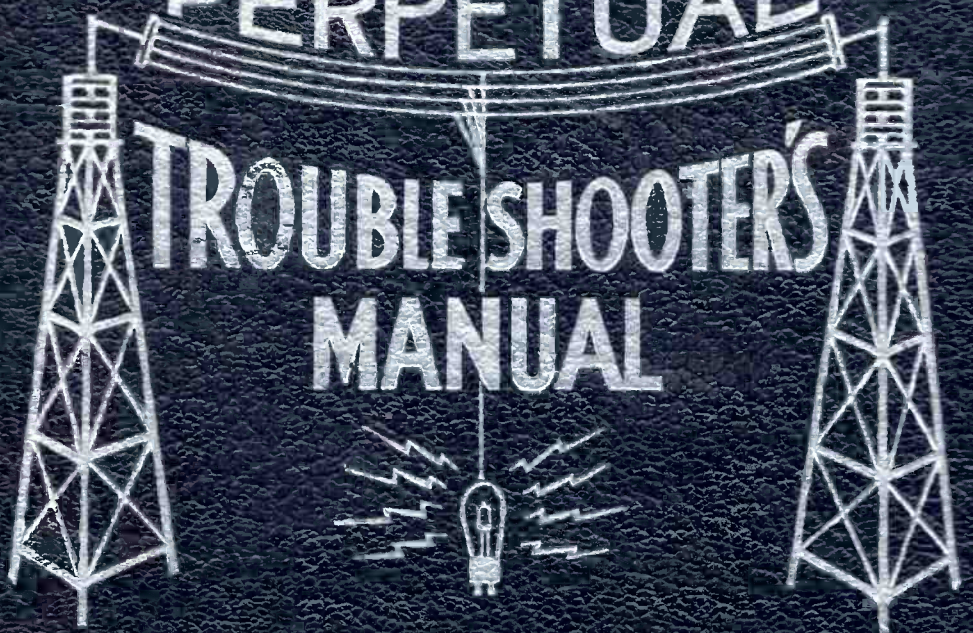
VOLUME III

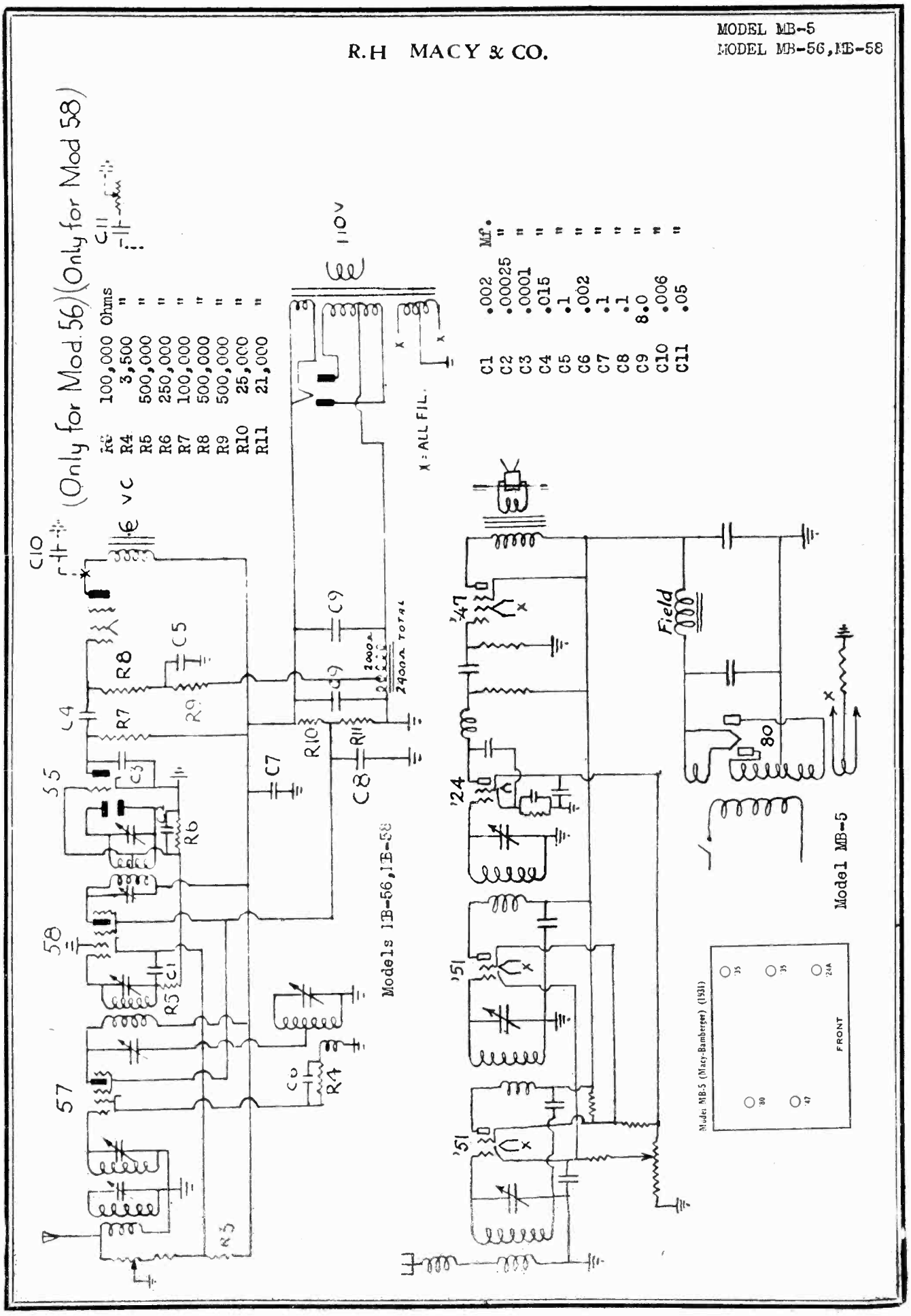
PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

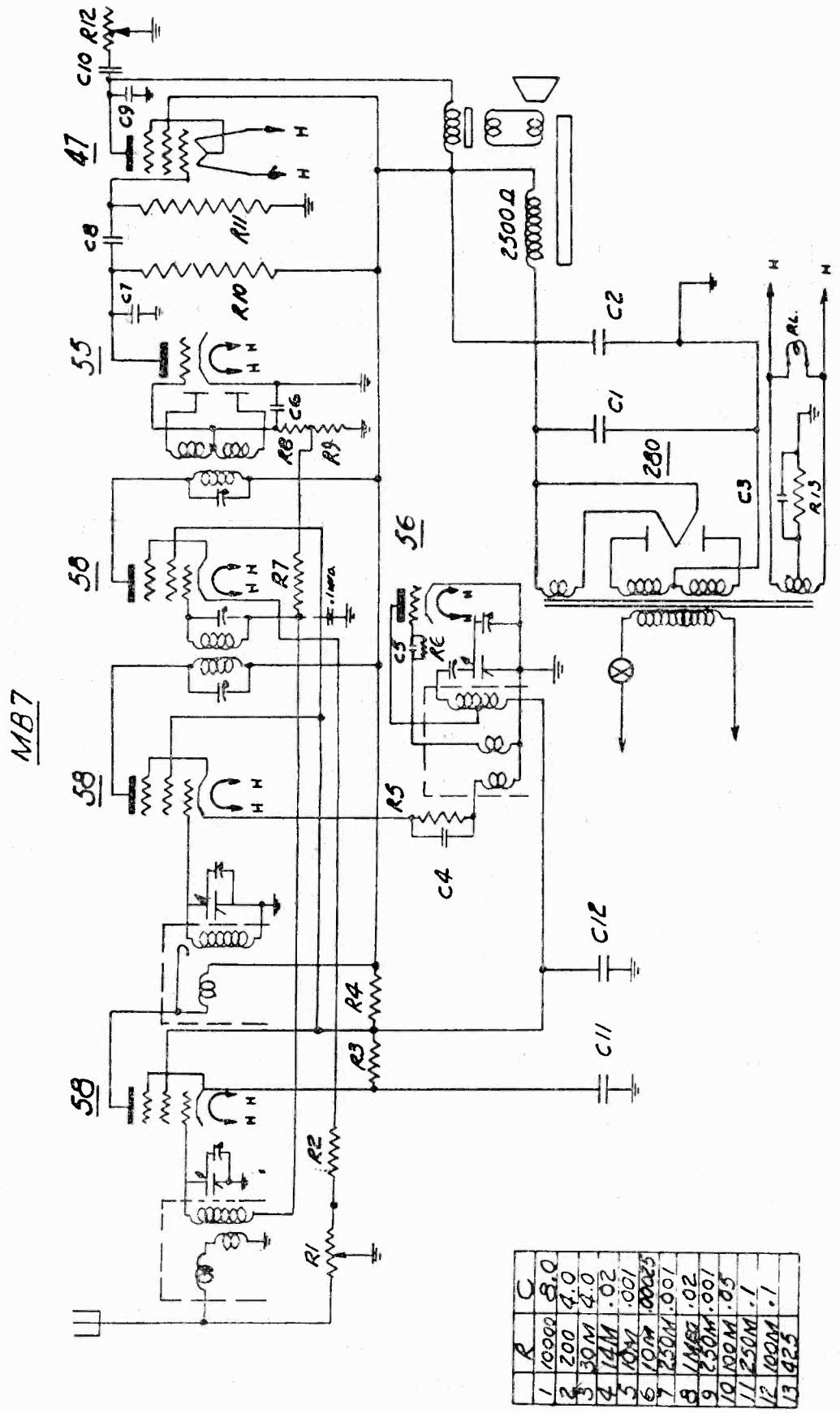
R.H MACY & CO.

MODEL MB-5
MODEL MB-56, MB-58



MODEL MB-710

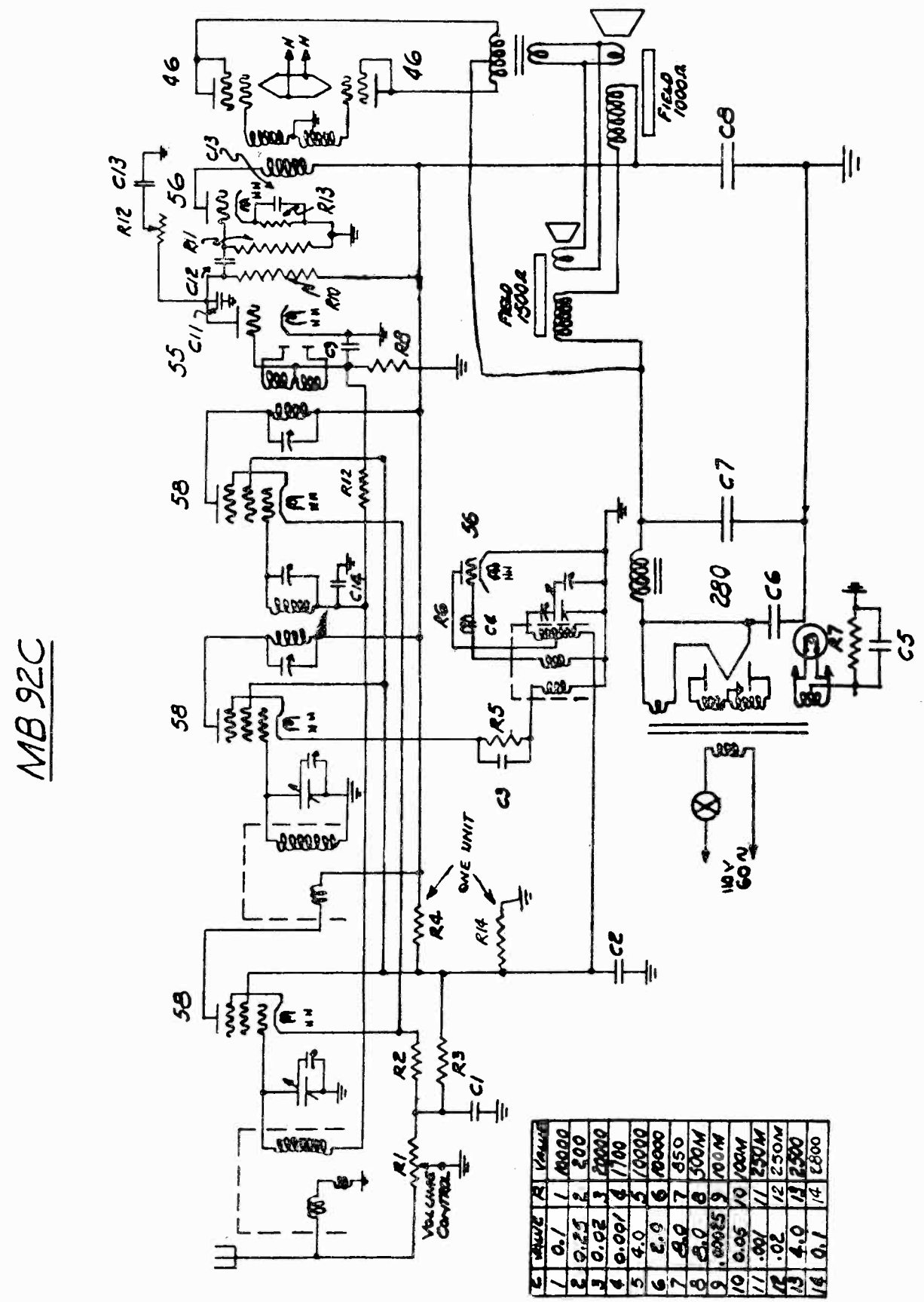
R. H MACY & CO.



	R	C
1	10000	8.0
2	200	4.0
3	30M	4.0
4	14M	.02
5	10M	.001
6	10M	.00025
7	250M	.001
8	1MEG	.02
9	250M	.001
10	100M	.05
11	250M	.1
12	100M	.1
13	425	

MODEL MB-92

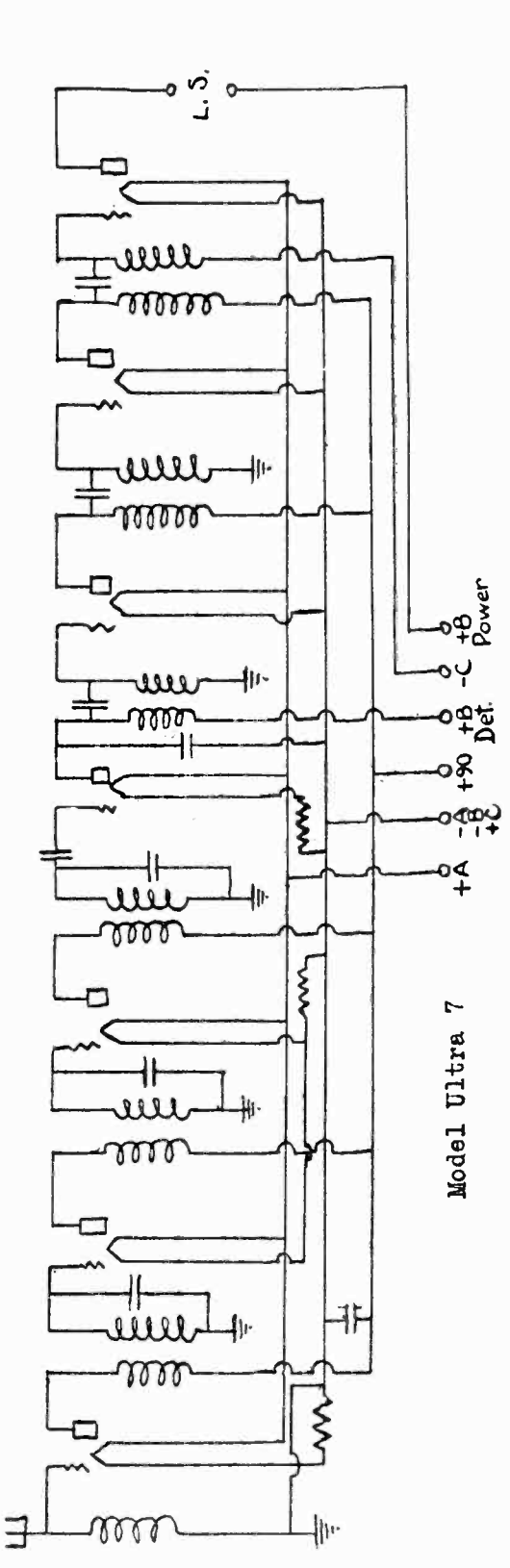
R. H. MACY & CO.



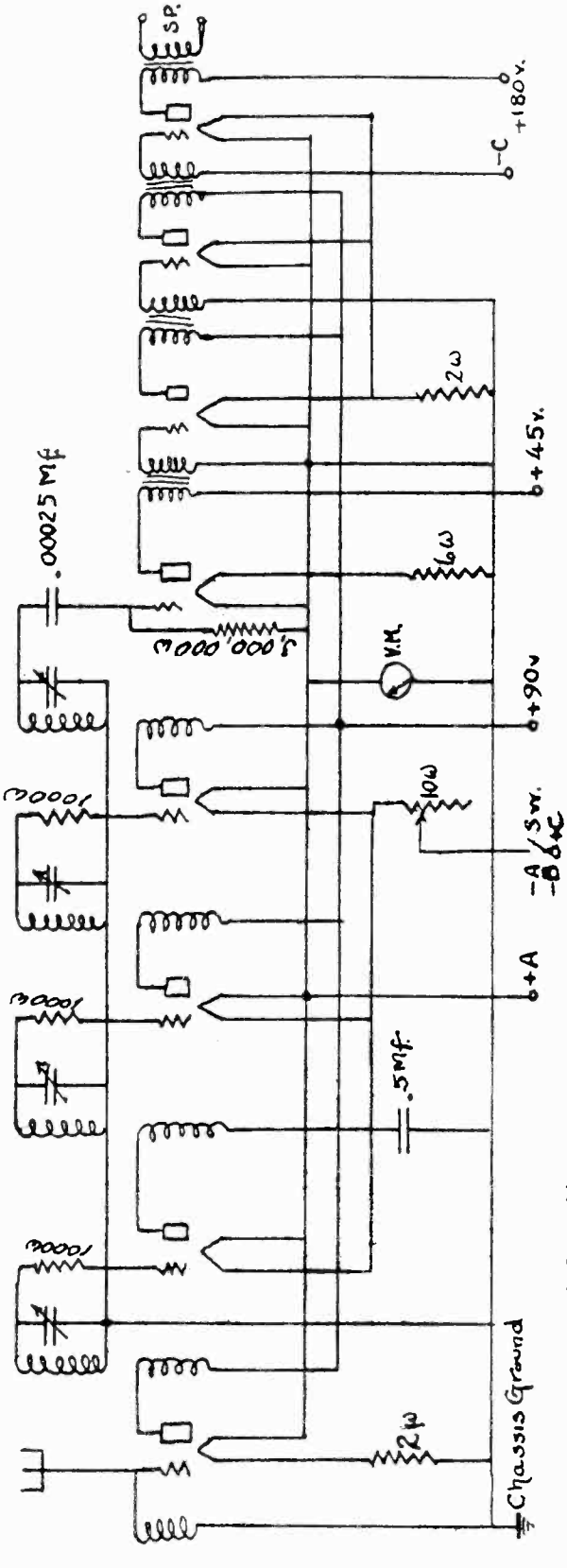
Ltr	Value	R	Value
1	0.1	1	40000
2	0.25	2	200
3	0.02	3	20000
4	0.001	4	1700
5	4.0	5	10000
6	2.0	6	40000
7	4.0	7	650
8	8.0	8	500M
9	.0025	9	100M
10	0.05	10	100M
11	.001	11	250M
12	.02	12	250M
13	4.0	13	2500
14	0.1	14	2800

MODEL Miraco Ultra 7
MODEL Miraco Unitone 8

MID-WEST RADIO CORP.



