PERPETUAL

TROUBLE SHOOTER'S MANUAL

VOLUME III

by

JOHN F. RIDER

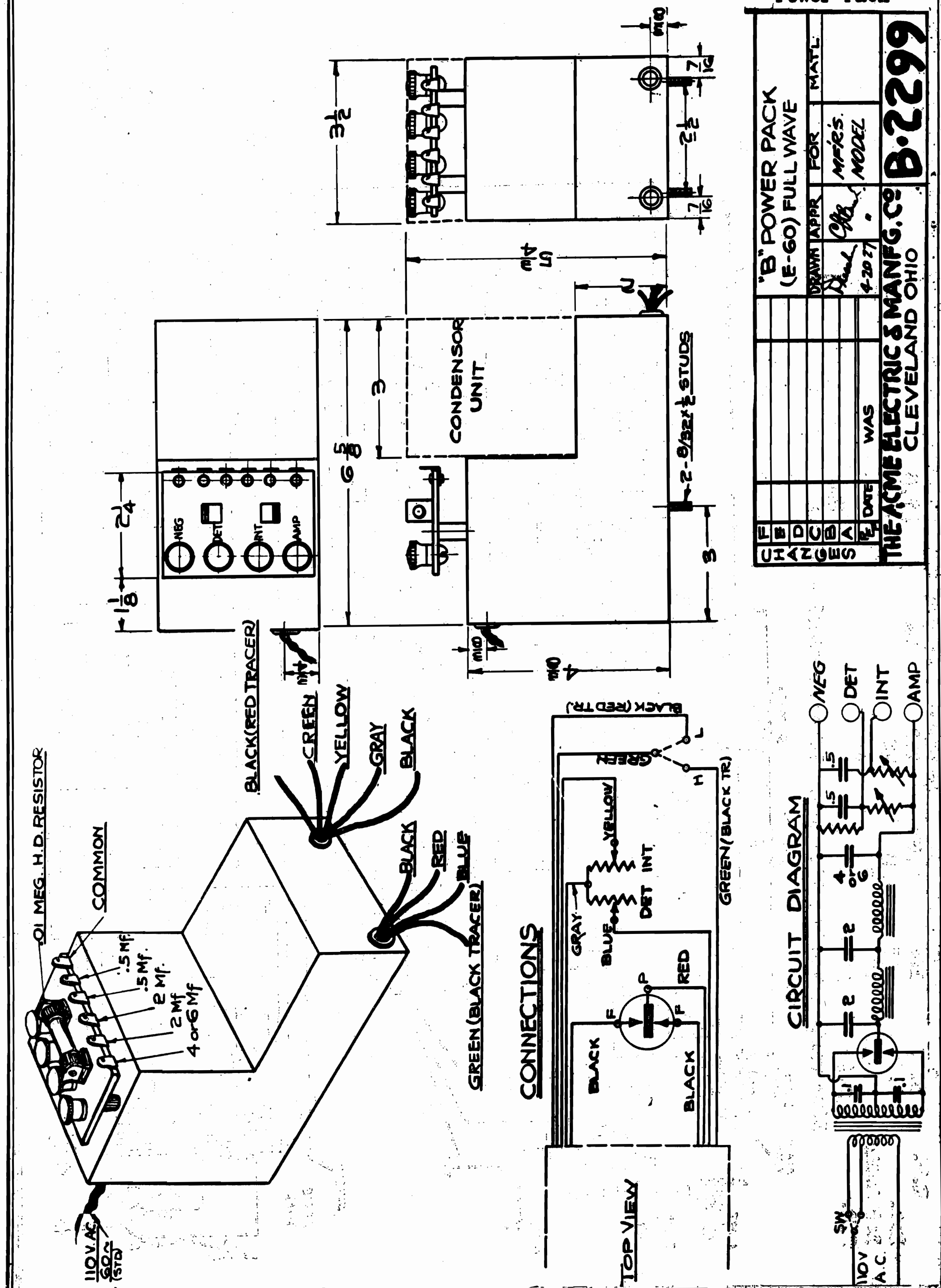
JOHN F. RIDER

1440 Broadway New York City

PRINTED IN U. S. A.

ACME ELECTRIC & MFG. CO.

MODEL E-60
Power Pack

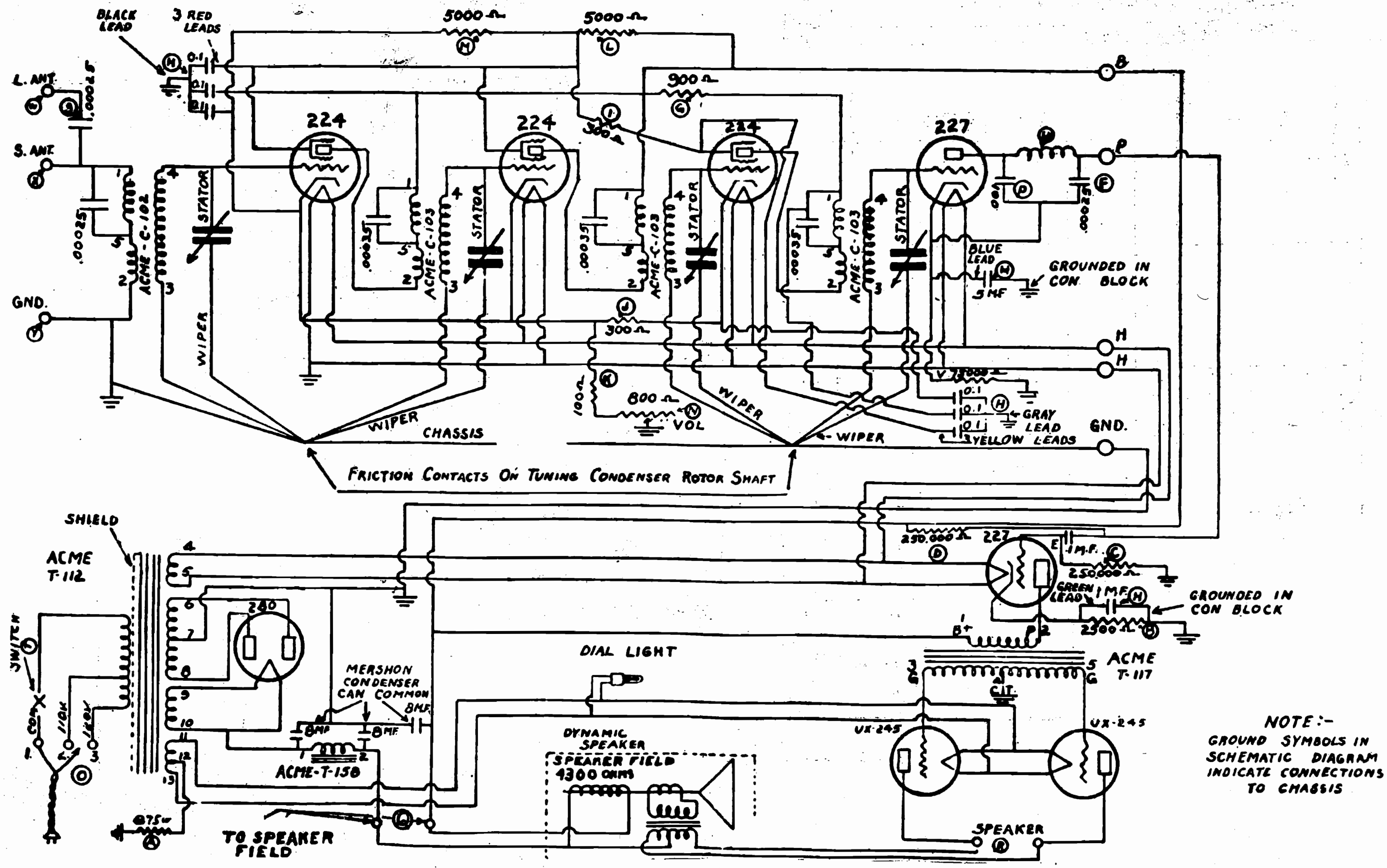


MODEL AC-98

ACME ELECTRIC & MFG. CO.

	A	B	C	Cathode	Screen	
R.F.	2.48	162	3.5	3.5	74	1.5
Det.	2.48	65	15	15		.2
1st Audio	2.48	152	13	13		5.2
P.P.	2.48	250V	52			32

Line voltage 110V on 110V tap. Volume control maximum.

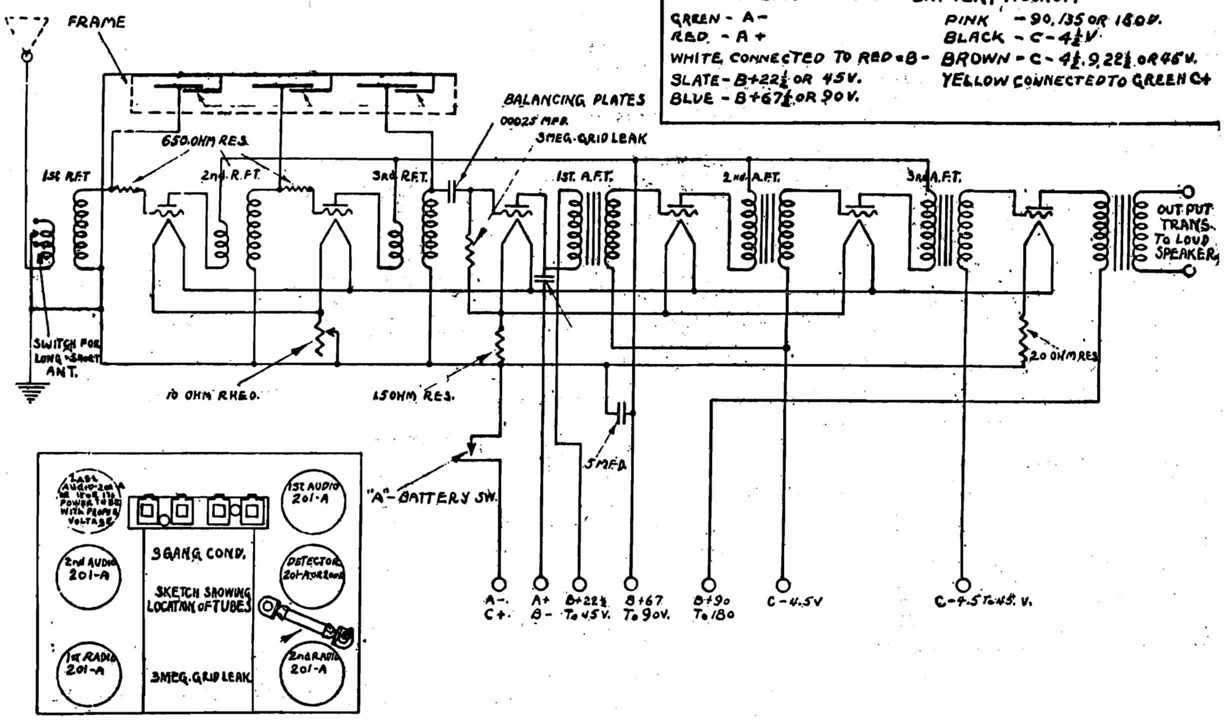


ALL-AMERICAN MOHAWK CORP.

MODEL Navajo
VA
Battery Operated

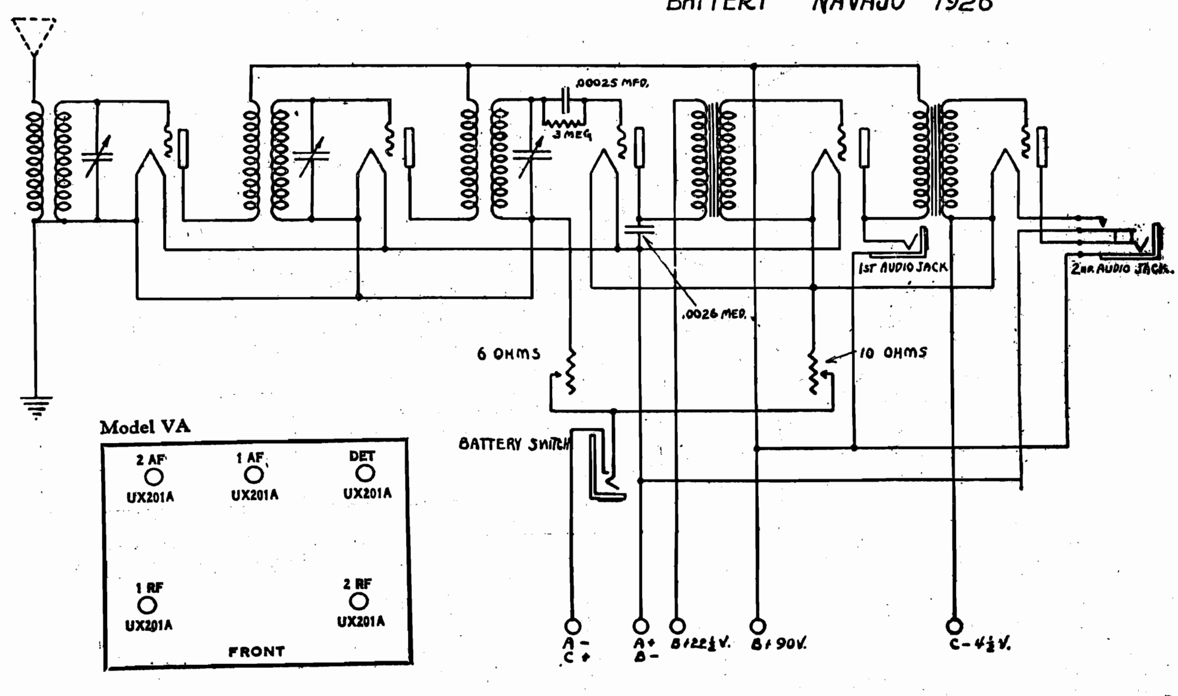
COLOR CODE AND BATTERY HOOKUP

GREEN - A-	PINK - 90, 135 OR 180V.
RED - A+	BLACK - C-4½V.
WHITE CONNECTED TO RED = B-	BROWN - C-4½, 9, 22½ OR 45V.
SLATE - B+22½ OR 45V.	YELLOW CONNECTED TO GREEN C+
BLUE - B+67½ OR 90V.	



NOTE: R.F. TRANSFORMERS ARE ENCLOSED IN A COPPER SHIELD AND SHIELDED TO EACH OTHER.

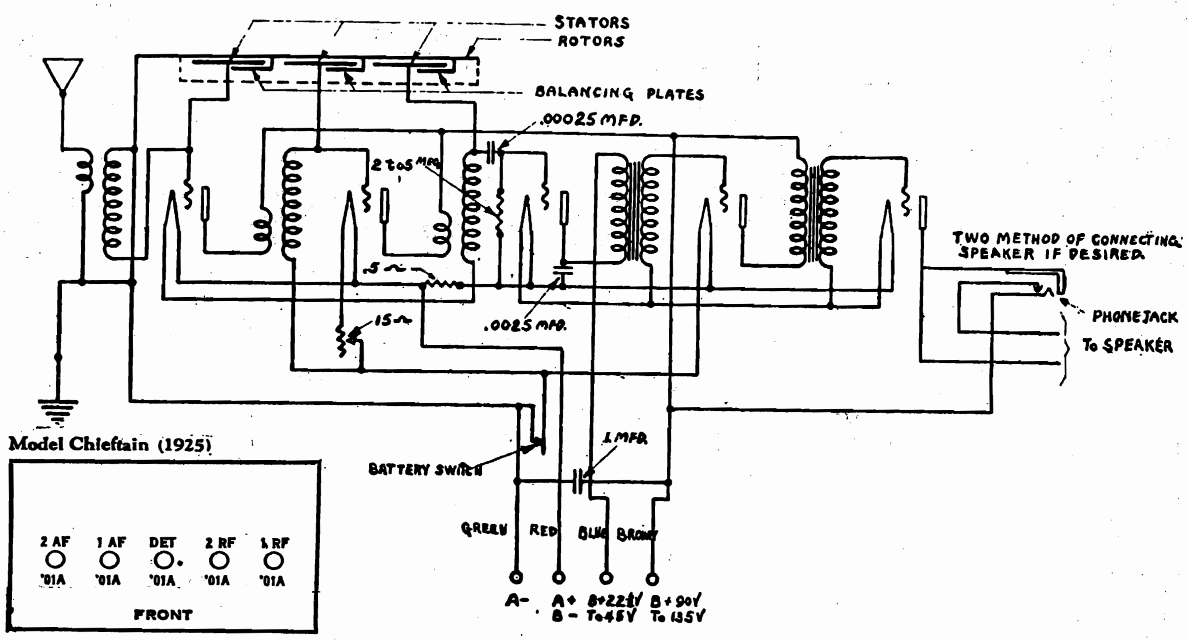
SCHEMATIC CIRCUIT of MOHAWK RECEIVER.
BATTERY NAVAJO 1926



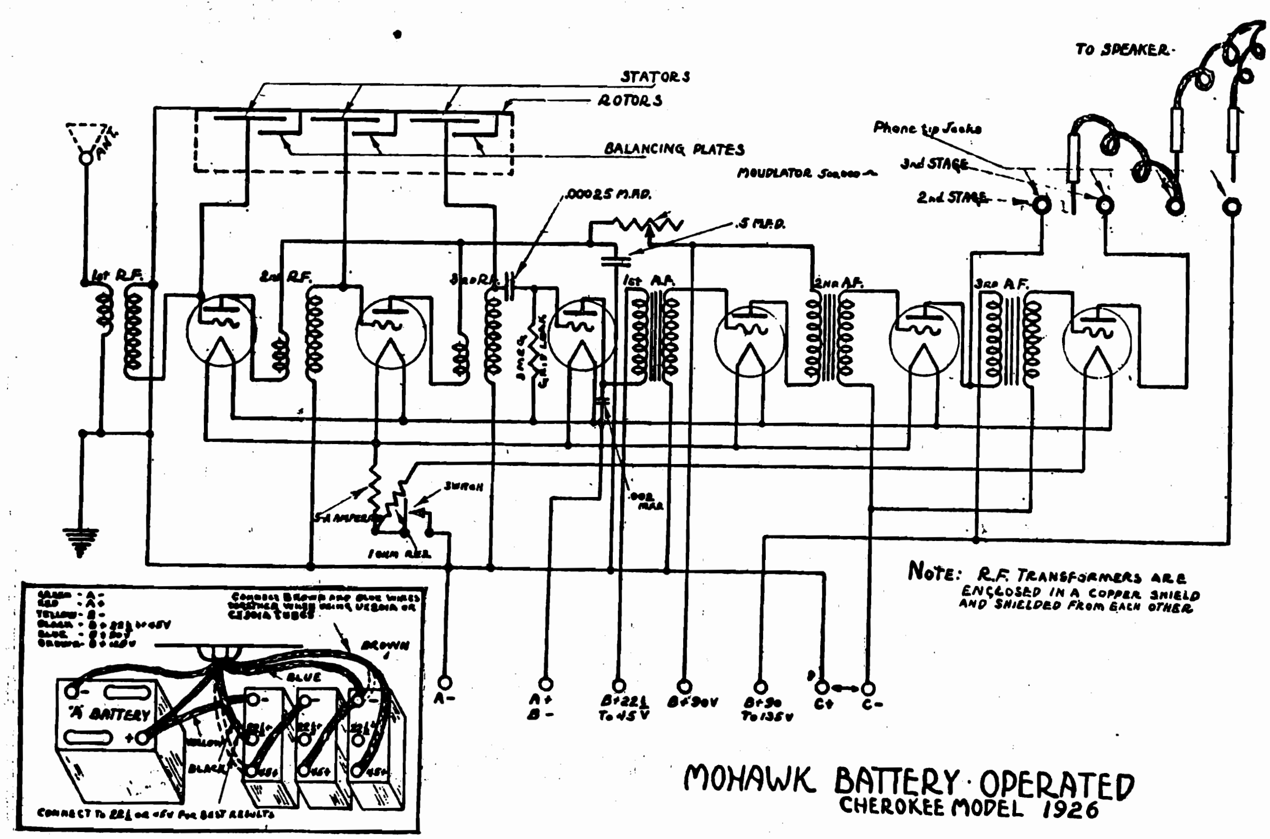
5 TUBE VA CIRCUIT -1925-26-

MODEL CHIEFTAN
CHEROKEE
Battery Operated

ALL-AMERICAN MOHAWK CORP.



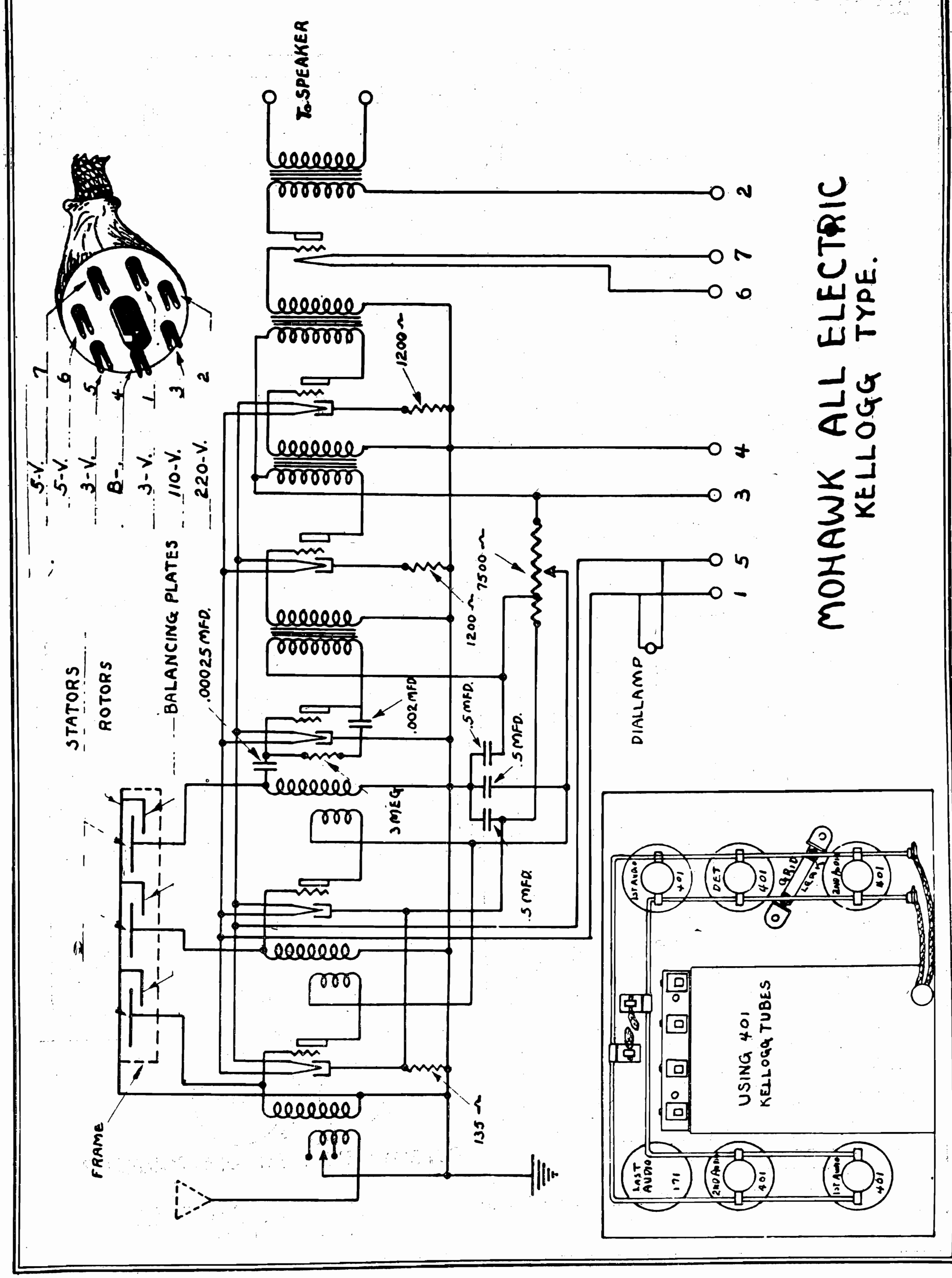
CHIEFTAIN BATTERY OPERATED -1925-



MOHAWK BATTERY OPERATED
CHEROKEE MODEL 1926

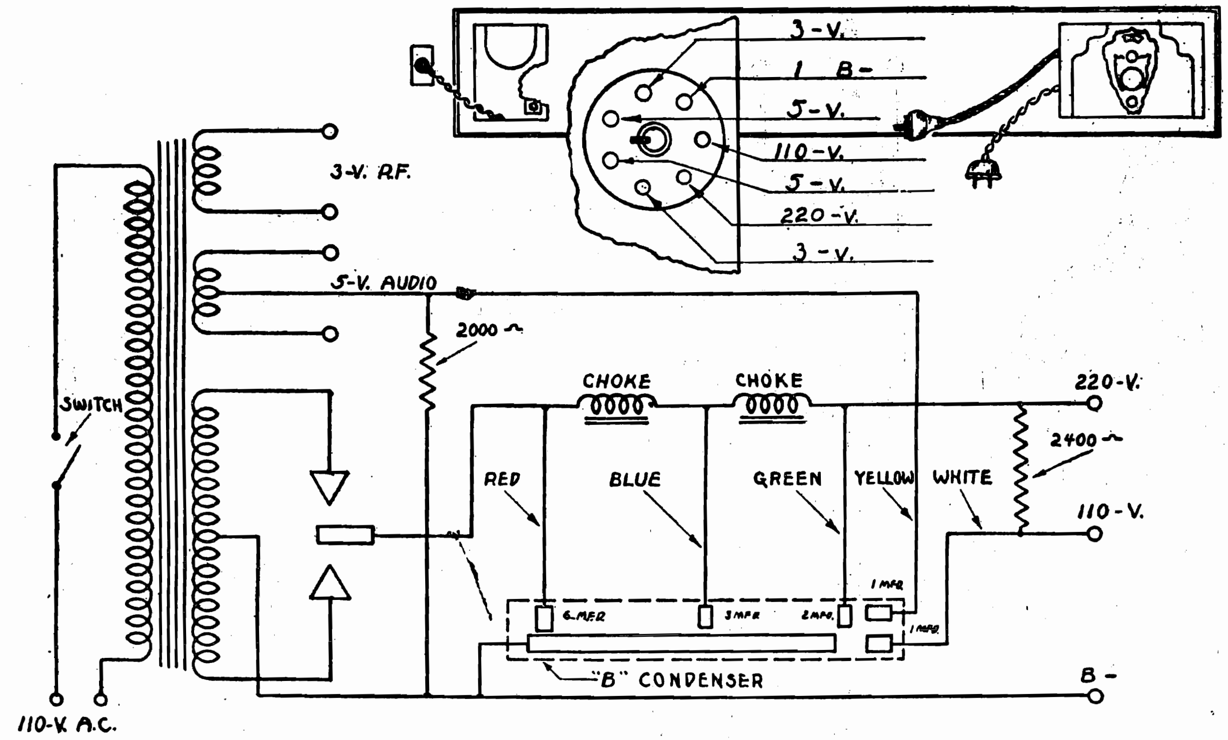
ALL-AMERICAN MOHAWK CORP.

MODEL Mohawk
All-Electric
Kellog Type

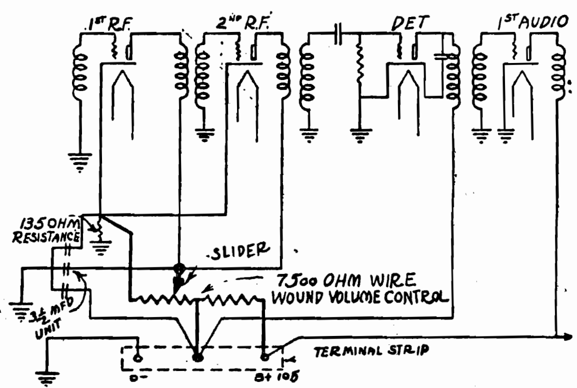


MODEL Mohawk 226
7 Contact
Power Pack and
Receiver View

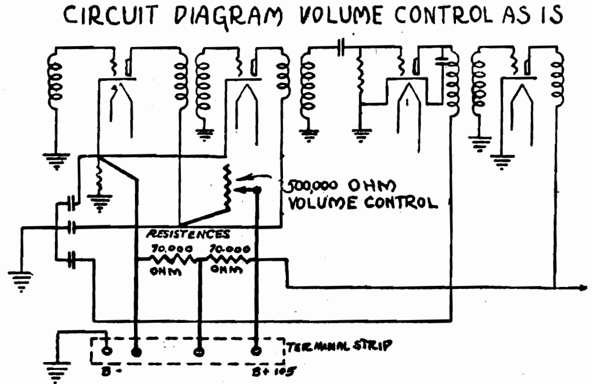
ALL-AMERICAN MOHAWK CORP.



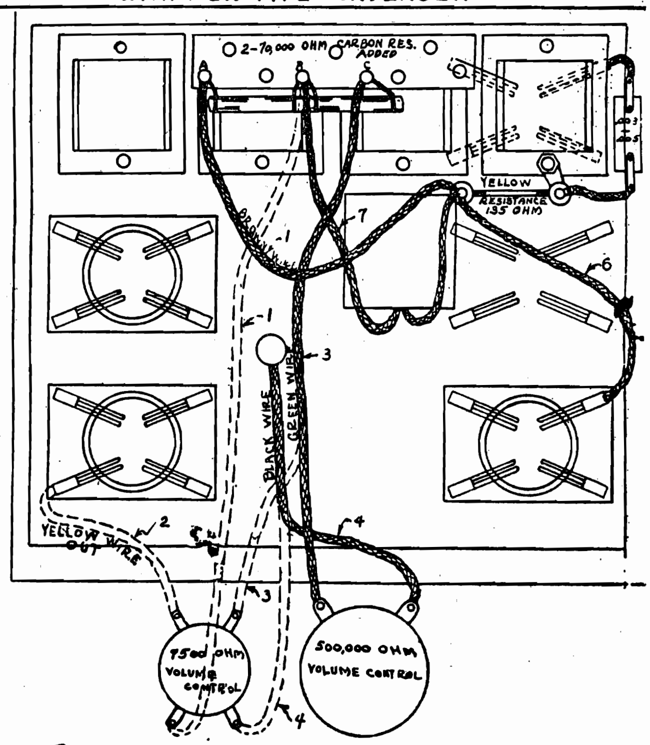
7 CONTACT POWER PACK for Mohawk 226
WITH MEW TYPE CONDENSER



CIRCUIT DIAGRAM VOLUME CONTROL AS IS



CIRCUIT DIAGRAM VOLUME CONTROL CHANGED

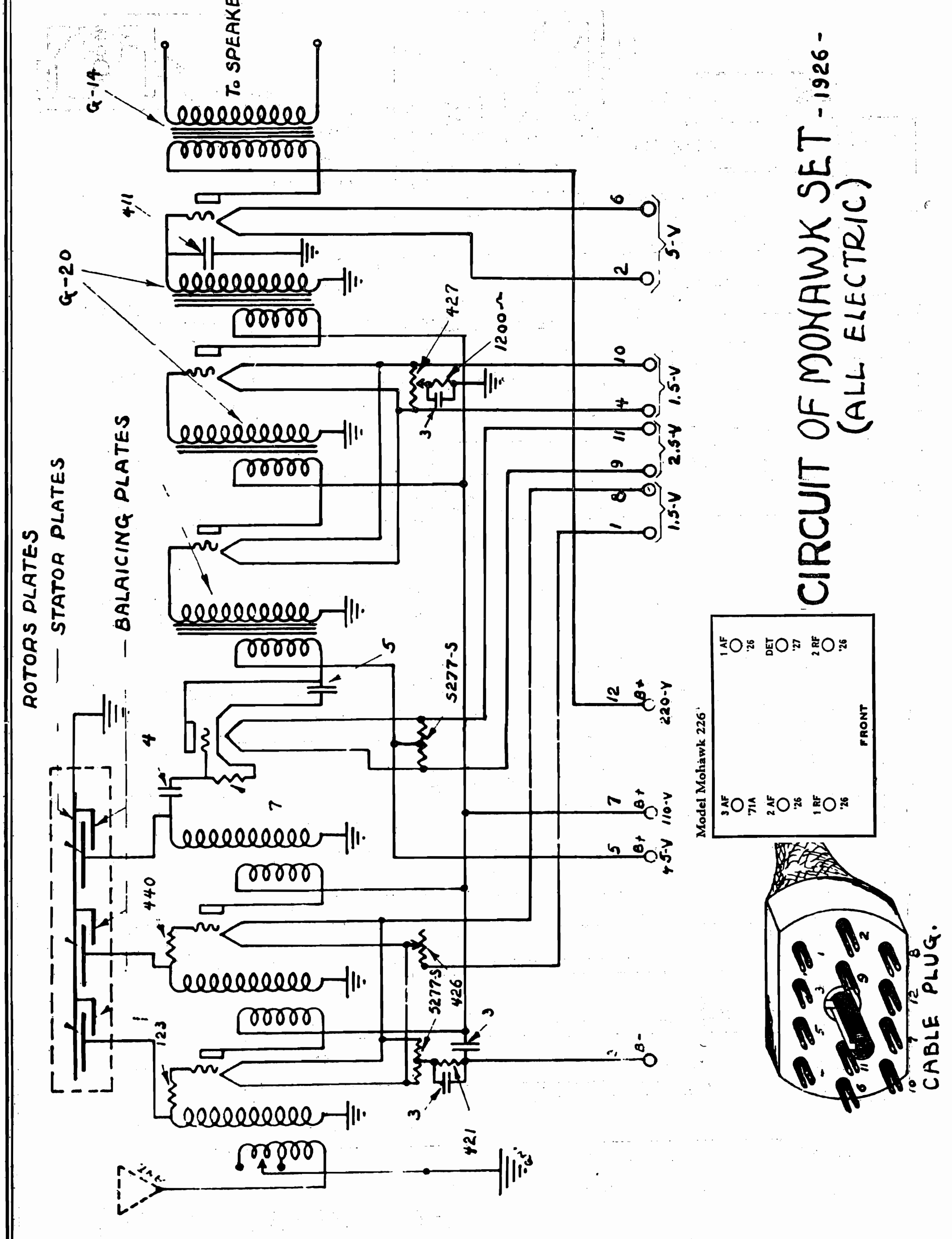


BOTTOM VIEW OF SET SHIELD REMOVED

MOHAWK RECIEVER
(KELLOGG TYPE)

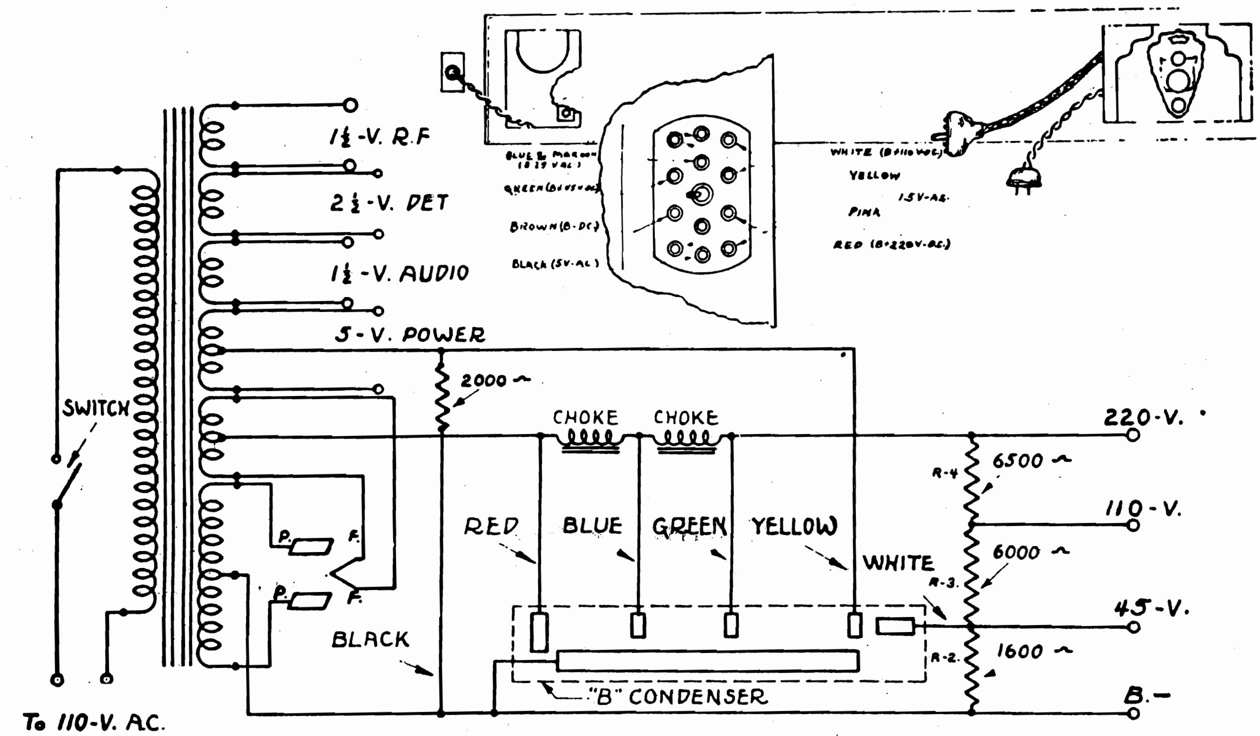
ALL-AMERICAN MOHAWK CORP.

MODEL Mohawk 1926
All-Electric
226 Type
Receiver Chassis

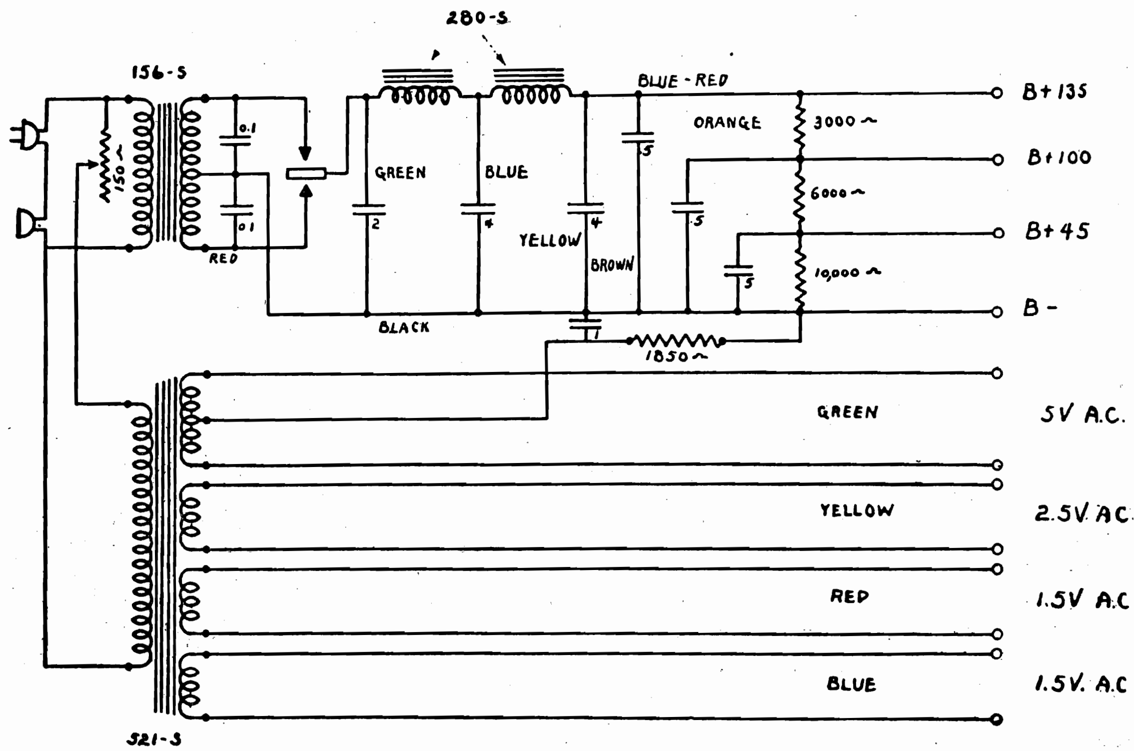


MODEL Mohawk 226
12 Contact
Power Pack
A-10 Eliminator

ALL-AMERICAN MOHAWK CORP.



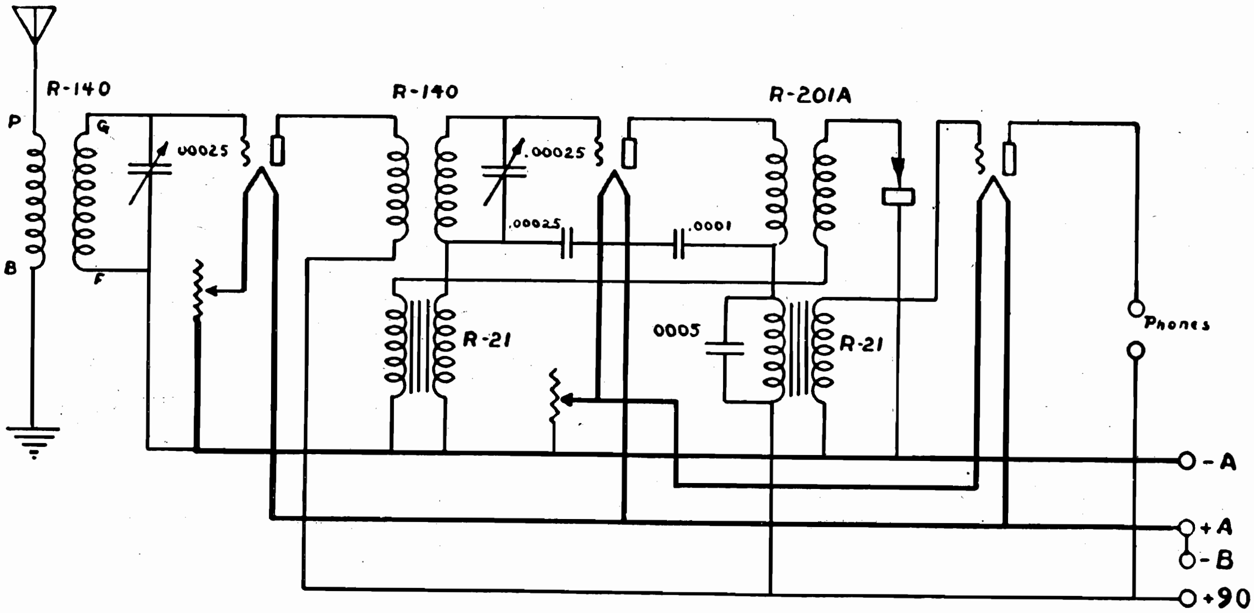
12 CONTACT POWER PACK for Mohawk 226
WITH NEW TYPE CONDENSER



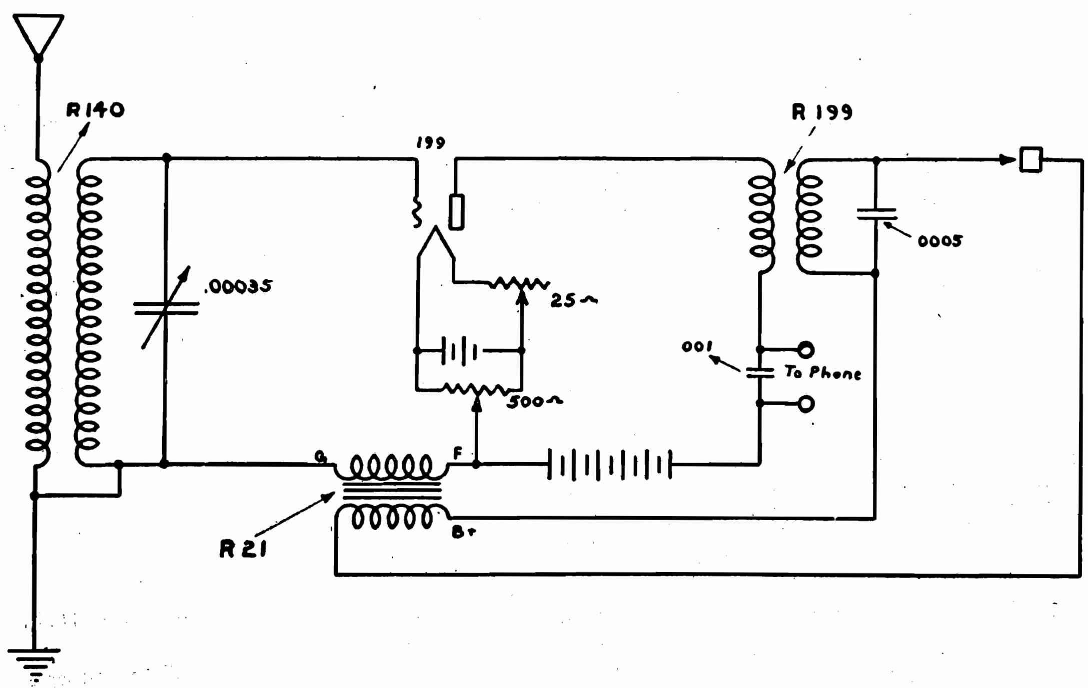
A-10 MOHAWK ELIMINATOR

ALL-AMERICAN MOHAWK CORP.

MODEL
All-Amax Junior
All-Amax Senior



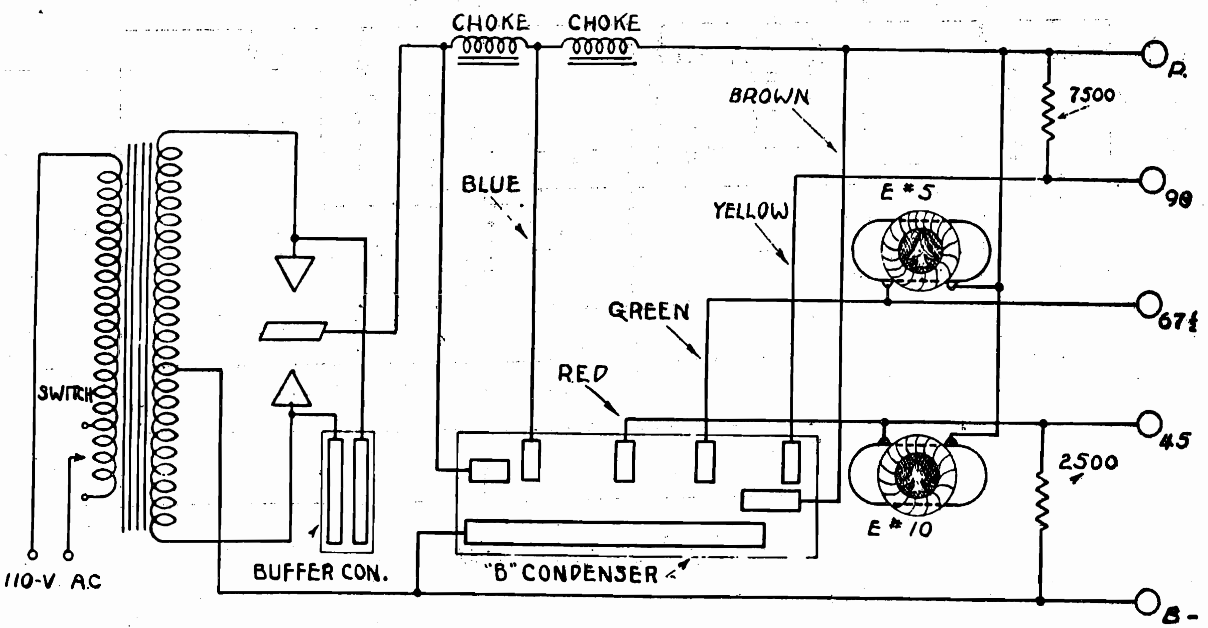
ALL-AMAX SENIOR



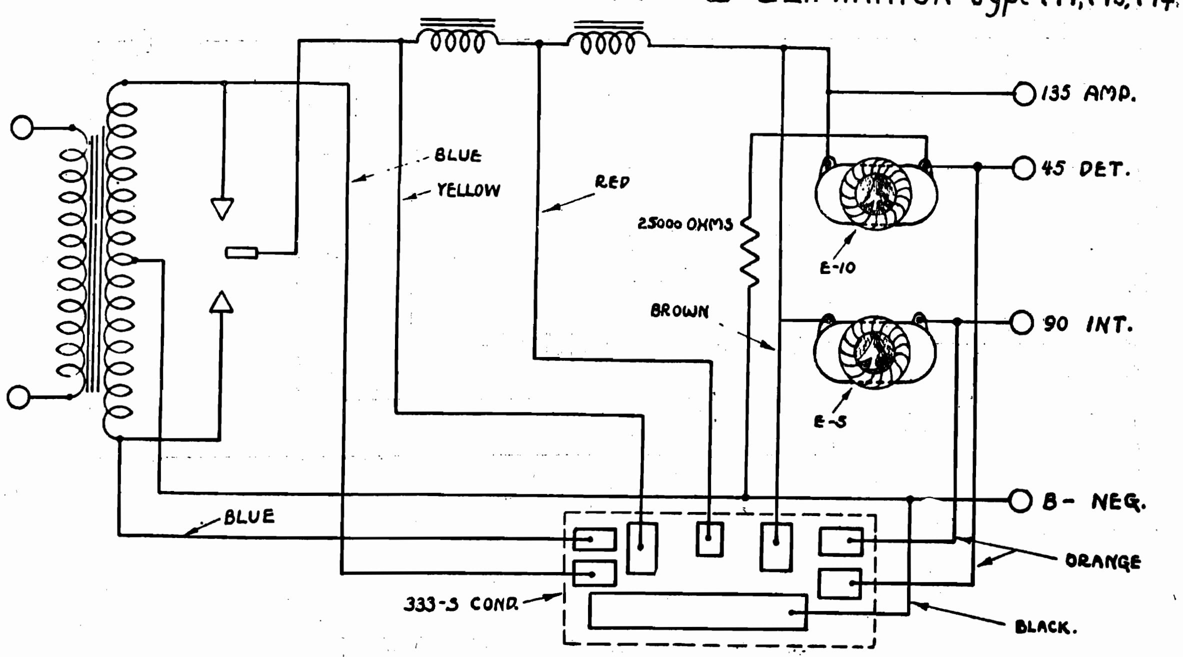
ALL-AMAX JUNIOR

MODEL A-1, A-3,
A-4, A-8
"B" Eliminators

ALL-AMERICAN MOHAWK CORP.



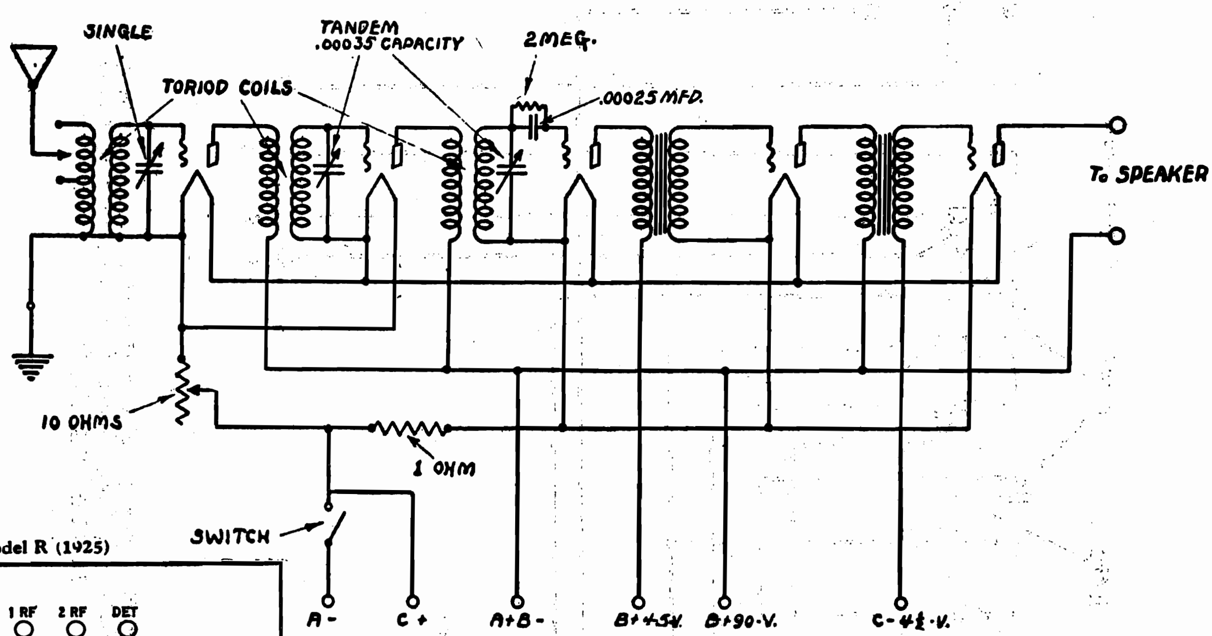
CONSTANT B" ELIMINATOR type A1, A3, A4.

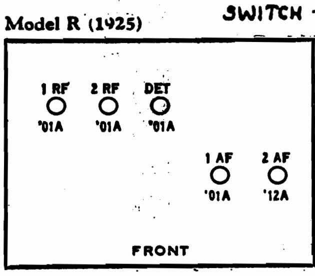


"B" ELIMINATOR TYPE A8 -1926-

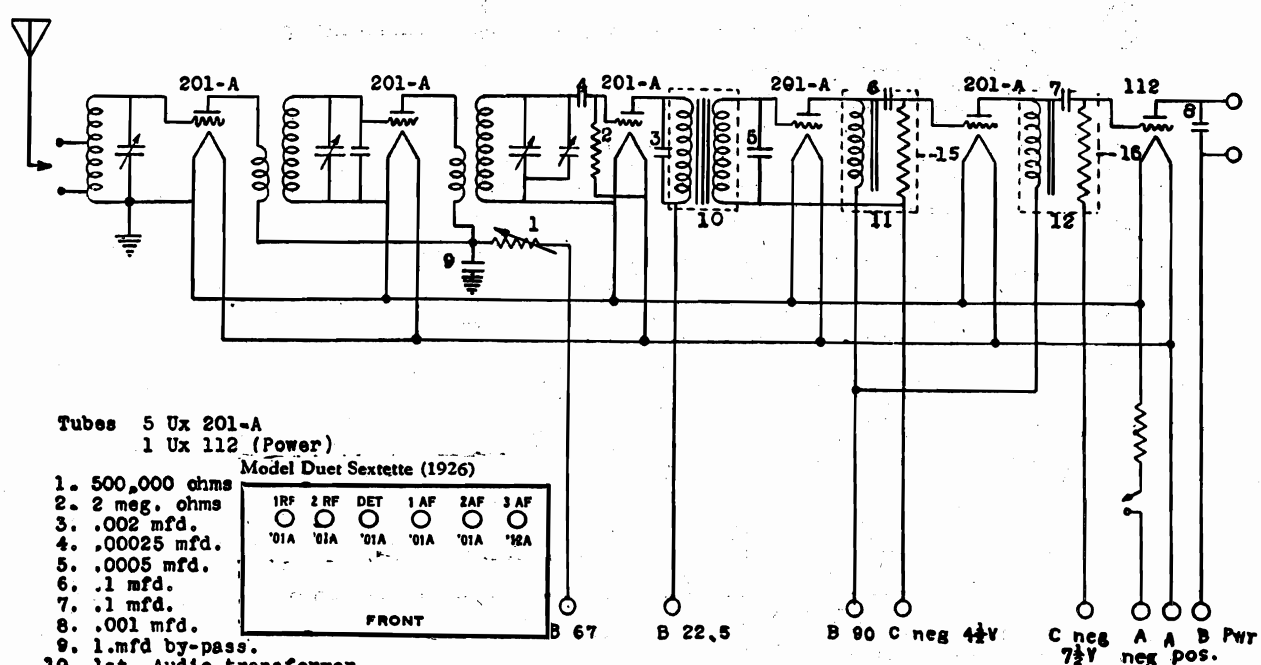
ALL-AMERICAN MOHAWK CORP.

MODEL R.
6 Tube Battery
Sextette
Duet





ALL AMERICAN - Model R. 1925



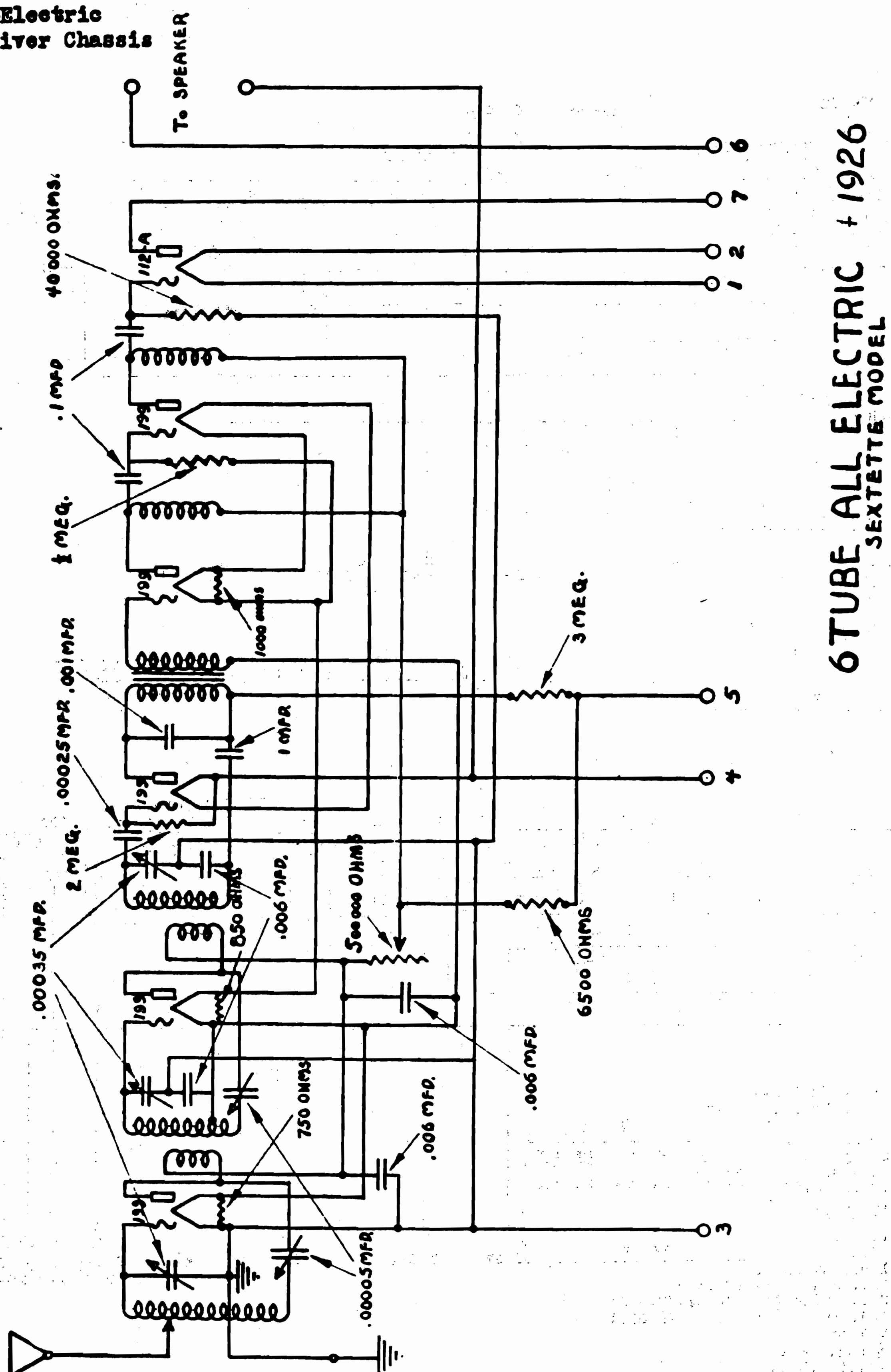
Tubes 5 Ux 201-A
1 Ux 112 (Power)

1. 500,000 ohms
2. 2 meg. ohms
3. .002 mfd.
4. .00025 mfd.
5. .0005 mfd.
6. .1 mfd.
7. .1 mfd.
8. .001 mfd.
9. 1.mfd by-pass.
10. 1st. Audio transformer
11. 2nd. audio (Impedence)(R-300)
12. 3rd. Audio (Impedence)(R-310)
14. 2/5 ohm.
15. ½ Meg. ohm.
16. 40,000 ohms.

1926 CIRCUIT DIAGRAM OF 6 TUBE BATTERY OPERATED RECEIVER.. 1927
(Sextette & Duet models)

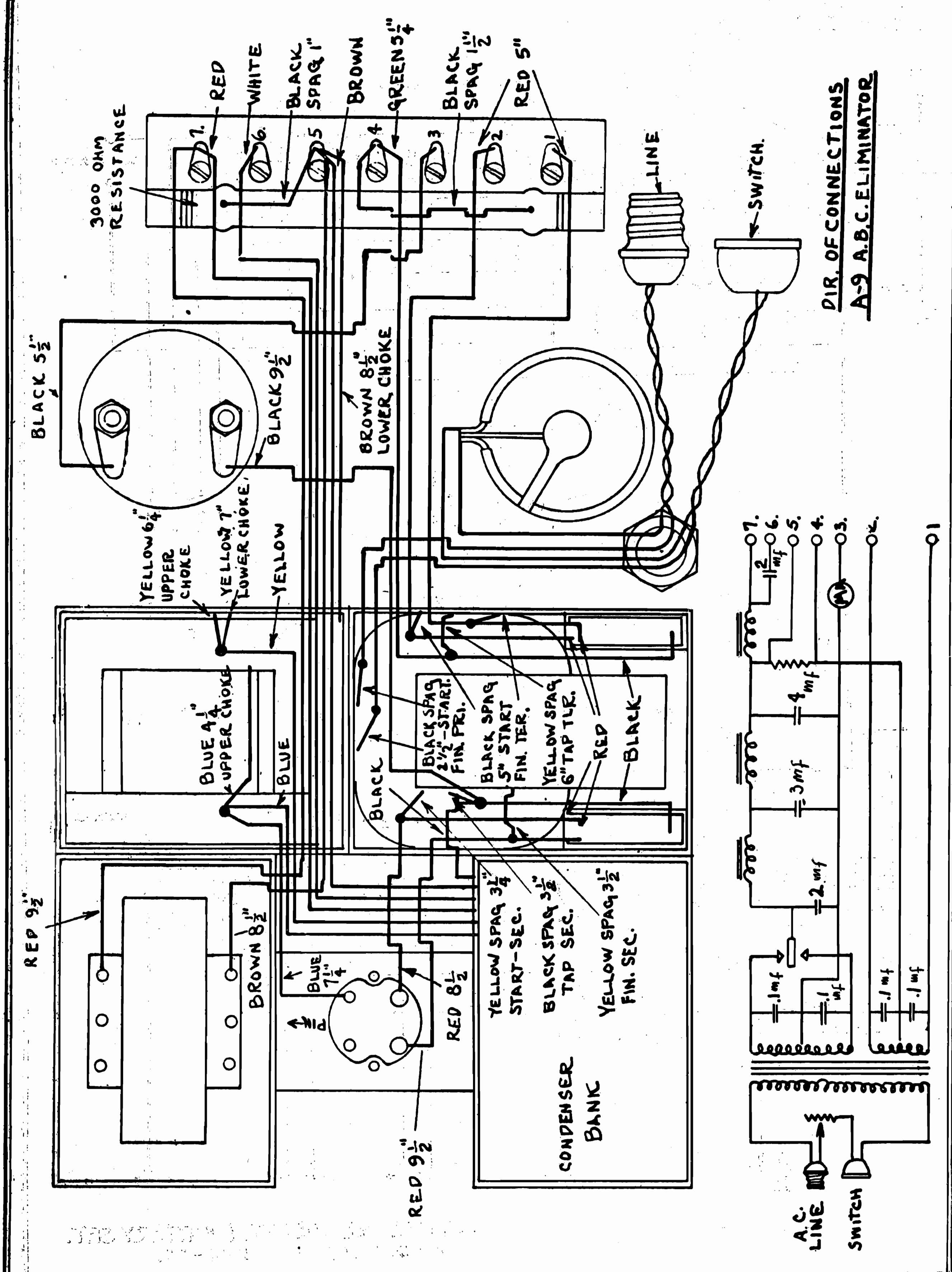
MODEL Sextette
6 Tube 1926
All-Electric
Receiver Chassis

ALL AMERICAN MOHAWK CORP.

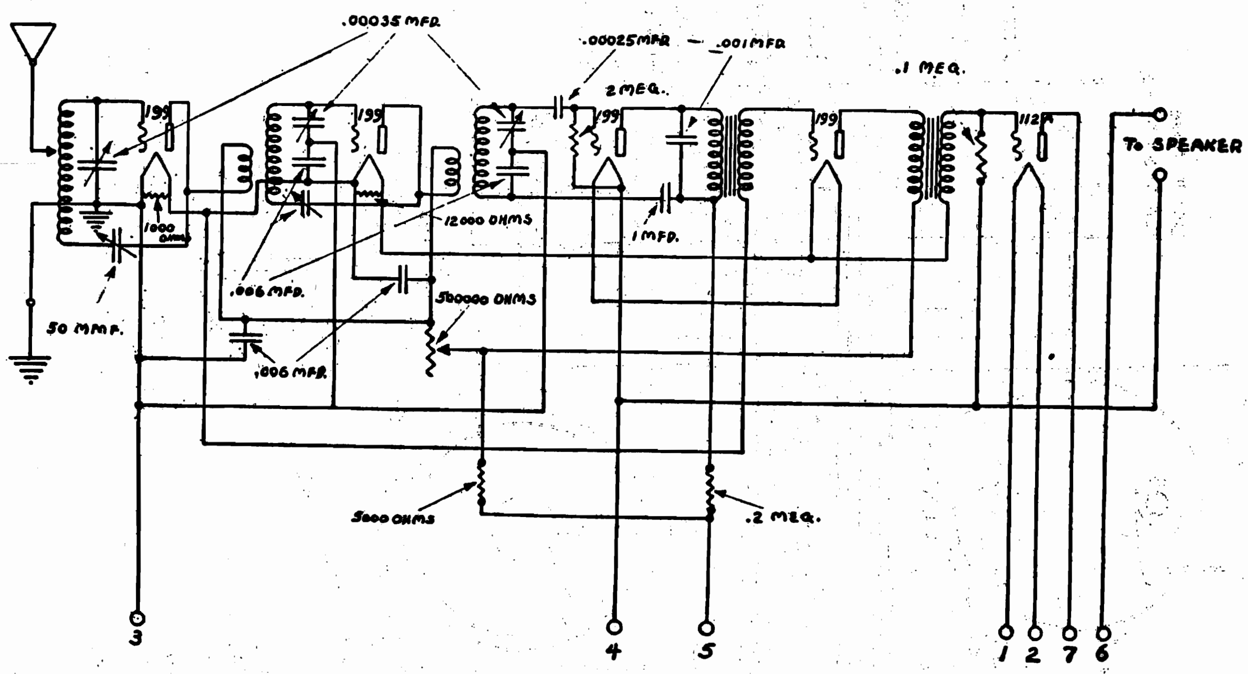


ALL-AMERICAN MOHAWK CORP.

MODEL A- 9 ABC
Power Pack

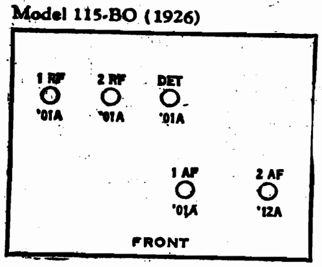


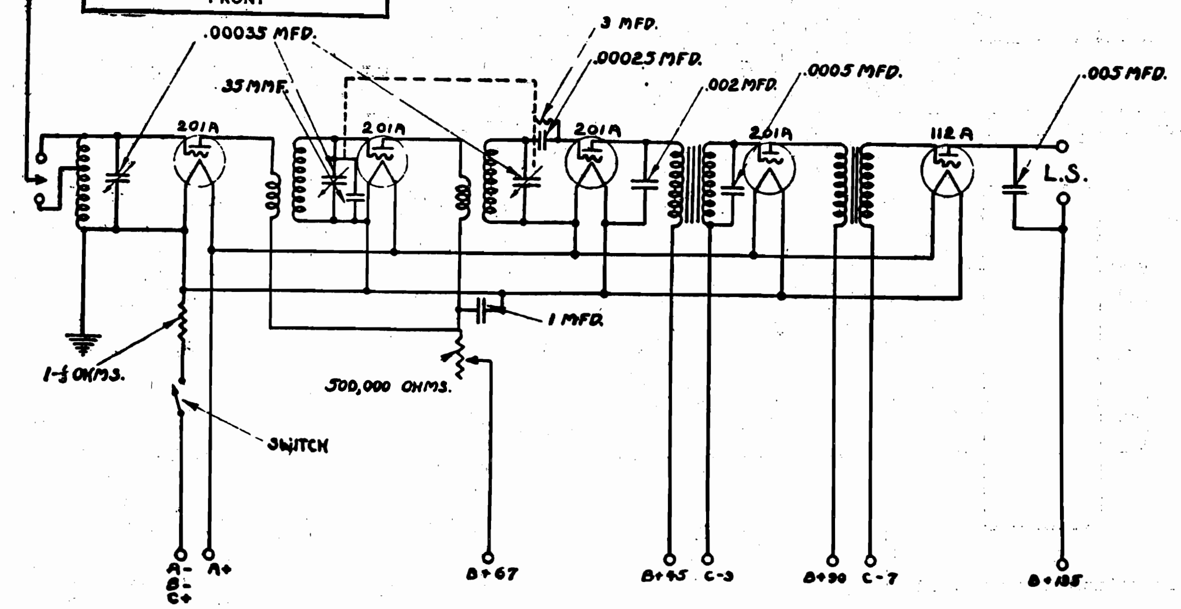
MODEL 115 -1926 ALL-AMERICAN MOHAWK CORP.
5 Tube All-Electric
MODEL 115- 1926
5 Tube All-Battery



5 TUBE ALL ELECTRIC - 1926.
MODEL - 115

Model 115-BO (1926)

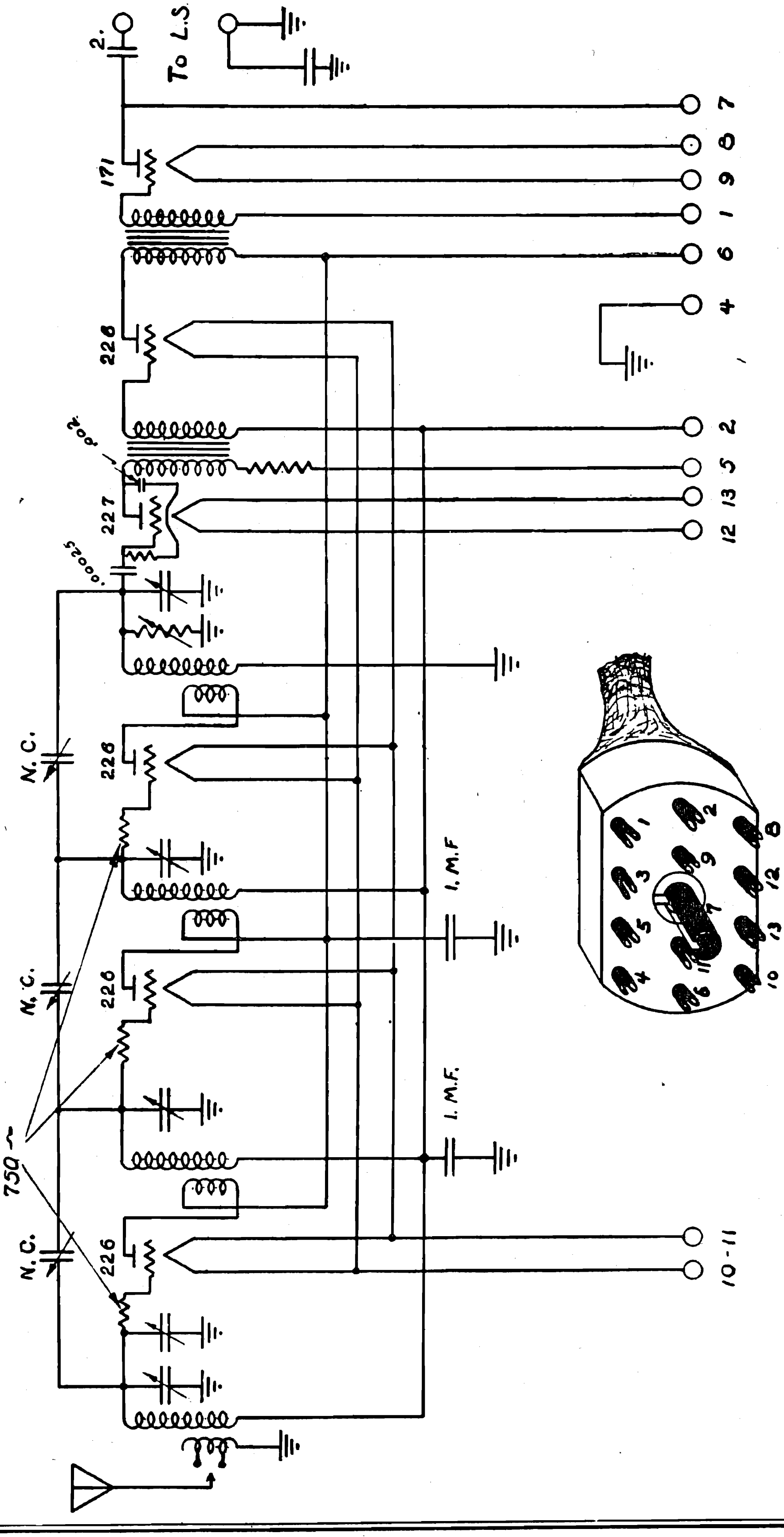




5 TUBE ALL AMERICAN BATTERY SET.
MODEL 115 - 1926-27.

ALL-AMERICAN MOHAWK CORP

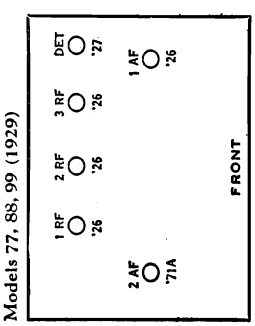
MODEL 77 Simplified
6 Tube A-C Rec.
1928-1929
Receiver Chassis



CIRCUIT DIAGRAM OF '27-'28
6 TUBE A.C. REC. (SIMPLIFIED) #77

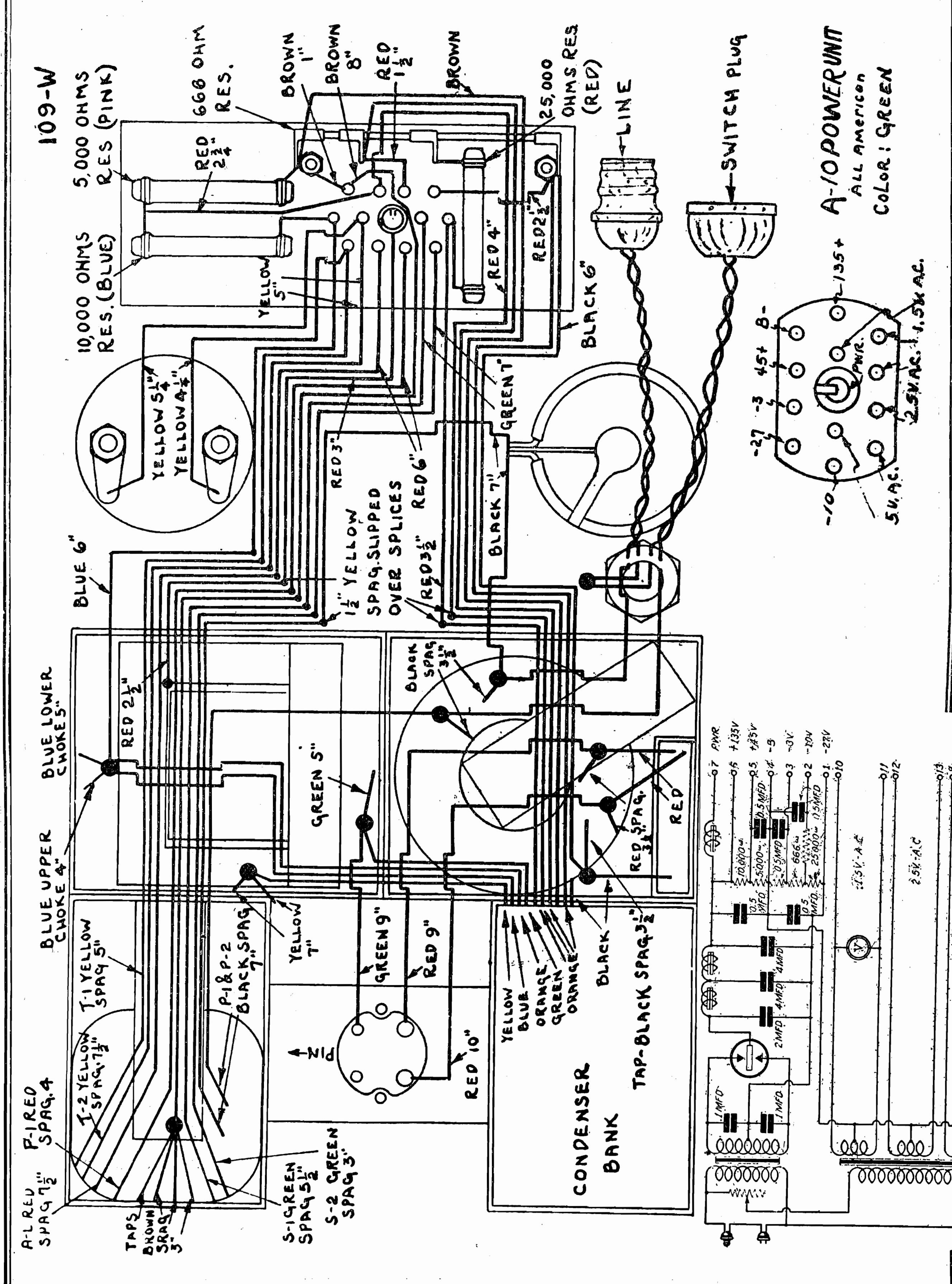
CABLE PLUG.

Models 77, 88, 99 (1929)



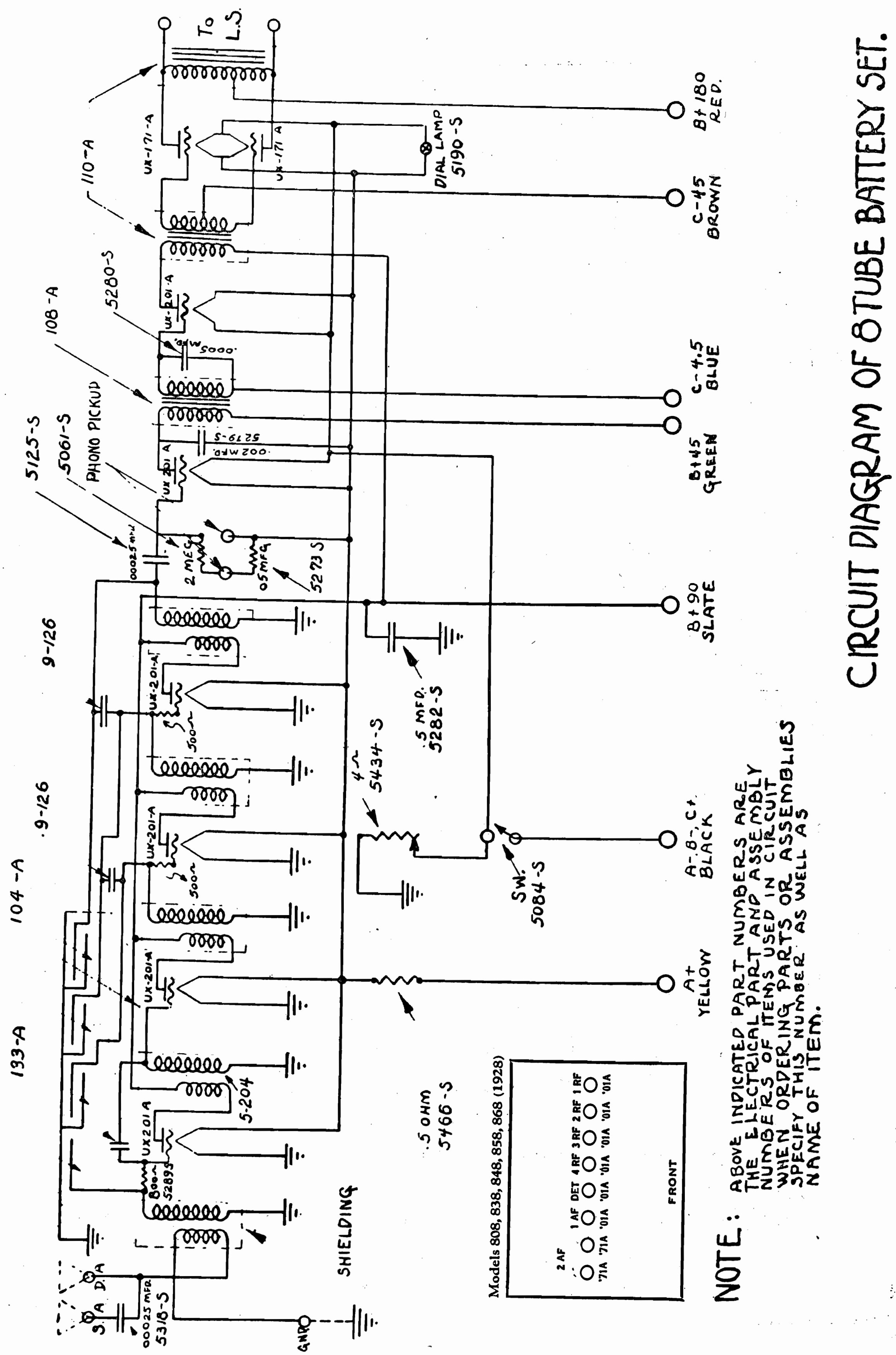
MODEL A-10
Power Pack

ALL-AMERICAN MOHAWK CORP.



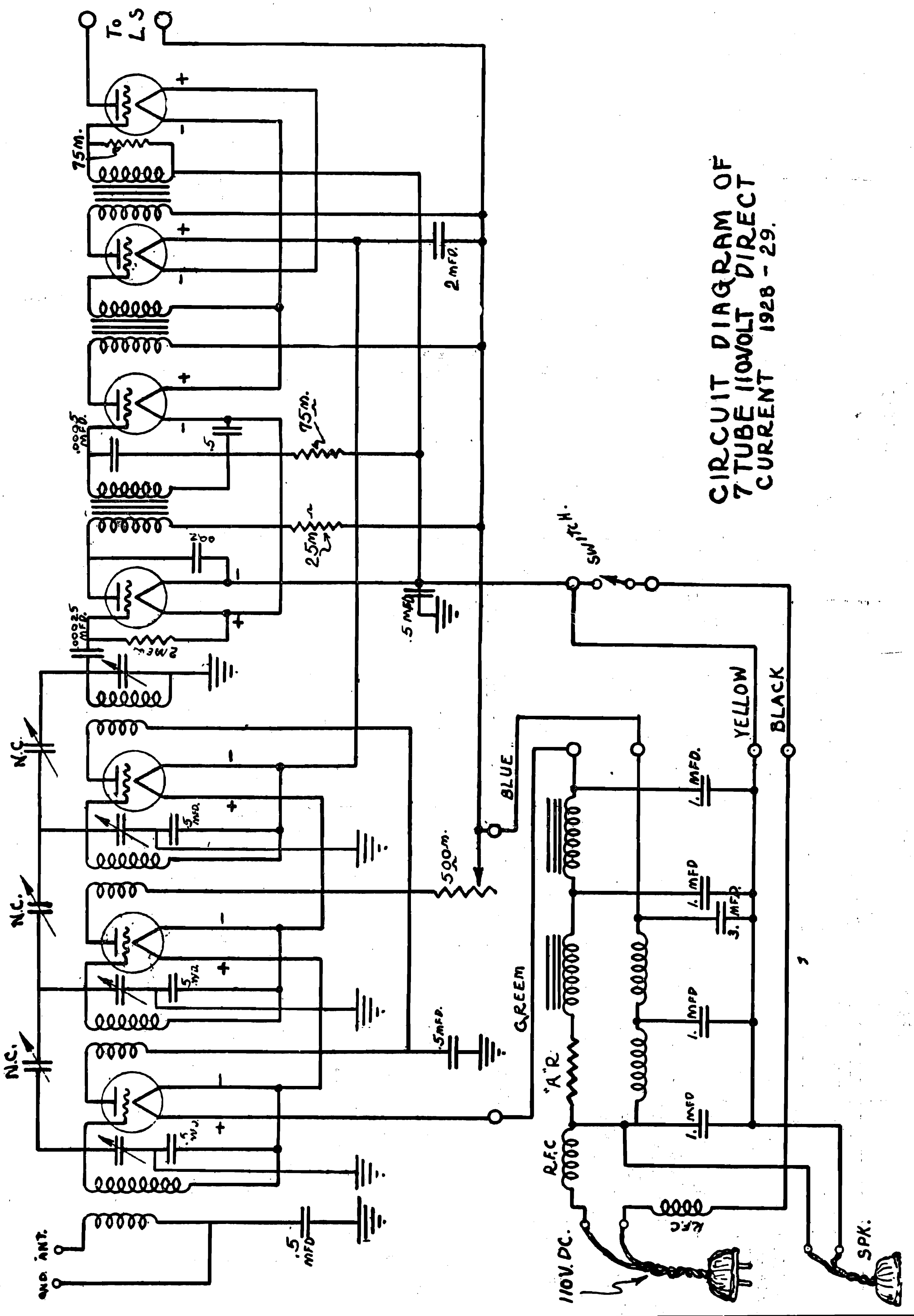
ALL-AMERICAN MOHAWK CORP.

MODEL 8 Tube Battery



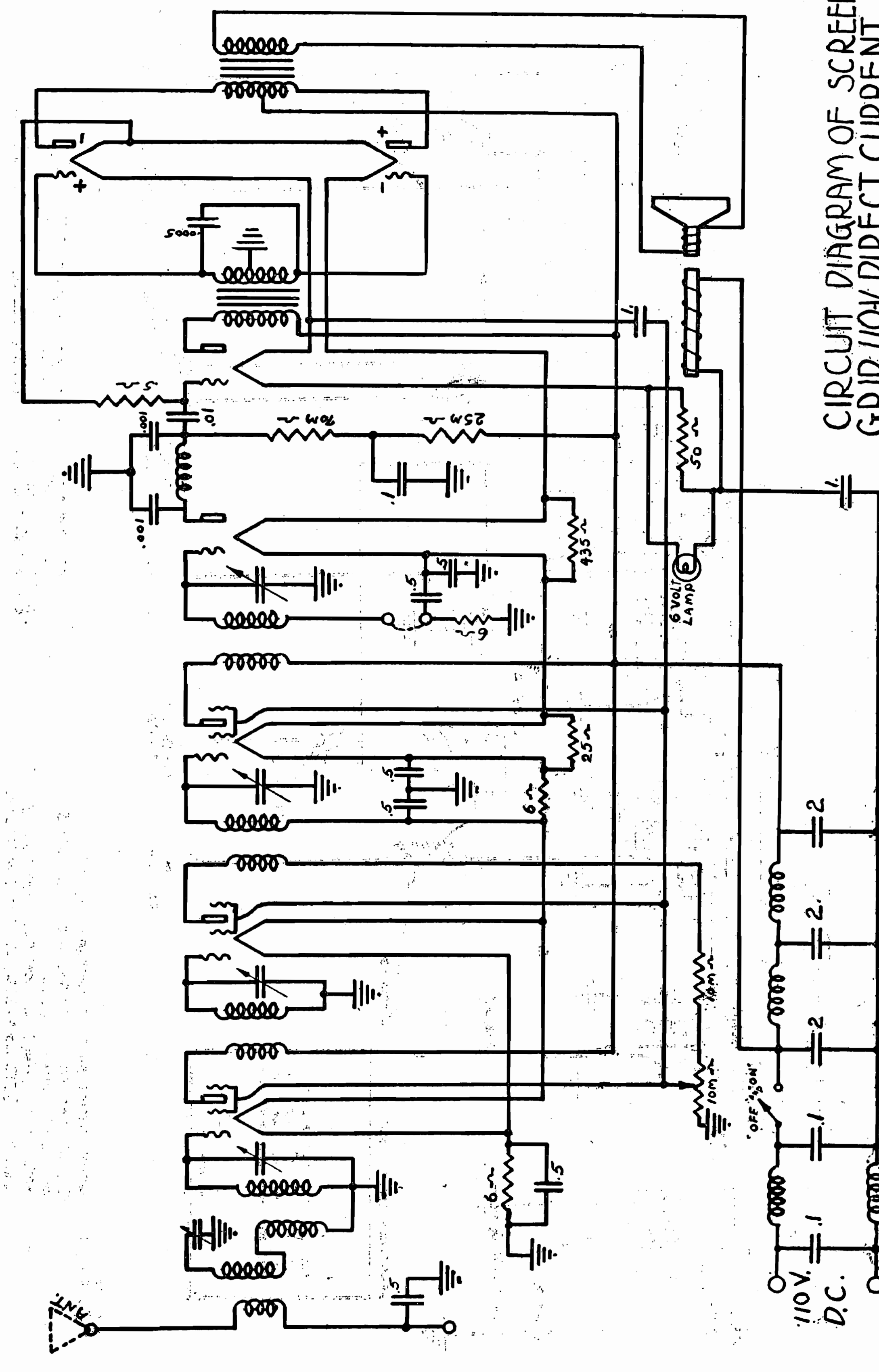
MODEL 7 Tube
110 V. D-C

ALL-AMERICAN MOHAWK CORP.



ALL-AMERICAN MOHAWK CORP.

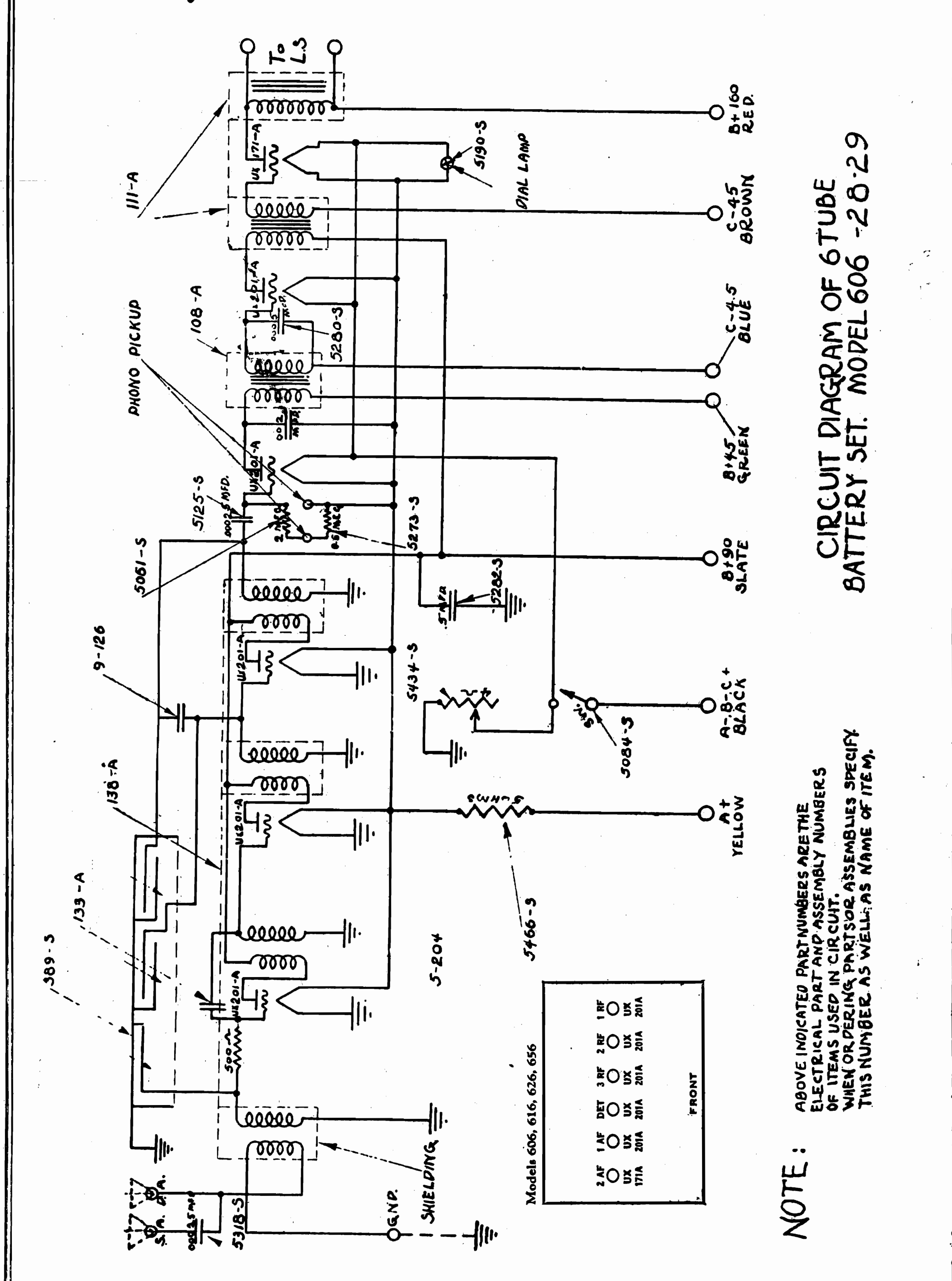
MODEL Screen Grid
110 V. D-C



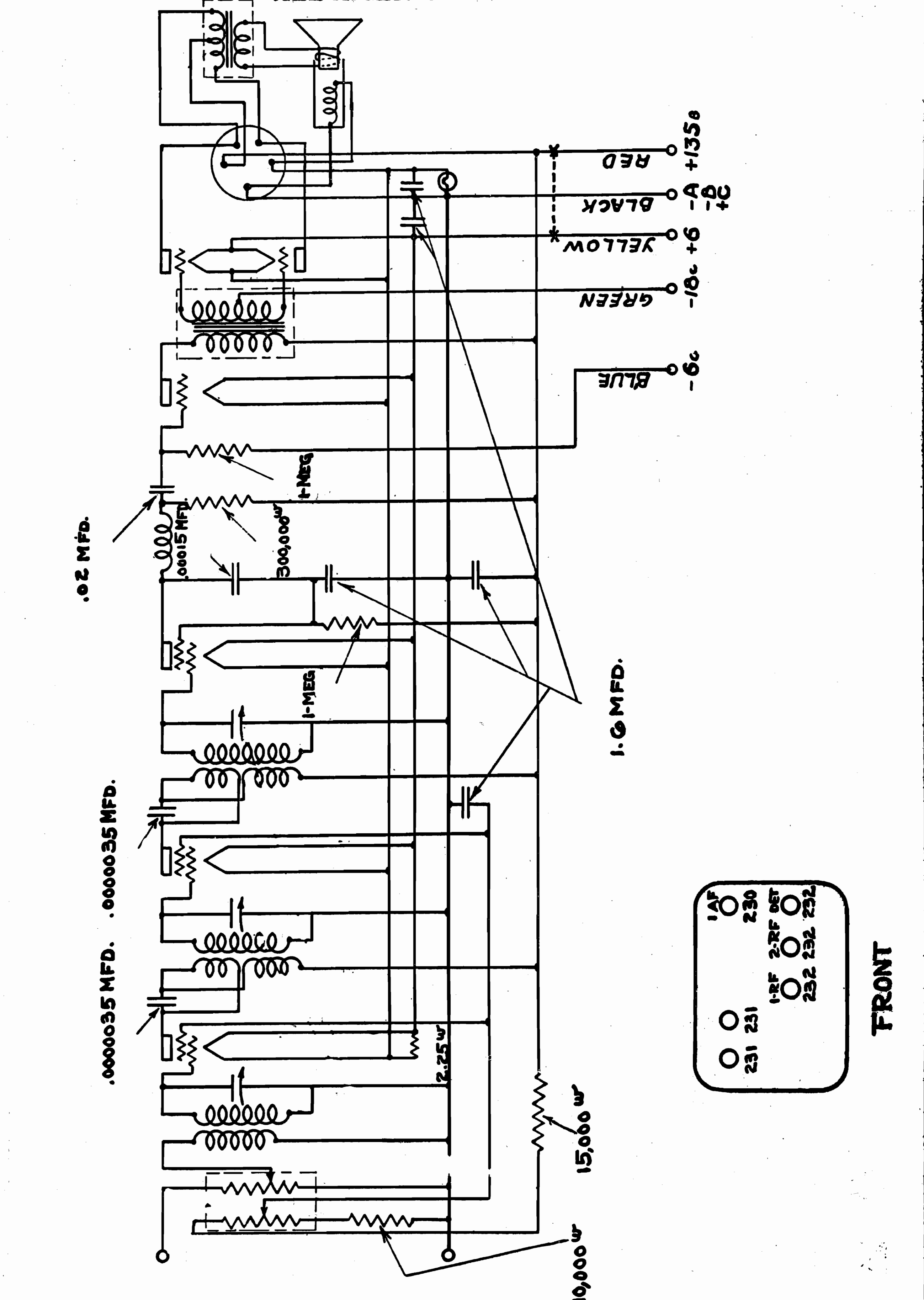
CIRCUIT DIAGRAM OF SCREEN GRID 110V. DIRECT CURRENT

MODEL 606
6 Tube Battery

ALL-AMERICAN MOHAWK CORP.

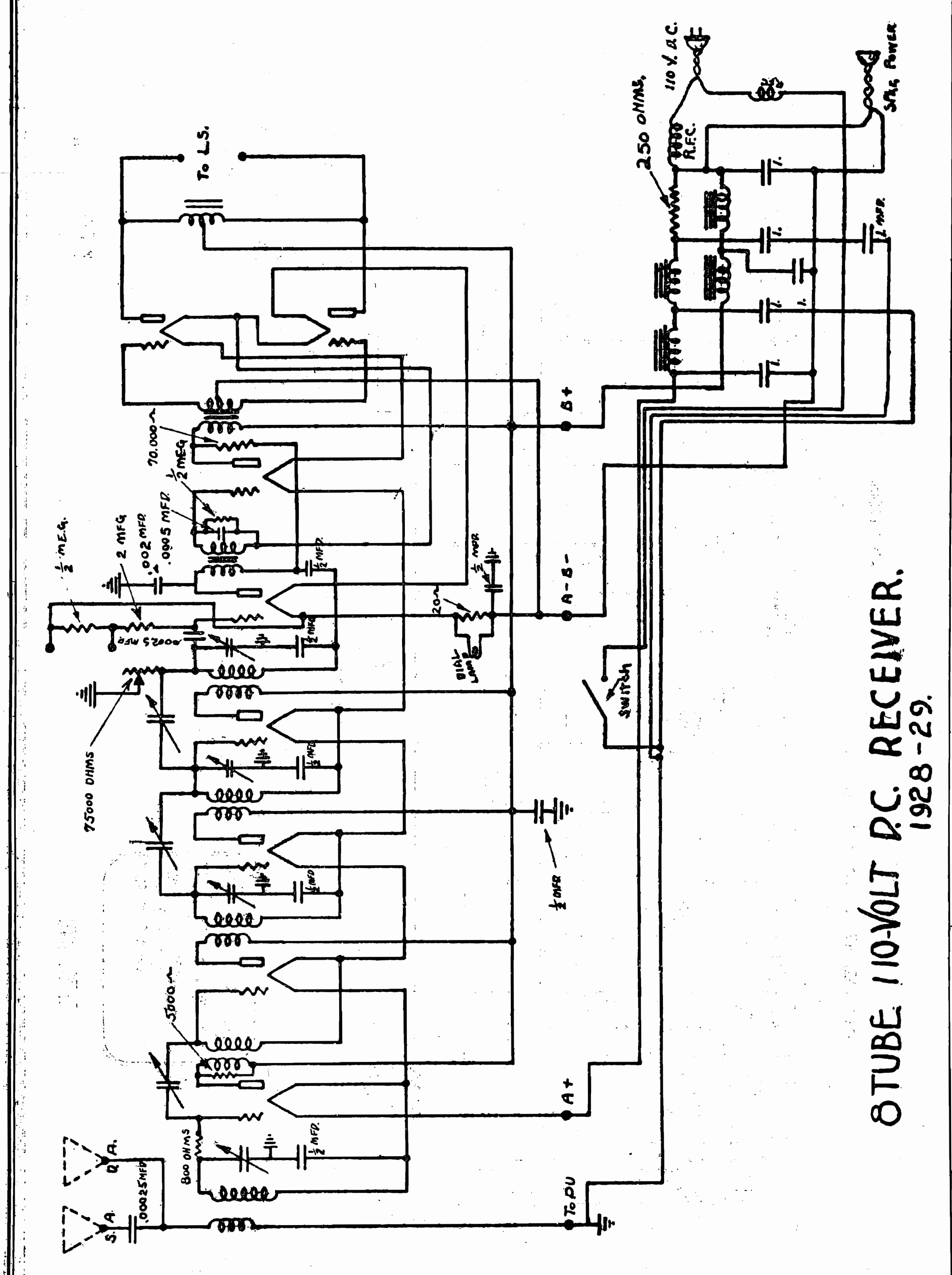


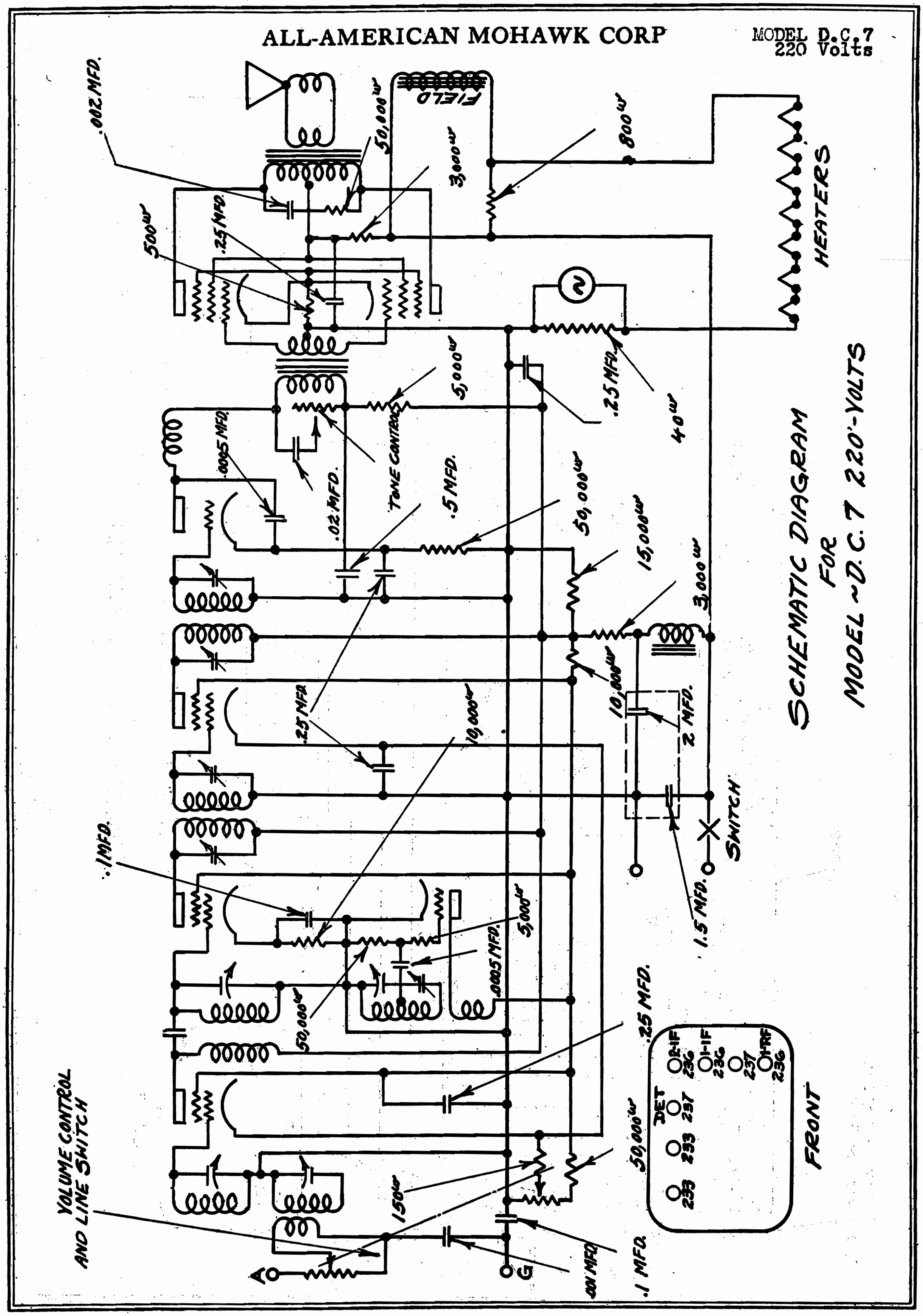
ALL-AMERICAN MOHAWK CORP. MODEL B 30-31



MODEL 8 Tube
110 V. D-C

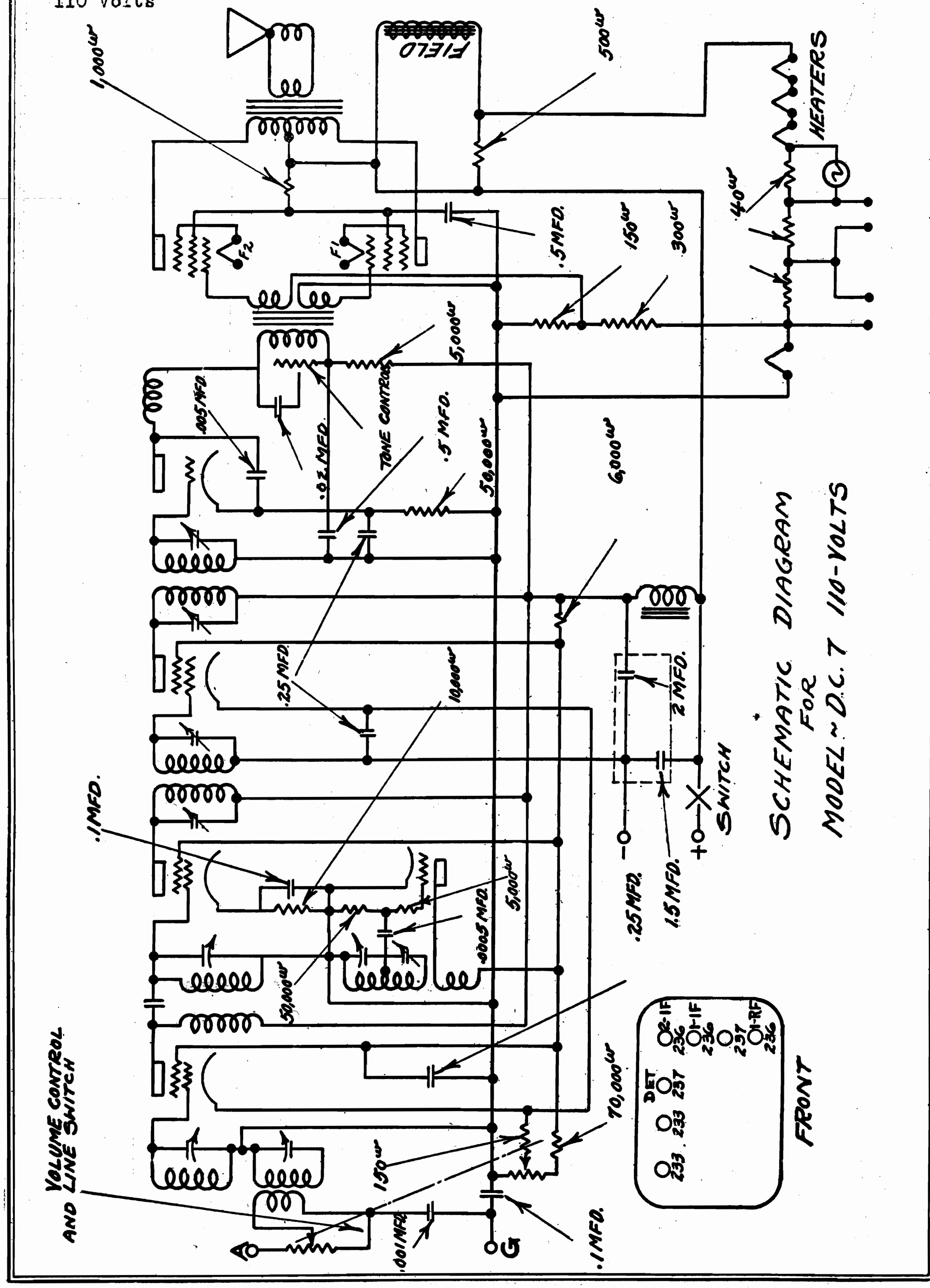
ALL-AMERICAN MOHAWK CORP.




ALL-AMERICAN MOHAWK CORP
MODEL D.C.7
220 Volts
SCHEMATIC DIAGRAM
FOR
MODEL ~D.C.7 220-VOLTS
FIELD
HEATERS
TONE CONTROL
SWITCH
VOLUME CONTROL
AND LINE SWITCH
FRONT
DET
.002 MFD.
50,000 w
3,000 w
800 w
500 w
.25 MFD.
5,000 w
.0005 MFD.
.02 MFD.
.5 MFD.
50,000 w
15,000 w
3,000 w
40 w
10,000 w
2 MFD.
1.5 MFD.
.1 MFD.
.001 MFD.
150 w
.25 MFD.
50,000 w
A
G

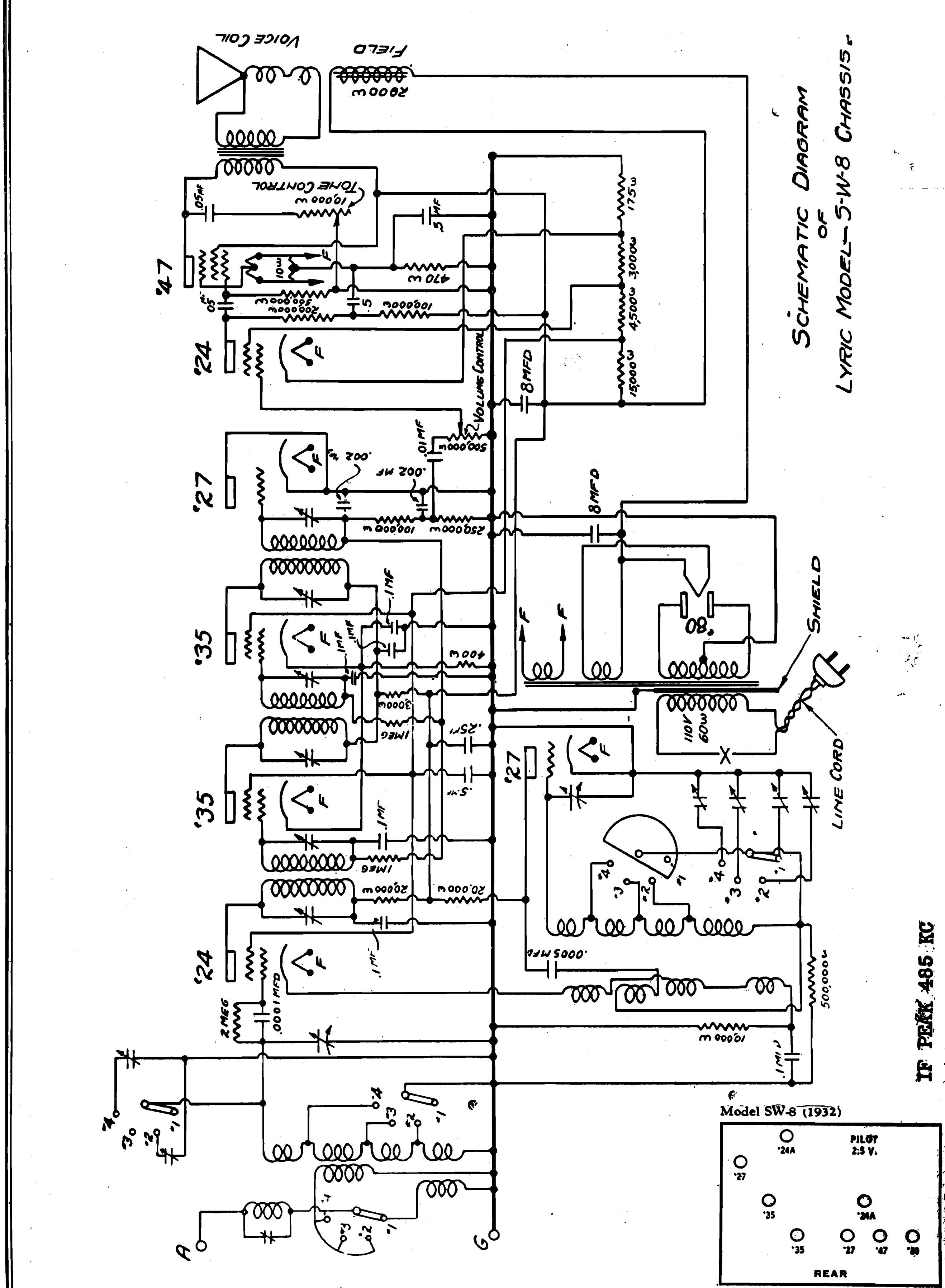
MODEL D.C. 7
110 Volts

ALL-AMERICAN MOHAWK CORP.



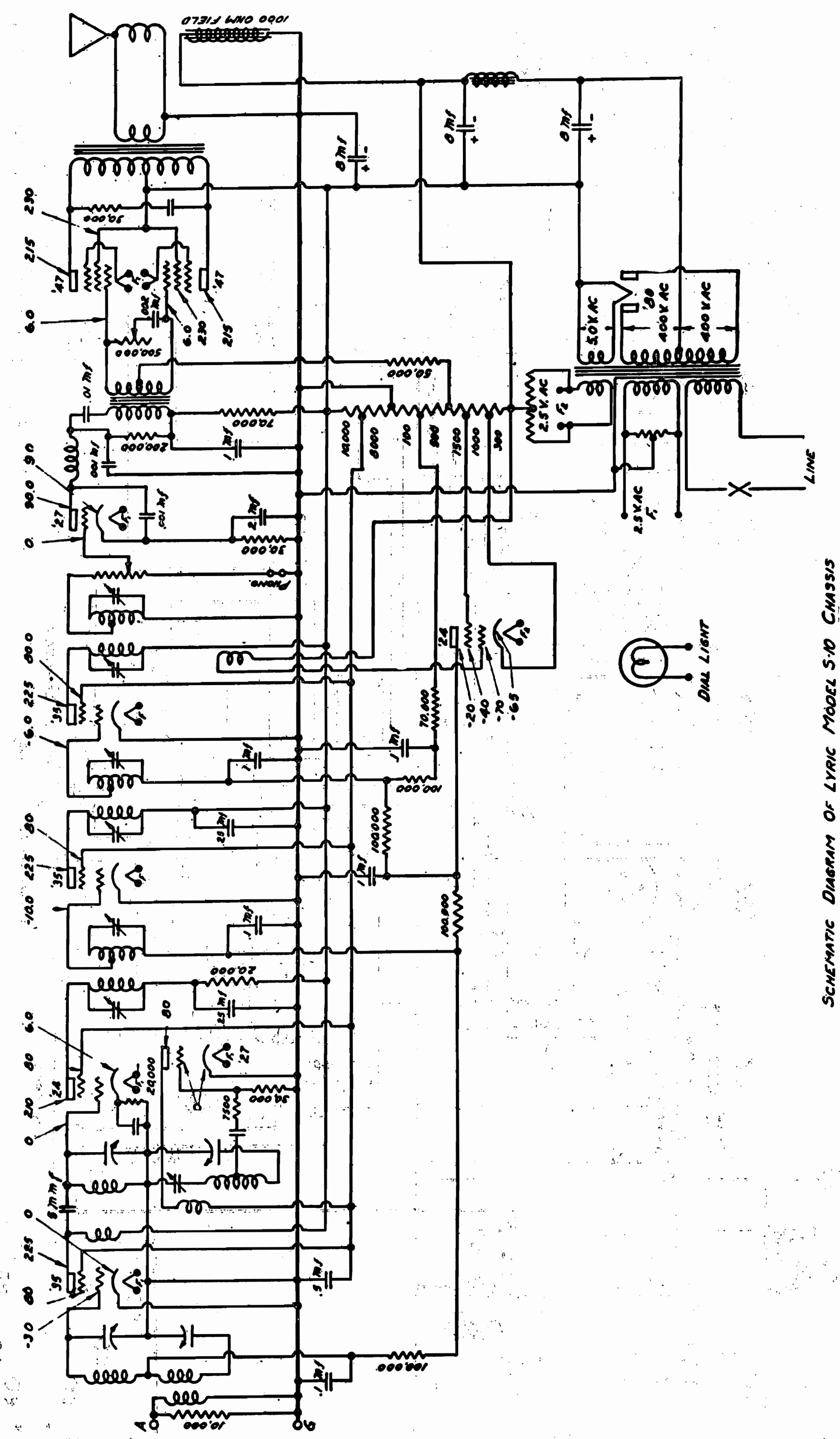
MODEL SW-8

ALL-AMERICAN MOHAWK CORP



MODEL S-10

ALL-AMERICAN MOHAWK CORP.

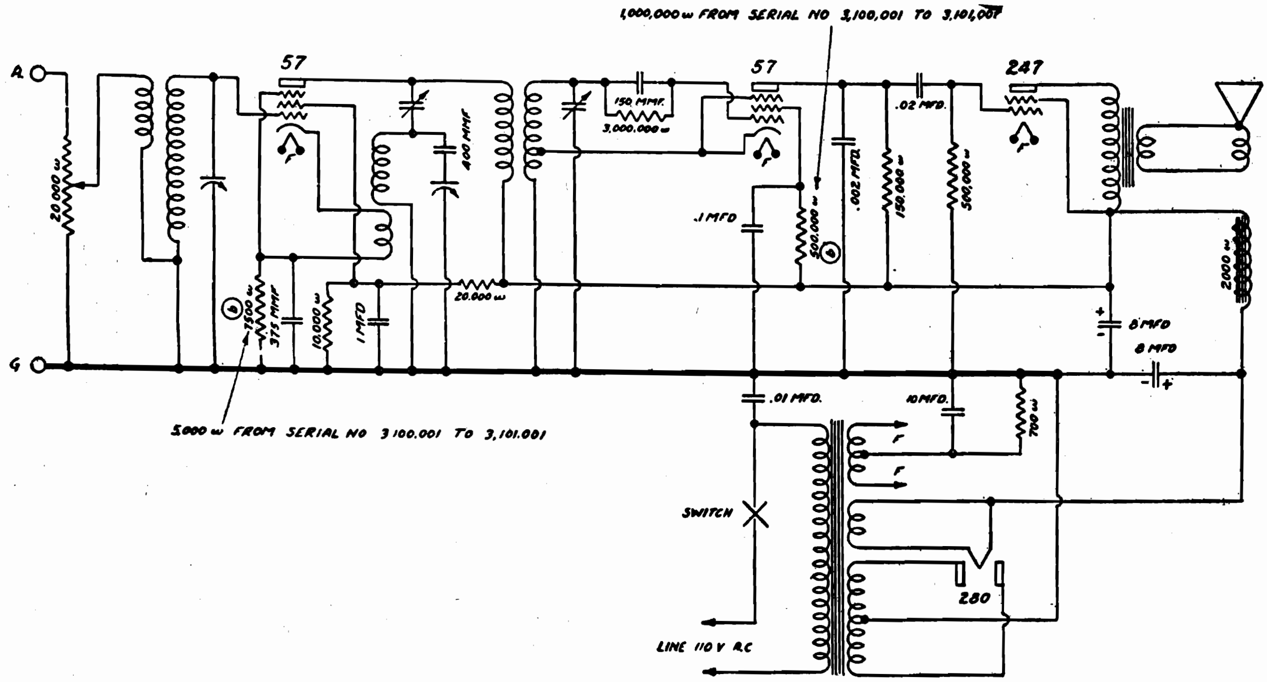


SCHEMATIC DIAGRAM OF LYRIC MODEL S-10 CHASSIS

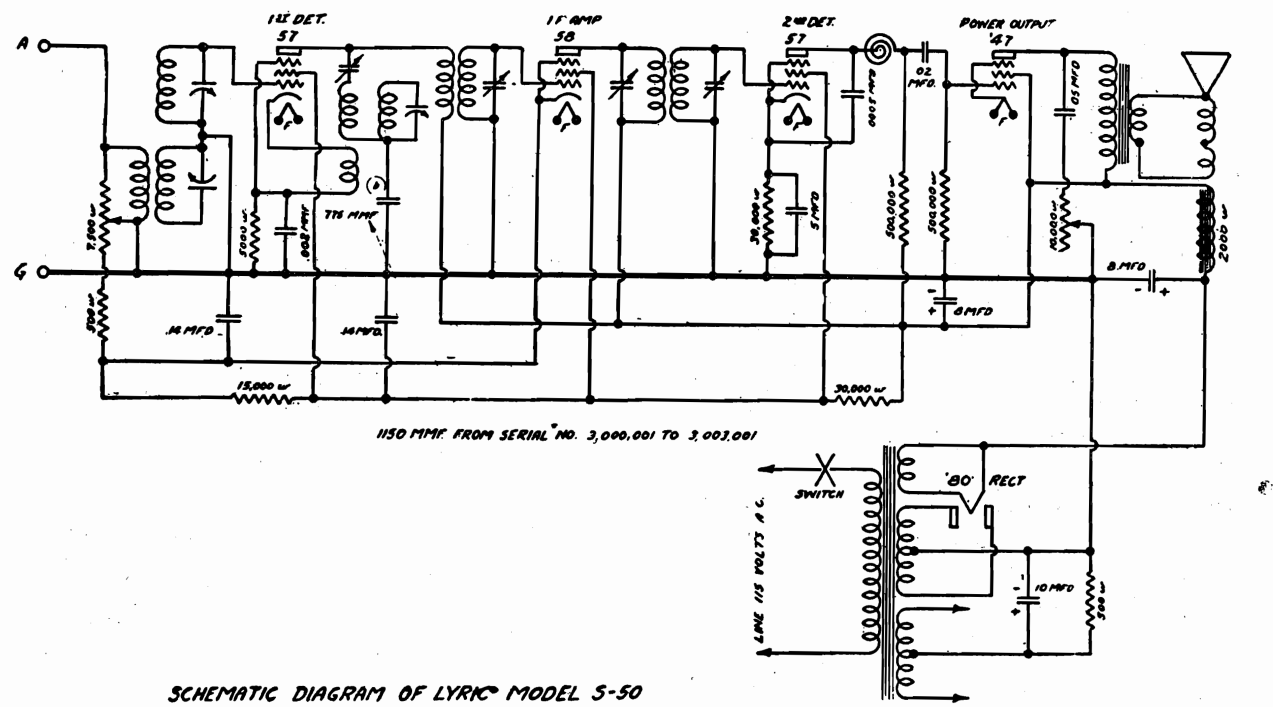
IF PEAK 175 KC

ALL-AMERICAN MOHAWK CORP.

MODEL S-40
S-50



SCHEMATIC_DIAGRAM MODEL S-40



SCHEMATIC DIAGRAM OF LYRIC MODEL S-50

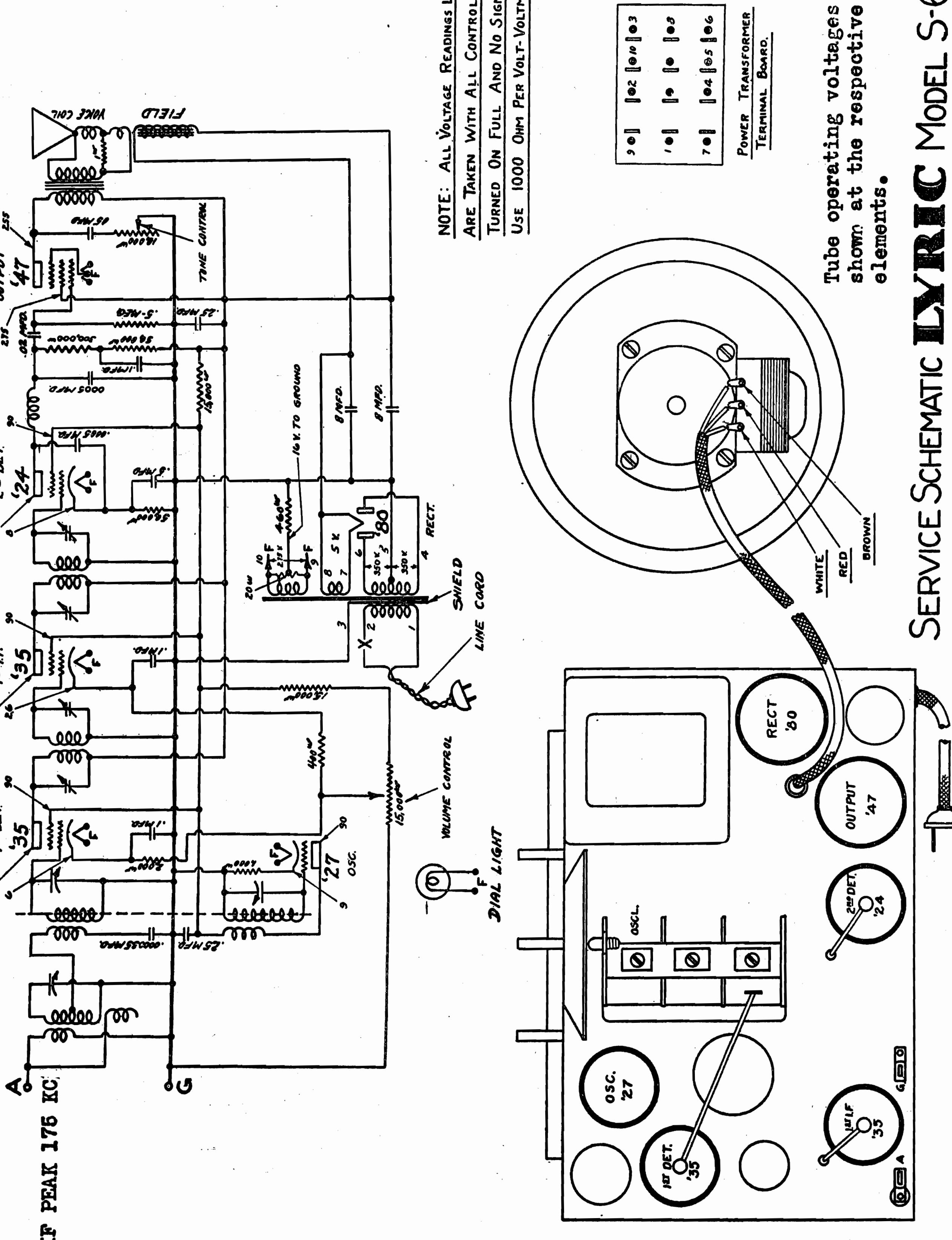
IF PEAK 175 KC

MODEL S-63

ALL-AMERICAN MOHAWK CORP.

NOTE: All Voltage Readings Listed Are Taken With All Controls Turned On Full And No Signal. Use 1000 Ohm Per Volt-Voltmeter

Tube operating voltages are shown at the respective tube elements.



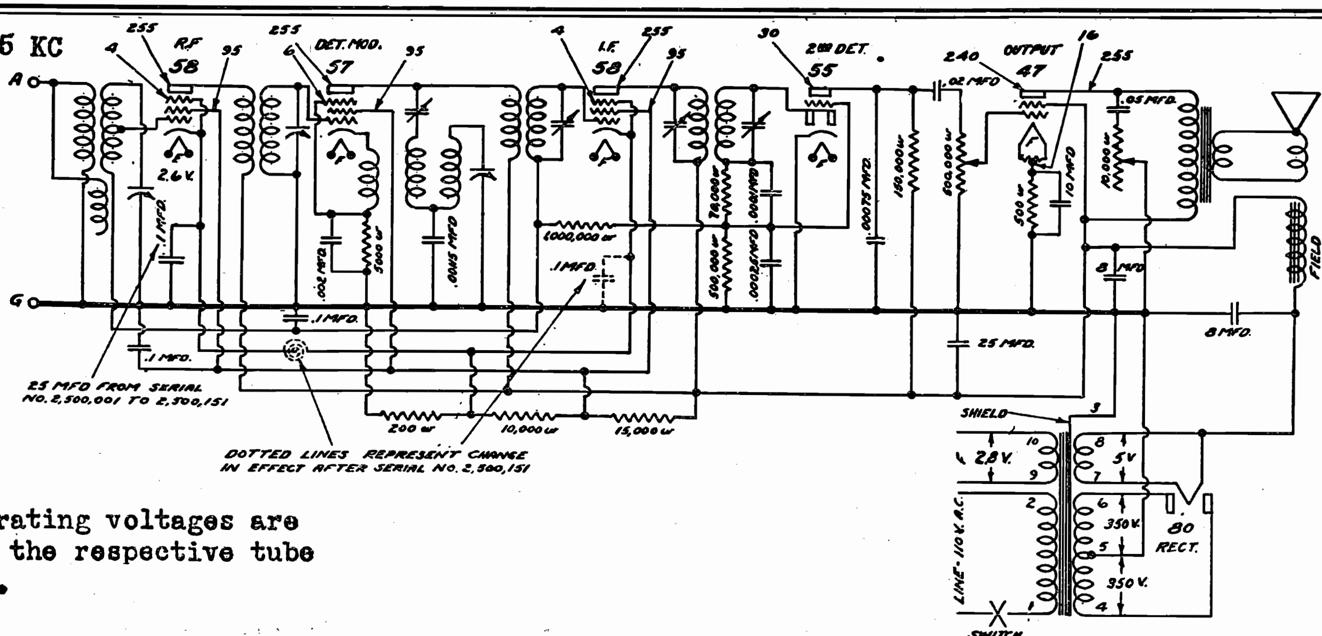
IF PEAK 175 KC

SERVICE SCHEMATIC LYRIC MODEL S-63

MODEL SA-65

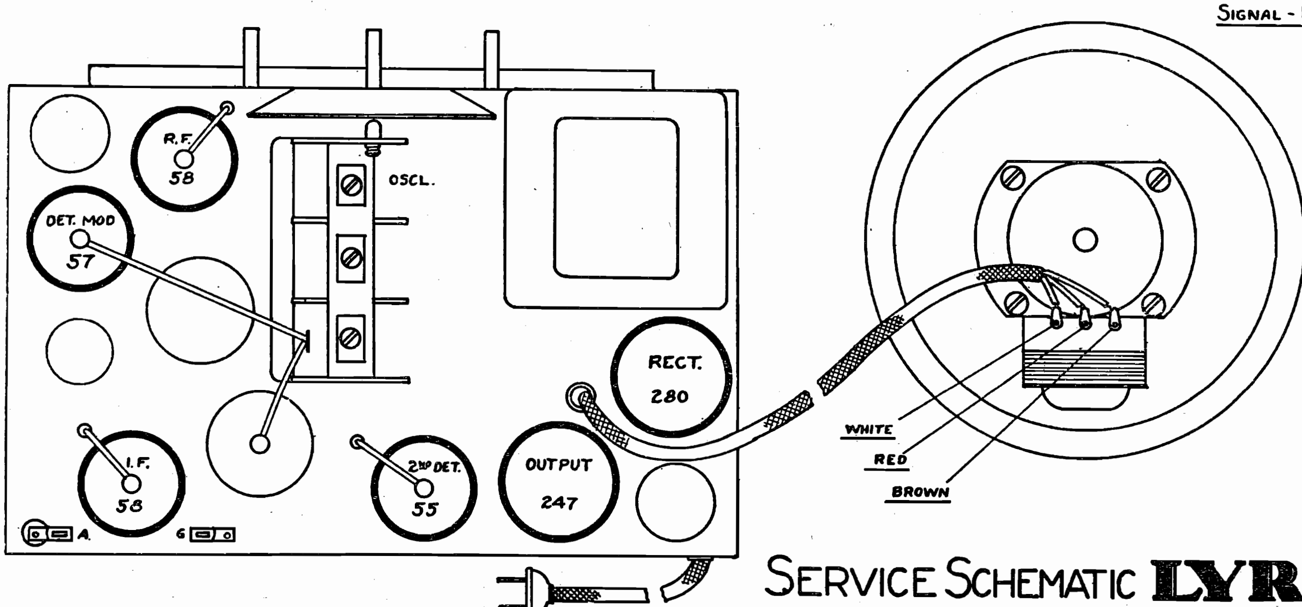
ALL AMERICAN MOHAWK CORP.

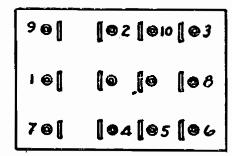
IF PEAK 175 KC



Tube operating voltages are shown at the respective tube elements.

NOTE: All Voltage Readings Listed Are Taken With All Controls Turned On Full And No Signal - Use 1000 w Per Volt - Voltmeter.



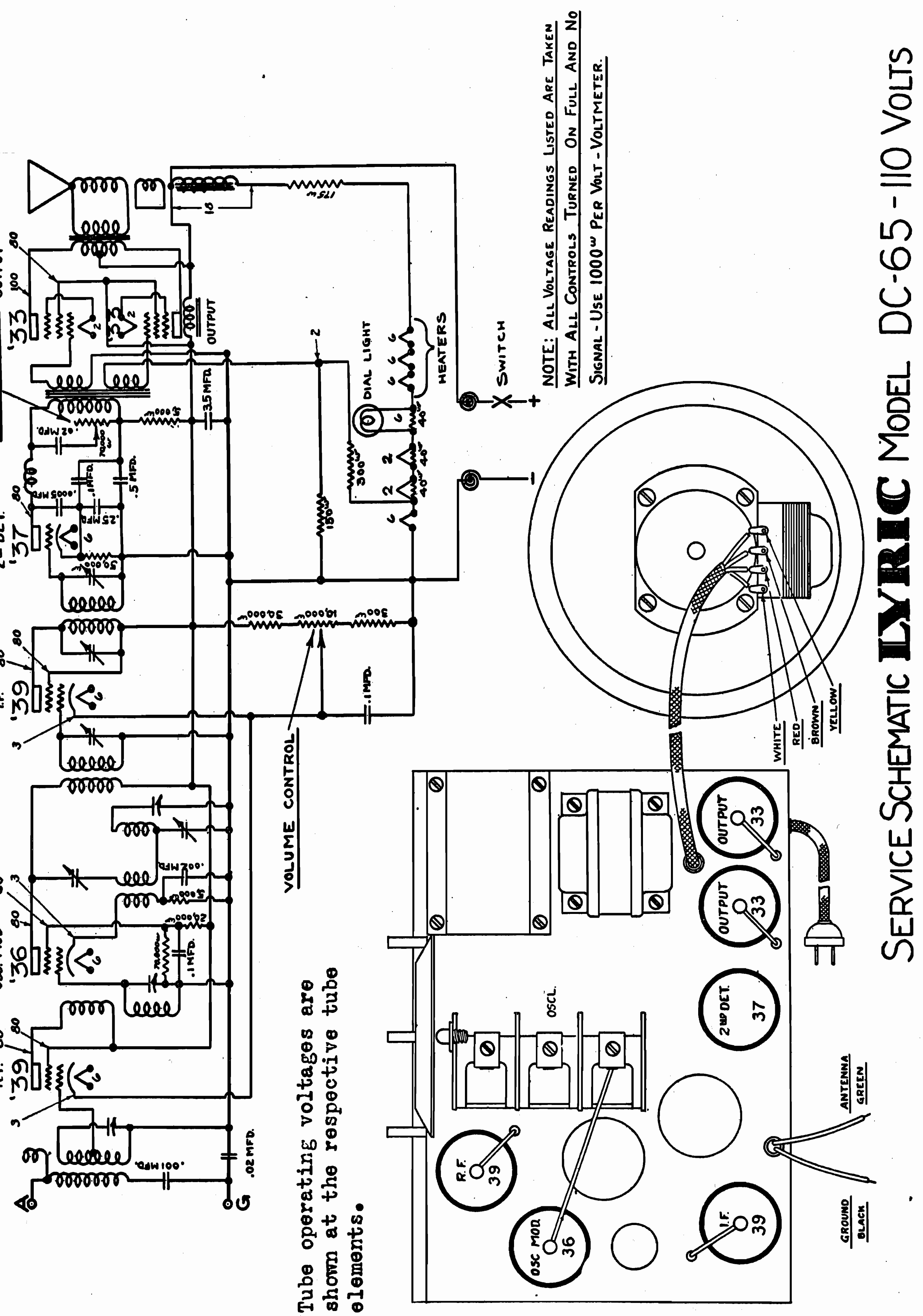


Power Transformer Terminal Board

SERVICE SCHEMATIC LYRIC MODEL SA-65

MODEL DC-65
110 Volts

ALL-AMERICAN MOHAWK CORP.

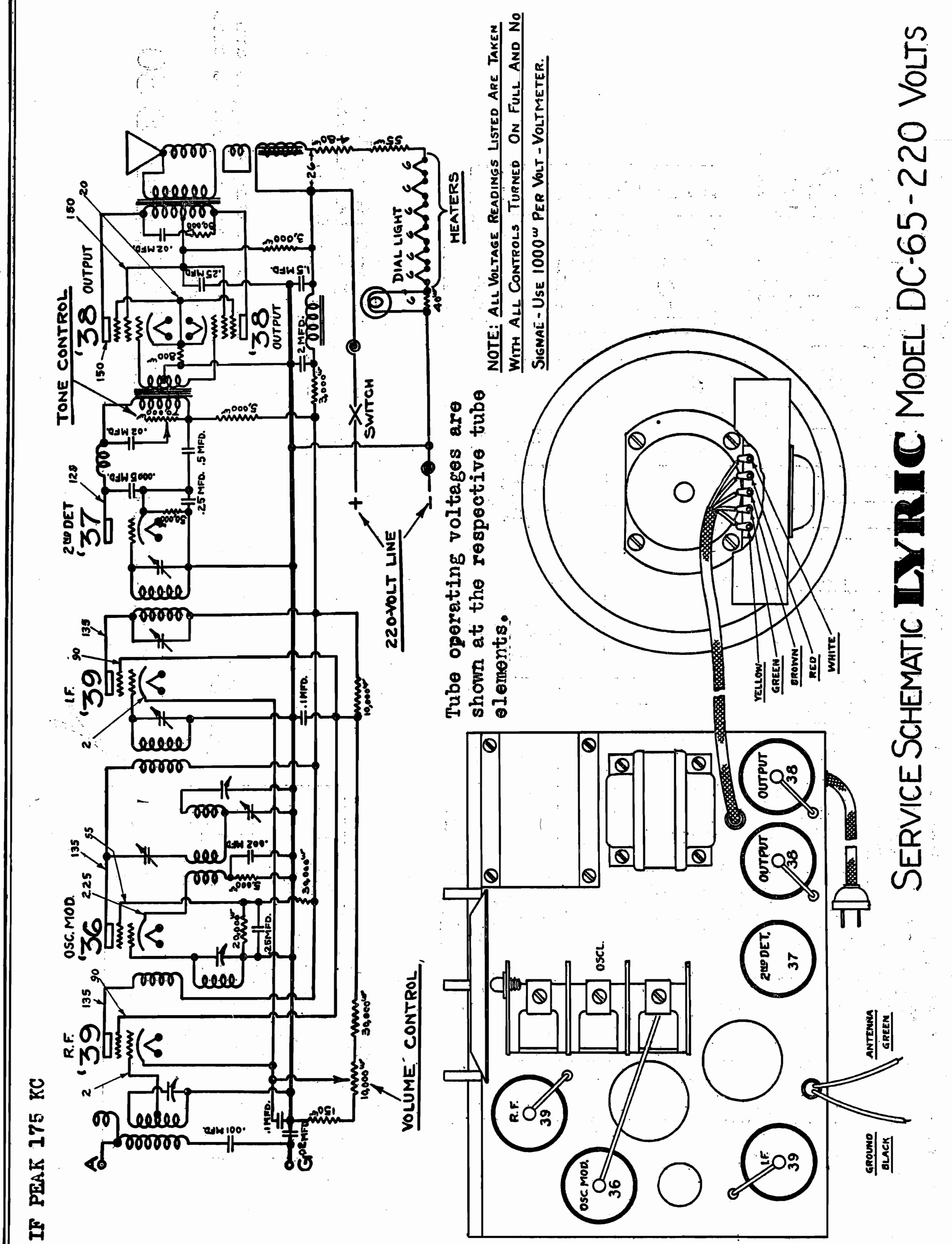


IF PEAK 175 KC

Tube operating voltages are shown at the respective tube elements.

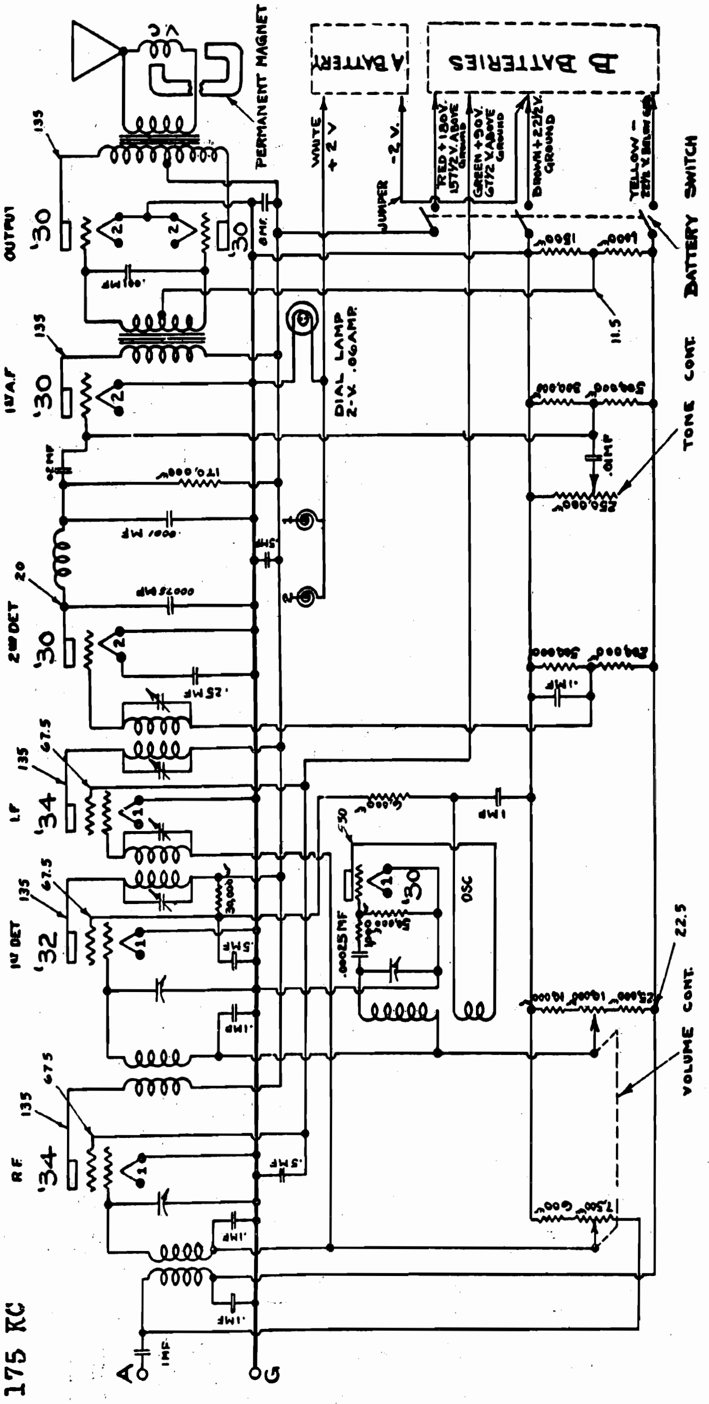
MODEL DC-65
220 Volts

ALL-AMERICAN MOHAWK CORP.



MODEL B-80

ALL-AMERICAN MOHAWK CORP.

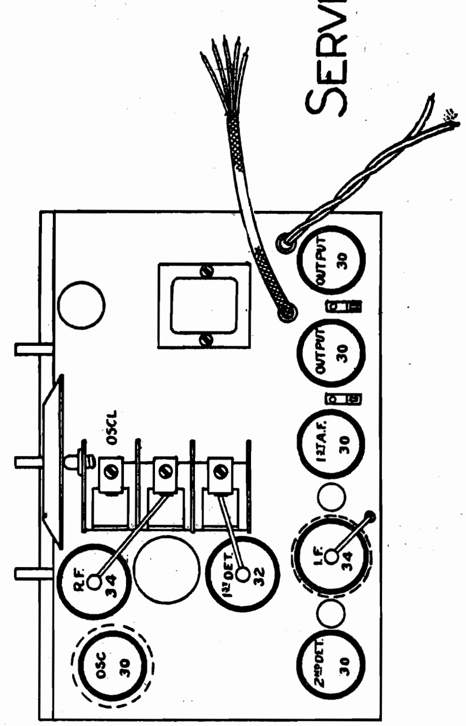


IF PEAK 175 KC

NOTE: All Voltage Readings Listed Are Taken With All Controls Turned On Full And No Signal - Use 1000Ω Per Volt - Voltmeter.

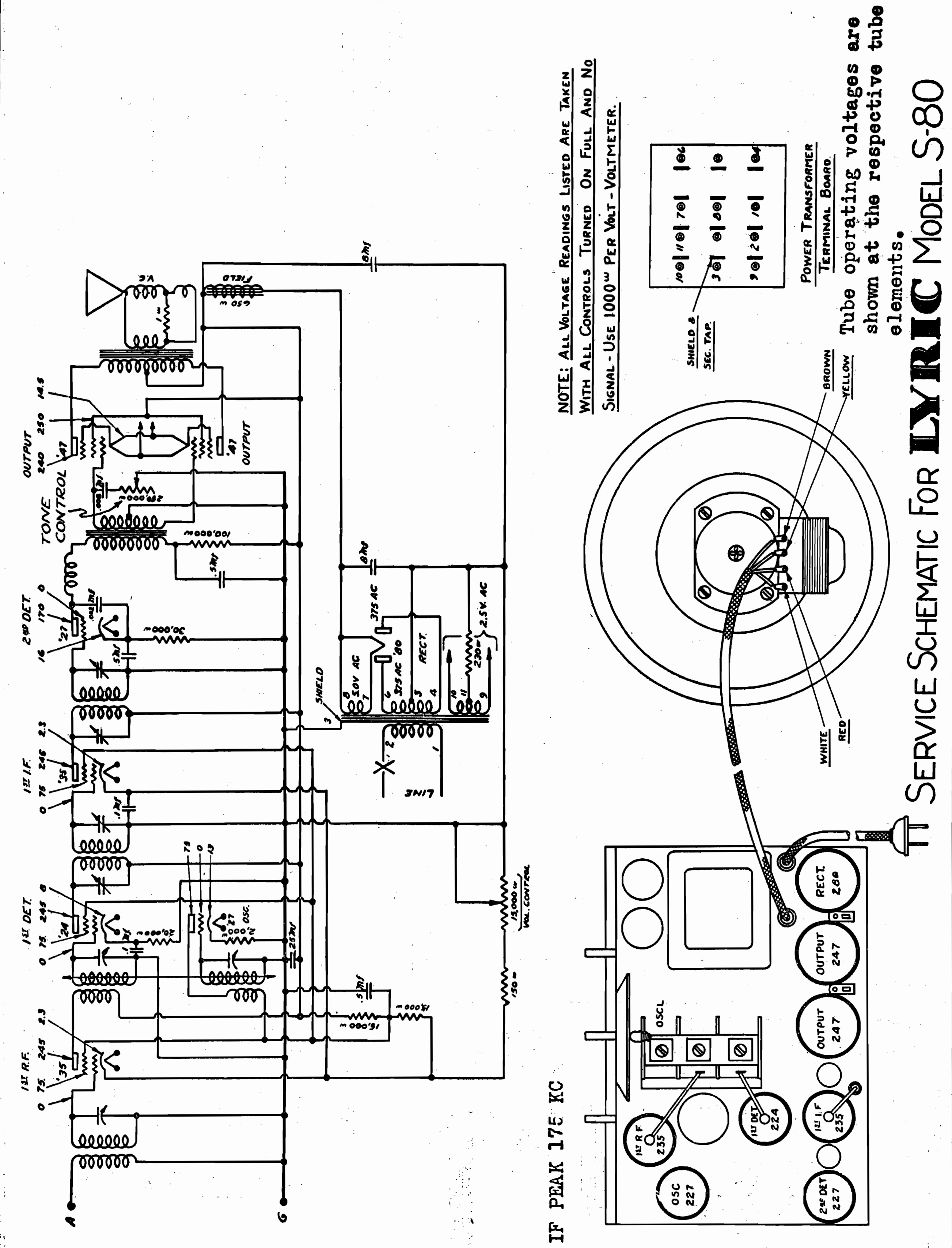
Tube operating voltages are shown at the respective tube elements.

Service Schematic LYRIC Model B-80



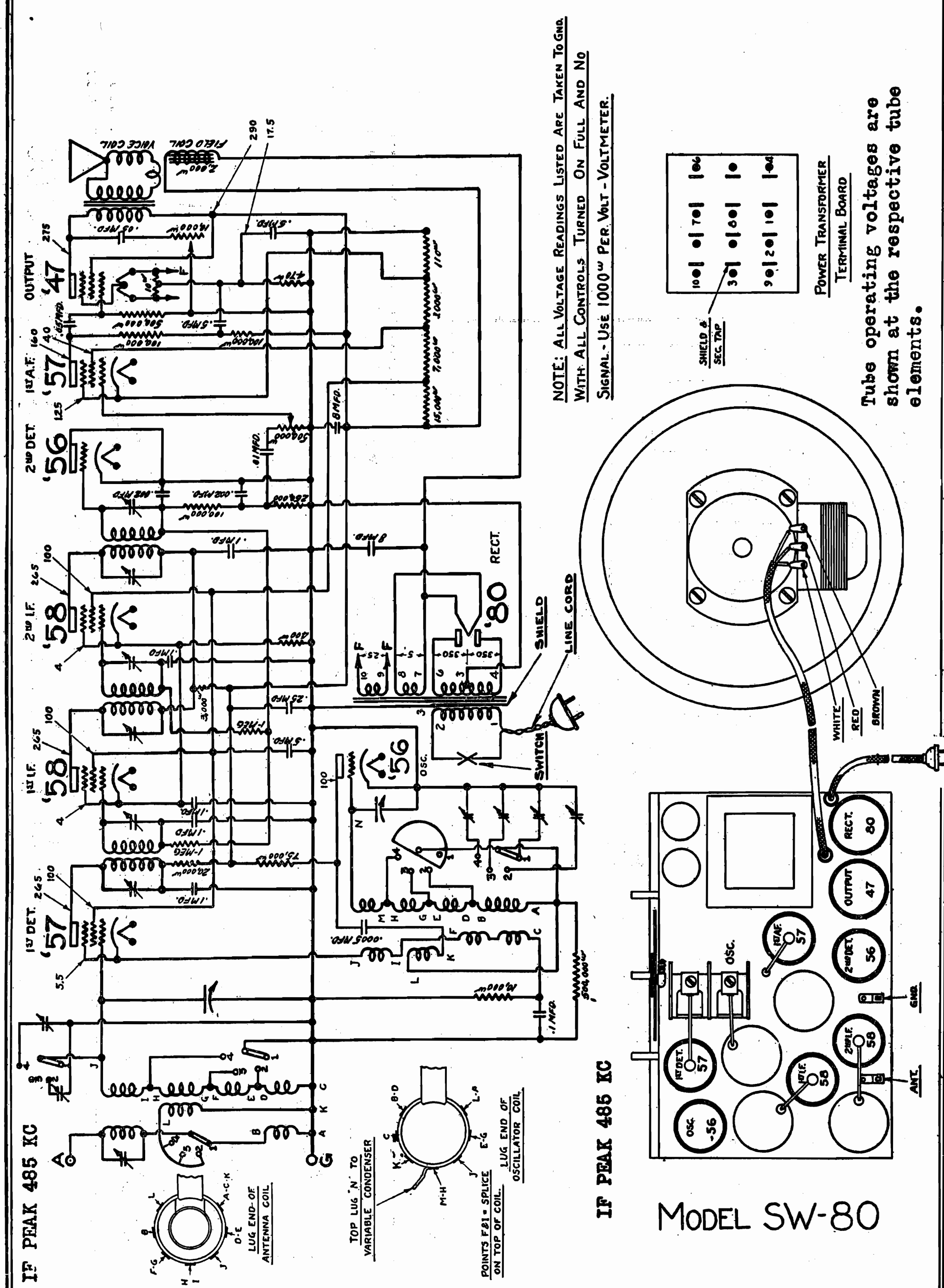
MODEL S-80

ALL-AMERICAN MOHAWK CORP.



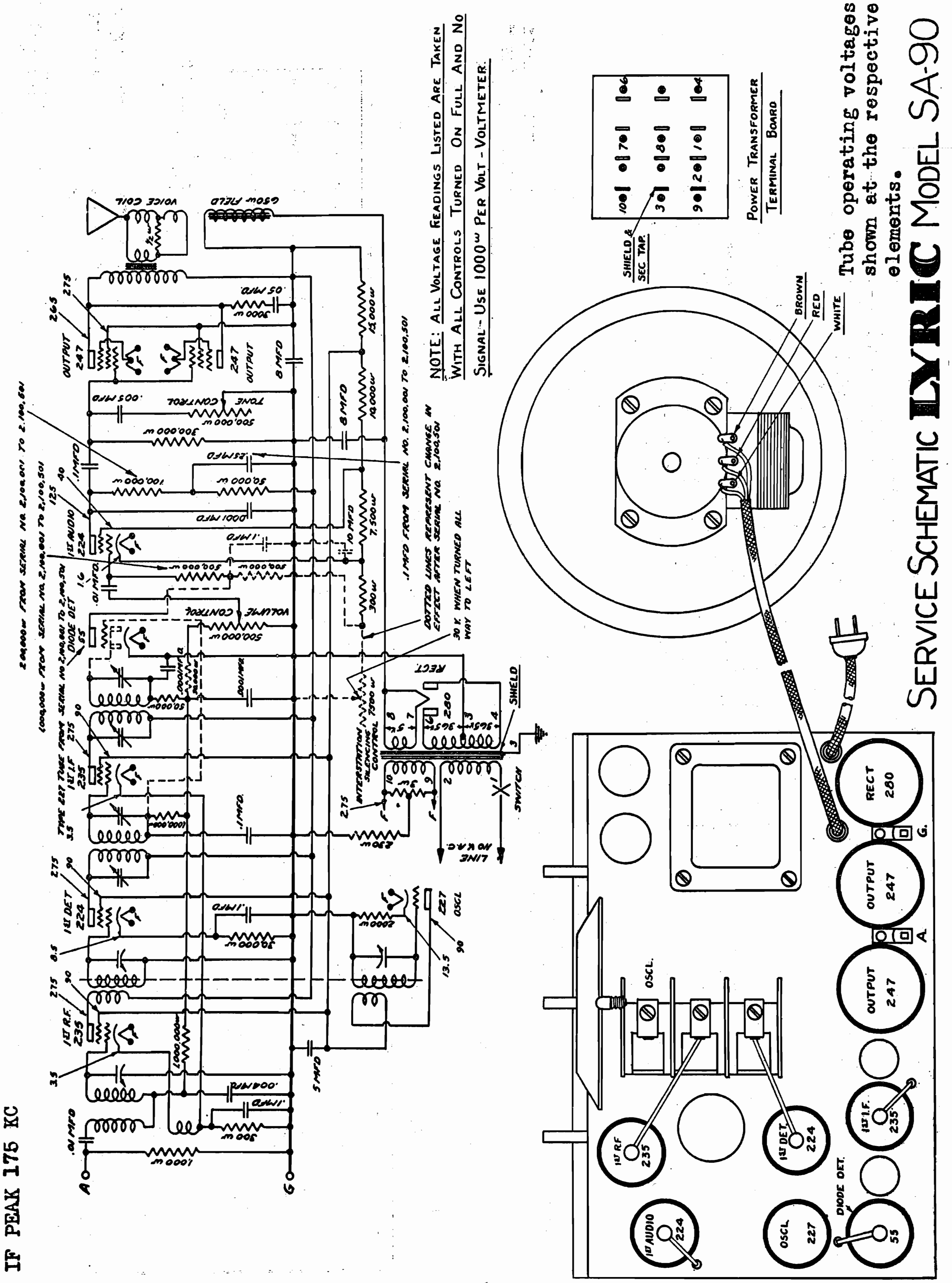
MODEL SW-80

ALL-AMERICAN MOHAWK CORP.



MODEL SA-90

ALL-AMERICAN MOHAWK CORP.



NOTE: All Voltage Readings Listed Are Taken With All Controls Turned On Full And No Signal - Use 1000Ω Per Volt - Voltmeter.

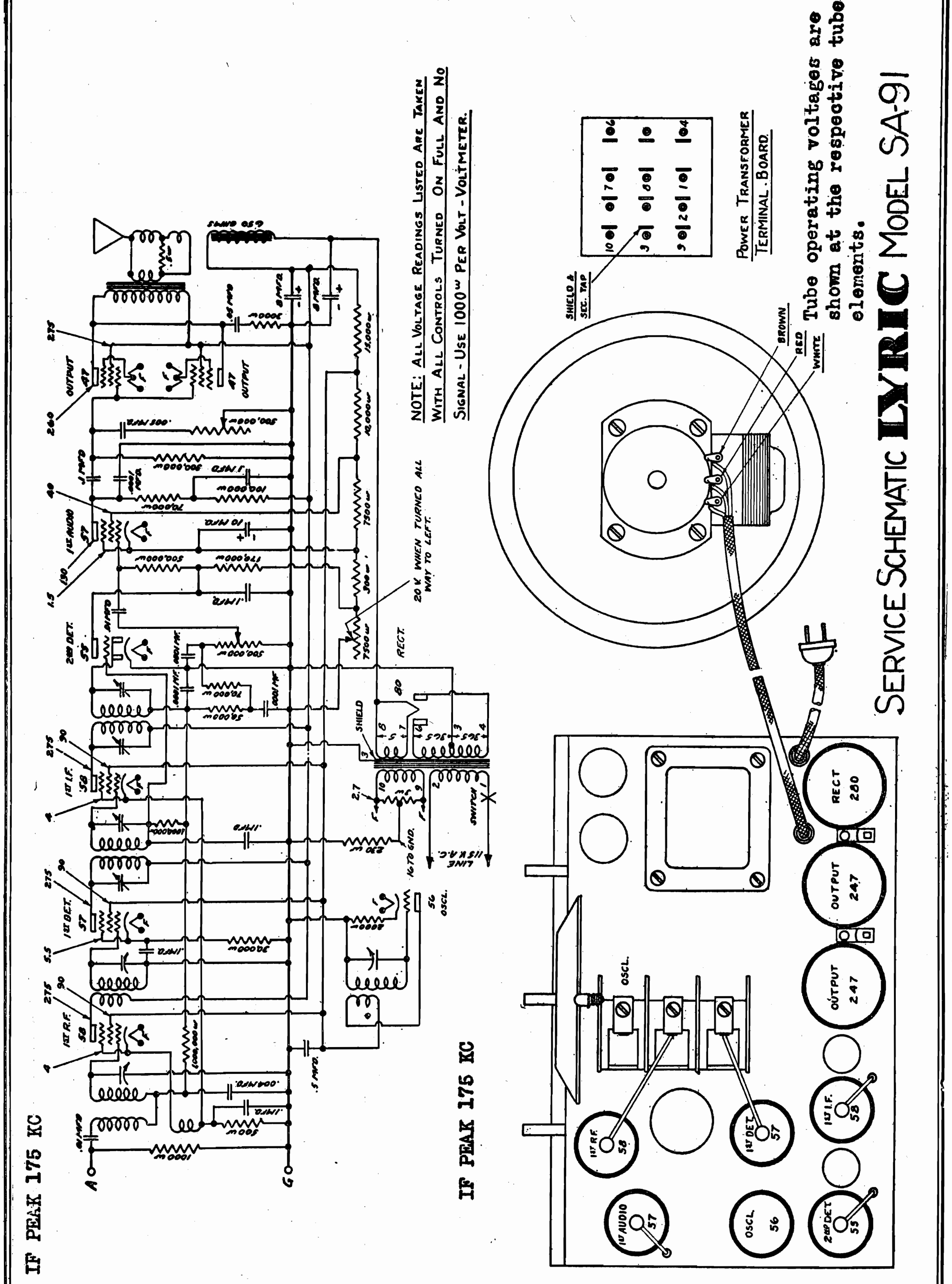
Tube operating voltages are shown at the respective tube elements.

SERVICE SCHEMATIC LYRIC MODEL SA-90

IF PEAK 175 KC

MODEL SA-91

ALL-AMERICAN MOHAWK CORP.



ALL AMERICAN MOHAWK CORP.

MODEL SA-91
Data

SERVICE NOTES

LYRIC MODEL SA 91 RECEIVER.

The Lyric type SA 91 Receiver is a 9 tube superheterodyne, embodying the following circuits:

1	1 stage RF amplification	1 Type 58 Tube
2	First detector	1 Type 57 Tube
3	Oscillator	1 Type 56 Tube
4	1 stage IF amplification	1 Type 58 Tube
5	Second detector, AVC and NOISE Suppressor	1 Type 55 Tube
6	First Audio stage	1 Type 57 Tube
7	Second audio stage	2 Type 47 Tube
8	High voltage rectifier	1 Type 280 Tube

Inasmuch as the operation of the set up to the second detector follows conventional principles, no detailed discussion will be given here. The action of the automatic volume control and noise suppressor, however, will be described in detail. To make the operation of these circuits more evident they are shown isolated from the rest of the set in diagram #59 A.

The type 55 tube used in the second detector position consists of a standard three element tube, similar to the type 56 with the addition of two small diode plate elements placed at the lower end of the cathode.

AUTOMATIC VOLUME CONTROL

The detector and automatic gain control functions are performed by the diode section of the type 55 tube which rectifies the energy sent to it by the intermediate frequency amplifier. The DC component of this energy passes through a net work of high resistances and by-pass condensers to the control grids of the RF and IF tubes to control the amount of amplification in these stages.

An increase in signal strength results in an opposite action increasing the amount of RF and IF amplification. The audio component of the signal rectified by the diode, is passed through the manual volume control which also serves as a part of the diode resistance net work. The adjustment of this control sets the amount of energy passed on to the audio amplifier for further amplification.

NOISE SUPPRESSOR

The noise suppression system operates by blocking the first audio amplifier tube and is controlled by the AVC system. Reference to figure 59A will show that the control grid of the 55 tube derives its bias from the AVC circuit being connected to the same point as the IF grid circuit. The plate circuit of this tube includes a resistance in the grid circuit of the 1st AF stage and the "noise" suppressor control which is one section of the voltage divider.

When no signal is being received, no voltage is developed in the AVC system and consequently there is no bias on the control grid of the 55 tube. This permits current to flow in its plate circuit which builds up a bias across resistor "A" overbiasing the #57 first audio tube and preventing it from aplifying static or noise which is being picked up.

When a signal is picked up the condition is reversed as the voltage developed in the AVC biases the suppressor tube grid and stops the flow of plate current. This removes the blocking bias from the first AF tube and permits the amplification of the signal.

The function of the noise suppressor control is to limit the minimum signal level, which the set will receive. This control varies the plate voltage on the control tube. As the voltage is increased (control turned to left) the amount of signal necessary to unlock the control system is increased and as the voltage is decreased (control turned to right) the signal required to unlock the noise suppressor is decreased until at the extreme clockwise position the noise control is inoperative.

To set the control the receiver should be tuned to a point where no stations are heard with the noise control turned to the extreme clockwise position. The noise control should then be turned to the left just far enough to silence static and other noises.

TECHNICAL DATA.

Drawing No. 59. Attached gives the complete circuit diagram of this receiver, electrical constants of parts and operating voltages on all tubes.

All voltage measurements should be made with a meter having a resistence of at least 1000 ohms per volt. The volume and noise controls should be turned to the extreme clockwise position and the set tuned between stations so that no signal is received while measurements are being made.

BALANCING.

Caution: When balancing radio frequency or IF circuits, be sure that the volume control is turned to the full "On" position and the output of the test oscilator adjusted to give a very weak signal. This is necessary to minimize the automatic volume control action and to permit the most accurate adjustment.

Intermediate
INTERMEDIATE FREQUENCY CIRCUITS.

The intermediate frequency amplifier of this receiver operates at 175 Kc. and an accurately calibrated test oscillator generating this frequency is necessary for ganging.

Current from the test oscillator should be fed into the set by removing the control grid cap on the type 57 detector modulator tube, and connecting the oscillator output terminals between the chassis pan and the control grid cap of this tube.

The IF transformers are tuned by adjusting the screws under the removable nmae name plate on the rear of the chassis.

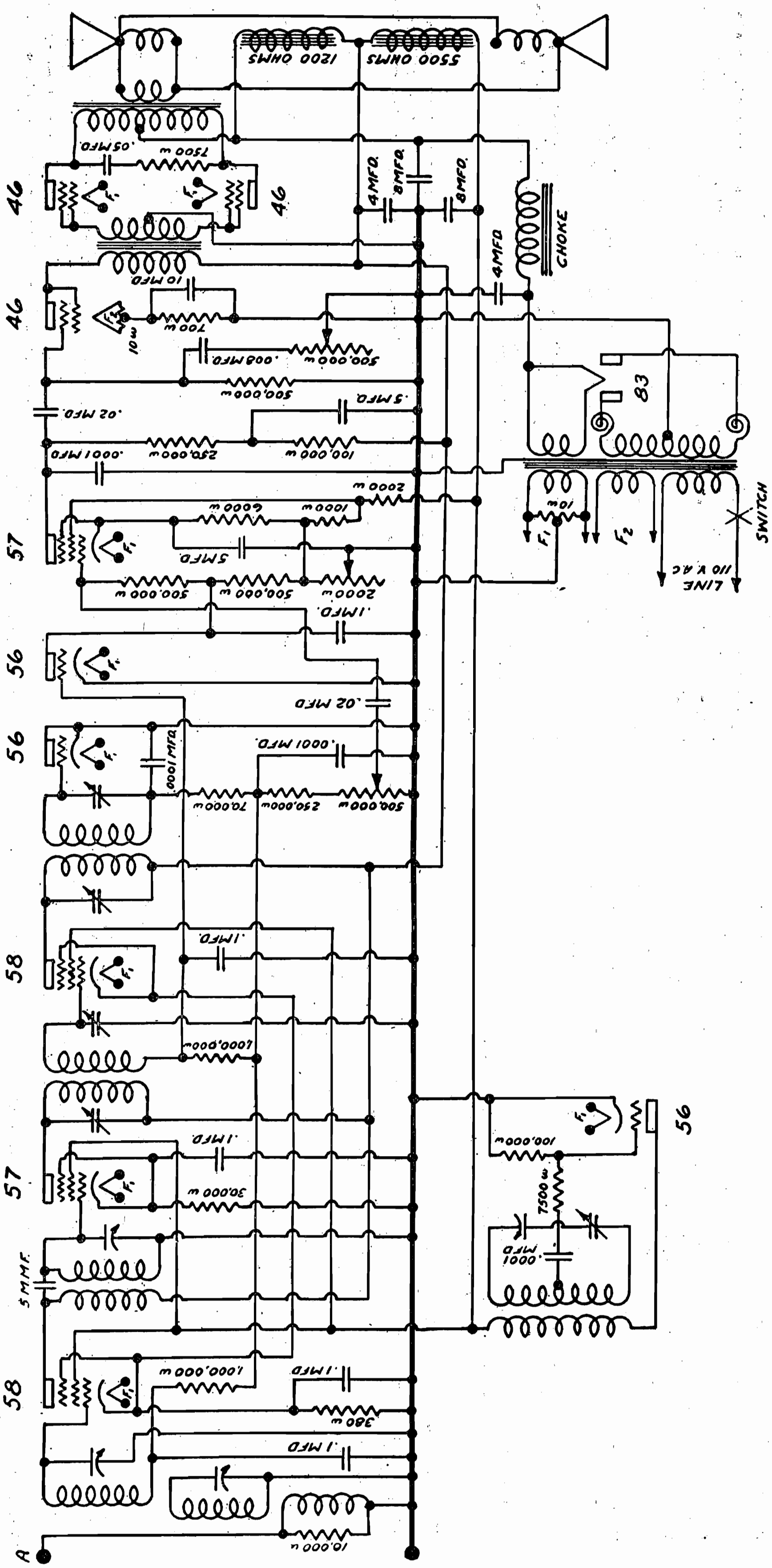
To align the RF circuits the test oscillator should first be set to some known frequency between 1400 and 1500 Kc. and the set tuned so that the dial pointer indicates this frequency. The trimmer condenser of the oscillator section of the variable condensor (front section) should then be tuned until the test signal is received with greatest output.

There are two possible adjustments on the trimmer condensers at which this signal may be received; the proper adjustment is that at which the trimmer is set to minimum capacity; that is, the adjustment at which the trimmer plate is farthest out. When this has been done the trimmer condensors of the second and third variable condensers are to be set to give maximum output.

The set should next be balanced at approximately 1250, 950, 700 and 550 Kc. in the order mentioned as follows:

MODEL SA-110

ALL-AMERICAN MOHAWK CORP.

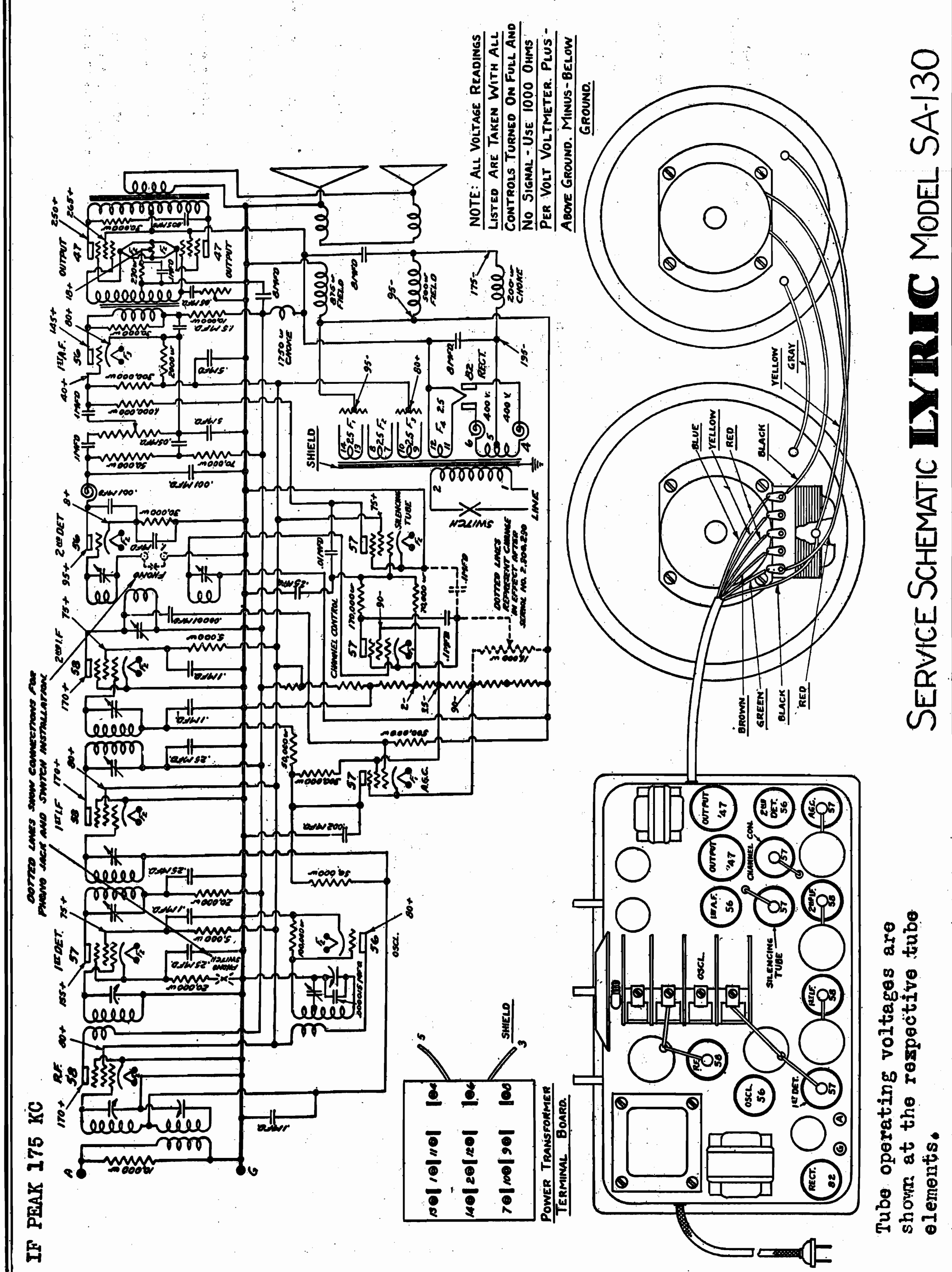


SCHEMATIC DIAGRAM OF LYRIC MODEL SA-110

IF PEAK 175 KC

MODEL SA-130

ALL-AMERICAN MOHAWK CORP.



MODEL SA-130
Service Notes

ALL-AMERICAN MOHAWK CORP.

SERVICE NOTES

LYRIC MODEL SA 130 RECEIVER.

The Lyric Model SA 130 receiver is a thirteen tube superheterodyne, embodying the "Channel Control" noise suppression system - an exclusive Lyric development.

Tube equipment consists of:

5	RCA 56 or equivalent
4	RCA 57 or equivalent
3	RCA 58 or equivalent
2	RCA 247 or equivalent
1	RCA 82 or equivalent

The outstanding feature of the "Channel Control" system of noise suppression is the fact that in addition to eliminating all static and other noise while the set is being tuned from one station to another, it makes it impossible to tune the set to anything but exact resonance with the desired signal. A variable control for the noise suppression system is placed toward the rear on the left side of the cabinet. This permits compensation for all conditions of static and other interferring noises. With the set tuned between stations so that no signal is received this knob should be rotated counter clockwise to the point where the static and other noises are just silenced. The set may then be tuned in the ordinary manner without further attention to the channel control. On channels where no station is operated or where the station is weaker than the static or interfering noise level nothing will be heard; however, on all channels where the received signal is above the noise level, the signal will be released when the set is tuned to exact resonance.

Thus it is impossible for the operator to mistune the set and receive the accompanying distorted signal.

The requirements of circuit alignment in this receiver make necessary extreme care when ganging either the RF or IF systems. For this reason detailed instructions are given. Unless these are followed, precisely, it will be impossible to obtain proper "Channel Control" operation.

Information regarding constants of the various parts, operating voltages and speaker connections are shown on the accompanying circuit diagram, drawing #56.

CIRCUIT ALIGNMENT.

Warning: Do not disturb alignment of this set unless you are sure it is in need of adjustment.

When aligning the tuned circuits of the Model SA 130 Lyric Channel Control receiver, it is necessary to follow the exact sequence of operations given in order to maintain accurate dial calibration and proper operation of the channel control system.

EQUIPMENT.

Equipment necessary for aligning the tuned circuits is as follows:

1. Calibrated RF oscillator with frequency range 550 - 1500 Kc.
2. Accurately calibrated 175 Kc. oscillator.
3. Output meter.
4. Insulated screw driver.
5. 3 Metalized 20,000 ohm, 1/2 watt resistors
   May be obtained from: International Resistance Corporation
   2006 Chestnut Street
   Philadelphia, Pa., or,
   Rudolph Wurlitzer Mfg. Company Service Dept.

GENERAL.

During all ganging operations the "Channel Control" knob must be in full "On" (extreme clockwise) position and the channel control tube, (indicated on diagram) removed from socket.

INTERMEDIATE FREQUENCY SYSTEM.

The intermediate frequency system of this receiver consists of two stages of 175 Kc. amplification. Three IF transformers are used.

The attached diagram #56 A shows a bottom view of the rear edge of the chassis pan and indicates the points at which the 20,000 ohm resistors are connected and the adjusting screws of the IF transformers.

Energy from the 175 Kc. oscillator is fed into the set by removing the grid cap from the first detector tube and connecting the oscillator between the grid cap of the tube and the chassis pan. As weak a signal as possible should be used in order to eliminate the apparent broadness of tuning caused by the automatic volume control.

1. Attach 20,000 ohm resistor across points 1 and 2 (This is done by bending ends of resistor leads to form plugs and inserting one lead into one of the small eyelets #1 and the other into the large eyelet #2.

2. Adjust screw "A" for maximum output.

3. Remove resistor from 1 and 2 and connect across points 3 and 4.

4. Adjust screw "B" for maximum output.

Note: Resistor must be left connected across points 3 and 4 while adjusting 2nd and 3rd stages and RF circuits.

5. Adjust second IF transformer as described above placing a second resistor across points 5 and 6 when adjusting C and transferring it to points 7 and 8 when adjusting D.

Note: Second resistor must be left connected across 7 and 8 while adjusting 3rd stage and RF circuits.

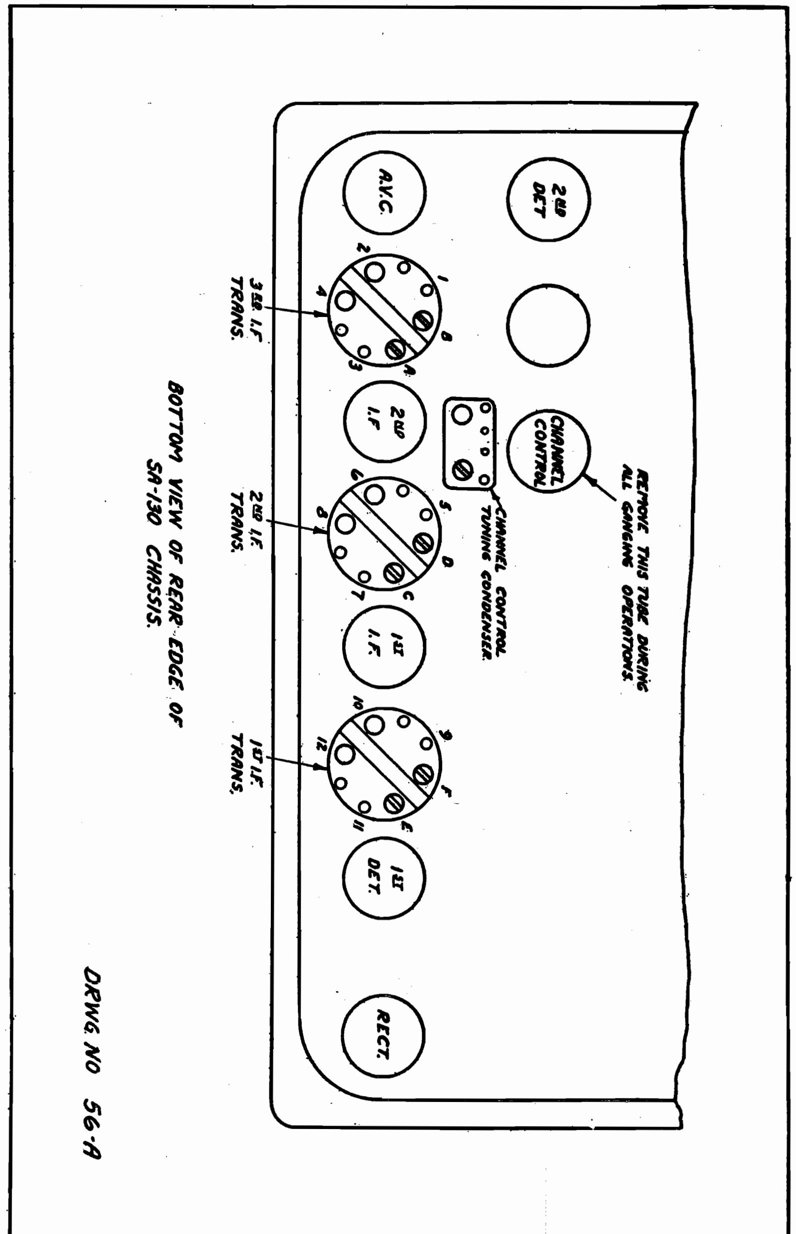
6. Adjust third IF transformer as described above placing a third resistor across points 9 and 10 when adjusting E and transferring it to points 11 and 12 when adjusting F.

Note: Third resistor must be left across 11 and 12 while adjusting RF circuits.

Important: Be sure to leave the three 20,000 ohm resistors connected across the IF transformers at points 3 and 4, 7 and 8, 11 and 12 while ganging them, in place also while ganging the RF circuits. It is impossible to align these circuits if this is not done.

ALL-AMERICAN MOHAWK CORP.

MODEL SA-130
Service Notes



SERVICE NOTES

- 3 -

7. Tune channel control circuit (adjusting screw G) for dip in output reading.

Note: The circuits of the three IF transformers are tuned for maximum output. The channel control circuit must be tuned for a dip or decrease in the output meter reading either side of which output increases.

It is important that the input from the 175 Kc. oscillator be kept as low as possible all during the aligning operations/as this permits the most accurate adjustment. and volume control turned all the way "On"

RF SYSTEM.

Viewing the variable condenser from the front of the chassis the four sections tune various circuits in the following order:

1st Section)
2nd Section) Antenna pre-selector system.
3rd Section) Oscillator.
4th Section) RF interstage transformer.

In this receiver an adjustable padding condenser is used to obtain the difference of 175 Kc. between the tuning of the oscillator and remaining RF circuits. The adjusting screw for this condenser is accessible through a hole in the chassis pan between the partitions of the oscillator section of the variable condenser.

Before attempting to gang the RF circuits the service man should be sure that the IF and channel control circuits are accurately tuned to 175 Kc. as described in the preceding section.

1. Adjust dial mechanism so that when condenser is turned to maximum capacity with plates against stop dial reads 525 Kc.

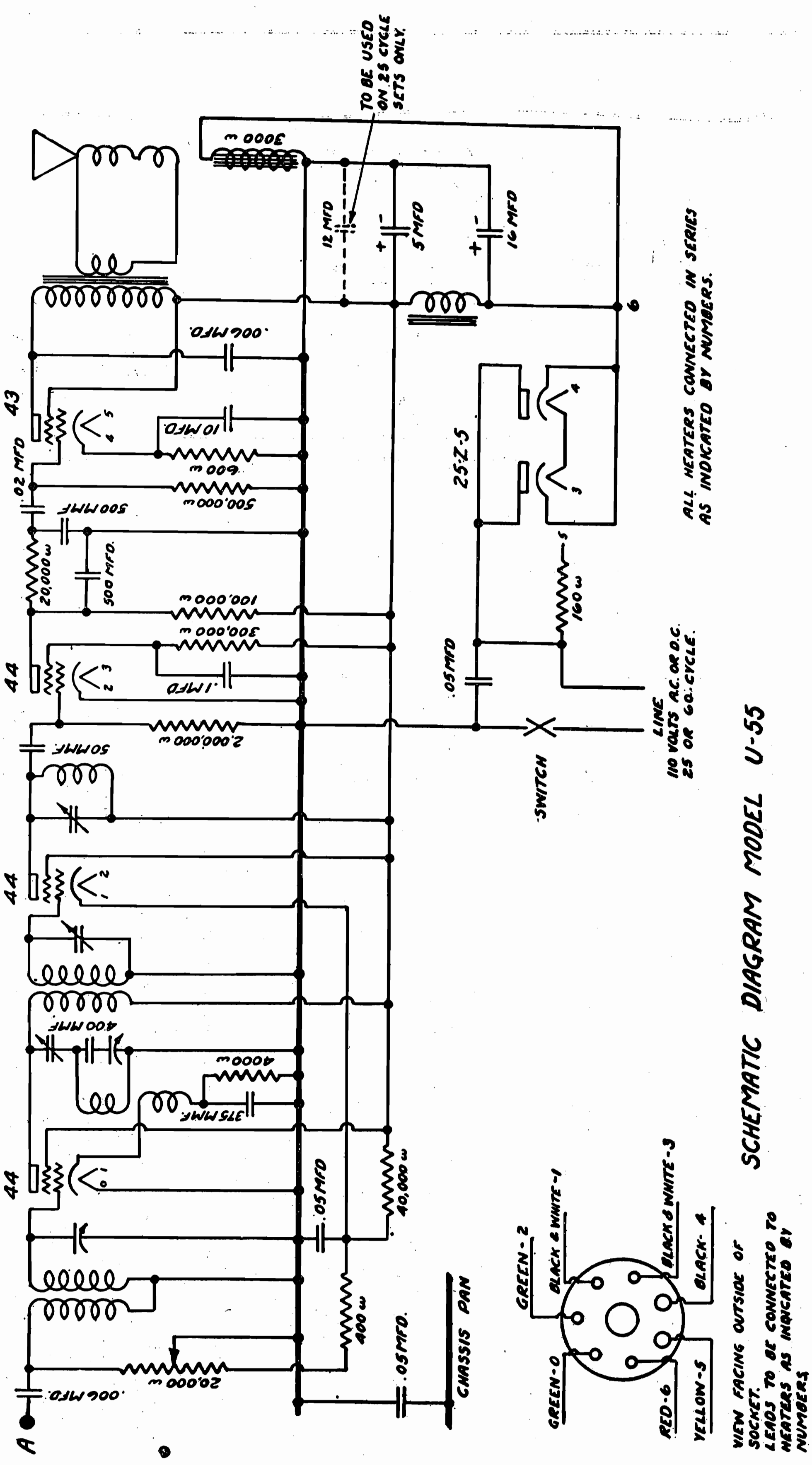
2. Set test oscillator to some known frequency between 550 and 600 Kc. Tune variable condenser so that pointer indicates this frequency on dial scale and adjust padding condenser until signal is heard with maximum output.

3. Test set oscillator to some known frequency between 1400 and 1500 Kc. and tune variable condenser until pointer indicates this frequency on dial. Adjust trimmer condenser of oscillator section, third trimmer from front of chassis until signal is heard with maximum output. Note: There are two possible settings of the oscillator trimmer condenser at which the signal can be heard. The proper setting is that at which the trimmer is set to minimum capacity (plate of trimmer condenser farthest out). The trimmer condensers of 1st, 2nd and 4th variable condenser sections should then be adjusted to give maximum output.

4. Align circuits at known frequencies approximately 1200 Kc., 900 Kc., 700 Kc. and 550 Kc. as follows: Set test oscillator to some known frequency, approximately. 1200 Kc., tune set so that dial indicates this frequency, bend adjustable sections of rotor end plates of oscillator condenser for maximum output, then bend adjustable sections of 1st, 2nd and 4th variable condenser sections for maximum output. Repeat process at some known frequency, approx. 900 Kc., 700 Kc. and 550 Kc. in order given.

With IF transformers set to exactly 175 Kc. and RF circuits aligned according to these instructions, the dial calibration should be accurate at all points of the dial to within one or two kilocycles.

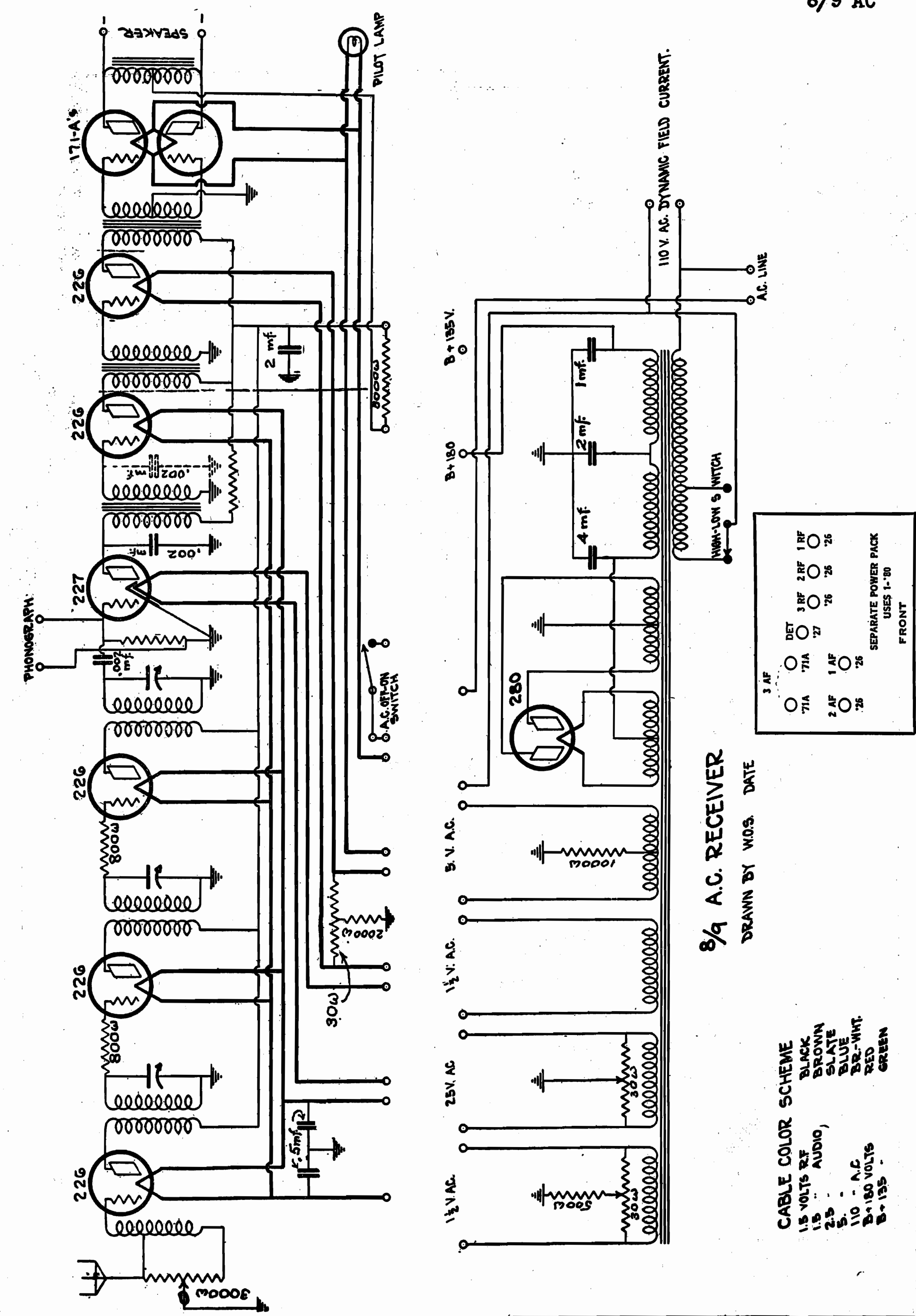
MODEL U-55 ALL-AMERICAN MOHAWK CORP.



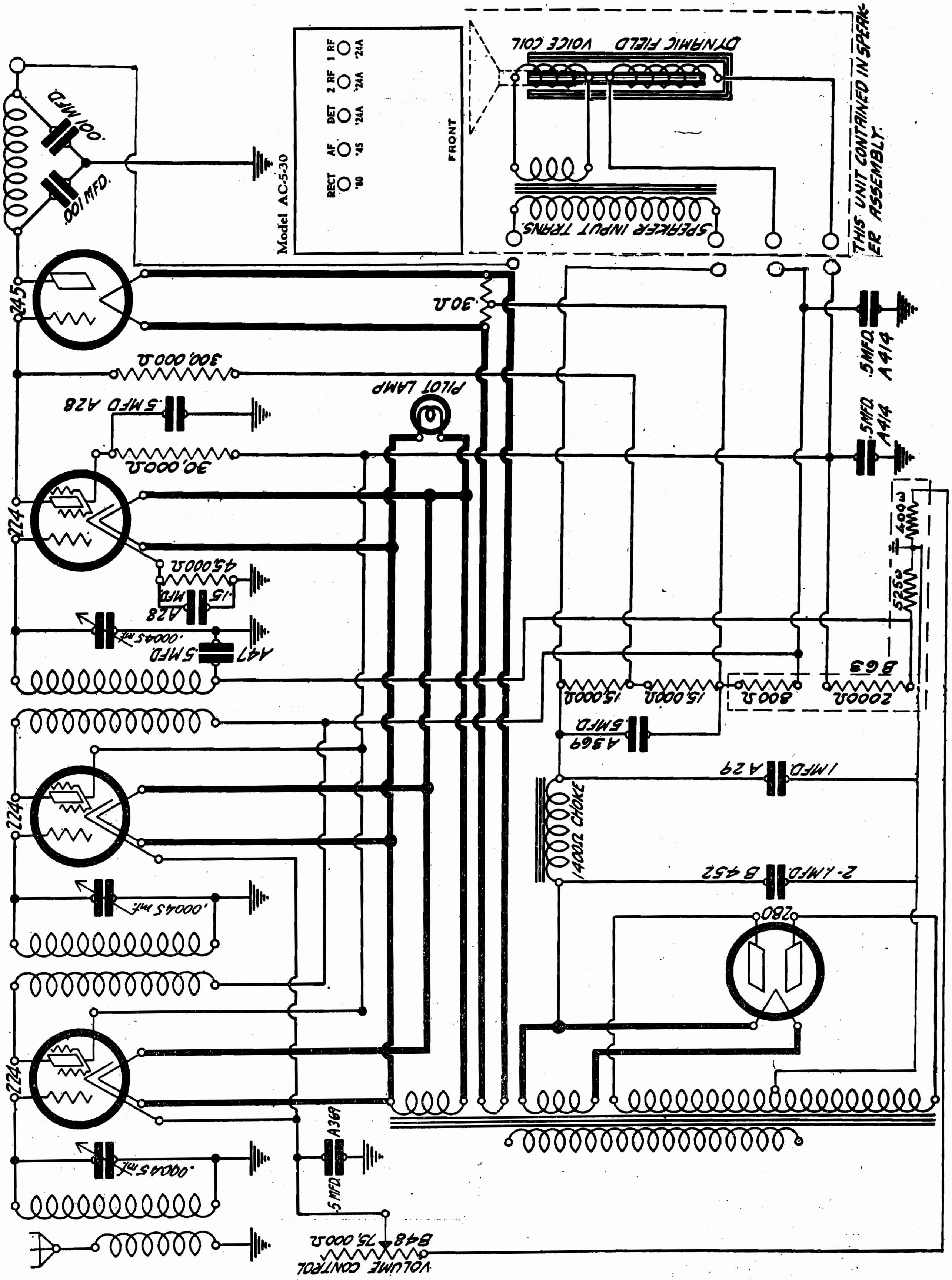
IF PEAK 485 KC

ALLIED RADIO CORP.

MODEL KNIGHT 8/9 AC



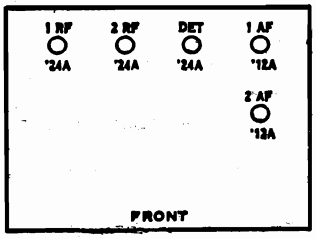
MODEL AC-5 (1930) ALLIED RADIO CORP.



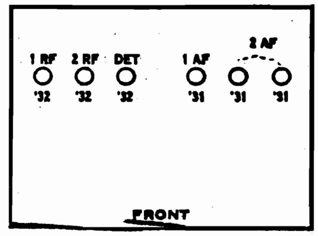
ALLIED RADIO CORP.

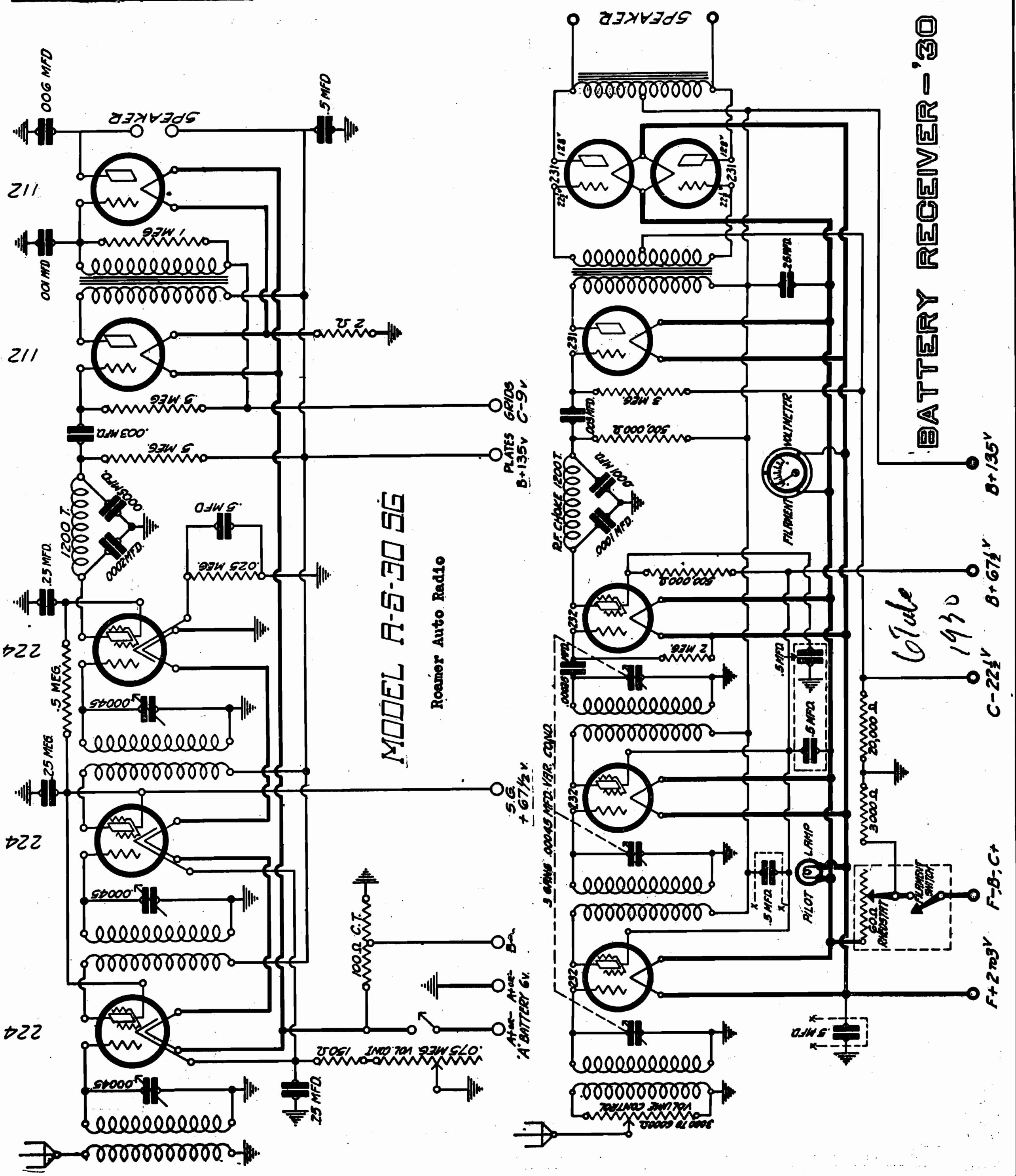
MODEL Roamer Auto Set 6 Tube "B" '30

Model A-5-30 SG



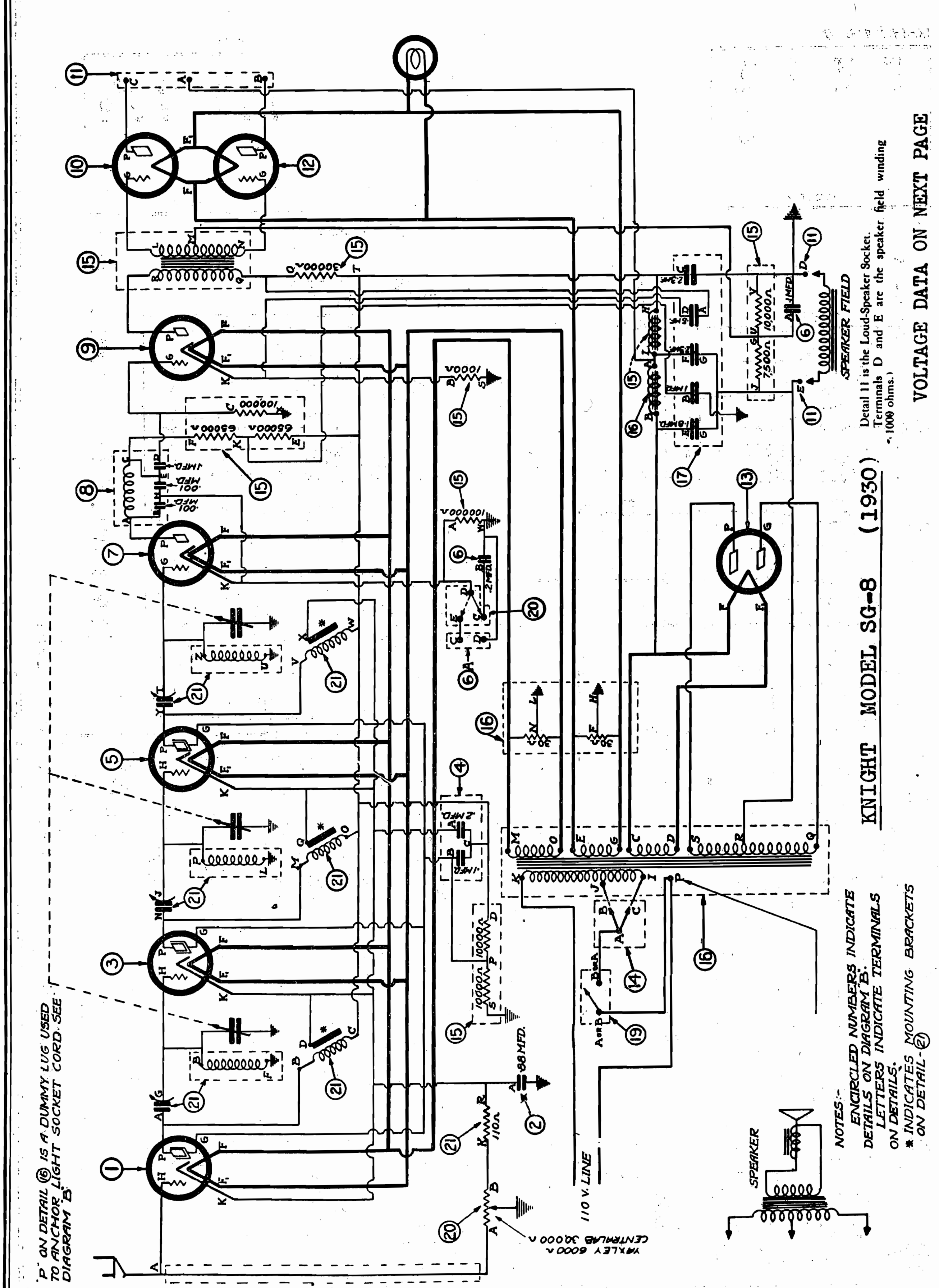
Model B-6-30





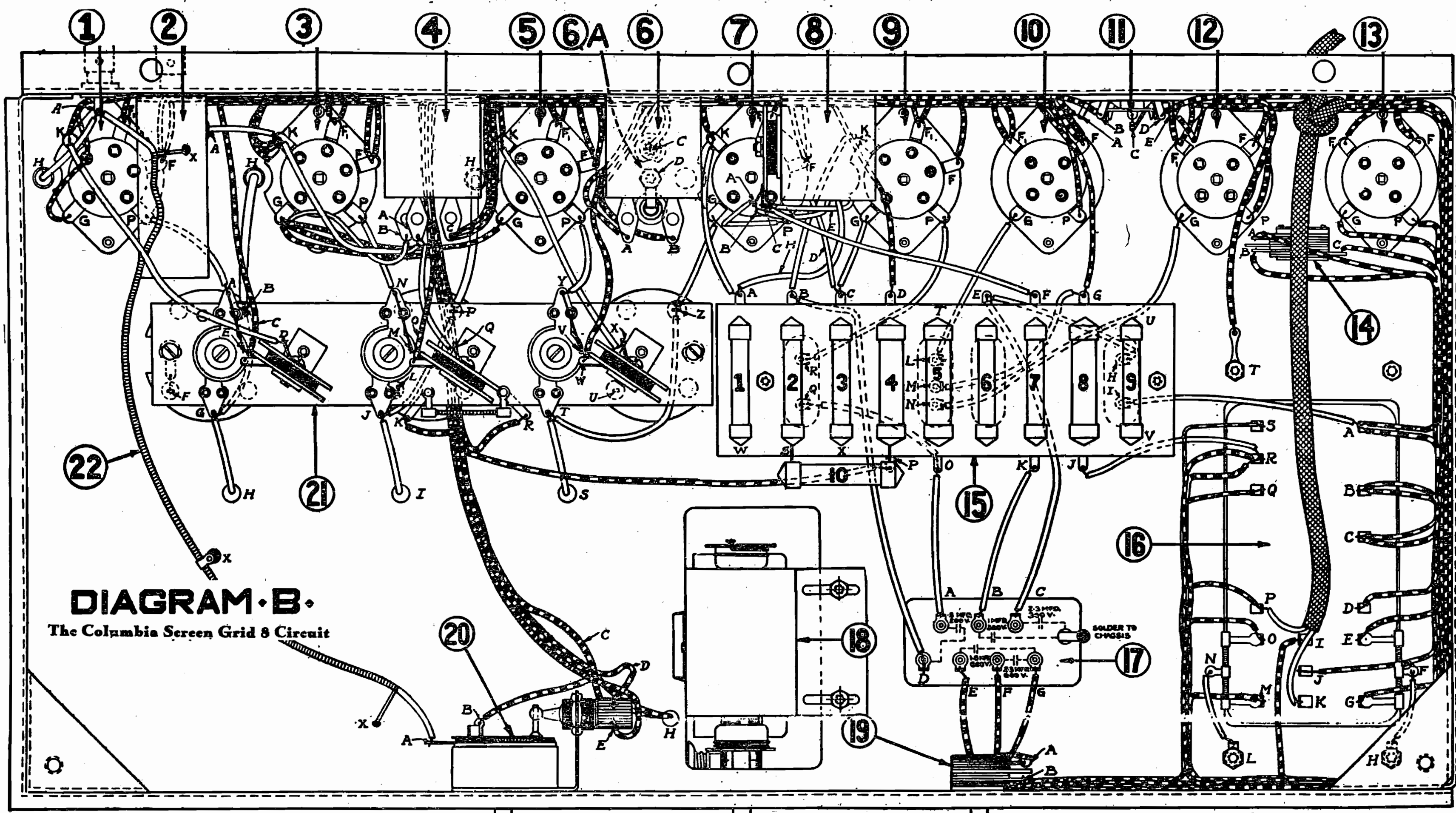
MODEL KNIGHT SG-8
1930

ALLIED RADIO CORP.



ALLIED RADIO CORP.

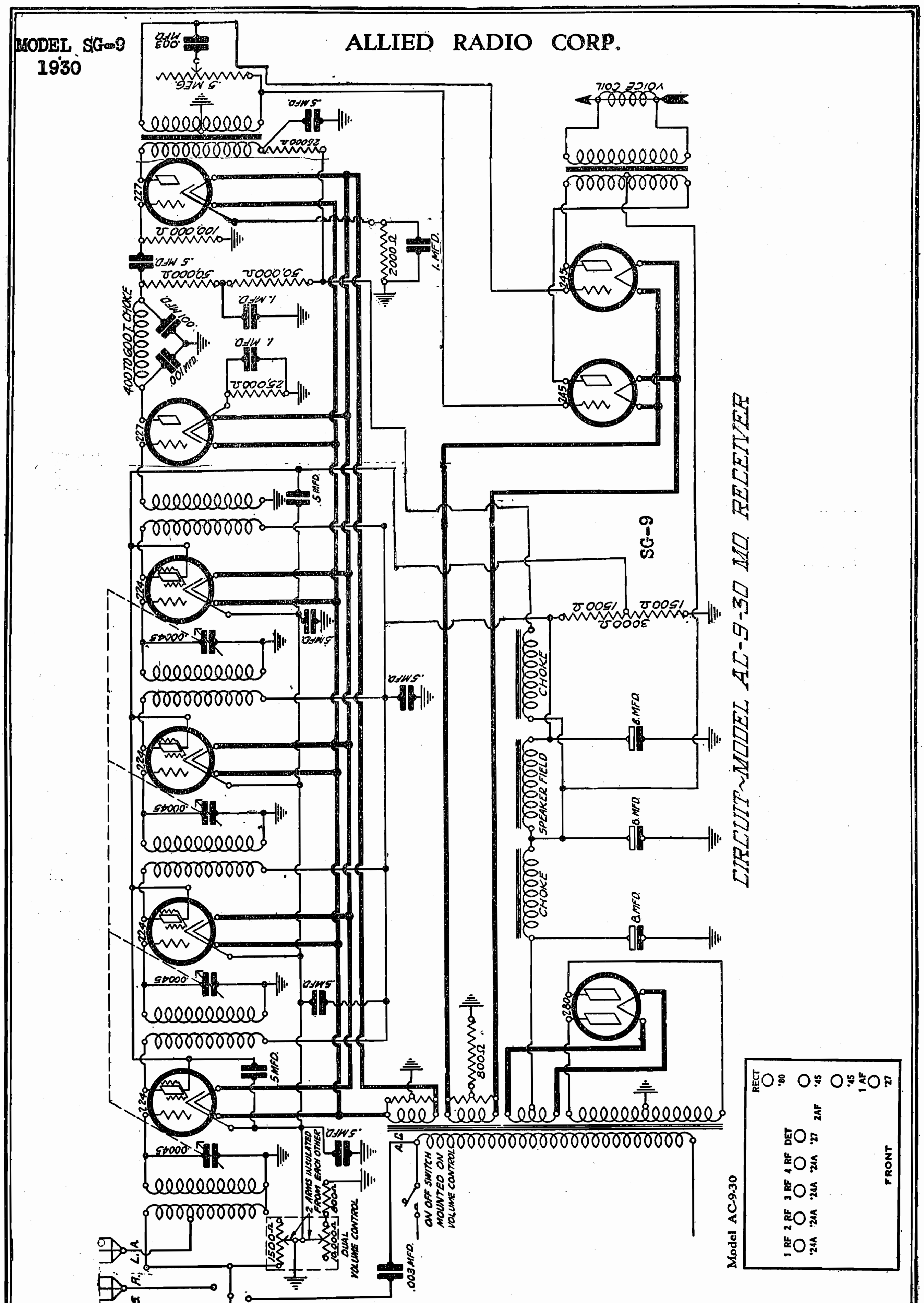
MODEL KNIGHT SG-8
Bottom View



KNIGHT MODEL SG-8 BOTTOM VIEW

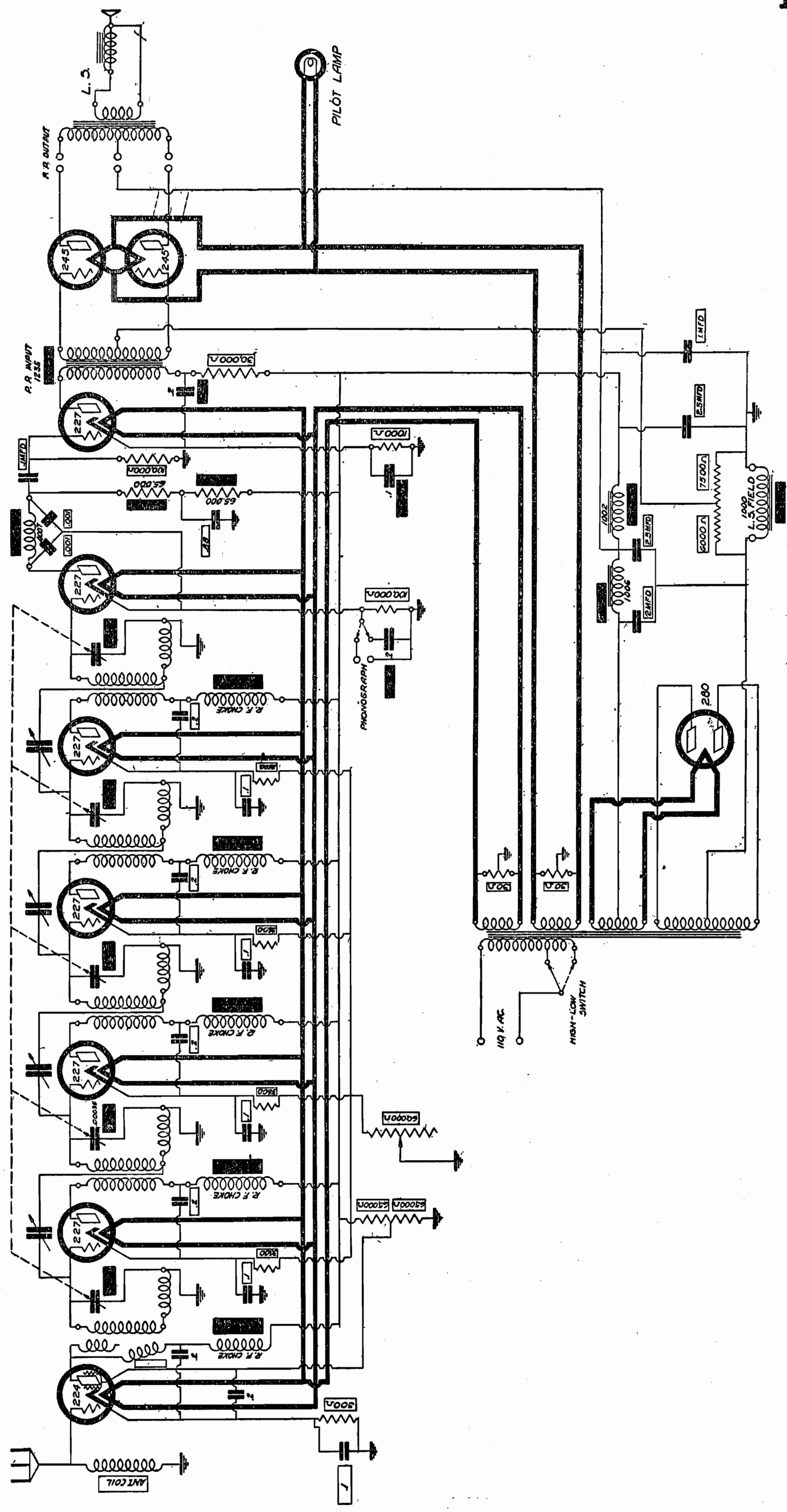
Tube No. In Order (1)	Type Of Tube (2)	Position of Tube 1st. R.F. Det., Etc. (3)	Readings, Plug In Socket Of Set: Tube Out: A Volts (4)	B Volts (5)	Tube In Tester: A Volts (6)	B Volts (7)	C Volts (Control Grid) (8)	Cathode —Heater Volts (9)	Normal Plate M.A. (10)	Plate M.A. Grid Test (11)	Plate Change M.A. (12)	Screen Grid Volts (13)
1	224	1st R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
2	224	2nd R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
3	224	3rd R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
4	227	Det.	2.45	106	2.4	106	—14.5	14.5	.2	....	....	
5	227	1st A.F.	2.45	162	2.4	68	—3.	3.	3.2	3.8	.6	
6	245	2nd.A.F.	2.35	230	2.2	212	—3.8	. .	20	23	3.	
7	245	2nd A.F.	2.35	230	2.2	212	—3.8	. .	19	22	3.	

Line Voltage 115. Set on Low (1) Volt Tap. Volume Control Position Maximum.


MODEL SG-9
1930
ALLIED RADIO CORP.
CIRCUIT~MODEL AC-9-30 MD RECEIVER
SG-9
VOICE COIL
.003 MFD
.5 MEG.
.5 MFD.
25000 Ω
227
100,000 Ω
2000 Ω
1. MFD.
.5 MFD.
50,000 Ω
50,000 Ω
400 TO 600 T. CHOKE
.001 MFD.
.001 MFD.
1. MFD.
1. MFD.
25000 Ω
227
245
245
224
.00045
1500 Ω
1500 Ω
3000 Ω
CHOKE
SPEAKER FIELD
8 MFD
CHOKE
280
800 Ω
.5 MFD
2 ARMS INSULATED FROM EACH OTHER
1500 Ω
2000 Ω
DUAL VOLUME CONTROL
ON OFF SWITCH MOUNTED ON VOLUME CONTROL
AC
.003 MFD.
L. A.
R.
S.
Model AC-9-30
1 RF '24A
2 RF '24A
3 RF '24A
4 RF '24A
DET '27
2AF '45
1 AF '27
RECT '80
FRONT

ALLIED RADIO CORP.

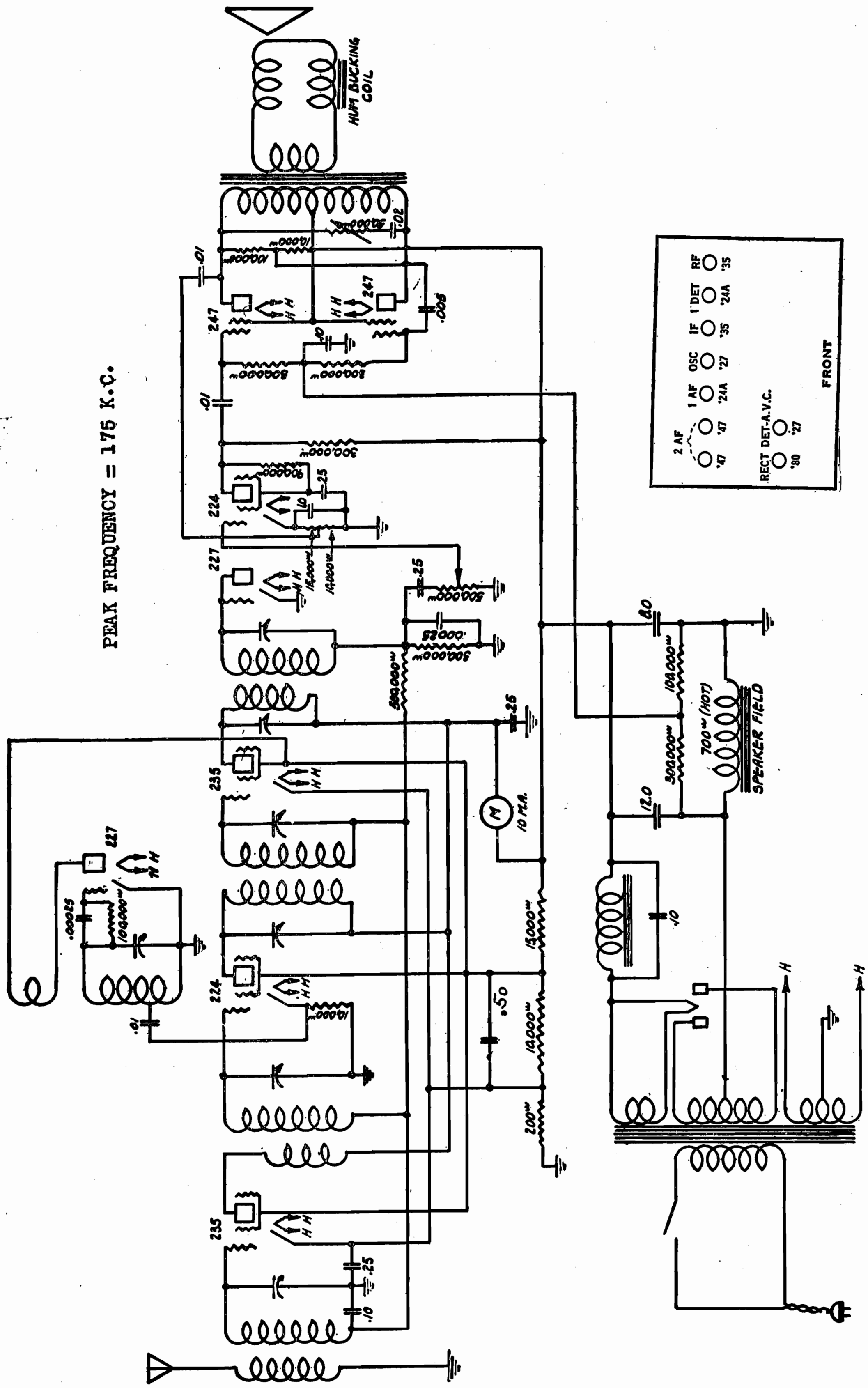
MODEL KNIGHT SG-10
1930



RECEIVER SG-10 (1930)

MODEL KNIGHT 118
AVC Super 1930

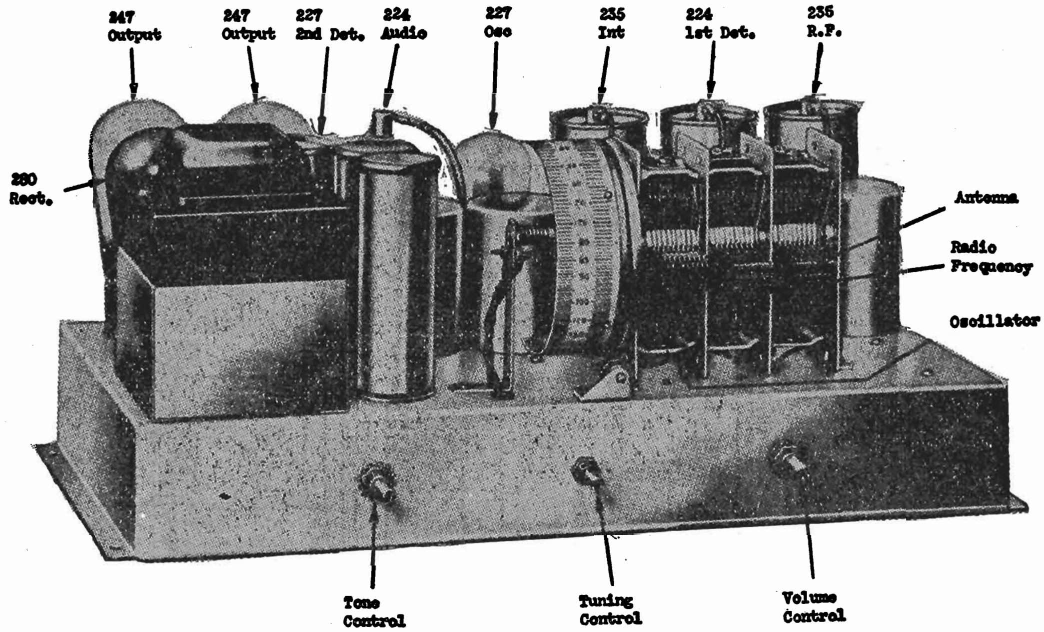
ALLIED RADIO CORP.



ELECTRO DYNAMIC SPEAKER:
The electro dynamic speaker field winding, which is 700 ohms, is utilized as an additional choke in the filter circuit. The correct bias for the two 247 output tubes is obtained from the voltage drop across the speaker field shunt resistors.

ALLIED RADIO CORP.

MODEL KNIGHT 118
Service Notes



ALIGNMENT OF RECEIVER:
Because of the construction and thorough impregnation of the intermediate coils, the intermediate stages should rarely need retracking. Only when an intermediate coil has become defective due to an open or burned out winding, should it be necessary to readjust the intermediate trimmers. Should this occur, it is necessary that an oscillator be used and the intermediate trimmers be adjusted at 175 kilocycles. To align the intermediate stages, connect the high side of the oscillator output to the grid circuit of the first detector, which is done by disconnecting the grid cap of the 224 first detector and connecting the high side of the test oscillator to the control grid of this tube. The ground side of the test oscillator should be connected to the ground post on the chassis. Set the oscillator at 175 kilocycles and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. Be sure that the output from the oscillator is not so large that it will overload the second detector. If during the alignment the meter goes off scale, reduce the output of the test oscillator or adjust the receiver volume control.

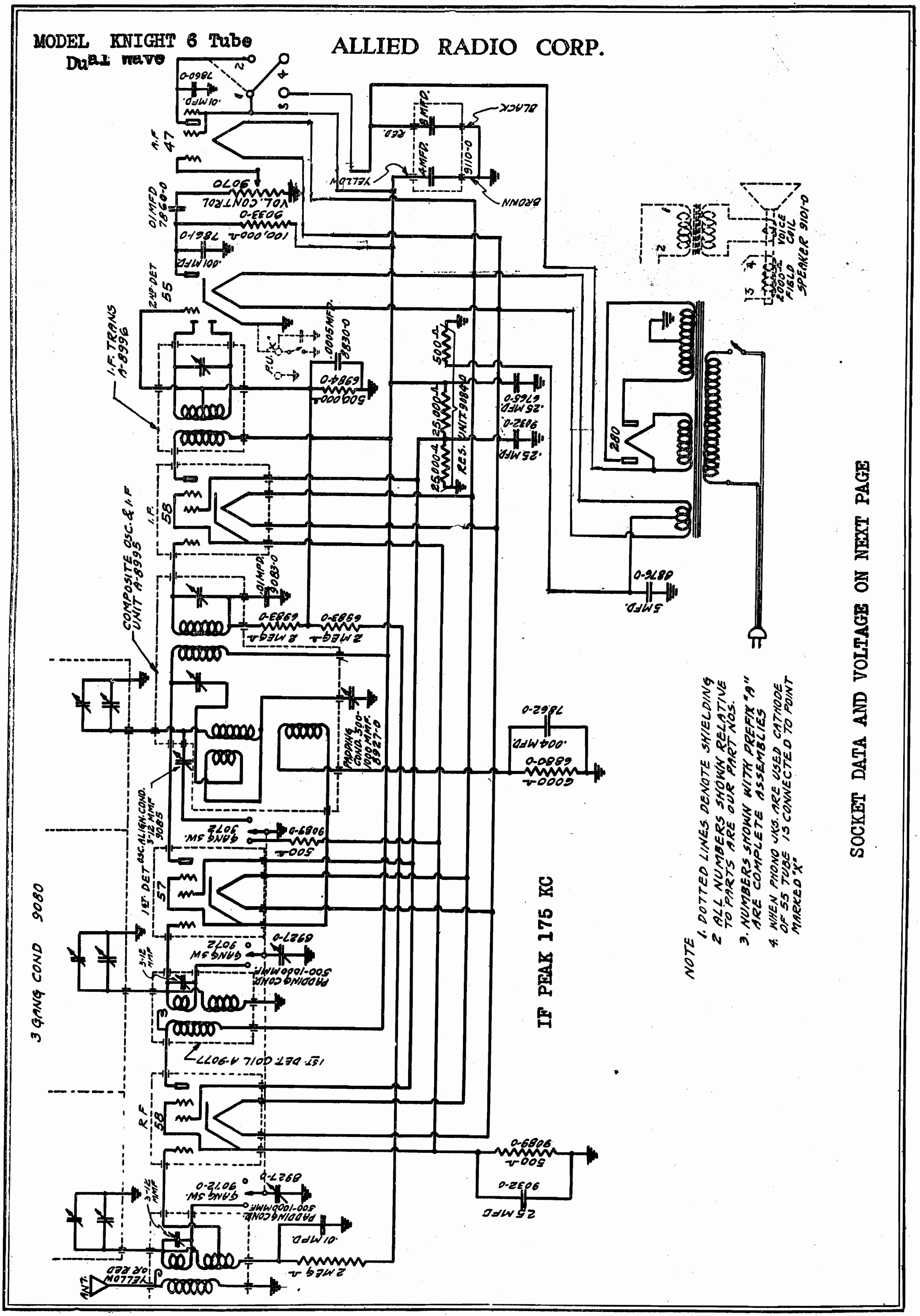
The trimmers of the intermediate coils are accessible through the small holes in the bottom of the chassis. There are two trimmers to each intermediate coil. Align the grid trimmer of the first intermediate coil. After a maximum reading is obtained by adjusting the grid trimmer on the first intermediate, adjust the primary for maximum reading and then recheck the grid side to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate coils. After both intermediate coils are properly aligned the adjustment of the intermediate stage is complete and they should not be further disturbed.

Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver is out of the cabinet it will be necessary to use some temporary indicator so that the position 1435 kilocycles on the the dial may be accurately located. (This indicator should be set so that when the variable condensers are at the maximum capacity stop the indicator points to the last line on the dial at the low frequency end.) Then track the variable condensers by adjusting the trimmer condensers in the following order: Oscillator, antenna and radio frequency - (reading from the front of the receiver toward the back, the variable condenser sections are: Oscillator, antenna and radio frequency). After the variable condensers have been properly tracked at 1435 kilocycles, adjust the oscillator to 1295 kilocycles. Tune the receiver to this frequency. Check alignment of the condensers at this point by bending the end plate of the rotors in and out, noting the change in reading on the output meter. If when the plates are bent in the reading is increased, it is an indication that that particular section requires more capacity and the end plate should be permanently bent in at this point; or, if when the end plate is bent away the reading is increased, the end plate should be bent away permanently, as it is an indication that that particular section requires less capacity at that particular point. The variable condensers should be checked in this manner at 1295, 880, 650 and 550 kilocycles. These points have been chosen so as to take advantage of the slots in the end plates of the variable condensers. This procedure of bending plates should rarely be necessary on the oscillator section, as the plates of the oscillator section are especially designed to properly track over the broadcast spectrum, providing the antenna and radio frequency stages are correctly aligned.

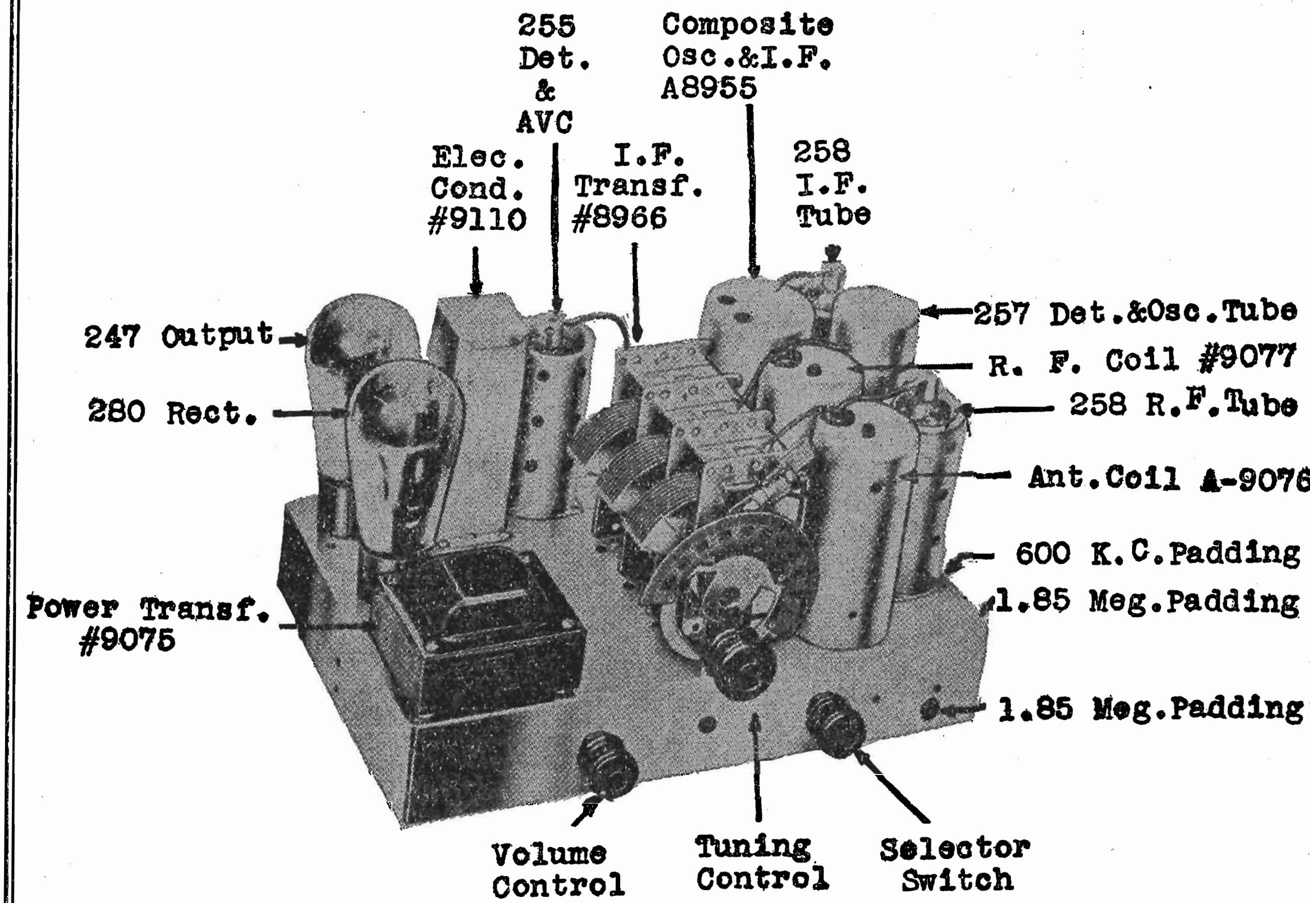
Tube Voltages

Type of tube	Position of Tube	Filament Volts	B Volts	C Volts	Normal Plate M.A.	Screen Volts
227	Oscillator	2.4	62.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4,35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
227	2nd Detector	2.4				
247	Pentode	2.4	220	8.**	32.5	250
247	Pentode	2.4	220	8.**	32.5	250
280	Rectifier	4.9			47.5 ea.plate	
224	1st Audio	2.4	100	2.1*	.5	35*

115 V. line Volume Control Full On
**To read the 247 bias, read between 247 grid and ground.
*These readings are only comparative and are not true voltages applied. The volt meter, when the readings are taken at these points, is in series with a very high resistance.


MODEL KNIGHT 6 Tube
Dual wave
ALLIED RADIO CORP.
A.F. 47
2ND DET 55
I.F. TRANS A-8996
COMPOSITE OSC. & I.F. UNIT A-8995
I.F. 58
1ST DET 57
RF 58
3 GANG COND 9080
1ST DET COIL A-9077
VOL. CONTROL 9070
SPEAKER 9101-0
IF PEAK 175 KC
NOTE
1. DOTTED LINES DENOTE SHIELDING
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NOS.
3. NUMBERS SHOWN WITH PREFIX "A" ARE COMPLETE ASSEMBLIES
4. WHEN PHONO JKS. ARE USED CATHODE OF 55 TUBE IS CONNECTED TO POINT MARKED "X"
SOCKET DATA AND VOLTAGE ON NEXT PAGE

ALLIED RADIO CORP. MODEL KNIGHT 6 Tube Dual Wave



VOLTAGE TABLE:
Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table given below is taken at 115 volts line. It must be remembered that the voltage readings vary directly as the line voltage and also with the accuracy of the meters used. A variation of 10% plus or minus is permissible.

TUBE VOLTAGES

Type of Tube	Position of tube	Filament volts	Plate volts	-C volts	Normal plate.M.A.	Screen Volts
258	Radio frequency	2.3	225	2.5*	8	92
257	Composite oscillator and modulator	2.3	225	5.	3.5	92
258	Intermediate frequency	2.3	225	2.5*	8	92
255	Detector and audio	2.3	30*			
247	Output	2.3	215	5 **	32.5	225
280	Rectifier	4.9	27.5 M.A. ea. plate			

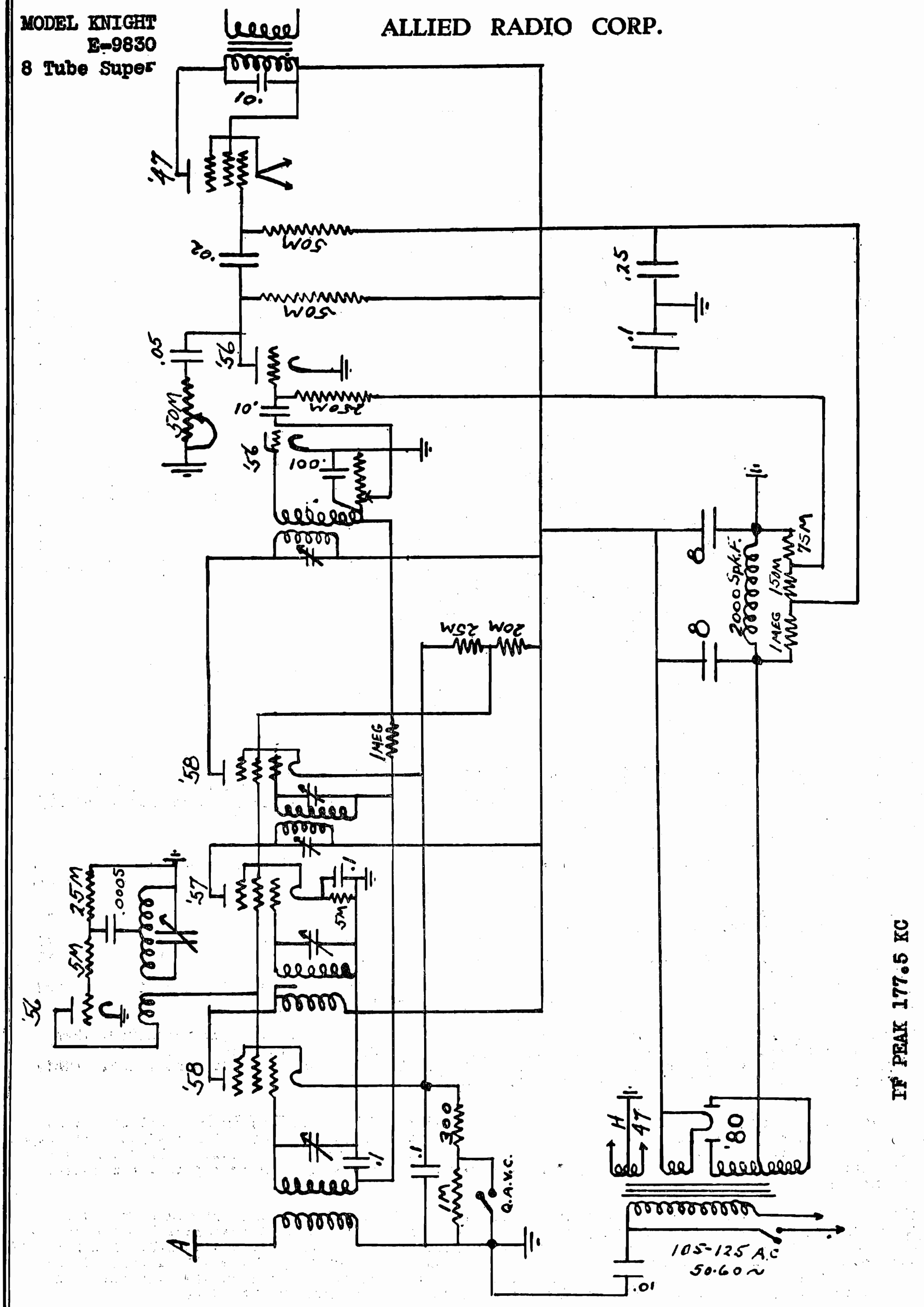
* These readings are only comparative and are not true voltages applied. The voltmeter, when readings are taken at these points, is in series with a very high resistance.
** To read 247 bias, read between 247 control grid and 500 ohm section of load resistor. (This point is by-passed with the 5 MFD Dry Elec. Cond.)

The ground side of the test oscillator should be connected to either the ground lead of the set or to the chassis. Set oscillator at 175 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. If during the alignment, the meter goes off scale reduce the output of the oscillator or adjust the receiver volume control.

Align the first intermediate transformer by turning the I.F. trimmer screw up and down until maximum reading is obtained on the output meter. The first intermediate transformer has two screws which are accessible through the top of the transformer shield can. The second I.F. trimmer should also be aligned in this manner. This trimmer is also mounted on top of the shield can. It is always best to re-check the adjustment after the first alignment to be sure that the alignment of the secondary has not been changed by the adjustment of the primary trimmer.

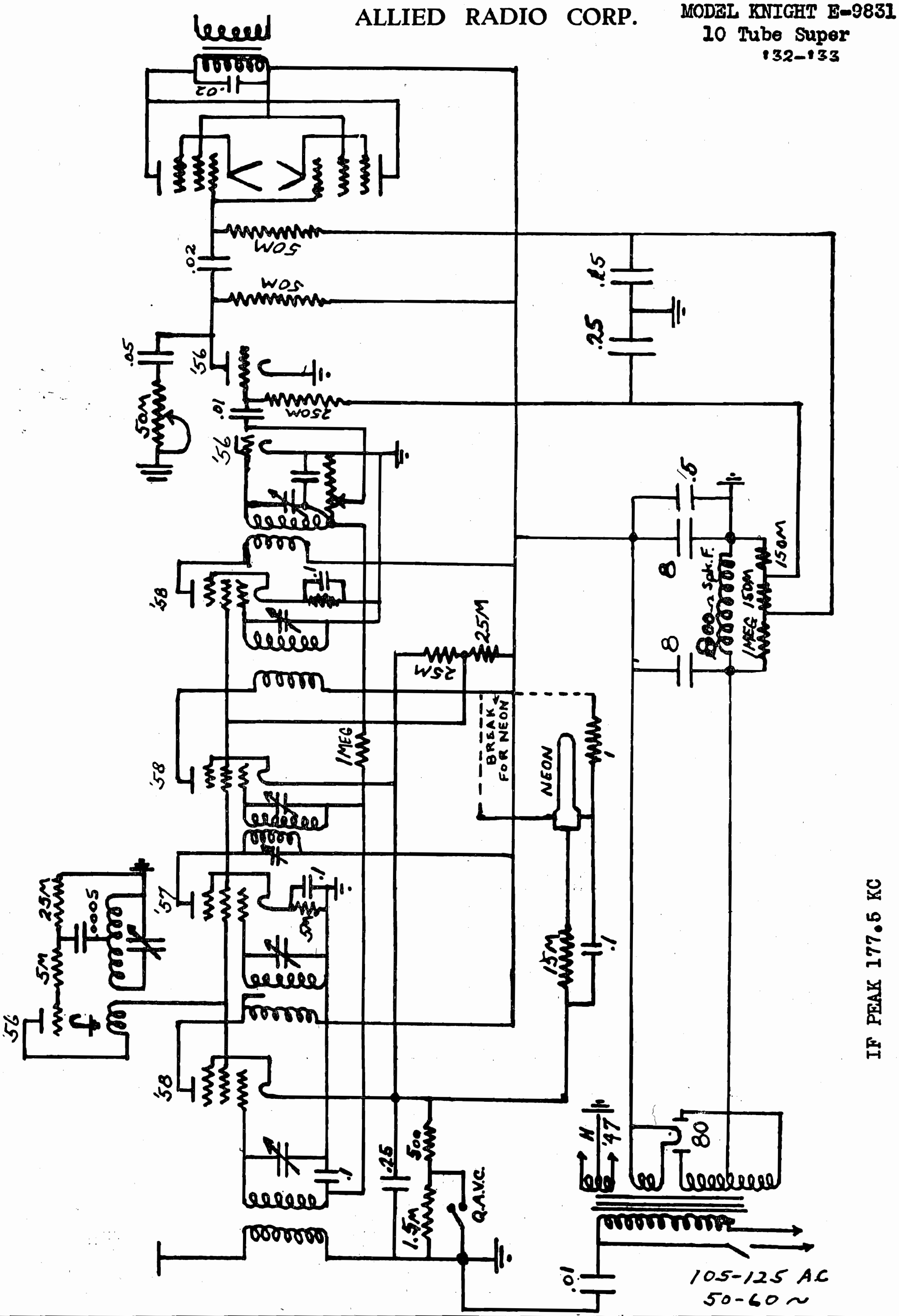
MODEL KNIGHT
E-9830
8 Tube Super

ALLIED RADIO CORP.



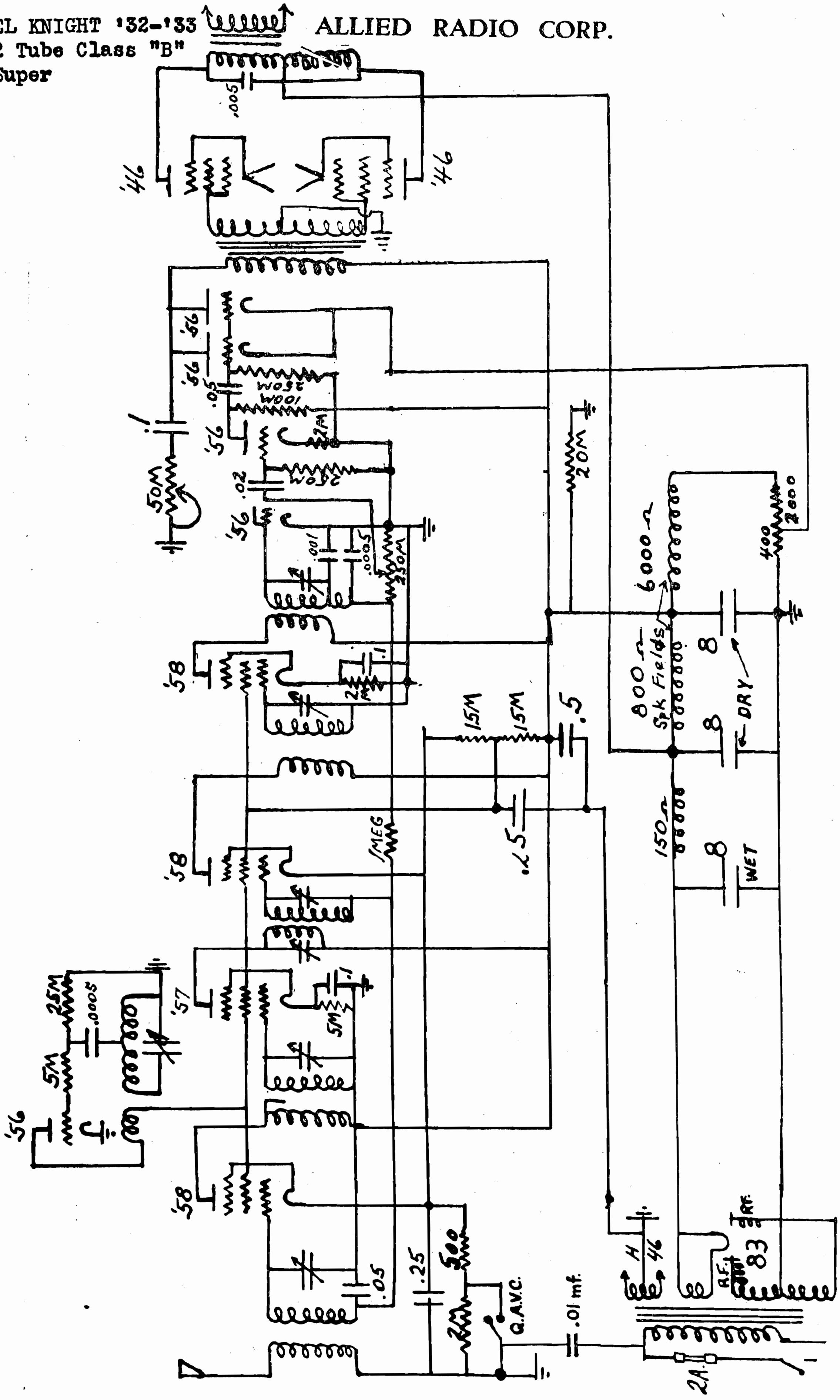
ALLIED RADIO CORP.

MODEL KNIGHT E-9831
10 Tube Super
'32-'33



MODEL KNIGHT '32-'33
12 Tube Class "B"
Super

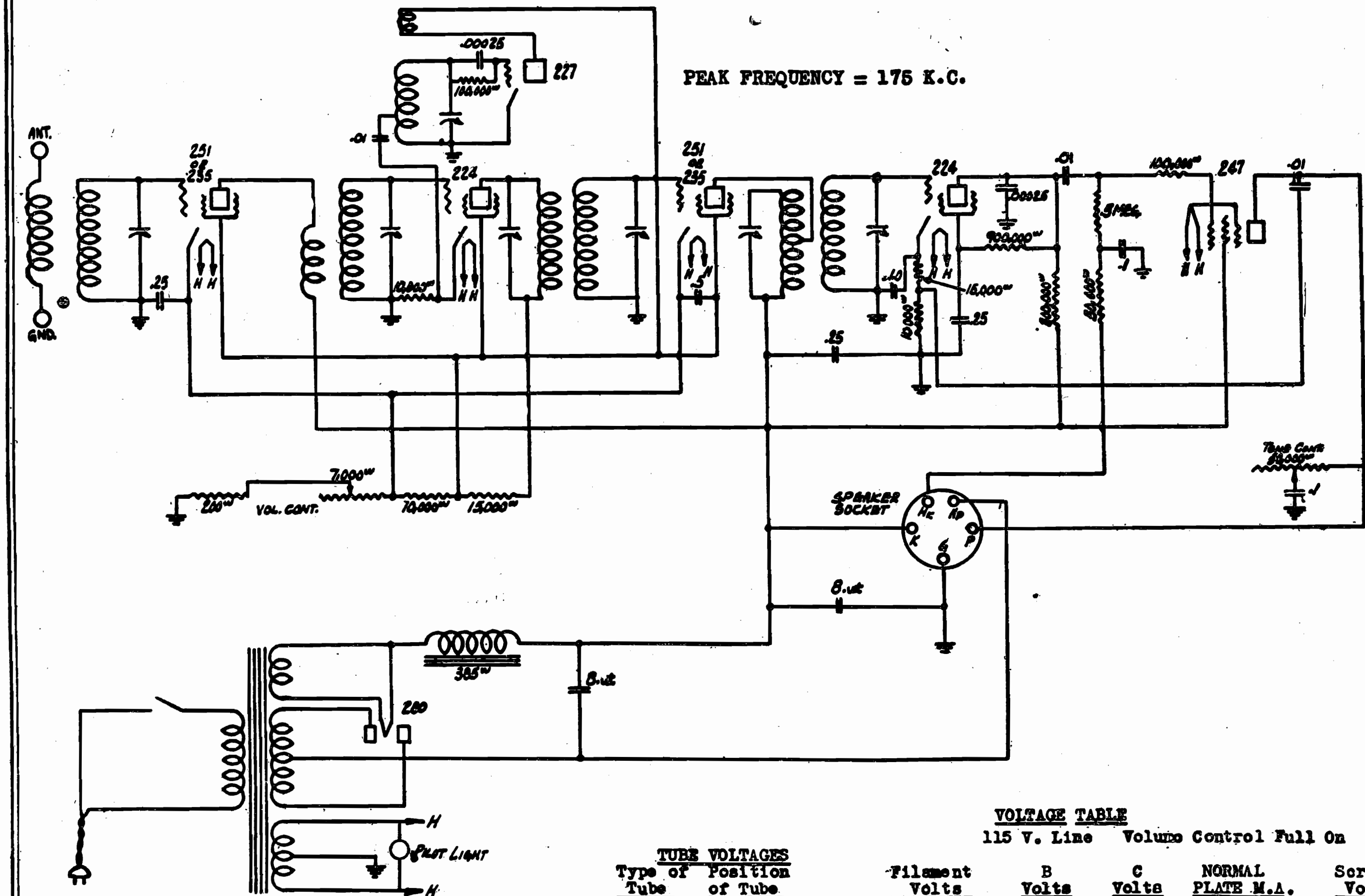
ALLIED RADIO CORP.



IF PEAK 177.5 KC

MODEL KNIGHT 7 Tube
Superhet '32

ALLIED RADIO CORP.



VOLTAGE TABLE

115 V. Line   Volume Control Full On

Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	NORMAL PLATE M.A.	Screen Volts
227	Oscillator	2.4	62.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4.35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
224	2nd Detector	2.4	100*	2.1*	2.5	35*
247	Pentode	2.4	250	16.5**	32.5	250
280	Rectifier	4.95			27.ea.plate	

(TUBE VOLTAGES)

*These readings are only comparative and are not true voltages applied. The volt meter, when the readings are taken at these points, is in series with a very high resistance.

** To read the 247 bias, read between H.K.speaker socket and ground.

KNIGHT 7 TUBE SUPERHETERODYNE
1932 MODEL

MODEL Knight 7 Tube
Superhet '32
Service Notes

ALLIED RADIO CORP.

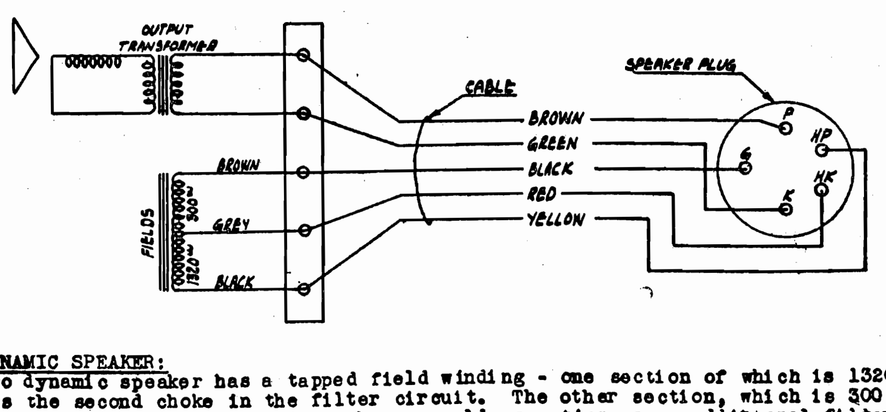
KNIGHT 7 TUBE SUPERHETERODYNE 1932 MODEL

INTERMEDIATE TRANSFORMERS:
The intermediate transformers are of the band pass type and of exceptionally high uniform gain. They are tuned to 175 kilocycles. The intermediate frequency trimmers are mounted on an isolantite base, preventing the transformer from becoming detuned due to the trimmer condensers absorbing moisture or warping. For this reason it should rarely, if ever, be necessary to re-track the intermediate frequency trimmers. In the event that it should be advisable to re-align the intermediate frequency coils, it is absolutely essential that a 175 kilocycle oscillator and an output measuring device be used.

ALIGNMENT OF RECEIVER:
Because of the construction and thorough impregnation of the intermediate coils, the intermediate stages should rarely need re-tracking. Only when an intermediate coil has become defective due either to an open or burned out winding, should it be necessary to re-adjust the intermediate trimmers. Should this occur, it is necessary that an oscillator be used and the intermediate trimmers be adjusted at 175 kilocycles. To align the intermediate stages, connect the high side of the oscillator output to the grid circuit of the first detector, which is done by disconnecting the grid cap of the 224 first detector and connecting the high side of the test oscillator to the control grid of this tube. The ground side of the test oscillator should be connected to the ground post on the chassis. Set the oscillator at 175 kilocycles and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. Be sure that the output from the oscillator is not so large that it will overload the second detector. If during the alignment the meter goes off scale, reduce the output of the test oscillator or adjust the receiver volume control.

The trimmers of the intermediate coils are accessible through the small holes in the top of the intermediate shield can. There are two trimmers to each intermediate coil. Align the grid trimmer of the first intermediate coil. After a maximum reading is obtained by adjusting the grid trimmer on the first int rmediate, adjust the primary for maximum reading and then re-check the grid side to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate coils. After both intermediate coils are properly aligned the adjustment of the intermediate stage is complete and they should not be further disturbed.

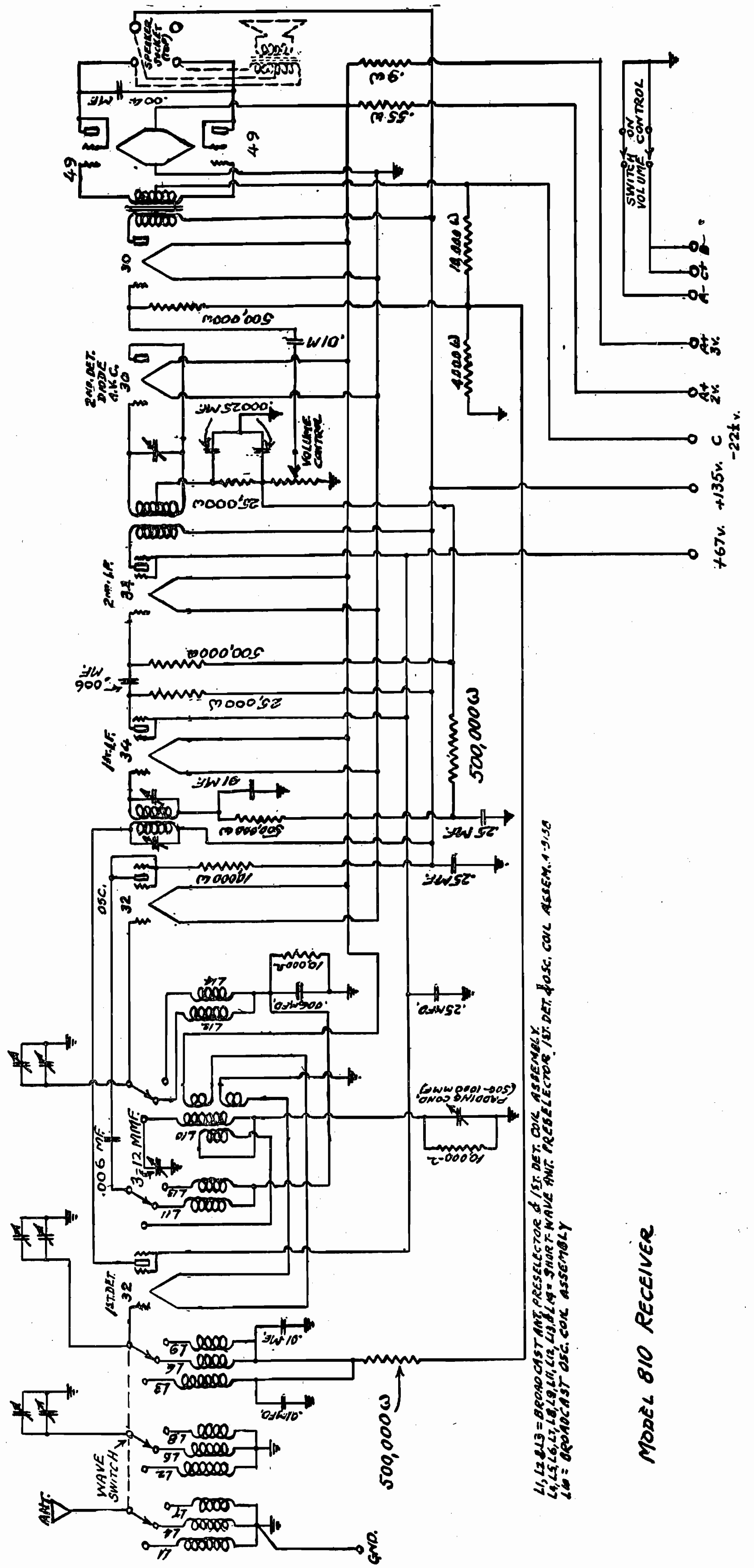
Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver is out of the cabinet it will be necessary to use some temporary indicator so that the position 1435 kilocycles on the dial may be accurately located. (This indicator should be set so that when the variable condensers are at the maximum capacity stop the indicator points to the last line on the dial at the low frequency end.) Then track the variable condensers by adjusting the trimmer condensers in the following order: Oscillator, antenna and radio frequency - (reading from the front of the receiver toward the back, the variable condenser sections are : Oscillator, antenna and radio frequency). After the variable condensers have been properly tracked at 1435 kilocycles, adjust the oscillator to 1295 kilocycles. Tune the receiver to this frequency. Check alignment of the condensers at this point by bending the end plate of the rotors in and out, noting the change in reading on the output meter. If when the plates are bent in the reading is increased, it is an indication that that particular section requires more capacity and the end plate should be permanently bent in at this point; or, if when the end plate is bent away, the reading is increased, the end plate should be bent away permanently, as it is an indication that that particular section requires less capacity at that particular point. The variable condensers should be checked in this manner at 1295, 880, 650 and 550 kilocycles. These points have been chosen so as to take advantage of the slots in the end plates of the variable condensers. This procedure of bending plates should rarely be necessary on the oscillator section, as the plates of the oscillator section are especially designed to properly track over the broadcast spectrum, providing the antenna and radio frequency stages are correctly aligned.



ELECTRO DYNAMIC SPEAKER:
The electro dynamic speaker has a tapped field winding - one section of which is 1320 ohms and is utilized as the second choke in the filter circuit. The other section, which is 300 ohms, is used to obtain the proper bias for the 247 tube, as well as acting as an additional filter choke.

ALLIED RADIO CORP.

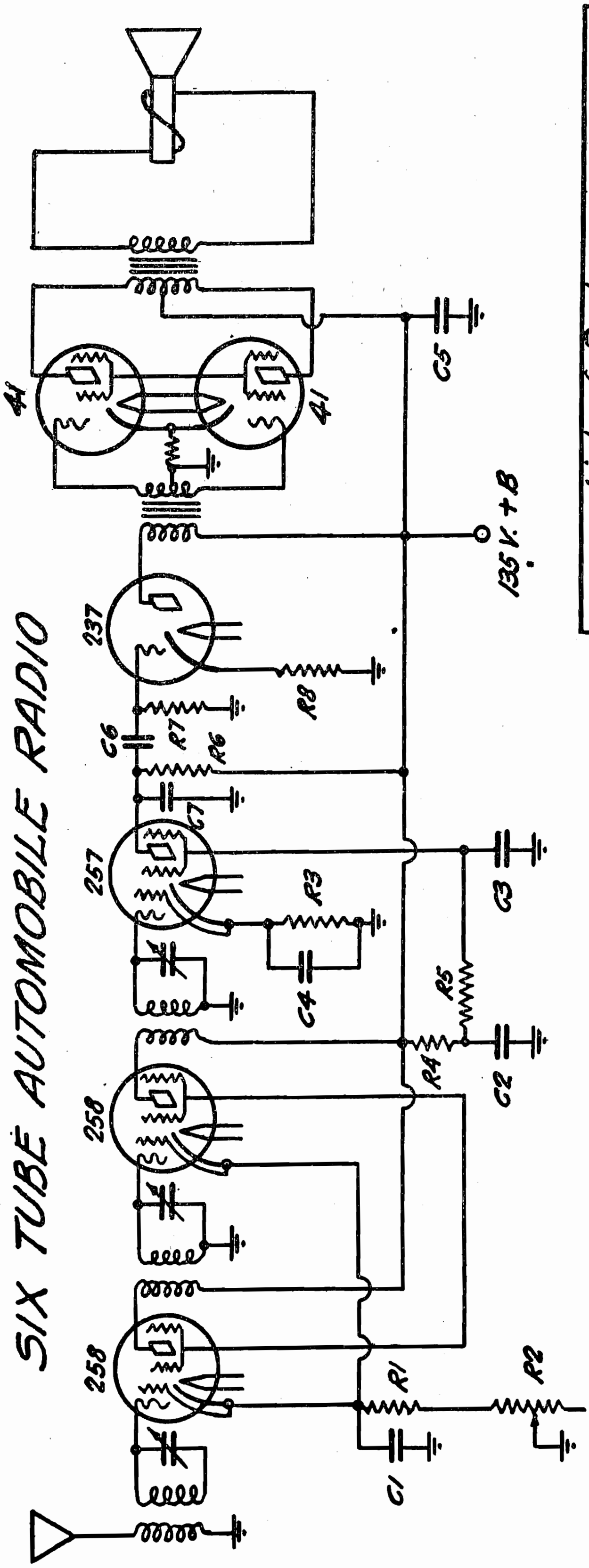
MODEL KNIGHT 8 Tube
All Wave Battery



MODEL KNIGHT 8 Tube
All Wave Battery

MODEL KNIGHT
Auto Set

ALLIED RADIO CORP.



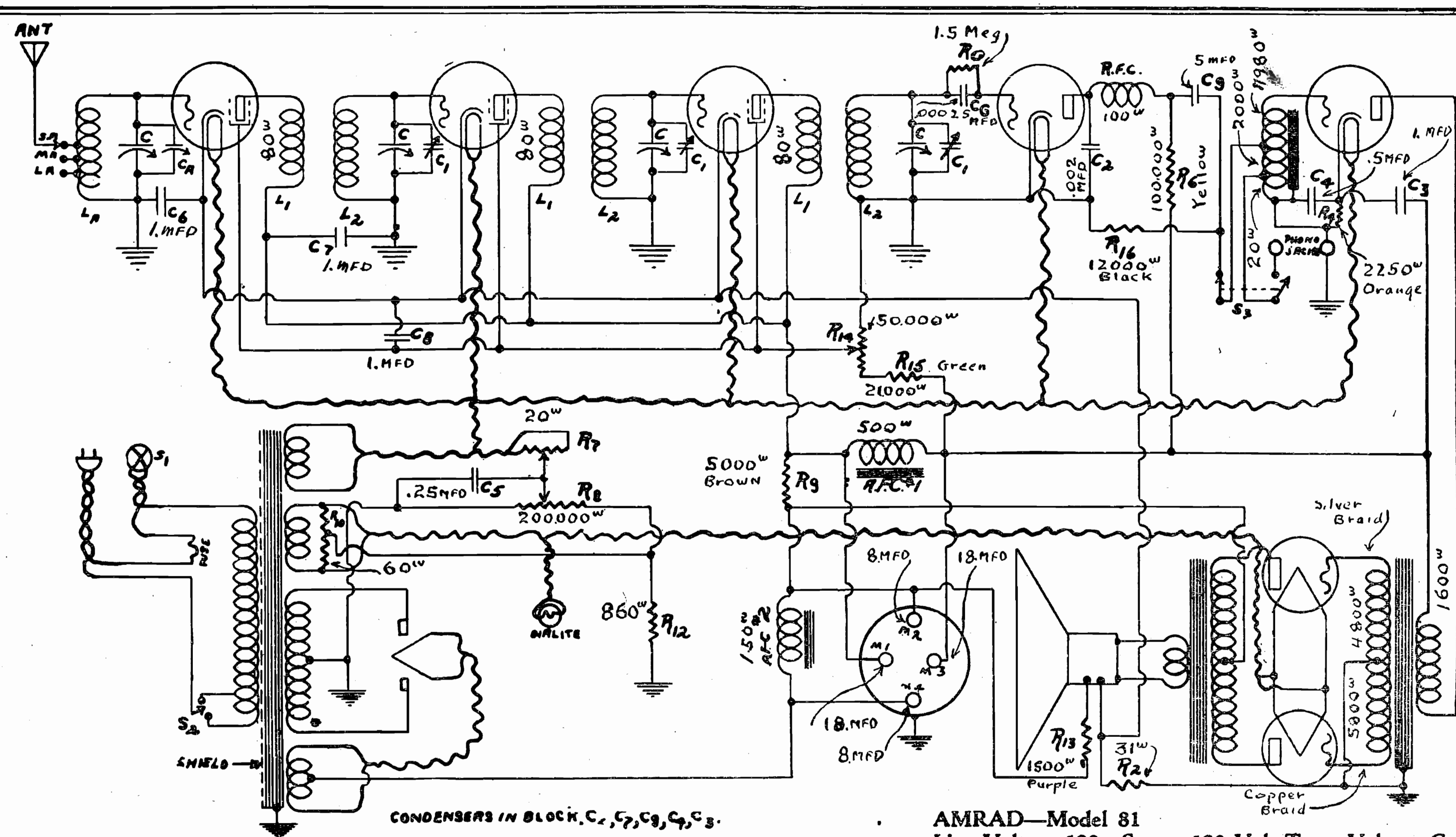
List of Parts	
3 R.F. Coils	R3, 50,000 ohms
1 3 Gang Condenser	R4, 50,000 ohms
1 Input Push-pull Trans	R5, 2 meg.
C1, C2, C3, C4, C5, 1/10	Mfd. Conds.
C6, .01 Cond.	R6, 250,000
C7, .001 Cond.	R7, 250,000
R1, 200 ohms	R8, 2,000 ohms
R2, 10,000 ohms	R9, 500 ohms.

The 5 Tube Model identical to above print except less 1-41 tube.

KNIGHT AUTO
1933

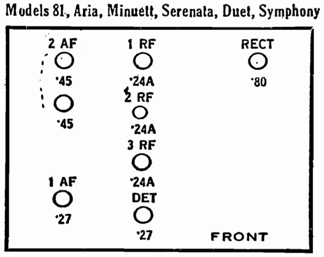
AMRAD CORPORATION

MODEL Bel-Canto 81.



CONDENSERS IN BLOCK. C_4, C_7, C_9, C_4, C_3.

Models 81, Aria, Minuett, Serenata, Duet, Symphony



BEL - CANTO SERIES

Aria, Minuett
Serenata, Duet
Symphony

RCA Speaker
0.8 Ohm
Secondary
410 Ohm Primary
7000 Ohm Field

Peerless Speaker
Single turn
Secondary
550 Ohm Primary

Condenser Data on next page.

AMRAD—Model 81

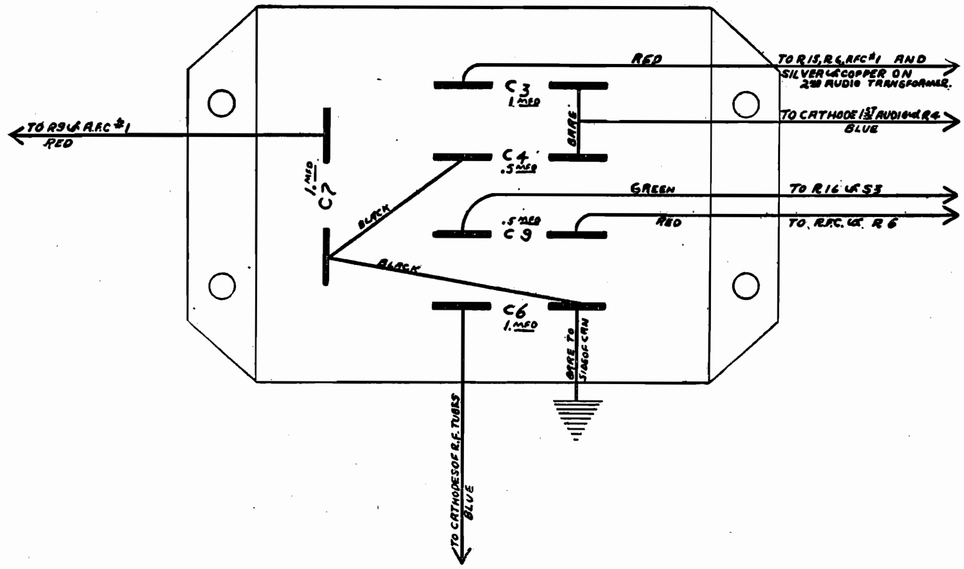
Line Voltage 120—Set on 120 Volt Tap—Volume Control Position Full On

Note: To get the 10.5 V. reading (4-8) the hum control potentiometer must be turned to ground side.

TUBE NO IN ORDER ①	TYPE OF TUBE ②	POSITION OF TUBE 1ST RF DET. ETC ③	READINGS, PLUG IN SOCKET OF SET									
			TUBE OUT		TUBE IN TESTER							
			A VOLTS ④	B VOLTS ⑤	A VOLTS ⑥	B VOLTS ⑦	C VOLTS (CONTROL GRID) ⑧	CATHODE-HEATER VOLTS ⑨	NORMAL PLATE M.A. ⑩	PLATE M.A. GRID TEST ⑪	PLATE CHANGE M.A. ⑫	SCREEN GRID VOLTS ⑬
1	224	1st RF	2.32	190	2.25	180	1.5	-	4	7.5	3.5-	80
2	224	2nd RF	2.32	190	2.25	180	1.5	-	4	7.5	3.5	.80
3	224	3rd RF	2.32	190	2.25	180	1.5	-	4	7.5	3.5	80
4	227	Det.	2.32	140	2.25	30	0	-	1.5	1.6	.1	-
5	227	1st AF	2.32	190	2.25	160	10.5	-	4.1	5.2	1.1	-
6	245	2nd AF	2.32	300	2.25	250	50	-	28	32	.4	-
7	245	2nd AF	2.32	300	2.25	250	50	-	28	32	.4	-
8	280	Rect.		-	4.65	-	-	-	110	-	-	-
9												
10												

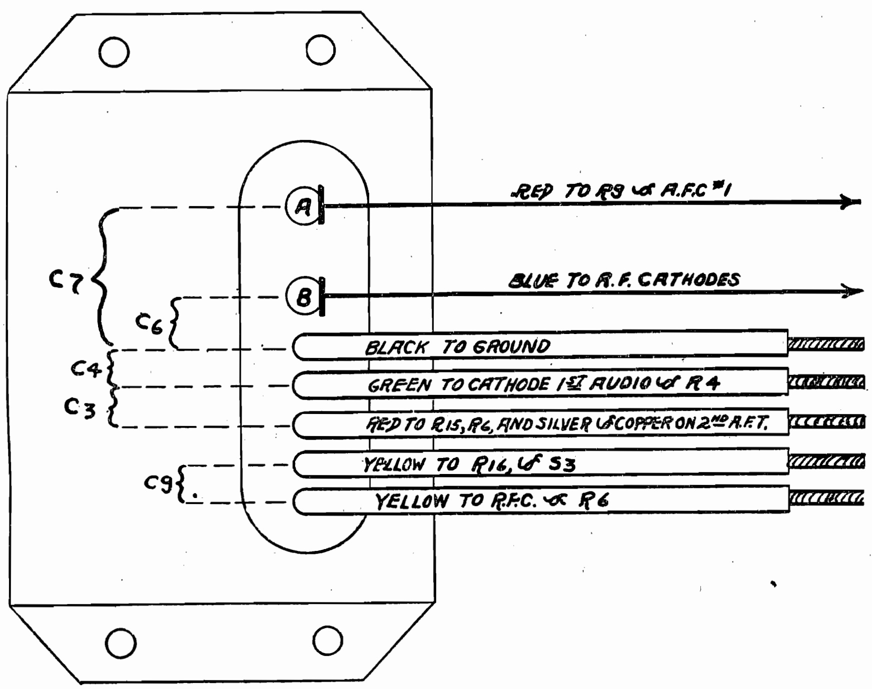
MODEL Bel-Canto 81
Condenser Data

AMRAD CORPORATION



BY-PASS BLOCK CONDENSER, NO. 8113

"Lug Terminal" Style. This block contains Fixed Condensers, C3, C4, C6, C7, C9. The different units are indicated, with their connections to their respective circuits.



BY-PASS BLOCK CONDENSER, NO. 8113

"Wire Terminal" Style. This block contains the same units as does the No. 8113 "Lug Terminal" Style. To test for capacity, opens or shorts, it is necessary to disconnect at least one terminal of the unit from the circuit.

ATWATER KENT MFG. CO.

MODEL 20
7570
4640
Data

Model 20 # 7570

CONDENSERS

Detector phone	.002 mfd	# 8241	500 volts
Detector grid	.000250 mfd	# 4465	500 volts
Plate bypass	.3 mfd	# 14902	450 volts

RESISTORS

Grid suppressors	600 ohms	# 4949	wire wound
Detector grid leak	2 megs	# 15892	1 watt Green
R-f rheostat	10 ohms	# 4690	
Detector rheostat	10 ohms	# 4690	

TRANSFORMERS

1st a-f primary	1700 ohms	# 4779
1st a-f secondary	3250 ohms	
2nd a-f primary	1700 ohms	# 4779
2nd a-f secondary	3250 ohms	

Model 20 # 4640

The parts used in # 4640 are substantially the same as used in # 7570 shown above, with the following exceptions.

1st and 2nd a-f transformers have different part numbers. In # 4640 they are # 7661. The d-c resistance of the respective primary and secondary windings is the same as designated for Model 20 # 7570. In other words a-f transformers # 4779 and # 7661 have like d-c resistance specifications for the primary and secondary windings. In receiver # 4640, transformer # 7661 is used in both the 1st and 2nd stages.

The detector grid condenser in receiver Model 20 # 4640 has the same capacity and voltage rating as used in # 7570, but has a different part number. The part number of this unit in receiver # 4640 is # 8112.

In both receivers, the plate circuit bypass condenser is adjacent to the 2nd r-f stage socket. The grid and phone condensers are adjacent to the detector and a-f assembly.

The wiring diagram in the manual shows a .2 mfd condenser as the plate circuit bypass unit. The Atwater-Kent specifications in their diagram manual shows such a condenser. On the other hand the parts specifications show a .3 mfd condenser in this position. If a .2 mfd unit is being used and the receiver performs well, there is no occasion for a change.

MODEL 20
#7960

Data

ATWATER KENT MFG. CO.

