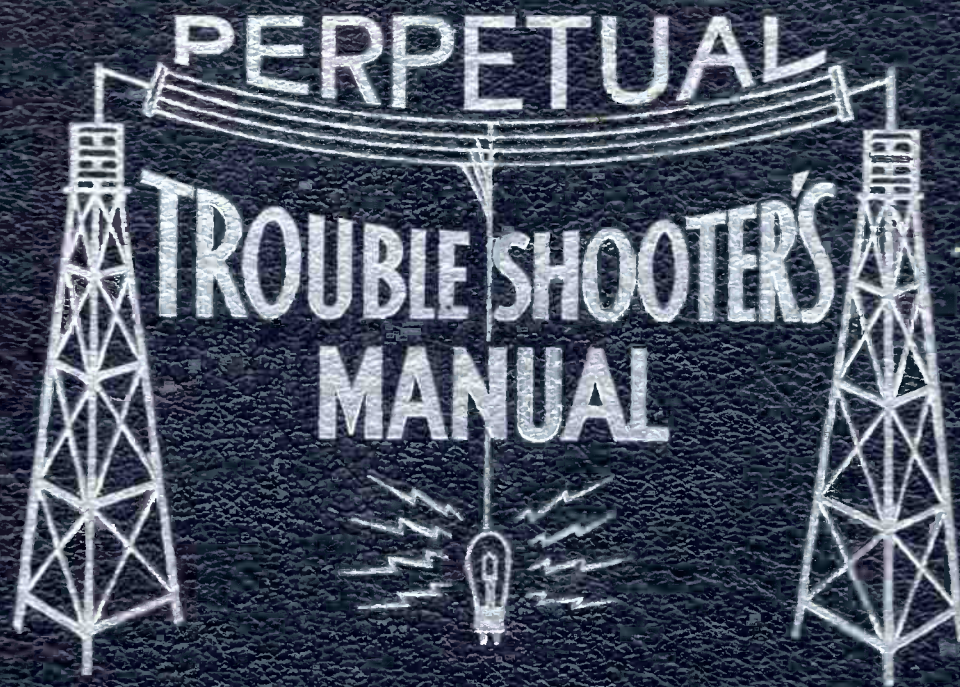


VOLUME II



JOHN F. RIDER

MODEL 62-040
Commodore
62-181
Sovereign

MONTGOMERY-WARD & CO.

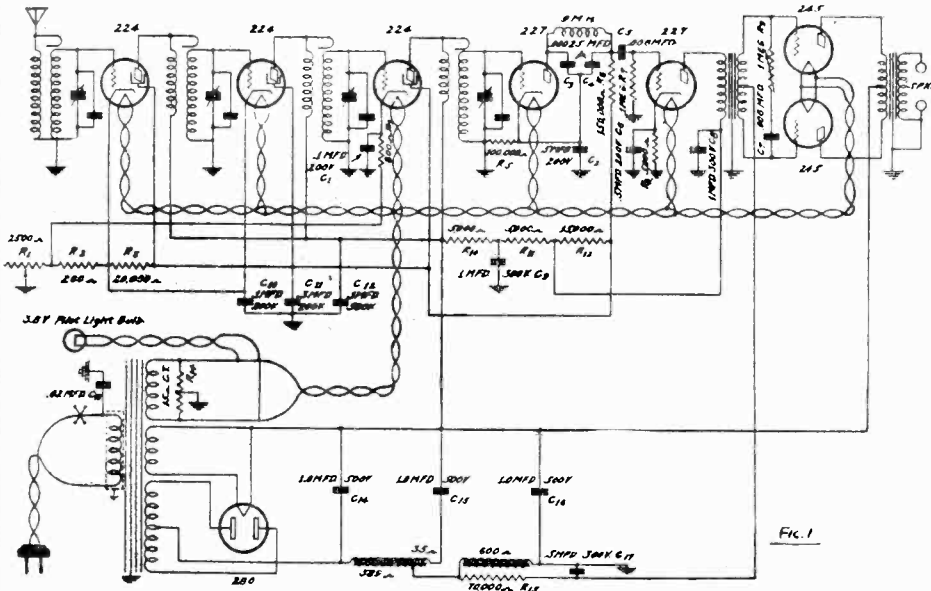


FIG. 1

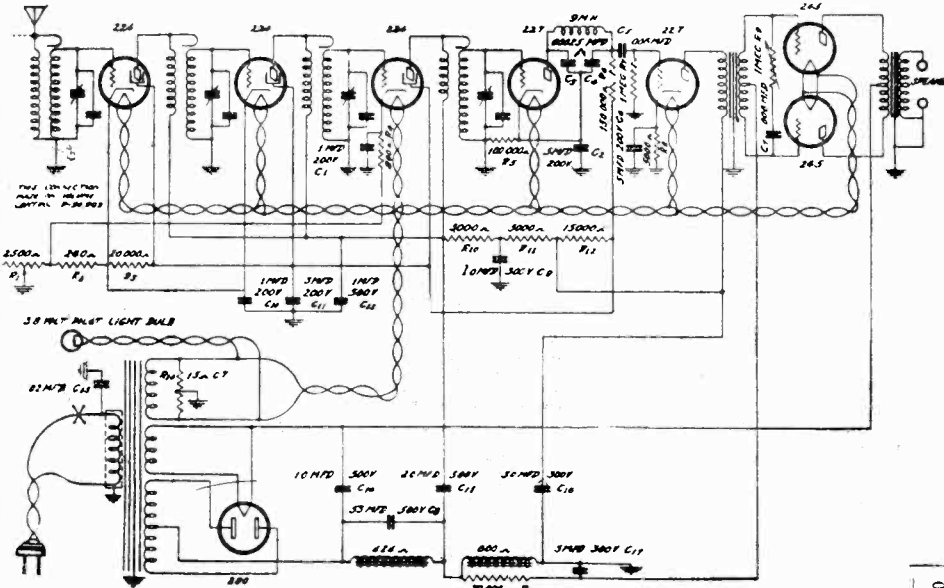
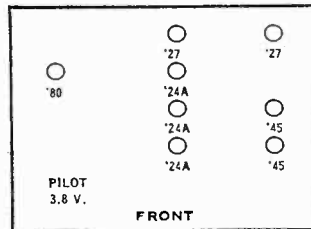


FIG. 3 25-Cycle Chassis

R.F. Coils

The R.F. Coils on this receiver are both inductively and capacitively coupled in such a way that the R.F. gain is constant throughout the entire broadcast band. Each coil is marked with a streak of paint inside the secondary coil near the lugs, according to the group into which it falls. Four coils of the same color are used in each chassis. When ordering a coil for replacement, therefore, be sure to mention the color of the paint on that coil so that it will be replaced with one of identically the same characteristics. If there is any doubt, return the coil. It is seldom that one of these radio frequency coils needs replacement, but should it be necessary to do so, first unsolder the wires on the coil lugs, then loosen the nuts holding the metal coil can. After the coil can is removed, loosen the two nuts holding the coil form and remove the coil.

Models 62-040, 62-181, 62-3335, 181, 187 (1930)



IMPORTANT
All chassis below serial number 139149 use volume control P-90966 shown in Figure 1. Chassis above 139149 use volume control P90969 shown in Figure 3. When replacing volume controls, use P90969 and volume control connections shown in Fig. 3.

Tube Voltages

All D.C. voltages taken with a 1000 ohm per volt meter on the scale indicated in column headed "Meter Scale." Turn the volume control all the way on and connect the antenna and ground leads together.

The grid, plate, and screen grid voltages are measured to cathode of the heater tubes and to filament of three-element tubes.

The dynamic loud speaker has a field resistance of 600 ohms. The field is used as one of the filter chokes in the power pack.

Tube	Circuit	Meter Scale	90 V.	100 V.	110 V.	120 V.	130 V.
1st two 224 R.F. Amplifier Tubes	Grid	0-5	-2.5	-2.9	-3.3	-3.7	-4.1
	Screen Grid	0-100	62	70	76	84	90
	Plate	0-750	220	240	270	295	310
2nd 224 R.F. Amplifier Tube	Grid	0-5	-1.9	-2.3	-2.6	-3	-3.4
	Grid-Plate	0-10	2.4	2.7	3	3.3	3.6
Detector 227 Tube	Grid	0-100	21	0.24	0.26	0.29	0.32
	Plate	0-10	3	4	5	5.55	6
227 Audio Amplifier Tube	Grid	0-250	90	145	158	170	183
	Plate	0-100	30	34	39	43	47
245 Power Tubes	Grid	0-750	220	240	270	300	320
	Plate	0-750	300	330	360	400	415

MONTGOMERY-WARD & CO.

MODEL 62-11,62-12,62-14,
62-27,62-19
Schematic (1st Type
Voltage

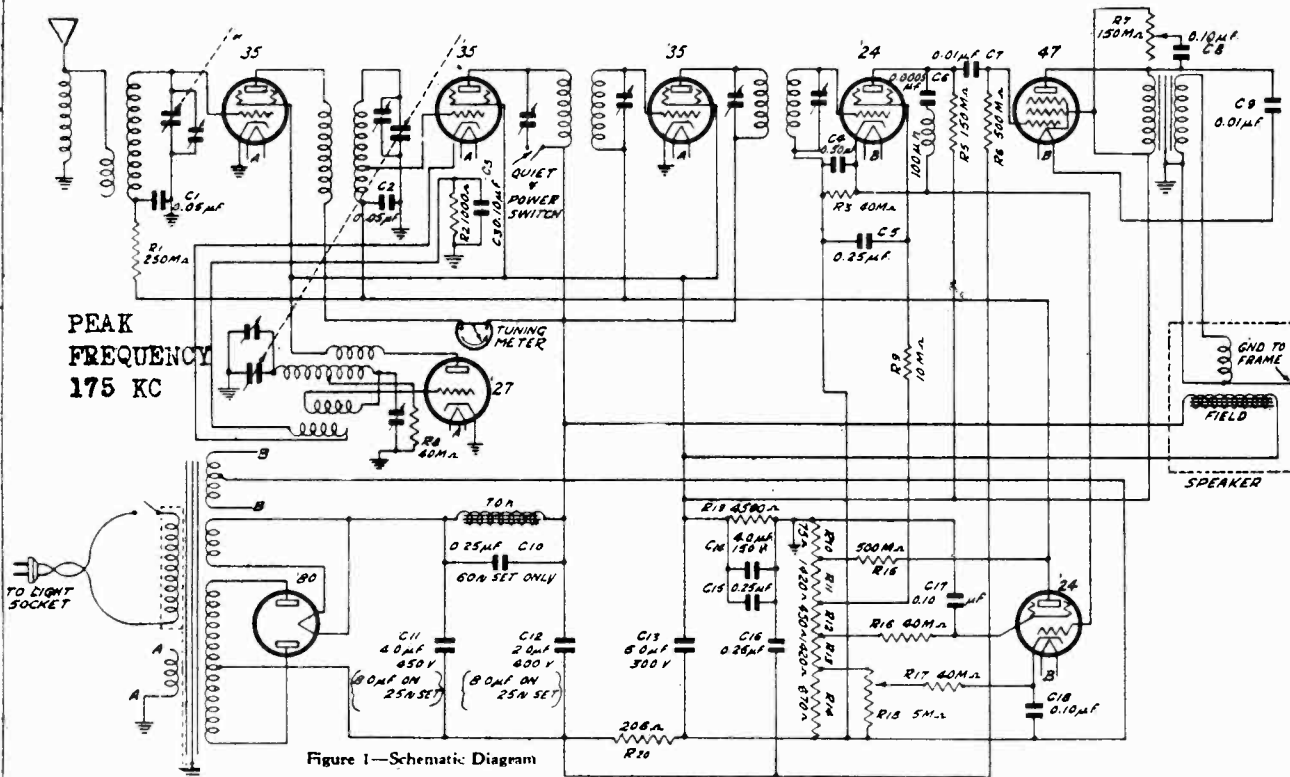


Figure 1—Schematic Diagram

TUBE	CIRCUIT	LINE VOLTAGE				
		90 V.	100 V.	110 V.	120 V.	130 V.
R.F.	Screen grid	70	78	85	92	100
'35	Plate	143	159	175	191	207
1st Det.	Screen grid	70	78	85	92	100
'35	Plate	143	159	175	191	207
I. F.	Screen grid	70	78	85	92	100
'35	Plate	143	149	175	191	207
Oscillator ..	Plate	70	78	85	92	100
2nd Det.	Screen grid	66	73	80	87	94
'24	Plate	127	134	141	148	155
A. V. C.	—Grid grid	14	15.5	17	18.5	20
'24	Screen	24	26	28	30	32
Audio	Accel. Grid	199	221	244	267	289
'47	Plate	171	190	210	230	250
Rectifier ...	Current (both plates)	67 MA	75 MA	82 MA	89 MA	96 MA
'80	Plate to Plate Voltage	512	569	625	682	739

The voltage readings on this chassis cannot be taken in the conventional way, namely between the tube elements and ground. You will note from diagram Figure No. 1, that the ground connection is taken off the shunt resistor near to the positive end, and the chassis is therefore, approximately 150 Volts positive, with respect to the tube elements. The correct voltage readings may be obtained by taking readings to the cathode of the heater type tubes, and filament of the 247.

NOTE "GRENADE" No 62-12

Two entirely different chassis were supplied to the Retail Stores under the name "Grenadier." Each chassis, however, has a different Catalogue number and should be distinguished from this number. The Grenadier No. 62-12 uses the U. S. Radio 8 tube chassis and is exactly the same as our Nos. 1238 and 1838. Therefore, when servicing or ordering repair parts for the Grenadier No. 62-12, use the No. 1238 and 1838 service manual. Grenadier No. 62-14 (Catalogue No. 62-11) is the Wells-Gardner 8 tube chassis which will be described in this service manual.

TURN THE VOLUME CONTROL ALL THE WAY ON, CONNECT THE ANTENNA AND GROUND LEADS TOGETHER AND TURN THE GANG CONDENSER PLATES ALL THE WAY OUT. CHECK THE LINE VOLTAGE.

MONTGOMERY-WARD & CO.

MODEL 62-11, 62-12, 62-14
62-27
Socket-Data

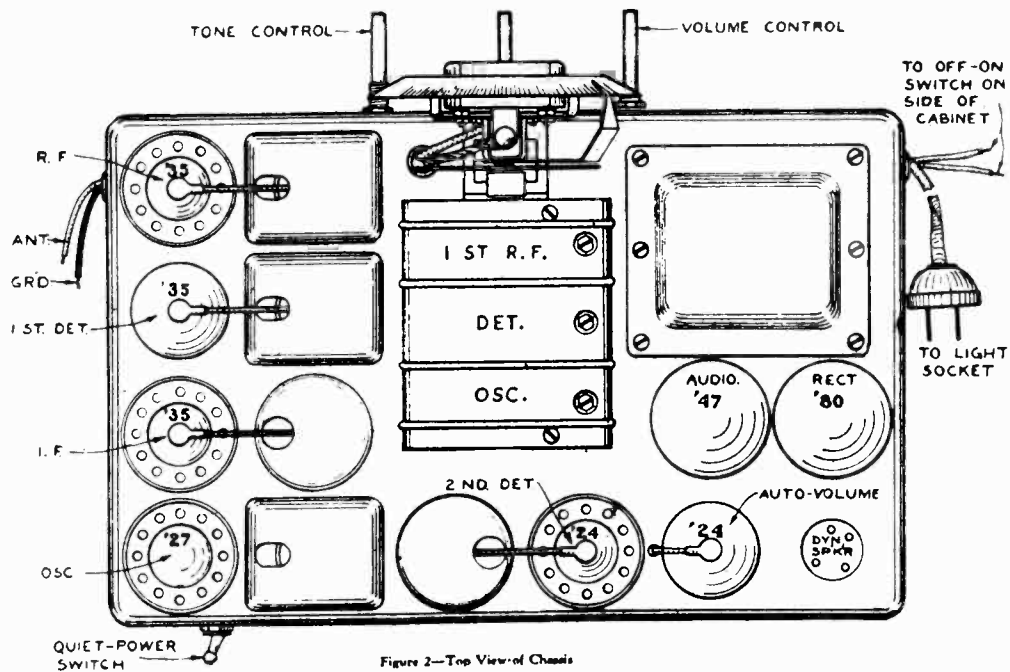


Figure 2—Top View of Chassis

Oscillator

A 227 tube used in this socket that does not oscillate will completely stop any signals from reaching the intermediate frequency amplifier and the chassis will not operate. There is also a slight variation in the characteristics of tubes, and for this reason it is advisable to try a number of tubes in the oscillator position and to use the one which gives the most satisfactory performance.

