODEL 93BR-560B

MONTGOMERY-WARD & CO.









Schematic Ref. No.	Part No.	Description
		RESISTORS
R1	BE13020	100M ohm—½ w.
R2	BE1309	200M ohm—½ w.
R3	BE13012	50M ohm—½ w.
R4	BE13022	5M ohm—½ w.
R5	BE13020	100M ohm—½ w.
R6	BE1304	3 megohm—½ w.
R7	BE1304	3 megohm—½ w.
R8	BE101166	1 megohm—volume control
R9	BE130225	15 megohm—½ w.
R10	BE130101	600 ohm—½ w.
R11	BE1303	500M ohm—½ w.
R12	BE13019	1 megohm—½ w.
R13	BE101169	Tone Control—1 Megohm
R14	BE13056	100 ohm—½ w.
*R15	BE13017	10M ohm—½ w.
		CONDENSERS
C	BE102106	2 gang variable condenser
C1	BE129132	.000125 mica
C2	BE12485	B. C. Antenna Trimmer
C3	BE12485	S. W. Antenna Trimmer
C4	BE1009	.05 x 200 v.
C5	BE12486	S. W. Pad
C6	BE12484	S. W. Osc. Trimmer
C7	BE12484	B. C. Osc. Trimmer
C8	BE12486	B. C. Pad
C9	BE12939	.00005 mica
C10	BE1009	.05 x 200 v.
C11	BE1009	.05 x 200 v.
C12	BE1292	.0005 mica
C13	BE1009	.05 x 200 v.
C14	BE12939	.00005 mica
C15	BE10012	.003 x 600 v.
C16	BE11986	8 mfd. lytic
C17	BE1006	.25 x 200 v.
C18	BE12921	.0002 mica
C19	BE10011	.01 x 400 v.
C20	BE10026	.02 x 400 v.
C21	BE10071	.004 x 600 v.
*C22	BE10020	.1 x 200 v.

C2 and C3 in one unit. C6 and C7 in same unit. C5 and C8 in one unit.

		PARTS
T1	BE111120	B. C.—S. W. Antenna Coil
T2	BE110118	B. C.—S. W. Osc. Coil
T3	BE10811G	Input I. F. Coil
T4	BE108112	Output I. F. Coil
T5	BE10569	Output Transformer
T6	BE114162R	6" P. M. Speaker
S1	BE12576	Band Switch
S2	BE12577	Pushbutton Switch—Pilot
S3		Off-on switch on tone control
P1	BE107243	1.5 v. Pilot Light
L1	BE1233	R. F. Choke Coil

Parts marked with * were added.

Several changes were made in the circuit of Model 93BR-560A to prevent a whistle which may occur on high signal inputs.
A partial bottom view of the chassis after the changes have been made, is shown above. The parts marked with an asterisk(*) were added. The model number after the changes were made is 93BR-560B. The data in Rider's Vol.X covering Model 93BR-560A apply to the later model with the exceptions as noted here.

CHANGES MADE

1. Fig. 1 shows a .004 x 600 volt tubular condenser connected from pin No. 3 on the 1Q5 tube socket to ground. Fig. 2 shows the change which was made. The .004 x 600 volt tubular condenser is connected between pin No. 3 and pin No. 4 on the 1Q5 tube socket.
2. Fig. 1 shows the wiring around the 1N5 1st I. F. tube socket before the changes were made. Note that there are three Red wires and one Red and White wire soldered to pin No. 4 on the 1N5 1st I. F. tube socket.
3. Fig. 2 shows the wiring around the 1N5 1st I. F. tube socket after the changes were made.

The changes made are as follows:

(a) A number 1139 stand-off insulated terminal strip was installed, it being held by one of the mounting nuts for the input I. F. transformer.

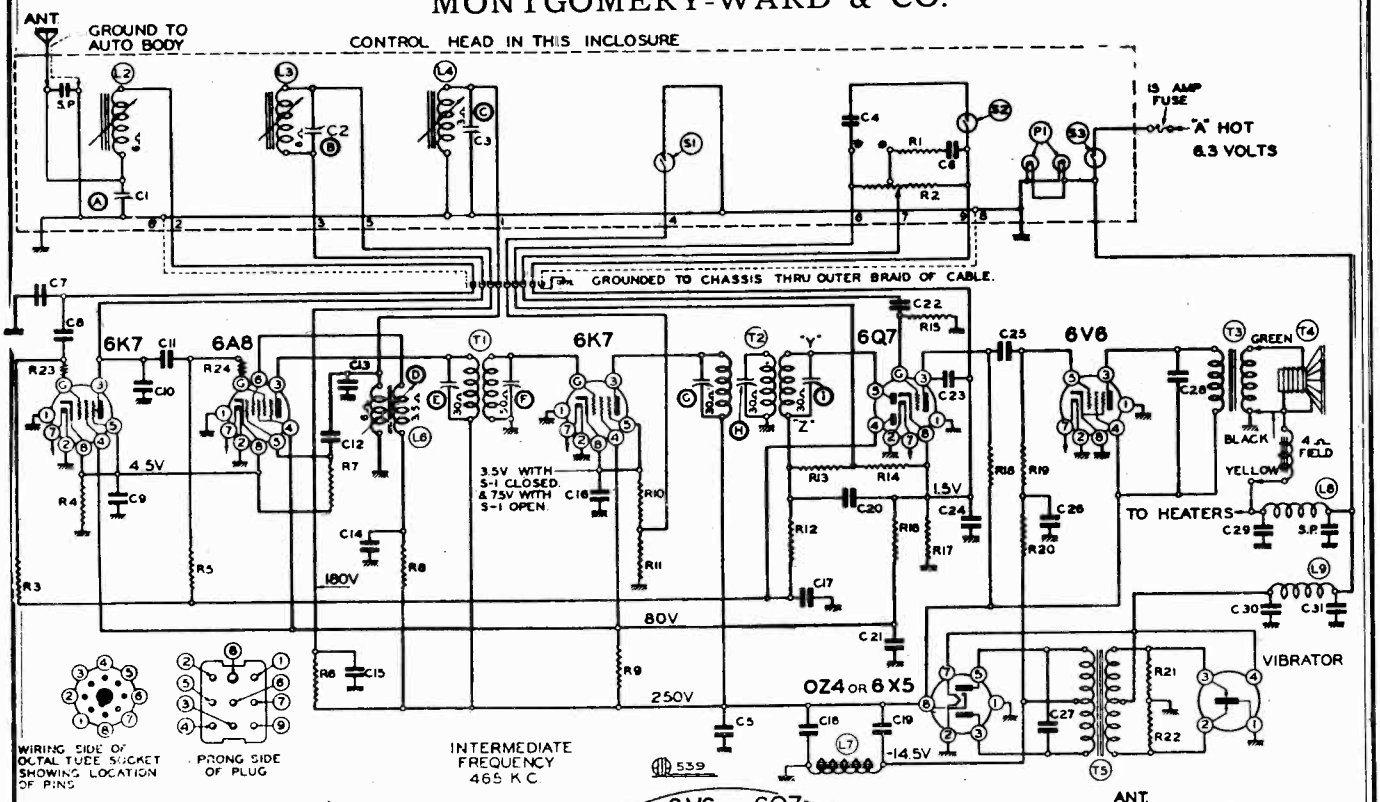
(b) The three Red wires and one Red and White wire soldered to pin No. 4 of the 1N5 1st I. F. tube socket (see Fig. 1), were unsoldered and soldered to the lug on the top of the stand-off terminal strip.

(c) A 10,000 ohm ½ watt resistor was connected from the lug of the stand-off terminal strip to pin No. 4 of the 1N5 1st I. F. tube socket.

(d) A .1 x 200 volt tubular by-pass condenser was added. One end was soldered to pin No. 4 of the 1N5 1st I. F. tube socket and the other end to the ground lug at the base of the 1A7 tube socket.

MONTGOMERY-WARD & CO.

MODEL 93BR-677



Code	Part No.	Description
		CONDENSERS
C1	124-45	Antenna trimmer 50 - 450 w. c. 350 mmf.
C2	127-82	R. F. Trimmer - 5-30 mmf.
C3	127-84	Oscillator Trimmer 5 - 30 mmf.
C4	100-25	.002 x 600 v. - 25%
C5	100-88	.1 x 400 v. 50 - 10%
C6	100-19	.006 x 600 v. - 25%
C7	129-95	.00015 Mica 2½%
C8	129-39	.00005 Mica 20%
C9	100-22	.05 x 200 v. 25%
C10	129-96	.000035 Mica 5%
C11	129-2	.0005 Mica 20%
C12	129-12	.00025 Mica 20%
C13	129-101	.00007 Mica 5%
C14	100-13	.05 x 400 v. 25%
C15	116-24	By pass block .25 x 400 v. 20-10%
C16	100-9	.05 x 200 v. 25%
C17	100-22	.05 x 200 v. 25%
C18	119-51	12 mfd. 350 w.v. lytic
C19	119-51	12 mfd. 350 w.v. lytic
C20	129-5	.0001 Mica 20%
C22	100-11	.01 x 400 v. 25%
C21	116-24	.25 x 400 v. 20-10% By pass block
C23	129-5	.0001 Mica 20%
C24	100-26	.02 x 400 v. 25%
C25	100-11	.01 x 400 v. 25%
C26	116-24	.25 x 200 v. 20-10%
C27	100-36	.01 x 1400 v. 20-10%
C28	100-89	.008 x 800 v. 10%
C29	129-6	.002 Mica 20%
C30	100-31	.5 x 120 v. 50-10%
C31	100-31	.5 x 120 v. 50-10%
SP		Spark Platcs (2)

C15, C21 and C26 in same unit
C18 and C19 in same unit

		RESISTORS
R1	130-214	30M - ½ w. 20%
R2	101-109	1.2 meg. volume control
R3	130-19	1 megohm - ½ w. 20%
R4	130-79	400 ohm - ½ w. 10%
R5	130-19	1 megohm - ½ w. 20%
R6	130-21	20M ohm - ½ w. 20%
R7	130-12	50M ohm - ½ w. 20%
R8	130-12	50M ohm - ½ w. 20%
R9	130-65	30M ohm - 1 watt 20%
R10	130-39	700 ohm - ½ w. 20%
R11	130-85	3M ohm - ½ w. 20%
R12	130-19	1 megohm - ½ w. 20%
R13	130-20	100M ohm - ½ w. 20%
R14	130-118	600M ohm - ½ w. 20%
R15	130-19	1 megohm - ½ w. 20%
R16	130-208	40M ohm - ½ w. 20%
R17	130-101	600 ohm - ½ w. 10%
R18	130-11	250M ohm - ½ w. 20%
R19	130-5	300M ohm - ½ w. 20%
R20	130-11	250M ohm - ½ w. 20%
R21	130-56	100 ohm - ½ w. 20%
R22	130-56	100 ohm - ½ w. 20%
R23	130-54	500 ohm - ½ w. 20%
R24	130-54	500 ohm - ½ w. 20%

		PARTS
L2	111-100	Antenna permeability coil complete
L3	109-40	R. F. Permeability coil complete
L4	110-84	Oscillator permeability coil complete
L6	110-75	Oscillator shunt coil Adj.
L7	105-62	Filter Choke - 250 ohms
L8	105-66	"A" Choke
L9	105-65	"A" Choke

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance	Percent	Color of Dot
	2½%	White
	5%	Green
	10%	Blue
	15%	Yellow
More Than	20%	Red
	20%	None

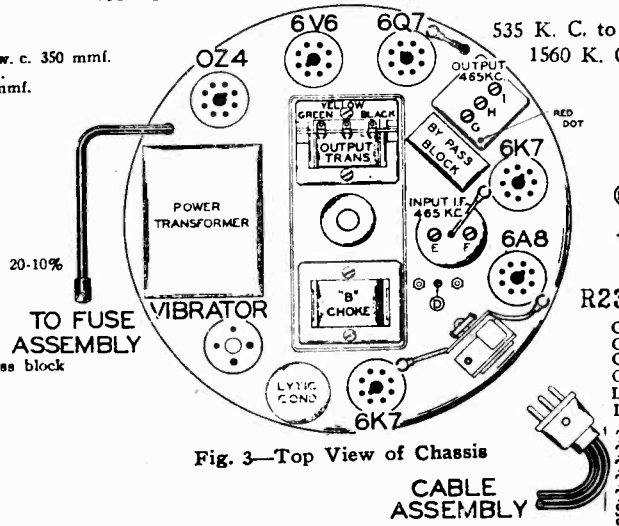
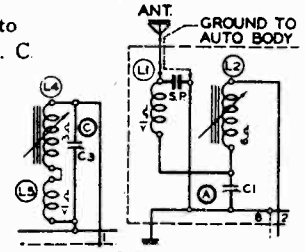


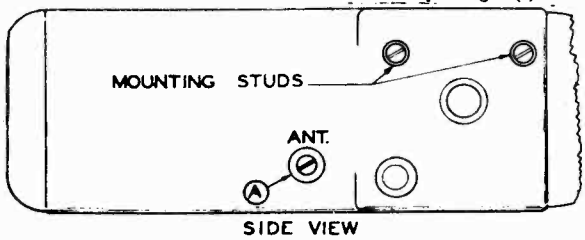
Fig. 3—Top View of Chassis



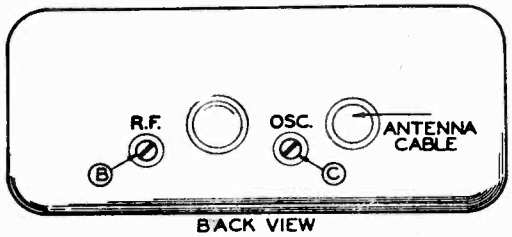
IN SOME RECEIVERS

R23, R24 GRID RES. NOT USED

C13	129-97	.00005 Mica 5%
C18	119-51	8.0 mfd. 350 w.v. lytic
C19	119-51	8.0 mfd. 350 w.v. lytic
C28	100-38	.01 x 800 v 10%
L1	111-96	Antenna Choke (No. 111-97)
L5	110-77	Oscillator series coil (No. 110-79)
T1	108-96C	Input I. F. Complete - 465 kc.
T2	108-115	Output I. F. Complete - 465 kc.
T3	105-61	Output Transformer
T4	114-113	8" Dynamic speaker
T5	104-132	Power Transformer
S1	125-47	Sensitivity switch
S2	125-47	Tone control switch
S3		Off-on switch on volume control
P1	107-97	6-8 v. pilot light (2)



SIDE VIEW



BACK VIEW

Fig. 4

AUTO RADIO

MODEL 93BR-677

MONTGOMERY-WARD & CO.

WIRING CONNECTIONS AND ASSEMBLY

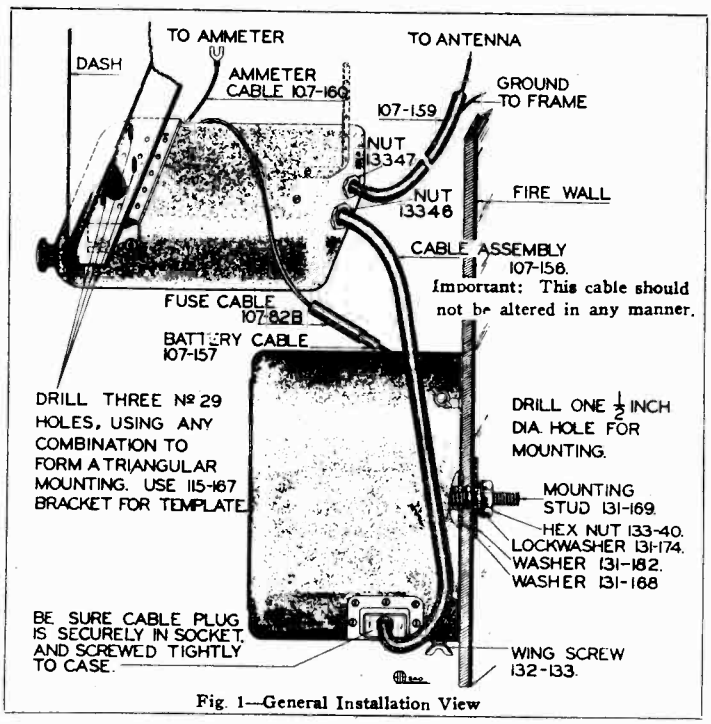


Fig. 1—General Installation View

Remote Tuner Units are matched to each radio unit at the factory; therefore it is important in such cases where another Remote Tuner Unit is required to replace the original one, that the entire Remote Unit be rebalanced to match the Radio Unit.

ADJUSTING ANTENNA TRIMMER (SET IN CAR)

Tune in a weak signal at approximately 1400 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna trimmer up or down until maximum output is obtained. See Fig. 4, adjustment "A" on side of remote tuner unit.

DUMMY ANTENNAS

The dummy antennas referred to in the following instructions are:

"I.F. Dummy" —A .5 mfd. condenser connected in series with the test oscillator output lead.

"Broadcast Dummy"—A 175 mmfd. cendenser connected in series with the output lead of the test oscillator.

I.F. ALIGNMENT: (465 K.C.)

IMPORTANT:

To align the output I.F. transformer without using a cathode ray oscillograph a 10M ohm resistor must be shunted across the tertiary coil of this unit.

Connect the resistor as indicated by points "Y" and "Z" on the circuit diagram as follows.

Locate the wires coming from the bottom of the output I.F. coil assembly on the underside of the radio chassis.

The white lead with green tracer which is connected to diode plate terminal No. 5 on the 6Q7 tube socket is one point and the white lead with brown tracer which is connected to the end terminal of the terminal strip is the other point. Proceed as follows:

1. With the dial of the Remote Tuner Unit set at 1400 K.C. and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy to grid of 6K7 I.F. tube.
2. Adjust trimmers "G" and "H" of output I.F. transformer for maximum gain, (See Fig. 3, top view).
3. Disconnect the 10M ohm resistor which has been shunted across the tertiary winding and adjust trimmer "I" for maximum gain.
   (a) This transformer is now correctly tuned. Under no circumstances re-adjust trimmers "G" and "H" after the 10M ohm resistor has been removed.
   (b) For alignment of the output I.F. transformer using a cathode ray oscillograph the 10M ohm resistor is not used and the procedure is similar to the alignment of any two circuit I.F. transformer; merely tune for a symmetrical curve of maximum amplitude.
   (c) Output connections for the cathode ray oscillograph should be made to pin No. 8 on 6Q7 tube socket and to the end terminal on the terminal strip; at this point the diode load resistors terminate.
4. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers "E" and "F" of input I.F. transformer for maximum gain.

NOTE: A red dot on top of output I.F. can designates location of trimmer "G"

BROADCAST ALIGNMENT:

1. With the dial on the Remote Tuner Unit set at 1560 K. C., connect test oscillator set at 1560 K. C. in series with broadcast dummy to the antenna lead of receiver.
2. Adjust oscillator trimmer (adjustment "C", on back of Remote Tuner Unit) to resonance. (See Fig. 4, back view).
3. Re-set test oscillator to 1400 K.C. and pick up signal by rotating dial on Remote Tuner Unit. Adjust R. F. trimmer (adjustment "B", on back of Remote Tuner Unit), and Antenna Trimmer (adjusment "A", on side of Remote Tuner Unit), to resonance.
4. Re-set test oscillator to 600 K.C. and rotate Remote Tuner Unit dial to 600 K. C. Adjust shunt oscillator adjustment "D", rotating dial to and fro at the same time adjusting shunt oscillator for maximum gain. This adjustment is accessible from the top of the radio chassis, (See Fig. 3, top view).
5. Go back and check 1400 K. C. If adjustment is made here, check 600 K. C. again.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are six levers on the dial by means of which six stations may be selected. (See "B" Fig. 2).

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now Rotate the turning knob (No. 2) to the left (counter clockwise) as far as it will turn, and tighten the special reset lock screw ("C") located on left side of remote turner unit. (See Fig. 2).

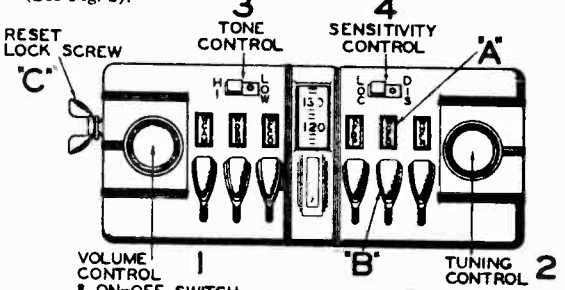


Fig. 2—Front View of Remote Tuner Unit

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

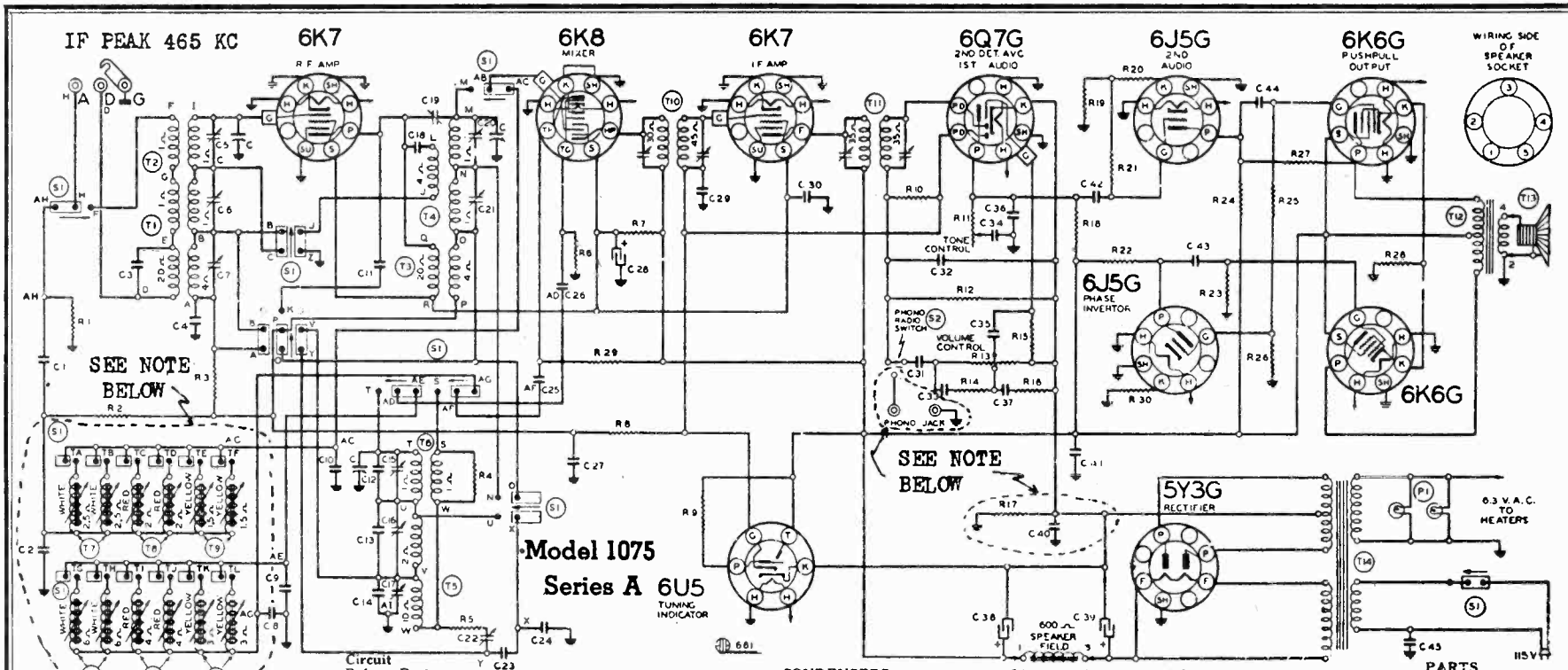
This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Reset lock screw "C" is loose when radio is shipped from factory).

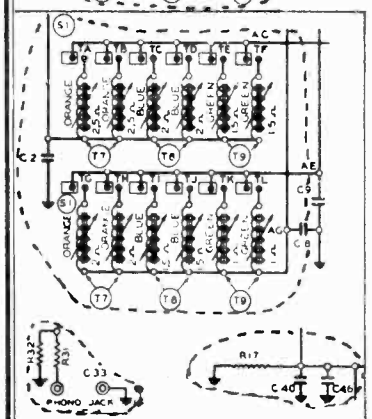
If you should desire to change any station you selected to another, loosen the locking screw "C" one or two turns; select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver.





Model 1075 Series B

Series A and Series B are similar. Series B differs from Series A as shown above.

Circuit Reference	Part No.	Description
		RESISTORS
R1	130179	20M ohm
R2	130241	200M ohm
R3	130205	100M ohm
R4	130235	1500 ohm
R5	130197	20 ohm
R6	13094	50M ohm
R7	130237	12,500 ohm
R8	130103	100M ohm
R9	130110	1 megohm (in Tuning Indicator Socket)
R10	1304	3 megohm
R11	101129	Tone Control (250M ohm)
R12	1303	500M ohm
R13	101128	Volume Control (1 megohm)
R14	1309	200M ohm
R15	130225	15 megohm
R16	130236	30M ohm
R17	130240	30 ohm
R18	130172	250M ohm
R19	13082	10M ohm
R20	130234	6M ohm
R21	13019	1 megohm
R22	130103	100M ohm
R23	1303	500M ohm
R24	130103	100M ohm
R25	130163	400M ohm
R26	13094	50M ohm
R27	130163	400M ohm
R28	130220	300 ohm
R29	130123	15M ohm
R30	130193	3M ohm
R31	13011	250M ohm
R32	13011	250M ohm

Circuit Reference	Part No.	Description
		CONDENSERS
C1	10025	.002 x 600 v.
C2	12971	.002 Mica
C3	12940	.0001 Mica
C4	10093	.05 x 200 v.
C5		S. W. Antenna Trimmer
C6		M. W. Antenna Trimmer
C7		B. C. Antenna Trimmer
C8	129123	.0008 Mica (Silver Mica type; 0-Temperature Coefficient)
C9	129119	.000329 Mica (Silver Mica type; 0-Temperature Coefficient)
C10	129111	.000484 Mica (Silver Mica type; 0-Temperature Coefficient)
C11	12934	.0002 Mica
C12	12981	.000010 Mica
C13	129113	.000015 Mica
C14	129113	.000015 Mica
C15		S. W. Oscillator Trimmer
C16		M. W. Oscillator Trimmer
C17		B. C. Oscillator Trimmer
C18	12938	.00005 Mica
C19		B. C. R. F. Trimmer
C20		S. W. R. F. Trimmer
C21		M. W. R. F. Trimmer
C22	12435	B. C. Series Pad
C23	129105	.0035 Compression Type
C24	129115	.00232 Compression Type
C25	10025	.002 x 600 v.
C26	12962	.00003 mica
C27	10093	.05 x 200 v.
C28	11961	12 mfd.-350 w.v. lytic condenser
C29	10026	.02 x 400 v.
C30	10053	.25 x 400 v.
C31	1009	.05 x 200 v.
C32	12921	.0002 Mica
C33	12921	.0002 Mica
C34	10011	.01 v 400 v.
C35	10071	.004 x 600 v.
C36	129114	.0003 Mica
C37	10078	.01 x 200 v.
C38	11964	10 mfd.—350 w.v. lytic
C39	11964	16 mfd.—400 w.v. lytic
C40	10020	.1 x 200 v.
C41	10074	.1 x 400 v.
C42	10026	.02 x 400 v.
C43	10026	.02 x 400 v.
C44	10026	.02 x 400 v.
C45	10061	.02 x 600 v.
C	10280	3 gang variable C38 and C39 in same unit
C46	11977	*200 mfd. x 6 v. lytic

		PARTS
T1	111105	B. C. Antenna Coil
T2	111106	B. W. M. W. Antenna Coil
T3	10945	B. C. R. F. Coil
T4	10946	S. W. M. W. R. F. Coil
T5	11090	B. C. Oscillator Coil
T6	11091	S. W.-M. W. Oscillator Coil
T12	10556B	Output Transformer
T13	114126	Dynamic Speaker (600 ohm field)
T14	104143	Power Transformer
S1	112466	Push Button Switch
S2		Phono Radio Switch
P1		(2) 6-8 volts pilot lights

Series A only			Series B only		
T7	11083 and 11083B	Low Frequency Tuner Coils	T7	110102 and 110102B	Low Frequency Tuner Coils
T8	11082	Medium Frequency Tuner Coils	T8	110101	Medium Frequency Tuner Coils
T9	11081 and 11081B	High Frequency Tuner Coils	T9	110100 and 110100B	High Frequency Tuner Coils
T10	108105H	Input I. F.—465 kc.	T10	108105H	Input I. F.—465 kc.
T11	108106G	Output I. F.—465 kc.	T11	108126	Output I. F.—465 kc.

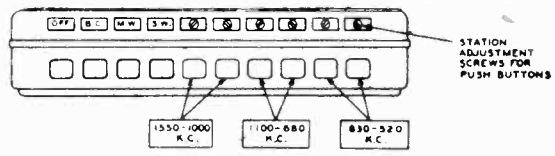


FIG. 4—Showing Station Adjustment Screws.

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- 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-metalic screwdriver.
- Dummy antennas—.1 mf., 200 mmf., and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Pushbutton Indicated Below Pushed "In"	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6K7 1.F Tube	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 2)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6K8	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 2)	Input I. F.	Adjust to maximum output
BAND BROAD-CAST	1690 Kc.	200 mmf	Antenna lead	Broadcast	Rotor full open (Plates out of mesh)	Trimmer (C17) (See Fig. 5)	Broadcast oscillator	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set dial at 1400 Kc.	Trimmer (C7), (C19) (See Fig. 5)	Broadcast antenna and R. F.	Adjust to maximum output
	600 Kc.	200 mmf.	Antenna lead	Broadcast	Set dial at 600 Kc.	Trimmer (C22) (See Fig. 5)	Broadcast oscillator series pad	Adjust to maximum rock dial. (See note "A")
SHORT WAVE BAND	17 Mc.	400 ohms	Antenna lead	Short Wave	Set dial at 17 MC	Trimmer (C15) (See Fig. 5)	Short wave oscillator	Adjust to maximum output
	17 Mc.	400 ohms	Antenna lead	Short Wave	Set dial at 17 MC	Trimmer (C5), (C20) (See Fig. 5)	Short wave antenna and R. F.	Adjust to maximum output
MEDIUM WAVE BAND	5 Mc.	400 ohms	Antenna lead	Med. Wave	Set dial at 5 MC	Trimmer (C16) (See Fig. 5)	Medium wave oscillator	Adjust to maximum output
	5 Mc.	400 ohms	Antenna lead	Med. Wave	Dial set at 5 MC	Trimmer (C6), (C21) (See Fig. 5)	Medium wave antenna and R. F.	Adjust to maximum output

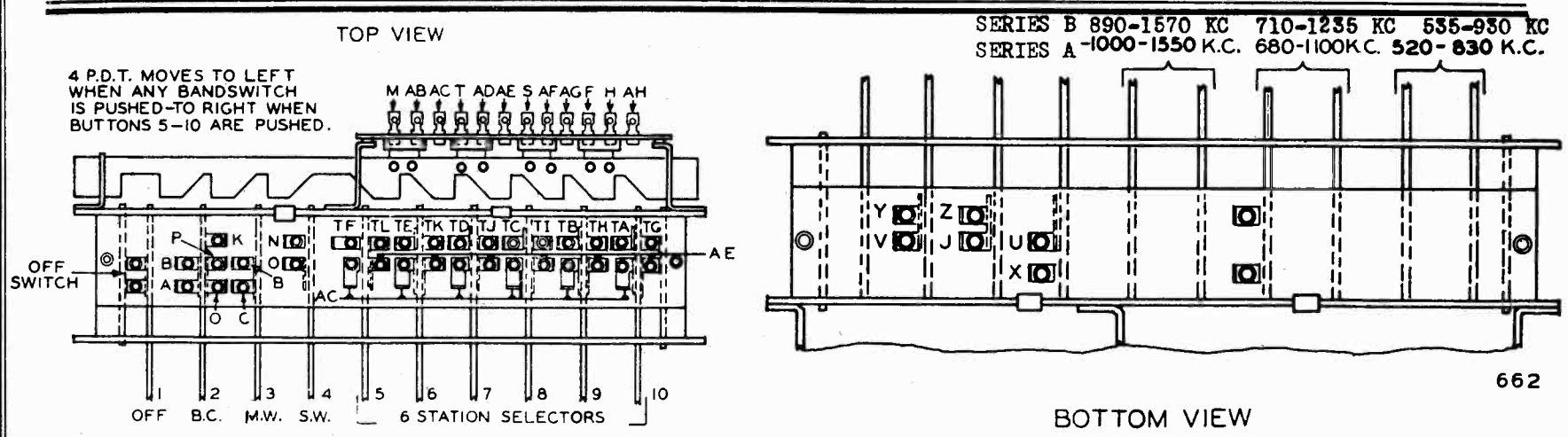
NOTE "A". Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attentuate the signal from the signal generator to prevent the leveling-off action of the AVC.

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

BAND	FREQUENCY RANGE
Broadcast	535 to 1690 Kc.
Medium Wave	1.66 to 5.5 MC.
Short Wave	5.5 to 18.0 MC.

Power Consumption ..... 100 Watts (At 115 volts 50-60 cycles)
Power Output ..... 5 Watts Undistorted, 7.5 Watts Maximum
Intermediate Frequency ..... 465 KC.



PROCEDURE FOR SETTING THE AUTOMATIC STATION PUSHBUTTONS:

Important: Allow the radio to "warm up" for about 15 minutes before setting the station adjustment screws for the pushbuttons.

Only a single adjustment for each station is required in setting up your favorite stations for automatic pushbutton operation. These adjustments are located at the front of the chassis shown in Fig. 4 and are accessible through the station call letter tab holes. The only equipment needed is a small screw driver to make the adiustments.

The range of the frequencies covered by each button are given below and are also shown in Fig. 4. Only stations within the frequency ranges given can be obtained on a particular button. Counting the station buttons from left to right, looking at the front of the set, the frequency ranges are as follows:

1. 1550 to 1000 Kilocycles.
2. 1550 to 1000 Kilocycles.
3. 1100 to 680 Kilocycles.
4. 1100 to 680 Kilocycles.
5. 830 to 520 Kilocycles.
6. 830 to 520 Kilocycles.

This means that any station which has a kilocycle number lying between 1550 and 1000 K.C. can be set up on either Button 1 or Button 2. Any station which has a kilocycle number lying between 1100 and 680 K.C. can be set on either Button 3 or Button 4. Any station which has a kilocycle number lying between 830 and 520 K.C. can be set on either Button 5 or Button 6.

After you have made up your list of stations, press button marked "Broadcast" and tune set manually until station selected having the highest frequency is tuned in and the program noted. Press button covering frequency range in which station is located (See Fig. 4). Adjust screw through station tab opening above button pressed until the same station is heard clearly and tuning indicator indicates that it is correctly tuned.

Press pushbutton marked "Broadcast" and tune in next station selected. Press button covering frequency range in which station is located. Adjust screw through station tab opening above button pressed until the same station is heard clearly and with maximum volume.

Follow this procedure for each button until you have selected all of your stations. The automatic buttons are now set up for quick tuning and no further adjustment is necessary.

