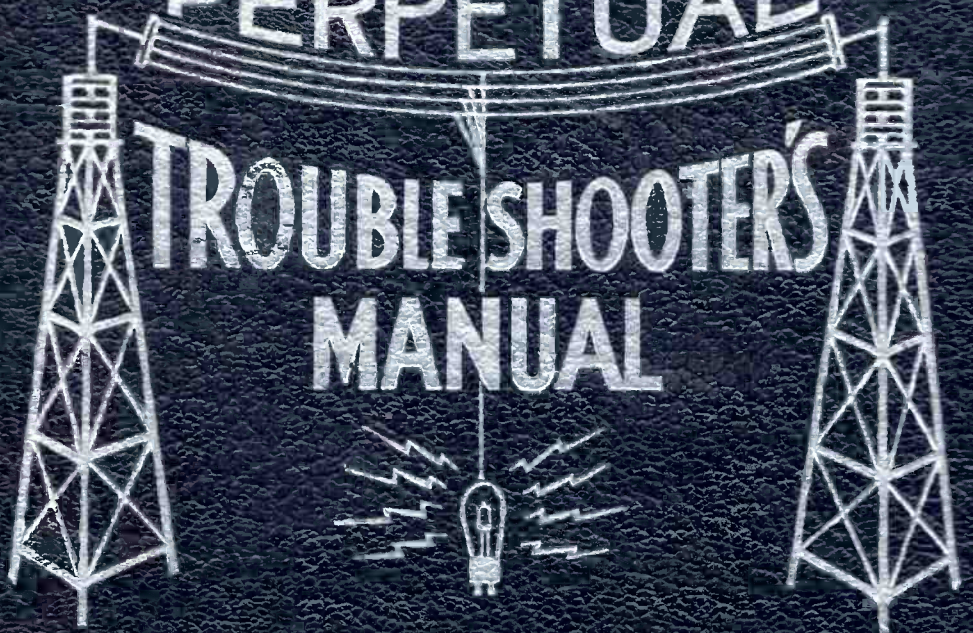
VOLUME III

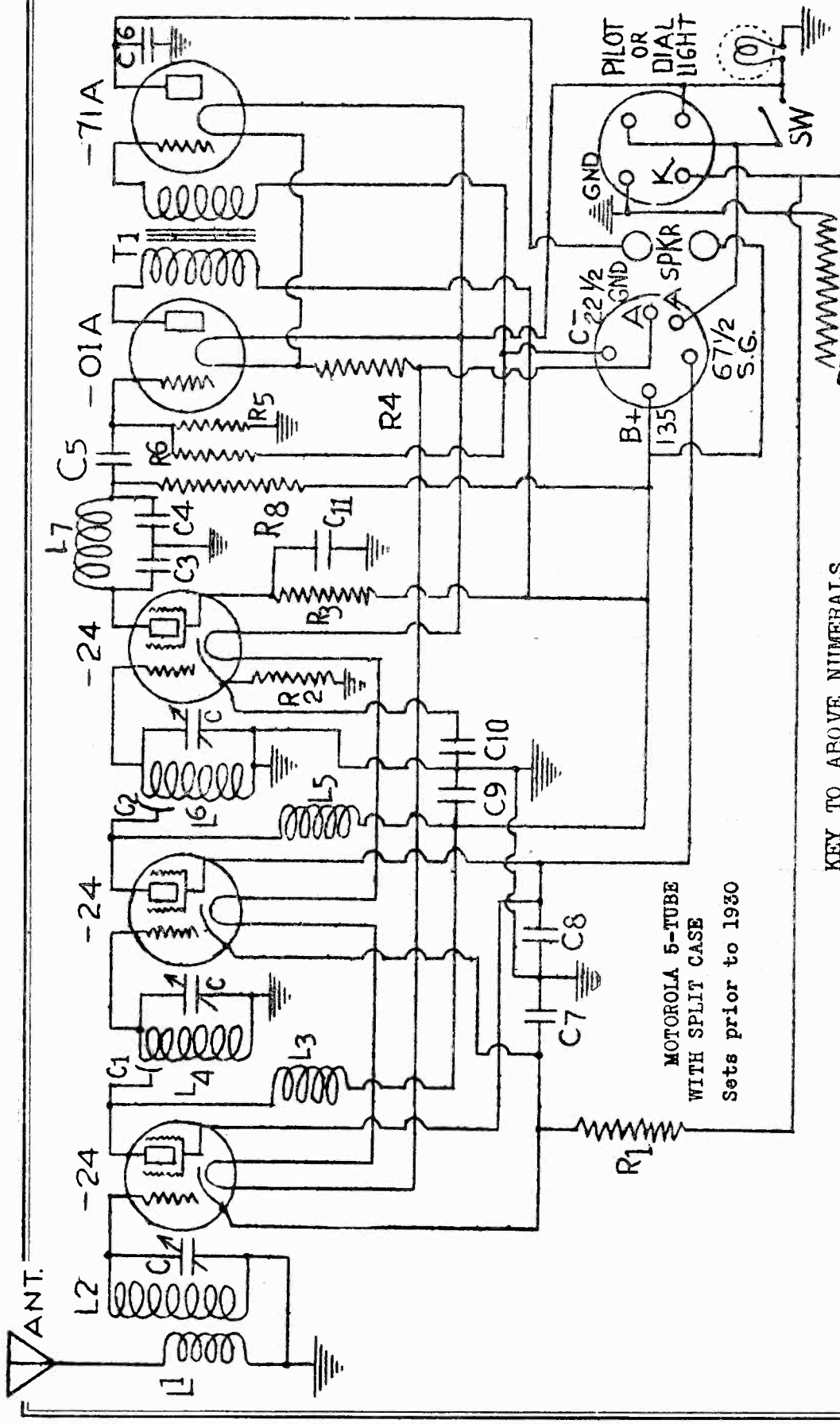
PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

GALVIN MFG. CO.

MODEL Motorola
5 Tube, Split Case



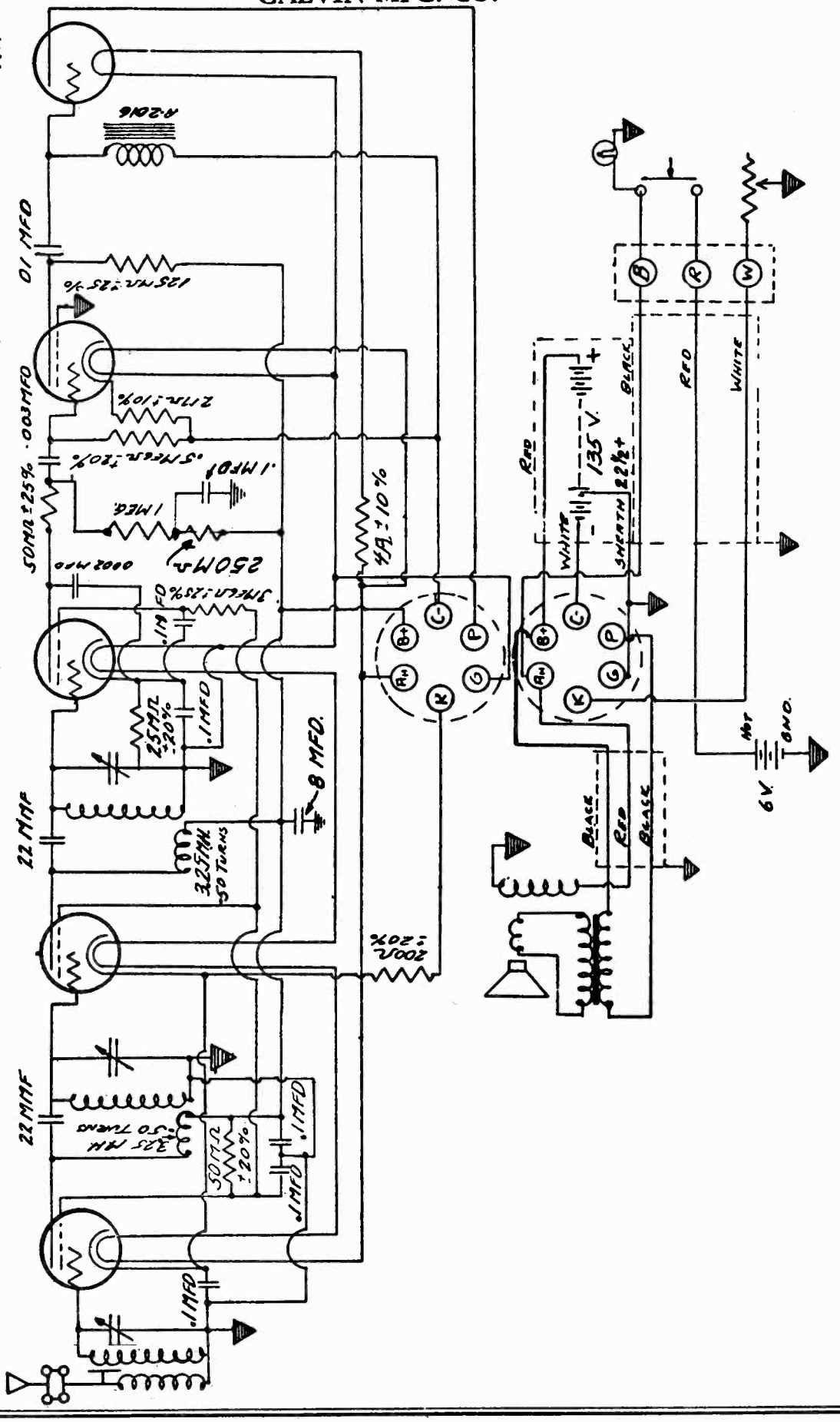
KEY TO ABOVE NUMERALS

L1 - Antenna primary
L2, L4, L6 - R.F. secondarys
L3, L5 - R.F. plate chokes
L7 - Detector plate choke
C, C1, C2 - Main tuning condensers
C1, C2 - R.F.coupling condenser. Cap. 9.6 microfarads
C3, C4 - 0001 mfd. condensers
C5, C6, C11 - .003 mfd.condensers
C7, C8, C9, C10 - .25 mfd.by pass condensers
R1 - 200 (Gray resistor
R2 - 25,000 (Black) resistor
R3, R6 - 3 meg (Blue or Pink) resistor
R4 - 2 wire wound resistor
R5, R8 - 1 meg (Lavender) resistor
R7 - 300.000 Volume control

MODEL Motorola
5T-71

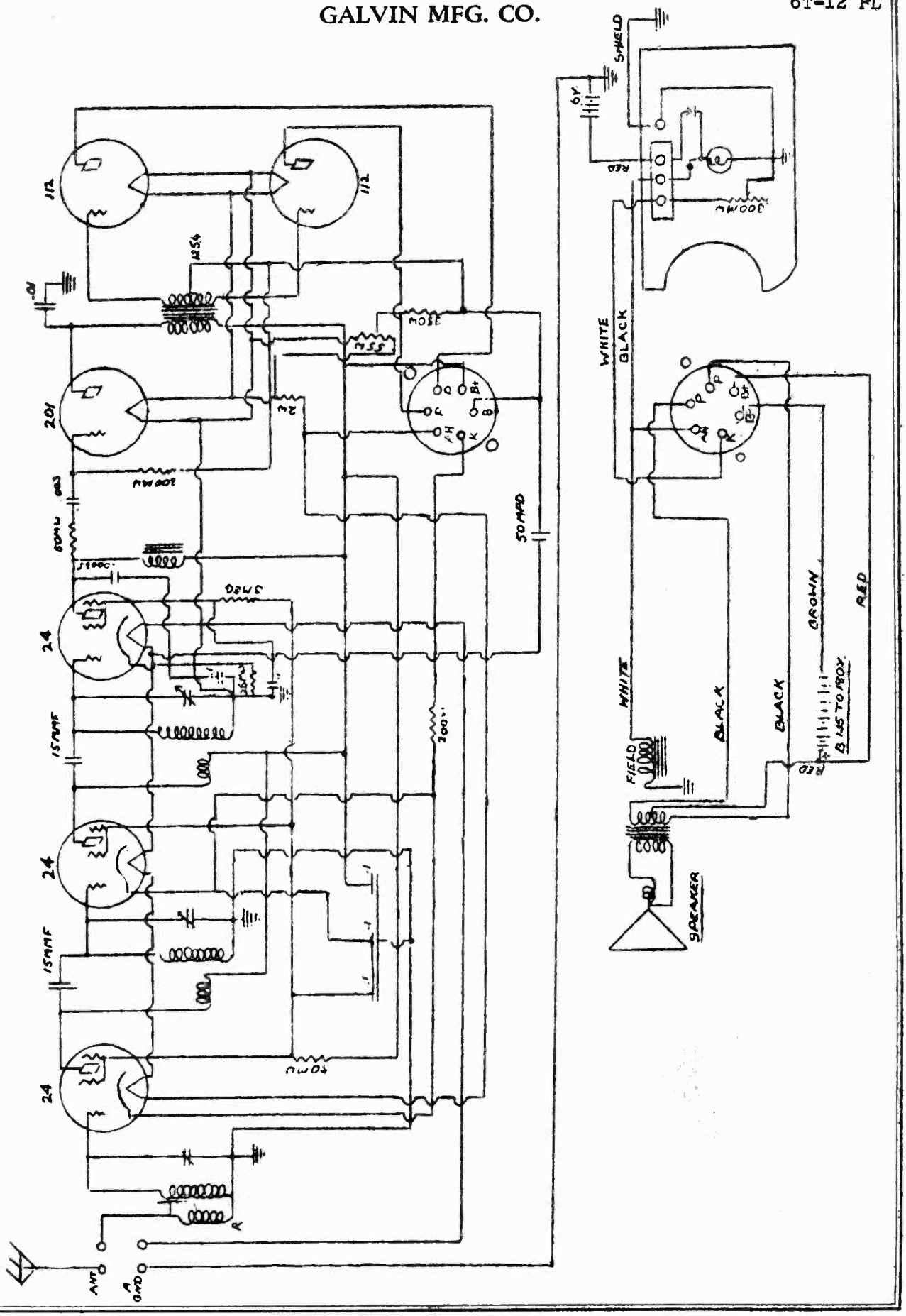
GALVIN MFG. CO.

OCT. 1, 1931



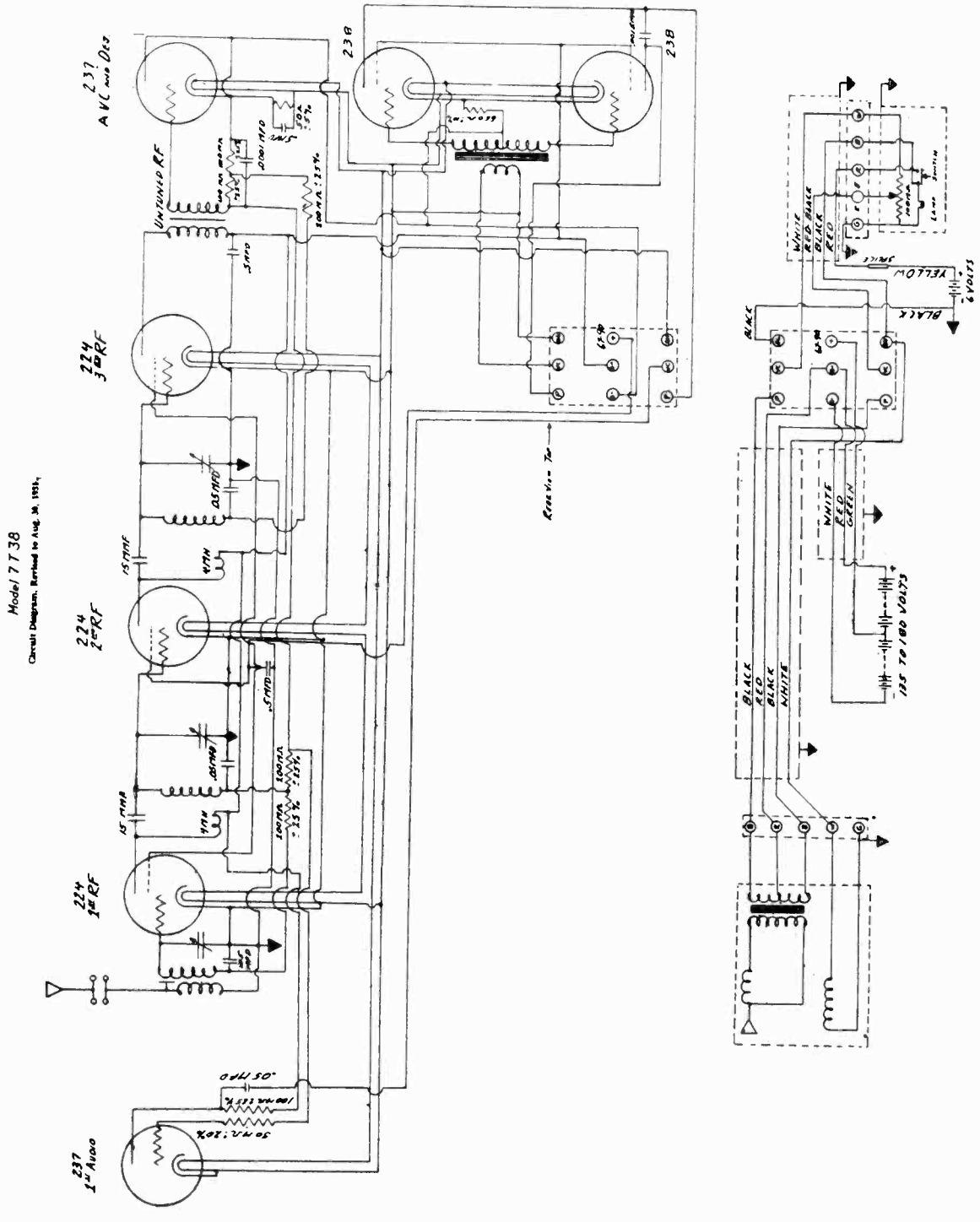
MODEL Motorola
6T-12 FL

GALVIN MFG. CO.



MODEL Motorola
7T-38
Schematic

GALVIN MFG. CO.



Socket layout and point-to-point data on next page. Variation of this receiver is sknown as 7T-38-A.

GALVIN MFG. CO.

MODEL Motorola
7T-38
Test Data

SOCKET #1
1 TO 13 50,000
2 TO S 100,000
3 TO X 0
2 TO H OPEN
Y TO I 0

SOCKET #2
4 TO 7 200,000
6 TO X 0
5 TO E 60
SR TO F 0
Y TO Z 0

SOCKET #3
7 TO 13 200,000
9 TO X 0
8 TO E 60
SR TO F 0
W TO K 0

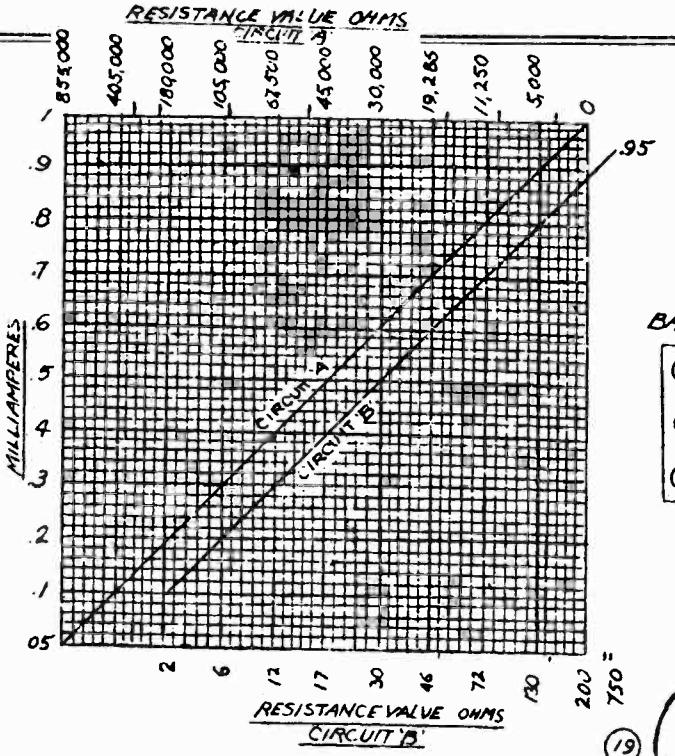
SOCKET #4
11 TO E 100
12 TO X 0
Y TO I 0
SR TO F 0
10 TO 13 300,000

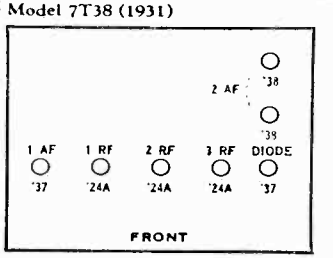
SOCKET #5
13 TO 15 200,000
15 TO X 50
14 TO 15 0
14 TO D 0
Y TO I 0

SOCKET #6
16 TO D 9,000
16 TO 19 18,000
18 TO D 650 TO 750
17 TO G C
S TO E 0

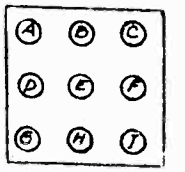
SOCKET #7
19 TO D 9000
21 TO D 650 TO 750
20 TO A 0
S TO E 0

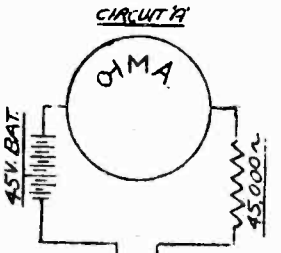
FEMALE PLUG
C TO B 3,000
E TO I OPEN
B TO H OPEN
A TO G OPEN
D TO E OPEN CONDENSER
D TO F OPEN CONDENSER
E TO C OPEN
E TO F OPEN
A TO C OPEN
G TO C OPEN
I TO D OPEN

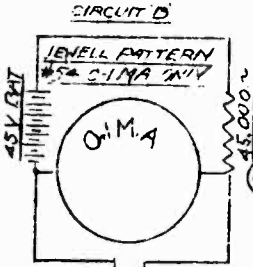


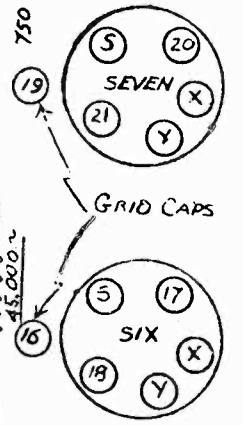


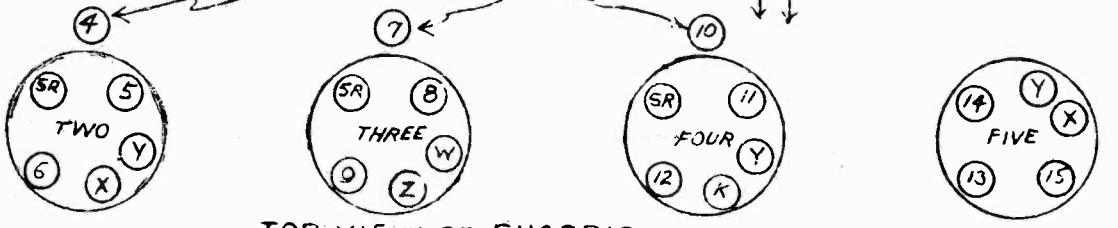
BACK TOP SET PLUG







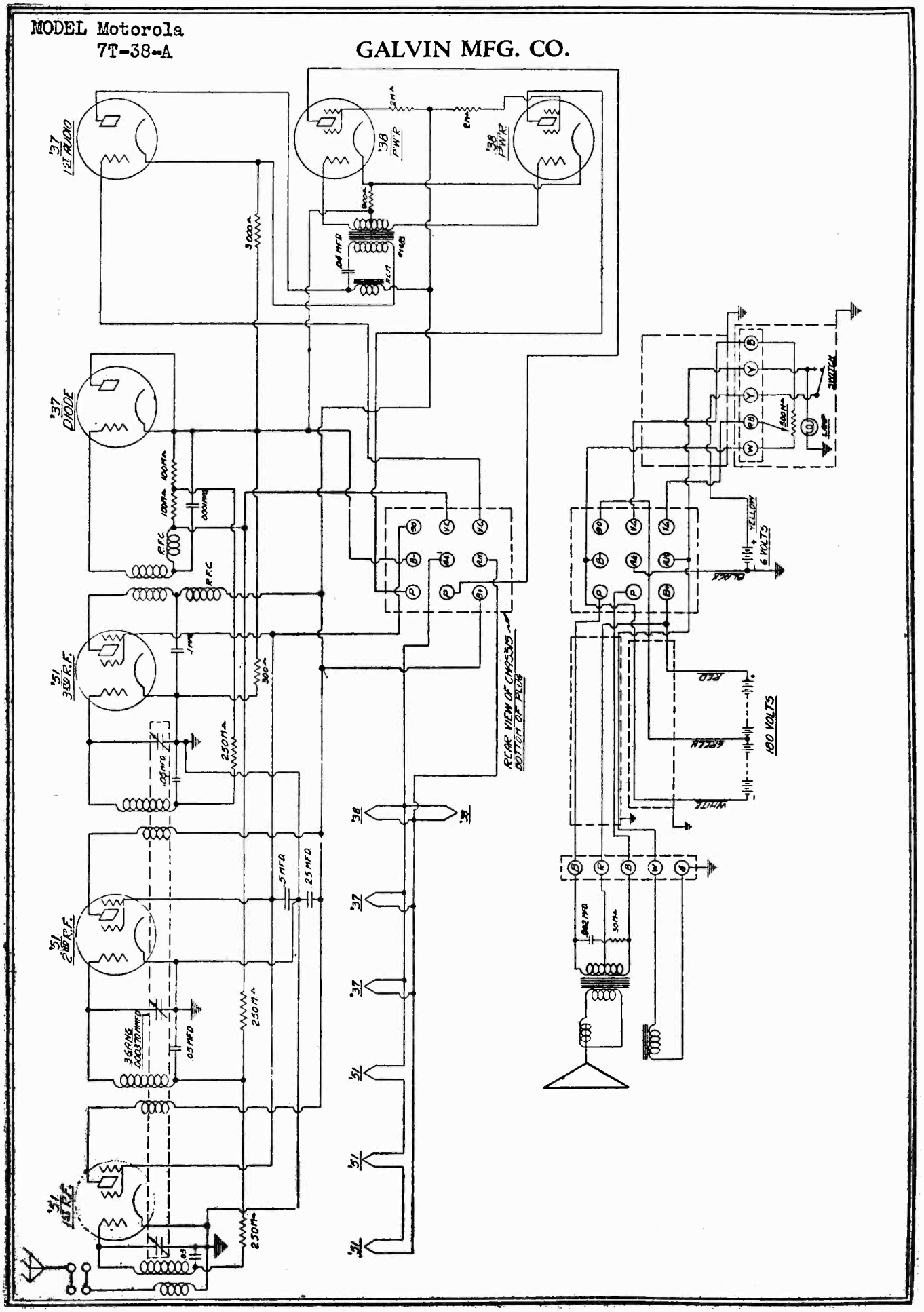




TOP VIEW OF CHASSIS

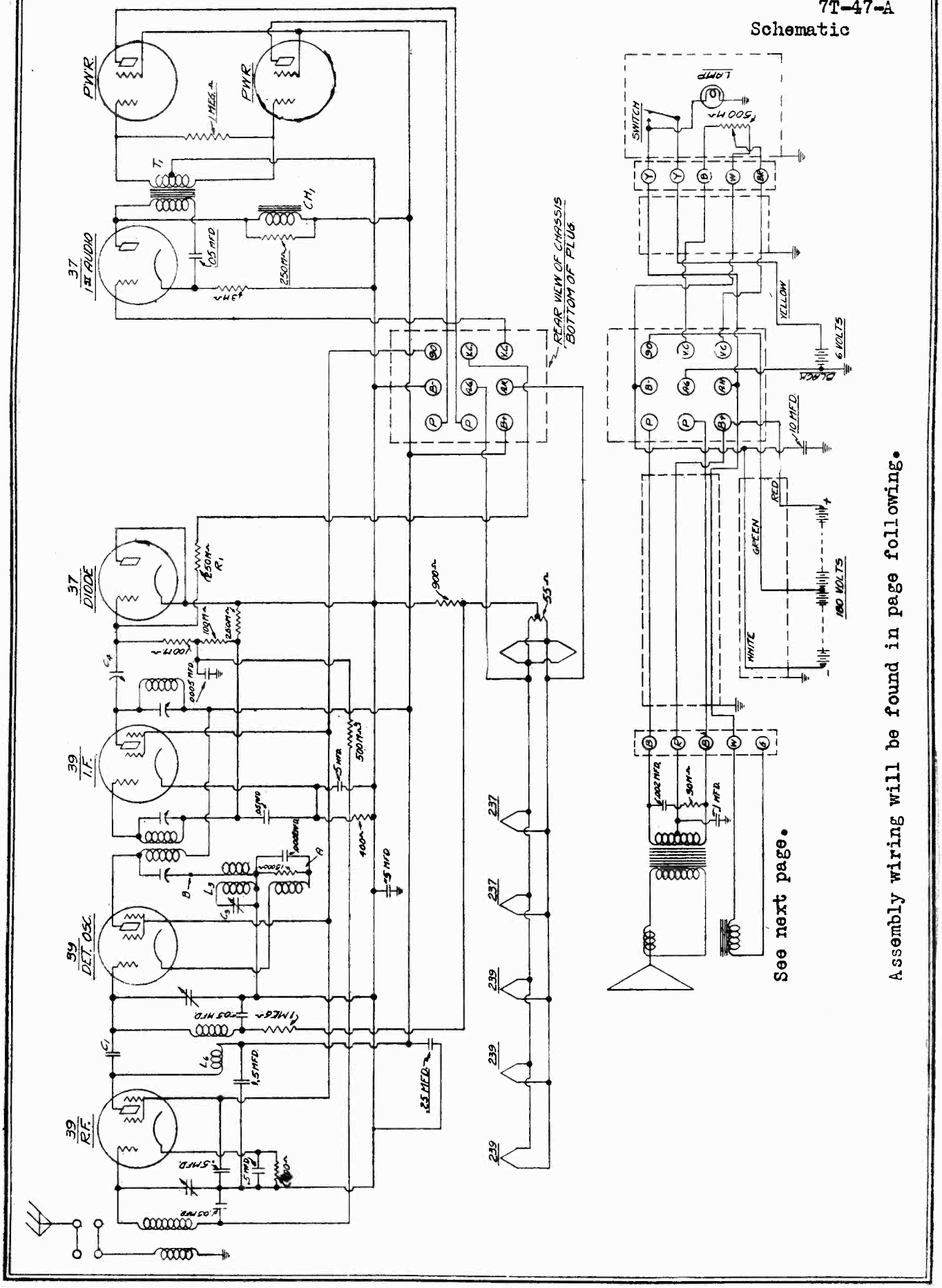
MODEL Motorola
7T-38-A

GALVIN MFG. CO.



GALVIN MFG. CO.

MODEL Motorola
7T-47-A
Schematic

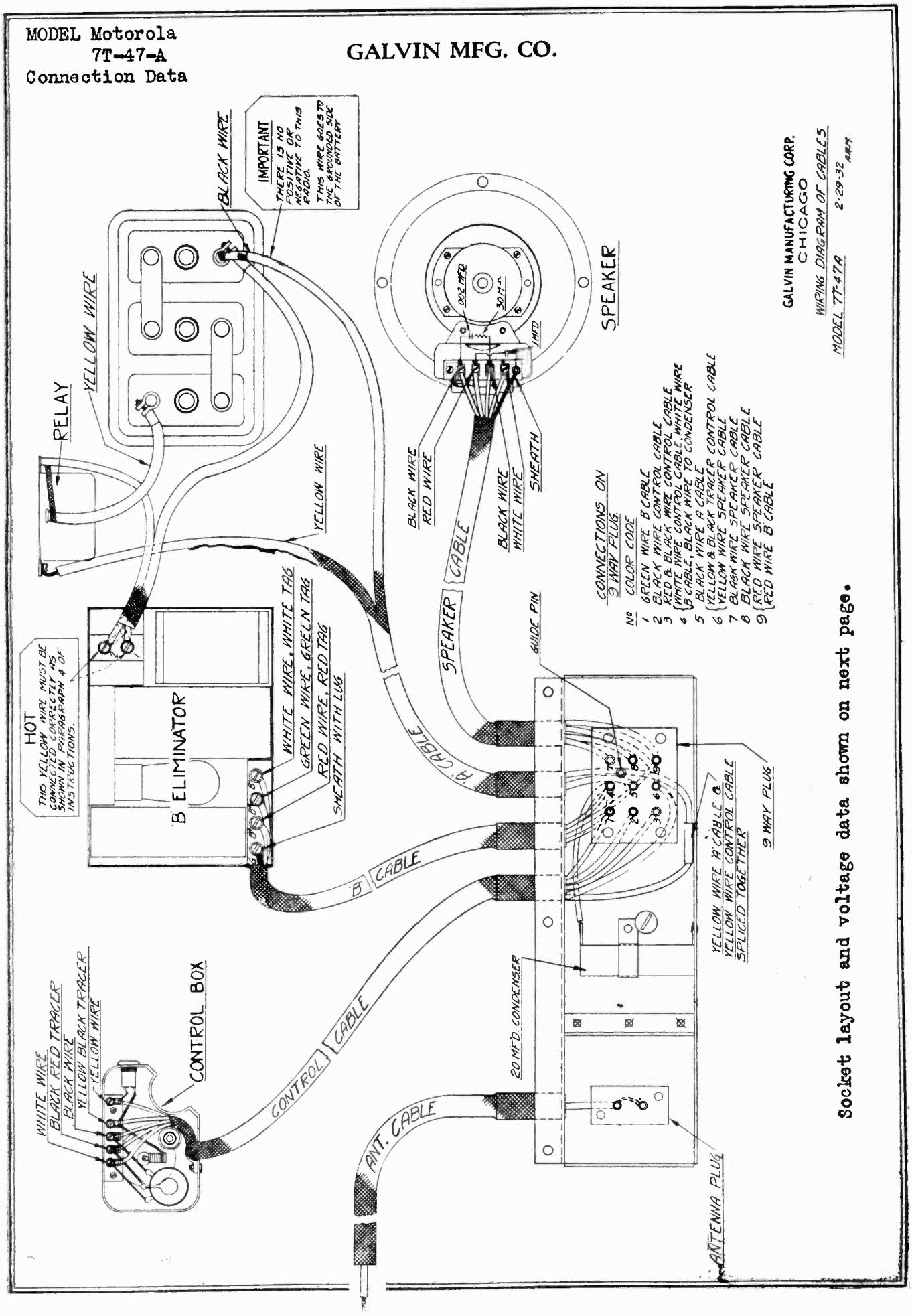


See next page.

Assembly wiring will be found in page following.

MODEL Motorola
7T-47-A
Connection Data

GALVIN MFG. CO.



Socket layout and voltage data shown on next page.

GALVIN MFG. CO.

MODEL Motorola
7T-47-A
Voltage - Notes

CONTINUITY TEST

INSTRUCTION
USE THE TEST CIRCUIT NOTED BY THE FOLLOWING MARKERS: + LOW RESISTANCE
* HIGH RESISTANCE
• MEGOHM TEST
TEST CIRCUITS GIVEN ON THE RIGHT HAND SIDE OF THIS SHEET.

DATA
SOCKET NO. 1:

TEST	FROM	TO	READ
+	S-1	C(B+90)	0
+	P-1	G(B+180)	30ω
•	G-1	G-3	600MΩ
•	G-1	B(B-)	850MΩ
*	K-1	B(B-)	300ω
+	FG-1	E(AG)	0
+	F.H-1	E(AH)	0

SOCKET NO. 2.

TEST	FROM	TO	READ
+	P-2	G(B+180)	43ω
•	G-2	B(B-)	1 MEG.
*	K-2	B(B-)	15MΩ
+	F.G-2	E(AG)	0
+	FG-2	H(A.H)	0
+	S-2	C(B+90)	0

DATA
SOCKET NO. 3

TEST	FROM	TO	READ
+	P-3	K-3	0
+	K-3	B(B-)	0
•	G-3	F(VC)	250MΩ
•	G-3	B(B-)	450MΩ
•	G-3	G-4	200MΩ
+	FG-3	E(AG)	0
+	F.H-3	H(A.H)	0

SOCKET NO. 4

TEST	FROM	TO	READ
+	S-4	C(B+90)	0
+	P-4	G(B+180)	60ω
*	K-4	B(B-)	300ω
•	G-4	B(B-)	250MΩ
+	FG-4	E(AG)	0
+	F.H-4	H(A.H)	0

SOCKET NO. 5.

TEST	FROM	TO	READ
*	P-5	G(B+180)	2MΩ
+	G-5	I(VC)	0
*	K-5	B(B-)	3MΩ
+	FG-5	E(AG)	0
+	F.H-5	H(A.H)	0

DATA
SOCKET NO. 6

TEST	FROM	TO	READ
+	S-6	G(B+)	0
+	P-6	A(P)	0
*	G-6	B(B-)	6MΩ
*	G-6	G-7	12MΩ
+	F.G-6	E(AG)	0
+	F.H-6	H(A.H)	0

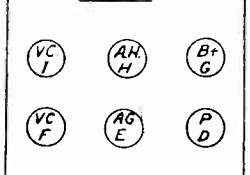
SOCKET NO 7

TEST	FROM	TO	READ
+	S-7	G(B+)	0
+	P-7	O(P)	0
*	G-7	B(B-)	6MΩ
+	FG-7	E(AG)	0
+	FH-7	H(A.H)	0

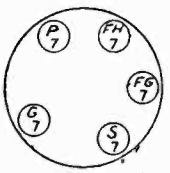
BACK PLUG

TEST	FROM	TO	READ
•	A(P)	GND	OPEN
•	B(B-)	GND	OPEN
	B(B-)	C(B+90)	OPEN
•	C(B+90)	GND.	OPEN
•	D(P)	GND	OPEN
*	E(AG)	B(B-)	900ω
•	E(AG)	GND	OPEN
+	E(AG)	H(A.H)	55ω
•	F(VC)	GND	OPEN
•	G(B+180)	B(B-)	OPEN
•	G(B+180)	GND	OPEN
•	H(A.H)	GND	OPEN
•	I(VC)	GND	OPEN

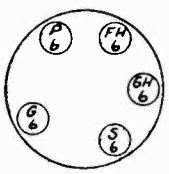
BOTTOM



TOP



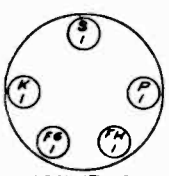
SOCKET NO 7



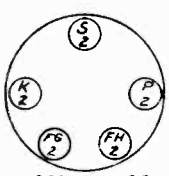
SOCKET NO 6

MOTOROLA CONTINUITY CHART
MODEL 7T-47-A.
GALVIN MFG CORP CHICAGO
M.V.K 6/17/32

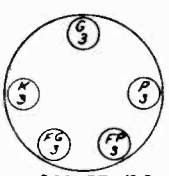
G 1 G 2 G 4



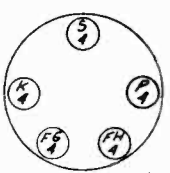
SOCKET NO 1



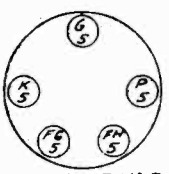
SOCKET NO 2



SOCKET NO 3



SOCKET NO 4



SOCKET NO 5

	1ST RF	DET OSC.	DIODE	I.F.	1ST AUDIO	LA's
E_p	176 V.	176 V.	0	176 V.	164 V.	176 V.
I_p	4.7 MILS.	13 MILS.	0	1 MIL.	4.1 MILS.	7.7 MILS
E_g	2V	8V.	0	2 V.	12 V.	18 V.
E_s	80V.	80V.	-	80V.	-	176 V.
I_s	1.1 MILS.	.3 MILS.	-	12 MILS.	-	1.6 MILS. NO SIGNAL
NO SIGNAL I-CATHODE	5.8 MILS.	1.7 MILS.	.00001	5.5 MILS.	4.1 MILS.	
100-M.M.V. I CATHODE	.9 MILS.	2.2 MILS.	.0004	1.5 MILS.	2 MILS.	
E_f	6.2 V.	6.2 V.	6.2 V.	6.2 V.	6.2 V.	6.2 V

A-BATTERY VOLTAGE AT TERMINALS 6.25 VOLTS

Volts cathode oscillating 8 V
Volts cathode not oscillating 4 V } (Measured with 10 V 1000~/volt meter)

MODEL Motorola
88
Sohematic

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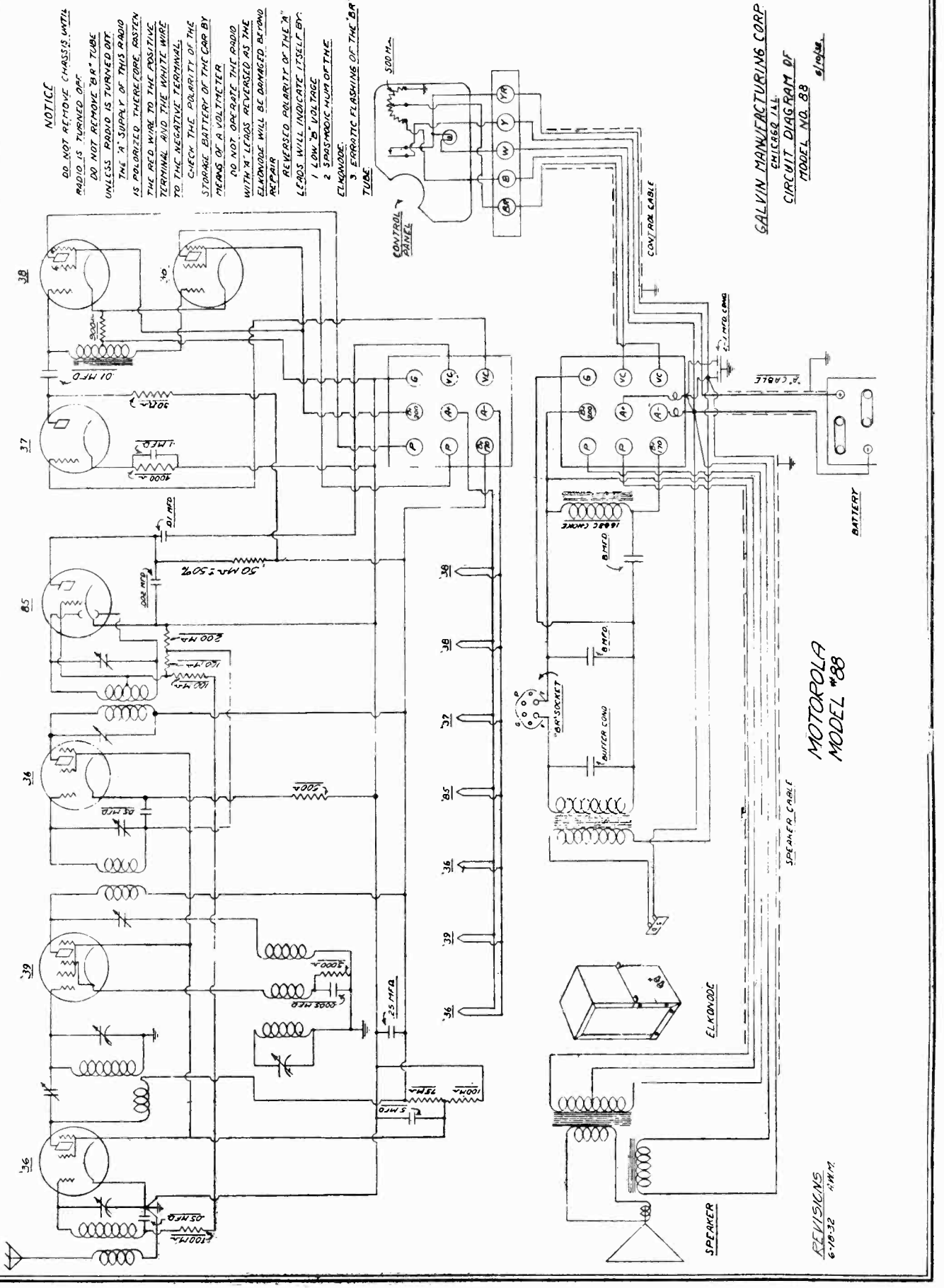

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MODEL Motorola
88
Voltage

TABLE No 2

	1ST R.F.	MIXER	I.F.	DET.	2ND AUDIO	'38
I_p	25 MILS.	2 MILS.	2.5 MILS.	1.8 MILS.	.7 MILS.	8.5 MILS.
E_p	*180 V.	*180 V.	*180 V.	*30 V.	*38 V.	*200 V.
E_s	0	6 V.	1 V.	0	2 V.	20 V.
E_3	*60 V.	*60 V.	*60 V.			*200 V.
I_3	.7 MILS.	.3 MILS.	.3 MILS.			2 MILS.
NO SIGNAL 1 CATHODE	3.4 MILS.	1.8 MILS.	2.8 MILS.			10.5 MILS.
100 M. M.V. 1 CATHODE	0	2.3 MILS.	.6 MILS.			11.4 MILS.
E_f	5.8 V.	5.8 V.	5.8 V.	5.8 V.	5.8 V.	5.8 V.

TOTAL CURRENT OF SET 31.8 MILS. AT 185 V. 'B' MAX.
'A' BATTERY VOLTAGE - 6.3 VOLTS AT BATTERY TERMINALS
'B' " " 5.8 " " 1ST R.F. TUBE.

* APPROX. VOLTAGES

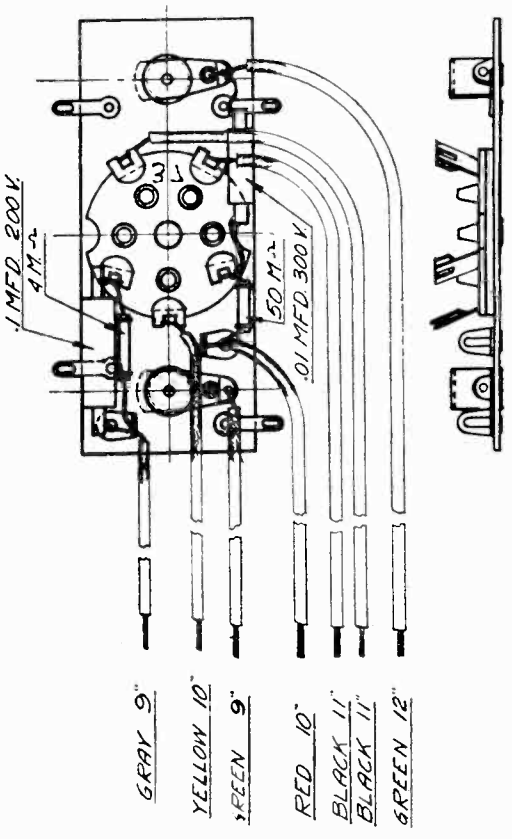
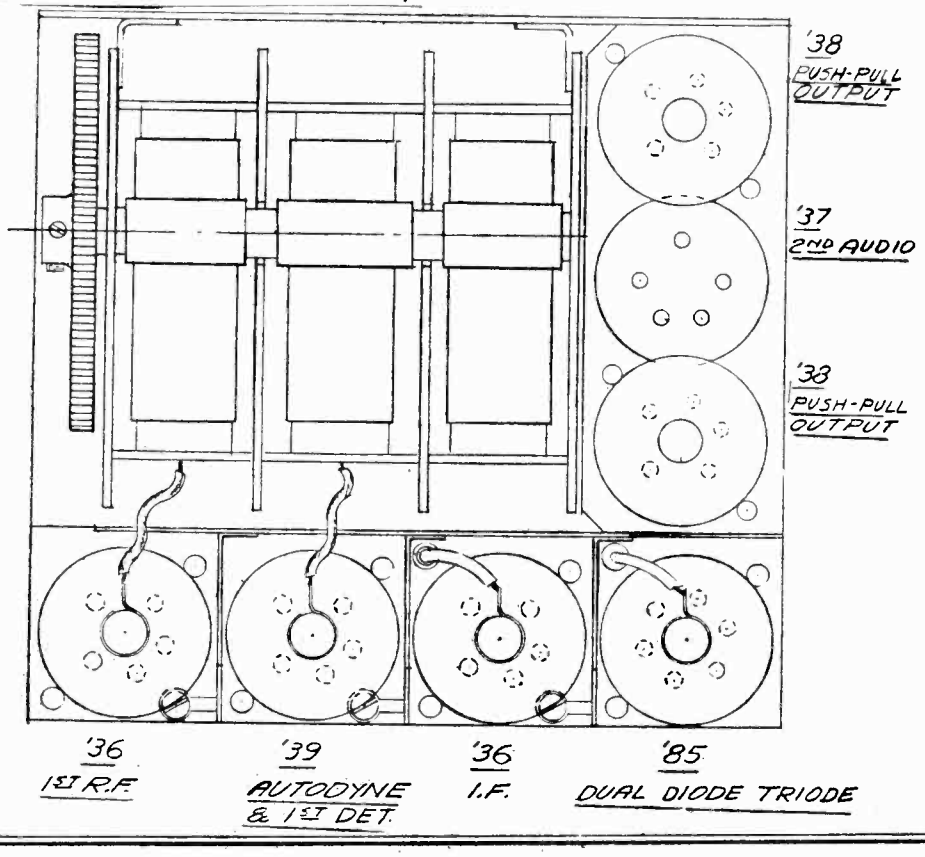


FIGURE 19

Figure (19) - shows the resistance audio coupling device that is used in the inverted socket which is a coupling medium that occurs between the 2nd audio and the push-pull stage.



MOTOROLA

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MODEL Motorola
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Service Notes

GALVIN MFG. CO.

INSTRUCTIONS
USE THE TEST CIRCUIT
NOTED BY THE FOLLOWING
MARKERS: + Low Resistance
* High Resistance
• Megohm Test
Test Circuits Given On
Right Hand Side Of This Sheet

SOCKET #1

TEST	FROM	TO	READ
•	S1	G(+B)	75MΩ
+	P1	G(+B)	30 Ω
•	G1	G4	200MΩ
+	K1	C(-B)	0
+	AG-1	E(AG)	0
+	AH-1	H(AH)	0

SOCKET #2

TEST	FROM	TO	READ
•	S2	G(+B)	75MΩ
+	P2	G(+B)	40Ω
+	G2	C(-B)	5Ω
*	K2	C(-B)	5MΩ
+	AG-2	E(AG)	0
+	AH-2	H(AH)	0

BACK PLUG

TEST	FROM	TO	READ
+	A (P)	C(-B)	OPEN
+	B (+BS)	C(-B)	"
+	C (-B)	G(+B)	"
+	D (P)	C(-B)	"
+	H (AH)	C(-B)	"
+	F (VC)	C(-B)	"
•	G (+B)	C(-B)	175MΩ
+	E (AG)	C(-B)	OPEN
+	I (VC)	C(-B)	"

SOCKET #3

TEST	FROM	TO	READ
•	S3	G(+B)	75MΩ
+	P3	G(+B)	40Ω
•	G3	G4	100MΩ
*	K3	C(-B)	500Ω
+	AG-3	E(AG)	0
+	AH-3	H(AH)	0

SOCKET #4

TEST	FROM	TO	READ
•	P4	G(+B)	100MΩ
•	G4	C(-B)	300MΩ
+	K4	C(-B)	0
+	AG4	E(AG)	0
+	AH4	H(AH)	0
+	C4a	G4	20Ω
+	C4b	G4	20Ω

SOCKET #5

TEST	FROM	TO	READ
+	S5	B(+BS)	0
+	P5	D(P)	0
*	G5	C(-B)	3MΩ
*	K5	C(-B)	900Ω
+	AG5	E(AG)	0
+	AH5	H(AH)	0

SOCKET #6

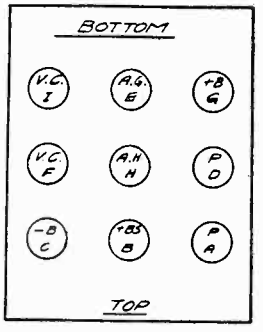
TEST	FROM	TO	READ
•	P6	G(+B)	50MΩ
+	G6	I(VC)	0
*	K6	C(-B)	4MΩ
+	AG-6	E(AG)	0
+	AH-6	H(AH)	0

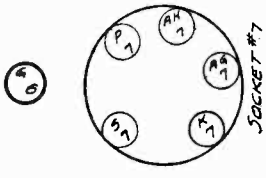
SOCKET #7

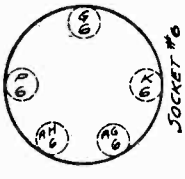
TEST	FROM	TO	READ
+	S7	B(+BS)	0
+	P7	D(P)	0
*	G7	C(-B)	3MΩ
*	K7	C(-B)	900Ω
+	AG-7	E(AG)	0
+	AH-7	H(AH)	0

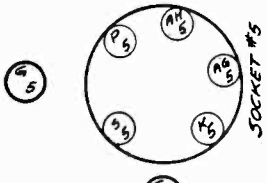
ANT

TEST	FROM	TO	READ
+	ANT	C(-B)	5Ω









MOTOROLA

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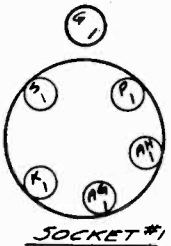
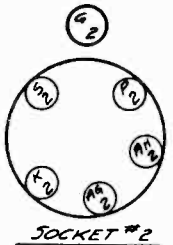
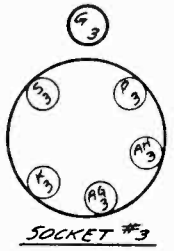
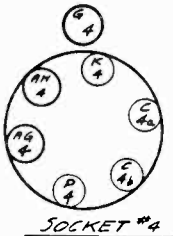






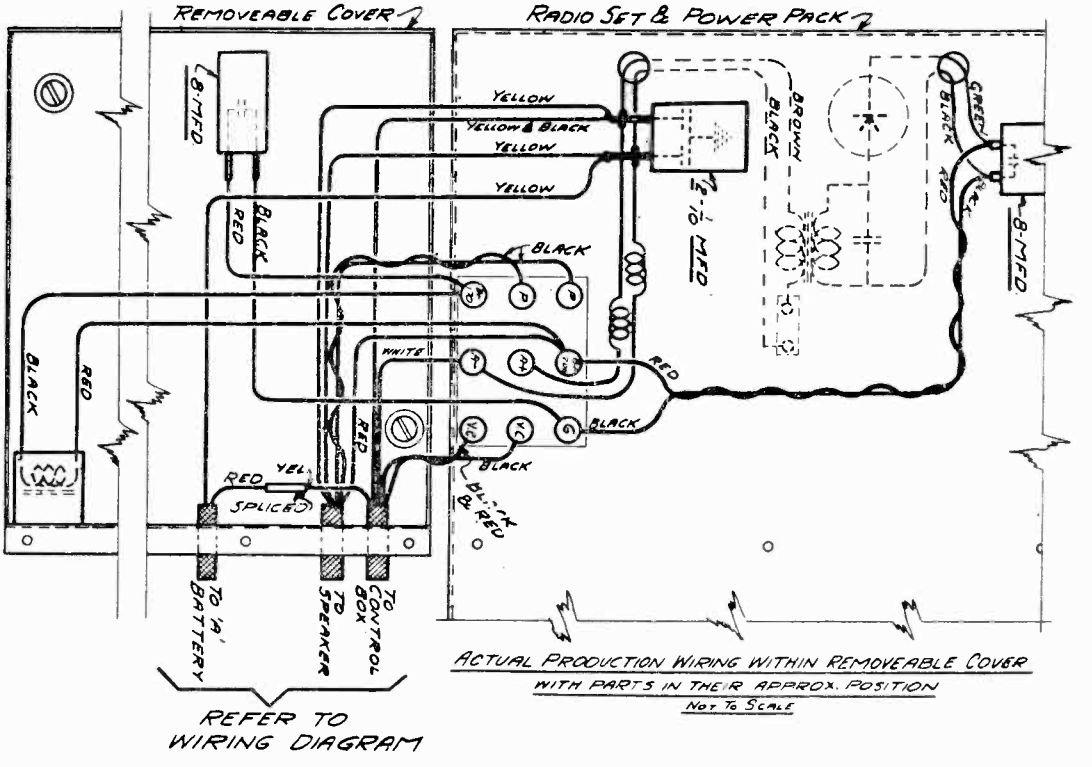


Ordinary AVC sets with normal tube hiss or noise level deliver sufficient bias to the tubes to prevent excessive plate current drain. The fourth tube, being second detector, is interchangeable with the 6 prong automotive type Wunderlich tube, Sylvania's 69 or 85 tube, or any other make of Dual Diode Triode. When the Wunderlich tube is interchanged with the 85 the grid clip which is normally connected on the top of the 85 tube can be ignored by merely taping it up and tucking it behind the tube, so that it will not become grounded. There is no substitution for the 5th tube, it being 37 second audio tube. The 6th and 7th tubes, or the 38 output tubes will be found to work best if the oval plate type of ER 38 is used, although any other type of 38 tube may be substituted.

* "Static bias is defined as self-biasing of the tube when there is no signal being imposed into the radio set, the radio being in a static condition."

GALVIN MFG. CO.

MODEL Motorola 88
Service Notes



Inverted Tube Socket - - - If the inverted tube socket and its associated wiring becomes defective, and it is required to replace it, it is only necessary to remove the set from the housing and unsolder the two green wires from the dummy lugs located in the tube laying on the right hand side of the chassis - also remove the two volume control wires whose position under the terminal post is shown in Figure (15) the "B" plus wire, heater and ground, leading in the cable assembly, and when all of these wires are disconnected the entire cabling may be removed, or it may be replaced by a new one, or the old one repaired, which is wired as shown in Figure (19).

Removal of Diode Unit - - - If after thoroughly checking continuity of the diode unit it is found defective, it is only necessary to disconnect the four wires on each terminal, and the 5th wire coming out of the hole in the center of the unit. After the removal of these wires, the two nuts that hold the terminal strip should be removed, and the entire unit can be pulled out.

If the I.F. unit is found defective, the four wires should be removed from the terminals of the unit and the 5th wire coming out of the center should be removed from the by-pass condenser terminal. The two screws holding the terminal strip in place should be removed. The unit is then ready to be pulled out after the oscillator section has been removed as described below.

Removal of Oscillator Coil - - - The oscillator coil as shown in Figure (18) is located in the lower left hand corner of the chassis, and to remove it the tube shield should be removed by removing the three sheet metal screws holding the bottom of the tube shield in place and the two 6/32 nuts holding the back of the tube shield. It may then be lifted out of place, which allows the stator connection of the third variable condenser to be unsoldered. Also remove the black #20 wire that is soldered to the wiper of this same section. After removal of these two wires solder an additional 8" or 10" of wire on to each of these wires. This will act as a pull wire. Then remove the two hex-head screws located in the lower left hand face of the chassis which will release the coil and it may be removed and pulled out. After it has been removed, unsolder the two pull wires that were originally soldered on to the leads, removed from the variable condenser. These will be very important when you attempt to replace this unit, as it will put the wires back to the condenser in the same place they were removed. This pull wire will be very essential, because if the oscillator section is removed without placing this pull wire in place, you will find it necessary to remove all of the other coils in the radio in order to reassemble the oscillator grid and stator connections.

MODEL Motorola 88
Service Notes

GALVIN MFG. CO.

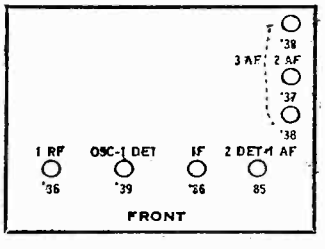
Removal of Antenna and Radio Frequency Coils - - - First remove the tube shield as previously described and unsolder all these stator connections on to the variable condenser. Remove the 160-tooth drive gear and remove the four hex-head sheet metal screws holding the variable condenser on to the brackets - then unhook the wipers from their position on the condenser and pull the condenser out, leaving the wipers soldered to the wires. This will allow complete access to the radio frequency and antenna coils.

Removal of Power Pack - - - Should the power pack become defective, it can be removed as a unit. It will be necessary to remove the housing from the car, or remove it from the bulkhead. Unscrew all of the screws holding the back cover plate in place tipping this back cover aside being careful not to pull any leads loose while working about it. It will be found very convenient to use the middle mounting screw on the bottom which will align with the middle mounting screw of the back cover and by fastening those two points together the lid will be held in an out of the way position. All leads are amply long to allow it to rest in that position. Unsolder the brown and black #14 wires connecting the transformer to by-pass condenser, also unsolder the red (or green) and black wire leading to the 8 mfd. filter condenser. There will be no further wires necessary to unsolder. Remove the two screws holding the top of the transformer case located near these two red (or green) and black wires mentioned. Remove one screw holding the second side of the transformer case located on the right side of the outer housing, also the four screws, two holding the Elkonode and two holding the transformer located on the bottom of the outer housing. This will allow the Elkonode and the BR tube and transformer all to be pulled from the chassis as a unit. After it is removed, it can be tested by applying 6 volts to the large terminals with positive polarity to the brown wire and applying a 5000-ohm resistor across the red (or green) and black wires, an 8 mfd. electrolytic condenser and a voltmeter. With this setup the Elkonode unit should consume not more than 2.25 amperes and the voltage drop across the 5000-ohm load should be between 160 to 170 volts, provided the battery voltage is on exactly 6.3 volts.

It is not recommended by us that any repairs to the Elkonode be attempted by the service stations. All defective Elkonodes should be returned to the factory or the manufacturers of the Elkonode as indicated by the label on same.

Open Buffer Condenser - - - This condenser shown as being applied directly across the secondary of the power transformer will be indicated by the failure of the BR tube to stay ionized. Ionization is the bluish-red glow always characteristic of Raytheon Rectifier tubes, while a shorted .05 condenser will be indicated by a spasmodic operation of the Elkonode, as well as failure of the BR tube to glow. As a general rule in all power packs when spasmodic operation of the Elkonode is observed, it is always an indication that the Elkonode is not feeding into the proper load. It is either unloaded or overloaded, and it is very hazardous if the Elkonode is allowed to operate in either one of the two conditions for any period of time.

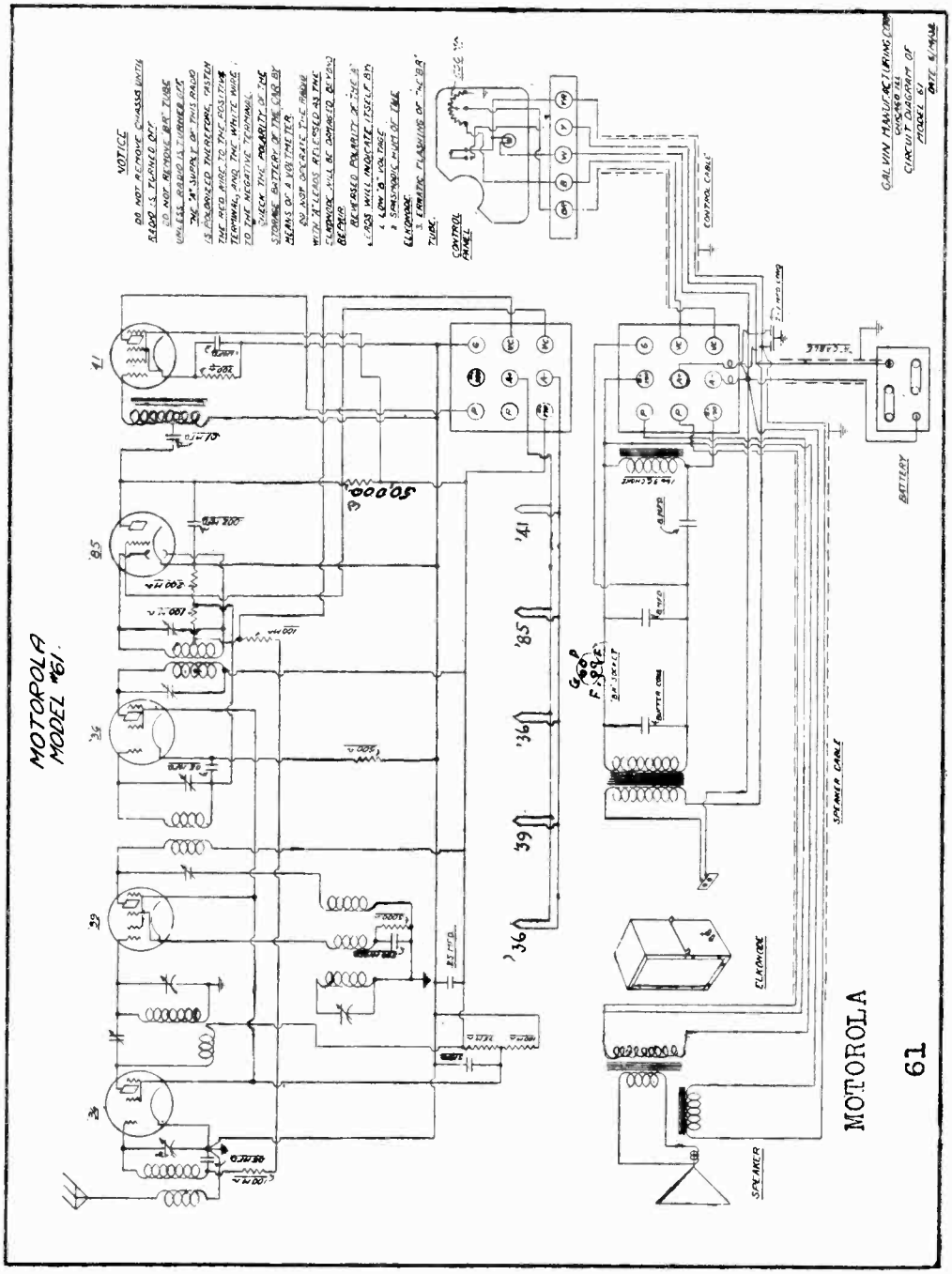
Model 88 (1932)



shows the tube layout and the sequence of tubes, reading from left to right as follows: 1st - 36 type used as 1st radio frequency, 2nd - 39 type used as an autodyne and 1st detector, 3rd - 36 type used as an I.F. stage, 4th - 85 type used as a Dual Diode Triode, meaning it is serving two purposes - that of the Dual Diode and a Triode, or three element 1st audio tube, 5th - 38 tube used as one of the output tubes operating as class "A" amplifier, 6th - 37 2nd audio tube, 38 - as the second of the push-pull output tube. The 36 and 39 tubes may be interchanged with each other, or all 36, or all 39 tubes can be used with the following expectations, when different type numbers are exchanged. It is recommended that a 36 be left in the 1st R.F. where it does not have a *static bias, and if left disconnected from antenna over a very long period of time very short life can be expected of the 39 when used in that position and no increase in sensitivity will be noticed. Substitution of the 36 in the autodyne socket will result in a 5% decrease in sensitivity and a corresponding decrease in oscillator hiss. Substitution of the 39 in the I.F. stage is suggested when an increase in sensitivity is desired. It is perfectly safe to use a 39 in the I.F. stage as it is statically biased.

GALVIN MFG. CO.

MODEL Motorola
61



For continuity test data, see information related to Motorola 88.

The Motorola Model 61 is very similar to the Model 88, the difference being in the design of the audio frequency end.

The Radio Frequency of Model 61 is interchangeable, serviced and wired in exactly the same manner as Model 88

The interchangeability of tubes as used in the radio frequency end can be done as described in Chapter III with all tubes, EXCEPTING THE 85 AND 41, which tubes must be interchanged only with tubes of corresponding numbers. The method of controlling volume in the Model 61 limits the adaptability of other types of detector tubes.

CAR INSTALLATION NOTES

AUBURN:

The majority of Auburns will be found to operate very satisfactorily on one suppressor, that being applied in the line between the ignition coil and the distributor.

The aluminum plate which houses the distributor must be thoroughly grounded, both top and bottom, and is most easily accomplished by riveting a piece of shielding braid on to the cover under the aluminum cover and carrying this shield down, fastening it under one of the head bolts.

Then remove the black and yellow wire on the ignition coil .. the other end of this wire is at the electrolux switch ... and replace this wire with a shielded wire, grounding this shielded wire where it passes through the bulkhead.

This should take care of the 1930 and 1931 Auburns.

BUICKS: (1929-30-31)

Due to the spark wires all being thoroughly shielded, the application of one suppressor is all that is necessary on a Buick. This suppressor should be applied as close to the distributor as it is possible to make it as the antenna pick-up is very severe. Grounding the wind shield, as well as the small metal pieces on both sides of the wind shield, will be found very effective, when a roof aerial is used as there are a number of Buick models that do not have these parts grounded.

CHEVROLET:

If the car is not a new model contact points should be examined thoroughly and if any of them have been pitted new contact points should be installed.

Apply an extra condenser at the ammeter, dome light filter in the dome light circuit if connected, and with a short piece of shielding bond the rain spouting which is the small angular material running close around the edge of the car roof. This has been discovered not to be grounded in the majority of Chevrolets and it will be necessary, after bonding it together, to then ground it to a corner post, checking thoroughly to see that the corner post used is likewise grounded.

Then abide with the same type of interference elimination used in the Buick which will effectively take care of this car.

It has also been found in some cases in this car that the person sitting on passenger side will radiate interference carried from his feet which are close to coil on other side of bulkhead, up to the antenna. A piece of screening placed under the floor mat will eliminate this type of interference. This screen must be grounded.

DODGE:

It is necessary that there be thorough shielding of the cable leading from the ignition coil to the bulkhead, grounding the shield to the outside of the bulkhead. An additional heavy bond must be made from the motor to the bulkhead, in some cars, or from the motor to the channel frame in others.

ESSEX:

It is very important in the Essex that the "A" Battery connections be made to the storage battery. It will also be necessary in all installations to install a by-pass condenser at the ignition switch. This condenser should be at least 1 mfd.

FORD: Model "A"

It will always be necessary in Fords to bond the spark control rod to the motor by means of a piece of shielding, soldering one end of the shielding to the rod and the other end under a cylinder head bolt.

It has occasionally been necessary to place an additional bond to the other end of the spark control rod to the bulkhead.

In a few instances it has been necessary to bond the electrolux cable to the bulkhead at the point where it enters the small rubber terminal block.

The distributor spacing must be checked up thoroughly to see that is is not too large, as this varies considerably in Fords. If it is found to be over five thousandths of an inch it should be built up with solder or pieced. Figure #6 indicates what is meant by building up the distributor.

GRAHAM-PAIGE:

The shielding of the wire from the ignition coil to the switch located on the steering column, grounding this shield to the bulkhead, is necessary in the Graham-Paige.
It is also necessary to place an additional by-pass condenser at the fuse block, located on the bulkhead, together with the standard suppressors. This will take care of the majority of this type car.

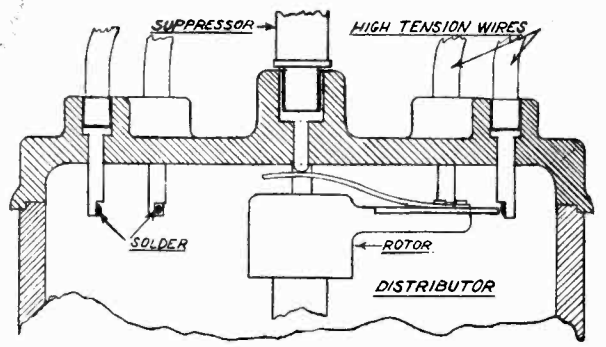


Figure 6

LINCOLN:

In the earlier model Lincoln that have the distributor coils mounted on the driver's side of the bulkhead, if it is impossible to eliminate antenna pick-up by any of the ordinary methods, it will be necessary to remove the coils and place them in the motor compartment. The same mounting holes may be used for the coils only they will be placed in the motor compartment instead of the driver's compartment.

The T junction of the flexible conduit should be loosened from the conduit and the flexible conduit placed up on the bakelite taper of the ignition coil. You will find enough slack in the flexible conduit to allow you to place the ignition cable proper in place before the flexible conduit is pushed up on the bakelite of the distributor. This will make a very neat appearing job and yet will accomplish the purpose desired.

On new Lincoln a dome light filter should be used - also it may be necessary to by-pass dome light feeder at the terminal board located back of the rear seat cushion with a .5 mfd. or larger capacity condenser.

LASALLE:

Remove the primary wire leading from the distributor to the ignition coil from the high tension conduit, keeping it outside this conduit. Shield the short length of wire leading from the distributor coil to the bulkhead, grounding this shield where it passes through the bulkhead. It will not be necessary to shield any wire other than this one.

In a few of the later custom models the application of two dome light filters will be necessary. They will have to be applied underneath the car at the junction boxes to their respective circuits.

On the 1932 model the coil is located on the bulkhead, on driver's side above the clutch pedals. To keep interference from being radiated by person driving car it is sometimes necessary to move coil to some other location.

OAKLAND:

For the reason of the No.8 spark plug being located so close to the storage battery, the Oakland "8" presents a rather difficult installation problem. A shielding of the spark plug wire leading to the No.8 spark plug will be of great assistance. It is extremely important that the "A" Battery connections of the radio be run directly to the post of the storage battery. The "A" Battery wires must be shielded clear up to the terminal posts, the shield covering the wire as close as it is practical to shield it.

It may often be necessary to place a double length of shielding over the "A" Battery wires as they come very close to the No.8 spark plug.

Dome light filters need to be installed in all sedans and an additional generator condenser must be applied either at the starter connection to the bulkhead or at the ammeter to the instrument board.

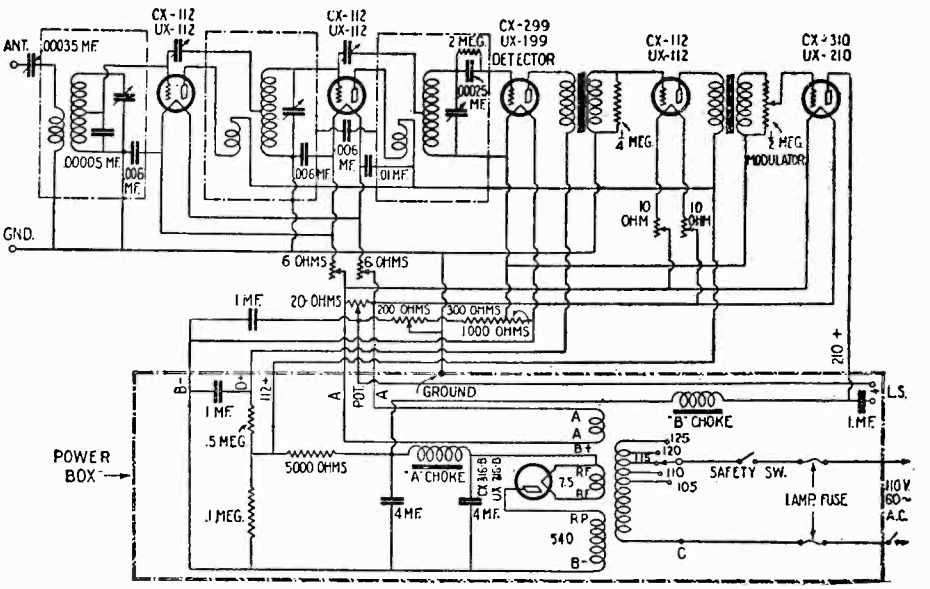
Shielding must be placed over the lead from the distributor coil to the bulkhead, grounding this shield at the bulkhead.

PLYMOUTH:

The Plymouth, due to the motor floating in rubber, will need the motor bonded to the chassis frame in several places ... principally to the channel frame, again at the bulkhead, and again at the radiator. Braided shielding is recommended for this bond and enough slack should be left so that motor is free to float.

GAROD RADIO CO.

MODEL EA



VOLTAGE TABLE

Tube	Plate	Fil.	Control Grid
210	380	7.5	28.
112	180.	4.5	7.
199	26	3.0	- -
Rect	525 AC	7.5	

COLOR CODING

The following table applies to EA receivers which employed the complete color code.