The oscillator has an adjustable tracking condenser which is adjusted at 600 kilocycles and remains fixed thereafter.

Automatic Volume Control Tube

The automatic volume control tube is equally as important as the oscillator tube. In this chassis a 224 is used. If the A.V.C. tube's characteristics are not exact, it will cause the chassis to lack sensitivity or spoil the tone quality. The tuning meter will not function properly with a poor A.V.C. tube. If the grid circuit of this tube is open the chassis will lose its sensitivity and in some cases will not pass signals. In each installation, therefore, it is advisable to try a number of 224's in the automatic volume control position and use the tube which gives the most satisfactory performance as to control of volume, operation of tuning meter, and tone quality.

Replacing Rubber Drive

You will note that the Vernier tuning drive on this chassis uses a rubber pinion. Under normal operating conditions this rubber will last for a number of years. Should it become worn it can be readily replaced by loosening the set screw of the brass bushing located next to the rubber pinion and pulling out the station selector shaft. Place a new bushing in position, slip the station selector shaft in place and tighten the set screw.

25 Cycle Chassis No. 62-14X

The 25 cycle receivers use power transformer No. P50540 instead of P50539. Two 8.0 mfd. electrolytic condensers No. P80880 are used instead of No. P80873 and No. P80874. The .25 mfd choke condenser C10 is not used in the 25 cycle chassis.

Resonance Meter

This meter is a small milliammeter in the plate return of the R. F. tube. When the receiver is turned on, and no signal is tuned in, the meter will indicate the total plate current drawn by the R. F. tube. When a signal is tuned in, the meter will indicate less current, and when tuned to resonance, the greatest swing (or least deflection), of the meter hand will be obtained.

The deflection of the meter hand will vary according to the setting of the manual volume control on this chassis.

Method of Aligning

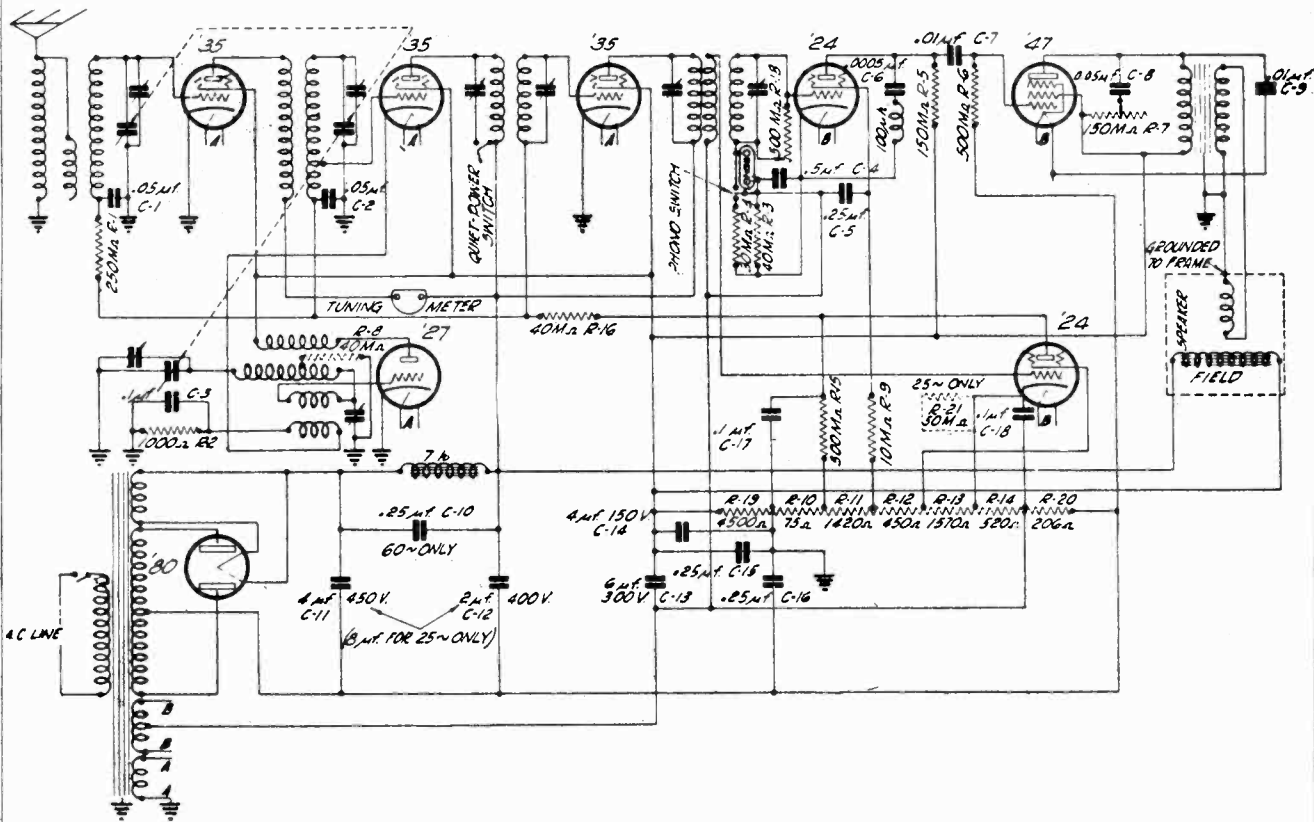
These chassis will only lose their alignment when they have been subject to extremely rough handling or have been used under abnormal conditions, as for instance, a very hot or very humid location. Under any one of these conditions, the alignment may shift slightly and the chassis should be realigned according to the following procedure.

Tune in a local station of approximately 1400 Kilocycles, being very careful to tune this station in at the exact resonance point. This may be easily done by carefully adjusting for maximum deflection of the tuning meter. Then reduce the volume to the desired level. Turn to Figure 2 and note the position of the first radio frequency trimmer adjustment. Slowly turn the trimmer to the right or left until the signal is at maximum intensity. Proceed to adjust the detector trimmer in the same manner. In most instances these two adjustments will align the chassis perfectly. If the receiver still lacks sensitivity after the first RF and detector trimmers have been adjusted, then the oscillator trimmer may be checked by turning the adjusting screw not more than a quarter of a turn to the right or left of its present adjustment. When aligning any of these receivers be sure that the condenser shield is firmly in place and that you are using good tubes in the chassis. This is particularly true in case of the oscillator and automatic volume control tube.

The R. F., 1st detector, oscillator and 1st I. F. tubes have one side of their heater circuit grounded.

The voice coil and speaker frame are grounded to prevent any "feedback" of a 175 K. C. frequency which might enter the speaker.

MODEL 62-11, 62-14, 62-19,
62-27
Schematic (2nd Type) MONTGOMERY-WARD & CO.
Schematic-Data



The automatic volume control system in this chassis has been changed and therefore some of the parts are not as listed and described in the service manual. The parts which differ are listed below and the revised automatic volume control circuit is shown in the schematic wiring diagram on the opposite side of this sheet. No other changes in the circuit or in the mechanical arrangement of the chassis have been made.

A chassis in which the automatic volume control system has been changed may be identified by a **green paint mark on the left rear corner of the chassis** near the speaker socket, or by two grid leaks brought out of the top of the 2nd I.F. transformer assembly. This chassis formerly had but one lead brought out of the top of the 2nd I.F. transformer assembly. The resonance meter furnishes a further means of identification as the deflection of the meter hand will not vary when the setting of the manual volume control is changed. This is due to the manual volume control having no effect on the action of the automatic volume control tube. The manual volume control is connected in parallel in the grid circuit of the 2nd detector tube and is used to vary the resistance in that circuit and, in so doing, control the input to that tube.

The following parts are for use only in a chassis having the revised automatic volume control system and are not interchangeable with those listed in the service manual repair parts list.

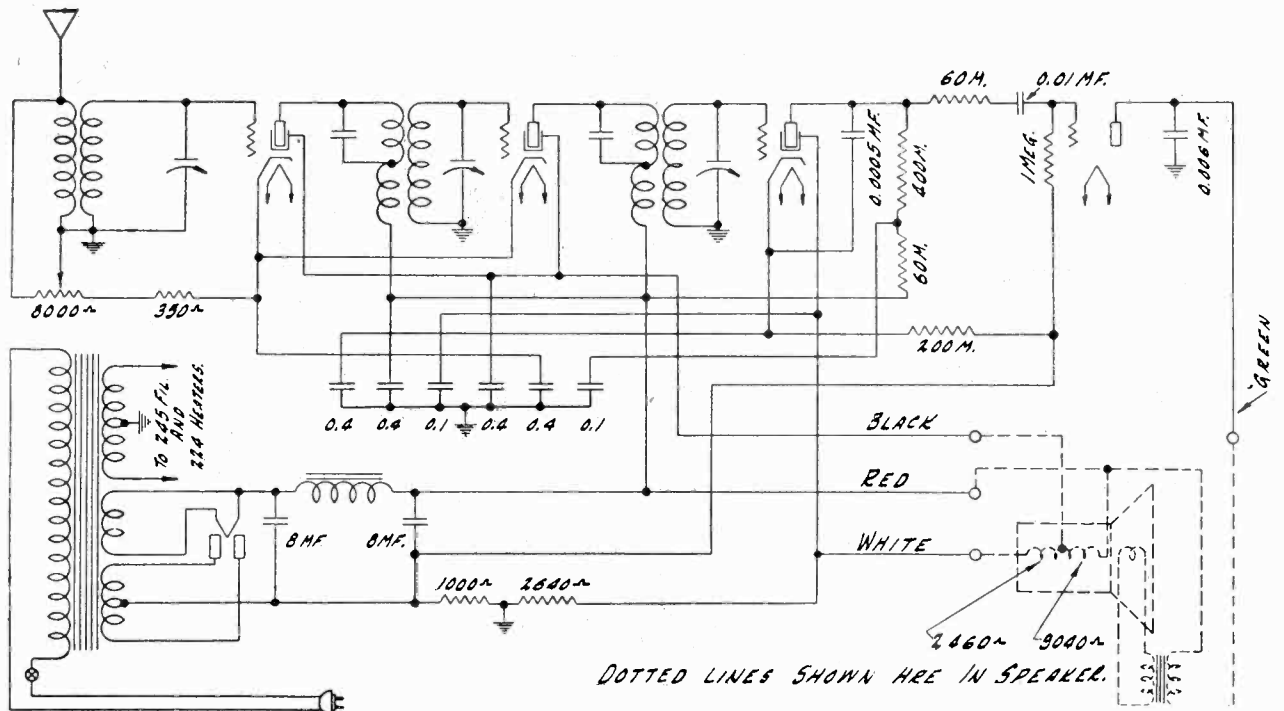
When ordering parts for replacement, be sure the correct part number is given.

Part No.	Name	Cost Price
P-90988-A	Candohm Resistor	\$.38
P-90988	500,000-ohm Volume Control	.30
P-1446	2nd I.F. Transformer Assembly	.70
P-70719	Shielded Volume Control Wire Assembly	.06
P-1445	R.F. Interstage Coil Assembly	.37

(The 40,000-ohm Resistor, R16, is a part of this assembly. The 500,000-ohm Resistor, R15, is a part of the R.F. Interstage Coil Assembly (Part No. 1397) listed in the service manual.)

MONTGOMERY-WARD & CO.

MODEL 62-070
Princess
62-060
Challenger Jr.
(1800)

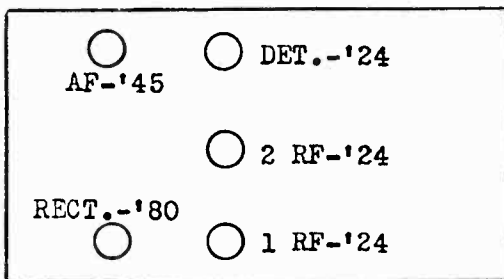


DOTTED LINES SHOWN HERE IN SPEAKER.

NO. 26 W CHASSIS—VOLTAGES AT SOCKETS—
VOLUME CONTROL AT MAXIMUM—LINE VOLT-
AGE, 115—PLUG IN SOCKET OF RECEIVER—
TUBE IN TEST SET

Type of Tube	Position	Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Radio		2.2	245	2.5	80	.6	2.5	2.9	5.1
224	2	2nd Radio		2.2	245	2.5	80	.6	2.5	2.9	5.1
224	3	Detector		2.2	130	3.	40	.1	3.	25	4
245	4	Audio		2.35	245	50.				28.	31.
280	5	Rectifier		4.6						25.	

.Per Plate



General Description

The Model 26W chassis used in both the Princess and Challenger, Jr., is similar in many respects to the 32W chassis used in the Troubadour. The operating voltages, however, will be found to be different, and also this chassis does not use the band pass filter input circuit, as used in the 32W. Only one 245 tube is used in this chassis, and only one stage of resistance coupled audio.

The speaker is of a new type using a center tap field. The entire field winding being used as a shunt resistor. The center tap supplies the screen grid voltage to the radio frequency tubes. Only two electrolytic filter condensers are used, and a number of the small bypass condensers are eliminated, as shown in the schematic diagram, Figure 1.

The general service procedure as described for the Model 32 W chassis can be used in servicing the 26W chassis.

AIRLINE 5 TUBE S.G.

"Princess" No 62-070
and
"Challenger Jr." No 62-060
(Cat. No 1800)

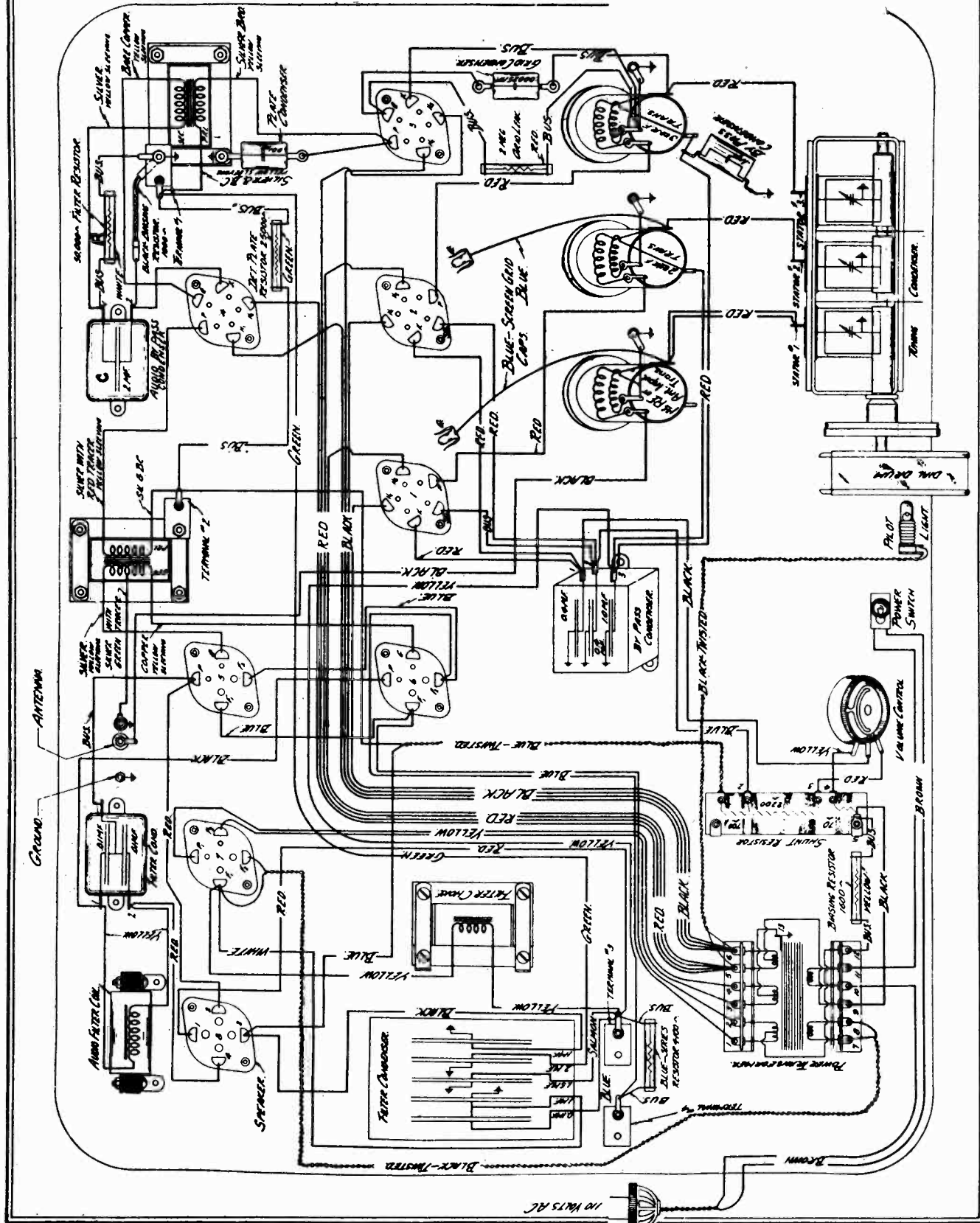
60 v CHASSIS No 26-W
25 v " No 26-WX

NOTE: For 25 Cycle Sets use No. 2281 Power Transformer instead of No. 2251.