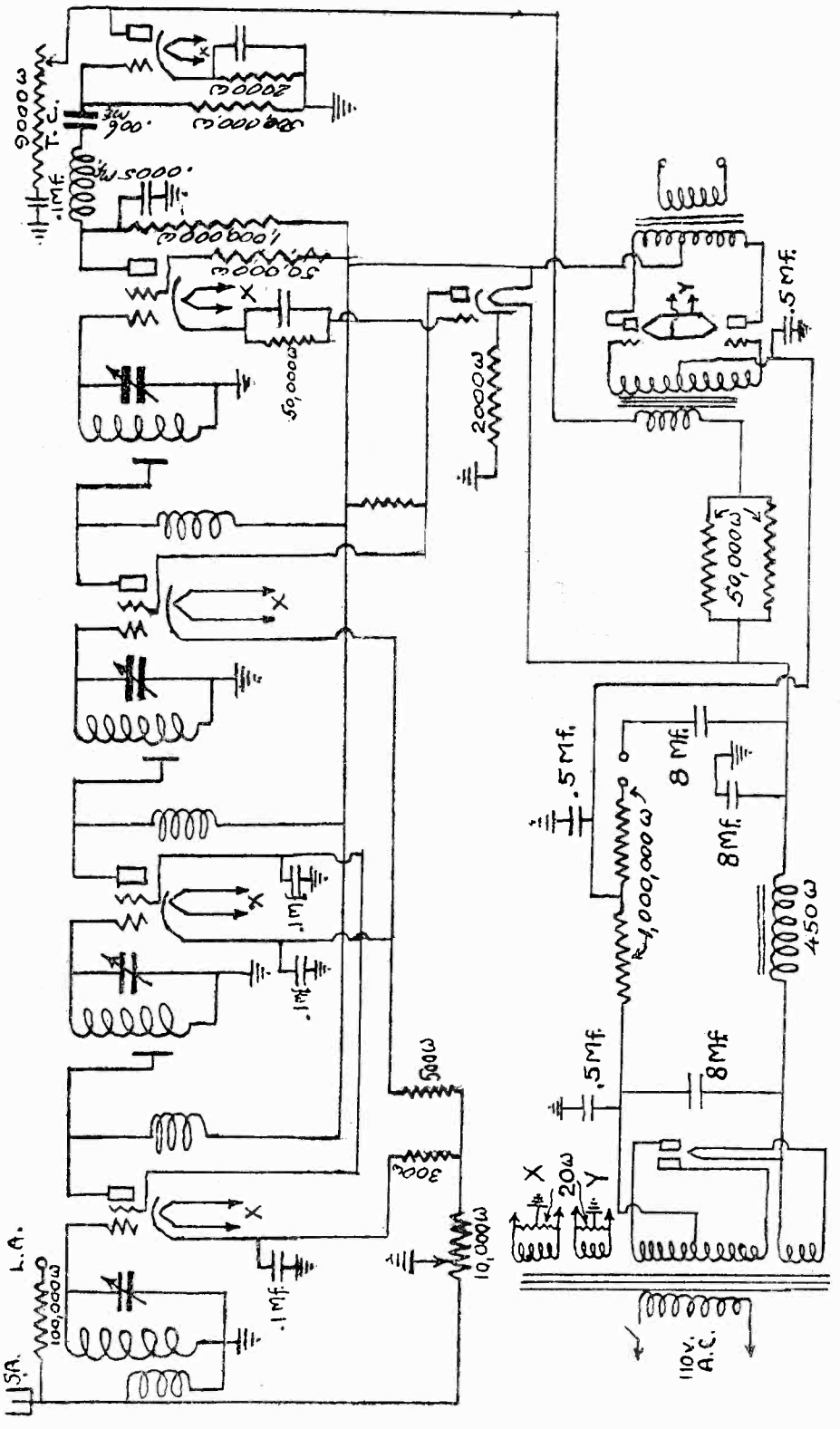
Model Ultra 7



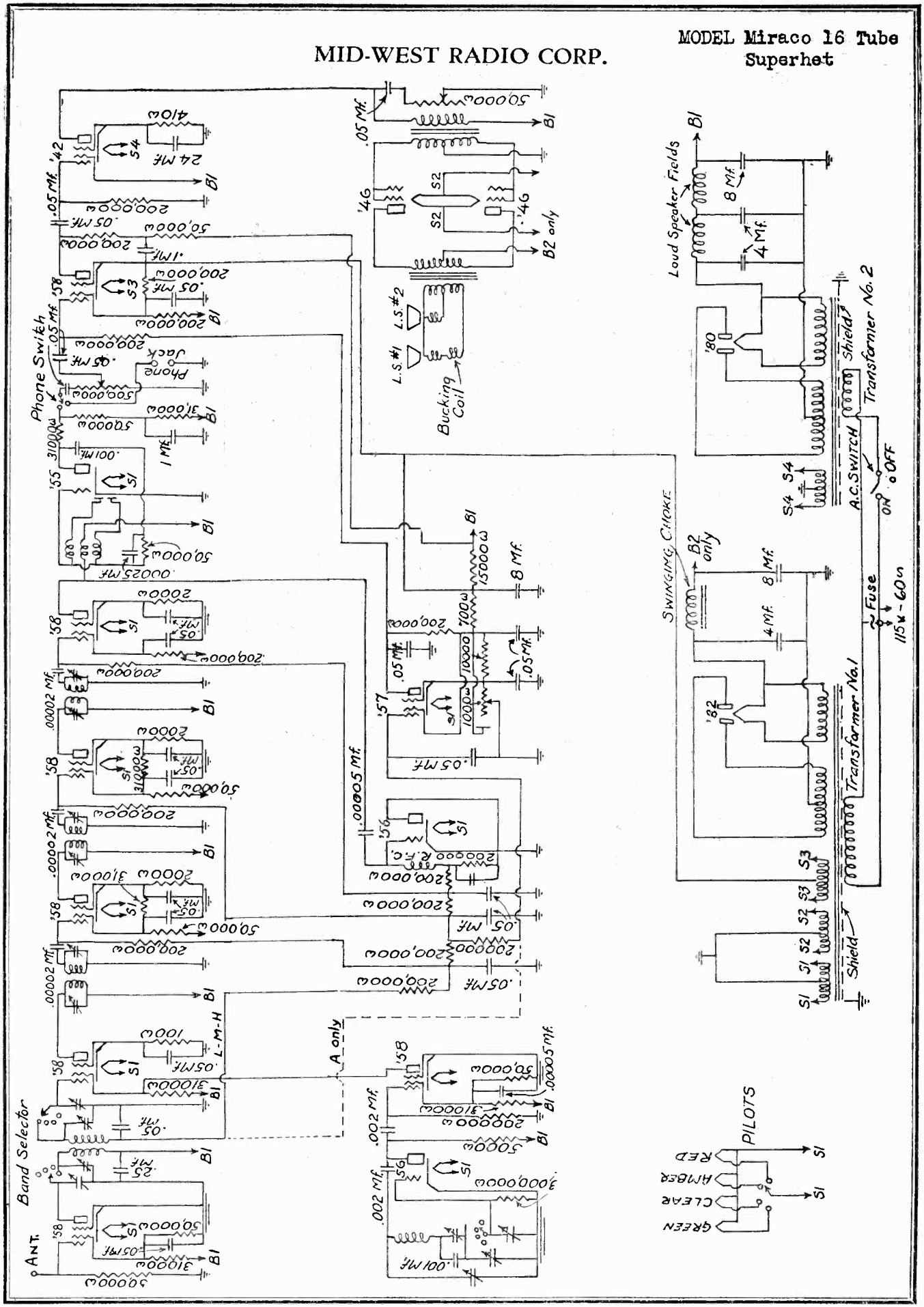
Model Unitone 8

MODEL Miraco AC9-4SG

MID-WEST RADIO CORP.

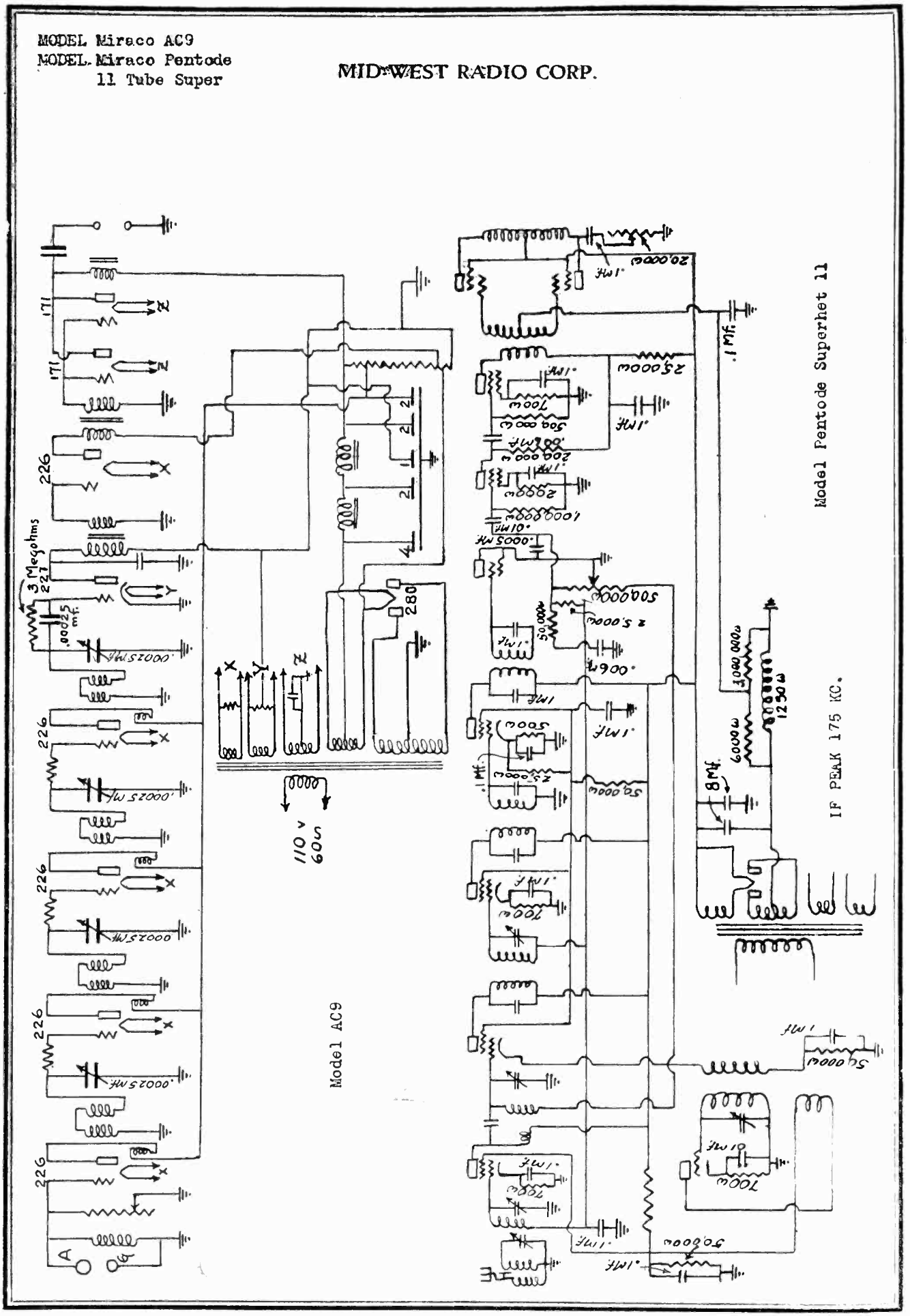


Early models have coupled R-F. transformers.



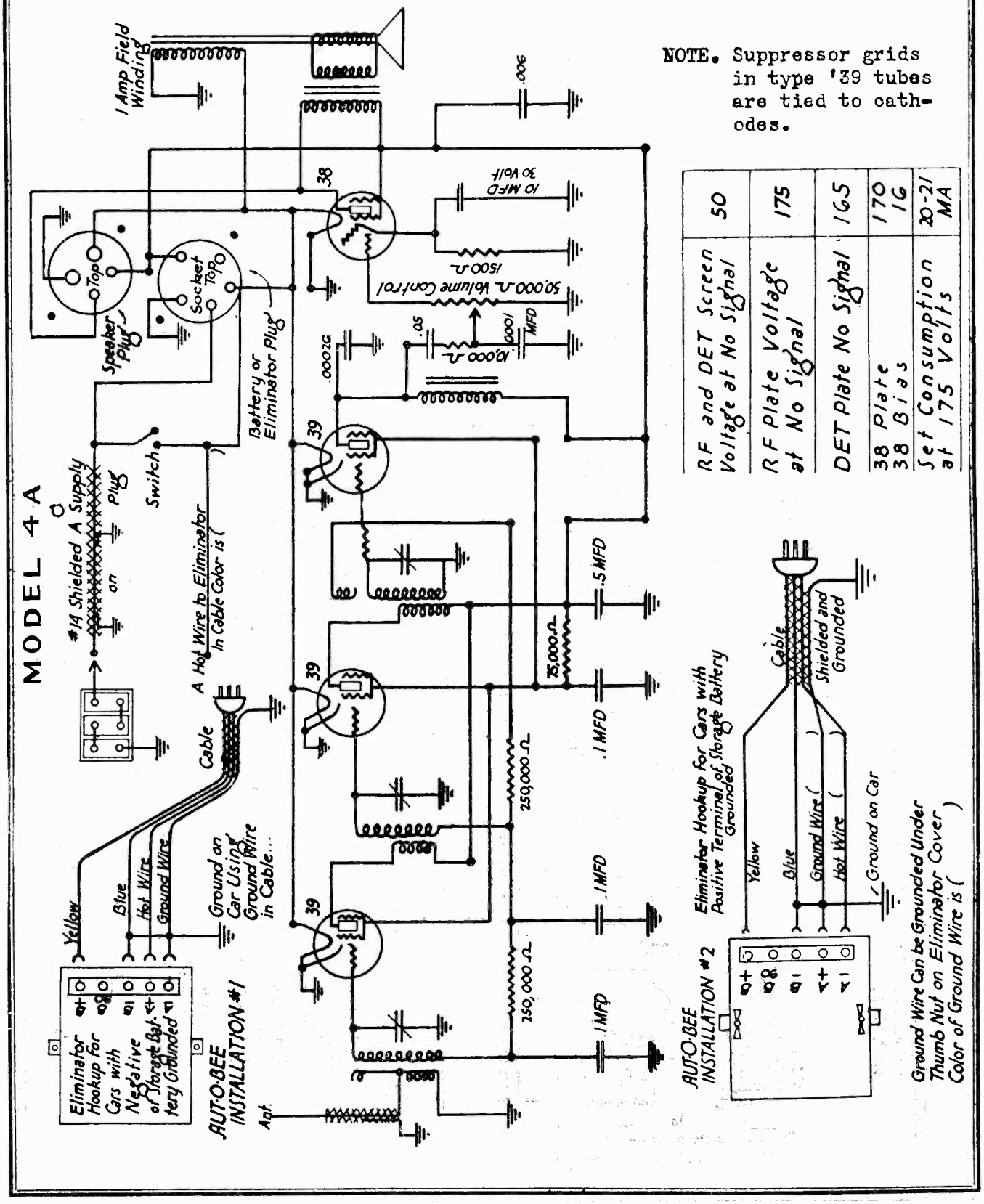
MODEL Miraco AC9
MODEL Miraco Pentode
11 Tube Super

MID-WEST RADIO CORP.



MISSION BELL RADIO MFG. CO., INC.

MODEL 4-A

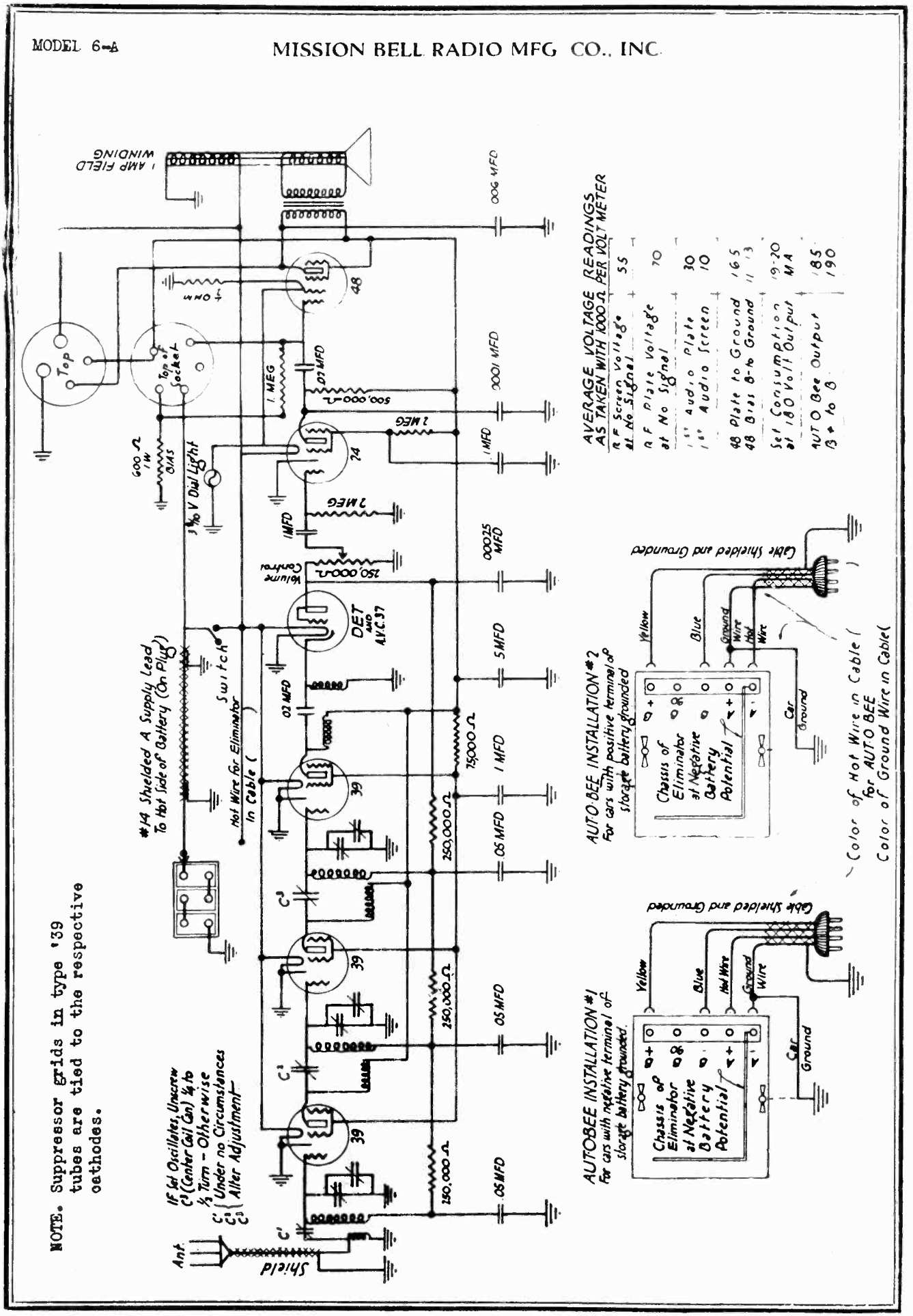


NOTE. Suppressor grids in type '39 tubes are tied to cathodes.

RF and DET Screen Voltage at No Signal	50		
RF Plate Voltage at No Signal	175		
DET Plate No Signal	165		
38 Plate		170	
38 Bias		16	
Set Consumption at 175 Volts			20-21 MA

MODEL 6-A

MISSION BELL RADIO MFG. CO., INC.



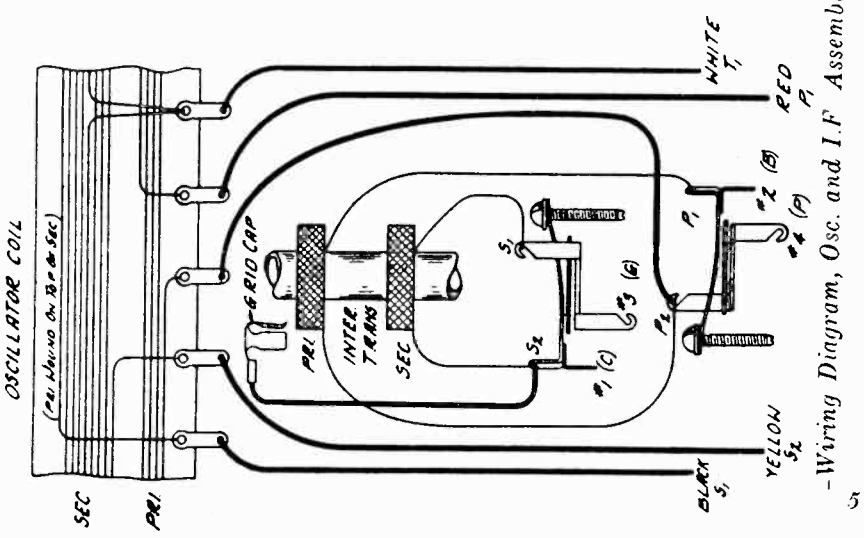
AVERAGE VOLTAGE READINGS AS TAKEN WITH 1000 Ω PER VOLT METER

R F Screen Voltage at No Signal	55
R F Plate Voltage at No Signal	70
1st Audio Plate	30
1st Audio Screen	10
48 Plate to Ground	165
48 Bias to Ground	11.3
Set Consumption at 180 Volts Output	19-20 MA
AUTO Bee Output 3 + to 8	185 190

NOTE. Suppressor grids in type '39 tubes are tied to the respective cathodes.

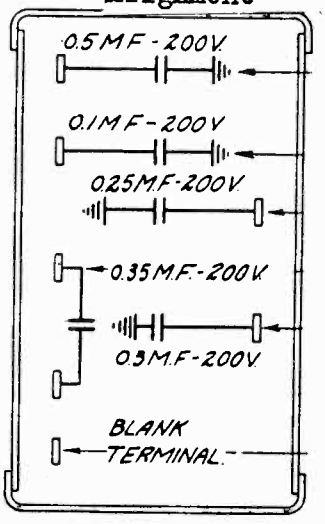
MONTGOMERY-WARD & CO.

MODEL 62-22,62-30
(62-21)

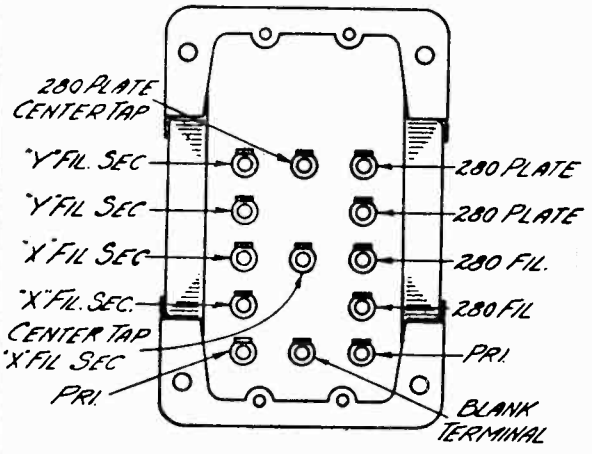


-Wiring Diagram, Osc. and I.F. Assembly

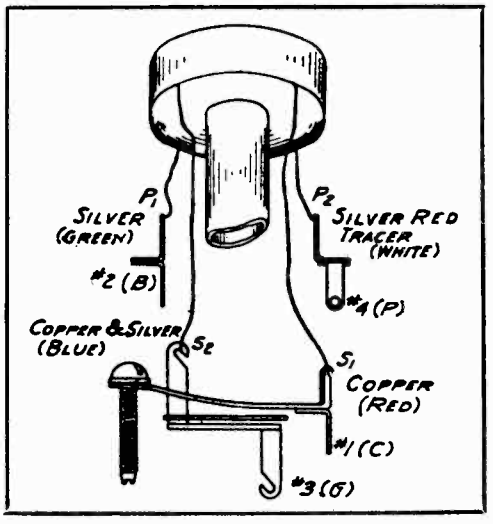
Notes
Alignment



5 Section Condenser Internal Wiring



-Power Transformer Terminals



-Wiring Diagram, 2nd I.F. Assembly

Aligning Intermediate Condensers—First align the intermediate condensers. A non-metallic screw driver is preferable for this. Adjust the signal generator for a signal of 262 K.C. The Localizer knob should be at the normal position as explained in the section on this control or else it may be turned to the extreme counter-clockwise position. One of the best ways of reading the output is by means of a rectifier type meter. This meter, if of low range, is connected across the secondary of the output transformer in the speaker. If it is of a high range, it may be connected across the primary of the transformer in series with a large condenser to prevent the flow of D.C. plate current through the meter. In either method of connection, opening the voice coil of the speaker will give a better deflection on the output meter.