Model 20 # 7960

CONDENSERS

Detector phone	.002 mfd	# 8241	500 volts
Detector grid	.00025 mfd	# 8112	500 volts
Plate bypass	.3 mfd	# 14902	450 volts

RESISTORS

Grid suppressors	600 ohms	# 4949	wire wound
Detector grid leak	2.0 megs	# 15892	1 watt Green
Detector bias	450 ohms	# 8190	tapped 180-270 ohms
A-f filament	1.0 ohm	# 8303	brown covered
Detector rheostat	20. ohms	# 8310	
R-f rheostat	10. ohms	# 4690	

TRANSFORMERS

1st a-f primary	1000 ohms	# 8060
1st a-f secondary	8000 ohms	
2nd a-f primary	1700 ohms	# 7661
2nd a-f secondary	3250 ohms	

The detector grid bias resistor is adjacent to the detector socket. It is a flat resistor. The plate bypass condenser is adjacent to the 2nd r-f socket. The phone condenser is located between the detector and 1st a-f sockets.

ATWATER KENT MFG. CO.

MODEL 30
Early
Late
Data

Model 30 Early

CONDENSERS

Detector phone	.002 mfd	# 8241	500 volts
Detector grid	.00025 mfd	# 8112	500 volts
Plate bypass	.3 mfd	# 14902	450 volts

RESISTORS

Grid suppressors	500 ohms	# 8092	flat wire wound
Detector grid leak	2.0 megs	# 15892	1 watt green
Detector bias	450 ohms	# 8190	tapped 180-270 ohms
A-f filament	1.5 ohm	# 8256	green covered
Detector rheostat	20 ohms	# 8310	
R-f rheostat	10 ohms	# 4690	

TRANSFORMERS

1st a-f primary	1000 ohms	# 8060
1st a-f secondary	7000 ohms	
2nd a-f primary	1700 ohms	# 7661
2nd a-f secondary	3250 ohms	

Antenna Choke	35 ohms	# 8232

Note. The early production of Model 30 can be recognized by the moulded end plate tuning condensers. The later production employed metal end plate or frame condensers. Furthermore, the early production has three separate sockets for the r-f tubes. The later production employs a single moulded base for the three r-f sockets. The same wiring diagram is used for the early and late productions of this receiver.

Model 30 Late

The parts employed in Model 30 Late, are substantially the same as used in Model 30 Early, with the exceptions as noted and also, the use of grid suppressors of 350 ohms each and part # 8439. These resistors are small flat, wire wound units.

Model 48

Model 48 is the identical of Model 30 Late, but has a gold finished panel and a few minor refinements.

Model 35 Early

Model 35 is like Model 30 except that the detector and a-f filaments are controlled by a single fixed resistor of 1.0 ohm, part # 8126 (brown covered). Also that grid suppressors are part # 8225. Same value as in Model 30 Early.

MODEL 32 **ATWATER KENT MFG. CO.**

Data

Model 32

CONDENSERS

Detector phone	.002 mfd	# 8241	500 volts
Detector grid	.00025 mfd	# 8112	500 volts
Plate bypass	.3 mfd	# 14902	450 volts

RESISTORS

Grid suppressors	865 ohms	# 8284	flat wire wound
Detector grid leak	2.0 megs	# 15892	1 watt green
Detector bias	450 ohms	# 8190	tapped 180-270 ohms
A-f filament	1.5 ohm	# 8256	green covered
Detector rheostat	20 ohms	# 8310	
R-f rheostat	5 ohms	# 8308	

TRANSFORMERS

1st a-f primary	1000 ohms	# 8060
1st a-f secondary	7000 ohms	
2nd a-f primary	1700 ohms	# 7661
2nd a-f secondary	3250 ohms	

CHOKES

Antenna choke	35 ohms	# 8232

Phone condenser and grid bias resistor are mounted upon detector and a-f tube shelf. The plate bypass condenser is located adjacent to the 4th r-f socket. The antenna choke listed above is designated as the "choke coil" in the wiring diagram
The antenna choke is located near the 1st r-f tube socket. The plate bypass condenser referred to in the above parts specification is listed as "fixed condenser" in the wiring diagram. While it is true that the wiring diagram illustrates a 3. meg detector grid leak, the Atwater-Kent parts list calls for the 2. meg unit mentioned above.

Model 35 Late

The parts used in the Model 35 Late, are the same as in Model 35 Early, except that the grid suppressors are 350 ohms each and are part # 8349 and are flat wire wound units.

MODEL 36
Receiver
Chassis
Data

ATWATER KENT MFG. CO.

Model 36

SPECIAL NOTE. The parts listed on this page are those used in the receiver chassis. The power supply chassis was available in two productions. The diagrams of the two power supply units are shown on page 98 of Rider's Manual, Volume 1. See Special page 98 for data concerning these two power packs.

These parts in receiver chassis

CONDENSERS

Detector phone	.002 mfd	# 9598	500 volts
Detector grid	.00025 mfd	# 8112	500 volts
Speaker filter	.3 mfd	# 14902	450 volts
R-f filament and plate bypass	.3 mfd		200 volts

RESISTORS

Volume control two sections	425 ohms	# 9781-9782	Each section 425 ohms
Filament shunt	50 ohms	# 9597	tapped 25-25 ohms
Detector grid leak	2. megs	# 15892	1 watt green
Grid suppressors	800 ohms	# 8996	flat wire wound

TRANSFORMERS

1st a-f primary	1000 ohms	# 8060
1st a-f secondary	7000 ohms	
2nd a-f primary	1700 ohms	# 7661
2nd a-f secondary	3250 ohms	

Note... In late "Y" units shown on page 139 the following resistors are used but not shown in the schematic. The "Y" unit is the power pack for the Model 36 receiver. These parts in power unit chassis.

RESISTORS

Detector plate	0.1 meg	# 8919	green paint
1st a-f plate	12500 ohms	# 15941	1 watt purple and yellow
R-fand 1st a-f bias	1100 ohms	# 9691	wire wound eliptical
2nd a-f bias	1750 ohms	# 9692	wire wound eliptical

These units and three center tapped filament shunt resistances are contained upon the panel assembly, which is located within the metal unit. The filament shunt resistors are of 20 ohms each, part # 9434.

Special attention is called to the fact that the r-f and 1st a-f filament circuit contains resistance wire in place of fixed resistors. The same is true of the detector circuit. See schematic of the early "Y" unit on page 139

Resistor 15941 (12,500 ohms) may be marked 9424, when found in the chassis. It is to be replaced by unit # 15941.

ATWATER KENT MFG. CO.

MODEL 33
MODEL 36 Early
MODEL 36 Late
MODEL 49

MODEL 36 ABOVE SERIAL No. 2,610,000

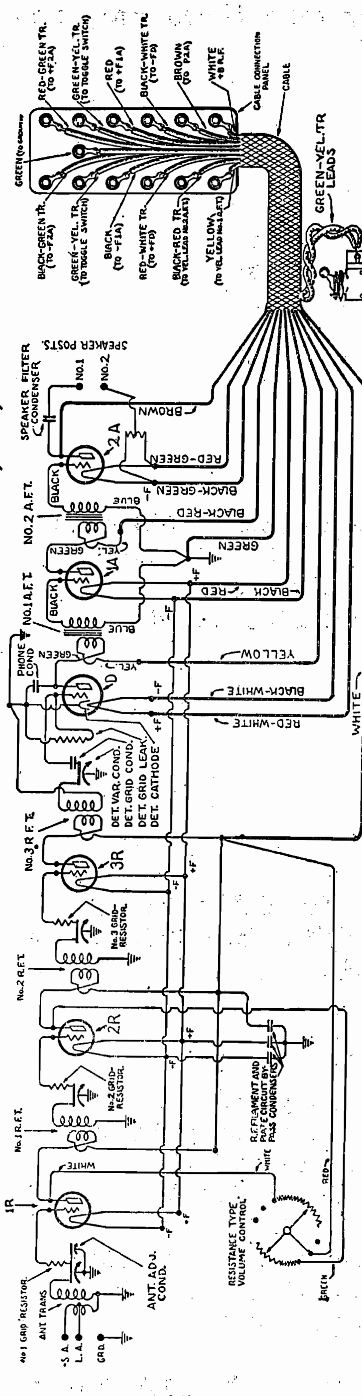
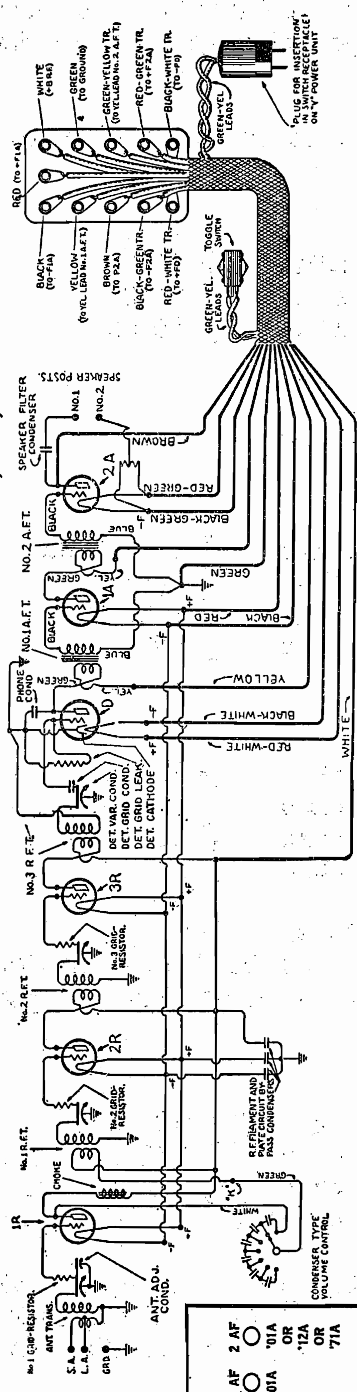
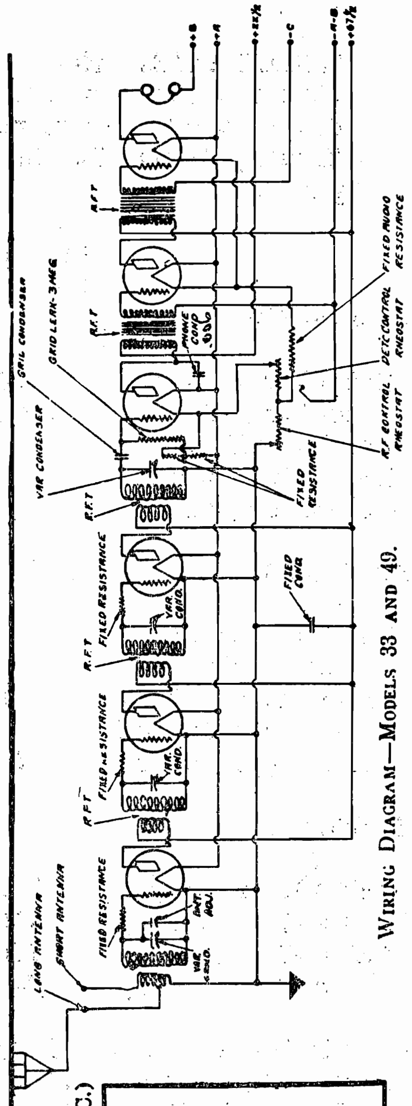


Fig. 70. Wiring Diagram of Model 36 With Resistance-Type Volume Control.

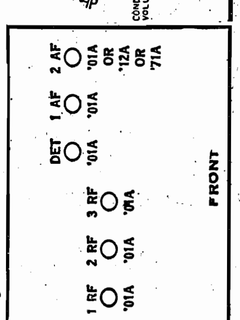
MODEL 36 BELOW SERIAL No. 2,610,000

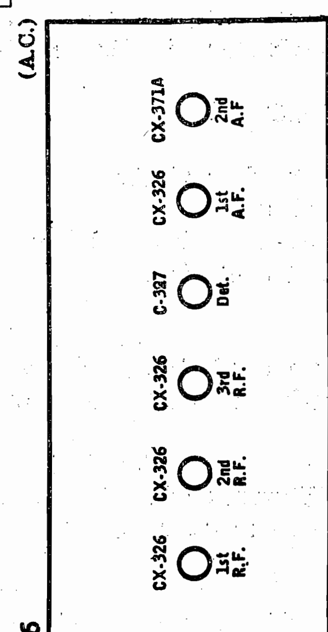


Wiring Diagram of Model 36 With Condenser-Type Volume Control.



Wiring Diagram—Models 33 and 49.





ATWATER KENT MFG. CO.

MODEL 33 and 49

Data

Model 33

CONDENSERS

Detector phone	.002 mfd	# 8241	500 volts
Detector grid	.00025 mfd	# 8112	500 volts
Plate bypass	.3 mfd	# 14902	450 volts

RESISTORS

Grid suppressors	800 ohms	# 8996	flat wire wound
Detector grid leak	2. megs	# 15892	1 watt green
Detector bias	450 ohms	# 8190	tapped 180 -270 ohms
A-f filament	1.5 ohms	# 8256	green covered
Detector rheostat	20 ohms	# 8310	
R-f rheostat	10 ohms	# 4690	

TRANSFORMERS

1st a-f primary	1000 ohms	# 8060
1st a-f secondary	7000 ohms	
2nd a-f primary	1700 ohms	# 7661
2nd a-f secondary	3250 ohms	

The wiring diagram illustrates a .5 mfd fixed condenser. This should be the value quoted in the table above in connection with the plate bypass condenser. In other words, the .5 mfd specification in the wiring diagram should be .3 mfd. The r-f control rheostat shown in the wiring diagram is rated at 20 ohms. The correct figure is 10 ohms, as stated in the table above.

The difference between the Model 33 and the Model 49 is that the latter has a gold finished panel. The antenna adjustment specification in the wiring diagram is a separately variable plate which is a part of the first tuning condenser. This plate is controlled by a small knob.

The wiring diagram on page 137 of Rider's Manual, Volume 1 shows a .006 mfd phone condenser. The correct value is as stated in the table above. At the time the diagrams were first published, the values designated were assumed to be correct as secured from supposedly reliable sources. The diagram further shows a 3. meg grid leak. This data was a part of the original diagram as furnished by the A-K organization. Subsequent to the publication of the original diagram, the parts list for that receiver showed a 2. meg grid leak as advised in the table.

Model 49

The Model 49 receiver is the same as the Model 33 and the parts list supplied above is applicable in its entirety.

MODEL 38
Early and Late
Data

ATWATER KENT MFG. CO.

SPECIAL NOTE.

Wiring diagram of power unit for Model 38 receiver is shown on page 144

These parts are in the receiver chassis.

CONDENSERS

R-f filament bypass	.3 mfd # 15158	200 volts *
R-f plate bypass	.05 mfd # 15158	400 volts *
Speaker filter	.3 mfd # 14902	450 volts
Detector phone	.002 mfd # 9598	500 volts
Detector grid	.00025 mfd # 8112	500 volts

* In one can.

RESISTORS

Volume control	400 ohms # 13604	wire wound
Grid suppressors	800 ohms # 8996	flat, wire wound
Detector grid leak	2.0 megs # 15892	1 watt green
Filament shunt **	50 ohms # 9597	wire wound tapped 25-25
R-f plate (late 38 only)	1500 ohms # 16253	flat wire wound

** In early 38 only.

TRANSFORMERS

1st a-f primary	1000 ohms # 8060
1st a-f secondary	7000 ohms
2nd a-f primary	1700 ohms # 7661
2nd a-f secondary	3250 ohms

NOTE.

Other parts used in this receiver and to be found in the power pack are listed in connection with the power pack shown on special page 144

POWER PACK for Model 38.

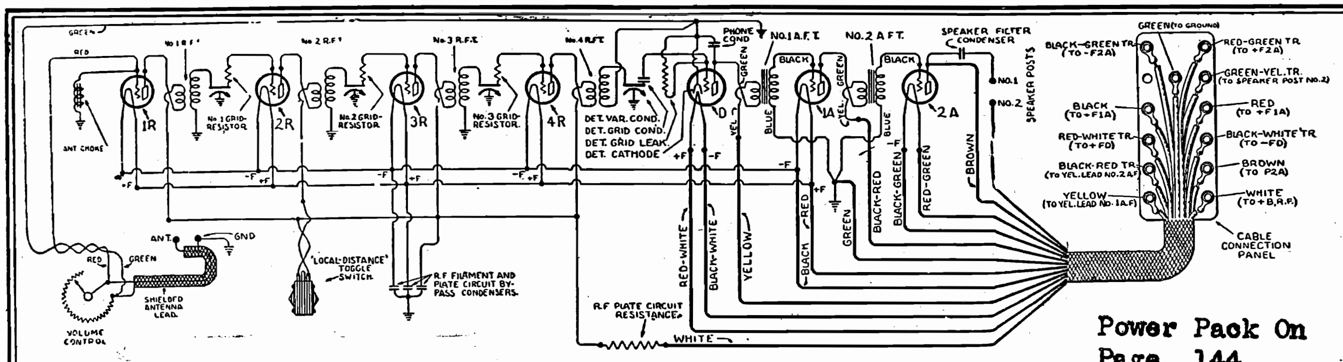
The power pack for the Model 38 receivers is the same as for the Model 37 (early) and (late) except that the r-f and 1st a-f bias resistor is 550 ohms, # 13138 in the (early) pack and is of the same ohmic value but part # 13303 in the (late) pack. Both are eliptical resistors, wire wound.

CONDENSER NOTE.

The r-f filament and r-f plate bypass condenser listed in the Atwater-Kent parts lists as # 15158 contains four individual condensers, although the receiver circuit employs only three of these units. It is possible that the fourth condenser which is of .2 mfd may be tied in with the .05 mfd unit via external connections. Bear in mind that this form of connection is not stated as being standard practice. This .2 mfd condenser is also rated at 400 volts.

ATWATER KENT MFG. CO.

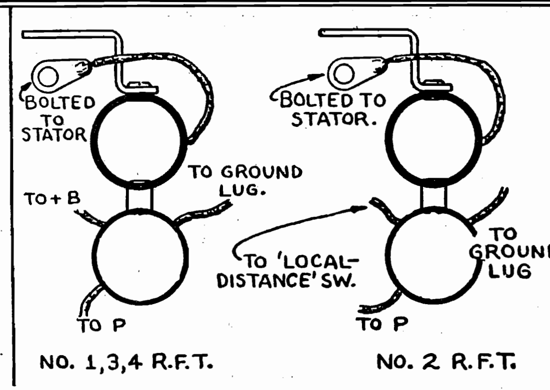
MODEL 37
MODEL 38
(A.C.)



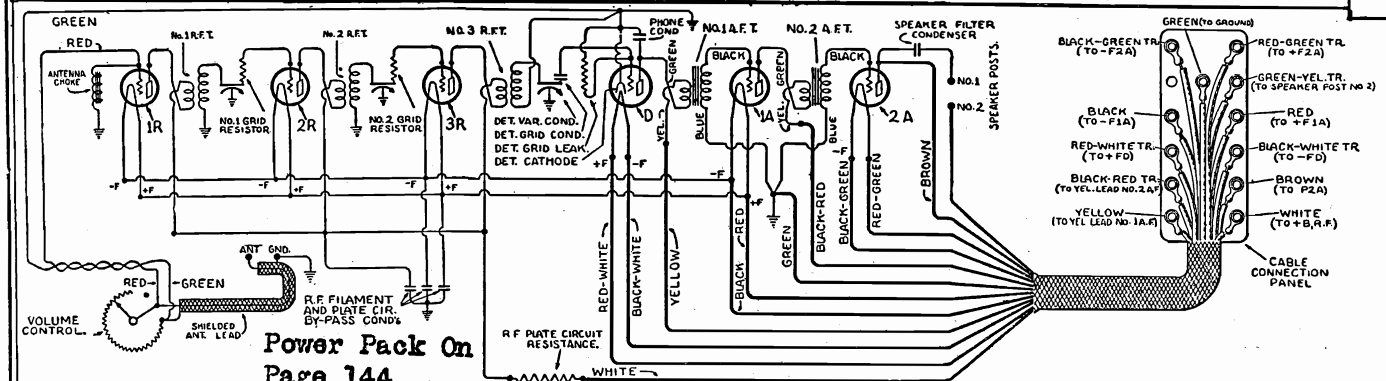
Power Pack On Page 144

WIRING DIAGRAM OF MODEL 38.

A 2nd-A. F. filament-shunt resistor is used before Serial No. 1,752,000 and the green-yellow tracer cable lead is not used. Connections for this resistor are shown in dotted lines in the diagram on page 61. A schematic diagram of the volume control is shown in Fig. 78.



SKETCH SHOWING CONNECTIONS FROM R. F. TRANSFORMERS



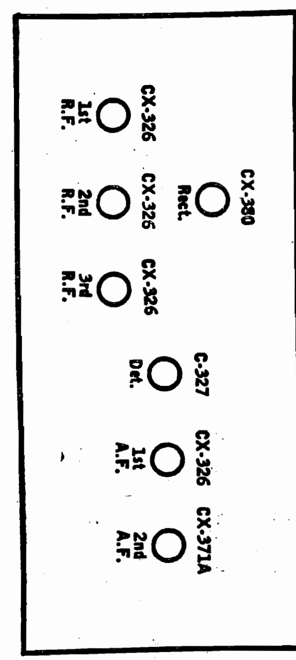
Power Pack On Page 144

WIRING DIAGRAM OF MODEL 37, 37-F, 37-C.

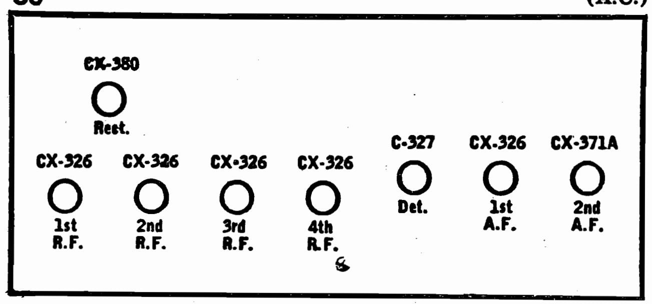
A 2nd-A F. filament-shunt resistor is used before Serial No. 1,385,000, in which case speaker post No. 2 connects to the centre-tap of this resistor, and the green-yellow tracer lead is not used. The R. F. plate circuit resistor is used after Serial No. 1,385,000.

In Model 37-C the on-off switch is connected to the two terminals on either side of the ground eyelet. A 2nd-A. F. filament-shunt resistor is used in the chassis of all Model 37-C receivers.

37



38 (A.C.)



ATWATER-KENT—Models 37-38
Line Voltage 115—On Early Models "B" and "C" Voltages Are Lower Than Shown

TUBE NO. IN ORDER	TYPE OF TUBE	POSITION OF TUBE 1ST. R.F., DET., ETC.	READINGS, PLUG IN SOCKET OF SET								
			TUBE OUT		TUBE IN TESTER						
			A VOLTS	B VOLTS	A VOLTS	B VOLTS	C VOLTS	CATHODE VOLTS	NORMAL PLATE M.A.	PLATE M.A. GRID TEST	PLATE M.A. CHANGE
1	226	1st.R.F.	1.3	173	1.25	165	10	-	4.8	8.4	3.6
2	226	2nd.R.F.	1.3	173	1.25	165	10	-	4.8	8.4	3.6
3	226	3rd.R.F.	1.3	173	1.25	165	10	-	4.8	8.4	3.6
4	227	Detector	2.25	80	2.0	22.5	-	-	2.2	2.2	0.0
5	226	1st.A.F.	1.3	173	1.25	165	10	-	4.8	8.4	3.6
6	171	2nd.A.F.	4.6	192	4.3	180	36	-	18.0	19.5	1.5
7	280	Rectifier	-	-	4.3	-	-	-	20.0	-	-
8											
9											
10											

MODEL 37
Power Pack
Early and Late
Data

ATWATER KENT MFG. CO.

Schematic

RESISTORS	Early	Late
Detector plate	100000 ohms #8919 Green paint	65000 ohms # 15592 1 watt black or bl. and gr.
1st a-f plate	12500 ohms #15941 red See late.	12500 ohms # 15941 red or purple and yellow or red.
R-f and 1st a-f bias	1100 ohms # 9691 eliptical	625 ohms # 13128 eliptical
2nd a-f bias	1750 ohms # 9692 eliptical	2200 ohms # 13289 eliptical
Filament shunt	20 ohms # 9434	20 ohms # 9434 flat, wire
Speaker choke	500 ohms	500 ohms
Filter chokes	1600 ohms total	1600 ohms total
CONDENSERS	See schematic	See Schematic. Condenser unit is # 13315. Also houses transformer.

Special Note.

A 1. mfd condenser is also contained in the transformer-condenser housing but this condenser is not connected in the model 37 power pack.

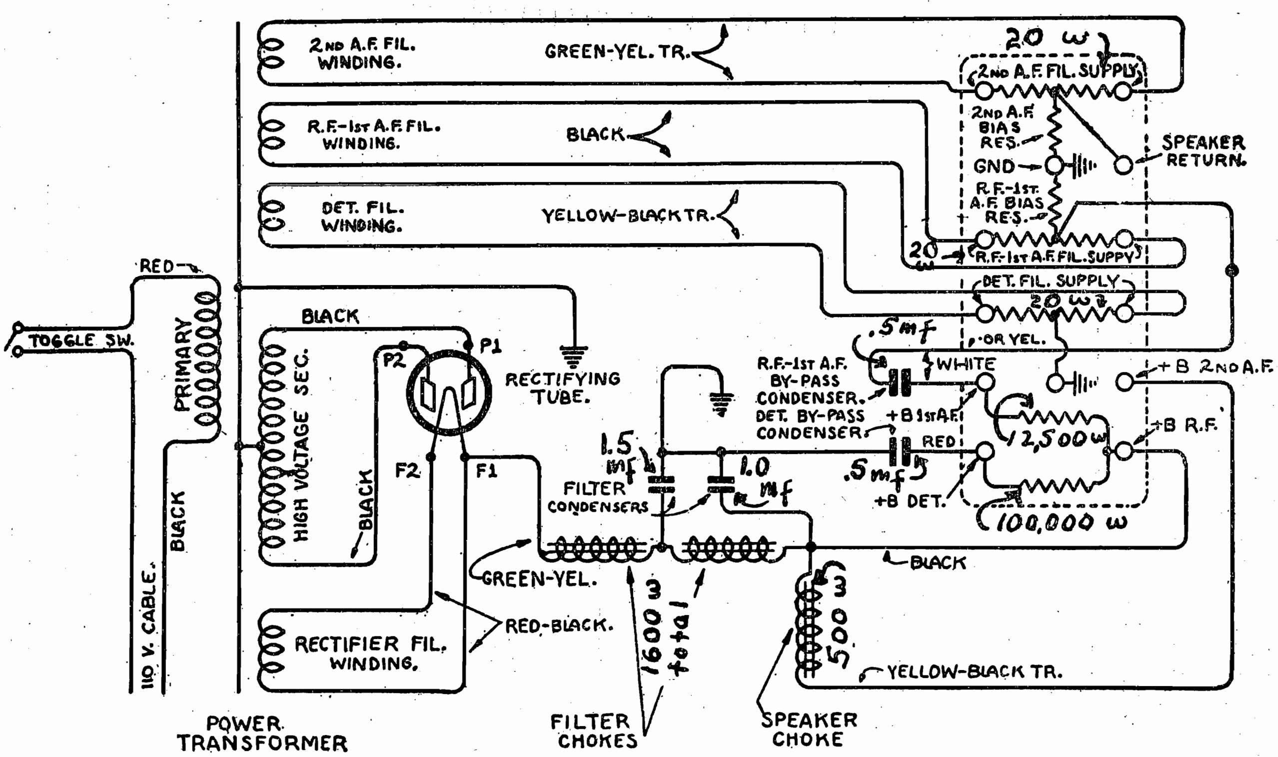


DIAGRAM OF POWER UNIT IN MODELS 37 AND 38

ATWATER KENT MFG. CO. MODEL 40, 42 and 52

Data

Model 40, 42 and 52

These parts are to be found in receiver chassis.

CONDENSERS

R-f filament bypass	.3 mfd # 15158	200 volts *
R-f plate bypass	.05 mfd # 15158	400 volts *
Speaker filter	.3 mfd # 14902	450 volts
Detector phone	.002 mfd # 9598	500 volts
Detector grid	.00025 mfd # 8112	500 volts

* In one can.

RESISTORS

Volume control	400 ohms # 13604	wire wound
Grid suppressors	350 ohms # 8439	flat wire wound
R-f plate	3000 ohms # 13369	flat wire wound
Detector grid leak	2.0 megs # 15892	1 watt green

TRANSFORMERS

1st a-f primary	1000 ohms # 8060
1st a-f secondary	7000 ohms
2nd a-f primary	1700 ohms # 7661
2nd a-f secondary	3250 ohms

These parts are to be found in the power pack chassis.

See page 145

RESISTORS

Detector plate	65000 ohms # 15592	1 watt black or black and green
1st a-f plate	12500 ohms # 15941	1 watt red or purple and red or purple and yellow
R-f and 1st a-f bias	625 ohms # 13538	flat wire wound *
2nd a-f bias	2200 ohms # 13538	flat wire wound *
Line voltage **	28 ohms # 13645	flat wire wound
Filament shunt	20 ohms # 9434	flat wire wound

* # 13538 is a single unit tapped 625 and 2200 ohms

** This line voltage control used only in Models 42 and 52

CHOKES

Speaker	500 ohms
Filter	1320 ohms total

SPECIAL NOTES ON FILTER CONDENSERS

It is necessary to refer to the power pack schematic on page 145 for the first model 40 power pack.

Also to the same page for the regular run of Models 42 and 52 power packs. In these units, the three filter condensers have capacity values of 1.5 mfd each. This assembly can be recognized by the fact that the speaker choke

ATWATER KENT MFG. CO.

FILTER CONDENSERS
40, 42 and 52

as a part of the assembly. The detector bypass condenser is rated at .5 mfd and the 1st a-f bypass condenser also is of .5 mfd. This type of assembly is also used in the 40-F, 42-F and 52-F.

The second type Model 40 power pack differs from the first. Refer to page 148 lower half of the page. You will find a circular illustration towards the right hand end of the layout, designated as condenser assembly. In this case, the condenser assembly is separate from the choke assembly. Only two filter condensers are used. The condenser shown on page 100 as connected between (F-1) of the rectifier filament system and ground, has been omitted. The first filter condenser in the revised power pack circuit is of 2.0 mfd and is connected to condenser terminal (1). The respective terminals upon this condenser represent the actual numerical designations upon the condenser unit in the power pack. In the majority of instances the condenser units are connected between the main can and the respective terminals. There are however some cases where the condenser unit is connected between two terminals.

The output filter condenser is of .5 mfd and joins terminal (5), being connected between terminal (5) and the main housing can. The detector bypass condenser is of .5 mfd and is connected to terminal (2), between terminal (2) and the condenser can. The 1st a-f bypass condenser is also of .5 mfd, but in this case is connected between the terminals (3) and (4).

ATWATER KENT MFG. CO

MODELS 41 and 51
Data

Models 41 and 51

SPECIAL NOTE.

Wiring diagrams of the three types of power packs employed in conjunction with this receiver are shown upon page 150

These parts are in the receiver chassis.

CONDENSERS

R-f filament bypass	.1 mfd # 15157	450 volts*
R-f plate bypass	.1 mfd # 15157	450 volts*
Detector phone	.002 mfd # 14072	500 volts
Detector grid	.00025 mfd # 8112	500 volts
Volume control bypass	.03 mfd # 13956	200 volts**
Detector filament bypass	.2 mfd # 13956	200 volts**

* All condensers in one can. Three used for r-f filament and one for r-f plate circuit.

** Both condensers in same can.

RESISTORS

Volume control	400 ohms # 13604	wire wound
Grid suppressors	350 ohms # 8439	flat wire wound
Detector grid leak	2.0 megs # 15892	1 watt green
Filament shunt	535 ohms # 14039	tapped for 235, 125 and 175 ohms. Yellow lead to contact 1. Between contact 1 and 2, 235 ohms: between contact 2 and 3, 125 ohms. Between contact 3 and 4, 175 ohms. Flat wire wound.
1st r-f plate	5000 ohms # 13901	thin tubular
1st r-f bias	4 ohms # 13961	thin green covered, flex.

TRANSFORMERS

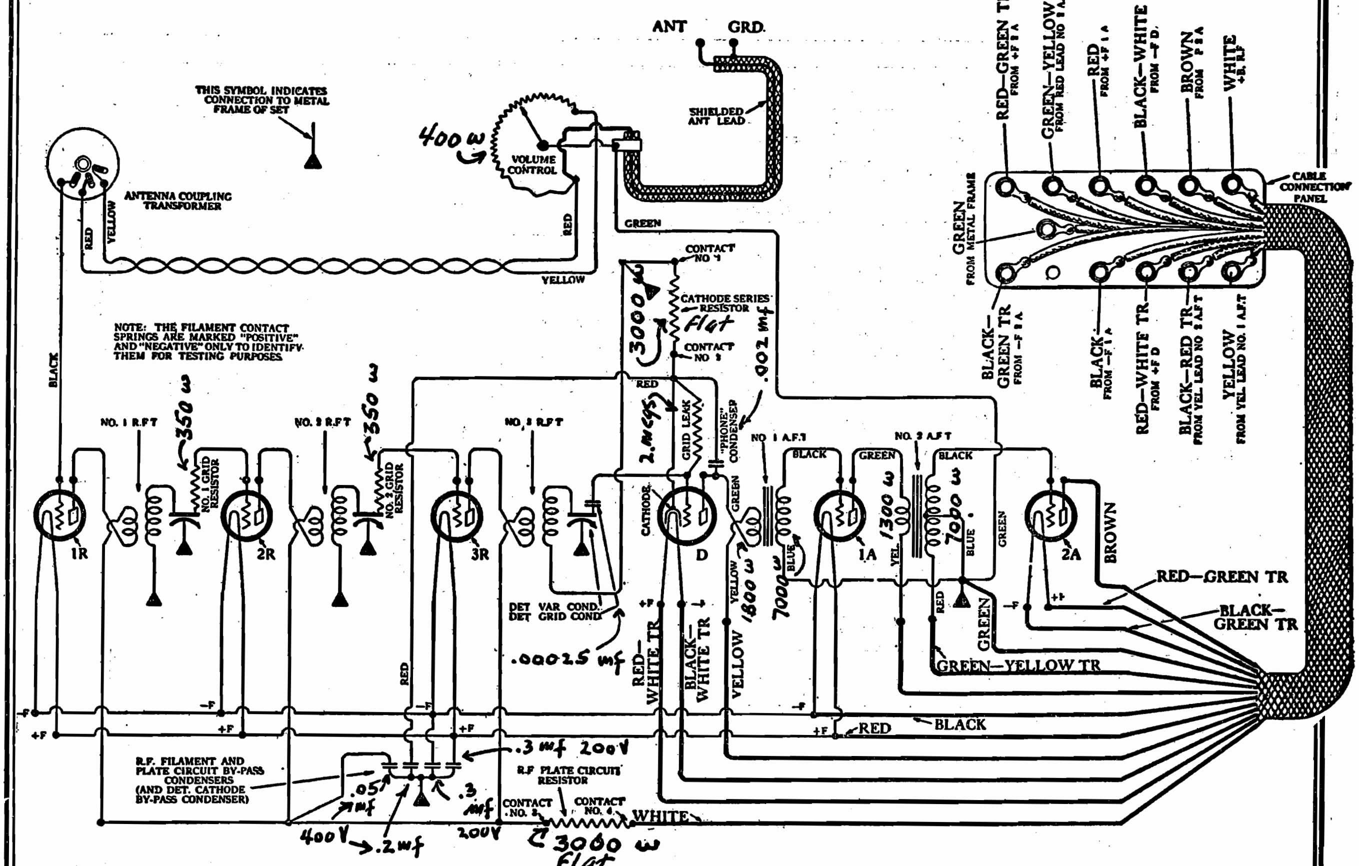
1st a-f primary	1000 ohms # 8060
1st a-f secondary	7000 ohms
2nd a-f primary	900 ohms # 14015
2nd a-f secondary	7000 ohms

These parts are in the power pack chassis.

Voltage regulator	242 ohms # 14041	flat wire wound
Detector plate resistor	12500 ohms # 15941	Originally # 9424. Tubular
Filter chokes	90 ohms Total	
Output choke	550 ohms	

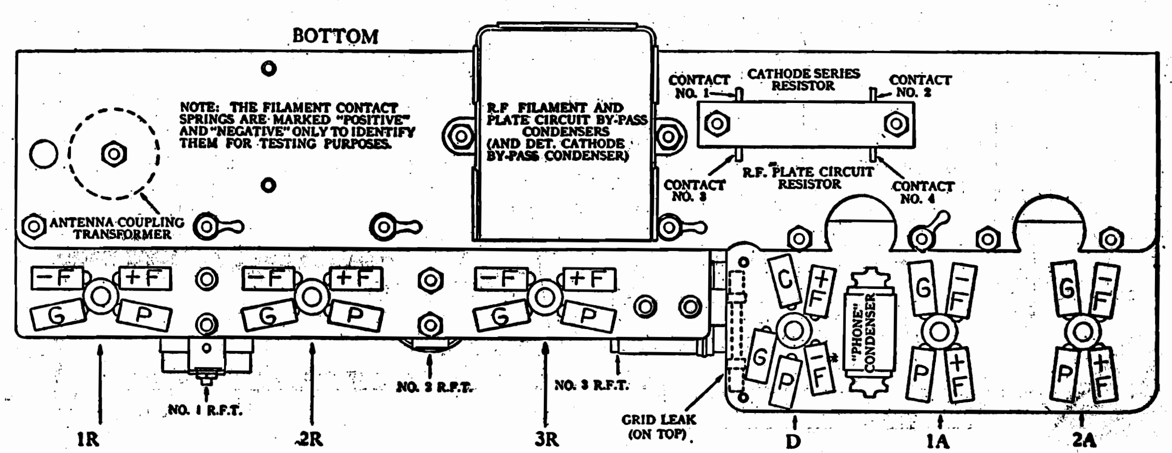
ATWATER KENT MFG. CO. MODEL 43 Receiver

Schematic



Wiring Diagram of Model 43 Set.
The +B, 1st A. F. cable lead is black with a red tracer.

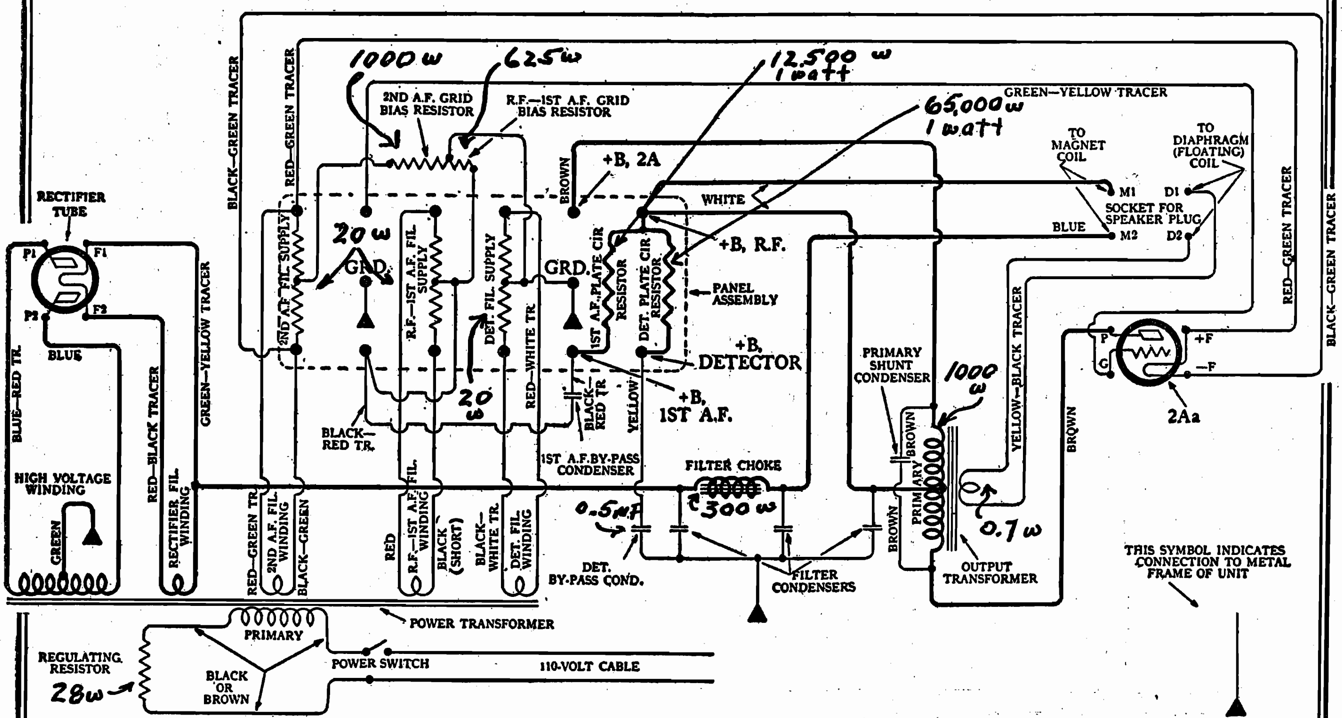
Wiring diagram of Model 43 power pack is shown on 152



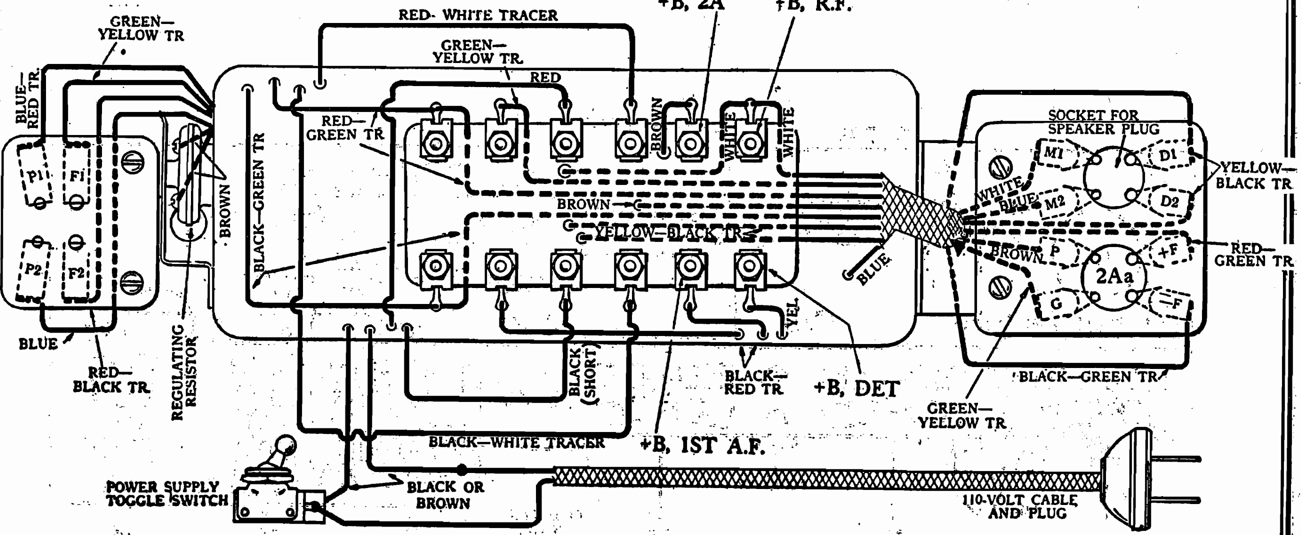
Test Chart for Model 43.

MODEL 43
Power Pack
Schematic

ATWATER KENT MFG. CO.



Wiring Diagram of Power Unit in Model 43.



Showing Connections and Approximate Position of Leads from Sealed Container in Model 43 Power Unit.
early type of power unit for Model 43, two brown leads from the primary-shunt condenser connect to the +B, 2A terminal and to the brown P2Aa lead respectively. In later models these connections are made internally.

ATWATER KENT MFG. CO.

MODEL 46 and 53

Model 46 and 53

SPECIAL NOTE. For wiring diagram see Model 43

CONDENSERS These parts are in the receiver chassis.

CONDENSERS

R-f filament bypass	.3 mfd # 15158	200 volts)	in one can
R-f plate bypass	.05 mfd # 15158	400 volts)	
Detector phone	.002 mfd # 9598	500 volts	
Detector grid	.00025 mfd # 14861	500 volts	

RESISTORS

Volume control	400 ohms # 13604	
Grid suppressors	350 ohms # 8439	flat wire wound
R-f plate	3000 ohms # 13369	flat wire wound
Detector cathode	3000 ohms # 13369	flat wire wound
Detector grid leak	2.0 megs # 15892	green 1 watt

TRANSFORMERS

1st a-f primary	1500 ohms # 14721
1st a-f secondary	7000 ohms
2nd a-f primary	1100 ohms # 14722
2nd a-f secondary	7000 ohms

These parts in power pack chassis

CONDENSERS

It is necessary to quote the color code connections of the condensers as they emanate from the condenser can.

Black- ground...White- 2. mfd...Green yellow- 1.5 mfd...Blue- 1.5 mfd...
Yellow- 1. mfd... Black and red and black and red- .5 mfd...

RESISTORS

Detector plate	65,000 ohms # 15592	1 watt
1st a-f plate	12,500 ohms # 15941	1 watt
R-f, 1st a-f bias	625 ohms # 14427)	single unit. flat wire wound and tapped.
2nd a-f bias	1,000 ohms # 14427)	
Filament shunt	20 ohms # 9434	flat tapped 10-10 ohms

CHOKES

Filter #1 and #2	300 ohms	total
Speaker field (46)	1700 ohms # 15629	
Speaker field (53)*	2500 ohms # 14361	*This value in early (53) only.
Speaker field (53)**	1700 ohms # 15631	**This value in late (53) only.

ATWATER KENT MFG. CO.

Model 47

SPECIAL NOTE.

Model 47 is similar to Model 46, bearing in mind the notes stated on page 154 and the information specified below. All parts not mentioned in the following list are as stated in connection with Model 46.

1st and 3rd grid suppressors	350 ohms	# 8439	
2nd grid suppressors	500 ohms	# 8225	
R-f plate resistor	1500 ohms	# 16253	
R-f and 1st a-f bias	550 ohms	# 15063)	single unit tapped
2nd a-f bias	1000 ohms	# 15063)	
Speaker field	1700 ohms	# 15629	

The above mentioned units are used in the Model 47, in place of whatever equivalent units are stated as being used in Models 46 and 53 and the balance of the units listed in connection with Models 46 and 53 may be interpreted as being used in Model 47.

MODEL 44 and 45

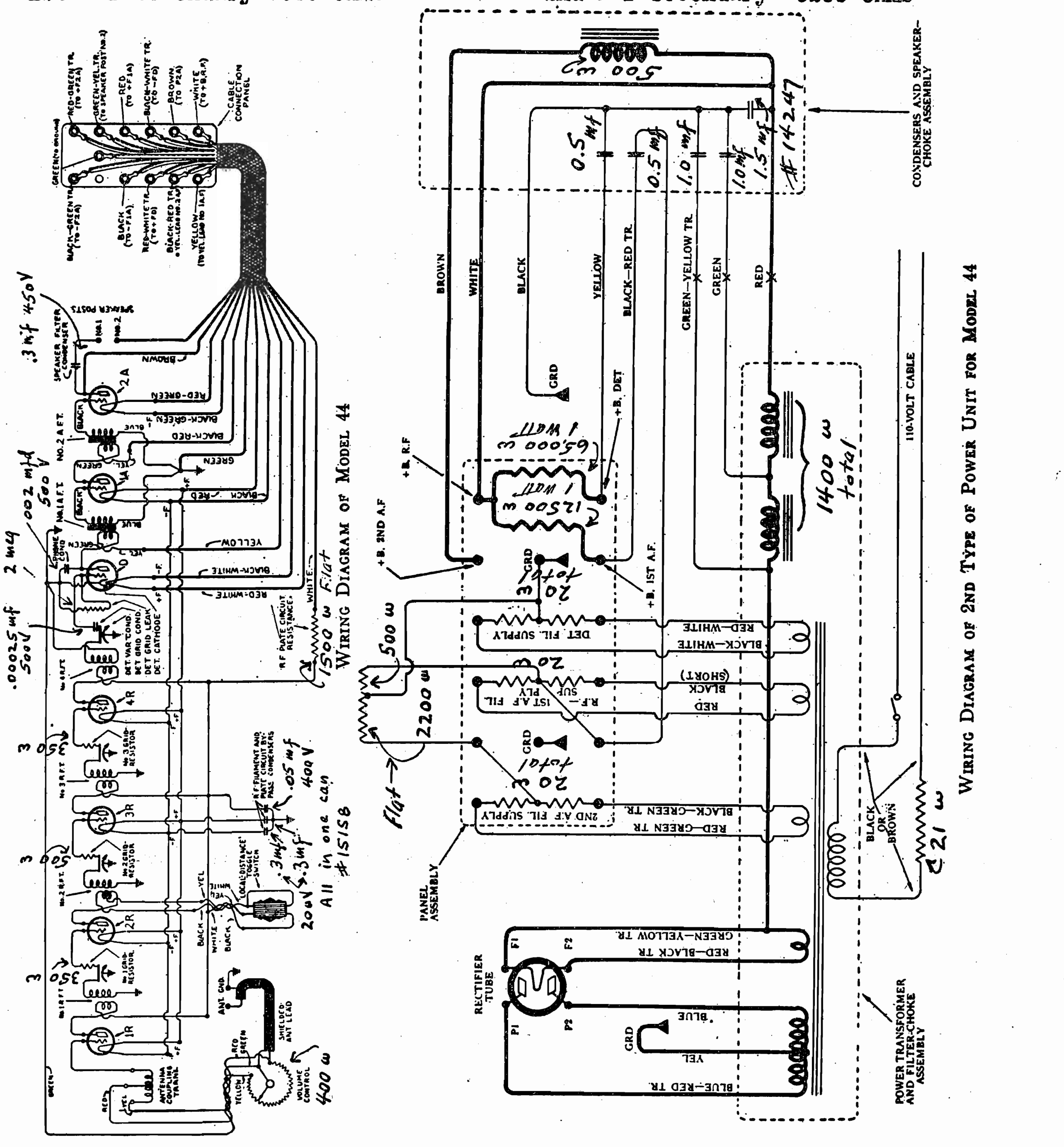
ATWATER KENT MFG. CO.

SPECIAL NOTE.

1st type power unit for Model 44 is shown on page 145. Second type power unit for Model 45 is shown on page 148.

TRANSFORMERS IN MODELS 44 and 45

1st a-f primary	1000 ohms # 8060	2nd a-f primary	1700 ohms # 7661
1st a-f secondary	7000 ohms	2nd a-f secondary	3250 ohms



WIRING DIAGRAM OF MODEL 44

WIRING DIAGRAM OF 2ND TYPE OF POWER UNIT FOR MODEL 44

Model 50

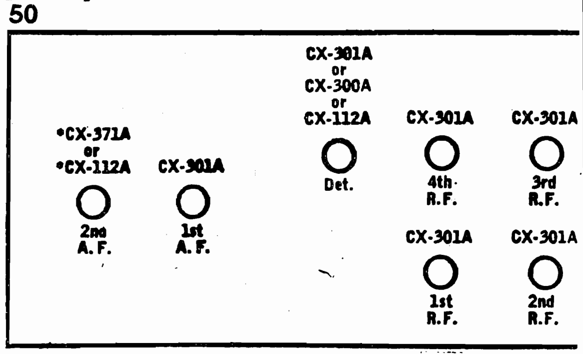
CONDENSERS

Detector grid	.00025	mfd	# 8593	500 volts
Detector phone	.002	mfd	# 8590	500 volts
Plate bypass	.3	mfd	# 14902	450 volts

RESISTORS

Detector grid leak	2.0	megs	# 15892 (8195)	1 watt
1st r-f plate	12500	ohms	# 8796	yellow glass
A-f filament	1.5	ohms	# 8627	black covered, flexible
Detector rheostat	20	ohms	# 8310	
R-f rheostat	5	ohms	# 8599	
R-f grid leak	2.0	megs	# 15892 (8195)	1 watt

50

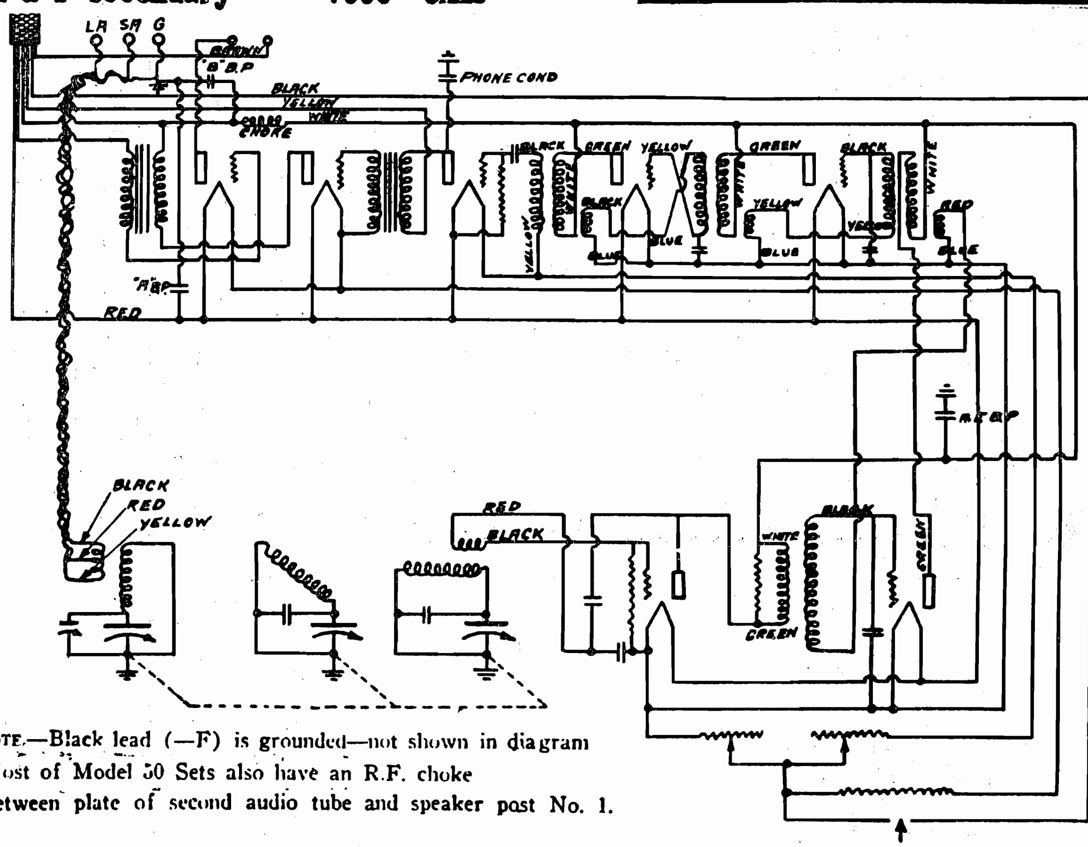


CHOKES

A-f plate	35	ohms	# 8232

TRANSFORMERS

1st a-f primary	1000	ohms	# 8650
1st a-f secondary	7000	ohms	
2nd a-f primary	1400	ohms	# 8940
2nd a-f secondary	7000	ohms	



NOTE.—Black lead (—F) is grounded—not shown in diagram
Most of Model 50 Sets also have an R.F. choke between plate of second audio tube and speaker post No. 1.

WIRING DIAGRAM OF MODEL 50.

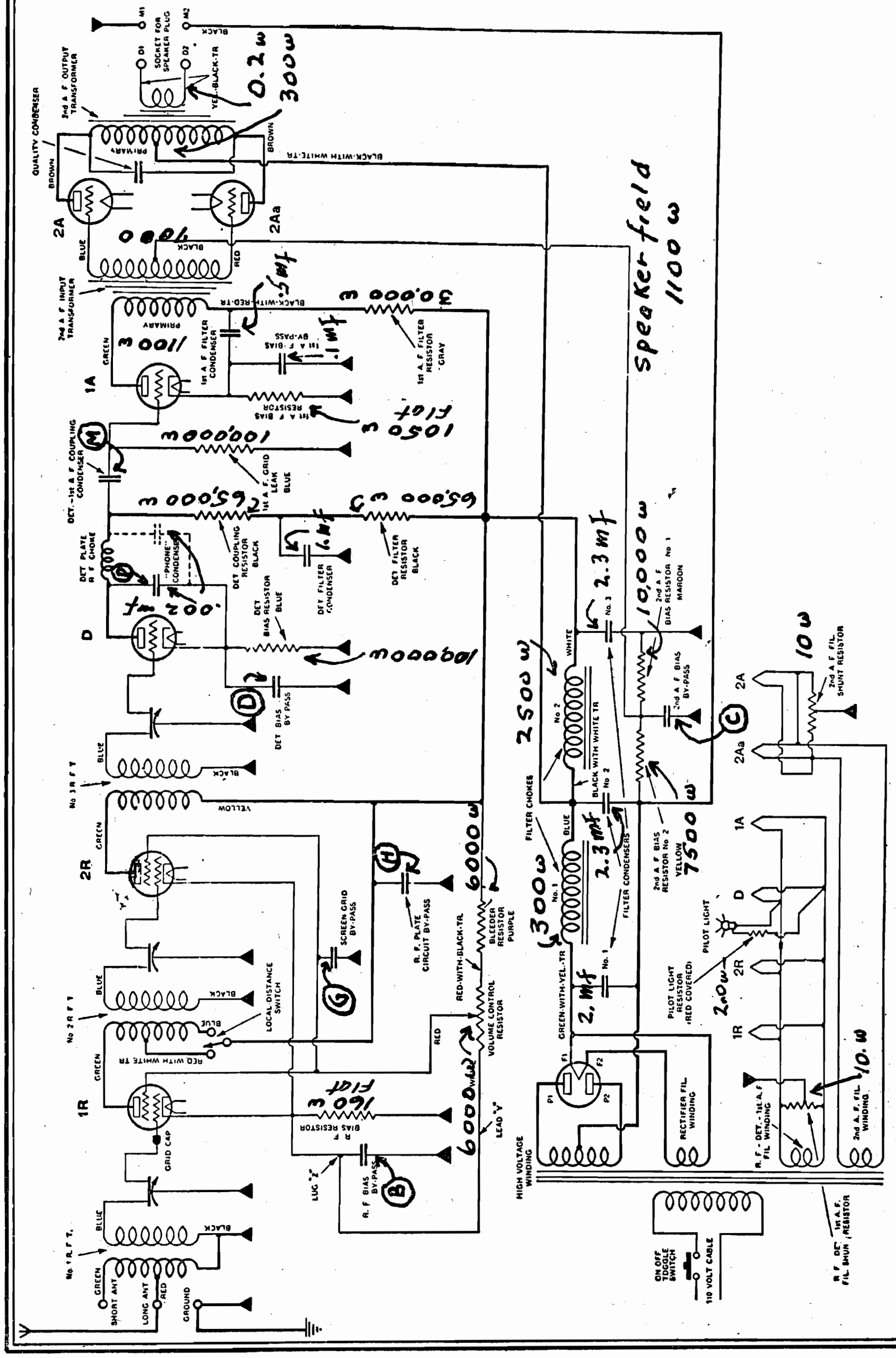
ATWATER KENT MFG. CO.

MODEL 55, 55-C
Early

VOLTAGE TABLE

Tube	Filament Early	Filament Late	Plate Early	Plate Late	Grid Early	Grid Late	Screen Early	Screen Late
R-F	2.2	2.2	160	160	2.8	3.7	78	96
Det	2.2	2.2	101	101	11.	11.		
1st A-F	2.2	2.2	64	69	1.8*	2.8*		
2nd A-F	2.2	2.2	213	230	39.	46		
Rec	4.5	4.5						

* Measured voltage, not operating voltage. Line voltage 110 V.



FILTER CONDENSER CONNECTIONS. See chassis

• These numbers refer to the figures shown within the circle representing the filter condenser can.

1st a-f filter	.5 mfd	connected between centre stud and terminal (3)
Detector filter	1. mfd	connected between terminal (4) and can
1st a-f bias	.5 mfd	connected between centre stud and can
Filter #1	2.0 mfd	connected between terminals (1) and (4)
Filter #2	2.3 mfd	connected between terminals (2) and (4)
Filter #3	2.3 mfd	connected between terminals (6) and can.

MODEL 55, 55-C
Early

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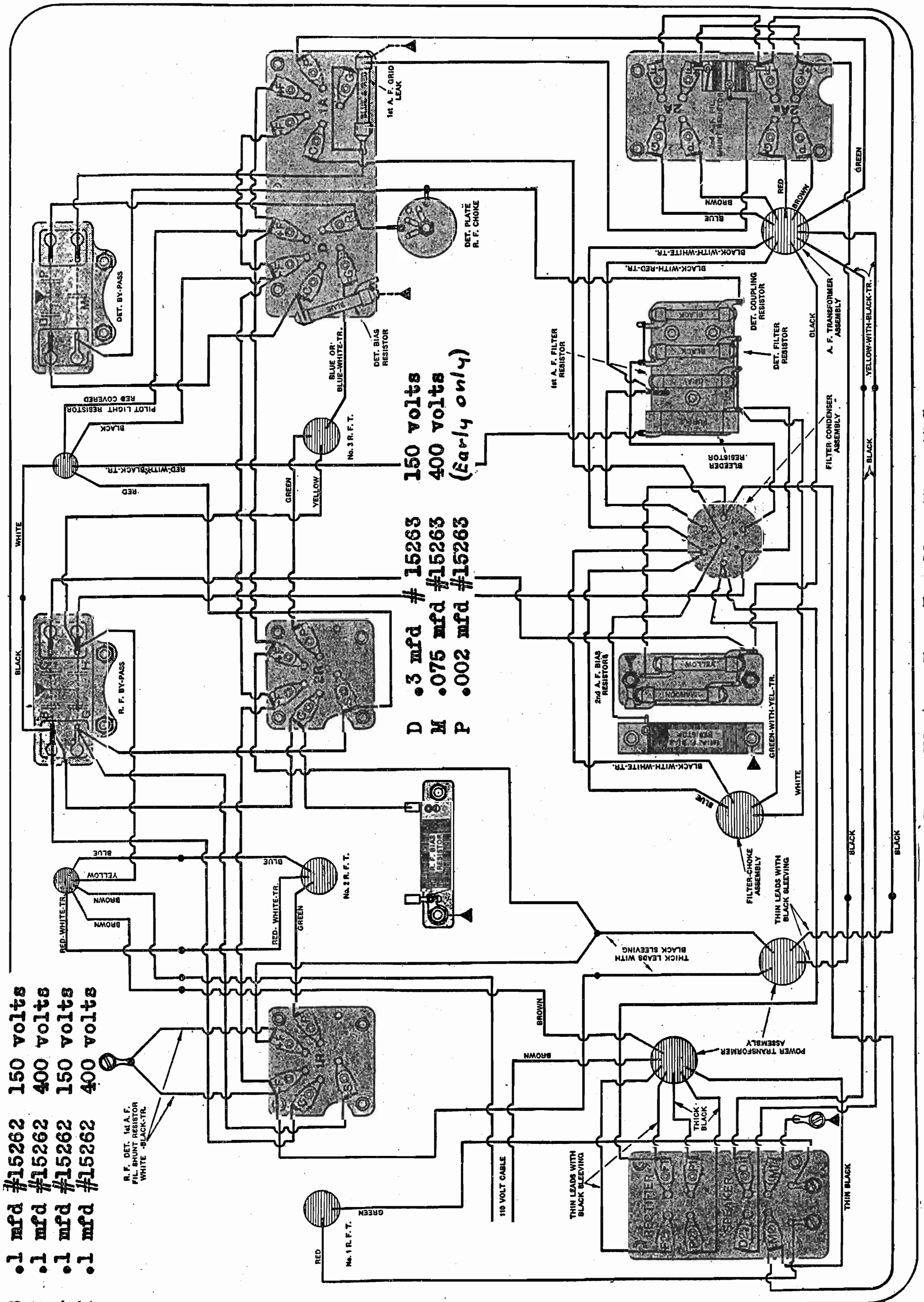

BOTTOM WIRING OF EARLY-TYPE MODEL 55 AND 55-C.

This drawing shows the new-style R. F. bias resistor. In some early sets, a separate double-type phone condenser is used.

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MODEL 55 and 55-C
Late
Schematic
Chassis

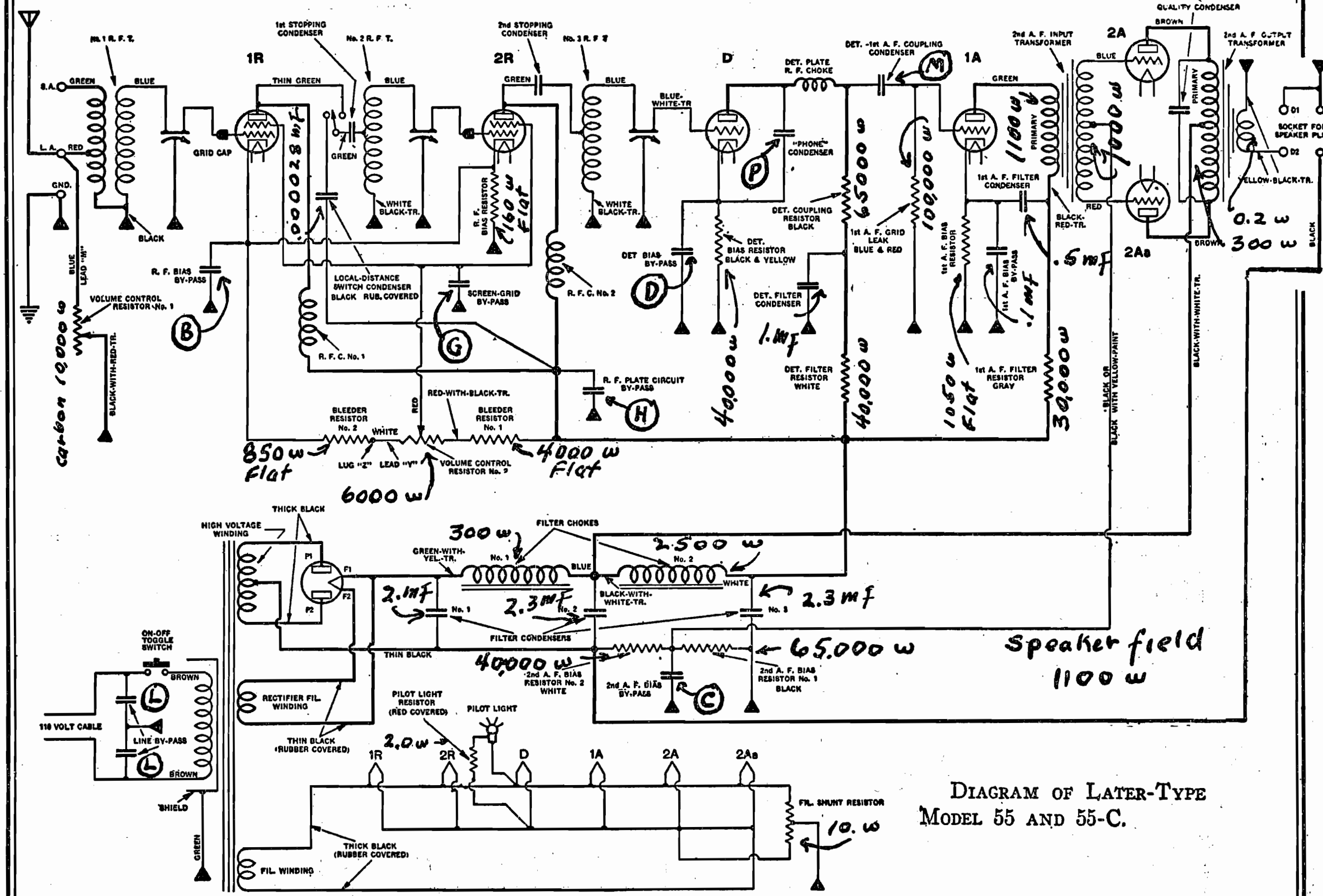
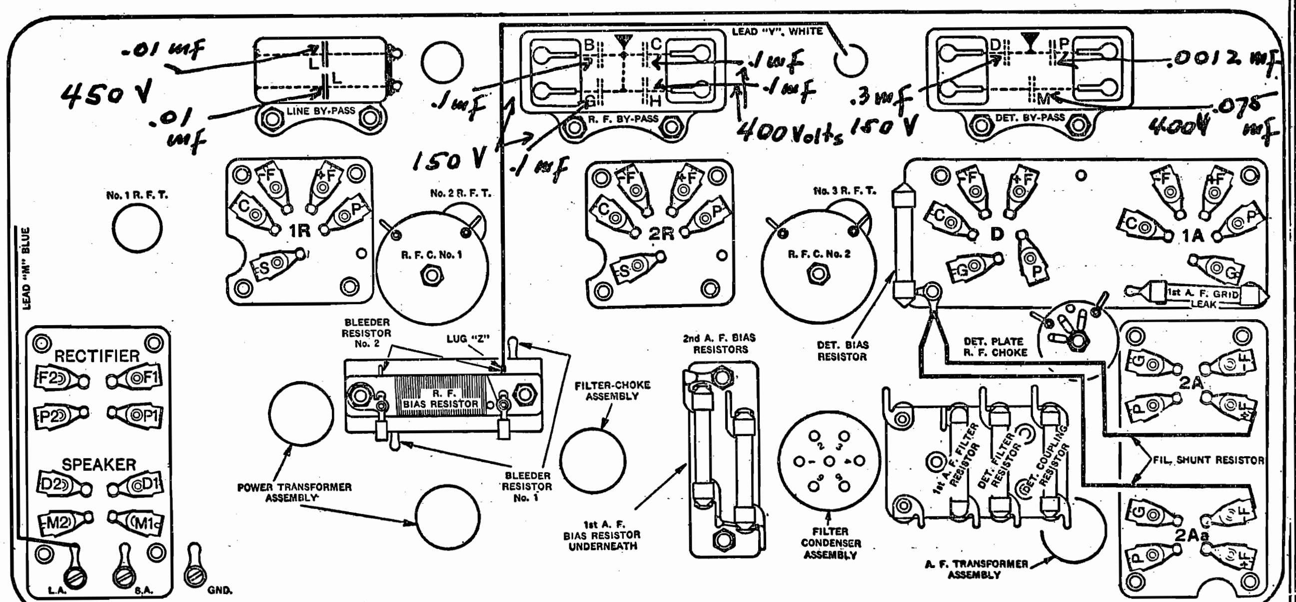


Diagram of Later-Type Model 55 and 55-C.



Bottom Chart of Later-Type Model 55 and 55-C.

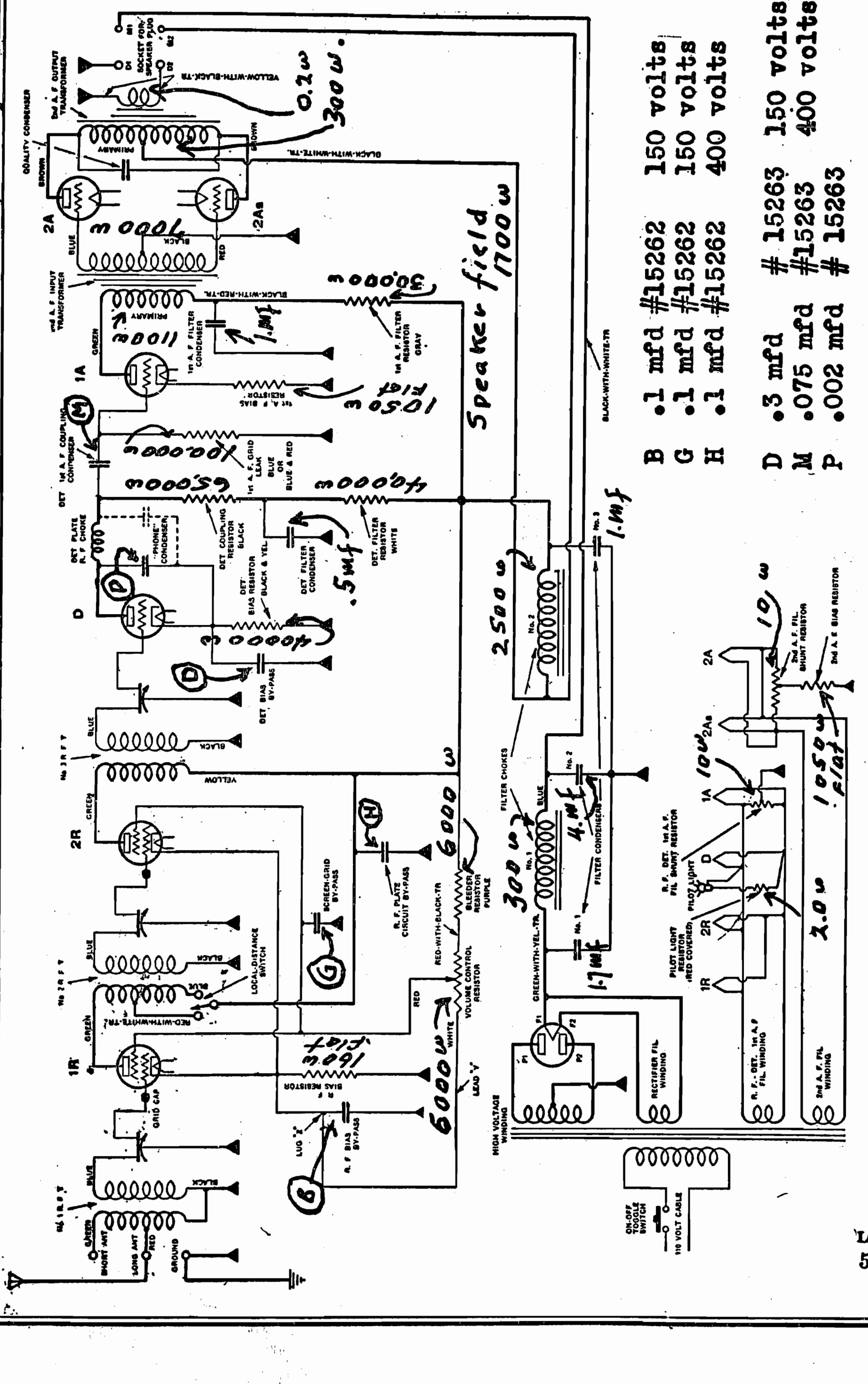
MODEL 55-F and 55-FC
Early

ATWATER KENT MFG. CO.

VOLTAGE TABLE

Tube	Filament	Plate	Grid	Screen
R-F	2.2	160	3.7	96
Det	2.2	101	11.	
1st A-F	2.2	69	2.8*	
2nd A-F	4.5	174	41.	
Rect.	4.5			

* Measured voltage, not operating voltage. Line voltage 110 V.



B	.1 mfd	#15262	150 volts
G	.1 mfd	#15262	150 volts
H	.1 mfd	#15262	400 volts
D	.3 mfd	# 15263	150 volts
M	.075 mfd	#15263	400 volts
P	.002 mfd	# 15263	

FILTER CONDENSER CONNECTIONS. (See chassis layout) The numbers and connections stated are marked upon the filter unit can and are also shown on the chassis layout within the cirle designating the filter condenser can.

Filter #1	1.7 mfd	connected between the center stud and can
Filter #2	4.0 mfd	connected between terminal (1) and can
Filter #3	1.0 mfd	connected between terminal (4) and can
Detector filter	.5 mfd	connected between terminal (2) and can
A-f filter	1.0 mfd	connected between terminal (3) and can

DIAGRAM OF EARLY-TYPE MODEL 55-F AND 55-F-C.

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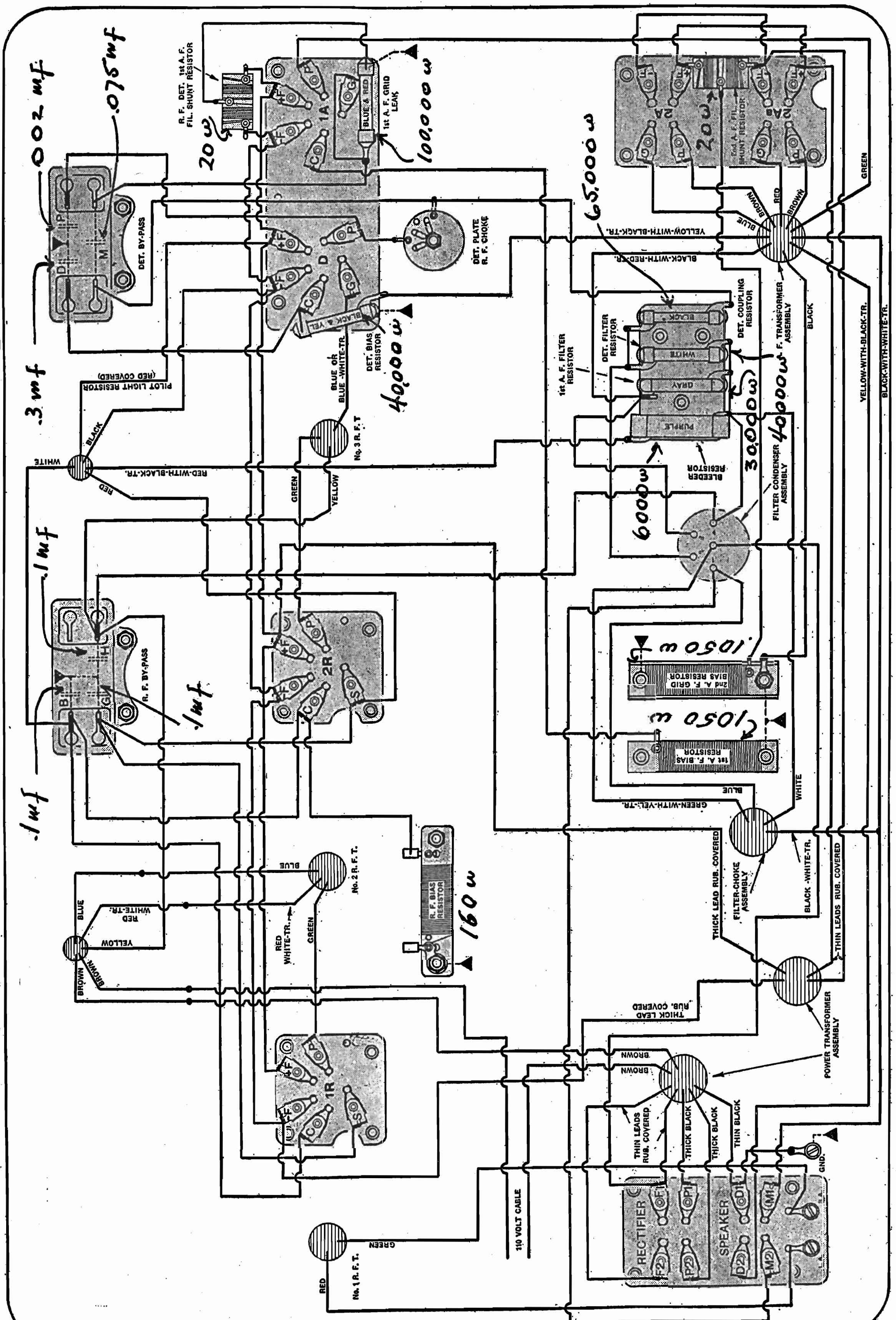
MODEL 55-F and 55-FC Early Chassis



BOTTOM WIRING OF EARLY-TYPE MODEL 55-F AND 55-F-C.

Some of these sets had a combination resistor, No. 15274, which is superseded by two separate resistors, No. 16988 being used as R. F. bias resistor, and No. 17077 as filament shunt resistor.

MODEL 55-F and 55-FC
Late
Chassis

ATWATER KENT MFG. CO.

FILTER CONDENSER CONNECTIONS. See data pertaining thereto on page 162
Bypass condenser specifications are shown below.

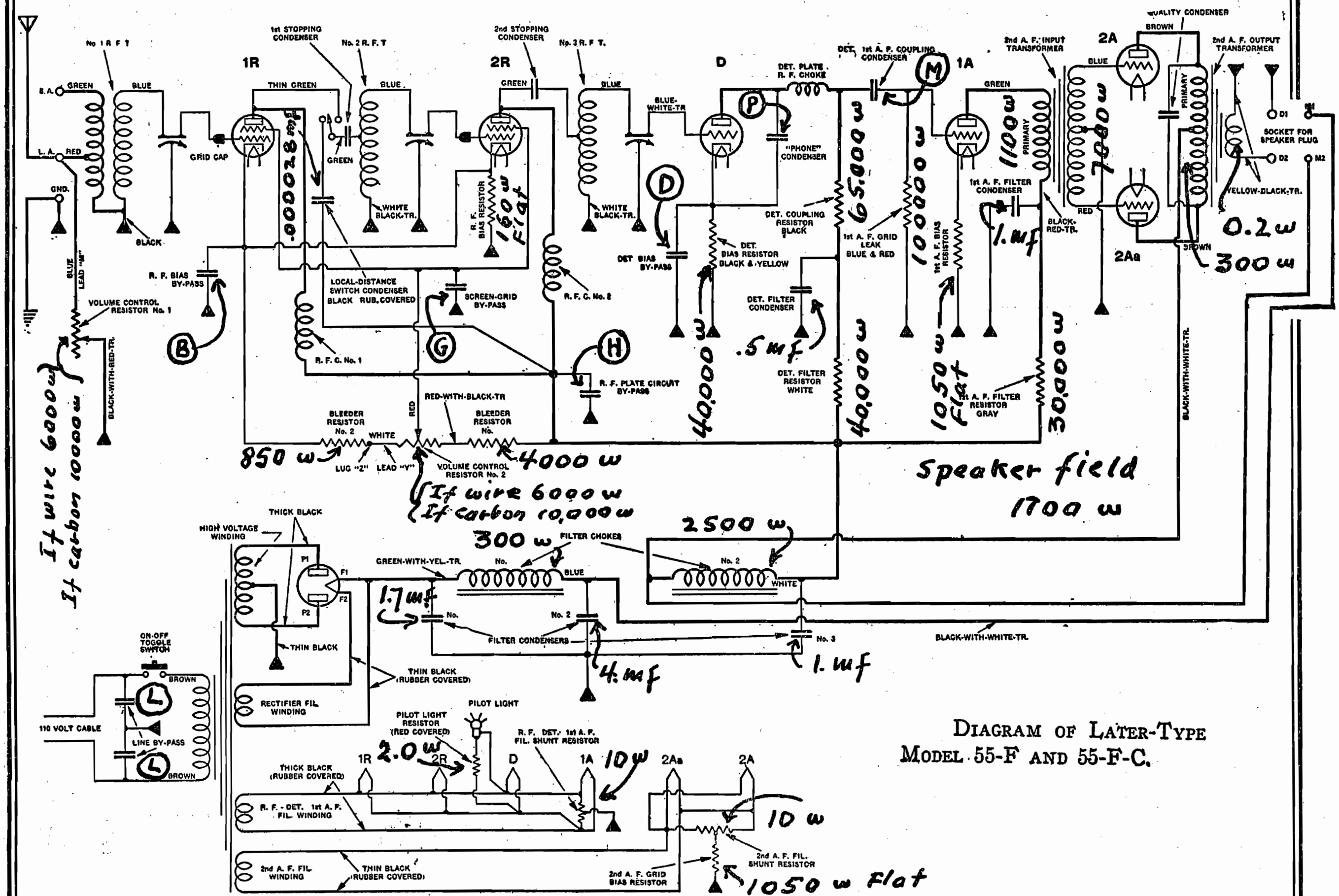
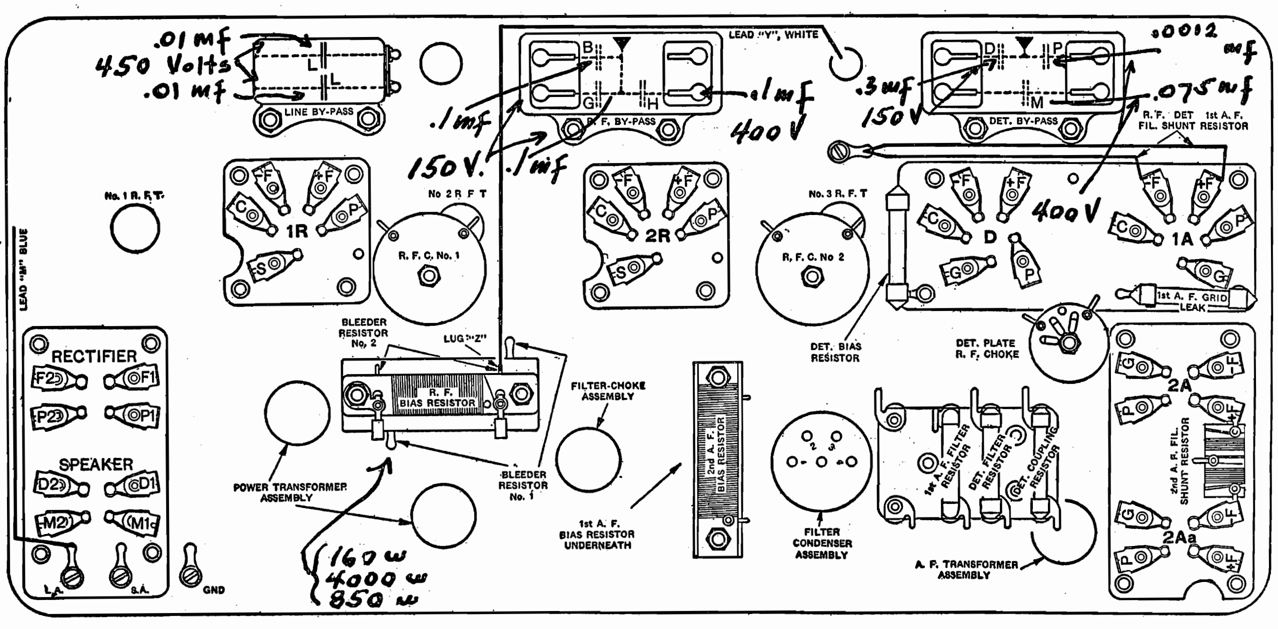


DIAGRAM OF LATER-TYPE MODEL 55-F AND 55-F-C.



BOTTOM CHART OF LATER-TYPE MODEL 55-F AND 55-F-C.

Filter condenser reference is to page 3-24.

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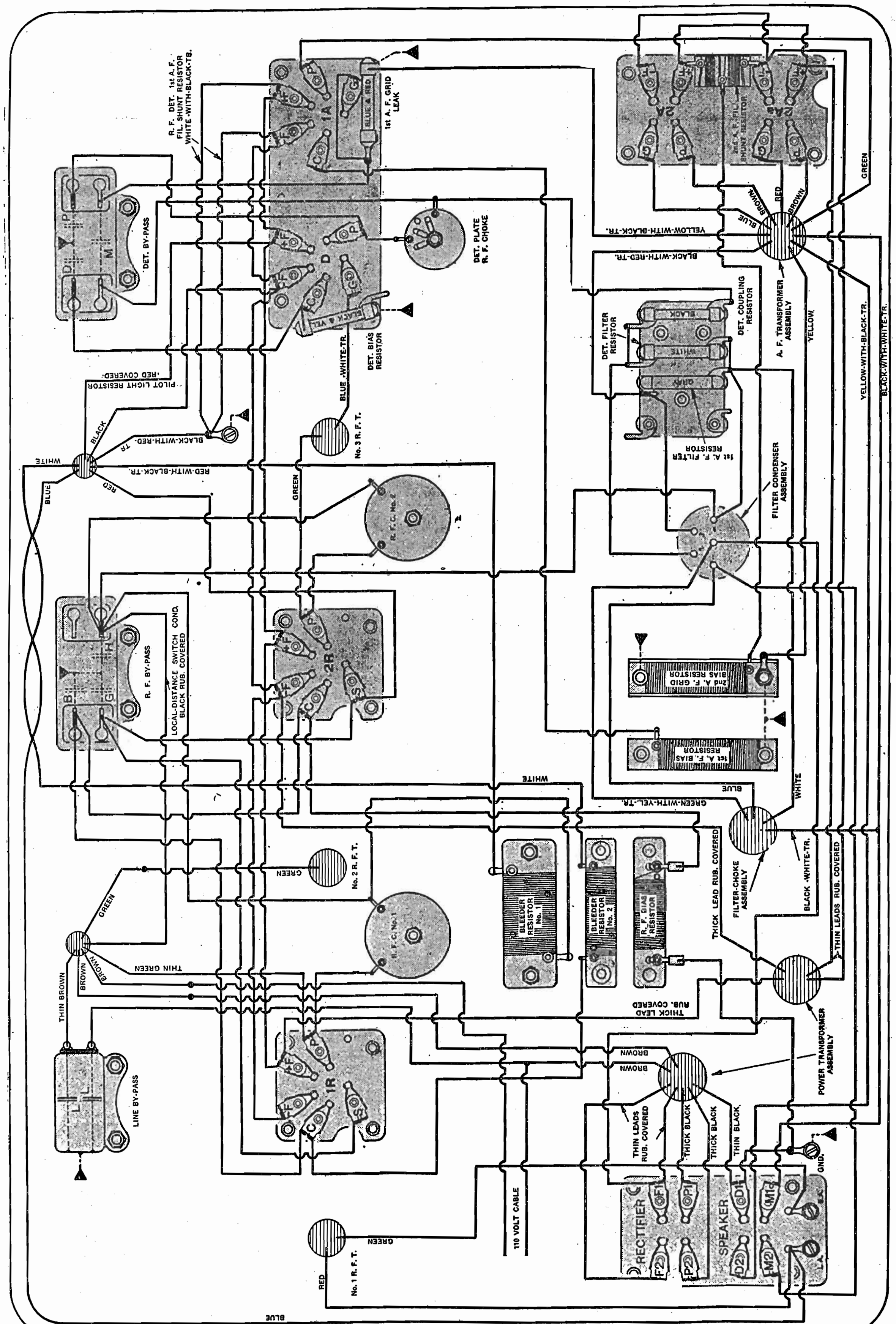
MODEL 55-F and 55-FC
Late Chassis



BOTTOM WIRING OF LATER-TYPE MODEL 55-F AND 55-F-C.

The 1st-A. F. bias resistor is mounted under the 2nd-A. F. bias resistor. The three other wire-wound resistors are mounted together, being insulated from each other by sheets of fibre.

Some of these sets had a combination resistor, No. 16868, which is superseded by two separate resistors, No. 16988 being used as R. F. bias, and No. 16989 as bleeder No. 2.

MODEL 60 and 60-C

ATWATER KENT MFG. CO.

Comparison of the Three Types of Model 60-C

	IN THE FIRST TYPE	IN THE SECOND TYPE	IN THE THIRD TYPE
VOLUME CONTROL	A **single** volume control regulates the screen-voltage	A **dual-type** volume control— 1. Regulates the amount of R.F. energy transferred from the 1st- to the 2nd-R.F. tube. 2. Regulates the screen-voltage.	A **dual-type** volume control— 1. Regulates the amount of R.F. energy transferred from the antenna circuit to the 1st-R.F. tube. 2. Regulates the R.F. control-grid voltage.
LOCAL-DISTANCE SWITCH	The local-distance switch is connected to the primary of No. 2 R.F.T. **(between the 1st and 2nd R.F. tubes).** In the distance position, the switch cuts in the entire primary of No. 2 R.F.T., thus giving three straight stages of R.F. amplification. In the local position, the switch cuts out a part of the primary of No. 2 R.F.T., thus reducing the total R.F. amplification.	The local-distance switch is connected to the 2nd stopping condenser **(between the 2nd- and 3rd-R.F. tubes).** In the distance position, the switch connects the 2nd stopping condenser to the plate of the 2nd-R.F. tube, thus giving three straight stages of R.F. amplification. In the local position, the switch connects the 2nd stopping condenser to the +B side of the plate-circuit of the 2nd-R.F. tube, thus reducing the total R.F. amplification.	The local-distance switch is connected to the secondary of No. 1 R.F.T. **(ahead of the 1st-R.F. tube).** In the distance position, the switch connects the grid-return lead of the 1st-R.F. tube to the chassis, thus giving three straight stages of R.F. amplification. In the local position,* the switch connects the grid-return lead of the 1st-R.F. tube to a coupling coil (on the 2nd-R.F. transformer) and then to the bias circuit of the 2nd-A.F. tubes. The coupling coil provides coupling between the 1st and 2nd tuned circuits, and the high negative grid bias makes the 1st-R.F. tube inoperative, thus reducing the total R.F. amplification.
R.F. TRANSFORMERS	The R.F. transformers are **inductively coupled.**	The R.F. transformers are **auto-transformer coupled.**	The R.F. transformers are **auto-transformer coupled.**
VARIABLE CONDENSERS	Both the 1st and 2nd types have four separate variable condensers controlled by pulleys and belts.		The variable condensers are of the "multiple" type, with the four rotors mounted on a common shaft.

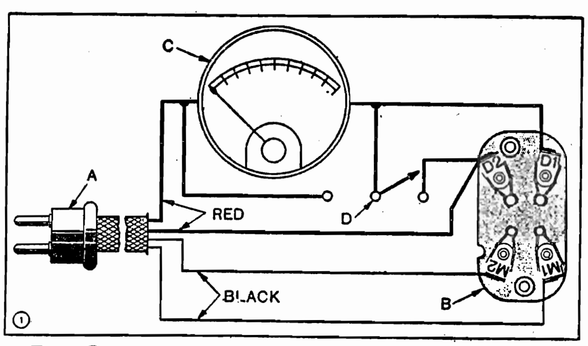
Output Measuring Circuit for Electro-Dynamic Receivers.

A—Plug-and-cord No. 14537. This is to be inserted in the speaker-plug socket of set that is being tested.

B—Speaker-plug socket No. 17512. Insert plug of correct type of electro-dynamic speaker in this socket.

C—Thermo-coupled galvanometer (115 milliamperes). This meter gives an indication of the amount of A. F. current that is flowing through the voice-coil circuit.

D—Single-pole—double-throw toggle switch No. 13678. With this switch, either the voice coil or the galvanometer may be shorted out of the circuit.



THE CONNECTIONS SHOWN IN HEAVY LINES MUST BE SHORT AND OF LOW RESISTANCE.

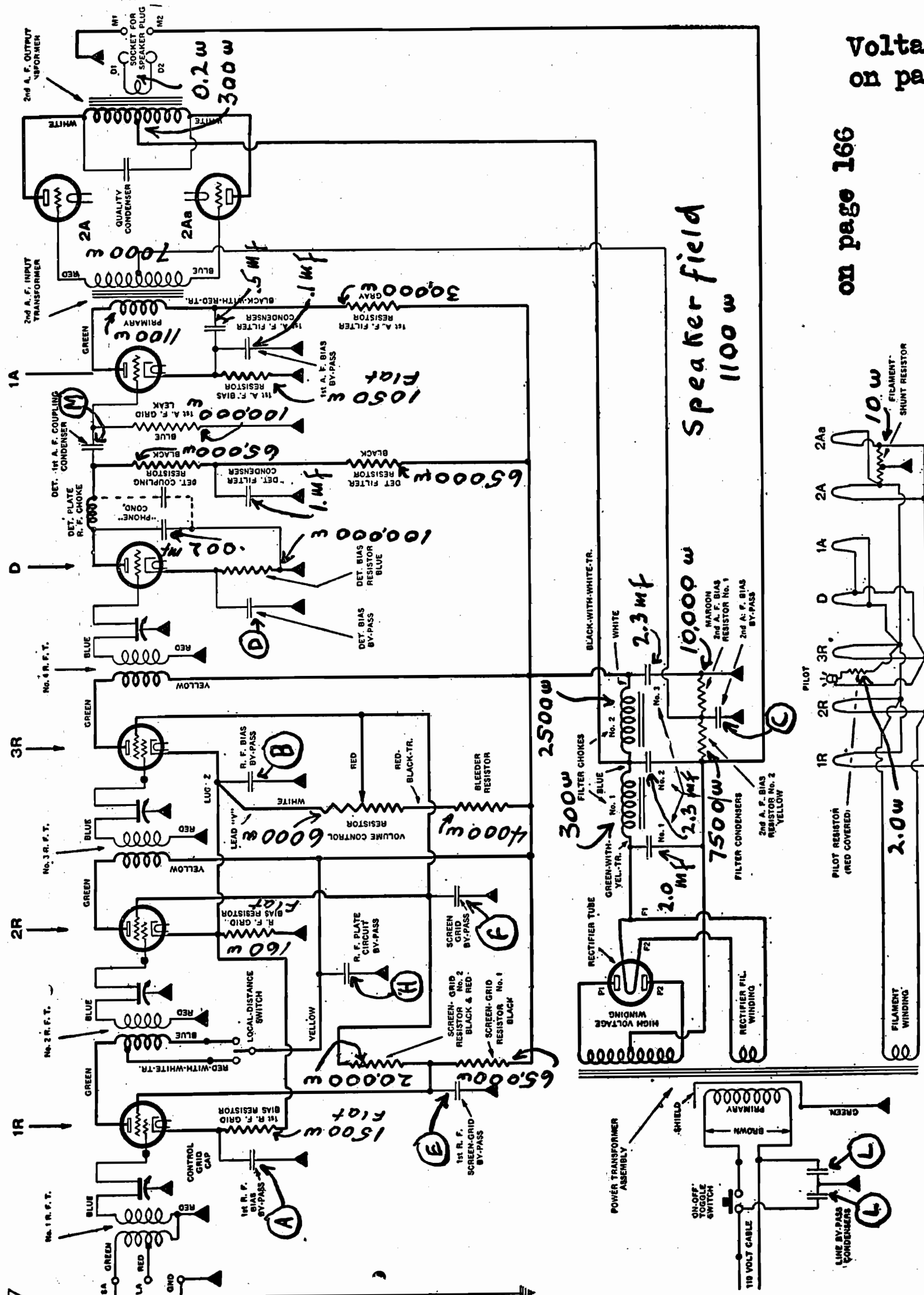
ATWATER KENT MFG. CO.

MODEL 60 and 60-C
Early
Schematic
Data

FILTER CONDENSER CONNECTIONS. See chassis layout
The numbers listed as connections are marked upon the filter condenser unit and shown within the circle designating the condenser unit on the chassis layout.

1st a-f filter	.5 mfd	connected between center stud and terminal (3)
Detector filter	1. mfd	connected between terminal (4) and can
1st a-f bias	.5 mfd	connected between center stud and can
Filter #1	2.0 mfd	connected between terminals (1) and (4)
Filter #2	2.3 mfd	connected between terminals (2) and (4)
Filter #3	2.3 mfd	connected between terminals (6) and can

Voltage data on page 173



BYPASS CONDENSER VALUES. The bypass condensers are designated by letters, exclusive of those within the filter condenser can. For bypass condensers, see schematic above and chassis layout on page 166

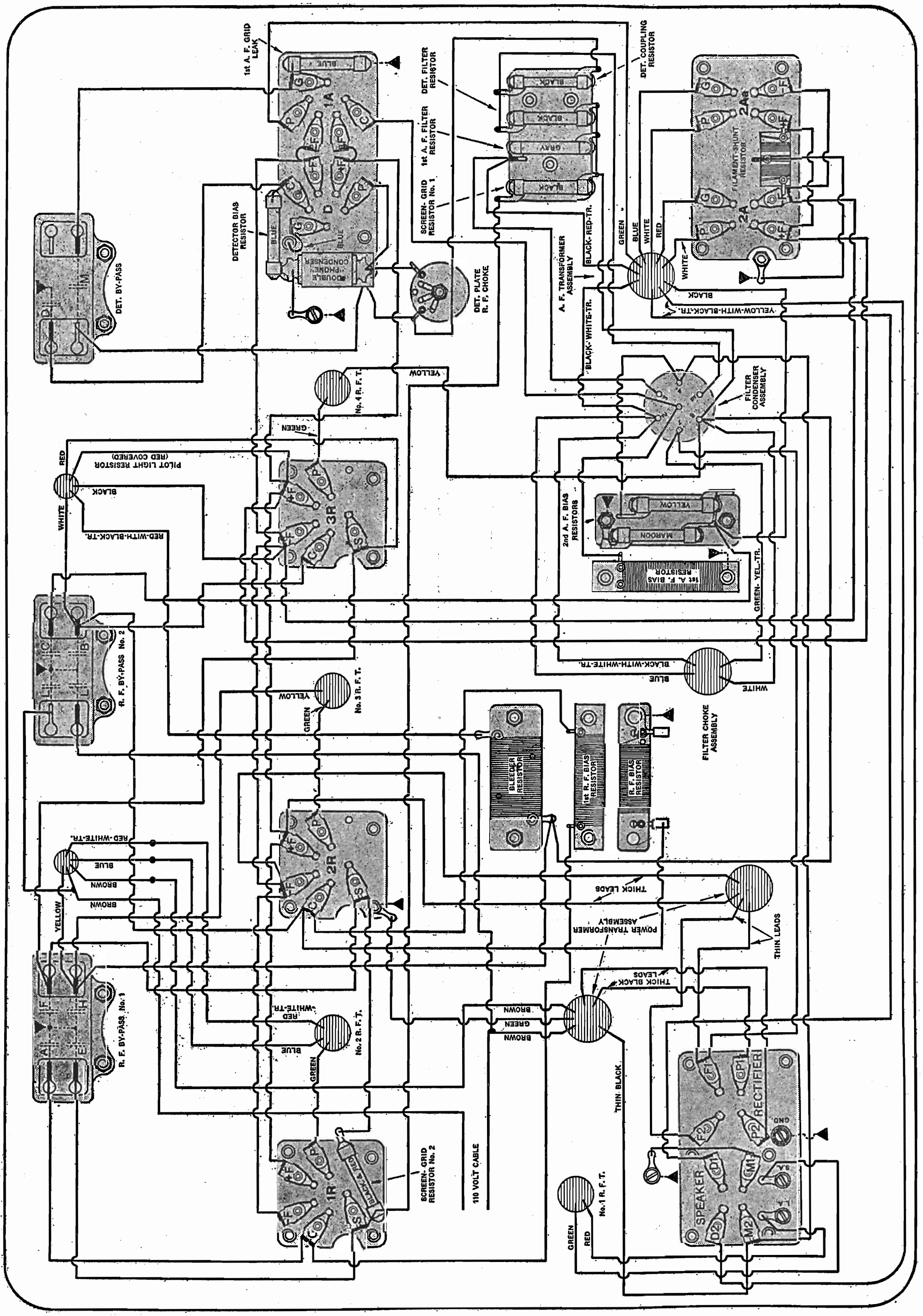
RF Bypass # 1	A	.1 mfd	150 volts	E	.1 mfd	150 volts
	F	.1 mfd	400 volts	H	.1 mfd	400 volts
RF Bypass #2	B	.1 mfd	150 volts	C	.1 mfd	150 volts
	L	.01 mfd	400 volts	L	.01 mfd	400 volts
Detector Bypass	D	.3 mfd	150 volts	M	.075 mfd	400 volts

EARLY-TYPE MODEL 60 AND 60-C.

Chassis reference is page 3-30. Voltage reference is page 3-35.

MODEL 60 and 60-C
Early Chassis

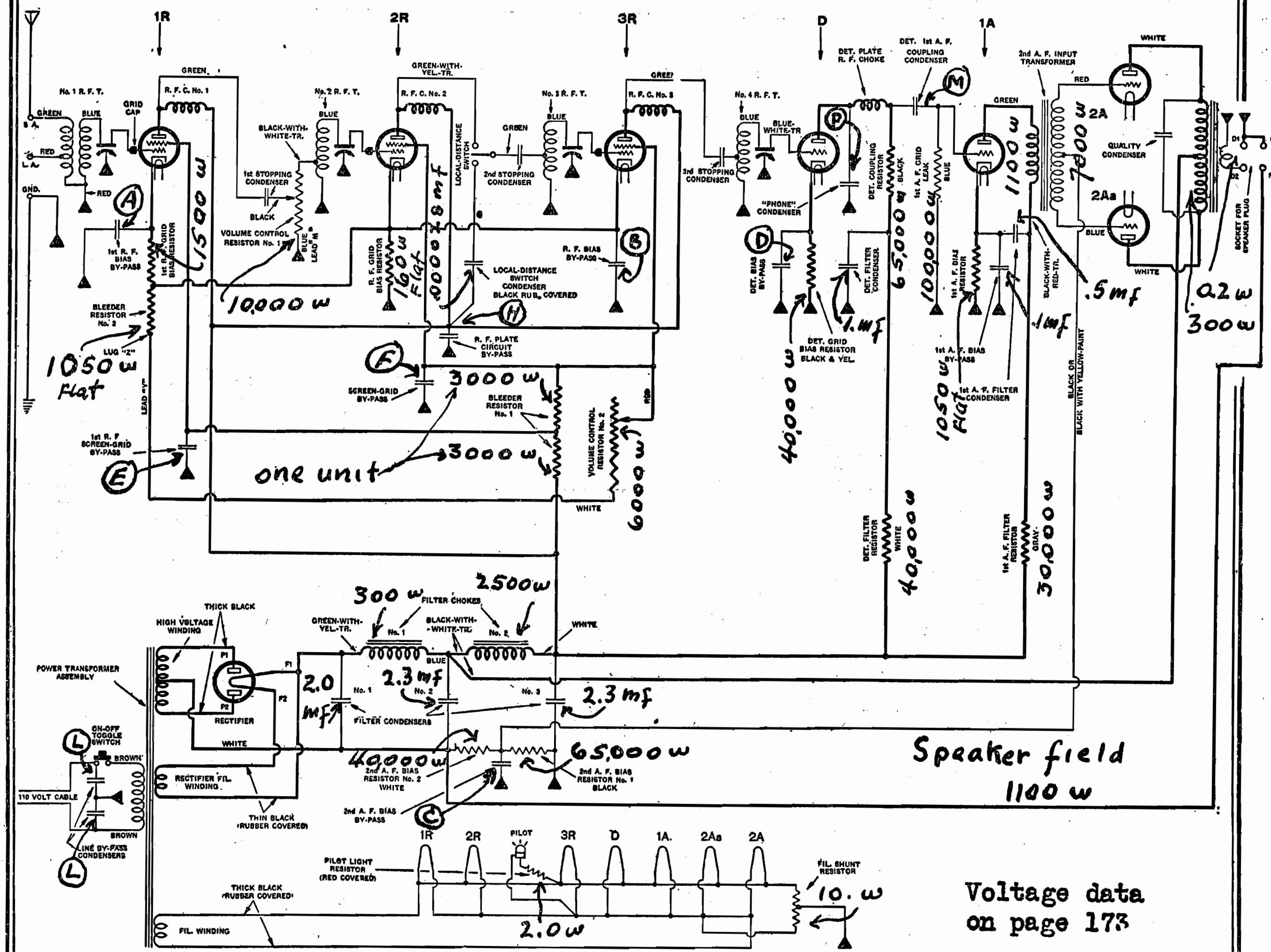
ATWATER KENT MFG. CO.



BOTTOM WIRING OF EARLY-TYPE MODEL 60 AND 60-C.

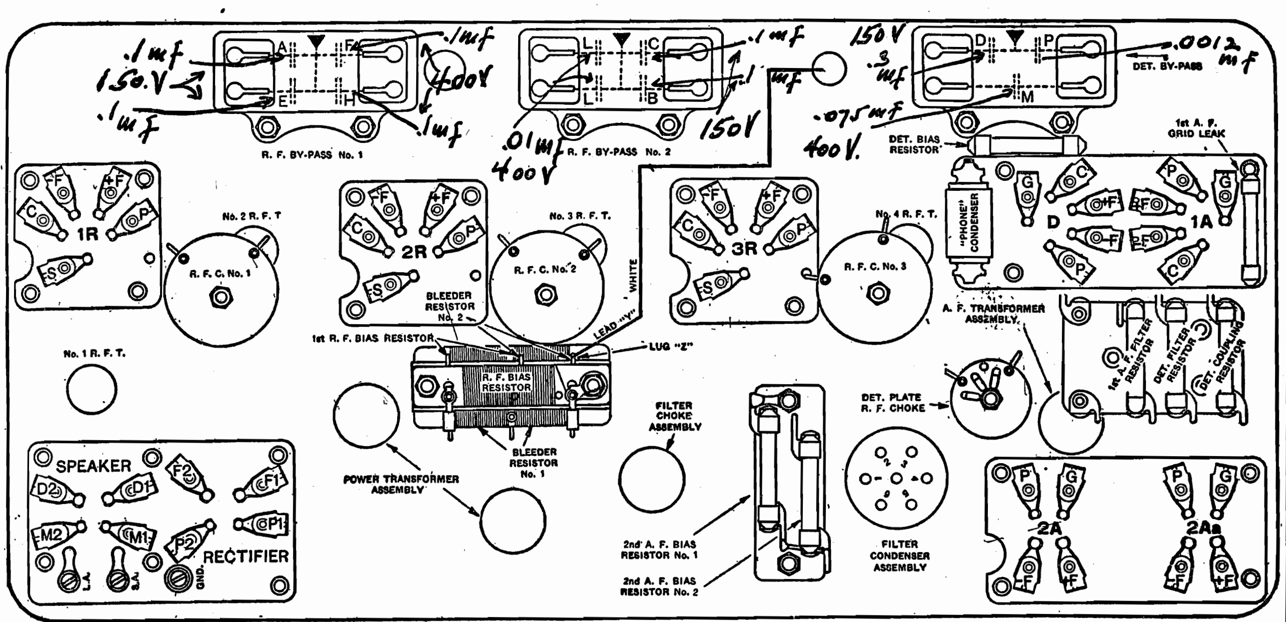
ATWATER KENT MFG. CO.

MODEL 60 and 60-C Late Schematic



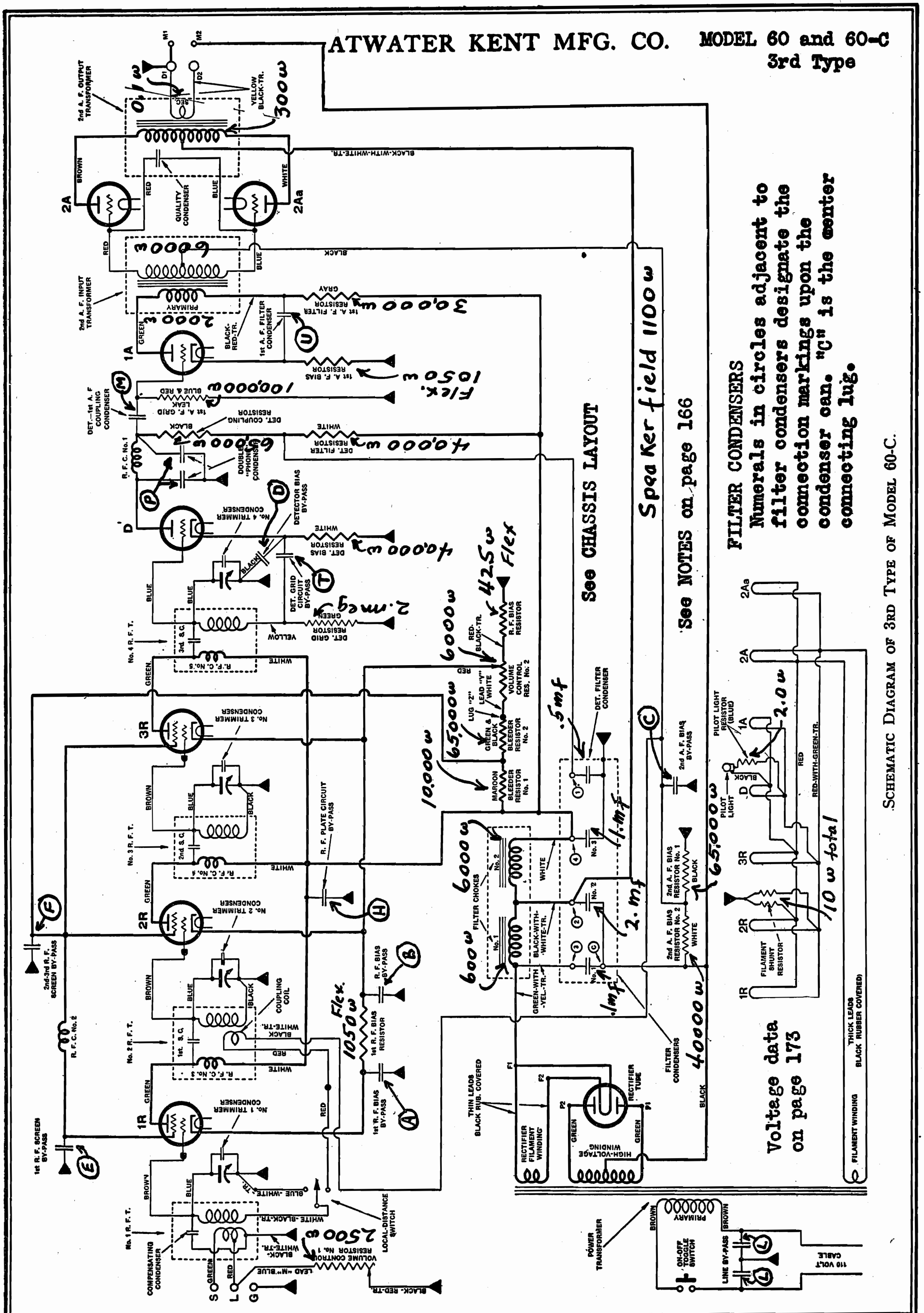
Voltage data on page 173

CIRCUIT OF LATER MODEL 60 AND 60-C.



BOTTOM CHART OF LATER-TYPE MODEL 60 AND 60-C.

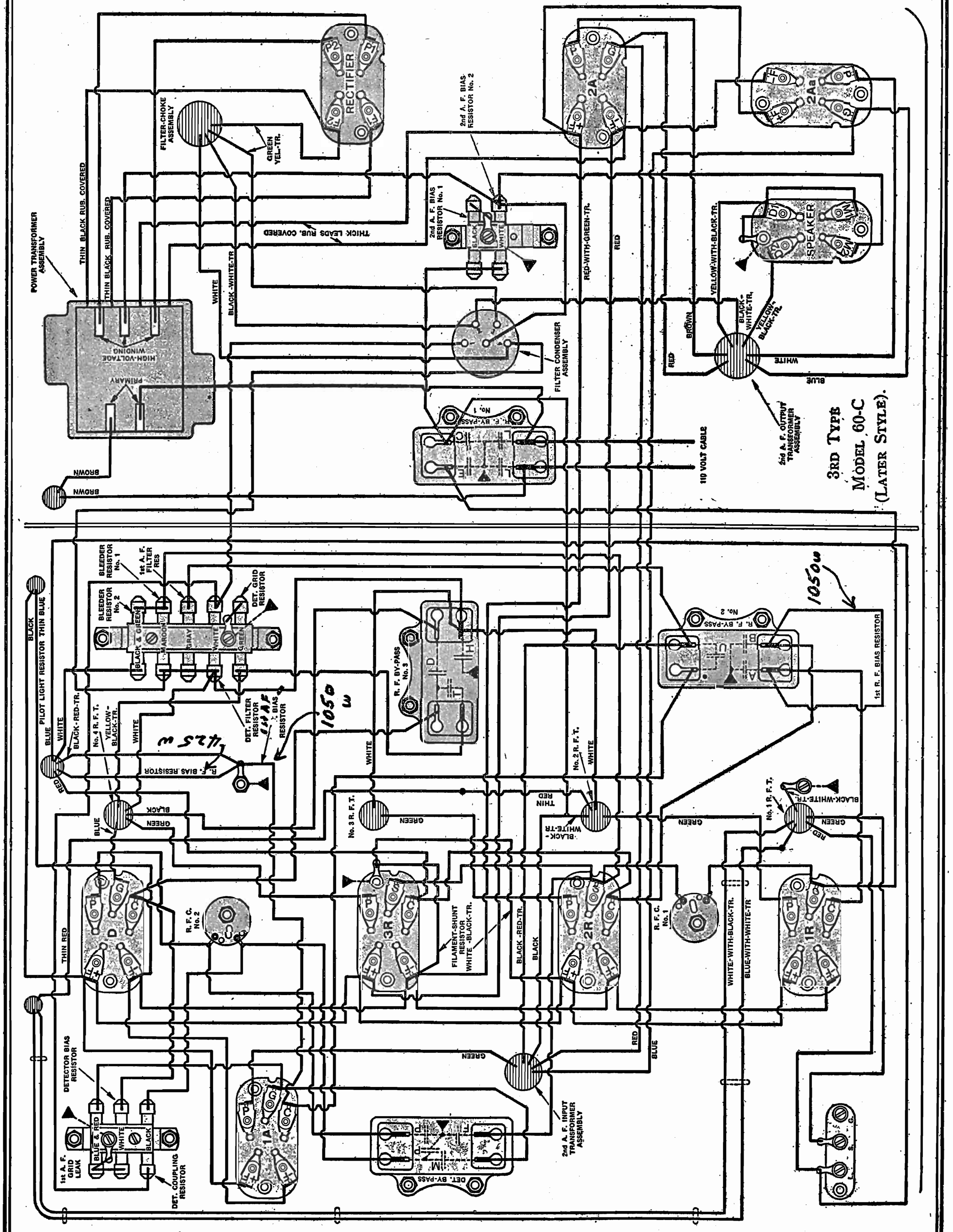
Filter Condenser data on page 3-29. Voltage data reference to page 3-35.


ATWATER KENT MFG. CO.
MODEL 60 and 60-C
3rd Type
FILTER CONDENSERS
Numerals in circles adjacent to filter condensers designate the connection markings upon the condenser can. "C" is the center connecting lug.
See CHASSIS LAYOUT
See NOTES on page 166
Speaker field 1100 ω
Voltage data on page 173
SCHEMATIC DIAGRAM OF 3RD TYPE OF MODEL 60-C.
2nd A. F. OUTPUT TRANSFORMER
QUALITY CONDENSER
2nd A. F. INPUT TRANSFORMER
1st A. F. FILTER CONDENSER
1st A. F. FILTER RESISTOR
1st A. F. BIAS RESISTOR
1st A. F. GRID LEAK
DET. COUPLING RESISTOR
DET.—1st A. F. COUPLING CONDENSER
DET. FILTER RESISTOR
DOUBLE "PHONE" CONDENSER
DETECTOR BIAS BY-PASS
DET. BIAS RESISTOR
DET. GRID CIRCUIT BY-PASS
DET. GRID RESISTOR
R. F. BIAS RESISTOR
VOLUME CONTROL RES. No. 2
BLEEDER RESISTOR No. 2
BLEEDER RESISTOR No. 1
DET. FILTER CONDENSER
2nd A. F. BIAS BY-PASS
PILOT LIGHT RESISTOR (BLUE)
PILOT LIGHT
FILAMENT SHUNT RESISTOR
R. F. PLATE CIRCUIT BY-PASS
FILTER CHOKES
2nd A. F. BIAS RESISTOR No. 1
2nd A. F. BIAS RESISTOR No. 2
FILTER CONDENSERS
RECTIFIER TUBE
RECTIFIER FILAMENT WINDING
HIGH-VOLTAGE WINDING
THIN LEADS BLACK RUB. COVERED
THICK LEADS BLACK RUBBER COVERED
FILAMENT WINDING
POWER TRANSFORMER
PRIMARY
ON-OFF TOGGLE SWITCH
LINE BY-PASS
110 VOLT CABLE
2nd-3rd R. F. SCREEN BY-PASS
R. F. C. No. 2
1st R. F. SCREEN BY-PASS
No. 1 R. F. T.
No. 2 R. F. T.
No. 3 R. F. T.
No. 4 R. F. T.
No. 1 TRIMMER CONDENSER
No. 2 TRIMMER CONDENSER
No. 3 TRIMMER CONDENSER
No. 4 TRIMMER CONDENSER
COUPLING COIL
COMPENSATING CONDENSER
VOLUME CONTROL RESISTOR No. 1
LOCAL-DISTANCE SWITCH
1st R. F. BIAS BY-PASS
1st R. F. BIAS RESISTOR
R. F. BIAS BY-PASS
2A
2Aa
1A
D
3R
2R
1R
0.1 ω
300 ω
6000 ω
2000 ω
30,000 ω
1050 ω Flex.
100,000 ω
65000 ω
40,000 ω
40,000 ω
2. meg
6000 ω
425 ω Flex
65,000 ω
10,000 ω
.5 mf
1. mf
2. mf
.1 mf
6000 ω
600 ω
65,000 ω
40000 ω
2.0 ω
10 ω total
1050 ω Flex
2500 ω

ATWATER KENT MFG. CO.

MODEL 60 and 60-C
3rd Type

Chassis



MODEL 60 and 60-C ATWATER KENT MFG. CO.
3rd Type

SPECIAL NOTE.

The Model 60-C, 3rd type was made in two productions. In the first production of this model, the r-f bias resistor, the 1st r-f bias resistor and the 1st a-f bias resistor were of the flat type; that us, wire wound upon a flat bakelite strip about 3 inches long by $\frac{3}{4}$ inch wide. In the second production of this model these "flat" resistors were replaced by "flexible" resistors which resemble ordinary insulated leads, except that each resistor has a die cast or molded metal lug at each end. The identification of these resistors is as follows:-

R-f bias resistor	#15830	Brown with white diagonal tracer
1st r-f bias	#15810	Brown with white straight stripe and no chassis lug
1st a-f bias	#15820	Brown with white straight stripe and one chassis lug.

When examining the chassis diagram you will find that these flexible resistors are indicated and bear descriptive designations, relative to their function and not color code.

FILTER CONDENSERS

Detector filter	.5 mfd	connected between terminal (1) and can
Filter #1	.1 mfd	connected between terminal (3) and center stud
Filter # 2	2.0 mfd	connected between terminal (2) and center stud
Filter #3	1.0 mfd	connected between terminal (4) and can

BYPASS CONDENSERS

RF Bypass #1	L	.01 mfd	400 volts	L	.01 mfd	400 volts
	C	.1 mfd	400 volts	E	.1 mfd	400 volts
RF Bypass #2	A	.1 mfd	150 volts	U	.12 mfd	400 volts
	B	.1 mfd	150 volts			
RF Bypass #3	D	.1 mfd	150 volts	H	.2 mfd	400 volts
	T	.04 mfd	400 volts			
Detector Bypass	F	.1 mfd	400 volts	M	.075 mfd	400 volts
	P	.00025 mfd	400 volts	P	.0012 mfd	400 volts

The function of the various individual units is designated upon the schematic wiring diagram.

MODEL 60 -C 3 rd type bears serial numbers from 5,670,001 to 5,684,000. It can further be recognized by the fact that the "local-distance" switch is connected to the secondary of the input transformer, "ahead" of the 1st r-f tube. This type connection is used only in the 3rd type of this model and in both productions of this model.

MODEL 60-C 2nd type has the "local-distance" switch between the 2nd and 3rd r-f tubes.
MODEL 60-C 1st type, has this switch between the 1st and 2nd r-f tubes.

Special page references are to pages 3-32 and 3-33.

ATWATER KENT MFG. CO.

MODEL 60 and 60-C

VOLTAGE DATA FOR MODELS 60 and 60-C (1st and 2nd Types)

Line voltage 110. 120 volt line is 10 percent higher.

Tube	Filament	Plate	Grid	Screen	
R-F(1st)	2.2	160	7.3	119	119
R-F (2nd-3rd)	2.2	160	3.7	83	
Det.	2.2	101	11.		
A-F (1st)	2.2	69	1.8*		
A-F (2nd)	2.2	230	44.		
Rect.	4.5				

* Measured, not actual operating voltage.

VOLTAGE DATA FOR MODEL 60 and 60-C (3rd Type)

Line voltage 110. Volume control at minimum.

Tube	Filament	Plate	Grid	Screen
R-F	2.3	170	16.5*	142
Det.	2.3	119	1.5	
A-F (1st)	2.3	73	1.9**	
A-B (2nd)	2.3	224	36. ***	

* Local distance switch at distance

** Measured, not actual operating voltage.

*** If 2nd A-F bias resistor #1 is open, bias will be about 85 v.

Checking Sensitivity of Set

When checking the sensitivity of the set, it is necessary to use an oscillator, and a meter to indicate maximum output volume.

A local oscillator is necessary to ensure constancy of signal strength; signals from broadcast stations are not sufficiently constant for this work.

An output meter is necessary to ensure a reliable indication of output volume; the ear is not reliable enough for this purpose.

The oscillator feeds a weak signal into the receiver. The signal is amplified in the receiver and produces a reading on a meter which is connected to the output of the set. This meter indicates the strength of output volume. The reading on the output meter is greatest when all the tuned circuits in the set are adjusted to the same frequency as the oscillator signal.

1. *Oscillator.*

The oscillator must provide modulated R. F. signals at four different frequencies in the broadcast range. *These four frequencies should correspond to dial settings of 5, 45, 65 and 95 on the dial of a 3rd type Model 60-C* ***which has the original factory synchronism.***

Each of the four R. F. oscillators should have an adjustable pick-up so that the strength of each oscillator may be controlled independently of the other three.

2. *Output Measuring Circuit.*

The output measuring circuit is shown and described

Adjusting Trimmer Condensers

1. Connect the common pick-up lead from the four R. F. oscillators to one end of a No. 8112 condenser. Connect the other end of this condenser to the Long-Antenna post. Connect the oscillator container to the Ground post.
2. Put plug "A" of the output measuring circuit in the speaker-plug socket on the set. Plug an F-4 type speaker in socket "B." Throw switch "D" to the right.
3. Put all tubes in the set; power switch on; volume control at maximum; local-distance switch at distance. Break away the sealing wax on the trimmer-condenser screws
4. *Tune set exactly to 5 on dial.* Reduce or increase the amount of pick-up from the 1st oscillator to secure a reading of about 20 on the output meter.
5. With a screw-driver, turn the pressure screw of the 4th trimmer condenser one way or the other, as necessary, to the point where the reading on the output meter is greatest. Repeat this process on the 3rd trimmer, then on the 2nd, and finally on the 1st. Reduce the pick-up from the 1st oscillator if necessary in order to keep the needle of the galvanometer near the centre of its scale.

This adjustment of the trimmer-condenser screws is termed the CORRECT POSITION.

MODEL 61,61-C DC
Early
Schematic

ATWATER KENT MFG. CO.

FILTER CONDENSER DATA. The filter condenser unit in the Model 61 and 61-C, (Direct Current) Early, contains two of the filter condensers and two other bypass condensers. The numbers to bd quoted in connection with the connections are marked upon the condenser can and are shown upon the chassis layout

1st a-f filter	.5 mfd	connected between terminals(1)and (3)
Detector filter	1.0 mfd	connected between terminals (2) and (6)
Filter # 2	4.0 mfd	connected between terminal (4) and center stud
Filter # 3	2.0 mfd	connected between terminal (5) and center stud

Filter #1 is a part of one of the bypass units as stated elsewhere on this page.

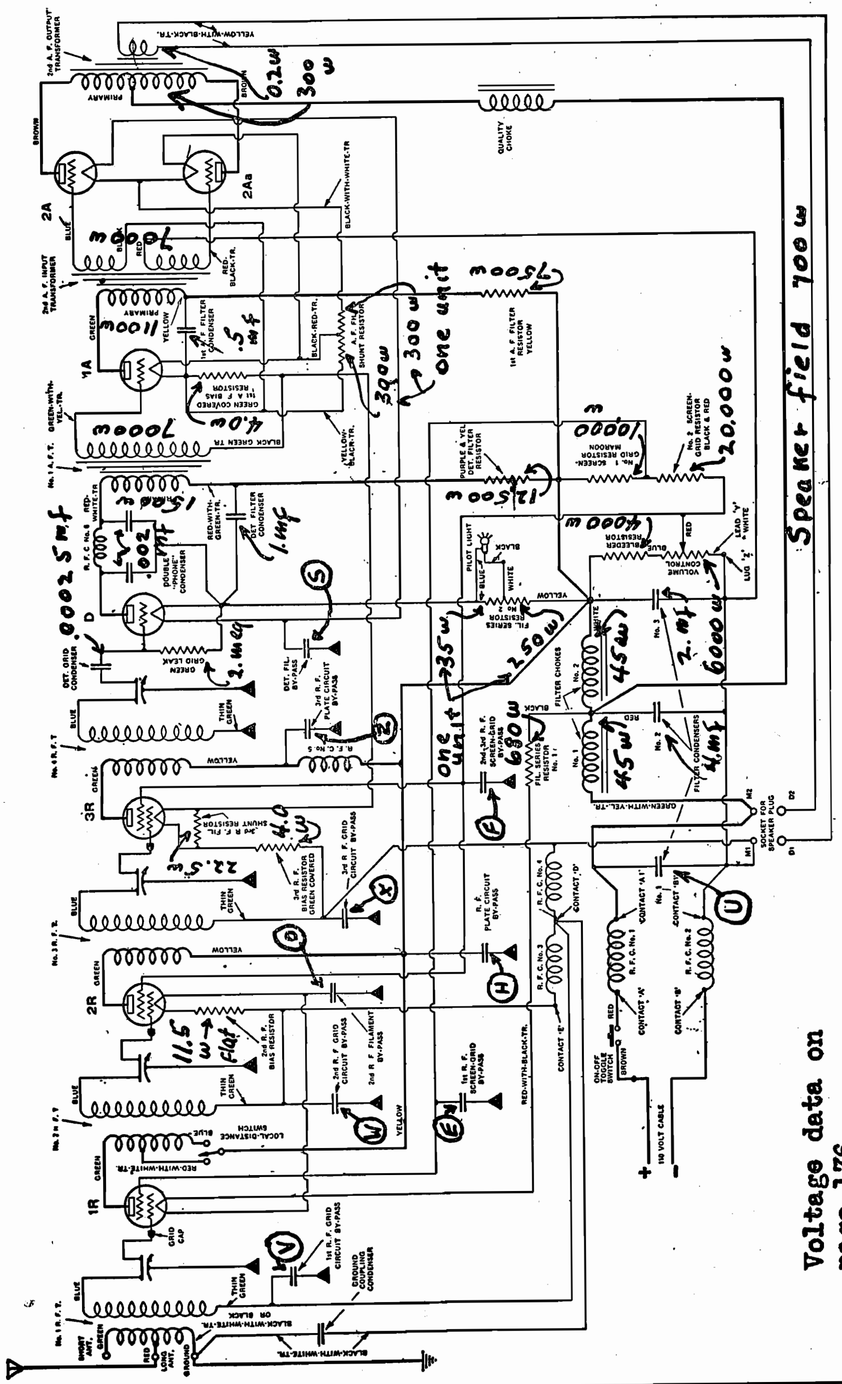


DIAGRAM OF EARLY MODEL 61 AND 61-C (DIRECT CURRENT).

Voltage data on page 176

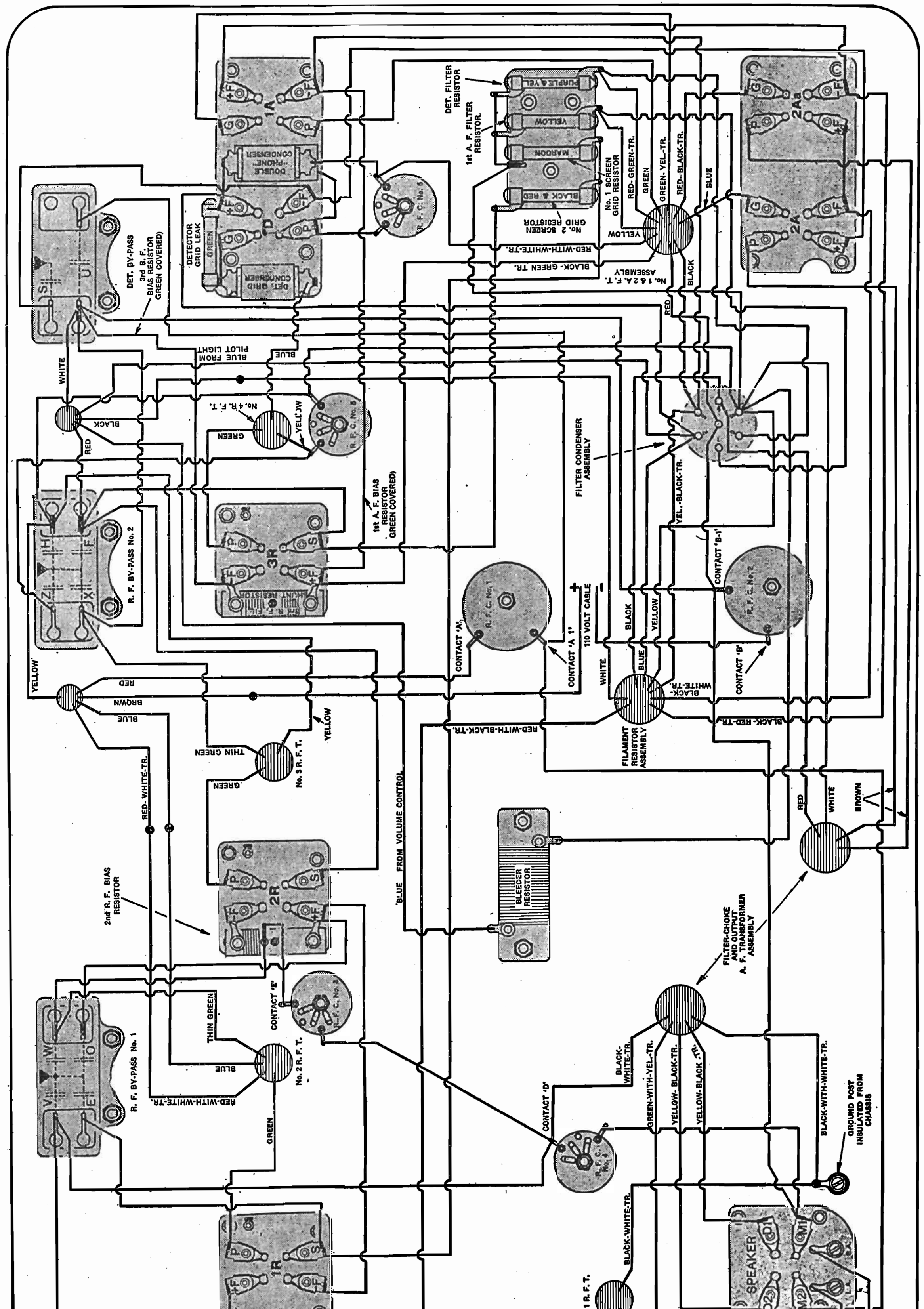
BYPASS CONDENSERS. The following designating letters are shown upon the schematic wiring diagram and also upon the chassis layout

RF Bypass #1	E	.1 mfd	150 volts	O	.1 mfd	400 volts
	V	.1 mfd	150 volts	W	.1 mfd	400 volts
RF Bypass #2	F	.1 mfd	400 volts	H	.1 mfd	400 volts
	X	.1 mfd	150 volts	Z	.1 mfd	150 volts
Detector Bypass	S	.3 mfd	150 volts	U*	.075 mfd	400 volts

* Condenser U is Filter #1

ATWATER KENT MFG. CO.

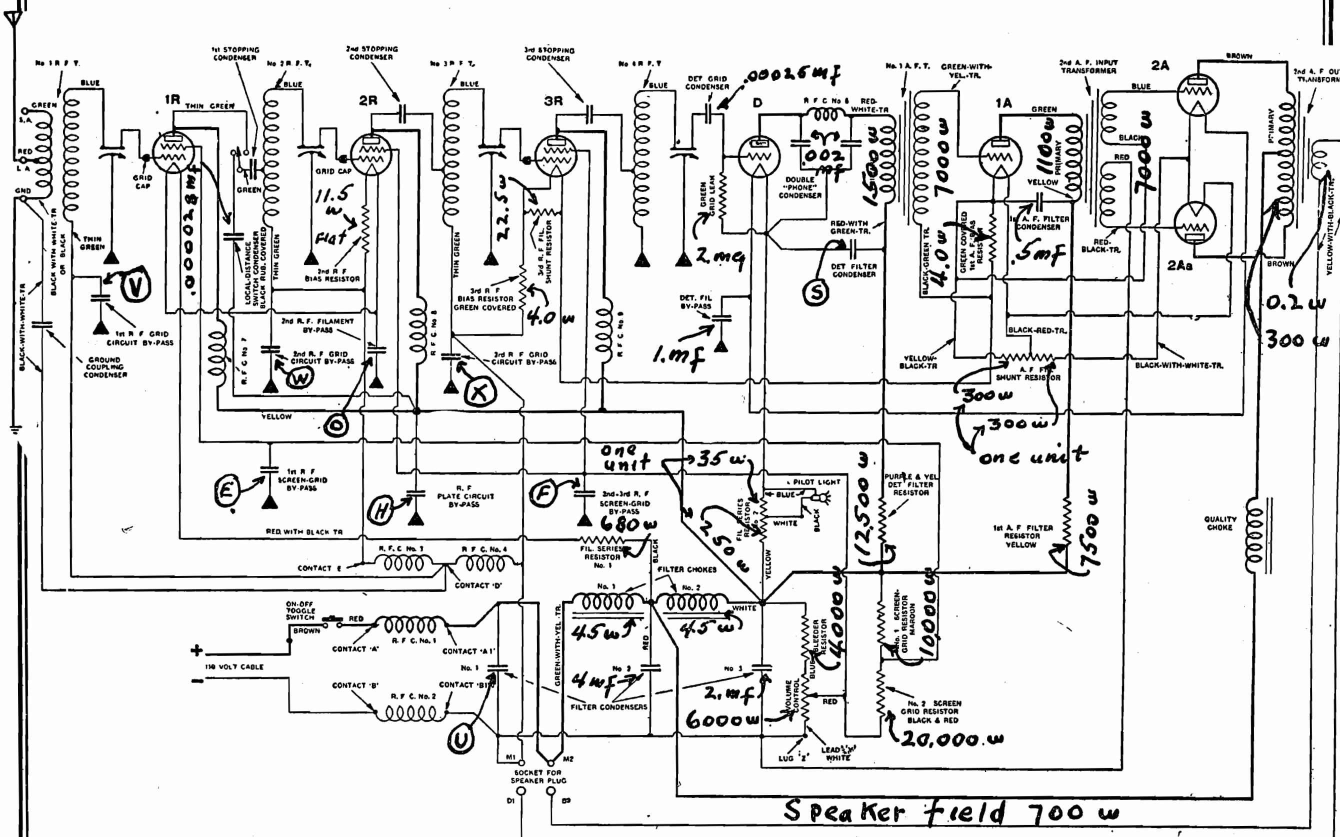
MODEL 61, 61-C
Early
Chassis



Bottom Wiring of Early-Type Model 61 and 61-C.

MODEL 61-61-C
Late Schematic

ATWATER KENT MFG. CO

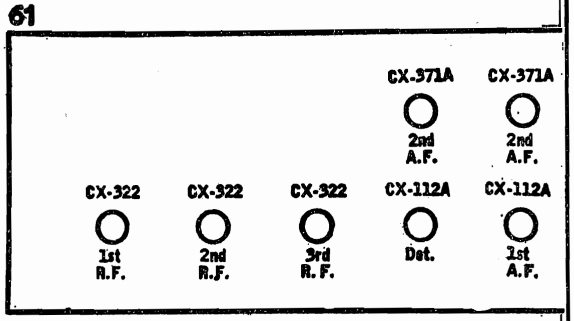


SCHEMATIC DIAGRAM OF LATER MODEL 61 AND 61-C (DIRECT CURRENT).

FILTER CONDENSER SPECIFICATIONS are shown on page 174. BYPASS CONDENSER designations shown upon wiring diagram also appear upon chassis layout on page177. For BYPASS CONDENSER data refer only to page 177 and not to page174.

	R-F	Det.	1st A-F	2nd A-F
Fil.	2.9	4.6	4.6	4.6
Plate	78	32	50	80
Grid	4.6*		1.4	9
Screen	60**			

61



* This voltage applies only to the 1st R-F stage. The 2nd R-F bias voltage is 1.4 voltas and the 3rd R-F bias voltage is 0.9 volts.

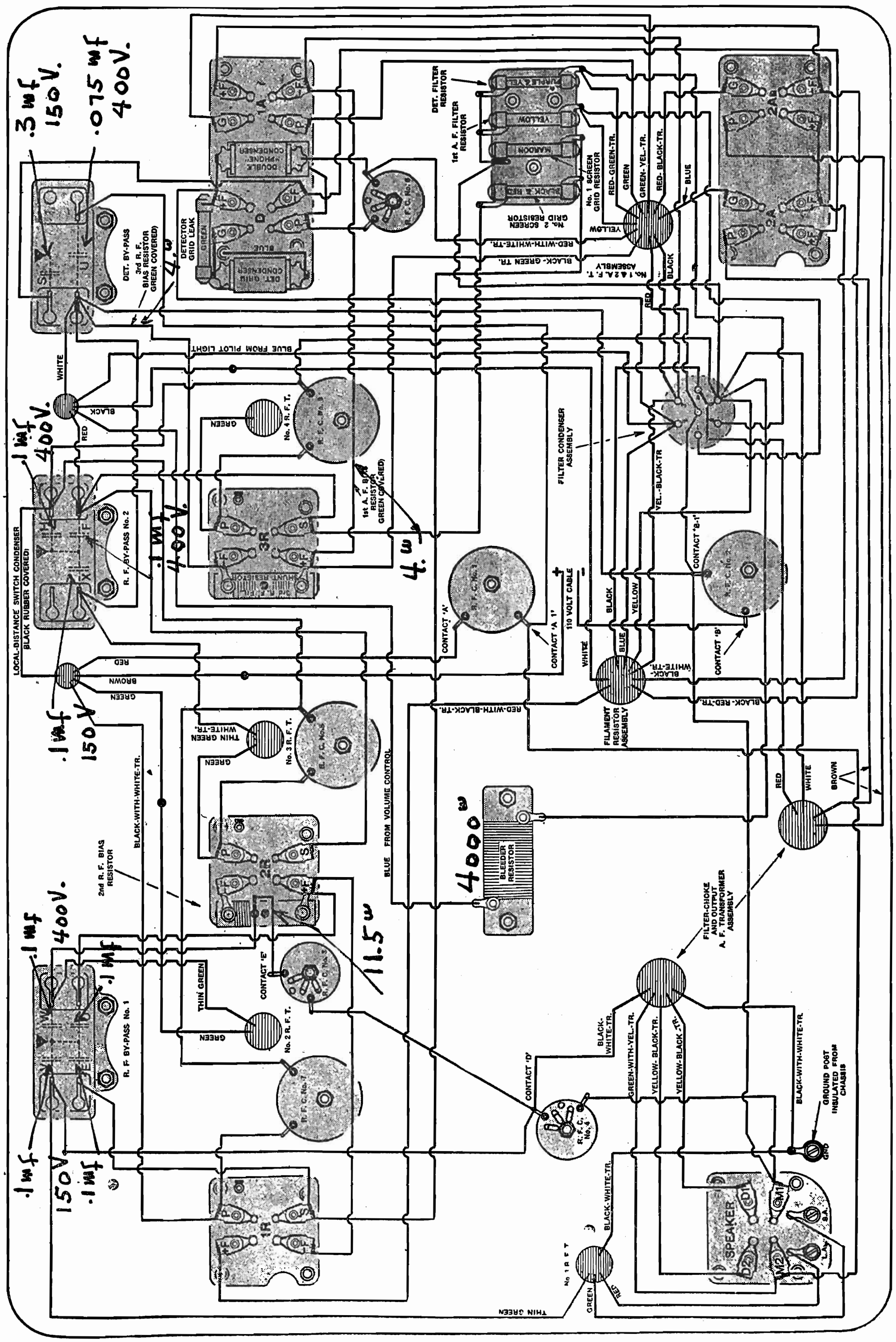
**The screen voltage quoted applies only to the third R-F tube. he other R-F tubes secure different values of screen voltage. R-F tube number 1 or rather the first R-F stage has 46 volts applied to its screen. Likewise the 2nd R-F stagehas 46 volts applied to its screen.

The forementioned voltage measurements are made with the volume control adjusted to minimum.

Filter Condenser reference page 3-36. Bypass Condenser reference page 3-39.

MODEL 61 and 61-C
Chassis Layout

ATWATER KENT MFG. CO.
MODEL 61 AND 61-C (Later Type)



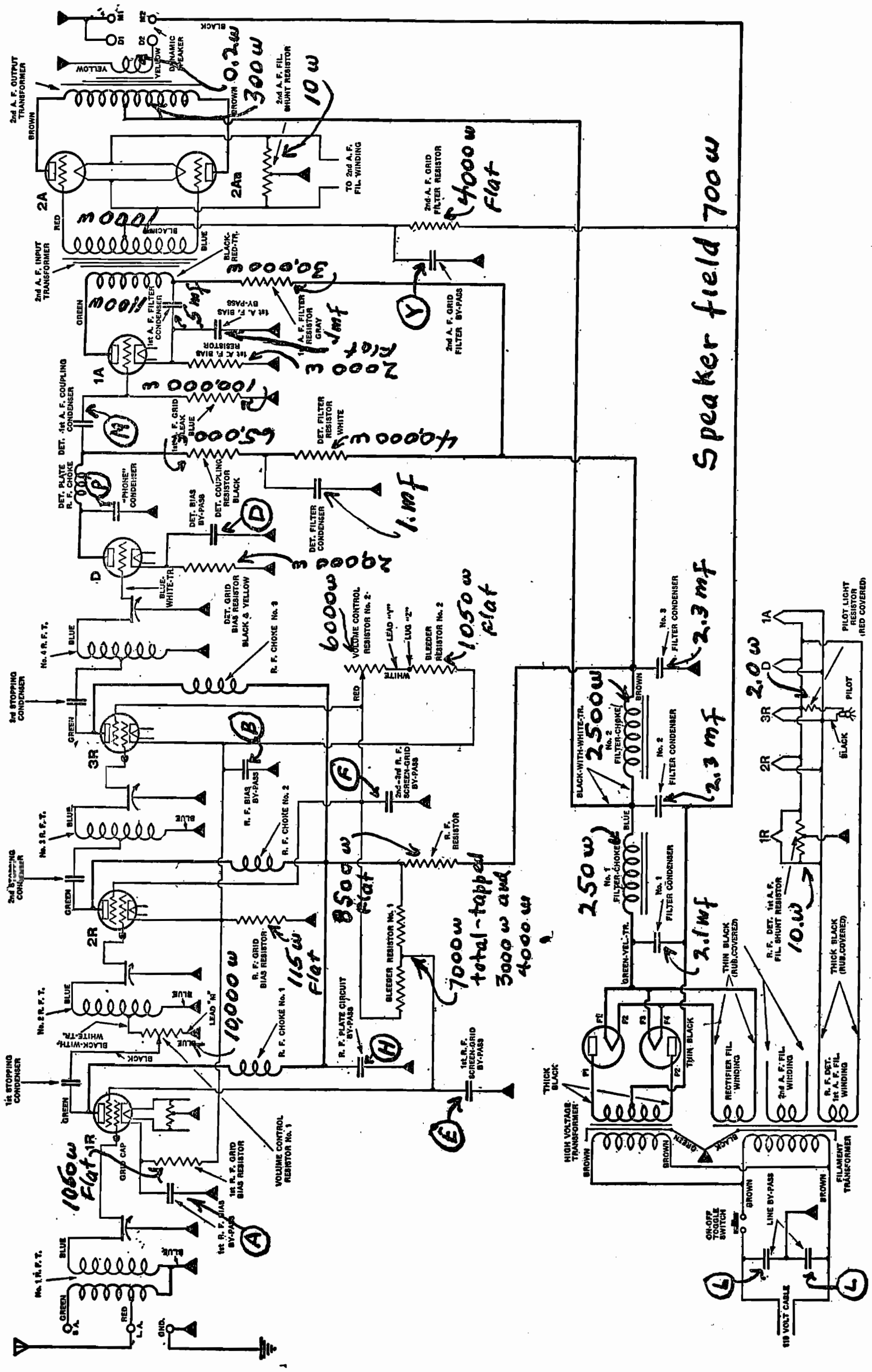
Bottom Wiring of Later-Type Model 61 and 61-C

MODEL 66
Schematic
Data

ATWATER KENT MFG. CO

FILTER CONDENSER CONNECTIONS. The following specifications should be used in conjunction with the schematic shown below and the chassis layout shown on The numerals refer to the numbers marked upon the condenser can

Filter #1	2.1 mfd connected between terminals (1) and (4)
Filter #2	2.3 mfd connected between terminals (2) and (4)
Filter #3	2.3 mfd connected between terminal (6) and can
Detector filter	1.0 mfd connected between terminal (5) and can
1st a-f filter	0.5 mfd connected between center stud and can
1st a-f bias	0.1 mfd connected between center stud and (3)



CIRCUIT OF MODEL 66.

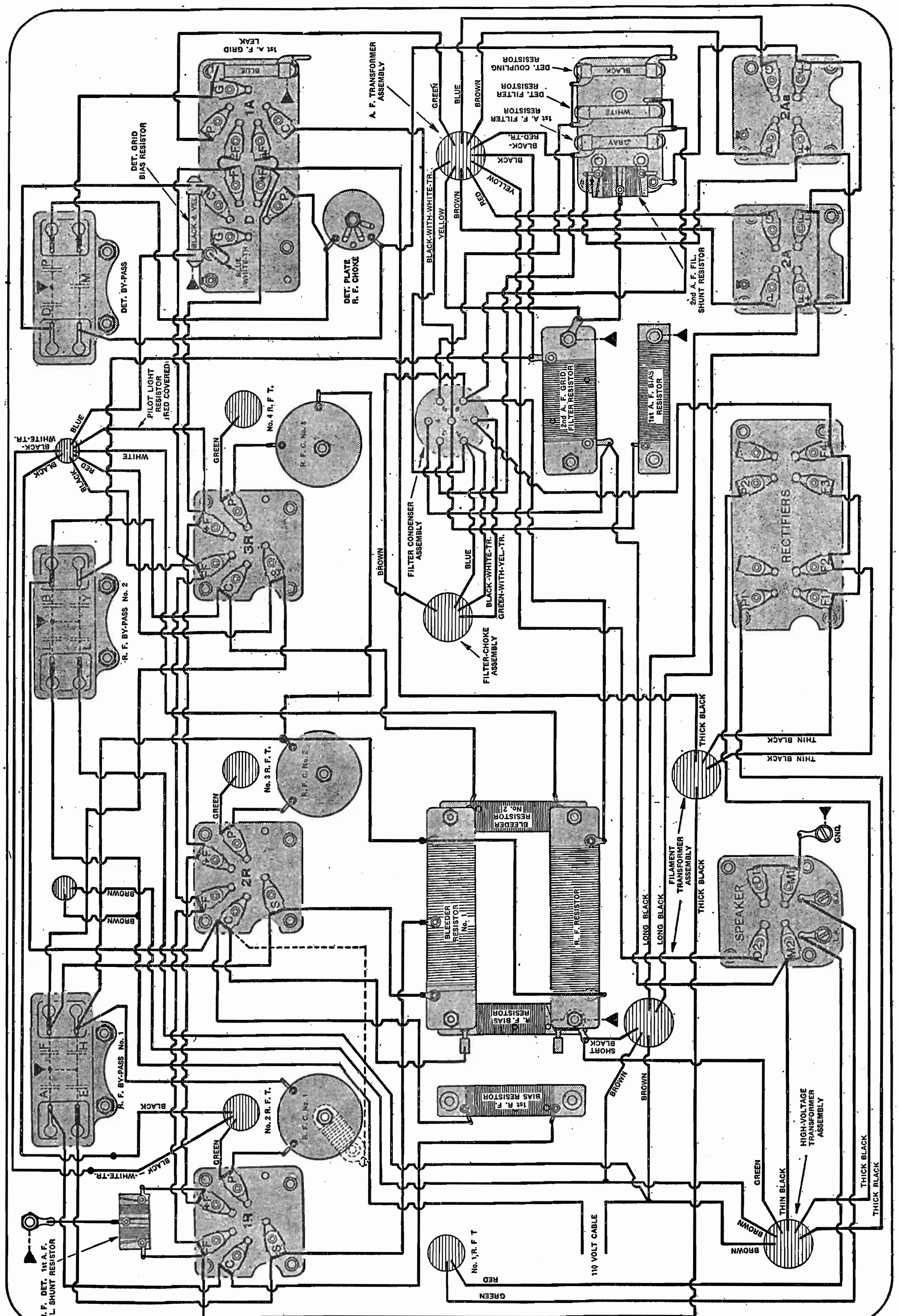
In some early Model 66, volume control resistor No. 1 is connected across the R. F. choke coil in the plate circuit of the 1st R. F. tube. The slider of this resistor is connected to a tap on No. 2 R. F. T. through a coupling condenser.

BYPASS CONDENSER VALUES. The letter designations given should be used in conjunction with the schematic wiring diagram above and the chassis layout

RF Bypass #1	A	.1 mfd	150 volts	F	.1 mfd	400 volts
	E	.1 mfd	150 volts	H	.1 mfd	400 volts
RF Bypass #2	B	.1 mfd	150 volts	L	.01 mfd	400 volts
	Y	.1 mfd	150 volts	L	.01 mfd	400 volts
Detector Bypass	D	.3 mfd	150 volts	M	.075 mfd	400 volts
				P	.0012 mfd	400 volts

ATWATER KENT MFG. CO.

MODEL 66 Chassis



BOTTOM WIRING OF LATER-TYPE MODEL 66.

The resistor shown in dotted lines is the old-style R. F. bias resistor. This is shown merely to indicate how the old-style R. F. bias resistor was connected. The 1st-R. F. bias resistor is mounted on top of the new-style R. F. bias resistor. The 1st-A. F. bias resistor is mounted under the 2nd-A. F. grid-filter resistor.

MODEL 66 Voltage
MODEL 67 and 67-C
Voltage

ATWATER KENT MFG. CO.

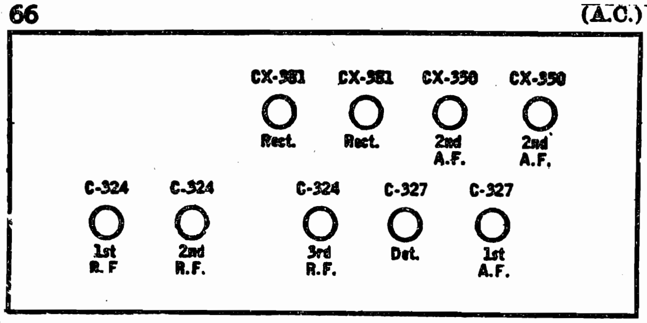
VOLTAGE DATA FOR MODEL 66

Line voltage 110. Line voltage of 120 volts increases voltage 10%.

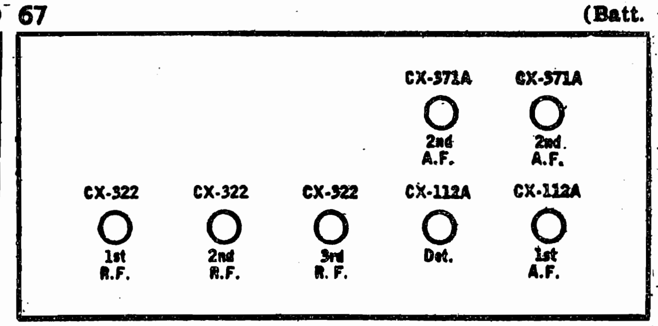
Tube	Filament	Plate	Grid	Screen
R-F (1st)	2.2	158	5.5	110
R-F (2nd-3rd)	2.2	160	2.8	78
Detector	2.2	206	23.	
A-F (1st)	2.2	137	2.8*	
A-F (2nd)	6.9	412	78.	

* This is the measured voltage, not the actual operating voltage.

66 (A.C.)



67 (Batt.



VOLTAGE DATA FOR MODELS 67 and 67-C

These values apply when the total "B" voltage is 150 volts.

Tube	Filament	Plate	Grid	Screen
RF (1st-2nd)	3.3	110	1.5	30
R-F (3rd)	3.3	110	2.5	25
Det.	5.0	50	--	
A-F (1st)	5.0	55	4.5	
A-F (2nd)	5.0	150	45.	

These values apply when the total "B" voltage is 180 volts.

Tube	Filament	Plate	Grid	Screen
R-F (1st-2nd)	3.3	135	1.5	45
R-F (3rd)	3.3	135	2.5	40
Det.	5.0	60	--	
A-F (1st)	5.0	65	4.5	
A-F (2nd)	5.0	180	45.	

ATWATER KENT MFG. CO.

MODEL 67, 67-C
Early and Late
Schematic

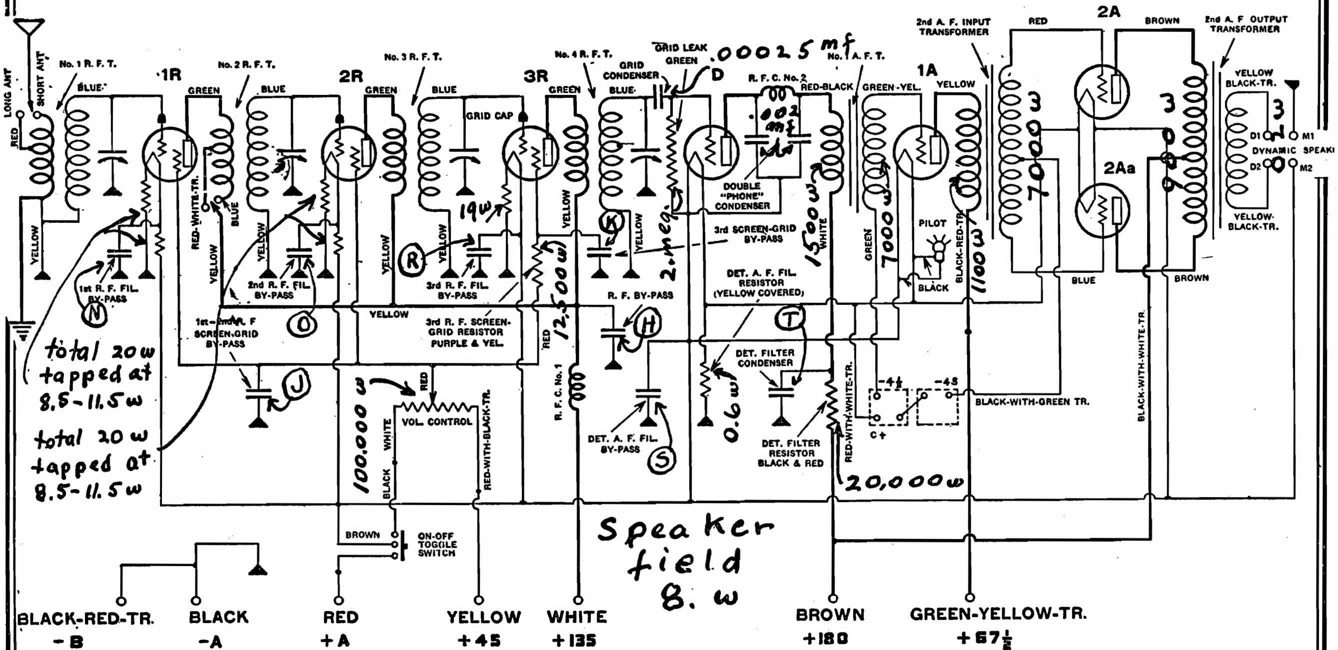


Diagram of Early Model 67 and 67-C (Battery Operated).

Voltage data on page 180

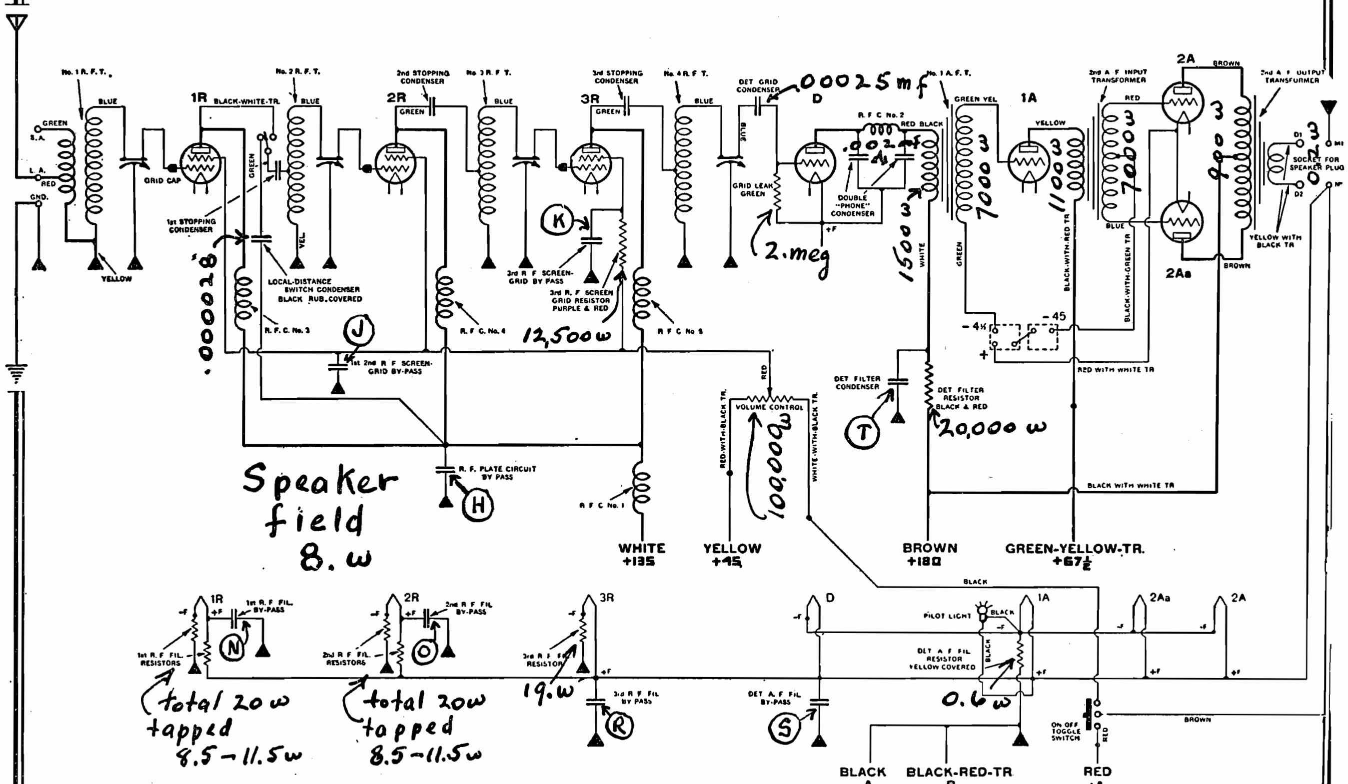


Diagram of Later Model 67 and 67-C (Battery Operated).

Voltage reference page 3-42.

MODEL 67,67-C
Early
Chassis

ATWATER KENT MFG. CO.

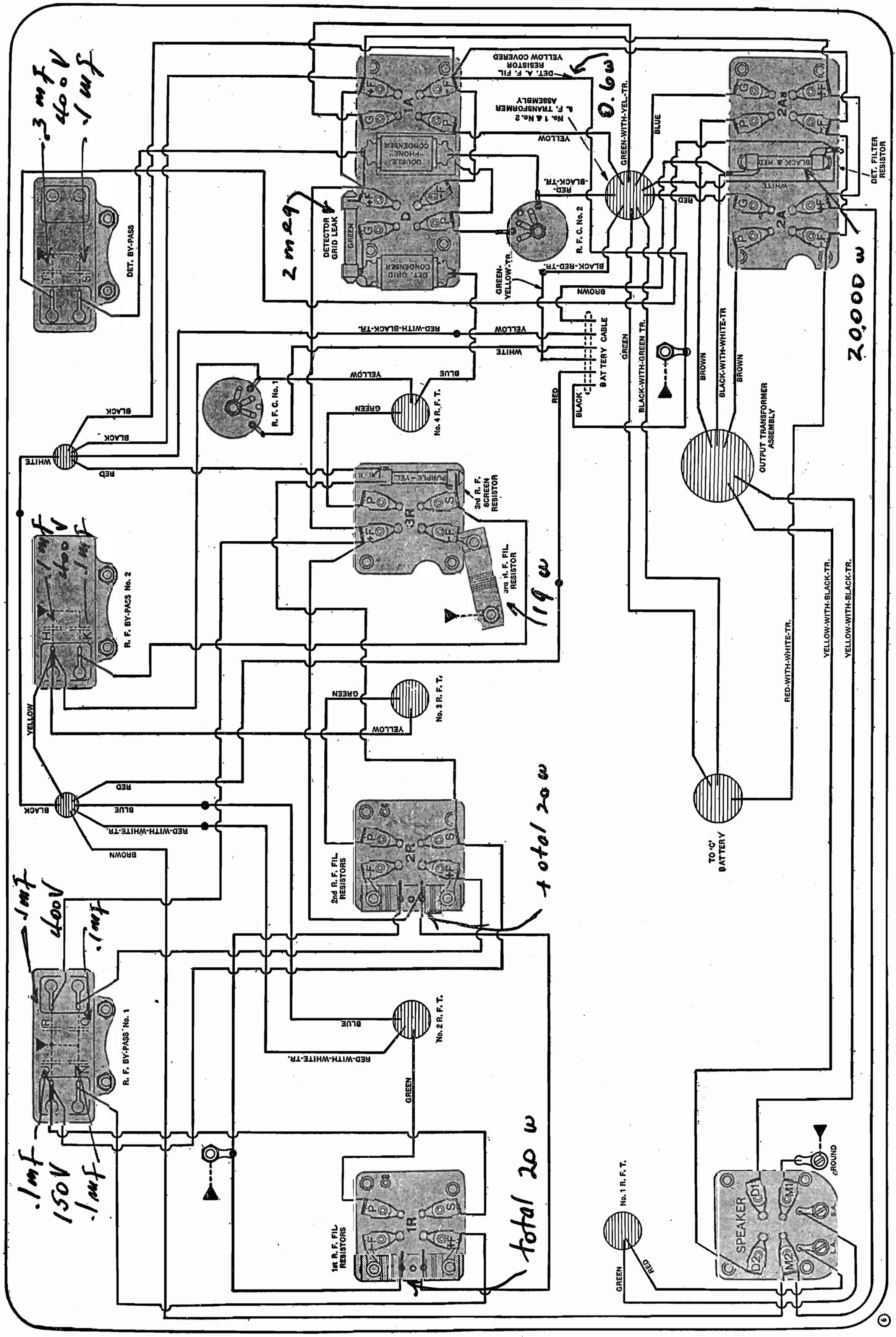
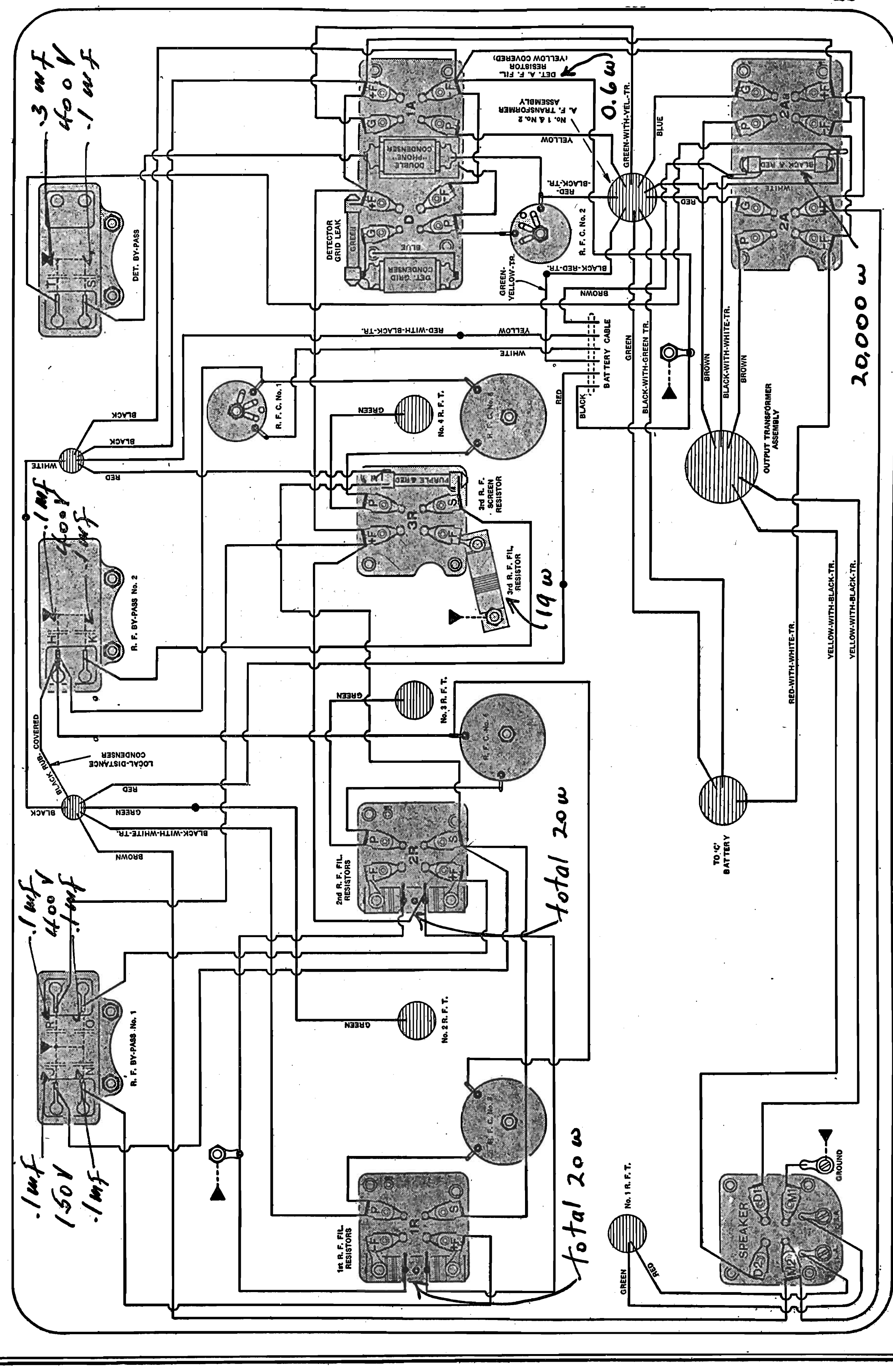


Fig. 155. Bottom Wiring of Early-Type Model 67 and 67-C.

ATWATER KENT MFG. CO.

MODEL 67, 67-C
Late
Chassis

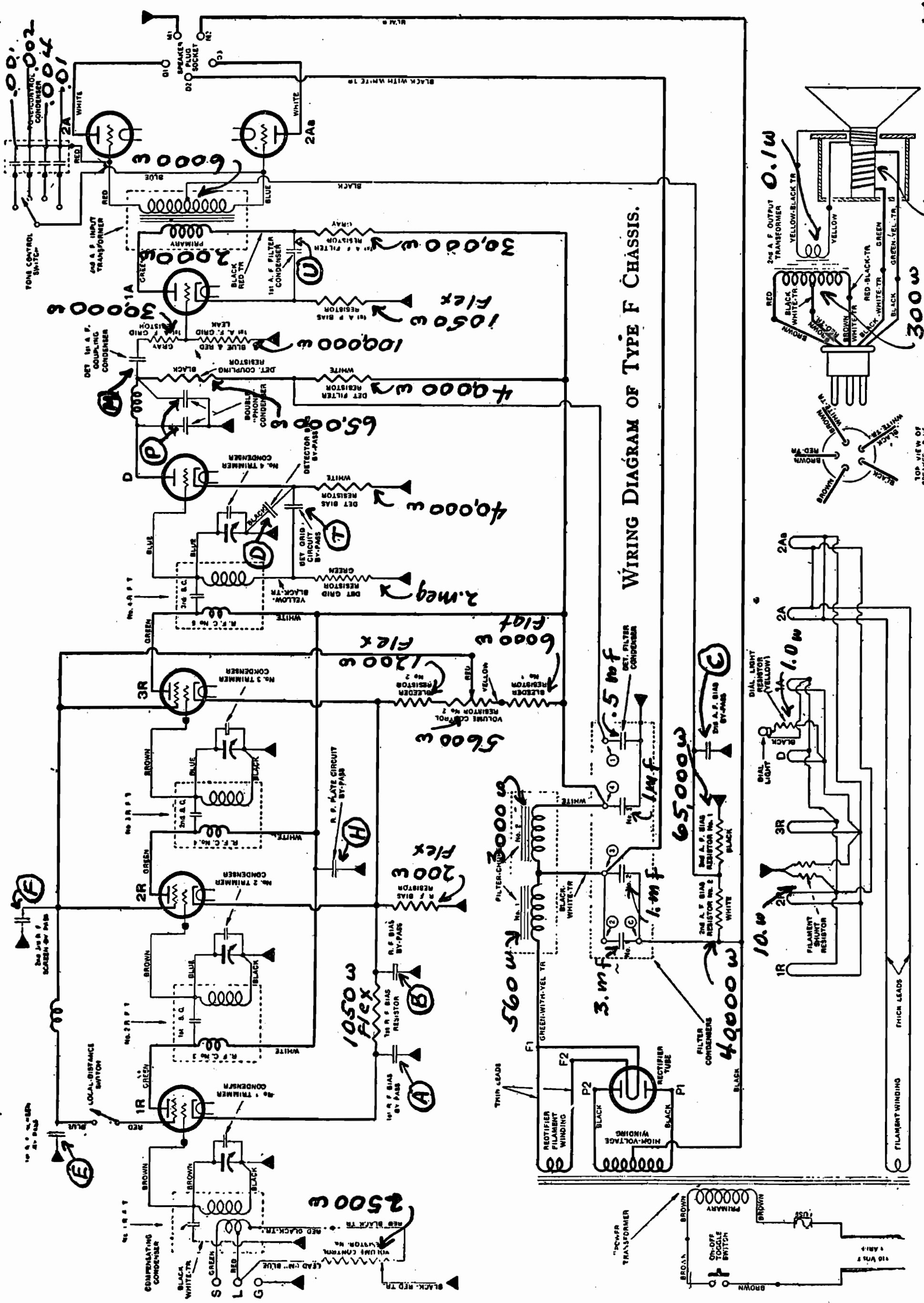


Bottom Wiring of Later-Type Model 67 and 67-C.
A black-with-red-tracer lead, connected to the end of the black cable lead, is for connection to —B.

MODEL 70, 74, 76
Chassis F

ATWATER KENT MFG. CO.

Voltage data on page 186



In some early-type F chassis, a line by-pass condenser is used and the 1st-A. F. grid resistor (gray) is omitted. In later-type F chassis, the filter condenser has only four contacts, and the top of the 1st-A.F. grid leak is connected to the opposite end of the 1st-A.F. grid resistor.

FILTER CONDENSER. In early models, the filter condenser has five contacts as indicated by the numbers within circles in the diagram. For those shown there

Detector filter	.5 mfd	connected between terminal (1)	and can
Filter #1	3.0 mfd	connected between terminal (2)	and center stud
Filter #2	1.0 mfd	connected between terminal (3)	and center stud
Filter #3	1.0 mfd	connected between terminal (4)	and can

BYPASS CONDENSERS. The letters within the circles correspond with the designations within the bypass units shown in the chassis layout

RF Bypass #1	C	.1 mfd	400 volts	E	.1 mfd	400 volts	# 15790
	F	.01mfd	400 volts	(In very early F "F" is .1 mfd.)			
RF Bypass #2	A	.1 mfd	150 volts	U	.12 mfd	400 volts	# 15770
	B	.1 mfd	150 volts				
RF Bypass #3	D	.1 mfd	400 volts	H	.2 mfd	400 volts	# 15780
	T	.04 mfd	400 volts				
Detector Bypass	R	.1 mfd	400 volts	M	.075 mfd	400 volts	# 15640
	P	.0012 mfd	400 volts	P	.00025 mfd	400 volts	
Tone Control	All condensers are rated at 100 volts						

ATWATER KENT MFG. CO.

MODEL 70, 74, 76
Chassis D

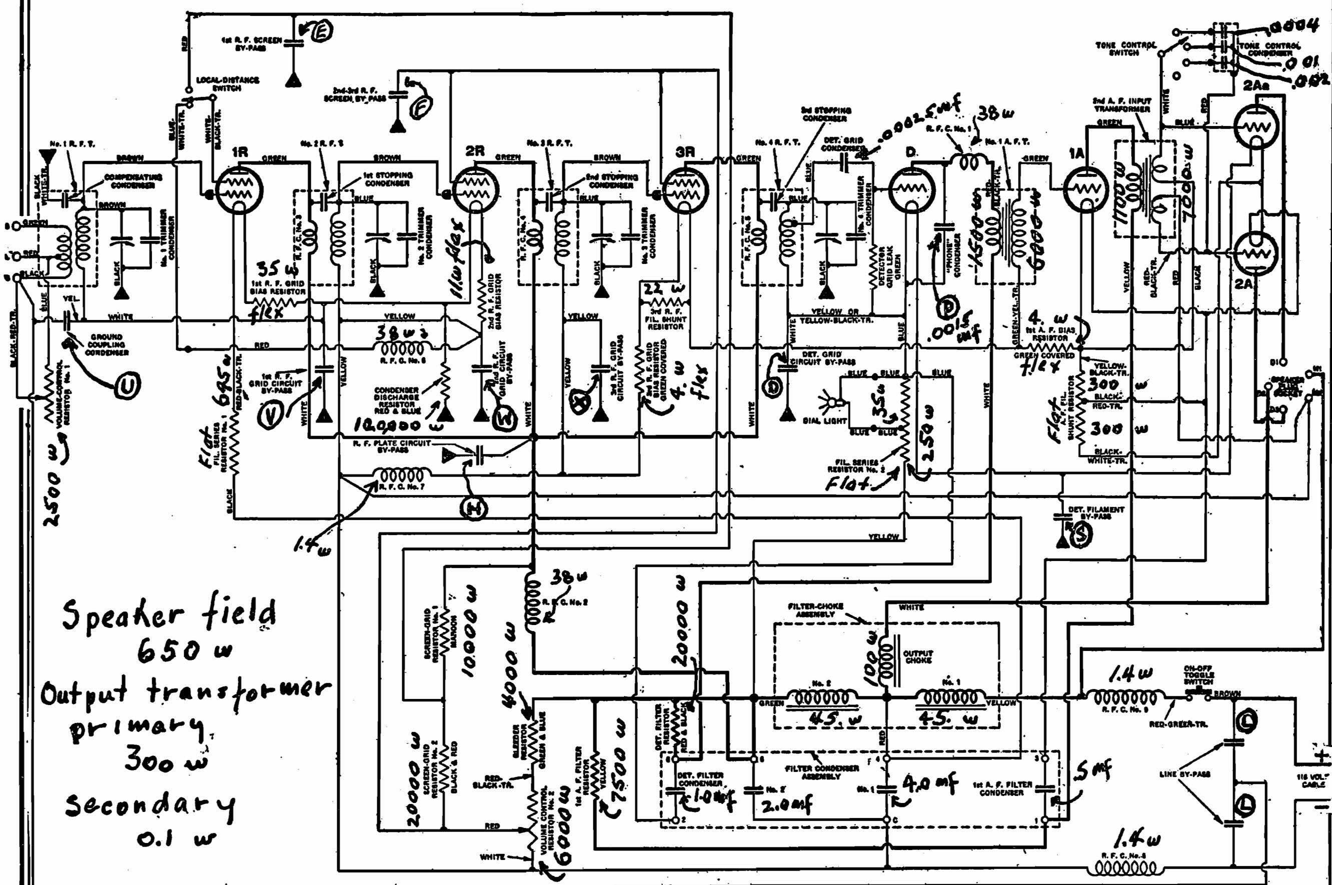


DIAGRAM OF D-1 CHASSIS.

BYPASS CONDENSERS. The letters within the circles adjacent to the various by-pass condensers correspond with the letters shown within the respective bypass units on chassis layout
Note exception stated beneath the following tabulation.

RF Bypass #1	L	.1 mfd	400 volts	L	.1 mfd	400 volts	# 14710
	U	.02 mfd	400 volts				
RF Bypass #2	E	.1 mfd	400 volts	F	.1 mfd	400 volts	# 15262
	V1*	.1 mfd	400 volts	W1*	.1 mfd	400 volts	
RF Bypass #3	H	.1 mfd	400 volts	S	.1 mfd	400 volts	# 16680
	P	.0015mfd	400 volts				
RF Bypass #4	D	.1 mfd	400 volts	V	.1 mfd	400 volts	# 15262
	X	.1 mfd	400 volts	W	.1 mfd	400 volts	

* Used only in D-2 chassis as shown in wiring diagram of D-2 receiver
These two condensers are not used in D-1 chassis, but are shown in their proper position in the chassis layout

Tone control All condensers are rated at 100 volts

SPECIAL NOTE.
Chassis D-1 and D-2 are identical except for the minor changes noted above in connection with bypass condensers W1 and V1 and also as noted on the D-2 schematic

MODEL 70,74,76
Voltage and Data

ATWATER KENT MFG. CO.

VOLTAGE TABLE FOR TYPE F CHASSIS

Set in operation. Volume control at maximum
L-D switch at distance

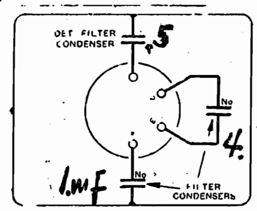
Use High Resistance D C Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages
Use A. C Voltmeter to Measure Filament Voltages

APPROX. VOLTAGES, USING 120 V. LINE

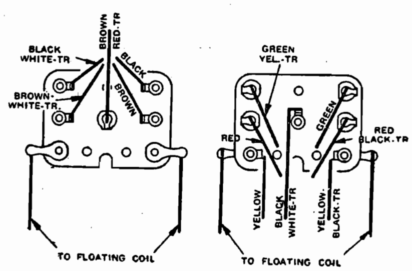
TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	2.5	180	6	92
2nd-R.F.	2.5	180	4	93
3rd-R.F.	2.5	180	4	93
Detector	2 5	117	30**	—
1st-A.F.	2.4	70	2	—
2A	2.7	250	55*	—
2Aa	2.7	250	55*	—

All readings made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.
* Use 250-volt scale.
** This is the voltage across the detector bias resistor; when measuring from grid to cathode, the voltage reading is only 2.

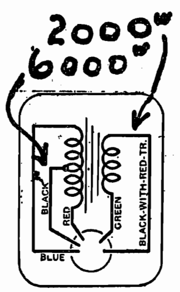
This condenser is used in late production.



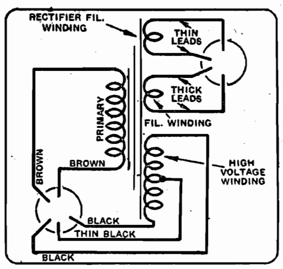
FILTER CONDENSER UNIT



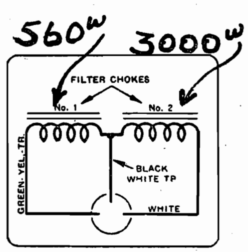
SPEAKER PANEL CONNECTIONS



2nd A. F. INPUT TRANSFORMER

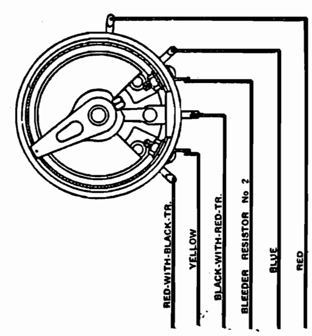


POWER TRANSFORMER

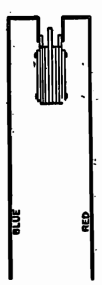


FILTER CHOKE UNIT

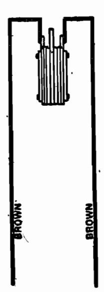
DUAL VOLUME CONTROL



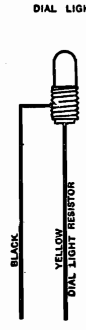
LOCAL-DISTANCE SWITCH



ON-OFF SWITCH

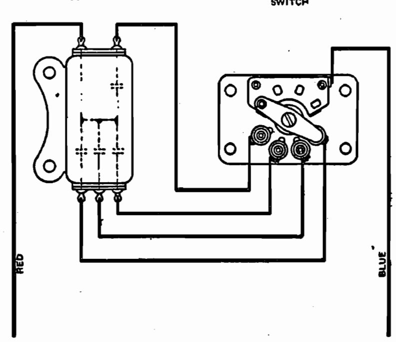


DIAL LIGHT



TONE CONTROL CONDENSER

TONE CONTROL SWITCH



Condensers in R.F. By-Pass No. 1

C—2nd-A.F. bias by-pass.
E—1st-R.F. screen by-pass.
F—2nd-3rd-R. F. screen by-pass.

Condensers in Detector By-Pass

M—Detector-1st A.F coupling condenser
P—"Phone" condenser.
P—"Phone" condenser.
R—Filament by-pass.

Condensers in R.F. By-Pass No. 2

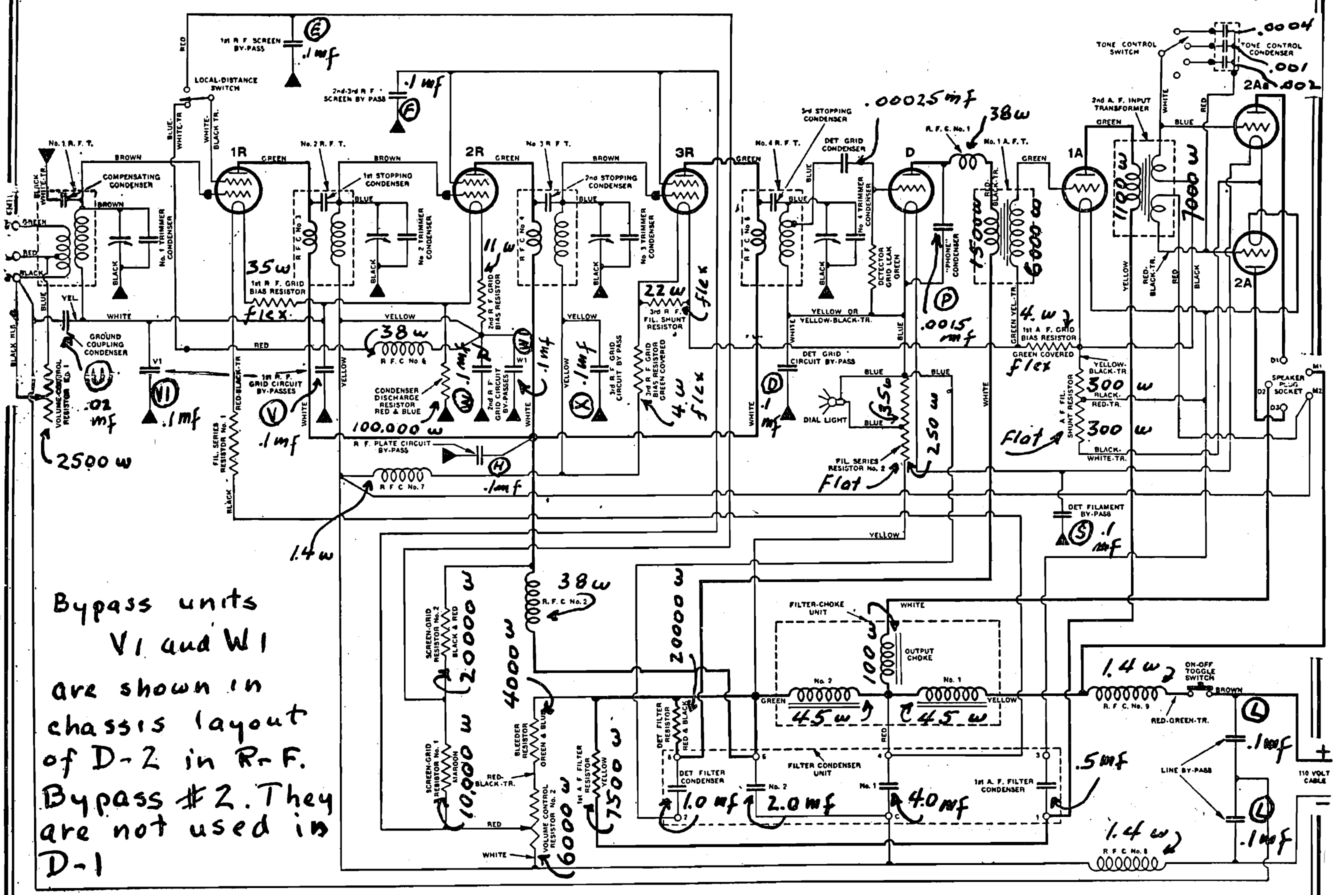
A—1st-R.F. bias by-pass.
B—R.F. bias by-pass.
U—1st-A.F filter condenser

Condensers in R.F. By-Pass No. 3

D—Detector bias by-pass
H—R.F. plate-circuit by-pass.
T—Detector grid-circuit by-pass.

ATWATER KENT MFG. CO.

MODEL 70, 74, 76
Chassis "D-2"



SCHEMATIC DIAGRAM OF TYPE D-2 CHASSIS.

Note the addition of by-pass condensers V-1 and W-1 and the reversal of screen-grid resistors No. 1 and No. 2.

VOLTAGE TABLE FOR TYPE D CHASSIS

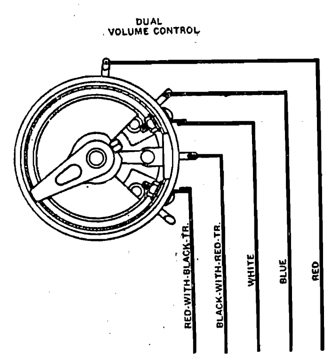
Set in operation. Volume control at maximum.
L-D switch at distance.

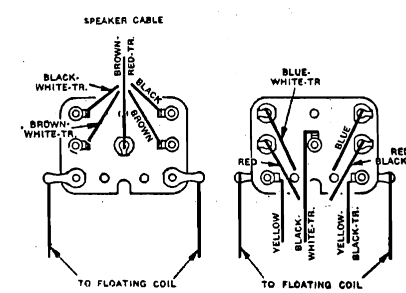
Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

APPROX. VOLTAGES, USING 120 V. LINE

TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	3.3	75	4.2	60*
2nd-R.F.	3.3	75	1.3	50
3rd-R.F.	3.3	75	1	50
Detector	5	20	—	—
1st-A.F.	5	45	6	—
2A	5	75	10	—
2Aa	5	80	10	—

All readings made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.
Use 250-volt scale to measure 2nd A. F. grid voltage.
*This is 50 volts in D-2 chassis.





SPEAKER PANEL CONNECTIONS

MODEL 76
Chassis P

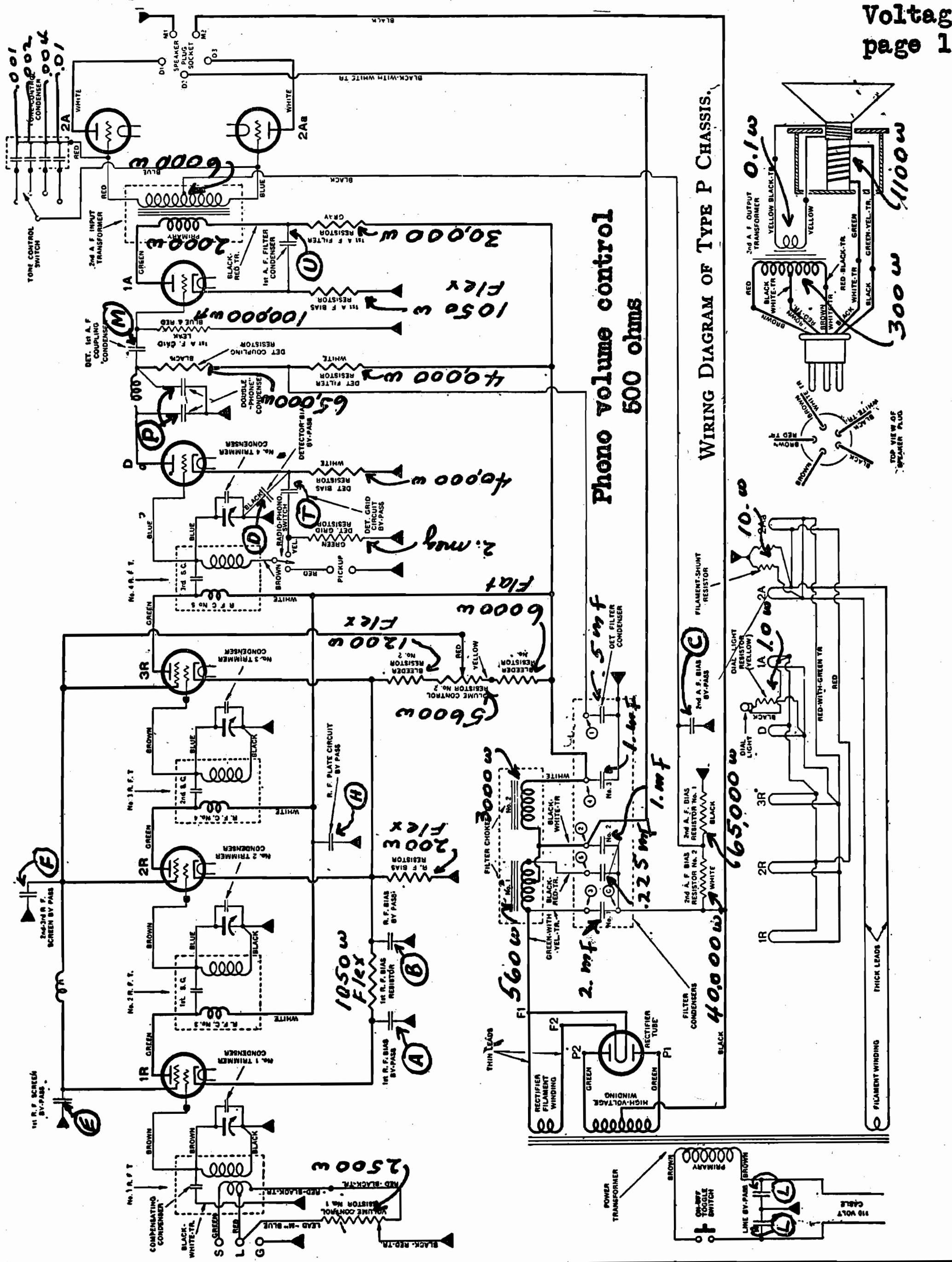
ATWATER KENT MFG. CO.

BYPASS CONDENSERS. The letters within circles designate the condensers within the multiple units shown on the chassis layout

RF Bypass #1	L	.01 mfd	400 volts	L	.01 mfd	400 volts	# 15790
	C	.1 mfd	400 volts	E	.1 mfd	400 volts	
RF Bypass #2	A	.1 mfd	150 volts	U	.12 mfd	400 volts	# 15770
	B	.1 mfd	150 volts				
RF Bypass #3	D	.1 mfd	400 volts	H	.2 mfd	400 volts	# 15780
	T	.04 mfd	400 volts				
Detector Bypass	F	.1 mfd	400 volts	M	.075 mfd	400 volts	# 15640
	P	.0012 mfd	400 volts	P	.00025 mfd	400 volts	

Tone Control   All condensers are rated at 100 volts

Voltage data on page 194



FILTER CONDENSERS. Numerals in circles designate connections upon filter condenser terminal block.

Detector filter	.1 mfd	connected between terminal (1) and can
Filter #1	2.0 mfd	connected between terminal (2) and center stud
Filter #2	1.0 mfd	connected between terminal (3) and center stud
Filter #3	1.0 mfd	connected between terminal (4) and can
Resonant condenser	.225 mfd	connected between terminal (5) and center stud

Voltage reference page 3-54.

MODEL 70 Series
Service Notes
"L-1"
Voltage

ATWATER KENT MFG. CO.

ADJUSTING TRIMMER CONDENSERS

When adjusting the trimmer condensers, it is necessary to have a four-wave oscillator, providing modulated signals at 1500, 1000, 800 and 600 kilocycles. The oscillator signals should come in at exactly these settings on two or more Type L sets THAT HAVE THE ORIGINAL FACTORY SYNCHRONISM.

1. Connect the common pick-up lead from the four R. F. oscillators to one end of a No. 8112 condenser. Connect the other end of this condenser to the Long-Antenna post. Connect the oscillator container to the Ground post.

2. Connect the output measuring circuit shown in Figure 259 to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left.

3. Put all tubes in the set; power switch on; volume control at maximum; local-distance switch at distance Break away the sealing wax on the trimmer-condenser screws.

4. Turn pointer exactly to the 1500 K. C. mark. Reduce or increase the amount of pick-up from the 1500 K. C. oscillator to secure a reading of about 20 on the output meter.

5. With a screw-driver, turn the pressure screw of the 4th trimmer condenser (on front variable condenser) one way or the other, as necessary, to the point where the reading on the output meter is greatest. Repeat this process on the 3rd trimmer, then on the 2nd, and finally on the 1st. Reduce the pick-up from the 1st oscillator if necessary in order to keep the needle of the galvanometer near the centre of its scale.

This adjustment of the trimmer-condenser screws is termed the CORRECT POSITION.

IMPORTANT SERVICE NOTES

1. In the Types L, F, P, D and Q chassis receivers, it is very important to arrange the three control-grid leads to the screen-grid tubes exactly parallel to each other. If these leads are not parallel, and two of them come close together, the dial readings will not be accurate, especially at the high-frequency end of the scale.

2. When replacing a flexible resistor, care must be taken to use a resistor having the same value. In the event of any uncertainty, make a continuity meter reading of a good resistor of the same type in a stock set, and then use a replacement resistor that gives the same reading on the continuity meter

3. A number of different code markings may be used to identify by-pass condensers that have the same part number. If the part number is the same, the condensers are interchangeable, even though the code markings are different.

VOLTAGE TABLE FOR TYPE L-1 CHASSIS

Set in operation. Volume control at maximum.
L-D Switch at distance.

Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

APPROX. VOLTAGES, USING 120 V LINE

TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	2.4	185	6	85
2nd-R.F.	2.35	185	4.5	86
3rd-R.F.	2.35	185	4.5	86
Detector	2.35	120	12**	—
1st-A.F.	2.35	75	3.5	—
2A	2.45	265	55*	—
2Aa	2.45	265	55*	—
Rectifier	5.			

In order to identify modifications of each chassis, where such modifications require new part numbers, a numeral is used after the type letter. Thus the 1st style of Type L chassis (below No. 6,234,881) is termed Type L-1, and the 2nd style (above No. 6,234,881) is termed Type L-2. This marking is for use only in Service literature and will not appear on the serial-number plates

MODEL 70, 74, 76
Chassis L-1

ATWATER KENT MFG. CO.

BYPASS CONDENSERS. The letters within the circles designate the condensers within the multiple units shown on the chassis layout

RF Bypass #1	L	.01 mfd	400 volts	L	.01 mfd	400 volts	# 15790
	C	.1 mfd	400 volts	E	.1 mfd	400 volts	
RF Bypass #2	A	.1 mfd	150 volts	U	.12 mfd	400 volts	#15770
	B	.1 mfd	150 volts				
RF Bypass #3	D	.1 mfd	400 volts	H	.2 mfd	400 volts	# 15780
	T	.04 mfd	400 volts				
Detector Bypass	F	.1 mfd	400 volts	M	.075 mfd	400 volts	# 15640
	P	.0012 mfd	400 volts	P	.00025 mfd	400 volts	
Tone Control	All condensers rated at 100 volts						

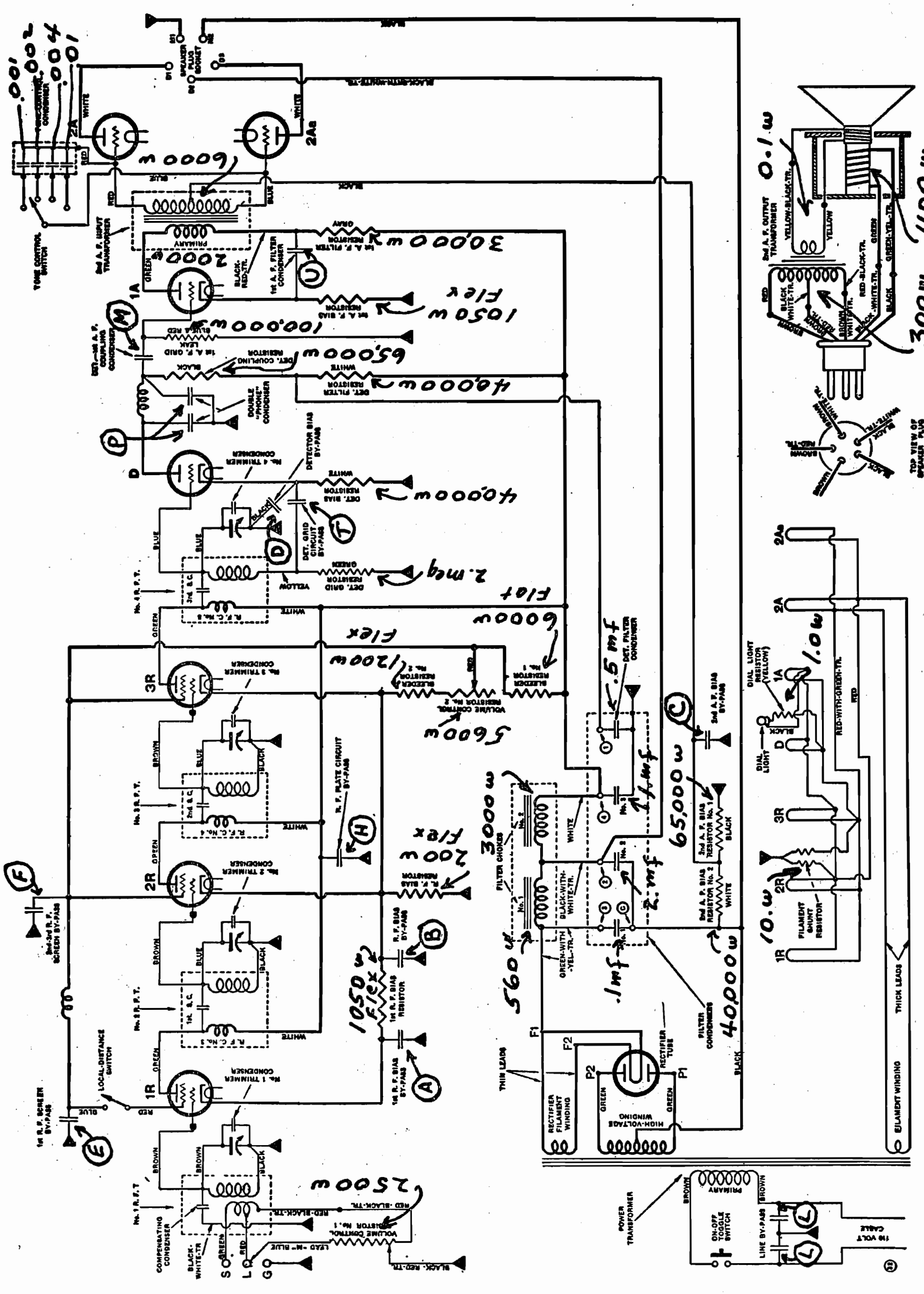


DIAGRAM OF L-1 CHASSIS.

FILTER CONDENSERS

Numerals within circles adjacent to filter condensers designate connections upon condenser can terminal block. These numbers are also shown upon the chassis layout

Detector filter	.5 mfd	connected between terminal (1) and can
Filter #1	.1 mfd	connected between terminal (3) and center stud
Filter #2	2.0 mfd	connected between terminal (2) and center stud
Filter #3	1.0 mfd	connected between terminal (4) and can

ATWATER KENT MFG. CO.

MODEL 70, 74, 76
Chassis L-2

BYPASS CONDENSERS. The letters within circles designate the condensers within the multiple units shown on the chassis layout

RF Bypass #1	L	.01 mfd	400 volts	L	.01 mfd	400 volts	# 15790
	C	.1 mfd	400 volts	E	.1 mfd	400 volts	
RF Bypass #2	A	.1 mfd	150 volts	U	.12 mfd	400 volts	# 15770
	B	.1 mfd	150 volts				
RF Bypass #3	D	.1 mfd	400 volts	H	.2 mfd	400 volts	# 15780
	T	.04 mfd	400 volts				
Detector Bypass	F	.1 mfd	400 volts	M	.075 mfd	400 volts	# 15640
	P	.0012 mfd	400 volts	P	.00025 mfd	400 volts	
Tone Control	All condensers are rated at 100 volts						

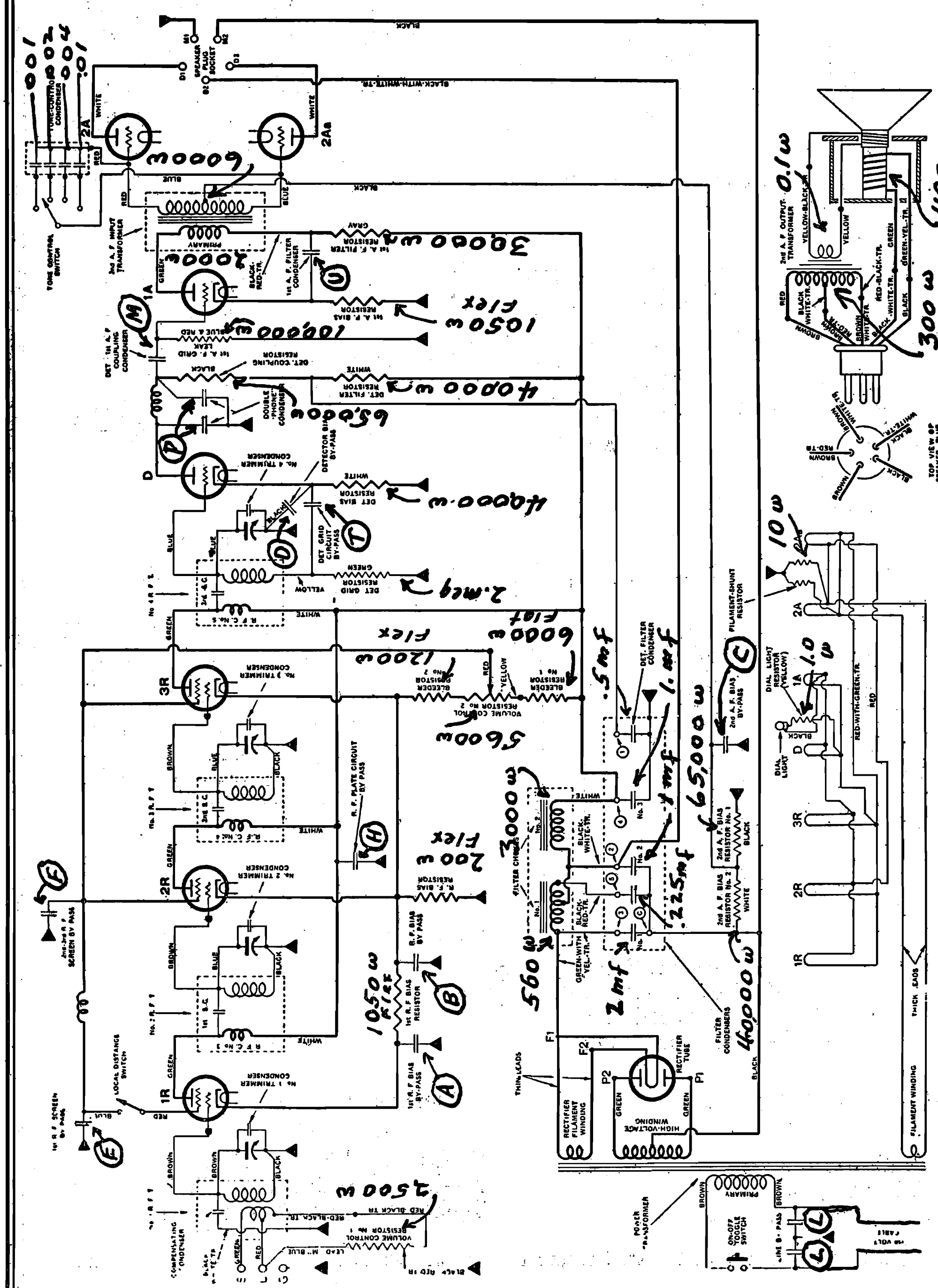


DIAGRAM OF L-2 CHASSIS.

In the majority of L-2 sets, the filament shunt resistor is connected across the R.F. filaments. Also, a 2-ampere fuse is connected in one side of the 110-volt line.

FILTER CONDENSERS. Numerals in circles designate connections upon filter condenser terminal block.

Detector filter	.1 mfd	connected between terminal (1) and can	
Filter #1	2.0 mfd	connected between terminal (2) and center stud	
Filter #2	1.0 mfd	connected between terminal (3) and center stud	
Filter #3	1.0 mfd	connected between terminal (4) and can	
Resonant condenser	.225 mfd	connected between terminal (5) and center stud	

Voltage reference page 3-54.

MODEL 70, 74, 76
Chassis "L-2"- "P"
Voltage Data
Notes

ATWATER KENT MFG. CO.

VOLTAGE TABLE FOR TYPE L-2 AND P CHASSIS

Set in operation. Volume control at maximum.
L-D (or 'phono) switch up.

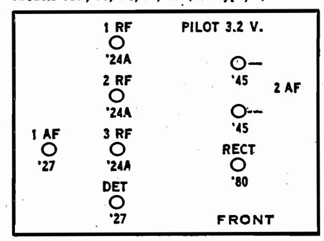
Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

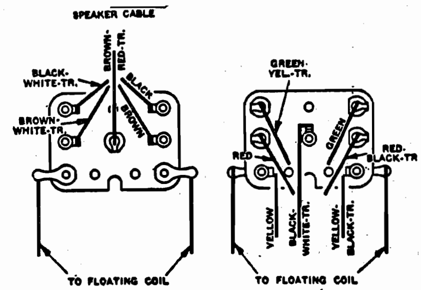
APPROX. VOLTAGES, USING 120 V. LINE

TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	2.4	180	5	85
2nd-R.F.	2.35	180	4.5	86
3rd-R.F.	2.35	180	4.5	86
Detector	2.35	110	14**	—
1st-A.F.	2.35	70	2	—
2A	2.45	250	55*	—
2Aa	2.45	250	55*	—
Rectifier	5.	—	—	—

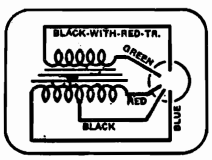
* Use 250-volt scale.
** This is the voltage across the detector bias resistor; when measuring from grid to cathode, the voltage reading is only 2.
All readings made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

Models 75P, 70, 74, 76, 60 (3rd type) (1930)

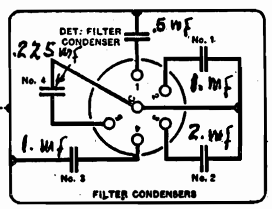




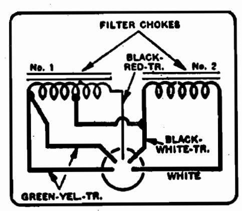
SPEAKER PANEL CONNECTIONS



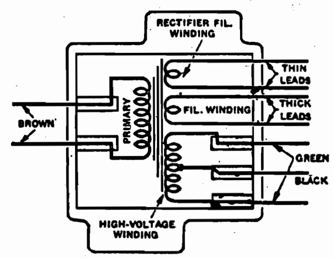
INPUT A. F. TRANSFORMER ASSEMBLY



FILTER CONDENSER ASSEMBLY

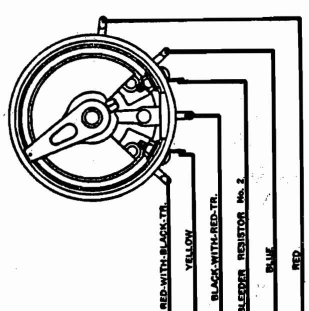


FILTER-CHOKE ASSEMBLY

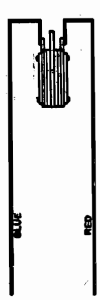


POWER TRANSFORMER ASSEMBLY

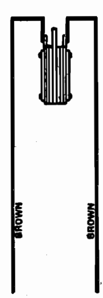
DUAL VOLUME CONTROL



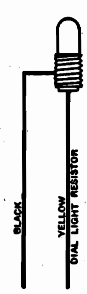
LOCAL-DISTANCE SWITCH



ON-OFF SWITCH

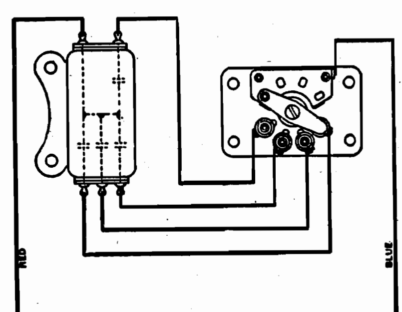


DIAL LIGHT



TONE CONTROL CONDENSER

TONE CONTROL SWITCH



Condensers in R.F. By-Pass No. 1

L—Line by-pass.
L—Line by-pass.
C—2nd-A.F. bias by-pass.
E—1st-R.F. screen by-pass.

Condensers in Detector By-Pass

F—2nd-3rd R.F. screen by-pass.
M—Detector-1st A.F. coupling condenser.
P—Phone condenser.
P—Phone condenser.

Condensers in R.F. By-Pass No. 2

A—1st-R.F. bias by-pass.
B—R.F. bias by-pass.
U—1st-A.F. filter condenser.

Condensers in R.F. By-Pass No. 3

D—Detector bias by-pass.
H—R.F. plate-circuit by-pass.
T—Detector grid-circuit by-pass.

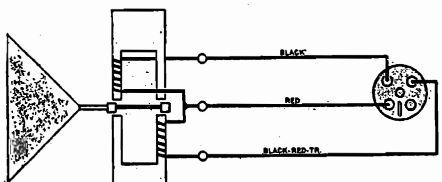
CONNECTION OF UNITS IN TYPE L-2 CHASSIS, AND, AT RIGHT, CONNECTIONS TO TERMINAL PANEL OF TYPE N SPEAKER.

ATWATER KENT MFG. CO.

MODEL 70, 76
Chassis "Q"
Voltage

Type Q Chassis (battery operated) has three stages of screen-grid R. F. amplification, grid detection, one stage of transformer-coupled audio, and a double-audio output stage.

An output filter choke and condenser are used in the Q-2 (above Serial No. 5704025), as shown in the diagram below. The Q-1 Chassis does not have these two parts.



Connections of Inductor Type J Speaker.

VOLTAGE TABLE FOR TYPE Q CHASSIS

Set in operation. Volume control at maximum.
L-D switch at distance.

Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

180 VOLTS "B" BATTERY

TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	3.3	135	1.5	45
2nd-R.F.	3.3	135	1.5	45
3rd-R.F.	3.3	135	2.5	45
Detector	5.0	70	—	—
1st-A.F.	5.0	67	45	—
2A	5.0	180	45	—
2Aa	5.0	180	45	—

R.F. By-Pass No. 1

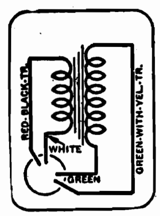
G—R.F. screen by-pass.
V—1st-R.F. grid-circuit by-pass.
Y—Output filter condenser.
N—1st-R.F. filament by-pass.

R.F. By-Pass No. 2 *

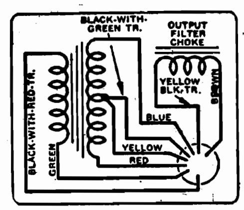
H—R.F. plate-circuit by-pass.
T—Detector filter condenser.
P—"Phone" condenser.
P—"Phone" condenser.

R.F. By-Pass No. 3

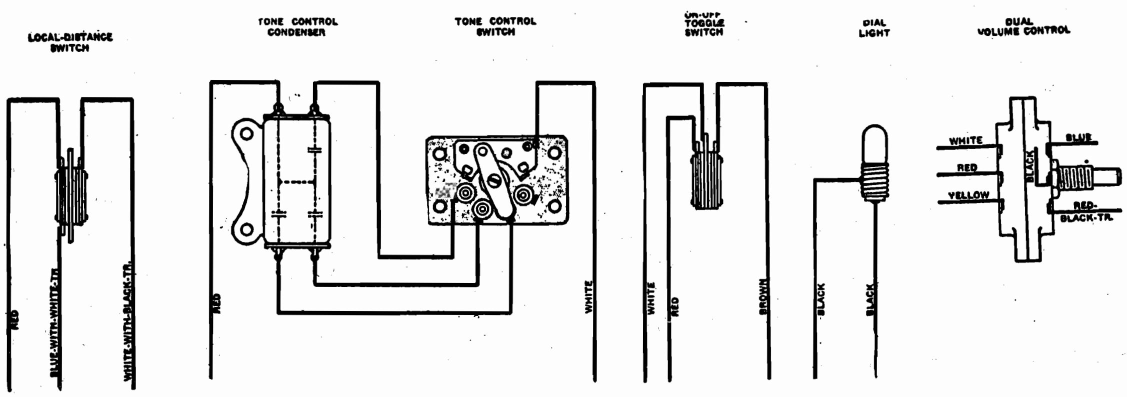
S—Detector filament by-pass.
R—3rd-R.F. filament by-pass.
R—3rd-R.F. filament by-pass.
O—2nd-R.F. filament by-pass.



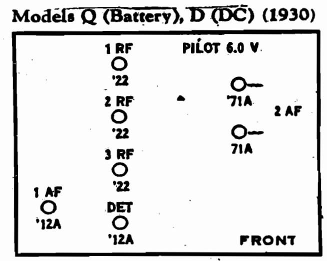
No. 1 A. F. T.



2nd A. F. INPUT TRANSFORMER



Models Q (Battery), D (DC) (1930)



The output filter choke is not used in the Q-1 chassis.

***The connections shown for R. F by-pass No. 2 are correct when this part is No. 16060 However, if a No. 18350 (H-28) is used, "P" and "P" are at top and "H" and "T" are at bottom; therefore, the connections to this condenser are correspondingly changed**

MODEL 70, 76
Chassis Q

ATWATER KENT MFG. CO.

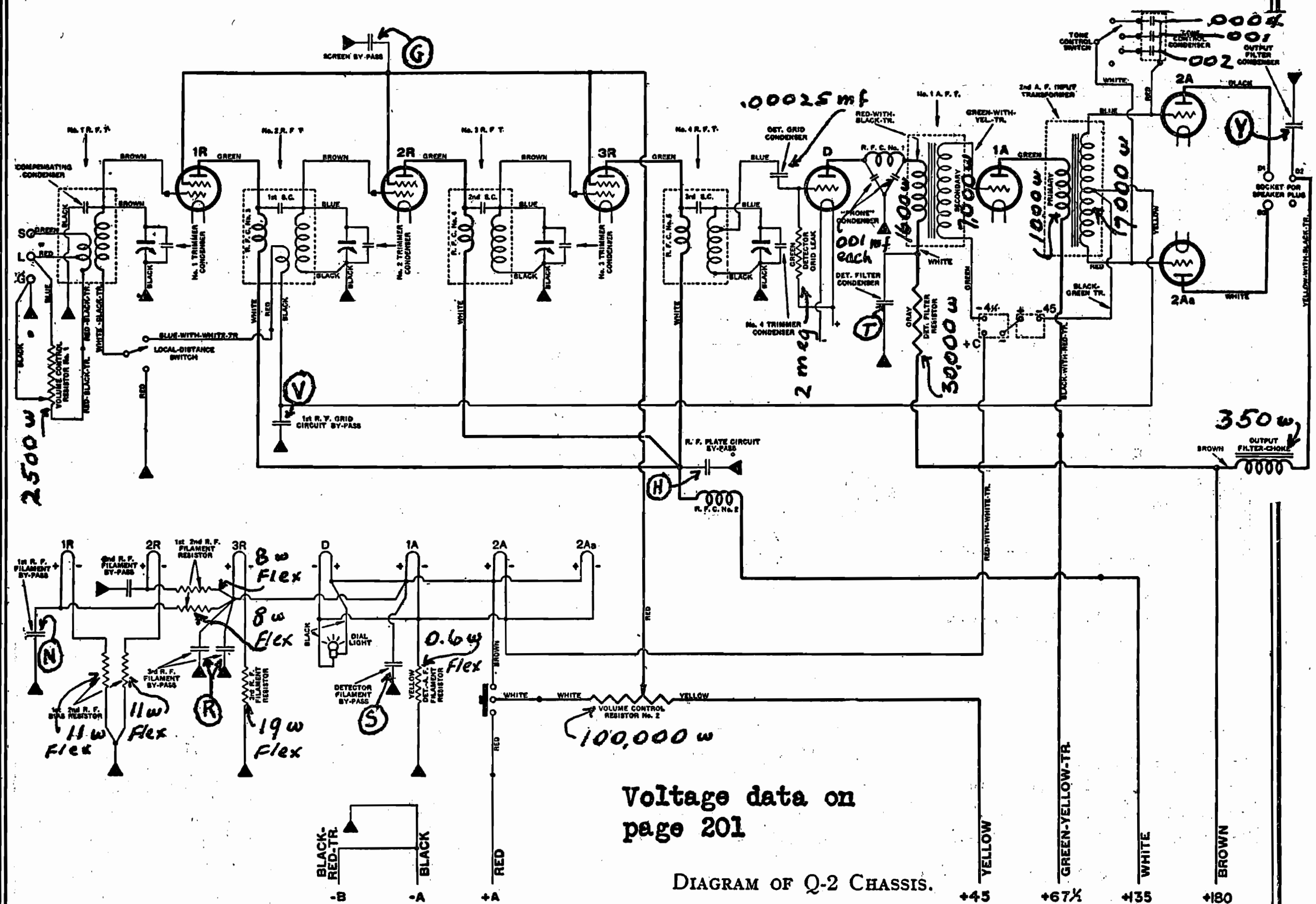
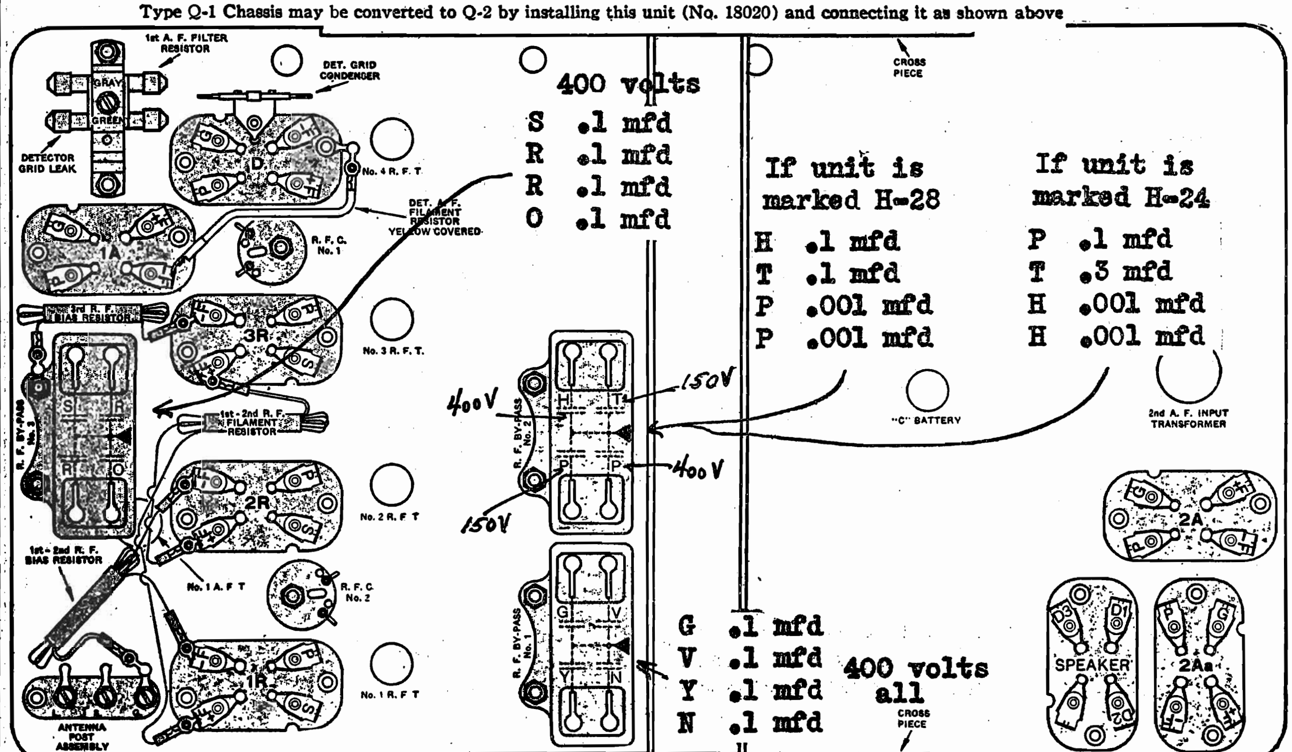


DIAGRAM OF Q-2 CHASSIS.

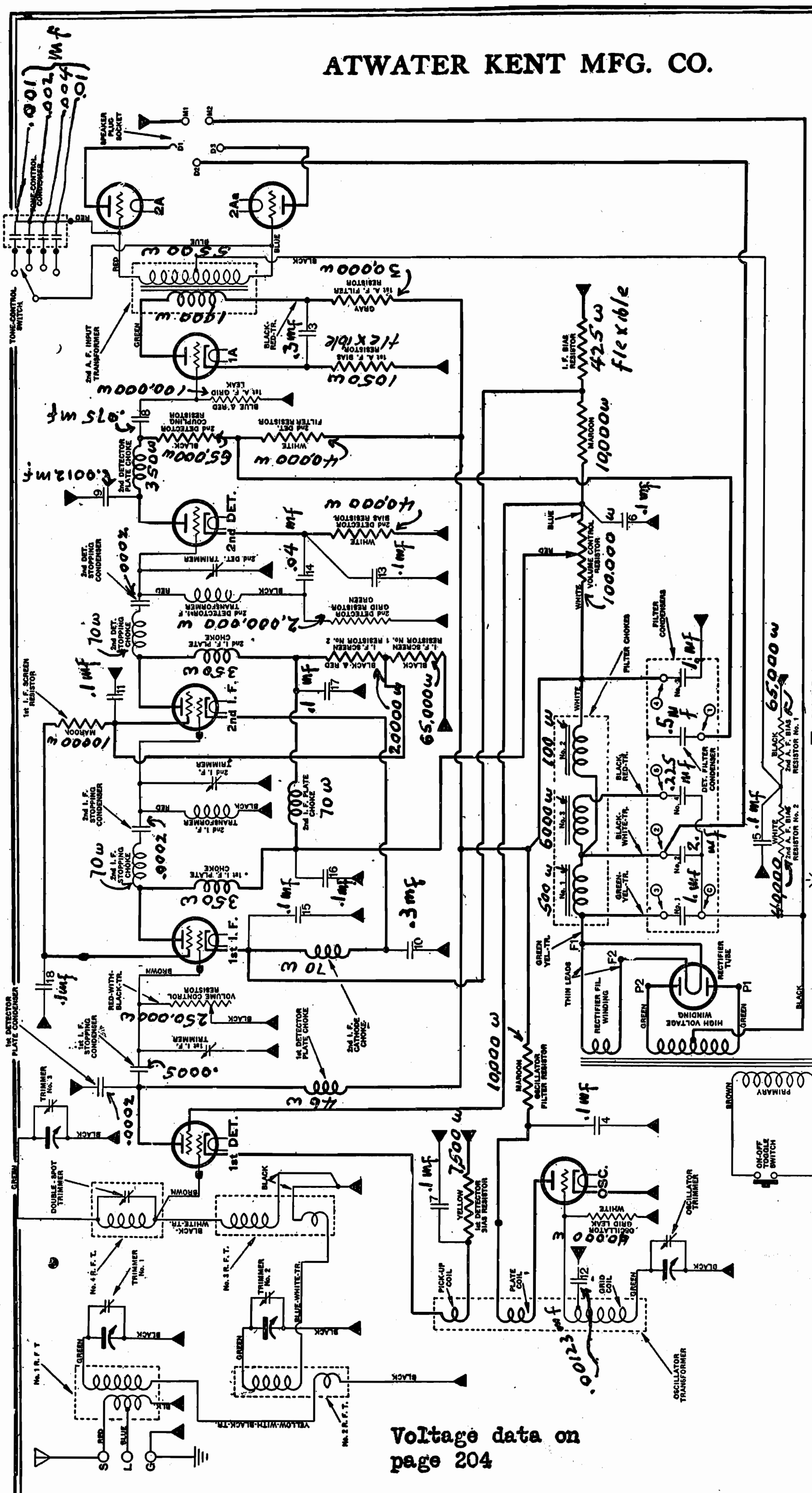
The output filter choke and filter condenser are used only in Type Q-2 Chassis. The choke is mounted in the 2nd-A. F. input transformer container. Type Q-1 Chassis may be converted to Q-2 by installing this unit (No. 18020) and connecting it as shown above



Voltage reference page 3-55.

ATWATER KENT MFG. CO.

MODEL 72
Chassis H-1



OUTPUT TRANSFORMER
Primary 300 ohms
Secondary 0.1 ohm

Field coil 1100 ohms

SCHEMATIC DIAGRAM OF TYPE H-1 CHASSIS

In some Type H-1 sets the +B lead to the I. F. screens is connected to the 1st-I. F. side of the 1st-I. F. screen resistor.

PEAK FREQUENCY
130 KC

Voltage data on page 204

Voltage reference page 114-O, Vol. I.

MODEL 72
Chassis H-1
Below serial
5,855,201

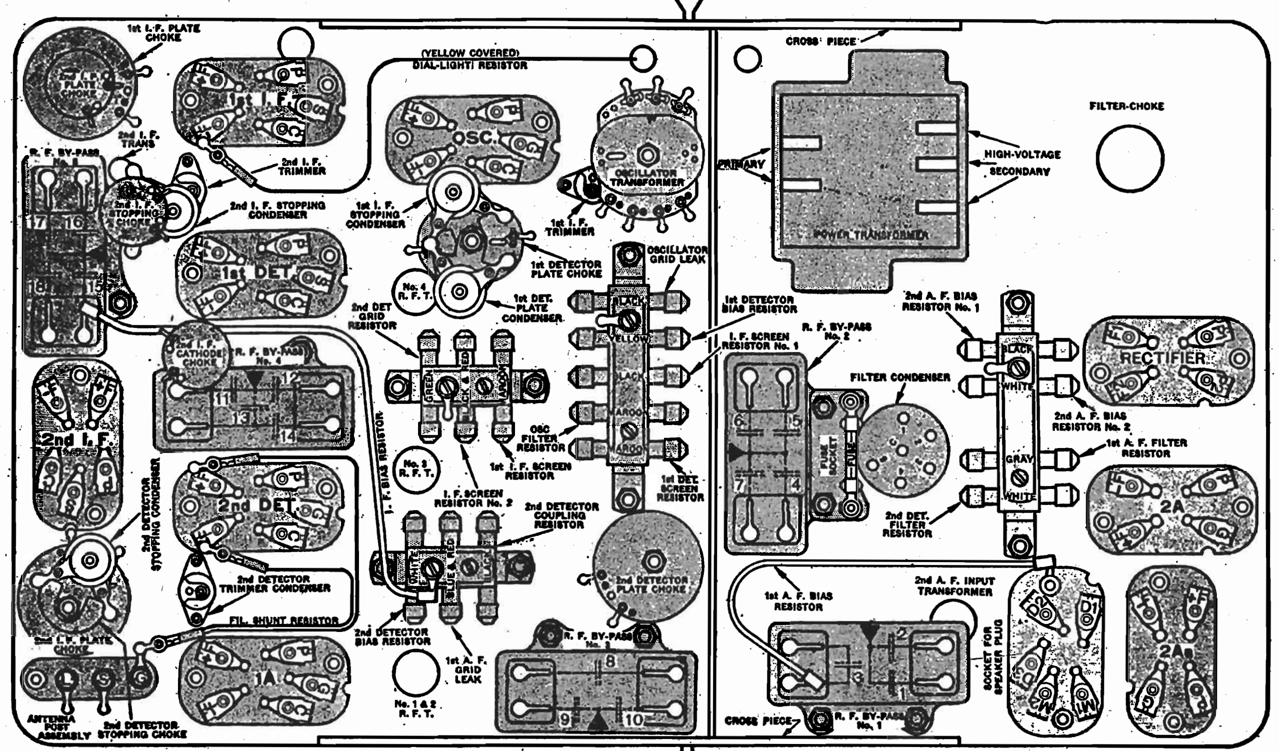
ATWATER KENT MFG. CO.

FILTER CONDENSERS. Numerals in circles indicate connections upon filter condenser terminal block. These numbers are shown upon the parts layout below and also upon the chassis layout

Detector filter	.1 mfd	connected between terminal (1) and can
Filter #1	2.0 mfd	connected between terminal (2) and center stud
Filter #2	1.0 mfd	connected between terminal (3) and center stud
Filter #3	1.0 mfd	connected between terminal (4) and can
Resonant condenser	.225 mfd	connected between terminal (5) and center stud

BYPASS CONDENSERS. The small numerals adjacent to the bypass condensers corresponds with the designating numerals upon the chassis layout

RF Bypass #1	1	.01 mfd	400 volts	2	.01 mfd	400 volts	# 17360
	3	.3 mfd	400 volts				
RF Bypass #2	4	.1 mfd	400 volts	5	.1 mfd	400 volts	# 15262
	6	.1 mfd	400 volts	7	.1 mfd	400 volts	
RF Bypass #3	8	.075 mfd	400 volts	9	.0012 mfd	400 volts	# 16745
	10	.3 mfd	150 volts				
RF Bypass #4	11	.1 mfd	400 volts	12	.00123mfd	400 volts	# 17370
	13	.1 mfd	400 volts	14	.04 mfd	400 volts	
RF Bypass #5	15	.1 mfd	400 volts	16	.1 mfd	400 volts	# 15262
	17	.1 mfd	400 volts	18	.1 mfd	400 volts	



Bottom Chart of Type H-1 Chassis

MODEL 72
Chasses H-1
H-2

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EQUIPMENT REQUIRED FOR SERVICING TYPE H CHASSIS

In order to make the correct adjustments of trimmer condensers in Type H chassis, it is necessary to have the following equipment:

1. **A four-wave oscillator** providing modulated signals at 1,500, 1,000, 800 and 600 kilocycles. The oscillator signals must come in at exactly these settings on a Type H chassis that has been checked on "standard-frequency" broadcast stations to make certain that the dial calibration is accurate. In other words, the set is used as a wavemeter to check the frequency of the oscillator. In turn, the set must be checked frequently against "standard-frequency" broadcast stations.

The oscillator frequencies should be checked at least once a day, and more often if necessary.

Each oscillator in the four-wave oscillator must have an adjustable pick-up. Adjustment of any one pick-up must not affect the frequency of its oscillator, nor should it affect the volume of the other oscillators.

The 1500 K. C. oscillator must have an extra pick-up that may be cut in to provide an extra-strong 1500 K. C. signal, or cut out to provide a normal-strength 1500 K. C. signal. The extra-strong 1500 K. C. signal is used in adjusting the double-spot trimmer.

2. **A 130-kilocycle oscillator.** This should be tuned to 130 K. C. by adjusting its trimmers to give maximum output when this oscillator is coupled to the I. F. amplifier in a Type H chassis that has the original factory synchronism. The frequency of the 130-K. C. oscillator should be checked frequently.

The 130-K. C. oscillator may be coupled to the Type H chassis in either one of two different methods, as follows: (a) The oscillator may be completely shielded, with a shielded lead connecting an adjustable pick-up in the oscillator to the control-grid cap of the 1st-detector. (b) The oscillator may be mounted under the test bench in such a position that it will be close to the 1st-detector plate-circuit choke. A 2-inch hole should be drilled at this point in the metal plate that covers the test bench. In this case, of course, the bottom plate of the set should be removed.

3 **An output measuring circuit** such as that shown **on page 166**

4. **Two No. 18261 coil shields with the tops cut off.** These are used in place of the regular No. 18261 shields to cover the I. F. transformers in Type H-2 Chassis, in order to make the I. F. trimmer condensers accessible.

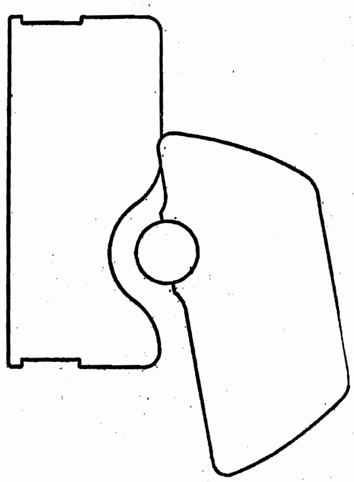
5. **One No. 17295 coil shield with a half-inch hole cut in the top.** This is used in place of the regular No. 17295 shield to cover No. 4 R. F. T., in order to make the double-spot trimmer accessible.

These specially cut shields are NOT supplied from the factory.

6. **One No. 15592 (black) tubular resistor** with a half-inch length of solid wire soldered to each end. This is used as described on Page 275.

7. **A trimmer-condenser screw-driver.** This should be made from a fibre rod about 10″ long and 1/4″ in diameter

INITIAL ADJUSTMENT OF ROTORS AND POINTER TO 1500 KILOCYCLES



POSITION OF ROTOR BLADES FOR 1500 K. C.

When the variable-condenser unit has been replaced or adjusted in any way, it is necessary to check the alignment as follows:—

Center the pointer on the control arm and tighten the pointer screws.

(1) Loosen the gear set-screws.

(2) Move the rotor plates to the position shown

(3) With the rotor in this position, adjust the control arm to the 1500 K. C. position and tighten the gear set-screws.

(4) Note how far down on the 1500 K. C. mark the pointer comes, then turn the condenser knob to the 550 K. C. mark. The pointer should come down on this mark approximately the same as on the 1500 K. C. mark. If it does not, it is an indication that the front panel is not centered.

(5) If the front panel is not centered, loosen the screw at each end of the bottom of the front panel and shift the panel as necessary. Tighten the panel screws and then reset the control arm

Output measuring circuit reference page 3-28.

ADJUSTING TRIMMERS ON TYPE H-1 CHASSIS

Preliminary

(a) Couple the 130 K. C. oscillator to the set.

(b) Connect the common pick-up lead from the four-wave oscillator to one end of a No. 8112 condenser. Connect the other end of this condenser to the Long-Antenna post. Connect the oscillator container to the Ground post.

(c) Connect the output measuring circuit shown on Page 256 to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left. Put S4 on the second tap.

(d) Put all tubes in the set. Break away the sealing wax on the trimmer-condenser screws.

(e) Put special coil shield on No. 4 R. F. T. so the double-spot trimmer is accessible.

(f) Make initial adjustment of rotors and dial pointer to 1500 K. C.

I. F. Trimmers

(g) Switch on the set and the 130 K. C. oscillator. Adjust the 2nd-I. F. trimmer for maximum output. Keep meter reading about 50 by regulating volume control on set.

(h) Adjust the 2nd-detector trimmer for maximum output. Do not touch the 1st-I. F. trimmer unless the I. F. amplifier is unstable. In this case, turn the adjusting screw of this trimmer anti-clockwise until the amplifier becomes stable. Turn off the 130 K. C. oscillator.

Oscillator Trimmers

(i) Tune in the 1500 K. C. signal and adjust the oscillator trimmer to bring in this signal at exactly 150 on the dial.

(j) Adjust the **pre-selector trimmers** Nos. 1, 2 and 3 for maximum output.

(k) Turn dial pointer exactly to 80. Screw the oscillator-transformer adjusting disc in or out as necessary to the point that gives maximum output from the 800 K. C. signal.

(l) Turn dial pointer to 150. Re-set the oscillator trimmer to give maximum output from the 1500 K. C. signal.

(m) Turn dial pointer to 80. Re-set the disc for maximum output.

(n) Turn dial pointer **exactly** to 150. Adjust the oscillator trimmer for maximum reading.

(o) Repeat operations (m) and (n) if necessary. The object of this procedure is to bring in both the 1500 K. C. and the 800 K. C. signals at exactly the correct points on the dial; 150 and 80 respectively.

Double-Spot Trimmers

(p) Switch on the extra-strong 1500 K. C. signal and tune in its double-spot at 1240 K. C. Adjust the double-spot trimmer to give **minimum output.**

(q) Switch on the normal-strength 1500 K. C. signal and tune it in at 150. Adjust trimmer No. 3 to give maximum output.

(r) Repeat the instructions given in paragraphs (p) and (q) until further adjustment gives no change in output.

1st-I. F. Trimmer

(s) Tune in the 1000 K. C. signal and adjust the 1st-I. F. trimmer for maximum audible output with the volume control full on. If the I. F. amplifier is unstable, screw the 1st-I. F. trimmer anti-clockwise to a stable position.

Re-seal the trimmer screws.

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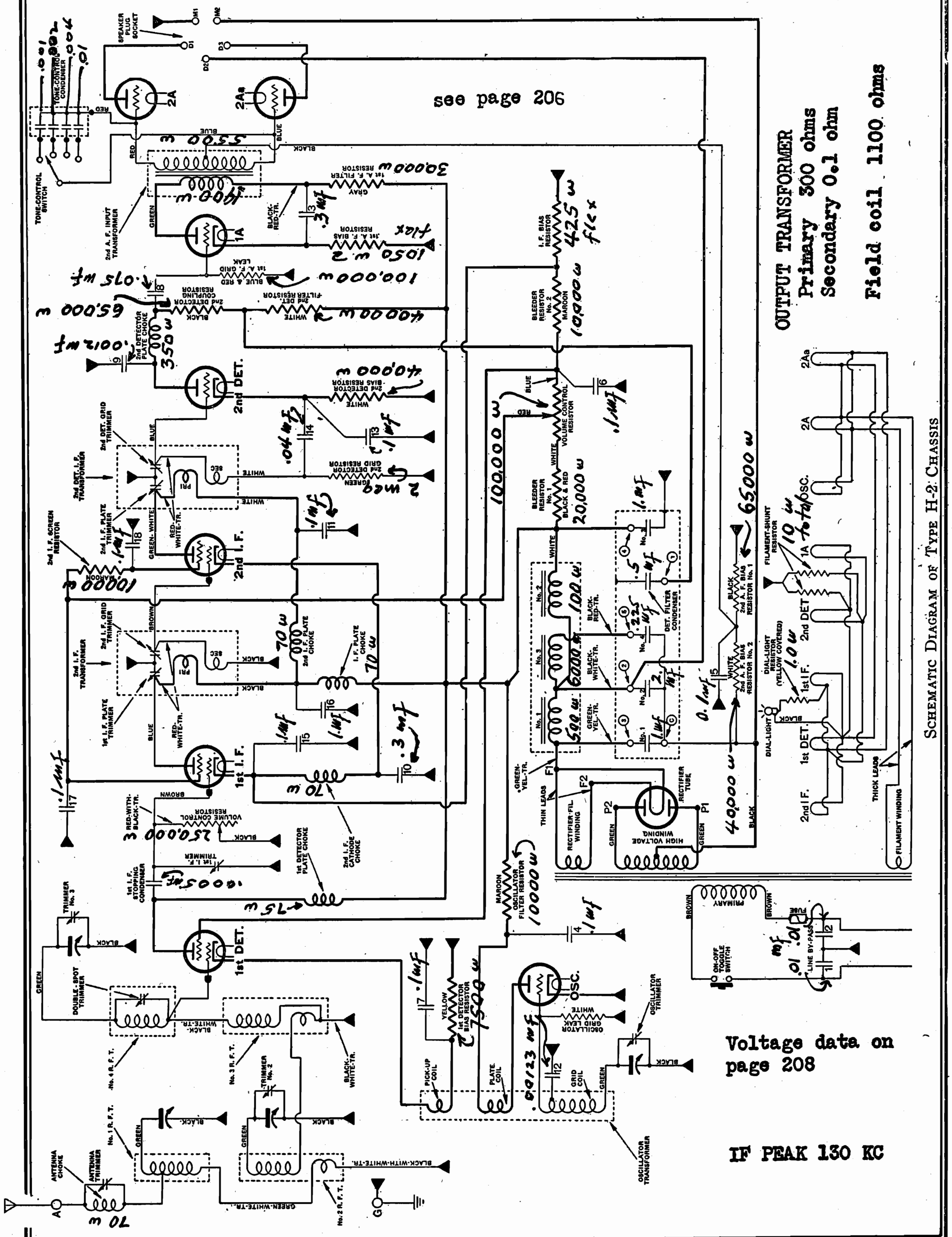
MODEL 72
Chassis H-2



Voltage reference page 114-R, Vol. I.

MODEL 72
Chassis H-2
Above serial
5,855,201

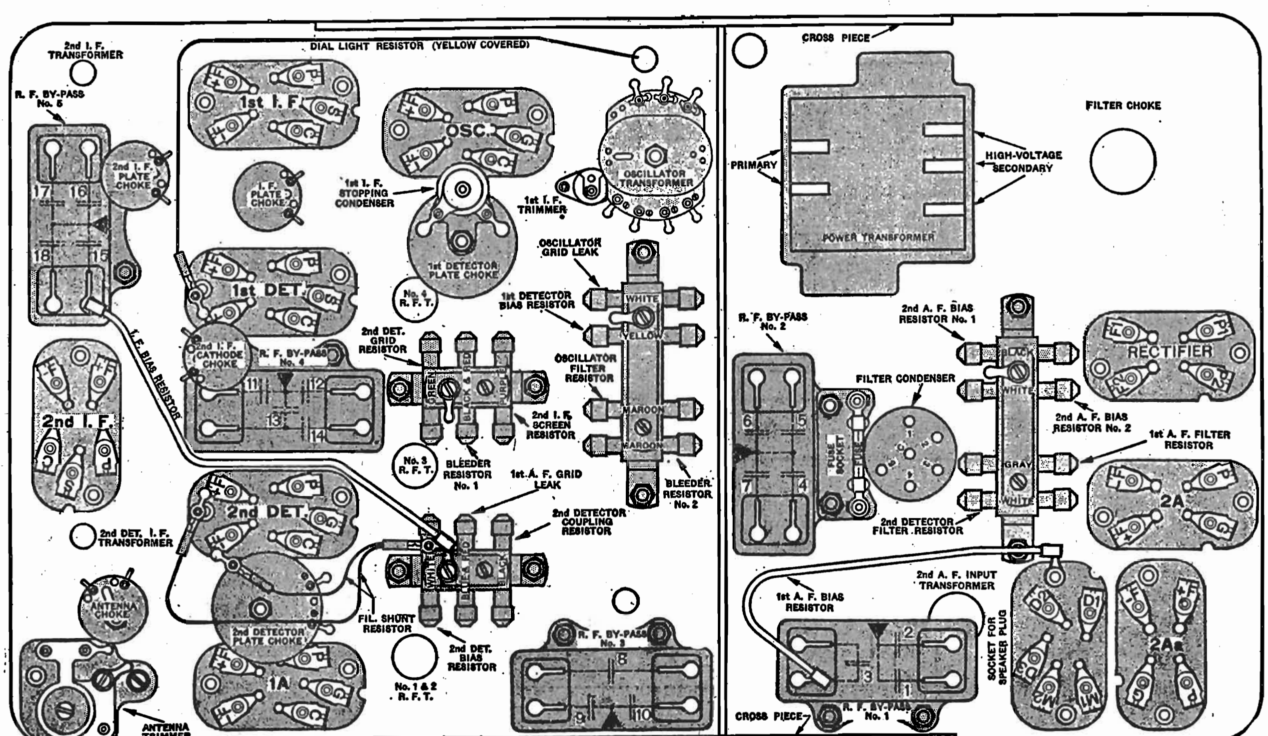
ATWATER KENT MFG. CO.

FILTER CONDENSERS. Numerals in circles shown on wiring diagram indicate connections upon filter condenser terminal block. These numbers are also shown upon the parts layout below. Also upon the chassis wiring diagram

Detector filter	.1 mfd	connected between terminal (1) and can
Filter #1	2.0 mfd	connected between terminal (2) and center stud
Filter #2	1.0 mfd	connected between terminal (3) and center stud
Filter #3	1.0 mfd	connected between terminal (4) and can
Resonant condenser	.225 mfd	connected between terminal (5) and center stud

BYPASS CONDENSERS. The small numerals adjacent to the various bypass condensers shown on the wiring diagram correspond with the designating numerals upon the parts layout below and the chassis

RF Bypass #1	1	.01 mfd	400 volts	2	.01 mfd	400 volts	# 17360
	3	.3 mfd	400 volts				
RF Bypass #2	4	.1 mfd	400 volts	5	.1 mfd	400 volts	# 15262
	6	.1 mfd	400 volts	7	.1 mfd	400 volts	
RF Bypass #3	8	.075 mfd	400 volts	9	.0012 mfd	400 volts	# 16745
	10	.3 mfd	150 volts				
RF Bypass #4	11	.1 mfd	400 volts	12	.00123 mfd	400 volts	# 17370
	13	.1 mfd	400 volts	14	.04 mfd	400 volts	
RF Bypass #5	15	.1 mfd	400 volts	16	.1 mfd	400 volts	# 15262
	17	.1 mfd	400 volts	18	.1 mfd	400 volts	



BOTTOM VIEW OF TYPE H-2 CHASSIS
In this chart, the 2nd-I. F. screen resistor should be maroon instead of purple.

ATWATER KENT MFG. CO.

ADJUSTING TRIMMERS ON TYPE H-2 CHASSIS

Preliminary

(a) Couple the 130 K.C. oscillator to the set.

(b) Connect the common pick-up lead from the four-wave oscillator to one end of a No. 8112 condenser. Connect the other end of this condenser to the Antenna post. Connect the oscillator container to the Ground post.

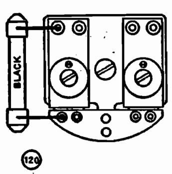
(c) Connect the output measuring circuit shown to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left. Put S4 on the second tap.

(d) Put all tubes in the set. Break away the sealing wax on the trimmer-condenser screws.

(e) Put special coil shield on No. 4 R.F.T. so the double-spot trimmer is accessible. Also put special shields on the I.F. transformers.

(f) Make initial adjustment of rotors and dial pointer to 1500 K.C.

I. F. Trimmers



(g) Switch on the set and the 130 K.C. oscillator. Connect the black resistor across the 2nd-detector grid trimmer (see small illustration at left) and adjust the 2nd-I.F. plate trimmer for maximum output.

(h) Connect the resistor across the 2nd-I.F. plate trimmer and adjust the 2nd-detector grid trimmer for maximum output.

(i) Connect the resistor across the 2nd-I.F. grid trimmer and adjust the 1st-I.F. plate trimmer for maximum output.

(j) Connect the resistor across the 1st-I.F. plate trimmer and adjust the 2nd-I.F. grid trimmer for maximum output.

(k) Adjust the volume control to keep the output meter reading about 50 during these operations.
Turn off the 130 K.C. oscillator.

Oscillator Trimmers

Connect the black resistor across the 2nd-detector grid trimmer while adjusting the oscillator trimmers.

(l) Tune in the 1500 K.C. signal and adjust the oscillator trimmer to bring in this signal at exactly 150 on the dial.

(m) Adjust the antenna trimmer and trimmers Nos. 2 and 3 for maximum output from the 1500 K.C. signal.

(n) Turn dial pointer exactly to 80. Screw the oscillator-transformer adjusting disc in or out as necessary to the point that gives maximum output from the 800 K.C. signal.

(o) Turn dial pointer to 150. Re-set the oscillator trimmer to give maximum output from the 1500 K.C. signal.

(p) Turn dial pointer to 80. Re-set the disc for maximum output.

(q) Turn dial pointer **exactly** to 150. Adjust the oscillator trimmer for maximum output reading.

(r) Repeat operations (p) and (q) until further adjustment gives no change in dial reading. The object of this procedure is to bring in, without further adjustment, both the 1500 K.C. and the 800 K.C. signals at exactly the correct points on the dial: 150 and 80 respectively.

Double-Spot Trimmers

Remove the black resistor for this adjustment.

(s) Switch on the extra-strong 1500 K.C. signal and tune in its double-spot at 1240 K.C. Adjust the double-spot trimmer to give **minimum** output.

(t) Switch on the normal-strength 1500 K.C. signal and tune it in at 150. Adjust trimmer No. 3 to give maximum output.

(u) Repeat the instructions given in paragraphs (s) and (t) until further adjustment gives no change in output.

1st-I. F. Trimmer

Connect the black resistor across the 2nd-detector grid trimmer for this adjustment.

(v) With volume control full on, tune in the 1000 K.C. signal and adjust the 1st-I.F. trimmer for maximum audible output.
Re-seal the trimmer screws.

VOLTAGE DATA

ATWATER KENT MFG. CO.

VOLTAGE TABLE

FOR MODEL 80, 81, 82, 82-D, 82-Q, 83, 84, 84-D, 84-Q, 85, 85-Q, 86, 87 and 89

The voltages listed in this table are only approximate, and are measured values, not actual operating values. Turn volume control to maximum.

Use 250-volt scale of a 1000-ohm-per-volt D. C. voltmeter.

All plate, screen and grid measurements are made from cathode in heater-type tube, and from —F in plain-filament-type tube.

When replacing a tubular resistor, use a resistor of the same identifying color. In a few cases, owing to engineering changes, the color of a resistor in a chassis may not agree with the color specified in the diagram. In such a case, disregard the diagram and use a replacement resistor having the same color as the defective unit. However, if a resistor has been removed, or its identification destroyed, replace it with a resistor having the color that is specified in the diagram for that set.

		Model 80	Model 81	Model 82	Model 82-D	Model 82 Q	Model 83	Model 84	Model 84 D	Model 84 Q	Model 85	Model 85-Q	Model 86	Model 87	Model 89
	Line Voltage	110	—	110	112	—	110	110	120	—	110	—	115	110	110
	Total "B" Voltage	—	125	—	—	125	—	—	—	125	—	125	—	—	—
R. F. Tube**	Filament	—	5.5	—	—	2	—	—	—	2	—	—	2.4	2.4	2.4
	Plate	—	125	—	—	125	—	—	—	125	—	—	125	170	125
	Screen	—	75	—	—	60	—	—	—	65	—	—	40	80	50
	Grid	—	Small	—	—	3	—	—	—	3	—	—	2	2	2
1st Det. Tube†	Filament	2.4	5.5	2.4	5.5	2	2.4	2.4	5.7	2	2.4	2	2.4	2.4	2.4
	Plate	225	95	135	70	125	225	205	80	125	135	125	125	160	120
	Screen	90	—	50	50	40	90	65	50	25	50	40	35	70	45
	Grid	5	7	4	5	3	5	6	5	3	3	3	4	11	4
I. F. Tube	Filament	2.4	—	2.4	6	2	2.4	2.4	6.5	2	2.4	2	2.4	2.4	2.4
	Plate	230	—	140	95	125	230	215	105	125	135	125	125	170	125
	Screen	95	—	50	50	60	95	65	55	65	50	65	40	80	50
	Grid	2	—	Small	Small	3	2	3	Small	Small	2	3	2	2	2
2nd Det. Tube	Filament	2.4	—	2.4	5.5	2	2.4	2.4	5	2	2.4	2	2.4	2.4	2.4
	Plate	110	—	105	55	45	110	90	55	60	100	40	95	90	120
	Screen	45	—	65	10	25	45	45	10	25	65	25	60	—	—
	Grid	5	—	8	2	3	5	6	1	3	7	3	8	Small	15
1st A. F. Tube	Filament	2.4	5.5	2.4	5.5	2	2.4	2.4	6	2	2.4	2	2.4	2.4	2.4
	Plate	230	120	230	75	55	230	205	80	55	215	55	210	90	120
	Screen	240	123	240	—	—	240	215	—	—	225	—	220	—	—
	Grid	4	11	5	3	3	4	5	2.5	3	5	3	5	3	4
2nd A. F. Tube	Filament	—	—	—	2	2	—	—	2	2	—	2	—	2.4	2.4
	Plate	—	—	—	85	120	—	—	90	120	—	120	—	200	225
	Screen	—	—	—	90	125	—	—	95	125	—	125	—	210	235
	Grid	—	—	—	7	15	—	—	7	5	—	15	—	14	14
Osc. Tube	Filament	2.4	—	2.4	5	2	2.4	2.4	6	2	2.4	2	2.4	2.4	2.4
	Plate	95	—	95	100	60	100	70	110	60	100	40	95	85	100
	Grid	*	—	*	*	*	*	*	*	*	*	*	*	*	*
Control Tube	Filament	—	5 5	2.4	—	—	—	—	—	—	2.4	—	2.4	—	2.4
	Plate	—	3	15	—	—	—	—	—	—	15	—	30	—	25
	Screen	—	—	8	—	—	—	—	—	—	7	—	7	—	5
	Grid	—	2	4	—	—	—	—	—	—	5	—	4	—	3

*** The measured oscillator grid voltage will vary dependent on the capacity of the voltmeter leads. In some cases, the presence of the leads will stop oscillation and no reading will be secured for grid bias. In other cases, the reading will be only slight, or it may be as high as 10 volts.**

****This includes the 1st, 2rd and 3rd R. F. tubes in Model 81. †This is the detector tube in Model 81.**

MODEL 80, 80-F
83, 83-F

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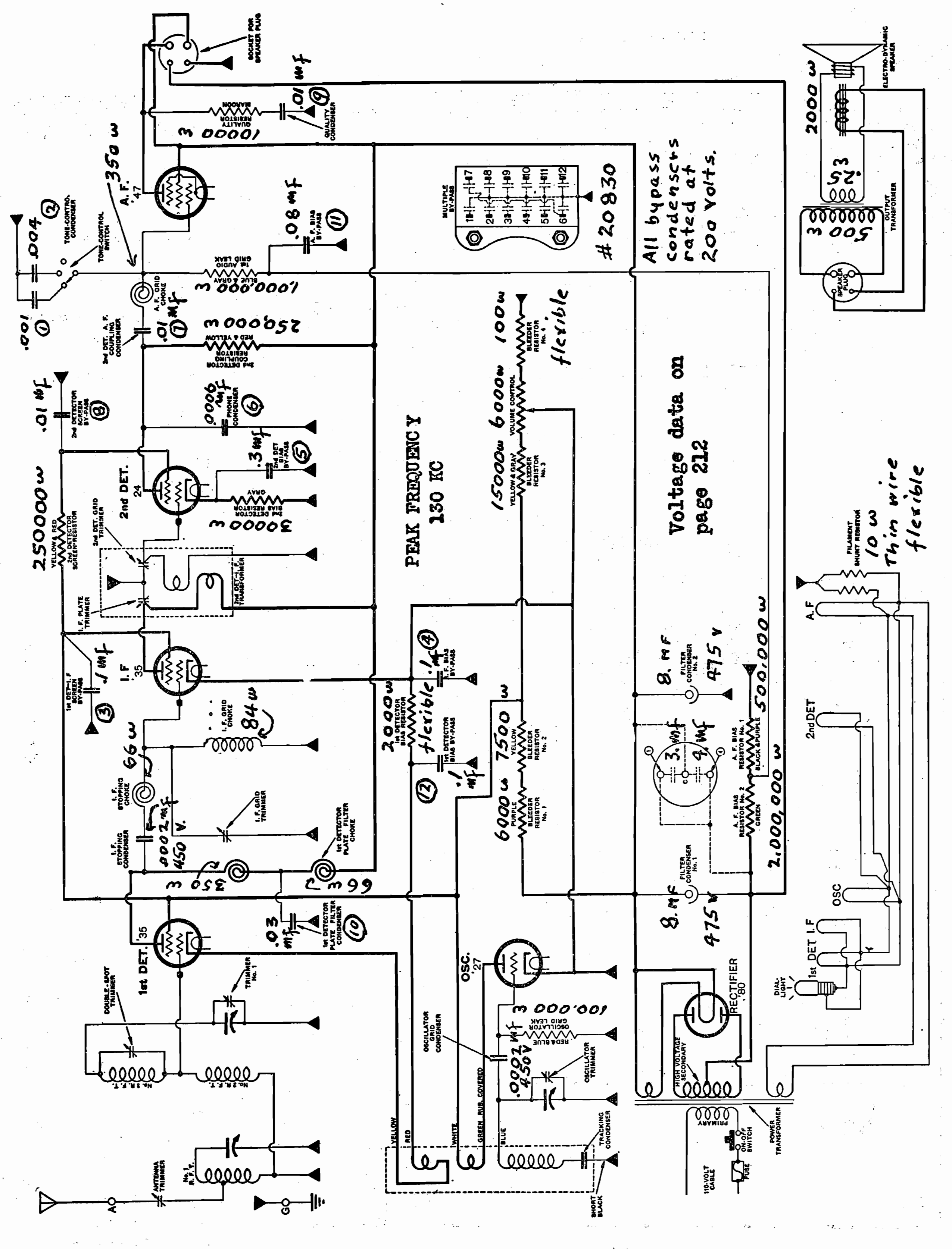
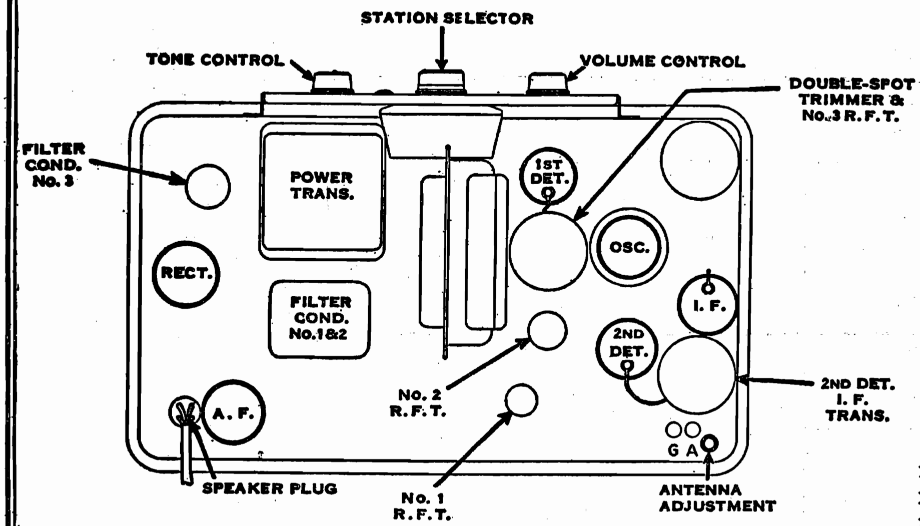


In Model 83 and 83-F, a filter-condenser unit is used and it is connected as shown in dotted lines. This unit is NOT used in Model 80 and 80-F. In Model 83, 83-F, the electrolytic filter condenser No. 1 is not used, and the filament circuit is slightly different.

Voltage reference page 3-66.

MODEL 80, 80-F
83, 83-F

ATWATER KENT MFG. CO.



TOP VIEW OF MODEL 83, 83-F.

The circle in the upper right-hand corner is the shield that covers the coupling unit between the 1st-detector and the I. F. tubes.

Condensers in Multiple By-pass Model 80, 80-F, 83, 83-F

1—Tone-control condenser.
2—Tone-control condenser.
3—1st-detector—I. F. screen by-pass.
4—I. F. bias by-pass.
5—2nd-detector bias by-pass.
6—Phone condenser.
7—2nd-detector—A. F. coupling condenser.
8—2nd-detector screen by-pass.
9—Quality condenser.
10—1st-detector plate filter condenser.
11—A. F. bias by-pass.
12—1st-detector bias by-pass.

The numbers given above correspond with the numbers marked upon the multiple condenser unit.

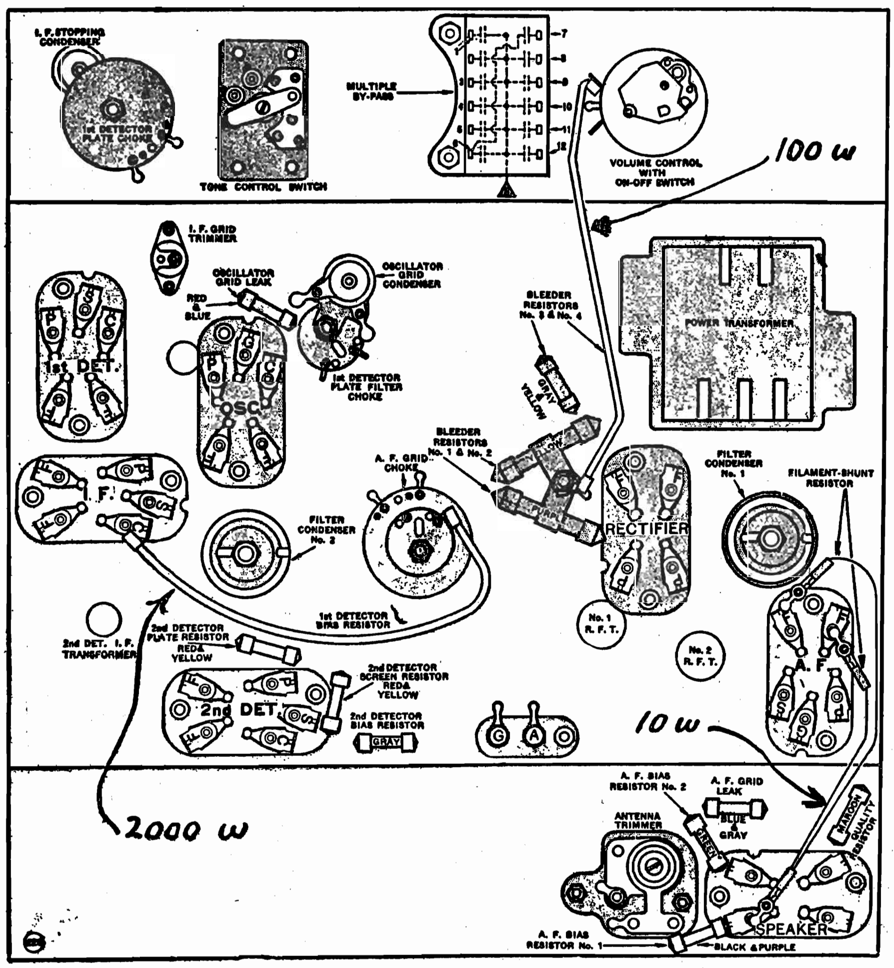


CHART OF MODEL 80, 80-F.

The parts on Model 83, 83-F are similar except that Model 83, 83-F has a filter condenser unit and only one electrolytic condenser.

VOLTAGE TABLE

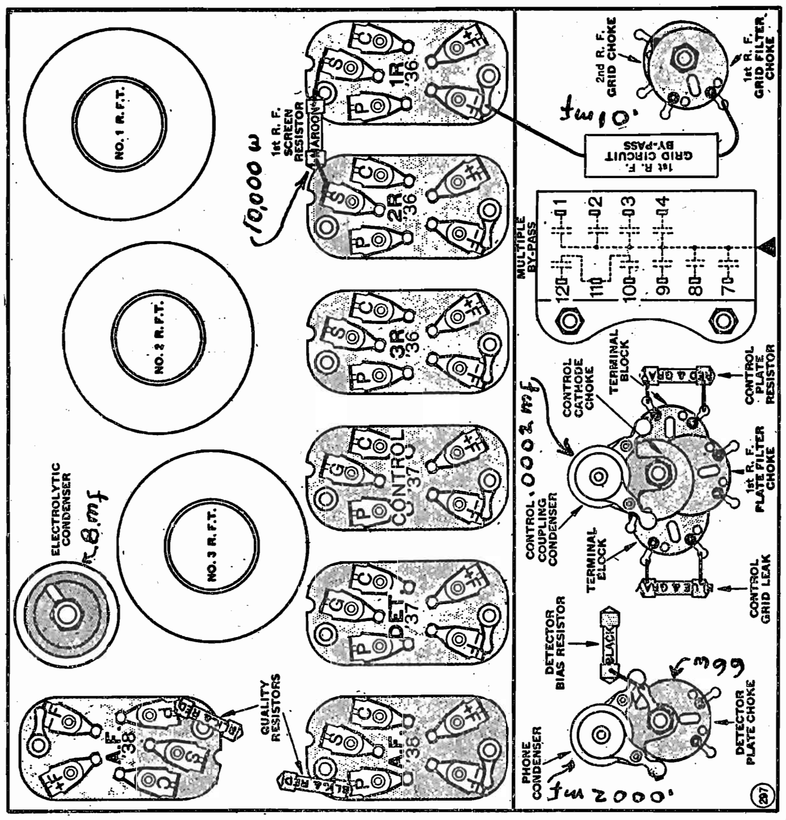
	Fil.	Plate	Screen	Control
1st Det.	2.4	225	90	5.
I-F	2.4	230	95	2.
2nd Det	2.4	110	45	5.
1st A-F	2.4	230	240	4.
2nd A-F				
Osc	2.4	100		*

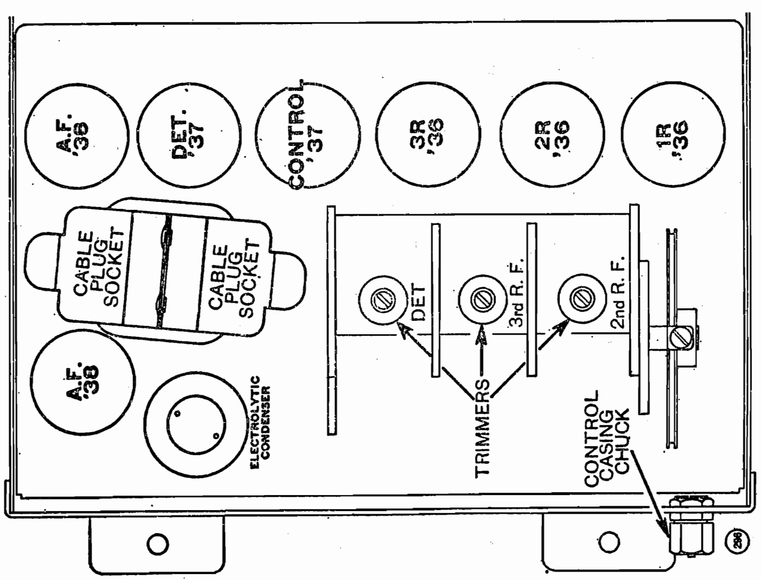
* A variable depending upon several factors. Capacity of voltmeter leads may cause oscillator tube to cease functioning.

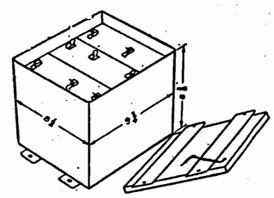
MODEL 81
81-B
81-C

ATWATER KENT MFG. CO.

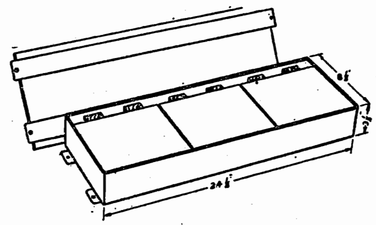
Bottom Chart.



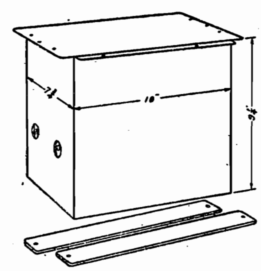




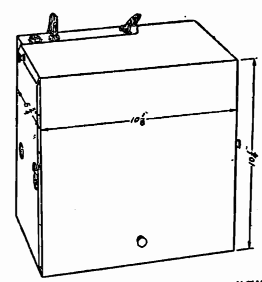
Square "B" Battery Container No. 21933 for Use with Model 81-B or 81-C.



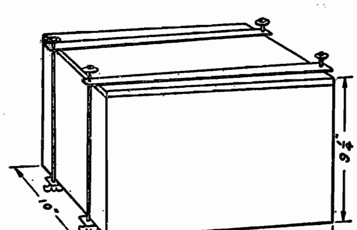
Long "B" Battery Container No. 21932 for Use with Model 81-B or 81-C.



Model 81-C Chassis and "C" Battery Container No. 21931.
(Mounted under floor or through hole cut in floor.)



Model 81-B Chassis and "C" Battery Container No. 21929.
(For dash mounting.)

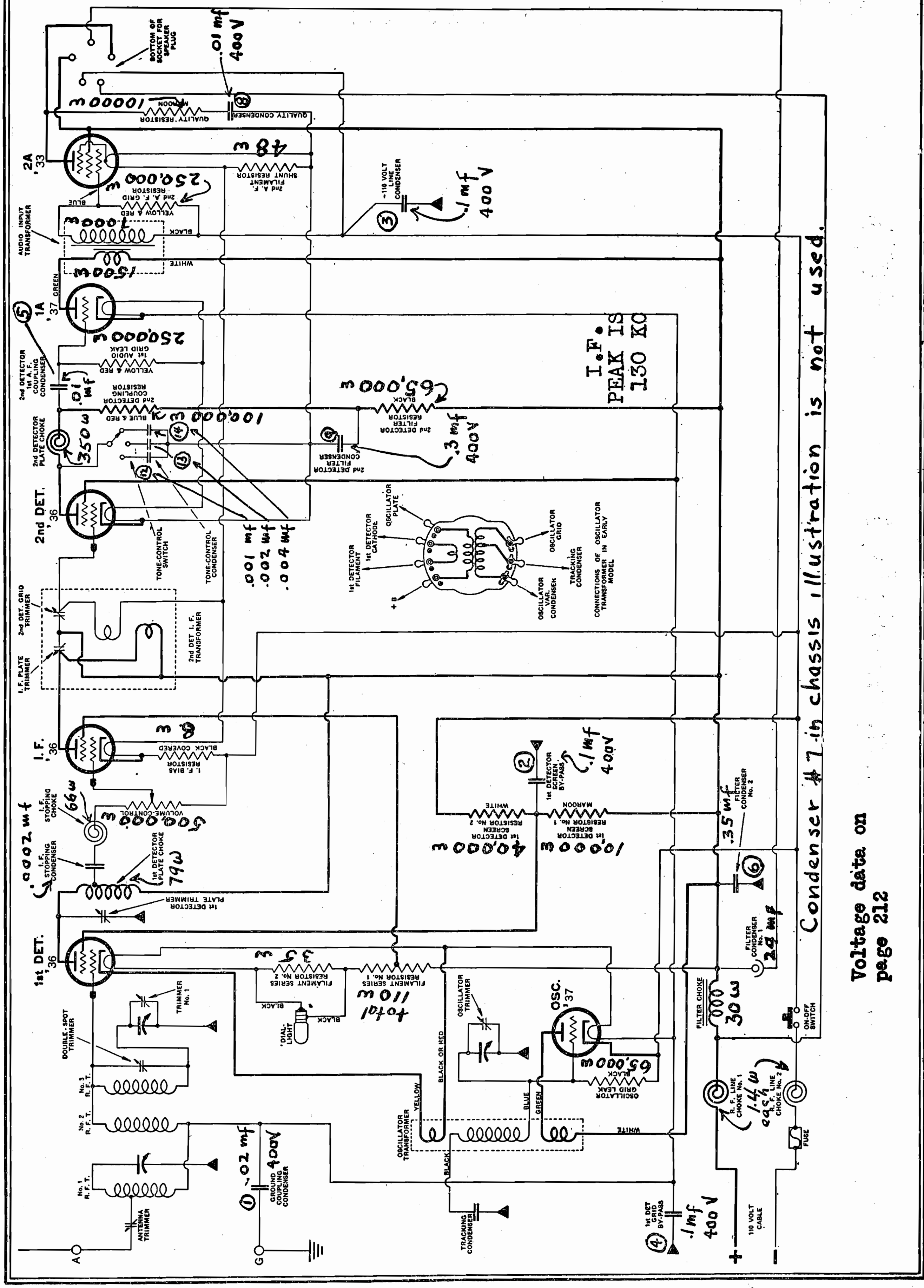


Model 81 Chassis and Battery Container.
(For under-floor mounting.)

Wiring diagram is shown on reverse side of this page.

ATWATER KENT MFG. CO.

MODEL 82-D

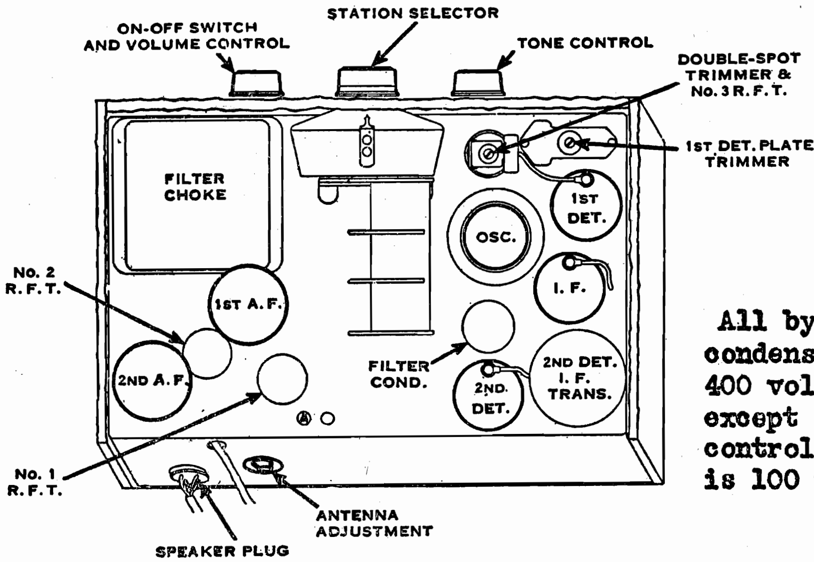


Voltage reference page 3-66.