NOTE: In setting up the pushbuttons, station identification may require switching back and forth to button marked "Broadcast" until the same program is heard for both. If the same program is heard on more than one station, find the station on dial tuning and select the proper one on the pushbutton by comparing the order or sequence of programs with that on dial tuning.

Punch out the station call letter tabs of the stations you have set up for the automatic buttons from the set of sheets supplied and insert them into the rectangular openings in the escutcheon. One of the small, clear celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

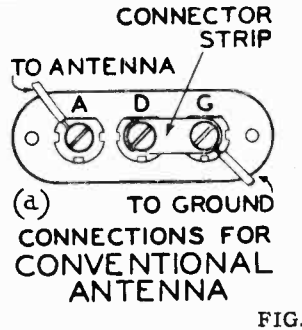
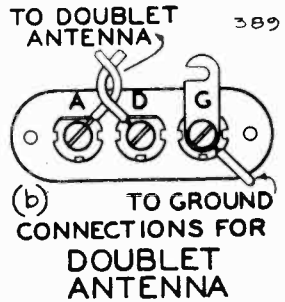


FIG. 1



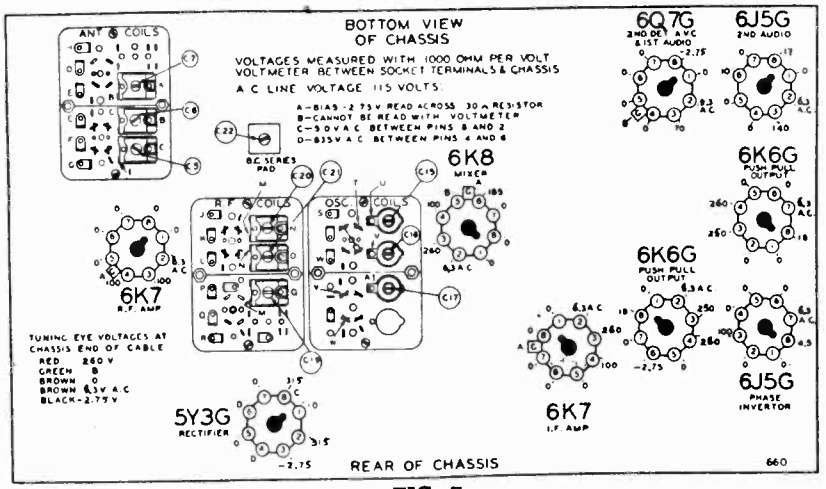


FIG. 5

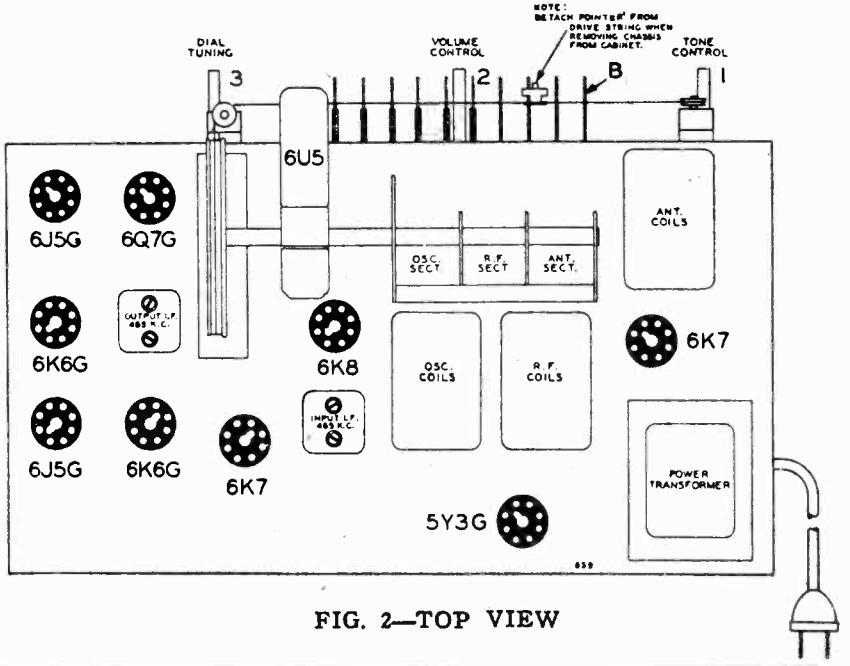
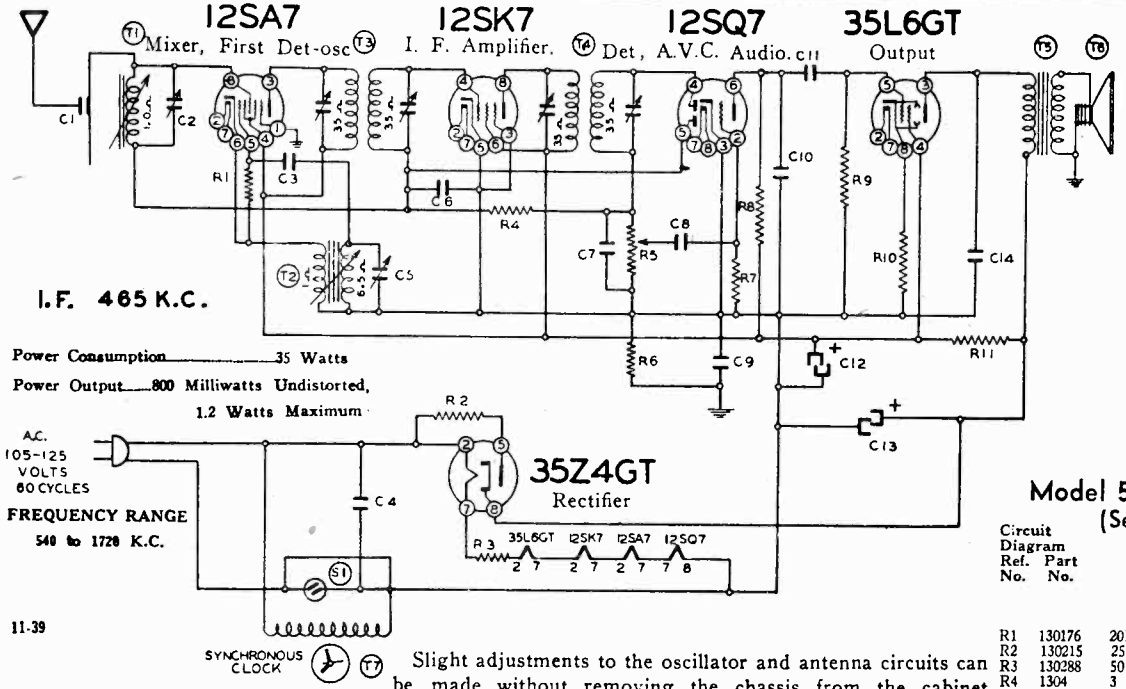


FIG. 2—TOP VIEW



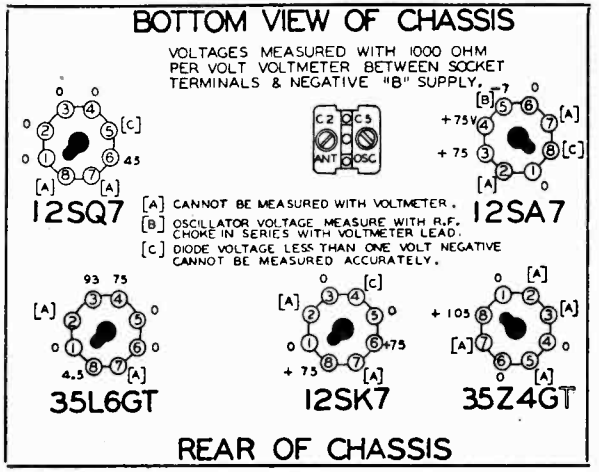


FIG. 3—BOTTOM VIEW

Model 571 Series A
(Serial No. 189300 and up)

Circuit Diagram Ref. No.	Part No.	Description
		RESISTORS
R1	130176	20M ohm—⅓ w.
R2	130215	25 ohm—½ w.
R3	130288	50 ohm—1½ w.
R4	1304	3 Megohm—⅓ w.
R5	101209	Volume Control—½ Meg.
R6	130100	150M ohm—⅓ w.
R7	130257	5 Megohm—⅓ w.
R8	130100	150M ohm—⅓ w.
R9	13011	250M ohm—⅓ w.
R10	130166	150 ohm—⅓ w.
R11	130199	1500 ohm—1 w.
		CONDENSERS
C1	131262	.0002 Washer Condenser (Ant. Clip on Ant. Plate)
C2	124100	Ant. Section Dual Trimmer
C3	12939	.00005 Mica
C4	1001	.1 x 400 v.
C5	124100	Osc. Section Dual Trimmer
C6	10013	.05 x 400 v.
C7	1295	.0001 Mica
C8	10025	.002 x 600 v.
C9	10091	.15 x 400 v.
C10	1292	.0005 Mica
C11	10071	.004 x 600 v.
C12	11992	20 Mfd. 'Lytic
C13	11992	40 Mfd. 'Lytic.
C14	10011	.01 x 400 v.
		C2 and C5 in one unit.
		C12 and C13 in one unit.
		PARTS
T1	111136	Antenna Coil Complete
T2	110126	Oscillator Coil
T3	108157D	Input I. F. Coil—465 Kc.
T4	108157E	Output I. F. Coil—465 Kc.
T5	105106	Output Transformer
T6	114187	4" Speaker—PM.
T7	104188	Electric Clock Complete
S1		On-Off Switch on Volume Control

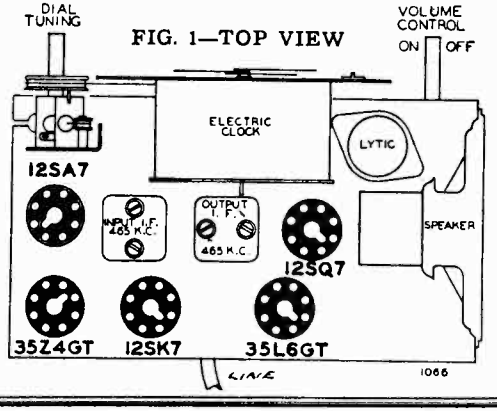


FIG. 1—TOP VIEW

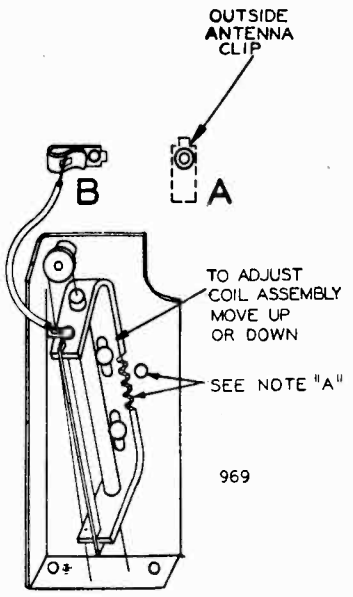


FIG. 4

Slight adjustments to the oscillator and antenna circuits can be made without removing the chassis from the cabinet through a hole which is provided on the bottom of the cabinet. (Remove snap-in button.)

The two adjustments on the trimmer assembly can be reached with a long insulated type screwdriver through this hole.

SERVICE NOTES:

Voltages taken from different points of circuit to —B are measured with all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volt A.C. line.

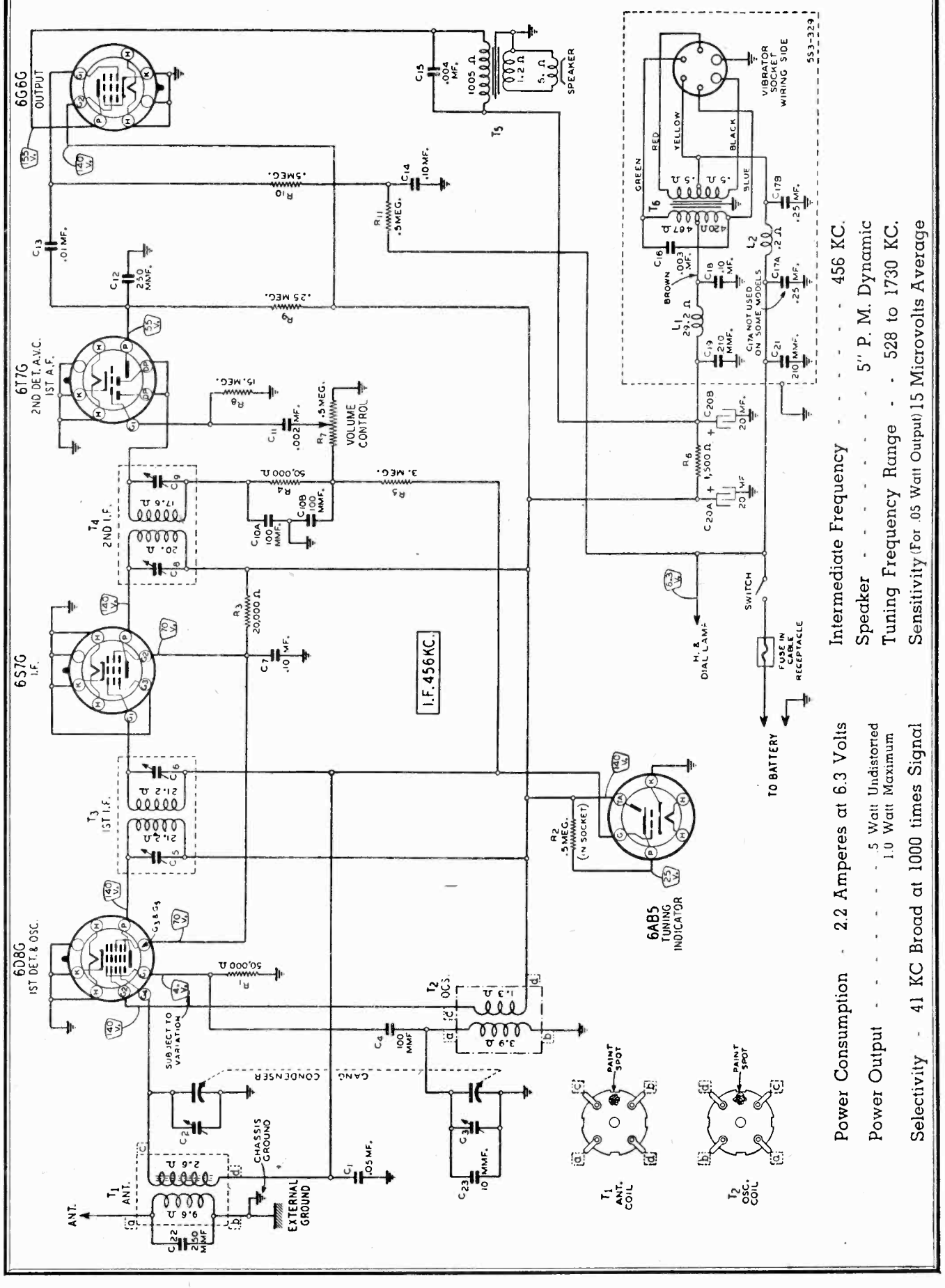
Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

MONTGOMERY-WARD & CO.

MODEL 93WG-562



Power Consumption - 2.2 Amperes at 6.3 Volts

Power Output - - - - - - - .5 Watt Undistorted
1.0 Watt Maximum

Selectivity - 41 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - 456 KC.

Speaker - - - - - - - - - - 5" P. M. Dynamic

Tuning Frequency Range - - 528 to 1730 KC.

Sensitivity (For .05 Watt Output) 15 Microvolts Average

MODEL 93WG-562

MONTGOMERY-WARD & CO.

Procedure for Setting the Station Buttons

Selecting the Stations to be Set

There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning.

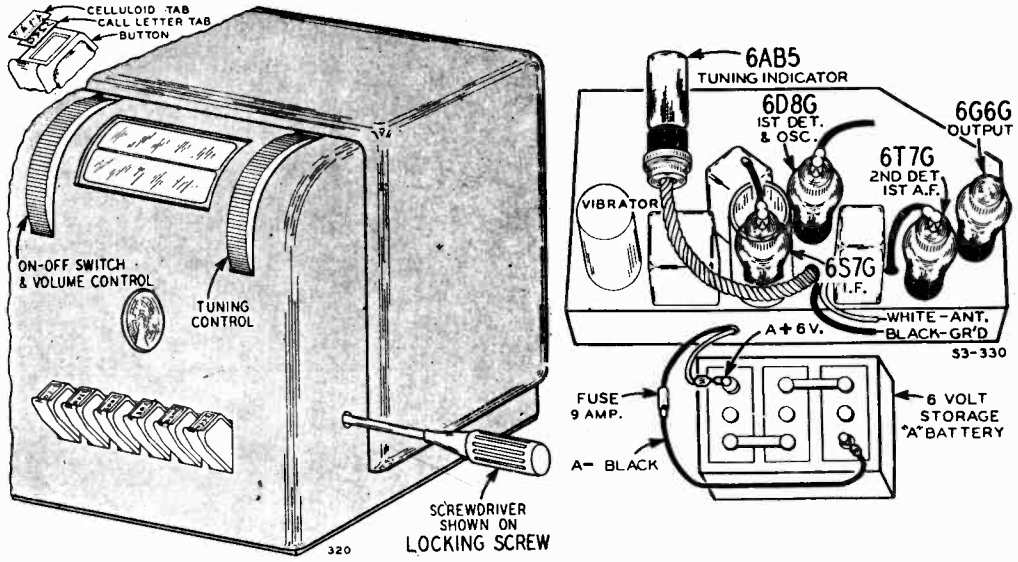
Make a list of your favorite stations, those which you tune in regularly. There may be any number up to and including 6 in this list.

It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and so on.

Any button may be used for any station you can receive, although it will be more convenient to set the stations so that the kilocycle numbers increase from left to right.

Setting a Station Button

At the right side of the cabinet (from the front) will be seen a cap which covers a hole in the cabinet—See illustration. Pry off this cap being careful not to scratch the cabinet. Removal of the cap will expose a large locking screw. Using a screwdriver, loosen the mechanism by turning this screw in a counter-clockwise direction. The screw will turn easily until the dial stops rotating. Then exert a slight amount of additional pressure and continue to turn the screw about one and one-half complete turns.



Select the first station from the list you have prepared, and carefully tune in this station by means of the manual tuning control using the tuning eye as a guide.

With one hand, hold the manual tuning control to prevent it from turning and with the other hand, push one of the station buttons shown in the illustration *all the way down*. It will go down easily at first and then a firm gentle pressure must be applied to push it down the rest of the way. It is better to start with the left hand button.

Hold *this* button all the way down. With the other hand, see whether or not this station is still accurately tuned in by moving the tuning control a slight amount back and forth while observing the tuning eye. *Be sure to hold the button all the way down.*

Release the button after the station is tuned in.

Carefully tune in the second station on your list. Then hold the tuning control and push the second button slowly and firmly all the way down. Check for accurate tuning.

Proceed in the same manner to set the remaining station buttons.

After all the stations are set, it will be necessary to lock the mechanism so that the settings will not change. Do this by turning the locking screw in a clockwise direction until it is tight. It will turn easily until the dial stops rotating—then additional pressure must be exerted. Replace the cap over the hole.

Remove the correct station call letter tab from the sheets supplied by bending the sheet back and forth at the score mark until the tab can be broken off. Press this tab all the way to the bottom of the space provided in the button. Cover the call letter tab with a celluloid tab, pressing this in until it snaps into place.

If at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments. Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

SIGNAL GENERATOR				
FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration)
456 KC	Signal Grid of 1st Det.	.1 mf.	Turn rotor to full open	1st I.F. (C5) & (C6) 2nd I.F. (C8) & (C9)
1730 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	Oscillator (C3)
1500 KC	Antenna Lead	200 mmf.	Turn rotor to max. output	Antenna (C2)

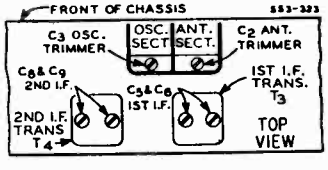
The following equipment is required for aligning:

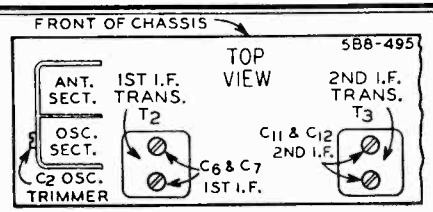
Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

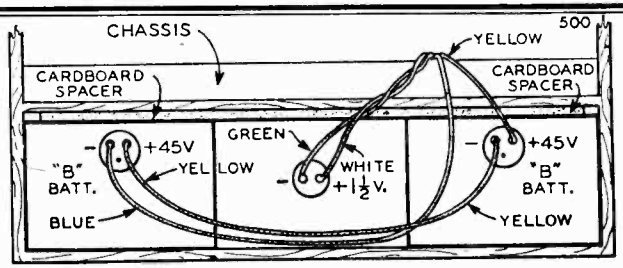
Output Indicating Meter: Non-Metallic Screwdriver.

Dummy Antennas—.1 mf. and 200 mmf.

CALIBRATION—If it is necessary to calibrate the radio, remove the back cover. Turn the tuning control drum until the 2 set screws on the dial hub near the volume control can be reached with a screwdriver. Loosen the 2 set screws by turning them about 1/8th turn in a counter-clockwise direction. Tune in an 800 KC signal. Hold the tuning control motionless and at the same time turn the dial drum until the dial is in calibration. Then slowly turn the tuning control drum until the 2 set screws can be reached and re-tightened with a screwdriver. Check to see that the dial has remained in calibration.



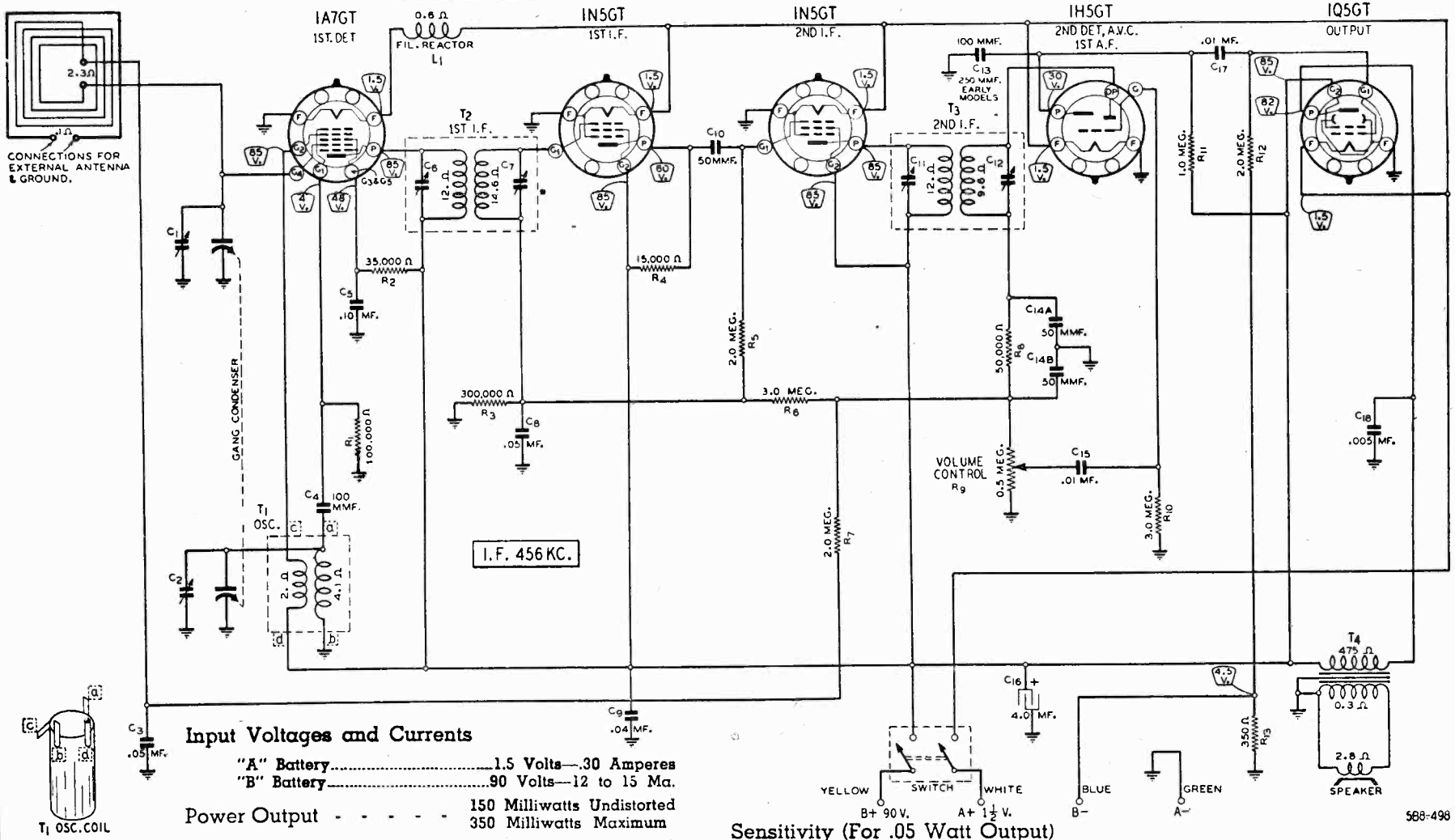




Removing Chassis from Cabinet

Take out the 2 screws, one at each rear corner of the chassis shelf. Remove battery cable clamp. Grasp the chassis shelf at each rear corner and edge it away from the cabinet front until the chassis shelf and chassis slide easily out of the cabinet.

To remove the shelf from the chassis, take out the bolt and the 2 screws at the bottom of the shelf.



Input Voltages and Currents

"A" Battery.....1.5 Volts—.30 Amperes
"B" Battery.....90 Volts—12 to 15 Ma.

Power Output - - - - - 150 Milliwatts Undistorted
350 Milliwatts Maximum

Selectivity - - 50 KC Broad at 1000 Times Signal

Sensitivity (For .05 Watt Output)

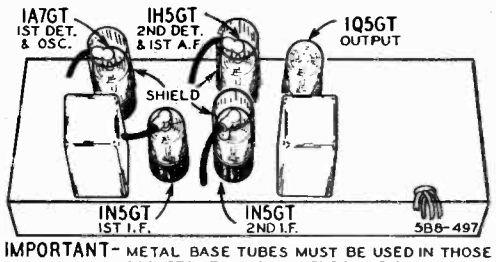
External Antenna.....10 Microvolts Average

MONTGOMERY-WARD & CO.

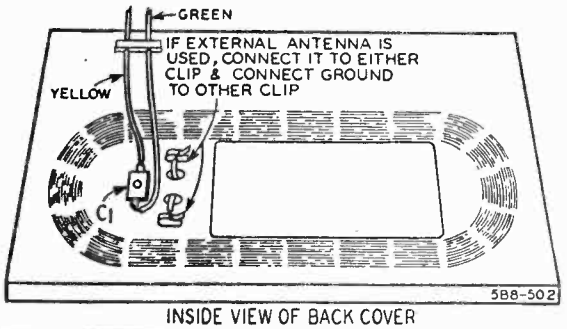
MODEL 93WG-565

MODEL 93WG-565

MONTGOMERY-WARD & CO.



IMPORTANT- METAL BASE TUBES MUST BE USED IN THOSE SOCKETS AT WHICH SHIELDS ARE SHOWN.



INSIDE VIEW OF BACK COVER

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:
A Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antenna—.1 mf.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration—page 3, and illustration of back—page 1)
456 KC	Signal Grid of 1st Det. (Top Cap)	.1 mf.	Turn rotor to full open	1st I.F. (C6) & (C7) 2nd I.F. (C11) & (C12)
1600 KC	Signal Grid of 1st Det.	.1 mf.	Turn rotor to full open	Oscillator (C2)
1500 KC	None—See Note A		Turn rotor to max. output	Antenna (C1)

NOTE A—Chassis must be in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. The back of the cabinet must be in place. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

CALIBRATION (For models with pointer in front of dial scale)—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, hold the pulley at the back of the dial, loosen the pointer screw, set the pointer at the 800 KC mark, and retighten the pointer screw.

Replacement Parts List

MISCELLANEOUS

SPEAKER

When ordering parts for speakers, specify part number of speaker and letters preceding part number stamped on the speaker.

Bin No.	Part No.	Description	Selling Price
	12A340	6" P.M. Dynamic Speaker	$2.84
		Cone and Voice Coil Assembly for above Speaker	.90
		Output Transformer only (T4)	.90
	14X251	Wire Screen to cover front of Speaker	.16

GENERAL

	3A293	Tube Socket—Octal (8 prong)	.10
	32X174	Tube Shield	.06
10003	30X44	Grid Clip only ..... Doz.	.06
	13X388	"A" Battery Cable and Plug Assembly	.10
	13X389	"B" Battery Cable and Plug Assembly	.14
	4A99	Terminal Strip (2 Lugs—1 Lug Insulated)	.04
	4A98	Terminal Strip (6 Lugs—4 Lugs Insulated)	.04
	4A139	Fibre Strip (Loop Antenna Leads)	.04

TRANSFORMERS AND COILS

Bin No.	Part No.	Code	Description	Selling Price
	9A1053	T1	Oscillator Coil Assembly	$0.42
	9A1192	T2	1st I.F. Transformer and Can Assembly	.92
	9A1193	T3	2nd I.F. Transformer and Can Assembly	.84
		T4	Output Transformer (See "Speaker")	
	9A1199	L1	Filament Reactor	.20
	9A1191		Loop Antenna Assembly	.54

CONDENSERS

TUBULAR

Bin No.	Part No.	Code	Capacitance	Voltage	Selling Price
11106	46X253	C3,C8	.05 mf.	180	$0.06
10979	46X254	C5	.10 mf.	180	.06
11539 -	46X250	C9	.04 mf.	180	.06
11256	46X249	C15,C17	.01 mf.	180	.06
10592	46X274	C18	.005 mf.	360	.06

MOLDED

10876	47X57	C4,C13	100 mmf.	.06
10625	47X56	C10	50 mmf.	.06

TRIMMER

17A110	C1	2.5-35 mmf.	Loop Antenna	.06
	C2	Part of Gang Condenser		
17A51	C6	70-150 mmf.	1st I.F.	.16
	C7	40-100 mmf.		
17A80	C11	50-120 mmf.	2nd I.F.	.18
	C12	85-185 mmf.		

MISCELLANEOUS

47X112	C14A	50 mmf.	Dual Mica	.06
	C14B	50 mmf.		
9870 45X250	C16	4 mf. 100	Dry Electrolytic	.20
14A114		2 Section Gang Condenser complete with Tuning Control Shaft		1.20

RESISTORS

CARBON

Bin No.	Part No.	Code	Resistance	Wattage	Selling Price
11097	A85104	R1	100,000 Ohm	0.2	$0.06
11189	A84353	R2	35,000 Ohm	0.2	.08
11061	A84304	R3	300,000 Ohm	0.2	.08
11094	A84153	R4	15,000 Ohm	0.2	.08
11086	A85205	R5,R7,R12	2 Megohm	0.2	.06
11116	A84305	R6	3 Megohm	0.2	.08
11068	A85503	R8	50,000 Ohm	0.2	.06
11090	A85305	R10	3 Megohm	0.2	.06
11188	A84105	R11	1 Megohm	0.2	.08
	A83351	R13	350 Ohm	0.2	.10

MISCELLANEOUS

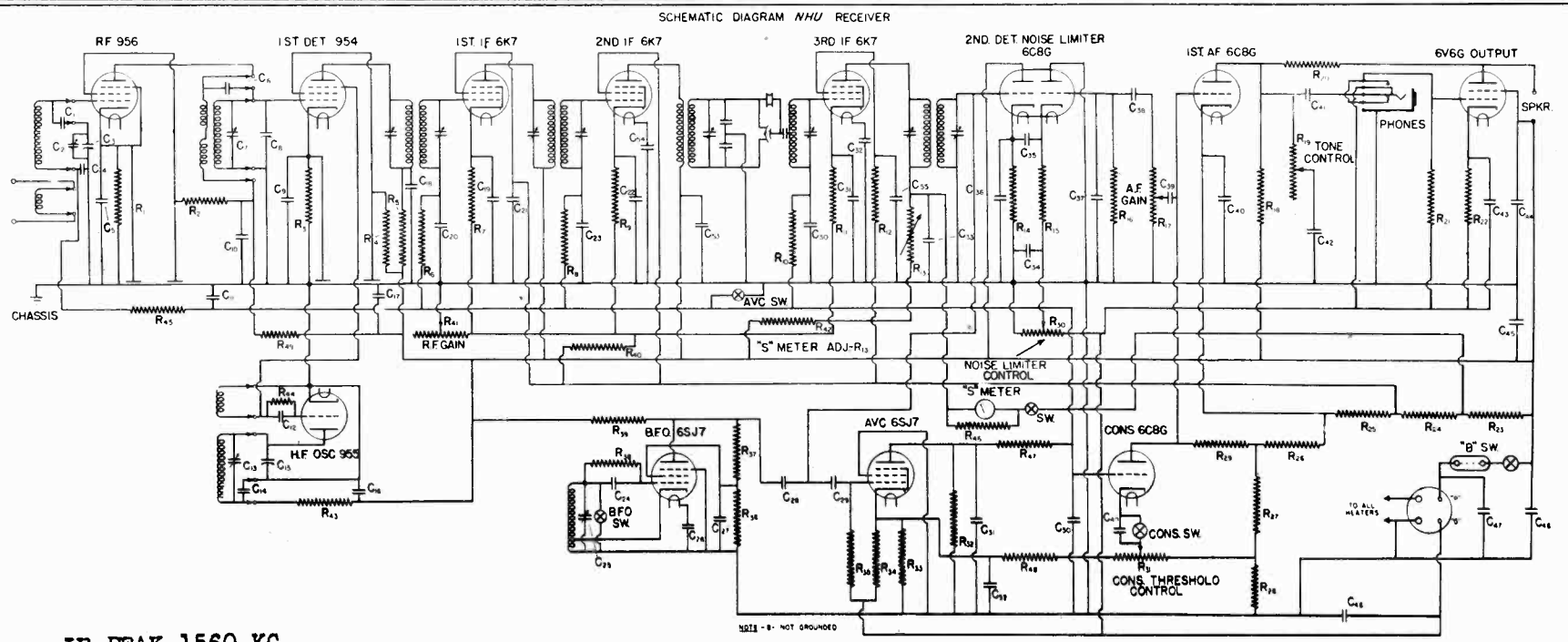
10144	36X274	R9	500,000 Ohm	Volume Control and On-Off Switch .48

DIAL AND DRIVE ASSEMBLY

Bin No.	Part No.	Description	Selling Price
	58X448	Dial Mounting Plate complete with Dial Scale, Pointer, and Pulley Shaft and Bracket	$0.54
	58X436	Cardboard Dial Scale	.06
	15X161	Pointer	.04
		14" Drive Cord (12 lb. Test) ..... Doz. Pcs.	.16
	28X206	Tension Spring for Drive Cord ..... Doz.	.12
	17X49	Celluloid Crystal	.06
	10A275	Tuning Control Knob	.06
	10A276	On-Off Switch and Volume Control Knob	.06
	4X345	Escutcheon for Tuning Control Knob	.12
	4X346	Escutcheon for On-Off Switch and Volume Control Knob	.12

Use only genuine factory tested parts to insure service jobs you can depend on and to obtain original set performance.