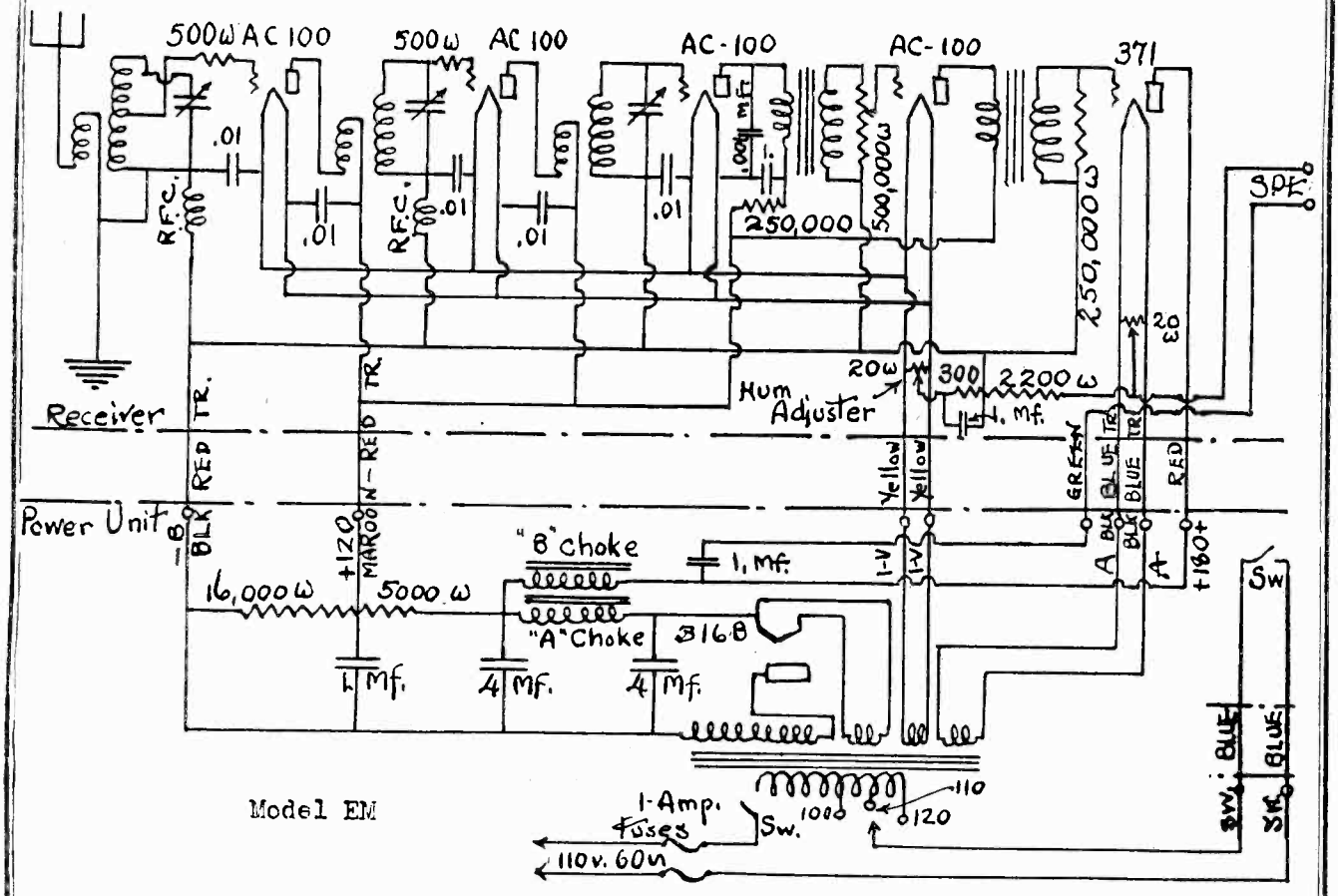
Circuit	Solid Color	Tracer
B Plus 210	Red	None
B Plus 112	Maroon	Red
B Plus Det.	Maroon	None
B Minus	Black	Red
A Plus	Yellow	None
A Minus	Black	Yellow
C Plus	Green	None
C Minus	Black	Green
Antenna	Blue	None
Ground	Black	Blue

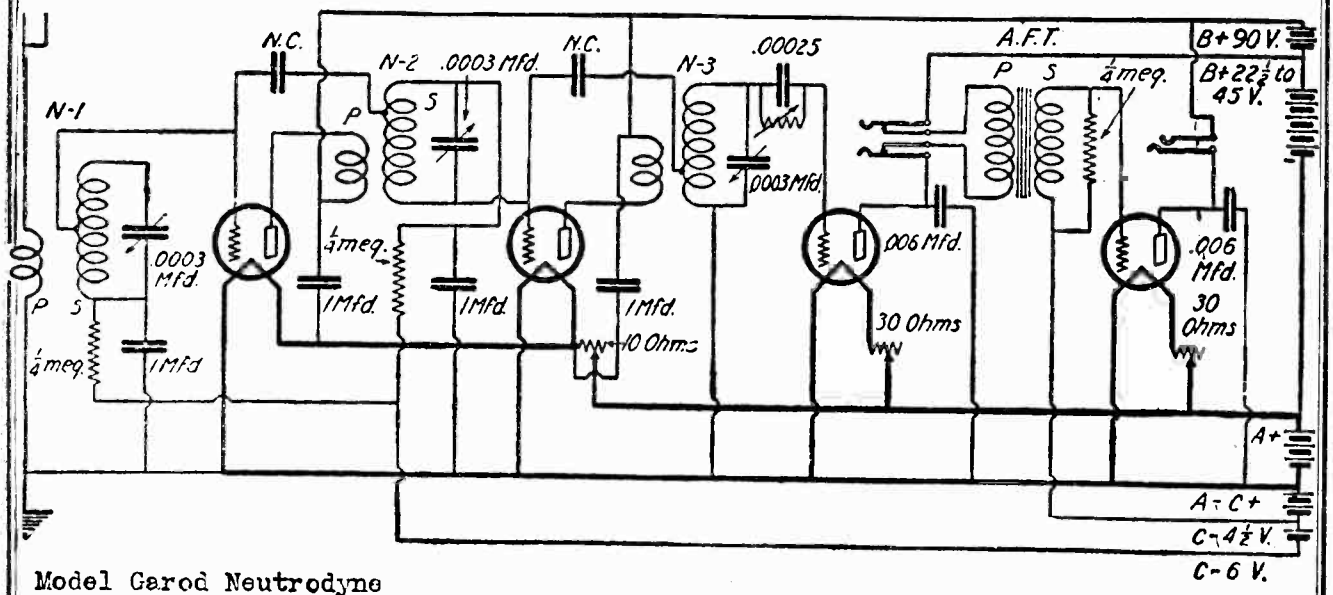
The following table applies to EA receivers wherein only the power cable is color coded.

Circuit	Solid Color	Tracer
B Plus 210	Red	None
B Plus 112	Maroon	None
B Plus Det.	Maroon	Black
B Minus	Black	Red
A Plus	Yellow	None
A Minus	Black	Yellow
Pot.	Black	Blue
Antenna	Blue	None
Ground	No braid	

MODEL Garod EM
MODEL Neutrodyne

GAROD RADIO CO.

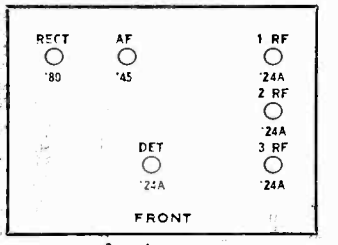


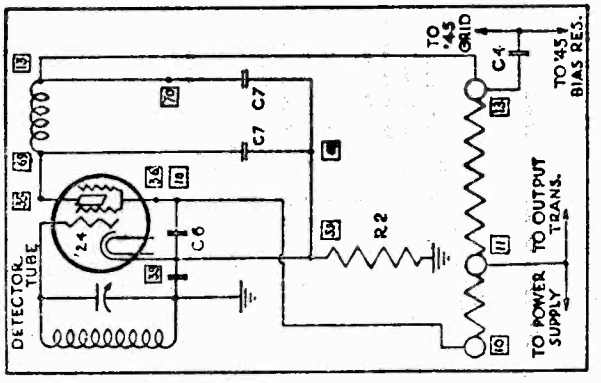


GENERAL MOTORS RADIO CORP.

MODEL 110,180,190
Little General

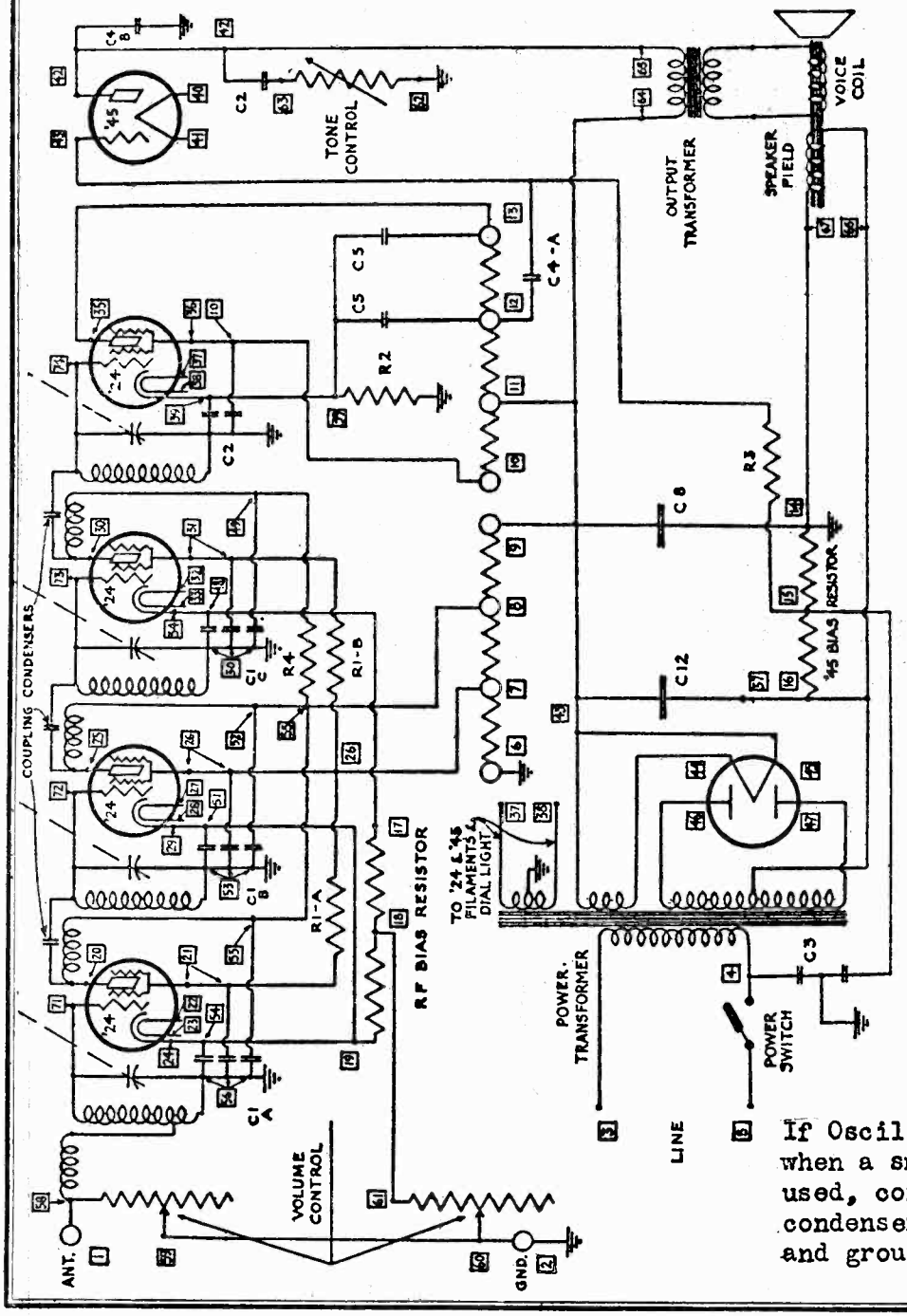
Models 110, 180, 190





The above insert shows a part of the Detector Circuit for Chassis with serial numbers above 23156 MA and 1611 MB — In the Chassis with Circuits as shown above, the Detector Plate Filter Circuit includes a choke coil in the Plate Circuit instead of one section of the Voltage Divider as in previous Chassis.

NOTE: In Chassis with serial numbers above 23156 M A and 1611 M B, the Tone Control Condenser and the Line By-Pass Condenser are included in the same can, with capacities as shown for Condenser No. C 2.



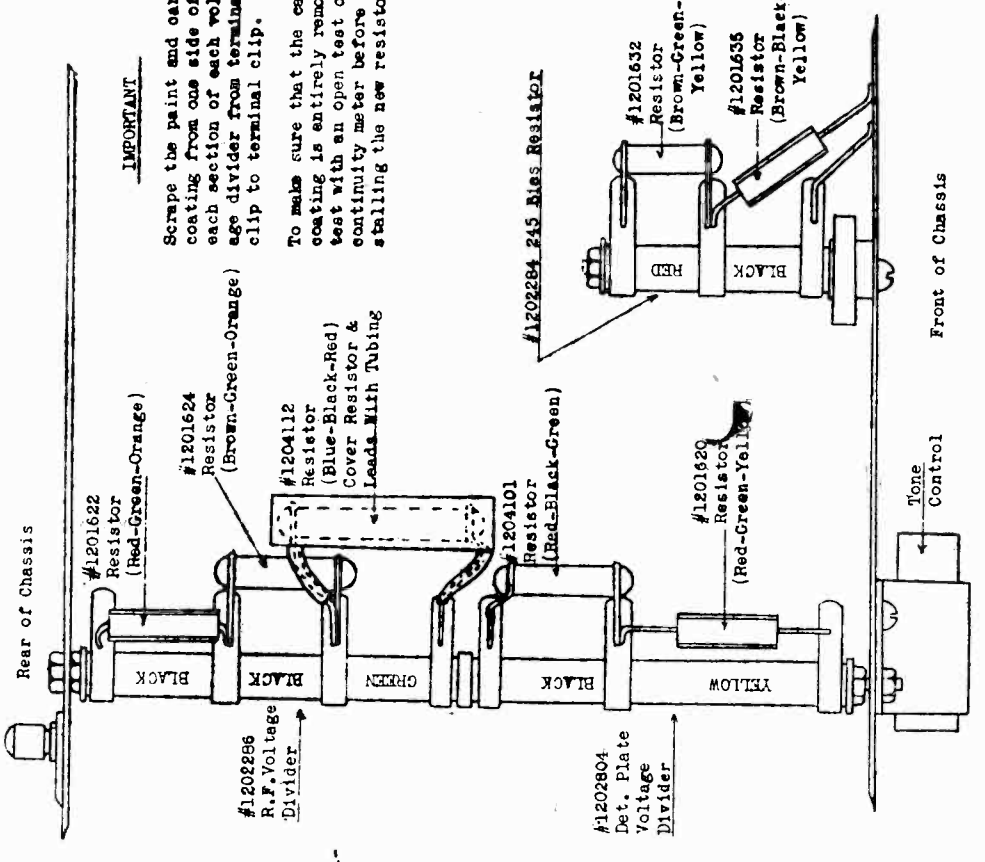
FIXED CONDENSERS		SINGLE FIXED RESISTORS					VOLTAGE DIVIDER		'45 BIAS RESISTOR				
NO.	CAPACITY	NO.	OHMS RESISTANCE	COLOR BODY	COLOR END	COLOR DOT	SECTION	RESISTANCE	SECTION	RESISTANCE			
C-1	.1-.1 Mfd.						6-7	22000 Ohms	14-15	10000			
C-2	.5-.1-.22 Mfd.	R 1	15,000	Brown	Green	Orange	7-8	12000 Ohms	15-16	150000			
C-3	.5-1 Mfd.	R 2	25,000	Red	Green	Orange	8-9	6,000 Ohms	15-16	150000			
C-4	.01 Mfd.	R 3	500,000	Green	Black	Yellow	10-11	2 Megohms	R.F. BIAS RESISTOR				
C-5	.00025 Mfd.	R 4	1,000	Insulated Resistor Wire			11-12	250,000 Ohms	SECTION	RESISTANCE			
C-6	.5-5 Mfd.						12-13	12000 Ohms	17-18	1000			
C-7	.0001 Mfd.						On chassis with serial numbers above 23156 MA		18-19	500			
C-8	8.0 Mfd.												
C-12	.120 Mfd.						11-13	122000 Ohms					

TUBE TYPE	FIL.	PLATE	CON. GRID	S. GRID	CATHODE	NORMAL MA.	GRID CHANGE			
'24 IRF	2.4	165	3.1	80	3	2.5	2.5			
'24 2RF	2.4	165	3.1	92	3	2.5	2.5			
'24 3RF	2.4	160	3.1	82	3	2.5	2.5			
'24 DET	2.5	100	6.5	12	10	.2	.1			
'45 1AF	2.4	225	3.0			20	40			
'80 RECT	4.5	360				20				

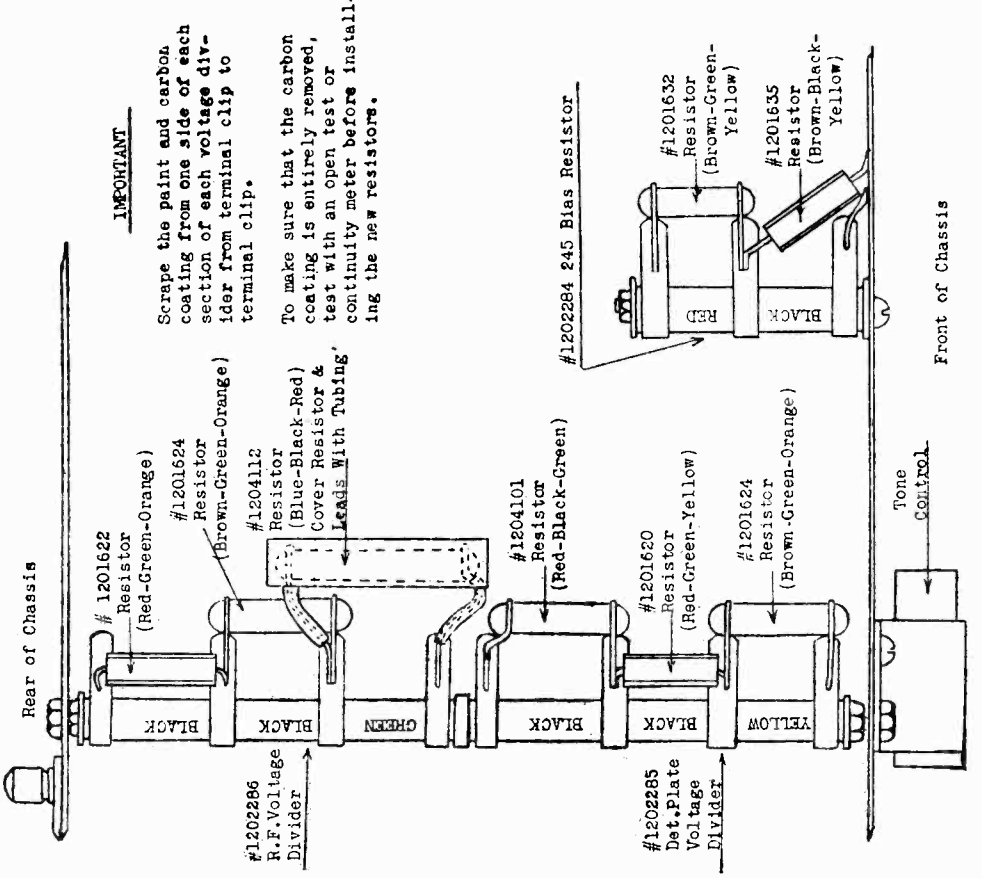
If Oscillation persists when a small aerial is used, connect a .0001 mfd condenser across the aerial and ground posts.

MODEL 110,180,190 GENERAL MOTORS RADIO CORP.
Divider Data

Instructions For Replacing the Voltage Dividers of Models 110, 180 and 190, Special Number 1, with Serial Numbers above 23156 MA and 1611 MB.

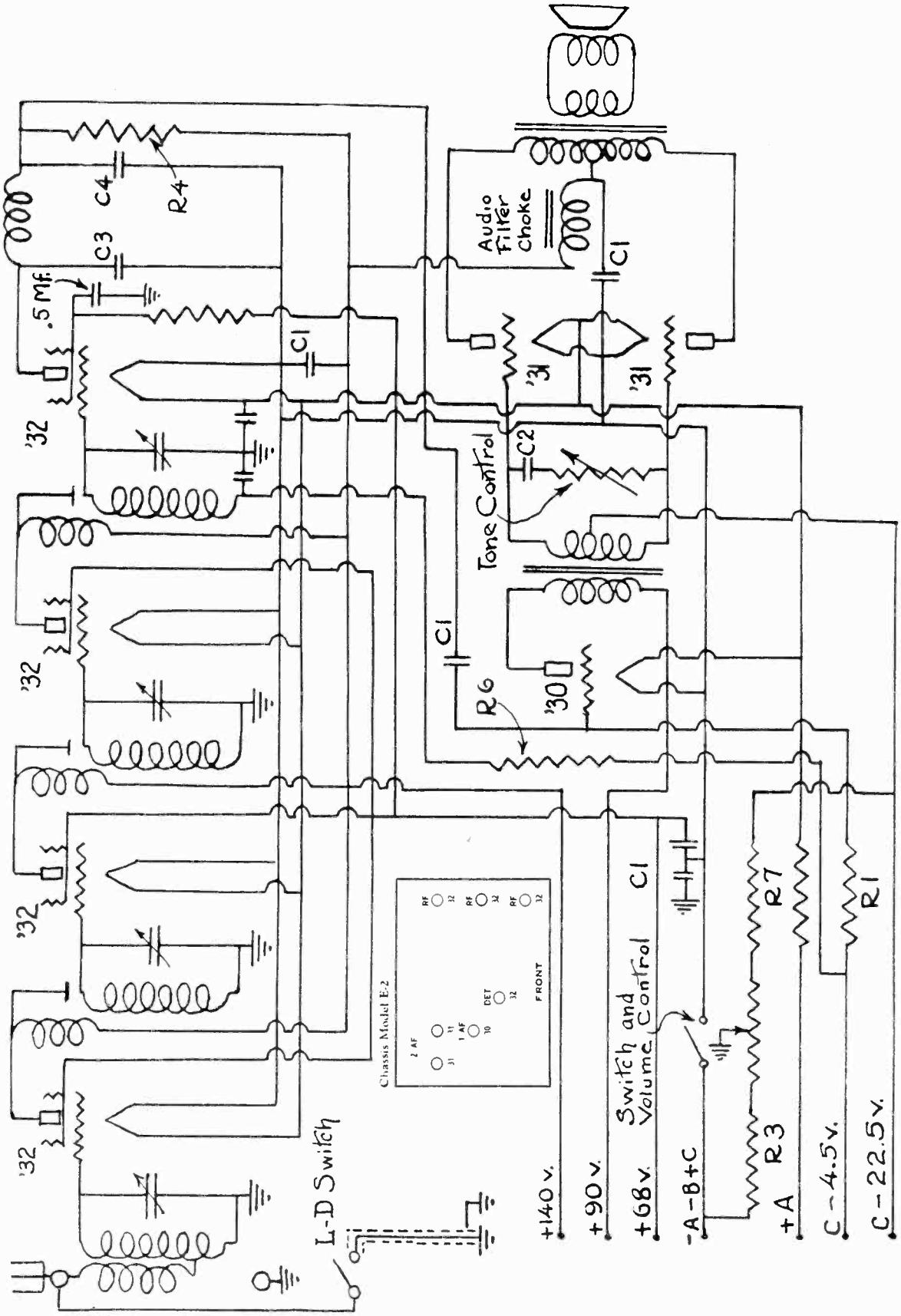


Instructions For Replacing the Voltage Dividers of Models 110, 180 and 190, Special Number 1, with Serial Numbers below 23157 MA and 1612 MB.



GENERAL MOTORS RADIO CORP.

MODEL 200, 201
(E-2)
Schematic



MODEL 200, 201
(E-2)
Voltage, Values

GENERAL MOTORS RADIO CORP.

RESISTORS

NO	BODY	END	HAND	RESISTANCE
R 1	Red	Black	Green	2,000,000
R 2	Green	Black	Yellow	500,000
R 3	Brown	Green	Yellow	150,000
R 4	Brown	Black	Yellow	100,000
R 5	Red	Green	Orange	25,000
R 6	Brown	Black	Orange	10,000
R 7	Lead from Terminal Strip to Det.Fil.			.75

CONDENSERS

NUMBER	CAPACITY
C-1	1 - .25 - .1 - .1 - .01
C-2	.002
C-3	.0005
C-4	.0001
C-5	.1

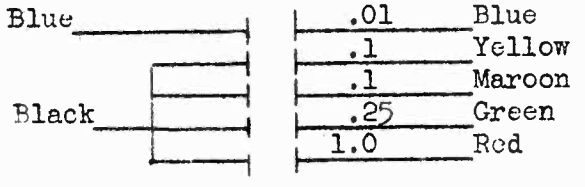
Capacities of C-1 Condenser are arranged as follows:

VOLTAGE TESTS

The following chart shows the approximate readings that should be obtained with any of the more reliable makes of Set Analyzers:

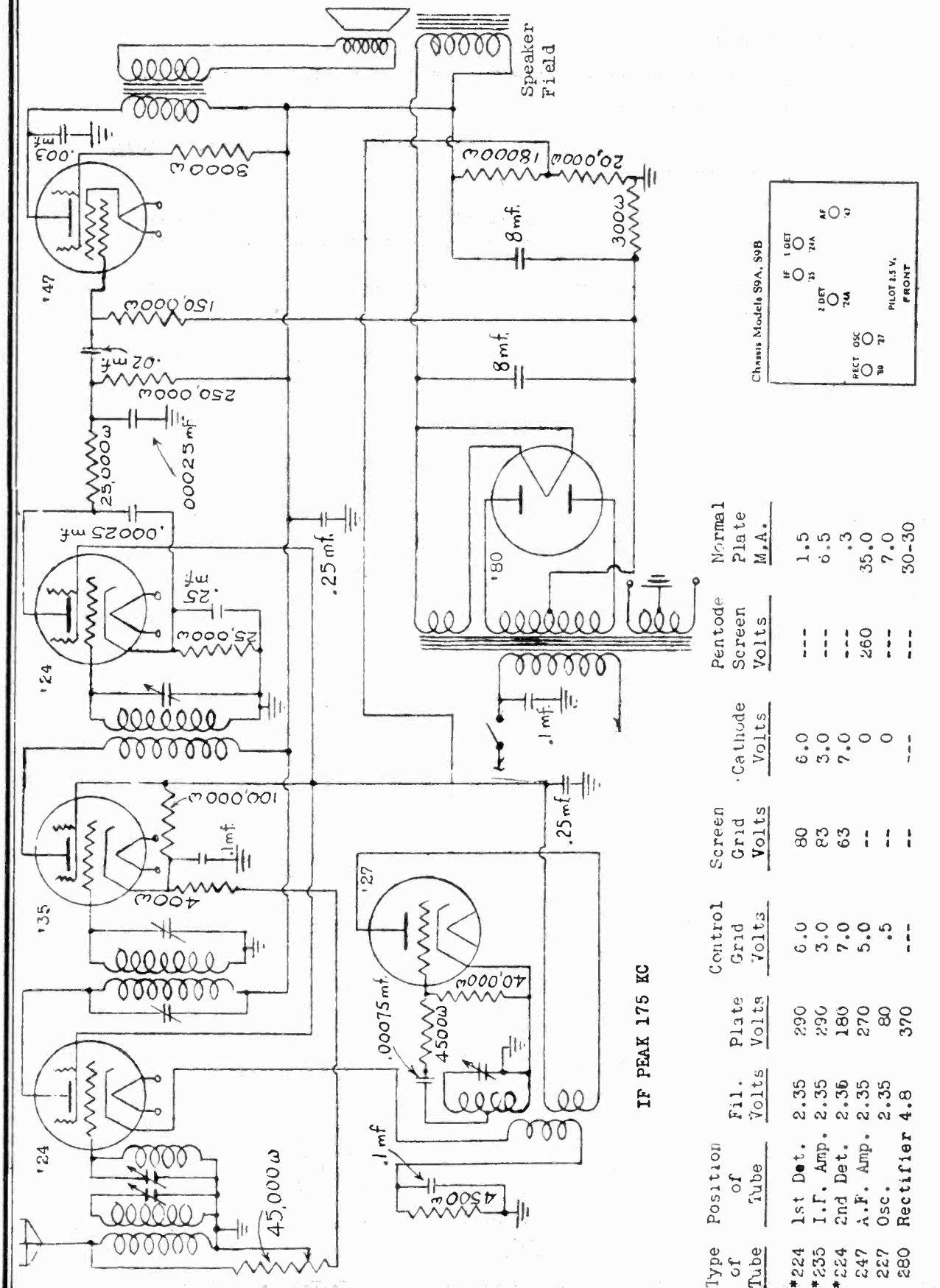
Type of Tube	Position of Tube	"A" Fil. Volts	"B" Plate Volts	"C" Control Grid Volts	Screen Volts	Normal Plate MA	Grid Change
232	1st R.F.	2	143	2	72	2	2.5
232	2nd R.F.	2	143	2	72	2	2.5
232	3rd R.F.	2	143	2	72	2	2.5
232	Detector	2	10	1	35	.2	.1
230	1st A.F.	2	90	---	--	2	3.5
231	2nd A.F.	2	135	19	--	5	20
231	2nd A.F.	2	135	19	--	5	20

Capacities of C-1 Condenser are arranged as follows:



GENERAL MOTORS RADIO CORP.

MODEL 211
(S-9A, S-9B)
Schematic



Type of Tube	Position of Tube	Fil. Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Pentode Screen Volts	Normal Plate M.A.
*224	1st Det.	2.35	290	6.0	80	6.0	---	1.5
*235	I.F. Amp.	2.35	290	3.0	83	3.0	---	6.5
*224	2nd Det.	2.36	180	7.0	63	7.0	---	.3
247	A.F. Amp.	2.35	270	5.0	--	0	260	35.0
227	Osc.	2.35	80	.5	--	0	---	7.0
280	Rectifier	4.8	370	---	--	---	---	30-30

Line voltage 113. Volume control on maximum.

MODEL 211
(S-9A,S-9B)
Trimmer Notes

GENERAL MOTORS RADIO CORP.

TRACKING PROCEDURE

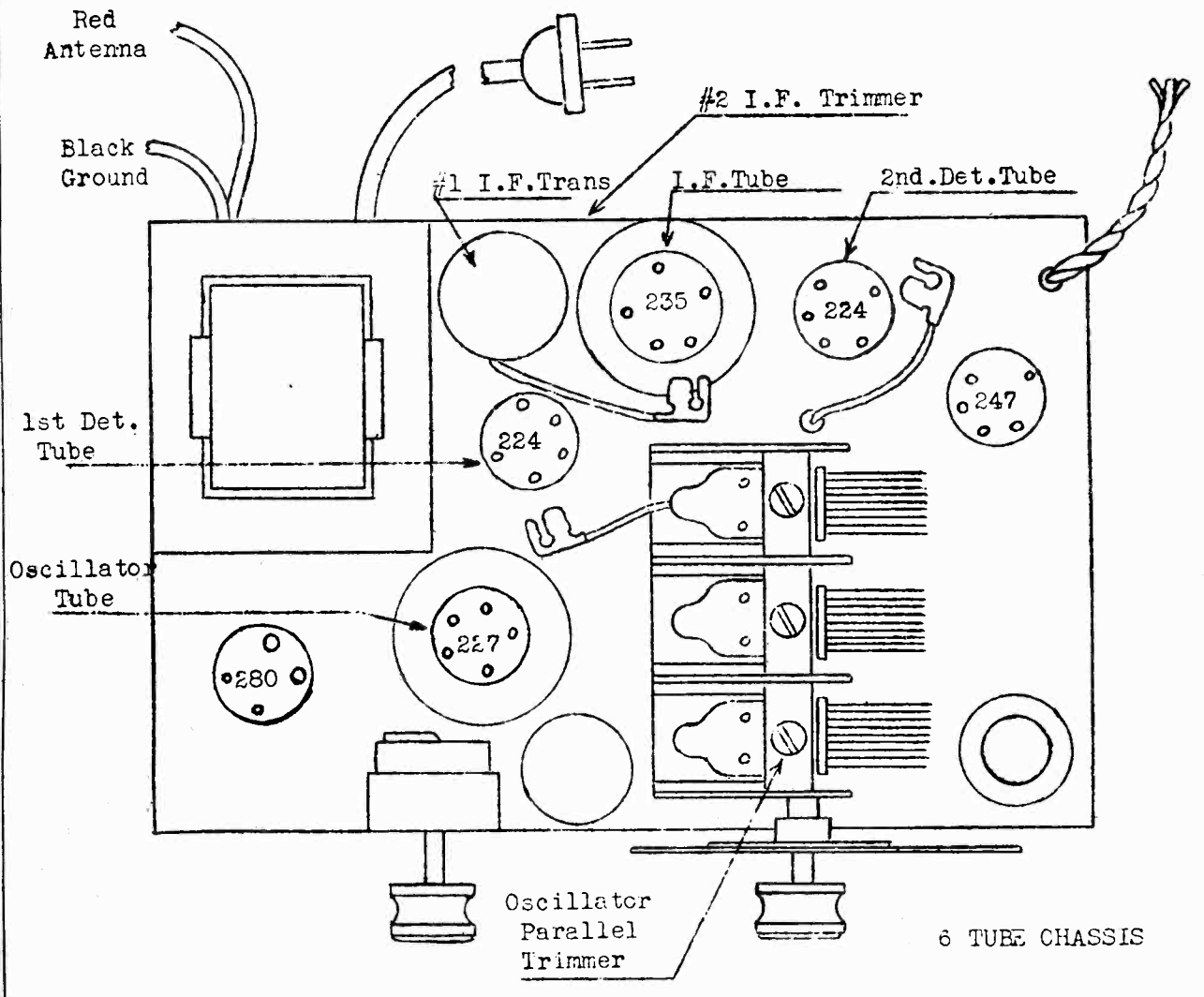
(1) Feed a signal of exactly 1400 K.C. into the chassis from the test oscillator.

(2) Adjust the oscillator parallel trimmer condenser to obtain a maximum output.

(3) Adjust the remaining parallel trimmer condensers located on top of the tuning condenser to obtain maximum output.

NOTE: Models S9A or S9B chassis do not employ an oscillator series trimmer condenser.

It is not necessary to make the tracking adjustment at 580 K.C. or 600 K.C.



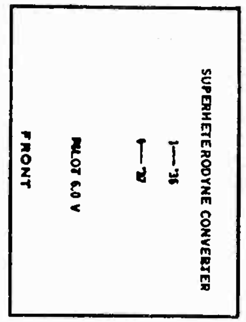
GENERAL MOTORS RADIO CORP.

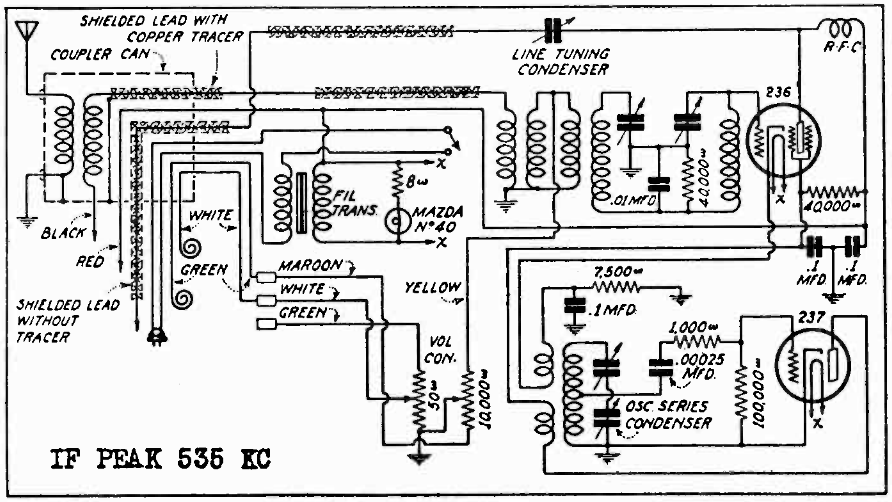
MODEL 281-(R-1A)
Converter
Schematic

The following is the table of voltages to be expected when the "B" supply voltage is 250 volts.

	Detector	*Oscillator*
Filament	6.7	6.7
Plate	240	70
Control Grid	10	1
Screen Grid	83	—
Cathode	10	1
Plate Current	1.5	5
Grid Test	1.0	0

Chassis Model R1A





Schematic diagram of the General Motors remote control converter which uses an impedance-matched transmission line between the converter and radio set

Referring to the schematic diagram shown herewith, it will be seen that provisions are made in the converter for supplying the heater voltage to the two tubes. Plate and screen voltages for these two tubes must be taken from the receiver with which the converter is used. This is the red lead, and should be connected to a point in the receiver supplying a voltage of 250. The black lead should connect to the ground post on receiver, and the shielded lead without tracer should connect to the antenna post on the receiver.

A green and a white lead are shown, with their ends twisted into the form of pigtails. These are used only when the volume control is also to be remotely operated, in which case the volume control in the converter is thrown into play.

All of the leads mentioned above, including the aerial and ground terminals, are in a special coupler unit which is ordinarily mounted in the receiver. The coupler can is indicated in the schematic diagram by the dotted lines. A transmission line leads from the coupler can to the converter, each end of the line having its impedance matched in transformers.

A four-prong adapter is provided with the converter for convenience in obtaining plate voltage from G.M. Models 120, 130, 140, 150 and 160 receivers, and a five-prong adapter for the 1931 G.M. superheterodyne receivers In each case the adapter should be plugged into the speaker socket and then the speaker plug placed into the adapter

Selector Dial Adjustment

Before attempting any tracking operation on the converter if it is out of adjustment, it is necessary to adjust the selector dial with respect to the rotor plates of the tuning condenser, as follows:

(1) Remove the cover from the converter unit and loosen the two set screws which hold the selector dial on the condenser shaft.
(2) Turn the tuning condenser by hand as far as it will go in a clockwise direction (the plates will then be fully in mesh).
(3) Replace the converter unit cover and, with the selector loose on the condenser shaft, turn the selector in a clockwise direction until the 56 line on the scale lines up with the right edge of the selector window. Tighten the set screws with the selector in this position.
(4) Carefully remove the converter unit cover and check the position of the tuning condenser rotor to be sure that it has not been moved, and replace the cover.
(5) Set the selector of the receiver at 535 kc. and go ahead with the tracking procedure.

Tracking Procedure

(1) Turn on both the converter and the receiver
(2) Feed a signal of exactly 1,400 kc. into the chassis from a test oscillator.
(3) Set the converter selector at exactly 140 and then remove the cover, being careful not to change the selector setting.
(4) Adjust the oscillator *parallel* trimmer condenser to obtain a maximum output in the output-meter. This trimmer is on top of the rear gang condenser and should be adjusted with a fibre screw driver
(5) Adjust the remaining parallel trimmer condensers (on top of the next two gang condensers) and also the line trimmer condenser which will be found on the chassis to the right of the gang condenser shaft. All these condensers should be adjusted for maximum output.
(6) Change the test oscillator signal to 580 kc. (Since it is impossible to obtain 580 kc. with some test oscillators, it may be necessary to set the oscillator at 600 kc., in which case the converter selector dial would be set at 60.)
(7) Place the converter unit cover in position and set the selector at 58 or 60 as the case may be, as explained above. Then remove the cover, being careful not to change the setting of the selector.
(8) Adjust the oscillator *series* condenser with a fibre screw driver, for maximum output. This condenser adjusting screw will be found on the chassis to the right of the rear gang condenser
(9) Turn the selector back to the position given in paragraph (3) and change the test oscillator signal to 1,400 kc.
(10) Re-peak the oscillator *parallel* trimmer condenser only. Do not change the position of the oscillator series condenser after it has been peaked at 580 kc. or 600 kc.

GENERAL MOTORS RADIO CORPORATION RECEIVERS,
Models 110, 160 and 190

For 1930 Little General, Models 110, 180 and 190, which have speaker plugs, disassemble the adapter and change the red lead from one small prong to the other. To disassemble the adapter plug remove the screw in the top and unsolder all four leads inside the prongs. Then plug the adapter into the speaker socket and insert the speaker plug into the adapter.

If the above models do not have speaker plugs, remove the chassis from the cabinet and solder a lead to the terminal of the voltage divider to which is soldered the black lead from the speaker cable. Bring this lead out the rear of the chassis and, after removing the adapter, solder it to the red lead from the coupler. Be sure that the splice between this lead and the red lead is well insulated.

GENERAL MOTORS RADIO RECEIVERS
Models 216, 217, 219 and 250

For the 1931 model seven tube Superheterodyne receivers, remove the insulation from the splice in the speaker cable and solder the end of the red wire from the coupler (from which the four prong adapter has been removed) to the yellow wire in the speaker cable. Be sure to re-insulate the splice in the speaker cable after this connection has been made.

GENERAL MOTORS RADIO RECEIVER,
Model 251

For the 1931 model eight tube Superheterodyne receiver, remove the four prong adapter from the red wire leading from the coupler. Then disassemble the five prong adapter and connect the red lead as shown in Figure 2.

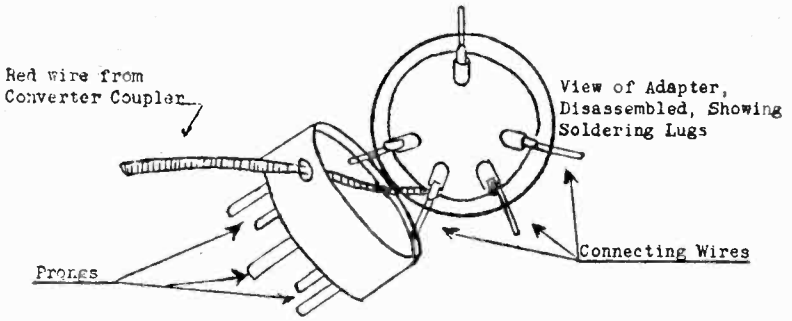


FIGURE 2.

When re-assembling the adapter, be sure that all connecting wires are well soldered in the prongs of the adapter.

GENERAL MOTORS RADIO RECEIVERS,
Models 252, 253, 254, 255, 256, 257, 258, 290 and 291

For the 1931 model ten tube receivers remove the four prongs adapter from the red wire leading from the coupler. Then disassemble the five prong adapter and connect the red lead as shown in Figure 3.

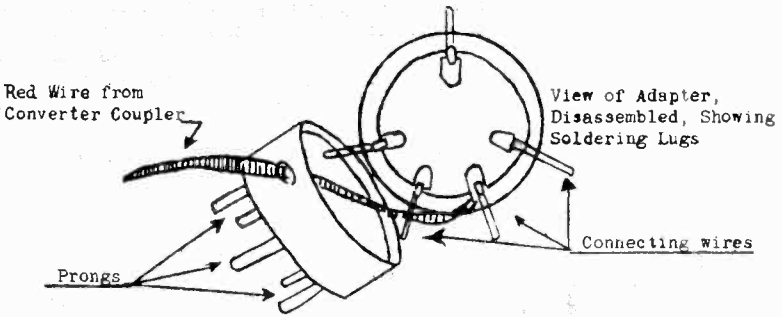


FIGURE 3.

When re-assembling the adapter, be sure that all connecting wires are well soldered in the prongs of the adapter.

RECEIVERS OTHER THAN GENERAL MOTORS RADIO

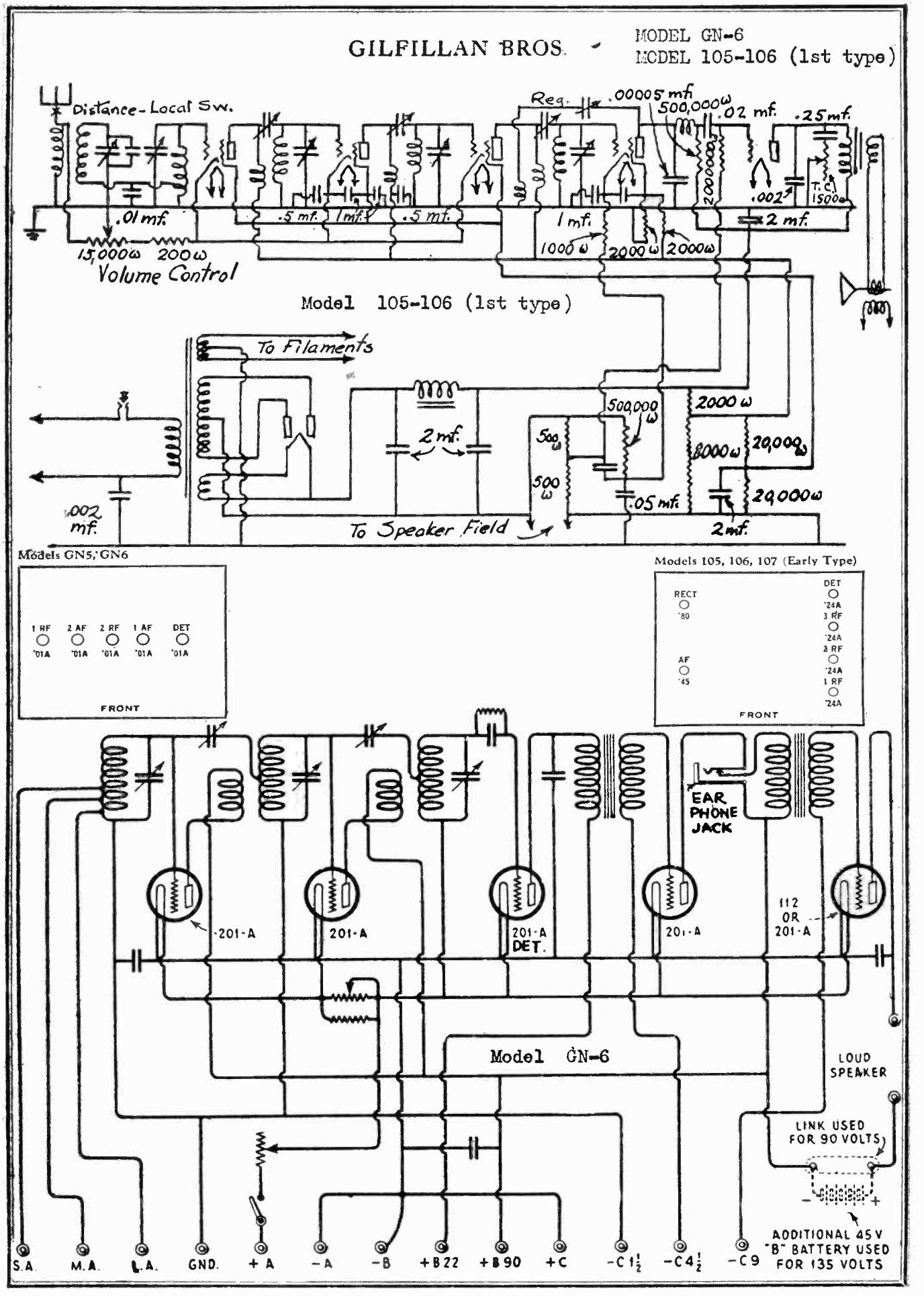
Many receivers use a plug to connect the speaker to the chassis and in most cases it is a simple matter to make the connections to the source of plate voltage on the proper prong of the plug, which must be determined by test.

If there is no speaker plug, or if the proper plate voltage (positive with respect to ground) is not found at the speaker plug, some other point for obtaining the plate voltage supply can be found in the receiver chassis. For instance; the chassis should be removed from the cabinet and connection made to a suitable point on the voltage divider system where from 135 to 250 volts (Preferably 250 volts) of filtered D.C. is available.

CAUTION: Do not make the connection to the plate terminal of any tube socket, nor to the prong of the speaker plug which connects to the plate of the output tubes.

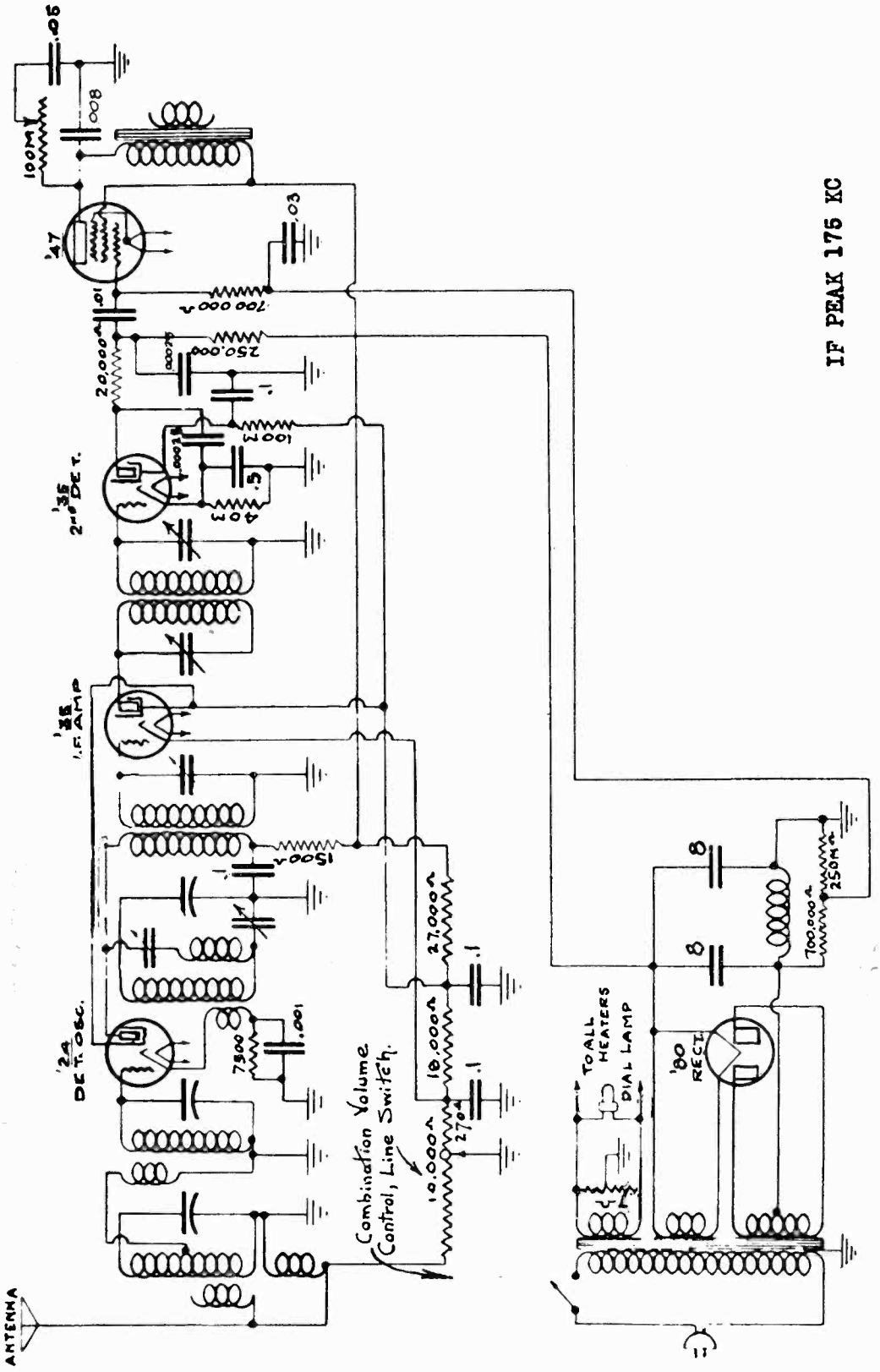
"A" VOLTAGE OR FILAMENT SUPPLY:

The Superheterodyne converter has, built in the base, a transformer which supplies current to heat the filaments of the two tubes in the converter. The transformer is connected to the A.C. line by inserting the power cord and plug attached to the coupler into a convenient light socket or wall receptacle near the receiver, preferably in the same one to which the receiver is connected if it is a double outlet. If only a single outlet is available, connect to the receiver and to the Superheterodyne converter by means of a two way socket.



MODEL HS-3

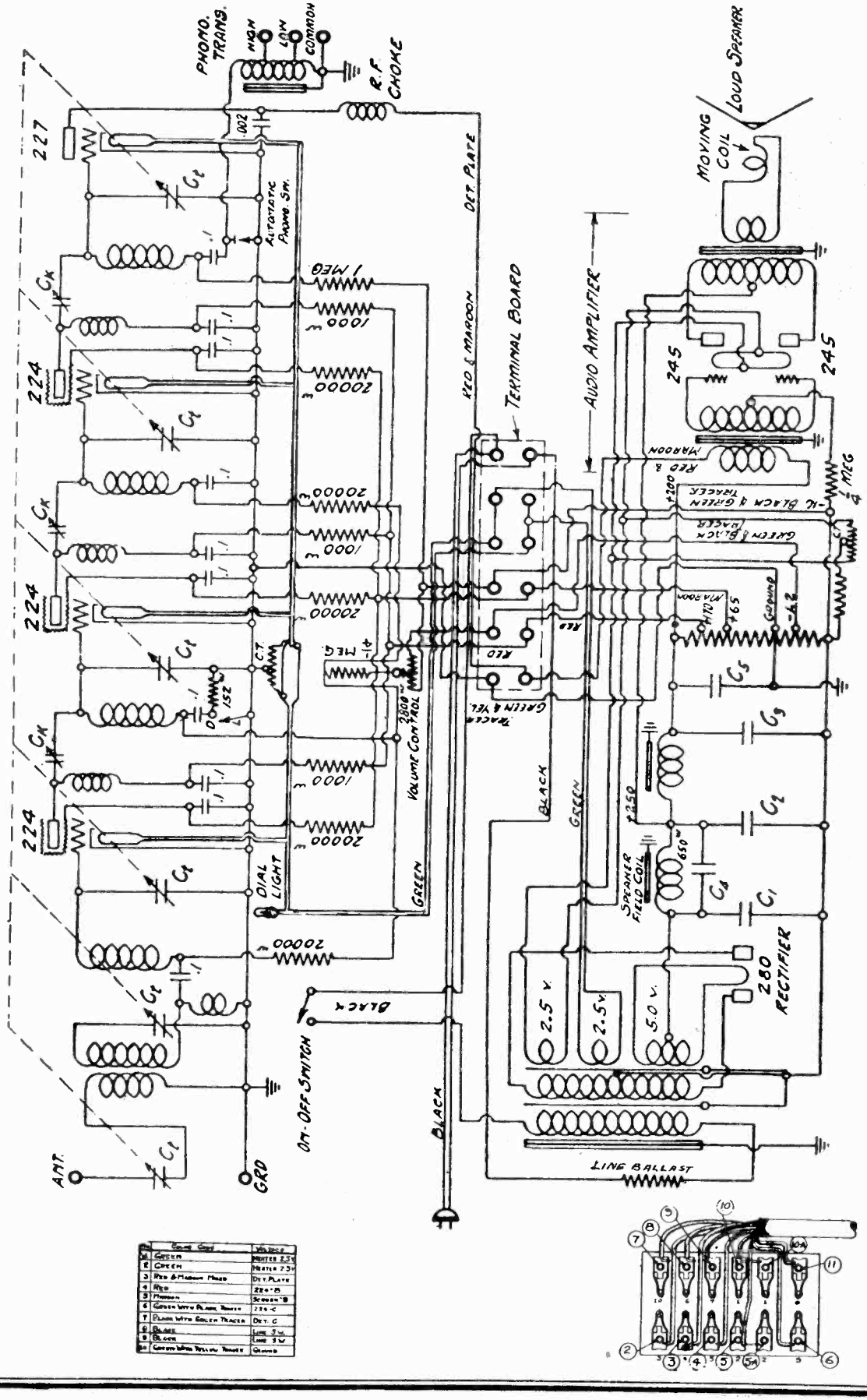
A. H. GREBE & CO.



IF PEAK 175 KC

MODEL Synchrophase SK-4
Late Model
Schematic

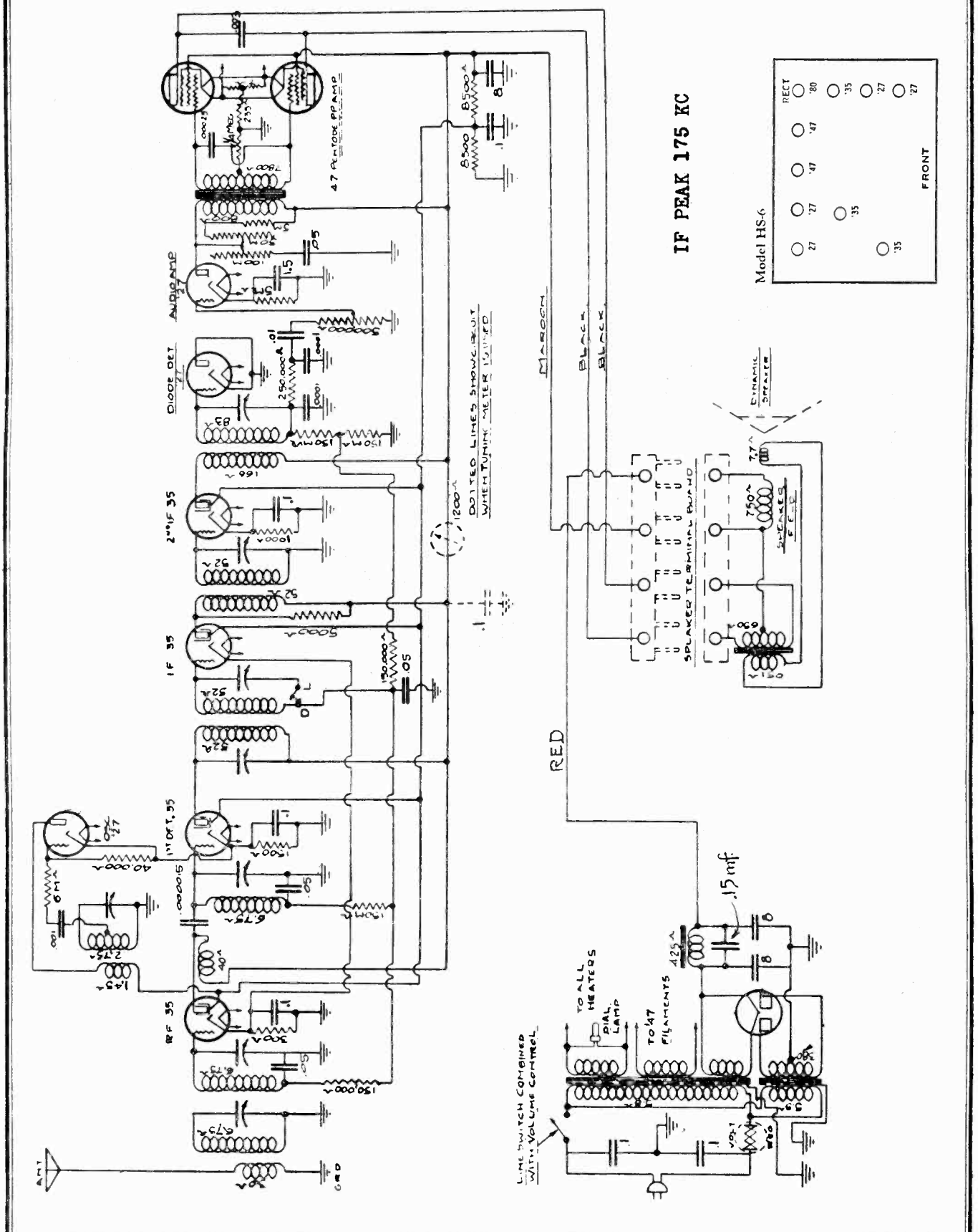
A. H. GREBE & CO.



GREBE SYNCHROPHASE SK-4 Late Model

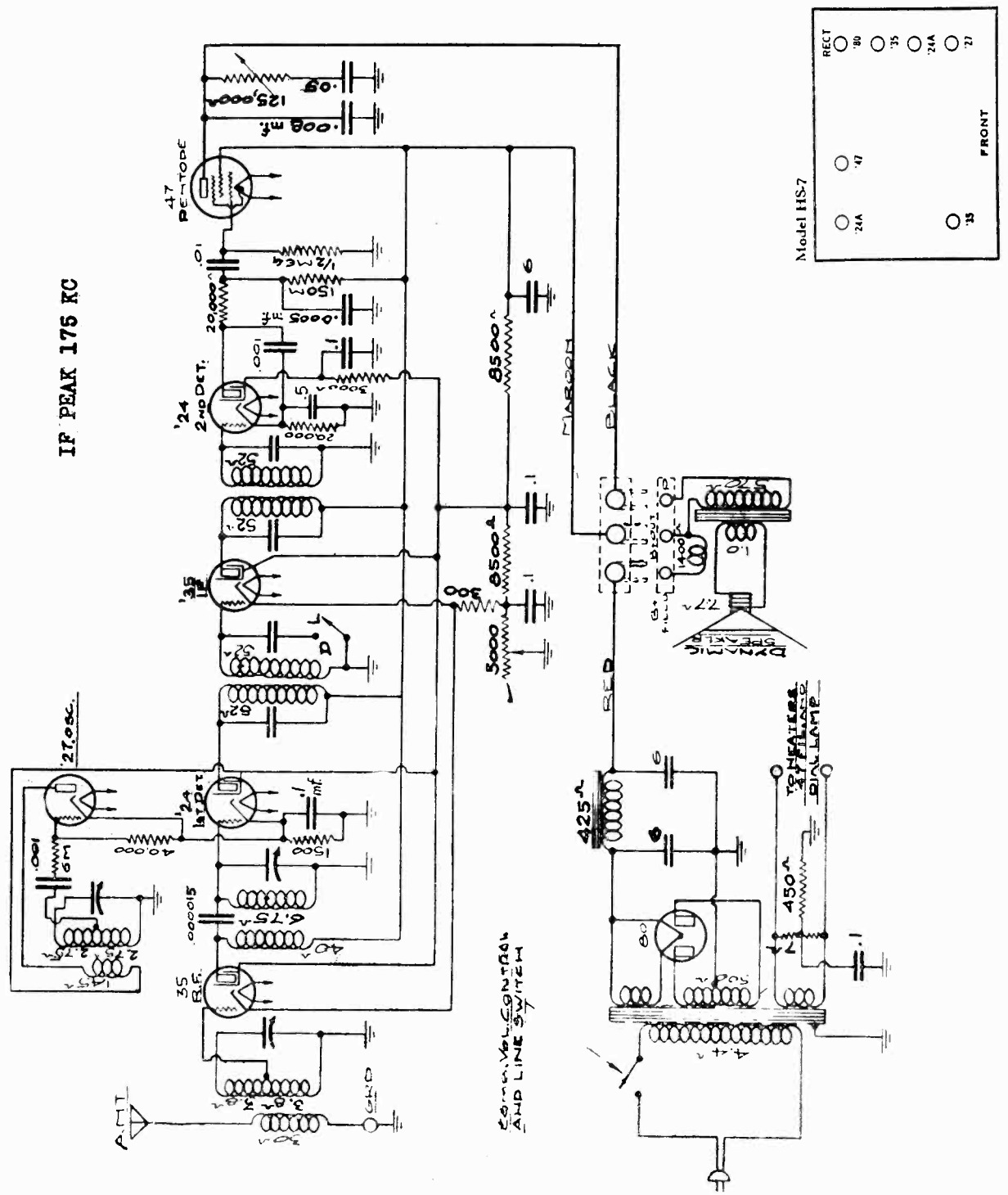
A. H. GREBE & CO.

MODEL HS-6



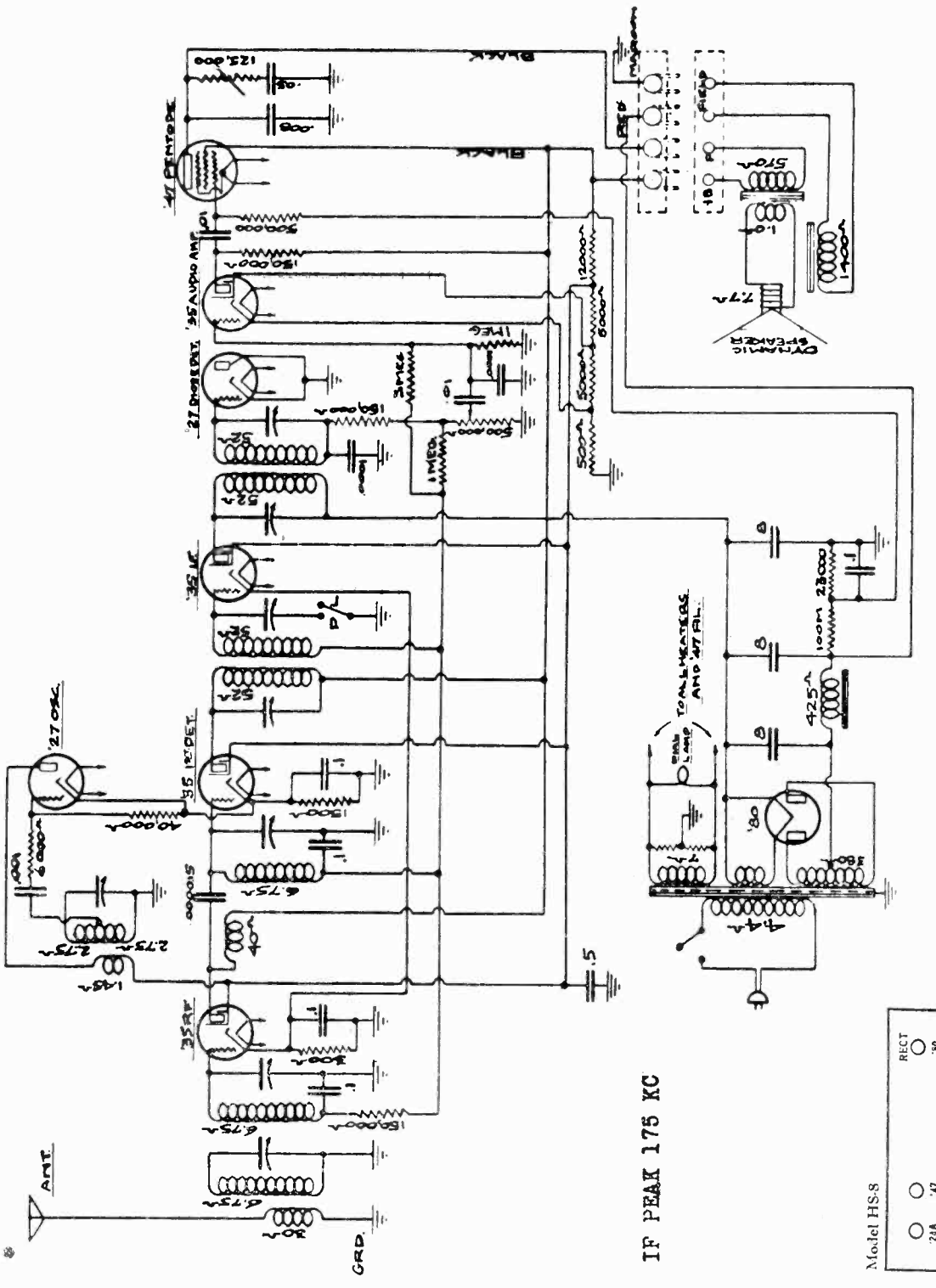
MODEL HS-7

A. H. GREBE & CO.



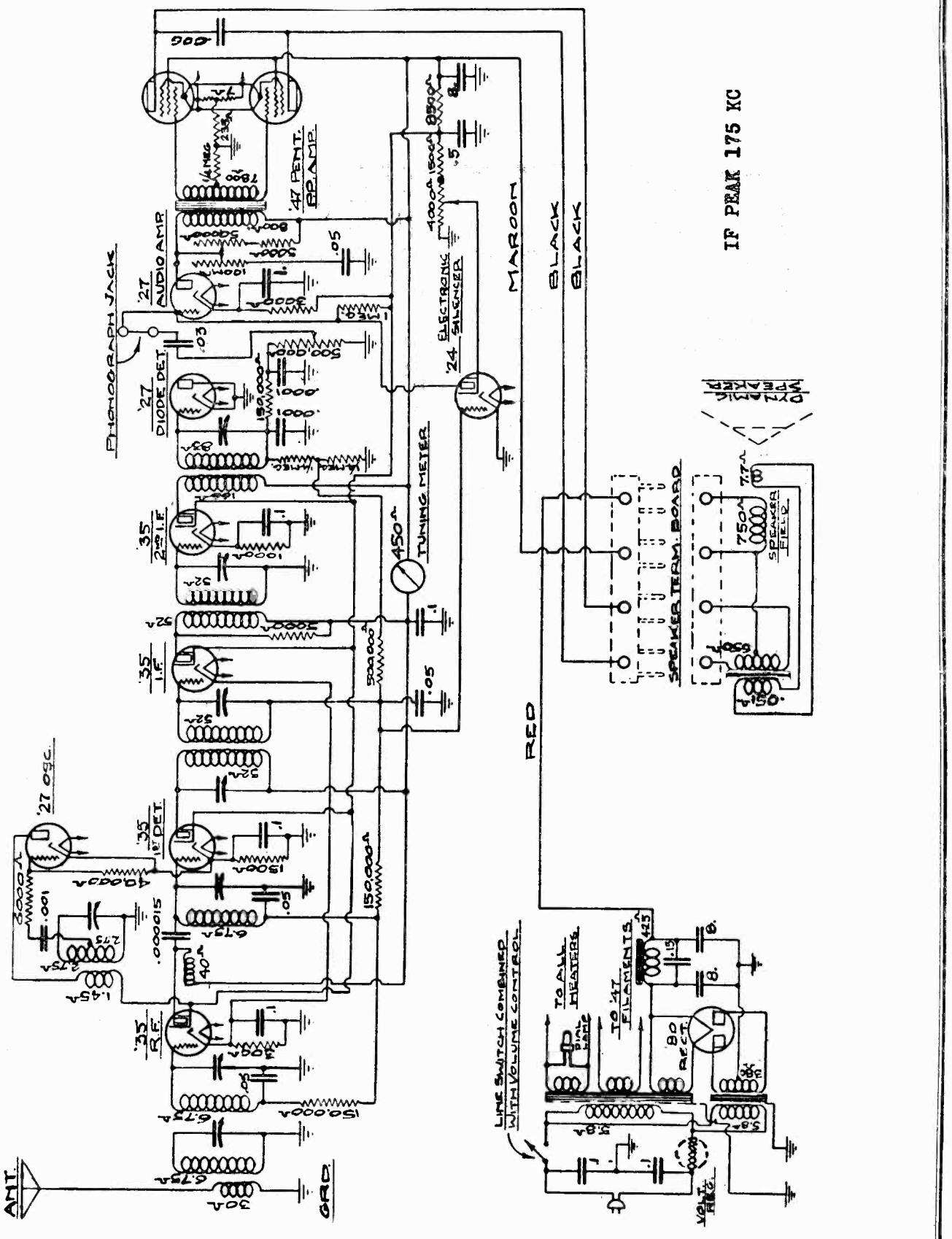
A. H. GREBE & CO.

MODEL HS-8



MODEL HS-12

A. H. GREBE & CO.



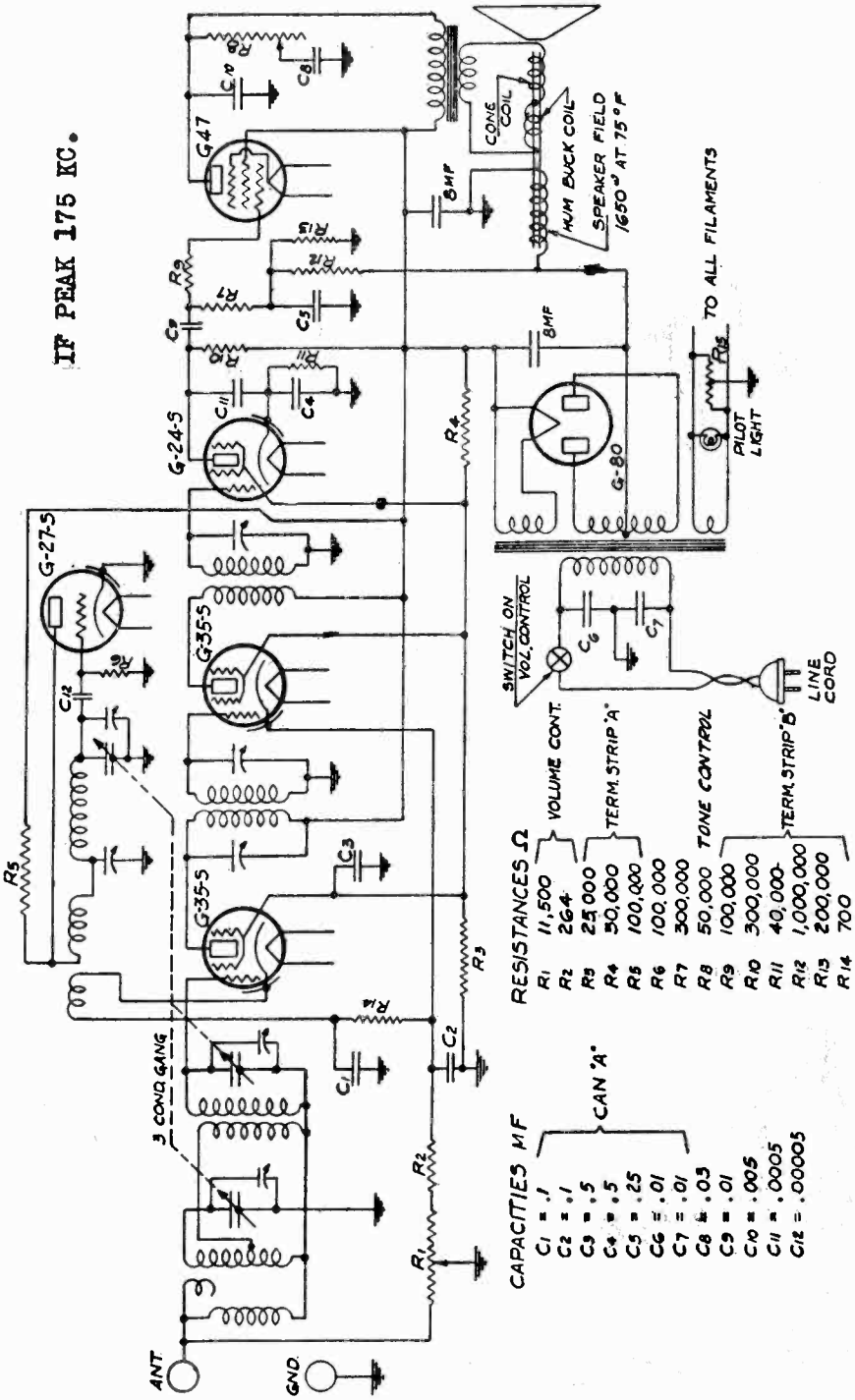
GRIGSBY - GRUNOW CO.

MODEL 55
Schematic

SCHEMATIC DIAGRAM OF MAJESTIC SCREEN GRID SUPERHETERODYNE RECEIVER

MODEL 55 CHASSIS — 115 VOLTS 50-60 CYCLES 70 WATTS

IF PEAK 175 KC.



Color Code of Power Transformer

Start of Primary	Yellow
Finish of Primary	Yellow
Start of 5 volt filament	Black
Finish of 5 volt filament	Black
Start of 2.5 volt heater	Yellow
Finish of 2.5 volt heater	Yellow
Start of Anode	Yellow
Center tap of Anode	Black
Finish of Anode	Red

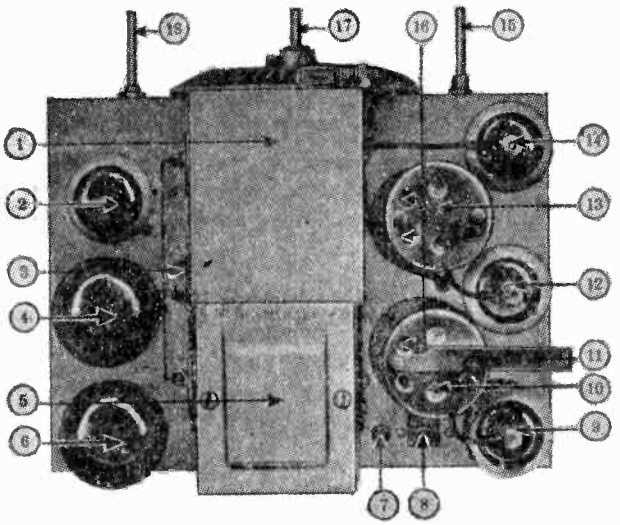
Model G-10-D Dynamic Speaker

The Model G-10-D dynamic speaker used with the Model 55 chassis has a field resistance of 1650 ohms at 75° F. The field structure of this speaker is of heavy "U" construction like that of the Model G-10-B dynamic speaker. The special light weight cone assembly used in conjunction with this speaker is also the same as used on the Model G-10-B Dynamic Speaker.

Model 55 Chasis Is Employed in the Ardmore, Berkshire and Viking Models.

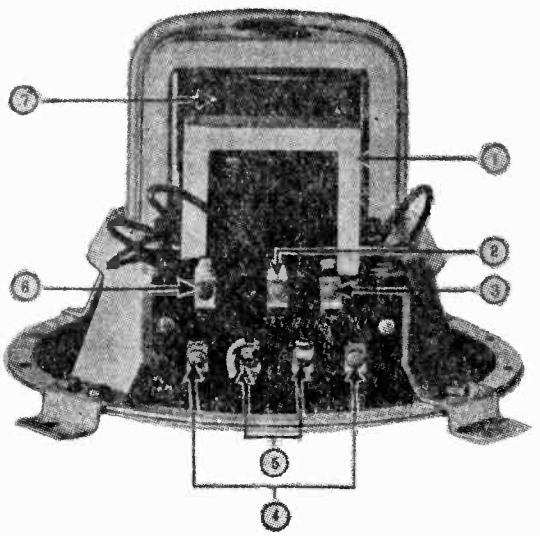
MODEL 55
Chassis Views

GRIGSBY-GRUNOW CO.