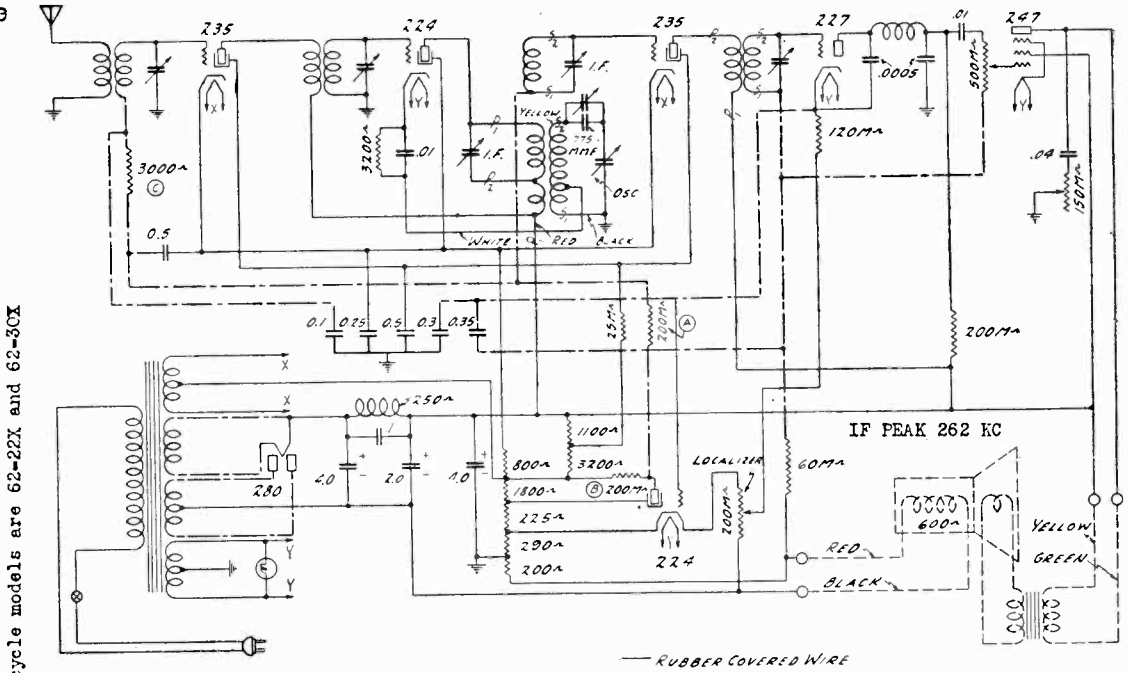
Remove the grid cap from the grid connection of the 224 1st detector tube and connect the lead from the signal generator to the grid of the 224 1st detector. The tube shield should be on and the chassis grounded. One way to make this connection is to bring the antenna lead from the signal generator through the place in the shield through which the grid wire passes. A grid cap on the end of the antenna lead of the signal generator will facilitate making this connection. This lead, of course, should be insulated. Another way of making this connection is to cut a hole of about 1" diameter in chassis tube shield over the 1st detector tube. The signal generator lead can then be passed through this hole to the grid connection of the 224 tube. Connect the ground lead of the signal generator to the ground post of the chassis.

The oscillator coil must be shorted out by grounding the lead from the tap on the secondary. This can be done conveniently by connecting a jumper from ground to the lug on the 3,200 ohm resistor at the end which connects to the oscillator.

The intermediate condenser adjusting screws are reached from the bottom of the chassis. There are two on the porcelain base of the oscillator and 1st I.F. transformer assembly, Part No. 3571 and one on the porcelain base of the 2nd I.F. transformer assembly, Part No. 3644. The volume control should be at maximum setting.

MODEL 62-22,62-30
(62-21)
Schematic - Data
Voltage

MONTGOMERY-WARD & CO.

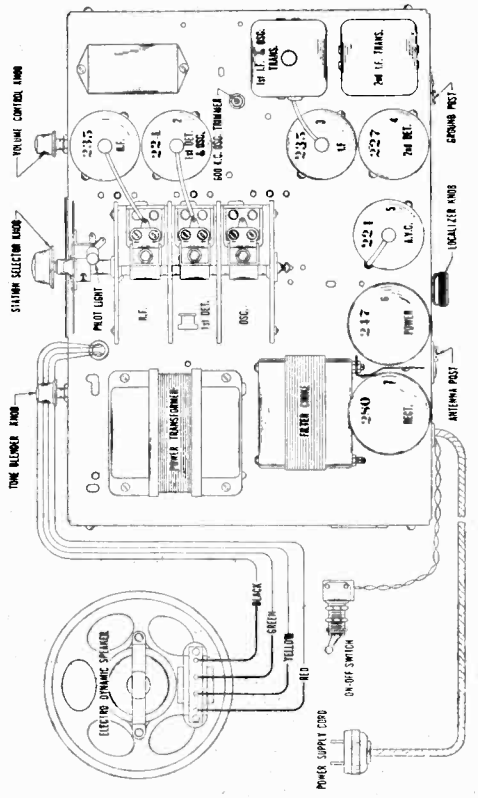


25 cycle models are 62-22X and 62-30X

— RUBBER COVERED WIRE

(A) AFTER SERIAL Nº 1,062,700 RESISTOR WILL BE OMITED.
(B) AFTER SERIAL Nº 1,062,700 RESISTOR WILL BE 300MΩ
(C) AFTER SERIAL Nº 1,070,000 RESISTOR CHANGED TO 5 μ h. CHOKE

There are certain features to be noted in this receiver. The mixer tube is of the autodyne type, wherein it functions as the mixer (1st detector) and at the same time function as the oscillator. The structure of the oscillator-IF transformer is shown separately. The structure of the 2nd IF transformer is also shown upon the same page. Take not of the changes recorded upon the wiring diagram. See the footnotes concerning the significance of the numbers contained within the circles.



—Top View of No. 1 Chassis showing Tube Sequence and Speaker Connections

No. 7 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM—LOCALIZER AT NORMAL SETTING

Type of Tube	Position of Tube	Function	Across Filament or Heater	Plate to Cathode	Grid to Cathode	Screen to Cathode	Screen MA	Cathode to Heater	Plate MA	Grid Test MA
235	1	RF	2.35	150	4.5(1)	70(2)	.9	4.5	2.7	4.2
224	2	1st Det &Osc	2.35	240	6.4	93	.3	6.4	1.8	2.6
235	3	I.F.	2.35	150	4.5(1)	70(2)	.9	4.5	2.7	4.2
227	4	2nd Det.	2.35	150	12-24(3)			0-10(3)	2-5(3)	21-51(3)
224	5	AVC	2.35	60	0-15(3)	9	0 (4)	12	0 (4)	0 (4)
247	6	Power	2.35	220	16 (5)	210	64		34	40
280	7	Rect	4.9						39 Per Plate	

(1) This voltage read across 800 ohm resistor
(2) Voltage as read with 600,000 ohm meter
(3) Varies with setting of localizer. Voltages read with high resistance meter.
(4) Current zero with no signal and localizer at normal position.
(5) The voltage read across 200 ohm section of voltage divider.

SETTING THE LOCALIZER.

Turn the localizer knob cpunterclockwise as far as it will go. Then turn the knob one quarter turn clockwise. Next tune in a fairly strong signal and reduce the volume by means of the volume control knob on the front panel. Then turn the localizer knob to the extreme clockwise position. This will cause plate current cutoff in the RF and IF tubes. Then turn the knob slowly in a counterclockwise direction until the signal is again heard. With a slight additional turn in the same direction the signal builds up sharply to full strength and this is the correct position of the localizer setting. This adjustment should not be changed unless the set is reinstalled or the tubes are changed. Incorrect adjustment of this knob will control the action of the AVC tube in such fashion that the automatic action will commence too soon or too late.

MODEL 921,923,924,839
(Radiola 21,22)
Conversion Data

MONTGOMERY-WARD & CO.

Method of Converting a 6 Volt Receiver for Using the 2 Volt Tubes

ALL of the original Radiola Models 21 (Table Model) and 22 (Console Model) were designed for 6 Volt storage battery operation. It is possible, however, to change the wiring of these sets slightly so that the new 2 Volt dry cell tubes may be used in conjunction with either the Aircell battery or our 2 Volt long life A battery.

Description of the original receiver for storage battery operation is given first. Following this, the method of changing over the set for 2 Volt tubes will be shown. The original color code is shown on the schematic diagram, Figure No. 1. For storage battery operation the cable should be connected to the batteries according to this code.

The following parts are necessary:

One No. 6000 long life A battery designed to last one year at three hours a day. One kit of tubes consisting of 2—No. 232 screen grids; 2—No. 230's; 1—No. 231. One new instruction book. One No. 5512-75 Milliampere pilot light. One pair of green and red resistors. One socket chart label to stick over old RCA labels. The last four items can be ordered on stock order by specifying "one conversion kit for Radiola Set." The A battery and tubes should be ordered on stock order in the usual way. When you receive all of the necessary parts to make the conversion, you will use them in the following manner:

Operation No. 1
First examine Figure No. 2. There are three resistors at the back of the chassis mounted directly underneath the sub-panel. The wires attached to these three resistors must not be removed but the three resistors should be shorted out by soldering short pieces of wire across as shown on the dotted lines in Figure No. 2. On the console models it is not necessary to remove the chassis to do this. Remove the chassis when changing the table model.

Operation No. 2
Insert new low drain pilot light and adjust the position by sliding the pilot light clamp up and down until the figures on the dial can be seen prominently.
NOTE: The insertion of this new pilot light is extremely important—the life of the A battery depends upon it.

Operation No. 3
Remove the Radiola instruction book, red service card and pilot light. Discard them.

Operation No. 4
Remove the battery tag from the cable and destroy it.

Operation No. 5
Connect one end of the green (2.2 Ohms) resistor to the end of the yellow positive A battery lead. This is important.

Operation No. 6
Insert new instruction books and paste new tube chart label over RCA tube position chart, and advertising sticker. This label is designed to cover the tube replacement label and the socket chart. Don't cover up the license notice.
The tube chart indicates the position of the new tubes. 232's—R.F. stages—230's—1st Audio and Detector—231—last audio.
The red resistor is given to the customer in an envelope. It contains a small red label tied at one end and instructing the customer how to use it, which is as follows:
Over a period of time the A battery voltage will drop. Its initial voltage is slightly over 3 Volts. The green resistor drops this 3 Volts down to 2 Volts for the tubes. After the set has been used for a few months the battery voltage will drop to about 2½ Volts, so it is necessary to use a smaller resistor on the battery to give the tubes 2 Volts. When the set begins to lose volume and the tubes go dim, the green resistor should be replaced with the red resistor. After the receiver has been in use a few months more, the battery voltage will drop to about 2 Volts, then the resistor should be removed entirely and the battery used alone until dead.

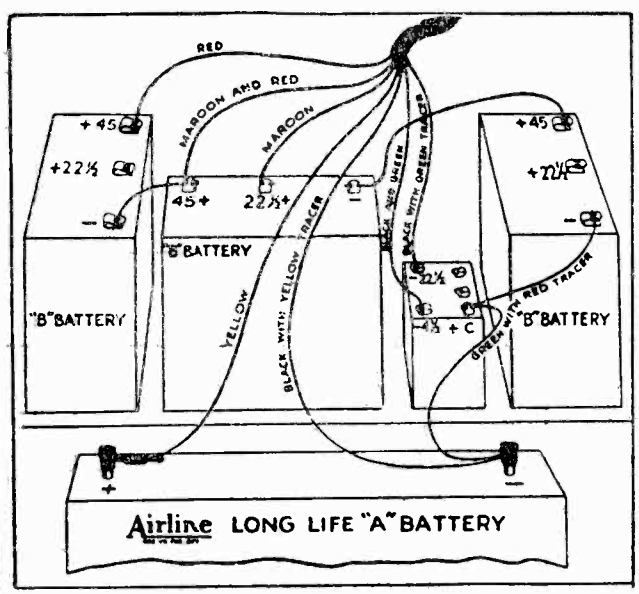
Note: The new color code and method of connecting the battery cable is shown in Figure No. 3. Use this color code for connecting the batteries after the conversion is made.
Caution: Be sure all battery connections are correct.

Alignment:
In order to align the condensers, it is necessary both in the console and table model, to first remove the chassis from the cabinet. Connect up all batteries and tune in a station at about 1400 Kilocycles. The trimmer condensers will be found mounted on the frame of the variable condenser nearest the front panel. These should be adjusted in turn for maximum volume on a station that does not fade.

Long Distance Switch:
In many localities the local distance switch will not operate satisfactorily on the local side.
In the country it is seldom necessary to use the local switch on the local side, for it is only put on as a safeguard to enable proper control of volume when under the shadow of powerful broadcast stations.

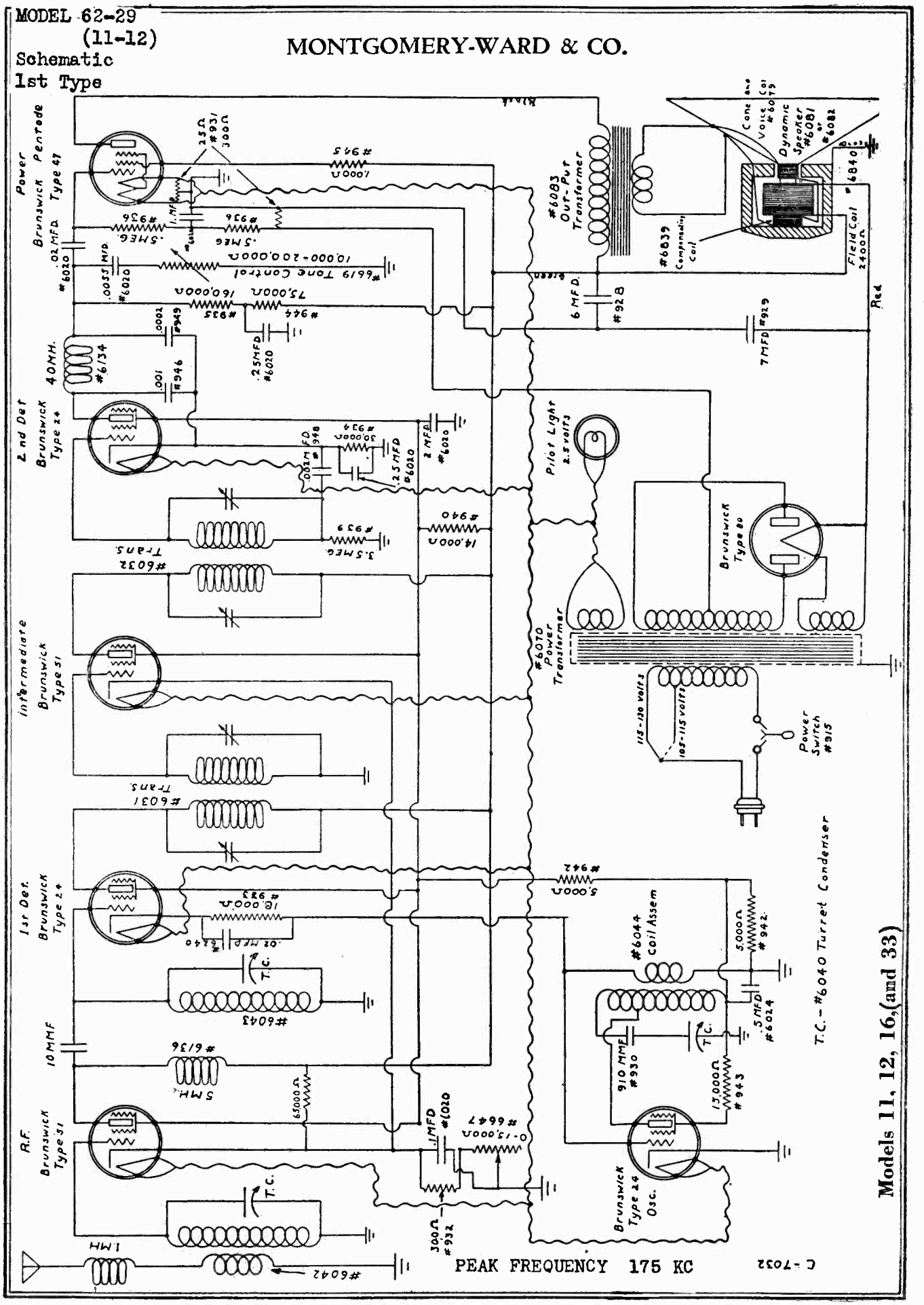
IMPORTANT NOTICE

If the pilot light should burn out and you are unable to obtain another one immediately, remove the celluloid strip from the escutcheon plate by sliding it out of its slot from the rear. This will enable the user to see the figures on the dial until such time as you are able to put the correct pilot light in place. **Never use any pilot light but the No. 5512 we recommend.**



MODEL 62-29
(11-12)
Schematic
1st Type

MONTGOMERY-WARD & CO.



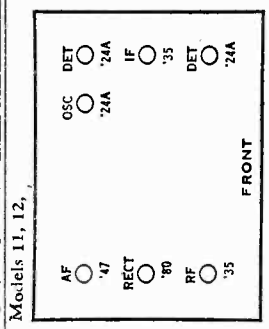
MONTGOMERY-WARD & CO.

MODEL 62-29
(11-12
Voltage-1st Type
Alignment

MODELS 11, 12, & 16.

SOCKET ANALYSIS—120 VOLT LINE

Volume Control Set at Maximum—Short Antenna to Ground



Models 11, 12,

Position	Type Tube	Heater Voltage	Control Grid Voltage	Plate Voltage	Plate Current	Screen Grid Voltage
1st R.F.	—51	2.25	3.5	230	3.4 MA	70
1st Det.	—24	2.25	5.8	220	.4 MA	62
I.F.	—51	2.25	3.8	220	9 MA	60
2nd Det.	—24	2.25	.2	115*	.3 MA	60
Osc.	—24	2.25	0	35	1.2 MA	22
Power Output	—47	2.25	1	220	33 MA	220
Rec. Tube	—80	4.7		(530	(26 MA	
				(530	(26 MA	

* Readings will vary according to resistance of meter. Tubes used in this test are average tubes.

METHOD OF ALIGNING R.F. CIRCUITS

In the event the antenna and first detector tuned circuits are out of alignment, they may be adjusted with the aid of a weak high frequency (1300 to 1500 K. C.) signal—produced by a distant station or a local test oscillator. Tune this signal in very carefully for maximum volume, or better still, if one is available, for maximum deflection on an output meter. Adjust the antenna tuned circuit adjustment screw (located near the type 47 tube on the top plate of the turret condenser) for maximum volume or for maximum deflection on an output meter. Then, without changing the position of the tuning knob, adjust the first detector adjustment screw—located adjacent to the A. C. switch—for maximum volume or maximum deflection on an output meter. Before tightening the lock unit on each adjustment screw, go over the adjustments a second time to secure the greatest possible accuracy. A drop of ambroid glue or collodian should be placed on each adjustment screw after the lock nut has been tightened to prevent handling and speaker vibrations from changing the adjustment.

In most cases it will be unnecessary to touch the oscillator adjustment screw (located between the antenna and first detector adjustment screws.) If this adjustment is necessary it is recommended that the intermediate frequency transformer circuits be tuned first (see following paragraph). Then tune oscillator circuit, employing same method as explained above for antenna tuned circuit and first detector circuit. In the event any circuit does not tune properly, check the circuit thoroughly for open and short circuits. If the trouble cannot be located, the coil should be replaced with a new one.