MODEL 500

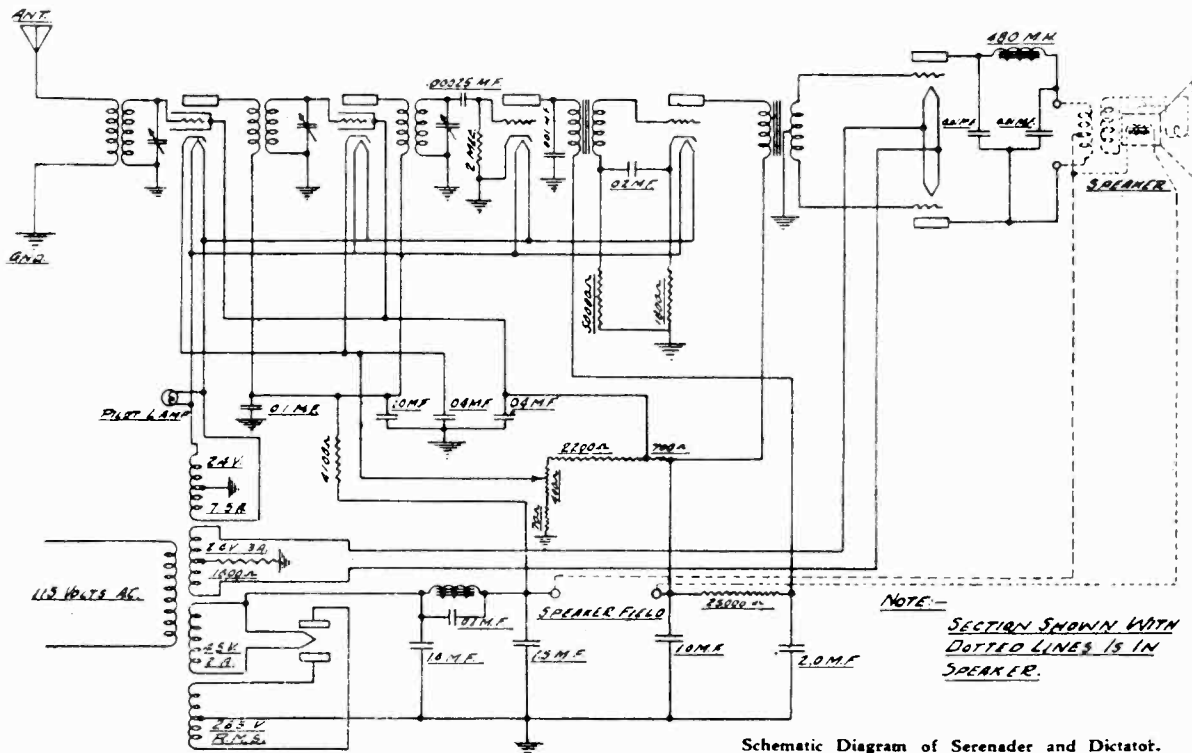
Dictator
10000
Serenader
Chassis

MONTGOMERY-WARD & CO.



MONTGOMERY-WARD & CO.

MODEL 500
 Dictator
 10000
 Serenader
 Schematic
 Voltage



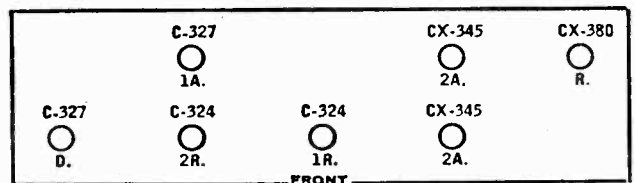
Schematic Diagram of Serenader and Dictator.

The Serenader and Dictator models use identically the same chassis. The schematic diagram is given in Picture 1. Comparing this diagram with the schematic diagram of the 2800 chassis (Balboa and De Sota) you will note generally the two chassis are the same. Therefore, the service instructions given for the 2800 chassis can be used in servicing the Dictator and Serenader models, with the following changes.

The Serenader and Dictator chassis use a high frequency cut-off filter which is shown in the schematic diagram as the 480 M.H. choke and the two .01 mfd. fixed condensers while the 2800 chassis uses a regulation tone control. In case of a short, in either of the two .01 mfd. condensers, no signals will reach the loud speaker. If the .01 mfd. condensers are open the filter will fail to function properly and the tone of the chassis will be of a high pitch.

Another change from the 2800 chassis will be noted in the cathode connections of the first audio stage. A .02 mfd. condenser, a 50,000 ohm resistor and an 1800 ohm resistor are connected in the cathode circuit of this stage. Any defects in the resistor or bypass condenser will give abnormal grid voltage on the first audio tube.

The Serenader and Dictator chassis use an antenna and ground lead wire while the antenna and ground binding posts are provided on the 2800 chassis.



TYPE NO. IN SOCKET TESTED	TYPE OF TUBE	POSITION OF TUBE IN SET	METER READINGS WITH JEWELL TEST PLUG IN SOCKET OF SET						TUBE TEST	PLATE CURRENT CHANGE
			FILAMENT OR HEATER	PLATE OR ANODE	CONTROL GRID-SPACE	NORMAL GRID-SCREEN	CATHODE TO HEATER	SCREEN OR L. P. TO PLATE		
1	284	1 R.F.	2.36	173	2.78	66	2.78	.87	3.0	
2	284	2 R.F.	2.31	173	2.78	66	2.78	.21	3.0	
3	227	Dot.	2.85	39	-	0	-	-	2.8	
4	247	1 A.P.	2.85	100	-	6.1	-	-	3.85	
5	245	2 A.P.	2.89	169	-	38	-	-	11.3	
6	245	2 A.P.	2.89	169	-	38	-	-	11.3	
7	280	Rect.	6.61	-	-	-	-	34.5	34.5	

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 re-

sistor 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.

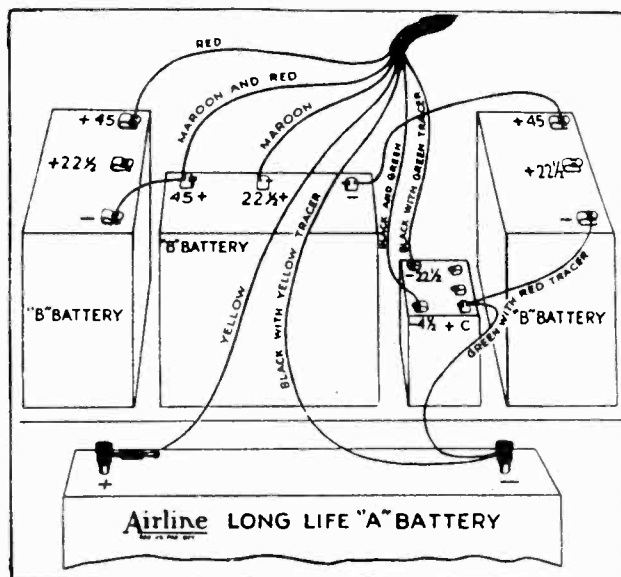
Long Distance Switch:

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

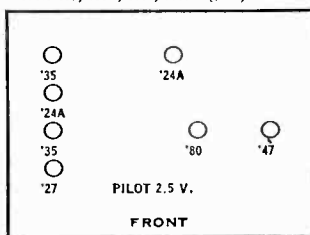
If the pilot light should burn out and you are unable to obtain another one immediately, remove the celluloid strip from the escutcheon plate by sliding it out of its slot from the rear. This will enable the user to see the figures on the dial until such time as you are able to put the correct pilot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



MODEL 1111 (62-1611)
 Fantasy
 811 (62-1711)
 Solo
 Voltage-Data

MONTGOMERY-WARD & CO.

Models 811, 811X, 1111, 1111X (1931)



R.F. and Oscillator Transformers

The antenna and R.F. coupling transformers are properly shielded and the oscillator unit is assembled in a shield together with the 600 K.C. tracking condenser, the .00075 condenser (C16) and the resistor (R14) to ground. This method of assembly has eliminated radiation which is a common fault in superheterodyne receivers.

These three units are matched within one microhenry. Each coil has a paint mark inside the coil form near the terminal lugs and the color of this mark indicates the inductance of the coils. The antenna, R.F., and oscillator units in each receiver have the same color and it is necessary that the color be mentioned when ordering a transformer for replacement.

RESISTORS

Diagram Key	Part No.	Resistance in ohms	Type
R1	P-90976		Vol. Cont.
R1	P-90978		Vol. Cont. With Switch
R3	P-90905-B	15,000	Carbon
R4	P-90916-B	40,000	Carbon
R5	P-90927-A	25,000	Carbon
R6	P-90926-A	30,000	Carbon
R7	P-90956	30,000	Carbon
R8	P-90977	1 Meg.	Tone Cont.
R9	P-90938-A	500,000	Carbon
R10	P-90941-A	50,000	Carbon
R11	P-90959-A	20,000	Carbon
R12	P-90930-C	10,000	Carbon
R13	P-90906-B	2,000	Carbon
R14	P-90956-A	30,000	Carbon
R15	P-90975-A	270	Candohm
R16	P-90963-A	150,000	Carbon
R17	P-90979	7,000	Carbon

STANDARD COLOR CODE

Tube	Circuit	Meter Scale	110 V.
R.F. (Ant.) '35	Grid	0—10	1.9
	Screen Grid	0—100	63.
	Plate	0—250	225.
1st Det. '24	Grid	0—25	14.5
	Screen Grid	0—100	65.
	Plate	0—250	220.
Int. '35	Grid	0—10	1.9
	Screen Grid	0—100	63.
	Plate	0—250	225.
2nd Det. '24	Grid	0—25	14.5
	Screen Grid	0—100	65.
	Plate	0—250	135.
Osc. '27	Grid Plate	0—100	80.
Aud. '47 (See Caution Above)	Grid	0—10	2.7
	Accelerating Grid	0—250	225.
	Plate	0—250	205.
'80 Rect.	Filament, to Ground	0—1000	233.

Tuning

The primary and secondary of both intermediate transformers are tuned with adjustable condensers which remain fixed after the transformers have been tuned to exactly 175 kilocycles.

The oscillator has an adjustable tracking condenser which is adjusted at 600 kilocycles and remains fixed thereafter.

Condensers and Resistors

Three blocks contain the majority of condensers. The choke in the plate circuit of the second detector tube is also contained in one of these blocks. The common leads of condenser blocks No. 1 and No. 2 are grounded. C1, C4, and C6 in block No. 3 have a common lead which is grounded, and the choke, and C3 in this block have a common lead connected to the plate of the 2nd detector.

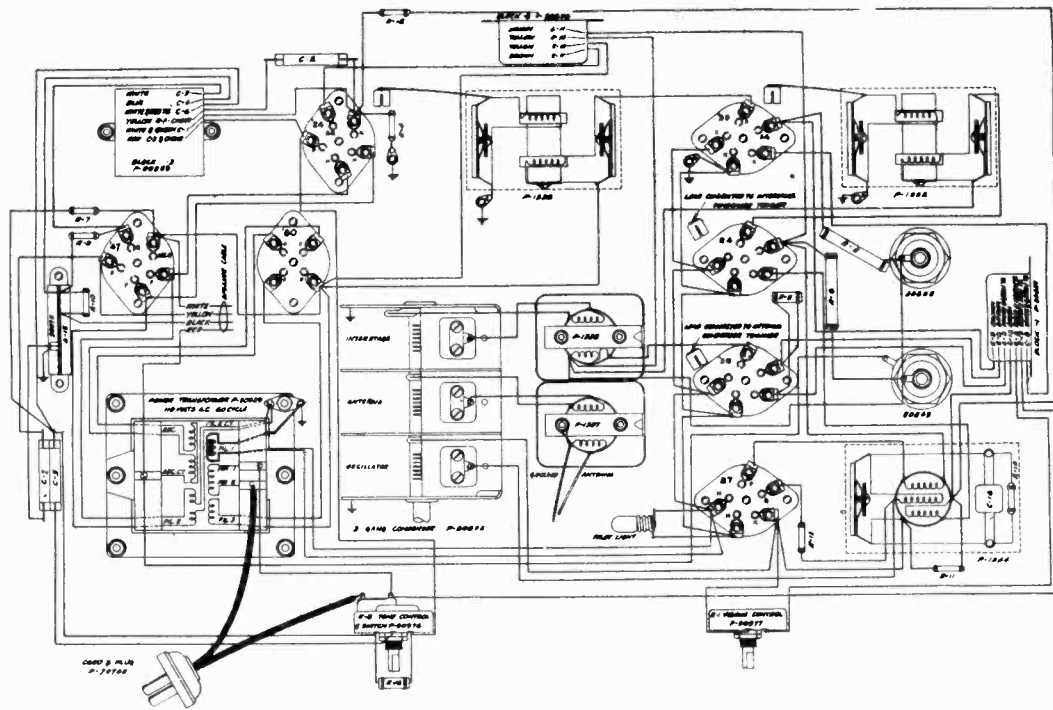
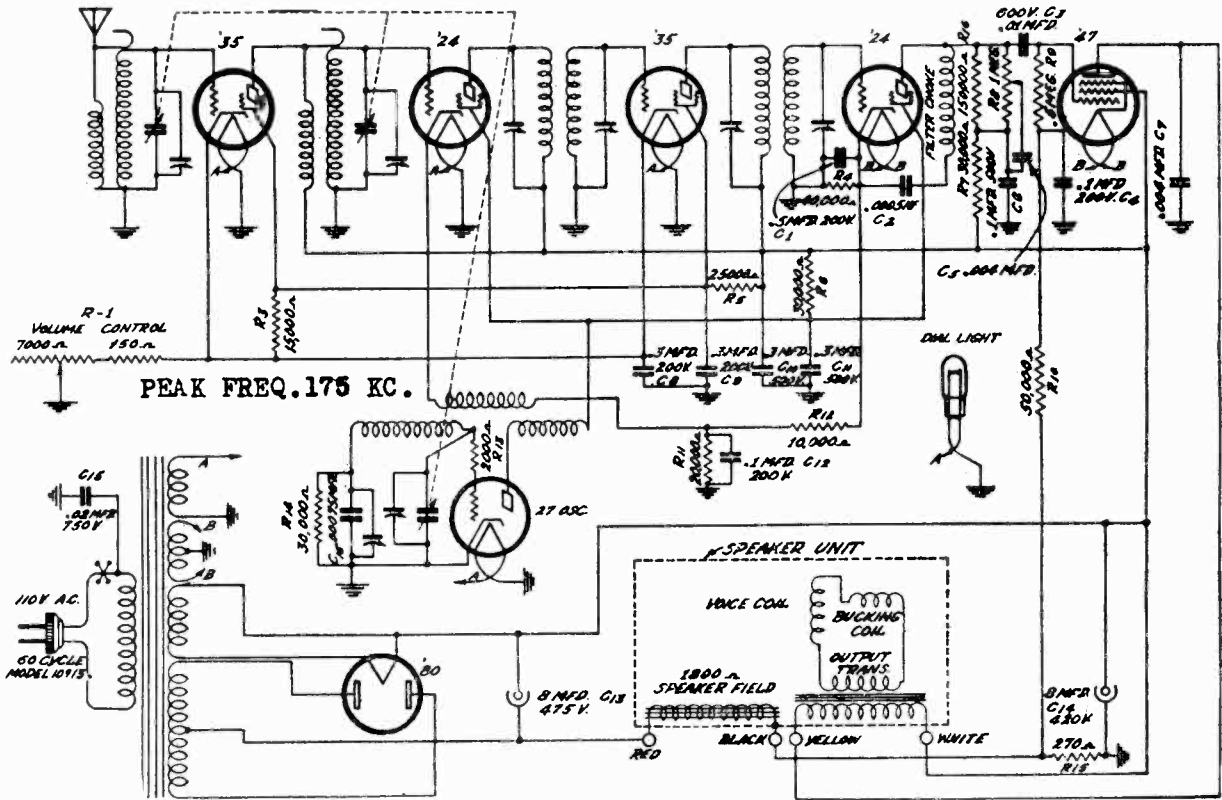
ANALYZER CHART

All voltages taken with a 1,000 ohm per volt voltmeter on the scale indicated in the column headed "Meter Scale." Turn the volume all the way on and connect the antenna and ground leads together. The grid, plate, and screen grid voltages are measured to cathode of the '24 and '35 tubes and to filament of the '47 tube.