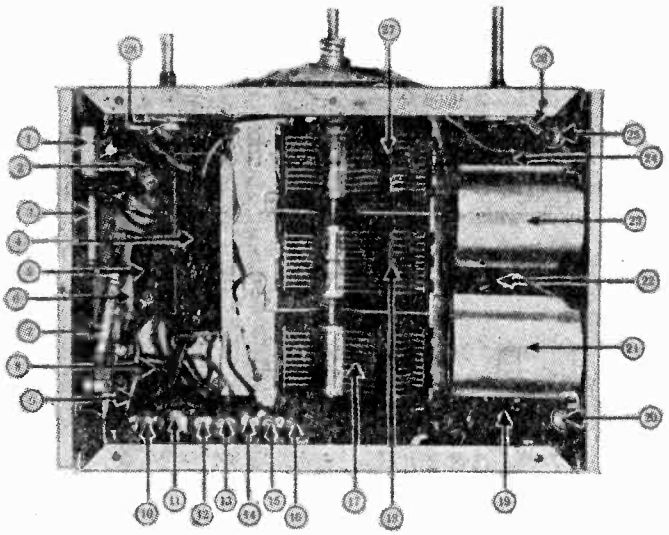
Top View of Model 55 Chassis

1. Condenser Bank
2. G-27-S Oscillator Tube
3. R. F. Aligning Condensers
4. G-80 Rectifier Tube
5. Power Transformer
6. G-47 Pentode Tube
7. Ground Terminal
8. Antenna Terminal
9. G-24-S 2nd Detector Tube
10. 2nd I. F. Transformer
11. Shield
12. G-33-S I. F. Tube
13. 1st I. F. Transformer
14. G-35-S 1st Detector Tube
15. Volume Control and Line Switch
16. I. F. Aligning Condensers
17. Tuning Control
18. Acoustic Control



Model G-10-D Speaker Employed in Ardmore, Berkshire and Viking Models

1. Output Transformer
2. Output Secondary and Hum Buck Coil Junction
3. B Positive and Primary of Output Transformer Junction (Red)
4. Field Coil Terminals (Black—Blue)
5. Voice Coil Terminals
6. Primary Plate Lead Terminals (Yellow)
7. Field Coil



Interior View of Model 55 Chassis

1. Oscillator Tracking Condenser
2. G-27-S Oscillator Tube Socket
3. 25,000 ohm Resistor R_1
4. By Pass Condenser Assembly
5. G-35-S I. F. Amplifier Tube Socket
6. 100,000 ohm Resistor R_2
7. 30,000 ohm Resistor R_3
8. G-35-S Second Detector Tube Socket
9. .0005 mfd. Condenser C_{11}
10. 40,000 ohm Resistor R_{11}
11. 700 ohm Resistor R_{14}
12. 300,000 ohm Resistor R_{15}
13. 100,000 ohm Resistor R_4
14. 300,000 ohm Resistor R_7
15. 1,000,000 ohm Resistor R_{13}
16. 200,000 ohm Resistor R_{16}
17. Oscillator Tuning Condenser
18. Antenna Tuning Condenser
19. G-47 Audio Tube Socket
20. .005 mfd. Condenser C_7
21. R. F. Coil
22. G-80 Rectifier Tube Socket
23. Antenna Coil
24. 100,000 ohm Resistor R_8
25. .03 mfd. Condenser C_8
26. Volume Control R_5 and R_6
27. R. F. Tuning Condenser
28. Tone Control and Line Switch R_9

MODEL 55 CHASSIS
TABLE OF VOLTAGE AND CURRENT READINGS

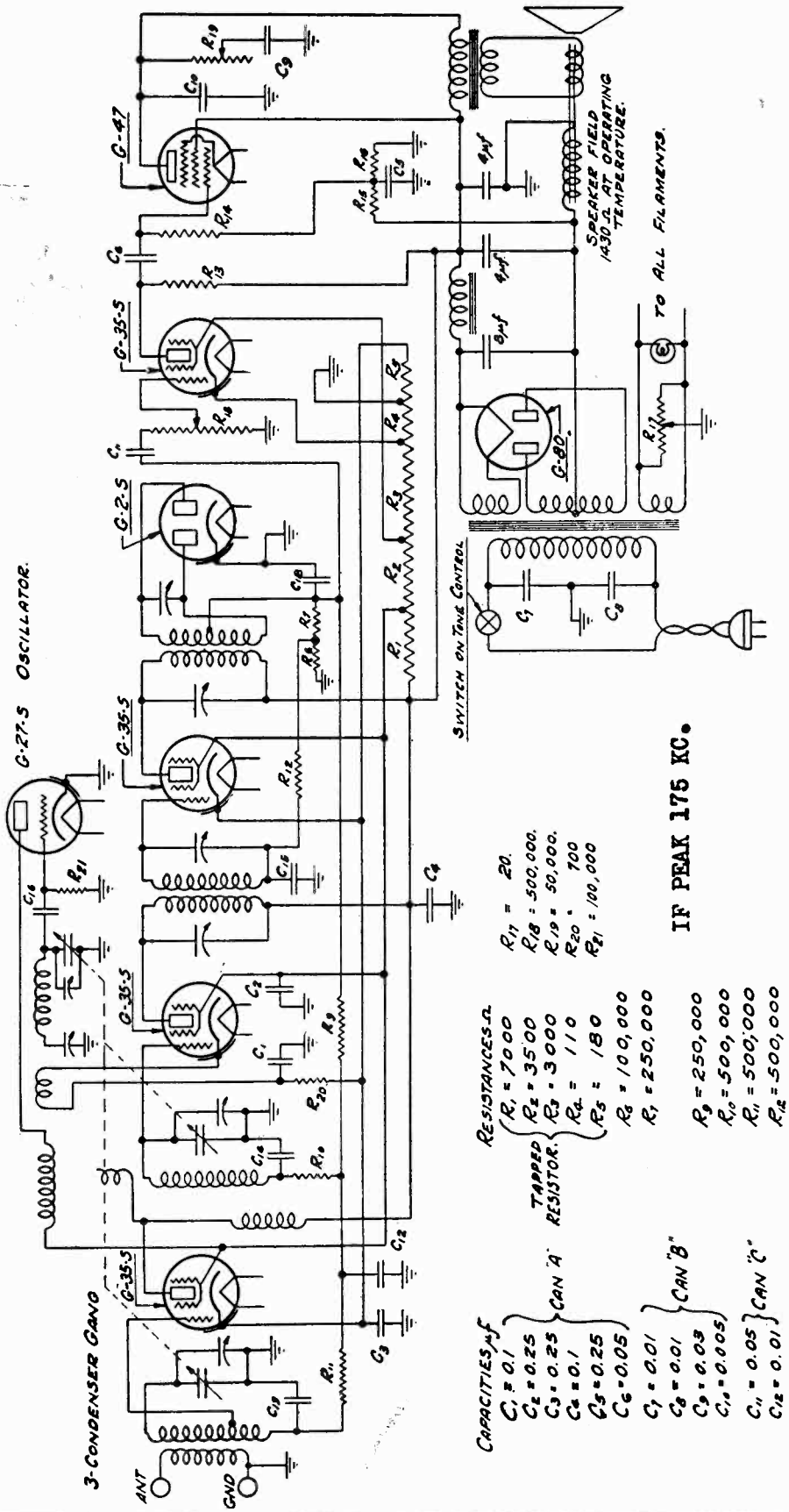
ALL D. C. VOLTAGE READINGS ARE TO GROUND

Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A. D. C.	Screen Voltage D. C.
G-27-S	2.5	65	.01	0	3.4	
G-35-S	2.5	265	.01	6	3.5	85
G-35-S	2.5	265	.01	2	10.5	85
G-24-S	2.5	85	.01	10	.4	85
G-47	2.5	250	.01		.35	265
G-80	5.0		265		65 Total	

LINE VOLTAGE—115 VOLTS VOLUME CONTROL—MAXIMUM

MODEL 200
Schematic

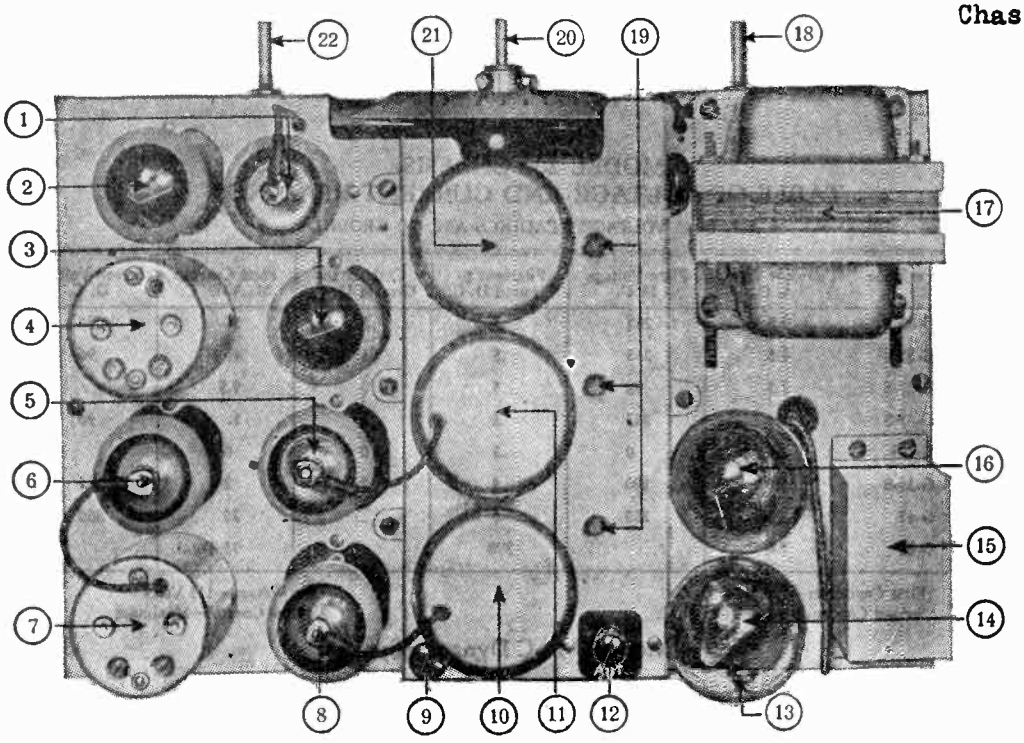
GRIGSBY - GRUNOW CO.



Model 200 Chassis Is Employed in the Sheffield, Fairfax and Explorer Models.

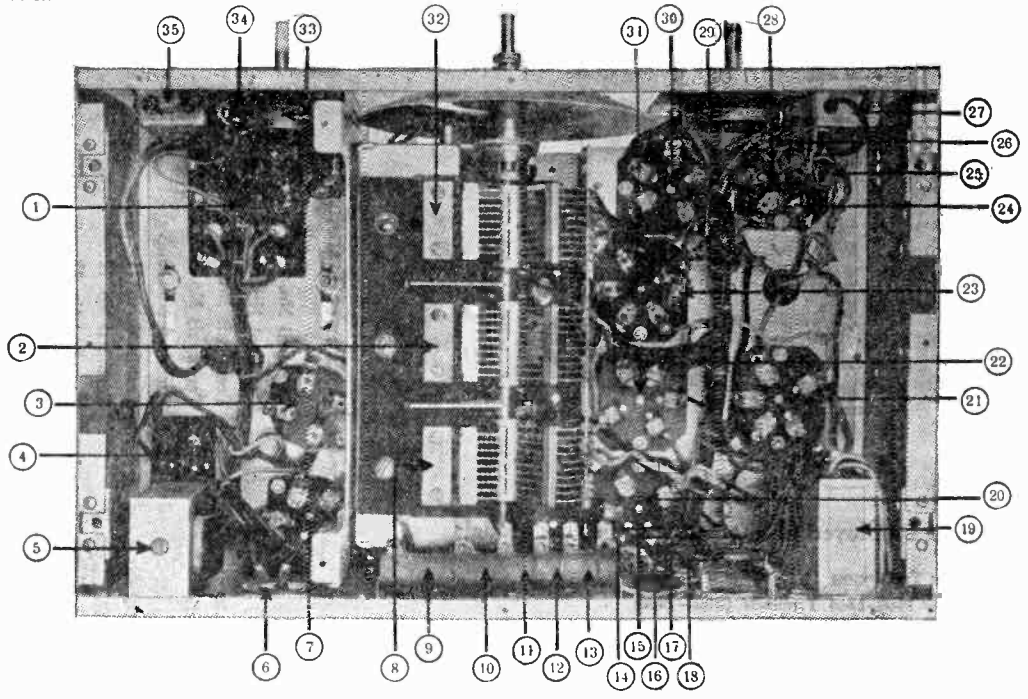
GRIGSBY - GRUNOW CO.

MODEL 200
Chassis Views



Top View of Model 200 Chassis

1. G-35-S 1st Audio Tube
2. G-2-S 2nd Detector Tube
3. G-27-S Oscillator Tube
4. 2nd I. F. Transformer
5. G-35-S 1st Detector Tube
6. G-35-S 1st I. F. Tube
7. 1st I. F. Transformer
8. G-35-S R. F. Tube
9. Ground Terminal
10. Antenna Coil
11. R. F. Coil
12. Antenna Terminal
13. Hum Adjustment
14. G-47 Pentode Tube
15. Filter Condenser
16. G-80 Rectifier Tube
17. Power Transformer
18. Line Switch and Acoustic Control
19. Gang Cond. Aligning Condensers
20. Tuning Control
21. Oscillator Coil
22. Volume Control



Interior View of Model 200 Chasis

1. Power Transformer
2. 1st Detector Tuning Condenser
3. G-80 Tube Socket
4. One 8 mfd. and Two 4 mfd. Electrolytic Filter Condenser
5. Filter Choke
6. Hum Control R_{17}
7. G-47 Tube Socket
8. Antenna Tuning Condenser
9. 7,000 ohm Resistance R_1
10. 3500 ohm Resistance R_2
11. 3000 ohm Resistance R_3
12. 110 ohm Resistance R_4
13. 180 ohm Resistance R_5
14. 200,000 ohm Resistor R_{16}
15. 1,000,000 ohm Resistor R_{13}
16. 300,000 ohm Resistor R_{14}
17. 700 ohm Resistor R_{20}
18. 100,000 ohm Resistor R_{22}
19. By-Pass Condenser Assembly Can A
20. G-35-S R. F. Amplifier Tube Socket
21. G-35-S I F Amplifier Tube Socket
22. G-35-S First Detector Tube Socket
23. 100,000 ohm Resistor R_{21}
24. 250,000 ohm Resistor R_8
25. 100,000 ohm Resistor R_6
26. 250,000 ohm Resistor R_7
27. Condenser Assembly Can C
28. G-2-S Second Detector Tube Socket
29. Volume Control R_{18}
30. G-35-S First Audio Amplifier Tube Socket
31. G-27-S Oscillator Tube Socket
32. Oscillator Tuning Condenser
33. Tone Control and Line Switch R_{19}
34. Oscillator Tracking Condenser
35. Audio Condenser Assembly Can B

MODEL 200
Voltage-Data

GRIGSBY - GRUNOW CO.

MODEL 200 CHASSIS
TABLE OF VOLTAGE AND CURRENT READINGS

ALL D. C. VOLTAGE READINGS ARE TO GROUND

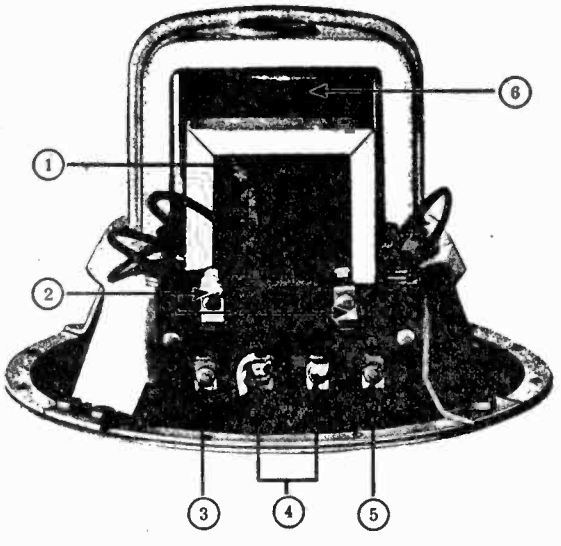
Tube Purpose	Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A.-D. C.	Screen Voltage D. C.	Screen Current M. A.-D. C.
R. F.	G-35-S	2.5	255	.5	3	5.	96	.1
1st Det.	G-35-S	2.5	255	.5	11	4.	96	.4
Osc	G-27-S	2.5	98	.5	0	9.5		
I. F.	G-35-S	2.5	255	.5	3	1.	96	.8
2nd Det	G-2-S	2.5	0	.5	0	0		
1st Aud.	G-35-S	2.5	100	.5	2	2	44	.4
Power Amp.	G-47	2.5	250	.5		25	260	6
Rectifier	G-80	5.0		290		75 Total		

First Condenser—290 Volts D. C.
Second Condenser—260 Volts D. C.

Line Voltage—115 Volts
Volume Control—Maximum

Model G-11-C Dynamic Speaker

The Model G-11-C Dynamic Speaker has a field resistance of 1430 ohms at operating temperature. The field structure is of heavy "U" construction mounted on a 6" base which is also used as a case for the output transformer The cone assembly is the same as used on the G-11-B Dynamic Speaker



Model G-11-C Speaker Employed in Sheffield and Fairfax Models

1. Output Transformer
2. Primary Plate Lead Terminals (Blue—Blue)
3. Field Coil Terminal (Black)
4. Voice Coil and Output Secondary Junction
5. Field Coil and Primary Tap Junction (Red)
6. Field Coil

Color Code of Power Transformer

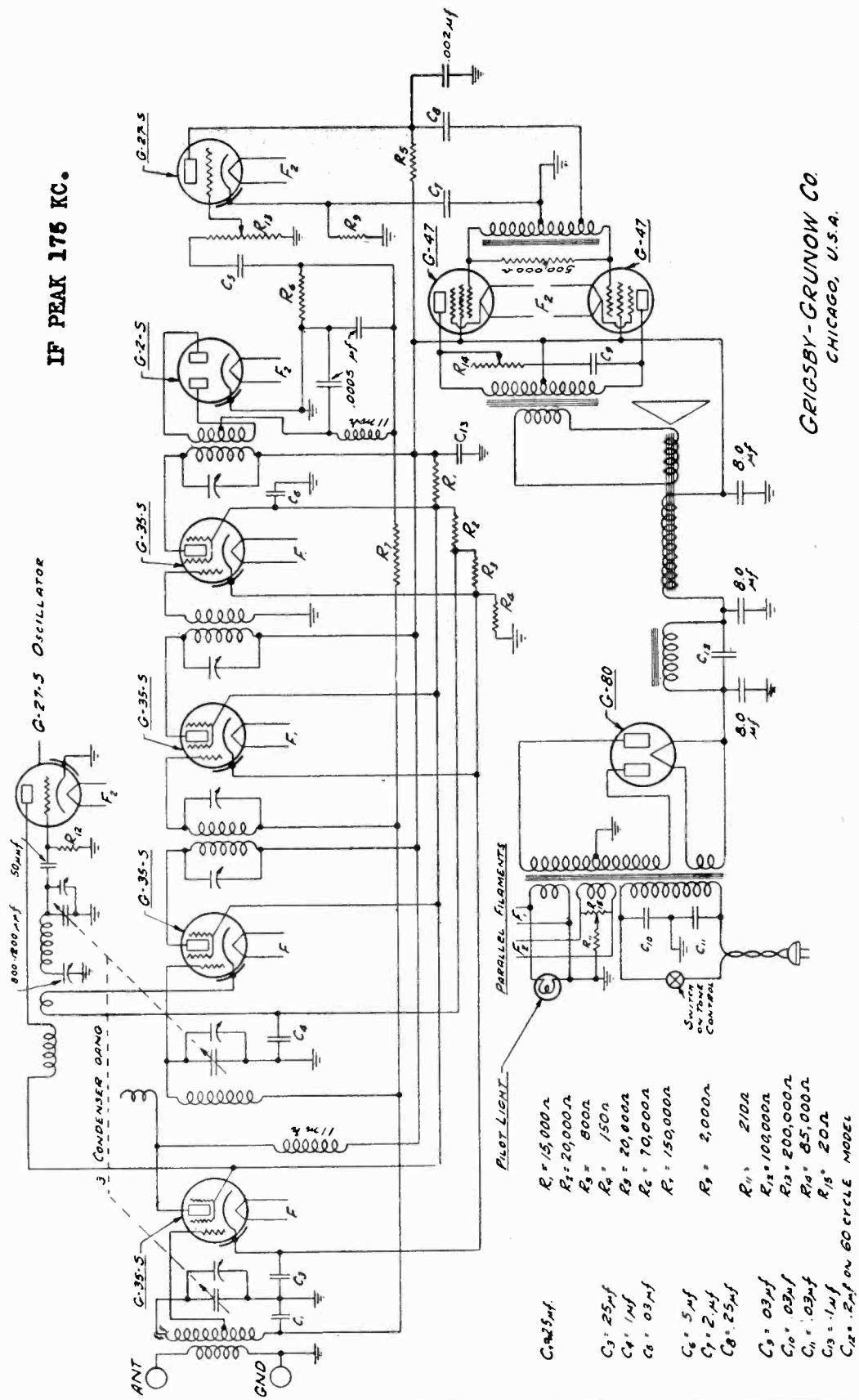
Primary	Terminal No. 1	Yellow
Primary	Terminal No. 3	Yellow
2.5 volt heater	Terminals No. 4 and 7	Black
2.5 volt heater	Terminals No. 6 and 9	Black
Anode	Terminal No. 10	Red
Anode center tap	Terminal No. 11	Black
Anode	Terminal No. 12	Red
5 volt filament	Terminal No. 13	Black
5 volt filament	Terminal No. 15	Black

GRIGSBY-GRUNOW CO.

MODEL 210
Schematic

SCHEMATIC DIAGRAM OF MAJESTIC SCREEN GRID SUPERHETERODYNE
AUTOMATIC VOLUME CONTROL RECEIVER. MODEL 210 CHASSIS.

IF PEAK 175 KC.

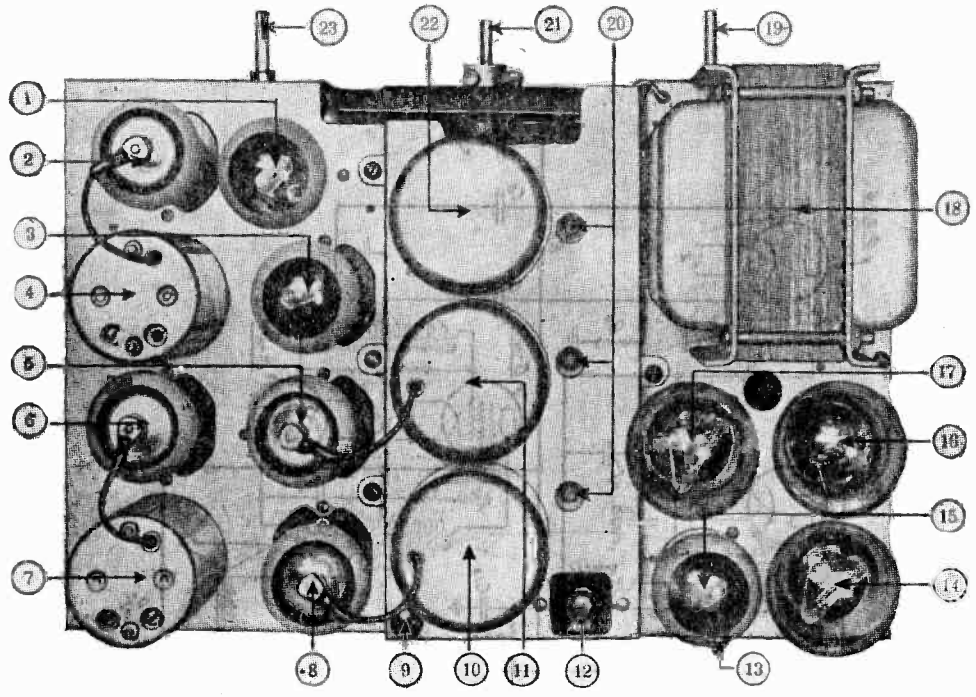


GRIGSBY-GRUNOW CO
CHICAGO, U.S.A.

Model 210 Chassis Is Employed in the Whitehall, Stratford and Croydon Models.

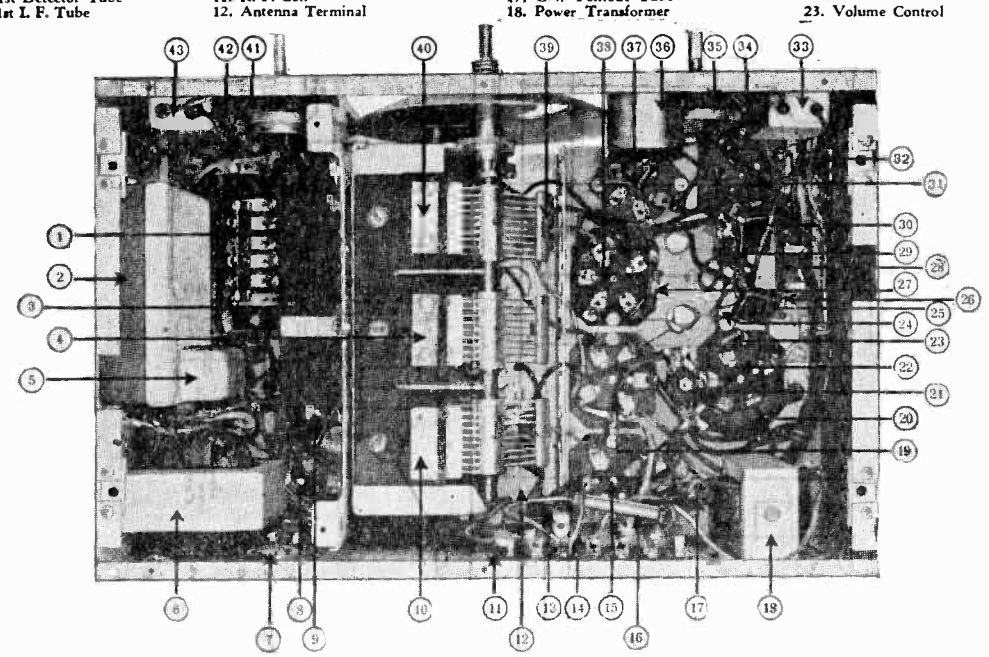
MODEL 210
Chassis Views

GRIGSBY - GRUNOW CO.



Top View of Model 210 Chassis

1. G-2-S 2nd Detector Tube
2. G-35-S 2nd I. F. Tube
3. G-27-S Oscillator Tube
4. 2nd I. F. Transformer
5. G-35-S 1st Detector Tube
6. G-35-S 1st I. F. Tube
7. 1st I. F. Transformer
8. G-35-S R. F. Tube
9. Ground Terminal
10. Antenna Coil
11. R. F. Coil
12. Antenna Terminal
13. Hum Adjustment
14. G-47 Pentode Tube
15. G-27-S 1st Audio Tube
16. G-80 Rectifier Tube
17. G-47 Pentode Tube
18. Power Transformer
19. Line Switch and Acoustic Control
20. R. F. Aligning Condensers
21. Tuning Control
22. Oscillator Coil
23. Volume Control



Interior View of Model 210 Chassis

1. 210 ohm Bias Resistor R_{11}
2. Two 8 mfd. Electrolytic Condensers
3. One 8 mfd. Electrolytic Condenser
4. First Detector Tuning Condenser
5. .2 mfd. Choke Tuning Condenser C_{12}
6. Filter Choke
7. Hum Control R_{13}
8. G-27-S First Audio Tube Socket
9. G-47 Pentode Tube Socket
10. Antenna Tuning Condenser
11. 2,000 ohm Resistor R_9
12. .25 mfd. By-Pass Condenser
13. .002 mfd. Condenser
14. By-Pass Condenser Assembly C_7, C_8, C_9
15. G-35-S R. F. Tube Socket
16. 20,000 ohm Resistor R_7
17. 500,000 ohm Resistor
18. Audio Input Transformer
19. G-35-S First Detector Tube Socket
20. 15,000 ohm Resistor R_1
21. R. F. Choke
22. G-35-S First I. F. Tube Socket
23. 150,000 ohm Resistor R_5
24. 70,000 ohm Resistor R_6
25. .0003 mfd. Condenser
26. 150 ohm Resistance R_4
27. 100,000 ohm Resistor R_{10}
28. 800 ohm Resistance R_3
29. R. F. Choke
30. .0005 mfd. Condenser
31. G-35-S Second I. F. Tube Socket
32. 20,000 ohm Resistor R_2
33. .03 mfd. C_5, .25 mfd. C_4, .1 mfd. C_1
34. 3rd I. F. Aligning Condenser
35. Volume Control R_{12}
36. 3rd I. F. Transformer
37. G-2-S Second Detector Tube Socket
38. G-27-S Oscillator Tube Socket
39. 50 Mmfd. Condenser
40. Oscillator Tuning Condenser
41. Tone Control and Line Switch R_{14}
42. Oscillator Tracking Condenser
43. Three .03 mfd. Condensers C_6, C_{10}, C_{11}

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MODEL 210
Voltage
Speaker Data

Model G-13, G-13-C and P. M. Speaker

The Model G-13 Dynamic Speaker employed in the Whitehall and Stratford Models has a field resistance of 570 ohms at operating temperature. The field structure is of heavy "U" construction mounted on a 6" base which is also used as a case for the output transformer. This speaker is interchangeable with the G-13 speaker used on Brentwood and Brucewood Models.

The Croydon Model employs a twin speaker arrangement using the G-13-C Dynamic Speaker for the low audio frequencies. The field coil is the same as used in the G-13 speaker but the cone assembly and output transformer are different.

To produce exceptionally clean fidelity on the higher audio frequencies, a Permanent Magnet Dynamic Speaker is used. This type P.M. speaker is a carefully built moving coil dynamic speaker, making use of a large bar of permanent magnet steel in place of the customary electro-magnet field of the usual dynamic speaker. With this construction it is possible to obtain exceptional high frequency response without overloading the G-80 rectifier, since no power is drawn to supply a field for this extra speaker. The voice coil of this speaker is connected in parallel to the voice coil of the G-13-C speaker.

Color Code of Power Transformer

Start of Primary	Yellow
Finish of Primary	Yellow
Start of 5 volt filament	Black
Finish of 5 volt filament	Black
Start of 2.5 volt heater No. 1	Black
Finish of 2.5 volt heater No. 1	Black
Start of 2.5 volt heater No. 2	Yellow
Finish of 2.5 volt heater No. 2	Yellow
Start of Anode	Red
Center tap of Anode	Black
Finish of Anode	Red

MODEL 210 CHASSIS

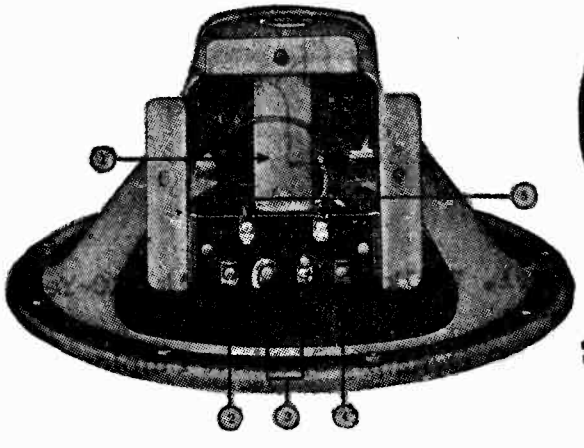
TABLE OF VOLTAGE AND CURRENT READINGS

ALL D. C. VOLTAGE READINGS ARE TO GROUND

Tube Purpose	Type	Filament Volts A. C.	Plate Volts D. C.	Filament to Ground D. C.	Cathode Volts D. C.	Plate Current M. A.-D. C.	Screen Volts D. C.	Screen Current M. A.-D. C.
Osc.	G-27-S	2.5	100	18	0	8		
R. F.	G-35-S	2.5	285	0	3	6	100	.8
1st Det.	G-35-S	2.5	285	0	8	1.4	100	4
1st I. F.	G-35-S	2.5	285	0	4	3	100	.6
2nd I. F.	G-35-S	2.5	285	0		9	100	.8
2nd Det.	G-2-S	2.5	— 5	18		0		
1st Audio	G-27-S	2.5	170	18	12	5.5		
Pow. Amp.	G-47	2.5	265	18		33	285	8
Pow. Amp.	G-47	2.5	265	18		33	285	8
Rectifier	G-80	5		400		120 Total		

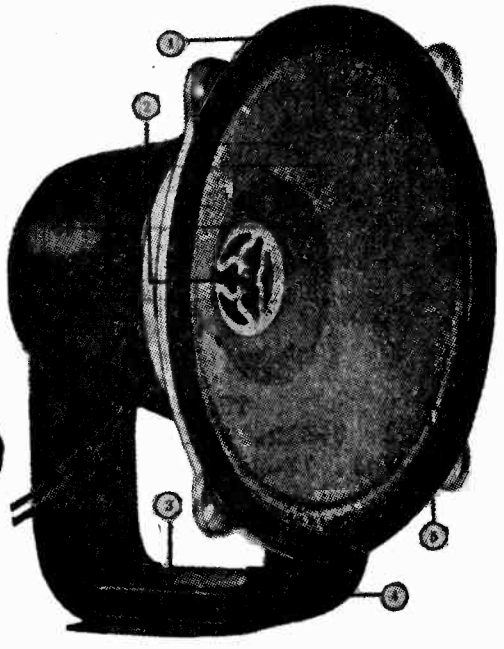
First Condenser—400 Volts D. C.
Second Condenser—375 Volts D. C.
Third Condenser—315 Volts D. C.

Line Voltage—115 Volts
Speaker Field—60 Volts
Volume Control—Maximum



Models G-13 and G-13-C Speakers Employed in Whitehall, Stratford and Croydon Models

1. Output Transformer
2. Field Coil Terminal (Black)
3. Voice Coil and Output Secondary Junction
4. Field Coil and Primary Tap Junction (Red)
5. Primary Plate Lead Terminals (Blue—Blue)



Permanent Magnet Speaker Employed in Croydon Model

1. Felt Gasket
2. Cone Centering Screw
3. Speaker Clamp
4. Permanent Magnet Field
5. Cone Assembly

MODEL 220
Schematic

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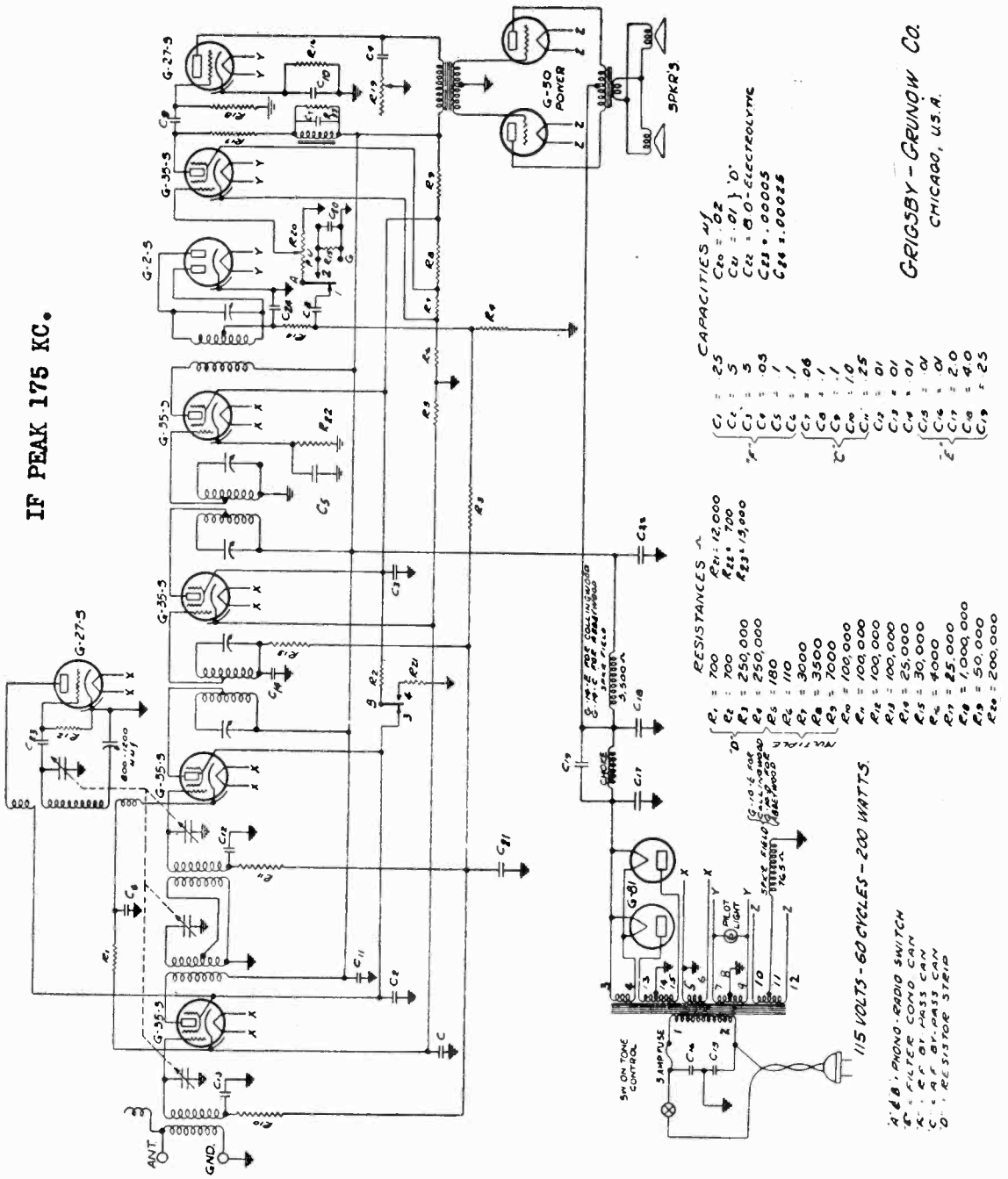

Model 220 Chassis Is Employed in the Collingwood and Abbeywood Models.

TRANSFORMER CODINGS

1-Blk. 2-Yel. 3-Blk. 4-Blk. 5-Yel. 6-Yel. 7-Blk. 8-Red. 9-Blk. 10-Yel. 11-Brn. 12-Yel. 13-Red. 14-Blk. 15-Red

Models G-10-E, G-14-E, G-14-C and G-14-D Dynamic Speakers Employed in Models Collingwood and Abbeywood

Both the Collingwood and Abbeywood Models are equipped with twin speakers The Collingwood model employs the G-10-E, a small dynamic speaker (field resistance 765 ohms), to produce the high tones, and the G-14-E, a large dynamic speaker (field resistance 5500 ohms), to produce the low tones. The Abbeywood Model employs the G-14-C, a large dynamic speaker (field resistance 5500 ohms), to produce the low tones, and the G-14-D, a large dynamic speaker (field resistance 765 ohms) to produce the high tones. These speakers operating simultaneously produces an almost flat audio frequency response curve which gives these receivers a truly faithful reproduction.

MODEL 220
Chassis Views

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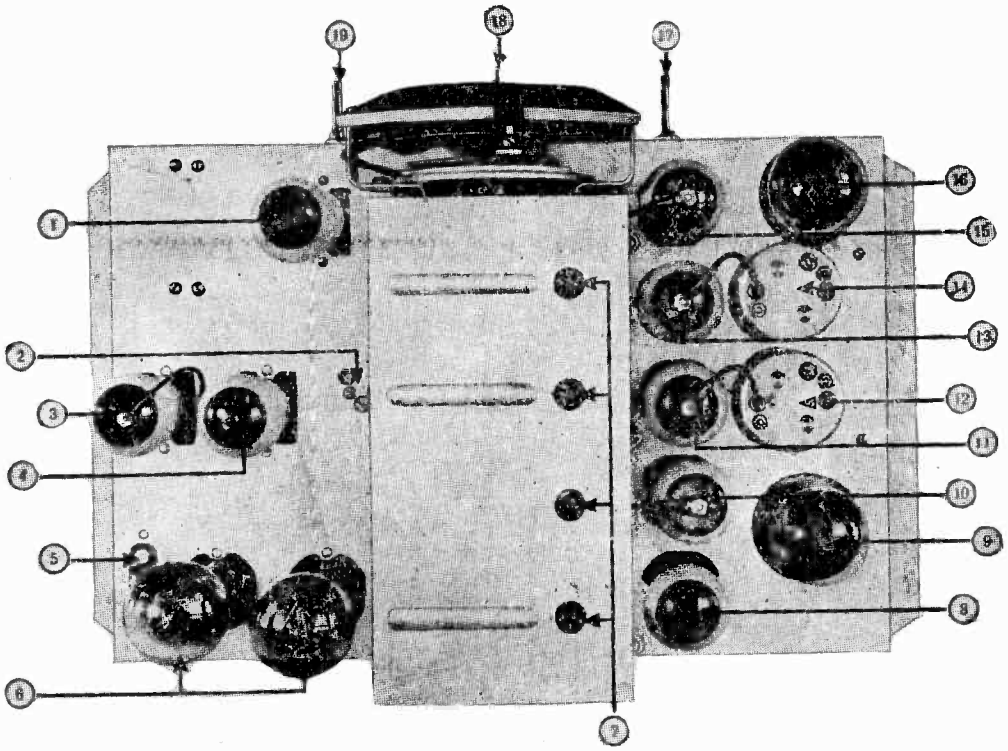
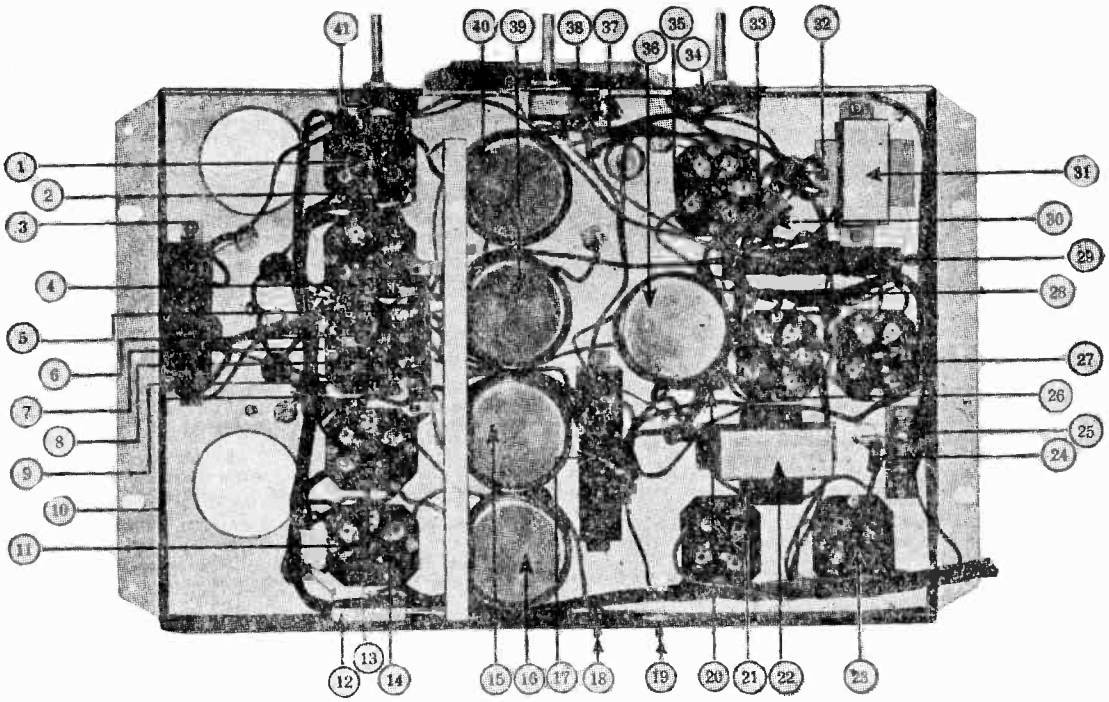


Top View of Model 220 Chassis

1. G-2-S Second Detector Tube
2. 3rd I. F. Aligning Condenser
3. G-35-S 1st Audio Tube
4. G-27-S 2nd Audio Tube
5. Phonograph Pickup Terminals
6. G-50 Power Output Tubes
7. R. F. Aligning Condensers
8. G-27-S Oscillator Tube
9. G-81 Half Wave Rectifier
10. G-35-S R. F. Tube
11. G-35-S 2nd I. F. Tube
12. 2nd I. F. Transformer
13. G-35-S 1st I. F. Tube
14. 1st I. F. Transformer
15. G-35-S 1st Detector Tube
16. G-81 Half Wave Rectifier
17. Acoustic Control and Line Switch
18. Tuning Control
19. Volume Control



Interior View of Model 220 Chassis

1. G-35-S 1st Detector Tube Socket
2. G-35-S 1st I. F. Tube Socket
3. R. F. Condenser Assembly C_1 to C_6
4. 700 ohm Resistor R_3
5. .01 mfd. Condenser C_{23}
6. 250,000 ohm Resistor R_5
7. G-35-S 2nd I. F. Tube Socket
8. 250,000 ohm Resistor R_4
9. 700 ohm Resistor R_1
10. 700 ohm Resistor R_{27}
11. G-35-S R. F. Tube Socket
12. Oscillator Tracking Condenser
13. 100,000 ohm Resistor R_{12}
14. G-27-S Oscillator Tube Socket
15. Antenna Coil
16. Oscillator Coil
17. A. F. Condenser Assembly C_7 to C_{11}
18. Antenna Terminal
19. Ground Terminal
20. 1,000,000 ohm Resistor R_{18}
21. G-50 Tube Socket
22. Push-pull Input Transformer
23. G-50 Tube Socket
24. 30,000 ohm Resistor R_{15}
25. Phonograph Pickup Terminals
26. G-27-S 2nd Audio Tube Socket
27. G-35-S 1st Audio Tube Socket
28. 4,000 ohm Resistor R_{16}
29. Voltage Divider Resistor R_2 to R_{17}
30. .01 mfd. Condenser
31. 1st Audio Plate Choke
32. 25,000 ohm Resistor R_{13}
33. 50,000 ohm Resistor R_{24}
34. Volume Control R_{26}
35. G-2-S Second Detector Tube Socket
36. 3rd I. F. Transformer Assembly
37. 12,000 ohm Resistor R_{25}
38. Radio Phonograph Switch
39. 1st R. F. Coil
40. 2nd R. F. Coil
41. Acoustic Control and Line Switch R_{14}

MODEL 220 (223)
Speaker Data
Record Changer
Notes

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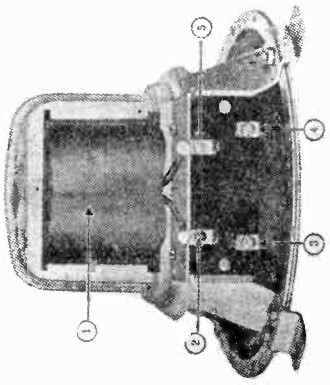
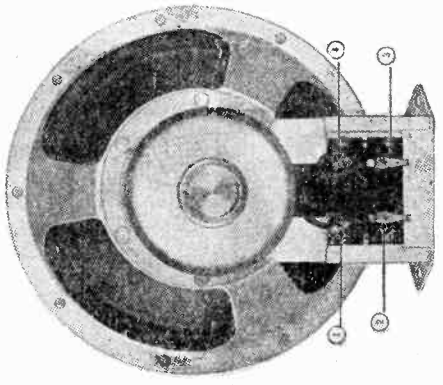


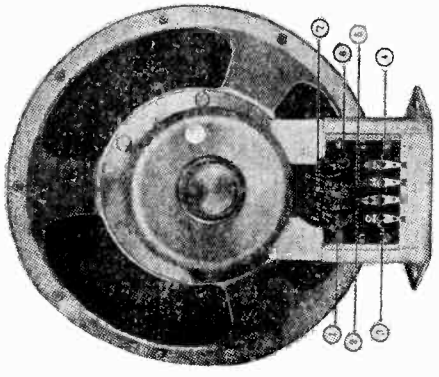
Model G-10-E Speaker Employed in Collingwood Model 221

1. Field Coil
2. Field Coil Terminal (Red)
3. Voice Coil Terminal (Brown and Yellow)
4. Voice Coil Terminal (Brown)
5. Field Coil Terminal (Black)



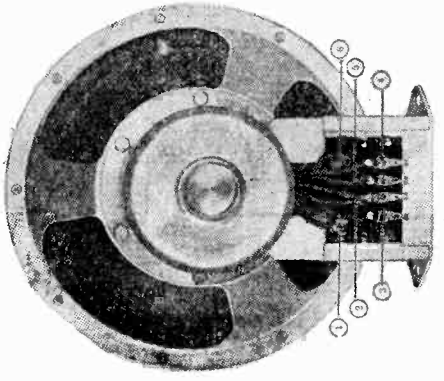
Model G-14-D Speaker Employed in Abbeywood Model 223

1. Voice Coil Terminal (Brown and Yellow)
2. Field Coil Terminal (Black)
3. Field Coil Terminal (Red)
4. Voice Coil Terminal (Brown)



Model G-14-E Speaker Employed in Collingwood Model 221

1. Output Secondary and Voice Coil Terminal (Brown)
2. Field Coil and Primary Tap Junction (Blue)
3. Primary Plate Lead Terminal (Yellow)
4. Field Coil Terminal (Black)
5. Primary Plate Lead Terminal (Red)
6. Output Secondary and Voice Coil Junction
7. Output Secondary Tap Terminal (Brown and Yellow)



Model G-14-C Speaker Employed in Abbeywood Model 223

1. Voice Coil and Output Secondary Junction (Brown)
2. Field Coil and Primary Tap Terminal (Blue)
3. Primary Plate Lead Terminal (Yellow)
4. Field Coil Terminal (Black)
5. Primary Plate Lead Terminal (Red)
6. Voice Coil and Output Secondary Junction (Brown and Yellow)

Automatic Record Changer Employed in Abbeywood Model 223 Receiver

IMPORTANT—The following instructions should be used in operating the MAJESTIC Automatic Record Changer employed in the Abbeywood Receiver.

WARNING—Before attempting to operate the automatic record changer, three screws which pass through the base plate of the record changer and the wood shelf, should be loosened so that the chassis is resting freely on the rubber cushions.

WARNING—AT NO TIME FOR ANY REASON SHOULD THE TURNTABLE BE STOPPED BY HAND. IF THIS WARNING IS NOT ADHERED TO, SERIOUS DAMAGE MAY RESULT.

RECORDS—It is possible to play the two types of records available for home entertainment, that is, the ordinary records and the new long playing records. Each of these two types can be obtained in both twelve and ten inch diameter. The approximate playing time of these records is as follows:

Ordinary Records		New Long Playing Records	
10 inch	2½ minutes	10 inch	10 minutes
12 inch	3½ minutes	12 inch	15 minutes

SPEED—The standard record turns at a speed of 78 revolutions per minute, whereas the long playing record turns at the rate of 33⅓ revolutions per minute. The mechanism is provided with a speed control lever to give either of these speeds, as required.

SWITCHES—The line switch for the phonograph motor is located near the front of the turntable.

Directly under the main tuning dial is the "Radio-Phonograph" switch, which should be turned to phonograph position for record playing. The line switch for the radio receiver is incorporated in the acoustic control assembly, which is located to the left of the phonograph switch.

NEEDLES—The long playing records should be played using only the special needles designed for this type of record. After the special needle has once been removed from the pick-up head, do not use it again. Replace with a new one.

Do not play ordinary records with the special needle designed for long playing records.

Instructions for Setting Selector Device

It will be noted that to the right of the turntable there is a selector lever for the purpose of playing ten inch records automatic, ten inch records repeat, twelve inch records repeat, and universal or manual operation.

10" AUTOMATIC—This is the only position in which the ten inch records are changed automatically.

10" REPEAT—In this position, the mechanism will repeat the playing of the same record as many times as desired.

12" REPEAT—The mechanism in this position will keep repeating a 12" standard record. Do not, however, attempt to repeat a 12" long playing record as it should be played manually with the lever in the universal position.

"UNIVERSAL"—In this position, the automatic changing and the repeat mechanism are not in operation, and the playing is controlled manually as with the ordinary phonograph. This position should always be used for playing the 12" long playing record and may be used for playing standard records.

Instructions for Operating Automatic Record Changer

Select the desired records and place them carefully in the record holder or magazine. The record at the bottom of the magazine will be the first one to be played.

The automatic-changing magazine handles from one to ten of the 10" records. Do not mix standard records with long playing records in the magazine for automatic playing, as each type requires a different speed and a different type of needle.

It is best to place the first record on the table by hand and start the needle very carefully in the first groove with the selector lever in the "Universal" position; then the lever may be turned to the automatic position if desired, after which the changer will operate as outlined in paragraph II under "Instructions for Setting Selector Device." This procedure protects the needle and the record, and assures longer life for both.

REJECT LEVER—While playing in the automatic position if it is desired to interrupt the record and to play the following one, pull forward the reject lever which is located to the right of the turntable. This will cause the mechanism to go through a complete cycle of changing the record.

RELOADING—When all of the records have been played through, and the magazine is empty, the mechanism will repeat the last record over and over. In reloading the magazine, switch off the motor at the time the magazine has traveled to the extreme left position, and carefully remove the stack of records from the turntable. Then replace them in the magazine in any desired sequence, with the side facing up which you desire to play. THE MAGAZINE MAY BE SWUNG UP AND DOWN, BUT DO NOT TRY TO FORCE IT SIDEWAYS MANUALLY.

ARM REST—When changing records, the pick-up should be placed on the rest, to the right. If it cannot be placed there without straining, this is a sign that the automatic mechanism has not completed its cycle. In this case, hold the pick-up loosely, turn on the motor switch and wait until the record magazine has moved to the extreme left, which will allow the pick-up to be placed on its rest.

Instructions for Operating Manually

By placing the lever in the "Universal" position, the records will be played manually. The 12 inch long playing records should always be played in this position.

Oiling

Every two or three months, the turntable should be removed and three or four drops of oil placed in each of the six holes provided.

PROCEDURE FOR ALIGNMENT OF MAJESTIC SUPERHETERODYNE RECEIVERS

WARNING: The Power Line shall never be connected to the receiver until the speaker and tubes are connected in the receiver. Do not remove any tubes without first turning off the power line.

To obtain the best possible adjustment the input must be low enough to keep the output below one watt. An output meter of the thermo-couple type should be used to indicate resonance point.

1. Supply a 175 K.C. signal to the grid of the first detector tube and adjust all the Intermediate Frequency tuning condensers to give maximum sensitivity.

2. Supply a 1,500 K.C. signal to the input of the receiver. Set the dial at 1,500 K.C. and adjust all radio frequency alignment condensers for maximum output.

3. Set the dial at 550 K.C. and adjust oscillator tracking condenser for maximum sensitivity with 550 K.C. feeding into the input of the receiver. For each adjustment of the oscillator tracking condenser, there will be a different dial setting for maximum sensitivity. The combination of tracking condenser adjustment and dial setting which gives maximum sensitivity, disregarding calibration, is the correct adjustment. If this adjustment falls within 5 K.C. of the 550 K.C. calibration point, readjust trimmers at 1,500 K.C. and check dial calibration at 1,000 K.C.

Each receiver must be aligned for maximum sensitivity.

Check the volume control throughout its range for noise, open or short circuit, and irregularity of control operation. Check the acoustic control over its entire range for noise, open, short circuit and operation.

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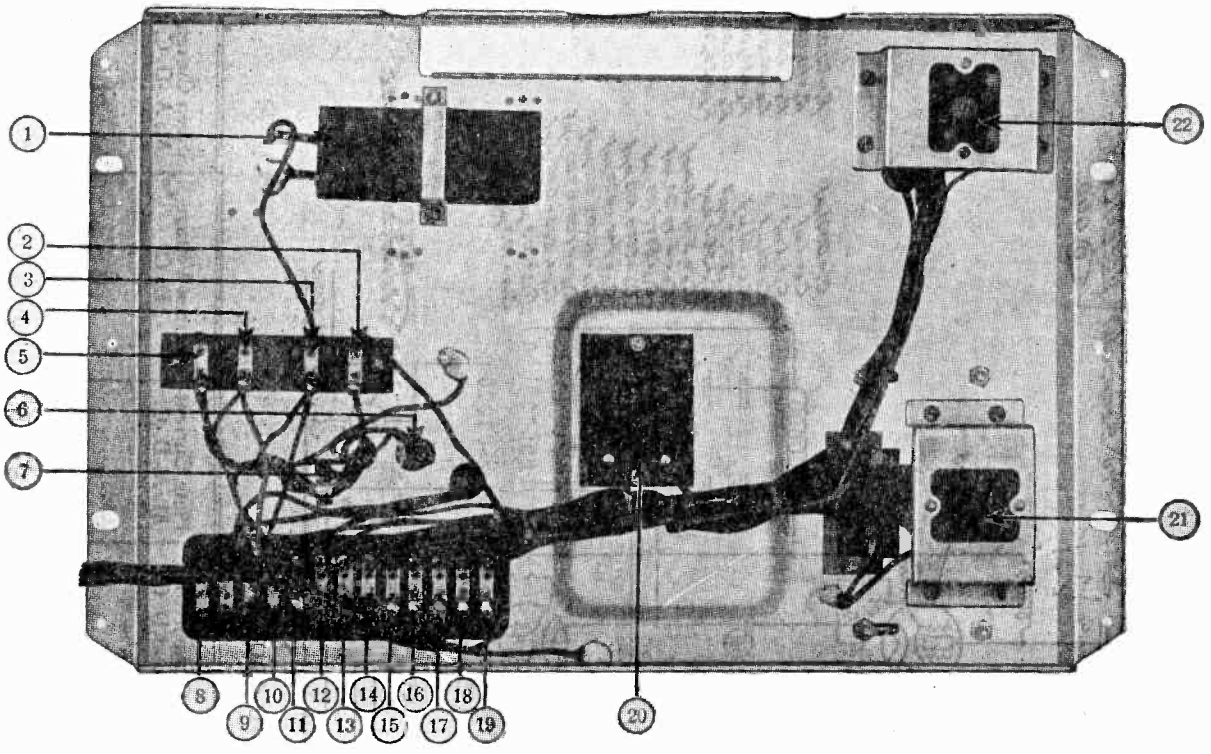
MODEL 220
Voltage
Chassis View



Interior View of Model 220 Power Unit

1. 8 mfd. Electrolytic Condenser
2. Red of 2 Wire Speaker Cable
3. Black of 4 Wire Speaker Cable
4. Yellow of 4 Wire Speaker Cable
5. Red of 4 Wire Speaker Cable
6. 2 Wire Speaker Cable
7. 4 Wire Speaker Cable
8. A. C. Line and Fuse Terminal
9. A. C. Line and Switch Terminal
10. Blue of 4 Wire Speaker Cable
11. Choke and C_H Terminal
12. G-81 Filament, Choke and C_H Terminal
13. Primary of Power Transformer and Switch Terminal
14. } 2.5 Volt Heater Terminal (Audio)
15. }
16. } 7.5 Volt Filament Terminal (G-50)
17. }
18. } 2.5 Volt Heater Terminal (R. F.)
19. }
20. Fuse Block
21. G-81 Rectifier Tube Socket
22. G-81 Rectifier Tube Socket

MODEL 220 CHASSIS TABLE OF VOLTAGE AND CURRENT READINGS

ALL D. C. VOLTAGE READINGS ARE TO GROUND

Tube Purpose	Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A.-D. C.	Screen Voltage D. C.	Screen Current M. A.-D. C.
R. F. Amp.	G-35-S	2.5	250	0	3	4.8	100	.5
Oscillator	G-27-S	2.5	100	0	0	8.5		
1st Detector	G-35-S	2.5	250	0	6	5.0	100	.7
1st I. F. Amp.	G-35-S	2.5	250	0	3	9.2	100	1.0
2nd I. F. Amp.	G-35-S	2.5	250	0	3.5	3.5	100	.6
2nd Detector	G-2-S	2.5	0	0	0	0		
1st Audio	G-35-S	2.5	185	0	2	1.5	46	.3
2nd Audio	G-27-S	2.5	280	0	20	4.5		
Power Amp.	G-50	7.5	500	84		40		
Power Amp.	G-50	7.5	500	84		40		
Rectifier	G-81	7.5		550		60		
Rectifier	G-81	7.5		550		60		

First Condenser—550 Volts D. C.
Second Condenser—520 Volts D. C.
Third Condenser—250 Volts D. C.
Line Voltage—115 Volts
Volume Control—Maximum
Phono Switch—Radio Position

MODEL 10
Schematic

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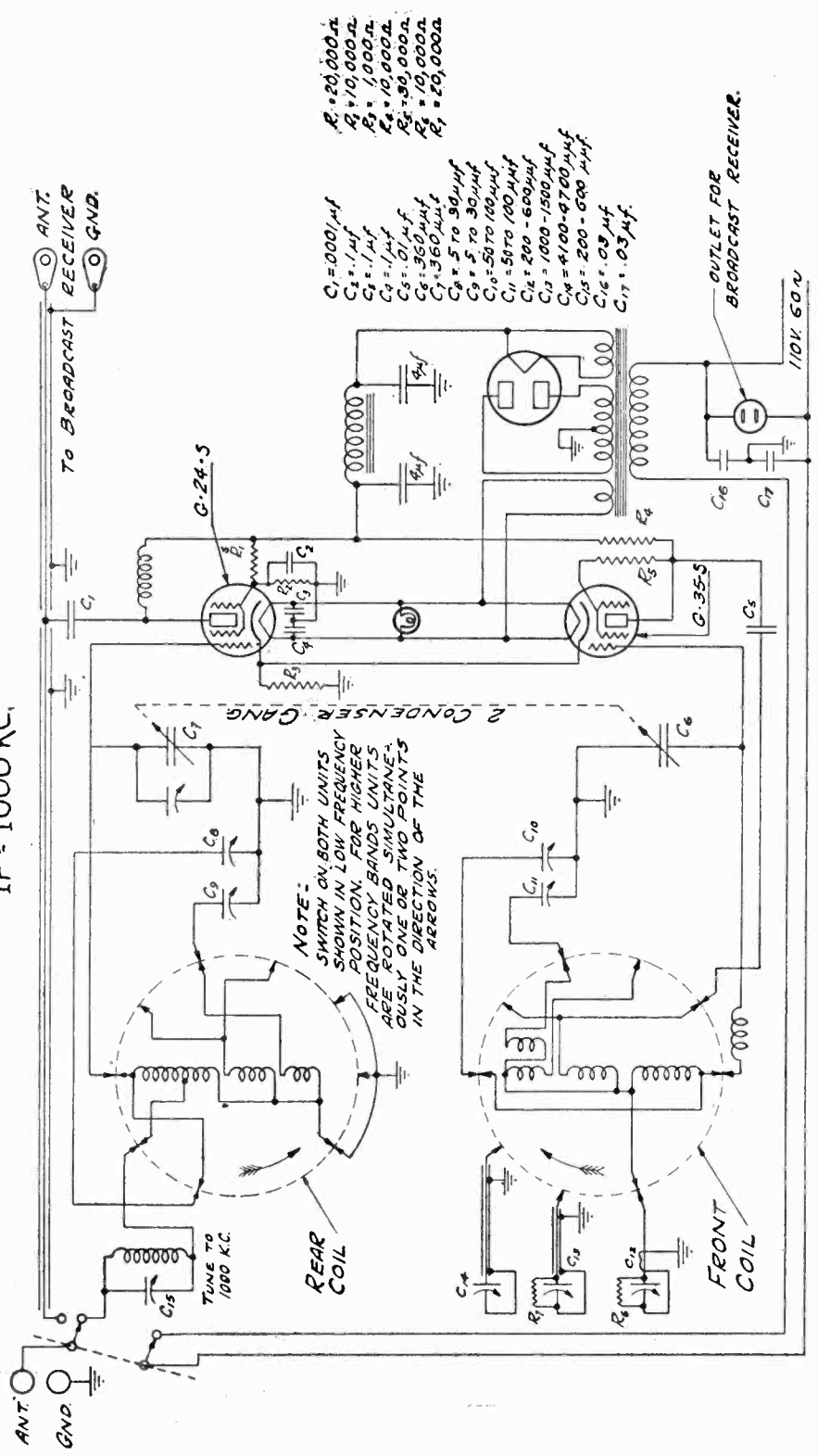


ALL D. C. VOLTAGE READINGS ARE TO GROUND

Tube Purpose	Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A.-D. C.	Screen Voltage D. C.	Screen Current M. A.-D. C.
Detector	G-24-S	2.5V	250	0	8	.1	135	.02
Oscillator	G-35-S	2.5V	170	0	8	7.5	75	1.0
Rectifier	G-80	5V	.....	275	.....	20 Total	.....	.....

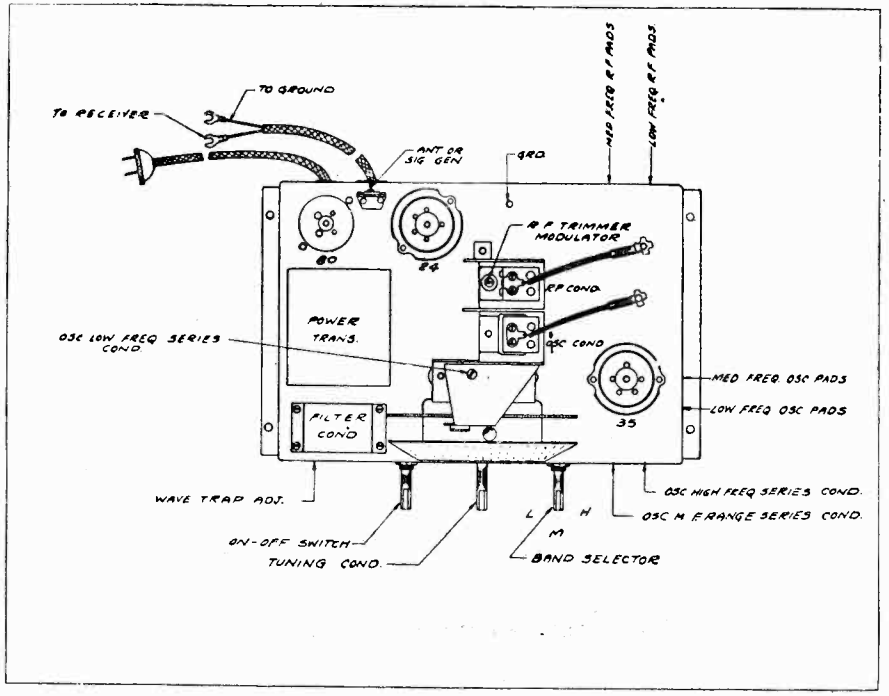
Line Voltage—115 Volts. Band Selector Switch in Medium Position.

Model 10 Chassis Is Employed in Model 11 Converter and in Viking and Explorer Models.

Color Code of Power Transformer

Start of Primary	Yellow
Finish of Primary	Red
Start of 5 volt filament	Yellow
Finish of 5 volt filament	Yellow
Start of 2.5 volt heater	Black
Finish of 2.5 volt heater	Black
Start of Anode	Blue
Center Tap of Anode	Black
Finish of Anode	Blue

Alignment



View Showing Location of Alignment Points

There are eight points at which the Model 10 Converter must be aligned and these must be adjusted accurately in order to have the converter operate at maximum efficiency. For the alignment of the Model 10, it will be necessary to use a signal generator that will oscillate at frequencies between 16,000 K.C. and 3,000 K.C. A signal generator of this type may be constructed by modulating a regular converter and calibrating it at the frequencies required for alignment. On page 6 will be found the circuit of a modulator we recommend for use in constructing a signal generator of the above mentioned type.

To calibrate the signal generator, the following procedure may be employed. Connect the signal generator with the shielded antenna cable to a converter which is hooked up for operation. Set the converter for reception on 16,000 K.C. (16 megacycles) and with the modulation of the signal generator turned on (this is controlled by turning on the plate voltage of the modulator circuit), rotate the dial until a signal from the generator is heard in the speaker of the receiver which is used as an amplifier for the converter. Tune this signal for maximum output and mark the dial of the generator where the signal comes in the loudest, for 16,000 K.C. The dial of the generator may be calibrated in the same manner at 9,000 K.C., 8,400 K.C., 7,400 K.C., etc., for the remaining frequencies necessary for alignment of the Model 10 Converter. In calibrating the signal generator, make certain that the signals heard are fundamentals and not harmonics. The harmonic of a signal will always be weaker than the fundamental.

Whenever it is necessary to realign a converter, it should be aligned at all points. The drawing on the preceding page will show the name and location of the various alignment points.

1. Tune the broadcast receiver which is connected to the converter to 1,000 K.C. and adjust volume control to minimum position. Insert receiver line plug into converter receptacle provided for the purpose. Check the on and off switch to see that it throws antenna to receiver as well as to the converter and at the same time disconnects the converter from the A.C. line.

2. Connect the generator with the shielded antenna cable to the converter and adjust all series alignment condensers to maximum position and all padding condensers to minimum position, including the R.F. trimmer on converter gang. Turn on the Receiver which is connected to the converter. Set selector switch on the medium range and with the converter gang set at about 50% rotation, impress a *1,000 K. C. signal on converter. Turn up volume control on receiver and adjust wave trap adjusting condenser for minimum output on the output meter attached to the receiver provided for the purpose. (It is very essential that an output meter be used.)

3. Rotate the gang condenser on the converter to the extreme right, loosen the set screws on hub of the dial and adjust for alignment with the indicator and long line at extreme left of the dial.

4. Set generator at 16,000 K.C. (modulation off) and band selector switch in the high frequency position. Rotate the tuning control of the converter until a beat note is heard with the generator. Then, with the modulation on, adjust the R.F. trimmer for maximum R.F. output.

5. Set generator at 9,000 K.C. (modulation on), and pick up signal in the converter. Turn off the modulation and adjust for zero beat with the oscillator high frequency series condenser.

6. Set generator at 8,400 K.C. and the band selector switch in medium position (modulation on). With the gang condenser on the converter turned all the way out, adjust the medium frequency oscillator padding condenser and then the medium frequency R. F. padding condenser for maximum output.

7. Set generator at 7,400 K.C. (modulation on) and tune the converter to pick up this signal. Turn off the modulation and adjust the medium frequency oscillator padding condenser for zero beat.

8. Set generator at 4,900 K.C. (modulation on), and tune the converter to this signal. Then with the modulation turned off, adjust the oscillator medium frequency series condenser for zero beat.

9. Set generator at 3,800 K.C. (modulation on), and band selector switch in low position. Rotate the gang condenser on the converter to the extreme left, and adjust the low frequency oscillator padding condenser and then the low frequency R.F. padding condenser for maximum output.

10. Set generator at 3,400 K.C. (modulation on) and tune converter to this signal. With the modulation turned off, adjust for zero beat with the low frequency oscillator padding condenser.

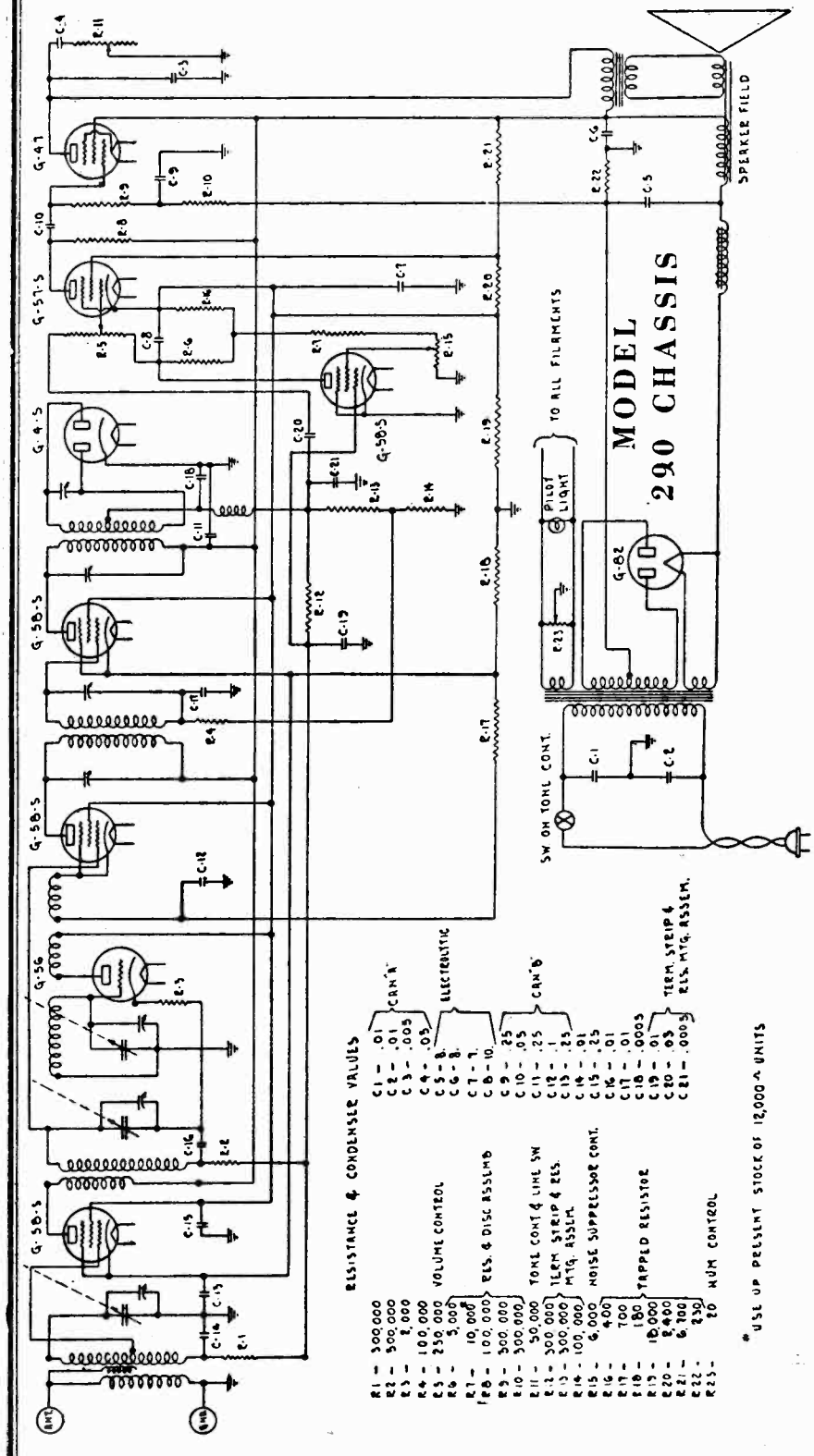
11. Supply a *1,500 K.C. signal from the oscillator used in aligning broadcast receivers, to the converter. Set the converter at 1.5 and adjust the oscillator low frequency series condenser for maximum output.

*NOTE. The 1,000 K.C. and 1,500 K.C. signals must be supplied by the regular oscillator which is used for aligning broadcast receivers.

When adjusting for a peak with the modulation on, keep the volume of the receiver employed for an amplifier, down as low as possible; just enough to have a reading on the scale of the output meter. In this way the peak will be sharper than it would be if a great deal of volume were used on the receiver, and it will also help to determine if the signal heard is a harmonic or a fundamental.

MODEL 290 Series
Schematic

GRIGSBY - GRUNOW CO.



		FILAMENT	PLATE	CATHODE	PLATE CUR.	SCREEN	SC. CUR.
R. F. Amp.	G-58-S	2.5	265	3	4.4	90	.1
Oscillator	G-56	2.5	90	15	1.6	.	.
1st Detector	G-58-S	2.5	265	6	.3	90	.6
I. F. Amp	G-58-S	2.5	265	3	5.8	90	1.5
2nd Detector	G-4-S	2.5	...	0	..	..	..
1st Audio	G-57-S	2.5	155	90	.6	135	.1
Power Amp.	G-47	2.5	240	.	.28	265	.7
Silent Tuner	G-58-S	2.5	85	0	1.4	0	0
Rectifier	G-82	2.5	...	..	TOTAL 70	..	..

LINE VOLTS 115

SILENT TUNER CONTROL ALL THE WAY CLOCKWISE.

All D.C. Voltage Readings Are to Ground.

IF PEAK 175 KC.

GRIGSBY GRUNOW CO.

MODEL 290 Series
Silent Tuning Data

AUTOMATIC
SYNCHRO-SILENT TUNING

When the dial of an ordinary automatic volume control set is tuned between stations, the sensitivity of the set is very high. In noisy locations, therefore, an automatic volume control set of the standard type might be open for considerable unfavorable reaction, because of the background of "hiss" and static heard when tuning between stations. For this reason many automatic volume control receivers in the past have had on them a push button or switch known as a "Speaker Mute." This device simply short circuits the voice coil of the dynamic speaker so that the signals are very much weakened. Instructions are given that this "Speaker Mute" should be operated whenever the set is tuned between stations. Obviously this remedies the difficulty, but is an undesirable operation, and likewise is very difficult to explain.

It is now easy to see how the new Majestic Synchro-Silent Tuning is quite unique and original. It was decided that since silencing of the radio set was desired between stations, the best place to accomplish this would be in the audio amplifier stage between the second detector and output. For this reason a new Type G-57-S tube is used for the first audio stage, because of its sharp grid voltage cut-off characteristic. By inserting a high bias in the grid circuit of this tube, it is "blocked out," and no signal will come through it.

To obtain this, a Type G-58-S is used as a Synchro tube. This Synchro tube obtains its plate supply through Resistor R-6, which is in the grid circuit of the audio amplifier. The Synchro tube obtains its grid voltage from the automatic volume control circuit. When there is no station tuned in, there is no automatic volume control voltage, and hence the grid of the Synchro tube is approximately at zero voltage. This causes its plate to draw a current through Resistor R-6. The voltage drop across this resistor biases the G-57-S audio amplifier tube so high that the audio amplifier is "blocked out" and hence no noise comes through.

tune in a station, remove the Synchro tube and notice no difference. On the other hand, if this tube is removed when no station is tuned in, the customary interstation noises are heard.

Because of the variation in antennae and noises in different locations, it is necessary to provide a control to govern the point at which the Synchro tube takes hold. A potentiometer, R-15, is therefore included in the screen circuit of the Synchro tube.