Prices Subject to Change Without Notice.



IF PEAK 1560 KC

For the sake of clarity in this schematic diagram, only one set of R.F. coils is shown. The terminals of each R.F. coil assembly are indicated, and it will be understood that condensers C1, C6, C7, C13 and C14 are duplicated in each range.

THE NHU is a communications type receiver designed primarily for operation in the frequency range from 27.5 to 62 megacycles. This spectrum is covered in three bands: 27.5 to 36 Mc., 34 to 46.5 Mc. and 45 to 62 Mc. A superheterodyne circuit is used and all elements necessary for communications service are incorporated

The power supply, Type 5856, employs a type 80 rectifier. The normal B current drain of the receiver is 65 ma. at 200 volts. The heater circuit requires 3 amperes at 6.3 volts.

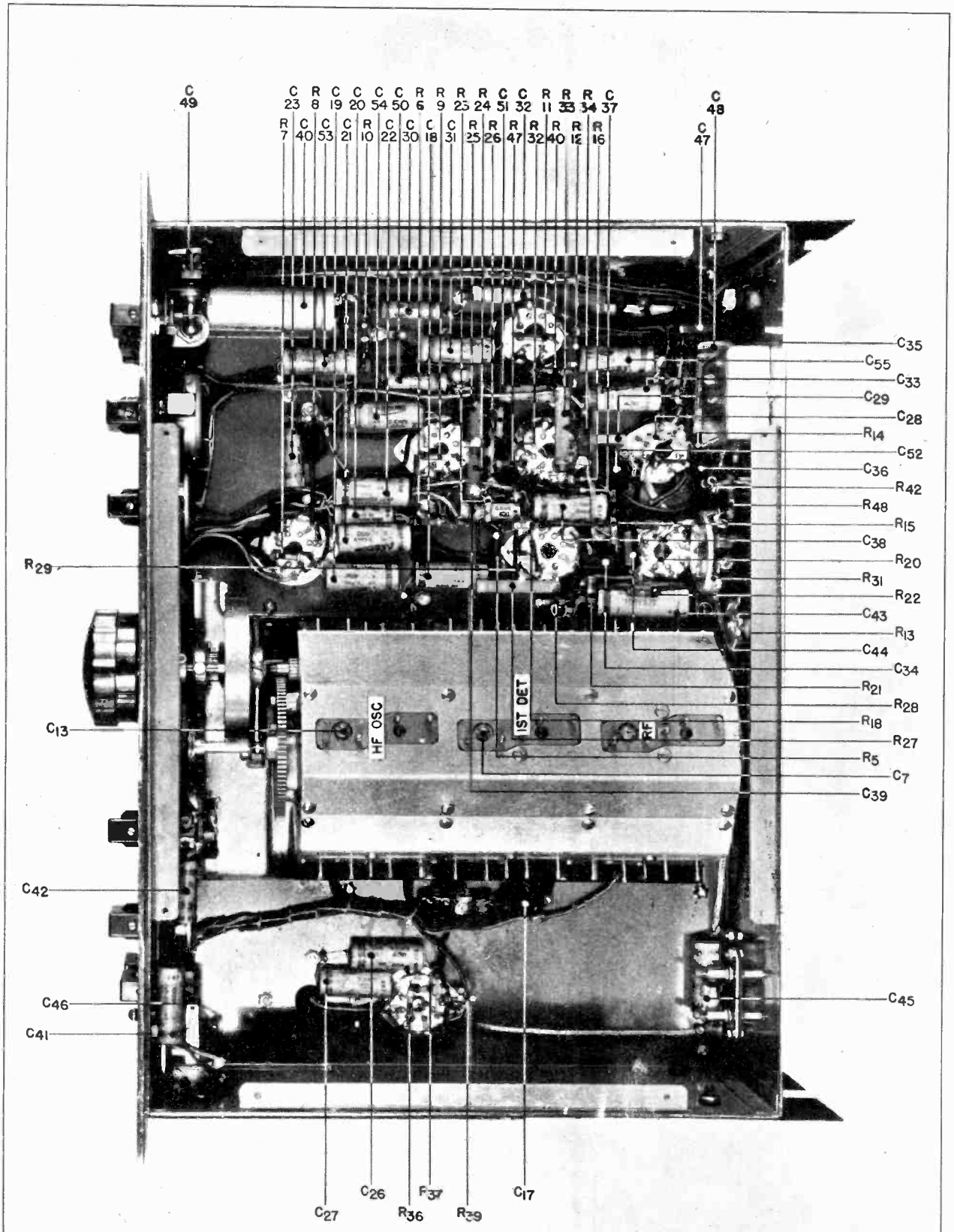
Battery model NHU receivers may be operated with 180 volts of B supply, with a current drain of 60 ma.

The input impedance of the receiver averages about 500 ohms and an open wire transposed line, constructed to have this impedance, will probably give best performance. Such a line may consist of two No. 10 wires spaced 1½ inches apart; two No. 14 wires spaced 2 inches apart may be used as an alternative.

The maximum undistorted audio output of the NHU is about 2 watts. Speaker terminals are provided at the rear of the receiver. The speaker is connected directly in the plate circuit of the 6V6G output tube and the speaker coupling transformer should, therefore, be designed to have an impedance of 5000 ohms. It should also be capable of carrying the 45 milliampere plate current of the output tube.

MODEL NHU

NATIONAL CO., INC.



Alignment and Service Data

TUBES

Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed to reduce the effect of such variations to a minimum, the high frequency oscillator and I.F. tubes should be selected with some care. A replacement high frequency oscillator should be checked in the receiver to make sure that the inter-electrode capacities are the same as those of the tube originally employed. This is easily determined by noting any change in calibration at the high frequency end of any coil range. The change should not exceed four or five dial divisions on the vernier scale.

Substitution of new tubes in the I.F. amplifier may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in the following pages.

Two other points should be checked when trying the new high frequency oscillator; a fairly strong steady signal should be tuned in, preferably on some frequency above 50 mc.; the C.W. oscillator should be turned off; jarring the receiver or lightly tapping the tube, should not show any evidence of noise in the output. Next turn on the C.W. oscillator to make sure that the tube does not introduce "modulation hum" on the carrier. The tube should again be lightly tapped to see whether or not its characteristics change.

R.F. AND H.F. OSCILLATOR ALIGNMENT

All circuits are carefully and accurately aligned before shipment, using precision crystal oscillators which insure close conformation to the dial calibration. No readjustments will be required, therefore, unless the receiver is subjected to extremely rough handling. Do not attempt to make any adjustments without first determining the exact function of each trimmer condenser and the effect that it will have upon performance.

The coil group which is plugged into the circuit at any time is the one directly underneath the contact strips of the R.F. sub-assembly. The coil nearest the front of the receiver is the H.F. oscillator, the middle coil is the first detector and the coil nearest the antenna terminal strip is the R.F. preselector. Complete alignment for any one coil range is apt to be rather complicated and it is recommended that the operator make no adjustments on the coils themselves. Even the conventional trimmer adjustments require considerable care and should not be attempted by anyone who has not had a great deal of practical experience with high frequency equipment. It should be kept in mind that the capacities and inductances employed in these high frequency circuits are extremely small. Leads to the contact terminals, variable condensers and tubes should not be moved or bent indiscriminately. Furthermore, hand capacity effects are very noticeable when making the trimmer adjustments and it will usually be found necessary to turn any given trimmer condenser to a slightly higher capacity than that which appears to give maximum response because the total circuit capacity will decrease appreciably when the screw driver is released from the trimmer shaft.

If it is found necessary to readjust any coil range of the NHU, the following procedure is recommended. Set the tuning dial near the high frequency end of the range and check the frequency reading by means of an accurate test oscillator or signal generator. Readjustment should be made if the dial is in error by more than about 1%. Correction of calibration is made by adjusting the high frequency oscillator trimmer, which is located underneath the contact terminal strip nearest the front of the receiver. It may be reached from the top of the chassis by means of a 6" or 8" metal screw driver, preferably having a shaft diameter of about 3/16". A screw driver with a metal shaft must be used since the trimmer condenser turns with difficulty but the shaft must not touch any of the metal parts of the receiver when making the adjustment. If the dial reading is found to be too low, more trimmer capacity is needed and vice versa. In adjusting the first detector trimmer in the middle compartment, no signal is necessary, correct alignment being indicated by maximum background noise. This background noise should be fairly loud when the R.F. and audio gain controls are fully advanced, the crystal filter being adjusted for minimum selectivity. Furthermore, the background noise will be approximately the same on all ranges. After the first detector trimmer is adjusted, the R.F. trimmer panel control should be checked to see that the R.F. circuits resonate properly, resonance being indicated by an increase in background noise. It may be advisable to use a test signal at this point since the correct R.F. trimmer adjustment is sharper than the peak in background noise would indicate. There are no internal trimmers on the R.F. coils which require adjustment.

With the receiver correctly aligned at the high frequency end of the range, the dial should be rotated towards the low numbers. The background noise may vary slightly over the range but should not change by more than 2 to 1 when progressing across the major portion of the dial. Ganging is checked by pressing one of the outside rotor plates of the gang condenser sideways towards the stator but not enough to make the plates touch. Any change in the position of the rotor plates on either the oscillator or detector condenser section should make background noise definitely weaker. The ganging of the R.F. stage can be checked by noting any change in the position of the R.F. trimmer control. Such a change at this point is relatively unimportant and does not indicate the need for realignment.

In making the initial adjustments on the high frequency oscillator and detector circuits, care must be taken to avoid the image frequencies. The oscillator normally works on the high frequency side of the signal circuits and the test signal will, therefore, appear as an image at a lower dial reading (where the oscillator moves to the low frequency side). The image will show up approximately 3.1 Mcs. lower since the intermediate frequency of the NHU is 1560 kc. It was previously stated that the alignment of the receiver should be correct to about 1% at the high frequency end of any range. The error may be somewhat greater at the center or low frequency dial readings since the receiver is adjusted at the factory for accurate ganging and best performance rather than for exact conformation to the dial scale.

I.F. AND CRYSTAL ALIGNMENT

The frequency to which the I.F. amplifier is tuned is determined by a quartz crystal built into the crystal filter unit. It is extremely important, therefore, that I.F. transformers be tuned exactly to the crystal frequency since the latter is not adjustable. The alignment process differs slightly from that ordinarily employed since the test oscillator or signal generator must first be tuned to the fundamental frequency of the crystal. This frequency is normally 1560 kc. in the NHU but may vary a few kilocycles in either direction.

With a test oscillator connected to the grid of the first detector tube and with the crystal filter adjusted for maximum selectivity, the phasing control being set at 5, the frequency of the test oscillator should be adjusted to give maximum output, as indicated on an output meter connected to the speaker terminals. The A.V.C. switch should be off and the R.F. and A.F. gain controls fairly well advanced. Any coil range may be connected and the setting of the tuning condenser is unimportant.

When using a modulated test signal, the high selectivity of the filter circuits will, under certain conditions, give a triple response since it is possible to separate the carrier frequency from the two side band frequencies. It is usually preferable, therefore, to employ an unmodulated signal, obtaining the necessary audio output by using the beat frequency oscillator. After the crystal peak has been found by carefully tuning the test oscillator in the neighborhood of 1560 kc. the seven I.F. adjustments should be made to give maximum sensitivity. The order in which the adjustments are made is not important. The locations of these adjustments are indicated in the top view photograph and are numbered from one to seven.

Since the I.F. transformers are tuned with air-dielectric condensers, the adjustments are permanent and need only be checked when new tubes are installed, provided, of course, the receiver is **not** subjected to severe mechanical shocks or vibration.

THE C.W. OSCILLATOR

With the I.F. amplifier correctly aligned to the crystal the C.W. oscillator panel control should be turned to zero. This adjustment should give zero beat with the test signal but if it does not it is only necessary to readjust either No. 8 or No. 9 trimmer.

S-METER ADJUSTMENT

With the R.F. gain control set at any position below 9, the S-meter is disconnected and should read zero. If it does not, it will be necessary to reset the zero adjustment on the meter itself. Advancing the R.F. gain control from 9 to 10 (with A.V.C. off) switches the meter into the circuit and in the absence of any signal or noise the meter should still read zero. If such is not the case readjust control R_{13}, as indicated in the photographs. Line voltage variations of 10 or 15 volts will cause the meter pointer to shift from zero about one division, and compensation may be effected if desired by readjustment of the same control. Similarly, substitution of any tubes in the I.F. amplifier, particularly in the third I.F. stage, will change the zero reading of the meter and compensation is made in the same manner.

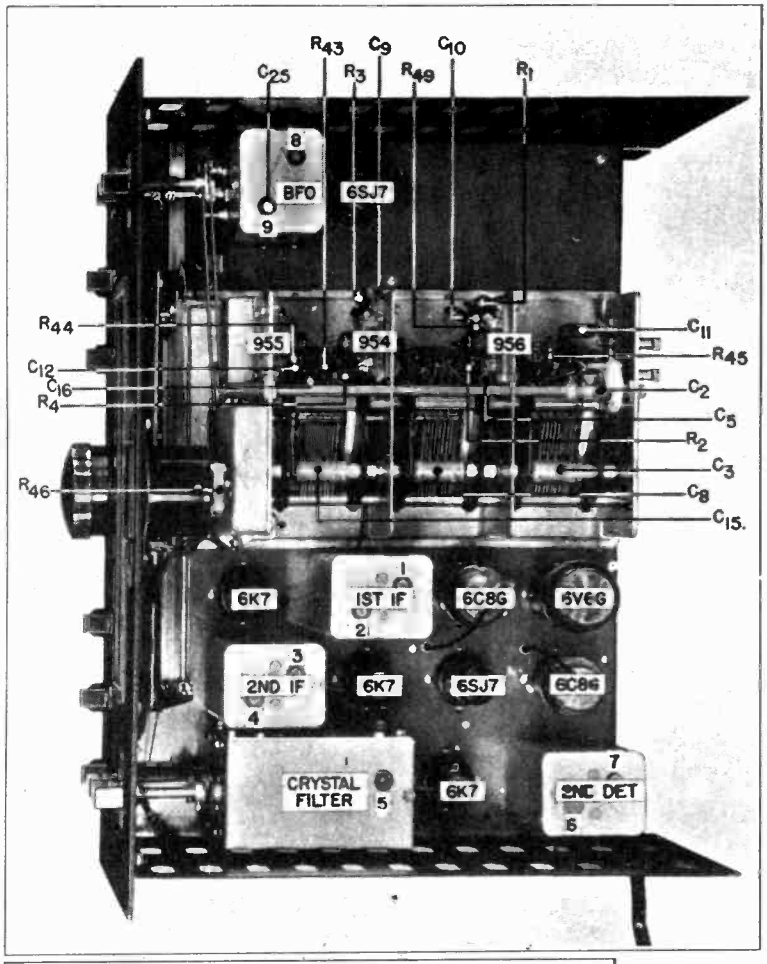
C.O.N.S. ADJUSTMENT

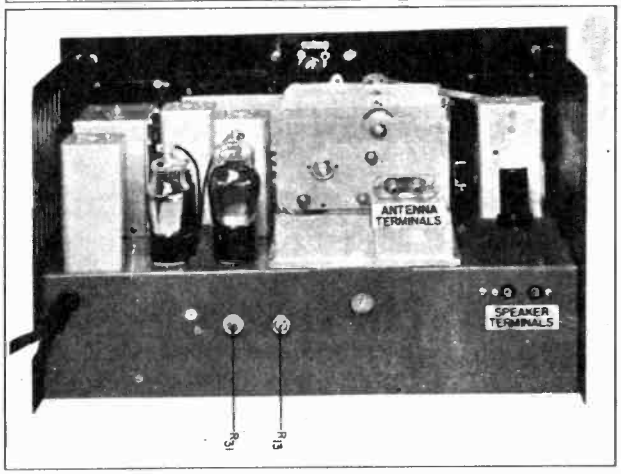
Before using the NHU with C.O.N.S. it is necessary to adjust the threshold signal level to which the squelch circuits respond. To do this the receiver must be set up in its normal operating position with the receiver antenna connected. The R.F. gain control

CONTINUED ON NEXT PAGE

MODEL NHU

NATIONAL CO., INC.





should be advanced to 9 and the receiver tuned to the operating frequency. The R.F. trimmer must be correctly resonated and the selectivity control set between 7 and 8 for maximum band width. The phasing control should be set at its normal operating position; the adjustment of the A.F. gain, tone and limiter controls is unimportant. The A.V.C.-C.O.N.S. switch should now be thrown to the "on" position and the threshold level adjustment, R_{31}, turned counterclockwise until the noise drops out. The control must not be retarded any farther than is necessary for the receiver will not respond to the desired signal. This point should be carefully checked by tuning in the signal with C.O.N.S. off and then turning it on to make sure that the signal is not squelched. The amount of leeway can be easily determined by retarding the R.F. gain control until the signal drops out. Ordinarily, the receiver will be operated with the R.F. gain control advanced to 9.

MISCELLANEOUS

There are a few additional points relating to the operation of the crystal filter which should be mentioned. Inasmuch as the A.V.C. circuits are actuated by the I.F. signal at the 2nd detector, it is essential that the desired station be very carefully and accurately tuned. If this is not done, the action of the selectivity control will appear to be restricted. Suppose, for instance, a signal is being received with the selectivity pointer set at minimum selectivity; readjusting the control to increase selectivity should, of course, reduce the strength of the signal due to side band cutting and should weaken the high audio frequencies. If the signal is tuned slightly off the center of the carrier, changing the selectivity control setting will result in greater audio output, since the fundamental I.F. signal reaching the 2nd detector will be decreased and the A.V.C. circuits will automatically increase the circuit again. Furthermore, the "tone control" effect, noted above, will be absent; in fact the high audio frequencies may be increased in volume. These effects are mentioned because they are apt to be confusing when the receiver is first put in operation. The obvious way of avoiding them is to tune in the signal with the control set near maximum selectivity and then readjust the selectivity knob, as may be required by receiving conditions.

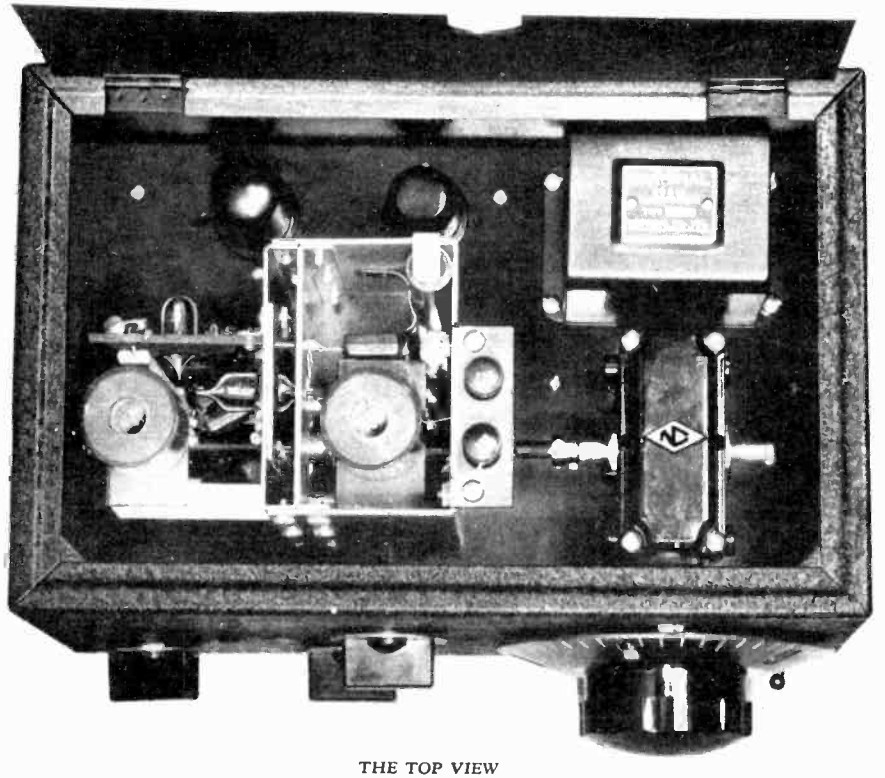
The setting of the phasing condenser will modify the range of selectivity. With the phasing condenser set near either end of its range (as would be required to eliminate an interfering signal close to the desired signal) it will not be possible to obtain knife-edge selectivity. There will still be a very definite single signal effect but modulation side bands will be passed through the filter since the capacity bridge circuit is unbalanced. This is a fundamental consideration and holds true in either phone or C.W. reception with A.V.C. either on or off.

CONDENSER AND RESISTOR LIST

Symbol	Function	Type	Rating
C_1	R.F. Padding	Fixed Mica	See Note No. 1.
C_2	R.F. Trimmer	Variable Air	15 mmf. max.
C_3	R.F. Tuning	Ganged Section	8–40 mmf.
C_4	R.F. Grid Return	Fixed Mica	.008 mfd. 500 Volt
C_5	R.F. Cathode Bypass	Tubular	.01 mfd. 400 Volt
C_6	R.F. Coupling	Fixed Ceramic	See Note No. 1.
C_7	1st Det. Trimmer	Variable Air	See Note No. 1.
C_8	1st Det. Tuning	Ganged Section	8–40 mmf.
C_9	1st Det. Cathode Bypass	Tubular	.01 mfd. 400 Volt
C_{10}	R.F. B+ Bypass	Tubular	.01 mfd. 400 Volt
C_{11}	R.F. AVC Bypass	Fixed Mica	.003 mfd. 500 Volt
C_{12}	H.F. Osc. Grid	Fixed Mica	100 mmf. 500 Volt
C_{13}	H.F. Osc. Trimmer	Variable Air	See Note No. 1.
C_{14}	H.F. Osc. Padder	Fixed Ceramic	See Note No. 1.
C_{15}	H.F. Osc. Tuning	Ganged Section	8–40 mmf.
C_{16}	H.F. Osc. Filter	Fixed Mica	250 mmf. 500 Volt
C_{17}	R.F. Filter	Fixed Mica	.003 mfd. 500 Volt
C_{18}	1st Det. B+ Bypass	Tubular	.1 mfd. 400 Volt
C_{19}	1st I.F. Cathode Bypass	Tubular	.1 mfd. 400 Volt
C_{20}	1st I.F. Grid Filter	Tubular	.01 mfd. 400 Volt
C_{21}	1st & 2nd I.F. Screen Bypass	Tubular	.1 mfd. 400 Volt
C_{22}	2nd I.F. Catliode Bypass	Tubular	.1 mfd. 400 Volt
C_{23}	2nd I.F. Grid Filter	Tubular	.01 mfd. 400 Volt
C_{24}	BFO Grid	Fixed Mica	100 mmf. 500 Volt
C_{25}	BFO Tuning	Variable Air	4 mmf.
C_{26}	BFO Heater Bypass	Tubular	.1 mfd. 400 Volt
C_{27}	BFO Screen Bypass	Tubular	.1 mfd. 400 Volt
C_{28}	BFO-2nd Det. Coupling	Special	2 mmf.
C_{29}	AVC Coupling	Fixed Mica	50 mmf.
C_{30}	3rd I.F. Grid Filter	Tubular	.01 mfd. 400 Volt
C_{31}	3rd I.F. Cathode Bypass	Tubular	.1 mfd. 400 Volt
C_{32}	3rd I.F. Heater Bypass	Tubular	.01 mfd. 400 Volt
C_{33}	3rd I.F. Plate Filter	Tubular	.1 mfd. 400 Volt
C_{34}	Limiter Control Bypass	Fixed Mica	.003 mfd. 500 Volt
C_{35}	2nd Det. Coupling	Metal Cased	1 mfd. 200 Volt
C_{36}	2nd Det. Cathode	Mica	100 mmf. 500 Volt
C_{37}	Limiter Output Bypass	Mica	100 mmf. 500 Volt
C_{38}	Limiter Output Blocking	Tubular	.1 mfd. 400 Volt
C_{39}	1st A.F. Grid Coupling	Tubular	.01 mfd. 400 Volt
C_{40}	1st A.F. Cathode Bypass	Electrolytic	8 mfd. 200 Volt
C_{41}	Audio Coupling	Tubular	.1 mfd. 400 Volt
C_{42}	Tone Control	Tubular	.01 mfd. 400 Volt
C_{43}	2nd A.F. Cathode	Electrolytic	25 mfd. 50 Volt
C_{44}	2nd A.F. Screen	Mica	.003 mfd. 500 Volt
C_{45}	Spkr. B+ Bypass	Tubular	.1 mfd. 400 Volt
C_{46}	B+ Switch Bypass	Mica	.003 mfd. 500 Volt
C_{47}	B+ Cable Bypass	Mica	.003 mfd. 500 Volt
C_{48}	Chassis to B− Bypass	Electrolytic	25 mfd. 50 Volt
C_{49}	CONS Switch Bypass	Mica	100 mmf. 500 Volt
C_{50}	AVC Filter	Tubular	.01 mfd. 400 Volt
C_{51}	AVC Plate Bypass	Tubular	.01 mfd. 400 Volt
C_{52}	AVC Cathode Bypass	Fixed Mica	.003 mfd. 500 Volt
C_{53}	I.F. B+ Bypass	Tubular	.1 mfd. 400 Volt
C_{54}	Heater Bypass	Tubular	.1 mfd. 400 Volt
R_1	R.F. Bias	Fixed	500 ohms ½ Watt
R_2	R.F. Screen	Fixed	50,000 ohms ½ Watt
R_3	1st Det. Bias	Fixed	5,000 ohms ½ Watt
R_4	1st Det. Screen	Fixed	250,000 ohms ½ Watt
R_5	1st Det. Plate Filter	Fixed	2,000 ohms ½ Watt
R_6	1st I.F. Grid Filter	Fixed	500,000 ohms ½ Watt
R_7	1st I.F. Bias	Fixed	500 ohms ½ Watt
R_8	2nd I.F. Grid Filter	Fixed	500,000 ohms ½ Watt
R_9	2nd I.F. Bias	Fixed	500 ohms ½ Watt
R_{10}	3rd I.F. Grid Filter	Fixed	500,000 ohms ½ Watt
R_{11}	3rd I.F. Bias,	Fixed	500 ohms ½ Watt
R_{12}	3rd I.F. Screen Filter	Fixed	2,000 ohms ½ Watt
R_{13}	S-Meter Adjustment	Variable	1,000 ohms 1 Watt
R_{14}	2nd Det. Load	Fixed	20,000 ohms ½ Watt
R_{15}	Limiter Input	Fixed	100,000 ohms ½ Watt
R_{16}	Limiter Output	Fixed	50,000 ohms ½ Watt
R_{17}	Audio Gain Control	Variable	500,000 ohms
R_{18}	1st A.F. Plate	Fixed	100,000 ohms ½ Watt
R_{19}	Tone Control	Variable	500,000 ohms
R_{20}	Degeneration	Fixed	1 meg. ½ Watt
R_{21}	2nd A.F. Grid	Fixed	500,000 ohms ½ Watt
R_{22}	2nd A.F. Bias	Fixed	250 ohms ½ Watt
R_{23}	S-Meter Bridge	Fixed	1,000 ohms ½ Watt
R_{24}	Voltage Divider	Fixed	5,000 ohms 1 Watt
R_{25}	Voltage Divider	Fixed	5,000 ohms 1 Watt
R_{26}	1st A.F. Bias	Fixed	150 ohms ½ Watt
R_{27}	Voltage Divider	Fixed	15,000 ohms 2 Watt
R_{28}	Voltage Divider	Fixed	1,500 ohms ½ Watt
R_{29}	CONS Plate	Fixed	500,000 ohms ½ Watt
R_{30}	Noise Limiter Control	Variable	10,000 ohms
R_{31}	CONS Threshold Control	Variable	10,000 ohms
R_{32}	AVC Plate	Fixed	500,000 ohms ½ Watt
R_{33}	Voltage Divider	Fixed	1,500 ohms 2 Watt
R_{34}	AVC Bias (Voltage Div.)	Fixed	200 ohms 1 Watt
R_{35}	AVC Grid	Fixed	5 meg. ½ Watt
R_{36}	BFO Screen Bleeder	Fixed	100,000 ohms ½ Watt
R_{37}	BFO Screen	Fixed	100,000 ohms ½ Watt
R_{38}	BFO Grid Leak	Fixed	50,000 ohms ½ Watt
R_{39}	BFO Plate	Fixed	250,000 ohms ½ Watt
R_{40}	R.F. Gain Bleeder	Fixed	50,000 ohms ½ Watt
R_{41}	R.F. Gain Control	Variable	10,000 ohms
R_{42}	S-Meter Bridge	Fixed	1,500 ohms ½ Watt
R_{43}	HFO Plate Filter	Fixed	5,000 ohms ½ Watt
R_{44}	HFO Grid Leak	Fixed	20,000 ohms ½ Watt
R_{45}	R.F. Grid Filter	Fixed	500,000 ohms ½ Watt
R_{46}	S-Meter Shunt	Fixed	130 ohms ½ Watt
R_{47}	AVC Filter	Fixed	500,000 ohms ½ Watt
R_{48}	CONS Threshold	Fixed	25,000 ohms ½ Watt
R_{49}	R.F. Plate Filter	Fixed	2,000 ohms ½ Watt

Note No. 1. — Condensers C_1, C_6, C_7, C_{13} and C_{14} are different in each coil range and are individually adjusted as circuit conditions may require. Definite ratings cannot be listed.

The 1-10
Ultra High Frequency Receiver



THE TOP VIEW

Note the double-shielding between the R.F. and detector circuits, and the unique arrangement of parts

Tubes and Power Supply

THE Type "1-10" receiver employs a 4-tube circuit, consisting of one stage of tuned R.F., a self-quenching superregenerative detector, transformer coupled to a first stage of audio which, in turn, is resistance coupled to a power output stage.

The tubes employed are as follows:

954 — R.F.
955 — Detector
6C5 — First Audio
6F6 — Second Audio

The receiver is designed for operation from the National Type No. 5886 AB power unit, all voltage dividers, etc., being built in so that but one B-voltage lead is necessary. This power supply furnishes six volts at 1.6 amperes to the heater circuit and 180 volts at 35 milliamperes to the plate and screen circuits. If desired, the heaters may be supplied from a 6-volt battery and the B-circuits from B-batteries. Voltages in excess of 180 are not recommended and receiver performance will be unsatisfactory on the "A" range at voltages below 167. If lower voltages must be used, as in portable operation, the 20,000 ohm resistor connected between the B+ lead and the regeneration control and the 35,000 ohm screen dropping resistor of the R.F. stage, may both be shorted out. This will allow the receiver to function normally with a maximum voltage of 90, but with reduced audio output. A 3-volt C-battery is used to supply bias to the R.F. tube. This battery is mounted in the rear righthand corner of the R.F. compartment, being held in place by a spring clip. Two Eveready Type 915 cells, or equivalent, are needed. They are mounted in a bakelite tube and the positive (center) terminal of the upper cell is grounded at the top by a retaining bracket.

Antenna

The importance of an efficient antenna cannot be over emphasized. The antenna lead, or leads, should be brought directly to the antenna binding posts at the top of the receiver. They may be threaded through the hole in the cover and arranged so that the cover may be opened for changing coils.

A small flexible lead will be found connected to the front antenna post. This supplies a ground connection where a single-wire antenna is used. It should be disconnected from the binding post when doublet feeders or two-wire lines are employed. An external ground connection is usually undesirable, but this point must be determined by experiment.

While the antenna primaries are of symmetrical construction, mechanical considerations prevent exact balance to ground, and there is some capacity coupling between the windings, especially at the higher frequencies.

Exact recommendations for antenna systems cannot be given, since the dimensions will depend upon the frequency at which best efficiency is desired, directional characteristics, etc. In general, however, the antenna proper should be tuned to the received signal. In many installations this condition may be satisfactorily realized by tuning the feeders with series or parallel condensers. The size of the tuning condensers will depend upon the frequency of the received signal and upon antenna dimensions. The transmission line must be efficient. As a rule, "twisted pair", or similar lines, are not satisfactory at frequencies much above 40 or 50 mc., especially where the length exceeds a full wavelength. The open wire or transposed line is much better.

Another general rule regarding antennae, is that any system which is found to be efficient in transmission will have good efficiency with the same directional characteristics, etc., in reception.

Output Circuit and Speaker

The plate circuit of the output tube is brought to the output jack, located at the rear lefthand side. There is no output transformer in the receiver. The speaker requirements are not at all critical, any good magnetic or dynamic speaker being satisfactory provided the input impedance is approximately 7000 ohms, and provided the speaker windings are capable of carrying the plate current of the output tube (about 25 ma.). Some magnetic speakers will require a filter system, such as a 1 to 1 transformer or a 30 henry choke and 1. mfd. condenser combination. There is no provision for the field excitation of a dynamic speaker from the Type No. 5886 AB power unit. For this reason, the permanent magnet type of dynamic speaker is recommended, no field excitation being required.

The headphone jack is located on the front panel, just below and to the left of the main dial. This jack is wired into the output of the first audio stage in such a way that when the phones are plugged in, the signal input to the last tube is completely disconnected. *It is important, however, that the plate circuit of the output tube be complete at all times.* If the speaker is to be disconnected, a jumper must be inserted in the tip-jacks to connect them together. The receiver should not be operated from the above mentioned power supply with the output tube removed, as the voltage might rise above 180 volts. When operated from batteries, the removal of the 6F6 is permissible and will give better battery economy.

Controls

The main dial is the tuning control; calibration curves for the various coils are shown on page 7. The curves are accurate to about three percent. It will be noted that frequency increases with dial reading.

The switch at the lower righthand corner breaks the positive B-supply lead and is useful for temporarily rendering the receiver inoperative during periods of transmission or when changing coils. When using B-battery plate supply, the switch should be thrown to the "Off" position at all times when the receiver is not in use, in order to avoid parasitic drain. No switch is provided for opening the heater circuit.

There are three small dials in addition to the main tuning dial. These control detector regeneration, audio gain, and the alignment of the R.F. circuit, and are marked accordingly.

Operating Characteristics

The "1-10" receiver is designed primarily for the experimenter and to this end has been made to have maximum sensitivity and a wide frequency range. The use of a self-quenching superregenerative detector with a stage of tuned R.F. provides excellent sensitivity and AVC action. Unfortunately, this type of detector introduces some distortion, since it does not have a linear characteristic. The distortion is small when signals are not modulated heavily, and increases with the percentage of modulation.

The various coils are stamped "A-1", "A-2", "B-1", "B-2", etc. They are used in pairs. The coil sockets of the R.F. and detector stages are marked "1", and "2", respectively, to correspond with the coil designations. The high frequency coils, (particularly the "A-1") must be pushed down in the socket as far as they will go. If they are not, the inductance of the primary and secondary circuits will be increased and the calibration of the circuit will be altered.

With any pair of coils in the receiver, the audio gain control should be advanced to 3 or 4 on the dial. Advancing the regeneration control will throw the detector circuits into superregeneration. This condition is indicated by a loud rushing or hissing noise. The hiss will drop down to a very low level or disappear entirely when a signal is tuned in, the reduction depending somewhat upon signal strength. The setting of the regeneration control at which the detector goes into superregeneration will vary with different sets of coils and with the condition of the 955 detector tube. On the "A" range it may be necessary to advance the control to the full on position as the detector tube begins to wear out. Sensitivity will depend upon the adjustment of the regeneration control, the maximum occurring just beyond the point where the hiss starts. The audio gain control must be used to control volume.