The grid voltage on the '27 oscillator cannot be taken except with a very sensitive, low scale voltmeter. The voltage is approximately .05 volts when the A.C. line voltage is 110 volts.

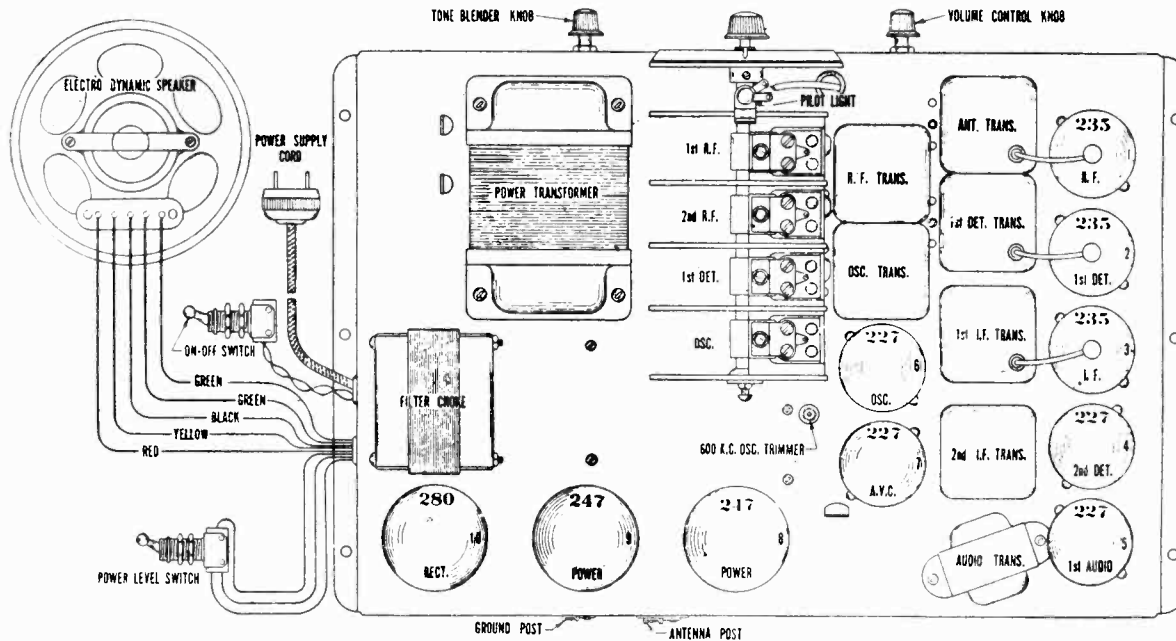
MONTGOMERY-WARD & CO.

MODEL 1111 (62-1611)
Fantasy
811 (62-1711)
Solo
Schematic



MODEL 1355 (62-1955)
Minstrel
Socket-Data

MONTGOMERY-WARD & CO.



Automatic Volume Control

The automatic volume control as used in this receiver varies the signal strength by changing the bias voltage of the R. F. and I. F. 235 tubes. A 227 tube is used as the A. V. C. tube. Plate, cathode and grid circuits of this tube are connected to the voltage divider resistor as shown in Fig. 1 to secure the required plate and grid voltage. In the plate circuit of this tube is a 200,000 ohm resistor. The grid circuits of the R. F. and I. F. tubes are connected to the plate of the A. V. C. tube through a 10,000 ohm resistor. The cathodes of these two tubes are connected through the 250 ohm biasing resistor to the other end of this 200,000 ohm resistor in the plate circuit (power level switch on "H" power). The grid of the A. V. C. tube is connected to the plate of the I. F. 235 tube through a .0005 condenser. The A. V. C. tube has an initial bias of 20 volts and under conditions of no signal, no plate current flows in this tube. However, when an A. V. C. voltage of 15 or greater is applied to the grid circuit of the A. V. C. through the .0005 coupling condenser, plate current flows and a drop is established across the 200,000 ohm resistor. This lowers the voltage of the R. F. and I. F. grids, increasing the bias and decreasing the sensitivity in proportion to the strength of the signal being received. The higher the A. V. C. voltage applied to the A. V. C. grid the greater the drop across the 200,000 ohm resistor and the higher the bias voltage. For weak signals, therefore, the A. V. C. does not affect the bias and maximum sensitivity is obtained, while for strong signals the bias is increased and a corresponding reduction in sensitivity effected.

Servicing

The usual checking of wiring and soldered connections and checking of resistors and condensers for opens, shorts, grounds and wrong value also apply, of course, to the Super-heterodyne. In working on the receiver care should be taken that the I. F. plate and grid leads are not bent too close to the chassis as the capacity to the ground will be excessively high. Note that the R. F. and I. F. control grids are not at ground potential and a slight shock can be obtained between the grid caps of these tubes and the chassis. Do not get the antenna lead near the 2nd detector as a harmonic of the signal in the 2nd detector plate circuit may feed into the antenna system and beat with the R. F. signal causing an audible whistle.

A good check to determine if the oscillator is working is to read the voltage across the 50,000 ohm resistor. This will vary between the limits as shown in the voltage chart for the oscillator bias, depending on the frequency to which the receiver is tuned.

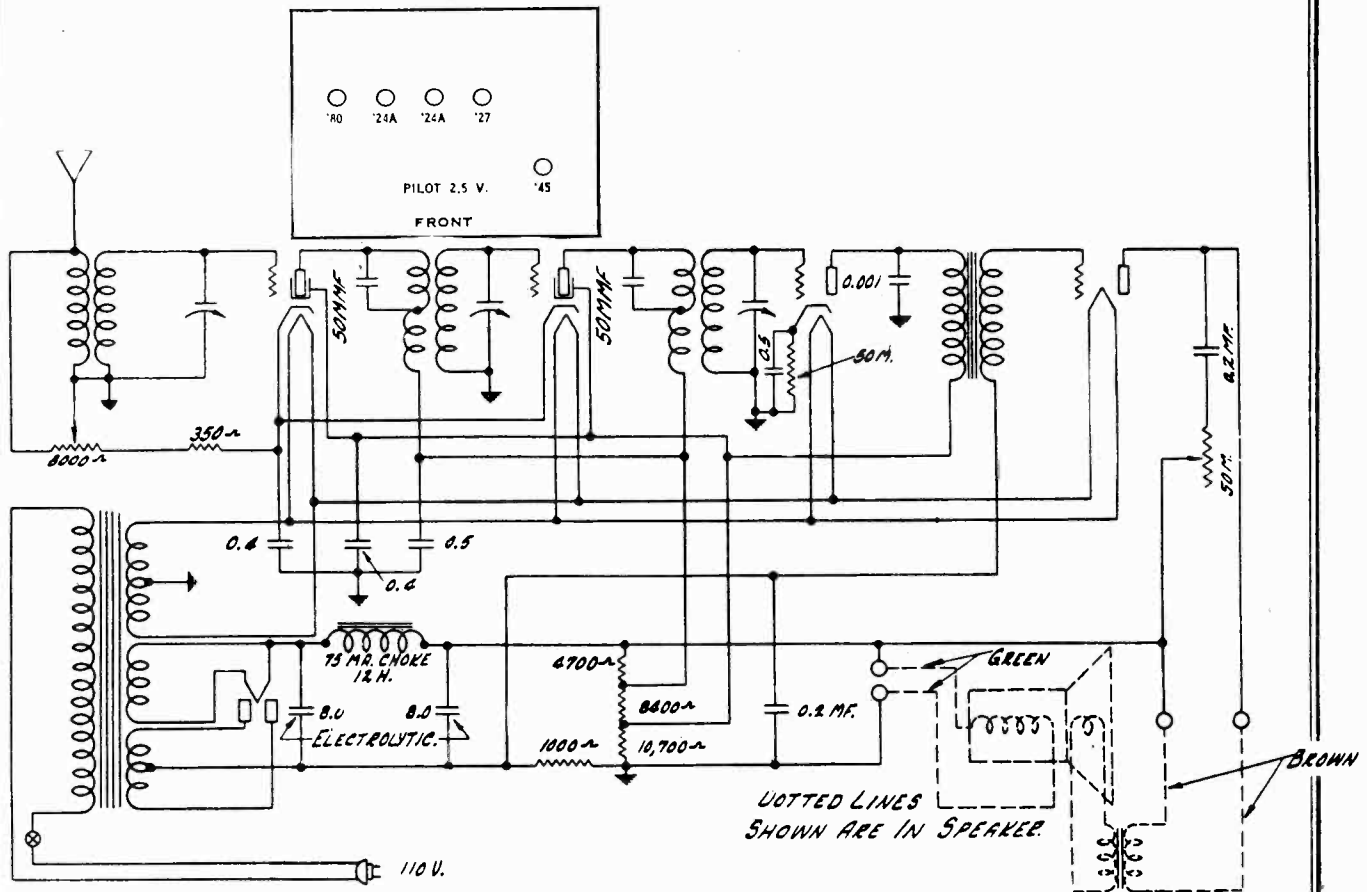
In order to provide satisfactory tracking with the R. F. and first detector tuned circuits the oscillator is provided with a 600 K. C. and a 1400 K. C. trimmer condenser. The 1400 K. C. trimmer condenser is located on top of the tuning condenser and is connected across the oscillator tuning condenser. The 600 K. C. trimmer condenser is across the 550 Mmf. fixed condenser and the adjusting screw is in back of the tuning condenser on top of the chassis.

The I. F. transformers are small universal wound coils mounted on tubing. The I. F. tuning condensers are small mica condensers. The coil tubing and condensers are mounted on porcelain bases and are enclosed in metal cans located on top of the chassis. The adjusting screws of the four I. F. tuning condensers are reached from the bottom of the chassis.

MODEL 1500
(27-W,15000)
Collegian

MONTGOMERY-WARD & CO.

Models 27W, 27WX, 1500, 15000, (1930)



The 27W Chassis uses the following tubes:
2—224's as R.F. Amplifiers,
1—227 as Detector,
1—245 as Audio Amplifier,
1—280 as Rectifier.

The two stages of screen grid R.F. amplification in conjunction with the tuned antenna stage of this chassis give a sensitivity averaging 10 Microvolts per meter while the 227 power detector used with the single stage high gain audio provides good power output, with excellent tone quality.

Volume Control

The 8000 ohm volume control is connected across the antenna and ground of the input stage. The movable arm of the volume control is connected to ground in series with the cathodes of the two 224 R.F. amplifier tubes. This method of connection gives us a dual volume control action, which varies the signal input to the antenna stage as well as the grid bias on the first two R.F. tubes. The volume control may be easily tested by taking the voltage readings from the cathode of the 224's to the ground connection and at the same time, varying the volume control. This will give an indication if the volume control is controlling the grid bias properly.

The R.F. transformers in the R.F. stages are the same as those used in the 32W and 26W chassis. The cathode, screen grid, and plates of the R.F. tubes are bypassed by the 964A bypass condenser

The Power Detector

The power detector receives its grid bias from the voltage drop across the 50M cathode resistor (Part No. 1892). The plate of the detector is bypassed to ground through the .001 M.F. R.F. plate bypass condenser.

The audio stage consists of a high ratio audio transformer of special design. The secondary of this transformer connects directly to the 245 power tube. The audio transformer may be tested with the continuity meter of your set checker. Disconnect the primary and secondary leads from the chassis before taking continuity measurements. Test the primary and secondary for opens or shorts, and also take continuity readings between the primary and secondary terminals, and ground. There should be no readings between these terminals and the core of the transformer or chassis ground.

The tone control is connected across the primary of the output push pull transformer, and consists of 50M variable resistance in series with a .2 M.F. fixed condenser. A short in this condenser will short circuit the primary of the speaker transformer and no signals will reach the loud speaker.

The power supply of the 27W chassis is similar to that used in some of our other chassis previously described.

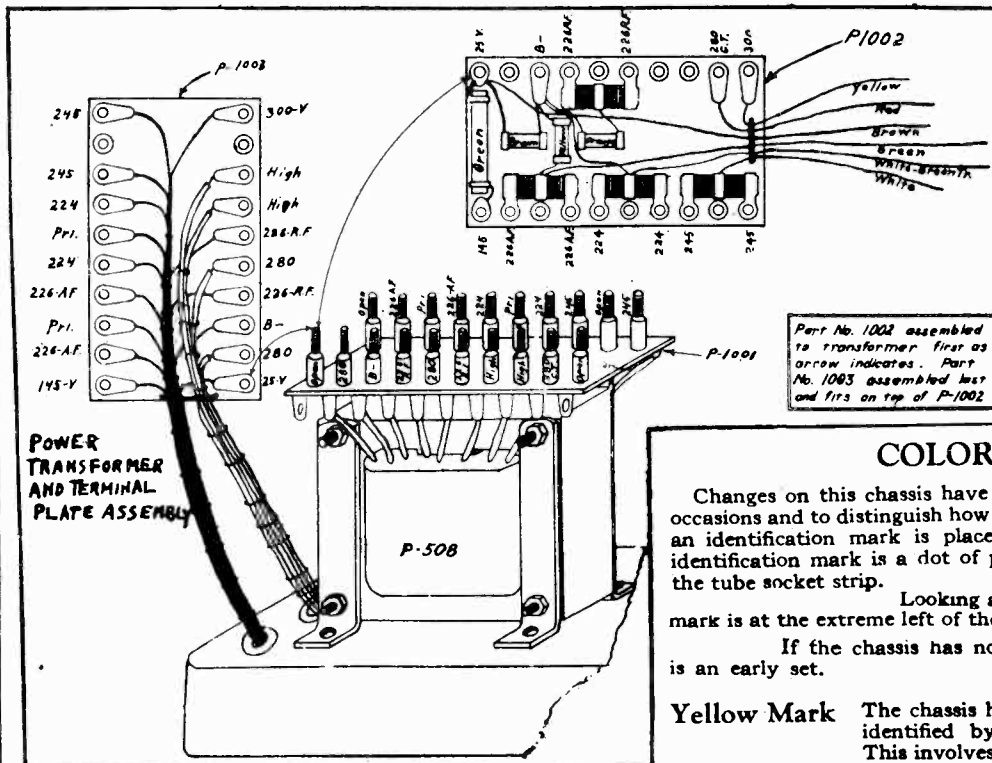
Two electrolytic condensers are used in the filter circuit and care must be taken that these chassis are always kept in an upright position to prevent any small amount of electrolytic leakage in the filter condensers. It is a good idea to inspect the electrolytic condensers, upon delivery of any sets, and to wipe the top perfectly dry.

25 Cycle Chassis No. 27WX

This chassis uses a 25 cycle power transformer. Otherwise the constants of the circuit are the same.

MODEL 2655, AE-10
Voltage-Data
Two Types

MONTGOMERY-WARD & CO.



COLOR CODE

Changes on this chassis have been made on several different occasions and to distinguish how one chassis differs from another, an identification mark is placed on each one changed. This identification mark is a dot of paint found on the end rivet of the tube socket strip.

Looking at the chassis from the back the mark is at the extreme left of the 226 tube socket

If the chassis has no mark it is understood that it is an early set.

Yellow Mark The chassis having the first changes may be identified by the yellow indicating mark. This involves four changes.

1. A "dual volume control" in place of the single type. The new volume control is made in two sections, with five lugs. The section nearest the chassis, having two lugs, operates exactly the same as the single volume control. The section behind the first, having three lugs, is placed in the first audio circuit to reduce the audio amplification and operates in tandem with the antenna volume control.

2. An interchange of position of the two audio transformers. The re-arrangement of the audio transformers has not altered their connections in the circuit.

3. An addition of a "dual half microfarad condenser" and two carbon resistors in the "B" circuit of the detector and first audio tubes. The 40,000 ohm black resistor with one section of the dual condenser is placed in the detector circuit (224) and the 15,000 ohm blue resistor with the other section of the dual condenser is placed in the first audio circuit (226). You will note that the yellow and blue leads in the cable connecting to the terminal strip have been interchanged.

4. A change in the location of the grounding of No. 1 lug on the condenser block. This lug is now grounded to the condenser case with a short piece of bare wire.

Red Mark All chassis having a red mark on the rivet of the tube socket strip have all of the changes mentioned above and in addition, have a one-tenth microfarad condenser connected from ground to one side of the 110 volt line

A peculiarity that may be experienced by the addition of this condenser is a loud hum on every station tuned in only when the antenna wire coming from the set is connected to ground. This can be eliminated by reversing the plug in the socket. Also be sure your antenna is not grounded, either by some other set being connected to your aerial or through any other means.