METHOD OF ALIGNING I.F. TRANSFORMERS

In the event the receiver is still insensitive and lacks proper selectivity after making the foregoing adjustments, the intermediate frequency transformers should be adjusted by one of the following methods:

1. Tuning Intermediate Transformers with 175 K.C. Oscillator

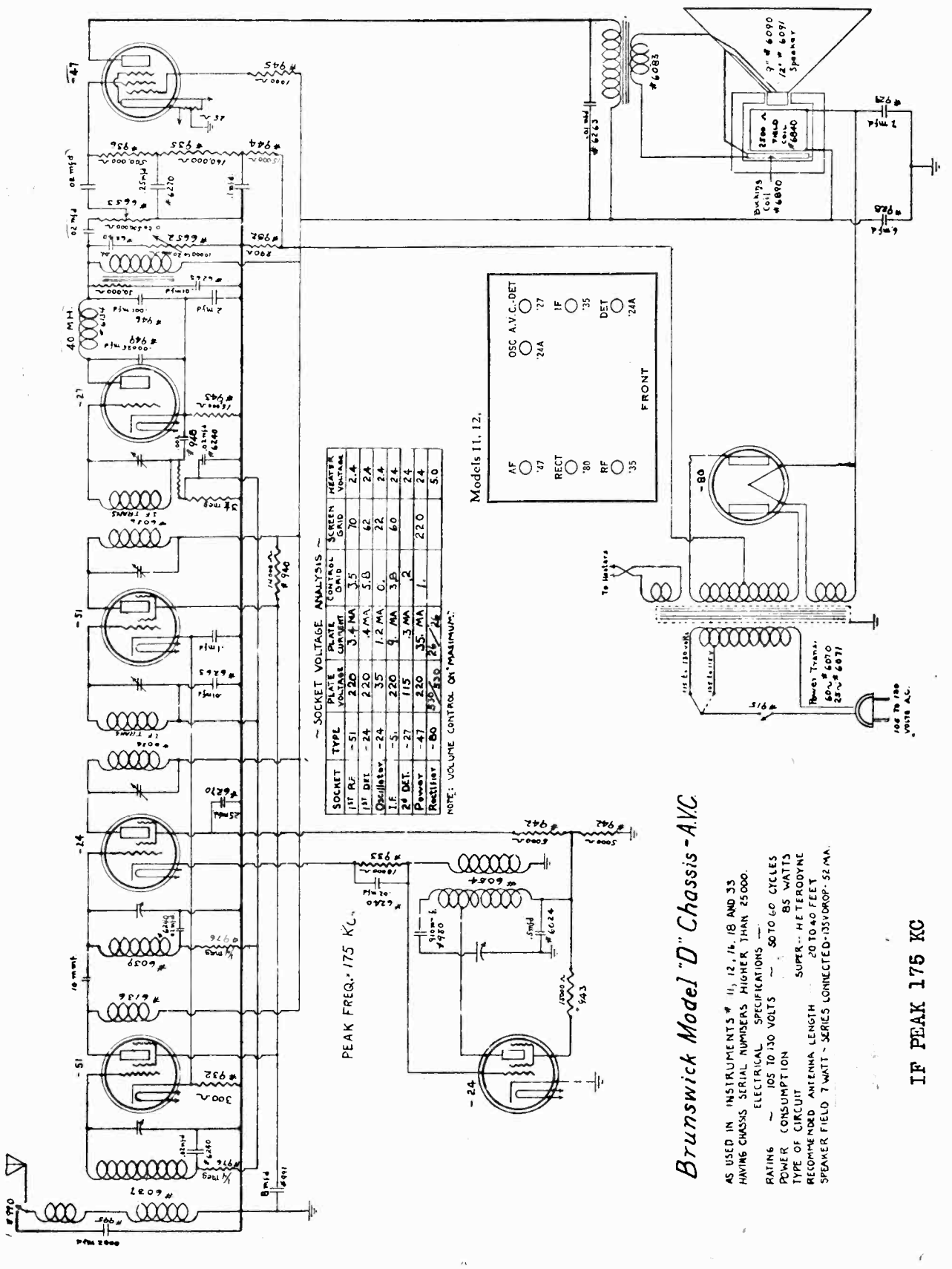
By far the best method of aligning the tuned circuits in the intermediate frequency transformers is to employ a 175 K.C. oscillator and output meter. In making this test, remove the oscillator tube and connect the output of the oscillator to the grid cap of the first detector. Usually it will not be necessary to remove the grid cap from the tube, this depending on the strength of the oscillator and the amount the I.F. transformers are out of line. Connect the output meter across the primary of the output transformer located on the speaker (terminals 3 and 7 counting from left to right). The four I.F. adjustment screws on the I.F. transformers, located inside the chassis, should be adjusted with a non-metallic screw driver for maximum deflection on the output meter. Go over all four adjustments a second time to secure maximum accuracy.

2. Tuning Intermediate Transformers without 175 K.C. Oscillator

In the event a 175 K.C. oscillator is not available a fairly close adjustment may be made by tuning in a faint broadcast signal, and with the volume control turned on full, adjust the transformers for maximum volume with a non-metallic screw driver. After adjusting the I.F. transformers, the R.F. circuits should be realigned as explained before.

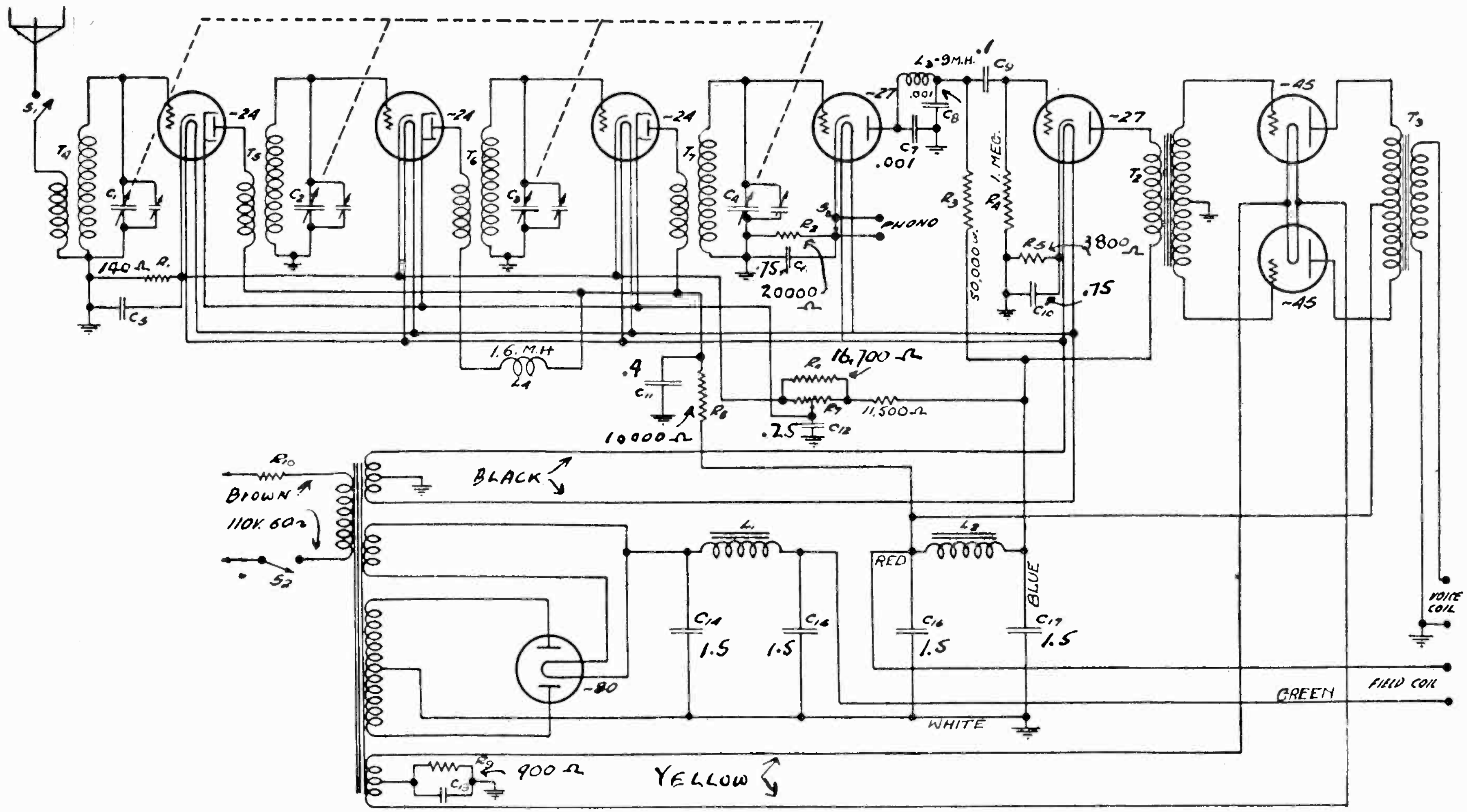
MODEL 62-29
(11-12)
Schematic
2nd Type

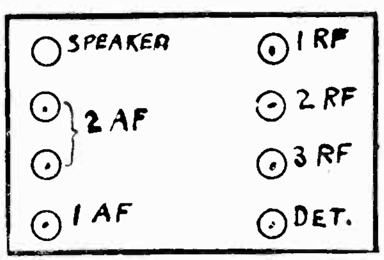
MONTGOMERY-WARD & CO.



MONTGOMERY-WARD & CO.

MODEL 62-020
(51)





—Model 51,
Line Voltage 125—Volume Control Full On

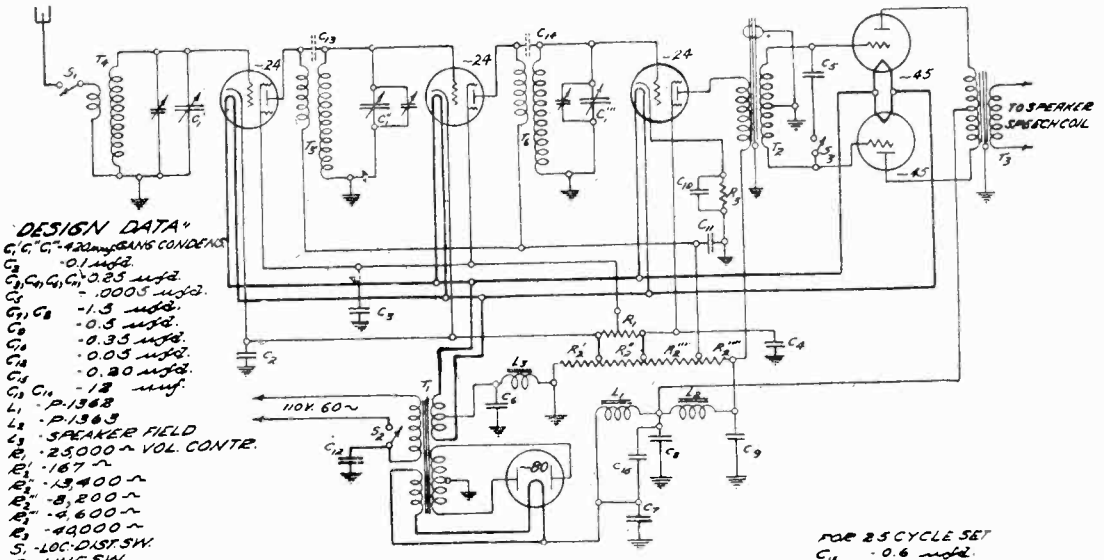
Tube No. in Order Tested	Type of Tube	Position of Tube in Set	Filament or Heater	Plate or Anode	Control Grid—Space GD+	Normal Grid—Screen GD+	Cathode to Heater	Screen GD L H 80 Plate	Plate R H 80 Plate	Tube Test	Plate Current Change
			Meter Readings with Jewell Test Plug in Socket of Set — Operating Voltages					Milliamperes			
1	224	1 R.F.	2.47	158	3	84	3	-	3.1	6.5	3.4
2	224	2 R.F.	2.47	158	3	84	3	-	3.8	7.8	4.0
3	224	3 R.F.	2.47	156	3	84	3	-	3.5	7.9	4.4
4	227	Det.	2.47	157	-	12.6	13.5	-	.8	.85	.06
5	227	1 A.F.	2.48	198	-	1.0	16	-	4.2	4.9	.7
6	245	PP-AF	2.55	227	-	42	-	-	22	26	4
7	245	PP-AF	2.55	225	-	42	-	-	27	32	5
8	280	Rect.	5.3	-	-	-	-	41	41	-	-

Line Voltage 105

Tube No. in Order Tested	Type of Tube	Position of Tube in Set	Filament or Heater	Plate or Anode	Control Grid—Space GD+	Normal Grid—Screen GD+	Cathode to Heater	Screen GD L H 80 Plate	Plate R H 80 Plate	Tube Test	Plate Current Change
			Meter Readings with Jewell Test Plug in Socket of Set — Operating Voltages					Milliamperes			
1	224	1 R.F.	2.09	146	2.43	87.5	2.43	-	2.72	5.55	2.83
2	224	2 R.F.	2.09	151	2.43	85.5	2.43	-	2.58	5.65	3.10
3	224	3 R.F.	2.09	151	2.43	87.5	2.43	-	2.75	5.8	2.92
4	227	Det.	2.09	134	-	12.2	13.15	-	.58	.78	.20
5	227	1 A.F.	2.14	170	-	1.22	13.6	-	3.31	4.08	.77
6	245	PP-AF	2.14	195	-	37.5	-	-	20.4	24.3	3.9
7	245	PP-AF	2.14	195	-	37.5	-	-	23.4	27.9	3.8
8	280	Rect.	4.51	-	-	-	-	35	35	-	-

MODEL 62-010

MONTGOMERY-WARD & CO.



DESIGN DATA"

C_1, C_1', C_1'' - 420 mmf GANG CONDENSER
C_2 - 0.1 mfd.
C_3, C_{11}, C_{11}' - 0.25 mfd.
C_4 - .0005 mfd.
C_5, C_8 - 1.3 mfd.
C_6 - 0.5 mfd.
C_9 - 0.35 mfd.
C_{10} - 0.05 mfd.
C_{12} - 0.20 mfd.
C_{13}, C_{14} - 18 mmf.
L_1 - P-1962
L_2 - P-1963
L_3 - SPEAKER FIELD
R_1 - 25,000 ~ VOL. CONTR.
R_2' - 167 ~
R_2'' - 13,400 ~
R_2''' - 8,200 ~
R_2'''' - 4,600 ~
R_3 - 40,000 ~
S_1 - LOC-DIST. SW.
S_2 - LINE SW.
S_3 - TONE CONTR. TOGGLE SW.
T - POWER TRANS.
T_1 - INPUT TRANS.
T_2 - OUTPUT TRANS.
T_3 - ANT. SELECT. COIL
T_4, T_5 - R.F. COILS.

FOR 25 CYCLE SET
C_1' - 0.6 mfd.
C_1'' - 2.0 mfd.
C_8 - 1.0 mfd.

Line Volts—105 Volts

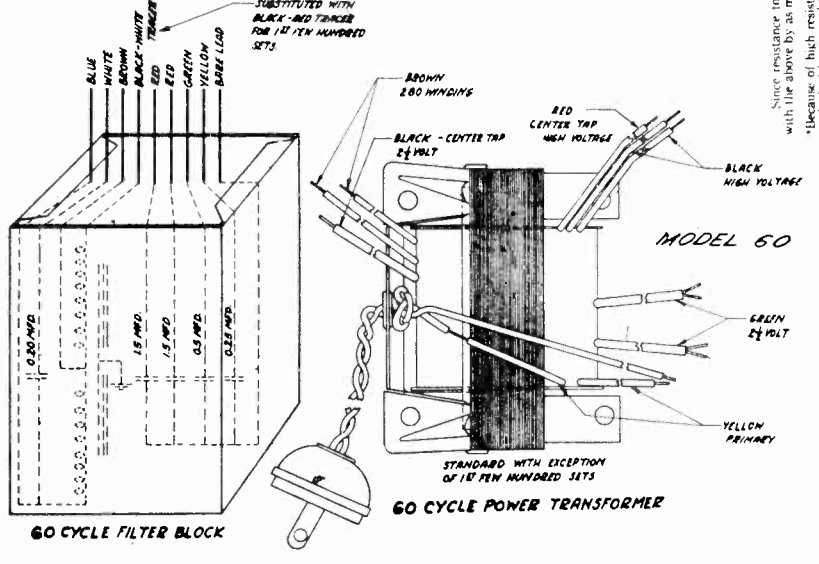
No.	Stage	Type Tube	A Volts	B Volts	Cont. Grid Volts	Cath. Volts	Ip' Norm.	Ip' G.D.	Ip'-Ip' (Diff)	SG Volts
1	1st r. f.	'24	2.05	165	2.6	44	2.1	3.6	1.5	76
2	2nd r. f.	'24	2.05	165	2.6	44	2.3	3.8	1.5	76
3	Det.	'24	2.06	196	*7.0	*26	*0.2	*1.3	*1.1	*70
4	AF	'45	2.15	230	45.0		28.	32.	4.0	
5	AF	'45	2.15	230	45.0		25.	29.	4.0	
6	Rect.	'80	4.6							

Line Volts—125 Volts

No.	Stage	Type Tube	A Volts	B Volts	Cont. Grid Volts	Cath. Volts	Ip' Norm.	Ip' G.D.	Ip'-Ip' (Diff)	SG Volts
1	1st r. f.	'24	2.55	197	3.1	50	2.7	4.7	2.0	97
2	2nd r. f.	'24	2.55	197	3.1	50	3.0	5.0	2.0	97
3	Det.	'24	2.55	250	*8.	*32	*0.2	*1.6	*1.4	*86
4	AF	'45	2.65	276	52.		35	40	5.0	
5	AF	'45	2.65	276	52.		31.	35.	5.0	
6	Rect.	'80	5.4							

Since resistance tolerances in the set are plus or minus 10% and tubes may vary 10 to 20% your readings may disagree with the above by as much as 20% in rare cases.

*Because of high resistance in the cathode circuit of this tube, together with the circuit used in most analyzers, the readings marked with an asterisk may vary over 100% when using different meter scales.

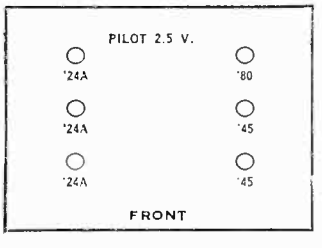


CAPACITY TABLES
Using 200 Volt Scale of A. C. Meter

(107 Volt 60 Cycle Line)

No.	Capacity	Reading	Your Reading	Part No.
C-2	.0 10	45.0		G-1136
C-3	0 25	70 0		G-1136
C-11	0 35	87.0		G-1136
C-10	0 35	86.0		G-1108
C-4	0 25	78.0		G-1108
C-12	0 05	20 0		G-1108
C-15	0 20	67 0		G-1106
C-7	1 5	105 0		G-1106
C-8	1.5	105.0		G-1106
C-9	0 5	95 0		G-1106
C-6	0.25	75.0		G-1106

Model 62-010 (1930)



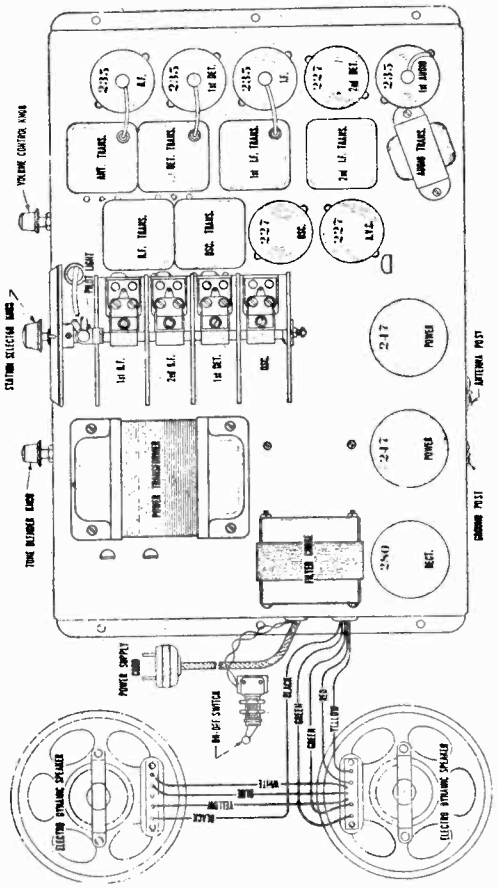
RESISTANCE TABLES
Using 6 Volt Battery with 0-10 Voltmeter
(1000 Ohms Per Volt)

Item tested	From	To	Reads	Your Reading	Resistance (ohms)
Voltage Divider with volume control connected across tap 1-2	Ground	Tap 1	6.0		167
	Ground	Tap 2	3 3		8900
	Ground	Tap 3	2.2		17000
	Ground	Tap 4	1 9		21600
Det. Bias resist.	Ground	Det. cath. prong	1 2		40000
Volume control	Across volume control (disconnected)		1.8		25000
L. 1. filter choke	Center Tap Output Trans.	280 fil. prong	5.9		226
L. 2. filter choke	Center Tap Output Trans.	Plt. prong det.	5.0		3000

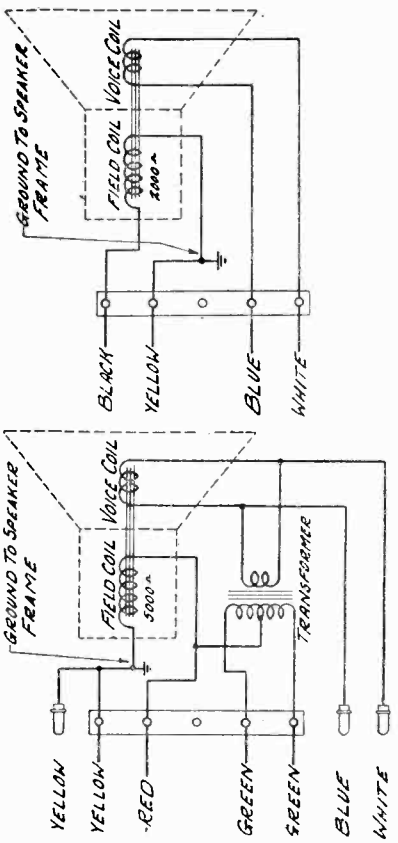
L. 1. and L. 2. for 25 cycle same as above

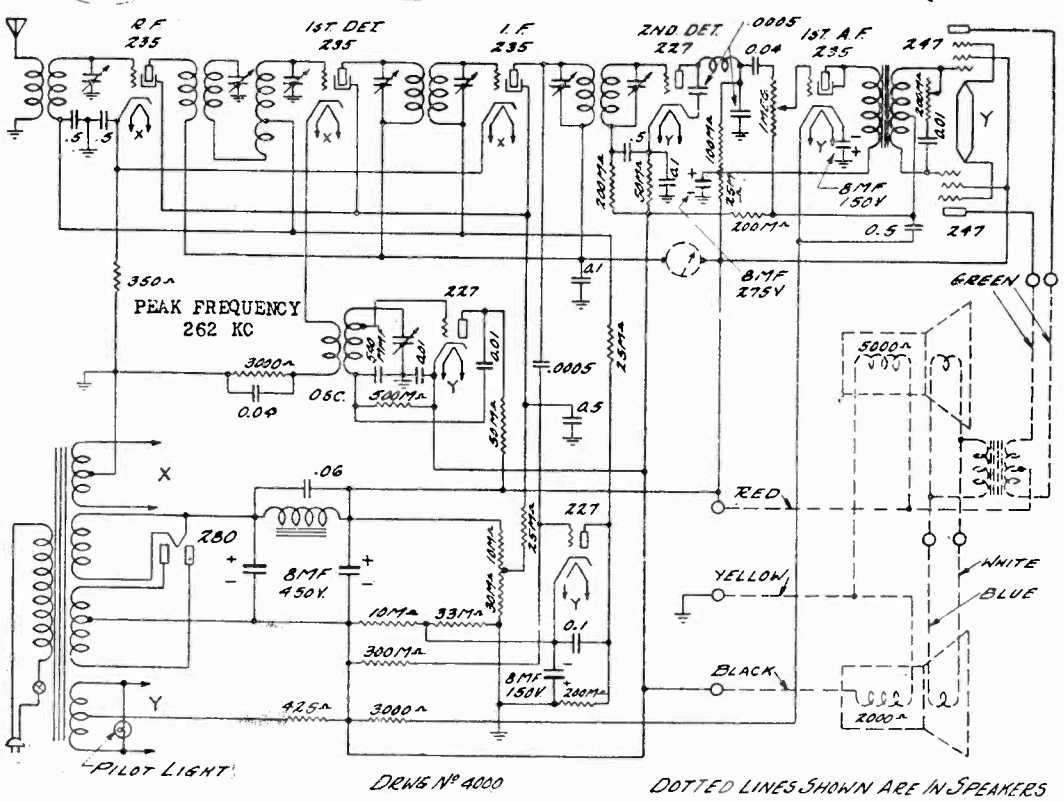
MONTGOMERY-WARD & CO.