With the antenna disconnected and the detector just beyond the point at which superregeneration starts, rotation of the R.F. trimmer control will produce a definite decrease in the detector hiss at a certain setting, usually between 2 and 4. The R.F. circuit is aligned with the detector at the middle of this "dead spot". Advancing the regeneration control will start the hiss again. It is well for the operator to familiarize himself with the effect of these two controls as one is dependent upon the other.

The regeneration control has some tuning effect, increased plate voltage causing an increase in frequency. This necessitates re-tuning toward the lower dial numbers. The effect will vary with the coils employed and the dial setting. Similarly, the effect of the trimmer condenser will vary over the range of the receiver and also over the range of any one pair of coils. With any type of antenna connected, even a few inches of wire, the effect of the R.F. trimmer upon the detector circuit will be greatly reduced if not eliminated. It may still be found by operating the detector at the very edge of superregeneration. The trimmer setting is still critical with regard to the receiver sensitivity, however. The alignment of the trimmer will change with the dimensions of the antenna and also with the tuning of the receiver when using an antenna of fixed size. The setting which aligns the R.F. stage may move in either direction on the trimmer dial, depending upon antenna characteristics.

In determining the correct trimmer setting, when a signal is already tuned in, the operator should judge by the degree of hiss suppression, the maximum suppression indicating correct alignment.

It is important that the regeneration control be advanced sufficiently so that the detector is oscillating strongly. If it is not, any received signal will appear to have a series of carriers a few k.c. apart over several divisions of the tuning dial.

The operator who is not familiar with the PW type dial and tuning mechanism may gain the impression that the receiver tunes very broadly. A superregenerative receiver is, of course, less selective than other types used on lower frequencies but selectivity cannot be judged by the dial space covered by a given signal unless the total equivalent scale length is remembered. Since the dial makes ten revolutions to cover any one coil range, the scale length is approximately 12 feet.

Maintenance

There are no circuit adjustments or trimmer settings to be made, other than those which are brought out to the front panel and which have been previously discussed.

The effect of decreasing battery voltages (both A and B) and ageing tubes will first be noticed when using the "A" coils, particularly at the extreme ends of the range. A 955 detector tube which will no longer operate on the "A" range will still give good performance at lower frequencies. Similarly, any poor connection at the tube socket or coil socket will be especially noticeable at the highest frequencies. In fact, the detector may refuse to go into superregeneration unless the coil contacts, etc., are perfectly clean.

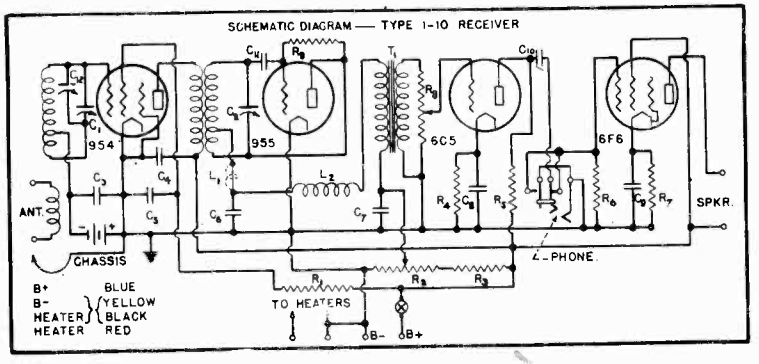
It will be noted that the variable condenser supports, coil sockets, and coil bases, etc. are made of Victron, and while this material has exceptional electrical characteristics, it is similar to hard rubber in mechanical strength and its inability to withstand heat. The receiver should not, therefore, be subjected to high temperatures and the Victron parts must be handled with reasonable care to prevent breakage.

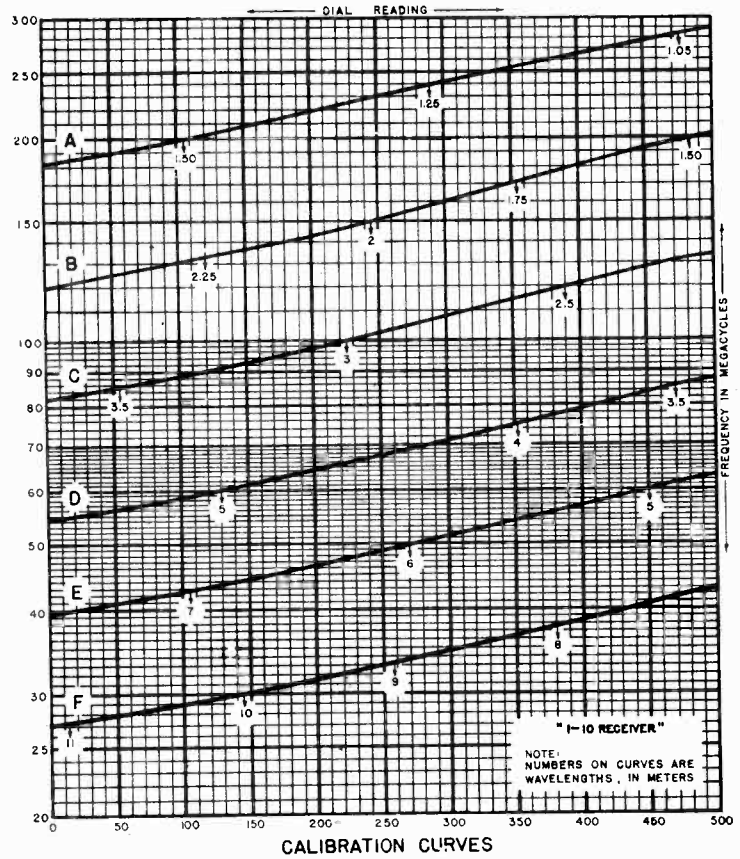
The C-battery does not supply any current and will require replacement but about once a year.

Additional coils for extending the range in either direction are not available.

List of Parts

C_1	R.F. Tuning Condenser	15 mmf. max.
C_2	Detector Tuning Condenser	15 mmf. max.
C_3	R.F. Grid Return Bypass	.002 mfd.
C_4	R.F. Plate Return Bypass	.003 mfd.
C_5	Screen Bypass (copper plate)	.0005 mfd.
C_6	Quench Frequency Bypass	.003 mfd.
C_7	Detector B+ Bypass	.5 mfd. — 200 volt
C_8	1st Audio Cathode Bypass	10 mfd. — 50 volt
C_9	2nd Audio Cathode Bypass	10 mfd. — 50 volt
C_{10}	Audio Coupling Condenser	1 mfd. — 400 volt
C_{11}	Detector Grid Condenser	.00005 mfd.
C_{12}	R.F. Trimmer Condenser	5 mmf. max.
R_1	Screen Dropping Resistor	35,000 ohms — ½ watt
R_2	Regeneration Control	50,000 ohm Potentiometer
R_3	Detector Plate Dropping Resistor	20,000 ohms — 1 watt
R_4	1st Audio Bias Resistor	5,000 ohms — ½ watt
R_5	1st Audio Plate Resistor	.1 megohm — ½ watt
R_6	2nd Audio Grid Leak	.5 megohm — ½ watt
R_7	2nd Audio Bias Resistor	500 ohms — 1 watt
R_8	Audio Gain Control	500,000 ohm Potentiometer
R_9	Detector Grid Leak	20 megohms
L_1	Ultra-audion Choke — Used only on Higher Frequency Ranges	250 millihenries
L_2	Quench Frequency Choke	4:1 Ratio
T_1	Audio Transformer	





ANTENNA input terminals are located at the rear left side of the receiver chassis. The input circuit is suitable for use with a single-wire antenna, a balanced feed line or a low impedance concentric transmission line. A short flexible grounding lead is attached to the chassis.

When using a single-wire antenna, the lead-in should be connected to the input terminal nearest the front of the receiver and the flexible lead, mentioned above, should be attached to the other terminal. The dimensions of the single-wire antenna system are not critical, the recommended length, including lead-in, being 75 to 100 feet.

Feed lines of doublet systems should be connected to the two input terminals; the flexible lead is not used.

The inner conductor of a concentric transmission line should be connected to the input terminal nearer the front of the receiver. The outer conductor and the flexible grounding lead should be connected to the other terminal.

Power Requirements

The Universal Model SW-3 can be operated from either an AC source in conjunction with a National Type 5886-AB Power Unit or from a combination of batteries. When AC or battery operated using one 6C5G and two 6J7G tubes, the heater circuits require .9 amperes at 6.3 volts; a "B" supply of 135 volts is recommended: When battery operated using one 1A5G and two 1N5G tubes, the filament circuits require .15 amperes at 1.5 volts; a 90-volt "B" supply is recommended.

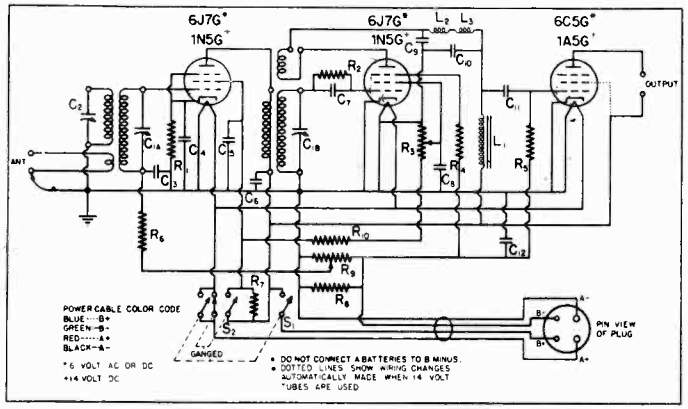
When using the 6.3-volt type tubes, the change-over switch mounted at the rear left-hand top of the chassis *must* be set in the "6.3" position. When the 1.4-volt series of tubes is used, the change-over switch *must* be set at "1.5."

A four-wire cable and plug is attached to the SW-3 Receiver. Plug prong connections are as shown in Dwg. No. 1. When AC-operated, the plug should be inserted in the output socket of the National Type 5886-AB Power Unit. When battery-operated, battery leads may be wired to a four-prong socket and the receiver cable and plug used to complete inter-connections. Alternatively, the plug may be removed and the cable leads connected directly to the battery terminals.

The National Type 686 Vibrator Pack is recommended for use with the SW-3 when a 6-volt DC source is available and when additional batteries for the "B" supply are not desirable. The plug connections of the SW-3 power cable are wired to match the output socket of the 686 Pack.

A type 6X5 tube *must* be used as a rectifier in the 686 Pack, although the rectifier socket is wired so that an OZ4 tube may be substituted without circuit changes.

Two types of commercial vibrator packs are generally available; the self-rectifier and the tube-rectifier. Of these, the latter is recommended, but only when a heater type of tube such as the 6X5 is employed. Packs having a cold-cathode gas rectifier tube such as an OZ4 cannot be used since the "B" current drain of an SW-3 is below the minimum value at which the tube functions normally.



DWG. NO. 1 — CIRCUIT DIAGRAM OF THE UNIVERSAL SW-3

C_1 — *dual variable air capacitor, 90 mmf. per section.*
C_2 — *Variable air capacitor, 50 mmf.*
C_3 — *.01-mfd., 400-volt paper capacitor.*
C_4 — *.1-mfd., 400-volt paper capacitor.*
C_5 — *.1-mfd., 400-volt paper capacitor.*
C_6 — *.1-mfd., 400-volt paper capacitor.*
C_7 — *.0001-mfd., mica capacitor.*
C_8 — *1.-mfd., 200-volt paper capacitor.*
C_9 — *.00025-mfd. mica capacitor.*
C_{10} — *.00025-mfd. mica capacitor.*
C_{11} — *.01-mfd. mica capacitor — part of coupler.*
C_{12} — *25-mfd., 50-volt elec. capacitor.*
L_1 — *700-henry choke — part of coupler.*
L_2 — *2.5-m.h. R.F. choke.*
L_3 — *5.5-m.h. R.F. choke.*
R_1 — *500-ohm, ½-watt resistor.*
R_2 — *5-megohm, ½-watt resistor.*
R_3 — *50,000-ohm potentiometer.*
R_4 — *5,000-ohm, ½ potentiometer.*
R_5 — *.25-megohm, ½-watt resistor — part of coupler.*
R_6 — *50,000-ohm, ½-watt resistor.*
R_7 — *70,000-ohm, ½-watt resistor.*
R_8 — *2,000-ohm, ½-watt resistor.*
R_9 — *3,000-ohm potentiometer.*
R_{10} — *20,000-ohm, ½-watt resistor.*
S_1 — *DPDT toggle switch.*
S_2 — *DPDT toggle switch.*

In no case should a common connection be made between B— and heater circuits. Such a connection would remove the bias voltage from the audio tube. For this reason, the heater center-tap resistor of all new Type 5886-AB Power Supplies is omitted. This omission will not affect the operation of any other National equipment for which the 5886-AB is recommended. The heater center-tap resistor must be removed from an older 5886-AB Supply when used in conjunction with a Universal Model SW-3.

R.F. Transformer Coils

Thirteen sets of plug-in coils are used to tune from 9 to 3000 meters. Five additional sets are used to bandspread the 10-, 20-, 40-, 80- and 160-meter amateur bands. See Dwgs. Nos. 2 and 3 and the coil listing

When operation on any general coverage range is desired, the proper set of coils should be plugged into the receiver coil sockets. R.F. amplifier and detector coils of Sets No. 30 to No. 35 and No. 39 to No. 41, inclusive, are identical and may be interchanged in the coil sockets of the receiver. Coils of Sets No. 36, No. 37, No. 38 and No. 42 are not interchangeable. The coil forms of these sets are marked on the bottom outside near the prongs — "D," detector coils; "R," R.F. amplifier coils.

With a band-spread range in use, the receiver will not function properly if the R.F. amplifier and detector coils are interchanged in the receiver coil sockets. The detector coil can be readily identified by the variable trimmer capacitor mounted at the top of the coil form. When the band-spread coils are used, the grid leads attached to the receiver should be removed from the tube grid caps and clipped in place on the insulated posts mounted on the sides of the metal shields next to the main tuning capacitor. The grid leads of the coils should be attached to the proper tube grid caps.

In all models of SW-3 Receivers, the R.F. amplifier coil socket is located at the left of the main tuning capacitor, as the receiver is viewed from the front; the detector coil socket is at the right side.

Controls

THE main tuning dial of the SW-3 Receiver is mounted on the front of the cabinet at the center. It is of the variable ratio type. A control lever is provided to adjust the control knob-to-capacitor drive coupling ratio to any desired point between the limits of 6 to 1 and 18 to 1. Scale graduations are from 0 to 150 divisions over the 270 degrees of rotation through which the dial turns the main capacitor. Calibration curves (Dwgs. Nos. 2 and 3) show the approximate frequency to which the receiver is tuned.

To the left of the main dial is the R.F. amplifier trimmer capacitor. This control is used to compensate for minor mistracking of the R.F. amplifier stage, as may be caused by antenna detuning. The trimmer knob should be adjusted to give maximum sensitivity, in the following manner: The regeneration control should be advanced beyond the point of detector oscillation. As the R.F. amplifier trimmer capacitor is rotated back and forth or "rocked," the regeneration control should be slowly retarded. At one adjustment of the latter, the detector will oscillate only with the R.F. amplifier trimmer set at a definite point. It is at this point that the R.F. amplifier and detector circuits track, and the receiver has maximum sensitivity.

Below the main dial is the R.F. gain control. The control disc is arbitrarily calibrated from 1 to 9. The purpose of the gain control is to adjust the amplification of the R.F. amplifier tube. Amplification increases as the control is turned toward 1. The graduated R.F. gain control makes possible reasonably accurate measurement of signal input, as follows: With the receiver tuned to either a modulated or unmodulated carrier, the R.F. gain control should be retarded until the signal is barely audible. The gain control disc number centered in the panel opening below the main dial will indicate the signal input in S units, a term commonly used by radio operators.

The regeneration control is located to the right of the main dial. It is used to adjust the voltage applied to the screen of the detector tube. As the control knob is turned in a clockwise direction, the amplification of the detector tube increases up to the point at which oscillation takes place. When receiving modulated signals (phone), best sensitivity will be had with the detector operated just below the point of oscillation. For C.W. (code) reception, the detector must be oscillating to produce a beat note, the frequency of which will be determined by the main dial setting.

At the left side center of the cabinet front panel is mounted a toggle switch. When the change-over switch mentioned under "Power Requirements" is set at "6.3," the panel toggle switch is used to open the receiver "B" circuits and silence the receiver as may be necessary during periods of transmission. With the change-over switch referred to above set at "1.5," the panel toggle switch is used as a battery ON-OFF control, opening both the filament and "B" circuits. It is also used to silence the receiver during transmission periods.

Alignment and Service

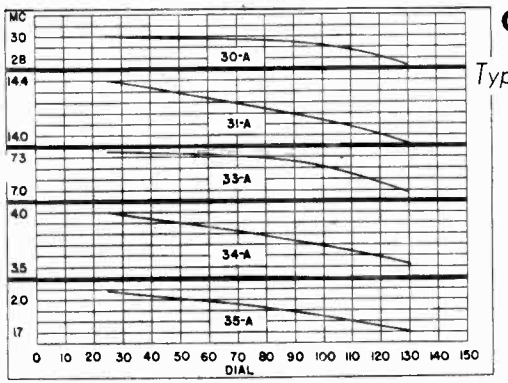
Coil Alignment

ALL SW-3 Receivers and coils are tested to laboratory standards and are, therefore, mutually interchangeable. In normal service, possible adjustment of the band-spread detector coils should be the only realignment required. The necessity for such adjustment is determined by the accuracy of receiver calibration as compared to the calibration curves Dwgs. Nos. 2 and 3.

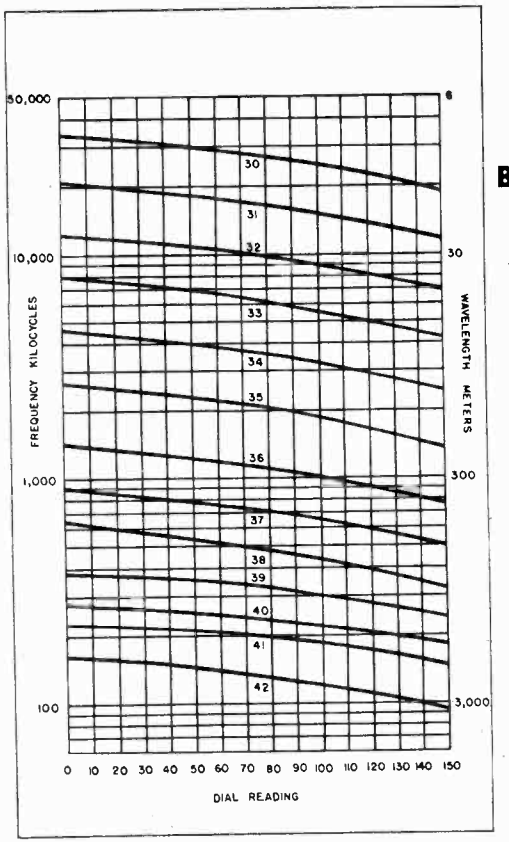
The procedure for adjusting any band-spread detector coil is as follows: With the coils to be aligned in place and with the receiver controls set for normal C.W. reception, the main dial should be tuned to the high frequency limit of the band. An accurate test oscillator or signal generator should be coupled to the receiver antenna input terminals and tuned to deliver a signal of the same frequency as indicated by the receiver dial setting. The trimmer capacitor in the detector coil should be varied until the test signal is tuned in. With this trimmer properly set, the low frequency limit should be accurate, and the R.F. amplifier and detector stages should track.

Tube and Circuit Failures

Failures can readily be located by checking the individual components, including tubes, with reliable equipment or by temporary substitution with parts known to be in good condition. A replacement detector tube should be selected with care to eliminate the possibility of trouble from microphonics, hum modulation, or instability of signals.



DWG. NO. 2 — BANDSPREAD COIL CALIBRATION CURVES



DWG. NO. 3 — GENERAL COVERAGE COIL CALIBRATION CURVES

General Coverage Coils:

Type No.	Range — Meters		
30	9	to	15
31	13.5	to	25
32	23	to	41
33	40	to	70
34	65	to	115
35	115	to	200
36	200	to	360
37	350	to	550
38	500	to	850
39	850	to	1200
40	1200	to	1500
41	1500	to	2000
42	2000	to	3000

Bandspread Coils:

Type No.	
30A	— 10-meter
31A	— 20-meter
33A	— 40-meter
34A	— 80-meter
35A	— 160-meter

MODEL ACSW-3
MODEL 2V DCSW-3
MODEL 6V DCSW-3

NATIONAL CO., INC.

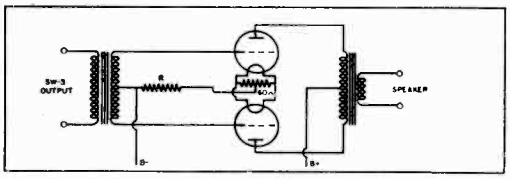
Earlier Models of SW-3

General

THE data on the Universal Model SW-3 applies, in most part, to all models of the SW-3 Receiver. Details applicable to older types only are given below.

AUDIO AMPLIFIER

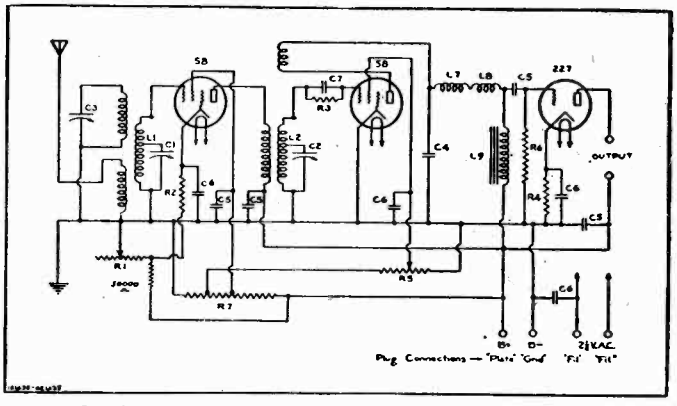
For loud speaker reception, the audio amplifier shown at the right is recommended. Resistor "R" will depend on the particular tubes employed, as follows: 2–45's, 750 ohms; 2–2A3's, 400 ohms; 2–2A5's triode connected, 350 ohms; 2–27's, 1000 ohms.



DWG. NO. 4 — CIRCUIT DIAGRAM OF AUDIO AMPLIFIER

ACSW-3 PARTS LIST

C_1 — *Dual variable air capacitor, 90 mmf. per section.*
C_2 — *Part of C_1, ganged.*
C_3 — *Variable air capacitor, 50 mmf.*
C_4 — *.00025-mfd. mica capacitor.*
C_5 — *.01-mfd. mica capacitor.*
C_6 — *.5-mfd., 200-volt paper capacitor.*
C_7 — *.0001-mfd. mica capacitor.*
L_1 — *R.F. amplifier transformer.*
L_2 — *Detector transformer.*
L_7 — *2.5-m.h. R.F. choke.*
L_8 — *5.5-m.h. R.F. choke.*
L_9 — *700-henry choke — part of coupler.*
R_1 — *10,000-ohm rheostat.*
R_2 — *300-ohm, ½-watt resistor.*
R_3 — *5-megohm, 1-watt resistor.*
R_4 — *2000-ohm, 1-watt resistor.*
R_5 — *50,000-ohm potentiometer.*
R_6 — *.25-megohm, ½-watt resistor — part of coupler.*
R_7 — *12,000-ohm voltage divider resistor — 3100, 2000, 6900-ohm sections.*



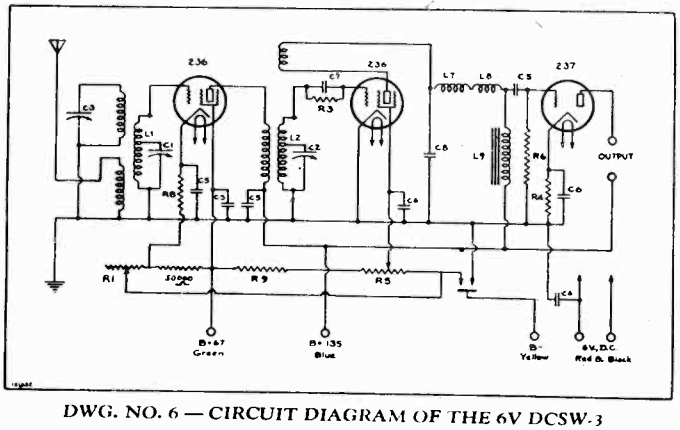
DWG. NO. 5 — CIRCUIT DIAGRAM OF THE ACSW-3

ACSW-3 Receiver

Dwg. No. 5 shows the circuit diagram and parts list. This model uses two type 58 tubes as R.F. amplifier and detector and one type 27 as audio. Heater circuits require 3.75 amps., 2.5 volts; "B" circuits, 135–180 volts D.C. "60–70" series of coils are used.

6V DCSW-3 PARTS LIST

The circuit diagram shows types 36 and 37 tubes in place for 6-volt DC operation. By simply substituting type 35 for type 36 and type 27 for type 37, the receiver may be converted to 2.5-volt AC operation, without circuit or coil changes. Circuit constants are identical with those applying to DWG. No. 5 with the following exceptions:
R_8 — *350-ohm, ½-watt resistor.*
R_9 — *20,000-ohm, 2-watt resistor.*

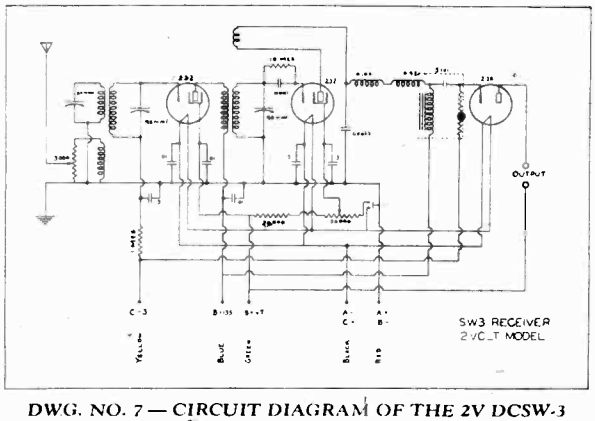


DWG. NO. 6 — CIRCUIT DIAGRAM OF THE 6V DCSW-3

6V DCSW-3 Receiver

Dwg. No. 6 shows the circuit diagram and lists values of parts. Tubes used are two type 36 as R.F. amplifier and detector and one-type 37 as audio. Heater circuits require .9 amps., 6.3 volts; "B" circuits, 67 and 135 volts DC.

If desired, type 35 tubes may be substituted for type 36 and type 27 for 37, making the receiver suitable for 2.5-volt heater operation. Heater current drain when so operated is 5.25 amps.; "B" potential, 67 and 135 volts DC. In either case. "10–20" series of coils are used.



DWG. NO. 7 — CIRCUIT DIAGRAM OF THE 2V DCSW-3

DWG. No. 7 shows the circuit and the values of component parts of the 2V DCSW-3 Receiver. This model was the preferred type for portable operation with low battery power consumption before the introduction of the Universal Model, using 1.4-volt tubes.

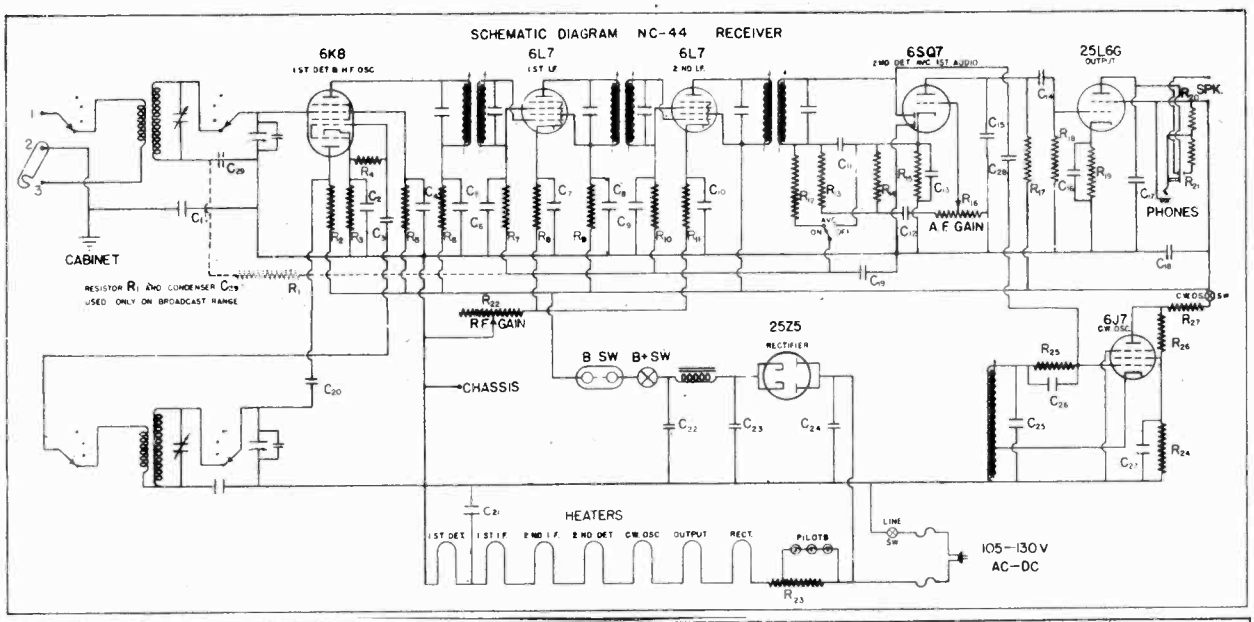
2V DCSW-3 Receiver

Dwg. No. 7 shows the circuit diagram and parts list. Two-type 32 tubes are used as R.F. amplifier and detector, one type 30 as audio. Filament circuits require .16 amps., 2 volts DC; "B" circuits, 67 and 135 volts; and bias circuits, 3 volts. "10–12" series coils are used.

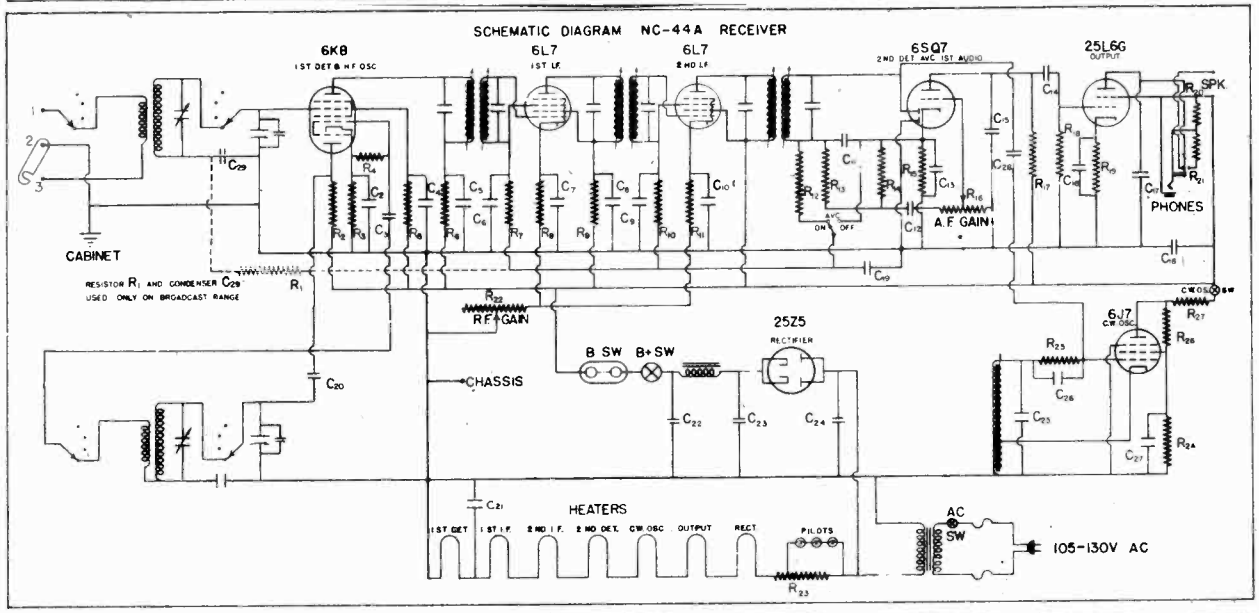
NATIONAL CO., INC.

MODEL NC-44
MODEL NC-44A
MODEL NC-44B

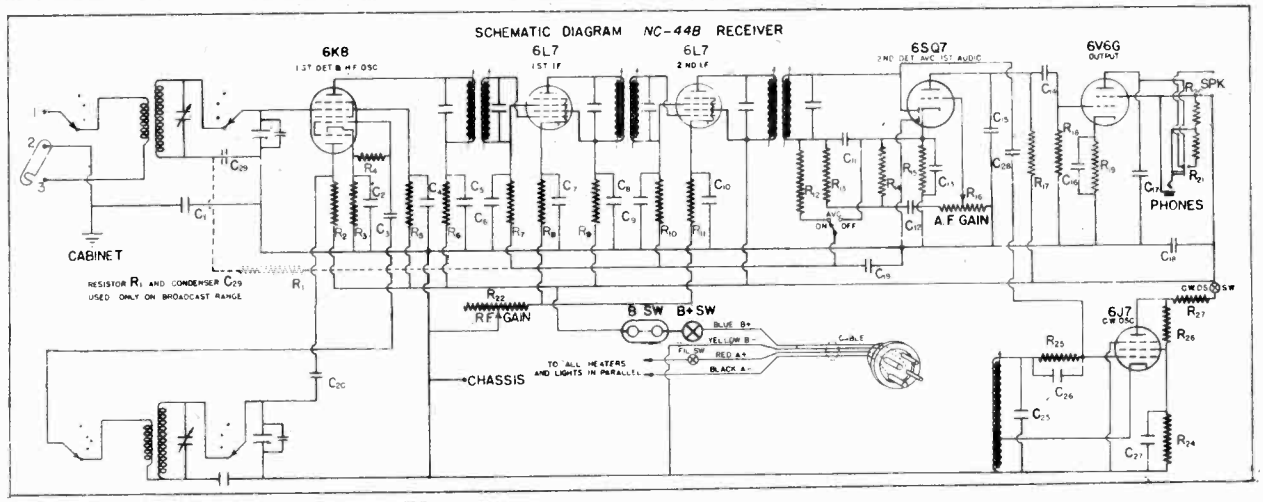
SCHEMATIC DIAGRAM NC-44 RECEIVER



SCHEMATIC DIAGRAM NC-44A RECEIVER



SCHEMATIC DIAGRAM *NC-44B* RECEIVER



IF PEAK 456 KC

PROTECTIVE DEVICES: A double fuse block is mounted underneath the chassis and contains two standard fuses designated as the type 3AG, having a rating of 2 amperes. One fuse is connected in either side of the line and will provide adequate protection against damage to the various tubes and circuit elements which might result from any short-circuit or ground.