Green Mark All Chassis with a green mark on the rivet of the tube socket strip contain the above changes and in addition have a change in the "combination phonograph switch" circuit. This changed circuit makes use of only the audio system of the set for phonograph reproduction, whereas the original circuit included the detector tube

The Phonograph, Radio, On, and Off positions of the switch are the same as in the early sets. To obtain maximum volume and best tone quality a pick-up coupling transformer should be used to match the pick-up used.

OPERATING VOLTAGES

Type of Tube	Position of Tube	TUBE IN TEST SET							
		"A" Volts	"B" Volts	Control Grid ("C") Volts	Screen Volts	Screen Current	Cathode Volts	Normal Ma.	Grid Test Ma.
226	1st R.F.	1.35	116	8.5				4.7	8.7
226	2nd R.F.	1.35	116	8.5				4.7	8.7
226	3rd R.F.	1.35	116	8.5				4.7	8.7
226	4th R.F.	1.35	116	8.5				4.7	8.7
224	Det.	2.2	80	1.3	15				
226	1st A.F.	1.4	110	1.0				4.0	5.0
245	2nd A.F.	2.2	232	42				27	32
245	2nd A.F.	2.2	232	42				27	32
280	Rect.	4.6						84	

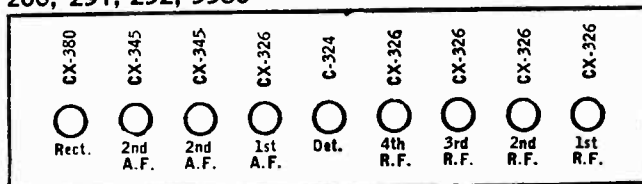
Line Voltage During Test—115 Volts

REVISION OF OPERATING VOLTAGES

Type of Tube	Position of Tube	TUBE IN TEST SET							
		"A" Volts	"B" Volts	Control Grid ("C") Volts	Screen Volts	Screen Current	Cathode Volts	Normal Ma.	Grid Test Ma.
224	Det.	2.2	75	1.3	15				
226	1st A.F.	1.4	77	1.0				4	5

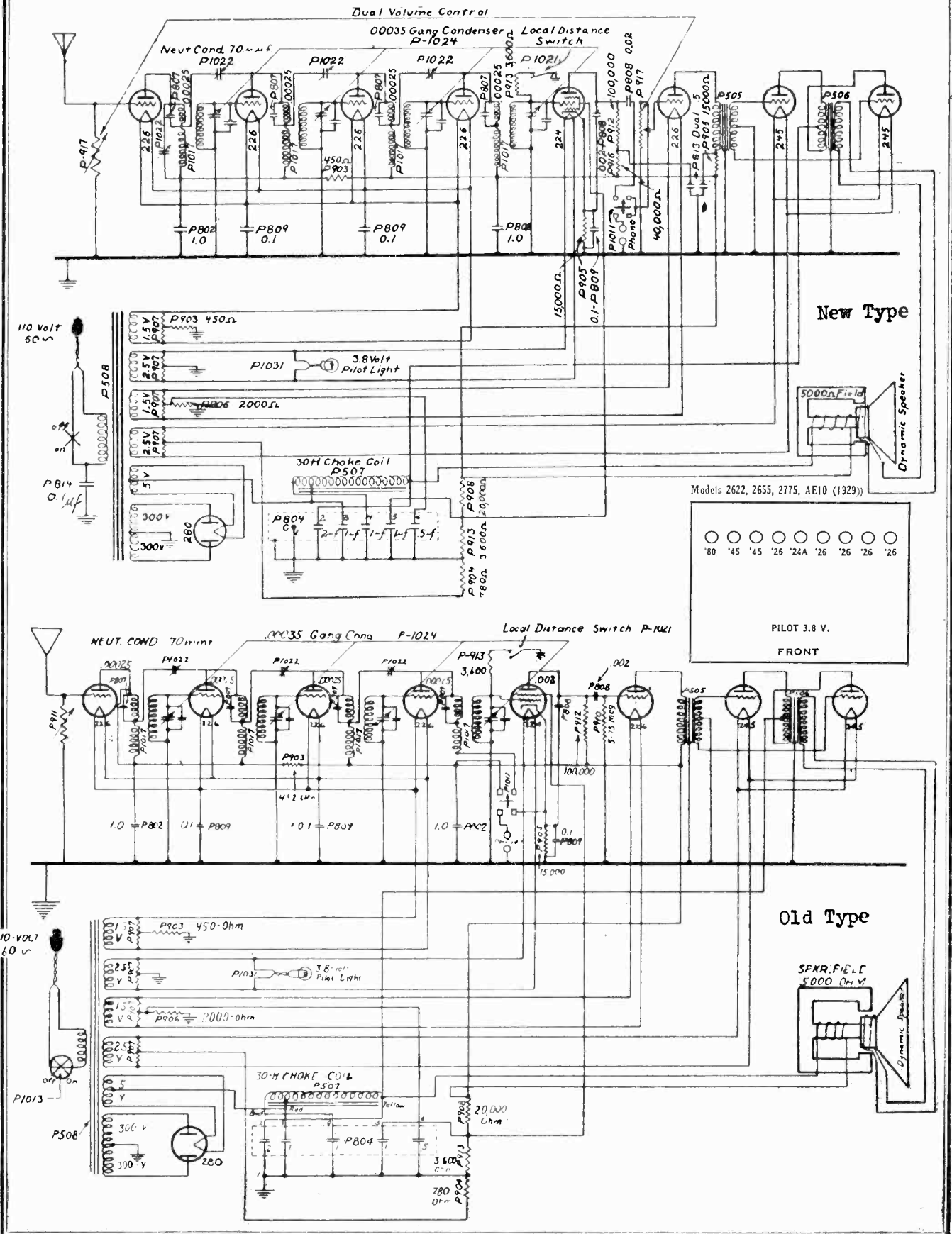
200, 291, 292, 9950

(A.C.)



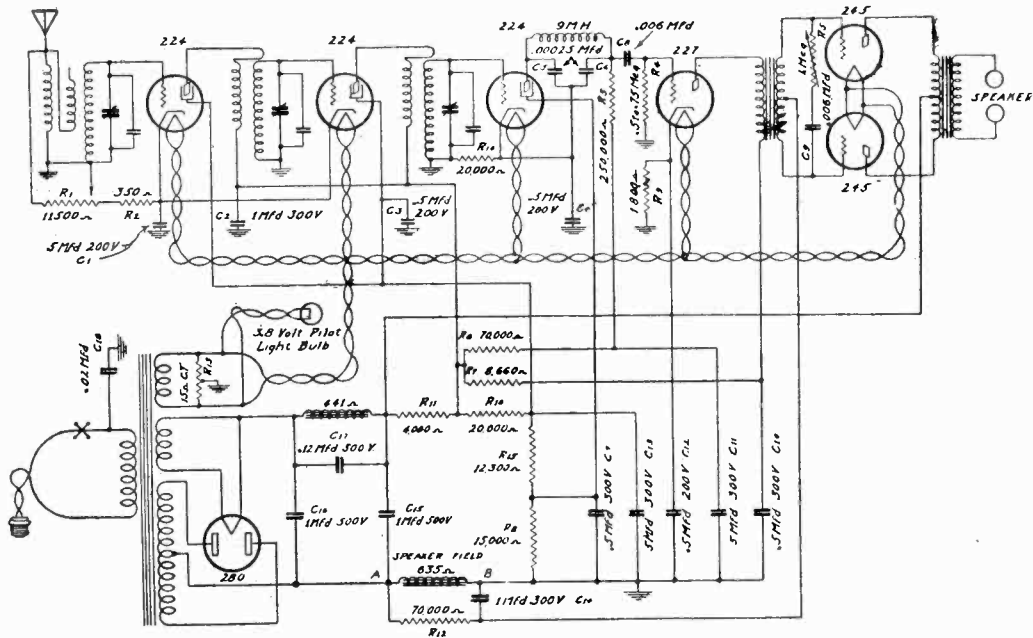
MONTGOMERY-WARD & CO.

MODEL 2655, AE-10
Schematic
1st & 2nd Types

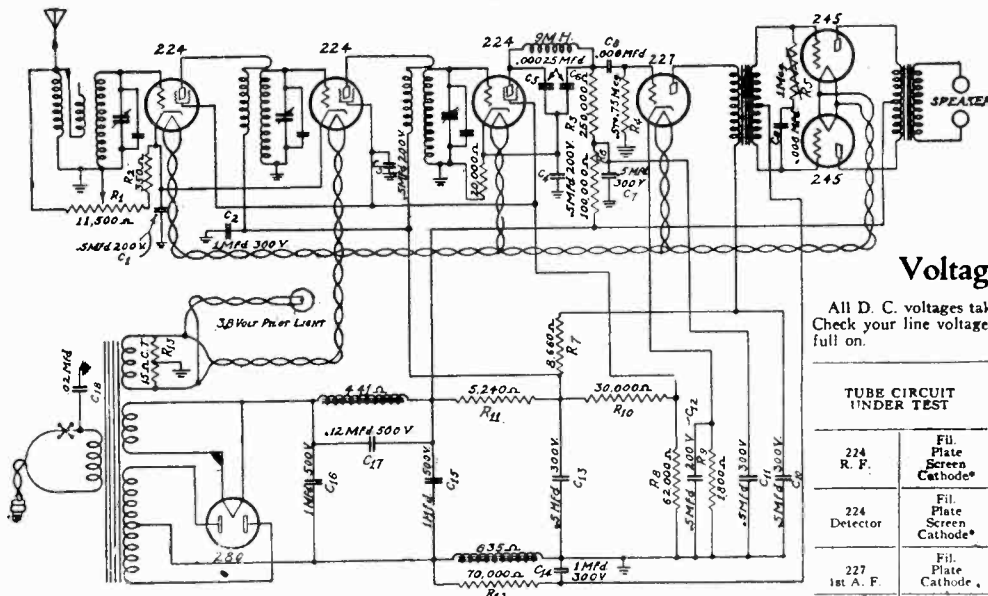


MONTGOMERY-WARD & CO.

MODEL 11,000
Challenger
Schematic
Two Types



Schematic Diagram of Challengers with Serial Number Above A94313.



Schematic Diagram of Challengers with Serial Number Below A94313.

Voltage Characteristics

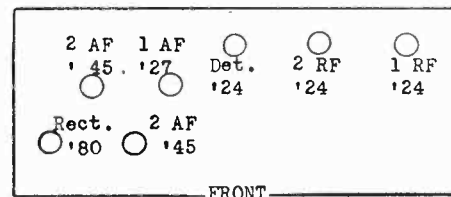
All D. C. voltages taken with a 1,000 ohm per volt voltmeter. Check your line voltage before taking readings. Volume control full on.

TUBE CIRCUIT UNDER TEST	LINE VOLTAGE					
	90 V.	100 V.	110 V.	120 V.	130 V.	
224 R. F.	1.75	1.95	2.17	2.3	2.57	
	130	150	109	183	193	
	68	78	80	94	100	
224 Detector	2.0	2.43	2.83	3.2	3.6	
	1.77	1.97	2.19	2.33	2.6	
	35	40.8	45.5	50.5	55	
227 1st A. F.	37.5	43	48	52	56.8	
	2.55	3.1	3.65	4.2	4.8	
	1.79	1.99	2.22	2.34	2.62	
245 2nd A. F.	95	108	118	122	138	
	5.7	6.7	7.5	8.4	9.3	
	1.8	2.0	2.23	2.35	2.62	
280 Rect.	180	210	231	255	280	
	-35	-42.3	-49	-55	-62	
	3.66	4.1	4.55	4.8	5.35	
		54 ma	64 ma	73 ma	82 ma	90 ma

* Control grid voltages on the 224 tubes are measured from cathode to ground.

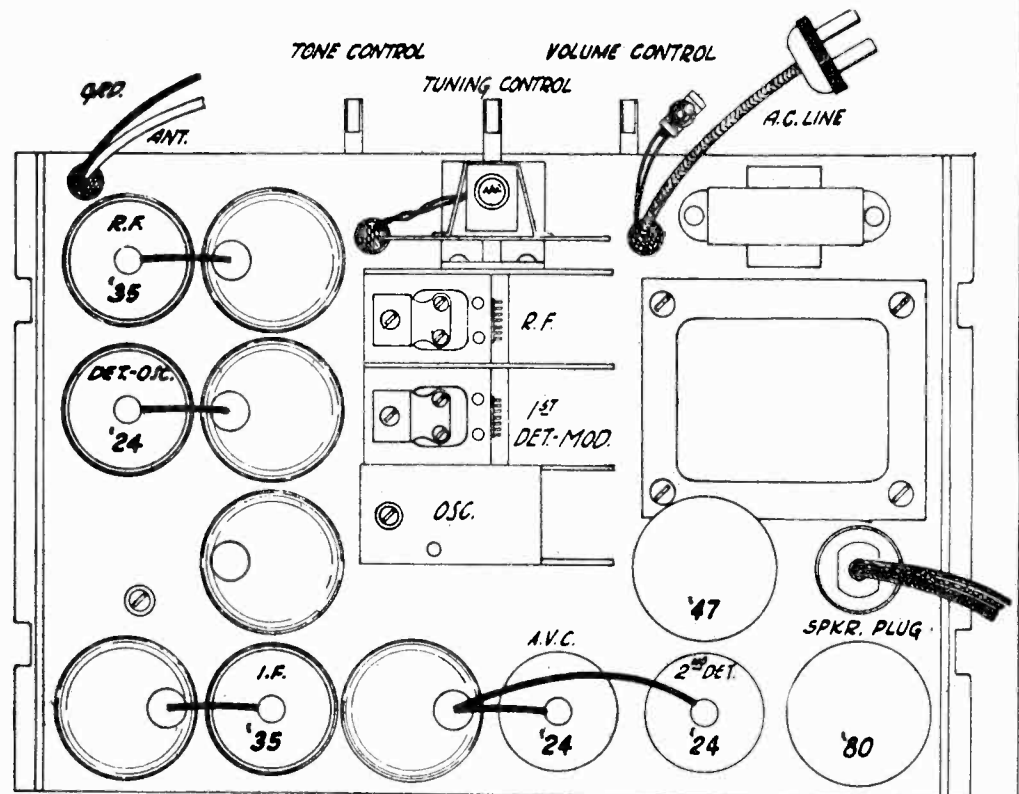
R.F. Coils

The antenna coil in particular is a departure from the usual performance of antenna stages in other receivers. With the usual commercial type of antenna circuit, a short antenna will detune the antenna stage and reduce the sensitivity of the set accordingly. The antenna stage in this set is so constructed that it will not be affected by short or long antennas to any appreciable extent. The R.F. coils in each stage are marked with a color, according to the group in which they fall, and three coils of the same color are placed in the chassis. This color marking is a streak of paint inside the secondary coil inside the lugs. In ordering coils for replacement, be sure to mention the color of the paint on the coil so that the replacements will be of the same characteristics. If in doubt, return the coils.



FRONT

MONTGOMERY-WARD & CO.

MODEL 62-20, 62-26
(62-25)Chassis
Data

Top View of Chassis.

273-J

I. F. and Oscillator Units

The primary and secondary of both intermediate transformers are tuned with adjustable condensers which remain fixed after the transformers have been tuned to exactly 175 kilocycles.

The oscillator 600 K.C. tracking condenser is mounted directly in front of the oscillator coil shield on the right rear corner of the chassis base.

Holes in the chassis base allow the tuning condensers for the intermediate transformers to be adjusted with a screw-driver from the under side of the chassis.

Power-Supply,

The 25 and 60 cycle power transformers are designed for operation on any 95 to 130 volt A.C. supply without adjustment and without overloading.

The 25 cycle chassis has a special power transformer and has two 8 mfd. 450 volt dry electrolytic condensers, in parallel, instead of the one condenser, C14, shown in the schematic diagram. An 8 mfd. 450 volt wet electrolytic condenser is mounted on top of the chassis base and this condenser replaces the condenser, C17, shown in the diagram. The 25 cycle chassis differs in no other way from the 60 cycle chassis.

Replacing Rubber Drive

You will note that the Vernier tuning drive on this chassis uses a rubber pinion. Under normal operating conditions this rubber will last for a number of years. Should it become worn it can be readily replaced by loosening the set screw of the brass bushing located next to the rubber pinion and pulling out the station selector shaft. Place a new bushing in position, slip the station selector shaft in place and tighten the set screw.

Automatic Volume Control (A.V.C.)

The action of the automatic volume control tube controls the grid bias on the R.F. and I.F. tubes and consequently the amplification of those tubes. The primary of the 2nd I.F. transformer has a tertiary winding which is connected in series in the A.V.C. tube grid circuit.

A signal of sufficient strength reaching the second detector, applies a voltage on the grid of the A.V.C. tube and the voltage thus applied depends upon the signal strength.