MODEL 82-D

ATWATER KENT MFG. CO.

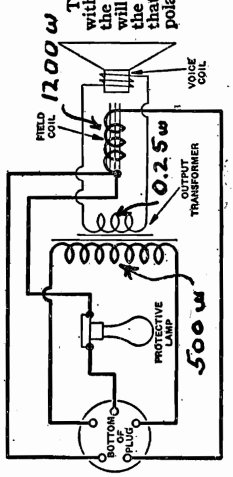
MODEL 82-D TOP VIEW AND CHART



All bypass condensers 400 volts except tone control which is 100 volts

Top View of Model 82-D.

The protective lamp (75 watts) is connected in series with the electrolytic filter condenser in the chassis. If the 110-volt D. C. supply plug is reversed, the lamp will light. When the 110-volt plug is properly inserted, the lamp does not light. This action is due to the fact that the electrolytic condenser passes current if the polarity of the applied D. C. voltage is not correct.



Circuit of Speaker Used in Model 82-D, 84-D.

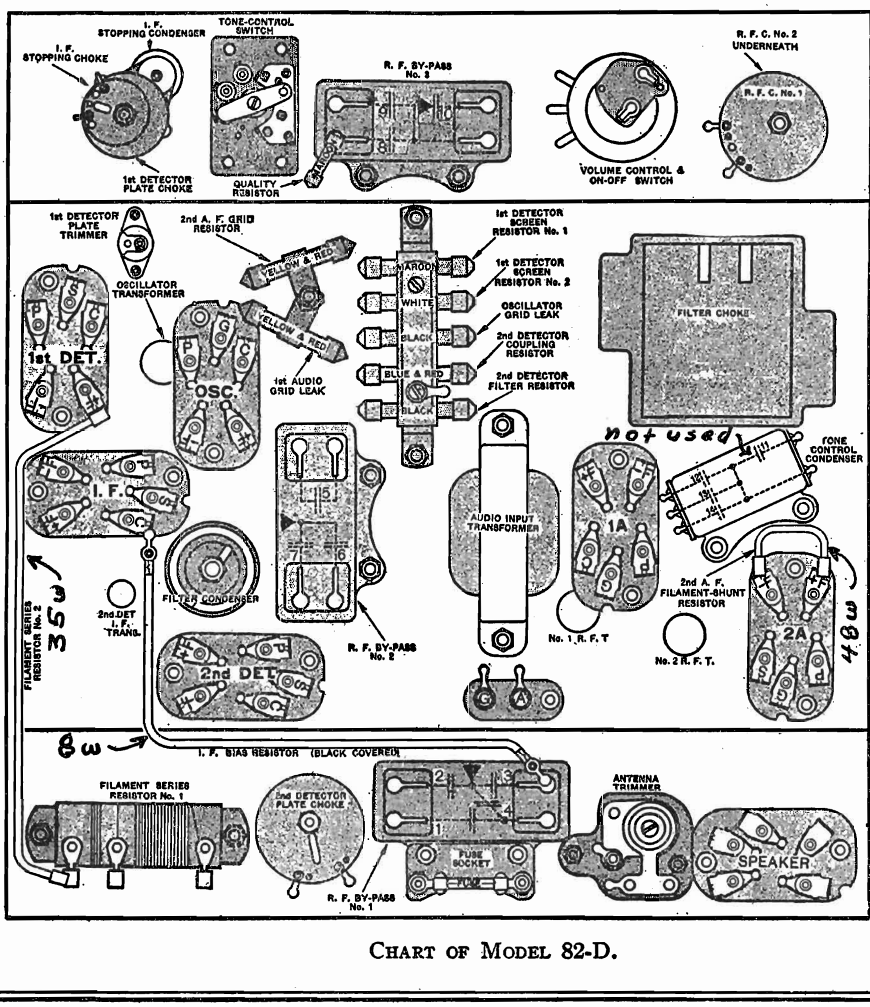


Chart of Model 82-D.

By-pass Condensers in Model 82-D

R. F. By-pass No. 1

1—Ground coupling condenser.
2—1st-detector screen by-pass.
3—110-volt line condenser.
4—1st-detector grid by-pass.

R. F. By-pass No. 2

5—2nd-detector—1st-A.F. coupling condenser
6—Filter condenser No. 2.
7—Not used.

R. F. By-pass No. 3

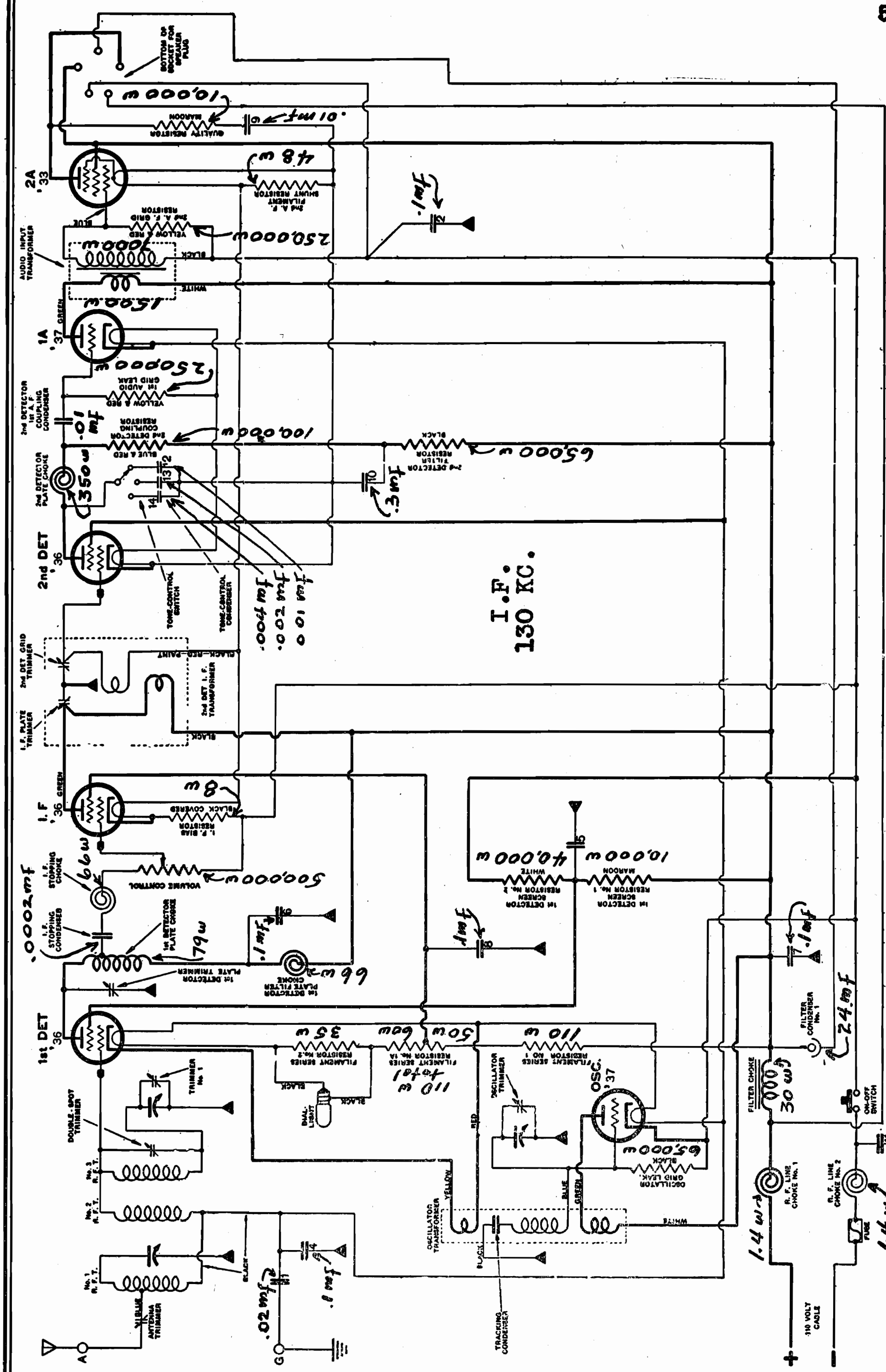
8—Quality condenser.
9—2nd-detector filter condenser.
10—110-volt line by-pass.

Tone-control Condenser

11—Not used.
12—Tone condenser.
13—Tone condenser.
14—Tone condenser.

ATWATER KENT MFG. CO.

MODEL 82-D
2nd Type
Above serial
5,760,301



CONDENSER DATA.
All bypass condensers are rated at 400 volts. Tone control condensers are rated at 100 volts.

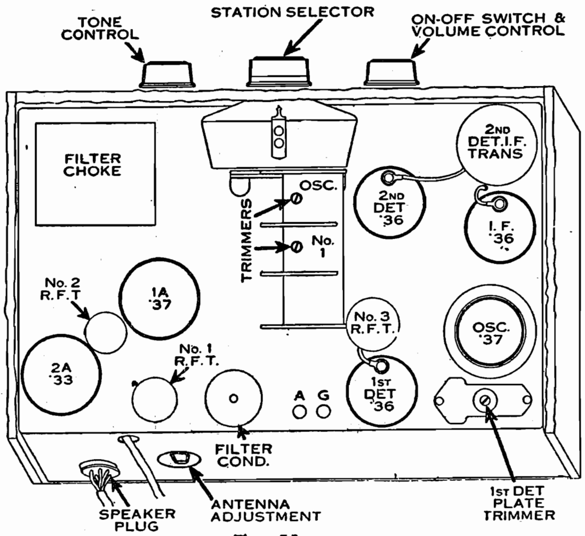
OUTPUT TRANSFORMER
Primary 300 ohms
Secondary 0.25 ohm
Field coil 1200 ohms

Voltage data on page 229

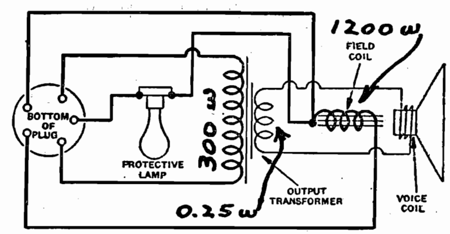
Voltage reference page 3-83.

MODEL 82-D
2nd Type
Above serial
5,760,301

ATWATER KENT MFG. CO.



Top View.



Circuit of Speaker Used in Model 82-D.

The protective lamp (75 watts) is connected in series with the electrolytic filter condenser in the chassis. If the 110-volt D. C. supply plug is reversed, the lamp will light. When the 110-volt plug is properly inserted, the lamp does not light. This action is due to the fact that the electrolytic condenser passes current if the polarity of the applied D. C. voltage is not correct.

By-pass Condensers

By-pass No. 1

1—Ground coupling condenser.
2—Negative 110-volt line by-pass.
3—Not used.
4—1st-detector grid filter condenser.

By-pass No. 2

5—1st-detector screen by-pass.
6—1st-detector plate filter condenser.
7—Filter condenser No. 2.
8—I. F. screen by-pass.

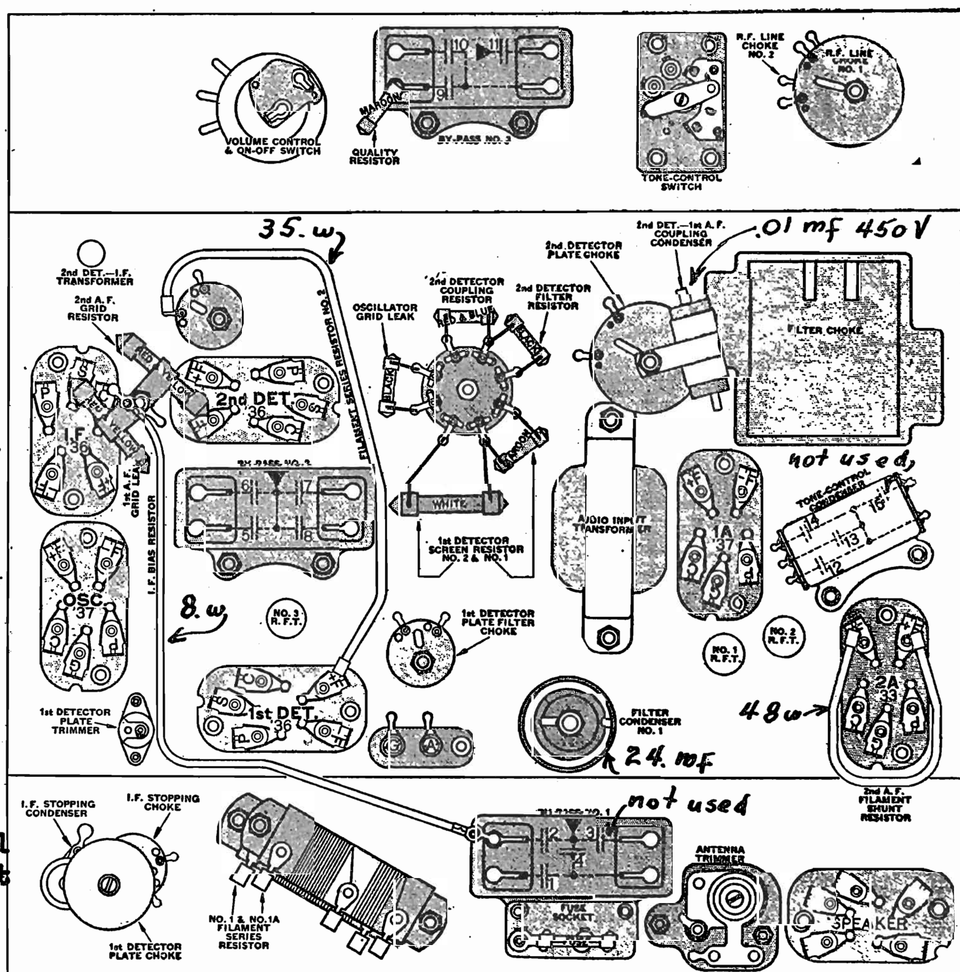
By-pass No. 3

9—Quality condenser.
10—2nd-detector plate filter condenser
11—Negative 110-volt line by-pass.

Tone-Control Condenser

12—Tone-control condenser.
13—Tone-control condenser.
14—Tone-control condenser.
15—Not used.

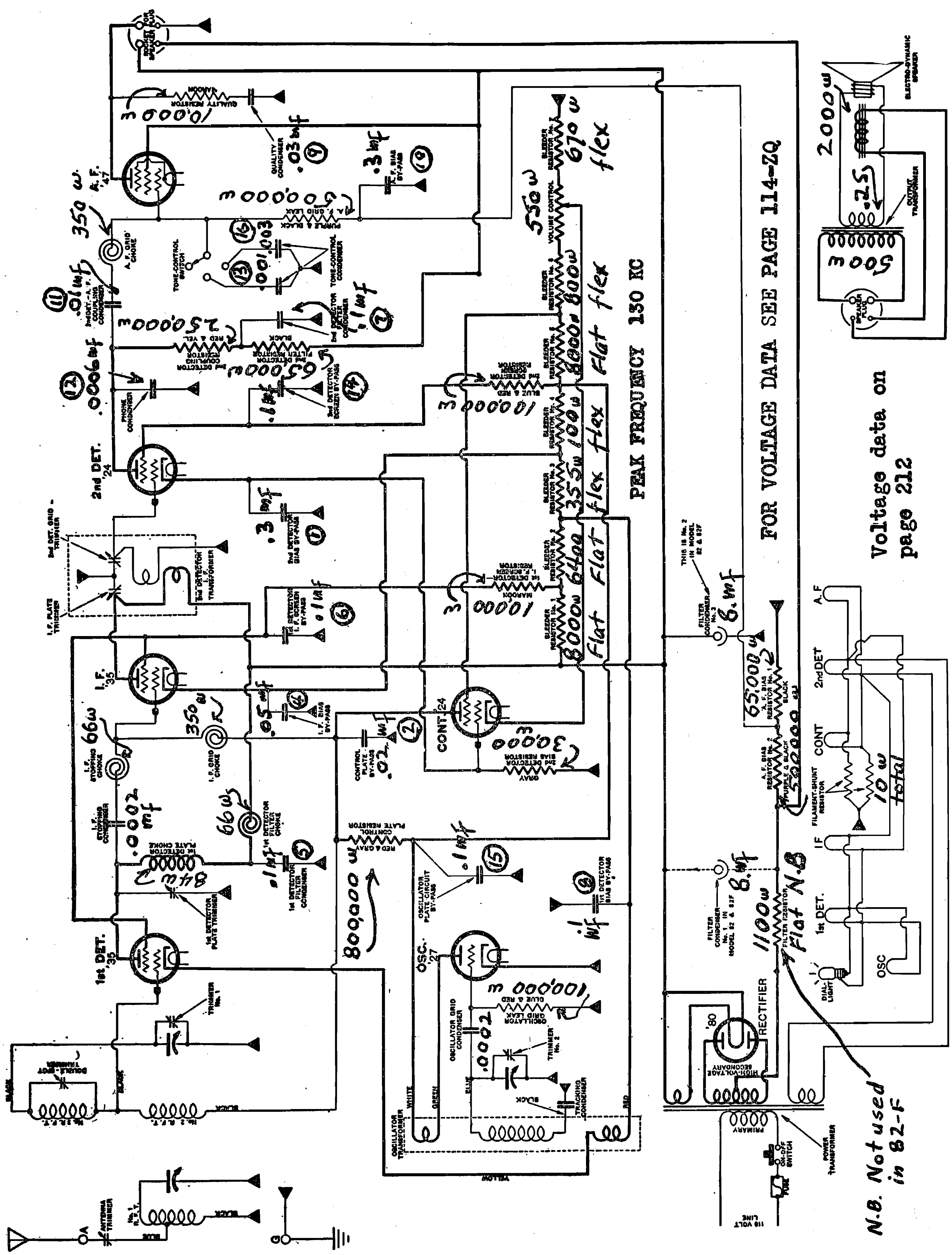
All bypass condensers rated at 400 volts. Tone control condensers rated at 100 volts



Bottom Chart.

MODEL 82, 82-F

ATWATER KENT MFG. CO.

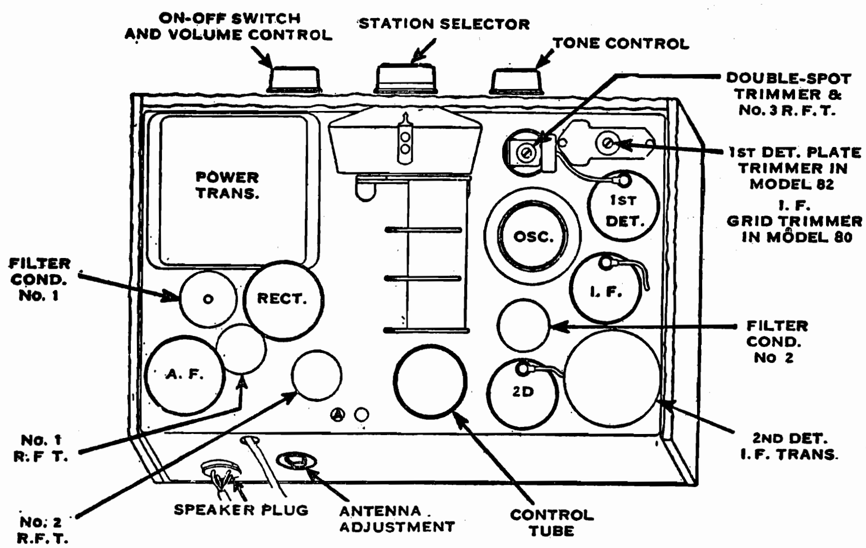


Numerals adjacent to bypass condensers designate units shown upon parts layout on next page within multiple condensers. Condenser voltage ratings are shown upon next page.

Voltage reference page 3-66.

MODEL 82, 82-F

ATWATER KENT MFG. CO.



Top View of Model 82, 82-F.

The top view of Model 80, 80-F is similar except that it has no control tube and the position of No.1 and No. 2 R. F. T. is interchanged.

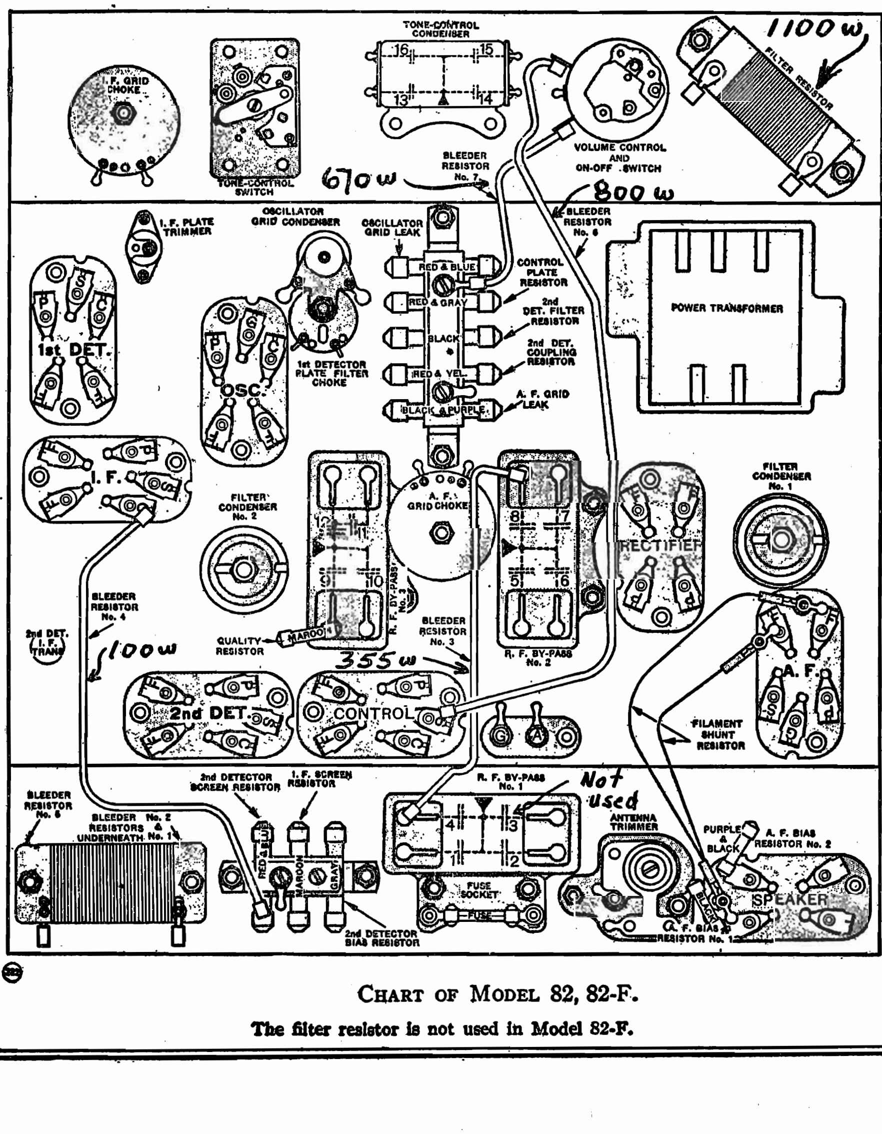


Chart of Model 82, 82-F.

The filter resistor is not used in Model 82-F.

CONDENSERS

RF Bypass # 1
21180
All 400 Volts

RF Bypass # 2
15262
5-6 150 volts
7-8 400 volts

RF Bypass # 3
21170
All 400 volts

Tone Control
20010
All 100 volts

By-pass Condensers in Model 82, 82-F

R. F. By-pass No. 1

1—2nd-detector bias by-pass.
2—Control plate by-pass.
3—Not used.
4—I. F. bias by-pass.

R. F. By-pass No. 2

5—1st-detector filter condenser.
6—1st-detector—I. F. screen by-pass.
7—2nd-detector filter condenser.
8—1st-detector bias by-pass.

R. F. By-pass No. 3

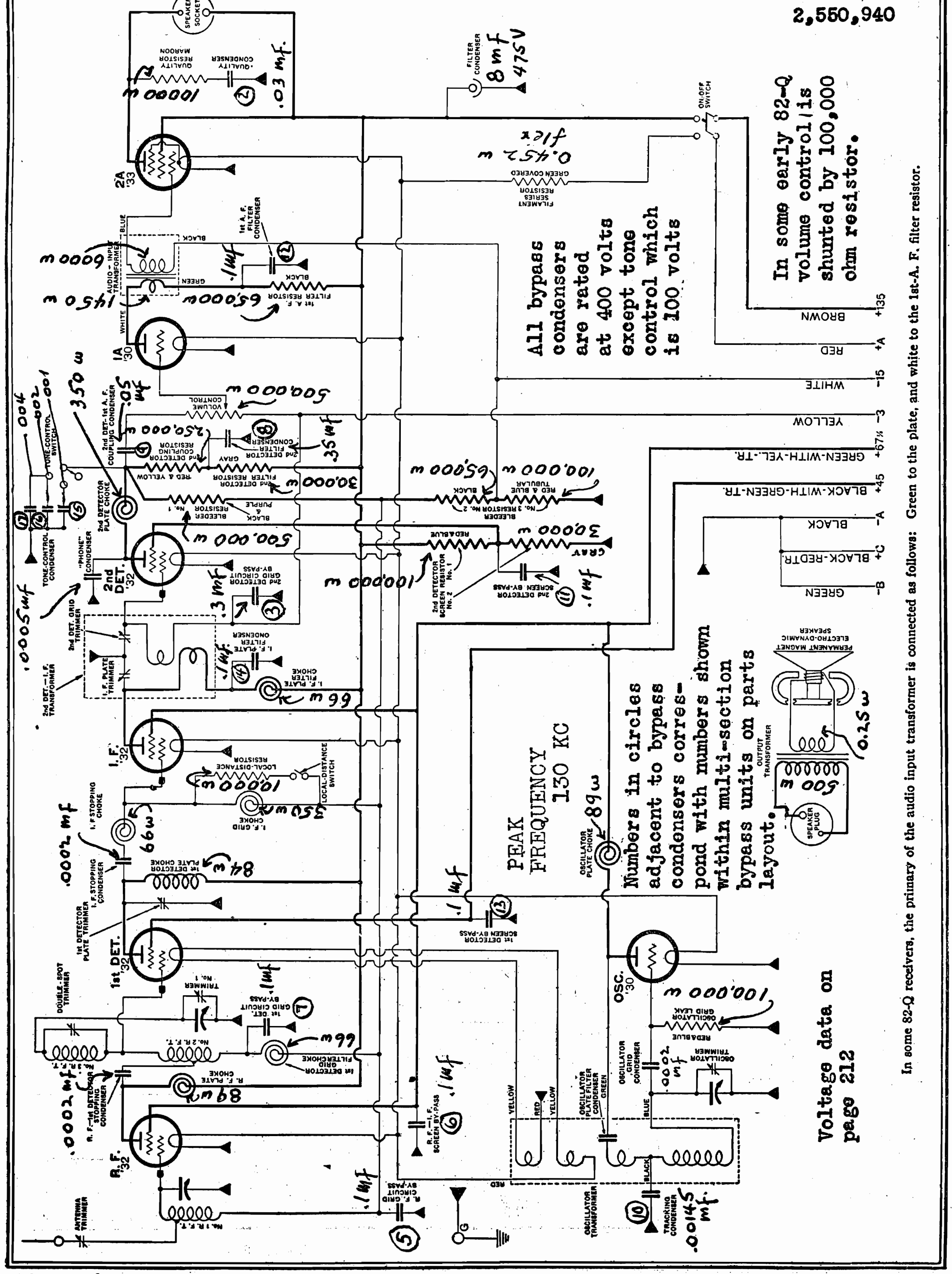
9—Quality condenser.
10—A. F. bias by-pass.
11—2nd-detector—A. F. coupling condenser.
12—Phone condenser.

Tone-control Condenser

13—Tone condenser.
14—2nd-detector screen by-pass.
15—Oscillator plate-circuit by-pass.
16—Tone condenser.

ATWATER KENT MFG. CO.

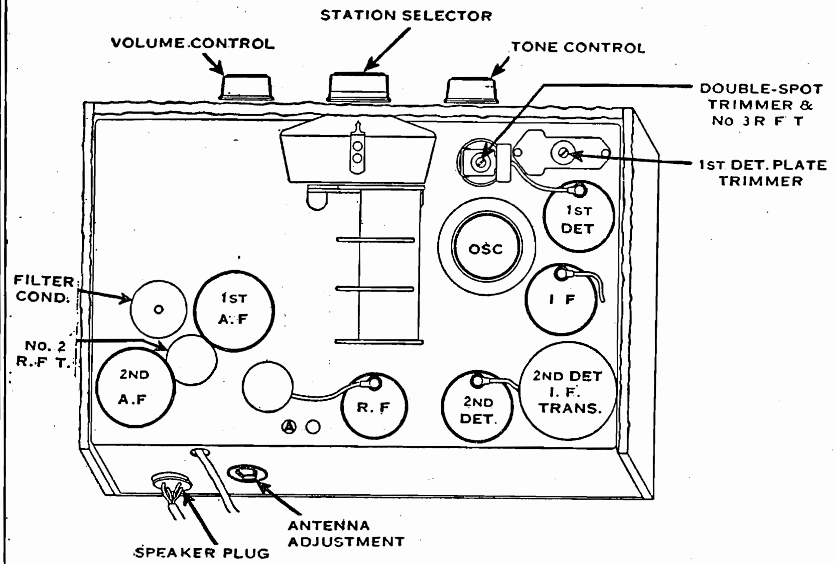
MODEL 82-Q
1st Type
Below serial
2,550,940



Voltage reference page 3-66.

MODEL 82-Q
1st Type
Below serial
2,550,940

ATWATER KENT MFG. CO.



TOP VIEW OF MODEL 82-Q.

RF Bypass # 1
 # 21170
RF Bypass # 2
 # 15262
RF Bypass #3
 # 19150
RF Bypass # 4
 # 15262
Tone Control
 # 16490

By-pass Condensers in Model 82-Q

R. F. By-pass No. 1

1—Not used.
2—Quality condenser.
3—2nd-detector grid-circuit by-pass.

R. F. By-pass No. 2

4—+B filter condenser.
5—R. F. grid-circuit by-pass.
6—R. F.—I. F screen by-pass.
7—1st-detector grid-circuit by-pass.

R. F. By-pass No. 3

8—2nd-detector filter condenser.
9—2nd-detector—1st-A. F. coupling condenser.
10—Tracking condenser.

R. F. By-pass No. 4

11—2nd-detector screen by-pass.
12—1st-A. F. filter condenser.
13—1st-detector screen by-pass.
14—I. F. plate filter condenser.

Tone-control Condenser

15—Tone condenser.
16—Tone condenser.
17—Tone condenser.
18—Not used.

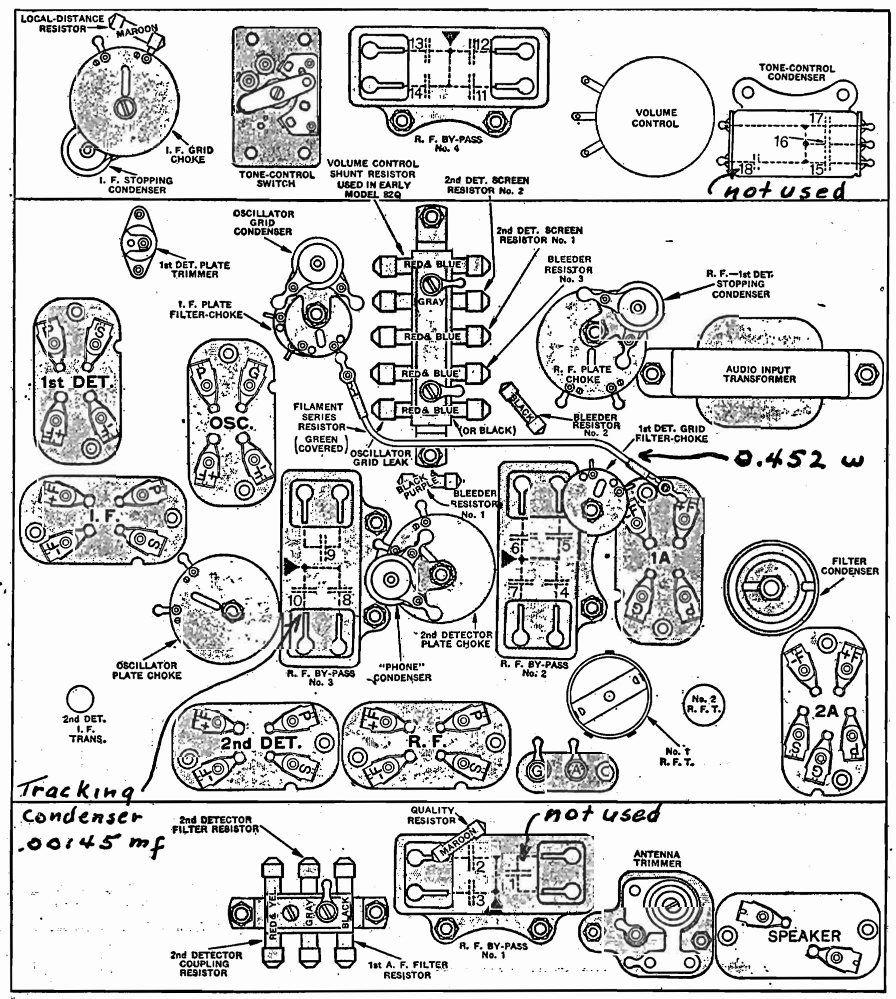
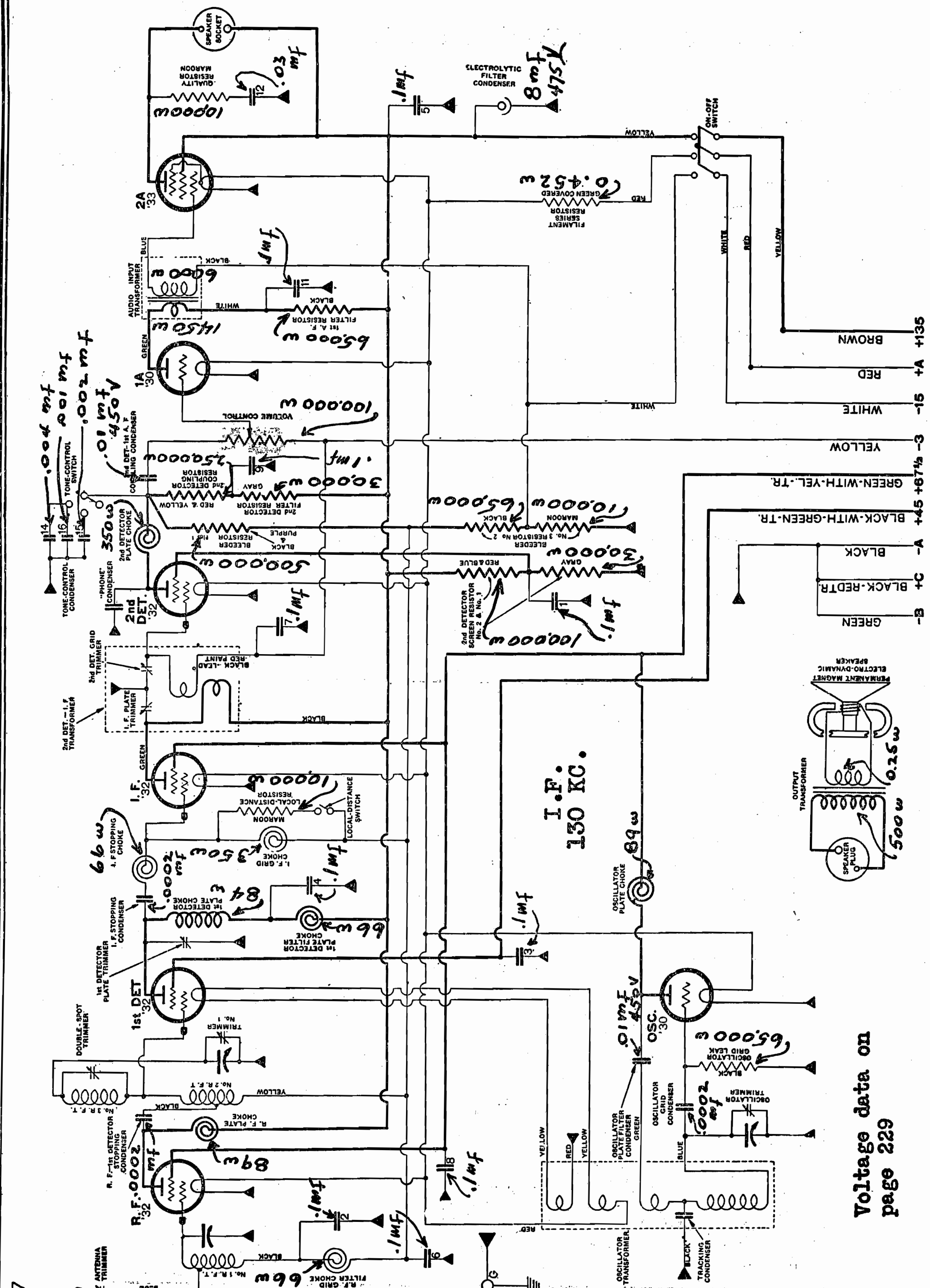


CHART OF MODEL 82-Q.

MODEL 82-Q
2nd Type
Above serial
2,550,940

ATWATER KENT MFG. CO



Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units in parts layout on next page.

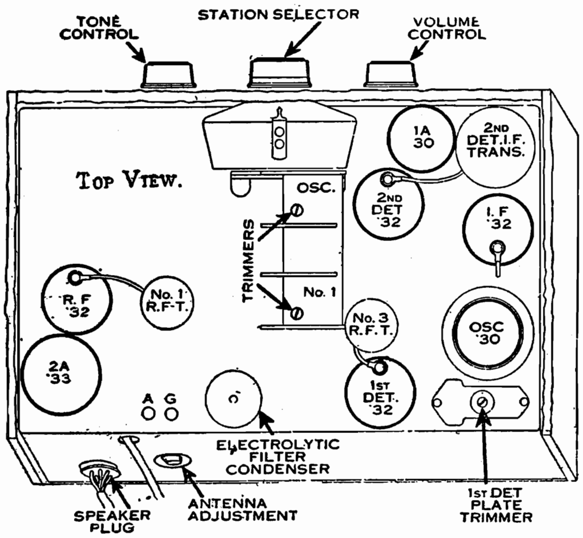
Voltage data on page 229

Voltage reference page 3-83.

MODEL 82-Q
2nd Type
Above serial
2,550,940

ATWATER KENT MFG. CO.

MODEL 82-Q (2nd Type) Above Serial No. 2550940



By-pass Condensers

By-pass No. 1

1—2nd-detector screen by-pass.
2—R. F. grid filter condenser.
3—1st-detector screen by-pass.
4—1st-detector plate filter condenser.

All 400 volts

By-pass No. 2

5—+B by-pass.
6—1st-detector—I. F. grid filter condenser.
7—2nd-detector grid-circuit by-pass.
8—R. F.—I. F. screen by-pass.

All 400 volts

By-pass No. 3

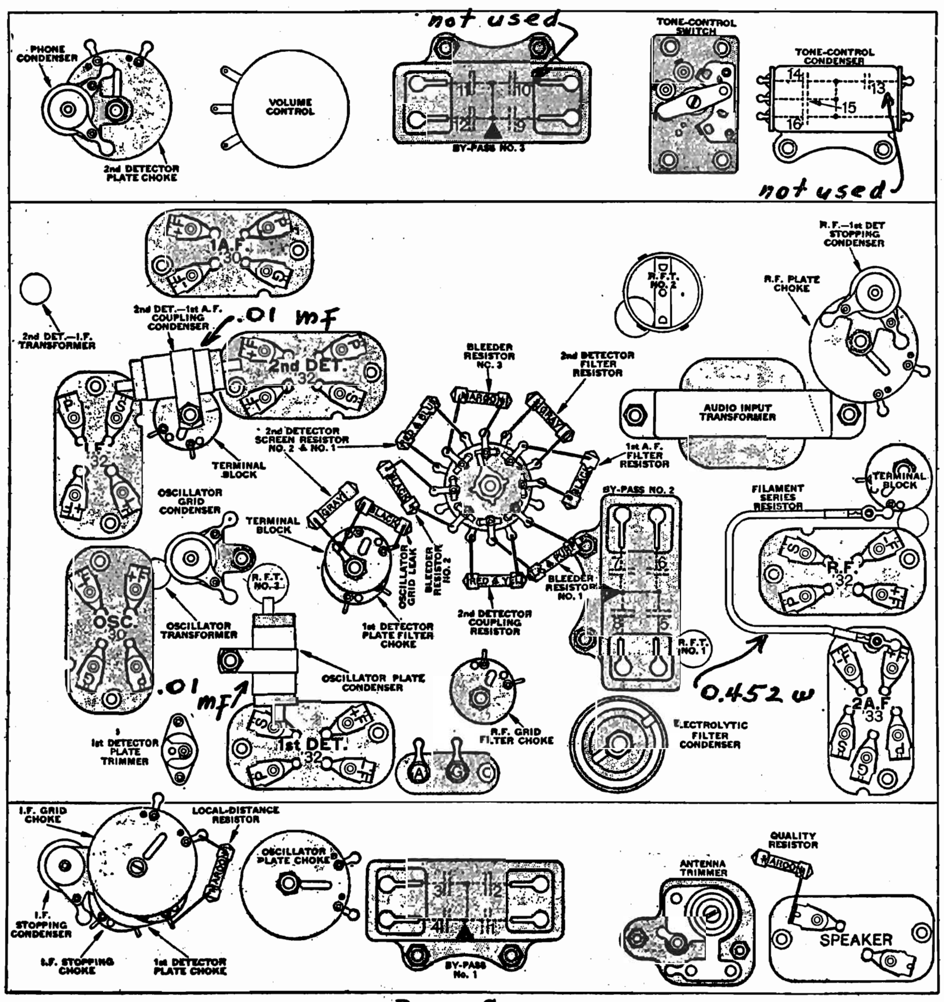
9—2nd-detector plate filter condenser.
10—Not used.
11—1st-A. F. plate filter condenser.
12—Quality condenser.

All 400 volts

Tone-control Condenser

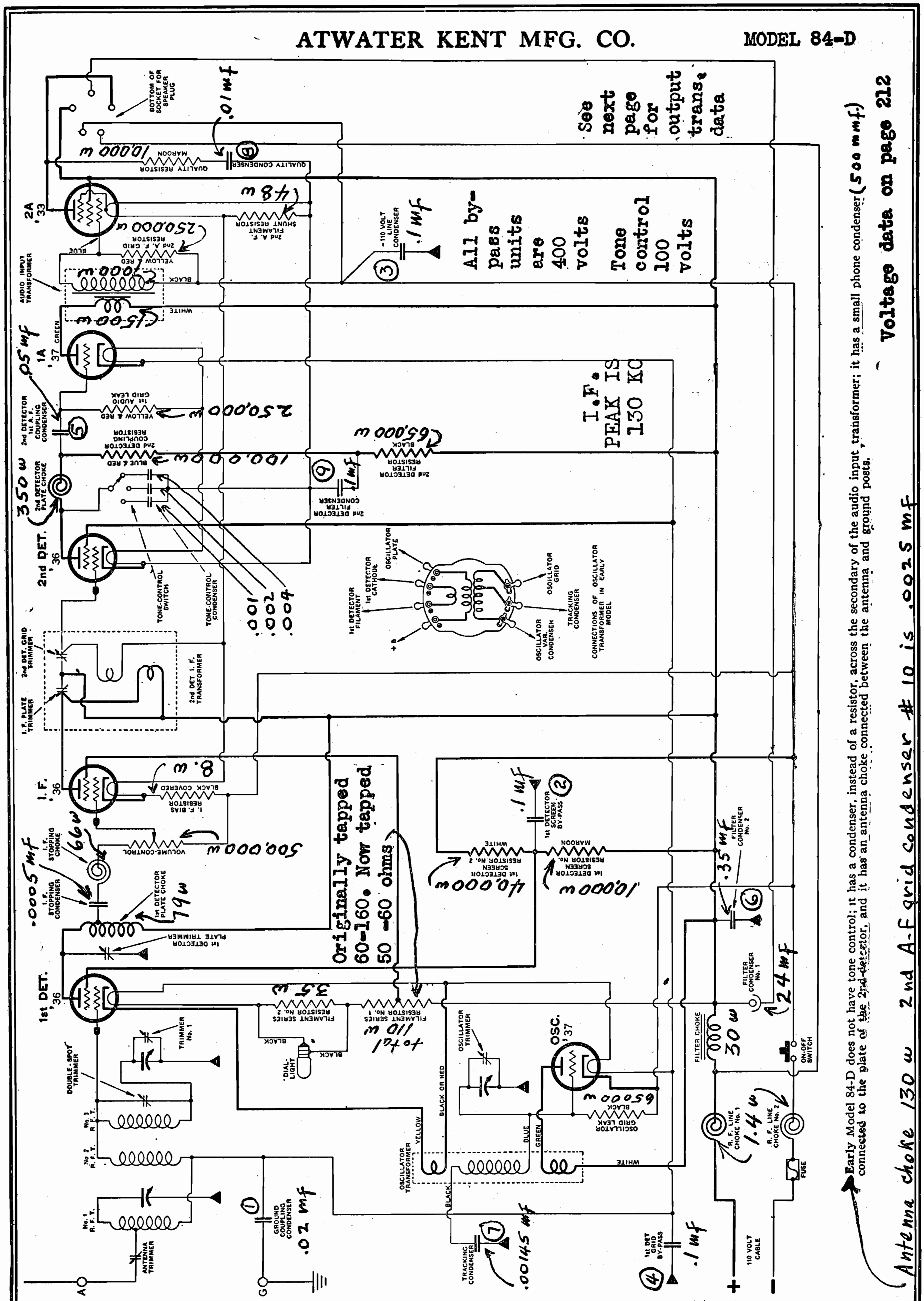
13—Not used.
14—Tone-control condenser.
15—Tone-control condenser.
16—Tone-control condenser.

All 100 volts



BOTTOM CHART.

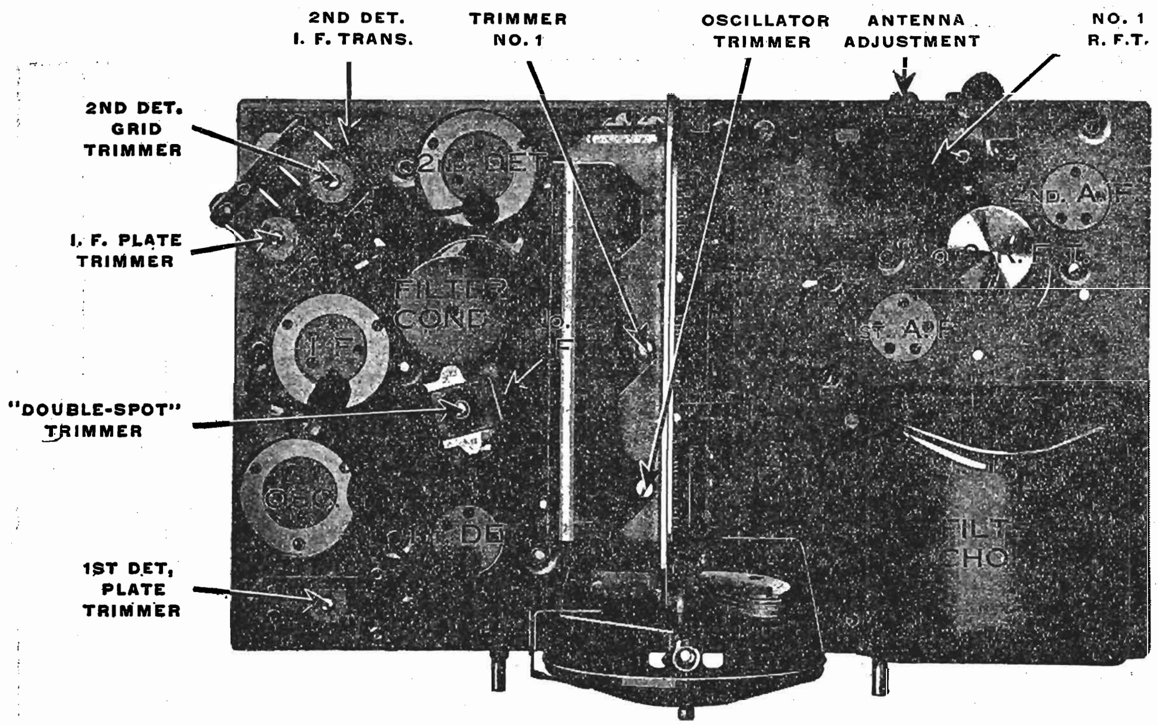
ATWATER KENT MFG. CO. MODEL 84-D



Voltage reference page 3-66.

MODEL 84-D

ATWATER KENT MFG. CO.



Top View of Model 84-D.

OUTPUT TRANSFORMER

Primary 500 ohms
Secondary 0.25 ohm

Field coil 1200 ohms

By-pass Condensers in Model 84-D

Condensers in R. F. By-pass No. 1

1—Ground coupling condenser.
2—1st-detector screen by-pass.
3—110-volt line condenser.
4—1st-detector grid by-pass.

R. F. By-pass No. 2

5—2nd-detector—1st-A. F. coupling condenser.
6—Filter condenser No. 2.
7—Tracking condenser.

R. F. By-pass No. 3

8—Quality condenser.
9—2nd-detector filter condenser.
10—2nd-A. F. grid condenser in early-type sets, 2nd-detector phone condenser in later-type sets.

Tone-control Condenser (Late-type sets only)

11—Not used.
12—Tone condenser.
13—Tone condenser.
14—Tone condenser.

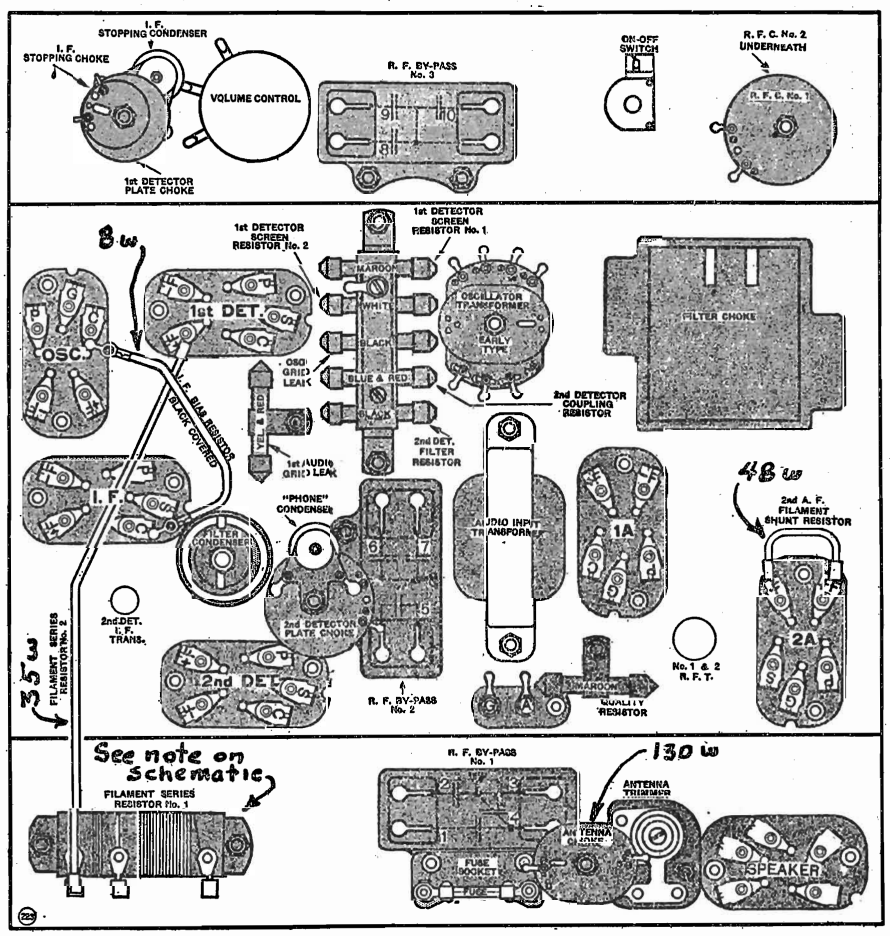


Chart of Model 84-D. (Early Type Without Tone Control.)

ATWATER KENT MFG. CO.

VOLTAGE TABLE FOR MODELS

81, 81-B, 81-C, 82-D, 82-Q, 85-Q, 86, 87, 89, 90, 92, 92-F, 93, 94, 96, 96-F, 99, 99-F, 99-P

The voltages listed in this table are only approximate, and are measured values, not actual operating values.
Use 250-volt scale of a 1,000-ohm-per-volt D. C. voltmeter.
Turn volume control to maximum.

In all sets equipped with sensitivity switch, voltage switch, or neon tuning light potentiometer: Before making measurements, place sensitivity swtich in NORMAL position, voltage switch in REDUCED VOLTAGE position, or neon tuning light potentiometer in full counter-clockwise position.

All plate, screen and grid measurements are made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

Line voltage=110 volts.

		81 81-B 81-C	82-D 2nd Type	82-Q 2nd Type	85-Q 2nd Type	86 2nd Type	87 3rd Type	89 3rd Type	90	92	92-F	93**	94	96 1st Type	96 2nd Type	96 3rd Type	96-F	99 1st Type	99 2nd Type	99 3rd Type and 99-P	99-F
R. F. Tube	Filament	5.5	—	2	2	2.4	2.4	2.4	2.4	2.4	2.4	—	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	125	—	125	132	122	160	120	210	120	125	—	190	100	150	205	195	130	135	215	180
	Screen	75	—	60	62	45	80	50	75	45	35	—	100	45	40	70	50	55	45	85	70
	Grid	1	—	3	4	4	8	4	2	2	2	—	3	3	3	3	3	3	3	4	3
1st Det. Tube	Filament	5.5	5.5	2	2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	95	70	125	132	112	160	115	200	115	120	90	185	110	135	150	150	105	110	255	210
	Screen	—	50	40	40	40	80	40	70	40	30	20	90	40	35	70	45	40	35	70	55
	Grid	—	5	3	4	6	8	7	7	5	5	1	10	5	4	4	5	7	5	8	6
I. F. Tube	Filament	—	6	2	2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	—	95	125	132	115	160	120	205	120	125	115	190	100	150	205	195	130	135	215	180
	Screen	—	50	60	62	45	80	50	75	45	35	—	100	45	40	70	50	55	45	85	70
	Grid	—	1	3	4	4	8	4	2	2	2	3	3	3	3	3	3	3	3	4	3
2nd Det. Tube	Filament	—	5.5	2	2	2.4	2.4	2.4	2.4	2.4	2.4	—	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	—	55	45	43	80	90	110	95	90	90	—	80	95	95	90	105	110	105	100	80
	Screen	—	10	25	28	40	—	—	35	50	55	—	65	55	45	30	50	—	—	—	—
	Grid	—	2	3	3	6	4	15	7	7	7	—	8	7	7	5	7	15	15	14	12
1st A. F. Tube	Filament	5.5	5.5	2	2	2.4	2.4	2.4	2.4	2.4	2.4	—	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	120	75	55	67	175	100	115	200	195	205	—	185	200	200	195	225	110	115	120	100
	Screen	123	—	—	—	185	—	—	210	205	215	—	195	210	210	205	235	—	—	—	—
	Grid	11	3	3	3	4	3	5	4	5	5	—	6	3	4	4	4	4	4	4	4
2nd A. F. Tube	Filament	—	2	2	2	—	2.4	2.4	—	—	—	—	—	—	—	—	—	2.4	2.4	2.4	2.4
	Plate	—	85	120	127	—	185	210	—	—	—	—	—	—	—	—	—	215	215	215	210
	Screen	—	90	125	132	—	190	215	—	—	—	—	—	—	—	—	—	225	225	225	220
	Grid	—	7	15	15	—	12	14	—	—	—	—	—	—	—	—	—	15	15	12	11
Osc. Tube	Filament	—	5	2	2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	—	100	60	62	80	80	90	75	80	85	110	100	80	70	80	80	75	65	115	90
	Grid	—	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Control Tube	Filament	5.5	—	—	—	2.4	—	2.4	—	2.4	2.4	—	—	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Plate	3	—	—	—	25	—	25	—	35	40	—	—	40	35	30	40	30	24	30	23
	Screen	—	—	—	—	5	—	5	—	—	—	—	—	—	—	—	—	7	7	15	14
	Grid	2	—	—	—	3	—	3	—	15	17	—	—	17	15	3	15	4	4	3	3

* The measured oscillator grid voltage will vary dependent on several factors. In some cases, no reading will be secured for grid bias. In other cases the reading will be only slight, or it may be as high as 10 volts.

** In Model 93, make measurements with frequency range switch turned to low frequency scale.

MODEL 84, 84-F
Early

ATWATER KENT MFG. CO.

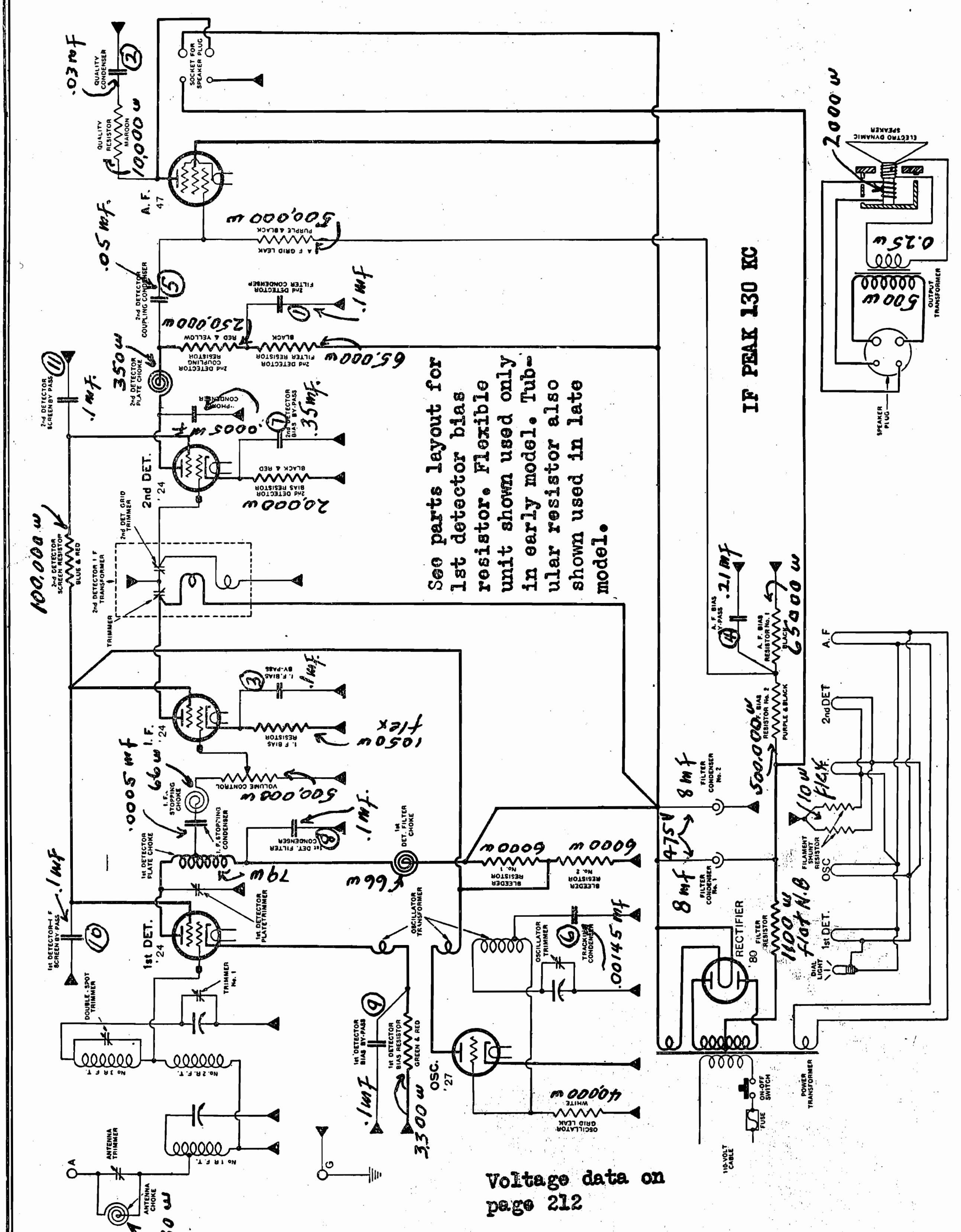


DIAGRAM OF EARLY-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).
In Model 84-F, the filter resistor (connected in series with the center-tap of the high-voltage winding) is NOT used.

Voltage reference page 3-66.

ATWATER KENT MFG. CO.

MODEL 84, 84-F
Late

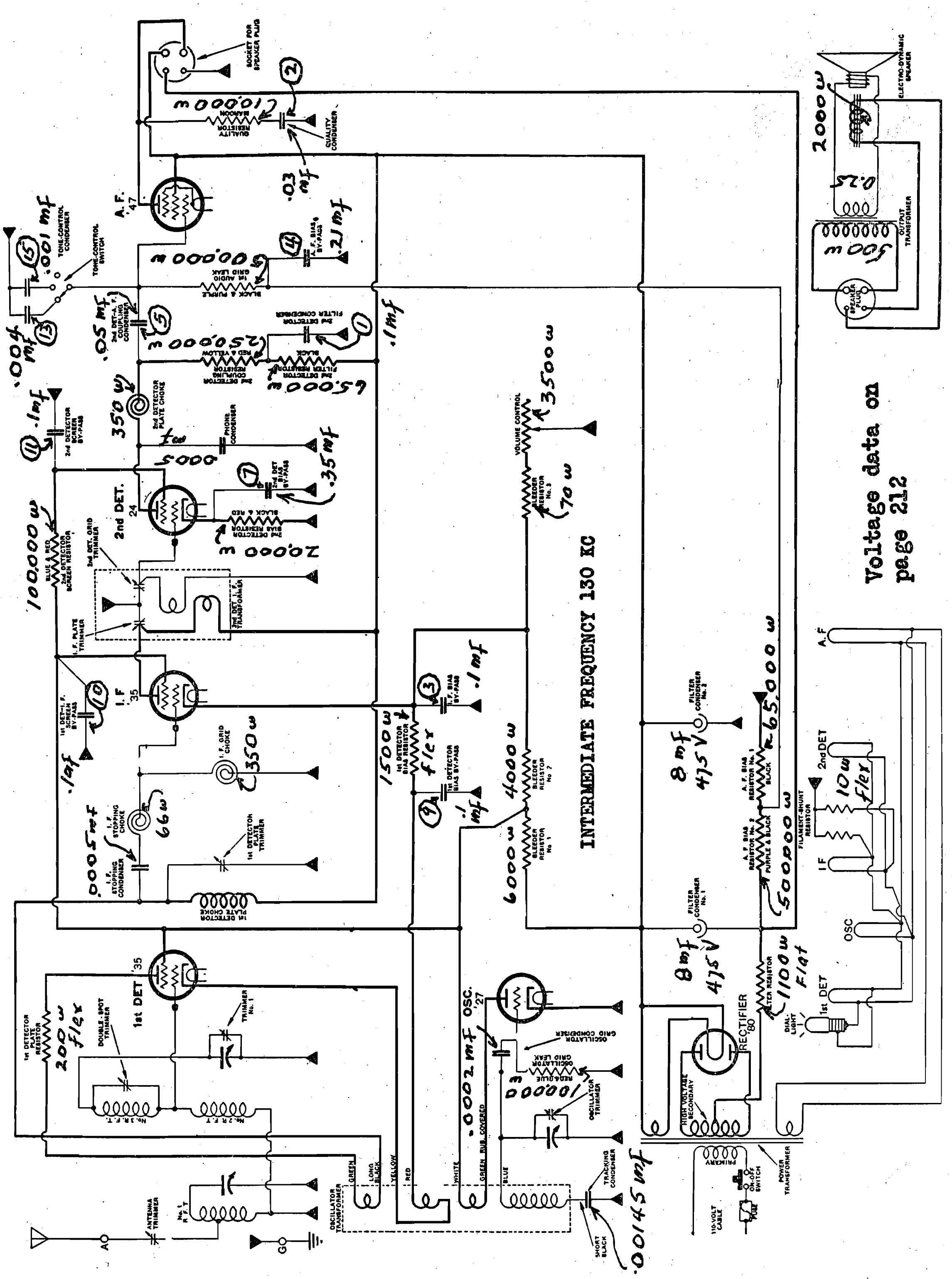


DIAGRAM OF LATE-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).
A few late-type Model 84 and 84-F receivers have slightly different oscillator transformers, as explained in the notes accompanying the parts list for these sets.
The filter resistor shown in the above diagram is NOT used in Model 84-F.
This set has a 1st-detector plate filter choke and condenser not shown in the diagram.

SPECIAL NOTE. Numerals within circles and adjacent to bypass condensers correspond with numbers marked within multi-section bypass condensers shown on parts layout. See next page.

Voltage reference page 3-66.

MODELS 84, 84-F
Early and Late

ATWATER KENT MFG. CO.

MODEL 84, 84-F CHARTS

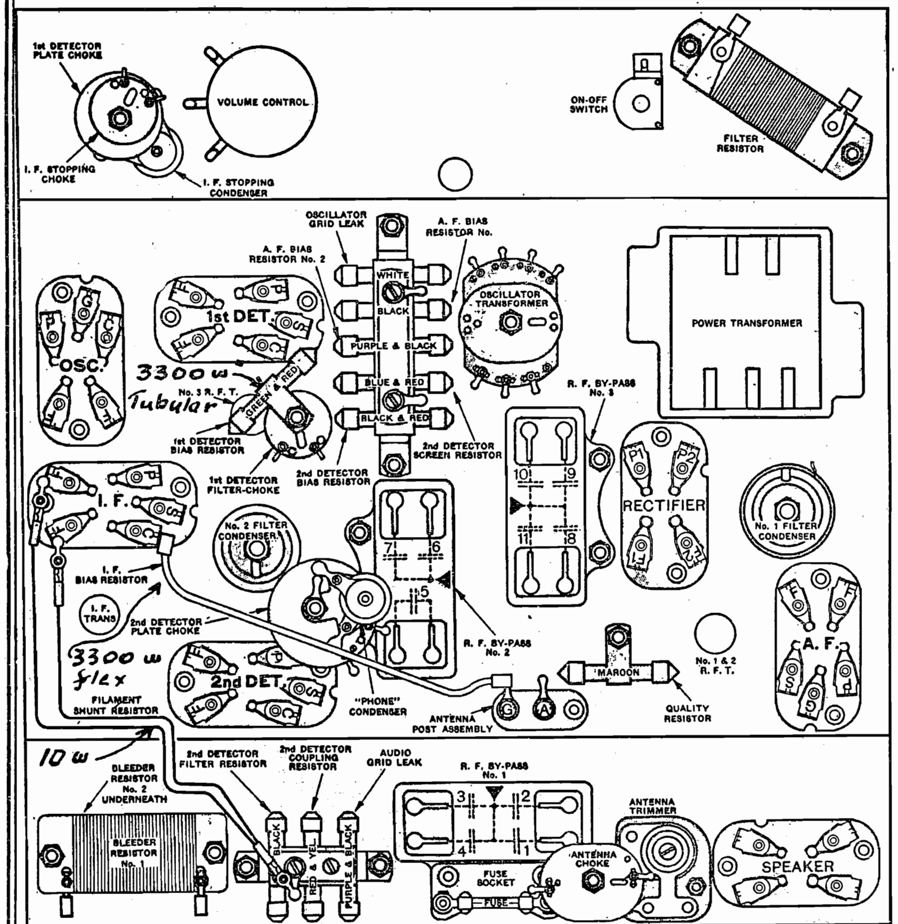


CHART OF EARLY-TYPE MODEL 84, 84-F.

In some early-type Model 84, 84-F, the 1st-detector bias resistor is a flexible type, and the quality resistor is wire-wound. These are both superseded by the tubular resistors indicated above.
The filter-resistor at top-right is NOT used in any Model 84-F

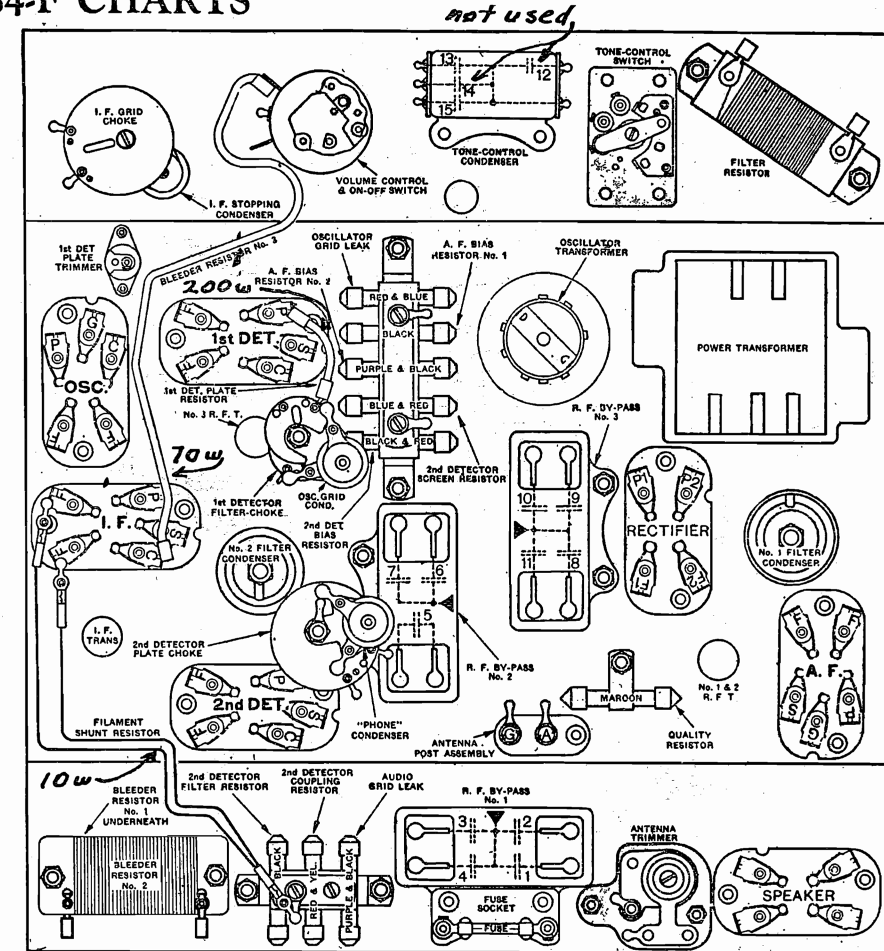


CHART OF LATE-TYPE MODEL 84, 84-F.

Some late-type Model 84, 84-F receivers have slightly different oscillator transformers and connections than indicated in the diagram. When servicing such sets, carefully note and adhere to the original method of wiring. A flexible type 1st-detector bias resistor (not shown above) is connected from condenser 9 to condenser 3.

By-pass Condensers in Model 84, 84-F.

400 Volts

R. F. By-pass No. 1

1—2nd-detector filter condenser.
2—Quality condenser
3—I. F. bias by-pass.
4—A. F. bias by-pass.

R. F. By-pass No. 2

5—2nd-detector—A. F. coupling condenser
6—Tracking condenser
7—2nd-detector bias by-pass.

400 Volts

R. F. By-pass No. 3

8—1st-detector filter condenser.
9—1st-detector bias by-pass.
10—1st-detector—I. F. screen by-pass.
11—2nd-detector screen by-pass.

400 Volts

100 Volts

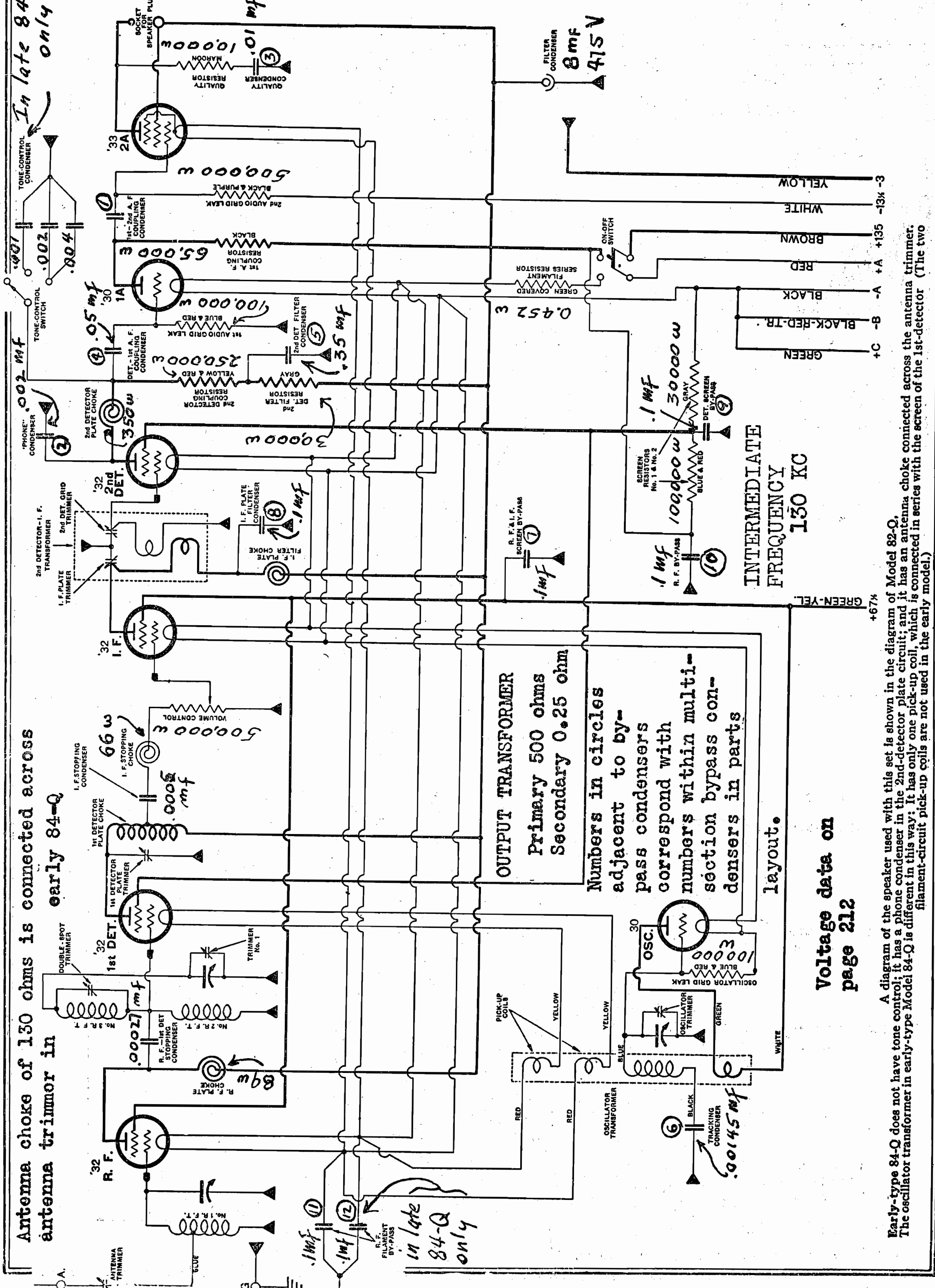
Tone-control Condenser

(used only in late type)

12—Not used.
13—Tone-control condenser.
14—Not used.
15—Tone-control condenser.

MODEL 84-Q
Early and Late

ATWATER KENT MFG. CO.



A diagram of the speaker used with this set is shown in the diagram of Model 82-Q.

Early-type 84-Q does not have tone control; it has a phone condenser in the 2nd-detector plate circuit; and it has an antenna choke connected across the antenna trimmer. The oscillator transformer in early-type Model 84-Q is different in this way: It has only one pick-up coil, which is connected in series with the screen of the 1st-detector (The two filament-circuit pick-up coils are not used in the early model.)

Voltage reference page 3-66.

MODEL 84-Q
Early and Late.

ATWATER KENT MFG. CO.

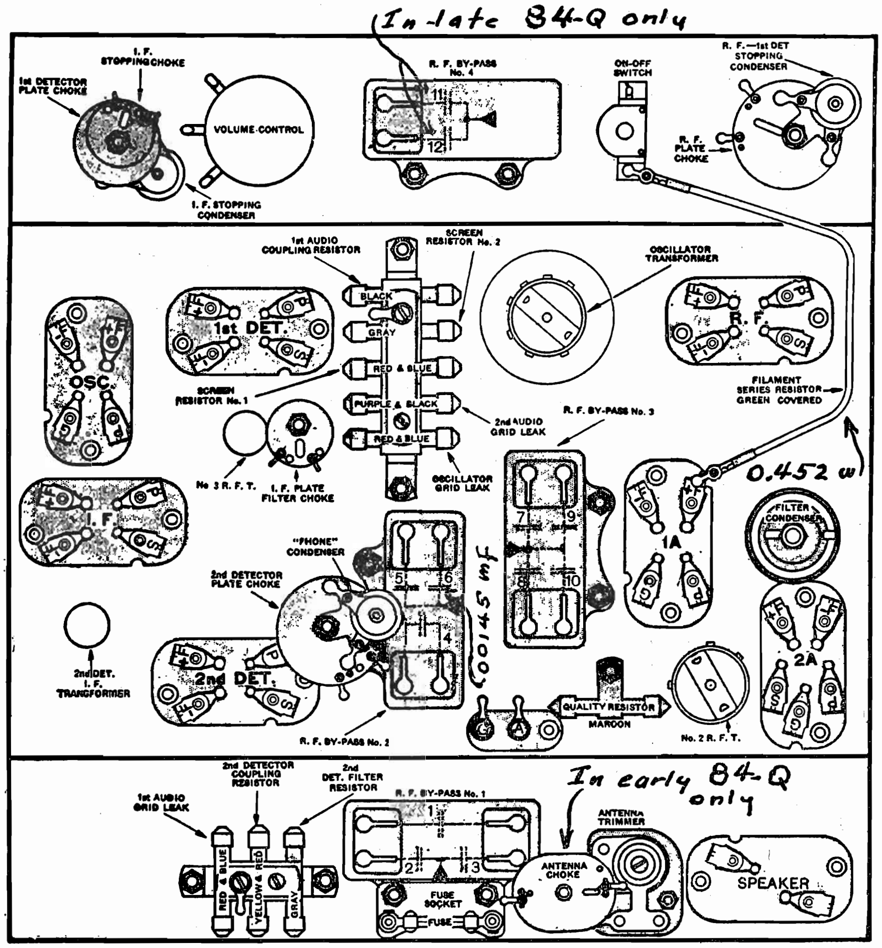


CHART OF MODEL 84-Q. (EARLY TYPE WITHOUT TONE CONTROL.)

MODEL 84-Q

By-pass Condensers in Model 84-Q

R. F. By-pass No. 1

1—1st-2nd A. F. coupling condenser
2—Phone condenser.
3—Quality condenser.

400 Volts

R. F. By-pass No. 2

4—2nd-detector—1st-A F. coupling condenser.
5—2nd-detector filter condenser.
6—Tracking condenser.

400 Volts

R. F. By-pass No. 3

7—R. F.-I. F. screen by-pass.
8—I. F. plate filter condenser.
9—1st-detector—2nd-detector screen by-pass.
10—+B filter condenser.

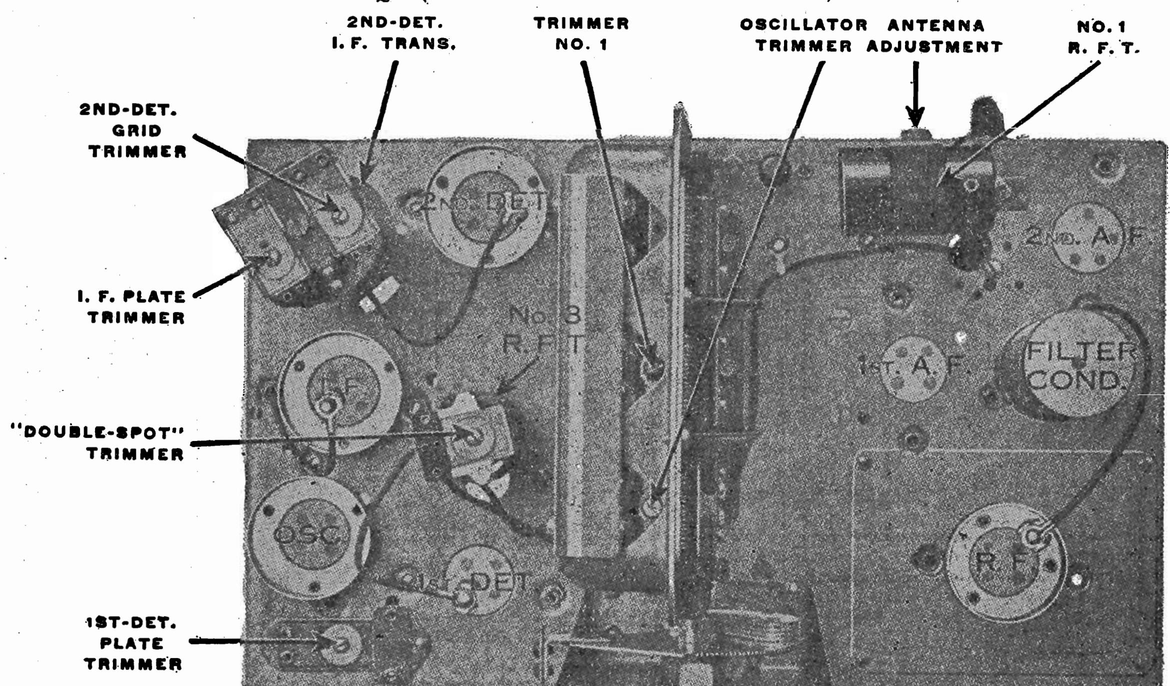
400 Volts

R. F. By-pass No. 4 (Later 84-Q only)

11—R. F. filament by-pass.
12—R. F. filament by-pass.

400 Volts

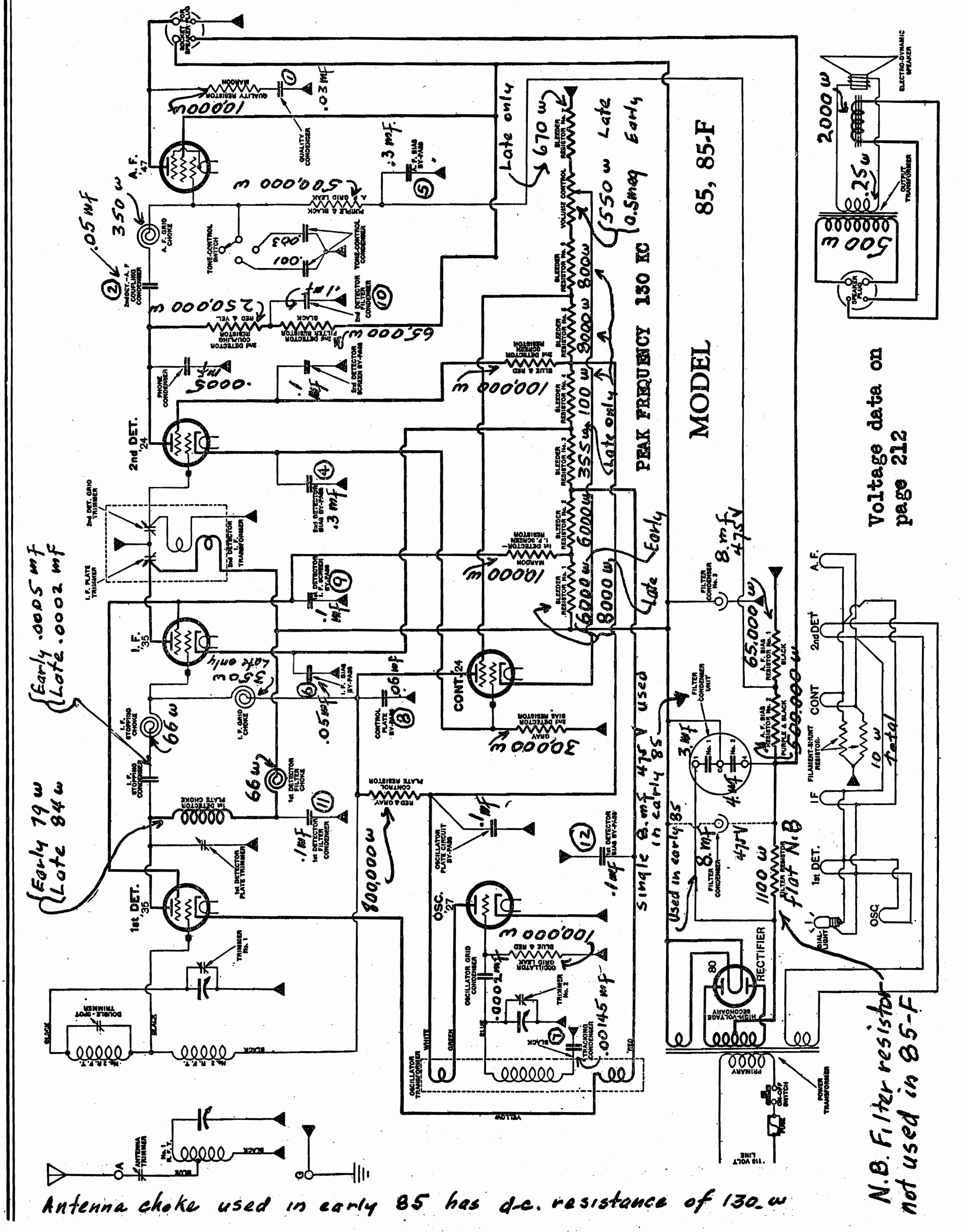
Tone control is 100 V.



In a few early-model 84-Q receivers, the position of the R. F. and the 1st-A. F. socket is interchanged.

MODEL 85, 85-F

ATWATER KENT MFG. CO.

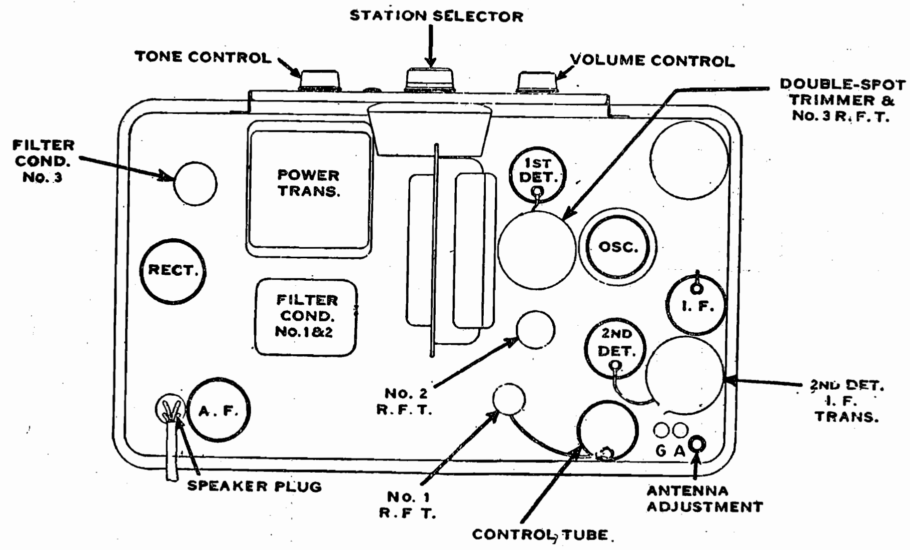


A few early-type Model 85 do not have automatic volume control; they have three electrolytic filter condensers; the circuit of these early Model 85 sets is similar to Model 80. The tracking condenser is mounted on the oscillator transformer in Model 82 and some 85 sets. The filament circuit of Model 82 is somewhat different from that shown above.

Voltage reference page 3-66.

MODEL 85, 85-F

ATWATER KENT MFG. CO.



Top View of Model 85, 85-F.

The circle in the top right corner represents the shield for the coupling unit between the 1st-detector and I. F. tubes.

CONDENSERS

RF Bypass # 1
19160 Early
19980 Late
All 400 volts

RF Bypass # 2
19150 Early
19990 Late
All 400 volts

RF Bypass # 3
15262
All 400 volts

Tone Control
16490 Early
20010 Late
All 100 volts

See schematic

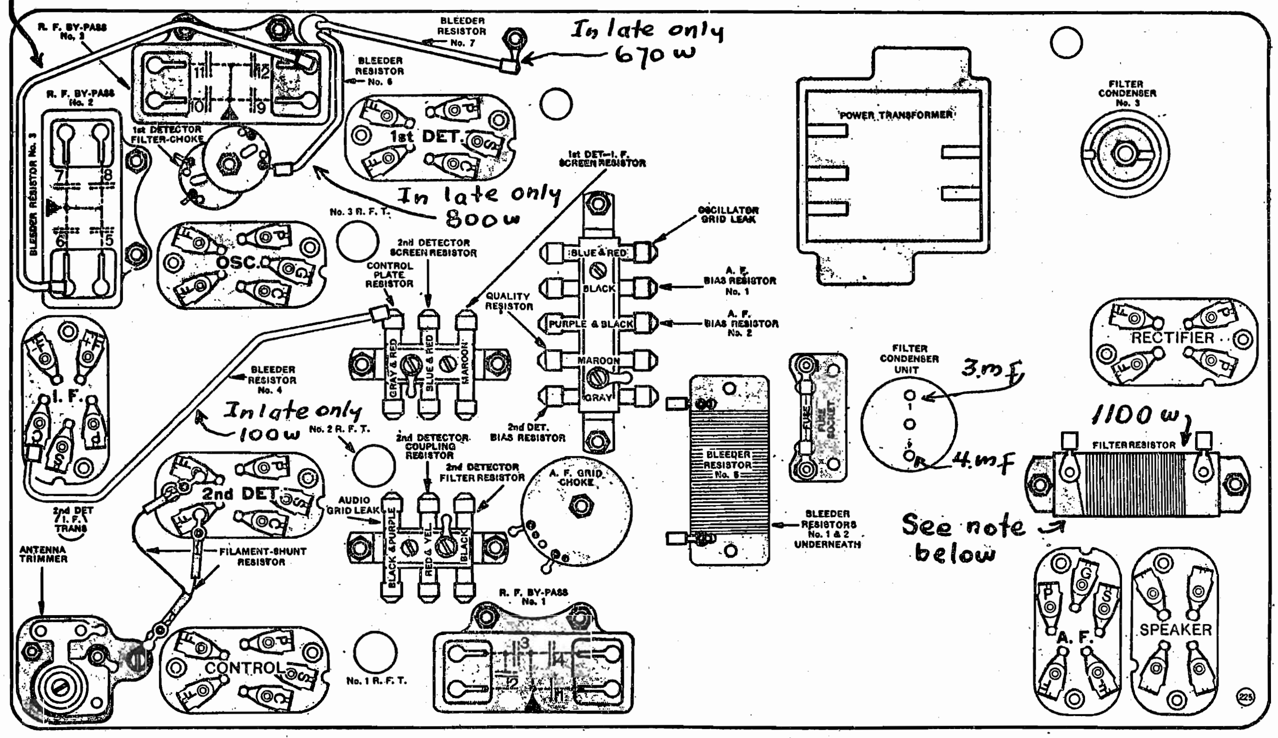


Chart of Model 85, 85-F.

The filter resistor is not used in Model 85-F.

By-pass Condensers in Model 85, 85-F

R. F. By-pass No. 1

1—Quality condenser.
2—2nd-detector—A. F. coupling condenser.
3—Phone condenser.
4—2nd-detector bias by-pass.

R. F. By-pass No. 2

5—A. F. bias by-pass.
6—I. F. bias by-pass.
7—Tracking condenser.
8—Control-plate by-pass.

R. F. By-pass No. 3

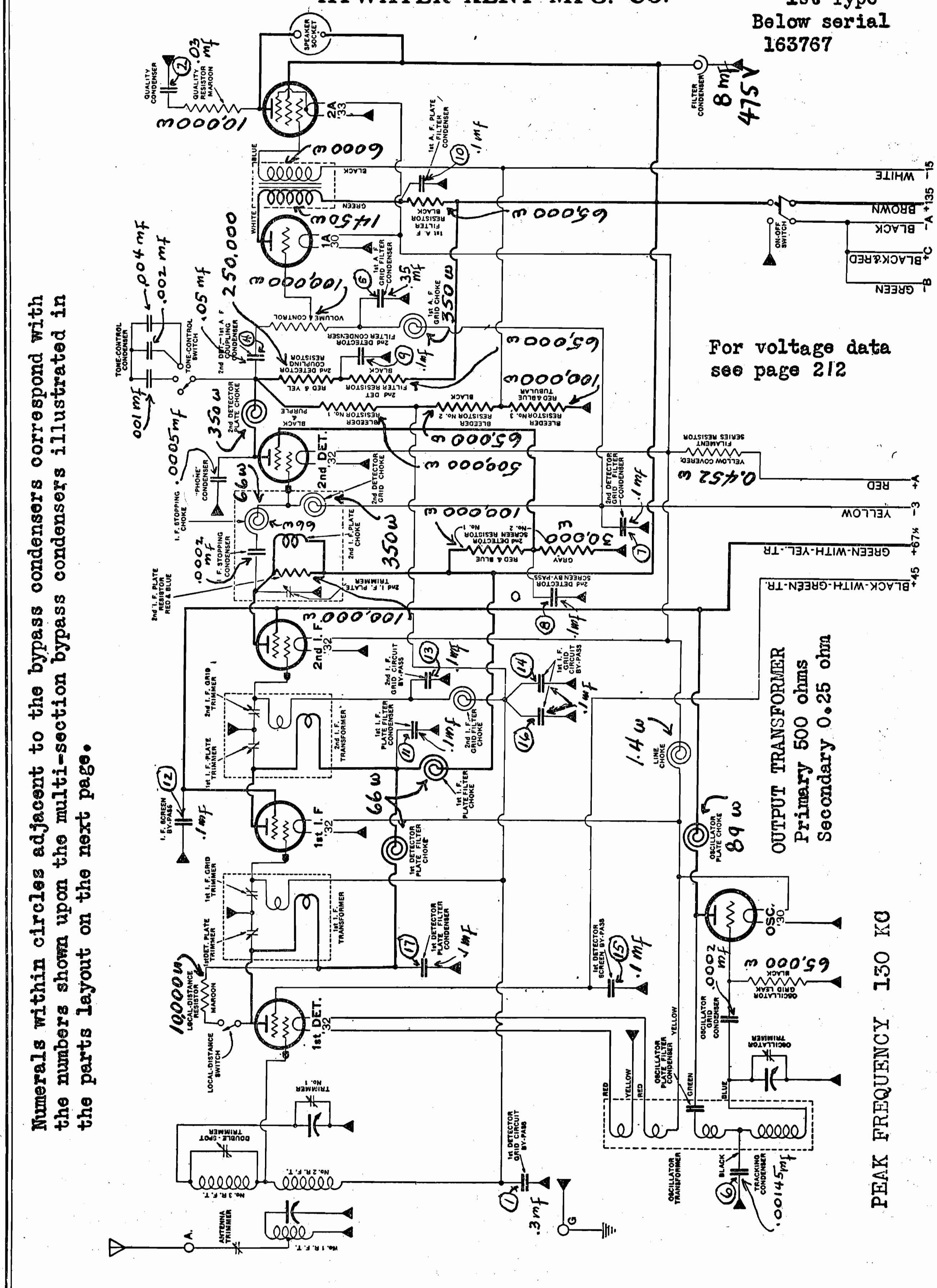
9—1st-detector—I. F. screen by-pass.
10—2nd-detector filter condenser.
11—1st-detector filter condenser
12—1st-detector bias by-pass.

Tone-control Condenser (on front panel)

Two top contacts—2nd-detector screen by-pass and oscillator plate-circuit by-pass.
Two bottom contacts—tone-control condensers.

ATWATER KENT MFG. CO.

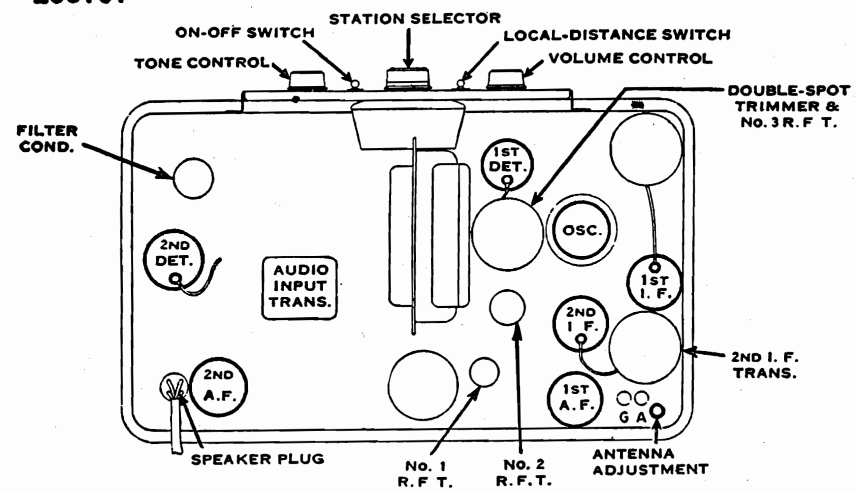
MODEL 85-Q
1st Type
Below serial
163767



Voltage reference page 3-66.

MODEL 85-Q
1st Type
Below serial
163767

ATWATER KENT MFG. CO.



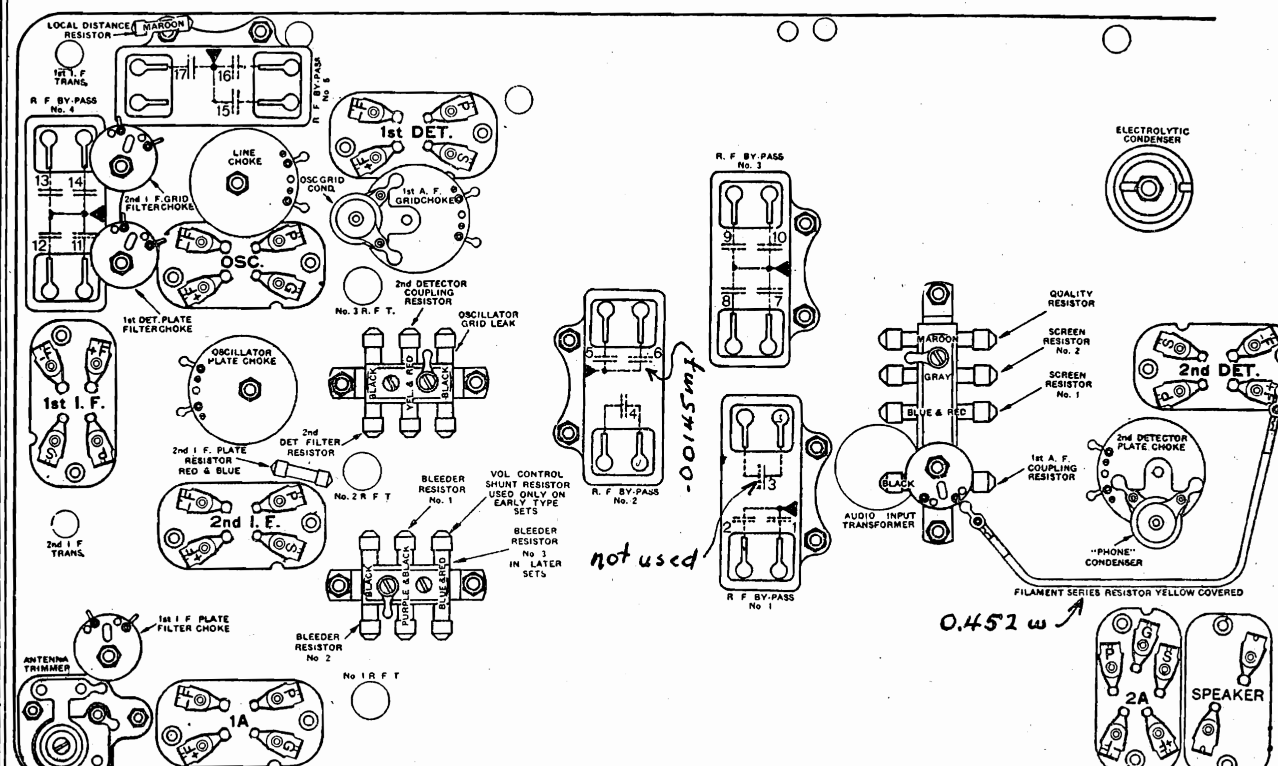
Top View of Model 85-Q.

The circle in the top right corner indicates the shield for the coupling unit between the 1st-detector and the 1st-I. F. tubes. The circle in the bottom center is the shield covering the coupling unit between the 2nd-I. F. and the 2nd-detector tubes.

CONDENSERS

RF Bypass # 1
 # 19980
400 volts
RF Bypass # 2
 # 19150
400 volts
RF Bypass # 3
 # 15262
400 volts
RF Bypass # 4
 # 15262
400 volts
RF Bypass # 5
 # 15262
400 volts

Tone Control condenser # 16490 100 volts



By-pass Condensers in Model 85-Q.

R. F. By-pass No. 1

1—1st-detector grid-circuit by-pass.
2—Quality condenser.
3—Not used.

R. F. By-pass No. 2

4—2nd-detector—1st-A. F. coupling condenser.
5—1st-A. F. grid filter condenser.
6—Tracking condenser.

R. F. By-pass No. 3

7—2nd-detector grid filter condenser.
8—2nd-detector screen by-pass.
9—2nd-detector filter condenser.
10—1st-A. F. plate filter condenser.

R. F. By-pass No. 4

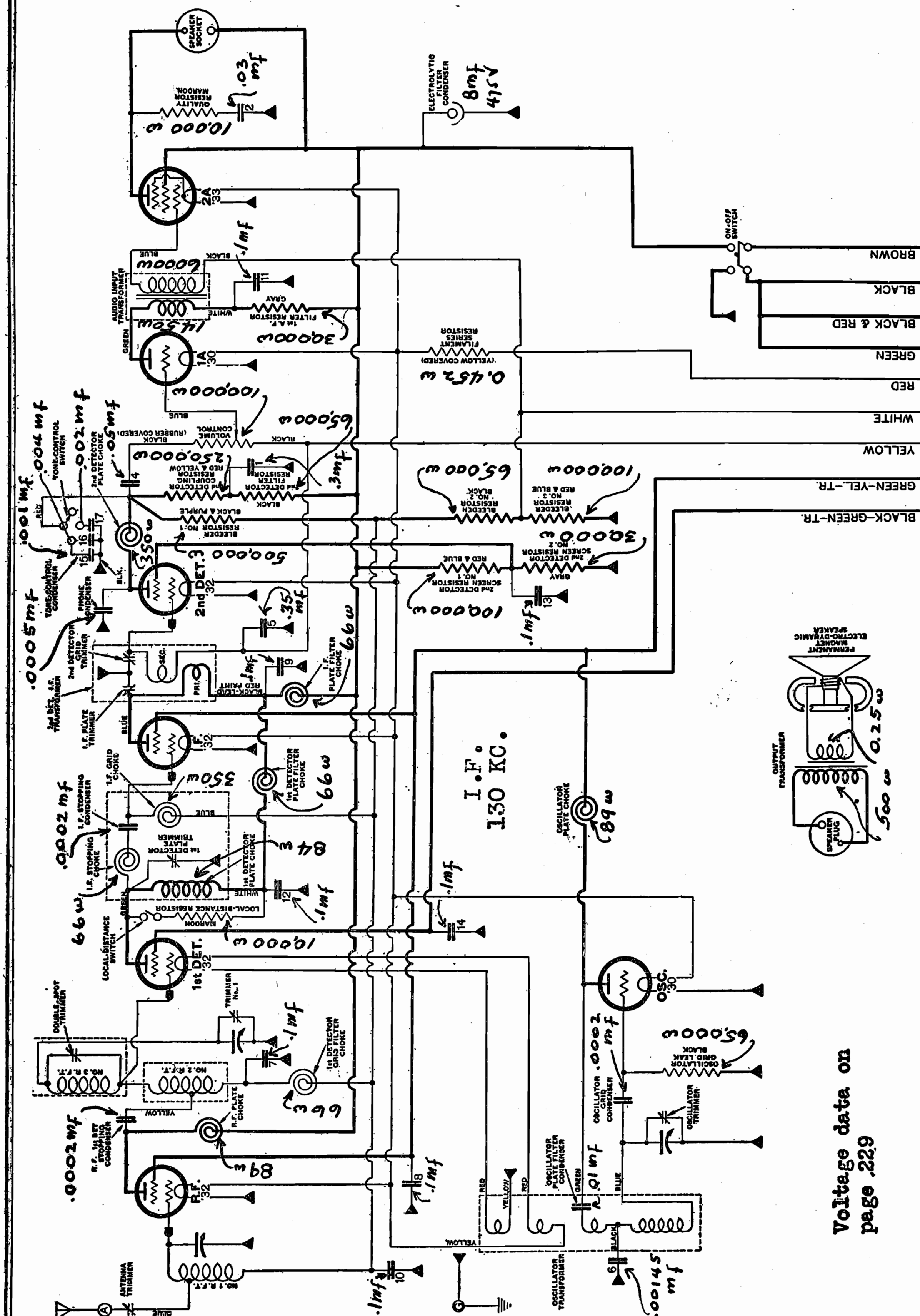
11—1st-I. F. plate filter condenser.
12—I. F. screen by-pass.
13—2nd-I. F. grid-circuit by-pass.
14—1st-I. F. grid-circuit by-pass.

R. F. By-pass No. 5

15—1st-detector screen by-pass.
16—1st-I. F. grid-circuit by-pass.
17—1st-detector plate filter condenser.

ATWATER KENT MFG. CO.

MODEL 85-Q
2nd Type
Above serial
163,767



Voltage data on page 229

The 1st type of Model 85-Q has two stages of I. F. and no R. F. stage.

Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units on parts layout on next page.

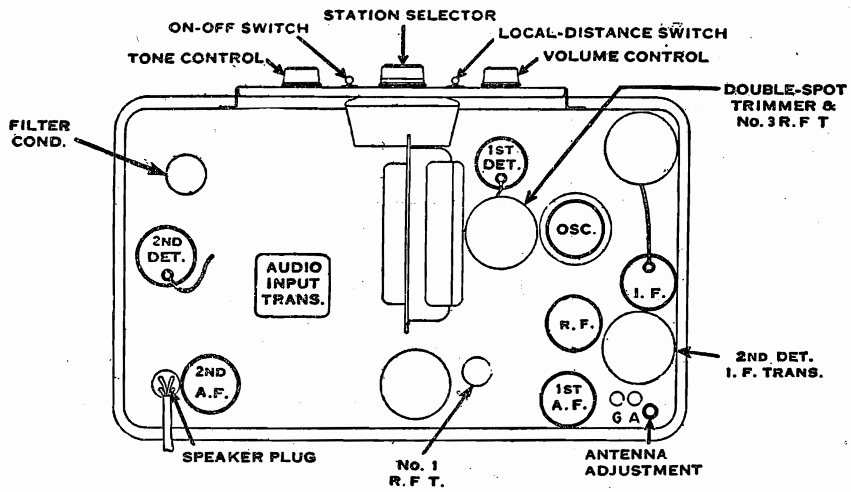
Voltage reference page 3-83.

MODEL 85-Q
2nd Type
Above serial
163,767

ATWATER KENT MFG. CO.

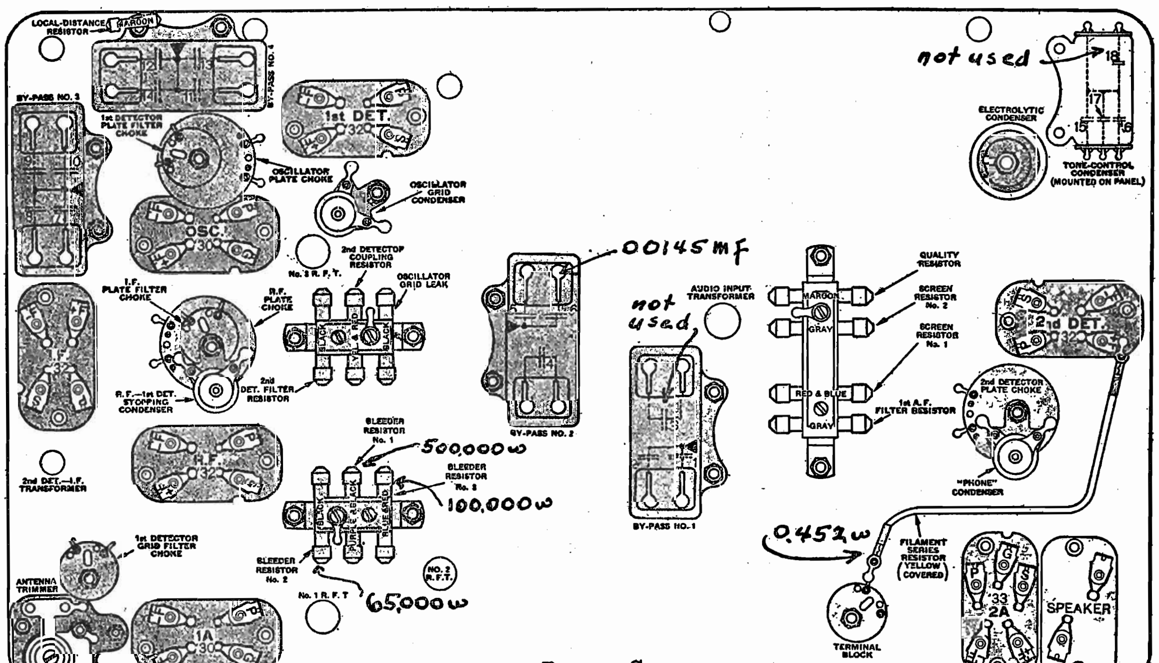
TUBES

R. F = '32
1st Det. = '32
I. F. = '32
2nd Det. = '32
1st A. F. = '30
2nd A. F = '33
Osc. = '30



Top View.

The coil shield in the upper-right corner encloses the coupling unit between the 1st-detector and the I. F. tubes. The coil shield at bottom center encloses No. 2 R. F. T.



Bottom Chart.

ALL BYPASS CONDENSERS RATED AT 400 VOLTS. TONE CONTROL RATED AT 100 VOLTS

By-pass Condensers

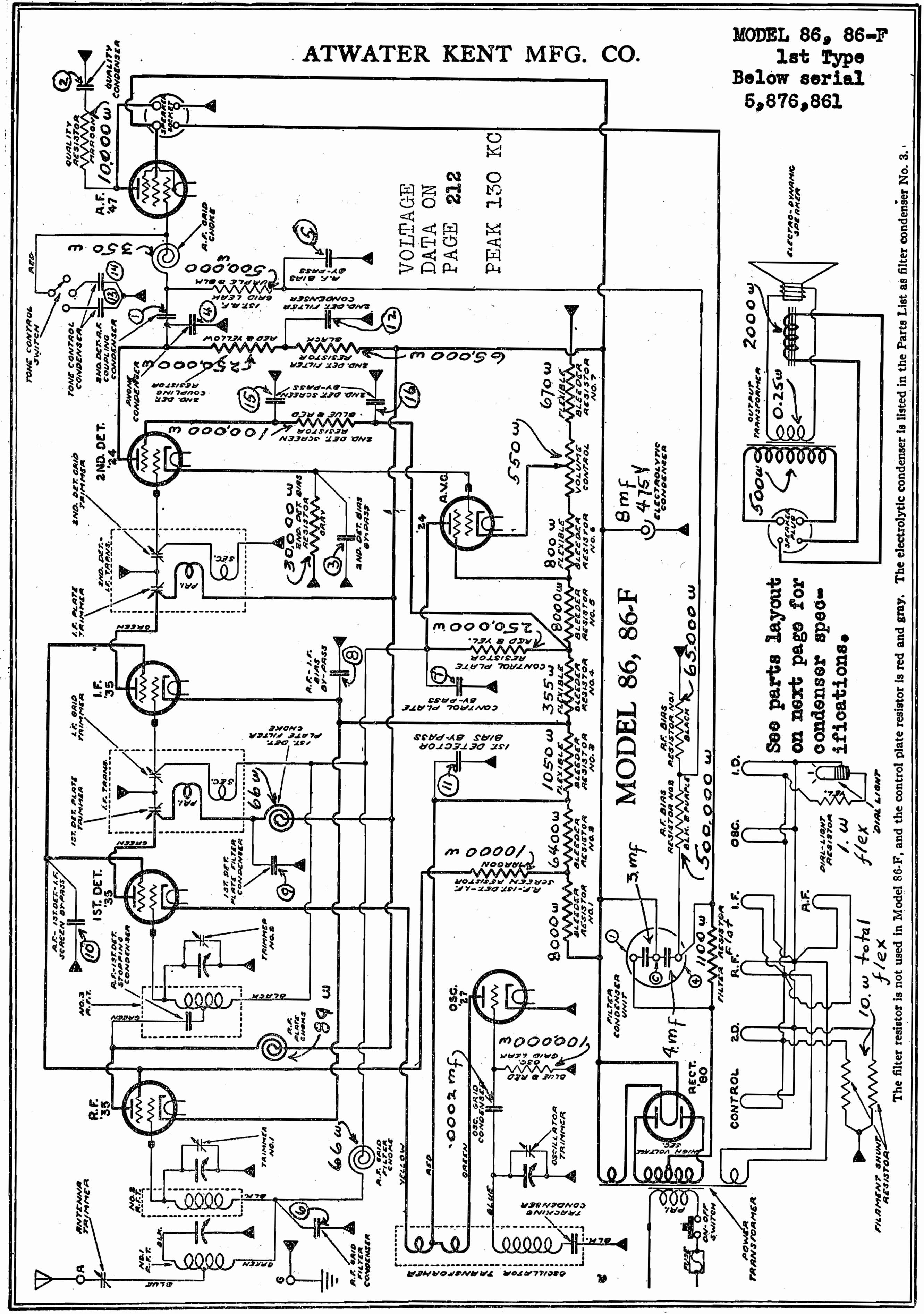
By-pass No. 1
1—2nd-detector plate filter condenser.
2—Quality condenser.
3—Not used.

By-pass No. 2
4—2nd-detector—1st-A. F. coupling condenser.
5—2nd-detector grid-circuit by-pass.
6—Tracking condenser.

By-pass No. 3
7—1st-detector grid filter condenser.
8—R. F.—I. F. screen by-pass.
9—I. F. plate filter condenser.
10—R. F.—I. F. grid filter condenser.

By-pass No. 4
11—1st-A. F. plate filter condenser.
12—1st-detector plate filter condenser.
13—2nd-detector screen by-pass.
14—1st-detector screen by-pass.

Tone-control Condenser
15—Tone-control condenser.
16—Tone-control condenser.
17—Tone-control condenser.
18—Not used.



Voltage reference page 3-66.

MODEL 86, 86-F
1st Type
Below serial
5,876,861

ATWATER KENT MFG. CO.

FILTER CONDENSER. The two small numbers adjacent to the filter condenser representations correspond with the numbers upon the condenser. The capacity between terminal (1) and the center stud is 3. mfd and between terminal (4) and the center stud it is 4. mfd.

BYPASS CONDENSER. The numbers in circles adjacent to the bypass condensers correspond with the designations within the multi-section units shown on the parts layout.

RF Bypass # 1	1.	.01 mfd	400 volts	2.	.03 mfd	400 volts	# 21170
	3.	.3 mfd	400 volts	4.	.0006 mfd	400 volts	
RF Bypass # 2	5.	.3 mfd	200 volts	6.	.02 mfd	200 volts	# 23330
	7.	.04 mfd	200 volts	8.	.05 mfd	200 volts	
RF Bypass # 3	9.	.1 mfd	400 volts	10.	.1 mfd	400 volts	# 15262
	11.	.1 mfd	400 volts	12.	.1 mfd	400 volts	
Tone Control	13.	.001 mfd	100 volts	14.	.003 mfd	100 volts	# 20010
	15.	.1 mfd	100 volts	16.	.1 mfd	100 volts	

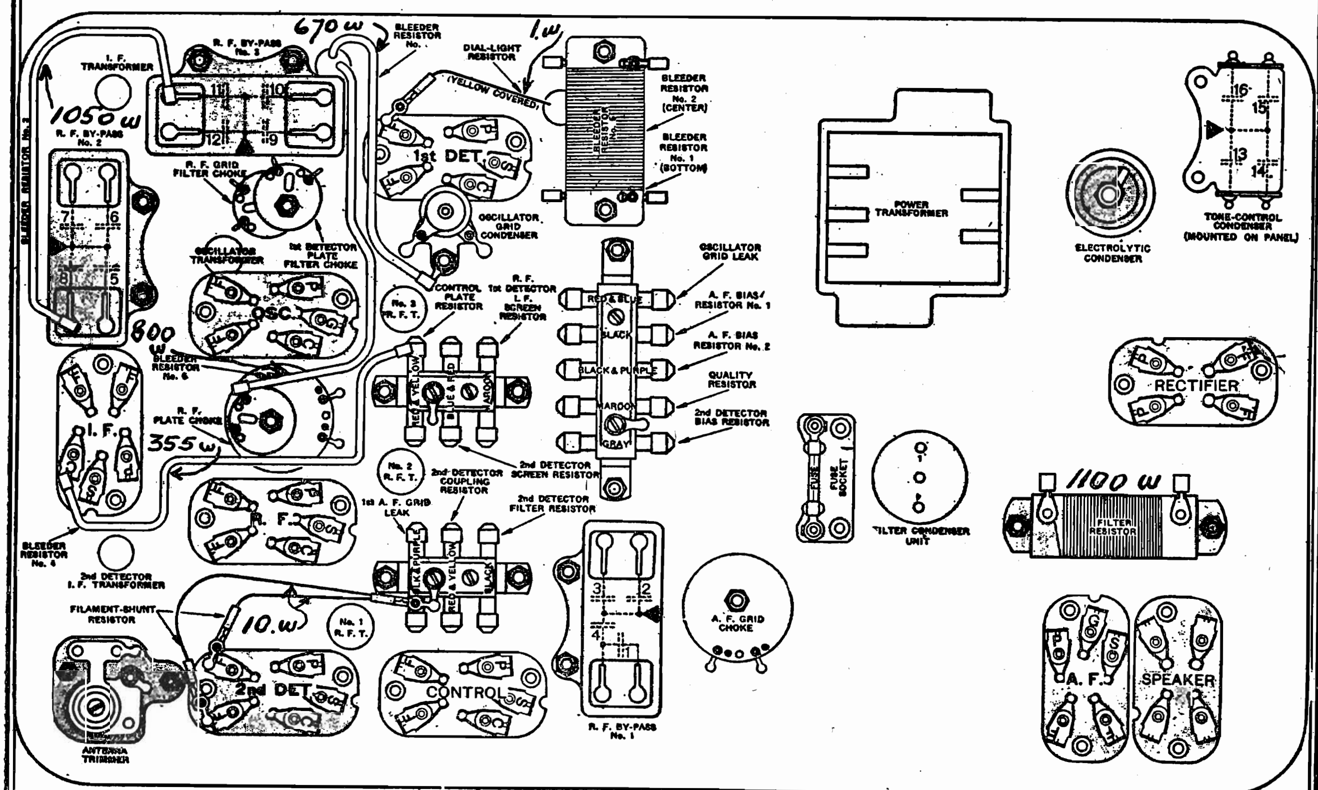


CHART OF MODEL 86, 86-F.

The filter resistor is not used in Model 86-F.

By-pass Condensers in Model 86, 86-F

R. F. By-pass No. 1

1—2nd-detector—A. F. coupling condenser.
2—Quality condenser.
3—2nd-detector bias by-pass.
4—Phone condenser.

R. F. By-pass No. 2

5—A. F. bias by-pass.
6—R. F. grid filter condenser.
7—Control plate by-pass.
8—R. F.—I. F. bias by-pass.

R. F. By-pass No. 3

9—1st-detector plate filter condenser.
10—R. F.-1st-detector—I. F. screen by-pass.
11—1st-detector bias by-pass.
12—2nd-detector filter condenser.

Tone-control Condenser

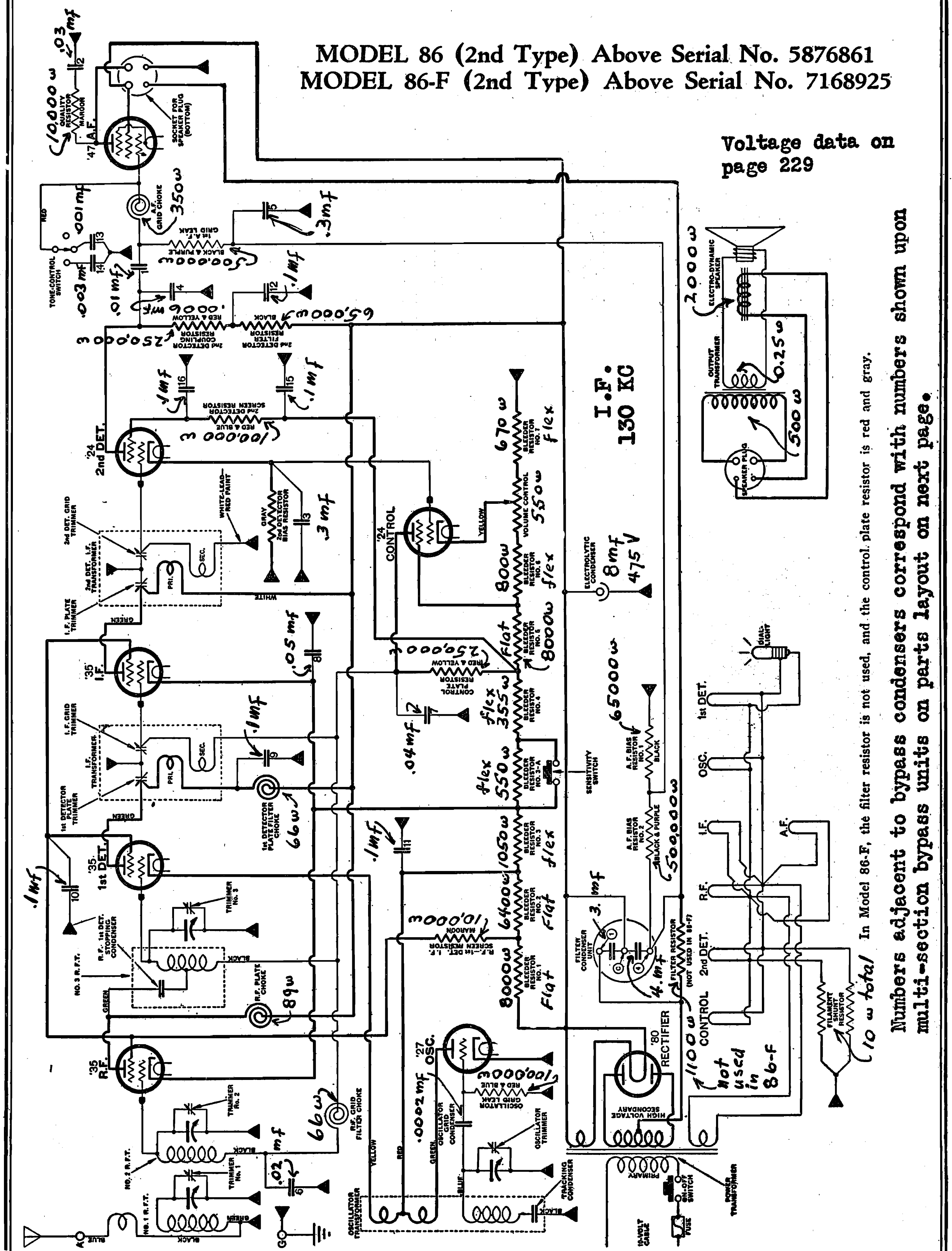
13—Tone-control condenser.
14—Tone-control condenser.
15—2nd-detector screen by-pass.
16—2nd-detector screen by-pass.

MODEL 86, 86-F
2nd Type

ATWATER KENT MFG. CO.

MODEL 86 (2nd Type) Above Serial No. 5876861
MODEL 86-F (2nd Type) Above Serial No. 7168925

Voltage data on page 229



In Model 86-F, the filter resistor is not used, and the control plate resistor is red and gray.

Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units on parts layout on next page.

Voltage reference page 3-83.

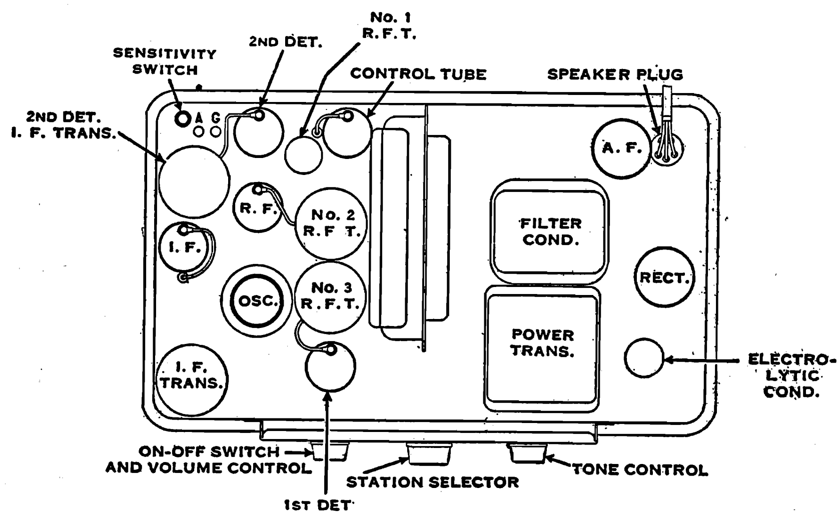
MODEL 86, 86-F
2nd Type

ATWATER KENT MFG. CO.

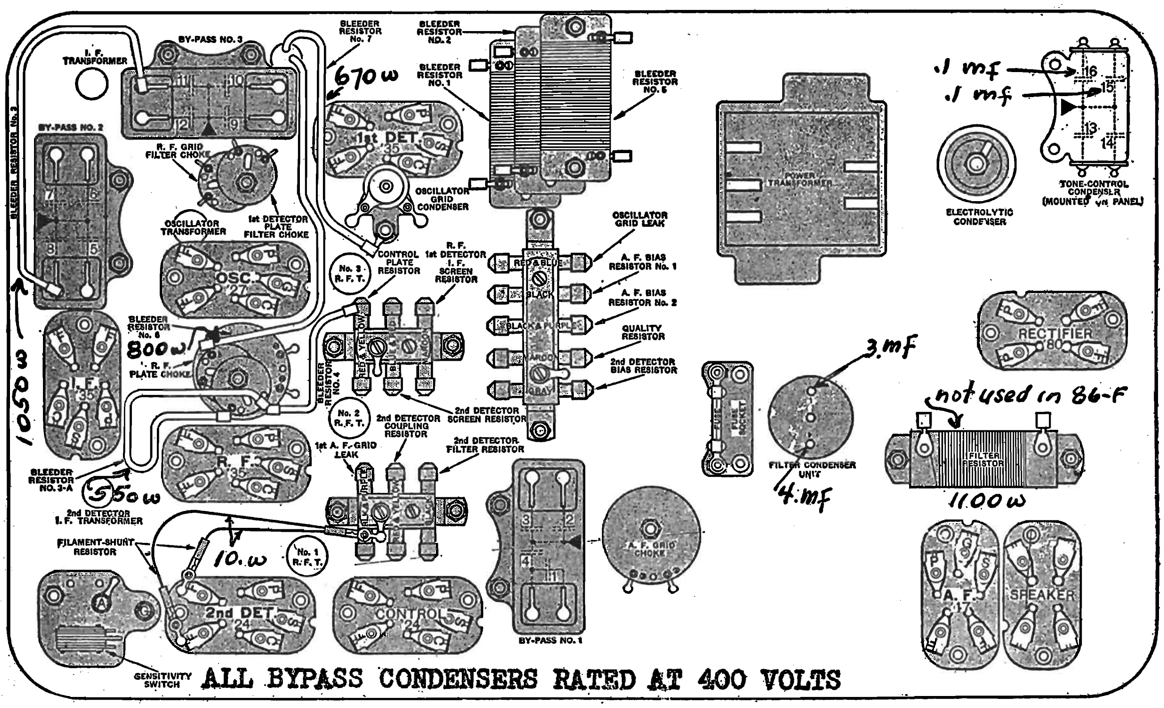
MODEL 86 (2nd Type) Above Serial No. 5876861
MODEL 86-F (2nd Type) Above Serial No. 7168925

TUBES

R. F. = '35
1st Det. = '35
I. F. = '35
2nd Det. = '24
A. F. = '47
Osc. = '27
Control = '24
Rectifier = '80



Top View.



Bottom Chart.
The filter resistor is not used in 86-F.

By-pass Condensers

100 Volts

By-pass No. 1

1—2nd-detector—A. F. coupling condenser.
2—Quality condenser.
3—2nd-detector bias by-pass.
4—Phone condenser.

By-pass No. 2

5—A. F. bias by-pass.
6—R. F. grid filter condenser.
7—Control plate by-pass.
8—R. F.—I. F. bias by-pass.

By-pass No. 3

9—1st-detector plate filter condenser.
10—Screen by-pass.
11—1st-detector bias by-pass.
12—2nd-detector plate filter condenser.

Tone-control Condenser

13—Tone-control condenser.
14—Tone-control condenser.
15—2nd-detector screen by-pass.
16—2nd-detector screen by-pass.

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MODEL 87
1st Type
Below serial
2,525,871

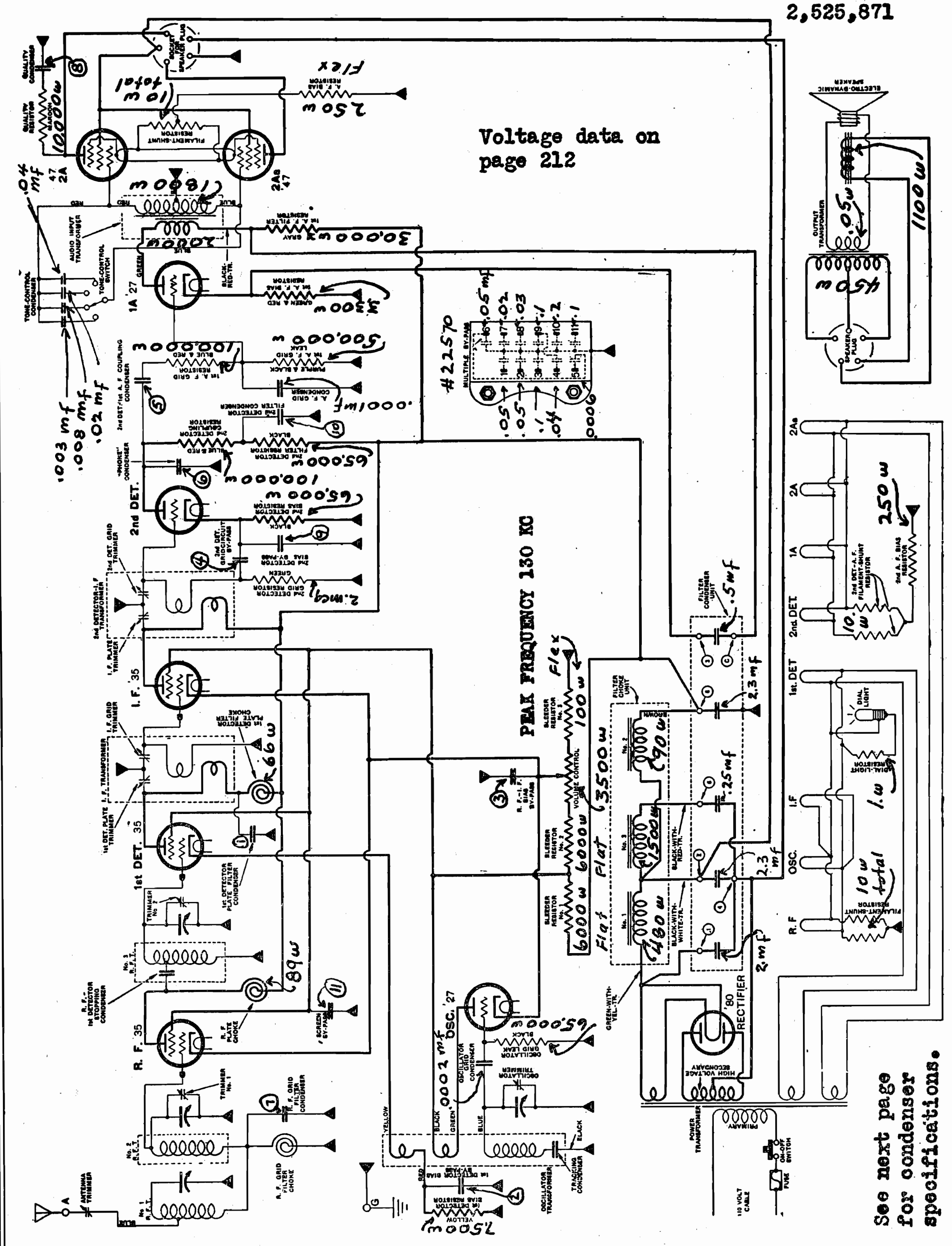


DIAGRAM OF MODEL 87 (A. C.-OPERATED).

In a few early-type Model 87 receivers, No. 2 and No. 3 R. F. transformers are connected between the R. F. tube and the 1st-detector, similar to the arrangement used in early Model 89

Voltage reference page 3-66.

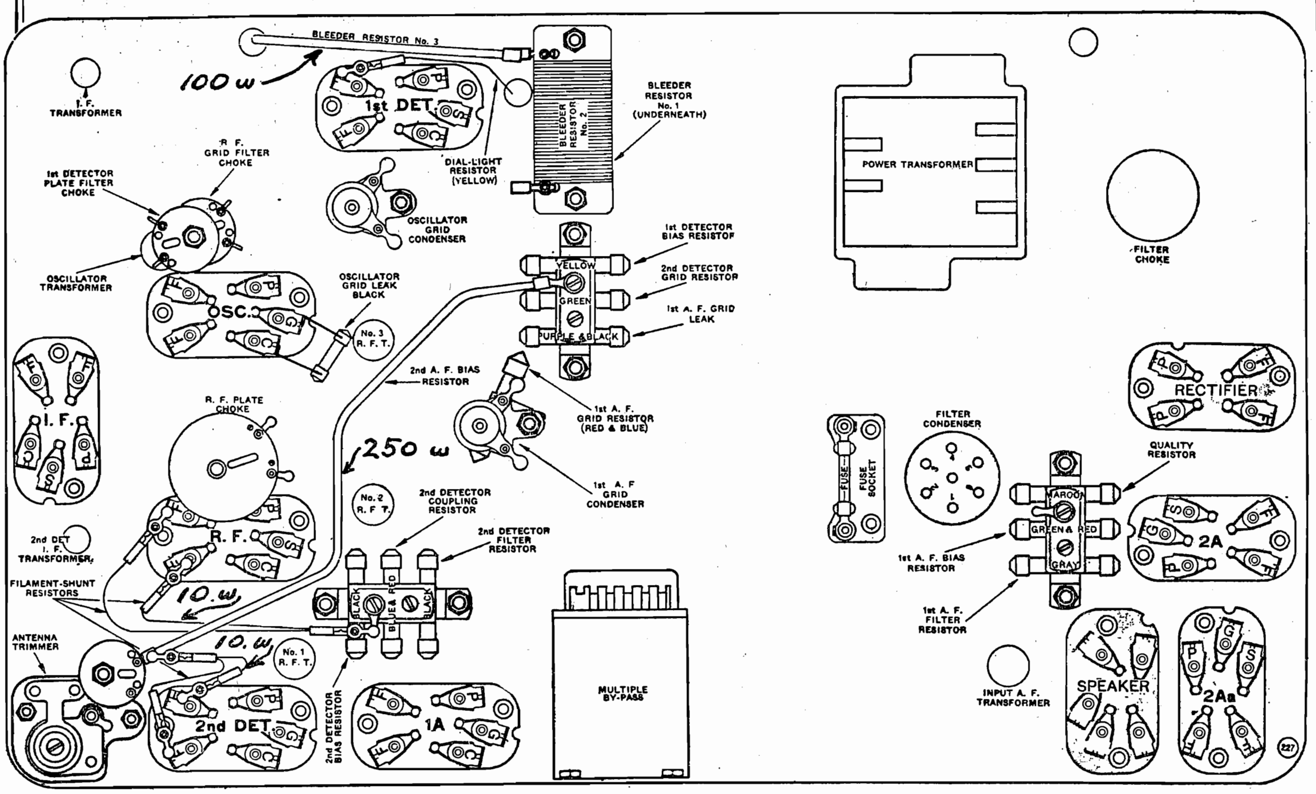
MODEL 87
1st Type
Below serial
2,525,871

ATWATER KENT MFG. CO.

BYPASS CONDENSERS: All bypass condensers located within the multiple unit are rated at 200 volts. The numbers shown within circles adjacent to the bypass condensers correspond with the numbers shown within the multiple bypass unit shown in connection with the schematic diagram. The multiple condenser unit is not marked with numbers. The condensers and numbers closest to the mounting holes represent the side of the condenser nearest the mounting holes.

FILTER CONDENSERS. The numbers in circles correspond with the numbers marked upon the filter unit. The following are the connections.

Filter # 1	2.0 mfd	connected between terminals (1) and (4)
Filter # 2	2.3 mfd	connected between terminals (2) and (4)
Filter # 3	2.3 mfd	connected between terminal (6) and can
1st A-F Bias	.5 mfd	connected between terminal (3) and center stud
Hum	.25 mfd	connected between terminals (4) and (5)
	.1 mfd	connected between center stud and can
	.1 mfd	connected between terminal (2) and can



Condensers in Multiple By-pass Model 87

The internal connections of the multiple by-pass are shown

1—1st-detector plate filter condenser
2—1st-detector bias by-pass.
3—R. F.—I. F bias by-pass.
4—2nd-detector grid-circuit by-pass.
5—2nd-detector—1st-A. F coupling condenser.
6—Phone condenser
7—R. F. grid filter condenser.
8—Quality condenser.
9—2nd-detector bias by-pass.
10—2nd-detector filter condenser,
11—R. F.—1st-detector—I. F. screen by-pass,

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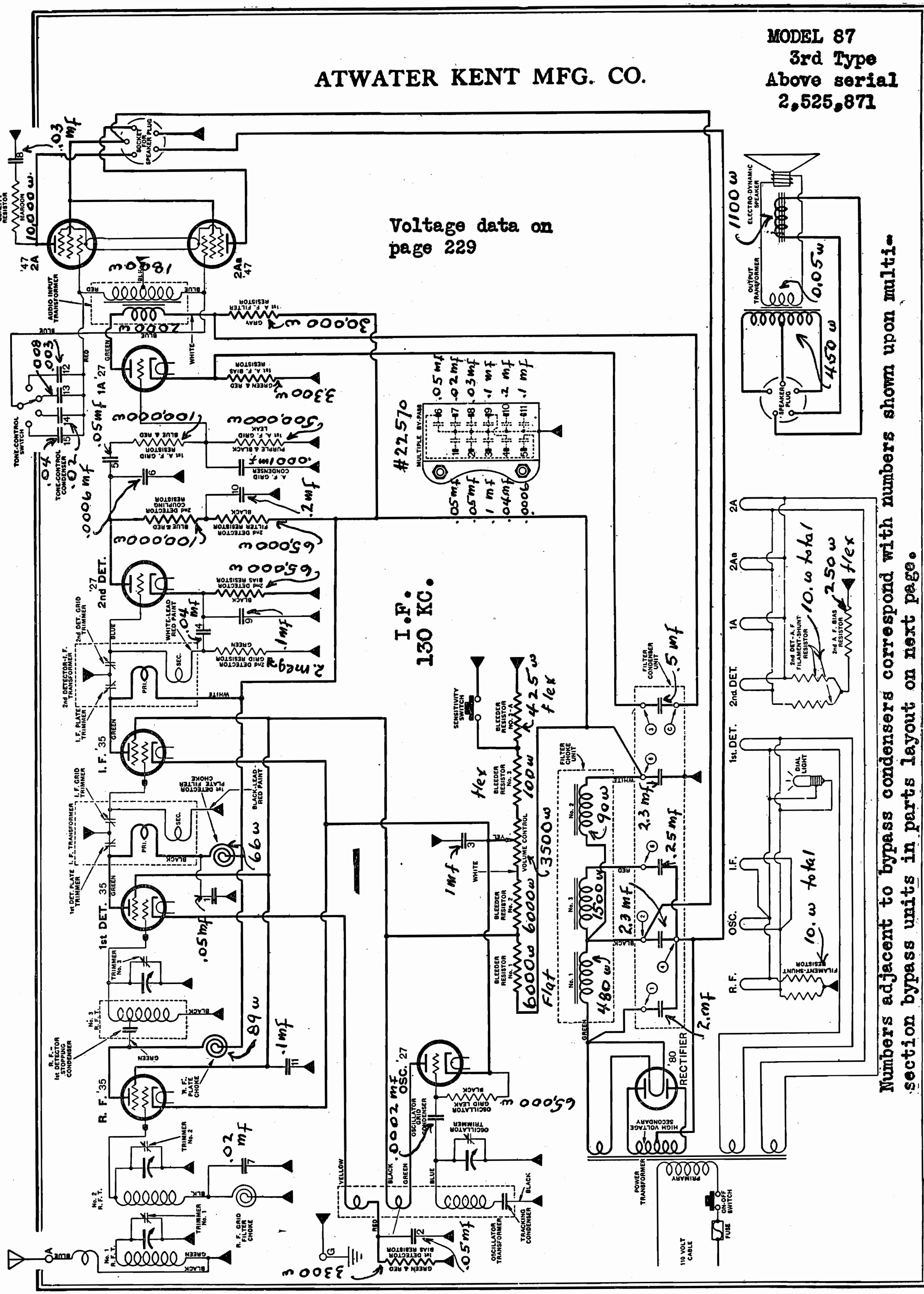
MODEL 87
3rd Type
Above serial
2,525,871

Voltage data on page 229



Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units in parts layout on next page.

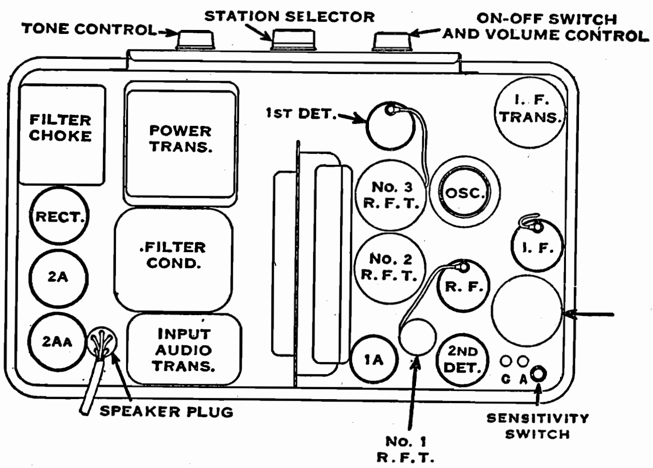
Voltage reference page 3-83.

MODEL 87
3rd Type
Above serial
2,525,871

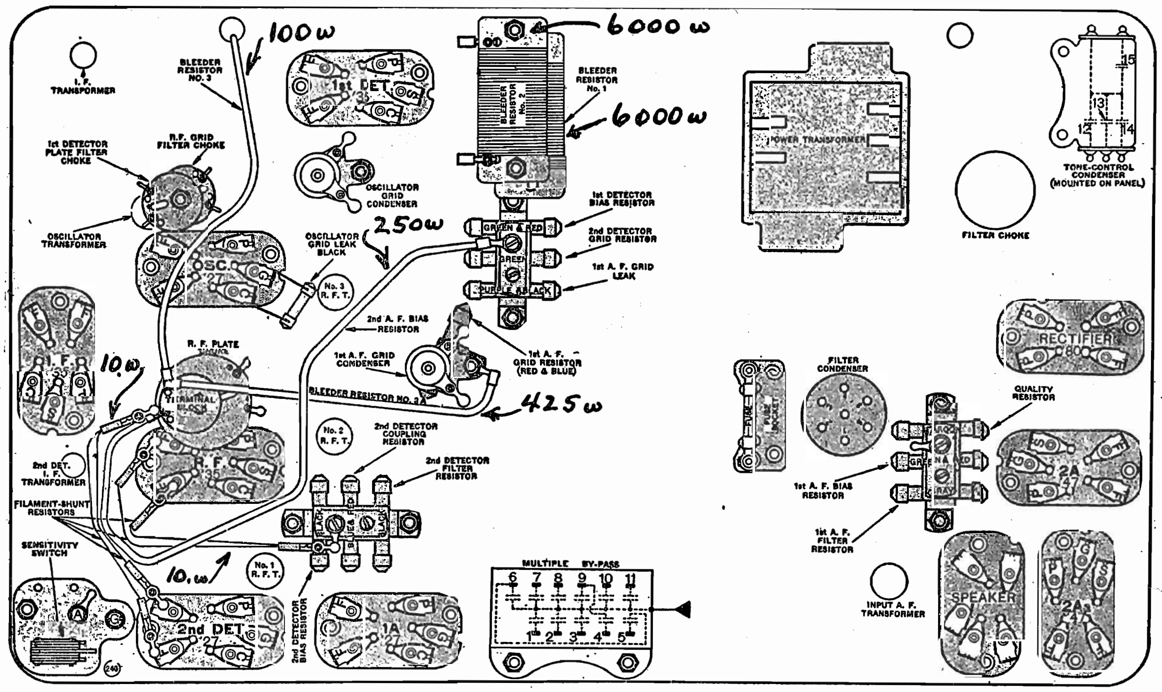
ATWATER KENT MFG. CO.

By-pass Condensers

1—1st-detector plate filter condenser.
2—1st-detector bias by-pass.
3—R. F.—I. F. bias by-pass.
4—2nd-detector grid-circuit by-pass.
5—2nd-detector—1st-A. F. coupling condenser.
6—Phone condenser.
7—R. F. grid filter condenser.
8—Quality condenser.
9—2nd-detector bias by-pass.
10—2nd-detector plate filter condenser.
11—Screen by-pass.



TOP VIEW.



BOTTOM CHART.

FILTER CONDENSERS. The numbers in circles adjacent to the filter condensers correspond with the numbers marked upon the filter condenser terminal block. The following are the connections within the unit.

Filter #1	2.0 mfd	connected between terminals (1) and (4)
Filter #2	2.3 mfd	connected between terminals (2) and (4)
Filter #3	2.3 mfd	connected between terminal (6) and can
Hum	.25 mfd	connected between terminals (4) and (5)
A-F Filter	.5 mfd	connected between terminal (3) and center stud
	.1 mfd	connected between terminal (2) and can (not used)
	.1 mfd	connected between center stud and can (not used)

ATWATER KENT MFG. CO.

MODEL 87-D
DC Superhet

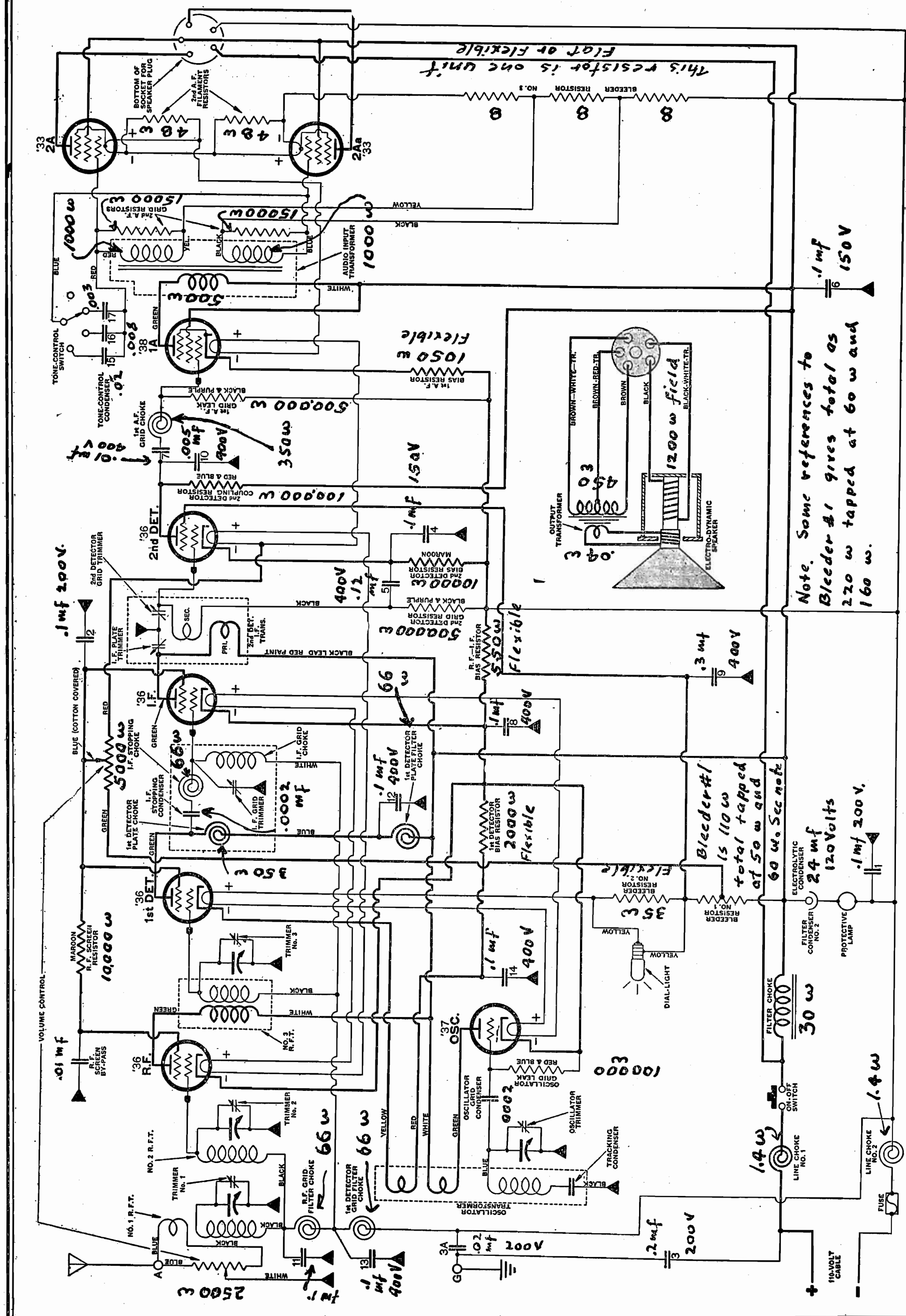


DIAGRAM OF MODEL 87-D.

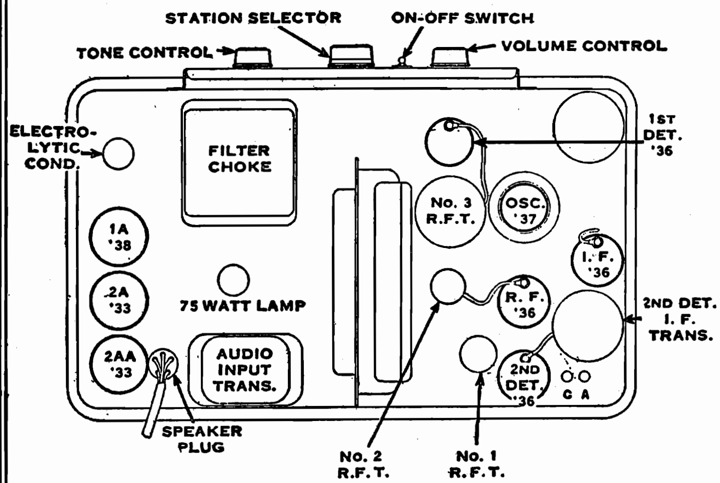
The 2nd-A. F. grid resistors are colored gray and green.

IF PEAK 130 KC

See next page for condenser data.

MODEL 87-D
D.C. SUPERHET.

ATWATER KENT MFG. CO.



Top View of Model 87-D.

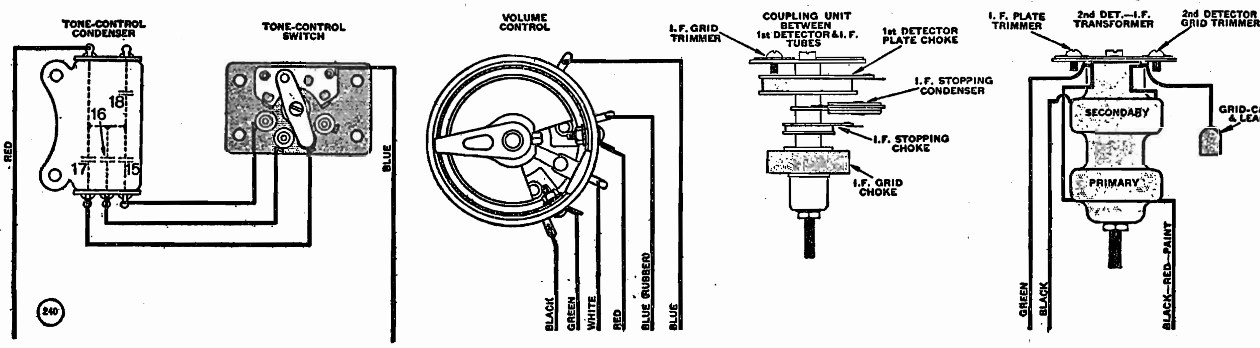
The circle in the top right-hand corner indicates the shield for the coupling unit between the 1st-detector and the I. F. tube.

The readings given in the table below were obtained with the 250-volt scale of a 1000-ohm-per-volt D. C. voltmeter. The values given are only approximate and are the measured values, not the actual operating voltages. All measurements are made from cathode in heater tubes and from —F in plain-filament-type tubes.

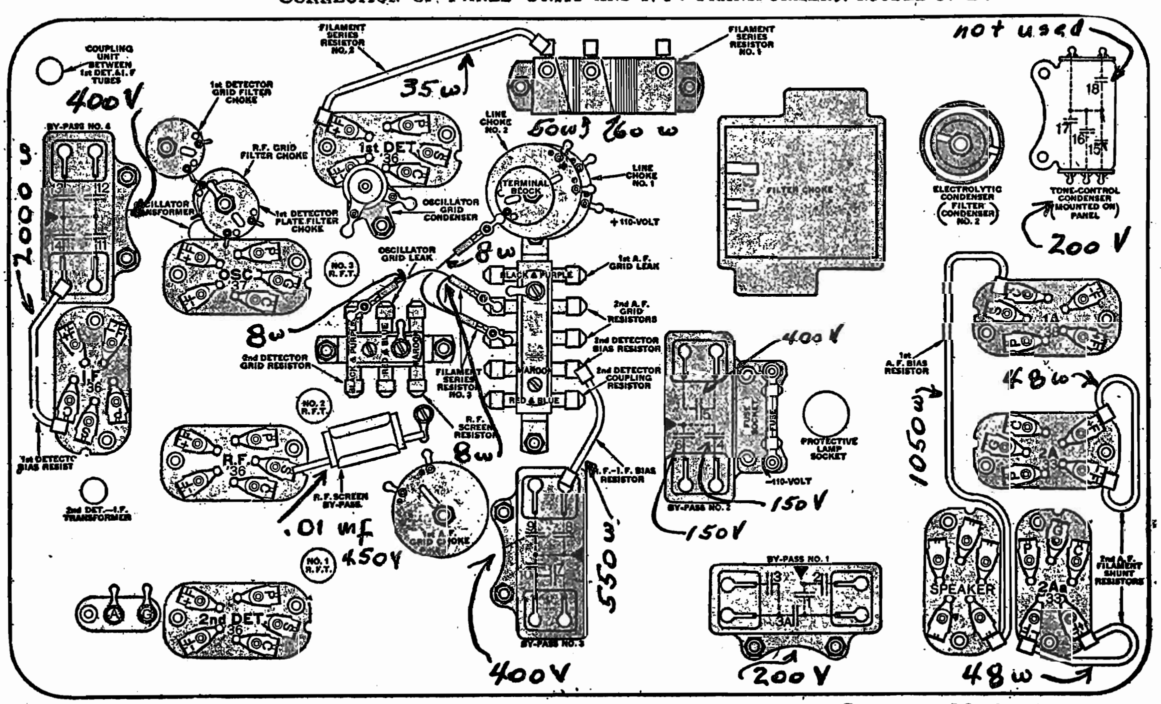
Voltage Table for Model 87-D

Turn Volume Control to Maximum
Line Voltage, 120

	APPROXIMATE VOLTAGES			
	FILAMENT	PLATE	SCREEN	GRID
R. F.	6	100	55	3
1ST-DET.	6	100	60	4
I. F.	6	100	60	3
2ND-DET.	6	65	40	SMALL
1ST-A. F.	6	93	98	4
2ND-A. F.	2	95	98	5
OSCILLATOR	6	100	—	5



Connection of Panel Units and I. F. Transformers. Model 87-D.



The 2nd-A. F. Grid resistors are colored gray and green.

Chart of Model 87-D.

ATWATER KENT MFG. CO.

MODEL 89, 89-F, 89-P
1st Type

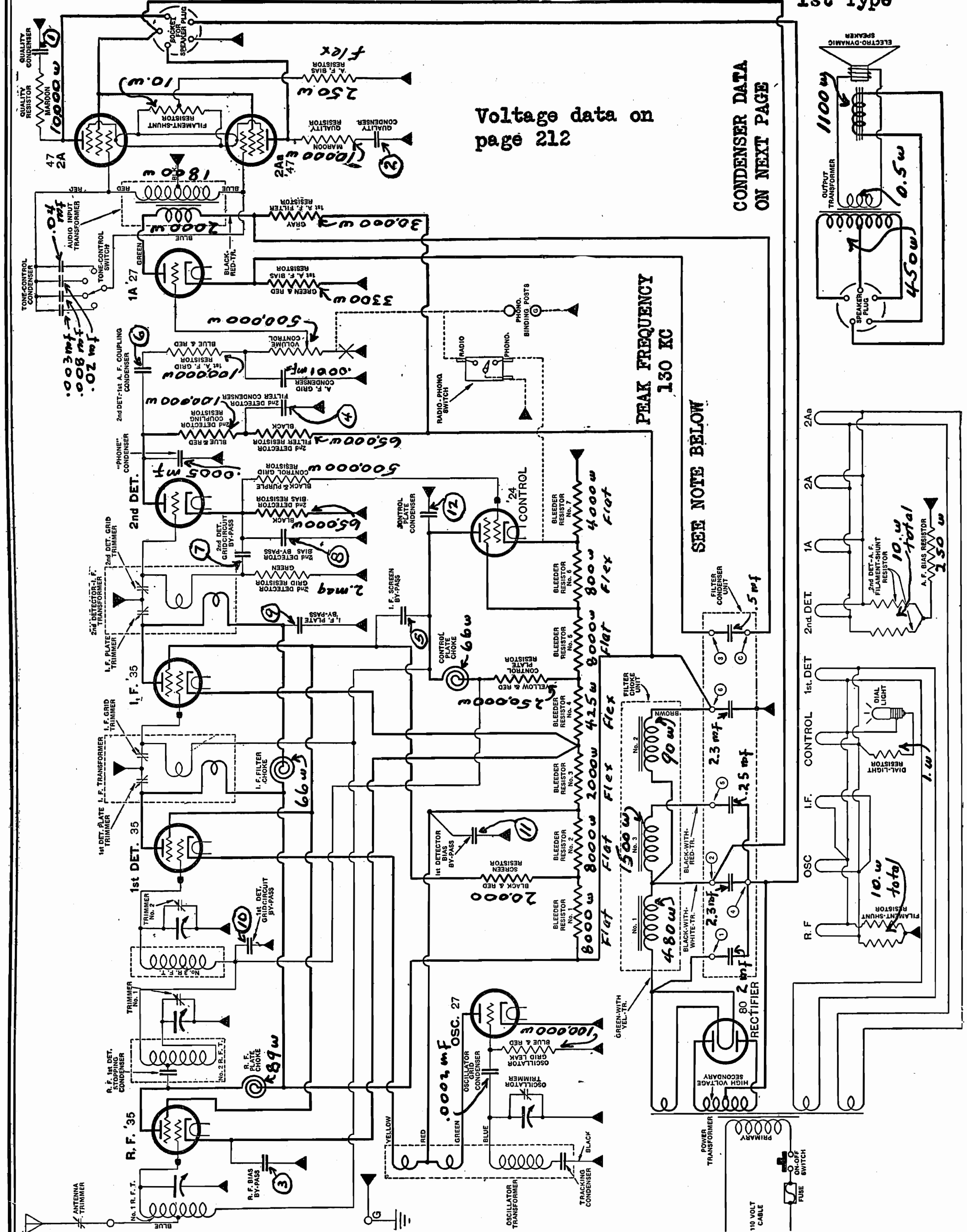


Diagram of Model 89, 89-F, and 89-P (A. C.-operated).

The 2nd-detector grid resistor and the 2nd-detector grid-circuit by-pass are NOT used in this set, and the grid-return of the 2nd-detector connects directly to the chassis.

Later types of this Model have No. 1 and No. 2 R. F. transformers connected ahead of the R. F. tube, as shown in the diagram of Model 87

The phonograph-switching circuit in 89-P is shown above in dotted lines.

Voltage reference page 3-66.

MODEL 89,89-F,89-P ATWATER KENT MFG. CO.

89 Below serial 6,755,181
89-F Below serial 1,585,395
89-P Below serial 1,935,904

FILTER CONDENSERS. The numerals adjacent to the filter condensers shown upon the wiring diagram correspond with the numbers stamped upon the condenser terminal block. The following are the connections:

Filter # 1	2.0 mfd	connected between terminals (1) and (4)
Filter # 2	2.3 mfd	connected between terminals (2) and (4)
Filter # 3	2.3 mfd	connected between terminal (6) and can
Hum	.25 mfd	connected between terminals (5) and (4)
A-F Filter	.5 mfd	connected between terminal (6) and center stud

BYPASS CONDENSERS. The numerals within circles adjacent to the bypass condensers shown upon the schematic wiring diagram correspond with the numbers shown upon the multi-section bypass units below.

Quality Condenser	1.	.03 mfd	450 volts	2.	.03 mfd	450 volts	# 21450
RF Bypass # 1	6.	.05 mfd	400 volts	7.	.04 mfd	400 volts	# 21440
	8.	.3 mfd	400 volts	*	See Note.		
RF Bypass # 2	3.	.1 mfd	400 volts	4.	.1 mfd	400 volts	# 22050
	5.	.3 mfd	400 volts				
RF Bypass # 3	9.	.1 mfd	400 volts	10.	.02 mfd	400 volts	# 21430
	11.	.06 mfd	400 volts	12.	.1 mfd	400 volts	

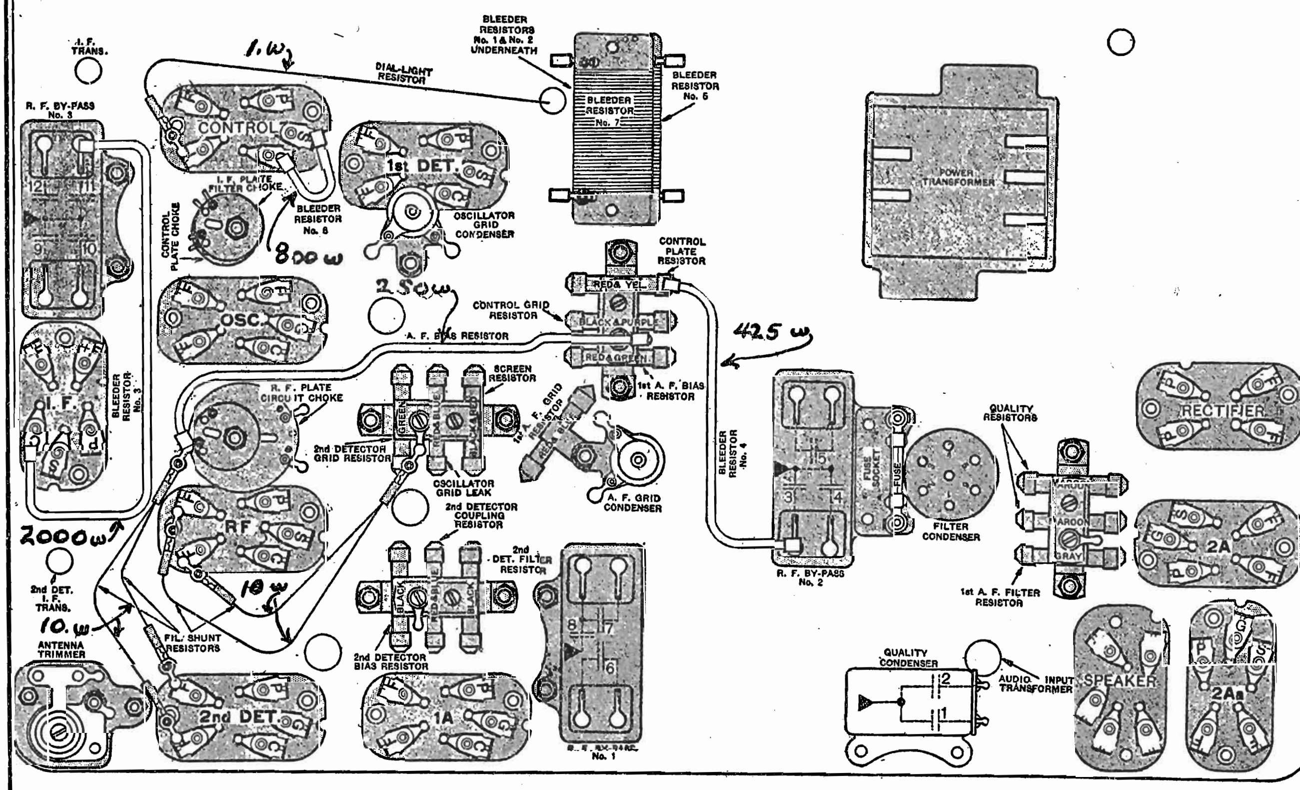


CHART OF MODEL 89, 89-F.

The 2nd-detector grid resistor is not used in late-type Model 89 89-F, 89-P.

Quality Condenser

1—Quality condenser.
2—Quality condenser.

R. F. By-pass No. 1

6—2nd-detector—1st-A. F. coupling condenser.
7—2nd-detector grid-circuit by-pass.
8—2nd-detector bias by-pass.
(A small "phone" condenser, not shown, is connected internally to the lower-left terminal of by-pass No. 1.)

R. F. By-pass No. 2

3—R. F. bias-by-pass.
4—2nd-detector filter condenser.
5—I. F. screen by-pass.

R. F. By-pass No. 3

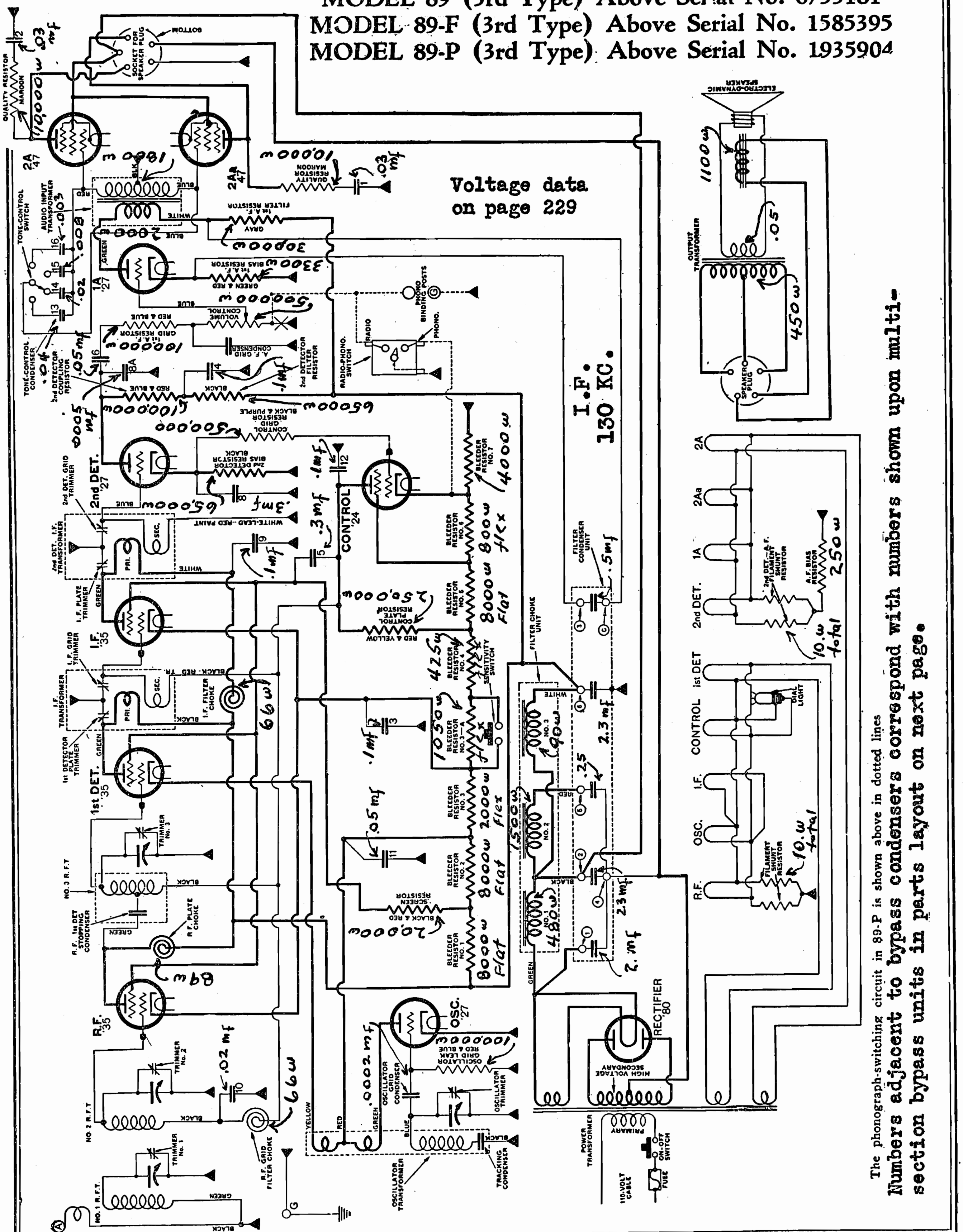
9—I. F. plate by-pass.
10—1st-detector grid-circuit by-pass.
11—1st-detector bias by-pass.
12—Control-plate condenser.

MODEL 89, 89-F, 89-P
3rd Type

ATWATER KENT MFG. CO.

MODEL 89 (3rd Type) Above Serial No. 6755181
MODEL 89-F (3rd Type) Above Serial No. 1585395
MODEL 89-P (3rd Type) Above Serial No. 1935904

Voltage data on page 229



Voltage reference page 3-88.

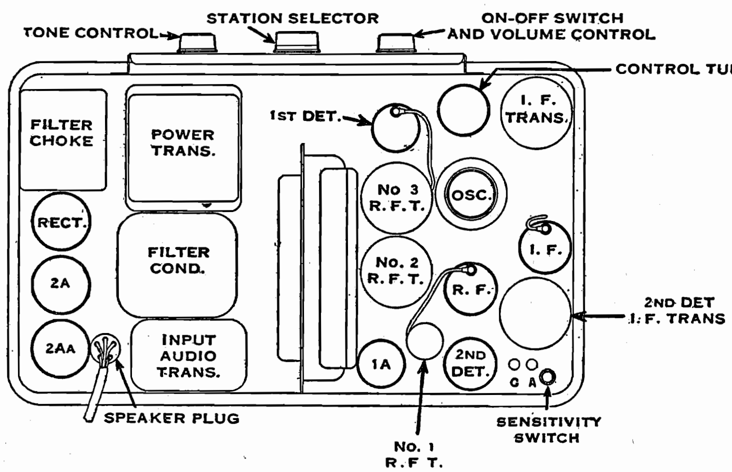
MODEL 89,89-F,89-P
3rd Type

ATWATER KENT MFG. CO.

MODEL 89 (3rd Type) Above Serial No. 6755181
MODEL 89-F (3rd Type) Above Serial No. 1585395
MODEL 89-P (3rd Type) Above Serial No. 1935904

TUBES

R. F. = '35
1st Det. = '35
I. F. = '35
2nd Det. = '27
1st A. F. = '27
2nd A. F. = '47(2)
Osc. = '27
Control = '24
Rectifier = '80

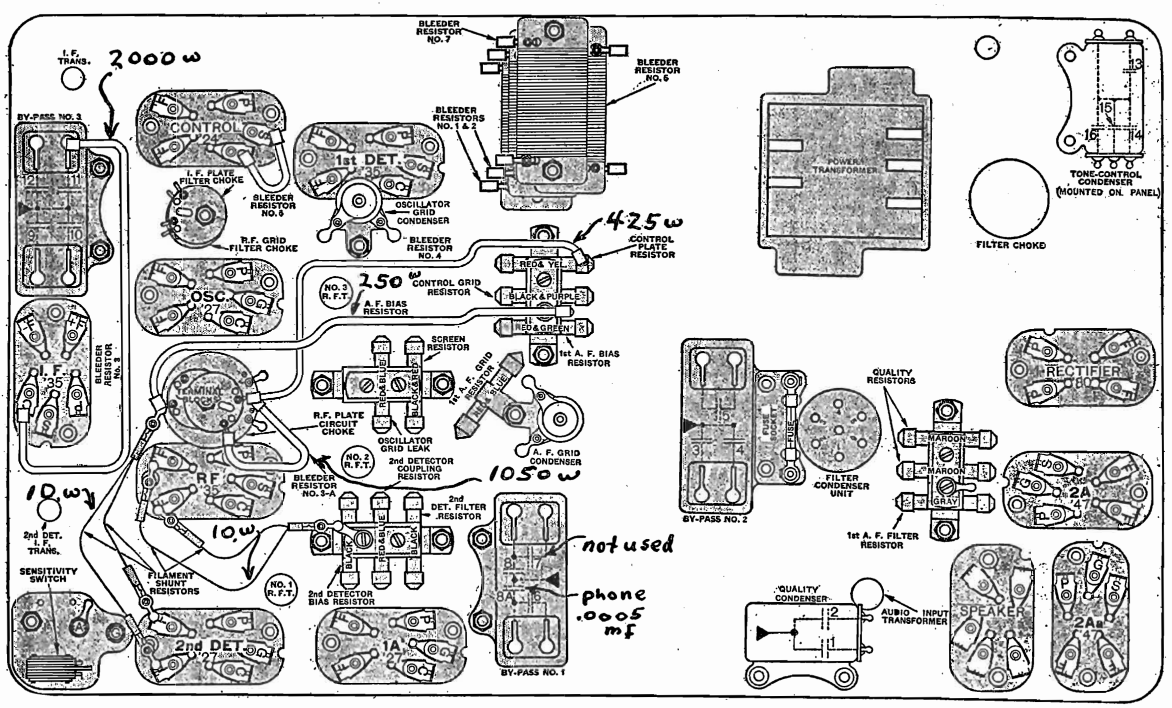


Top View.

Model 89-P has two binding posts for pick-up connection at the rear of the chassis, and a radio-phono toggle switch is mounted on the front panel.

RF Bypass # 1 rated at 400 volts
RF Bypass # 2 rated at 200 volts
RF Bypass # 3 rated at 400 volts

Quality condenser rated 450 volts
Tone control rated 200 volts



Bottom Chart.

By-pass Condensers

By-pass No. 1

6—2nd-detector—1st-A. F. coupling condenser.
7—Not used.
8—2nd-detector bias by-pass.
8A—Phone condenser.

By-pass No. 2

3—R. F.—I. F. bias by-pass.
4—2nd-detector plate filter condenser.
5—Screen by-pass.

By-pass No. 3

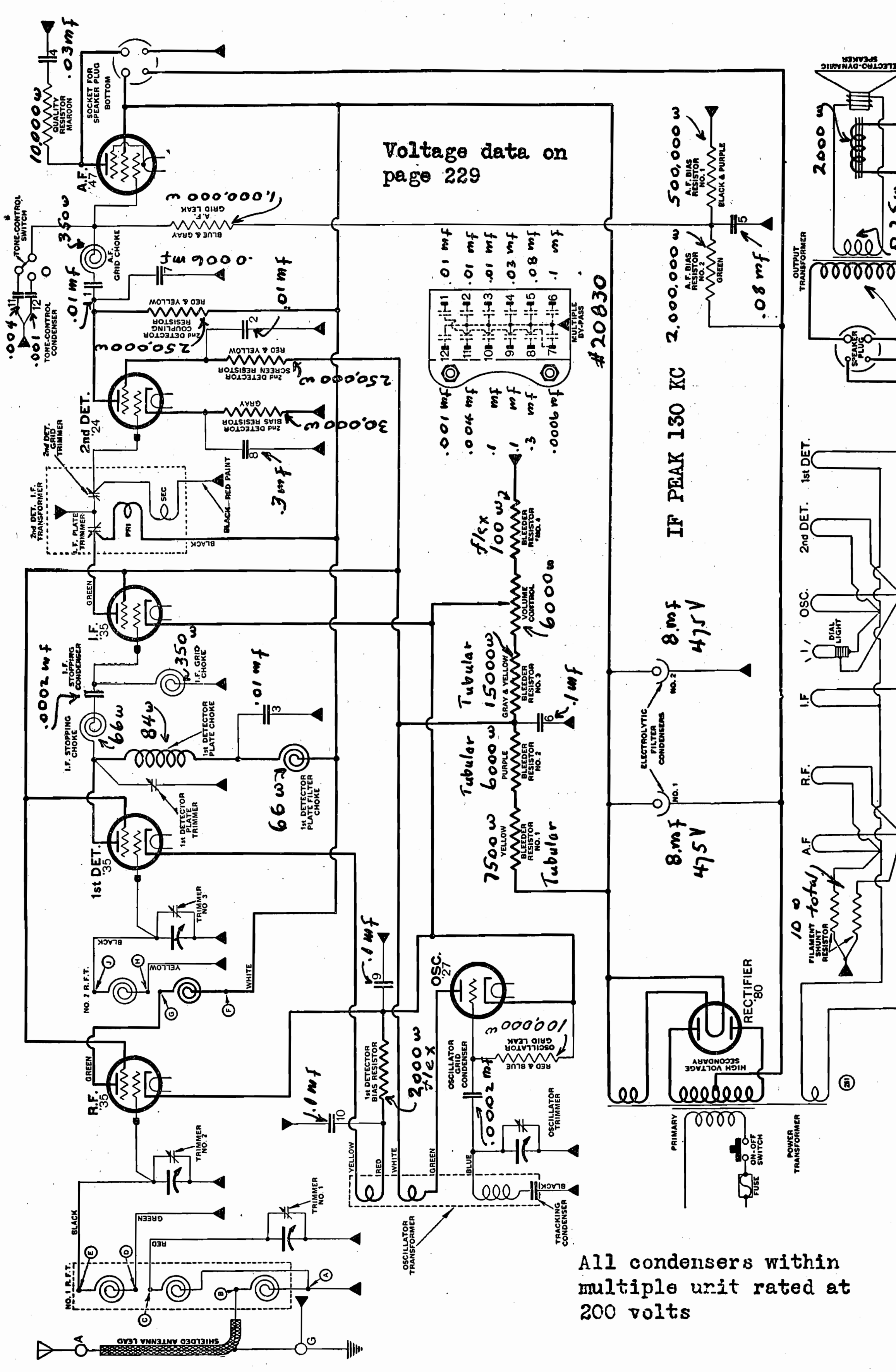
9—I. F. plate filter condenser.
10—R. F. grid filter condenser.
11—1st-detector bias by-pass.
12—Control plate by-pass.

Tone-control Condenser

13—Tone-control condenser.
14—Tone-control condenser.
15—Tone-control condenser.
16—Tone-control condenser.

ATWATER KENT MFG. CO.

MODEL 90,90-F



All condensers within multiple unit rated at 200 volts

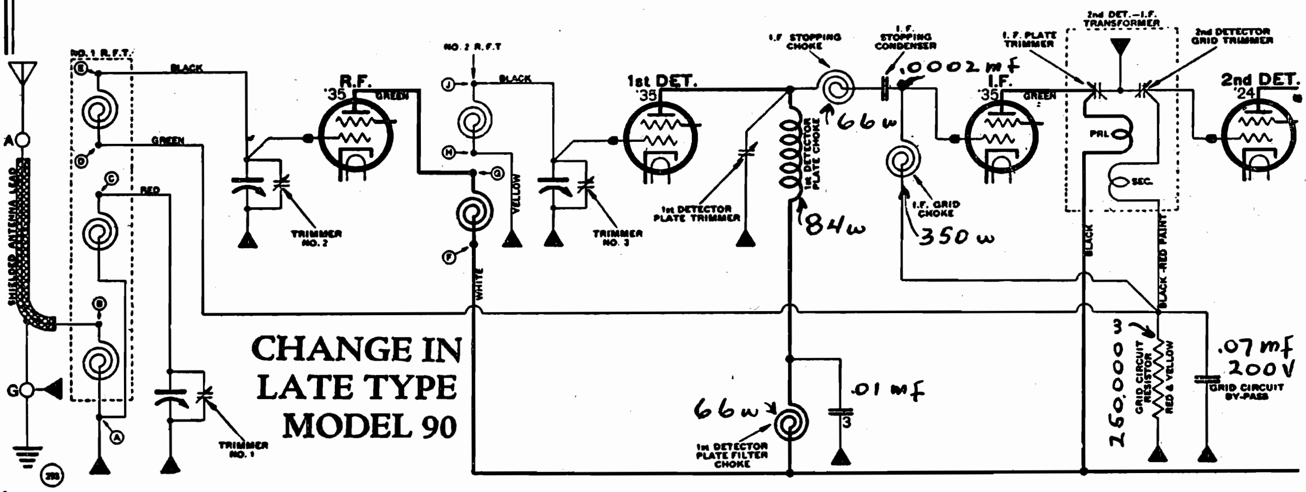
Numbers adjacent to bypass condensers correspond with numbers shown upon multiple bypass unit on this and next page.

The colors of bleeders No. 1 and No. 2 may be reversed in some sets. This does not affect the operation.

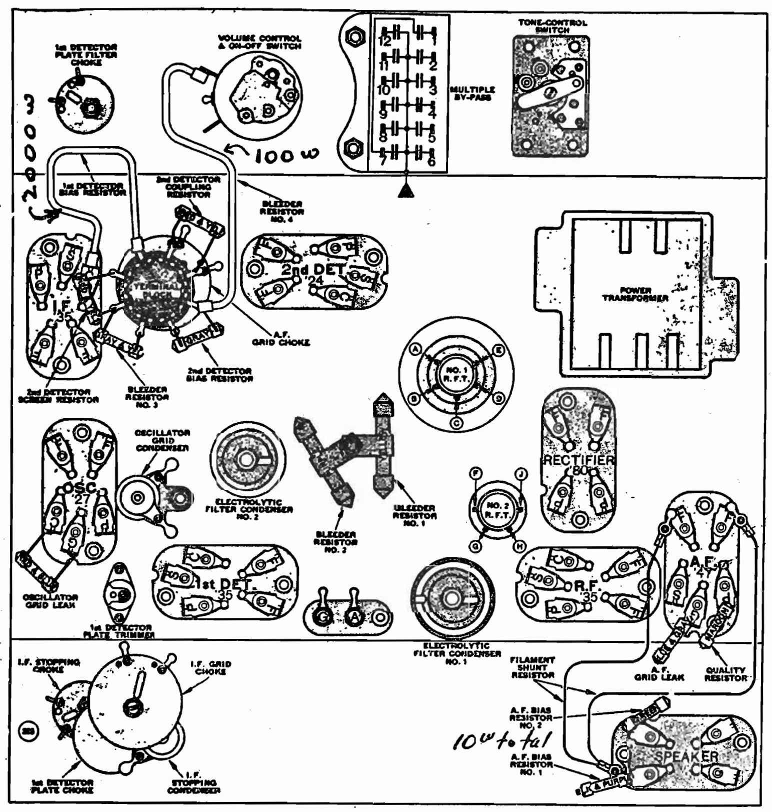
Voltage reference page 3-83.

MODEL 90, 90-F
Early and Late

ATWATER KENT MFG. CO.



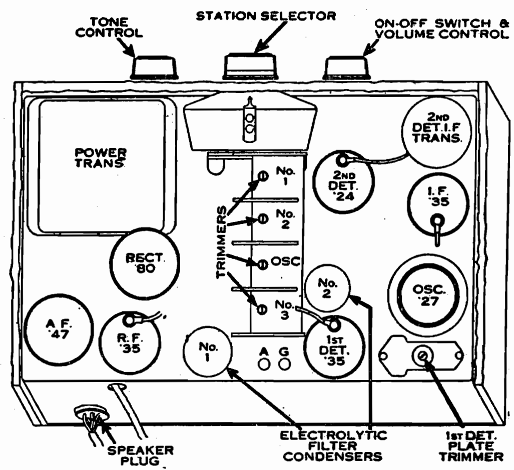
In late type Model 90, the grid returns of the R. F., I. F., and 2nd-detector tubes are connected to ground through a red-and-yellow resistor as shown above.



Bottom Chart.

In some sets, the colors of bleeders No. 1 and No. 2 may be reversed. This does not affect the operation.

In late-type sets, the connections to R. F. T. No. 2 are as follows:—Yellow to F, black to G, white to H, green to J.



Top View.

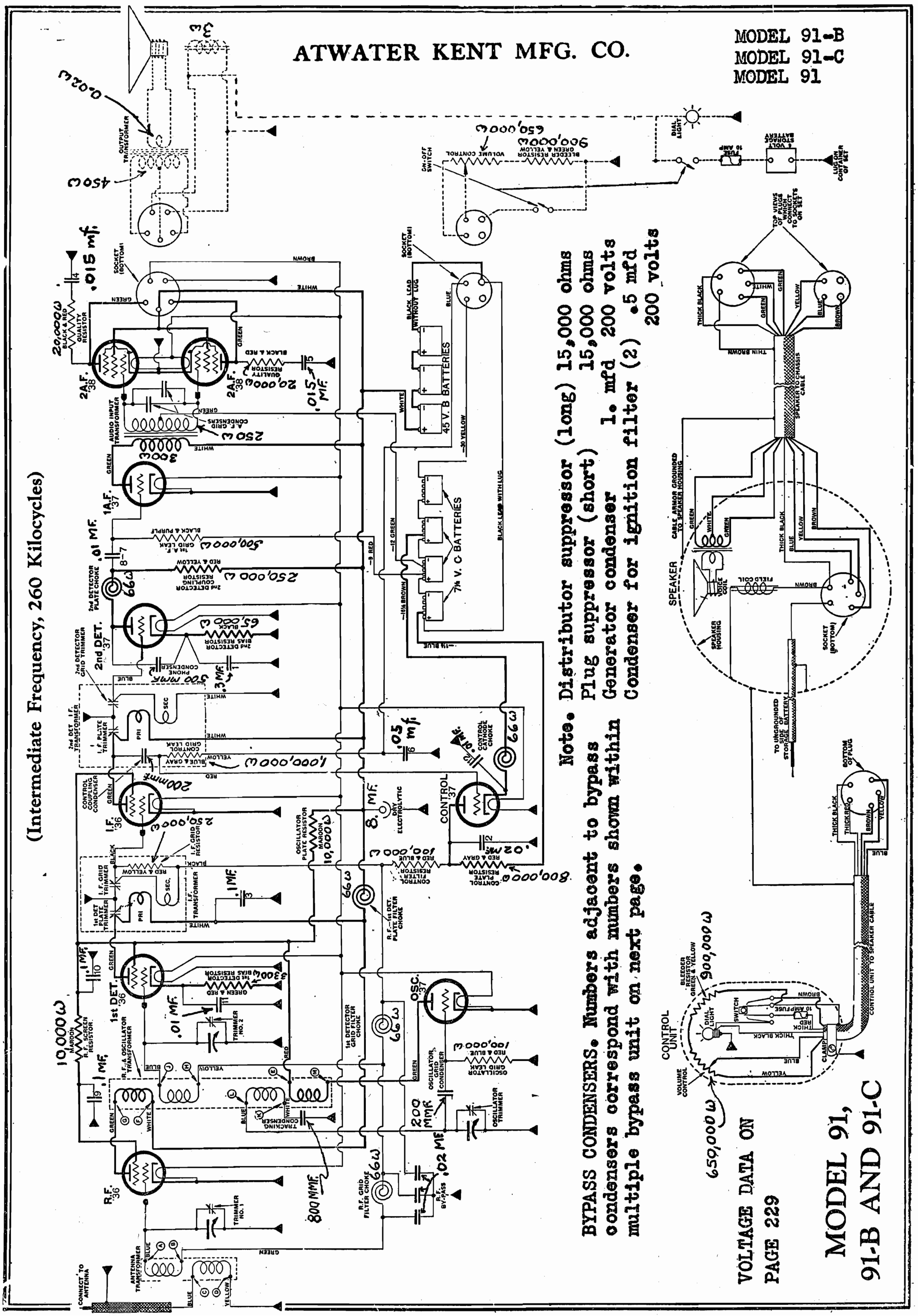
All Bypass condensers are rated at 200 volts

By-pass Condensers

1—2nd-detector—A. F. coupling condenser.
2—2nd-detector screen by-pass.
3—1st-detector plate filter condenser.
4—Quality condenser.
5—A. F. bias by-pass.
6—R. F.—1st-detector—I. F. screen by-pass.
7—Phone condenser.
8—2nd-detector bias by-pass.
9—R. F. bias by-pass.
10—1st-detector bias by-pass.
11—Tone-condenser.
12—Tone condenser.

ATWATER KENT MFG. CO.

MODEL 91-B
MODEL 91-C
MODEL 91



Note. Distributor suppressor (long) 15,000 ohms
Plug suppressor (short) 15,000 ohms
Generator condenser 1. mfd 200 volts
Condenser for ignition filter (2) .5 mfd 200 volts

BYPASS CONDENSERS. Numbers adjacent to bypass condensers correspond with numbers shown within multiple bypass unit on next page.

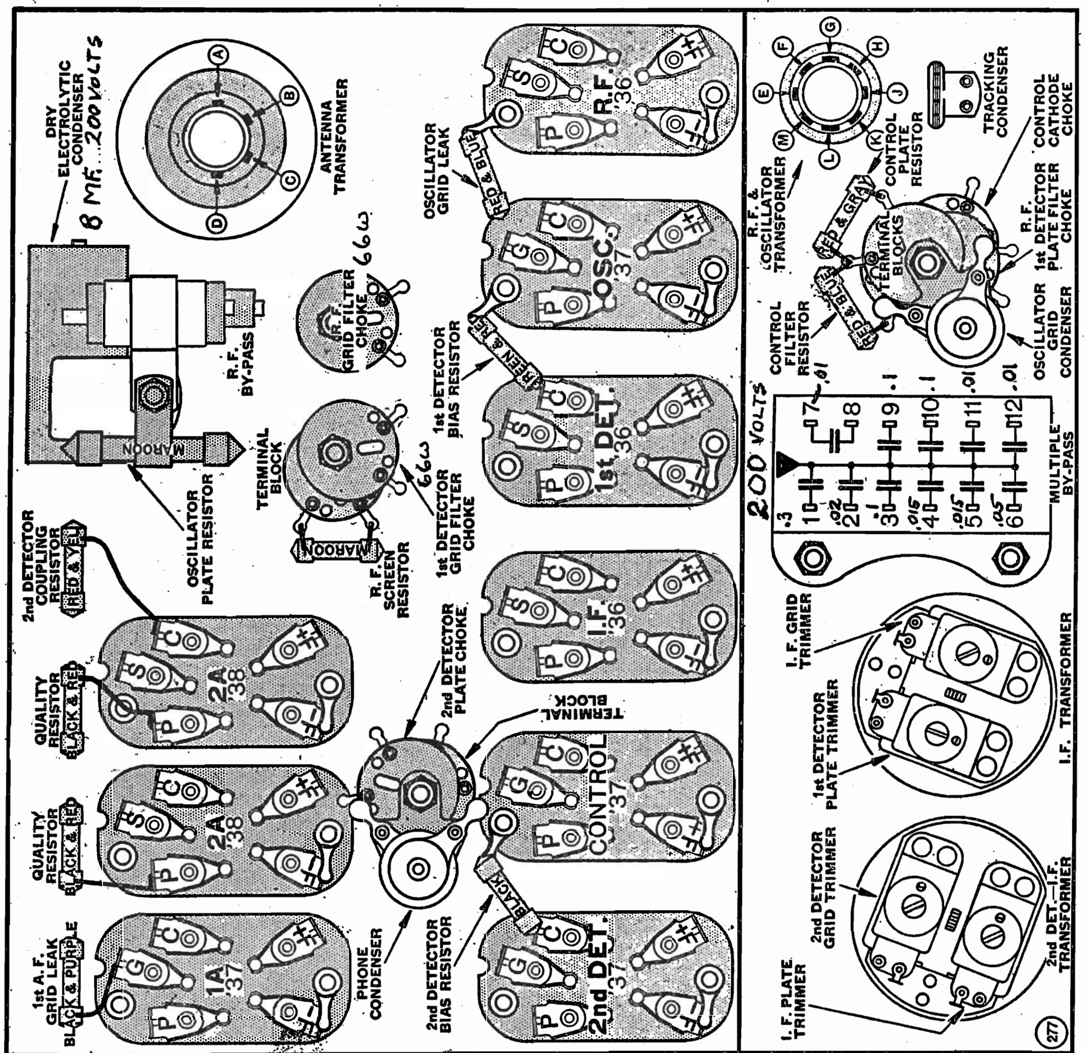
VOLTAGE DATA ON PAGE 229

MODEL 91, 91-B AND 91-C

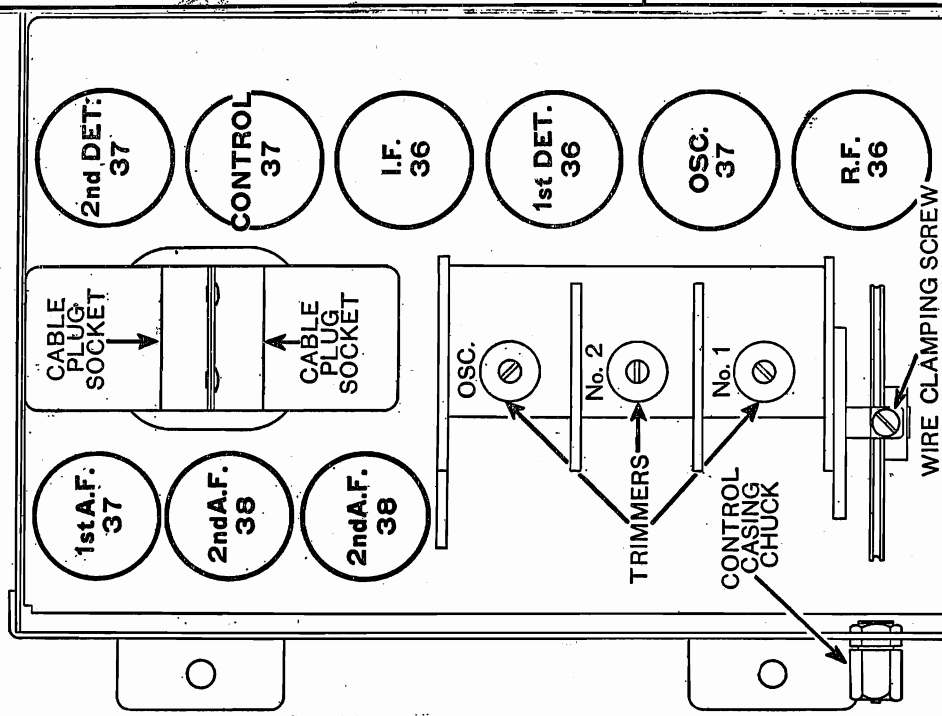
MODEL 91-B
MODEL 91-C
MODEL 91

ATWATER KENT MFG. CO.

MODEL 91, 91-B, 91-C
(Intermediate Frequency, 260 Kilocycles)



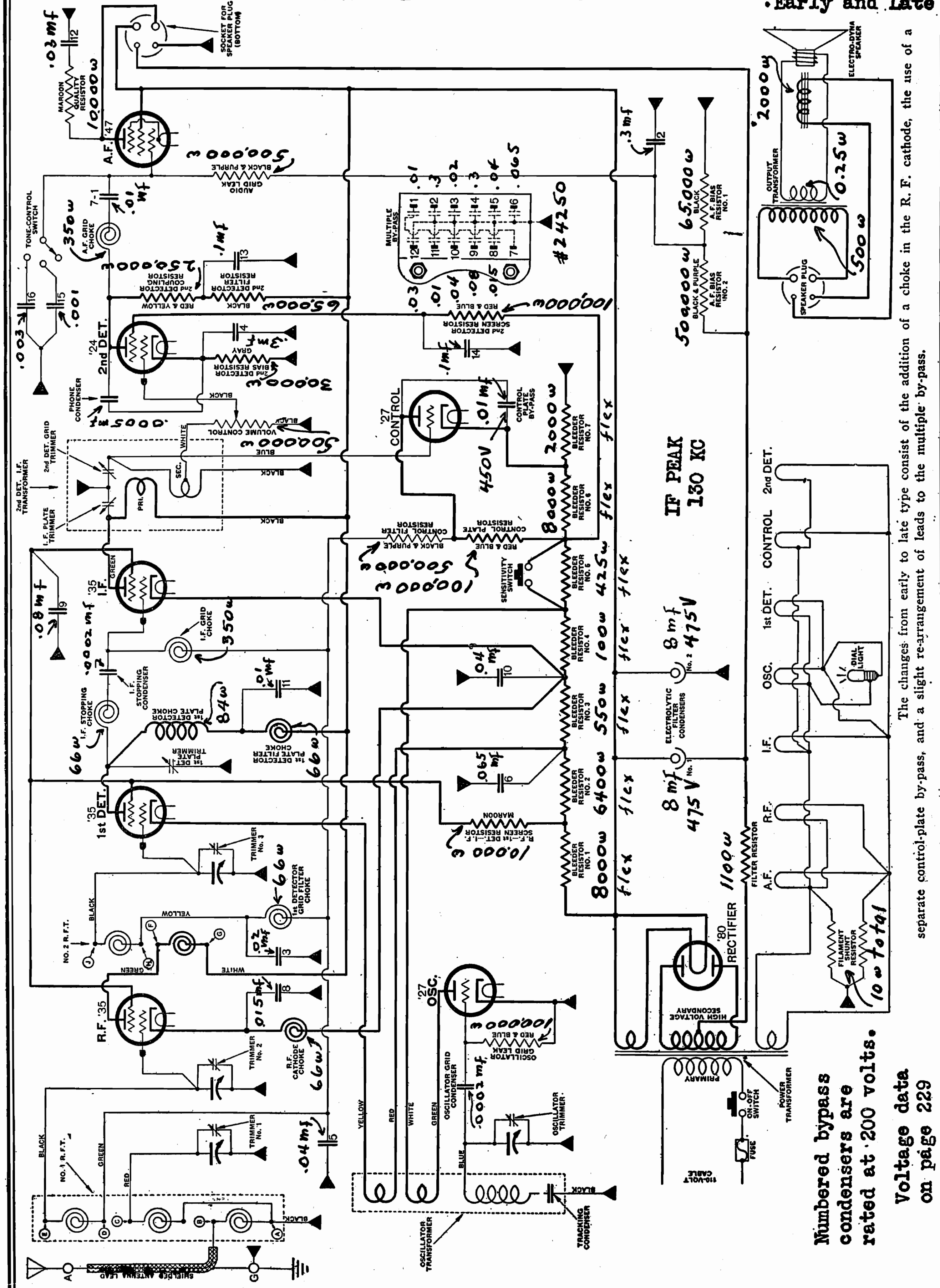
Bottom Chart of Model 91, 91-B and 91-C.



Top View of Model 91, 91-B and 91-C Chassis Showing Location of Tubes.

ATWATER KENT MFG. CO.

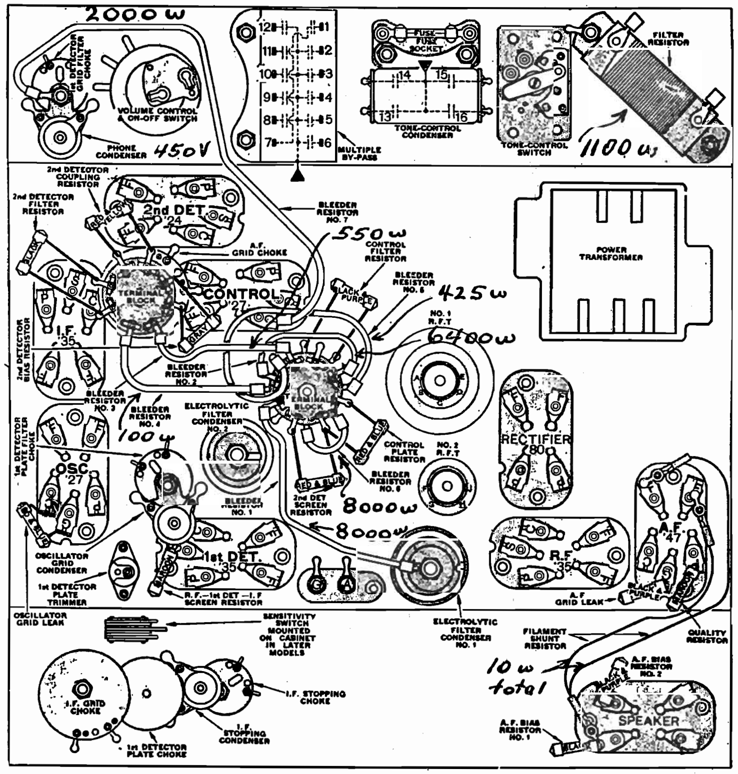
MODEL 92
Early and Late



Voltage reference page 3-83.

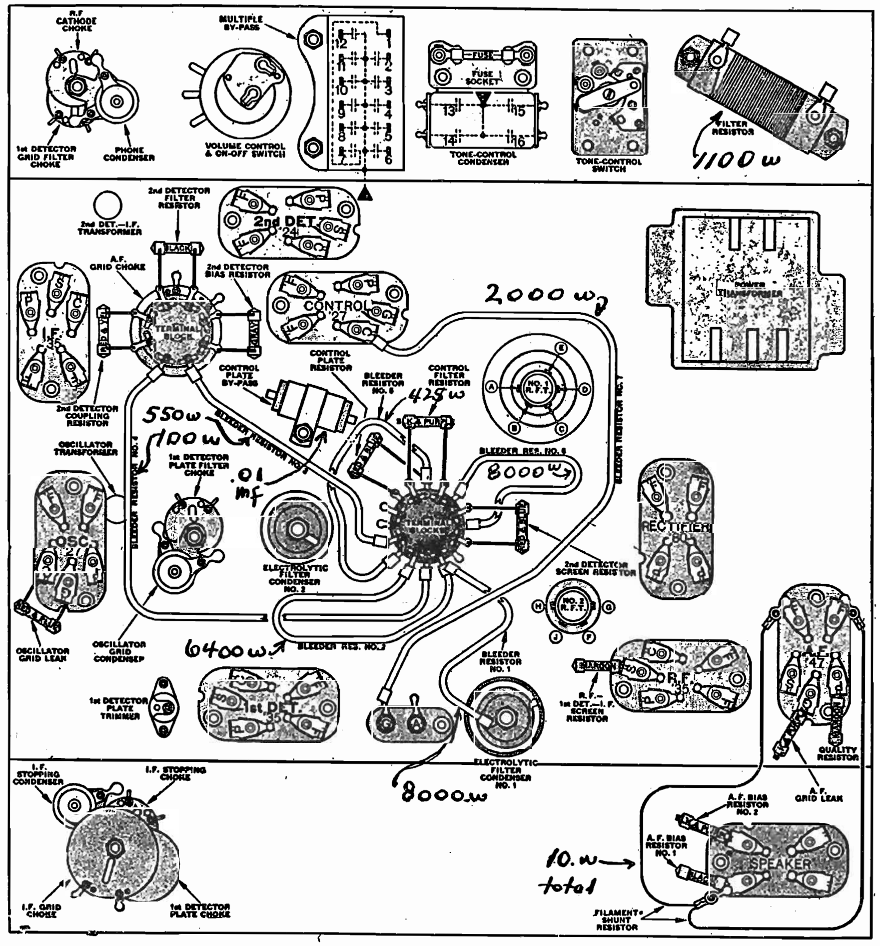
MODEL 92
Early and Late

ATWATER KENT MFG. CO.



By-pass Condensers in Early-Type Model 92

1—2nd-detector—A. F. coupling condenser
2—A. F. bias by-pass.
3—1st-detector grid filter condenser
4—2nd-detector bias by-pass.
5—R. F. grid filter condenser.
6—1st-detector bias by-pass.
7—2nd-detector—A. F. coupling condenser.
8—R. F.—I. F. bias by-pass.
9—R. F. 1st-detector—I. F. screen by-pass.
10—1st-detector plate filter condenser.
11—Control plate by-pass.
12—Quality condenser.



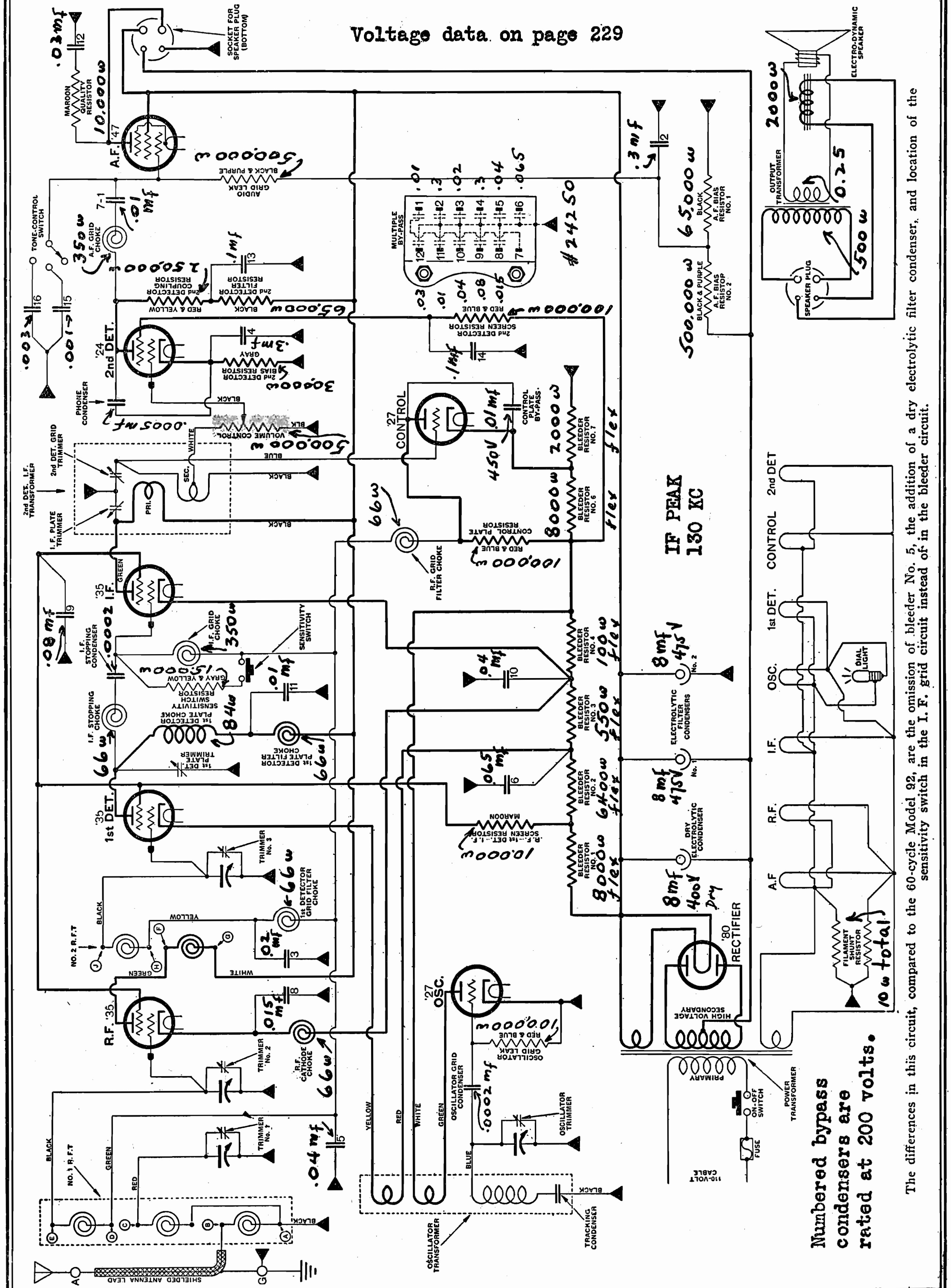
BOTTOM CHART OF LATE TYPE MODEL 92.

Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units in schematic diagram on preceding page.

ATWATER KENT MFG. CO.

MODEL 92-F

Voltage data on page 229



Numbered bypass condensers are rated at 200 volts.

The differences in this circuit, compared to the 60-cycle Model 92, are the omission of bleeder No. 5, the addition of a dry electrolytic filter condenser, and location of the sensitivity switch in the I. F. grid circuit instead of in the bleeder circuit.

Voltage reference page 3-83.

MODEL 92
MODEL 92-F

ATWATER KENT MFG. CO.

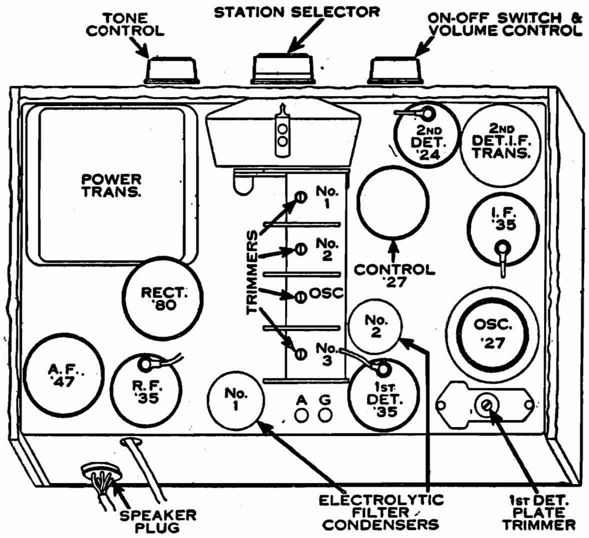
By-pass Condensers in Late-Type 92 and 92-F

1—2nd-detector—A. F. coupling condenser.
2—A. F. bias by-pass.
3—1st-detector grid filter condenser.
4—2nd-detector bias by-pass.
5—R. F. grid filter condenser.
6—1st-detector bias by-pass.
7—2nd-detector—A. F. coupling condenser.
8—R. F. bias by-pass.
9—R. F. 1st-detector—I. F. screen by-pass.
10—I. F. bias by-pass.
11—1st-detector plate filter condenser.
12—Quality condenser.

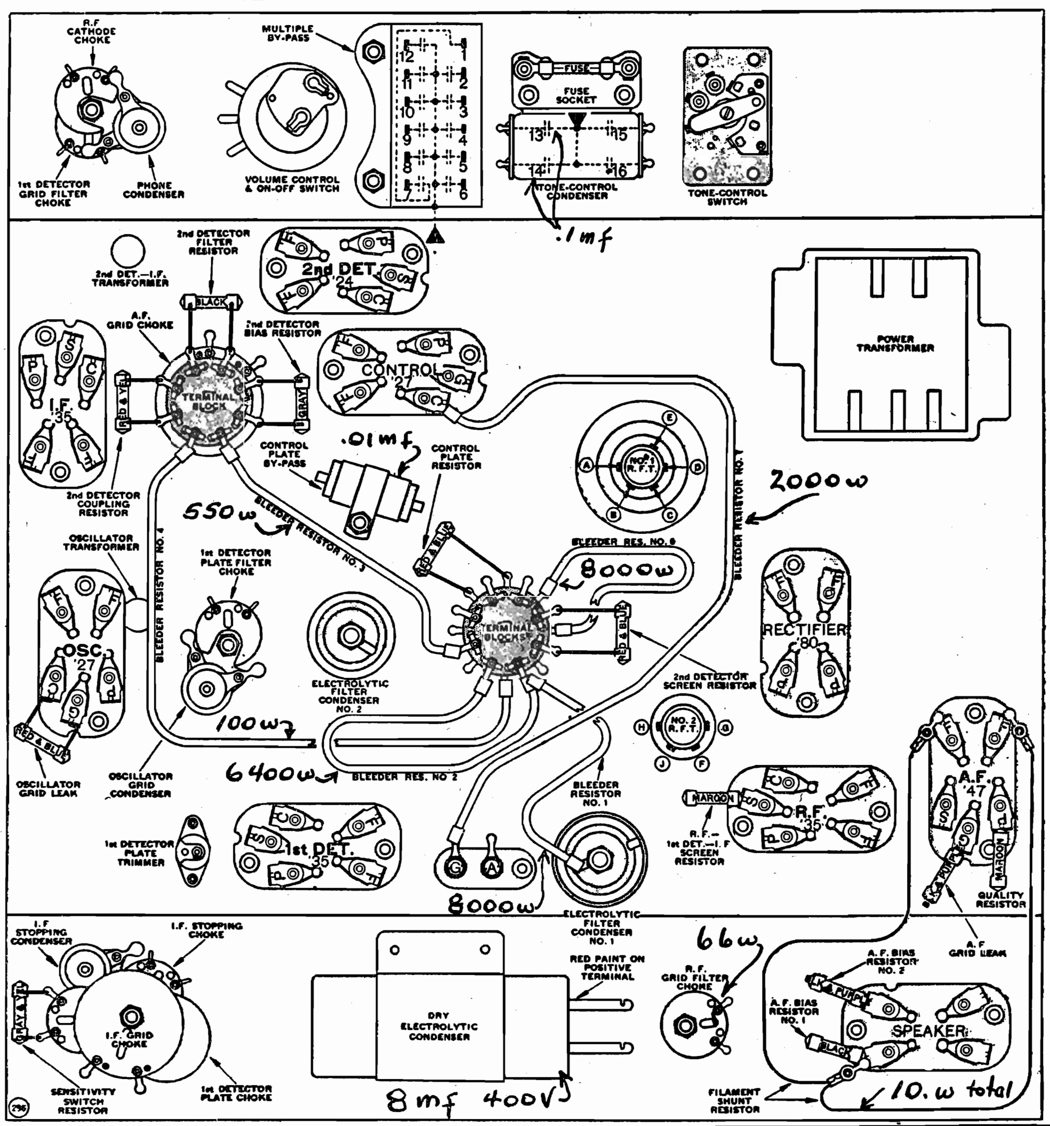
Tone-control Condenser

13—2nd-detector plate filter condenser.
14—2nd-detector screen by-pass.
15—Tone condenser.
16—Tone condenser.

MODEL 92, 92-F TOP VIEW

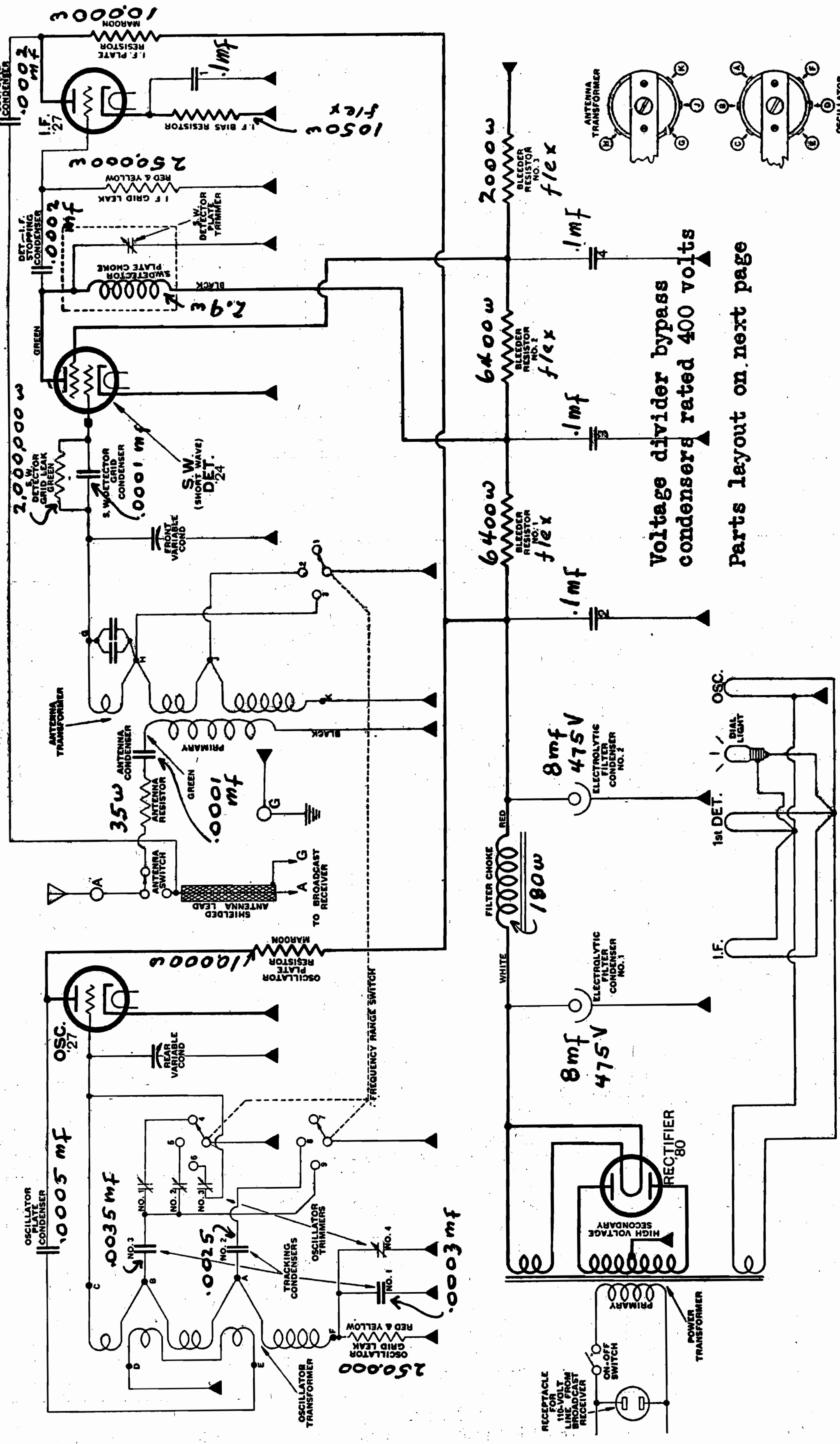


MODEL 92-F CHART



ATWATER KENT MFG. CO.

MODEL 93
Short Wave
Converter



THE INTERMEDIATE FREQUENCY IS 1,000 KILOCYCLES.

The two fixed condensers across contacts G and H of the antenna transformer are listed as "compensating condensers" in the parts list. In a few early-type sets, a paper-and-foil condenser is used instead of electrolytic filter condenser No. 1.

In some Model 93 converters, an antenna choke, not shown above, is connected across the antenna condenser. This choke is No. 26510. ←2.7w

MODEL 93 SHORT WAVE CONVERTER

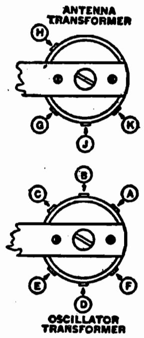
Voltage data on page 229

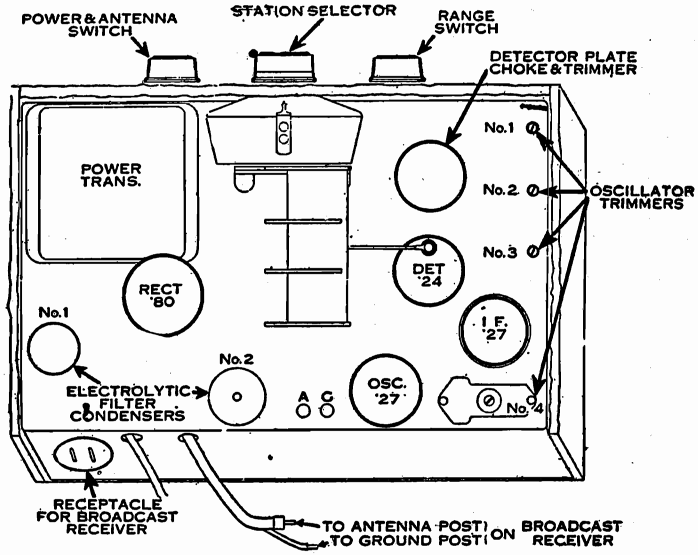
Voltage reference page 3-83.

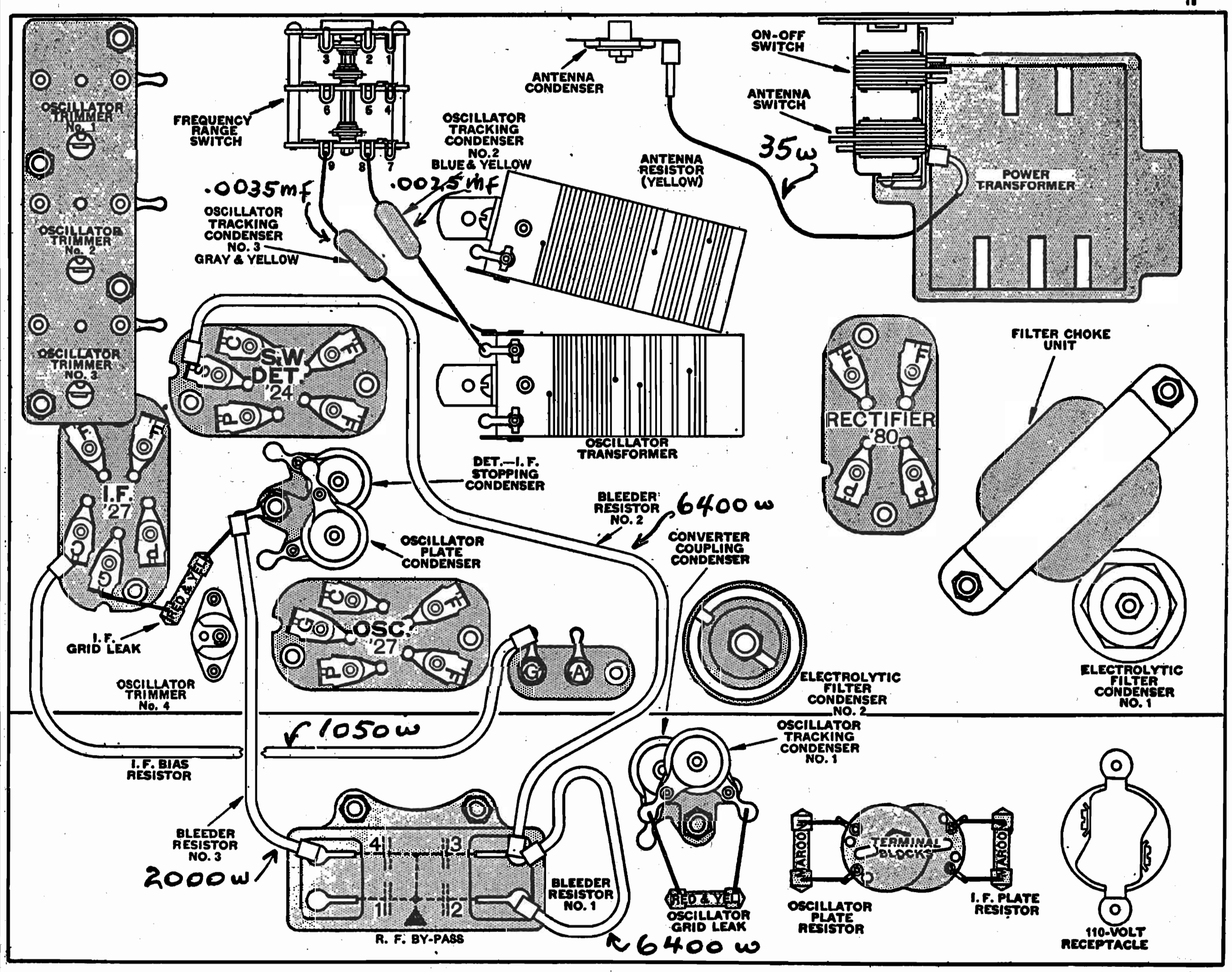
MODEL 93
Short Wave
Converter

ATWATER KENT MFG. CO.

SHORT WAVE CONVERTER





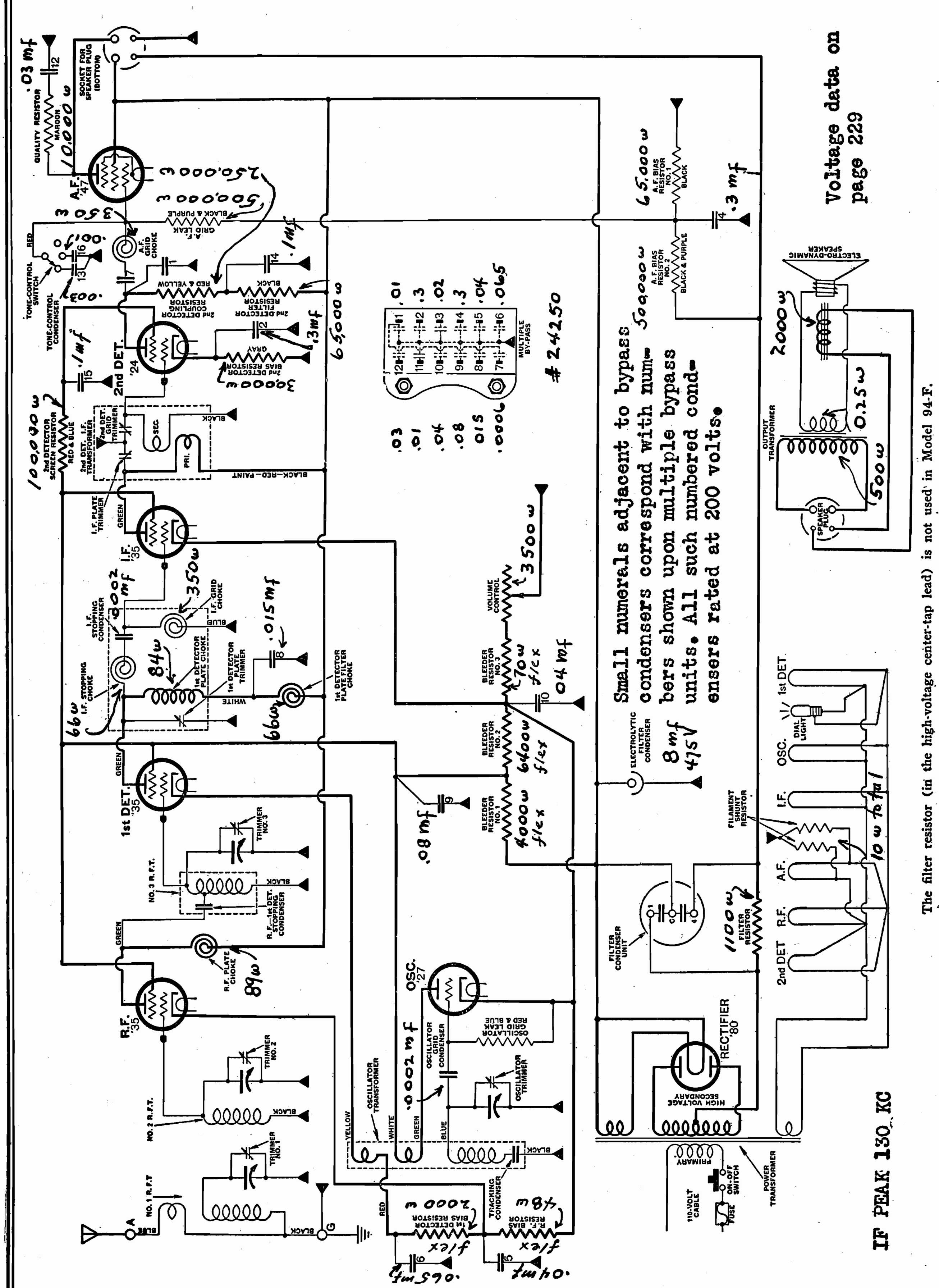


BOTTOM CHART.

In servicing this converter, do not change the original position of the wiring as it will distarb the dial calibration. An antenna choke, No. 26510, not shown above, is connected across the antenna condenser in some Model 93 converters.

ATWATER KENT MFG. CO.

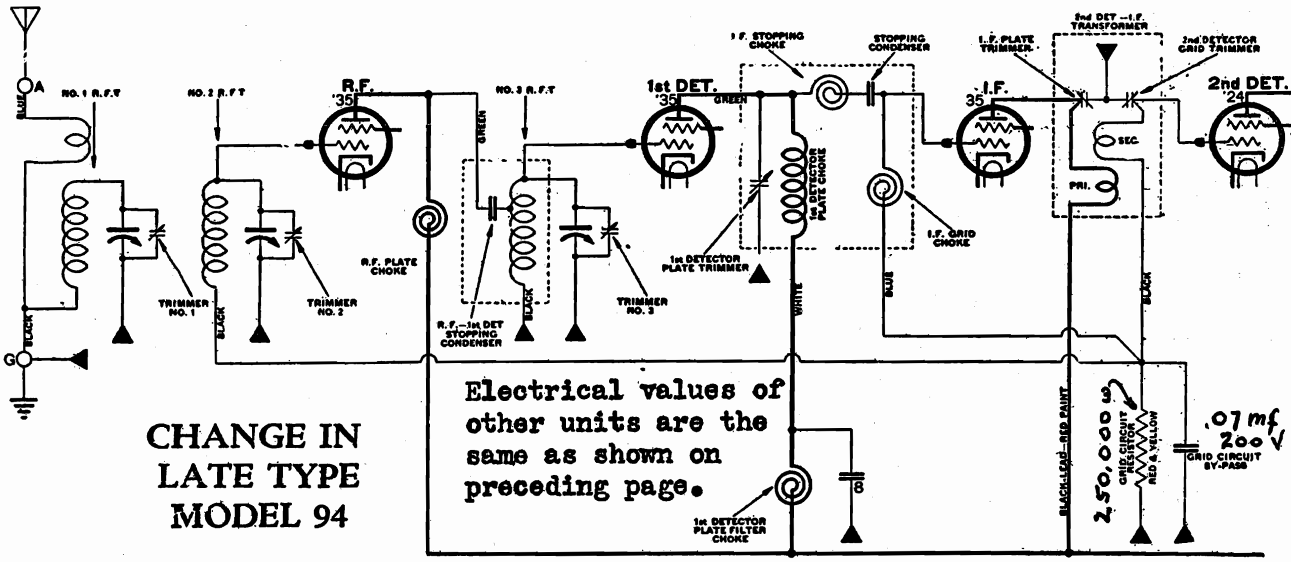
MODEL 94, 94-F



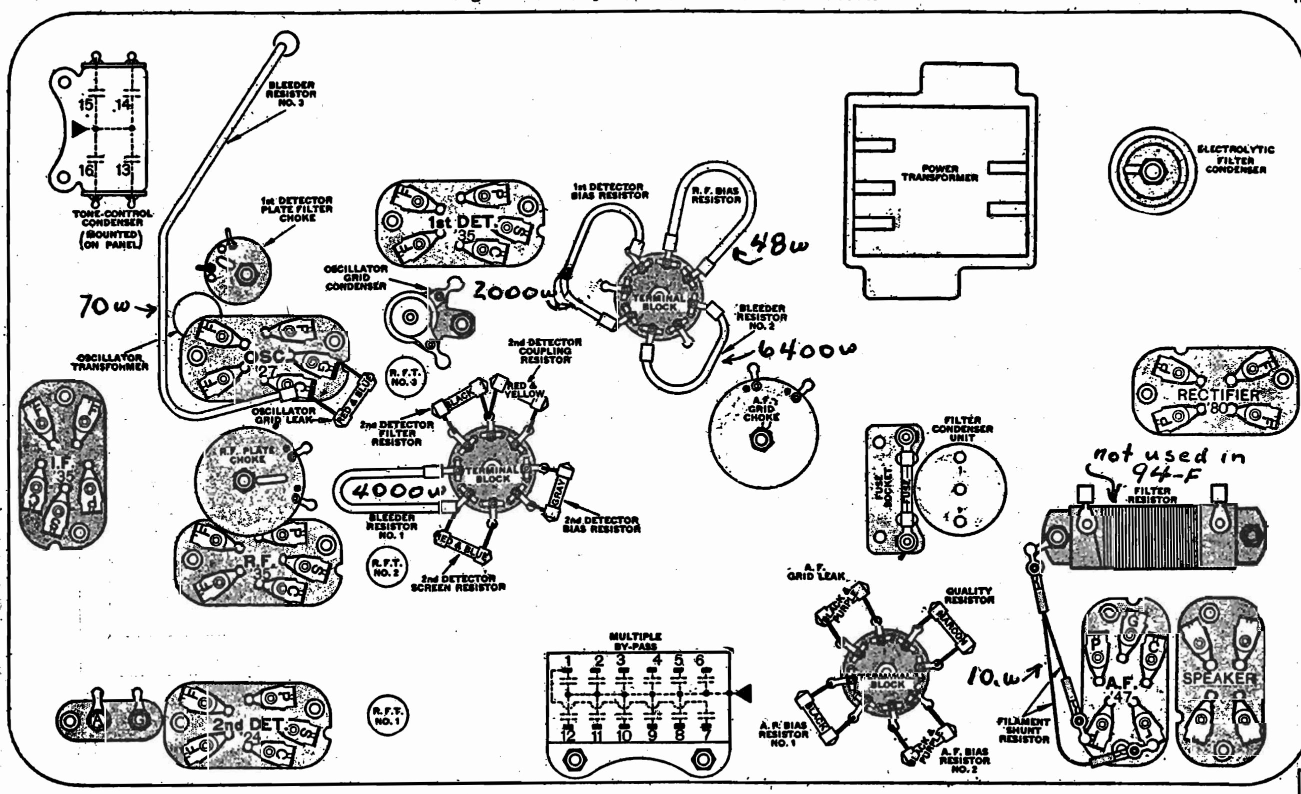
Voltage reference page 3-83.

MODEL 94, 94-F

ATWATER KENT MFG. CO.



In late type Model 94, the grid returns of the R. F., I. F., and 2nd-detector tubes are connected to ground through a red-and-yellow resistor as shown above.



BOTTOM CHART.

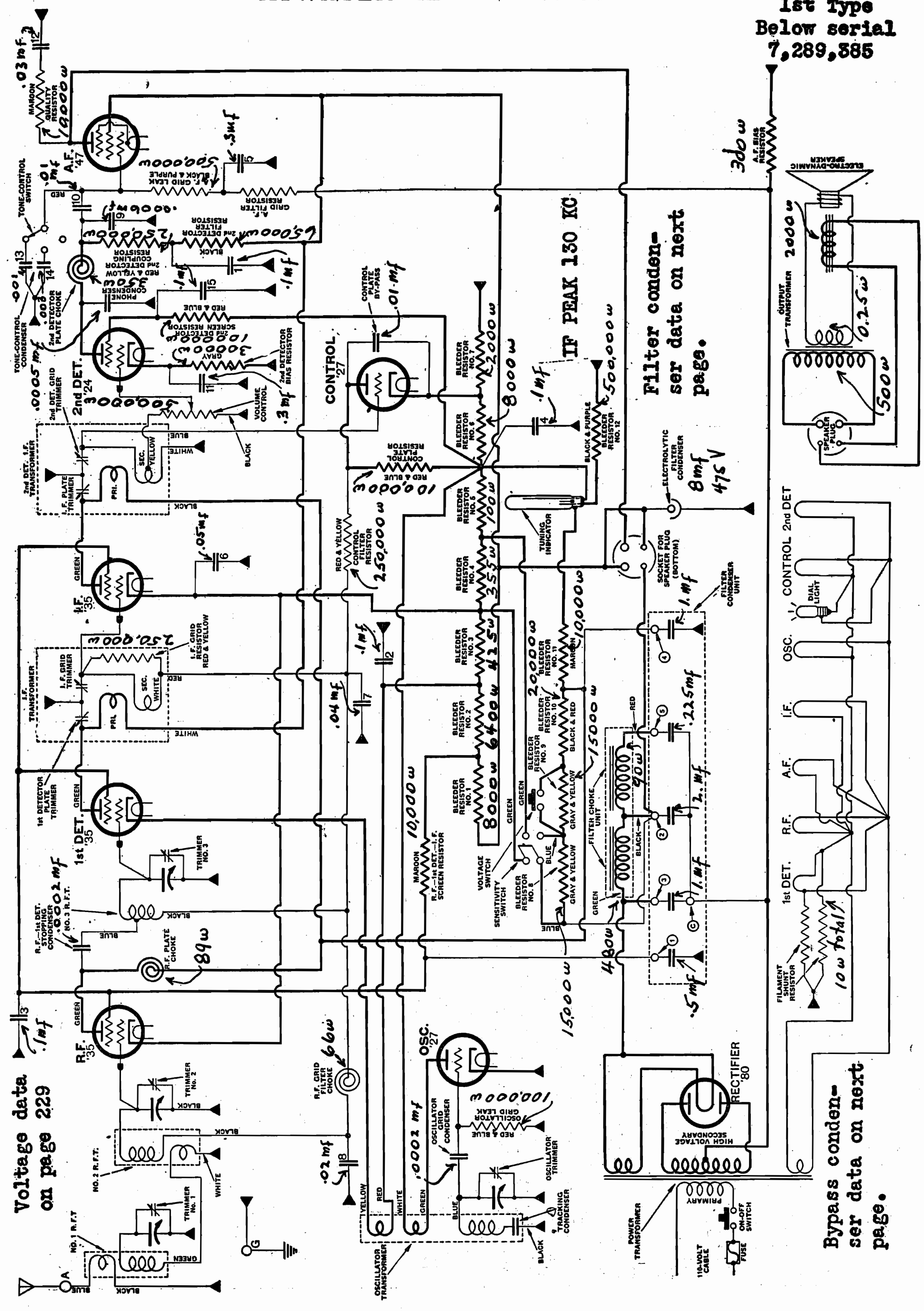
The filter resistor is not used in Model 94-F.

Condensers in Multiple By-pass
1—Phone condenser.
2—2nd-detector bias by-pass.
3—Not used.
4—A. F. bias by-pass.
5—R. F. bias by-pass.
6—1st-detector bias by-pass.
7—2nd-detector—A. F. coupling condenser.
8—1st-detector plate filter condenser.
9—R. F. 1st-detector—I. F. screen by-pass.
10—I. F. bias by-pass.
11—Not used.
12—Quality condenser

Tone-control Condenser (on panel)
13—Tone condenser.
14—2nd-detector plate filter condenser.
15—2nd-detector screen by-pass.
16—Tone condenser.

ATWATER KENT MFG. CO.

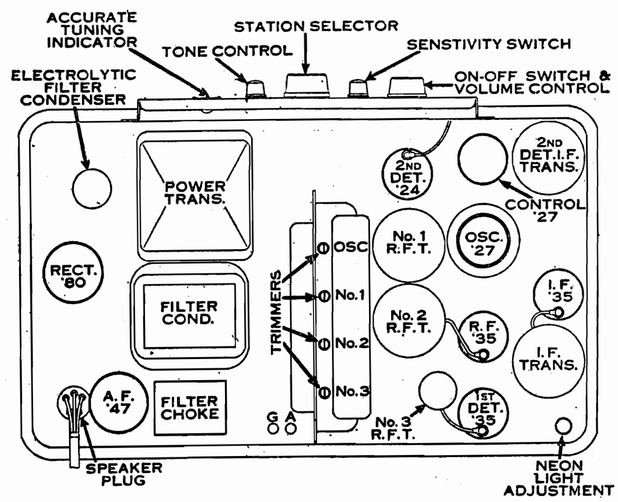
MODEL 96
1st Type
Below serial
7,289,385



MODEL 96
1st Type
Below serial
7.289.385

ATWATER KENT MFG. CO.

MODEL 96, 96-F TOP VIEW



BYPASS CONDENSERS
RF Bypass # 1
400 volts
RF Bypass # 2
200 volts
RF Bypass # 3
400 volts
Tone Control
100 volts

By-pass No. 1
1—2nd-detector plate filter condenser.
2—1st-detector bias by-pass.
3—R. F. 1st-detector — I. F. screen by-pass.
4—Control plate filter condenser.

By-pass No. 2
5—A. F. grid filter condenser.
6—R. F.—I. F. bias by-pass.
7—1st-detector—I. F. grid filter condenser.
8—R. F. grid filter condenser.

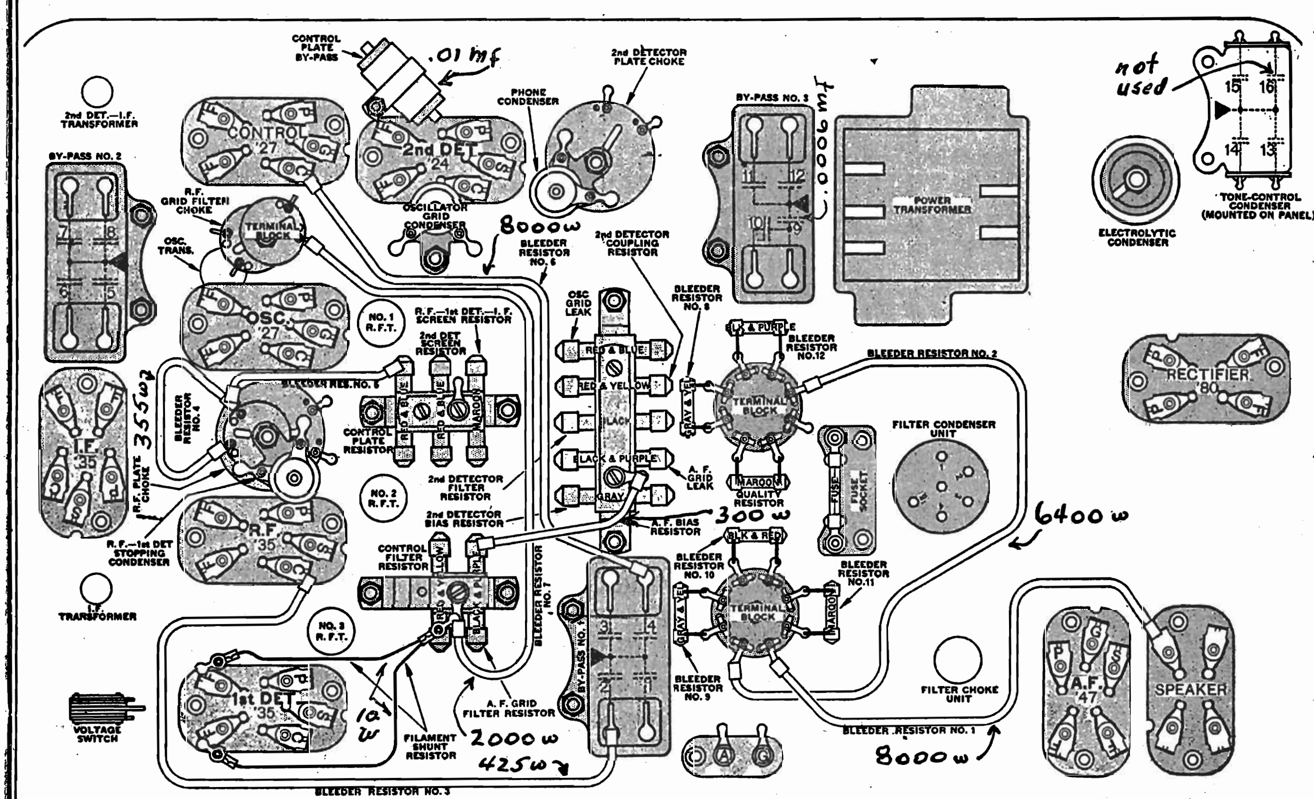
By-pass No. 3
9—Phone condenser.
10—2nd-detector — A. F. coupling condenser.
11—2nd-detector bias by-pass.
12—Quality condenser.

Tone-control Condenser (on panel)
13—Tone condenser.
14—Tone condenser.
15—2nd-detector screen by-pass.
16—Not used.

FILTER CONDENSERS. The small numbers adjacent to the filter condensers correspond with the numbers marked upon the filter condenser terminal block. The following are the internal connections.

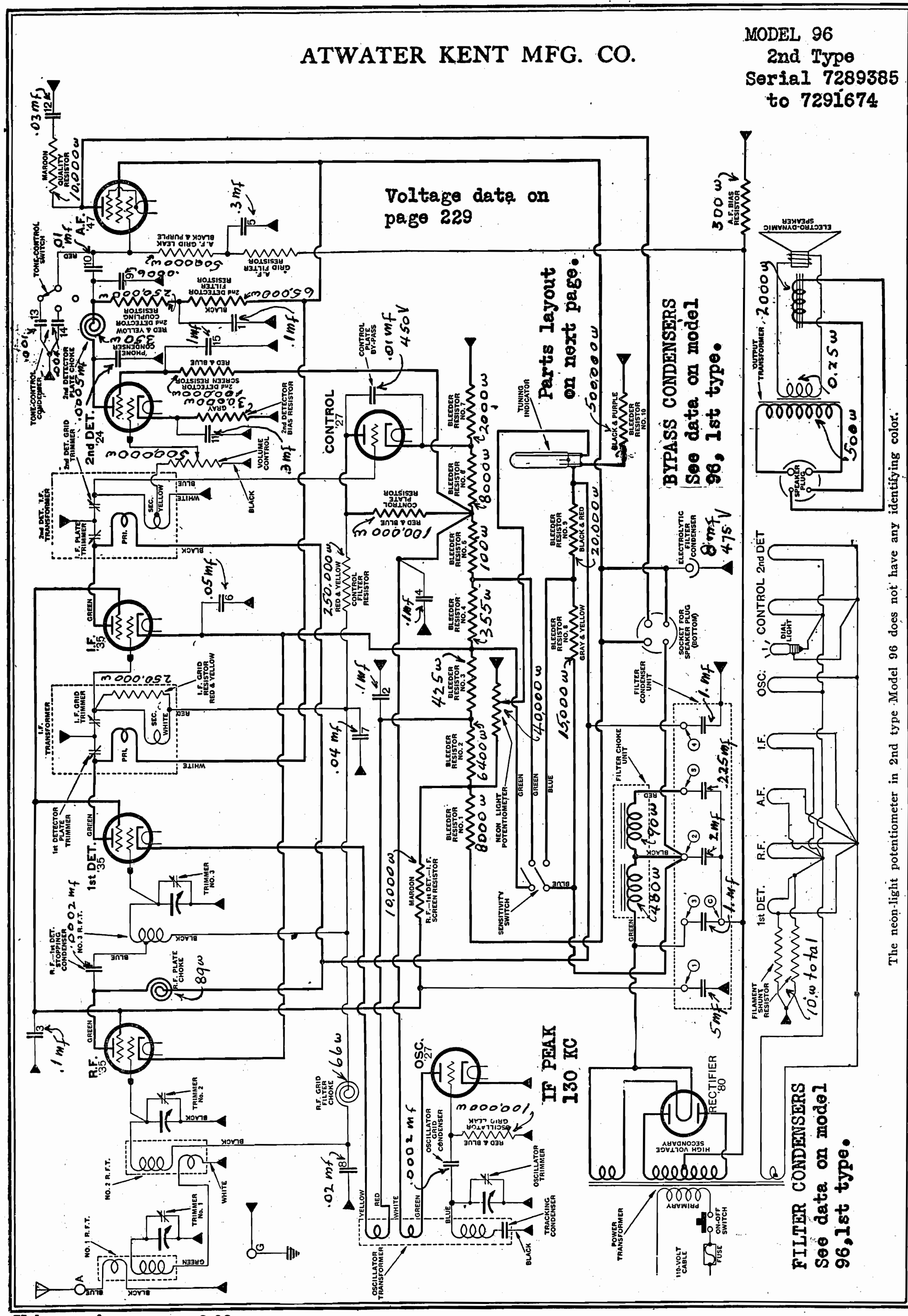
Filter # 1	1. mfd	connected between terminal (3) and center stud
Filter # 2	2. mfd	connected between terminal (2) and center stud
Filter # 3	1. mfd	connected between terminal (4) and can
Hum	.225 mfd	connected between terminal (5) and center stud
Divider	.5 mfd	connected between terminal (1) and can

CHART OF MODEL 96 (1st Type) Below Serial No. 7289385



ATWATER KENT MFG. CO.

MODEL 96
2nd Type
Serial 7289385
to 7291674



Voltage reference page 3-83.

MODEL 96
3rd Type
Above serial
7,291,674

ATWATER KENT MFG. CO.

CHART OF MODEL 96 (2nd Type) Serial Nos. 7289385 to 7291674

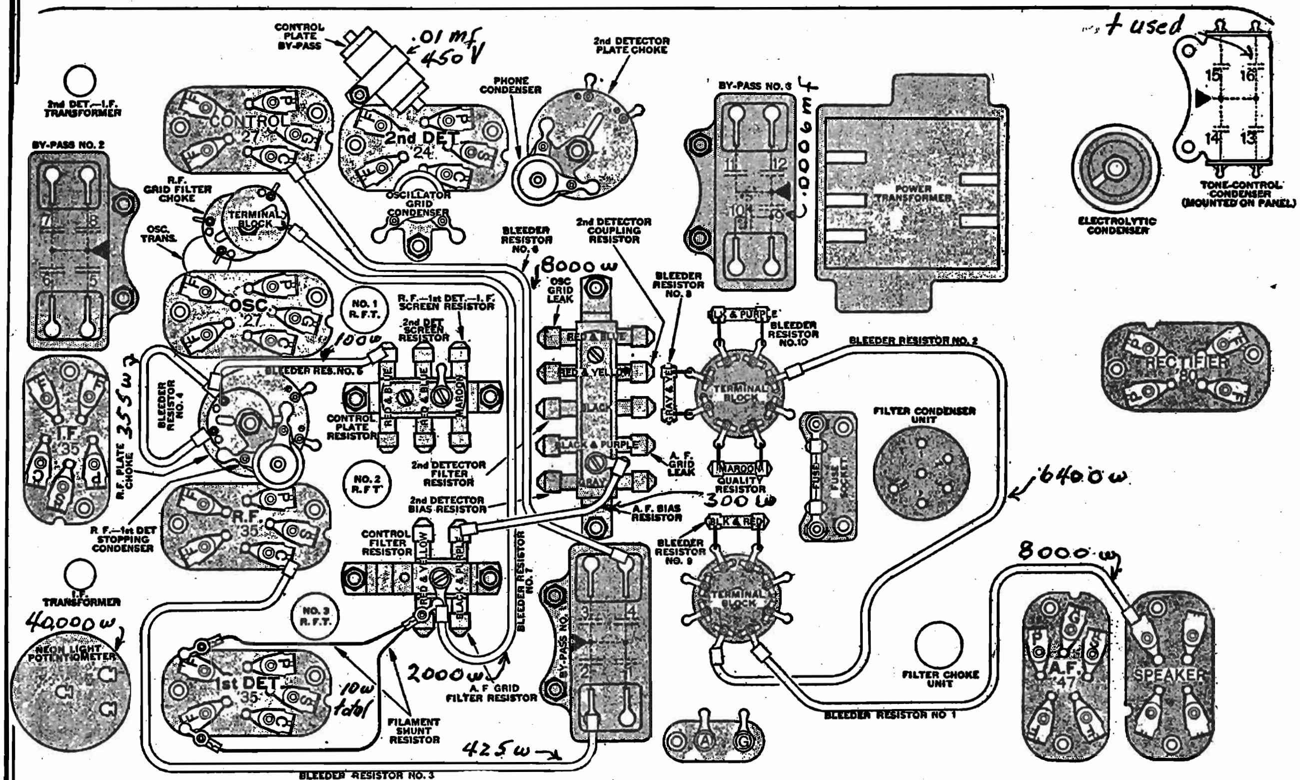
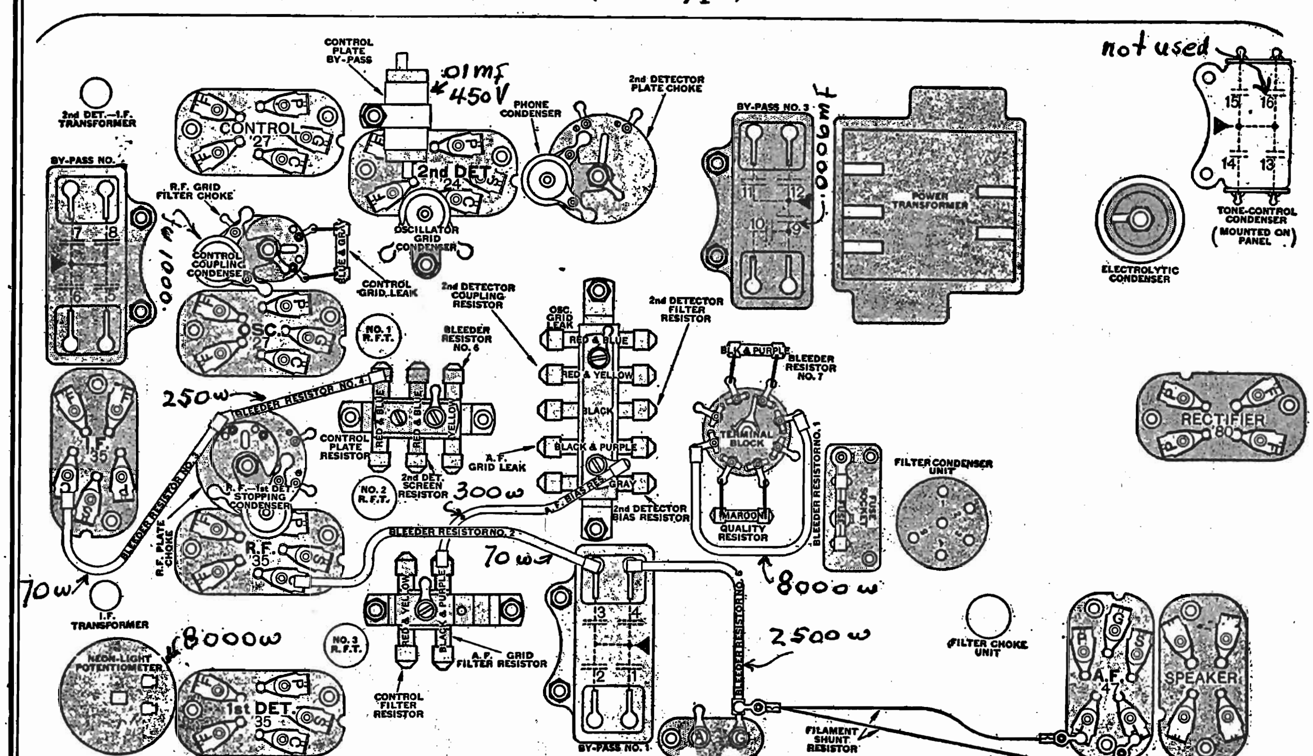


CHART OF MODEL 96 (3rd Type) Above Serial No. 7291674

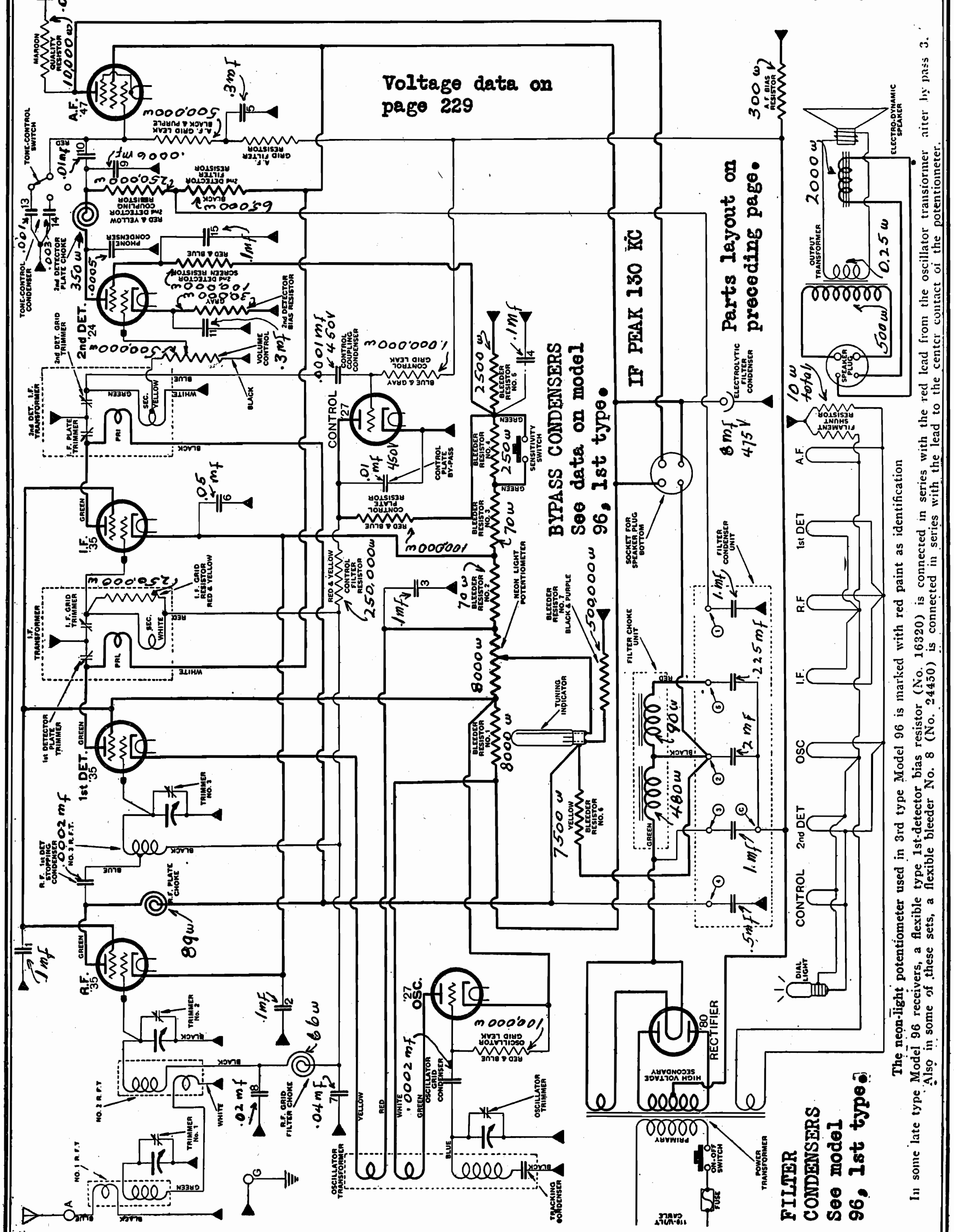


In some late type Model 96 receivers, a flexible type 1st-detector bias resistor (No. 16320) is connected between condenser 3 (in by-pass No. 1) and the lower contact of the potentiometer. In this case, bleeder No. 2 is connected from the lower contact of the potentiometer to the R. F. cathode. Also in some of these sets, a flexible bleeder No. 8 (No. 24450) is connected in series with the lead to the center contact of the potentiometer.

ATWATER KENT MFG. CO.

MODEL 96
3rd Type
Above serial
7,291,674

Voltage data on page 229



The neon-light potentiometer used in 3rd type Model 96 is marked with red paint as identification.
In some late type Model 96 receivers, a flexible type 1st-detector bias resistor (No. 16320) is connected in series with the red lead from the oscillator transformer after by pass 3. Also in some of these sets, a flexible bleeder No. 8 (No. 24430) is connected in series with the lead to the center contact of the potentiometer.

Voltage reference page 3-83.

ATWATER KENT MFG. CO.

TABLE OF VOLTAGES ACROSS BLEEDER RESISTORS IN MODELS 85-Q, 86, 87, 89, 90, 92, 92-F, 93, 94, 96, 96-F, 99, 99-F, 99-P

Turn volume control to maximum.

In all sets equipped with sensitivity switch, voltage switch, or neon tuning light potentiometer: Before making measurements, place sensitivity switch in NORMAL position, voltage switch in REDUCED VOLTAGE position, or neon tuning light potentiometer in full counter-clockwise position.

Line voltage=110 volts.

Bleeder Resistor No.	85-Q 2nd Type	86 2nd Type	87 3rd Type	89 3rd Type	90	92	92-F	93	94	96 1st Type	96 2nd Type	96 3rd Type	96-F	99 1st Type	99 2nd Type	99 3rd Type and 99-P	99-F
1	45	65	80	60	74*	68	72	75	95	70	90	80	97	82	93	62	50
2	9	47	45	55	60*	50	48	70	100	50	45	1	54	55	70	115	95
3	15	5	2	8	50	5	5	20	3	5	4	1	5	50	42	8	6
3-A	—	4	7	6	—	—	—	—	—	—	—	—	—	—	—	—	—
4	—	3	—	1	2	1	2	—	—	5	4	5	5	8	6	1	1
5	—	50	—	48	—	3	—	—	—	2	1	50	1	5	3	5**	5
6	—	5	—	5	—	62	70	—	—	65	55	32	66	1	1	60	45
7	—	5	—	25	—	15	18	—	—	17	15	112	17	60	49	15	15
8	—	—	—	—	—	—	—	—	—	32	28	—	50	7	7	22	22
9	—	—	—	—	—	—	—	—	—	32	33	—	7	26	27	47	37
10	—	—	—	—	—	—	—	—	—	38	95	—	125	33	24	5	1
11	—	—	—	—	—	—	—	—	—	2	—	—	—	25	35	170	122
12	—	—	—	—	—	—	—	—	—	60	—	—	—	5	98	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—	—	10	—	—	—
14	—	—	—	—	—	—	—	—	—	—	—	—	—	90	—	—	—

* The readings across No. 1 and No. 2 bleeders in Model 90 may be reversed; see note under diagram of Model 90.
** Bleeder No. 5 is not used in 99-P and the grid voltage of the '35 tubes is lower than indicated.

VOLTAGE TABLE

91, 91-B, 91-C, 188, 188-F, 260, 260-F, 469, 469-F

The voltages listed in this table are only approximate and are measured values, not actual operating values.

Use 250-volt scale of a 1000-ohm-per-volt voltmeter.

TONEBEAM ADJUSTMENT FULL COUNTER CLOCKWISE; RANGE SWITCH AT LOCAL.

All plates, screen and grid measurements are made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

LINE VOLTAGE = 110 VOLTS

Tube	Circuit	91 91-B 91-C	188 188-F	260 260-F 1st Type	260 260-F 2nd Type	469 469-F
R. F. Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	130	130	200	250	125
	Screen	80	75	90	70	110
	Grid	2	3	2	1	2
1st-Det. Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	125	130	200	250	160
	Screen	75	75	20	60	100
	Grid	5	1	1	2	5
I. F. Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	130	130	200	250	125
	Screen	85	75	90	70	110
	Grid	2	4	2	1	2
2nd-Det. Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	60	95	**	**	170
	Screen	—	55	**	**	—
	Grid	9	4	**	**	15
1st-A. F. Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	130	205	115	110	230
	Screen	—	215	—	—	235
	Grid	3	3	2	1	15
2nd-A. F. Tube	Filament	6	—	2.4	2.4	—
	Plate	127	—	230	225	—
	Screen	130	—	235	230	—
	Grid	12	—	15	15	—
Osc Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	100	85	35	40	75
	Grid	*	*	*	*	*
Control Tube	Filament	6	2.4	2.4	2.4	2.4
	Plate	5	40	**	**	14
	Grid	2.5	10	**	**	10

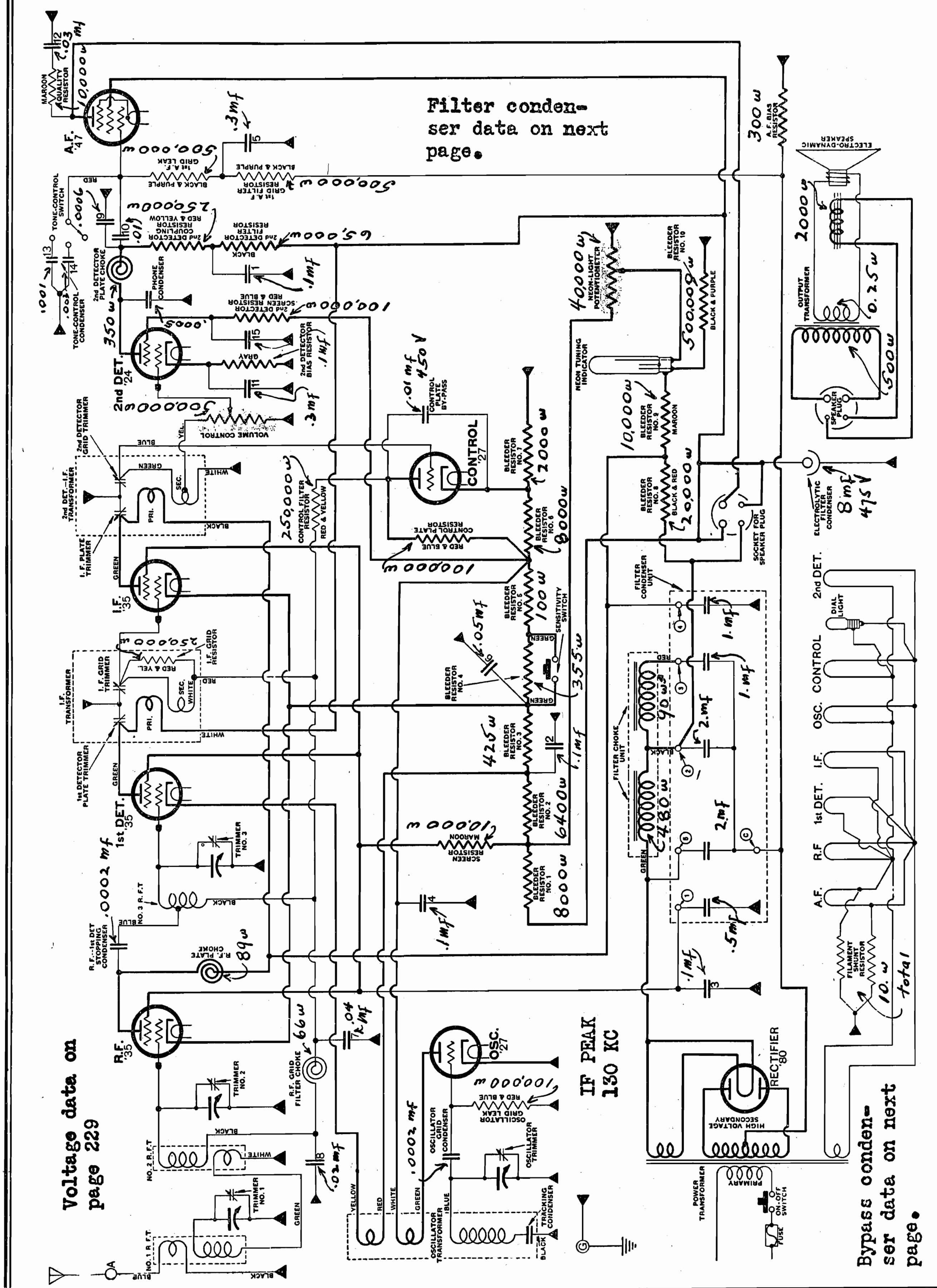
VOLTAGES ACROSS BLEEDER AND BIAS RESISTORS

Resistor	188 188-F	260 260-F 1st type	260 260-F 2nd type	469 469-F
Bleeder No. 1	50	92	90	50
Bleeder No. 2	85	108	75	110
Bleeder No. 3	70	73	55	8
Bleeder No. 4	11	20	15	12
Bleeder No. 5	—	88	30	Slight
Bleeder No. 6	—	50	85	35
Bleeder No. 7	—	—	—	55
1st-detector bias	5	2	1	3
R. F.-I. F. bias No. 1	Slight	4	6	1
R. F.-I. F. bias No. 2	7	2	2	—
2nd-I. F. bias	—	Slight	Slight	—
2nd-detector bias	5	—	—	15
1st-A. F. bias	—	5	5	—
A. F. bias	12	15	15	15
Tonebeam adjustment	—	95	120	65

* The measured oscillator grid voltage will vary dependent on several factors. In some cases, no reading will be secured for grid bias. In other cases, the reading will be only slight, or it may be as high as 10 volts.
** In Model 260 and 260-F, the 2nd-detector also functions as automatic-volume-control tube. The voltages that can be read at this socket are as follows: 1st type, cathode to ground 20 volts, grid to ground 7 volts. 2nd type, cathode to ground 15 volts, grid to ground 5 volts.

ATWATER KENT MFG. CO

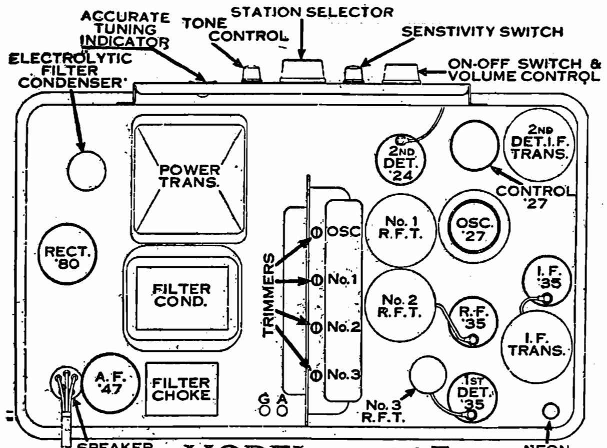
MODEL 96-F



Voltage reference page 3-83.

MODEL 96-F

ATWATER KENT MFG. CO.



MODEL 96-F TOP VIEW

By-pass No. 1

1—2nd-detector plate filter condenser.
2—1st-detector bias by-pass.
3—R. F. 1st-detector — I. F screen by-pass.
4—Control plate filter condenser.

By-pass No. 2

5—A. F. grid filter condenser.
6—R. F.—I. F. bias by-pass.
7—1st-detector—I. F. grid filter condenser.
8—R. F. grid filter condenser.

By-pass No. 3

9—Phone condenser.
10—2nd-detector — A. F. coupling condenser.
11—2nd-detector bias by-pass.
12—Quality condenser.

Tone-control Condenser (on panel)

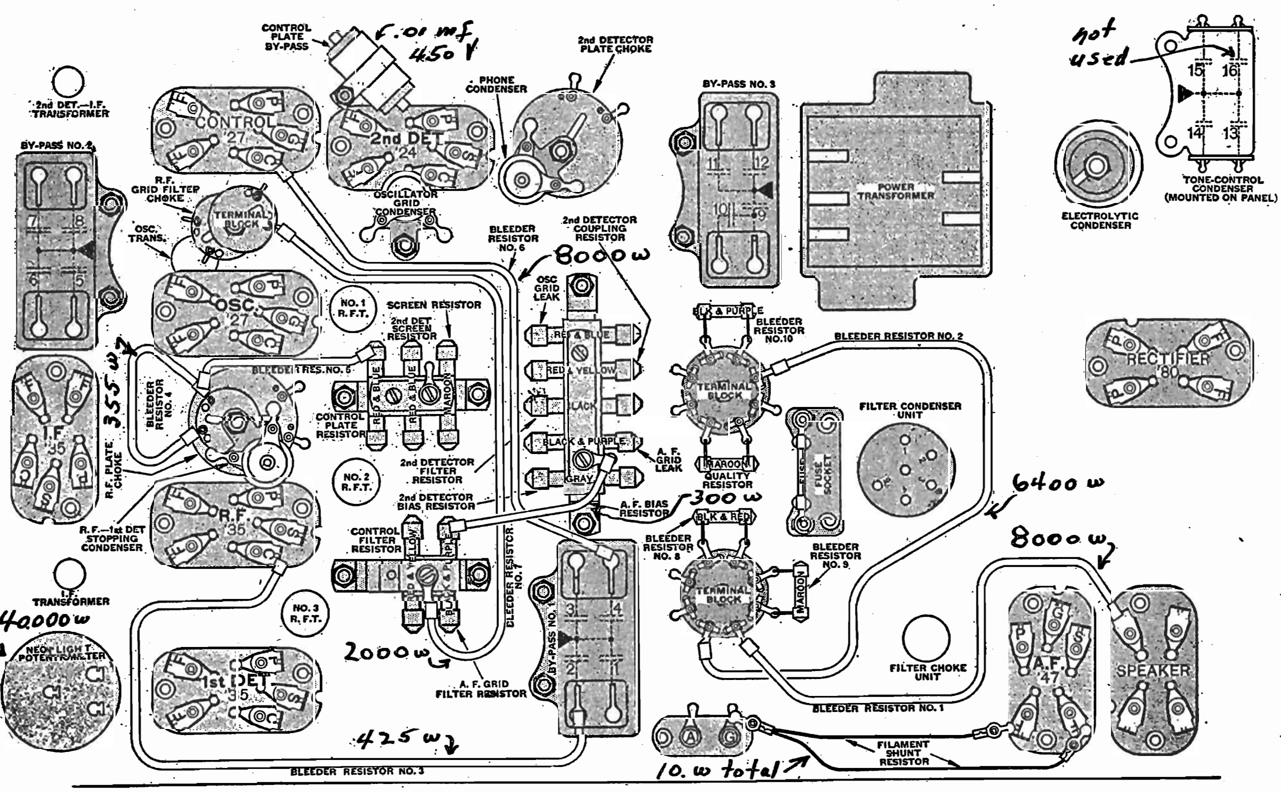
13—Tone condenser.
14—Tone condenser.
15—2nd-detector screen by-pass.
16—Not used.

BYPASS CONDENSERS
RF Bypass # 1 400 volts
RF Bypass # 2 200 volts
RF Bypass # 3 400 volts
Tone Control 100 volts

FILTER CONDENSERS. The filter condenser block employed in the 96-F is not the same as that used in the 96 (1st type). The small numerals adjacent to the filter condensers correspond with the numerals marked upon the filter condenser terminal block. The following are the internal connections.

Filter # 1	2.0 mfd	connected between terminal 5 and center stud
Filter # 2	2.0 mfd	connected between terminal (2) and center stud
Filter # 3	1.0 mfd	connected between terminal (4) and can
Hum	1.0 mfd	connected between terminal (3) and center stud
Bypass	.5 mfd	connected between terminal (1) and can

MODEL 96-F BOTTOM CHART



ATWATER KENT MFG. CO.