The operator who uses break-in, or who is experimenting with various types of transmitting and receiving antennae should provide some means of preventing excessive R.F. pick-up which might harm the input circuit of the receiver. In case of doubt, it is recommended that an R.F. ammeter be connected in the antenna lead-in, or in one of the doublet feeders close to the receiver, in order to measure the actual R.F. pick-up. This current should not exceed .1 ampere.

DIAL LAMPS: From the circuit diagram, it may be seen that the dial is illuminated by three lamps connected in series across a portion of the series heater resistor. These lamps are the standard "brown bead" type, designed for 6.3 volts and drawing .15 ampere. Since they necessarily form a part of the heater circuit of the receiver, burned out lamps should be replaced promptly, for, although the receiver will not be harmed, the various tubes will not function quite as efficiently if the dial lamps are not lighted.

NATIONAL NC-44 RECEIVER

AC-DC Model

CAPACITORS

	mfd.	volts		mfd.	volts
C1-	.1	400	C15-	.0005	mica
C2-	.1	400	C16-	25.	50
C3-	.0001	mica	C17-	.001	mica
C4-	.1	400	C18-	.1	400
C5-	.1	400	C19-	.01	400
C6-	.01	400	C20-	.005	mica
C7-	.1	400	C21-	.1	400
C8-	.1	400	C22-	40	200
C9-	.01	400	C23-	40	200
C10-	.1	400	C24-	.1	400
C11-	.00025	mica	C25-	.0001	mica
C12-	.01	400	C26-	.0001	mica
C13-	25	50	C27-	.1	400
C14-	.1	400	C28-	.000002	
			C29-	.01	400

RESISTORS

	ohms	watts		ohms	watts
R1-	.5 meg-	1/2	R15-	5,000	1/2
R2-	10,000	1/2	R16-	.5 meg-	
R3-	200	1/2		A.F.Gain	
R4-	25,000	1/2	R17-	.1 meg-	1/2
R5-	1,000	1/2	R18-	.5 meg-	1/2
R6-	1,000	1/2	R19-	140	1
R7-	.5 meg-	1/2	R20-	500	1/2
R8-	300	1/2	R21-	1,000	2
R9-	1,000	1/2	R22-	10,000	
R10-	.5 meg-	1/2		R.F.Gain	
R11-	300	1/2	R23-	132	10
R12-	1. meg-	1/2	R24-	.1 meg-	1/2
R13-	.5 meg-	1/2	R25-	50,000	1/2
R14-	1. meg-	1/2	R26-	.1 meg-	1/2
			R27-	.1 meg-	1/2

THE NC-44A RECEIVER

AC Model

Recommendations pertinent to the NC-44 (AC-DC) receiver apply also to the NC-44A (AC) model, except as follows:

The NC-44A is designed for operation from 105-130 volt, 50-60 cycle lines only and draws approximately 50 watts. Attempted operation from other AC sources or from DC lines will cause serious damage to the receiver.

The schematic diagram below shows the circuit of the NC-44A model.

Parts List same as NC-44, except that C1 is not used.

THE NC-44B RECEIVER

Battery Model

The NC-44B (Battery Operated) is basically the same as the NC-44 (AC-DC) model, the power supply being omitted. In general, the data given applies to the NC-44B. Data applicable to the NC-44B only is as follows:

The tube complement is the same as the NC-44 except that a type 6V6G tube is used in the audio output stage; the rectifier tube is omitted. The heater circuit requires 2.25 amps. at 6 volts; a "B" supply of 90-135 volts is recommended. The "B" drain is approximately 40-65 milliamperes.

If desired, the NC-44B may be operated entirely from a 6-volt DC source in conjunction with a National Type 686 Vibrator Power Pack. On special order and at an increase in price, the receiver can be furnished with a built-in vibrator pack (Type NC-44BV).

Operation from AC lines is made possible by employing a National Type 5886AB Power Supply.

Receiver power cable color code and connector plug connections are shown on the circuit diagram below. Plug prong connections match the output socket wiring of the Types 686 and 5886AB Power Supplies.

As stated above, the output stage employs a 6V6G tube. The loud speaker furnished with the receiver is equipped with a coupling transformer to match the load impedance of the output tube - 5000 ohms. Since both speaker and headphone outputs are obtained from the output tube, it is not possible to operate the receiver with this tube removed from its socket.

The main dial is illuminated by two dial lamps connected in parallel across the heater circuit. These lamps are the standard "brown bead" type, designed from 6.3 volts and drawing .15 ampere each.

CAPACITORS

	mfd.	volts		mfd.	volts
C1-	.1	400	C14-	.1	400
C2-	.1	400	C15-	.0005	mica
C3-	.0001	mica	C16-	25	50
C4-	.1	400	C17-	.001	mica
C5-	.1	400	C18-	.1	400
C6-	.01	400	C19-	.01	400
C7-	.1	400	C20-	.005	mica
C8-	.1	400	C25-	.0001	mica
C9-	.01	400	C26-	.0001	mica
C10-	.1	400	C27-	.1	400
C11-	.00025	mica	C28-	.000002	
C12-	.01	400	C29-	.01	400
C13-	25	50			

RESISTORS

	ohms	watts		ohms	watts
R1-	.5 meg-	1/2	R15-	5,000	1/2
R2-	10,000	1/2	R16-	.5 meg-	Pot.
R3-	200	1/2		A.F.Gain	
R4-	25,000	1/2	R17-	.1 meg-	1/2
R5-	1,000	1/2	R18-	.5 meg-	1/2
R6-	1,000	1/2	R19-	350	1
R7-	.5 meg-	1/2	R20-	500	1/2
R8-	300	1/2	R21-	1,000	2
R9-	1,000	1/2	R22-	10,000	Rheo.
R10-	.5 meg-	1/2		R.F.Gain	
R11-	300	1/2	R24-	.1 meg-	1/2
R12-	1.0 meg-	1/2	R25-	50,000	1/2
R13-	.5 meg-	1/2	R26-	.1 meg-	1/2
R14-	1.0 meg-	1/2	R27-	.1 meg-	1/2

MODELS NC-45,
NC-45A
NC-45B

NATIONAL CO., INC.

MODEL NC-44
MODEL NC-44A
MODEL NC-44B

GENERAL DESCRIPTION: The NC-44 is an inexpensive seven-tube receiver covering frequencies from 540 to 30,000 kilocycles in four ranges, the various ranges being selected by means of a conventional band switch.

The circuit of the receiver, as shown in the schematic diagram, is simple, but effective. It consists of a 6K8 combination first detector and oscillator, two I.F. stages with permeability tuned iron-core transformers and 6L7 tubes, a 6SQ7 combination second detector - AVC - first audio stage, and a single audio output stage employing a 25L6G. The C.W. oscillator is a 6J7 and the rectifier is a 25Z5. The receiver is designed for operation from 105-130 volt AC or DC lines and draws approximately 40 watts.

A dual tuning system provides both general coverage and band spread operation. The main tuning capacitor is of straight line frequency design and is coupled to a scale calibrated accurately in megacycles; it is operated through a vernier reduction drive having a ratio of about 30 to 1. The electrical bandspread system comprises a separate two-gang tuning capacitor with a separate dial mechanism and dial scale. Practically all tuning in the short-wave ranges will be done with this bandspread capacitor and the various amateur bands are spread as follows:

3.5 to 4.0	megacycles	65 divisions
7.0 to 7.3	"	50 "
14.0 to 14.4	"	56 "
28.0 to 30.0	"	40 "

Separate audio and I.F. gain controls are provided and each of these controls is fitted with a switch. When the audio gain control is turned to the "off" position, the B-supply circuit is opened to place the receiver in stand-by position. Turning the R.F. gain control to the minimum position turns the receiver completely off. In addition to these controls, separate switches are provided for the C.W. oscillator and the AVC circuits. A BSW terminal panel for external (remote) stand-by control is mounted at the rear of the chassis. The terminals are connected in series with the B+ switch.

ANTENNA: Three antenna terminals are located on the right-hand side of the cabinet. The center terminal is grounded to the cabinet and is provided with a strap by means of which it may be connected to either of the other terminals when using a single-wire antenna. In general, it will be found best to connect this strap between the center and the right-hand terminals; the single-wire antenna being connected to the remaining terminal. For all-around short-wave reception, the simple single-wire antenna will be found satisfactory except in extremely noisy locations. The overall length may be between 50 and 100 feet and an external ground is not required.

For amateurs who wish to obtain best performance on any particular band, the single-wire antenna should be made to have an overall length, including lead-in, approximately equal to an odd quarter-wave length. For instance, at 10 meters the antenna may be 24, 40 or 56 feet, etc. These figures represent 3, 5 and 7 quarter-wave lengths, respectively. An antenna designed in this manner will provide good signal pick-up with efficient transfer to the receiver and will, at the same time, minimize hand-capacity and other similar undesirable effects.

From the above, it will be seen that the same antenna cannot be expected to function with full efficiency on more than one band, unless some provision is made for tuning. Such tuning can often be satisfactorily accomplished by means of a series variable capacitor having a maximum capacity of 100 or 200 mmf.

Doublet antennae, directive arrays, etc., having two-wire feeder systems, can be connected directly to the two outside antenna terminals, the center terminal and strap not being used.

Where local noise is not bothersome, the single-wire type of antenna is to be preferred. In some installations, however, where there are some one or more sources of interference within fifty feet of the receiver, the single-wire will pick up the disturbance on the lead-in. Under such conditions, the doublet may provide the better signal-to-noise ratio. The improvement will be small, however, unless the pick-up portion can be erected at a considerable distance from the noise source (i.e., about twice the distance which separates the source from the receiver). If the installation cannot be made in this manner, the use of a doublet may weaken signals due to unavoidable losses in the feeder system, and the signal-to-noise ratio will not be improved.

OUTPUT CIRCUIT: As shown in the schematic diagram, the output terminals of the receiver are connected in the plate circuit of the 25L6G power output tube. The speaker terminals are at the rear of the chassis. The speaker furnished with the receiver is of the permanent magnet dynamic type having a suitable coupling transformer to match the load impedance of the tube - 1500 ohms. A headphone jack is mounted at the rear of the chassis and is wired in such manner that the speaker is quiet when the phones are in use. The impedance of the headphones should be approximately 20,000 ohms, this being the usual impedance of phones having a total DC resistance of between 2000 and 3000 ohms. The NC-44 should not be operated unless either a speaker or a headphone set is connected to the proper terminals. Also, the receiver will not function with the output tube removed from its socket, since all heaters are connected in series and since this tube supplies both speaker and headphone outputs.

SPEAKER MOUNTING: The loud speaker is mounted in a small cabinet finished to match the receiver. To obtain best tone quality the speaker chassis should be mounted on a large baffle isolated mechanically from the receiver. The baffle should be of non-resonant material, so that it will not vibrate. A baffle three or four feet square will generally prove satisfactory. More uniform bass response will be obtained by increasing the baffle size up to about nine feet square. Mounting the speaker and receiver in the same cabinet, or console, is not recommended since vibration from the speaker is apt to be transferred to the tubes, producing microphonic noises.

OPERATING INSTRUCTIONS: As previously stated, the NC-44 receiver may be connected to either the AC or DC lines. In the case of a DC line, the receiver will be inoperative unless the plug has the correct polarity. This must be determined by trial, but the receiver will not be harmed in any way if the plug happens to be reversed. After the receiver is plugged in and the antenna is connected, both the R.F. and A.F. gain controls should be advanced to 6 or 7. The AVC switch should be "on" and the C.W. oscillator switch "off". The band selector switch, which is located in the middle of the front panel between the two tuning knobs, should be set to indicate the desired frequency range, and the bandspread tuning knob at the right should be set so that the small pointer reads ninety on the scale. Stations may then be tuned in, in the regular way, by means of the left-hand, or general coverage, tuning knob.

It should be noted that the frequency calibration of the main scale will only be correct when the bandspread pointer is at ninety. After a station has been found, however, the bandspread control will provide a vernier action which makes tuning of high frequency signals very easy, particularly where the receiver is to be used in amateur communication work. Ordinarily, the AVC switch will be "on" at all times and the R.F. gain control will be well advanced with volume being controlled by the A.F. gain adjustment. When receiving extremely strong signals, such as would be obtained from a local broadcast station, the R.F. gain control should be retarded in order to avoid any possibility of tube overload or distortion. The C.W. oscillator may be used if desired in locating weak signals with the AVC switch either "on" or "off".

ALIGNMENT AND SERVICE DATA: Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed to reduce the effect of such variations to a minimum, the converter and I.F. tubes should be selected with some care. A replacement converter should be checked in the receiver to make sure that the interelectrode capacities are the same as those of the tube originally employed. This is easily determined by noting any change in calibration at the high frequency end of any coil range. The change should not exceed two or three dial divisions.

The intermediate frequency of the NC-44 receiver is 456 kilocycles. The three I.F. transformers are of the permeability tuned iron-core type and are adjustable from the outside of the cabinet. The transformers are of such construction that the factory adjustment is permanent and they should not be re-tuned, therefore, unless there are definite indications that such tuning is required. The high frequency coils and trimmer capacitors are mounted underneath the chassis, being grouped above the band-selector switch. The oscillator coils are mounted nearest the left-hand side of the receiver with the first detector coils at the right. The adjustment of these circuits is quite conventional but here, again, the various trimmers should NOT be adjusted indiscriminately, as it is often rather difficult to determine the correct capacitor settings without special test equipment.

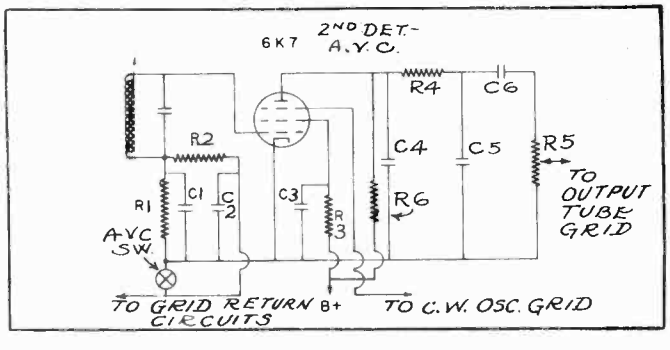
DET – AVC – AUDIO TUBE

6K7—6SQ7

Earlier models of the NC-44 Series of Receivers used a type 6K7 as a combination second detector - AVC - first audio. Later models employed a 6SQ7 in place of the 6K7, with improved AVC action. The diagram of circuit connections of the 6K7 tube is shown below.

This does not apply to the NC-45 Series.

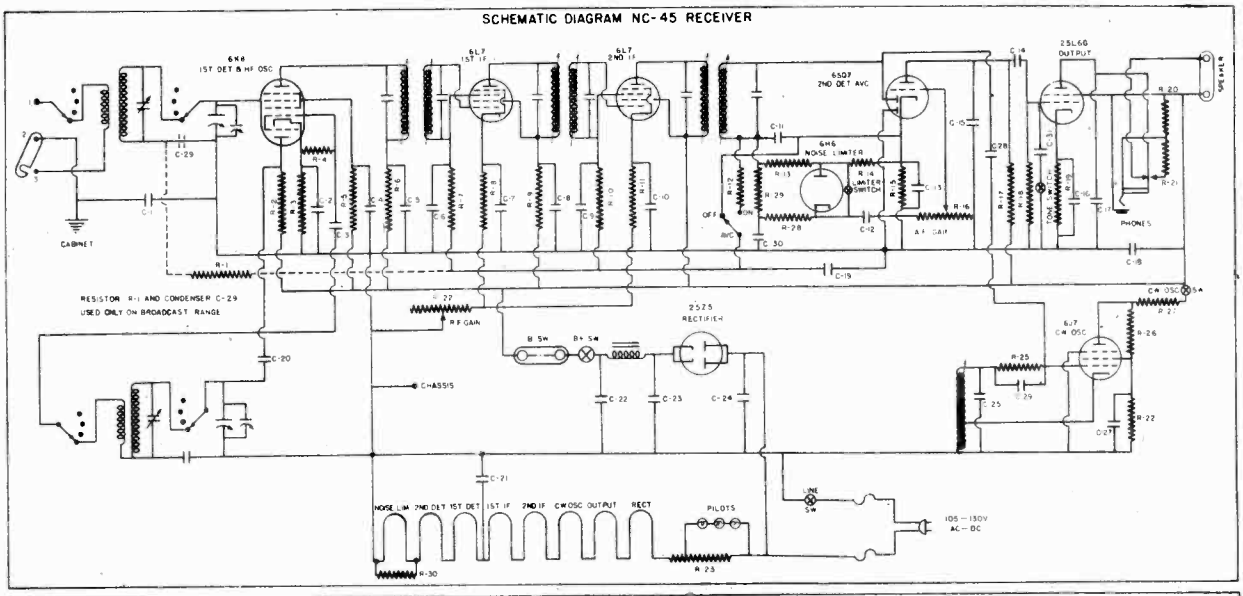
CAPACITORS		RESISTORS	
mfd.	volts	ohms	watts
C1-.00025	mica	R1- 1 meg-	1/2
C2-.01	400	R2- 1 meg-	1/2
C3-.1	400	R3-.5 meg-	1/2
C4-.0001	mica	R4-20,000	1/2
C5-.0005	mica	R5-.5 meg-	
C6-.1	400	Audio Gain	
		R6-.1 meg-	1/2



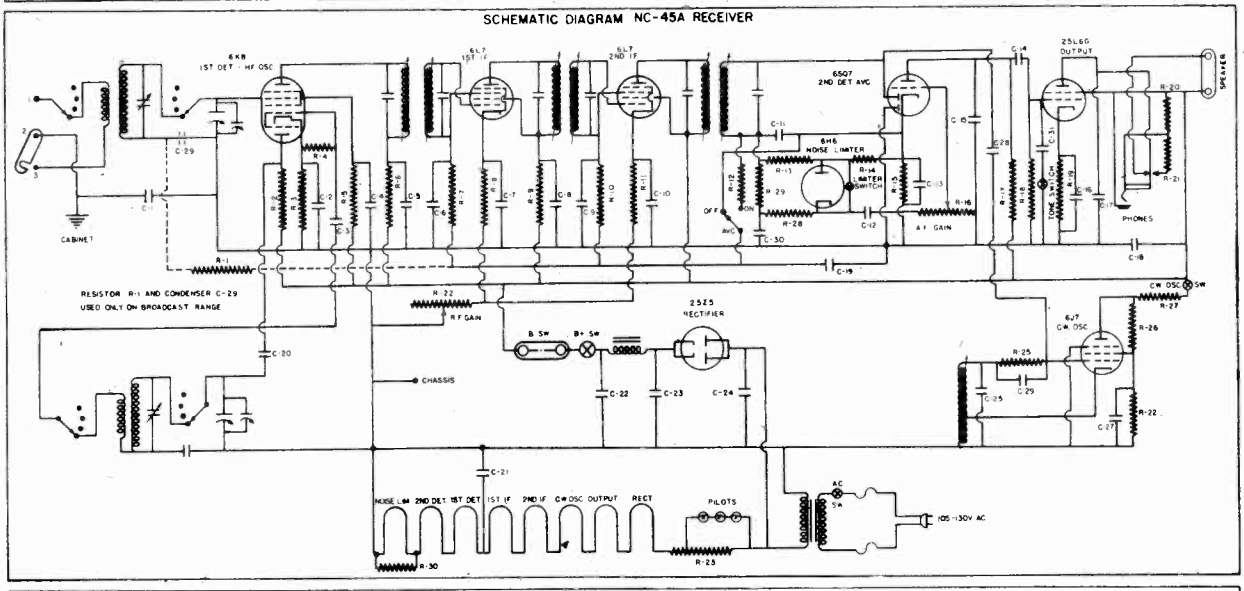
MODEL NC-45
MODEL NC-45A
MODEL NC-45B

NATIONAL CO., INC.

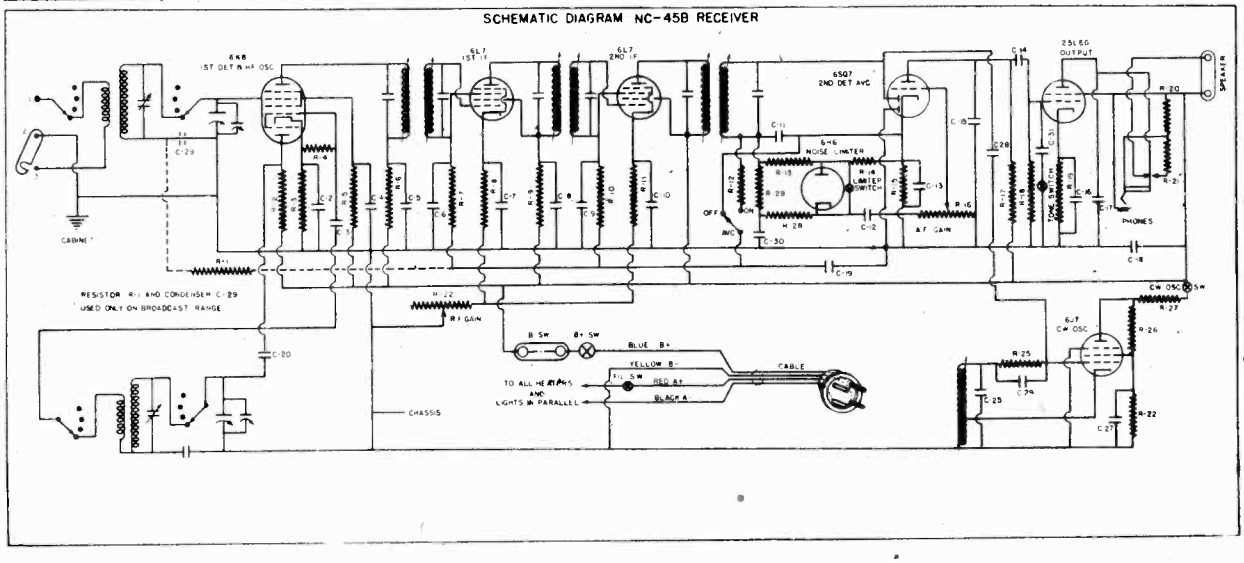
SCHEMATIC DIAGRAM NC-45 RECEIVER



SCHEMATIC DIAGRAM NC-45A RECEIVER



SCHEMATIC DIAGRAM NC-45B RECEIVER



IF PEAK 456 KC

MODEL NC-45
MODEL NC-45A
MODEL NC-45B

NATIONAL CO., INC.

FOR CIRCUIT DESCRIPTION, OPERATING AND SERVICING DATA, SEE THAT PERTAINING TO THE NC-44 SERIES WHICH IS SIMILAR TO THE NC-45 SERIES OF RECEIVERS.

THE NC-45 RECEIVER

CAPACITORS

	mfd.	volts		mfd.	volts
C1	-.1	400	C17	-.001	mica
C2	-.1	400	C18	-.1	400
C3	-.0001	mica	C19	-.01	400
C4	-.1	400	C20	-.005	mica
C5	-.1	400	C21	-.1	400
C6	-.01	400	C22	- 40	200
C7	-.1	400	C23	- 40	200
C8	-.1	400	C24	-.1	400
C9	-.01	400	C25	-.0001	mica
C10	-.1	400	C26	-.0001	mica
C11	-.00025	mica	C27	-.1	400
C12	-.01	400	C28	-.000002	
C13	- 25	50	C29	-.01	400
C14	-.1	400	C30	-.1	400
C15	-.0005	mica	C31	-.003	mica
C16	- 25	50			

RESISTORS

	ohms	watts		ohms	watts
R1	- .5 meg-	1/2		A.F. GAIN	
R2	-10,000	1/2	R17	-.1 meg-	1/2
R3	- 200	1/2	R18	-.5 meg-	1/2
R4	-25,000	1/2	R19	- 140	1
R5	- 1,000	1/2	R20	- 500	1/2
R6	- 1,000	1/2	R21	-1,000	2
R7	- .5 meg-	1/2	R22	-10,000	
R8	- 300	1/2		R.F. GAIN	
R9	- 1,000	1/2	R23	- 132	10
R10	- .5 meg-	1/2	R24	-.1 meg-	1/2
R11	- 300	1/2	R25	-50,000	1/2
R12	- 1. meg-	1/2	R26	-.1 meg-	1/2
R13	- .5 meg-	1/2	R27	-.1 meg-	1/2
R14	- .5 meg-	1/2	R28	- 1 meg-	1/2
R15	-5,000	1/2	R29	- 1 meg-	1/2
R16	-.5 meg-		R30	- 100	1/2

THE NC-45A RECEIVER

AC Model

Recommendations pertinent to the NC-45 (AC-DC) receiver apply also to the NC-45A (AC) model, except as follows:

The NC-45A is designed for operation from 105-130 volt, 50-60 cycle lines only and draws approximately 50 watts. Attempted operation from other AC sources or from DC lines will cause serious damage to the receiver.

The schematic diagram below shows the circuit of the NC-45A model.

Parts List same as NC-45, except that C1 is not used.

THE NC-45B RECEIVER

Battery Model

The NC-45B (Battery Operated) is basically the same as the NC-45 (AC-DC) model, the power supply being omitted. In general, the data given on pages applies to the NC-45B. Data applicable to the NC-45B only is as follows:

The tube complement is the same as the NC-45 except that a type 6V6G tube is used in the audio output stage; the rectifier tube is omitted. The heater circuit requires 2.55 amps. at 6 volts; a "B" supply of 90-135 volts is recommended. The "B" drain is approximately 40-65 milliamperes.

SEE THE NOTES UNDER MODEL NC-44B, WHICH ALSO APPLY TO THE MODEL NC-45B.

CAPACITORS

	mfd.	volts		mfd.	volts
C1	- .1	400	C15	-.0005	mica
C2	- .1	400	C16	- 25	50
C3	- .0001	mica	C17	-.001	mica
C4	- .1	400	C18	-.1	400
C5	- .1	400	C19	-.01	400
C6	- .01	400	C20	-.005	mica
C7	- .1	400	C25	-.0001	mica
C8	- .1	400	C26	-.0001	mica
C9	- .01	400	C27	-.1	400
C10	- .1	400	C28	-.000002	
C11	- .00025	mica	C29	-.01	400
C12	- .01	400	C30	-.1	400
C13	- 25	50	C31	-.003	mica
C14	- .1	400			

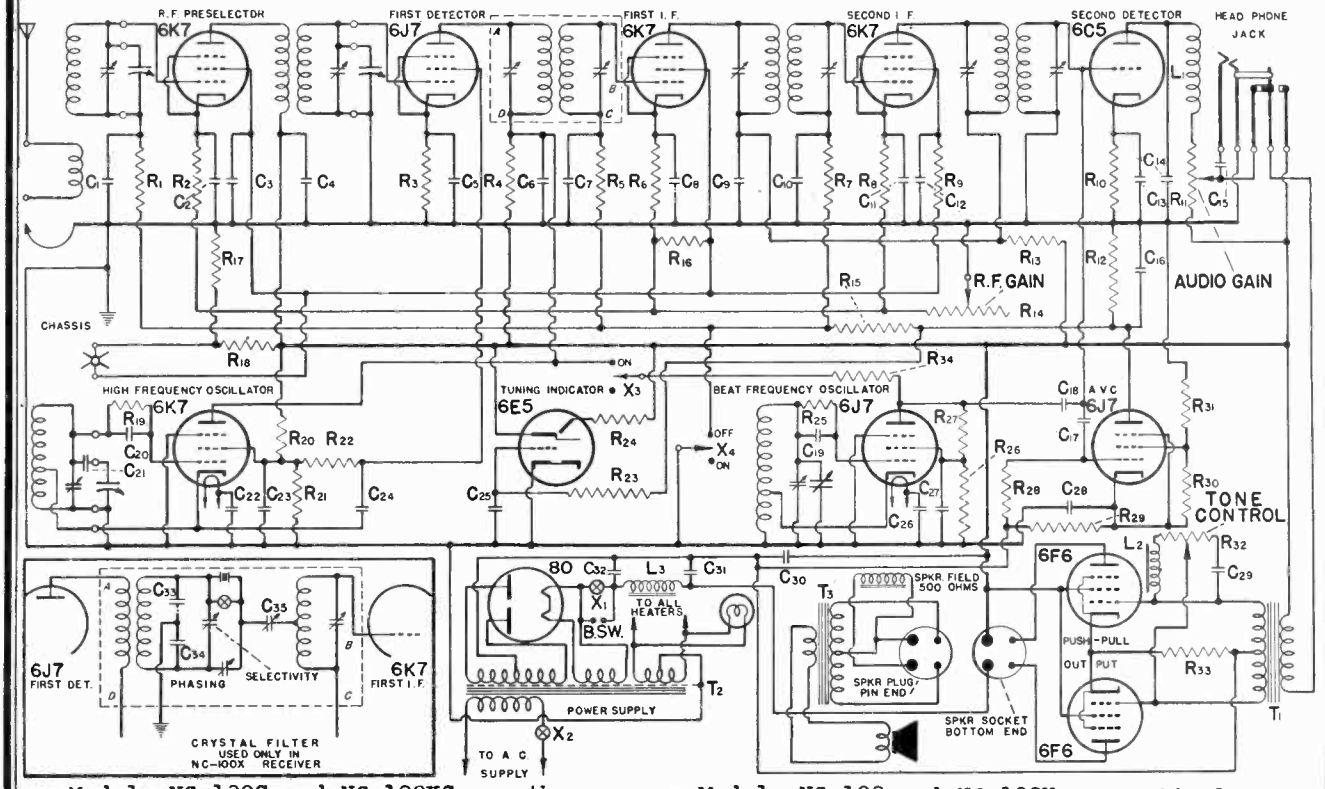
RESISTORS

	ohms	watts		ohms	watts
R1	- .5 meg-	1/2	R16	-.5 meg-	Pot.
R2	-10,000	1/2		A.F. GAIN	
R3	- 200	1/2	R17	-.1 meg-	1/2
R4	-25,000	1/2	R18	-.5 meg-	1/2
R5	- 1,000	1/2	R19	- 350	1
R6	- 1,000	1/2	R20	- 500	1/2
R7	- .5 meg-	1/2	R21	-1,000	2
R8	- 300	1/2	R22	-10,000	Rheo.
R9	- 1,000	1/2		R.F. GAIN	
R10	- .5 meg-	1/2	R24	-.1 meg-	1/2
R11	- 300	1/2	R25	-50,000	1/2
R12	-1.0 meg-	1/2	R26	-.1 meg-	1/2
R13	- .5 meg-	1/2	R27	-.1 meg-	1/2
R14	- .5 meg-	1/2	R28	-1.0 meg-	1/2
R15	- 5,000	1/2	R29	-1.0 meg-	1/2

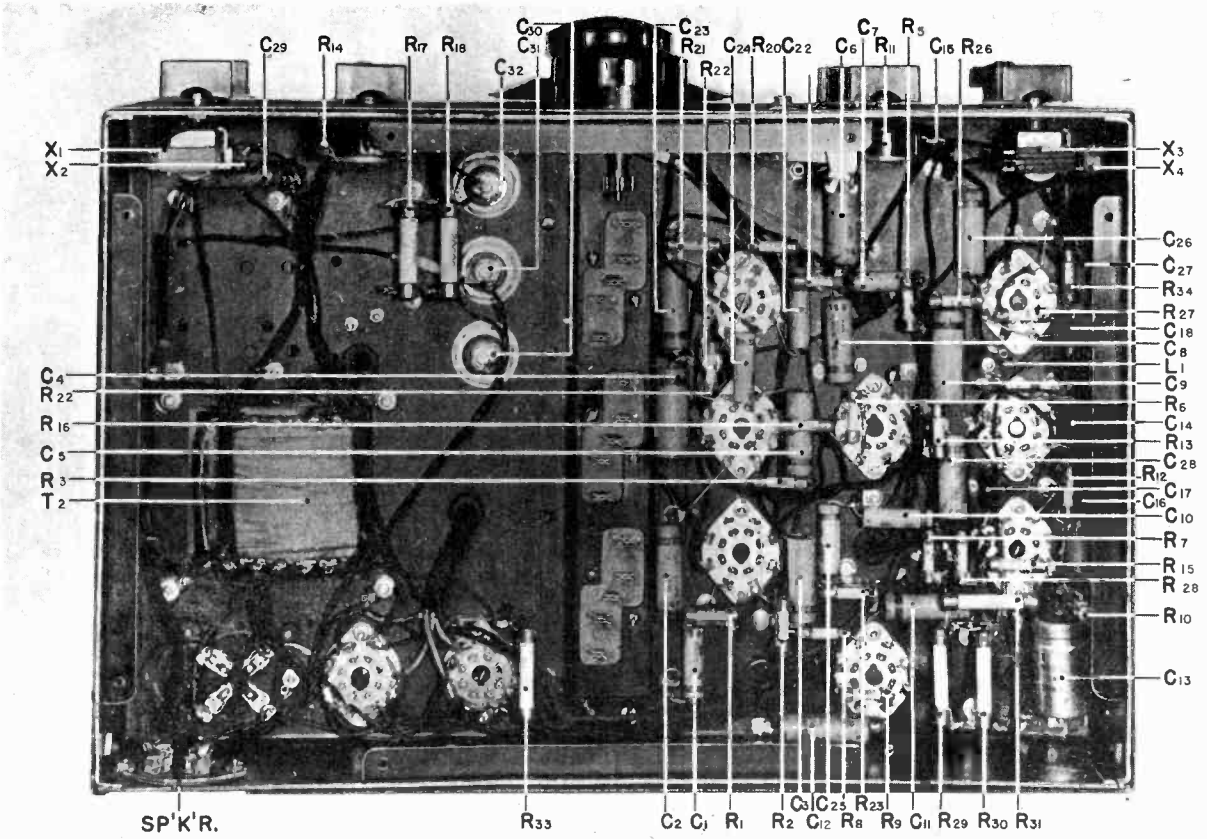
MODELS NC-100 Series

NATIONAL CO., INC.