There are certain precautions necessary in setting the value of this potentiometer as follows:

When a station is tuned in, automatic volume control voltage develops across Resistors R-13 and R-14 and this automatic volume control voltage is impressed in the form of negative bias on the Synchro tube. The plate of the Synchro tube now draws little or no current, and hence the bias across Resistor R-6 disappears, leaving nothing but the normal operating bias on the audio amplifier tube. In this condition the entire set is operative just as though there were no Synchro tube in the circuit. In fact, it is possible to

Set suppressor knob to position of no suppression. (All the way clockwise when facing suppressor control.)

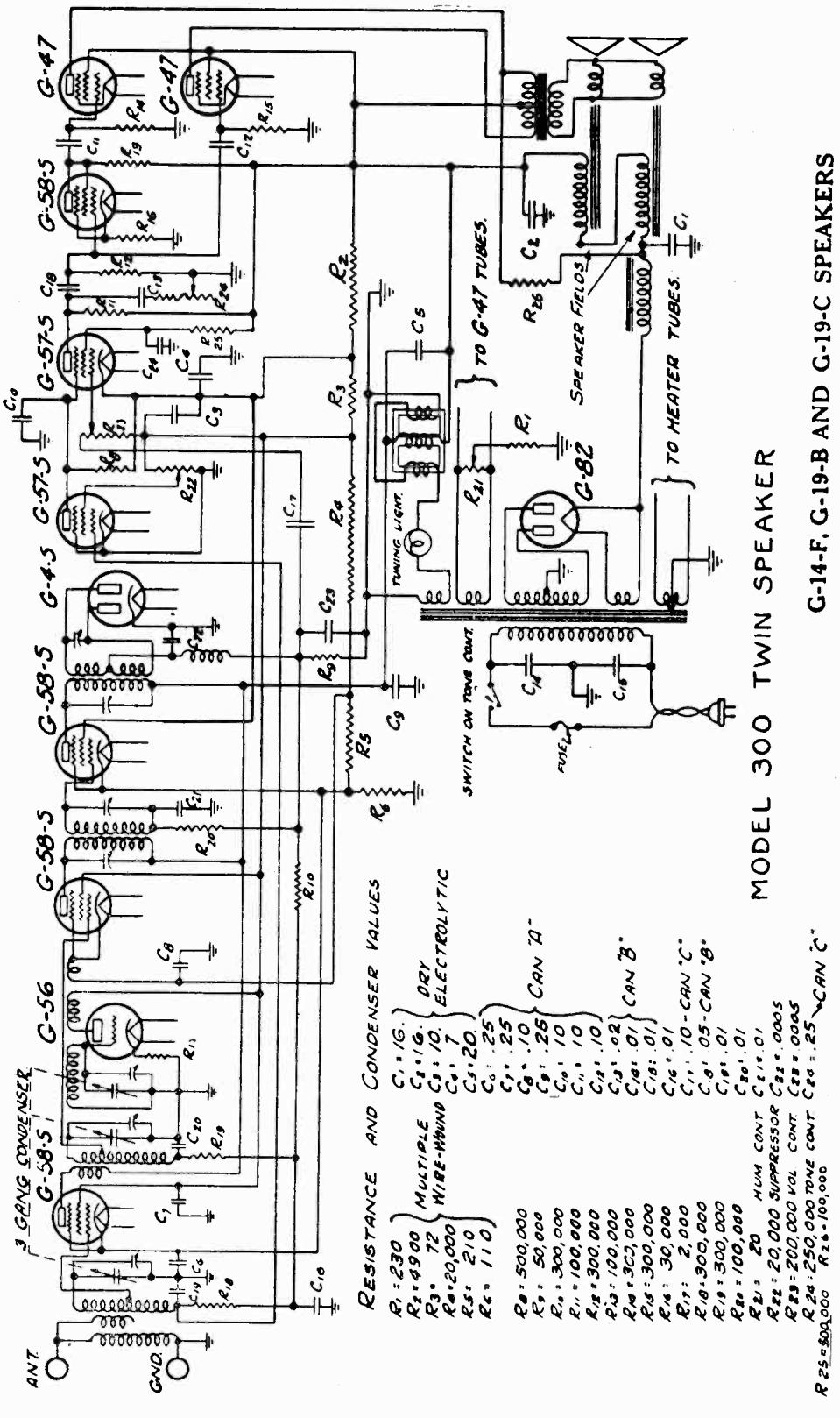
Tune receiver to a position off of the broadcasting station, preferably near the low frequency end of the dial.

Turn volume control full on. In this position a great deal of noise will be heard, depending upon the location.

Adjust noise suppressor control by rotating counter-clockwise slowly until the noise just stops. It will be found that the noise drops out quite suddenly, and it is desirable that the control be set only to the position required to take out the noise and no further counter-clockwise than necessary.

MODEL 300 Series
Schematic

GRIGSBY - GRUNOW CO.



MODEL 300 TWIN SPEAKER

G-14-F, G-19-B AND G-19-C SPEAKERS

For single speaker operation the large G-14-F speaker is used in connection with the 300 chassis. It has a field resistance of 1040 ohms and a voice coil resistance of 1.7 ohms. For dual speaker operation the G-19-B and G-19-C speakers are used simultaneously. Both of these speakers are of generous design, and handle great amounts of power. Each has a field resistance of 520 ohms and a voice coil resistance of 1.7 ohms. The frequency response represents the very latest in dynamic speaker development.

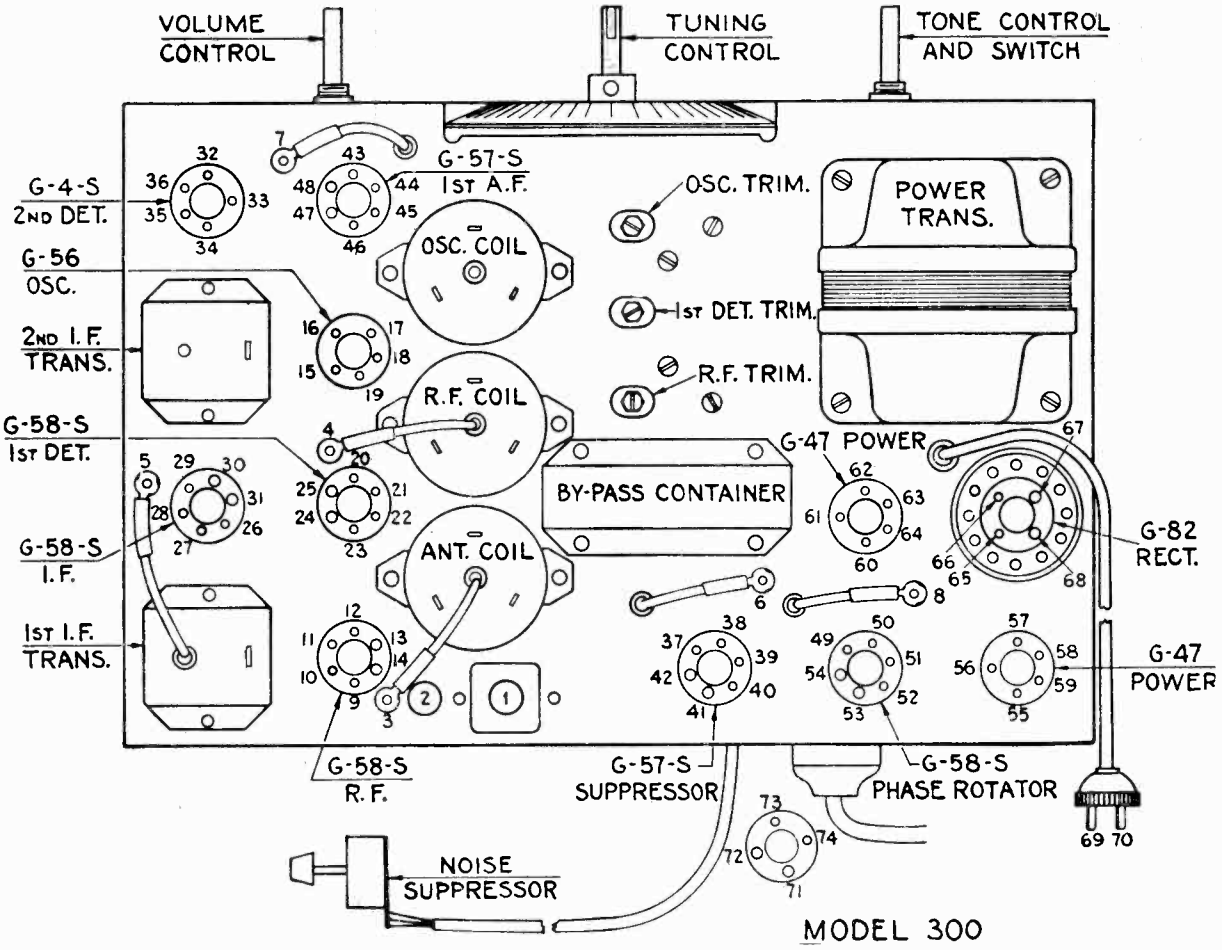
POWER TRASFORMER CODE

Rectifier Filament Terminals #1 and 3. Black
Heater Center Tap. Terminal #2. . . . Green
Tuning Light . . . Terminals #4 and 6. Black
47 Filament. . . . Terminals #5 and 8. Yellow
Start of Anode . . Terminal #10. . . . Red
Center Tap of Anode Terminal #11. . . . Black
Finish of Anode. . Terminal #12. . . . Red
Primary. . . . . Terminal #13. . . . Yellow
Dummy Lug. . . . . Terminal #14. . . .
Primary. . . . . Terminal #15. . . . Yellow

IF PEAK 175 KC.

GRIGSBY - GRUNOW CO.

MODEL 300 Series
Chassis-Data



REACTANCE RESONANCE INDICATOR

This is an entirely new feature in radio. By referring to the wiring diagram, it will be seen that the reactor used consists of three windings on three legs respectively, of the iron core. The windings on the two end legs are connected in series with the pilot light, while the winding on the center leg is connected in series with the plates of the R.F., First Detector, and I.F. tubes. An electrolytic condenser, C-5, is connected so as to shunt the center winding. Its purpose will be explained later.

The operation of the reactor is as follows:

When the set is turned on and the tubes are warmed up, but no station is tuned in, a relatively large plate current will flow through the center winding. This saturates the iron core so that the reactance of the two outer windings is quite low, and considerable current therefore flows through the pilot light. When a station is tuned in, it operates the G-4-S Automatic Volume Control tube so that an automatic bias voltage is built up across Resistor R-9. This bias voltage is, in turn, impressed upon the control grids of the R.F., First Detector and I.F. tubes. When this bias is impressed on these amplifier tubes, the normal A.V.C. action takes place; namely, their amplification is decreased. It also happens, however, that their plate current is decreased, due to the higher negative bias on their grids. This reduced plate current flowing through the center winding of the reactor relieves the saturation in the iron core so that reactance of the out windings increases and the current flowing through the pilot light is therefore reduced, causing the pilot light to dim when a station is tuned in.

It is, therefore, a simple and fascinating matter to adjust the dial until the pilot light is dimmest, with the perfect assurance that exact resonance will be located.

The two outer windings are connected so that they buck each other so far as the center leg of the core is concerned. Hence, there will be induced no A.C. in the center winding, which is in the plate circuit of the amplifier tubes. Because of small unbalances which may occur, it has been found necessary that we place the electrolytic condenser, C-5, across the center winding so that there is no possible chance of any A.C. getting into the plate circuit of the amplifier tubes.

CONTINUITY AND RESISTANCE CHECK
MODEL 300 CHASSIS

NOTE: All readings are taken from designated point to ground, unless otherwise specified. Readings taken with volume and tone controls both turned to maximum clockwise position, all tubes removed from their sockets and speaker plug removed from chassis.

Due to manufacturing tolerances on carbon resistors, the values given below may be expected to differ plus or minus 25 per cent.

Before making the following tests, check for gang condenser or I.F. trimmer short circuits.

Terminal No.	Resistance in Ohms	If resistance differs greatly from value shown, check the following:
1	Low resistance primary	Antenna Coil Primary
2	Short circuit	Solder Connection Ground Post to Chassis
3	650,000	Antenna Coil Secondary C19,R19,C16,C20,R10,R9
4	650,000	R.F. Coil Secondary R19, and test #3
5	150,100	I.F. Coil Secondary C21,R20, and tests #3 and #4
6	650,000	Make test #3
7	210,079	R23,C3,C17,R22,R4,R5,R6, and tests #3,#4 and #5
8	300,000	R12,C18,C12, and test #55
9	110	C6,R6 or C8
10	Same as #9	Solder Connection Suppressor to Cathode
11	10,079	C7,C4,C2,C3,R22,R4,R5 and R6
12	16,051	R.F. Coil Primary, High Impedance Winding of Reactance Unit, C9,C2,C4,R2,R3,and test #11
13	Very low resis.	Heater Winding,and Center Tap to Ground
14	Same as #13	
15	2000	R17
16	Low resistance	Oscillator Coil Secondary
17	10,079	Oscillator Coil Primary,and test #11
18	Same as #13	
19	Same as #13	
20	320	Oscillator Coil Cathode Winding C8,R5,C6,R6; also test #11
21	Same as #20	Solder Connection Suppressor to Cathode
22	Same as #11	
23	16,151	1st I.F. Coil Primary, and test #12 and #11
24	Same as #13	
25	Same as #13	
26	110	C6,R6, and tests #20 and #11
27	Same as #26	Solder Connection Suppressor to Cathode
28	10,151	R3,C4,C7,R4,C8,R5,R6,C2,C3,R22, and tests #20 and #9
29	16,151	2nd I.F. Coil Primary, and test #12 and #11
30	Same as #13	
31	Same as #13	
32	Short circuit	Solder Connection Cathode to Chassis
33	50,100	2nd I.F. Coil Secondary, and R.F. Choke,C22,C17,R9, C23, and tests #3,#4 and #5
34	Same as #33	
35	Same as #13	
36	Same as #13	
37	Short circuit	Solder Connection Suppressor Cathode to Chassis
38	Same as #37	Solder Connection Suppressor to Cathode
39	0 to 10,079	Variable with R22; R22, and test #11
40	510,151	C10,R8,C4, and tests #28,#20 and #9
41	Same as #13	
42	Same as #13	
43	Same as #28	
44	Same as #40	
45	515,051	C24,R25, and tests #11 and #12
46	115,051	C13,R11, and test #55
47	Same as #13	
48	Same as #13	
49	30,000	R16
50	Same as #49	
51	115,051	C11,R13,C2, and tests #46 and #55
52	Same as #51	
53	Same as #13	
54	Same as #13	
55	15,051	C2,R2,C4,R3,C7,R4,R5,and R6; also tests #9,#20,and #11
56	300,000	R14,R15,C11 and C12
57	Open	Shorted Plate to Chassis
58	230 to 250	G47 Filament Winding,R21,and R1
59	Same as #58	
60	Same as #55	
61	Same as #56	
62	Open	Shorted Plate to Chassis
63	Same as #58	
64	Same as #58	
65	210 aprox.	Secondary of Power Transformer
66	Same as #65	
67	Open	G82 Filament Winding, Filament Choke, and C1
68	Same as #67	
69	Open	C14 and C15 or Power Transformer Primary
70	Same as #69	
71	Same as #55	
72	Same as #67	
73	Same as #57	
74	Same as #62	
TEST BETWEEN THE FOLLOWING POINTS		
69 to 70	Very low resistance	Fuse - "on and off" switch - C14 and C15 or Power Transformer Primary
12 to 55	1000	R.F. Coil Primary - Reactance Unit or C5
11 to 28	72	R3 or (C4-C7).
11 to 20	20,000	R4 - Oscillator Coil Cathode Winding or (C7-C8)
72 to 73	100,000	R26
SUPPRESSOR CONTROL UNIT LUGS		
Black Lead	Short Circuit	Solder Connection Black Lead to Ground
Red Lead	Same as #39	
Blue Lead	Same as #11	

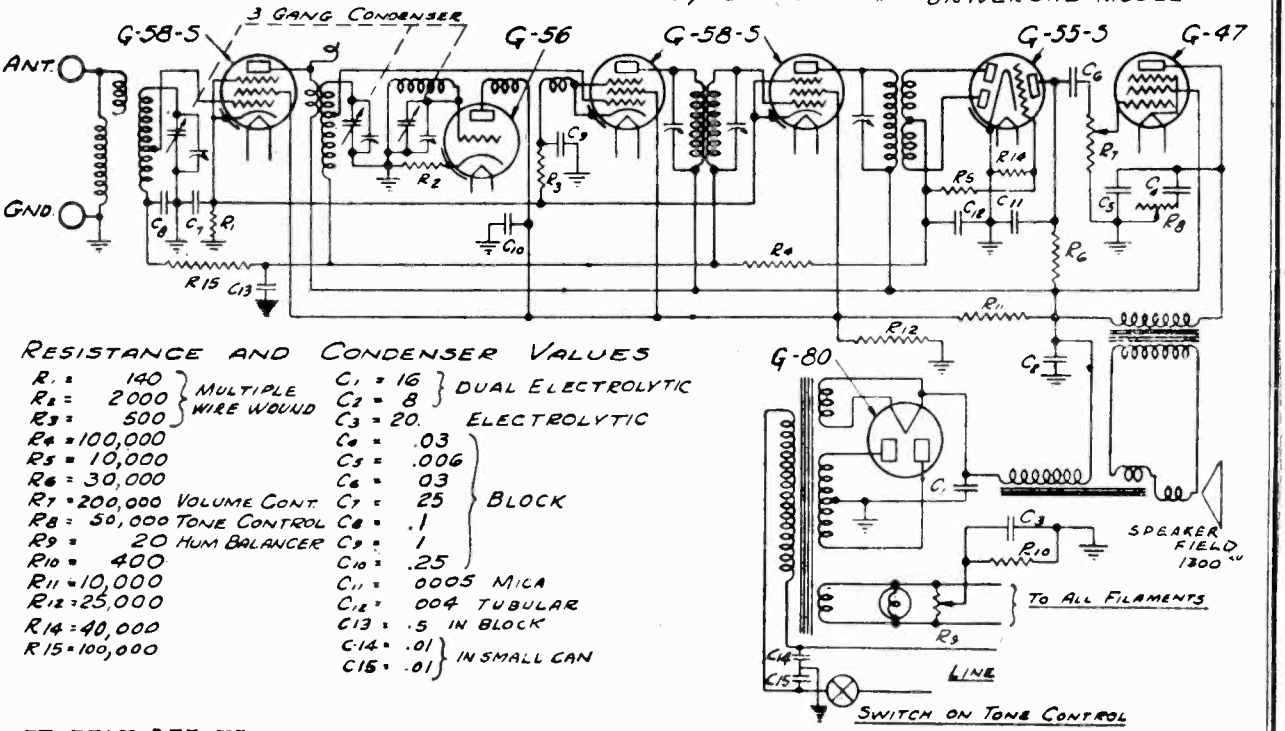
NOTE - If the above tests show normal conditions, it will be necessary to inspect and test the various units and wiring in the circuit where the particular difficulty has been previously localized.

GRIGSBY - GRUNOW CO

MODEL 310-A
Two Types
Schematic

MODEL 310-A SINGLE SPEAKER

FOR SERIAL NUMBERS 12,868 AND UNDER, 115 V. 50-60 CYCLE
" " " 10,515 " " " UNIVERSAL MODELS



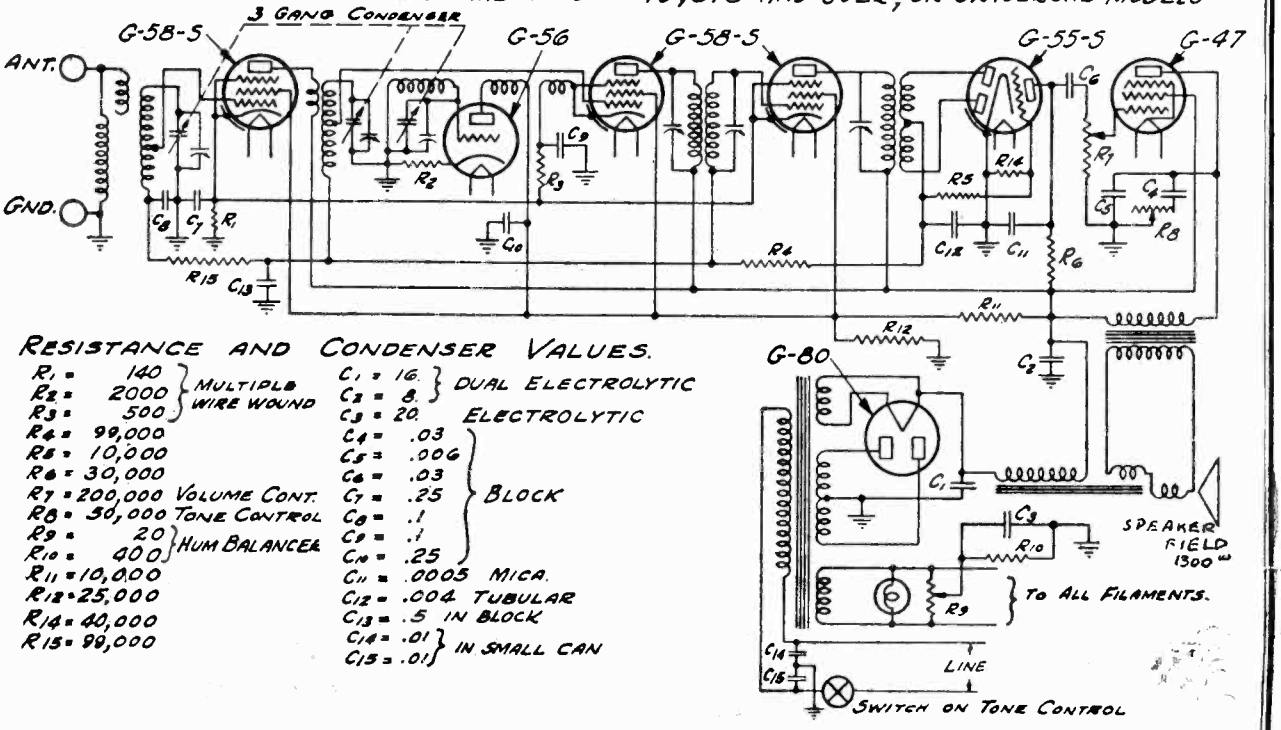
RESISTANCE AND CONDENSER VALUES

R1 = 140	MULTIPLE WIRE WOUND	C1 = 16	DUAL ELECTROLYTIC
R2 = 2000		C2 = 8	
R3 = 500		C3 = 20.	ELECTROLYTIC
R4 = 100,000		C4 = .03	BLOCK
R5 = 10,000		C5 = .006	
R6 = 30,000		C6 = .03	
R7 = 200,000	VOLUME CONT.	C7 = 25	
R8 = 50,000	TONE CONTROL	C8 = .1	
R9 = 20	HUM BALANCER	C9 = 1	
R10 = 400		C10 = .25	
R11 = 10,000		C11 = .0005	MICA
R12 = 25,000		C12 = .004	TUBULAR
R14 = 40,000		C13 = .5	IN BLOCK
R15 = 100,000		C14 = .01	IN SMALL CAN
		C15 = .01	

IF PEAK 175 KC.

MODEL 310-A SINGLE SPEAKER

FOR SERIAL NUMBER 12,869 AND OVER, ON 115V. 50-60 CYCLE.
FOR SERIAL NUMBER 10,516 AND OVER, ON UNIVERSAL MODELS



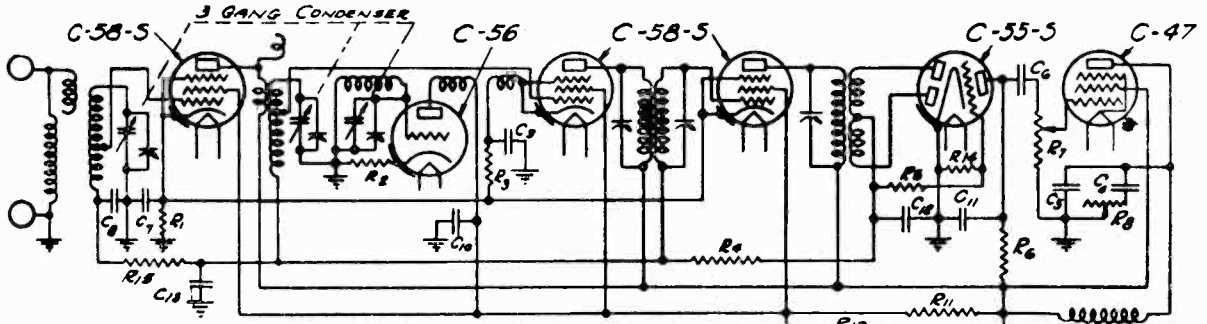
RESISTANCE AND CONDENSER VALUES.

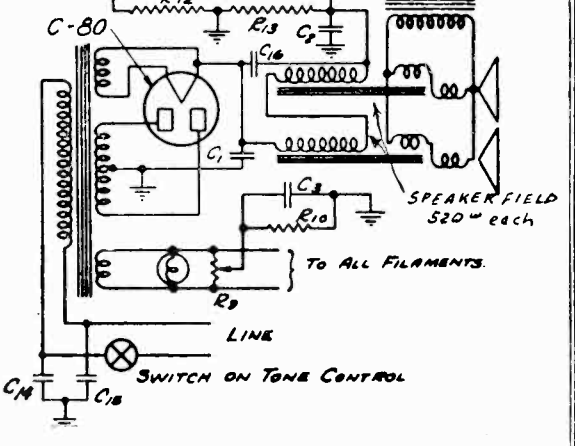
R1 = 140	MULTIPLE WIRE WOUND	C1 = 16.	DUAL ELECTROLYTIC
R2 = 2000		C2 = 8.	
R3 = 500		C3 = 20.	ELECTROLYTIC
R4 = 99,000		C4 = .03	BLOCK
R5 = 10,000		C5 = .006	
R6 = 30,000		C6 = .03	
R7 = 200,000	VOLUME CONT.	C7 = .25	
R8 = 50,000	TONE CONTROL	C8 = .1	
R9 = 20	HUM BALANCER	C9 = .1	
R10 = 400		C10 = .25	
R11 = 10,000		C11 = .0005	MICA.
R12 = 25,000		C12 = .004	TUBULAR
R14 = 40,000		C13 = .5	IN BLOCK
R15 = 99,000		C14 = .01	IN SMALL CAN
		C15 = .01	

MODEL 310-B
Two Types
Schematic

GRIGSBY - GRUNOW CO.

MODEL 310-B TWIN SPEAKER.
FOR SERIAL NUMBER 12,304 AND UNDER.



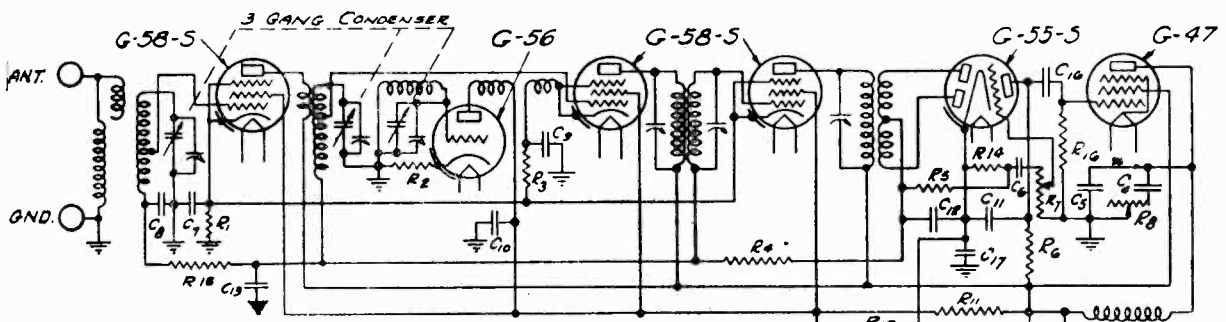


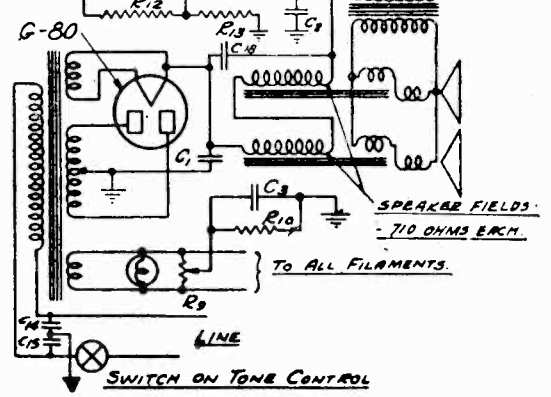
RESISTANCE AND CONDENSER VALUES

R_1 = 140	MULTIPLE WIRE WOUND	C_1 = 16.	DUAL ELECTROLYTIC	
R_2 = 2000		C_2 = 8.		
R_3 = 500		C_3 = 20.	ELECTROLYTIC	
R_4 = 99,000		C_4 = .03	BLOCK	
R_5 = 10,000		C_5 = .006		
R_6 = 30,000		C_6 = 03		
R_7 = 200,000	VOLUME CONT.	C_7 = 25		
R_8 = 30,000	TONE CONTROL	C_8 = 5		
R_9 = 20	HUM BALANCER	C_9 = 1		
R_{10} = 400		C_{10} = .25		
R_{11} = 10,000		C_{11} = .0005	MICA	
R_{12} = 25,000		C_{12} = .004	TUBULAR.	
R_{13} = 25,000	WIRE WOUND	C_{13} = .5	IN BLOCK	
R_{14} = 40,000		C_{14} = .01	IN SMALL CAN	
R_{15} = 99,000		C_{15} = 01		
		C_{16} = 11	TUBULAR	

IF PEAK 175 KC.

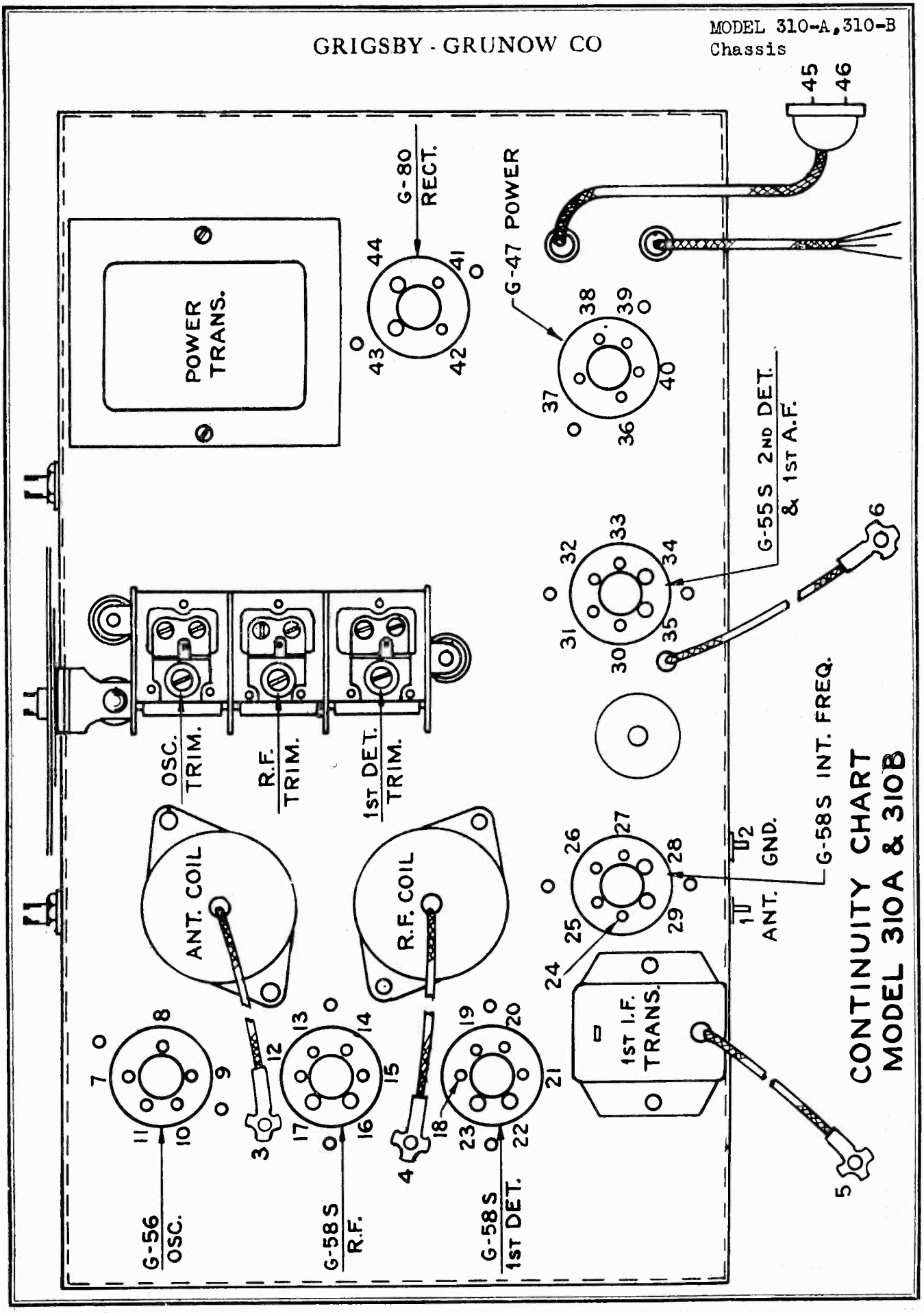
MODEL 310-B TWIN SPEAKER.
EFFECTIVE ON SERIAL #12,304 AND OVER





RESISTANCE AND CONDENSER VALUES

R_1 = 350	MULTIPLE WIRE WOUND	C_1 = 16.	DUAL ELECTROLYTIC	
R_2 = 2000		C_2 = 8.		
R_3 = 500		C_3 = 20.	ELECTROLYTIC	
R_4 = 300,000		C_4 = .03	BLOCK	
R_5 = 10,000		C_5 = .006		
R_6 = 100,000		C_6 = .03		
R_7 = 200,000	VOLUME CONT.	C_7 = .25		
R_8 = 30,000	TONE CONTROL	C_8 = .1		
R_9 = 20	HUM BALANCER	C_9 = .1		
R_{10} = 400		C_{10} = .25		
R_{11} = 8,000		C_{11} = .0005	MICA	
R_{12} = 9,000		C_{12} = .004	TUBULAR	
R_{13} = 350		C_{13} = .5	IN BLOCK	
R_{14} = 40,000		C_{14} = .01	IN SMALL CAN	
R_{15} = 99,000		C_{15} = .01		
R_{16} = 300,000		C_{16} = .03	TUBULAR.	
		C_{17} = 10.	ELECTROLYTIC	
		C_{18} = .07	TUBULAR	



CONTINUITY AND RESISTANCE CHECK
FOR MODEL 310-A SERIAL #12868 AND UNDER

For chassis with later serial numbers and 310-B chassis see deviations of this chart.

NOTE: All readings are from designated terminal to ground, unless otherwise noted.
Volume and tone controls in maximum clockwise rotation, speakers disconnected and all tubes removed from their sockets.
Due to manufacturing tolerances on carbon resistors, the readings given below may vary plus or minus 25 per cent.
Make previous test for condenser gang short circuits.

Terminal No.	Resistance in Ohms	If Resistance differs greatly from value shown, check the following:
1	Very low resistance	Antenna Coil Primary Circuit
2	Short circuit	Solder connection on Ground Post
*3	250,000	Antenna Coil Secondary, C8,R15,C13; Also test #4
*4	150,000	R.F. Coil Secondary; Also tests #3 and #5
*5	150,100	I.F. Coil Secondary, R4,R5,R14,C12; Also test #3
*6	40,000	R14 or C12
7	2,000	R2
8	Very low resistance	Oscillator Coil Secondary
‡*9	25,000	C10,R12,C2,C11 or Oscillator Coil Primary
‡10	400 to 420	Heater winding, R9,R10 or C3
11	Same as #10	
*12	140	R1,C7 or C9
*13	Same as #12	
‡*14	25,000	C10,R12,C2 or C11
‡*15	35,000	R.F. Coil Primary, C11,C2,R11,R12 or C10
16	Same as #10	
17	Same as #10	
*18	640	Oscillator Coil Cathode Winding, C9,R3,R1 or C7
*19	Same as #18	
*20	Same as #14	
*21	35,100	1st I.F. Coil Primary; Also test #15
22	Same as #10	
23	Same as #10	
*24	Same as #12	
*25	Same as #12	
*26	Same as #14	
*27	35,100	2nd I.F. Coil Primary; Also test #15
28	Same as #10	
29	Same as #10	
*30	Short circuit	Connection 2nd Detector Cathode to ground
*31	5050	2nd I.F. Coil Secondary, R5,R14,C12 or C13
*32	Same as #31	
‡*33	65,000	C6,C11,R6,C2,R11,R12 or C10
34	Same as #10	
35	Same as #10	
‡*36	35,000	C11,C2,R11,R12 or C10
*37	200,000	C6 or R7
38	Open circuit	C4 or C5
39	Same as #10	
40	Same as #10	
41	240	Power Transformer Secondary
42	Same as #41	
‡43	Open circuit	G80 Filament Winding or C1
44	Same as #43	
45	Open circuit	C14 or C15
46	Same as #45	
SPEAKER CORD		
Green	Same as #38	
*Yellow	Same as #36	
*Black	Same as #43	

CONTINUITY AND RESISTANCE CHECK (Cont'd)
FOR MODEL 310-A SERIAL #12868 AND UNDER

For chassis with later serial numbers and 310-B chassis see deviations of this chart.

Terminal No.	Resistance in Ohms	If Resistance differs greatly from value shown, check the following:
TEST BETWEEN POINTS		
8 and Oscillator Trimmer Condenser Lug	Short circuit	Solder Connection Gang to Oscillator Grid
3 and R.F. Trimmer Condenser Lug	Very low resistance	Solder Connection Gang to Antenna Coil to Terminal #3 or Antenna Coil Secondary
4 and 1st Detector Trimmer Condenser Lug	Very low resistance	Solder Connection Gang to R.F. Coil to Terminal #4 or R.F. Coil Secondary
45 & 46	Very low resistance	Line Switch,C14 and C15 or Power Transformer Primary

*For Models 310-A serial #12869 and over, and 310-B Chassis see deviations given below.

DEVIATIONS IN CHART READINGS FOR MODEL 310-A SERIAL #12869 AND OVER		
3	248,000	Same as #3 in chart
4	149,000	Same as #4 in chart
5	149,100	Same as #5 in chart
DEVIATIONS IN CHART READINGS FOR MODEL 310-B SERIAL #12304 AND UNDER		
3	248,000	Same as #3 in chart
4	149,000	Same as #4 in chart
5	149,100	Same as #5 in chart
‡9	14,584	Oscillator Coil Primary, C10,R12,R11,R13,C2 or C11
‡14	14,584	C10,R12,R11,R13,C2 or C11
‡15	14,584	R.F. Coil Primary, R11,R12,R13,C11,C2 or C10
20	Same as #14	
‡21	14,584	1st I.F. Coil Primary, R11,R12,R13,C11,C2 or C10
26	Same as #14	
‡27	14,584	2nd I.F. Coil Primary, R11,R12,R13,C11,C2 or C10
‡33	44,584	C6,C11,R6,C2,R11,R12,R13,or C10
‡36	14,584	R11,R12,R13,C11,C2 or C10
SPEAKER CABLE		
‡Yellow	14,584	R11,R12,R13,C11,C2 or C10
‡Black	Open curcuit	G80 Filament Winding, C1 or C16
DEVIATIONS IN CHART READINGS FOR MODEL 310-B SERIAL #12306 AND OVER		
‡3	449,350	Antenna Coil Secondary, C8,R15,C13,R4,C12,R5,C6,R14, R13,C11,C17 or C2
‡4	350,350	R.F. Coil Secondary, C8,R15,C13,R4,C12,R5,C6,R14, R13,C11,C17 or C2
‡5	350,450	I.F. Coil Secondary, C8,R15,C13,R4,C12,R5,C6,R14,R13, C11,C17 or C2
6	200,000	R7,C6 or C16
9	9,350	Oscillator Coil Primary; Also test #26
12	350	R1,C7 or C9
13	Same as #12	
14	Same as #26	
15	17,350	R.F. Coil Primary; Also test #30

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CONTINUITY AND RESISTANCE CHECK (Cont'd)

DEVIATIONS IN CHART READINGS FOR MODEL 310-B SERIAL #12305 AND OVER

*For Models 310-A serial #12869 and over, and 310-B chassis see deviations given below.

Terminal No.	Resistance in Ohms	If Resistance differs greatly from value shown, check the following:
18	850	Oscillator Cathode Winding, R3,R1,C7 or C9
19	Same as #18	
20	Same as #26	
21	17,450	1st I.F. Coil Primary; Also test #36 below
24	Same as #12	
25	Same as #12	
‡26	9,350	C10,R12,R13,C2,C17
27	17,450	2nd I.F. Coil Primary; Also test #36 below
‡30	350	C17 or R13
31	50,400	C13,C12,R5,R14,C6,R13
32	Same as #31	
‡33	117,350	C11,C16,R6,C2,R11,C10,R12 or R13
‡36	17,350	C2,C11,R11,C10,R12,R13; Also test #30
37	300,000	C16 or R16
41	175	Power Transformer Secondary
42	Same as #41	

SPEAKER CABLE

‡Black	Open circuit	G80 Filament Winding, C1 or C18
Yellow	Same as #36	

If the above tests show a normal condition it will be necessary to check the various units and wiring in the circuits where the particular difficulty has been previously localized.

‡ Note that the readings vary according to the polarity of the test leads, due to the presence of electrolytic condensers. Use the polarity giving approximately the same results as given above.

NOTICE

All Model 310-A chassis over serial #10951 using a 70 watt, 115 volt, 60 cycle power transformer and all over serial #10516 using a Universal power transformer employed the 2nd type of coils and gang condenser.

MODEL 310-B:

Between serial #10001 and #12304 the first type of coils and gang condenser were used. Over serial #12304 the 2nd type of coils and gang condenser were used.

In replacing any coils or gang condensers in these chassis it will be necessary to carefully observe the serial number and the wattage rating on the name plate so as to be able to make the correct replacements.

POWER TRANSFORMER COLOR CODE

Primary. . . . . .Stranded Yellow
Primary. . . . . .Stranded Yellow
High Voltage . . . . . Stranded Red
High Voltage Center Tap. Stranded Black
High Voltage . . . . . Stranded Red
Heater . . . . . .Solid Black
Heater . . . . . .Solid Black
Rectifier Filament . . . . Solid Yellow
Rectifier Filament . . . . Solid Yellow

There are two distinct types of R. F. coils, antenna coils, oscillator coils and gang condensers used on the Model 310 series MAJESTIC Receivers. The first type manufactured employed a #7826 antenna coil, #7830 R. F. coil, #7834 3-gang condenser and #7845 oscillator coil. The second type employed a #8160 3-gang condenser, #8367 antenna coil, #8368 oscillator coil and #8590 R. F. coil. These changes took effect as per the following:

MODEL 310-A:

Starting with serial #10001 there were 1,917 receivers manufactured with a 60 watt, 115 volt, 60 cycle power transformer. These are covered by serial #10001 to #11917. At this point in production the 60 watt power transformer was replaced by a 70 watt power transformer. Then, starting with serial #10001 again there were 951 manufactured with a 70 watt, 115 volt, 60 cycle power transformer. These were covered by serial #10001 to #10951. Starting with serial #10001 there were 516 receivers manufactured using a Universal power transformer. All the aforementioned receivers employed the first type of coils and gang condenser as mentioned above.

MODEL 320
Schematic
Data

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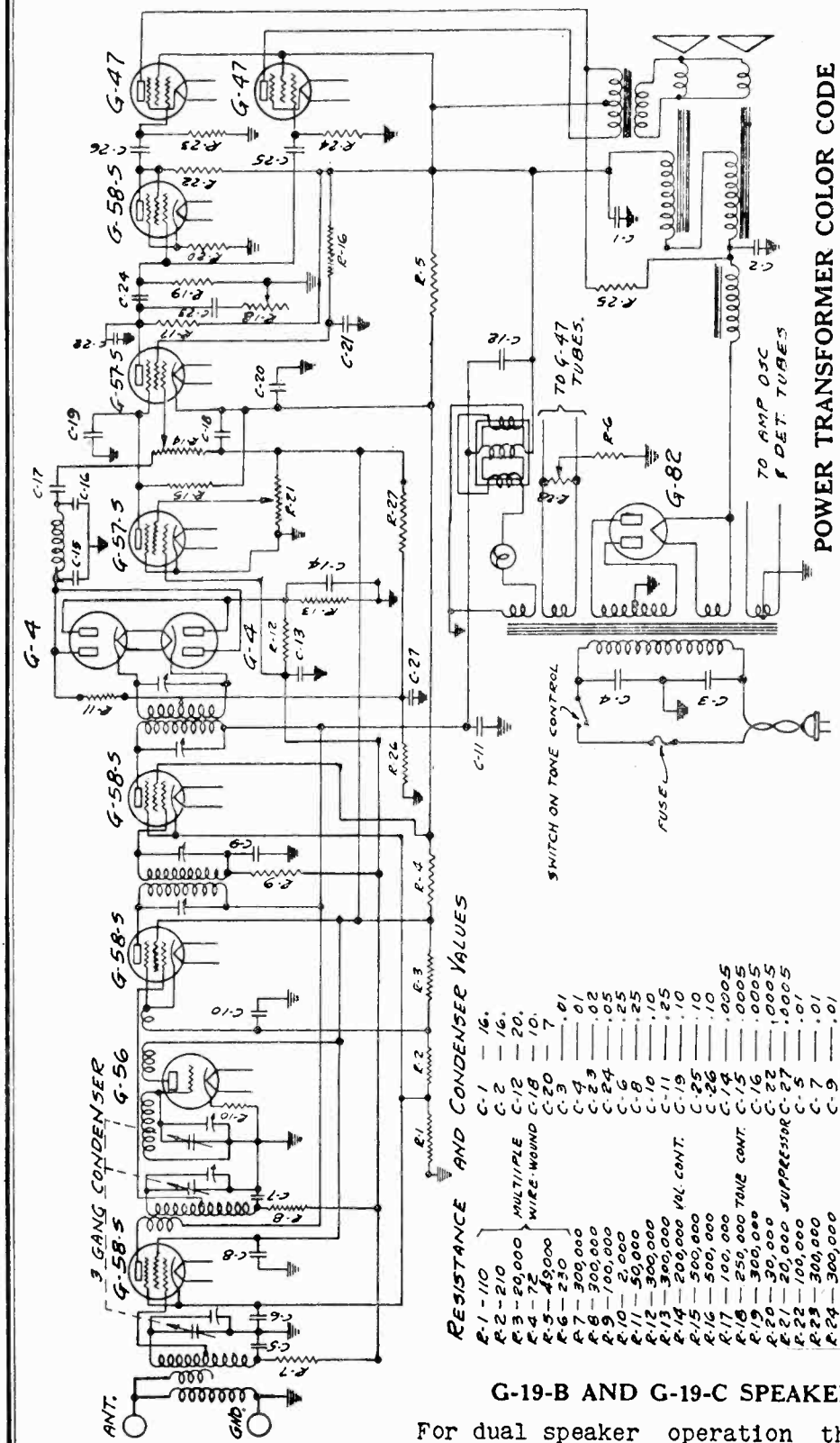

POWER TRANSFORMER COLOR CODE

Primary	Lead #13 - Yellow
Primary	Lead #15 - Yellow
Tuning Light	Lead #10
Tuning Light	Lead #11
G-47 Filament	Lead #7
G-47 Filament	Lead #8
Heater	Lead #4
Heater Center Tap	Lead #1
Heater	Lead #5
Rectifier Filament	Lead #2 - Red
Rectifier Filament	Lead #3 - Red
High Voltage	Lead #6 - Yellow
High Voltage Center Tap	Lead #9 - Black
High Voltage	Lead #12 - Yellow

IF PEAK 175 KC.

RESISTANCE AND CONDENSER VALUES

R-1 - 110		C-1 — 16.	
R-2 - 210		C-2 — 16.	
R-3 - 20,000	MULTIPLE WIRE WOUND	C-12 — 20.	
R-4 - 72		C-18 — 10.	
R-5 - 49000		C-20 — 7	
R-6 - 230		C-3 — .01	
R-7 — 300,000		C-4 — .01	
R-8 — 300,000		C-23 — .02	
R-9 — 100,000		C-24 — .05	
R-10 — 2,000		C-6 — .25	
R-11 — 50,000		C-8 — .25	
R-12 — 300,000		C-10 — .10	
R-13 — 300,000		C-11 — .25	
R-14 — 200,000	VOL. CONT.	C-19 — .10	
R-15 — 500,000		C-25 — .10	
R-16 — 500,000		C-26 — .10	
R-17 — 100,000		C-14 — .0005	
R-18 — 250,000	TONE CONT.	C-15 — .0005	
R-19 — 300,000		C-16 — .0005	
R-20 — 30,000		C-22 — .0005	
R-21 — 20,000	SUPPRESSOR	C-27 — .0005	
R-22 — 100,000		C-5 — .01	
R-23 — 300,000		C-7 — .01	
R-24 — 300,000		C-9 — .01	
R-25 — 75,000		C-13 — .01	
R-26 — 5,000		C-17 — .10	
R-27 — 100,000		C-21 — .25	
R-28 — 20	HUM CONT.		

OTHER FEATURES

The Model 320 Chassis is also equipped with Synchro-Silent Tuning, Reactance Resonance Indicator and resistance-coupled push-pull output. These function just the same in the Model 320 Chassis as they do in the 300.

G-19-B AND G-19-C SPEAKERS

For dual speaker operation the G-19-B and G-19-C speakers are used simultaneously. These speakers are of the same design as those used with the Model 300 twin speaker chassis.

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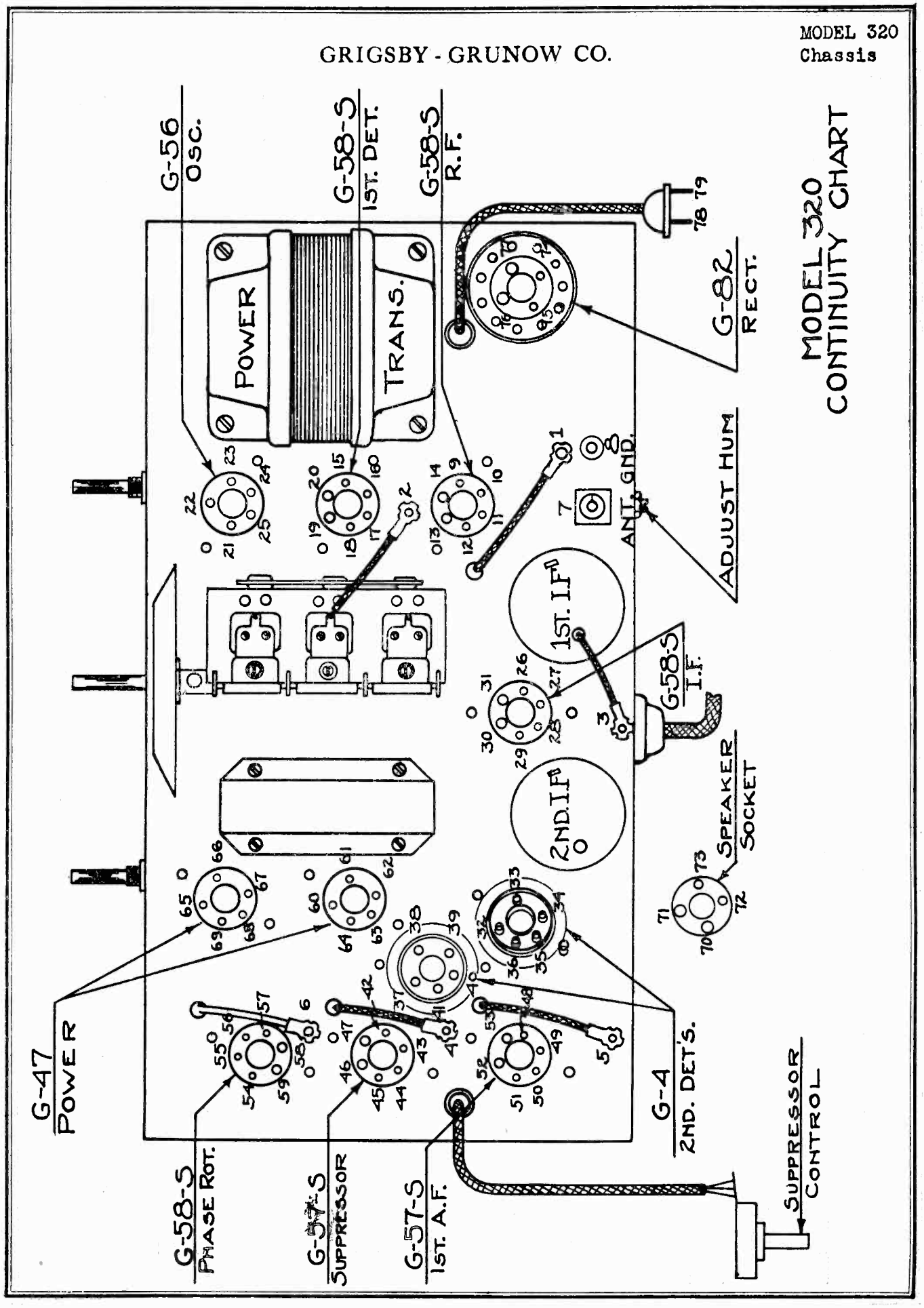
MODEL 320
Chassis



CONTINUITY AND RESISTANCE CHECK
MODEL 320 CHASSIS

NOTE: All readings are taken from designated point to ground, unless otherwise specified. Readings taken with volume and tone controls both turned to maximum clockwise position; all tubes removed from their sockets and speaker plug removed from chassis.

Due to manufacturing tolerances on carbon resistors, the values given below may be expected to differ plus or minus 25 per cent.

Before making the tests given below, check for gang condenser short circuits.

Terminal No.	Resistance in Ohms	If Resistance obtained differs greatly from that given, check the following:
1	900,000	Antenna Coil Secondary, C5,R7,C7,C9,C13,R12,R13 and C14
2	900,000	R.F. Coil Secondary and R8; Also test #1
3	800,000	I.F. Coil Secondary and R9; Also test #1
4	600,000	C13,R12,R13 and C14; Also test #1
5	209,196	R14,C18,R21,C8,R3,R2,R1,R27,C27,R26,C20,C1 and Wiring to Suppressor Control
6	300,000	C25,R19 and C24
7	Low resis. thru Ant. Coil Primary	Antenna Coil Primary
8	Short circuit	Solder Connection "GND" Post to Chassis Frame
9	110	C6,C10 and R1; Also tests #15 and #11
10	Same as #9	
11	9,196	C8,R3,R2,R1,C20,C1,C18 and C11; Also tests #12 and #5
12	59,268	R.F. Coil Primary, C11, High Impedance Winding of Reactance Unit, C12,C1,R5,R4,R3,R2 and R1; also test #5
13	Very low resis. thru Heater Winding	Heater Winding or Heater Winding Center Tap to ground
14	Same as #13	
15	320	Oscillator Coil Cathode Winding, C10,R2 or R1; Also tests #12 and #5
16	Same as #15	
17	Same as #11	
18	59,368	1st I.F. Coil Primary; Also tests #12 and #5
19	Same as #13	
20	Same as #13	
21	2000	R10
22	Very low resis. thru Osc. Coil Sec.	Oscillator Coil Secondary and Connections thereto
23	9196	Oscillator Coil Primary and test #11
24	Same as #13	
25	Same as #13	
26	Same as #9	
27	Same as #9	
28	9288	C20; Also tests #5,#11 and #12
29	59368	2nd I.F. Primary; Also tests #12 and #5
30	Same as #13	
31	Same as #13	
32	4838	2nd I.F. Coil Secondary, R26,C27,C15,C16; Also tests #11,#12 and #5
33	54,788	R11 and test #32
34	300,000	R13,C14 and tests #1,#2 and #8
35	Same as #13	
36	Same as #13	
37	Same as #32	

CONTINUITY AND RESISTANCE CHECK (Cont'd)
MODEL 320 CHASSIS

Terminal No.	Resistance in Ohms	If resistance obtained differs greatly from that given, check the following:
38	Same as #33	
39	Same as #34	
40	Same as #13	
41	Same as #13	
42	Short circuit	Solder connection Cathode to ground
43	Short circuit	Solder connection Suppressor to Cathode
44	0-9196 Variable with R21	R21,C27 and C18; Also tests #11,#15 and #32
45	509,268	C19,R15,C18,C20; and tests #11,#28 and #5
46	Same as #13	
47	Same as #13	
48	Same as #28	
49	Same as #45	
50	558,268	C21,R16, and tests #12,#28,#11,#15 and #51
51	158,268	C22,R17,C23,C24; Also test #50
52	Same as #13	
53	Same as #13	
54	30,000	R20
55	Same as #54	
56	158,268	R22,C26 and tests #50,#12,#28,#11,#15 and #51
57	Same as #56	
58	Same as #13	
59	Same as #13	
60	58,268	Make all tests listed in test #56
61	300,000	R23,R24,C26 and C25
62	Open	Test #71
63	230 to 250	R28,R6 and G47 Filament Winding
64	Same as #63	
65	Same as #60	
66	Same as #61	
67	Open	Test #71
68	Same as #63	
69	Same as #63	
70	Same as #60	
71	Open	Filter Choke, C2 and G82 Filament Winding
72	Same as 62,967	
73	Same as 62,967	
74	220 aprox.	Power Transformer Secondary
75	Same as #74	
76	Open	G82 Filament Winding, Filter Choke, and C2
77	Same as #76	
78	Open	C3,C4 or Power Transformer Primary
79	Same as #78	

SUPPRESSOR CONTROL UNIT LUGS		
Black Lead	Short	Solder Connection to ground
Blue Lead	Same as #11	
Red Lead	Same as #44	

TEST BETWEEN THE FOLLOWING POINTS		
78-79	Very low resis.	Power Transformer Primary, C3,C4,"on & off" switch and fuse.
1-2	600,000	R7,R8,C5 and C7
2-3	400,000	R8,R9,C7 and C9
12-65	1,000	Reactance Unit and C12
48-51	149,000	R17,R5,C22 and C20
28-11	72	R4,C20 and C8
15-17	20,000	R3,C8 and C10

NOTE: If the above tests show a normal condition, it will be necessary to check the various units and wiring in the circuit where the difficulty has been previously localized.

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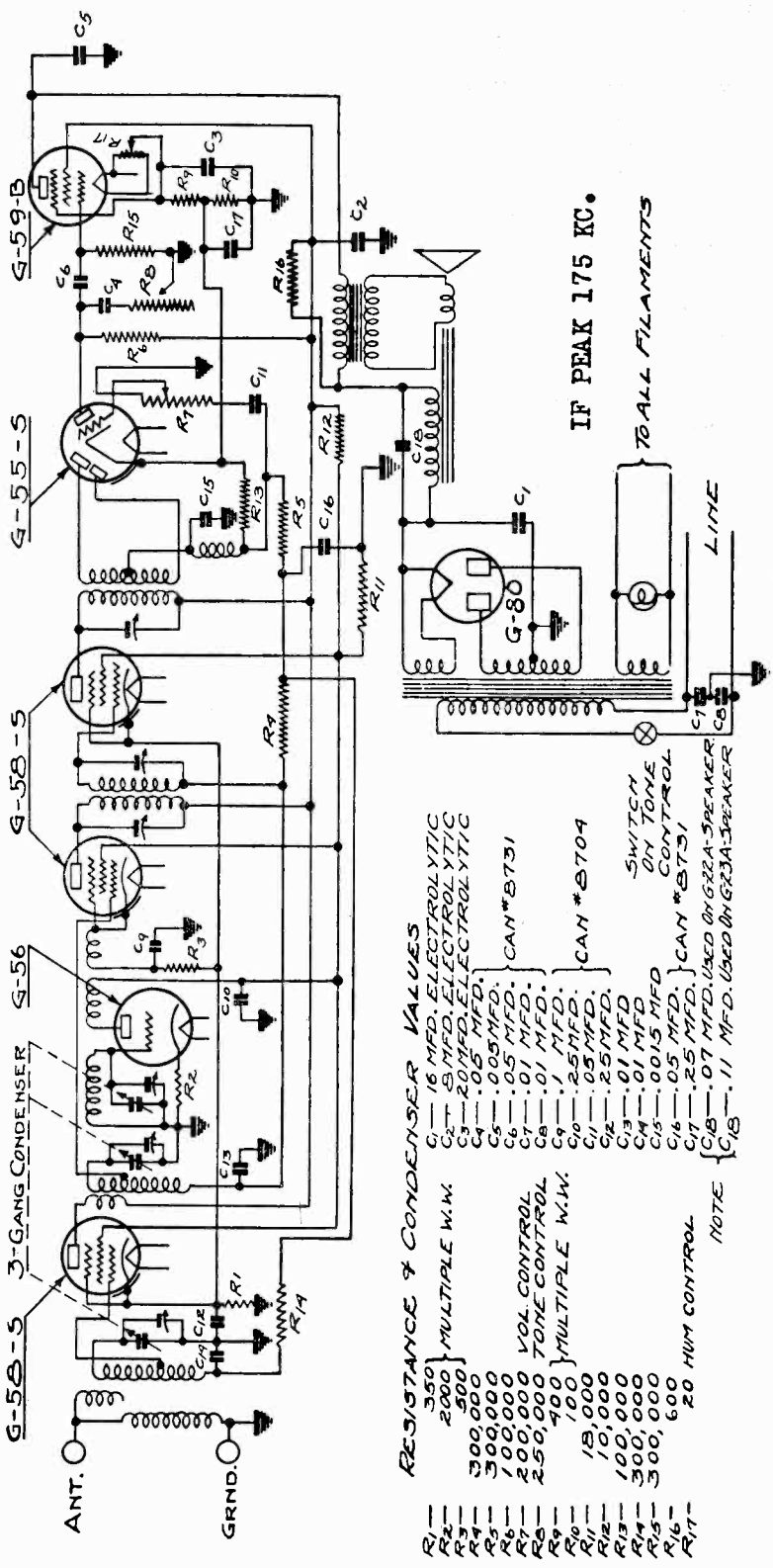
MODEL 330 Series
Schematic- Data



Voltages To Ground

Tube	Fil.	Plate	Screen	Cathode
RF	2.3	250.	88.	7.2
Mod	2.3	250	88.	9.3
Osc	2.3	90	---	18.
IF	2.31	250	88.	7.2
2nd D)	2.32	Triode	---	4.3
1st AF)		65	250.	
Output	2.34	254	---	19.
Rect.	4.8	352 AC		--

Line Voltage 115.. V.C. Max.

POWER TRANSFORMER COLOR CODE

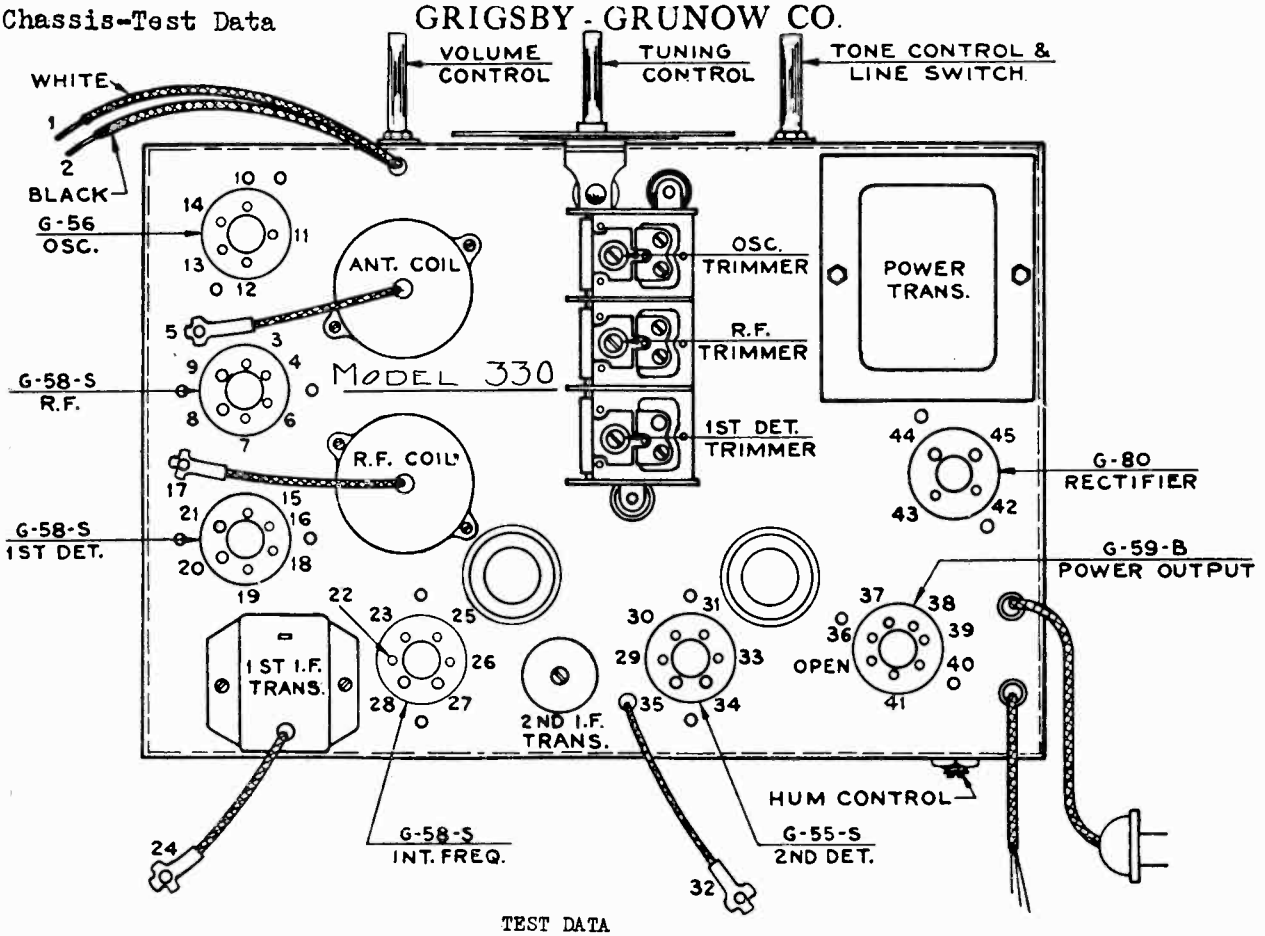
Primary ----------	Stranded Yellow
Primary ----------	Stranded Yellow
High Voltage ------	Stranded Red
High voltage G.T. -	Stranded Black
High Voltage ------	Stranded Red
Heater ------------	Solid Black
Heater ------------	Solid Black
Rectifier Filament	Solid Yellow
Rectifier Filament	Solid Yellow

SPEAKERS

* The Model G-23-A, a six and one-half inch dynamic speaker, is used in conjunction with the Model 330 chassis when used in the Model 331 receiver while the Model G-22-A, a twelve inch dynamic speaker, is used in the Model 336 receiver. Both have a field resistance of 970 ohms.

* In some of the early models of the 330 chassis, as used in the 331 receiver, the six and one half inch dyanmic speaker is a "Best" D-65, with a field coil rated at 1070 ohms hot.

MODEL 330 Series
Chassis-Test Data



TEST DATA

All readings are taken between designated point and ground. Readings are taken with volume control turned to maximum clockwise position and all tubes removed from sockets. Speaker REMAINS in the circuit. Before making these tests, test for gang and i-f trimmer condenser shorts.

* Readings will vary according to the polarity of the test leads because of the presence of electrolytic condensers.

Terminal Number		Resistance in Ohms
1	Antenna Lead	Very low resistance
2	Ground Lead	Short circuit
3	R. F. Cathode	350
4	R. F. Suppressor	Same as #3
5	R. F. Grid	700,000
*6	R. F. Screen	18,000
*7	R. F. Plate	28,000
*8	R. F. Filament	510
9	R. F. Filament	Same as #8
10	Oscillator Cathode	2,000
11	Oscillator Grid	Low resistance
*12	Oscillator plate	18,000
13	Oscillator Filament	Same as #8
14	Oscillator Filament	Same as #8
15	1st Detector Cathode	850
16	1st Detector Suppress.	Same as #15
17	1st Detector Grid	700,100
*18	1st Detector Screen	Same as #6
*19	1st Detector Plate	28,100
20	1st Detector Filament	Same as #8
21	1st Detector Filament	Same as #8
22	I. F. Cathode	Same as #3
23	I. F. Suppressor	Same as #3
24	I. F. Grid	700,200
*25	I. F. Screen	Same as #6

Terminal Number		Resistance in Ohms
*26	I. F. Plate	28,100
27	I. F. Filament	Same as #8
28	I. F. Filament	Same as #8
*29	2nd Detector Cathode	100
30	2nd Detector Diode Plate	100,200
31	2nd Detector Diode Plate	Same as #30
32	2nd Detector A.F.Grid	200,000
*33	2nd Detector A.F.Plate	128,000
34	2nd Detector Filament	Same as #8
35	2nd Detector Filament	Same as #8
*36	Power Screen	28,000
37	Power Grid	300,000
*38	Power Plate	29,250
*39	Power Third Grid	500
40	Power Filament	Same as #8
41	Power Filament	Same as #8
42	Rectified Plate	Approximately 163
43	Rectifier Plate	Same as #42
*44	Rectified Filament	29,570
*45	Rectifier Filament	Same as #44
32 to 30		300,200
33 to 37		428,000
8 to 9		Very low resistance
44 to 45		Very low resistance
Between line cord leads		Very low resistance
Line cord leads to ground		Open

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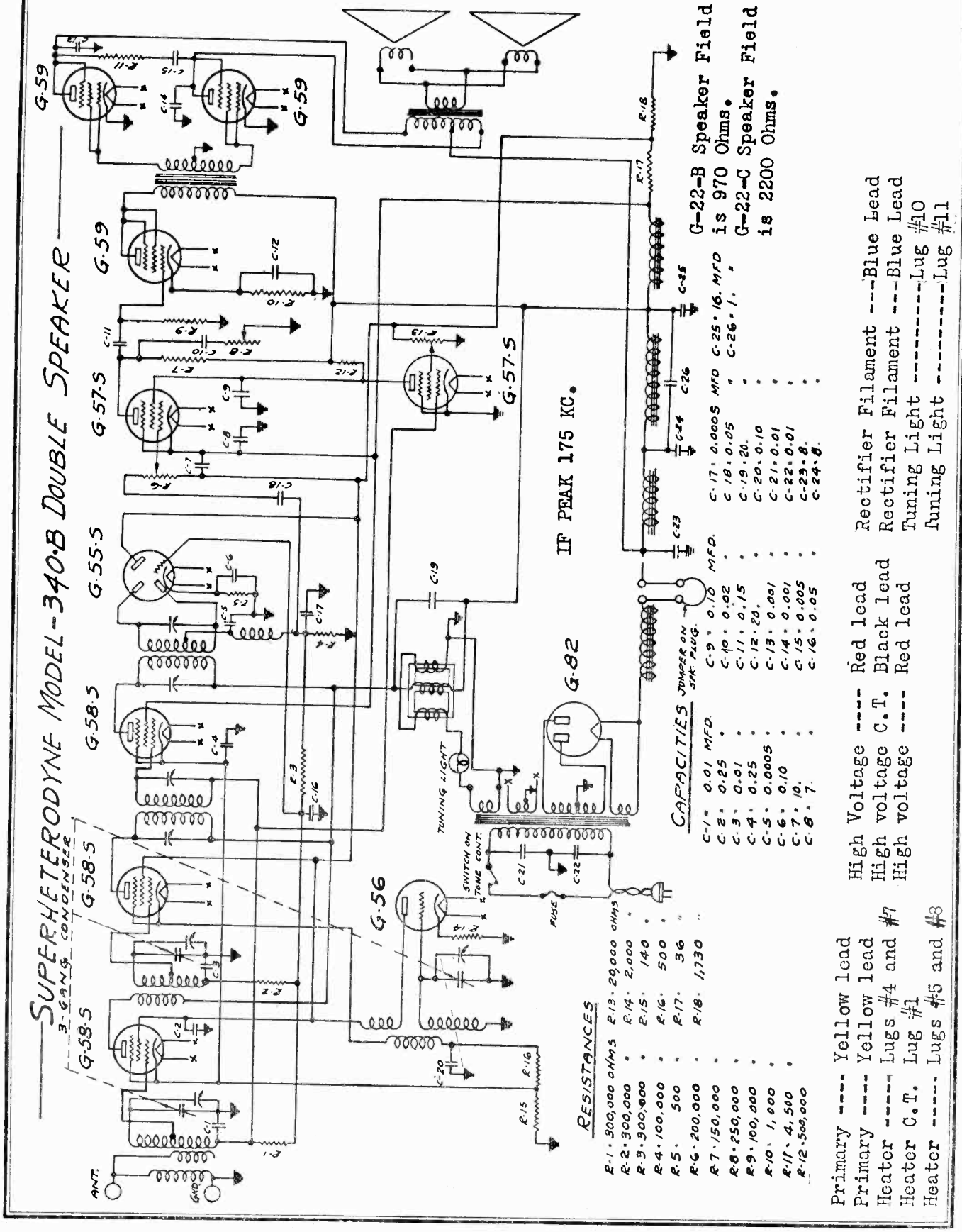
MODEL 340 Series
Schematic



MODEL 340
Chassis
Voltage
Test Data

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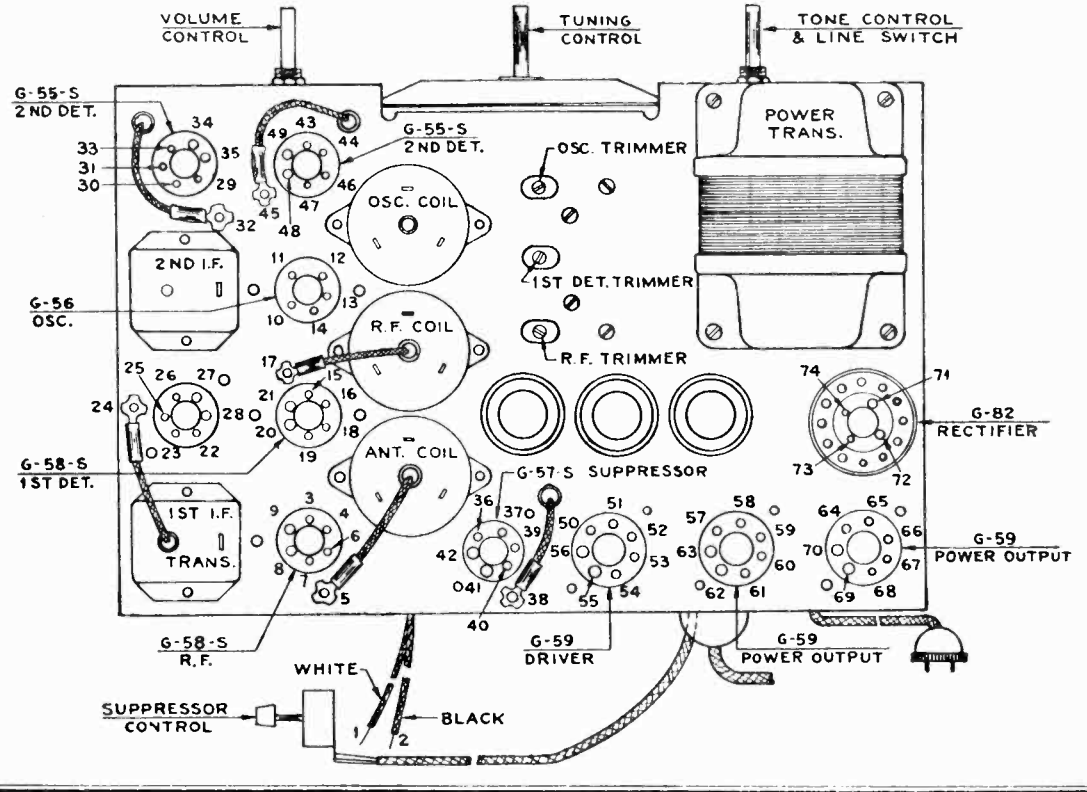
VOLTAGE TO GROUND

TUBE	FILAMENT	PLATE	SCREEN	CATHODE	SUPPRESSOR
R.F.Amp.	2.5	210	80	2.5	2.5
Mod.	2.5	210	80	4.5	4.5
Osc.	2.5	80	18	---	---
IF	2.5	210	85	2.5	2.5
		TRIODE			
		80	---	1.1	---
2nd Det.	2.5	105	100	82.2	82.2
1st AF	2.5	100	*0	0	*0
Supp.	2.5	225	225	22.	225.
Driver	2.5	360	0	0	360
Output	2.5	----	--	--	--
Rectifier	2.5				

All readings are taken from designated point to ground unless otherwise specified. Volume control at maximum clockwise position. All tubes removed. Speaker in circuit.
*Readings vary according to polarity of test leads due to electrolytic units.