The plate of the A.V.C. tube will draw current when the grid voltage of the tube rises in potential and the drop in plate current is applied to the grids of the R.F. and I.F. tubes through their grid returns to the A.V.C. tube plate. This results in a control of the amplification of these tubes and a practically constant receiver output.

The manual volume control adjusts the negative biasing on the control grid of the A.V.C. tube, regulating in this manner the level of the input to the second detector at which the A.V.C. action commences. Thus the manual volume control behaves virtually as an output level control.

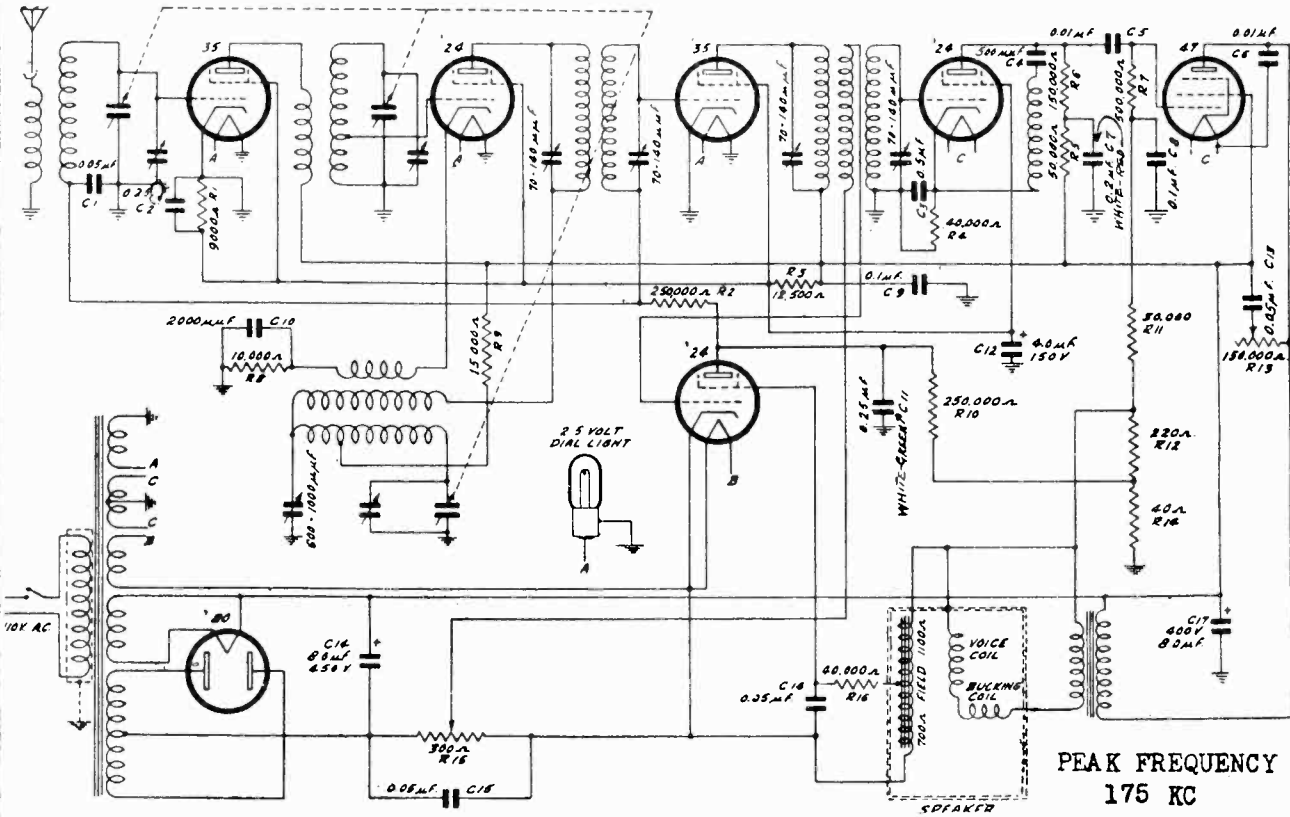
If the A.V.C. tube is defective or removed from its socket, there will be no control of the volume. Similarly, if the A.V.C. tube grid circuit is open, the plate of the tube applies a high grid bias on the R.F. and I.F. tube grids and practically no amplification is obtained from these tubes and consequently no receiver output.

A signal which is too weak to affect the A.V.C. tube grid voltage will not, of course, produce any change in plate current and the maximum amplification of the R.F. and I.F. tubes will be obtained, depending upon their grid bias as set by the A.V.C. tube plate.

MODEL 62-20,62-26X
(62-25)

MONTGOMERY-WARD & CO.

Schematic
Voltage



PEAK FREQUENCY
175 KC

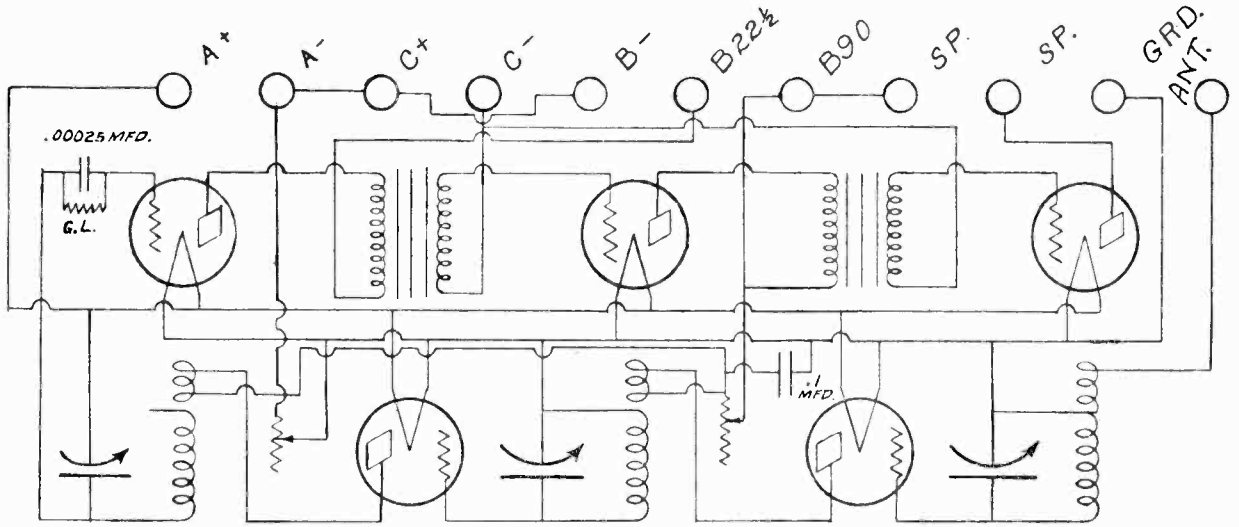
TUBE	CIRCUIT	LINE VOLTAGE				
		90 V.	100 V.	110 V.	120 V.	130 V.
R. F. '35	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
Det.-Modulator '24	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
I. F. '35	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
2nd Detector '24	Screen-Grid	70	78	85	92	100
	Plate	154	171	187	204	221
Audio '47	Accelerating Grid	199	221	244	267	289
	Plate	181	200	220	240	260
A. V. C. '24	Grid	12.3	13.7	15.1	16.5	17.8
	Screen-Grid	34.5	38.5	42	46	50
Rectifier '80	Plate to Plate	308	342	376	410	445
	Current (both plates)	52.3 MA	58.1 MA	64 MA	69.7 MA	75.5 MA

TURN THE VOLUME CONTROL ALL THE WAY ON, CONNECT THE ANTENNA AND GROUND LEADS TOGETHER AND TURN THE GANG CONDENSER PLATES ALL THE WAY OUT. CHECK THE LINE VOLTAGE.

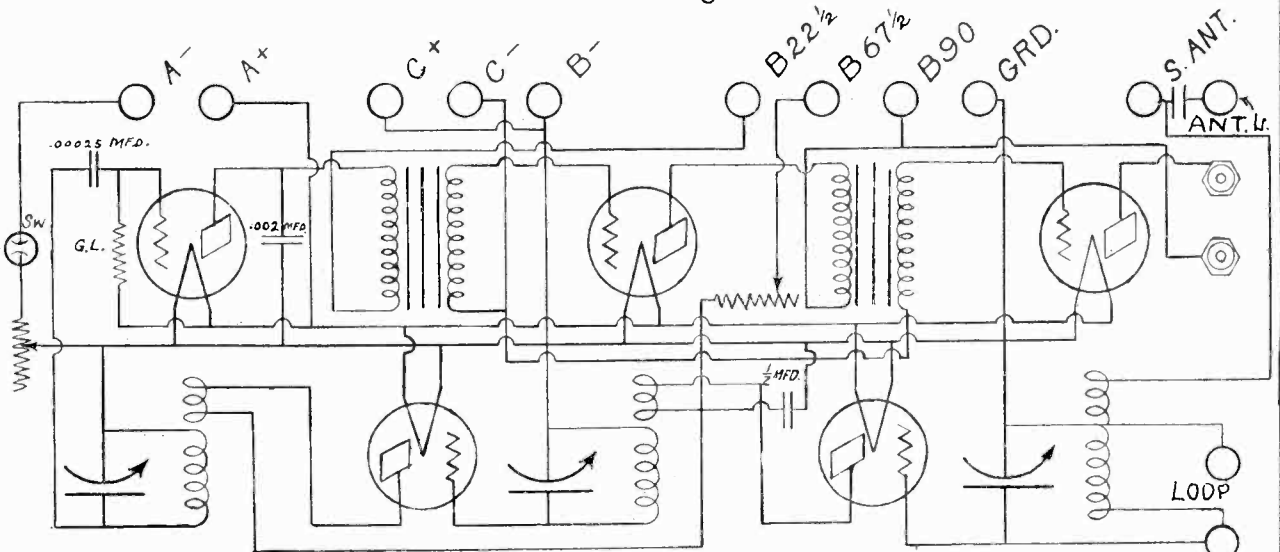
The voltages shown are measured to the cathode of the heater type tubes and to filament of the '47 Pentode.

OZARKA, INC.

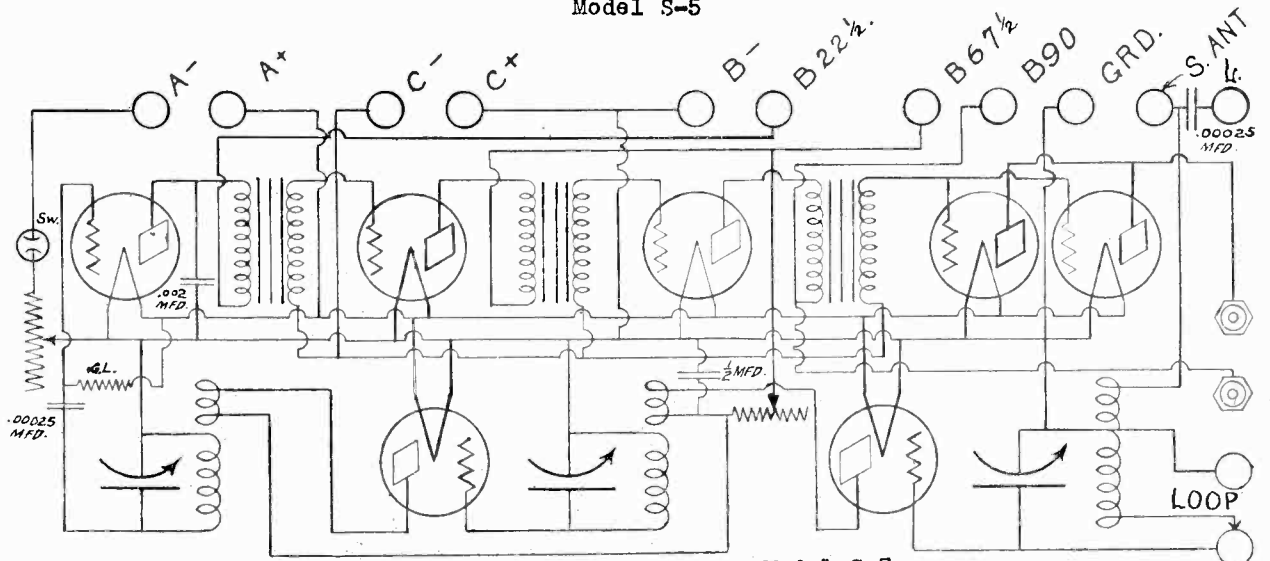
MODEL Viking 5-A
MODEL S-5
MODEL S-7



Model Viking 5-A



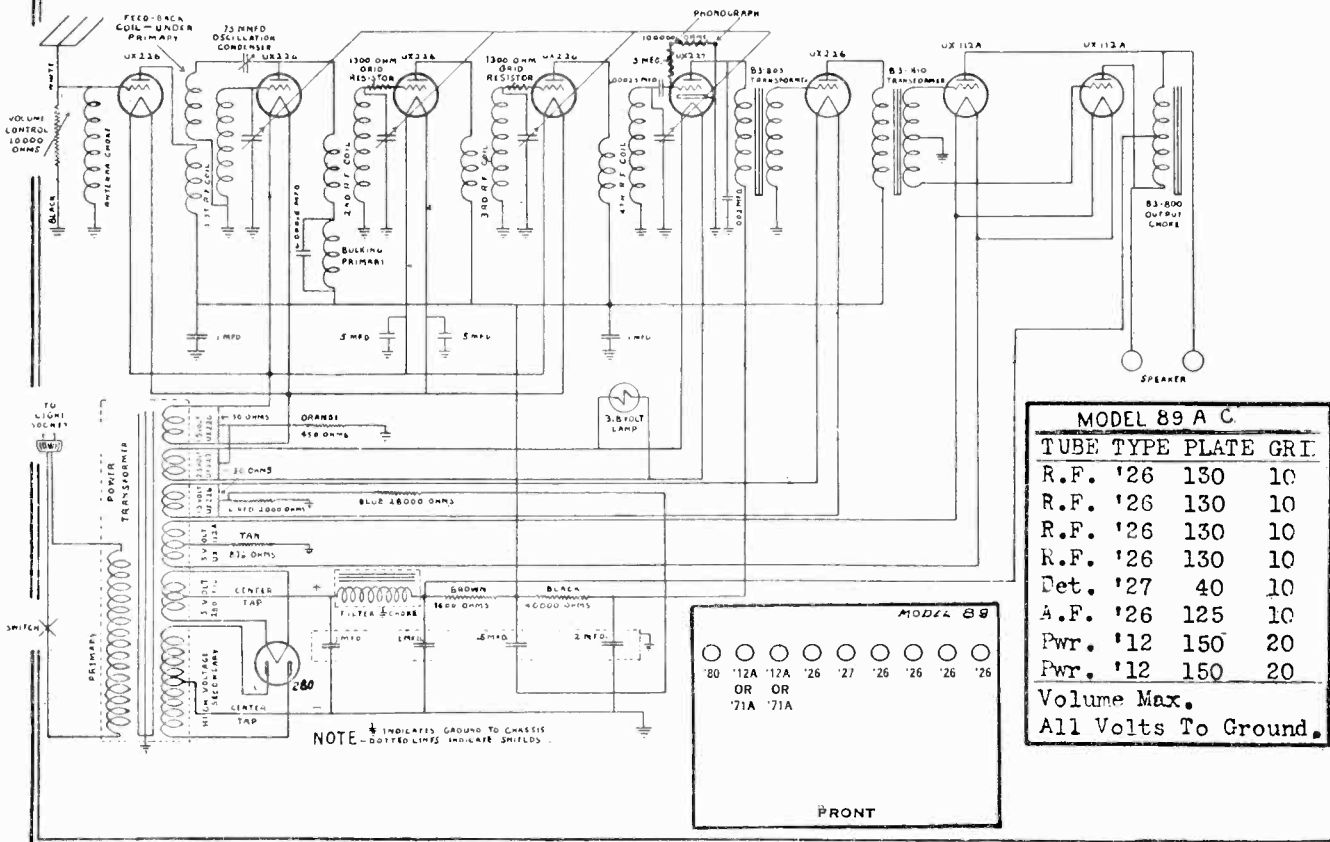
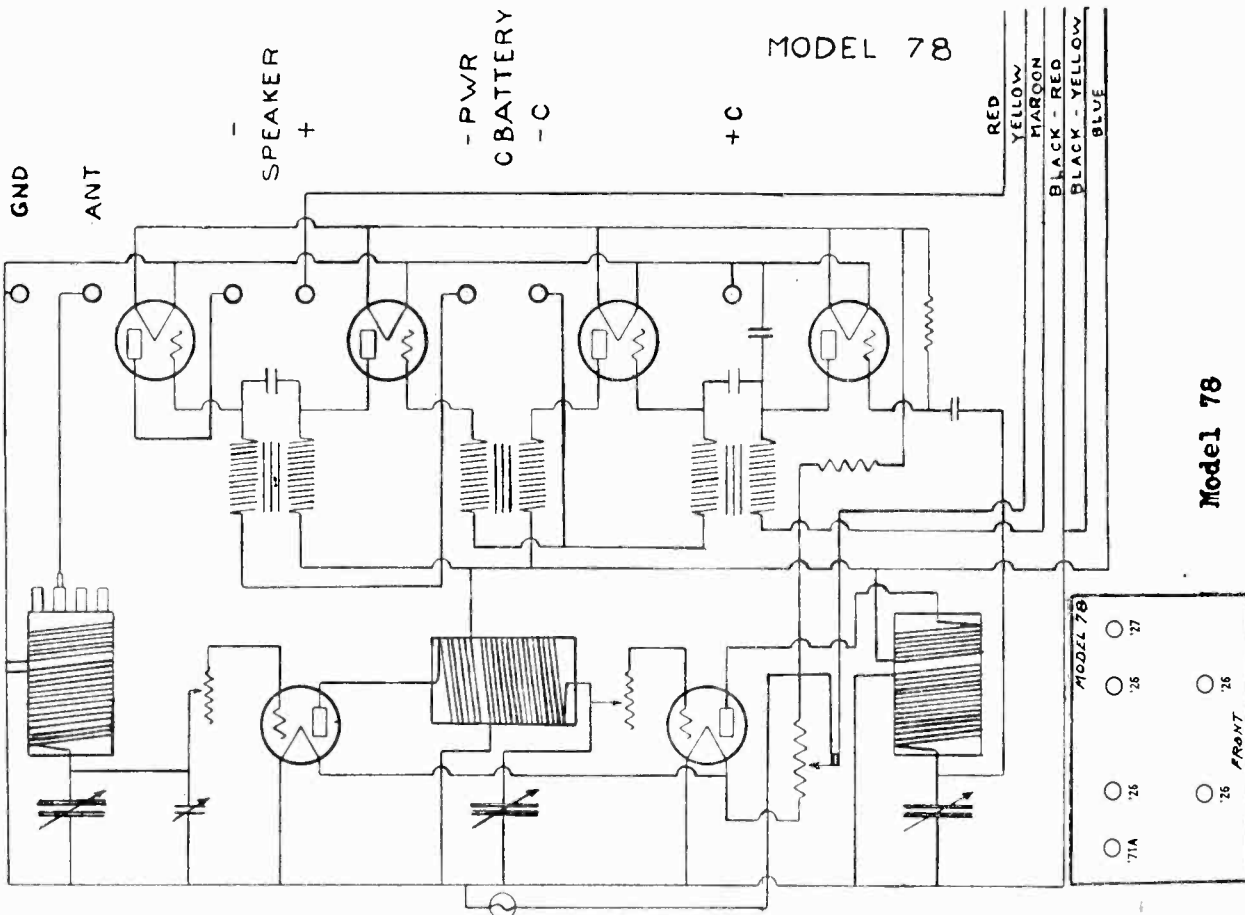
Model S-5