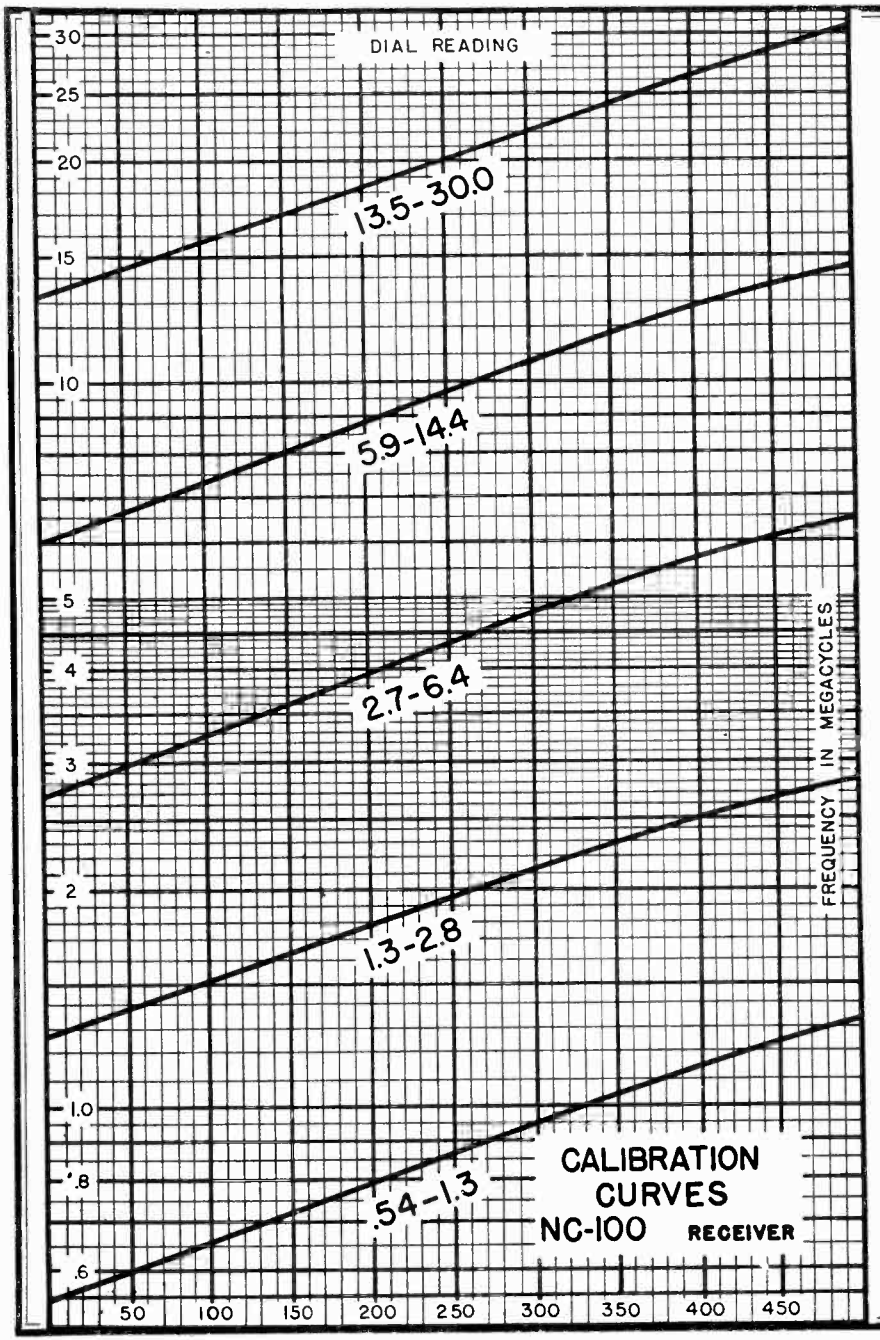
SCHEMATIC DIAGRAM —— TYPE NC-100 RECEIVER



Models NC-100S and NC-100XS are the same as Models NC-100 and NC-100X respectively except that they have a 12-inch speaker instead of a 10-inch speaker.



FOR PARTS VALUES, SEE NEXT PAGE



The alignment and other instructions pertaining to Model NC-100A also apply to Model NC-100 and NC-100X with the following exceptions:

Under "Preliminary Adjustments --- The I.F.", paragraph 3, The I.F. adjustments are indicated on the layout diagram, Nos. 4 to 8 inclusive.

The crystal filter output coupling condenser, adjustment No. 3, serves as a fixed I.F. gain control and, in general, should not be touched.

Resistor and Condenser List

R_1	R.F. Grid filter	.5 megohm	½ watt
R_2	R.F. Cathode Bias	350 ohms	½ watt
R_3	1st Det. Cathode Bias	5000 ohms	½ watt
R_4	H.F. Circuit B + Filter	2000 ohms	½ watt
R_5	1st I.F. Grid Filter	.5 megohm	½ watt
R_6	1st I.F. Cathode Bias	350 ohms	½ watt
R_7	2nd I.F. Grid Filter	.5 megohm	½ watt
R_8	2nd I.F. Cathode Bias	500 ohms	½ watt
R_9	2nd I.F. Screen Filter	2000 ohms	½ watt
R_{10}	2nd Det. Cathode Bias	20,000 ohms	½ watt
R_{11}	Audio Volume Control	50,000 ohm potentiometer	
R_{12}	AVC Plate	.5 megohm	½ watt
R_{13}	I.F. B + Filter	2000 ohms	½ watt
R_{14}	R.F. Gain Control	10,000 ohm variable	
R_{15}	Common Grid Filter	.5 megohm	½ watt
R_{16}	Gain Control Bleeder	50,000 ohms	½ watt
R_{17}	Voltage Divider	20,000 ohms	2 watt
R_{18}	Voltage Divider	20,000 ohms	2 watt
R_{19}	H.F. Oscillator Grid Leak	20,000 ohms	½ watt
R_{20}	H.F. Oscillator Voltage Divider	50,000 ohms	½ watt
R_{21}	H.F. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{22}	1st Det. Screen Filter	100,000 ohms	½ watt
R_{23}	Tuning Indicator Grid Filter	.5 megohm	½ watt
R_{24}	Tuning Indicator Target	.1 megohm	½ watt
R_{25}	C.W. Oscillator Grid Leak	50,000 ohms	½ watt
R_{26}	C.W. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{27}	C.W. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{28}	AVC Grid Return	.5 megohm	½ watt
R_{29}	AVC Voltage Divider	350 ohms	1 watt
R_{30}	AVC Voltage Divider	1000 ohms	2 watt
R_{31}	AVC Voltage Divider	1000 ohms	2 watt
R_{32}	Tone Control	500,000 ohm potentiometer	
R_{33}	Output Cathode Bias	250 ohms	2 watt
R_{34}	C.W. Oscillator Plate Filter	.25 megohm	½ watt

C_1	R.F. Grid Filter	.01 mfd.	400 volt
C_2	R.F. Cathode Bypass	.1 mfd.	200 volt
C_3	R.F. and 1st I.F. Screen Bypass	.1 mfd.	200 volt
C_4	R.F. and H.F. Osc. Plate Bypass	1 mfd.	400 volt
C_5	1st Det. Cathode Bypass	.1 mfd.	200 volt
C_6	1st Det. Plate Filter	.1 mfd.	400 volt
C_7	1st I.F. Grid Filter	.01 mfd.	400 volt
C_8	1st I.F. Cathode Bypass	.1 mfd.	200 volt
C_9	1st and 2nd I.F. Plate Filter	.1 mfd.	400 volt
C_{10}	2nd I.F. Grid Filter	.01 mfd.	400 volt
C_{11}	2nd I.F. Cathode Bypass	.1 mfd.	200 volt
C_{12}	2nd I.F. Screen Filter	.1 mfd.	200 volt
C_{13}	2nd Det. Cathode Bypass	10. mfd.	50 volt
C_{14}	2nd Det. Plate Bypass	.001 mfd.	Mica
C_{15}	Phone Coupling	.1 mfd.	400 volt
C_{16}	AVC Plate Bypass	.1 mfd.	200 volt
C_{17}	AVC Grid Coupling	.0001 mfd.	Mica
C_{18}	C.W. Oscillator Coupling	2 mmf.	Special
C_{19}	C.W. Oscillator Grid	.001 mfd.	Mica
C_{20}	H.F. Oscillator Grid	.0001 mfd.	Mica
C_{21}	H.F. Oscillator Series Padding — Different for each range		
C_{22}	H.F. Oscillator Heater Bypass	.01 mfd.	400 volt
C_{23}	H.F. Oscillator Screen Bypass	.1 mfd.	200 volt
C_{24}	H.F. Oscillator Coupling	.01 mfd.	400 volt
C_{25}	Tuning Indicator Grid Filter	.01 mfd.	400 volt
C_{26}	C.W. Oscillator Heater Bypass	.1 mfd.	200 volt
C_{27}	C.W. Oscillator Screen Bypass	.1 mfd.	200 volt
C_{28}	AVC Cathode Bypass	.1 mfd.	200 volt
C_{29}	Tone Control	.01 mfd.	400 volt
C_{30}	B-Supply Filter	8 mfd.	450 volt
C_{31}	B-Supply Filter	8 mfd.	450 volt
C_{32}	B-Supply Filter	8 mfd.	450 volt
C_{33}	Crystal Filter Bridge	.0001 mfd.	Mica
C_{34}	Crystal Filter Bridge	.0001 mfd.	Mica
C_{35}	Crystal Filter Coupling	35 mmf.	Variable

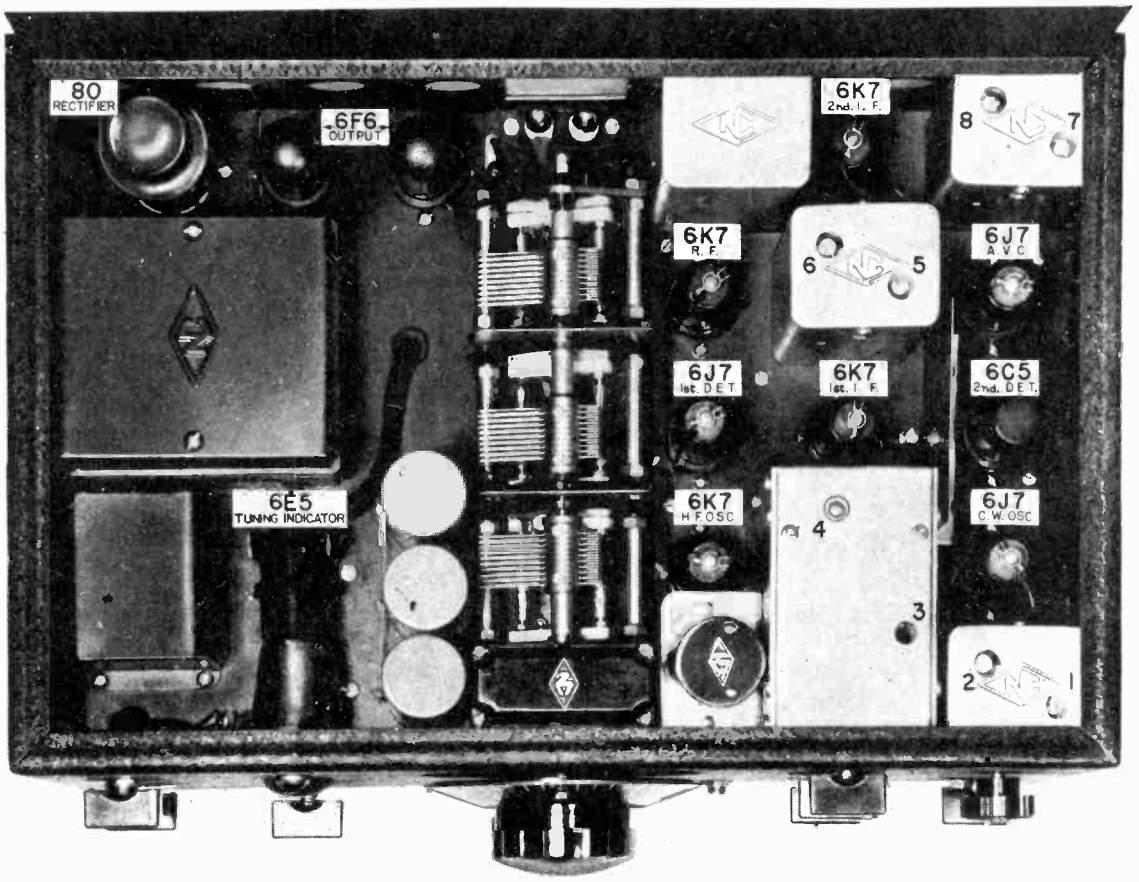
X_1	B + (stand-by) Switch
X_2	AC On-Off Switch
X_3	C.W. Oscillator Switch
X_4	AVC On-Off Switch

L_1	2nd Det. I.F. Choke	7. mh.
L_2	Tone Filter Choke	18. Henry
L_3	B-Supply Filter Choke	20. Henry

T_1	Push-Pull Input Audio Transformer	4:1 Ratio
T_2	Power Transformer	
T_3	Output Transformer	Mounted on Speaker

MODELS NC-100 Series

NATIONAL CO., INC.



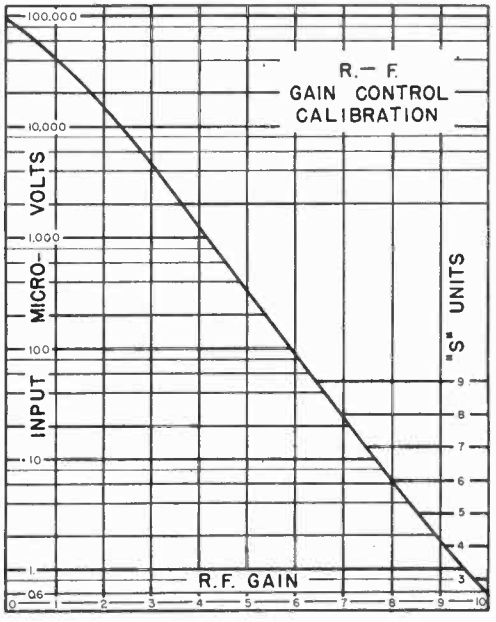
TOP VIEW OF NC- 100X RECEIVER

Measurement of Signal Strength

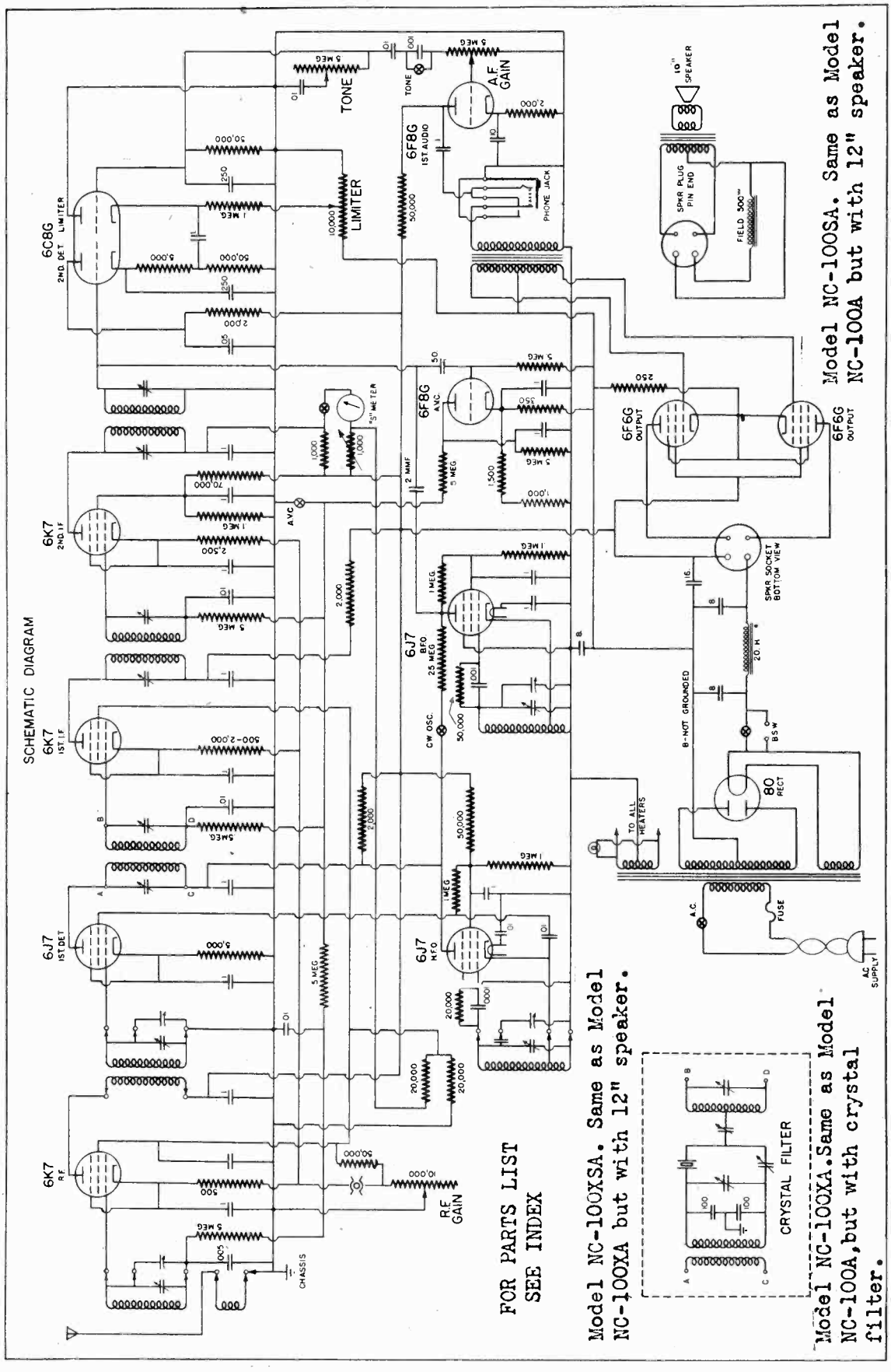
The combination of the R.F. gain control and tuning indicator make possible the accurate measurement of signal strength. With AVC either on or off, the R.F. gain control is advanced to the point where the electron ray tuning indicator just begins to show some change in pattern. The accompanying calibration curve shows the relation between signal input and this setting of the R.F. gain control.

The size of the shaded area will vary with the modulation of the signal when the AVC is off. This variation does not indicate over-modulation, or carrier shift, but is the normal result to be expected when using an amplified-delayed system of AVC.

For the amateur station operator who prefers to give reports in R or S units, rather than microvolts input, we suggest the use of the righthand scale of the chart. Adjacent points are 6 db. apart, this spacing giving a total range, between the weakest signal and an S-9 signal, of 48 db. Most operators seem to agree that the S-steps should be separated by a 4 to 1 power ratio (6 db.), and since the characteristics of the receiver determine the level of the weakest signals which may be received intelligibly, an "extremely strong" signal (S-9) is, on the NC-100, defined as one resulting in an input of 51 microvolts.

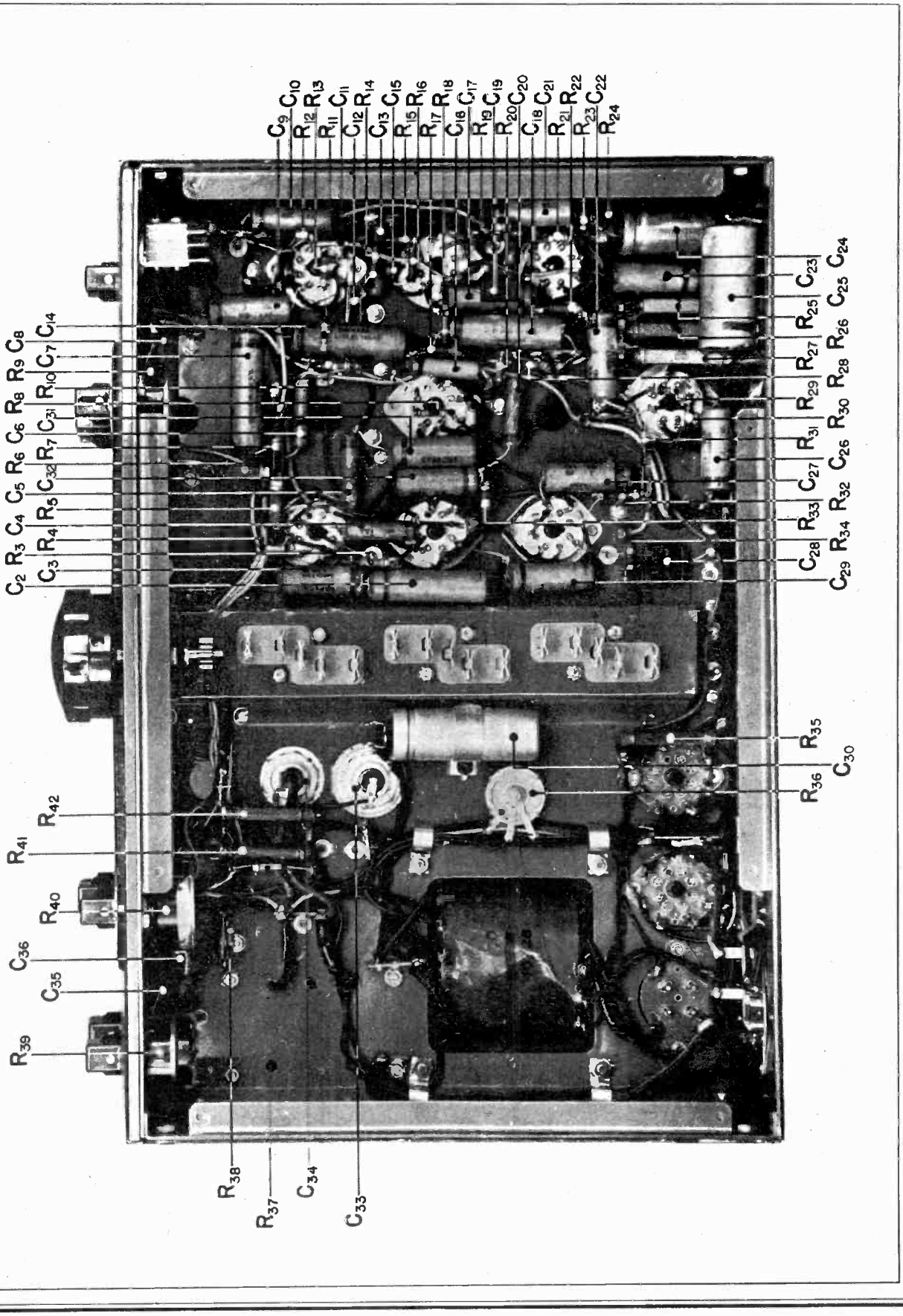


NATIONAL CO., INC.



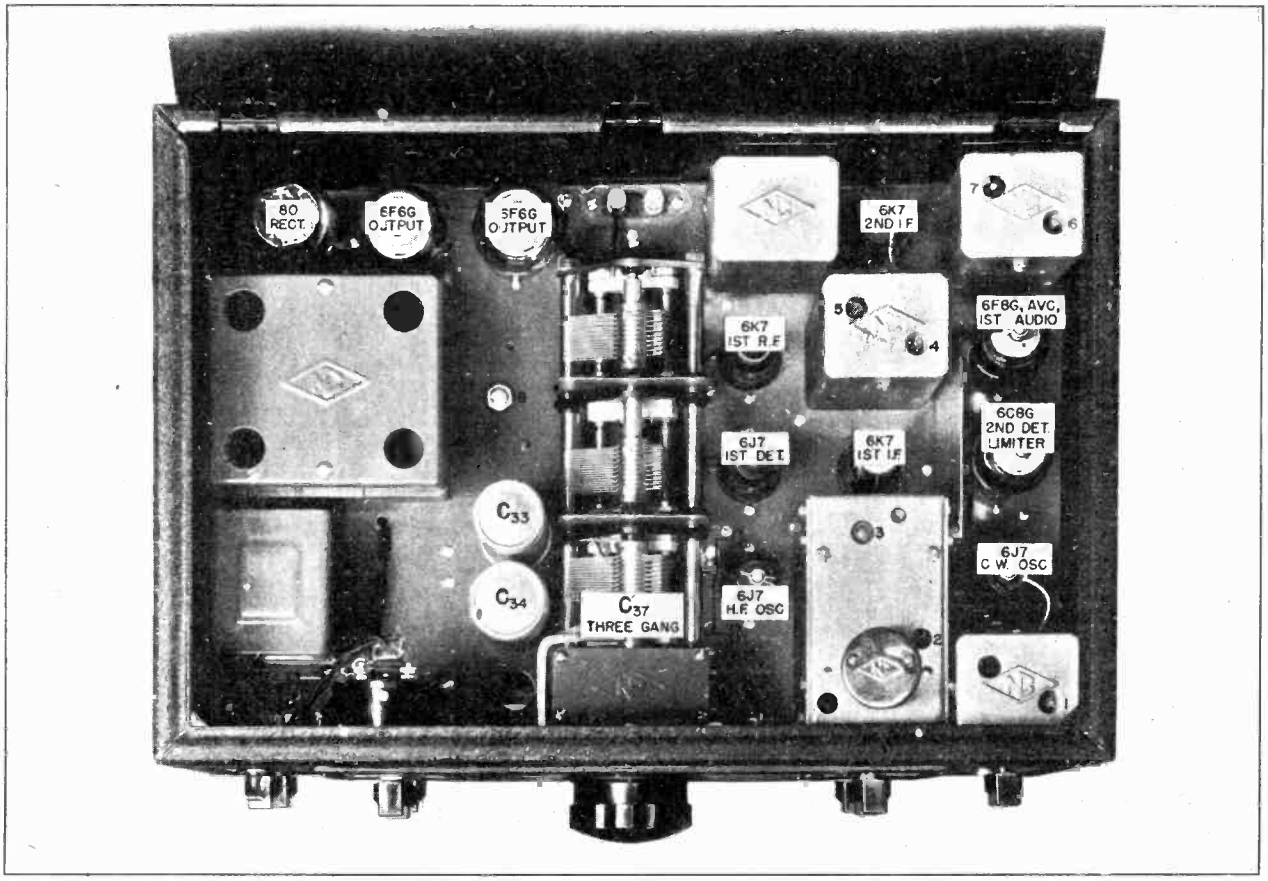
MODELS NC-100A Series

NATIONAL CO., INC.

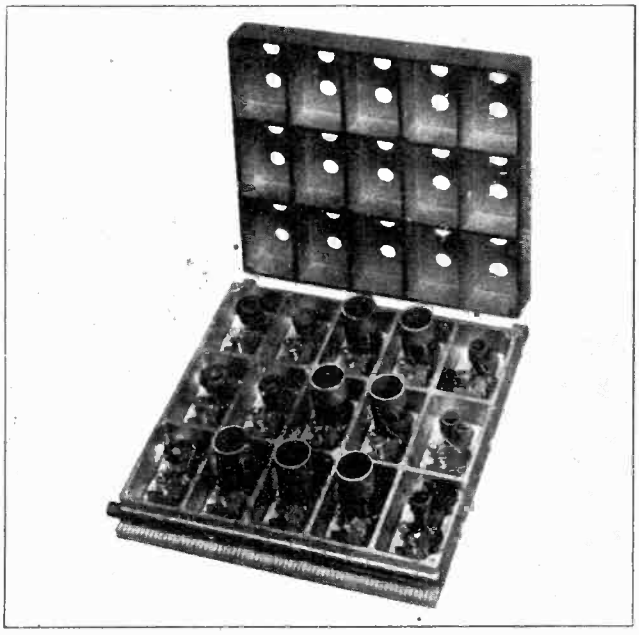


Bottom View of NC-100XA

NATIONAL CO., INC.

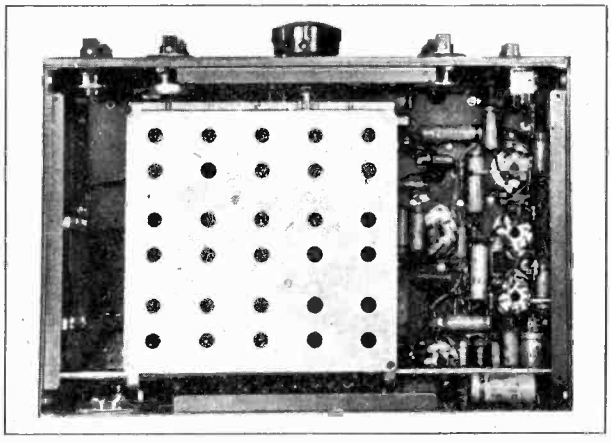


Top View of NC-100XA



THE COMPLETE COIL ASSEMBLY

Permanence of circuit characteristics is assured by the rigid cast aluminum shield and by air dielectric trimmer condensers with R-39 insulation.

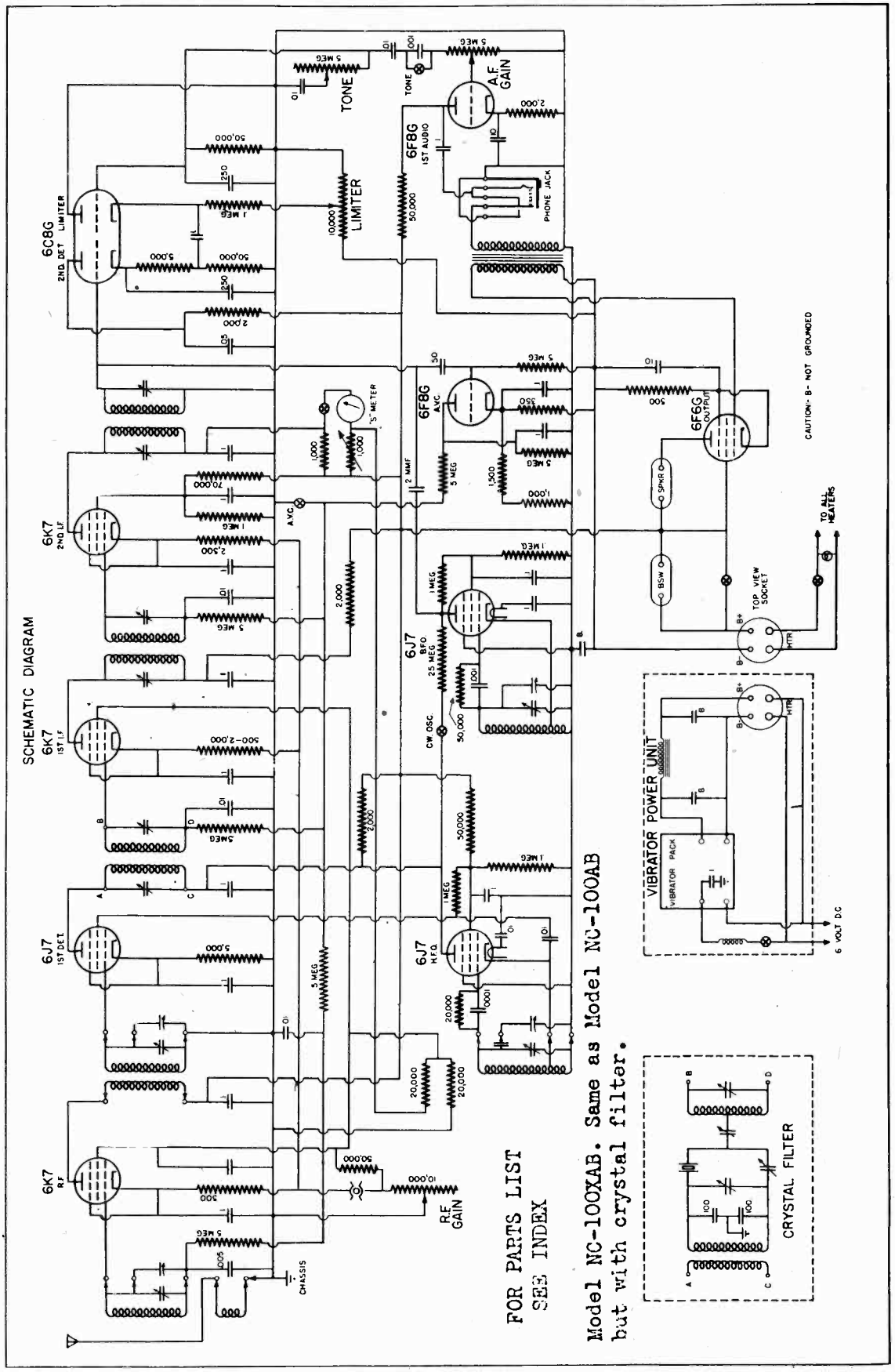


BOTTOM VIEW

The coil assembly is shown midway between the 1.3-2.8 mc. and 2.7-6.4 mc. ranges.

MODELS NC-100AB Series

NATIONAL CO., INC.



Alignment and Service Data

TUBES

Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed to reduce the effect of such variations to a minimum, the high frequency oscillator and I.F. tubes should be selected with some care. A replacement high frequency oscillator should be checked in the receiver to make sure that the inter-electrode capacities are the same as those of the tube originally employed. This is easily determined by noting any change in calibration at the high frequency end of any coil range. The change should not exceed two or three dial divisions. Compensation for small variations in tube capacity may be made by changing the position of the oscillator grid lead with relation to the body of the tube.

Substitution of new tubes in the I.F. amplifier may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in the following pages.

Two other points should be checked when trying the new high frequency oscillator; a fairly strong steady signal should be tuned in, preferably on some frequency above 10 mc.; the C.W. oscillator should be turned off; jarring the receiver or lightly tapping the tube, should not show any evidence of noise in the output. Next turn on the C.W. oscillator to make sure that the tube does not introduce "modulation hum" on the carrier. The tube should again be lightly tapped to see whether or not its characteristics change.

R.F. AND B.F. OSCILLATOR ALIGNMENT

All circuits are carefully and accurately aligned before shipment, using precision crystal oscillators which insure close conformation to the calibration curves. No readjustments will be required, therefore, unless the receiver is subjected to extremely rough handling. Do not attempt to make any adjustments without first determining the exact function of each trimmer condenser and the effect that it will have upon performance.

The coil group which is plugged into the circuit at any time is the one directly underneath the 3-gang tuning condenser at the center of the chassis. The coil nearest the front of the receiver is the high frequency oscillator, the middle coil is the first detector, and the coil nearest the antenna-ground binding post strip is the R.F.

As shown in the photographs, there are two holes in each coil compartment; of each pair, the one nearest the front of the receiver is directly over the trimmer condenser.

Complete alignment of any one coil range is made as follows: Set the tuning dial near the high frequency end of the range and check the dial reading by means of an accurate test oscillator or a signal of known frequency; readjustment should be made if the dial reading is in error by more than 2 per cent.

Correction for calibration is made by adjustment of the high frequency oscillator trimmer (nearest the front of the receiver). A screw driver with a metal shaft may be used, but the shaft should not touch the aluminum casting while the trimmer is being turned. If the dial reading is found to be too low, more trimmer capacity is needed and vice versa. In adjusting the R.F. and first detector trimmers, no signal is necessary, correct alignment being indicated by maximum background noise. This background noise should be fairly loud when the R.F. and audio gain controls are fully advanced, the crystal filter being switched off. Furthermore, the background noise will be approximately the same on all ranges. The first detector trimmer will have much greater effect upon the amplitude of this noise than the R.F. trimmer, but actually the setting of each is equally important.

With calibration correct at the high frequency end of the range, the dial should be rotated toward the lower numbers. The background noise may vary slightly over the range but should not get appreciably weaker except in the case of the .54 to 1.3 mc. coils. Ganging is checked by pressing one of the outside rotor plates of the oscillator condenser sideways toward the stator, but not enough to make the plates touch. The same check may be applied to the first detector and R.F. tuning condensers. Any bending of the rotor plates should make the background noise definitely weaker. A similar check can, of course, be made by bending the rotor plates out, away from the stator, care being taken not to bend the plates so far that they will not return to their original position.

On the two highest frequency ranges, it may be possible to make the initial oscillator adjustment incorrectly. There are two settings of the oscillator trimmer condenser which will tune in the desired signal at the proper point on the dial; of these, the higher frequency setting (least trimmer capacity) is correct. In checking the ganging of the 13.5 to 30 mc. range, the R.F. condenser has little effect upon the background noise at the low frequency end of the scale and at this one point it is better to use a test signal. Should any error in tracking be found on one range, it is probable that the same error will be present on all ranges and correction may be made by permanently bending the rotor plates of the tuning condenser section in question.

I.F. AND CRYSTAL ALIGNMENT INSTRUCTIONS

Before attempting to check the alignment or adjust a single signal receiver it is essential that the operator be familiar with the principles involved and the type of performance to be expected.