MODEL 99
1st and 2nd Types

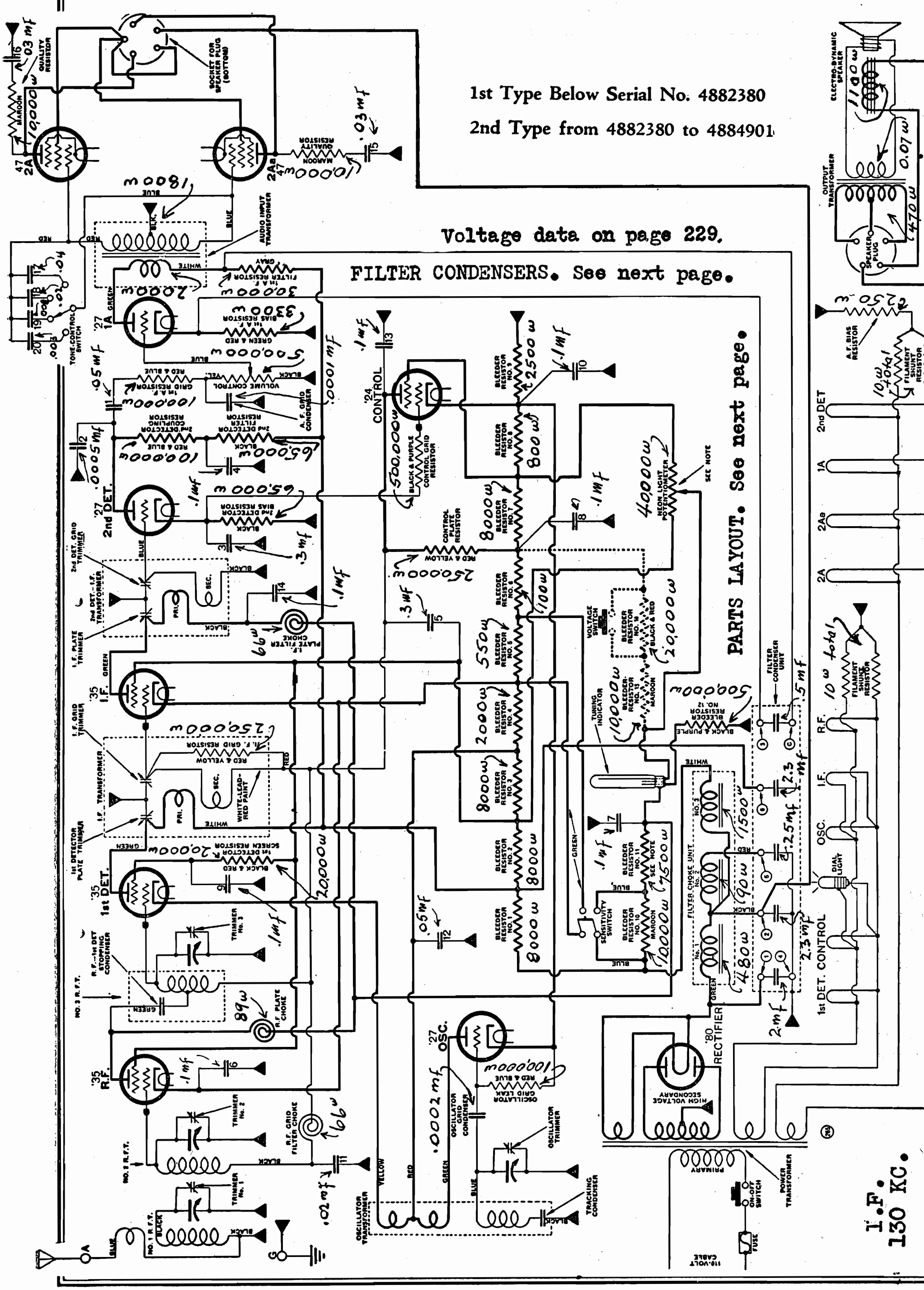
1st Type Below Serial No. 4882380

2nd Type from 4882380 to 4884901

Voltage data on page 229.

FILTER CONDENSERS. See next page.

PARTS LAYOUT. See next page.



I.F. 130 KC.

NOTE—In 1st type sets, the neon-light potentiometer is not used, and the circuit is connected as shown in dotted lines. In early sets using the voltage switch, bleeder No. 11 is yellow. In sets using the potentiometer, bleeder No. 11 is yellow-and-gray. In a few sets using the potentiometer, bleeder No. 11 consists of two gray resistors in parallel. The neon-light potentiometer in 2nd type Model 99 does not have any identifying color.

Voltage reference page 3-83.

MODEL 99
1st Type

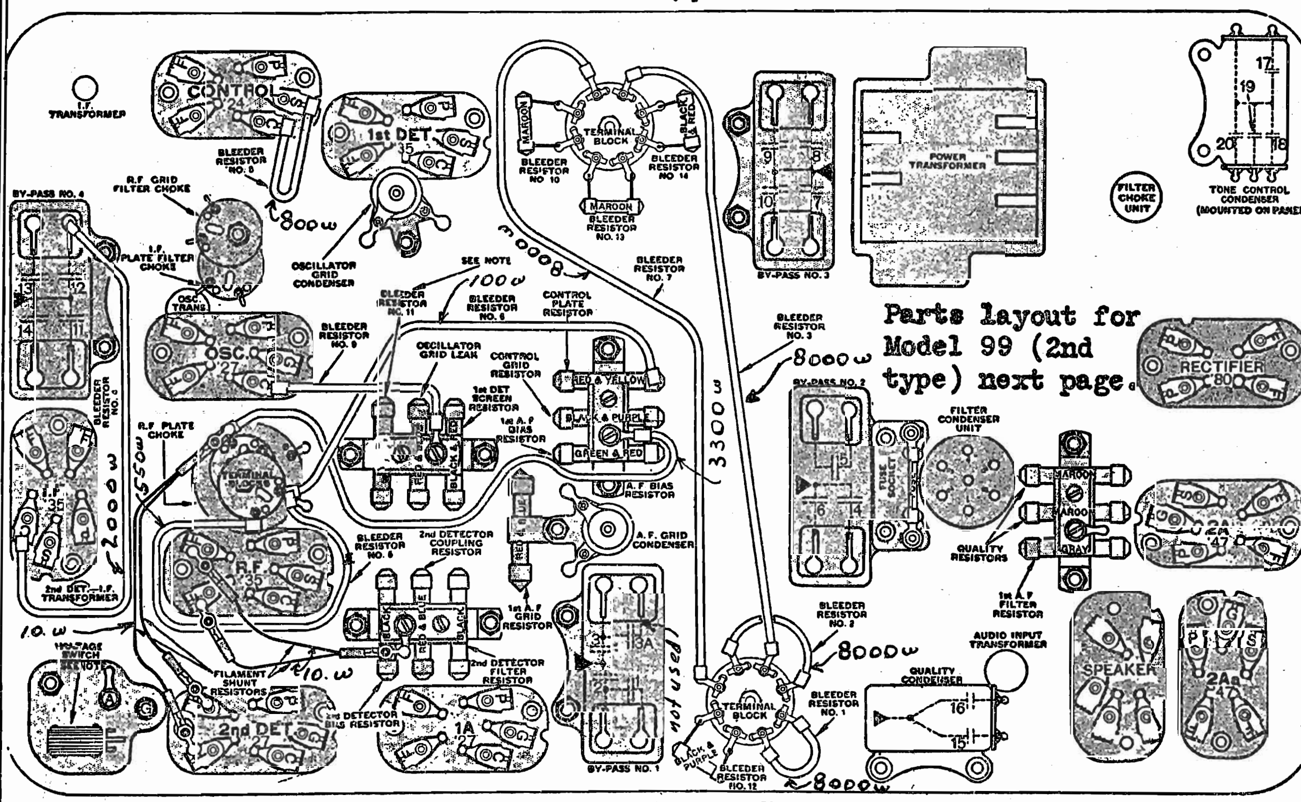
ATWATER KENT MFG. CO.

Below serial 4,882,380

The small numerals adjacent to the filter condensers upon the schematic wiring diagram correspond with the numbers marked upon the filter condenser terminal block. Also with the numbers shown upon the parts layout. The following are the internal connections. All of the units within the can are NOT used.

Filter # 1	2.0 mfd	connected between terminals (1) and (4)
Filter # 2	2.3 mfd	connected between terminals (2) and (4)
Filter # 3	2.3 mfd	connected between terminal (6) and can
Hum	.25 mfd	connected between terminals (5) and (4)
A-F filter	.5 mfd	connected between terminal (3) and center stud
	.1 mfd	connected between terminal (2) and can (not used)
	.1 mfd	connected between center stud and can (not used)

CHART OF MODEL 99 (1st Type) Below Serial No. 4882380



Bleeder Resistor No. 11 is Yellow

By-pass No. 1

1—2nd-detector — A F coupling condenser
2—Phone condenser
3—2nd-detector bias by-pass
3A—Not used.

400 volts #21440

By-pass No. 2

4—2nd-detector plate filter condenser
5—Screen by-pass.
6—R. F. bias by-pass.

200 volts #22050

By-pass No. 3

7—R. F. plate filter condenser.
8—Control plate filter condenser
9—1st-detector screen by-pass.
10—Control cathode by-pass.

400 volts #15262

By-pass No. 4

11—R. F. grid filter condenser
12—1st-detector bias by-pass.
13—Control plate by-pass.
14—I. F plate filter condenser

400 volts #21430

Quality Condenser

15—Quality condenser
16—Quality condenser.

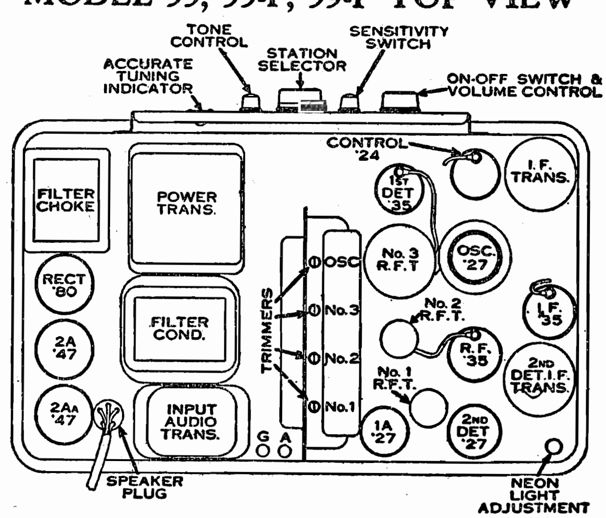
450 volts #21460

Tone-control Condenser (on panel)

17—Tone condenser.
18—Tone condenser.
19—Tone condenser.
20—Tone condenser.

200 volts #21630

MODEL 99, 99-F, 99-P TOP VIEW



ATWATER KENT MFG. CO.

MODEL 99 (2nd)
99 (3rd)

CHART OF MODEL 99 (2nd Type) Serial Nos. 4882380 to 4884901

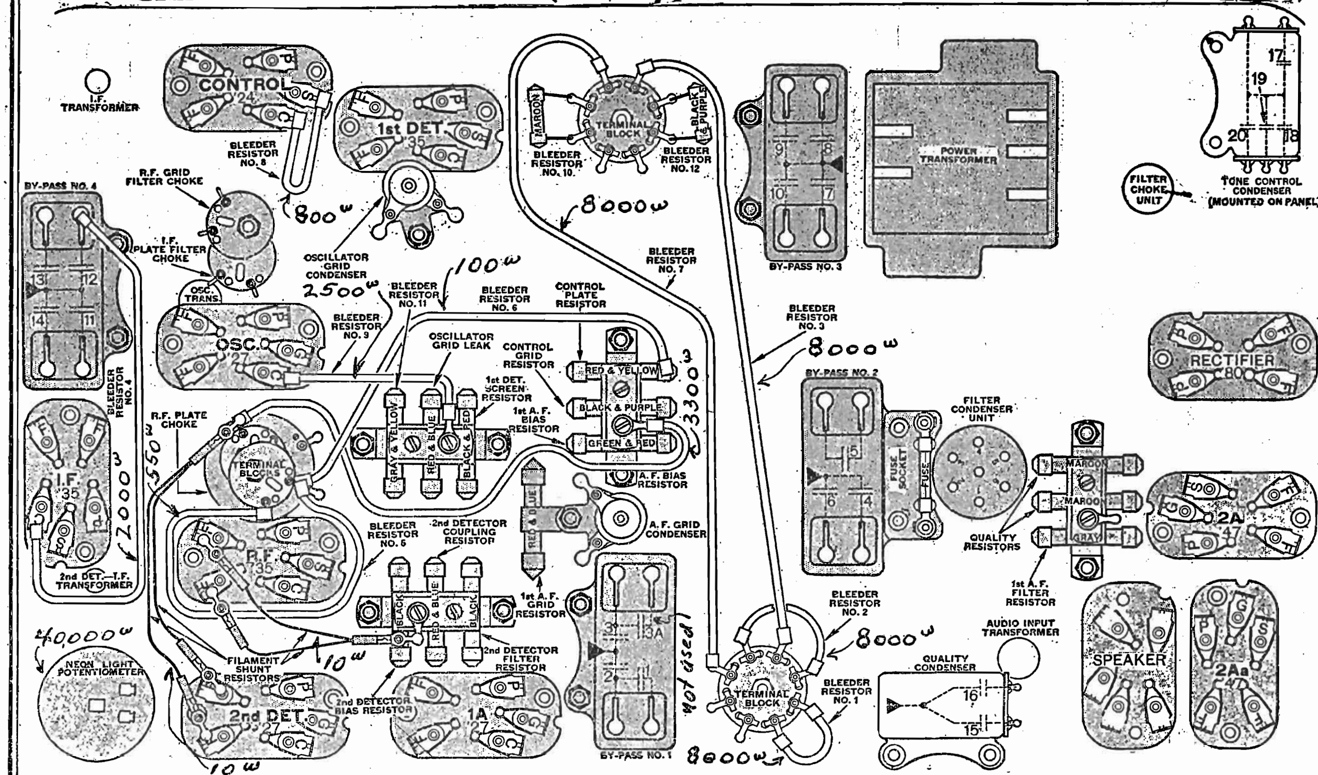
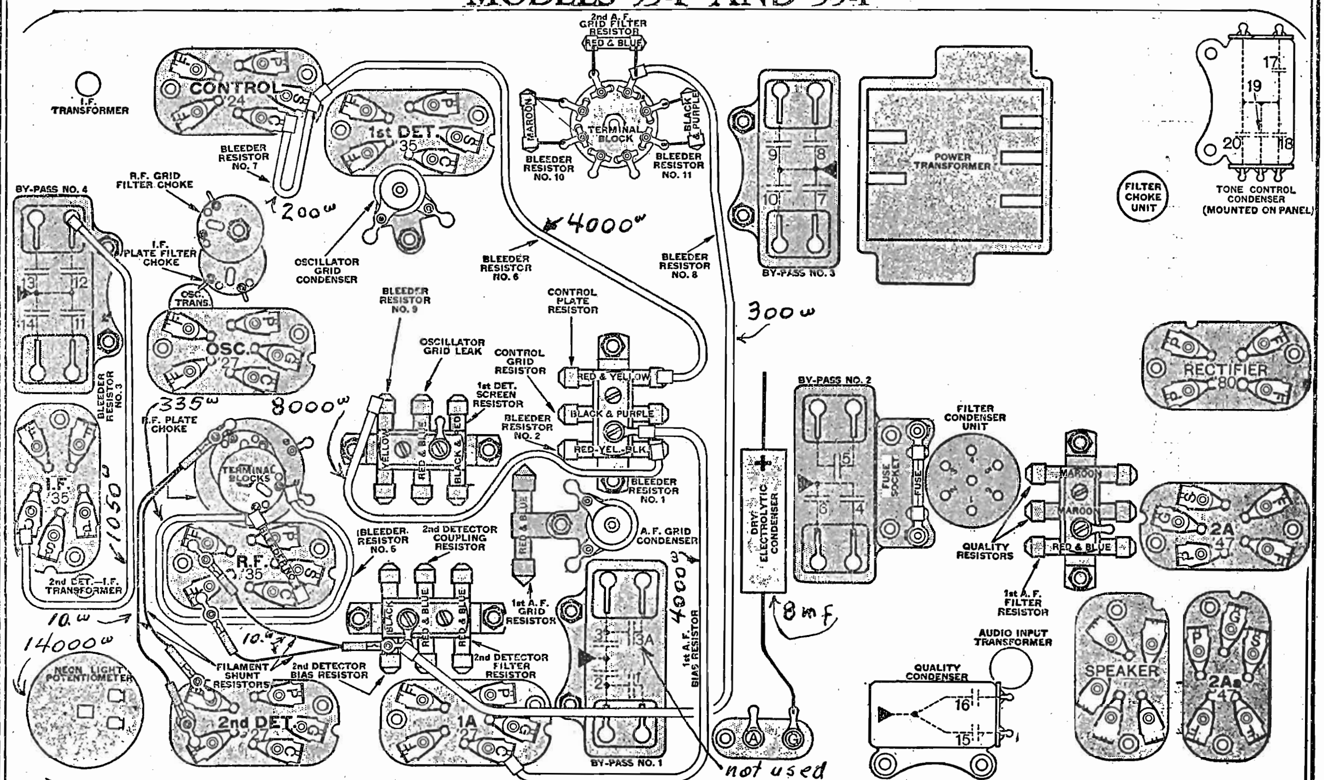


CHART OF MODEL 99 (3rd Type) Above Serial No. 4884901
MODELS 99-F AND 99-P



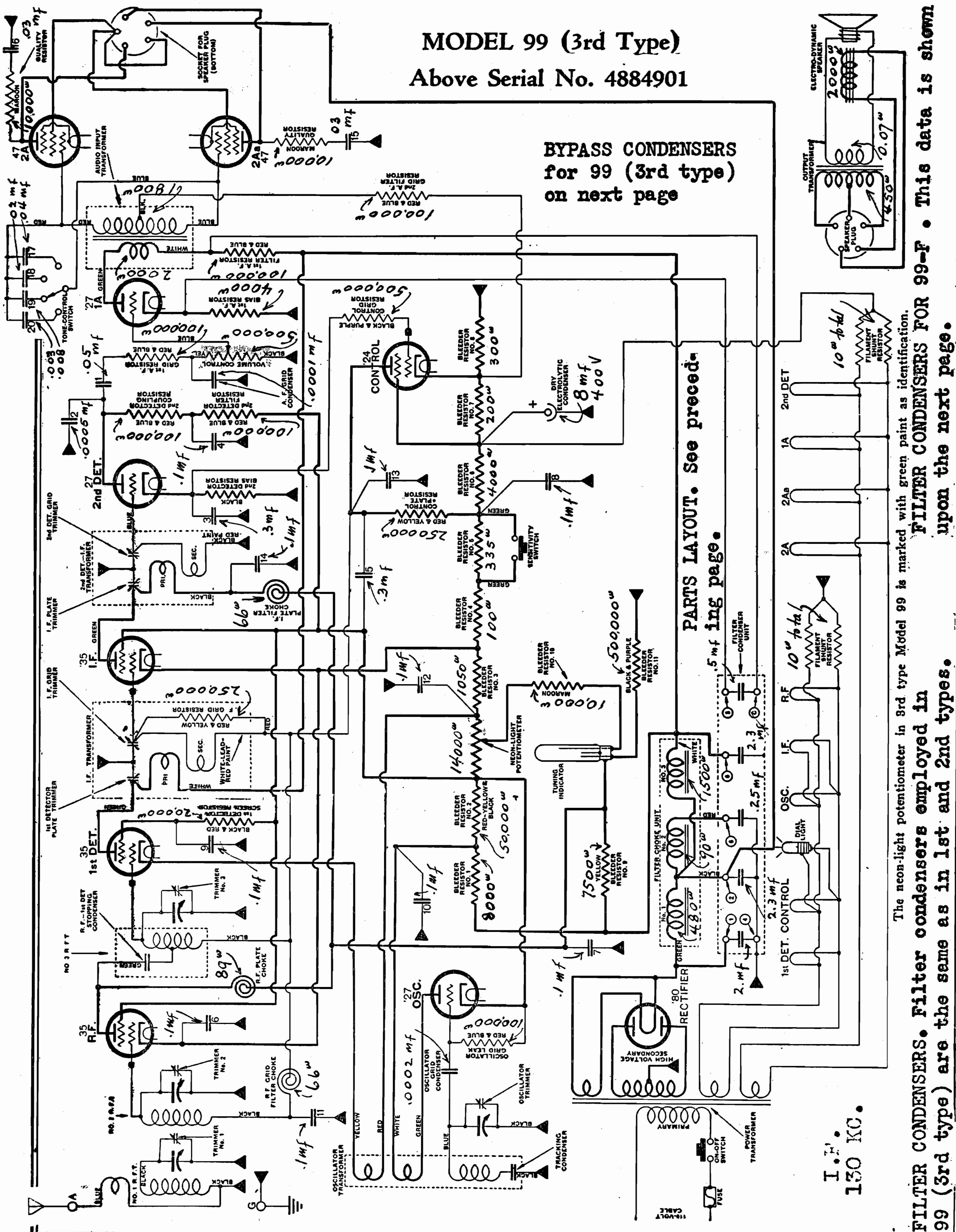
Additional data on 99 (3rd type), 99-F and 99-P will be found on the next page. Also filter condenser data for 99-F will be found on the same page.

MODEL 99 (3rd)
Above serial
4,884,901

ATWATER KENT MFG. CO.

MODEL 99 (3rd Type)
Above Serial No. 4884901

BYPASS CONDENSERS for 99 (3rd type) on next page



PARTS LAYOUT. See preceding page.

FILTER CONDENSERS FOR 99-F • This data is shown upon the next page.

The neon-light potentiometer in 3rd type Model 99 is marked with green paint as identification.

FILTER CONDENSERS. Filter condensers employed in 99 (3rd type) are the same as in 1st and 2nd types.

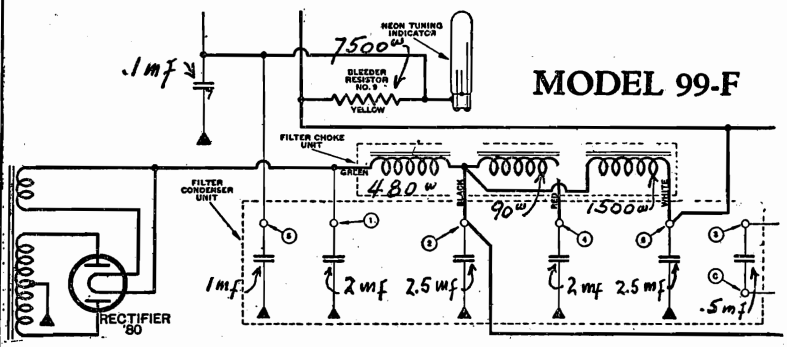
I.F. 130 KC.

MODEL 99-F
99-P

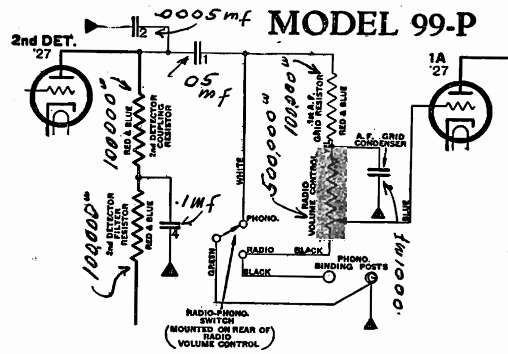
ATWATER KENT MFG. CO.

SPECIAL NOTE.

The model 99-F receiver is the same as the model 99 (3rd type) except for the use of a different filter condenser and for the use of a speaker field coil of 1100 ohms. The internal connections of this filter condenser # 25130 are shown below. Also data pertaining to the model 99-P. In all other respects, the receivers are like the model 99-(3rd type).



Filter Circuit of Model 99-F
The rest of the circuit is the same as the 3rd type Model 99.



Phonograph Switching Circuit
The rest of the circuit is the same as the 3rd type Model 99, except that there is no sensitivity switch and bleeder No. 5 is omitted.

FILTER CONDENSER CONNECTIONS. The small numerals in circles adjacent to the filter condensers shown above correspond with the numerals marked upon the filter condenser terminal block and also with the numbers shown upon the parts layout. The following are the internal connections.

Filter # 1	2.0 mfd connected between terminal (1) and can
Filter # 2	2.5 mfd connected between terminal (2) and can
Filter # 3	2.5 mfd connected between terminal (6) and can
Hum	2.0 mfd connected between terminal (4) and can
	1.0 mfd connected between terminal (5) and can
	.5 mfd connected between terminal (3) and center stud

BYPASS CONDENSERS for models 99 (3rd type), 99-F and 99-P.

The numbers shown adjacent to the bypass condensers in the schematic wiring diagram correspond with the numerals designated in the parts layout within the bypass condenser cans. The following are the specifications.

RF Bypass # 1	#21440	400 volts	Condensers 1,2,3 and 3A. (3A is not used)
RF Bypass # 2	#22050	200 volts	Condensers 4,5 and 6
RF Bypass # 3	# 15262	400 volts	Condensers 7,8,9 and 10
RF Bypass # 4	#15262	400 volts	Condensers 11,12,13 and 14
Quality	#21450	450 volts	Condensers 15 and 16
Tone control	#21530	200 volts	Condensers 17,18,19 and 20

ATWATER KENT MFG. CO.

VOLTAGE TABLE FOR MODELS 188, 260, 469, 469-D, 469-Q, 480, 558, 558-D, 558-Q, 612, 627, 812.

TURN SILENCING ADJUSTMENT FULL CLOCKWISE, TONEBEAM ADJUSTMENT FULL COUNTER-CLOCKWISE, RANGE SWITCH AT LOCAL.

All plate, screen and grid measurements are made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

Line voltage=110 volts. Total "B" voltage on "Q" sets at time of test=170 volts.

		2nd TYPE 188	3rd TYPE 260	2nd TYPE 469	480† Local	480† Dist.	558	558-D 469-D	558-Q 469-Q	627	612	812
R. F. TUBE	Filament	2.4	2.4	2.4	2.4	2.4	2.4	6	2	2.4	2.4	2.4
	Plate	225	185	190	98	65	215	83	170	220	180	215
	Screen	90	75	55	93	70	92	58	80	115	65	80
	Grid	1	2	1	3	3	1	1	1	5	2	1
1st DET. TUBE	Filament	2.4	2.4	2.4	2.4	2.4	2.4	6	2	2.4	2.4	2.4
	Plate	220	195	205	95	65	212	80	170	220	175	217
	Screen	85	65	45	83	65	88	55	48	120	55	67
	Grid	5	2	3	5	5	5	5	9	6	3	3
1st I. F. TUBE	Filament	2.4	2.4	2.4	2.4	2.4	2.4	6	2	2.4	2.4	2.4
	Plate	220	185	185	98	65	215	83	170	220	175	217
	Screen	90	80	55	93	70	92	58	80	115	65	80
	Grid	2	1	1	4	1	2	1	1	7	3	3
2nd I. F TUBE	Filament	—	2.4	—	2.4	2.4	—	—	2	—	2.4	2.4
	Plate	—	205	—	238	238	—	—	170	—	175	215
	Screen	—	80	—	56	56	—	—	40	—	65	78
	Grid	—	4	—	7	3	—	—	1	—	3	4
55 or 85 TUBE	Filament	2.4	2.4	2.4	—	—	2.4	6	—	2.4	2.4	2.4
	Plate	95	80	70	—	—	93	42	—	70	63	85
	D-1	10	30	12	—	—	10	2	—	6	10	55
	D-2	0	0	0	—	—	0	0	—	0	0	0
	Grid	4	3	2	—	—	4	1	—	1	2	4
2nd DET TUBE	Filament	—	—	—	2.4	2.4	—	—	2	—	—	—
	Plate	—	—	—	173	173	—	—	0	—	—	—
	Grid	—	—	—	17	17	—	—	0	—	—	—
CONTROL TUBE	Filament	—	—	—	2.4	2.4	—	—	*	—	—	—
	Plate	—	—	—	43	43	—	—	*	—	—	—
	Grid	—	—	—	15	15	—	—	*	—	—	—
1st A. F TUBE	Filament	—	—	—	—	—	—	—	2	—	—	—
	Plate	—	—	—	—	—	—	—	105	—	—	—
	Screen	—	—	—	—	—	—	—	50	—	—	—
	Grid	—	—	—	—	—	—	—	1	—	—	—
DRIVER TUBE	Filament	—	—	—	—	—	—	—	2	—	2.4	2.4
	Plate	—	—	—	—	—	—	—	165	—	230	203
	Screen	—	—	—	—	—	—	—	—	—	230	203
	Grid	—	—	—	—	—	—	—	4	—	14‡	14‡
OUTPUT TUBES	Filament	2.4	2.4	2.4	2.4	2.4	2.4	25	2	2.4	2.4	2.4
	Plate	215	225	200	226	226	207	70	170	205	280	355
	Screen	225	230	205	232	232	217	70	—	215	0	0
	Grid	5	13	12	17	17	13	12	15	4	0	0
OSC. TUBE	Filament	2.4	2.4	2.4	2.4	2.4	2.4	6	***	2.4	2.4	2.4
	Plate	93	27	55	123	123	93	63	***	100	63	42
	Grid	**	**	**	**	**	**	**	***	**	**	**
SILENCING TUBE	Filament	2.4	2.4	2.4	—	—	2.4	6	—	—	2.4	2.4
	Plate	120	150	95	—	—	114	50	—	—	88	155
	Screen	25	0	0	—	—	26	3	—	—	0	0
	Grid	1	1	1	—	—	1	1	—	—	1	0

*In Models 558-Q and 469-Q, the 2nd-detector and control are combined in one tube.
**The oscillator grid voltage varies, dependent on several factors.
***In Models 558-Q and 469-Q, the 1st-detector and oscillator are combined in one tube.
†It is advisable to repeat measurements of the R. F., 1st-det., and I. F. tubes in the Model 480 at each position of the frequency-band switch. The voltages on the short-wave ranges should correspond to those at the "distant broadcast" position.

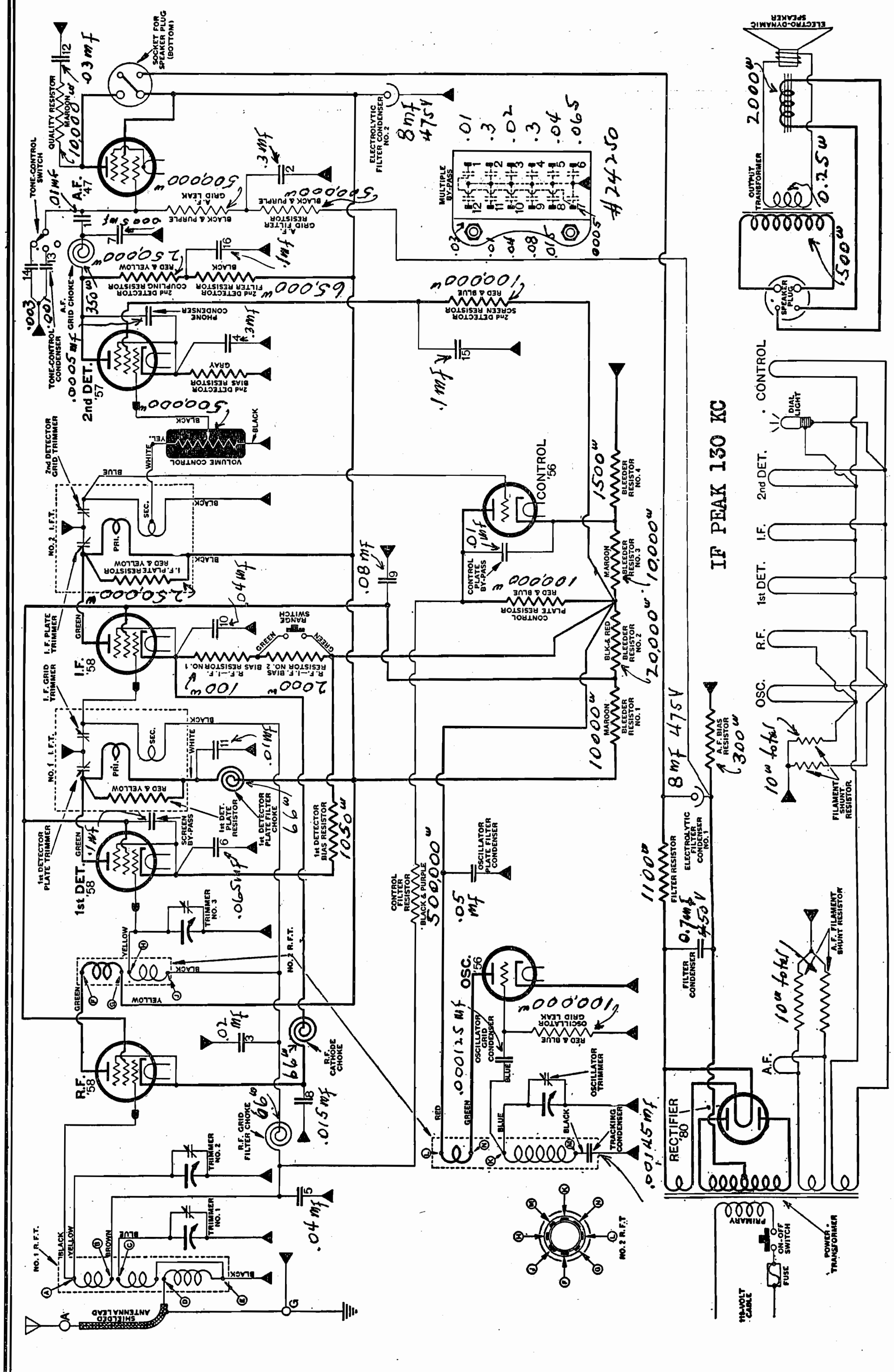
VOLTAGES ACROSS RESISTORS

	2nd TYPE 188	3rd TYPE 260	2nd TYPE 469	480	558	558-D 469-D	627	612	812
BLEEDER RESISTORS									
Bleeder resistor No. 1	93	88	152	43	88	28	—	60	143§
Bleeder resistor No. 2	—	153	9	100	—	—	—	123	172
Bleeder resistor No. 3	—	27	87	15	—	—	—	0	27
Bleeder resistor No. 4	—	138	87	0	—	—	—	12	0
Bleeder resistor No. 5	—	0	62	30	—	—	—	—	80
Bleeder resistor No. 6	—	23	22	40	—	—	—	—	81
Bleeder resistor No. 7	—	—	0	—	—	—	—	—	—
BIAS RESISTORS									
R.F.-I.F. bias resistor	2	—	1	—	2	3	—	2	3
R.F.-I.F. bias resistor No. 1	—	1	—	—	—	—	1	—	—
R.F.-I.F. bias resistor No. 2	—	2	—	—	—	—	10	—	—
R.F.-1st-I.F. bias resistor No. 1	—	—	—	1	—	—	—	—	—
R.F.-1st-I.F. bias resistor No. 2	—	—	—	5	—	—	—	—	—
1st-detector bias resistor	5	1	2	2	4	4	6	—	1
2nd-I.F. bias resistor	—	—	—	—	—	—	—	0	1
2nd-I.F. bias resistor No. 1	—	—	—	1	—	—	—	—	—
2nd-I.F. bias resistor No. 2	—	—	—	5	—	—	—	—	—
2nd-detector bias resistor	—	—	—	16	—	—	—	—	—
Control bias resistor No. 1	12	8	6	—	12	4	6	5	9
Control bias resistor No. 2	14	73	23	—	13	4	12	20	55
2nd A.F. bias resistor	—	—	—	—	—	13	—	—	—
A.F. bias resistor	14	13	12	16	—	—	—	—	—
Driver bias resistor	—	—	—	—	—	—	—	28	27
MISCELLANEOUS									
Screen resistor	37	193	—	—	33	—	100	120	215
2nd-I.F. screen resistor	—	—	—	18	—	—	—	40	17
Tonebeam adjustment	—	87	47	85	—	—	—	63	93
Silencing adjustment	102	130	147	—	100	108	—	132	150§
Four-prong speaker field								140	120
Five-prong speaker field								190	240
Front rectifier (83) (P to F)								340	370
Back rectifier (83) (P to F)								290	360

§ In sets where bleeder No. 1 is gray, its voltage is 170, and the voltage across the silencing adjustment is 115. ‡ In early 612 and 812, the measured voltage on the driver grid is about 27

ATWATER KENT MFG. CO.

MODEL 188, 188-F
1st Type



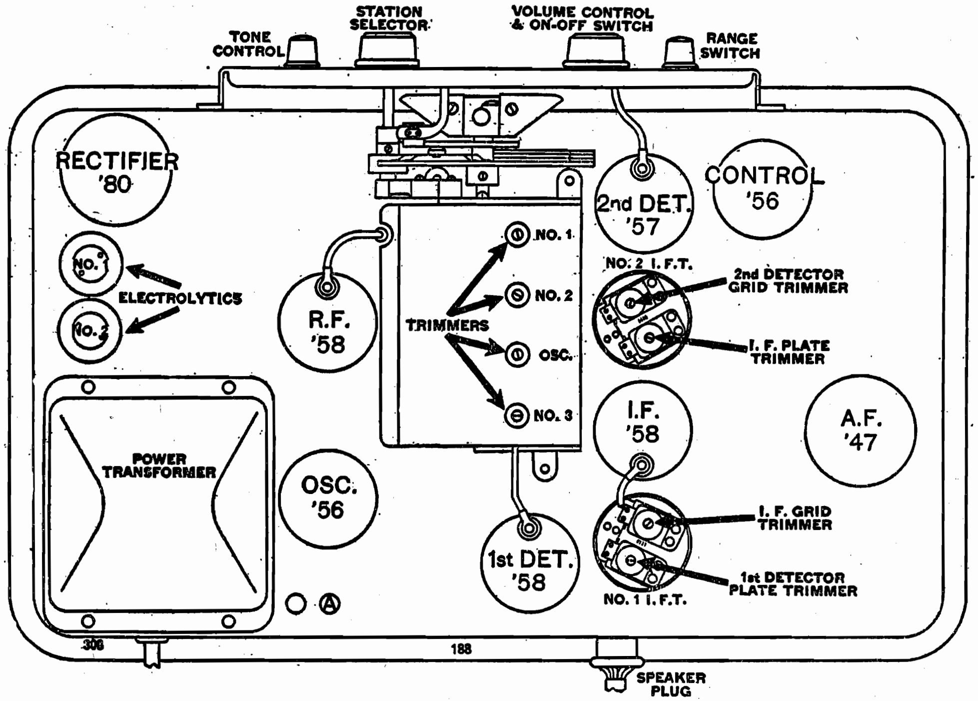
In late-type sets, bleeder No. 2 is black. In late-type Models 188 and 188-F, the oscillator grid winding on No. 2 R. F. T. is split into two separate sections, thus making five coils instead of four on this transformer. Also, a small compensating condenser (No. 16360) is connected across contacts K and M of No. 2 R. F. T.

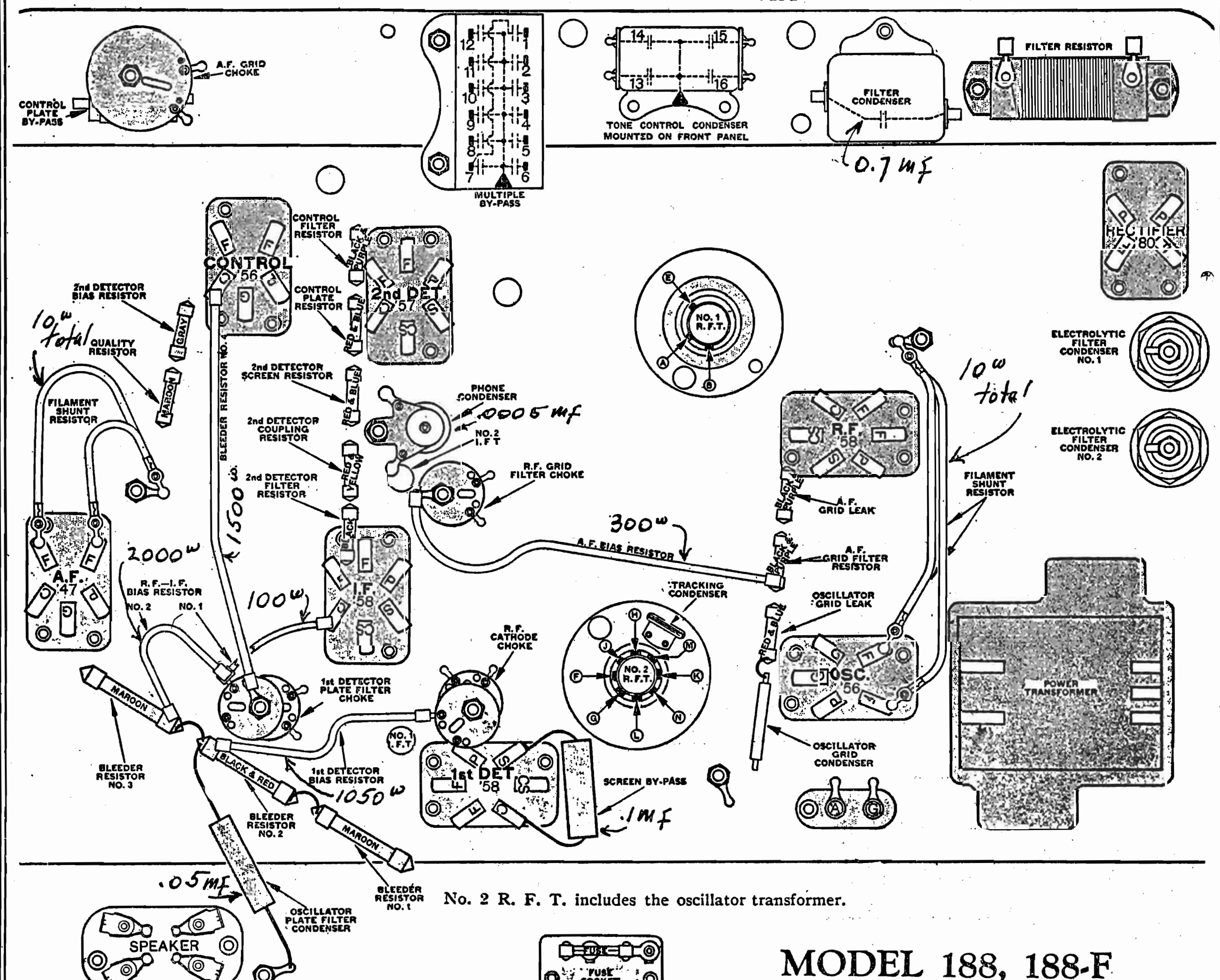
The late-type No. 23028 R. F. transformer group, which incorporates these changes, supersedes the early-type group. The early-type group is not supplied for service. When installing the late group in place of an early group, it is essential to remove the early-type 1st detector bias resistor No. 21030, and install in its place a late-type 1st detector bias resistor No. 16320. A No. 16320 flexible resistor is provided for this purpose with each No. 23028 R. F. transformer group.

It is also necessary to connect the blue lead from the oscillator grid condenser (125 mmf.) to the extra terminal at the side of No. 2 R. F. T. instead of to terminal K. The extra terminal is the center tap of the oscillator grid coil.

MODEL 188, 188-F
1st Type

ATWATER KENT MFG. CO.



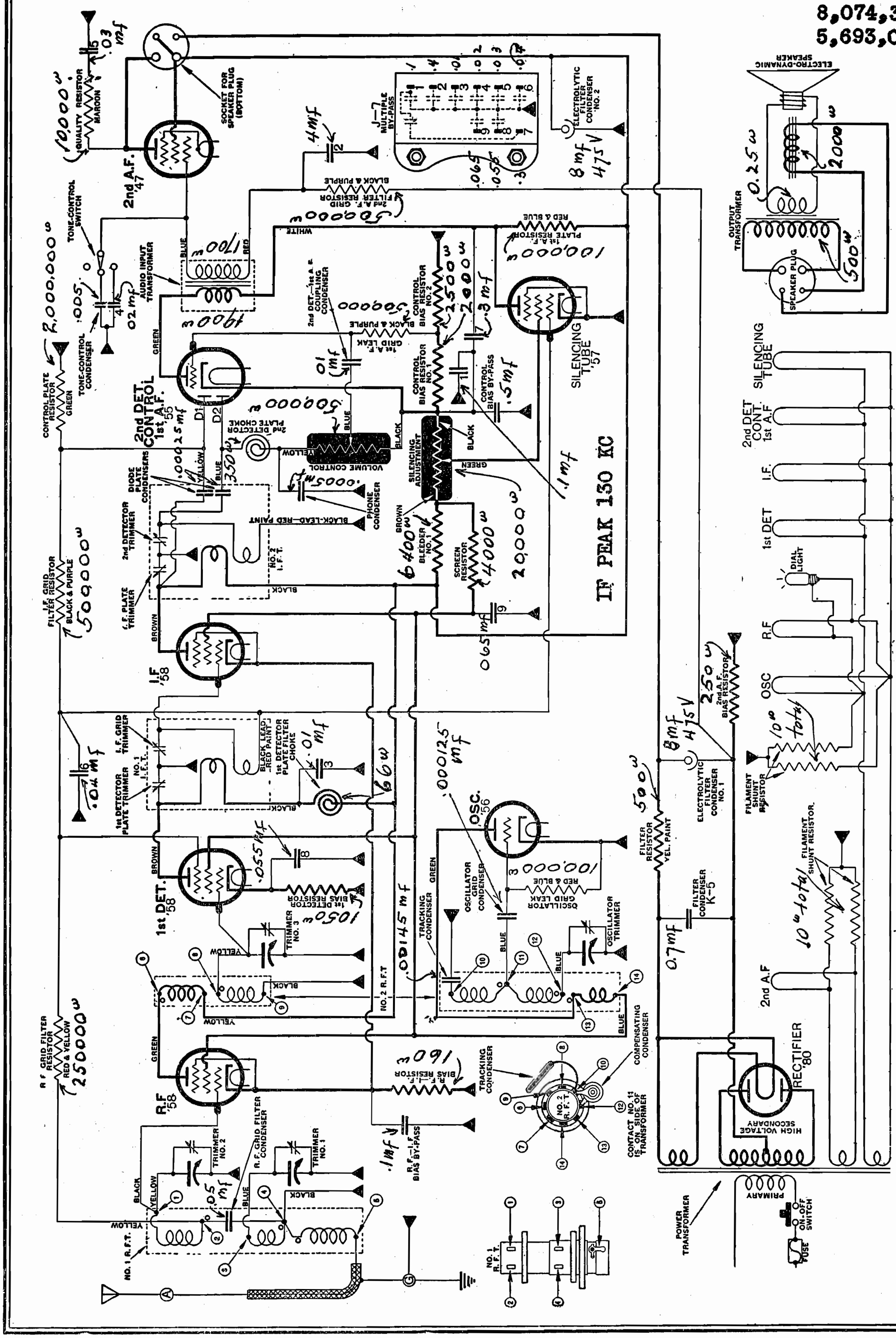


No. 2 R. F. T. includes the oscillator transformer.

MODEL 188, 188-F

ATWATER KENT MFG. CO.

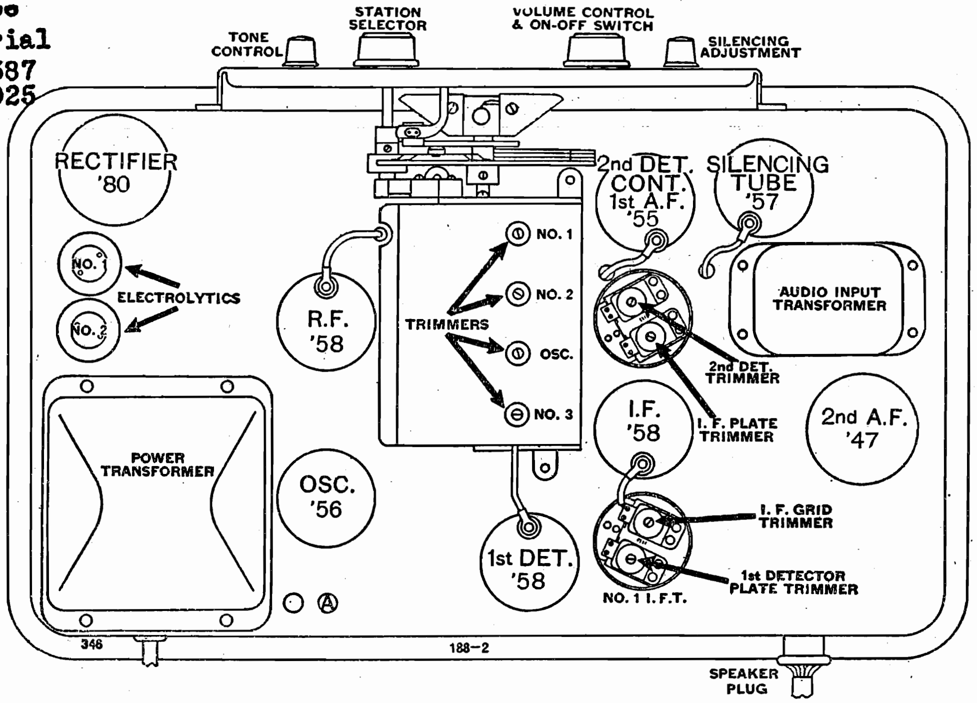
MODEL 188,188-F
2nd Type
Above serial
8,074,387
5,693,025

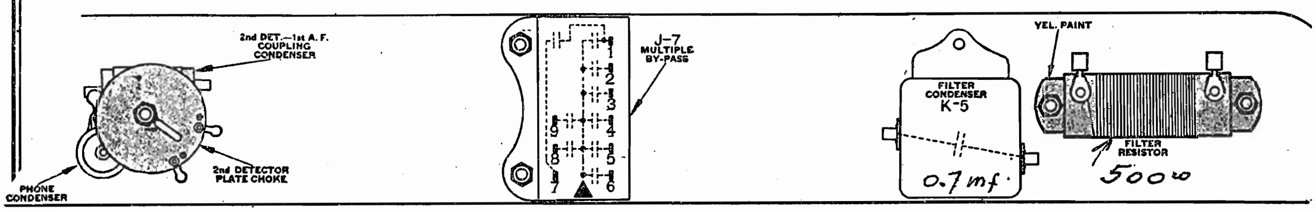


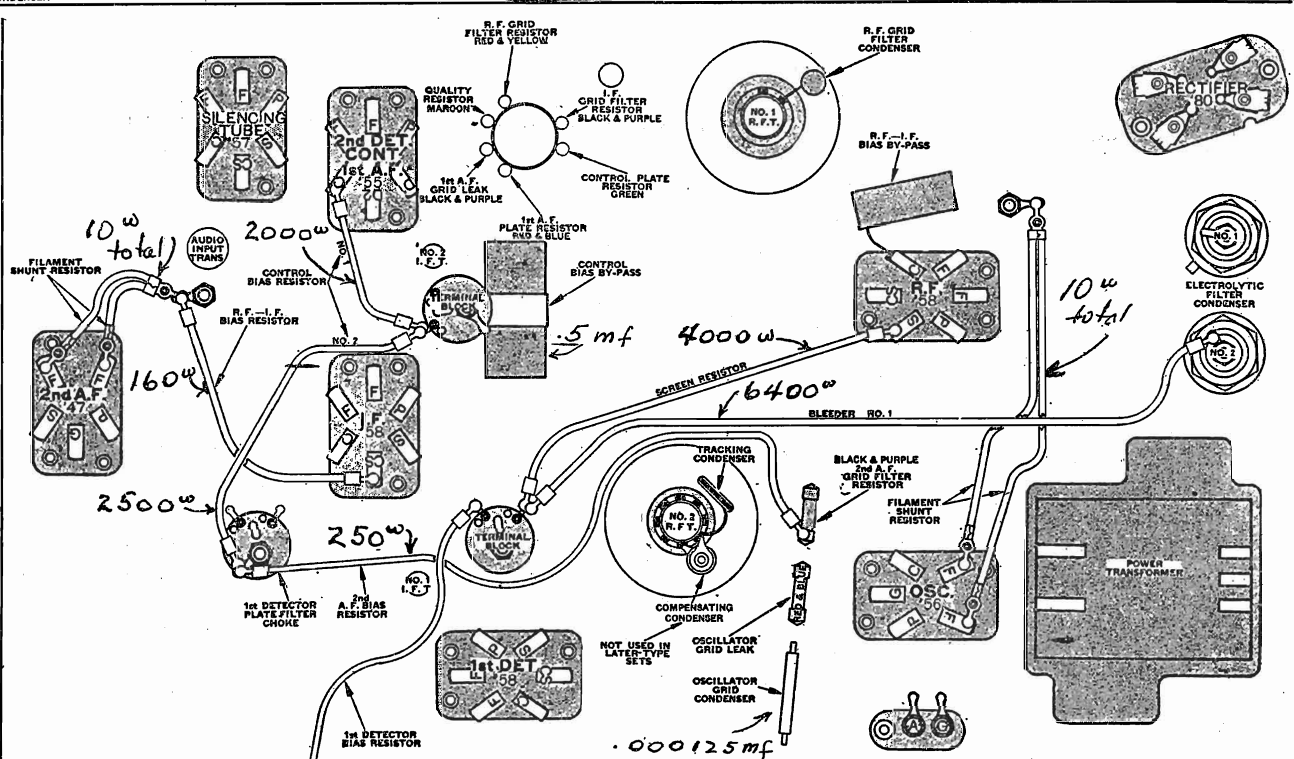
Small numerals adjacent to numbered bypass condensers correspond with units shown within multiple condenser shown on this page and upon the parts layout on next page.

MODEL 188, 188-F
2nd Type
Above serial
8,074,387
5,693,025

ATWATER KENT MFG. CO.



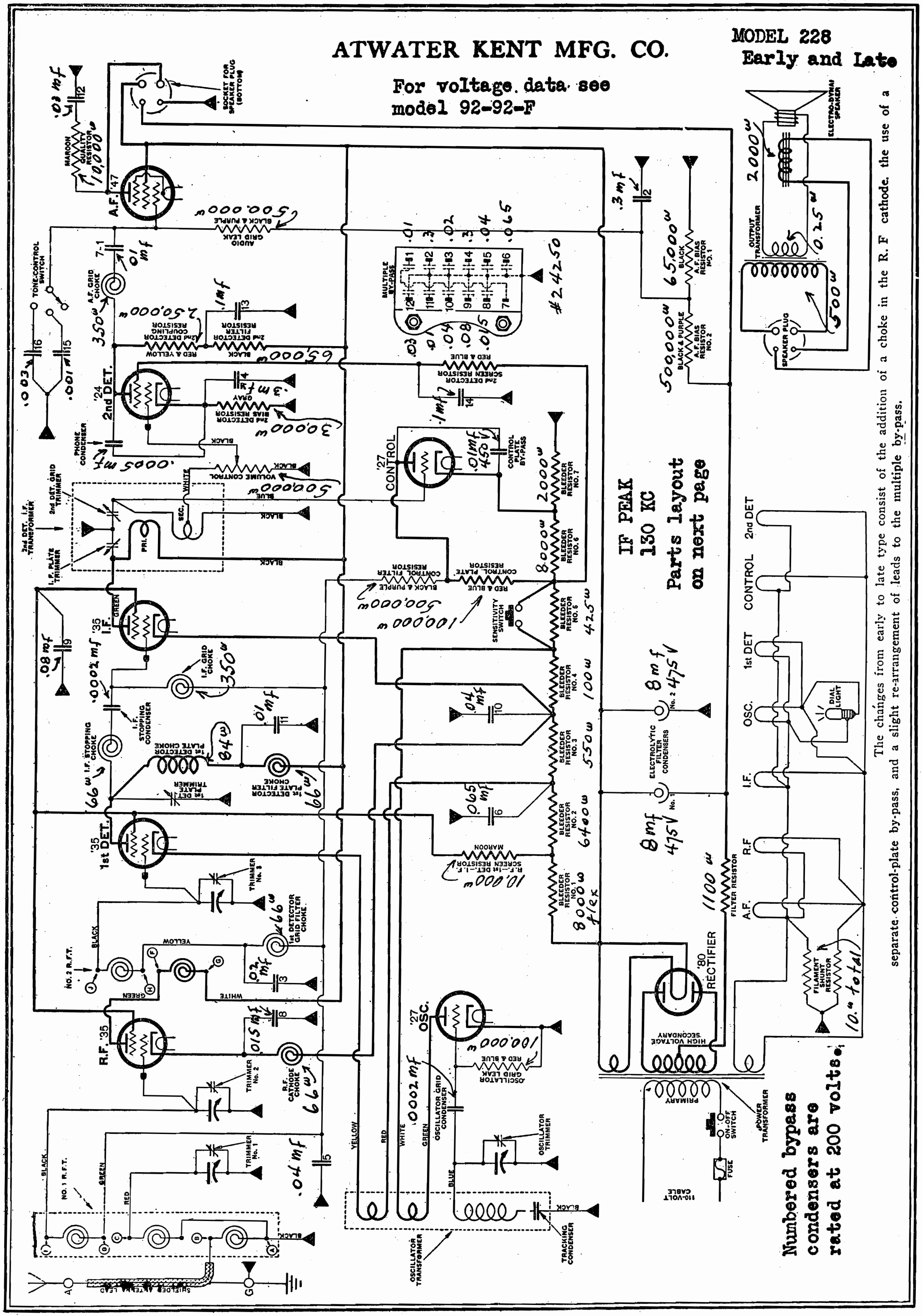




ATWATER KENT MFG. CO.

MODEL 228
Early and Late

For voltage data see
model 92-92-F



IF PEAK
130 KC

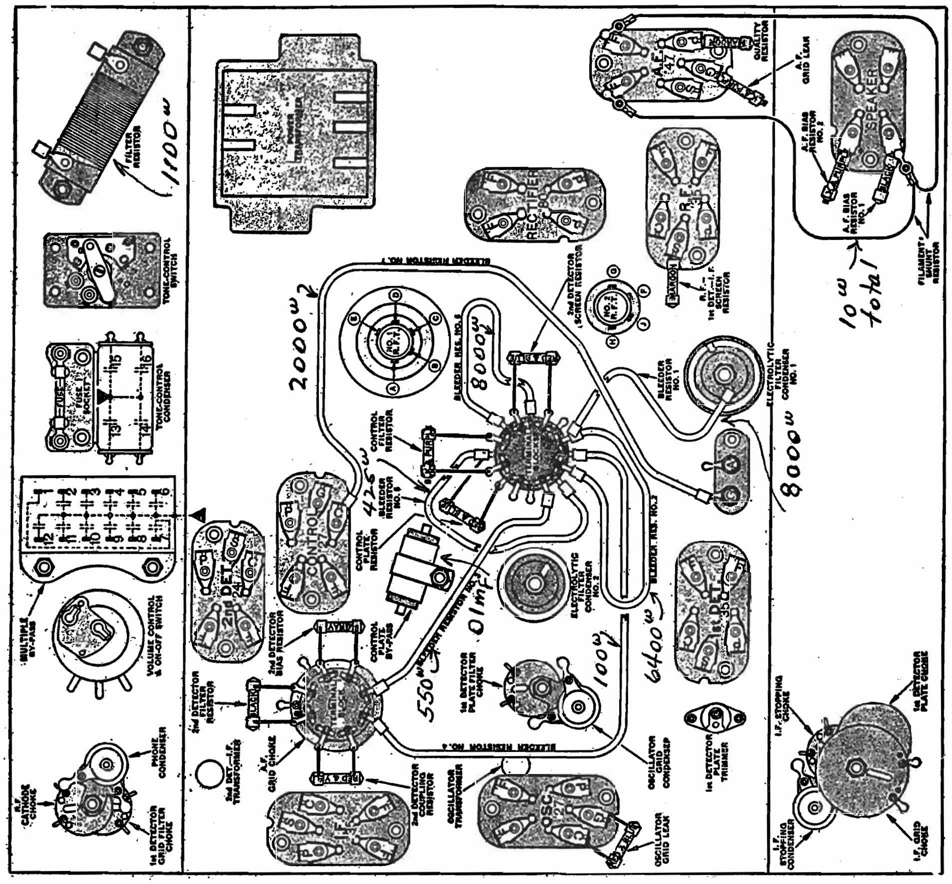
Parts layout
on next page

The changes from early to late type consist of the addition of a choke in the R. F cathode, the use of a separate control-plate by-pass, and a slight re-arrangement of leads to the multiple by-pass.

Numbered bypass condensers are rated at 200 volts.

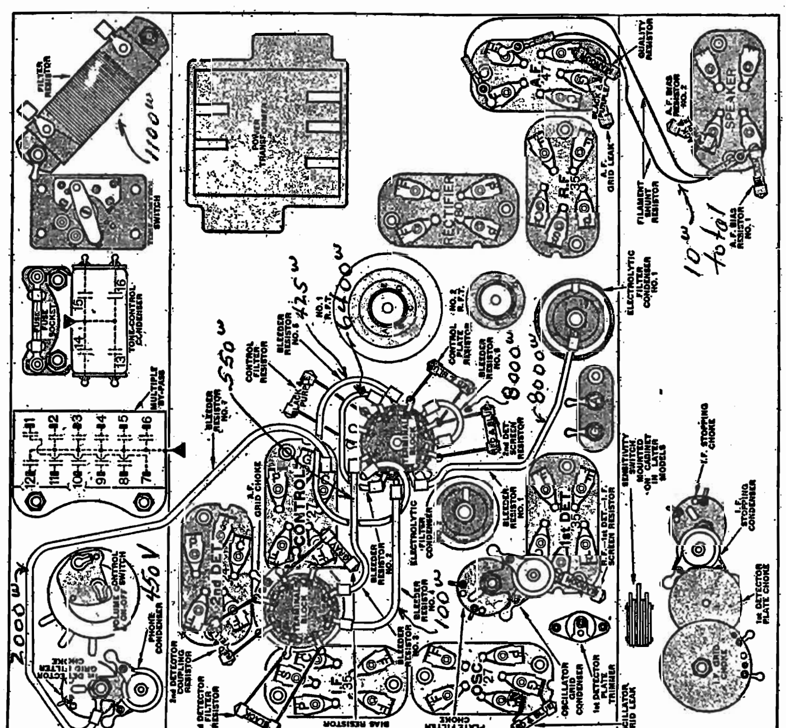
MODEL 228
Early and Late

ATWATER KENT MFG. CO.



228 Late

PARTS LAYOUT



228 · Early

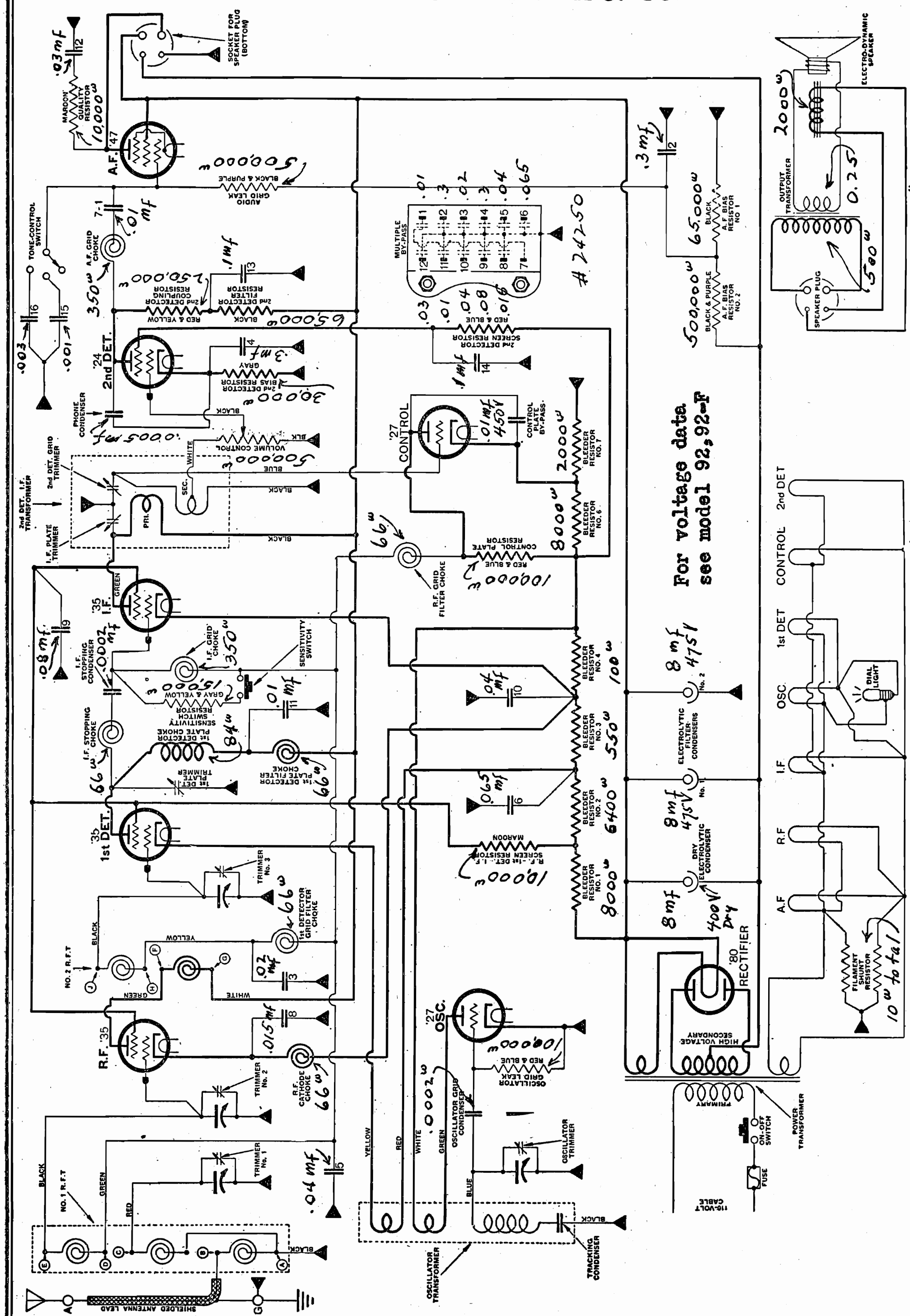
By-pass Condensers

1—2nd-detector—A. F. coupling condenser.
2—A. F. bias by-pass.
3—1st-detector grid filter condenser.
4—2nd-detector bias by-pass.
5—R. F. grid filter condenser.
6—1st-detector bias by-pass.
7—2nd-detector—A. F. coupling condenser
8—R. F.—I. F. bias by-pass.
9—R. F. 1st-detector—I. F. screen by-pass
10—1st-detector plate filter condenser.
11—Control plate by-pass.
12—Quality condenser

Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section units in schematic diagram on preceding page.

MODEL 228-F

ATWATER KENT MFG. CO.



The difference between the 228 and 228-F is the omission of the filter resistor, also bleeder # 5, addition of dry electrolytic condenser and position of sensitivity switch.

MODEL 228-F Chart
228-F Top View
228 Top View

ATWATER KENT MFG. CO.

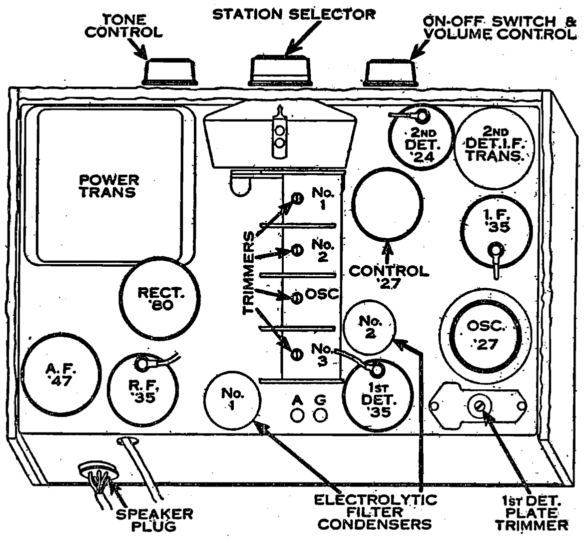
By-pass Condensers in Late-Type

1—2nd-detector—A. F. coupling condenser
2—A. F. bias by-pass.
3—1st-detector grid filter condenser
4—2nd-detector bias by-pass.
5—R. F. grid filter condenser.
6—1st-detector bias by-pass.
7—2nd-detector—A. F. coupling condenser
8—R. F. bias by-pass.
9—R. F. 1st-detector—I. F. screen by-pass.
10—I. F. bias by-pass.
11—1st-detector plate filter condenser.
12—Quality condenser.

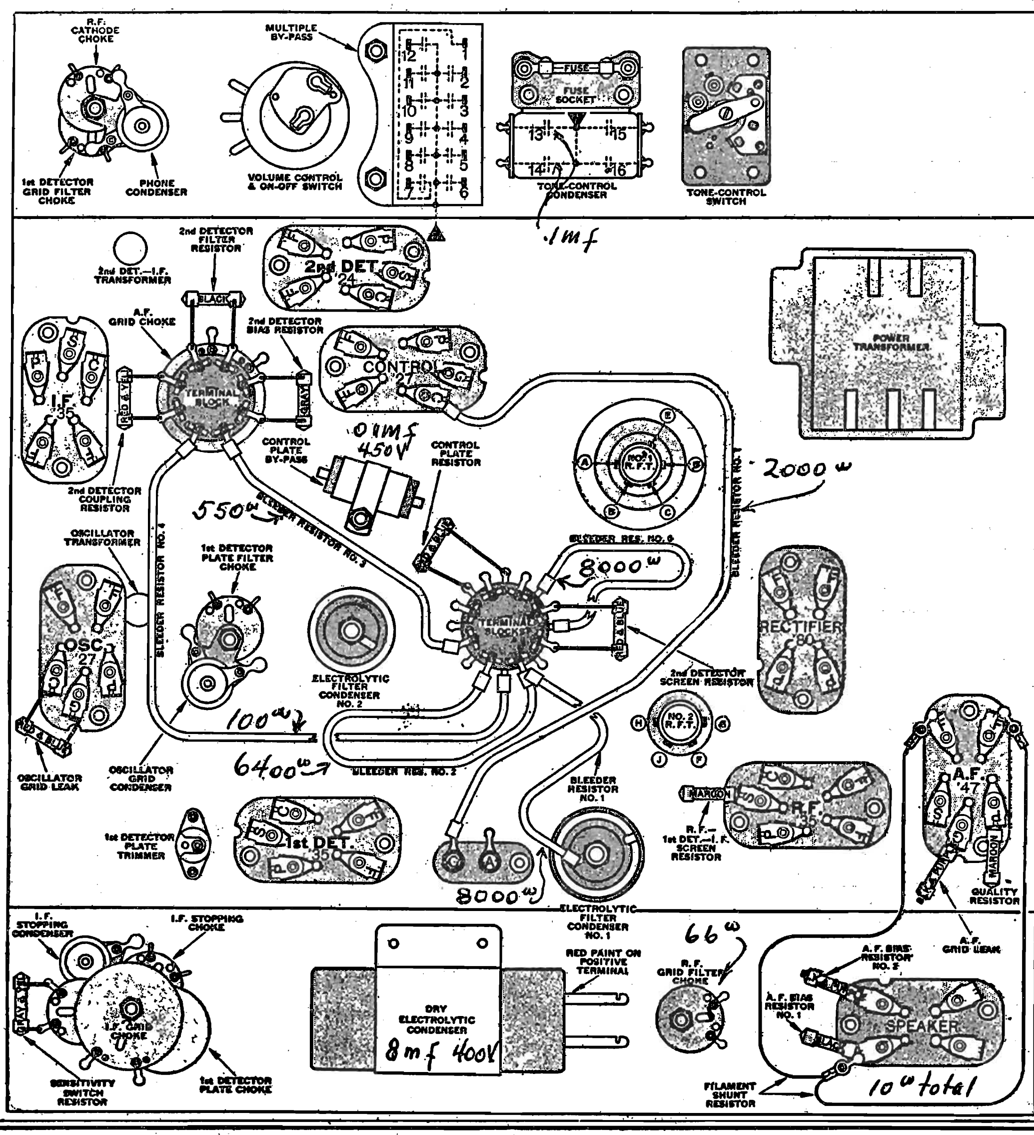
Tone-control Condenser

13—2nd-detector plate filter condenser
14—2nd-detector screen by-pass.
15—Tone condenser.
16—Tone condenser.

TOP VIEW

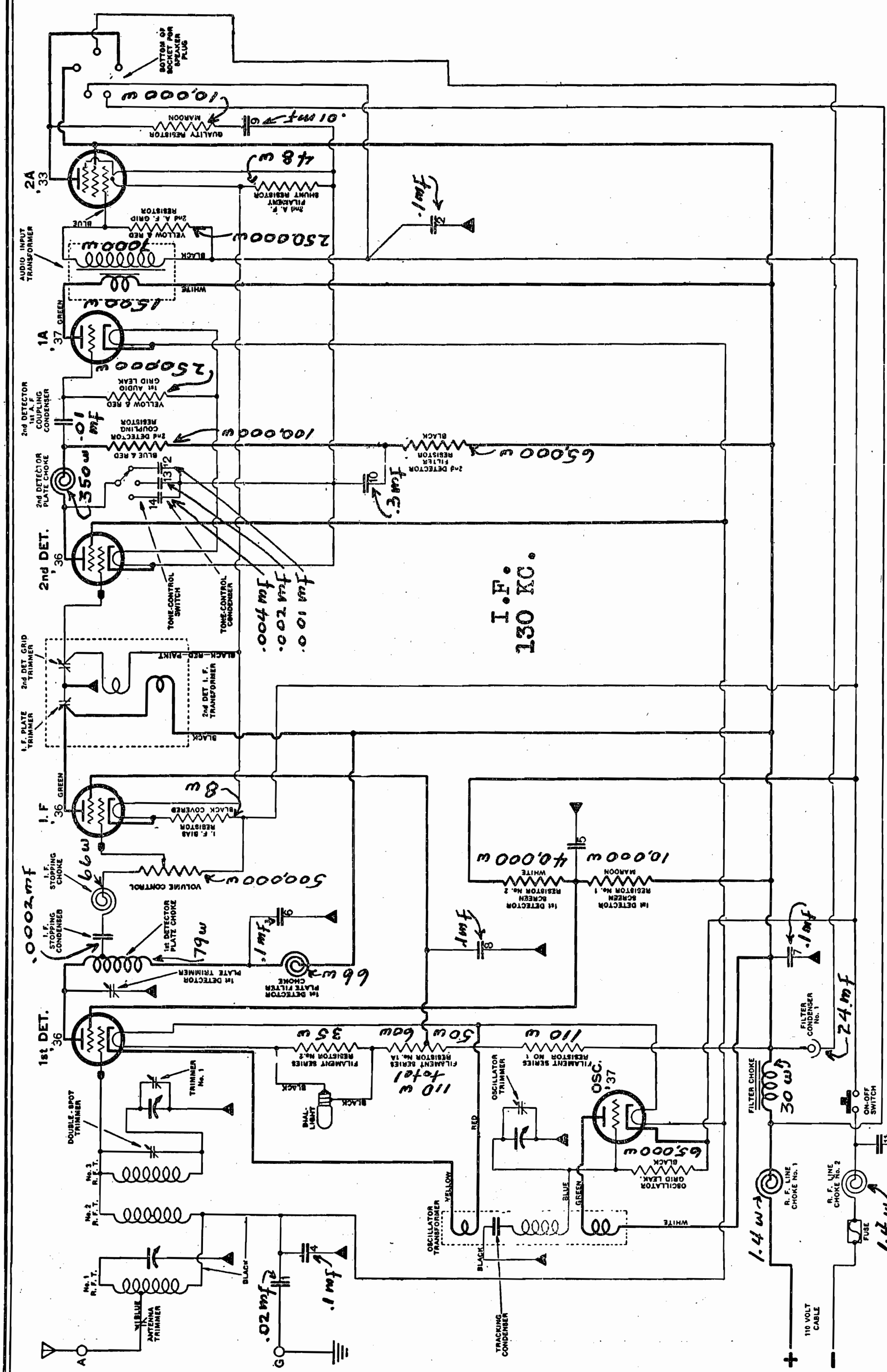


MODEL 228-F CHART



MODEL 228-D

ATWATER KENT MFG. CO.



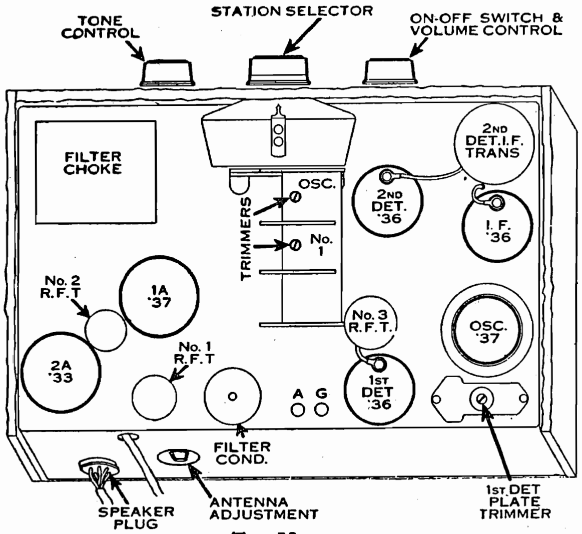
CONDENSER DATA. See next page.
All bypass condensers are rated at 400 volts. Tone control condensers are rated at 100 volts.

OUTPUT TRANSFORMER (Next page)
Primary 300 ohms
Secondary 0.25 ohm
Field coil 1200 ohms

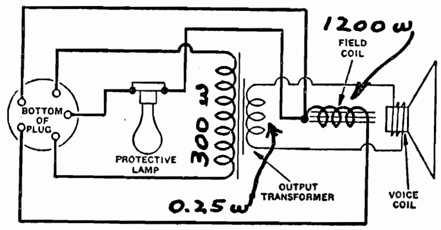
For voltage data see model 82-D, 2nd type.

MODEL 228-D

ATWATER KENT MFG. CO.



Top View.



Circuit of Speaker

The protective lamp (75 watts) is connected in series with the electrolytic filter condenser in the chassis. If the 110-volt D. C. supply plug is reversed, the lamp will light. When the 110-volt plug is properly inserted, the lamp does not light. This action is due to the fact that the electrolytic condenser passes current if the polarity of the applied D. C. voltage is not correct.

By-pass Condensers

By-pass No. 1

1—Ground coupling condenser.
2—Negative 110-volt line by-pass.
3—Not used.
4—1st-detector grid filter condenser.

By-pass No. 2

5—1st-detector screen by-pass.
6—1st-detector plate filter condenser.
7—Filter condenser No. 2.
8—I. F. screen by-pass.

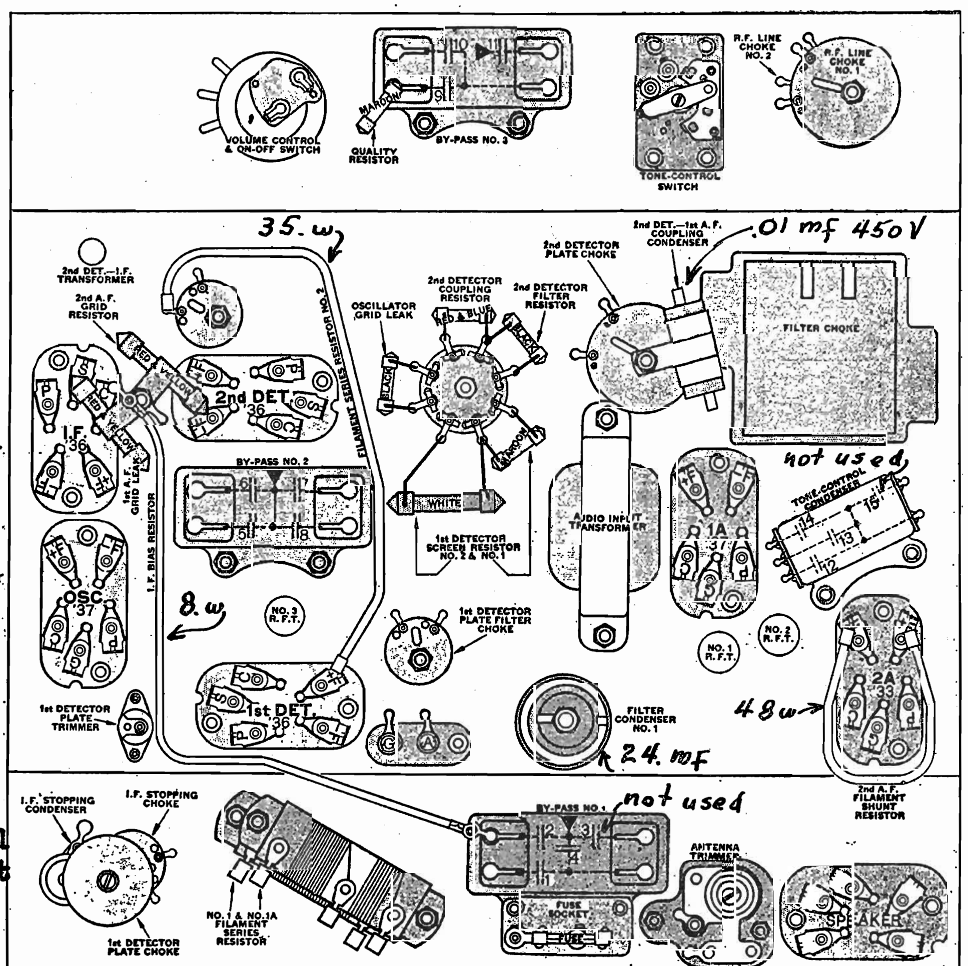
By-pass No. 3

9—Quality condenser.
10—2nd-detector plate filter condenser.
11—Negative 110-volt line by-pass.

Tone-Control Condenser

12—Tone-control condenser.
13—Tone-control condenser.
14—Tone-control condenser.
15—Not used.

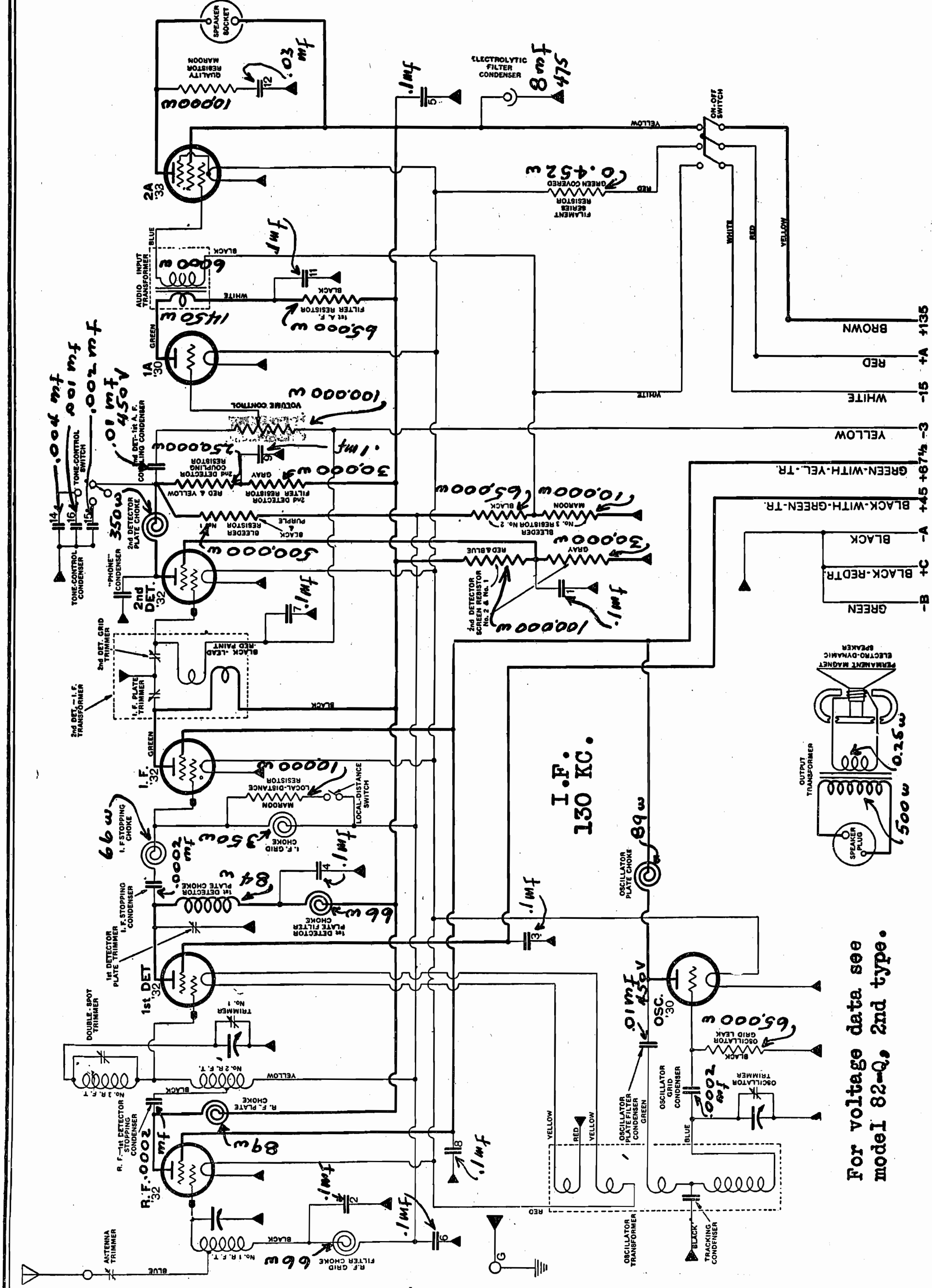
All bypass condensers rated at 400 volts. Tone control condensers rated at 100 volts



Bottom Chart.

MODEL 228-Q

ATWATER KENT MFG. CO

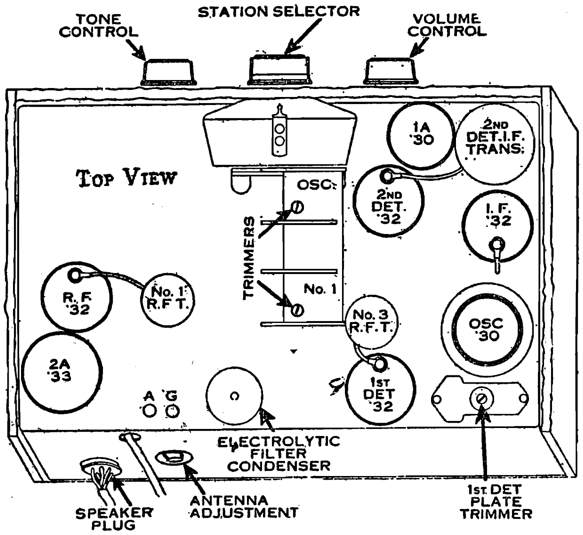


For voltage data see model 82-Q, 2nd type.

Numbers adjacent to bypass condensers correspond with numbers shown upon multi-section bypass units in parts layout on next page.

MODEL 228-Q

ATWATER KENT MFG. CO.



By-pass Condensers

By-pass No. 1

1—2nd-detector screen by-pass.
2—R. F. grid filter condenser.
3—1st-detector screen by-pass.
4—1st-detector plate filter condenser.

All 400 volts

By-pass No. 2

5—+B by-pass.
6—1st-detector—I. F. grid filter condenser.
7—2nd-detector grid-circuit by-pass.
8—R. F.—I. F. screen by-pass.

All 400 volts

By-pass No. 3

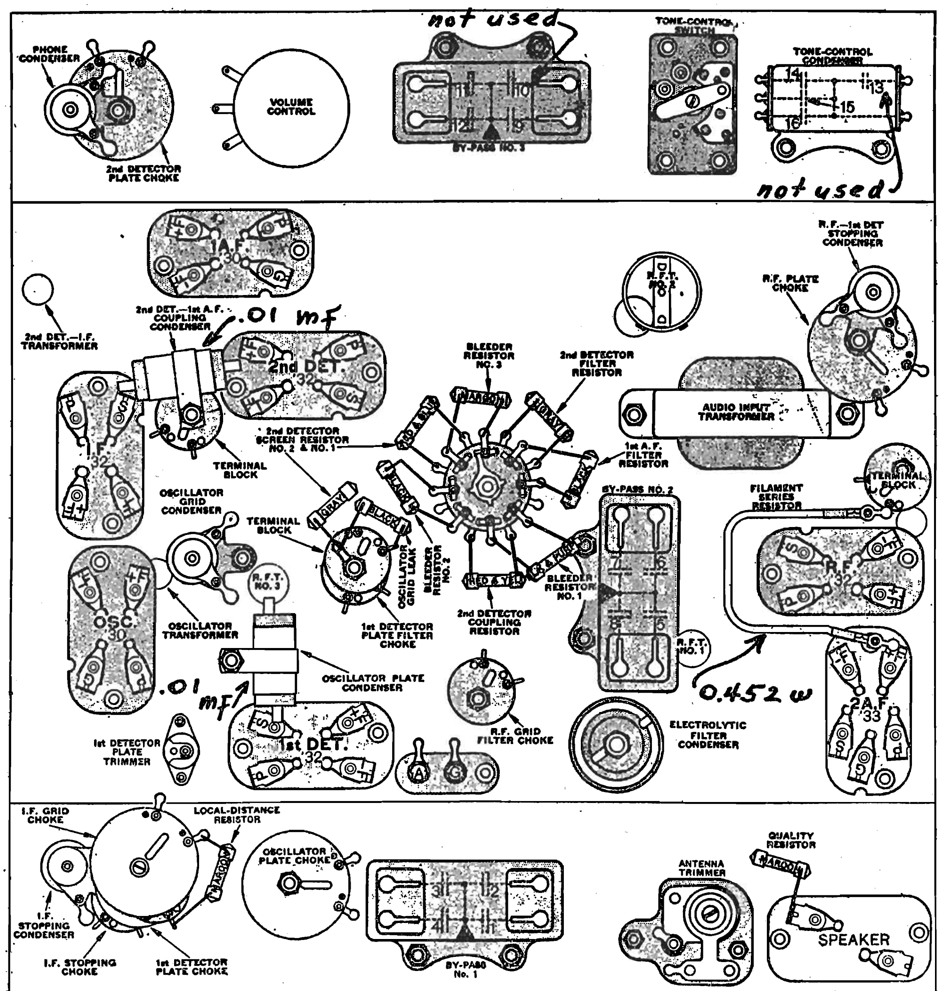
9—2nd-detector plate filter condenser.
10—Not used.
11—1st-A. F. plate filter condenser.
12—Quality condenser.

All 400 volts

Tone-control Condenser

13—Not used.
14—Tone-control condenser.
15—Tone-control condenser.
16—Tone-control condenser.

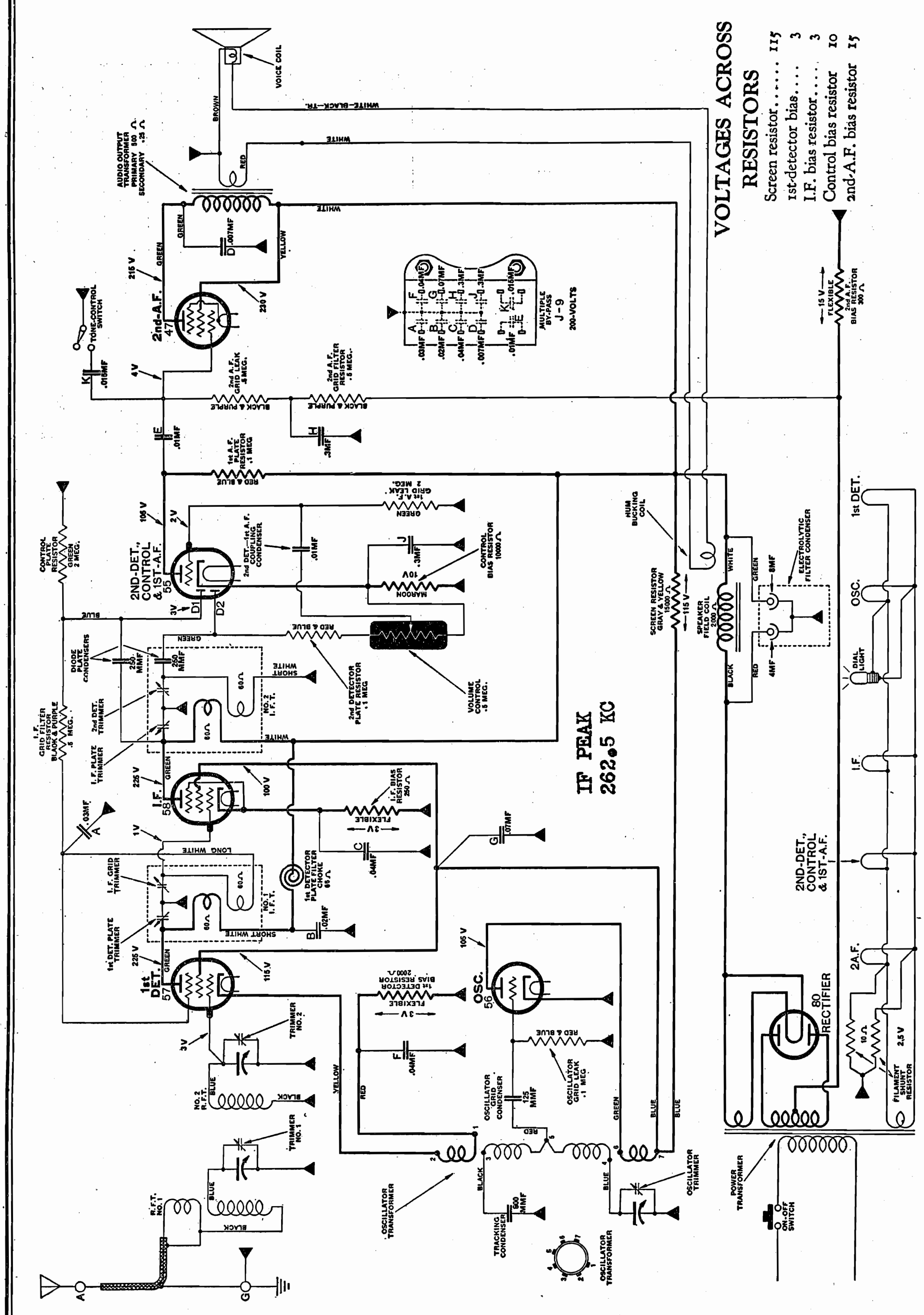
All 100 volts



BOTTOM CHART.

ATWATER KENT MFG. CO.

MODEL 246



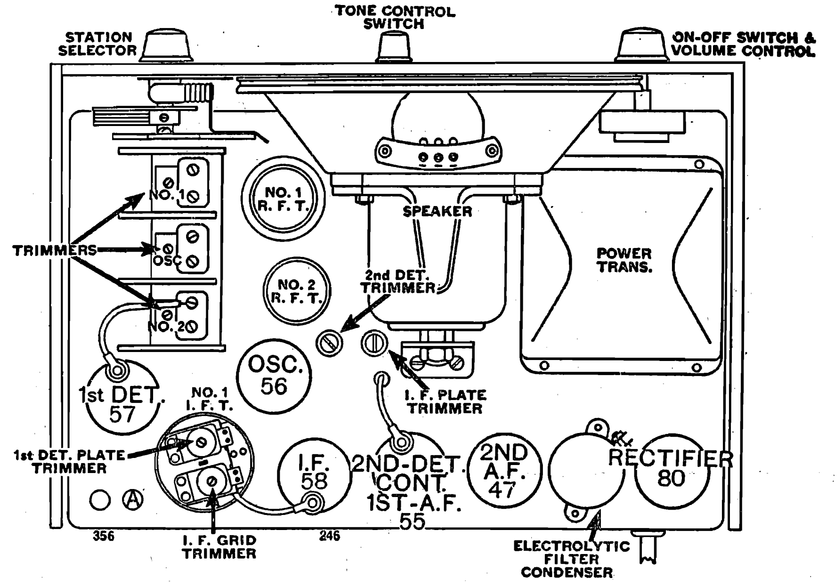
VOLTAGES ACROSS RESISTORS

Screen resistor......	115
1st-detector bias....	3
I.F. bias resistor....	3
Control bias resistor	10
2nd-A.F. bias resistor	15

The plate screen and grid voltages, shown in the above diagram, are made from the cathode of the respective tubes. Use the 250-volt scale of a 1000-ohm-per-volt D. C. voltmeter. Line voltage = 110 volts.

MODEL 246

ATWATER KENT MFG. CO.



VOLTAGE TABLE FOR MODEL 246

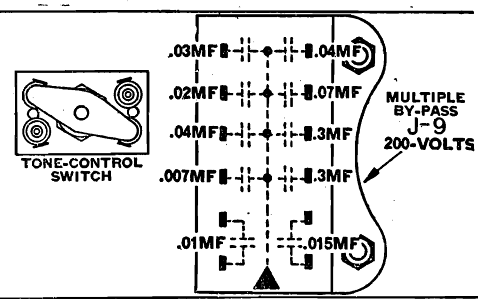
All measurements made from cathode.

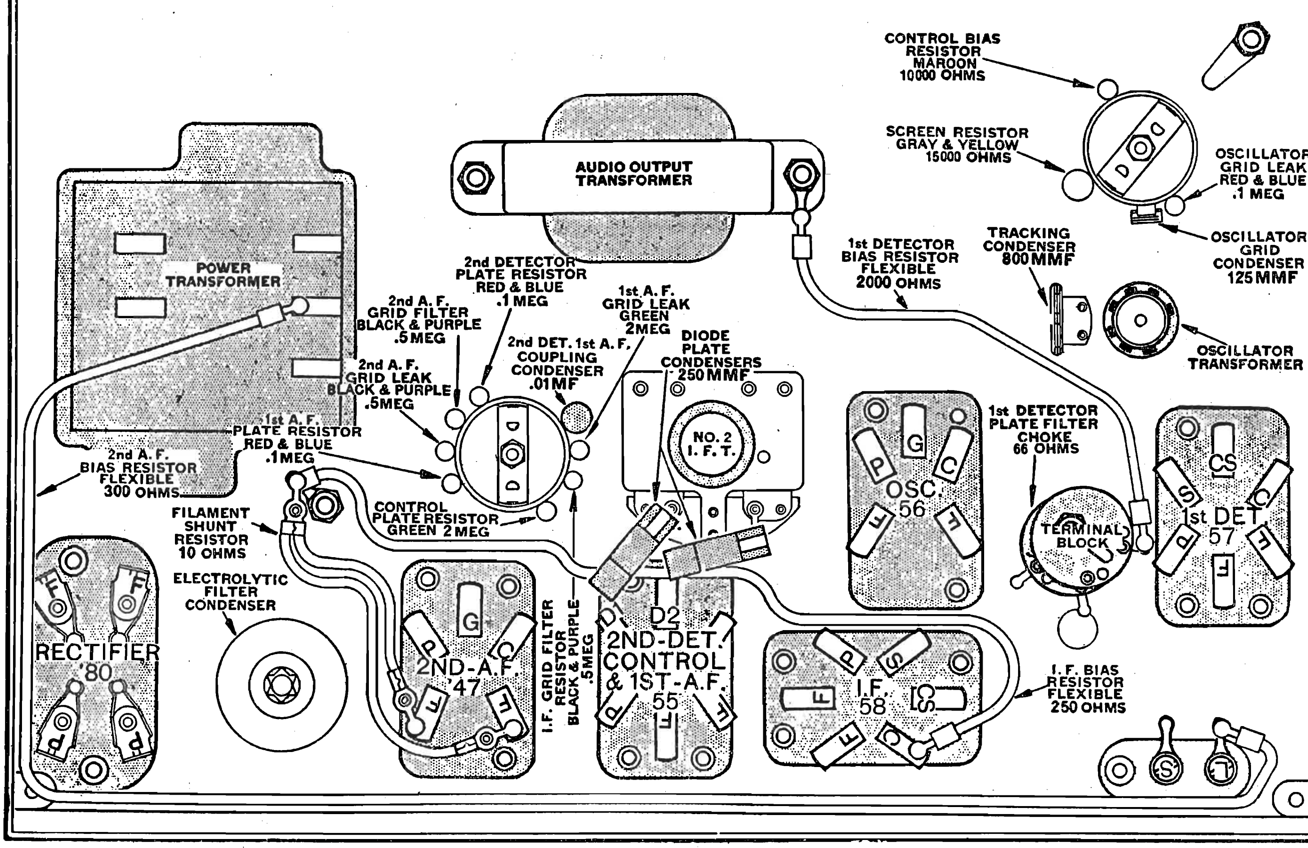
Line Voltage, 110 volts

1st Det. tube	Filament	2.4
	Plate	225
	Screen	115
	Grid	3
I.F. tube	Filament	2.4
	Plate	225
	Screen	100
	Grid	1
Osc. tube	Filament	2.4
	Plate	105
	Grid	8*
55 tube	Filament	2.4
	Plate	105
	D1	3
	D2	**
	Grid	2
2nd A.F. tube	Filament	2.4
	Plate	215
	Screen	230
	Grid	4

*The oscillator grid voltage varies.

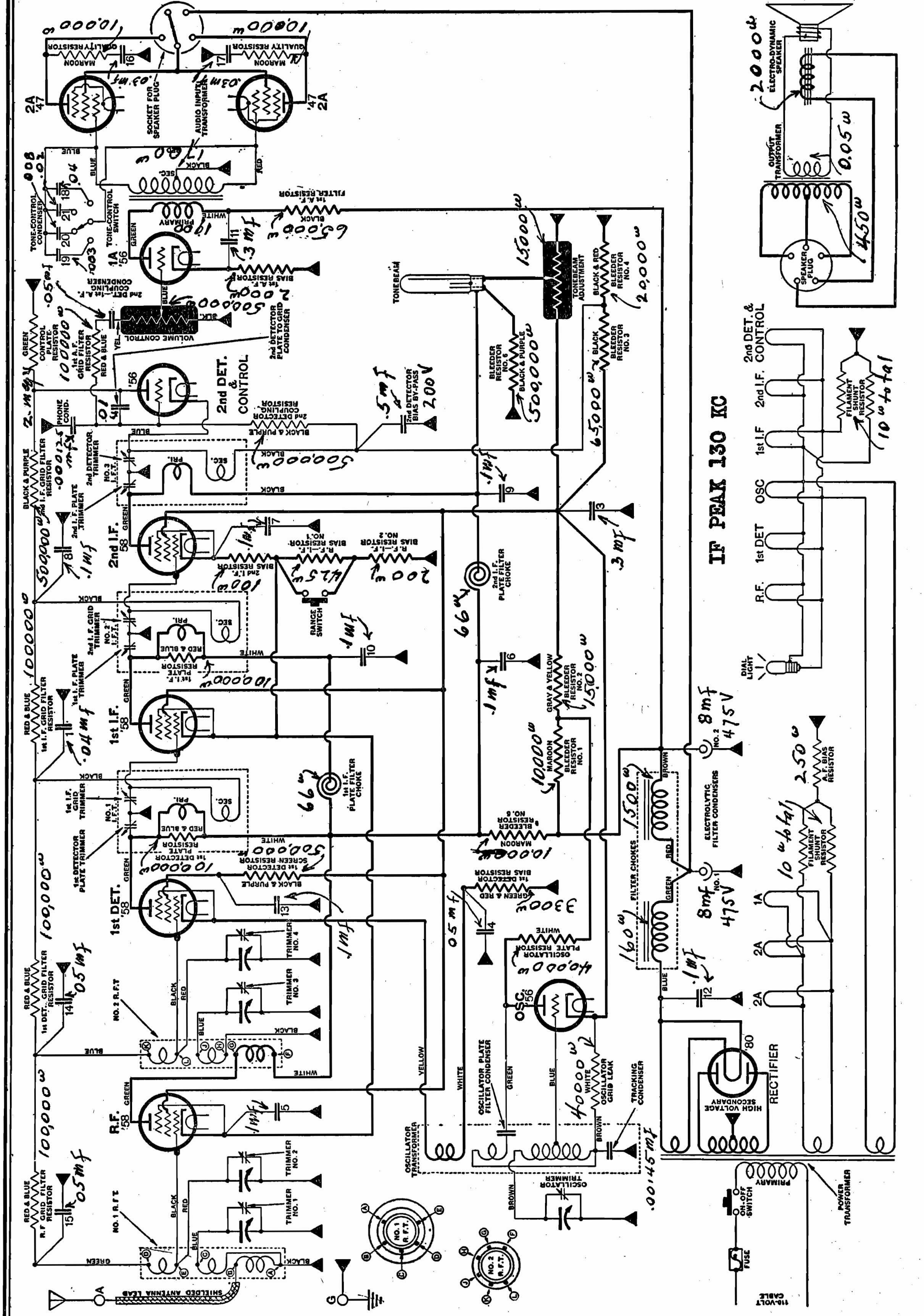
**The voltage from 2D to cathode is zero when no signal or noise is being picked up.



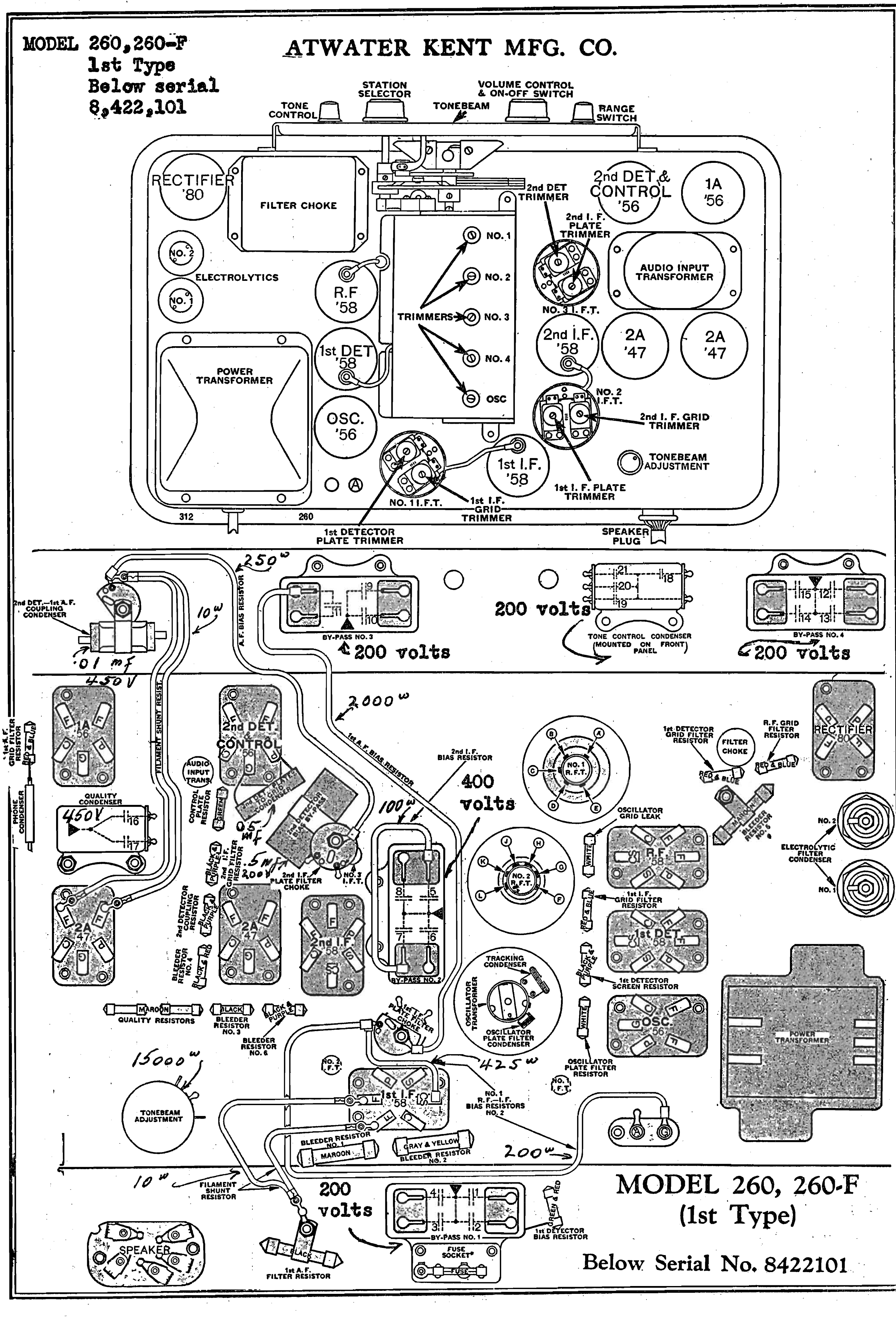


ATWATER KENT MFG. CO.

MODEL 260,260-F
1st Type
Below serial
8,422,101

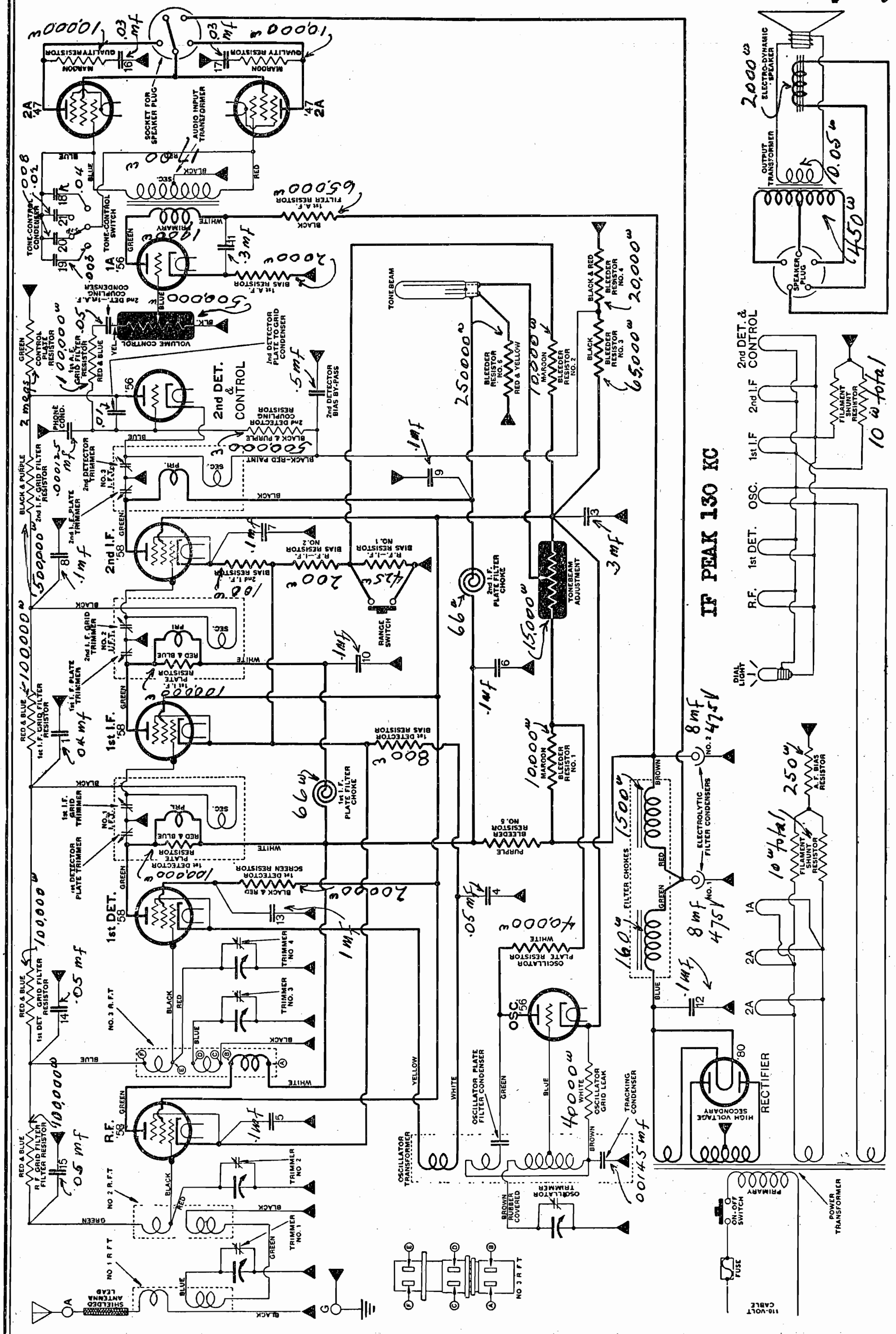


Numbers adjacent to bypass condensers correspond with numbers shown within multi-section bypass units on parts layout. See next page.


MODEL 260, 260-F
1st Type
Below serial
8,422,101
ATWATER KENT MFG. CO.
TONE CONTROL
STATION SELECTOR
TONEBEAM
VOLUME CONTROL & ON-OFF SWITCH
RANGE SWITCH
RECTIFIER '80
FILTER CHOKE
2nd DET TRIMMER
2nd DET & CONTROL '56
1A '56
2nd I. F. PLATE TRIMMER
NO. 1
NO. 2
NO. 3
NO. 4
OSC
TRIMMERS
ELECTROLYTICS
R.F '58
AUDIO INPUT TRANSFORMER
NO. 3 I. F.T.
2nd I.F. '58
2A '47
2A '47
1st DET '58
POWER TRANSFORMER
NO. 2 I.F.T.
2nd I. F. GRID TRIMMER
OSC. '56
TONEBEAM ADJUSTMENT
1st I.F. '58
1st I. F. PLATE TRIMMER
NO. 1 I.F.T.
1st I.F. GRID TRIMMER
312
260
1st DETECTOR PLATE TRIMMER
SPEAKER PLUG
250 w
2nd DET.—1st A. F. COUPLING CONDENSER
10 w
A. F. BIAS RESISTOR
BY-PASS NO. 3
200 volts
200 volts
TONE CONTROL CONDENSER (MOUNTED ON FRONT) PANEL
BY-PASS NO. 4
200 volts
.01 mf
450 V
1st A. F. GRID FILTER RESISTOR
RED & BLUE
FILAMENT SHUNT RESIST.
2,000 w
1st A. F. BIAS RESISTOR
2nd I. F. BIAS RESISTOR
400 volts
1st DETECTOR GRID FILTER RESISTOR
FILTER CHOKE
R. F. GRID FILTER RESISTOR
RECTIFIER 80
AUDIO INPUT TRANS.
PHONE CONDENSER
QUALITY CONDENSER
450 V
CONTROL PLATE RESISTOR
GREEN
.05 mf
.5 mf
200 V
100 w
2nd I. F. PLATE FILTER CHOKE
NO. 3 I.F.T.
OSCILLATOR GRID LEAK
MAROON
BLEEDER RESISTOR NO. 5
ELECTROLYTIC FILTER CONDENSER
NO. 2
NO. 1
WHITE
R.F 58
2nd I. F. GRID FILTER RESISTOR
BLACK & PURPLE
2nd DETECTOR COUPLING RESISTOR
BLEEDER RESISTOR NO. 4
BLACK & RED
2A 47
2nd I.F. 58
BY-PASS NO. 2
1st I. F. GRID FILTER RESISTOR
1st DET 58
TRACKING CONDENSER
1st DETECTOR SCREEN RESISTOR
OSCILLATOR TRANSFORMER
OSCILLATOR PLATE FILTER CONDENSER
OSC. 56
QUALITY RESISTORS
BLACK
BLEEDER RESISTOR NO. 3
BLEEDER RESISTOR NO. 6
1st I. F. PLATE FILTER CHOKE
POWER TRANSFORMER
15000 w
425 w
OSCILLATOR PLATE FILTER RESISTOR
NO. 2 I.F.T.
NO. 1 I.F.T.
TONEBEAM ADJUSTMENT
1st I.F. 58
NO. 1 R.F.—I.F. BIAS RESISTORS NO. 2
BLEEDER RESISTOR NO. 1
GRAY & YELLOW
BLEEDER RESISTOR NO. 2
200 w
10 w
FILAMENT SHUNT RESISTOR
200 volts
BY-PASS NO. 1
GREEN & RED
1st DETECTOR BIAS RESISTOR
FUSE SOCKET
FUSE
SPEAKER
1st A.F. FILTER RESISTOR
MODEL 260, 260-F
(1st Type)
Below Serial No. 8422101

ATWATER KENT MFG. CO.

MODEL 260, 260-F
2nd Type
Above serial
8,422,101

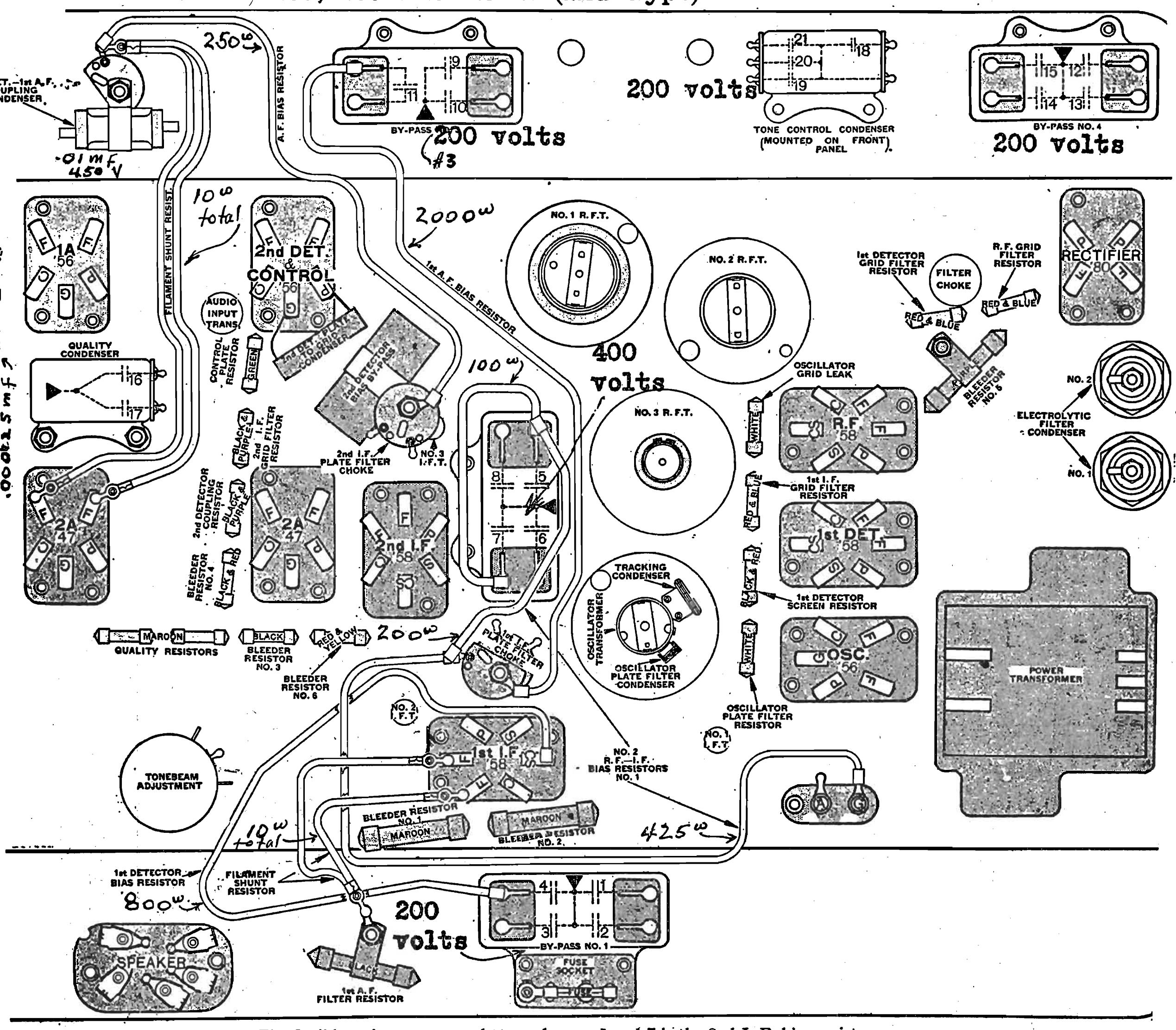


Numbers adjacent to bypass condensers correspond with numbers shown within multi-section bypass condensers on parts layout. See next page.

MODEL 260, 260-F
2nd Type
Above serial 8,422,101

ATWATER KENT MFG. CO.

MODEL 260, 260-F CHART (2nd Type) Above Serial No. 8422101



The flexible resistor connected to condensers 5 and 7 is the 2nd I. F. bias resistor.

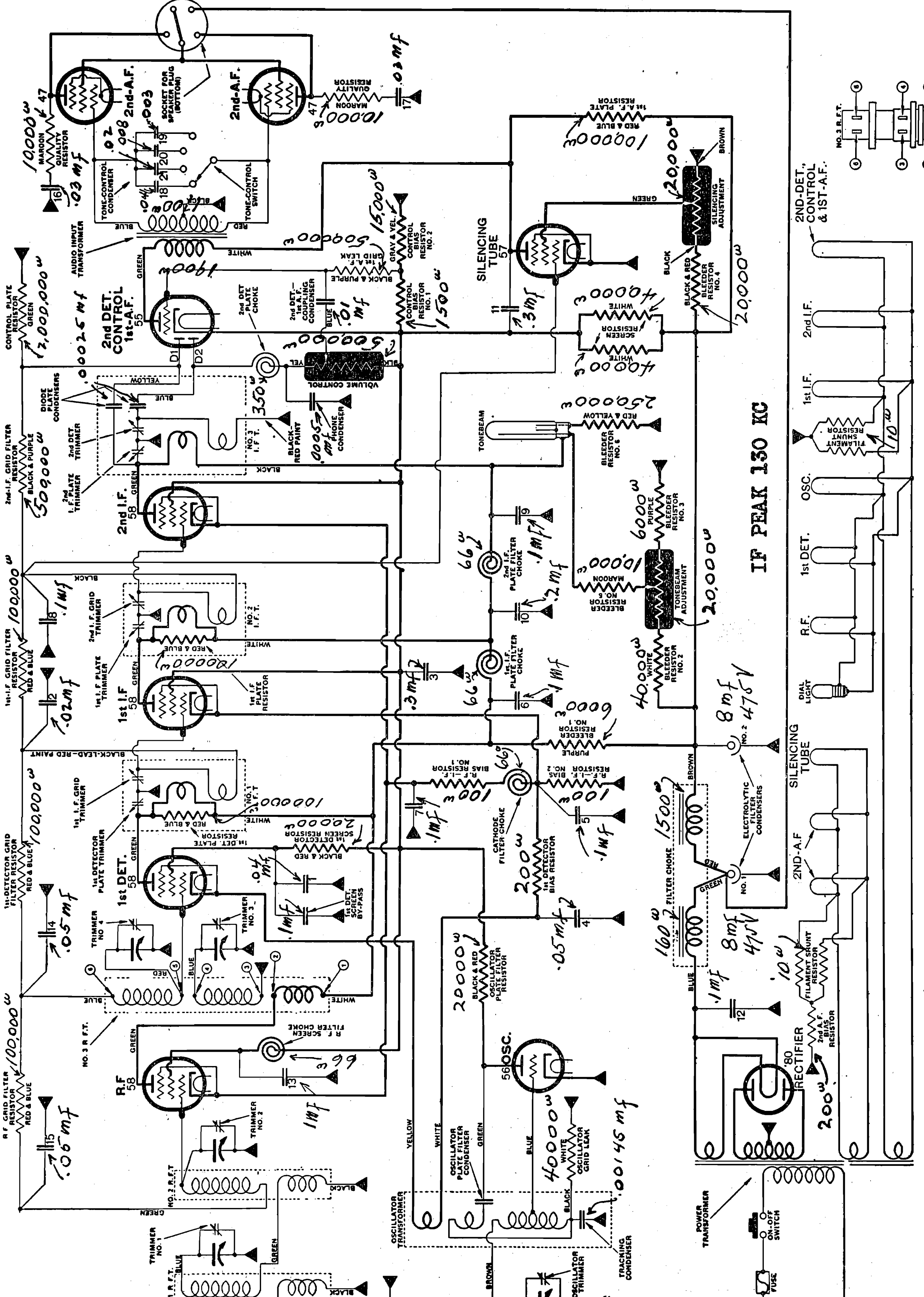
BYPASS CONDENSERS

RF Bypass # 1	# 23330	200 volts
RF Bypass # 2	# 15262	400 volts
RF Bypass # 3	# 22050	200 volts
RF Bypass # 4	# 27120	200 volts
Tone control	# 21530	200 volts
Quality	# 21450	450 volts

2nd detector bias bypass .05 mfd 200 volts
2nd detector plate to grid .05 mfd 200 volts
2nd detector-1st A-f coupling .01 mfd 450 volts
Phone condenser 000125 mfd 500 volts

ATWATER KENT MFG. CO.

MODEL 260, 260-F
3rd Type
Above serial
6,188,242

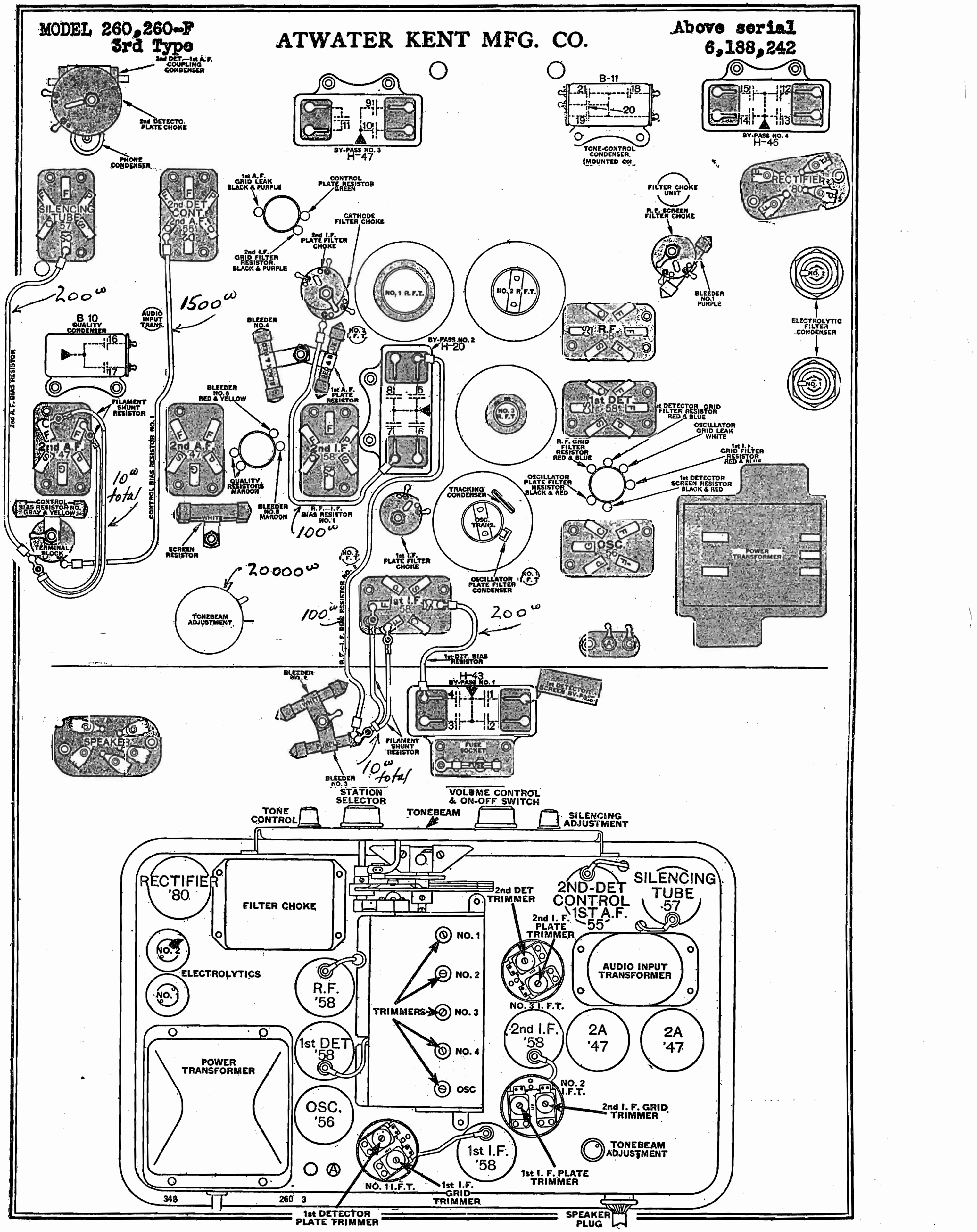


In late-type sets, the 2nd detector plate choke is replaced by a No. 20980 red-and-blue resistor, and the black-and-red bleeder No. 4 is replaced by a No. 29710 gray resistor, and in these sets, the voltage across bleeder No. 4 is about 160 volts, and the voltage across the silencing adjustment is about 107 volts.

MODEL 260, 260-F 3rd Type

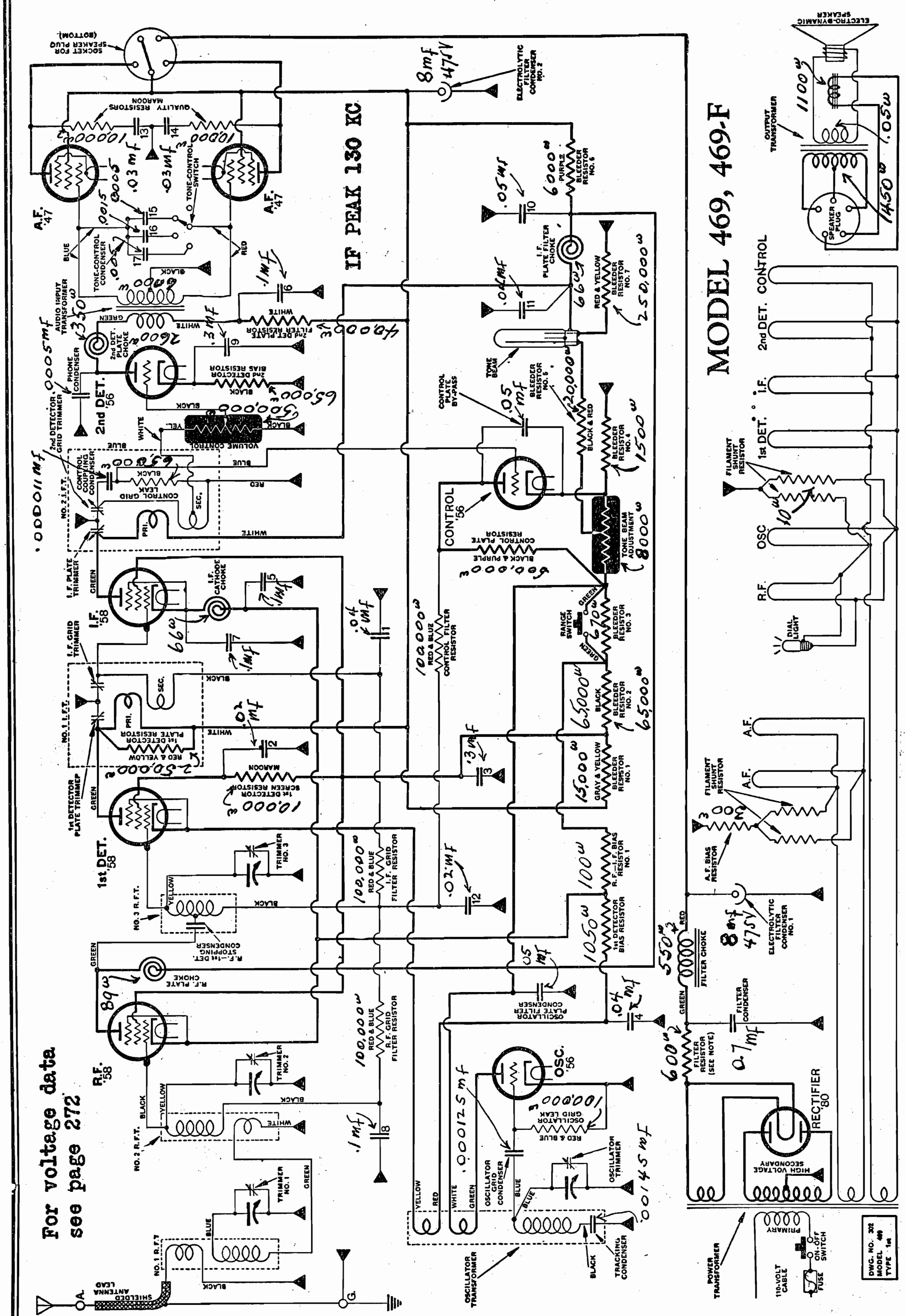
ATWATER KENT MFG. CO.

Above serial 6,188,242



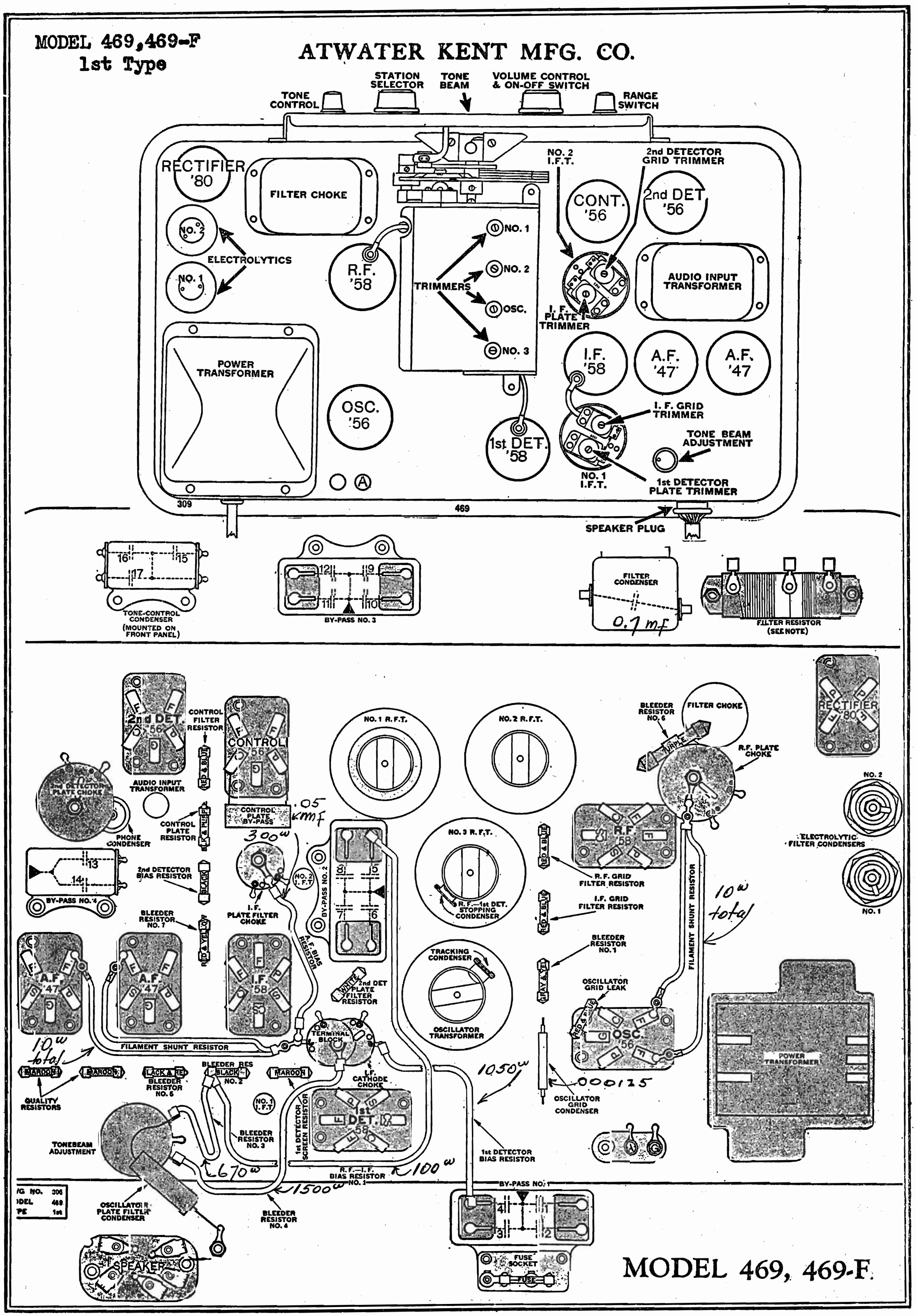
ATWATER KENT MFG. CO.

MODEL 469, 469-F
1st Type



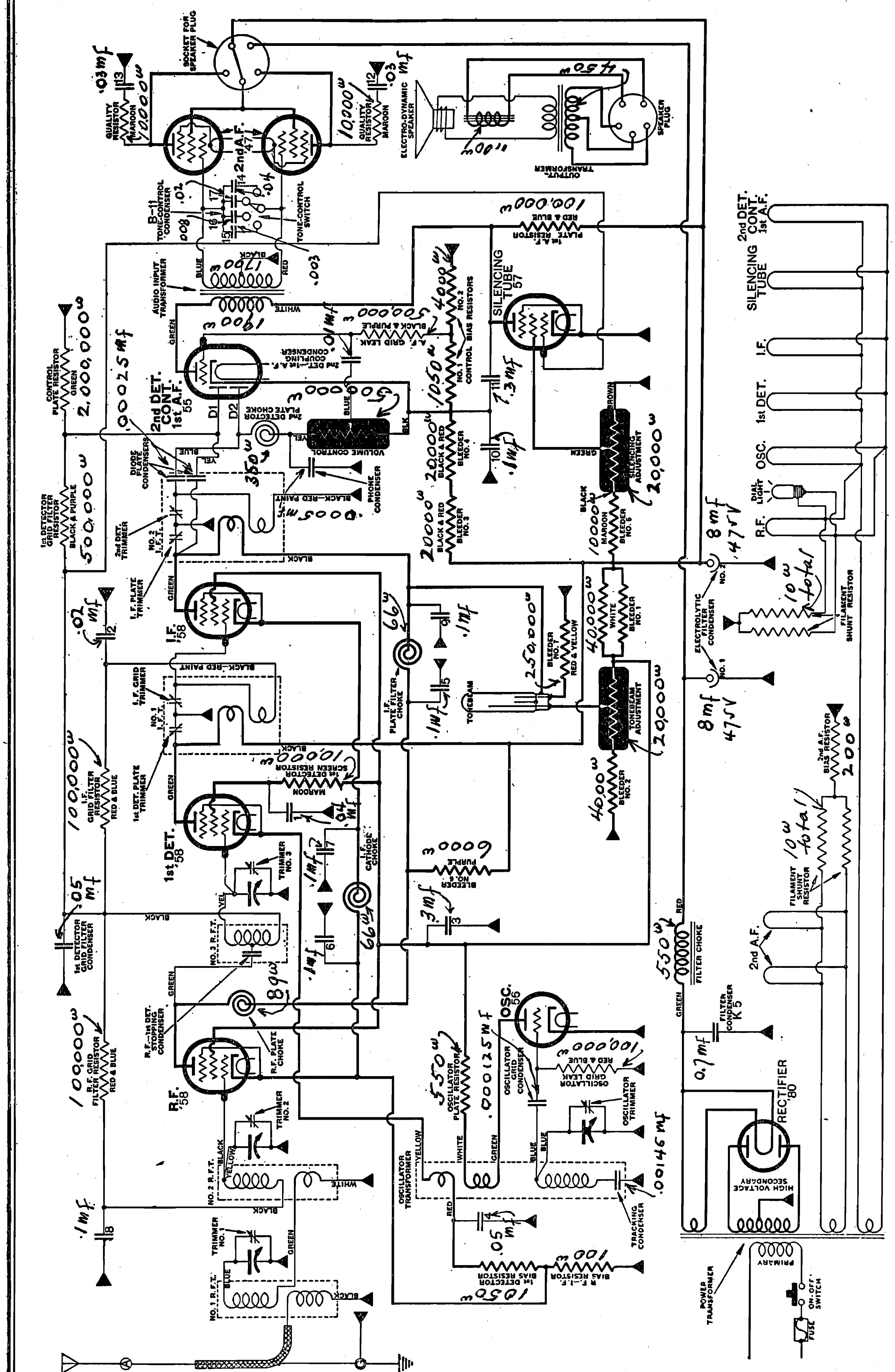
Early-type Model 469 receivers employed a T-12-A power transformer which necessitated the use of a filter resistor (No. 19180-X) as shown above. Later types of this model use a T-23 power transformer which does not require the filter resistor. The T-12-A transformer is not supplied for service, being superseded by the T-23. When installing T-23 in place of a defective T-12-A, it is necessary to remove or short circuit the filter-resistor.

In late-type 469, the 2nd detector filter resistor is sealed inside the audio input transformer, which has six leads; The white lead is for connection to condenser 6, and a yellow lead is for connection to plus B. When replacing an early-type audio input transformer, with the late-type, it is necessary to remove the external 2nd-detector filter resistor.


MODEL 469,469-F
1st Type
ATWATER KENT MFG. CO.
TONE CONTROL
STATION SELECTOR
TONE BEAM
VOLUME CONTROL & ON-OFF SWITCH
RANGE SWITCH
RECTIFIER '80
FILTER CHOKE
NO. 2 I.F.T.
2nd DETECTOR GRID TRIMMER
CONT. '56
2nd DET '56
NO. 2
NO. 1
ELECTROLYTICS
R.F. '58
TRIMMERS
NO. 1
NO. 2
OSC.
NO. 3
I. F. PLATE TRIMMER
AUDIO INPUT TRANSFORMER
POWER TRANSFORMER
I.F. '58
A.F. '47
A.F. '47
OSC. '56
1st DET. '58
I. F. GRID TRIMMER
TONE BEAM ADJUSTMENT
NO. 1 I.F.T.
1st DETECTOR PLATE TRIMMER
309
469
SPEAKER PLUG
TONE-CONTROL CONDENSER (MOUNTED ON FRONT PANEL)
BY-PASS NO. 3
FILTER CONDENSER
0.7 mf
FILTER RESISTOR (SEE NOTE)
2nd DET. '56
CONTROL FILTER RESISTOR
CONTROL '56
NO. 1 R.F.T.
NO. 2 R.F.T.
BLEEDER RESISTOR NO. 6
FILTER CHOKE
RECTIFIER '80
R.F. PLATE CHOKE
2nd DETECTOR PLATE CHOKE
AUDIO INPUT TRANSFORMER
PHONE CONDENSER
CONTROL PLATE RESISTOR
CONTROL PLATE BY-PASS
.05 mf
300 w
NO. 3 R.F.T.
R.F. '58
ELECTROLYTIC FILTER CONDENSERS
2nd DETECTOR BIAS RESISTOR
BY-PASS NO. 4
I.F. PLATE FILTER CHOKE
BY-PASS NO. 2
R.F.—1st DET. STOPPING CONDENSER
R.F. GRID FILTER RESISTOR
I.F. GRID FILTER RESISTOR
10 w total
FILAMENT SHUNT RESISTOR
BLEEDER RESISTOR NO. 7
A.F. BIAS RESISTOR
BLEEDER RESISTOR NO. 1
A.F. '47
A.F. '47
I.F. '58
TRACKING CONDENSER
2nd DET PLATE FILTER RESISTOR
OSCILLATOR GRID LEAK
OSC. '56
OSCILLATOR TRANSFORMER
FILAMENT SHUNT RESISTOR
10 w total
TERMINAL BLOCK
POWER TRANSFORMER
QUALITY RESISTORS
BLEEDER RESISTOR NO. 5
BLEEDER RES NO. 2
I.F. CATHODE CHOKE
1050 w
.000125
OSCILLATOR GRID CONDENSER
NO. 1 I.F.T.
1st DET. '58
1st DETECTOR SCREEN RESISTOR
TONEBEAM ADJUSTMENT
BLEEDER RESISTOR NO. 3
670 w
1st DETECTOR BIAS RESISTOR
R.F.—I.F. BIAS RESISTOR NO. 1
100 w
1500 w
BY-PASS NO. 1
OSCILLATOR PLATE FILTER CONDENSER
BLEEDER RESISTOR NO. 4
SPEAKER
FUSE SOCKET
FUSE
MODEL 469, 469-F.

ATWATER KENT MFG. CO.

MODEL 469 – 469-F
Second Type
Above Serial
8498122
6186242

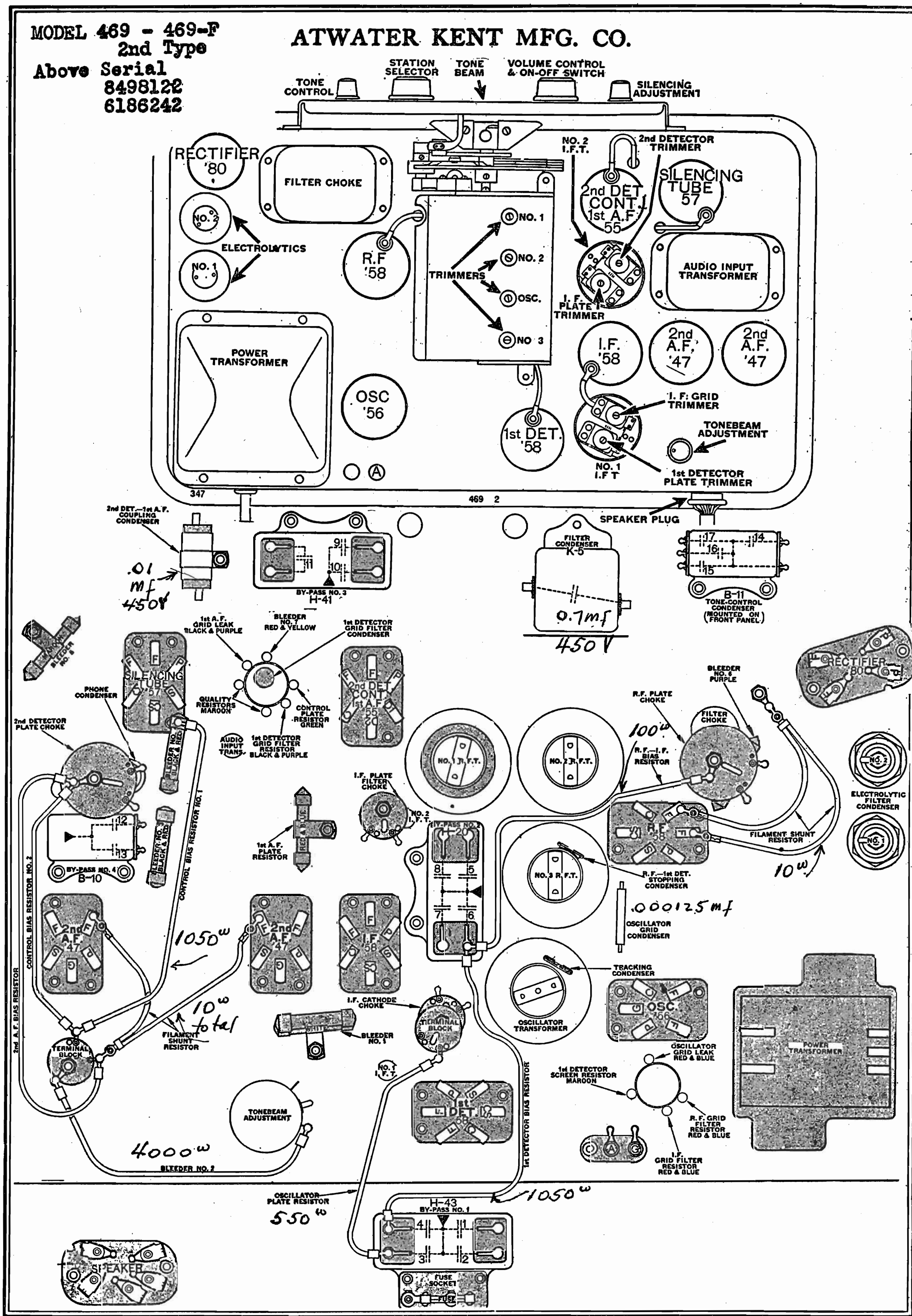


IF PEAK 130 KC

Small numerals adjacent to numbered bypass condensers correspond with units shown within multiple condenser shown on this page and upon the parts layout on next page.

Voltage data page 280

Voltage reference page 3-134.

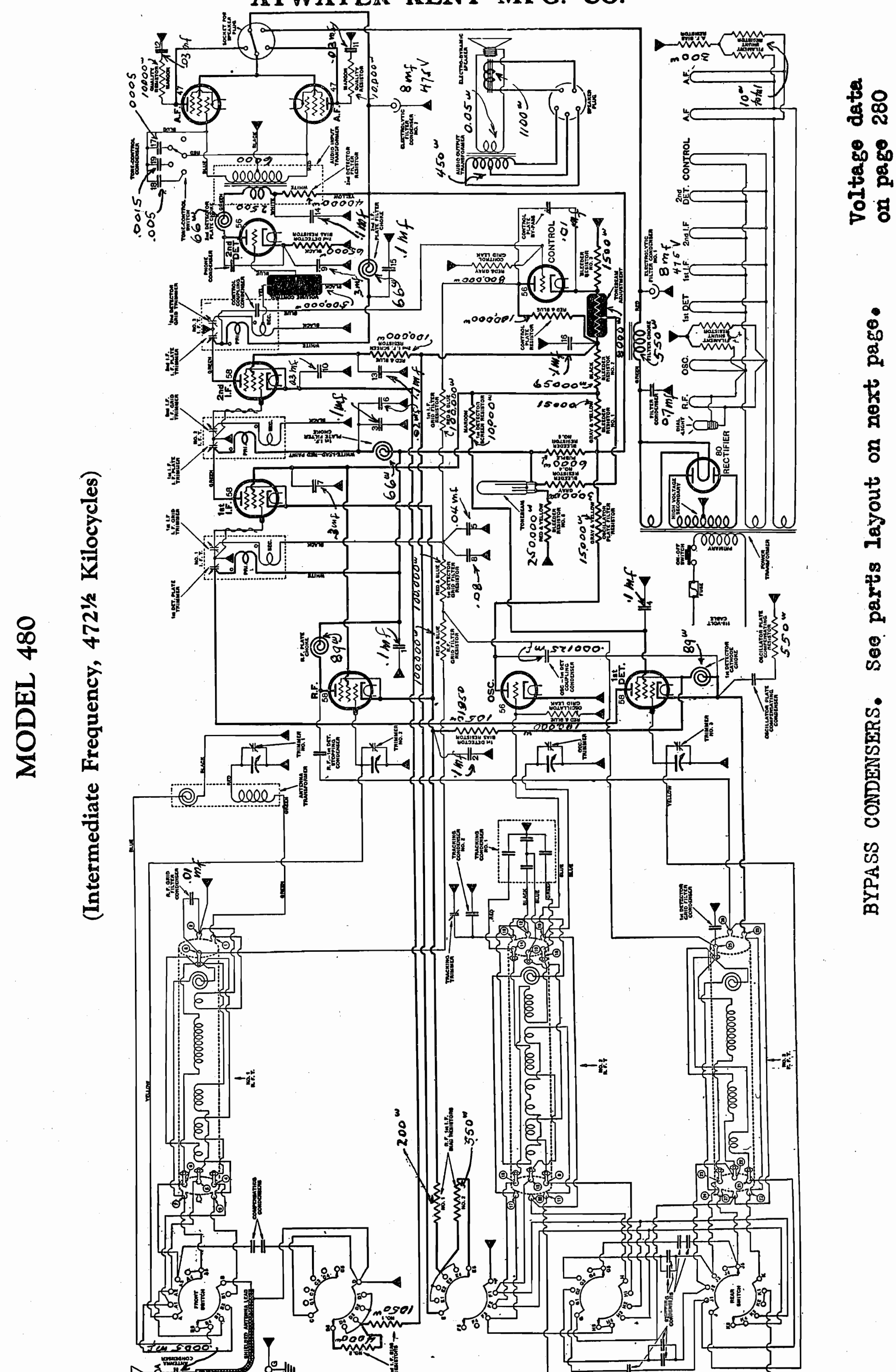

MODEL 469 - 469-F
2nd Type
Above Serial
8498122
6186242
ATWATER KENT MFG. CO.
TONE CONTROL
STATION SELECTOR
TONE BEAM
VOLUME CONTROL & ON-OFF SWITCH
SILENCING ADJUSTMENT
RECTIFIER '80
FILTER CHOKE
NO. 2 I.F.T.
2nd DETECTOR TRIMMER
SILENCING TUBE 57
2nd DET. CONT. 1st A.F. 55
ELECTROLYTICS
R.F '58
TRIMMERS
NO. 1
NO. 2
OSC.
NO 3
AUDIO INPUT TRANSFORMER
I. F. PLATE TRIMMER
POWER TRANSFORMER
I.F. '58
2nd A.F. '47
2nd A.F. '47
OSC '56
1st DET. '58
I. F. GRID TRIMMER
TONEBEAM ADJUSTMENT
NO. 1 I.F.T.
1st DETECTOR PLATE TRIMMER
347
469 2
SPEAKER PLUG
2nd DET.—1st A.F. COUPLING CONDENSER
.01 mf 450V
BY-PASS NO. 3 H-41
FILTER CONDENSER K-5
0.7mf
450V
B-11 TONE-CONTROL CONDENSER (MOUNTED ON FRONT PANEL)
BLEEDER NO. 8
1st A.F. GRID LEAK BLACK & PURPLE
BLEEDER NO. 7 RED & YELLOW
1st DETECTOR GRID FILTER CONDENSER
PHONE CONDENSER
QUALITY RESISTORS MAROON
CONTROL PLATE RESISTOR GREEN
AUDIO INPUT TRANS.
1st DETECTOR GRID FILTER RESISTOR BLACK & PURPLE
2nd DETECTOR PLATE CHOKE
BLEEDER NO. 6 PURPLE
R.F. PLATE CHOKE
100ω
R.F.—I.F. BIAS RESISTOR
NO. 1 I.F.T.
NO. 2 I.F.T.
I.F. PLATE FILTER CHOKE
NO. 2 I.F.T.
1st A.F. PLATE RESISTOR
BY-PASS NO. 2
ELECTROLYTIC FILTER CONDENSER
FILAMENT SHUNT RESISTOR
10ω
NO. 3 R.F.T.
R.F.—1st DET. STOPPING CONDENSER
.000125 mf
OSCILLATOR GRID CONDENSER
BY-PASS NO. 4 B-10
BLEEDER NO. 5 BLACK & RED
BLEEDER NO. 4 BLACK & RED
CONTROL BIAS RESISTOR NO. 1
CONTROL BIAS RESISTOR NO. 2
2nd A.F. BIAS RESISTOR
1050ω
10ω total
FILAMENT SHUNT RESISTOR
TERMINAL BLOCK
I.F. CATHODE CHOKE
BLEEDER NO. 1
TRACKING CONDENSER
OSCILLATOR TRANSFORMER
OSC. '56
OSCILLATOR GRID LEAK RED & BLUE
1st DETECTOR SCREEN RESISTOR MAROON
R.F. GRID FILTER RESISTOR RED & BLUE
I.F. GRID FILTER RESISTOR RED & BLUE
POWER TRANSFORMER
NO. 1 I.F.T.
1st DET. 58
TONEBEAM ADJUSTMENT
4000ω
BLEEDER NO. 2
1st DETECTOR BIAS RESISTOR
1050ω
OSCILLATOR PLATE RESISTOR
550ω
H-43 BY-PASS NO. 1
SPEAKER
FUSE SOCKET
FUSE

MODEL 480

ATWATER KENT MFG. CO.

MODEL 480

(Intermediate Frequency, 472½ Kilocycles)



Voltage data on page 280

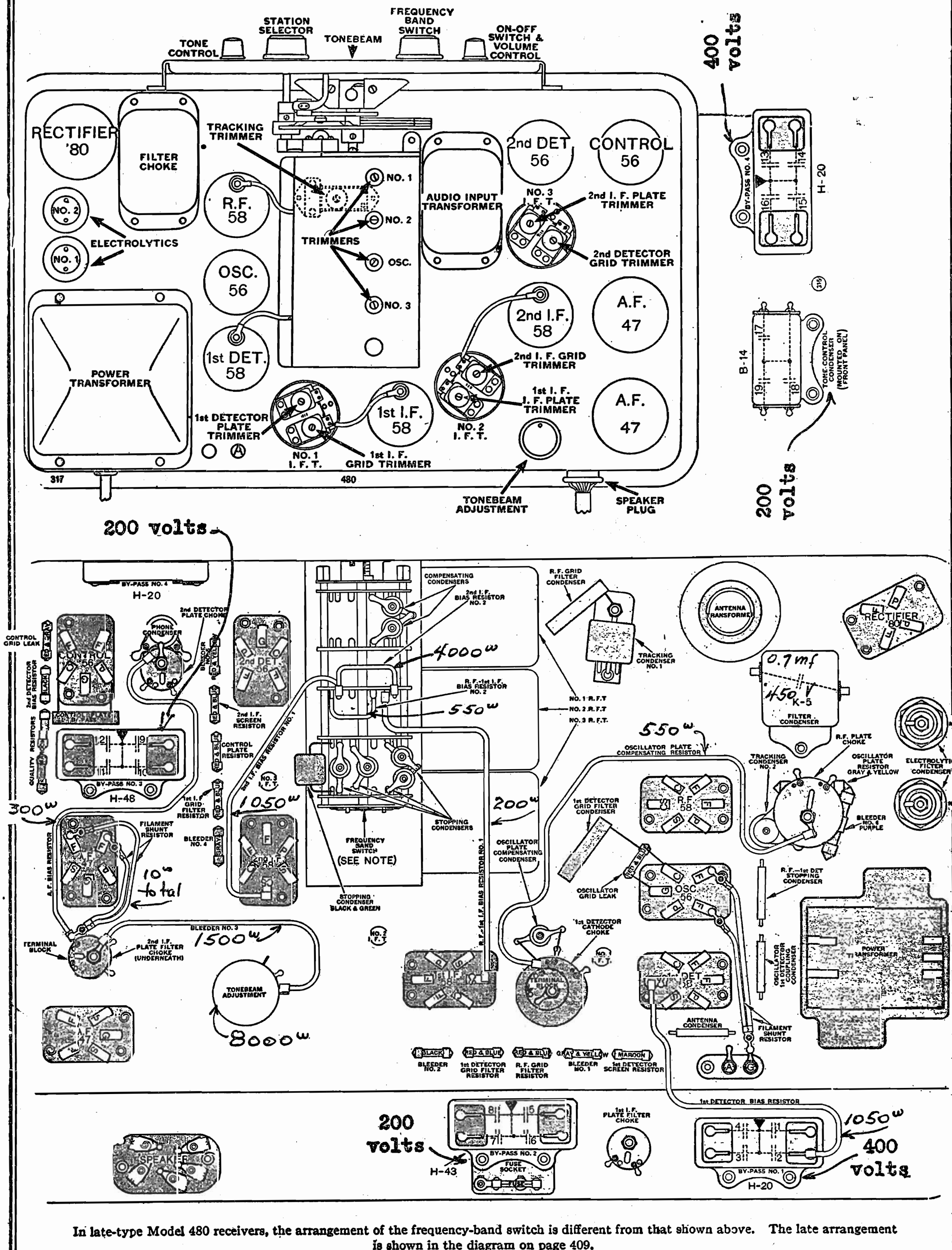
BYPASS CONDENSERS. See parts layout on next page.

In some early-type Model 480 receivers the circuit arrangement and contacts of the frequency-band switch are different from that shown above.

IMPORTANT: In late-type Model 480, the control-coupling condenser and the control grid leak are omitted, and there is no blue lead from No. 3 I. F. T. In these late sets, the grid of the control tube is connected to the yellow lead from No. 3 I. F. T.

Voltage reference page 3-134.

MODEL 480 — ATWATER KENT MFG. CO.

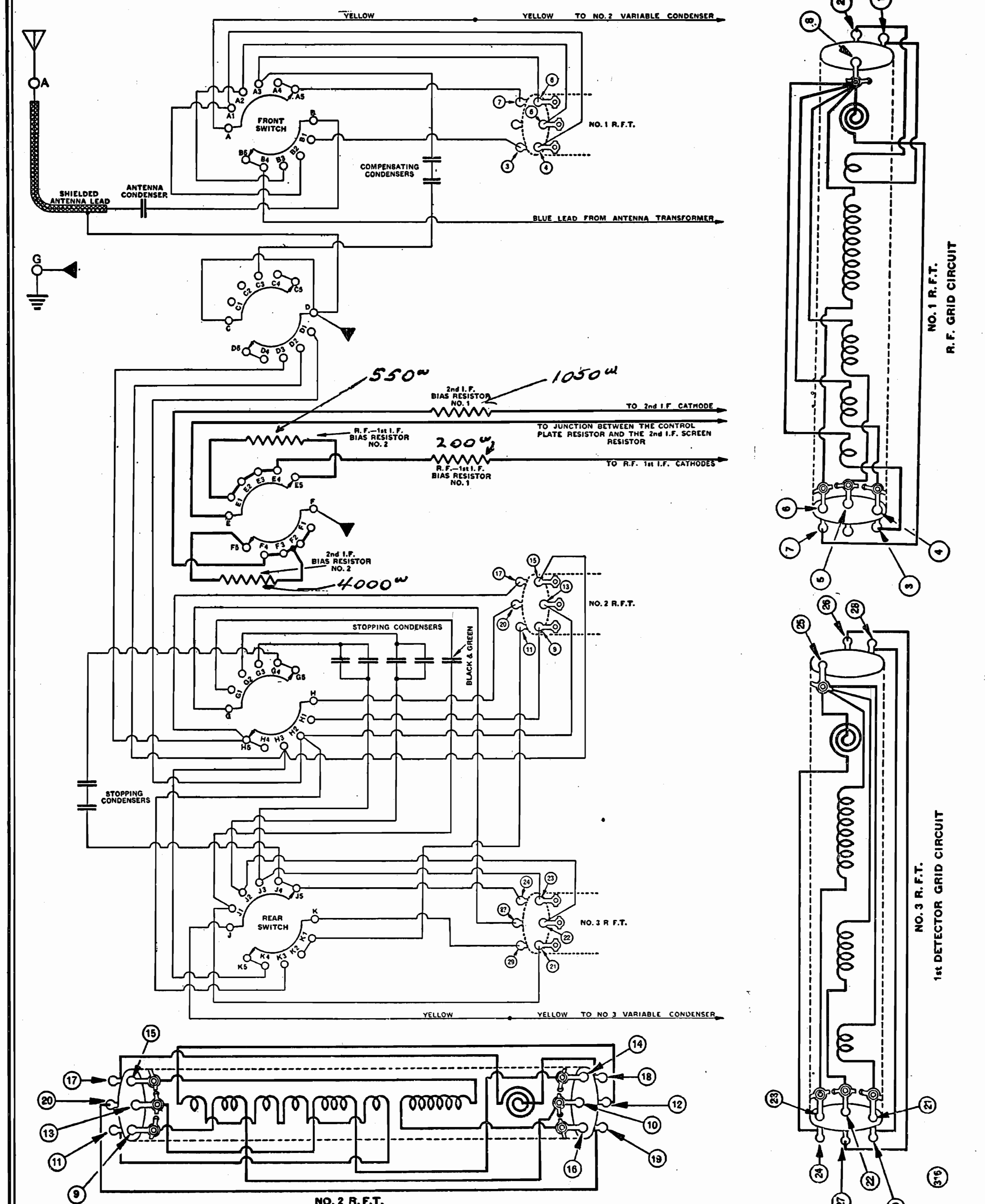


In late-type Model 480 receivers, the arrangement of the frequency-band switch is different from that shown above. The late arrangement is shown in the diagram on page 409.

ATWATER KENT MFG. CO.

MODEL 480

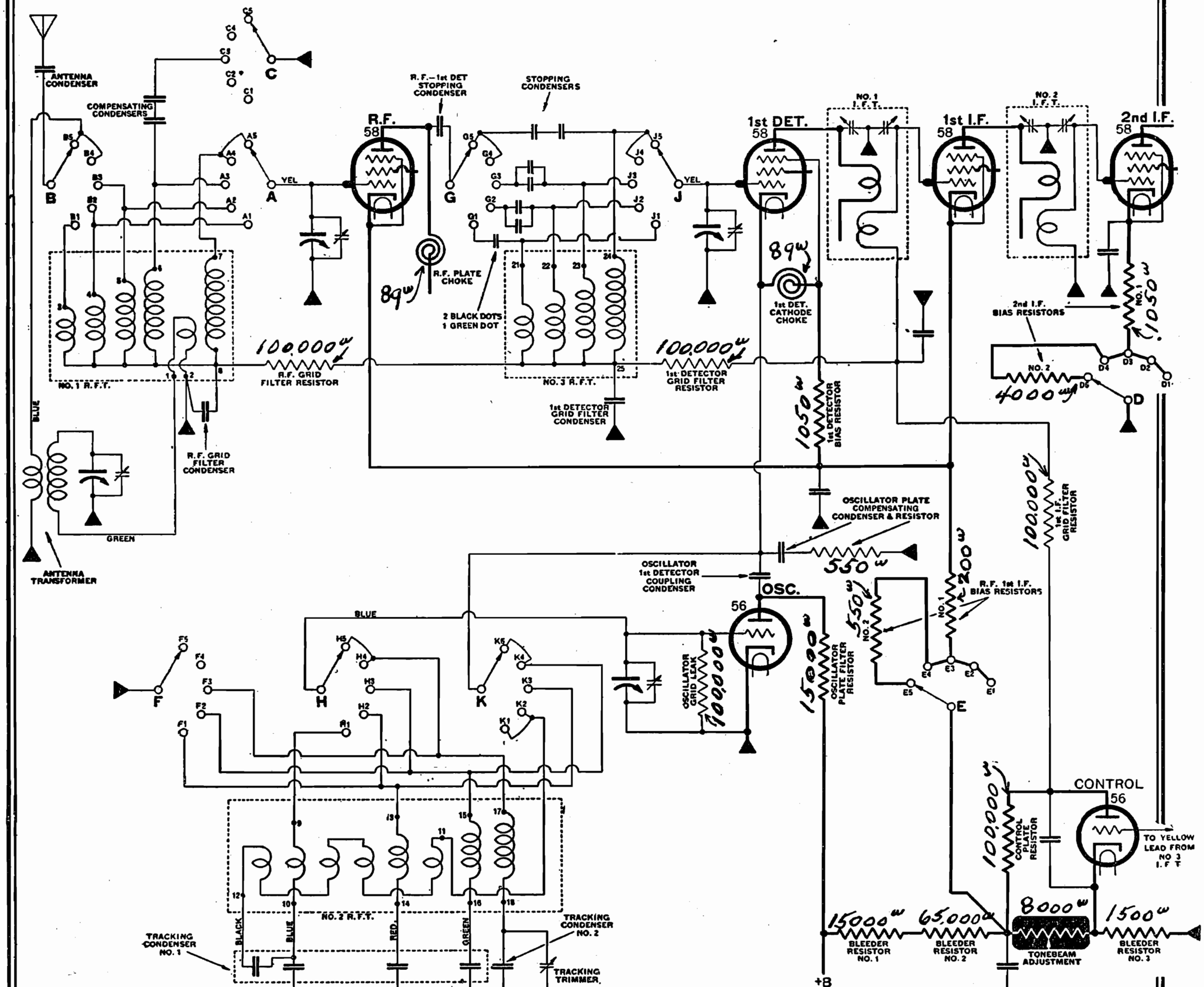
MODEL 480 FREQUENCY-RANGE-SWITCH CIRCUIT (Early Type)



NO. 2 R.F.T.
OSCILLATOR PLATE & GRID CIRCUITS

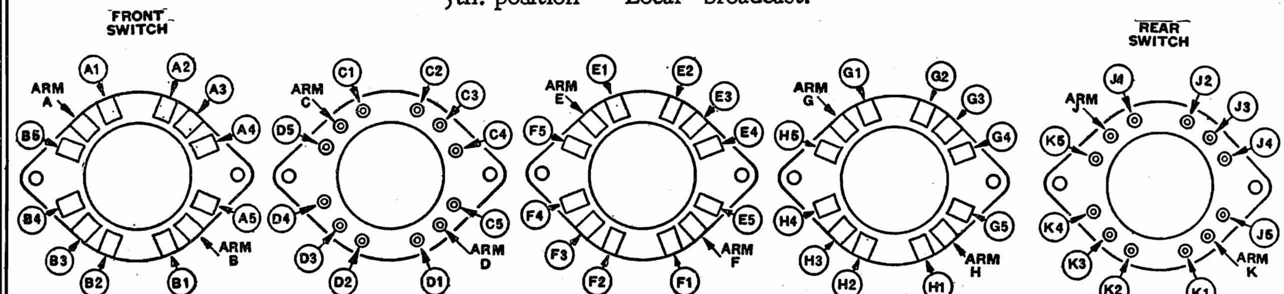
ATWATER KENT MFG. CO.

MODEL 480 SIMPLIFIED SCHEMATIC



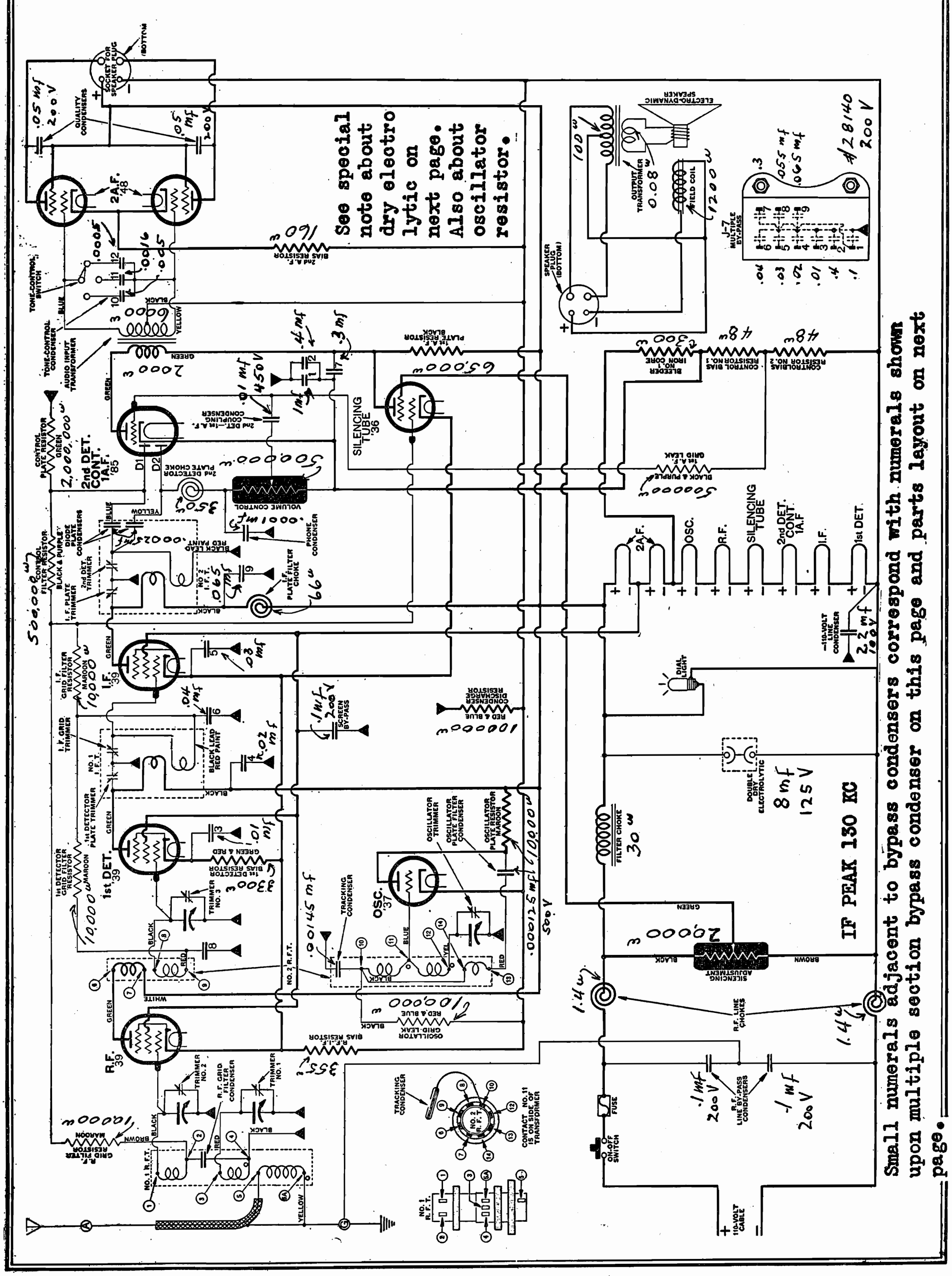
The frequency-range switch in Model 480 has five positions as follows:

1st. position —8.2 to 21.2 megacycles.
2nd. position—3.6 to 9.2 megacycles.
3rd. position—1.5 to 4 megacycles.
4th. position—"Distance" broadcast.
5th. position—"Local" broadcast.



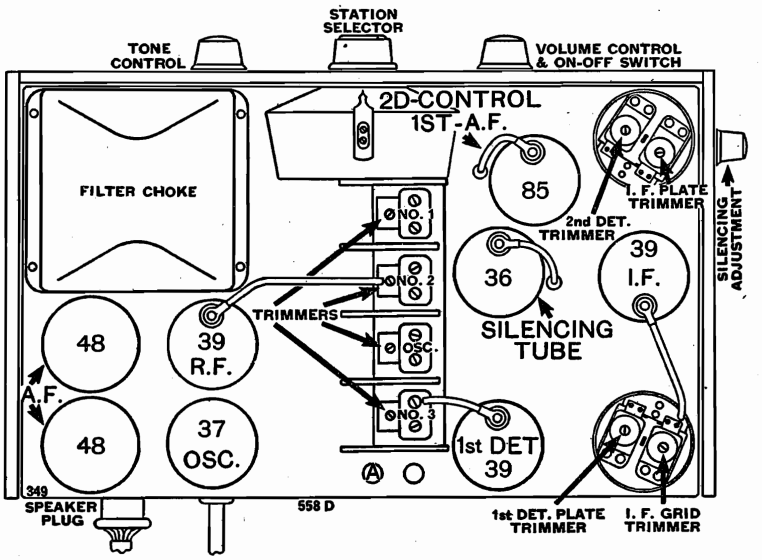
ATWATER KENT MFG. CO.

MODEL 469-D
MODEL 558-D

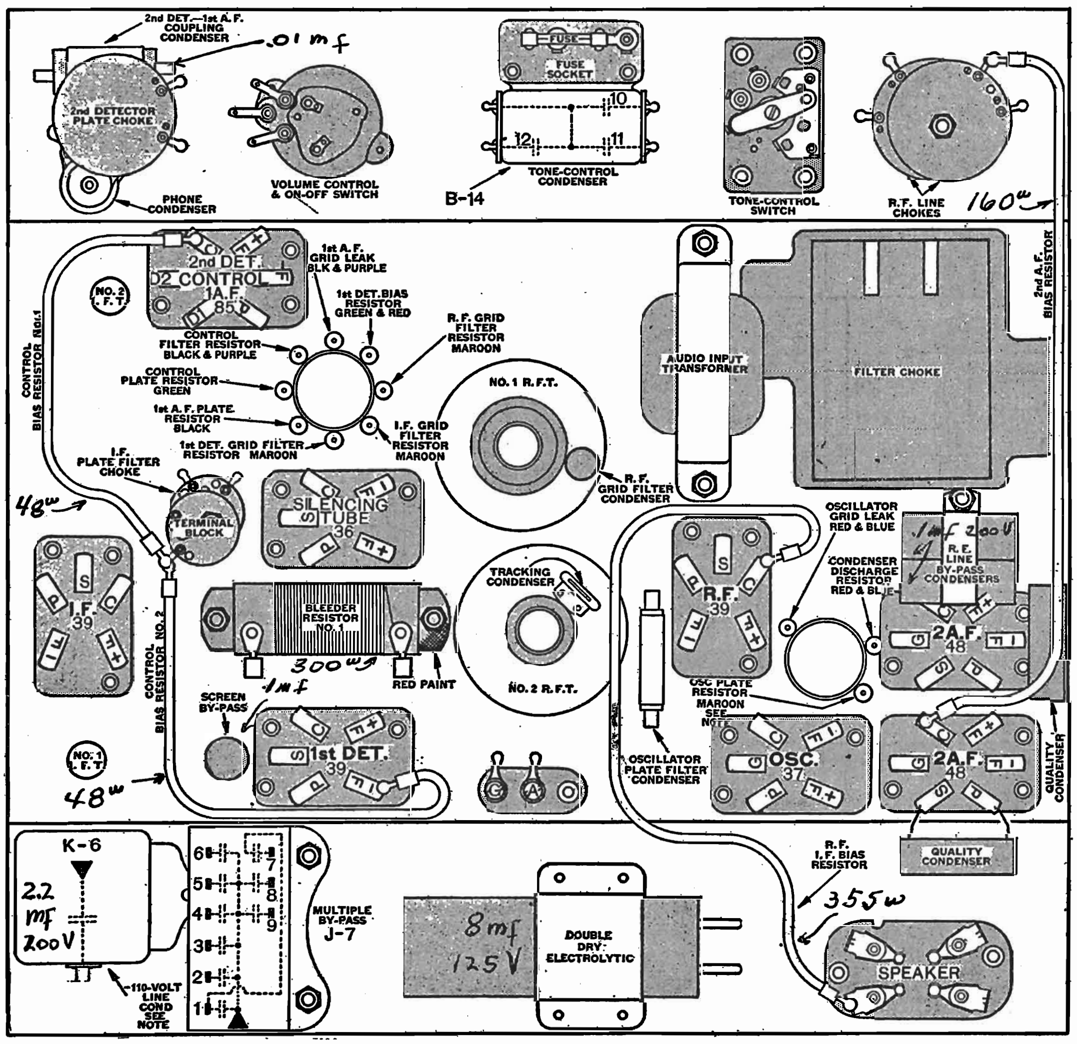


MODEL 469-D
MODEL 558-D

ATWATER KENT MFG. CO.

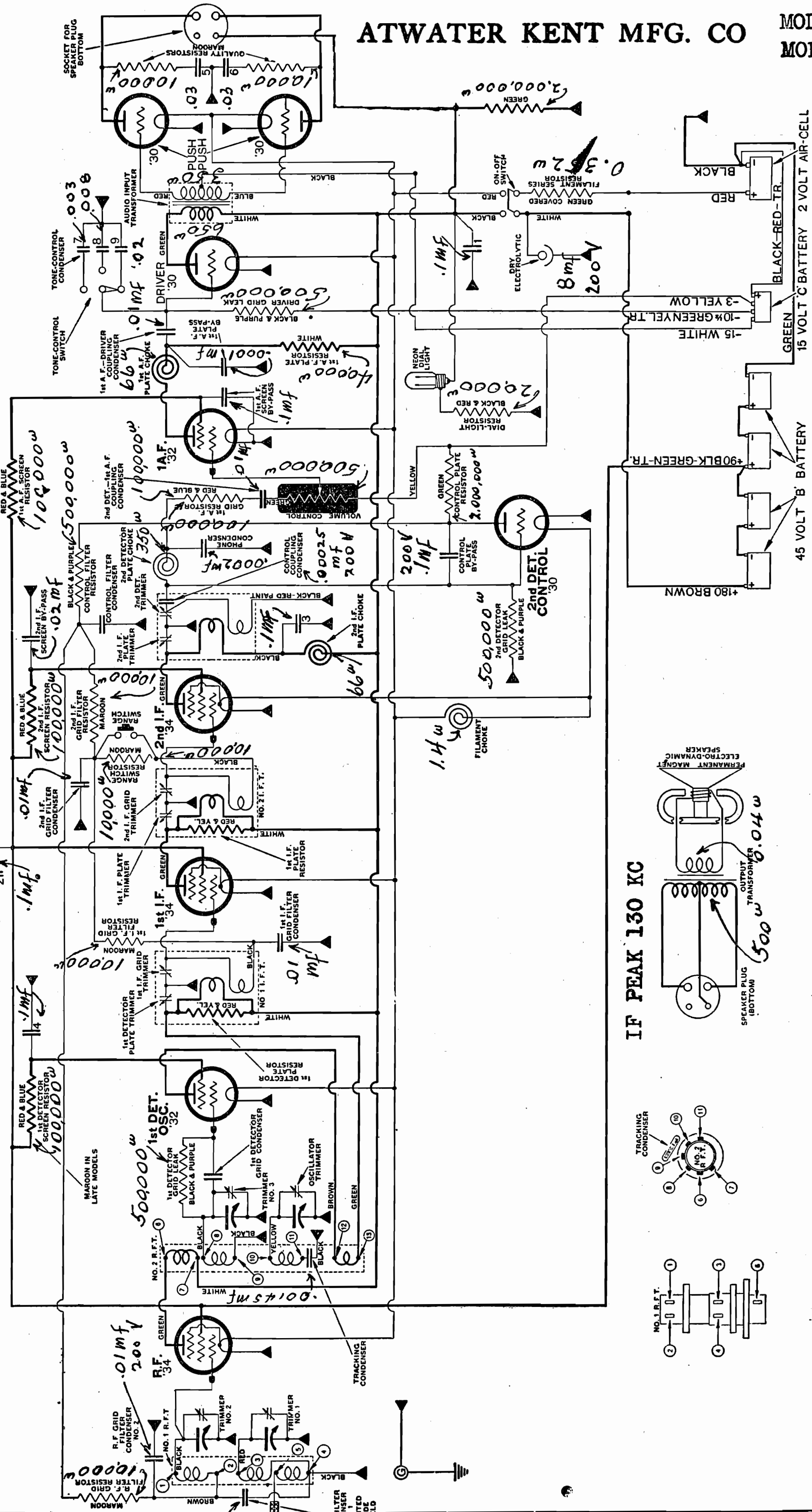


All condensers within multiple section unit are rated at 200 volts. Also a black resistor is connected across the maroon oscillator plate filter resistor.
In some of these sets a tubular dry electrolytic is used as the 110 volt line condenser.



ATWATER KENT MFG. CO

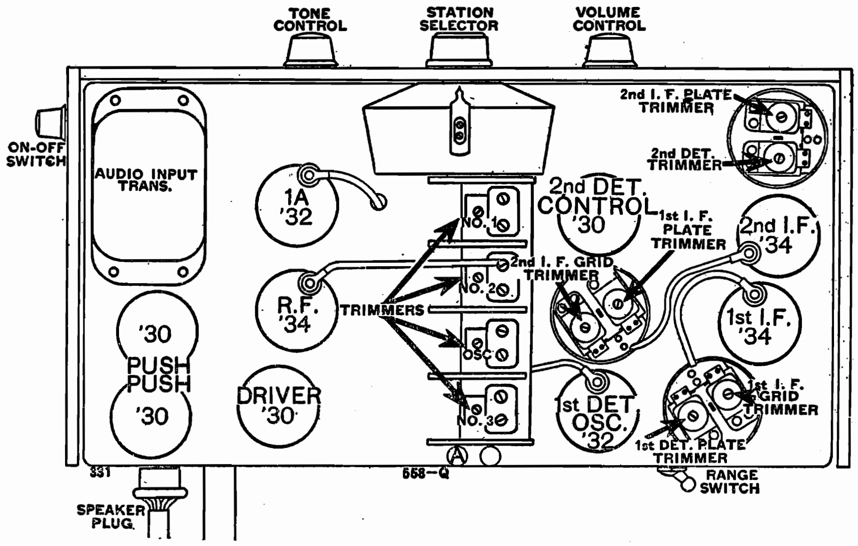
MODEL 469-Q
MODEL 558-Q



Small numerals adjacent to bypass condensers correspond with numerals shown upon multiple section bypass condenser on this page and parts layout on next page.

MODEL 558-Q
MODEL 469-Q

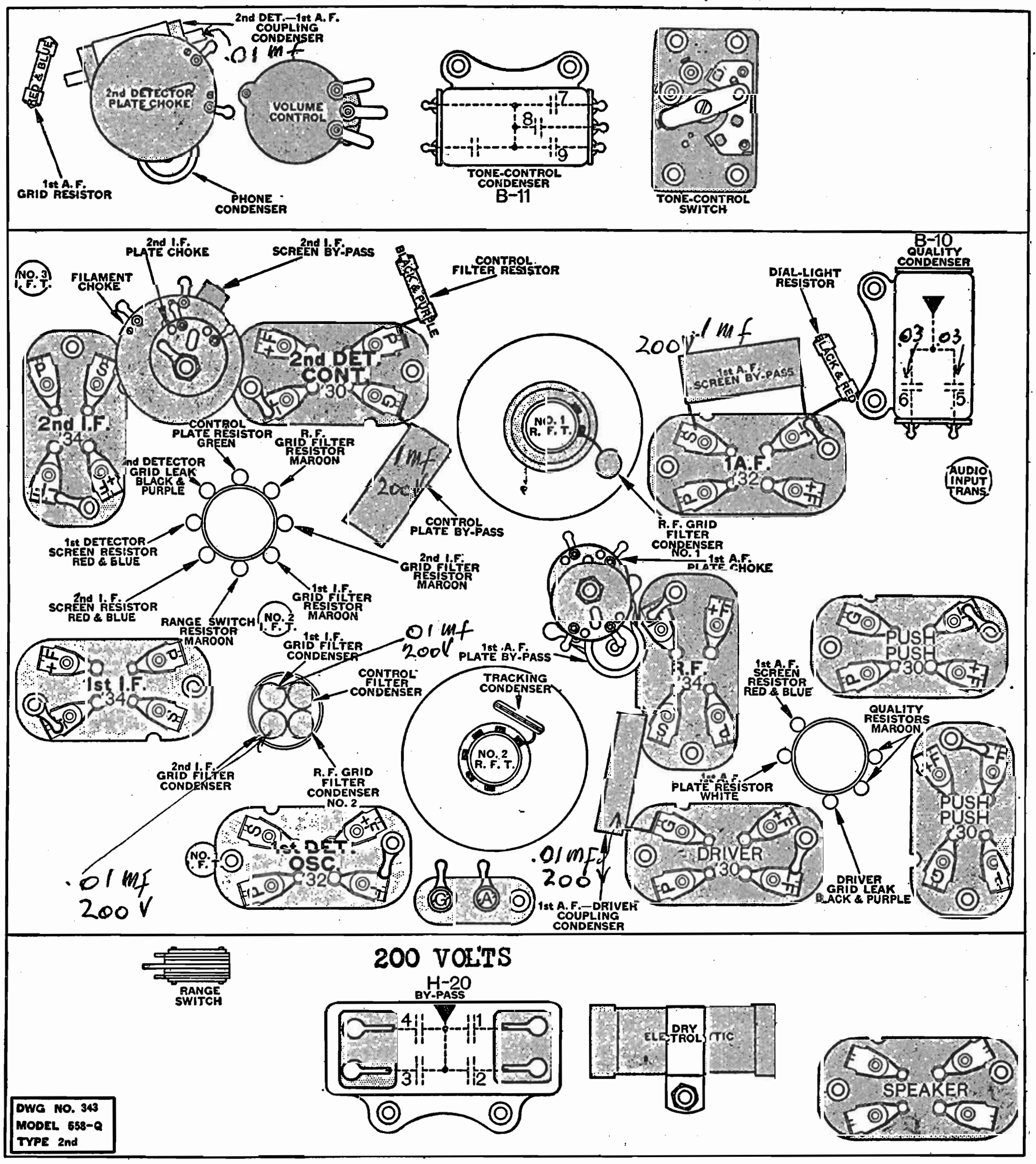
ATWATER KENT MFG. CO.



NUMBER
BYPASS CONDENSERS
400 VOLTS

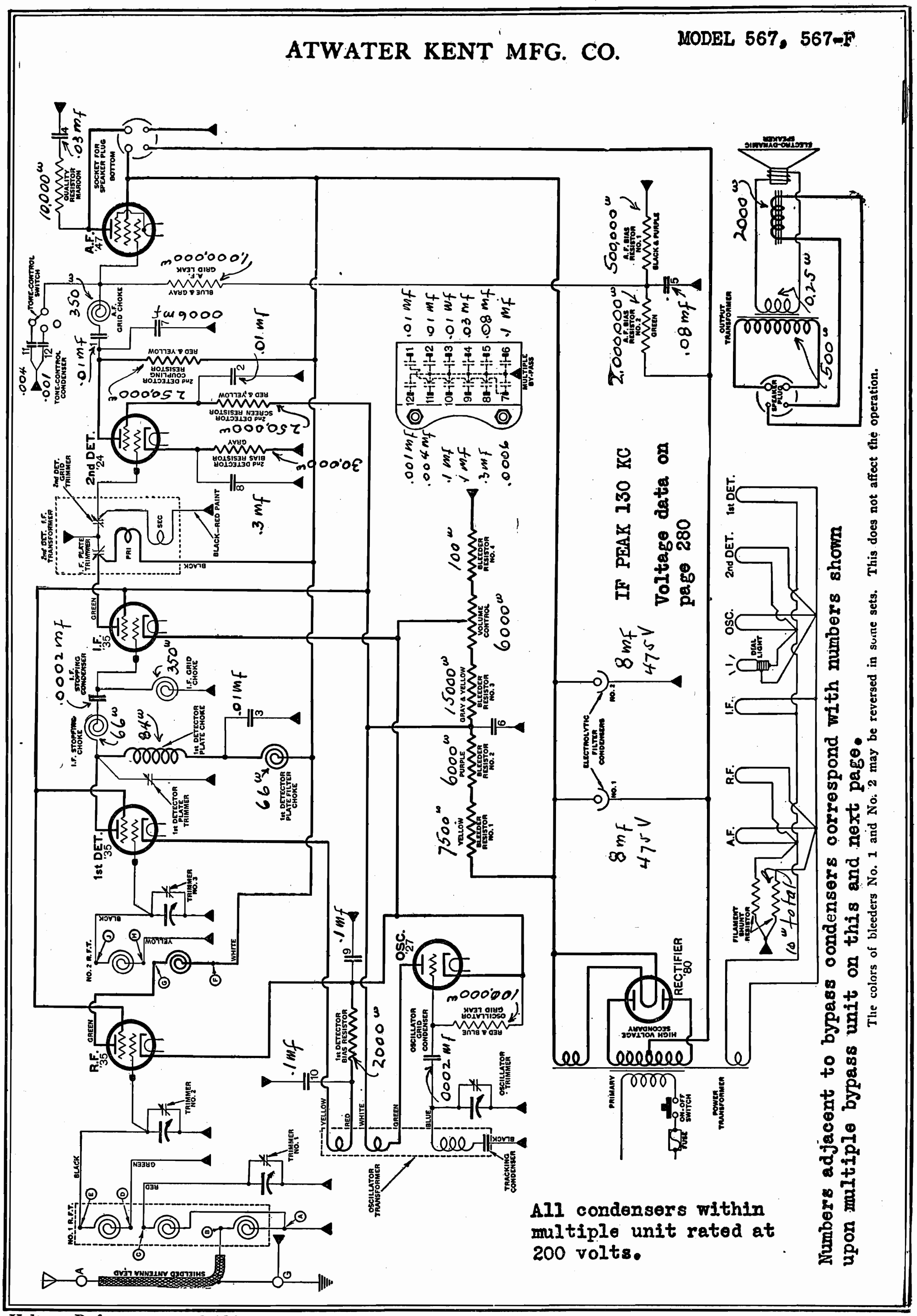
QUALITY 450 VOLTS

TONE 200 VOLTS



ATWATER KENT MFG. CO.

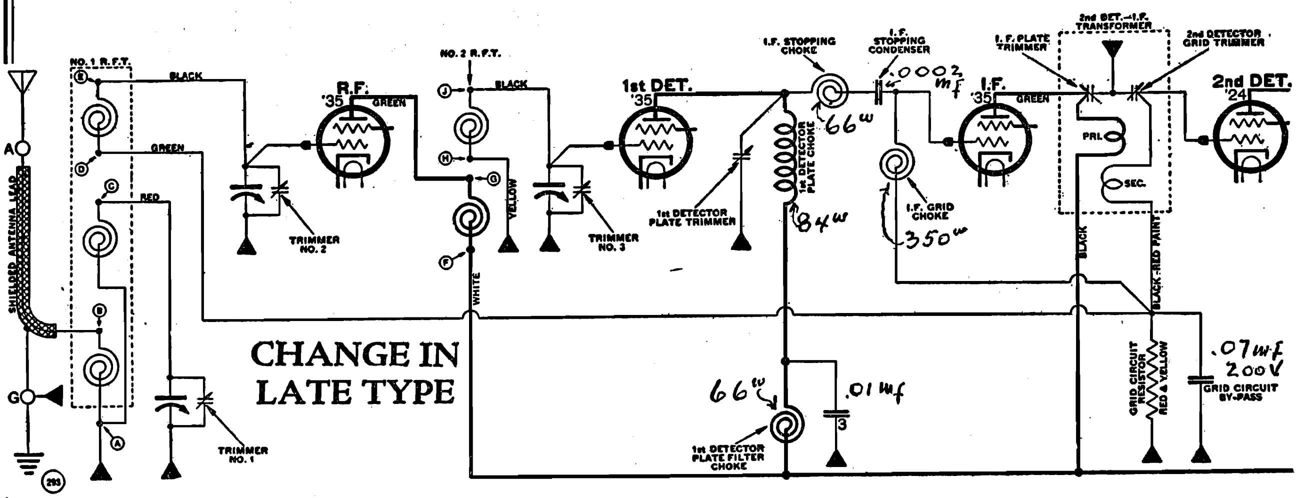
MODEL 567, 567-F



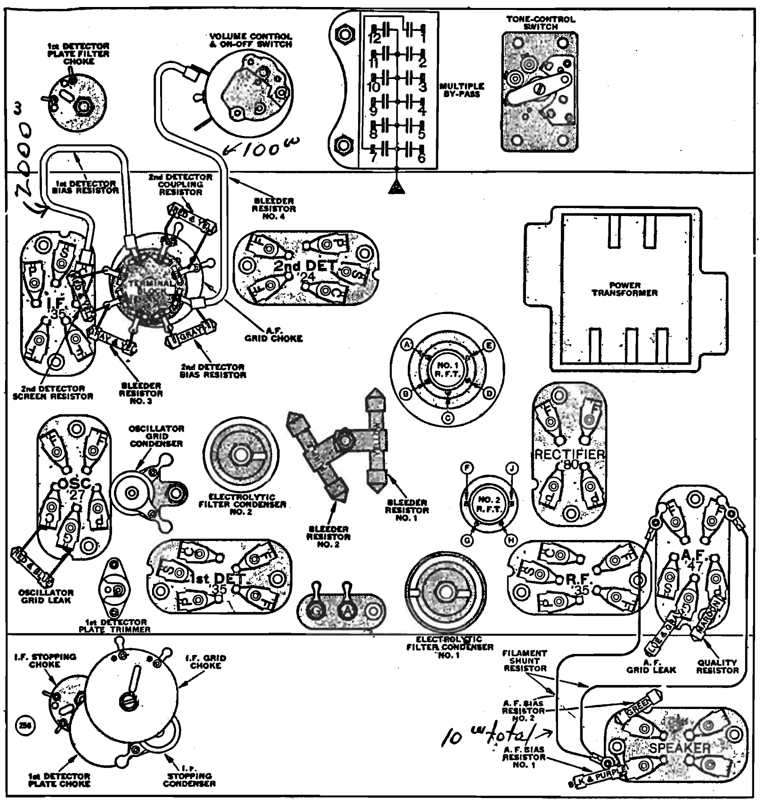
Voltage Reference page 3-134.

MODEL 567, 567-F

ATWATER KENT MFG. CO.



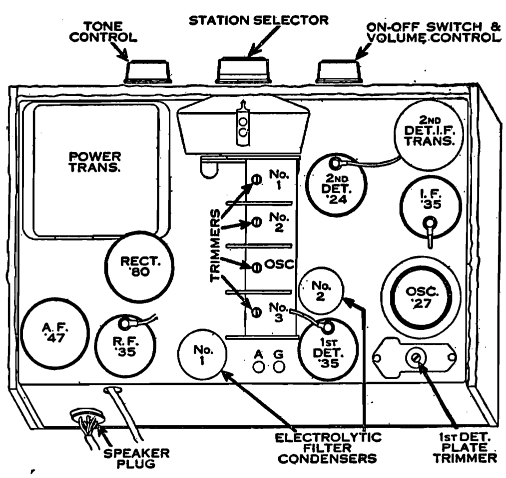
In late type the grid returns of the R. F., I. F., and 2nd-detector tubes are connected to ground through a red-and-yellow resistor as shown above.



BOTTOM CHART.

In some sets, the colors of bleeders No. 1 and No. 2 may be reversed. This does not affect the operation.

In late-type sets, the connections to R. F. T. No. 2 are as follows:—Yellow to F, black to G, white to H, green to J.



TOP VIEW.

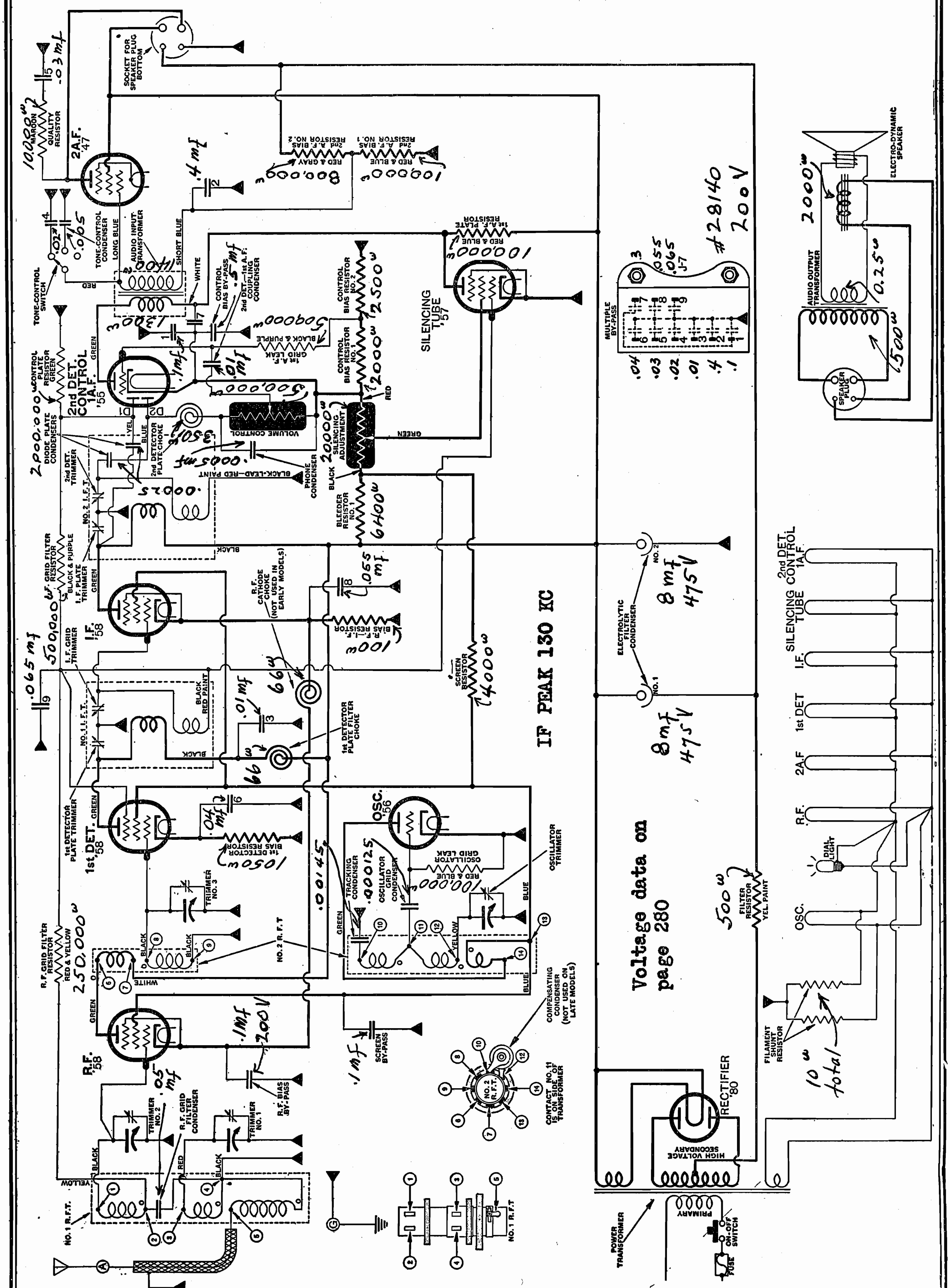
All numbered bypass condensers are rated at 200 volts.

By-pass Condensers

1—2nd-detector—A. F. coupling condenser.
2—2nd-detector screen by-pass.
3—1st-detector plate filter condenser.
4—Quality condenser.
5—A. F. bias by-pass.
6—R. F.—~~1st-detector~~—I. F. screen by-pass.
7—Phone condenser.
8—2nd-detector bias by-pass.
9—R. F. bias by-pass.
10—1st-detector bias by-pass.
11—Tone-condenser.
12—Tone condenser.

ATWATER KENT MFG. CO.

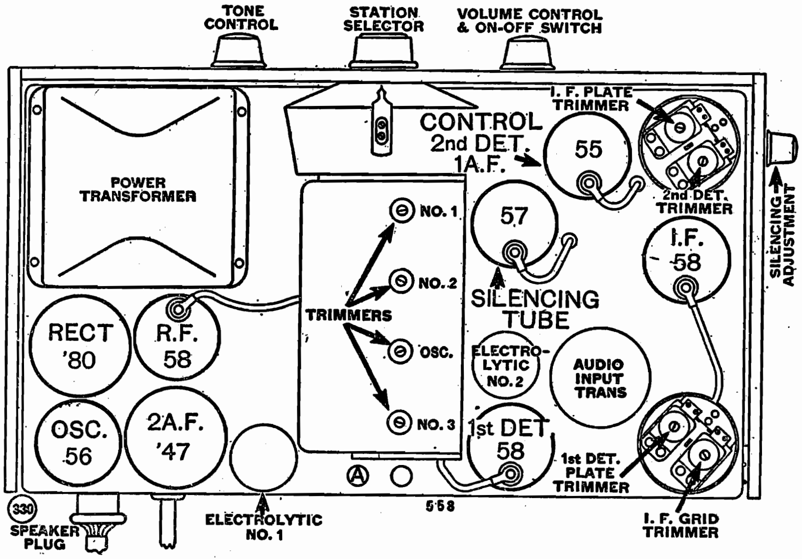
MODEL 588

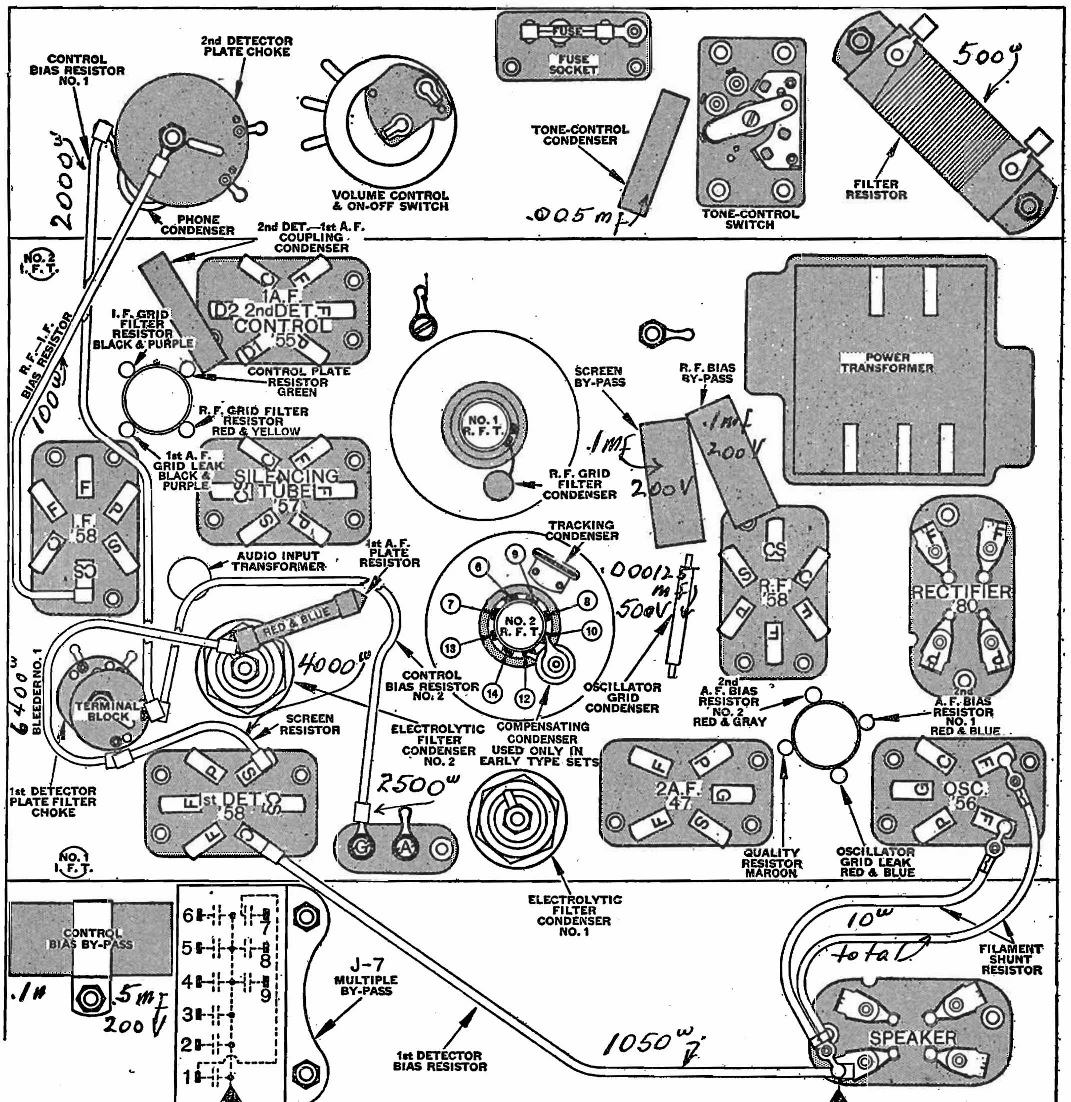


Voltage Reference page 3-134.

MODEL 588

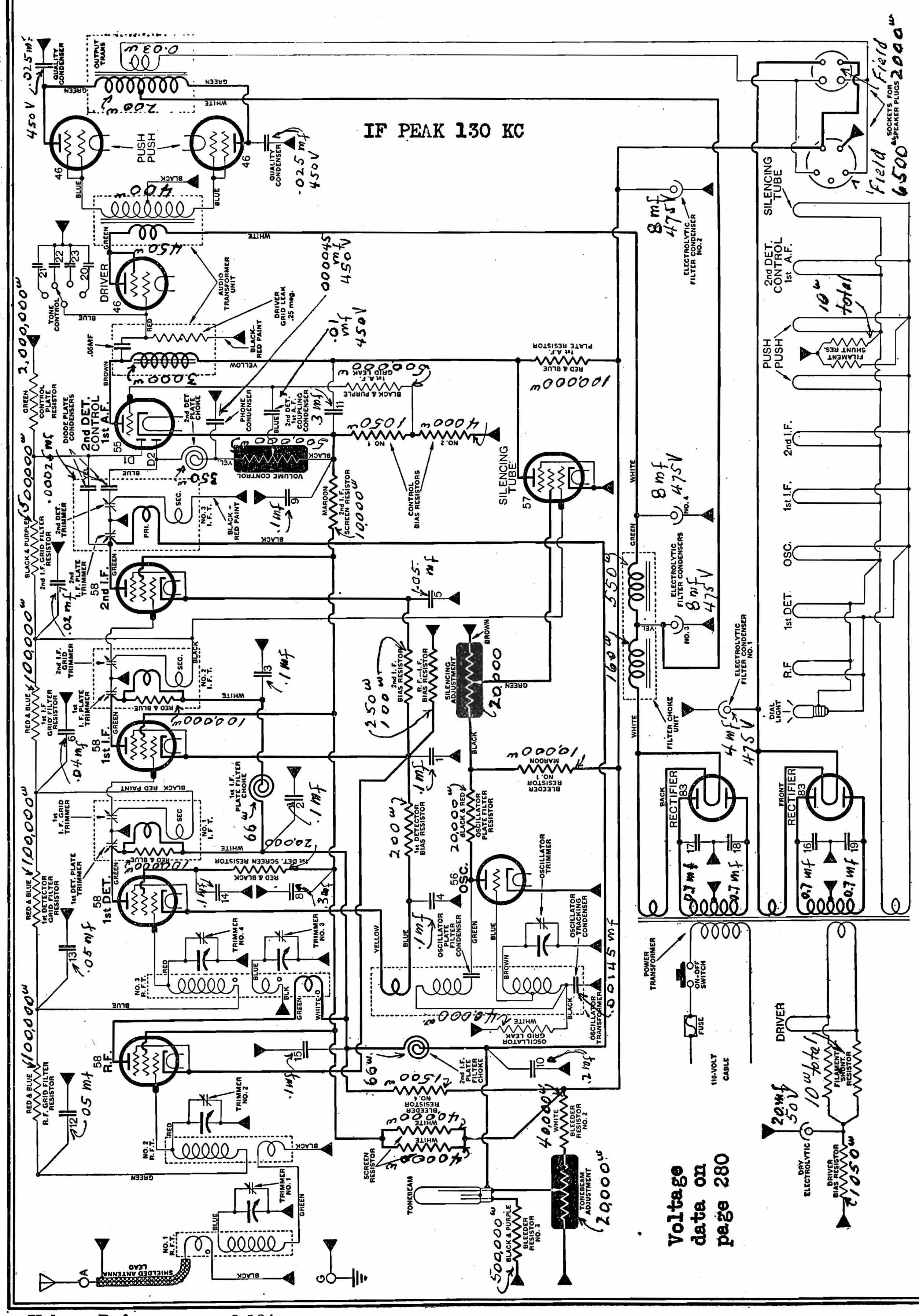
ATWATER KENT MFG. CO.





ATWATER KENT MFG. CO.

MODEL 612



In early Model 612, the tone-control condenser is a B-11 and the quality condensers are .02MF. Later Model 612 uses a B-15 tone-control condenser and .015MF quality condensers. The latest type Model 612 uses a B-16 tone-control condenser and .025MF quality condensers. When replacing any of these units, use the same part as the original, except in the case of the .015MF quality condensers which are superseded by .025MF. In early Model 612, an audio transformer is used to couple the 1st-A.F. and driver tubes.

The power transformer has an internal shield which is connected to chassis. This shield is not shown in the above diagram.

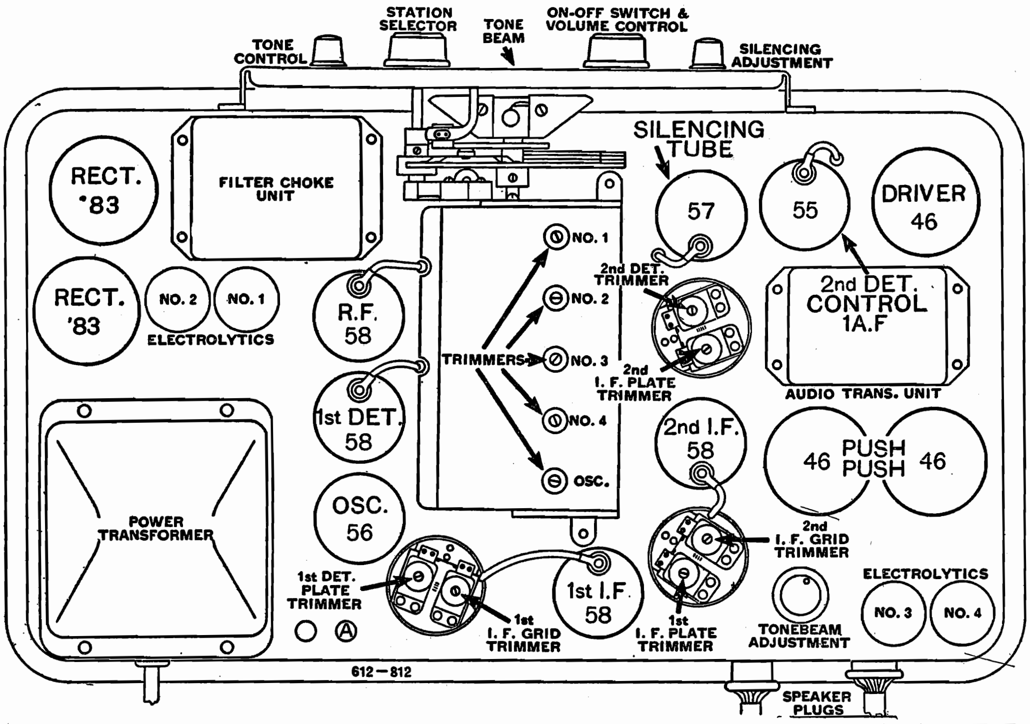
In late Model 612, the control-grid of the silencing tube connects to the green lead from No. 2 R. F. T. instead of to the black lead from No. 2 I. F. T.

In early Model 612, by-pass No. 5 is an H-20. Use H-40 for replacement.

Voltage Reference page 3-134.

MODEL 612

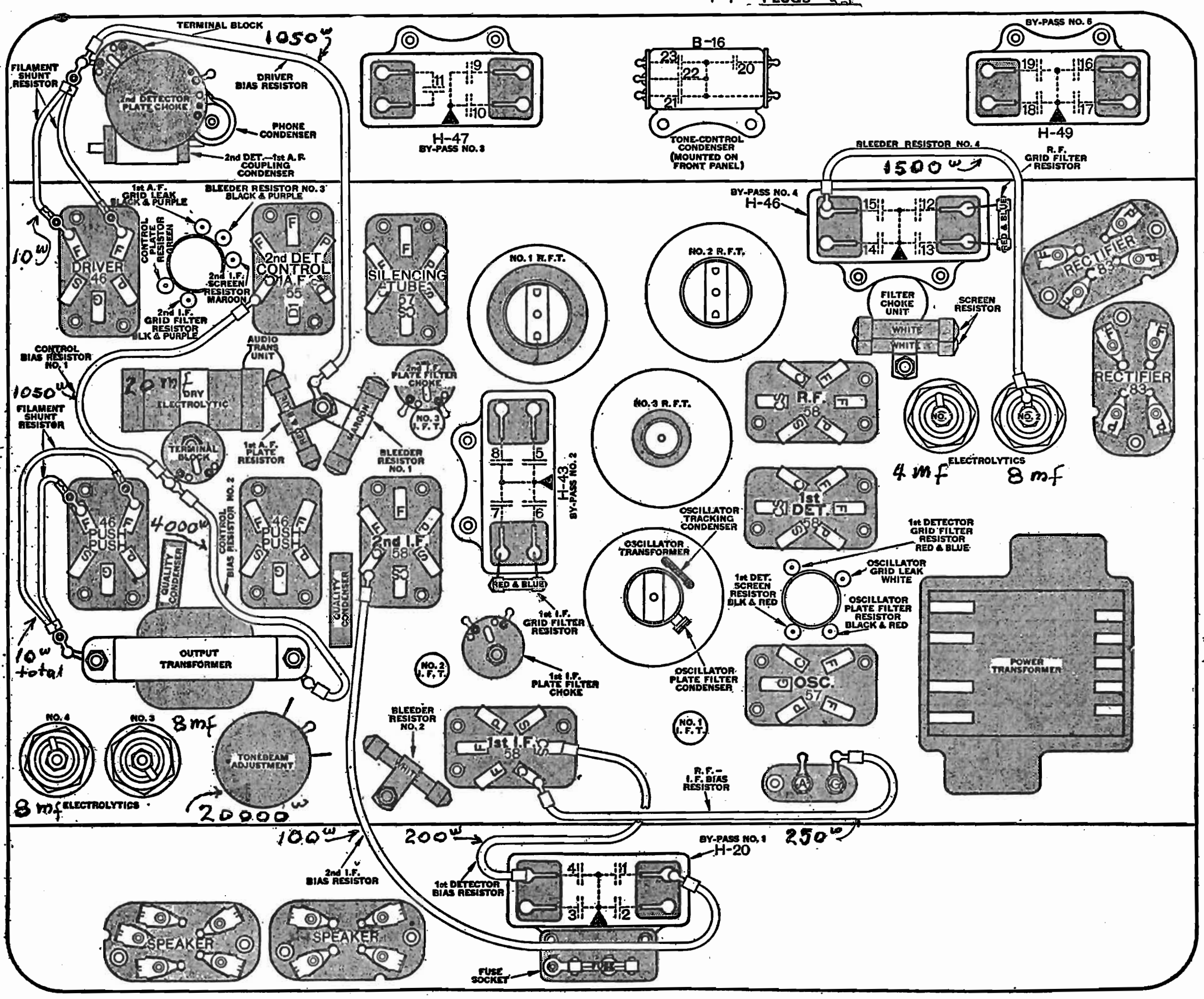
ATWATER KENT MFG. CO.



BYPASS CONDENSERS

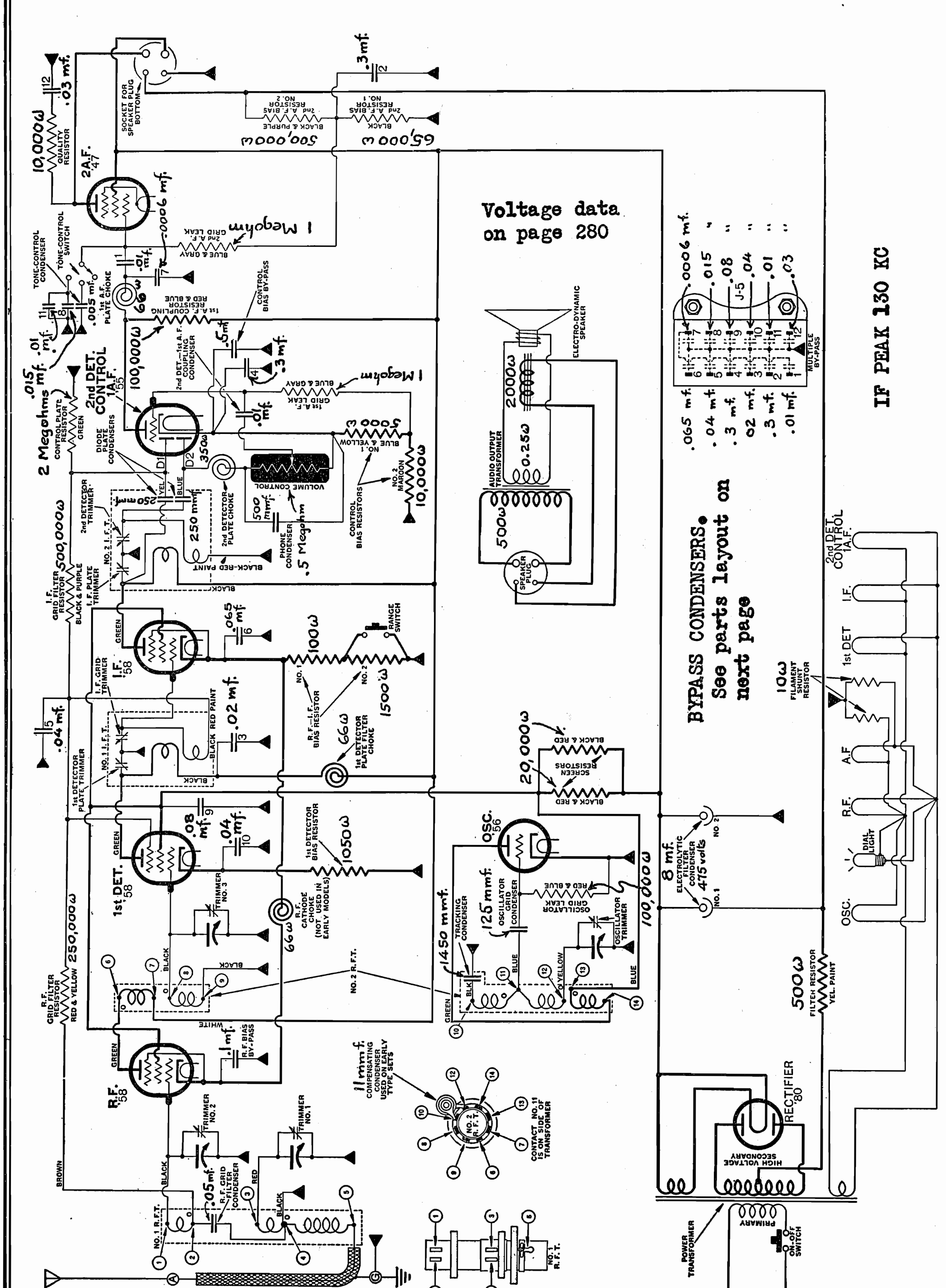
Bypass # 1 400 volts
Bypass # 2 200 volts
Bypass #3 200 volts
Bypass # 4 400 volts
Bypass # 5 400 volts

In early 612, bypass condensers 16,17,18 and 19 are .1 mfd each.



ATWATER KENT MFG. CO.

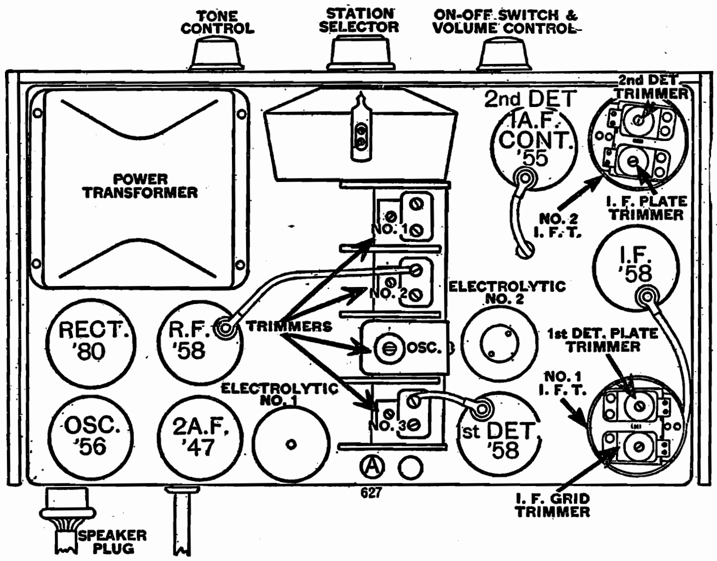
MODEL 627

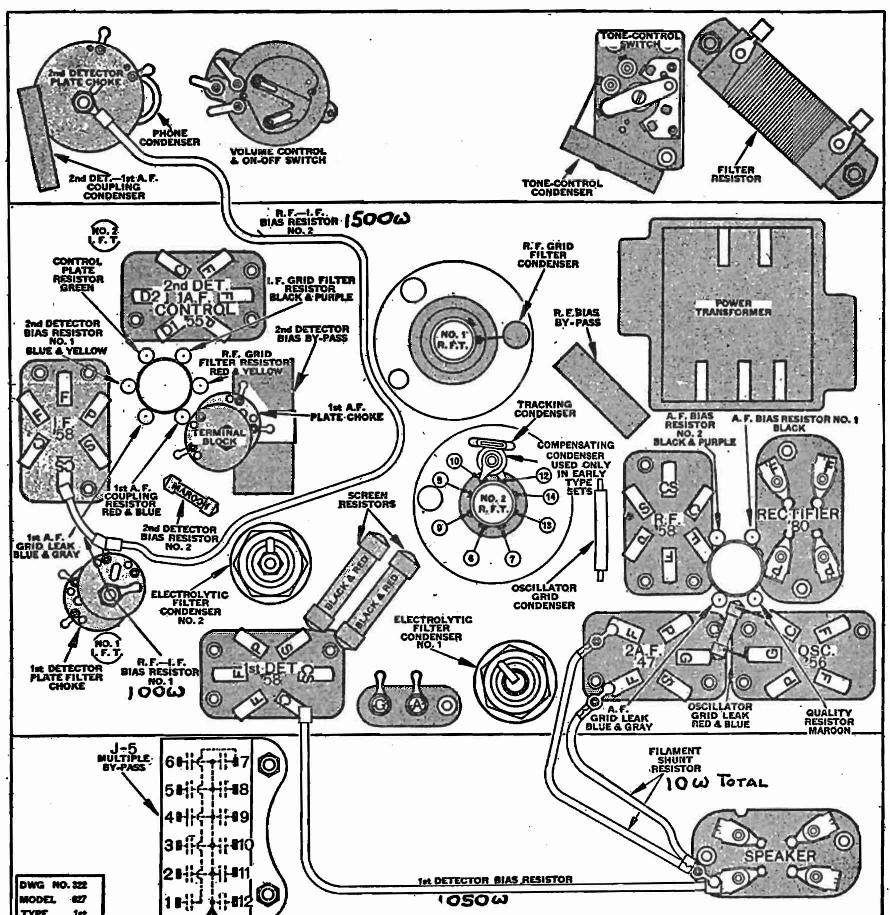


Voltage Reference page 3-134.

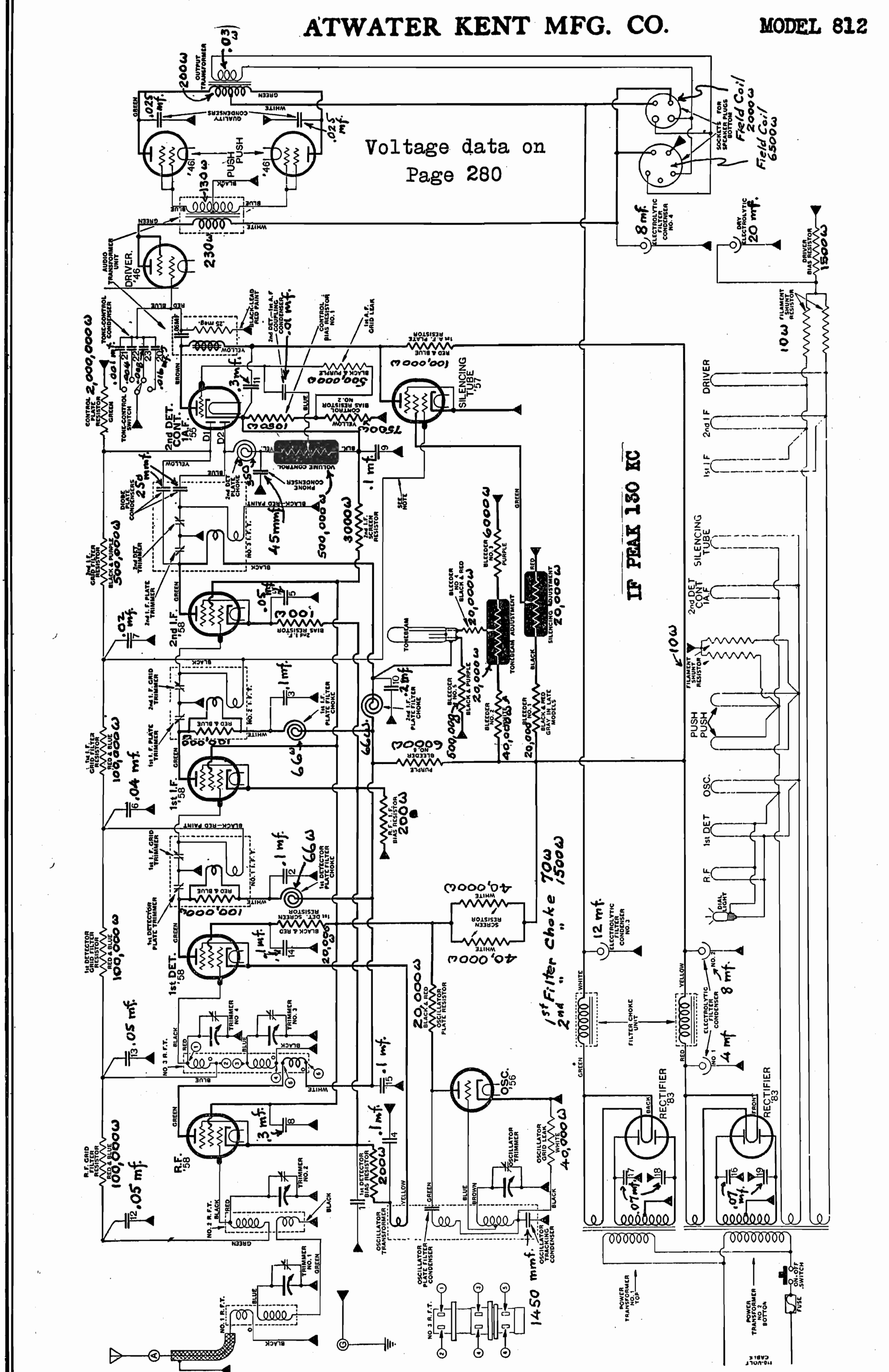
MODEL 627

ATWATER KENT MFG. CO.





ATWATER KENT MFG. CO. MODEL 812

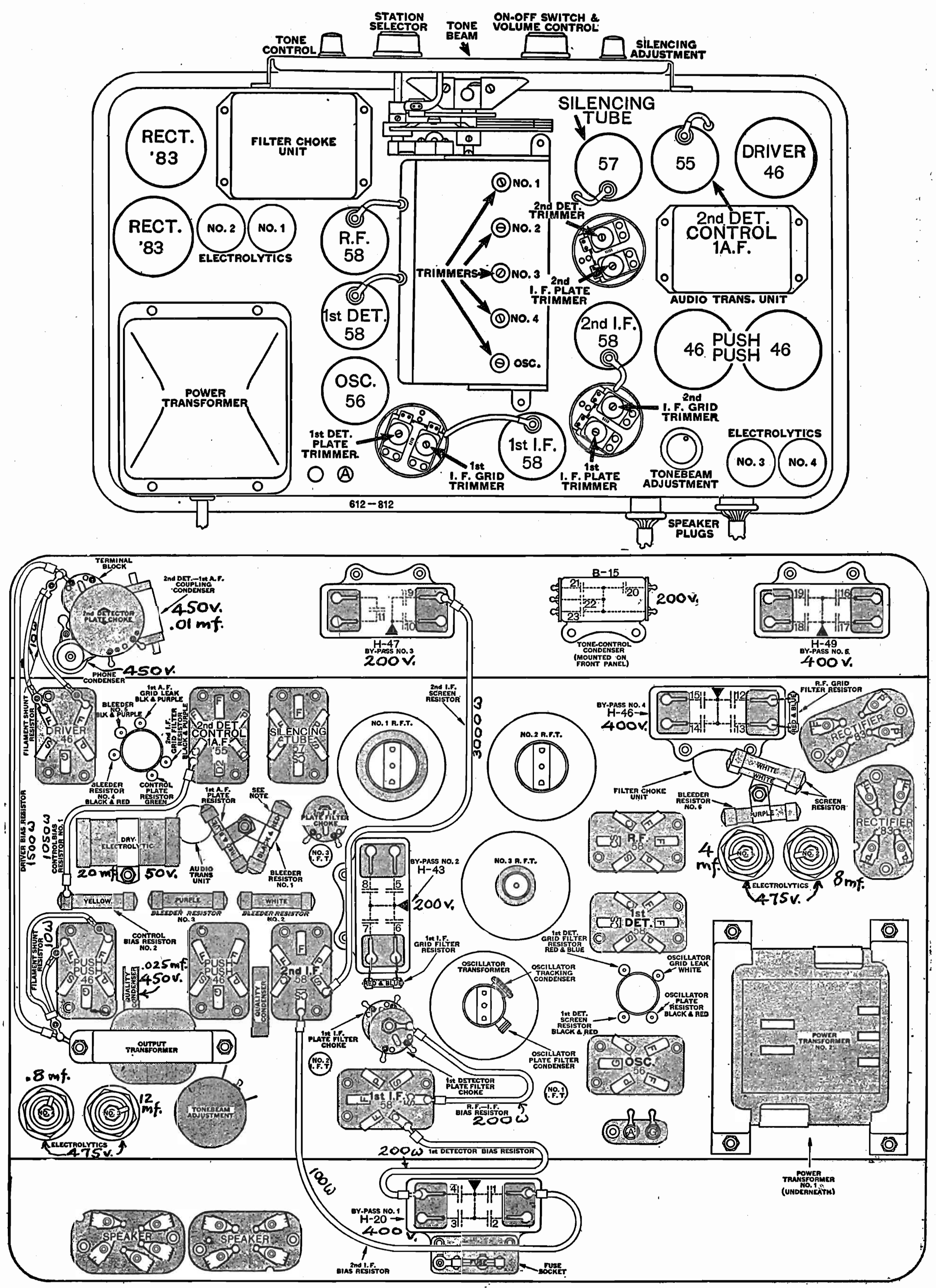


In early Model 812, the tone-control condenser is a B-11 and the quality condensers are .02MF. Later Model 812 uses a B-15 tone-control condenser and .015MF quality condensers. The latest type Model 812 uses a B-16 tone-control condenser and .025MF quality condensers. When replacing any of these units, use the same part as the original, except in the case of the .015MF quality condensers which are superseded by .025MF
In early Model 812, an audio transformer is used to couple the 1st-A. F. and driver tubes.
The power transformer has an internal shield which is connected to chassis. The shield is not shown in the above diagram.
In late Model 812, the control-grid of the silencing tube connects to the green lead from No. 2 R F T instead of to the black lead from No. 2 I. F. T
In early Model 812 by-pass condenser No. 5 is an H-20. Use H-49 for replacement.

Voltage Reference page 3-134.

MODEL 812

ATWATER KENT MFG. CO.



ATWATER KENT MFG. CO.
SERVICE NOTES

SYNCHRONIZING SPEAKERS IN MODELS 612 and 812

In order to get correct tone quality from the dual-speaker sets, Models 612 and 812, it is essential that the two speakers be so connected that the diaphragms of both work in unison or synchronism. If the terminals of one speaker are reversed, the tone of the set will be flat.

To test for proper connections, remove the speakers from the cabinet (leaving them plugged in) so the movement of the diaphragms can be observed. Turn on set, but turn volume down. Connect the terminals of a 1½-volt dry cell across the voice coil-terminals of either one of the speakers. If the diaphragms move in or out together at the instant of contact, the speaker connections are O. K. If one moves out and the other moves in, they are bucking, and the remedy is to reverse the red leads of the five-prong speaker at the voice-coil terminal strip.

TYPE '55 TUBE

The 55 tube (known as a duo-diode triode) as used by Atwater Kent in current models, serves three purposes, acting as 2nd-detector, automatic volume control, and 1st-A.F. amplifier.

The lower part of the tube has two small plates and the cathode, forming a duo-diode. One of these small plates (D-2) and the cathode functions as a diode or half-wave 2nd-detector. The other small plate (D-1) and the cathode functions as a diode or two-element automatic volume control.

The upper part of the tube has a plate, grid, and cathode, forming a triode, with the grid brought out to a cap on the top of the tube.

The signal voltage developed across the manual volume control in the 2nd-detector plate circuit is impressed on the grid of the triode, which acts as 1st-A.F. amplifier.

The automatic volume control plate (D-1) is actuated by strong signals in such a way as to produce an increased negative bias on the control grids of the R.F. and I.F. tubes, thus reducing their amplification and tending to keep a uniform signal level. The voltage drop across control bias resistors No. 1 and 2 determines the signal level at which the automatic volume control begins to function.

The drop across control bias resistor No. 1 is the bias voltage for the 1st-A.F. grid.

There is no bias on the 2nd-detector plate.

TYPE '85 TUBE

The 85 tube used in Models 469-D and 558-D corresponds to the 55 tube described above.

ACTION OF SILENCING TUBE

The silencing tube is so connected in the plate circuit of the 1st-A.F. tube that when no signal is being received (that is, when the set is tuned between stations), the plate voltage and consequently the amplification of the 1st-A.F. tube is decreased. When a signal is tuned in, the silencing tube automatically restores the normal plate voltage and amplification of the 1st-A.F. tube.

The automatic action of the silencing tube is secured by having the grid of the silencing tube connected to the automatic volume control circuit.

An adjustment for selecting the desired amount of silencing between stations is provided by having the screen of the silencing tube connected to a potentiometer by means of which the screen voltage may be regulated.

PUSH-PUSH AMPLIFICATION

"Class B" or push-push amplification is used in Atwater Kent Models 612, 812, 469-Q and 558-Q, to provide high power output with comparatively low power consumption.

Class B amplification differs from regular push-pull amplification in this way:—

In **push-pull** amplification, the grids of the two tubes are biased to a point where there is comparatively *high plate current* in each tube. When an A.C. signal voltage is impressed on the grids, the plate current of one tube decreases, and the plate current of the other tube increases in like amount. This action reverses as the impressed A.C. grid voltage reverses. Note that both tubes are functioning at all times, one pushing while the other pulls.

In class B or **push-push** amplification, the grids of the two tubes are biased to a point where there is practically *no plate current* in either tube. (The 46 tube is designed to give low plate current with zero grid bias.) When an A.C. signal voltage is impressed on the grids, one grid swings more negative, and the other grid swings positive. The plate current of the first tube cannot decrease as it is already practically zero, but the plate current of the other tube increases. This action reverses as the impressed A.C. signal voltage reverses. Note that in class B amplification, only one tube functions at a time, the other tube being inoperative for that half-cycle of the impressed A.C. signal voltage. The name push-push is derived from this action.

NECESSITY FOR DRIVER TUBE

In **push-pull** amplification, the grids do not swing positive, so there is practically no grid current, and very little power is required to feed the grid circuit.

However, in **push-push** amplification the grids swing positive, thus drawing grid current, and considerable power is required to feed the grids of these tubes.

This power is furnished by a "driver" tube which provides sufficient power output to swing or "drive" the grids of the push-push-tubes.

NECESSITY FOR 83 TUBE

In **push-pull** amplification, the average plate current of the two tubes is practically constant at all times, regardless of signal strength. The current drain on the power unit is therefore practically constant, so there is no tendency for the output voltage of the power supply to vary. Under this condition the type 80 rectifier tube is satisfactory as it can supply the constant drain.

In **push-push** tubes there is practically no plate current when the volume control is turned down. But when a signal is received and the volume control is turned up, the push-push tubes alternately draw high plate current. This intermittant drain on the power supply necessitates use of a special rectifier and filter circuit to maintain constant voltage under the varying current drain. The 83 tube is designed to meet this condition as it has low internal resistance and good voltage regulation.

ACTION OF TONEBEAM

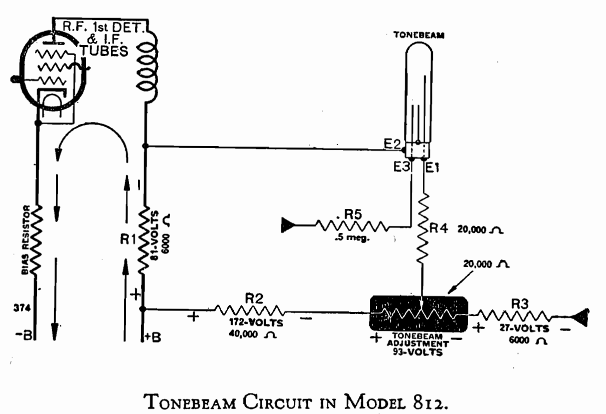
The Atwater Kent tonebeam is a neon light-column that indicates visually when the set is tuned correctly to resonance with the incoming signal.

A typical circuit arrangement for the tonebeam is shown below. This particular circuit is used in Model 812.

The tonebeam requires an initial bias to make the short center electrode (E-2) positive with respect to the long electrode (E-1). The bias is adjustable to take care of different tonebeam tubes, the adjustment being provided by a potentiometer in series with resistors R-2 and R-3 which limit the range of adjustment. In the circuit shown below, the bias voltage across E-1 and E-2 can be adjusted from 91 to 184 volts.

When a signal is tuned in, the automatic volume control increases the negative bias on the control grids of the R.F., 1st-detector, and I.F. tubes, thus decreasing their plate current. This decrease in plate current causes a decrease in voltage across R-1 and a corresponding increase in the voltage difference between electrodes E-1 and E-2. The increase in voltage across E-1 and E-2 causes the neon glow to extend up the long electrode. When the initial bias voltage is adjusted to the correct operating point, an increase of about 20 volts across E-1 and E-2 will cause the neon glow to extend up to the top of the long electrode E-1.

The electrode E-3 and resistor R-5 are used to ensure stable operation of the tonebeam. Resistor R-4 is used to make the tonebeam action more uniform on weak and strong signals.



Tonebeam Circuit in Model 812.

TUBULAR RESISTORS

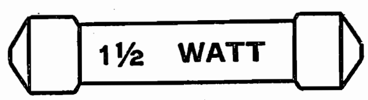
(When replacing a tubular resistor, use a resistor of the same identifying color and size)

Part No.	Color	Resistance	List Price
20920	Red-yellow	250,000 Ohms	$ .25
20930	Black-purple	500,000 Ohms	.25
20940	Green	2,000,000 Ohms	.25
20950	Maroon	10,000 Ohms	.25
20960	Gray-yellow	15,000 Ohms	.25
20970	Gray	30,000 Ohms	.25
20980	Red-blue	100,000 Ohms	.25
21040	Black	65,000 Ohms	.25

Part No.	Color	Resistance
21050	Blue-gray	1,000,000 Ohms
23120	Red-black	20,000 Ohms
23130	Red-gray	800,000 Ohms
23170	Green-yellow	900,000 Ohms
26160	White	40,000 Ohms
26410	Green-red	3,300 Ohms
28050	Blue-yellow	5,000 Ohms

Part No.	Color	Resistance	List Price
15285	Gray	30,000 Ohms	$ 25
15544	Yellow	7,500 Ohms	.25
15545	Maroon	10,000 Ohms	.25
15592	Black	65,000 Ohms	.25
15891	Black-red	20,000 Ohms	.25
15892	Green	2,000,000 Ohms	.25
16282	Blue-red	100,000 Ohms	.25
16724	White	40,000 Ohms	.25

Part No.	Color	Resistance
19346	Green-red	3,300 Ohms
19581	Red-yellow	250,000 Ohms
19649	Black-purple	500,000 Ohms
20151	Purple	6,000 Ohms
20223	Red-gray	800,000 Ohms
21784	Gray-green (superseded by 22211)	
22211	Yellow-gray	15,000 Ohms
22407	Black-yellow-red	50,000 Ohms



Part No.	Color	Resistance	List Price
27210	Maroon	10,000 Ohms	$ .30
27220	Gray-yellow	15,000 Ohms	.30
28030	Red-black	20,000 Ohms	.30
28750	White	40,000 Ohms	.30

Part No.	Color	Resistance
28760	Red-blue	100,000 Ohms
28770	Purple	6,000 Ohms
29710	Gray	30,000 Ohms

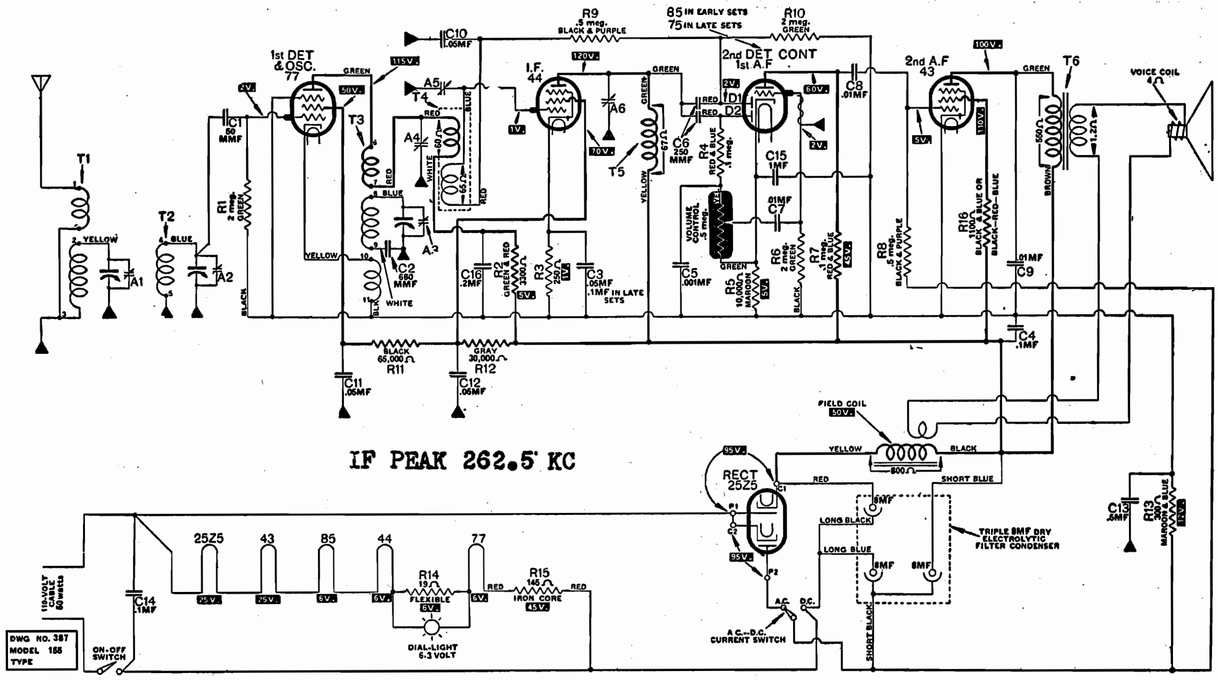
The resistors shown above are of the tubular type, that is designated and illustrated as such. The wattage rating are shown in the illustrations. In order to avoid confusion, by listing the wattage rating of the various tubular resistors upon each wiring diagram and parts layout, such information is omitted and this page furnished in its place.

The various tubular resistors, with the possible exception of those used in the very old receivers, are exactly as shown above and it is a simple matter to determine the wattage rating by comparing the resistor with the illustration shown above. As a matter of fact, there can be no confusion concerning the half watt resistor. As to the difference between the one watt and one and one-half watt unit, the increased diameter of the latter is easily seen. As a matter of fact the one watt unit has pointed caps. whereas the one and one-half watt unit has somewhat blunt cap ends.

The color designations stated upon the wiring diagrams correspond with the colors stated above. Likewise the values stated in the diagrams correspond with the values given above. The flexible and flat resistors are so indicated upon the wiring diagrams and parts layouts. Wattage rating for these units is not available at the time of this writing.

ATWATER KENT MFG. CO.

MODEL 155
Schematic
1st Type Below
serial 7086900
Chassis Layouts



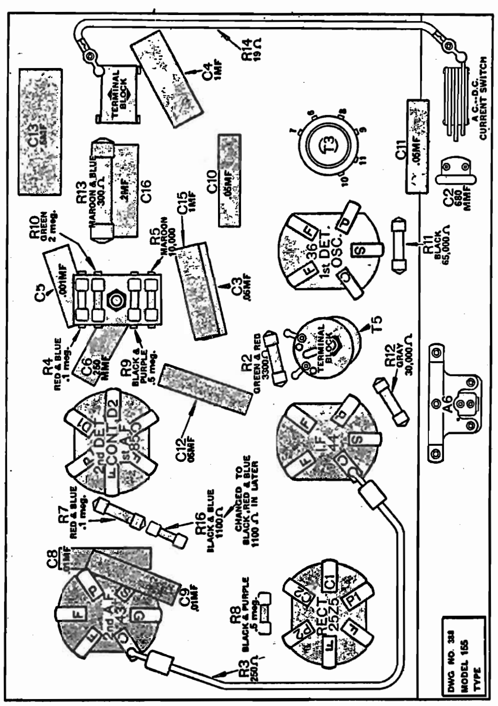
The type 75 tube is not used in any 1st-type Model 155. The 2nd-type 155, which uses the 75 tube, will be described in a later supplement.

The 1st-type of Model 155 was made with three different arrangements of parts under the chassis. The first and third arrangements are shown in the charts below. The second arrangement is similar to the third except that in the second arrangement, condensers C3, C10, C12, C13, C15 and C16 are separate units.

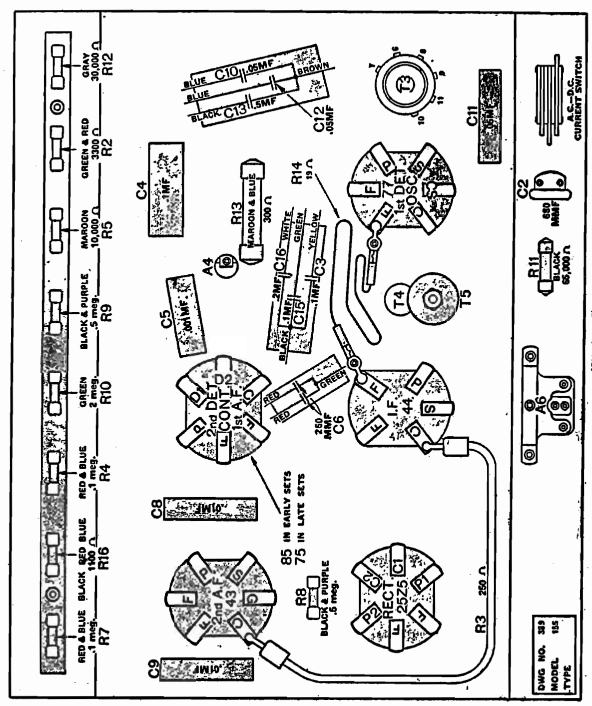
In early 1st-type Model 155, the 1st-detector and oscillator is a type '36 tube.

The voltages shown above are for a line supply of 110-volts A.C.

Resistor R1 in the above diagram should be 1 meg. blue and gray.



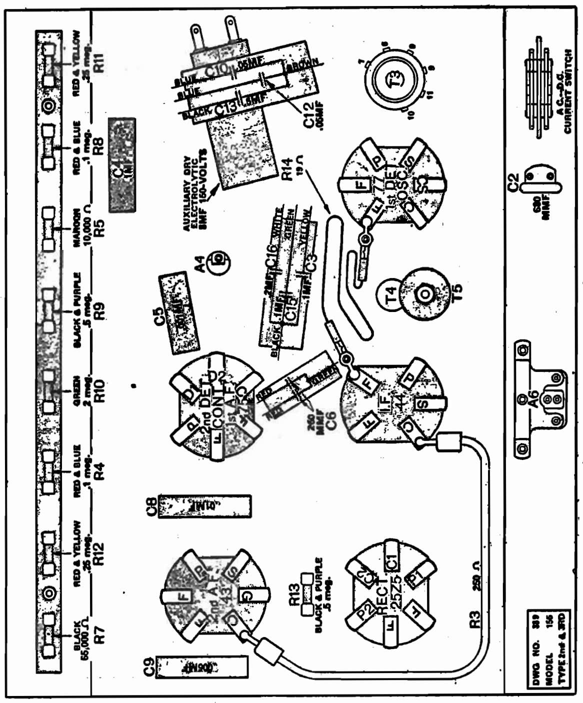
First arrangement of parts under chassis in 1st-type Model 155.



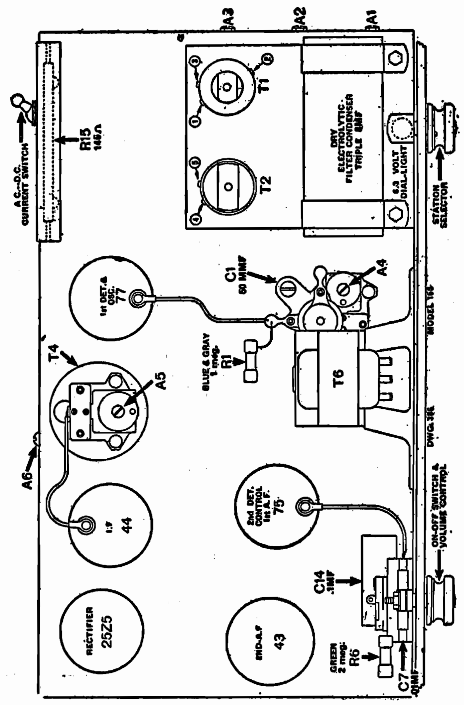
Third arrangement of parts under chassis in 1st-type Model 155.

MODEL 155
Schematic
2nd Type Above
serial 7086900

ATWATER KENT MFG. CO.



Arrangement of parts under chassis in 2nd-type Model 155 above Serial No. 7086900



Top view of 2nd-type Model 155, showing location of tubes and trimmers.

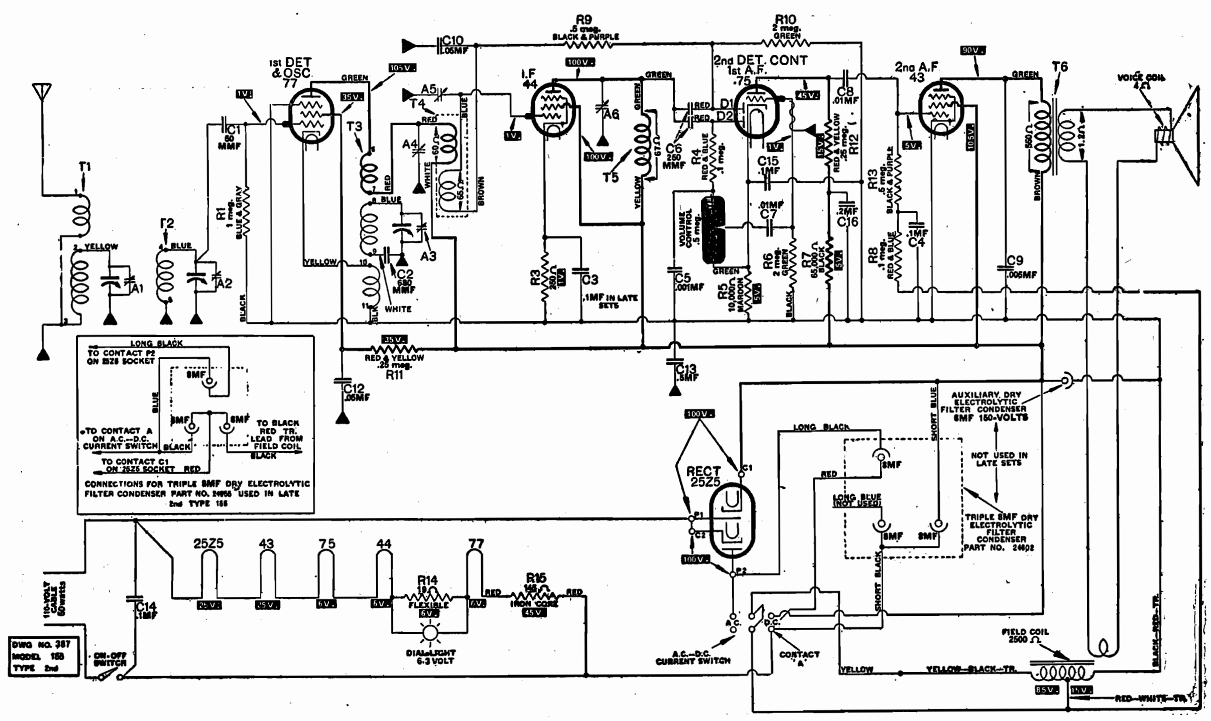
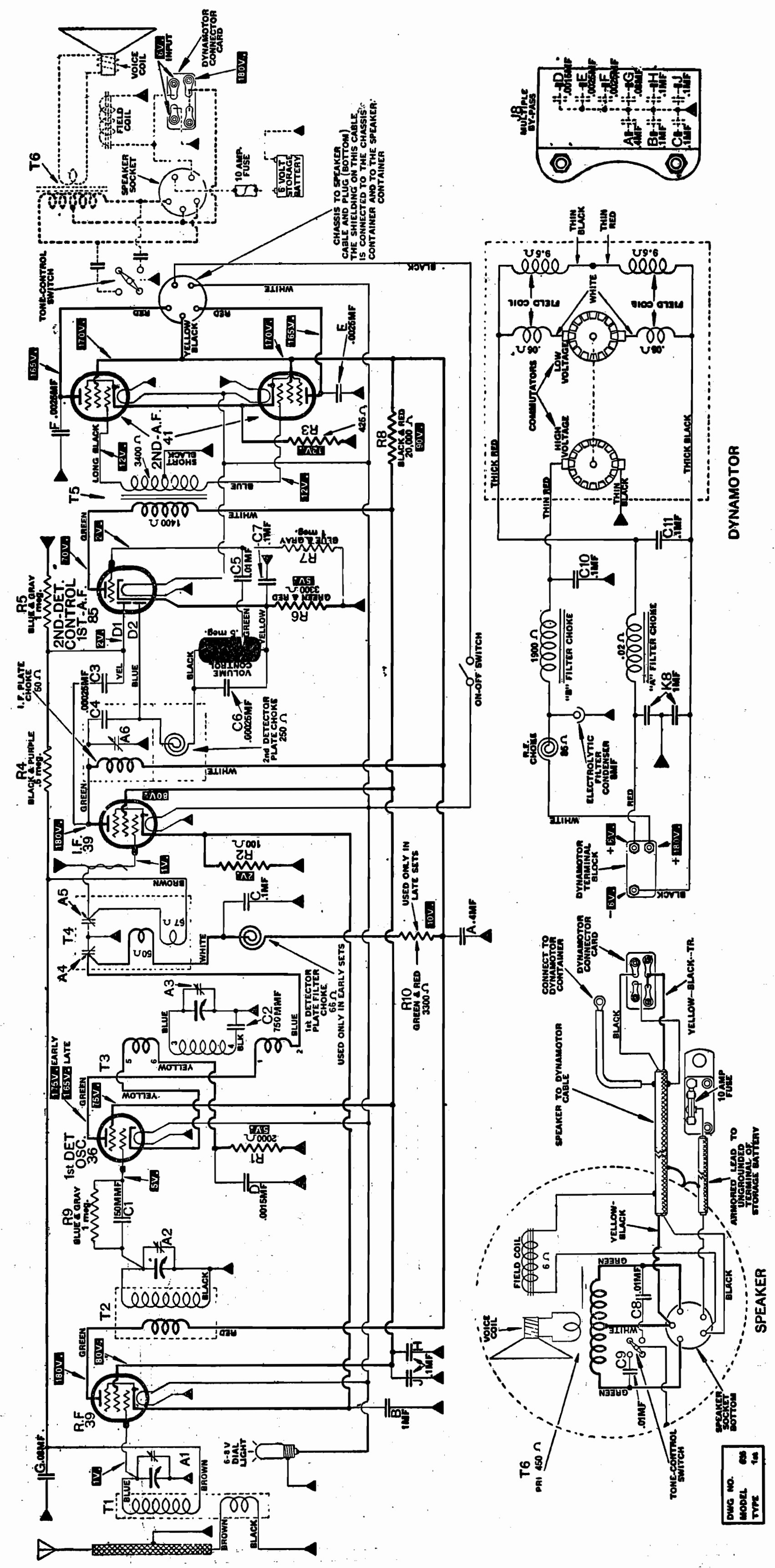


Diagram of 2nd-type Model 155 above Serial No. 7086900. Voltages shown above are for a line supply of 110-volts A.C.

MODEL 636
Schematic

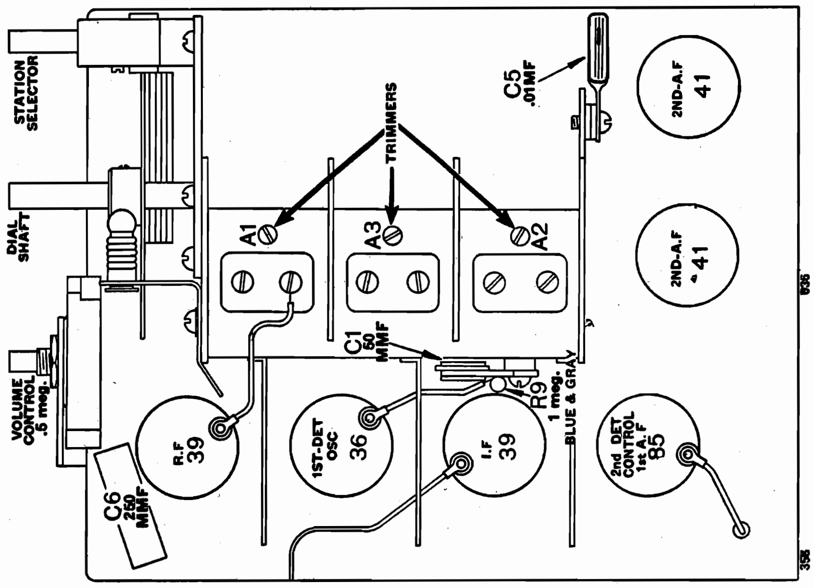
ATWATER KENT MFG. CO.

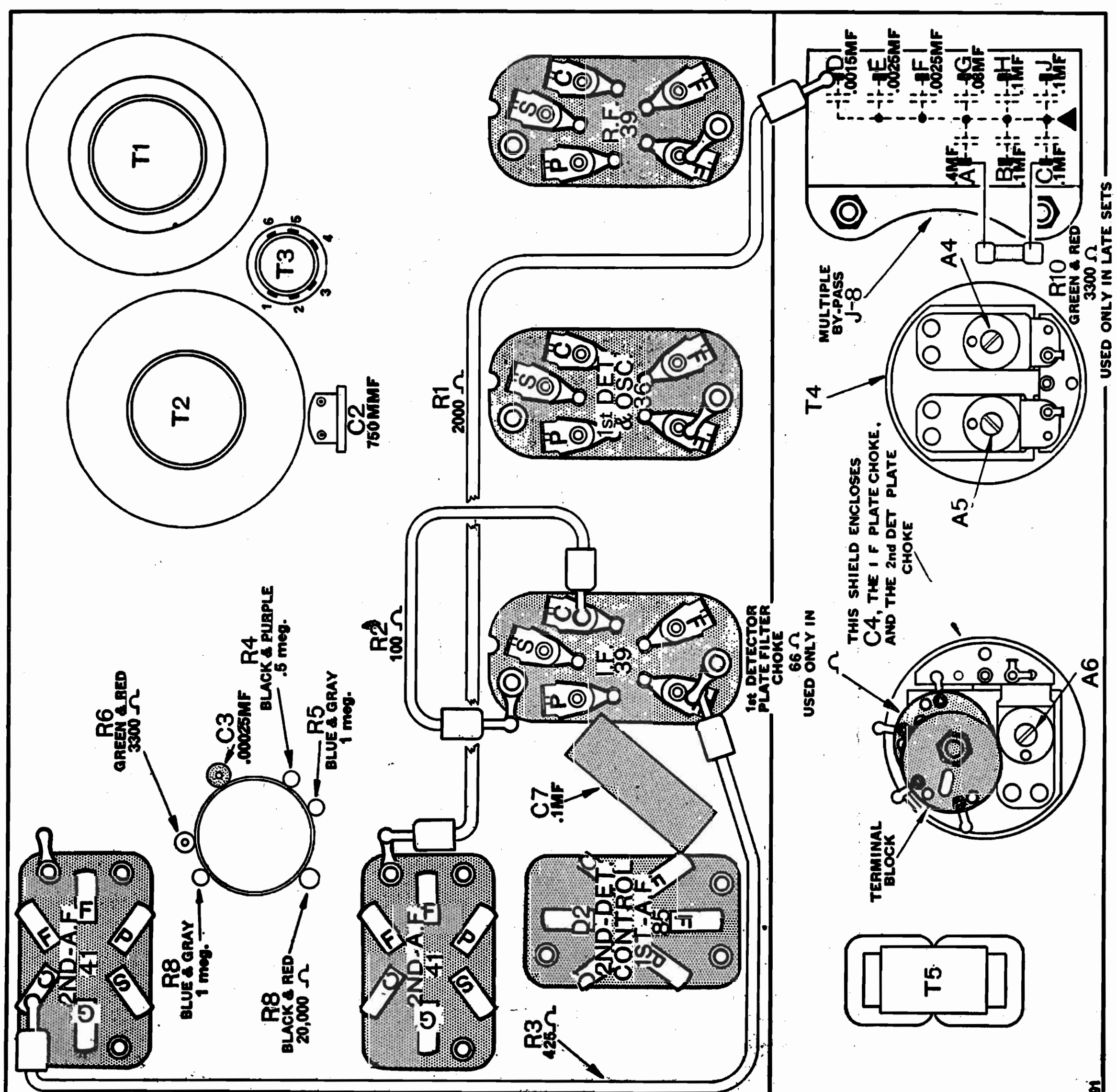
(Intermediate frequency, 262½ kilocycles)



MODEL 636
Trimmers
Chassis Layout

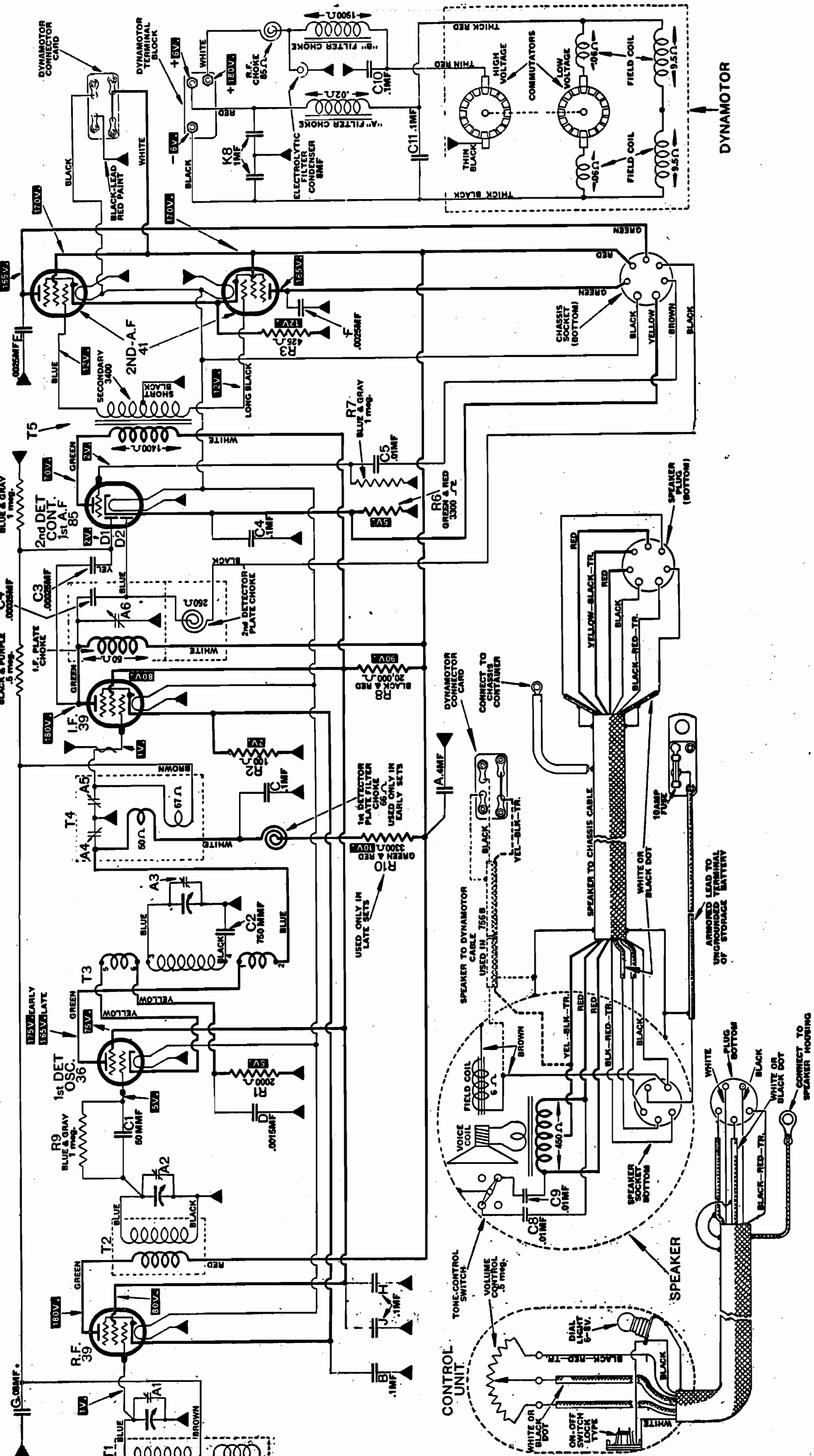
ATWATER KENT MFG. CO.





MODEL 756, 756-B
Schematic

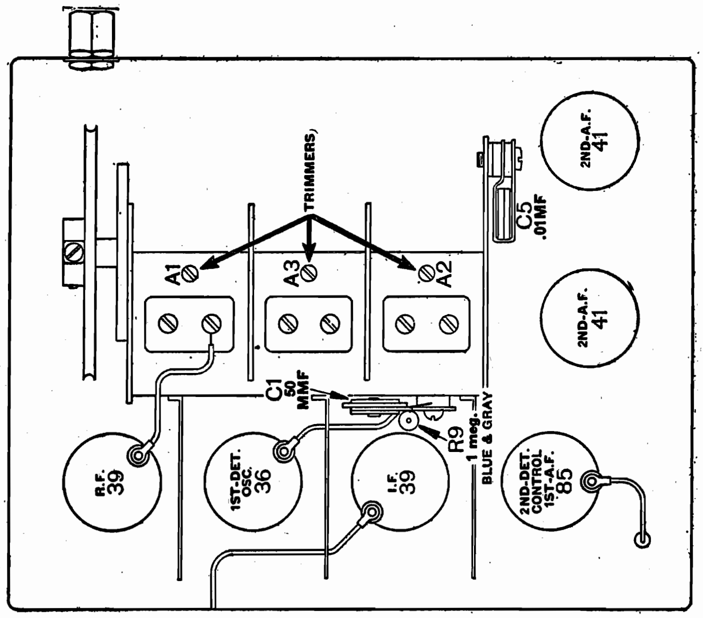
ATWATER KENT MFG. CO.

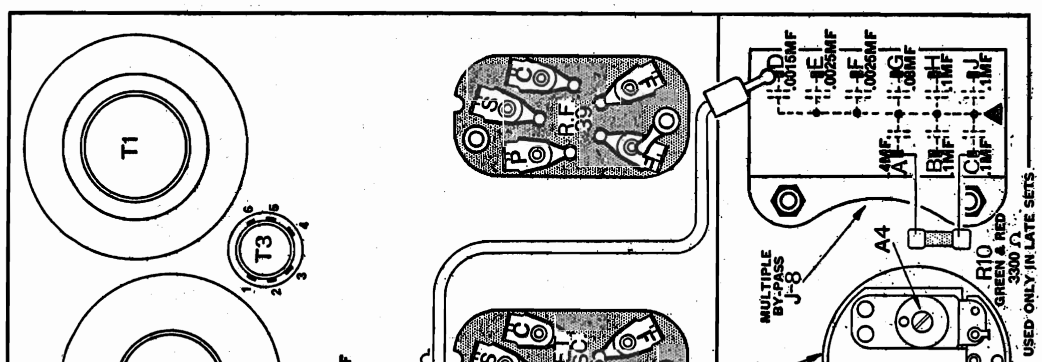


(Intermediate frequency, 262½ kilocycles)

MODEL 756,756-B
Chassis Layout
Trimmers

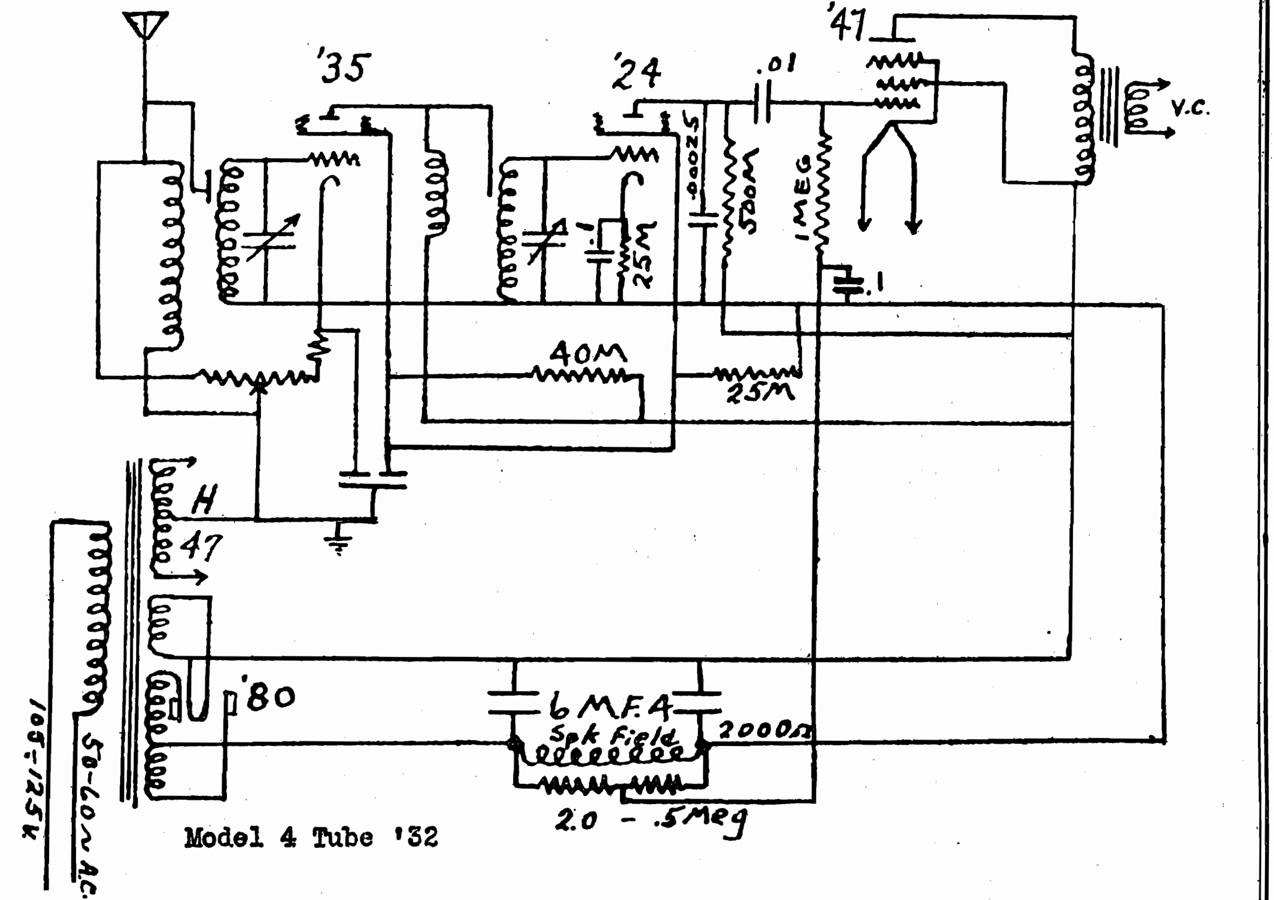
ATWATER KENT MFG. CO.





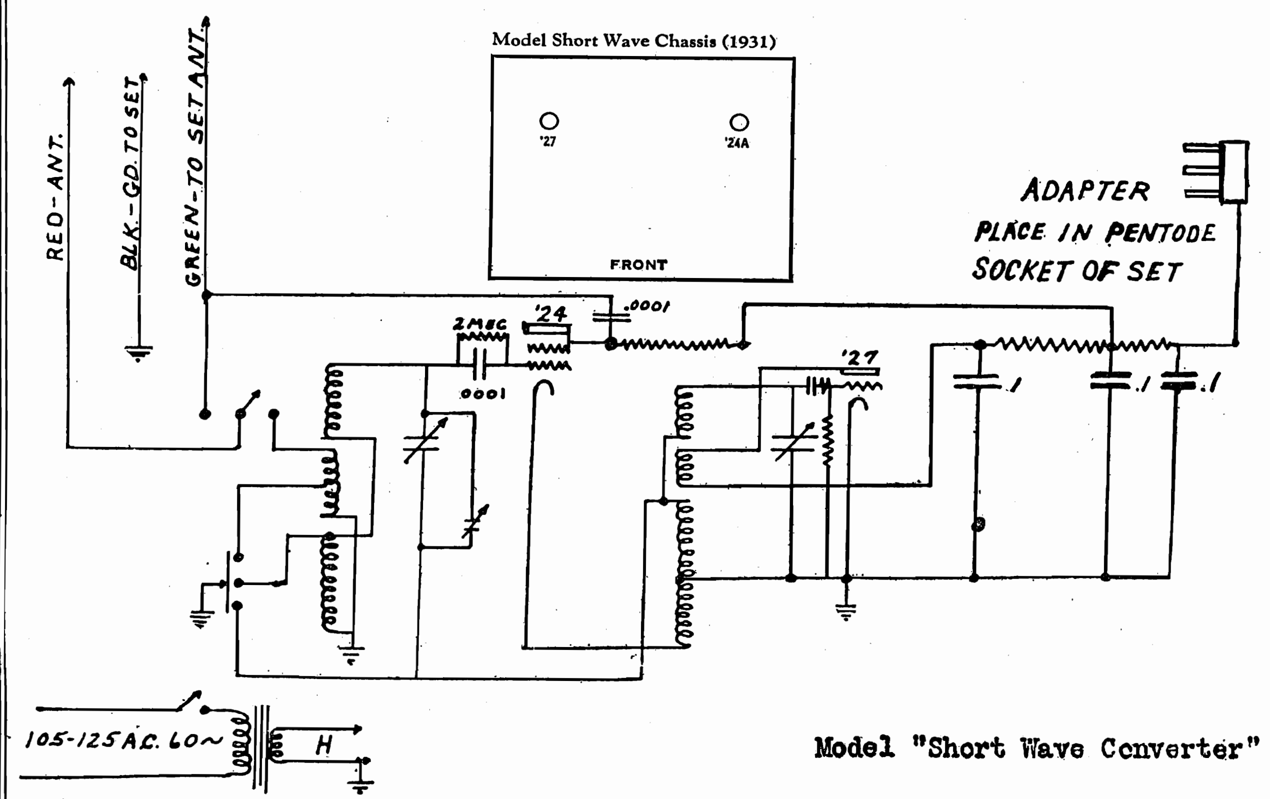
AUDIOLA RADIO CO.