MODEL 62-38,62-40,62-50
Schematic, Socket
Speaker Data



Top View of Chassis Showing Tube Location and Connections of Speakers





DRWG Nº 4000

DOTTED LINES SHOWN ARE IN SPEAKERS

MODEL 62-38,62-40,62-50
Alignment
Voltage

MONTGOMERY-WARD & CO.

SPEAKERS

The output of the receiver is fed into the primary of the transformer for the speakers. In the chassis matched speakers are used. Both are D.C. baffle mounting electrodynamic speakers—one having a cone diameter of 10 inches and the other an 8 inch cone.

The fields of both speakers are energized by the power system and are a part of the total resistance shunted across the power system from which the required voltages are obtained. The 5000 ohm field coil is a component part of the 10 inch speaker—Part No. 3846—as is the output transformer. The 5000 ohm field coil is above ground potential whereas the 2000 ohm field coil is below ground potential, as can be seen by referring to Fig. 1. The ground potential side of each field coil winding is grounded to the speaker frame. The voice coil of each speaker is connected in parallel across the secondary winding of the output transformer.

CAUTION—Do not use any other type of speakers with the chassis than the two supplied with it. It can readily be appreciated from the above that the speakers are especially designed for this chassis.

An open or shorted voice coil in either of the speakers will cause poor audio quality. Check voice coil tips (blue and white) at speaker terminal strip for good electrical contact. A shorted 2000 ohm speaker coil will cause distortion as will also an open 5000 ohm speaker coil, and in both cases, the needle of the tuning meter will swing to the extreme left.

The polarity of the leads connecting the voice coils of the two speakers in parallel should be checked. If the blue and white wires making these connections are reversed, distortion and motorboating will result, because one cone is moving out while the other is moving in, and vice versa.

ual. If one of the pilot light terminals is grounded, the second audio bias will be shorted out and there will be distortion present.

If the 2000 ohm field coil of the electrodynamic speaker is open lack of volume will be experienced and will be evidenced by the needle of the visual tuning meter, swinging almost to the extreme right. The same will be true if the 5000 ohm field of the electrodynamic speaker is open. However, in this case the needle of the tuning meter will swing to the extreme left. The yellow wire connecting the speakers to the chassis ground should be checked for good electrical connection. If this lead is making poor contact loss of volume will result. The tuning meter will register approximately a 50% reduction in swing at no signal.

MICROPHONIC HOWL

Chassis is mounted in the console cabinet on sponge rubber washers to prevent any microphonic action that might otherwise arise due to vibrations set up between the speaker and tube elements.

At the time of installation of the receiver the two bolts, one at the center of the flange at each end of the chassis should be removed. These bolts are used to securely anchor the chassis to the cabinet shelf and are intended only for shipping purposes. If they are not removed vibrations of the speaker will be transmitted to the tube elements and a microphonic howl may result.

This howl may also manifest itself when the chassis and speaker are being tested on a service bench thus making it very difficult to service the unit. The chassis or speaker should be cushioned as a preventive.

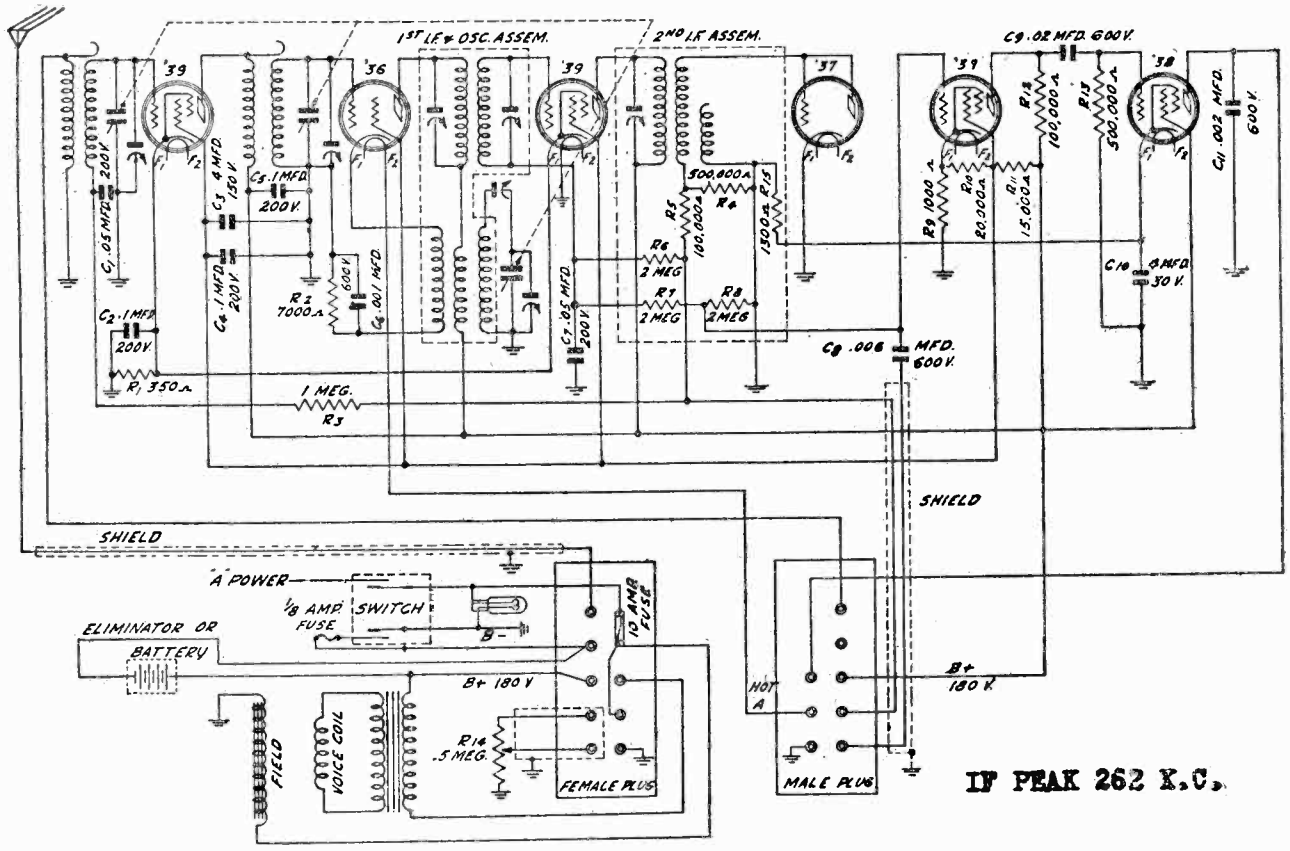
—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
235	1	R.F.	2.2	160	2.8 (1)	60	.4	0.	2.7	6.1
235	2	1st Det.	2.25	160	6.5	55	.3	7.	1.8	2.4
235	3	I.F.	2.2	160	2.8 (1)	60	.4	0.	2.7	6.1
227	4	2nd Det.	2.3	105	6. (2)			5.5	.2	.3
235	5	1st Audio	2.3	125	13. (3)			7.	2.8	3.0
227	6	Osc.	2.35	110	11-28 (3)			21.	3.4	3.5
227	7	A.V.C.	2.3	55 (4)	21. (6)			1.5	0.	0.
247	8	Power	2.3	250	20. (6)	258	4.6		20.	26.
247	9	Power	2.35	250	20. (6)	258	4.6		20.	26.
280	10	Rect.	5.0						50. Per Plate	

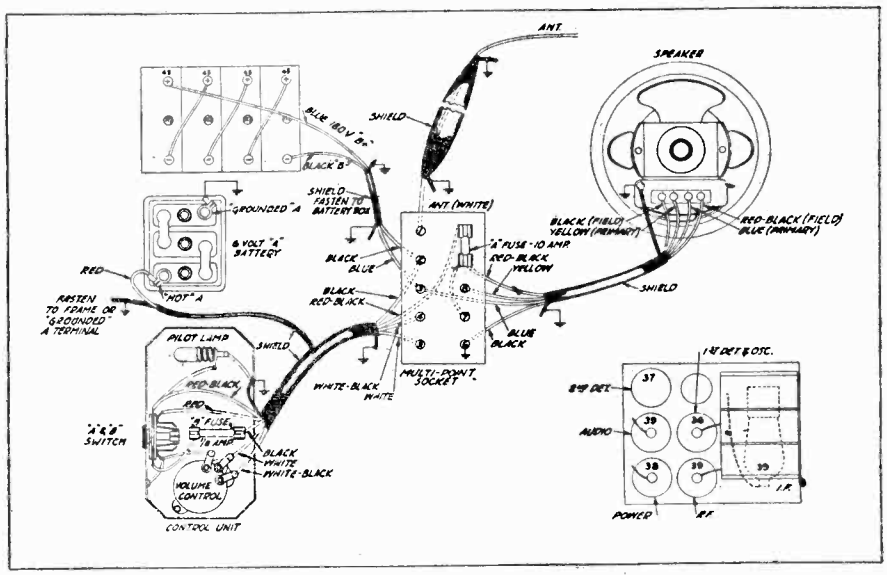
(1) Measured across 350 ohm bias resistor.
(2) Measured across 3000 ohm bias resistor. B- to Cathode.
(3) Measured across 500 M ohm osc. bias resistor. Bias voltage varies from 11 to 28 between 1500 and 650 K.C. settings of tuning condenser.
(4) Measured from B- to A.V.C. plate.
(5) Measured from B- to A.V.C. Cathode.
(6) Measured across 425 ohm bias resistor. B- to "Y" filament.

MONTGOMERY-WARD & CO.

MODEL Auto Radio



IF PEAK 262 K.C.



VOLTAGE DATA

Tube	*Plate*	*Screen*	*Grid*	*Plate MA.*
R-F.	177	80	3	3.6
1st Det.	173	76	7*	.9*
I-F.	177	80	3	3.6
2nd Det.	0	0	0	0
1st A-F.	54	77	6	1.2
Output	159	165	15.5	10.0

* Will vary with dial setting.

MODEL Auto Radio MONTGOMERY-WARD & CO.

Mounting "B" Eliminator and Relay

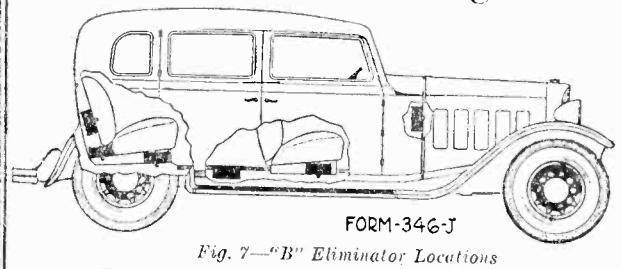


Fig. 7—"B" Eliminator Locations

In addition to the following instructions, a complete installing bulletin for the "B" eliminator is furnished by the manufacturer with each unit. The "B" eliminator can be conveniently mounted in a number of locations in the car as shown in Fig. 7. Under the front seat or in the motor compartment under the hood is a convenient place. The eliminator should be at least 12" away from any ignition or lighting wires of the automobile. Never install the eliminator on end, that is, with the mounting brackets at the top and bottom. Short out the "B" fuse when a "B" Eliminator is used.

In Fig. 1 the "B" eliminator is shown under the front seat, at the right hand side, for illustrative purposes. If, as shown in the illustration, the antenna lead comes down the right front corner post and the "B" eliminator is under the front seat, it should be moved to the left as far as possible. In general, mount it on the opposite side of the car that the antenna lead is installed.

The relay should be mounted near the car storage battery so that the two leads will reach. It is mounted on the frame of the car. Before making any connections to the battery, determine which side is grounded and which side is ungrounded. Then find out if the ungrounded or hot side is positive or negative. This will vary with the make of car.

In Fig. 8 is shown how the connections are made in either case. Unscrew the clamp bolts on the battery and connect lug of yellow lead to the "hot" side of the battery and the lug of the black lead to the grounded side. The bolt goes through the hole in the lug and the lug is bent over. Connect the shielded two-lead cable from the "A" battery and relay to the "B" eliminator. Note that the proper connections will depend on which side the battery is grounded. The "B" cable connections from the chassis may then be completed to the "B" eliminator. It is important that the "B" cable to the eliminator be located as far away from the "A" supply cable as possible. Run them to the "B" eliminator at opposite sides of the car as shown in Fig. 1.

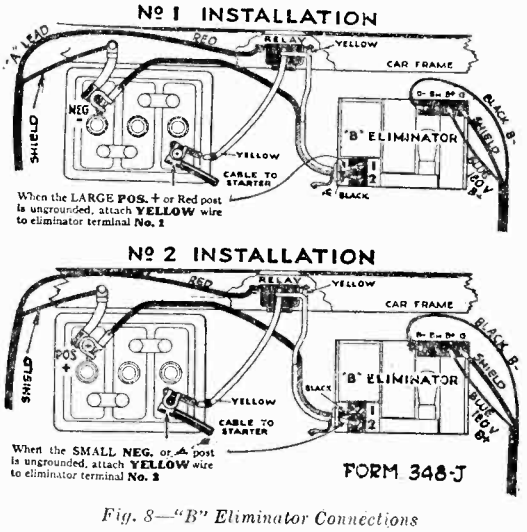


Fig. 8—"B" Eliminator Connections

Suppression of Ignition and Generator Noise

After the receiver is in satisfactory working order, start the motor and note the amount of noise. As a general rule, spark plug suppressors, a distributor suppressor and a ½ mfd. condenser on the generator are all that is required for the reduction of ignition and generator noise. If these items do not reduce the noise sufficiently, other measures as described below are required.

One spark plug suppressor is required for each plug. The method of mounting is shown in Fig. 12. Remove the wire from the top of the plug, put the suppressor on, and attach the wire to the top of the suppressor.

A distributor suppressor is put in the high tension lead, between the coil and the distributor head. Position "C," Fig. 12, on the distributor head is the most satisfactory and most commonly used point of mounting. If this is not practical, the high tension line may be cut *close to the distributor head* and the distributor suppressor with wood screw ends inserted in the line as shown in position "B."

The ½ mfd. generator condenser is installed as shown in Fig. 12. The lead from the condenser goes to one side of the cut-out connection on the generator. The mounting clamp grounds the other side of the condenser.

After the above procedure has been followed, again start the motor. If noisy operation persists, a number of steps can be taken and the various suggestions as given can be tried until the noise is satisfactorily reduced.

Try two suppressors in the high tension line, one at the coil end in addition to one at the distributor end, position "C," Fig. 12.

Ground all cables and tubing which pass through the dash, such as oil lines, gas lines, etc. Ground to the dash or at the nearest convenient point on the frame with a good short ground connection. Use the left-over shield from the "B" battery lead for this purpose.

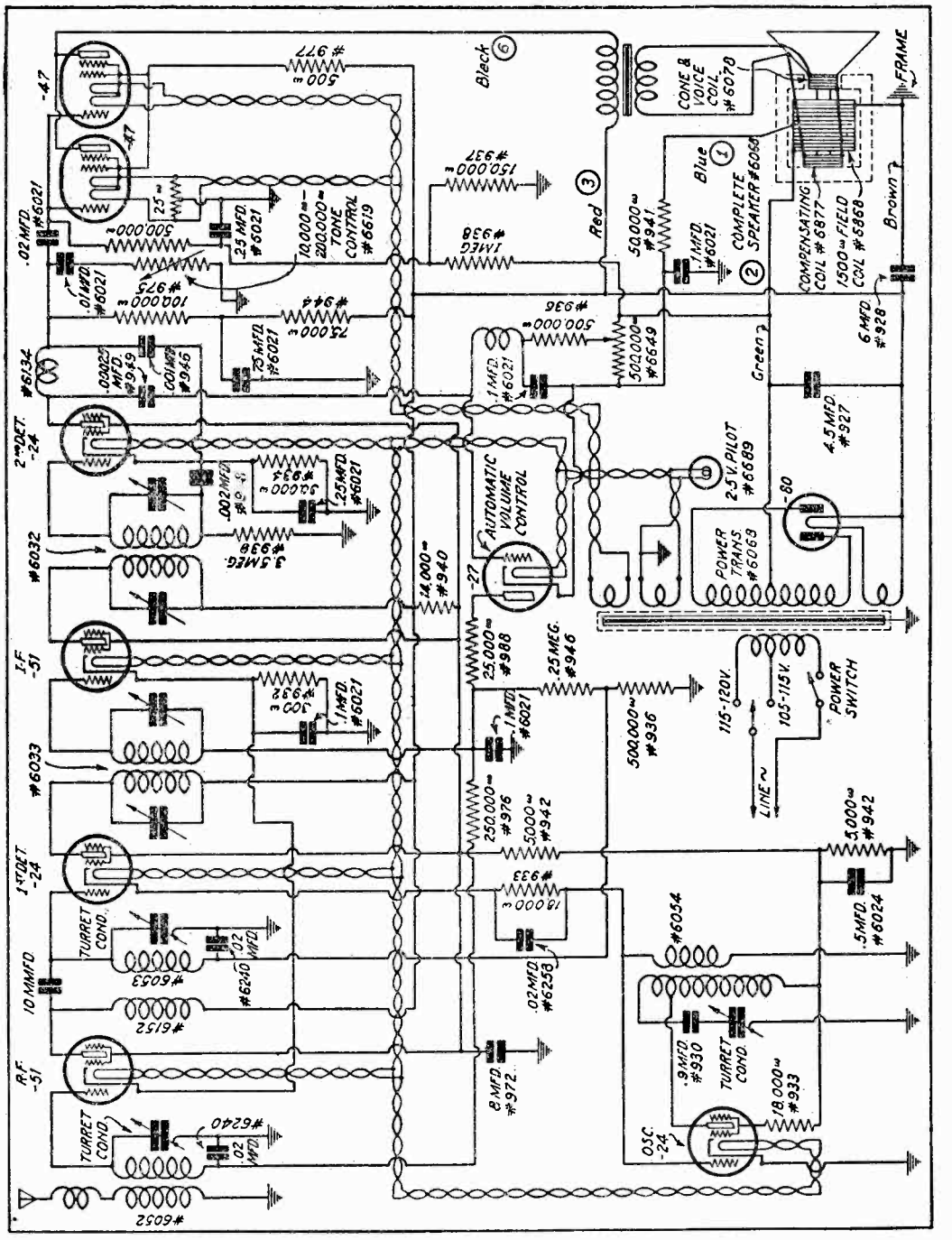
If the chassis and coil are both in back of the dash (under the cowl), take off the coil and mount it on the front of the dash (in the engine compartment). If the coil cannot be moved, place a copper can over it and ground the can at the coil mounting.

Clean and respace spark plugs—clean and check distributor points—check distributor condenser.

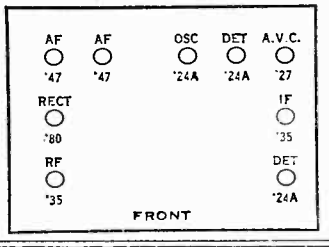
In some cases, the high and low tension leads between the coil and distributor are run close together. In some cases they are in the same conduit. If this is the case, remove the low tension lead from this conduit.

MODEL 17

MONTGOMERY-WARD & CO.



Models 17, (1931)



IF PEAK 175 KC

MODEL 62-1,62-2 MONTGOMERY-WARD & CO.

Model 62-2 Notes

The model 62-2 is practically identical to the Model 62-1, with the following differences. Instead of the two tube push-pull output circuit utilized in the 62-1 model, only one '47 is used in the 62-2. Due to the omission of one output tube, the plate current is lowered. In order to produce the required control grid bias, an additional 260 ohm resistor is added in series with the voltage divider circuit.