A receiver of this type is simply a superheterodyne which may be adjusted to have extremely high selectivity on all signals. The effective width of the selectivity curve is only a few cycles, usually between 20 and 100. This means that when tuning in a given C.W. signal, tuning is going to be very sharp and the dial must be turned slowly in order to avoid missing the signal entirely. As compared to the straight superheterodyne, the single signal receiver is about 100 times as selective. The straight super will pick up a signal and will reproduce both sides of the audio beat note at about the same strength; that is, the carrier whistle may be varied from either side of zero beat up to about 3000 cycles when the receiver is tuned and the whistle will remain about the same strength at any pitch. The single signal receiver, however, being 100 times as sharp, will not perform in this manner, but as the receiver is tuned across the carrier the audio response will be very sharply peaked at one certain pitch of the carrier whistle. Detuning the receiver a small fraction of a degree, while it changes the pitch only slightly, will make the signal much weaker, since it has been detuned from the sharp selectivity peak.

The main point to remember when considering single signal receivers is that they are simply ultra selective superheterodynes, which must be tuned exactly to the signal and that the beat oscillator must be detuned from the crystal frequency in order to obtain an audible beat note.

PRELIMINARY ADJUSTMENTS—THE I.F.

From the above explanation, the reader will see that it is absolutely essential that the I.F. transformers be aligned to the crystal, since the two must work together. This alignment may be accomplished in a number of ways. If the I.F. transformers are far out of adjustment, it is necessary to connect an external crystal oscillator which uses the crystal from the receiver. This oscillator is put in operation and is coupled to the first detector of the receiver. In most cases no actual connection will be required since the field from the oscillator will be sufficiently strong to be picked up, even with the I.F. far out of adjustment. If coupling is required, a lead twisted around the grid cap of the detector tube and run near the oscillator tank coil, will be suitable. The beat oscillator is turned on and adjusted until the crystal signal is picked up. The pitch of the beat note is not important as long as it is well inside the audible range.

All the I.F. transformers are now adjusted for maximum signal. This adjustment need not be made with any great degree of precision, since the crystal will not oscillate at exactly the same frequency to which it will be resonant in the receiver. The phasing control should be set at 0.

The I.F. adjustments are indicated on the layout diagram, Nos. 3 to 7, inclusive.

The crystal filter output coupling condenser, adjustment No. 2, serves as a fixed I.F. gain control and, in general, *should not* be touched.

The crystal may now be removed from the oscillator and installed in the receiver. Throw the switch to connect the crystal for single signal reception. Set the selectivity control for maximum selectivity; that is, with the pointer rotated all the way to the right. Now, tune in a steady signal from a local oscillator or monitor. Tuning very slowly across the carrier, there should be one point at which the signal will peak very sharply. The audio pitch of this peak will be nearly the same as the pitch of the beat used when the crystal oscillator was being picked up.

THE BEAT OSCILLATOR

Once the peak has been found, it would be well for the operator to familiarize himself with the action of the beat oscillator control by changing its tuning in order to obtain an audio note which is most pleasing to copy, or which coincides with any peaks in the loudspeaker or headphones. It makes little difference to which side of the audio beat the beat oscillator is tuned. After a satisfactory pitch has been found, tune the signal by means of the tuning dial so that the signal goes down through zero beat and up to approximately the same pitch on the other side. This response is, of course, much weaker than that of the peak and it may be necessary to turn up the volume control in order to obtain fair volume. The phasing, or balancing, condenser is now adjusted until the signal is WEAKEST. Normally, this setting is near mid-scale.

THE SELECTIVITY CONTROL

The action of the selectivity control may now be checked. With the receiver tuned exactly as it was *before adjusting the phasing condenser*, the selectivity control should be rotated and it will be found that the signal will be loudest at a certain setting. This setting is usually found with the pointer nearly vertical. The setting giving this maximum response is that at which the selectivity of the crystal filter is minimum. Since even at this minimum selectivity the crystal filter is much more selective than the straight super, the signal will be weaker than that obtainable when the crystal is cut out.

When a pure steady signal is carefully tuned to a single signal peak, the selectivity control should have practically no effect upon signal strength. If there is any form of modulation, however, the signal will be loudest when the selectivity control is set for minimum selectivity, since this adjustment allows a greater width of signal or modulation to be passed.

FINAL I.F. ADJUSTMENT

The final adjustment of the I.F. transformers may now be made. Set the control for maximum selectivity, carefully tune in a steady signal until it is exactly on the crystal peak, and adjust each of the I.F. transformer tuning condensers for maximum signal strength. (*In almost all cases where the I.F. amplifier has once been aligned to the crystal, this check is all that would be required, and it is not necessary to put the crystal in an external oscillator.*) Even if the I.F. amplifier is considerably out of alignment, the crystal frequency may be found by employing a strong local signal from a monitor or frequency meter, slowly tuning across it while listening for a peak in the audio beat note. If the peak is found at a very high audio pitch it will be necessary to change the tuning of the beat oscillator so that the audio peak will be well inside the limits of audibility. It is probable that if the peak signal is found at all, the I.F. amplifier will not be far out of tune and the readjustments required will be small.

Since the I.F. transformers are tuned with air dielectric condensers, the adjustments when once made are permanent and need only be checked when new tubes are substituted, provided of course the receiver is not subjected to severe mechanical shocks or vibration.

CHECKING CRYSTAL ACTION

The crystal response, or crystal activity, may be easily checked as follows: With the signal tuned in exactly as mentioned in the previous paragraph and the selectivity control set at maximum selectivity, disconnecting the filter (by turning the phasing knob to 0), should weaken the signal slightly. There will, of course, be a great increase in tube hiss, background noise, and interfering signal, but the actual strength of the desired signal should be weaker. It is possible, of course, to obtain a louder signal in the straight super connection by resetting the selectivity control and this is quite normal. The fact that a signal is weakened when using the crystal filter is relatively unimportant, inasmuch as the filter is only used when interference or static is present, and such interference will be made about 100 times weaker, thereby greatly improving the readability of the signal.

A crystal which is found to be a poor resonator should be carefully removed from the holder and both crystal and plates cleaned with alcohol, gasoline, carbona, ether, or some similar fluid. In reassembling the holder care must be taken to see that the crystal is free between the plates; that is, that there is a suitable air gap (usually two or three thousandths) between the plates and the crystal and that the crystal is free to move sideways in any direction. The fibre pieces may be removed if desired as they serve only to protect the crystal in shipment.

"S" METER ADJUSTMENT

If it should happen that the "S" meter network gets out of balance, the procedure for correction is as follows: Disconnect the antenna and turn the CONTROL switch to MVC, set the R.F. GAIN full on. Then, by means of a screw driver, adjust the balancing control (No. 8, receiver top view) until the meter reads 0.

Special Instructions for the NC-101X and NC-101XA Receivers

The NC-101X is a special model of the NC-100X receiver, employing the same circuit, etc., but covering only the five low-frequency amateur bands. Each of these bands is spread out over the major portion of the dial and, as shown by the accompanying calibration curves, each band starts at 50 and ends at 450. The curves are accurate to about .25% of the operating frequency.

All operating instructions, circuit data, alignment and service notes contained in the NC-100 Instruction Manual apply to the NC-101X receiver, except those sections referring to the calibration and alignment of the high frequency circuits.

Complete alignment of any coil range is made as follows: Set the tuning dial at 450, and check the calibration curve by means of an *accurate* test oscillator. Readjustment of the high frequency oscillator trimmer condenser should be made if the calibration is in error by more than 20 dial divisions. Check the alignment of R.F. and 1st Det. circuits by setting the trimmers for maximum background noise. (See Page 9.) Re-check the H.F. Oscillator, then turn the dial to 50, and note the calibration. Ganging is tested by checking R.F. and 1st Det. trimmer adjustments.

The design of the high frequency circuits, particularly that of the H.F. Oscillator, is such that frequency drift is extremely small, after the receiver has reached its operating temperature. It should be remembered, however, that the band spread tuning arrangement tends to magnify a small change in frequency. For instance, on the 20 meter band, each dial division represents only 1000 *cycles*. Ten kilocycles will, therefore, be spread over about two-and-one-half inches of scale length, even though the actual frequency change is but .07 of one percent. Only a comparatively few amateur transmitters will maintain constant frequency to such a high degree of precision, even with crystal control.

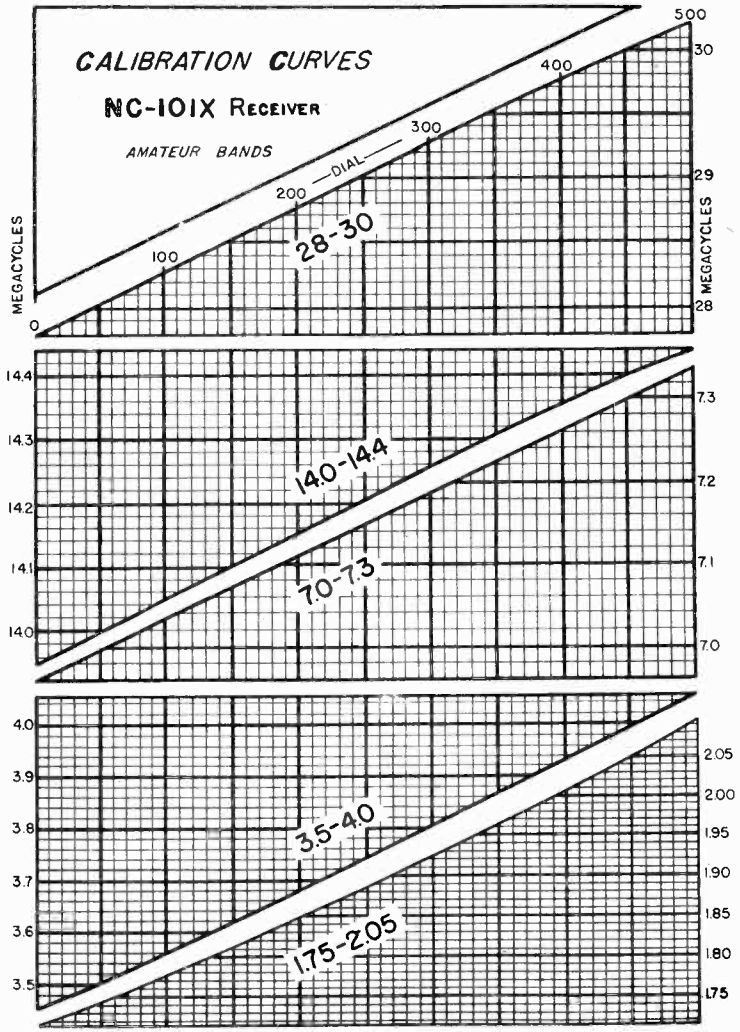
There should be ample room for air to circulate on all sides of the receiver, in order to reduce drift to a minimum. Do not pile magazines or papers on the cover and do not install the receiver in a small console or in a closely fitting compartment or bookcase.

Supplementary Instructions for Battery Models

The Battery Operated Types of the NC-100A series are identical in operation and adjustment to the standard AC models. Battery power drain is reduced by using a single 6F6G output tube. The recommended speaker is an 8-inch permanent magnet type.

Normal operation of the NC-100B series may be obtained by using either a combination of batteries or a properly filtered battery operated vibrator pack or gen-e-motor to supply 6 volts to the heater and approximately 180 volts to the receiver B circuits.

Receivers primarily designed for battery operation can be used with an external power pack, such as the National Type 5886, for operation from AC lines. When used in this manner, the four prong plug attached to the receiver power cable should be inserted in the socket outlet of the power unit. For use with other power supplies, the cable plug may be unsoldered and the wires connected to the outlet terminals of the power unit.



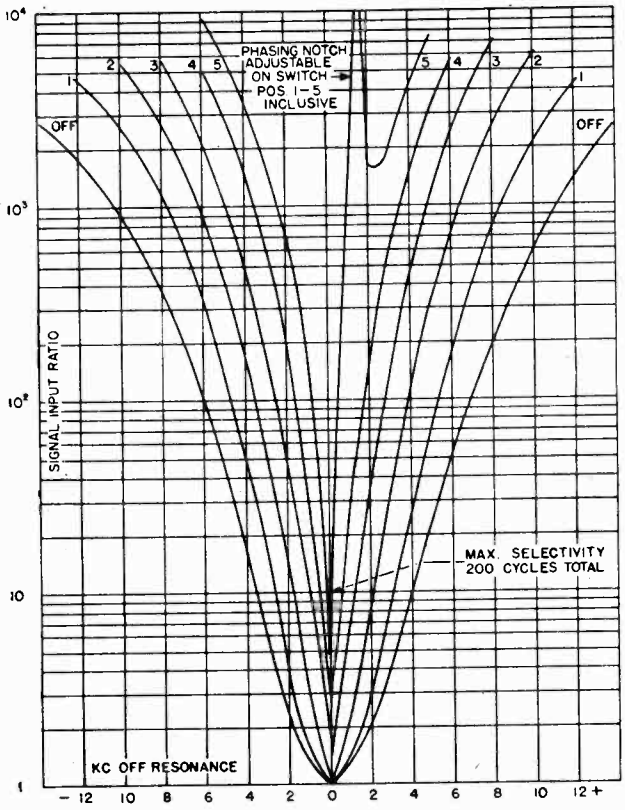
CAPACITOR AND RESISTOR LIST

Symbol	Function	Type	Rating
C_1	H.F. Osc. Grid	Mica	.0001 mfd., 500 Volt
C_2	R.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_3	H.F. Osc. Screen	Paper	.1 mfd., 400 Volt
C_4	H.F. Osc. Coupling	Paper	.01 mfd., 400 Volt
C_5	H.F. Osc. Heater Bypass	Paper	.01 mfd., 400 Volt
C_6	1st I.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_7	1st Det. B+ Bypass	Paper	.1 mfd., 600 Volt
C_8	1st Aud.-Output Coupling	Paper	.1 mfd., 600 Volt
C_9	C.W. Osc. Heater Bypass	Paper	.1 mfd., 400 Volt
C_{10}	C.W. Osc. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{11}	C.W. Osc. Coupling	Bakelite	1. mmf., 400 Volt
C_{12}	Limiter Output Bypass	Mica	.00025 mfd., 500 Volt
C_{13}	Lim.-1st Audio Coupling	Paper	.01 mfd., 400 Volt
C_{14}	1st I.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_{15}	2nd Det. Cathode Bypass	Mica	.00025 mfd., 500 Volt
C_{16}	R.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_{17}	2nd Det. Plate Bypass	Paper	.05 mfd., 600 Volt
C_{18}	2nd I.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_{19}	AVC Input Coupling	Mica	.00005 mfd., 500 Volt
C_{20}	2nd I.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_{21}	AVC Plate Bypass	Paper	.1 mfd., 400 Volt
C_{22}	2nd I.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{23}	AVC Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{24}	1st Audio Cathode Bypass	Electrolytic	10. mfd., 50 Volt
C_{25}	2nd Det.-Lim. Audio Coupling	Paper	1. mfd., 200 Volt
C_{26}	2nd I.F. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{27}	R.F. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{28}	R.F. Grid Filter	Mica	.005 mfd., 300 Volt
C_{29}	R.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{30}	B− to Chassis Bypass	Electrolytic	8. mfd., 200 Volt
C_{31}	1st I.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{32}	1st Det. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{33}	B+ Filter	Electrolytic	16. mfd., 350 Volt
C_{34}	B+ Filter	Electrolytic	8.-8. mfd., 475 Volt
C_{35}	Tone Control	Paper	.01 mfd., 400 Volt
C_{36}	Tone Control	Mica	.001 mfd., 500 Volt
C_{37}	Main Tuning	Air	225 mmf., 3 Gang
R_1	H.F. Osc. Grid	Carbon	20,000 Ohm, ½ Watt
R_2	Limiter Control	Wire Wound	10,000 Ohm, Variable
R_3	1st Det. Screen	Carbon	100,000 Ohm, ½ Watt
R_4	H.F. Osc. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_5	H.F. Osc. Screen	Carbon	50,000 Ohm, 1 Watt
R_6	1st Audio Plate	Carbon	50,000 Ohm, 1 Watt
R_7	1st Det. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_8	1st I.F. Cathode Bias	Carbon	500–2,000 Ohm, ½ Watt
R_9	Audio Gain Control	Composition	500,000 Ohm, Variable
R_{10}	1st I.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{11}	C.W. Osc. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_{12}	C.W. Osc. Plate Filter	Carbon	250,000 Ohm, ½ Watt
R_{13}	C.W. Osc. Screen	Carbon	100,000 Ohm, ½ Watt
R_{14}	Limiter Output	Carbon	50,000 Ohm, ½ Watt
R_{15}	2nd Det. Load	Carbon	50,000 Ohm, ½ Watt
R_{16}	2nd Det. I.F. Filter	Carbon	5,000 Ohm, ½ Watt
R_{17}	1st I.F. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_{18}	2nd Det. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_{19}	Limiter Input	Carbon	100,000 Ohm, ½ Watt
R_{20}	R.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{21}	AVC Plate Filter	Carbon	500,000 Ohm, ½ Watt
R_{22}	AVC Grid	Carbon	5. Megohm, ½ Watt
R_{23}	AVC Plate	Carbon	500,000 Ohm, ½ Watt
R_{24}	1st Audio Cathode Bias	Carbon	2,000 Ohm, ½ Watt
R_{25}	AVC Volt. Div.	Carbon	1,000 Ohm, 2 Watt
R_{26}	AVC Volt. Div.	Carbon	1,500 Ohm, 2 Watt
R_{27}	AVC Cathode Bias	Carbon	350 Ohm, 2 Watt
R_{28}	2nd I.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{29}	2nd I.F. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_{30}	2nd I.F. Screen	Carbon	70,000 Ohm, ½ Watt
R_{31}	2nd I.F. Cathode	Carbon	2,500 Ohm, ½ Watt
R_{32}	R.F. Cathode Bias	Carbon	500 Ohm, ½ Watt
R_{33}	1st Det. Cathode Bias	Carbon	5,000 Ohm, ½ Watt
R_{34}	R.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{35}	Output Cathode Bias	Carbon	250 Ohm, 2 Watt
R_{36}	S Meter Adjustment	Wire Wound	1,000 Ohm, Variable
R_{37}	S Meter Bridge	Carbon	1,000 Ohm, ½ Watt
R_{38}	R.F. Gain Bleeder	Carbon	50,000 Ohm, ½ Watt
R_{39}	Tone Control	Composition	500,000 Ohm, Variable
R_{40}	R.F. Gain Control	Wire Wound	10,000 Ohm, Variable
R_{41}	B+ Volt. Div.	Carbon	20,000 Ohm, 2 Watt
R_{42}	B+ Volt. Div.	Carbon	20,000 Ohm, 2 Watt

MODELS NC-200 Series

NATIONAL CO., INC.

Six uniform steps of selectivity, as shown in Dwg. No. 1, and a variable phasing control allow the receiver to be adjusted to almost any operating condition, a highly desirable feature for both short wave communication and broadcast band reception. The curves show that any degree of selectivity between that of full single signal operation and wide band broadcast reception is available, the ratio between the two being almost forty to one.



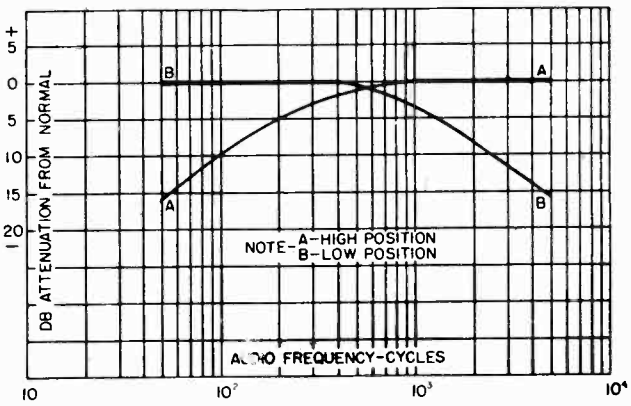
Dwg. No. 1. Typical Selectivity Characteristics

Signal Strength Meter

A 0 to 1 milliammeter, serving as a signal strength meter, is front panel mounted. It is fitted with a scale graduated in S-units from 1 to 9 and in db above S-9 from 0 to 40 db. The bridge circuit, in which the meter is connected, makes possible accurate signal input readings from below 1 microvolt to 1,000 microvolts.

Antenna Input

Antenna input terminals are located at the rear of the receiver chassis near the center. The input circuit is suitable for use with a single wire antenna, a balanced feed-line or a low impedance concentric transmission line. Average input impedance is 500 ohms.



Dwg. No. 2. Tone Control Action

Tone Control

The tone control is used to vary the frequency characteristic of the audio amplifier as shown in the accompanying curves, Dwg. No. 2. The control is particularly helpful when receiving weak signals through interference, as explained in Section 3.

Audio Output

Two audio output circuits are provided:

(1) A headphone jack is mounted on the front panel and is wired so as to silence the loud speaker when the phone plug is inserted. The correct load impedance for the headphone output is 20,000 ohms, this being the usual impedance of phones having a DC resistance of between 2000 and 3000 ohms. Maximum audio output available at the phone jack is 15 milliwatts.

(2) A five prong speaker socket (X-1) is provided at the rear of the receiver chassis. To this socket are brought the audio output leads. The proper load impedance (total) for the output circuit is 10,000 ohms. Maximum undistorted audio power output available is 8 watts.

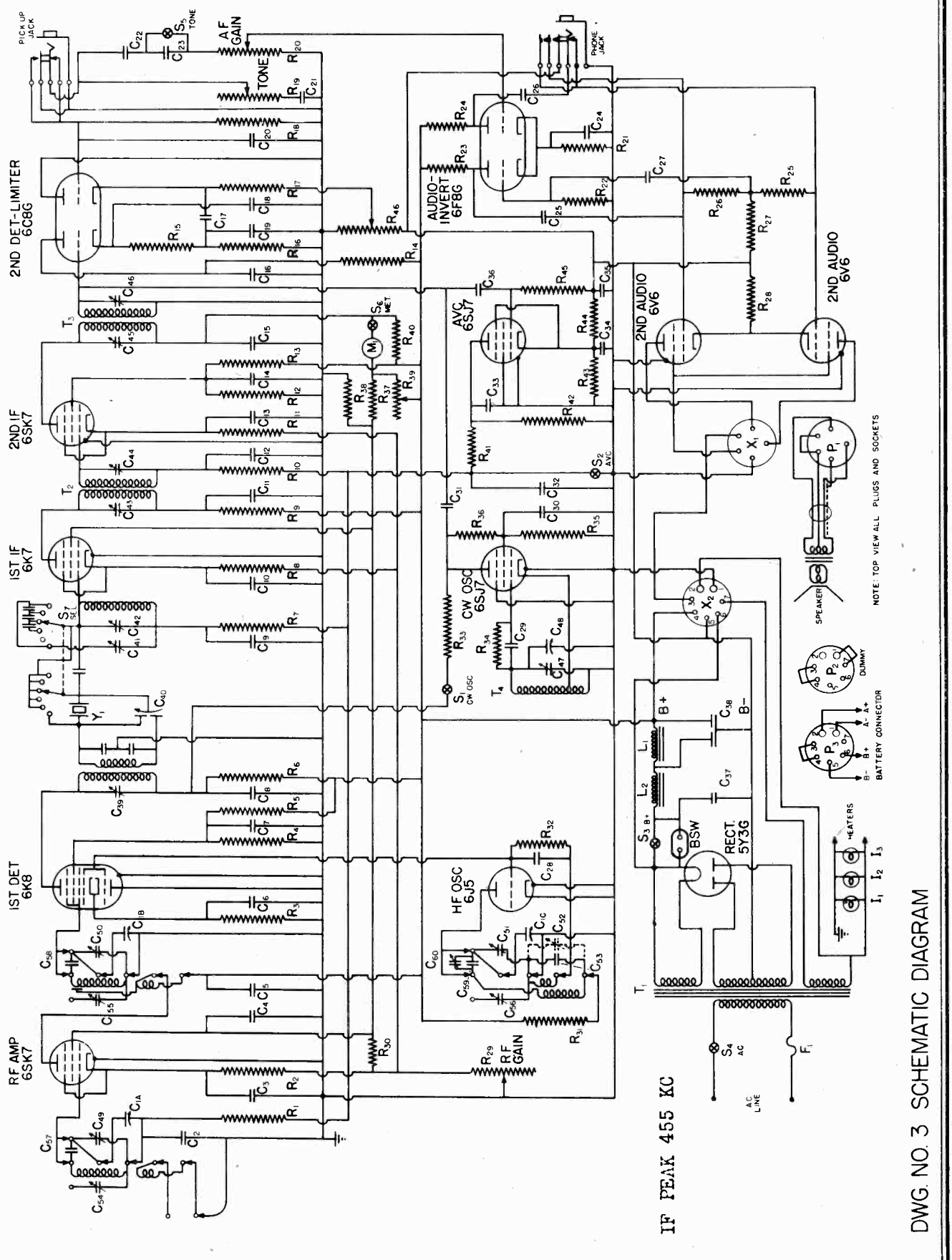
Power Supply

The standard NC-200 Receiver is designed for operation from a 110/120 volt, 50/60 cycle power source. Normal power consumption is approximately 100 volt-amps. The built-in power supply delivers all voltages required by the heater and B supply circuits — 4.5 amperes at 6.3 volts and 100 milliamperes at 250 volts, respectively. One side of the AC input line is connected through a 2 ampere fuse housed in an extractor post marked "FUSE" which is mounted at the rear of the receiver chassis.

All NC-200 Receivers are equipped with a seven prong plug and socket combination to permit portable or emergency operation from batteries.

MODELS NC-200 Series

NATIONAL CO., INC.



MODELS NC-200 Series

NATIONAL CO., INC.

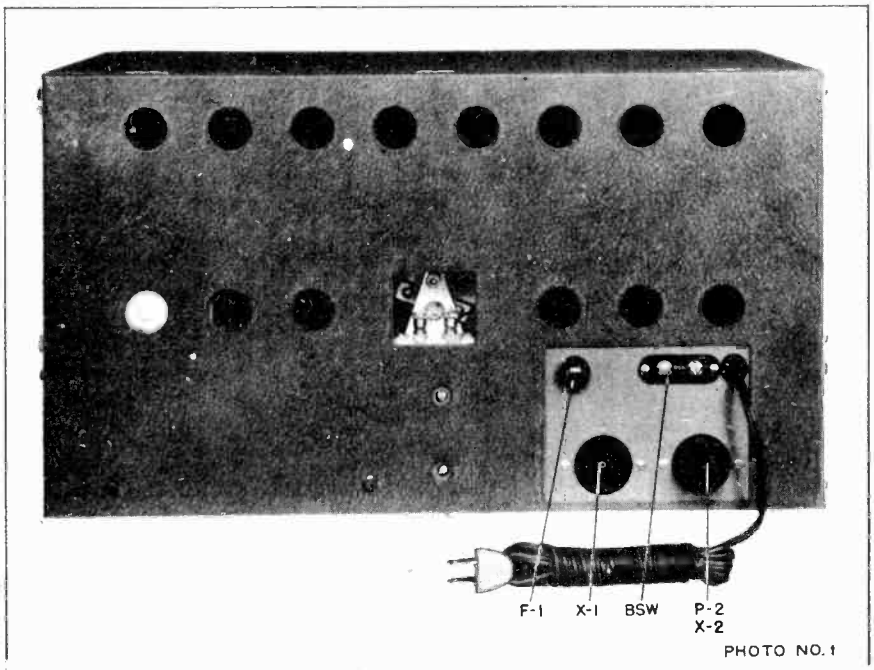


PHOTO NO. 1

Model NC-200 TG and Model NC-200 TGM are the same except that the latter does not have the amateur band spread feature. Model NC-200 RG same as Model NC-200 TG except that the NC-200 RG is for rack mounting.

Pick-up Jack

A pick-up jack mounted on the front panel of the Receiver may be used to connect auxiliary apparatus, such as a phonograph pick-up, to the audio system of the NC-200 Radio Receiver. This input circuit is high impedance and feeds into the 6F8G Audio Amplifier-Phase Inverter tube. The TONE and AF GAIN controls are operative with this connection.

Antenna Recommendations

When using a single-wire antenna, the lead-in should be connected to one antenna input terminal and the short flexible lead, which is attached to the chassis, should be fastened to the other terminal. The dimensions of the single-wire antenna system are not critical, the recommended length, including lead-in, being from 75 to 100 feet, although any length between 25 and 200 feet may be used.

Feed-lines of doublet systems should be connected to the two input terminals. The flexible lead is not used.

The inner conductor of a concentric transmission line should be connected to one input terminal. The outer conductor and the flexible grounding lead should be connected to the other terminal.

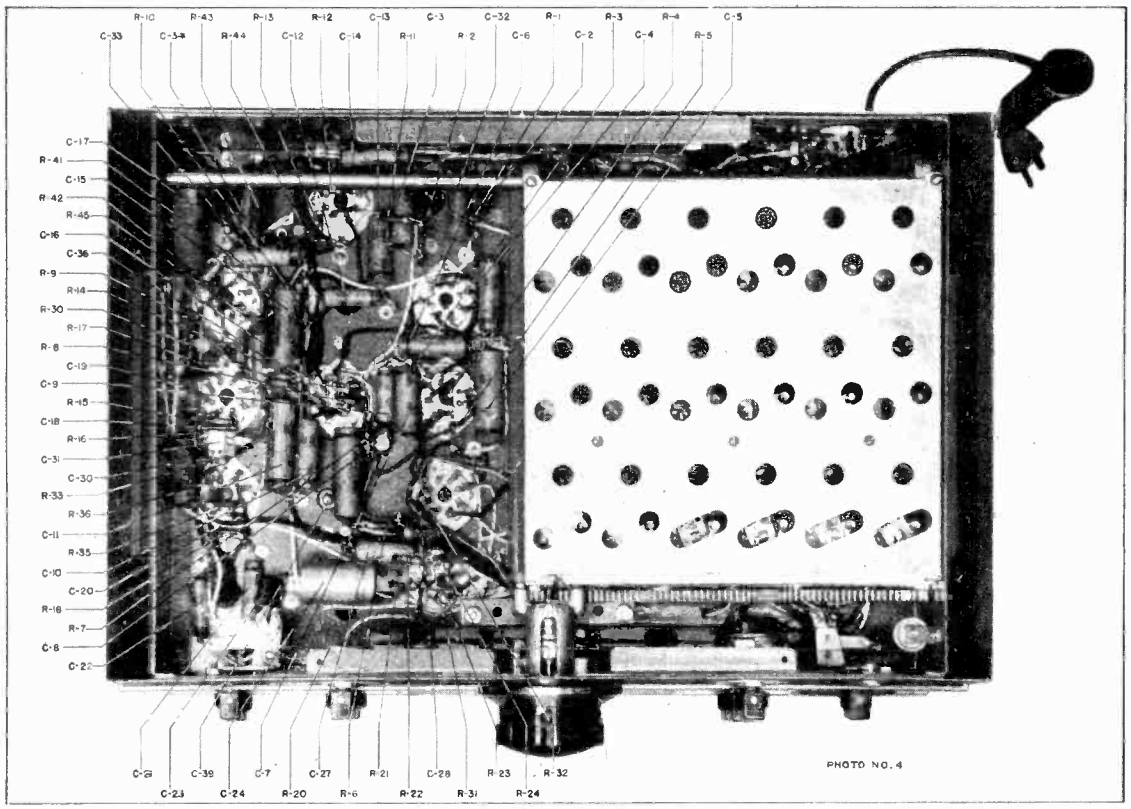
An external ground connection to the chassis may or may not be necessary. It should be used unless it reduces signal strength.

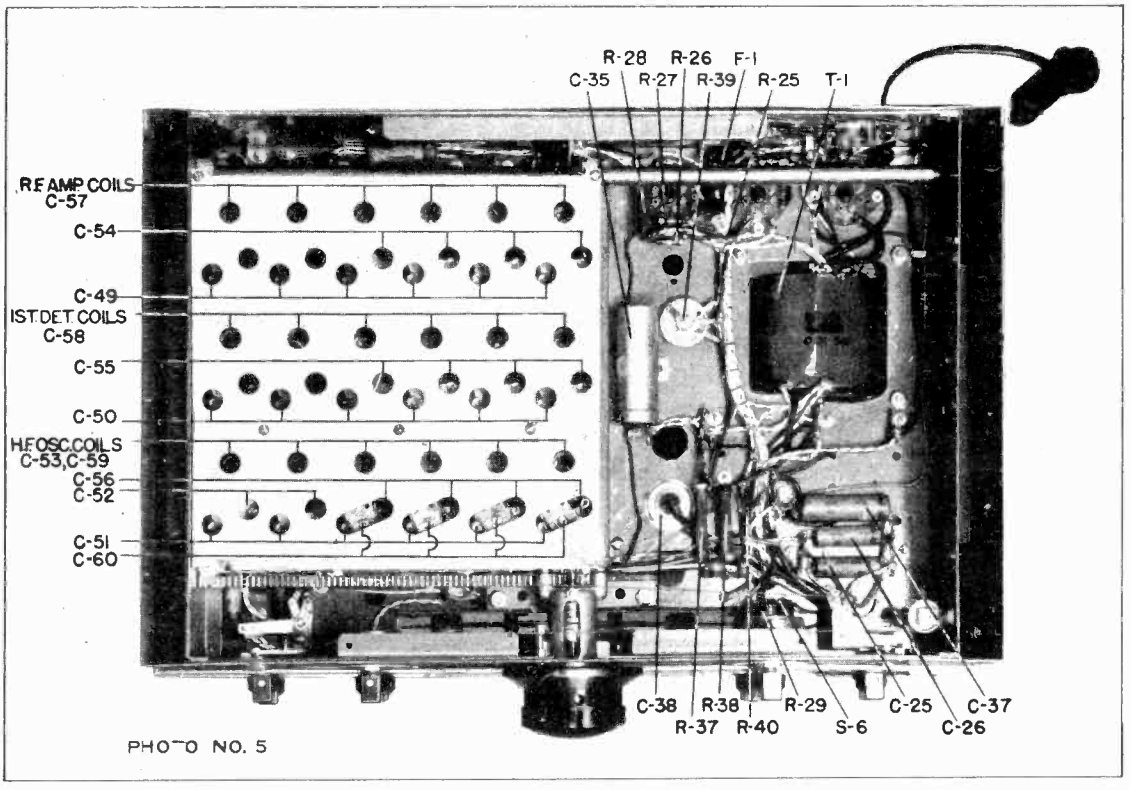
Battery Operation

The NC-200 may be operated in portable or emergency service by connecting batteries to the terminals of battery connector plug P-3 and inserting it in socket X-2, in place of plug P-2. See Dwg. No. 3. For normal operation with somewhat reduced loud speaker output, a 6 volt heater supply (storage battery) should be connected to terminals 1 and 2 of plug P-3, and a 180 volt B supply should be connected to plug terminals 5 and 6. The jumper between terminals 3 and 4 (of P-3) completes the plate and screen supply circuits of the 6V6 output tubes. It may be omitted, with greater battery economy, when operation with head-phones only is desired. A suggested refinement is to connect a switch between terminals 3 and 4, thus permitting the 6V6 B supply to be opened at will. Alternatively, removal of speaker plug P-1 from socket X-1 will open the 6V6 B supply in the same manner, without harming the output tubes. A further economy of battery power may be effected by removing the 6V6 tubes from their sockets.