MODEL 4-Tube '32
MODEL "Short Wave Converter"



Model 4 Tube '32

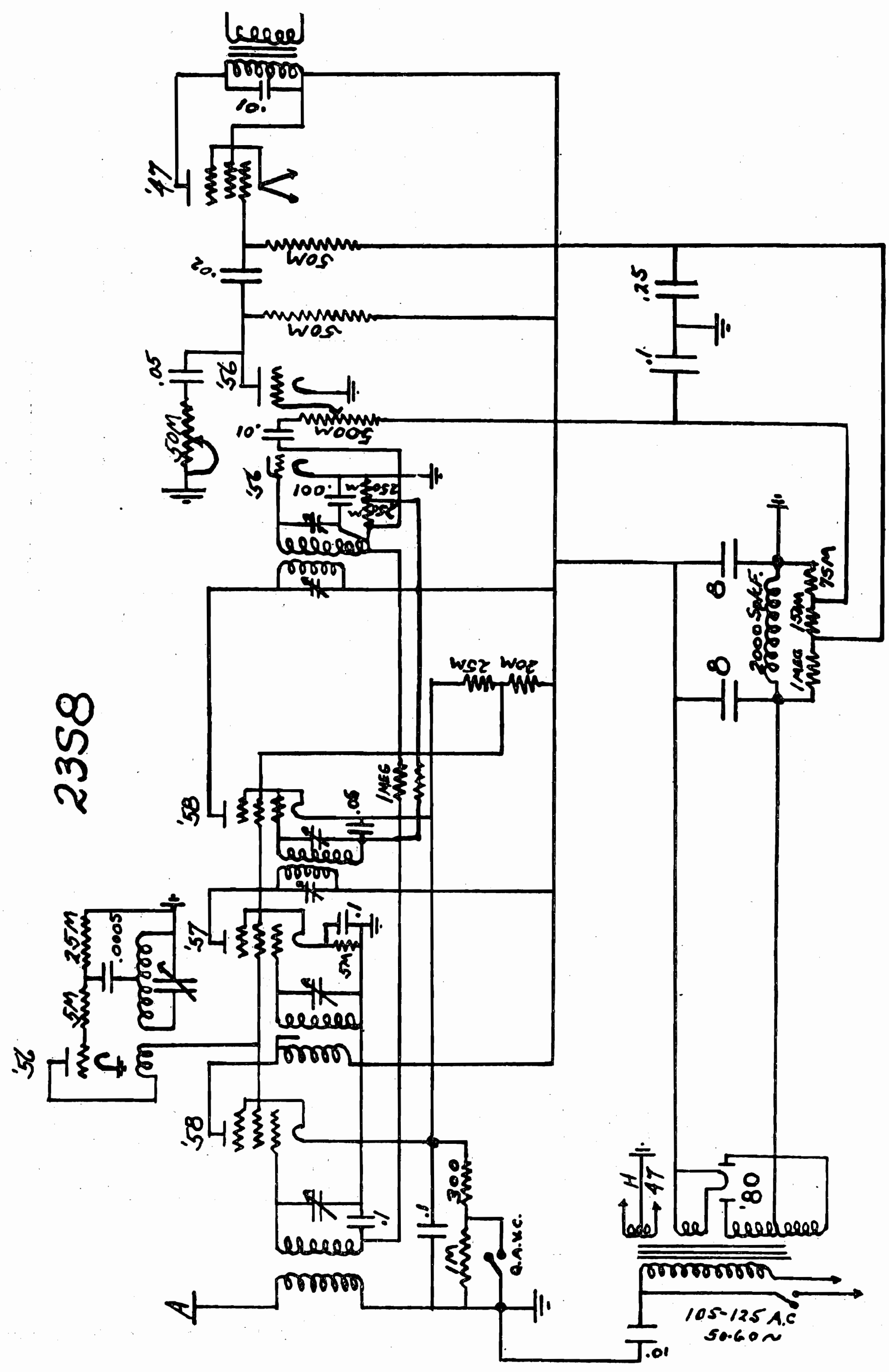
Model Short Wave Chassis (1931)



Model "Short Wave Converter"

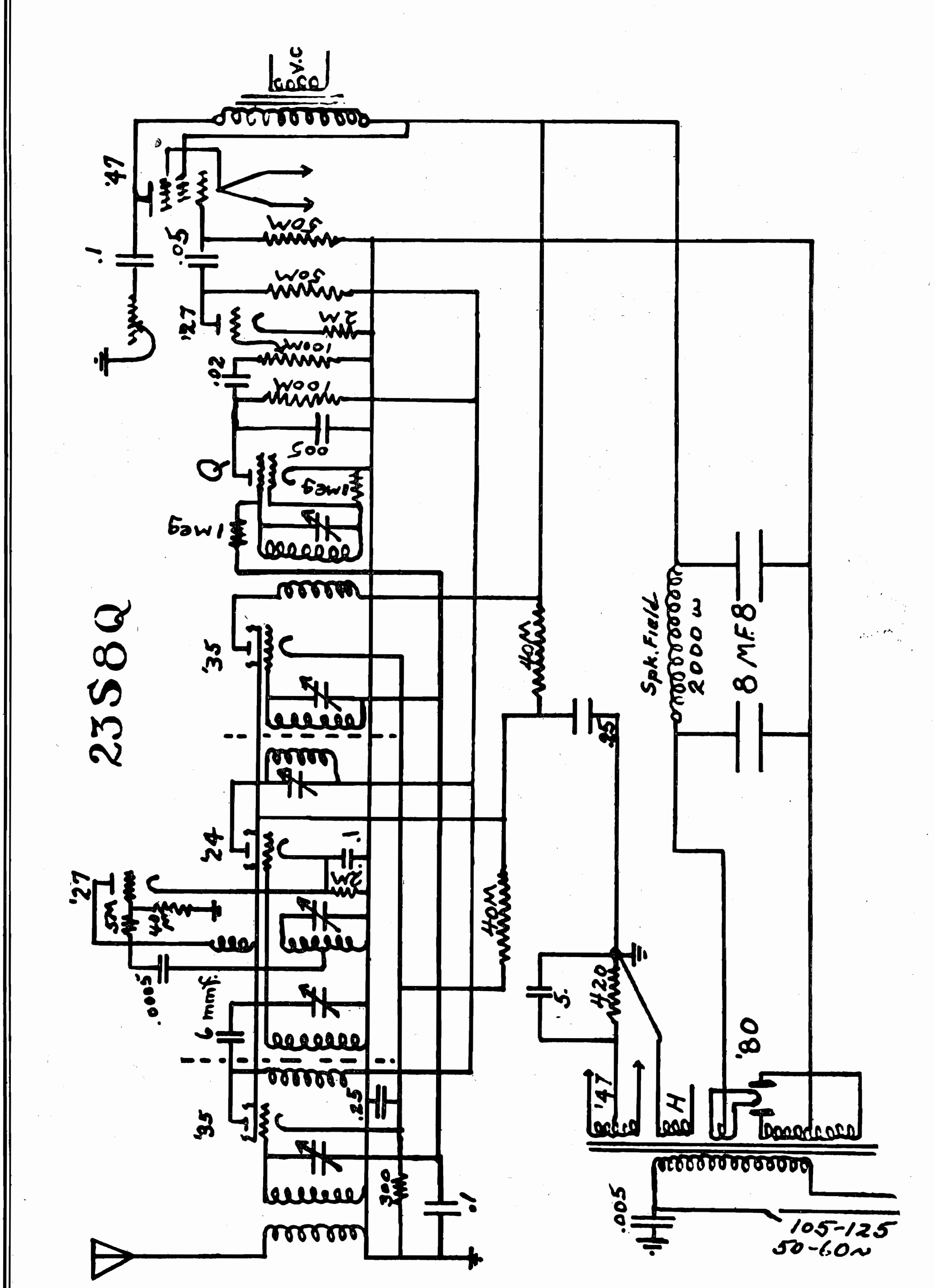
MODEL 23-S-8

AUDIOLA RADIO CO.



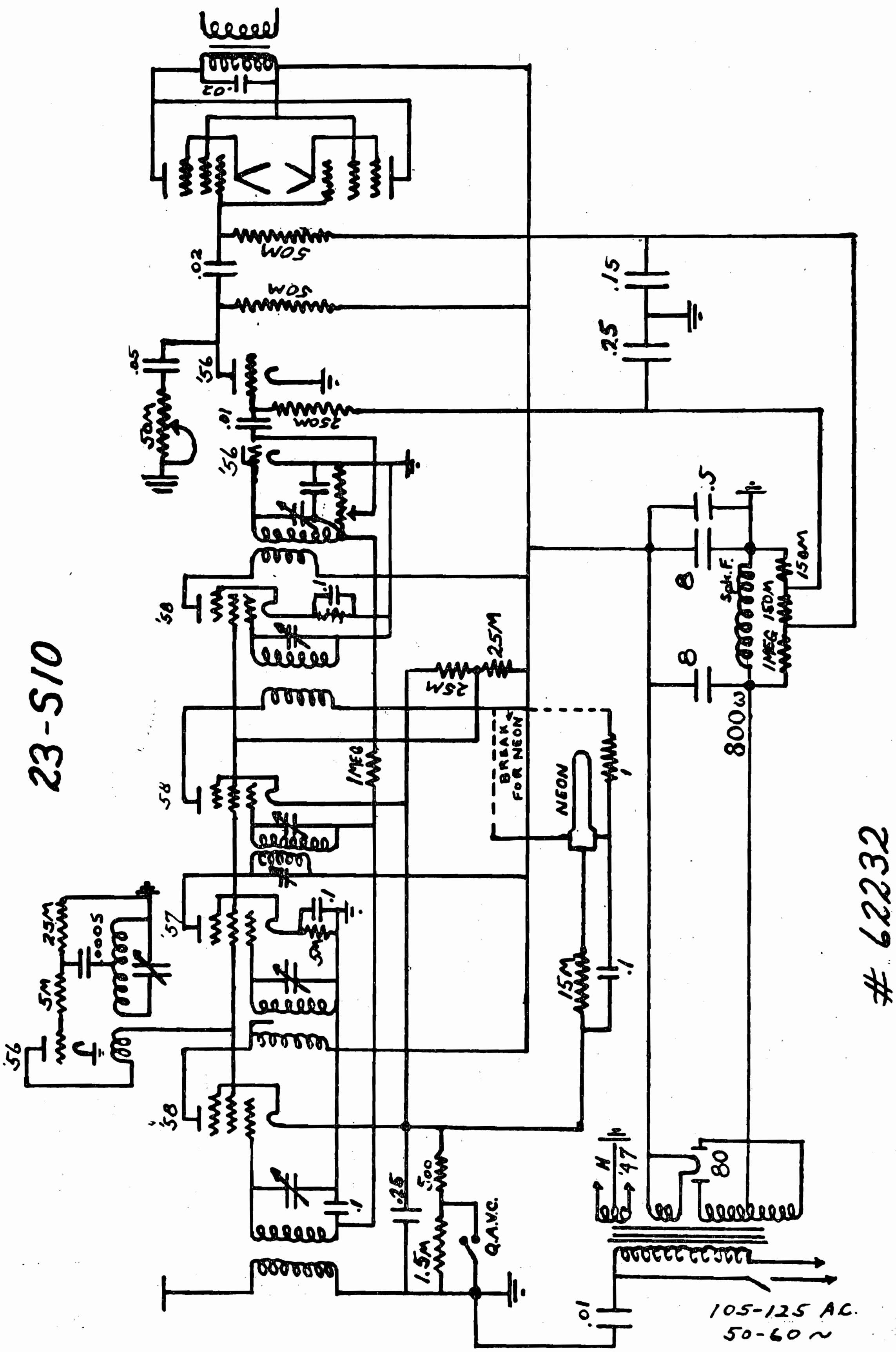
AUDIOLA RADIO CO.

MODEL 23-S-8Q



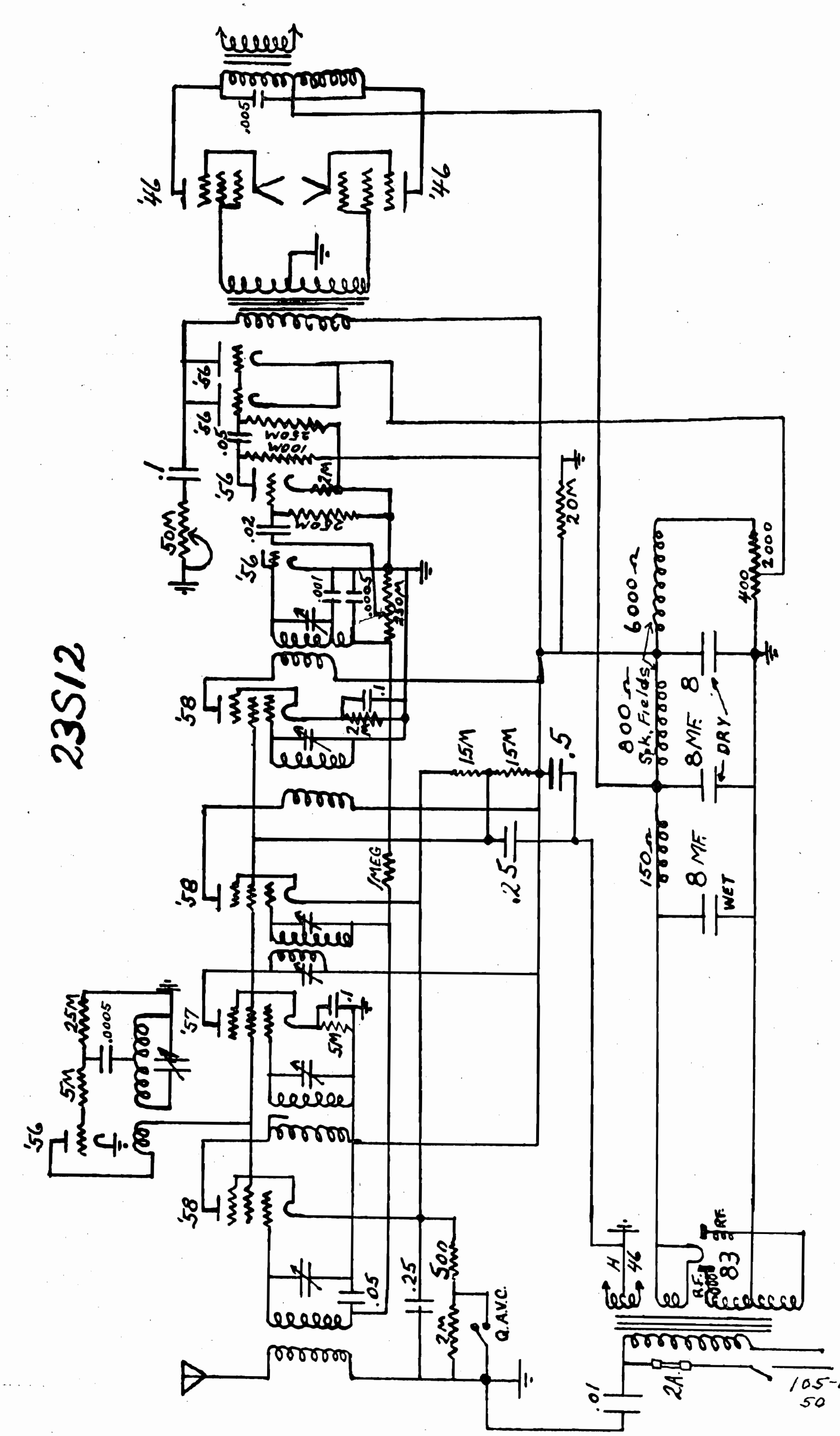
MODEL 23-S-10

AUDIOLA RADIO CO.



AUDIOLA RADIO CO.

MODEL 23-S-12

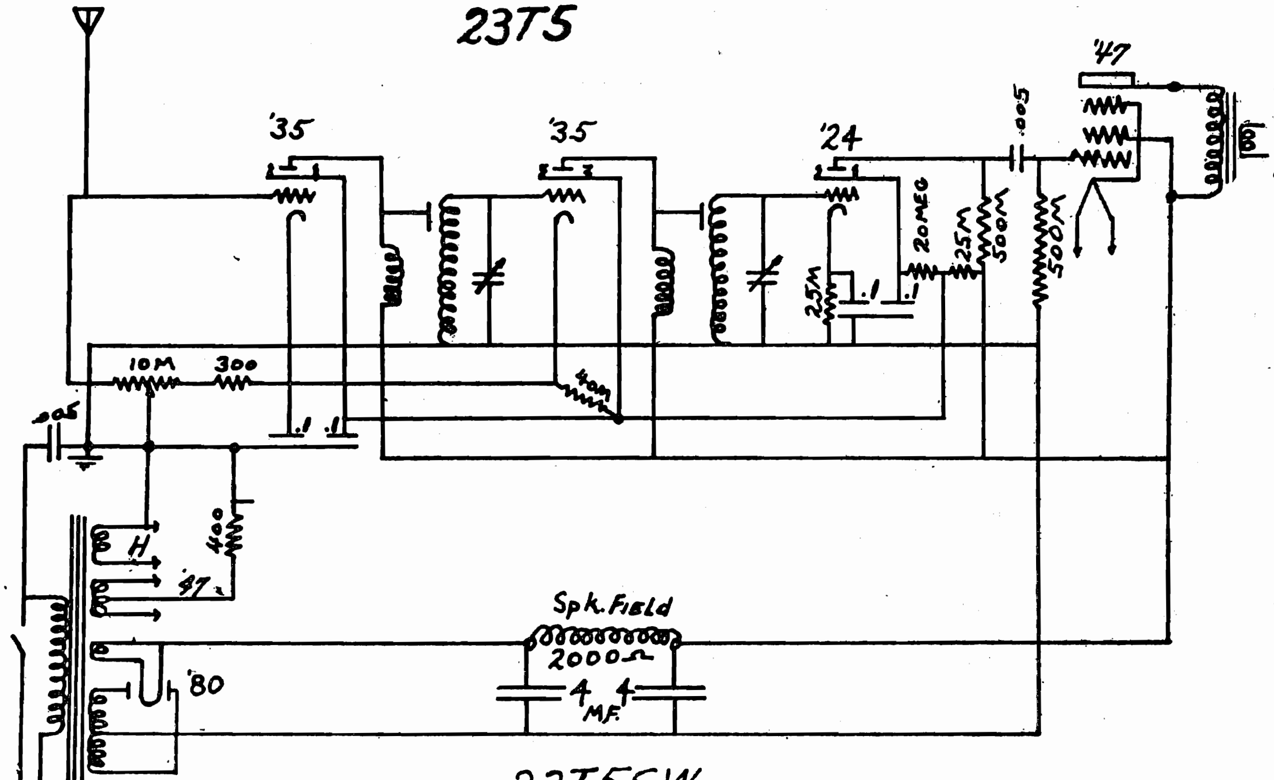


IF PEAK 177.5 KC

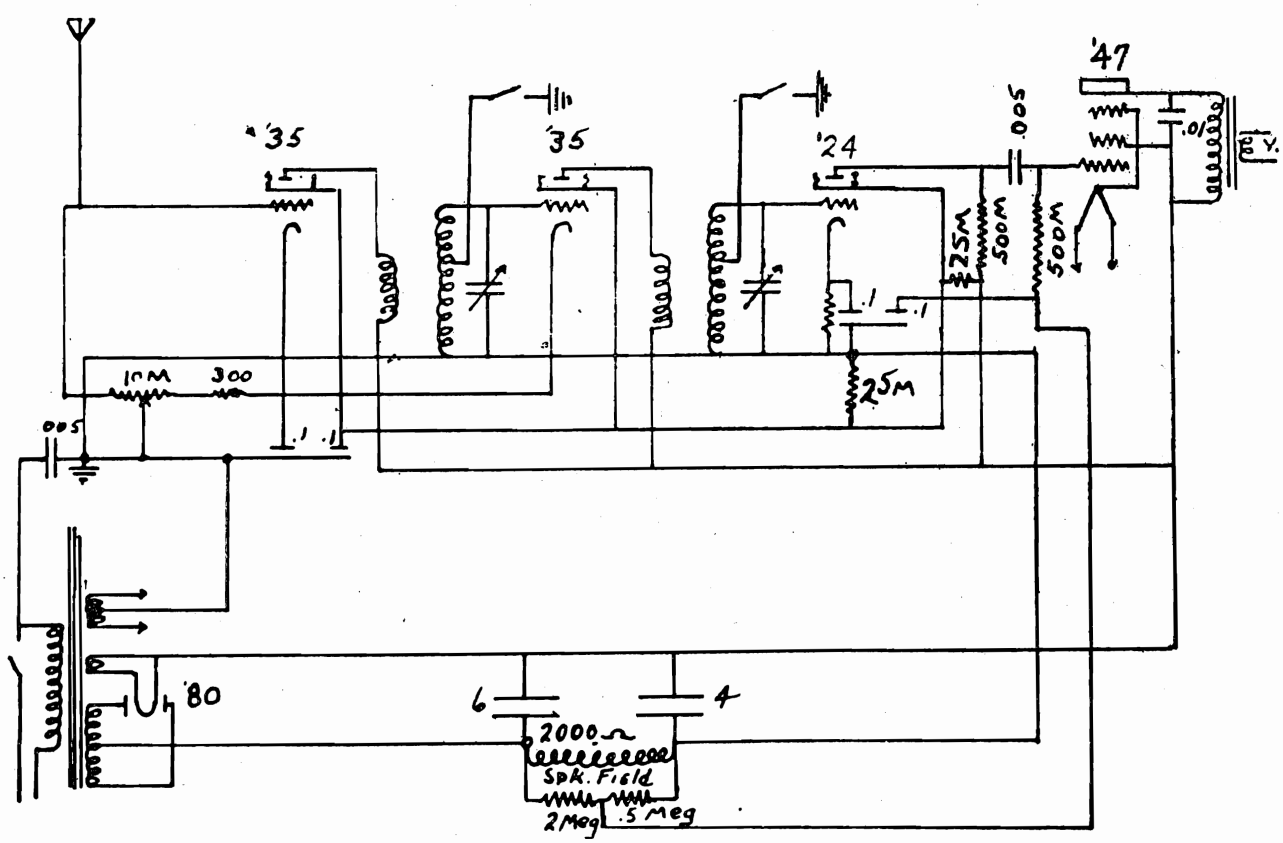
MODEL 23-T-5
MODEL 23-T-5-SW

AUDIOLA RADIO CO.

23T5

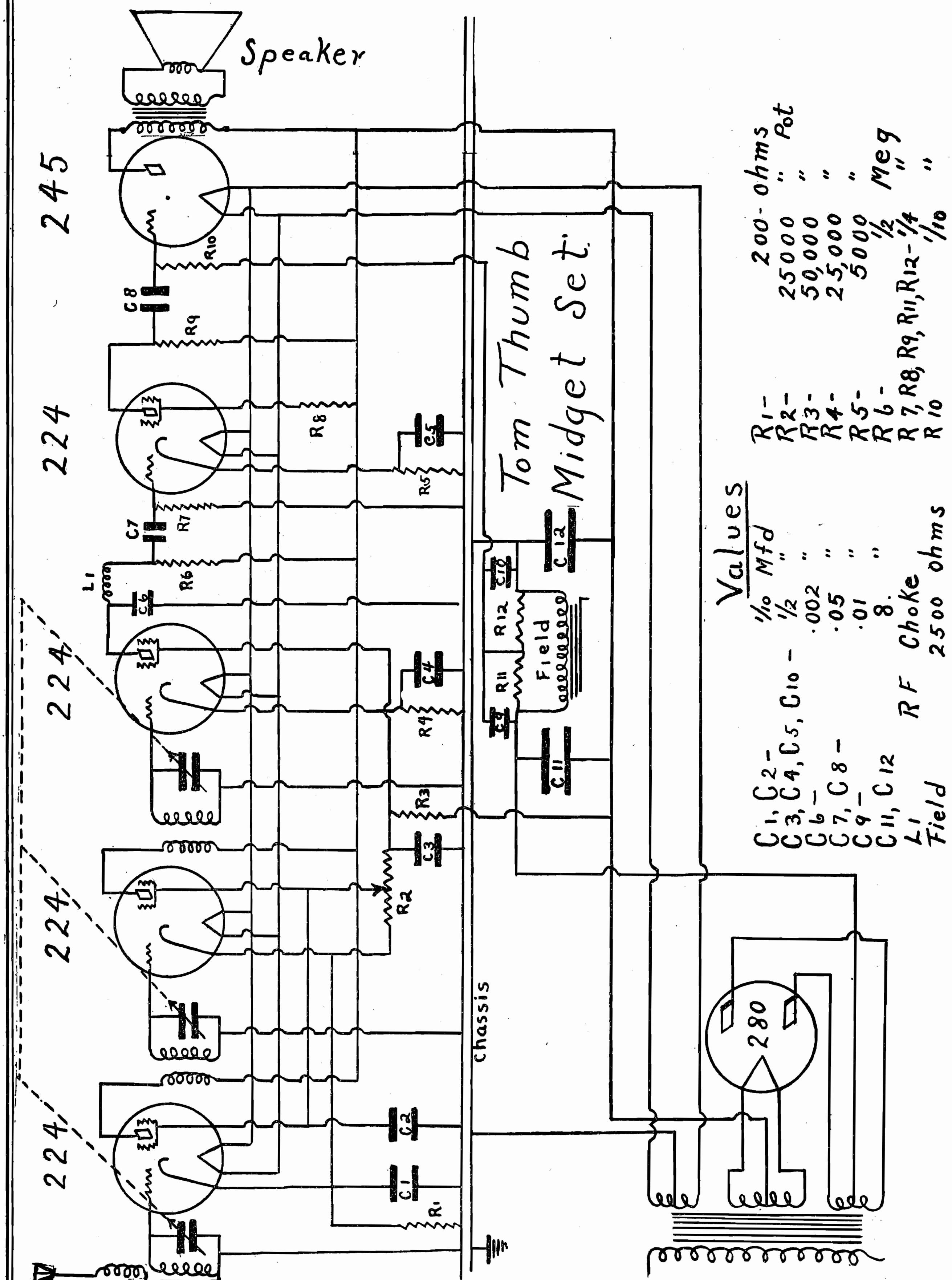


23T55W



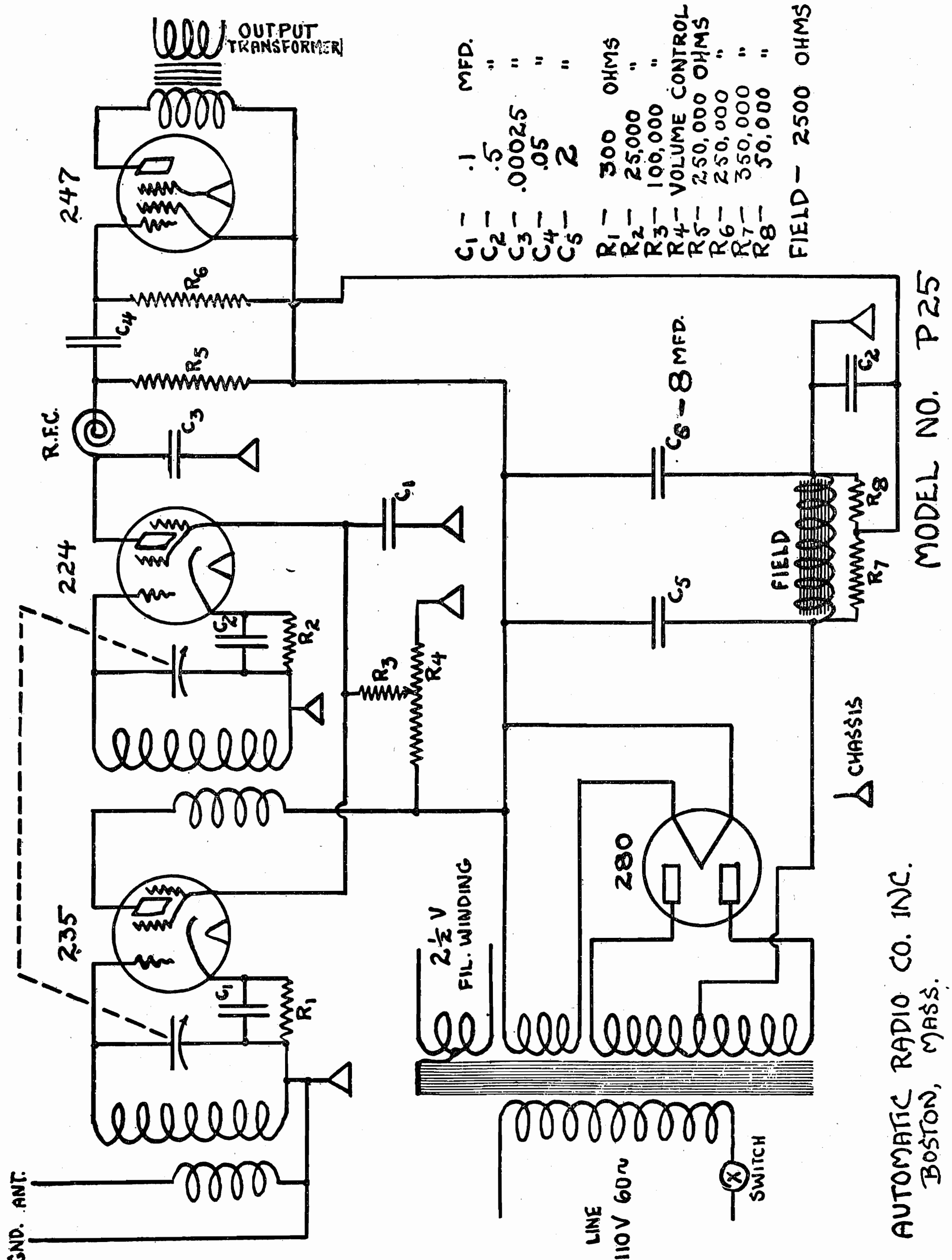
MODEL "TOM THUMB"
Midget Set

AUTOMATIC RADIO MFG. CO.



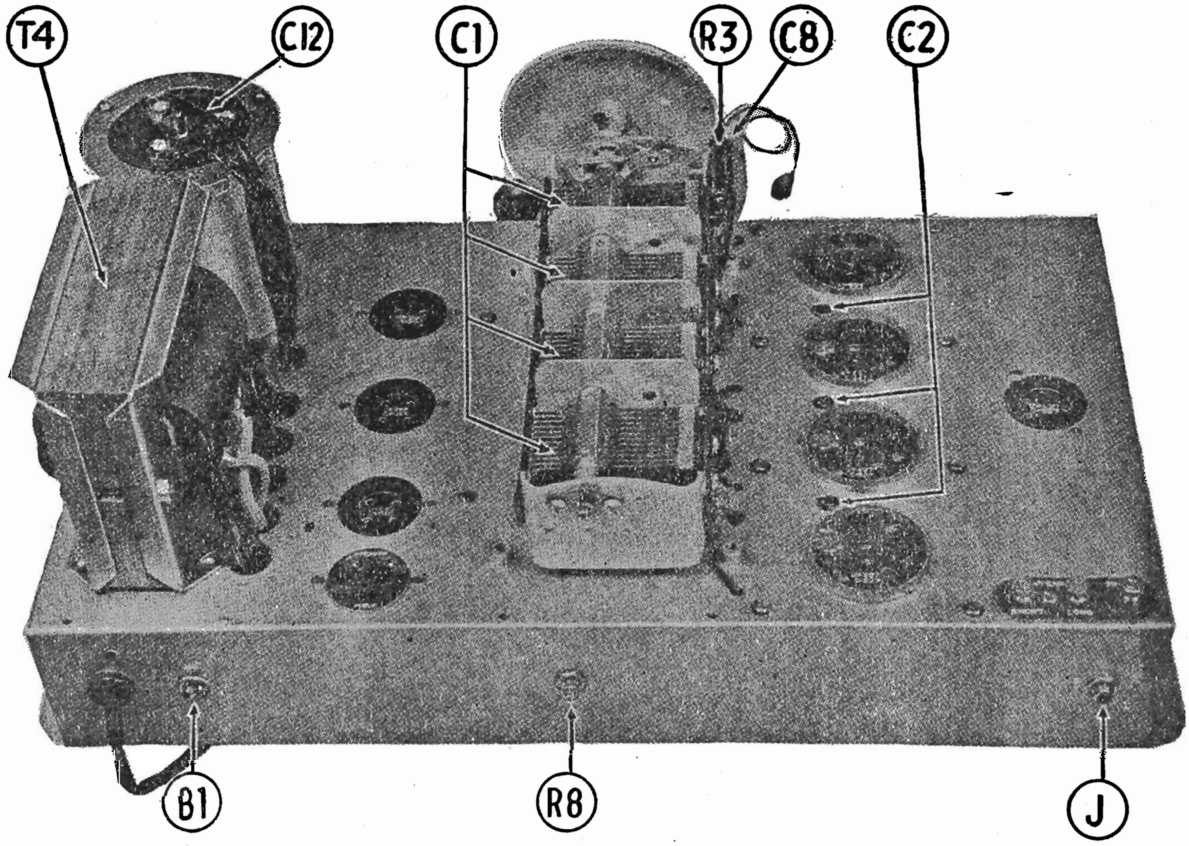
MODEL P-25

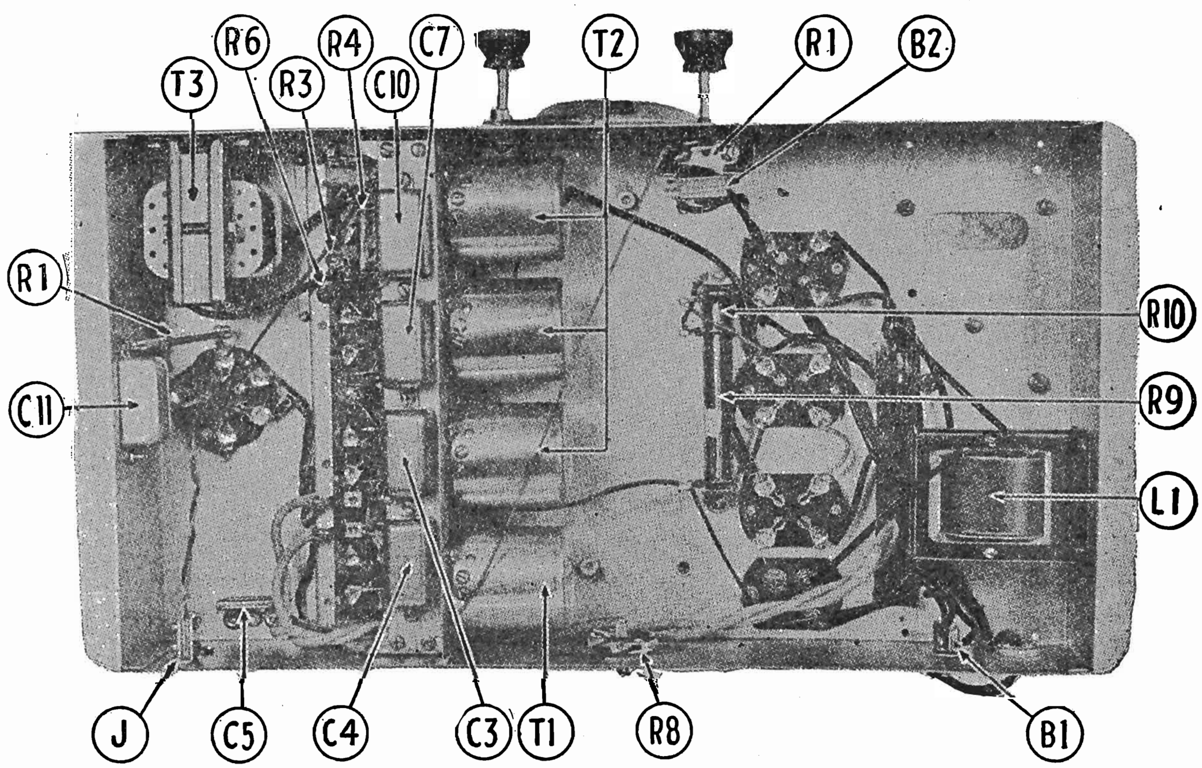
AUTOMATIC RADIO MFG. CO.



BALKEIT RADIO CO.

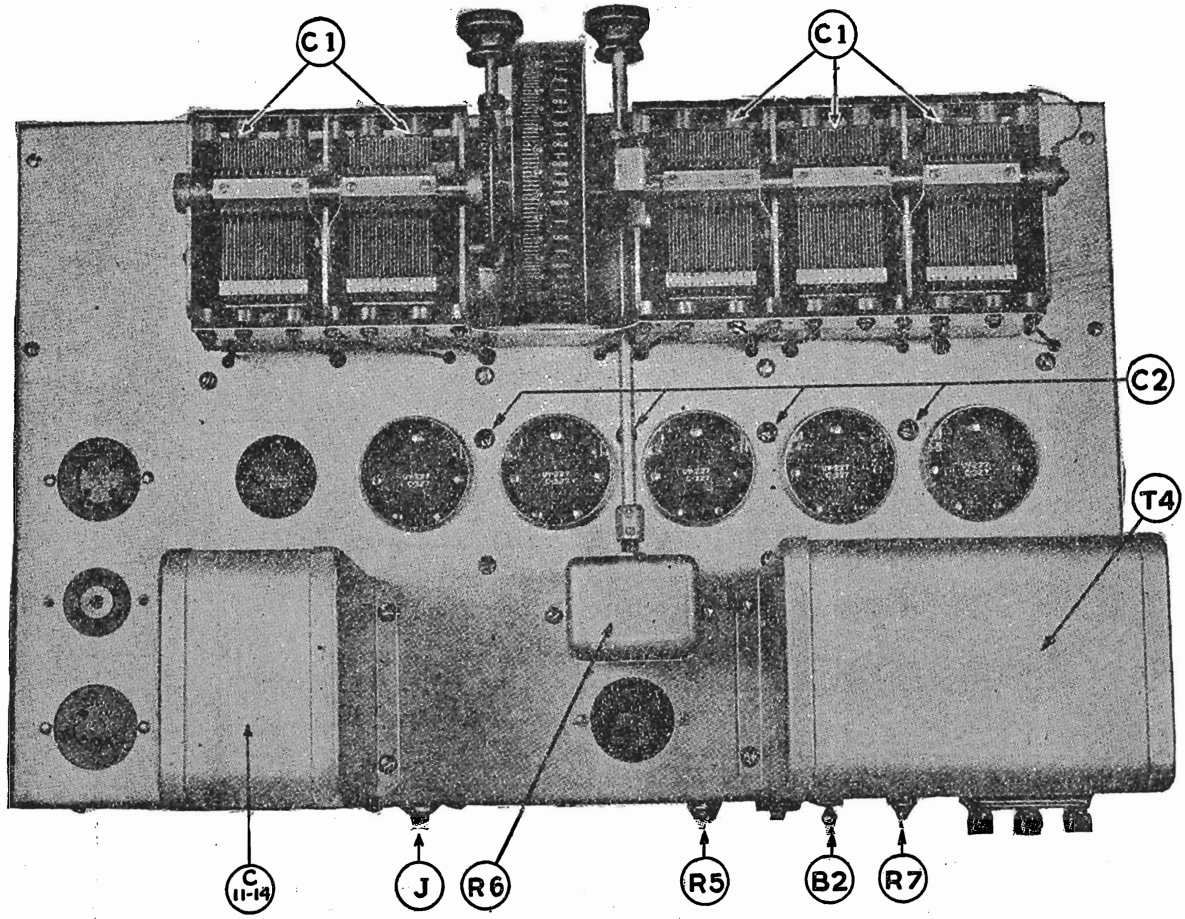
MODEL "F"

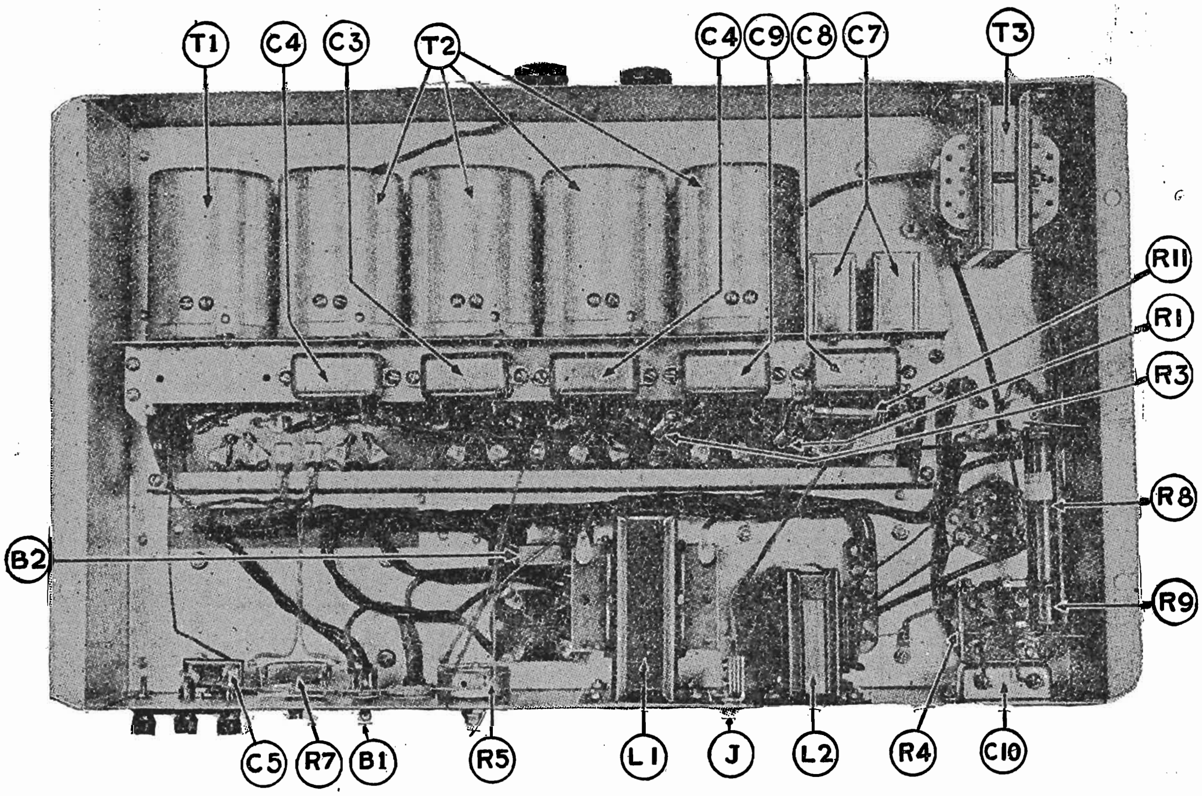




BALKEIT RADIO CO.

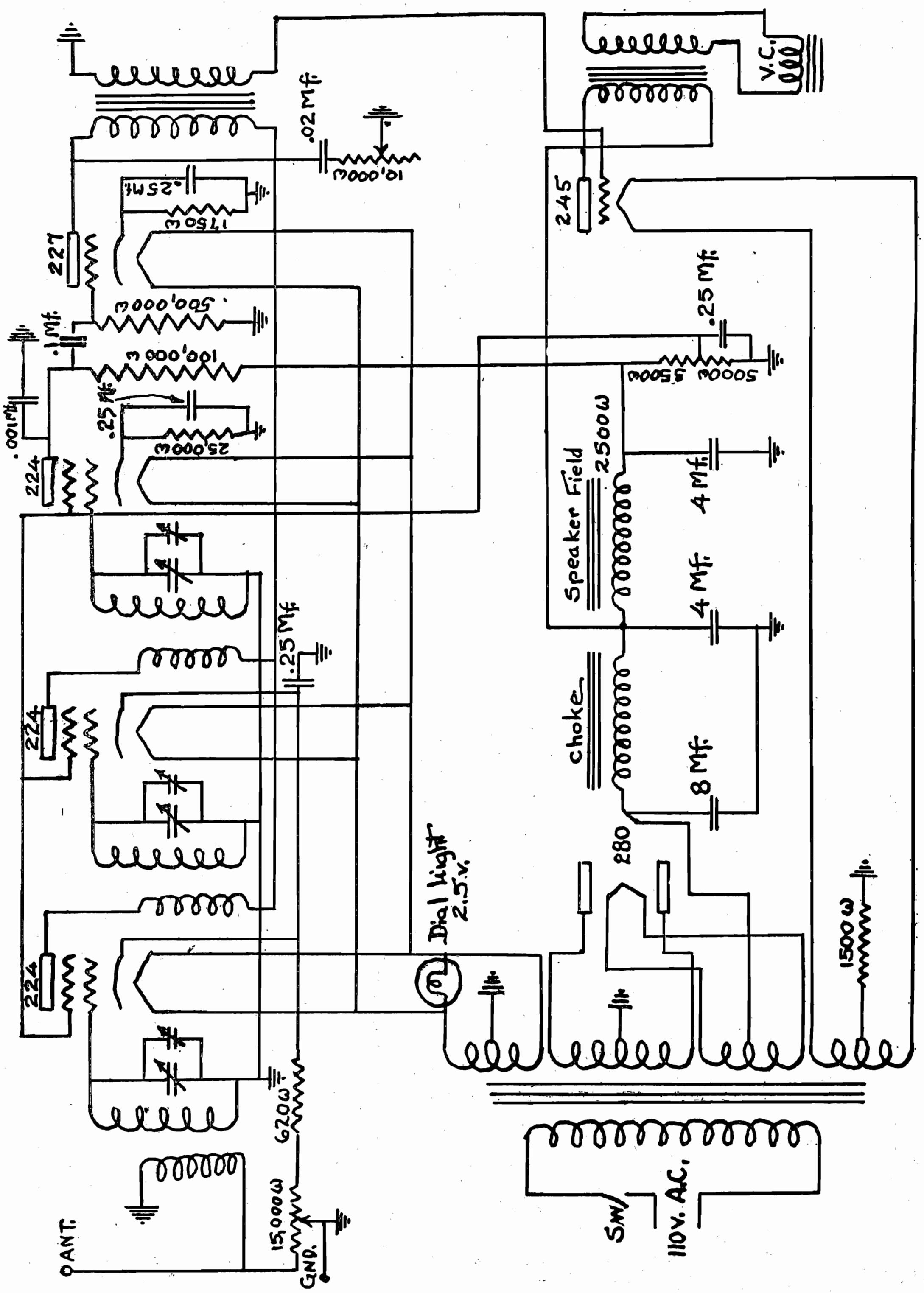
MODEL "C"





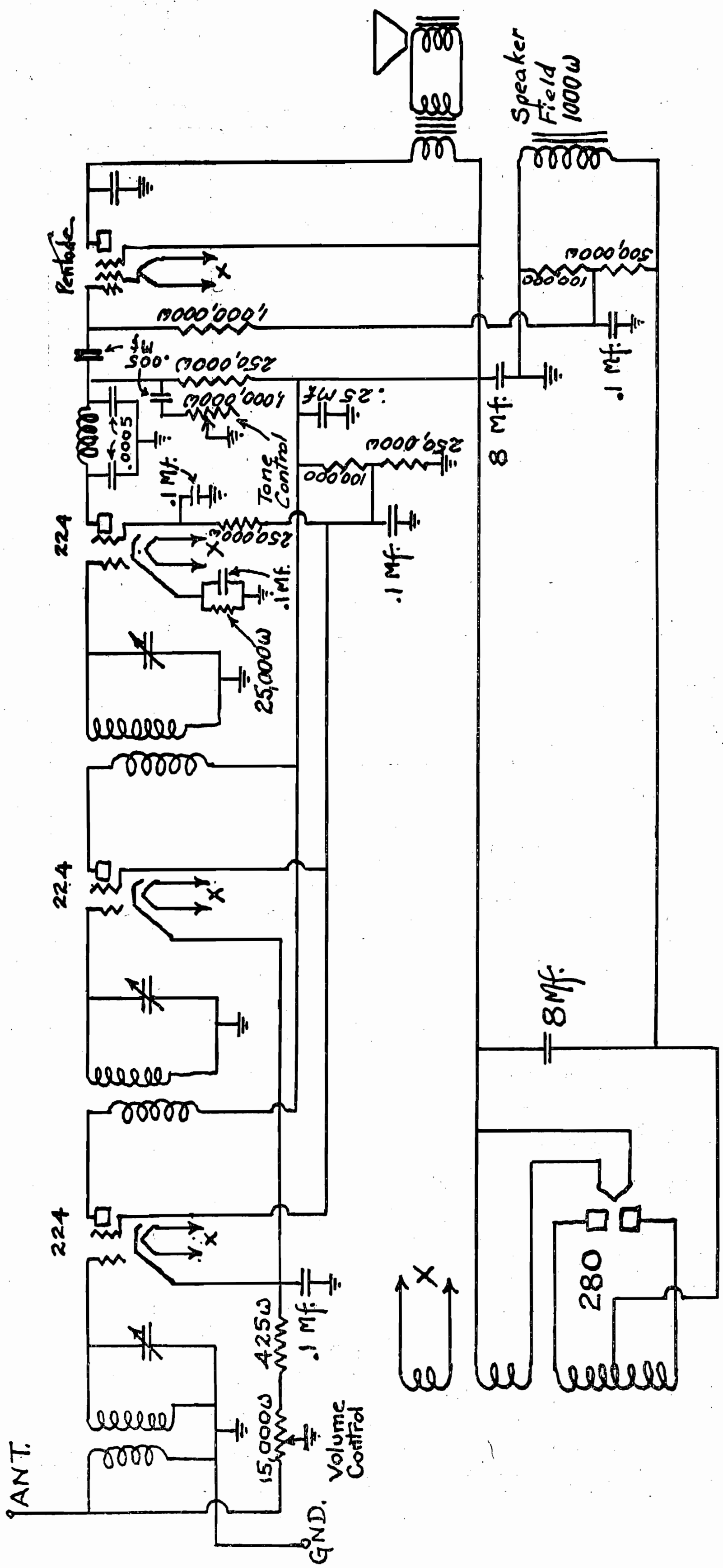
MODEL "E"

BALKEIT RADIO CO.



BALKEIT RADIO CO.

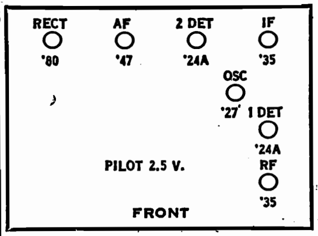
MODEL "KP"



MODEL L-7

BALKEIT RADIO CO.

Model L-7 (1931)

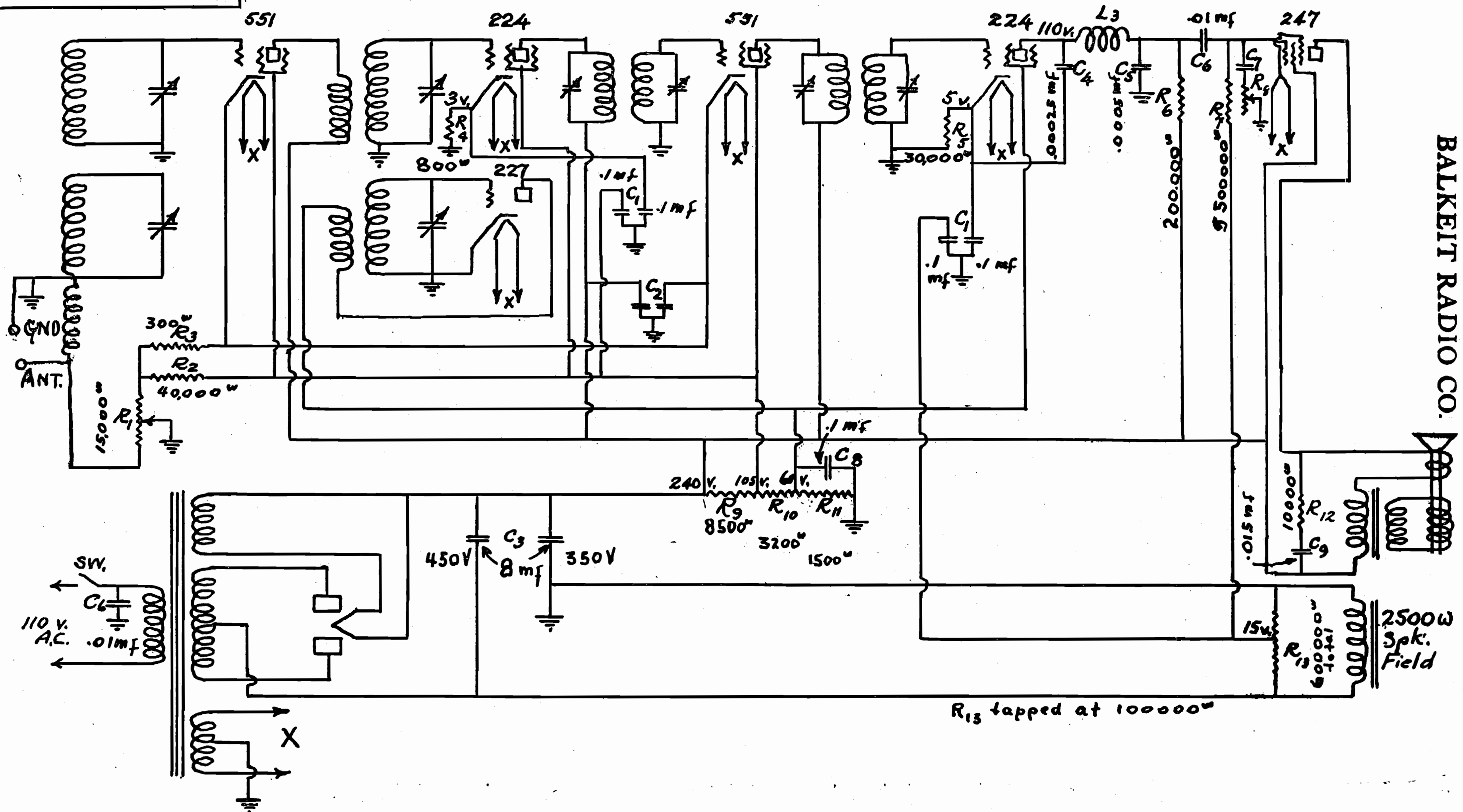


Values Not Shown Upon Schematic Diagram

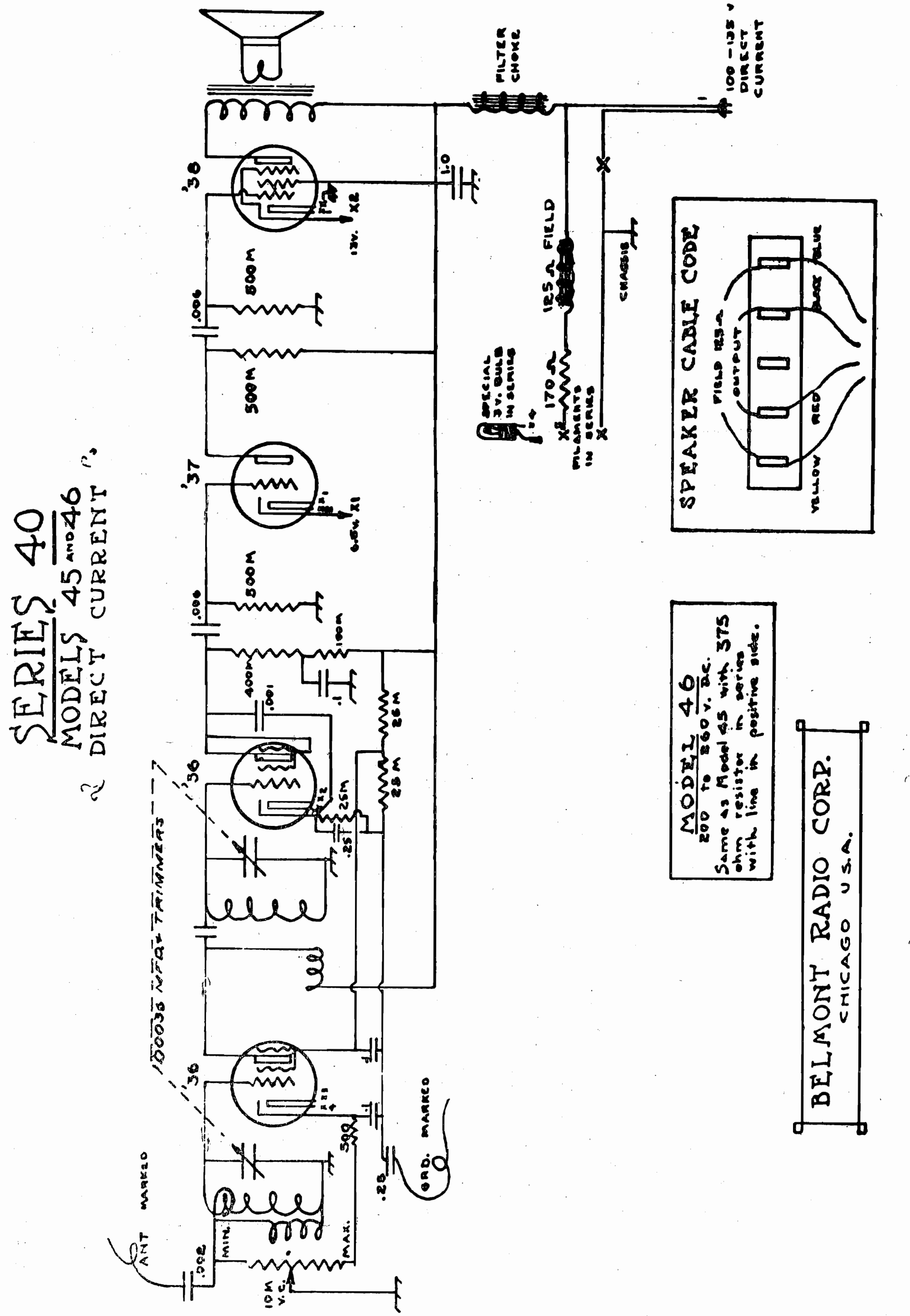
C2 dual condenser. One section .1 mfd and 200 volts and other section .25 mfd and 300 volts.

C7 .004 mfd and 200 volts.

R8 10,000 ohms to 1,000,000 ohms as tone control resistor.

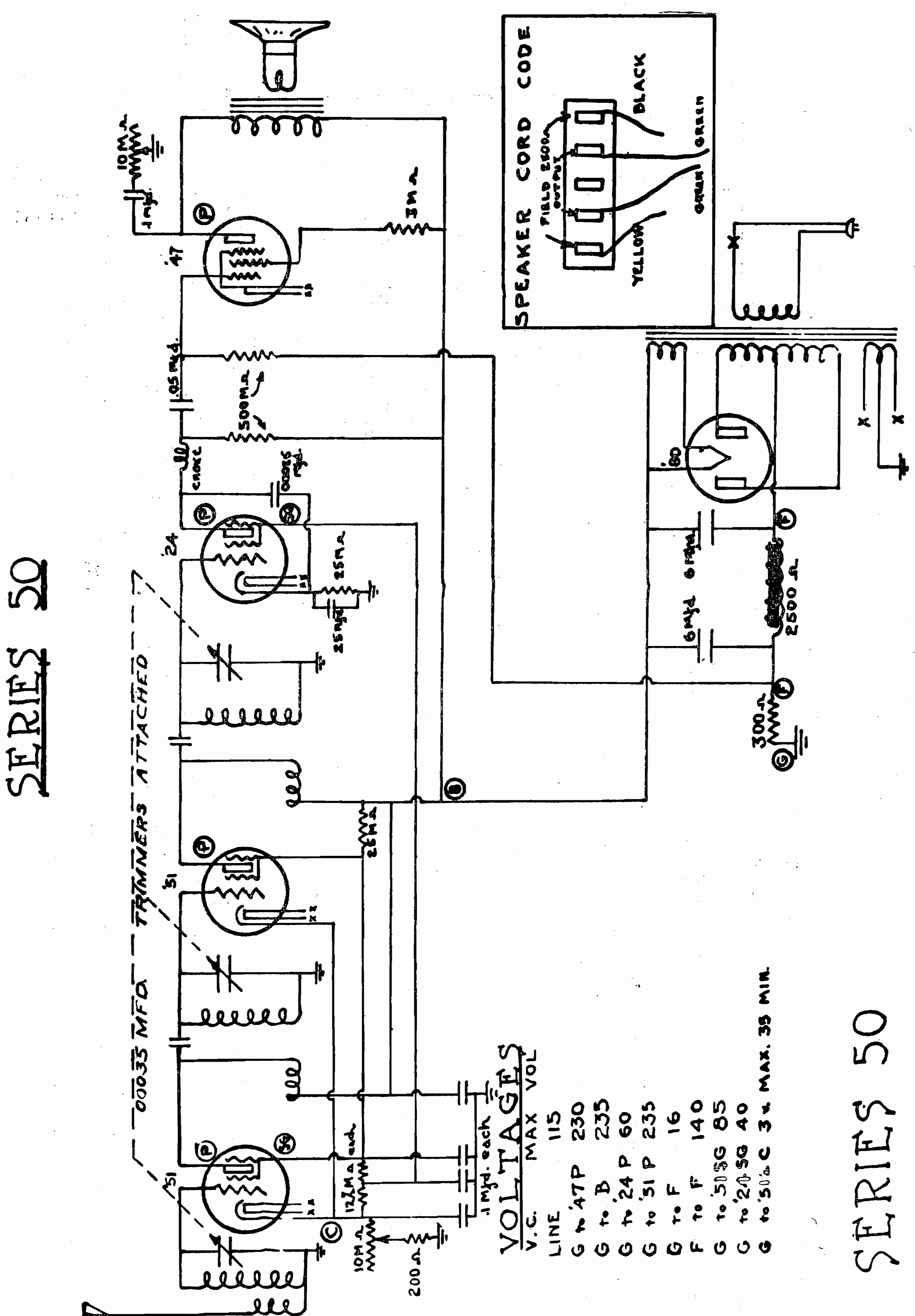


BELMONT RADIO CORP.



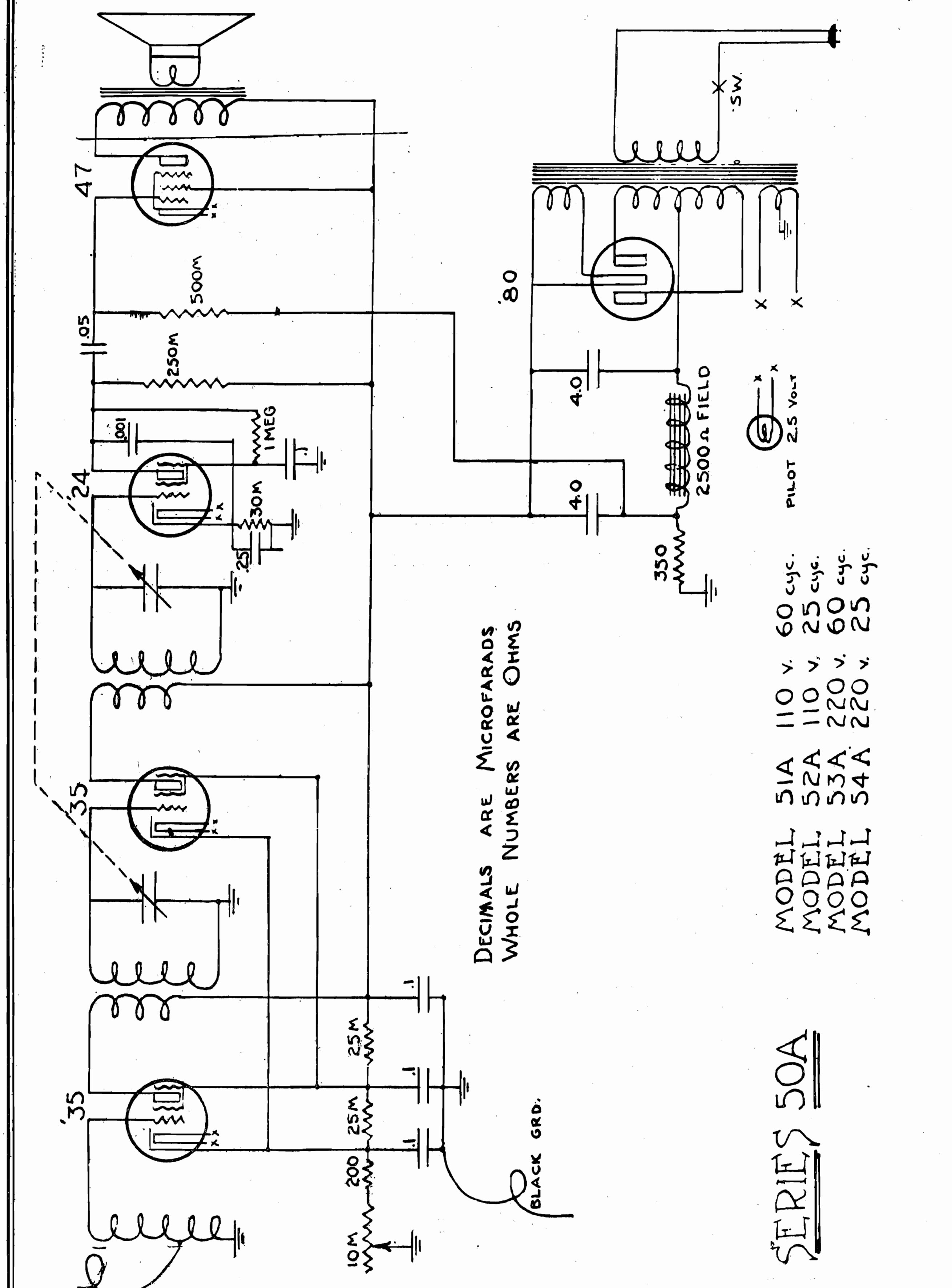
MODEL 50
Series

BELMONT RADIO CORP.



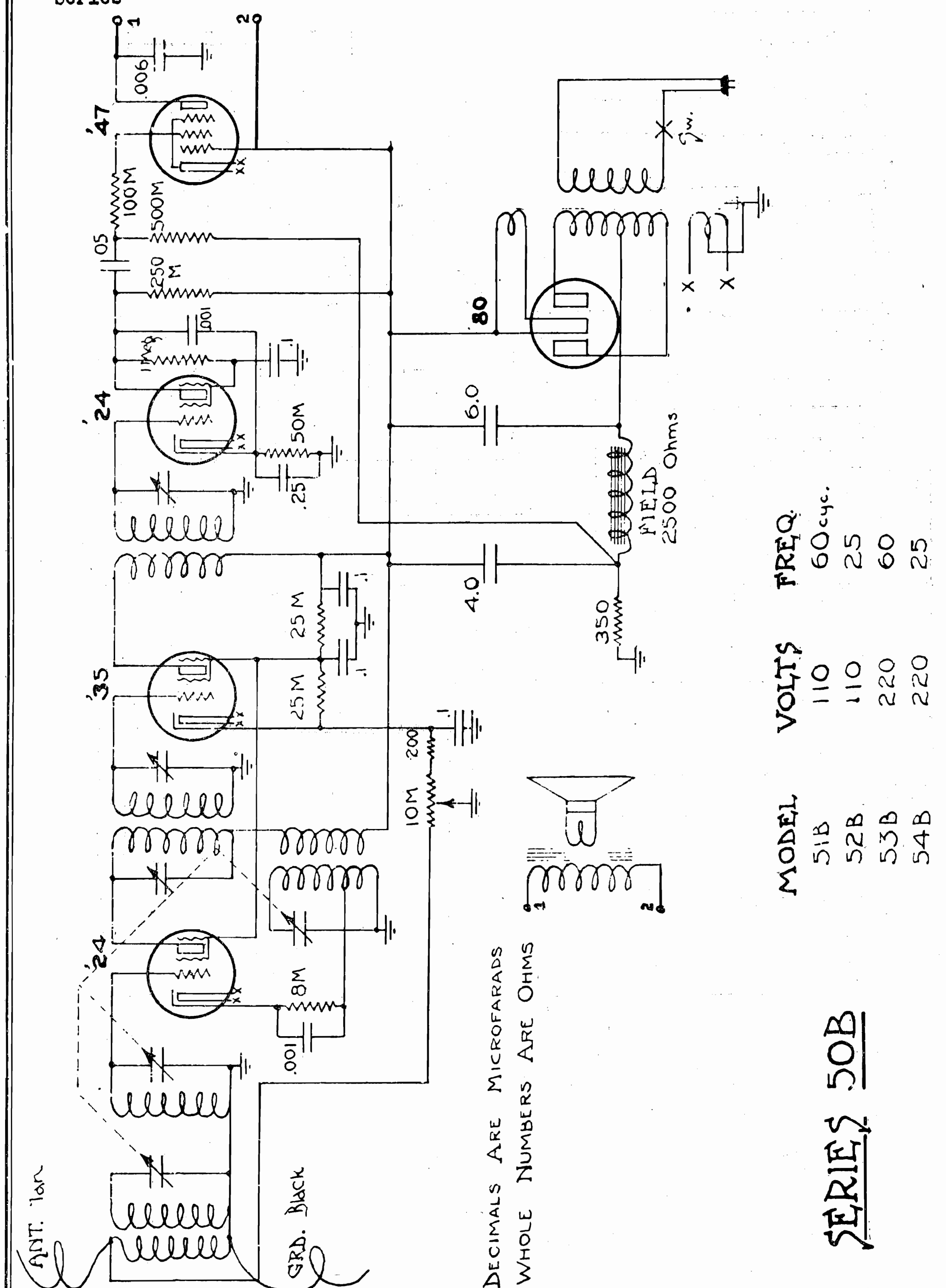
BELMONT RADIO CORP.

MODEL 50-A Series



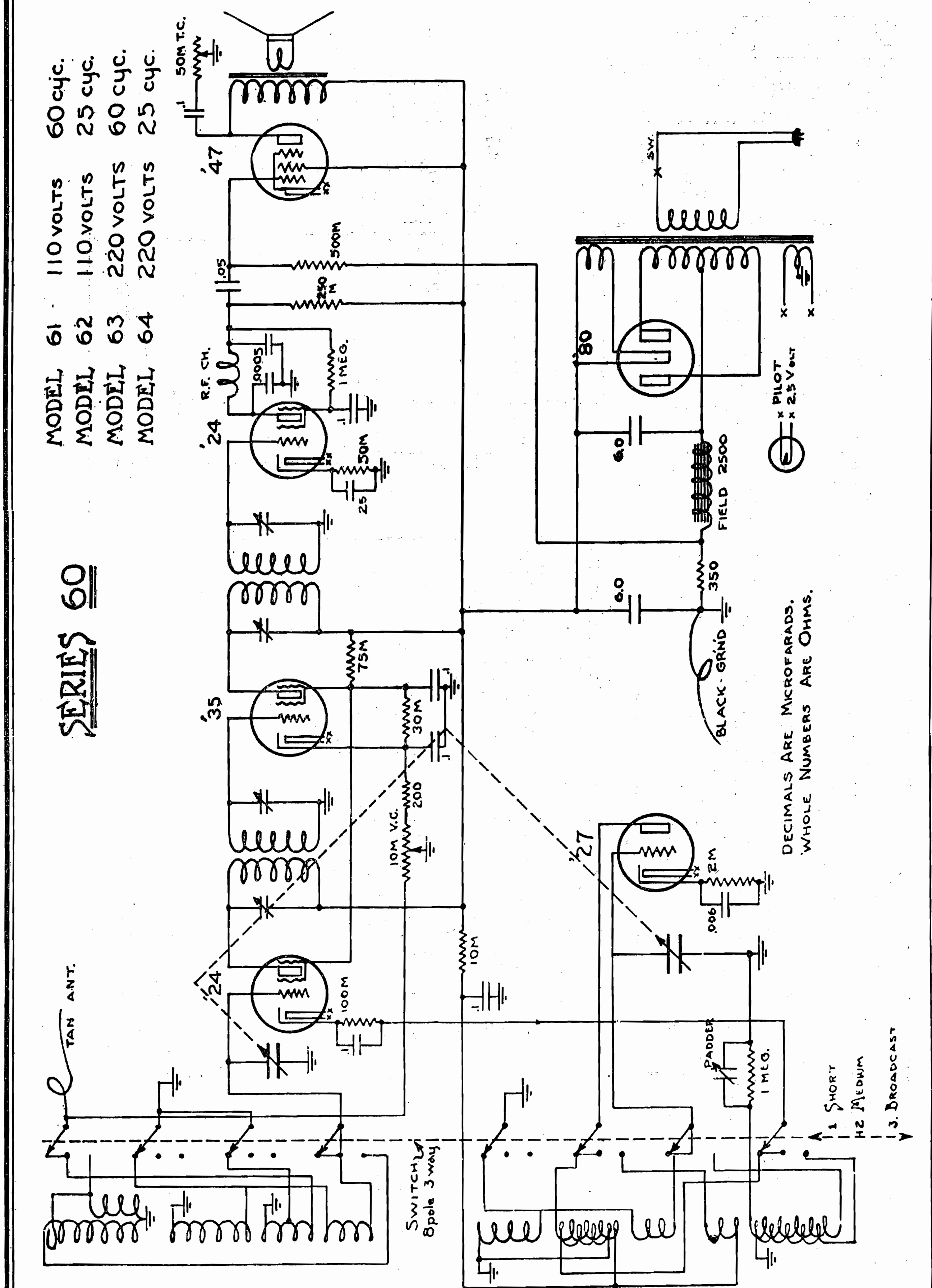
MODEL 50-B
Series

BELMONT RADIO CORP.



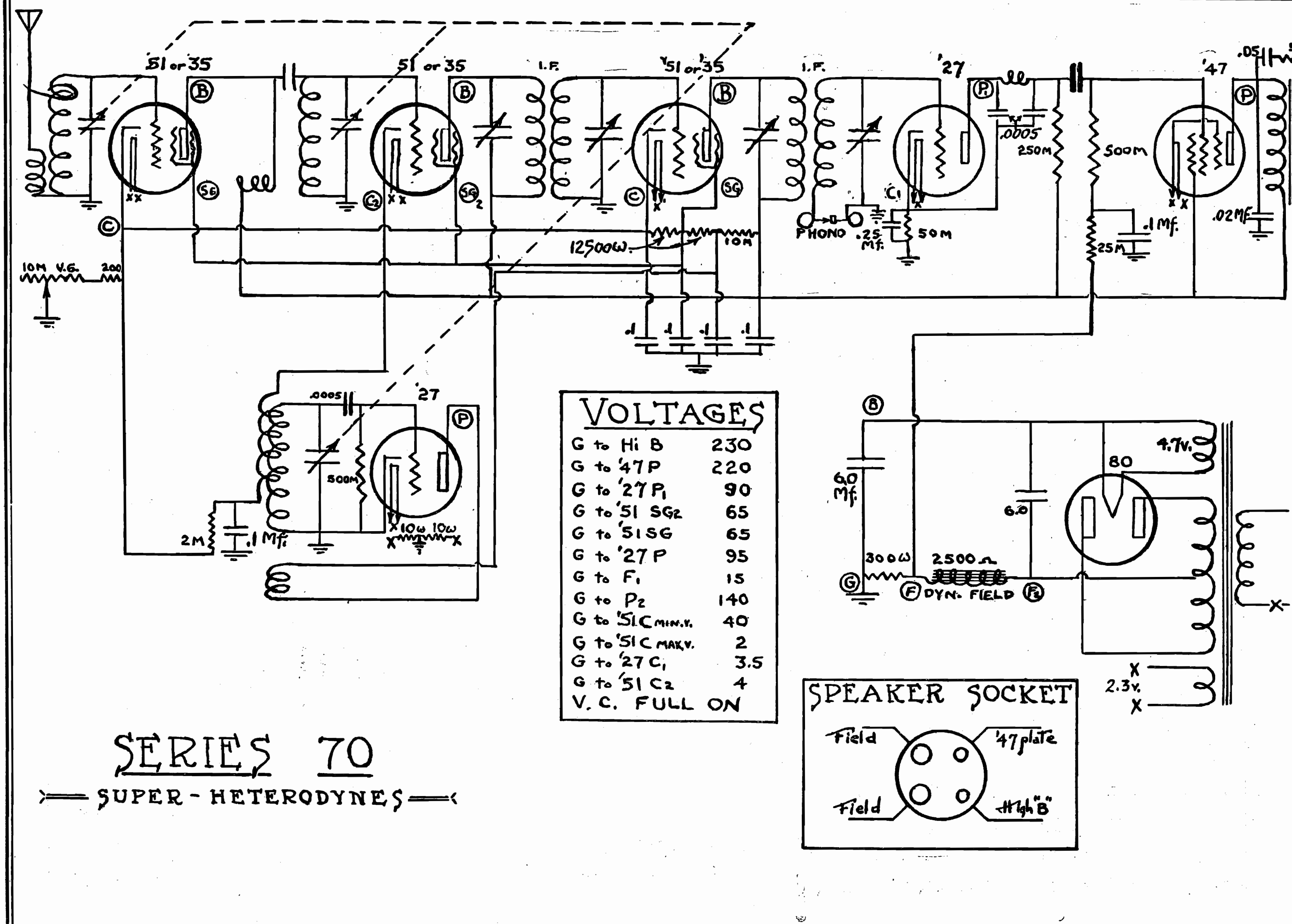
BELMONT RADIO CORP.

MODEL 60
Series



BELMONT RADIO CORP.

MODEL 70 Series



VOLTAGES

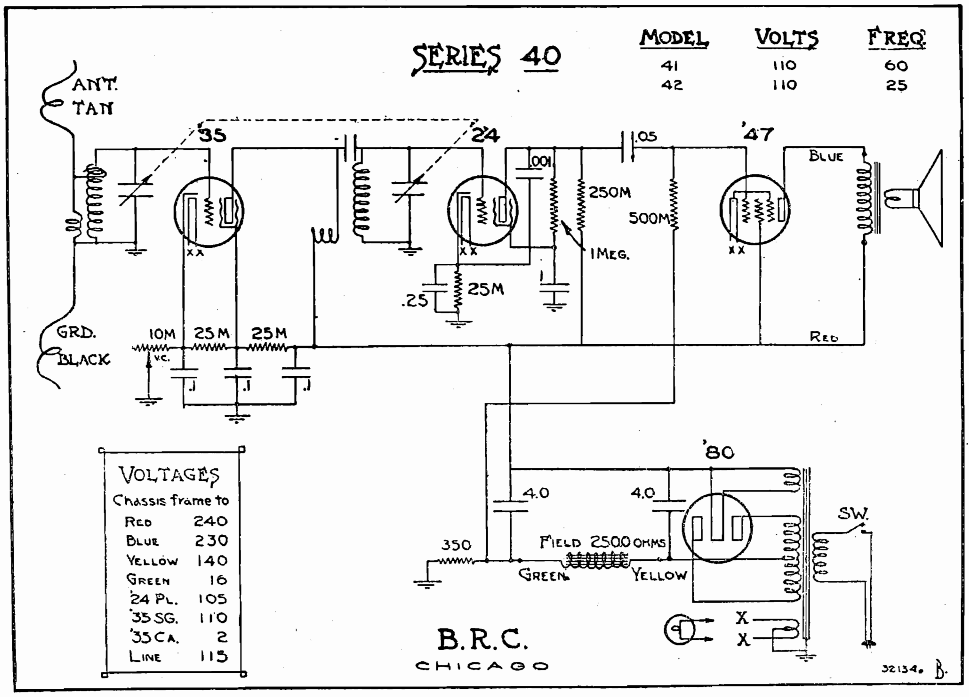
G to Hi B	230
G to '47 P	220
G to '27 P1	90
G to '51 SG2	65
G to '51 SG	65
G to '27 P	95
G to F1	15
G to P2	140
G to '51 C min. v.	40
G to '51 C max. v.	2
G to '27 C1	3.5
G to '51 C2	4
V. C. FULL ON	

SERIES 70

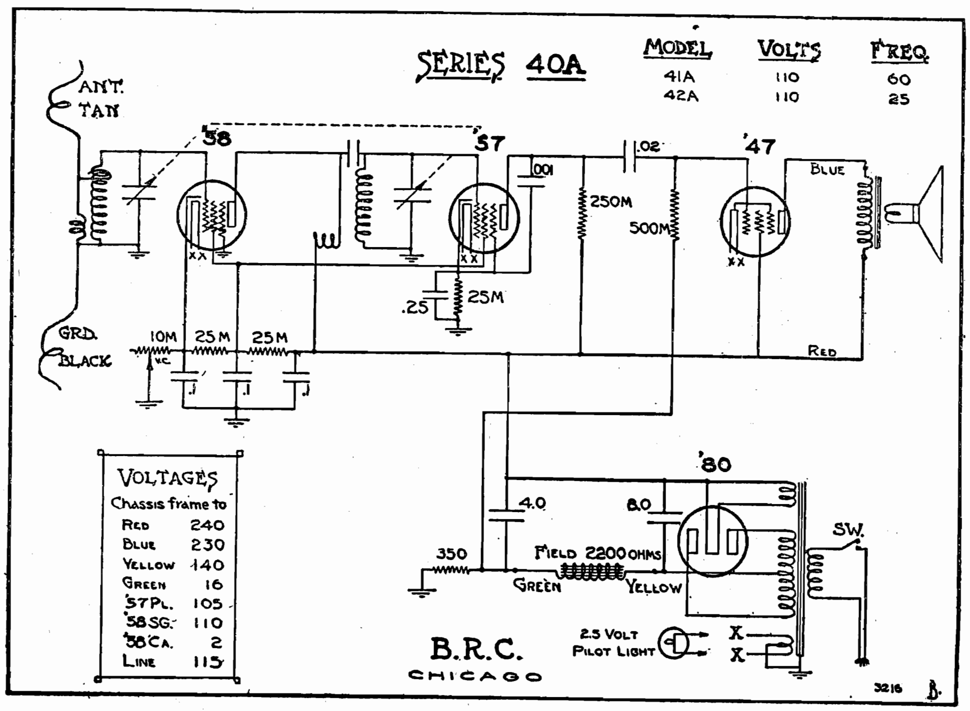
—SUPER-HETERODYNES—

BELMONT RADIO CORP.

MODEL Series 40 AC
MODEL Series 40-A AC



DECIMAL ARE MICROFARADS. WHOLE NUMBERS ARE OHMS.



DECIMALS ARE MICROFARADS. WHOLE NUMBERS ARE OHMS.

MODEL 50-C
MODEL 525

BELMONT RADIO CORP.

OPERATING INSTRUCTIONS

1. Carefully remove antenna wire from its compartment and stretch out full length. A properly erected well insulated outdoor antenna about 75 feet in length, including lead-in is recommended for permanent installations. A GROUND IS NOT REQUIRED.
2. After making certain that power supply is 110 volts, insert plug in receptacle.
3. Rotating VOLUME control clockwise (right) from off position turns power switch on, continued rotation increases volume. IF SET DOES NOT OPERATE IN ONE MINUTE ON DIRECT CURRENT REVERSE PLUG IN RECEPTACLE.
4. Advance volume control three-quarter turn, then select the desired station. Tune this station to the loudest point on the scale, then raise or lower volume with VOLUME control. Never regulate volume by detuning station selector, always adjust VOLUME control.

FIVE TUBES, 2—6D6, 1—75, 1—43, 1—25Z5.

SERVICE SUGGESTIONS

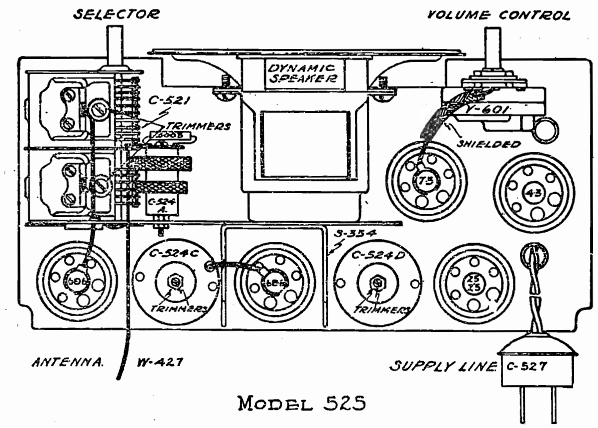
NOTE—CONNECTING CORD OF SET GETS WARM IN NORMAL OPERATION. DO NOT BECOME ALARMED.

Make sure that all tubes are pushed firmly in their proper sockets and that the clips are securely fasteneed to the caps on the tops of the tubes.

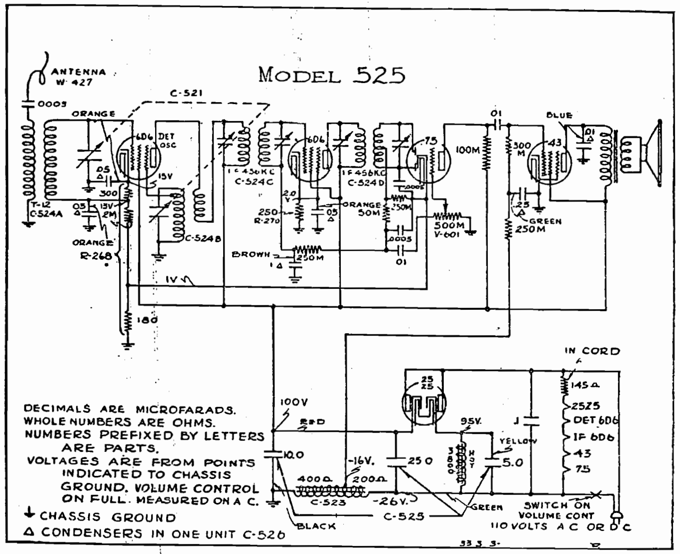
That the aerial is stretched out and that the connections to an outdoor antenna (if used) are good.

If necessary to change tubes or service chassis, UNDER NO CIRCUMSTANCES REMOVE BACK OR CHASSIS WITHOUT FIRST REMOVING PLUG FROM LIGHT SOCKET.

To remove chassis from cabinet, pull off knobs from front, remove back (held with screws to case). Remove four mounting screws, then chassis can be slipped out of case.



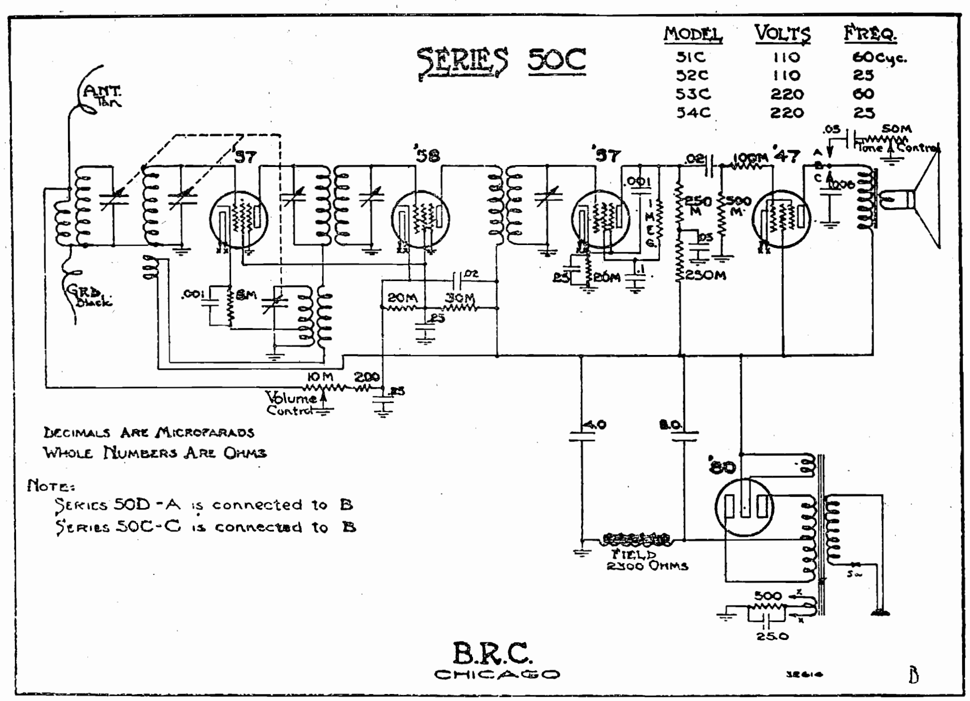
MODEL 525



Schematic circuit diagram Model 525 AC-DC Superheterodyne, with automatic volume control

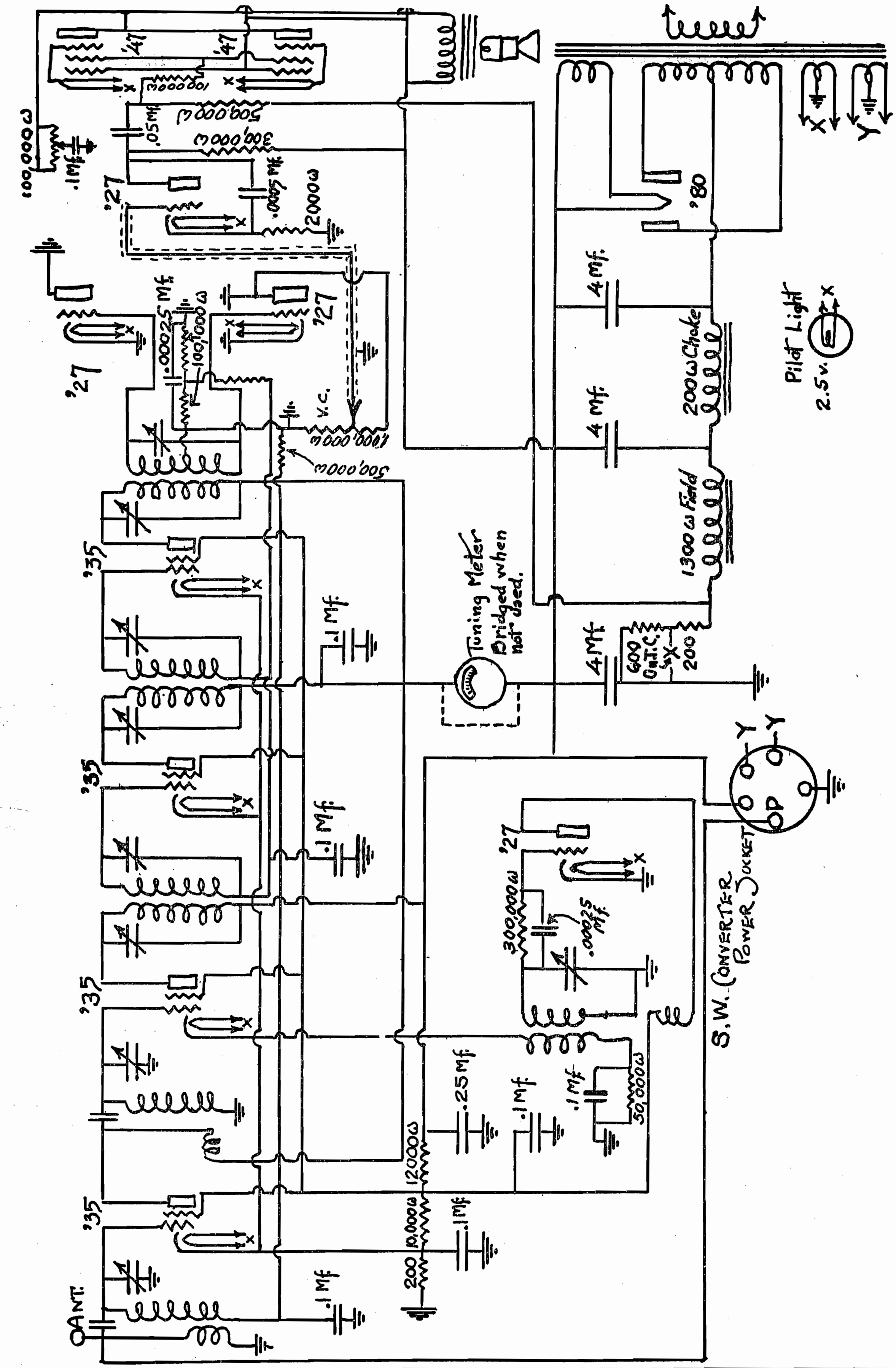
Should it be necessary, at any time, to rebalance this set the procedure is as follows. Attach a 456 kilocycle oscillator to the grid of the 6D6 tube in back of the variable condenser and adjust the trimming condensers of the I. F. transformers to maximum deflection on an output meter connected across the primary of the speaker input transformer. While adjusting these trimmers, the variable condenser should be at the maximum capacity position—at the extreme right of its rotation.

Next disconnect the antenna wire and connect an oscillator in series with a 75 mmf. condenser to the antenna coil. Rotate the condenser plates to the minimum capacity position—extreme left turn, and adjust the trimmer condenser of the rear section of the variable condenser to resonance with an oscillator set at 1725 kilocycles, then adjust the condenser of the front section of the variable condenser to resonance. Align at 1400—1200—1000—800—600—530 kilocycles, bend slotted plates of variable condenser if necessary.



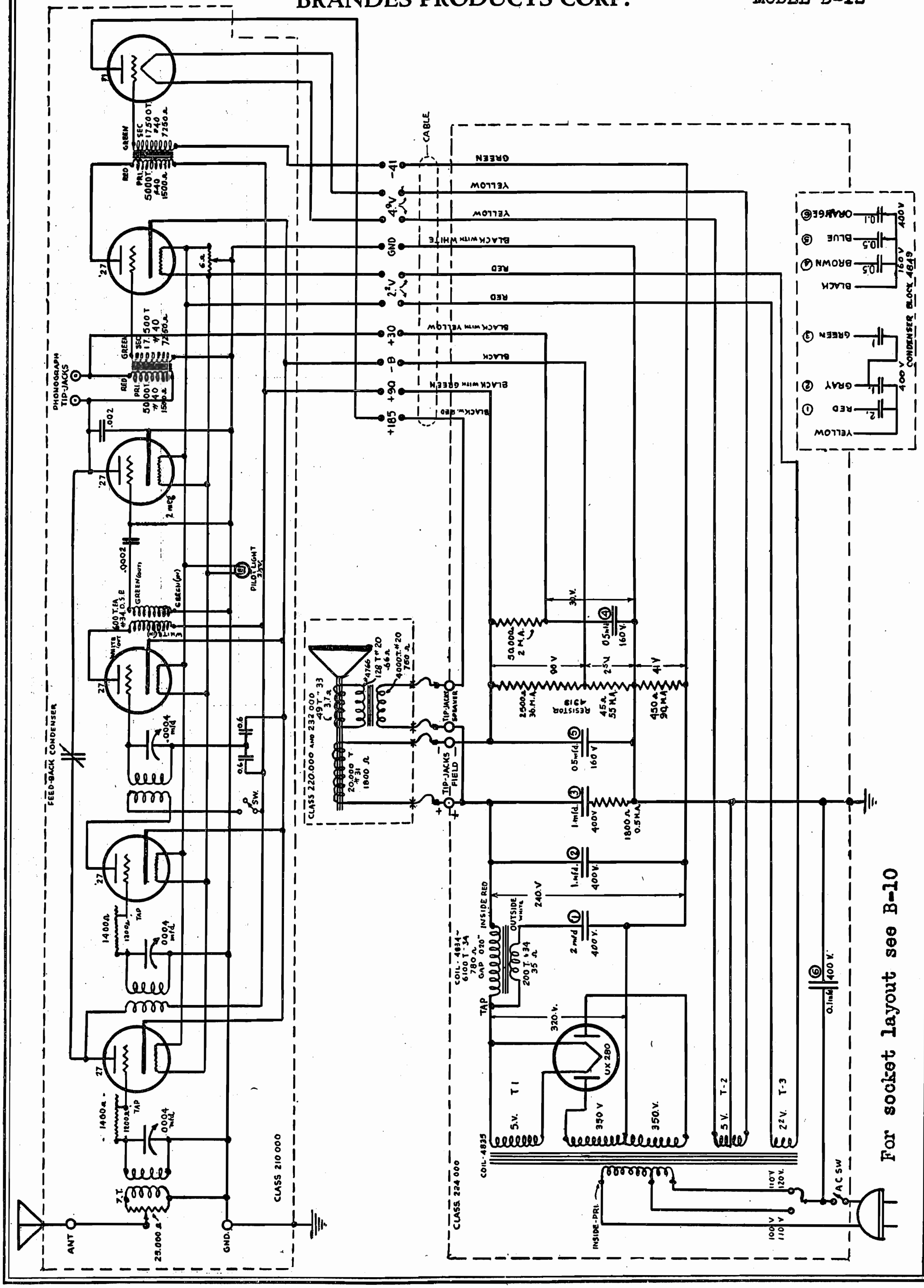
BELMONT RADIO CORP.

MODEL 110
Series

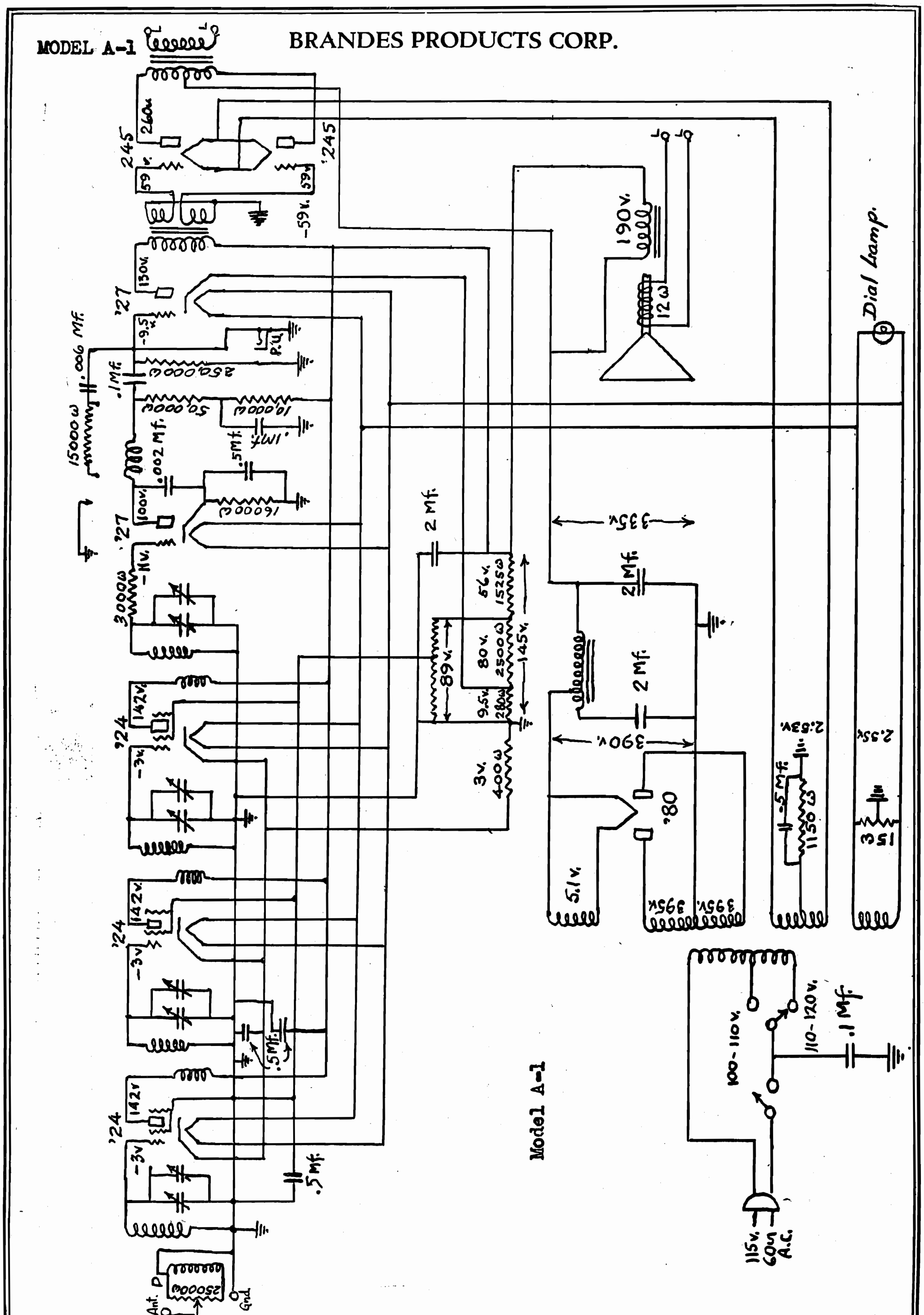


BRANDES PRODUCTS CORP.

MODEL B-11
MODEL B-12

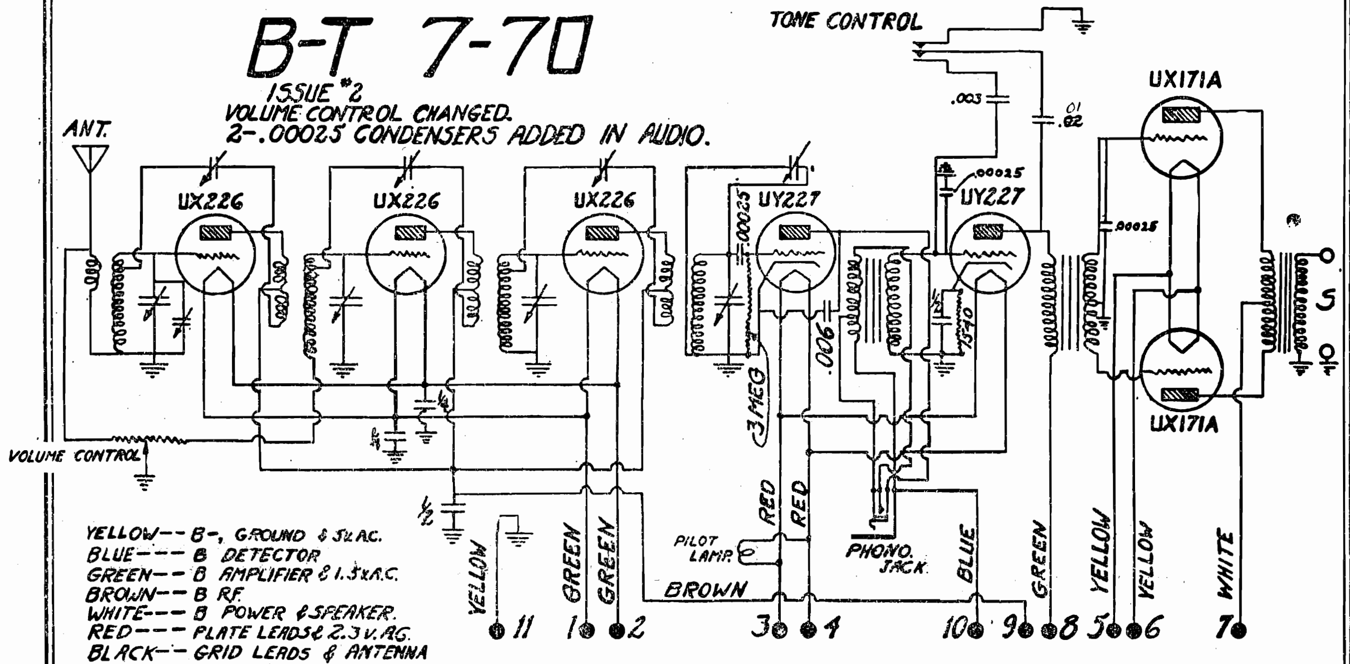


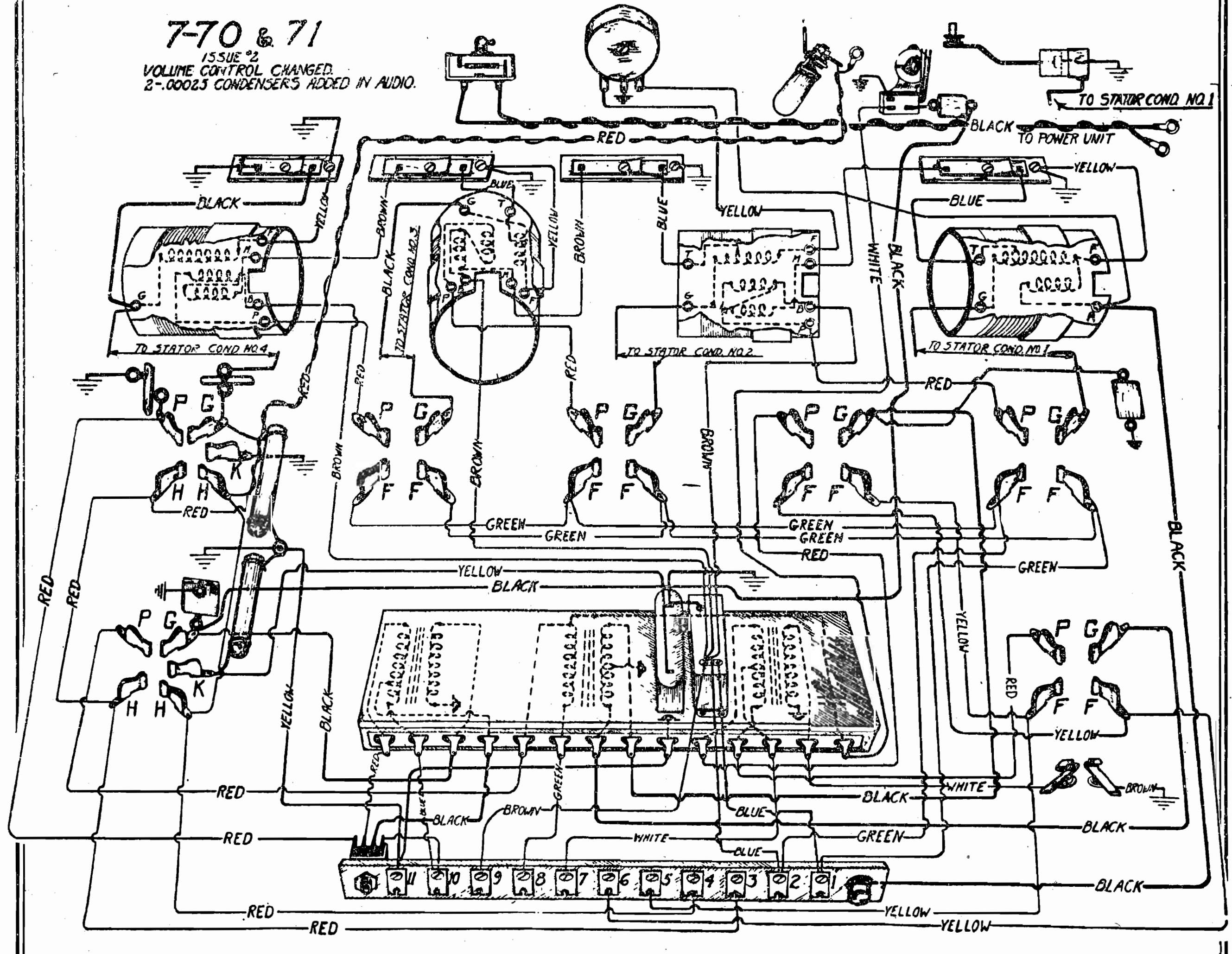
For socket layout see B-10


MODEL A-1
BRANDES PRODUCTS CORP.
245
'245
260v.
59
59v.
-59v.
190v.
12Ω
Dial Lamp.
'27
130v.
-9.5v.
P.U.
.006 Mf.
15000Ω
.1Mf.
250,000Ω
50,000Ω
10,000Ω
.1Mf.
.002 Mf.
.5Mf.
100v.
160000Ω
-11v.
3000Ω
2 Mf.
335v.
2Mf.
2 Mf.
390v.
'80
5.1v.
395v.
395v.
56v.
1525Ω
80v.
2500Ω
145v.
89v.
9.5v.
280Ω
3v.
400Ω
'24
142v.
-3v.
.5Mf.
2.63v.
.5Mf.
1150Ω
2.5v.
15Ω
Model A-1
100-110v.
110-120v.
.1Mf.
115v.
60~
A.C.
Ant.
Gnd.
25000Ω

BREMER-TULLY MFG. CO

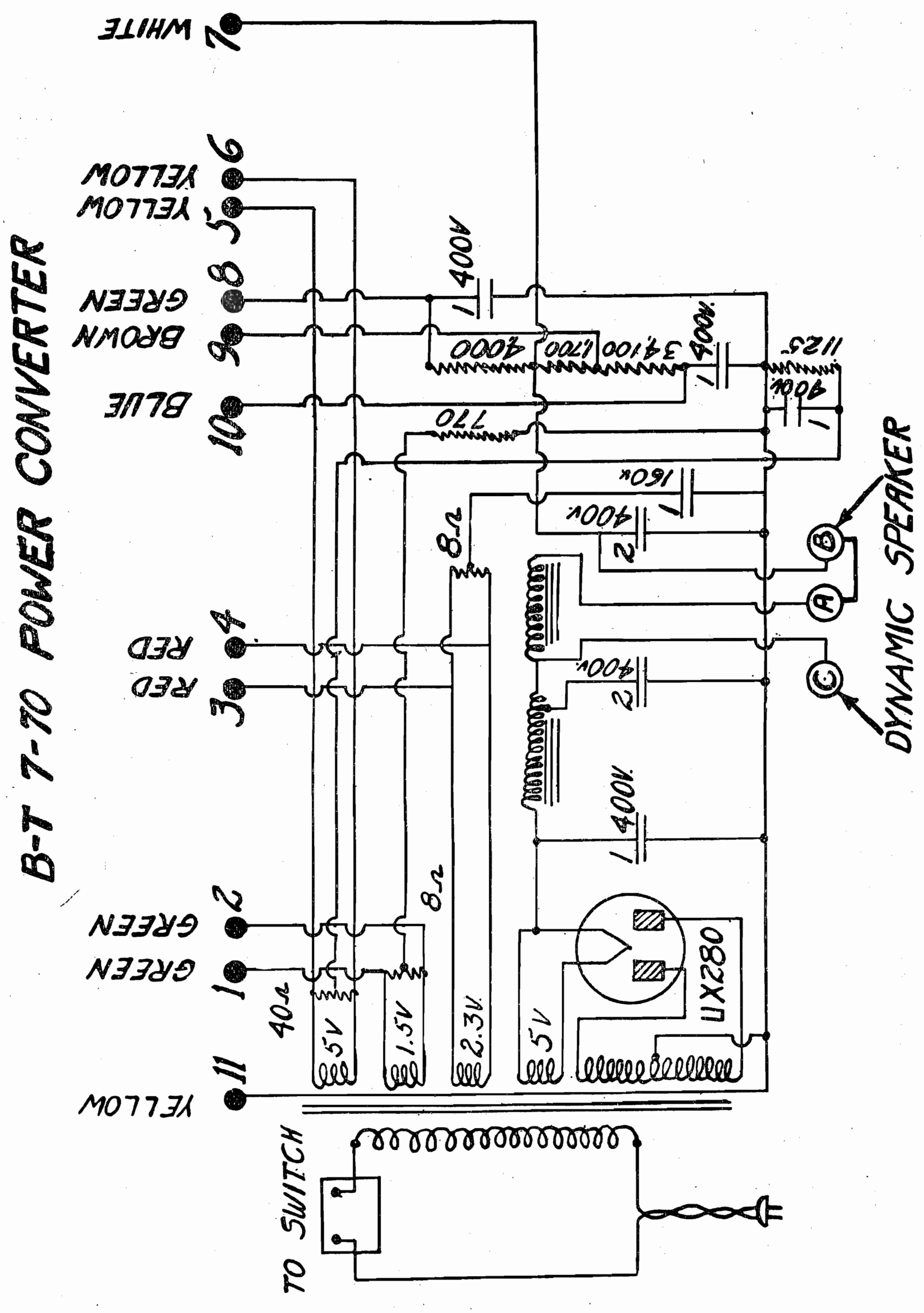
MODEL 7-70
Receiver





MODEL 7-70
Power Converter

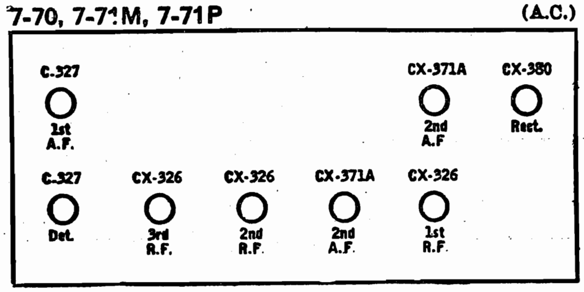
BREMER-TULLY MFG. CO



BREMER-TULLY—Models 7-70 and 7-71
Line Voltage 115

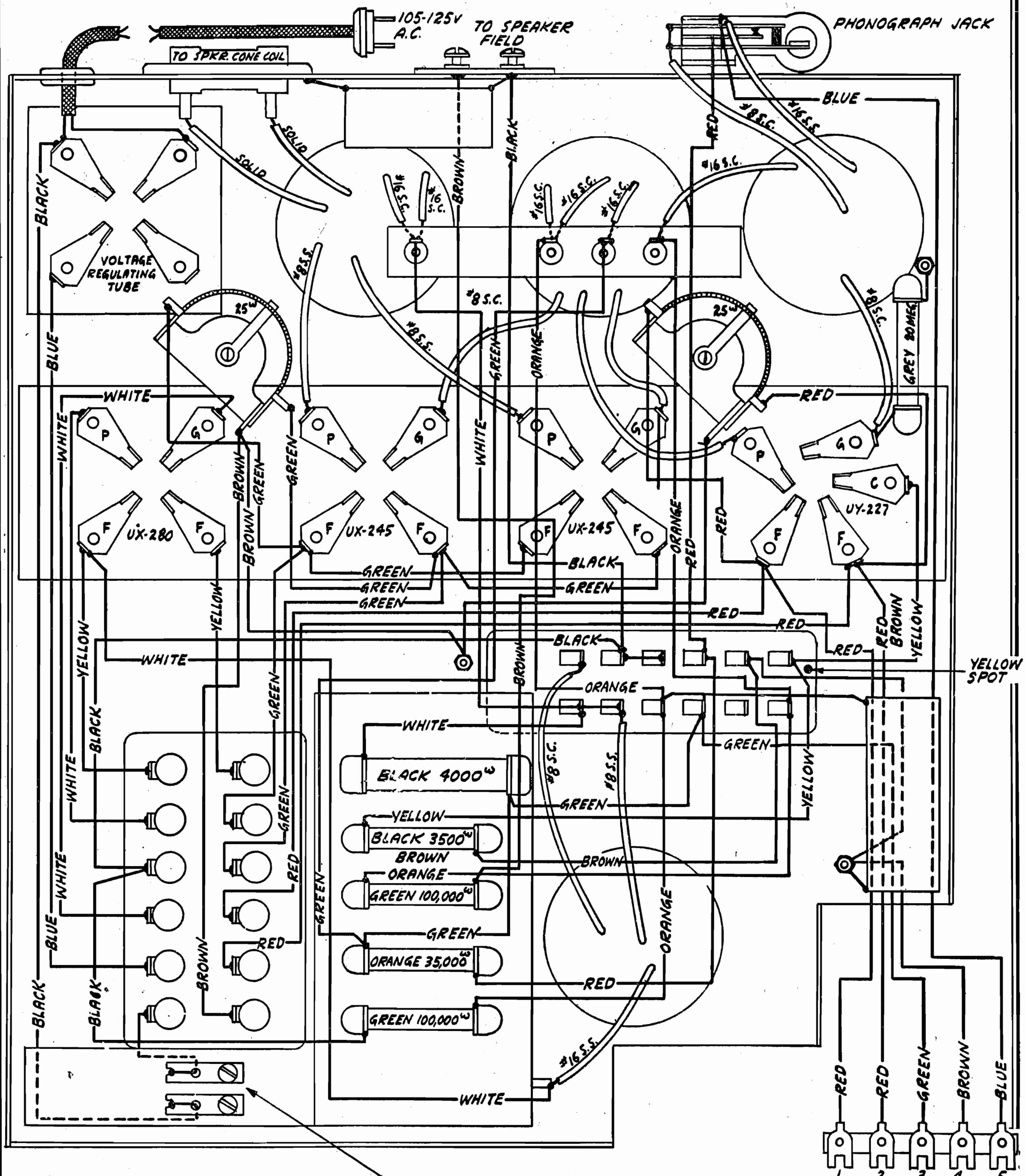
TUBE NO IN ORDER	TYPE OF TUBE	POSITION OF TUBE 1ST RF DET ETC	READINGS, PLUG IN SOCKET OF SET								
			TUBE OUT		TUBE IN TESTER						
			A VOLTS	B VOLTS	A VOLTS	B VOLTS	C VOLTS	CATHODE VOLTS	NORMAL PLATE M.A	PLATE M.A-GRID TEST	PLATE M.A CHANGE
1	226	1st.R.F.			1.4	150	9	—	5	12	7
2	171A	Push-Pull			4.9	130	30	—	18	31	13
3	226	2nd.R.F.			1.4	150	9	—	5	12	7
4	226	3rd.R.F.			1.4	150	9	—	5	12	7
5	227	Detector			2.1	60	0	—	2	-	-
6	227	1st.A.F.			2.1	150	8	—	5	8	3
7	171A	Push-Pull			4.9	150	18	—	18	31	13
8											
9											
10											

7-70, 7-71M, 7-71P **(A.C.)**



BREMER-TULLY MFG. CO

MODEL 81, 82
Power Unit
Chassis

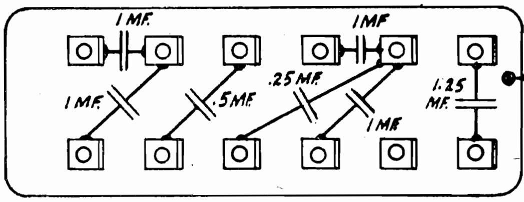


#8 S.C. = #8 STRAND COPPER WIRE
#8 S.S. = #8 STRAND SILVER WIRE
#16 S.C. = #16 STRAND COPPER WIRE
#16 S.S. = #16 STRAND SILVER WIRE

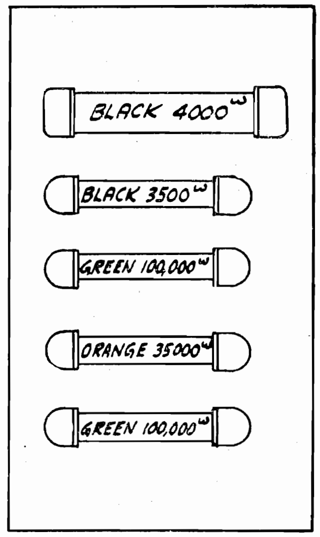
81, 82 AF and Power Unit Chassis

MODEL 81, 82 Data
MODEL "ABC" Power Pack

BREMER-TULLY MFG. CO

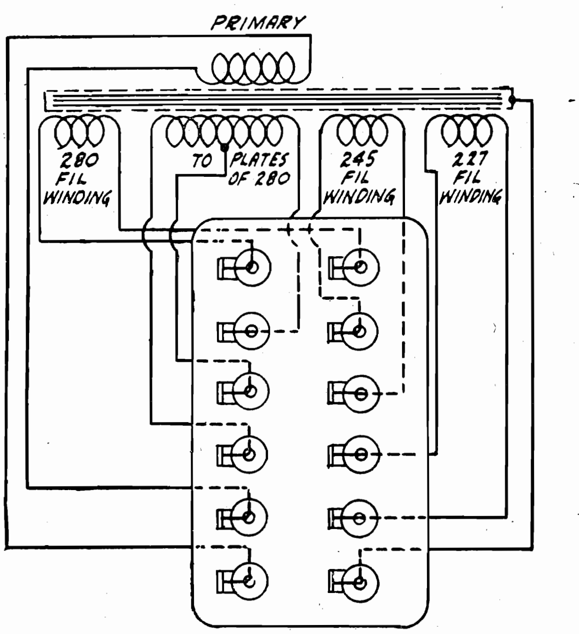


INTERNAL CONNECTIONS OF FILTER AND BY-PASS CONDENSERS

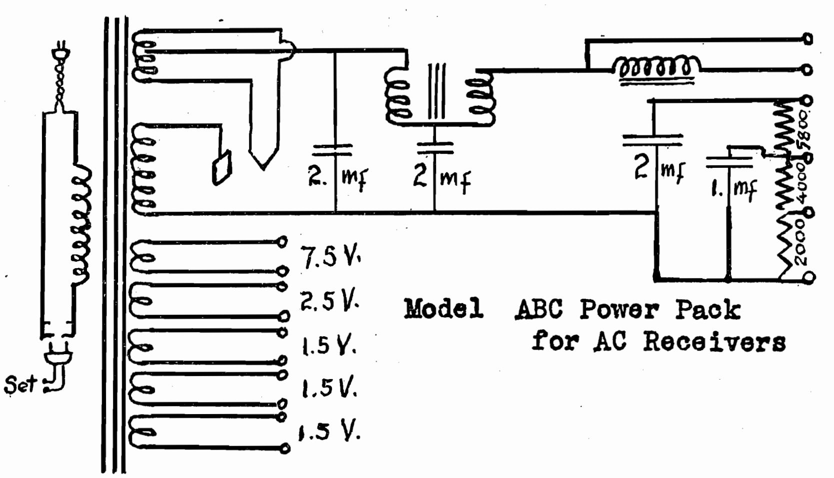


ARRANGEMENT OF RESISTORS ON TERMINAL BOARD

Model 81,82 Data



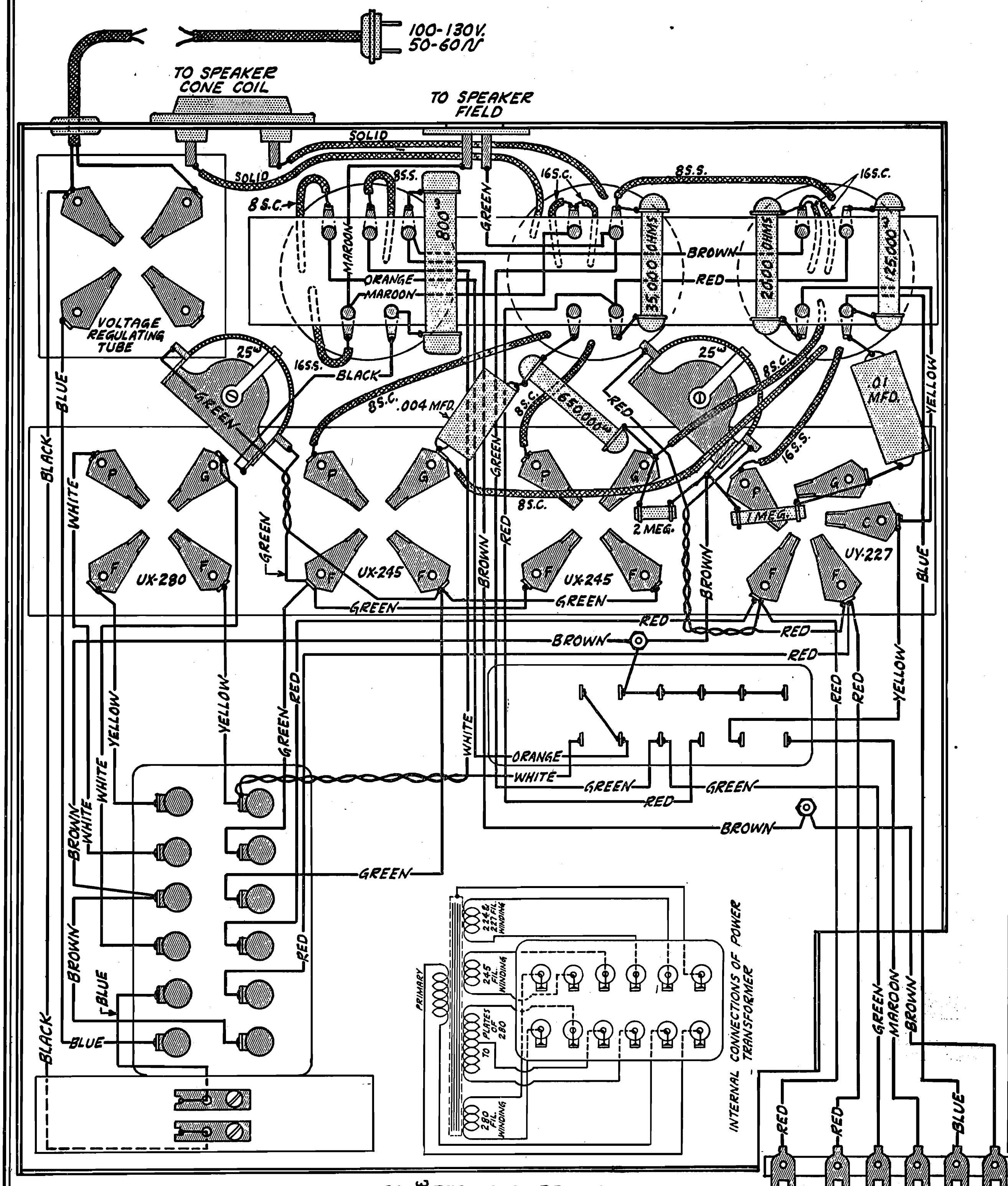
INTERNAL CONNECTIONS OF POWER TRANSFORMER



Model ABC Power Pack for AC Receivers

BREMER-TULLY MFG. CO

MODEL S-81, S-82
60 cy. AF Chassis



#8 S.C. = #8 STRAND COPPER WIRE
8 S.S. = #8 STRAND SILVER WIRE
16 S.C. = #16 STRAND COPPER WIRE
16 S.S. = #16 STRAND SILVER WIRE

800Ω RESISTOR - BROWN
2000Ω RESISTOR - PINK
35,000Ω RESISTOR - ORANGE
125,000Ω RESISTOR - WHITE
650,000Ω RESISTOR - GREEN
1 MEG. RESISTOR - PURPLE

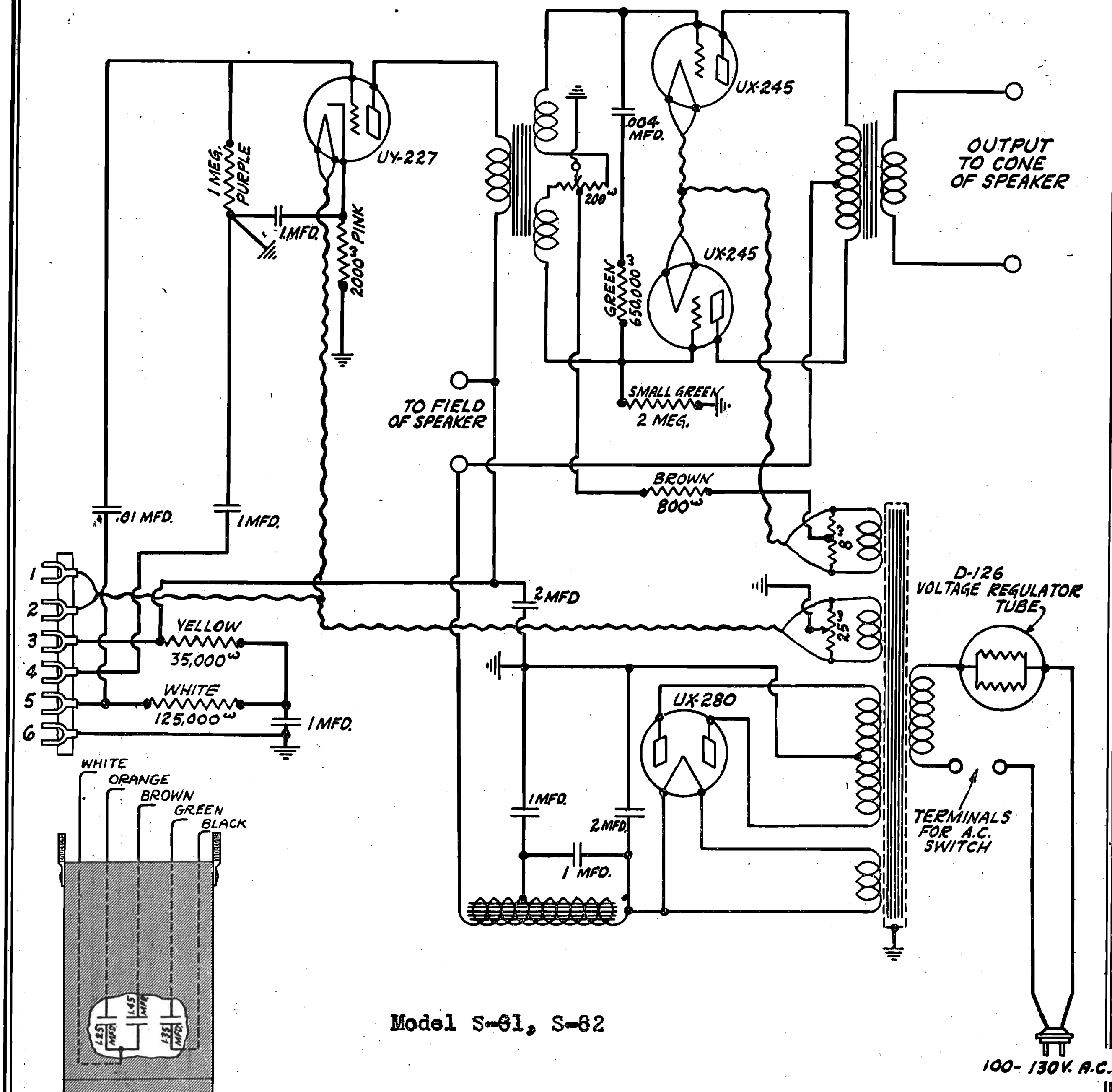
2 MEG. RESISTOR - LIGHT GREEN

7005

ACTUAL WIRING DIAGRAM OF AUDIO AMPLIFIER POWER SUPPLY CHASSIS

MODEL S-81, S-82
25 Cy. Power pack
and AF schematic

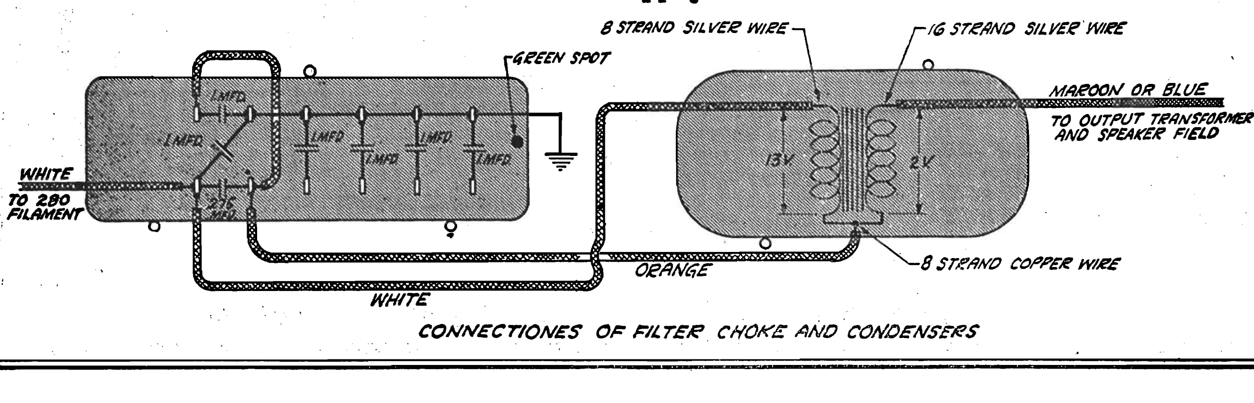
BREMER-TULLY MFG. CO



Model S-81, S-82

CONNECTIONS OF 25 CYCLE ADDED FILTER CONDENSERS

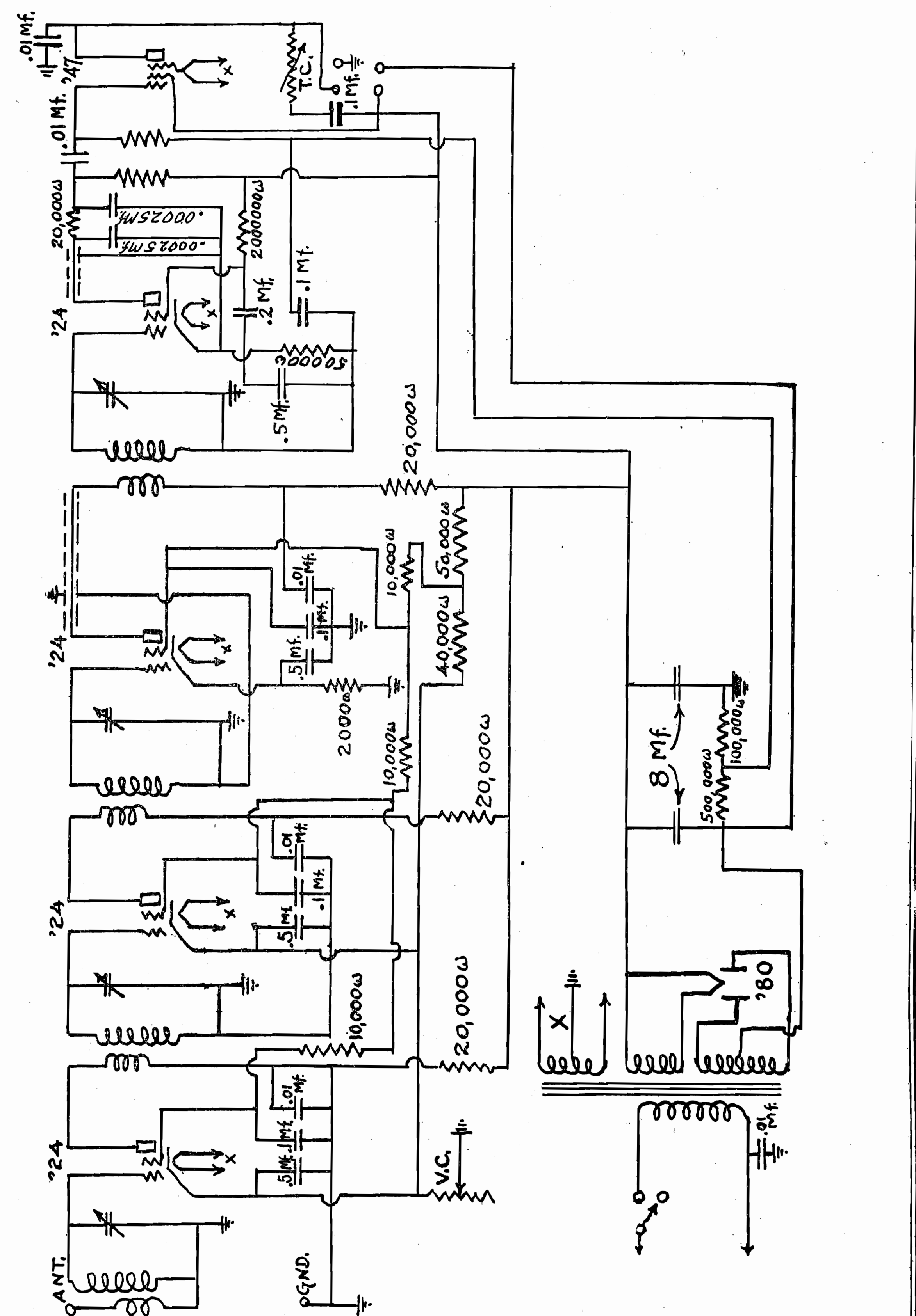
Model S-81, S-82 25 cycle AF and Power Supply schematic



CONNECTIONES OF FILTER CHOKE AND CONDENSERS

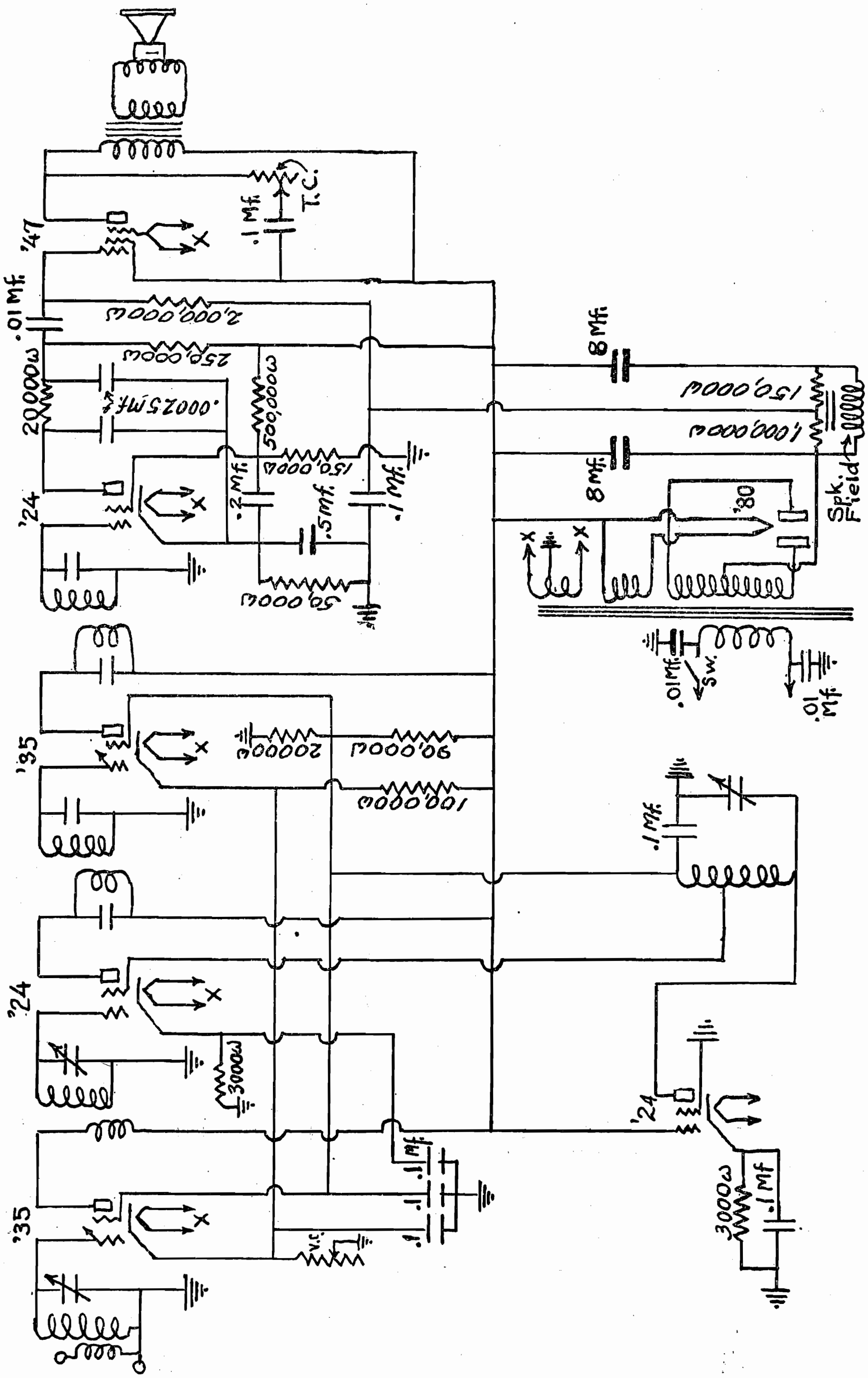
MODEL 20

BROWNING - DRAKE CORP.



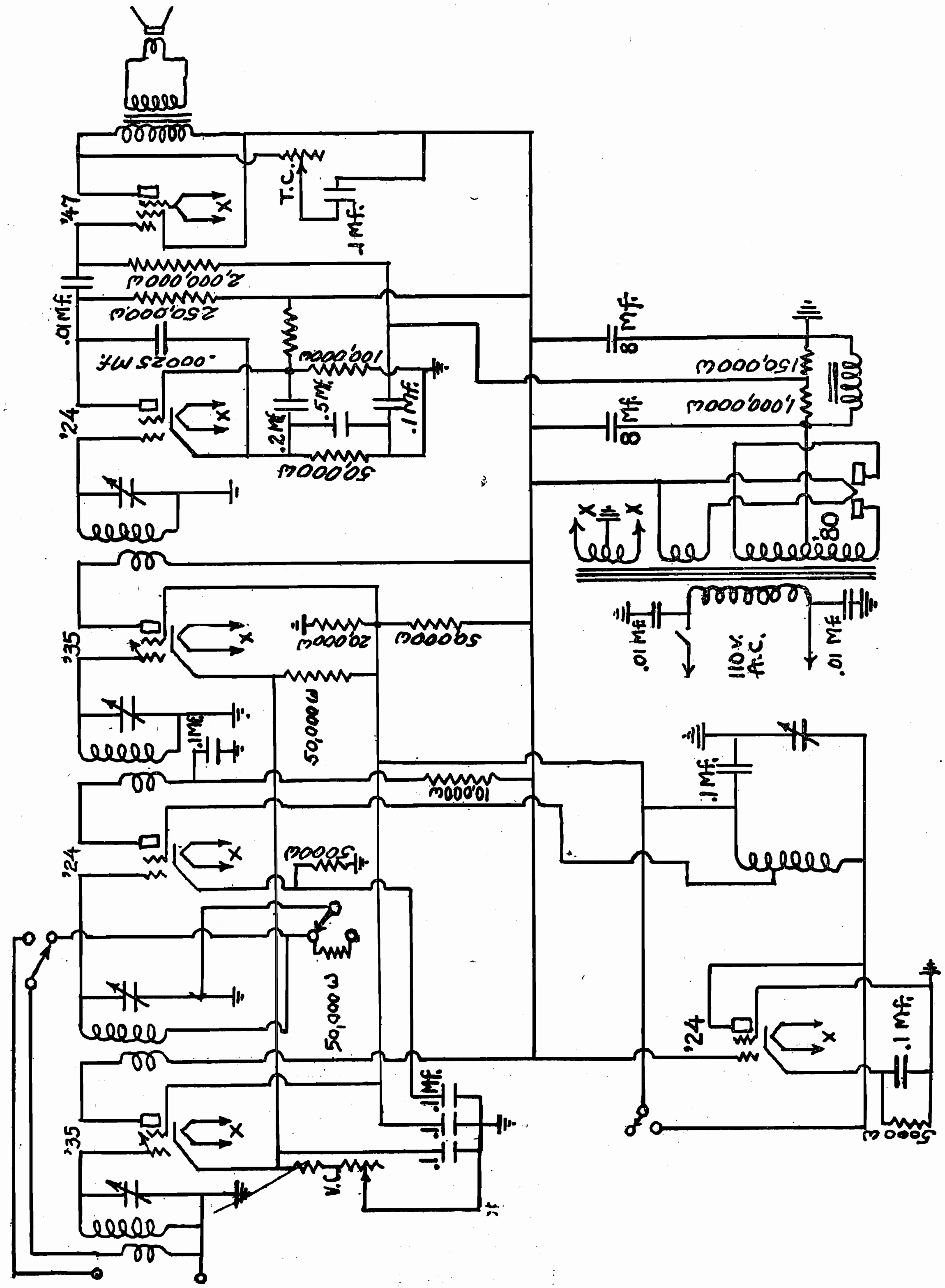
MODEL 40

BROWNING - DRAKE CORP.



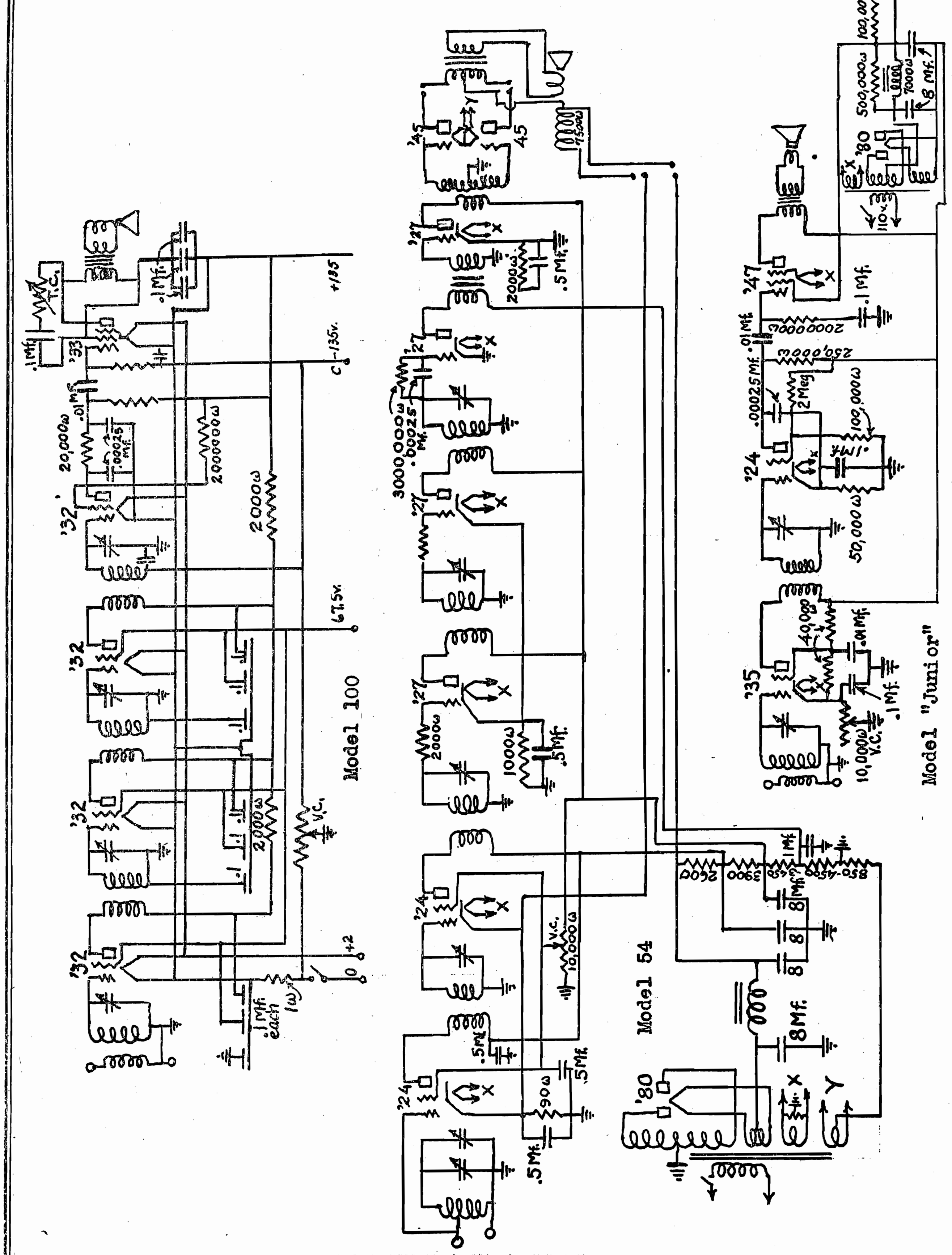
MODEL 80

BROWNING - DRAKE CORP.



MODEL "Junior"
MODEL 54
MODEL 100

BROWNING - DRAKE CORP.



MODEL 3 NC8,5 NC8
Alignment Data

BRUNSWICK RADIO CORP.

Material needed: Non-metallic screw driver, special 180 kilocycle test oscillator, coupling lead and a UY-227 with one filament or heater prong sawed off close to base of tube. **Do not under any circumstances attempt these adjustments without this equipment.**

Proceed as follows:

(a) Remove radio chassis from cabinet and place on box, or table, located convenient to rear of cabinet. Leave all cables connected but if necessary remove tape that holds these cables together

(b) Take tandem tuning condenser from chassis by removing the three retaining screws, nuts and lock washers. Unsolder the four leads by pulling the condensers as far forward as possible to make the rear connections accessible. The condensers may now be removed by tilting the rear end up and pulling clear.

(c) Replace the screw holding the ground connection on under side of chassis and be sure this lead makes good electrical contact with chassis. See Print CA-6039.

(d) Place oscillator near receiver chassis and connect resonance meter in series with plate lead of second detector as explained in paragraph (a) under "Adjustment of Trimming Condensers."

(e) Clip coupling lead from oscillator to grid lead of 1st detector (2nd lead from left of those removed from gang condenser) marked "B" in Print CA-6039, and turn operating switch on. Turn the oscillator on, adjusted for 180 kilocycles, and signal from oscillator should be heard in speaker.

(f) With non-metallic screw driver adjust the third, second and first I. F. tuning condenser adjustment screws in order mentioned (tuning condensers on those nearest front of chassis, see Print CA-6039), for maximum volume in speaker and maximum deflection of milliammeter.

If meter needle goes off scale, reduce volume with volume control. After setting adjustment screws once for maximum milliammeter reading, carefully go over them a second time to be sure they are all exactly tuned for maximum amplification at 180 kilocycles. No signal or a loud howl indicates that the neutralizing condensers are off and should be adjusted before the final tuning operation.

C. Part II—Neutralization of I. F. Transformer.

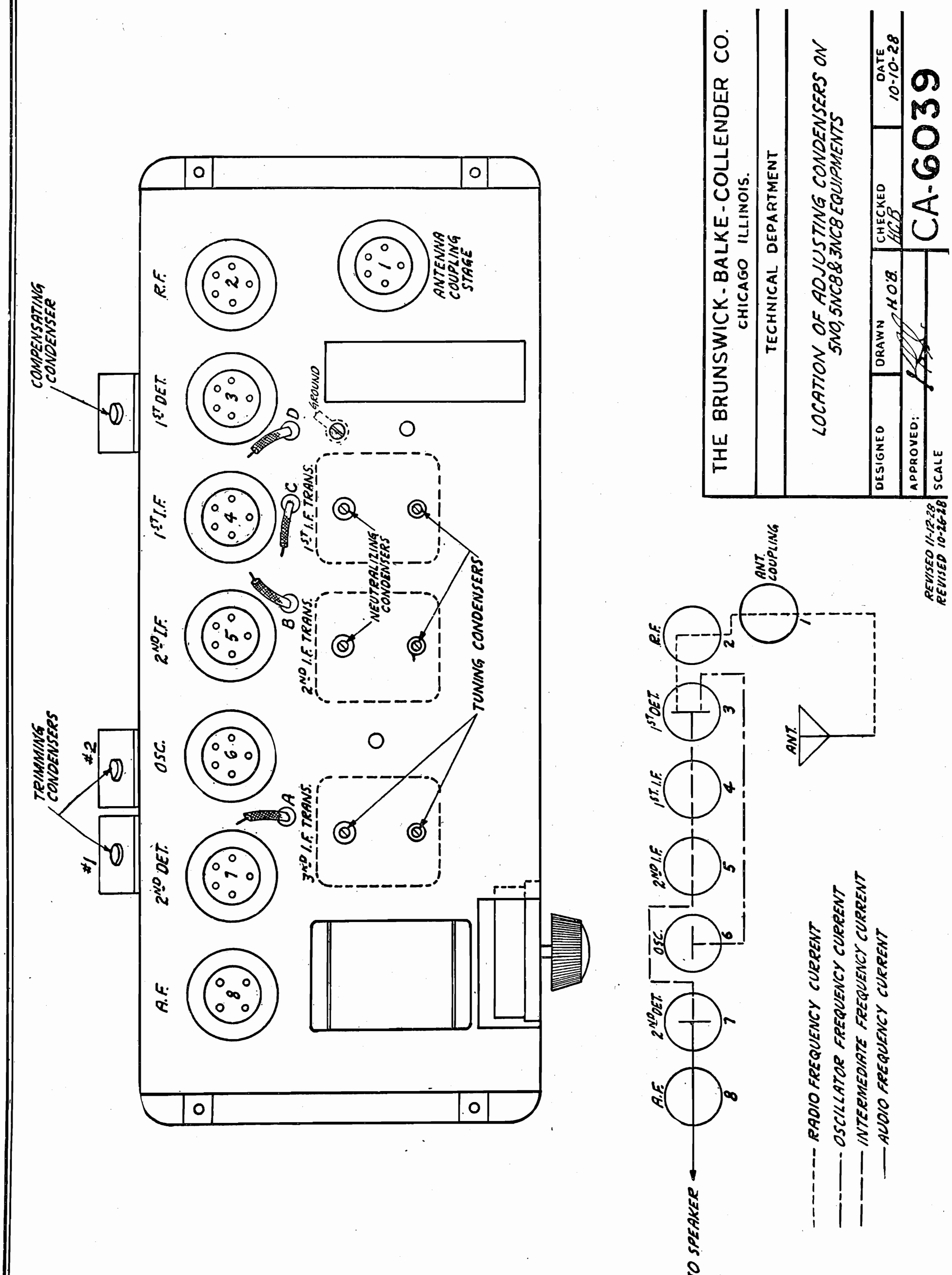
(a) With apparatus set up as before, substitute special UY-227 tube with amputated heater prong in first I. F. socket (fifth tube from left side). Adjust set screw toward the rear of the right hand transformer for minimum meter deflection and minimum sound in speaker.

(b) Inter-change special UY-227 tube in first I. F. stage with the regular tube in the second I. F. stage (fourth tube from left side) and adjust set screw toward rear of middle transformer for minimum meter reading and minimum sound in phones. The left transformer is not neutralized, the two condensers in this unit are in parallel and are both used for tuning.

After tuning and neutralizing the I. F. amplifier, it is best to check the adjustment of the oscillator trimming condensers as mentioned before in this Bulletin.

MODEL 5 NO, 5 NC8,
3 NC8
Trimmer Locations

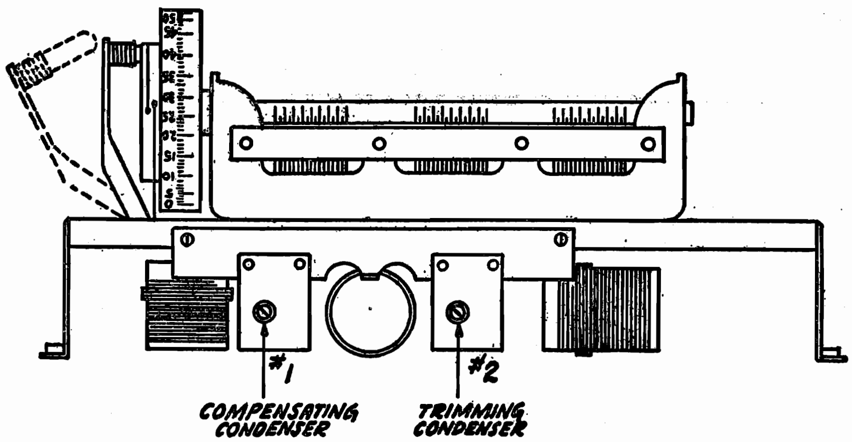
BRUNSWICK RADIO CORP.



MODEL R-1
Voltage and Data

BRUNSWICK RADIO CORPORATION

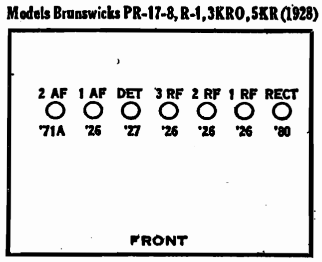
Socket	Tube Type	Fil.	Grid	Plate	Current Plate
1st R.F.	UX-226	1.5	— 9	130	4.5
2nd R.F.	UX-226	1.5	— 9	130	4.5
3rd R.F.	UX-226	1.5	— 9	130	4.5
Detector	UY-227	2.5	0	30	2.0
1st Audio	UX-226	1.5	— 9	130	4.5
2nd Audio	UX-171-A	5.0	—30	135	17.0



Adjustment for Low Line Voltages. The R-1 is normally adjusted for line voltages between 115 and 120 volts and should not be changed unless it has been definitely ascertained that the line voltage is less than 115 volts and then only when the volume is insufficient to satisfy the customer.

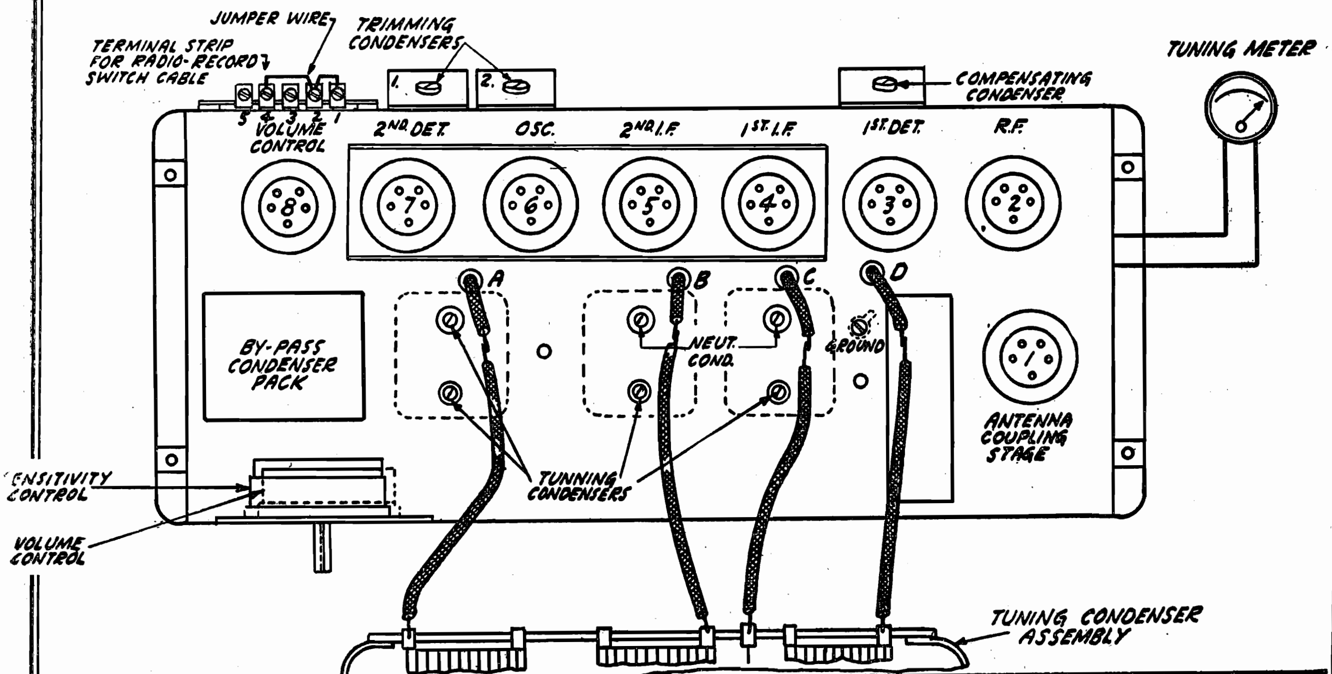
To change the taps used on the power transformer untape and unsolder the **black with red tracer** lead at its junction with the power cable about three inches from the SPU. Connect the **red and black** lead to the power cable lead, solder and tape. Tape up the unused **black with red tracer** lead.

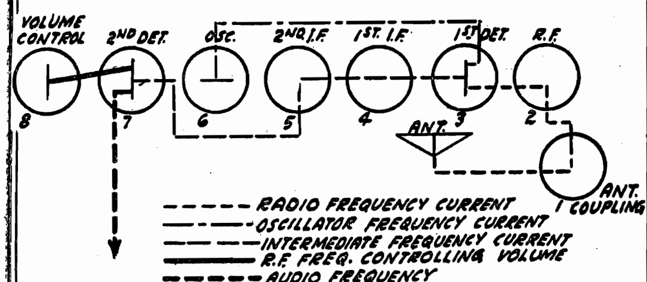
Models Brunswicks PR-17-8, R-1, 3KRO, 5KR (1928)



MODEL 3 NW 8
Trimmers and Notes

BRUNSWICK RADIO CORPORATION

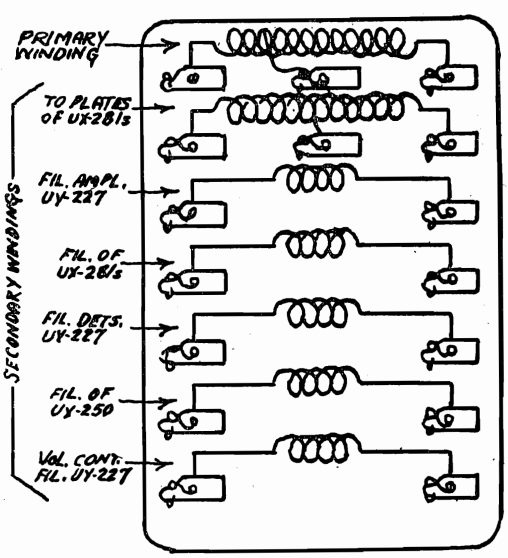




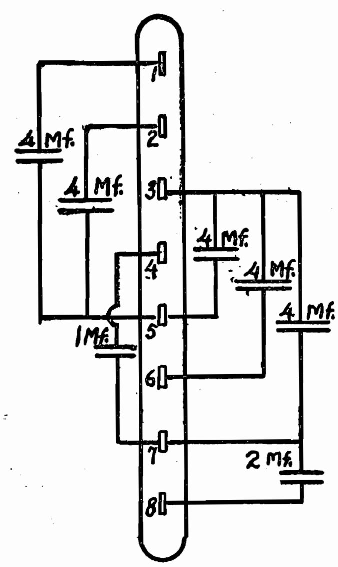
THE BRUNSWICK-BALKE-COLLENDER CO.
CHICAGO, ILLINOIS.
TECHNICAL DIVISION

① VOLTAGE DIVIDER CIRCUIT
② LOCATION OF ADJUSTMENT CONDENSERS
③ TUBE SEQUENCE AND FUNCTION

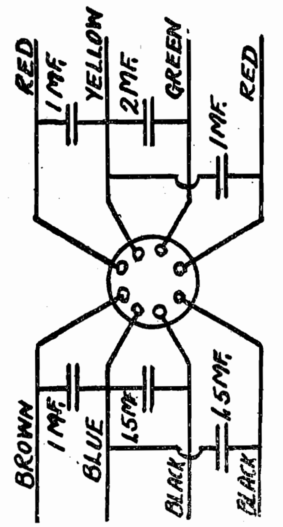
DESIGNED	DRAWN	CHECKED	DATE
	H.O.B.	G.C.C. PMC	1-18-29
APPROVED KRS.		CA-6057	



INTERNAL CONNECTIONS OF POWER TRANSFORMER



INTERNAL CONNECTIONS OF FILTER CONDENSERS



INTERNAL CONNECTIONS OF BY-PASS CONDENSERS IN RECEIVER

MODEL 3 NW 8
Voltage and Notes

BRUNSWICK RADIO CORPORATION

-VOLTAGE AND CONTINUITY TESTS

Voltage Test on Chassis, X-1104—With set in normal operating condition, Volume Control on maximum, Radio-Record Switch on "Radio" and all tubes known to be good.

Socket	Tube Type	Fil.	Grid	Cathode	Plate	Plate Current
1st R.F.	UY-227	2.25	6	17	135	4
2nd R.F.	UY-227	2.25	6	17	135	4
1st Det.	UY-227	2.25	11	16	80	1
1st I.F.	UY-227	2.25	6	17	135	5
2nd I.F.	UY-227	2.25	6	17	135	5
Osc.	UY-227	2.25	0	17	80	6
2nd Det.	UY-227	2.25	22	15	180	1
2nd Det.*	UY-227	2.25	22	5	140	5
Vol. Cont.	UY-227	2.25	5	0	90	None
Pilot	T-3, 6 V. @ O. 15A	5.				
Power	UX-250	7.25	60	None	400	50

*Note: This reading applies when Radio-Record Switch is in "Record" position.

Voltage Test on SPU, X-902, Terminal Strip

FROM	TO	VOLTAGE	CURRENT
Bias	Detector Cathode	10	Direct
Bias	Amplifier Plate	12	Direct
Bias	Amplifier Cathode	150	Direct
Pilot	Pilot	4	Alternating
Filament	Amplifier	2.5	Alternating
Filament	Detector	2.5	Alternating
Filament	Volume Control	2.5	Alternating

Note: The voltages given in the above tests are not necessarily the true voltages but are rather the readings obtained on a standard set checker.

The Tuning Meter is a necessity in securing the maximum in tone quality from this instrument. With the automatic volume control set for the pre-determined volume all signals are amplified to or cut down to the desired volume and it is difficult to tell the exact point of resonance on the tuning dial. For this reason the meter instead of the ear should be used as a guide for true resonance. The tuning meter is in reality a milliammeter inserted in the plate circuits of the radio frequency and intermediate frequency amplifier tubes. Until the current is turned on the tuning meter will register at its maximum position. This is because the meter has a reversed movement and will automatically assume a 0 position when the maximum plate current is flowing through it. The action of the incoming signal is to reduce the current and the needle will move towards 10. This meter is also of considerable advantage to the Technician in adjusting the 3NW8 intermediate tuning and neutralizing condensers.

MODEL 3 NW 8
Service Notes

BRUNSWICK RADIO CORPORATION

-SERVICE ADJUSTMENTS

The Line Voltage Switch should be adjusted at the time of installation. This switch is normally placed in the 120 volt position and should be left there at all times unless the Technician has measured the line voltage and finds it to be constantly below 115 volts and that the volume on the 120 volt position is insufficient to satisfy the customer. If such is the case, this voltage switch located between the two UX-281 rectifier tubes on the SPU should be thrown over into the opposite position marked 110 volts.

The Hum Minimizing Potentiometer located on the SPU between the UX-250 power amplifier tubes and the field plug should be adjusted with a screw driver at the time of installation for minimum hum. If this adjustment makes a noise in the loud speaker due to corrosion on the potentiometer winding, the slotted shaft should be worked vigorously back and forth. Allow a period of two minutes before this adjustment is made to be sure that all tubes are operating at the correct temperature.

The Compensating Condenser located on the left hand side of the radio chassis facing the instrument from the rear should be adjusted if the set shows any tendency toward oscillation. This is adjusted at 1400 kilocycles with a non-metallic screw driver in the following manner:

Tune in the 1400 kilocycle signal to maximum intensity with the volume control in maximum position. Turn compensating screw to the right until instrument oscillates in a pronounced manner, then reverse the direction of rotation until this oscillation ceases. Tune in a 550 kilocycle signal and repeat adjustment as above.

The Trimming Condensers should not be adjusted unless the Technician is sure that all other portions of the circuit are correct, that all tubes are good and that the line voltage switch and compensating condenser are in the correct positions. If the instrument appears normal in every way but is insensitive on any or all portions of the tuning drum, it is fairly safe to assume that the trimming condensers are out of adjustment.

The adjustment of these condensers requires a modulated oscillator capable of oscillating from 550 to 1400 kilocycles. If such an oscillator is available, locate it two or three feet from the 3NW8 and adjust it to oscillate at 1400 kilocycles. Tune this radiated signal in on the 3NW8 to its point of maximum intensity, as registered on the tuning meter. Then with non-metallic screw driver adjust trimming condenser No. 1 as shown on Print CA-6057 for the maximum deflection of the tuning meter. The peak is fairly sharp at this frequency and care should be taken to get the condenser adjustment accurate. Now re-adjust the modulated oscillator to oscillate at 550 kilocycles and adjust trimmer condenser No. 2 for maximum meter reading. The adjustment will be found much broader and to get a definite peak indication it will be necessary to set the oscillator some distance from the set and retard the sensitivity control.

After these adjustments have been made once it will be necessary to go over them a second time at least, and if they are far out of adjustment a third re-adjustment is advisable.

The Intermediate Transformer Tuning Condenser Adjustment Screws are located beneath the tandem tuning condenser assembly. These adjustments are provided to peak the transformers of the intermediate amplifier, should the intermediate transformers lose their adjustment during shipment. An untuned intermediate transformer is characterized by low volume, distortion and the inability of the receiver to pick up distant signals. If adjustment

BRUNSWICK RADIO CORPORATION

MODEL 3 NW 8
Service Notes

has been made of the oscillator trimming condenser and R. F. compensating condenser, and if the antenna, ground and tubes are known to be in good condition, insensitivity and distortion on the part of the receiver indicates that an adjustment of the transformer tuning condensers is necessary. They should be adjusted in the following manner:

1. Remove chassis from cabinet by taking out the four machine screws, removing volume control, sensitivity control and tuning control knobs and unscrewing the two wood screws that hold tuning meter to front panel of cabinet. The control knobs are of the "push-on" type and can be removed by pulling straight out. The chassis with power cable attached, but with radio-record switch cable detached, should be placed on a small table located conveniently at the rear of the cabinet so that the instrument may be operated connected to the socket power unit. As indicated in Print CA-6057, it will be necessary to connect small jumper wires between terminals 1, 2 and 4 on the radio-record switch terminal strip.

2. Remove the tandem tuning condenser assembly by unscrewing the three machine screws bolting it to the chassis, and unsoldering four connection made to the rear of the condensers. Place tuning condenser assembly in a convenient position for operation in front of the receiver chassis, as shown in Print CA-6057. It will facilitate the tuning of these condensers if they are set on a tube carton or similar sized box. The machine screw holding the grounded lug should be replaced in the chassis. This is indicated on Print CA-6057 by the screw head marked "ground." Small jumper leads should be soldered between the condenser assembly and the former condenser connections. These should be approximately four inches long and are shown on Print CA-6057.

   With all tubes in their proper sockets and known to be in good condition the set may now be operated in the usual manner and at the same time the tuning and neutralizing condensers are available for adjustment.

   The oscillator referred to in the previous paragraph under the caption "Trimming Condensers" may be used to adjust the tuning and neutralizing condensers of the intermediate transformers. This oscillator should be modified in such a way that it will transmit an unmodulated wave. Assuming the oscillator described on Page 6 of Service Bulletin No. 63 is used, this may be changed from a modulated to an unmodulated oscillator by replacing the 3-8 megohm grid leak with a grid leak of about 40,000 ohms.

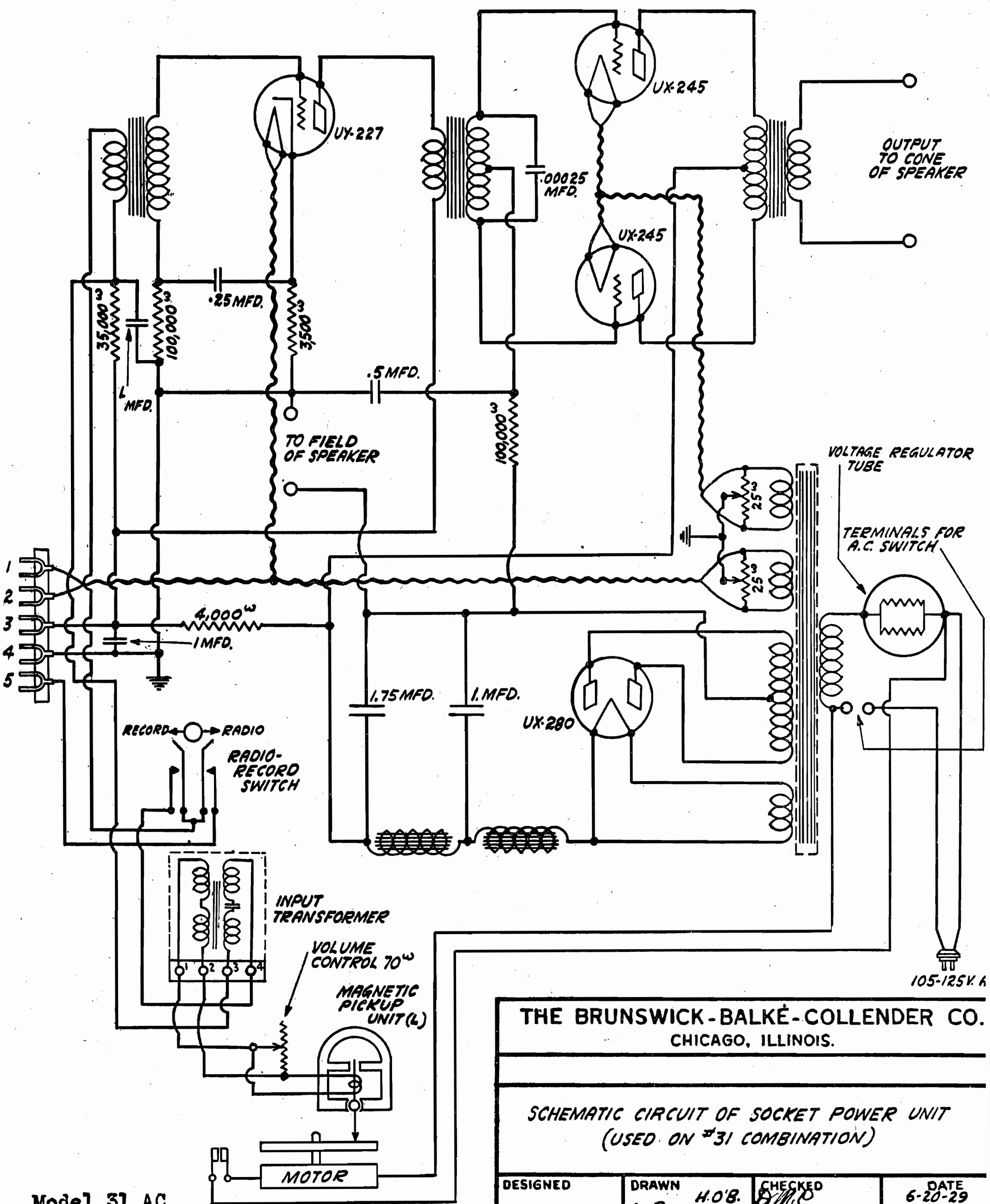
   The oscillator should be placed in operation at 750 kilocycles several feet from the receiver to be adjusted; and the receiver should be tuned accurately to the oscillator frequency. The volume and sensitivity controls should be so adjusted that the tuning meter will register three quarters of full scale deflection. With a non-metallic screw driver the tuning condensers may now be adjusted for maximum deflection on the tuning meter. A very sharp and well defined peak will be found by this method and the tuning meter may be kept on scale by reducing the volume control. The transformers should be adjusted, starting with No. 3, then No. 2 and No. 1 last.

After these transformers have been properly peaked once, using the above method, they should be neutralized and then repeaked a second time.

The Intermediate Transformer Neutralizing Adjustments are made with the apparatus set up in the same manner as described above.

MODEL 31 AC
SPU Schematic

BRUNSWICK RADIO CORPORATION



THE BRUNSWICK-BALKE-COLLENDER CO.
CHICAGO, ILLINOIS.

SCHEMATIC CIRCUIT OF SOCKET POWER UNIT
(USED ON #31 COMBINATION)

DESIGNED	DRAWN H.O'B.	CHECKED B.M.C	DATE 6-20-29
APPROVED KRS		CA-6074	

Model 31 AC
SPU Schematic

BRUNSWICK RADIO CORPORATION

MODEL 14,21,31, 81,82 AC
Service Notes

Adjustment of Neutralizing Condensers

To neutralize the R.F. amplifier proceed as follows:

1. Adjust a modulated oscillator for operation at 1400 kilocycles and couple it to the long antenna post of the receiver with a five-foot wire, one end of which should be wrapped two or three times about the oscillator coil.

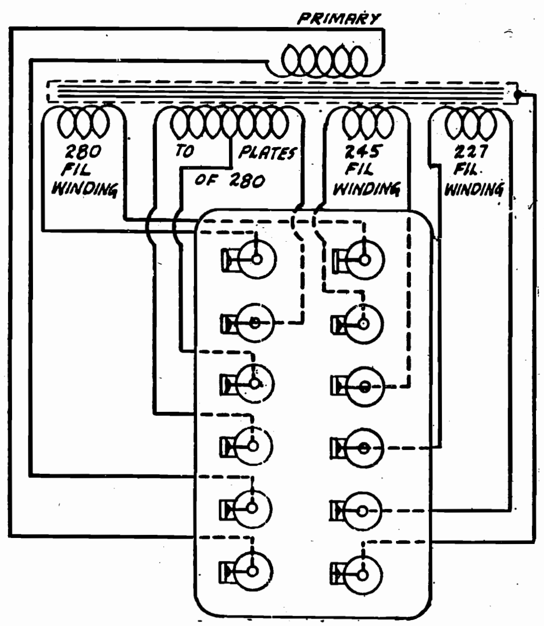
2. Tune the oscillator signal in on the radio to maximum volume using both the tandem condenser control and the antenna compensator control.

3. Allow the receiver and oscillator to operate for about a minute in order that the tubes may become thoroughly warmed up and stable. Then replace the first R.F. tube with a good tube of average characteristics (one that will not cause a set that has previously been neutralized to oscillate) with one of the heater prongs cut off. It is very important that the tube from which the heater prong has been removed be of the same make and type as it is desired to use in the R.F. amplifier—do not neutralize with one make of tube and then use a different make for an amplifier. To do so may cause the receiver to oscillate stronger than it did in the beginning.

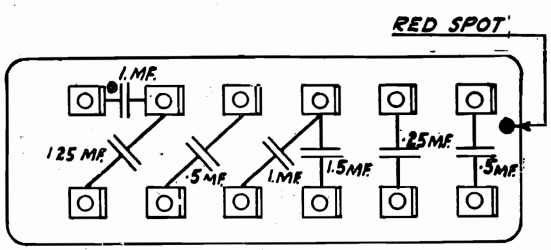
4. Adjust the first R.F. neutralizing condenser for minimum signal. The neutralizing condensers will be found located between the coil and tube sockets of the stage they neutralize. Because of the great amplification secured, a node or dead spot will not be found.

5. Remove the dummy tube and insert in its place a good tube. Place the dummy tube in the second R.F. socket and after allowing one minute for the first R.F. tube to become thoroughly heated, neutralize the second stage as explained.

   In the event any trouble is experienced in neutralizing this receiver, a thorough check should be made of the receiver voltages and the by-pass condensers. An open by-pass condenser may allow sufficient radio frequency energy to feed back from one stage to another to make neutralizing impossible. If voltages are tested and found O.K. and the by-pass condensers are all good a different dummy tube should be used.



INTERNAL CONNECTIONS OF POWER TRANSFORMER

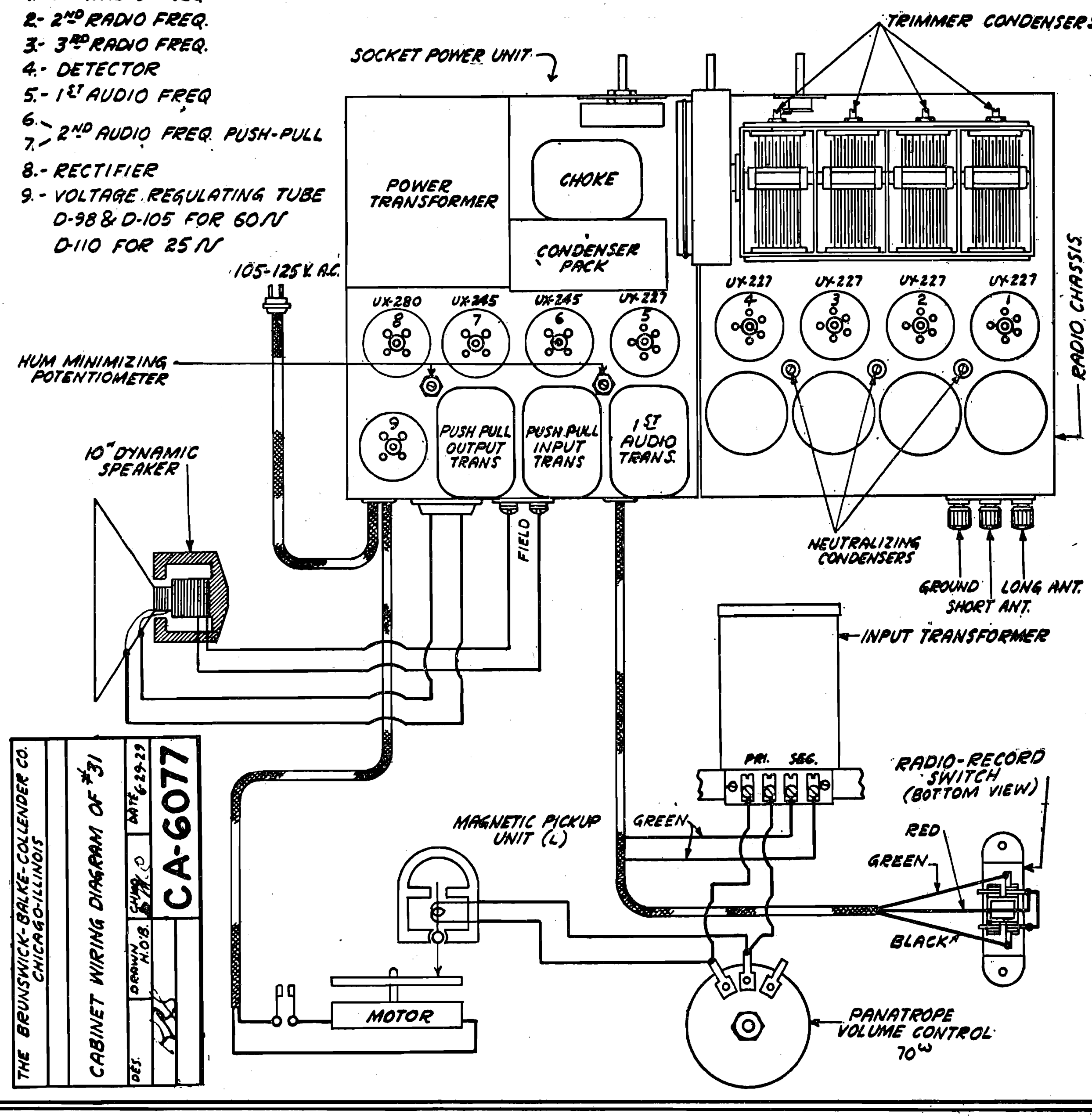


INTERNAL CONNECTIONS OF FILTER AND BY-PASS CONDENSERS

MODEL 14, 21, 31, 81 and 82 AC Socket and Notes

BRUNSWICK RADIO CORPORATION

1.- 1ST RADIO FREQ.
2.- 2ND RADIO FREQ.
3.- 3RD RADIO FREQ.
4.- DETECTOR
5.- 1ST AUDIO FREQ
6., 7.- 2ND AUDIO FREQ. PUSH-PULL
8.- RECTIFIER
9.- VOLTAGE REGULATING TUBE D-98 & D-105 FOR 60~ D-110 FOR 25~



Adjustment for Minimizing Hum—In order that the receiver may be adjusted for quiet operation on any A.C. line, two hum minimizing potentiometers have been placed on the SPU chassis connected across the UY-227 filament winding and the UX-245 filament winding respectively. The UY-227 hum minimizing potentiometer is located between the UY-227 socket and the first UX-245 socket. The adjustment of this control should be made after the UX-245 hum minimizing potentiometer has been adjusted. If the UY-227 hum minimizing potentiometer appears irresponsive, a new tube should be inserted in the first audio and detector sockets.

An excessive hum which usually appears on a strong local or nearby station and which can not be balanced out with the hum minimizing potentiometers may be due to one or more of the R.F. stages oscillating, in which case the receiver should be neutralized before the hum minimizing potentiometers are adjusted.

MODELS 14, 21 and COMBINATION MODEL 31 with PANATROPE

MODEL S-14, S-21,
S-31, S-81, S-82
Service Notes

BRUNSWICK RADIO CORP.

MODELS S-14, S-21 and COMBINATION MODEL S-31 with PANATROPE

The Panatrope Combination Model S-31

The Input Transformer, between the pickup and amplifier, has a very high turn ratio (75 to 1) and is mounted at an angle found to give the least amount of hum.

Adjusting Trimmers on Condenser Gang To make this adjustment tune in a weak station as near the 1500 kilocycle end of dial as possible, and with lock nuts loose, adjust the four screws to give the loudest signal. With this adjustment completed, the lock nuts should be tightened. One factor to observe when making this operation is not to continually increase the capacity of the trimming condensers, as the high frequency tuning limit of the set will be lowered.

External Pickup Operation

In the event it is desired to use the Models S-14 and S-21 to amplify and reproduce phonographic music, any good pickup may be connected to an ordinary telephone plug and inserted in the radio jack located in the rear of the socket power unit. Phonograph volume may be controlled by the volume control usually furnished with such equipment. It is important to remember, if this magnetic pickup is used, that the radio cannot be operated until the plug is removed.

The Voltage Regulator Tube

While ballast D-110 is normally intended for use in these models, there are special conditions encountered where the line voltage is extremely high. When this is the case, it is advisable to use a D-105 tube, which will effect a reduction in the voltages applied to the different tubes, preventing short life due to over-voltage.

In the 25 Cycle Model an additional filter condenser is used; also the power transformer and filter choke deviate from the 60-cycle standard.

There are two hum minimizing potentiometers on the socket power unit chassis.

Hum will result in the Model S-31 if the grounding wires on the induction disc motor and suspension arm are removed. Examine these to see that they are in place. It is possible in some cases where hum is experienced in the record side to make a slight reduction by unclamping the pickup input transformer and reclamping it in the angle found to give less hum. This angle is determined with the set turned on and the switch turned toward the record position by noting the amount of hum when the transformer is held at various positions.

If the hum is heard only when the station is tuned in, it is probably caused by some peculiar condition existing in the lighting lines, and can usually be eliminated by grounding the ballast tube side of line through a .25 mfd. condenser.

THE POWER PACK.

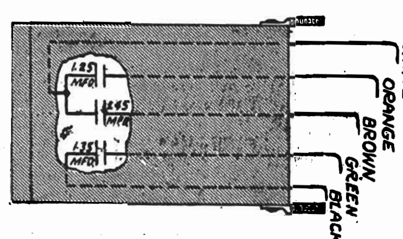
The filter in the plate supply system is of the type wherein a certain percentage of the a-c component in the rectified voltage is applied across a choke section, inducing a corresponding current in an adjacent section. This latter section is connected in series with the filter output in such a manner as to buck out, or cancel, any alternating current induced across the filter input system.

Power Consumption	(60 cycle model)	110 Watt
" "	(25 " ")	130 "

Speaker Field - 4750 Ohm, 160 Volt, 34 Ma.

PANATROPE - Type of motor - Induction disc
" - Power consumption of motor- 35 Watt
" - Type of magnetic pickup- Low imped.

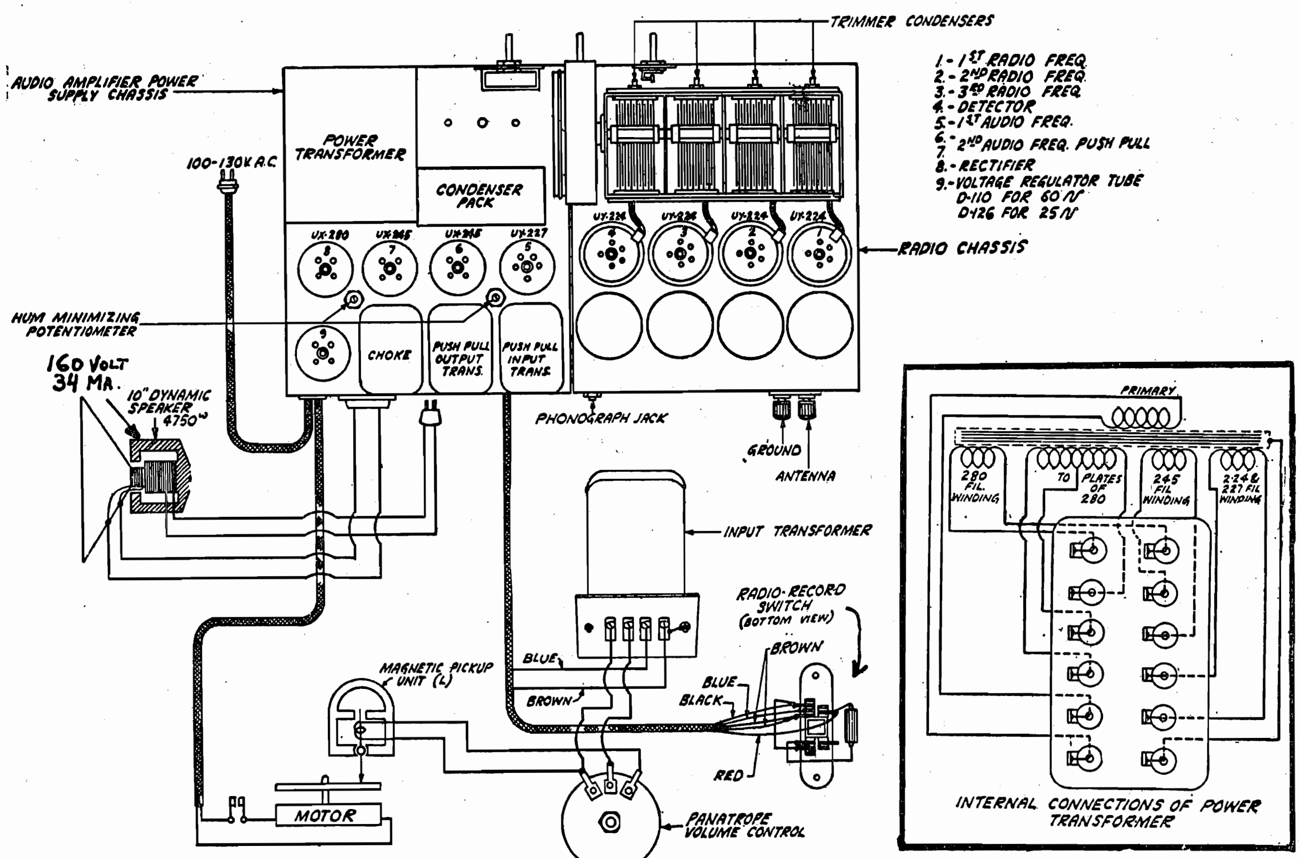
The following Ballast units are specified by
BRUNSWICK - For 60 cyc. -DURESITE BALLAST D-110
" 25 " - " " D-126



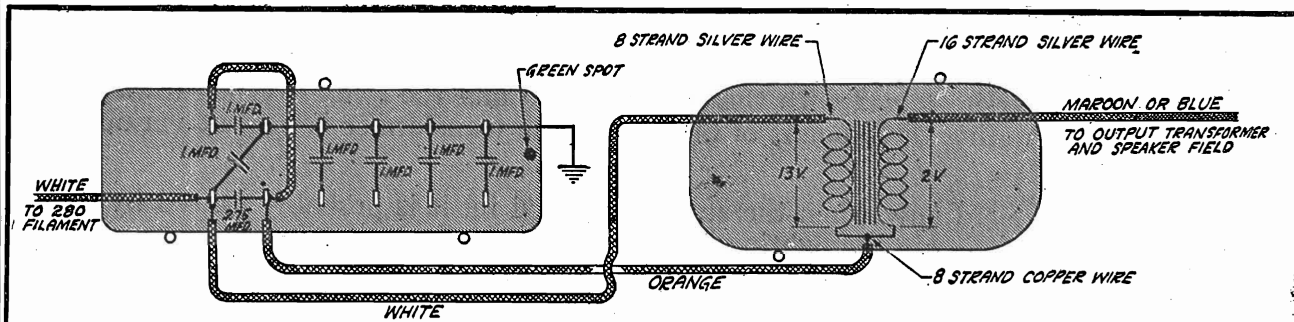
CONNECTIONS OF 25 CYCLE ADDED FILTER CONDENSERS

MODEL S-14, S-21, S-31, S-81, S-82 Voltage and Socket Data

BRUNSWICK RADIO CORPORATION



Cabinet Wiring Diagram of S-31



CONNECTIONES OF FILTER CHOKE AND CONDENSERS

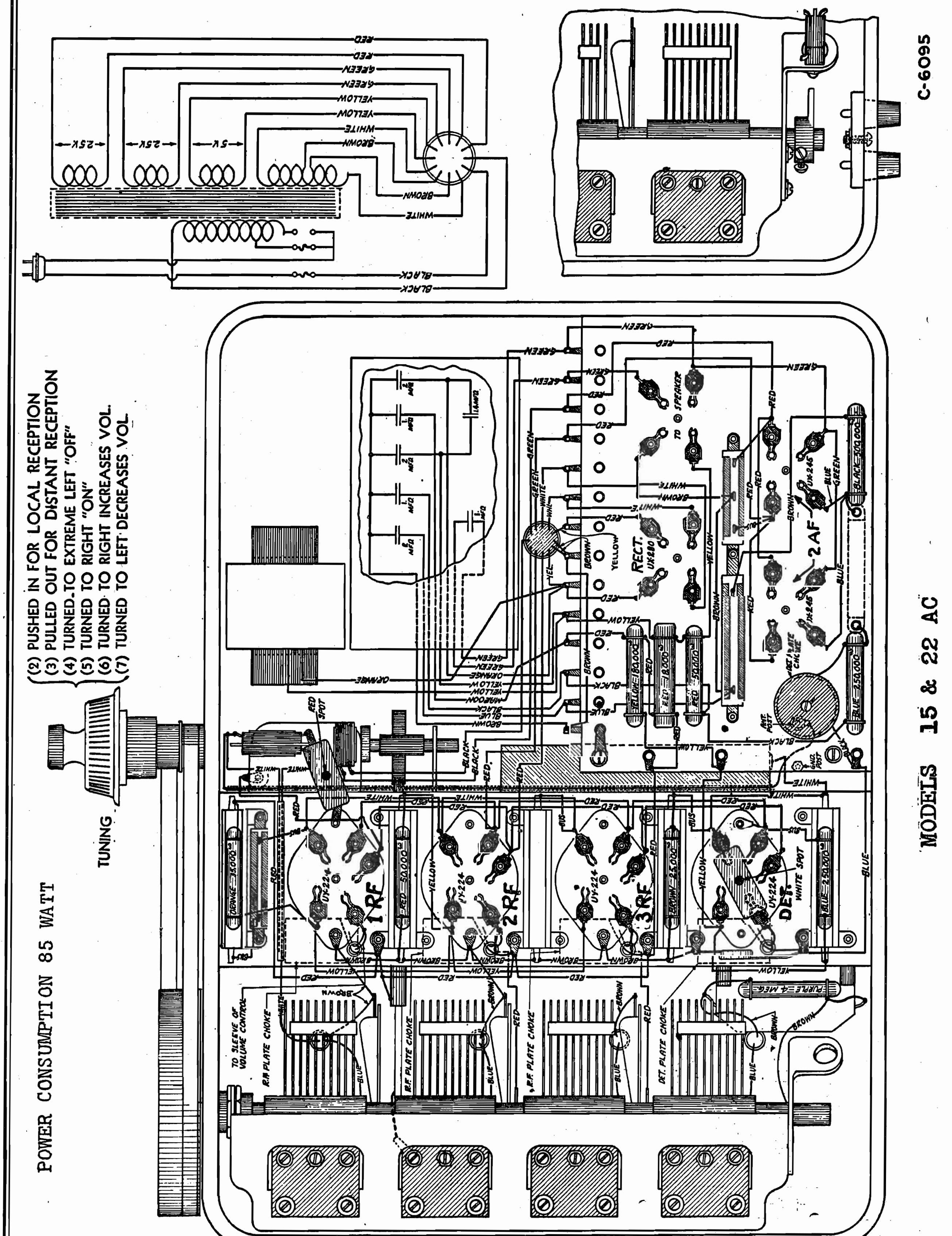
VOLTAGE AT SOCKETS
(Volume control at maximum.)

Position of Tube	Heater to Cathode Volts	Control Grid to Cathode Volts	Screen-Grid to Cathode Volts	Plate to Cathode Volts	Plate Current Milamps	Filament or Heater Volts
1st, 2nd, 3rd R. F	—2.5	—2.5	60	135	1.7	2.5
Detector	*—5	*—5	*13	*84	.2	2.5
1st A. F.	—8	*—.27		130	4.5	2.5
Power Stage		—45		245	28	2.5
Rectifier					45 per Plate	5

*Readings may vary considerably depending on resistance of voltmeter used.

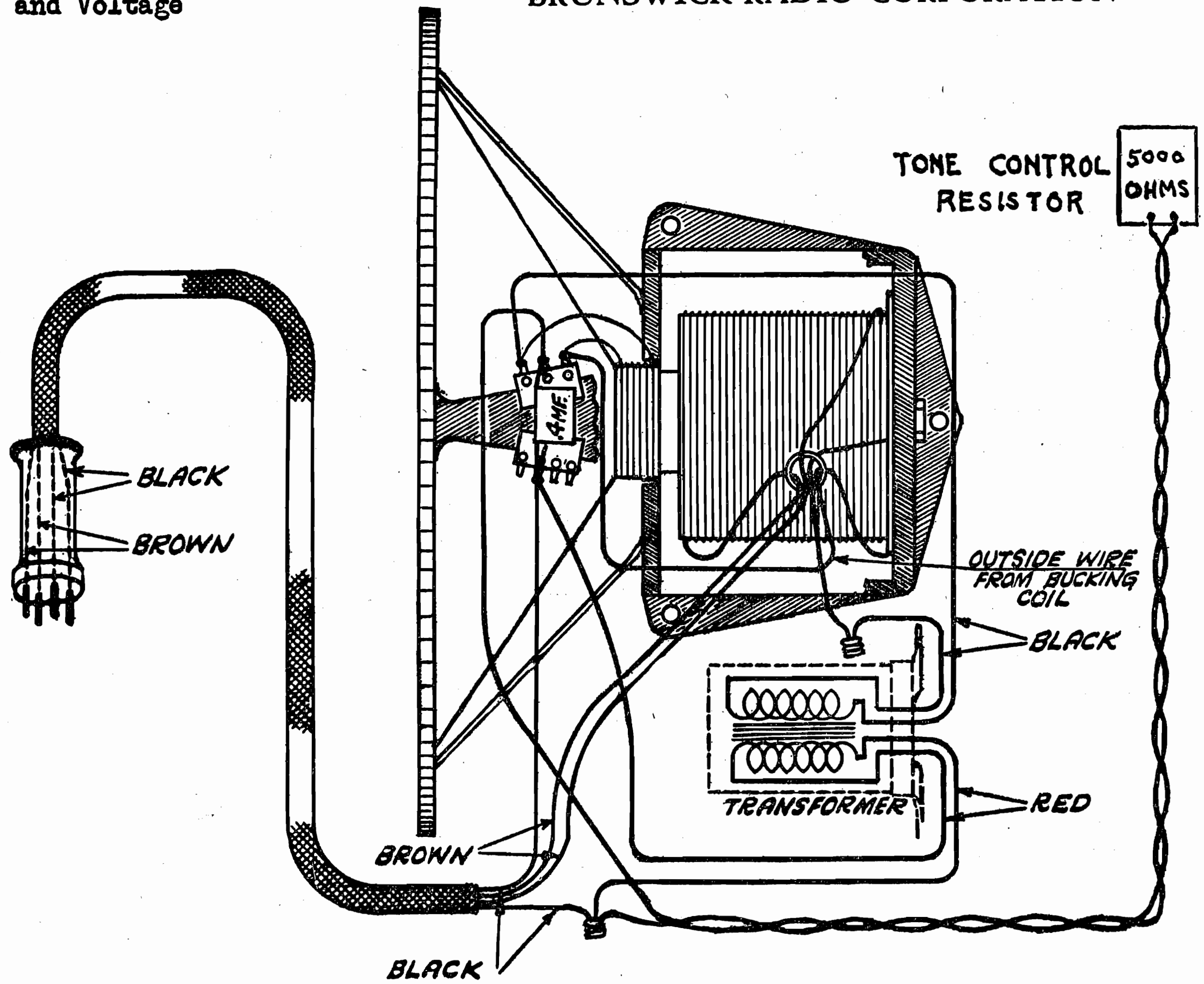
MODEL 15, 22 AC Chassis Also 32 and 42 AC

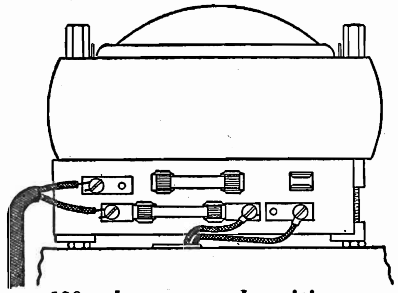
BRUNSWICK RADIO CORP.



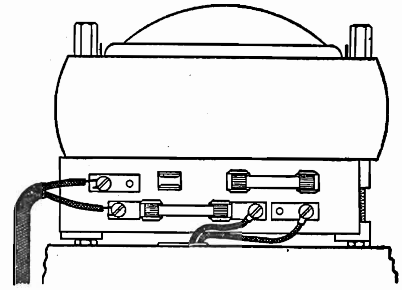
MODEL 15, 22, 32, 42 AC
AC Speaker
and Voltage

BRUNSWICK RADIO CORPORATION





120 volt or normal position

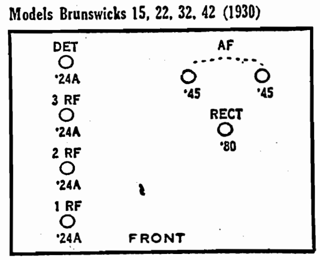


110 volt position

BRUNSWICK—Models 15-22-32-42
Line Voltage 110—Voltage Tap 120
Volume Control Full On

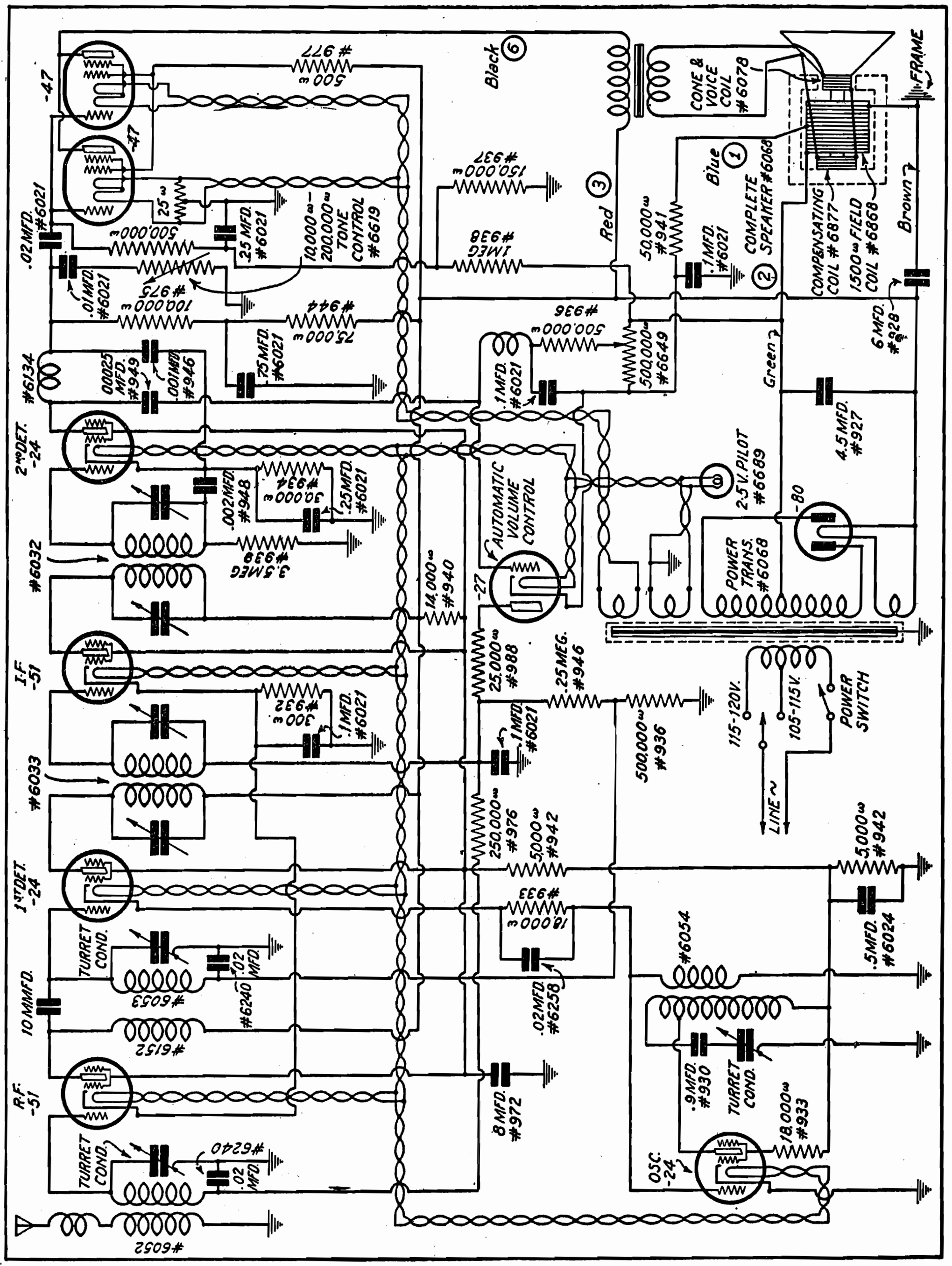
Tube No. in Order Tested (1)	Type of Tube (2)	Position of Tube in Set (3)	Meter Readings with Jewell Test Plug in Socket of Set — Operating Voltages: Filament or Heater (4)	Plate or Anode (5)	Control Grid—Space (6) CD+	Normal Grid—Screen (7) CD+	Cathode to Heater (8)	Screen Gd L. H. '80 (9) Plate	Milliamperes: Plate R. H. '80 (10) Plate	Tube Test (11)	Plate Current Change (12)	(13)
1	224	1 R.F.	2.5	178	2.5	60	2.5	-	2.2			
2	224	2 R.F.	2.5	178	2.5	60	2.5	-	2.2			
3	224	3 R.F.	2.5	178	2.5	60	2.5	-	2.6			
4	224	Det.	2.5	180	-	24.3	8.0	-	36			
5	245	1 A.F.	2.5	242	-	12	-	-	30			
6	245	2 A.F.	2.5	242	-	12	-	-	30			
7	280	Rect.	4.8	385	-	-	-	40	40			
8												
9												

Models Brunswicks 15, 22, 32, 42 (1930)

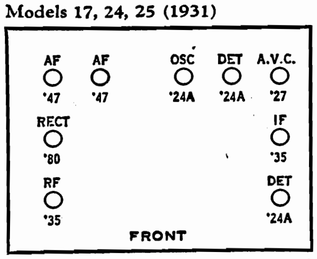


MODEL 17,24,25 AC
Schematic

BRUNSWICK RADIO CORPORATION



Models 17, 24, 25 (1931)



IF PEAK 175 KC

BUSH & LANE PIANO COMPANY

MODEL 10
Voltage and Service Notes

NEUTRALIZING and RESONANCE TESTS

Neutralizing the Bush & Lane Chassis No. 10 De Luxe is an extremely simple and rapid operation. A near-by powerful station may be used for this purpose, but a much more desirable and accurate means is by use of a modulated oscillator, that is, a vacuum tube oscillator generating an audible note. Buzzer modulated, or other types of oscillators, are entirely satisfactory. The circuit of a very simple oscillator is given in Fig. 5, which is of the grid leak and condenser modulated type. It will be apparent, to a person unfamiliar with such apparatus, that is is nothing more than a regenerative detector circuit. For neutralizing purposes the switch across the grid leak and condenser is left open, and no deflection will be had on the O-2 milliampere DC meter.

Tune receiver to approximately 1200 kilocycles, and the oscillator to the receiver, which should result in a strong audible signal in the speaker. If the receiver was previously oscillating at 1200 kilocycles, first neutralize at a lower frequency, about 800 or 900 kilocycles, and repeat at 1200 kilocycles.

Replace the third R. F. tube (third from rear) with a "dead" tube, whose filament has been opened by drilling into the tube base near a filament prong and breaking that filament wire. Adjust neutralizer NC3 (third from rear) until a minimum of the oscillator signal is heard. If oscillator signal is weak, move oscillator closer to antenna, or even connect one of the resonance testing clips onto antenna. When minimum point is found, replace the good tube and allow it to heat to normal operating condition.

Next replace the second R. F. tube with the "dead" or neutralizing tube, and adjust NC2 (second neutralizer from rear) for a minimum of signal. Replace good tube, allowing it to heat. Finally, replace the first R. F. tube with the "dead" tube and adjust NC1, (neutralizer nearest rear) for a minimum of signal. Replace good tube and allow to heat to normal operating temperature.

It is advisable to place shield over "dead" tube, each time, while neutralizing.

After neutralizing, the receiver should be stable over the entire frequency range, and if not, the trouble is due to tubes, ungrounded shielding of four-gang condenser, coil shields, tube shields, or altered wiring under the base.

Accurate resonance tests may be made with an oscillator indicating resonance by the "dip" of a meter in either the plate or the grid circuit of the oscillator tube. The simple oscillator shown in Fig. 5 may be used for this purpose by closing the switch across the grid leak and condenser, shorting them, when a deflection of the O-2 milliampere meter will be noted, showing the circuit to be oscillating. One wire from the 8-turn pickup coil is connected directly to the "ground" or chassis. The other wire from this coil terminates at two .00025 Mfd. grid condensers in series which in turn are attached to a clip. These condensers must be as near the clip as possible. A single .0001 Mfd. condenser is sufficient.

Attaching the clip and condensers to the stator of the first condenser (this may be done below the base, at grid terminal of first coil) rotate dial of oscillator tuning condenser until a "dip" or "wiggle" of the milliammeter is found, indicating that the oscillator is in resonance with the circuit under test. Note oscillator dial reading. It should be repeated when moving clip and fixed condensers to each of the other coils, with receiver tuning condenser left in the same position.

A check for resonance with receiver tuning condenser plates nearly full "in" and nearly full "out" is sufficient.

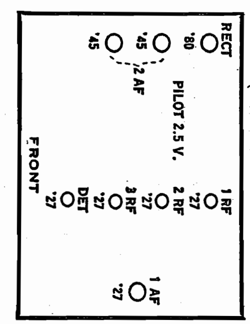
If the oscillator dial is calibrated from 0 to 100, a difference in reading of one degree on the dial is considered fairly good resonance, though limits are held much more closely at the factory. Unless compensated for, while making resonance tests, the oscillator will usually show a variation in detector coil and antenna coil from the second and third coils. This is caused by the antenna coupling and detector coupling systems, and need not be considered alarming.

Service laboratories desiring any further testing information than given in this instruction manual may obtain same by writing the factory testing department.

Line Voltage 112—Set on 120 Volt Tap

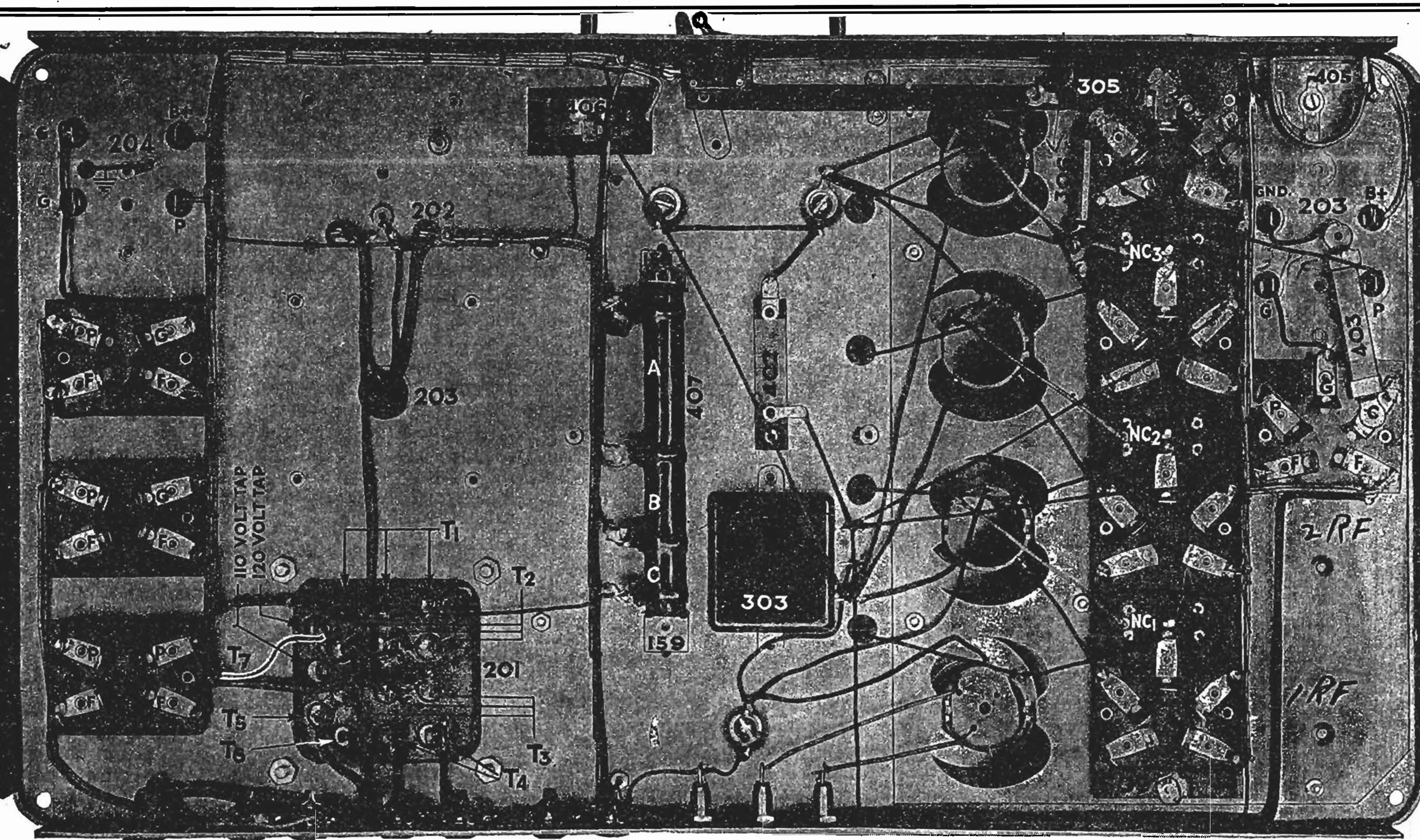
Tube No. in Order (1)	Type of Tube (2)	Position of Tube 1st. R.F. Det., etc. (3)	Readings, Plug in Socket of Set — Tube Out: A Volts (4)	Tube Out: B Volts (5)	Tube in Tester: A Volts (6)	Tube in Tester: B Volts (7)	C Volts (Control Grid) (8)	Cathode-Heater Volts (9)	Normal Plate M.A. (10)	Plate M.A. Grid Test (11)	Plate Change M.A. (12)	Screen Grid Volts (13)
1	227	1st RF	2.45	130	2.37	118	8	8	5.8	8.8	3	
2	227	2nd RF	2.45	130	2.37	118	8	8	5.8	8.8	3	
3	227	3rd RF	2.45	130	2.37	118	8	8	5.8	8.8	3	
4	227	Det.	2.45	135	2.37	38	0	0	2.1	2.1	0	
5	227	1st AF	2.45	160	2.37	112	9	9	4.8	6.5	1.7	
6	245	Pwr.	2.45	290	2.45	240	45	-	30	35	5	
7	245	Pwr.	2.45	290	2.45	240	45	-	30	35	5	
8	280	Rect.	5		5.0	-	-	-	112	-	-	
9												
10												

Model 10 (1927)



MODEL 10
Chassis

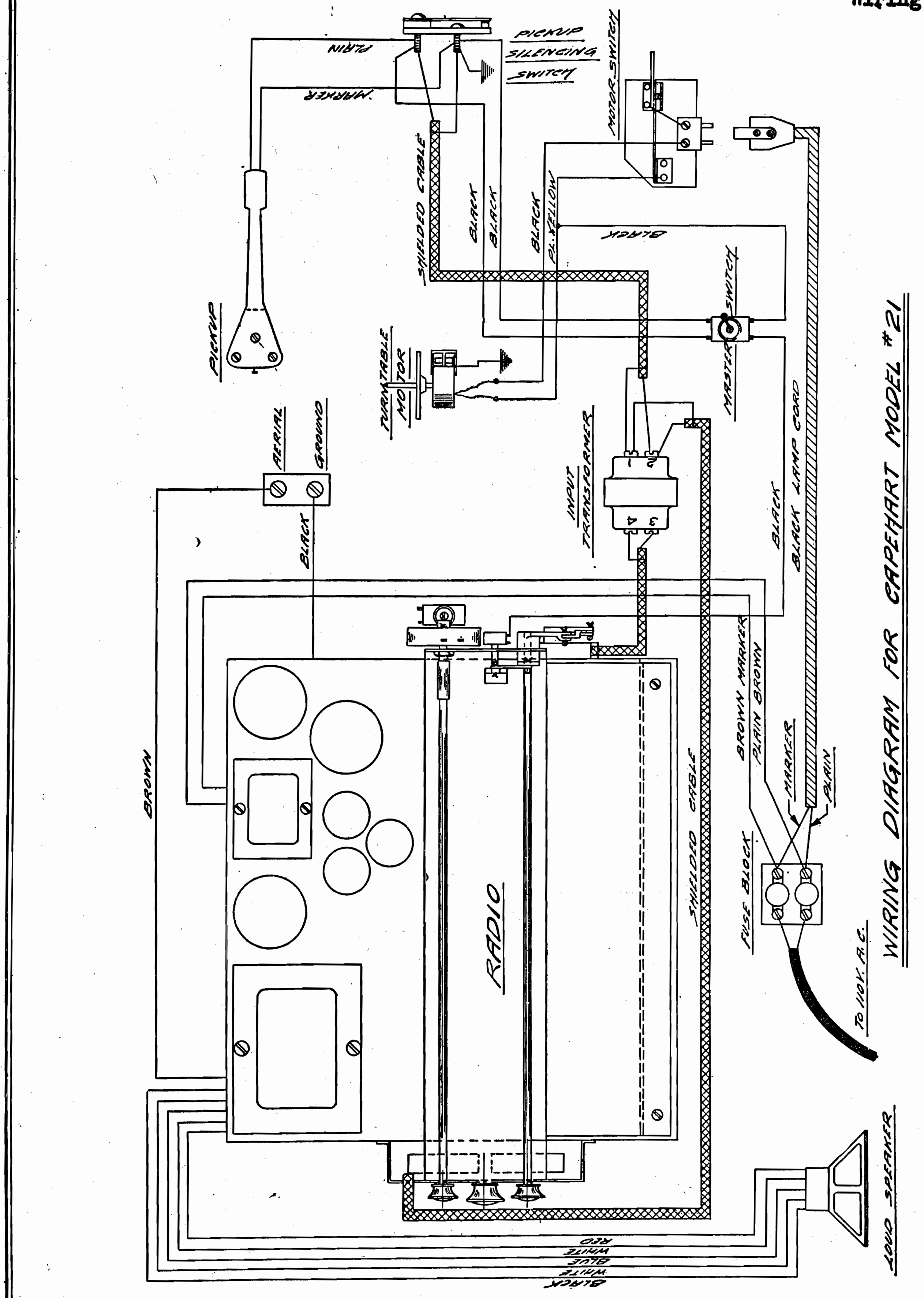
BUSH & LANE PIANO COMPANY



154—Pilot Lamp, 3 volt.
116—AC Cord and Plug.
117—AC Power Switch.
201—Power Transformer.
202—Filter Choke.
203—First Audio Transformer.
204—Push-Pull Input Transformer.
301—Four-gang Tuning Condenser.
302—Filter Condenser Block.
303—Double By-pass Condenser, ½ Mfd. and ½ Mfd.
305—.00025 Mfd. Grid Condenser (included with 4-socket panel also).
306—.002 Mfd. Detector Plate By-pass Condenser.
402—550 ohm Bias Resistor for the three R. F. stages.
403—1500 ohm Bias Resistor for the first audio stage.
404—Grid Leak, 2 megohms.
405—Hum Control, 20 ohm potentiometer.
406—Volume Control 10,000 ohm potentiometer.
409—Volume Control Insulating Washer, flat.
410—Volume Control Insulating Washer, extruded.
411—Volume Control Mounting Nut.
407—Voltage Divider Resistor, 5,250 ohm total.
A—3,000 ohms.
B—1,500 ohms.
C— 750 ohms.
159—Voltage Divider, Resistor Mounting Bracket.
501—Terminal Strip, complete with pin jacks.
506—First Audio Socket (UY227 or C327).
507—Power Tube Socket (UX245 or CX345).
508—Rectifier Tube Socket (UX280 or CX380).

CAPEHART CORPORATION

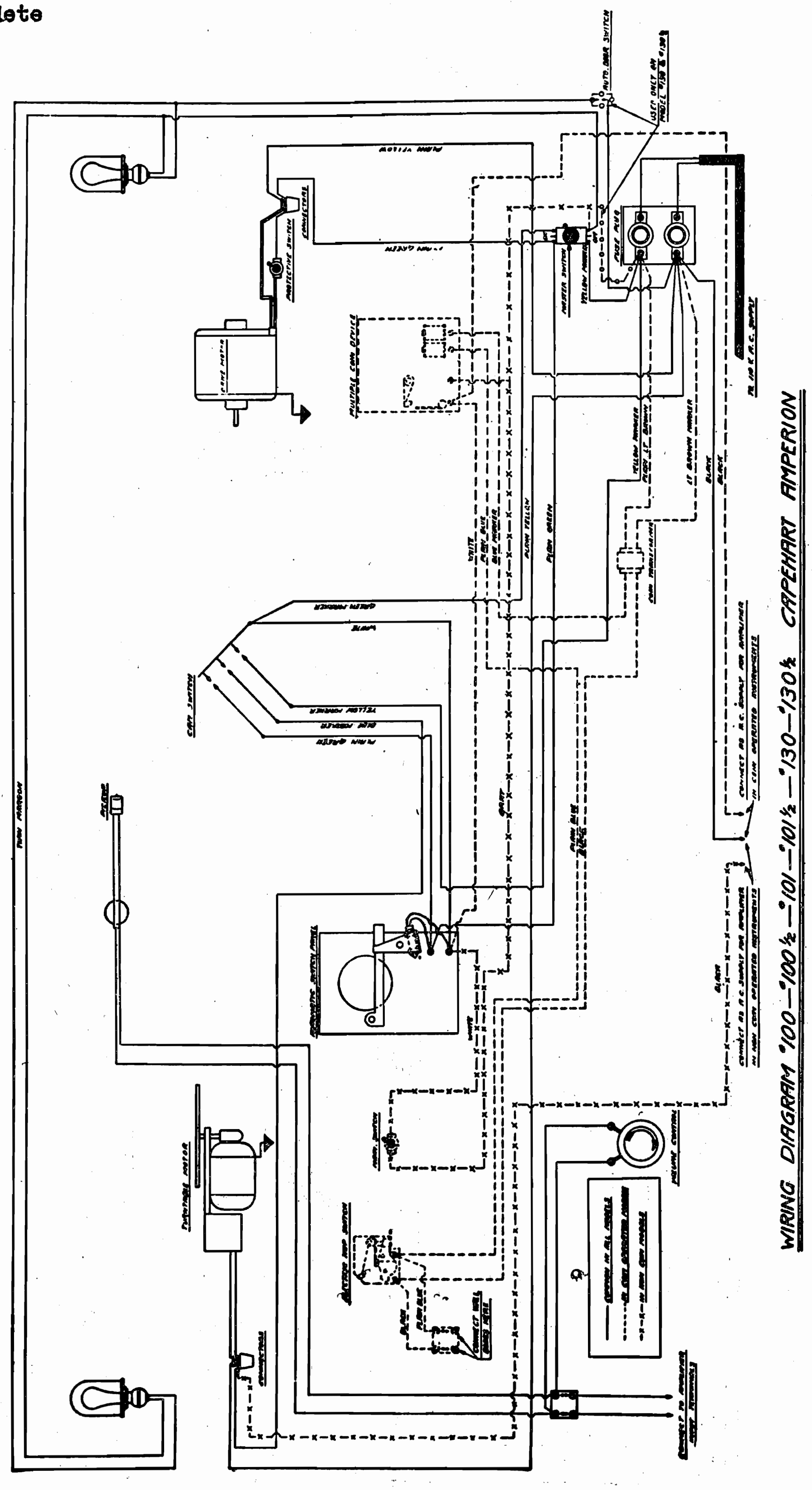
MODEL 21
Cabinet
Wiring



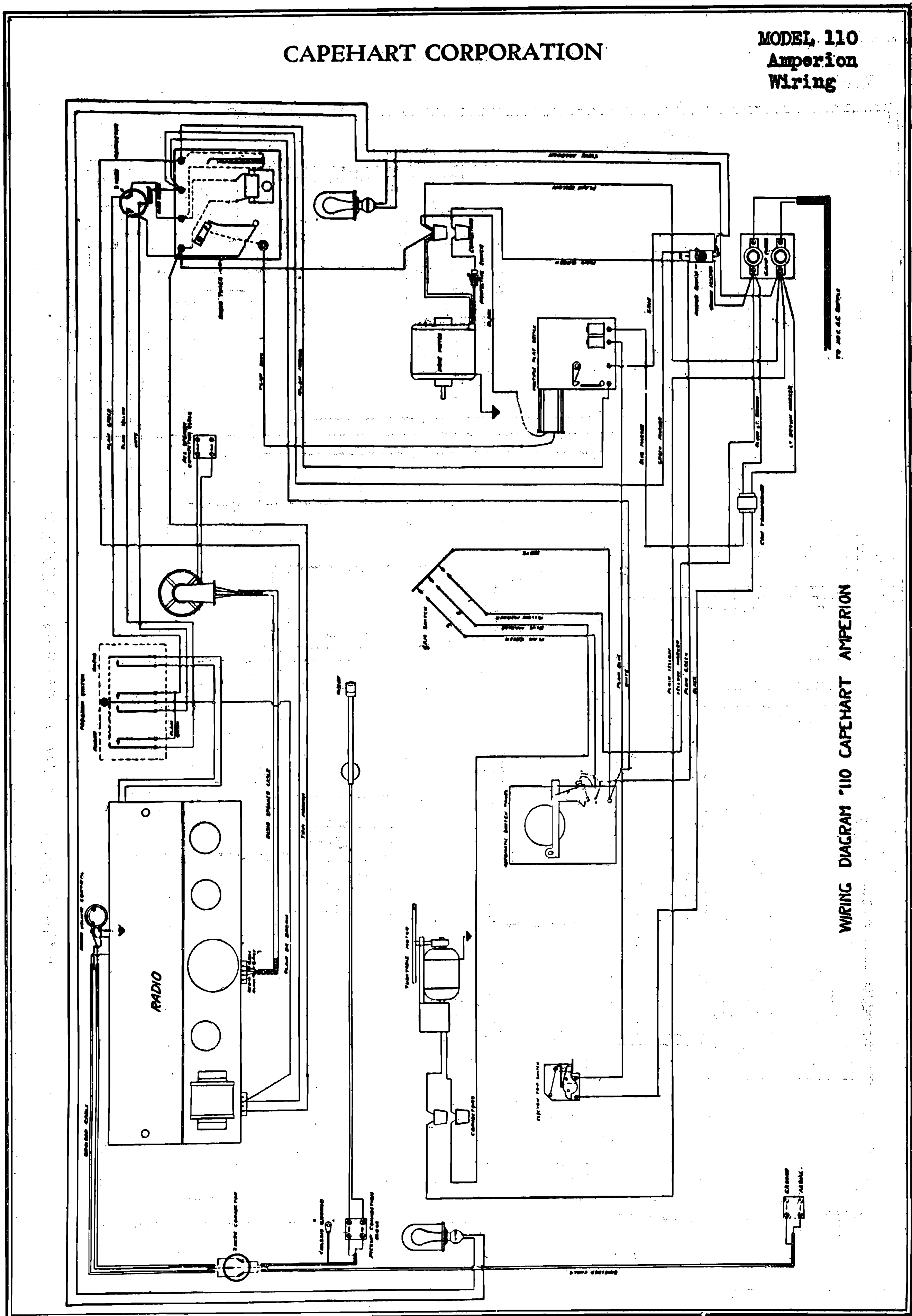
WIRING DIAGRAM FOR CAPEHART MODEL #21

MODEL 100, 100½, 101, 101½, 130, 130½ Complete Wiring

CAPEHART CORPORATION

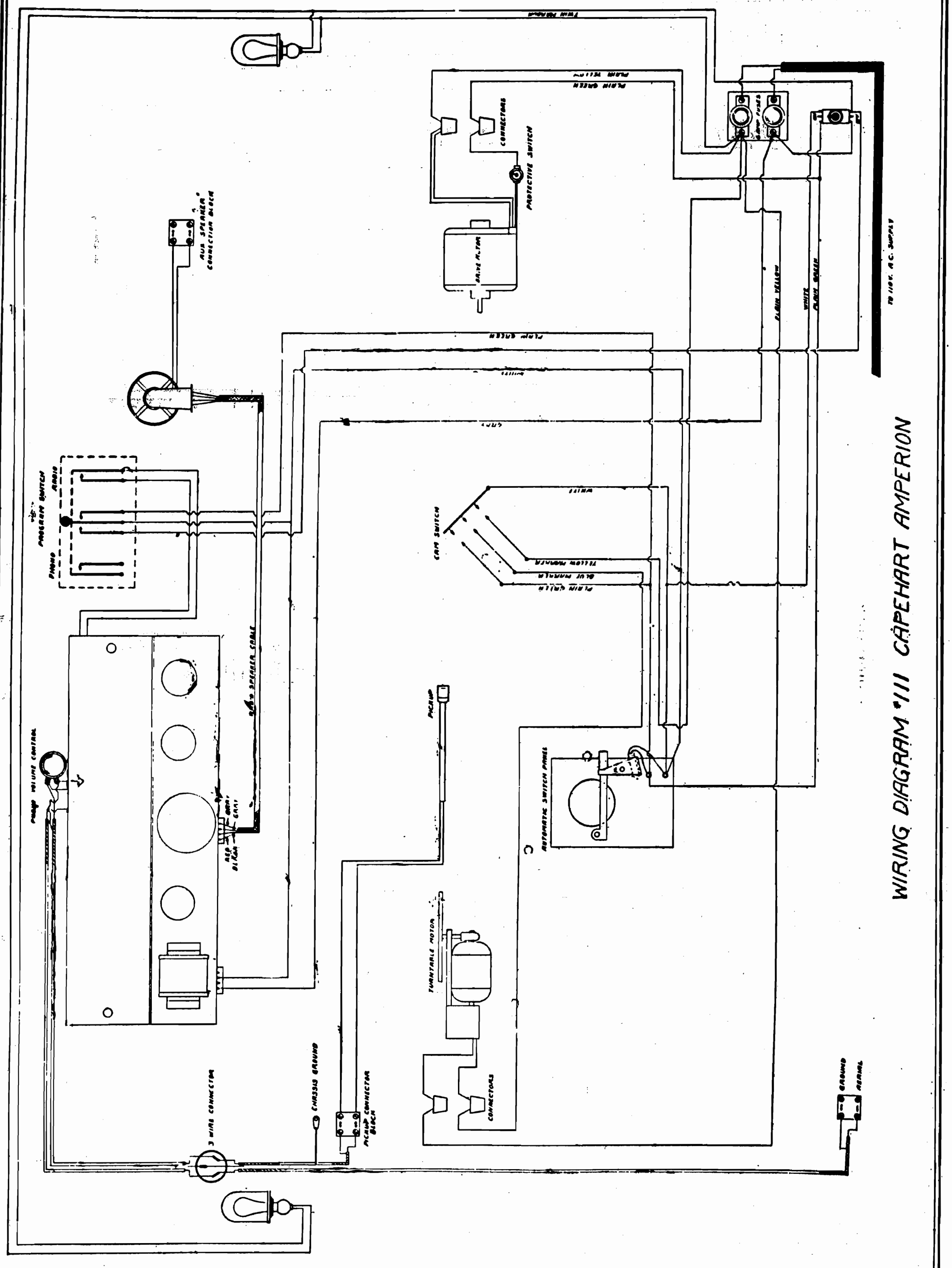


WIRING DIAGRAM #100—#100½—#101—#101½—#130—#130½ CAPEHART AMPERION


CAPEHART CORPORATION
MODEL 110
Amperion
Wiring
WIRING DIAGRAM '110 CAPEHART AMPERION
RADIO

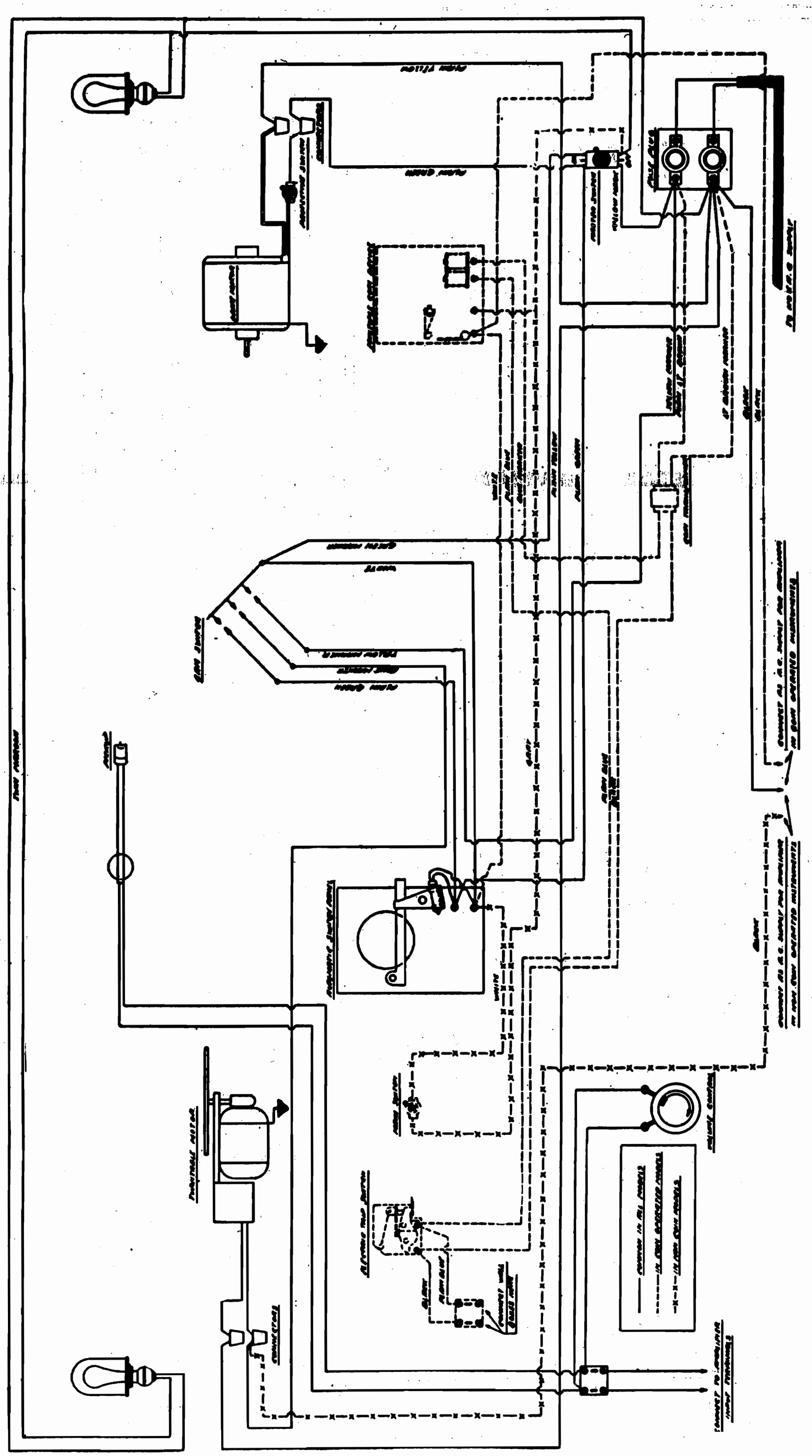
MODEL 111
Amperion
Wiring

CAPEHART CORPORATION



CAPEHART CORPORATION

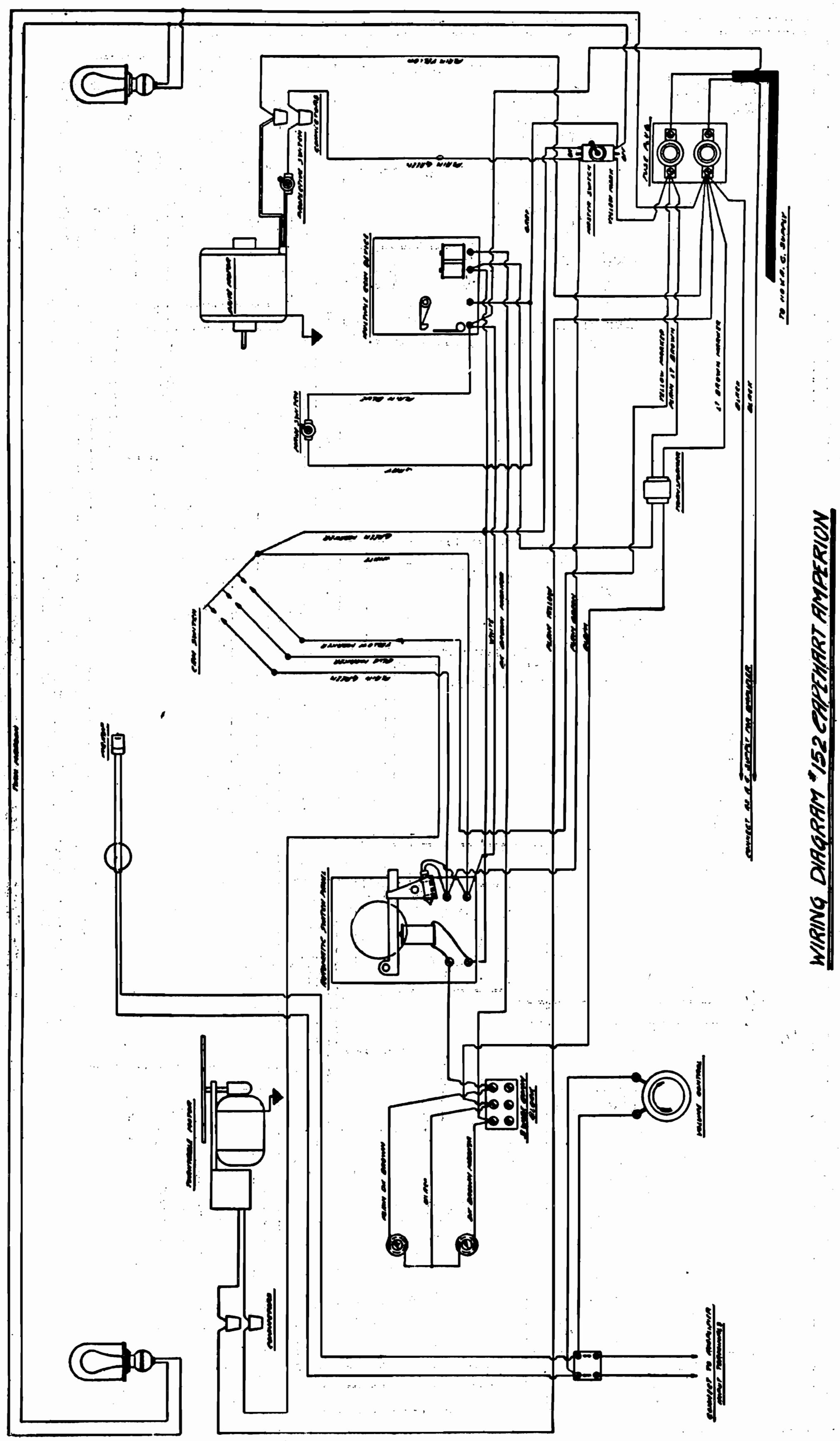
MODEL 150,151
Amperion
Wiring



WIRING DIAGRAM #150—#151 CAPEHART AMPERION

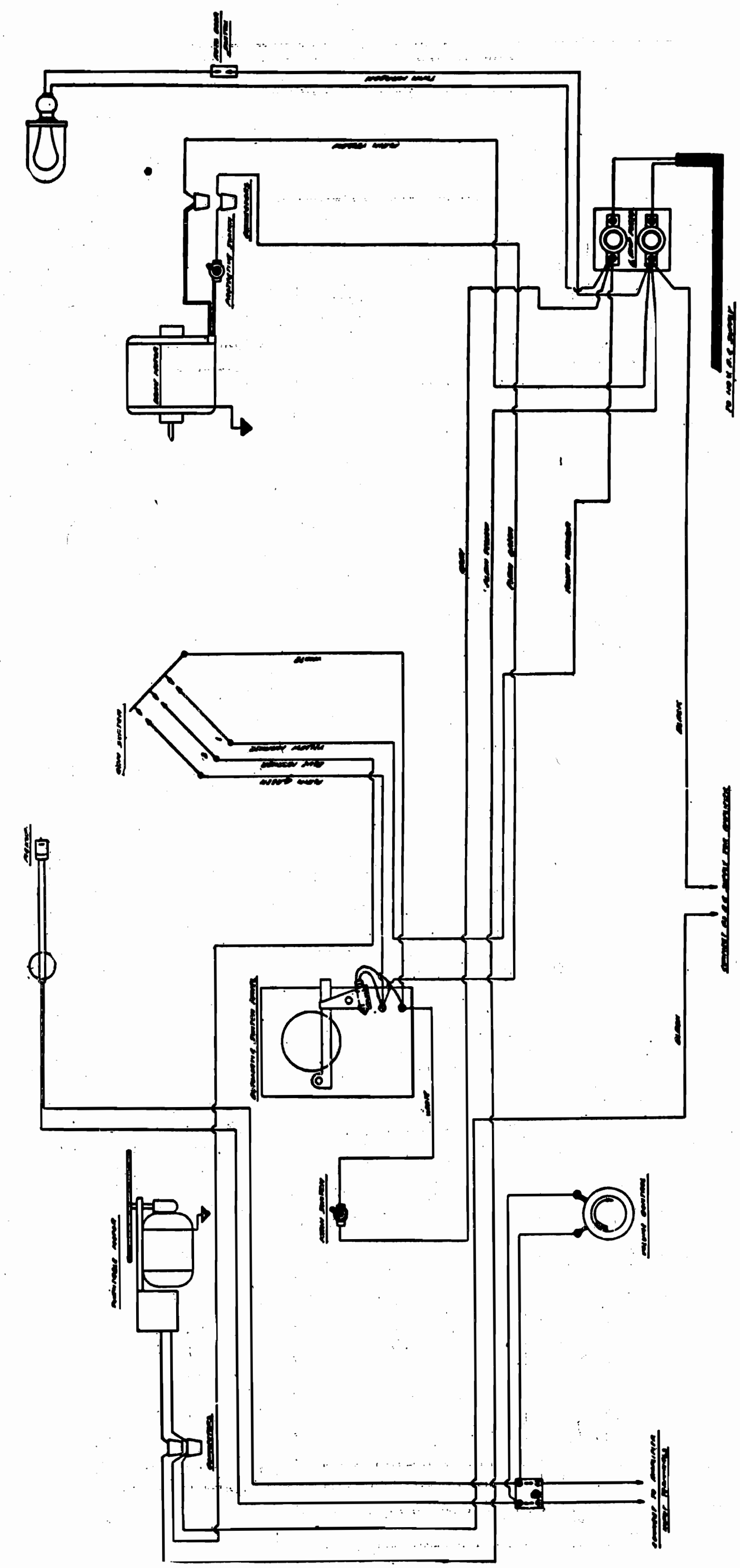
MODEL 152
Amperion
Wiring

CAPEHART CORPORATION



CAPEHART CORPORATION

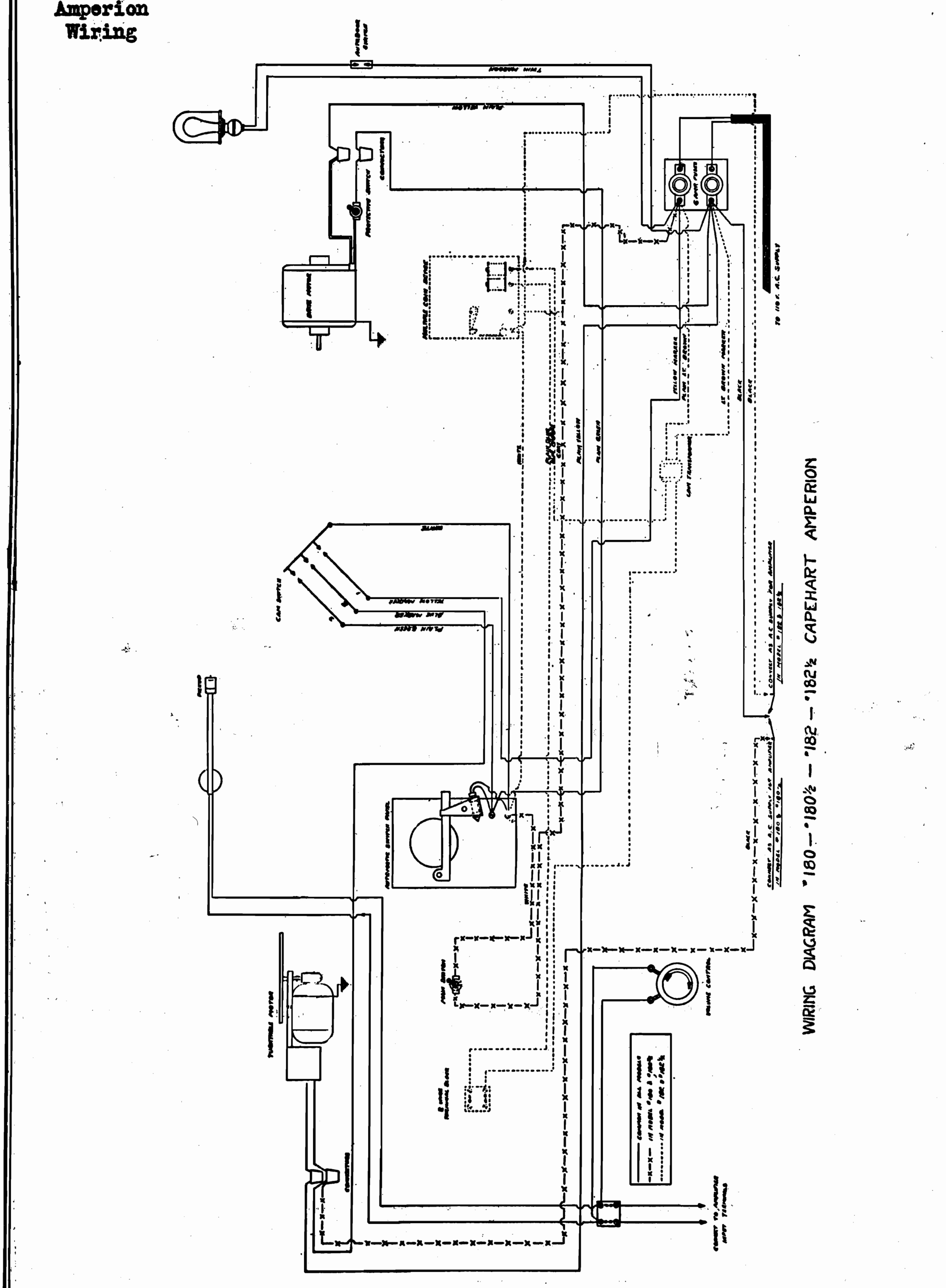
MODEL 170
Amperion
Wiring



WIRING DIAGRAM #170 CAPEHART AMPERION

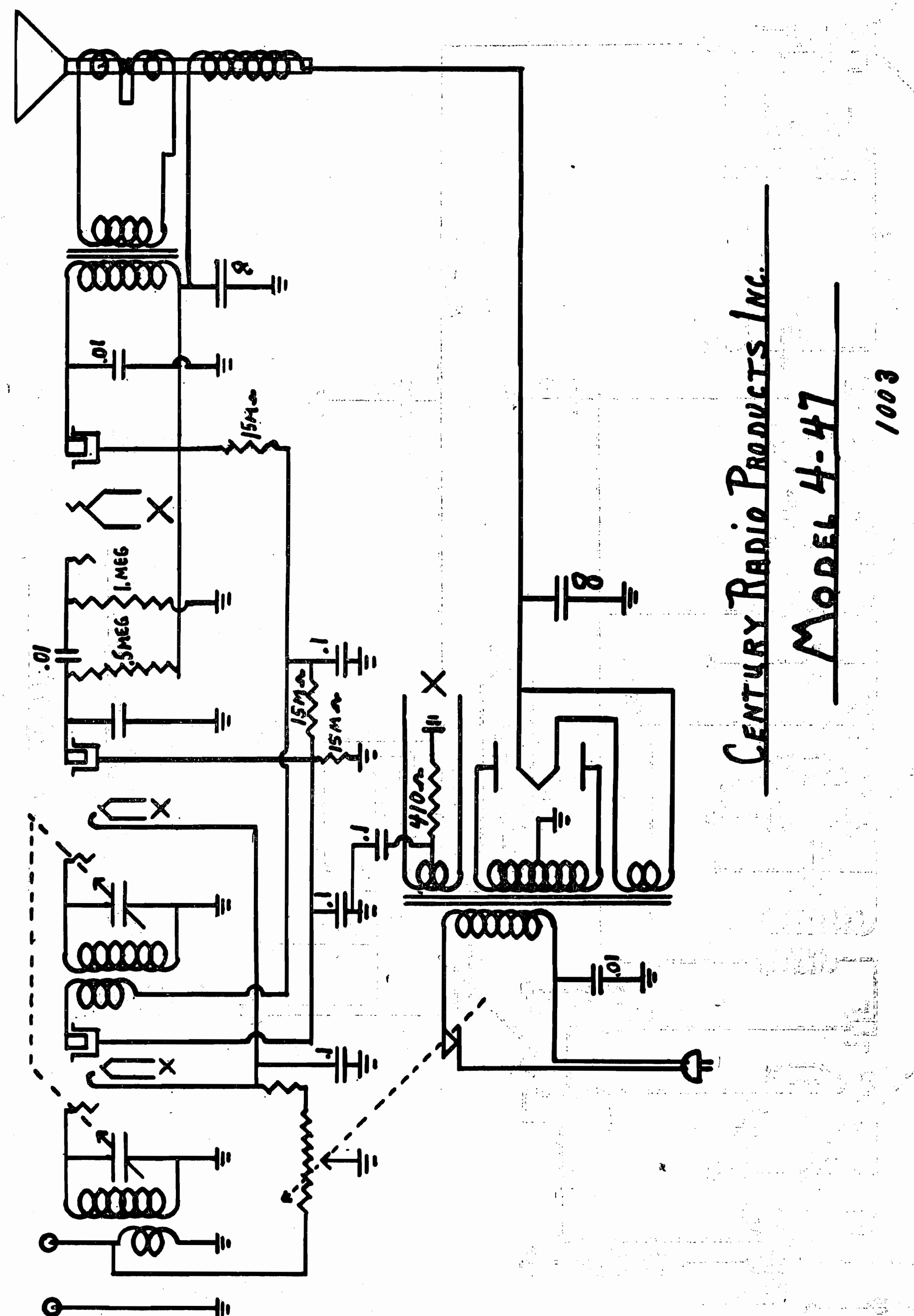
MODEL 180, 180½, 182, 182½
Amperion Wiring

CAPEHART CORPORATION



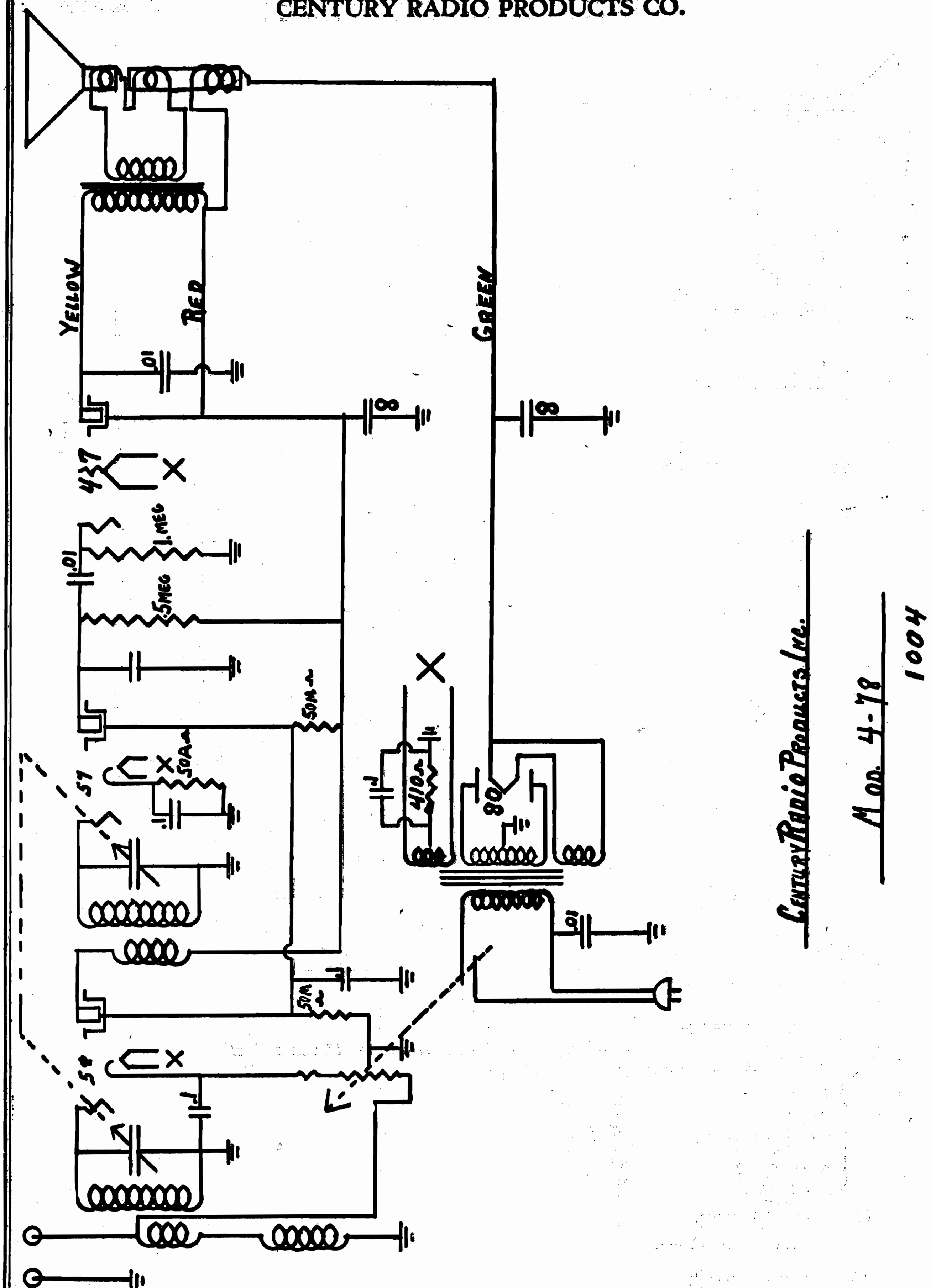
MODEL 4-47
Schematic

CENTURY RADIO PRODUCTS CO.



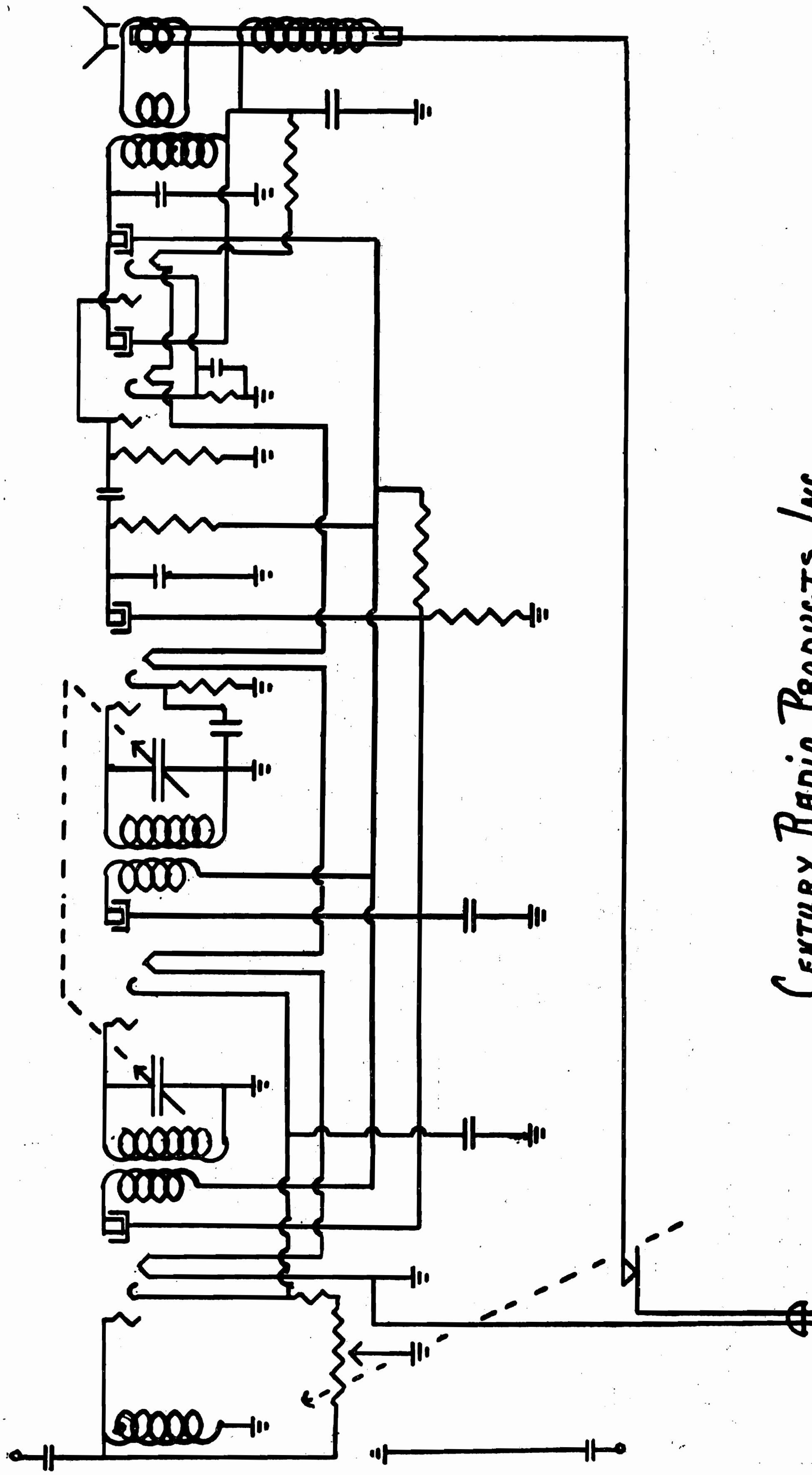
MODEL 4-78

CENTURY RADIO PRODUCTS CO.



MODEL 5-38

CENTURY RADIO PRODUCTS CO.



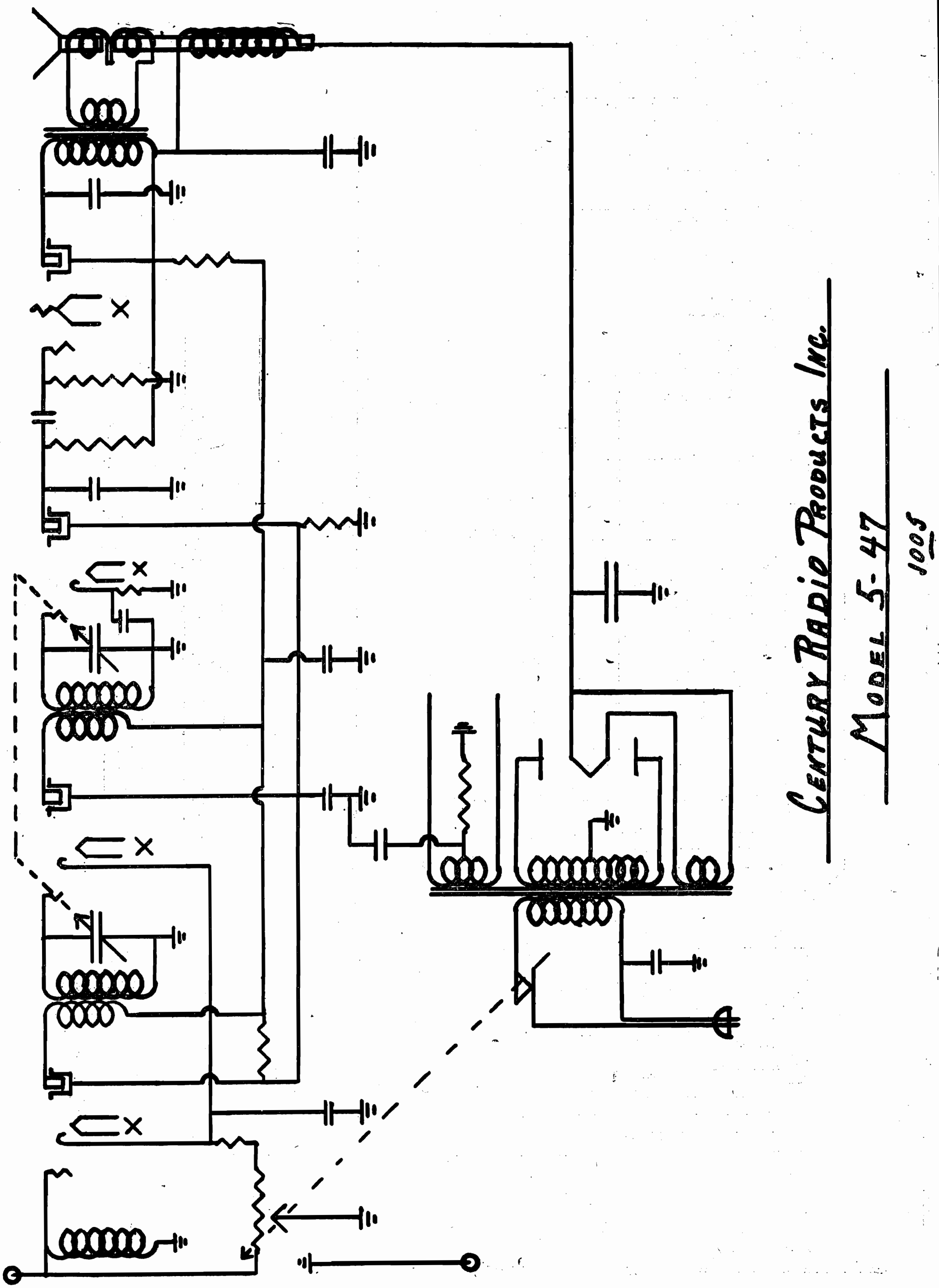
Century Radio Products Inc.

Model 5-38 - D.C. 110V.

1006

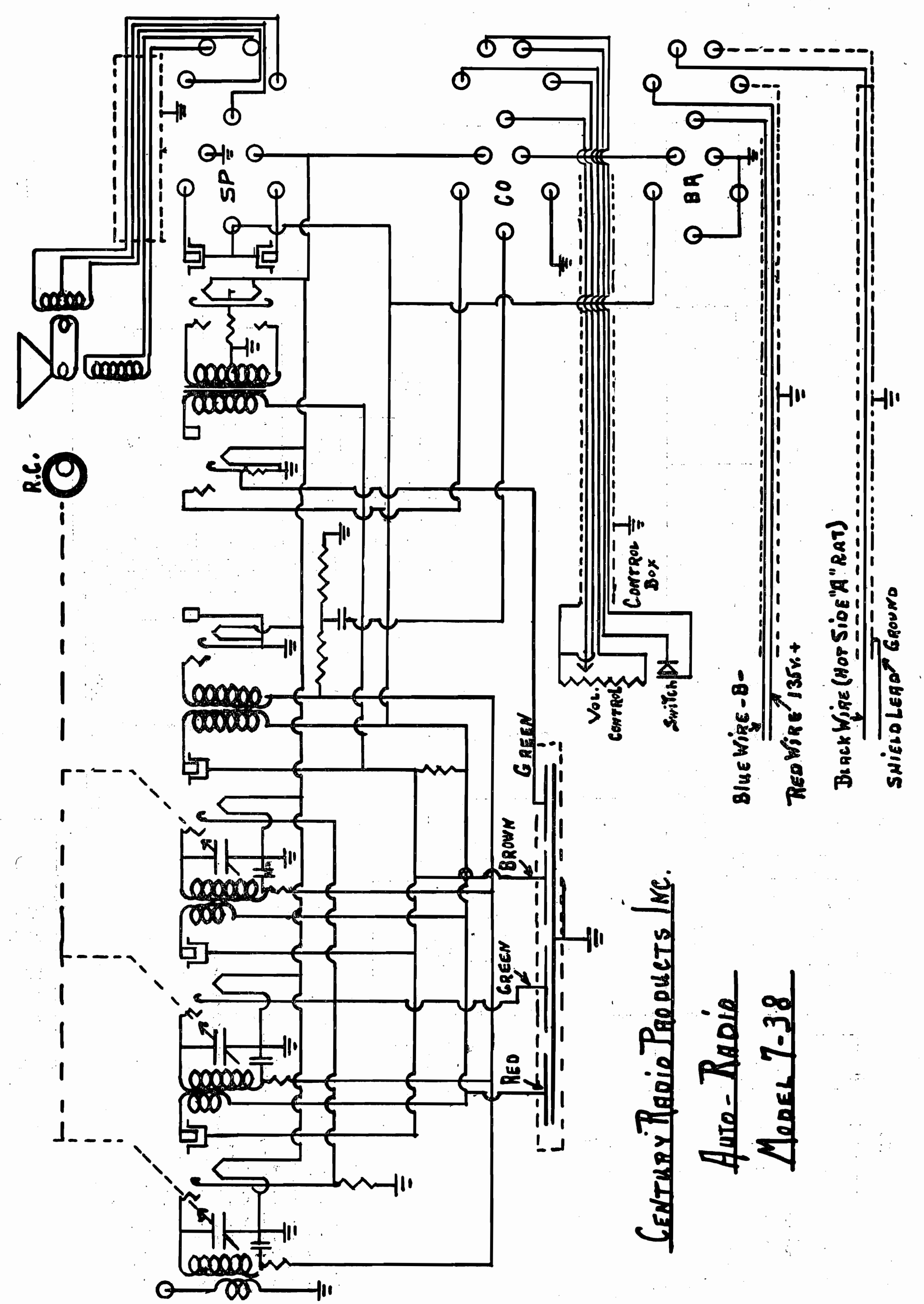
MODEL 5-47

CENTURY RADIO PRODUCTS CO.



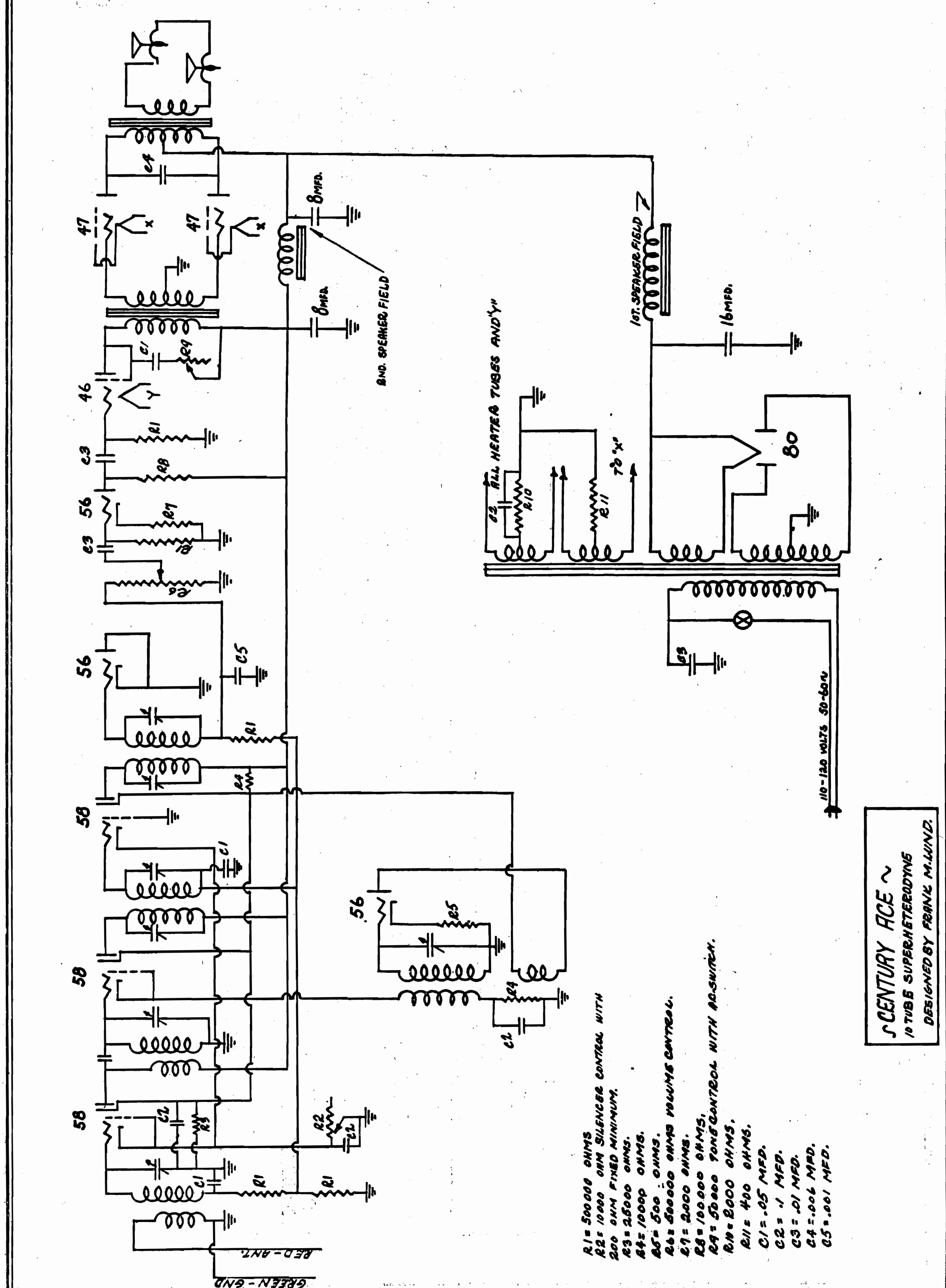
MODEL 7-38
Auto Radio

CENTURY RADIO PRODUCTS CO.



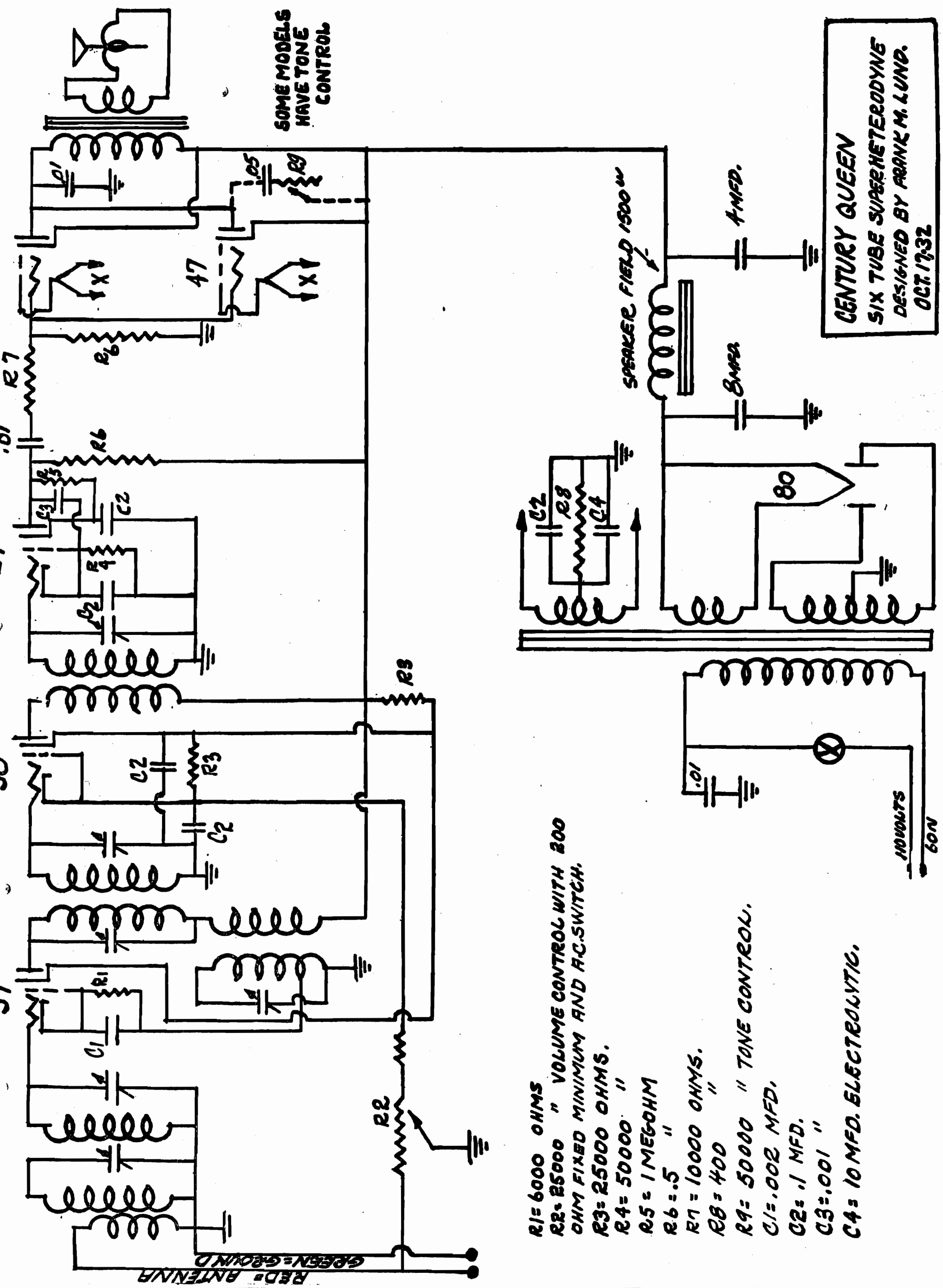
MODEL. Century Ace

CENTURY RADIO PRODUCTS CO.



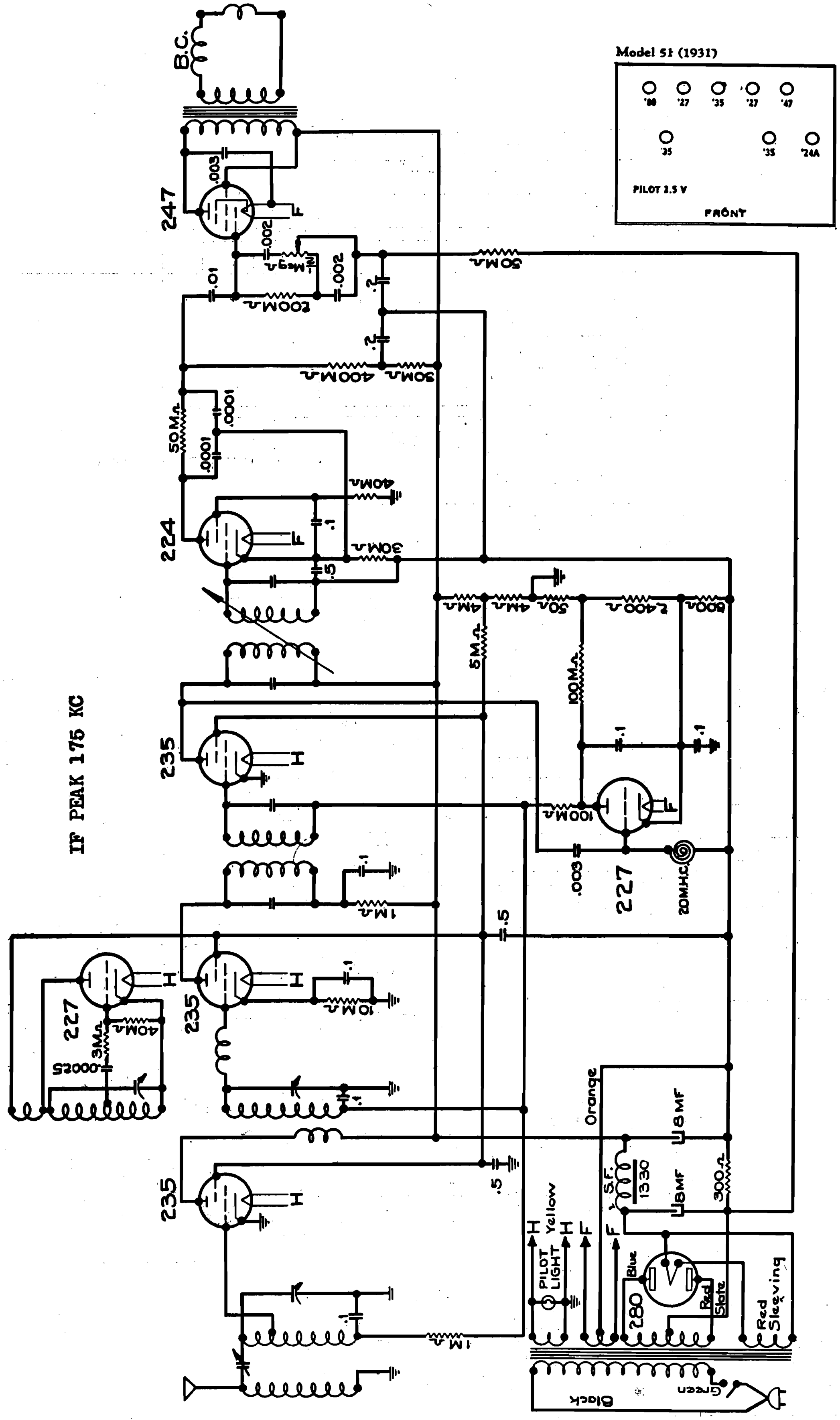
MODEL Century Queen

CENTURY RADIO PRODUCTS CO.