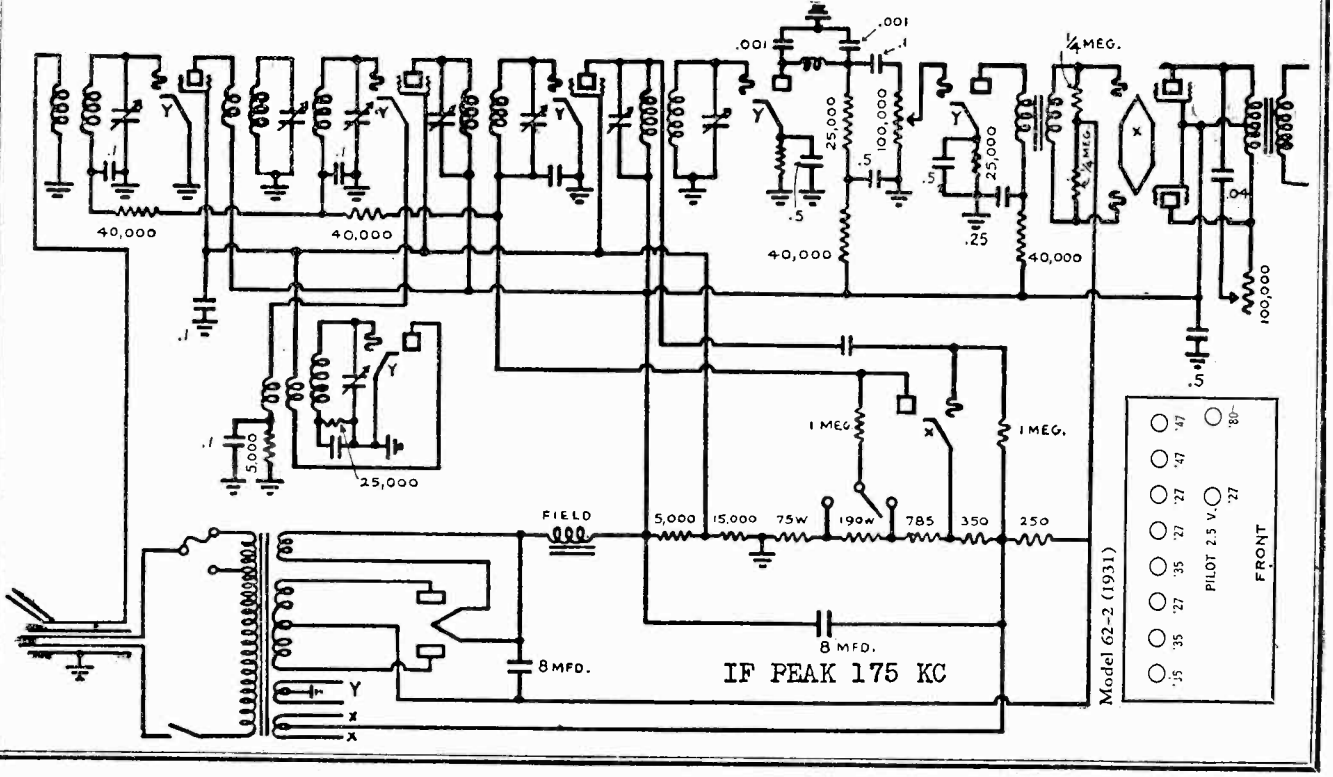
Other differences are as follows: The detector plate resistor is 25,000 ohms instead of 250,000 ohms. The operating voltages are also higher. Thus, the voltage between ground and the r-f plates is 180 volts: between ground and the r-f screens, it is 100 volts: between the ground and the oscillator plate it is 100 volts; between ground and the second detector plate it is 140 volts and the voltage between the filament and the output tube plates is 250 volts.

Voltage For Model 62-1

All voltages measured from ground as common terminal.

280 filament 265 volts	R-f screen 85 volts
Low side of field 165 volts	1st Detector cathode 6 volts
247 plates 155 volts	2nd Detector cathode 10 volts
247 screens 165 volts	R-f plates 165 volts
Oscillator plate 85 volts	1st Detector plate 165 volts
1st A-f plate 75 volts	2nd Detector plate 60 volts
1st A-f cathode 5 volts	247 plate to filament 210

Across AVC voltage divider sections. (See diagram) 75 ohms- 3 volts: 190 ohms -10 volts: 785 ohms-40 volts: 350 ohms- 57 volts: 250 ohms- 75 volts.
Heater voltage- 2.25 volts. 47 Filament -2.25 volts. 280 filament-4.7 volts



MONTGOMERY-WARD & CO.

MODEL 62-7, 62-8
MODEL 62-9

TERMINAL VOLTAGES

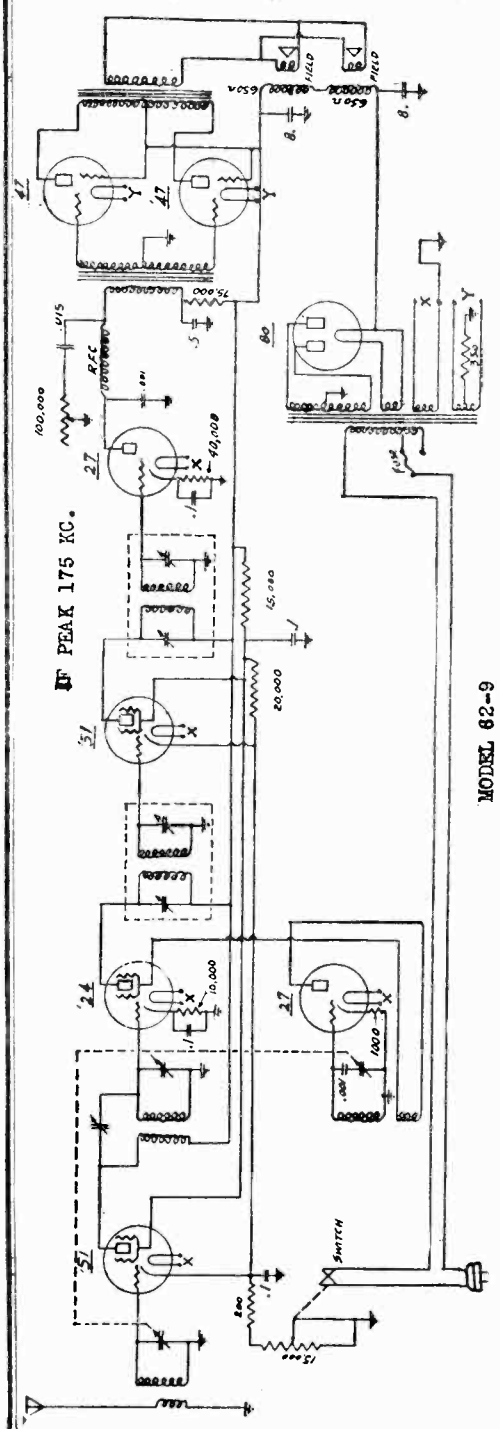
Ground to high side of field (280 Filament)	370 Volts D.C.
Ground to Pentode plates	225 Volts D.C.
Ground to Pentode screens	250 Volts D.C.
Ground to RF plates	250 Volts D.C.
Ground to Detector Plate	155 Volts D.C.
Ground to Second Detector Cathode	20 Volts D.C.
Ground to RF Screens	100 Volts D.C.
Ground to RF Cathodes	4 Volts D.C.
Ground to Pentode Filaments	15.5 Volts D.C.
Across each field	35 Volts D.C.
Across all heaters	2.25 Volts AC.
Across Pentode filaments	2.25 Volts AC.
Across Rectifier Filament	4.6 Volts AC.

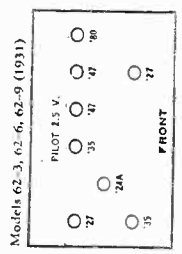
Above readings plus or minus ten per cent with fuse in 110 volt position and 110 volts on the line. Volume control at maximum.

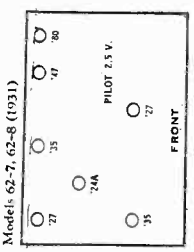
TERMINAL VOLTAGES

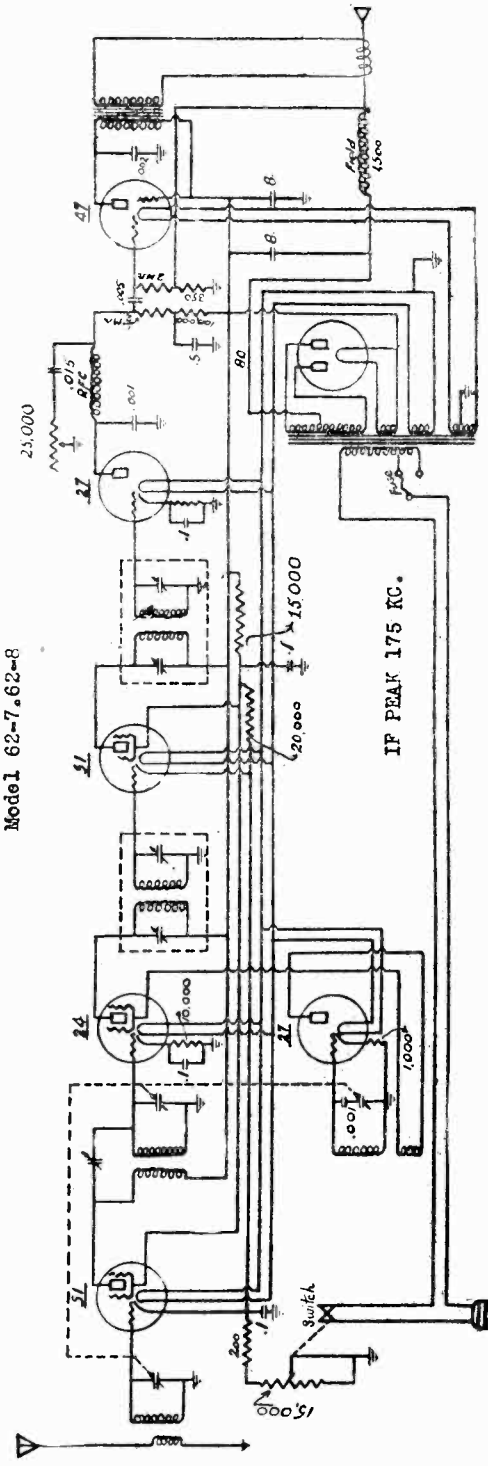
Ground to high voltage (280 Filament)	225 Volts
Ground to Pentode plate	215 Volts
Ground to Pentode screen	225 Volts
Ground to RF plates	225 Volts
Across insulated filter Condenser	325 Volts
Ground to Detector plate	55 Volts
Ground to Second Detector Cathode	10 Volts
Ground to RF Screens	100 Volts
Ground to RF Cathodes	3.5 Volts
Across all heaters	2.2 AC
Across Pentode filament	2.2 AC
Across Rectifier filament	4.8 AC
Across field	90 Volts

Above readings made with 300 V. Scale Voltmeter, 1000 ohms per volt, with volume control at maximum, line voltage—110, 60 cycles.



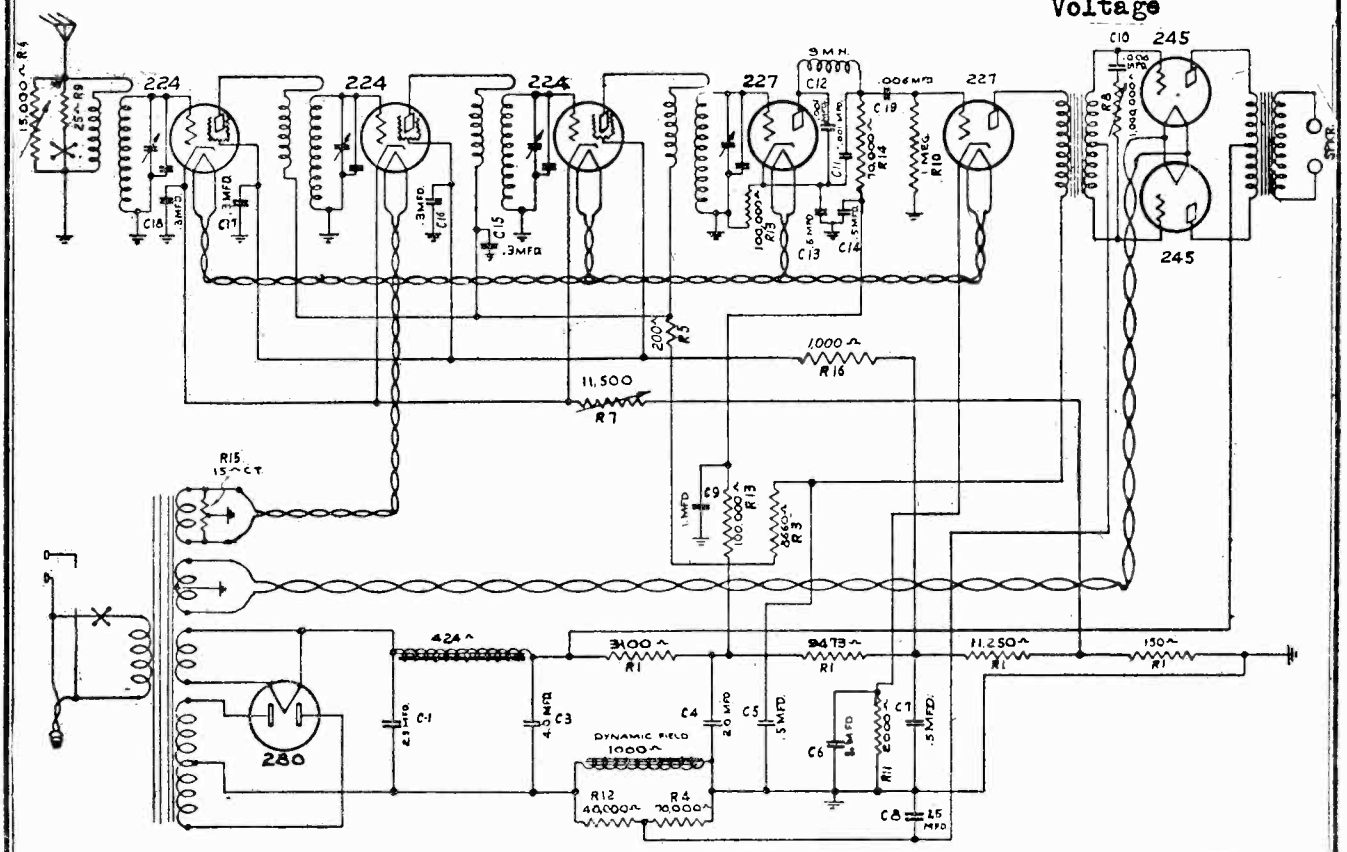






MONTGOMERY-WARD & CO.

MODEL 2955X, 2957X
25 cycles
Schematic
Voltage



Schematic Wiring Diagram, 25 Cycle Model.

The filter system of the 25-cycle chassis shown above is somewhat different than that in the 60-cycle chassis, and the detector plate circuit resistor has been changed from 10,000 ohms to 100,000 ohms.

All servicing data, with the exception of the tube voltages, is the same for both the 25 and 60-cycle chassis.

APPROXIMATE OPERATING VOLTAGES

A. C. LINE VOLTAGE—117. · VOLUME CONTROL FULL ON

Tube	*Position*	*Filament*	*Plate*	*Screen*	*Grid**	*Cathode*
224	1st R.F.	2.3	178	90	— 3.0*	3.0
224	2nd R.F.	2.3	178	90	— 3.0*	3.0
224	3rd R.F.	2.3	178	90	— 3.0*	3.0
227	Detector	2.3	100		—10.5*	10.5
227	1st Audio	2.3	130			9.0
245	2nd Audio	2.4	250		51.0	
245	2nd Audio	2.4	250		51.0	
280	Rectifier	4.7				

*** Grid voltages on the 224 R.F. and 227 detector tubes are taken from grid to cathode and not from grid to ground. The grid voltage on the first audio tube is measured from cathode to ground.**

MODEL Musette 52,53 — MUSETTE — MODEL Musette 52,53

Circuit Constants

Each unit in the accompanying diagram carries a serial number. The values of these units are as follows:

Condensers: A-203, 8 mfd. electrolytic; A-304, .0001 mfd.; A-305, special coupling; A-306, .25 mfd.; A-307, .006 mfd.; A-308, .002 mfd.

Chokes: C-102, 505 turns; C-104, 1,200 turns.

Resistors: R-102, volume control, 6,400 ohms with 200 ohms fixed; R-103, tone control resistor, special; R-203, center tapped, 15 ohms; R-310, 25,000 ohms; R-311, one megohm; R-312, 200 ohms; R-313, .5 megohm; R-314, 100,000 ohms; R-315, 50,000 ohms; R-316, 3 megohms.

Voltage Data

The ordinary set analyzer will not give correct voltage readings on the Musette due to so many readings having to be taken through high resistance. Even a high-resistance voltmeter will not give a correct reading for the following circuits: C bias for '45 tube; detector plate voltage; screen grid voltage and grid bias; first audio plate and first audio C bias. A voltmeter with from 800 to 1,000 ohms resistance per volt should give a deflection on these circuits, but the reading will be reduced by the high resistances.

In checking to determine there are no open circuits, see that at least some reading is had on the above circuits, being sure the volume control is turned to maximum volume position. Then read the following voltages which vary according to a-c. line voltage, being sure the antenna is disconnected and condenser shield is in position.

Reading from:

Chassis to plate prongs of the 1st and 2nd r-f. tubes and '45 output tube, from 190 to 210 volts.

Chassis to screens of 1st and 2nd r-f. tubes, from 75 to 110 volts.

Chassis to cathodes of 1st and 2nd r-f. tubes, should not exceed 5 volts.

Filament to filament of all tubes except '80, from 2.3 to 2.5 volts.

Between chassis and '80 filament, from 190 to 210 volts. Should this read 250 volts or more, indications are that the electrolytic condenser on rectifier side is shorted to chassis.

Across speaker field, from 100 to 110 volts. This reading checks the filter condenser and indicates that the speaker field is not shorted.

If all the above voltages are correct and some meter deflection is had on the other mentioned circuits, you can assume other voltages to be correct and look for the trouble elsewhere.

Adjusting

It will be seen from the circuit diagram that the tone control is made up of the condenser A-307 and the variable resistor R-103. If variation of this control has no effect, the condenser is open. If a variation of this control to maximum low note position cuts out the received signal, the condenser is shorted.

If an exceedingly long antenna is used with the Musette it may well effect the tracking of the first r-f. circuit. A 50-foot antenna is recommended.

When adjusting for resonance, use the trimmers only at the bottom end of the dial and make the necessary adjustments with the trimmers open as much as possible. If they are screwed down tightly, there is a constant added capacity to the tuned circuit which might not allow the set to tune down low enough. The adjustment of the detector tuned circuit is quite critical and great care should be taken in this adjustment.

Adjust at the top of the dial by bending the split fins on the rotor plates of the condensers. When making these, as well as the trimmer adjustments, select a weak signal to work on.

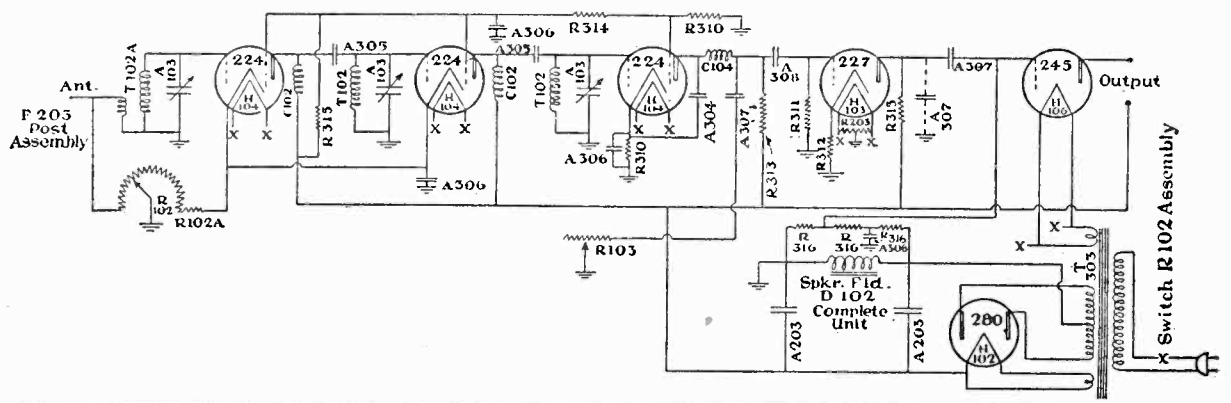
Hum Elimination

In case of excessive hum, first determine whether it is in the chassis or the speaker by removing the '45 tube. If the hum stops, the trouble is most likely in the chassis. If the hum continues, it is probably in the speaker.

Hum in the chassis is usually due to either a defective '24 detector tube or electrolytic condensers either shorted, open, or not properly "formed."

Hum in the speaker may be due to the hum bucking coil being connected up in the reverse manner. Therefore, first try reversing the bucking coil leads. These wires come out of the pot coil and go to the output transformer mounted on the side of the speaker. Looking from the back, with the transformer at the left, the yellow upper inside connection and the black lower center connection are the leads which should be reversed.

1. R-310	25 M Ohm	1. Red with yellow dot
2. R-311	1 Megohm	2. Brown with green dot
3. R-312	2000 Ohm	3. Red with black ends
4. R-313	.5 Megohm	4. Green with yellow dot
5. R-314	100 M Ohm	5. Brown with yellow dot
6. R-315	50 M Ohm	6. Green with orange dot
7. R-316	3 Megohm	7. Yellow with green dot



MODEL Musette 310

MUSETTE

Resonance Adjustment

Do not attempt to adjust the resonance of this set on a local or powerful carrier. Due to overloading, such signals might be louder if the set were actually thrown out of resonance.