Terminal Number	Resistance in ohms
1 Antenna lead	Low resistance
2 Ground lead	Short circuit
3 R. F. Cathode	140
4 R. F. Suppressor	Same as #3
5 R. F. Grid	700,000
* 6 R. F. Screen	1,592
* 7 R. F. Plate	5,628
8 R. F. Filament	Very low resistance
9 R. F. Filament	Same as #8
10 Oscillator Cathode	2,000
11 Oscillator Grid	Low resistance
*12 Oscillator Plate	1,592
13 Oscillator Filament	Same as #8
14 Oscillator Filament	Same as #8
15 1st Det. Cathode	640
16 1st Det. Suppressor	Same as #15
17 1st Det. Grid	700,000
*18 1st Det. Screen	Same as #6
*19 1st Det. Plate	5,728
20 1st Det. Filament	Same as #8
21 1st Det. Filament	Same as #8
22 I. F. Cathode	Same as #3
23 I. F. Suppressor	Same as #3
24 I. F. Grid	700,100
*25 I.F. Screen	Same as #43
*26 I.F. Plate	5,728
27 I. F. Filament	Same as #8
28 I. F. Filament	Same as #8
29 2nd Det. Cathode	500
30 2nd Det. Diode Plate	100,100
31 2nd Det. Diode Plate	Same as #30
32 2nd Det. A.F. Grid	400,000
*33 2nd Det. A.F. Plate	Same as #6
34 2nd Det. A.F. Filament	Same as #8
35 2nd Det. A.F.	Same as #8
36 Synchro Cathode	Short Circuit
37 Synchro Suppressor	Same as #36

Terminal Number	Resistance in Ohms
38 Synchro grid	Same as #5
*39 Synchro Screen	0 to 1,592
*40 Synchro Plate	603,828
41 Synchro Filament	Same as #8
42 Synchro Filament	Same as #8
*43 A. F. Cathode	1,628
*44 A. F. Suppressor	Same as #43
*45 A. F. Grid	201,592
*46 A. F. Screen	Same as #40
*47 A. F. Plate	153,828
48 A. F. Filament	Same as #8
49 A. F. Filament	Same as #8
50 Driver Cathode	1,000
51 Driver Control Grid	100,000
*52 Driver Screen Grid	4,308
*53 Driver Third Grid	Same as #52
*54 Driver Plate	Same as #52
55 Driver Filament	Same as #8
56 Driver Filament	Same as #8
57 Power Cathode	Short Circuit
58 Power Control Grid	180
59 Power Screen Grid	Same as #58
*60 Power Third Grid	5,013
*61 Power Plate	Same as #60
62 Power Filament	Same as #8
63 Power Filament	Same as #8
64 Power Cathode	Short circuit
65 Power Control Grid	Same as #58
66 Power Screen Grid	Same as #58
*67 Power Third Grid	Same as #60
*68 Power Plate	Same as #60
69 Power Filament	Same as #8
70 Power Filament	Same as #8
*71 Rectifier Filament	5,038
*72 Rectifier Filament	Same as #71
73 Rectifier Plate	Approximately 125
74 Rectifier Plate	Same as #73



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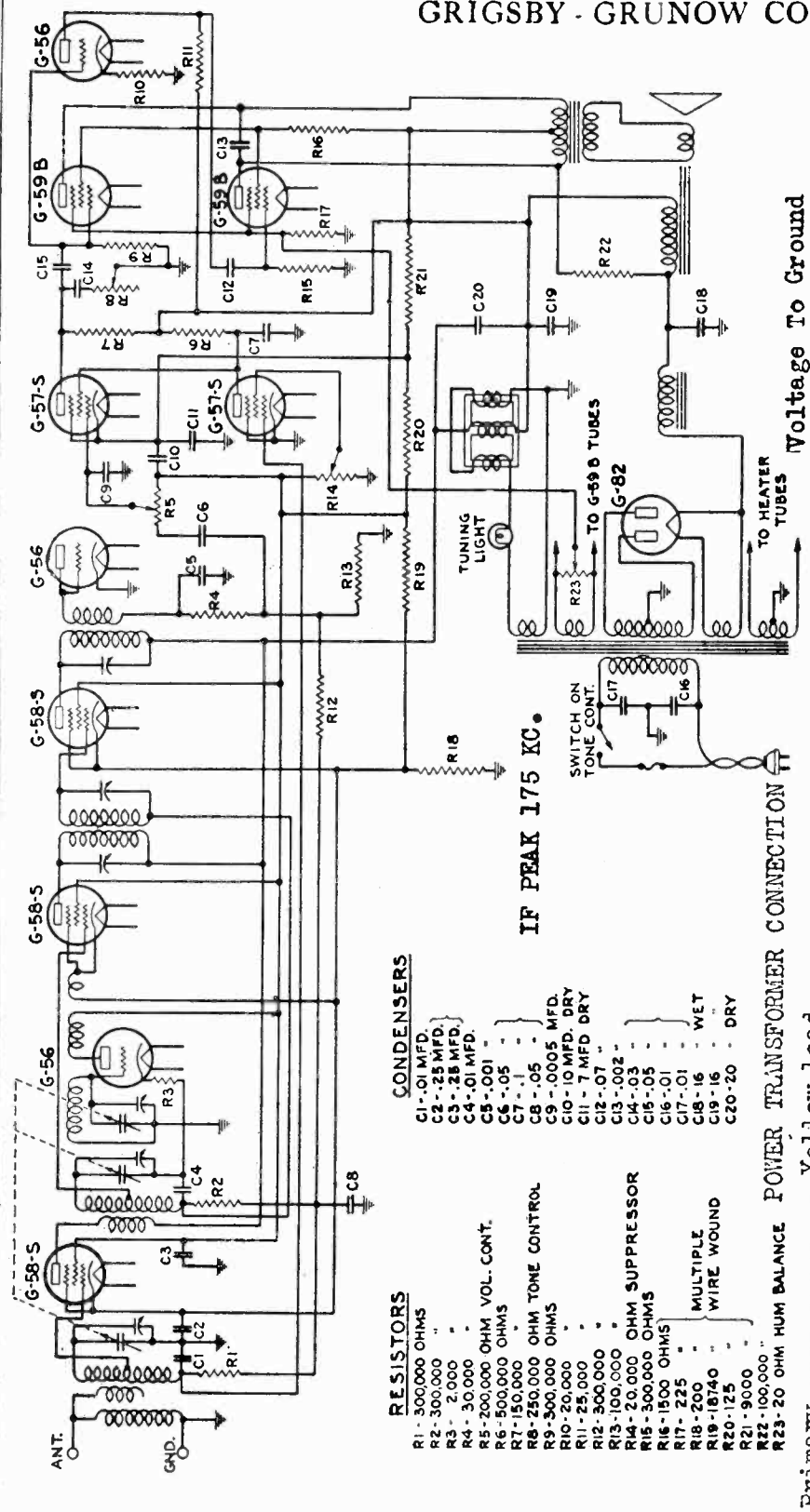
MODEL 360
Schematic
Voltage



POWER TRANSFORMER CONNECTION

Primary ----------	Yellow lead
Primary ----------	Yellow lead
High voltage -------	Red lead
High voltage C.T. ---	Black lead (stranded)
High voltage -------	Red lead
Pentode Heater ------	Lug #7
Pentode Heater ------	Lug #8
R. F. Heater -------	Lug #4
R. F. Heater C.T. ---	Lug #1
R. F. Heater -------	Lug #5
Tuning Light -------	Lug #10
Tuning Light -------	Lug #11
Rectifier filament --	Black lead (solid)
Rectifier filament --	Black lead (solid)

Voltage To Ground

Tube	Fil	Plt.	Scr	K*	Sup Grid
RF Amp.	2.35	275	105	5.	5. -
Mod.	2.35	275	105	5.	5. -
Osc.	2.35	105	-	15.	- -
IF Amp.	2.3	275	105	5.	5. -
2nd Det.	2.3	0	-	-	- -
1st Audio	2.3	140	135	115	115. 90.
Supp.	2.32	135	-	-	- -
Ph.Rot.	2.35	260	-	17	- -
Output	2.35	280	270	-	18 -
Rect.	2.5	---	-	-	- -

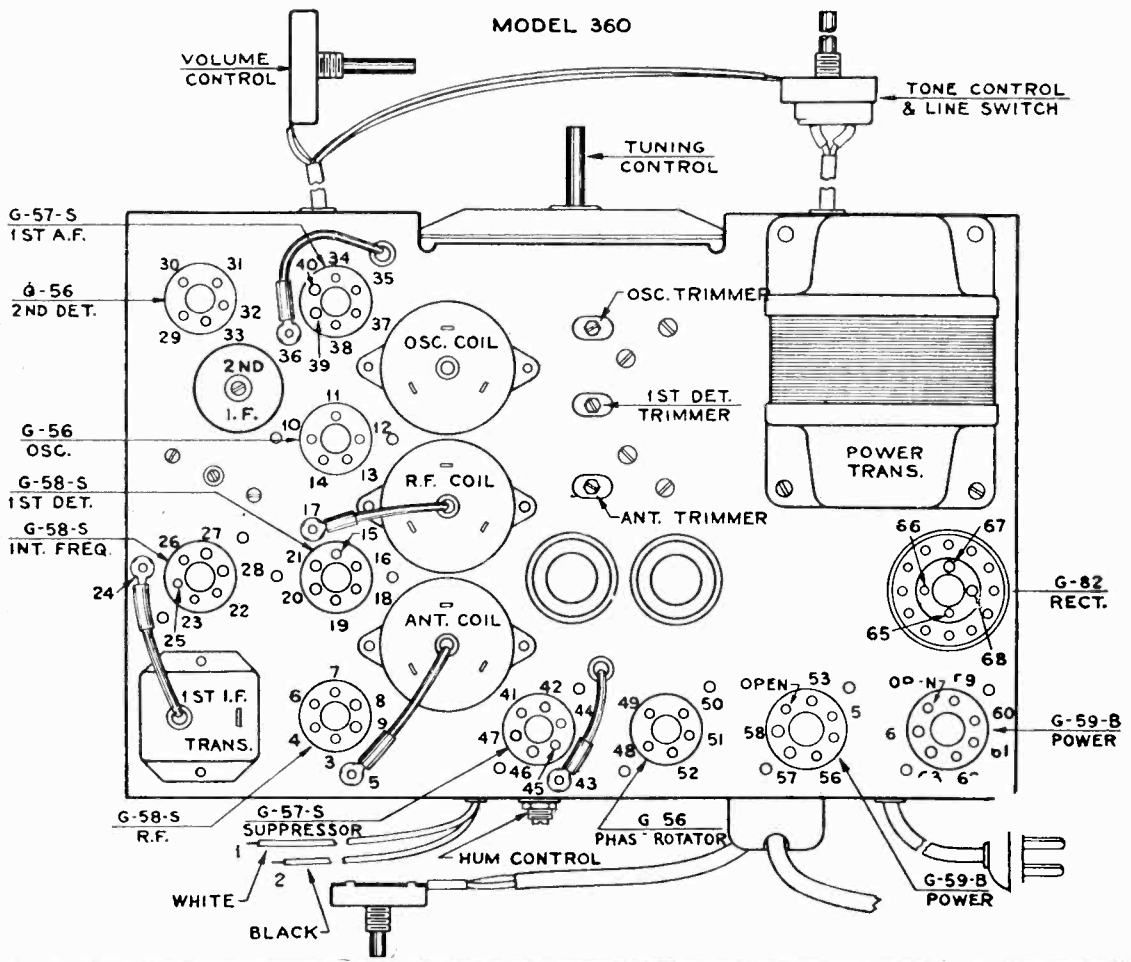
* K= Cathode. Line voltage 115 V... V.C. Max.
Synchro-Silent Tuner- Clockwise

The type G-22-D dynamic speaker is used in conjunction with the Model 360 chassis. It has a diameter of twelve inches and a field coil resistance of 450 ohms. The speaker is connected to the chassis by the plug system and is so wired that when the plug is removed from the chassis, no D.C. voltage can be applied to the electrolytic condensers even if the receiver is turned "on".

MODEL 360 Series
Chassis
Test Data

GRIGSBY - GRUNOW CO.

Terminal Number		Resistance in Ohms
1	Antenna lead	Low resistance
2	Ground lead	Short circuit
3	R. F. Cathode	200
4	R. F. Suppressor	Same as #3
5	R. F. Grid	700,000
* 6	R. F. Screen	9,730
* 7	R. F. Plate	20,655
8	R. F. Filament	Same as #13
9	R. F. Filament	Same as #13
10	Oscillator Cathode	2,000
11	Oscillator Grid	Low resistance
*12	Oscillator Plate	9,730
13	Oscillator Filament	Very low resistance
14	Oscillator Filament	Same as #13
15	1st Detector Cathode	200
16	1st Detector Suppressor	Same as #15
17	1st Detector Grid	700,000
*18	1st Detector Screen	Same as #6
*19	1st Detector Plate	20,755
20	1st Detector Filament	Same as #13
21	1st Detector Filament	Same as #13
22	I. F. Cathode	Same as #3
23	I. F. Suppressor	Same as #3
24	I. F. Grid	700,100
*25	I. F. Screen	Same as #6
*26	I. F. Plate	20,755
27	I. F. Filament	Same as #13
28	I. F. Filament	Same as #13
29	2nd Detector Cathode	Short circuit
30	2nd Detector Grid	130,100
31	2nd Detector Plate	Same as #30
32	2nd Detector Filament	Same as #13
33	2nd Detector Filament	Same as #13
*34	A. F. Cathode	9,855
*35	A. F. Suppressor	Same as #34
*36	A. F. Grid	209,730
*37	A. F. Screen	518,855
*38	A. F. Plate	168,855
39	A. F. Filament	Same as #13
40	A. F. Filament	Same as #13
41	Synchro Cathode	Short Circuit
42	Synchro Suppressor	Same as #41
43	Synchro Grid	700,000
*44	Synchro Screen	0 to 9,730
*45	Synchro Plate	Same as #37
46	Synchro Filament	Same as #13
47	Synchro Filament	Same as #13
48	Phazer Cathode	20,000
49	Phazer Grid	300,000
*50	Phazer Plate	43,855
51	Phazer Filament	Same as #13
52	Phazer Filament	Same as #13
53	Power Grid	300,000
*54	Power Screen	20,355
55	Power Suppressor	225
*56	Power Plate	Approx. 453
57	Power Filament	Same as #55
58	Power Filament	Same as #55
59	Power Grid	Same as #49
*60	Power Screen	Same as #54
61	Power Suppressor	Same as #55
*62	Power Plate	Same as #56
63	Power Filament	Same as #55
64	Power Filament	Same as #55
65	Rectifier Plate	Approx. 163
66	Rectifier Plate	Same as #65
*67	Rectifier Filament	19,595
*68	Rectifier Filament	Same as #67
Line cord leads to ground		Open
17 to 36		909,730



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MODEL 360 Series
Reactance Tuning
Indicator Notes

REACTANCE RESONANCE INDICATOR

By referring to the wiring diagram, it will be seen that the reactor used consists of three windings on three legs respectively, of the iron core. The windings on the two end legs are connected in series with the pilot light, while the winding on the center leg is connected in series with the plates of the R.F., First Detector, and I.F. tubes. An electrolytic condenser, C-20 is connected so as to shunt the center winding. Its purpose will be explained later.

The operation of the reactor is as follows:

When the set is turned on and the tubes are warmed up, but no station is tuned in, a relatively large plate current will flow through the center winding. This saturates the iron core so that the reactance of the two outer windings is quite low, and considerable current therefore flows through the pilot light. When a station is tuned in, it operates the G-56 Automatic Volume Control tube so that an automatic bias voltage is built up across Resistor R-13. This bias voltage is, in turn, impressed upon the control grids of the R.F., First Detector and I.F. tubes. When this bias is impressed on these amplifier tubes, the normal AVC action takes place; namely, their amplification is decreased. It also happens, however, that their plate current is decreased, due to the higher negative bias on their grids. This reduced plate current flowing through the center winding of the reactor relieves the saturation in the iron core so that reactance of the outer windings increases and the current flowing through the pilot light is therefore reduced, causing the pilot light to dim when a station is tuned in.

It is, therefore, a simple and fascinating matter to adjust the dial until the pilot light is dimmest, with the perfect assuredness that exact resonance will be located.

The two outer windings are connected so that they buck each other so far as the center leg of the core is concerned. Hence, there will be induced no A.C. in the center winding, which is in the plate circuit of the amplifier tubes. Because of small unbalances which may occur, it has been found necessary that we place the electrolytic condenser, C-20 across the center winding so that there is no possible change of any A.C. getting into the plate circuit of the amplifier tubes.

AUTOMATIC VOLUME CONTROL

Bias voltage for the automatic volume control system is obtained from the voltage drop across the 100,000 ohm resistor, R-13, and is applied to the grids of the radio frequency amplifier, first detector and intermediate frequency amplifier tubes to control their amplification.

The manual volume control is a 200,000 ohm potentiometer connected in the grid circuit of the first audio amplifier and it is entirely independent of the automatic volume control in its action.

SPEAKER

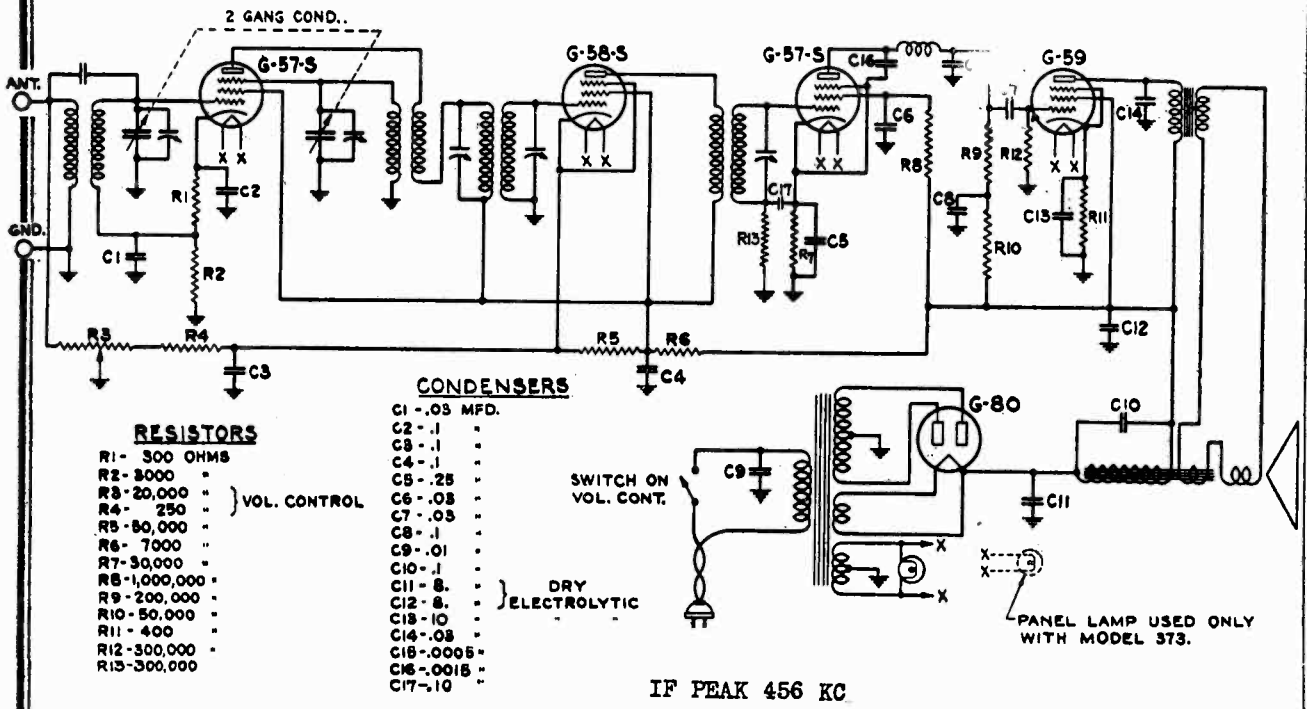
The type G-22-D dynamic speaker is used in conjunction with the Model 360 chassis. It has a diameter of twelve inches and a field coil resistance of 450 ohms. The speaker is connected to the chassis by the plug system and is so wired that when the plug is removed from the chassis, no D.C. voltage can be applied to the electrolytic condensers even if the receiver is turned "on".

Filter Condenser Data

First Filter Condenser..350 Volts DC Second Filter Condenser.. 300 Volts DC

MODEL 370 Series
Schematic
Alignment Notes

GRIGSBY-GRUNOW CO.



RESISTORS

R1- 300 OHMS
R2- 3000 "
R3-20,000 " } VOL. CONTROL
R4- 250 "
R5-80,000 "
R6- 7000 "
R7-30,000 "
R8-1,000,000 "
R9-200,000 "
R10-50,000 "
R11-400 "
R12-300,000 "
R13-300,000

CONDENSERS

C1-.05 MFD.
C2-.1 "
C3-.1 "
C4-.1 "
C5-.25 "
C6-.05 "
C7-.05 "
C8-.1 "
C9-.01 "
C10-.1 "
C11-8. " } DRY ELECTROLYTIC
C12-8. "
C13-10 "
C14-.05 "
C16-.0005 "
C16-.0015 "
C17-.10 "

IF PEAK 456 KC

The Model 370 is a five tube superheterodyne chassis designed for single speaker operation in the Model 371 and 373 receivers.

SPEAKER DATA

Two types of speakers are used in the 370 series. One type, the "Best" D-65 has a d-c resistance of 1300 ohms hot and a diameter of 5 inches. The G-26-A speaker has a diameter of 5¼ inches and a d-c resistance of 1100 ohms at 70° F.

POWER TRANSFORMER COLOR CODE

Primary	Stranded yellow
Primary	Stranded yellow
High voltage	Stranded red
High voltage C.T.	Stranded green
High voltage	Stranded red
Heater	Solid black
Heater C.T.	Stranded green
Heater	Solid black
Rectifier filament	Solid yellow
Rectifier filament	Solid yellow

ALIGNMENT PROCEDURE

The receiver must be aligned with the volume control in maximum position.

Supply a 456 K.C. signal to the first detector grid and align the three I.F. tuning condensers to give maximum sensitivity.

Turn the gang condenser completely in mesh; set the dial at the line below 550 K.C. and lock in place.

Set the dial at 1500 K.C. and after supplying a 1500 K.C. signal to the input of the receiver, align the two radio frequency circuits for maximum output.

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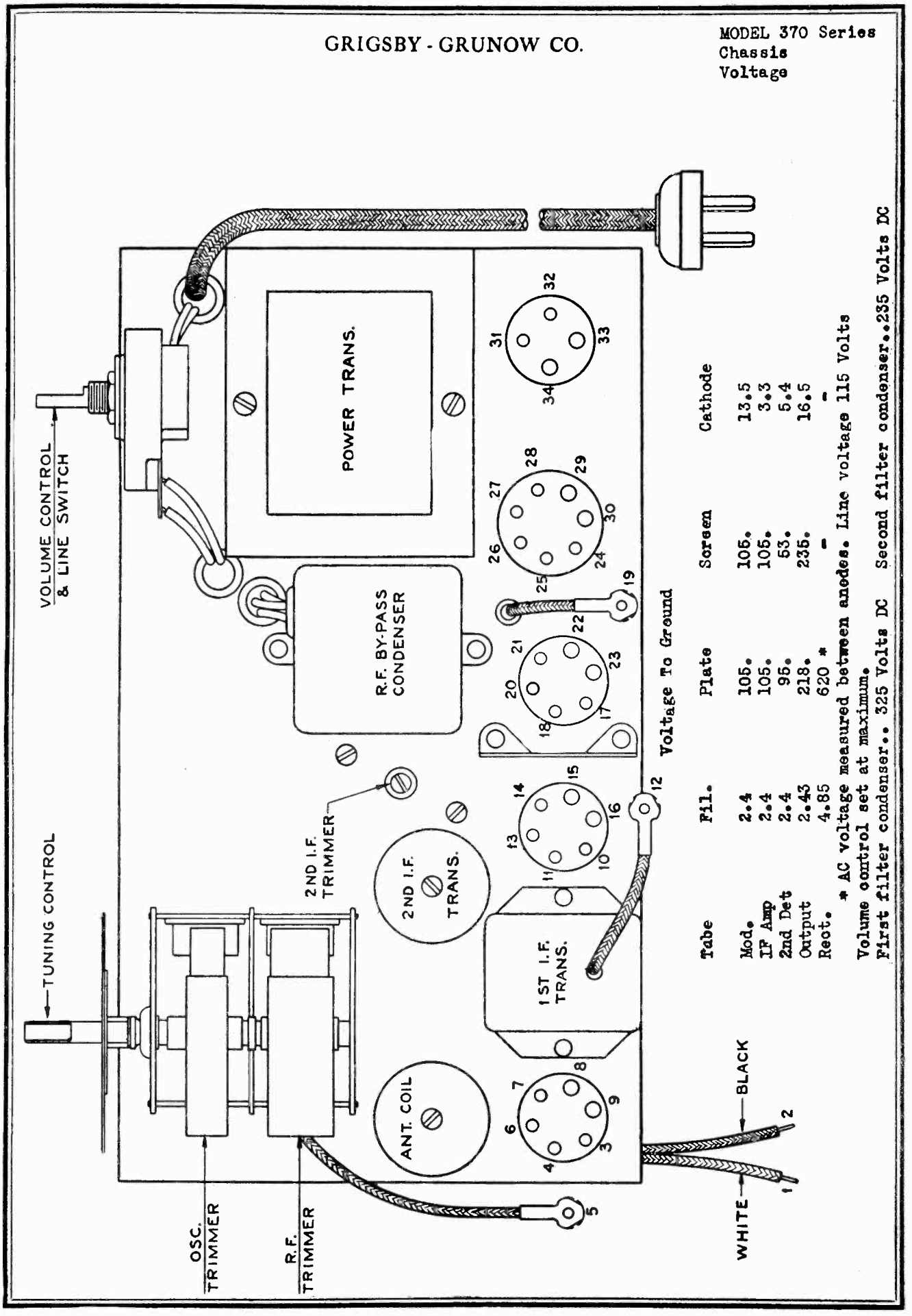
MODEL 370 Series
Chassis
Voltage



Voltage To Ground

Tube	Fil.	Plate	Screen	Cathode
Mod.	2.4	105.	105.	13.5
IF Amp	2.4	105.	105.	3.3
2nd Det	2.4	95.	53.	5.4
Output	2.43	218.	235.	16.5
Rect.	4.85	620 *	-	-

* AC voltage measured between anodes. Line voltage 115 Volts
Volume control set at maximum.
First filter condenser.. 325 Volts DC Second filter condenser..235 Volts DC

MODEL 370 Series
Test Data

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MODEL 370 CONTINUITY

NOTE: All readings are taken from designated point to ground unless otherwise specified. Readings are taken with volume control turned to maximum clockwise position and all tubes removed from their sockets.
Speaker to remain in circuit.
Due to manufacturing tolerances on carbon resistors, the values given below may be expected to differ plus or minus 15 per cent.
Before making the following tests, check for gang condenser or I.F. trimmer short circuits.
*Note that the readings vary according to the polarity of the test leads due to the presence of electrolytic condensers. Use the polarity giving approximately the results shown below.

TERMINAL NUMBER	RESISTANCE IN OHMS	If resistance differs greatly from value shown, check the following:
1	Low resistance	Antenna coil primary and connections to ground
2	Short circuit	Solder connection - ground lead to chassis
3	3,300	C2, R1, C1, R2
4	Very low resistance	Oscillator coil secondary or connections to chassis
5	3,000	Antenna coil secondary, C2, R2, C1
* 6	50,250	C4, C12, C14, R5, C3, R4, R3, C11 and C13
* 7	50,350	Oscillator coil primary, 1st I.F. coil primary and test #6
8	Very low resistance	Heater filament winding or center tap to chassis
9	Same as #8	
10	250	C3, R4, R3 and test #6
11	Same as #10	
12	Approx. 100	1st I. F. coil secondary or connection to chassis
*13	Same as #6	
*14	50,350	2nd I. F. Coil primary and tests #6 and #7
15	Same as #8	
16	Same as #8	
17	30,000	R7, C5
18	Same as #17	
19	Approx. 100	2nd I. F. coil secondary or connections to chassis
*20	1,057,250	C6, R8, R6 and test #6
*21	307,300	C16, R.F. choke, C7, R9, R10, C13, R6, and test #6
22	Same as #8	
23	Same as #8	
24	400	R11
25	Same as #24	
26	300,000	C7, R12 and test #21
*27	57,250	C12, C14 and test #6
*28	57,730	Output transformer primary C14 and tests #27 and #6
29	Same as #8	
30	Same as #8	
31	App. 238	Power transformer secondary or center tap to Chassis
32	Same as #31	
*33	58,350	C11, C10, Speaker field, C80 Filament winding or tests #27 and #6
34	Same as #33	
21 to 26	607,300	C7 or tests #21 and #26
31 to 32	App. 475	Power transformer secondary
Between line cord leads	Very low resistance	Power transformer primary or "on-off" switch
Line cord leads to ground	Open	Power transformer primary or C9
1 to 5	3000	Capacitor - Ant. to 1st Det. Grid

If the above tests show a normal condition, it will be necessary to check the units and wiring in the circuits where the difficulty has been previously localized.

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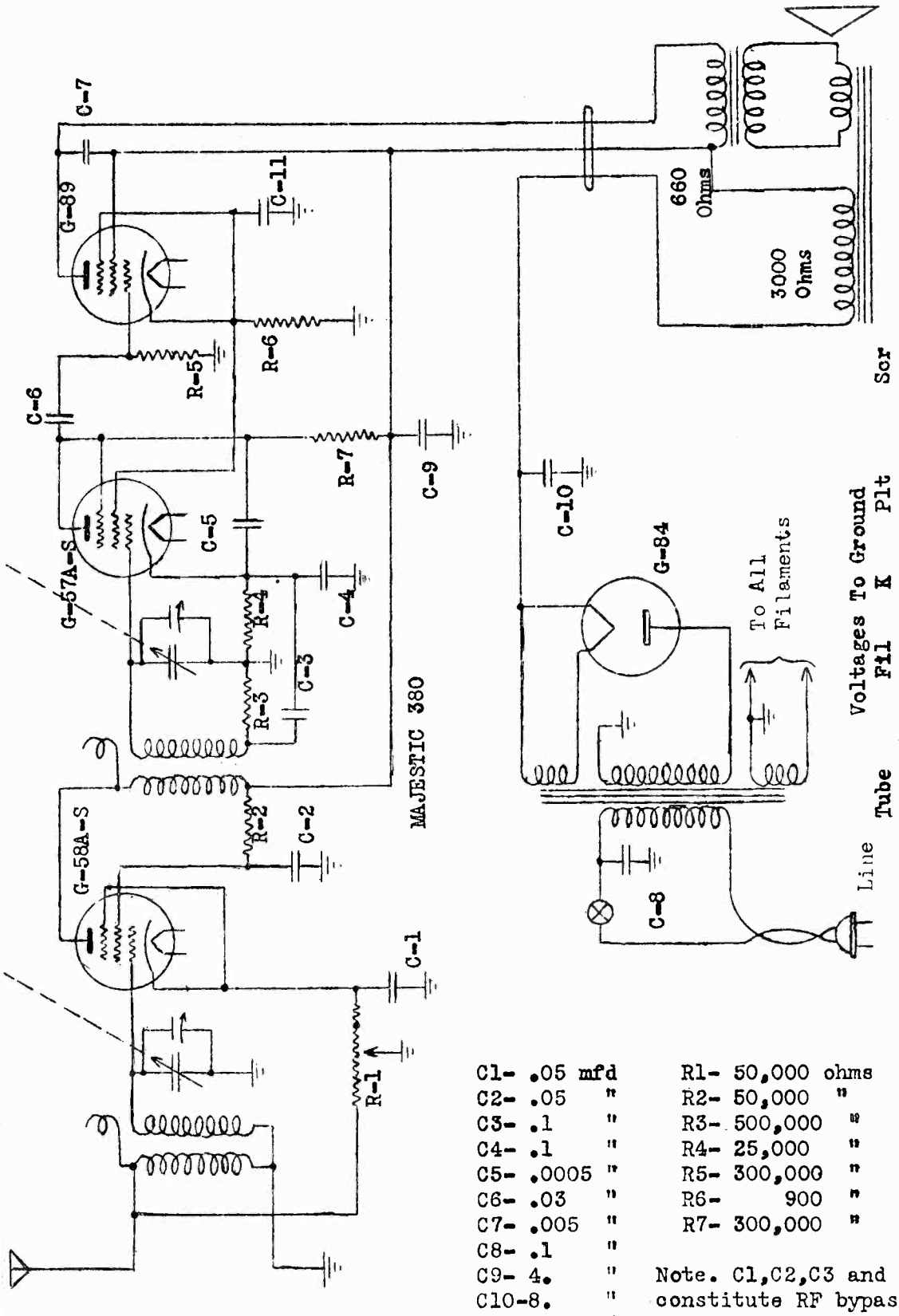
MODEL 380
Schematic
Voltage



Voltages To Ground				
Tube	Fil	K	Plt	Scr
RF Amp	5.9	2.5	178	—
Det.	5.9	1.4	80	18.4
Output	5.9	18.4	171	183.
Rect	2.4		350 AC	—

Line voltage 115 Volts. Kc. Cathode

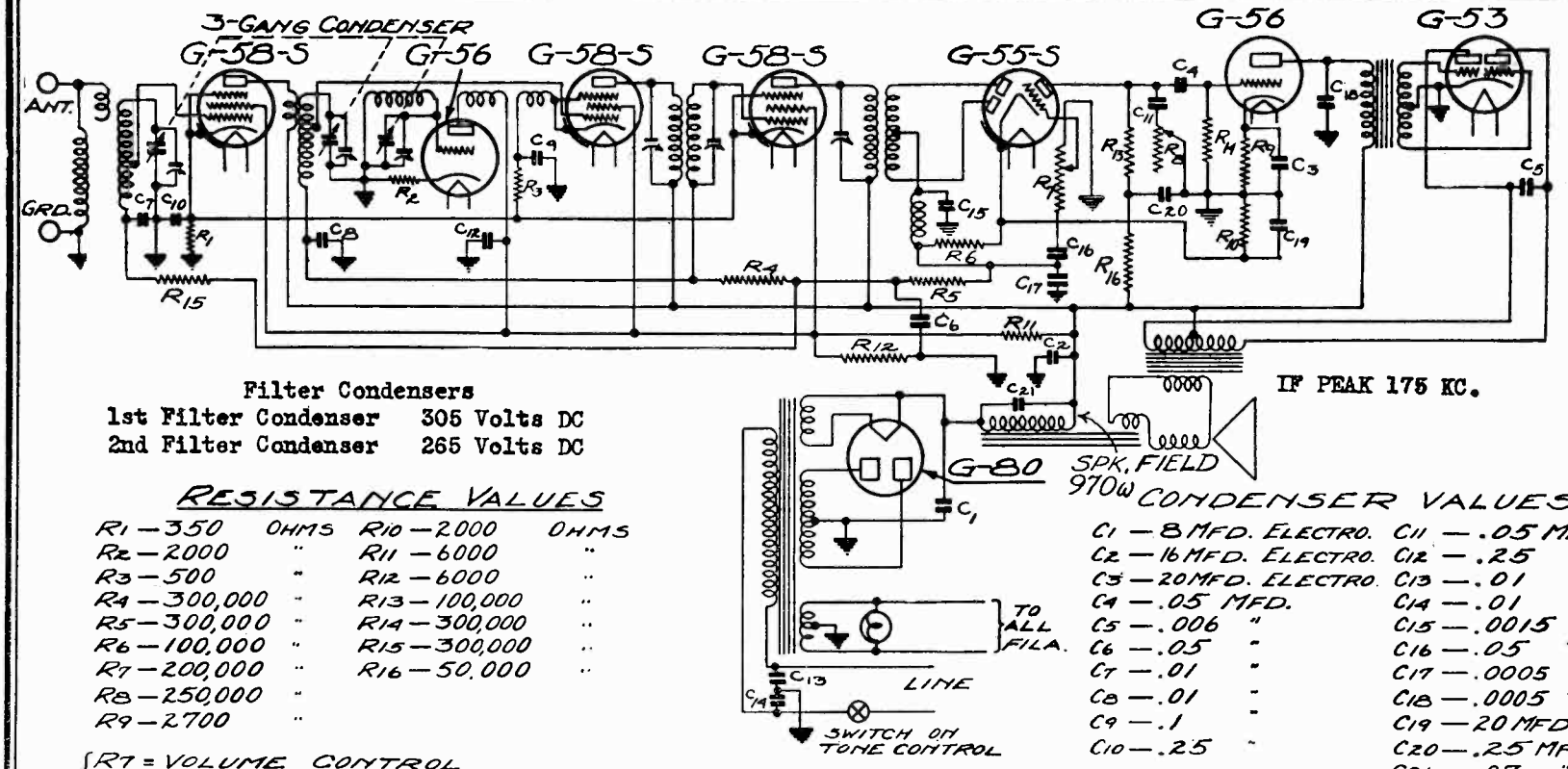
TRANSFORMER
Primary----Stranded Yellow
High Voltage---Red
Rect. Filament---Black
Heaters--- Solid Yellow

C1- .05 mfd		R1- 50,000 ohms	
C2- .05	"	R2- 50,000	"
C3- .1	"	R3- 500,000	"
C4- .1	"	R4- 25,000	"
C5- .0005	"	R5- 300,000	"
C6- .03	"	R6- 900	"
C7- .005	"	R7- 300,000	"
C8- .1	"		
C9- 4.	"		
C10-8.	"		
C11-10.	"		

Note. C1,C2,C3 and C4 constitute RF bypass can.

MODEL 390 Series
Schematic
Voltage

GRIGSBY-GRUNOW CO.



Filter Condensers

1st Filter Condenser 305 Volts DC
2nd Filter Condenser 265 Volts DC

RESISTANCE VALUES

R1 — 350	OHMS	R10 — 2000	OHMS
R2 — 2000	"	R11 — 6000	"
R3 — 500	"	R12 — 6000	"
R4 — 300,000	"	R13 — 100,000	"
R5 — 300,000	"	R14 — 300,000	"
R6 — 100,000	"	R15 — 300,000	"
R7 — 200,000	"	R16 — 50,000	"
R8 — 250,000	"		
R9 — 2700	"		

R7 = VOLUME CONTROL
R8 = TONE CONTROL

CONDENSER VALUES

C1 — 8 MFD. ELECTRO.	C11 — .05 MFD.
C2 — 16 MFD. ELECTRO.	C12 — .25 "
C3 — 20 MFD. ELECTRO.	C13 — .01 "
C4 — .05 MFD.	C14 — .01 "
C5 — .006 "	C15 — .0015 "
C6 — .05 "	C16 — .05 "
C7 — .01 "	C17 — .0005 "
C8 — .01 "	C18 — .0005 "
C9 — .1 "	C19 — 20 MFD ELECTRO.
C10 — .25 "	C20 — .25 MFD.
	C21 — .07 "

The Model 390 is an eight tube superheterodyne chassis designed for single speaker operation in the Model 393 receiver.

POWER TRANSFORMER CODE

Primary	Stranded Yellow
Primary	Stranded Yellow
High voltage	Stranded Red
High voltage C.T.	Stranded Black
High voltage	Stranded Red
Heater	Solid Black
Heater	Solid Black
Rectifier filament	Solid Yellow
Rectifier filament	Solid Yellow

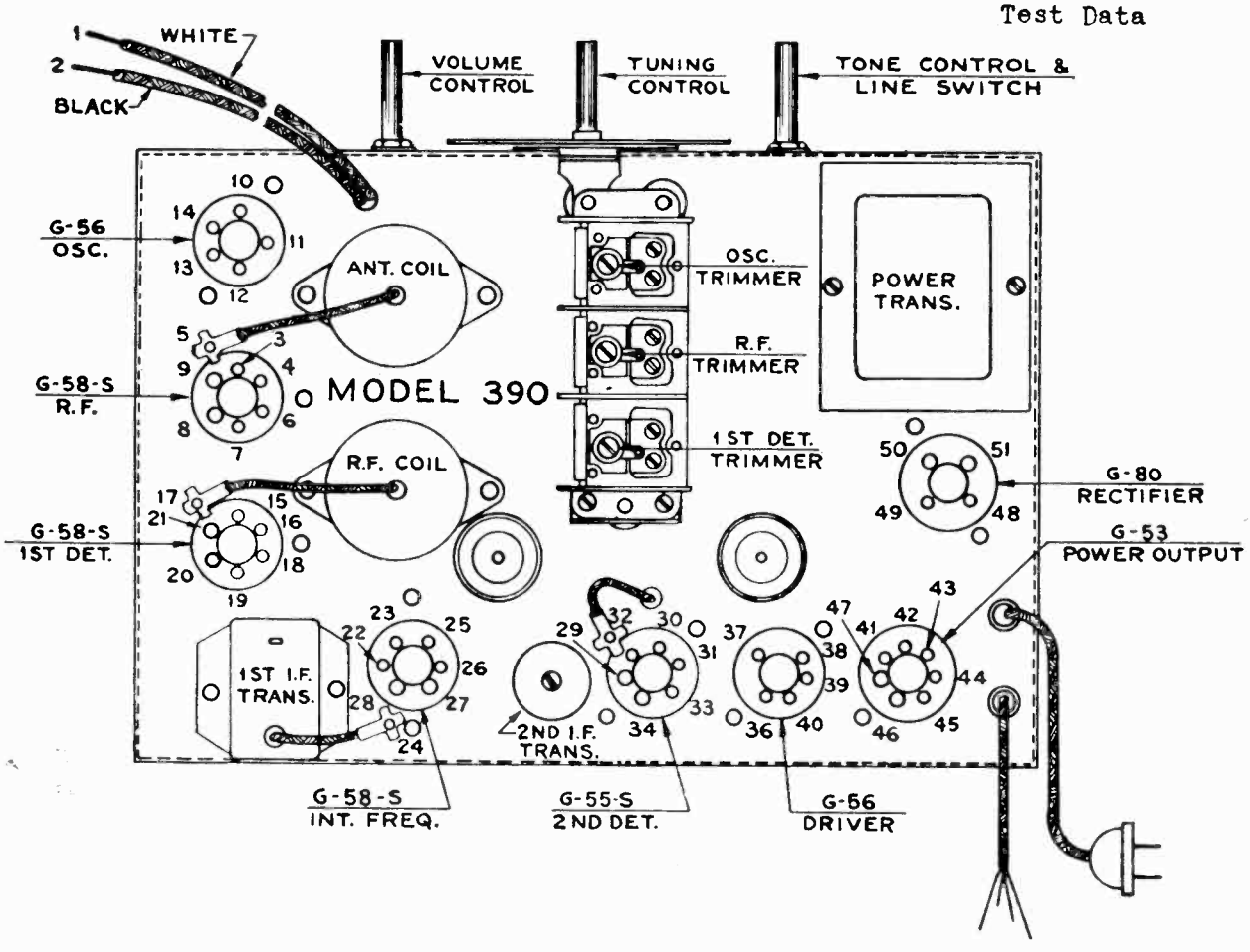
Voltage To Ground

Tube	Fil.	Plt.	Scr.	K	Sup
RF Amp	2.3	265	95.	6.5	6.5
Mod.	2.35	265	95	9.5	9.5
Osc.	2.38	98	-	13.5	-
IF Amp	2.28	265	95	6.5	6.5
2nd Det	2.4	50*	-	3.0	-
Driver	2.41	262	-	12.5	-
Output	2.42	262**	262***	-	-
Rect.	4.9	320AC	-	-	-

* Triode ** Plate #1 *** Plate #2
Line Voltage 115. V.C. set at Max.
K = Cathode.

GRIGSBY - GRUNOW CO.

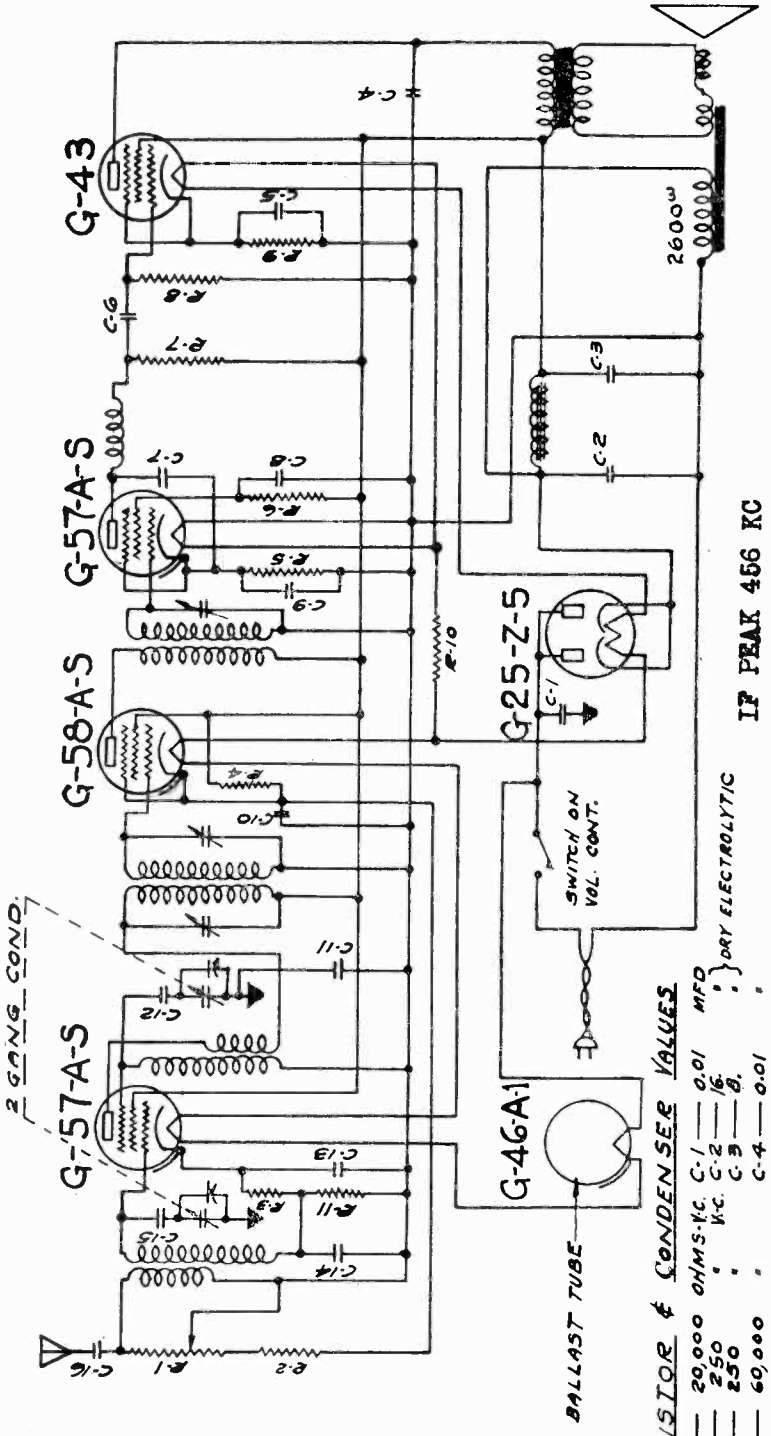
MODEL 390 Series
Chassis
Test Data



Terminal Number		Resistance in Ohms
1	Antenna	Very low resistance
2	Ground	Short Circuit
3	R. F. Cathode	350
4	R. F. Suppressor	Same as #3
*5	R. F. Grid	700,000
6	R. F. Screen	6,000
*7	R. F. Plate	1?,000
8	R. F. Filament	Very low resistance
9	R. F. Filament	same as #8
10	Osc. Cathode	2,000
11	Osc. Grid	Very low resistance
12	Osc. Plate	6,000
13	Osc. Filament	same as #8
14	Osc. Filament	same as #8
15	1st Det. Cathode	850
16	1st Det. Suppressor	Same as #15
*17	1st Det. Grid	70?,000
18	1st Det. Screen	Same as #6
*19	1st Det. Plate	1?,100
20	1st Det. Fil.	Same as #8
21	1st Det. Fil.	Same as #8
22	I. F. Cathode	Same as #3
23	I. F. Suppressor	Same as #3
*24	I. F. Grid	70?,100
25	I. F. Screen	Same as #6
*26	I. F. Plate	1?,100
27	I. F. Fil.	Same as #8
28	I. F. Fil.	Same as #8
*29	2nd Det. Cathode	?,000
*30	2nd Det. Diode Plate	10?,100
*31	2nd Det. Diode Plate	Same as #30
32	2nd Det. A.F. Grid	200,000
33	2nd Det. A.F. Plate	1?,000
34	2nd Det. Filament	Same as #8
35	2nd Det. Filament	Same as #8
*36	1st A.F. Cathode	?,700
37	1st A.F. Grid	300,000
*38	1st A.F. Plate	1?,500
39	1st A.F.Filament	Same as #8
40	1st A.F.Filament	Same as #8
41	Power Cathode	Short Circuit
42	Power Grid #1	150
43	Power Grid #?	Same as #4?
*44	Power Plate #1	1?,?00
45	Power Plate #?	Same as #44
46	Power Filament	Same as #8
47	Power Filament	Same as #8
48	Rectifier Plate	Approx. 160
49	Rectifier Plate	Same as #48
*50	Rectifier Filament	13,000
51	Rectifier Filament	Same as #50
44 to 45		Aprox 270
33 to 37		46?,000
50 to 51		Low resistance
8 to 5		Very low resistance
Between line cord leads		Very low resistance
Line cord leads to ground		Open

MODEL 400 Series

GRIGSBY - GRUNOW CO.



RESISTOR & CONDENSER VALUES

R-1 — 20,000 OHMS-½ W.	C-1 — 0.01 MFD		
R-2 — 250 " ½ W.	C-2 — 16. " } DRY ELECTROLYTIC		
R-3 — 250 "	C-3 — 8. " }		
R-4 — 60,000 "	C-4 — 0.01 "		
R-5 — 30,000 "	C-5 — 10. " DRY ELECTROLYTIC		
R-6 — 1,000,000 "	C-6 — 0.10 "		
R-7 — 500,000 "	C-7 — 0.0005 "		
R-8 — 500,000 "	C-8 — 0.10 "		
R-9 — 700 "	C-9 — 0.25 "		
R-10 — 500 "	C-10 — 0.25 "		
R-11 — 2,000 "	C-11 — 0.01 "		
	C-12 — 0.01 "		
	C-13 — 0.25 "		
	C-14 — 0.10 "		
	C-15 — 0.01 "		
	C-16 — 0.001 "		

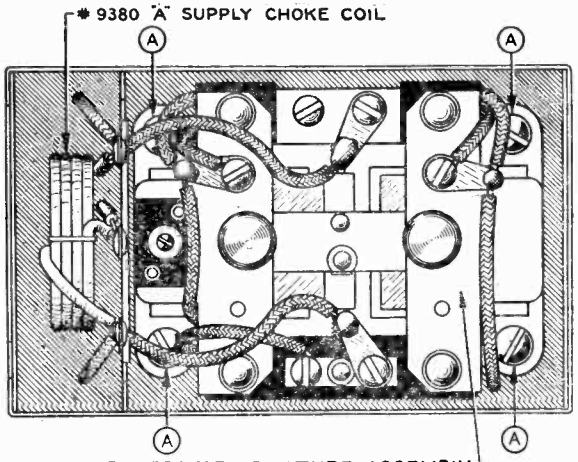
IF PEAK 456 KC

TUBE Mod. &	FIL.	PLATE	SCR.	CATHODE
Osc.	6.3	105	105	13
IF Amp.	6.3	105	105	*3 to 30
2nd Det.	6.3	18	18	2
Output	25.0	96	105	16
Rect.	25.0	-	-	118
Ballast	46.1	-	-	-

* Varies according to setting of volume control.

ALIGNMENT PROCEDURE

1- With the volume control in maximum volume position and the gang condenser completely out of mesh, supply a 456 K.C. signal to the grid of the modulator tube and adjust the 3 I.F. tuning condensers for maximum sensitivity.
2- With the gang condenser and volume control in the same position, supply a 1730 K.C. signal to the input of the receiver and align the 2 R.F. trimmer condensers for maximum sensitivity.



#9367 VIBRATOR ARMATURE ASSEMBLY

Fig. 11

DURO-MUTE POWER UNIT

The Duro-Mute Power Unit of the MAJESTIC Model 116 Auto Receiver is completely housed in the large metal container located at the extreme right of the receiver (see Figure 12).

Do not tamper with this unit unless it has proven defective by causing a gradual decrease in plate voltages and power output.

Should it, at any time, become necessary to inspect or replace the vibrator armature assembly of this unit, the proccdure outlined below should be followed:

If the receiver is installed in the automobile, remove it from the firewall by loosening the clamping screws and sliding it off the supporting brackets.

Take off the top and bottom covers of the chassis container.

Unsolder the red, yellow, blue and black leads from the speaker output transformer

Remove the flexible drive cable from the gang condenser drive pulley, being careful not to cause any sharp bends or kinks in the cable.

After removing the five screws from the ends of the receiver, lift the container and speaker from the chassis, being careful not to place undue strain on the antenna lead wire.

Unscrew the four screws which hold the cover of the Duro-Mute Power Unit in place. The cover is easily removed by rocking slightly and lifting upward.

The entire vibrator armature assembly is now accessible for inspection or replacement.

WARNING!
Do not file the contacts or tamper with any of the adjustments on the vibrator armature assembly. This unit has been carefully adjusted at the factory for utmost efficiency and any changes will seriously affect its operation.

The guarantee on the receiver will become void if the above warning is not followed.

If the vibrator armature assembly is known to be defective, remove it by disconnecting the necessary wires and unscrewing the four large screws marked "A" in Figure 11.

Replace with a new part #9367 vibrator armature assembly.

If there was a spacing washer under each of the screws at "A", they should not be used when the vibrator armature assembly is replaced with a new one.

Replace the Duro-Mute Power Unit cover, being certain that is fits snugly and properly supports the filter choke clamp.

Reassemble the outer container and speaker to the chassis and replace the bottom cover. Solder the speaker leads.

Assemble the flexible drive cables to the drive pulley so that with the tuning dial rotated to zero, the condenser gang will be completely unmeshed.

Turn on the receiver and test for proper operation over the entire tuning range,also noting that the drive cable operates smoothly and correctly.

Replace cover and assemble receiver to firewall.

CAUTION! Be sure to tighten all nuts and screws securely.

VOLTAGE CHART FOR MODEL 116 AUTO RECEIVER

TUBE	PURPOSE IN CIRCUIT	PLATE VOLTAGE	SCREEN VOLTAGE	CATHODE VOLTAGE	SUPPRESSOR VOLTAGE	GRID VOLTS
G57A-S	1st Detector Oscillator	110	110	15	0	1.4
G58A-S	1st I.F. Amplifier	180	90	3.5	3.5	...
G58A-S	2nd I.F. Amplifier	180	90	3.5	3.5	...
G75	2nd Detector and 1st Audio Amplifier	135	...	2.25	...	...
G89	Power Amplifier	170	180	0	0	...
G6-Z5	Rectifier	...	...	180	...	...

NOTE: All measurements made from designated points to ground with a 1000 ohm per volt, 300 volt range, D.C. voltmeter, the receiver connected storage battery delivering 6.0 volts at the battery terminals under load, the condenser gang fully meshed, and no signal supplied to the input of the receiver.

The tubes should be previously tested to assure that they are in good condition.

MODEL 116
Data

GRIGSBY - GRUNOW CO.

TECHNICAL DATA, SCHEMATIC DIAGRAMS AND COMPLETE PARTS LISTS PERTAINING TO MAJESTIC MODEL NO. 116 AUTO RECEIVERS

There are four types of the Model No.116 series auto receivers. The first three types are all known as Model 116's and are covered by serial numbers 10,001 to 16,036. The last type is known as Model 116-A and is covered by serial numbers 16,037 and up.

Model 116—Type 1

This receiver is wired according to the circuit diagram, figure No.175-A, and is the type that first left the factory.

Model 116—Type 2

This receiver is wired as shown in figure No.175-B, and is practically the same as type No.1. The main changes being that Resistor R-3 was shorted out, Resistor R-5 was replaced by one of 3,000 ohms, Resistor R-8 was replaced by one of 50,000 ohms, and instead of returning R-8 to ground, it was connected to the cathode of the G-75 tube.

Model 116—Type 3

The receivers of this type are wired according to figure No.175-C, and differ from type No.1 in that they have a G-85A tube for a second detector, a G-6Y5 tube for a rectifier, two 4,000 ohm resistors, R-17 and R-18 added, Resistor R-5 and Condenser C-22 omitted, and a different type of bias circuit. Also the filament of the rectifier tube is separated from the other filaments and connected to the white wire with a red tracer that comes from the control unit.

Model 116A—Type 4

This type receiver is wired according to figure No.175, issue #5, and is known as the Model 116-A. The difference between this type and the preceding type is only in the connection and value of some of the resistors and condensers as will be noted on the diagram. The second detector and rectifier tubes are also of the G-85A and G-6Y5 types respectively.

A special Globar Resistor (R-14), is connected across the plates of the rectifier tube in place of the spark gap and resistor which was used on the Model 116. This resistor has a value of 500,000 ohms at 750 volts D.C., and a value of 1500 ohms at 2000 volts D.C.

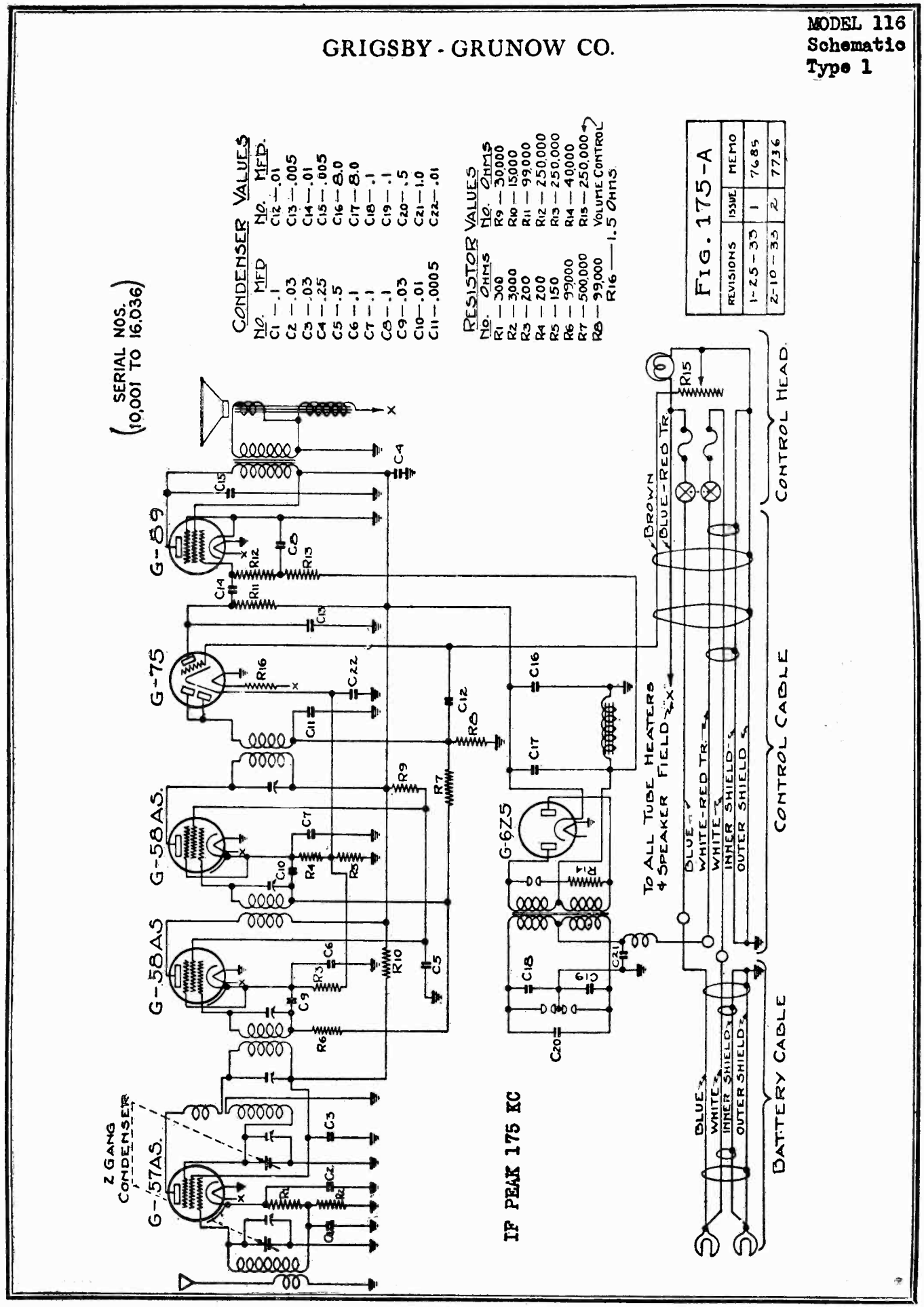
TUBES

The G-6Y5 rectifier is of the full wave mercury vapor type having a heater rating of 6.3 volts. The tube voltage drop is approximately 15 volts. This tube is spray shielded and the tube shielding is connected to one of the heater prongs which in the circuit is grounded.

The G-85A-S tube is a duodiode-triode similar to the type G-85. The only difference being that the triode part of the G-85A-S is of the multi-mu design and has a lower mutual conductance.

GRIGSBY - GRUNOW CO.

MODEL 116
Schematic
Type 1



MODEL 116
Schematic
Type 3

GRIGSBY - GRUNOW CO.

Fig. 175-C		
REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736

NOTICE

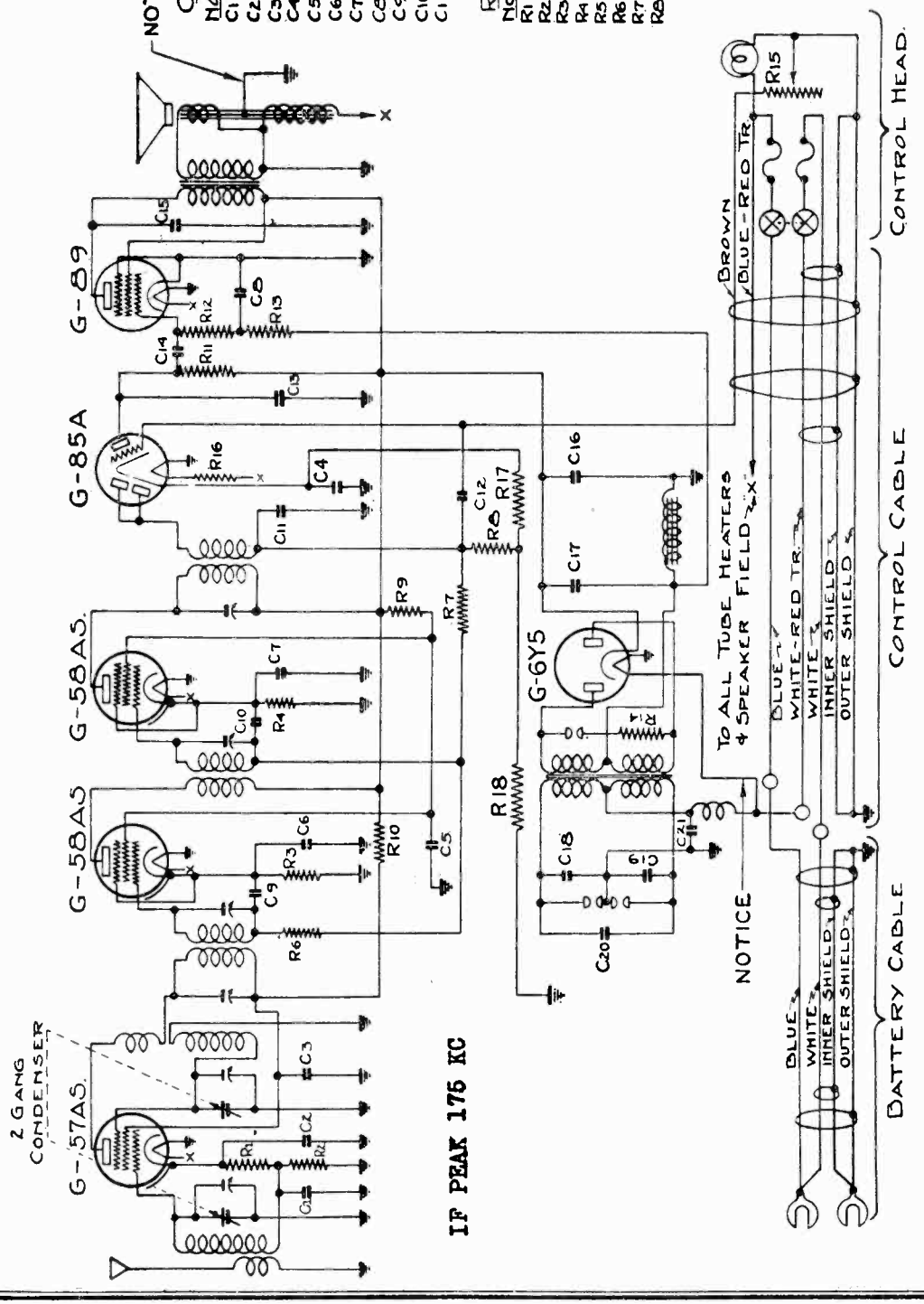
CONDENSER VALUES

No.	MFD.	No.	MFD
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.25	C15	.005
C5	.5	C16	8.0
C6	.1	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	1.0
C11	.0005	C22	

RESISTOR VALUES

No.	Ohms
R1	300
R2	3000
R3	200
R4	200
R5	99000
R6	99000
R7	500,000
R8	99,000
R9	30000
R10	15000
R11	99,000
R12	250,000
R13	250,000
R14	40,000
R15	250,000 Volume Control
R16	1.5 Ohms
R17	4000 "
R18	4000 "

(SERIAL NOS. 10,001 TO 16,036)



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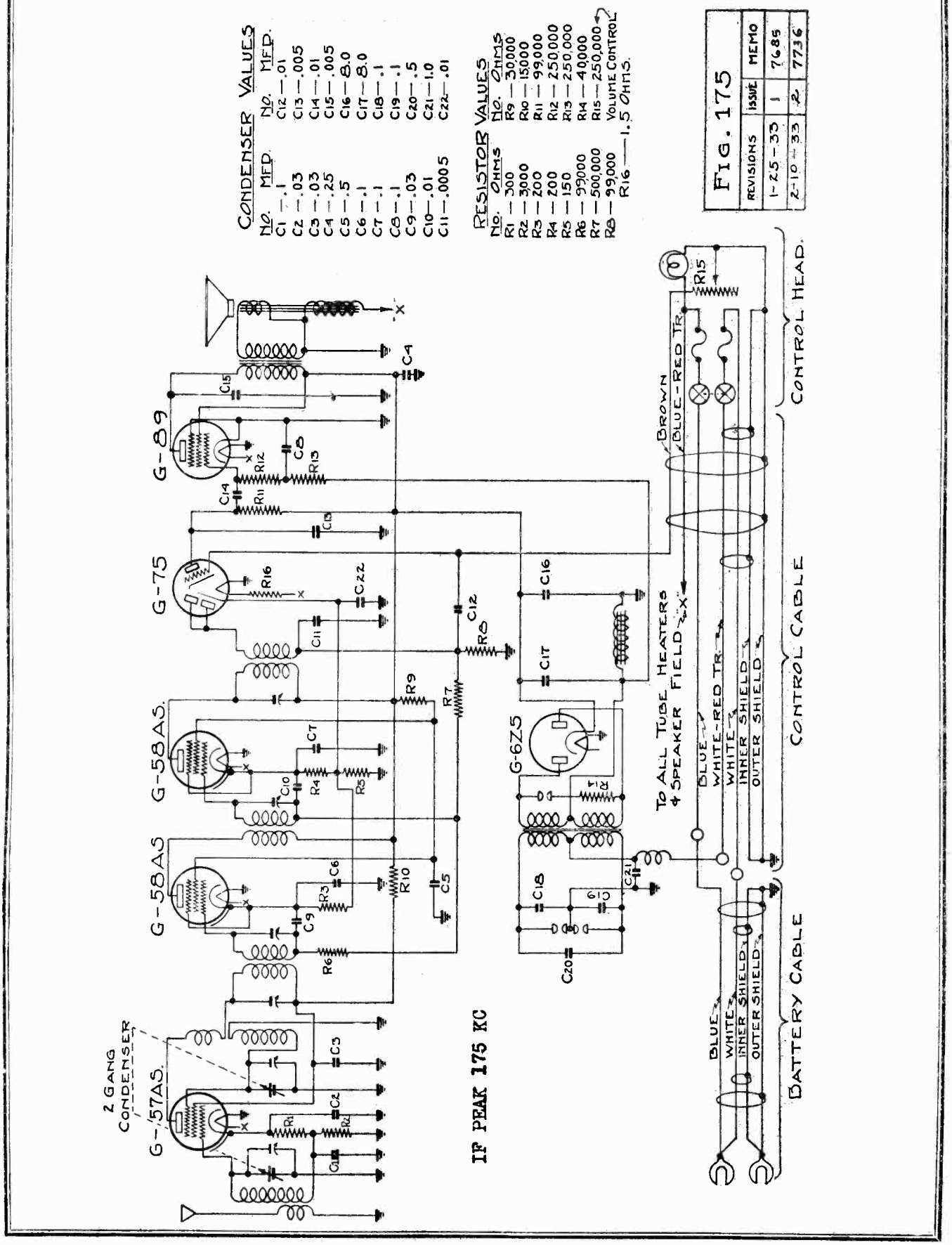
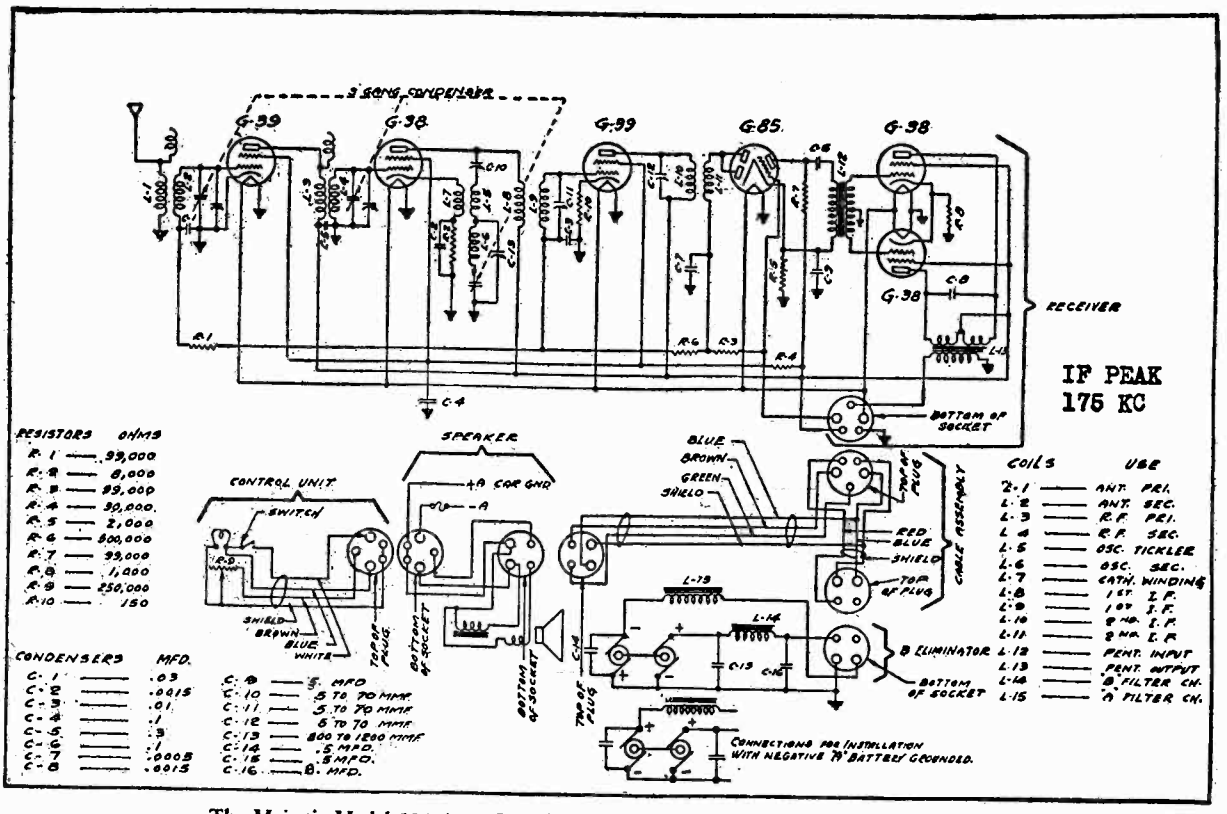
MODEL 116
Schematic
Type 4



MODEL 114

GRIGSBY - GRUNOW CO.



The Majestic Model 114 Auto Superheterodyne. This has an AVC and squelch circuit

MAJESTIC 114 VOLTAGE DATA

Tube	*Plate*	*Screen*	*Cathode*
R-F.	180	85	0.0
Osc.-Mod.	180	85	15.0
I-F.	180	85	1.1
Det.-A-F.	50*	..	2.0
Pwr.	170	180	17.0
Pwr.	170	180	17.0

* Plate of a-f. part of tube.

Majestic Model 114 Super

This super is provided with automatic volume control, between station noise suppression, a push-pull power stage and a "B" power unit in place of the usual "B" batteries. The "B" supply is of the motor type.

Noise suppression is obtained by the use of the resistor R-5 in the G-85 cathode circuit. There is a voltage across this resistor due to the space current of the triode portion of this tube, hence the ground end of R-5 is more negative than the cathode end, and R-3 is more positive than ground. A certain signal voltage must, therefore, reach the diode plates before the diode plate end of R-3 attains a voltage below ground potential. This is similar to the usual delayed AVC while the condition of no signal exists, the grids of the G-39's tend to be positive, and are prevented from being actually more positive than their cathodes by the fact that they draw grid current through the resistors R-6 and R-1. The fact that these tubes are drawing grid current prevents them from giving the full amplification of which they are capable under proper voltage conditions. When, however, sufficient signal reaches the diode plates to produce three volts across the resistor R-3, the G-39 tubes attain their full mutual conductance and the entire system works as a normal AVC circuit.

ALIGNMENT

To align this receiver it will be necessary to use a special chassis container can that has holes drilled in it to permit reaching the aligning condenser with an aligning tool. The bale should be removed before inserting the chassis in the special container can as it covers the two i-f. aligning screws.

Completely connect the receiver as for operation with the volume control in maximum position. It will be necessary to connect the cathode of the G-85 tube to ground to stop the inter-station noise suppression action while aligning the receiver.

Supply a 175-kc. signal to the grid of the G-38 first detector tube and align the three r-f. aligning condensers for maximum output. (Two are located on the first i-f. transformer, and one just below the G-85 tube.)

Supply a 1,500-kc. signal to the antenna post and align the two trimmers on the gang condenser for maximum output.

Turn the gang condenser to approximately maximum capacity position and supply a 550-kc. signal to the antenna post. Adjust the series aligning condenser, which is located just below the first i-f. transformer, for maximum output. For each adjustment of the series alignment condenser there will be a different gang condenser setting which gives maximum output. The combination of gang setting and series condenser adjustment which give maximum output, disregarding setting, is the correct adjustment.

Be sure to remove the ground from the G-85 cathode after completing alignment.

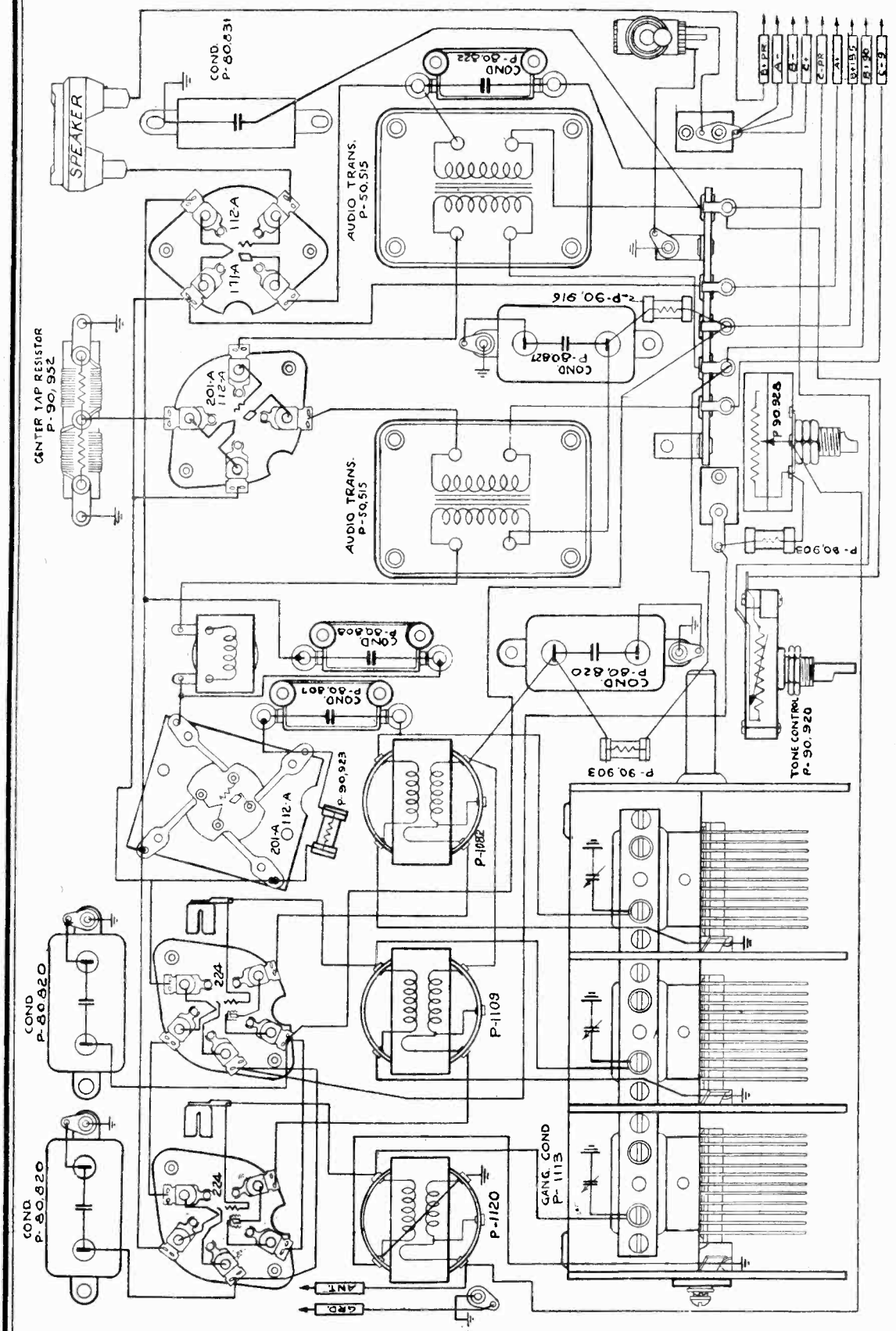
BATTERY CONNECTION

The "B" eliminator on the Model 114 as supplied from the factory is connected for operation in automobiles which have the positive terminal of the battery grounded. When an installation is to be made in a car having the negative terminal of the battery grounded, it will be necessary to reverse the two leads that come out of the generator near the choke and connecting assembly.