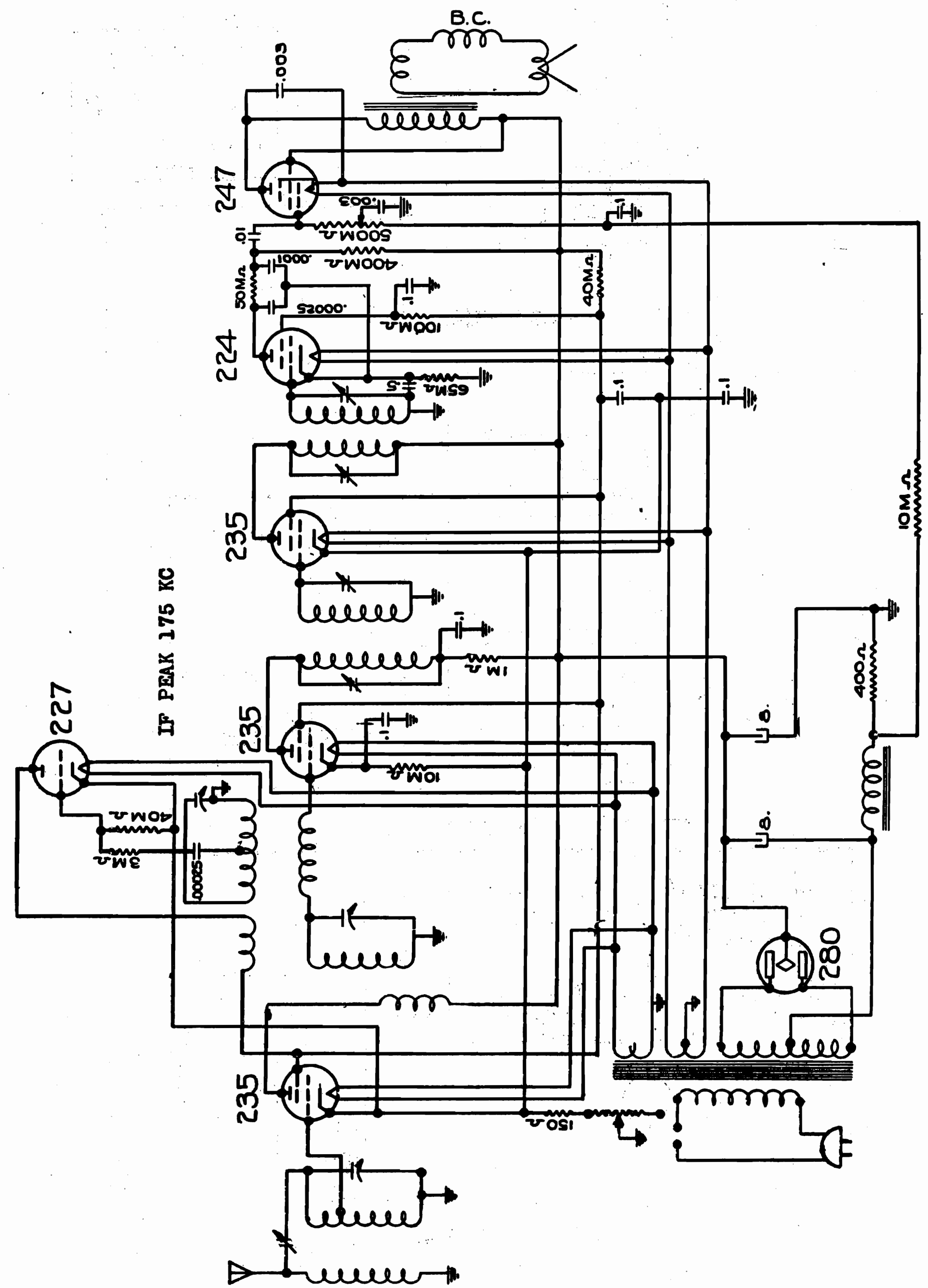
COLONIAL RADIO CORP.

MODEL 51
Schematic



MODEL 52
Schematic

COLONIAL RADIO CORP.



MODEL 51
MODEL 52
Voltage

COLONIAL RADIO CORP.

MODEL 51 - 60 CYCLE

	Trans. 235	Osc. 227	IF 235	RF 235	247 Output	AVC 227	280 DC	Det 224
PLATE VOLTAGE	160	55	160	160	242	48	370	80
AVERAGE PLATE CURRENT MA	1.	-	5.	5.	26.	-	-	.2
SCREEN VOLTAGE	58	-	58	58	250	-	-	40
AVERAGE SCREEN CURRENT MA	.2	-	1.	1.	7.	-	-	.15
GRID VOLTAGE	10	-	1.5	1.5	18	-	-	6
FILAMENT VOLTAGE	2.4	2.4	2.4	2.4	2.6	2.5	5	2.5

SPEAKER FIELD VOLTAGE 83 volts   Line Voltage 115 volts
TOTAL PLATE CURRENT 60 ma   Total Watts 85

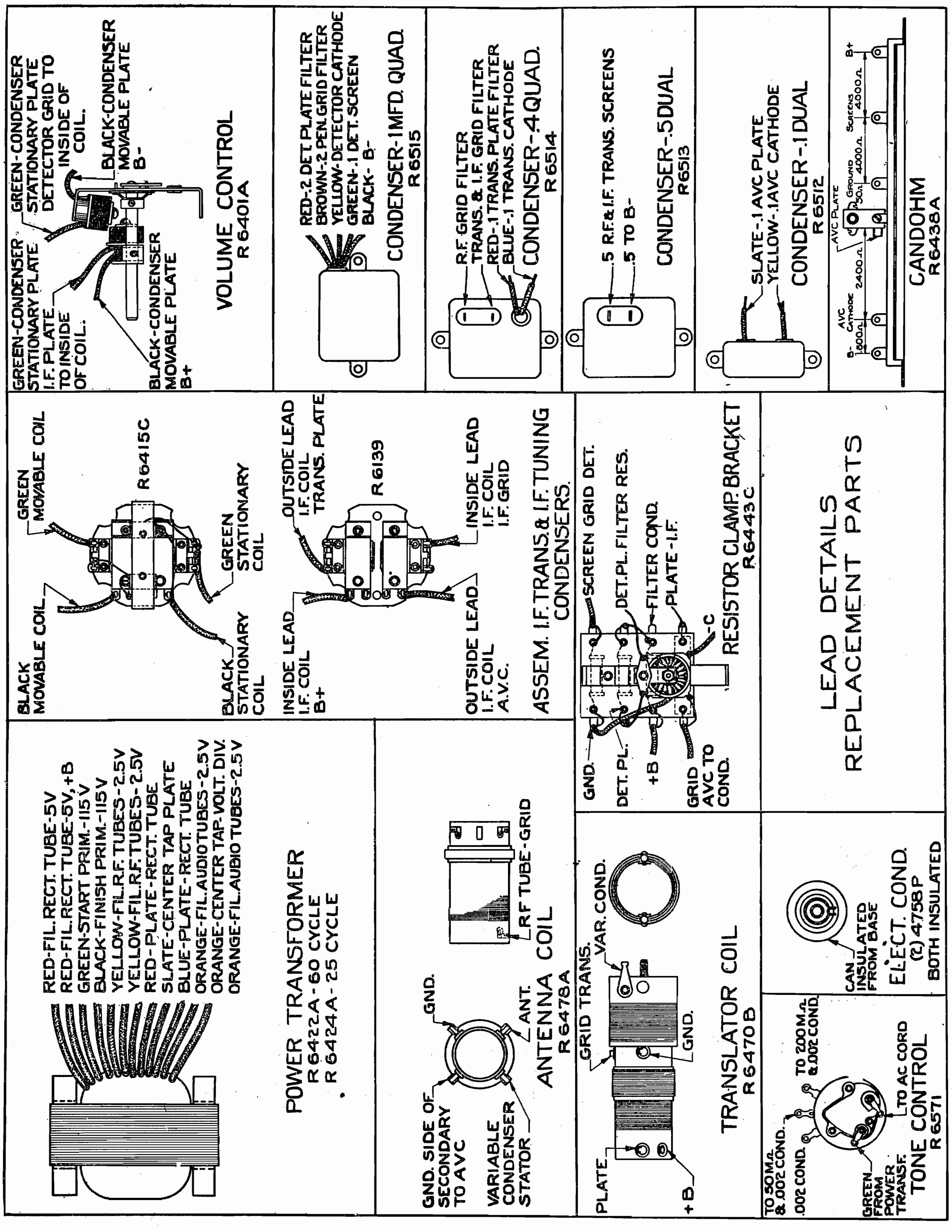
MODEL 52 60 CYCLE

	Trans. 235	Osc. 227	IF 235	RF 235	Det 224	Pentode 247	280
PLATE VOLTAGE	230	55	230	230	75	220	360
AVERAGE PLATE CURRENT MA	1.	3.	5.	5.	.2	26.	
SCREEN VOLTAGE	55		55	55	38	230	
AVERAGE SCREEN CURRENT MA	.2		1.	1.	.15	7.	
GRID VOLTAGE	10		1.5	1.5	5	17	
FILAMENT VOLTAGE	2.47	2.52	2.54	2.56	2.5	2.49	5

SPEAKER FIELD 115 volts   LINE VOLTAGE 115
TOTAL PLATE CURRENT 40 ma.   TOTAL WATTS 70

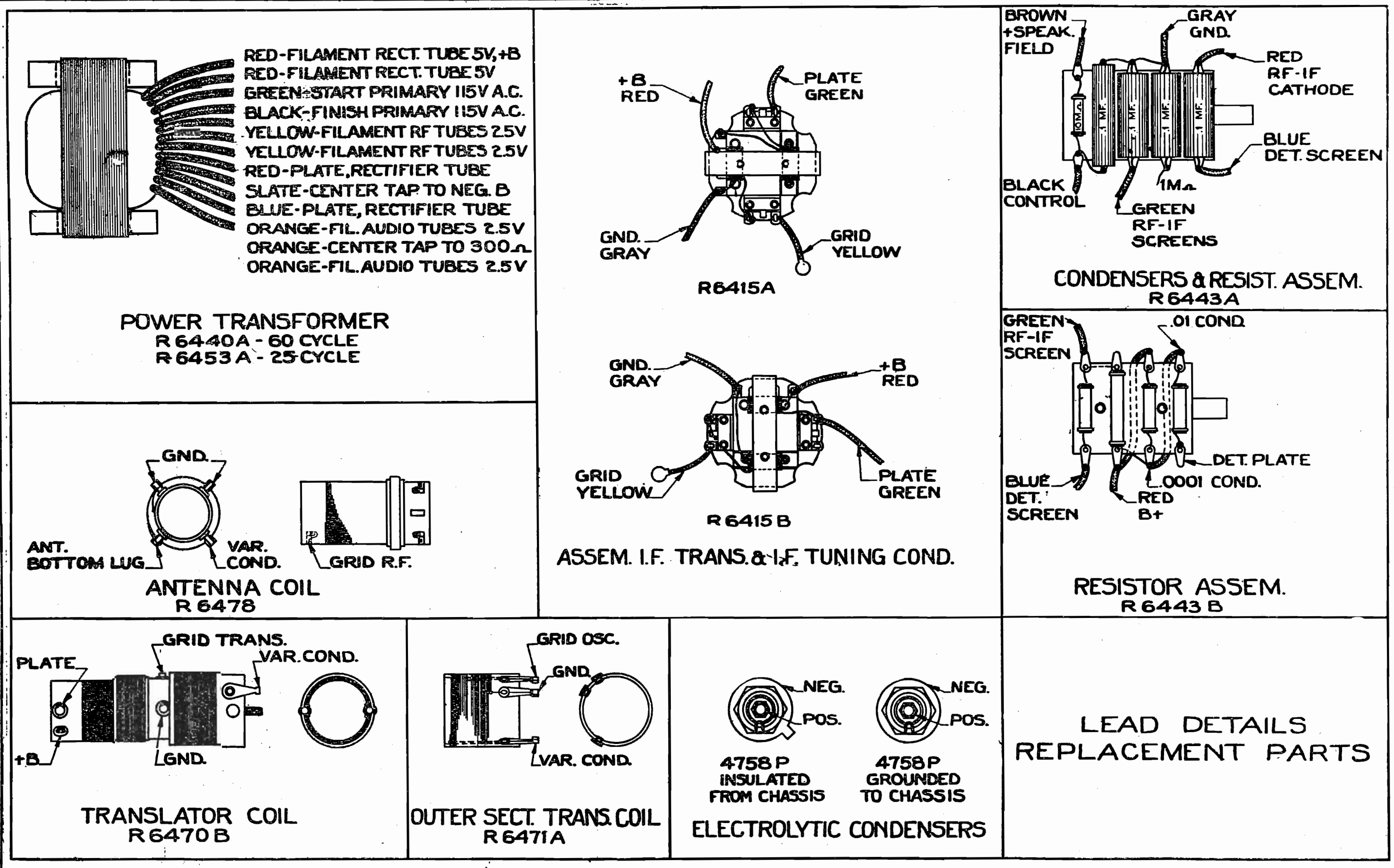
MODEL 51
Parts Coding

COLONIAL RADIO CORP



MODEL 52
Parts Coding

COLONIAL RADIO CORP.



Note: All voltages measured with 1000 ohm per volt voltmeter. 280 output measured on 750 volt scale, DC voltages under 10 volts measured on 10 voltscale, and all others measured on 250 volt scale. Control grid bias measured from cathode to ground. 247 bias measured across 400 ohm bias resistor.

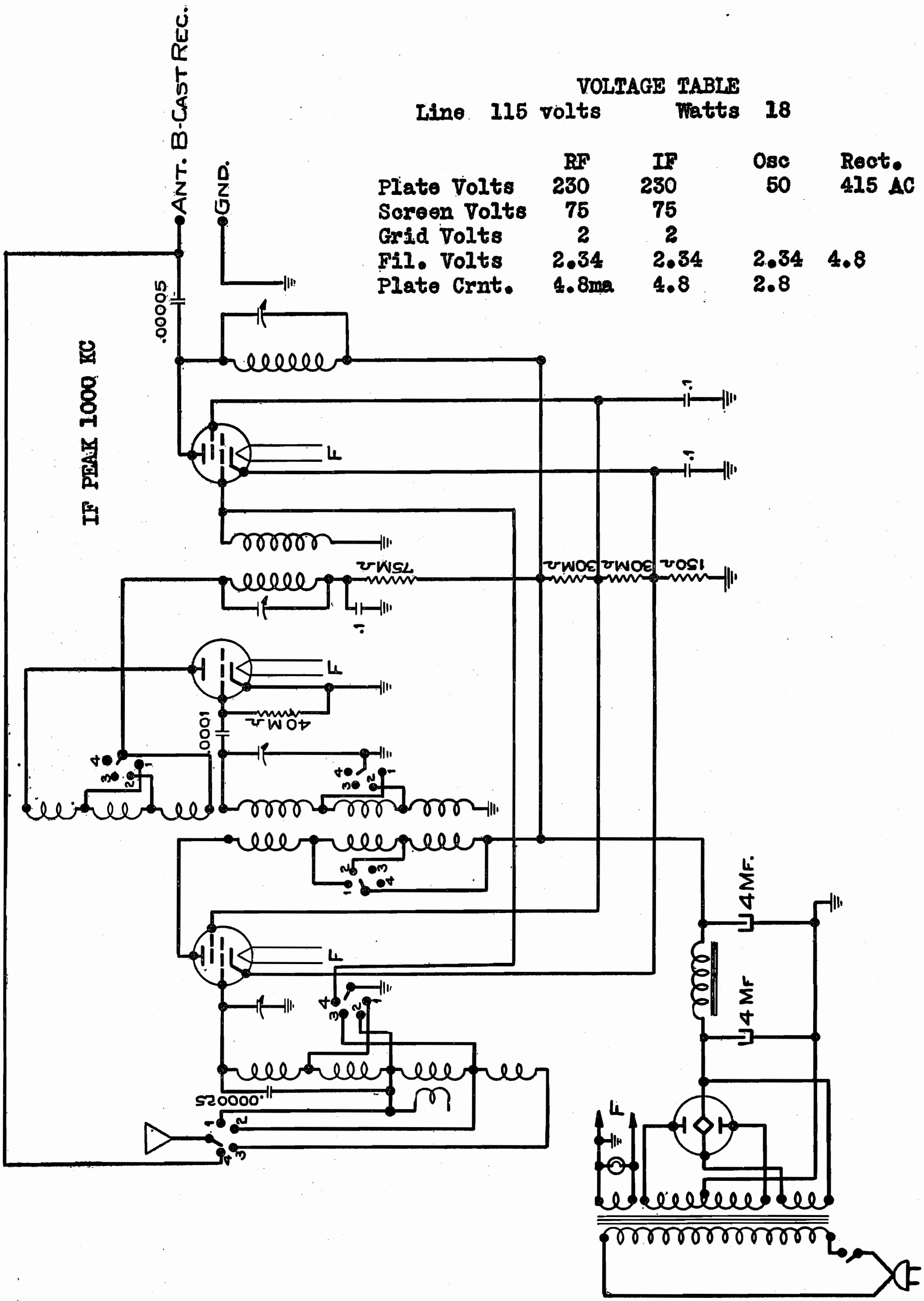
MODEL 55
Schematic
Voltage

COLONIAL RADIO CORP.

VOLTAGE TABLE

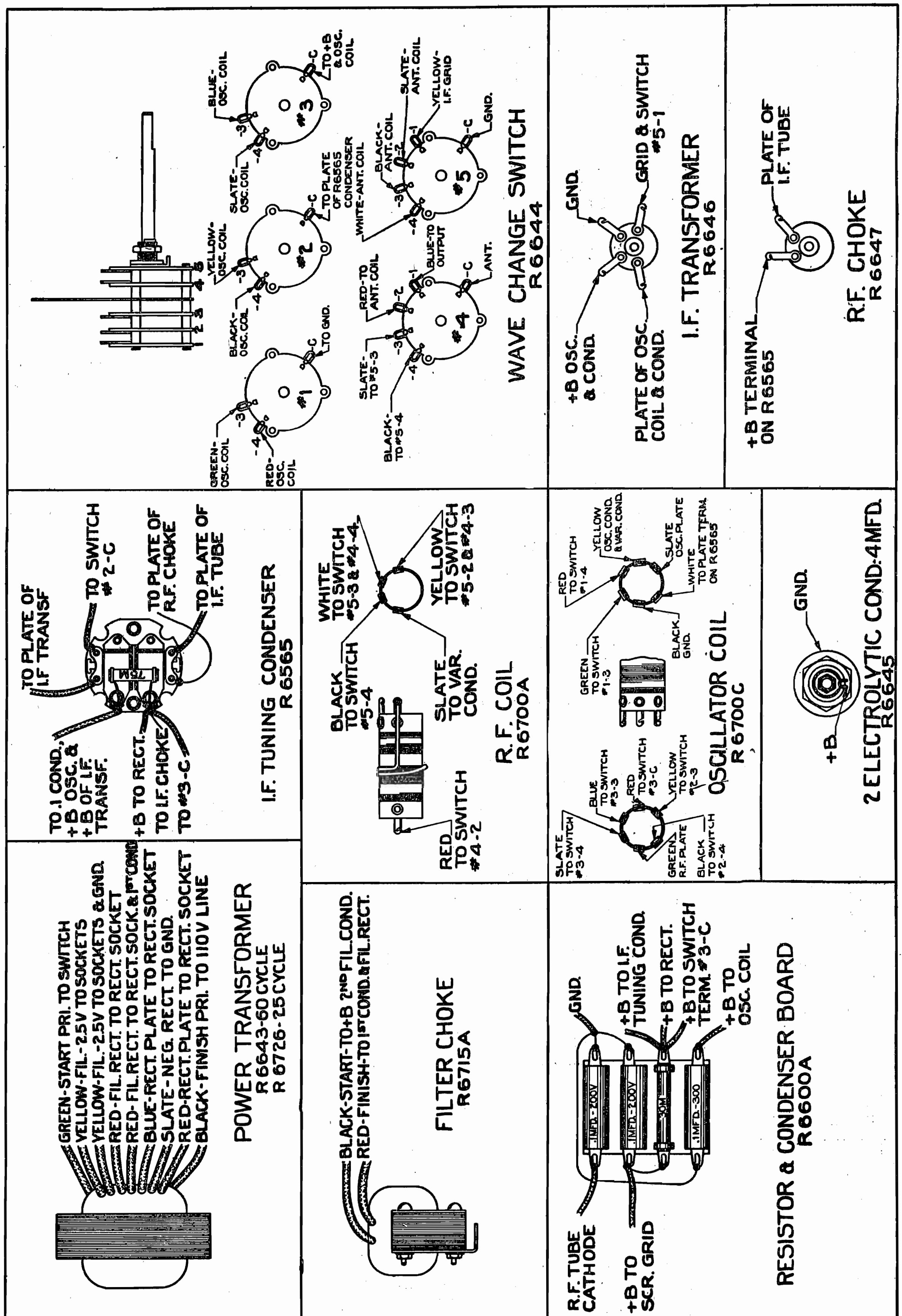
Line 115 volts   Watts 18

	RF	IF	Osc	Rect.
Plate Volts	230	230	50	415 AC
Screen Volts	75	75		
Grid Volts	2	2		
Fil. Volts	2.34	2.34	2.34	4.8
Plate Crnt.	4.8ma	4.8	2.8	



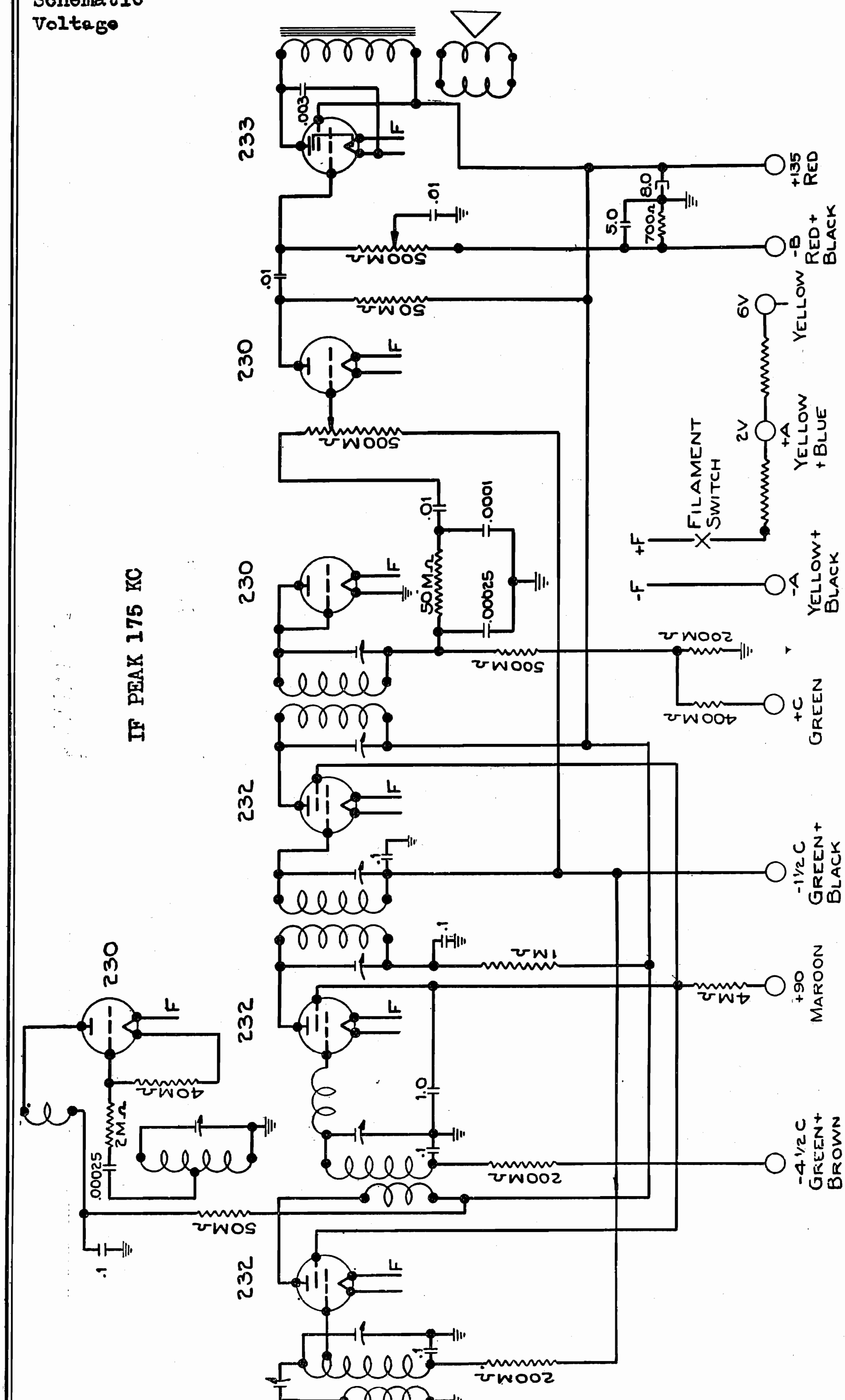
MODEL 55
Parts Coding

COLONIAL RADIO CORP.



MODEL 56
Schematic
Voltage

COLONIAL RADIO CORP.

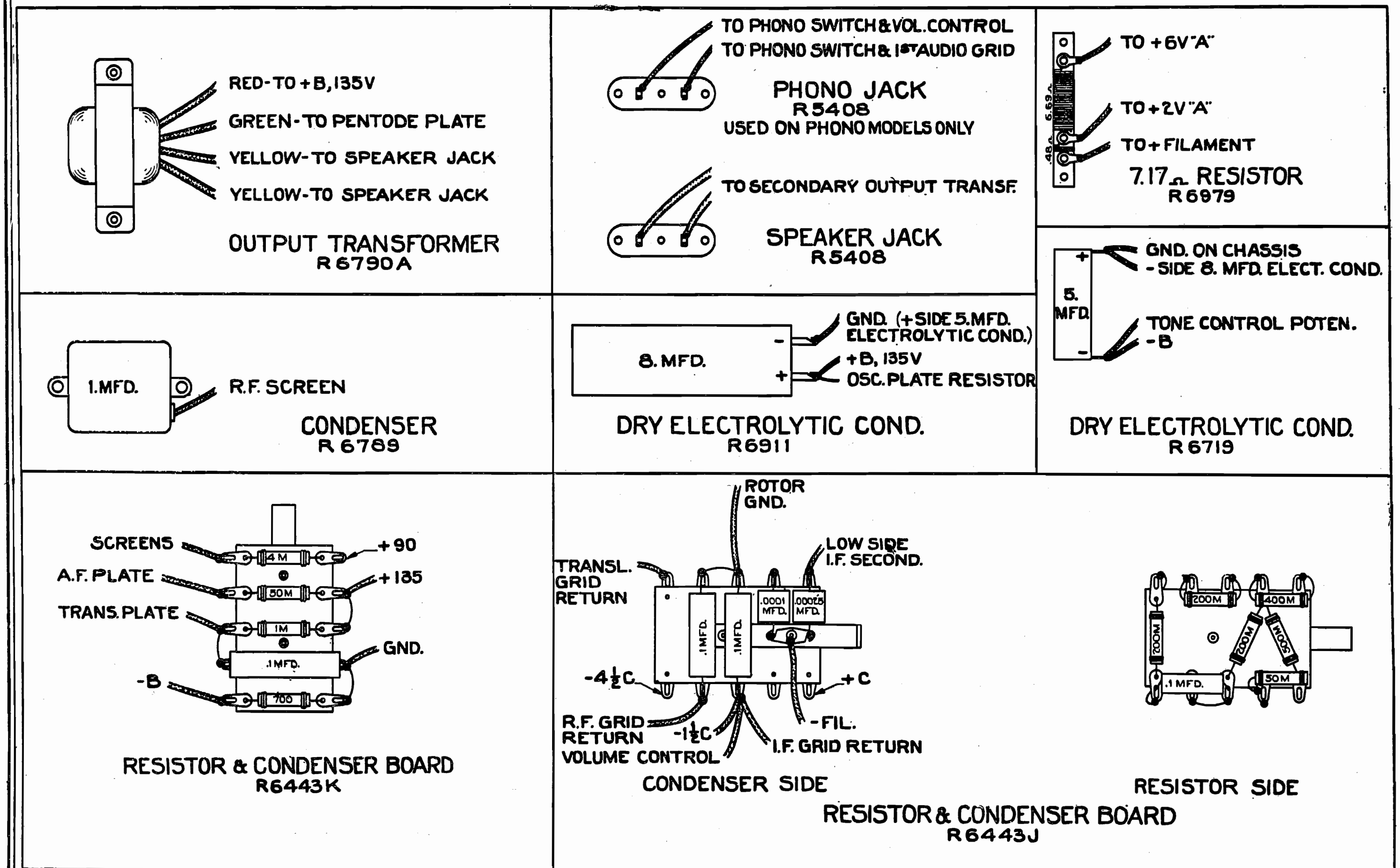


	RF	Osc	Tran	Det-AVC	1st AF	Output	IF
Plate Volts	125	35	123	---	50	122	125
Plate Crnt. ma	1.5	2.0	.5	---	.5	14.	1.5
Screen Volts	67.5	--	67.5	---	---	125	67.5
Grid Volts	1.5	--	4.5	----	1.5	13.5*	1.5
Filament Volts	2.	2.	2.	2.	2.	2.	

* Across 700 ohm bias resistor

COLONIAL RADIO CORP.

MODEL 56
Parts Coding

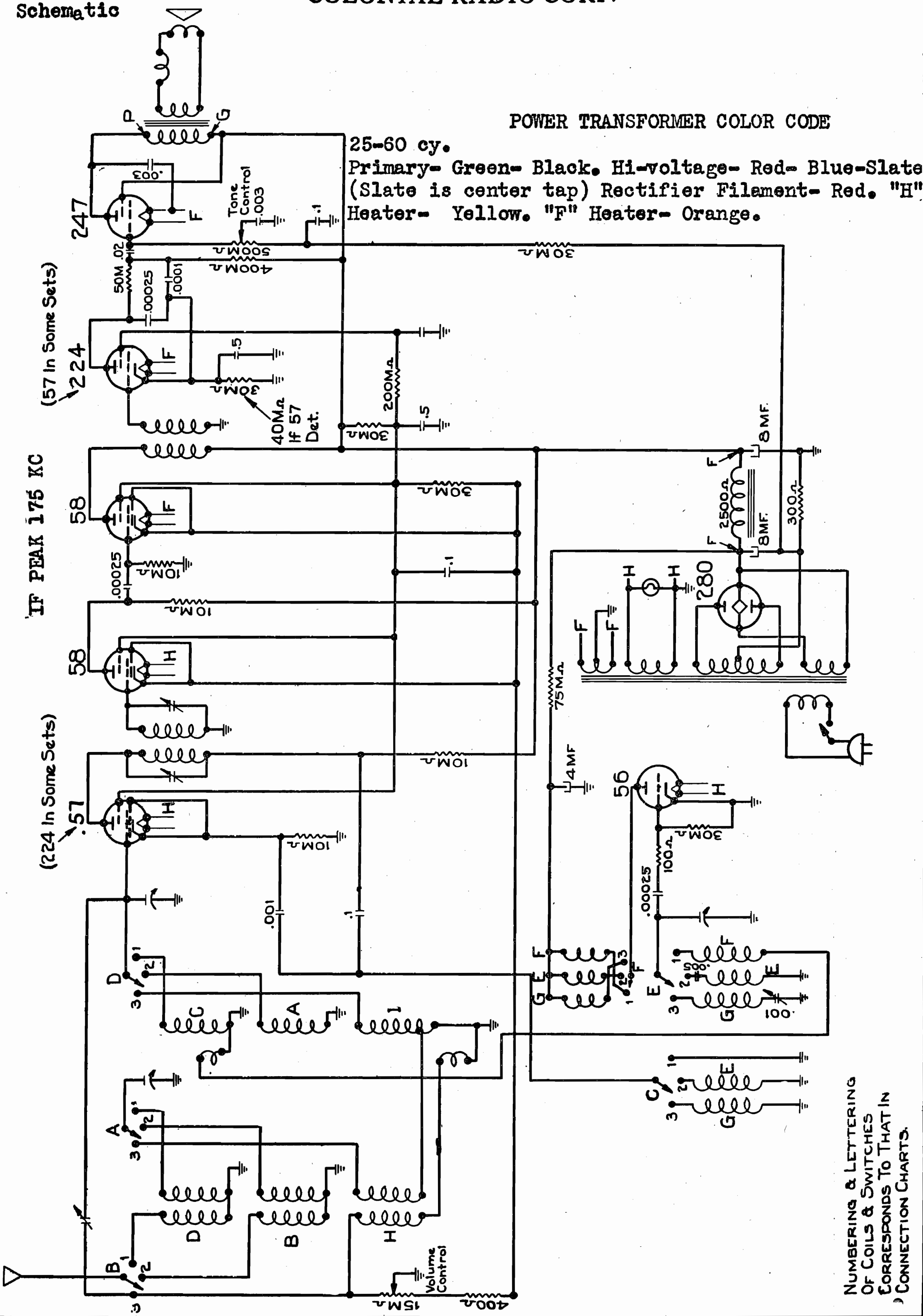


MODEL 62
Schematic

COLONIAL RADIO CORP.

POWER TRANSFORMER COLOR CODE

25-60 cy.
Primary- Green- Black. Hi-voltage- Red- Blue-Slate (Slate is center tap) Rectifier Filament- Red. "H" Heater- Yellow. "F" Heater- Orange.



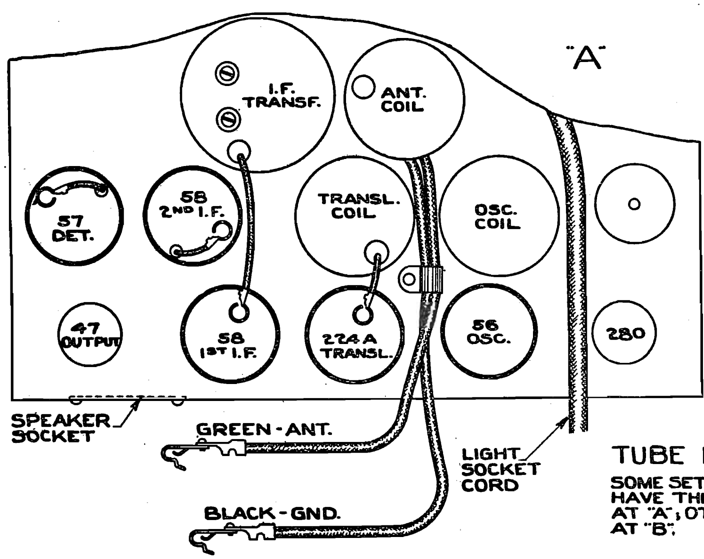
NUMBERING & LETTERING OF COILS & SWITCHES CORRESPONDS TO THAT IN CONNECTION CHARTS.

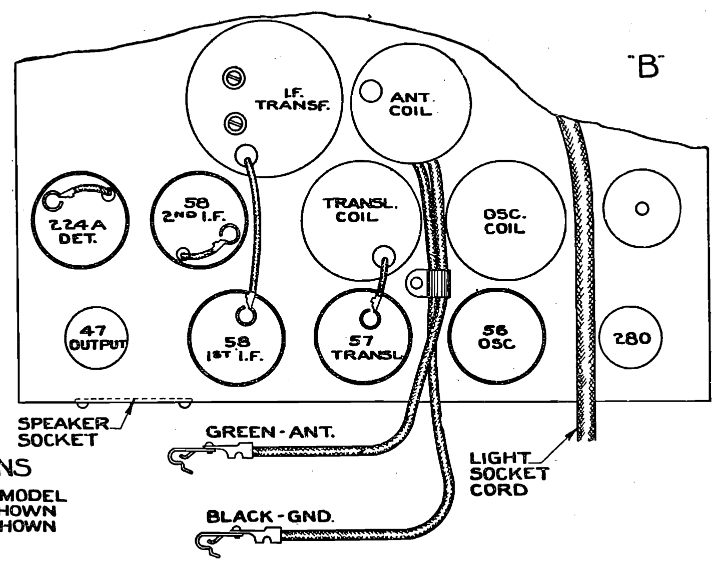
COLONIAL RADIO CORP.

MODEL 62
Voltage
Socket

TUBE	Fil. Volt.	Plate Volt. Vol. Max.	Plate Volt. Vol. Min.	Screen Volt. Vol. Max.	Screen Volt. Vol. Min.	Control Grid V. Vol. Max.	Control Grid V. Vol. Min.	Plate Current Vol. Max.	Plate Current Vol. Min.	Screen Current Vol. Max.	Screen Current Vol. Min.
224 - Translator *** 57 - Translator	2.5 2.5	215 215	215 215	75 75	125 125	-6 -5	-10 -7.5	.5 .5	.8 .5	.2 .25	.2 .25
58 - First I.F.	2.5	175	175	75	75	-4	-45	3.5	0	1	0
58 - Second I.F.	2.5	220	180	80	80	-4	-45	4.5	0	1	0
57 - Second Detector*** 224 - Second Detector	2.5 2.5	75 64	78 64	40 40	70 70	-3 3.6	-5 -4.6	.1 .25	.1 .25	.05 .05	.05 .05
247 - Output	2.5	215	225	250	260	**	**	26.5	32	5.5	6.75
56 - Oscillator	2.5	40 - 60 *						4			
280 - Rectifier	4.8	Max. DC Volts - 350						25 M.A. Each Plate			

* 40 Volts when not oscillating; 60 Volts when oscillating. Stop from oscillating by touching finger to grid. Line - 117 Volts; Watts - 65.





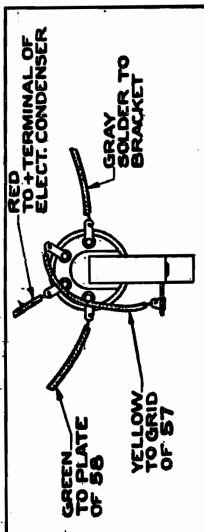
TUBE POSITIONS
SOME SETS OF THIS MODEL HAVE THE LAYOUT SHOWN AT "A", OTHERS AS SHOWN AT "B".

** 530,000 ohms in series.

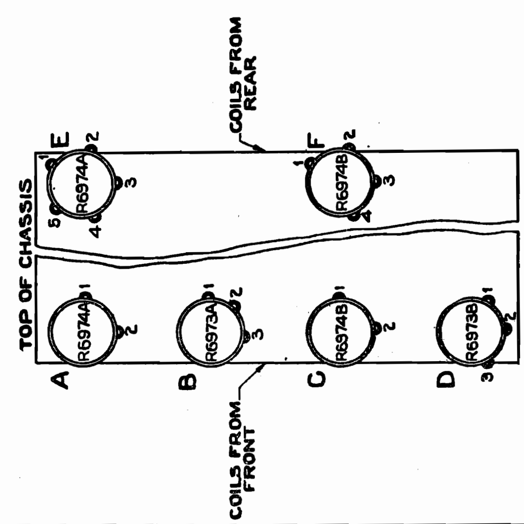
*** Some of these sets have a 224 translator and a 57 detector.
Others have a 57 translator and a 224 detector.

MODEL 62
Parts Coding

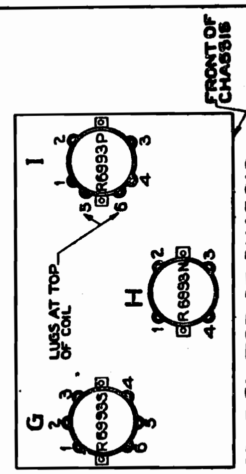
COLONIAL RADIO CORP.



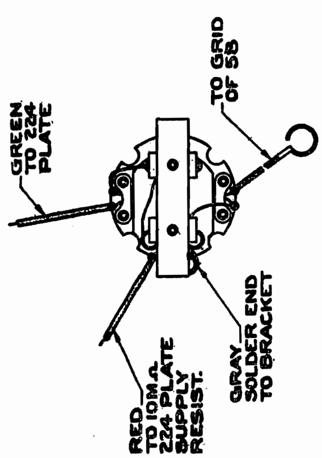
2ND I.F. TRANSFORMER
R 7056 B



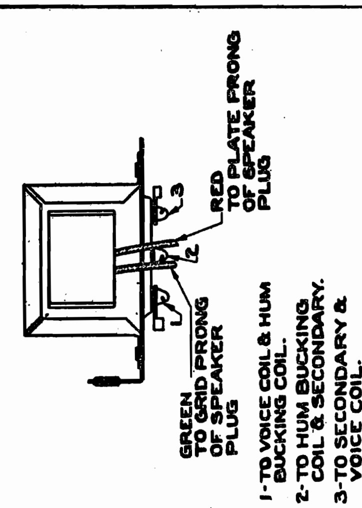
POSITIONS OF COILS & LUGS
LETTERING & NUMBERING CORRESPONDS TO THAT IN SCHEMATIC DIAGRAM & CONNECTION CHART.



COILS ON TOP OF CHASSIS



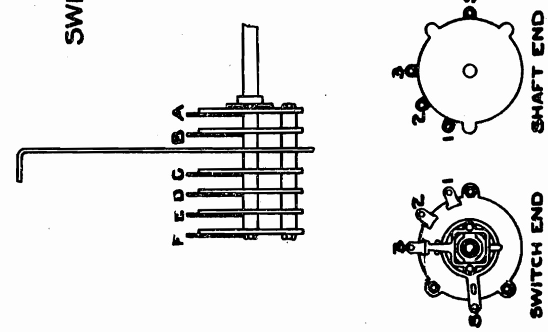
1ST I.F. TRANSFORMER
R6415L



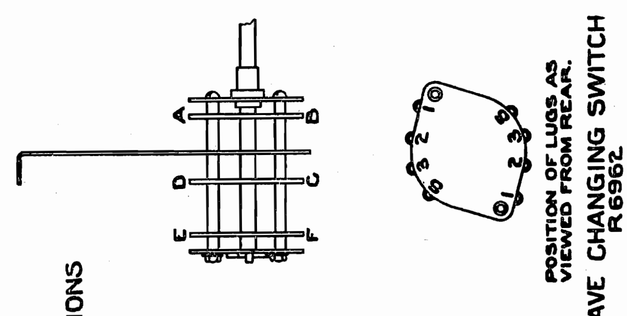
1-TO VOICE COIL & HUM BUCKING COIL.
2-TO HUM BUCKING COIL & SECONDARY.
3-TO SECONDARY & VOICE COIL.

OUTPUT TRANSFORMER
S 6317A

SWITCH CONNECTIONS



WAVE CHANGING SWITCH
R 7238



POSITION OF LUGS AS VIEWED FROM REAR.

WAVE CHANGING SWITCH
R6962

SOME SETS OF THIS MODEL HAVE THE R6962 SWITCH & OTHERS THE R 7238.

LETTERING & NUMBERING CORRESPONDS TO THAT IN SCHEMATIC DIAGRAM & CONNECTION CHART.

COLONIAL RADIO CORP

MODEL 62
Coil Connections

Should the contacts of the wave changing switch become noisy in time, they can be cleaned with a piece of absorbent cotton twisted around a toothpick and dipped in alcohol, Carbona, carbon tetrachloride or similar substance.

The positions of the wave changing switch are:

#1 (Furthest left or counter-clockwise) 5000 to 16000 kc

#2 1600 to 5100 kc

#3 550 to 1600 kc

Coil A

Lug #1 - To switch plate "D", lug 2
Lug #2 - To coil "C", lug 1, and ground

Coil B

Lug #1 - To switch plate "B", lug 2
Lug #2 - To switch plate "A", lug 2
Lug #3 - To coil "D", lug 3, and ground

Coil C

Lug #1 - To ground and to coil "A", lug 2
Lug #2 - To switch plate "D", lug 1

Coil D

Lug #1 - To switch plate "B", lug 1
Lug #2 - To switch plate "A", lug 1
Lug #3 - To ground and coil "B", lug 3

Coil E

Lug #1 - To switch plate "C", lug 2
Lug #2 - To switch plate "F", lug 2
Lug #3 - To coil "F", lug 1 and to + side of 4 MFD. condenser mounted on rear chassis.
Lug #4 - To .005 condenser
Lug #5 - To ground

Coil F

Lug #1 - To coil "E", lug 3 and to 75M ohms resistor
Lug #2 - Blank
Lug #3 - To switch plate "E", lug 1
Lug #4 - To switch plate "F", lug 1

Coil G

Lug #1 - To switch plate "F", lug 3
Lug #2 - To + side of 4 MFD. condenser mounted on rear chassis
Lug #3 - To "High" side of padding condenser mounted on rear of variable tuning condensers.
Lug #4 - To switch plate "E", lug 3
Lug #5 - To ground
Lug #6 - To switch plate "C", lug 3

Coil H

Lug #1 - To volume control and image suppressor condenser mounted on top of second variable tuning condenser unit.
Lug #2 - To coil "I", lug 3
Lug #3 - To coil "I", lug 1
Lug #4 - To switch plate "A", lug 3

Coil I

Lug #1 - To coil "H", lug 3
Lug #2 - To ground
Lug #3 - To coil "H", lug 2
Lug #4 - To middle terminal of volume control
Lug #5 - To switch plate "D", lug 3
Lug #6 - To stator, middle variable tuning condenser unit and grid clip of translator tube.

The pilot light bracket is pulled off of its mounting on the chassis for replacement of the bulb.

MODEL 62
Switch Connections

COLONIAL RADIO CORP.

SWITCH CONNECTIONS *

Two types of switches are used in these receivers. Some have three plates and others six. In the illustrations the switches are so numbered and lettered that the coil and switch connections tabulated below are correct for either type switch.

Plate A

Lug #1 - To coil "D", lug 2
Lug #2 - To coil "B", lug 2
Lug #3 - To coil "H", lug 4
Lug S - To stator of #1(shaft-end unit) variable tuning condenser unit

Plate B

Lug #1 - To coil "D", lug 1
Lug #2 - To coil "B", lug 1
Lug #3 - To volume control and coil "H", lug 1
Lug S - To antenna lead

Plate C

Lug #1 - To ground
Lug #2 - To coil "E", lug 1
Lug #3 - To coil "G", lug 6
Dug S - To .1 and .001 condensers mounted on rear of chassis

Plate D

Lug #1 - To coil "C", lug 2
Lug #2 - To coil "A", lug 1
Lug #3 - To coil "I", lug 5
Lug S - To stator, second variable tuning condenser unit

Plate E

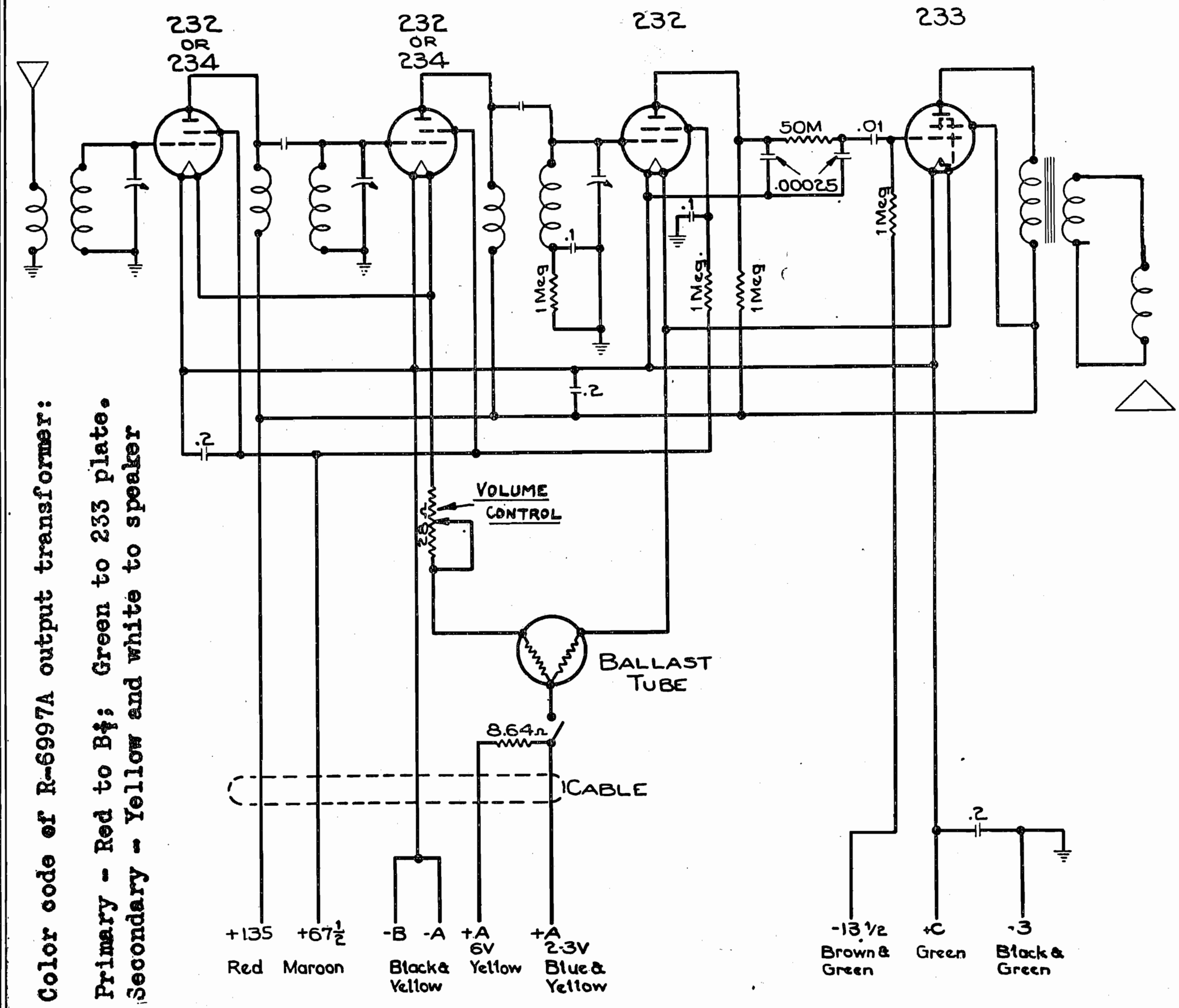
Lug #1 - To coil "F", lug 3
Lug #2 - To .005 condenser other side of which goes to coil "E", lug 4.
Lug #3 - To coil "G", lug 4
Lug S - To .00025 oscillator grid condenser and stator of number three variable tuning condenser unit.

Plate F

Lug #1 - To coil "F", lug 4
Lug #2 - To coil "E", lug 2
Lug #3 - To coil "G", lug 1
Lug S - To plate, 56 Oscillator

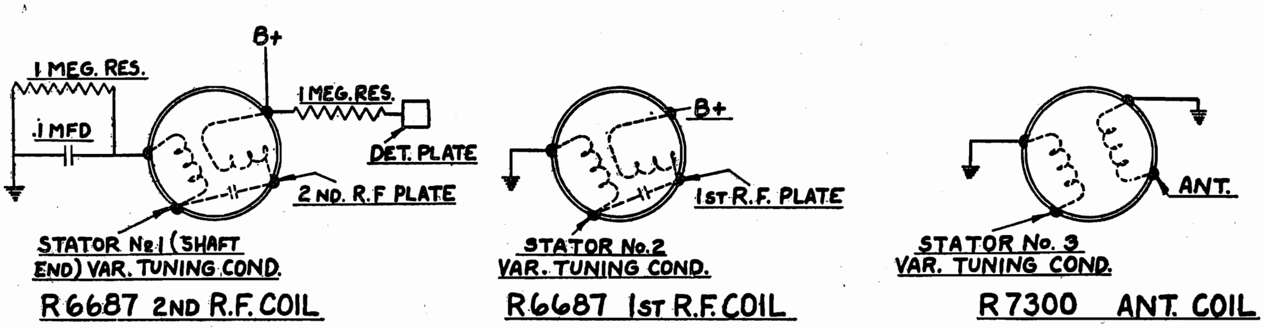
MODEL 65
Schematic

COLONIAL RADIO CORP.



Color code of R-6997A output transformer:

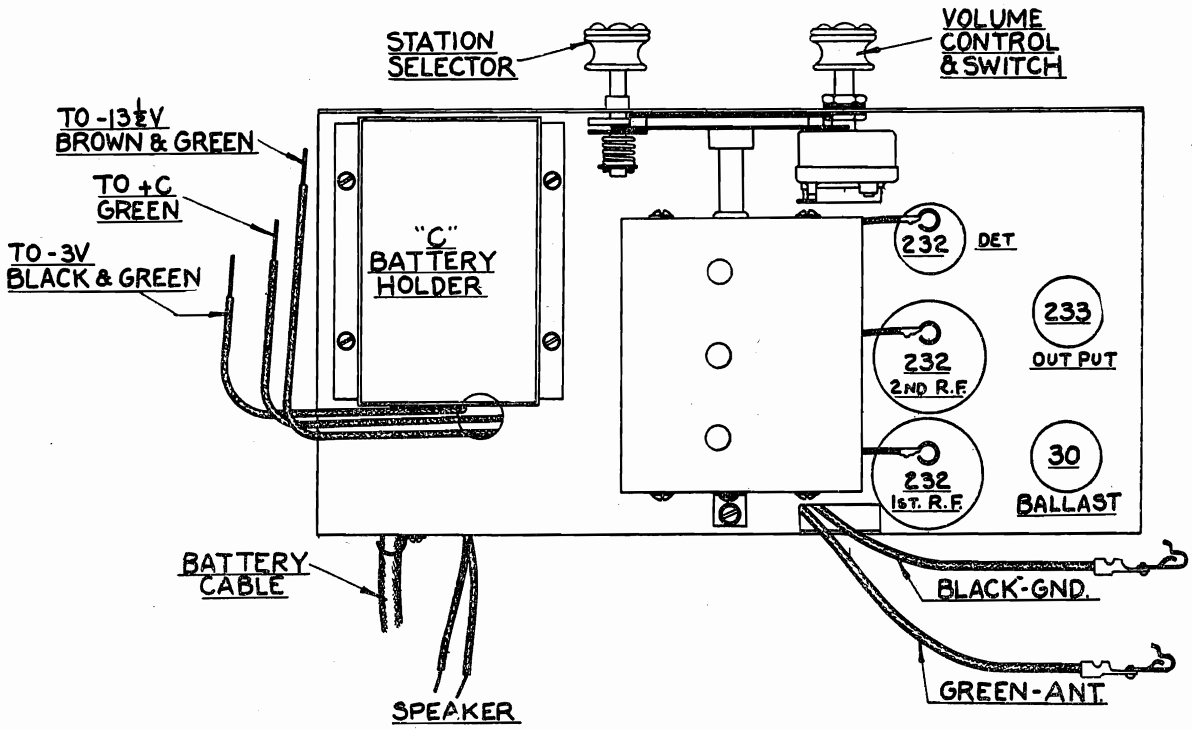
Primary - Red to B+; Green to 233 plate.
Secondary - Yellow and white to speaker



COIL CONNECTIONS
VIEWED FROM BOTTOM OF CHASSIS

MODEL 65
Voltage
Socket

COLONIAL RADIO CORP.



TUBE POSITIONS

TUBE	Filament Voltage	Plate Voltage	Screen Voltage	Control Grid V.	Plate Current	Screen Current
232 - First R.F.	2.1	135	67	-3	1.7	.125
232 - Second R.F.	2.1	135	67	-3	1.7	.125
232 - Detector	2.05	27*	13.5*	*	.05	Too low to read
233 - Output	2.05	135	135	*	14	4

Total "B" current drain - 22.4 M.A.
Total "A" current drain - 440 M.A.

* 1 Meg. resistor in series.

Grid, plate and screen voltages taken between negative side of filament and respective element. Volume Control at maximum.

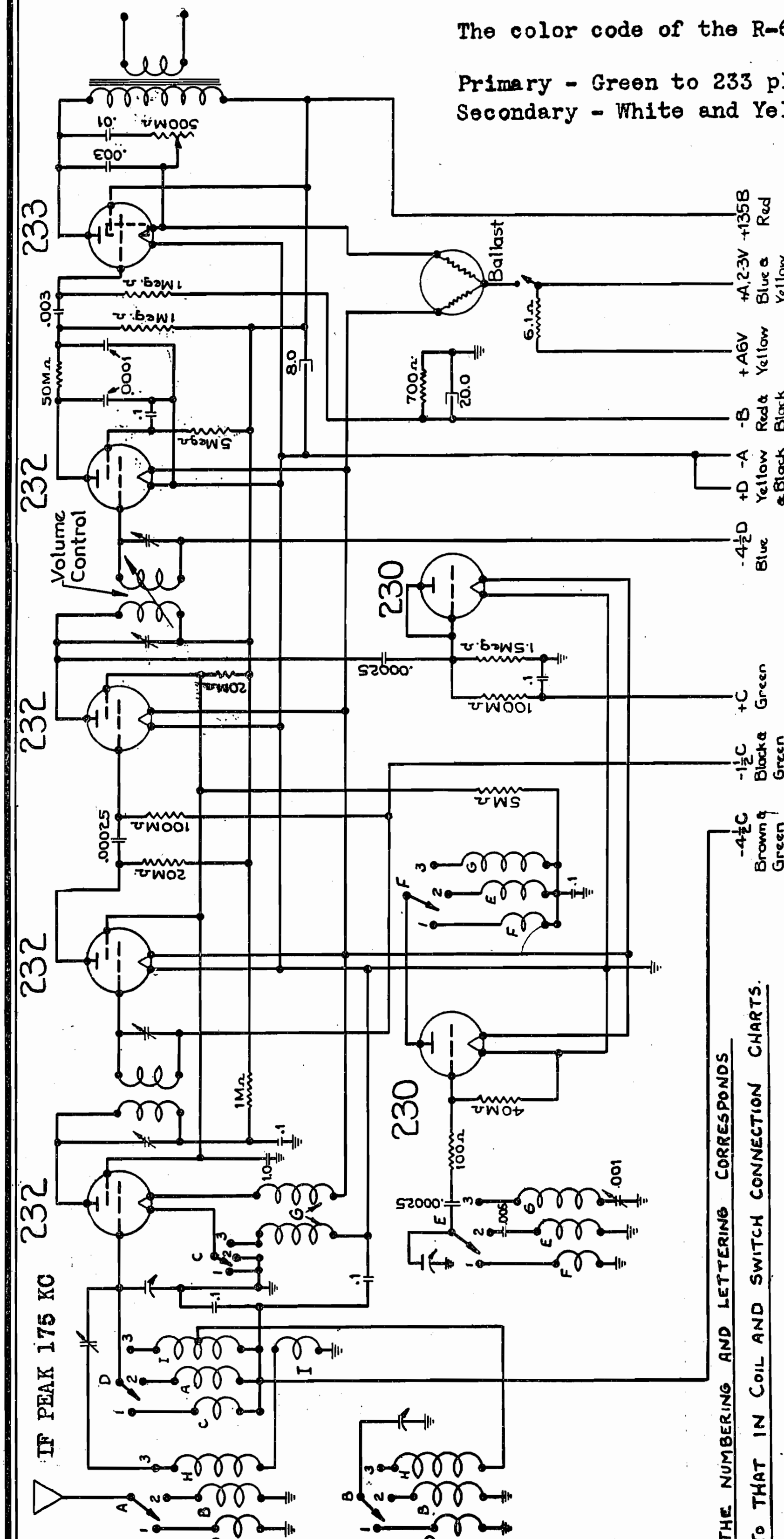
Control grid readings taken on 7.5 volt scale of 1000 ohms per volt meter; others on 250 volt scale. These are average values. Usually, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at rated plate voltage will serve as an indication of proper Grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of the cable may cause the circuit to oscillate and give erratic readings. Usually touching a finger to the grid will stop oscillation.

COLONIAL RADIO CORP.

MODEL 69
Schematic

The color code of the R-6790A output transformer is:

Primary - Green to 233 plate; Red to B+
Secondary - White and Yellow to speaker jacks.



THE NUMBERING AND LETTERING CORRESPONDS TO THAT IN COIL AND SWITCH CONNECTION CHARTS.
SWITCH LEVERS ARE "LUG S" IN CHARTS.

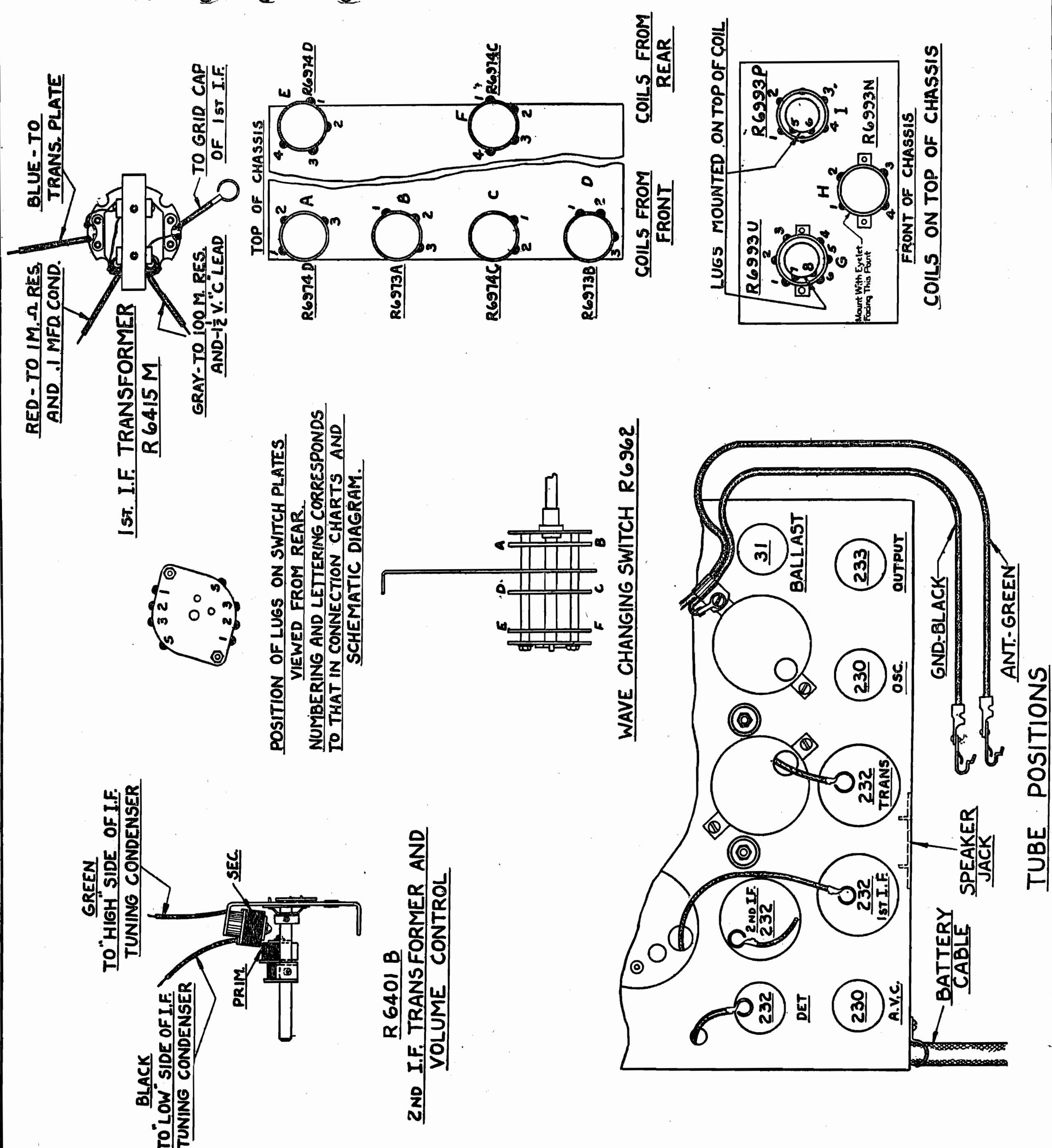
Should the IF transformers be replaced, it will be necessary to retune them. This can be done only if the service man has a 175 kc oscillator of reasonable accuracy. An insulated adjusting screw driver must be used since the primary tuning condensers are at high d.c. potential with respect to the chassis. Further, the automatic volume control must be shorted out by a connection from C+ to the chassis. The first stage IF transformer is mounted on top of the chassis and the adjusting screws are accessible through the holes in the top of the transformer shield can. The adjusting screws for the 2nd IF stage tuning condensers are accessible through the holes in the chassis to the right of the first IF transformer, facing the front of the chassis.

MODEL 69
Voltage
Socket
Parts Coding

COLONIAL RADIO CORP.

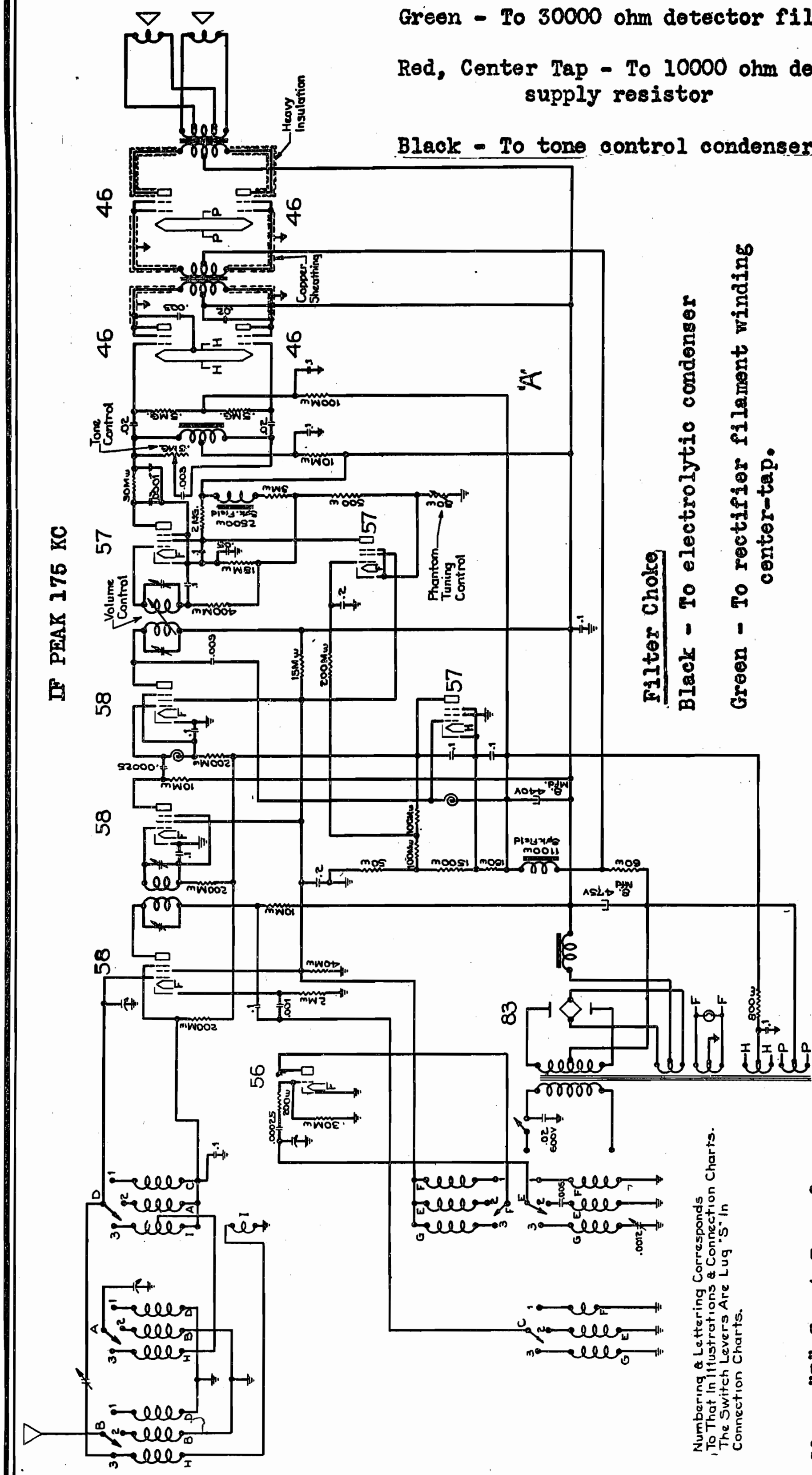
	Fil.	Plate	Screen	C.Grid	Plt. Crnt	Scr. Crnt
232 Translator	2.	118	50	1.	.6 ma	.05 ma
232 1st IF	2.	78	50	*	2.	.4
232 2nd IF	2.	118	50	*	1.5	.1
232 Detector	2.	15*	4*	-4.5	Too low to read	
233 Output	2.	112	120	*	11.	3.
230 Oscillator	2.	44-50**	--	--	2.5 - 2**	--
230 AVC	2.	Used as rectifier with plate and grid joined.				

* High resistance in series.
**Second value applies when tube is not oscillating. Stop oscillation by touching finger to grid.



COLONIAL RADIO CORP.

MODEL 71
Schematic
Transformer
Notes



Driver Input Auto-Transformer

Green - To 30000 ohm detector filter resistor

Red, Center Tap - To 10000 ohm detector plate supply resistor

Black - To tone control condenser

Filter Choke

Black - To electrolytic condenser

Green - To rectifier filament winding center-tap.

Class "B" Input Transformer

Primary:

Black, in Shielded Lead - To plate of the Driver tube next to A.V.C. tube.

Red, Center Tap - To B +

Black with Tracer, in Shielded Lead - To plate of the Driver tube next to Translator tube.

Shield Pigtail - To ground

Secondary:

Green in Shielded Lead - To grid of the Class "B" tube next to rectifier tube.

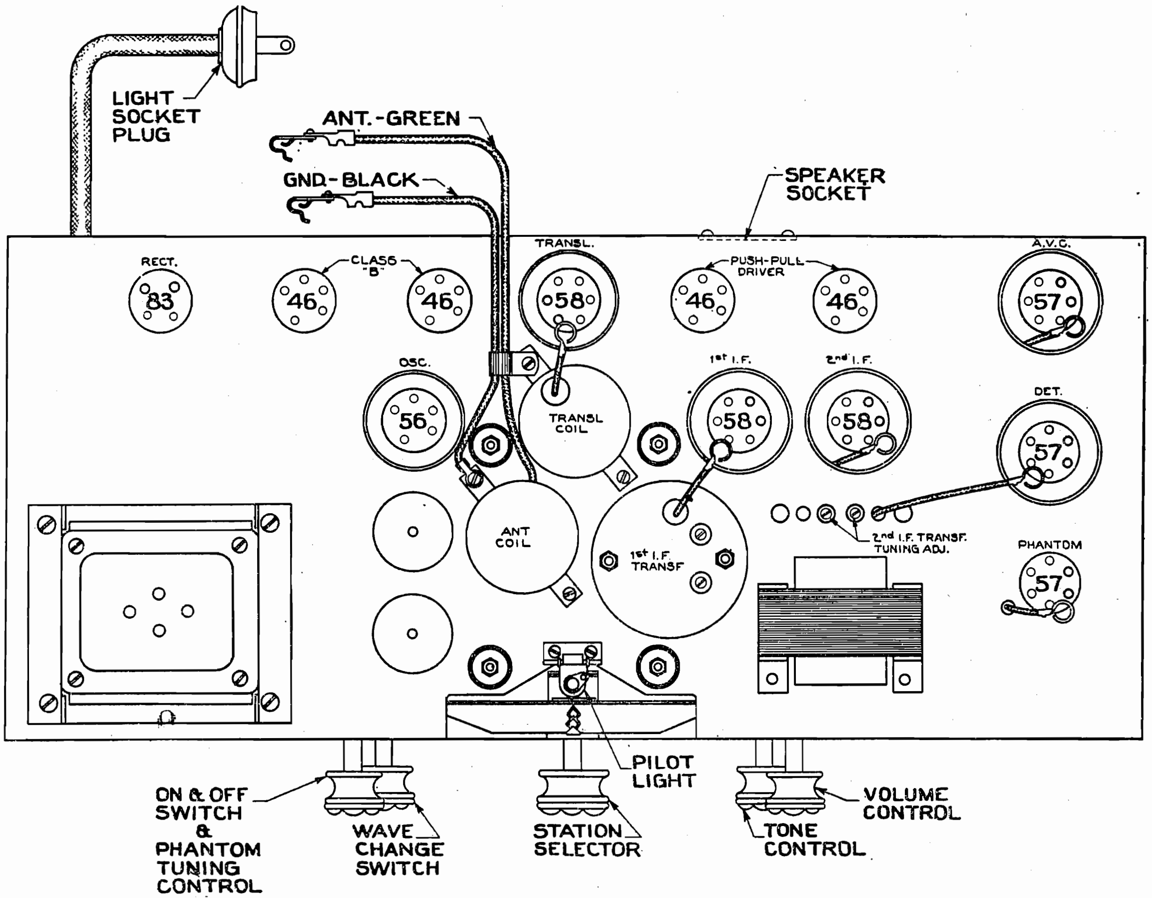
Slate, Center Tap - To 60 ohm bias resistor and heater prong of speaker socket.

Green with Tracer, in Shielded Lead - To grid of the Class "B" tube next to Translator tube.

Shield Pigtail - To ground.

MODEL 71
Socket
Voltage

COLONIAL RADIO CORP.



TUBE VOLTAGE and CURRENT CHART

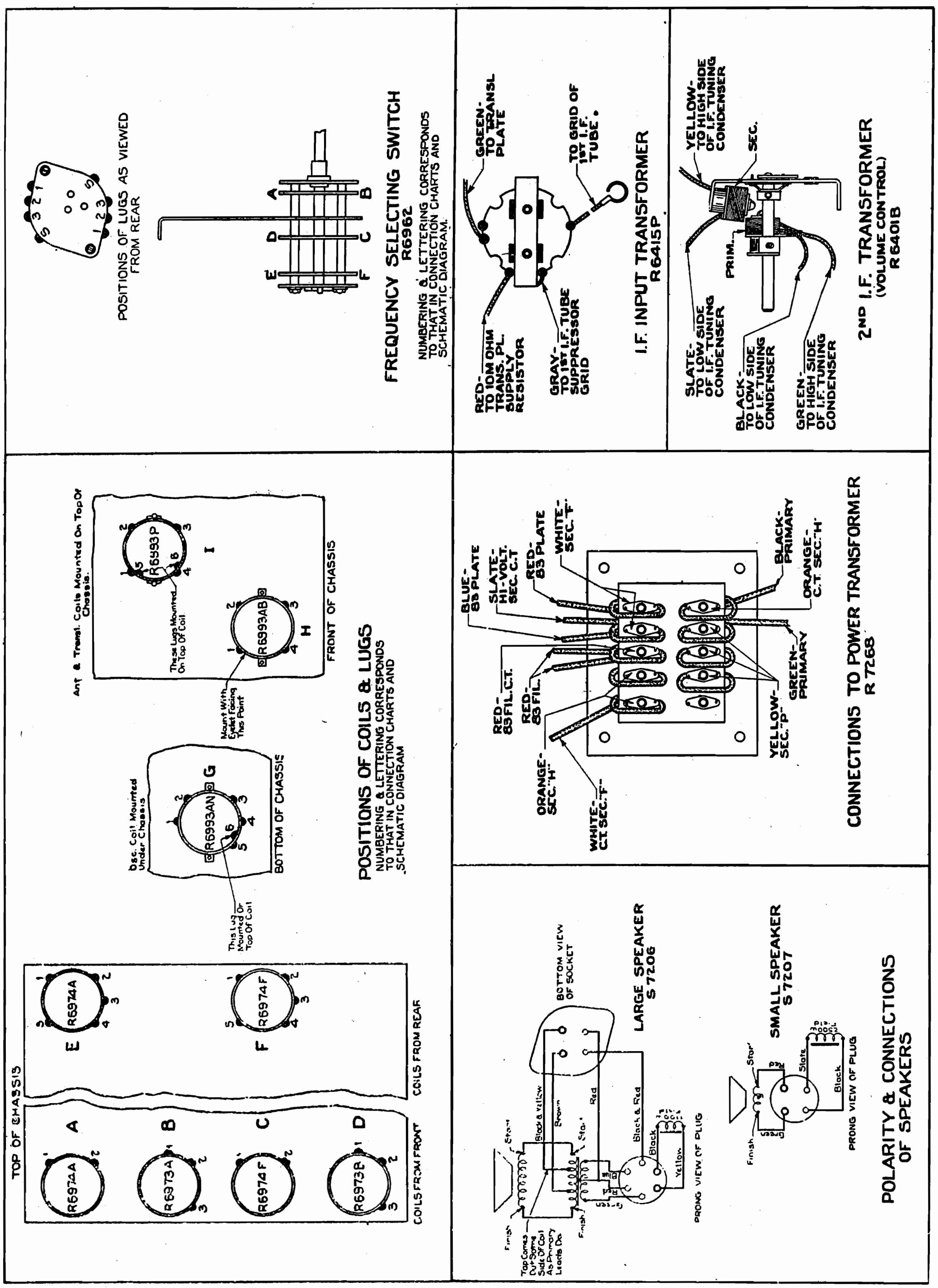
MODEL 71

TUBE	PLATE VOLTAGE	SCREEN VOLTAGE	GRID VOLTAGE	PLATE M.A.	SCREEN M.A.	GRID M.A.
58 - Translator	190	60	-5	.4	.2	
56 - Oscillator	65	--	-10	4	--	
58 - 1st IF	170	65	*	3	.8	
58 - 2nd IF	200	65	*	4.5	1	
57 - Detector	170	40a	*	.2a	b	
46 - Drivers	250	250	-10*	18	3.5	
46 - Class "B"	370	5	+5	21-50c	.5-5c	1.8-11c
57 - A.V.C.	50	80	-10	b	b	
57 - Phantom	45a	65a	*	b	1.25d	
83 - Rectifier	Max. d.c. - 390 Volts			70 m.a. each plate		

* High resistance in series
a "Phantom Tuning Control" knob turned all the way to the right
b Too low to read.
c The latter value when a loud signal is being received.
d "Phantom Turning Control" knob turned all the way to the left, (but not so far as to switch set off).

COLONIAL RADIO CORP.

MODEL 71
Parts Coding



MODEL 71
Service Notes

COLONIAL RADIO CORP.

THE AUTOMATIC VOLUME CONTROL ACTION

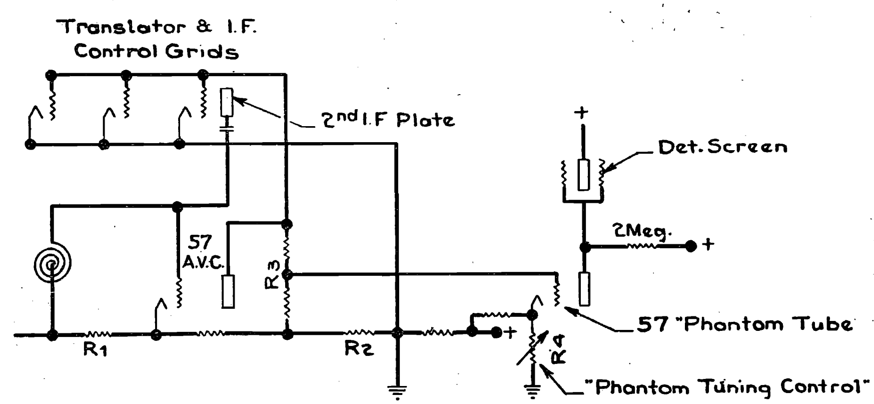
A portion of the signal existing at the plate of the second IF tube is impressed on the grid of the 57 A.V.C. tube. Normally, the A.V.C. grid is biased negatively by the voltage drop across R 1, and therefore no plate current flows through R 3. When the IF signal is impressed on the A.V.C. grid, the positive halves of the cycle cause plate current to flow, creating a voltage drop across R 3. Since R 3 is also in the grid return circuits of the translator and IF tubes, the drop across it changes the amplification of these tubes by changing their grid bias. The stronger the IF signal, the greater the A.V.C. plate current, the larger the negative bias on the translator and IF tubes and consequently the less their amplification. The gain, then, varies inversely with the strength of the incoming signal, and the signal voltage at the plate of the second IF remains substantially constant. With no signal or very weak signal, the negative bias on the translator and IF is approximately two volts, provided by the drop across R 2. With a strong signal the negative bias may be twenty-five volts due to the combined drops across R 2 and R 3.

THE "PHANTOM TUNING CONTROL" ACTION

Anyone who has tuned a sensitive receiver having A.V.C. knows how extremely noisy reception is at those portions of the dial in between comparatively strong stations. This irritating noise is due to the fact that the A.V.C. action makes the receiver gain maximum when no carrier is being received. As a result, static, electrical disturbances, heterodyne whistles from weak, distant stations, and tube noises are tremendously amplified. But, in the Model 1640, the "Phantom Tuning Control" completely overcomes this objectionable feature. Instead of being at maximum when no station is received, the gain is automatically reduced to zero by the "Phantom" control. The dial can be turned from end to end without fear of having one's ears assulted by crashes of noise. The receiver automatically remains completely silent until a station powerful enough to insure satisfactory reception is tuned in. All noises and weaker stations are rejected. Yet, none of the desirable features of A.V.C. are sacrificed.

As may be seen from the diagram, the grid of the 57 "Phantom" tube receives its bias from the drop across the adjustable resistor R 4 plus the drop across R 3. The plate of the "Phantom" tube and the detector screen are supplied from a common 2 megohm resistor. When a signal is received, the drop across R 3 biases the "Phantom" tube grid negatively, no plate current flows, and the only drop across the 2 megohm resistor is that due to the very small detector screen current. But, when no signal is impressed on the antenna, and therefore no voltage developed across R 3, plate current flows through the "Phantom" tube, producing a large drop across the 2 megohm resistor. As a result, the detector screen does not have proper voltage, the detector is made inoperative and there is no response to static and other noises. By adjustment of R 4, the sensitivity of the detector with respect to the strength of the incoming signal can be varied. When all the resistance of R 4 is in the circuit, it provides bias high enough so that no "Phantom" tube plate current flows, even though the received signal is very weak and hence no drop developed at R 3. Accordingly, the detector will be sensitive and the receiver will respond to weak signals. When the resistance of R 4 is at its minimum value, plate current will flow through the "Phantom" tube, the detector will be insensitive and the receiver silent, until a signal is received of sufficient strength so that the drop across R 3 cuts off the "Phantom" tube plate current. The action is very sharp. If the control is set for satisfactory reception from a station of certain strength, the receiver will be silent to a signal of only 2 d.b. less strength.

In operation, turning the "Phantom Tuning Control" knob to the right increases the resistance of R 4. It should not be turned further right than necessary for satisfactory reception of the desired station. However, it must be turned far enough to prevent the desired station from fading in and out abruptly. This happens when the knob position is almost but not quite far enough to the right.



SIMPLIFIED SCHEMATIC DIAGRAM OF

A.V.C. AND "PHANTOM TUNING CONTROL".

COLONIAL RADIO CORP.

MODEL 73
Schematic
Voltage

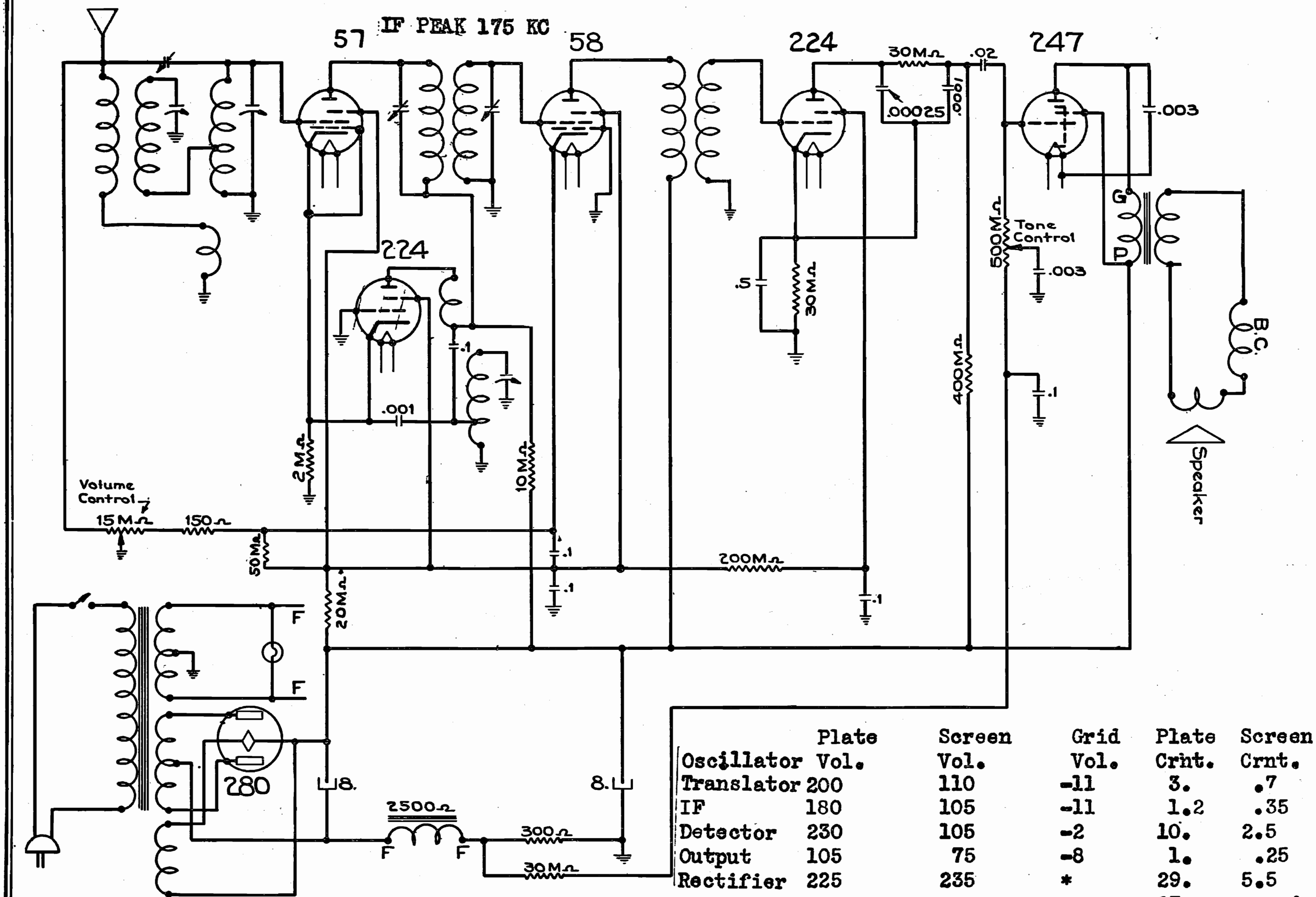


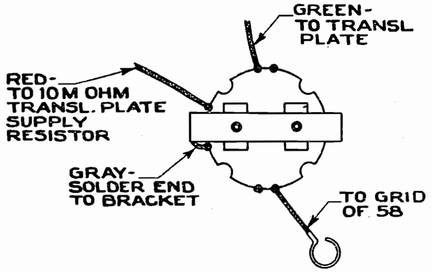
	Plate Vol.	Screen Vol.	Grid Vol.	Plate Crnt.	Screen Crnt.
Oscillator Translator	200	110	-11	3.	.7
IF	180	105	-11	1.2	.35
Detector	230	105	-2	10.	2.5
Output	105	75	-8	1.	.25
Rectifier	225	235	*	29.	5.5
				27. per anode	

This receiver tunes from 1765 kc to 520 kc.

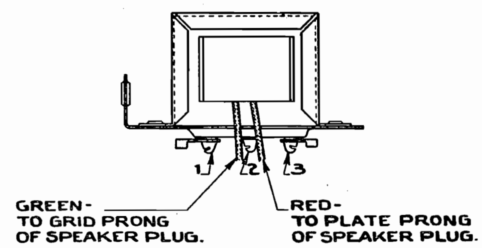
* 530,000 ohms in series. Volume control at maximum.

MODEL 73
Parts Coding

COLONIAL RADIO CORP.

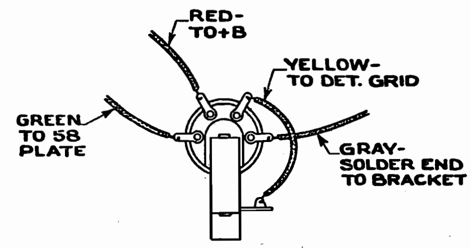


I.F. Input Transformer
R 6415 H

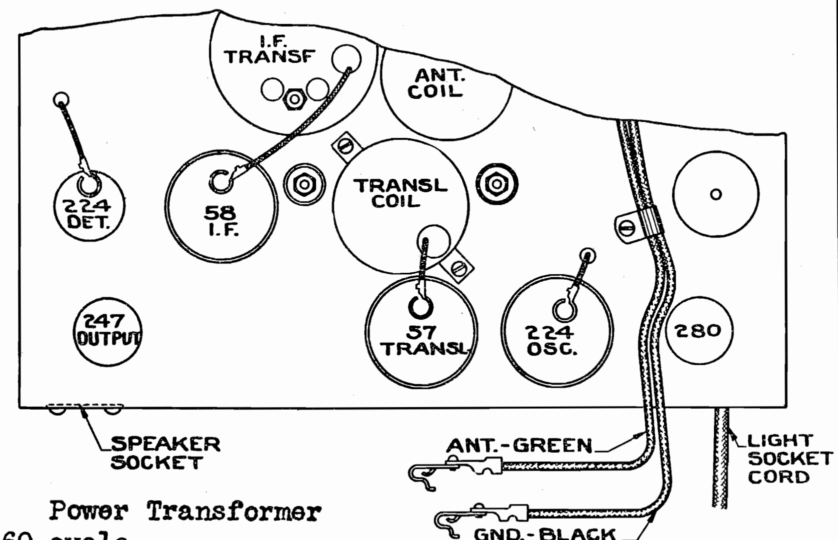


1 TO VOICE COIL & HUM BUCKING COIL.
2 TO HUM BUCKING COIL & SECONDARY.
3 TO SECONDARY & VOICE COIL

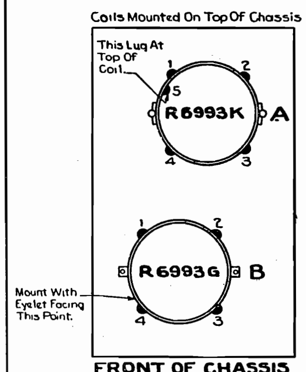
Output Transformer
S 6317A



I.F. Output Transformer
R 7056 A

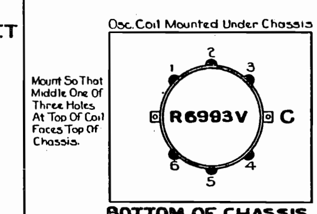


Power Transformer
25-60 cycle.
Primary: Green and Black.
High Voltage. Red and Blue; Slate center tap. Stranded wire leads.
Rectifier Fil: Red. Solid wire leads.
Heater: Yellow; Solid wire leads.



COIL "A"
LUG #1: TO COIL "B", LUG 2.
LUG #2: TO CENTER TERMINAL, VOL. CONTROL.
LUG #3: TO COIL "B", LUG 1.
LUG #4: TO GROUND.
LUG #5: TO STATOR, MIDDLE VAR. TUNING COND. UNIT; 57 GRID CLIP.

COIL "B"
LUG #1: TO COIL "A", LUG 3.
LUG #2: TO COIL "A", LUG 1.
LUG #3: TO STATOR, #1 (SHAFT END) VAR. TUNING CONDENSER UNIT.
LUG #4: TO ANT., VOL. CONTROL & IMAGE SUPPRESSOR CONDENSER.



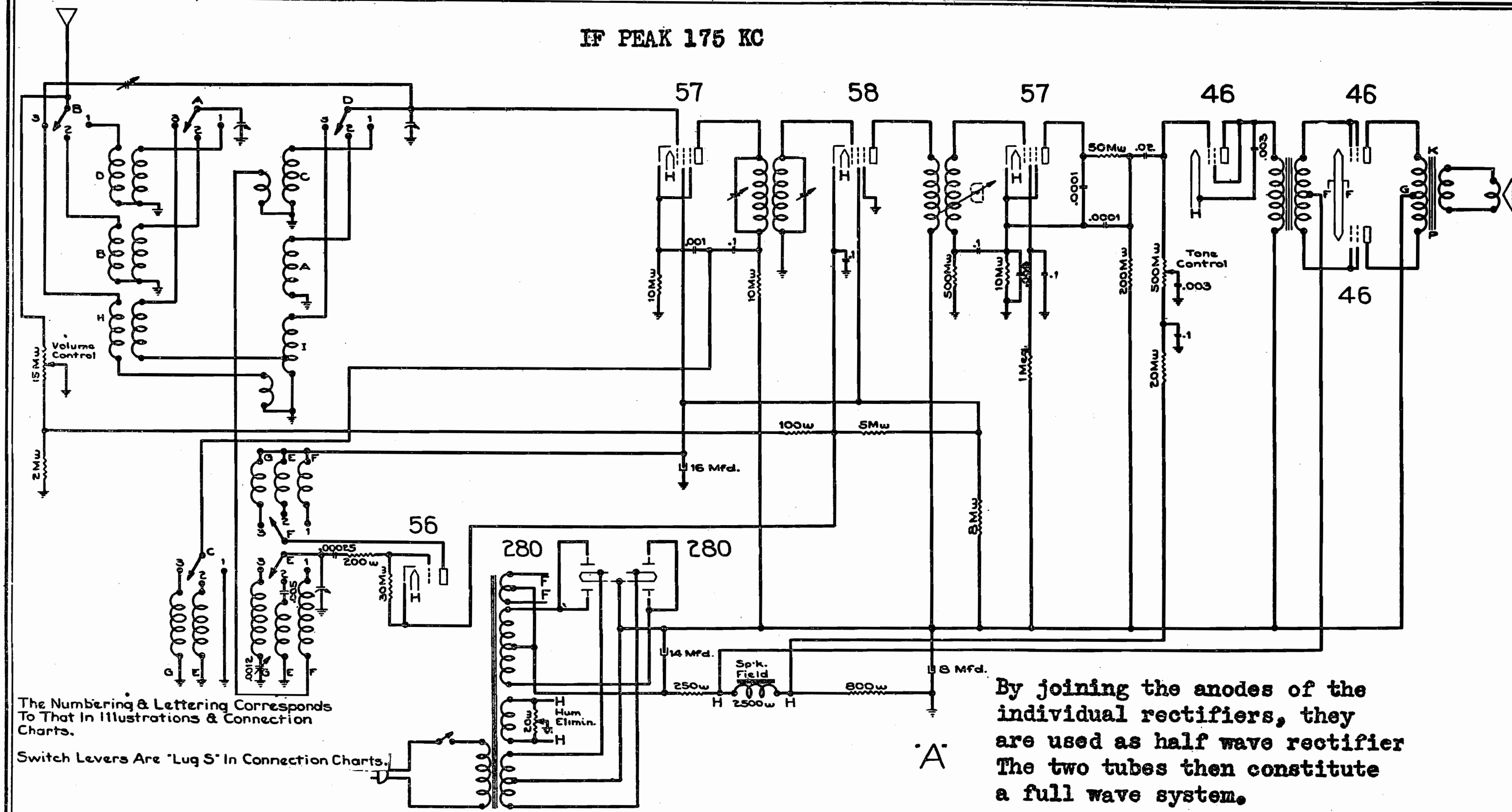
COIL "C"
LUG #1: TO STATOR, #3 VAR. TUNING COND. UNIT.
LUG #2: TO 10M OHM OSC. & TRANSL. PLATE SUPPLY RESISTOR.
LUG #3: TO 224 OSC. PLATE
LUG #4: BLANK
LUG #5: TO .001 & .1 CONDENSERS
LUG #6: TO VAR. TUNING COND. FRAME.

Polarity of speaker plug must be correct, otherwise bad hum will develop.

COLONIAL RADIO CORP.

MODEL 76
Schematic
#1

IF PEAK 175 KC



By joining the anodes of the individual rectifiers, they are used as half wave rectifier The two tubes then constitute a full wave system.

Power Transformer
Primary ---Green and Black
Hi-Voltage---Red and Blue with
Slate for center tap.
Rectifier Fil.--Red. Solid wire.
Output Fil.---Orange. Solid wire.
Heater.---Yellow. Solid wire.

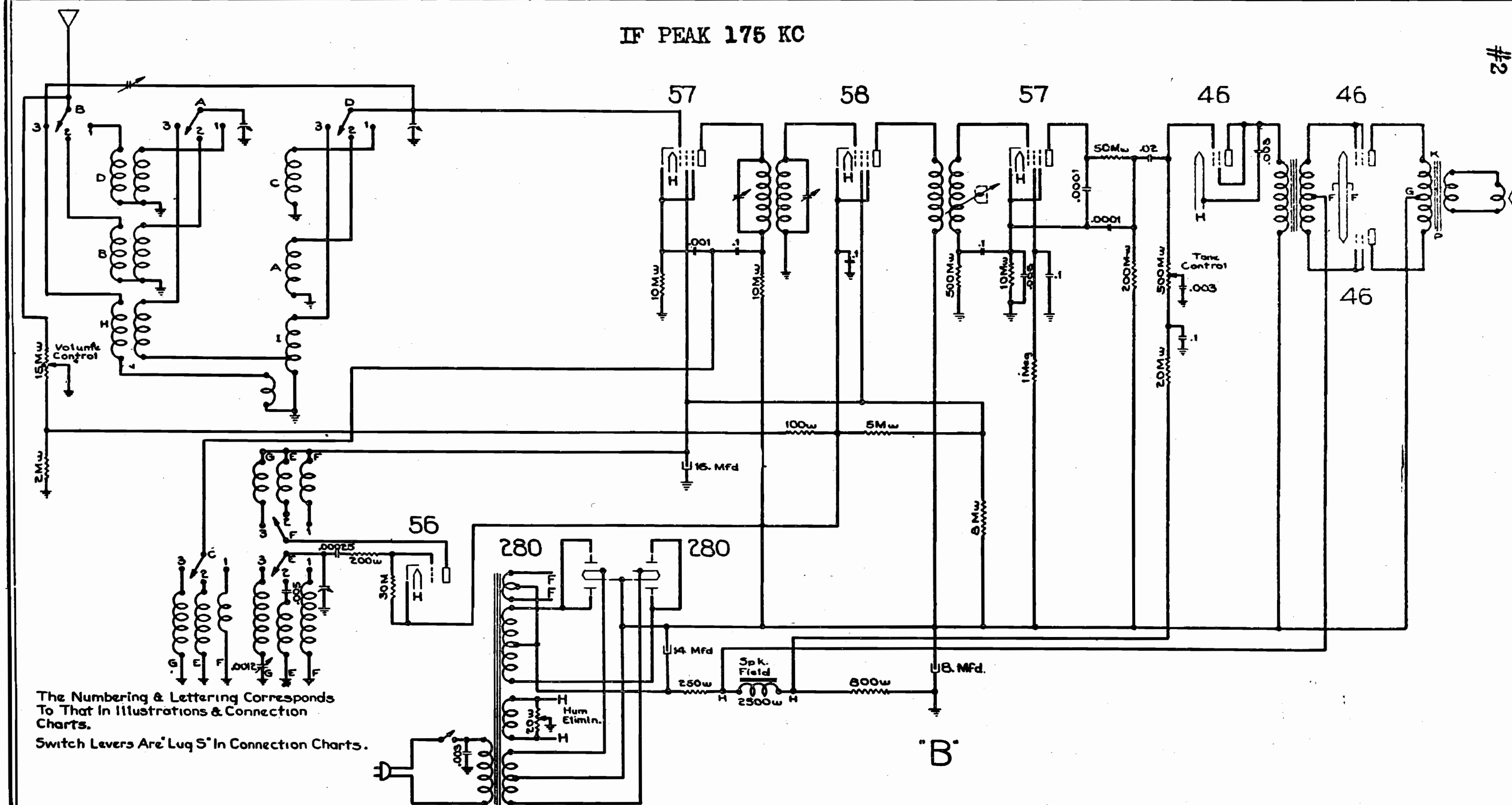
AF Transformer (Input)
Primary--- Black to driver plate.
Red to B plus.
Secondary --- Green to grid. Slate is center tap. In some sets the green lead has a tracer. Further, one of these leads (green) comes out singly from one side of the coil and connects to the grid of the 46 next to the translator.

AF Transformer (Output)
Green and Blue to 46 plates.
Red is center tap to B plus.
See schematic for connections to speaker plug.
Secondary.-- #16 enamelled wire leads to voice coil.

Speaker Field... Black and Slate.

MODEL 76
Schematic
#2

COLONIAL RADIO CORP.



Some sets of this model are wired as in Schematic "A"; others as in "B". Those wired as in "A" have four lugs on coil "F"; those wired as in "B" have five lugs.

Because constants must be correct for proper operation, substitute parts should not be used when replacements are needed. The polarity of the AF transformers is critical and must be maintained as shown in the illustration and Connection Chart when new transformers are installed.

By joining the anodes of the individual rectifiers, they are used as half wave rectifiers. The two tubes then constitute a full wave system.

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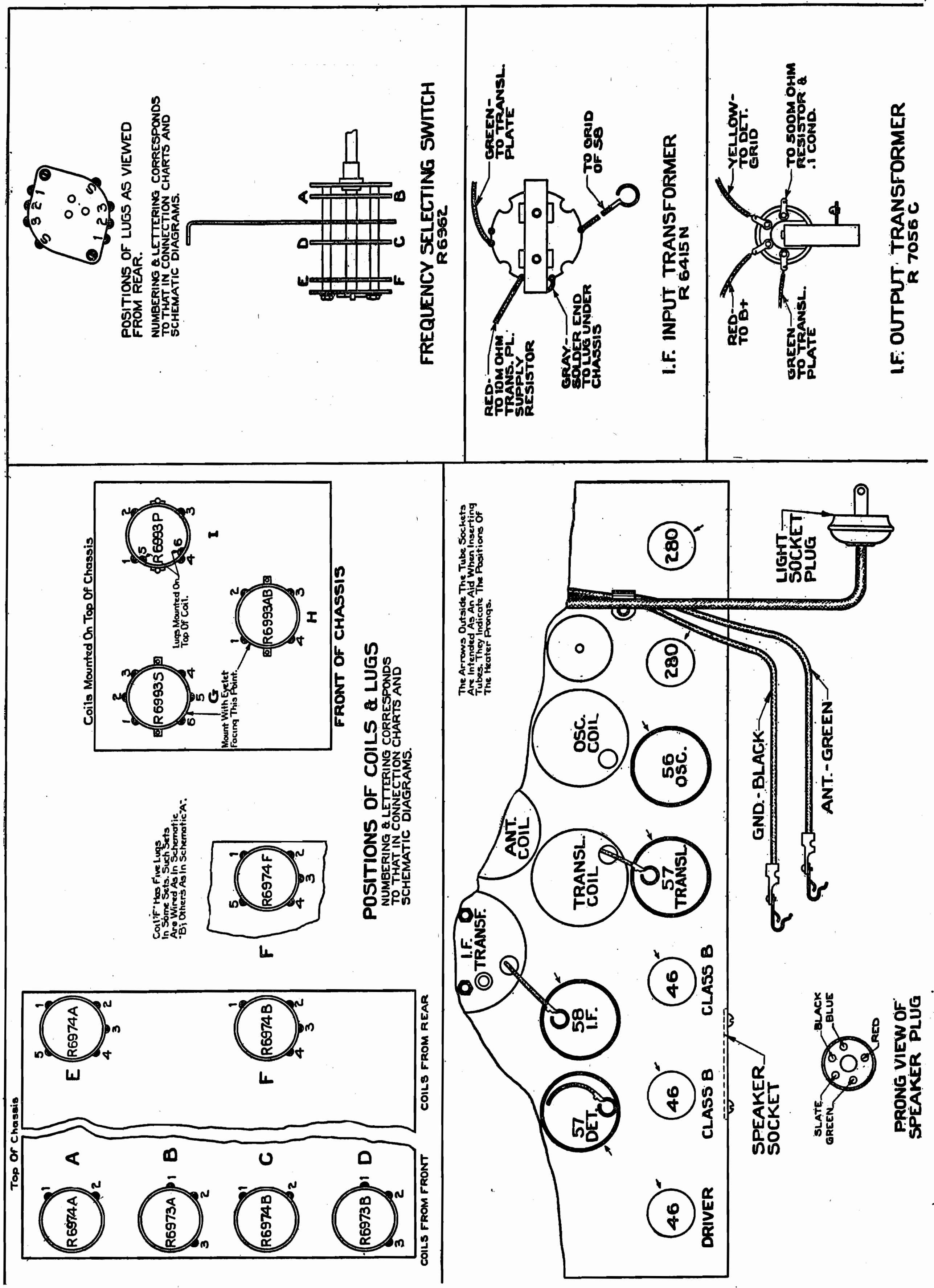
MODEL 76
Parts Coding



MODEL 76
Voltage
Alignment
Data

COLONIAL RADIO CORP.

INSTRUCTIONS FOR ALIGNING SHORT WAVE COILS

It sometimes happens that all-wave receivers which are in perfect alignment at broadcast frequencies are out of alignment on short waves. Reception of the same station at two points a few divisions apart on the dial, or poor sensitivity, results. This condition will be most liable to occur on the shortest wave-range, for two reasons. First, the required accuracy of alignment is much greater on this range. For instance, assume a receiver tuned to 600 kc. with its oscillator high in its frequency setting by .2%. That means the IF signal generated will be 176.55 kc. instead of 175 kc. Satisfactory reception still is possible. Now suppose the receiver is tuned to 15,000 kc. The IF signal then becomes 205 kc and reception is impossible, although the oscillator is still "out" only the same .2%. The second reason is that the coils for the shortest wave-range have the fewest turns and lowest inductance. Consequently, a change in the position of a single turn means a change in a comparatively large percentage of the total turns on the coil, with resultant effect on frequency. If a coil with ten turns has one shifted, 10% of the total are thereby shifted. But if a coil has a hundred turns and one is shifted, only 1% of the total are shifted. Thus it is apparent why realignment most often is necessary on the shortest wave-range.

When realignment is called for, it can be done as follows: Tune in a station at about 6200 kc. If the station is heard at two points, tune to the one of higher frequency. If none can be picked up, the noise level will serve as an indication of sensitivity. Then shift an end turn of wire toward or away from the other turns on the high-range translator and band-pass coils until maximum signal or noise is heard. These coils are the lower two of the four mounted on the switch plate. (Coils "C" and "D" in Service Manual illustrations). When the best spacing of the turn for maximum volume is found, the wire should be secured in place with amberoid or similar substance.

If the receiver is equipped with automatic volume control, this should be rendered inoperative or else a small signal input used. One method is to twist the antenna lead-in around the receiver's antenna lead for a few inches instead of connecting it directly to the antenna lead clip. The input can then be varied by changing the length for which the leads are twisted.

	Plate Vol.	Screen Vol.	Grid Vol.	Plate Crnt.	Screen Crnt.
56 Oscillator	75	-	-8	5	-
57 Translator	240	70	-6	.4	.1
58 IF	240	70	-2	9	2.
57 Detector	115	80	-2	.5	.1
46 Driver	240	240	-10*	12	2.5
46 Class "B"s	385	7	+7	30-65**	1.7-15**
280 Rectifier	Max. d.c.	390 volts		25 ma per plate of each tube	

* 520,600 ohms in series

** Second value applies when a very loud signal is being received. Grid current is for both grids. Values are per tube.
Touching a finger to the grid of a tube will cause it to cease oscillating.

COLONIAL RADIO CORP.

SERVICE NOTES

MODELS T-345 AND C-399

Model T-345 and C-399 receivers are six tube superheterodynes incorporating many advances from conventional design. The tubes, with the exception of the 280 rectifier, are of the highly efficient 0.3 ampere heater type. The receivers are over 30% more economical to operate than similar ones using the conventional 2½ volt tubes.

Type 236 screen grid tubes are used for the combination oscillator-translator and for the second detector; a type 239 super-control R.F. pentode for the R.F. amplifier stage. Litz wound coils insure keen selectivity and sensitivity throughout the extended tuning range of 1765 kc to 520 kc.

Two of the new, type 89 triple grid power output tubes in a paralelled pentode connection, and an efficient dynamic speaker provide excellent reproduction.

The Combination Oscillator-Translator is shown schematically in Fig. (12).

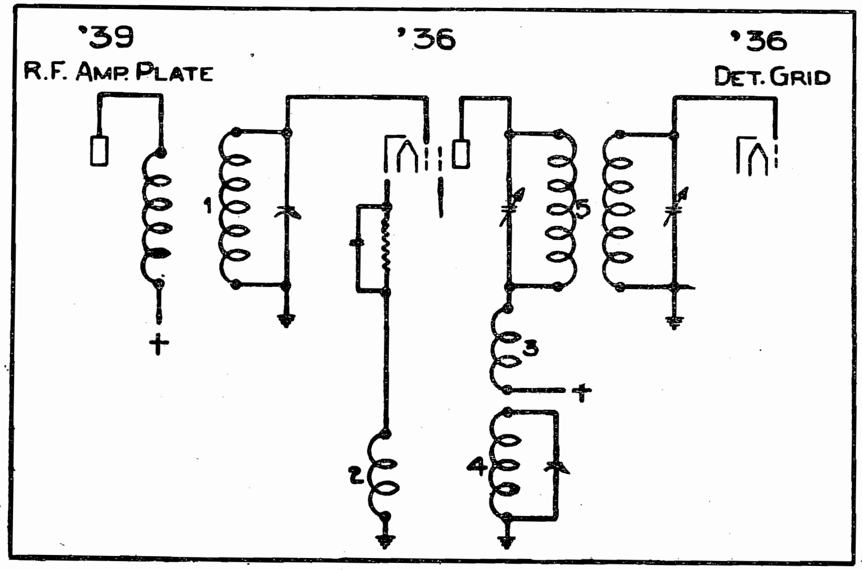
Coils (1) and (2) comprise the grid circuit; coils (3), (4) and (5) the plate circuit. The amplified broadcast signal is applied to the grid of the 236 tube by coil (1) which is tuned to the broadcast signal's frequency. Because coils (2) and (3) are coupled together through coil (4), feedback occurs and the tube is made to oscillate. The frequency of oscillation, determined by the tuned coil (4), is made 175 kc higher than the frequency of the broadcast signal and of coil (1). Since both the broadcast signal and a frequency 175 kc higher are impressed on the tube's grid, a 175 kc I.F. signal is created in the plate circuit of the tube. This 175 kc signal is selected by the tuned coil (5) and coupled to the detector grid.

If it becomes necessary to align the oscillator-translator and R.F. stages, it should be done at about 1250 kc and then "touched up" at about 1600 kc. Trouble may be experienced if an attempt is made to secure alignment at 1600 kc without having obtained approximate alignment at 1250 kc. At 1600 kc the capacity of the oscillator trimmer may be sufficient to tune the oscillator-translator stage to the same frequency as the R.F. stage, resulting in feedback and violent oscillation.

The 2500 ohm speaker field is used as the filter choke. It carries the plate and screen current of all the tubes as well as the bleeder current flowing through the screen supply resistors to ground. Should the output transformer, plug, or voice coil be replaced, it is important that it be reconnected with polarity correct as shown in the service illustration. Otherwise the hum due to the field will be in phase with that in the hum bucking coil, intensifying instead of eliminating the speaker hum.

The variable tuning condenser is floated on cushion rubber to prevent microphonics. Should there be trouble from microphonics which cannot be eliminated by changing the detector tube, the nuts on the four condenser mounting studs may be loosened. Neither the condenser shaft, dial, nor knob must be allowed to touch the chassis or cabinet lest the effect of the rubber mounting be lost.

The pilot light clip is pulled off of its mounting on the chassis for replacement of the bulb.



(12). The Oscillator - Translator Circuit

Power Transformer Color Code

PRIMARY: Green; Black.
RECTIFIER PLATE: Red; Blue; Slate-center tap. Stranded wire leads.
RECTIFIER FILAMENT: Red. Solid wire leads.
HEATERS: Orange. Solid wire leads.

Tube Voltage and Current Chart

TUBE	Plate Voltage Vol. Cont. at Max.	Plate Voltage Vol. Cont. at Min.	Screen Voltage Vol. Cont. at Max.	Screen Voltage Vol. Cont. at Min.	Grid Voltage Vol. Cont. at Max.	Grid Voltage Vol. Cont. at Min.	Plate m. a. Vol. Cont. at Max.	Plate m. a. Vol. Cont. at Min.	Screen m. a. Vol. Cont. at Max.	Screen m. a. Vol. Cont. at Min.
'39—R. F.	160	140	90	95	−2	−30	6	.0	1.6	0
'36—Osc.-Transl.	160	160	85	115	−5	−6.7	.5	.65	.1	.15
'36—Dectector	75	75	30	30	−5* (−15 actual)	−5* (−15 actual)	.2	.2	(a)	(a)
89—Output	150	155	165	170	* (−18 actual)	* (−18 actual)	15.5	18	3	3
'80—Rectifier	Max. d.c.=295 v.						Plate current=22 m.a. per plate.			

(*)—High series resistance.
(a)—Too low to read.
Watts=60.
Speaker field voltage=110 v.

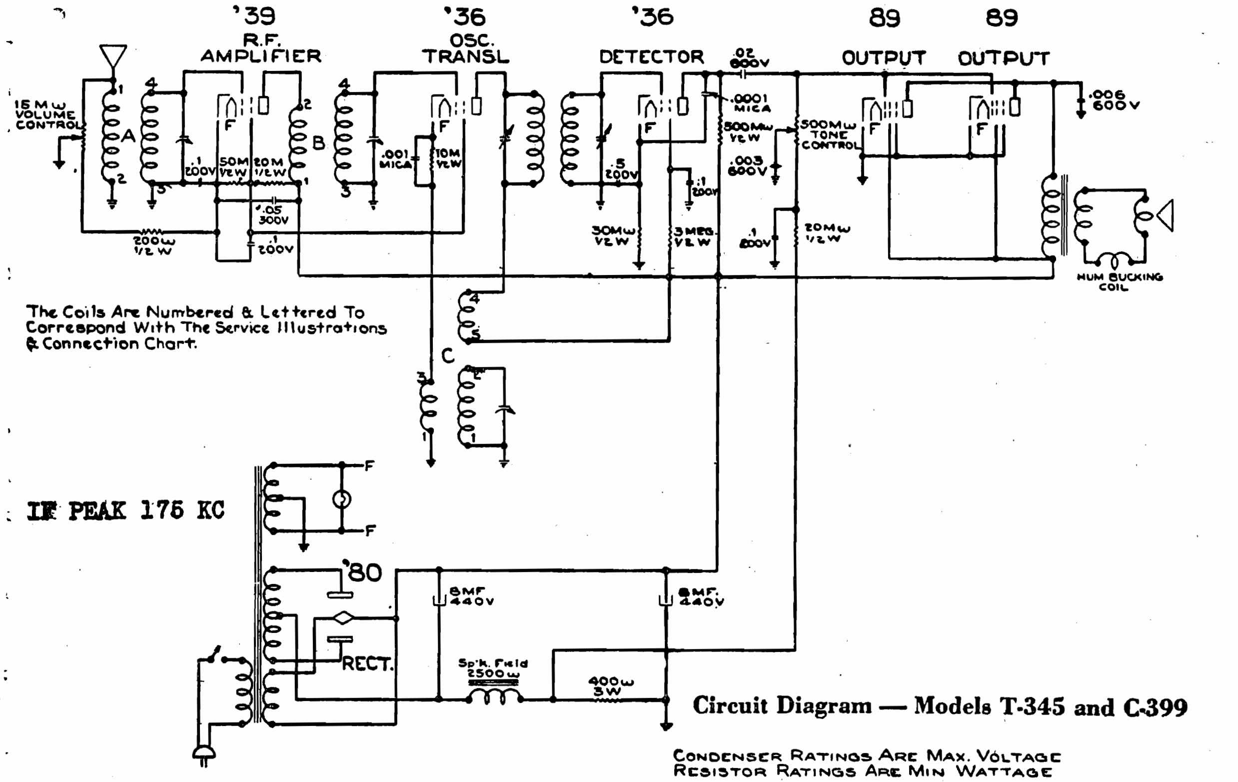
Control grid readings taken on 150 volt scale of 1000 ohms per volt meter; others on 750 volt scale. Readings taken with antenna and ground shorted together and no signal received. These are average values. Ordinarily, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at the rated plate voltage will serve as an indication of proper grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of the cable may cause the circuit to oscillate and give erratic readings. Usually, touching a finger to the grid or plate will stop oscillation. These readings were taken with the speaker field hot. Readings taken when the field is cold will be higher because of the lowered field resistance.

Physical and Electrical Specifications

Model	Height	Width	Depth	Net Weight	Packing Case Dimensions	Weight Packed	Watts
T-345	17½"	14½"	10¼"	25½ lbs.	19½" x 15¾" x 12"	32 lbs.	45
C-399	38¼"	24"	13"	50 lbs.	42" x 27" x 16¾"	65½ lbs.	45

MODEL T-345
C-399
Schematic
Parts Coding

COLONIAL RADIO CORP.



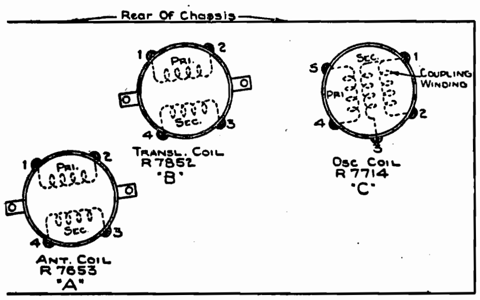
IF PEAK 175 KC

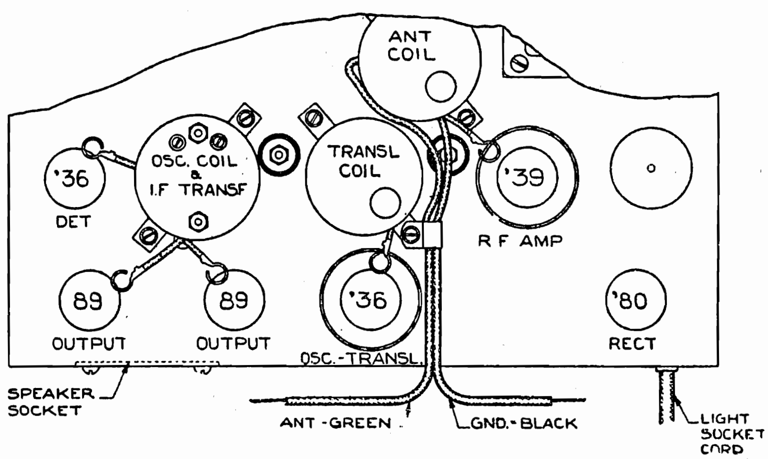
Circuit Diagram — Models T-345 and C-399

CONDENSER RATINGS ARE MAX. VOLTAGE
RESISTOR RATINGS ARE MIN WATTAGE

ILLUSTRATION FOR COIL REPLACEMENT AND CONTINUITY CHECKING

COILS ARE MOUNTED ON TOP OF THE CHASSIS AND LUG CONNECTIONS ARE VIEWED FROM THE TOP.





COIL "A"

Lug #1 To Volume Control & Antenna Lead
Lug #2 To Middle Terminal Of Volume Control (Gnd)
Lug #3 To Variable Tuning Condenser Rotors. (Gnd)
Lug #4 To '39 Grid & Stator #1 Of Variable Tuning Condenser. (Unit Nearest Dial)

COIL "B"

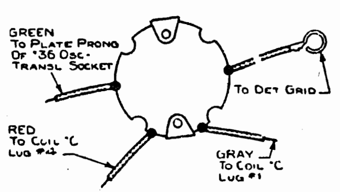
Lug #1 To Screen Of 89 Tubes (B+)
Lug #2 To Plate Prong Of '39 Tube Socket.
Lug #3 To Variable Tuning Condenser Rotors. (Gnd.)
Lug #4 To Grid Of '36 Osc.-Transl. Tube & Stator #2 Of Variable Tuning Condenser

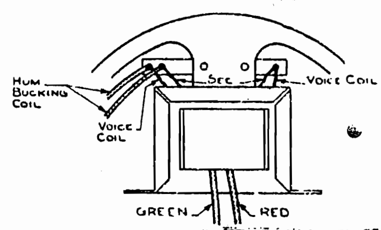
COIL "C"

Lug #1 To Gnd. & To Gray Lead Of R7713A I F Transformer
Lug #2 To Stator #3 Of Variable Tuning Condenser
Lug #3 To .001 Bi-pass Condenser & 10 M Ohm Osc.-Transl Cathode Resistor
Lug #4 To Red Lead Of R7713A I F Transformer
Lug #5 To B+

THE COILS ARE NUMBERED & LETTERED IN THE SCHEMATIC TO CORRESPOND WITH THIS CHART

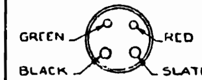
I. F. TRANSFORMER
R7713A
MOUNTED ON TOP OF R 7714
Oscillator Coil





CONNECTIONS OF 57806A OUTPUT TRANSFORMER MOUNTED ON REAR OF SPEAKER

PRONG VIEW OF SPEAKER PLUG



(13). Service Illustration — Models T-345 and C-399

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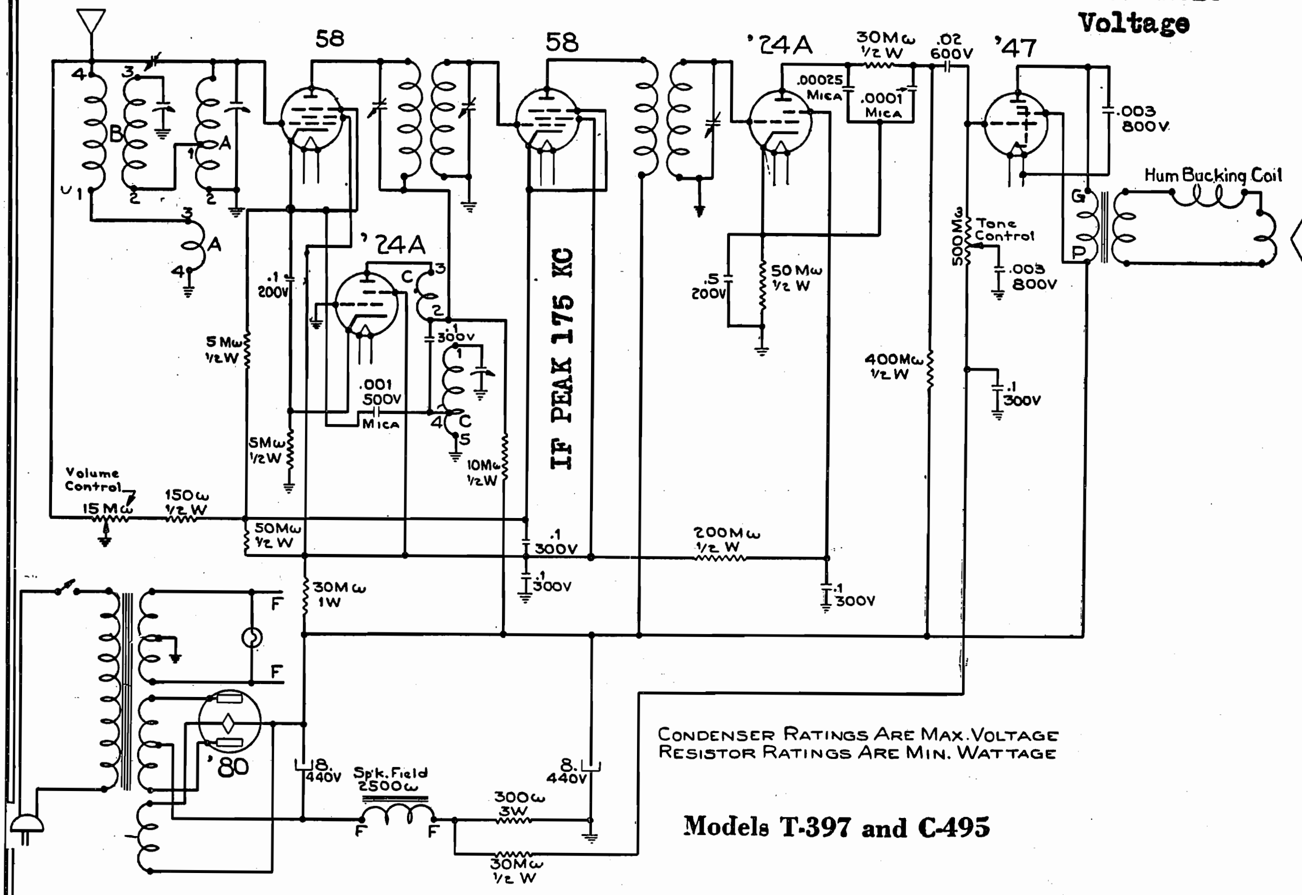
MODEL T-397
C-495
Schematic
Voltage



Models T-397 and C-495

TUBE	Plate Voltage Vol. Cont. at Max.	Min.	Screen Voltage Vol. Cont. at Max.	Min.	Grid Voltage Vol. Cont. at Max.	Min.	Plate m. a. Vol. Cont. at Max.	Min.	Screen m. a. Vol. Cont. at Max.	Min.
'24A—Oscillator	185	205	90	130	− 8	−13	1.1	1.9	.4	.7
58—Translator	185	170	80	95	−11	−37	1.6	.2	.36	0
58—IF	220	195	85	95	− 2	−37	6	.2	1.7	0
'24A—Dectector	135	125	60	95	− 9*	−11*	.1	.2	(a)	(a)
'47—Output	215	225	230	240	(a)* (actual −14)	(a)* (actual −13)	28	33	6	7
'80—Rectifier	Max. d.c.=365 v.						Plate Current=25 m.a. per plate.			

Watts=70

Speaker field voltage=120 v.

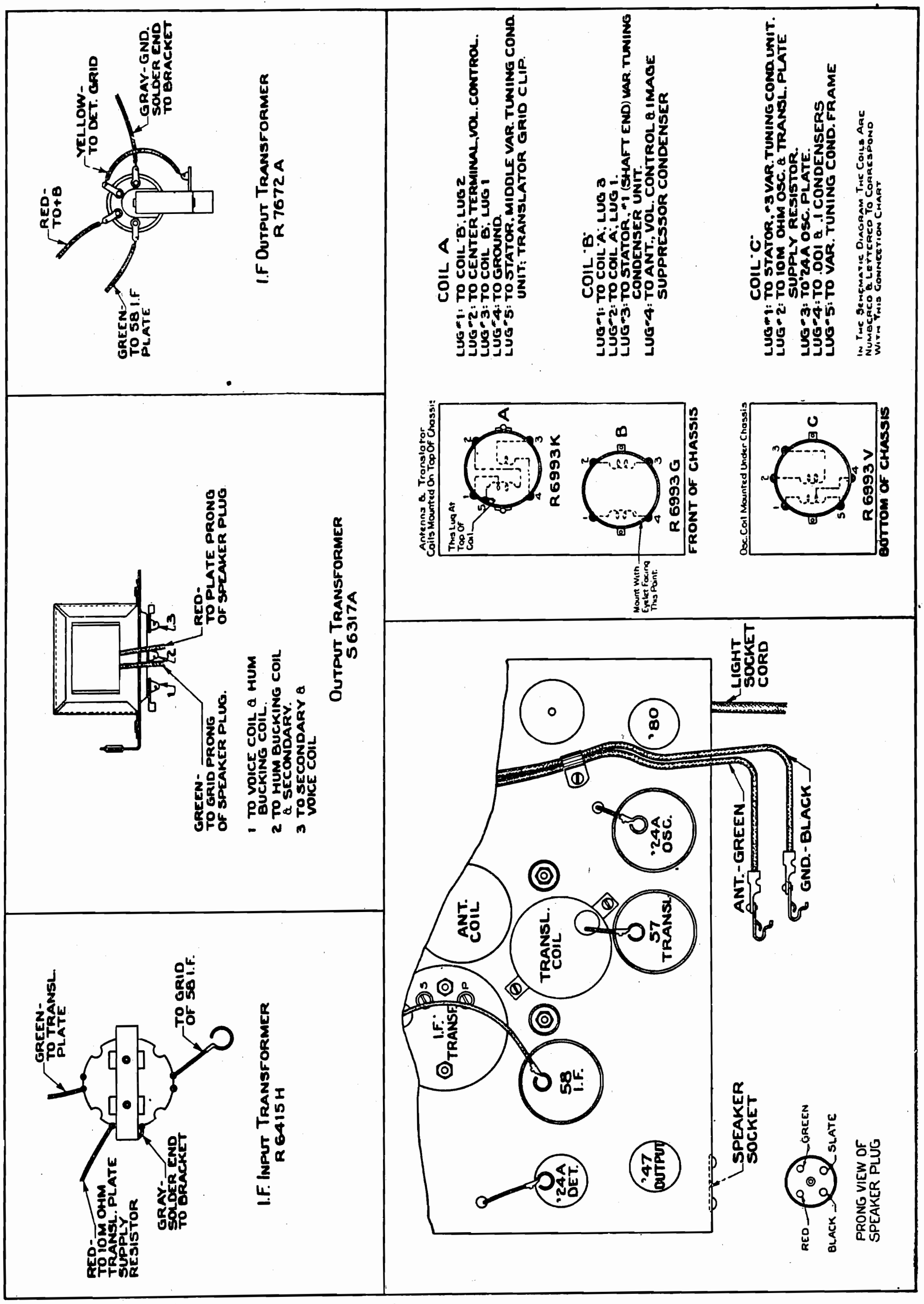
(a)—Too low to read.

(*)—Reading low because of high resistance in series.

Control grid readings taken on 150 volt scale of 1000 ohms per volt meter; others on 750 volt scale. Readings taken with antenna and ground shorted together and no signal received. These are average values. Ordinarily, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at the rated plate voltage will serve as an indication of proper grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of and the cable may cause the circuit to oscillate and give erratic readings. Usually, touching a finger to the grid or plate will stop oscillation. These readings were taken with the speaker field hot. Readings taken when the field is cold will be higher because of the lowered field resistance.

MODEL T-397
C-495
Parts Coding

COLONIAL RADIO CORP



— Models T-397 and C-495

Power Transformer Color Code

PRIMARY: Green; Black.

RECTIFIER PLATE: Red; Blue; Slate-center tap. Stranded wire leads.

RECTIFIER FILAMENT: Red. Solid wire leads.

HEATERS: Yellow. Solid wire leads.

COLONIAL RADIO CORP.

MODEL T-397
C-495
Parts List

REPLACEMENT PARTS AND PRICE LIST

MODELS T-397 AND C-495

Part No.	Description	List Price
R-5509A	Board – Terminal	$ .03
R-7392A	Board – Terminal, double	.05
R-7630	Booklet – Instruction (T-397)	.08
R-7631	Booklet – Instruction (C-495)	.08
R-7027A	Bracket – Dial drive assembly	.39
R-6495	Bushing – Fibre	10 for .12
R-7487	Cabinet – Midget (T-397)	7.62
R-7477	Cabinet – Console (C-495)	15.48
R-4715	Clamp – Antenna and ground	.02
R-7011A	Clip – Antenna and ground lead	.04
R-7031	Clip – Pilot light	.12
R-6381	Clip – Screen grid	10 for .07
R-6381H	Clip – Screen grid with 6" lead	.04
R-6381F	Clip – Screen grid with 5" lead	.04
R-6381N	Clip – Screen grid with 7-3/4" lead	.04
R-6381S	Clip – Screen grid with 3" lead	.04
R-6993G	Coil – Antenna	.79
R-6993V	Coil – Oscillator	.58
R-6993K	Coil – Translator (lug type mounting)	.50
R-6993BD	Coil – Translator (bracket type mtg.)	.50
D-4758P	Condenser – Electrolytic 8 mfd. 440v.	1.19
R-6565	Condenser – Tuning, I.F. input transf.	.43
R-6218B	Condenser – Tuning, I.F. output transf.	.43
R-7119	Condenser – Variable tuning with suppressor	4.12
R-7119A	Condenser – Variable tuning with suppressor, dial and drive assembly	5.80
R-4303	Condenser – .0001 mfd. mica	.14
R-4592	Condenser – .00025 mfd. mica	.14
R-6759	Condenser – .001 mfd. 500v. mica	.17
R-6461	Condenser – .003 mfd. 800v.	.14
R-6761	Condenser – .02 mfd. 600v.	.15
R-6444	Condenser – .1 mfd. 200v.	.17
R-6138	Condenser – .1 mfd. 300v.	.20
R-6451	Condenser – .5 mfd.	.32
R-6762	Control – Volume	1.25
R-6454	Control – Tone	.74
R-7566A	Cord – Extension	.34
R-7018D	Dial and indicator assembly	.62
R-7635	Escutcheon	.29
R-7055	Insulator – suppressor	.01
R-7636	Knob – Large	.17
R-7637	Knob – Medium	.16
R-5289	Lamp – 2-1/2 volt pilot	.20
R-5346B	Lead – Antenna (26")	.09
R-5345A	Lead – Ground (24")	.09
R- 954	Nut – 4/36	100 for .13
R- 951	Nut – 6/32	100 for .18
R-3760	Nut – 8/32	100 for .18
R-6183	Resistor – 300 ohm, 3 watt vitreous	.38
R-6155	Resistor – 150 ohm, 1/2 watt carbon	.19
R-6510	Resistor – 5 M ohm, 1/2 watt carbon	.19
R-6152	Resistor – 10 M ohm, 1/2 watt carbon	.19
R-6156	Resistor – 30 M ohm, 1/2 watt carbon	.19
R-6689	Resistor – 30 M ohm, 1 watt carbon	.19
R-6445	Resistor – 50 M ohm, 1/2 watt carbon	.19
R-5830	Resistor – 200 M ohm, 1/2 watt carbon	.19
R-5822	Resistor – 400 M ohm, 1/2 watt carbon	.19
R-7090	Screw – Drive lever	.03
R-7359	Screw – Escutcheon	10 for .05
R-7413	Screw – Set, dial	10 for .08
R-6532	Screw – 3/48 x 1/4 R. H.	10 for .02
R-1738	Screw – 6/32 x 1/4" R. H.	100 for .35
R-1737	Screw – 6/32 x 1/4" F. H.	100 for .35
R-2159	Screw – 6/32 x 3/8" F. H.	100 for .35
R- 655	Screw – 6/32 x 3/8" R. H.	100 for .35
R- 651	Screw – 6/32 x 1/2" R. H.	100 for .35
R- 650	Screw – 6/32 x 5/8" R. H.	100 for .35
R-1734	Screw – 6/32 x 2-1/2" R. H.	100 for 1.05
R-7061	Screw – 6/40 x 5/16" R. H.	100 for .35
R-4377	Screw – 8/32 x 1/2" R. H.	100 for .40
R-4334	Screw – 10/32 x 1/4" R. H.	100 for .45
R-6214	Screw – 10/32 x 1" chassis to cabinet	100 for .55
R-6652A	Shaft – Dial drive assembly	.15
R-6763A	Shield – Antenna coil	.21
R-6064	Shield – Chassis bottom	.16
R-5323A	Shield – Bottom, tube	.10
R-6450	Shield – Electrolytic condenser	.04
R-6573	Shield – I.F. transformer	.15
R-6018A	Shield – Oscillator; translator coil	.15
R-5322	Shield – Top, tube	.07
R-6023	Socket – 4 prong	.09
R-6041	Socket – 5 prong	.10
R-7042	Socket – 6 prong	.11
R-2412	Spacer – Terminal board	.02
R-5796	Spacer – Electrolytic condenser, fibre	.01
R-5153	Spaghetti	10 ft. for .80
S-6294AC	Speaker, complete with transformer	6.70
S-6300A	Speaker cone and voice coil	1.14
S-6412	Speaker field coil	1.48
S-7414	Speaker plug	.18
S-6317A	Speaker transformer	1.45
R-7648	Sticker – Tube layout	.04
R-7013	Stud – Variable condenser	10 for .23
R-7627	Tag – "Distributed by Graybar"	10 for .35
R-7621	Tag – Guarantee	10 for .17
R-6415	Transformer, I.F. input	.49
R-6415H	Transformer, I.F. input with tuning condenser	1.26
R-7672	Transformer, I.F. output (coils, terminals and wooden core only)	.75
R-7672A	Transformer, I.F. output assembly	1.03
R-6987BC	Transformer, 60 cycle power	3.80
R-6235	Tube – Cushion, for variable condenser mounting	10 for .12
R-5795	Washer – Insulating, electrolytic cond.	.01
R-6530	Washer – Insulating, small, for suppressor condenser	10 for .05
R-6529	Washer – Insulating, large, for suppressor condenser	10 for .05
R-4794	Washer – Insulating, tone control	.01
R-4327	Washer – Lock #6	100 for .27
R-4328	Washer – Lock #8	100 for .22
R-4329	Washer – Lock #10	100 for .22
R- 912	Washer – Power transformer to chassis	10 for .07
R-7471	Washer – Shakeproof, end plates	10 for .06
R-7491	Washer – Socket insulating	.01
R-6128	Washer – Variable condenser mtg.	10 for .08
R-6129	Washer – Variable condenser mtg.	10 for .08
R-6234	Washer – Var. cond., cushion	10 for .16
R-2422	Washer – Vitreous resistor	10 for .04
R-6458	Wedge – Power transformer coil	.02

Prices are F. O. B. Buffalo. Order by part number and description.

Dealers should order replacement parts from their Graybar branch. Orders placed directly with the factory for replacement parts amounting to less than $2.00 net are subject to a 50 cents packing charge.

Material may not be returned to the factory for credit or replacement without written factory authorization.

MODEL C-595
MODEL C-695
Voltage
Service Notes

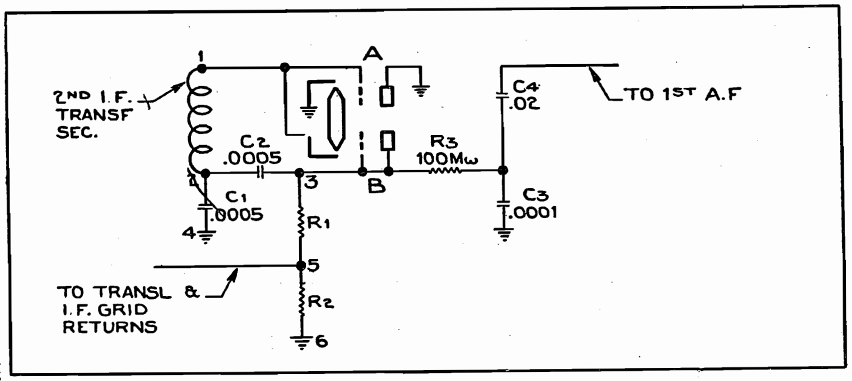
COLONIAL RADIO CORP.

SERVICE NOTES

MODELS C-595 AND C-695

The Model C-595 and C-695 receivers are highly developed superheterodynes, identical except for their output stages. The C-595 is a nine tube receiver using a single '47 power output pentode. The C-695 is a ten tube receiver with two '47s in parallel in its output stage. The frequency range of these receivers is from 530 kc to 1765 kc. They embody such features as a distortionless A. V. C.-diode detector that cannot be overloaded, two high gain stages of I. F. amplification, two audio stages and the use of high amplification pentodes in all but the A. V. C.-detector and first audio stages.

A voltage generated by the 58 oscillator beats with the broadcast signal, creating a 175 kc signal in the plate circuit of the 58 translator tube. This 175 kc signal is transformer coupled to the first 58 I. F. tube and resistance-capacity coupled to the second 58 I. F. It is then transformer coupled to the two 56 A. V. C.-diode detector tubes. The output of these tubes is impressed across a 1 megohm variable voltage divider which functions as the volume control. A '27 tube in the first audio stage is resistance-capacity coupled to the power output stage.



A.V.C. - Diode Detector — Models C-595 and C-695

The A. V. C. - Diode Detector—Two type 56 tubes are used as an A. V. C.-diode detector, with no d. c applied to their elements. The circuit is shown schematically in Fig. (4) and its action will be easily understood if the following explanation is read carefully.

Assume there is a signal voltage across the second I. F transformer secondary. At a particular instant point (1) will be positive and point (2) negative. Current will flow from point (1) through tube "A" from grid to cathode, to point (4) of C1, through C1 back to the negative side of the transformer secondary, point (2). C1, then, will be charged with point (4) positive and point (2) negative. One half cycle later, point (1) of the transformer secondary will be negative and point (2) positive. Current will then flow from point (2) through C2, through tube "B" from grid and plate to cathode, back to the negative side of the secondary, point (1). C2, then will be charged with point (2) positive and point (3) negative. As revealed by the schematic, the voltages of C1 and C2 are impressed across R1 and R2. The r. f. component is filtered out by R3 and C3 and the a. f. component is fed to the grid of the first A. F. tube through C4. The potential across C1 and C2, and therefore that across R1 and R3 varies with the strength of the I.F. signal. However, the potential across R2 is used to vary the I. F. and translator control grid biases and hence the amplification of those tubes. Any gain in the strength of the received signal increases their negative grid bias, cuts down their amplification and so tends to maintain the signal voltage at the I. F. output at a substantially constant value.

The plate of tube "A" is tied to ground and is used only as a shield.

TUBE VOLTAGE AND CURRENT CHARTS

MODEL C-595

TUBE	Plate Voltage	Screen Voltage	Grid Voltage	Plate m. a.	Screen m. a.
58—Oscillator	80	185	−12	9	3.5
58—Translator	180	70	− 9*	1	.3
58—1st IF	125	75	*	9	2
58—2nd IF	205	75	*	9	2
'27—AF	75		−6 (Vol. Control at Min.)	1.2	
'47—Output	200	210	− 5* (−18 Actual)	15	3
'80—Rectifier	Max. d.c.=380 v.			Plate Current=32 m.a. per plate.	

Watts=85.
Speaker field voltage=170 v

(*) Reading low because of high series resistance.

MODEL C-695

TUBE	Plate Voltage	Screen Voltage	Grid Voltage	Plate m. a.	Screen m. a.
58—Oscillator	90	200	−12.5	8	3
58—Translator	190	90	− 6*	.9	.3
58—1st IF	115	95	*	7.5	2
58—2nd IF	210	95	*	8	2
'27—AF	70		−6 (Vol. Control at Min.)	1.3	
'47—Output	200	210	− 7* (−24 Actual)	6.5	1.1
'80—Rectifier	Max. d.c.=365 v.			Plate Current=25 m.a. per plate.	

Watts=85.

Speaker field voltage=135 v.

(*) Reading low because of high series resistance.

Control grid readings taken on 150 volt scale of 1000 ohms per volt meter; others on 750 volt scale. Readings taken with antenna and ground shorted together and no signal received. These are average values. Ordinarily, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at the rated plate voltage will serve as an indication of proper grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of the cable may cause the circuit to oscillate and give erratic readings. Usually, touching a finger to the grid or plate will stop oscillation. These readings were taken with the speaker field hot. Readings taken when the field is cold will be higher because of the lowered field resistance.

COLONIAL RADIO CORP.

MODEL C-595
MODEL C-695
Service Notes

SUPPLEMENTARY SERVICE NOTES (A)

MODELS C-595 AND C-695

Certain alterations, indicated in the revised circuit diagram, Fig. (6A), have been made in Model C-595 and C-695 receivers built since the printing of the Service Manual. No attempt should be made by service men to incorporate these changes in the earlier production receivers.

The R7056D I.F. output transformer, which was tuned by a copper ring inductance adjuster, has been replaced by an R6415R transformer, tuned with condensers. Its connections are shown in Fig. (5A).

The 58 oscillator tube has been replaced by a 224A necessitating the circuit modifications shown in the revised schematic. The connection of lug 2, coil A is changed to the terminal board to which are also connected the 10 M ohm oscillator and translator plate supply resistor, and a .1 condenser. The addition to the replacement parts list is an R7884—15 M ohm, 2 watt carbon resistor listing at 31 cents. Receivers embodying these changes are somewhat more selective than those of the original production.

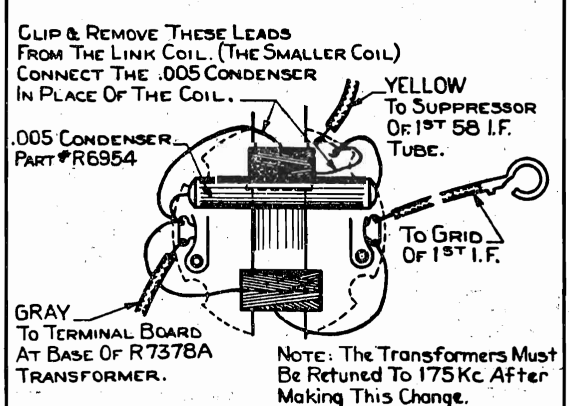
The following voltage and current readings are obtained with the 224A oscillator. The readings for the other tubes are the same as given in the original voltage and current chart.

Plate Voltage 175 v.
Screen Voltage 90 v.
Grid Voltage −10 v.
Plate Current 1.3 m.a.
Screen Current .4 m.a.

It was mentioned in the Manual that those receivers using the R7725A I.F. input transformer are more selective than those with an R7411A transformer. This same selectivity improvement can be obtained with the R7411A transformer by removing the link coil (the smaller of the two coils) and replacing it with a .005 condenser, part No. R6954. See Fig. (5A). No other change is necessary although the I.F stages will have to be returned to 175 kc. This change is recommended in instances of poor selectivity.

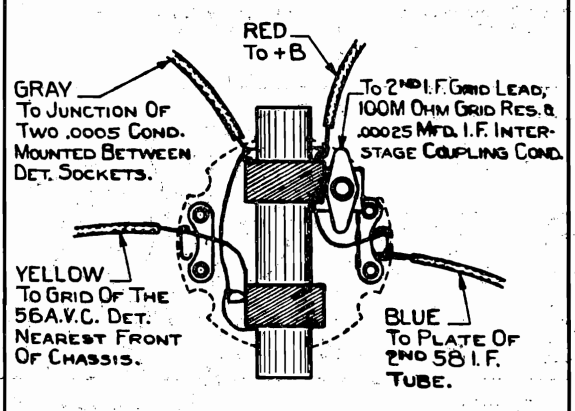
A slight amount of hum, which disappears when a carrier is tuned in, is normal to Models C-595 and C-695. Severe hum, which becomes increased when a carrier is tuned in, is definite indication of faulty type 56 detector tubes. Sometimes interchanging their positions will eliminate the hum. Otherwise the type 56 tubes must be replaced.

I.F. Link Circuit Change For Improving Selectivity In Models C595 & C695



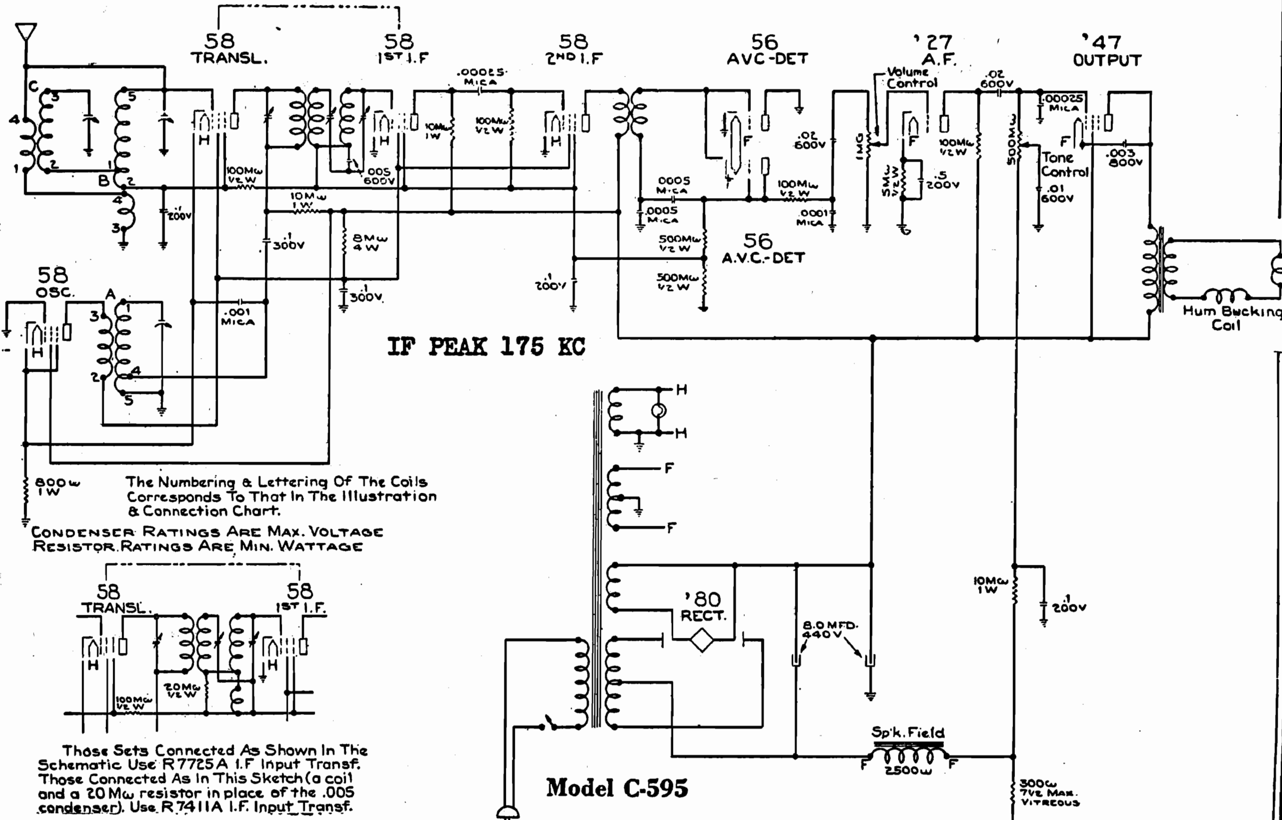
1st I.F. INPUT TRANSFORMER R7411A Viewed From Top Rear

Connections Of R6415R I.F. Output Transformer (Mounted Under Chassis)



MODEL C-595
Schematic
Parts Coding

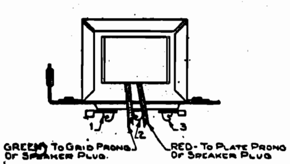
COLONIAL RADIO CORP.



The Numbering & Lettering Of The Coils Corresponds To That In The Illustration & Connection Chart.

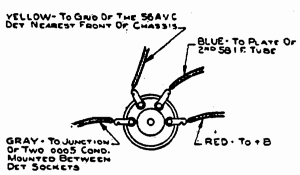
Condenser Ratings Are Max. Voltage
Resistor Ratings Are Min. Wattage

Those Sets Connected As Shown In The Schematic Use R7725A I.F Input Transf. Those Connected As In This Sketch (a coil and a 20 Mω resistor in place of the .005 condenser). Use R7411A I.F. Input Transf.



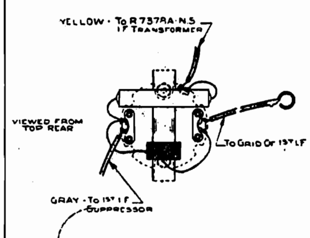
1-To Voice Coil & Hum Bucking Coil.
2-To Hum Bucking Coil & Secondary.
3-To Secondary & Voice Coil.

Output Transformer
S6317A

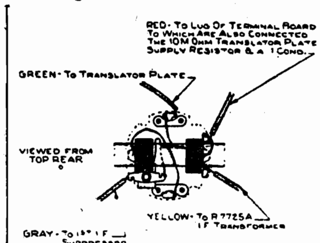


(MOUNT WITH TERMINAL BOARD FACING REAR OF CHASSIS.)

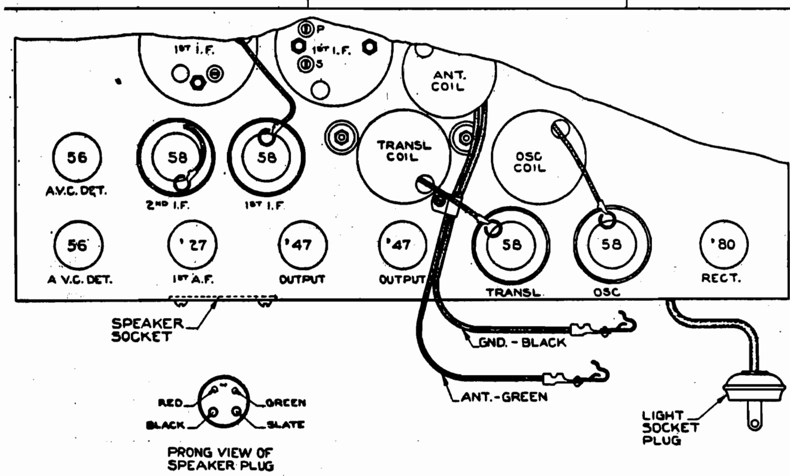
I.F Output Transformer
R 7056 D



1ST I F Input Transformer
R7725A

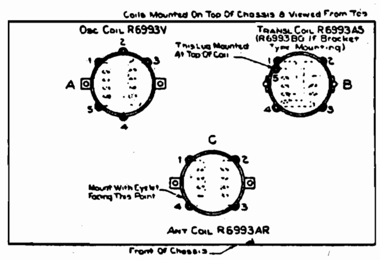


1ST I.F Input Transformer
R7378A-NS



Models C-595 and C-695

Illustration For Continuity Checking Of Coil Windings
and
Connection Chart For Installing Replacement Coils



COIL A
- Lug #1-To Stator Of #3 Variable Tuning Condenser Unit (Unit Furthest From Dial)
- Lug #2-To Screen of Translator Tube
- Lug #3-To Plate Of Oscillator Tube
- Lug #4-To Terminal Board To Which Are Also Connected A .001 & .1 Condenser.
- Lug #5-To Variable Tuning Condenser Frame (Gnd)

COIL "B"
- Lug #1-To Coil C Lug #2
- Lug #2-To Terminal Board To Which Are Also Connected A Lead To The Translator Suppressor & A 100M Ohm Resistor
- Lug #3-To Ground
- Lug #4-To Coil "C", Lug #1

COIL "C"
- Lug #1-To Coil B, Lug #4
- Lug #2-To Coil "B", Lug #1.
- Lug #3-To Stator, Variable Tuning Condenser #1.
- Lug #4-To Antenna Lead & Image Suppressor Condenser

In The Schematic Diagram The Coils Are Numbered & Lettered To Correspond With The Connection Chart.

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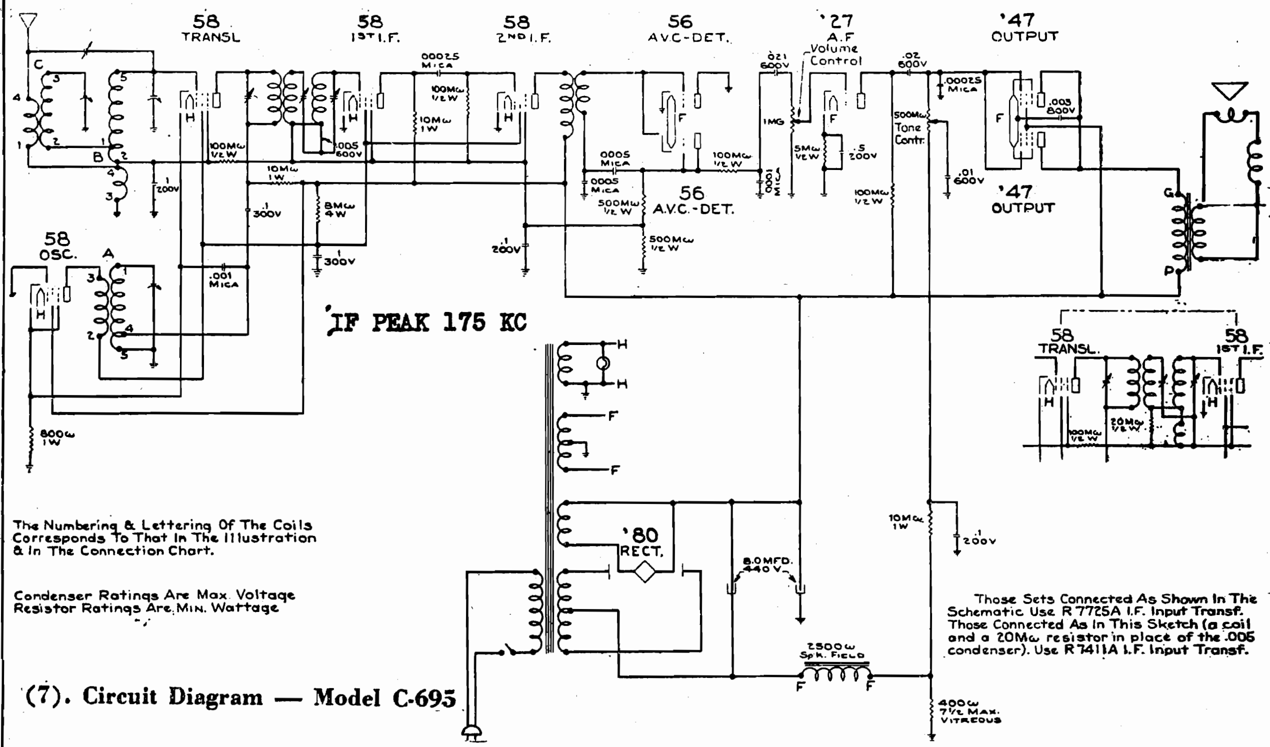
MODEL C-695
Schematics
#1 and #2



(7). Circuit Diagram — Model C-695

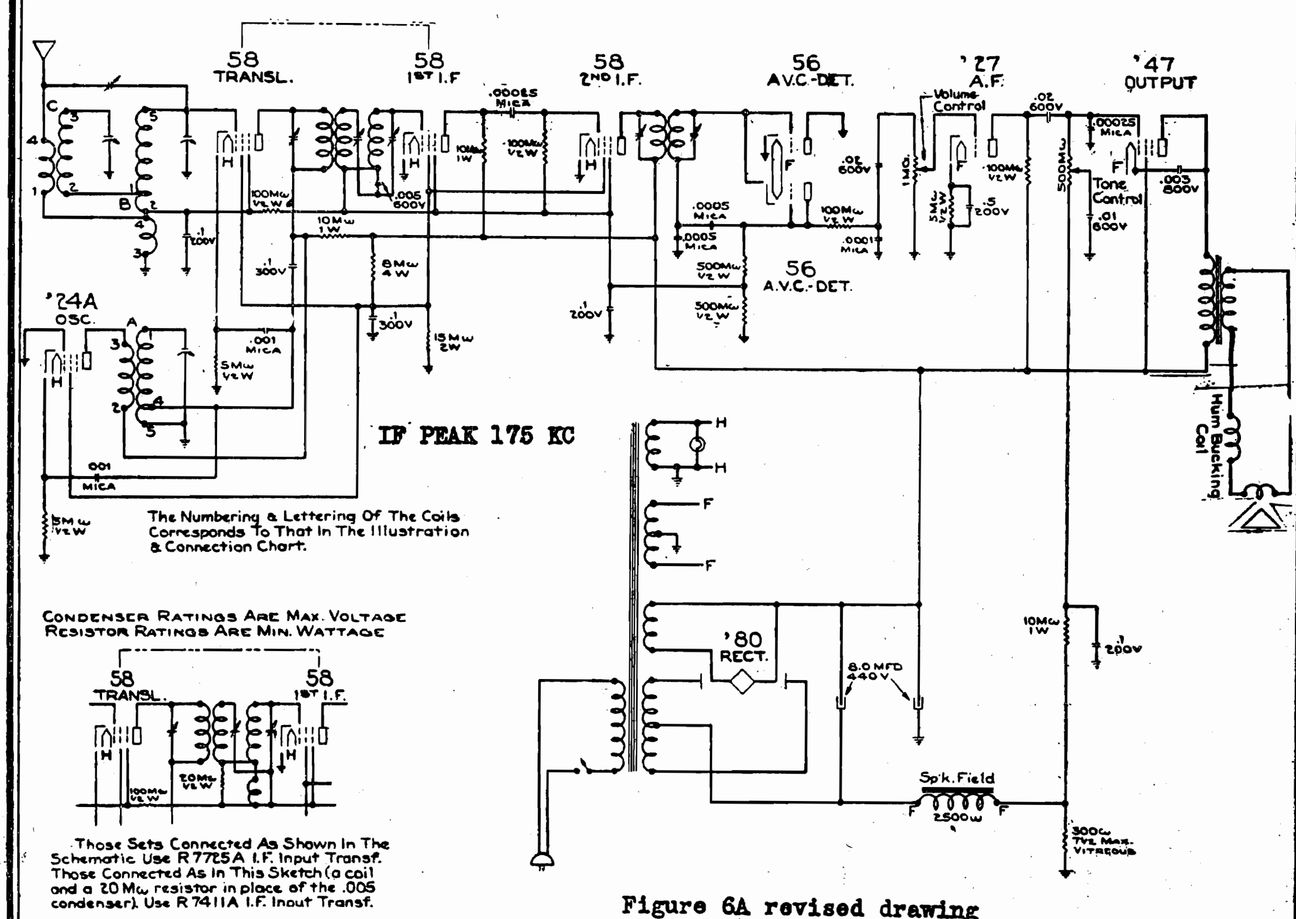


Figure 6A revised drawing

Circuit Diagram — Model C-595

MODEL C-995
Service Notes
Voltage

COLONIAL RADIO CORP.

SERVICE NOTES

MODEL C-995

The C-995 receivers are twelve tube de luxe superheterodynes embodying every proven advancement in design. Their frequency range extends from 530 kc to 1765 kc. High gain r. f. pentodes and two I. F. stages insure extreme sensitivity and keen selectivity. Automatic Volume Control nullifies fading and prevents blasting. A push-pull Class "A" driver stage, a Class "B" output stage, two mercury vapor rectifiers, and a powerful 12" Class "B" dynamic speaker make for reproduction that is truly fascinating in its realism.

A '24A oscillator produces a voltage which is combined with the broadcast signal, creating a 175 kc signal in the plate circuit of the 58 translator tube. This 175 kc signal is transformer coupled to the first 58 I. F. tube and resistance-capacity coupled to the second 58 I. F. It is then transformer coupled to the 57 detector. The coupling between primary and secondary of this transformer is variable and is employed as the volume control. Since it is inductive, it is completely noiseless in operation.

The first I. F. transformer is mounted on the top of the chassis with its adjusting screws accessible through the holes in the top of the shield. (See illustration). The adjusting screws for the second I. F. transformer tuning condenser are accessible through the holes in the chassis to the right of the first I. F. transformer, facing the front of the chassis. A dummy tube, i. e., either a burned out one or one with a heater prong insulated from its socket contact, must be placed in the A.V.C. socket to render the A.V.C. action inoperative when peaking the I. F. stages. Be sure the flexible grid lead is connected to the grid cap of the 57 dummy tube and that the tube shield is in place.

The detector is coupled through an auto-transformer (mounted on the speaker) to two 46s connected as a Class "A" push-pull driver stage. This auto-transformer has a high permeability nickel-alloy core. If for any reason excessive d. c. (25 m.a. or more) flows through the transformer, the permeability of its core and hence the inductance of it may be greatly lowered. As a consequence, tone quality will be impaired and the transformer should be replaced.

The best quality of reproduction will be obtained when the type 46 tubes are well matched in their dynamic characteristics. Interchange their positions until the best combination is found.

The filaments of the 82 rectifiers are connected in series. Should one tube burn out the other will not light, preventing the overloading of the remaining tube which would result were they connected in parallel.

The A. V. C. Circuit—The A. V. C. circuit is shown schematically in Fig. (8) and its action will be easily understood if the following explanation is read carefully:

As revealed by the diagram, R1, R2, and R3 form part of a resistance network across the "B" supply. With reference to point (a), points (b), (c) and (d) are progressively more negative. Accordingly, the drop across R2 furnishes the plate voltage for the A. V. C. tube and the drop across R3 furnishes its negative grid bias. The values are such that no plate current flows. Since there is no plate current, no voltage drop exists across R4, and points (b) and (e) are at the same potential. The drop across R1 furnishes the grid bias for the translator and I. F. tubes.

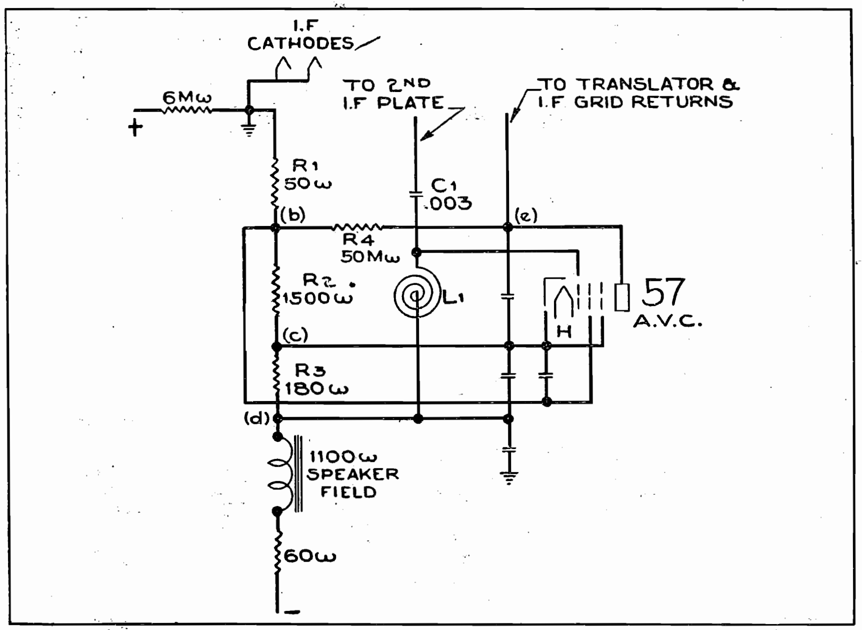
Now assume a signal at the plate of the second I. F tube. It is impressed across L1 through C1. The positive half cycles of the signal voltage, impressed on the A. V. C. tube's grid, cause plate current to flow, creating a voltage drop across R4. Point (e) now is more negative than point (b) by the amount of R4's drop. In other words the I. F. and the translator grids have been made more negative with respect to their cathodes and consequently their amplification has been decreased. The stronger the signal, the greater the translator and I. F. negative grid bias and the less the amplification of these tubes. The gain, then, varies inversely as the signal strength, and the signal voltage at the plate of the second I. F. tube is maintained at a substantially constant value.

The variable tuning condenser is floated on cushion rubber to prevent microphonics. Should there be trouble from microphonics which cannot be eliminated by changing the detector tube, the nuts on the four condenser mounting studs may be loosened. Neither the condenser shaft, dial nor knob must be allowed to touch the chassis or cabinet lest the effect of the rubber mounting be lost.

There is a variable center-tap hum eliminating resistor mounted on the rear plate of the chassis near the speaker socket. Its screw driver adjustment is accessible through the hole in the chassis. Care must be used in making the adjustment since it is a fine one. In addition it sometimes is necessary to interchange the positions of the type 46 tubes until the combination resulting in minimum hum is found.

There is a condenser connected from one side of the power cord to ground for the prevention of line noise. The power cord plug should be tried in both possible positions in its receptacle and left in the one affording quieter reception.

The pilot light clip is pulled off of its chassis mounting for replacement of the bulb.



(8). A.V.C. Circuit — Model C-995

TUBE	Plate Voltage	Screen Voltage	Grid Voltage	Plate m. a.	Screen m. a.
58—Translator	160	70	−3*	1.4	.3
'24A—Oscillator	160	70	−6	.8	.3
58—1st IF	145	75	−4	4	.9
58—2nd IF	185	75	−4	4	1
57—Detector	160	65	*	.3	.1
57—A. V. C.	50	70	−9	0	0
46—Driver	240	240	−10* (−30 actual)	17	3.5
46—Class "B"	365	+4.5	+4.5	18–70 (a)	1.7–13 (a)(b)
82—Rectifier	Max. d.c.=365 v.			Plate Current=32 m.a. per plate per tube. (c).	

Watts=150.

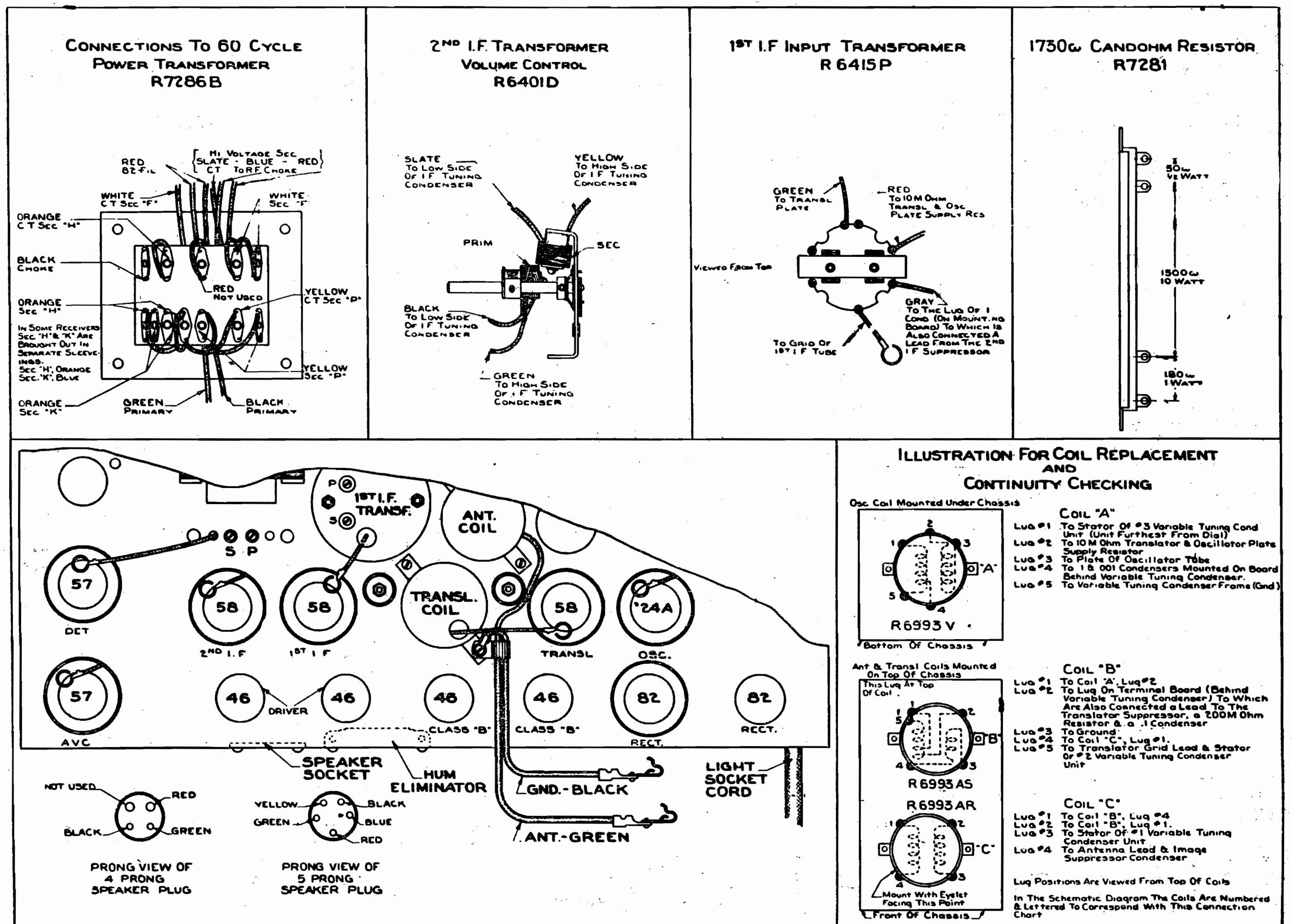
Speaker field voltage=90 v.

(*) Reading low because of high series resistance.

(a) The latter value on a strong signal.
(b) Value is for both grids tied together.
(c) The plate current may divide unevenly between the two plates, but the total for each tube should be about 65 m.a.

MODEL C-995
Parts Coding

COLONIAL RADIO CORP.



(9). Service Illustrations — Model C-995

MODEL C-995
Service Notes

COLONIAL RADIO CORP.

SUPPLEMENTARY SERVICE NOTES (A)

MODEL C-995

ADDING A "HI-LO" SENSITIVITY SWITCH TO THOSE RECEIVERS WHICH DO NOT HAVE ONE BUILT IN.

THESE INSTRUCTIONS REPLACE SUPPLEMENT A, PAGE TWENTY-SIX A, FORM R-7900 OF THE MANUAL.

In a great many locations a high level of noise is encountered when the Model C-995 is tuned between stations. This is due to the fact that in the absence of a carrier the A. V. C. action causes the receiver to attain its full sensitivity.

The maximum sensitivity of this receiver is needed only when tuning for exceptionally weak, distant stations. Accordingly, a sensitivity control switch has been incorporated in later production C-995's. This switch can be added easily to those receivers not having it built in.

The parts needed are contained in switch-resistor kit, part number R-5167BC, which can be ordered from the Colonial Radio Corporation, Buffalo, New York. This kit contains:

1—R-6483A "Hi-Lo" Switch with leads.

1—R-7187 100 ohm, 1 watt carbon resistor.

1—Blue print of instructions for making the change.

A 15/32" hole is to be drilled in the right hand side of the cabinet, as shown in Figure 9A. A wood bit, *not* a metal twist drill, must be used and care should be taken not to splinter the cabinet. The switch is then mounted as shown, with its terminals facing upward.

The wire lead between lugs #1 and #2 of the Candohm resistors, should be removed and the R-7187, 100 ohm resistor connected between these two lugs, as shown in the illustration. The ground connection to lug #1 must be opened and a new ground connected to lug #2. The two leads from the R-6483A switch are to be connected to lugs #1 and #3 of Candohm resistor R-7281.

The action of the R-7187, 100 ohm resistor is to increase the residual, fixed grid bias on the I. F. tubes thereby reducing their gain. The "Hi-Lo" switch is in the open position then, marked "Lo". ***Ordinarily, the receiver should be operated with the switch left in this position.*** When the switch is closed, the "Hi" position, the 50 ohm section of the R-7281 Candohm is shorted out, the bias is decreased and the gain increased. With the switch in this position, extremely distant reception is possible, but ***unless conditions are ideal, reception will be noisy.***

Noise heard while the receiver is tuned to a station is due to the low ratio of signal strength to noise level. No amount of amplification can overcome this. *Any* receiver sensitive enough to pick up the station must pick up the noise.

The schematic diagram, Figure 10 of the Manual, should be changed to correspond with the sketch in Figure 9A. A ground should be shown from the junction of the .2 mfd. condenser and the 100 ohm resistor, and the "Hi-Lo" switch should be shown across the 50 ohm resistor instead of across the 100 ohm one.

TO FURTHER REDUCE THE BETWEEN STATION NOISE IN C-995's HAVING THE SENSITIVITY SWITCH ALREADY BUILT IN.

Receivers having the "Hi-Lo" switch built in have it connected across the 100 ohm resistor, i. e., between lugs #1 and #2. To still further reduce the between station noise when the switch is in the "Hi" position, remove the switch lead from lug #2 and connect it to lug #3. The switch lead to lug #1 remains the same, as do all other connections. Operation with the switch in the "Lo" position will be the same as it previously was.

It is very important that the set owner be carefully instructed in the proper use of the "Hi-Lo" switch in order that he may obtain the fine performance of which this receiver is capable.

SUPPLEMENTARY SERVICE NOTES (A)

MODEL C-995

Model C-995 receivers built since the Service Manual was printed, have a sensitivity control switch mounted on the right side of the cabinet. Ordinarily, it should be left in the position marked "Lo". This position minimizes the between station noise, due to electrical disturbances, which in some localities is annoying. The position marked "Hi", should be used only when tuning for extremely weak, distant stations requiring the full sensitivity of the receiver.

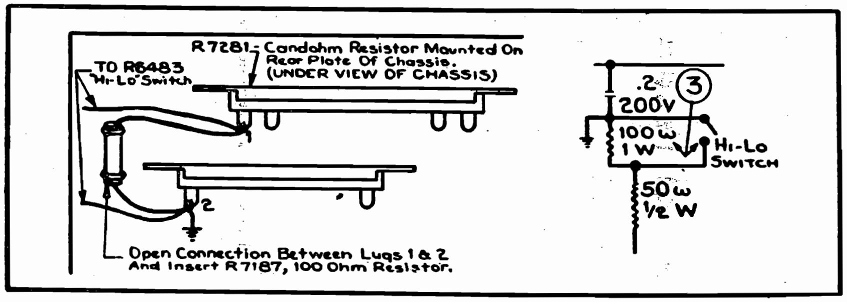
As revealed by the schematic, this switch, in its closed position, shorts out a 100 ohm resistor. The residual bias on the I.F. tubes is thereby reduced from a value of −8 volts to approximately −3 volts, increasing sensitivity.

A connection to ground from one side of the "Hi-Lo" switch should have been shown in Fig. (10) of the Service Manual. This connection is shown in Fig. (9A).

Receivers having the "Hi-Lo" switch built in use an R7862, 1830 ohm Candohm resistor which includes the 100 ohm resistor. The "Hi-Lo" Sensitivity Control switch can be added to receivers not having it, by connecting an R7187, 100 ohm, 1 watt carbon resistor to the R7281, 1730 ohm Candohm. See Fig. (9A).

The additions to the replacement parts and price list are:

Part No.	Description	List Price
R-7862	Resistor – 1830 ohm Candohm	.70
R-7187	Resistor – 100 ohm, 1 watt carbon	.19
R-6483	Switch – "Hi-Lo"	.55



(9A). Sensitivity Control Switch Connection

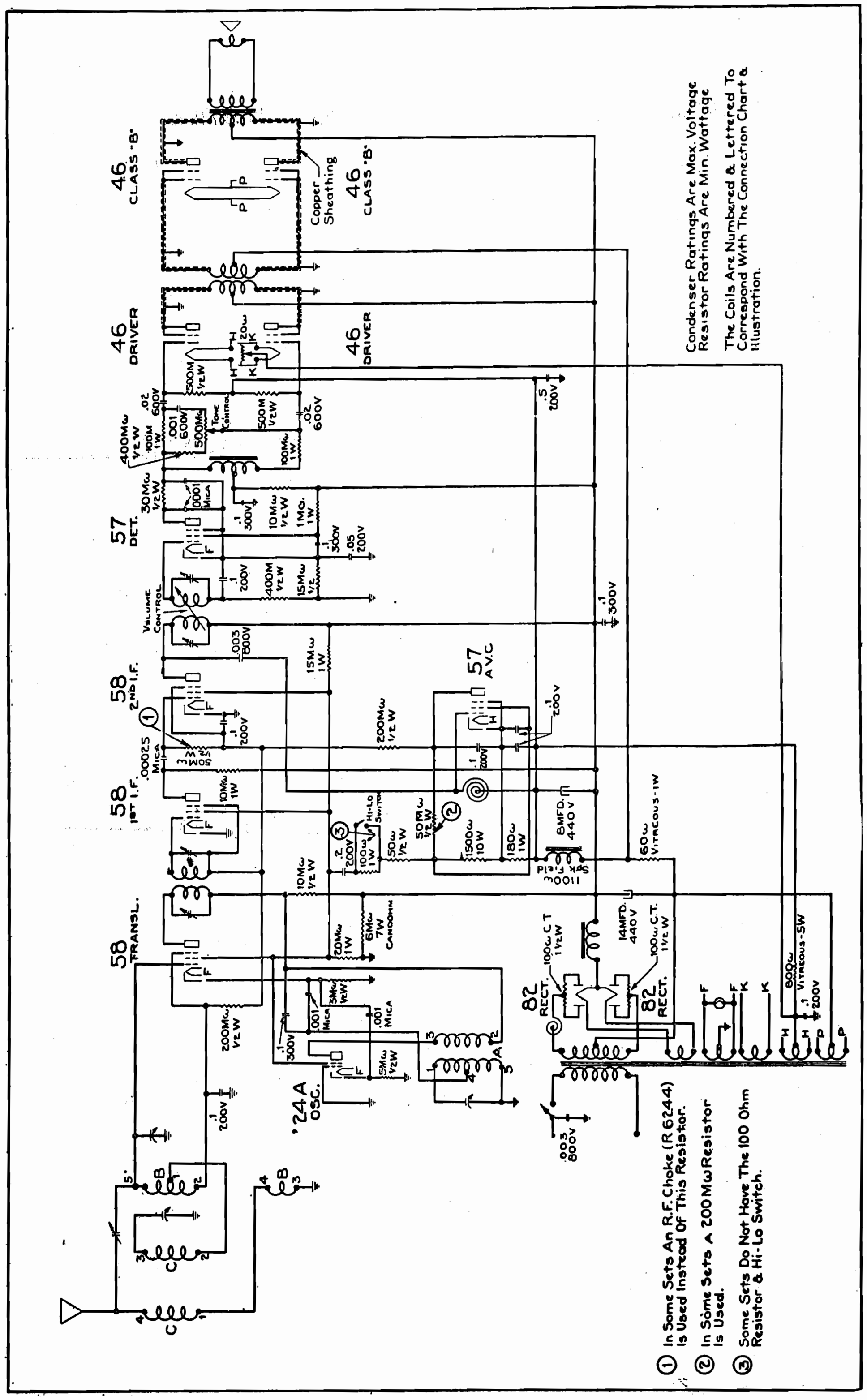
PHYSICAL AND ELECTRICAL SPECIFICATIONS

Model	Height	Width	Depth	Net Weight	Packing Case Dimensions	Weight Packed	Watts (105-125v. 60 cycle)
T-397	17¼"	14¼"	10"	27 lbs.	19¼"x16½"x12"	35 lbs.	70
C-495	39¾"	22"	11¾"	45½ lbs.	42¼"x24½"x14½"	60 lbs.	70
C-595	39¼"	24¾"	12½"	51 lbs.	42¼"x29" x16½"	80 lbs.	85
C-695	42¼"	24¾"	13¼"	56 lbs.	45¼"x29½"x17¼"	87 lbs.	85
C-995	45"	26"	14¼"	91½ lbs.	47¾"x31½"x18¾"	125 lbs.	150

COLONIAL RADIO CORP.

MODEL C-995
Schematic

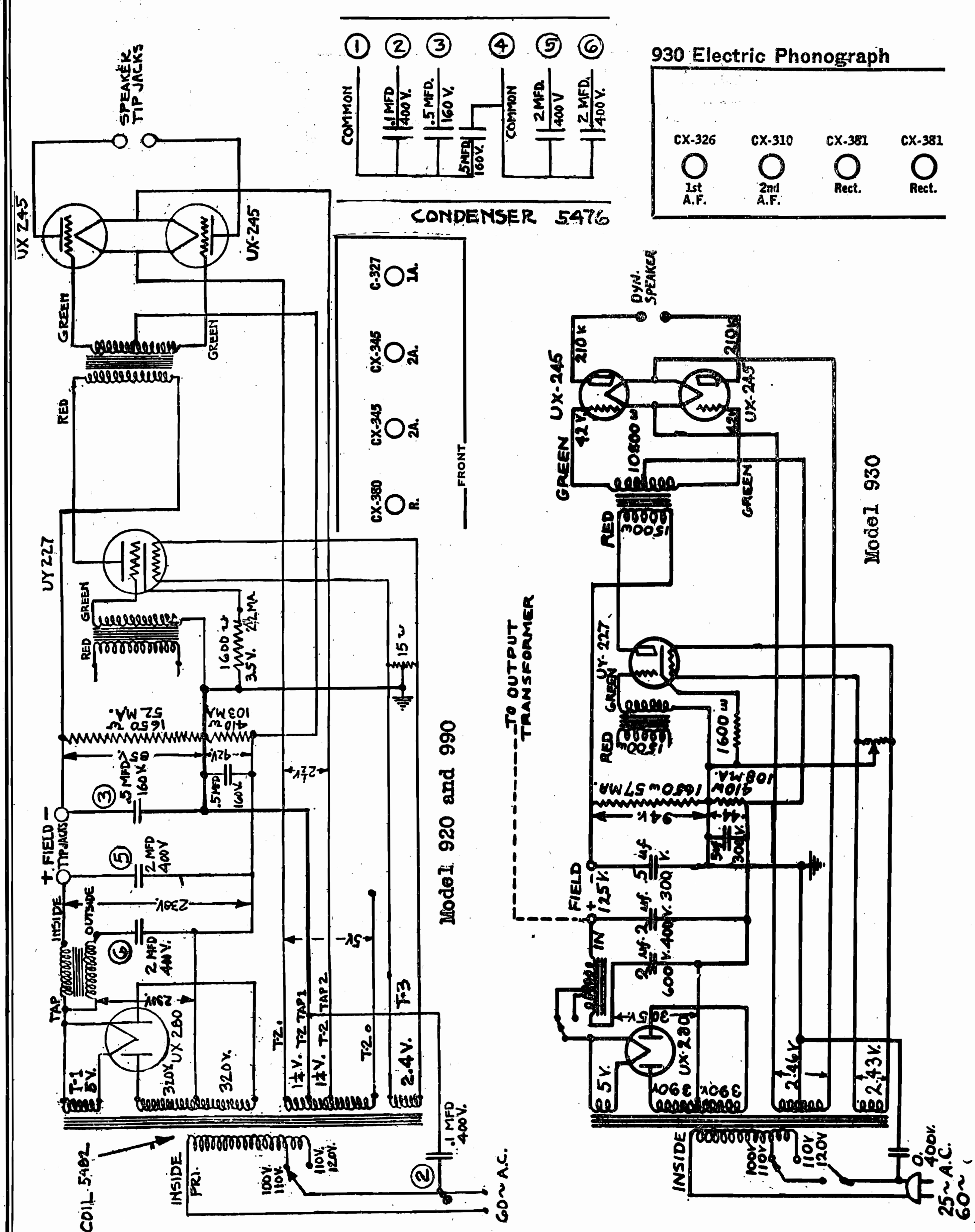
IF PEAK 175 KC



(10). Circuit Diagram — Model C-995

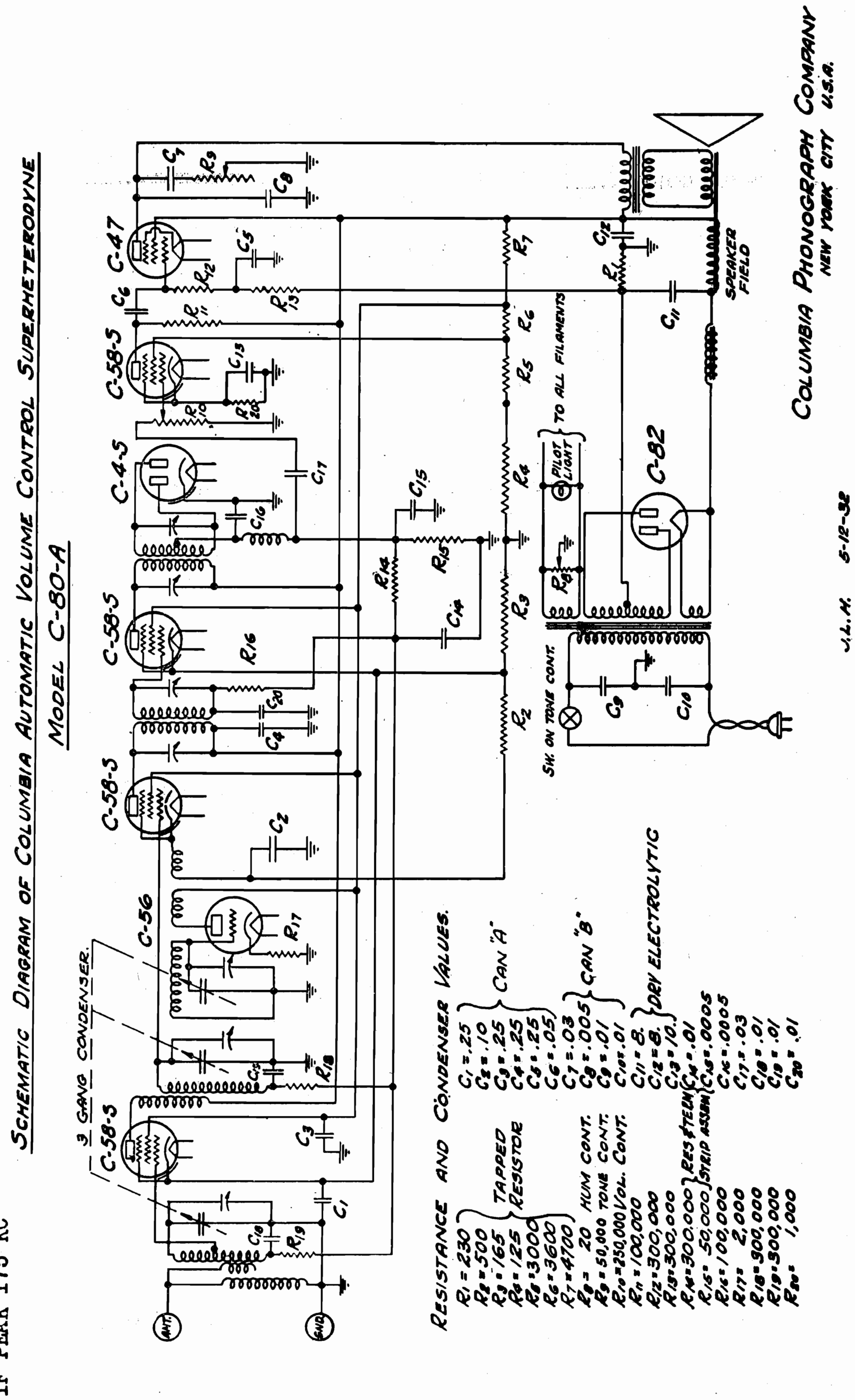
MODEL 920
MODEL 930
MODEL 990
Schematic

COLUMBIA PHONOGRAPH COMPANY



MODEL C-80-A
Schematic

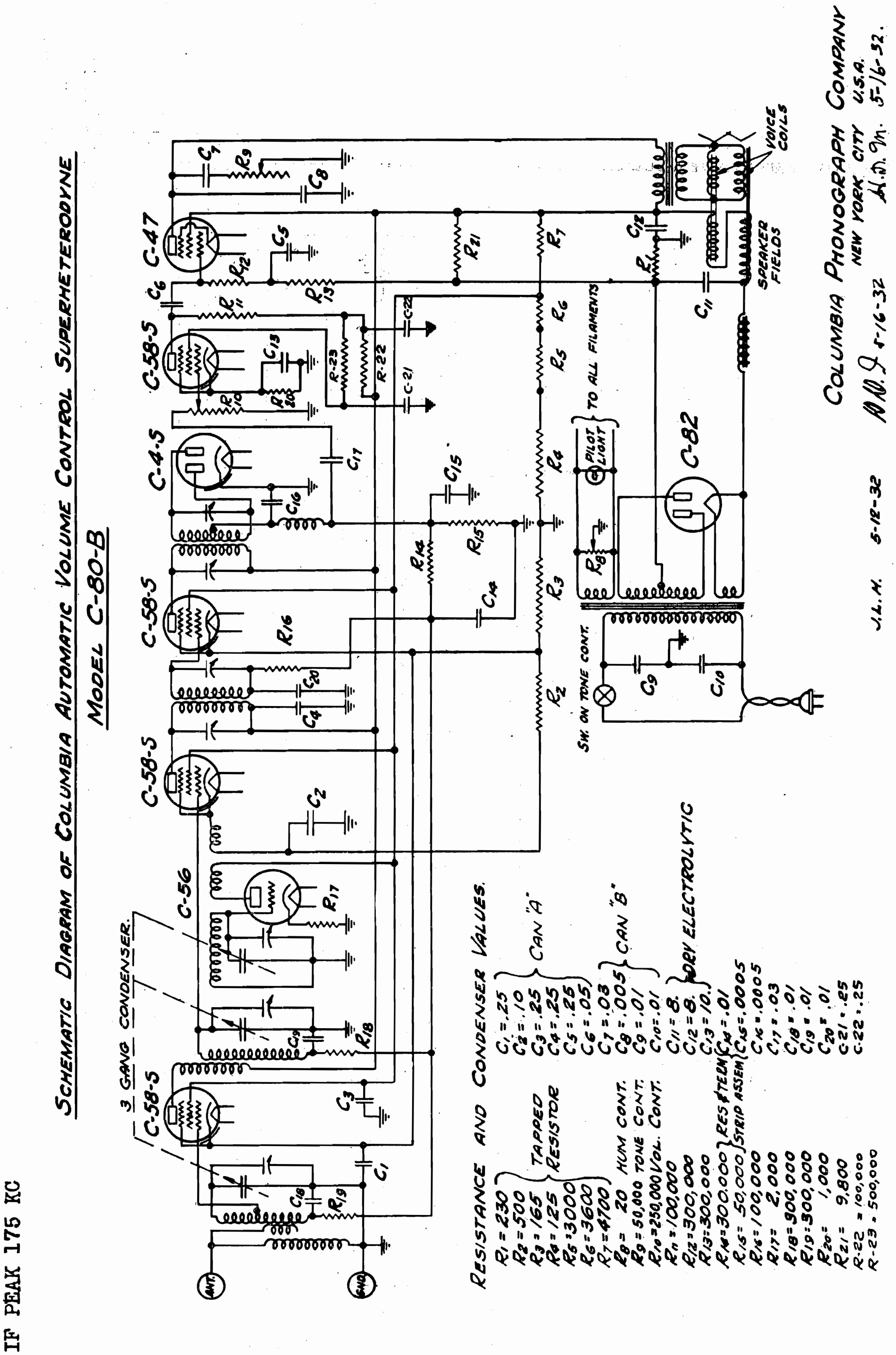
COLUMBIA PHONOGRAPH COMPANY



IF PEAK 175 KC

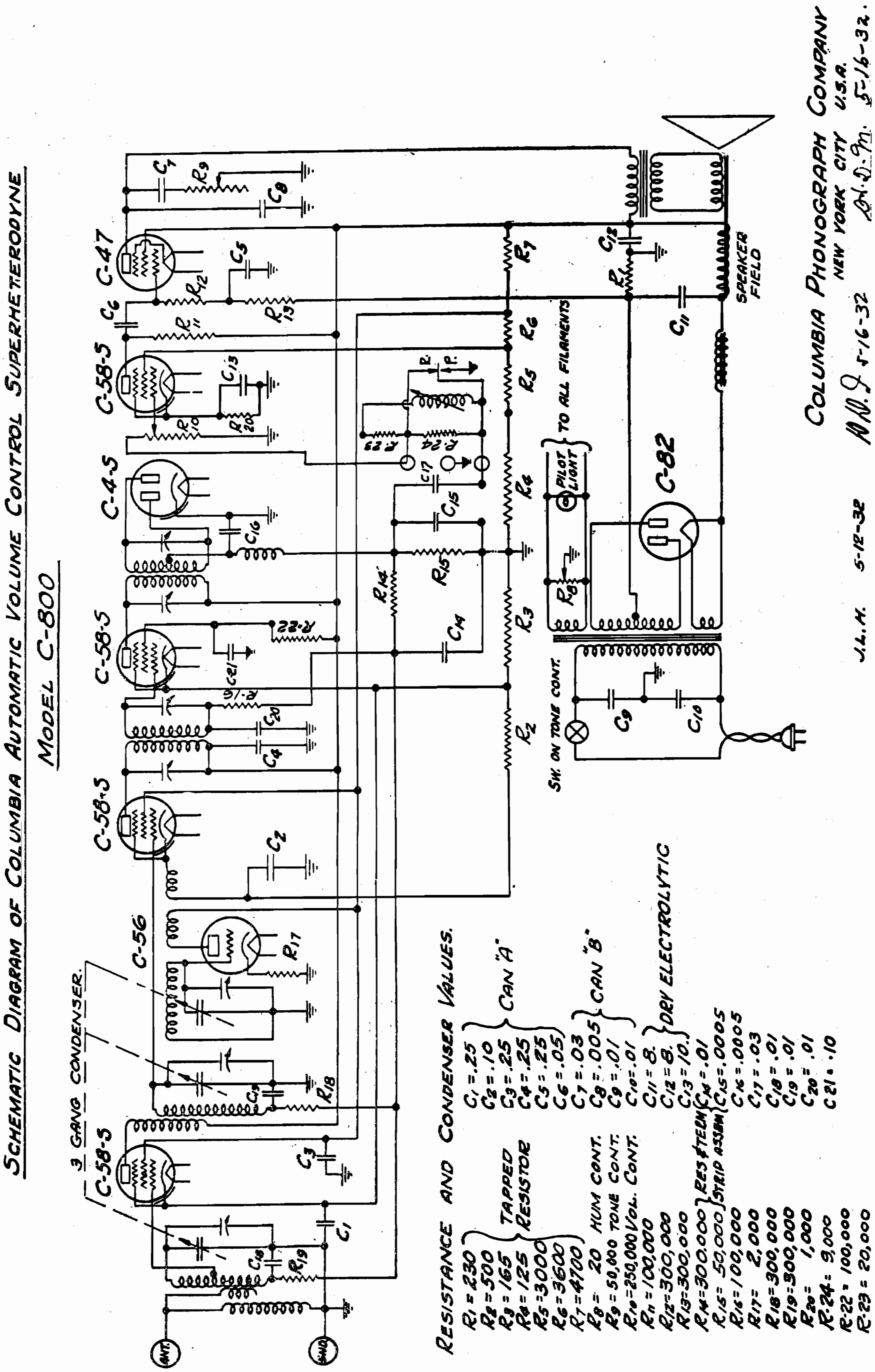
COLUMBIA PHONOGRAPH COMPANY

MODEL C-80-B
Schematic



MODEL C-800
Schematic

COLUMBIA PHONOGRAPH COMPANY



IF PEAK 175 KC

COLUMBIA PHONOGRAPH COMPANY

MODEL C-80-A, C-80-B C-800 C-90 Data

MODEL C-80-A, C-80-B & C-800-A CHASSIS
TABLE OF VOLTAGE AND CURRENT READINGS.
ALL D.C. VOLTAGE READINGS ARE TO GROUND.

TUBE PURPOSE	TYPE TUBE	PLATE VOLTS	PLATE CUR. M.A.-D.C.	CATHODE VOLTS	SCREEN VOLTS	SCREEN CUR. M.A.-D.C.
R.F.Amp.	C-58-S	210	6.4	4	110	1.6
Osc.	C-56	110	2.2	17	- -	- -
1st.Det.	C-58-S	210	4.0	6	110	1.0
I.F.Amp.	C-58-S	210	5.6	4	90	1.6
2nd Det.	C-4-S	- -	- -	0	-	- -
1st.Audio	C-58-S	38	2.4	3	50	.6
Output	C-47	200	25	- -	210	6.0
Rect.	C-82	- -	TOTAL 75	- -	- -	- -

LINE VOLTS 115 VOLUME CONTROL MAXIMUM

CODE OF MODEL C-80-B POWER TRANSFORMER

Rectifier filament - - Terminals #1 and 3 - - Black
Heater center tap - - Terminal #2 - - - - - Green
*Not used - - - - - - Terminals #4 and 6 - -
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

*NOTE:- Some power transformers were made without lugs on Terminals #4 and #6.

CODE OF MODEL C-90 POWER TRANSFORMER

Rectifier filament - - Terminals #1 & 3 - - Black
Heater center tap - - Terminal #2 - - - - Green
47 Filament - - - - - Terminals #5 & 8 - - Yellow
Tuning light - - - - Terminals #4 & 6 - - Black
Heaters - - - - - - - Terminals #7 & 9 - - Black
Start of Anode - - - Terminal #10 - - - - Red
Center tap of Anode - Terminal #11 - - - - Black
Finish of Anode - - - Terminal #12 - - - - Red
Primary - - - - - - - Terminal #13 & #15 - Yellow
Dummy Lug - - - - - - Terminal #14

HUM ELIMINATOR

To insure humless operation, there is incorporated in the filament circuit a hum balancing potentiometer, R-8, which is located on top of the chassis directly in front of the by-pass condenser assembly. After the set has been installed, this hum balance should be adjusted for minimum hum in the speaker by turning right or left as required. In some cases, it may be necessary to readjust this control when any of the tubes are replaced.

MODEL C-80-A
C-80-B
C-800
Data

COLUMBIA PHONOGRAPH COMPANY

MODEL CM-16-A and C-19-A DYNAMIC SPEAKERS

The model CM-16-A is a small dynamic speaker designed for use in conjunction with the Model C-80-A chassis in the table model receivers where comparatively small space is available. The field resistance of this speaker is 1260 ohms at 70° F.

The Model C-19-A is a large full sized dynamic speaker representing the latest in modern speaker development. The field resistance is the same as that of the CM-16-A.

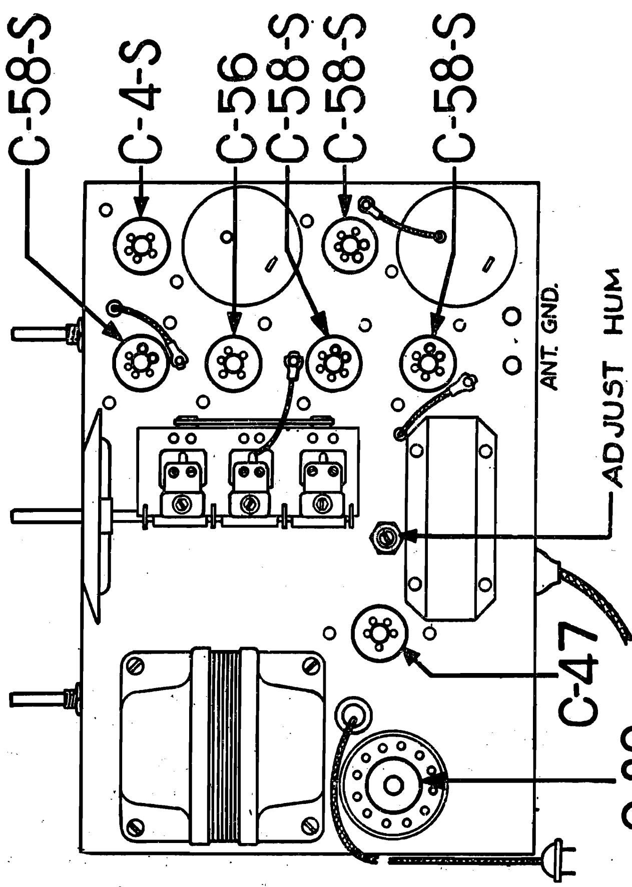
TECHNICAL DATA PERTAINING TO MODEL C-80-B CHASSIS

The circuit of the Model C-80-B chassis is the same as that of the C-80-A except for the necessary changes to adapt it for dual speaker operation. The power transformer and choke coil are both larger to provide for the extra current necessary to energize two speaker fields. In addition, resistor R-21 is incorporated as a bleeder.

Speakers C-19C and C-19-E, both full sized dynamic speakers, having a field resistance of 520 ohms each, are employed in conjunction with the model C-80-B chassis.

C-80-A and C-800-A
CODE OF POWER TRANSFORMER

Rectifier filament	Terminal #1	Yellow
Rectifier filament	Terminal #3	Yellow
Heater	Terminal #4 & 7	Black
Heater	Terminal #6 & 9	Black
Start of Anode	Terminal #10	Red
C.T. of Anode	Terminal #11	Black
Finish of Anode	Terminal #12	Red
Primary	Terminal #13	Yellow
Dummy Lug	Terminal #14	
Primary	Terminal #15	Yellow



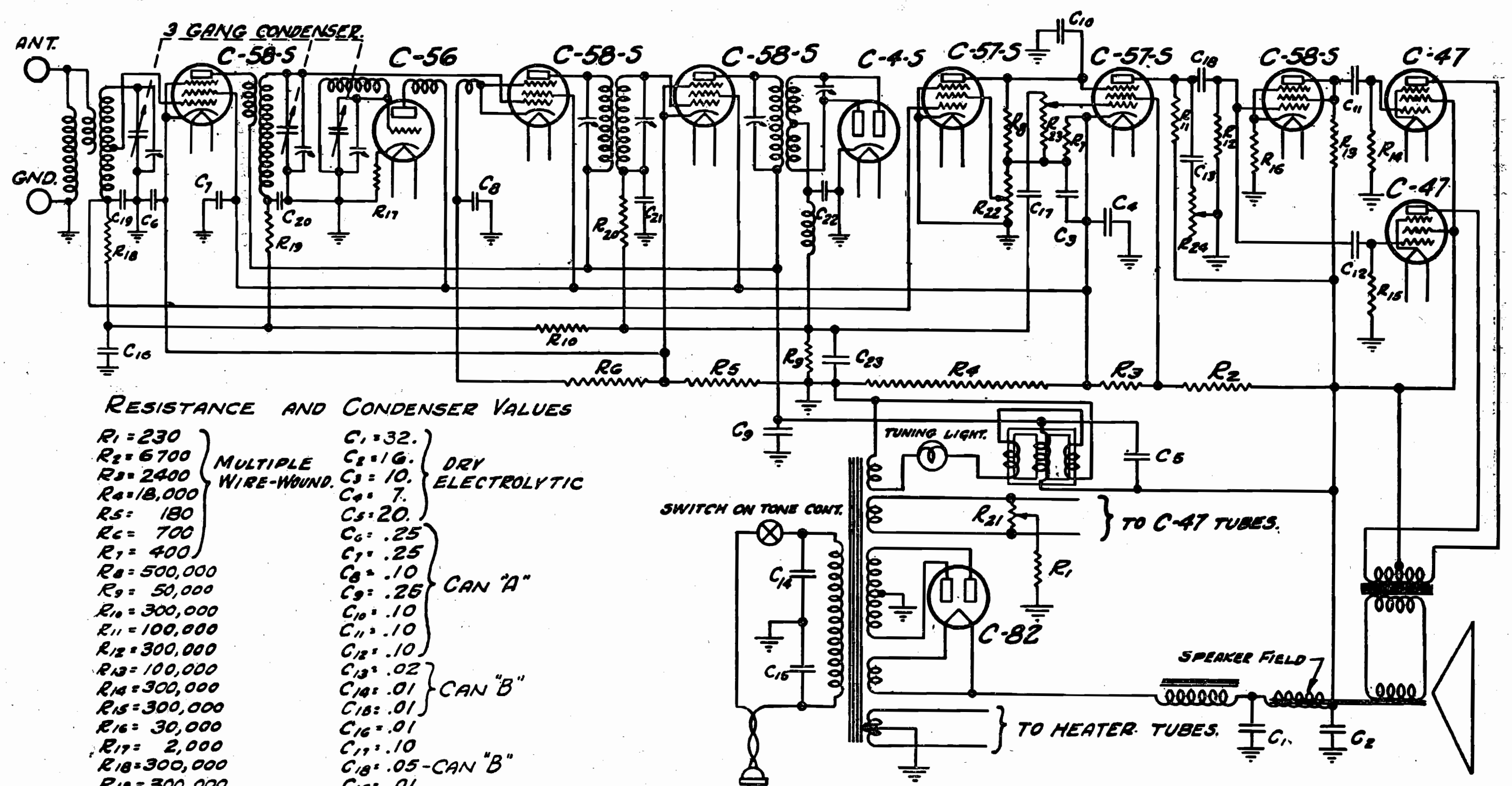
TOP VIEW OF CHASSIS

COLUMBIA PHONOGRAPH COMPANY

MODEL C-90
Schematic

SCHEMATIC DIAGRAM of COLUMBIA AUTOMATIC VOLUME CONTROL SUPERHETERODYNE MODEL C-90 SINGLE SPEAKER

IF PEAK 175 KC



RESISTANCE AND CONDENSER VALUES

R_1 = 230		C_1 = 32.	DRY ELECTROLYTIC
R_2 = 6700	MULTIPLE WIRE-WOUND.	C_2 = 16.	
R_3 = 2400		C_3 = 10.	
R_4 = 18,000		C_4 = 7.	
R_5 = 180		C_5 = 20.	
R_6 = 700		C_6 = .25	CAN "A"
R_7 = 400		C_7 = .25	
R_8 = 500,000		C_8 = .10	
R_9 = 50,000		C_9 = .25	
R_{10} = 300,000		C_{10} = .10	
R_{11} = 100,000		C_{11} = .10	
R_{12} = 300,000		C_{12} = .10	
R_{13} = 100,000		C_{13} = .02	CAN "B"
R_{14} = 300,000		C_{14} = .01	
R_{15} = 300,000		C_{15} = .01	
R_{16} = 30,000		C_{16} = .01	
R_{17} = 2,000		C_{17} = .10	
R_{18} = 300,000		C_{18} = .05	CAN "B"
R_{19} = 300,000		C_{19} = .01	
R_{20} = 100,000		C_{20} = .01	
R_{21} = 20	HUM CONT.	C_{21} = .01	
R_{22} = 20,000	SUPPRESSOR	C_{22} = .0005	
R_{23} = 200,000	VOL. CONT.	C_{23} = .0005	
R_{24} = 250,000	TONE CONT.		

COLUMBIA PHONOGRAPH CO.
NEW YORK CITY.

J.L.H. 7-5-32.

COLUMBIA PHONOGRAPH COMPANY

MODEL C-90
Silent Tuning Notes

AUTOMATIC SYNCHRO-SILENT TUNING CONTROL

Since the development of efficient automatic volume control receivers, there has been the objectionable noise when tuning from one station to another. The Model C-90 Chassis is equipped with an Automatic Synchro-Silent Tuning Control, which, when properly adjusted, entirely eliminates this noise.

The Automatic Synchro-Silent Tuning Control is located on the right hand side of the cabinet and may be adjusted as follows: Turn the receiver on and tune it to a position between two broadcasting stations, preferably near the low frequency end of the dial (60 to 65). Turn the volume control to maximum position and the Automatic Synchro-Silent Tuning Control clockwise as far as possible. Now slowly rotate the Automatic Synchro-Silent Tuning Control in a counter-clockwise direction until no more noise is heard. The noise will stop rather suddenly, and it is desirable that the Automatic Synchro-Silent Tuning Control be set only in the position required to eliminate the noise.

The set is now ready for operation and it will be found that stations come in with just as much volume as they would if the Automatic Synchro-Silent Tuning Control were not used but when tuning between stations the set is absolutely quiet.

If at any time it is desired to get maximum distance without regard to noise, between stations, simply turn the Automatic Synchro-Silent Tuning Control Knob as far clockwise as possible.

The function of the Automatic Synchro-Silent Tuning Control is as follows: One of the new type C-57-S tubes is used in the First Audio stage because of its sharp plate current cut-off characteristic. By inserting a high negative bias in the suppressor grid circuit of this tube, the tube is "blocked out" and no signal will come through.

To obtain this, a type C-57-S tube is used as a Synchro tube. This obtains its plate supply through resistor R-8, which is in the suppressor grid circuit of the audio amplifier tube. 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 bias. This causes its plate to draw current through resistor R-8. The voltage drop across this resistor biases the C-57-S audio amplifier tube so high that the audio amplifier is "blocked out", and hence no noise comes through.

When a station is tuned in, Automatic Volume Control voltage develops across resistor R-9 and this voltage is impressed in the form of a negative grid bias on the Synchro tube. The plate of the Synchro tube now draws little or no current, and hence the bias across resistor R-8 disappears, leaving nothing but 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 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 will be heard. Because of the variations in antennae and noises in different localities, it is necessary to provide a variable control to govern the point at which the Synchro tube takes hold. A potentiometer, R-22, is therefore included in the screen grid circuit of the Synchro Tube.

SENSITIVITY

Because of the elimination of noise between stations by Columbia Automatic Synchro-Silent Tuning, it has been possible to improve the sensitivity of the C-90 chassis to several times that heretofore used. In cases where low sensitivity is encountered, the adjustment of the Automatic Synchro-Silent Tuning Control should be carefully checked, as well as all the tubes in the radio frequency end of the chassis. This should always be done before attempting to increase sensitivity by re-aligning the condensers.

PUSH-PULL RESISTANCE COUPLING CIRCUIT

This is a feature which has never before appeared in a broadcast receiver. The advantages of resistance coupling are so well known that it is unnecessary to point out how good tone quality and well designed resistance coupling are synonymous. The advantages of push-pull are also well known, the chief among these being that it is possible to get greater output with less distortion. Now, as mentioned above, for the first time we have both of these features in one chassis.

In push-pull amplification, it is necessary that the grids of the push-pull tubes be fed with voltages that are equal in magnitude, but exactly opposite in phase or polarity. When a transformer is used, this is accomplished simply by using the two extremes of the secondary winding to feed the push-pull grids, and if a center tap is provided, these voltages are bound to be equal, and opposite in value.

In the new Columbia circuit, phase rotation is accomplished by making use of the fact that a signal in passing through a vacuum tube is rotated in phase exactly 180° (complete reversal). Following the audio channel from the duodiode detector, we find that the audio voltage built up across Resistor R-9 is fed to the C-57-S audio tube through potentiometer R-23. The output of this audio amplifier follows two channels. The direct and conventional channel is through condensers C-18 and C-11 to the lower of the two C-47 push-pull output pentodes. The remaining channel is through condenser C-17, and the C-58-S phase rotating tube. The signal coming out of this tube built up across R-13 is reversed in polarity over that originally built up across R-11. This reversed signal is fed to the upper of the two C-47 output Pentodes. By suitable design, the C-58-S phase rotating tube and associated circuit is arranged so that no change in the magnitude of the signal takes place, the only change being a reversal of polarity or phase.

In this way, we have two voltages fed to the two C-47 output tubes which are equal in magnitude, but opposite in polarity and true push-pull resistance coupled operation results.

COLUMBIA PHONOGRAPH COMPANY

MODEL C-90
Voltage
Tuning Notes

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 Dettector, 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 C-4-S 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 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. Beaause 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.

MODEL C-90
All voltages to ground

TUBE PURPOSE	TYPE TUBE	PLATE VOLTS	PLATE CUR. M.A.-D.C.	CATHODE VOLTS	SCREEN VOLTS	SCREEN CUR. M.A.-D.C.
R.F.Amp.	C-58-S	255	4.0	2	75	1.0
Osc.	C-56	75	4.0	12	- -	- -
1st.Det.	C-58-S	255	2.6	9	75	0.6
I.F.Amp.	C-58-S	255	4.4	2	75	1.0
2nd Det.	C-4-S	- -	- -	0	- -	- -
1st Audio	C-57-S	200	*	75	120	*
Ph.Shifter	C-58-S	116	1.0	32	116	0.3
Output	C-47	240	60	-	255	6.6
Rect.	C-82	- -	TOTAL 160	-	-	-
Synchro-	C-57-S	*	*	0	73	3.8

4

MODEL C-100
Schematic
Voltage
Notes

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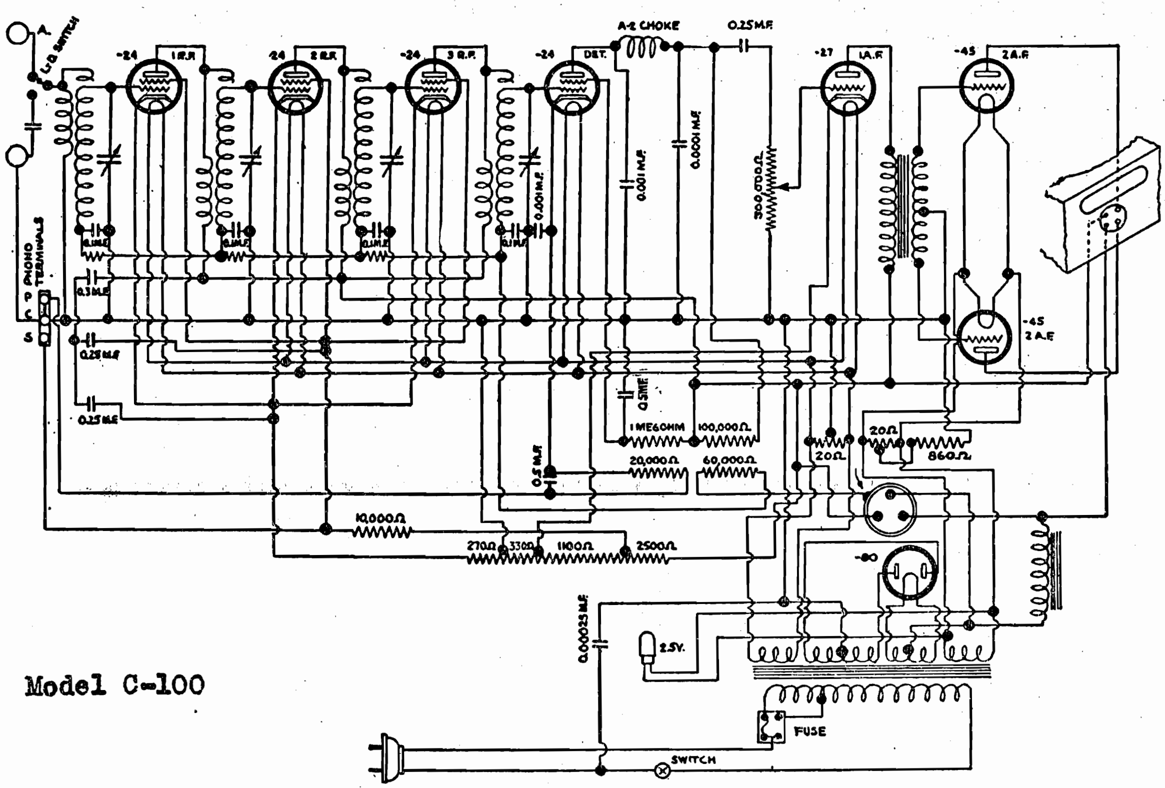
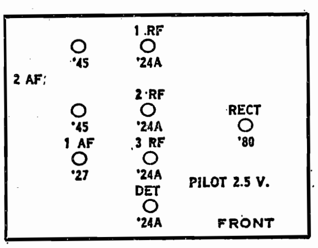


Model C-100



Voltage Limits

Filament Voltages	
All tubes but rectifier	2.3 to 2.6
Rectifier tube	4.6 to 5.2
Plate Voltages	
R. F. tubes	170 to 190
Detector tube	95 to 105
1st Audio tube	130 to 150
Output tubes	220 to 250
Rectifier tube (A. C. voltage)	250 to 280 each plate
Control Grid Voltages	
R. F. tubes	2.5 to 3.5
Detector tube	4.0 to 7.0
1st Audio tube	8.0 to 11.0
Output tubes	40.0 to 50.0
Screen Grid Voltages	
R. F. tubes	60 to 75
Detector tube	35 to 55

To be measured with speaker connected and line voltage of 117½ (235 for 220 volt receivers) with fuse in "High" position or of 107½ (215 for 220 volt receivers) with fuse in "Low" position. Measure plate and grid voltages with a high-resistance, D. C. voltmeter (600 ohms or more per volt) from plate or grid tube contact to emitter contact, except in the case of the grid voltage of the first audio tube, which should be measured from the emitter to the chassis.

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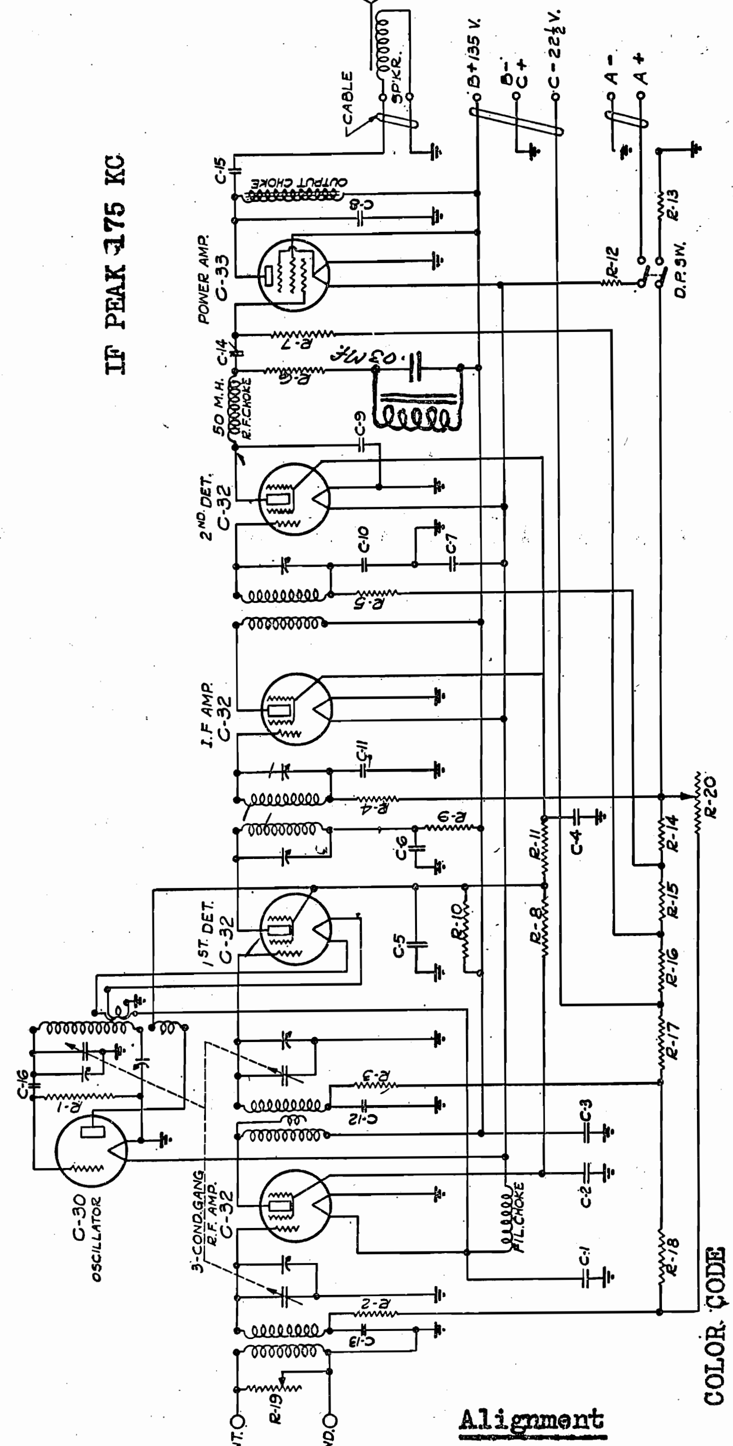
MODEL 120-B
Schematic
Notes

NOTE.. This chassis is used in the model 123 receiver

BATTERY RECEIVER MODEL 120-B

IF PEAK 175 KC



RESISTANCES Ω

- R1 = 330,000
- R2 = 100,000
- R3 = 100,000
- R4 = 100,000
- R5 = 100,000
- [illegible]
- R7 = 600,000 (TERM. STRIP "A")
- R8 = 50,000 (TERM. STRIP "A")
- R9 = 250 (TERM. STRIP "A")
- R10 = 20,000
- R11 = 50,000
- R12 = 0.45
- R13 = 375 (TERM. STRIP "B")
- R14 = 830 (TERM. STRIP "B")
- R15 = 920 (TERM. STRIP "B")
- R16 = 1,500 (TERM. STRIP "B")
- R17 7,250 (TERM. STRIP "B")
- R18 2,530 (TERM. STRIP "B")
- R19 = 10,000 (VOLUME CONTROL)
- R20 = 10,000 (VOLUME CONTROL)
- R6 = 25,000

CAPACITIES M.F

- C1 = .1 (CAN)
- C2 = .1 (CAN)
- C3 = .27 (CAN)
- C4 = .1 (CAN)
- C5 = .1 (CAN)
- C6 = .1
- C7 = .1
- C8 = .004
- C9 = .00025
- C10 = .01
- C11 = .01
- C12 = .01
- C13 = .01
- C14 = .067 ← TERM. STRIP "A"
- C15 = .4
- C16 = .00005

COLOR CODE

Speaker. Red and Green or Black (Small lugs)

A plus 2 volts.. Red with large lug.
A minus 2 volts.. Black with large lug.

B plus 135 volts.. Red
B minus 135 volts... Black

C plus 22.5 volts.. Black
C minus 22.5 volts.. Blue

Storage Battery In Place of Air-Cell
To make the above change short circuit the .450 ohm filament resistor. Then connect a 2 volt storage battery cell to the "A" terminals.

Alignment

Use an output meter. Supply a 175 kc signal to the grid of the first detector and align all i-f trimmers. Apply a 1500 kc signal to the input of the receiver and tune to this signal. Then adjust all r-f trimmers for maximum signal. Supply a 600 kc signal to the input of the receiver and tune to this signal. Then adjust the oscillator tracking condenser and tuning control simultaneously for maximum output. The combination of tracking condenser adjustment and dial setting with maximum output, disregarding calibration is the correct setting.

MODEL 120-B
Voltage
Notes

COLUMBIA PHONOGRAPH COMPANY

Note... This chassis is used in the model 123 receiver.

VOLTAGE TABLE

Tube	Fil. Volts	Plate Volts	Plate Current	Screen Volts	Screen Current	Grid Bias VC Max	Grid Bias VC Min
RF	2.0	135	1.2ma	40	.3ma	-3	-11
Osc.	2.0	55	3.0	-	-	0	0
1st Det.	2.0	135	.2	55	.2	-8	-14
IF Amp.	2.0	135	.3	22	.3	-3	-3
2nd Det.	2.0	20	*	22	.4	-8	-8
Output	2.0	130	12	135	2.6	-13.5	-13.5

* Less than .1 ma.

Precautions When Using Other Than Air-Cell

1. It is recommended that the cell be mounted outside of the cabinet because of the creepage of the electrolyte which may spoil the cabinet and chassis. However, if the battery is mounted within the cabinet, the maximum overall dimensions should not exceed the following.. Height 11 inches; Length 12 inches; Width 6 inches.

2. A rubber mat is also required. This mat should extend to the full height of the battery so as to protect the chassis and cabinet against the action of acid. Naturally, the battery rests on the mat.

3. Lead coated battery clips must be provided for the battery cable for connection to the battery.

4. The cell must be of the lead-sulphuric acid type and not of the Edison nickel iron type. It should have a flat discharge curve, which can be obtained by proper design. At least, the cell selected for the purpose must be of the proper design so as to afford the correct discharge characteristic.

5. The capacity of the cell should be at least 100 ampere-hours to a final voltage of 1.8. The desired voltage range is from 2.1 to 1.9 volts during the major portion of the period of discharge.

Resistors

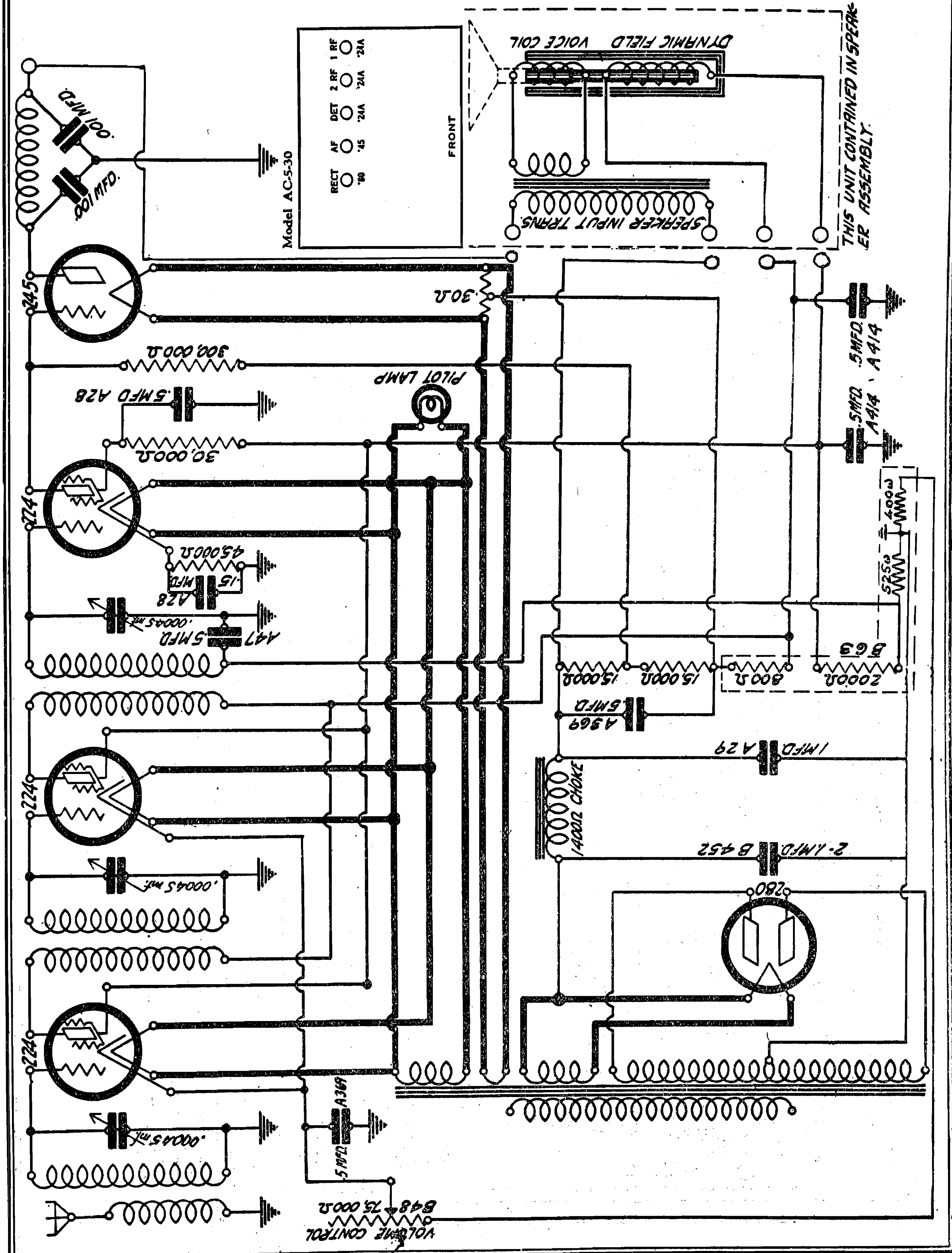
Reference to the table of resistors will provide information concerning the arranegement of these units, that is their position upon terminal strip "A" or "B".

Condensers

Reference to the listing of condensers will furnish information with respect to the units housed within a single can and the condenser mounted upon the terminal strip "A".

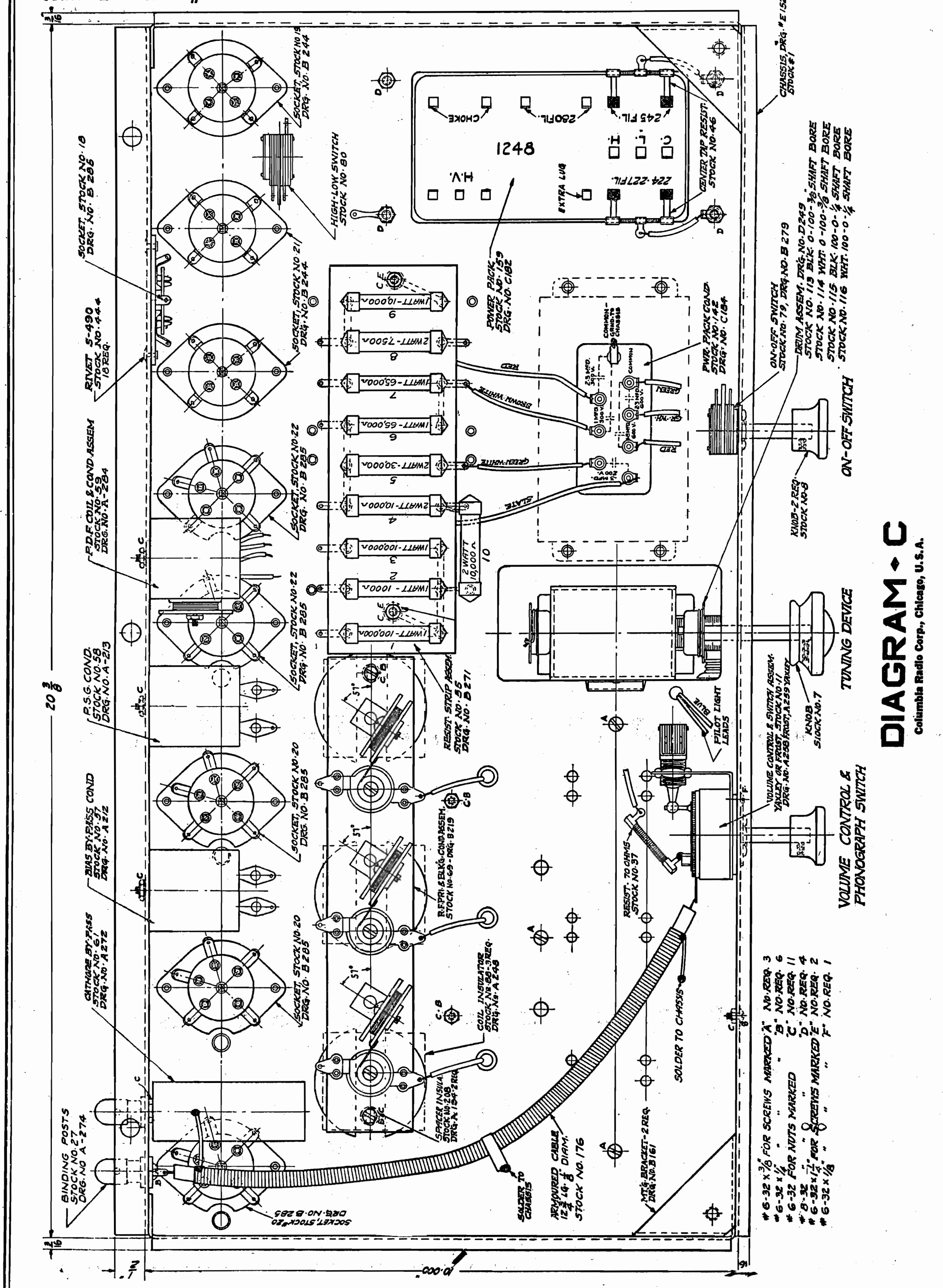
COLUMBIA RADIO CORPORATION

MODEL SG-5
1930
Schematic



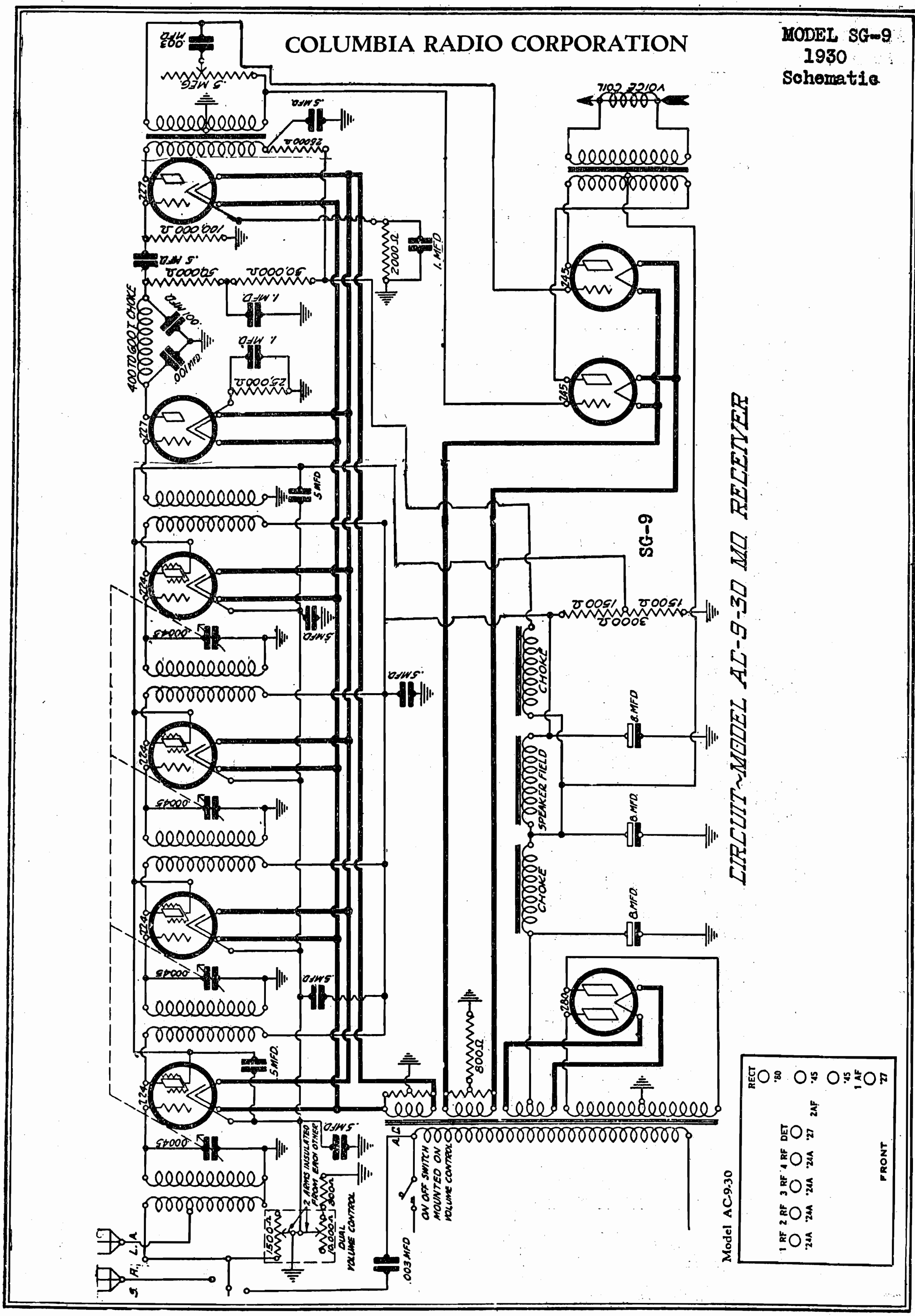
MODEL SG-8
Chassis View #2

COLUMBIA RADIO CORPORATION



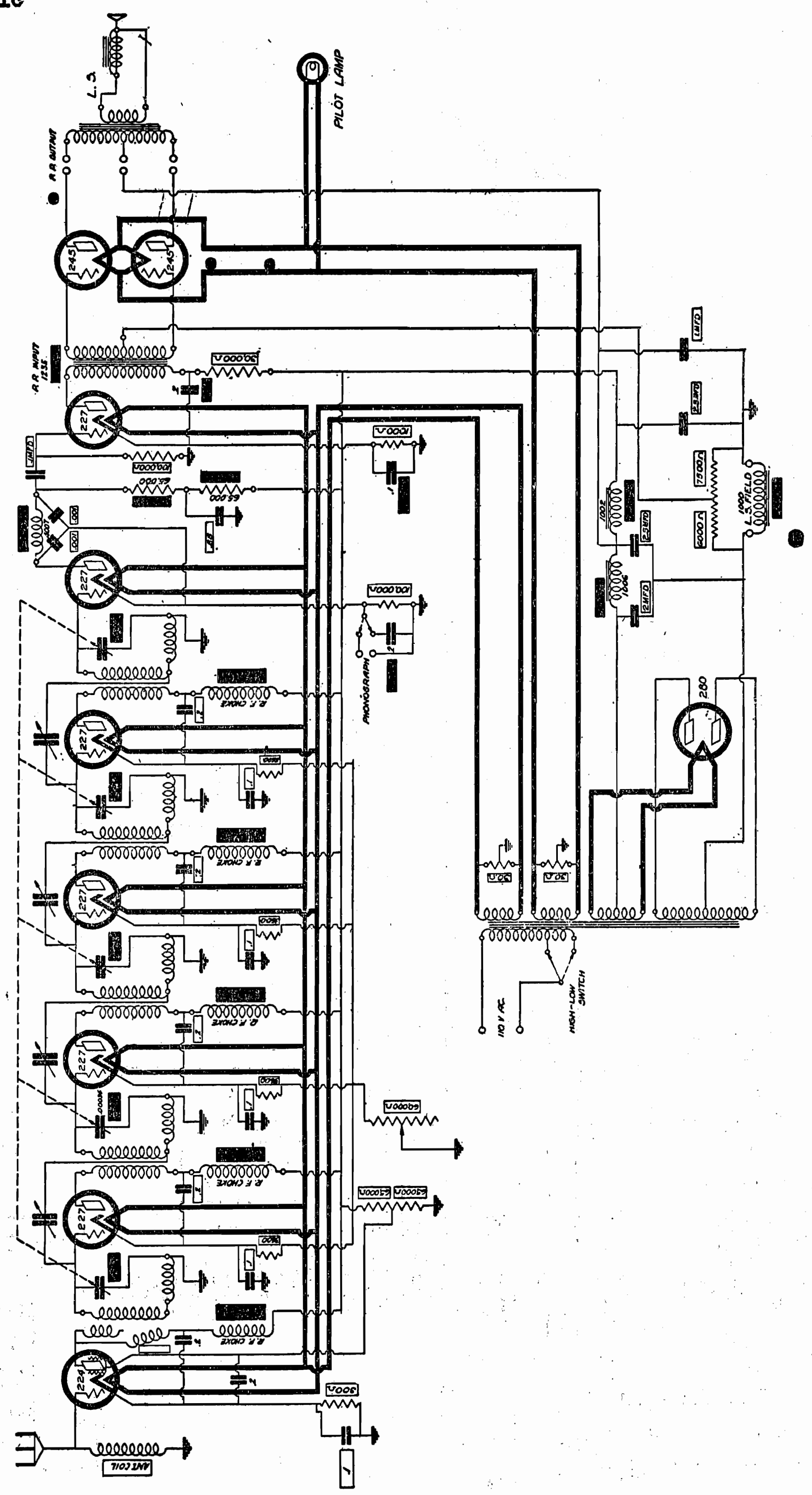
COLUMBIA RADIO CORPORATION

MODEL SG-9
1930
Schematic



MODEL SG-10
Schematic

COLUMBIA RADIO CORPORATION



RECEIVER SG-10 (1930)

CROSLEY RADIO CORP.

TUNING CONDENSER AND ALIGNMENT NOTES

Recent chasses are equipped with tuning condensers mounted together as gangs in metal frames. On most of these chasses one or more small adjustable aligning condensers, called "padding condensers", are provided, mounted on the condenser frames. All of these chasses have tuning condensers with split end plates on either the rotors or stators for use in adjusting the condensers so that they track together—that is, so that they tune together throughout the entire range of the station selector dial.

See the accompanying chart to determine the method of aligning any particular chassis. Then refer to the section indicated on the chart.

I. Bandbox, Jr., Models 401, 401-A; Bandbox, Models 601 and 602; Jewelbox, Models 704, 704-A, 704-B.

These receivers are equipped with "acuminators", which are small, adjustable aligning condensers across the first and second tuning condensers. The acuminators are used as auxiliary tuning controls, being adjusted by small levers on the front of the receiver. The detector stage tuning condenser is aligned by means of a small adjustable aligning condenser (not operated as a tuning control) mounted on the chassis. This condenser should be so adjusted that all three condensers may be brought into sharp resonance, with the aid of the acuminators, at all settings of the station selector.

Proceed as follows to adjust the aligning condenser:

1. Set acuminators at approximately their middle positions.
2. Tune carefully to a weak signal of 1000 to 1500 kilocycles frequency, from a broadcasting station or local modulated oscillator.
3. If necessary, reduce volume by means of volume control or filament rheostat, retuning carefully to middle of signal band (maximum signal with retarded volume control).
4. Adjust aligning condenser by means of a balancing wrench or No. 4 socket wrench until signal is loudest with wrench removed (since capacity of wrench may change tuning).
5. Retune slightly if this improves volume; then readjust aligning condenser.
6. Tune to signals at various dial settings to see whether it is possible to tune sharply with acuminators to signals at all frequencies. If not possible, realign, as above.

II. Gembox, Model 608

This receiver has no acuminators or other aligning condensers across the first two tuning condensers, but has an adjustable aligning condenser across the detector-stage tuning condenser. The aligning condenser is mounted on top of the condenser frame.

To align, proceed as follows:

1. Tune carefully to a signal of moderate strength of 1000 to 1500 kilocycles frequency, from a broadcasting station or local modulated oscillator. If necessary, reduce volume by means of volume control. Be sure to tune to middle of signal band (loudest signal with retarded volume control).
2. Adjust aligning condenser by means of a balancing wrench or No. 4 socket wrench until signal is loudest with wrench removed (since capacity of wrench may change tuning).
3. Retune slightly if this improves volume, and readjust aligning condenser. Continue re-tuning and realigning until no further improvement is noted.

III. Gemchest, Model 609; Gembox, Model 610

These receivers have no aligning condensers. The tuning condensers have four-section split end plates on the stators, which are used for adjusting the tuning condensers so that they track together. In order to make this adjustment, a beat-frequency oscillator should be used. See section VIII-B.

IV. Showbox and Showchest, Models 705, 706, 708; Jewelbox, Model 804; Models 41-A and 42

These receivers have aligning condensers across their detector-stage tuning condensers. In addition, the rotors of the tuning condensers have seven-section split end plates for adjusting so that the condensers track together. The aligning condenser on Jewelbox, Model 804 is mounted on the chassis, to the rear of the condenser gang, and is adjustable by means of a balancing wrench or No. 4 socket wrench. The aligning condenser on each of the other models is mounted inside the condenser frame, and is adjustable by means of a square head screw extending through the condenser frame just above the power switch.

A. Adjusting Rotor End Plates For Tracking.

A beat-frequency oscillator should be used for this purpose. See section VIII-A.

B. Adjusting Detector Stage Aligning Condenser.

Proceed as follows:

1. Tune to a signal of moderate strength of 1000 to 1500 kilocycles frequency (dial setting about 5 to 15) from a broadcast station or local modulated oscillator. Tune to middle of signal band (loudest signal with retarded volume control) reducing volume by means of volume control if necessary.
2. Adjust aligning condenser until signal is loudest. Retune slightly if this improves volume, and readjust aligning condenser.
3. Continue retuning and readjusting aligning condenser until no further improvement is noted.

V. Models 20, 21, 22, 40S, 41S, 42S, 82S; 60S, 61S, 62S, 63S.

These receivers are not equipped with aligning or padding condensers. The rotors of the tuning condensers have seven-section split end plates, for adjusting the condensers so that they track together. As explained below, these may also be adjusted on the chassis for aligning the three stages.

A. Adjusting Rotor End Plates for Tracking.

To adjust the condensers so that they track together, a beat-frequency oscillator should be used. See section VIII-A.

B. Aligning Tuning Condensers on Chassis.

Proceed as follows:

1. IMPORTANT! Cover the caps and clips on the tops of the screen grid tubes with tape, so that no metal is exposed.
2. Tune to a signal of moderate strength between 1200 and 1500 kilocycles (dial setting 5 to 15) from a broadcast station or local modulated oscillator. Carefully adjust station selector to middle of signal band (loudest signal with retarded volume control).
3. Procure a strip of copper or brass just narrow enough to slip easily into the louvres (ventilator openings) on the covers over the screen grid tubes.

Slide this piece of metal through one of the louvres toward the first-stage screen grid tube cap, keeping the metal grounded against the shield. Note whether the loudness increases or decreases. Try this for each screen grid tube.

4. If the volume increases in every case, or decreases in every case, the receiver is not tuned sharply. Retune and check again.

5. If the volume increases in some cases but not in others, more capacity is needed in those stages showing increased volume. If the volume decreases in some stages but not in others, less capacity is needed in the stages exhibiting decreased volume. Note which condenser needs adjusting worst, and whether it requires increased or decreased capacity.

6. Remove shield cover from condenser frame and adjust interleaved split end plate of condenser out of alignment. Bend split sector slightly toward adjacent stator plate to increase capacity, or slightly away from it to decrease capacity.

7. Retune and recheck as above.

8. Repeat until metal strip test fails to show lack of alignment.

VI. Models 30S, 31S, 33S, 34S—Early Production, Not Equipped With Padding Condensers Adjustable From Outside of Condenser Frames.

These receivers have aligning or padding condensers for each tuned stage, but these condensers are not adjustable from outside the tuning-condenser frame. They are adjusted permanently with a special tool at the factory, and should not be changed. If realignment is necessary, this may be taken care of by adjusting the tracking with a beat-frequency oscillator as explained in section VIII-A. The rotors of the tuning condensers are equipped with seven-sector split end plates for this purpose.

VII. Models 30S, 31S, 33S, 34S—Late Production, Equipped With Padding Condensers Adjustable From Outside Condenser Frame.

These receivers are equipped with small adjustable padding or aligning condensers for two tuned stages, adjustable from outside the tuning condenser frames by means of screws extending through the frames. The rotors of the tuning condensers have seven-sector split end plates, for adjusting them so that they track together.

A. Adjusting Rotor End Plates For Tracking.

This should be done by means of a beat-frequency oscillator. See section VIII-A.

B. Adjusting Padding Condensers With Outside Station Signals.

Proceed as follows:

1. Tune to a weak signal between 1200 and 1500 kilocycles (dial setting 5 to 15). Carefully tune to middle of signal band (maximum signal with retarded volume control), reducing volume by means of volume control if necessary.

2. Loosen locknut with three-eights inch end wrench and adjust padding condenser toward rear of chassis until signal is loudest. Retune slightly if this improves volume, and readjust padding condenser. Repeat until no improvement is noted; then tighten locknut without permitting adjusting screw to turn.

3. Adjust the other padding condenser as in "2".

4. If when aligning signal becomes too strong to allow of accurate adjustment, tune to a weaker signal and repeat above procedure.

C. Adjusting Padding Condensers With Local Oscillator.

Follow above procedure, except:

1. Instead of adjusting for maximum signal loudness, adjustment may be made for maximum reading on a 250 volt D. C. voltmeter, having a resistance of about 250,000 ohms, connected across the detector grid bias resistance, from emitter to chassis. A small punched strip may be used to make the connection to the emitter prong of the tube, or this may be reached by removing the bottom of the chassis. The speaker must remain connected.

2. It is advisable to check the alignment for oscillator signals at two frequencies—at about 10 and 40 on the station selector dial.

VIII. Aligning Condensers for Tracking With Beat-Frequency Oscillator

The following procedure is for the purpose of adjusting the tuning condensers so that they "track together"; that is, so that they each change capacity by the same amount when the station selector is rotated. This insures uniform tuning throughout the entire range of the station selector, but does not align the condenser so that all circuits are tuned to the same frequency. The latter is accomplished by means of the aligning or padding condensers. The proper procedure, then, is: first, adjust condensers for tracking by means of beat-frequency oscillator; second, replace condenser gang on chassis and align circuits by means of padding condensers.

A. Condensers Having Seven Sector Split End Plates on Rotors.

Proceed as follows:

1. Take off cover from condenser frame. Unsolder leads and remove frame from chassis. Hold gang directly in front of you, with rotors entirely interleaved between stators, and note whether rotor plates of each condenser are centered between corresponding stators. If any require centering, loosen set screws and slide along shaft until properly centered. Then tighten set screws. When you are satisfied that all rotors are properly centered, tighten all set screws holding rotors to shaft.

Table II—Allowable Variation in Capacity at Different Settings—Seven-Sector Rotor Plates

Number of Split Sectors Entered Into Stator	Allowable Difference Between Any Two Condensers of Gang
1	1.5 mmf.
2	1.5 mmf.
3	2.0 mmf.
4	2.0 mmf.
5	2.5 mmf.
6	2.5 mmf.
7	2.5 mmf.

2. Place frame in jig on top of beat-frequency oscillator. Turn station-selector knob so that there is no interleaving of rotors and stators—that is, so that condensers are set for minimum capacity.

3. Check the capacity of each condenser. If there is a variation in capacity, adjust the compensators C1, C2, and C3 on the beat frequency oscillator so that the same reading is obtained with each condenser.

4. Turn station selector knob so that first sector of each split end plate is entered into stator. Check capacity of each condenser. If there is a variation

CROSLEY RADIO CORP.

greater than that given in Table 1, note which condenser is farthest out. Then rotate station selector until first split end plate of this condenser may be adjusted. Spring this sector slightly toward adjacent stator plate to increase capacity or slightly away from adjacent stator plate to decrease capacity. Adjust station selector so that first split sectors are again interleaved with stators, and recheck capacities. If there is too much variation, readjust as above. Repeat until variation of capacity is within the limits given in Table I.

5. Rotate station selector until first two split sectors are entered into stators. Check capacity variation as above. If variation is greater than allowable limits given in Table I, adjust condenser farthest out by springing second split end plate sector of that condenser toward adjacent stator plate to increase capacity or away from adjacent stator plate to decrease capacity. Recheck and readjust until variation is within allowable limits of Table I, as outlined in "4".

6. Repeat above procedure with three, four, five, six, and seven sectors entered into stators. Remember that the sector to be adjusted in each case is the last one entered into the stators prior to checking. Thus, to compensate for variation found when five sectors are interleaving stators, the fifth sector should be adjusted, etc.

7. After completing adjustment, recheck in each position and readjust as necessary.

8. Replace frame on chassis, and align padding condensers.

B. Condensers Having Four Sector Split End Plates on Stators.

Follow the above procedure, except adjust the split stator sectors instead of rotor sectors, referring to Table III for allowable limits of variation.

Table III - Allowable Capacity Variation at Different Settings - Four Sector Stator Plates

Number of Split Stator Sectors Interleaved by Rotors	Allowable Difference Between Any Two Condensers of Gang
1	2.0 mmf.
2	2.0 mmf.
3	2.5 mmf.
4	2.5 mmf.

TABLE OF DYNACOIL SPEAKERS

Type Letter	Number of Leads	Field Carries	For Use With Receivers
G	4	Plate Current all Tubes	82H
H	4	Plate Current all Tubes	41A and 42
J	4	Plate Current all Tubes	Early Models 40S, 41S, 42S, 82S
K	5	Filament Current	60, 61, 62
L	5	Filament Current	60S, 61S, 62S, 63S D. C. Comrade, D. C. Crony, D. C. Partner
M	4	Plate Current all Tubes but Output	Later Models 40S, 41S, 42S, 82S All 30S, 31S, 32S, 34S. A. C. Playmate, A. C. Comrade, A. C. Crony, A. C. Partner.

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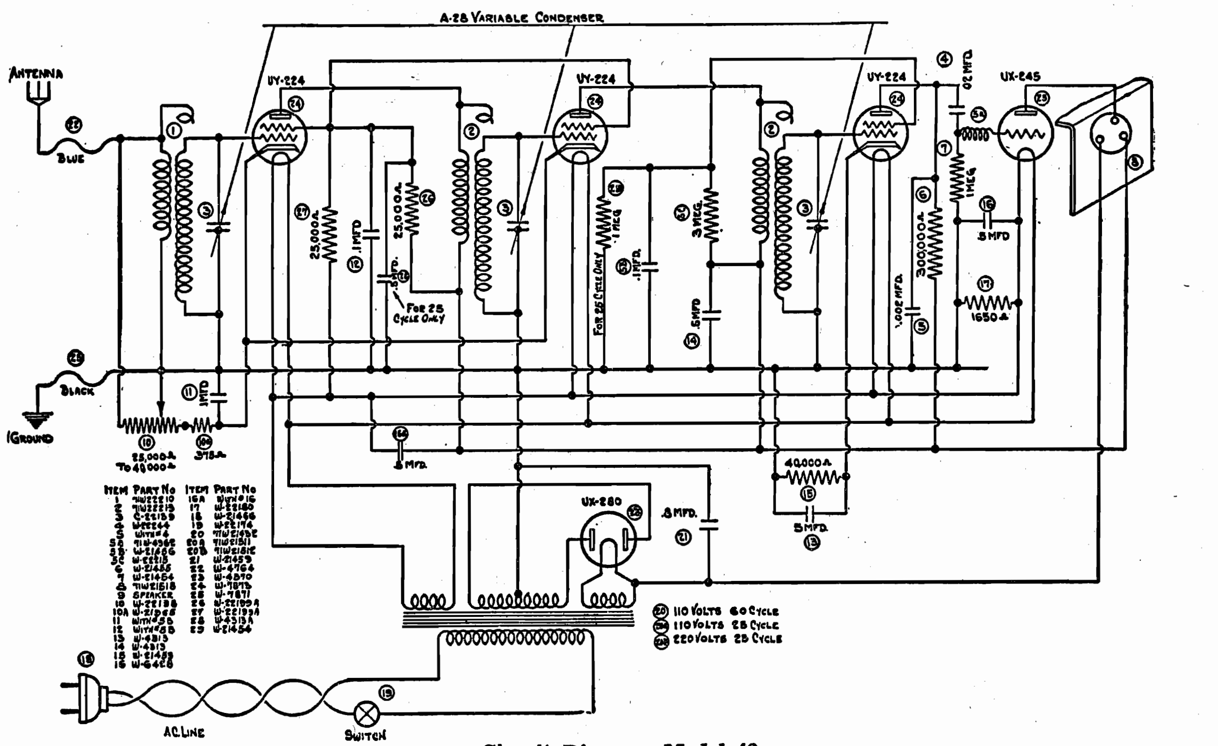
MODEL 48
Schematic, Voltage



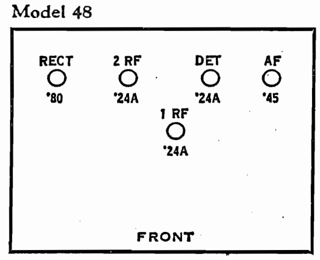
Circuit Diagram Model 48

Voltage Limits

To be measured with tubes in place, speaker connected, and line voltage of 117½ (235 for 220 volt receivers. Measure plate and grid voltages with a high-resistance D. C. volt-meter (600 ohms or more per volt) from plate or grid socket contact to emitter contact. Use a low-range A. C. meter to measure filament voltages.

Filament Voltages	
All tubes but rectifier	2.3 to 2.5
Rectifier tube	4.6 to 4.8
Plate Voltages	
R. F. amplifier tubes	160 to 190
Detector tube	105 to 125
A. F. amplifier tube	125 to 155
Rectifier tube	220 A. C.
Screen Grid Voltages	
R. F. amplifier tubes	80 to 90
Detector tube	40 to 50
Control Grid Voltages	
R. F. amplifier tubes	2.5 to 3.1
Detector tube	6.0 to 7.0
A. F. amplifier tube	25 to 35

Model 48



Installation Notes

Because of the low sensitivity of this chassis it is better to use a comparatively large aerial with it if possible. A good ground should, of course, be used.

One must be careful in inserting the speaker plug not to force it in when the prongs are improperly lined up with the socket holes.

This model employs the following tubes: two -24 screen grid amplifiers, a -24 screen grid detector, a -45 power output amplifier, and a -80 rectifier.

CROSLEY RADIO CORP.

MODEL 91 AUTO
Parts List

Parts List

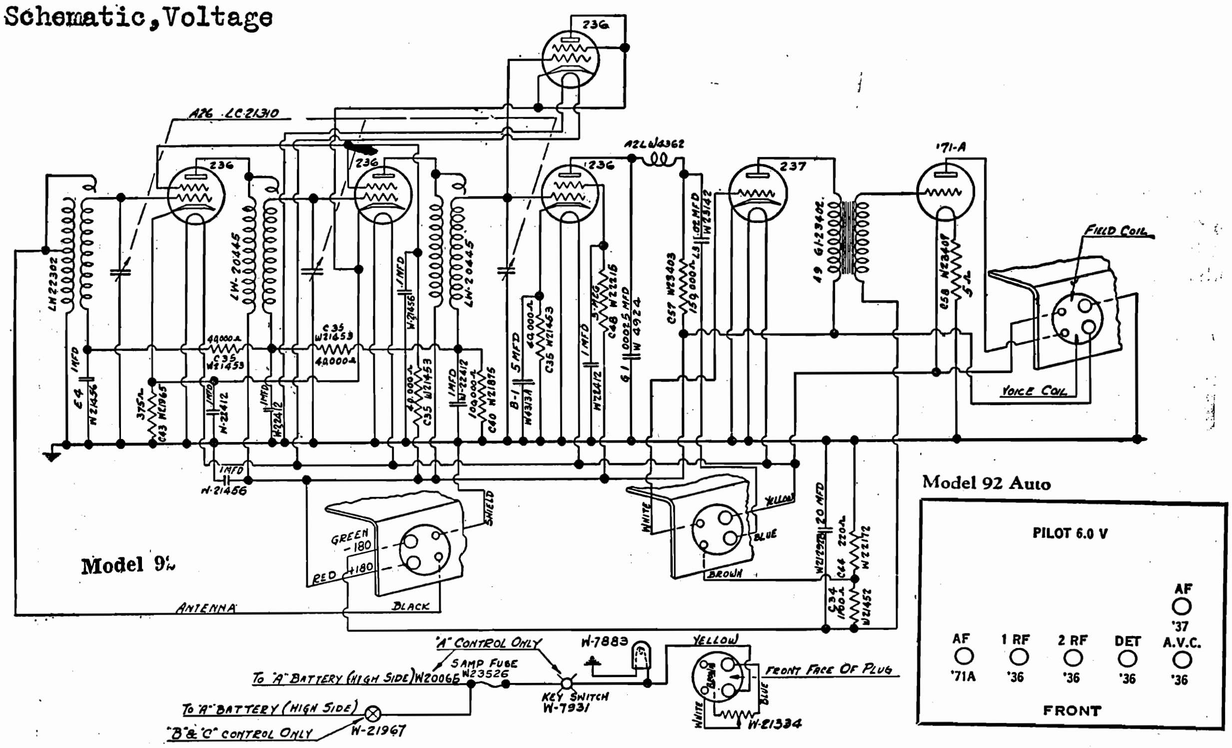
INSTRUCTIONS FOR ORDERING—Give part number, description of part, and serial number of receiver on which part is to be used. If article wanted is not listed separately, then that part of complete assembly containing this article should be ordered. Goods shipped on open account to Crosley Wholesale Distributors only. Cash must accompany Dealer and Consumer orders. Prices are subject to the usual trade discounts.

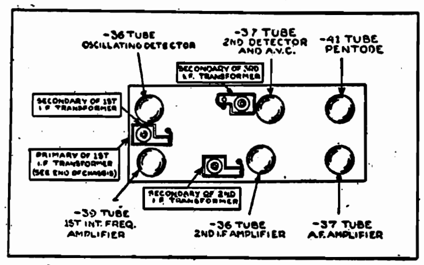
Qty.	Part No.	Description	List Price Each
		CABINET	
1	W-21888A	Housing	2.00
1	W-21887	Front Cover	.50
1	W-21553A	Drive Bracket Hole Cover	.10
1	W-21554A	Drive Bracket Cover	.15
1	B-21555A	Chassis Bottom	.25
1	W-21714	Battery Plug Bracket	.10
		CHASSIS	
1	C-21528	Chassis	.75
5	W-7871	Socket (4 Prong)	.25
3	W-7873	Socket (5 Prong)	.30
2	W-7872	Socket Guide	.10
3	W-7874	Socket Guide	.10
1	W-21622	Socket Guide (Speaker)	.10
1	W-21623	Socket Guide (Volume Control)	.10
1	W-21624	Socket Guide (Battery-Antenna)	.10
2	W-20445	R. F. Transformer	2.50
1	W-20444	R. F. Transformer (Antenna)	2.50
3	W-22208	Grid Connection	.25
3	W-20092C	R. F. Coil Shields	.50
1	W-21292A	Electrolytic Condenser	2.00
1	W-5385	A. F. Transformer	3.25
1	W-21310	Variable Condenser Assembly	12.00
2	B-21325	Tube Shield	.20
		DRIVE	
1	W-21309	Condenser Drive Assembly	3.25
	W-21547	Spindle Stop	.10
2	K-1	Cotter Pin	.05
2	W-20157	Set Screw	.05
	W-21548	Stop Nut	.10
	W-21549	Drive Spindle	1.00
	B-21550	Condenser Drive Pulley	1.25
	W-20634	Condenser Drive Cord (2 used)	.25
	W-21968	Tension Spring	.25
	W-21551	Spindle Stop Spring	.15
1	W-21575	Condenser Drive Bracket Assembly	.75
		PARTS UNDER CHASSIS	
2	W-4313	.5 Mfd. Fixed Condenser	1.20
2	W-7944	.1-.1 Mfd. Fixed Condenser	1.10
2	W-20448	.1 Mfd. Fixed Condenser	1.00
1	W-4362	Plate Choke	.50
1	W-6941	.001 Fixed Condenser	.40
1	W-21341	Mounted Resistor Assembly	3.30
	W-21574	25 -25 Ohm Resistance	.60
3	W-4923	60,000 Ohm Resistor	.60
	W-5735	150,000 Ohm Resistor	.60
1	W-21340	Mounted Resistor Assembly	3.30
	W-21573	3 -750 Ohm Resistance	.60
	W-4921	10,000 Ohm Resistor	.60
	W-4923	60,000 Ohm Resistor	.60
	W-6704	300,000 Ohm Resistor	.60
	W-20464	1 Meg. Resistor	.60
		MISCELLANEOUS	
1	W-21362	Battery Box (Standard type)	2.00
1	W-21363	Battery Box Lid (Standard type)	.75
1	W-21365	Cable Clip	.05
	W-22337	Battery Box (Oblong type)	2.00
	W-22336	Battery Box Lid (Oblong type)	.75
1	W-21572	"B" Battery Fuse Unit Assembly	.50
	W-20109	Fuse (1/4 amp.)	.10
2	W-21370	"B" Battery Connector Cable	.10
2	W-20284	Universal Joint	1.00
1	W-7941	Drive Shaft (12" long)	.10
1	B-21367B	Battery Cable (8' 6" long)	4.00
3	W-4751A	Cable Clamp	.05
	W-20068	Eliminator	.80
	W-20070	Spark Plug Suppressor	.60
	W-20071	Distributor Head Suppressor	.70
	W-21315	**TYPE "A" DASH CONTROL COMPLETE**	7.00
2	W-7919	Knob	.20
2	W-7947	Spring	.05
1	W-7946	Fuse Panel	.35
1	W-7959C	Mounting Plate & Dial Light Clip Assembly	.80
1	W-21316	Dial & Gear	.50
1	W-7928A	Escutcheon	.80
1	W-7931A	Key Switch	1.25
1	W-7907A	Pinion	.20
1	W-7958A	Pinion Shaft	.15
1	W-21334	Volume Control	1.75
2	W-7880	Mounting Clamp	.05
1	W-7882A	Dial Light Receptacle	.15
1	W-4907	Tension Spring	.05
1	W-4751A	Cable Clamp	.05
1	W-7912A	Dial Bushing	.10
1	W-7983A	Fuse (3 amp.)	.10
1	W-20057	Key Switch Insulator Sleeve	.05
1	W-20069	Switch to Fuse Lead	.10
1	B-21368A	Dash Control Cable (Standard 20" long)	1.25
	B-21386A	Dash Control Cable (Special 32" long)	2.50
1	W-7998	Adapter Shaft	.10
	W-21308	**TYPE "B" DASH CONTROL COMPLETE**	7.00
	W-21935	**TYPE "C" DASH CONTROL COMPLETE**	7.00
1	W-21556	Dial & Gear	.50
1	W-21557	Pinion	.20
1	W-21558	Pinion Shaft	.15
1	W-21559	Pinion Shaft Spacer	.05
2	W-4907	Tension Spring	.05
1	W-21560	Drive Support Bracket	.10
1	W-7946	Fuse Panel	.35
1	W-21561	Sub-Panel	.80
1	W-21365	Cable Clip	.05
1	W-21334	Volume Control	1.75
1	W-7983A	Fuse (3 amp.)	.10
1	W-21562	Dial Light Socket	.25
1	W-21563	Dial Stud	.05
1	W-21564	Dial Light Housing	.10
1	W-2282C	Fibre Washer	.05
1	W-7931A	Key Switch	1.25
2	W-20068	Switch Leads (18" long)	.05
1	W-21565	Escutcheon (large, for type B)	.80
1	W-21600	Escutcheon (small, for type C)	.50
2	W-5311	Screw (for type B)	.05
2	W-21936	Mounting Clamp (for type C)	.10
2	W-21937	Mounting Screw (for type C)	.05
2	W-7919	Knob	.20
2	W-7947	Spring	.05
1	W-21368A	Dash Control Cable (Standard 20" long)	1.25
	W-21386A	Dash Control Cable (Special 32" long)	2.50
		279 SPEAKER	
1	C-21617A	Speaker Frame	1.75
1	W-21655	Type C Dynacone Motor Assembly	8.00
1	W-21619	Name Plate	.50
1	W-21659A	Cone	1.00
1	W-1629G	Outer Cone Nut	.05
1	W-1495J	Outer Cone Clamp	.05
1	W-1496K	Inner Cone Clamp	.05
1	W-5874	Inner Cone Nut	.05
1	B-21369A	Speaker Cable (Standard 10 1-2" long)	.75
1	B-21649A	Speaker Cable (Special 30" long)	2.00

Schematic on page 238-1, Vol. I.

MODEL 92 AUTO.
Schematic
MODEL 95
Schematic, Voltage

CROSLEY RADIO CORP.





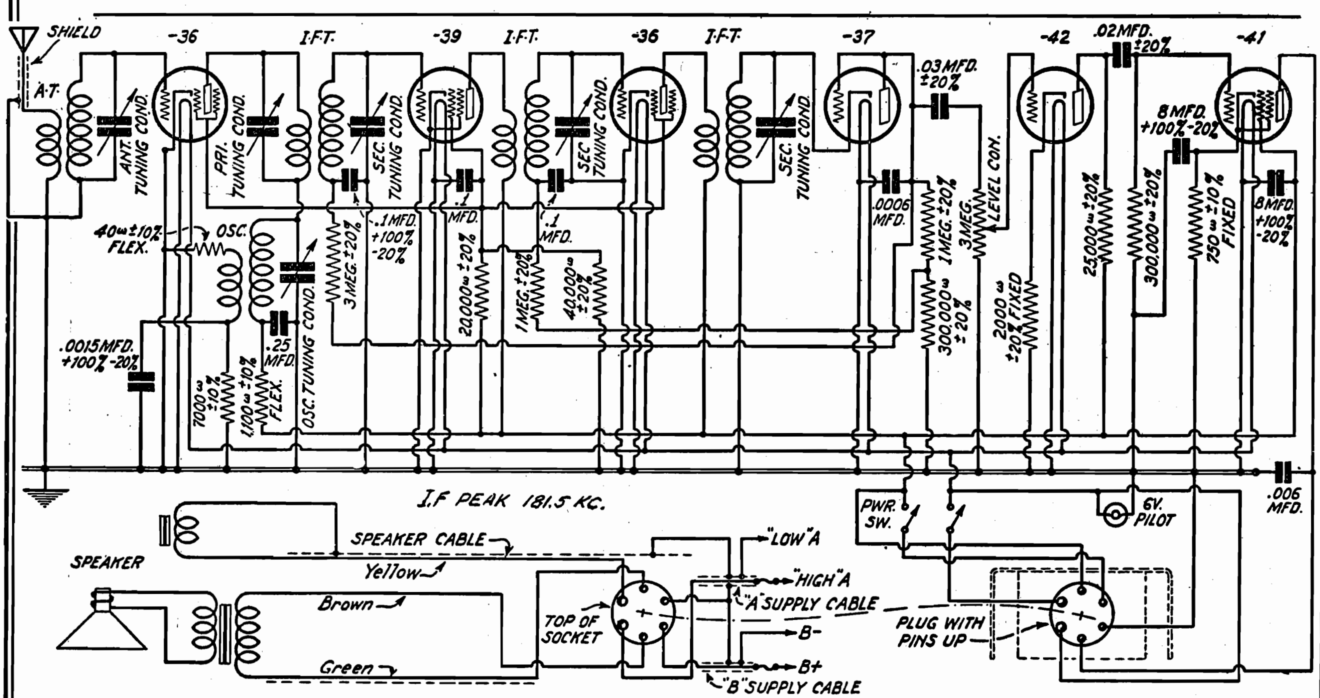
Model 95

CROSLEY MODEL 95 (ROAMIO) VOLTAGE DATA

Tube	Plate	Screen	Grid
1st Det.	160—180	70—80	—7 to —9
I-F.	160—180	70—80	AVC only
2nd Det.	0	......	0
1st A-F.	80—90	......	—5 to —6
Output	150—170	160—180	—16 to —18

Plate and screen voltages measured from element to chassis.

Schematic diagram of the Crosley Model 95 (Roamio), with combination oscillator-detector



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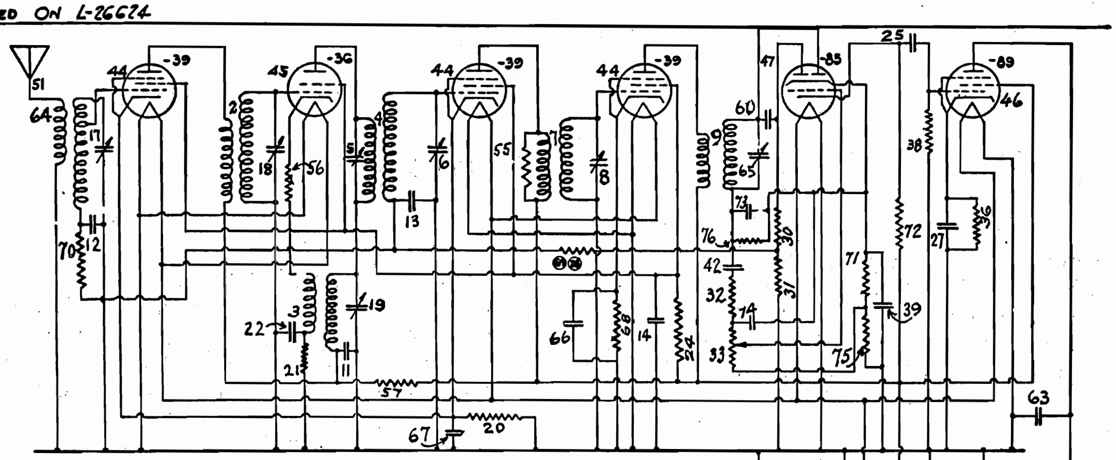
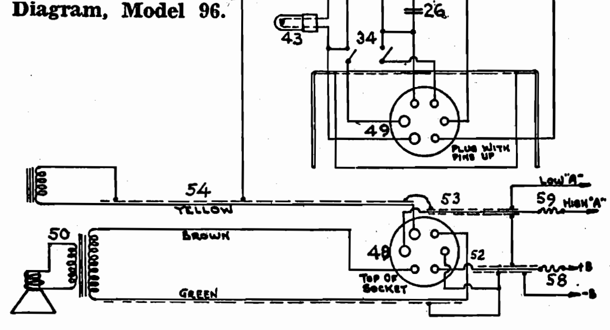
MODEL 96
Schematic
Voltage

USED ON L-26624



Circuit Diagram, Model 96.



I-F.PEAK 181.5 KC.