Model S-7

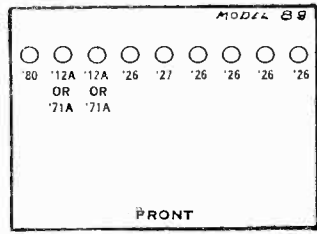
MODEL 78 Battery
MODEL 89 AC

OZARKA, INC.



MODEL 89 A C		
TUBE	TYPE	PLATE GRI.
R.F.	'26	130 10
R.F.	'26	130 10
R.F.	'26	130 10
R.F.	'26	130 10
Det.	'27	40 10
A.F.	'26	125 10
Pwr.	'12	150 20
Pwr.	'12	150 20

Volume Max.
All Volts To Ground.

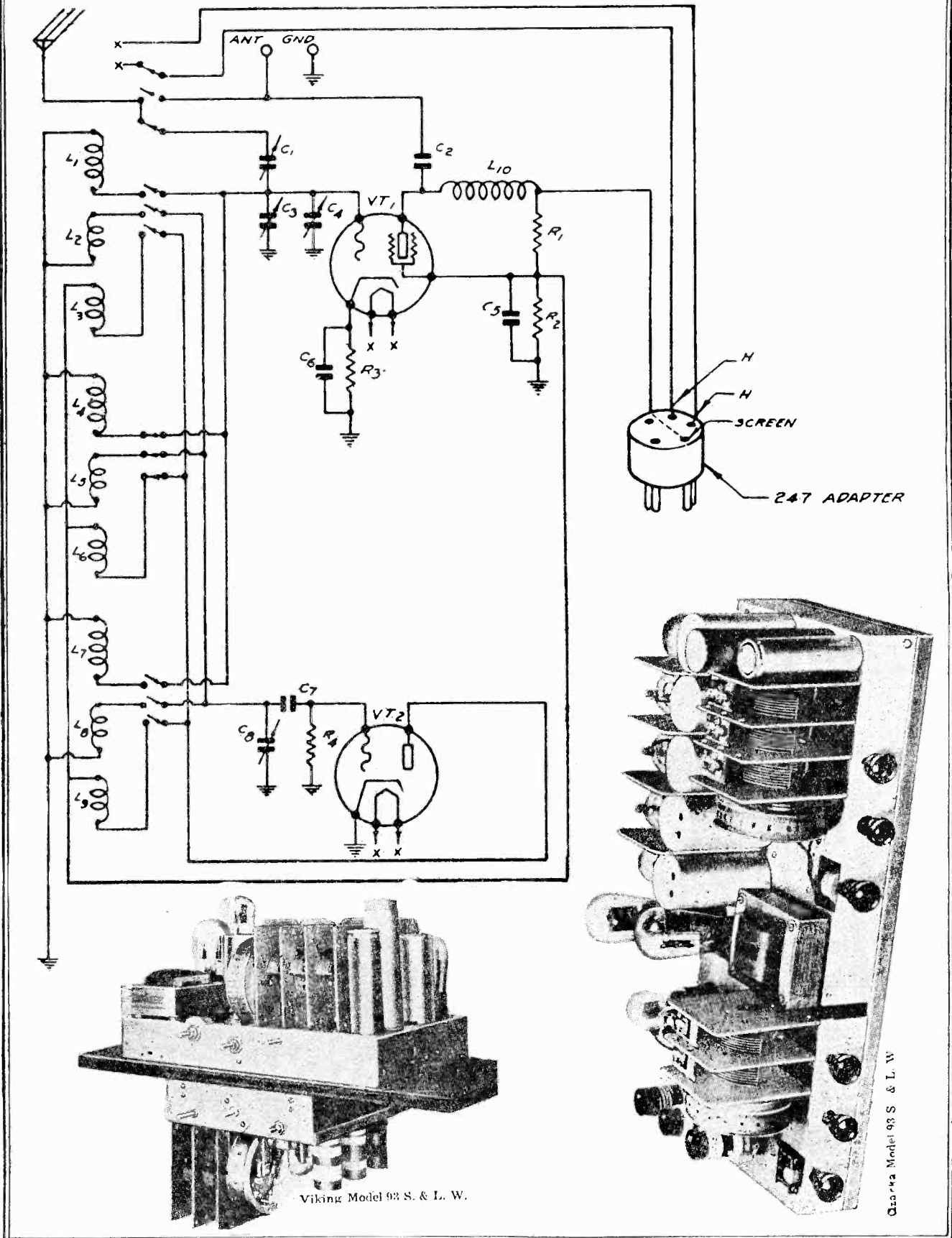


NOTE: † INDICATES GROUND TO CHASSIS
- DOTTED LINES INDICATE SHIELDS.

FRONT

OZARKA, INC.

MODEL Short-Wave Converter
Schematic, Chassis Views

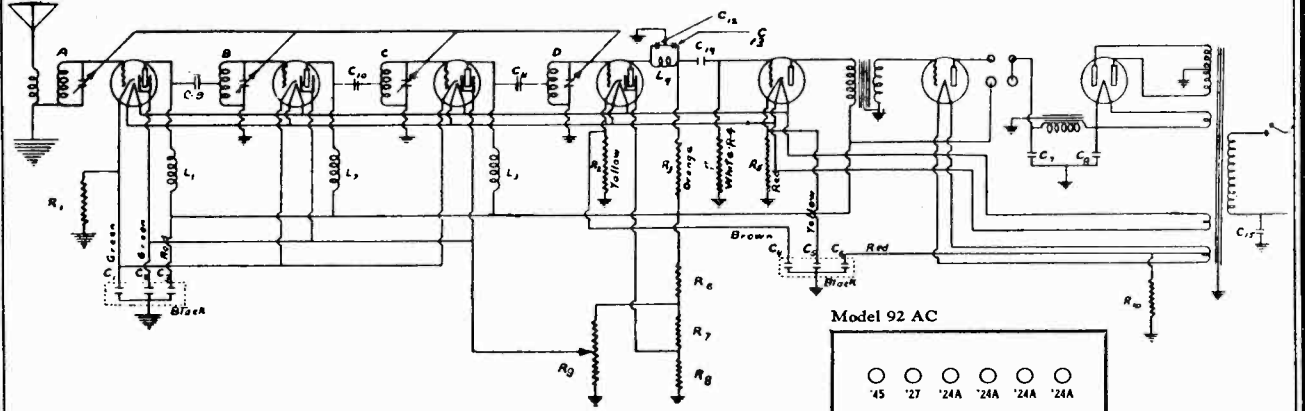


Viking Model 93 S. & L. W.

Ozarka Model 93 S. & L. W.

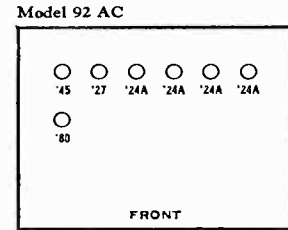
OZARKA, INC.

MODEL Viking 92 AC
Schematic, Chassis
Voltage



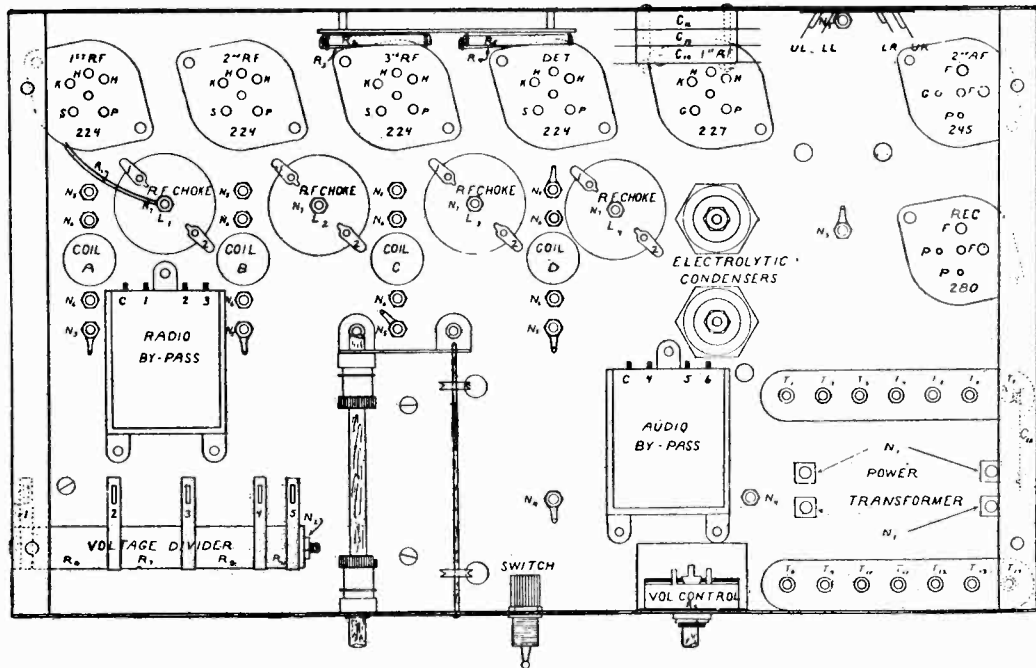
C1	.25	Mf.	RF Bypass
C2	.25	"	"
C3	1.0	"	"
C4	.25	"	AF
C5	.1	"	"
C6	.5	"	"
C7	8.0	"	"
C8	8.0	"	"
C9	.0001	"	"
C10	.0001	"	"
C11	.0001	"	"
C12	.001	"	"
C13	.001	"	"
C14	.005	"	"
C15	.005	"	"

R1	225	Ohms
R2	40,000	"
R3	350,000	"
R4	1,000,000	"
R5	2,000	"
R6	5,000	"
R7	5,000	"
R8	5,000	"
R9	10,000	"
R10	1,600	"



Tube Type	Plate	S.Grid	Cath.
R.F. '24	150	70	2
R.F. '24	150	70	2
R.F. '24	150	70	2.5
Det. '24	50	35	8
A.F. '27	140	--	50(Grid)
Pwr. '45	270	--	
Rect. '80			

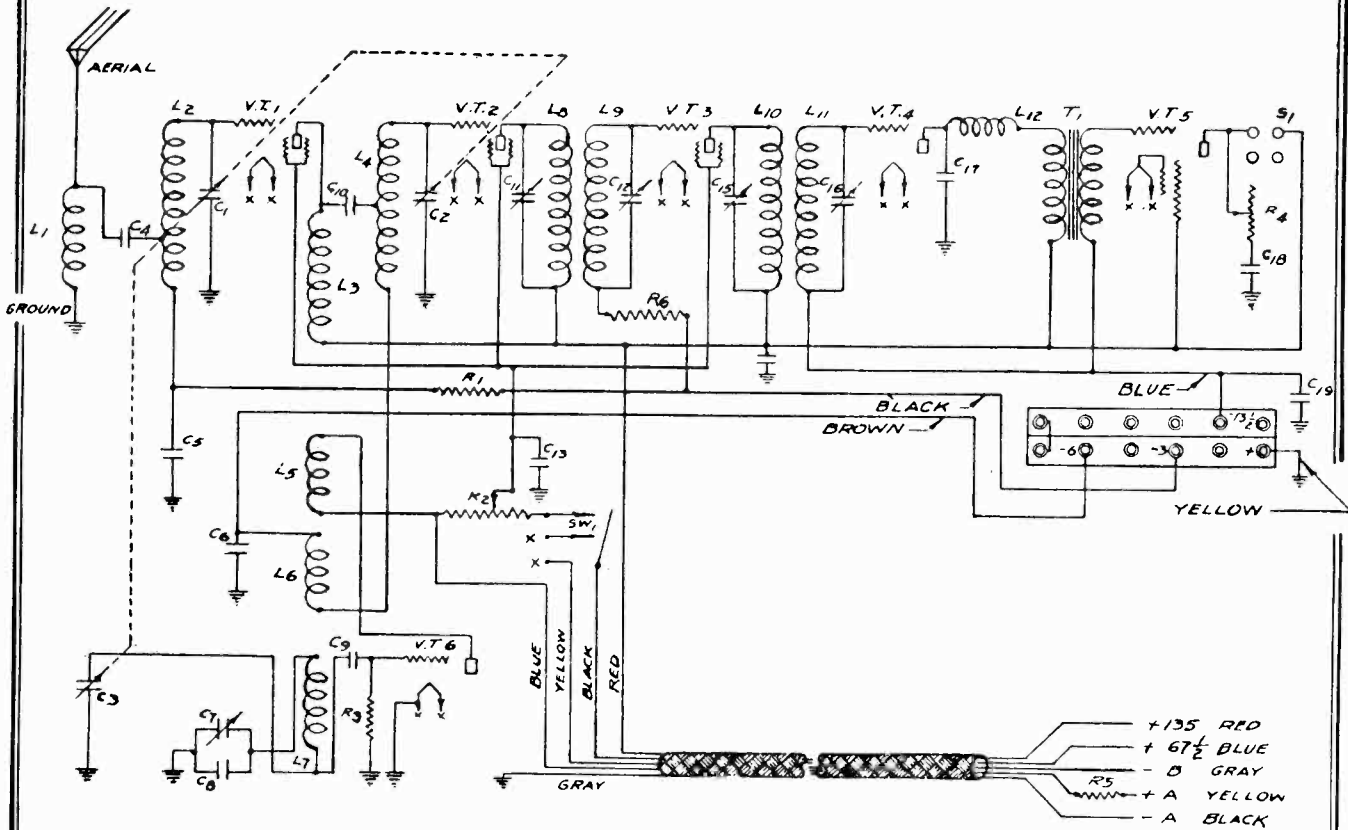
Volume MAX. Voltages to ground.



OZARKA, INC.