When voltage readings are to be taken, use a 1,000 ohms per volt, 300-volt, d-c. voltmeter. Readings should be taken between elements and ground, with the condenser gang fully meshed and no signal. The data is given in the accompanying table.

GULBRANSEN CO.

MODEL 53
Chassis



Pictorial Wiring Diagram.

MODEL 53
Schematic
Voltage

GULBRANSEN CO.

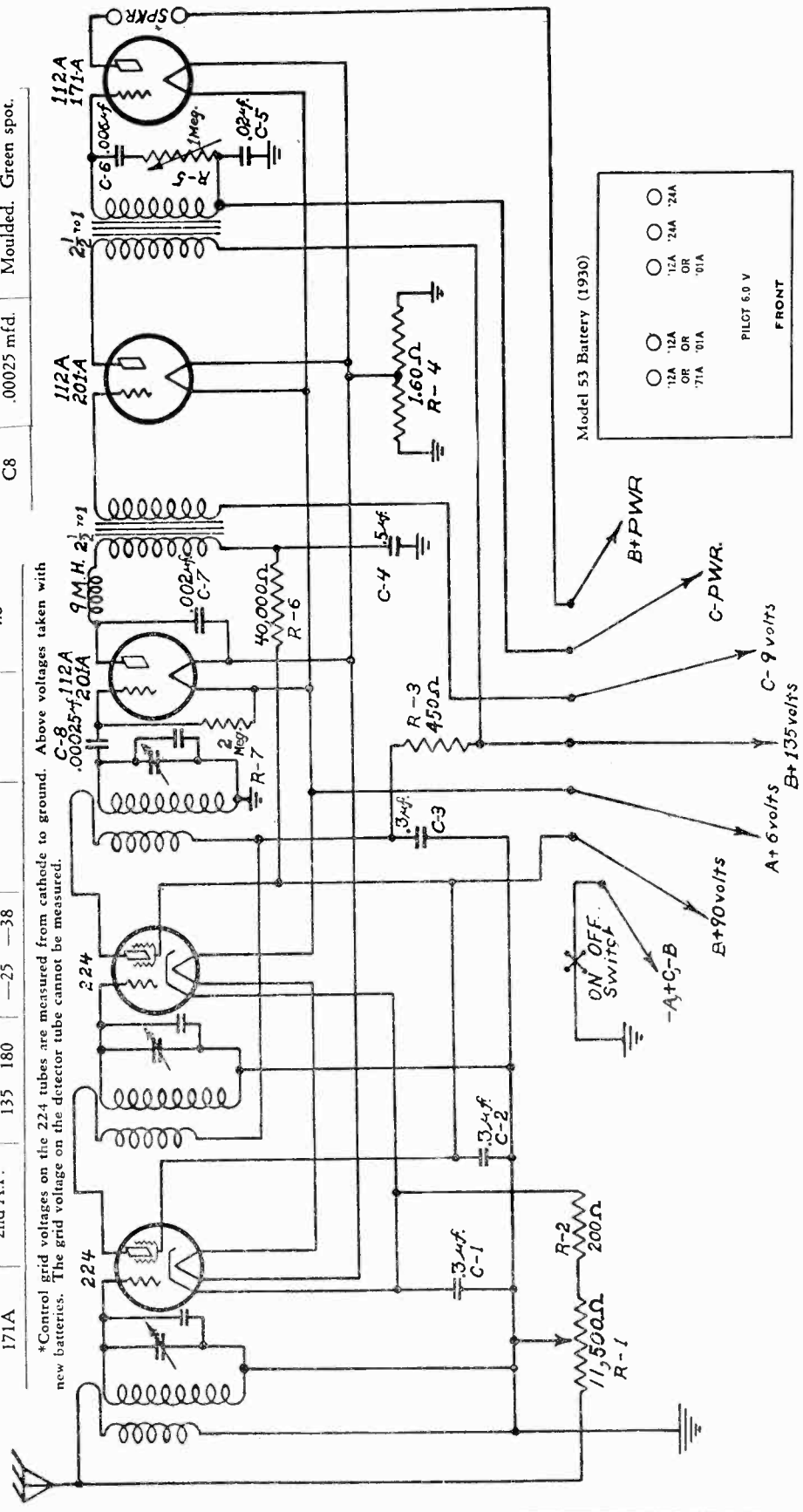
FIXED CONDENSERS

Code*	Resistance	Description
C1-C2-C3	.3 mfd.	Metal case.
C4	.5 mfd.	Metal case.
C5	.02 mfd.	Tubular. Green spot.
C6	.006 mfd.	Moulded. Orange spot.
C7	.002 mfd.	Moulded. Yellow spot.
C8	.00025 mfd.	Moulded. Green spot.

Volume Control Full on—Taken with a 1,000 Ohm Per Volt Voltmeter
Connect Antenna and Ground Leads Together

Tube	Position	Plate	Grid	Screen	Cathode	Filament
224	1st R.F.	135	—2.3*	90	2.3	2.5
224	2nd R.F.	135	—2.3*	90	2.3	2.5
201A 112A	Detector	24				4.5
201A	1st A.F.	135	—9			4.6
112A 171A	2nd A.F.	135 135 180	—8½ —25 —38			4.6

*Control grid voltages on the 224 tubes are measured from cathode to ground. Above voltages taken with new batteries. The grid voltage on the detector tube cannot be measured.



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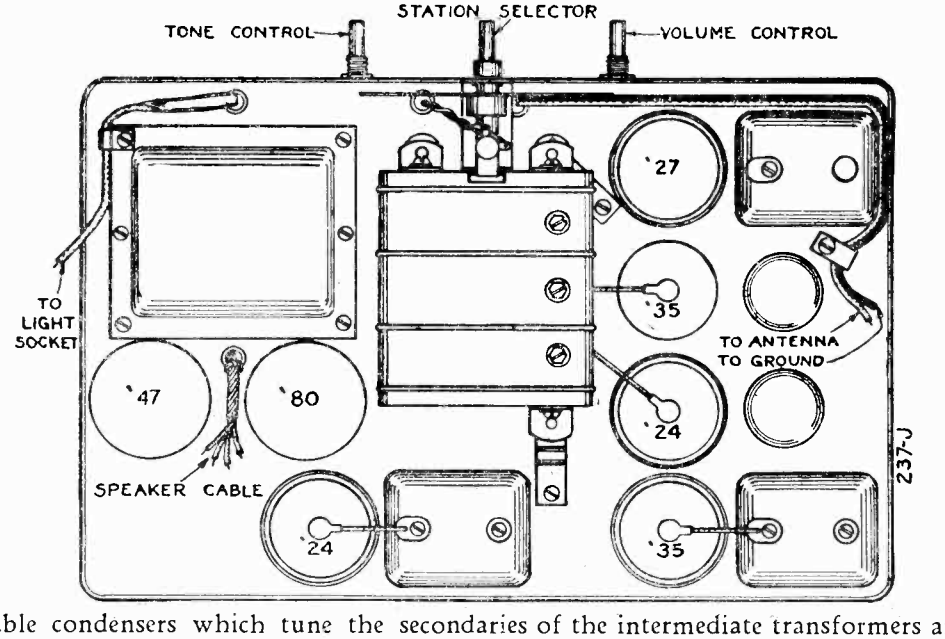
MODEL 10 Series Voltage Data

Tube	Circuit	Meter Scale	90 V.	100 V.	110 V.	120 V.
R.F.	Grid	0—10	1.5	1.7	1.9	2.1
(Ant.)	Screen Grid	0—100	53.	58.	63.	66.
'35	Plate	0—250	195.	210.	225.	238.
1st	Grid	0—25	14.	14.3	14.5	15.
Det.	Screen Grid	0—100	63.	64.	65.	67.
'24	Plate	0—250	190.	205.	220.	233.
Int.	Grid	0—10	1.5	1.7	1.9	2.1
'35	Screen Grid	0—100	53.	58.	63.	66.
	Plate	0—250	195.	210.	225.	237.
2nd	Grid	0—25	14.	14.3	14.5	15.
Det.	Screen Grid	0—100	63.	64.	65.	67.
'24	Plate	0—250	110.	123.	135.	145.
Osc.	Grid					
'27	Plate	0—100	76.	78.	80.	82.
Aud.	Grid	0—10	2.1	2.4	2.7	3.
'47	Accelerating					
(See Caution	Grid	0—250	188.	210.	225.	240.
Above)	Plate	0—250	170.	190.	205.	220.
'80	Filament					
Rect.	to					
	Ground	0—1000	198.	215.	233.	250.



The adjustable condensers which tune the secondaries of the intermediate transformers are located under the hole in top of the shield where the grid lead to the tube is brought out. The condensers which tune the primaries are located under the small hole opposite. The capacity of each condenser is varied by rotating the small adjustment screw under the hole.

GANG CONDENSERS

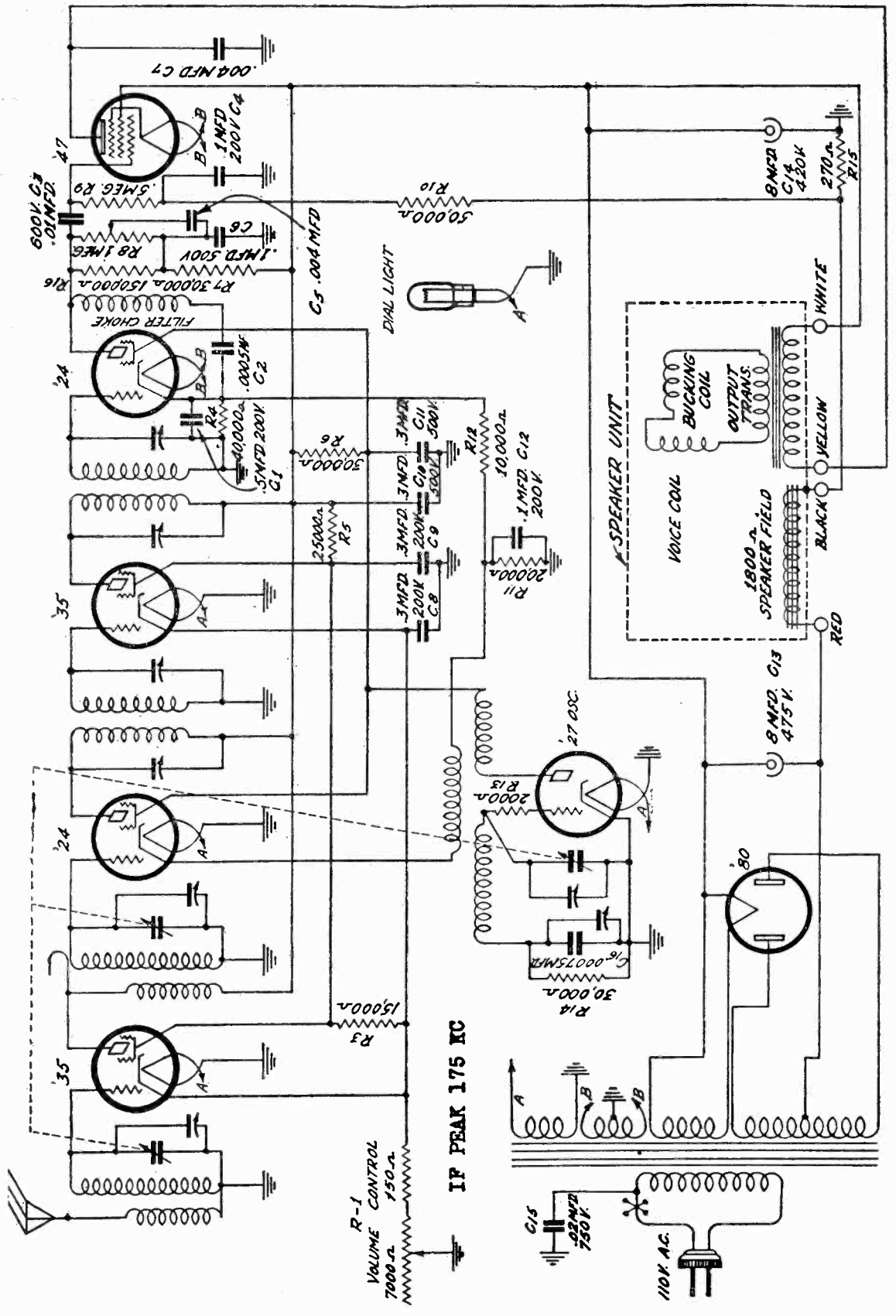
Couple the test oscillator output to the antenna, (white wire), on the receiver.

Tune the oscillator to 1400 K.C. and carefully tune the receiver to the signal.

A trimmer condenser is mounted over each condenser in the gang and is adjusted by turning the screw located under the hole in top of the gang shield. The shield should not be removed. Adjust each trimmer condenser for maximum deflection on the output meter.

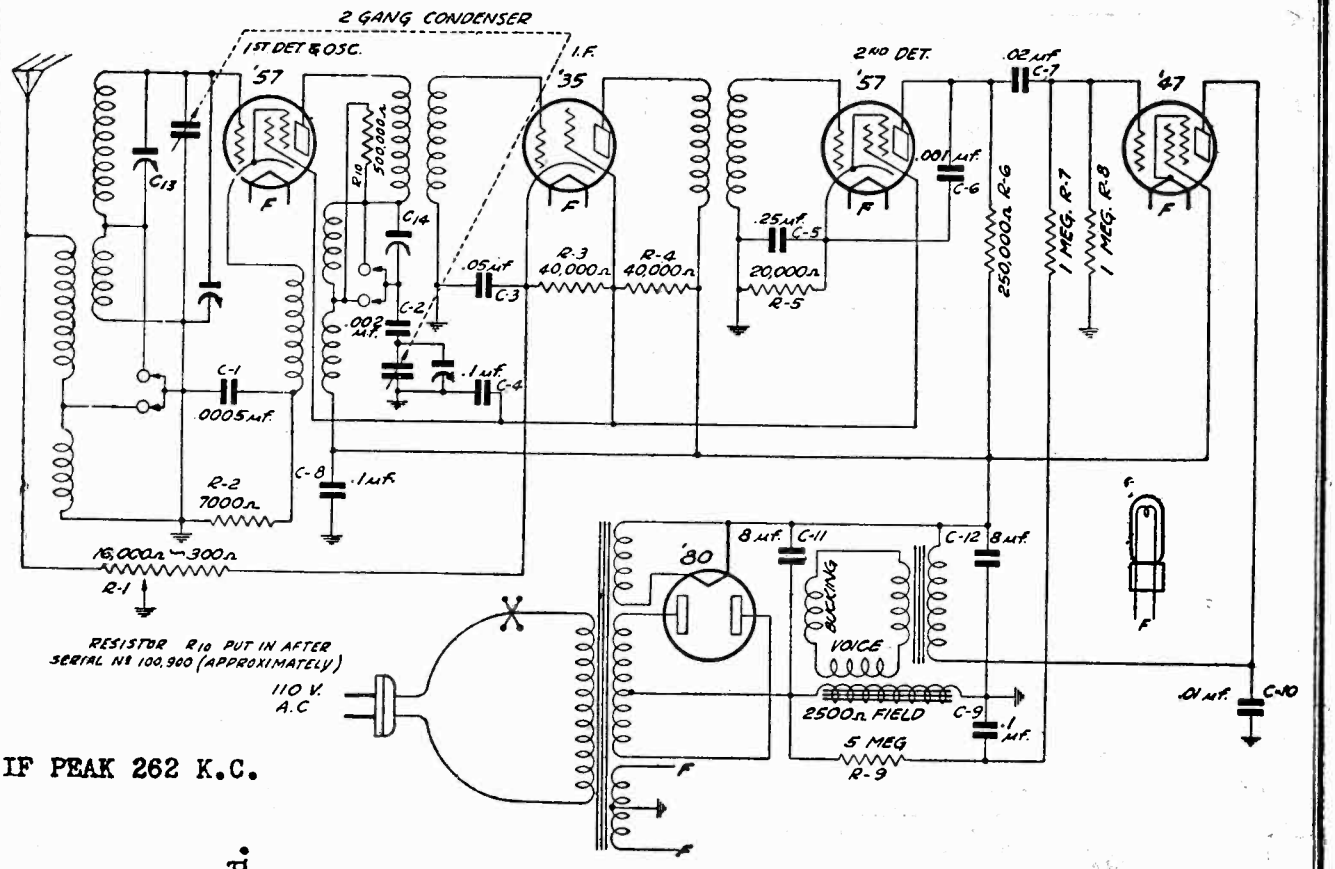
MODEL 10 Series
Schematic

GULBRANSEN CO.



GULBRANSEN CO.

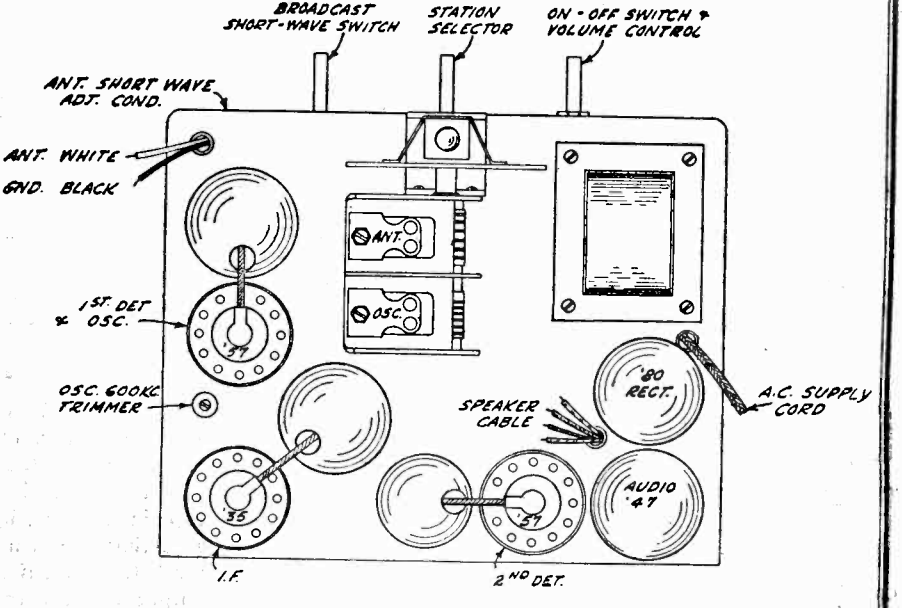
MODEL 352
Schematic
Voltage



IF PEAK 262 K.C.

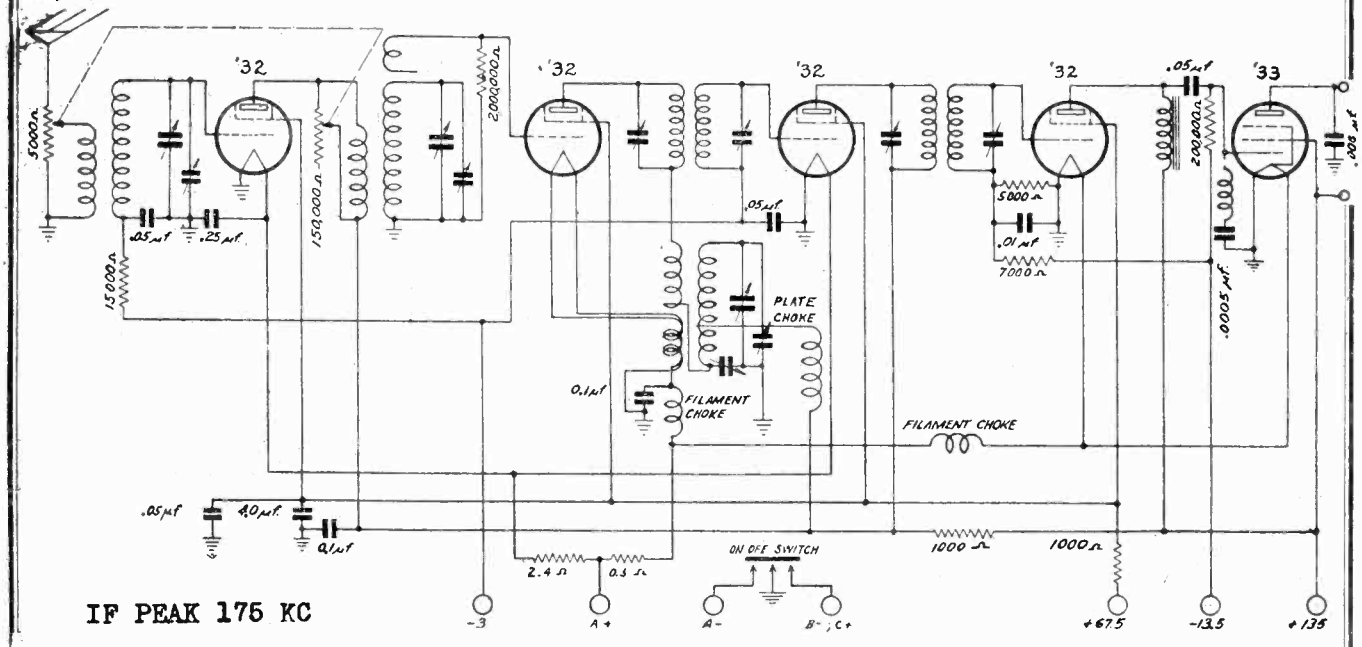
Tube	Fil.	Plate to Cathode	Screen to Cathode	Grid to Cathode	Plate Cmt.
1st Det	2.15	225	90	4.	.5
IF Amp	2.15	230	90	3.2*	6.2
2nd Det	2.15	170	90	4.3	.2
Audio	2.15	225	240	14.**	23.
Rect.	4.75	620 volts AC from plate to plate			

* When read with cord and plug, ground the control grid.
** High resistance interferes with correct reading.

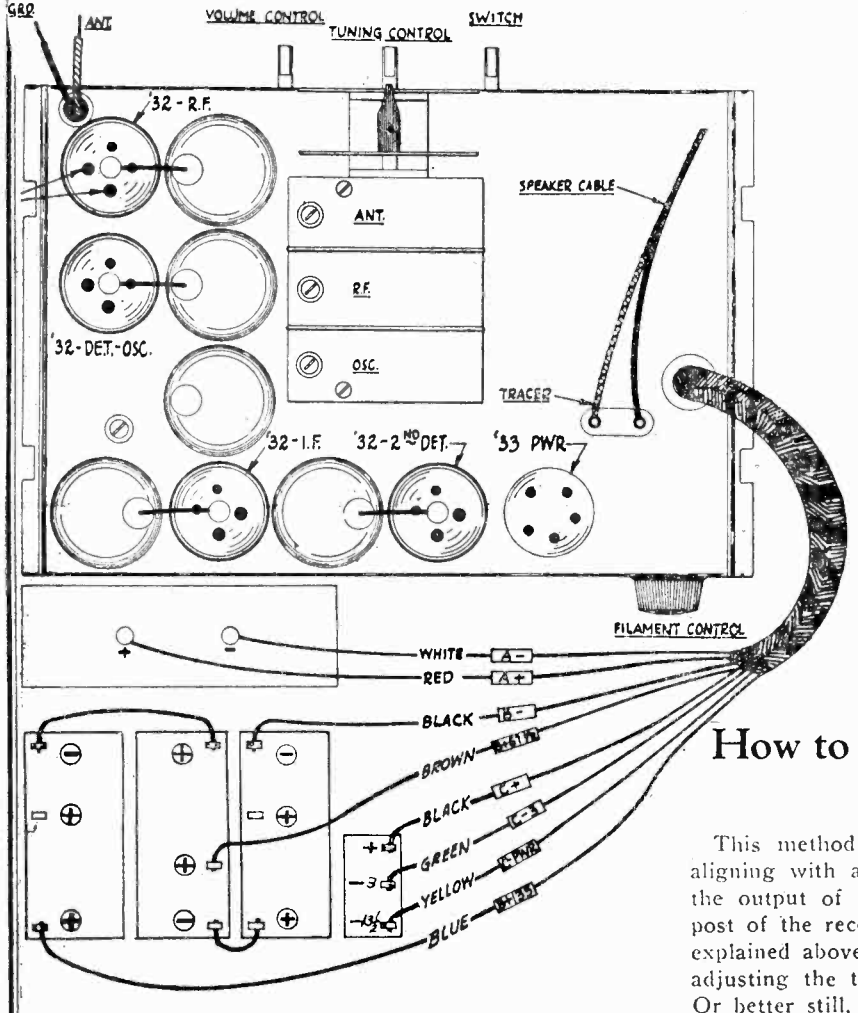


MODEL 92,93
Schematic
Data

GULBRANSEN CO.



IF PEAK 175 KC



For Voltage Data See Index

at 175 K.C. To do this, adjust the oscillator to 175 K.C. and connect the output to the grid of the first detector tube, without removing the clip on the tip of the tube. A condenser of .006 mfd. or larger should be inserted in series with this oscillator lead.

Adjust the four I.F. adjustment screws for maximum volume on the output meter. The oscillator section of the tuning condenser should then be adjusted by means of its compensator for maximum response in the output meter. A very high signal level from the generator may be necessary to locate the signal if the set is badly out of resonance. Reduce immediately when the signal is located. Bring the antenna and first R.F. compensators to resonance next. Remove the output meter and adjust the 600 K.C. tracking condenser on a 600 K.C. signal from the oscillator, in the same manner as explained for adjusting the 600 K.C. tracking condenser on a broadcast signal.

How to Align the Receiver With An Oscillator

This method is essentially the same as explained for aligning with a broadcast signal, with the exception that the output of the oscillator is connected to the antenna post of the receiver. The chassis may then be aligned as explained above, by tuning the oscillator to 1400 K.C. and adjusting the trimming condensers for maximum volume. Or better still, if an output meter is available, connect the output meter across the speaker and in each case adjust the trimming condensers for greatest deflection on the output meter. If the receiver has been badly damaged, or the intermediate frequency adjustments have been tampered with, it will be necessary to re-align the intermediate stages

MODEL 92,93
Voltage
MODEL 352
Parts List

GULBRANSEN CO.

MODEL 92,93 Voltage Data

Tube and Voltage Tests

The tubes should be tested in a set analyzer and the voltage measurements taken on each tube before servicing the receiver in any other manner. Weak or defective tubes should be replaced.

The measurement of grid bias voltages is not recommended as this causes an abnormal rise in plate current which is injurious to the tube. When the receiver does not function properly and the trouble is apparently due to incorrect grid bias on any tube or tubes, the cause of the incorrect bias may be determined by applying the proper continuity test.

CAUTION: Do not attempt to take voltage measurements or test the '33 pentode tube with a set analyzer which is not designed to test that type of tube. A special adaptor is necessary. The latest type analyzers only are designed to test pentode tubes. The UY socket in an analyzer which is used to test '24, '35, and '27 tubes cannot be used to test '33 pentode tubes. A break-in adaptor and the external binding posts of the set analyzer may be used to take voltage measurements when an adaptor is not available.

Comparison of the voltage measurements taken and those shown in the chart below will show any irregularities. The cause of any variation may be determined by applying the proper continuity test. REMEMBER:—Voltage measurements will vary slightly with different sets of tubes, and also with different chassis. Unless the voltages are radically different than normal, they may be considered satisfactory.

The voltages shown in the chart were taken with a 1000 ohm per volt voltmeter; voltage measurements taken with a voltmeter having a different resistance will, of course, differ from those shown.

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 BATTERY VOLTAGES

TUBE	CIRCUIT	VOLTAGE
R.F. '32	Filament	2.
	Screen Grid	65.
	Plate	127.
	Control Grid	1.4
1st Det. & Oscillator '32	Filament	2.
	Screen Grid	65.
	Plate	85.
	Control Grid	No Reading
I.F. '32	Filament	2.
	Screen Grid	65.
	Plate	125.
	Control Grid	5. *
2nd Det '32	Filament	2.
	Screen Grid	67.
	Plate	127.5
	Control Grid	3.2
Audio '33	Filament	2.
	Screen Grid	132.5
	Plate	117.5
	Control Grid	7.5 **

*This includes filament voltage.
**250 v. Scale.

REPAIR PARTS LIST FOR No. 352 SERIES FIVE TUBE BROADCAST BAND AND SHORT WAVE SUPERHETERODYNE

When ordering parts, the part number and the serial number must be given. If there is a spot of paint on the chassis be sure to give this color. If this information is not available return the old part to insure getting the correct part.

Part No.	Name	List Price
P-50548	110 V. 60 Cycle Power Transformer	3.15
P-50549	220 V. 40-60 Cycle Power Transformer	5.60
P-50558	110 V. 25 Cycle Power Transformer	7.00
P-1474	'80 Tube Socket	.15
P-1464	'35 Tube Socket	.15
P-1468	'47 Tube Socket	.15
P-1580	'57 Tube Socket	.15
P-1273	Pilot Light, 2.5 V.	.25
P-20479	Mounting Strap for Electrolytic Condenser	.15
P-70702	Attachment Cord and Plug	.95
P-20513	L. Bracket for Broadcast Short-Wave Switch	.10
P-1578	Broadcast Short-Wave Switch	1.65
P-1441	Two-Terminal Mounting Strip	.10
P-1515	Small Knob	.15
P-1516	Large Knob	.20
P-5037	R.F. Transformer Assembly	1.25
P-5038	1st I.F. and Oscillator Assembly, Complete with Can	2.85
P-5039	2nd I.F. Assembly, Complete with Can	2.20
P-30374	Bushing for Rubber Pinion	.10
P-10224	Rubber Pinion	.10
P-1594	Dial Strip	.25
P-20527	Dial Strip Support Disc	.10
P-1477	Drive Disc and Hub Assembly	.20
P-20529	Drive Shaft	.10
F-1280	Escutcheon	.40
P-1415	Pilot Light Socket	.15
P-20528	Tube Shield	.35
P-20315	Wing Nuts for Tube Shield	.10

RESISTORS

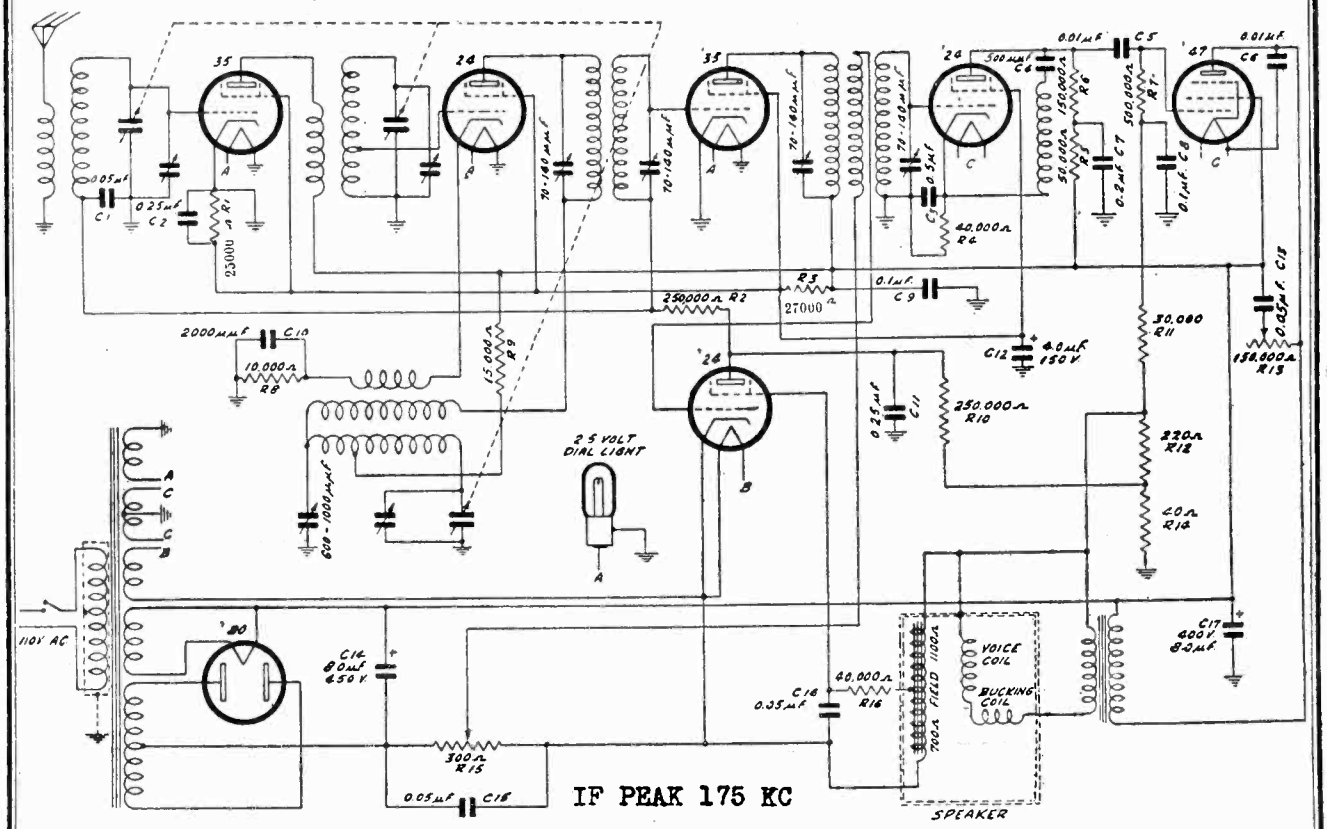
Part No.	Code	Capacity Voltage	Type	List Price
P-91019	R-1	Volume Control & 110 V. A.C.	Switch	$1.40
P-A-90979	R-2	7,000 ohm	Carbon	.25
P-B-91021	R-3	40,000 ohm	Carbon	.25
P-B-91021	R-4	40,000 ohm	Carbon	.25
P-A-90959	R-5	20,000 ohm	Carbon	.20
P-A-90954	R-6	250,000 ohm	Carbon	.20
P-A-90948	R-7	1,000,000 ohm	Carbon	.25
P-A-90948	R-8	1,000,000 ohm	Carbon	.25
P-A-91015	R-9	5,000,000 ohm	Carbon	.25
P-A-90929	R-10	500,000 ohm	Carbon	.25

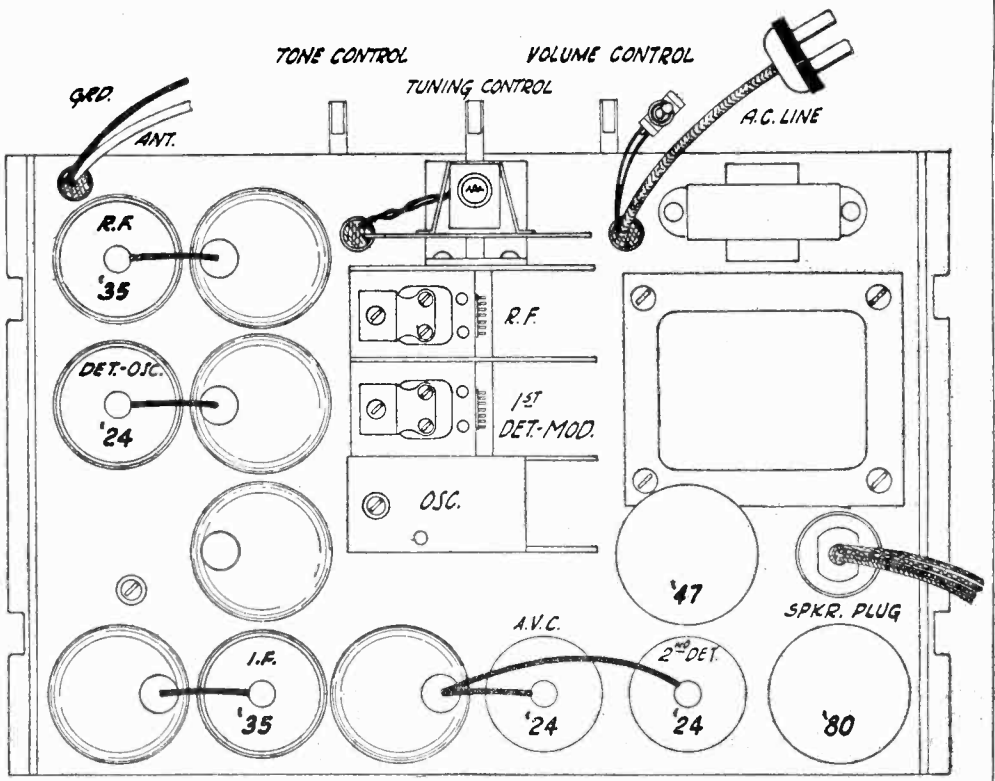
CONDENSERS

Part No.	Code	Resistance	Type	List Price
P-80867	C-1	.0005 mfd., 600 V.	Moulded	$0.20
P-80808	C-2	.002 mfd., 600 V.	Moulded	.30
P-80890	C-3	.05 mfd., 400 V.	Tubular	.20
P-80887	C-4	.10 mfd., 400 V.	Tubular	.40
P-80888	C-5	.25 mfd., 200 V.	Tubular	.40
P-80905	C-6	.001 mfd., 400 V.	Tubular	.15
P-80868	C-7	.02 mfd., 600 V.	Tubular	.25
P-80887	C-8	.10 mfd., 400 V.	Tubular	.40
P-80864	C-9	.10 mfd., 200 V.	Tubular	$0.30
P-80872	C-10	.01 mfd., 600 V.	Tubular	.25
P-80894	C-11	8.0 mfd., 450 V.	Electrolytic Block	2.85
	C-12	8.0 mfd., 450 V.		
	2 Neg. leads, green, Pos. lead yellow, common			
P-1575	C-13	Short Wave Adjusting Condenser		.35
P-1442	C-14	Oscillator 600 K.C. Trimmer Condenser		.50
P-80910	Two Gang Variable Condenser			3.00

GULBRANSEN CO.

MODEL 53
Schematic
Socket





R1—25,000 ohm resistor and R3—27,000 ohm resistor formerly were 9,000 ohms and 12,500 ohms respectively. The latter values apply for all sets having Cand-ohm units; the former values for all sets having vitreous enamel units.

MODEL 53
Voltage
Parts List

GULBRANSEN CO.

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.

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

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

Repair Parts List for 60 cycle, 110 volt Chassis; 25 cycle, 110 volt Chassis; 40 to 60 cycle, 110-120 volt Chassis.

When ordering repair parts, the number of the parts and the serial number of the chassis MUST be given.

RESISTORS

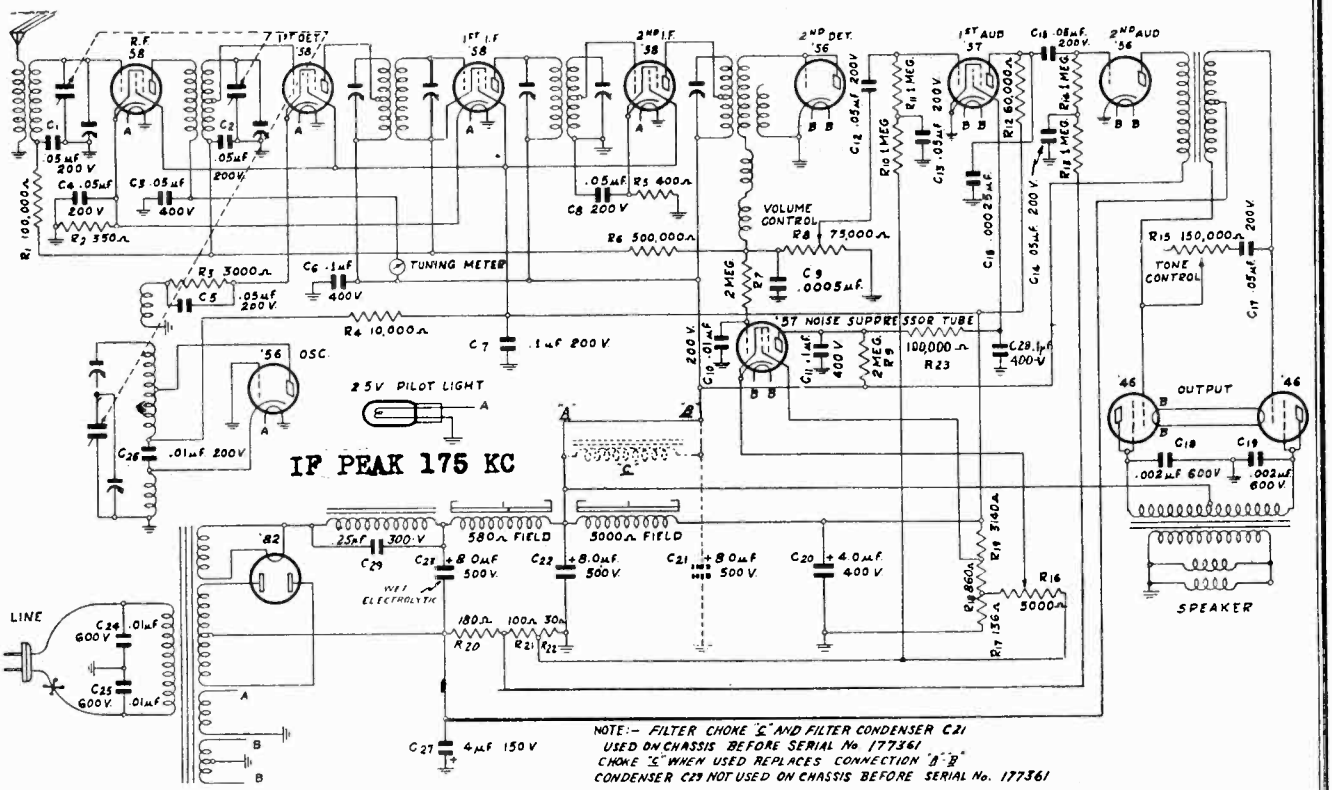
Part No.	Key No.	Resistance	Type	Price
P-90954-B	R-2	250,000 ohm	Carbon	$0.20
P-90916-C	R-4	40,000 ohm	Carbon	.25
P-90941	R-5	50,000 ohm	Carbon	.20
P-90963-B	R-6	150,000 ohm	Carbon	.25
P-90938-B	R-7	500,000 ohm	Carbon	.25
P-90930-D	R-8	10,000 ohm	Carbon	.20
P-90905-C	R-9	15,000 ohm	Carbon	.25
P-90954-B	R-10	250,000 ohm	Carbon	.20
P-90956-A	R-11	30,000 ohm	Carbon	.25
P-90993	R-13		Tone Control	.90
P-90991-A	R-15		Volume Control	.85
P-90916-C	R-16	40,000 ohm	Carbon	.25
P-91003	R-1	27,000 ohm	Carbon	.25
P-91002	R-3	25,000 ohm	Carbon	.25
P-91001	R-12, R-14	VITREOUS ENAMEL		.45

CONDENSERS

Part No.	Key No.	Capacity	Type	Voltage Rating	Price
P-80862-A	C-1	.05 mfd.	Tubular	160 V.	$0.30
P-80888	C-2	.25 mfd.	Tubular	160 V	.40
P-80867	C-4	.0005 mfd.	Molded		.20
P-80872	C-5	.01 mfd.	Tubular	600 V.	.25
P-80872	C-6	.01 mfd.	Tubular	600 V.	.25
P-80864-B	C-8	1 mfd.	Tubular	160 V.	.30
P-80887	C-9	.1 mfd.	Tubular	400 V.	.40
P-80808-A	C-10	.002 mfd.	Molded	400 V.	.30
P-80891-B	C-12	4.0 mfd.	Dry Electrolytic	150 V.	.85
P-80890	C-13	.05 mfd.	Tubular	400 V.	.30
P-80894	C-14	8.0 mfd.	Dry Electrolytic (Dual)	450 V.	2.85
	C-17	8.0 mfd.			
P-80862-A	C-15	.05 mfd.	Tubular	160 V.	.30
P-80862-A	C-16	.05 mfd.	Tubular	160 V.	.30
P-80849	C-17	8.0 mfd.	Wet Electrolytic (25 cycle only)	450 V.	2.20
P-80886-B	C-3	.5 mfd.	Block	160 V. White	
	C-7	.2 mfd.		400 V. White-red	
	C-11	.25 mfd.		160 V. White-green	
	Choke			Yellow	1.60
P-1385	Osc.	600 K.C.	Tracking Condenser		.85
P-80882	Gang Condenser (no shield)				5.70

GULBRANSEN CO.

MODEL 522
Schematic Data



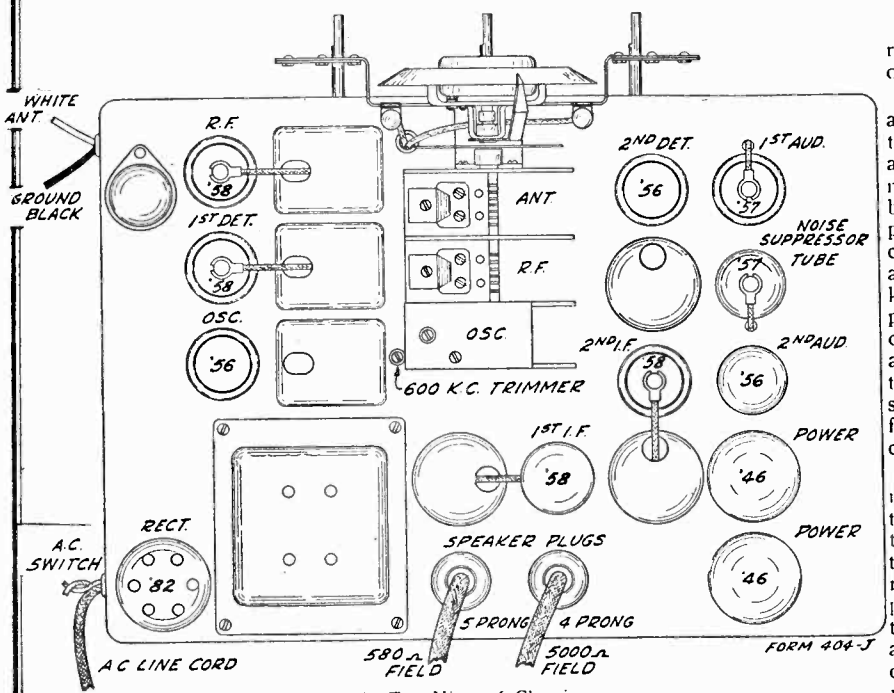


Fig. 2—Top View of Chassis

A capacity winding in the 3rd I.F. transformer serves as a bypass condenser to ground. This condenser, in conjunction with the two chokes in the grid-plate circuit of the 2nd detector tube acts as an I.F. filter.

NOISE SUPPRESSOR—Noise suppressing action, when tuning between stations, is very ingeniously obtained in this receiver by controlling the screen voltage of the 57 1st audio tube.

Referring to Fig 1, consider the movable arm of the noise suppressor potentiometer, R-16, at the extreme left (knob at extreme clockwise position). Assume no signal being received, which would bring the control grid of the noise suppressor tube to ground potential. The cathode of this tube is sufficiently positive at this setting of the noise suppressor knob to cause cut-off in the tube. No plate current flows. The screen voltage of the 57 1st audio tube is not reduced and the tube amplifies normally. Additional bias voltage impressed on the noise suppressor tube due to a signal has no further effect, as the tube is already at cut-off.

Now consider the movable arm of the noise suppressor potentiometer, R-16, at the extreme right (knob at extreme counter-clockwise position). At this setting, the noise suppressing action is at a maximum. The cathode of the noise suppressor tube is now negative, relative to the grid. Plate current flows in this tube and the plate voltage drops due to the drop across resistor R-9. The screen voltage of the 57 1st audio tube also drops, as it feeds through the same line. The screen voltage of this tube differs from the plate voltage of the noise suppressor tube only by the drop across resistor R-23. Under no signal conditions the screen voltage of the 57 1st audio tube is sufficiently low to prevent this tube from amplifying.

When a weak signal (noise) is received, the control volt-

MODEL 322
Voltage
Data

GULBRANSEN CO.

age applied to the grid of the noise suppressor tube makes this grid more negative. Less plate current flows and the voltage of the plate of the noise suppressor tube and the screen of the 1st audio tube rises. If the signal is weak, the screen voltage will not be raised sufficiently to allow the 1st audio tube to amplify.

When a strong signal (station) is received, there is sufficient control voltage to bring the noise suppressor tube to cut-off. This allows the screen voltage of the 1st audio tube to rise to its full amount and the tube amplifies fully.

The audio amplifier has three stages. The first stage uses the type 57 tube mentioned above. It is resistance coupled to the 2nd audio stage which uses a 56 tube. The 2nd audio tube is transformer coupled to the output stage, which uses two 46 tubes in a stage of semi-Class "B" amplification. At low volume the amplification is Class "A" for better tone quality, while at large volume, the output changes to Class "B" in order to get large power output

Voltages

Check the voltages at the sockets to see if the power unit is delivering the correct voltages. The antenna and ground should be disconnected and the antenna and ground leads from the set connected together.

All of the D.C. voltage readings as shown on the chart are read with a 1,000 ohm per volt meter. As high a range as possible should be used. In general, the higher the resistance of the meter, the more accurate the reading will be

The voltage chart gives the voltages with all tubes in, the speaker connected and the set in operating condition. These voltages are typical of the sets but will vary slightly with variations in individual receivers and variations in tube characteristics. All voltages in the chart are taken with a line voltage of 115. Differences in line voltage as well as differences in test equipment used will introduce other variations in the voltage readings.

Voltages at Sockets

LINE VOLTAGE 115—ANTENNA SHORTED TO GROUND—NOISE SUPPRESSOR AT MAXIMUM CLOCKWISE POSITION

Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M A
58	R.F.	2.4	242	90	4(1)	4
58	1st Det.	2.4	250	86	7(1)	2
56	Osc.	2.4	24		0	8
58	1st I.F.(2)	2.4	252	90	4(1)	4
58	2nd I.F.(2)	2.4	254	91	3	5.7
56	2nd Det.	2.4	0		0	0
57	1st Audio	2.4	65	55	4(3)	.4
57	NoiseSup.	2.4	55	20	3(1)	0
56	2nd Audio	2.4	255		14(4)	3.3
46	Power	2.4	260	260	34	23
82	Rectifier	2.4	880 volts plate to plate			53 per plate

(1) Read from cathode to ground.
(2) If I.F. readings are made with a cord and plug, ground the control grid through a condenser to prevent oscillation and motor boating.
(3) Read across 30 ohm section of voltage divider.
(4) Read across 30 ohm and 100 ohm section of voltage divider

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal of 175 K.C. and accurately calibrated signals over the broadcast band, and an output indicating meter are necessary. The procedure is as follows:

Set the signal generator for 175 K.C. Connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Turn the tuning condenser rotor until the plates are completely out. The ground lead from the signal generator goes to the ground lead of the receiver. Then adjust the five intermediate frequency condensers for maximum output. The adjusting screws for these condensers are reached from the bottom of the chassis.

Next set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the signal generator is, in this instance, connected to the antenna lead of the receiver. Set the dial pointer on the 1400 K.C. mark on the dial scale and adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator trimmer first.

Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached from the top of the chassis and is between the tuning condenser and the coil cans. A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output

Setting the Noise Suppressor

The action of the noise suppressor is to establish a certain signal strength level below which all signals are cut out, and above which all signals come through without being reduced in intensity.

The general method of using the noise suppressor is to first turn the knob to the "Power" or right hand position. At this point there is usually considerable noise received. Turn the knob to the left until the noise is eliminated, and then continue to tune the set in the regular manner to whatever stations are wanted.

When tuning for far, distant stations, the knob should be turned to the extreme right hand or "Power" position, as the weak station signals may be cut out along with the noise signals if the noise suppressor is used.

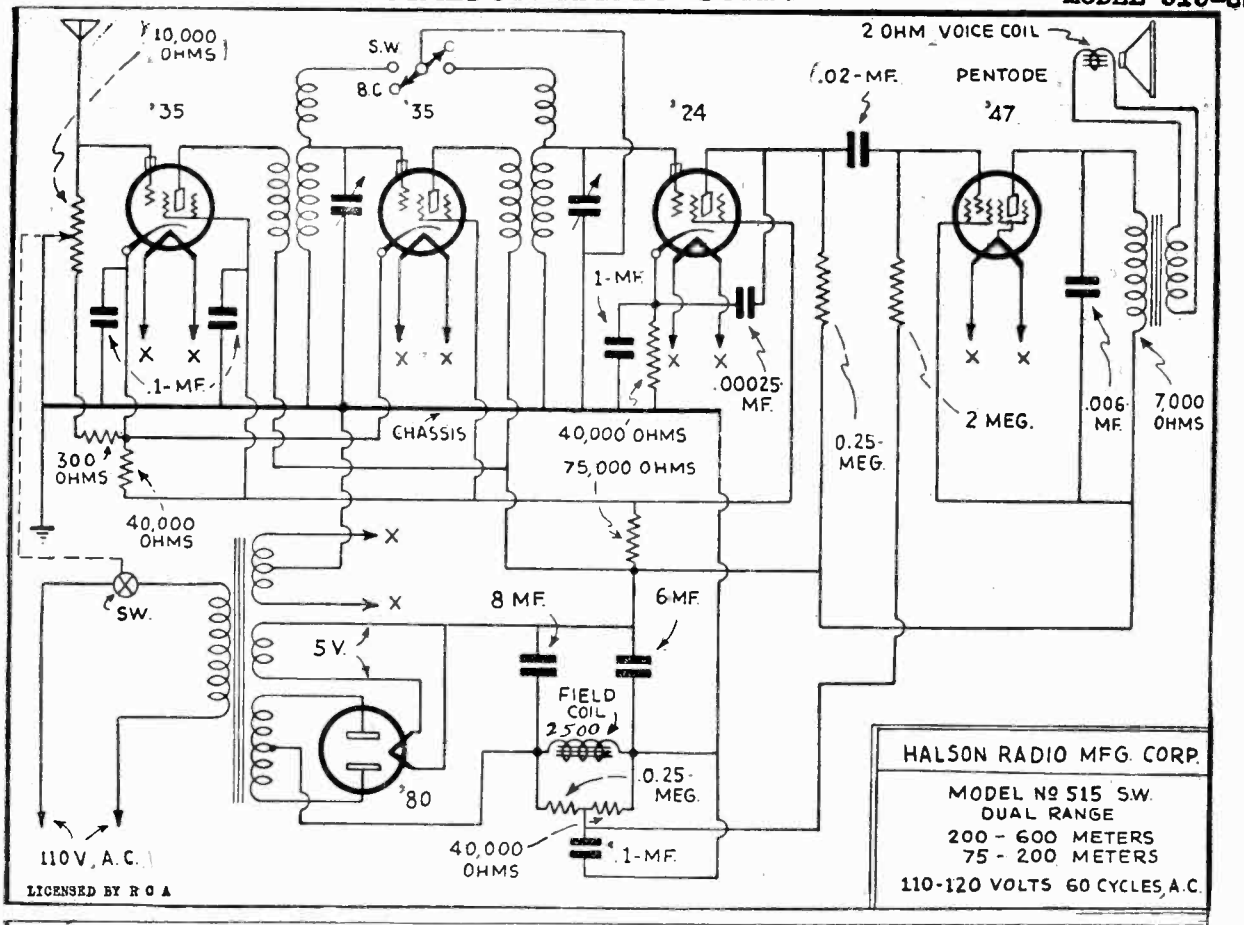
When tuning in local stations the knob may be turned well toward the left hand or "Quiet" position, as the station signals are very powerful compared with the noise signals.

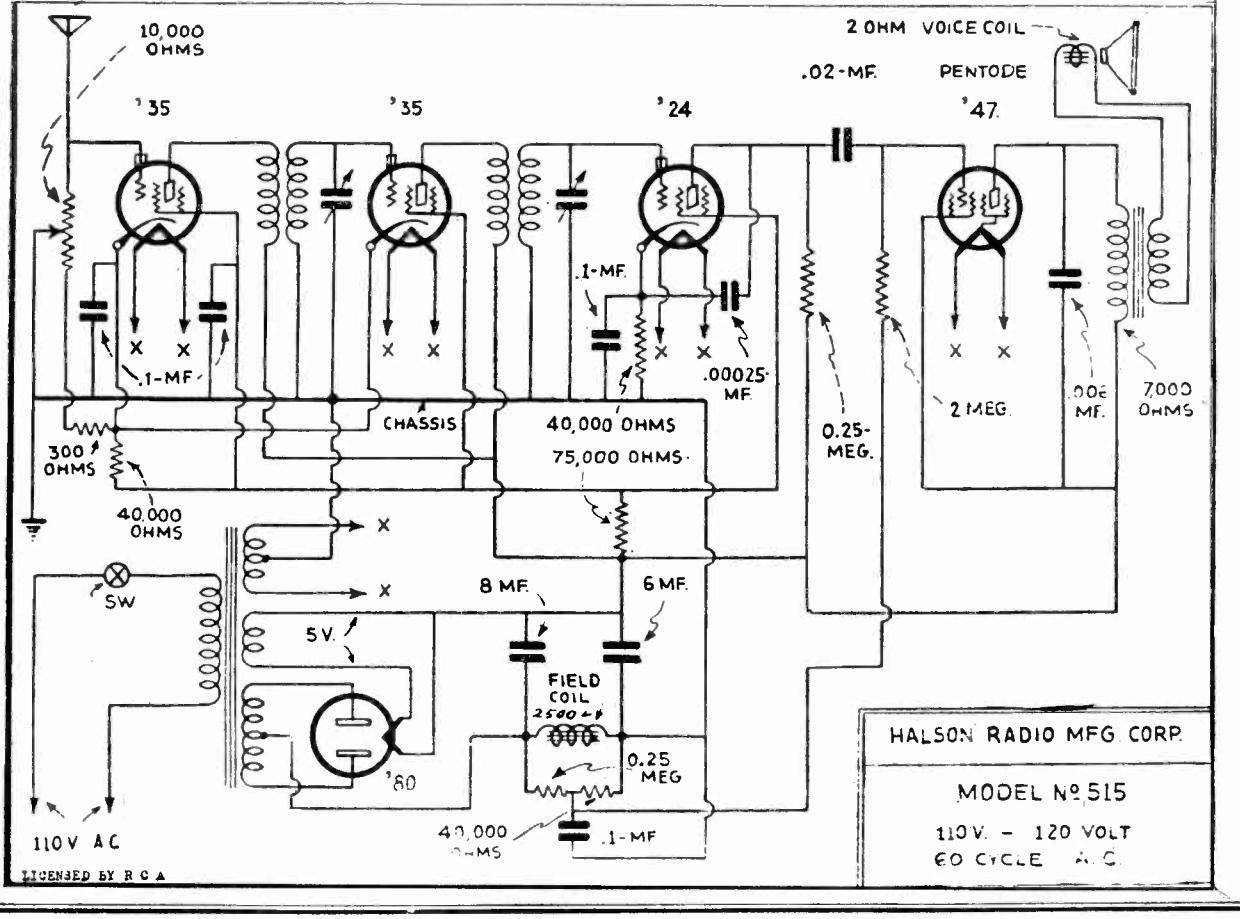
If the signal of a station is distorted, turn the noise suppressor knob to the right until the signal becomes clear.

In the early models, a vitreous enamel, six-section voltage divider resistor was used instead of the wire wound type used at the present time.

HALSON RADIO CORP.

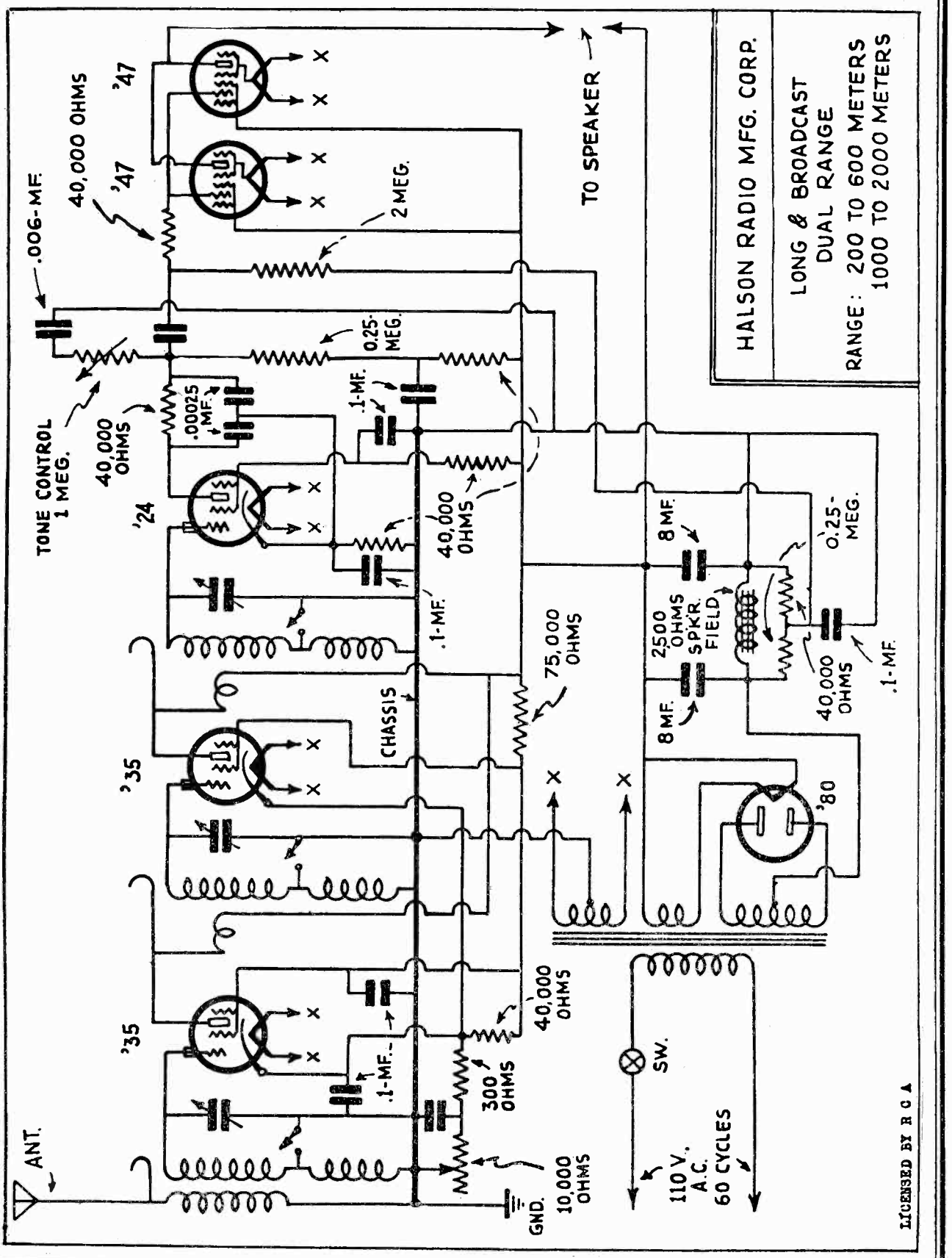
MODEL 516
MODEL 515-SW





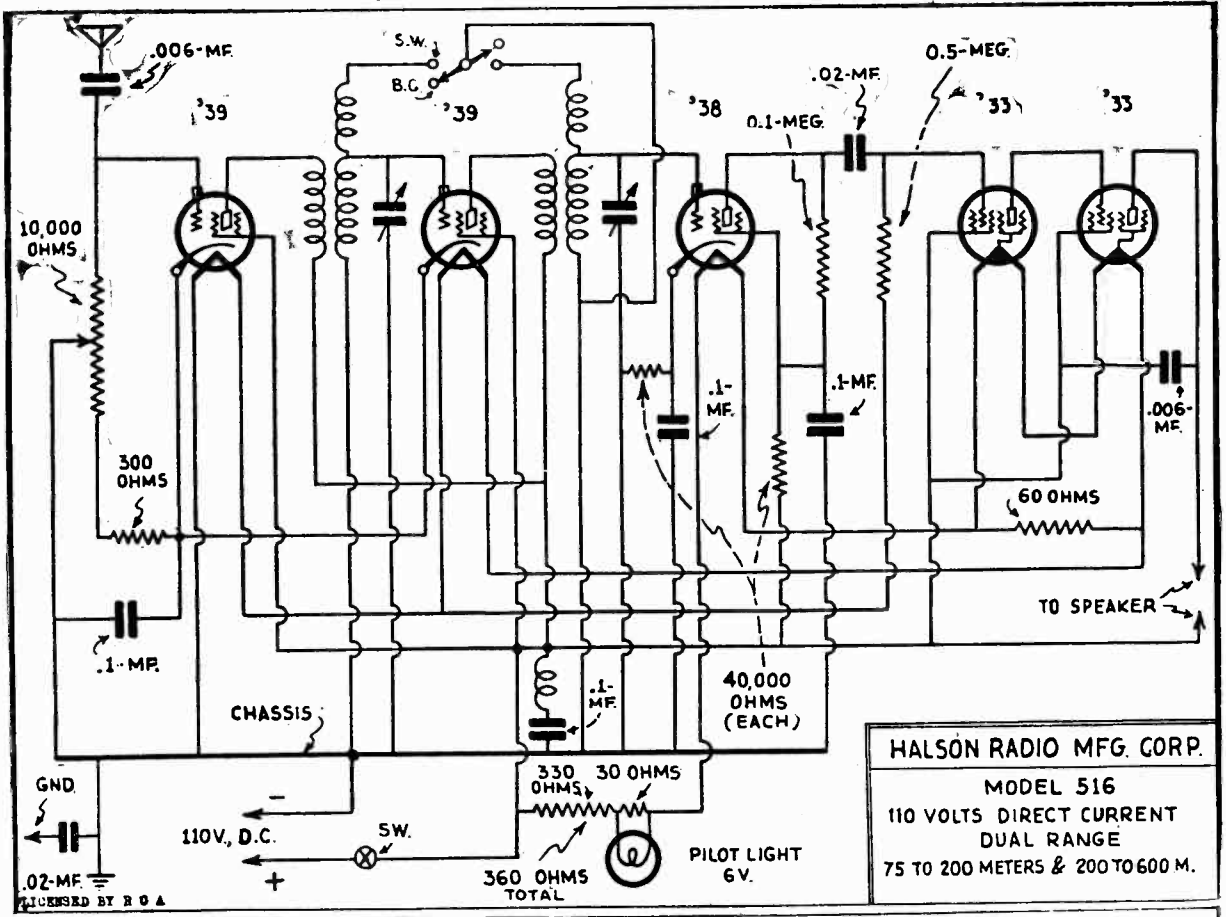
MODEL Dual Range
Long-Broadcast

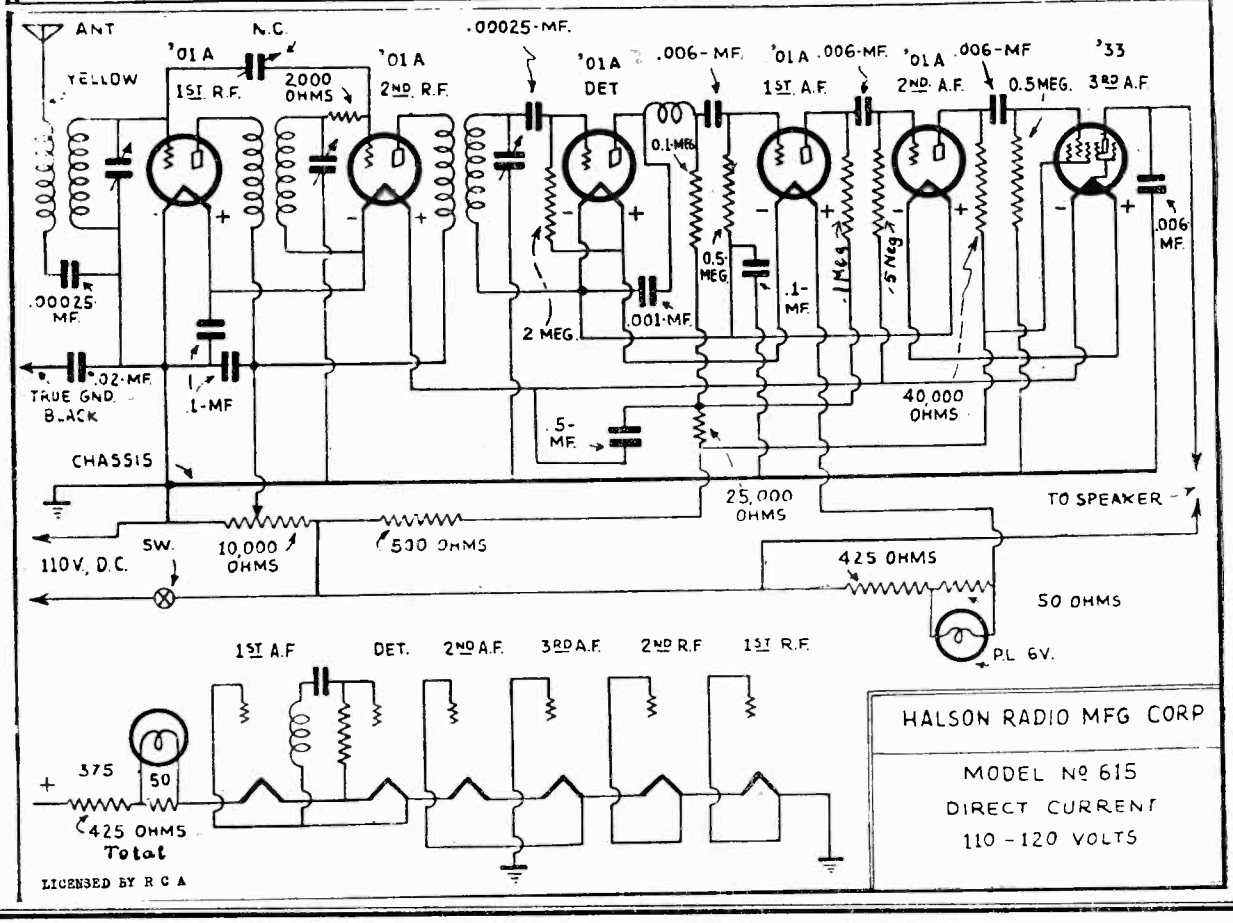
HALSON RADIO CORP.



HALSON RADIO CORP.

MODEL 516
MODEL 615

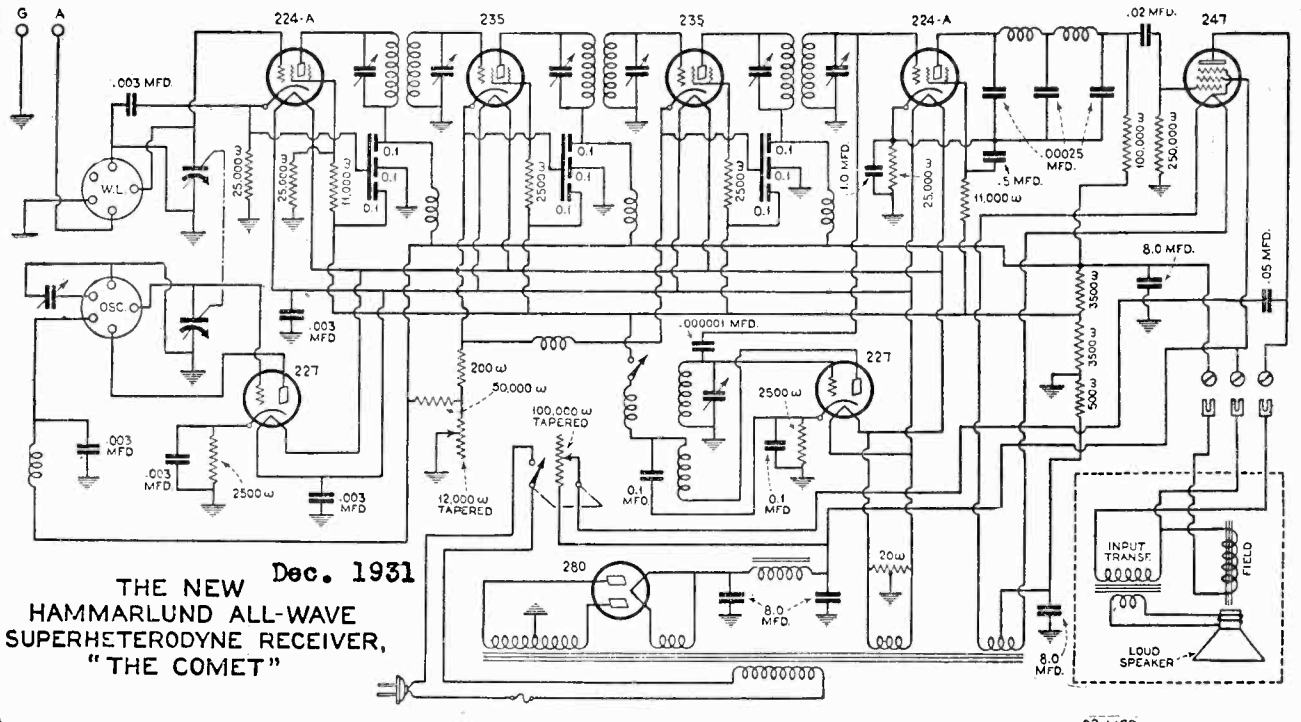




HAMMARLUND MFG. CO.

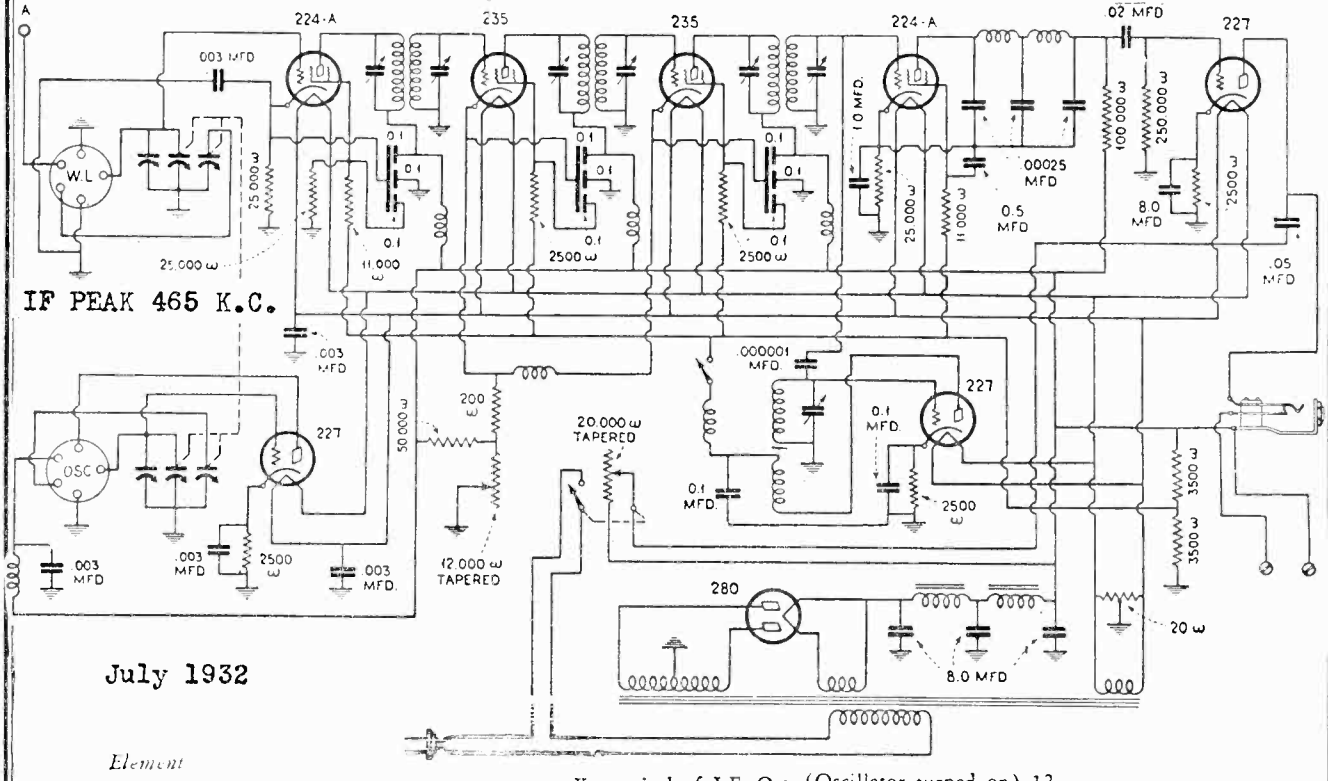
MODEL Comet Pro
December 1931
July 1932

IF PEAK 465 K.C.