96 CHASSIS ASSEMBLY WIRING DIAGRAM

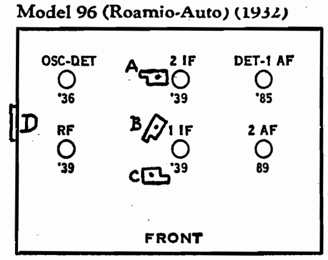
~~1~~	~~G4-24986~~	~~Antenna Coil~~	~~37~~	~~W-21897~~	~~60,000 Ohms ±20%~~	73	W-26152	0.0001 Condenser
2	G1-25068	R.F. Transformer	38	W-21455	300,000 Ohms ±20%	74		.00015 Condenser
3	G1-24096	Osc. Coil	39	W-25870	6 Mfd. Condenser	75	W-21453	40,000 Ohms ±20%
4	G1-25444	I.F. Transformer	~~40~~	W-25972	~~0.0005 Mfd. Cond.~~	76	W-21454	1 Meg Ohm ±20%
5	W-24988	Pri. Tuning Cond.	41		~~0.0006 Mfd. Cond.~~			
6	W-25002A	Sec. Tuning Cond.	42	W-22685	0.006 Mfd. Cond.			
7	G1-25445	I.F. Transformer	43	W-4099-A	Dial Lamp 6V.			
8	W-25002A	Sec. Tuning Condenser	44	G11-26614	-39 Socket			
9	G3-25445	I.F. Transformer	45	G11-26614	-36 Socket			
~~10~~	~~W-25002A~~	~~Sec. Tuning Cond.~~	46	G12-26614	-89 Socket			
11	W-25438	0.1 Mfd. Cond.	47	G27-26614	-85 Socket			
12		0.1 Mfd. Cond.	48	W-25925A	Six Prong Male Sock.			
13	W-25438	0.1 Mfd. Cond.	49	W-25936A	Six Prong Female A.			
14		0.1 Mfd. Cond.	50	L-26871	222 Speaker			
~~15~~	~~W-25438~~	~~0.1 Mfd. Cond.~~	51	W-6700	Ant. Lead 14" Long			
~~16~~		~~0.1 Mfd. Cond.~~	52	W-22998	"B" Cable			
17	C-26602A	Var. Cond. R.F. Sec.	53	W-26440	"A" Cable			
18		Var. Cond. R.F. Sec.	54	A-25692C	Speaker Cable			
19		Var. Cond. Osc. Sec.	55	W-21227	60,000 Ohms ±20%			
20	W-24097	350 Ohms ±10%	56	W-23012	40 Ohms ±10%			
21	W-21876	10,000 Ohms ±20%	57	W-21452	1100 Ohms ±10%			
22	W-25687	.0015 Mfd. Cond.	58	W-20109	1/4 Amp. Fuse			
~~23~~	~~W-23172A~~	~~220 Ohms ±10%~~	59	W-25791	10 Amp Fuse			
24	W-22196	20,000 Ohms ±20%	60	W-26571	.0005 Mfd. Cond.			
25	W-23142	0.02 Mfd. Cond.	~~61~~	~~W-5383~~	~~.003 Mfd. Cond.~~			
26	W-25857	8 Mfd. Cond.	~~62~~	~~W-24785~~	~~500,000 Ohms ±20%~~			
27		8 Mfd. Cond.	63	W-25636	.003 Mfd. Cond.			
~~28~~	~~W-22215~~	~~3 Megohms ±20%~~	64	G5-24995	Antenna Coil			
~~29~~	~~W-22215~~	~~3 Megohms ±20%~~	65	G1-24995	Sec. Tuning Cond.			
30	W-21454	1 Megohm ±20%	66	W-25516	0.250 Mfd. Cond.			
31	W-21454	1 Megohms ±20%	67		0.250 Mfd. Cond.			
32	W-21455	300,000 Ohms ±20%	68	W-22582	450 Ohms ±10%			
33	W-25781A	Volume Control	69	W-21454	1 Megohm ±20%			
34		Switch	70	W-21454	1 Megohm ±20%			
~~35~~	~~W-6705~~	~~3500 Ohms ±10%~~	71	W-21876	10,000 Ohms ±20%			
36	W-22514	750 Ohms ±10%	72	W-23403	150,000 Ohms ±20%			

Aligning Intermediate Frequency Stages

1. A local oscillator tuned accurately to 181.5 kilocycles is required.
2. Set the dial of the station selector to 550 kilocycles.
3. Connect the high side of the test oscillator output through a condenser of approximately 0.1 mf. capacity to the grid of the first detector tube, and the low side of the test oscillator to chassis. Do not remove the clip wire from the grid of the first detector tube.
4. Adjust the two padding condensers at either side of the first intermediate frequency transformer for maximum reading on the output meter.
5. Adjust the secondary padding condensers on the second and third intermediate frequency transformers for maximum reading on the output meter.

Filament Voltages	
All tubes	5.8 to 6.2
Plate Voltages	
R.F., First Det., and I.F. tubes	160 to 200
Second Detector tube	70 to 90
Output tube	150 to 190
Screen Grid Voltages	
R.F., First Det., and I.F. tubes	85 to 105
Output tube	160 to 200
Operating Grid Voltages	
R.F and First I.F. tubes	-3.6 to -4.4
First Detector tube	-6.3 to -7.7
Second I.F. tube	-1.8 to -2.2
Second Detector tube	-5.4 to -6.6
Output tube	-13 to -15

Model 96 (Roamio-Auto) (1932)



A-Secondary of 1st i-f trans.
B-Secondary of 3rd i-f trans.
C-Secondary of 2nd i-f trans.
D-Primary of 1st i-f trans. mounted on side of chassis.

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MODEL 120
Condenser Notes

Aligning Tuning Condensers

The tuning condensers of the first radio-frequency, first detector, and oscillator stages must be aligned so that they track together. This is done by means of padding condensers, much the same as in the case of other Crosley receivers, except that both high and low frequency adjustments are provided.

The alignment of the tuning condensers is a process requiring considerable skill, and should only be undertaken when absolutely necessary, nd only by those who have had extensive servicing experience. While station signals can be used for aligning, it is advised that a local modulated oscillator be employed. The procedure for aligning the tuning condensers of chassis 120 is as follows:

1. Leaving the shield cover in place, tune to a signal between 1300 and 1500 kilocycles.
2. Turn the volume control all of the way on. If all signals within the required range are too loud, connect a 0.00025 m. f. fixed condenser between the "A" and "G" terminals, and then couple the antenna very loosely to the local-distance switch leads.
3. If, when carefully tuned to the middle of the band, the dial reading does not correspond to the frequency of the signal, but is not more than two channels off, set the dial at the correct frequency, and adjust the padding condenser on the oscillator tuning condenser (the tuning condenser farthest toward the rear of the chassis) until the signal is loudest. Check the tuning by re-adjusting the station selector. It may not be possible to regulate the oscillator padding condenser so that the oscillator condenser is properly aligned with the **exact** dial setting, in which case align the padding condenser with a dial setting as close to the actual frequency as practicable.
4. After aligning the oscillator padding condenser, carefully adjust the padding condensers on the other two tuning condensers until the signal is received with greatest volume.
5. Tune to a signal of about 600 kilocycles frequency. If the dial setting, when carefully adjusted, is not more than one channel different from the actual frequency of the signal, it is possible to align the low frequency tracking, **but do not make this adjustment unless absolutely necessary.** The low frequency alignment adjustment is at the rear of the chassis, back of the shield, and is sealed at the factory. Break the seal, and insert a screwdriver **made of bakelite or other insulating material** in the adjusting screw. Set the tuning dial at the actual frequency of the signal, and adjust for best volume. If it is not possible to align the condenser with the dial set at the exact signal frequency, set the dial as close to the exact frequency as practicable.
6. If a screwdriver of insulating material is not available, adjustment may be made with an ordinary screwdriver by turning the screw slightly, removing the screwdriver, and retuning—repeating this process (being sure to turn the screw in such a direction that the tuning approaches more nearly the desired frequency, of course) until the dial setting agrees with, or approximates, the actual signal frequency.

Aligning Intermediate Frequency Stages

The intermediate amplifier and detector circuits must be tuned accurately to 175 kilocycles. They are aligned carefully at the factory, and no change should be necessary. In order to align them, an accurately tuned local oscillator operating at 175 kilocycles is essential.

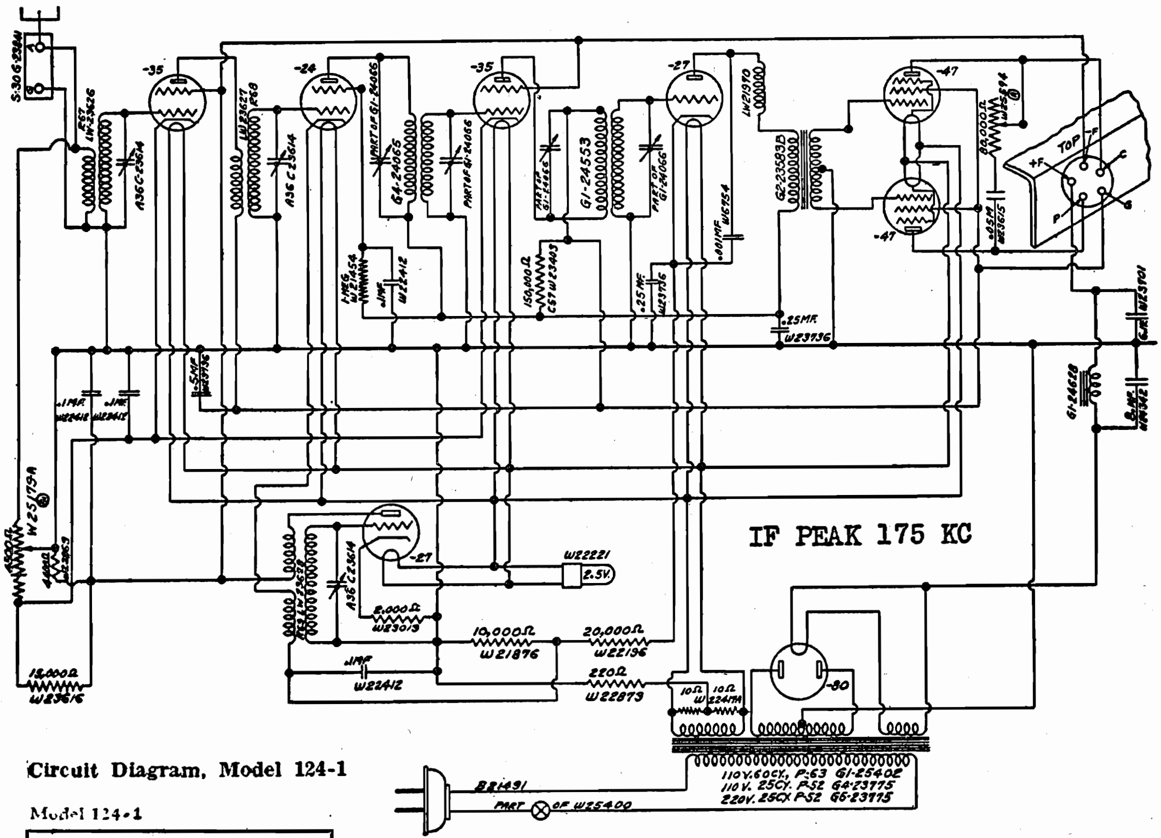
Alignment of the intermediate frequency circuits should be undertaken only when absolutely necessary. The procedure for aligning the intermediate frequency amplifier, first detector output, and second detector output circuits to 175 kilocycles is as follows:

1. A local oscillator tuned accurately to 175 kilocycles frequency is required.
2. Remove the oscillator tube from the chassis. Remove the clip wire from the top of the intermediate frequency amplifier tube. Connect the test oscillator output from the control grid of the intermediate amplifier to ground. Adjust the two screws on either side of the rear r. f. coil (the coil between the intermediate frequency amplifier socket and the output tubes) until the oscillator signal gives the largest reading on the output meter.
3. Replace intermediate frequency amplifier tube, connecting screen grid clip to top of tube. Remove the first detector tube. Connect the oscillator output from the first detector grid to ground, and adjust the two screws at either side of the front r. f. coil for maximum reading on the output meter. Slight readjustment of the screws beside the rear coil may improve the output somewhat.

Schematic on page 238-A, Vol. I.

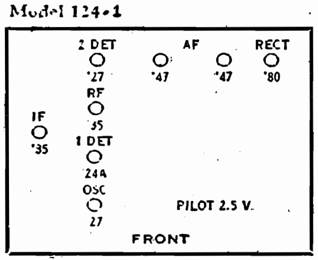
MODEL 124-1
Schematic
Voltage

CROSLEY RADIO CORP.



Circuit Diagram, Model 124-1

Model 124-1

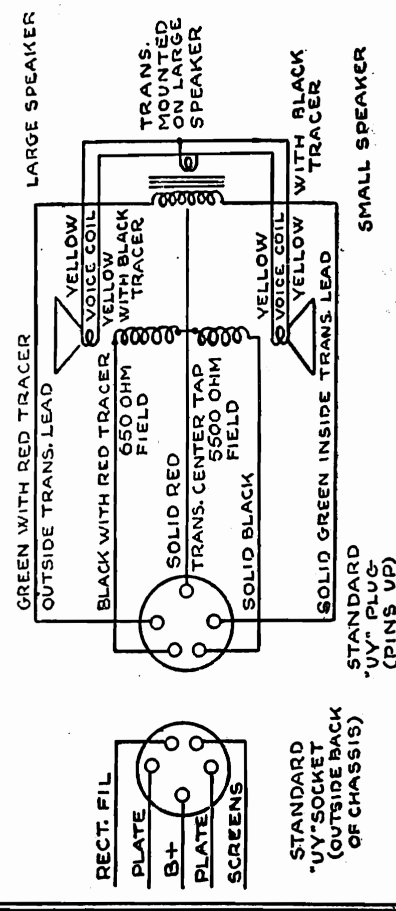


FILAMENT VOLTAGES
- All tubes but Rectifier . . . . 2.2 to 2.5
- Rectifier tube . . . . 4.6 to 5.0

PLATE VOLTAGES
- R.F. and I.F. Tubes . . . . . . 245 to 285
- First Detector Tube . . . . . . 130 to 150
- Oscillator Tube . . . . 80 to 100
- Second Detector Tube . . . . . 120 to 140
- Output Tube . . . . 230 to 270
- Rectifier . . . . 330 to 390

SCREEN GRID VOLTAGES
- R.F. and I.F.Tubes . . . . . . 80 to 100
- First Detector Tube . . . . . . 75 to 85
- Output Tubes . . . . 230 to 280

GRID VOLTAGES
- R.F. and I.F.Tubes . . . . . . -3.0 to -3.4
- First Detector Tube . . . . . . -7.0 to -9.0
- Oscillator Tube . . . . -10.0 to -12.0
- Second Detector Tube . . . . -16.0 to -20.0
- Output Tubes . . . . -15.0 to -17.0



Speaker connections

CROSLEY RADIO CORP.

IF Amplifier
Tuning Condenser
Alignment Notes

Alignment of I. F. Amplifiers and Tuning Condensers

Alignment Of I.F. Amplifiers

The primary and secondary circuits of the intermediate frequency transformers of these receivers must be tuned accurately to the intermediate frequency employed. For this purpose, small aligning condensers are shunted across the primaries and secondaries of the I.F. amplifier transformers in most instances. These condensers are adjusted carefully at the factory and normally no change in them should be necessary.

In order to align the I.F. stages, an accurately-tuned local oscillator and an output meter are required. The output meter used must be of the high impedance type (suih as a Rectox or Vacuum Tube Voltmeter) and must have a range, either directly, or through a divider system, of 500 volts. Such quipment may be purchased from a number of manufacturers of electrical measuring instruments.

To align the I.F. stages, proceed as follows:

1. Connect the output meter in shunt across the primary of the speaker transformer. (Connections may be made by removing terminal cover from speaker).

2. Tune the test oscillator to the intermediate frequency used in the receiver aligned. Models 126-1, 128, and 131 use an intermediate frequency of 175 kilocycles. Models 129, 129-1, 130, 130-1, 132-1, 133, 134, 134-1, 135, 136-1, 137, and 141 use an intermediate frequency of 181.5 kilocycles.

3. Tune the receiver to approximately 550 kilocycles (gang condenser set at maximum capacity).

4. Connect the high side of the test oscillator through a .05 to .1 microfarad condenser to last I.F. transformer, and the low side of the the grid of the tube immediately preceding the oscillator to chassis. Do not remove the clip wire from the grid of the tube.

5. Adjust the aligning condenser (or condensers) shunted across the last I.F. transformer for maximum reading on the output meter.

6. Change the high side of the oscillator to the grids of the other tubes preceding the I.F. transformers and adjust these aligning condensers in the same manner.

After this procedure has been followed the I.F. stages will be properly aligned.

Alignment of Tuning Condensers

The alignment of tuning condensers is a process requiring considerable skill, and should be undertaken only when absolutely necessary.

Station signals may be used for aligning, but it is advisable to employ a local modulated oscillator.

1. Connect the high side of the oscillator through a dummy antenna or 0.00025 mf. condenser to the antenna and the low side to the ground terminal of the receiver, and adjust the oscillator to a frequency of aproximately 1400 kilocycles.

2. Tune the receiver to the local oscillator signal, or to a station signal, of known frequency, between 1300 and 1400 kilocycles. Turn the volume control on full.

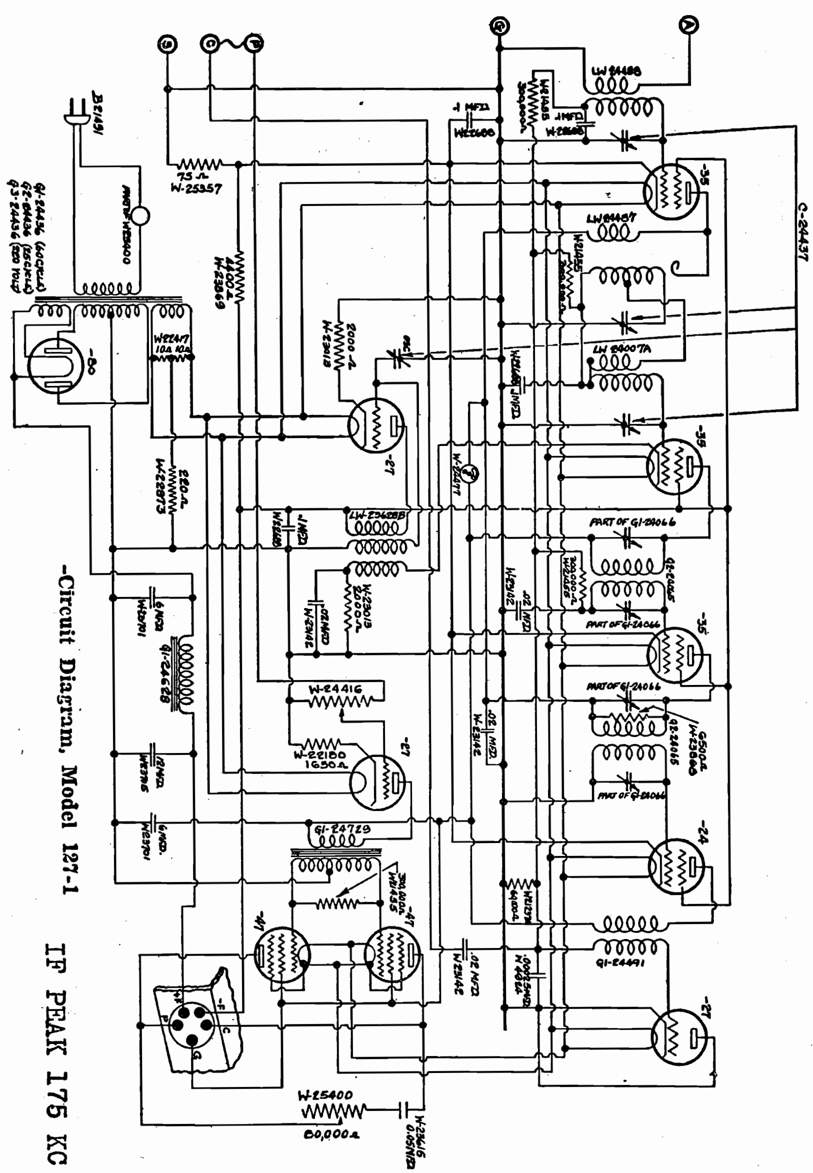
3. If when carefully tuned to give a maximum reading on the output meter the dial reading does not correspond to the frequency of the signal, adjust the padding condenser on the oscillator tuning condenser and retune the receiver until the setting is as nearly correct as it is possible to adjust it with the receiver properly tuned.

4. After adjusting the oscillator padding condenser, be sure that the station selector is adjusted to the middle of the signal band. Then adjust the other padding condensers for maximum output.

5. Adjustment should be made with a screwdriver of insulating material. If such a screwdriver is not available, adjust with an ordinary screwdriver so that the output is best, or the frequency setting best, **with the screwdriver removed from the chassis.**

CROSLEY RADIO CORP.

MODEL 127-1
Schematic
Voltage
Notes

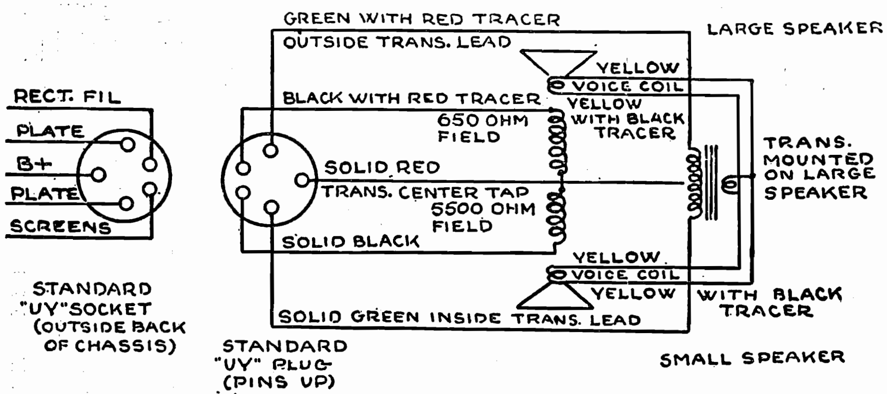


-Circuit Diagram, Model 127-1

IF PEAK 175 KC

CROSLEY VOLTAGE DATA

Tube	*Fil.*	*Plate*	*Screen*	*Grid*
R-F	2.2—2.6	210—250	80—94	—2.7 to —3.3
1st Det.	2.2—2.6	220—260	80—94	—5 to —7
1st I-F.	2.2—2.6	210—250	80—94	—2.7 to —3.3
2nd I-F.	2.2—2.6	220—260	80—94	—2.7 to —3.3
Osc.	2.2—2.6	80—94	......	....
1st A-F.	2.2—2.6	205—245	......	—12 to —14
Output	2.2—2.6	205—245	210—250	—12 to —16
Rect.	4.4—5.2	....	......	....



Speaker connections for the Crosley Model 127-1 receiver

Alignment

To align the i-f. stages, use a local oscillator tuned accurately to 175 kc. Connect the high side of this oscillator through a 0.1-mfd. condenser to the grid of the first detector tube, but do not remove the grid cap. Connect the low side of the oscillator to the chassis.

Turn the station selector dial to 550 kc. and adjust the condensers on either side of the coupling transformer between first detector and first i-f. amplifier to give maximum reading on output meter.

Then adjust the condensers on either side of the coupling transformer between the first and second i-f. transformers to give maximum output meter reading. So much for the i-f. stages.

To align the oscillator, antenna coupler and r-f. amplifier stage, the following procedure should be followed:

Connect a 1,400-kc. oscillator through a .00025-mfd. condenser to the antenna post of the receiver. (A dummy antenna should be used if available).

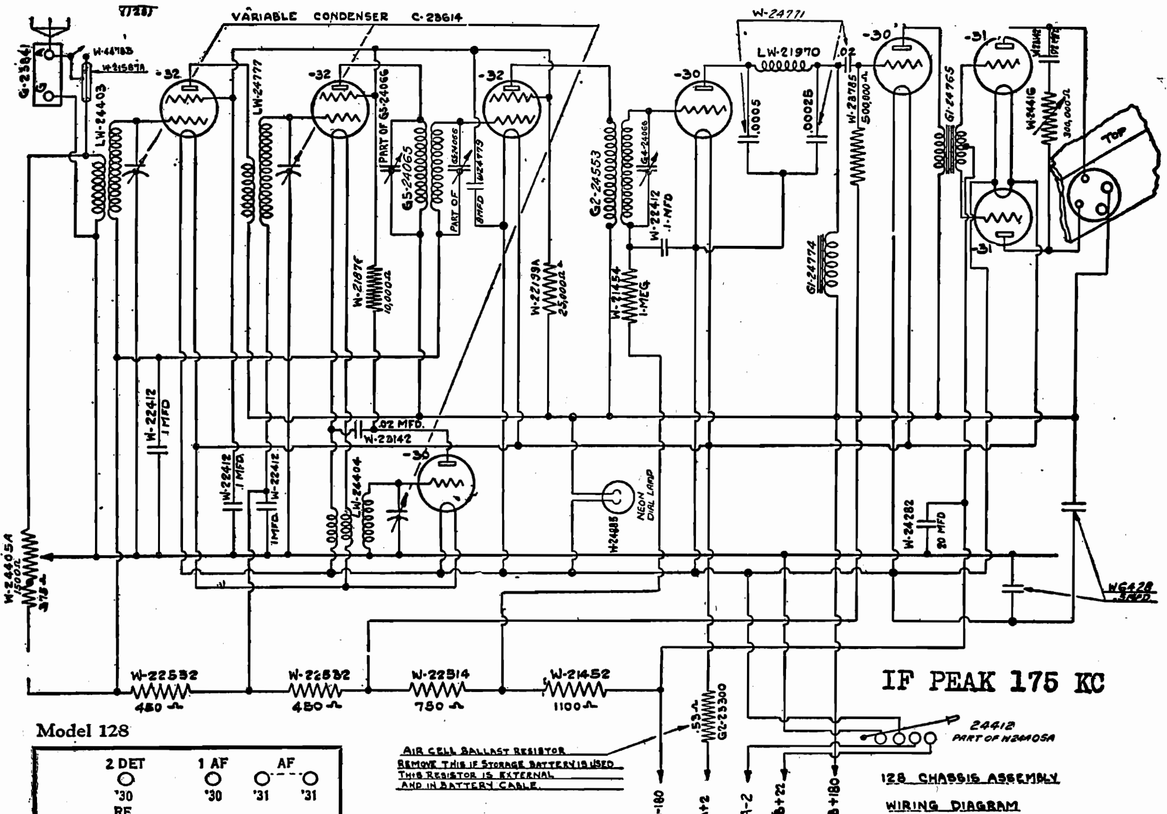
Tune the receiver to 1,400 kc. and adjust the padding condensers on the sides of the sections of the ganged condenser unit to give maximum output meter reading.

Voltage Data

The voltages should be measured with the dual speakers connected, the tubes in position, and a line voltage of 117-1/2 volts. (235 for 220-volt receivers). All voltages should be measured with a high-resistance voltmeter. The plate, screen, and control grid voltages are measured from the elements named, to the emitter.

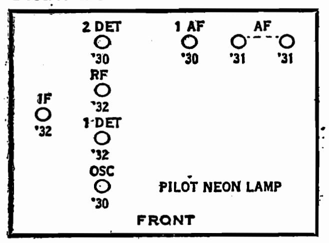
MODEL 128
MODEL 131
Schematic

CROSLEY RADIO CORP.



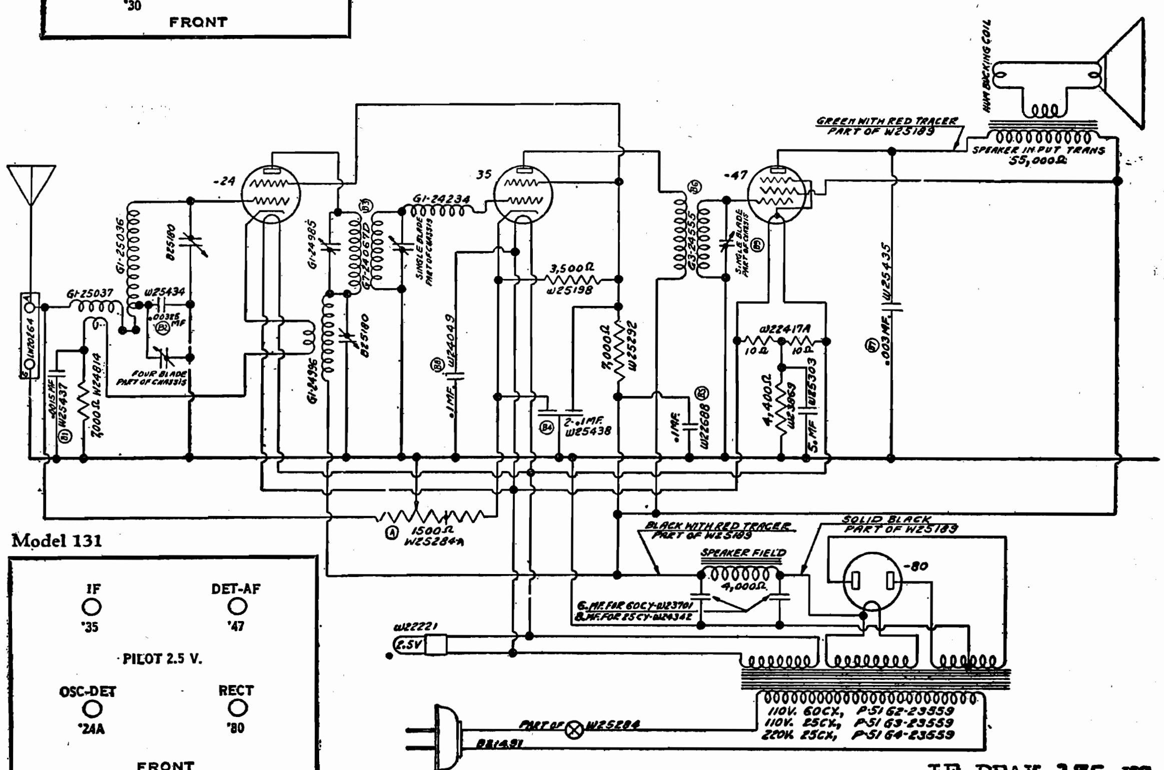
IF PEAK 175 KC

Model 128



Circuit Diagram, Model 128

Model 131

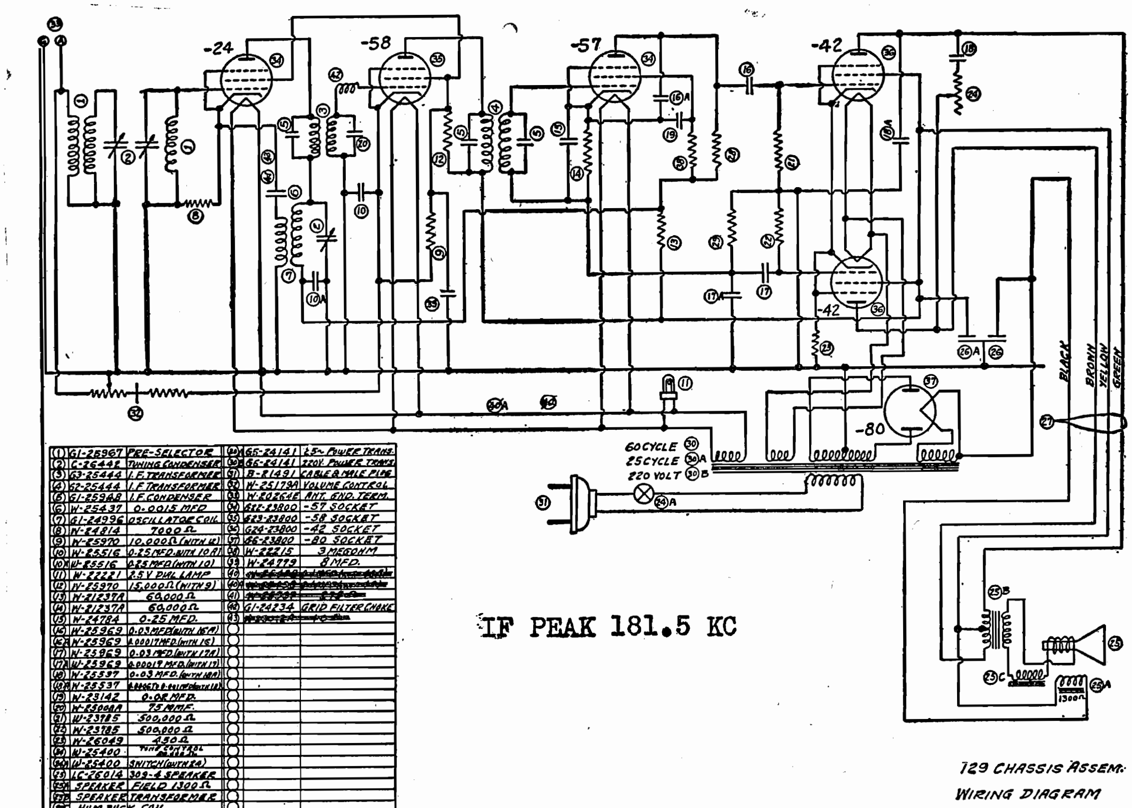


IF PEAK 175 KC

Circuit Diagram, Model 131

CROSLEY RADIO CORP.

MODEL 129
Schematic
Voltage
Notes



(1)	G1-25967	PRE-SELECTOR	(30A)	G5-24141	25~ POWER TRANS.
(2)	C-26442	TUNING CONDENSER	(30B)	G6-24141	220V. POWER TRANS.
(3)	G3-25444	I.F. TRANSFORMER	(31)	B-21491	CABLE & MALE PLUG
(4)	G2-25444	I.F. TRANSFORMER	(32)	W-25179A	VOLUME CONTROL
(5)	G1-25988	I.F. CONDENSER	(33)	W-20264E	ANT. GND. TERM.
(6)	W-25437	0.0015 MFD.	(34)	G22-23800	-57 SOCKET
(7)	G1-24996	OSCILLATOR COIL	(35)	G23-23800	-58 SOCKET
(8)	W-24814	7000 Ω	(36)	G24-23800	-42 SOCKET
(9)	W-25970	10,000 Ω (WITH 12)	(37)	G6-23800	-80 SOCKET
(10)	W-25516	0.25 MFD. WITH 10A	(38)	W-22215	3 MEGOHM
(10A)	W-25516	0.25 MFD. (WITH 10)	(39)	W-24779	8 MFD.
(11)	W-22221	2.5 V DIAL LAMP	(40)	~~[illegible]~~	~~[illegible]~~
(12)	W-25970	15,000 Ω (WITH 9)	(40A)	~~[illegible]~~	~~[illegible]~~
(13)	W-21237A	60,000 Ω	(41)	~~[illegible]~~	~~[illegible]~~
(14)	W-21237A	60,000 Ω	(42)	G1-24234	GRID FILTER CHOKE
(15)	W-24784	0.25 MFD.	(43)	~~[illegible]~~	
(16)	W-25969	0.03 MFD. (WITH 16A)			
(16A)	W-25969	0.00017 MFD. (WITH 16)			
(17)	W-25969	0.03 MFD. (WITH 17A)			
(17A)	W-25969	0.00019 MFD. (WITH 17)			
(18)	W-25537	0.03 MFD. (WITH 18A)			
(18A)	W-25537	[illegible] (WITH 18)			
(19)	W-23142	0.02 MFD.			
(20)	W-25008A	75 MMF.			
(21)	W-23985	500,000 Ω			
(22)	W-23985	500,000 Ω			
(23)	W-26049	450 Ω			
(24)	W-25400	TONE CONTROL [illegible]			
(24A)	W-25400	SWITCH (WITH 24)			
(25)	LC-26014	309-4 SPEAKER			
(25A)	SPEAKER	FIELD 1300 Ω			
(25B)	SPEAKER	TRANSFORMER			
(25C)	HUM BUCK	COIL			
(26)	W-25542A	8 MFD. (WITH 26A)			
(26A)	W-25542A	4 MFD. (WITH 26)			
(27)	W-26041	SPEAKER CORD			
(28)	W-21455	300,000 Ω			
(29)	W-21455	300,000 Ω			
(30)	G6-23559	60~ POWER TRANS.			

Circuit Diagram, Model 129

Specifications

Models 129 and 129-1 are six-tube superheterodynes for operation from A.C. electrical circuits, differing only in that Model 129 is adapted to the operation of a single speaker, and Model 129-1 to the operation of dual speakers. The tubes used are: a -24 type oscillating first detector, a -58 type I.F. amplifier, a -57 type second detector, two -42 type push-pull output tubes, and a -80 type rectifier.

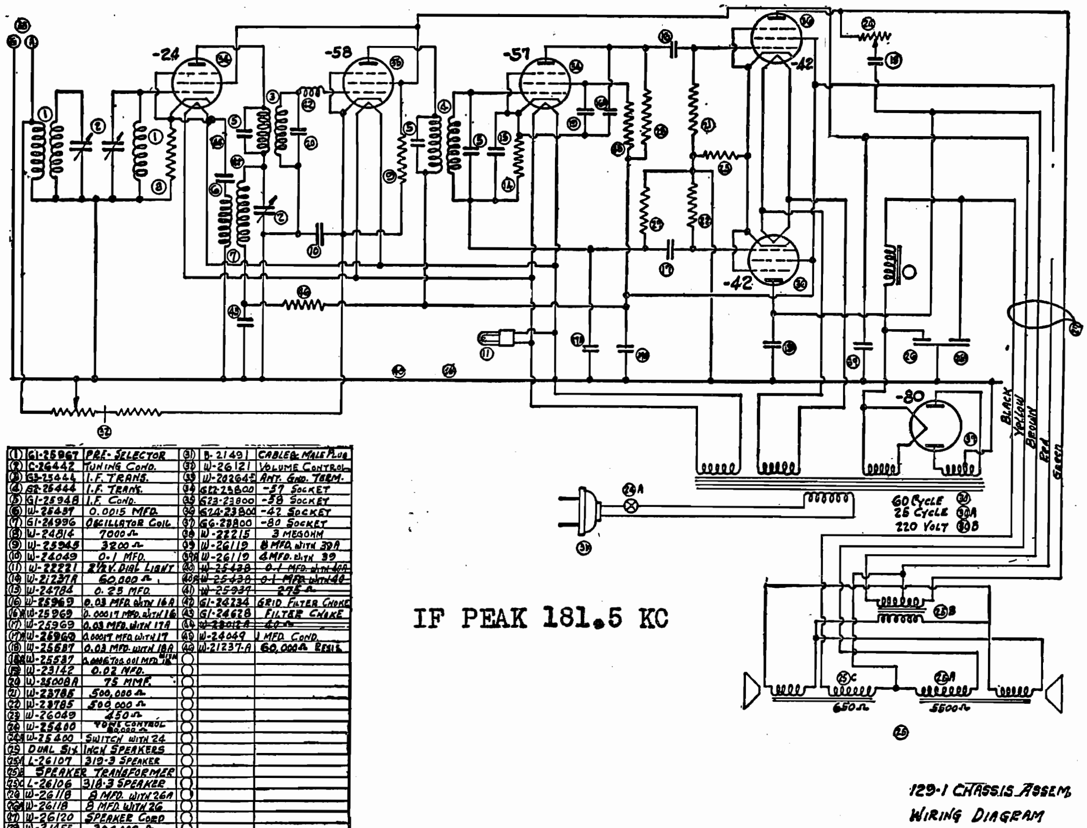
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages as shown in table. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
First Detector, I. F. Amplifier, and Second Detector tubes	2.3 to 2.7
Output tubes	6.0 to 7.0
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector tube	175 to 215
I. F. Amplifier tube	260 to 320
Second Detector tube	72 to 88
Output tubes	240 to 300
Rectifier tube	335 to 365
Screen Grid Voltages	
First Detector and I. F. Amplifier tubes	85 to 105
Second Detector tube	27 to 33
Output tubes	240 to 300
Operating Grid Voltages	
First Detector tube (cathode to chassis)	7 to 9
I. F. amplifier tube (cathode to chassis)	2.7 to 3.3
Second Detector tube (across 6,000 ohm bias resistor)	6.3 to 7.7
Output tubes (cathode to chassis)	18 to 22

MODEL 129-1
Schematic
Voltage
Notes

CROSLEY RADIO CORP.



1	G1-25967	PRE-SELECTOR	31	B-21491	CABLE & MALE PLUG
2	C-26442	TUNING COND.	32	W-26121	VOLUME CONTROL
3	G3-25444	I.F. TRANS.	33	W-20264-E	ANT. GND. TERM.
4	G2-25444	I.F. TRANS.	34	G22-23800	-57 SOCKET
5	G1-25948	I.F. COND.	35	G23-23800	-58 SOCKET
6	W-25437	0.0015 MFD.	36	G24-23800	-42 SOCKET
7	G1-24996	OSCILLATOR COIL	37	G6-23800	-80 SOCKET
8	W-24814	7000 Ω	38	W-22215	3 MEGOHM
9	W-25945	3200 Ω	39	W-26119	8 MFD. WITH 39A
10	W-24049	0.1 MFD.	39A	W-26119	4 MFD. WITH 39
11	W-22221	2½V. DIAL LIGHT	40	~~W-25438~~	~~0.1 MFD. WITH 40A~~
14	W-21237A	60,000 Ω	40A	~~W-25438~~	~~0.1 MFD. WITH 40~~
15	W-24784	0.25 MFD.	41	~~W-25937~~	~~275 Ω~~
16	W-25969	0.03 MFD. WITH 16A	42	G1-24234	GRID FILTER CHOKE
16A	W-25969	0.00017 MFD. WITH 16	43	G1-24628	FILTER CHOKE
17	W-25969	0.03 MFD. WITH 17A	44	~~W-28012A~~	~~40 Ω~~
17A	W-25969	0.00017 MFD WITH 17	45	W-24049	1 MFD. COND.
18	W-25587	0.03 MFD. WITH 18A	46	W-21237-A	60,000 Ω RESIS.
18A	W-25537	[illegible] TO 0.001 MFD WITH 18			
19	W-23142	0.02 MFD.			
20	W-25008A	75 MMF.			
21	W-23785	500,000 Ω			
22	W-23785	500,000 Ω			
23	W-26049	450 Ω			
24	W-25400	TONE CONTROL [illegible] Ω			
24A	W-25400	SWITCH WITH 24			
25	DUAL SIX	INCH SPEAKERS			
25A	L-26107	319-3 SPEAKER			
25B		SPEAKER TRANSFORMER			
25C	L-26106	318-3 SPEAKER			
26	W-26118	8 MFD. WITH 26A			
26A	W-26118	8 MFD. WITH 26			
27	W-26120	SPEAKER CORD			
28	W-21455	300,000 Ω			
29	W-21455	300,000 Ω			
30	G7-25634	60~ POWER TRANS.			
30A	G8-25669	25~ POWER TRANS.			
30B	G9-25669	220V. POWER TRANS.			

IF PEAK 181.5 KC

Circuit Diagram, Model 129-1

Specifications

Models 129 and 129-1 are six-tube superheterodynes for operation from A.C. electrical circuits, differing only in that Model 129 is adapted to the operation of a single speaker, and Model 129-1 to the operation of dual speakers. The tubes used are: a -24 type oscillating first detector, a -58 type I.F. amplifier, a -57 type second detector, two -42 type push-pull output tubes, and a -80 type rectifier.

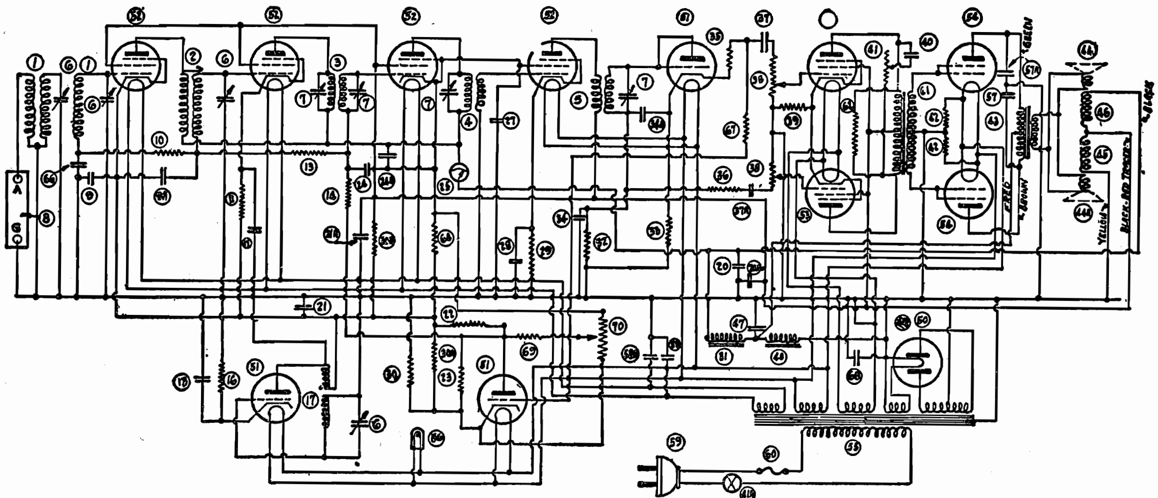
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages as shown in table. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
First Detector, I. F. Amplifier, and Second Detector tubes	2.3 to 2.7
Output tubes	6.0 to 7.0
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector tube	175 to 215
I. F. Amplifier tube	260 to 320
Second Detector tube	72 to 88
Output tubes	240 to 300
Rectifier tube	335 to 365
Screen Grid Voltages	
First Detector and I. F. Amplifier tubes	85 to 105
Second Detector tube	27 to 33
Output tubes	240 to 300
Operating Grid Voltages	
First Detector tube (cathode to chassis)	7 to 9
I. F. amplifier tube (cathode to chassis)	2.7 to 3.3
Second Detector tube (across 6,000 ohm bias resistor)	6.3 to 7.7
Output tubes (cathode to chassis)	18 to 22

MODEL 132-1
Schematic
Voltage
Notes

CROSLEY RADIO CORP.



IF PEAK 181.5 KC

1	G1-25967	PRESELECT. COIL	24A	W-25438	.1 MFD COND WITH 26	44	MODEL 324	SPEAKER	67	W-26597	3 MEG RESIS.
2	G1-25968	R.F. TRANS	25	W26091	TUNING METER	46		SPKR. FIELD 1800Ω	68	W-26816	0.1 MFD COND.
3	G1-25444	I.F. TRANS.	26			45	MODEL 325	SPKR. FIELD 5500Ω	69	W-23786	500,000Ω RESIS.
4	G1-25446	I.F. TRANS.	27	W25438	.1 MFD. COND	44A		SPEAKER	70	W-26877	M.S. CONTROL
5	G3-25445	DIODE TRANS.	28		1. MFD COND	47	W-26194-A	12 MFD COND.			
6	C-26112	VAR. COND.	29	W-22514	750Ω RESIS.	48	G2-24628	CHOKE			
7	G1-25948	I.F. COND.	30	W-6703	6000Ω RESIS.	49	~~W-26575~~	~~.006 COND~~			
8	W-20264-E	TERM. STRIP	30A	W-4921	10,000Ω RESIS.	50		'82 SOCKET			
9	W-25438	.1 MFD. COND.	30B	W-25292	7000Ω RESIS.	51	G21-23800	'56 SOCKET			
9A		.1 MFD. COND.	30C			52	G23-23800	'58 SOCKET			
10	W-4923	60,000Ω RESIS.	31	LW28213-C	FILTER CHOKE	53	G24-23800	'42 SOCKET			
11	W-23013	2000Ω RESIS.	32	W-23785	500,000Ω RESIS.	54	G26-23800	'46 SOCKET			
12	W-25435	.003 MFD. COND.	33	W-23785	500,000Ω RESIS.	55	G5-25669	PWR. TRANS. 60~			
13	W-4923	60,000Ω RESIS.	34	W-26152A	.00015 MFD. COND.	56	W-22221	DIAL LIGHT			
14	W-21453	1 MEG RESIS.	34A		.0001 MFD. COND.	57	W-26576	.02 MFD COND.			
15	W-25435	.003 MFD COND.	35	W-21455	300,000Ω RESIS.	57A		.02 MFD COND.			
16	W-6705	35K Ω RESIS.	36	W-21455	300,000Ω RESIS.	58	W25438	.1 MFD COND.			
17	G1-24996	OSCIL. COIL	37	W-23635	.006 MFD COND.	58A		.1 MFD COND.			
18	~~W-26188~~	~~SWITCH~~	37A	W-23635	.006 MFD. COND.	59	B-21491	CORD & PLUG			
19	~~W-26877~~	~~5 MEG RESIS.~~	38	W-25367	VOLUME CONTROL	60	W-7983A	FUSE 3 AMP			
20	W-26118	8 MFD COND.	39	W26049	460Ω RESIS.	61	G2-24765	AUDIO TRANS.			
20A		8 MFD COND.	40	W23615	.05 MFD. COND.	62	W26619	34,000Ω RESIS.			
21	W-26119	~~8 MFD COND.~~	41	W25400	TONE CONTROL	63					
21A		4 MFD COND.	41A		SWITCH	64	W-23012A	40Ω RESIS.			
22	W-23403	150,000Ω RESIS.	42	W-22417-A	POTENTIOMETER	65					
23	W-26578	5 MEG RESIS.	43		TRANS.	66	W-23142	.02 MFD. COND.			
24	W-25436	.1 MFD COND. WITH 24A									

132-1 CHASSIS WIRING DIAGRAM

Circuit Diagram, Model 132-1

Specifications

This is a twelve-tube superheterodyne for operation from A.C. electric circuits. It employs a -58 type R.F. amplifier tube, a -58 type first detector tube, a -56 type oscillator tube, two -58 type I.F. amplifier tubes, a -56 type diode second detector tube, a -56 type automatic volume control tube, two -42 type push-pull A.F. amplifier tubes, two -46 type push-pull output tubes, and a -82 mercury vapour rectifier tube.

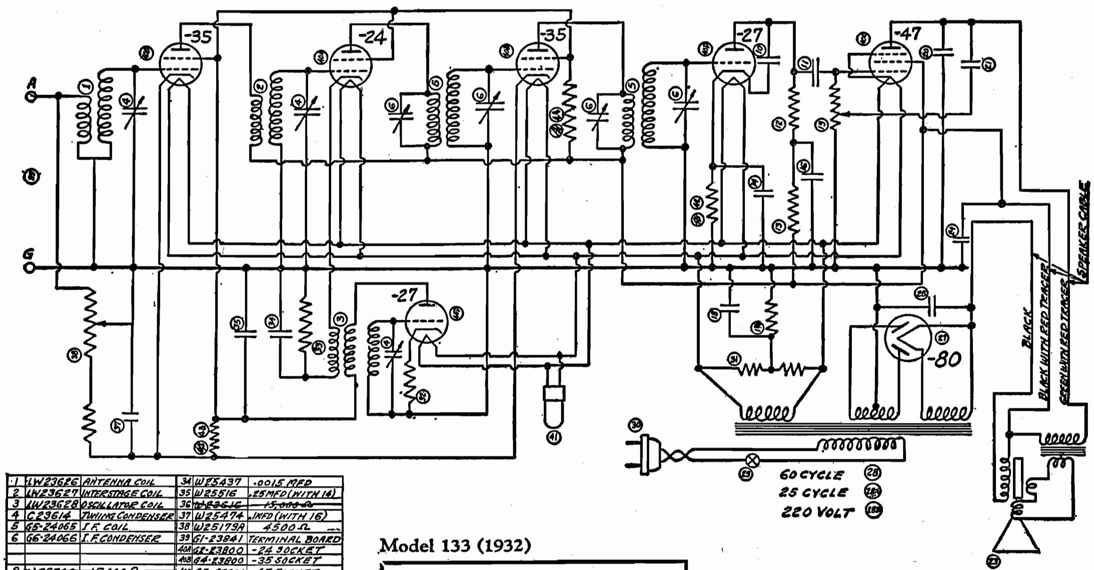
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohm per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages as shown in table. Use a low-range A.C. voltmeter for heater voltages.

Heater Or Filament Voltages	
All tubes but A. F. Amplifier and Rectifier	2.2 to 2.6
A. F. Amplifier tubes	5.2 to 6.4
Rectifier	2.4 to 2.6
Plate Voltages	
R. F., First Detector, and First I. F. tubes	180 to 220
Oscillator tube	150 to 190
Second I. F. tube	200 to 240
A. V. C. tube	60 to 80
A. F. Amplifier tubes	190 to 230
Output tubes	380 to 430
Rectifier tube	390 to 440
Screen Grid Voltages	
R. F., First Detector, and First I. F. tubes	50 to 70
Second I. F. tube	150 to 180
A. F. tubes	200 to 240
Bias Voltages	
R. F. and First I. F. Tubes (cathode to grid)	.4 to .6
First Detector tube (cathode to grid)	2 to 3
Oscillator (cathode to chassis)	12 to 15
Second I. F. tube	7 to 9
A.V.C. tube (cathode to chassis)	70 to 85
Output tubes (cathode to chassis)	25 to 32
A. F. Amplifier tubes (cathode to chassis)	20 to 27

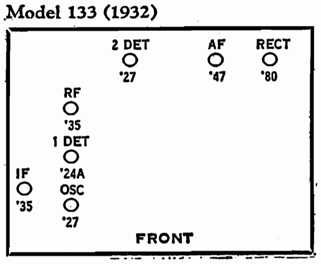
MODEL 133
Schematic
Voltage
Notes

CROSLEY RADIO·CORP.



1	LW23626	ANTENNA COIL	34	W25437	.0015 MFD
2	LW23627	INTERSTAGE COIL	35	W25516	.25 MFD (WITH 14)
3	LW23628	OSCILLATOR COIL	36	~~W23616~~	~~15,000 Ω~~
4	C23614	TUNING CONDENSER	37	W25474	.1 MFD (WITH 16)
5	G5-24065	I.F. COIL	38	W25179A	4500 Ω
6	G6-24066	I.F. CONDENSER	39	G1-23841	TERMINAL BOARD
			40A	G2-23800	-24 SOCKET
			40B	G4-23800	-35 SOCKET
9	~~W25540~~	~~15,000 Ω~~	40C	G5-23800	-47 SOCKET
10	W25537	.0006 MFD.	40D	G3-23800	-27 SOCKET
11	W25537	.03 MFD (WITH 10	41	W22221	2.5 V DIAL LAMP
12	W23403	150,000 Ω	42	W21237-A	60,000 Ω
13	W23403	150,000 Ω	43	W-25946	15000 Ω WITH 44
14	W25516	.25 MFD	44	W25946	15000 Ω WITH 43
15	~~[illegible]~~	~~25,000 Ω~~			
16	W25474	.1 MFD			
17	W25521	450 Ω			
18	W25303	5 MFD			
19	W25539	300,000 TO 500,000 Ω			
20	W25538	.0015 MFD			
21	W25538	.0015 MFD (WITH 20)			
23	LC25518	SPEAKER			
24	W25542	4 MFD			
25	W25542	8 MFD (WITH 24)			
27	G6-23800	-80 SOCKET			
28	G1-25534	60~ POWER TRANS.			
28A	G2-23775	25~ POWER TRANS.			
28B	G3-23775	220V. POWER TRANS.			
29	W25539	SWITCH (WITH 19)			
30	B21491	CABLE			
31	W22417A	10 Ω, 10 Ω			
32	W23013	2,000 Ω			
33	W21876	10,000 Ω			

Model 133 (1932)



IF PEAK 181.5 KC

133 CHASSIS ASSEMBLY WIRING DIAGRAM

Circuit Diagram, Model 133

Specifications

Model 133 is a seven-tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -35 type R.F. tube, a -24 type first detector, a -27 type oscillator, a -35 type I.F. tube, a -27 type second detector, a -47 type output tube, and a -80 type rectifier.

Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohm per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.4 to 5.4
Plate Voltages	
R. F., First Detector, and I. F. tubes	265 to 325
Oscillator tube	80 to 100
Second Detector tube	125 to 155
Output tube	230 to 280
Rectifier tube	395 Volts A C
Screen Grid Voltages	
R. F., First Detector, and I. F. tubes	80 to 100
Output tube	250 to 310
Bias Voltages	
R. F. and I. F. tubes	2.7 to 3.3
First Detector tube	6 to 7
Oscillator tube	11 to 13
Second Detector tube	14 to 18
Output tube	16 to 20

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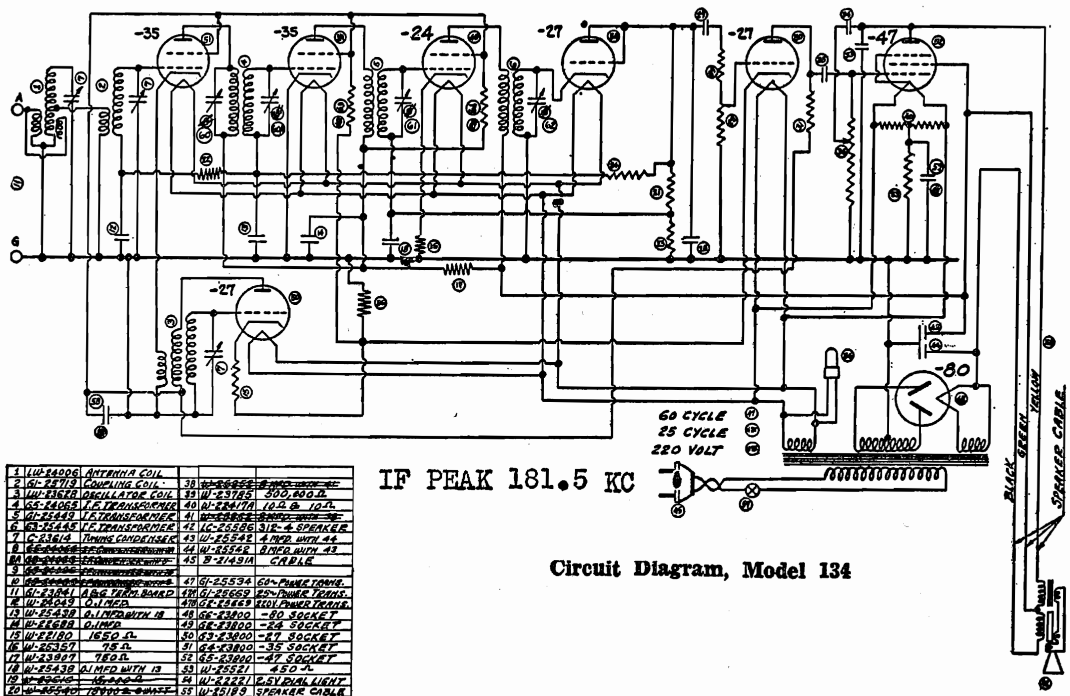
MODEL 134
Schematic
Voltage
Notes



IF PEAK 181.5 KC

Circuit Diagram, Model 134

1	LW-24006	ANTENNA COIL			
2	G1-25719	COUPLING COIL	38	~~[illegible]~~	~~[illegible]~~
3	LW-23628	OSCILLATOR COIL	39	W-23785	500,000 Ω
4	G5-24065	I.F. TRANSFORMER	40	W-22417A	10 Ω & 10 Ω
5	G1-25449	I.F. TRANSFORMER	41	~~[illegible]~~	~~[illegible]~~
6	G3-25445	I.F. TRANSFORMER	42	LC-25586	312-4 SPEAKER
7	C-23614	TUNING CONDENSER	43	W-25542	4 MFD. WITH 44
8	~~[illegible]~~	~~[illegible]~~	44	W-25542	8 MFD. WITH 43
8A	~~[illegible]~~	~~[illegible]~~	45	B-21491A	CABLE
9	~~[illegible]~~	~~[illegible]~~			
10	~~[illegible]~~	~~[illegible]~~	47	G1-25534	60~ POWER TRANS.
11	G1-23841	A&G TERM. BOARD	47A	G1-25669	25~ POWER TRANS.
12	W-24049	0.1 MFD.	47B	G2-25669	220V. POWER TRANS.
13	W-25438	0.1 MFD. WITH 18	48	G6-23800	-80 SOCKET
14	W-22688	0.1 MFD	49	G2-23800	-24 SOCKET
15	W-22180	1650 Ω	50	G3-23800	-27 SOCKET
16	W-25357	75 Ω	51	G4-23800	-35 SOCKET
17	W-23907	750 Ω	52	G5-23800	-47 SOCKET
18	W-25438	0.1 MFD WITH 13	53	W-25521	450 Ω
19	~~[illegible]~~	~~[illegible]~~	54	W-22221	2.5V DIAL LIGHT
20	~~[illegible]~~	~~[illegible]~~	55	W-25189	SPEAKER CABLE
21	W-23785	500,000 Ω	56	W-24097	350 Ω
22	W-21875	100,000 Ω	57	W-25539	SWITCH WITH 36
23	W-21875	100,000 Ω	58	W25857	8 MFD. WITH 59
24	W-22215	3-MEGOHMS	59	W25857	8 MFD. WITH 58
			60	G7-24066	I.F. CONDENSER WITH 60A
			60A	G7-24066	I.F. CONDENSER WITH 60
27	W-25537	0.03 MFD WITH 28	61	G7-24066	I.F. CONDENSER WITH 62
28	W-25537	0.0006 MFD WITH 27	62	G7-24066	I.F. CONDENSER WITH 61
29	W-25666	3-MEGOHMS	63	W25946	15000 Ω WITH 64
			64	W-25946	15000 Ω WITH 63
31	W-22199A	25,000 Ω			
33	W-25538	0.0015 MFD WITH 34			
34	W-25538	0.0015 MFD. WITH 33			
35	W-22688	0.1 MFD.			
36	W-25539	TONE CONTROL [illegible]			

Specifications

Models 134 and 134-1 are both eight-tube chasses for operation from A.C. electrical circuits. They employ similar superheterodyne circuits, the essential differences being due to the fact that Model 134 is used with a single speaker and Model 134-1 with dual speakers. Both employ a -35 or -51 type first detector tube, a -27 type oscillator tube, a -35 or -51 type first I.F. amplifier tube, a -24 type second I.F. amplifier tube, a -27 type second detector and automatic volume control tube, a -27 type first A.F. amplifier tube, a -47 type output tube, and a -80 type rectifier tube.

Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (225 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode contact to chassis.

Model 134

Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector and I. F. Amplifier tubes	260 to 310
Oscillator tube	77 to 93
First A. F. tube	50 to 60
Output tube	240 to 290
Rectifier tube	350 to 410
Screen Grid Voltages	
First Detector and I. F. Amplifier tubes	77 to 93
Output tube	260 to 310
Bias Voltages	
Oscillator tube	11 to 13
First Detector and First I. F. Amplifier tubes	0
Second I. F. tube	0.4 to 0.6
First A. F. Amplifier tube	4 to 6
Output tube	17.5 to 21.5

MODEL 134-1
Schematic
Voltage

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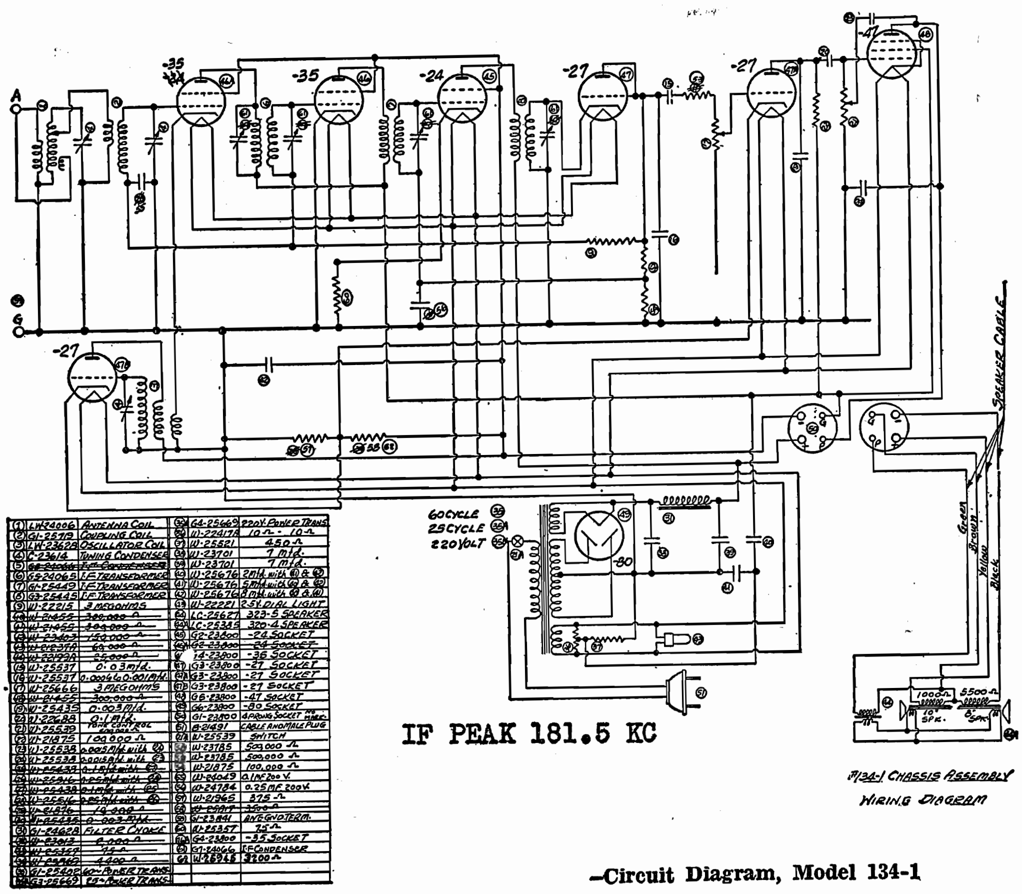
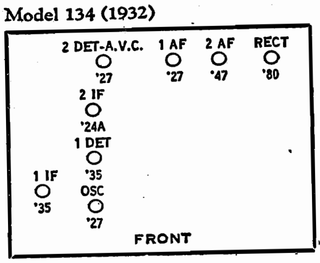


—Circuit Diagram, Model 134-1

Model 134-1

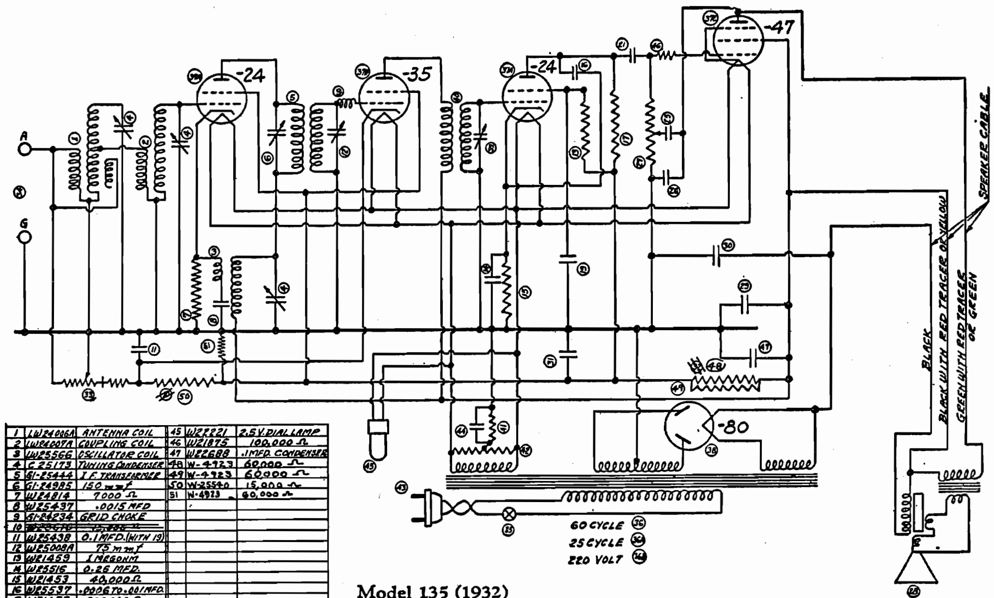
Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector and First I. F. tubes	240 to 290
Oscillator tube	77 to 93
Second I. F. Amplifier tube	325 to 375
First A. F. Amplifier tube	125 to 155
Output Tube	230 to 280
Rectifier tube (measured from each plate to chassis)	340 to 400
Screen Grid Voltages	
First Detector and I. F. tubes	77 to 93
Output Tube	245 to 295
Bias Voltages	
Oscillator tube	12 to 14
First Detector and First I. F. Amplifier tubes	0
Second I. F. tube	0.5 to 0.7
First A. F. tube	11 to 13
Output Tube	14 to 18

Model 134 (1932)



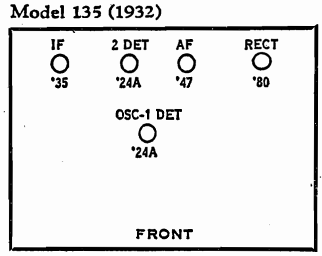
CROSLEY RADIO CORP.

MODEL 135
Schematic
Voltage
Notes



1	LW24006A	ANTENNA COIL	45	W22221	2.5 V. DIAL LAMP
2	LW24007A	COUPLING COIL	46	W21875	100,000 Ω
3	W25566	OSCILLATOR COIL	47	W22688	.1 MFD. CONDENSER
4	C25173	TUNING CONDENSER	48	W-4923	60,000 Ω
5	G1-25444	I. F. TRANSFORMER	49	W-4923	60,000 Ω
6	G1-24985	150 mmf	50	W-25540	15,000 Ω
7	W24814	7000 Ω	51	W-4923	60,000 Ω
8	W25437	.0015 MFD			
9	G1-24234	GRID CHOKE			
10	~~[illegible]~~	~~[illegible]~~			
11	W25438	0.1 MFD. (WITH 19)			
12	W25008A	75 mmf			
13	W21459	1 MEGOHM			
14	W25516	0.25 MFD.			
15	W21453	40,000 Ω			
16	W25537	.0006 TO .001 MFD.			
17	W21455	300,000 Ω			
19	W25438	0.1 MFD (WITH 11)			
21	W25537	0.09 MFD. (WITH 16)			
25	W25572	.0005 MFD.			
26	W25572	.0005 MFD (WITH 25)			
27	W25539	400,000 Ω			
28	LC25618	SPEAKER			
29	W25542	4 MFD.			
30	W25542	8 MFD (WITH 29)			
31	W25516	0.25 MFD. (WITH 14)			
32	~~[illegible]~~	~~[illegible] Ω~~			
33	W25573	4800 Ω			
34	LW20264	TERMINAL BOARD			
35	W25400A	(WITH 27)			
36	G5-23559	60 ~ POWER TRANS.			
36A	G3-24141	25 ~ POWER TRANS.			
36B	G4-24141	220 V. POWER TRANS.			
37A	G2-23800	-24 SOCKET			
37B	G4-23800	-35 SOCKET			
37C	G5-23800	-47 SOCKET			
38	G6-23800	-80 SOCKET			
39	W25008A	75 mmf.			
40	G1-25445	I. F. TRANSFORMER			
41	W25521	450 Ω			
42	W22417A	10 Ω - 10 Ω			
43	B21491	CABLE			
44	W25303	5 MFD.			

Model 135 (1932)



IF PEAK 181.5 KC

135 CHASSIS ASSEMBLY WIRING DIAGRAM

Circuit Diagram, Model 135

Specifications

Model 135 is a five tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -24 type oscillating first detector, a -35 or -51 type I.F. amplifier, a -24 type second detector, a 147 output pentode, and an -80 type rectifier.

Voltage Limits

The following are the approximate voltages which should be measured with tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.8
Rectifier tube	4.4 to 5:4
Plate Voltages	
First Detector and I. F. tubes	250 to 290
Second Detector tube	40 to 60
Output tube	220 to 270
Rectifier tube	350 to 400
Screen Grid Voltages	
First Detector and I. F. tubes	70 to 90
Second Detector tube	20 to 35
Output tube	225 to 275
Bias Voltages	
First Detector tube	6 to 9
I. F. tube	2.7 to 3.5
Second Detector tube	4 to 6
Output tube	16 to 21

MODEL 136-1
Schematic Voltage

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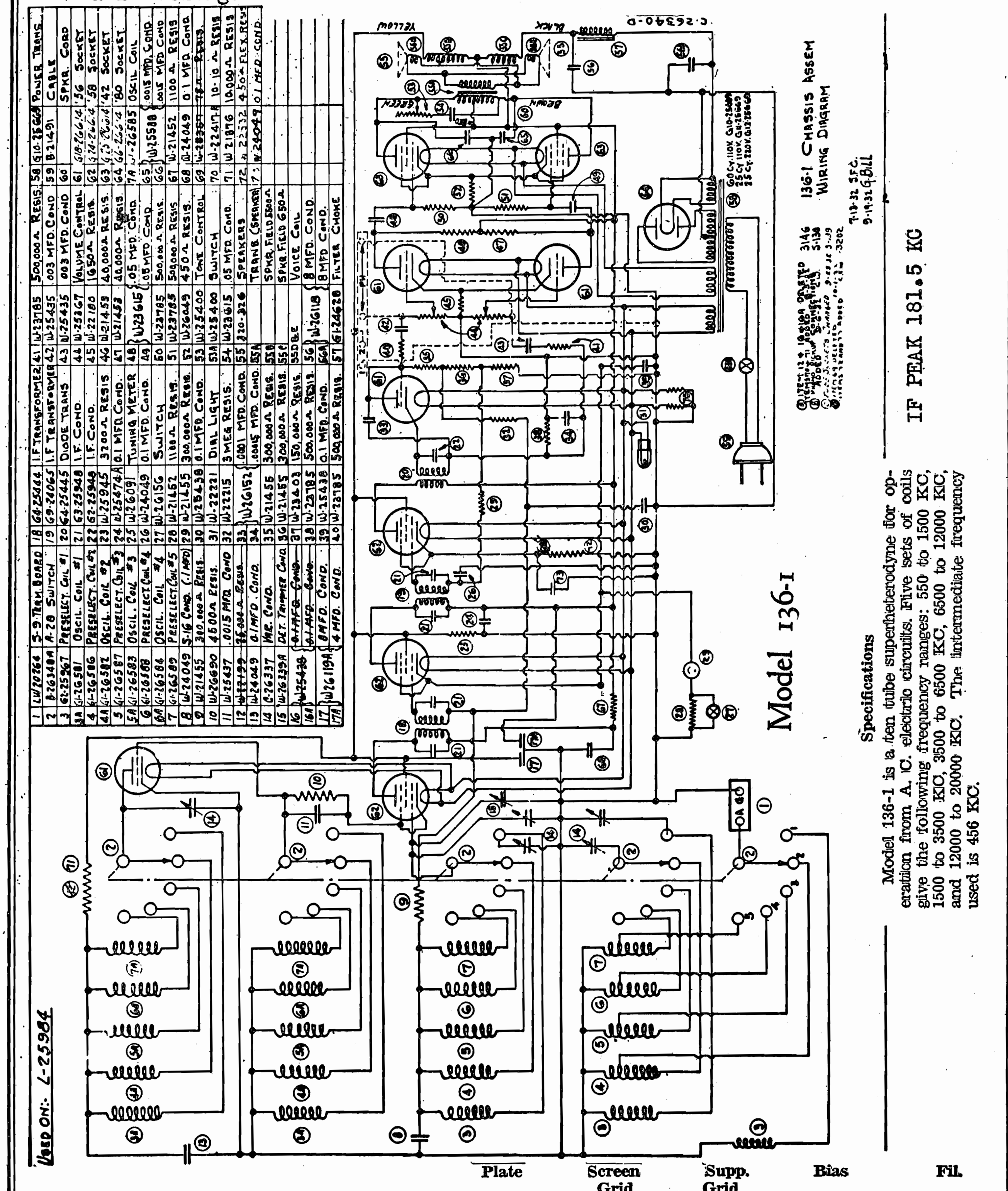

Specifications

Model 136-1 is a ten tube superheterodyne for operation from A. C. electric circuits. Five sets of coils give the following frequency ranges: 550 to 1500 KC, 1500 to 3500 KC, 3500 to 6500 KC, 6500 to 12000 KC, and 12000 to 20000 KC. The intermediate frequency used is 456 KC.

		Plate	Screen Grid	Supp. Grid	Bias	Fil.
-56	Oscillator	45			0	2.5
-58	1st Detector	275	100	0	10.0	2.5
-58	1st I. F. Amplifier	275	100	0	2.5	2.5
-58	2nd I. F. Amplifier	275	100	0	4.0	2.5
-56	Diode Detector	0			0	2.5
-56	Push Pull A. F. Amplifier	135		0	7.0	2.5
-56	Push Pull A. F. Amplifier	135		0	7.0	2.5
-42	Output	270	275		20.0	6.3
-42	Output	270	275		20.0	6.3
-80	Rectifier	370				4.8

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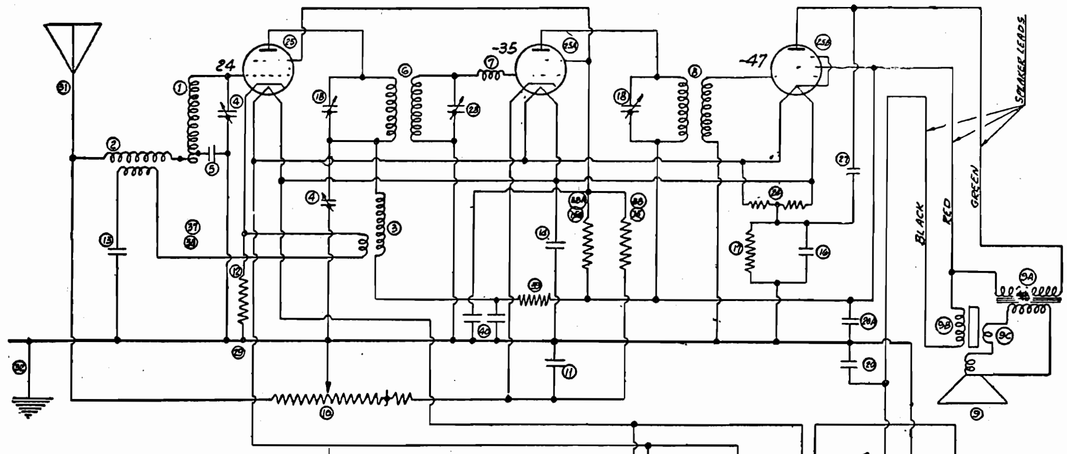
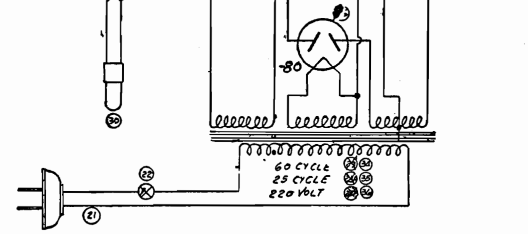
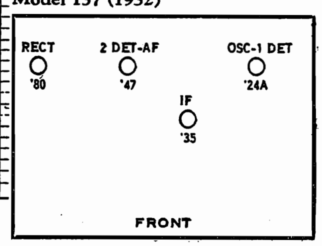
MODEL 137
Schematic
Voltage
Notes





1	G1-25086	ANTENNA COIL	28	W25008A	I.F. TUNING COND.
2	G1-25037	CATHODE COUPLER	29	W24049	.1 MFD.
3	G1-24996	OSCILLATOR COIL	30	W22221	2.5V. DIAL LAMP
4	B26056	TUNING CONDENSER	31	W26072	ANTENNA LEAD
5	W25434	.00325 MFD. ± 5%	32	W26073	GROUND LEAD
6	G3-25444	I.F. TRANSFORMER	33	~~W25837~~	~~275Ω ±10% (FLEX)~~
7	G1-24236	R.F. GRID CHOKE	34	G7-23559	60 CY. POWER TRANS
8	G1-25445	I.F. TRANSFORMER	35	G8-23659	25 CY. POWER TRANS
9	L25212	SPEAKER	36	G9-23559	220V. POWER TRANS
9A		INPUT TRANS 50,000Ω	37	~~W-23012A~~	~~40Ω ±10% FLEX~~
9B		SPEAKER FIELD 4,000Ω	38	W-25970	10000Ω ±10% WITH 38A
9C		HUM BUCK COIL 18 TURNS	38A	W-25970	15,000Ω ±10% WITH 38
10	W25964A	V. CONTROL 1500Ω TOTAL	39	W-21237A	60,000Ω ±20%
11	W25438	.1 MFD. (WITH 14)	40	W-25438	(0.1-0.1) MFD. COND.
12	W24814	7000Ω ±10%			
13	W25457	.0015 MFD			
14	W25438	.1 MFD. (WITH 11)			
~~15~~	~~W25961~~	~~3500Ω ±10% (WITH 15A)~~			
~~15A~~	~~W25961~~	~~7000Ω ±10% (WITH 15)~~			
16	W25308	.5 MFD.			
17	W23869	4400Ω ±10% (FLEX)			
18	G2-25948	I.F. TUNING COND.			
19					
20	W25542	8 MFD. (WITH 20A)			
20A	W25542	4 MFD (WITH 20)			
21	B21491	CABLE			
22	W25964A	ON-OFF SWITCH (WITH 10)			
~~23~~	~~G2-23559~~	~~60 CY. POWER TRANS.~~			
~~23A~~	~~G3-23599~~	~~25 CY. POWER TRANS.~~			
~~23B~~	~~G4-23555~~	~~220V. POWER TRANS.~~			
24	W22417A	10Ω - 10Ω			
25	G2-23800	-24 SOCKET			
25A	G4-23800	-35 SOCKET			
25B	G5-23800	-47 SOCKET			
26	G6-23800	-80 SOCKET			
27	W25435	.003 MFD			

Model 137 (1932)



IF PEAK 181.5 KC

137 CHASSIS ASSEMBLY WIRING DIAGRAM

Circuit Diagram, Model 137

Specifications

Model 137 is a four-tube superheterodyne for operation from A.C. electric circuits. The tubes employed are as follows: a -24 type oscillating first detector, a -35 or -51 type I.F. amplifier, a -47 type second detector and output tube, and an -80 type rectifier.

Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.6
Rectifier tube	4.4 to 5.2
Plate Voltages	
First Detector and I. F. tubes	220 to 260
Second Detector tube	210 to 250
Rectifier tube	380 to 430
Screen Grid Voltages	
First Detector and I. F. tubes	90 to 110
Second Detector tube	220 to 260
Bias Voltages	
First Detector tube	8 to 10
I. F. tube	2.7 to 3.3
Second Detector tube (with no signal)	25 to 30

MODEL 141
Schematic
Voltage
Notes

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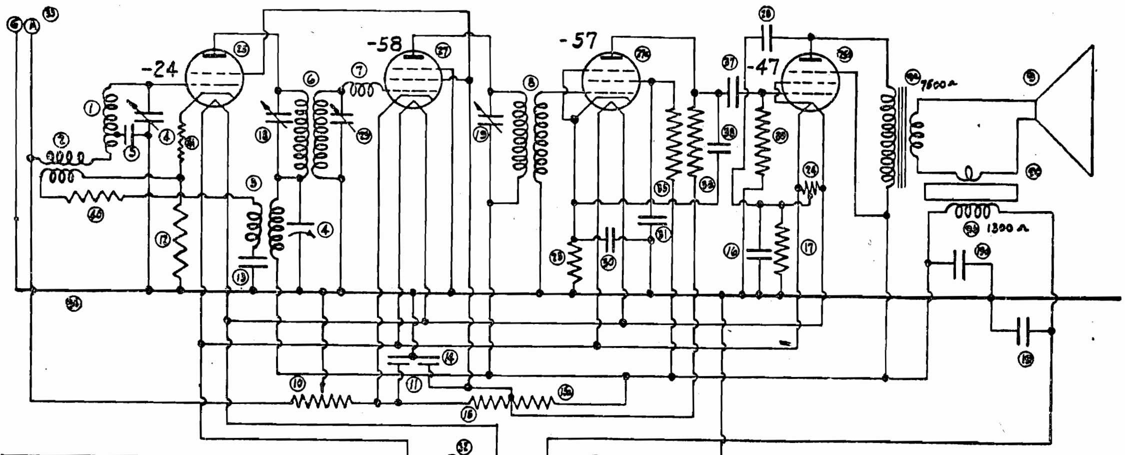
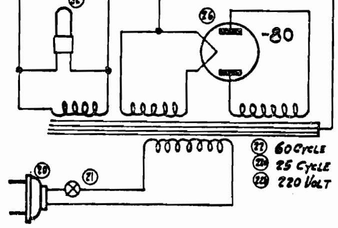
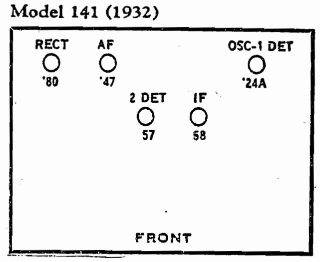




1	G-25096	Antenna Coil	26	G6-23800	-80 Socket
2	W-25897	Cathode Coupler	27	G8-23800	-58 Socket
3	G-24996	Oscillator Coil	27a	G7-23800	-57 Socket
4	B-250568	Tuning Condenser	28	W-25435	0.003 MFD.
5	W-25434	0.00375 MFD.	29	W-25009A	I.F. Tuning Cond.
6	G9-25444	I.F. Transformer	30	W-25438	0.1 MFD. with 31
7	G-24234	R.F. Grid Choke	31	W-25438	0.1 MFD. with 30
8	G-25446	I.F. Transformer	32	LW-26606	Dial Light [illegible]
9	L-20490	818-B Speaker	33	W-26072	Antenna Lead-Blue
9a	Input	Transformer	34	W-26073	Ground Lead-Black
9b	Speaker	Field	35	W-28215	3 Megohm
9c	Hum Buck	Coil	36	W-21455	300,000 Ω
10	W-26673	Volume Control [illegible]	37	W-25687	0.02 MFD. with 38
11	W-26438	0.1 MFD with 14	38	W-25687	0.0006 MFD with 37
12	W-24814	7,000 Ω	39	W-23785	500,000 Ω
13	W-25427	0.0015 MFD	40	W-23018A	40 Ω
14	W-26438	0.1 MFD with 11	41	W-25935	275 Ω
15	W-25970	10,000 Ω with 15a			
15a	W-25970	15,000 Ω with 15			
16	W-25308	.5 MFD			
17	W-25521	450 Ω			
18	G2-25368	I.F. Tuning Cond.			
19	W-25542	8 MFD with 19a			
19a	W-25542	4 MFD with 19			
20	W-21491	Cord & Plug			
21	W-23618C	Switch with 10			
22	G7-23559	Power Trans. 60 ~			
22a	G8-23559	Power Trans. 25 ~			
22b	G9-23559	Power Trans. 220 V.			
23	W-21287A	60,000 Ω			
24	W-22417A	18 Ω - 18 Ω			
25	G8-23800	-24 Socket			
25a	G5-23800	-47 Socket			

IF PEAK 181.5 KC

Model 141 (1932)



141 Chassis Assembly
Wiring Diagram

Circuit Diagram, Model 141

Specifications

Model 141 is a five-tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -24 type oscillating first detector, a -58 type I.F. amplifier, a -57 type second detector, a -47 type output tube, and a -80 type rectifier.

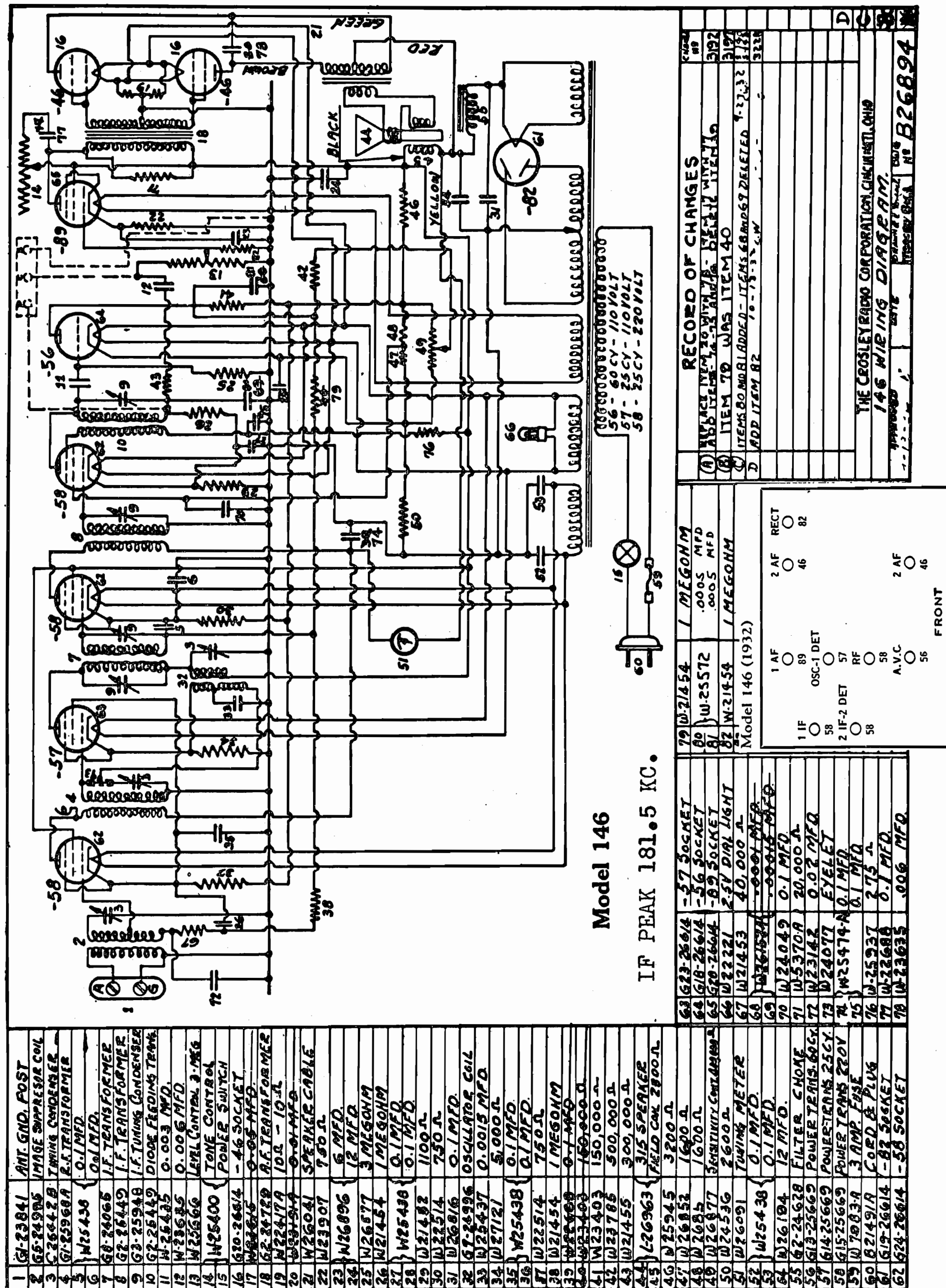
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers), Measure plate and screw grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.6
Rectifier tube	4.3 to 5.3
Plate Voltages	
First Detector and I. F. tubes	230 to 270
Second Detector tube	30 to 50
Output tube	230 to 260
Rectifier tube	340 to 380
Screen Grid Voltages	
First Detector and I. F. tubes	90 to 110
Second Detector tube	30 to 50
Output tube	235 to 265
Bias Voltages	
First Detector tube	8 to 10
I. F. tube	3.1 to 3.9
Second Detector tube	9 to 12
Output tube	16 to 21

CROSLEY RADIO CORP.

MODEL 146
Schematic
Voltage



Line voltage 117½ volts (235 for 220 volt receivers)

Specifications

Models 146 and 146-1 are nine tube super-heterodynes for operation from A. C electric circuits. Model 146 uses a single speaker

		Plate	Screen Grid	Supp. Grid	Bias	FiL.
-58	R. F. Amplifier	195	62	0	2.5*	2.5
-57	Osc. Detector	195	132	0	9.0	2.5
-58	1st I. F. Amplifier	200	62	0	2.0*	2.5
-58	2nd I. F. Amp. and Diode	0	105	200	5.0	2.5
-56	A. V. C.	60			70.0	2.5
-89	A. F. Amplifier	180	200	0	20.0	6.0
-46	Class B Output	350			0	2.5
-46	Class B Output	350			0	2.5
-82	Rectifier	380				2.5

* Measured across cathode resistors

MODEL 146-1
Schematic
Voltage

CROSLEY RADIO CORP.

1	G5-24995	ANTENNA COIL
2	G1-25968	R.F. INTERSTAGE COIL
3	G7-24996	OSCILLATOR COIL
4	G8-24065	1ST I.F. TRANSFORMER
5	G2-25449	2ND I.F. TRANSFORMER
6	G2-25449	3RD I.F. TRANSFORMER
7	C-26442B	VARIABLE CONDENSER
8	63-25948	I.F. TUNING CONDENSER
9	G2-24729	A.F. TRANSFORMER
10	W-22417A	10-10 Ω FIL. POTEN.
11	W-23191	.01 MFD. CONDENSER
12	W-22196	20,000 Ω RESISTOR
13	W-23615	.05 MFD. CONDENSER
14	W-25594	80,000 Ω TONE CONTROL
15	W-23635	.006 MFD. CONDENSER
16	W-23907	750 Ω RESISTOR
17	W-25540	15,000 Ω RESISTOR
18	W-25435	.003 MFD. CONDENSER
19	W-23403	150,000 Ω RESISTOR
20	W-21454	1 MEGOHM RESISTOR
21	W-25666A	3-MEGOHM LEVEL CONTROL
22	W-21455	300,000 Ω RESISTOR
23	W-25538	.0015 MFD. CONDENSER
24		.0015 MFD. CONDENSER
25	W-25438	.1 MFD. CONDENSER
26		.1 MFD. CONDENSER
27	W-23142	.02 MFD. CONDENSER
28	W-21454	1-MEGOHM RESISTOR
29	W-21454	1-MEGOHM RESISTOR
30	W-21454	1-MEGOHM RESISTOR
31	W-25438	.1 MFD CONDENSER
32		.1 MFD. CONDENSER
33	W-27121	5000 Ω RESISTOR
34	W-25437	.0015 MFD. CONDENSER
35	W-22514	750 Ω RESISTOR
36	W-23142	.02 MFD. CONDENSER
37	W-26091	TUNING METER
38	W-25857A	8 MFD. CONDENSER
39		8 MFD. CONDENSER
40	W-25573	4500 Ω SEN CONTROL
41	W-27120	25,000 Ω RESISTOR
42		8500 Ω RESISTOR
43	W-25945	3200 Ω RESISTOR
44	G2-24628	1ST FILTER CHOKE
45	LW-23213	2ND FILTER CHOKE
46	W-26194	12 MFD. CONDENSER
47	W-25542	8 MFD. CONDENSER
48		4 MFD. CONDENSER
49	G13-25669	60~ POWER TRANS.
50	PART OF W-25594	POWER SWITCH
51	W-7983A	3 AMP. FUSE
52	B-21491A	CORD & PLUG
53	W-22221	2.5V. DIAL LAMP
54	W-26600	SPEAKER CABLE
55	L-26109	925-4 SPEAKER 5500 Ω FIELD
56	L-26999	921-4 SPEAKER 650 Ω FIELD
57	G1-23841	ANT-GND. STRIP
58	G24-26614	-58 SOCKET
59	G23-26614	-57 SOCKET
60	G29-26614	-55 SOCKET
61	G28-26614	-89 SOCKET
62	G20-26614	-46 SOCKET
63	G19-26614	-82 SOCKET
64	W-24077	EYELET CONDENSER
65	W-4921	10,000 Ω RESISTOR
66	W-26152A	.0001 MFD. CONDENSER
67		.00015 MFD. CONDENSER
68	W-23635	.006 MFD. CONDENSER
69	W-21454	1-MEGOHM RESISTOR
70	G14-25669	25~ POWER TRANS.
71	G15-25669	220V. POWER TRANS.
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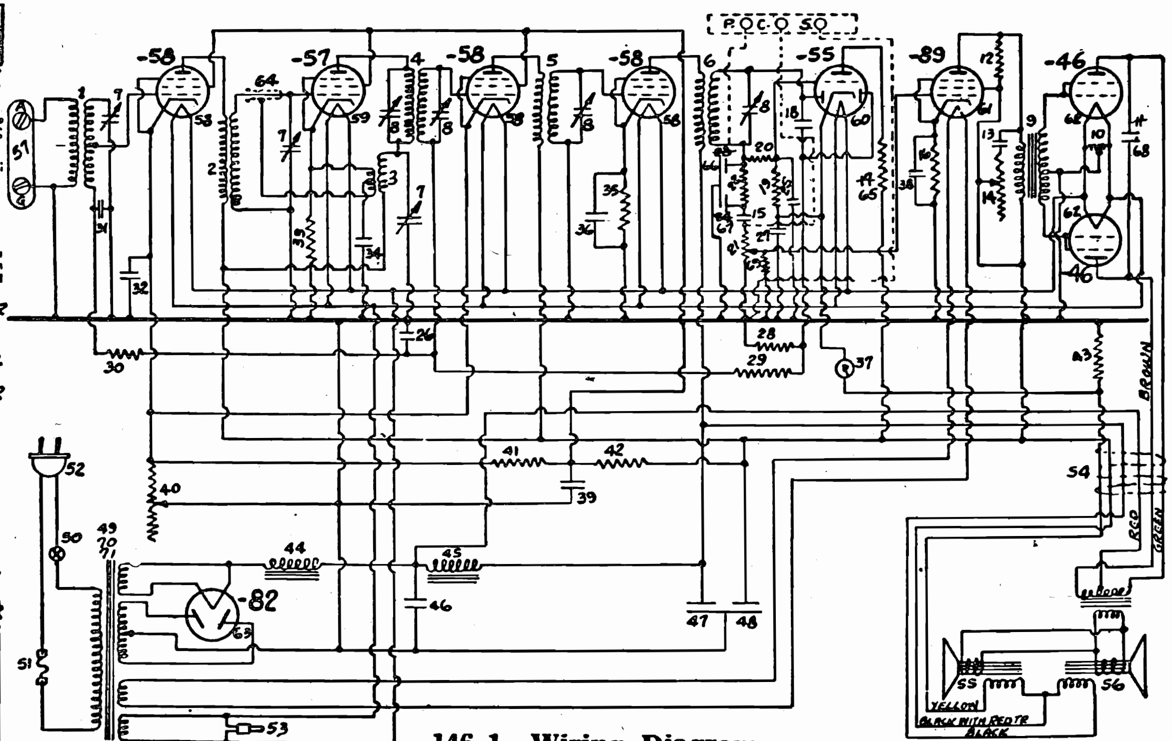
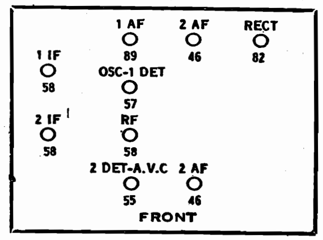


146-1—Wiring Diagram

		Plate	Grid Screen	Grid Supp.	Bias	Fil.
-58	R. F. Amplifier	310	130	0	4.5	2.5
-57	Osc. Detector	290	130	0	6.0	2.5
-58	1st I. F. Amplifier	310	130	0	4.5	2.5
-58	2nd I. F. Amp.	310	130	0	6.0	2.5
-56	Diode Detector and A. V C	80				2.0
-89	A. F. Amplifier	250	255		28.0	6.0
-46	Class B Output	365			0	2.5
-46	Class B Output	365			0	2.5
-82	Rectifier	380				2.5

IF PEAK 181.5 KC

Model 146-1 (1932)



Model 146-1 uses two speakers. The intermediate frequency used in both models is 181.5 kilocycles

CROSLEY RADIO CORP.

MODEL 147
Schematic
Voltage

Line voltage—117.5 volts.
Plate voltage measured from plate contact to cathode contact.
Screen grid voltage measured from screen grid contact to cathode contact.
Bias voltage measured from cathode to negative of "B" supply.

1	W-27652	.003 MFD.
2	LW-27680	ANTENNA COIL
3	LW-27681	INTERSTAGE COIL
4	B-27706	TUNING CONDENSER
5	W-27694	VOLUME CONT. 4500 Ω
6		LINE SWITCH
7	W-25438	.1 MFD.
8		.1 MFD.
9	W-27677A	8 MFD.
10		8 MFD.
11	W-21237A	60,000 Ω
12	W-26577	3 MEG.
13	W-27203	.02 MFD.
14	W-26578	5 MEG.
15	W-26690	4500 Ω
16	~~W-25438~~	~~.003 MFD.~~
17	W-27675	300 Ω RED DEVIL
18	~~G1-24284~~	~~10 MA~~
19	G2-24774	FILTER CHOKE
20	W-27676	4 MFD.
21		4 MFD.
22	LW-27815	CORD & PLUG
23	~~G34-27727~~	~~R SOCKET~~
24	G11-27727	-36 SOCKET
25	G15-27727	-38 SOCKET
26	G17-27727	-39 SOCKET
27	27790	340 SPEAKER
28	W-26072	ANTENNA LEAD
29	W-4639C	2 AMP. FUSE
30	W-27652	.003 MFD.
31	W-28100	300 Ω CANDOHM
32	G12-27727	-37 SOCKET
33	W-27652	.003 MFD.
34	G1-24234	FILTER CHOKE
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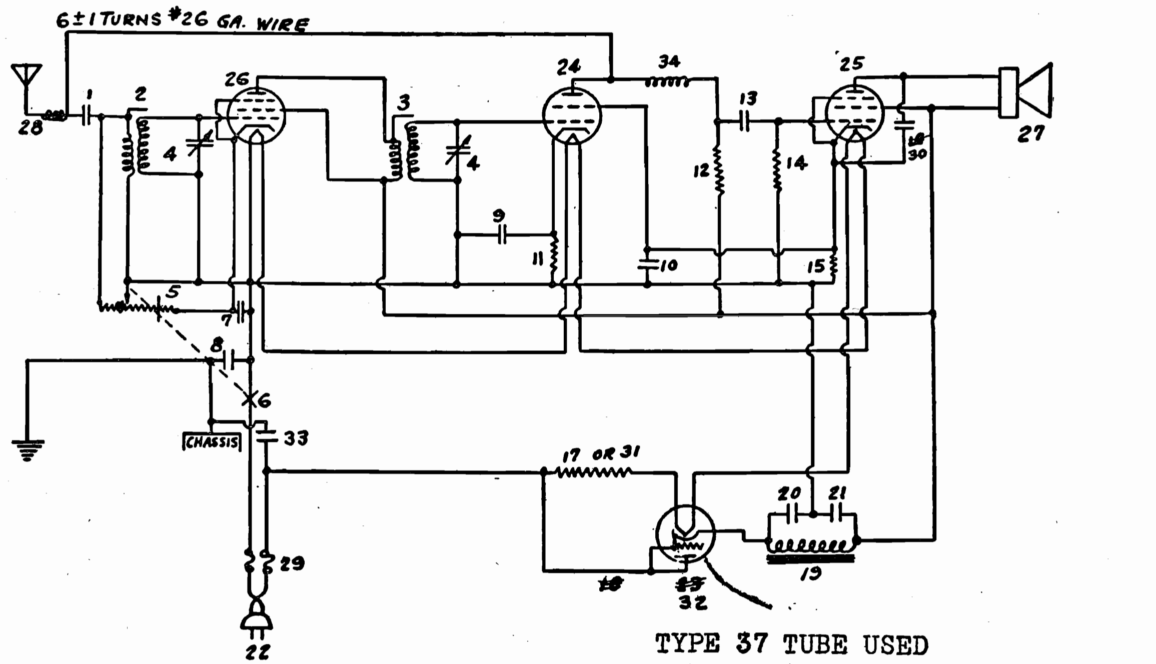


TYPE 37 TUBE USED
EARLY MODEL EMPLOYED KR TUBE

Specifications

Model 147 is a four tube tuned radio frequency receiver designed for operation from 110 volt, 25 or 60 cycle A. C. and 110 volt D. C. electric circuits.

Tube	Position	Plate	Screen Grid	Voltages Supp. Grid	Bias	Fil.
	Voltages with A. C. Power Supply					
-39	R. F. Amplifier	104	104		1.3	5.6
-36	Detector	5	7		1.2	5.6
-38	Output	92	95		14	5.6
-37	Rectifier				118	5.6
	Voltages with D. C. Power Supply					
-39	R. F. Amplifier	100	100		1.2	5.6
-36	Detector	5	7		1.0	5.6
-38	Output	92	95		12.0	5.6
-37	Rectifier	3			102	5.6

	RECORD OF CHANGES	Change No.
A	ITEM 16 REPLACED WITH ITEM 30 11-19-32	3262
B	ITEM 31 ADDED AS SELECT ITEM WITH ITEM 17 11-23-32	3295
B	ITEM 18 DELETED. ITEM 23 REPLACED BY ITEM 32	3262
C	ITEM 33 ADDED 11-29-32	3281
D	ADD ITEM 34 12-7-32	3309

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
147 WIRING DIAGRAM
APPROVED DATE 11-5-32 Schaefer DWG. NO. B-27788

MODEL 148
Schematic
Voltage

CROSLEY RADIO CORP.

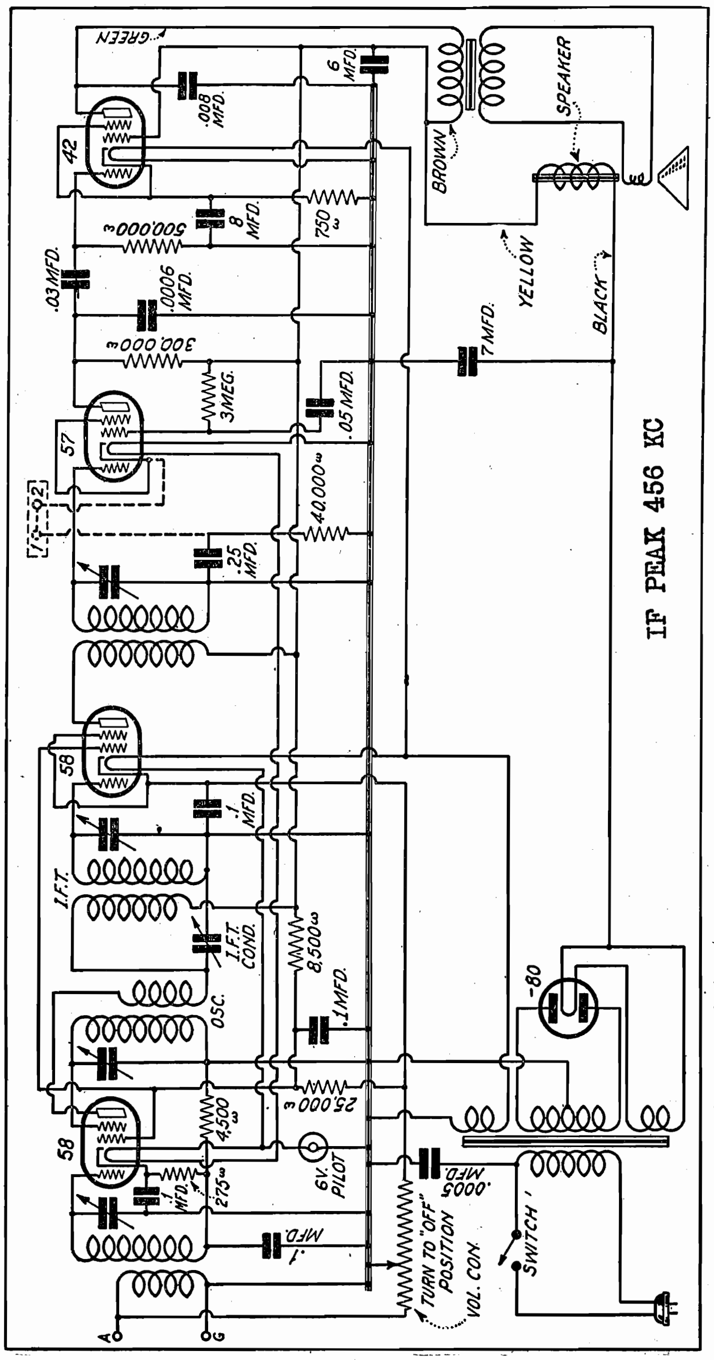
Line voltage 117½ volts (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

Screen grid voltage measured from screen grid contact to cathode contact.

Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis, except as noted.



IF PEAK 456 KC

Schematic diagram of the Crosley Model 148 Superheterodyne

Tube	Position	Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	Osc. Detector	230	110	33	2.7*	2.5
-58	I. F. Amplifier	255	140	0	3.0	2.5
-57	Detector	180	40	0	5.3	2.5
-42	Output	240	255	0	17.0	7.0
-80	Rectifier	330				4.8

*Across 275 ohm resistor in cathode circuit.

Specifications

Model 148 is a five tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 456 kilocycles.

MODEL 150
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

1	G7-24995	ANTENNA COIL
2	G2-25960A	INTERSTAGE COIL
3	G9-24996	OSCILLATOR COIL
4	G-26442B	TUNING CONDENSER
5	G1-25444	FIRST I.F. TRANS.
6	G0-25444	SECOND I.F. TRANS.
7	W-25008-A	I.F. TUNING COND.
8	G-25948	PRIM. TUNING COND. I.F.
9		SECOND I.F. TUNING COND.
10		SECONDARY TUNING COND.
11	W-21455	300,000 Ω
12	W-21455	300,000 Ω
13	W-22881	15,000 Ω
14	W-21876	10,000 Ω
15	W-26577	3 MEGOHMS
16	W-21455	300,000 Ω
17	W-26577	3 MEGOHMS
18	W-21875	100,000 Ω
19	W-23142	0.02 MFD.
20	W-26877	LEVEL CONT. 300,000 Ω
21	LC-25518	312-4 SPEAKER
22		FIELD COIL 1800 Ω
23	LW-20264	ANT. GND. POST
24	W-25438	0.1 MFD.
25		0.1 MFD.
26	W-24049	0.1 MFD.
27	W-24814	7,000 Ω
28	W-25437	0.0015 MFD.
29	W-21454	1 MEGOHM
30	W-26870A	6 MFD.
31	W-23907	750 Ω
32	B-21491A	CORD & PLUG
33	W-25594	TONE CONTROL
34		POWER SWITCH
35	W-24049	0.1 MFD.
36	G14-23559	POWER TRANS. 60CY.
37	G7-24141	POWER TRANS. 25CY.
38	G8-24141	POWER TRANS. 220V.
39	W-25542A	8 MFD.
40		4 MFD.
41	W-27389	110 Ω
42		2,000 Ω
43		8,000 Ω
44		15,000 Ω
45	G24-26614	-58 SOCKET
46	G23-26614	-57 SOCKET
47	G20-26614	-55 SOCKET
48	G25-26614	-42 SOCKET
49	G6-26614	-80 SOCKET
50	W-22221	2.5V DIAL LAMP
51	W-24077	2.5 MMF.
52	W-26041	SPEAKER CORD
53	W-7159	4400 Ω (FOR PHONO ONLY)
54	W-24049	0.1 MFD. (FOR PHONO ONLY)
55	W-23625	0.006 MFD.
56	W-23142	0.02 MFD.
57	W-26571	0.0005 MFD.
58	W-27540	0.0005 MFD.
59	W-27652	.003 MFD.
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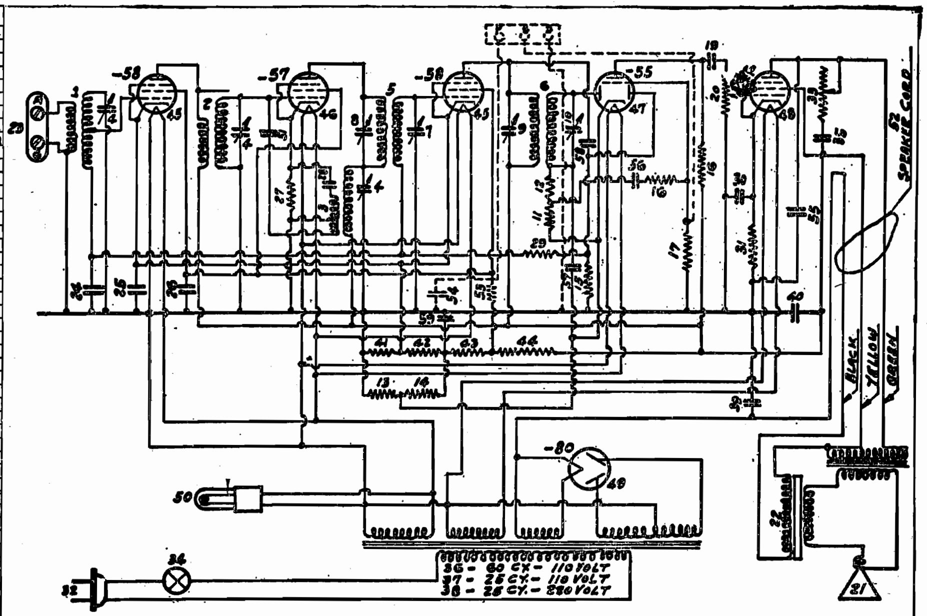

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	RECORD OF CHANGES	Change No.
A	ITEM 59 ADDED	[illegible]
B		[illegible]
C		[illegible]

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
150 WIRING DIAGRAM
APPROVED | DATE 10-6 | No. B27356

IF PEAK 181.5 KC

Specifications

Model 150 is a six tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 181.5 kilocycles.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all but the filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of the values given in the following table.

Line voltage 117½ volts (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

Screen grid voltage measured from screen grid contact to cathode contact.

Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis.

Tube	Position	Plate	Screen Grid	Voltages Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	260	90	0	2.5	2.5
-57	Oscillating detector	240	80	0	5.0	2.5
-58	I. F. Amplifier	275	100	0	2.5	2.5
-55	Detector	95			23.0	2.5
-42	Output	255	260	0	22.0	6.3
-80	Rectifier	360				5.0

MODEL 155.
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

Specifications

Model 155 is a four tube superheterodyne designed for operation from D. C. electric circuits. The intermediate frequency used is 456 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all voltages. The voltage limits are + or — 10% of values given in the following table.

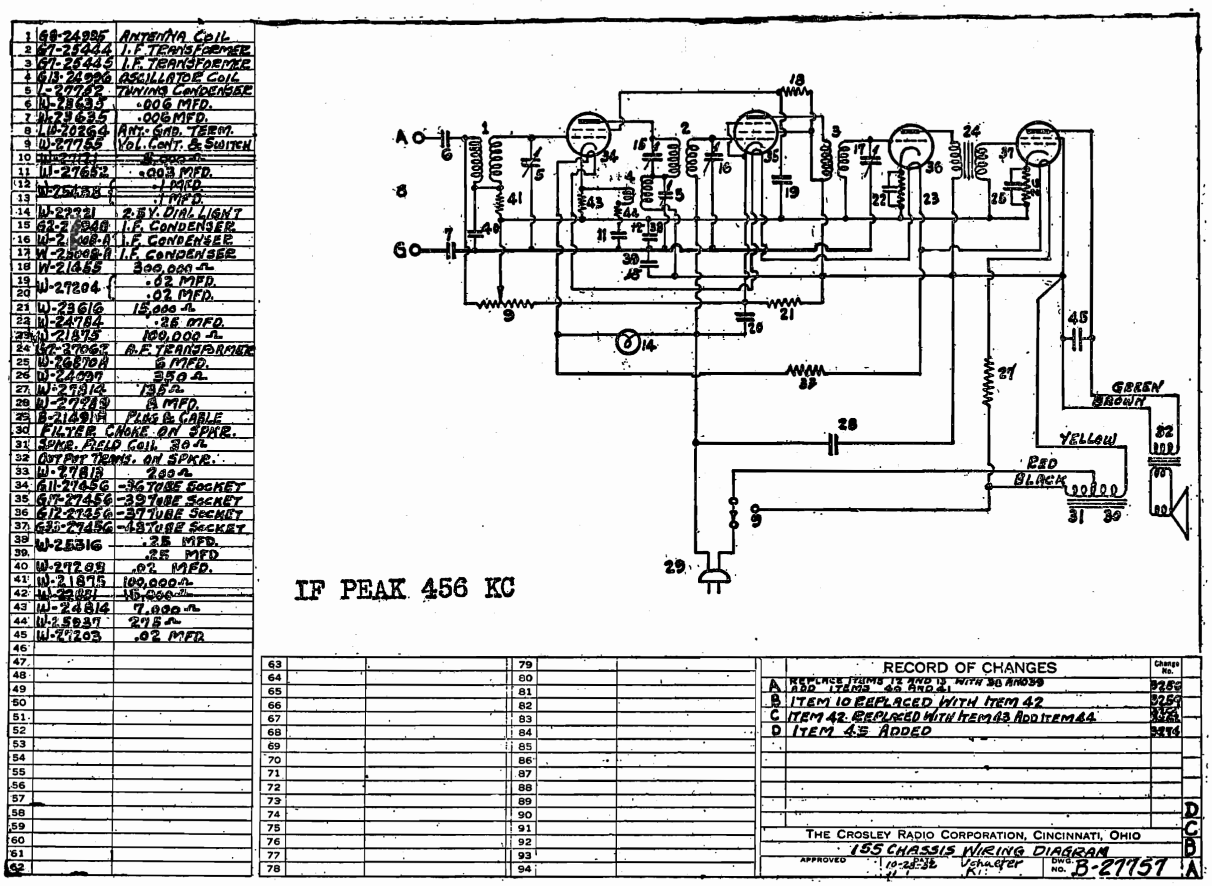
Line voltage—117.5 volts.

Plate voltage measured from plate contact to cathode contact.

Screen grid voltage measured from screen grid contact to cathode contact.

Bias voltage measured from grid contact or negative of D. C. supply to cathode contact.

Tube	Position	Voltages Plate	Screen Grid	Bias	Fil.
-36	Oscillating Detector	92	60	5.0	6.3
-39	I. F. Amplifier	96	96	3.6	6.3
-37	2nd Detector	82		9.5	6.3
-48	Output	65	80	15.0	30.0



MODEL 156
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

1	LW-20264	ANTENNA GROUN POST
2	G1-27937	ANT. & OSC. COILS
3	B-27425	TUNING COND.
4	W-25438	0.1 MFD.
5	W-25438	0.1 MFD.
6	G8-25948	I.F. TUNING COND.
7	W-25008-A	I.F. TUNING COND.
8	W-25008-A	I.F. TUNING COND.
9	G7-25444	I.F. TRANS.
10	G7-25445	I.F. TRANS.
11	W-26577	3 MEG GRID LEAK
12	W-5382	0.00025 MFD.
13	G1-27912	REGENERAT. CONT. COND.
14	W-21455	300,000 Ω
15	W-27203	0.02 MFD.
16	W-21454	1 MEGOHM GRID LEAK
17	L-27917	336-3 SPEAKER
18	M-41	EYELET CONDENSER
19	B-27930	BATTERY CABLE
20	W-25438	0.1 MFD.
21	W-25438	0.1 MFD.
22	W-27939	VOLUME CONT. 10,000 Ω
23	W-27939	SWITH
24	G9-27456	-30 SOCKET
25	G31-27456	-34 SOCKET
26	G10-27456	-32 SOCKET
27	G36-27466	-33 SOCKET
28	W-26577	3 MEG. RESIS.
29	W-27933	SPEAKER CABLE
30	G2-23300	AIR CELL RESISTOR
31	W-24077	EYELET COND.
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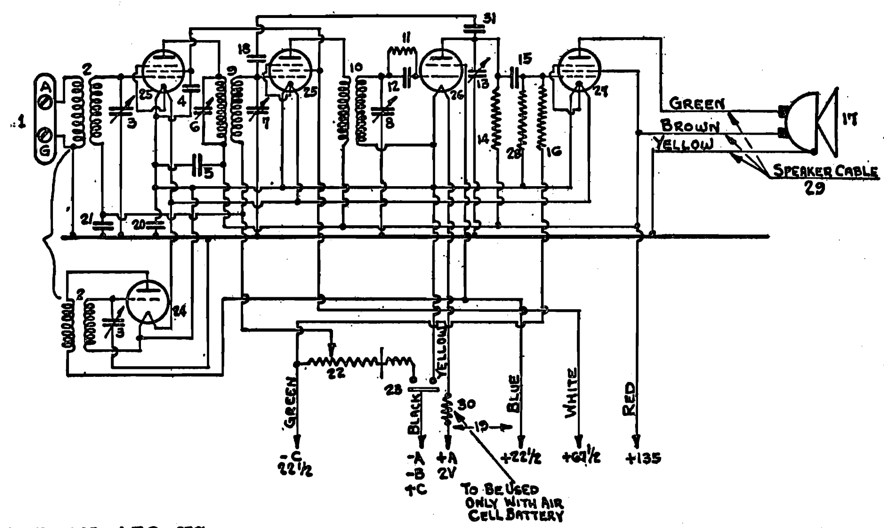

IF PEAK 456 KC

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RECORD OF CHANGES | Change No.

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
156 WIRING DIAGRAM
APPROVED | BILL DATE 11-10-32 | DWG NO. B-27938

Specifications

Model 156 is a five tube battery superheterodyne designed for operation from a 2 volt "A" battery, three 45 volt "B" batteries, and a 22½ "C" battery. The intermediate frequency used is 456 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohm per volt, or more) for all voltages. The voltage limits are + or − 10% of values given in the following table.

Battery voltage should be that specified above.

Plate voltage measured from plate contact to filament contact, except as specified.

Screen grid voltage measured from screen grid contact to filament contact.

Bias voltage measured from grid contact to negative filament contact.

Tube	Position	Voltages			
		Plate	Screen Grid	Bias	Fil.
-34	1st Detector	135	67.5	4.0	2.0
-30	Oscillator	22.5		0	2.0
-34	I. F. Amplifier	135	67.5	4.0	2.0
-32	2nd Detector	135*	22.5	0	2.0
-33	Output	135	135		2.0

* Measured to battery side of 300,000 ohm Plate Resistor.

MODEL 157
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

1	G7-24995	ANTENNA COIL
2	G2-25968	INTERSTAGE COIL
3	G14-24996	OSCILLATOR COIL
4	G5-24065	FIRST I.F. TRANS.
5	G10-24065	SECOND I.F. TRANS.
6	C-26442B	TUNING CONDENSER
7	G3-25948	I.F. TUNING CONDENSERS
8	W-27203	0.02 MFD.
9	W-22180	1650 Ω
10	W-25857	8 MFD.
11		8 MFD.
12	W-25970	15,000 Ω
13		10,000 Ω
14	W-25937	275 Ω
15	W-22215	3-MEGOHMS
16	W-21454	1-MEGOHM
17	W-21455	300,000 Ω
18	~~[illegible]~~	~~[illegible]~~
19	W-26559	0.006 MFD.
20	W-25666	LEVEL CONT. 3-MEG.
21	W-23013	2,000 Ω
22	W-21237	60,000 Ω
23	~~[illegible]~~	~~[illegible]~~
24	W-21455	300,000 Ω
25	W-22514	750 Ω
26	W-22873	220 Ω
27	W-25517	0.008 MFD.
28		0.05 MFD.
29	W-25594	TONE CONT. & SWITCH 20,000 Ω
30	W26118A	8 MFD.
31		8 MFD.
32	W-22221	2.5V DIAL LIGHT
33	B-21491A	CORD & PLUG
34	LW-20264	ANT. GND. POST
35	27869	337-4 SPEAKER-8"
36	G24-26614	-58 SOCKET
37	G23-26614	-57 SOCKET
38	G18-26614	-56 SOCKET
39	G25-26614	-42 SOCKET
40	G6-26614	-80 SOCKET
41	G10-25669	POWER TRANS. 60 CY.
42	G11-25669	POWER TRANS. 25 CY.
43	G12-25669	POWER TRANS. 220 V.
44	W-22417A	10 Ω - 10 Ω
45	27870	337-5 SPEAKER-10"
46	W-27932	.0001 MFD.
47	W-27932	.0001 MFD.
48	W-25537	.03 MFD.
49		.001 MFD.
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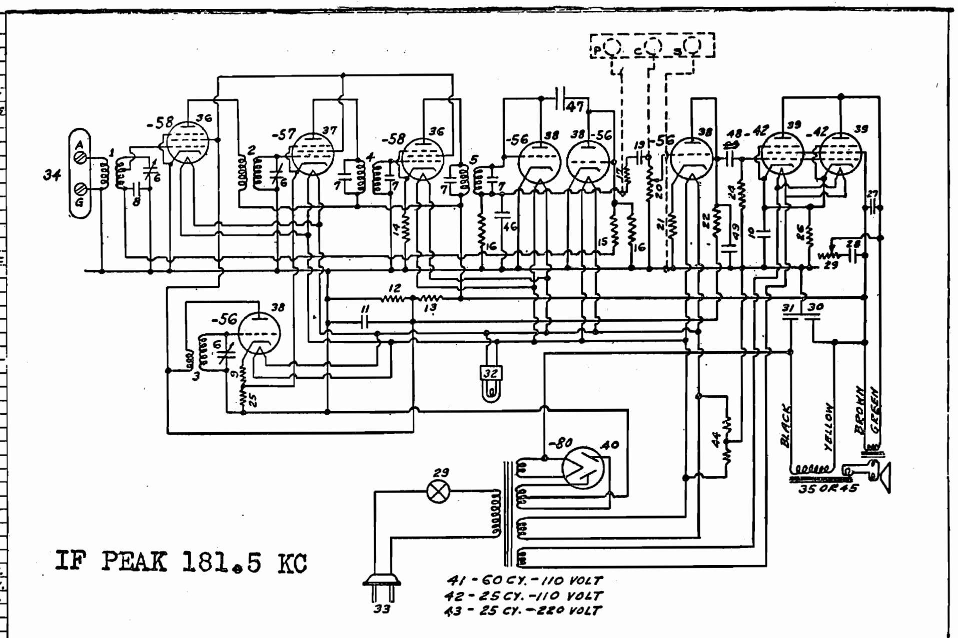


	RECORD OF CHANGES	Change No.
A	ITEM 18 REPLACED WITH ITEMS 46 & 47	3259
B	ITEM 23 REPLACED WITH ITEMS 48 & 49	3286

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
157 WIRING DIAGRAM
APPROVED DATE 11-5-32 R.E. Brosch DWG. NO. B-27855

Specifications

Model 157 is a ten tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 181.5 kilocycles.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

Line voltage—117.5 volts (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

Screen grid voltage measured from screen grid contact to cathode contact.

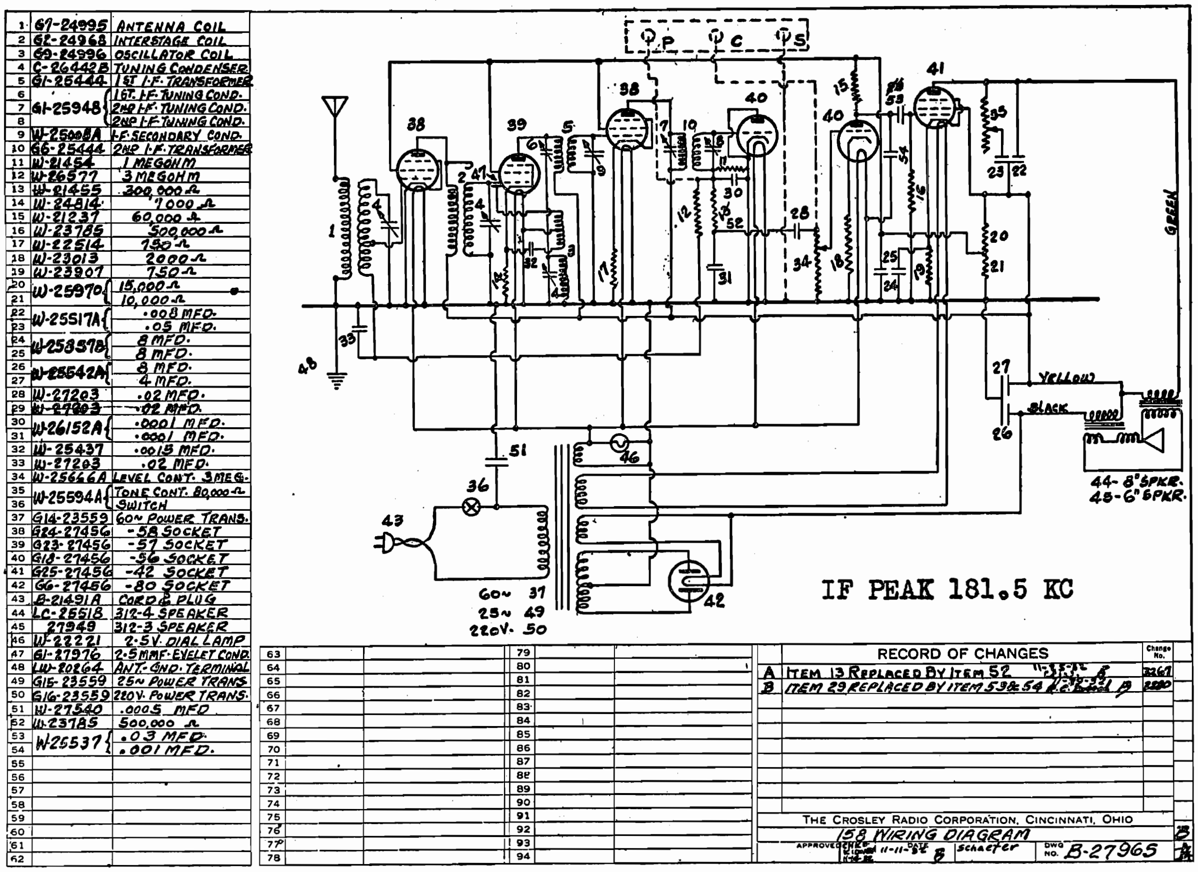
Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis.

Tube	Position	Plate	Screen Grid	Voltages Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	240	110	0	0	2.5
-57	1st Detector	240	110	0	6.0	2.5
-56	Oscillator	110			20.0	2.5
-58	I. F. Amplifier	240	110	0	2.8	2.5
-56	Detector	0				2.5
-56	AVC Rectifier	0				2.5
-56	A. F. Amplifier	40			2.0	2.5
-42	Parallel Output	250	260		17.5	6.3
-42	Parallel Output	250	260		17.5	6.3
-80	Rectifier	350				4.8

CROSLEY RADIO CORP.

MODEL 158
Schematic
Voltage
Notes



Specifications

Model 158 is a seven tube superheterodyne designed for operation from A. C. electric circuits. The intermediate frequency used is 181.5 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. Voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or − 10% of values given in the following table.

Line voltage—117.5 (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

Screen grid voltage measured from screen grid contact to cathode contact.

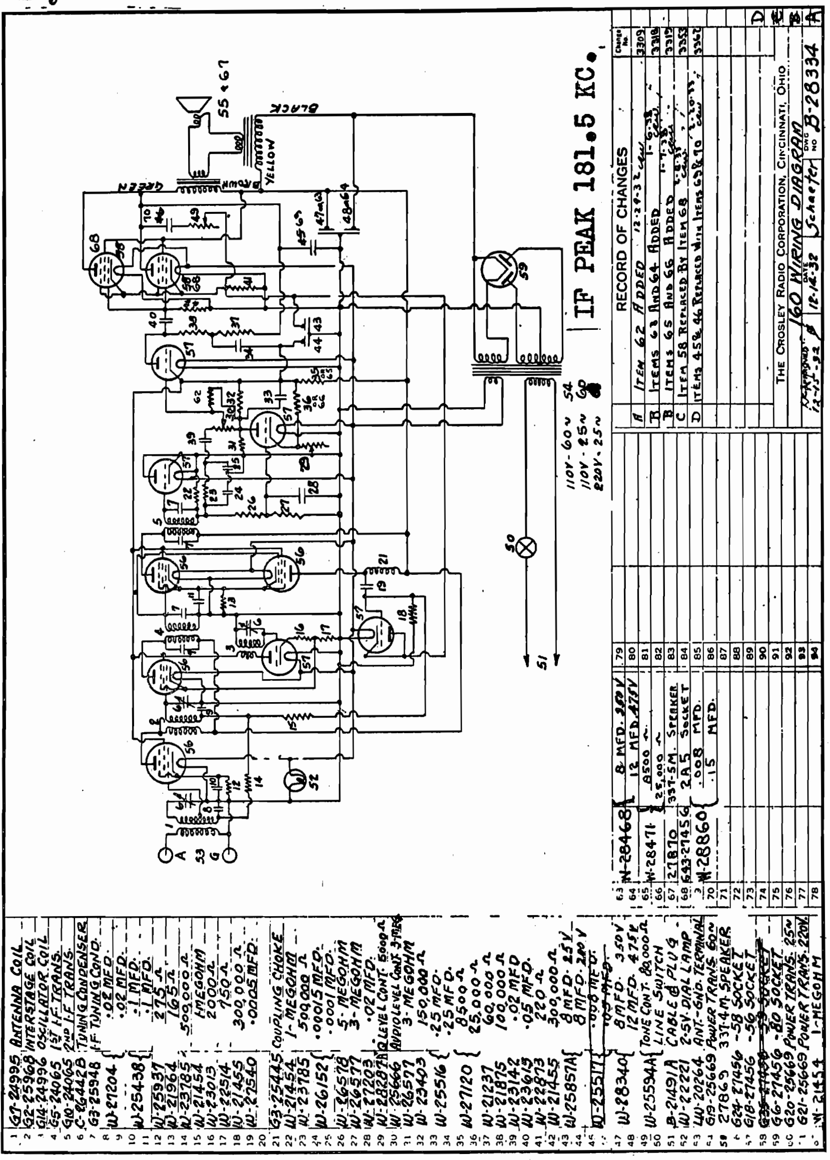
Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis.

Tube	Position	Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	270	85	0	0	2.5
-57	Oscillating Detector	270	80	0	6.0	2.5
-58	I. F. Amplifier	275	80	0	4.0	2.5
-56	Detector	0				2.5
-56	A. F. Amplifier	40			1.6	2.5
-42	Output	245	250		22.0	6.3
-80	Rectifier	350				4.8

MODEL 160
Schematic
Voltage
Layout

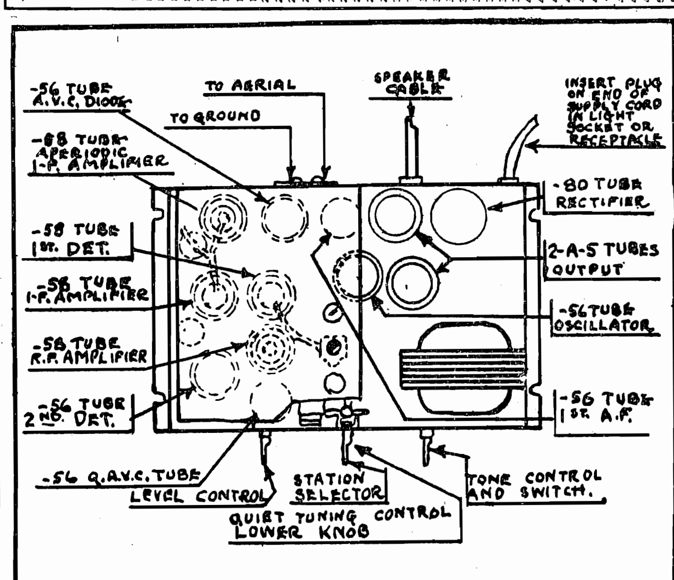
CROSLEY RADIO CORP.



Line voltage -- 117.5 volts (235 for 220 volt receivers).

Tube	Position	Plate	Screen Grid	Cathode	Fil.
-58	R. F. Amplifier	265	120	4	2.5
-58	1st Detector	260	120	9	2.5
-58	I. F. Amplifier	260	115	4	2.5
-58	Aperiodic I. F. Amplifier	260	115	4	2.5
-56	Oscillator	120		22	2.5
-56	AVC diode	17		17	2.5
-56	QAVC Tube	90		0-20*	2.5
-56	2nd Detector	0		0	2.5
-56	A. F. Amplifier	190		120	2.5
-59†	Output (Class A Pentode)	250	260	17	2.5
-59†	Output (Class A Pentode)	250	260	17	2.5
-80	Rectifier	380			4.8

* Voltage dependent on position of "Q" control.
† May be 2A5 tubes.



SPECIFICATIONS

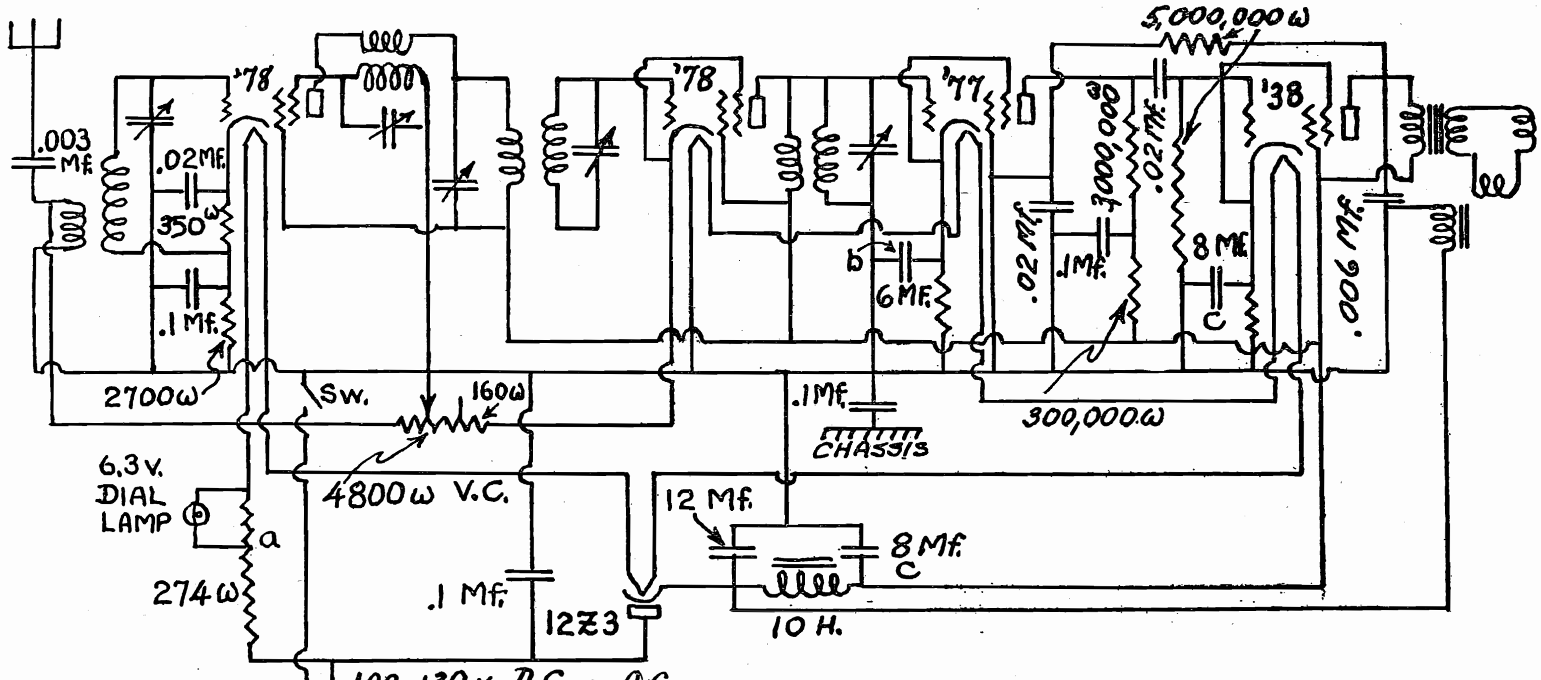
Model 160 is a twelve tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 181.5 KC.

VOLTAGE DATA

All voltages, except filament, measured from tube contact to chassis. Filament voltages measured between heater contacts.

CROSLEY RADIO CORP.

MODEL 163
Schematic
Voltage
Notes



IF PEAK 456 KC

Specifications

Model 163 is a five tube superheterodyne designed to operate on 100 to 130 volts, D.C. or any frequency A.C., electric circuits. The intermediate frequency is 456 KC.

Voltages for A.C. *

Tube	Position	Plate	Screen Grid	Cathode	Supp. Grid	Fil.
-78	Oscillator Modulator	105	105	2.5	20	6.3
-78	I.F.Amplifier	105	105	3.0	3.0	6.3
-77	2nd Detector	5	5	4.0	4.0	6.3
-38	Output	102	105	8.0	8.0	6.3
12Z3	Rectifier	117.5AC		120		12.6

Voltages with D.C. operation are about 10% lower than those with A.C. operation.

MODEL 154
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

Specifications

Model 154 is a midget four tube superheterodyne designed for operation from A. C. electric circuits. The intermediate frequency used is 456 KC. In addition to the combination volume control-switch and the tuning control, there is a regeneration control, a short fibre rod with a screw driver slot, located at the rear of the chassis. This should be adjusted for the most sensitive operation without oscillation in the receiver.

Tubes and Voltage Limits

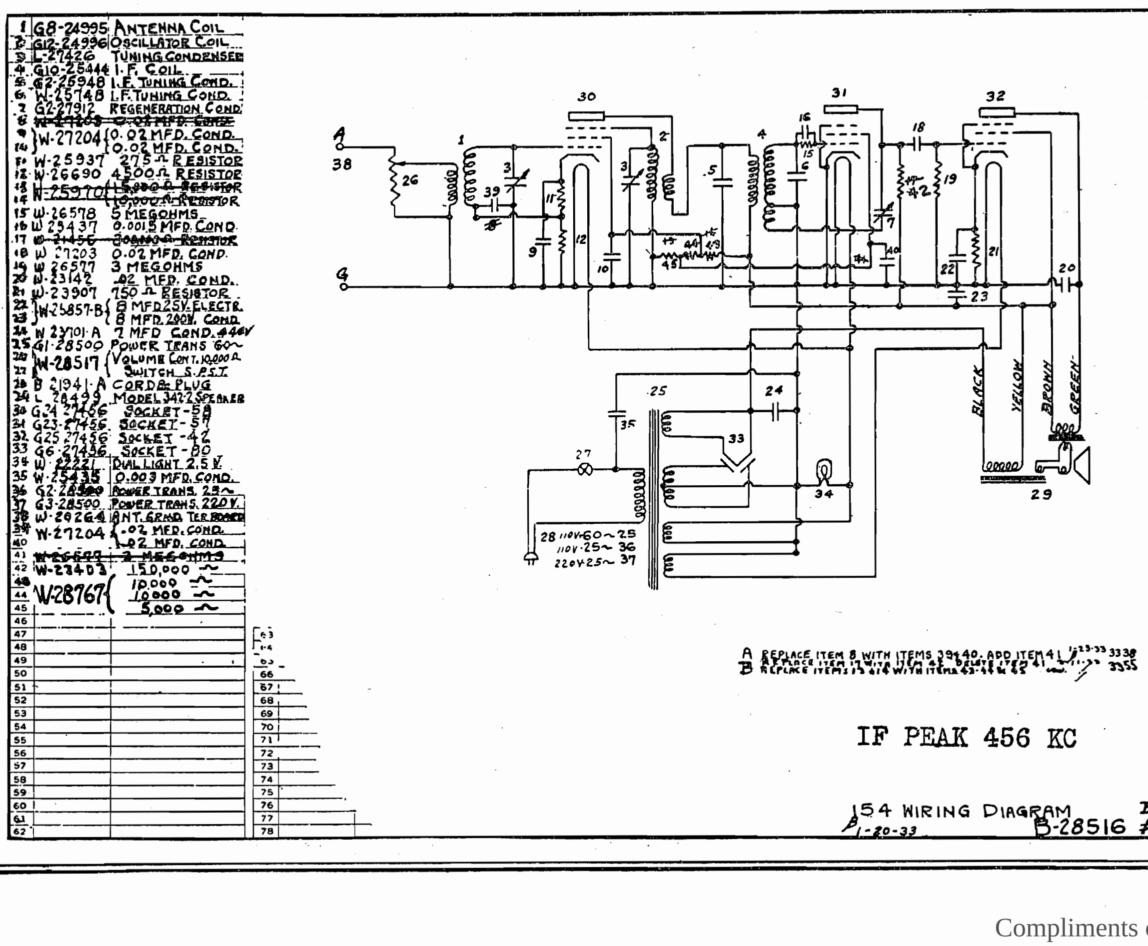
The tubes and their functions and voltages are shown in the following chart. All tube voltages are to be measured with the set in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for measuring all but filament voltages. Measure filament voltages with a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

Line voltage—117.5 volts (235 for 220 volt receivers).

All voltages, except filament, measured from tube contact to chassis.

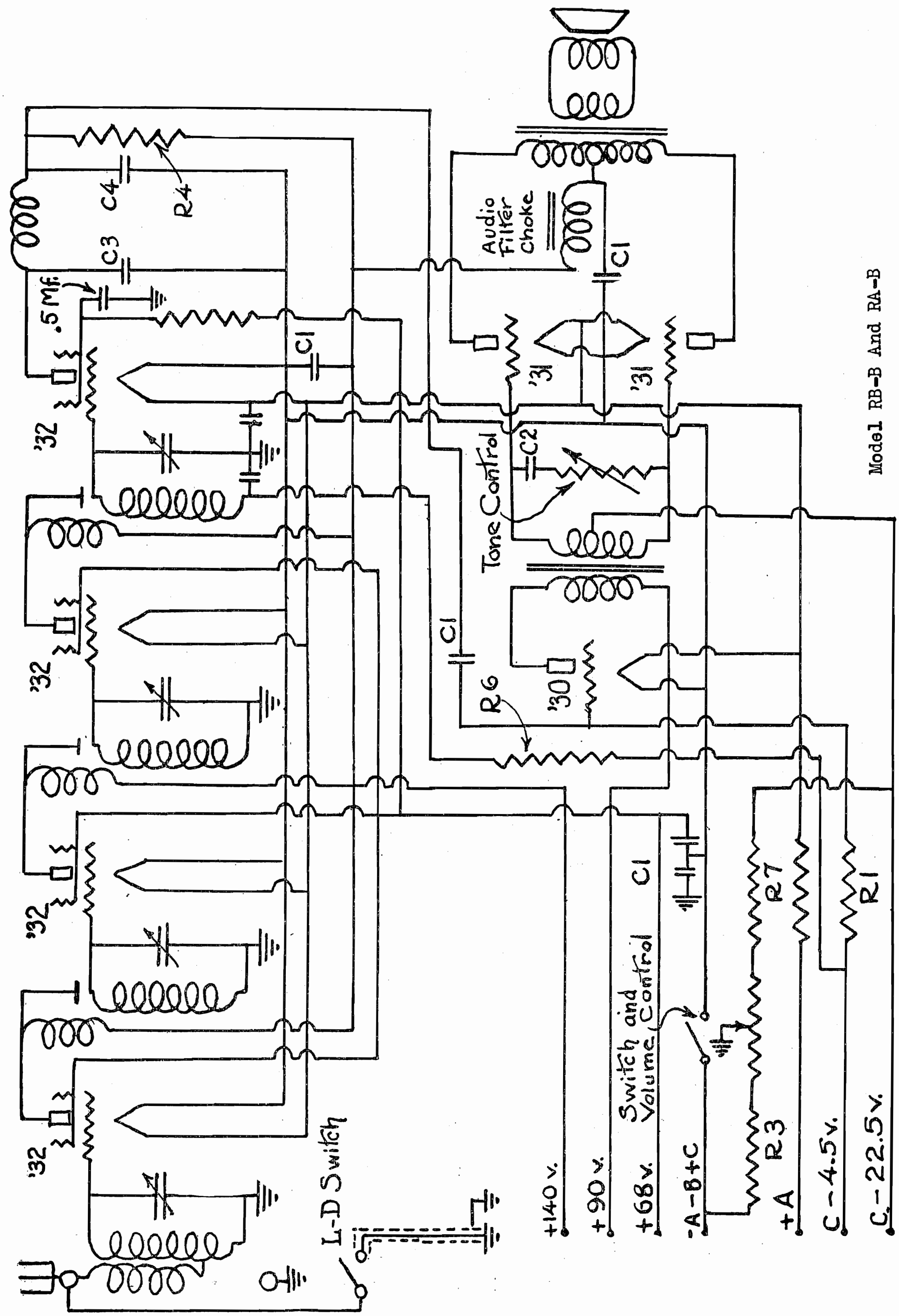
Filament voltages measured between filament contacts.

Tube	Position	Plate	Voltages Screen Grid	Cathode	Control Grid	Fil.
-58	Oscillator modulator	200	100	16	-14	2.5
-57	2nd Detector	25	20	0	0	2.5
-42	Output	190	200	12	0	6.3
-80	Rectifier	310				5.0



DELCO APPLIANCE CORP.

MODEL RB-B
RA-B
Schematic



MODEL RB-B
RA-B
Voltage
Values

DELCO APPLIANCE CORP.

RESISTORS

NO	BODY	END	HAND	RESISTANCE
R 1	Red	Black	Green	2,000,000
R22	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

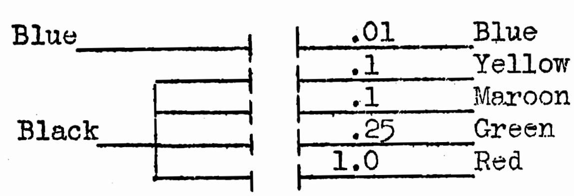
Capacities of C-1 Condenser are arranged as follows:

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:

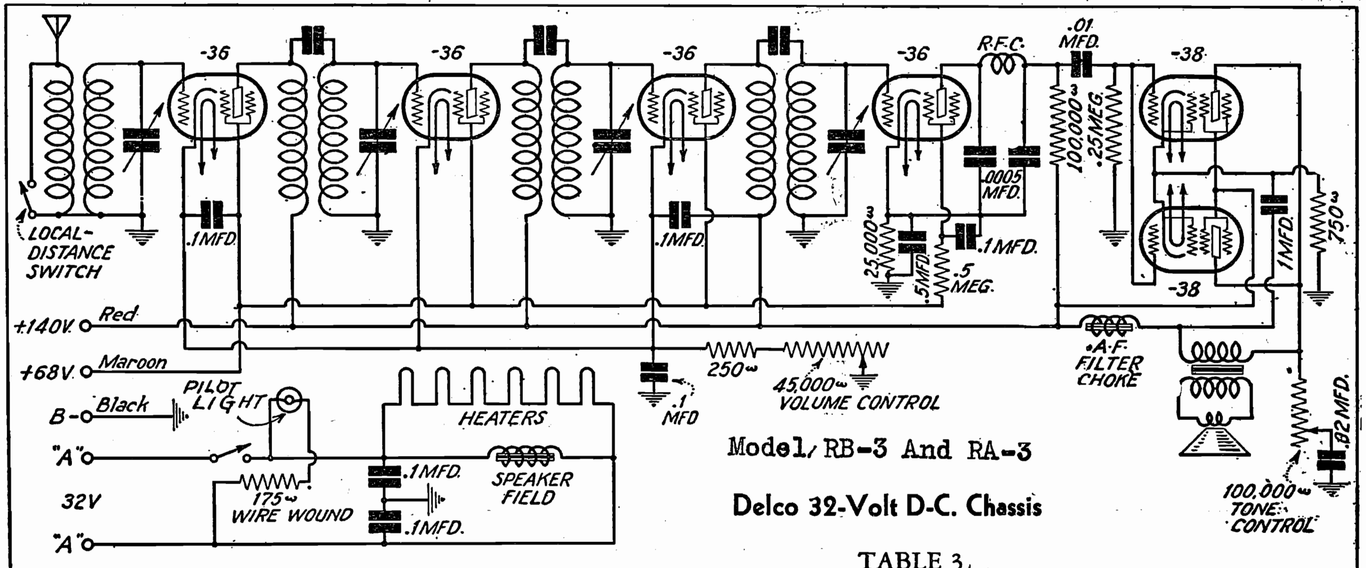


DELCO APPLIANCE CORP.

MODEL RB-3
RA-3
Schematic
Notes

TABLE 1

No.	Body	End	Spot	Ohms	Watts
R-1	Red	Green	Brown	250	0.5
R-2	Violet	Green	Brown	750	0.5
R-3	Red	Green	Orange	25,000	0.5
R-4	Brown	Black	Yellow	100,000	1.0
R-5	Red	Green	Yellow	250,000	0.5
R-6	Green	Black	Yellow	500,000	0.5
R-7	(Wire-wound resistor)			175	6.0



Model RB-3 And RA-3

Delco 32-Volt D-C. Chassis

TABLE 3

Tube	Fil.	Plate	Grid	Screen	Pentode	Plate MA.
1st R-F.	6.2	125	1.8	62	..	2.0
2nd R-F.	6.2	125	1.8	62	..	2.0
3rd R-F.	6.2	125	1.8	62	..	2.0
Det.	6.2	75	1.0	8	..	.1
Pentodes	6.0	50	.6	40	10	7.0

TABLE 2

No.	Capacity
C-1	.0005
C-2	.02
C-3	.1-.1
C-4-A	.5
C-4-B	1.
C-4-C	.1
C-4-D	.1
C-4-E	.01

The resistors used in the receiver are color-coded. The corresponding values and wattage ratings are given in Table 1. The condensers carry numbers. The corresponding values are given in Table 2. Condensers C-4-A to C-4-E inclusive, are contained in the by-pass condenser pack.

The voltage readings which may be expected on test are given in Table 3. These are based on a line voltage of 36, and with the volume control on full. Cathode voltage is zero in every case.

Selector Dial Adjustment

If the pointers on the dial window do not indicate the frequency of the stations correctly, the dial may be rotated to the correct position. To do this it will be necessary to remove the chassis from the cabinet.

After the chassis is removed, measure the vertical distance from the bottom of the cabinet to the indicating points on the dial window (inside the cabinet). Tune in a station of known frequency, loosen the two square head set screws which hold the dial and hub assembly to the tuning condenser shaft. Hold the condenser rotor stationary and turn the selector dial on the condenser shaft until the frequency shown on the selector dial of that particular station is the same vertical distance from the bottom of the chassis as that previously measured from the bottom of the cabinet to the indicating points on the dial window inside the cabinet.

The dial light bulb is rated at 6 volts and has a standard flashlight base. It can be removed or replaced easily by lifting the dial light, socket and bracket assembly, up and off of the dial light mounting bracket.

Trimmer Condenser Adjustment

A small condenser is located on the top of each of the four tuning condensers. If the selectivity is not normal, it may be necessary to re-align.

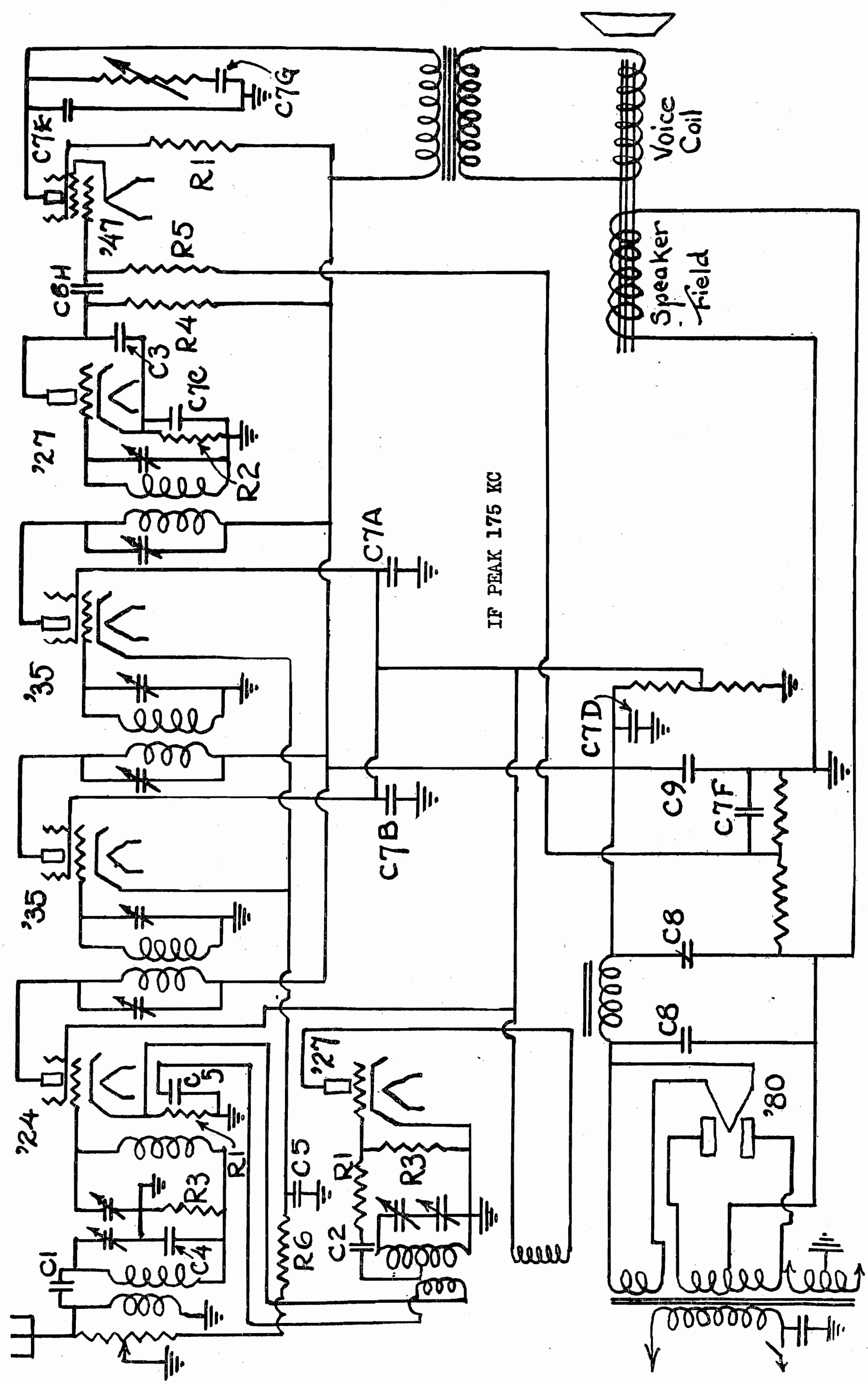
The trimmer condensers are adjusted by means of nuts or studs which may be turned with a socket wrench or screwdriver having an insulated handle. They are accessible for adjustment through the four holes in the top of the gang condenser shield.

To adjust the trimmers, tune in a station broadcasting on a frequency of approximately 1,400 kc. Adjust the volume by means of the volume control unit until the station can be faintly but clearly heard.

Starting at the front, adjust each trimmer in order from front to rear.

MODEL RB-1
RC-1
Schematic

DELCO APPLIANCE CORP.



Model RB-1 And RC-1

DELCO APPLIANCE CORP.

MODEL RB-1
RC-1
Voltage
Values

VOLTAGE DATA

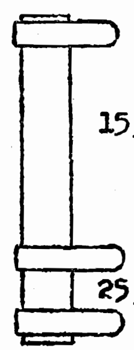
Type of Tube	Position of Tube	Fil Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathods Volts	Pentode Screen Volts	Normal Plate MA
224	1st Det.	2.1	225	2.0	85	7	--	1
235	1st I.F.	2.1	225	3.3	79	5	--	14
235	2nd I.F.	2.1	225	3.3	75	5	--	13
227	Oscillator	2.15	75	0	--	0	--	5
227	2nd Det.	2.15	125	15.0	--	15	--	1
247	A.F.	2.15	210	1.0	--	--	200	3.5
280	Rect.	4.5	300	---	--	--	--	25-25

Line Volts 110. Volume Control on Full

RESISTORS

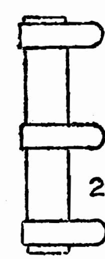
NO.	BODY	END	SPOT	RESISTANCE	WATTS
R1	Yellow	Green	Red	4,500	1/2
R2	Red	Green	Orange	25,000	1/2
R3	Yellow	Black	Orange	40,000	1/2
R4	Brown	Black	Yellow	100,000	1/2
R5	Green	Black	Yellow	500,000	1/2
R6	In Metal Cover			400	

Voltage Divider



Brown 15,000 Ohms
Red 25,000 Ohms

Pentode Bias



Green 52 000 Ohms
Red 200,000 Ohms

CONDENSERS

NO.	CAPACITY
C1	.00001 Mfd.
C2	.0005 Mfd.
C3	.002 Mfd.
C4	.01 Mfd.
C5	.1-.1 Mfd.
C6	.1 Mfd.

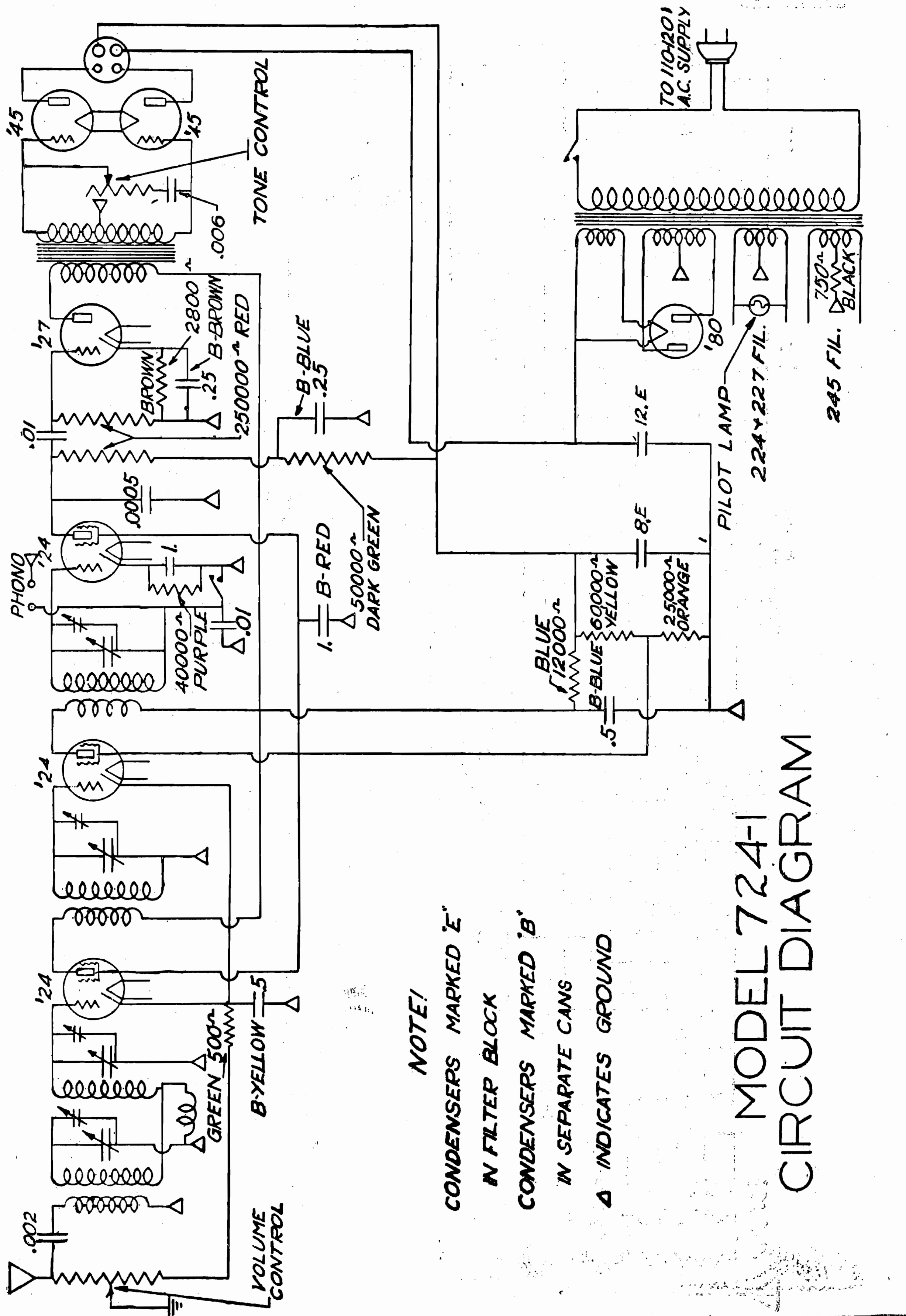
NO.	CAPACITY	LEAD COLOR
C7A	.25	Green
C7B	.25	Green
C7C	.1	Brown
C7D	.25	Terminal
C7E	.006	Red
C7F	.25	Green
C7G	.03	Blue
C7H	.03	White-White

C8 4-4 Mfd. (Electrolytic)
C9 8 Mfd. (Electrolytic)

Condensers C7A to C7H, inclusive, are included in the By-Pass Condenser Pack.

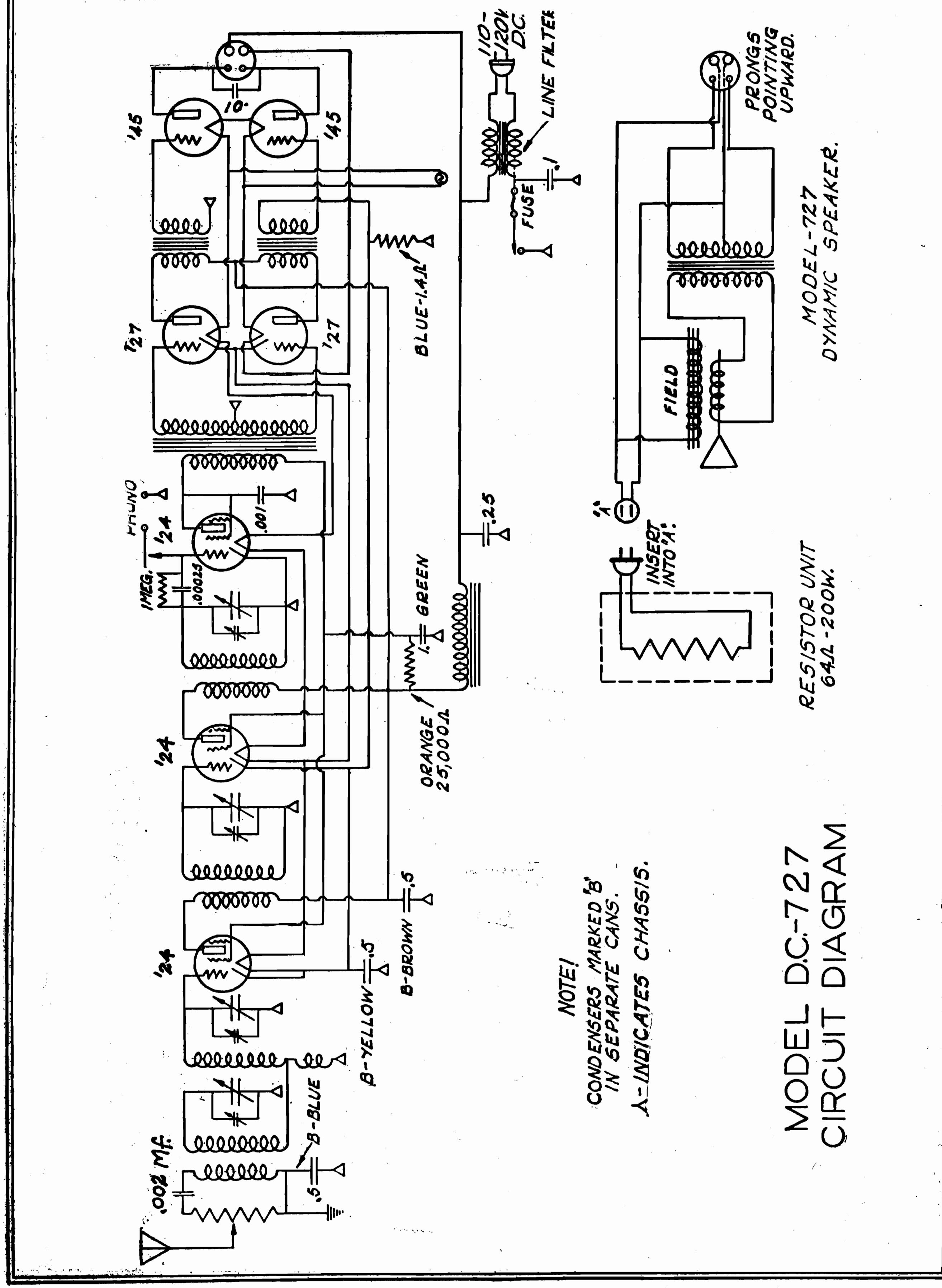
DEWALD RADIO

MODEL AC 724-1
Schematic



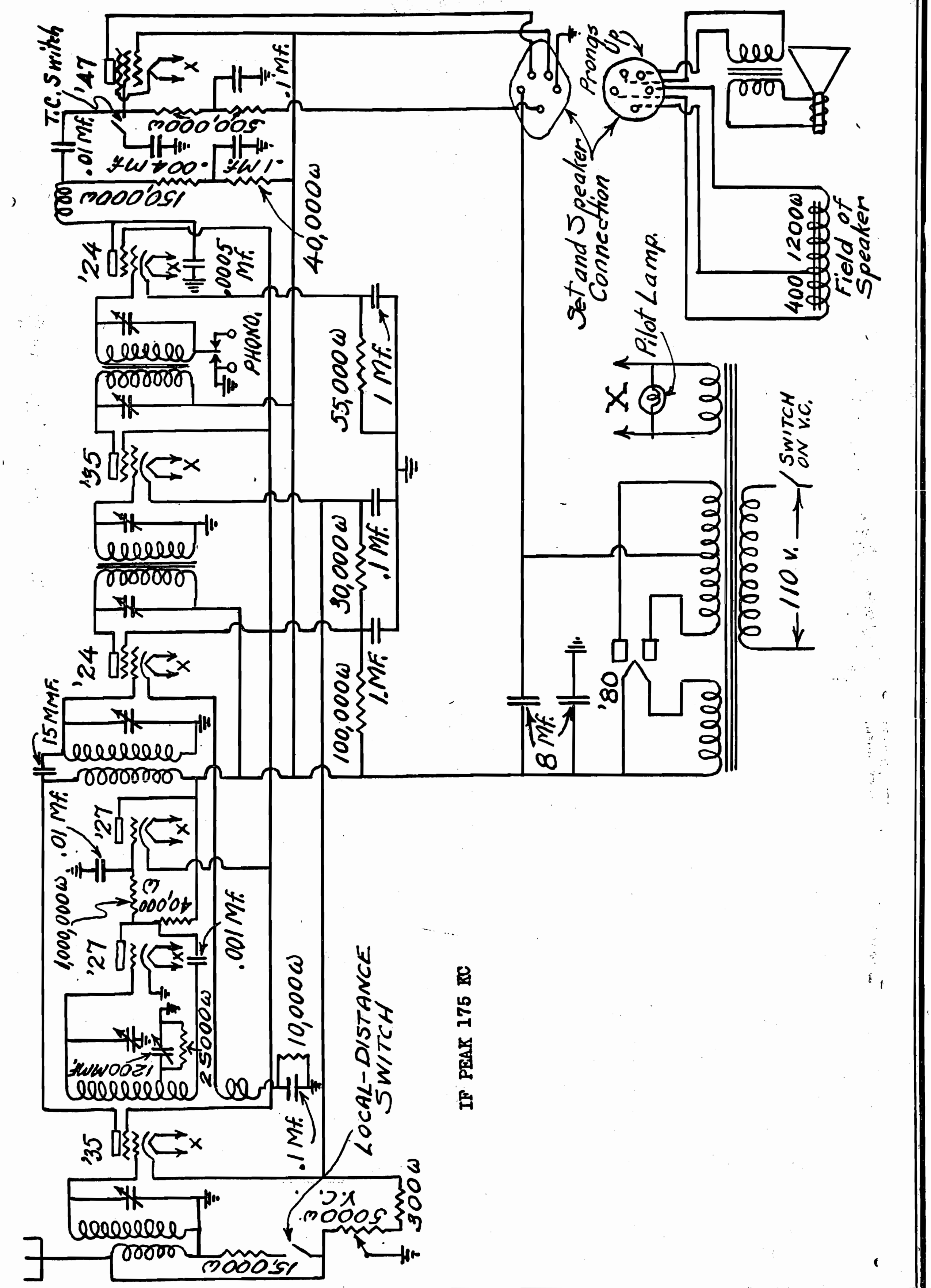
MODEL DC 727
Schematic

DEWALD RADIO



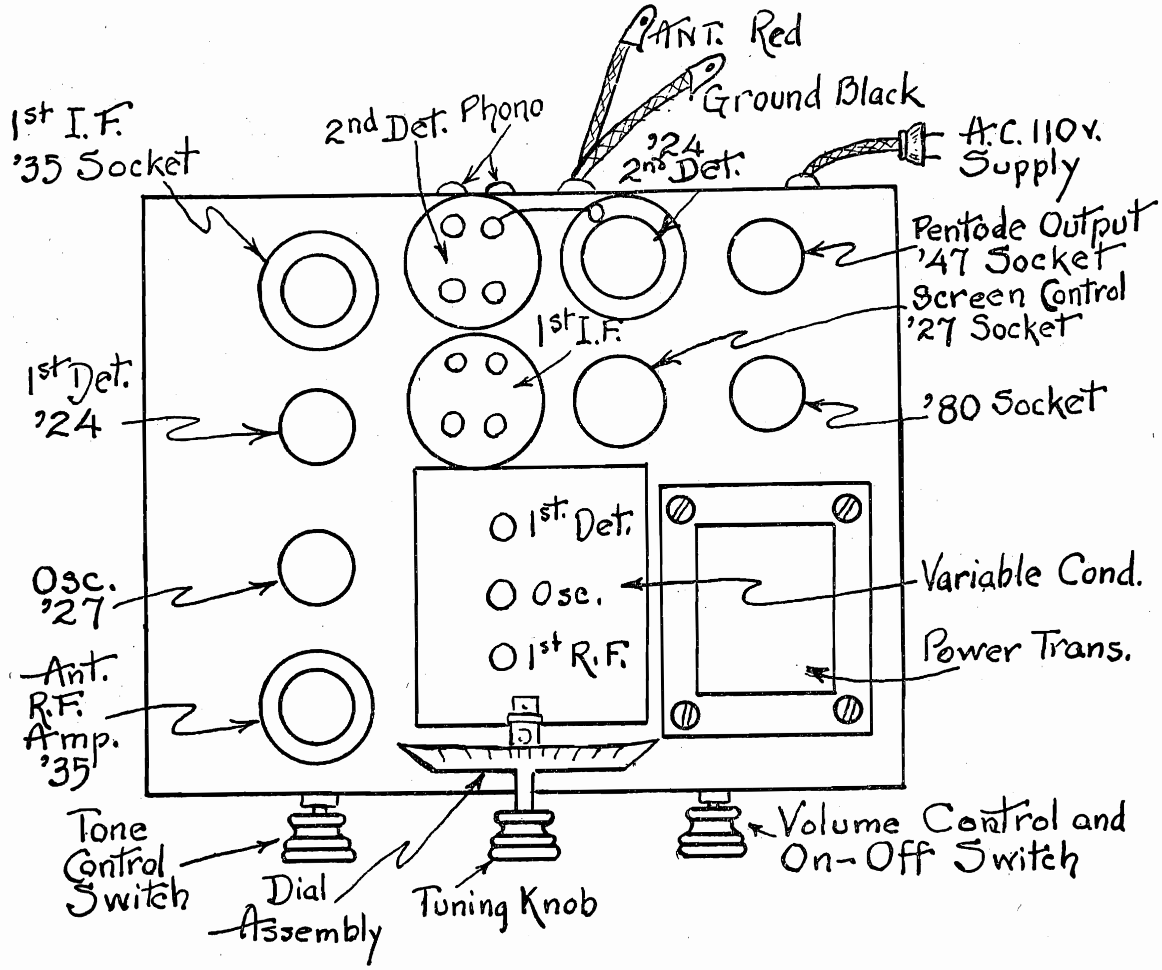
MODEL AC 746-7M
Schematic

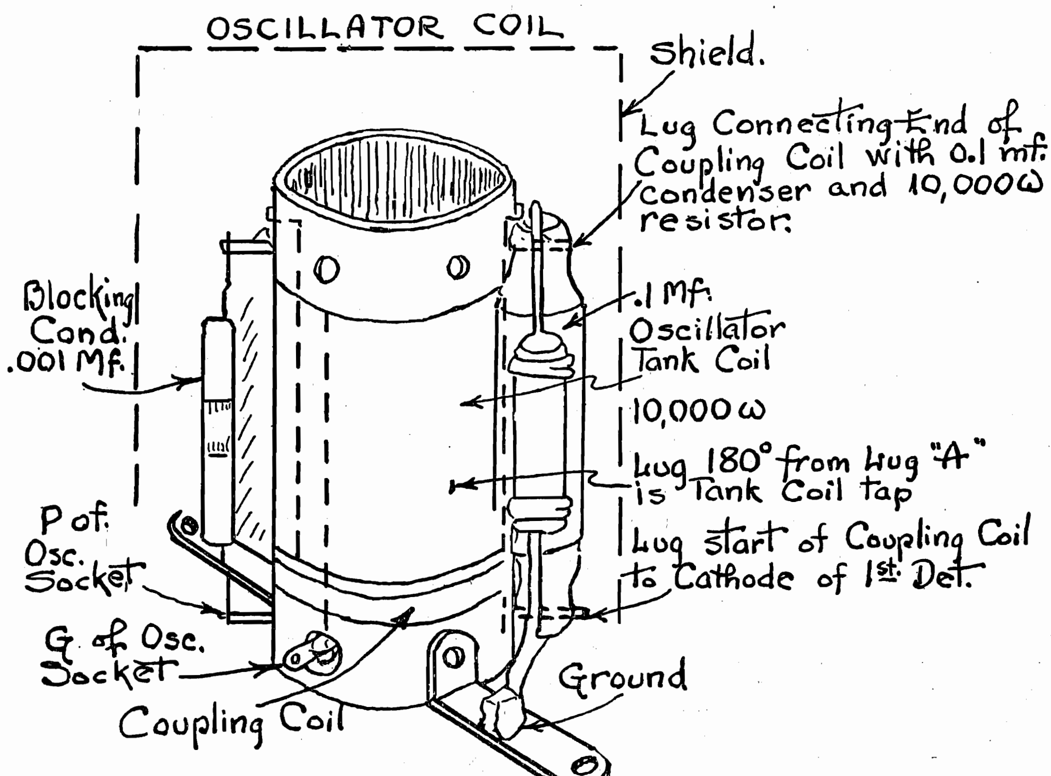
DEWALD RADIO



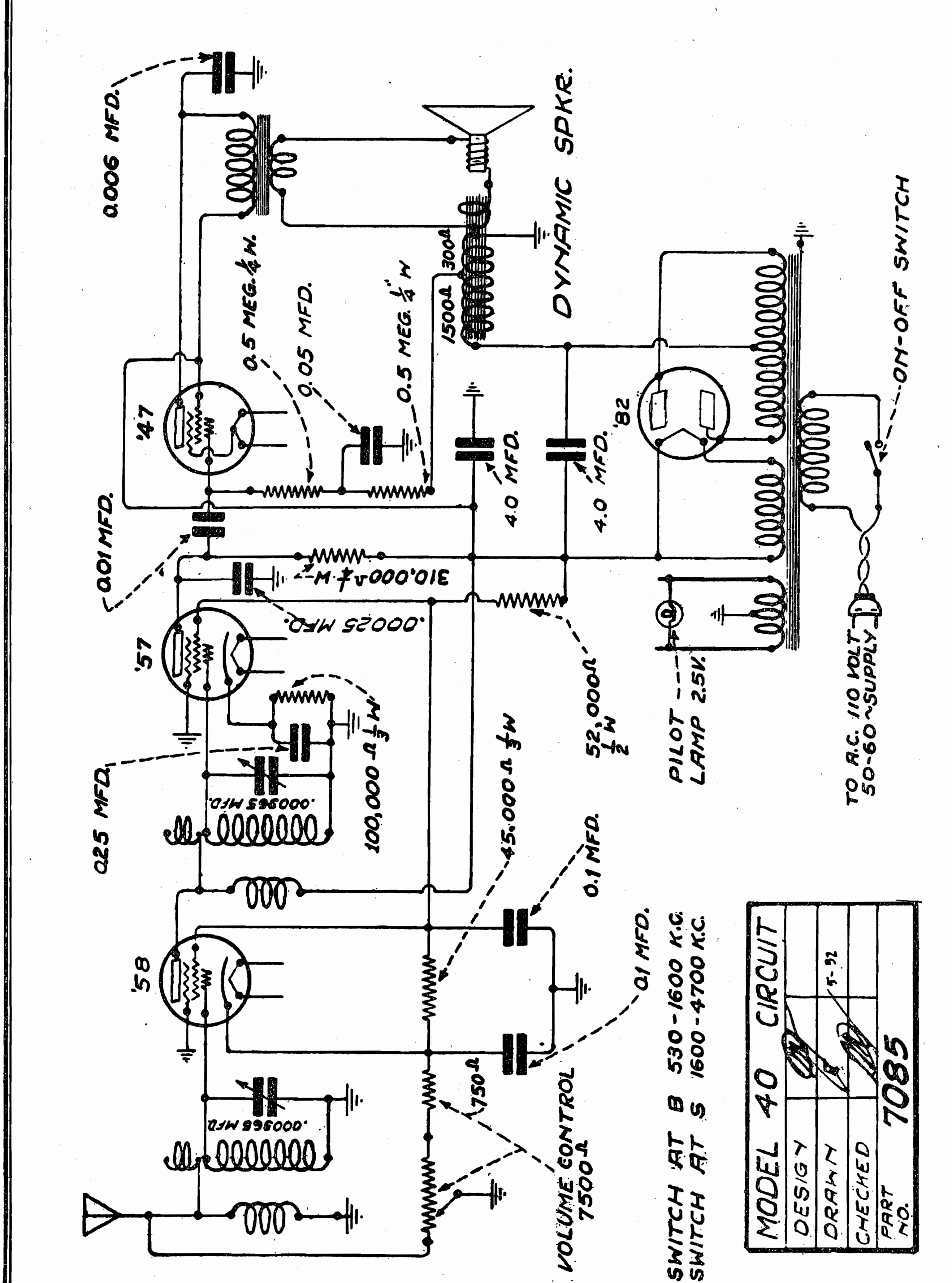
MODEL AC 746-7M
Notes

DEWALD RADIO



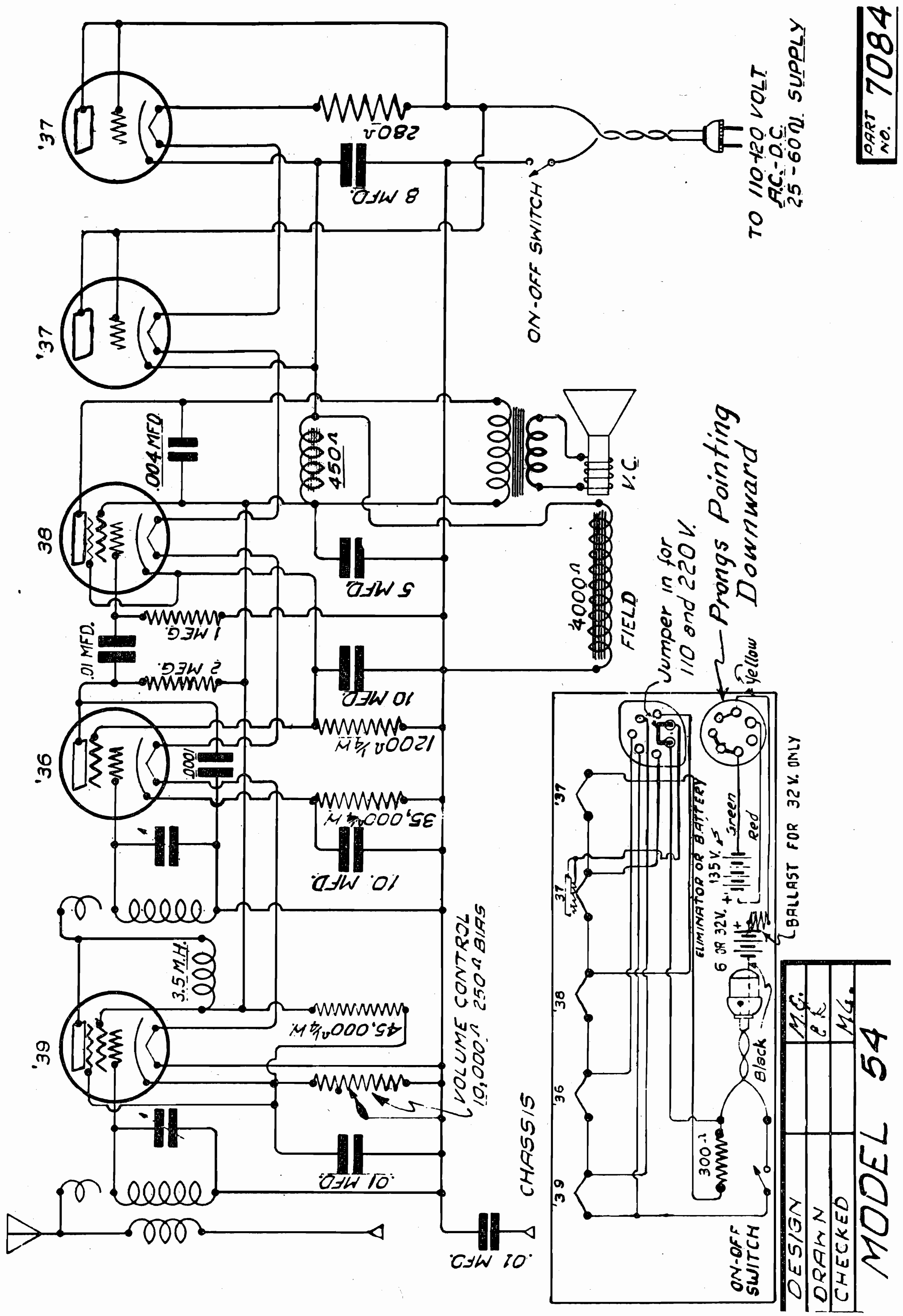


DEWALD RADIO



MODEL 54
Schematic

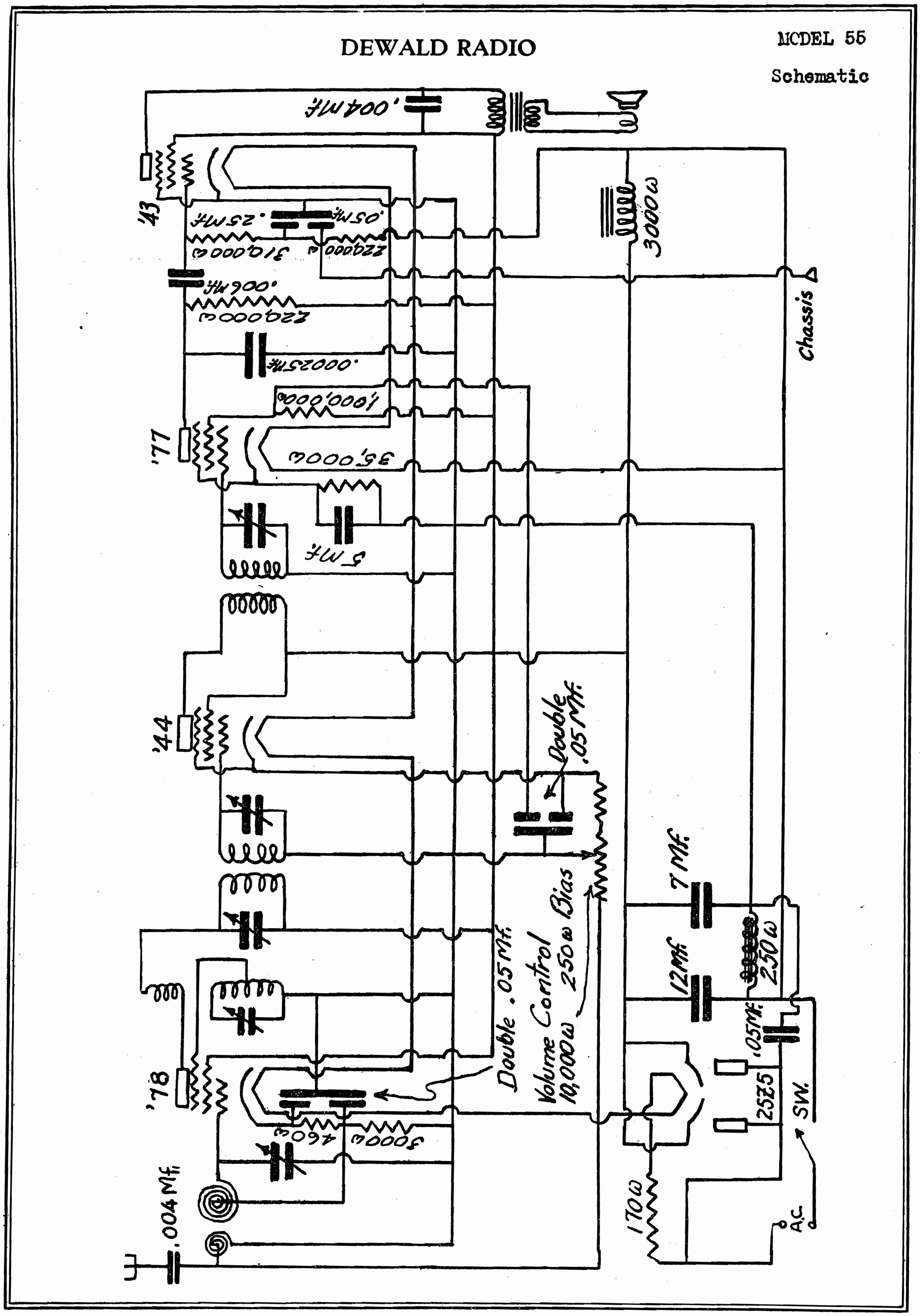
DEWALD RADIO



DEWALD RADIO

MODEL 55

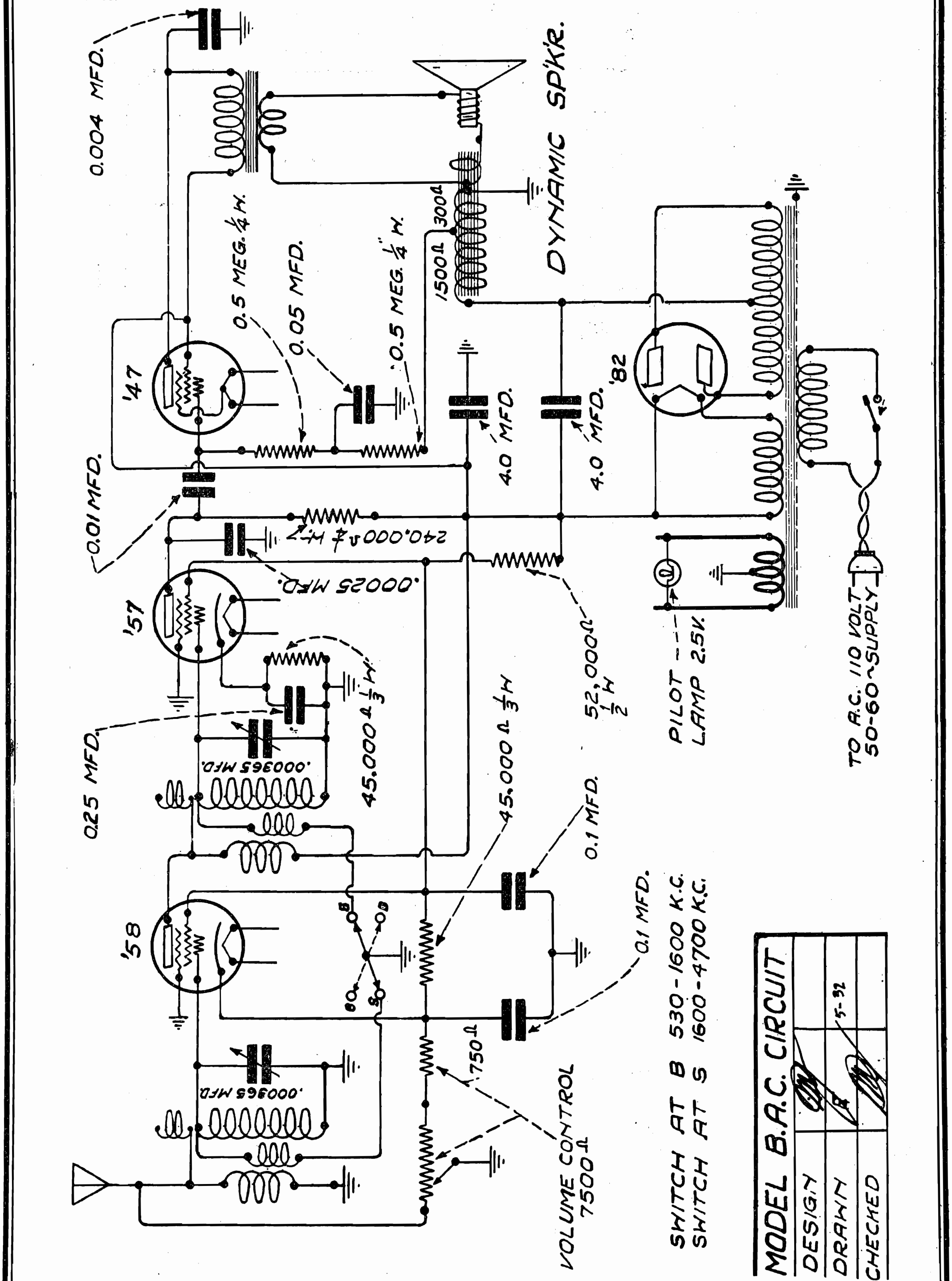
Schematic



MODEL B-A-C

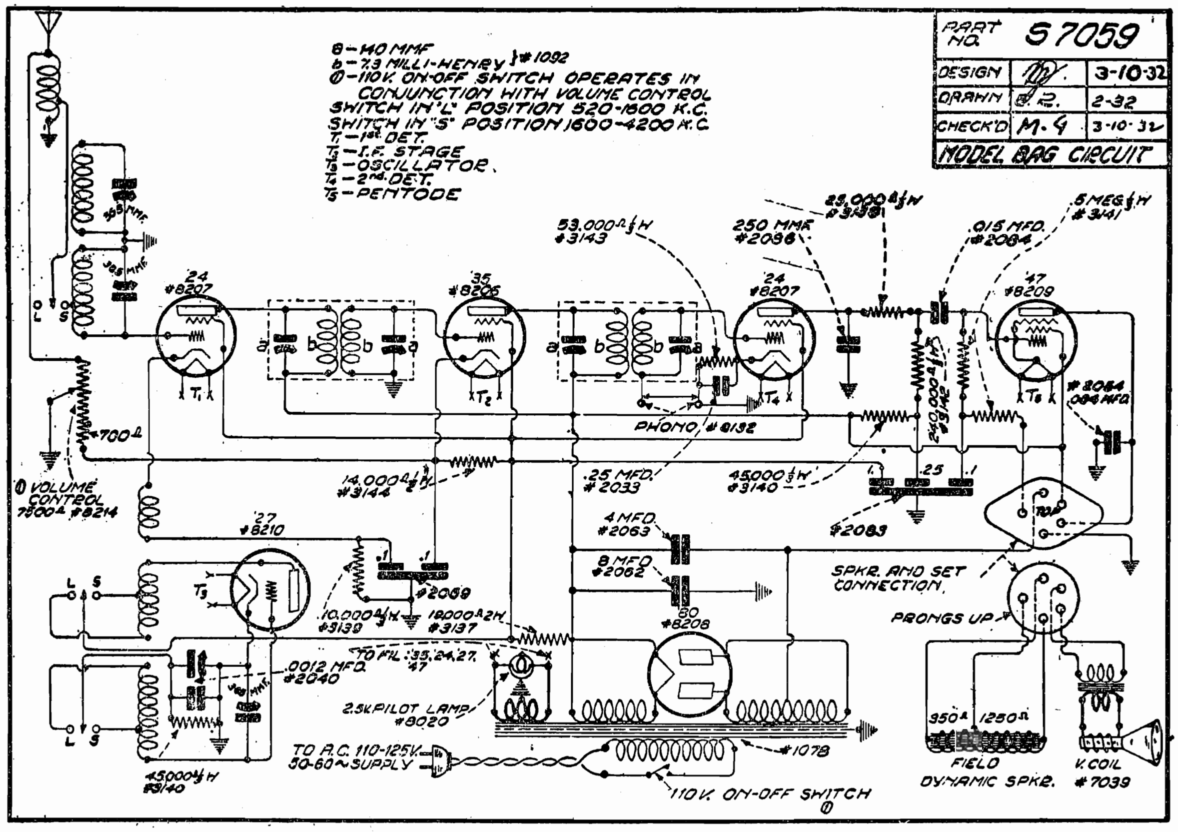
DEWALD RADIO

Schematic



DEWALD RADIO

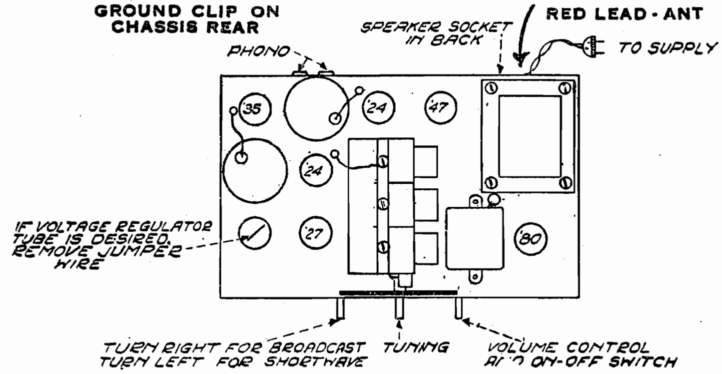
MODEL B-A-G
Schematic



READINGS TAKEN WITH 1000 OHM PER VOLT D.C. VOLTMETER

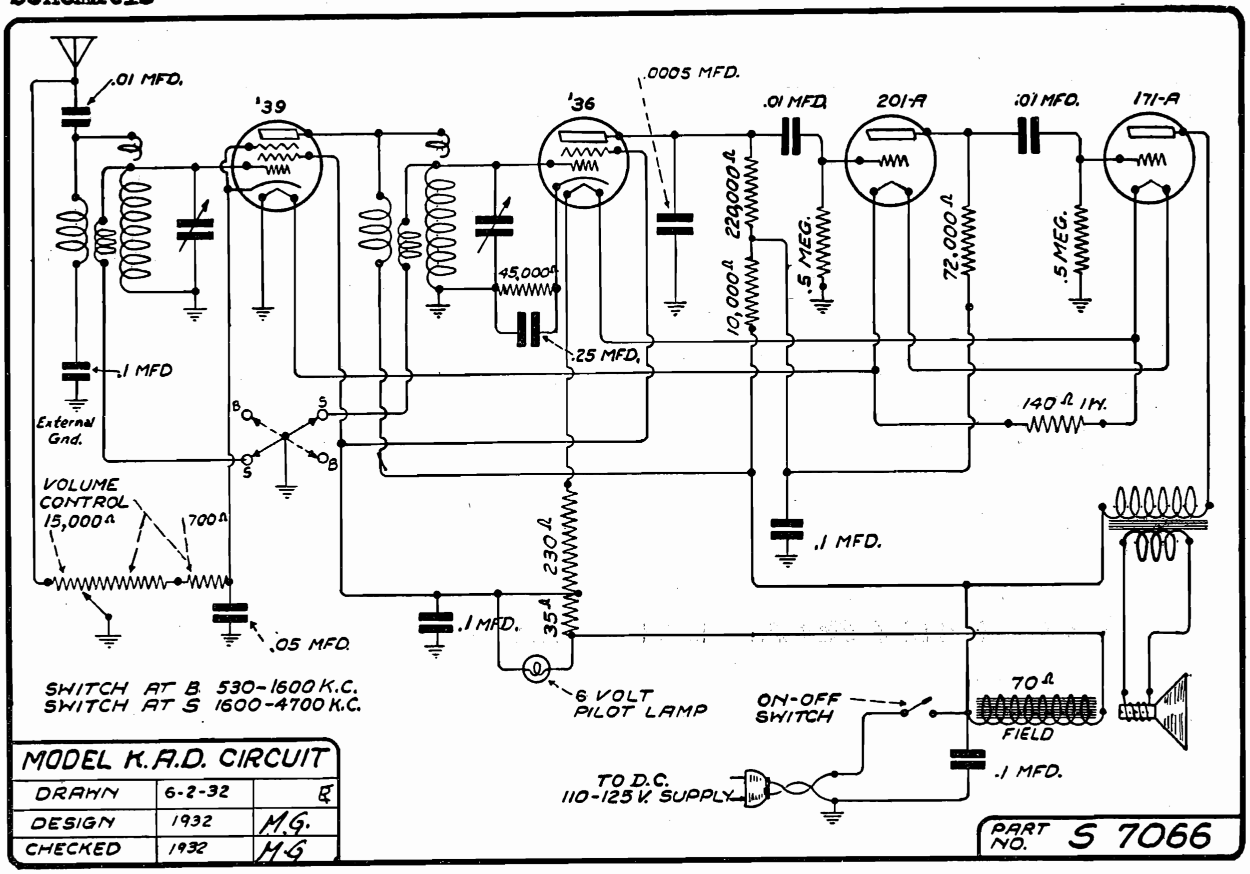
Chassis to plate of T-1	220-250 Volts
Chassis to plate of T-2	220-250 Volts
Chassis to plate of T-3	70-120 Volts
Chassis to plate of T-4	70-100 Volts
Chassis to plate of T-5	220-250 Volts
Chassis to screen of T-1	70-120 Volts
Chassis to screen of T-2	70-120 Volts
Chassis to screen of T-3	
Chassis to screen of T-4	70-120 Volts
Chassis to screen of T-5	220-260 Volts
Chassis to cathode of T-1	6- 10 Volts
Chassis to cathode of T-2 (Depends on Volume Control Position)	4- 30 Volts
Chassis to cathode of T-3	0 Volts
Chassis to cathode of T-4	7- 10 Volts

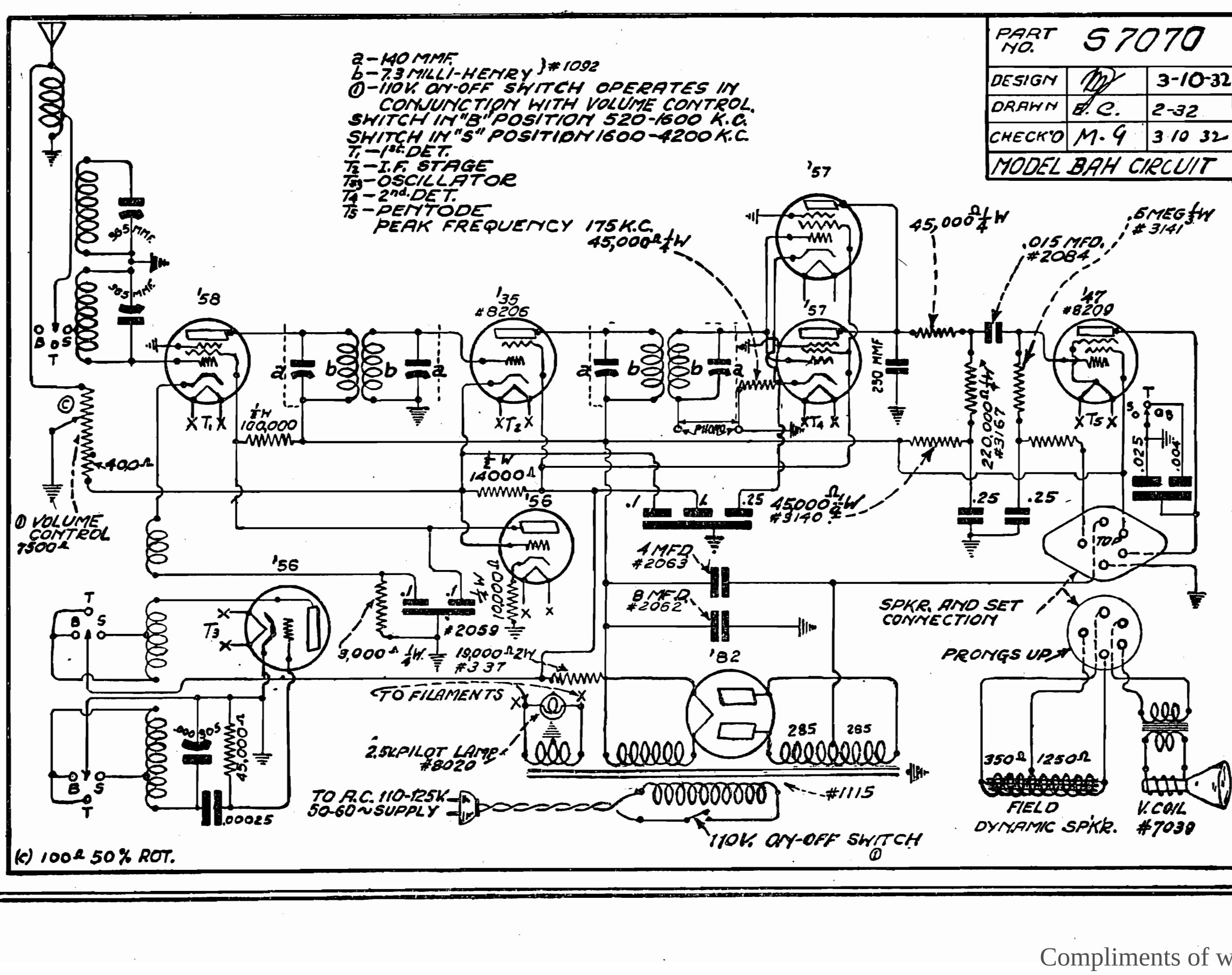
FILAMENTS: (a) T-1, 2, 3, 4, 5 .... 2.25 to 2.5 Volts
(b) T-6 .... 4.75 to 5.0 Volts.



MODEL K-A-D
MODEL B-A-H
Schematic

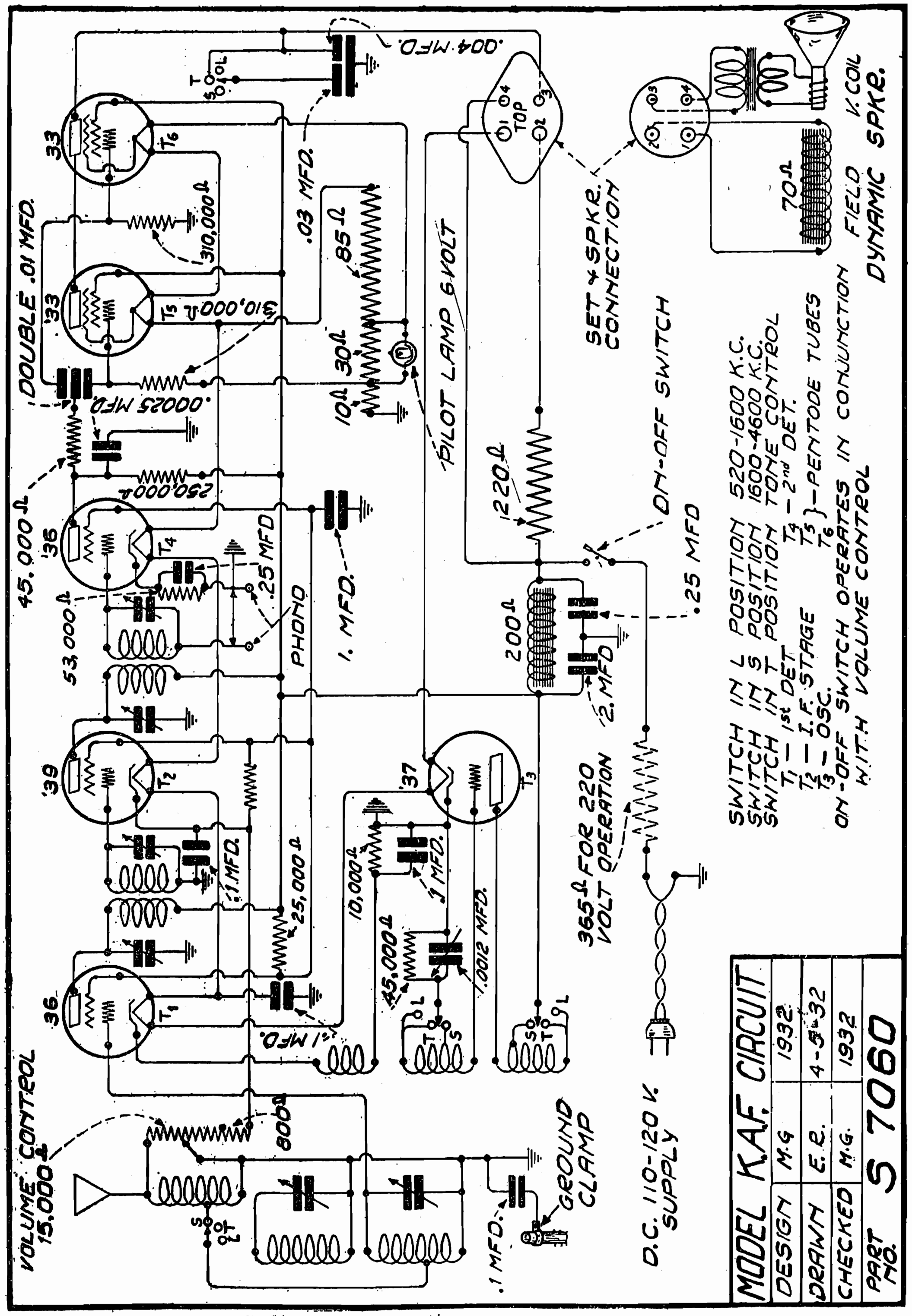
DEWALD RADIO





MODEL K-A-F
Schematic

DEWALD RADIO



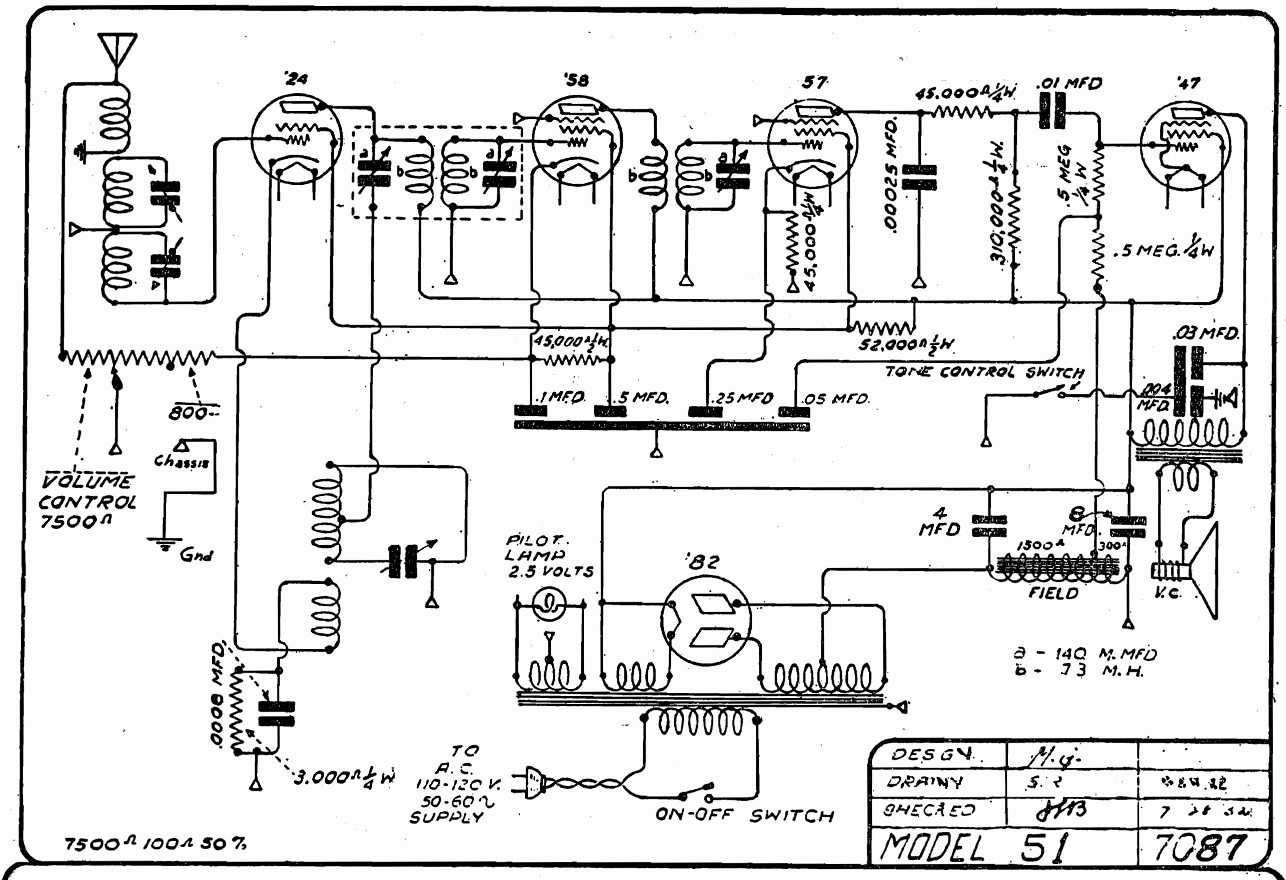
FILAMENTS: (a) T-1, 2, 3, 4 .... 5.5 to 7 Volts
(b) T-5, 6 .... 1.85 to 2.1 Volts

1. Chassis to plate of T-1 .... 85-110 Volts
2. Chassis to plate of T-2 .... 85-110 Volts
3. Chassis to plate of T-3 .... 85-110 Volts
4. Chassis to plate of T-4 .... 35- 50 Volts
5. Chassis to plate of T-5 .... 100-120 Volts
6. Chassis to plate of T-6 .... 100-120 Volts
7. Chassis to screen of T-1 .... 35- 50 Volts
8. Chassis to screen of T-2 .... 35- 50 Volts
9. Chassis to screen of T-3 ....
10. Chassis to screen of T-4 .... 35- 50 Volts
11. Chassis to screen of T-5 .... 85-110 Volts
12. Chassis to screen of T-6 .... 85-110 Volts
13. Chassis to cathode of T-1 .... 3- 6 Volts
14. Chassis to cathode of T-2 ....(Depends on Volume Control Position) 2- 25 Volts
15. Chassis to cathode of T-3 .... 0 Volts
16. Chassis to cathode of T-4 .... 3- 6 Volts

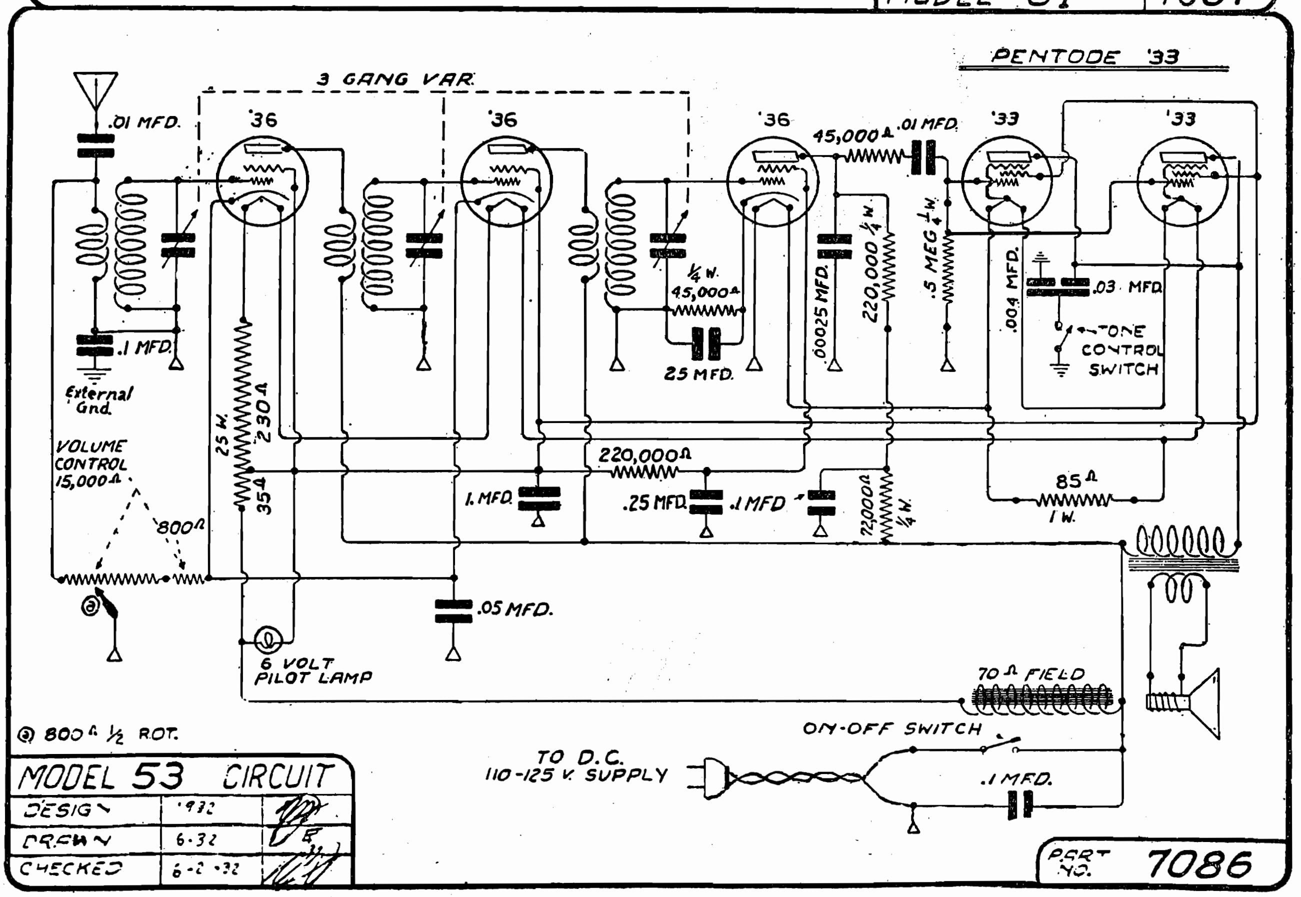
Do not allow Ground Lead to come in contact with any part of chassis. Do not operate receiver without pilot lamp. If it burns out replace with 6 volt No. 40 Mazda.

MODEL 51
MODEL 53

DEWALD RADIO



DESGN.	M.G.	
DRAWN	S.	
CHECKED	HB	
MODEL 51		7087

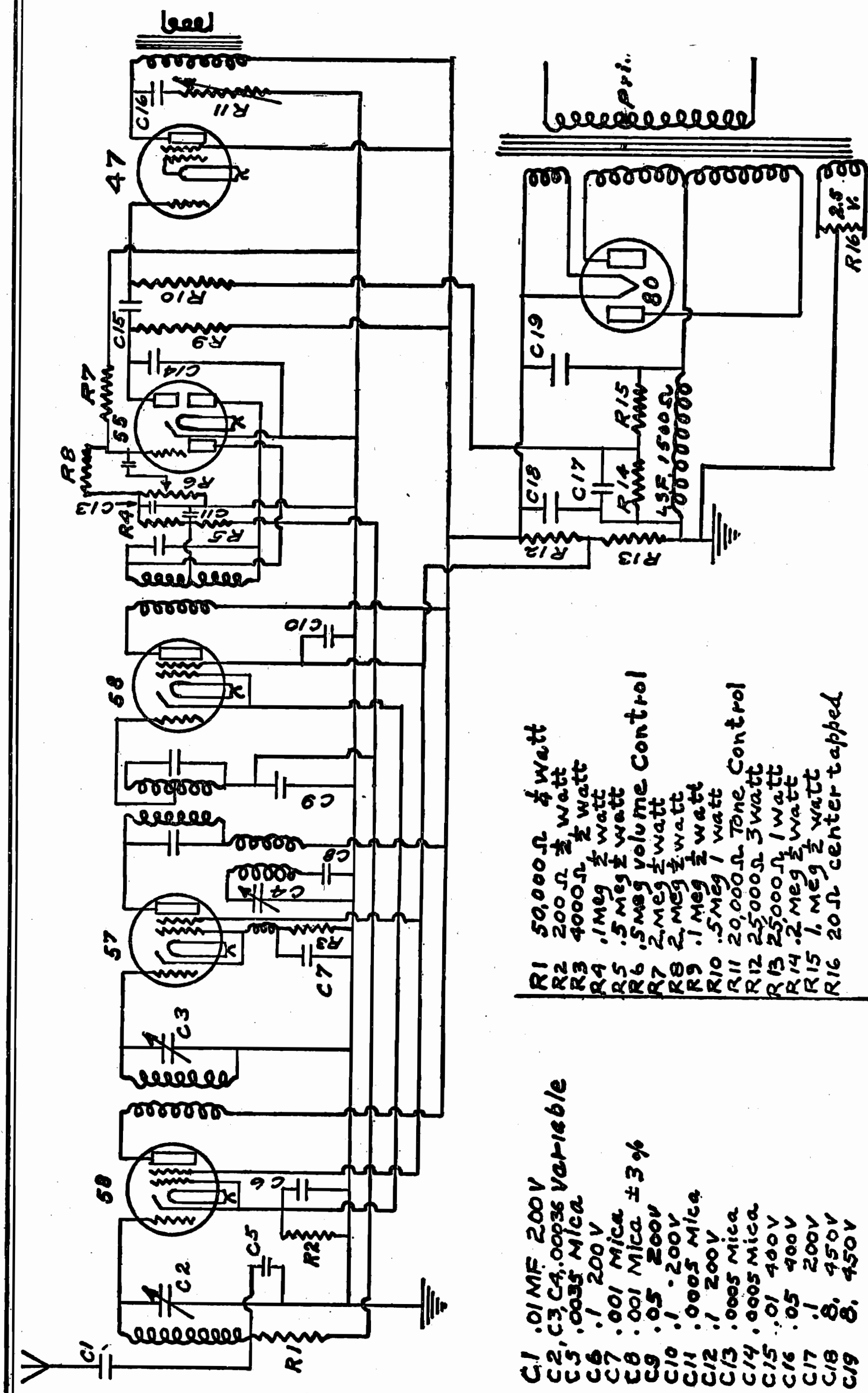


MODEL 53 CIRCUIT		
DESIGN	1932	
DRAWN	6-32	
CHECKED	6-2-32	

PART NO. 7086

ECHOPHONE RADIO MFG. CO.

MODEL 5
Schematic
Voltage



C1 .01 MF 200V
C2, C3, C4 .00035 Variable
C5 .0035 Mica
C6 .1 200V
C7 .001 Mica
C8 .001 Mica ±3%
C9 .05 200V
C10 .1 200V
C11 .0005 Mica
C12 .1 200V
C13 .0005 Mica
C14 .0005 Mica
C15 .01 400V
C16 .05 400V
C17 .1 200V
C18 8. 450V
C19 8. 450V

R1 50,000Ω ¼ watt
R2 200Ω ½ watt
R3 4000Ω ½ watt
R4 .1 Meg ½ watt
R5 .5 Meg ½ watt
R6 .5 Meg volume Control
R7 2. Meg ½ watt
R8 2. Meg ½ watt
R9 .1 Meg ½ watt
R10 .5 Meg 1 watt
R11 20,000Ω Tone Control
R12 25000Ω 3 watt
R13 25000Ω 1 watt
R14 .2 Meg ½ watt
R15 1. Meg ½ watt
R16 20Ω center tapped

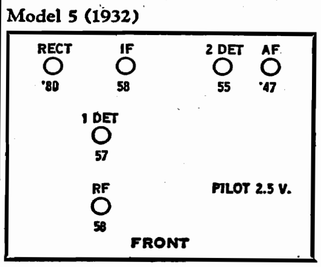
All Condensers & Resistors ±10% unless otherwise Specified

IF PEAK 175 KC

Echophone—Model 5—Schematic Diagram

Screen grid 247 tube to ground	240-250 volts
All heaters	2.4-2.6 volts
'80 filament	4.8-5.2 volts
Plate '80 tube to ground	350-370 volts AC
Across speaker field	95-105 volts

Model 5 (1932)



Plates 58 tubes to ground	240-250 volts
Screen grids 58 tubes to ground	90-110 volts
Cathode 58 tubes to ground	2-3 volts
Plate 57 tube to ground	240-250 volts
Screen 57 tube to ground	90-110 volts
Cathode 57 tube to ground	4-6 volts
Audio plate of 55 tube to ground	20-45 volts
Plate 247 tube to ground	235-245 volts

ECHOPHONE RADIO MFG. CO.

Models 5 and 14 Superheterodyne

CIRCUIT

The Echophone Model 5 is a six tube Superheterodyne employing triple grid Pentode and the new duplex diode-triode tubes and having automatic volume control. The circuit consists of one stage of R. F. amplification using a type 58 tube; a combined detector and oscillator using a type 57 tube; one stage of 175 KC I. F. amplification using a type 58 tube; a combined second detector, automatic volume control and first audio stage using a type 55 tube; an output stage using a type 247 tube and a power supply using a type 280 tube.

The first detector-oscillator circuit employs a plate coil in series with the primary of the first I. F. transformer, which is coupled to a coil in the cathode circuit of the oscillator tube. A third coil, coupled to both the plate and cathode coils is tuned by one section of the gang condenser and is made to track with the antenna and R. F. circuits by means of a fixed series condenser.

In lining up the circuits at the high frequency end of the band care must be used in adjusting the trimmer condenser on the R. F. Section. If this trimmer is tightened too much the reaction between the R. F. and oscillator circuits will cause the oscillator to stop oscillating or shift to the frequency of the R. F. tuned circuit. This shifting can readily be recognized by tuning to a lower frequency where it will be found that the dial calibration is far from right and all the tuned circuits are out of line with the oscillator.

The volume control acts on the audio circuit by varying the input to the audio portion of the 55 tube.

A type 55 tube is used as a full wave rectifier for the second detector. The rectified R. F. voltage developed across the input of this tube is fed back to the R. F. and I. F. tubes to provide the automatic volume control action. The grid, cathode and output plate of this tube are used as a triode to give audio amplification.

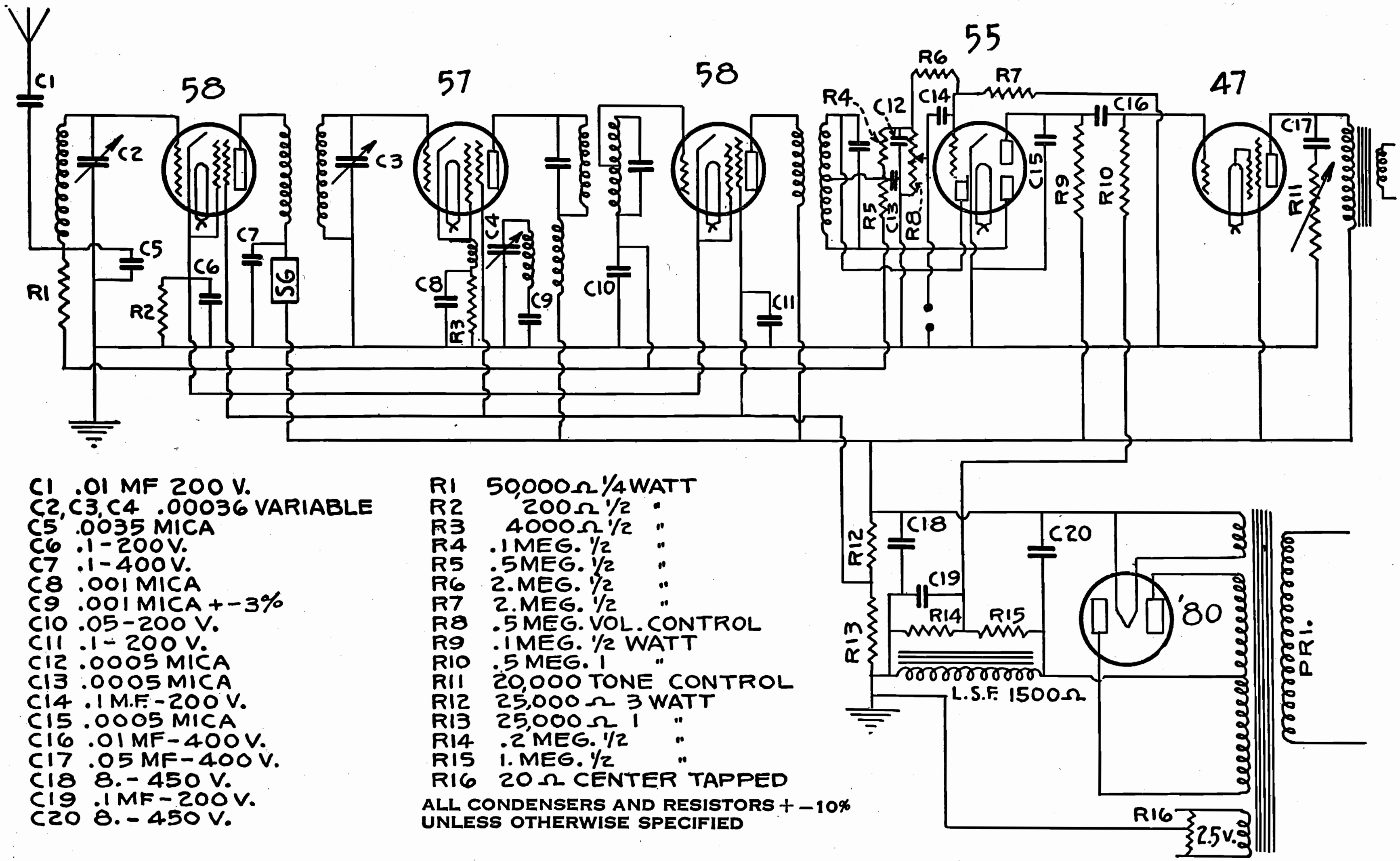
The filter circuit consits of two 8 MF electrolytic condensers and the 1500 ohm speaker field. The speaker field is in the negative lead and a part of the voltage drop across it is used to bias the grid of the power tube. A bucking coil is used in the speaker to keep the field ripple out of the voice coil.

The tone control consists of a variable resistor and fixed condenser in series across the plate of the power tube and ground.

The model 14 is similar to the model 5 except that Shadowgraf tuning has been added. This device operates on the same principle as the more familiar meter tuning devices, excepting that a shadow of varying width instead of a meter band is used as the indicator.

MODEL 14
Schematic

ECHOPHONE RADIO MFG. CO.



C1 .01 MF 200 V.
C2, C3, C4 .00036 VARIABLE
C5 .0035 MICA
C6 .1-200V.
C7 .1-400V.
C8 .001 MICA
C9 .001 MICA +-3%
C10 .05-200 V.
C11 .1-200 V.
C12 .0005 MICA
C13 .0005 MICA
C14 .1 M.F.-200 V.
C15 .0005 MICA
C16 .01 MF-400 V.
C17 .05 MF-400 V.
C18 8.-450 V.
C19 .1 MF-200 V.
C20 8.-450 V.

R1 50,000Ω 1/4 WATT
R2 200Ω 1/2 "
R3 4000Ω 1/2 "
R4 .1 MEG. 1/2 "
R5 .5 MEG. 1/2 "
R6 2. MEG. 1/2 "
R7 2. MEG. 1/2 "
R8 .5 MEG. VOL. CONTROL
R9 .1 MEG. 1/2 WATT
R10 .5 MEG. 1 "
R11 20,000 TONE CONTROL
R12 25,000 Ω 3 WATT
R13 25,000 Ω 1 "
R14 .2 MEG. 1/2 "
R15 1. MEG. 1/2 "
R16 20 Ω CENTER TAPPED

ALL CONDENSERS AND RESISTORS + -10%
UNLESS OTHERWISE SPECIFIED

IF PEAK 175 KC

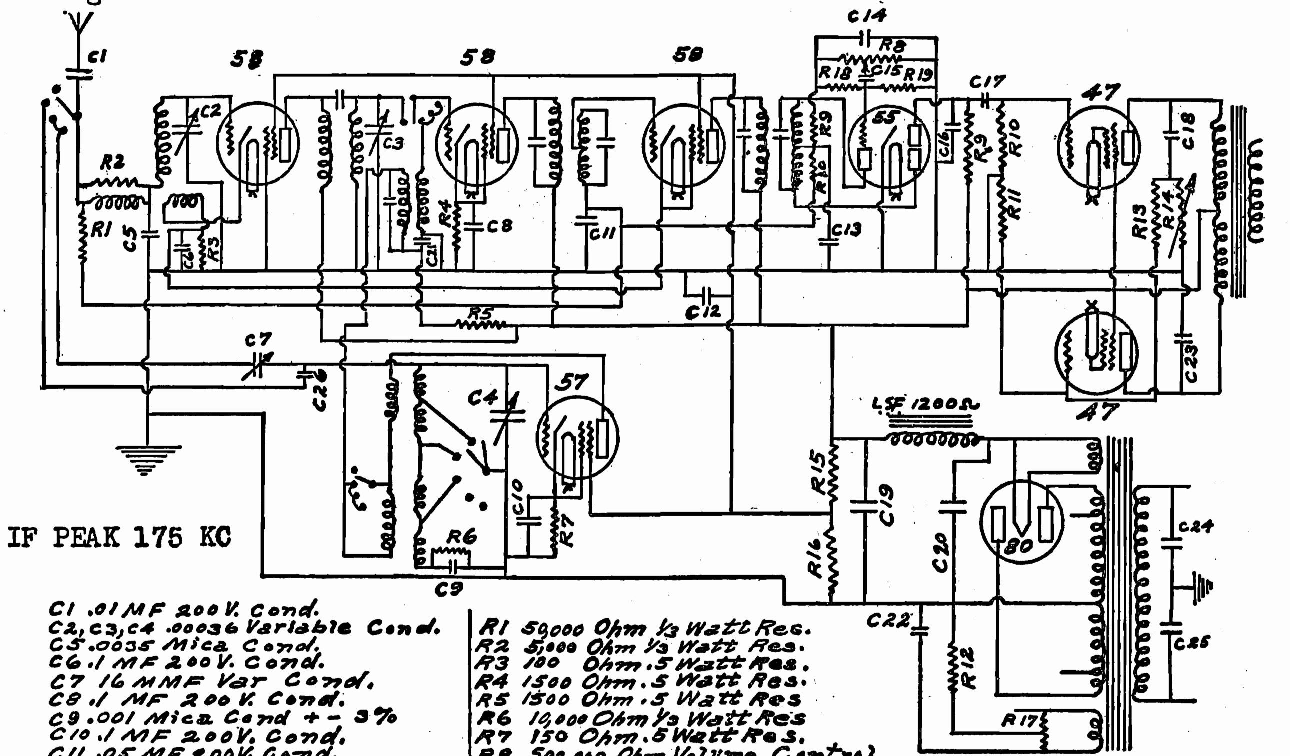
ECHOPHONE—Model 14
Schematic Diagram

For voltage data see Model 5

MODEL 10, 15, 20
Schematic
Voltage

ECHOPHONE RADIO MFG. CO.

MODEL 16,17,18
Voltage

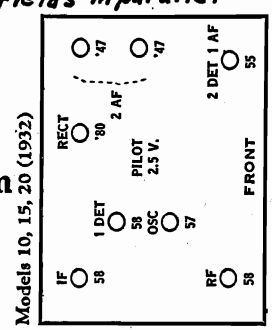


IF PEAK 175 KC

C1 .01 MF 200 V. Cond.
C2, C3, C4 .00036 Variable Cond.
C5 .0035 Mica Cond.
C6 .1 MF 200 V. Cond.
C7 16 MMF Var Cond.
C8 .1 MF 200 V. Cond.
C9 .001 Mica Cond +- 3%
C10 .1 MF 200 V. Cond.
C11 .05 MF 200 V. Cond.
C12 .1 MF 200 V. Cond.
C13 .0005 Mica Cond
C14 .00025 Mica Cond.
C15 .1 MF 200 V. Cond.
C16 .0005 Mica Cond.
C17 .01 MF 400 V. Cond.
C18 .05 400 V. Cond.
C19 8 MF 500 V. Cond.
C20 8 MF 500 V. Cond.
C21 .1 MF 400 V. Cond.
C22 .1 MF 200 V. Cond.
C23 .006 MF 400 V. Cond.
C24 .01 MF 400 V. Cond
C25 .01 MF 400 V. Cond.
C26 30 MMF Mica Cond.

R1 50,000 Ohm 1/3 Watt Res.
R2 5,000 Ohm 1/3 Watt Res.
R3 100 Ohm .5 Watt Res.
R4 1500 Ohm .5 Watt Res.
R5 1500 Ohm .5 Watt Res
R6 10,000 Ohm 1/3 Watt Res
R7 150 Ohm .5 Watt Res.
R8 500,000 Ohm Volume Control.
R9 100,000 Ohm .5 Watt Res
R10 .5 Meg .5 Watt Res.
R11 10,000 Ohm .5 Watt Res
R12 400 Ohm 3 Watt Res.
R13 .25 Meg .5 Watt Res.
R14 20,000 Ohm Tone Control
R15 15,000 Ohm 3 Watt Res.
R16 25,000 Ohm 1 Watt Res.
R17 20 Ohm C. Tapped Res.
R18 2 Meg .5 Watt Res.
R19 2 Meg .5 Watt Res.

Note—
Models 15 & 20 have 2-4000Ω speaker fields in parallel



Echophone—Model 10, 15, 20—Schematic Diagram

MODELS 10, 15, 16, 17, 18, 20 SUPERHETERODYNE

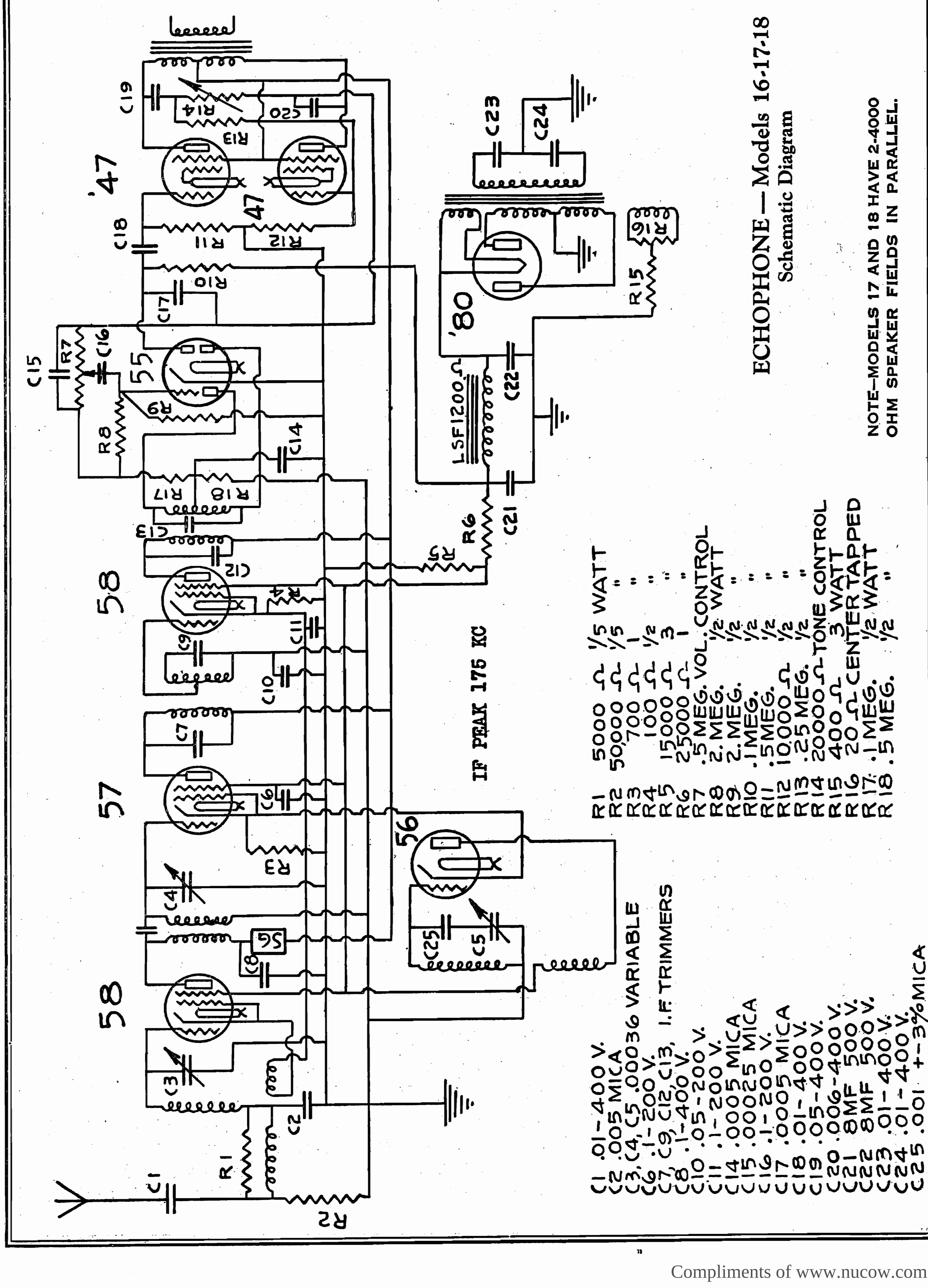
VOLTAGE TESTS

All voltage tests made with volume control on full and no signal in set.

	MODEL 10		MODELS 15-20	
Plates of 58 tubes to ground	225-235	volts	240-250	volts
Screen grids of 58 tubes to ground	90-100	"	95-105	"
Cathodes RF and IF tubes to ground	1-2	"	1-2	"
Cathode 1st Detector tube to ground	6-8	"	6-8	"
Plate of Oscillator tube to ground	210-220	"	215-225	"
Screen grid Oscillator tube to ground	90-100	"	95-105	"
Cathode of Oscillator on broadcast to ground	1 volt		1 volt	
Audio plate of 55 tube to ground	20-30	volts	20-30	volts
Plates of 47 tubes to ground	220-230	"	230-240	"
Across speaker field	120-130	"	170-180	"
All heaters	2.4-2.6	"	2.4-2.6	"
'80 filament	4.8-5.2	"	4.8-5.2	"
Center tap of heaters to ground	17-18	"	18-19	"
280 plate to ground	350-370	"AC	400-420	"AC

ECHOPHONE RADIO MFG. CO.

MODEL 16,17,18
Schematic



MODEL 10,15, 20
MODEL 16,17,18
Notes

ECHOPHONE RADIO MFG. CO.

Models 10, 15, 20—16, 17, 18

Short and Standard Wave Superheterodyne

CIRCUIT

The Echophone Models 10, 15 and 20 employ the same chassis, the only difference being in the cabinets, the speakers and the connection of the power transformer. The Model 10 has a single 8" speaker and Models 15 and 20 have dual 8" speakers.

The Echophone Model 10 is an 8 tube combination short and standard wave receiver employing triple grid, pentode and the new duplex diode-triode detector tube. The circuit consists of an R. F. stage using a type 58 tube; a first detector (which operates as an I. F. tube on the short wave bands) using a type 58 tube; an oscillator stage using a type 57 tube; a 175KC I. F. stage using a type 58 tube; a combined second detector, automatic volume control and first audio stage using a type 55 tube; a push pull output stage using two type 247 tubes; and a power supply using a type 280 tube.

The R. F. tube is not used on the three short wave bands, and the antenna is coupled to the grid of the oscillator tube through a small adjustable condenser. Should the oscillator stop oscillating on the shortest wave band, this condenser capacity should be decreased slightly. The oscillator coil is tapped for the three short wave bands and has two tickler coils in series. On the two shortest bands the larger of the two ticklers is short circuited.

The first detector and oscillator are inductively coupled and when operating on short waves the grid of the first detector tube is switched to an I. F. transformer having its primary connected in the plate circuit of the oscillator tube, there by providing an extra I. F. stage for short wave reception.

A type 55 tube is used as a full wave rectifier for the second detector. The rectified R.F. voltage developed across the input of this tube is fed back to the R. F. and I. F. tubes to provide the automatic volume control action. The grid, cathode and output plate of this tube are used as a triode to give audio amplification.

The output stage consists of two type 247 tubes in a resistance coupled push-pull circuit.

The filter circuit consists of the 1200 ohm speaker field (on the Model 10) and two 8 MF electrolytic condensers. A bucking coil is used in the speaker to keep the field ripple out of the voice coil.

The Model 15 and 20 chasses employ dual speakers with fields of 4000 ohms each connected in parallel. The power transformers in the Models 10, 15 and 20 are the same, the high voltage plate supply winding being tapped. The tapped portion of the winding being used on the Model 10 chassis and the full winding is used on the Models 15 and 20 to provide the extra voltage necessary to excite the dual speaker fields.

NOTE: The voice coils of the dual speakers are connected in parallel and must bear the proper relation to each other. To check this connection, disconnect the voice coil of the speaker without the transformer mounted on it. An increase in volume with this coil disconnected indicates that the voice coils are reversed, and should be corrected by inter-changing the red and green wires leading to the speaker without the transformer.

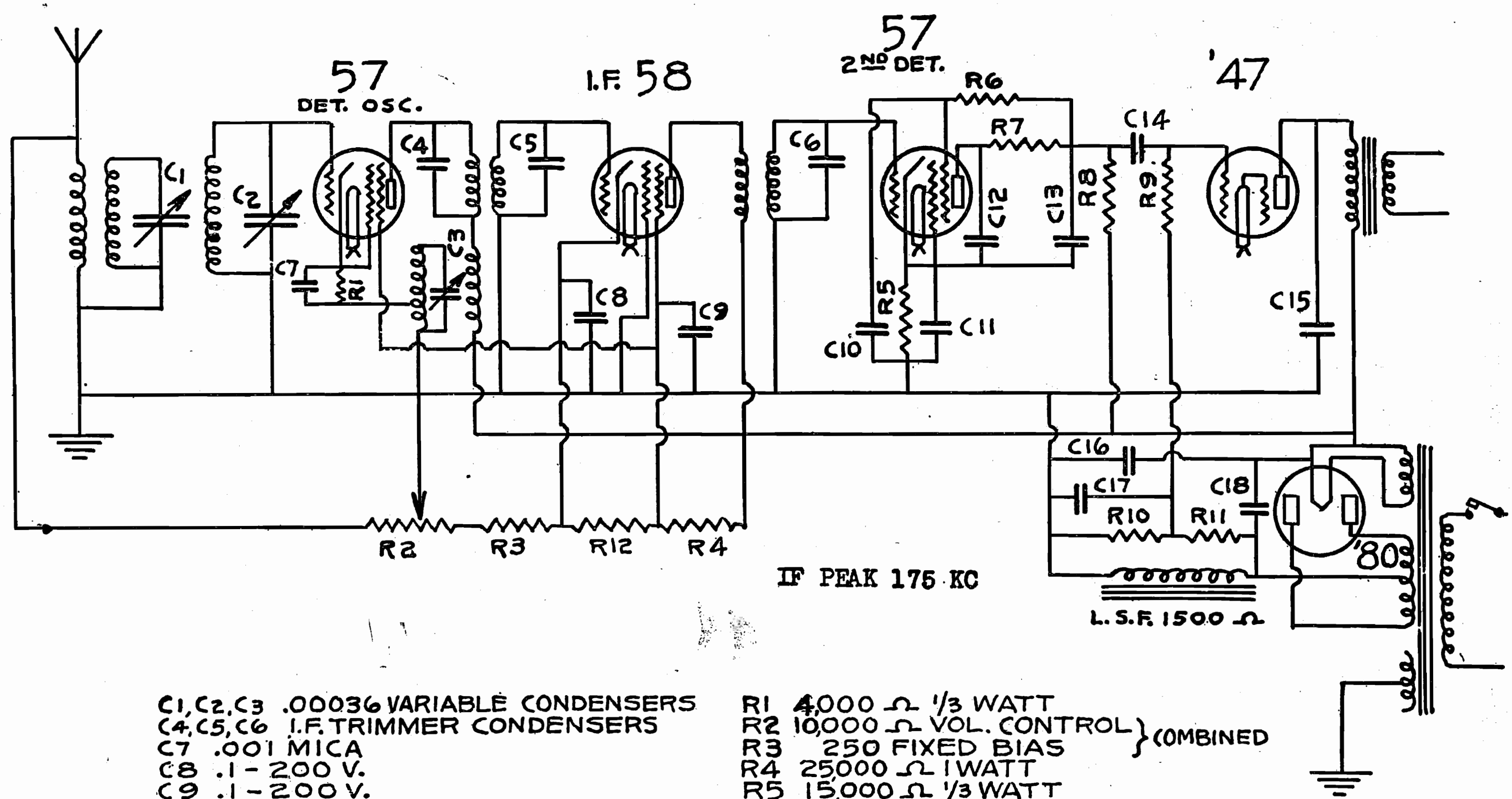
Models 16, 17, 18

These models are similar to the Models 10, 15 and 20, excepting that they are not designed for short wave reception and that Shadowgraf tuning has been added.

The oscillator and R. F. Coils are different from the coils used in the Models 10, 15 and 20, and the oscillator tube is a 56 instead of a 57. The first detector was changed from a 58 to a 57 tube. The Shadowgraf tuning device works on the same principle as the more familiar meter tuning devices, excepting that a shadow of varying width instead of a meter band is used as the indicator.

MODEL 12, 38
Schematic

ECHOPHONE RADIO MFG. CO.



IF PEAK 175 KC

C1, C2, C3 .00036 VARIABLE CONDENSERS
C4, C5, C6 I.F. TRIMMER CONDENSERS
C7 .001 MICA
C8 .1 - 200 V.
C9 .1 - 200 V.
C10 .1 - 200 V.
C11 .25 - 200 V.
C12 .0005 MICA
C13 .00025 MICA
C14 .006 - 400 V.
C15 .006 - 400 V.
C16 4 M.F. ELECTROLYTIC
C17 .1 - 200 V.
C18 8 M.F. ELECTROLYTIC

NOTE: EARLY MODELS 12-R1 WAS 2000 Ω

R1 4,000 Ω 1/3 WATT
R2 10,000 Ω VOL. CONTROL } COMBINED
R3 250 FIXED BIAS
R4 25000 Ω 1 WATT
R5 15,000 Ω 1/3 WATT
R6 1. MEG. 1/3 "
R7 .15 MEG. 1/3 "
R8 .5 MEG. 1/3 "
R9 .5 MEG. 1/3 "
R10 .2 MEG. 1/3 "
R11 1. MEG. 1/3 "
R12 25,000 Ω 1/2 WATT

ECHOPHONE
Models 12 and 38
Schematic Diagram

ALL CONDENSERS AND RESISTORS + − 10%
UNLESS OTHERWISE SPECIFIED

MODEL 12,38
Voltage

ECHOPHONE RADIO MFG. CO.

Model 12 Superheterodyne

CIRCUIT DESCRIPTION

The Echophone Model 12 is a 5-tube Superheterodyne employing the new types 57 and 58 tubes. The circuit consists of a pre-selector; combined first detector and oscillator, employing a type 57 tube; a 175 KC I. F. stage employing a type 58 tube; a second detector employing a type 57 tube; an output stage employing a type 247 tube and a rectifier and filter system employing a type 280 tube.

The oscillator is tuned by a special section of the three gang condenser and no series padding condenser is used. The I.F. stage is single tuned, the plate coil being made self resonant at 175 KC. The second detector is a resistance coupled power detector obtaining its screen grid voltage from its plate thru a 1 Meg. resistor.

The filter circuit consists of an 8 MF and a 4 MF electrolytic condenser and the speaker field. Part of the drop across the field, which is in the negative side of the filter circuit, is used to bias the grid of the 247 tube.

The volume control operates by varying the bias on the 58 tube and by limiting the antenna in-put to the pre-selector.

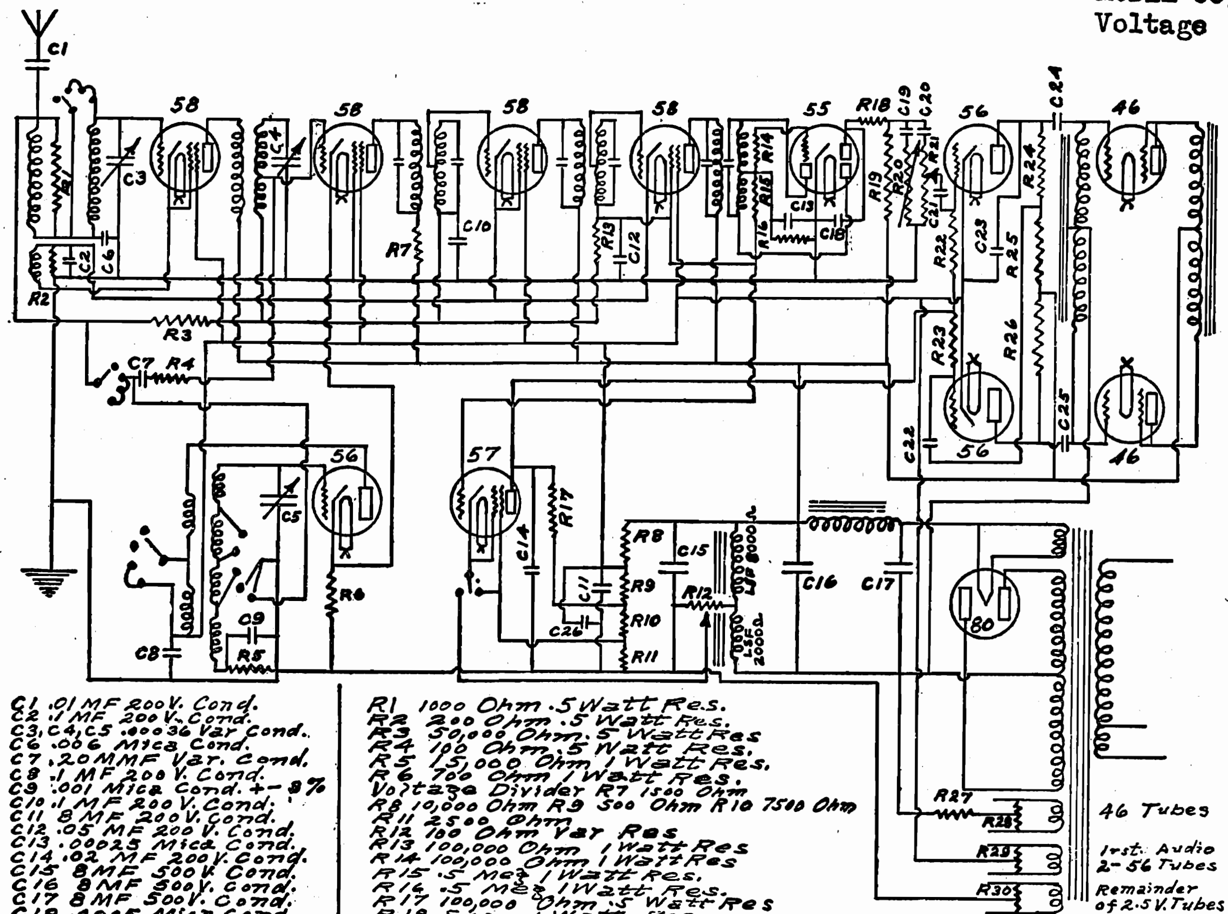
VOLTAGE TESTS

All D. C. voltages given were tested on 250V scale of a 1000 ohms per volt meter with volume on full and no signal in the receiver, line voltage 115.

Fil. 280 tube to ground	240-250V
Plate oscillator and I. F. tubes to ground	240-250V
Screen oscillator and I. F. tubes to ground	90-100
Cathode I. F. tube to ground	2-3
Cathode oscillator tube to ground	4-10
Plate of second detector to ground	30-45
Screen of second detector to ground	20-30
Cathode of second detector to ground	5-10
Across speaker field	90-100
Plates 280 to center tap of high voltage	350-370V AC
All heaters	2.4-2.6V AC
Fil. 280 tube	4.9-5.1V AC

MODEL 35
Schematic
MODEL 35,36
Voltage

ECHOPHONE RADIO MFG. CO.

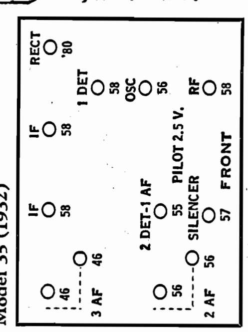


C1 .01 MF 200 V. Cond.
C2 .1 MF 200 V. Cond.
C3, C4, C5 .00036 Var Cond.
C6 .006 Mica Cond.
C7 .20 MMF Var. Cond.
C8 .1 MF 200 V. Cond.
C9 .001 Mica Cond. +- 8%
C10 .1 MF 200 V. Cond.
C11 8 MF 200 V. Cond.
C12 .05 MF 200 V. Cond.
C13 .00025 Mica Cond.
C14 .02 MF 200 V. Cond.
C15 8 MF 500 V. Cond.
C16 8 MF 500 V. Cond.
C17 8 MF 500 V. Cond.
C18 .0005 Mica Cond.
C19 .02 400 V. Cond.
C20 .1 MF 400 V. Cond.
C21 .02 MF 400 V. Cond.
C22 .02 MF 400 V. Cond.
C23 .001 Mica Cond.
C24 .05 MF 1000 V. Cond.
C25 .05 MF 1000 V. Cond.
C26 .1 MF 200 V. Cond.

R1 1000 Ohm .5 Watt Res.
R2 200 Ohm .5 Watt Res.
R3 50,000 Ohm .5 Watt Res
R4 100 Ohm .5 Watt Res.
R5 15,000 Ohm 1 Watt Res.
R6 700 Ohm 1 Watt Res.
Voltage Divider R7 1500 Ohm
R8 10,000 Ohm R9 500 Ohm R10 7500 Ohm
R11 2500 Ohm
R12 100 Ohm Var Res
R13 100,000 Ohm 1 Watt Res
R14 100,000 Ohm 1 Watt Res
R15 .5 Meg 1 Watt Res.
R16 .5 Meg 1 Watt Res.
R17 100,000 Ohm .5 Watt Res
R18 5,000 1 Watt Res.
R19 50,000 1 Watt Res.
R20 500,000 Vol. Control
R21 500,000 Ohm Tone Control
R22 100,000 Ohm 1 Watt Res.
R23 100,000 Ohm 1 Watt Res.
R24 50,000 Ohm 1 Watt Res.
R25 5,000 Ohm .5 Watt Res.
R26 50,000 Ohm 1 Watt Res.
R27 1000 Ohm 3 Watt Res.
R28, R29, R30 20 Ohm C.T. Res

IF PEAK 175 KC

Echophone—Model 35—Schematic Diagram



Model 35 (1932)

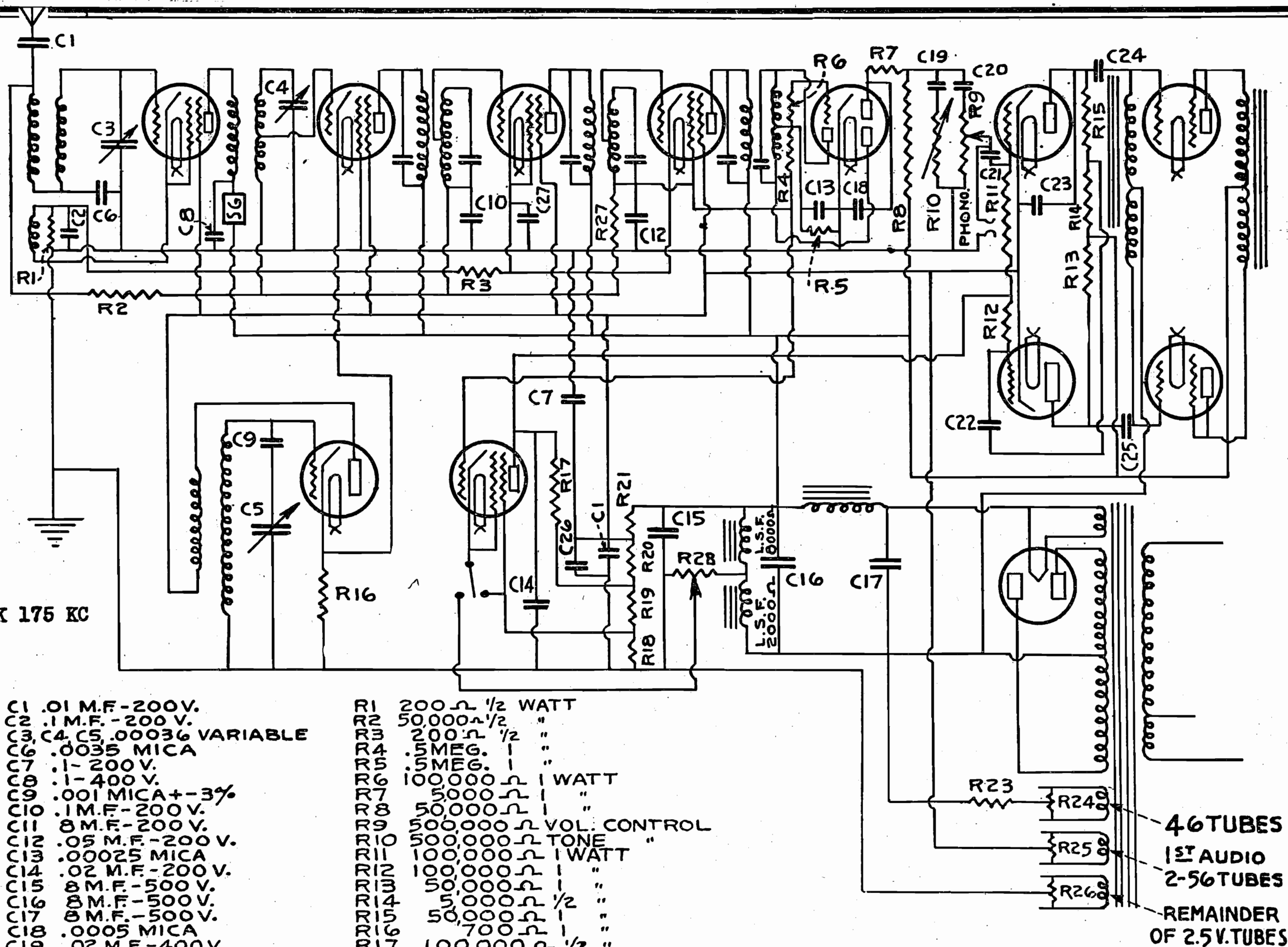
MODELS 35 AND 36 SUPERHETERODYNE
VOLTAGE TESTS

All voltage tests made with volume control on full and no signal

Plates of RF.-IF. and 46 tubes to ground	245-255 volts
Screen grids of RF. and IF. tubes to ground	85-95 "
Cathodes of RF. and IF. tubes to ground	1-2 "
Plate of 1st Detector to ground	245-255 "
Cathode of 1st Detector to ground	4-6 "
Screen grid of 1st Detector to ground	85-95 "
Plate of Oscillator tube to ground	85-95 "
Cathode of Oscillator tube to ground	4-6 "
Plates of 56 audio tubes to ground	155-165 "
Bias on 56 audio tubes is the voltage across the two middle taps on voltage divider	3.75 "
Bias on 46 tubes (across 1000-ohm, 3-watt resistor)	40-45 "
Plate to ground of 57 tube	45-55 "
Drop across filter choke	25 "
Plate of 280 tube to ground	425 " AC
Drop across series speaker field	135-145 "

MODEL 36
Schematic

ECHOPHONE RADIO MFG. CO.



IF PEAK 175 KC

C1 .01 M.F.-200V.
C2 .1 M.F.-200 V.
C3, C4, C5, .00036 VARIABLE
C6 .0035 MICA
C7 .1-200V.
C8 .1-400V.
C9 .001 MICA+-3%
C10 .1 M.F.-200V.
C11 8 M.F.-200V.
C12 .05 M.F.-200 V.
C13 .00025 MICA
C14 .02 M.F.-200 V.
C15 8 M.F.-500 V.
C16 8 M.F.-500 V.
C17 8 M.F.-500 V.
C18 .0005 MICA
C19 .02 M.F.-400 V.
C20 .1 M.F.-400 V.
C21 .02 M.F.-400 V.
C22 .02 M.F.-400 V.
C23 .001 MICA
C24 .05 M.F.-1000 V.
C25 .05 M.F.-1000 V.
C26 .1 M.F.-200 V.
C27 .5 M.F.-200 V.

R1 200 Ω ½ WATT
R2 50,000 Ω ½ "
R3 200 Ω ½ "
R4 .5 MEG. 1 "
R5 .5 MEG. 1 "
R6 100,000 Ω 1 WATT
R7 5,000 Ω 1 "
R8 50,000 Ω 1 "
R9 500,000 Ω VOL. CONTROL
R10 500,000 Ω TONE "
R11 100,000 Ω 1 WATT
R12 100,000 Ω 1 "
R13 50,000 Ω 1 "
R14 5,000 Ω ½ "
R15 50,000 Ω 1 "
R16 700 Ω 1 "
R17 100,000 Ω ½ "
VOLTAGE DIVIDER - R18-2500 Ω, R19-7500 Ω
R20-500 Ω, R21-10,000 Ω,
R23 1000 Ω 3 WATT
R24, R25, R26 - 20 Ω C.T. RESIST.
R27 100,000 Ω 1 WATT
R28 100 Ω VARIABLE

ECHOPHONE — Model 36
Schematic Diagram

ALL CONDENSERS AND RESISTORS + - 10%
UNLESS OTHERWISE SPECIFIED

ECHOPHONE RADIO MFG. CO.

Models 35 and 36

Short and Standard Wave Superheterodyne

CIRCUIT

The Echophone Model 35 is a twelve tube combination short and standard wave receiver having automatic volume control and silent tuning and employing triple grid, duplex diode-triode and the new type 46 output tubes. The circuit consists of a stage of high gain R. F. amplification using a type 58 tube; a first detector stage using a type 58 tube; an oscillator stage using a type 56 tube; two stages of 175KC I. F. amplification using type 58 tubes; a combined detector, automatic volume control and first audio stage using a type 55 tube; a second audio stage employing two type 56 tubes in push pull; an output stage using two type 46 tubes in push pull; a silent tuning control using a type 57 tube, and a power supply using a type 280 tube. The R. F. tube is used as an antenna coupling tube on short waves, all the rest of the tubes performing the same functions on both standard and short waves.

The oscillator coil is tapped for the three short wave bands and has two tickler coils, the largest being short circuited on the two shortest wave bands.

The first detector and oscillator tubes are coupled by means of a common cathode resistor.

A type 55 tube is used as a full wave rectifier for the second detector. The rectified R. F. voltage developed across the input of this tube is fed back to the R. F., first detector and I. F. tubes to provide the automatic volume control action. The grid, cathode and output plate of this tube are used as a triode to give audio amplification.

The second audio stage consists of two type 56 tubes in a resistance coupled push pull circuit.

The output stage consists of two type 46 tubes in an impedence coupled push pull circuit working into the two 12" dual speakers.

The volume control operates by varying the in put to the push pull type 56 tubes in the second audio stage.

The filter circuit consists of a choke, three 8 MF eletrolytic condensers and the 2000 ohm series speaker field.

The silent tuning control consists of a type 57 tube so arranged that when the set is tuned off a carrier wave it causes the bias on the tye 56 second audio stage tubes to increase to a point where the tube cuts off there by silencing the whole audio system. When the set is tuned across a carrier wave the control tube causes the bias to drop to normal and a signal is heard. When the volume control knob is pulled out the cathode and screen grid of the control tube are connected together causing the silence control to be in-operative.

An adjustable control for varying the sensitivity of the silent tuning control is provided on the back of the chassis. This control varies the bias on the silent tuning control tube, the type 57 tube) which tube in turn varies the bias on the second audio stage tubes. The lower the bias on the audio tubes, the weaker the carrier wave necessary to cause the audio system to operate. This variable control should be adjusted so that stations which are used mostly will cause the silent control to operate properly. When receiving weak distant stations or when operating on the short wave bands the volume control knob should be pulled out.

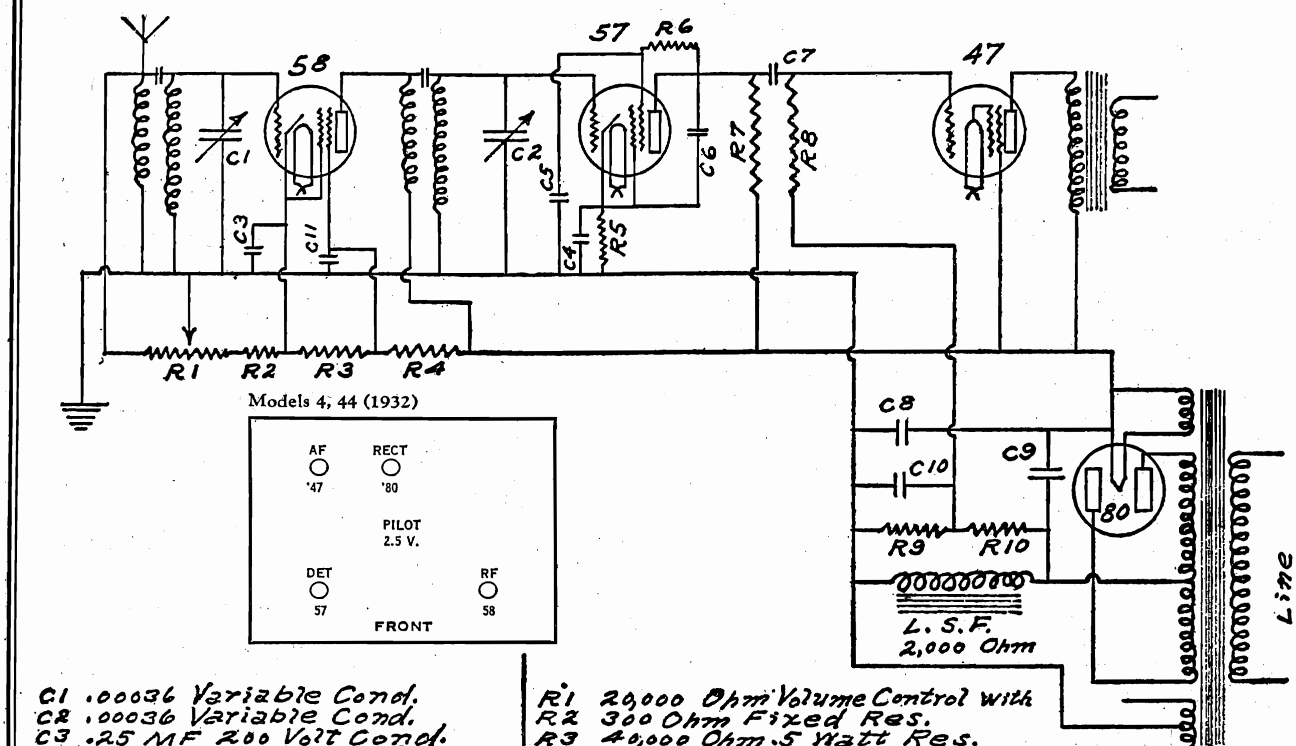
The tone control consists of a variable resistor and fixed condenser in series connected across the audio plate of the second detector and ground.

NOTE: The voice coils of the dual speakers are connected in parallel and must bear the proper relation to each other. To check this connection, disconnect the voice coil of the speaker without the transformer mounted on it. An increase in volume with this coil disconnected indicates that the voice coils are reversed, and should be corrected by inter-changing the red and green wires leading to the speaker without the transformer.

The Model 36 is similar to the Model 35 excepting that it is not designed for short wave reception. There is no short wave switch and the oscillator and R. F. coils are different from the coils used in the Model 35. These changes are self evident by comparing the Model 35 and 36 circuits. Shadowgraf tuning is incorporated in the Model 36. This device operates on the same principle as the more familiar meter tuning devices, excepting that a shadow of varying width instead of a meter band is used as the indicator.

MODEL 4,44
Schematic
Voltage

ECHOPHONE RADIO MFG. CO.



C1 .00036 Variable Cond.
C2 .00036 Variable Cond.
C3 .25 MF 200 Volt Cond.
C4 .25 MF 200 V. Cond.
C5 .1 MF 200 V. Cond.
C6 .001 Mica Cond.
C7 .01 MF 400 V. Cond.
C8 4 MF 400 V. Cond.
C9 8 MF 400 V. Cond.
C10 .1 MF 200 V. Cond.
C11 .1 MF 200 V. Cond.

R1 20,000 Ohm Volume Control with
R2 300 Ohm Fixed Res.
R3 40,000 Ohm .5 Watt Res.
R4 50,000 Ohm 1 Watt Res.
R5 15,000 Ohm .5 Watt Res.
R6 1 Meg. .5 Watt Res.
R7 .5 Meg. .5 Watt Res.
R8 .5 Meg. .5 Watt Res.
R9 200,000 Ohm .5 Watt Res.
R10 1 Meg. .5 Watt Res.

All Resistors & Condensers +-10%

Echophone—Model 4 and 44—Schematic Diagram

The R. F. stage is impedence coupled and there is a small coupling condenser fastened on the lower end of the R. F. coil. If the set is weak or oscillates at the high frequency end of the band a slight adjustment of this condenser will remedy the trouble. After adjusting this condenser the gang condenser should be checked for alignment with the rotor plates nearly open.

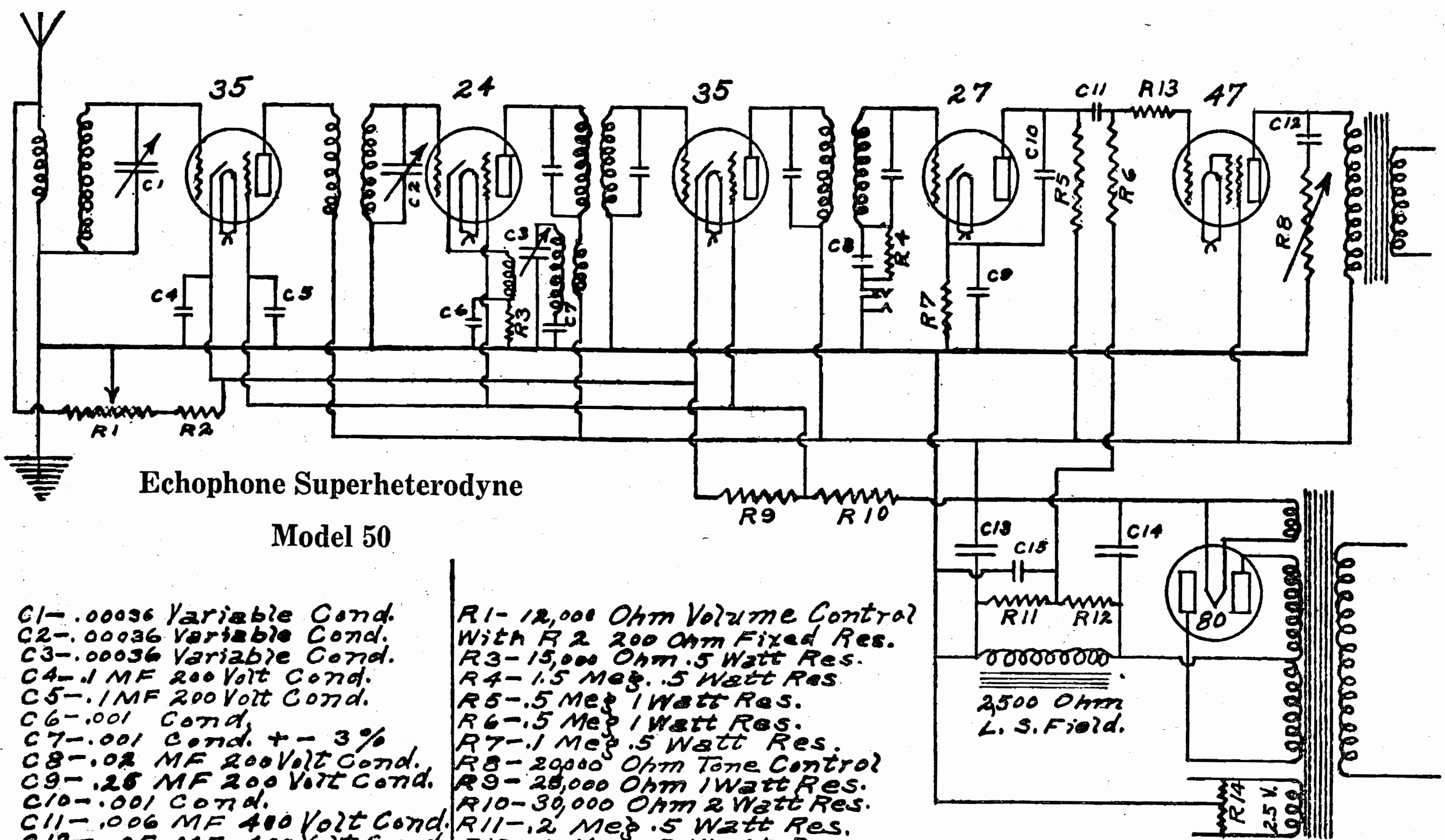
VOLTAGE TESTS

All voltage tests made with volume control on full and no signal in set.

Plate of 58 tube to ground	245-250 volts
Screen grid of 58 tube to ground	85-95 "
Cathode of 58 tube to ground	2-3 "
Plate of 47 tube to ground	235-245 "
Screen grid of 47 tube to ground	245-250 "
Plate of 57 tube to ground	50-75 "
Screen grid of 57 tube to ground	20-40 "
Cathode of 57 tube to ground	2-5 "
Across speaker field	85-95 "
All heaters	2.4-2.6 "
'80 filament	4.8-5.2 "
Plate '80 tube to ground	340-360 "AC

ECHOPHONE RADIO MFG. CO.

MODEL 50
Schematic



Echophone Superheterodyne

Model 50

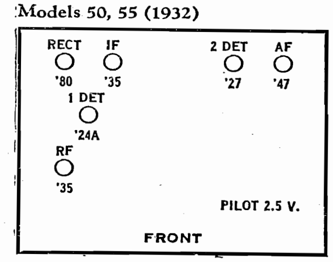
C1—.00036 Variable Cond.
C2—.00036 Variable Cond.
C3—.00036 Variable Cond.
C4—.1 MF 200 Volt Cond.
C5—.1 MF 200 Volt Cond.
C6—.001 Cond.
C7—.001 Cond. +− 3%
C8—.02 MF 200 Volt Cond.
C9—.25 MF 200 Volt Cond.
C10—.001 Cond.
C11—.006 MF 400 Volt Cond.
C12—.06 MF 400 Volt Cond.
C13—8 MF 450 Volt Cond.
C14—8 MF 450 Volt Cond.
C15—.1 MF 200 Volt Cond.