To check resonance, remove the back shield and place it above the tubes, making sure however that it makes a good connection (metal to metal) with the chassis. The trimmer condensers are then accessible and are found directly behind the three screen grid tubes on the variable condensers.

Set the dial so that a signal of low intensity and low wavelength is received and carefully adjust each trimmer to maximum signal strength. Usually the gang condenser will then be in resonance at the higher wavelengths as well, but in some instances when a new condenser has been installed, it may be necessary to warp slightly the two outer plates on each rotor section, which are split for this purpose.

In servicing a set where the volume is insufficient or broadness of tuning is apparent, the antenna stage, or the trimmer nearest the end of the chassis should always be adjusted to the length of the antenna upon which the set is to operate.

Voltage Data

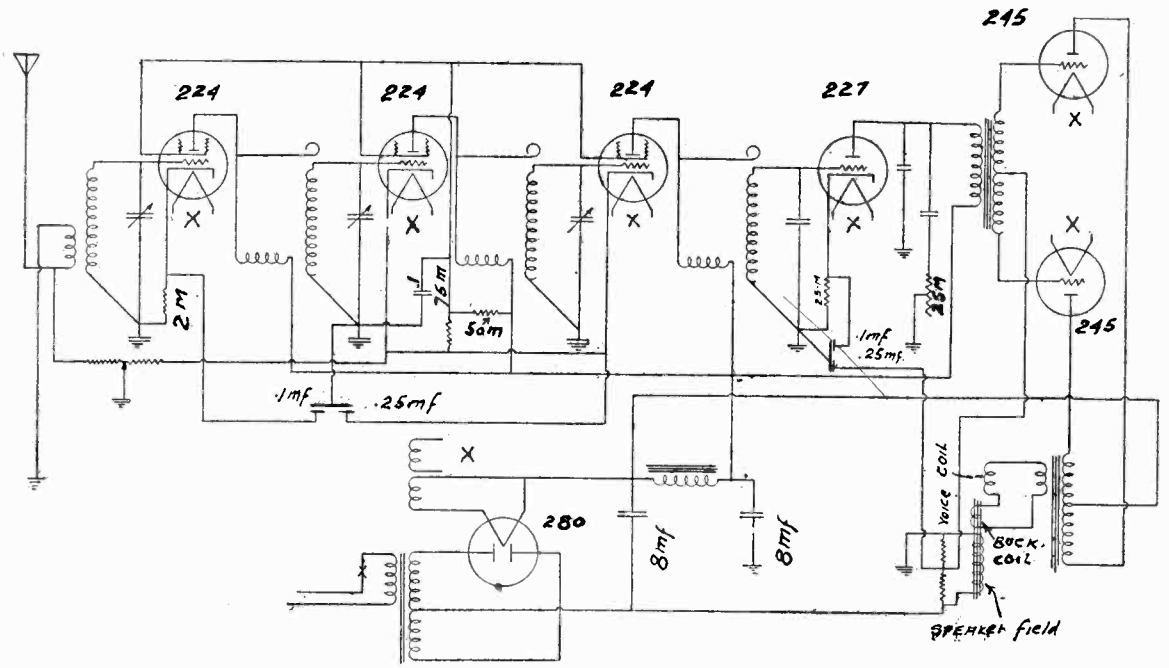
As very high resistances are used the ordinary set tester will not give correct indications on the following circuits: C bias on the '45 tubes; screen voltages on the r-f. tubes; cathode voltage on third r-f. tube.

Using a voltmeter having 1,000 ohms per volt, and with volume on full, the following approximate voltages will be obtained: (In making these readings the antenna should be disconnected.)

Across speaker field	100-120 V.
Chassis to plate of 1st, 2nd r-f. and '45 tubes	210-230 V.
Ground to cathodes, 2nd and 3rd r-f.	1½-10 V.
Ground to cathode, 1st r-f....	9-10 V.
Filament to filament, all tubes..	2.4-2.5 V.
Filament to filament of '80....	4.8-5 V.
Filament to ground, '80.....	210-230 V.

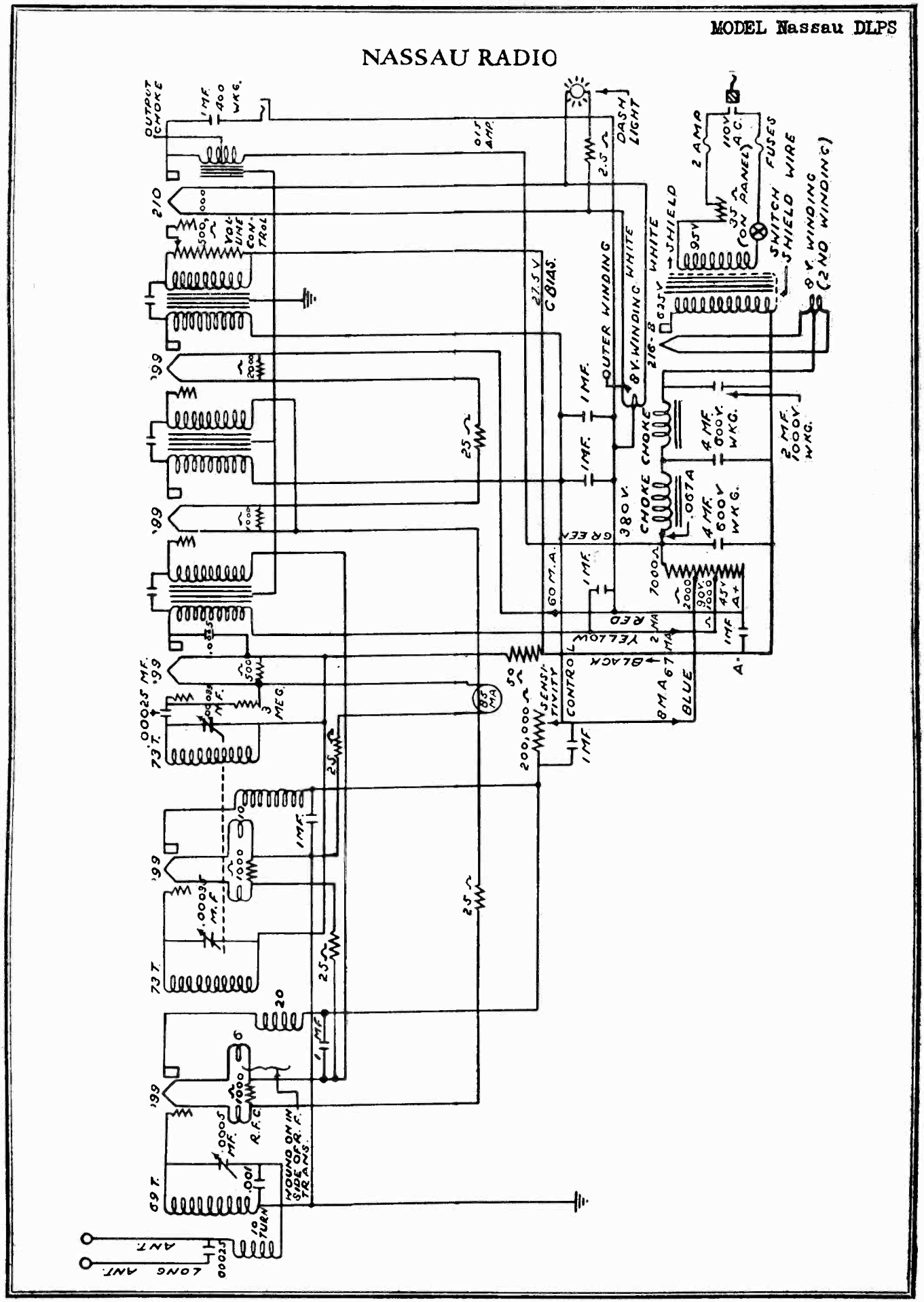
Should the filament-to-ground reading on the '80 tube exceed 230 volts, a grounded electrolytic condenser or an open biasing resistor is indicated; if no reading is obtained, a grounded plate circuit, an open high-voltage secondary, or open speaker field is indicated. If the plate circuit is grounded the speaker field is made to dissipate the '80's entire output and a voltage of 250 to 300 will be obtained across the speaker field terminals.

The bias voltage of the '45 tubes in push-pull is obtained by reading across the speaker field and dividing it by two; this should be approximately 50 to 55 volts. This voltage is dependent upon the two resistors mounted on the electrolytic condenser; if a deflection is had on the voltmeter when reading from ground to the center tap of these resistors, and the voltage drop across the speaker field is from 110 to 120 volts, it may be assumed that the bias on the '45's is correct. A reading of less than 100 volts across the speaker field is indicative of a defective speaker or open resistor somewhere within the circuit.



MODEL Nassau DLPS

NASSAU RADIO



MODEL AGS

THE NATIONAL COMPANY

Intermediate Frequency Amplifier

The intermediate frequency amplifier is tuned to 500 kc. by means of the condenser adjusting screws located at the top of the i.f transformer cans. A signal generator should be coupled to the first detector grid circuit, and an approximate alignment effected with the volume control switch at "MVC" and the beat-frequency switch at "voice." Final alignment is made with the selector switch in the "AVC" position with a very low input.

The selector switch is then returned to the MVC position and the compensating condenser adjusted through the hole near the middle of the chassis bottom. At low signal levels, there should be no difference in sensitivity with the selector switch in either the "AVC" or "MVC" positions.

Beat-Frequency Oscillator

All adjustments should be made on the beat-frequency oscillator with the volume control selector switch at "MVC." Ordinarily, the beat-frequency oscillator is set at 500 kc. by zero beating a perfectly tuned signal. However, as already suggested, additional selectivity can be secured by detuning the beat-frequency from 1000 to 2000 cycles, which will be desirable when considerable code operation is contemplated. Either of the two adjusting screws in the beat-frequency oscillator coil unit can be employed in setting the frequency.

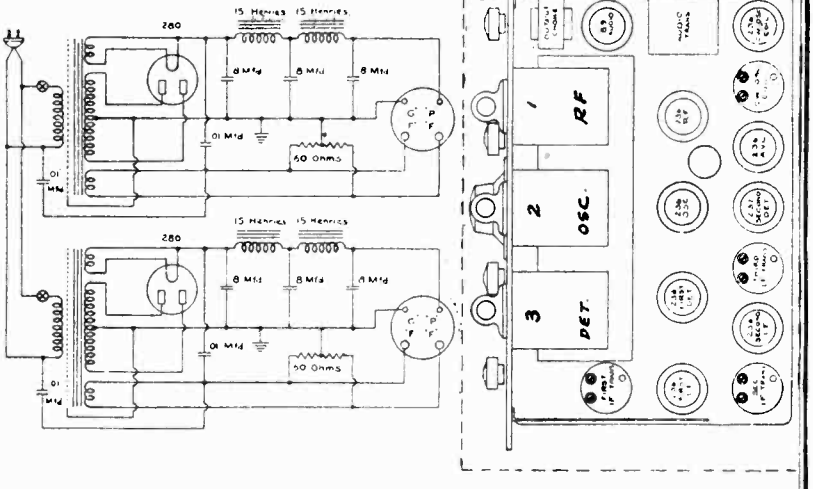
R.f. First Detector and Oscillator

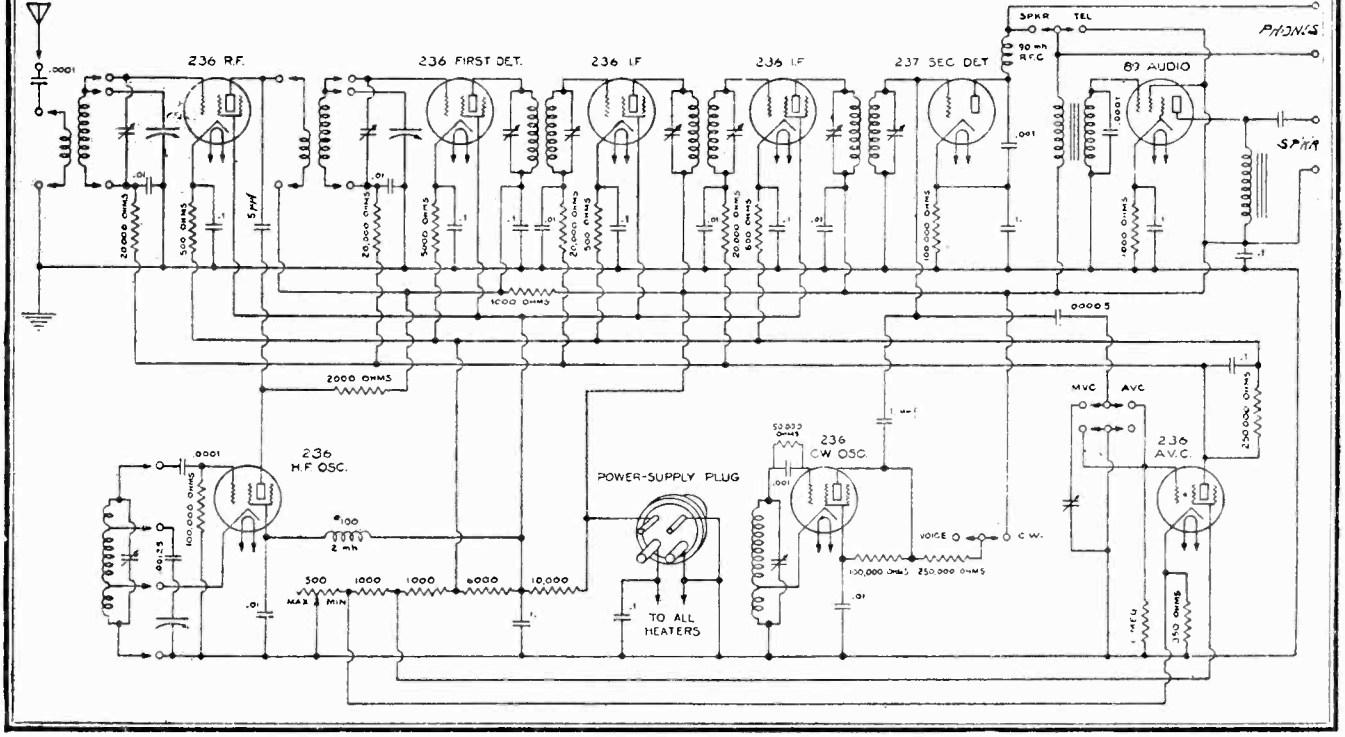
Should any of the high-frequency circuits be thrown out of alignment, realignment should be effected as follows:

The oscillator coils are adjustable over a limited range by means of the individual shunt padding condensers integral with the coil units. These should be adjusted so that the tuning conforms with the coil calibrations, starting with any coil — preferably D or E. The r.f. and detector circuits are then adjusted for maximum sensitivity, at the high frequency end of the scale, by means of the trimming condensers on the left and right hand ends of the condenser shield.

After one set of coils is correctly adjusted, it will be necessary only to adjust the padding condenser on the remaining oscillator coils for correct tracking, as the r.f. and detector coils are all set, at the factory, for perfect tuning when the individual oscillator padding condensers are correctly lined up.

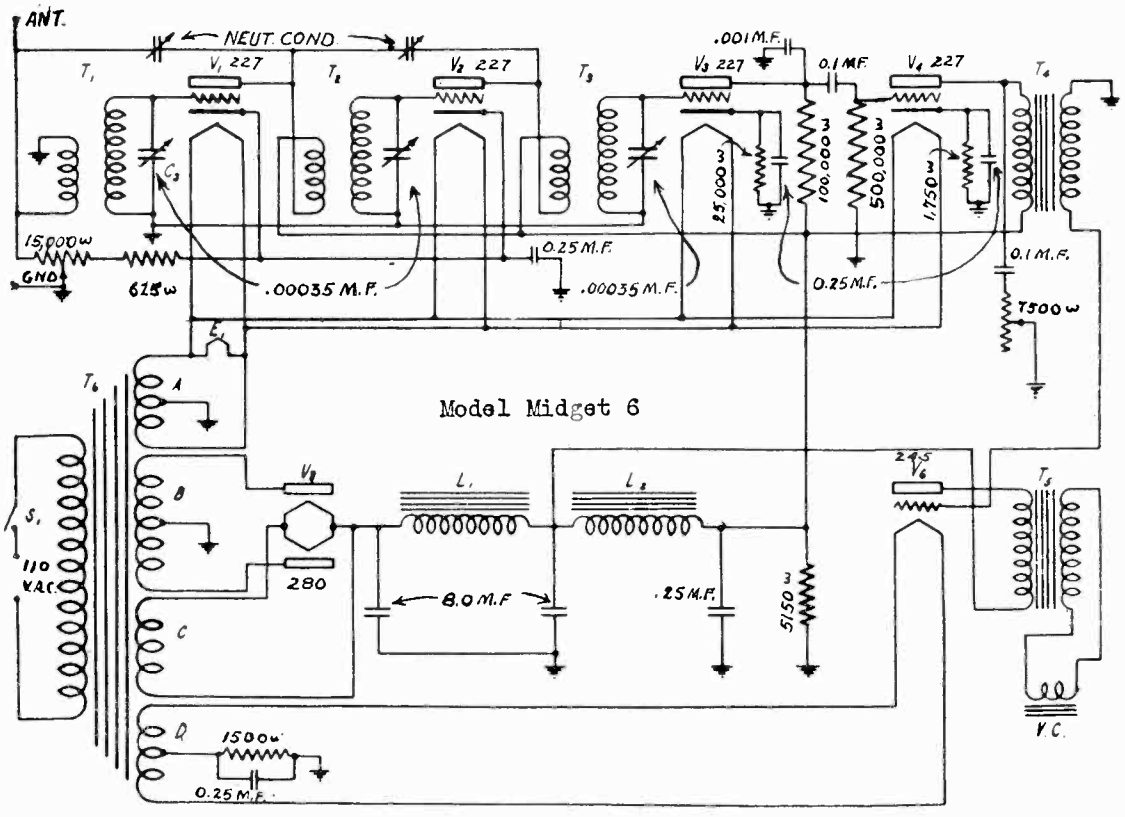
Circuit diagram of the GRDPU double power supply unit specially designed for noise and hum reduction.





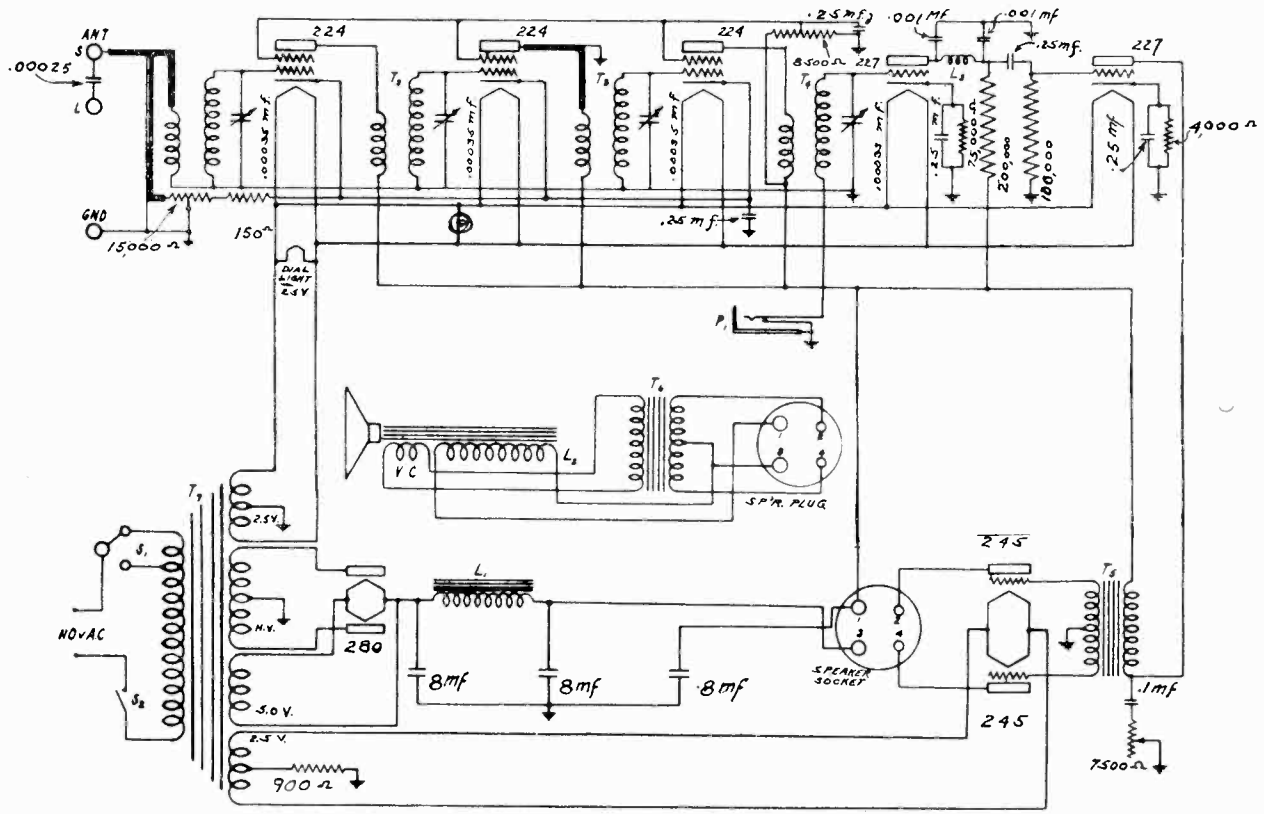
MODEL Midget 6
MODEL Screen Grid 8

NATIONAL TRANSFORMER CO.