Do not attempt to use plug P-2 for battery connection, since the jumper between terminals 1 and 7 would be incorrect.

NATIONAL CO., INC.





The two bottom views above show the NC-200 Receiver with the coil carriage at the extreme ends of its travel. It will be noted that such construction makes all components readily accessible for test or replacement.

MODELS NC-200 Series

NATIONAL CO., INC.

ALIGNMENT DATA

General

All circuits are carefully aligned, before shipment, using precision crystal oscillators which insure close conformability to the dial calibration. No readjustment will be required, therefore, unless the receiver is tampered with or damaged.

To determine the necessity for realignment, the receiver should first be carefully checked against its normal performance as described 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-200 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.

The coil group which is plugged into the circuit at any time is the one directly underneath the three gang master tuning capacitor. The coil nearest the front panel of the receiver is in the H.F. oscillator circuit, the middle coil is in the first detector circuit and the coil nearest the antenna input terminal panel is in the R.F. amplifier circuit. See Photo No. 5.

All coils have individual general coverage trimmer capacitors. The H.F. oscillator circuits of broadcast ranges E & F have, also, general coverage variable series padding capacitors. All coils of ranges A, B, C and D have band-spread trimmer capacitors. Variable series padding capacitors are used in all H.F. oscillator band-spread circuits. These capacitors are identified on Photo No. 5.

Adjustment of general coverage circuits affects the alignment of the band-spread circuits. On the other hand, band-spread circuit adjustments have little effect on general coverage circuit alignment. This fact must be kept in mind when any high frequency circuit is adjusted. A screw driver having a metal shaft may be used to make adjustments in the high frequency circuits but capacity effects will be noticeable, and the shaft should not touch any part of the aluminum casting.

Before proceeding with the alignment of any circuit of the receiver, the equipment must be set up as specified in Section 2, except that the antenna lead-in or transmission line must be disconnected. An output meter having a 20,000 ohm resistive load should be connected to the phone output jack. The POWER SUPPLY knob should be set at B+ ON and the R.F. GAIN knob set at 9. The TONE control knob should be set at N and the LIMITER knob should be retarded to 0.

Alignment of the equipment may be divided into three major steps:

(1) I.F. Amplifier Alignment
(2) General Coverage Alignment
  (a) H.F. Oscillator
  (b) First Detector and R.F. Amplifier
  (c) Tracking of H.F. Circuits
(3) Band Spread Alignment
  (a) H.F. Oscillator
  (b) First Detector and R.F. Amplifier
  (c) Tracking of H.F. Circuits

The circuits *MUST* be tuned in the above order when complete alignment is necessary.

I.F. Amplifier Alignment

The intermediate frequency of the NC-200 Receiver is 455 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator Y-1.

Tuning capacitors are provided on the crystal filter and on each I.F. transformer. These capacitors are designated by symbol numbers C-39 and C-41 to C-46, inclusive, on Photo Nos. 3 and 4.

The high output lead of an accurately calibrated signal generator should be connected to the grid terminal of the first detector tube and the grounded lead to any convenient point on the chassis. The flexible lead need not be disconnected from the grid of the tube. Connection is made directly from the output jack of the signal generator, the dummy antenna being omitted. The CONTROL SWITCH of the receiver should be in the CWO position and the modulation of the signal generator turned off to provide a steady C.W. test signal. The PHASING control of the receiver should be set at 0 and the SELECTIVITY control at 5. The A.F. GAIN control should be fully advanced.

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. The output attenuator of the signal generator should be retarded after the signal generator has been tuned to the I.F. peak in order to avoid I.F. or audio overload; the C.W. OSC. control must be set to provide an audio beat note in the middle of the audio range (between 400 and 1000 cycles).

The I.F. tuning capacitors C-39 and C-43 to C-46,

inclusive, should each be carefully adjusted to give a maximum reading on the output meter. The order in which the adjustments are made is not important. While making I.F. amplifier adjustments, it will be necessary to retard the attenuator of the signal generator if the readjustment increases I.F. amplifier gain to the point where overload occurs.

The crystal filter SELECTIVITY knob should then be set at 1 and the signal generator detuned between 3 and 4 kilocycles either side of the crystal frequency. Capacitor C-42 should be tuned for maximum output meter reading. After this adjustment is made, the SELECTIVITY knob should be set at OFF and the signal generator retuned to *exact* crystal frequency. Compensator capacitor C-41 should then be adjusted for maximum reading on the output meter.

The performance of the I.F. amplifier and audio circuits may be checked against the stage gain data in Section 4–3 after alignment has been completed. Selectivity may be checked against the curves of Dwg. No. 1.

After alignment of the I.F. amplifier has been completed, the C.W. OSC. control should be set at 0 at which setting the CW. oscillator should be at zero beat with the test signal. If zero beat does not occur at 0, readjust capacitor C-47 of transformer T-4, as shown in Photo No. 3.

The quartz crystal resonator Y-1 may be checked at the conclusion of I.F. amplifier alignment as follows: The SELECTIVITY control should be set at 5 and the signal generator tuned to the crystal frequency. The output meter reading should be noted. When the SELECTIVITY knob is turned to OFF, the meter reading should decrease 1 to 2 db. provided the PHASING knob is at 0. An increase in meter reading can, in most cases, be traced to an improper adjustment in the I.F. amplifier, since the crystal resonator is mounted in a sealed holder, and it is rather unlikely that trouble will be had from that source.

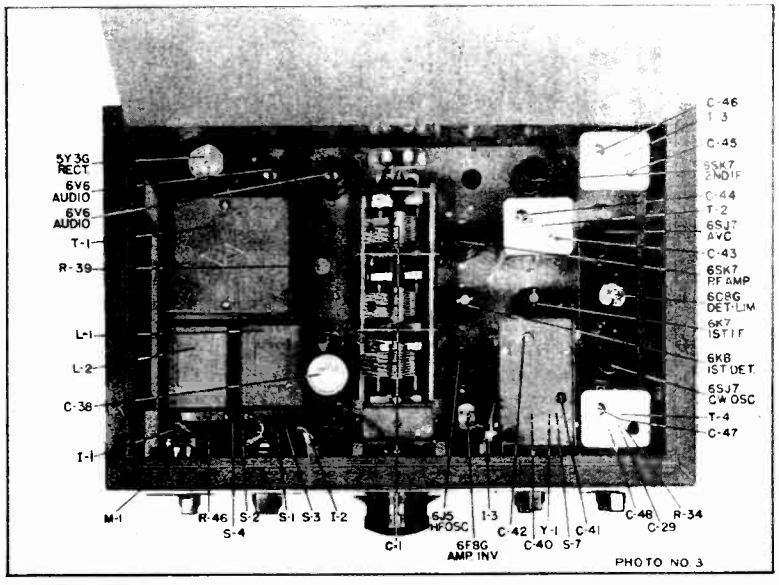


PHOTO NO. 3

General Coverage Alignment

(a) H.F. Oscillator

Alignment is effected as follows: With the coil range to be aligned connected in the circuit and with the receiver controls set as recommended in Section 5–1, the MAIN TUNING dial should be set near the high frequency end of the range. A signal generator should be connected to the antenna input terminals through a standard IRE dummy antenna and accurately tuned to deliver a signal of the same frequency as that indicated by the receiver dial setting. If, when this signal is tuned in, the dial reading is too high, the capacity of the H.F. oscillator general coverage circuit trimmer C-51 should be decreased to make correction. Conversely, low dial readings are corrected by increasing the capacity of trimmer C-51.

It is imperative that the high frequency oscillator circuits operate at a higher frequency than that of the first detector and R.F. amplifier circuits. This can be checked by tuning in the image signal, which should appear at a dial reading approximately 910 kilocycles below that of the real signal. The image signal should be considerably weaker if the R.F. amplifier is correctly aligned and a stronger test signal may be required before the image can be found. If the image does not appear at the lower frequency dial setting, the H.F. oscillator circuit is incorrectly adjusted and the capacity of the H.F. oscillator trimmer capacitor in question must be decreased until the real signal and image signal appear at the proper points on the dial.

(b) First Detector and R.F. Amplifier

With the signal generator adjusted to deliver a modulated signal near the high frequency limit of the range to be checked, the receiver should be tuned to give maximum output, as indicated by the output meter. The first detector and R.F. amplifier trimmer capacitors C-50 and C-49, respectively, should then be varied until the output meter reads maximum. On the highest frequency bands, adjustment of the first detector and R.F. amplifier trimmers may change the calibration of the high frequency oscil-

lator, necessitating retuning of the MAIN TUNING dial. If these trimmers should require considerable realignment, it may be necessary to readjust the high frequency oscillator trimmer C-51 in order to maintain correct calibration.

A very simple and quick method of first detector and R.F. trimmer alignment may be used if a signal generator is not available. This method consists of setting the trimmers at the adjustment which provides maximum circuit or background noise. It will be found that trimmer settings under this method are sufficiently sharp to provide good alignment, although the adjustment must be made with care to avoid alignment to the image frequency.

(c) Tracking of H.F. Circuits

After the H.F. oscillator, first detector and R.F. amplifier trimmers have been properly set at the high frequency limit of the range, the receiver should be tuned to a frequency toward the low frequency end. Tracking at any point up to the low frequency limit may be checked by adjusting the signal generator to the proper frequency and testing the settings of the first detector and R.F. amplifier trimmers for maximum gain. Calibration may be checked also at these points. After such a test, all trimmers checked should be reset at the high frequency end of the band since their settings are most critical at this point.

Errors in tracking near the low frequency limit of the band can be caused by defects in any of three circuit elements.

(1) The tuning capacitor section.

(2) The circuit inductance.

(3) The H.F. oscillator series padding capacitor.

In order to determine if one or more sections of the master tuning capacitor C-1 are the cause of any mistracking present, it is necessary to make the check described above on two or more different bands. If the same tracking error appears on all bands, the master tuning capacitor is definitely at fault. The error should be corrected by permanently bending the rotor or stator plates to provide the proper capacity.

If the tracking error appears only in the R.F. amplifier or first detector stage and on only one band, the inductance of the tuned circuit of the stage is incorrect. Should the tracking checks indicate that the H.F. oscillator circuit of a particular band is at fault, either the inductance of the circuit, the series padding capacitor or both may be responsible.

After any change or readjustment is made to any high frequency circuit inductance or series padding capacity, it will be necessary to realign the associated trimmer at the high frequency limit of the coil range. Tracking should then be rechecked.

Band-Spread Alignment

(a) H.F. Oscillator

The method of adjusting the H.F. oscillator band-spread trimmer C-56 of any range is the same as that described under Section 5–3 (a) above. As stated previously (Section 5–1), the adjustment of the general coverage trimmers must not be altered at this time.

(b) First Detector and R.F. Amplifier

The method of adjusting the band-spread trimmers C-58 and C-57 of the first detector and R.F. Amplifier circuits is the same as that described under Section 5–3 (b).

(c) Tracking of H.F. Circuits

After steps (a) and (b) have been completed, the MAIN TUNING control should be turned to the low frequency band limit, and the accuracy of the dial reading checked. If the dial reading is too low, the capacity of the series padding capacitor C-60 (see Photo No. 5) should be increased until the dial reading is correct, and vice versa. The MAIN TUNING control should then be reset at the high frequency band limit, and step (a) repeated. Recheck the low frequency dial reading and repeat the whole procedure if necessary.

The detector and R.F. amplifier stages have fixed band-spread series padding capacitors. These circuits will, therefore, track properly with the H.F. oscillator stage provided that the general coverage circuits are properly aligned and that the band-spread H.F. oscillator circuits are accurately tuned.

S-Meter Adjustment

The S-meter balancing resistor R-39, shown in Photo No. 3, is used to obtain zero meter reading in the absence of signal input to the receiver. The adjustment is as follows: Set the R.F. GAIN control at 10, CONTROL SWITCH at MVC, and disconnect the antenna leads; adjust R-39 until the S-meter reads zero.

Band Indicator Adjustment

An adjustment for centering the band indicator markers in the horizontal slots of the dial face is located in back of the MAIN TUNING knob. It is recommended that the MAIN TUNING knob be pulled out to engage the band changing mechanism, and turned clockwise to the last position before the stop. The red band marker should then indicate 28 to 30 mc. (10 meter) band-spread. To make the adjustment, simply remove the tuning knob and set the ¼" hex-head screw as may be required. The screw is self-locking.

Stage Gain Measurements

The sensitivity measurements listed below are made with the equipment set up as specified in Section 5–1. The CONTROL SWITCH should be set at MVC, the A.F. GAIN at 10, the SELECTIVITY at OFF and the PHASING at 0. The signal generator should be adjusted to deliver a test signal of 455 plus or minus 2 kc. either modulated or unmodulated. The high output lead should be attached to the grid of the tube specified in the table below and the ground lead connected to the receiver chassis.

With 1 milliwatt output at the phone jack, the test signal should be within the limits specified below.

Terminal	*Test Signal*
First Det. Grid	50 ± 10 Microvolts
First I.F. Grid	250 ± 50 Microvolts
Sec. I.F. Grid	50,000 ± 10,000 Microvolts
Sec. Det. Grid	Over 1 volt

Voltage Tabulation

All measurements of voltages should be made with the equipment connected for normal operation with AC supply of 115 volt, 50/60 cycle. Except as noted, the R.F. GAIN knob is set at 9, the LIMITER knob set at 0 and the CONTROL SWITCH knob set at MVC. A DC Voltmeter of 1000 ohms per volt sensitivity should be used. The following table must not be considered as a list of the actual operating voltages since loading effects of the measuring instrument will disturb many of the circuits and alter normal voltage distribution. All voltages are measured between specified terminal and chassis.

Tube Terminal	*DC Volts ±15%*
R.F. Amp. Grid	0
R.F. Amp. Cathode	3 A
R.F. Amp. Cathode	25 A*
R.F. Amp. Screen	80 B
R.F. Amp. Plate	230 B
First Det. Grid	0
First Det. Cathode	1 A
First Det. Screen	80 B
First Det. Plate	225 B
H.F. Osc. Grid	C
H.F. Osc. Cathode	0
H.F. Osc. Plate	90 B
First I.F. Grid	0
First I.F. Cathode	3 A
First I.F. Cathode	25 A*
First I.F. Screen	80 B
First I.F. Plate	225 B
Sec. I.F. Grid	0
Sec. I.F. Cathode	5 A
Sec. I.F. Cathode	25 A*
Sec. I.F. Screen	95 B
Sec. I.F. Plate	225 B
Sec. Det. Grid	0
Sec. Det. Cathode	8 A
Sec. Det. Plate	225 B
Limiter Grid	−3 A
Limiter Cathode	4.5 A
Limiter Cathode	0 #
Limiter Plate	0
AVC Grid	−25 A†
AVC Cathode	−45 A†
AVC Screen	0 †
AVC Plate	0 †
B.F. Osc. Grid	C
B.F. Osc. Cathode	0 §
B.F. Osc. Screen	10 A§
B.F. Osc. Plate	25 A§
Amp.-Inv. Grids	0
Amp.-Inv. Cathode	4.5 A
Amp.-Inv. Plates	115 B
Audio Grids	−20 A
Audio Cathodes	−40 A
Audio Screens	230 B
Audio Plates	215 B
B+ Common	230 B
B− Common	−50 B

A — 0 to 50 volt meter scale
B — 0 to 250 volt meter scale
C — Accurate measurement cannot be made
* — R.F. GAIN knob set at 0
# — LIMITER knob set at 10
† — CONTROL SWITCH knob set at AVC
§ — CONTROL SWITCH knob set at CWO

The Power Output Tubes used in the NC-200 Radio Receiver may be the metal type 6V6 or the glass type 6V6GT/G. It is necessary, however, to provide glass type 6V6GT/G output tubes with metal shields to avoid oscillation in the audio amplifier. The recommended shield is Goat type G1222K with type G1004 connector.

PARTS LIST

Symbol	*Function*	*Type*	*Rating*
	CAPACITORS		
C_{1A}	R.F. Amplifier Tuning	Air	225 mmf. max.
C_{1B}	First Detector Tuning	Air	225 mmf. max.
C_{1C}	H.F. Oscillator Tuning	Air	225 mmf. max.
C_2	R.F. Grid Filter	Mica	.005 mfd., 300 v. d.c. w.
C_3	R.F. Cathode By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_4	R.F. Screen By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_5	R.F. B+ By-pass	Paper	.1 mfd., 600 v. d.c. w.
C_6	First Det. Cathode By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_7	First Det. Screen By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_8	First Det. B+ By-pass	Paper	.1 mfd., 600 v. d.c. w.
C_9	First I.F. Grid Filter	Paper	.01 mfd., 600 v. d.c. w.
C_{10}	First I.F. Cathode By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{11}	First I.F. B+ By-pass	Paper	.1 mfd., 600 v. d.c. w.
C_{12}	Sec. I.F. Grid Filter	Paper	.01 mfd., 600 v. d.c. w.
C_{13}	Sec. I.F. Cathode By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{14}	Sec. I.F. Screen By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{15}	Sec. I.F. B+ By-pass	Paper	.1 mfd., 600 v. d.c. w.
C_{16}	Sec. Det. Plate By-pass	Paper	.01 mfd., 600 v. d.c. w.
C_{17}	Sec. Det. to Limiter Audio Coupling	Paper	1. mfd., 200 v. d.c. w.
C_{18}	Sec. Det. Cathode By-pass	Ceramic	.00025 mfd., 1,000 v. d.c. w.
C_{19}	Sec. Det. I.F. By-pass	Mica	.001 mfd., 500 v. d.c. w.
C_{20}	Limiter Output By-pass	Ceramic	.00025 mfd., 1,000 v. d.c. w.
C_{21}	Tone Control	Paper	.01 mfd., 600 v. d.c. w.
C_{22}	Limiter to Inverter-Audio Coupling	Paper	.01 mfd., 600 v. d.c. w.
C_{23}	Tone Control	Mica	.001 mfd., 500 v. d.c. w.
C_{24}	Inverter-Audio Cathode By-pass	Elec.	10 mfd., 50 v. d.c. w.
C_{25}	Inverter-Audio to Output Coupling	Paper	.1 mfd., 400 v. d.c. w.
C_{26}	Inverter-Audio to Output Coupling	Paper	.1 mfd., 400 v. d.c. w.
C_{27}	Inverter Feedback Coupling	Paper	.1 mfd., 400 v. d.c. w.
C_{28}	H.F. Oscillator Grid	Ceramic	.0001 mfd., 1,000 v. d.c. w.
C_{29}	Beat Oscillator Grid	Mica	.001 mfd., 500 v. d.c. w.
C_{30}	Beat Oscillator Screen By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{31}	Beat Osc. to Sec. Det. Coupling	Bakelite	1 mmf., 400 v. d.c. w.
C_{32}	AVC Output By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{33}	AVC Plate By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{34}	AVC Cathode By-pass	Paper	.1 mfd., 400 v. d.c. w.
C_{35}	B Minus By-pass	Elec.	8 mfd., 200 v. d.c. w.
C_{36}	AVC to Sec. Det. Coupling	Ceramic	.00005 mfd., 1,000 v. d.c. w.
C_{37}	Power Supply Filter	Paper	.1 mfd., 600 v. d.c. w.
C_{38}	Power Supply Filter	Elec.	8 and 8 mfd., 475 v. d.c. w
C_{39}	Crystal Filter Input Tuning	Air	6 to 85 mmf.
C_{40}	Crystal Filter Phasing Control	Air	5 and 5 mmf.
C_{41}	Crystal Filter Compensating	Ceramic	2 to 6 mmf.
C_{42}	Crystal Filter Output Tuning	Air	6 to 85 mmf.
C_{43}	T-2 Primary Tuning	Air	6 to 85 mmf.
C_{44}	T-2 Secondary Tuning	Air	6 to 85 mmf.
C_{45}	T-3 Primary Tuning	Air	6 to 85 mmf.

Continued on next page

PARTS LIST (Continued)

Symbol	Function	Type	Rating
	CAPACITORS (Continued)		
C_{46}	T-3 Secondary Tuning	Air	6 to 85 mmf.
C_{47}	T-4 Tuning	Air	6 to 85 mmf.
C_{48}	C.W. Osc. Control	Air	1 to 10 mmf.
C_{49}	Gen. Cov. R.F. Amplifier Trimmer	Air	See Note No. 1
C_{50}	Gen. Cov. 1st Det. Trimmer	Air	See Note No. 1
C_{51}	Gen. Cov. H.F. Osc. Trimmer	Air	See Note No. 1
C_{52}	Gen. Cov. H.F. Osc. Padder	Air	See Note No. 1
C_{53}	Gen. Cov. H.F. Osc. Padder	Mica	See Note No. 1
C_{54}	Band-Spread R.F. Amplifier Trimmer	Air	See Note No. 1
C_{55}	Band-Spread 1st Det. Trimmer	Air	See Note No. 1
C_{56}	Band-Spread H.F. Osc. Trimmer	Air	See Note No. 1
C_{57}	Band-Spread R.F. Amp. Padder	Ceramic	See Note No. 1
C_{58}	Band-Spread 1st Det. Padder	Ceramic	See Note No. 1
C_{59}	Band-Spread H.F. Osc. Padder	Ceramic	See Note No. 1
C_{60}	Band-Spread H.F. Osc. Padder	Ceramic	2 to 6 mmf.
	RESISTORS		
R_1	R.F. Grid Filter	Fixed	500,000 Ohm, ½ w.
R_2	R.F. Cathode Bias	Fixed	500 Ohm, ½ w.
R_3	First Det. Cathode Bias	Fixed	250 Ohm, ½ w.
R_4	First Det. Screen Bleeder	Fixed	100,000 Ohm, ½ w.
R_5	First Det. Screen Dropping	Fixed	50,000 Ohm, ½ w.
R_6	First Det. Plate Filter	Fixed	2,000 Ohm, ½ w.
R_7	First I.F. Grid Filter	Fixed	20,000 Ohm, ½ w.
R_8	First I.F. Cathode Bias	Fixed	See Note No, 2, ½ w.
R_9	First I.F. Plate Filter	Fixed	2,000 Ohm, ½ w.
R_{10}	Sec. I.F. Grid Filter	Fixed	500,000 Ohm, ½ w.
R_{11}	Sec. I.F. Cathode Bias	Fixed	See Note No, 2, ½ w.
R_{12}	Sec. I.F. Screen Bleeder	Fixed	100,000 Ohm, ½ w.
R_{13}	Sec. I.F. Screen Dropping	Fixed	70,000 Ohm, ½ w.
R_{14}	Sec. Det. Plate Filter	Fixed	2,000 Ohm, ½ w.
R_{15}	Sec. Det. I.F. Filter	Fixed	5,000 Ohm, ½ w.
R_{16}	Sec. Det. Load	Fixed	25,000 Ohm, ½ w.
R_{17}	Limiter Input	Fixed	50,000 Ohm, ½ w.
R_{18}	Limiter Output	Fixed	50,000 Ohm, ½ w.
R_{19}	Tone Control	Comp. Var.	500,000 Ohm, 1 w.
R_{20}	A.F. Gain Control	Comp. Var.	500,000 Ohm, 1 w.
R_{21}	Inverter-Audio Cathode Bias	Fixed	1,000 Ohm, ½ w.
R_{22}	Inverter Grid	Fixed	500,000 Ohm, ½ w.
R_{23}	First Audio Plate	Fixed	50,000 Ohm, ½ w.
R_{24}	First Audio Plate	Fixed	50,000 Ohm, ½ w.
R_{25}	Output Grid	Fixed	250,000 Ohm, ½ w.
R_{26}	Output Grid	Fixed	250,000 Ohm, ½ w.
R_{27}	Inverter Feedback Coupling	Fixed	250,000 Ohm, ½ w.
R_{28}	Output Cathode Bias	Fixed	200 Ohm, 2 w.
R_{29}	R.F. Gain Control With Switch	W. W. Var.	10,000 Ohm, 1½ w.
R_{30}	R.F. Gain Bleeder	Fixed	50,000 Ohm, ½ w.

PARTS LIST (Continued)

Symbol	Function	Type	Rating
	RESISTORS (Continued)		
R_{31}	H.F. Osc. B+ Dropping	Fixed	50,000 Ohm, 1 w.
R_{32}	H.F. Osc. Grid	Fixed	50,000 Ohm, ½ w.
R_{33}	Beat Osc. Plate Filter	Fixed	250,000 Ohm, ½ w.
R_{34}	Beat Osc. Grid	Fixed	50,000 Ohm, ½ w.
R_{35}	Beat Osc. Screen Bleeder	Fixed	100,000 Ohm, ½ w.
R_{36}	Beat Osc. Screen Dropping	Fixed	100,000 Ohm, ½ w.
R_{37}	B+ Voltage Divider	Fixed	20,000 Ohm, 2 w.
R_{38}	B+ Voltage Divider	Fixed	20,000 Ohm, 2 w.
R_{39}	S-Meter Adjustment	W. W. Var.	1,000 Ohm, 1 w.
R_{40}	S-Meter Bridge	Fixed	1,000 Ohm, ½ w.
R_{41}	AVC Plate Filter	Fixed	500,000 Ohm, ½ w.
R_{42}	AVC Plate	Fixed	500,000 Ohm, ½ w.
R_{43}	AVC Voltage Divider	Fixed	1,500 Ohm, 2 w.
R_{44}	AVC Cathode Bias	Fixed	500 Ohm, 2 w.
R_{45}	AVC Grid	Fixed	5,000,000 Ohm, ½ w.
R_{46}	Limiter Control	W. W. Var.	10,000 Ohm, 1½ w.
	MISCELLANEOUS		
F_1	AC Line Fuse	Glass Encl.	2 Amp.
I_1	S-Meter Lamp	No. 40	6 v., .15 a.
I_2	Dial Lamp	No. 47	6 v., .15 a.
I_3	Dial Lamp	No. 47	6 v., .15 a.
L_1	Power Supply Filter Choke	Potted	17 h., 100 ma.
L_2	Power Supply Filter Choke	Potted	17 h., 100 ma.
M_1	Signal Strength Meter	"S" Scale	0 to 1 ma.
P_1	Loud Speaker Connector Plug	Molded	5 Prong
P_2	Dummy Plug for AC Operation	Molded	7 Prong
P_3	Battery Connector Plug	Molded	7 Prong
S_1, S_2	Control Switch	Two Gang	SPST 250 v., 1 a.
S_3, S_4	Power Supply Switch	Two Gang	SPST 250 v., 1 a.
S_5	Tone Control Switch	Part of R-19	SPST
S_6	S-Meter Switch	Part of R-29	SPST
S_7	Selectivity Control Switch	Rotary	2 Section, Ganged
T_1	Power Transformer	150 Watt	115 Volt, 60 Cycle
T_2	I.F. Transformer	Air Tuned	455 kc.
T_3	I.F. Transformer	Air Tuned	455 kc.
T_4	Beat Osc. Transformer	Air Tuned	455 kc.
X_1	Audio Output Socket	Bakelite	5 Prong
X_2	Battery Connector Socket	Bakelite	7 Prong
Y_1	Crystal Resonator	Quartz	455 kc.

Note No. 1. Capacitor rating is different in each coil range and is individually adjusted as circuit conditions may require. Definite rating cannot be listed. C-52 used in E and F ranges only. C-54 to C-60, inclusive, used in A, B, C and D ranges only.

Note No. 2. Resistors R-8 and R-11 may have values between 300 and 5,000 ohms since they are chosen to meet the circuit requirements of the particular receiver. The resistance values are determined after careful laboratory test and cannot be changed without impairing performance.

NOTICE:—Due to the exigencies of the War Program, the manufacturer may have found it necessary to employ substitute, interchangeable parts in certain receivers. Such parts do not impair performance in any way, but should replacement become necessary it is suggested that the type indicated in the Parts List be obtained, if possible.

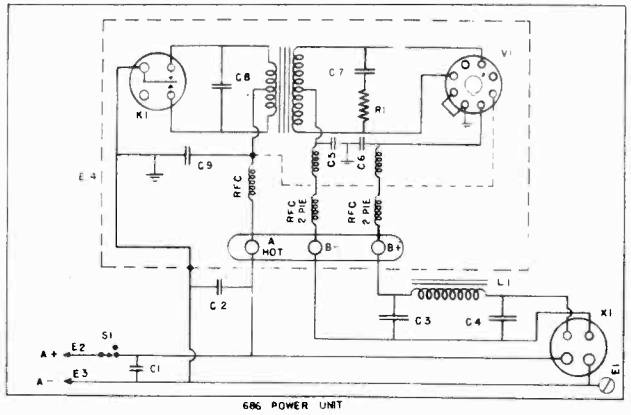


FIGURE 1

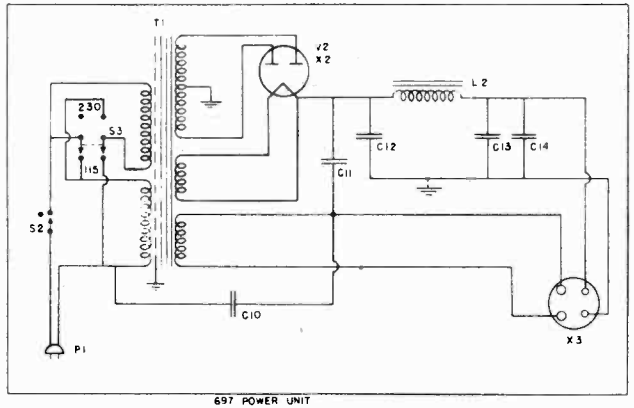


FIGURE 2

TABLE I

TYPICAL OPERATING CONDITIONS

VARIABLE	686	1286	697
Primary Voltage	6 V D.C.	12 V D.C.	115 or 230 V A.C.
Frequency	0	0	50/60 cycles/sec.
Heater Voltage	6 V D.C.	12 V D.C.	6.2 V A.C.
Heater Current	3 Amp.	- -	3.4 Amp. A.C.
B Voltage	165 V D.C.	165 V D.C.	240 V D.C.
B Milliamperes	45 D.C.	45 D.C.	70 D.C.
Line Current	6.3 Amp.	- -	.65 Amp.
Power Consumption	38. Watt	- -	70 Watt

Note:- The Type 0Z4 Rectifier Tube is used in the 1286 Power Unit and may be used in the 686 Power Unit in which case the rectifier filament connection (shown dotted) is not needed.

NOTE:

THE 115-230 VOLT FEATURE HAS BEEN OMITTED FROM THE SCHEMATIC, FIG.2

NATIONAL TYPE 686 TABLE MODEL POWER UNIT

The National Type 686 Table Model Power Unit operates from a 6 volt DC supply to provide approximately 165 volts at 45 milliamperes DC. The circuit diagram of this unit is shown in Figure 1. Battery clips are provided for convenient connection to a 6 volt storage battery or similar source of power. Output voltages for both A and B supply are available at a four prong socket for convenient plug and cable connection to associated apparatus. Table No. I lists typical operating voltages and currents when used with the National Type HRO Radio Receiver. Parts Lists are given in Table No. II. The Power Unit consists of a Mallory Type 6B200 Vibrapack and a condenser input single section filter. The Vibrapack uses a 6A5 (or 0Z4) type rectifier tube and a Mallory Type 626 vibrator. It should be noted that B- is not connected to the Power Unit chassis; A- is connected to the chassis.

NATIONAL TYPE 1286 TABLE MODEL POWER UNIT

The National Type 1286 Power Unit is similar to the Type 686 Power Unit except that it is designed to operate from 12 volts DC. The Vibrapack is a Mallory 12B200 with a G626 vibrator and an 0Z4 rectifier tube. The voltages available at the output socket are 12 volts DC and 165 volts at 45 milliamperes DC. Table No. I lists typical operating voltages and currents when used with the National HRO-12S Radio Receiver.

NATIONAL TYPE 697 TABLE MODEL POWER UNIT

The National Type 697 Table Model Power Unit operates from 115 or 230 volts AC, 50/60 cycles, to provide 240 volts at 70 milliamperes DC and 6.2 volts at 3.4 amperes AC. The circuit diagram of this unit is shown in Figure 2. Output voltages for both A and B supply are available at a four prong socket for convenient plug and cable connection to associated apparatus. Table No. I lists typical operating voltages and currents when used with the National Type HRO Radio Receiver. Parts Lists are given in Table III.

The Type 697 Power Unit consists of a power transformer, glass Type 80 rectifier tube, and a single section condenser input filter. B- is connected to the Power Unit chassis. The transformer primary and B+ input to the filter are by-passed to one side of the heater supply winding for R.F. filtering. A primary tap selector switch is provided to permit operation from either 115 or 230 volt supply lines.

NATIONAL RACK MOUNTING POWER UNITS

Either of the Table Models 686 or 697 Power Units are available for rack mounting. The National Type numbers for the 686 and 697 Power Units, rack mounted, are SPU-686 and SPU-697, respectively.

TABLE III
PARTS LIST

NO.	SYMBOL	MFR. DESIG.	DESCRIPTION	MFR.
			TYPE 697 POWER UNIT	
1	P-1	Allied 150	Cord and Plug	9
1	S-2	20599NU	SPST Toggle	2
1	S-3	20905-H	DPDT Toggle	2
2	C-10,11	1450	Mica: .01 mfd. 300 V DC W	1
1	C-12,13,14	D-7166	Elec: 8-8-8 mfd. 475 V DC W	8
1	L-2	80	17 Henry Choke	6
1	T-1	3385	110-220 V. Power Transformer	6
1	V-2	-80	Rectifier Tube	7
1	X-3	X-18	4-Prong Socket	3
1	X-2	X-18	4-Prong Socket Marked 80	3
			TYPE 686 OR 1286 POWER UNIT	
1	E-4	6B200	Vibrapack (686 only)	4
1	E-4	12B200	Vibrapack (1286 only)	4
2	E-2,3	24A	Battery Clips	5
1	S-1	20994	SPST Toggle Switch	2
1	C-1	1467	Mica: .005 mfd. ±10%, 300 V DC W	1
1	C-2	G014AB	Paper: .1 mfd. +20-10%, 400 V DC W	8
1	C-3,4	D-7165	Elec.: 8-8 mfd. 475 V DC W	8
1	L-1	80	17 Henry ±20% Inductance	6
1	X-1	X-18	4-Prong Socket	3
1	E-1	HCLUG	Screw Terminal Battery Cable	6
1	V-1	6X5	Rectifier Tube (686 only)	7
1	V-1	0Z4	Rectifier Tube (1286 only)	7
1	K-1	626	Vibrator (686 only)	4
1	K-1	G626	Vibrator (1286 only)	4

LIST OF MANUFACTURERS

1 Aerovox Corporation, New Bedford, Mass.
2 Arrow-Hart & Hegeman, Hartford, Conn.
3 Cinch Mfg. Company, Chicago, Illinois
4 P.R. Mallory & Co, Indianapolis, Ind.
5 Mueller Elec. Co., Cleveland, Ohio
6 National Company, Inc. Malden, Mass.
7 RCA Mfg. Company, Harrison, N.J.
8 Sprague Products Co. No. Adams, Mass.
9 Cornish Wire Co., New York, N.Y.