Dec. 1931

THE NEW HAMMARLUND ALL-WAVE SUPERHETERODYNE RECEIVER, "THE COMET"

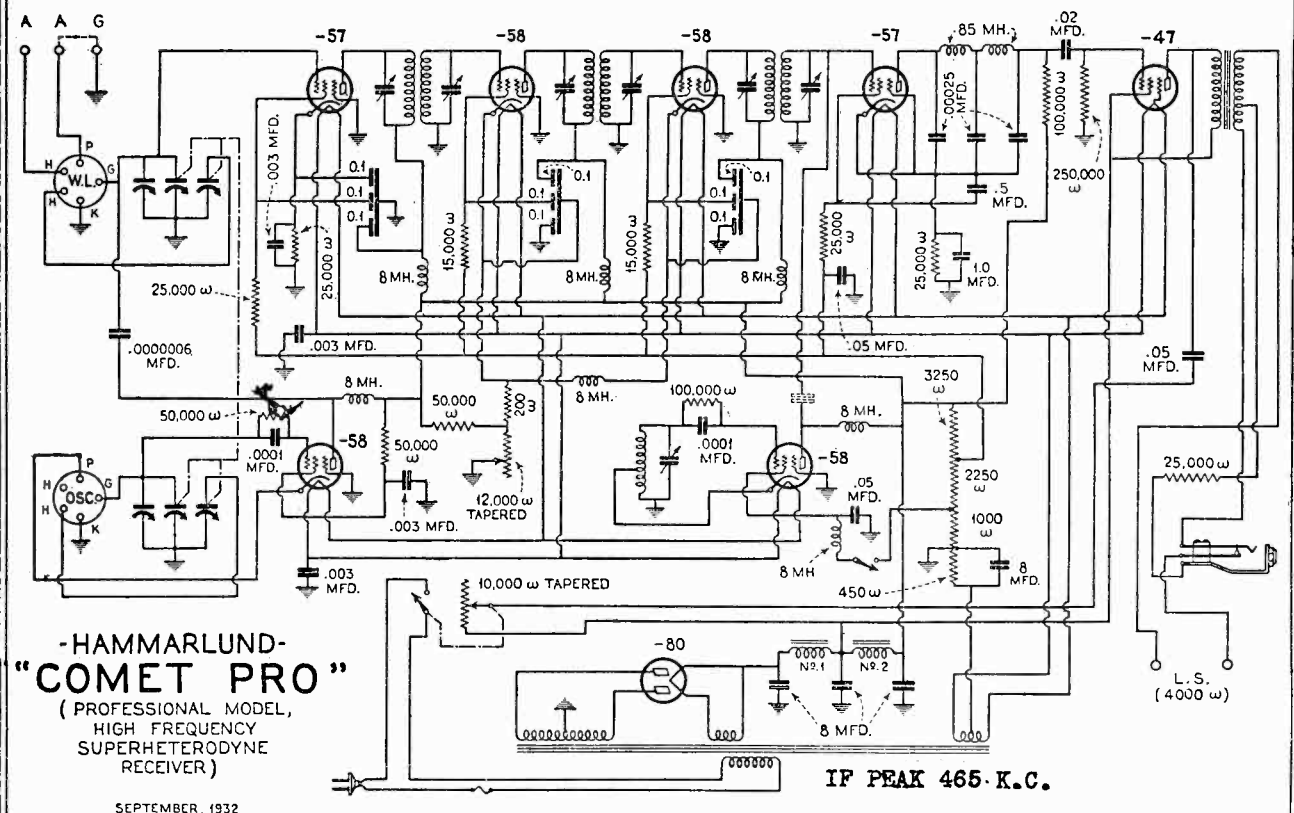


July 1932

Element	
Top terminal of voltage divider	175
Second terminal of voltage divider	80
Third terminal of voltage divider	0
Bottom terminal of voltage divider	0
K terminal of 1st Det.	5
K terminal of H-F. Osc.	30
K terminal of 1st and 2nd I-F. (Max.)	32
(Varies with volume control setting) (Min.)	2
K terminal of 1st A-F.	12
K terminal of 2nd Det.	8
K terminal of I-F. Osc. (Oscillator turned on)	12
P terminal of 2nd Det.	110
P terminal of H-F. Osc., 1st and 2nd I-F., 1st Det. and 1st A-F (With phones or speaker connected)	75
P terminal of I-F. Osc	80
G terminal of 1st Det.	55
G terminal of 1st and 2nd I-F and 2nd Det	75

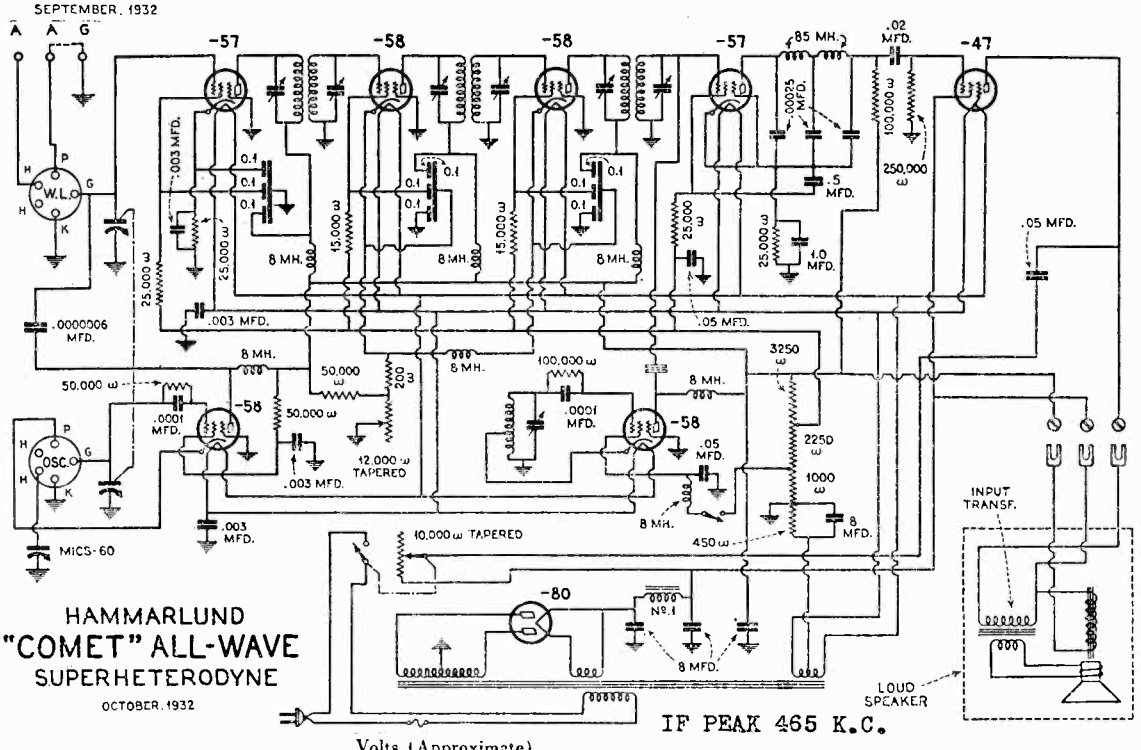
MODEL Comet Pro
September 1932
October 1932

HAMMARLUND MFG. CO.



-HAMMARLUND-
"COMET PRO"
(PROFESSIONAL MODEL, HIGH FREQUENCY SUPERHETERODYNE RECEIVER)

IF PEAK 465 K.C.



HAMMARLUND
"COMET" ALL-WAVE
SUPERHETERODYNE
OCTOBER, 1932

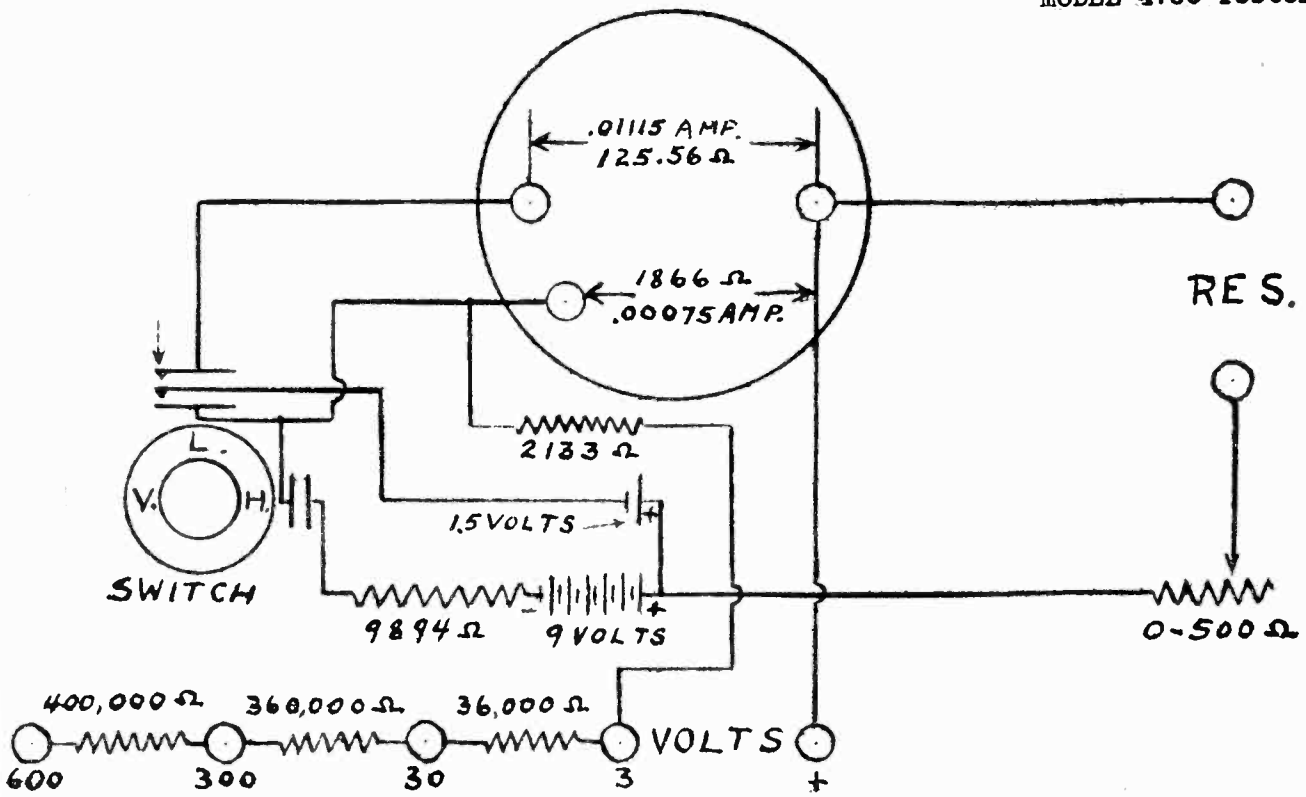
IF PEAK 465 K.C.

Volts (Approximate)

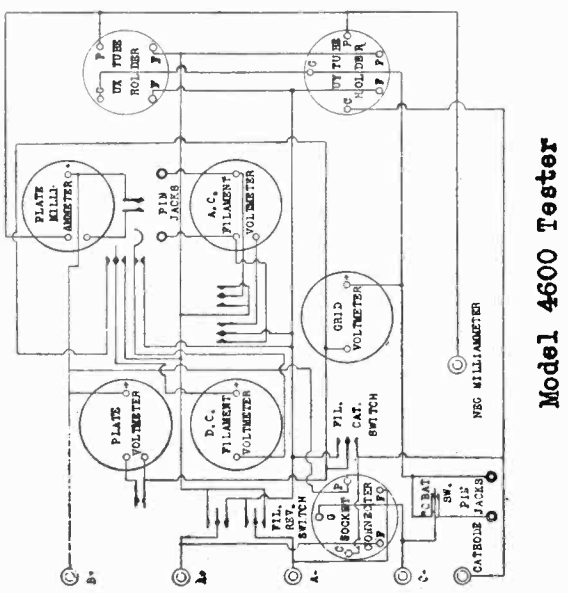
Top terminal of voltage divider	200	"	K terminal of second detector	5	"
Second terminal of voltage divider	100	"	P terminal of second detector	135	"
Third terminal of voltage divider	30	"	P terminal of H.F. oscillator, first and second I.F., first detector and I.F. oscillator	200	"
Fourth terminal of voltage divider	0	"	G terminal of first detector, second detector and first and second I.F.	110	"
Bottom terminal of voltage divider	20	"	G terminal of H.F. oscillator	90	"
K terminal of first detector	5	"			
K terminal of first and second I.F. (Max.)	35	"			
(Varies with volume control) (Min.)	3	"			

HICKOK ELECT. INSTRUMENT CO.

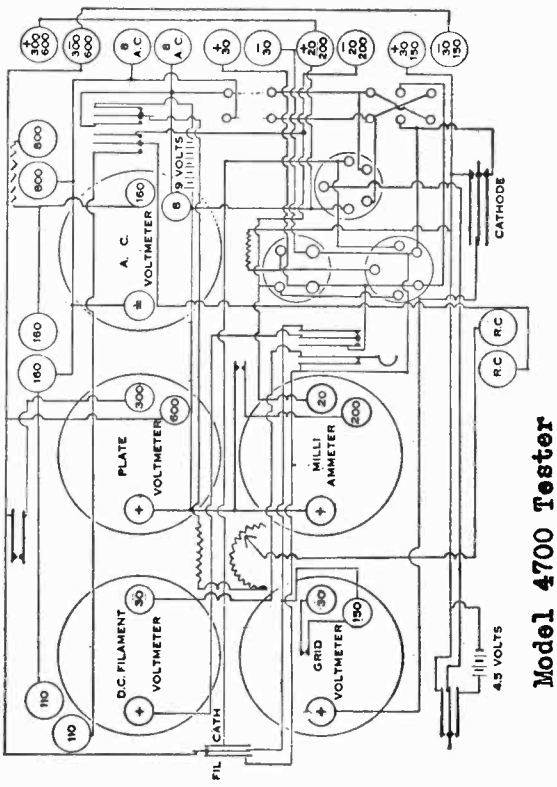
MODEL 48
Volt-Ohm
Meter
MODEL 4600 Tester
MODEL 4700 Tester



Model 48 Volt-Ohm Meter



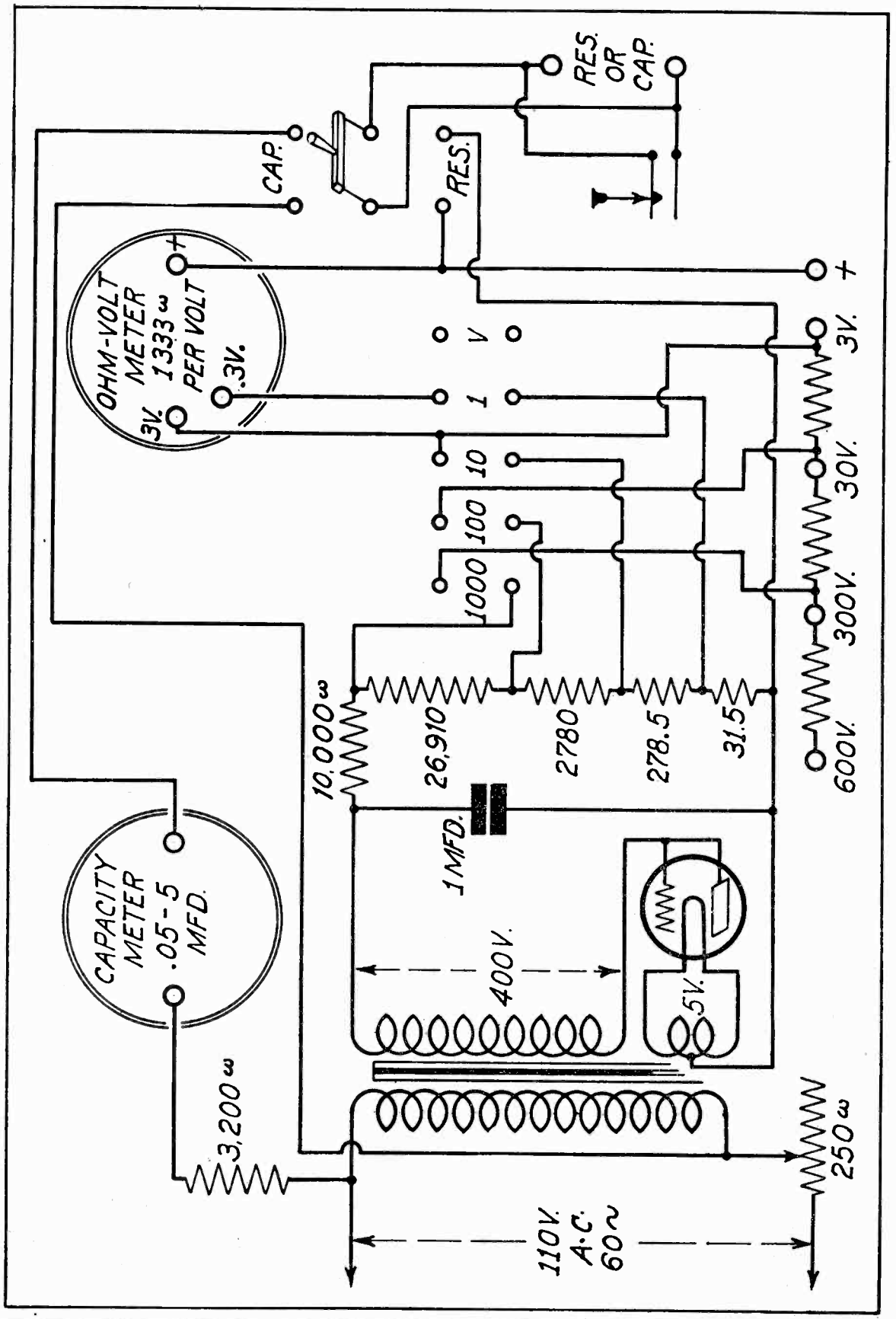
Model 4600 Tester



Model 4700 Tester

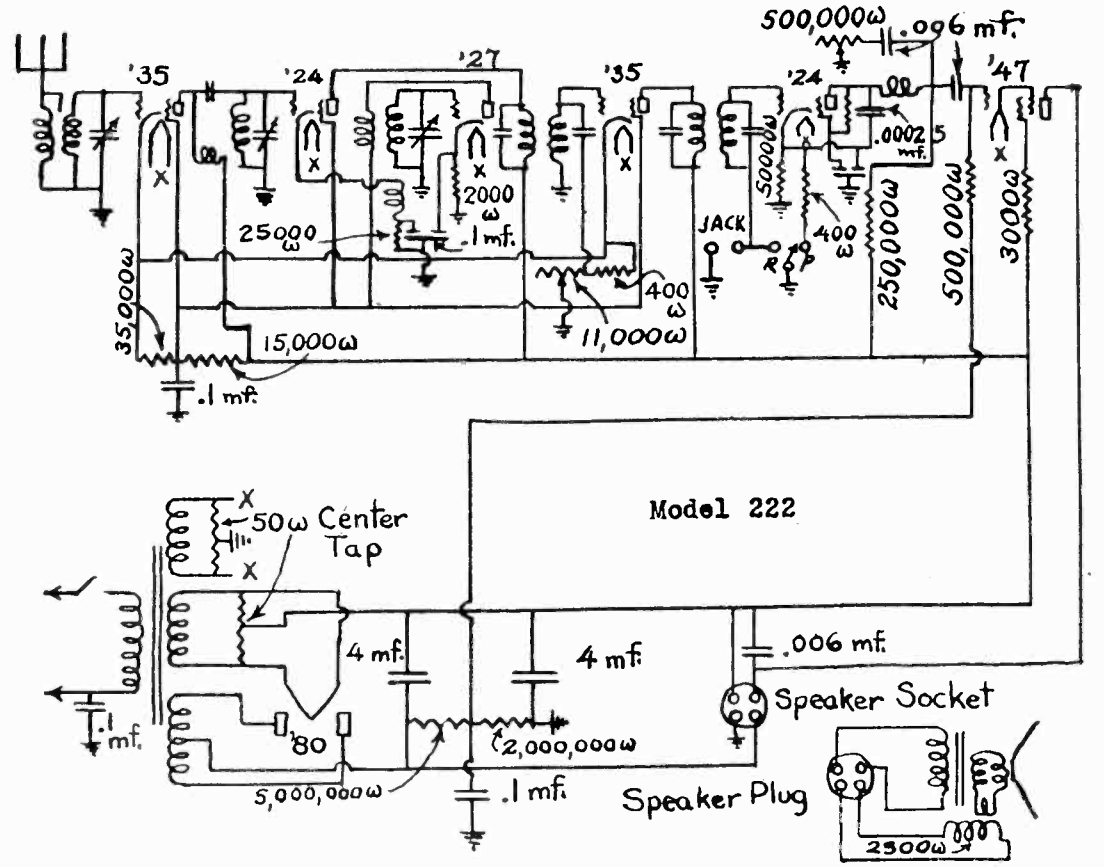
MODEL 4949
Volt-Ohm
Capacity Meter

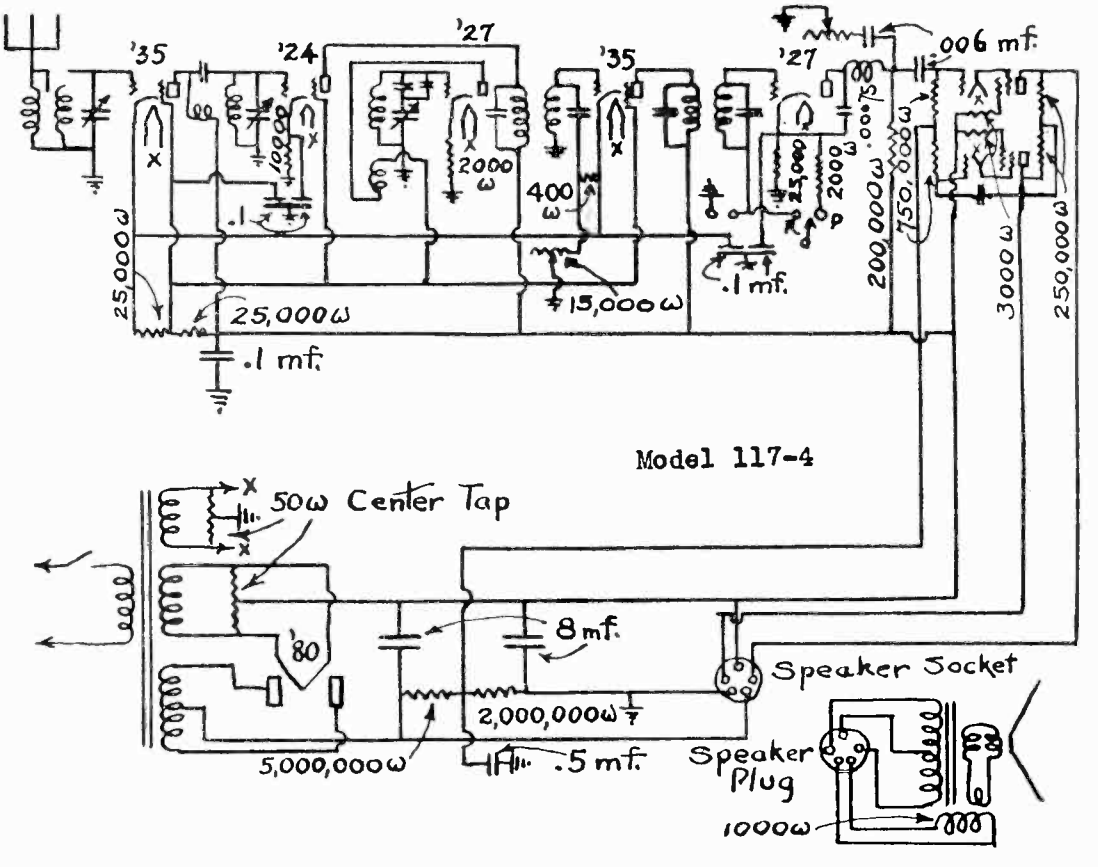
HICKOK ELECT. INSTRUMENT CO.



HIGH FREQUENCY LABORATORIES

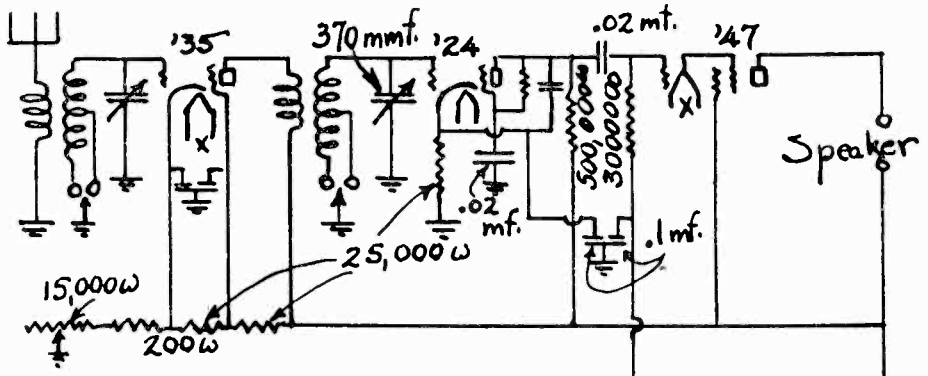
MODEL 222
MODEL 117-4



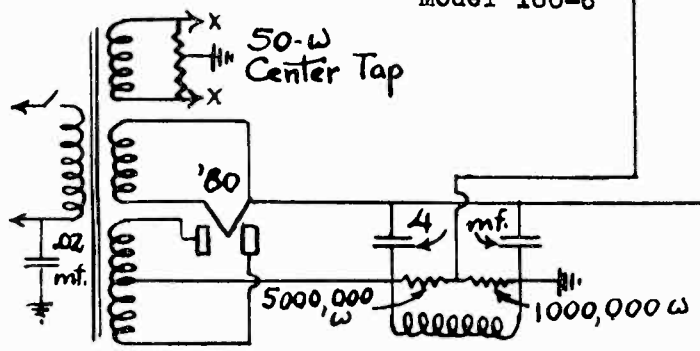


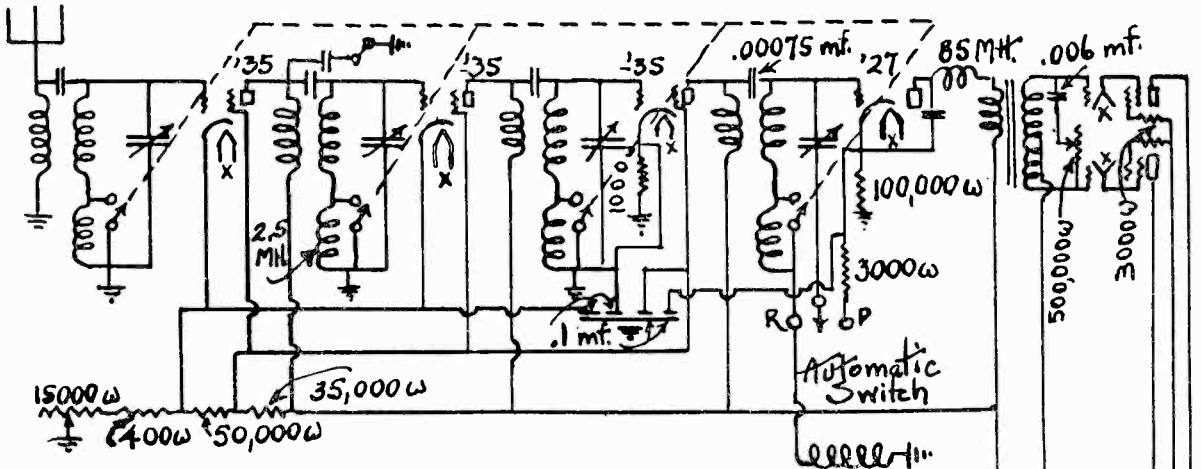
MODEL 160-6
MODEL 200

HIGH FREQUENCY LABORATORIES

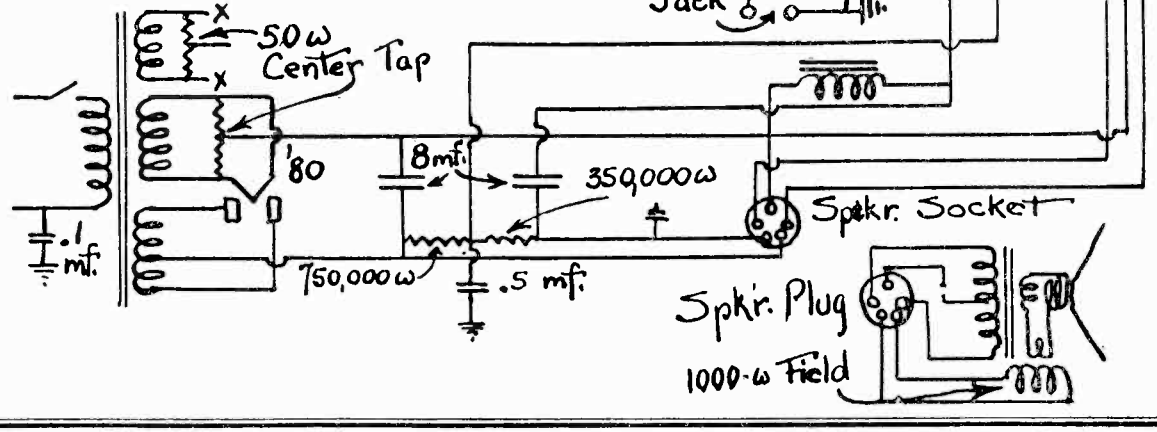


Model 160-6





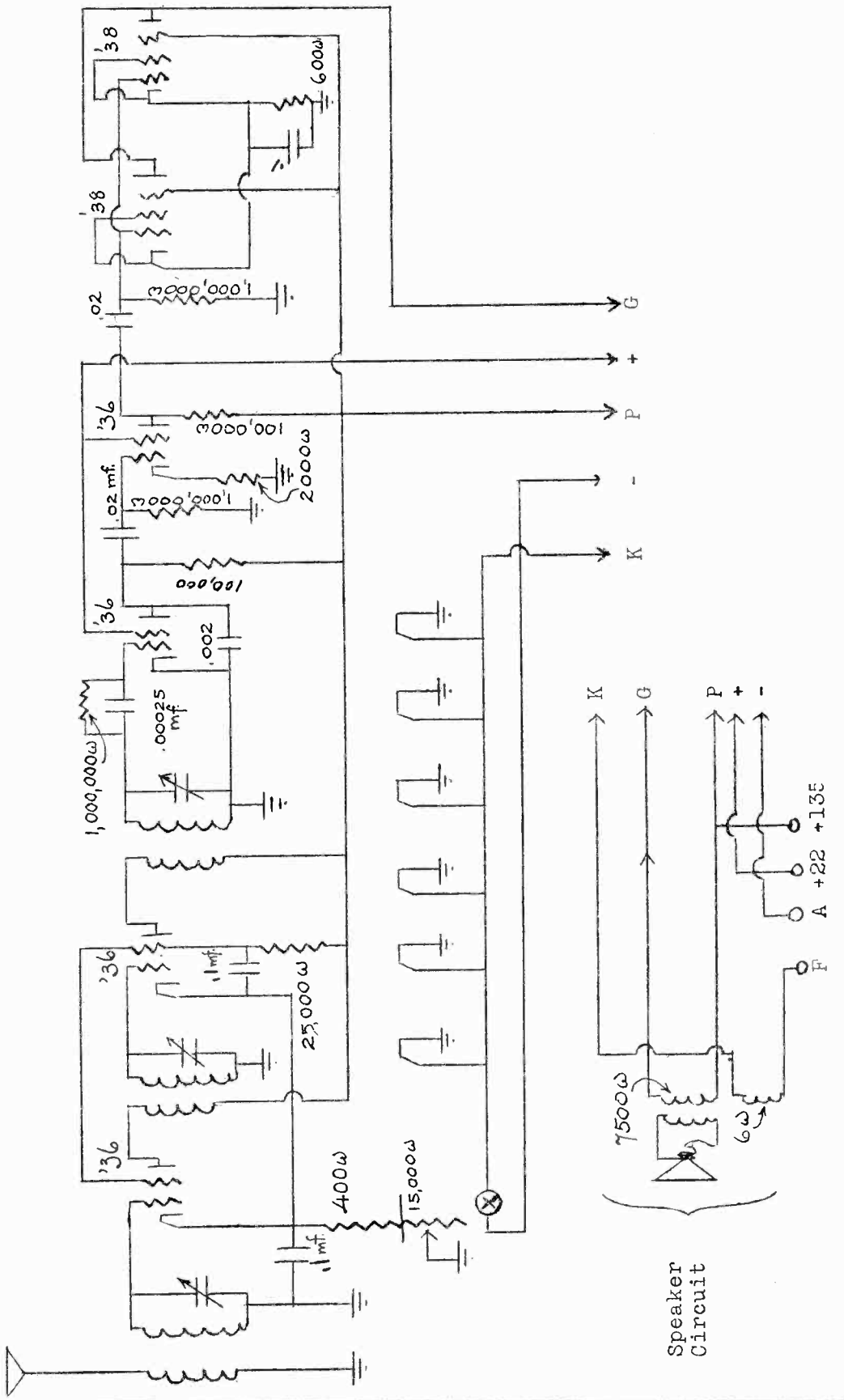
Model 200



CHARLES HOODWIN CO. MODEL A Aero Pentode Auto

AERO PENTODE AUTO RADIO MODEL A 1932

BEFORE NOVEMBER 10,1931

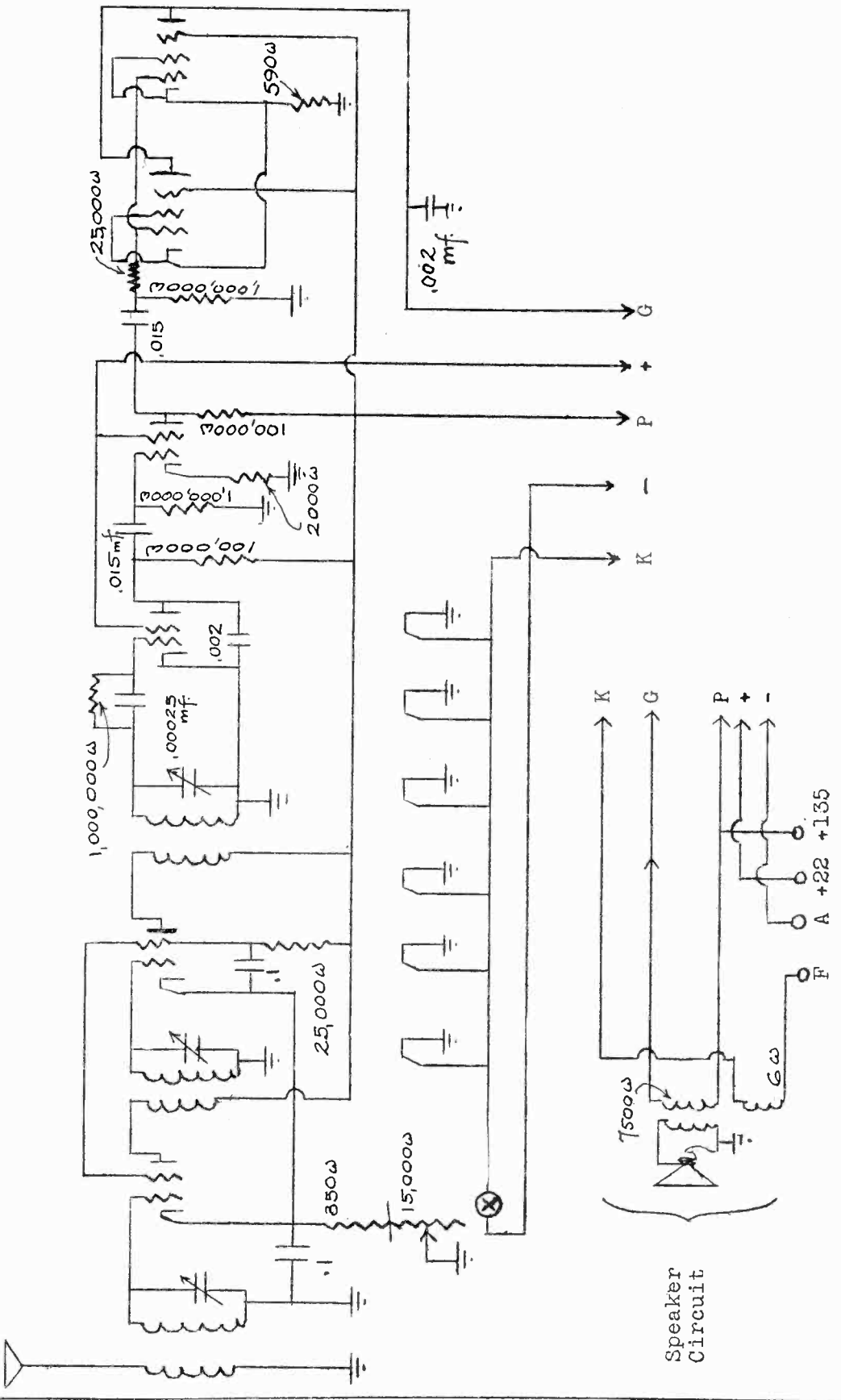


MODEL B Aero Pentode Auto

CHARLES HOODWIN CO.

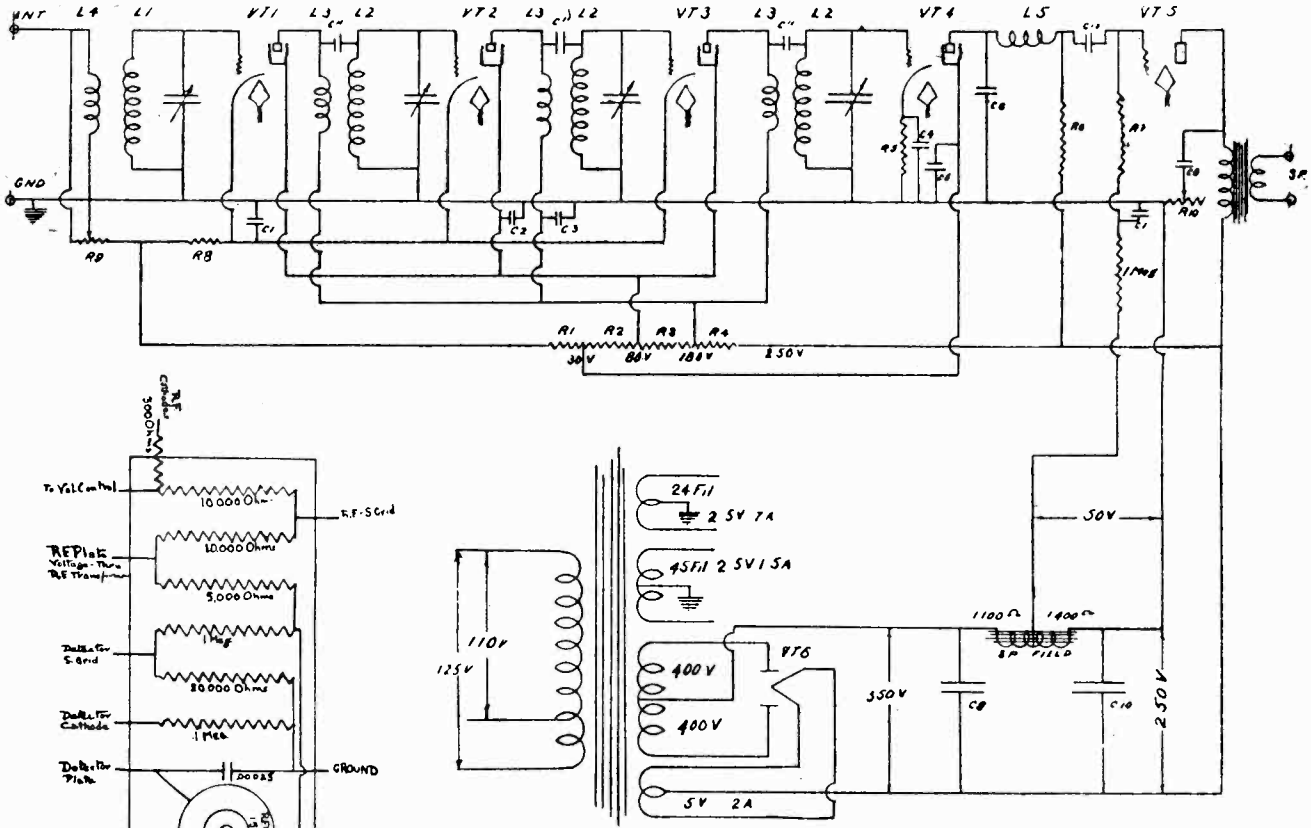
AERO PENTODE AUTO RADIO MODEL B 1932

AFTER NOVEMBER 10,1931



HERBERT H. HORN

MODEL Tiffany Tone 15
Schematic
Voltage



Resistor Strip

Additional Voltage Data will be found on next page

NOTE: All D. C. voltage readings are made with a meter of 1000 ohms per volt. If a lower resistance is used the voltages will be lower in proportion to the resistance used.

1. Power Transformer:

The transformer used is a heavy duty type, using a special insulation to take care of the surge caused, when a set is thrown on.

The primary winding is tapped for 110 and 125 volts: The twisted pair being the 110 volt tap.

The secondary winding is center tapped, having 350 volts each side of center: When under load.

The filament voltages are:

224—2.3 volts A.C.
245—2.5 volts A.C.
280—5.0 volts A.C.

The center tap of the 224's is grounded.

The center tap of the 245's is connected to the 1100 ohm end of the speaker field.

MODEL Tiffany Tone 15
Data

HERBERT H. HORN

2. A 280 type tube is used for rectifying.
The filament voltage is 5 volts A. C.
There is 350 volts from center tap to each plate, under full load.
3. Speaker Field is tapped at 1400 ohms from ground to 245 grid return, and 1100 ohms from 245 grid return to center tap of power transformer secondary.
4. Electrolytic condenser Positives are connected to center tap of 280 filament. One of the condensers is grounded through its shell. The other condenser is connected through its shell to the 1100 ohm end of the field.

Section B

1. Power audio stage employs a 245 tube, using the following voltages:
Grid 5 volts (from ground to grid).
Plate 250 volts (from ground).
Fil. 2.5 volts A. C.
2. Full scale continuity, from plate to one side of speaker transformer.
Meter deflection from grid to tap on field.
Full scale to ground from either side of Fil's.
3. A click should be heard shorting out grid.

Section C

1. Detector voltages:
Screen Grid.....40 volts
Plate .....70 volts
Cathode ..... 6 volts (no signal)
Heater ..... 2.3 volts A.C.
2. Detector plate to B Positive of Res. Strip .05 of full scale.
Screen grid to ground .5 scale continuity.
Cathode to ground .1 scale continuity.
3. Place Ant. to grid of tube, loud rumble should be heard in speaker.

Section D

1. 3rd R. F. voltages:
Screen Grid ..... 80 volts
Plate .....180 volts
Cathodes ..... 2 to 12 volts (Vol. Control on to off)
Heater ..... 2.3 volts A. C.
2. Continuity: Plate through R. F. Primary to B Pos. of Res. Strip about .5 scale.
Screen Grid to ground about .7 scale.
Cathode to 300 ohm resistor, full scale.
Grid to ground, full scale.
3. Place Ant. to grid, signal of oscillator should be heard.
4. Capacitators should be set on oscillator using an output meter. Set Var. Condenser trimmers to maximum signal strength, then adjust coil capacitators to maximum. With Bakealite Screw Driver, gradually unscrew all capacitators a quarter turn. Capacitators are located on top of R. F. Coils, adjustment being made through top of R. F. Shield Can. Then take output reading at the same frequency. Repeat until output meter reading begins to drop off, then retrim Var. Condensers.
In case set is put on too long an Ant. capacitator can be reduced in capacity, as described above, so that set tunes to 10 k. c.

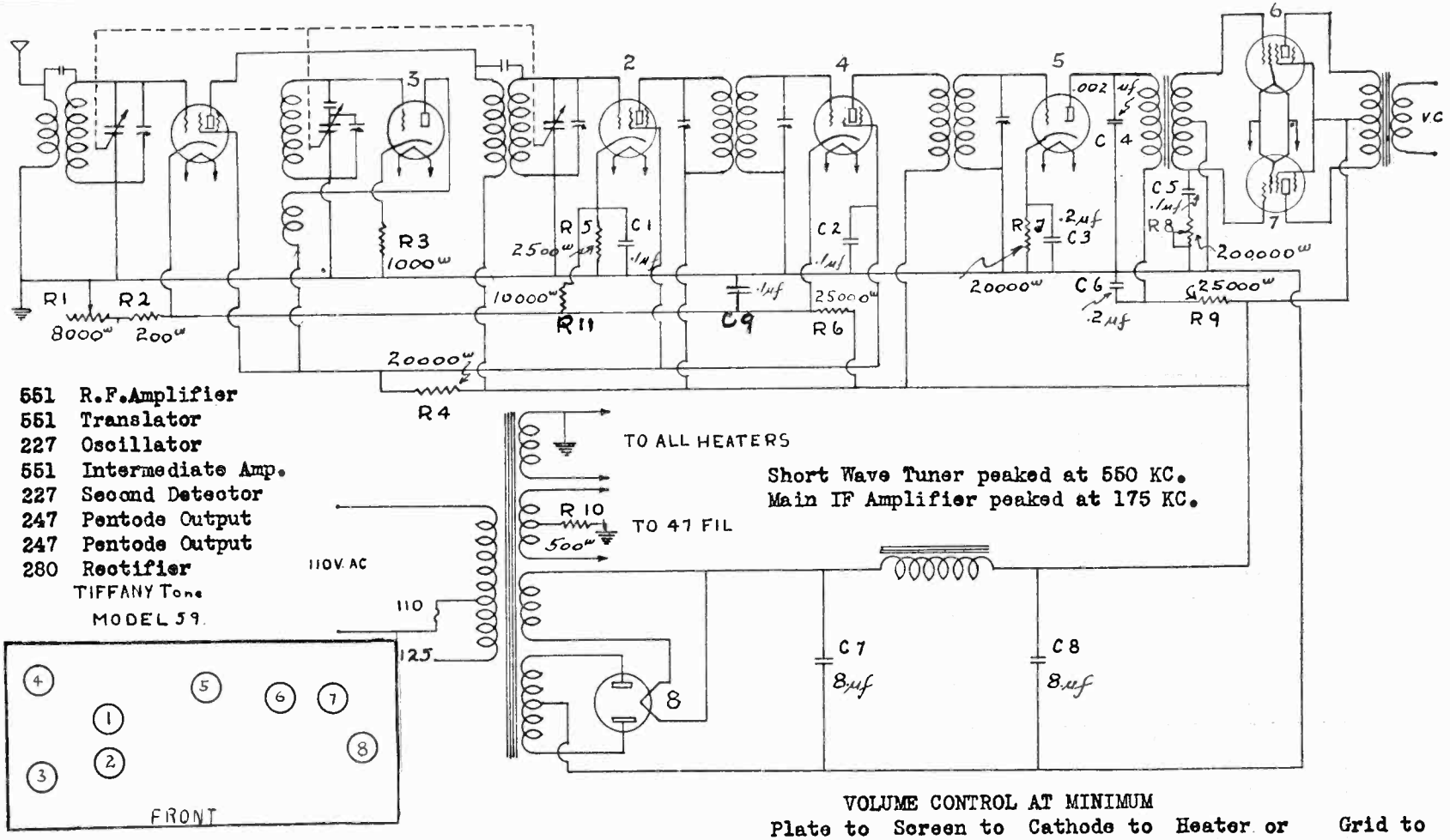
Section E and F Tests Are the Same as Section D

Section G
Refer to Plate 3

1. Resistor Strip:

Section H

1. Speaker Field is 2500 ohms over all; tapped at 1400 ohms from ground end.
2. Voice coil has a Resistance of 3.5 ohms, giving full scale.
Transformer has a resistance of 600 ohms on Plate to B Pos. side, giving almost full scale.
Voice coil side of transformer is 1 ohm, giving full scale.



Short Wave Tuner peaked at 550 KC.
Main IF Amplifier peaked at 175 KC.

The IF Trimmers are accessible from the under side of the chassis, there being two slotted screws protruding through the underside of the porcelain base of both IF transformers.
The rear section of the gang condenser tunes the RF stage; the center section tunes the oscillator and the front section, the translator.

VOLUME CONTROL AT MINIMUM

No.	Position	Plate to Ground	Screen to Ground	Cathode to Ground	Heater or Fil.Voltage	Grid to Ground
1	R.F.Amp.	240	105	*26	2.4 AC	0
2	Translator	240	105	*15	2.4 AC	0
3	Oscillator	105			2.4 AC	0
4	Int. Amp.	240	105	*26	2.4 AC	0
5	Detector	180		*22	2.4 AC	0
6-7	Power Tubes	230	240	Fil*16	2.4 AC	0
8	Rectifier	0		Fil·380	4.8 AC	0

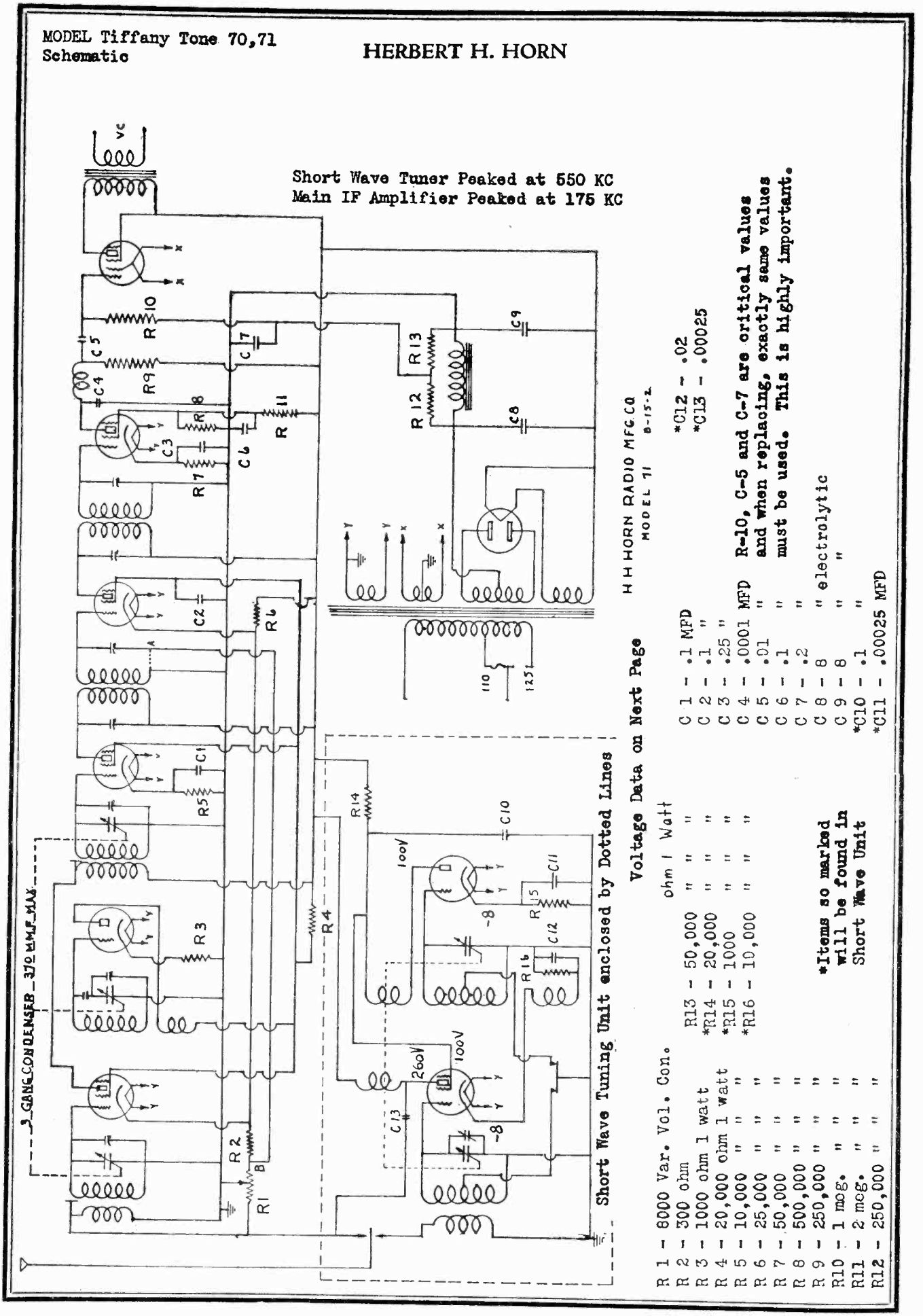
*Voltmeter resistance 50,000 ohms. All other voltages measured with 250,000 ohm meter.

HERBERT H. HORN

MODEL Tiffany Tone 59,69,90
Schematic
Voltage

MODEL Tiffany Tone 70,71
Schematic

HERBERT H. HORN



R 1 - 8000 Var. Vol. Con.
R 2 - 300 ohm
R 3 - 1000 ohm 1 watt
R 4 - 20,000 ohm 1 watt
R 5 - 10,000 " "
R 6 - 25,000 " "
R 7 - 50,000 " "
R 8 - 500,000 " "
R 9 - 250,000 " "
R10 - 1 meg. " "
R11 - 2 meg. " "
R12 - 250,000 " "

ohm 1 Watt

R13 - 50,000 " "
*R14 - 20,000 " "
*R15 - 1000 " "
*R16 - 10,000 " "

*Items so marked will be found in Short Wave Unit

C 1 - .1 MFD
C 2 - .1 "
C 3 - .25 "
C 4 - .0001 MFD
C 5 - .01 "
C 6 - .1 "
C 7 - .2 "
C 8 - 8 " electrolytic
C 9 - 8 " "
*C10 - .1 "
*C11 - .00025 MFD
*C12 - .02
*C13 - .00025

R-10, C-5 and C-7 are critical values and when replacing, exactly same values must be used. This is highly important.

HERBERT H. HORN

MODEL Tiffany Tone 70,71
Voltage Data

VOLUME CONTROL AT MAXIMUM

No.	Position	Plate to ground	Screen to ground	Cathode to ground	Heater or Fil.Voltage	Grid to ground
1	R.F. Amp	260	90	*3.5	2.45 AC	0
2	Translator (1st Det.)	260	90	*7	2.45 AC	0
3	Oscillator	90		*4	2.45 AC	0
4	Int. Amp	260	90	*3.5	2.45 AC	0
5	Detector	118	*30	*8	2.45 AC	0
6-7	Power tubes	260	260	0	2.51 AC	*3.3
8	Rectifier	0		375 AC	4.8 AC	0

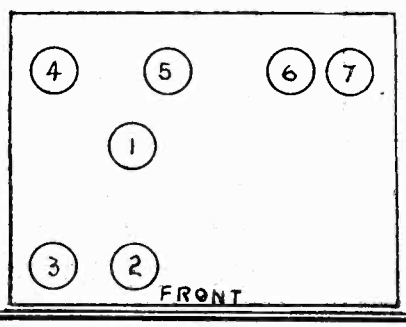
VOLUME CONTROL AT MINIMUM

No.	Position	Plate to ground	Screen to ground	Cathode to ground	Heater or Fil.Voltage	Grid to ground
1	R.F. Amp	290	130	*50	2.45 AC	0
2	Translator (1st.Det.)	290	130	*25	2.45 AC	0
3	Oscillator	130		*4	2.45 AC	0
4	Int. Amp.	290	130	*50	2.45 AC	0
5	Detector	130	*28	*5	2.45 AC	0
6-7	Power Tubes	280	290	0	2.4 AC	*3.3
8	Rectifier	0		375 AC	4.8 AC	0

*Voltmeter resistance 50,000 ohms. All other voltages measured with 250,000 ohm meter.

To balance: The front section of the two gang condensor tunes the detector stage to signal frequency; the back section tunes the oscillator coil to a frequency 550 KC greater than signal frequency. If the small variable condenser, which is paralleled with the detector condenser, will not resonate its circuit within its capacity range, it will be necessary to change the trimmer located on the oscillator section of the main tuning condenser. This may be done by tuning in a signal and rotating the variable trimmer to a maximum resonance; if this point is reached with the balancing condenser plates at maximum capacity, it will be necessary to reduce the oscillator trimmer capacity, and if the resonance point is approached with the balancing condenser at minimum capacity, it will be necessary to add capacity to the oscillator trimmer. This should be regulated so the balancing condenser peaks with the plates about half way out, with the short wave tuning dial set at 50.

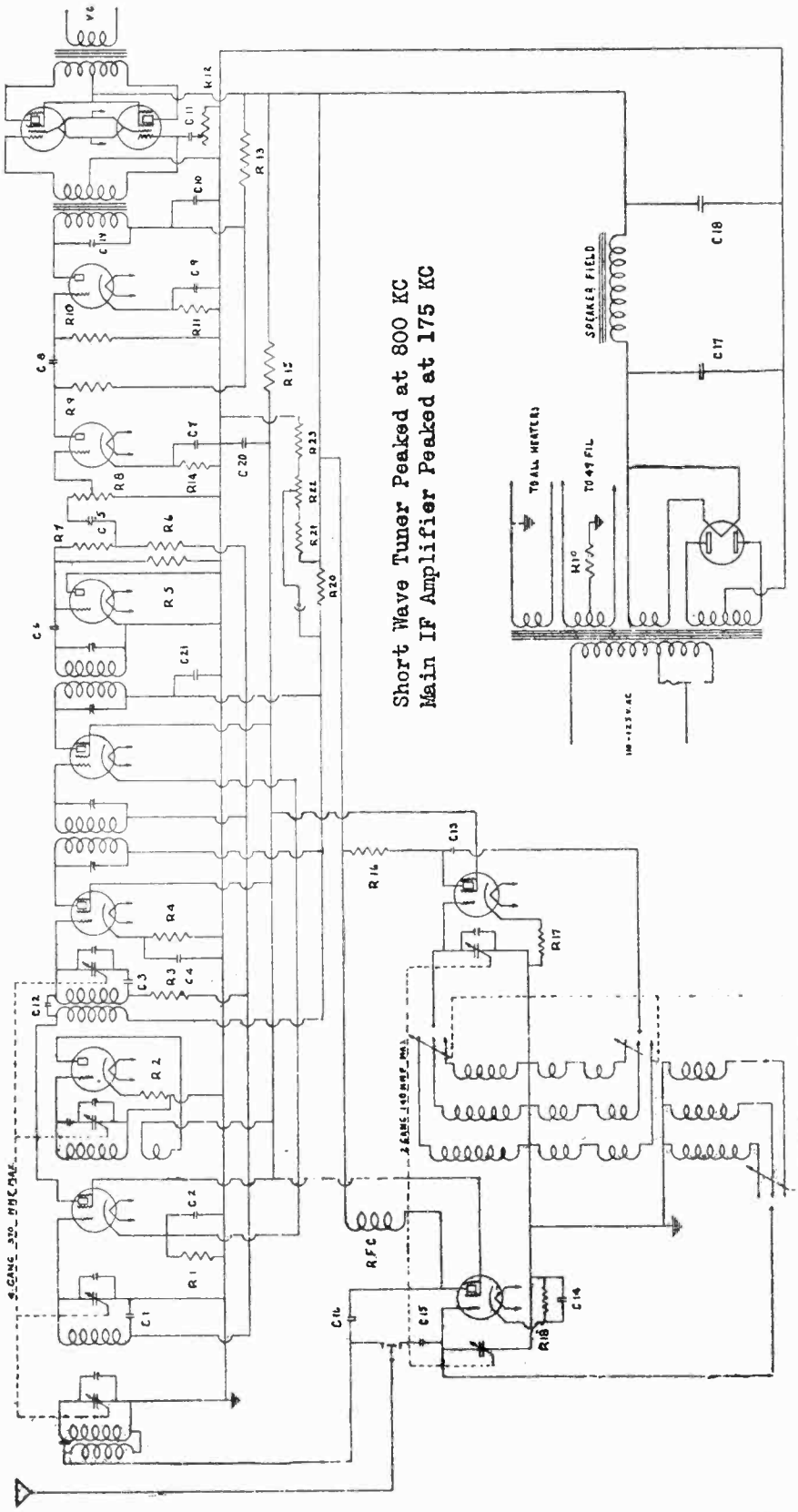
IF Trimmers are accessible from the underside of the porcelain base of both IF Transformers.



1	335	RF
2	224	1st Det.
3	327	Oscillator
4	335	Intermediate
5	324	2nd Detector
6	347	Output Pentode
7	380	Rectifier

MODEL Tiffany Tone 101-B,102

HERBERT H. HORN



C1	- .02	mfd.	C13	- .02	mfd.	R1	- 200	ohms	
C2	- .1	"	C14	- .02	"	R2	- 1,000	"	1 watt
C3	- .1	"	C15	- 10	mmfd.	R3	- 500,000	"	"
C4	- .1	"	C16	- .00025	mfd.	R4	- 1,500	"	"
C5	- .02	"	C17	- 8	mfd.	R5	- 500,000	"	"
C6	- 15	mmfd.	C18	- 8	"	R6	- 500,000	"	"
C7	- .25	mfd.	C19	- .002	"	R7	- 250,000	"	"
C8	- .02	"	C20	- .1	"	R8	- 500,000	"	Variable
C9	- .25	"	C21	- .1	"	R9	- 100,000	"	1 watt
C10	- 2.0	"				R10	- 2 Megohm		"
C11	- .1	"				R11	- 2,500	ohms	"
C12	- 12	mmfd.				R12	- 500,000	"	Variable

R13	-	20,000	" 1 watt
R14	-	2,500	" "
R15	-	20,000	" "
R16	-	20,000	" "
R17	-	2,000	" "
R18	-	10,000	" "
R19	-	300	" 3 "
R20	-	2,500	" 1 "
R21	-	50,000	" 1 "
R22	-	10,000	" Variable
R23	-	5,000	" 1 watt

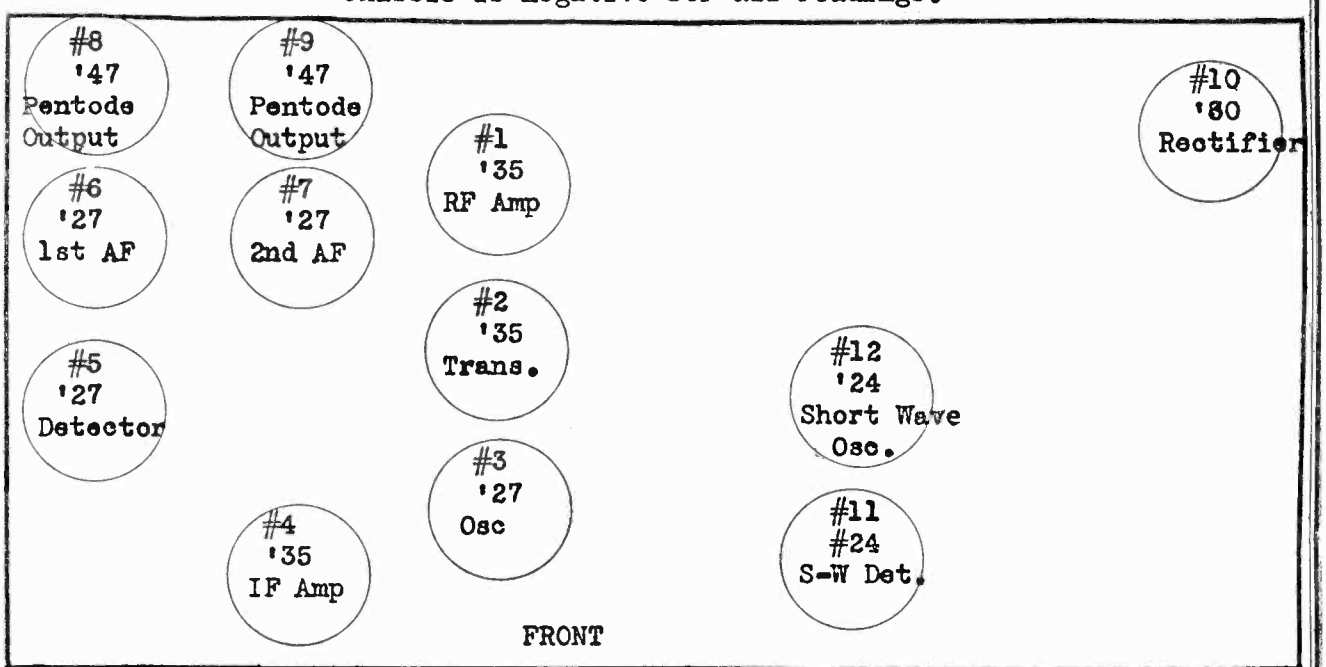
HERBERT H. HORN

MODEL Tiffany Tone 101-B, 102
Voltage Data

VOLTAGE READING AT TUBE SOCKETS
WITH NO SIGNAL INPUT

No.	Type	Ground to	Plate	Screen	Fil. or Cathode	Heater or Fil. Voltage
1	335	R.F. Amp.	228	87	*2.8	2.1
2	335	Translator	228	87	*8.	2.1
3	327	Oscillator	87	-	*3.5	2.1
4	335	Int. Amp.	228	87	*2.8	2.1
5	327	Detector (2nd)	0	-	0	2.1
6	327	1st A.F.	*30	-	*1.75	2.1
7	227	2nd A.F.	240	-	*16.5	2.1
8-9	347	Output	2.50	-	*18.0	2.3
10	280	Rectifier	360 AC Each	-	0	4.8
11	324	S.W.Detector	260	87	*25	2.2
12	324	S.W.Oscillator	130	87	*.9	2.2

*Voltmeter resistance 50,000 ohms. All other voltages measured with 250,000 ohm meter. Chassis is negative for all readings.



MODEL Tiffany Tone 101-B, 102
Condenser Adjustments

HERBERT H. HORN

ADJUSTMENT OF INTERMEDIATE FREQUENCY CONDENSERS

There are two intermediate frequency transformers. Both the grid and plate circuits of each must be tuned sharply to 175 kilocycles. The condenser adjustments are accessible from the under side of the chassis, there being two slotted screws protruding through the insulated base of each intermediate transformer.

A modulated oscillator, accurately calibrated to 175 kilocycles, and an 0-to-15 milliameter is necessary. Connect the output of the oscillator to the control grid cap of the translator tube, removing the normal grid lead. The ground terminal of the oscillator must be connected to the ground terminal of the set. Connect the 0-to-15 milliameter in series with the R.F. cathode resistor and ground. Turn the set on, adjust the volume control of the set and the output control of the oscillator until the oscillator signal is audible in the speaker.

Adjust the four intermediate condenser screws for maximum output. Peak resonance is indicated on the motor by a dip of the needle and adjustments should be made for minimum current. Go over the four adjustments twice to make sure that they are peaked as closely as possible. This completes the I.F. tuning adjustments.

LINE-UP ADJUSTMENTS OF THE GANG CONDENSER

The four sections of the tuning condenser function as follows: The first section, looking at the rear of the chassis, tunes the selector stage. The second section tunes the grid circuit of the R.F. amplifier. The third section tunes the grid circuit of the translator tube, and the fourth section (nearest the front of the chassis) tunes the oscillator. The first three must track together at signal frequency, while the oscillator circuit must maintain a frequency 175 kilocycles higher than the signal frequency.

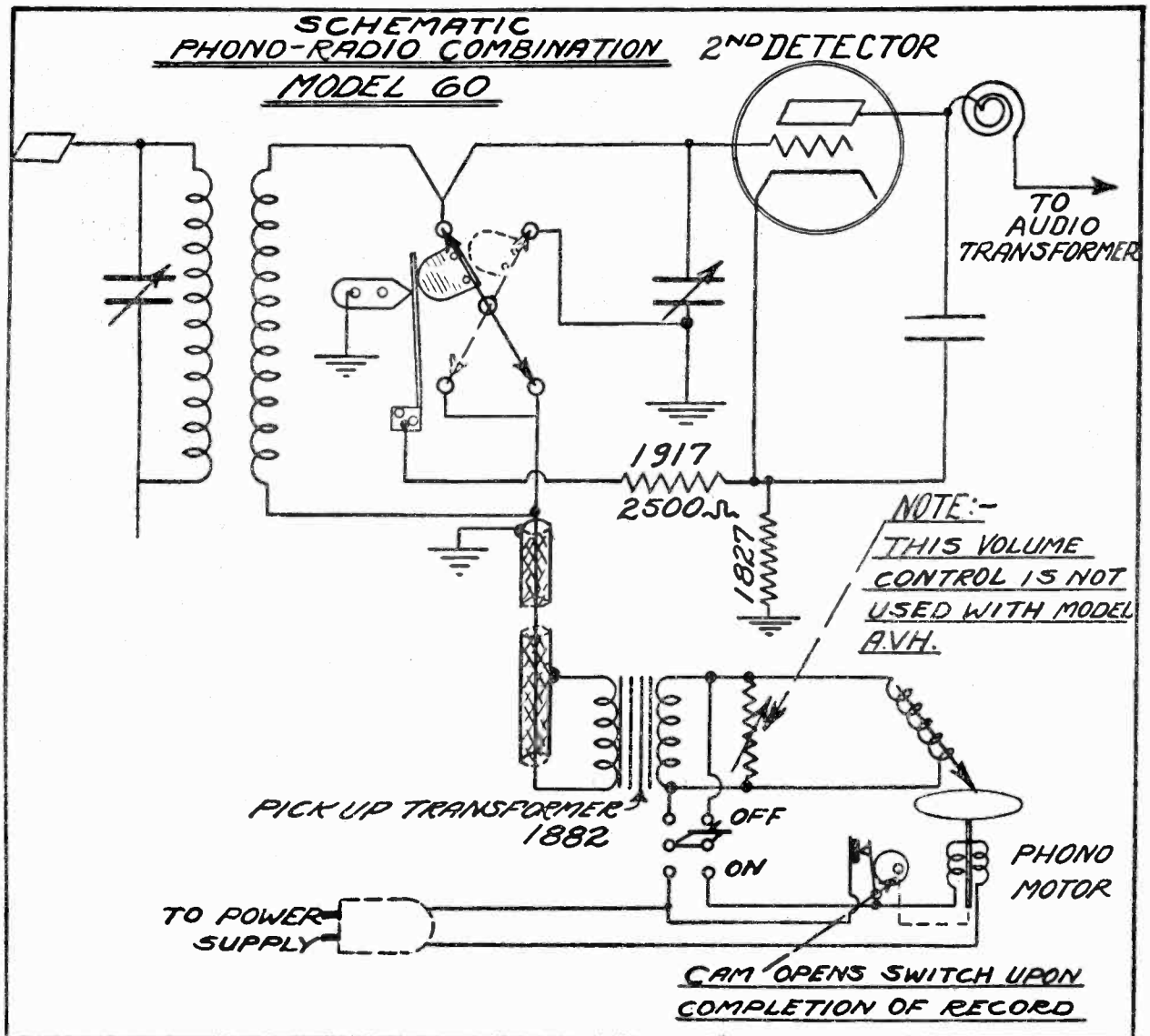
Connect the output of the oscillator through the dummy antenna to the antenna and ground posts of the receiver. Connect the milliammeter as before. Set the oscillator at 1200 KC and the dial on the set at 1200 KC. Then adjust the oscillator section trimmer, translator, R.F., and pre-selector output. Do not again change the trimmers but establish resonance over the tuning range by bending the vanes of the split rotor plates as necessary.

SHORTWAVE TUNING SECTION

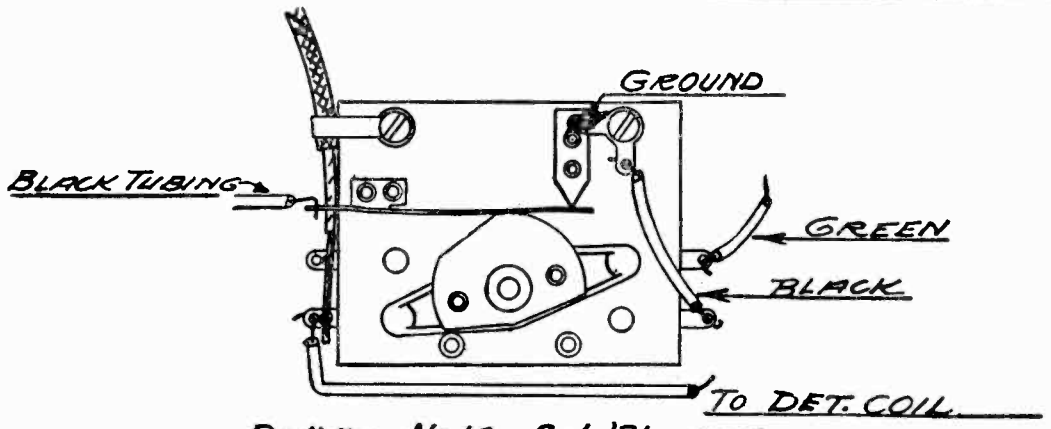
To balance - Turn the dial to 800 KC with the band selector on broadcast, then switch to the green shortwave band and set the dial near 6.2 mogacycles. At this point rosonance may be obtained by varying the trimmer on the shortwave oscillator gang (the rear section of the two gang condenser) until maximum output is obtained from either a modulated oscillator, a shortwave station or from the natural static level. The approximate adjustment of this trimmer may be obtained by turning the adjusting screw down tight and then releasing it 1/4 turn.

HOWARD RADIO CO.

MODEL 60
(AVH)
Phono Data



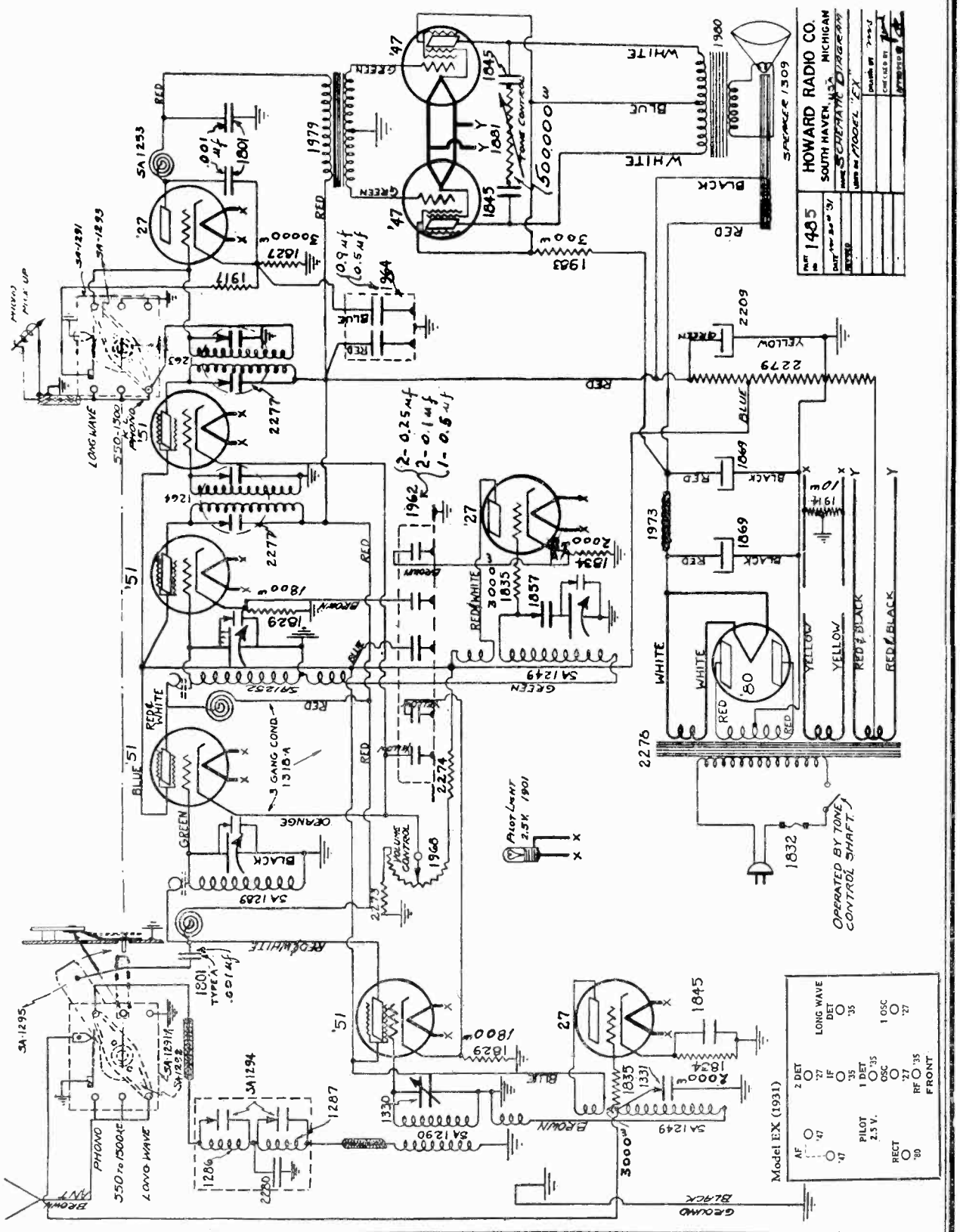
PICTORIAL VIEW OF THE ABOVE SWITCH ACTION:-



DRAWING No 16 - 9-1-'31 - M.B.