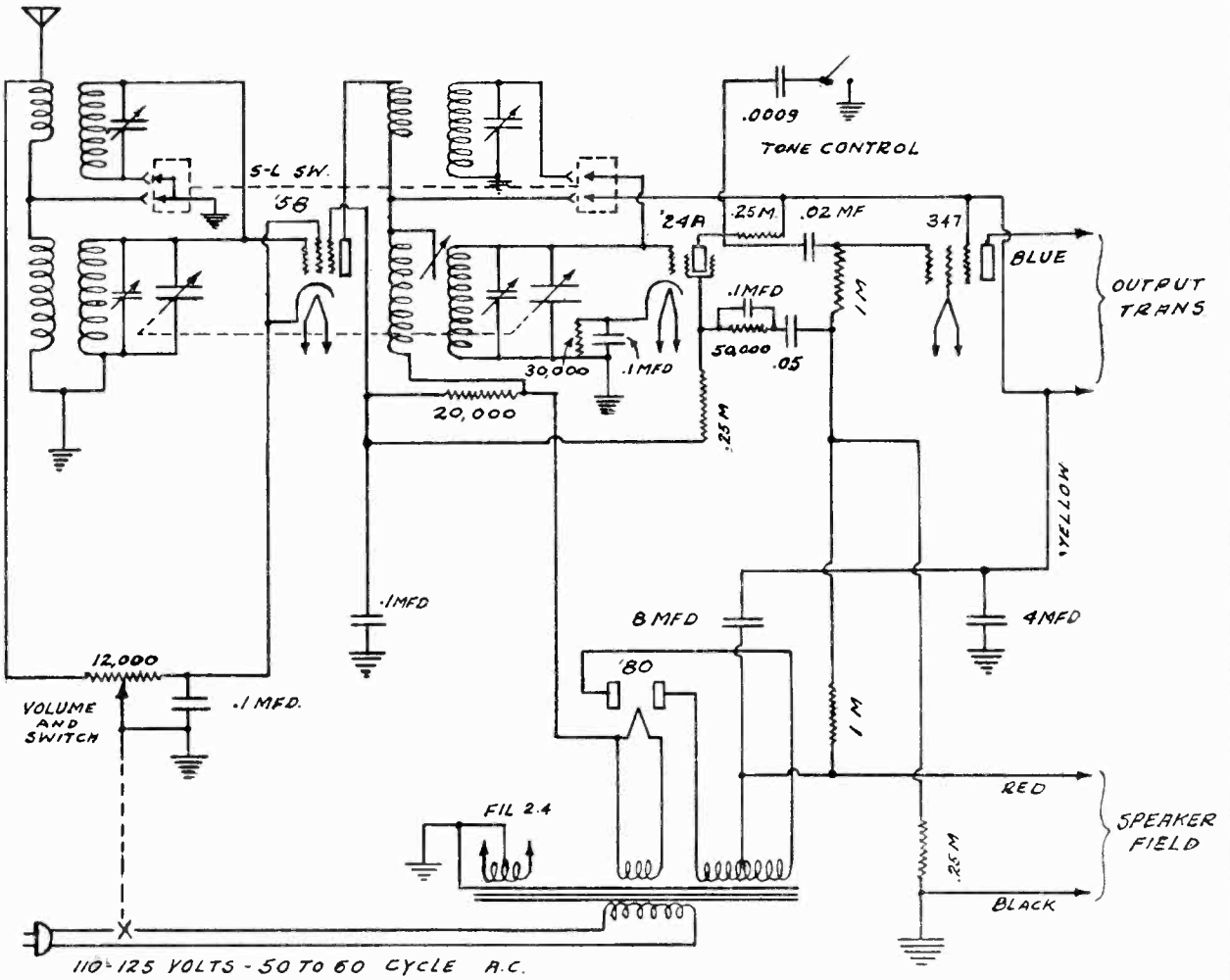
Model Midget 6

Model Screen Grid 8



MODEL 4 Combination
Dual Wave

NORCO MFG. CO.



This Radio Receiver is of the Tuned Radio Frequency type, employing the following tubes:

No. 58 as radio frequency amplifier; #324-A as detector; #347 as power audio and #380 as rectifier.

The dual wave operation allows signal reception covering 4000 kilocycles to 1500 kilocycles when the "wave changing switch" is in the short wave position and from 1700 K. C. to 550 K. C. when the wave changing switch is in the Long Wave position.

The controls of the set are as follows:

The knob at the left controls the volume - increasing in a clockwise rotation. This knob also controls the line power switch. The center knob controls the station selector dial. The knob at the right operates the "two tap" tone control switch. In the center and below the station selector knob is the wave changing switch, the two positions of which are designated by "S" for short wave and "L" for the longer (standard broadcast) wave.

INSTALLATION:

This set is designed to operate from a standard power supply of 110 to 125 volts, 50 or 60 cycles, alternating current.

Best results will be obtained when operated from a fifty foot antenna and a good ground - connected respectively to the red and black wires at the back of the chassis.

SERVICE DATA:

Due to the fact that the wave changing switch connects the short wave and broadcast secondaries in parallel when operating on the short wave band it is necessary always to adjust for resonance on the broadcast band first.

The parallel balancing trimmers will be found on the side of the two gang condenser.

The R. F. plate to grid coupling condenser is the black insulated disc fastened to the side of the detector coil secondary. Obviously any change in the adjustment of this coupling condenser will necessitate re-adjustment of the parallel balancing trimmers. To re-align the short wave circuits adjust to resonance the two parallel circuit trimmers mounted upon the front side of the R.F. transformer and the short wave coil bracket All alignment operations should be made with a modulated oscillator attenuated to a very weak signal.

The Radio Frequency broadcast transformers are of the "resonated primary" type . the primaries being broadly peaked at 500 kilocycles. The secondary or grid coils are tuned simultaneously by the Two Gang Variable Condenser.

The sensitivity response is increased at the high frequency end of the broadcast band by the introduction of a small coupling capacity from the R.F. plate to the detector grid. The plate of the detector is "capacity coupled" to the grid of the #347 power tube and the plate of the power tube transformer coupled to the electro-dynamic speaker.

The grid bias for the power tube is obtained by a voltage divider system across the choke (dynamic speaker field) on the negative side of the high voltage circuit.

Voltage readings for servicing purposes follow:

A.C. Voltages:

Heater filaments	-- 2.4 volts
Power Tube filament	- 2.4 volts
Rectifier filament	— 4.8 volts

D.C. Voltages:

From Ground to:

#380 tube filament	----	250 volts
#347 " screen grid	----	250 "
#347 " Plate	----	245 "
#58 " Plate	----	250 "
#58 " screen grid	----	130 to 180 volts varies with position of volume control
#324A tube plate	----	100 volts measured with one mil. meter and 600,000 ohm series resister due to small current.
#324A Tube Screen grid	----	12 volts
#324A " Kathode	----	4 volts
#347 " Grid	----	17 volts

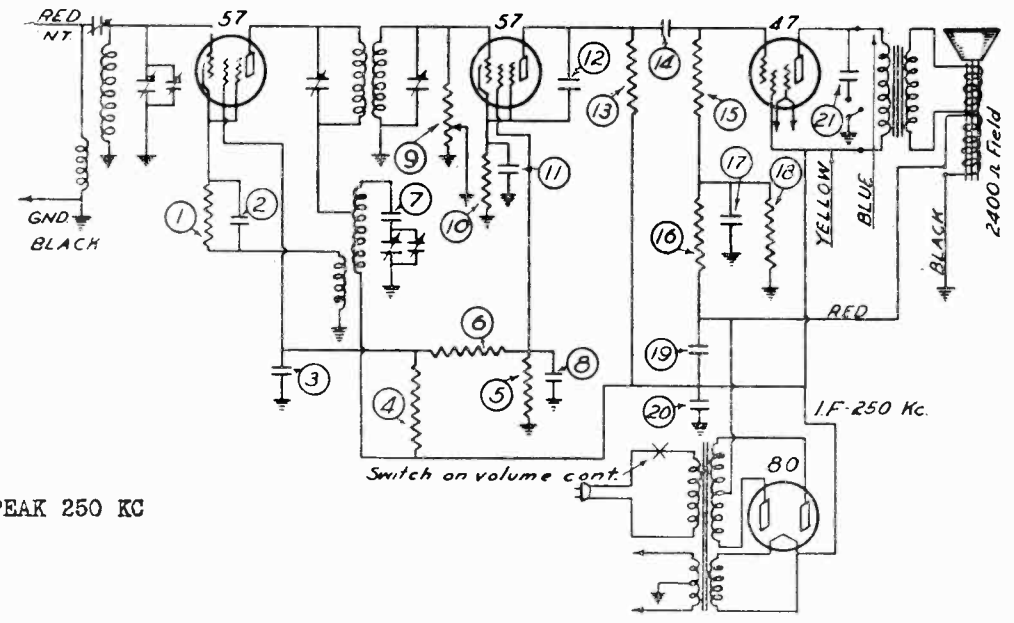
Due to small current meter readings will be inaccurate

Speaker field (Red Lead) - 100 volts negative.

Use positive side of meter to ground.

MODEL 4 Super

NORCO MFG. CO.



IF PEAK 250 KC

RESISTOR DATA	
Number	Resistance
1	6000
4	25,000
6	250,000
5	30,000
9	500,000
10	25,000
13	¼ - ½ Meg
15	1,000,000
16	1,000,000
18	250,000

CONDENSER DATA			
Number	Capacity		
2	005	14	02
3	05	17	.05
7	001	19	8 mfd
8	1	20	4 mfd
11	1	21	02
12	00025		

This Radio Receiver is of the Superheterodyne type employing the following tubes:

#380 as rectifier; #57 as mixer oscillator; #57 as detector and #347 as audio power amplifier. The Mixer-Oscillator tube is located between the #380 tube and the Antenna-R.F. coil. The detector tube is located between the #347 and the oscillator coil.

INSTALLATION:

This set is designed to operate from a standard power supply of 110 to 125 volts, 50 or 60 cycles, alternating current. Best results will be obtained when operated from a fifty foot antenna and a good ground - connected respectively to the red and black wires at the back of the chassis.

CONTROLS:

The knob at the left controls the volume increasing in a clockwise rotation. This knob also controls the line power switch. The center knob controls the station selector dial. The knob at the right operates the variable tone control.

SERVICE DATA:

In the center-front of the chassis is located the variable tuning condenser. The front section (nearest the dial) tunes the oscillator plate coil. The back section (nearest the power transformer) tunes the secondary of the R.F. coil.

The antenna-R.F. coil form located at the left of the tuning condenser contains the following windings: At the top is the secondary or grid coil, trimmed by the trimmer condenser mounted on and controlling the back section of the tuning condenser.

At the bottom of the coil form is the "resonated" antenna coil, capacity coupled to the grid coil by the coupling trimmer on the front of the coil form.

The oscillator coil form at the right of the tuning condenser contains the tuned oscillator plate coil which is trimmed by the front section trimmer. The kathode coupling coil is below the tuned section.

Mounted inside of the oscillator coil form is the 250 K. C. intermediate transformer. The plate or primary section is tuned by the trimmer mounted beneath the chassis and accessible for tuning thru the hole in the chassis between the coil for and the variable condenser. The secondary is tuned by the trimmer at the top of the coil form nearest the detector tube.

The grid bias for the power tube is obtained by a voltage divider system across the choke (dynamic speaker field) on the negative side of the high voltage circuit.

Voltage readings for servicing purposes follow:

A.C. VOLTAGES:

Line	--	118 volts
Heater filaments	--	2.3 "
Power tube filament	--	2.3 "
Rectifier filament	--	5.0 "

D.C. VOLTAGES:

From Ground to:

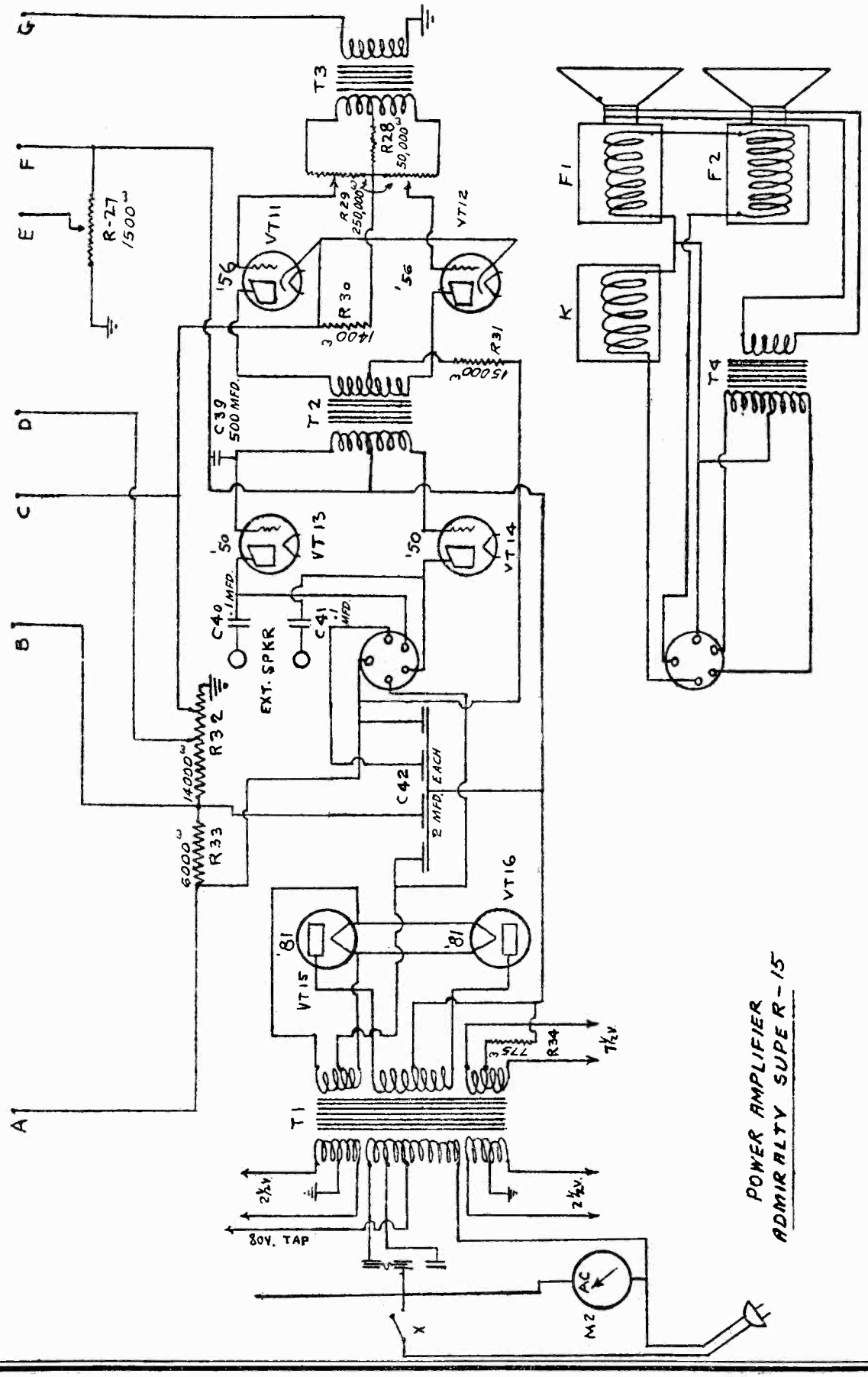
#380	Rectifier tube	filament	--	270 volts
#347	Power "	screen grid	--	270 "
#347	" "	plate	--	265 "
#347	" "	grid	--	17 "
#57	Mixer-Osc. "	plate	--	270 "
#57	" "	screen grid	--	215 "
#57	" "	kathode	--	12 "
#57	Detector "	plate	--	130 "
#57	" "	screen grid	--	30 "
#57	" "	kathode	--	3½ "

Due to small current, meter readings will be inaccurate on detector plate and power tube grid.

Speaker field (red lead) -- 80 volts negative.)

NORDEN-HAUCK, INC.

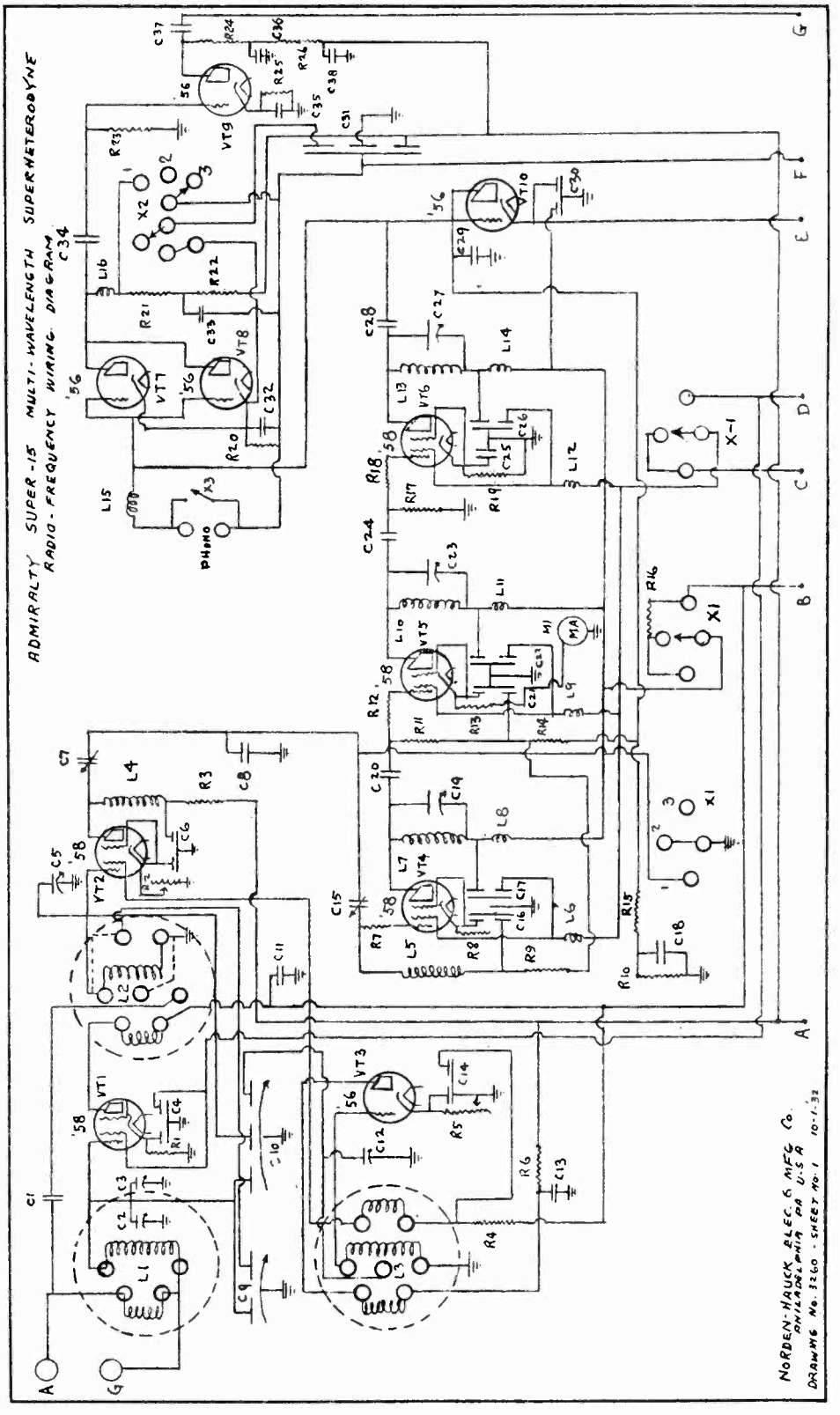
MODEL Super 15
Power Pack and
A-F Amplifier



MODEL Super 15
R-F Chassis

NORDEN-HAUCK, INC.

R-1	3000 Ohms	R-14	100,000 Ohms	C- 1	15 MMF.	C- 19	100 MMF .
R-2	50,000 Ohms Variable	R-15	100,000 Ohms	C- 4	.25 Mfd.	C- 20	100 MMF .
R-3	150,000 Ohms	R-16	30,000 Ohms	C- 6	.25 Mfd.	C- 21	.25 Mfd.Each
R-4	250,000 Ohms	R-17	2 Meg.	C- 7	100 MMF.	C- 22	2-sec. .25 Mfd.
R-5	10,000 Ohms	R-18	10,000 Ohms	C- 8	.03 Mfd.	C- 23	100 MMF.
R-6	50,000 Ohms	R-19	750 Ohms	C- 11	.25 Mfd.	C- 24	100 MMF.
R-7	10,000 Ohms	R-20	50,000 Ohms	C- 12	65 MMF.	C- 25	.25 Mfd.
R-8	300 Ohms	R-21	50,000 Ohms	C- 13	.1 Mfd.	C- 26	2-sec. .25 Mfd.
R-9	100,000 Ohms	R-22	25,000 Ohms	C- 14	.25 Mfd.	C- 27	100 MMF.
R-10	100,000 Ohms	R-23	150,000 Ohms	C- 15	100 MMF.	C- 28	100 MMF.
R-11	2 Meg.	R-24	50,000 Ohms	C- 16	2-sec. .25 mfd.Ea.	C- 29	1.Mfd.
R-12	10,000 Ohms	R-25	2700 Ohms	C- 17	2-sec. .25 mfd.Ea.	C- 30	2-sec. .25 Mfd.
R-13	3400 Ohms	R-26	25,000 Ohms	C- 18	.25 Mfd.	C- 31	3-sec. 1.Mfd.
						C- 32	.03 Mfd.
						C- 33	1.Mfd.
						C- 34	1.Mfd.
						C- 35	.25 Mfd.
						C- 36	.25 Mfd.
						C- 37	1.Mfd.
						C- 38	.25 Mfd.



MODEL 91 AC
MODEL V-16

OZARKA, INC.