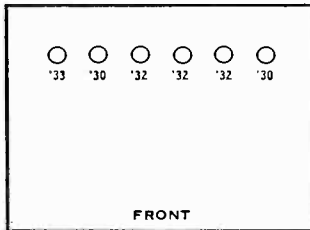
MODEL 93 Battery
Superheterodyne

MODEL 93 SUPERHETERODYNE (Battery)



IF PEAK 175 KC.

Model 93 Battery



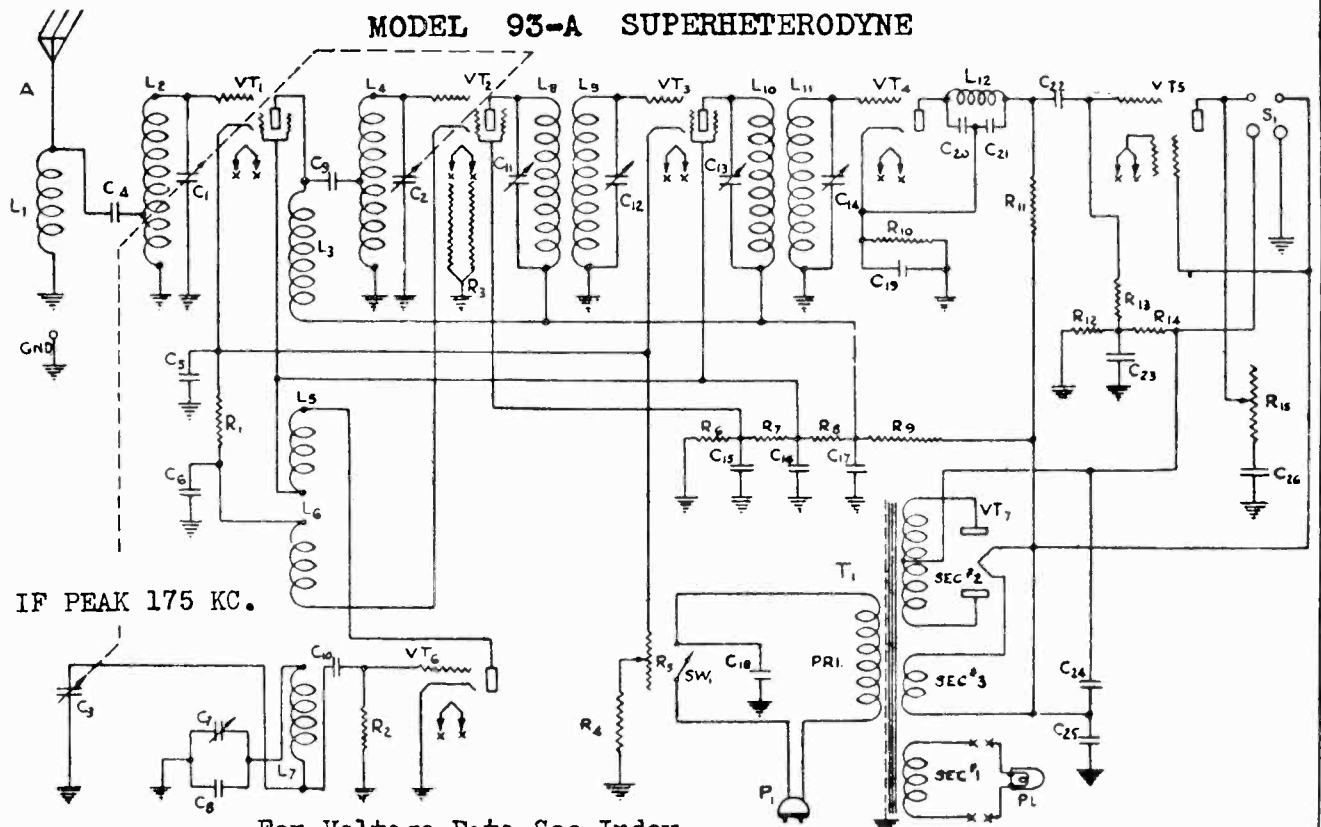
MODEL 93-A				
Tube	Type	Plate	S.Grid	Cath.
Osc.	'27	80	--	--
R.F.	'35	155	80	1.5
Det.	'35	155	40	2.
I.F.	'35	155	80	1.5
Det.	'27	125	--	13.
Pwr.	'47	182	200	
Rect.	'80			

Volume Max. Volts To Ground.
Diagram on page 458-B-7

MODEL 93-A

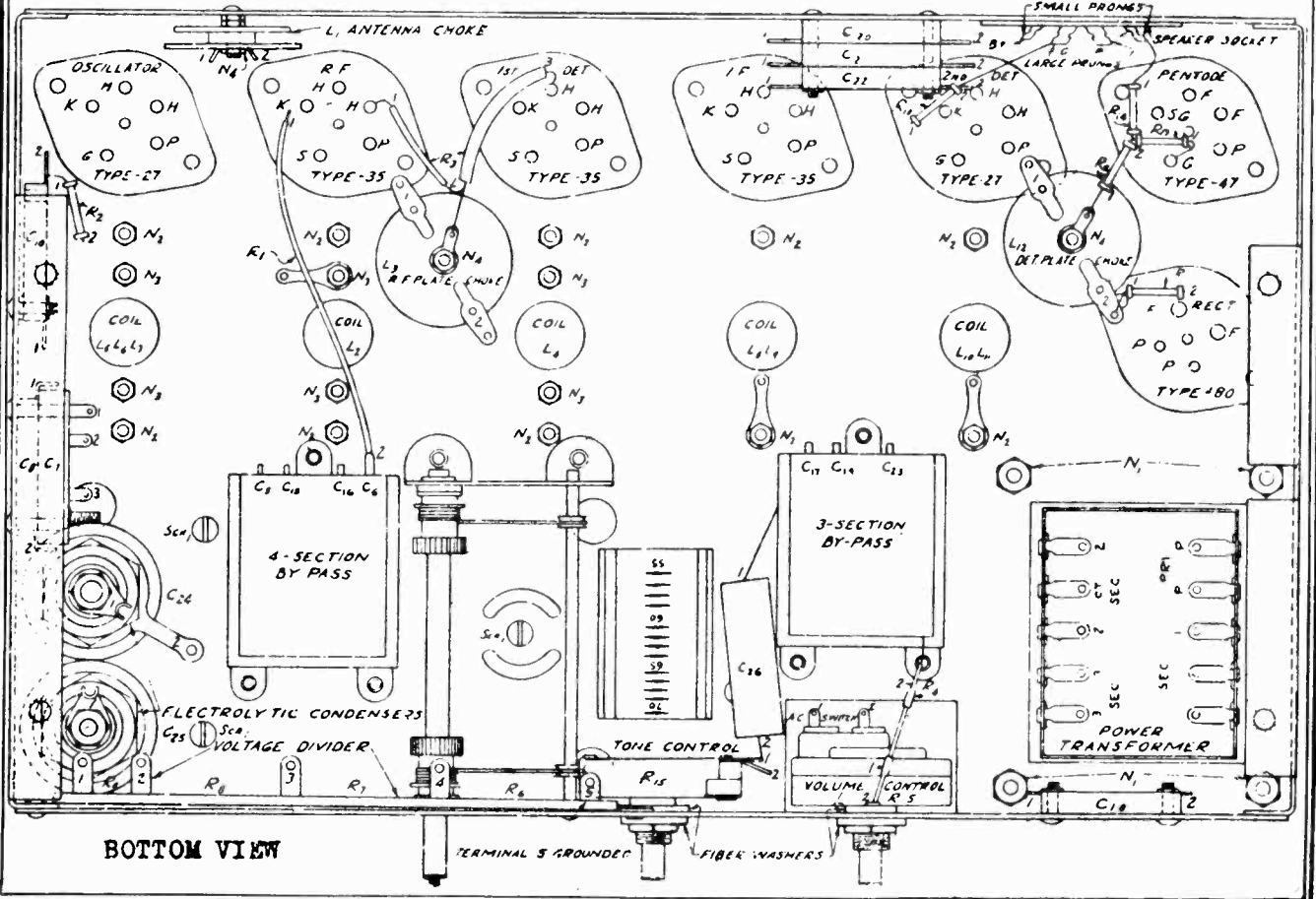
OZARKA, INC.

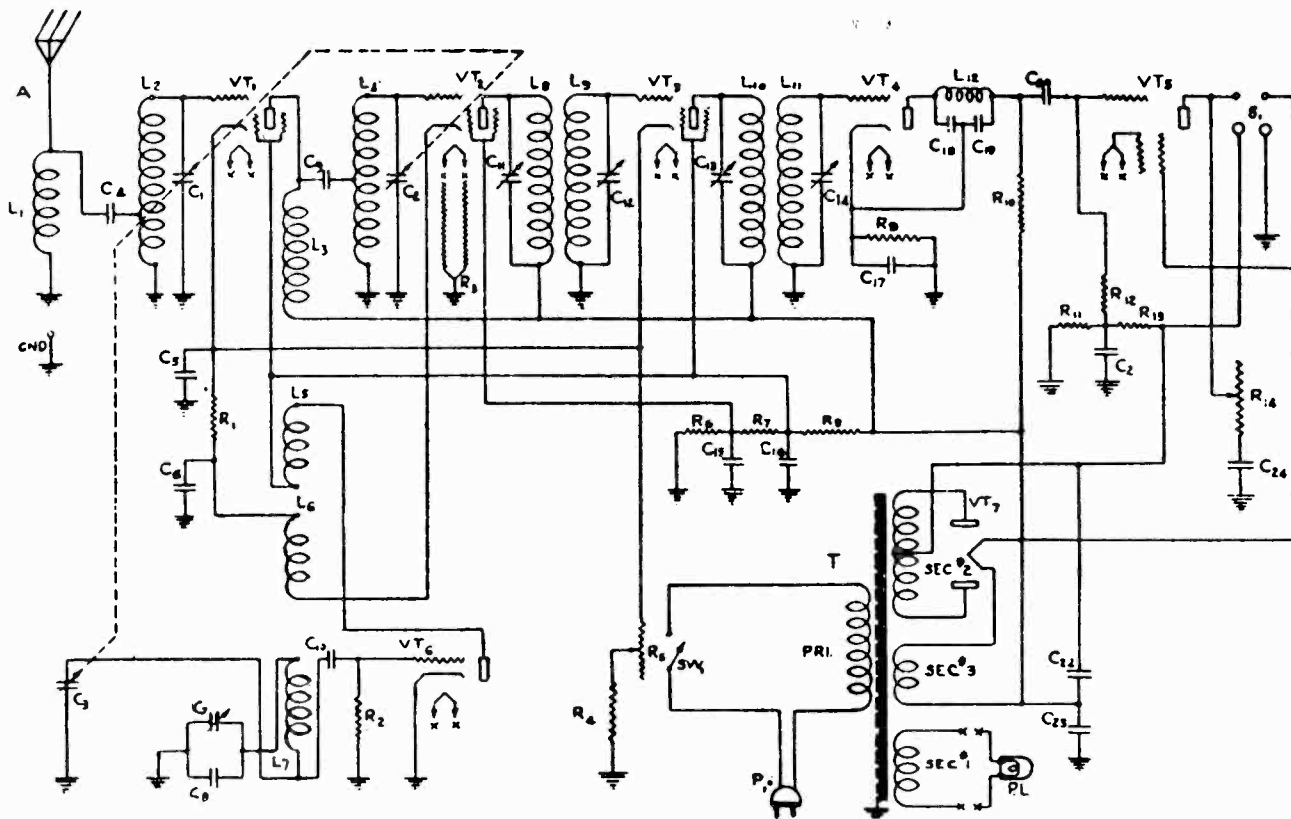
MODEL 93-A SUPERHETERODYNE



IF PEAK 175 KC.

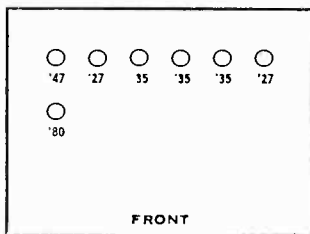
For Voltage Data See Index





IF PEAK 175 KC.

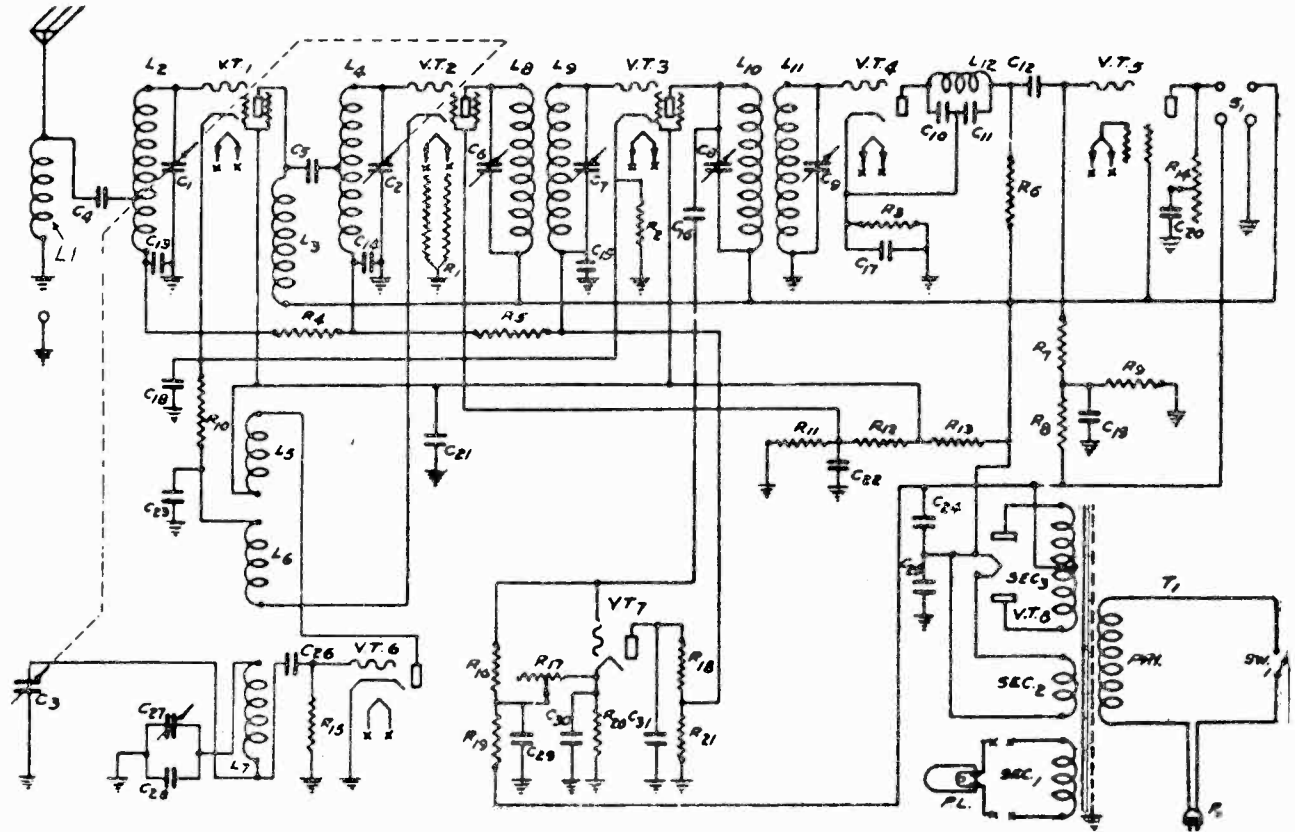
Models 93A, 93B



MODEL 93-B				
Tube	Type	Plate	S.Grid	Cath.
Osc.	'27	80	--	--
R.F.	'35	190	85	1.5
Det.	'35	190	45	2.
I.F.	'35	190	85	1.5
Det.	'27	125	--	12.
Pwr.	'47	175	190	
Rect.	'80			
Vol.-Max.				Volts To Ground.

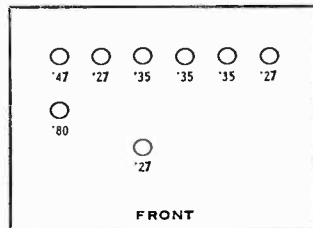
MODEL 94-AVC

OZARKA, INC.



IF PEAK 175 KC.

Model 94A, 94B (A.V.C.)



MODEL 94				
Tube	Type	Plate	S.Grid	Cath.
Osc.	'27	80	--	
R.F.	'35	190	85	1.5
Det.	'35	190	45	2.
I.F.	'35	190	85	1.5
Det.	'27	125	--	12.
Pwr.	'47	175	190	--
A.V.C.	'27			10.
Rect.	'80			
Volume Max.				Volts To Ground.