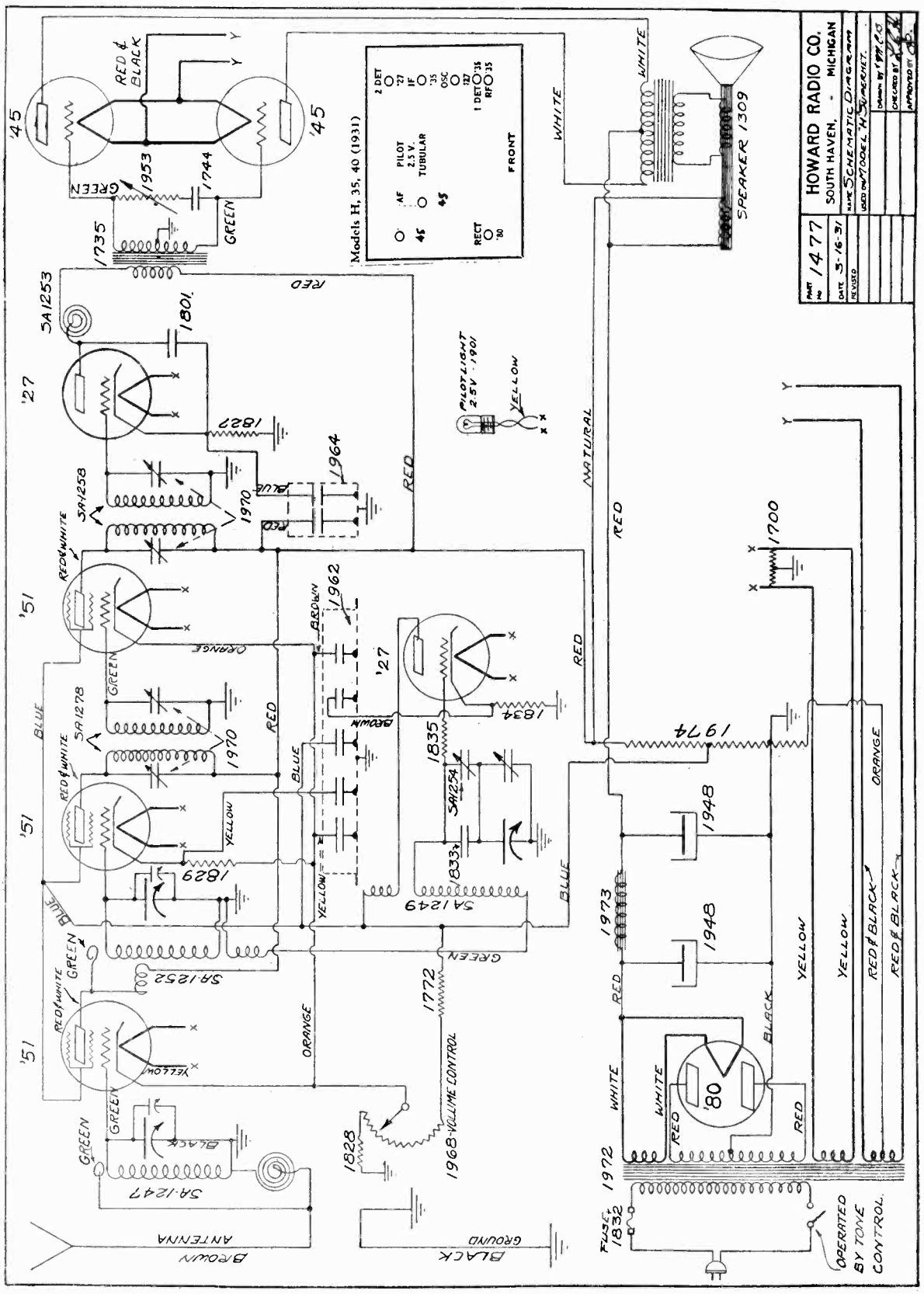
MODEL EX
Dual Range
Schematic

HOWARD RADIO CO.



HOWARD RADIO Co

MODEL 35,40
Chassis H with
'45s
Schematic



MODEL 35,40
Chassis H with
'45s
Alignment

HOWARD RADIO CO.

MODEL "H"

ADJUSTMENTS The 175 kc. oscillator must be accurately tuned to 175 kc. and only 175 kc. If this precaution is not observed it will be impossible to align the oscillator to the rest of the set and the set will not operate correctly as the oscillator is designed for exact 175 kc. operation.

The second intermediate frequency amplifier transformer shield can is removed and one side of the small variator condenser is disconnected from the primary coil. This coil is connected so that it still is in the plate circuit of the tube but the tuning condenser is not connected in the circuit. Now remove the grid cap from the intermediate amplifier tube and connect a 3 megohm resistor from the control grid to ground. Now connect the output from the 175 kc. oscillator to the grid of the intermediate frequency amplifier tube and tune the secondary for maximum deflection of the output meter. (Low voltage alternating current meter, 0 to 3 volts, connected across the voice coil of speaker). Now remove the shield can and connect the small tuning condenser that was previously removed back across the primary coil. With the 175 kc. oscillator connected the same as before, tune the primary for a maximum deflection of the output meter. (Caution: Do not under any circumstances try to retune the secondary after having tuned the primary. **This is important.**) After having tuned this stage proceed to the next intermediate frequency:

(b) Replace the grid cap on the intermediate frequency amplifier and proceed to the first detector tube. Remove this tube cap and connect the 175 kc. oscillator as before, being sure to connect the 3 megohm resistor from control grid to ground. Now proceed to tune the intermediate frequency transformer by tuning the secondary first for maximum deflection of the output meter and then tuning the primary for maximum deflection. Tuning this transformer must be done very carefully as the selectivity of the whole receiver depends entirely on the tuning of this transformer.

(c) To line up the radio frequency amplifier and detector stages, remove the oscillator tube and the second detector tube. Unsolder the connection on the plate terminal of first detector tube socket and solder a wire from this terminal to the plate terminal of the second detector tube socket. Now set the Test Oscillator (R. F. Generator) which tunes over the broadcast frequency range to 1400 kcs. Connect the output of this oscillator to the aerial and ground wires of the receiver. Now make sure that when the tuning condensers are all in maximum capacity that the pointer on the escutcheon lines up with the line just beyond the 550 kc. dial mark and then turn the dial until the escutcheon pointer lines up with the 1400 kc. line on the dial. The tuning condenser trimmers should now be adjusted until a maximum deflection is shown by the output meter. Now set the oscillator to 1000 kcs. Turn the dial to 1000 kcs. and then secure maximum deflection on the output meter by moving the serated plates of the variable condenser in or out as the case may be. Repeat the same procedure at 600 kcs. as was used at 1000 kcs. (Do not touch the trimmer condensers after having once set them at 1400 kcs.). Unsolder the wire connecting the first detector plate terminal to the second detector plate terminal. Resolder the wire that was originally unsoldered from the first detector plate terminal. Now replace the oscillator and second detector tubes.

(d) To line up the oscillator tune the set to 1400 kcs. and adjust the oscillator tuning condenser trimmer (the last hole of the three holes in a line on the top of the tuning condenser housing) as viewed from the front of the set, (see Fig. 1) until a maximum reading is secured on the output meter. Adjust the Test Oscillator to 600 kcs. and tune the receiver to 600 kcs. Now adjust the oscillator series condenser trimmer (the hex. nut in the hole to the left of the oscillator tuning condenser trimmer hole) until a maximum deflection is secured on the output meter. Now reset the Test Oscillator to 1400 kcs. and retune the set to 1400 kcs. and make adjustments if any are necessary on the oscillator tuning condenser trimmer. It is very seldon necessary to make any readjustments at 1400 kcs. after they have once been made.

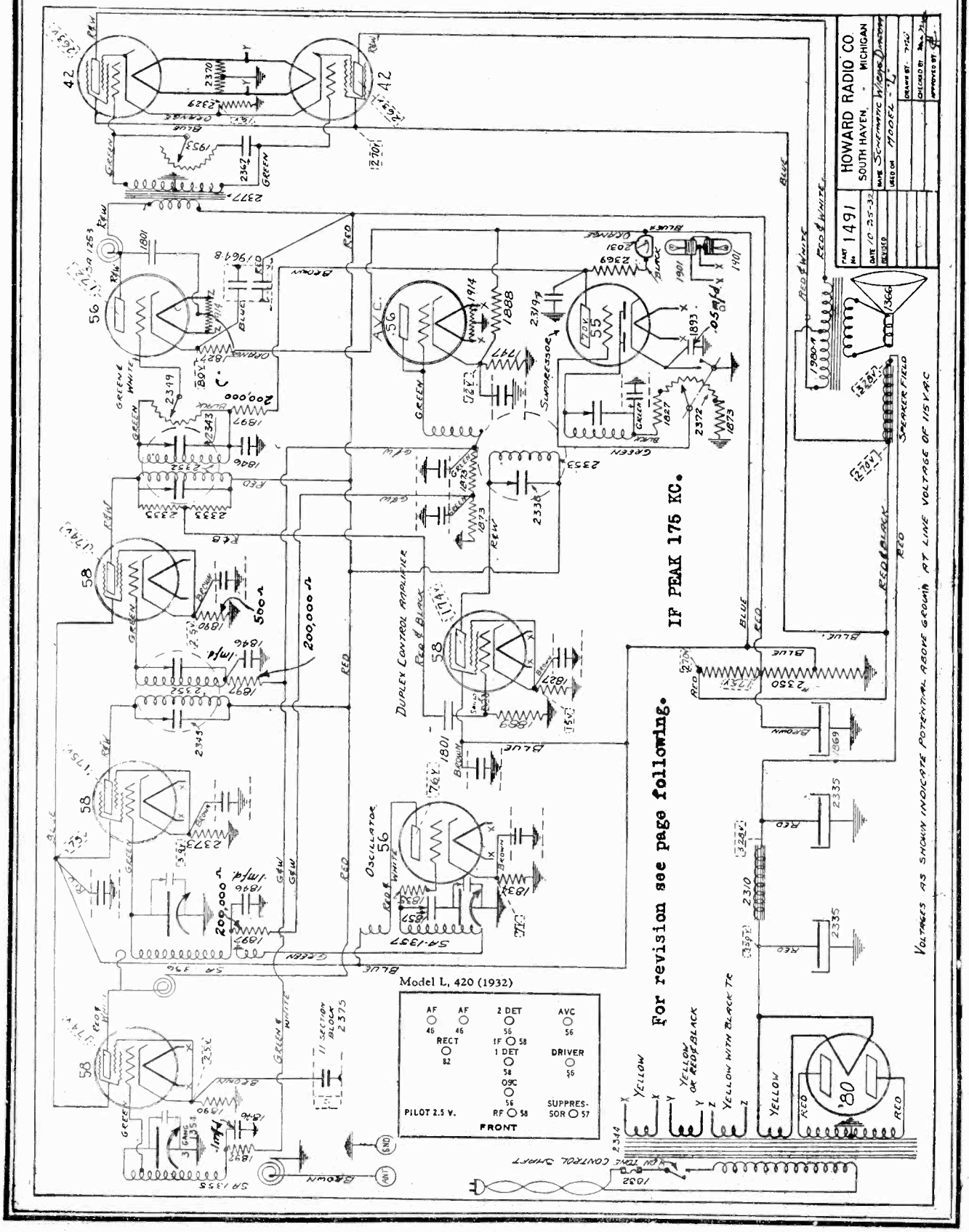
Now tune the Test Oscillator to 1000 kcs. and tune the set to 1000 kcs. Try adjusting the antenna trimmer condenser to determine whether the oscillator aligns at this frequency. If the antenna trimmer must increase capacity to give maximum deflection of output meter the oscillator tuning condenser serated plates should be moved out. If the antenna trimmer condenser is decreased in capacity the oscillator tuning condenser serated plates should be bent in towards the stator plates.

The Test Oscillator must again be set to 1400 kcs. and the set retuned to 1400 kcs. to make sure that the antenna trimmer condenser has been correctly reset after the oscillator adjustment has been made at 1000 kcs.

In making tests after having made adjustments according to the foregoing paragraphs, it is necessary to replace the tube and coil can shields before making the tests.

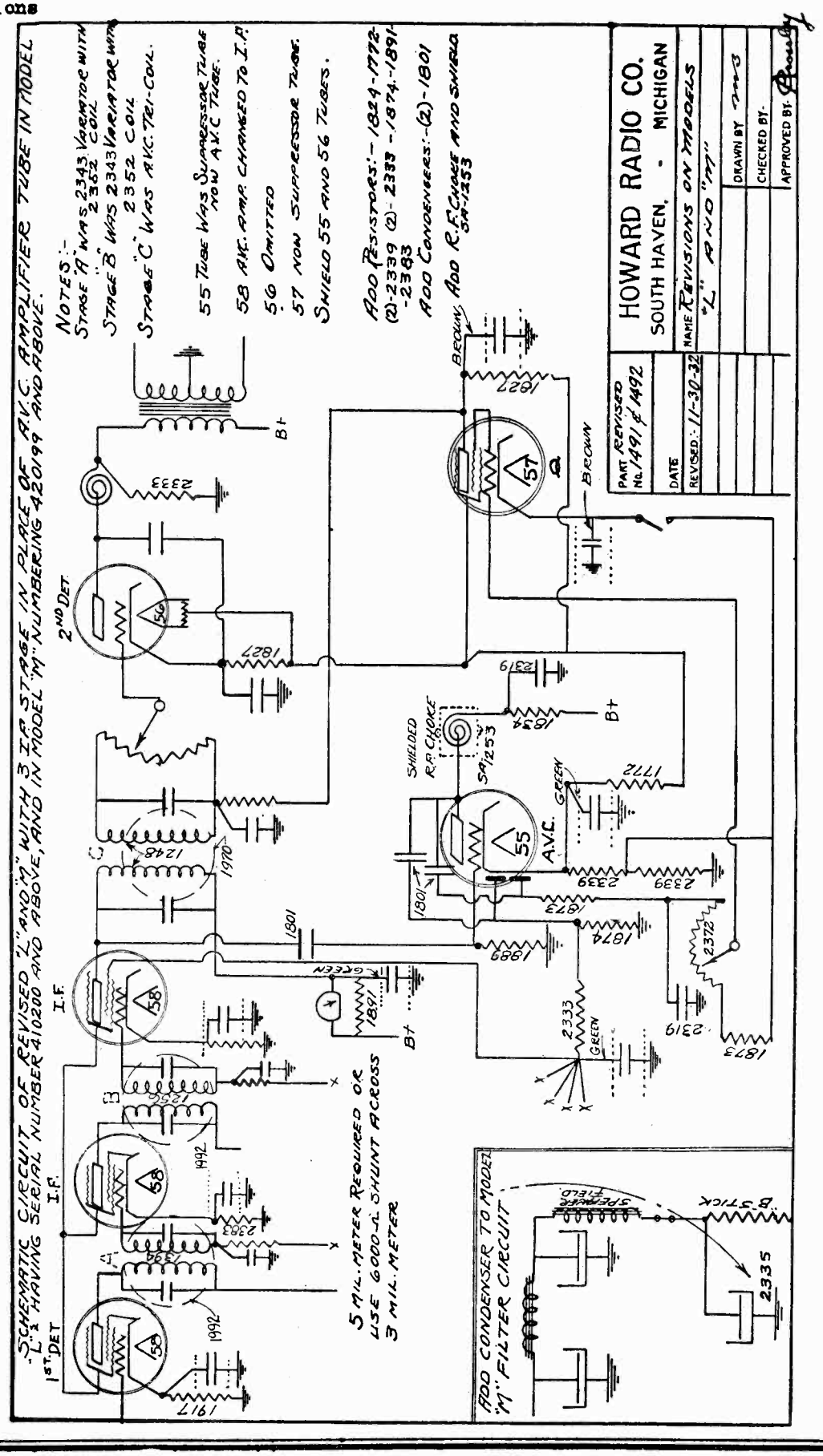
HOWARD RADIO CO.

MODEL 420 1st type
(Chassis L)



MODEL L Chassis
Revisions
MODEL M Chassis
Revisions

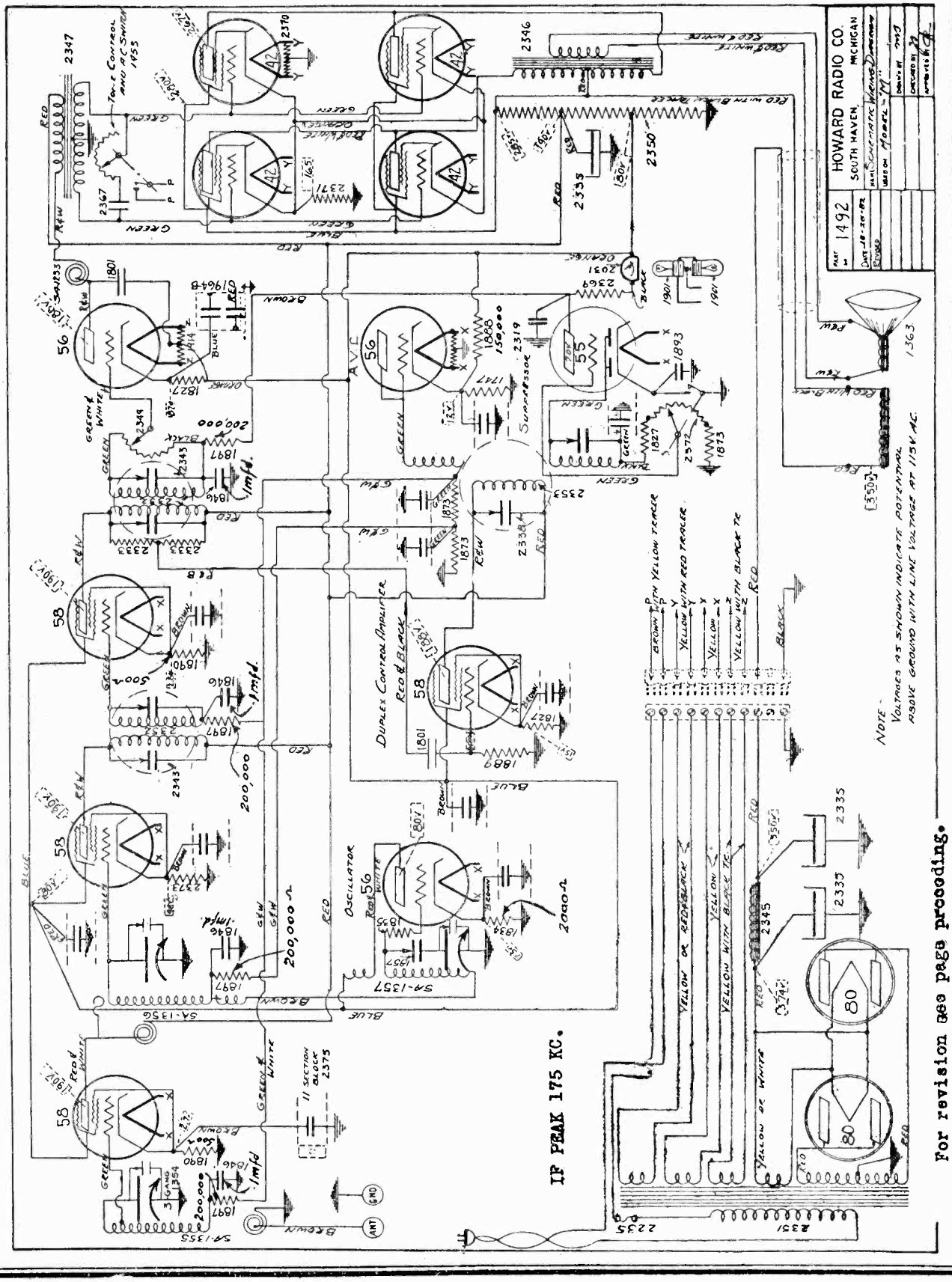
HOWARD RADIO CO.



The revision shown upon this schematic applied to the Model L Chassis shown upon the page preceding and the Model M Chassis on the page following.

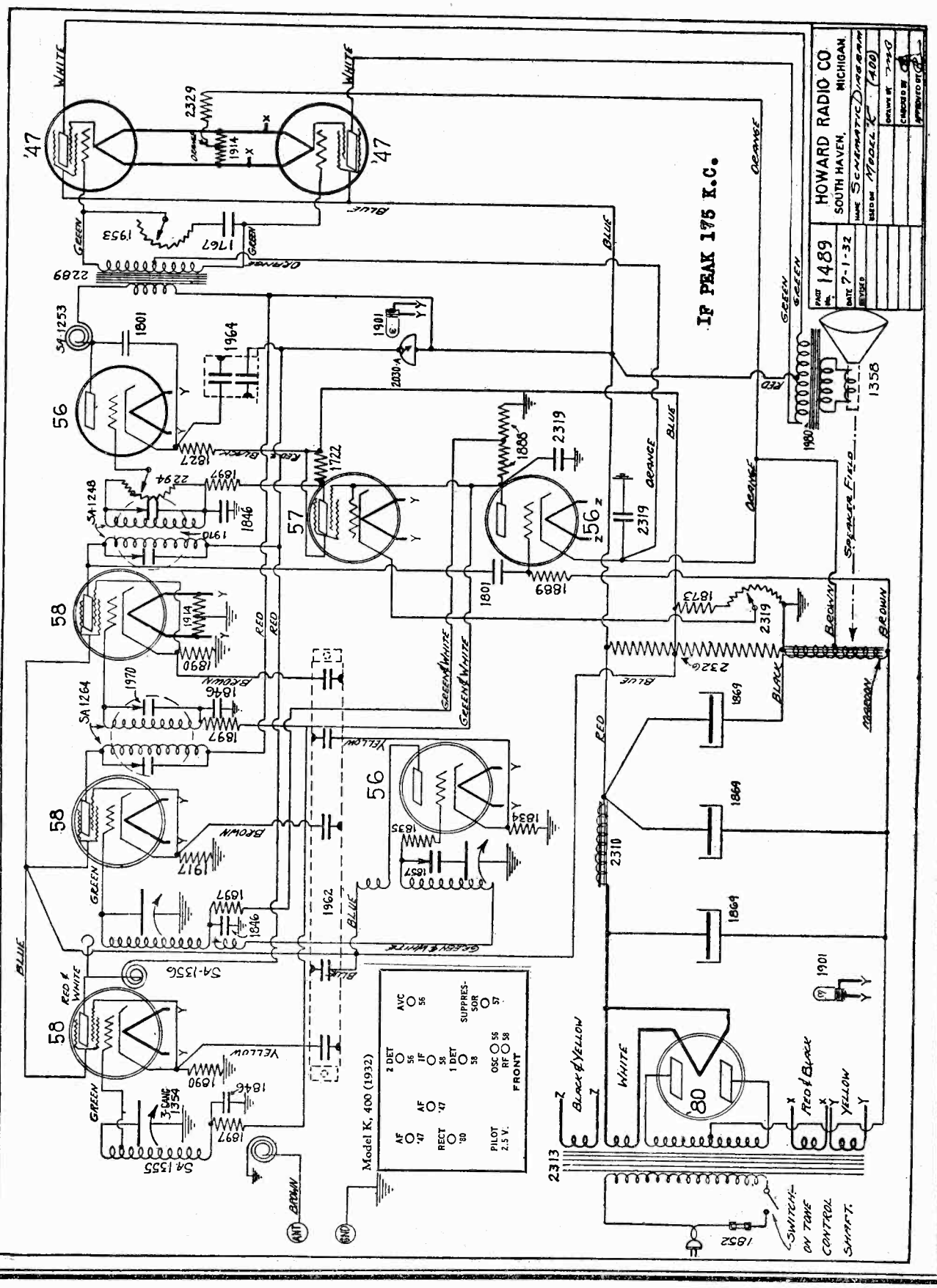
HOWARD RADIO CO.

MODEL M Chassis
1st type
Schematic



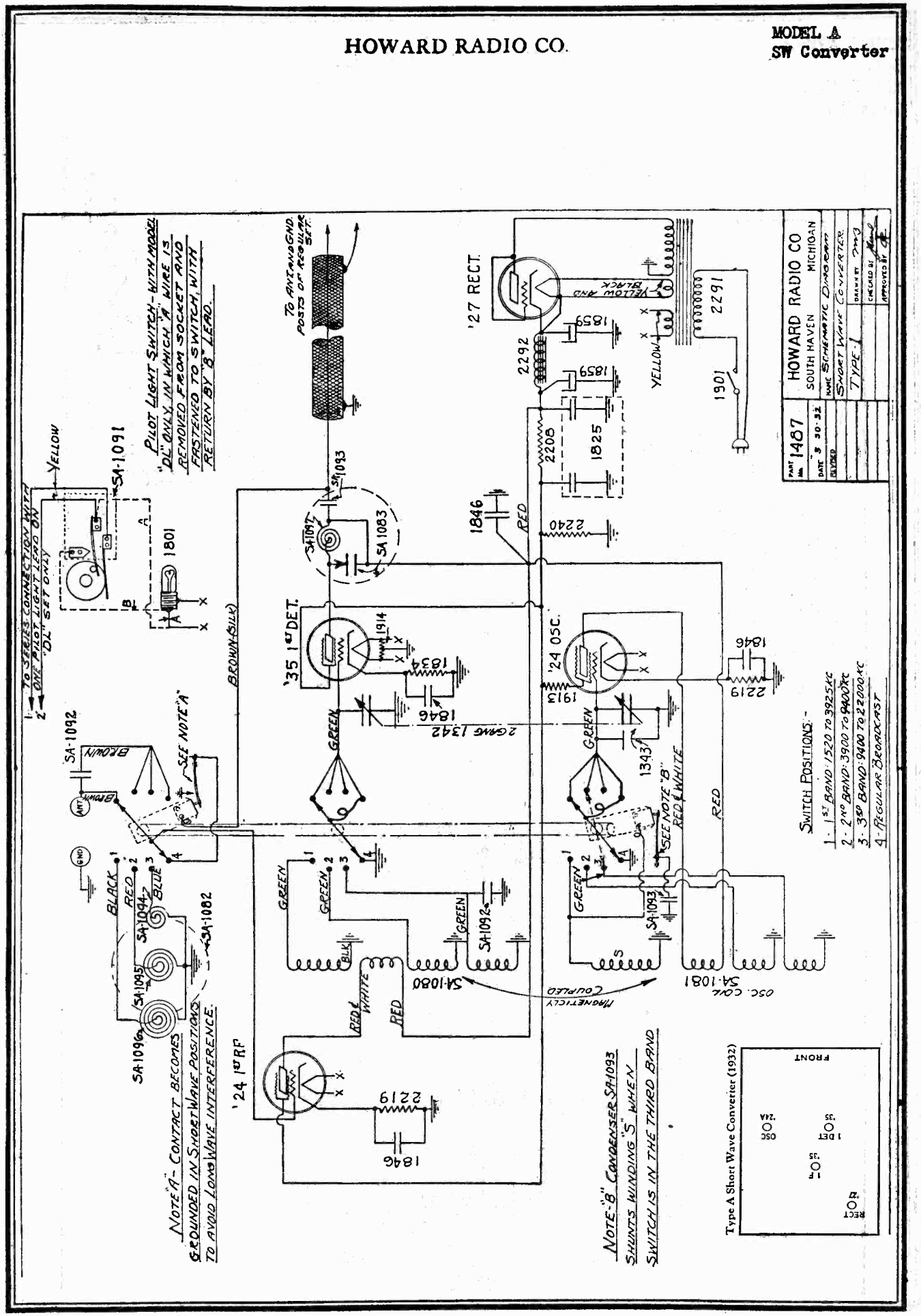
MODEL 400
Chassis K

HOWARD RADIO CO.



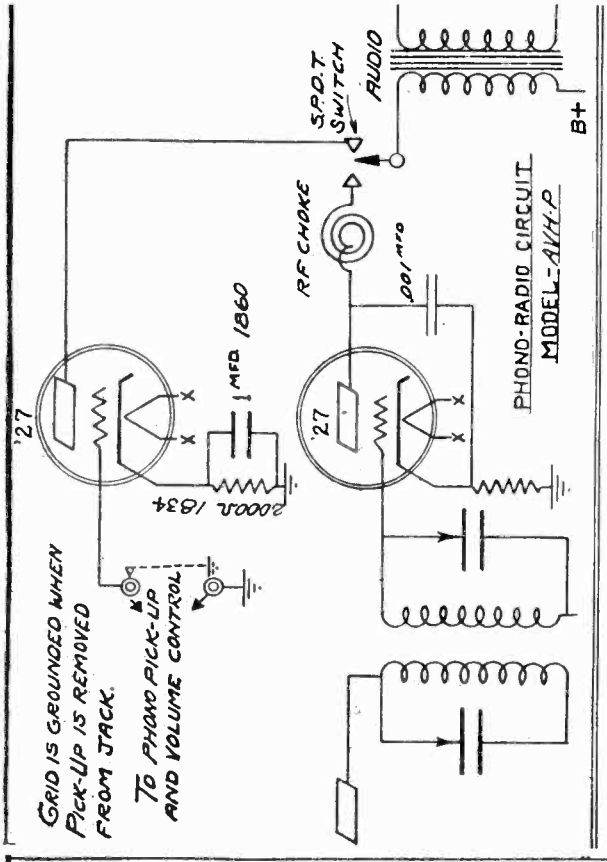
HOWARD RADIO CO.

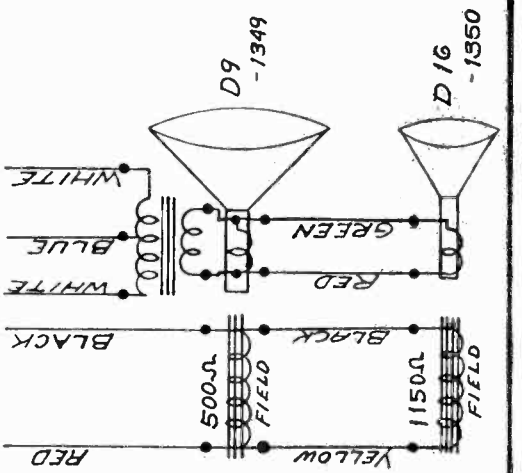
MODEL A
SW Converter



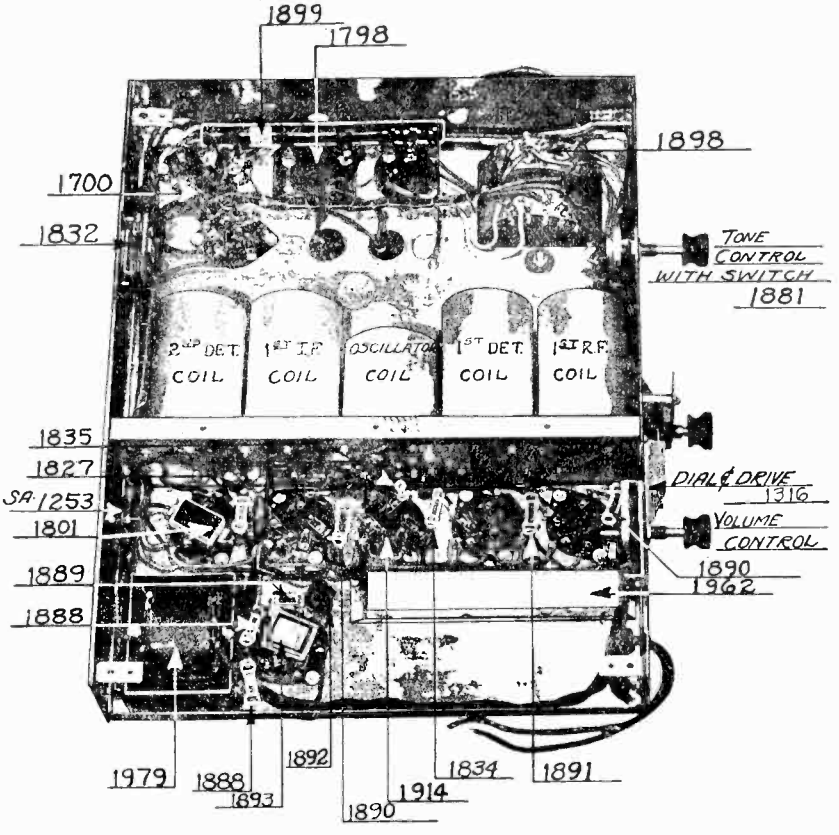
MODEL AVH-P
Data
MODEL AVH
Chassis

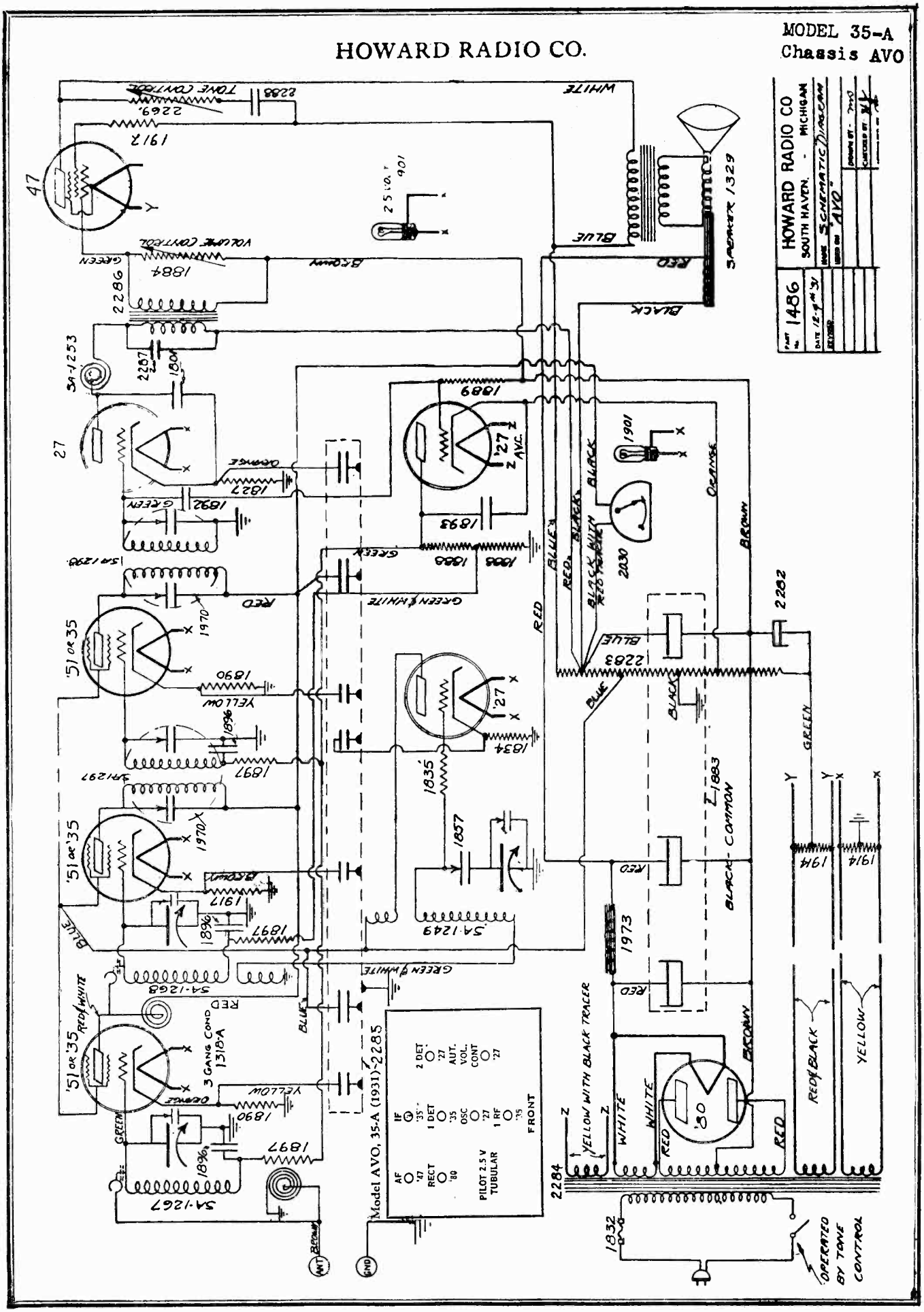
HOWARD RADIO CO.





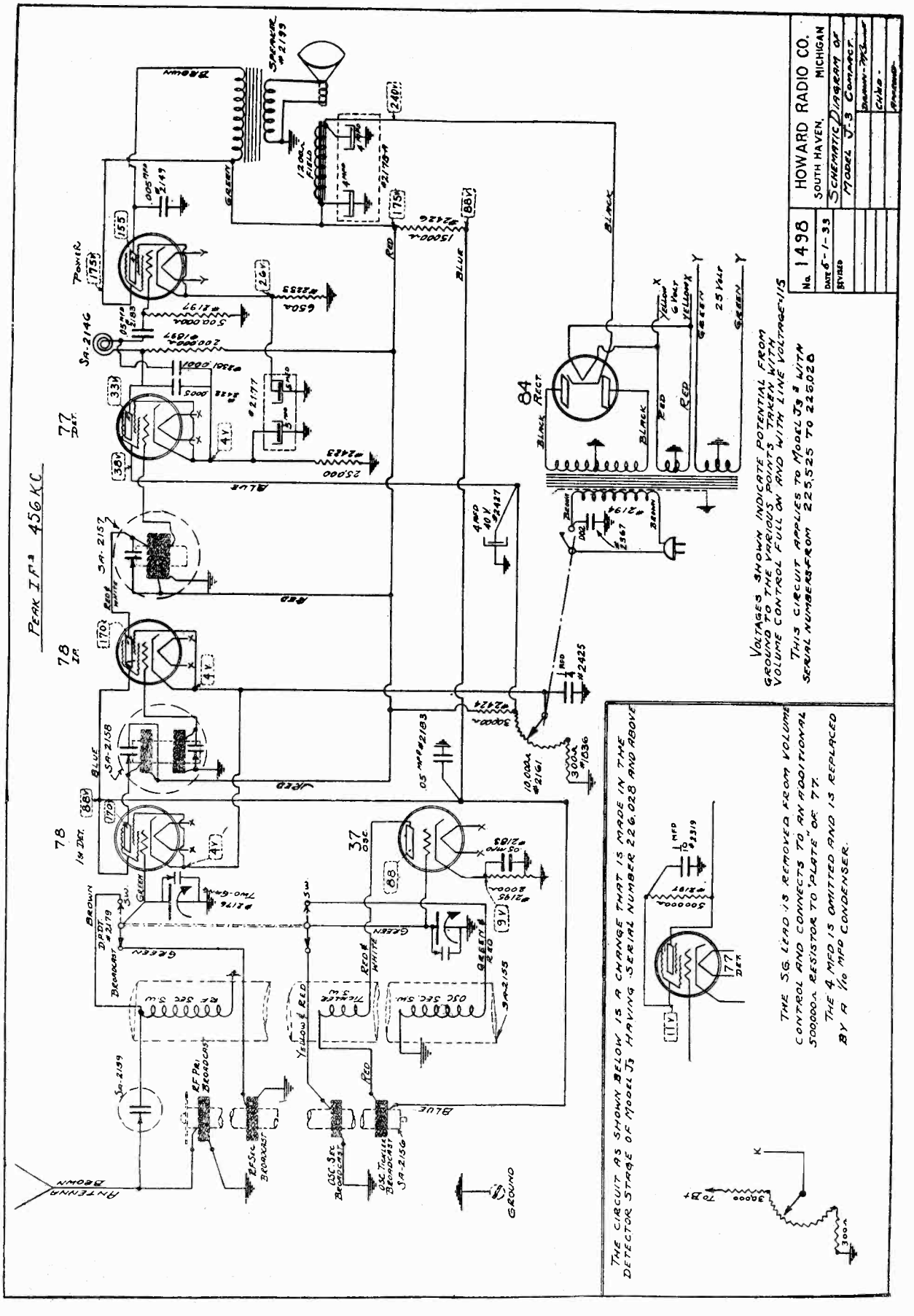
SPEAKER CIRCUIT
TWO SPEAKERS
MODEL - AVH-P





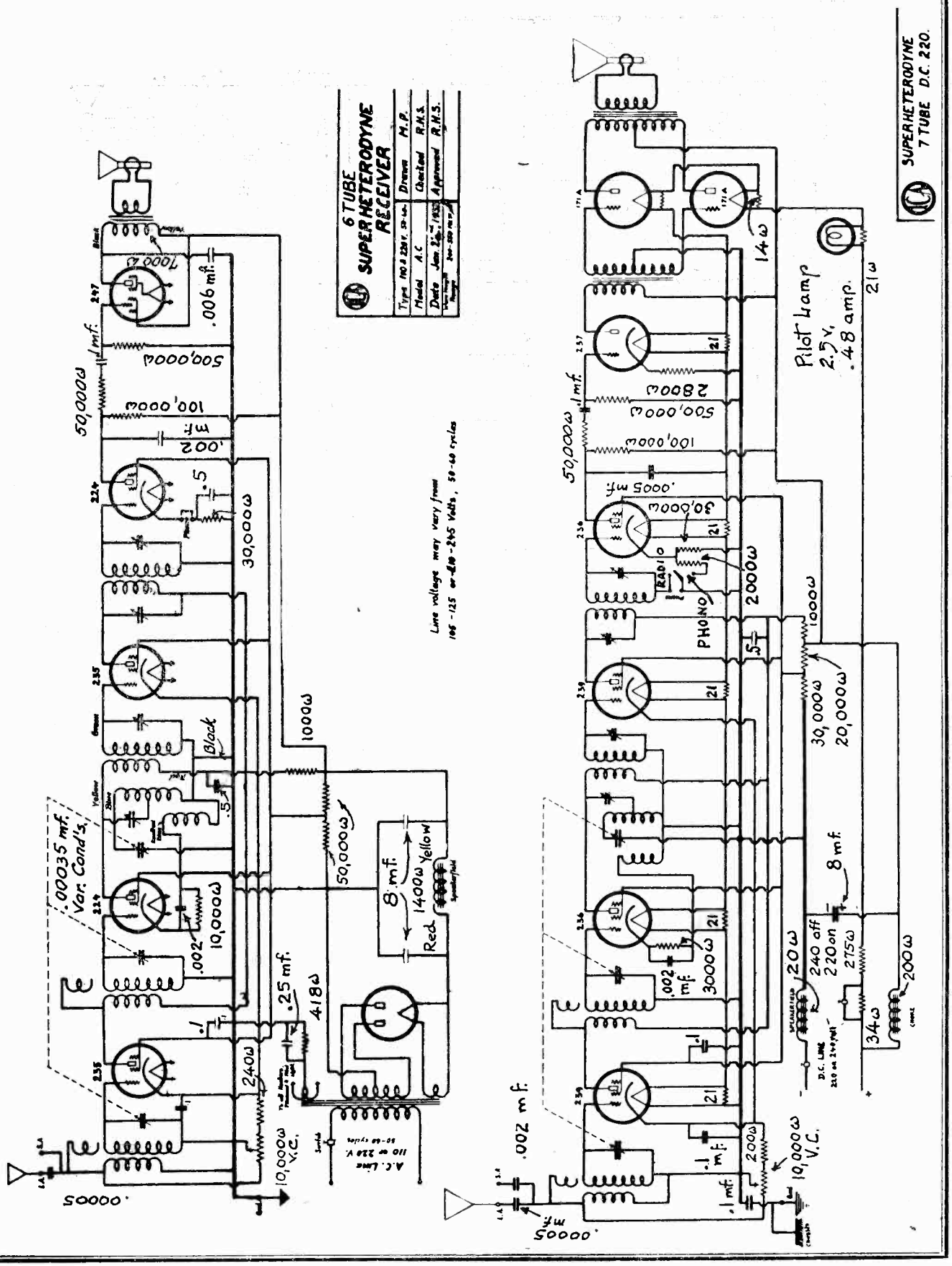
MODEL J-3 Compact

HOWARD RADIO CO



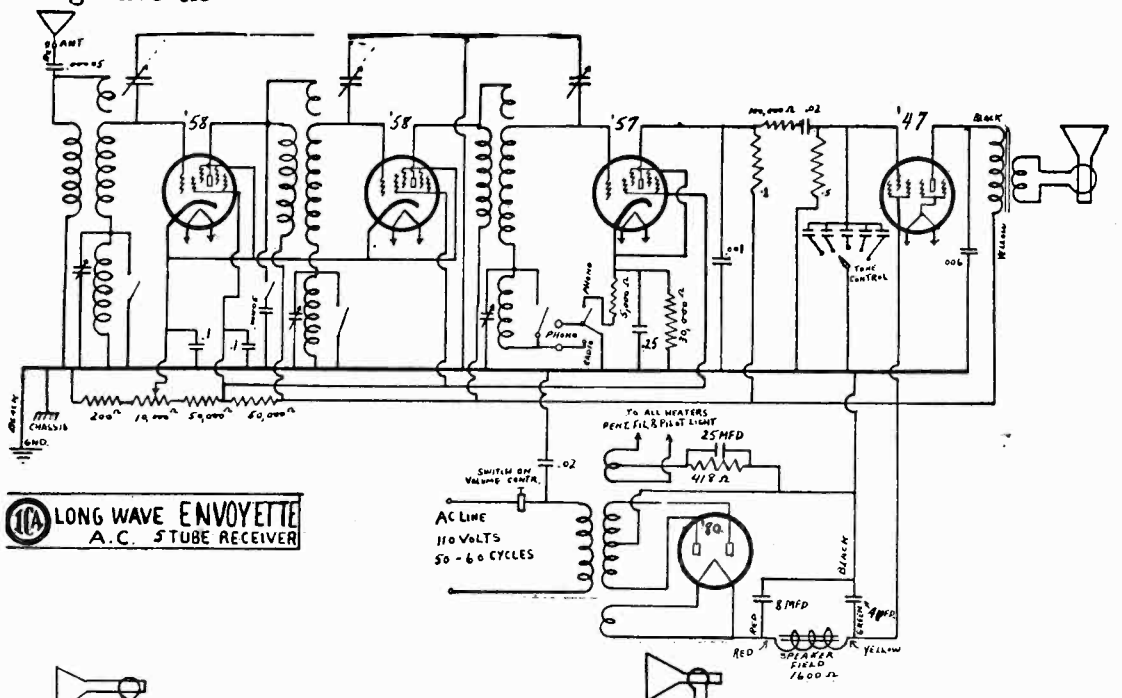
INSULINE CORP. OF AMERICA

MODEL 7 Tube 220 V DC
Superheterodyne
MODEL 6 Tube AC
Superheterodyne

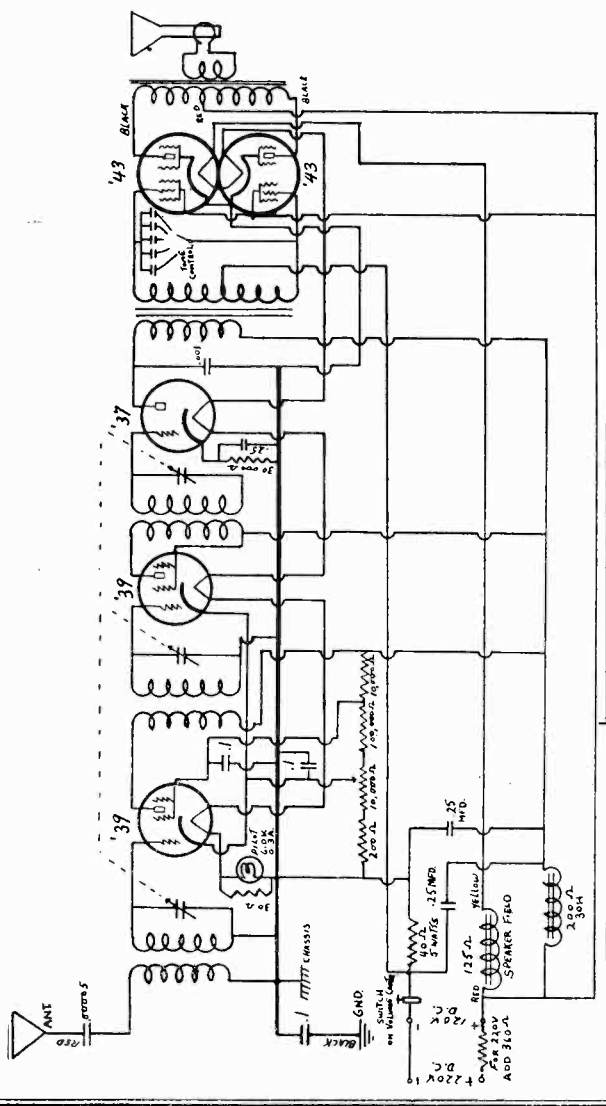


MODEL Envoyette
5 Tube AC
5 Tube DC
Long Wave AC

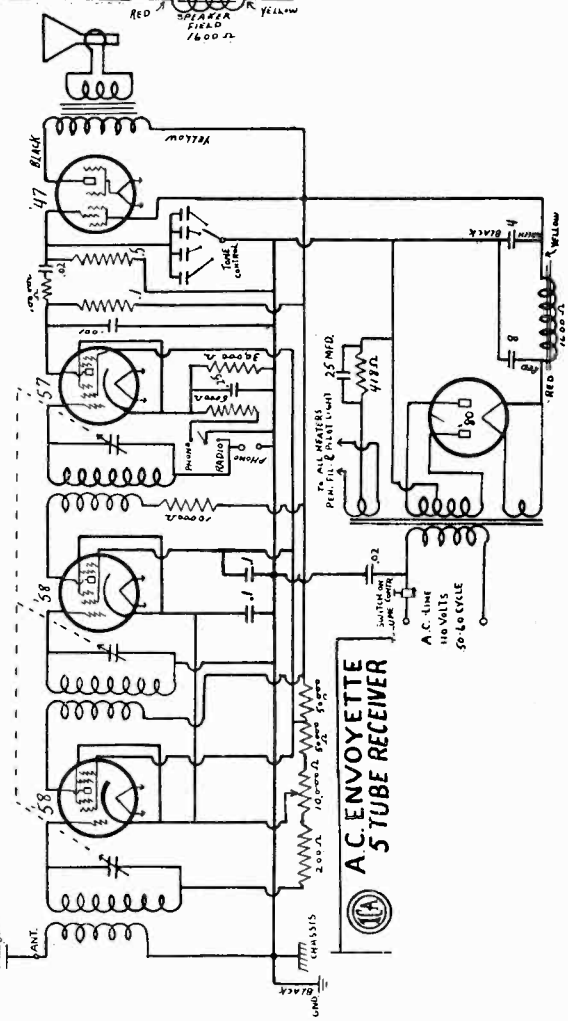
INSULINE CORP. OF AMERICA



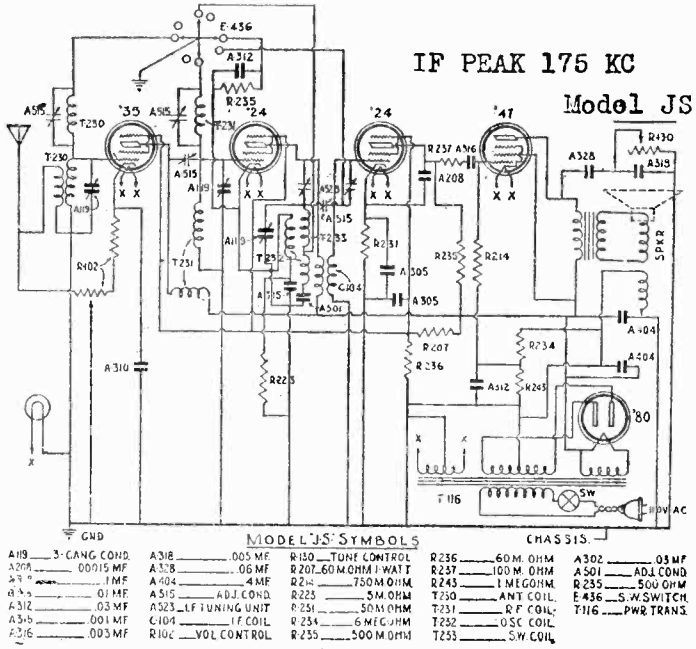
LONG WAVE ENVOYETTE
A.C. 5 TUBE RECEIVER



D.C. ENVOYETTE
5 TUBE RECEIVER



A.C. ENVOYETTE
5 TUBE RECEIVER



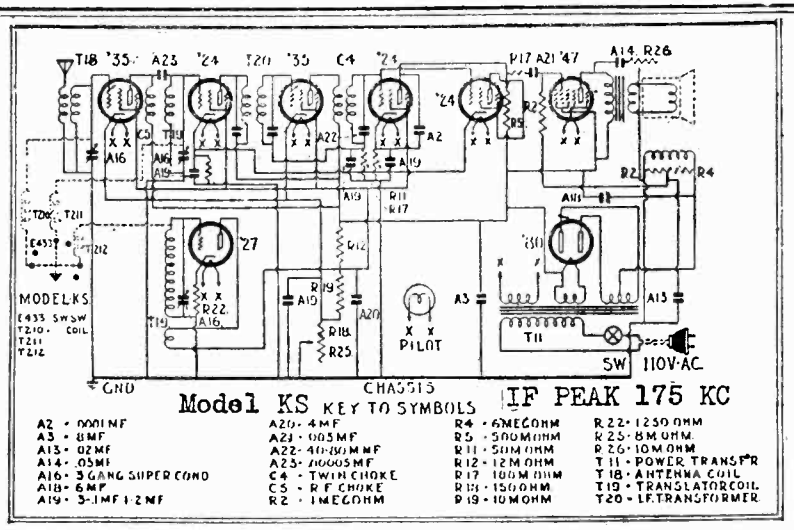
The following are average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage.

	Plate	Screen	Cathode
Pentode tube —ground to	240	245	None
235 R. F. tube —ground to	245	70	2 5
224 1st. Detector tube —ground to (center tube)	245	70	7
224 2nd. Detector —ground to	75	70	10

The grid of the Pentode is biased through such high resistance that only an indication of negative bias can be read with an ordinary high resistance meter

Voltage Readings:

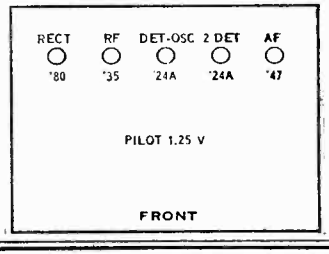
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.



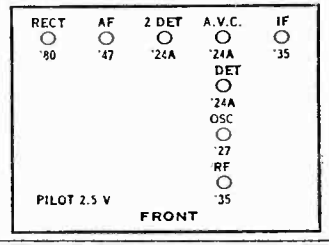
Test Voltages: Measured with volume control on full position measured with D. C. voltmeter having-at least 1000 ohms per volt. Line voltage 115.

Ground to	Plate	Screen	Cathode
'35 R. F. Tube	250	75	3
27 Oscillator Tube	75	—	12
'24 1st. Detector Tube	250	75	9
'35 I. F. Tube	250	75	3
'24 Automatic Volume Control Tube	—	—	9
'24 2nd. Detector Tube	85	75	7
'47 Audio Amplifier Tube	230	250	—

Models J, JS (1932)



Models K, KS (1932)



Instructions for Aligning and Balancing
MODEL JS RECEIVER

TO ALIGN THE JS RECEIVER ON SHORT WAVES

The service man should remember that when the receiver is thrown to short waves it no longer is a superheterodyne but is converted to a tuned R.F. circuit. However, as we have previously called the oscillator circuits by that name, we will continue to call this circuit the oscillator condenser and coil.

Under no circumstances are the detector and first R.F. trimmers found on the variable condensers to be changed when aligning the set on short waves.

Turn the short wave switch to the short wave position and allow the receiver to warm up.

Adjust the local oscillator to 3750 KC (80 meters).

Remove the grid clip from the first detector (middle screen grid tube) and substitute it for the grid clip of the second detector (224 nearest the 247).

NOTE: Use insulated screwdriver for all short wave trimmer adjustments.

Adjust carefully the antenna trimmer (A) found mounted on the antenna coil for maximum strength.

Adjust trimmer (C) mounted on the detector coil beneath the chassis for maximum signal strength.

NOTE: The short wave trimmer on the detector coil is the trimmer mounted nearest the grid end of the coil. The trimmer (D) mounted nearest the lugs on the ground end of the coil is used as a coupling capacity and should not be touched except when the receiver oscillates uncontrollably. Any adjustment of this coupling capacity necessitates the re-alignment of the entire set.

Connect the grid clip of the 1st and 2nd detector tubes to their respective grid caps and carefully adjust the oscillator coil trimmer on top of the variable condenser nearest the dial.

The set is now properly aligned to the high frequency (low wave) end of the band.

Set the local oscillator at 1660 KC (180 meters) and tune its carrier to be sure the set is working properly on the low frequency end of this band. As the coils are properly matched at the factory, no adjustment need be made if the receiver is properly trimmed at the high frequency end of the dial.

If it is necessary to change the oscillator trimmer from the previous setting obtained on the broadcast band, the variation must be compensated for by the trimmer (B) found on the space-wound coil. This is accomplished in the following manner:

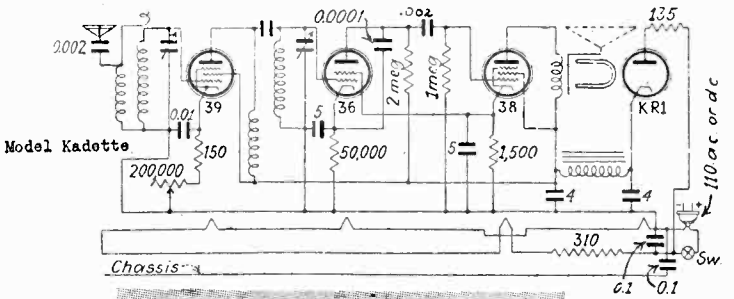
Turn the switch to the long wave position.

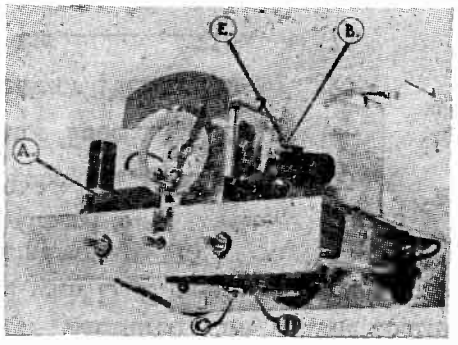
After removing the second detector grid clip, put the grid clip from the first detector onto the second detector grid cap.

Tune in a station around 1400 KC (215 meters).

Put the grid clips onto their respective grid caps.

Carefully readjust, without touching the dial, the trimmer (B) on the space-wound coil until maximum signal strength is obtained.





Set your local test oscillator to 1400 KC (215 meters)

Remove the first detector oscillator tube from its socket and remove the grid clip from the second detector tube.

NOTE: The first detector oscillator tube is the 224 tube in the center stall of the tube shield. The second detector is the 224 tube nearest the pentode.

Put the grid clip from the first detector tube which has been removed onto the second detector grid cap and by turning the dial locate the carrier from your local oscillator. This crosses the grid leads and allows set to operate as a simple four tube tuned radio frequency set, the oscillator being entirely out of the circuit.

Carefully adjust the two trimmers on the first R. F. and detector tubes to maximum signal strength and also adjust the dial at the same time so that the 1400 KC frequency actually tunes to the 1400 KC dial setting when maximum signal strength is had.

NOTE: The first R. F. trimmer is the CENTER trimmer on the variable condenser. The detector trimmer is the trimmer nearest the tube shield, also on the variable condenser.

Without changing the dial setting, insert the detector oscillator in its socket and connect all grid clips back to their original position.

Carefully adjust the oscillator trimmer to maximum signal strength.

NOTE: The oscillator trimmer is the trimmer nearest the dial on the top of the variable condenser.

The set is now properly adjusted only on the high frequency end of the dial all of which is done by the tuning condenser trimmers, but the padder now must be adjusted to assure tracking at the low frequency (long wave)end

To adjust the receiver on the low frequency end of the dial, the following procedure is necessary.

1—Set your local oscillator to 650 KC (462 meters) and again switch the grid clip from the first detector oscillator tube to the second detector tube. When this switch is made always first remove the grid clip from the second detector tube.

2—Carefully turn your dial until the maximum signal strength is obtained from the local oscillator.

3—Without again turning the dial, put the grid clips of the first and second detector tubes on their respective grid caps.

4—Adjust the padder condenser (E) to maximum signal strength.

INTERNATIONAL RADIO CORP.

MODEL CS
Short Wave
Trimmer Data

TO ALIGN THE CS RECEIVER ON SHORT WAVES

The service man should remember that when the receiver is thrown to short waves it no longer is a superheterodyne but is converted to a tuned R.F. circuit. However, as we have previously called the oscillator circuits by that name we will continue to call this circuit the oscillator condenser and coil.

Under no circumstances are the detector, first R.F. and oscillator Trimmers found on the variable condensers to be changed when aligning the set on short waves.

Turn the short wave switch to the short wave position and allow the receiver to warm up.

Adjust the local oscillator to 3750 KC (80 meters).

Remove the grid clip from the first detector (middle screen grid tube) and by means of extension lead substiture it for the grid clip on the second detector (224 nearest the 247).

NOTE: Use insulated screwdriver for all short wave trimmer adjustments.

Adjust carefully the antenna trimmer (D) found mounted on the antenna coil for maximum strength.

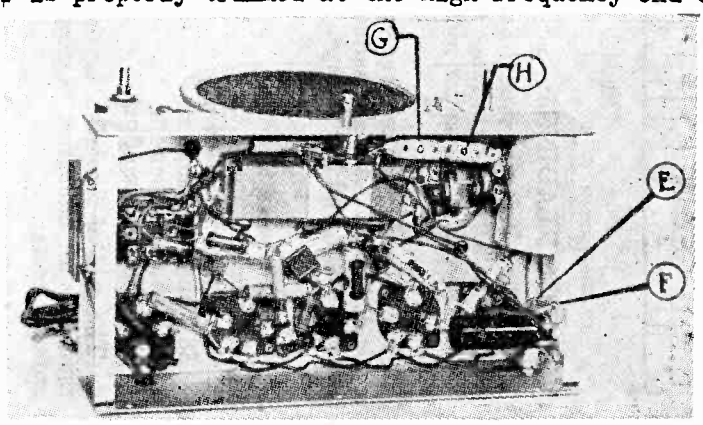
Adjust trimmer (E) mounted on the detector coil beneath the chassis for maximum signal strength.

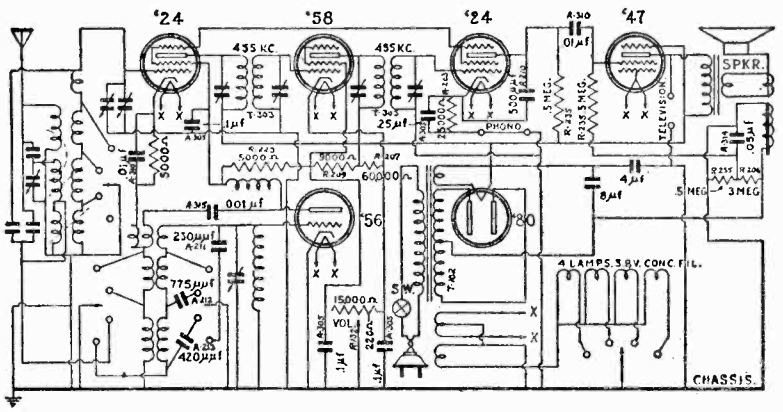
NOTE: The short wave trimmer on the detector coil is the trimmer mounted nearest the grid end of the coil. The trimmer (F) mounted nearest the lugs on the ground end of the coil is used as a coupling capacity and should not be touched except when the receiver oscillates uncontrollably. Any adjustment of this coupling capacity necessitates the re-alignment of the entire set.

Connect the grid clip of the 1st and 2nd detector tubes to their respective grid caps and carefully adjust the oscillator coil trimmer (H) to maximum signal strength.

The set is now properly aligned on the high frequency (low wave) end of the band.

Set the local oscillator at 1660 KC (180) meters) and tune its carrier to be sure the set is working properly on the low frequency end of this band. As the coils are properly matched at the factory, no adjustment need be made if the receiver is properly trimmed at the high frequency end of the dial.





Model AW-55

IF PEAK 445 KC

VOLTAGE READINGS:

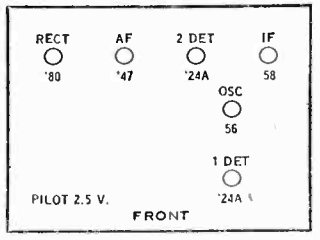
NOTE: Voltages should be measured with volume control all the way "ON" and the range selector in position 3 (broadcast). Use a 250-volt D. C. meter with a resistance of 1000 ohms per volt.

The following are average voltages measured on 118 volt 60 cycle A. C. line. A slight variation is allowable for variations in meters, tubes, and line voltage.

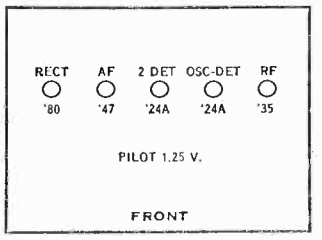
	Plate	Screen	Cathode
'47 Tube —ground to	235	245	.....
'24 Tube —ground to (Tube next to '47)	70	40	6
58 Tube —ground to	240	100	3
'24 Tube —ground to	240	40	8
56 Tube —ground to	40	.....	0

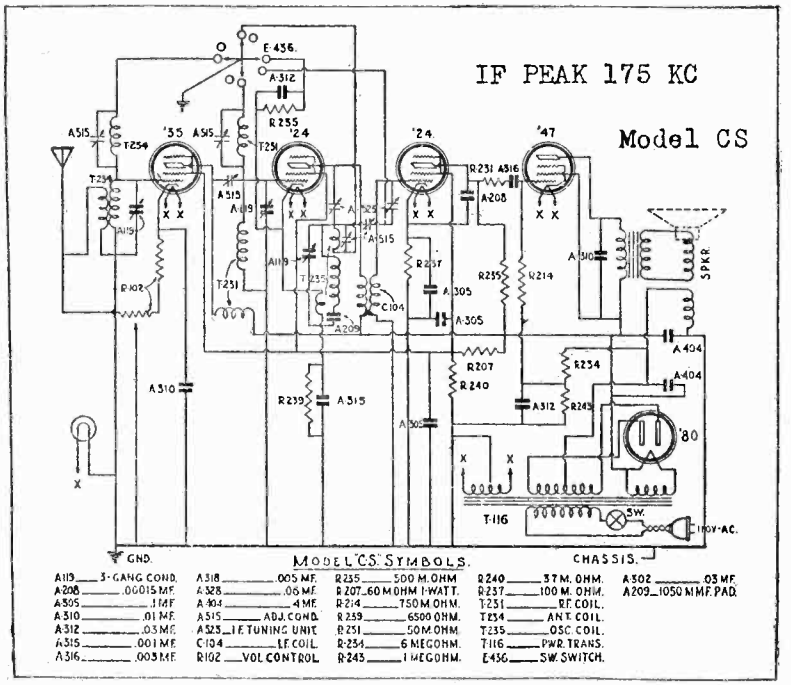
The grid of the '47 is biased through such high resistances that only an indication of negative bias can be read with an ordinary meter.

Model AW-55 (1932)



Models C, CS (1932)





Voltage Readings:

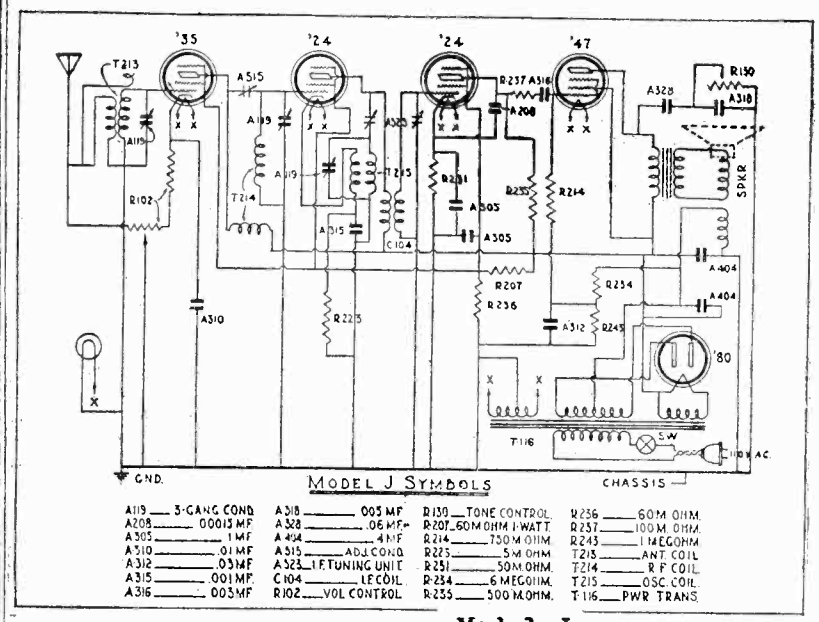
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.

The following are average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage.

	Plate	Screen	Cathode
Pentode tube —ground to	240	245	None
235 R. F. tube —ground to	245	70	2.5
224 1st. Detector tube —ground to (center tube)	245	70	7
224 2nd. Detector —ground to	75	70	10

INTERNATIONAL RADIO CORP.

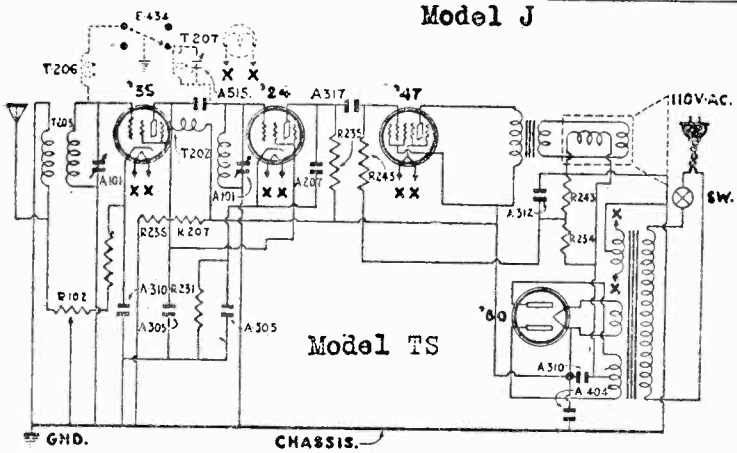
MODEL T,TS
MODEL J
Schematics,Data



MODEL J SYMBOLS

A119 — 3-GANG COND.	A318 — .005 MF	R130 — TONE CONTROL	R236 — 60M OHM.
A208 — .00015 MF	A328 — .06 MF	R207 — 60M OHM 1 WATT	R257 — 100 M. OHM.
A305 — 1 MF	A 404 — 4 MF	R214 — 750 M OHM.	R243 — 1 MEGOHM.
A310 — .01 MF	A315 — ADJ. COND.	R225 — 5 M OHM.	T213 — ANT. COIL
A312 — .03 MF	A323 — I.F. TUNING UNIT	R251 — 50 M OHM.	T214 — R.F. COIL
A315 — .001 MF.	C104 — LF. COIL	R234 — 6 MEGOHM.	T215 — OSC. COIL
A316 — .005 MF	R102 — VOL. CONTROL	R235 — 500 M OHM.	T116 — PWR. TRANS.

Model J



Model TS

MODEL T SYMBOLS.

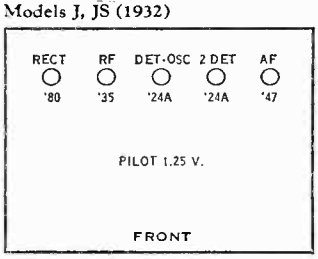
A101. 2 GANG VAR. COND.	R243. 1 MEGOHM.	A515. ADJ. COND.
A207. .0001 MF.	R231. 50 M. OHM.	E434. SHORT WAVE SWITCH.
A310. .01 MF.	R234. 6 MEGOHM.	T206. S.W. ANT. COIL.
A404. 4 MF.	R235. .5 MEGOHM.	T207. S.W. RF. COIL.
A312. .03 MF.	R236. 60 M. OHM.	
A317. .006 MF.	R207. 60 M. OHM.	
A305. .1 MF.	T202. RF COIL.	
R102. 5020 OHM.	T203. ANTENNA COIL.	

The following are average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage.

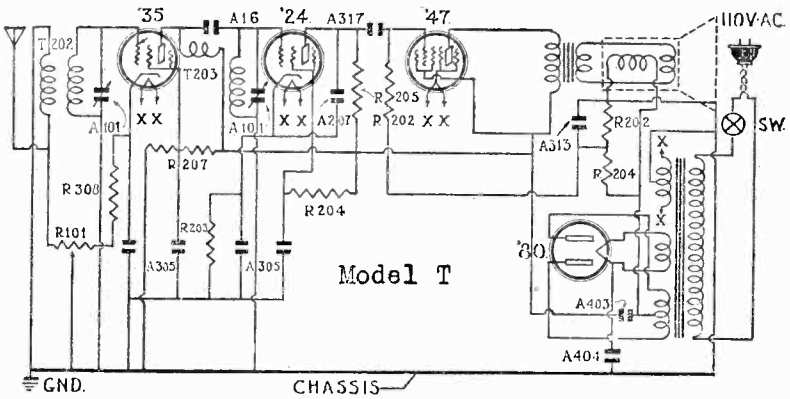
Model J	Plate	Screen	Cathode
Pentode tube —ground to	240	245	None
235 R. F. tube —ground to	245	70	2.5
224 1st. Detector tube —ground to (center tube)	245	70	7
224 2nd. Detector —ground to	75	70	10

The grid of the Pentode is biased through such high resistance that only an indication of negative bias can be read with an ordinary high resistance meter.

Models J, JS (1932)

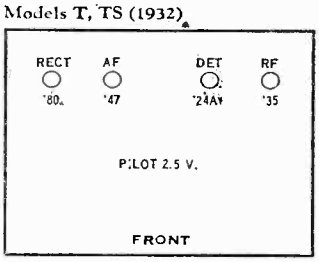


Model T, TS	Plate	Screen	Cathode
Detector tube —ground to	80 V	80 V	7 V
1st R. F. tube —ground to	240 V	80 V	2.0 V
Pentode tube —ground to	235 V	240 V	None



Model T

Models T, TS (1932)



COUPLING ADJUSTMENT - OSCILLATION CONTROL

One of the principal differences to be noted is the method of Coupling the first radio frequency stage to the detector; i.e. the 35 tube to the 24 tube. The R.F. tube plate is fed through a choke mounted on the coil (T-3). The plate is coupled to the grid of the detector by an adjustable condenser (A-16) which is located on the coil terminals underneath the chassis and adjusted by turning a screw in the center. This condenser controls to a considerable extent the oscillation.

In adjusting - with the set in operation on the recommended length of aerial turn condenser screw all the way down and if set oscillates badly at any point on the dial loosen screw until oscillation just stops. Note that a movement of this screw changes the tracking of the 2-gang tuning condenser so while oscillation might stop, it will probably start again when the tuning condenser trimmers are balanced. In other words, the changing of this capacity stops oscillation both by loosening the coupling and by throwing the tuning out of track and the latter must be corrected for selectivity and then the coupling readjusted.

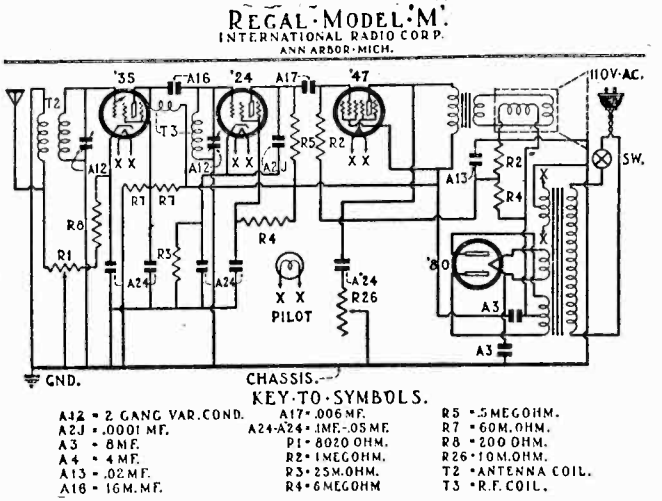
FURTHER OSCILLATION CONTROL

The selectivity of any set with two tuned stages depends considerably upon a slight amount of regeneration being introduced over the entire band. The above mentioned adjustment takes care of most of this but if the set is too "hot" at some one point, the regeneration can be smoothed out by turning the antenna coil (on top of base) on its axis to reduce coupling.

For best performance, the above adjustments should be made so the set just spills over at some one point on the dial when the volume control is all the way "ON".

In smoothing out oscillation troubles be sure the speaker leads are as far away from any tube as possible. Also look out for antenna wire feeding back by being coiled inside of set.

Also, if a set oscillates too violently to be controlled readily by the volume control - be sure that the two grid lead wires from the tuning condenser trimmers to the grid caps on the tubes are separated far as possible.



Following are the average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage:

	Plate	Screen	Cathode
Detector Tube —ground to	60 V	7 V	3.5 V
1st R. F. Tube —ground to	240 V	82 V	2.0 V
Pentode Tube —ground to	235 V	240 V	None

The grid of the Pentode is bias through such high resistance that only an indication of negative bias can be read with an ordinary high resistance meter.