R1—12,000 Ohm Volume Control
With R2 200 Ohm Fixed Res.
R3—15,000 Ohm .5 Watt Res.
R4—1.5 Meg. .5 Watt Res.
R5—.5 Meg 1 Watt Res.
R6—.5 Meg 1 Watt Res.
R7—.1 Meg .5 Watt Res.
R8—20,000 Ohm Tone Control
R9—25,000 Ohm 1 Watt Res.
R10—30,000 Ohm 2 Watt Res.
R11—.2 Meg .5 Watt Res.
R12—1. Meg .5 Watt Res.
R13—.15 Meg .5 Watt Res.
R14—20 Ohm Center Tapped Res.

All Condensers And Resistors +− 10%
Unless Otherwise Specified.

IF PEAK 175 KC

Models 50, 55 (1932)



MODEL 50
Notes
Voltage

ECHOPHONE RADIO MFG. CO.

Model 50 Superheterodyne

CIRCUIT

The Echophone Model 50 is a six tube Superheterodyne, employing screen grid, variable MU and Pentode tubes. The circuit consists of one stage of R. F. amplification using a type 235 tube; a combined first detector and oscillator using a type 224 tube; one stage of I. F. amplification working at 175 KC and using a type 235 tube; a second detector using a type 227 tube; a single audio stage using a type 247 Pentode tube, and a power supply system using a type 280 tube.

The first detector-oscillator circuit employs a plate coil in series with the primary of the first I. F. transformer, which is coupled to a coil in the cathode circuit of the oscillator tube. A third coil, coupled to both the plate and cothode coils is tuned by one section of the gang condenser and is made to track with the antenna and R. F. circuits by means of a fixed series condenser.

In lining up the circuits at the high frequency end of the band care must be used in adjusting the trimmer condenser on the R. F. section. If this trimmer is tightened too much the reaction between the R. F. and oscillator circuits will cause the oscillator to stop oscillating or shift to the frequency of the R. F. tuned circuit. This shifting can readily be recognized by tuning to a lower frequency where it will be found that the dial calibration is far from right and all the tuned circuits are out of line with the oscillator.

The volume control acts as a dual control by varying the bias on the R. F. and I. F. tubes and by varying the antenna input to the antenna stage.

The filter circuit consists of two 8 MF electrolytic condensers and the 1500 ohm speaker field. The speaker field is in the negative lead and a part of the voltage drop across it is used to bias the grid of the power tube. A bucking coil is used in the speaker to keep the field ripple out of the voice coil.

The tone control consists of a variable resistor and fixed condenser in series across the plate of the power tube and ground.

MODEL 50 VOLTAGE TESTS

All D. C. Voltages given were tested on 250 V scale of a 1000 ohms per volt meter with volume on full and no signal in the receiver, line voltage 115.

Fil. 280 tube to ground	240-250V
Screen grid—R. F. and I. F. tubes to ground	90-110V
Across speaker field	90-100V
Cathode R. F. and I. F. tubes to ground	2-3V
Plate detector oscillator tube to ground	240-250V
Plate of second detector to ground	20-45V
Cathode of second detector to ground	3-5V
All heaters	2.4-2.6V AC
Plates 280 tube to center tap of high voltage	350-370 AC
Cathode detector oscillator tube to ground	5-10V
Fil. 280 tube	4.9-5.1V AC

ECHOPHONE RADIO MFG. CO.

Model 70 Superheterodyne

FOR DIRECT CURRENT

CIRCUIT

The Echophone Model 70 is an eight tube Superheterodyne, employing variable MU tubes.

The circuit consists of one stage of high gain R.F. amplification using an NY 65 tube; a first detector using an NY 65 tube; one stage of I.F. amplification using an NY 65 tube and working at 175 K.C.; a second detector using an NY 67 tube; a first audio stage using an NY 67 tube; a second audio stage using two type 171 tubes in push-pull and an oscillator using an NY 67 tube. The first detector is of the grid biased type. The second detector is a resistance coupled power detector having a phonograph pick-up jack incorporated in its grid return circuit.

The oscillator circuit is of the conventional tuned grid type, employing plate feed back and is coupled to the first detector tube by means of a common bias resistor.

The R.F. stage is a high gain impedence coupled type with capacity coupling condenser mounted on the coil. This condenser should require no adjustment after leaving the factory.

The intermediate frequency amplifier has a total of four tuned circuits, adjusted to 175 K.C.

The first audio stage is resistance coupled. The second audio stage is transformer coupled push-pull. The bias for the last audio stage is obtained by operating the negative side of the 171A filaments 19 volts positive in respect to "B— "

The volume control acts as a dual control by varying the bias on the R.F. and I.F. tubes and by varying the antenna input to the antenna coil.

The filter circuit consists of two paper condensers and an iron core choke in the positive side of the supply line.

The speaker is a 1500 ohm dynamic with the field connected across the supply line. The negative side of the supply line is connected to the chassis and all the grid returns are also brought to the chassis.

As the negative side of most supply lines is grounded care should be exercised to prevent the ground wire from coming in contact with any part of the chassis except the ground post. No harm will be done if the ground wire touches the chassis **providing the service cord is plugged in the light socket in the proper direction.** However if the service plug is reversed, a short circuit will result if the ground wire touches the chassis.

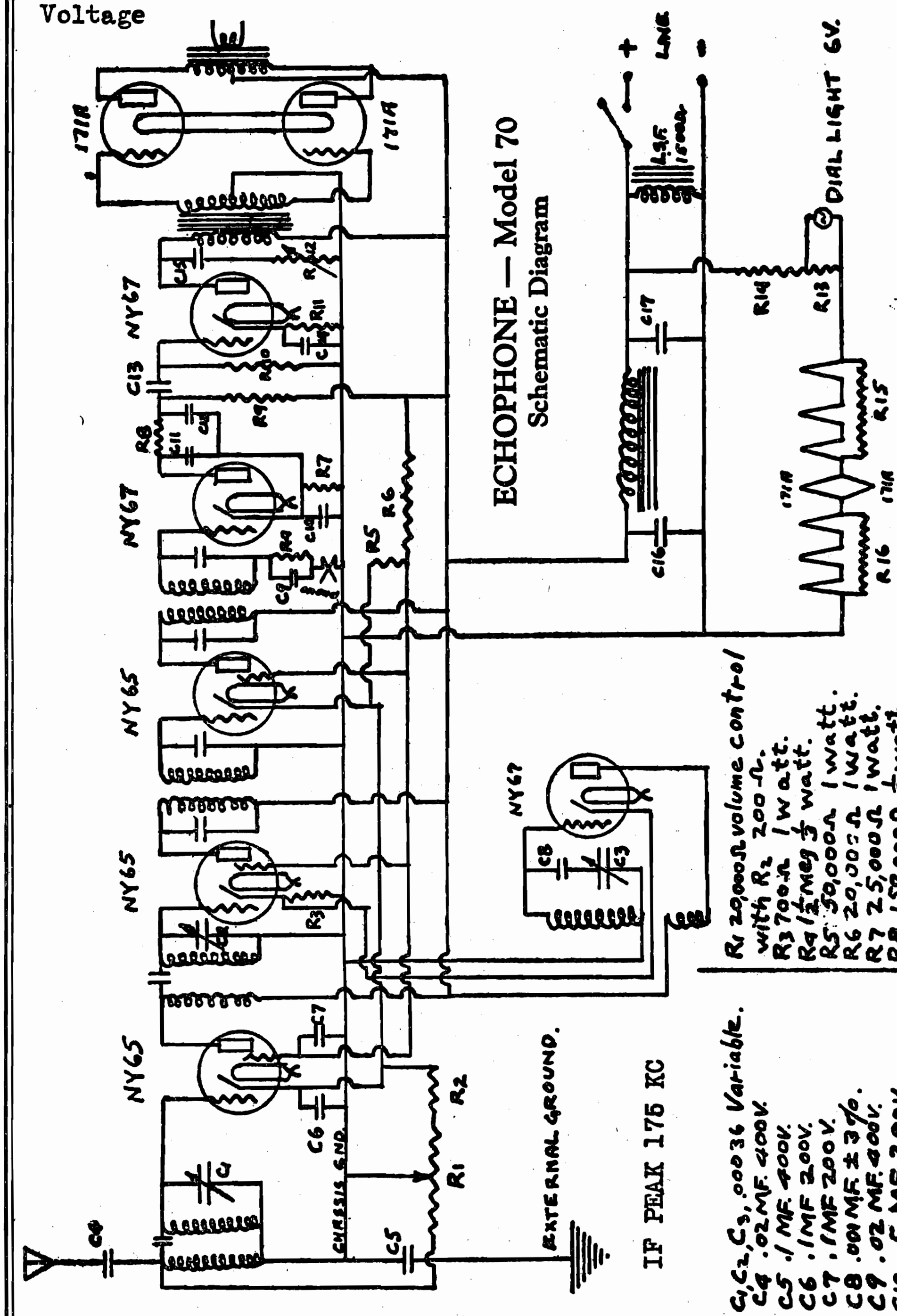
This set is designed to operate on line voltages of 105 to 125 volts. However on line voltages of over 115 a line voltage regulator or Amperite line ballast tube is recommended to insure long life of tubes.

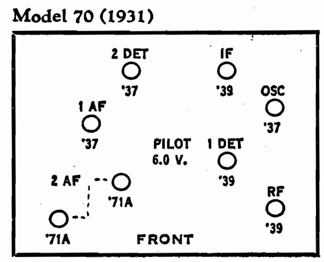
The filaments of the heater type tubes (NY 65 and NY 67) are connected in series and the filaments of the 171A tubes are connected in parallel to each other and in series with the heater tubes, the filament resistor and dial lamp. Therefore if any one of the heater tubes is burned out or is removed from the set none of the remaining tubes will light. If one of the 171A tubes is removed an extra load will be thrown on the remaining 171A tube which will probably cause it to burn out. **No tube should be removed while set is turned on.**

A resistor is connected across the dial lamp so that the set will operate without the dial lamp. However, the lamp should be replaced as soon as convenient because when it is out an extra load is thrown on the resistor which is in parallel with it.

MODEL 70 DC
Schematic
Voltage

ECHOPHONE RADIO MFG. CO.





C1, C2, C3, .00036 Variable.
C4 .02 MF. 400V.
C5 .1 MF. 400V.
C6 .1 MF. 200V.
C7 .1 MF 200V.
C8 .001 MF. ± 3%.
C9 .02 MF. 400V.
C10 .5 MF. 200V.
C11 .001 MF.
C12 .00025 MF.
C13 .002 MF 400V.
C14 .5 MF 200V.
C15 .05 MF 400V.
C16 6 MF 200V.
C17 .1 MF 400V.

R1 20,000Ω volume control with R2 200Ω.
R3 700Ω 1 watt.
R4 1/2 Meg 1/2 watt.
R5 50,000Ω 1 watt.
R6 20,000Ω 1 watt.
R7 25,000Ω 1 watt.
R8 150,000Ω 1/2 watt.
R9 250,000Ω 1 watt.
R10 1 Meg 1/2 watt.
R11 1500Ω 1 watt.
R12 20,000Ω Tone control.
R13 15Ω } 50 watts.
R14 125Ω
R15 200Ω 2 watt.
R16 200Ω 2 watt.

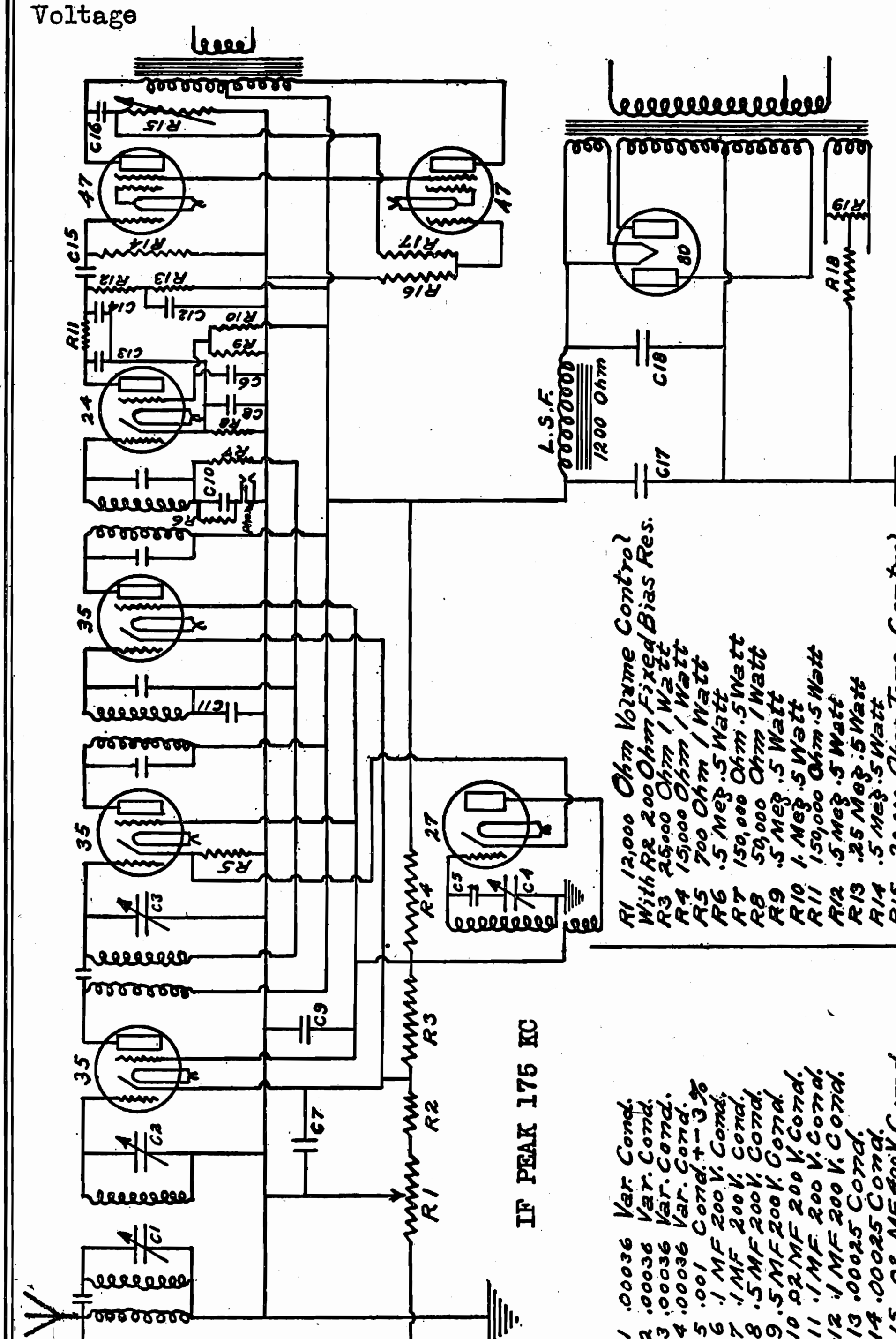
MODEL 70
VOLTAGE TESTS

Line voltage 115, volume on full, no signal on set.

171-A plate to ground	100-110 volts
RF. and IF plate to ground	100-110 volts
RF and IF screen to ground	50-60 volts
RF and IF cathode to ground	2.5-3.5 volts
1st Detector plate to ground	100-110 volts
1st Detector screen to ground	50-60 volts
1st Detector and Oscillator cathode to ground	4-6 volts
2nd Detector plate to ground	35-45 volts
2nd Detector cathode to ground	4-6 volts
1st Audio plate to ground	100-110 volts
1st Audio cathode to ground	5-8 volts
Filament heaters	6.2-6.6 volts
171-A filament	4.8-5.1 volts

MODEL 90 (Rev.)
Schematic
Voltage

ECHOPHONE RADIO MFG. CO.



ECHOPHONE Model 90 Schematic Diagram

Revised

R1 12,000 Ohm Volume Control
With R2 200 Ohm Fixed Bias Res.
R3 25,000 Ohm 1 Watt
R4 15,000 Ohm 1 Watt
R5 700 Ohm 1 Watt
R6 .5 Meg .5 Watt
R7 150,000 Ohm .5 Watt
R8 50,000 Ohm 1 Watt
R9 .5 Meg .5 Watt
R10 1 Meg .5 Watt
R11 150,000 Ohm .5 Watt
R12 .5 Meg .5 Watt
R13 .25 Meg .5 Watt
R14 .5 Meg .5 Watt
R15 20,000 Ohm Tone Control
R16 10,000 Ohm .5 Watt
R17 .25 Meg 1 Watt
R18 250 Ohm 2 Watt
R19 20 Ohm C.T. Res.

All Resistors +-10% Unless Otherwise Specified.

C1 .00036 Var. Cond.
C2 .00036 Var. Cond.
C3 .00036 Var. Cond.
C4 .00036 Var. Cond.
C5 .001 Cond. +-3%
C6 .1 MF 200 V. Cond.
C7 .1 MF 200 V. Cond.
C8 .5 MF 200 V. Cond.
C9 .5 MF 200 V. Cond.
C10 .02 MF 200 V. Cond.
C11 .1 MF 200 V. Cond.
C12 .1 MF 200 V. Cond.
C13 .00025 Cond.
C14 .00025 Cond.
C15 .02 MF 400 V. Cond.
C16 .05 MF 400 V. Cond.
C17 8 MF 450 V. Cond.
C18 12 MF 450 V. Cond.

All Cond. +-10% Unless Otherwise Specified

The following applies to Model 90 receivers having the R.F. and oscillator coils separated and mounted at right angles to each other.

R.F. and I.F. cathode to ground	2.5-3.5 volts
First Detector plate to ground	235-250 volts
First Detector Screen to ground	70- 80 volts
First Detector and Osc. cathode to ground	4- 6 volts
Oscillator plate to ground	70- 90 volts
Voltage drop across field	95-110 volts
Filament voltage all 2.5 volt tubes	2.4-2.6 volts
Filament voltage 280 tube	4.8- 5 volts

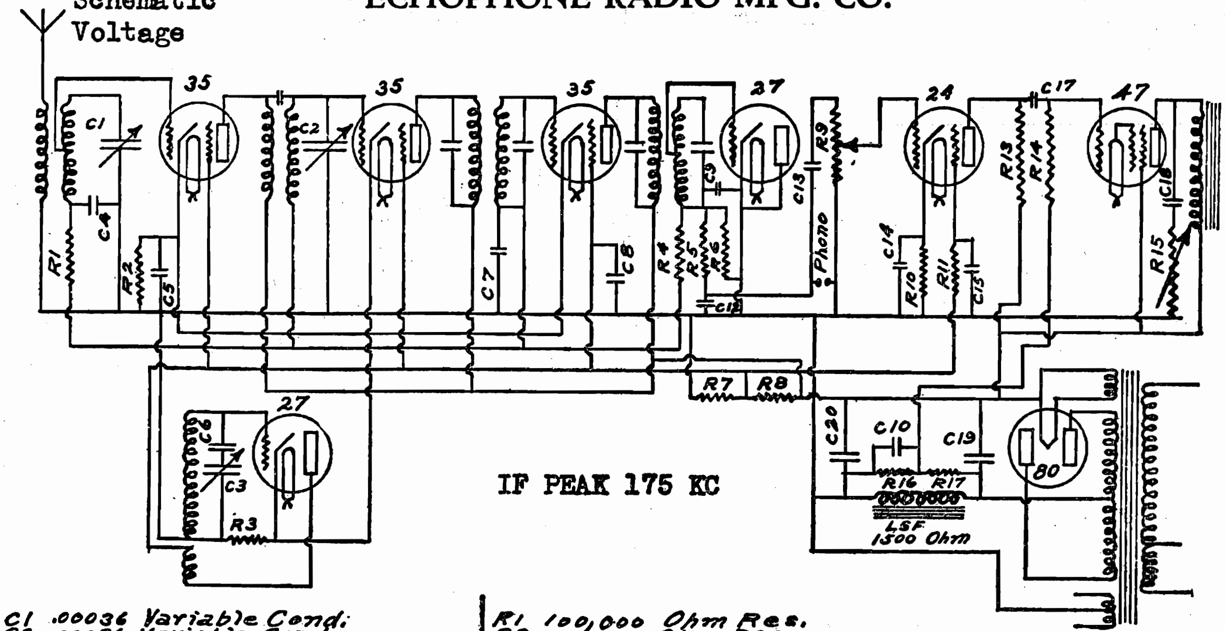
MODEL 90 VOLTAGE TESTS

Line voltage 114, volume on full, no signal on set.

247 Plate to ground	230-240 volts
247 Screen to ground	235-250 volts
247 Bias-Center tap resistor to ground	13- 18 volts
Second Detector plate to ground	30- 40 volts
Second Detector screen to ground	25- 35 volts
Second Detector cathode to ground	7- 9 volts
R.F. and I.F. plate to ground	235-250 volts
R.F. and I.F. screen to ground	70- 80 volts

MODEL 81
Schematic
Voltage

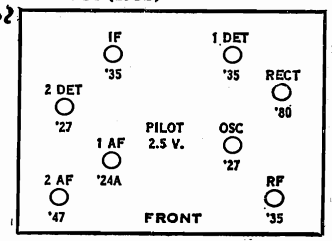
ECHOPHONE RADIO MFG. CO.



C1 .00036 Variable Cond.
C2 .00036 Variable Cond.
C3 .00036 Variable Cond.
C4 .1 MF 200 V. Cond.
C5 .1 MF 200 V. Cond.
C6 .001 Mica Cond. + - 3%
C7 .1 MF 200 V. Cond.
C8 .1 MF 200 V. Cond.
C9 .0001 Mica Cond.
C10 .1 MF 400 V. Cond.
C12 .001 Mica Cond.
C13 .01 200 V Cond.
C14 .5 MF 200 V. Cond.
C15 .1 MF 200 V. Cond.
C16
C17 .006 MF. 400 V. Cond.
C18 .05 MF 400 V. Cond.
C19 8 MF 450 V. Cond.
C20 8 MF 450 V. Cond.

R1 100,000 Ohm Res.
R2 100 Ohm Res.
R3 700 Ohm Res.
R4 .25 Meg. Res
R5 100,000 Ohm Res
R6 .25 Meg. Res.
R7 20,000 Ohm 2 Watt Res.
R8 50,000 Ohm Res.
R9 500,000 Ohm Volume Control
R10 20,000 Ohm Res.
R11 100,000 Ohm Res.
R12
R13 .5 Meg. Res.
R14 .5 Meg. Res.
R15 20,000 Ohm Tone Control
R16 200,000 Ohm Res.
R17 1 Meg. Res

Model 81 (1932)



All Condensers & Resistors + - 10% Unless Otherwise Specified

Echophone—Model 81—Schematic Diagram

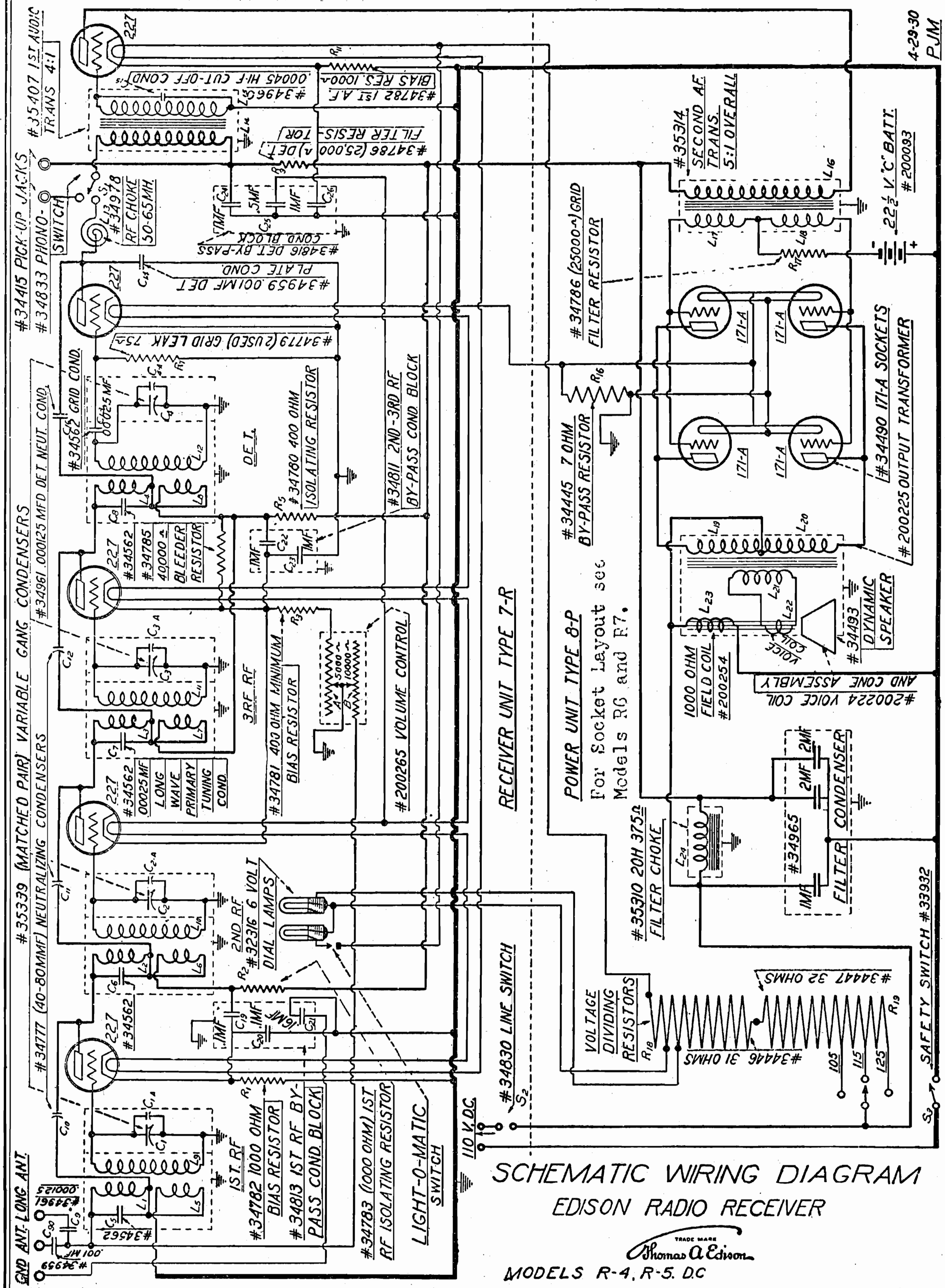
MODEL 81 VOLTAGE TESTS

All D. C. voltages given were tested on 250V scale of a 1000 ohms per volt meter with volume on full and no signal in the receiver, line voltage 115.

Filament 280 tube to ground	240-250V
Screen grid R. F. and I. F. tubes to ground	90-100V
Plate oscillator tube to ground	90-100V
Across speaker field	90-100V
Cathode R. F. and I. F. tubes to ground	2-3V
Plate second detector to ground	0-V
Cathode second detector to ground	0-V
Cathode of oscillator and first detector to ground	5-10V
Plate 280 to center tap of high voltage	360-380V AC
All heaters	2.4-2.6V AC
Filament 280 tube	4.9-5.1V AC
Plate first detector, R.F., and I.F. tubes to ground	240-250V
Plate first audio tube to ground	30-50V
Cathode first audio tube to ground	3-6V
Screen grid first audio to ground	50-75V

THOMAS A EDISON, INC.

MODELS R4,R5 DC
Schematic



SCHEMATIC WIRING DIAGRAM
EDISON RADIO RECEIVER

Thomas A Edison

MODELS R-4, R-5. DC

THOMAS A. EDISON, INC.

MODELS R6,R7
Resistance Data

BOTTOM VIEW OF RECEIVER UNIT SHOWING FILTER UNIT TERMINALS AND RESISTORS

R-10 AUTOMATIC VOLUME CONTROL VOLTAGE DIVIDER
R-11 " " " "
R-12 DETECTOR OUTPUT FILTER RESISTOR
R-13 3RD R.F. PLATE ISOLATING "
R-14 " " GRID " "
R-15 1ST + 2ND R.F. GRID " "

R-20 1ST + 2ND R.F. PLATE ISOLATING RESISTOR
R-21 2ND + 3RD " BIAS "
R-22 HIGH POTENTIAL END S. G. VOLTAGE DIVIDER
R-23 1ST A.F. PLATE ISOLATING RESISTOR
R-24 1ST R.F. BIAS "
R-25 1ST SCREEN GRID ISOLATING "

R-30 TONE BALANCE RESISTOR
R-31 HUM BUCK "
R-32 2ND A.F. BIAS "
R-33 PLATE COUPLING "
R-34 LOW POTENTIAL END S.G. VOLTAGE DIVIDER
R-35 1ST A.F. BIAS RESISTOR
R-36 GRID LEAK

#200165 DETECTOR FILTER UNIT
(WITH RESISTORS)

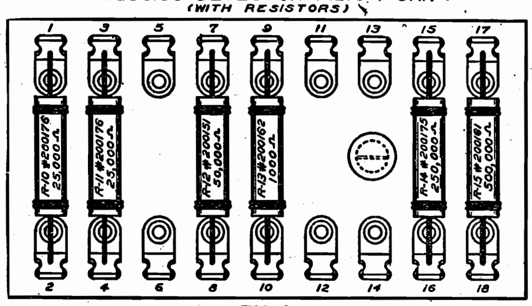


FIG. 1

#200156 R.F. FILTER UNIT
(WITH RESISTORS)

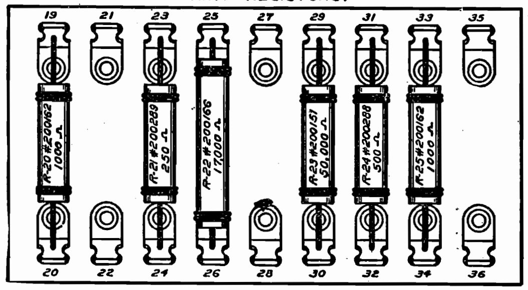


FIG. 2

#200131 A.F. FILTER UNIT
(WITH RESISTORS)

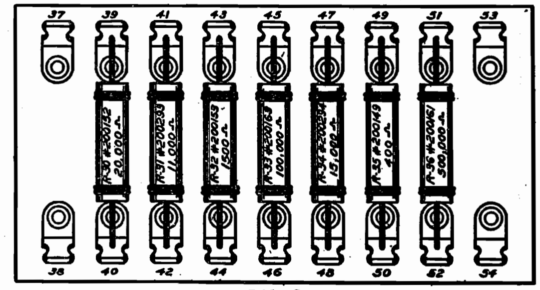


FIG. 3

SCHEMATIC DIAGRAM FOR FILTER UNITS (RESISTORS NOT SHOWN)

#201046 DETECTOR FILTER UNIT

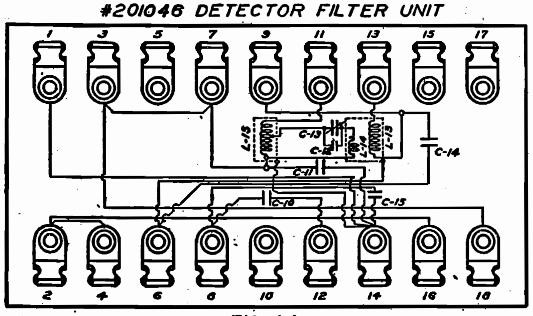


FIG. 1-A

C-10 0.25 MF #200130 DETECTOR COUPLING CONDENSER
C-11 .0001 " #200803 AUTO. V.C. RES. BY-PASS "
C-12 40 MMF #201080 FIXED COUPLING "
C-13 80 MMF #200373 ADJUSTABLE " "
C-14 .05 MF #200369 3RD R.F. PLATE BY-PASS "
C-15 .0005 " #200189 DETECTOR OUTPUT FILTER "
L-15 #200170 AUTO TRANSFORMER
L-13 + L-14 #200172 COUPLING "

#201045 R.F. FILTER UNIT

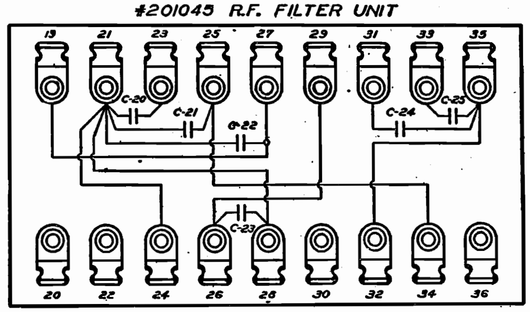


FIG. 2-A

C-20 0.5 MF 2ND + 3RD R.F. BIAS BY-PASS CONDENSER
C-21 1.0 " " " SCREEN GRID " "
C-22 .05 " 1ST + 2ND R.F. PLATE " "
C-23 1.0 " 2ND A.F. PLATE " "
C-24 0.5 " 1ST R.F. BIAS " "
C-25 0.1 " " SCREEN GRID " "

#201044 A.F. FILTER UNIT

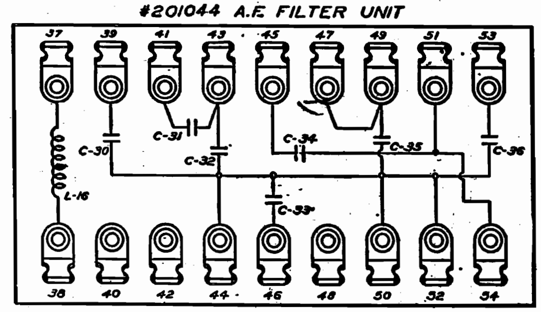
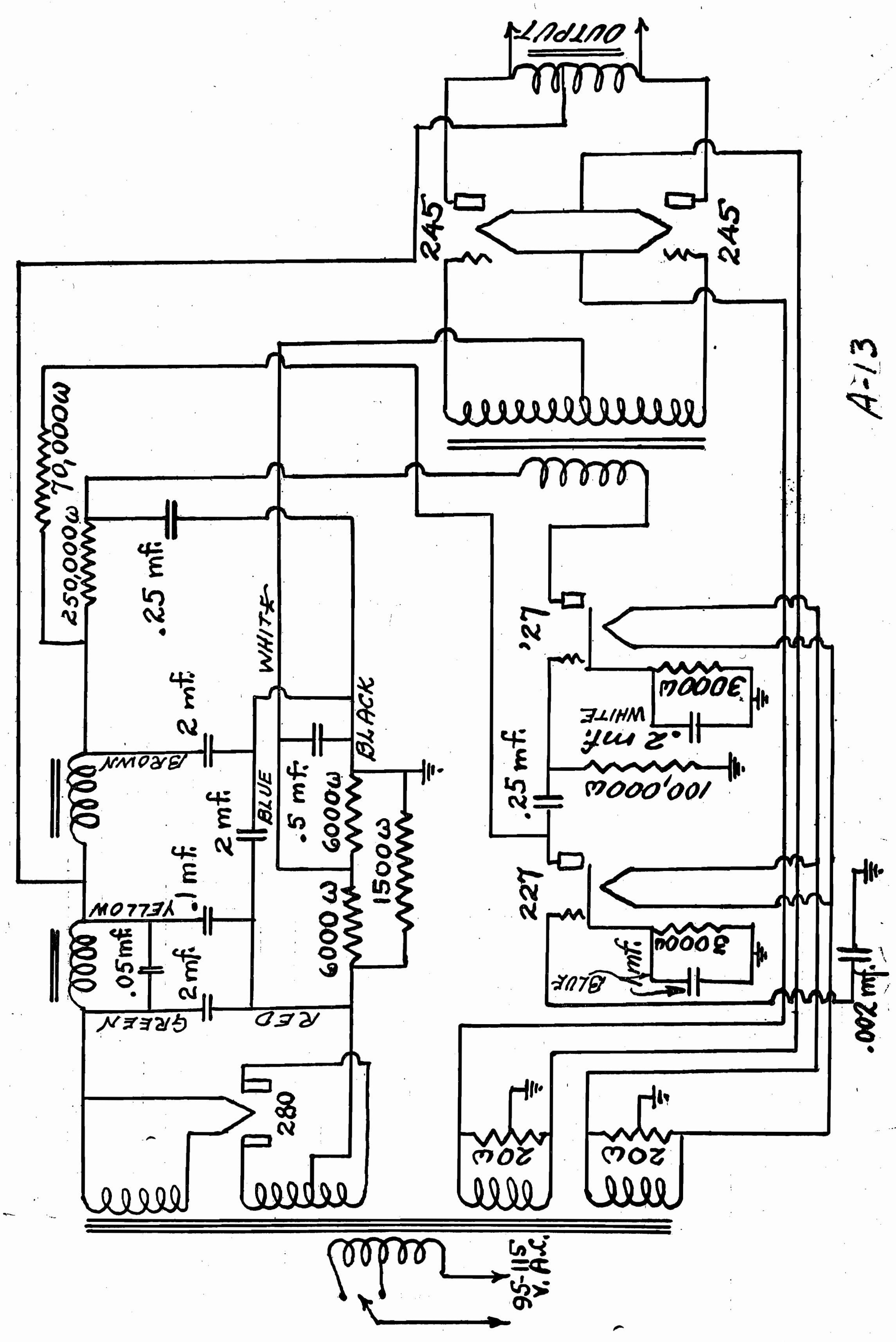


FIG. 3-A

C-30 .025 MF TONE BALANCE CONDENSER #1
C-31 0.5 " HUM BUCK "
C-32 1.0 " 2ND A.F. BIAS BY-PASS CONDENSER
C-33 1.0 " 1ST " PLATE " "
C-34 0.25 " " " PLATE COUPLING "
C-35 1.0 " " " BIAS BY-PASS "
C-36 .0005 " TONE CONTROL "
L-16 #200167 R.F. CHOKE

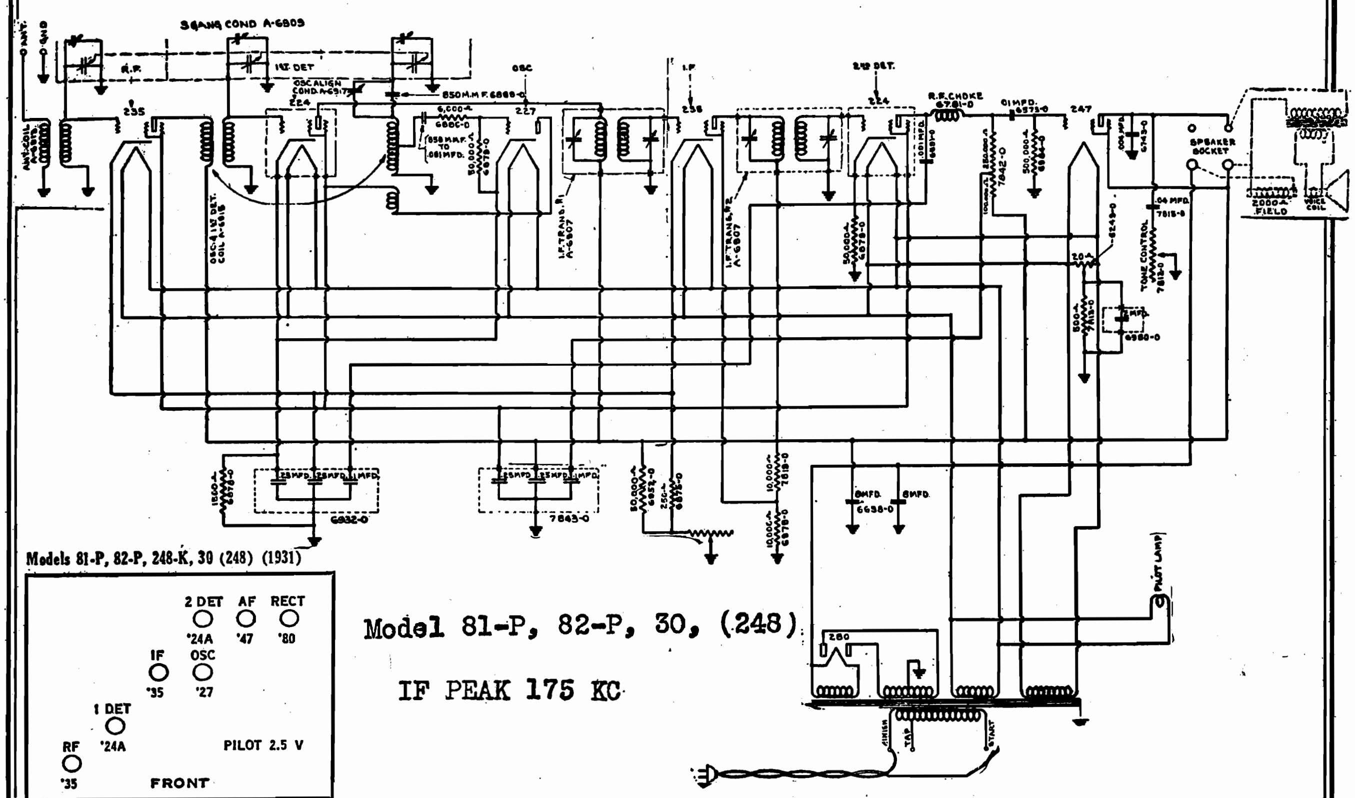
ELECTRICAL
RESEARCH LABORATORIES, Inc.

MODEL A-13 Amplifier
Schematic

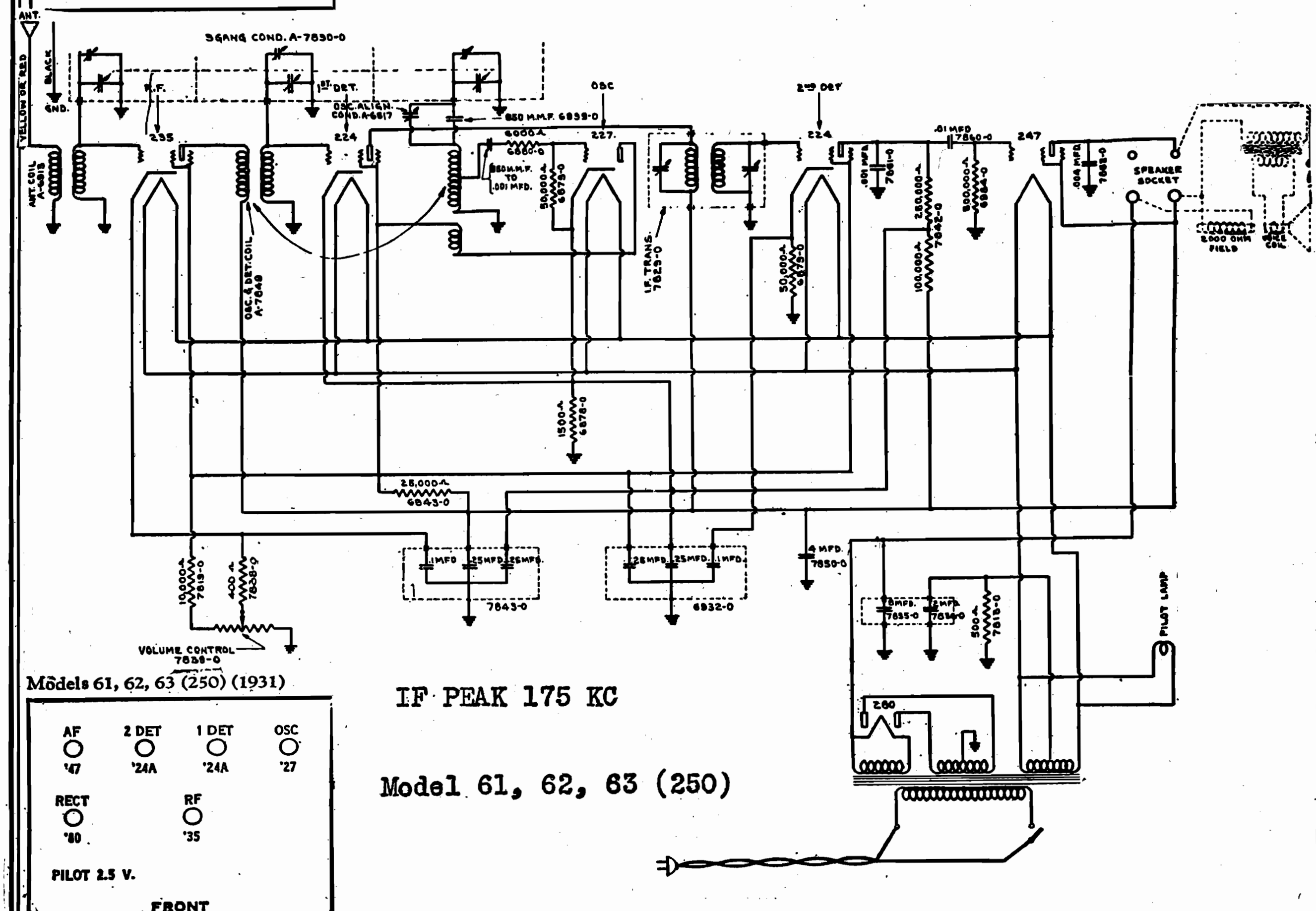


MODEL 81-P, 82-P, 30, (248)
MODEL 61, 62, 63 (250)
Schematic

ELECTRICAL RESEARCH LABORATORIES, Inc.



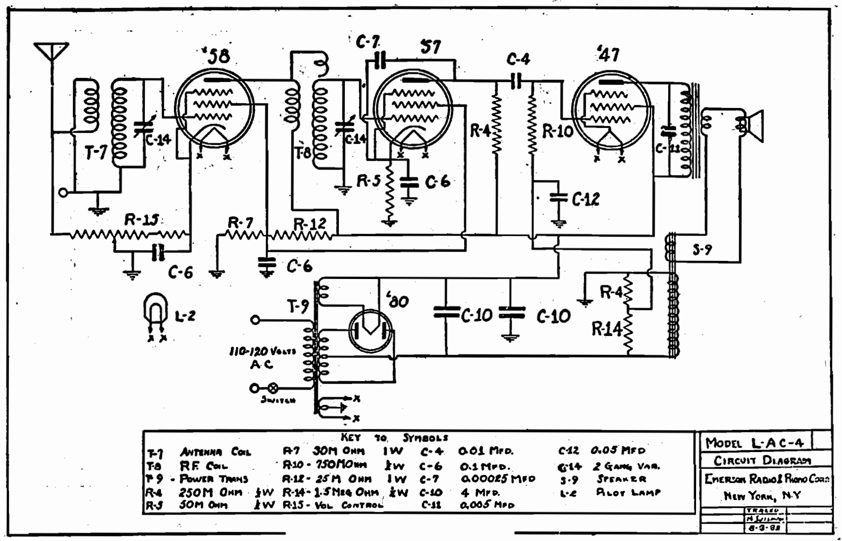
Models 81-P, 82-P, 248-K, 30 (248) (1931)

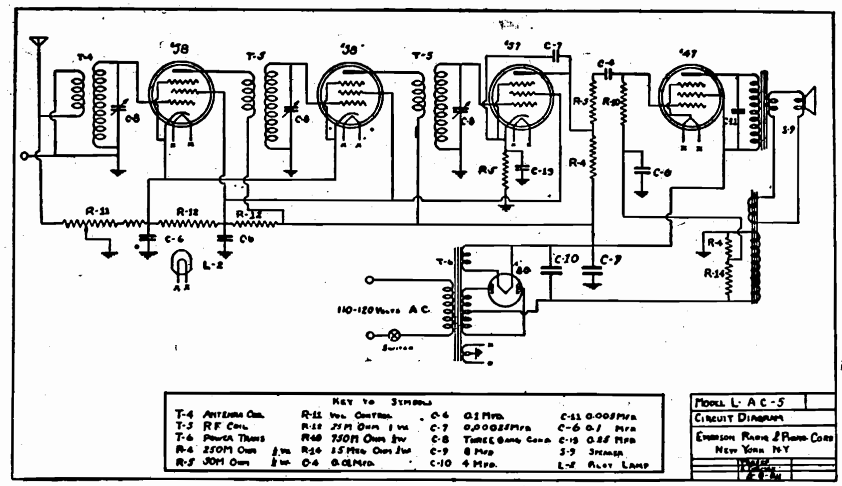


Models 61, 62, 63 (250) (1931)

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL L-AC-4
MODEL L-AC-5
Schematic
Voltage





Model L-AC-4

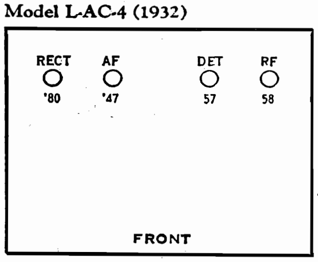
	Plate	Screen	Cathode
347 Tube—ground to	215	237	none
58 Tube—ground to	237	92	2
57 Tube—ground to	115	92	4.5

Line Voltage 119

The bias on the pentode cannot be read on the volt meter.

These readings are approximate and will vary slightly with sets, tubes, etc.

Model L-AC-4 (1932)



Model L-AC-5

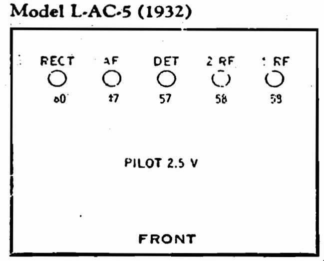
	Plate	Screen	Cathode
347 Pentode Tube ground to	220	240	none
58 First R. F. Tube ground to	240	90	4.5
58 Second R. F. Tube ground to	240	90	4.5
57 Detector Tube ground to	114	90	4.5

Line Voltage 119

The bias on the 347 cannot be read with the volt meter.

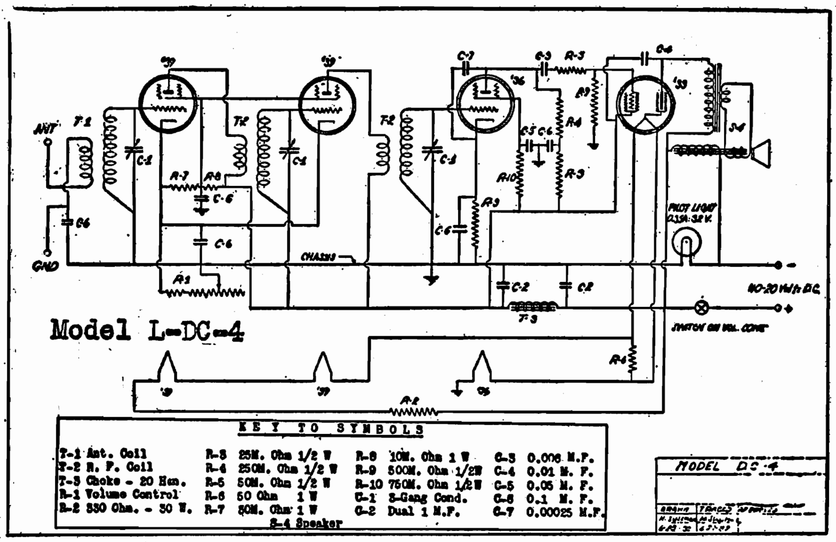
These readings are approximate and will vary slightly with tubes, set, etc.

Model L-AC-5 (1932)



MODEL T, TS
MODEL L-DC-4
Schematics
Data

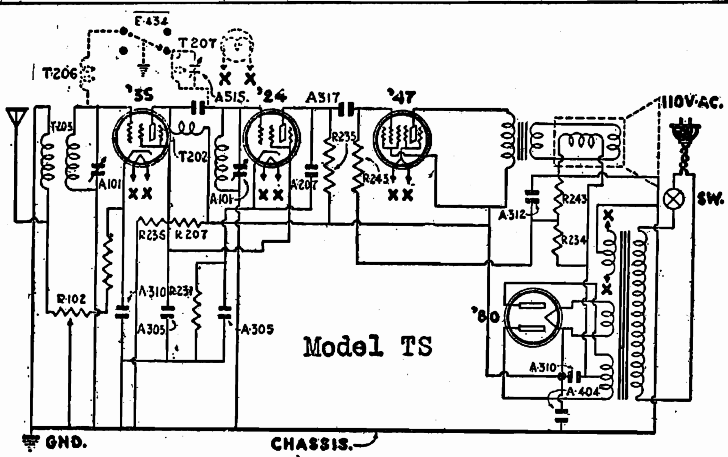
EMERSON RADIO AND PHONOGRAPH CORPORATION



Model L-DC-4

Approximate Voltages	Plate	Screen	Cathode
333 Pentode Tube to Chassis	105	110	none
339 R. F. Tubes to Chassis	110	80	3
336 Detector Tube	75	20	5

The bias on the pentode is obtained by reading from pentode filament to Chassis and should be about 9 volts.



MODEL T SYMBOLS.

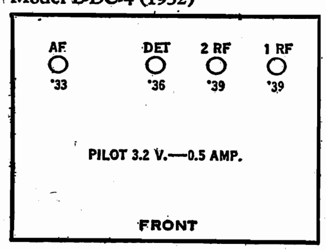
A101. 2-GANG VAR. COND.
A207. .0001 MF.
A310. .01 MF.
A404. 4 MF.
A312. .03 MF.
A317. .006 MF.
A305. .1 MF.
R102. 8020 OHM.
R243. 1 MEGOHM.
R231. 50 M.OHM.
R234. 6 MEGOHM.
R235. .5 MEGOHM.
R236. 60 M.OHM.
R207. 60 M.OHM.
T202. RF COIL.
T203. ANTENNA COIL.

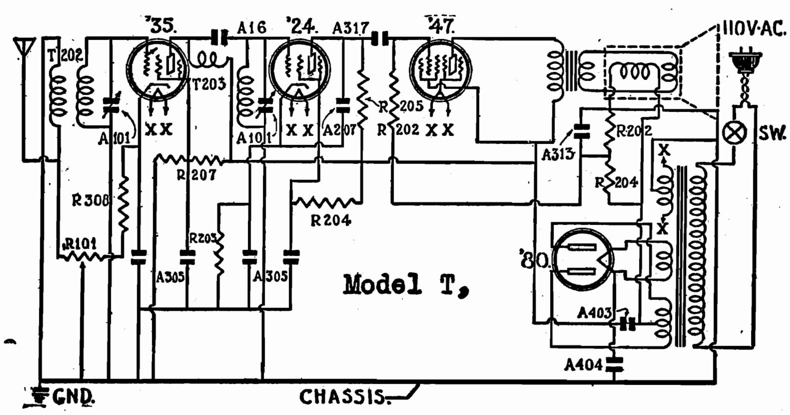
MODEL TS.

A515. ADJ. COND.
E434. SHORT WAVE SWITCH.
T206. S.W. ANT. COIL.
T207. S.W. RF. COIL.

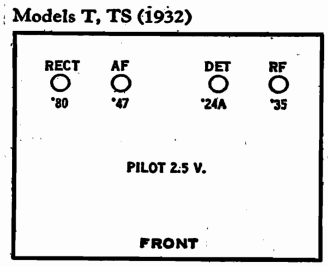
Model T, TS		Plate	Screen	Cathode
Detector tube	—ground to	80 V	80 V	7 V
1st R. F. tube	—ground to	240 V	80 V	2.0 V
Pentode tube	—ground to	235 V	240 V	None

Model L-DC-4 (1932)



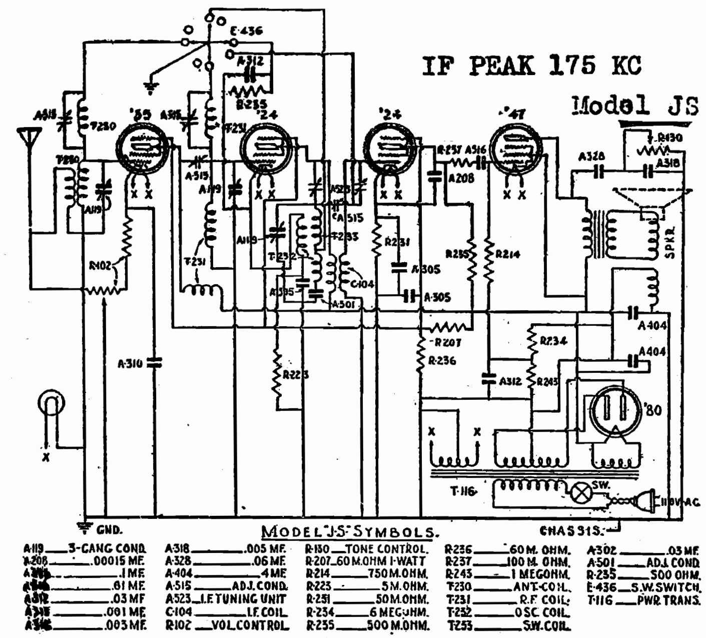


Models T, TS (1932)



MODEL *JS
MODEL KS
Schematic
Data

EMERSON RADIO AND PHONOGRAPH CORPORATION



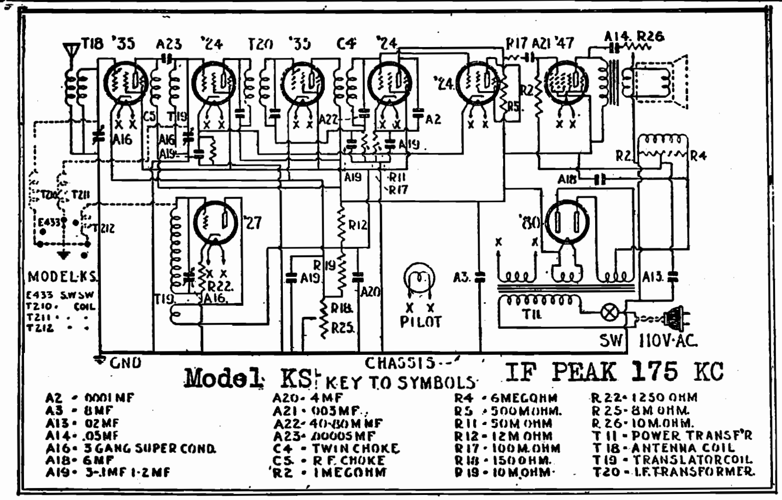
The following are average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage.

	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:

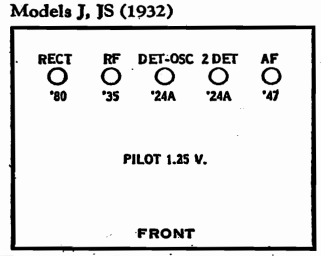
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.



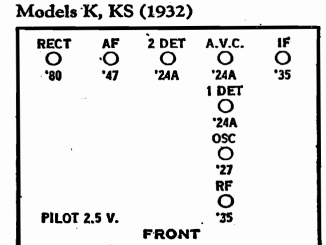
Test Voltages: Measured with volume control on full position measured with D. C. voltmeter having at least 1000 ohms per volt. Line voltage 115.

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)

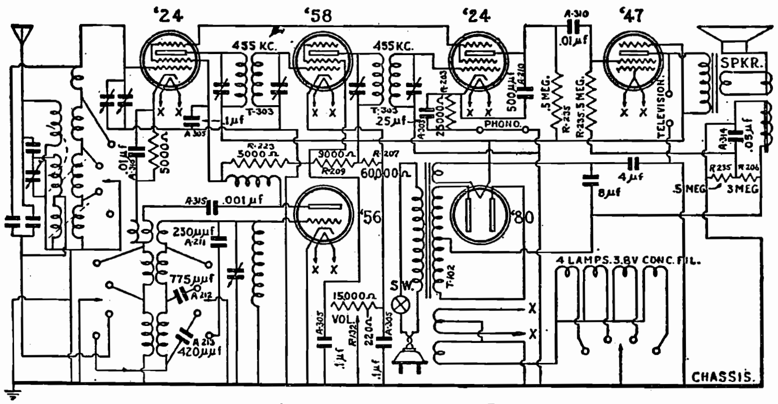


Models K, KS (1932)



MODEL AW-55
MODEL CS
Schematic
Data

EMERSON RADIO AND PHONOGRAPH CORPORATION



Model AW-55 5.

IF PEAK 445 KC

VOLTAGE READINGS:

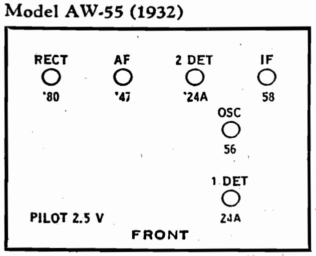
NOTE: Voltages should be measured with volume control all the way "ON" and the range selector in position 3 (broadcast). Use a 250-volt D. C. meter with a resistance of 1000 ohms per volt.

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.

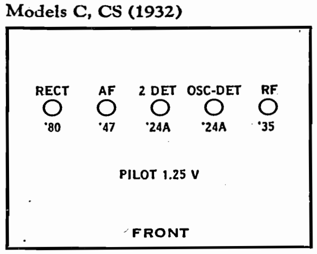
	Plate	Screen	Cathode
'47 Tube —ground to	235	245	......
'24 Tube —ground to (Tube next to '47)	70	40	6
58 Tube —ground to	240	100	3
'24 Tube —ground to	240	40	8
56 Tube —ground to	40	......	0

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)

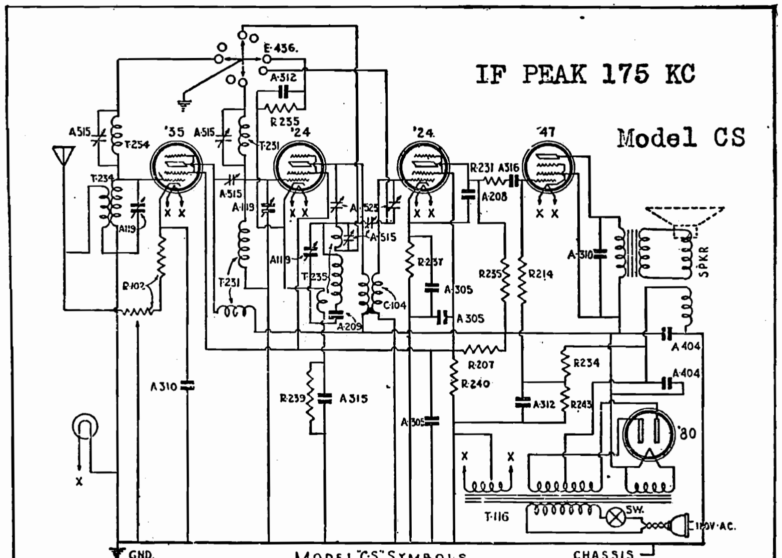


Models C, CS (1932)



IF PEAK 175 KC

Model CS



MODEL "C.S." SYMBOLS.

A-119 — 3-GANG COND.	A-318 — .005 MF.	R-235 — 500 M. OHM	R-240 — 37 M. OHM.	A-302 — .03 MF.
A-208 — .00015 MF.	A-328 — .06 MF.	R-207 — 60 M. OHM 1-WATT.	R-237 — 100 M. OHM.	A-209 — 1050 MMF. PAD.
A-305 — .1 MF.	A-404 — 4 MF.	R-214 — 750 M. OHM.	T-231 — R.F. COIL.	
A-310 — .01 MF.	A-515 — ADJ. COND.	R-239 — 6500 OHM.	T-234 — ANT COIL.	
A-312 — .03 MF.	A-525 — I.F. TUNING UNIT.	R-251 — 50 M. OHM.	T-235 — OSC COIL.	
A-315 — .001 MF.	C-104 — I.F. COIL.	R-234 — 6 MEGOHM	T-116 — PWR. TRANS.	
A-316 — .003 MF.	R-102 — VOL. CONTROL	R-243 — 1 MEGOHM.	E-436 — SW. SWITCH.	

Voltage Readings:

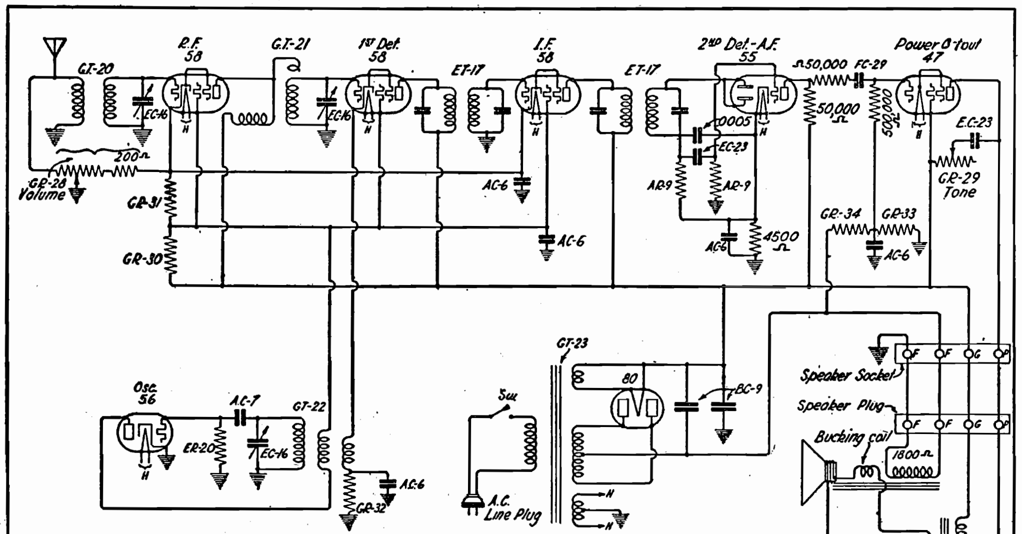
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.

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

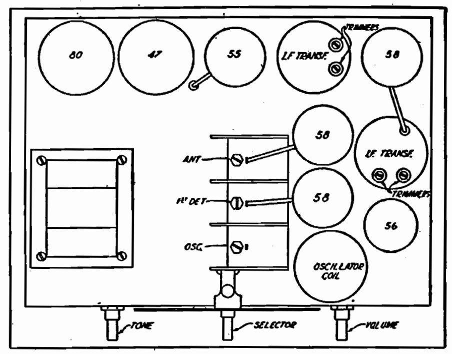
MODEL M-AC-7
Schematic
Data

EMERSON RADIO AND PHONOGRAPH CORPORATION



—: NOMENCLATURE :—		
GT-20 = SHIELDED ANT. COIL	GR-31 = 20,000Ω 1 WATT	EC-23 = .03 MF. 300V.
GT-21 = SHIELDED R.F. INTERSTAGE COIL	GR-32 = 2000Ω 1/2 W.	AC-6 = .1 MF. 200V.
GT-22 = SHIELDED R.F. OSCILLATOR COIL	ER-20 = 35,000Ω 1/2 W.	Ω = OHMS
ET-17 = 175 KC. SHIELDED I.F. TRANSF.	GR-33 = 100,000Ω 1/2 W.	
GT-23 = POWER TRANSFORMER	AR-9 = 500,000Ω 1/2 W.	
EC-16. = GANGED CONDENSER	GR-34 = 600,000Ω 1/2 W.	
GR-28 = 5000Ω VOLUME CONTROL	BC-9 = 8-8 MF. 500V. PEAK	
GR-29 = 30000Ω TONE CONTROL	AC-7 = .00025 MF. MICA	
GR-30 = 12,500Ω 2 WATTS	FC-29 = .02 MF. 200 V.	

Model M-AC-7



The receiver is accurately adjusted at the factory and no adjustment should be changed except by an experienced serviceman. The intermediate frequency is 175 K.C.

Minor reasons for failure of Set to function

1. **Defective Tubes**
2. **Grid Clips off Tubes**
3. **Volume Control not fully on**
4. **Tubes not in sockets securely**
5. **Aerial disconnected or grounded**
6. **Defective A.C. plug or poor plug connection**

Voltage Readings:

Readings should be taken with the Volume Control fully on and the Station Selector set for 550 K.C.

Use a high resistance D.C. voltmeter.

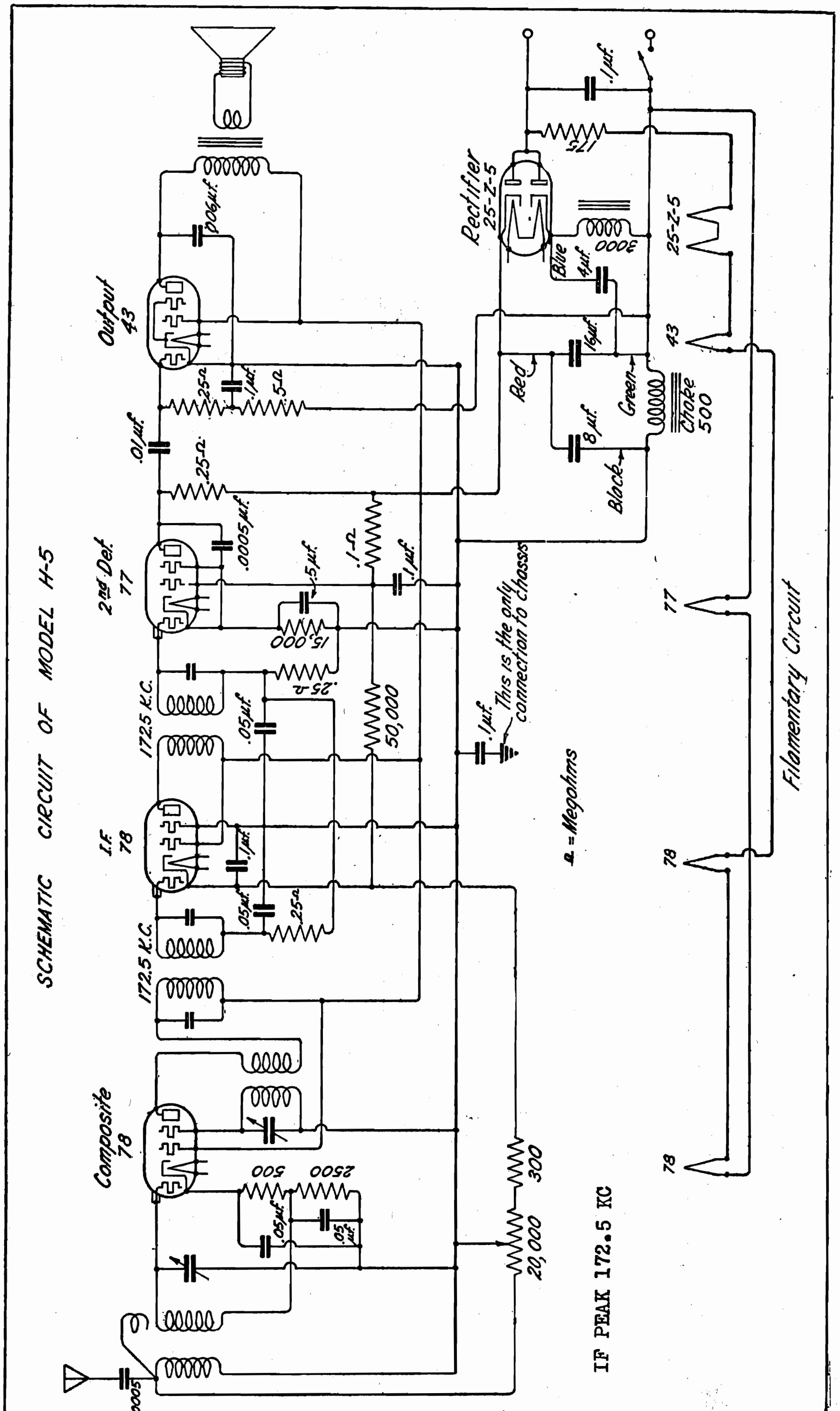
Ground to—	Plate	Screen	Cathode
56 Oscillator	80—100	—	—
58 R.F. Amplifier	235—250	90-110	3—5
58 1st Detector	235—250	90-110	5—7
58 I.F. Amplifier	235—250	90-110	3—4
55 Second Detector	125—135	—	8—11
47 Output Pentode	215—225	235-250	—

Line Voltage—115

The bias on the 47 cannot be read with the voltmeter.

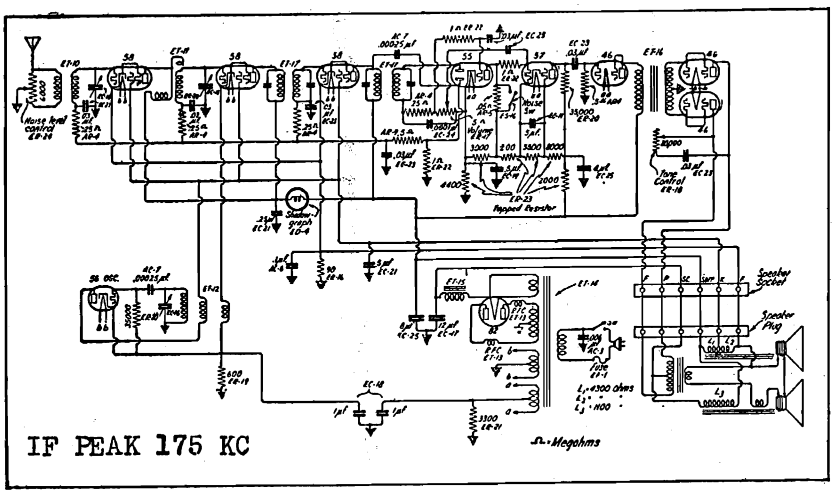
MODEL H-5
Schematic

EMERSON RADIO AND PHONOGRAPH CORPORATION



MODEL B-AC-10
Schematic
Data

EMERSON RADIO AND PHONOGRAPH CORPORATION



Voltage Readings

(Antenna and Ground Shorted—Noise Suppression 'off'.)

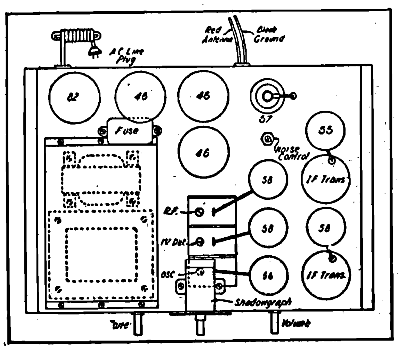


	Plate	Screen	Cathode
		Chassis To	
58—R. F.	230-250	95-115	3-5
58—Det.	230-250	95-115	5-7
56—Osc.	95-115	....	5-7
58—I. F.	230-250	95-115	3-5
55—Duo-diode triode	75-90	....	40-50
46—Driver	230-250	....	30-35
46 / 46 } Amplifiers	310-330	....	....

Line Voltage—117

Operation:

Turn the right-hand control knob ('on-off' switch and volume control combined) clockwise. Adjust the center knob (station selector) to the desired station. It will be noted that as the station is tuned in the shadow above the numbers on the dial gets narrower. The point of minimum shadow is the point where the station is exactly tuned in. The dial is calibrated in frequency to simplify tuning for a desired station.

Re-adjust the volume control if necessary for the desired output.

The tone control may be set for the type of output desired.

When the set is first used it may be desirable to adjust the noise suppression control. For most localities no adjustment is necessary, but where the noise level is very high adjustment is advisable. With the noise suppression switch set to suppression, tune between stations. Adjust the control on the chassis by means of a screw driver until the noise just about disappears. This adjustment should be permanent and require no revision unless local conditions change or increased sensitivity is desired.

If it is desired to receive distant stations, the noise suppression switch should be turned 'off'. If the noise control has been adjusted a further increase of sensitivity can be secured by turning the control clockwise (to the right) as far as it will go.

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 65
Voltage
Data

Average Voltage Readings

Filament	280	4.85 v. A.C.	Measure across socket
"	245	2.45 v. A.C.	" " "
"	1st A.F.	2.45 v. A.C.	" " "
"	Det. & 224's	2.35 v. A.C.	" " "

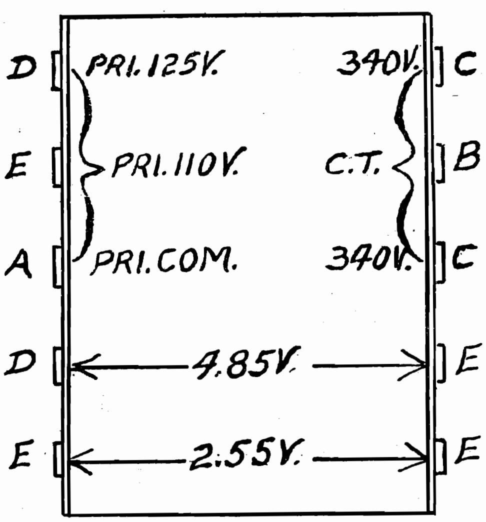
When all tubes light, measurement H-H (2.35 v.) as shown in drawing above, is ordinarily sufficient and can be taken without removal of set from cabinet.

245 plate	240 v. D.C.	As shown above, plate to chassis
245 grid	-50 v. D.C.	As shown above, field to chassis
1st A.F. plate	65 v. D.C.	Plate to cathode
1st A.F. grid	$-3\frac{1}{2}$ v. D.C.	Cathode to chassis
Det. plate	vary widely with different meters approximately 45 volts.	Plate to cathode
Det. grid	vary widely with different meters	Cathode to chassis

Note:- In taking readings, have all tubes in place, and the speaker connected; place the Hi-Lo switch in proper position to agree with your line voltage.

All D.C. voltages must be measured with a voltmeter having 800 to 1000 ohms per volt, otherwise the readings will not be correct.

224 plate	160v	Plate to cathode
224 grid (control)	1.5 v. to 20 v. according to position of volume control.	Cathode to grid clip
224 grid (screen)	0-75 v.	Cathode to grid contact of socket.



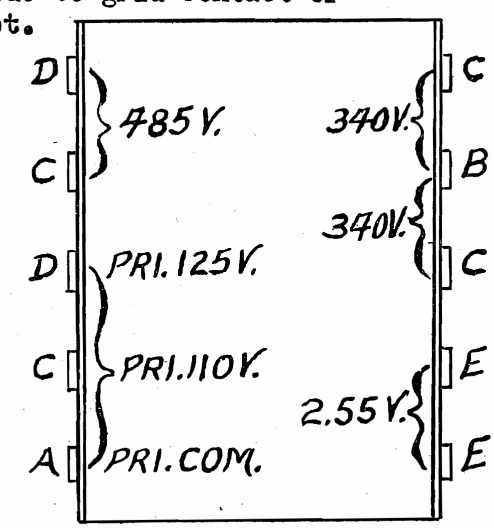
A—Black Wire

B—Red Wire.

C—Green Wire.

D—Black and White Wire.

E—Green and White Wire.



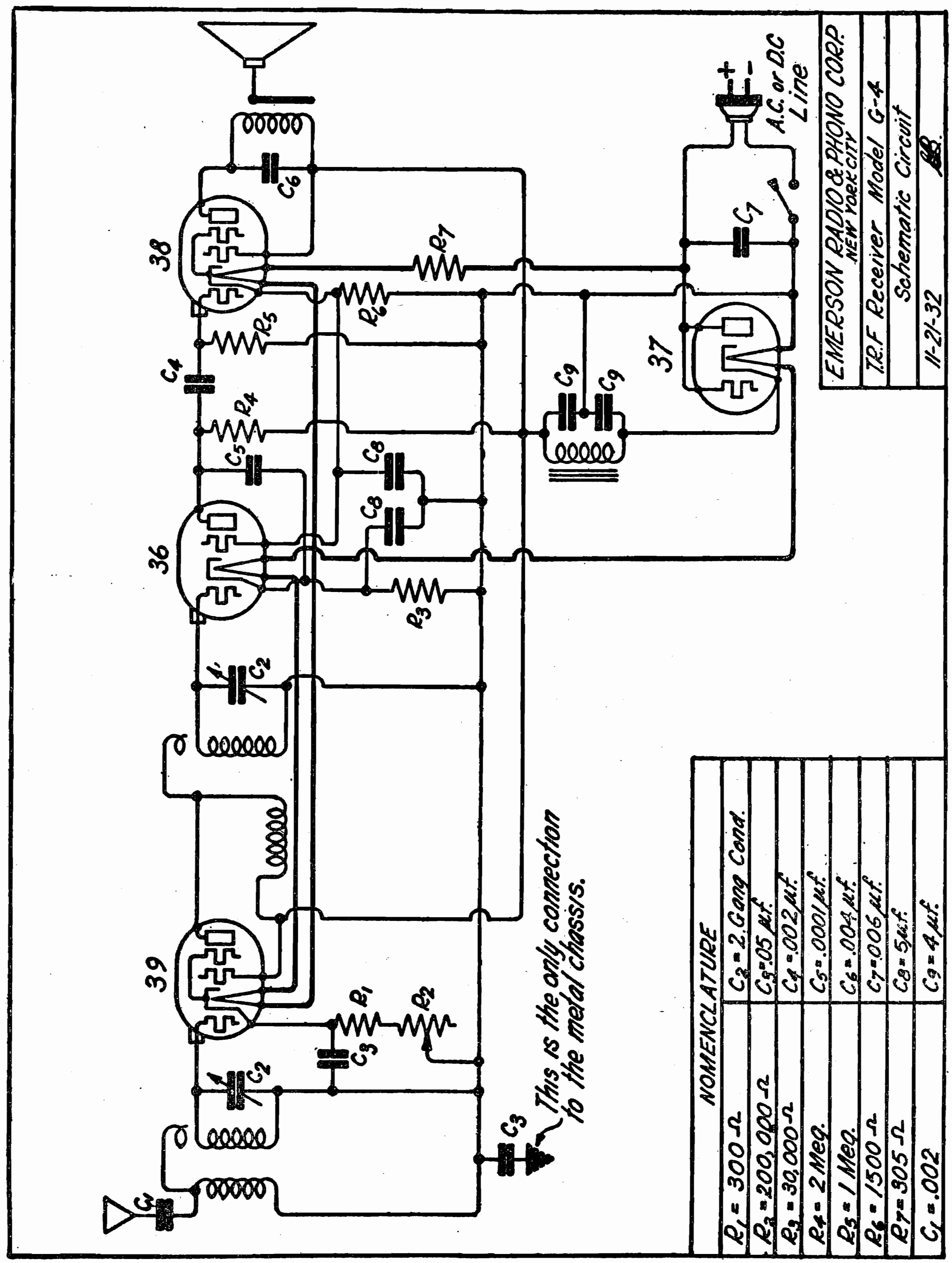
2

Power Transformer Wiring Connections

No. 1 and 2—as used with Dynamic Speaker.

MODEL 20-A, 25-A

EMERSON RADIO AND PHONOGRAPH CORPORATION

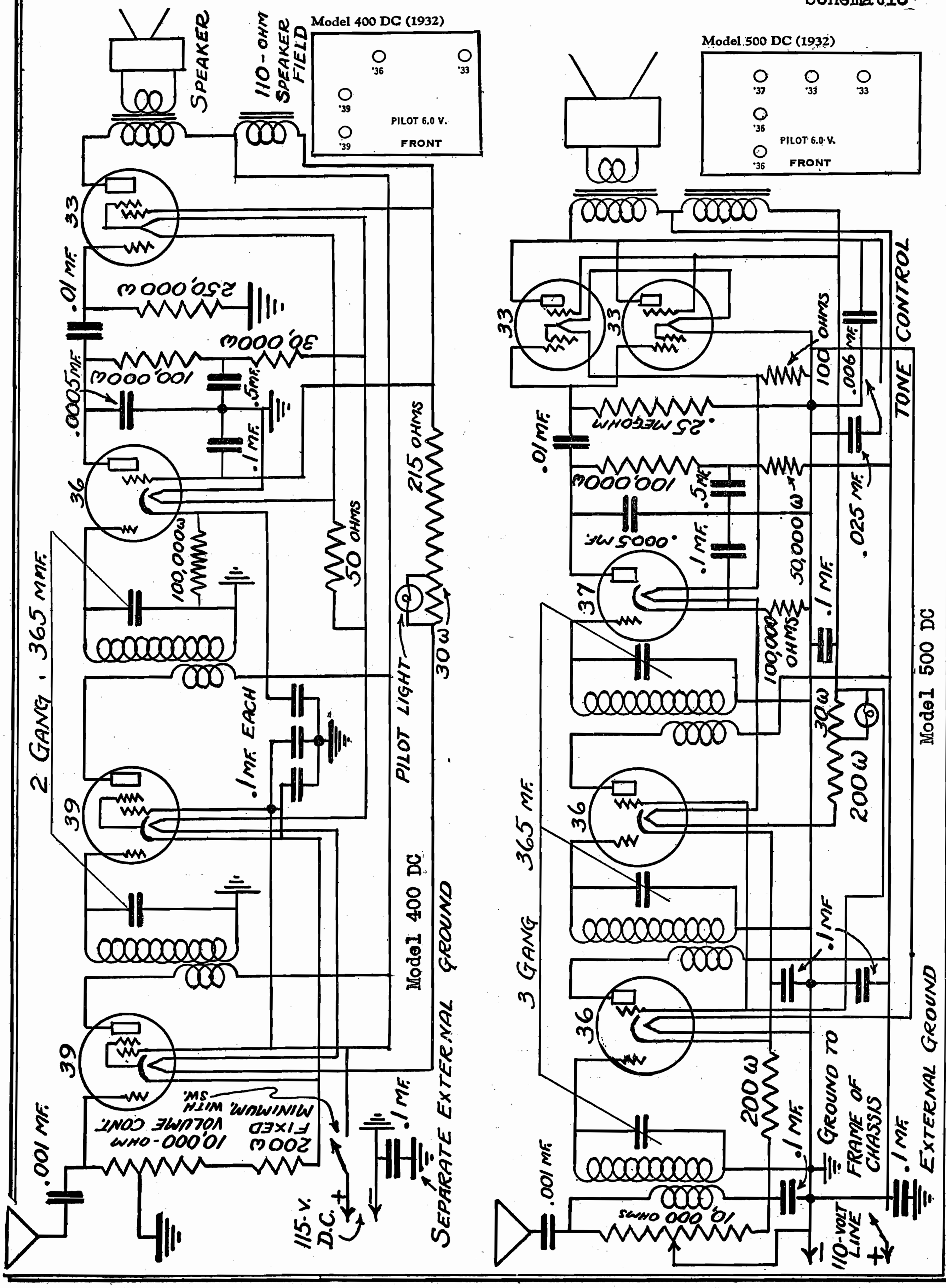


Tube	Cathode	Screen	Plate
39	*	10.5	----
36	2.5	110.	110
38	10.5	110.	110

Volume control full on. Tuning dial set at 550 KC. Antenna outside of cabinet. * Circuit structure interferes with accurate reading.

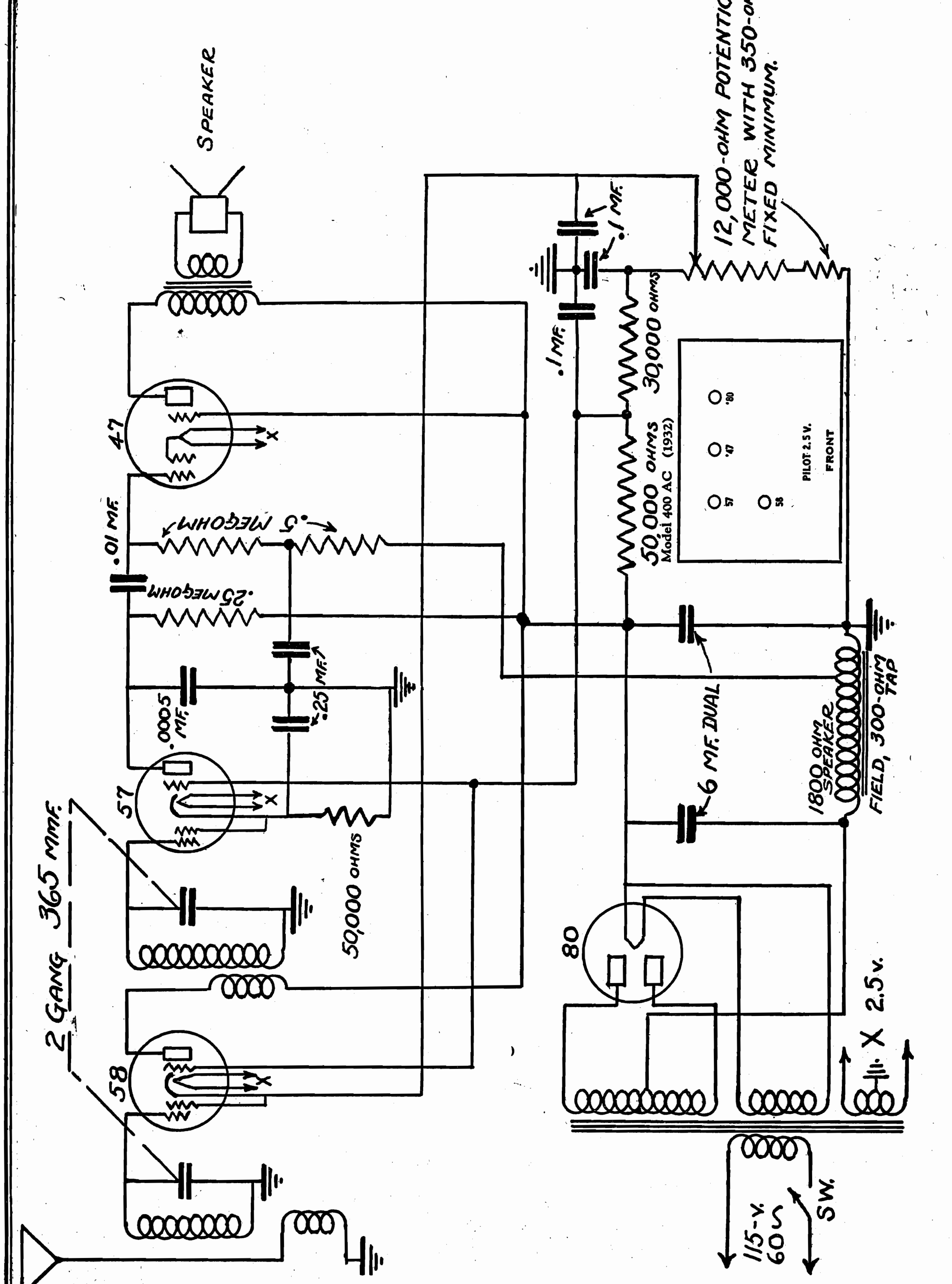
EMPIRE ELECTRICAL PRODUCTS

MODEL 400 DC
MODEL 500 DC
Schematic



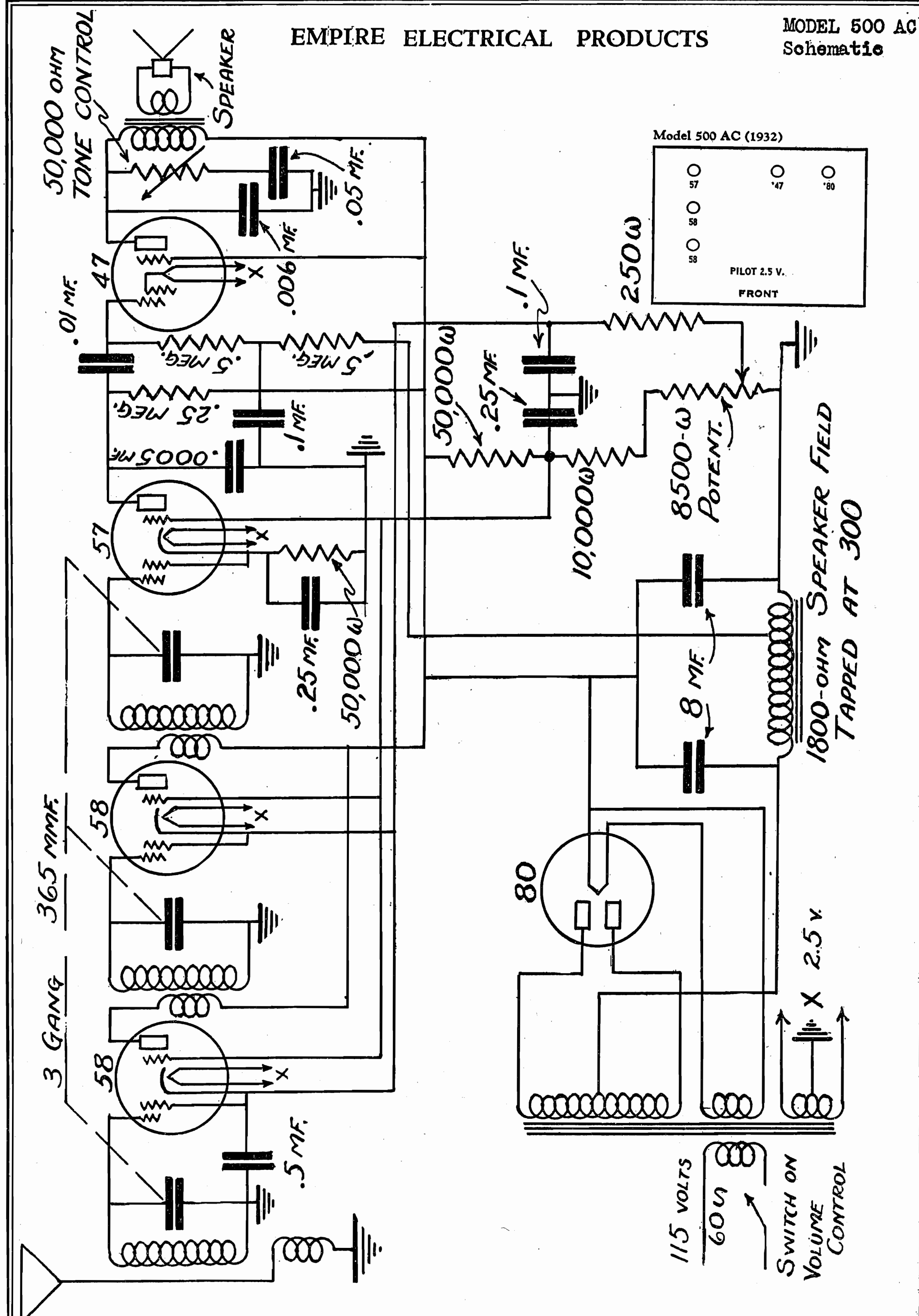
MODEL 400 AC
Schematic

EMPIRE ELECTRICAL PRODUCTS



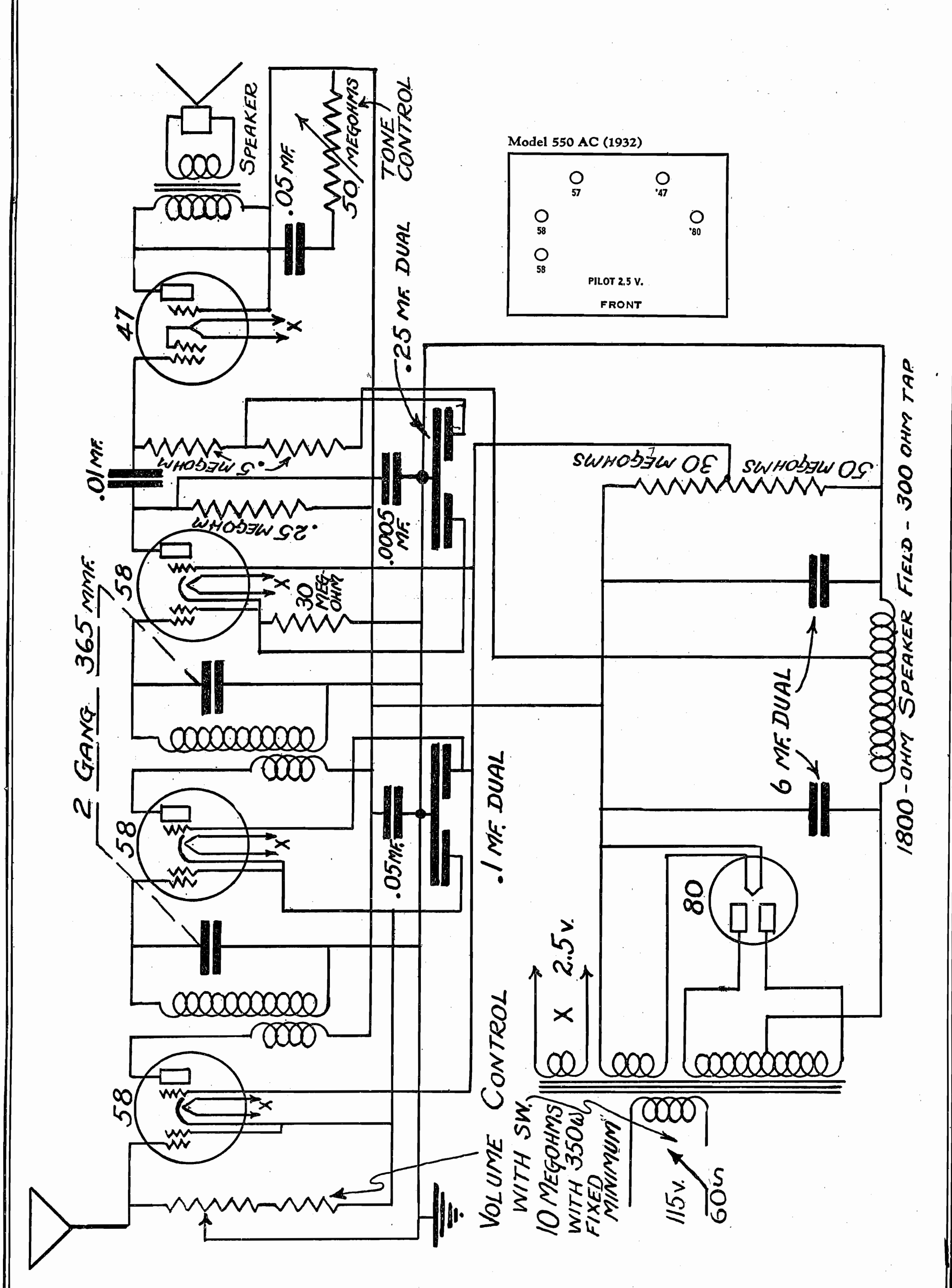
EMPIRE ELECTRICAL PRODUCTS

MODEL 500 AC
Schematic



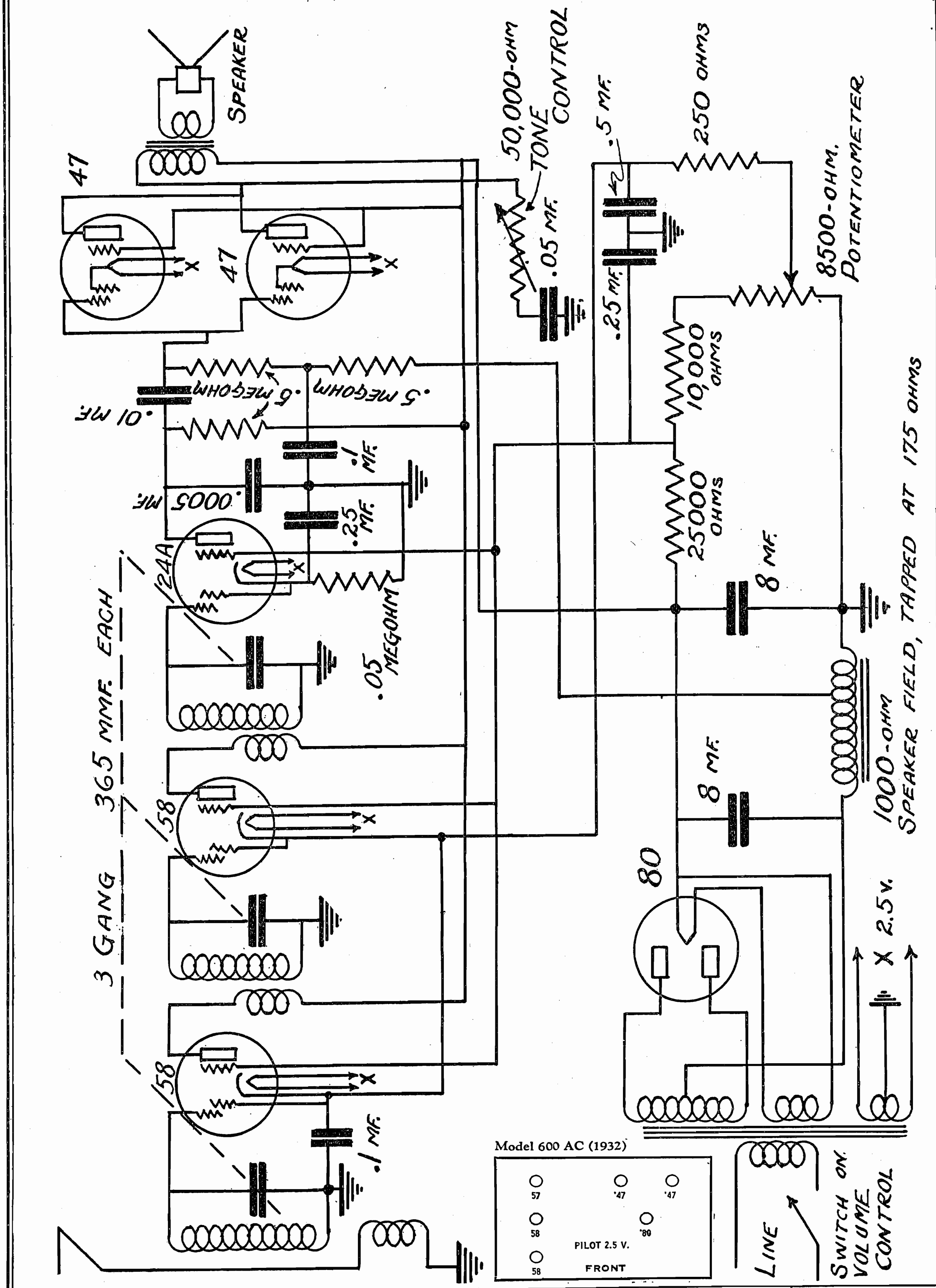
MODEL 550 AC
Schematic

EMPIRE ELECTRICAL PRODUCTS



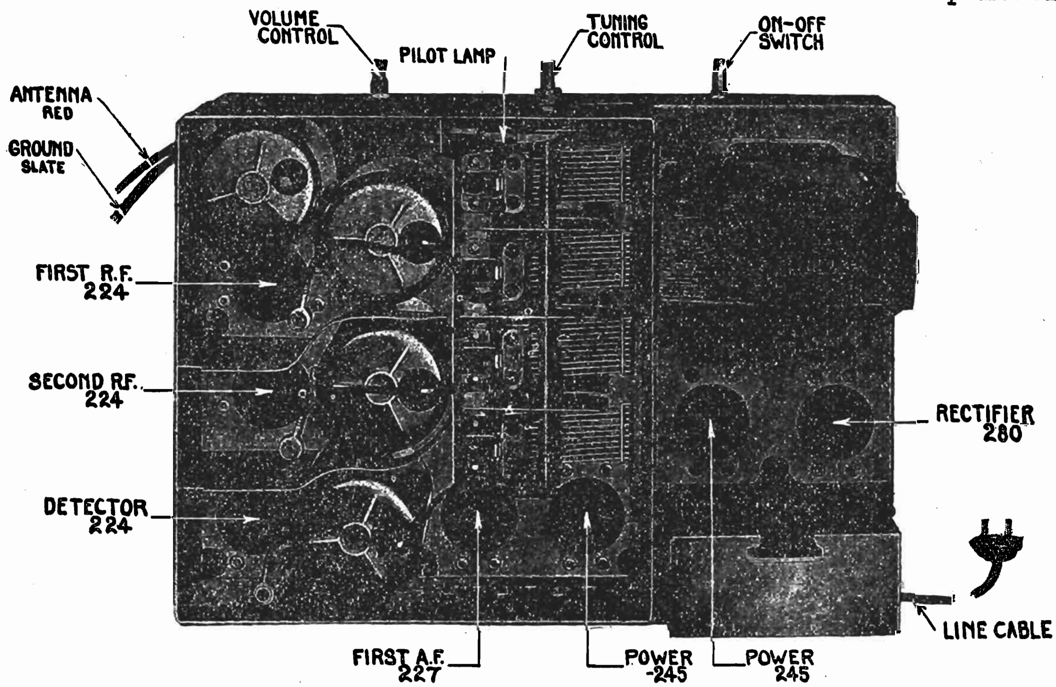
MODEL 600 AC
Schematic

EMPIRE ELECTRICAL PRODUCTS



FADA RADIO & ELECTRIC CORP.

MODEL 43,761,764
766,767
Chassis View
Compensating Data



COMPENSATING INSTRUCTIONS
Fada 43,761,762,764,766 and 767
inclusive of all KF and KG
chassis.

The compensating condensers are located on their respective tuning condensers. They are adjusted by the use of a screw driver. Since the adjusting screws are at ground potential, it is not necessary to insulate the screw driver. There are four holes in the tube and condenser housing cover which permit insertion of the screw driver for compensating purposes.

To compensate receiver:-

1st. Carefully tune the receiver to a broadcast station or local oscillator, at approximately 225 meters. Turn the volume control down so that each compensator adjustment will be apparent in the change in volume.

2nd. Beginning with the antenna compensator, carefully adjust each compensator in turn for MAXIMUM SIGNAL. Do not disturb the main tuning condenser.

3rd. After the receiver has been compensated in accordance with these instructions, carefully retune the receiver to the correct dial setting of the station being received and repeat the process of compensation so as to assure accuracy.

Special Note.

When compensating the receiver, or before and during the compensation process, be certain that the tube and overall condenser housing is firmly in place. If not, the compensating adjustments will not be accurate.

Schematic on page 84-A, Vol. I.

MODEL 43 (KF)
MODEL 761,762,764,766,767 (KG) FADA RADIO & ELECTRIC CORP.

Voltages.

VOLTAGE READINGS ON 60 CYCLE "KG" RECEIVER

The following voltage readings are to be taken at points beneath the chassis. Be sure that the overall condenser and tube shield housing cover is fastened in place or else oscillation will occur which will affect voltage readings. The speaker field coil must remain connected in the circuit and all tubes must be in their correct sockets, otherwise excessive voltages will develop which may tend to break down sections of the condenser block.

1. General Information
   Volume Control Set for minimum volume.

Line Volts	Line Watts	Filament Volts Rect.	Pwr.	Det. R.F. Aud.	Line Amps.	Plate-Cath. Volts Pwr.	R.F. AUD.	Det.	Screen Volts Det.	R.F.
100	-	4.2	2.05	1.92	.678					
105	-	4.5	2.2	2.15	.72					
110	-	4.68	2.3	2.25	.75					
115	86.5	4.9	2.41	2.38	.79	255	180	136	32	90.5
120	-	5.1	2.5	2.48	.82					
125	-	5.35	2.62	2.58	.85					
130	-	5.55	2.74	2.69	.89					

VOLTAGE READINGS ON 60 CYCLE "KF" RECEIVER

1. General Information
   Volume Control Set for minimum volume.

Line Volts	Line Watts	Filament Volts. Rect.	Power	Det. 1st R.F. Amp.	Aud.	Plate-Cath. Volts Pwr.	R.F.	Det.	Screen Volts Det.	R.F.
100	57.0	4.4	2.0	2.1						
105	62.0	4.6	2.13	2.22						
110	68.5	4.8	2.25	2.35						
115	75.0	5.0	2.35	2.48		210	170	118	20	80
120	81.5	5.2	2.45	2.58						
125	88.0	5.4	2.55	2.7						
130	95.0	5.6	2.65	2.8						

VOLTAGE READINGS ON 25 CYCLE "KF" RECEIVER

1. General Information
   Volume Control Set for minimum volume.

Line Volts	Line Watts	Filament Volts Rect.	Pwr.	Det. R.F. Aud.	Line Amps.	Plate-Cath. Volts Pwr.	R.F. Aud.	Det.	Screen Volts Det.	R.F.
100	54	4.4	1.95	2.0	.57					
105	59	4.6	2.5	2.1	.60					
110	65	4.8	2.15	2.2	.63					
115	71	5.1	2.25	2.3	.66	200	160	120	25	75
120	77	5.3	2.35	2.4	.70					
125	84	5.5	2.45	2.55	.74					
130	90	5.7	2.55	2.65	.77					

FADA RADIO & ELECTRIC CORP.

MODEL 45 KU
Voltage

CONTINUITY AND VOLTAGE READINGS ON KU RECEIVER - MODEL 45 (60 CYCLE)

Line Voltage 115 A.C. -- 103 watts
No signals - - - Volume control maximum

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	CONTROL GRID VOLTS	PLATE CURRENT	SCREEN GRID VOLTS
F-235	R.F. & I.F.	178	3.5	7	100
F-224	1st Det.	170	11	1.1	100
F-227	Oscillator	90	18	2.25	--
F-227	2nd Det.	190	*21	1.25	--
F-247	Pentodes	240	15	30	250
F-280	Rectifier			100 total	

*Bias reading, taken across 25,000 ohm bias resistor

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage	across	280	ohm	AF filter choke	(1881-X)	28	volt
"	"	800	"	Speaker field	(3-1266-Ms)	90	"
"	"	3,000	"	Resistor	(1416-Ms)	69	"
"	"	13,000	"	Resistor *	(2-1436-Ms)	80	"
"	"	13,000	"	Resistor *	(2-1436-Ms)	63	"
"	"	7,500	"	Volume control	(3-1337-Ms)	40	"
"	"	50,000	"	Resistor	(3-1248-Ms)	40	"
"	"	250	"	bias resistor	(2-1299-Ms)	3.5	"
"	"	200	"	bias resistor	(3-1283-Ms)	15	"

* 1st res. connected to 1416-Ms - 2nd res. connected to volume control

VOLTAGES ACROSS FILTER CONDENSERS

1st -- 375 | 2nd -- 345 | 3rd -- 250

DC RESISTANCE VALUES

PART NO.	DESCRIPTION	PRIMARY		SECONDARY	
1873-X	Antenna coil	10	ohm	3.4	ohm
1875-X	R.F. coil	69	"	3.4	"
1876-X	Oscillator pickup coil	.74	"	3.4	"
1869-X	I.F. transformer	100	"	100	"
1870-X	I.F. transformer	100	"	100	"
1879-X	Input pushpull transformer	2,600	"	9,430	"
1880-X	Output pushpull transformer	734	"	.75	"
1874-X	Post selector coil - - - - - - - - - - - -	3.4	ohm		
2413-Y	R.F. Choke- - - - - - - - - - - - - -	134	"		
3-1266-Ms	12-A speaker field - - - - - - - - - -	800	"		
1881-X	A.F. choke - - - - - - - - - - - - - -	280	"		

Adjustment Notes on next page.

Schematic on page 88-A, Vol. I. Adjustment notes on page 88-D, Vol. I.

MODEL 48, 49, 65 (KW) FADA RADIO & ELECTRIC CORP.
Voltage Data

CONTINUITY AND VOLTAGE READINGS ON KW RECEIVER - MODELS 65, 49, 48 (60 CYCLE)

Line Voltage 115 A.C. -- Wattage 115
No signal - Flashograph tube dark - antenna & ground tied

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	CONTROL GRID VOLTS	PLATE CURRENT	SCREEN GRID VOLTS
F-235	R.F.& 1st I.F.	160	* 4.8	6	100
F-235	1st Det.	148	*16	1.1	88
F-227	Oscillator	96	*20	3.4	--
F-235	2nd I.F.	250	* 6.3	4.2	100
F-227	2nd Det.	--	-	-	--
F-227	1st A.F.	230	*25	.1	--
F-247	Pentodes	232	15	30	241
F-280	Rectifier			Total 109	

*Bias readings, must be taken across each respective bias resistor. Correct readings cannot be obtained at control grids due to use of series resistors.

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage	across	280	ohm	AF filter choke	(1881-X)	31	Volts
"	"	800	"	Speaker field	(3-1266-Ms)	100	"
"	"	7,000	"	Resistor	(3-1264-Ms)	93	"
"	"	25,000	"	Resistor	(3-1328-Ms)	136	"
"	"	13,000	"	Resistor	(2-1436-Ms)	76	"
"	"	7,500	"	Neon control	(3-1324-Ms)	40	"
"	"	400	"	Bias resistor	(3-1329-Ms)	4.8	"
"	"	1,500	"	Bias resistor	(2-1384-Ms)	6.3	"
"	"	25,000	"	Bias resistor	(2-1438-Ms)	25	"
"	"	200	"	Bias resistor	(3-1283-Ms)	.15	"

VOLTAGES ACROSS ELECTROLYTIC CONDENSERS

1st -- 388 2nd -- 356 3rd -- 256

DC RESISTANCE VALUES

PART NO.	DESCRIPTION	PRIMARY		SECONDARY
1873-X	Antenna coil	10	ohm	3.4
1875-X	R.F. coil	69	"	3.4
1876-X	Oscillator coil	.74	"	3.4
1869-X	I.F. transformer	100	"	100
1891-X	I.F. transformer	145	"	175
1893-X	Input pushpull transformer	2,860	"	6,660
1880-X	Output pushpull transformer	734	"	.75
1874-X	Post selector coil - - - - - - - - - - 3.4 ohm			
1881-X	A.F. choke - - - - - - - - - - - - - - 280 "			
3-1266-Ms	12-A speaker field - - - - - - - - - - 800 "			
2413-Y	R.F. choke - - - - - - - - - - - - - - 134			

Schematic on page 88-B, Vol. I.

FADA RADIO & ELECTRIC CORP. MODEL KO-KOC 51,53,57 Voltage Data

CONTINUITY AND VOLTAGE READINGS ON
KO - KOC RECEIVER - MODELS 51, 53, 57 (60 CYCLE)

Line Voltage 115 A.C. -- Wattage 75
No signals - - - Volume control maximum

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	CONTROL GRID VOLTS	PLATE CURRENT	SCREEN GRID VOLTS
E-235	R.F.& I.F.	188	3.3	5.5	94
F-224	1st Det.	181	10	1	87
F-227	Oscillator	92	17	2.3	-
F-224	2nd Det.	* 86	* 8	-	* 12
F-247	Pentode	216	15	32	237
F-280	Rectifier			total 60	

* Voltage readings are low due to current drain of voltmeter.

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage across	2,250 ohm	Speaker field	(3-1310-Ms) -	135	volt
" "	3,000 "	Resistor	(2-1330-Ms)	60	"
" "	15,000 "	Resistor *	(2-1381-Ms)	89	"
" "	15,000 "	Resistor *	(2-1381-Ms)	69	"
" "	250,000 "	Resistor	(2-1440-Ms)	60	"
" "	7,500 "	Volume control**	(3-1337-Ms)	34	"

* 1st res. connected to 2-1330-Ms - 2nd res. connected to Vol con
** Control listed is for KOC - use 3-1269-Ms (7,500 ohm) for KO.

VOLTAGES ACROSS ELECTROLYTIC CONDENSERS

1st -- 387 2nd -- 252

DC RESISTANCE VALUES

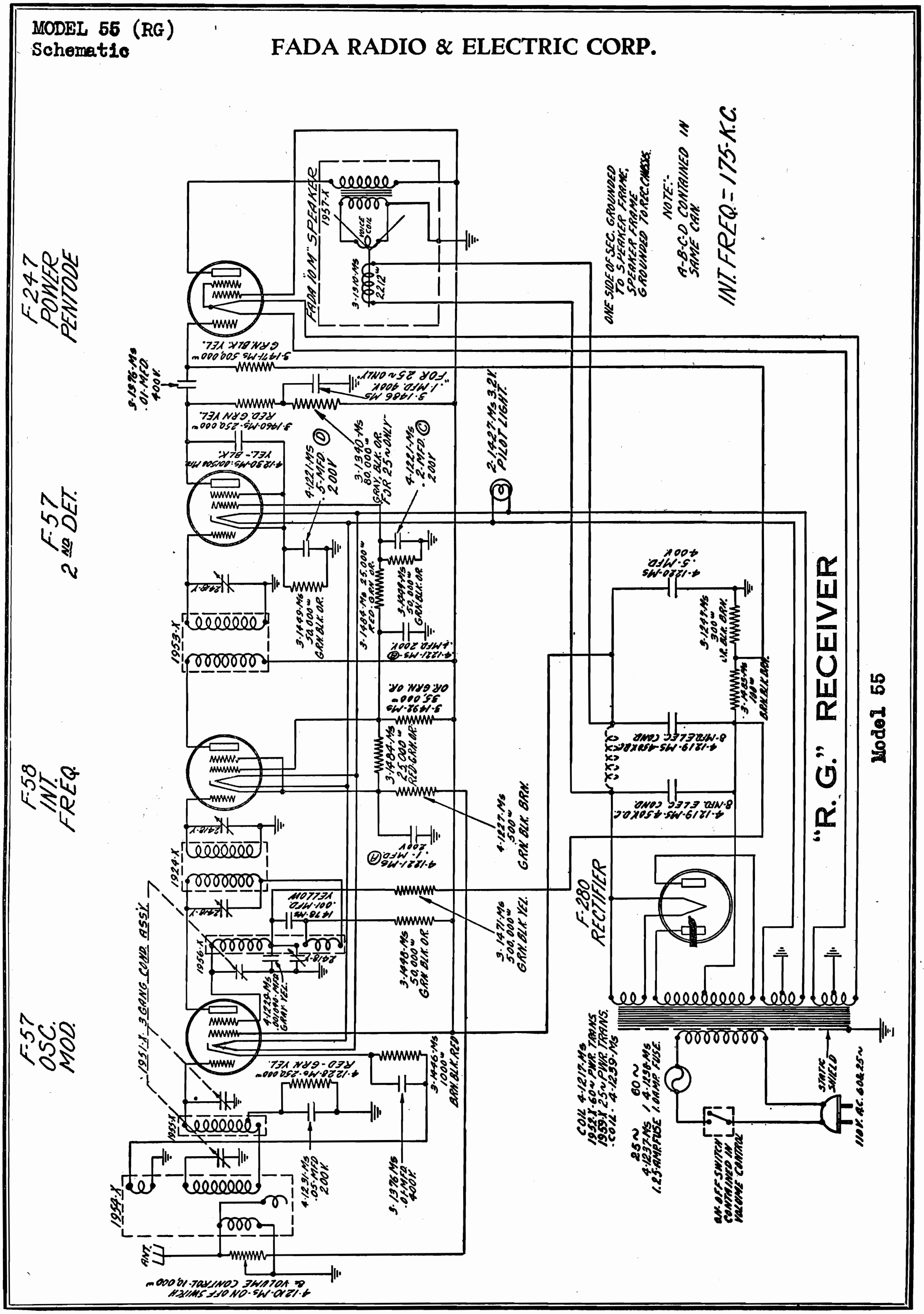
PART NO.	DESCRIPTION	PRIMARY		SECONDARY	
1873-X	Antenna coil	10	ohm	3.4	ohm
1875-X	R.F. coil	69	"	3.4	"
1876-X	Oscillator coil	.74	"	3.4	"
1888-X	I.F. transformer	100	"	100	"
1870-X	I.F. transformer	100	"	100	"
1886-X	Output pushpull transformer	708	"	1.003	"
1874-X	Post selector coil - - - - - - - - - - - - - -	3.4 ohm			
2413-Y	R.F. choke - - - - - - - - - - - - - - - - -	134 "			
3-1310-Ms	1C-B speaker field - - - - - - - - - - - - -	2250 "			

I-F trimmers are located in the rear right hand corner of the chassis. When aligning disconnect the control grid lead from the 1st detector tube. The oscillator series condenser aligned at 600 kc is on the right side of the chassis, when viewed from the front. When adjusting the oscillator series condenser, adjust the test oscillator and receiver to 600 kc. Now tune the oscillator series condenser until maximum output is indicated. It will be necessary to "rock" the main tuning control during this adjustment. The regular tuning condenser compensators are adjusted at 1400 kc.

Schematic on page 88-C, Vol. I.

MODEL 55 (RG)
Schematic

FADA RADIO & ELECTRIC CORP.



FADA RADIO & ELECTRIC CORP.

MODEL 55 (RG)
Voltage

CONTINUITY AND VOLTAGE READINGS ON
RG RECEIVER - MODEL 55
Line voltage 115 volts AC - Input watts 52

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	PLATE MA CURRENT	CONTROL GRID VOLTS	SCREEN GRID VOLTS
F-57	1st Det. Osc.	60*	3.3	6.0**	240
F-58	Int. Freq.	242	4.0	3.5	81
F-57	2nd Det.	131*	.1	---	47
F-47	Pwr. Pentode	224	30.0	16.0**	246
F-80	Rectifier	---	53.0 total	---	---

* These readings were taken with a 1,000 ohm per volt meter and are not indicative of effective voltages.

** Bias readings are to be taken across each respective bias resistor. Correct readings cannot be obtained at control grids due to series resistors.

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage across	2,225 ohm	speaker field	(3-1310-Ms)		135 volts
" "	35,000 "	resistor	(3-1492-Ms)		153. "
" "	300 "	bias resistor	(3-1247-Ms)		16. "
" "	100 "	bias resistor	(3-1495-Ms)		5.5 "
" "	500 "	bias resistor	(4-1227-Ms)	***	3.5 "
" "	1,000 "	bias resistor	(4-1228-Ms)		6. "

*** This may be a 2-1358-Ms (brown with blue end) 500 ohm resistor.

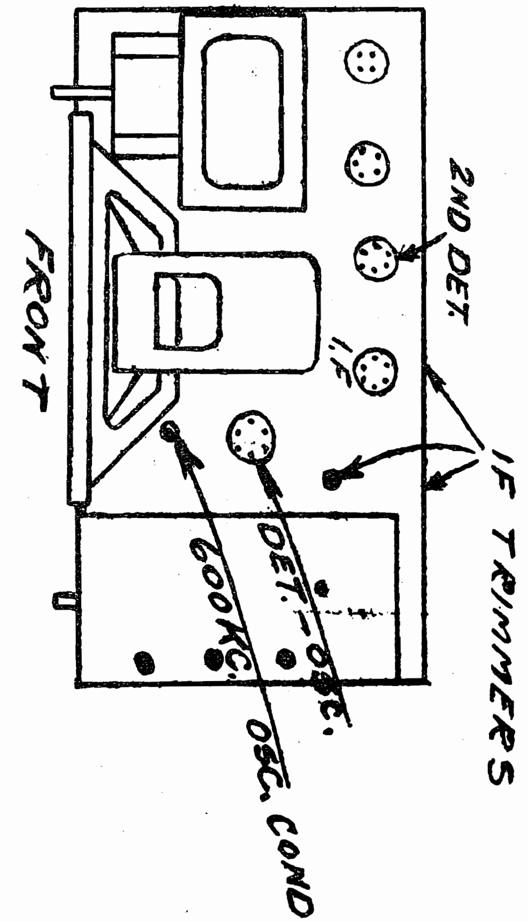
VOLTAGES ACROSS ELECTROLYTIC CONDENSERS
1st - 400 volts   2nd - 265 volts

D.C. RESISTANCE VALUES

	PRIMARY	SECONDARY
1954-X Antenna coil	20. ohms	3.4 ohms
1955-X Post selector coil	--	3.4 "
1956-X Oscillator coil	.8 ohms	2.7 "
1924-X I.F. transformer	97. "	97. "
1953-X I.F. transformer	125. "	125. "
1957-X Output transformer	719. "	1.1 "
1952-X Power transformer primary winding		7.5 ohms
" " " high voltage "		450. "
" " " rectifier "		.24 "
" " " heater "		.08 "
" " " power pentode "		.137 "
Speaker field coil (3-1310-Ms)		2212. "
Speaker voice coil (1932-X)		5.6 "

MODEL 55 (RG)
Adjustments

FADA RADIO & ELECTRIC CORP.



The Fada Model 55 is a five-tube superheterodyne using the new "50" series tubes and the Fada 10-M dynamic speaker. The intermediate frequency employed is 175 kc.

If it is necessary to remove the chassis from the cabinet, the tuning and volume control knobs will have to be removed from their shafts, and the five speaker leads disconnected. After screws are removed from the bottom of the cabinet, the chassis will slide out.

ADJUSTMENTS

To accurately adjust the various trimmer condensers, it is necessary to use a shielded signal generator capable of giving a modulated carrier frequency which can be accurately attenuated at 175 kc., 600 kc., and 1400 kc.

The receiver volume control should be turned to its maximum position and the signal output of the receiver controlled by the attenuator of the signal generator.

For test purposes on chassis removed from the cabinet it will be necessary to place a grounded metal shield between the second detector and i-f. tubes. The shield should project about one inch above the tops of the tubes—the same as the shield which is mounted on the speaker frame.

Shifting of control grid wires after adjustments have been made will throw the receiver out of alignment. It is therefore necessary to press these wires close to the tube shields before attempting any adjustments.

The three i-f. condensers are located in the rear and top of the chassis itself, and should be adjusted as follows:

Disconnect the outside antenna system from the receiver and connect a lead from the output of the signal generator to the control grid of the detector-oscillator tube. Do not disconnect the control-grid cap from the tube, nor remove the tube shield. Connect the ground (slate) lead of the receiver to the ground post of the signal generator. Connect a 250-mmfd. condenser in series with the lead wire of the signal generator.

Place an output meter across the secondary of the receiver output transformer (which is mounted on the speaker).

Now place the signal generator in operation and adjust the frequency output to 175 kc. Regulate the attenuator control so that the output meter is low enough to insure accuracy in adjusting the i-f. condensers of the receiver.

With the aid of a No. 4 socket wrench adjust the three i-f. condensers to resonance as indicated by the greatest swing of the needle on the output meter.

The compensators for the tuning condenser gang are located at the top of their respective tuning condensers and can be adjusted by the aid of a screw driver. To adjust, remove the lead wire which is connected to both the control grid of the detector-oscillator tube and also to the output system of the signal generator.

Now connect the antenna (red) wire of the receiver to the output system of the signal generator. The ground (slate) wire of the receiver is to remain connected to the ground post of the signal generator.

Adjust the carrier frequency output of the signal generator to 1400 kc. and set the tuning dial of the receiver to approximately 15. Starting with the compensator nearest the front of the receiver, adjust each compensator in turn for maximum signal output as indicated on the output meter. Do not disturb the setting of the gang condenser during these operations. Leave the volume control on full and regulate the signal output of the attenuator control of the signal generator.

The oscillator series condenser can be adjusted through the hole in the top of the chassis to the left of the speaker looking from the back. In this case adjust the carrier frequency of the signal generator to 600 kc. and pick up the signal at about 84 on the receiver tuning dial. With the No. 4 socket wrench adjust the condenser for maximum reading in output meter. To insure perfect adjustment it is necessary to "rock" the ganged condenser back and forth in order to follow the maximum signal output.

After the oscillator series condenser is properly adjusted, turn the tuning dial of the receiver to approximately 15 and adjust the signal generator to 1400 kc.; then repeat adjustment of all variable condenser compensators as heretofore outlined.

RECEIVER
Specifications

FADA R. IO & ELECTRIC CORP.

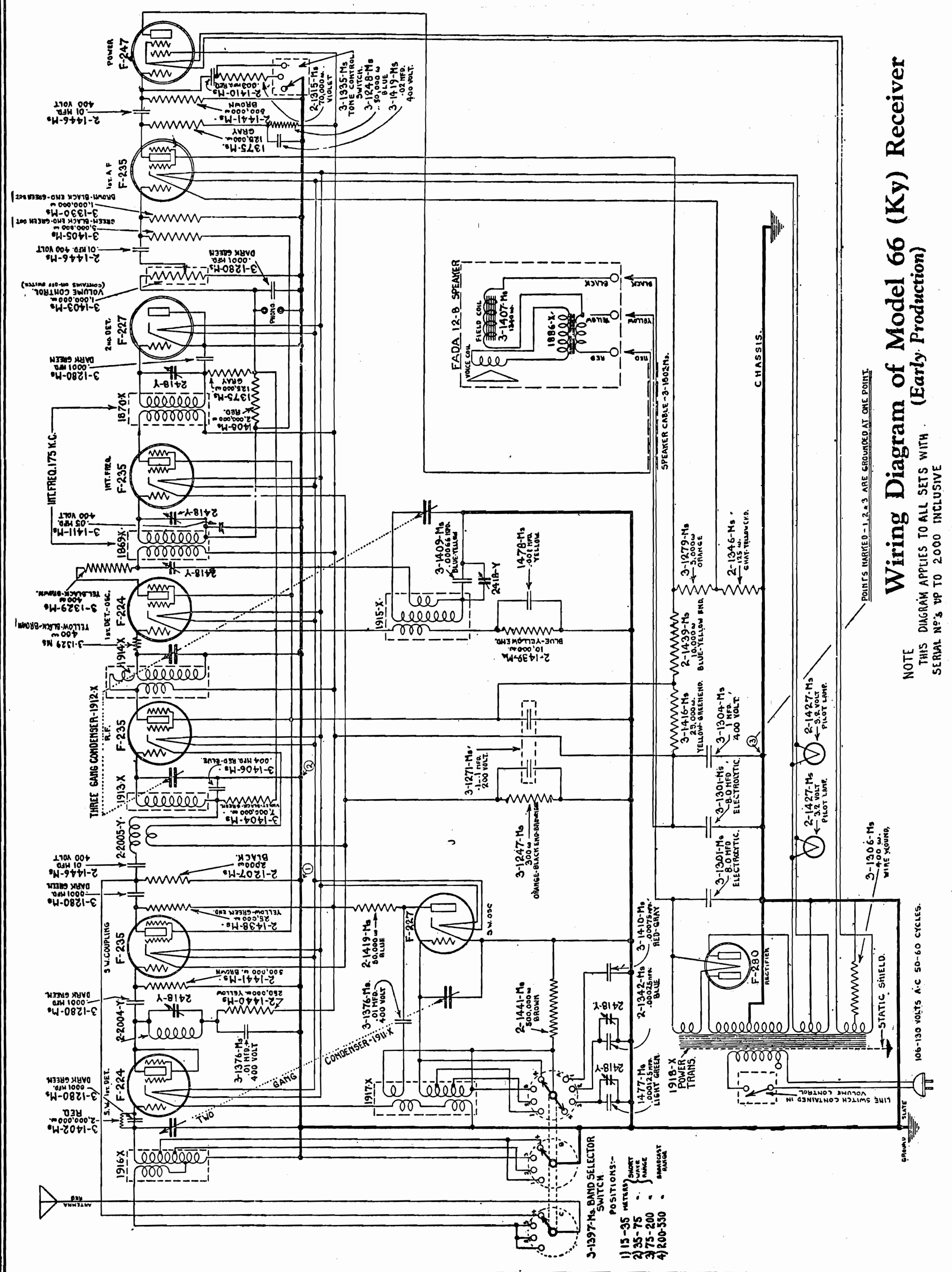
IDENTIFICATION OF RECEIVERS

These data should be of aid when seeking to identify the chassis. The shop code or number will be found at the end of the serial number on all receivers as far back as the KA.

SHOP CODE	SPEAKER	RECEIVER MODEL	TYPE	NO. OF TUBES
F	-	460/A and R-60	Battery	6
H	-	480/A, 50/80-A,R-80	Battery	8
A	-	265-A,RP-65	Battery	6
B	-	475-A,45/75-A	Battery	7
C	-	480-B,50/80-B	Battery	8
AP	-	265-CA,RP-65-CA	AC	7
BP	-	475-CA,45/75-CA	AC	8
D	-	10,11,30,31	AC	7
DC	-	12	DC	6
E	14-B	50,70,71,72	AC	9
Rèv. E	14-B	75,77	AC	8
G	-	16,17,RP-17	AC	8
GA	6	20	AC	8
GB	15-C	32	AC	8
GC	-	18	DC	7
K	7-C	35	AC	7
M	15-C	25,M-180,15-M,35-M	AC	8
O	-	22	B attery	6
Rev. K.	7-B	35-B	AC	8
P	7-A	40	AC	8
S	7-B	26,36,36-S	DC	7
KA	8-A,8-B,	41,42,44,46,47	AC	9
KB	9-A,9-B	81,82,84,86	DC	12
Rèv.M.	7-C	28,M-250,35-C,7-MA	AC	8
KE	4-C	122	Air-Cell	7
KF	10-A	43	AC	7
KG	10-A	761,762,764,766	AC	7
KO	10-B	51	AC	7
KOC	10-B	53,57(57 Phono Comb.)	AC	7
KU	12-A	45	AC	8
KW	12-A	48,49	AC	10
KX*	10-F	61,63 (Long and normal wave.)	AC	5
KY	12-B	66 (Short and normal wave.)	AC	10
KOF	12-B	512,532,572 (220 volt AC.)	AC	7
KOC-110	10-E	171,173	DC	8
KC-220*	10-C	251,253,257 (257 Phono Comb.)	DC	6
KOC-220*	10-G	Chassis		6
RA	12-E	74,76,73,87,88,89,97	AC	9
RC	12-E	78,79	AC	11
RE	10-B	73,85	AC	7
RF*	10-B	732,852 (230 volts-50 cycles)	AC	7
RX*	10-F	93,95 (Long and normal wave)	AC	7
RG	10-M	55	AC	5
RE-110	10-B	Chassis(110 volt)	DC	7
RE-220*	10-B	Chassis(220 volt)	DC	7

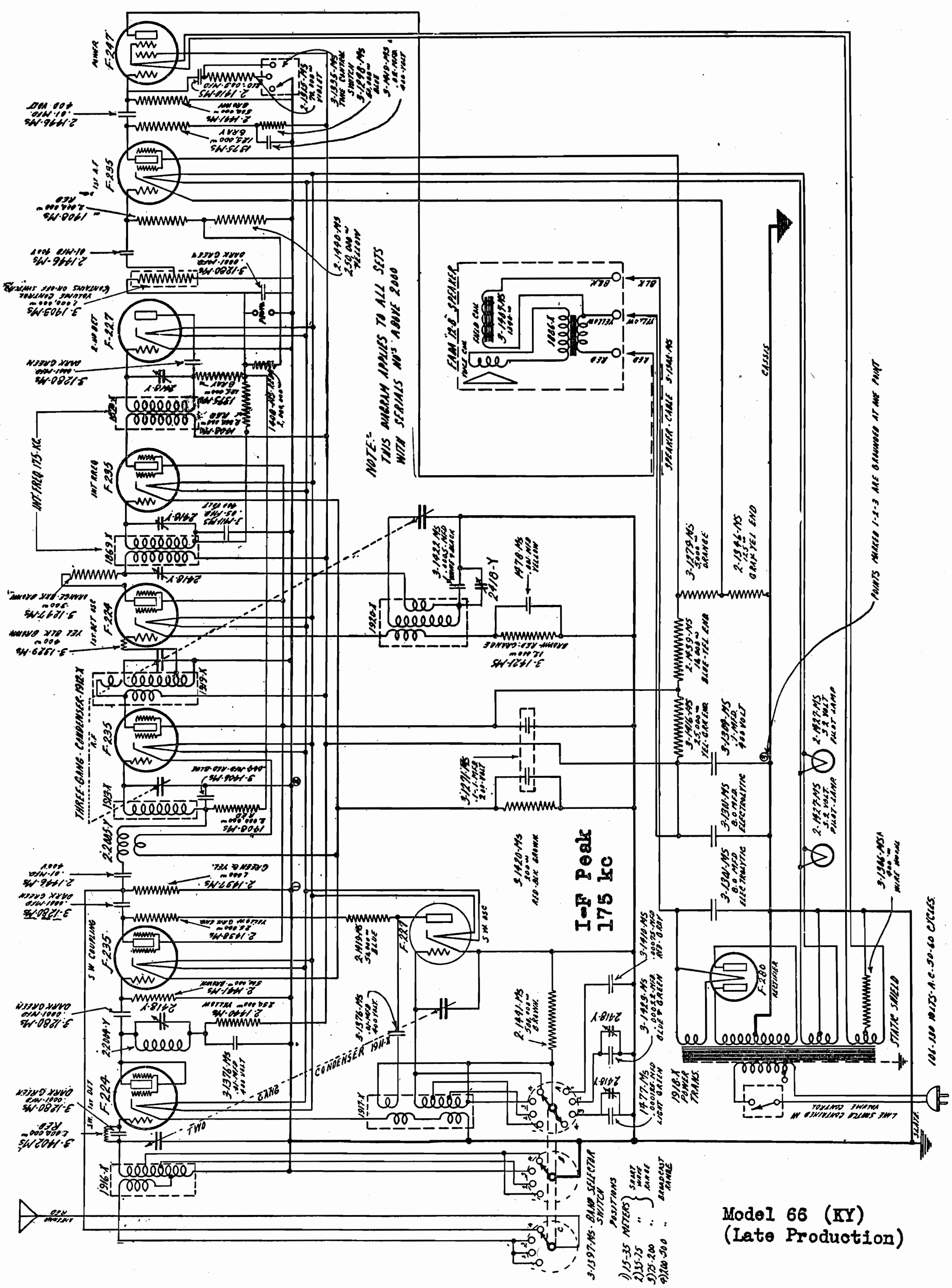
MODEL 66 (KY)
Early Production
Schematic

FADA RADIO & ELECTRIC CORP.



FADA RADIO & ELECTRIC CORP.

MODEL 66 (KY)
Late Production
Schematic



Model 66 (KY)
(Late Production)

MODEL 66 (KY)
Service Notes

FADA RADIO & ELECTRIC CORP.

GENERAL SERVICE NOTES ON KY RECEIVER - MODEL 66

It is sometimes necessary to install normal band Receivers on antenna systems having shielded lead-in wires, to minimize electrical interference, but is is unwise to use this type of installation on the KY Receiver because it will seriously affect reception on short waves.

Oscillation may be experienced on the short wave Receiver due to the selection of a first detector-oscillator tube. This oscillation may be cured by inserting a 400 ohm resistor (3-1329-Ms) in series with the control grid of the first detector-oscillator tube.

In any case where the short wave receiver oscillates when the 400 ohm resistor is already installed, it may be necessary to clean the contacts and the section of the band selector switch nearest the front of the chassis.

While on the subject of oscillation we wish to call attention to the three-quarter size shield used on the short wave oscillator tube. This shielding was designed to insure correct performance of the oscillator tube and under no circumstances should the shielding be substituted or altered.

In checking over the chassis be sure to avoid any possibility of disturbing the wiring, especially the bare ground wires directly beneath the short wave variable gang condensers which on their rubber shock mounting may come low enough to make contact with the wiring and cause considerable noise or microphonics to result.

In any case of an intermittent signal which is not directly traceable to defective tubes or shorted wiring, it is advisable to allow the chassis to play for about an hour so that the various integral parts can become fairly warm. Then allowing the chassis to continue to operate, turn it over on its side and gently tap with an insulated tool, the various bypass condensers and resistors in an effort to locate one having an intermittent circuit. It may also be necessary to gently pull on condenser and resistor leads as well as lugs in order to locate an intermittent connection in a defective part. This method of trouble shooting is to be preferred over the "hit and miss" method of replacing parts at random until the trouble disappears.

It is assumed, of course, that the service man is familiar with the fact that a mircophonic condition can be caused by allowing the control shafts and knobs of the gang condensers, volume controls and switches to touch the front panel of the cabinet.

On a sensitive Receiver such as the KY, there is a microphonic condition which may develop and which cannot be eliminated by the usual method of removing microphonic tubes, etc. In cases of this kind it is more than likely that the wire on the inside of the short wave oscillator or normal wave oscillator coils is flapping against the side of the tubing. This can readily be corrected by using wax or lacquer to secure the wires to the tubing.

FADA RADIO & ELECTRIC CORP.

MODEL 66 (KY)
Trimmer Notes

COMPENSATING INSTRUCTIONS FOR KY RECEIVER - MODEL 66

In order to accurately adjust the various trimmer condensers of the Receiver in accordance with the following instructions, it is essential to use a shielded signal generator capable of giving a modulated signal which can be accurately attenuated at 175 K.C., 600 K.C., 1460 K.C., 3460 K.C., and 6000 K.C.

This Receiver is equipped with an automatic volume control, which necessitates setting the manual volume control of the Receiver, to its maximum position and controlling the volume of the signal with the aid of the attenuator control of the signal generator.

ADJUSTMENT OF I.F. CONDENSERS

The three (3) I.F. condensers are located in the rear and side of the chassis itself, as indicated in the sketch.

(1) Remove the overall condenser and tube shield housing cover so that a wire from the attenuator circuit of the signal generator can be attached to the control grid cap of the first detector - oscillator tube. Do not disconnect the control grid connector from the tube. The housing cover can be laid in place upside down if necessary.

(2) Disconnect the outside antenna system from the Receiver during this operation.

(3) Turn the rotar plates of the variable condensers on the normal bank Receiver so that all plates are meshed (maximum capacity).

(4) Place an output meter across the speaker voice coil (secondary of the Receiver output transformer, which is mounted on speaker) so that the variations in signal intensity can be measured by eye as well as detected by ear. Output meters with a multi-range scale are generally supplied with good quality commercial signal generators.

(5) Place the signal generator in operation and adjust the frequency indicator to 175 K.C. Regulate the attenuator control so that the output signal is weak enough to insure accuracy in adjusting the I.F. condensers of the Receiver.

(6) With the aid of a #4 socket wrench, adjust the three (3) I.F. condensers to resonance as indicated by the loudest signal and greatest swing of the needle in the output meter.

ADJUSTMENT OF NORMAL BAND VARIABLE GANG CONDENSER COMPENSATORS

The compensating condensers are located at the top of their respective tuning condensers. They can be adjusted with a screw driver. There are three holes (see sketch) in the overall condenser and tube shield housing cover, which permit insertion of the screw driver for compensating purposes.

MODEL 66 (KY)
Trimmer Notes

FADA RADIO & ELECTRIC CORP.

(1) Remove the wire from the attenuator circuit of the signal generator which was attached to the control grid of the first detector - oscillator tube and replace the overall condenser and tube shield housing cover.

(2) Connect the red antenna wire of the Receiver to the signal generator.

(3) Set the signal generator at 1460 K.C.

(4) Set the calibrated dial of the normal bank Receiver to read 1460 K.C.

(5) Turn the bank selector switch of the Receiver as far to the right as it will go - (normal wave setting).

(6) Starting with the compensator nearest the back of the Receiver, adjust each compensator in turn for maximum signal output as indicated in the output meter. Do not disturb the setting of the gang condenser during these operations. Leave the volume control on full and regulate signal strength with the attenuator control of the signal generator.

ADJUSTMENT OF OSCILLATOR
SERIES CONDENSER

The oscillator series condenser can be adjusted through the hole nearest the rear on the right side of chassis (see sketch).

(1) Tune the signal generator to a signal of 600 K.C.

(2) Set the calibrated dial of the normal bank Receiver to 600 K.C.

(3) With the aid of a #4 socket wrench adjust the oscillator series condenser until a maximum signal is indicated in the output meter. To insure perfect adjustment it is necessary to "rock" the variable gang condenser in order to follow the maximum signal output.

(4) After oscillator series condenser is properly adjusted, turn the calibrated dial of the Receiver to 1460 K.C. and adjust the signal generator to the same frequency, then readjust all variable gang condenser compensators as outlined in the foregoing instructions.

ADJUSTMENT OF THE SHORT WAVE
VARIABLE GANG CONDENSER COMPENSATORS

The compensators are located at the top of their respective turning condensers and can be adjusted with the aid of a screw driver.

(1) Turn the band selector switch to the 35/75 meter position.

(2) Turn the normal bank variable gang condensers so that the indicator points to the red mark. Best results will no doubt be obtained when the indicator is pointing to about 99 degrees or the beginning of the red mark rather than the center or extreme end.

(3) Adjust the signal generator to 6000 K.C.

FADA RADIO & ELECTRIC CORP.

MODEL 66 (KY)
Trimmer Notes

(4) Tune the short wave Receiver to pick up the 6000 K.C. signal at about 38 degrees on the dial.

(5) Beginning with the compensator nearest the front of the Receiver, adjust the two compensators for maximum signal as indicated in the output meter.

ADJUSTMENT OF SHORT WAVE
COUPLING CONDENSER

The hole through which the condenser is to be adjusted will be found in the chassis between the S.W. first detector and S.W. coupling tubes. (see sketch).

(1) Leave the bank selector switch set at 35-75 meters.

(2) Leave the signal generator tuned to 6000 K.C.

(3) With the aid of a #4 socket wrench, adjust the short wave coupling condenser for maximum signal as indicated in the output meter.

ADJUSTMENT OF OSCILLATOR SERIES CONDENSERS

The oscillator series condensers can be adjusted through the holes located in the front center of the chassis, between the short wave variable gang condenser and the overall condenser and tube shield housing.

(1) Leave the band selector switch set at 35-75 meters.

(2) Adjust the signal generator to a signal of 3460 K.C.

(3) Turn the short wave variable gang condenser to 100 degrees so that all plates are meshed (maximum capacity).

(4) Adjust the front series tracking condenser for maximum signal as indicated in the output meter.

(5) Set the band selector switch to the 75-200 meter setting but leave the variable gang condensers as they are.

(6) Adjust the signal generator to 1460 K.C.

(7) With the aid of a #4 socket wrench, adjust the rear series tracking condenser for maximum signal as indicated in the output meter. It may become necessary to place the hand on the control grid of the short wave first detector tube to prevent oscillation during this adjustment.

(8) After the above adjustments have been completed check for accuracy by immediately tuning in local broadcast stations especially on the short waves.

I-F CONDENSERS

See Voltage Page for location of intermediate frequency trimmer condensers

MODEL 66 (KY)
Voltage
Socket
IF Condensers

FADA RADIO & ELECTRIC CORP.

Line voltage 115 A.C. -- 100 watts
No signals -- Ant. & ground leads tied together

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	CONTROL GRID VOLTS	PLATE CURRENT	SCREEN GRID VOLTS
F-224	S.W. 1st Det.	28	-	1.2	28
F-235	S.W. Coupling	152	4	4.4	100
F-227	S.W. Osc.	59	-	5.3	-
F-235	R.F.	290	4	4.4	100
F-224	1st Det.Osc.	282	8	.8	92
F-235	Int. Freq.	290	4	4.4	100
F-227	2nd Det.	-	-	-	-
F-235	1st A.F.	48	-	1.4	34
F-247	2nd A.F.	250	17*	34.0	276
F-280	Rectifier			76.0 total	

* True bias reading, taken across 400 ohms bias resistor

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

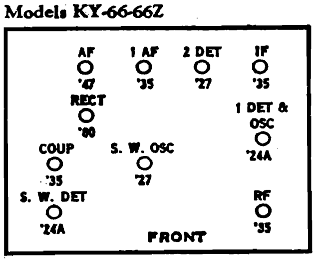
Voltage across	1,400 ohm	Speaker field	(3-1407-Ms)	102	volts
" "	25,000 "	resistor	(3-1416-Ms)	193	"
" "	10,000 "	resistor	(2-1439-Ms)	70	"
" "	50,000 "	resistor	(2-1419-Ms)	232	"
" "	400 "	resistor	(3-1306-Ms)	17	"
" "	300 "	resistor	(3-1247-Ms)	4	"

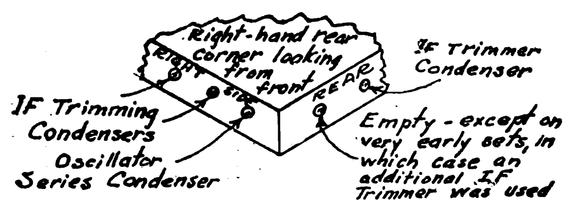
DC RESISTANCE VALUES

		PRIMARY	SECONDARY
1919-X or 1914-X	R.F.Coil	70.9 ohms	3.4 ohms
1916-X	Short wave ant. coil	.19 "	.89 "
1869-X	I.F. transformer	100.00 "	100.00 "
1870-X	I.F. transformer	100.00 "	100.00 "
1886-X	Output transformer	708.00 "	1.003 "
1913-X	Antenna coil	- -	3.4 "
2-2005-Y	Image suppressor coil	15.5 "	1.47 "
2-2004-Y	Coupling coil	12.6 "	
3-1407-Ms	12-B speaker field	1400.00 "	

1915-X or 1920-X	Oscillator coil -	Pick up coil	.59 ohms
		Secondary	2.8 "
		Tickler Coil	16.9 "
1917-X	Short wave osc. coil -	Pick up coil	.2 ohms
		Secondary	.6 "
		Tickler Coil	.2 "

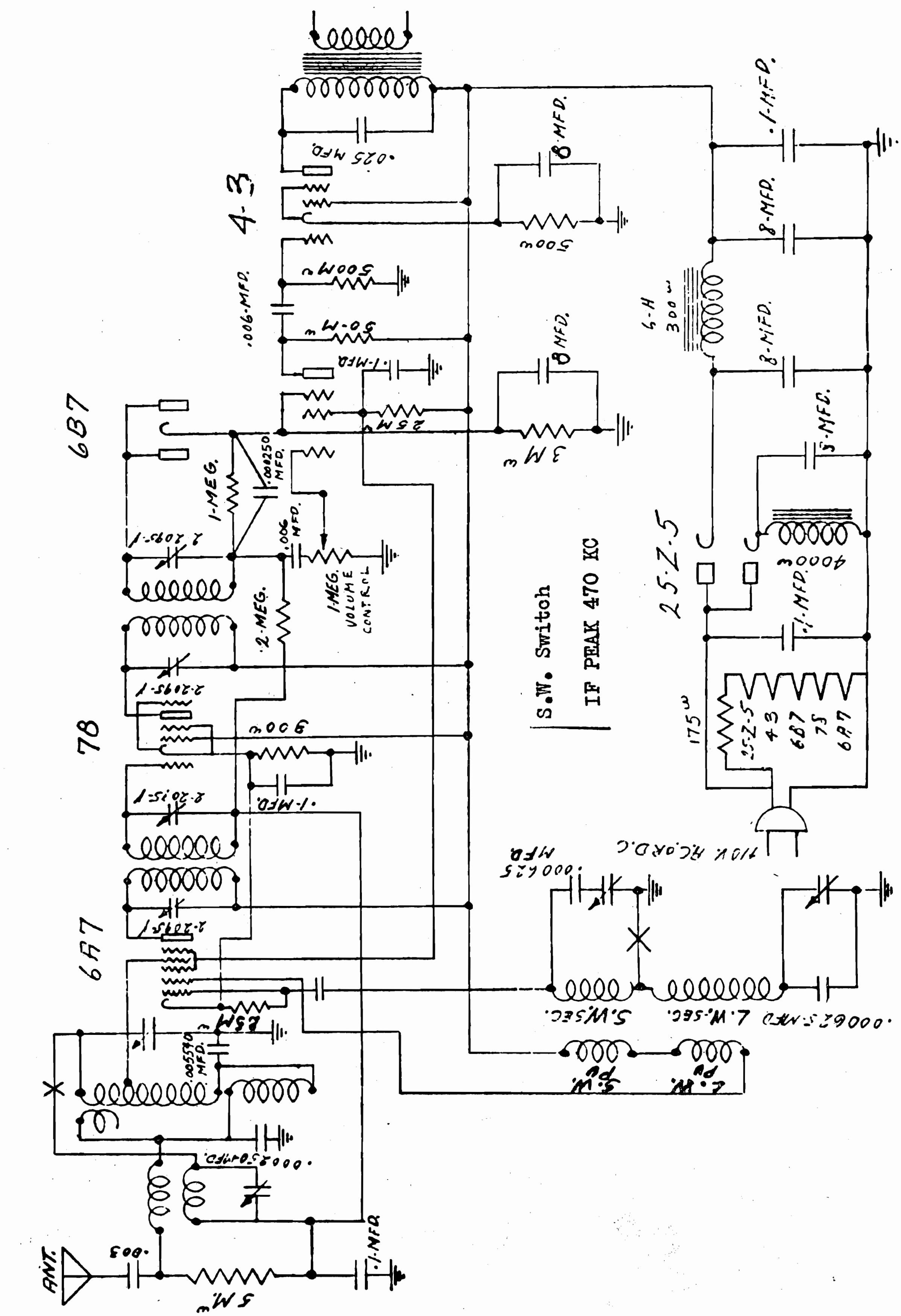
Models KY-66-66Z





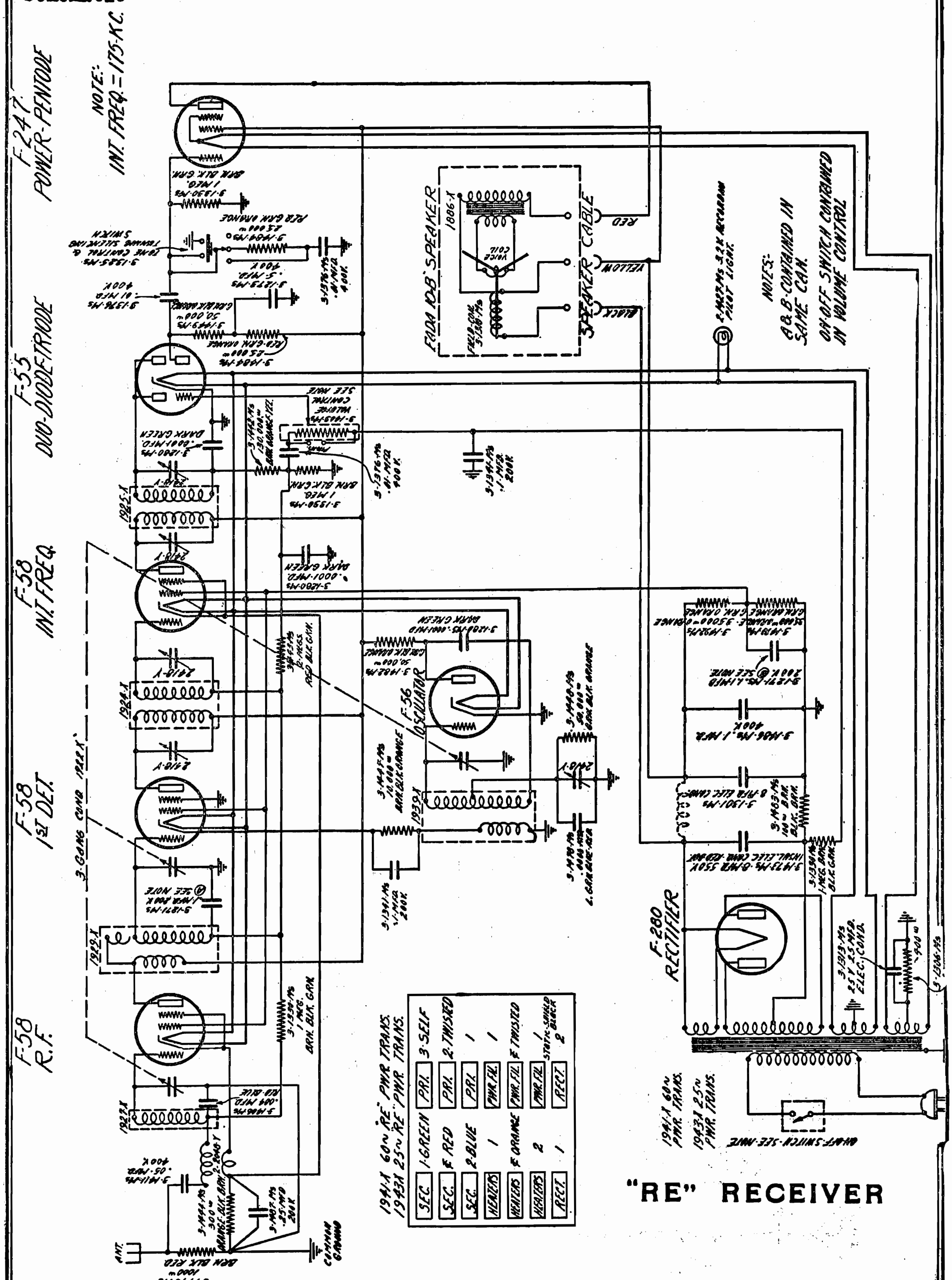
MODEL RN

FADA RADIO & ELECTRIC CORP.



MODEL 73, 85 (RE)
Schematic

FADA RADIO & ELECTRIC CORP.

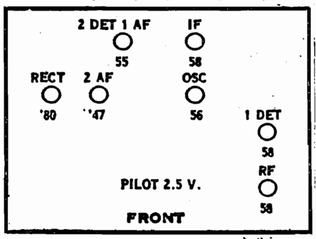


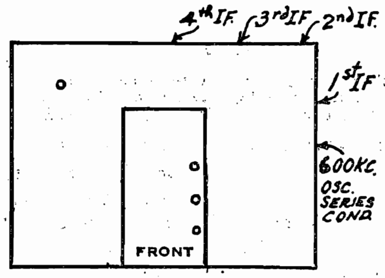
"RE" RECEIVER

FADA RADIO & ELECTRIC CORP.

MODEL 73, 85 (RE)
Voltage Data

Models 73, 73Z, 85, 85Z (1932)





CONTINUITY AND VOLTAGE READINGS ON
RE RECEIVER - MODELS 73 and 85 (60 cycle)

Line voltage 115 A.C. -- Wattage 69
No signals -- Ant. & ground leads tied together

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	PLATE MA CURRENT	CONTROL GRID VOLTS	SCREEN GRID VOLTS
F-58	R.F. & I.F.	267	8.0	4.8	90
F-58	1st Detector	263	1.0	10.0	85
F-56	Oscillator	72	4.0	--	--
F-55	(2nd Det. Diode	--	--	--	--
	(1st A.F. triode	94	2.5	6.2	--
F-247	Pwr Pentode	236	32.0	15.0	258
F-280	Rectifier		64.0 total		

Note:- Bias readings are to be taken across each respective bias resistor. Correct readings cannot be obtained at control grids due to use of series resistors.

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage across	2,500 ohm	Speaker field	(3-1310-Ms)	155 volts
" "	35,000 "	Resistor (2 watt)	(3-1492-Ms)	182 "
" "	35,000 "	Resistor (1 watt)	(3-1470-Ms)	91 "
" "	100 "	Bias resistor	(3-1483-Ms)	8.2 "
" "	300 "	Bias resistor	(3-1444-Ms)	4.8 "
" "	400 "	Bias resistor	(3-1306-Ms)	14 "

VOLTAGE ACROSS ELECTROLYTIC CONDENSERS

1st -- 428 2nd -- 273

DC RESISTANCE VALUES

		PRIMARY	SECONDARY
1927-X	Antenna coil	-- ohm	3.5 ohm
1929-X	R.F. coil	71 "	3.5. "
1939-X	Oscillator coil	.8 "	3.5. "
1924-X	I.F. transformer	97 "	97 "
1925-X	I.F. transformer	97 "	97 "
2-2048-Y	Suppressor coil	15.5 "	1.47 "
1886-X	Output transformer	708 "	1.003 "

3-1310-Ms10-B speaker field . . . . . .2500 ohms

MODEL 73, 85 (RE)
Alignment Data

FADA RADIO & ELECTRIC CORP.

TABLE 1

The measurements below should be made with all tubes removed from their sockets, the speaker disconnected, silencing switch off and pilot light removed. Unless otherwise clearly indicated, all resistance values are measured between chassis and point stated.

Reference Points	*Value in Ohms*	*Reference Points*	*Value in Ohms*
Aerial to ground	1,000	2 Det. diode plate to plate	0
		2 Det. diode plates	1,130,097
R-F. control grid	4 megs.	2 Det. input coil only	97
R-F. grid winding only	3.5	2 Det. cathode	0
R-F. suppressor coil pri. only	15.5	2 Det. control grid (V.C. all out)	1 meg.
R-F. cathode	301.47	2 Det. triode plate to 47 screen	75,000
R-F. suppressor coil sec. only	1.47		
R-F. screen grid	35,000	Osc. control grid	50,000
R-F. plate to 47 screen	71	Osc. grid coil only (complete)	3.5
Suppressor grid to r-f. cathode	0	Osc. cathode	0
		Osc. plate to 47 screen	50,000
1 Det. control grid	3 megs.		
1 Det. grid coil only	3.5	47 control grid	1 meg.
1 Det. cathode	10,000.8	47 filament	400
1 Det. cathode-osc. coil only	.8	47 screen grid	70,000
1 Det. suppressor grid	0	47 plate to 80 fil.	3,208
1 Det. screen grid	35,000	47 plate to screen	708
1 Det. plate to 47 screen	97		
		80 filament	72,500
I-F. control grid	3 megs.	80 anode to anode	350-400
I-F. grid coil only	97	80 anode	225-250
I-F. cathode	301.47		
I-F. suppressor to i-f. cathode	0	Across speaker field only	2,500
I-F. screen grid	35,000		
I-F. plate to 47 screen	97	Across output trans. sec. only	1.003

ADJUSTMENT OF I-F. CONDENSERS

The four i-f. condensers are located in the rear and side of the chassis itself. For adjustment, proceed as follows:

1. Disconnect the outside antenna system from the receiver and connect a lead wire from the dummy antenna system of the signal generator to the control grid of the first detector tube. Do not disconnect the control grid connector from the tube, nor remove the tube shield. Connect the ground (slate) lead of the receiver to the ground post of the signal generator. In the event that the signal generator being used does not have a dummy antenna system, connect a 250-mfd. condenser in series with the lead wire.

2: Remove the 56 oscillator tube from the receiver socket. Place an output meter across the secondary of the receiver output transformer (which is mounted on the speaker) so that the variations in signal output can be noted.

3. Place the signal generator in operation and adjust the frequency output to 175 kc. Regulate the attenuator control so that the output signal is low enough to insure accuracy in adjusting the i-f. condensers of the receiver.

4. With the aid of a No. 4 socket wrench adjust the four i-f. condensers to resonance as indicated by the greatest swing of the output meter.

ADJUSTMENT OF GANGED CONDENSERS

The compensators for the ganged condensers are located at the top of their respective tuning condensers, and can be adjusted with the aid of a screw driver. For adjustment, proceed as follows:

1. Remove the lead wire which is connected to both the control grid of the first detector and also to the dummy antenna system of the signal generator.

2. Connect the antenna (red) wire of the receiver to the dummy antenna system of the signal generator. The ground (slate) wire of the receiver is to remain connected to the ground post of the signal generator.

3 Adjust the carrier frequency output of the signal generator to 1,400 kc., and set the calibrated dial of the receiver to read 1,400 kc.

4. Starting with the compensator nearest the rear of the receiver, adjust each compensator in turn for maximum signal output as indicated on the output meter. Do not disturb the setting of the gang condenser during these operations. Leave the manual volume control on full and regulate the signal output with the attenuator control of the signal generator as before.

ADJUSTMENT OF OSCILLATOR

The oscillator series condenser can be adjusted through the hole in the side of the chassis, near the first i-f. transformer. Proceed as follows:

1. Adjust the carrier frequency output of the signal generator to 600 kc., and set the calibrated dial of the receiver to read 600 kc.

2. With the aid of a No. 4 socket wrench adjust the oscillator series condenser until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is necessary to "rock" the ganged variable condenser in order to follow the maximum signal output.

3. After the oscillator series condenser is properly adjusted turn the calibrated dial of the receiver to 1,400 kc., and adjust the signal generator to the same frequency, then readjust all variable condenser compensators as outlined in the foregoing instructions.

The resistance measurement data for the Fada "RE" chassis is given in Table 1.

MODEL 74,76,83,88,89 (RA)
Voltage Data
Socket

FADA RADIO & ELECTRIC CORP.

VOLTAGE READINGS
"RA" Receiver. Models 74,76,83,88,89
60 cycles

Type	Use	Plate Volts	Plate Crn't	Control Grid Volts	Screen Grid Volts
-58	R-F & I-F	180	7.0	4.2	110
-58	1st Det	173	1.1	11.0	103
-56	Osc.	70	4.0	----	----
-56	2nd Det	--	----	---	---
-56	1st A-F	164	2.0	10.0	----
-47	PP Output	248	34.0	15.0	262
-80	Rect.		112.0 total		

Note. Bias readings are to be taken across each respective bias resistor. Series resistors prevent accurate voltage determinations at control grids.

VOLTAGES ACROSS VOLTAGE DIVIDER AND BLEEDER RESISTORS

Voltage across	280 ohm AF filter choke	(1933-X)	31 volts
" "	800 ohm Speaker field	(3-1266-MS)	95 volts
" "	7000 ohm resistor	(3-1264-MS)	92 volts
" "	25000 ohm resistor	(3-1450-MS)	161 volts
" "	30000 ohm resistor (neon)	(3-1440-MS)	115 volts
" "	200 ohm bias resistor	(3-1283-MS)	15 volts
" "	300 ohm bias resistor	(3-1444-MS)	4.2 volts
" "	5000 ohm bias resistor	(3-1445-MS)	10 volts

VOLTAGE ACROSS ELECTROLYTIC CONDENSERS

1st----402 2nd---- 371 3rd---- 276

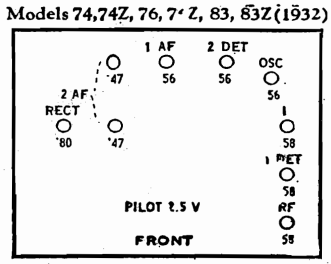
DC RESISTANCE VALUES

		Primary	Secondary
1927-X	Antenna coil	--- ohm	3.5 ohm
1929-X	R-F coil	71	3.5
1939-X	Oscillator coil	.8	3.5
1924-X	I-F transformer	97.	97.
1925-X	I-F transformer	97.	97.
2-2036-Y	Suppressor coil	15.5	1.47
1926-X	Input A-F trans.	2933.	9600.
1934-X	Output A-F trans.	745.	.75
1933-X	Choke	280 ohms	
2413-Y	R-F choke	134 ohms	
3-1266-MS	12-E Speaker field	800 ohms	

I-F ALIGNMENT

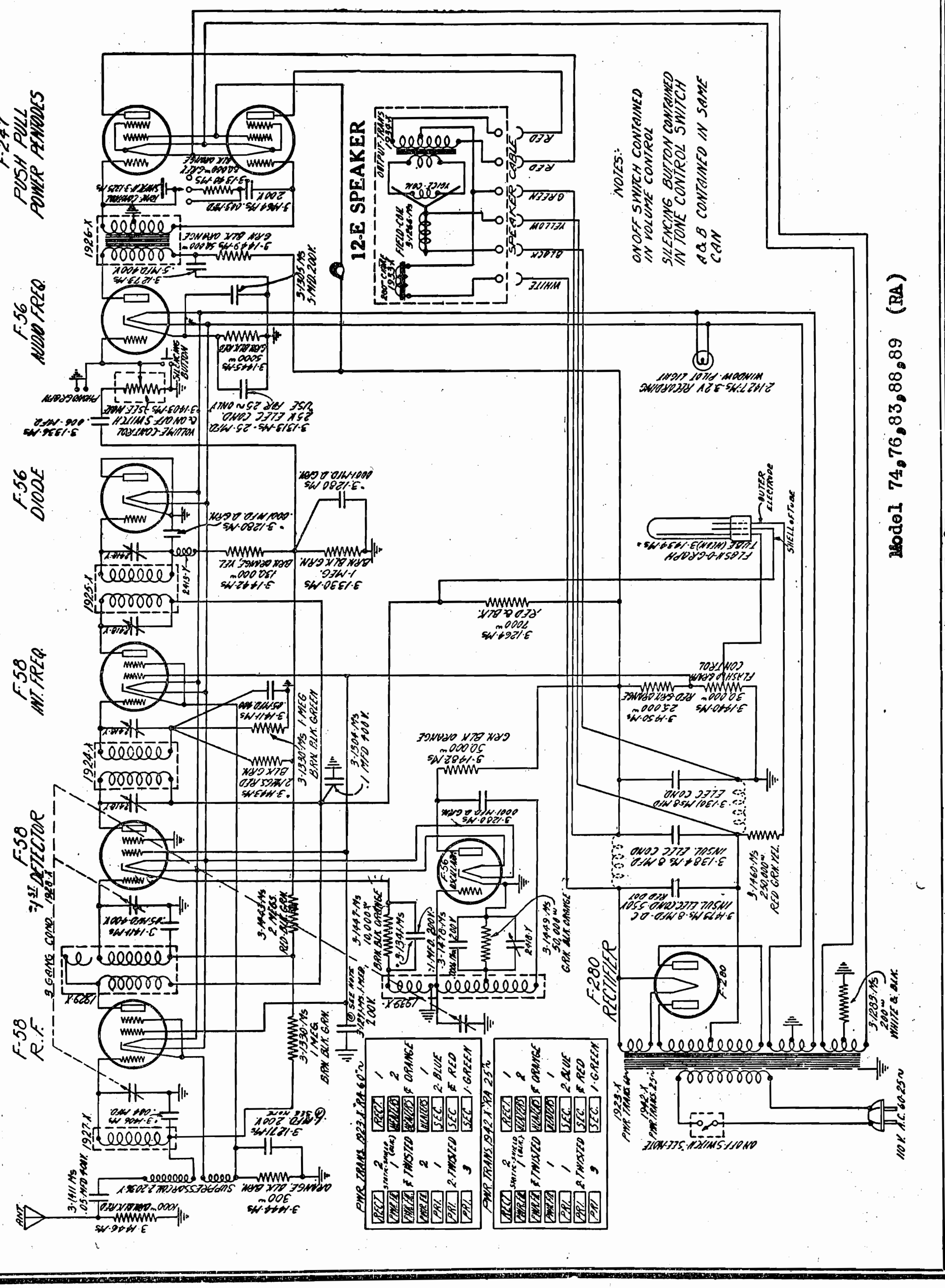
I-f trimmers are in the rear and on the side of the chassis. Facing rear of chassis, 1st and 2nd i-f trimmers are on left side; former nearest front of chassis. 3rd,4th and oscillator trimmers neare t ob- server. From left to right, they are Osc. 3r. i-f and 4th i-f

Models 74,74Z, 76, 7' Z, 83, 83Z(1932)



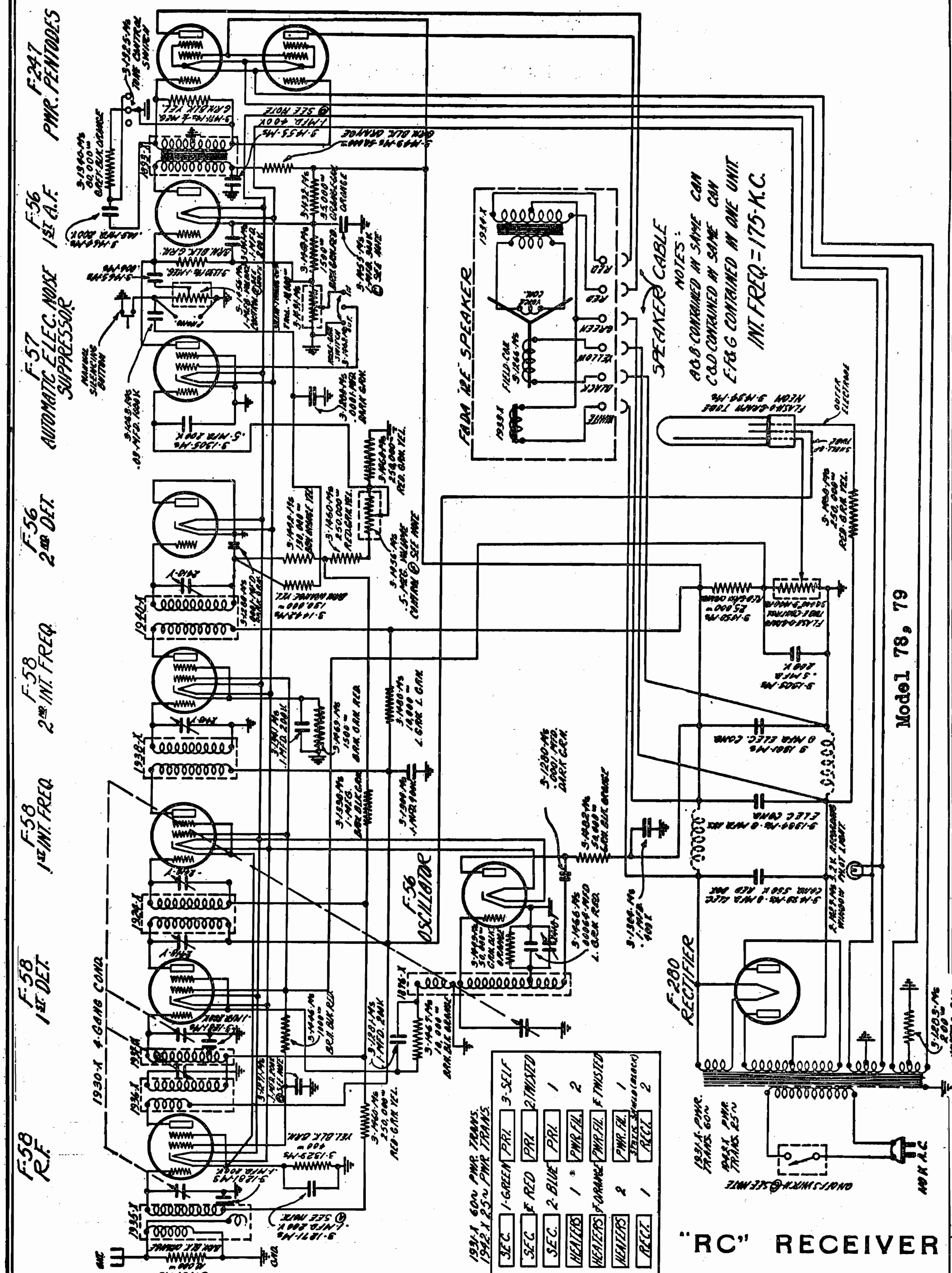
MODEL 74, 76, 83, 88, 89
(RA)
Schematic

FADA RADIO & ELECTRIC CORP.



FADA RADIO & ELECTRIC CORP.

MODEL 78, 79 (RC)
Schematic



"RC" RECEIVER

MODEL 78, 79 (RC)
Voltage

FADA RADIO & ELECTRIC CORP.

RC RECEIVER - MODELS 78 and 79 (60 CYCLES)

line voltage 115 A.C. -- Wattage 110
No signals -- Ant. & ground leads tied together

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	PLATE MA CURRENT	CONTROL GRID VOLTS	SCREEN GRID VOLTS
F-58	R.F. & 1st I.F.	175	4.1	3.5	105
F-58	1st Detector	166	1.2	12.0	96
F-56	Oscillator	70	4.0	--	--
F-58	2nd I.F.	264	4.0	6.0	102
F-56	2nd Detector	--	--	--	--
F-57	Noise suppressor	--	--	--	--
F-56	1st Audio	140	1.0	--	--
F-247	Pwr Pentode	245	32.0	15.0	255
F-280	Rectifier		110. total		

Note: - Bias readings are to be taken across each respective bias resistor. Correct readings cannot be obtained at control grids due to series resistors.

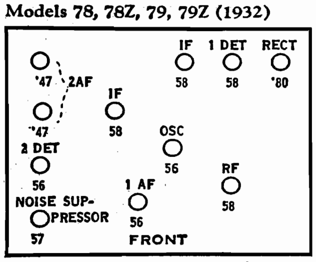
VOLTAGES ACROSS ELECTROLYTIC CONDENSERS

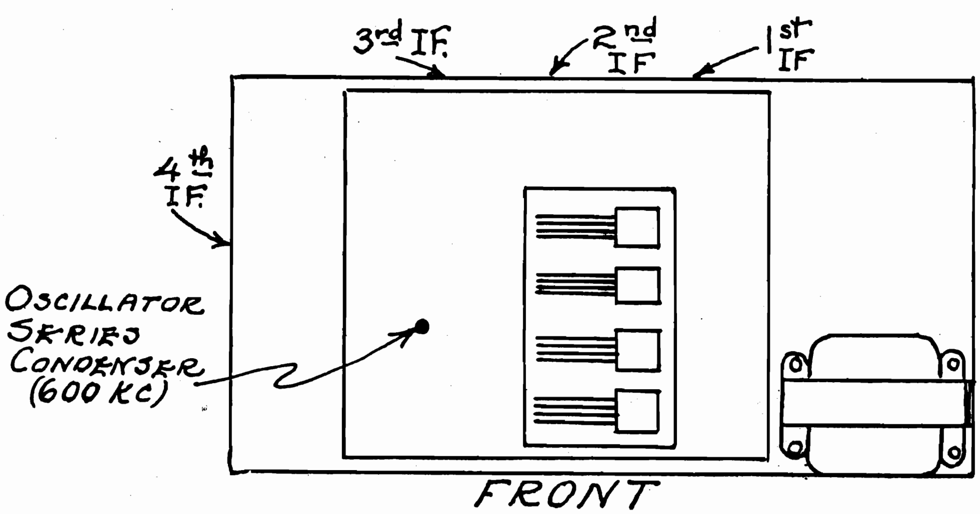
1st -- 402 2nd -- 370 3rd -- 270

DC RESISTANCE VALUES

		PRIMARY		SECONDARY	
1935-X	Antenna coil	22	ohms	3.4	ohms
1936-X	R.F. coil	70	"	3.4	"
1937-X	Post selector coil	--	"	3.4	"
1876-X	Oscillator coil	.74	"	3.4	"
1924-X	I.F. transformer	97	"	97	"
1938-X	I.F. transformer	50	"	100	"
1940-X	I.F. transformer	150	"	125	"
1893-X	Input P.P. transformer	2,860	"	6,660	"
1934-X	Output P.P. transformer	734	"	.75	"
1933-X	A.F. filter choke -----------	280 ohms			
3-1266-Ms	12-E speaker field ----------	800 "			

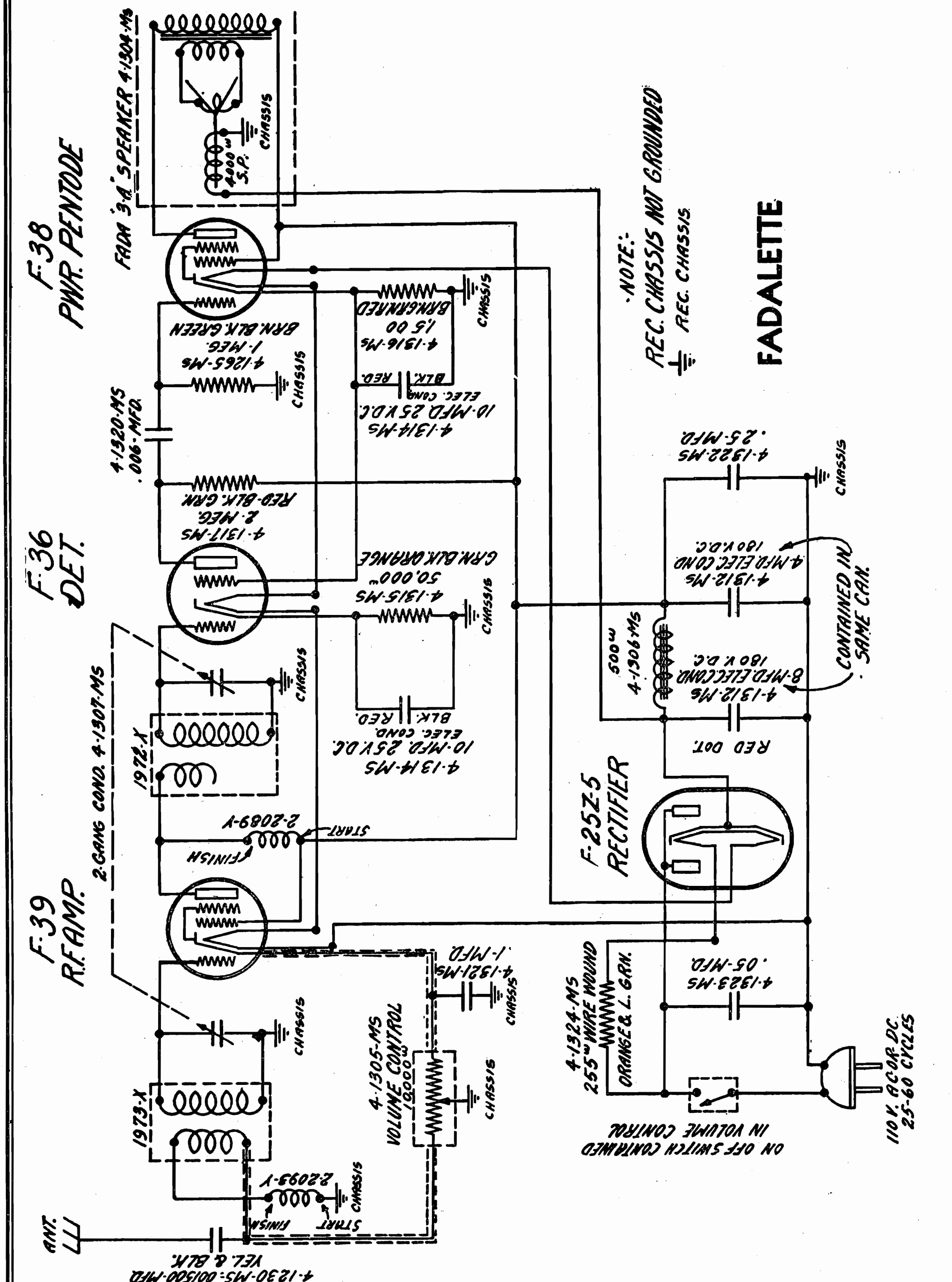
Models 78, 78Z, 79, 79Z (1932)





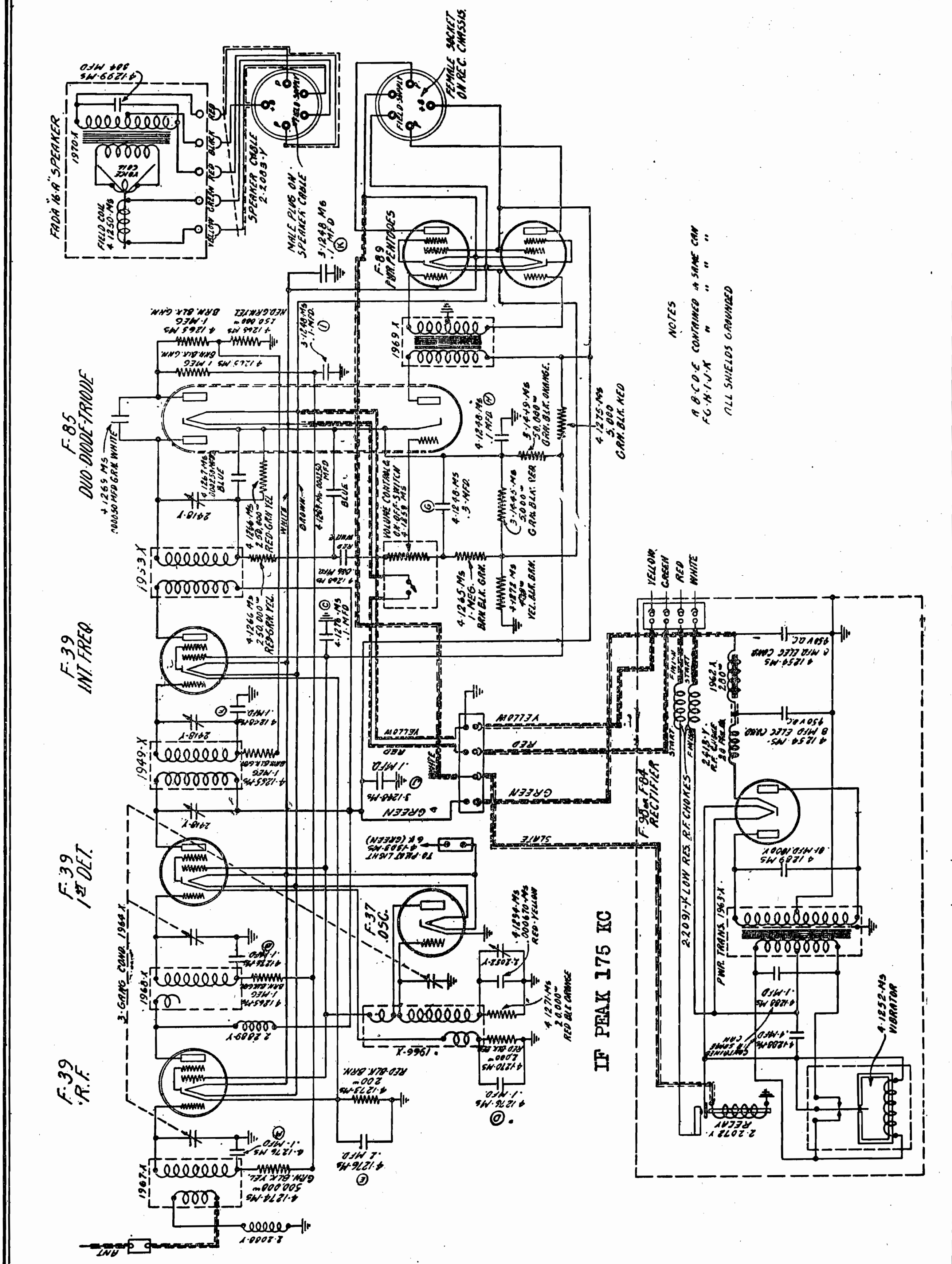
MODEL 103 (RL)
"Fadalette"

FADA RADIO & ELECTRIC CORP.



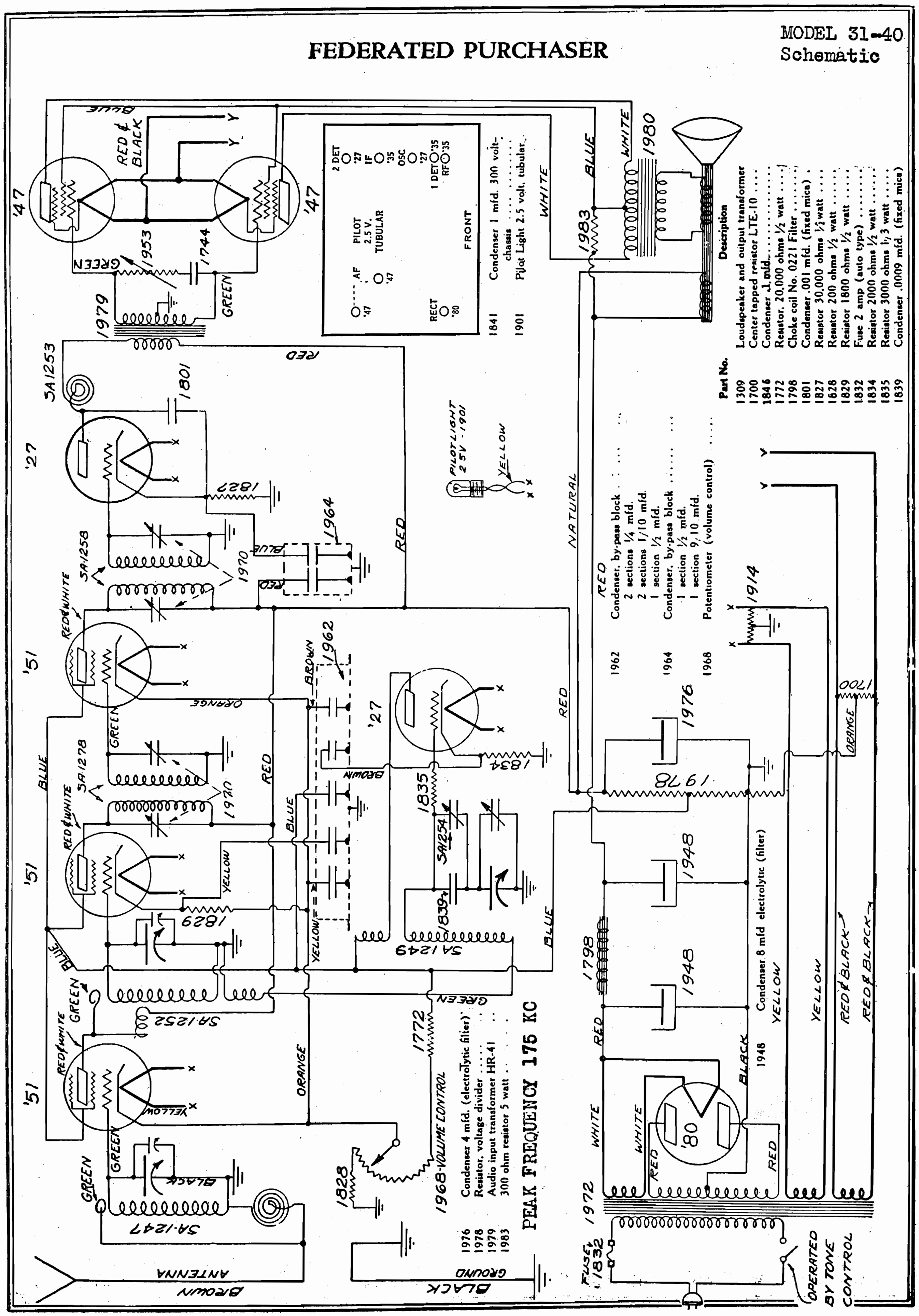
MODEL 101 (RK)
Motoset

FADA RADIO & ELECTRIC CORP.



FEDERATED PURCHASER

MODEL 31-40
Schematic



Part No.	Description
1309	Loudspeaker and output transformer
1700	Center tapped resistor LTE-10
1846	Condenser .1 mfd.
1772	Resistor, 20,000 ohms ½ watt
1798	Choke coil No. 0221 Filter
1801	Condenser .001 mfd. (fixed mica)
1827	Resistor 30,000 ohms ½ watt
1828	Resistor 200 ohms ½ watt
1829	Resistor 1800 ohms ½ watt
1832	Fuse 2 amp (auto type)
1834	Resistor 2000 ohms ½ watt
1835	Resistor 3000 ohms 1/3 watt
1839	Condenser .0009 mfd. (fixed mica)

1841	Condenser 1 mfd. 300 volt-chassis
1901	Pilot Light 2.5 volt, tubular
1948	Condenser 8 mfd electrolytic (filter)
1962	Condenser, by-pass block: 2 sections ¼ mfd., 2 sections 1/10 mfd., 1 section ½ mfd.
1964	Condenser, by-pass block: 1 section ½ mfd., 1 section 9,10 mfd.
1968	Potentiometer (volume control)
1976	Condenser 4 mfd. (electrolytic filter)
1978	Resistor, voltage divider
1979	Audio input transformer HR-41
1983	300 ohm resistor 5 watt

MODEL 35, 40
Data
MODEL "Cathedral Tone"
Schematic

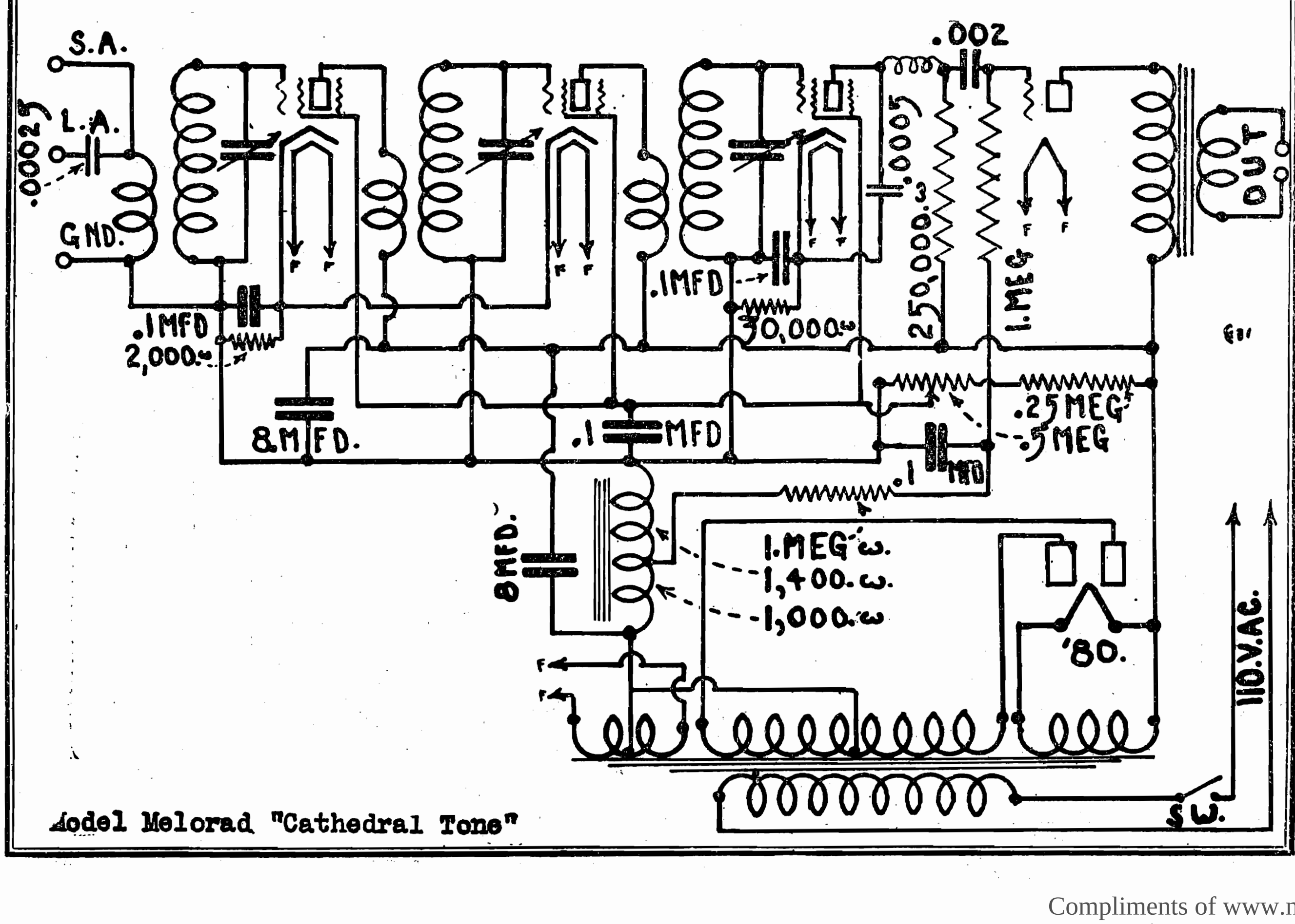
FEDERATED PURCHASER

Model 35, 40

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:

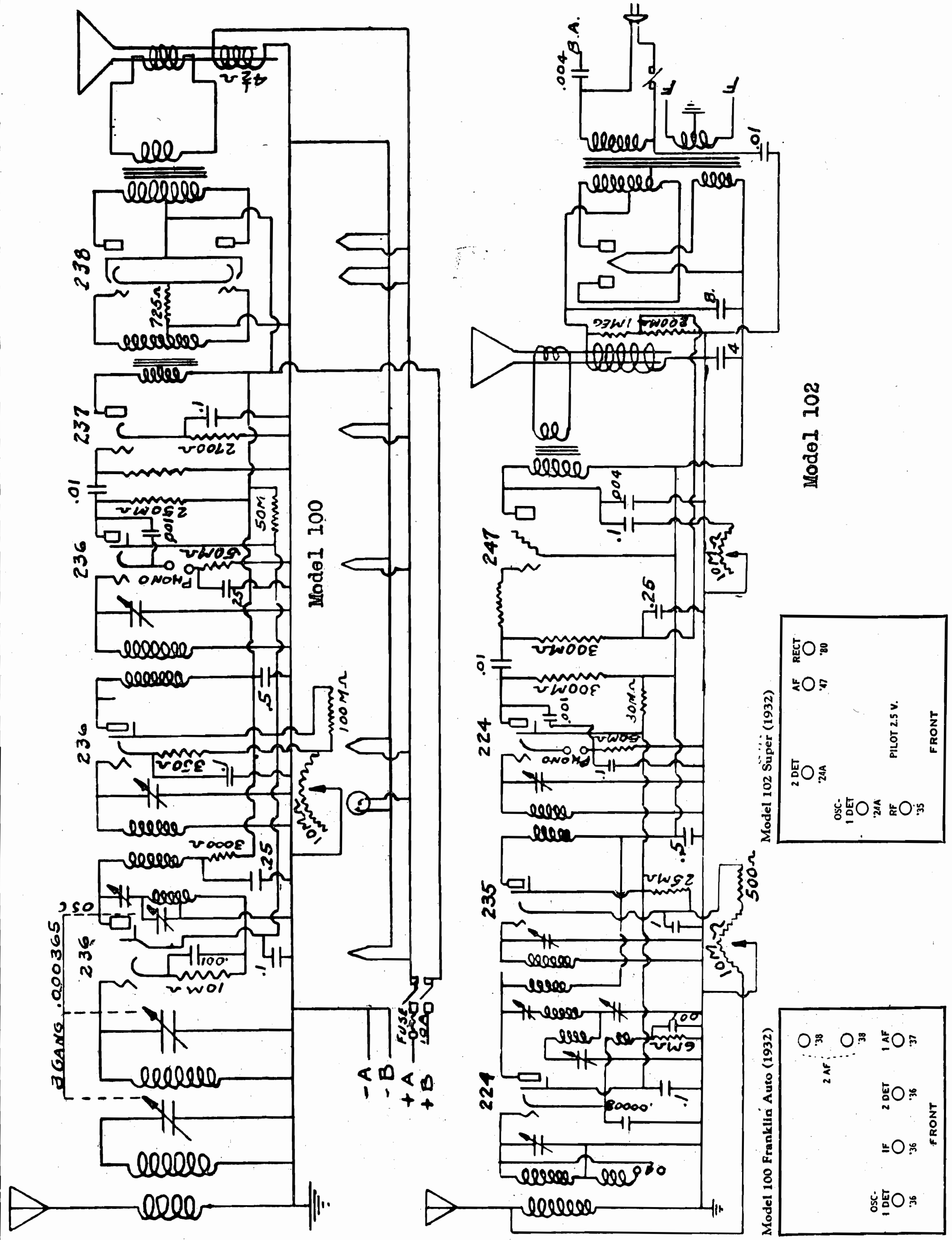
(b) Replace the grid cap on the intermediate frequency amplifier and proceed to the first detector tube. Remove this tube cap and connect the 175 kc. oscillator as before, being sure to connect the 3 megohm resistor from control grid to ground. Now proceed to tune the intermediate frequency transformer 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.



Model Melorad "Cathedral Tone"

FRANKLIN RADIO CORP.

MODEL 100
MODEL 102
Schematics



MODEL 100
Service Notes

FRANKLIN RADIO CORP.

CONNECTING "A" BATTERY

The "A" battery connections of the Franklin Auto Radio have no polarity. By this is meant, neither negative or positive, but the heavy green wire with tracer must always be connected to the "hot" side of the battery,(the ungrounded side of the storage battery). The sheath may be attached to any convenient ground connection such as any bolt passing into the frame of the car or direct to the grounded terminal of the storage battery.

We recommend that the heavy green wire with tracer be attached either directly to the "hot" side of the storage battery or to the heavy cable running to the starter switch. Never, under any circumstances, attach the heavy green wire with tracer to any of the ignition wires or light wires. Special warning is given against connecting this wire to the generator wire anywhere along its length.

CONNECTING MODEL 100

Remove radio chassis from housing and fasten steering column mounting bracket to bottom of housing with machine screws that are furnished, or if steering column cannot be used, use the bolts that are furnished to fasten housing to bulkhead of car; drawing the three bolts through the three mounting holes in back of housing. In this case be sure to allow housing to extend about 3/4" to 1" away from bulkhead, by adjusting the series of nuts also furnished for this purpose. This will relieve any warping of housing and chassis, so as not to throw the radio set out of balance.

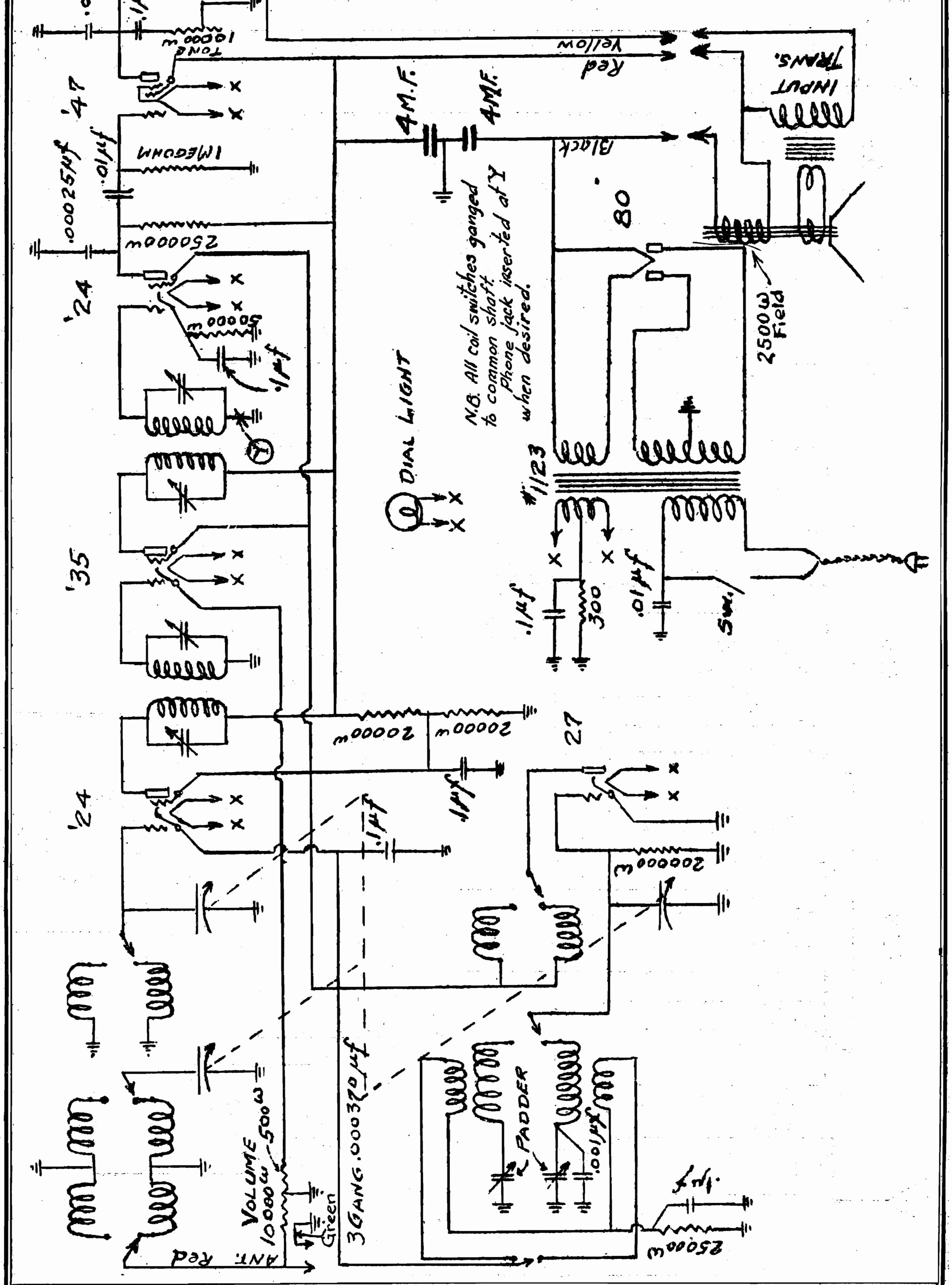
Now pass driving control cable through grommeted hole in front cover of housing. With radio chassis still removed from housing, set dial scale on remote control to 0, Now, using a small wrench or pair of pliers unscrew bushing headnut on variable condenser back pllate about three fourths of the way, and pass control wire through hole in bushing until control cable sheath enters into hole of the bushing. Then tighten up the bushing headnut with dial scale at 0. Then grasp the condenser pulley in one hand and revolve same until condenser plates are all the way open and will not turn further in that direction. Holding condenser in this position, loosen clamp screw at top of the pulley and run control wire under clamp until all the slack is taken out of the wire. Then tighten clamp screw down on wire rather tight. Procede to put chassis back into housing and bolt down as it was before removal from housing.

DETERMINING PICKUP

The first thing to do in the elimination of ignition noise is to determine whether it is being picked up by the antenna and antenna leadin, or by the set itself. To determine this, turn on the set and start the motor. Then disconnect the leadin at a point where it is connected with the shielded lead going to the receiver. If the noise stops, it naturally shows that the noise is being picked up somewhere in the antenna system. If the noise is still in evidence after disconnectin g the leadin, the noise is presumably chassis pickup. Sometimes there is a combination of the two, and in this case, it is necessary to first eliminate the chassis noise and then the remaining noise can be removed using methods normally discussed in connection with ignition noise elimination.

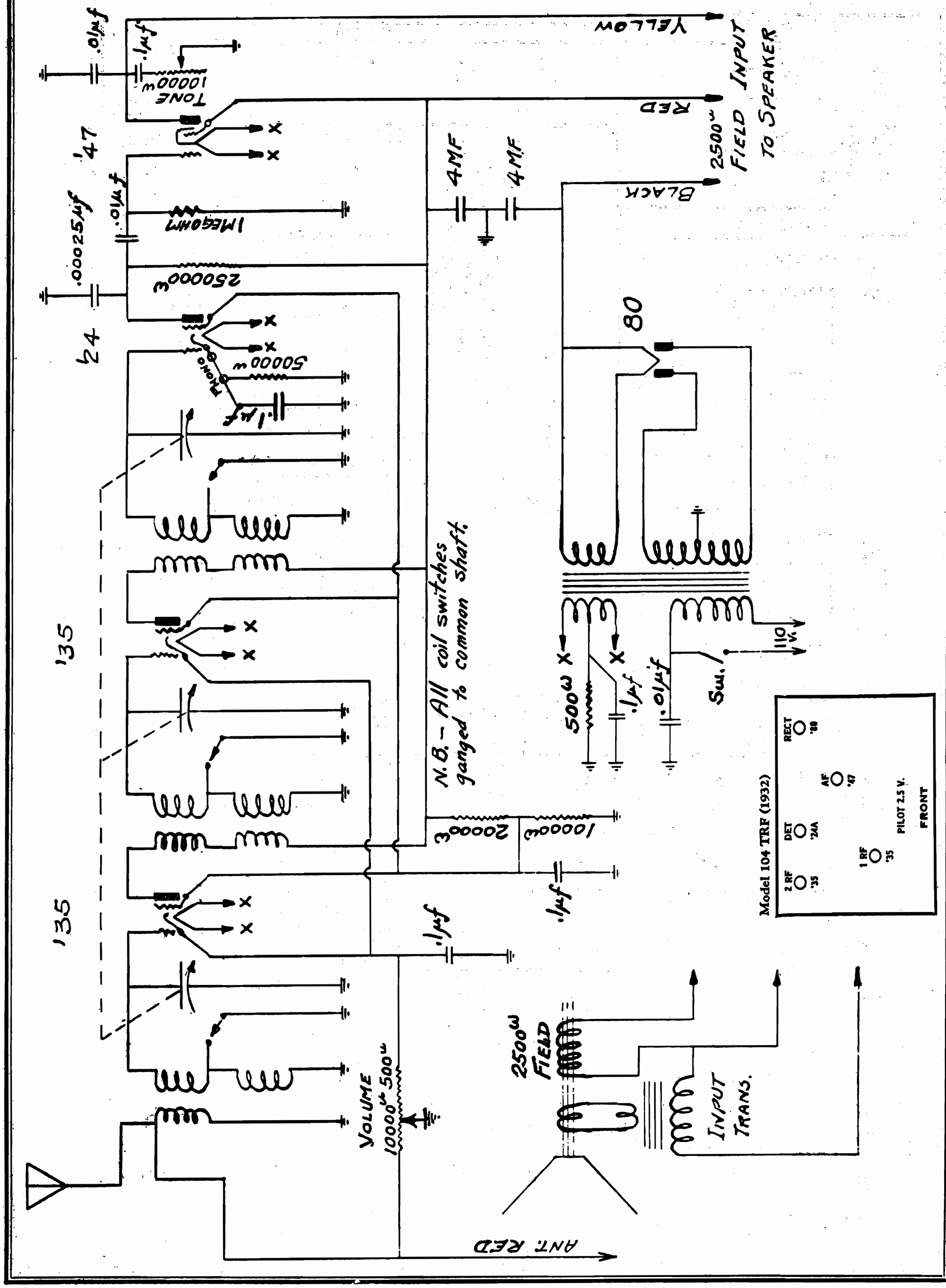
FRANKLIN RADIO CORP.

MODEL 6 Tube Super Schematic



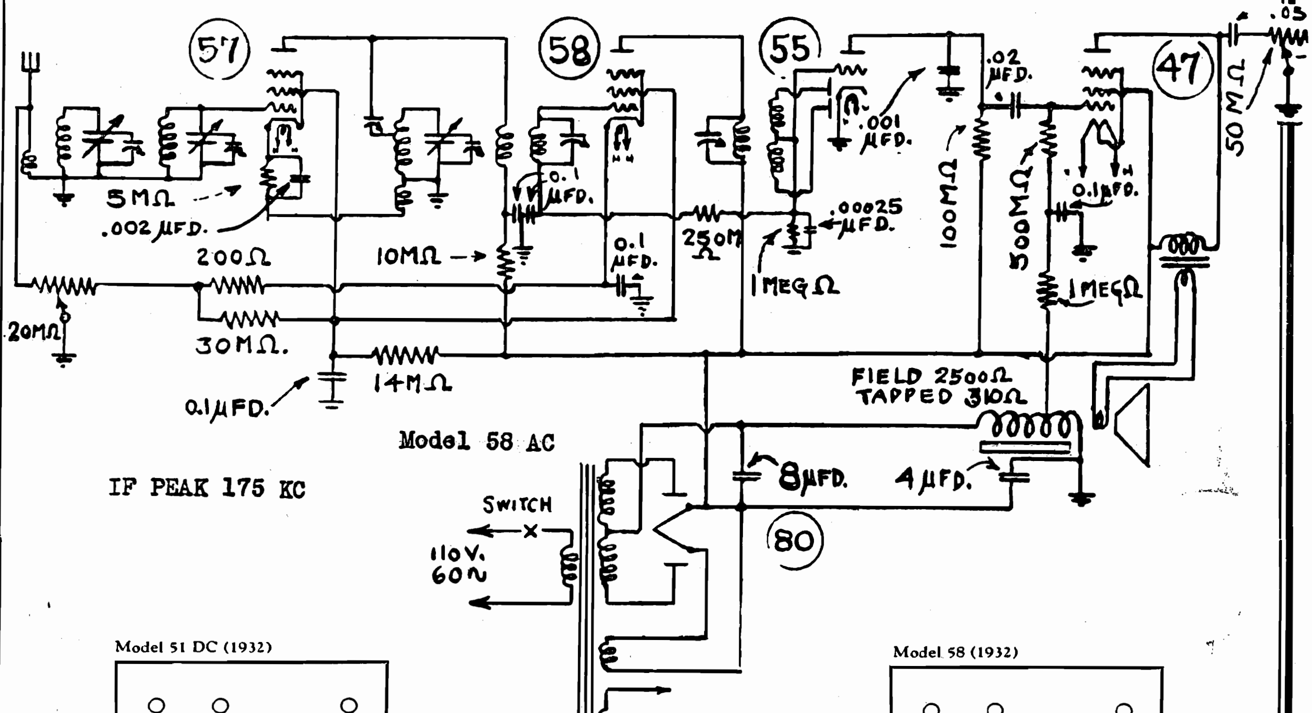
MODEL 104
Schematic

FRANKLIN RADIO CORP.



MODEL 51 DC
MODEL 58 AC

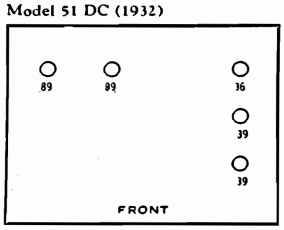
FREED RADIO AND TELEVISION CORP.



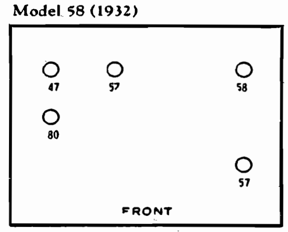
Model 58 AC

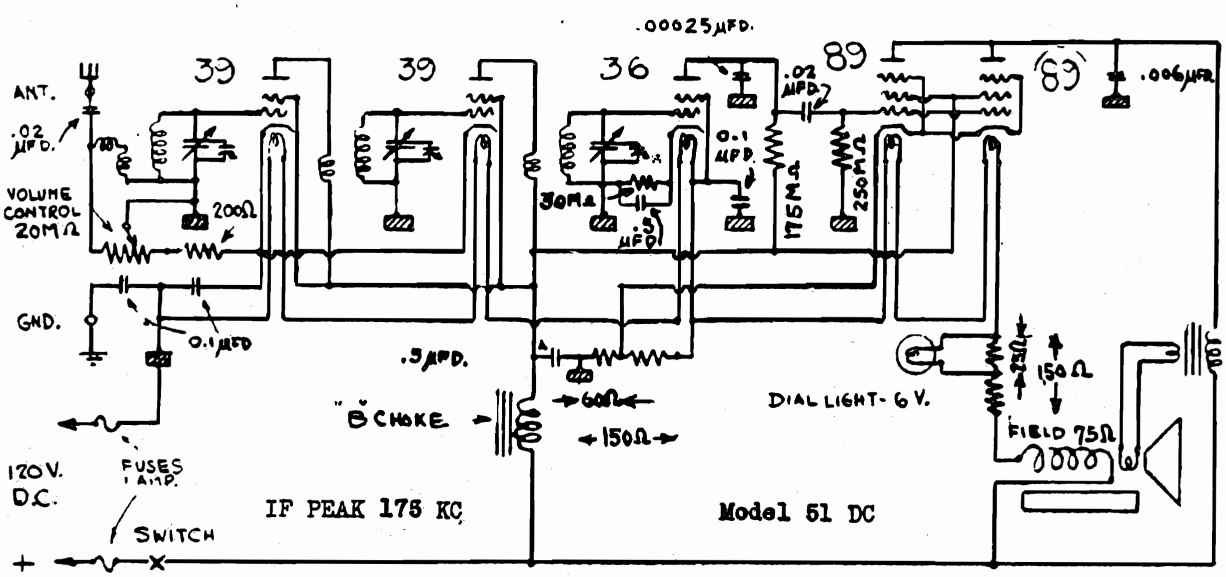
IF PEAK 175 KC

Model 51 DC (1932)



Model 58 (1932)



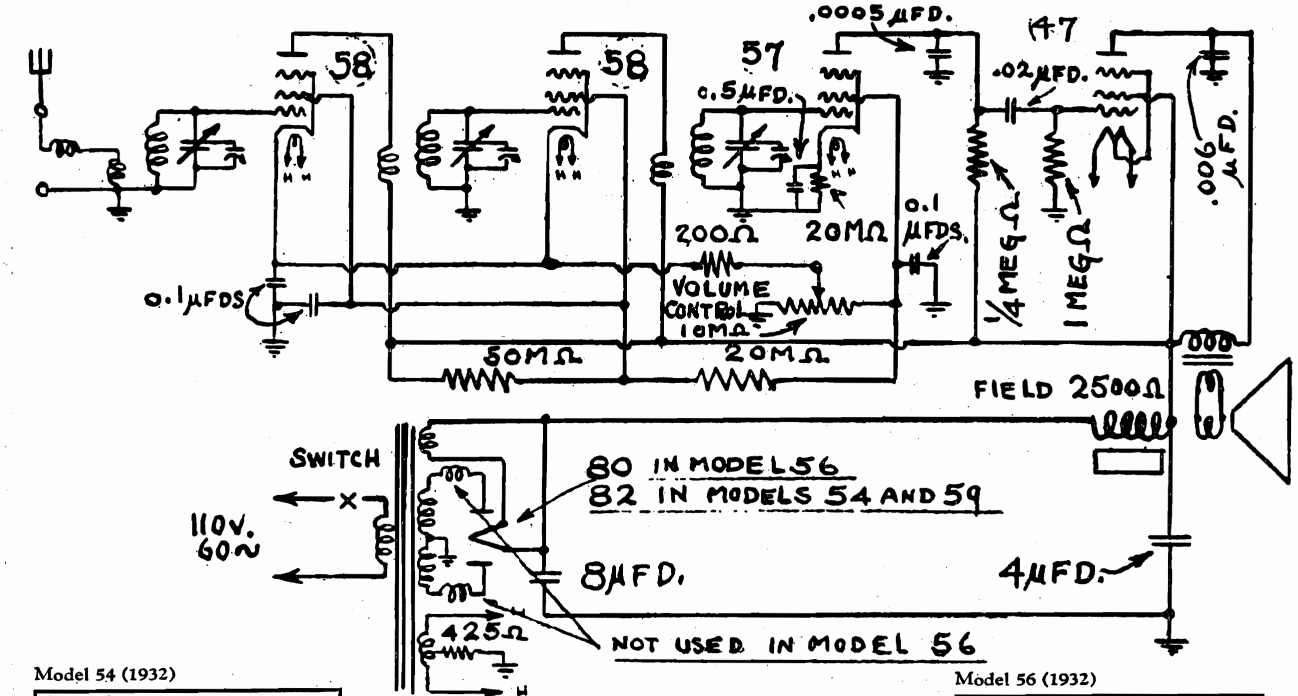


IF PEAK 175 KC

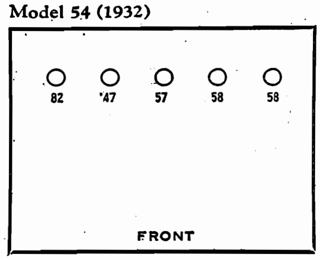
Model 51 DC

FREED RADIO AND TELEVISION CORP.

MODEL 54, 56, 59
MODEL MB-5

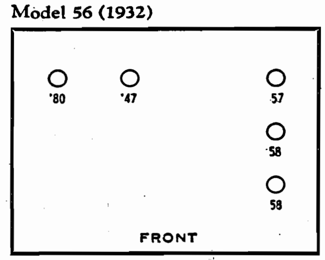


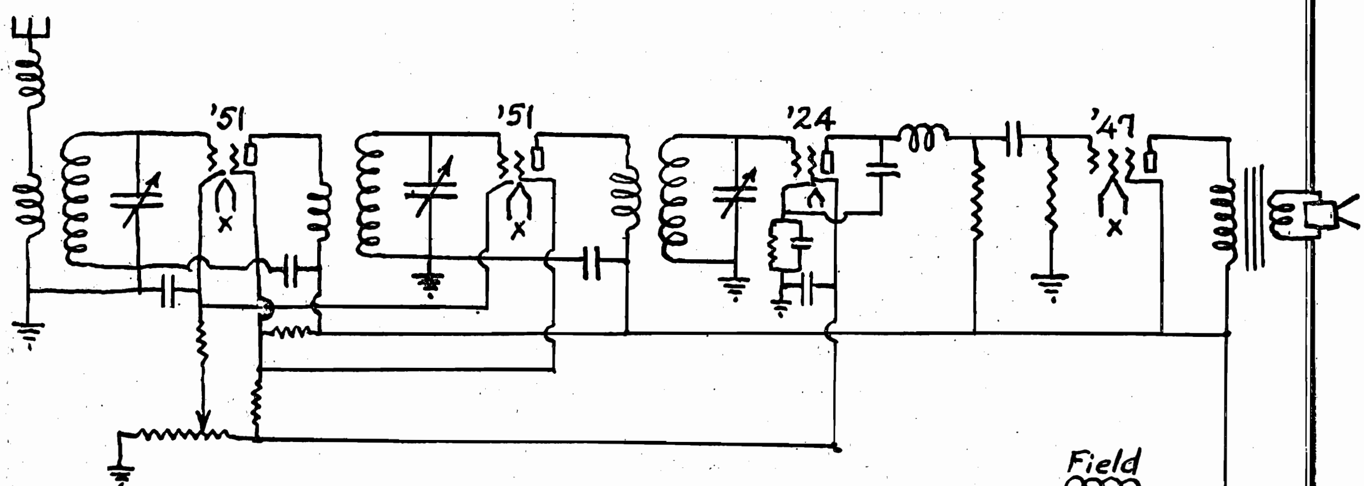
Model 54 (1932)

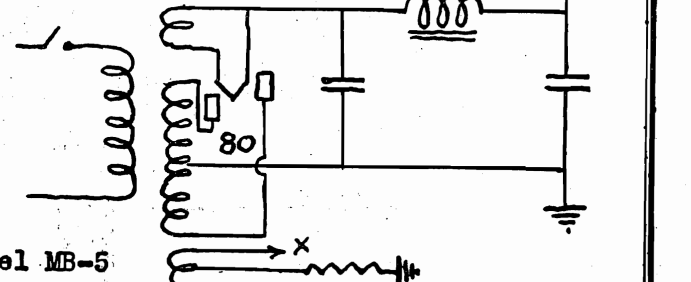


Model 54, 56, 59

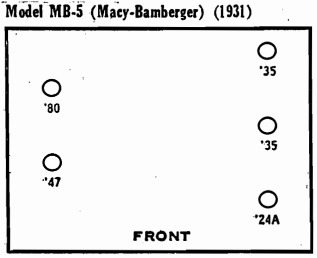
Model 56 (1932)





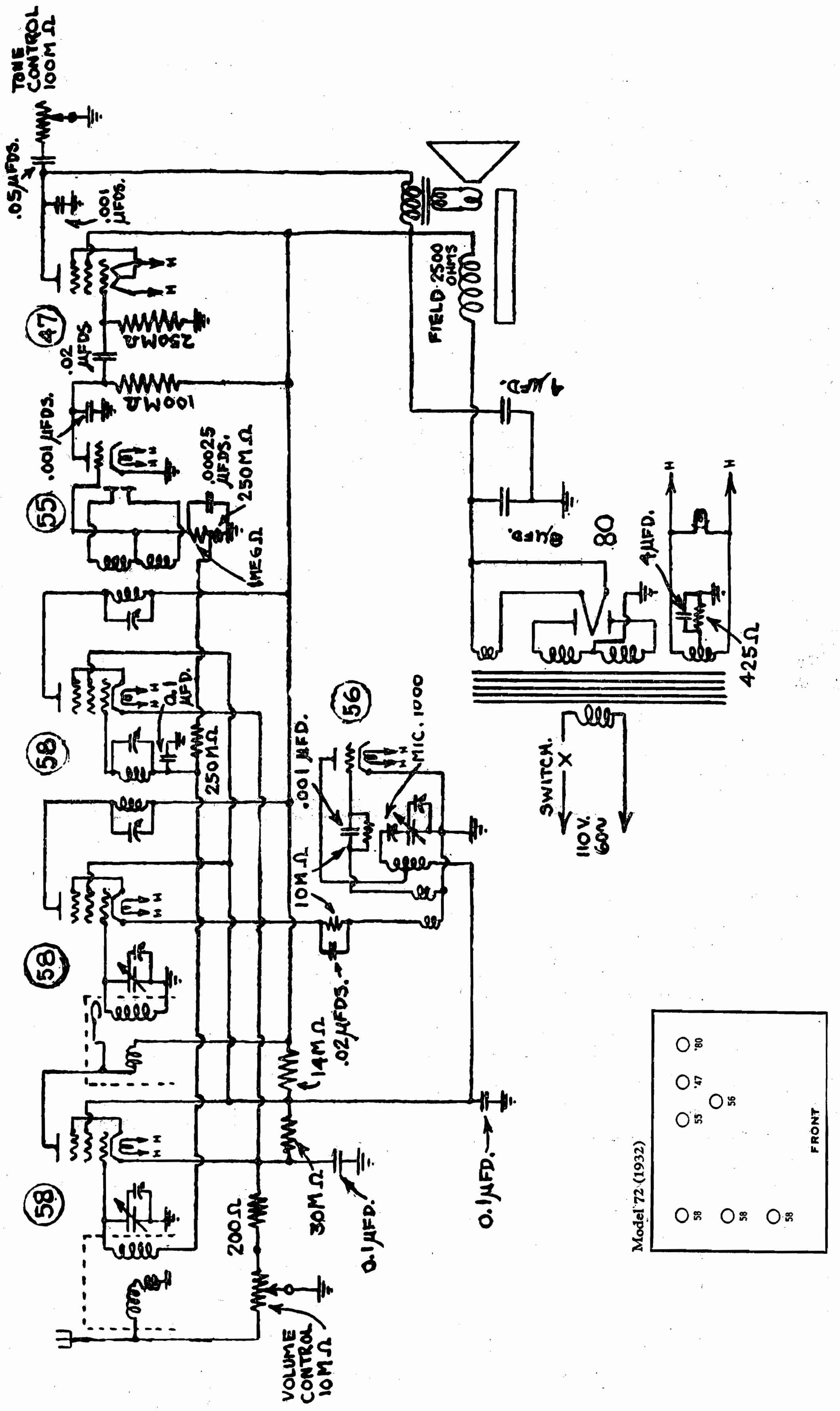


Model MB-5 (Macy-Bamberger) (1931)



Model MB-5

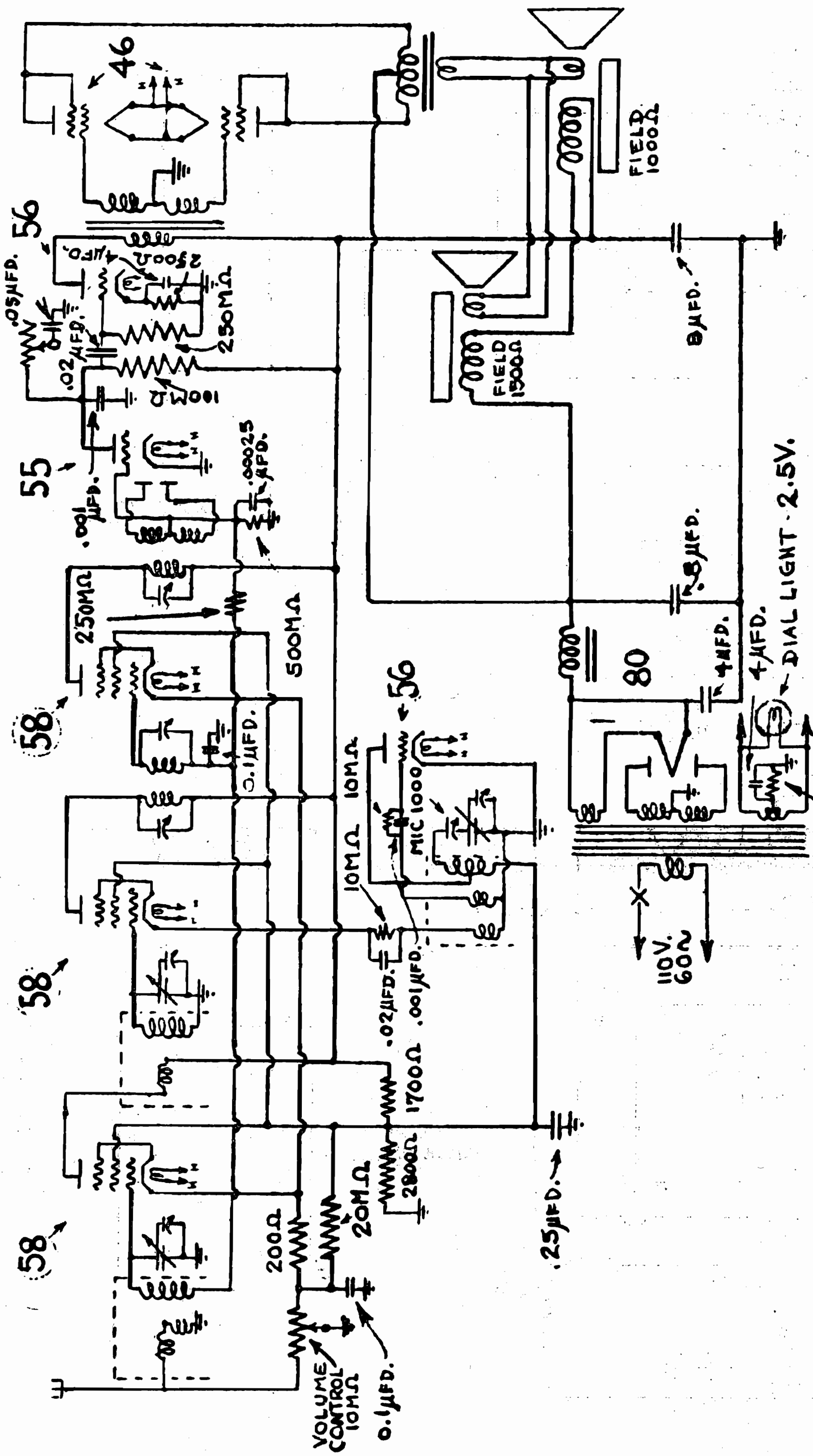
MODEL 72, 74, MB-7 FREED RADIO AND TELEVISION CORP.



IF PEAK 175 KC

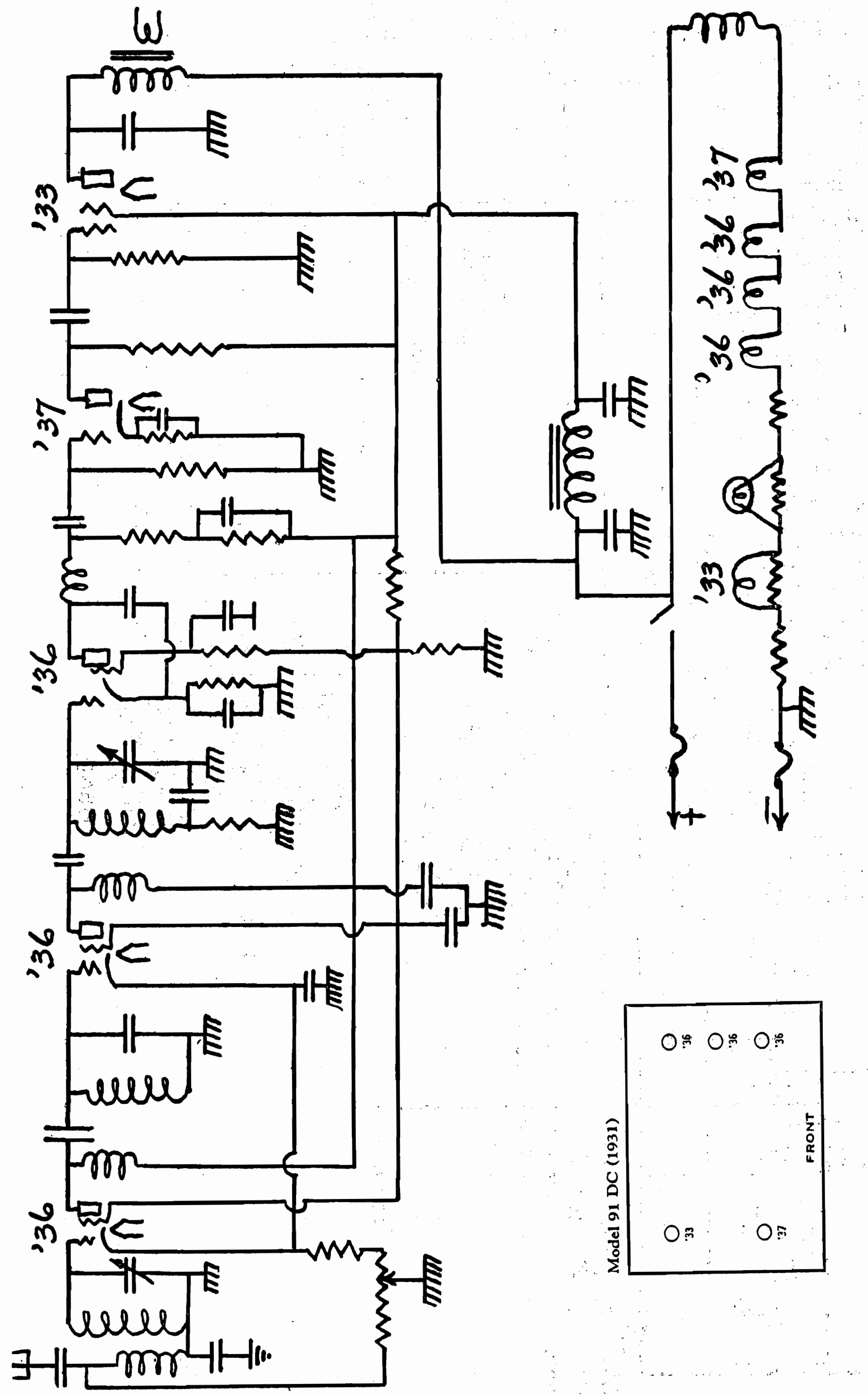
MODEL MB-9, 90

FREED RADIO AND TELEVISION CORP.



MODEL 91 DC

FREED RADIO AND TELEVISION CORP.

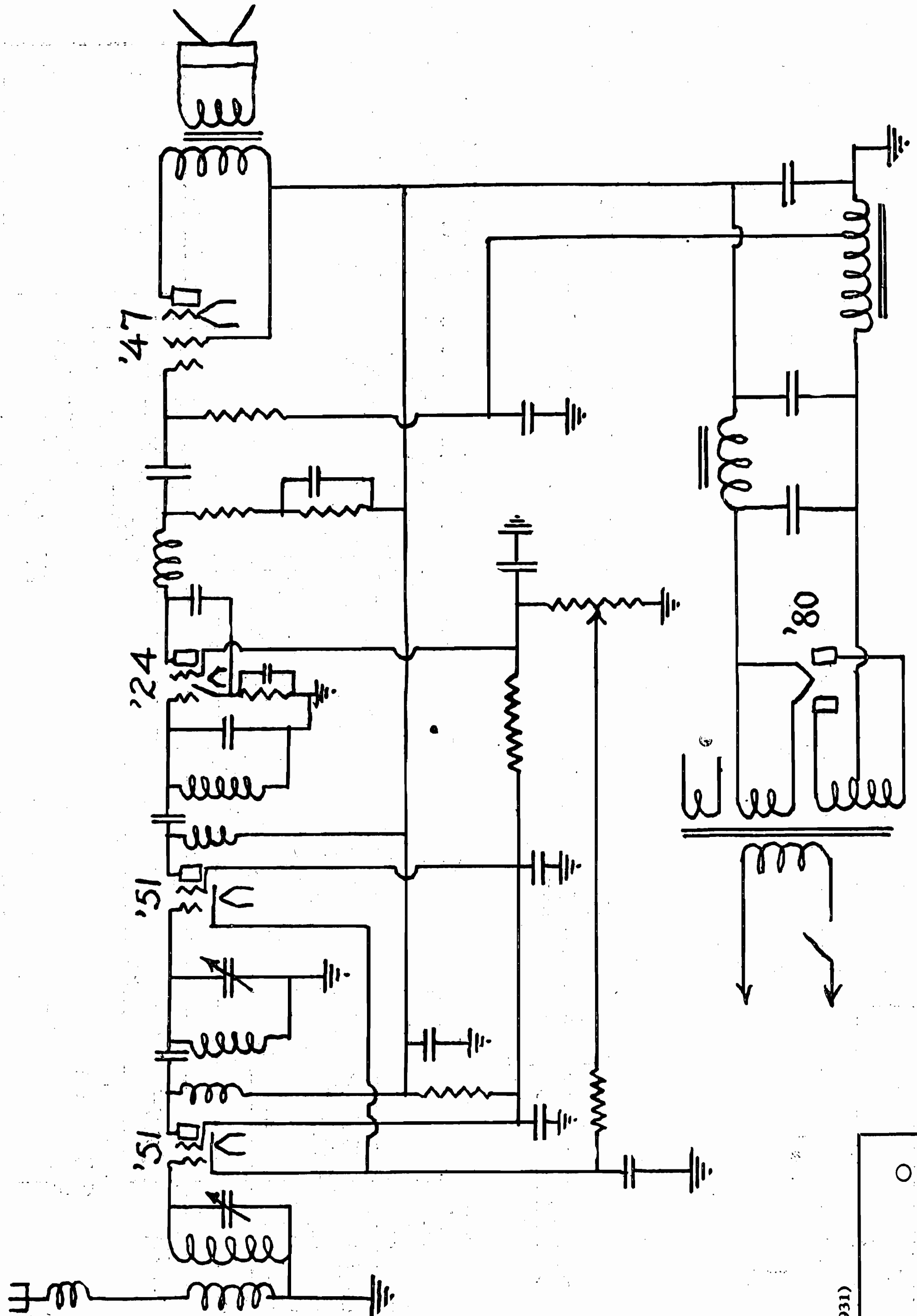


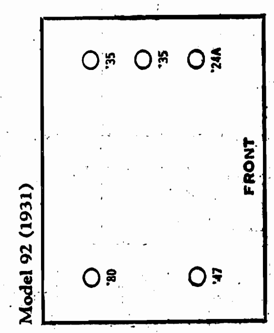
Antenna wire is green
Ground wire is black

Make certain that the grid caps do not touch tube shields.

FREED RADIO AND TELEVISION CORP.

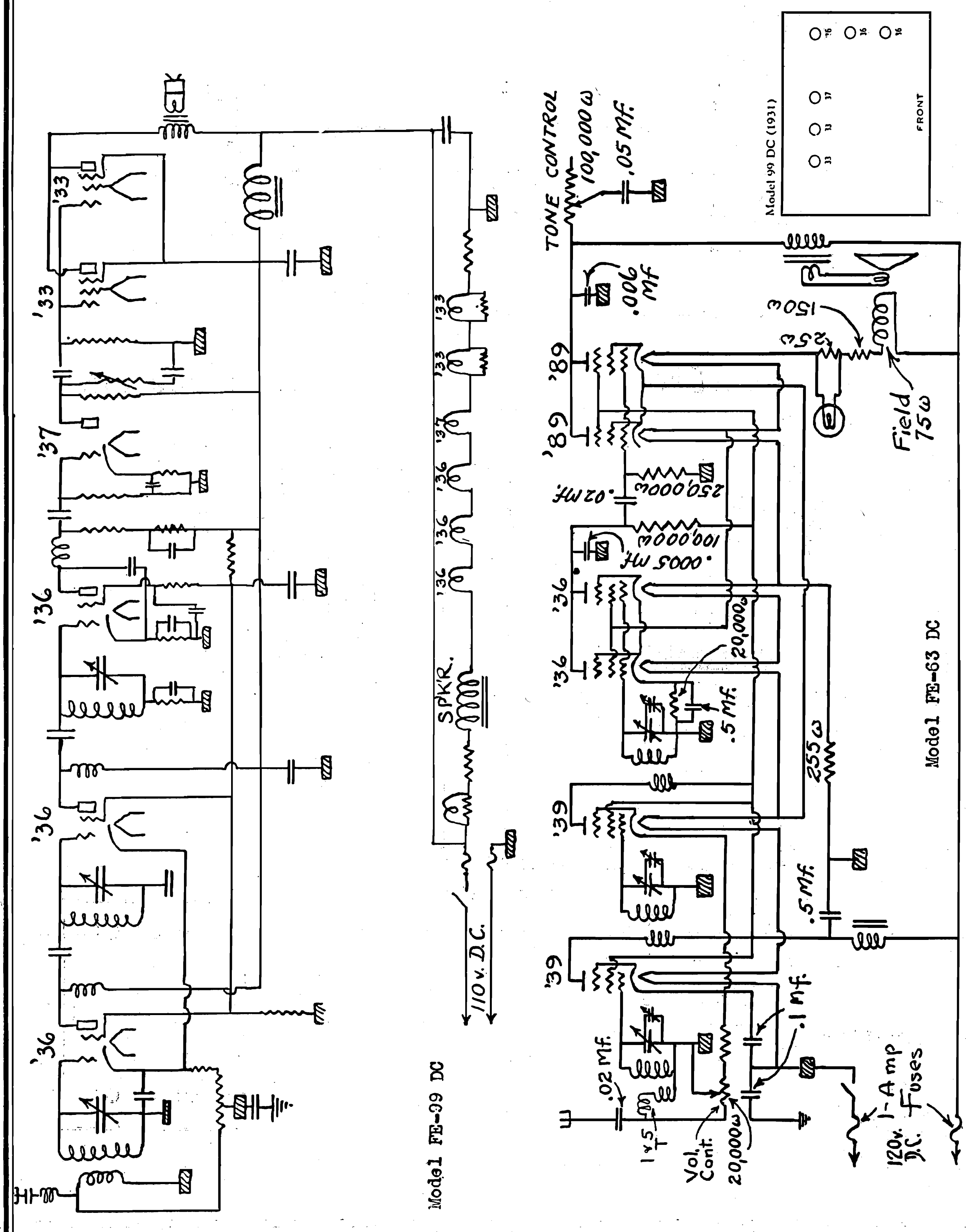
MODEL 92 AC



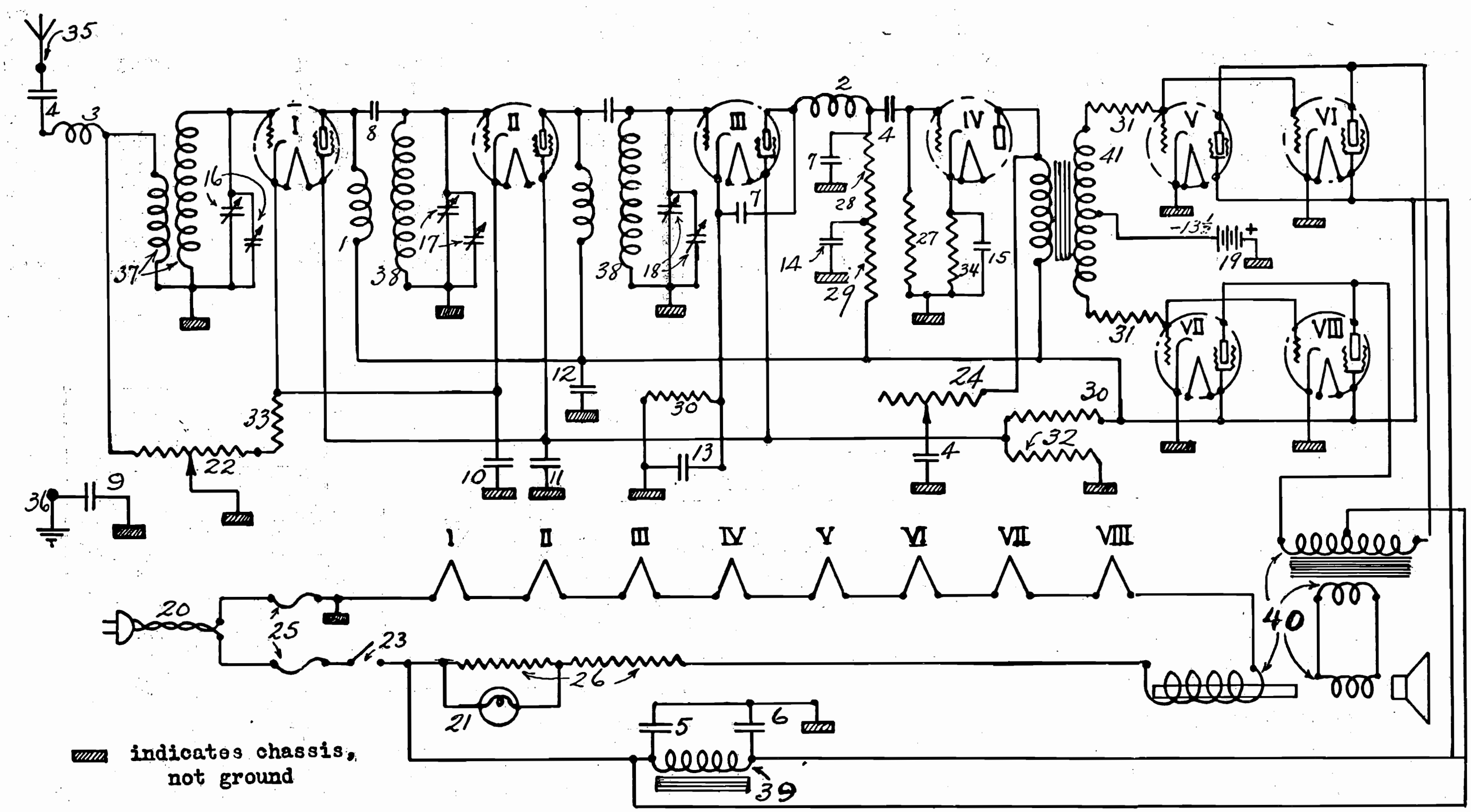


MODEL FE-99 DC
MODEL FE-63 DC

FREED RADIO AND TELEVISION CORP.



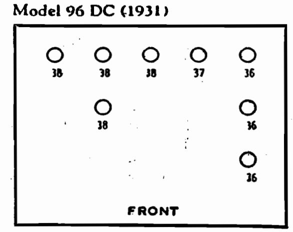
FREED RADIO AND TELEVISION CORP.



indicates chassis, not ground

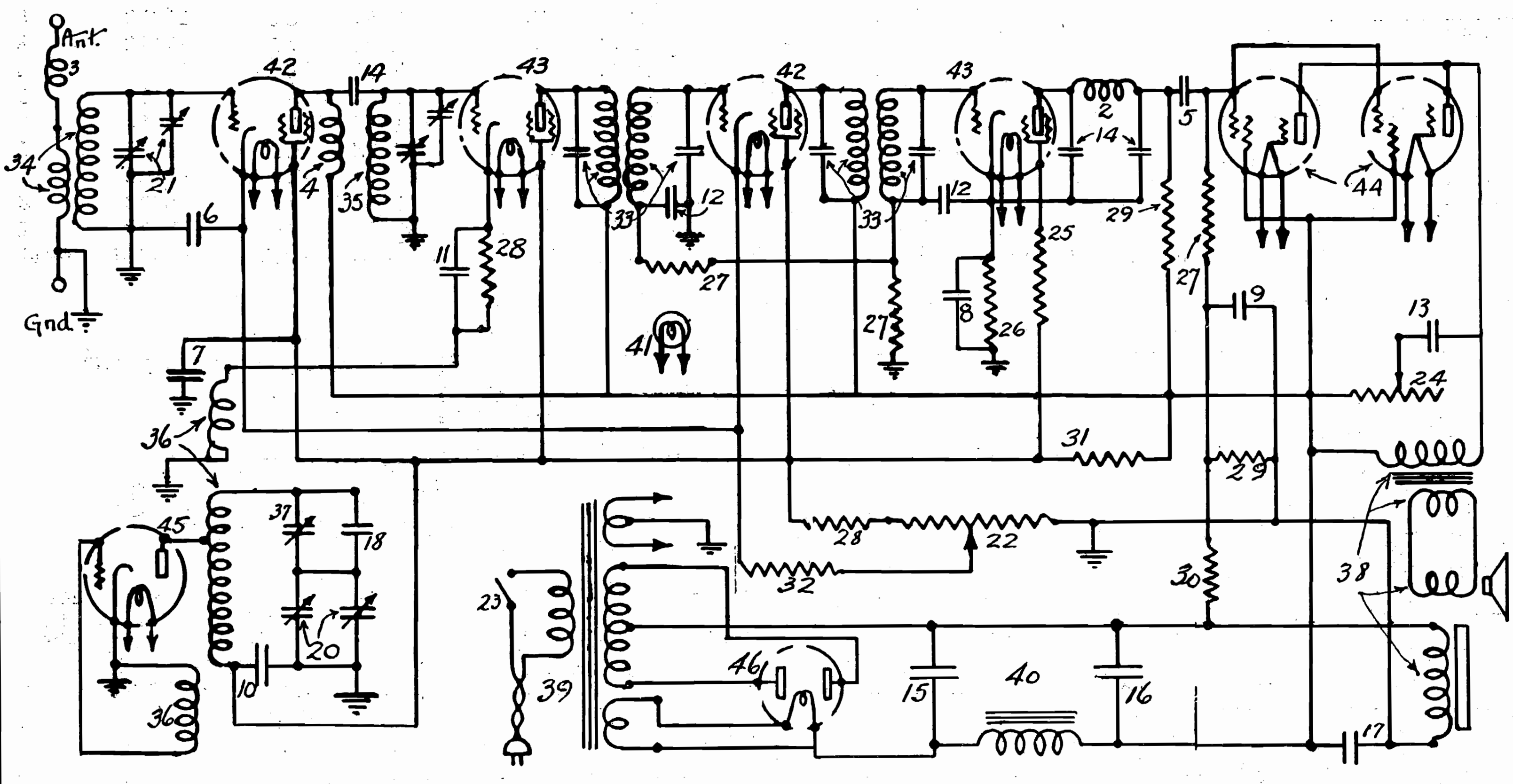
Item	Part #	Item	Part #	Item	Part #	Item	Part #	Item	Part #	Item	Part #
1	23.4	10	24.18	19	26.2	28	30.4	37	35.10	I	'36
2	23.9	11	24.18	20	26.7	29	30.5	38	35.11	II	'36
3	23.12	12	24.18	21	26.14	30	30.6	39	36.5	III	'36
4	24.3	13	24.18	22	26.15	31	30.17	40	36.2	IV	'37
5	24.7	14	24.18	23	26.15	32	30.16	41	36.6	V	'38
6	24.7	15	24.18	24	26.16	33	30.12			VI	'38
7	24.10	16	25.1	25	26.19	34	30.18			VII	'38
8	24.11	17	25.1	26	30.1	35	35.8			VIII	'38
9	24.15	18	25.1	27	30.3	36	35.8				

Model 96 DC (1931)



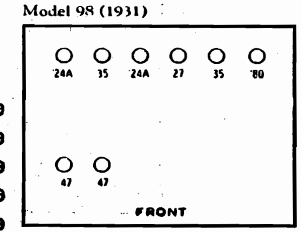
MODEL FE 98

FREED RADIO AND TELEVISION CORP.



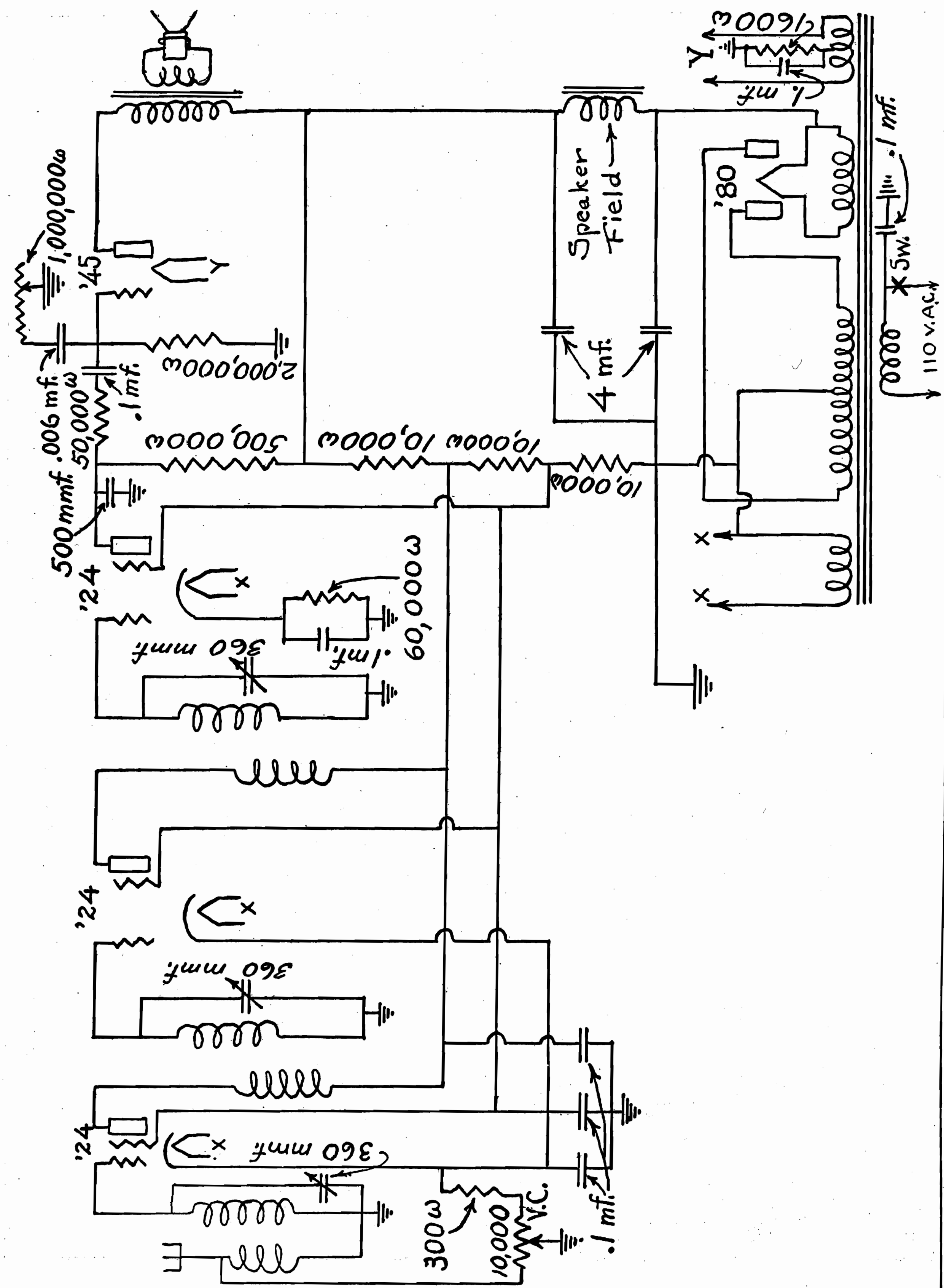
Item	Part #	Item	Part #	Item	Part #	Item	Part #	Item	Part #
1	35.8	11	24.15	19		29	30.20	39	36.9
2	23.9	12	24.21	20	25.1	30	30.21	40	36.16
3	23.12	13	24.29	21		31	30.22	41	26.27
4	23.4	14	24.10	22	26.26	32	30.23	42	'51 tube
5	24.3	15	24.30	23		33	35.15	43	'24 tube
6		16	24.23	24	26.30	34	35.16	44	'47 tube
7		17	24.19	25	30.3	35	35.17	45	'27 tube
8	24.26	18	24.20	26	30.6	36	35.18	46	'80 tube
9				27	30.10	37	35.19		
10				28	30.19	38	36.1		

Model 98 (1931)



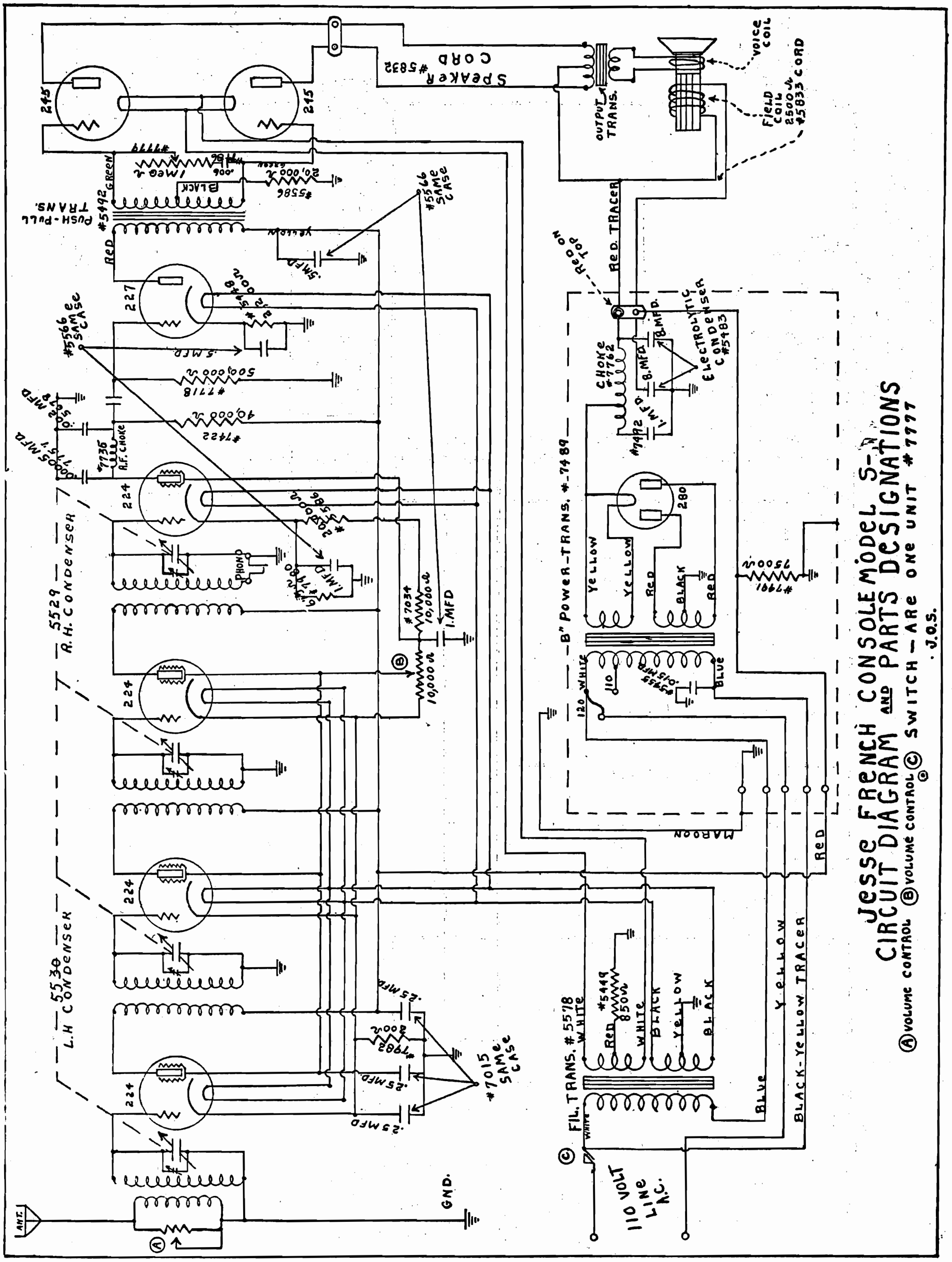
MODEL "H-2" Junior
Schematic

JESSE FRENCH & SONS PIANO CO.



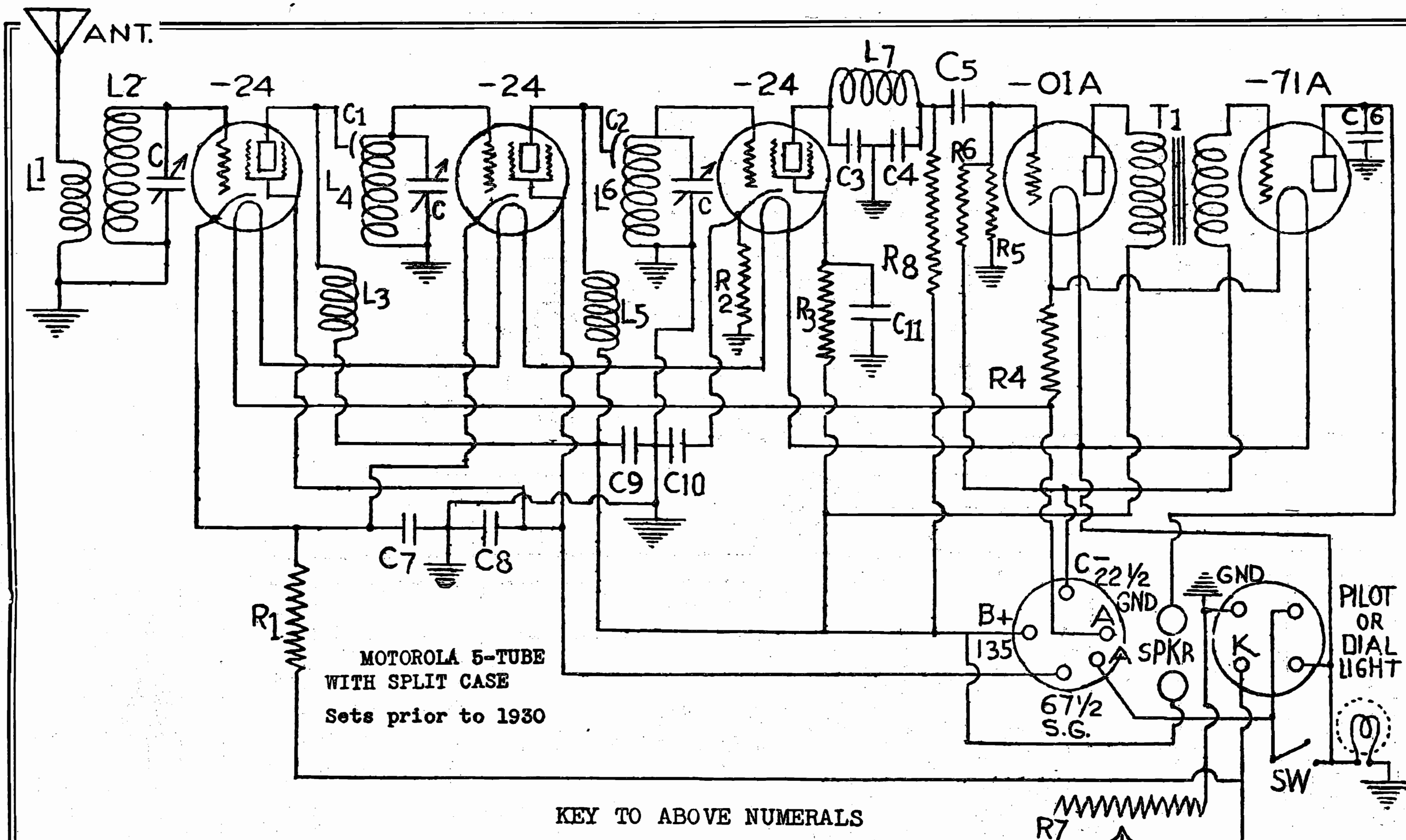
MODEL S-2

JESSE FRENCH & SONS PIANO CO.



GALVIN MFG. CO.

MODEL Motorola
5 Tube, Split Case



MOTOROLA 5-TUBE
WITH SPLIT CASE

Sets prior to 1930

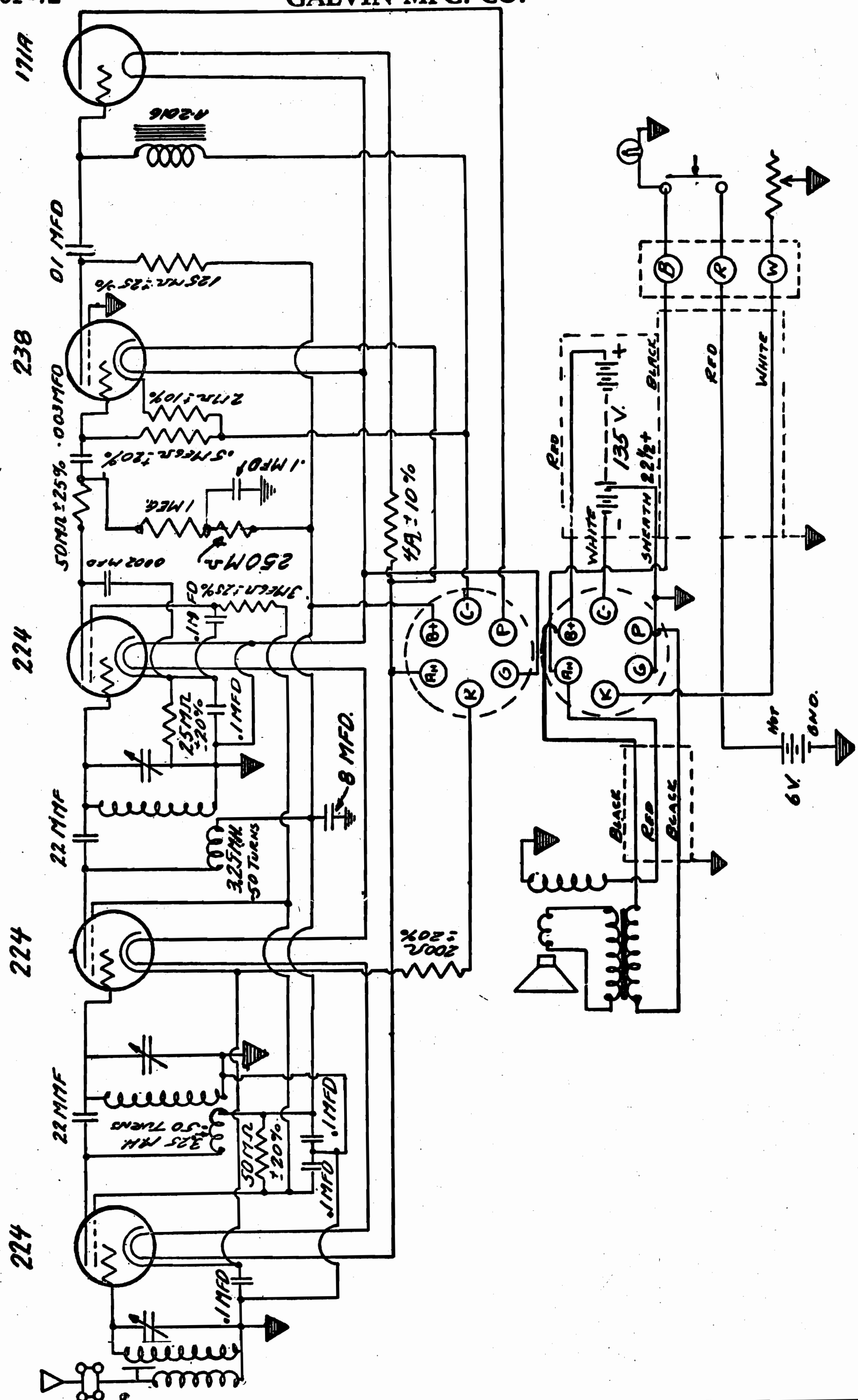
KEY TO ABOVE NUMERALS

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

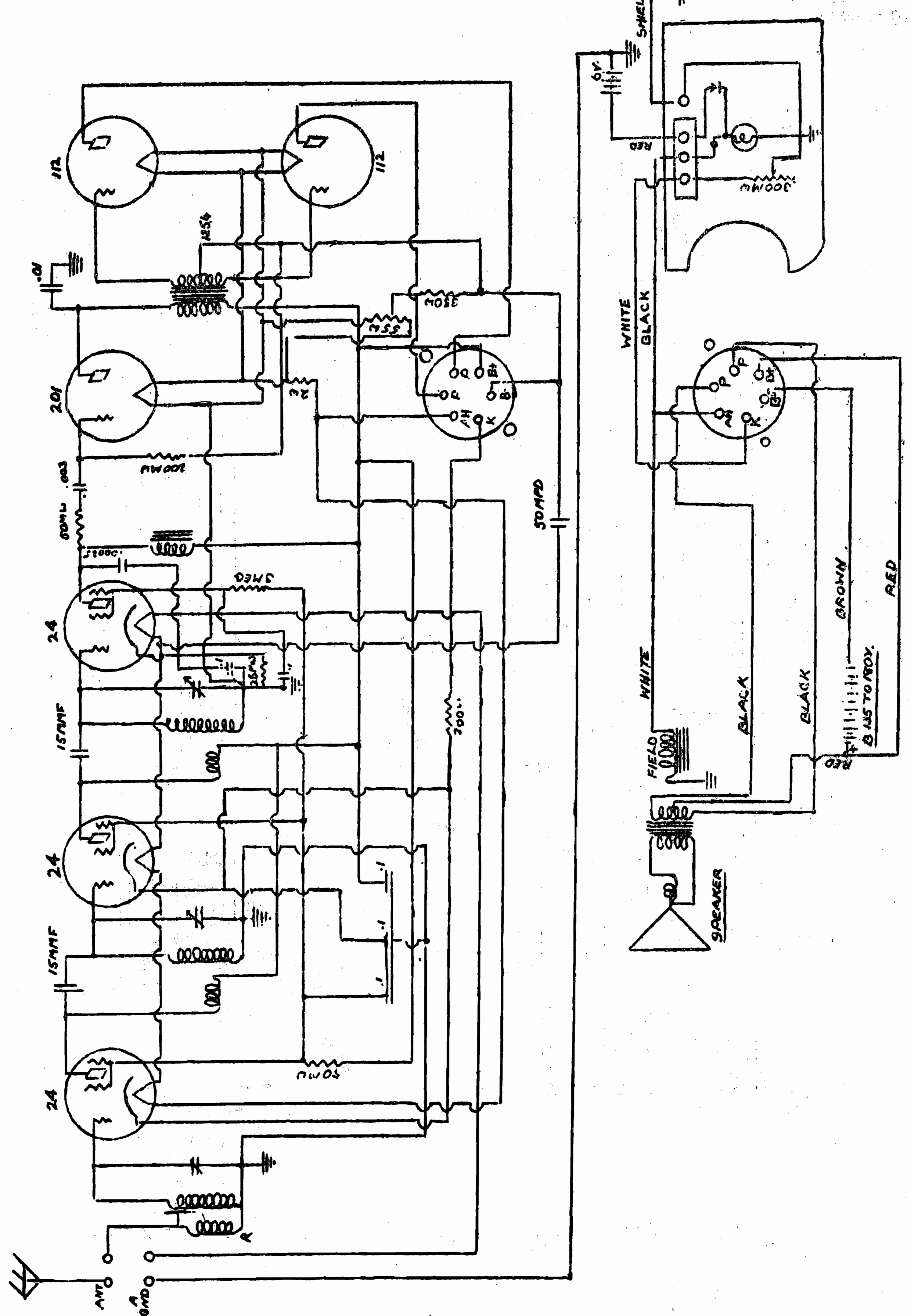
GALVIN MFG. CO.

OCT. 1, 1931



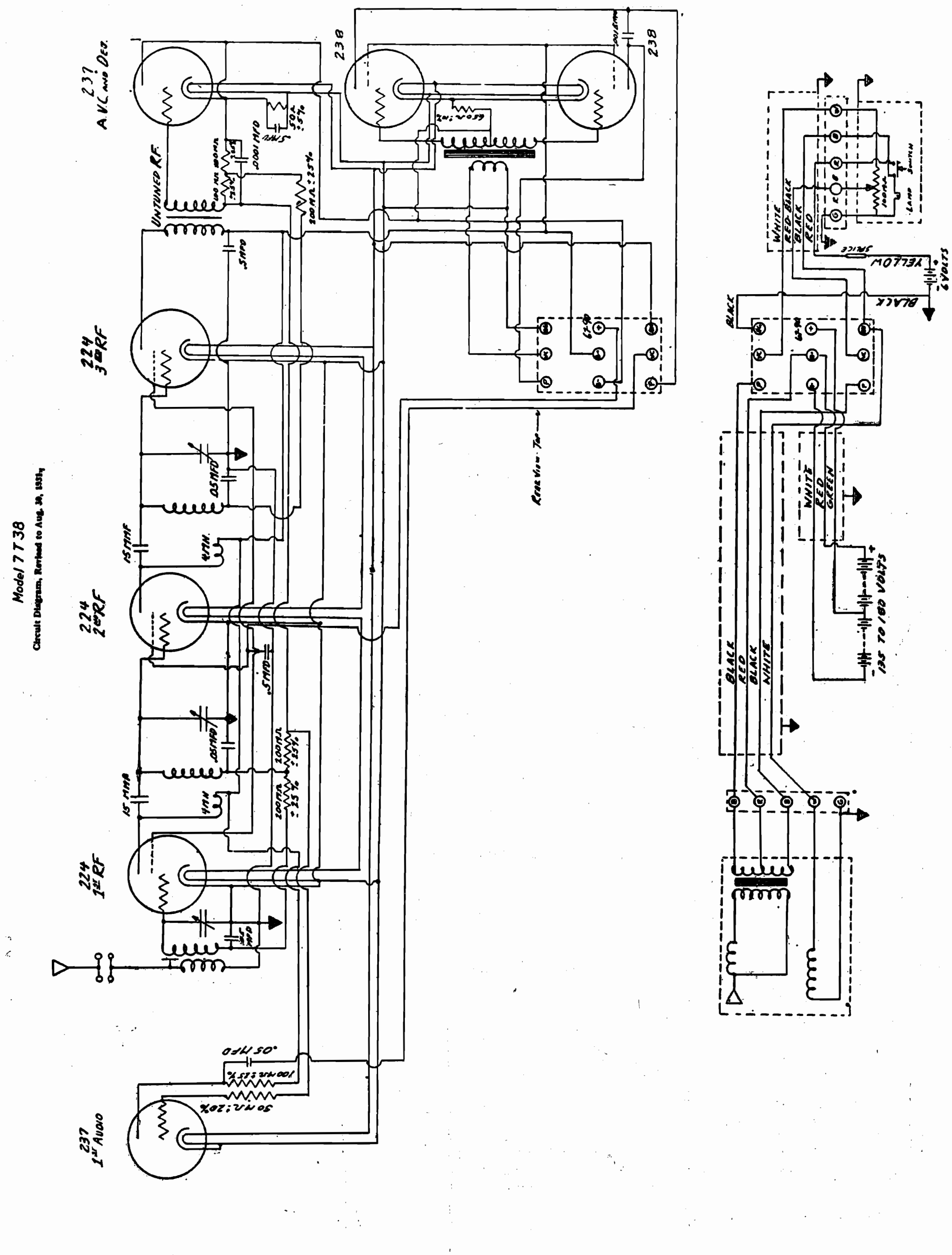
MODEL Motorola
6T-12 PL

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 known as 7T-38-A.

MODEL Motorola 7T-38
Test Data

GALVIN MFG. CO.

SOCKET #1
1 TO 13 50,000
2 TO 5 100,000
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

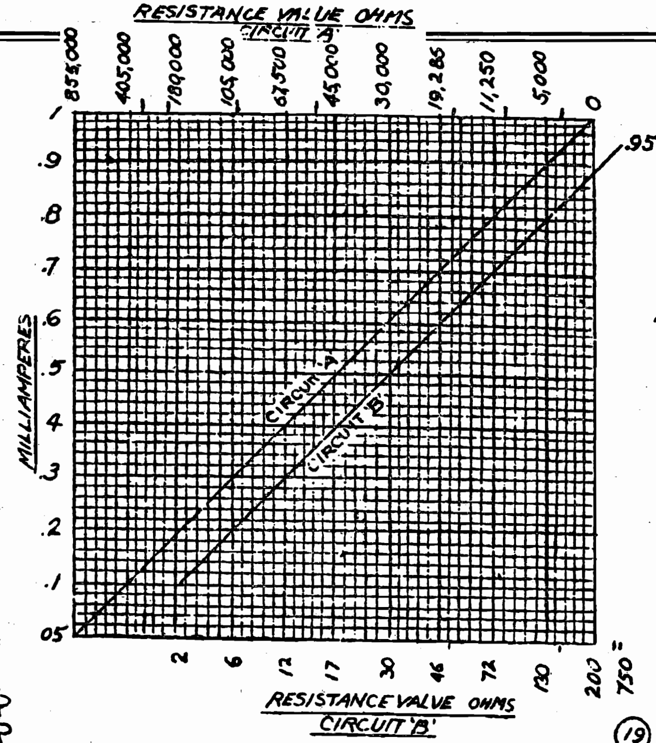
SOCKET #4
11 TO E 100
12 TO X 0
Y TO I 0
SR TO F 0
10 TO 13 300,000

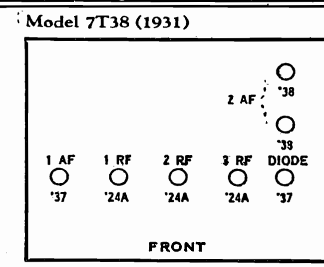
SOCKET #5
13 TO 15 200,000
15 TO X 50
14 TO 15 0
14 TO D 0
Y TO I 0

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

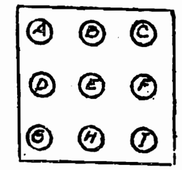
SOCKET #7
19 TO D 9000
21 TO D 650 TO 750
20 TO A 0
5 TO E 0

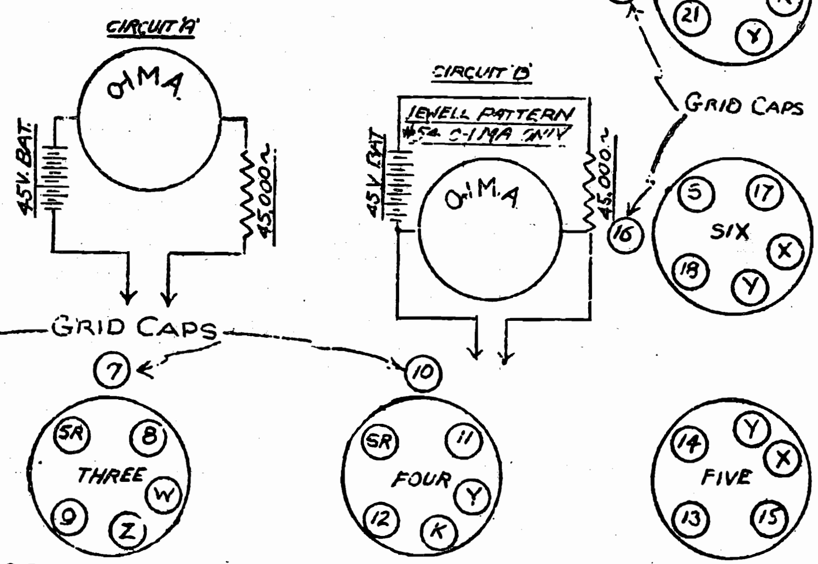
FEMALE PLUG
C TO B 3,000
E TO I OPEN
B TO H OPEN
A TO G OPEN
D TO E OPEN CONDENSER
D TO F OPEN CONDENSER
E TO C OPEN
E TO F OPEN
A TO C OPEN
G TO C OPEN
I TO D OPEN





BACK TOP SET PLUG

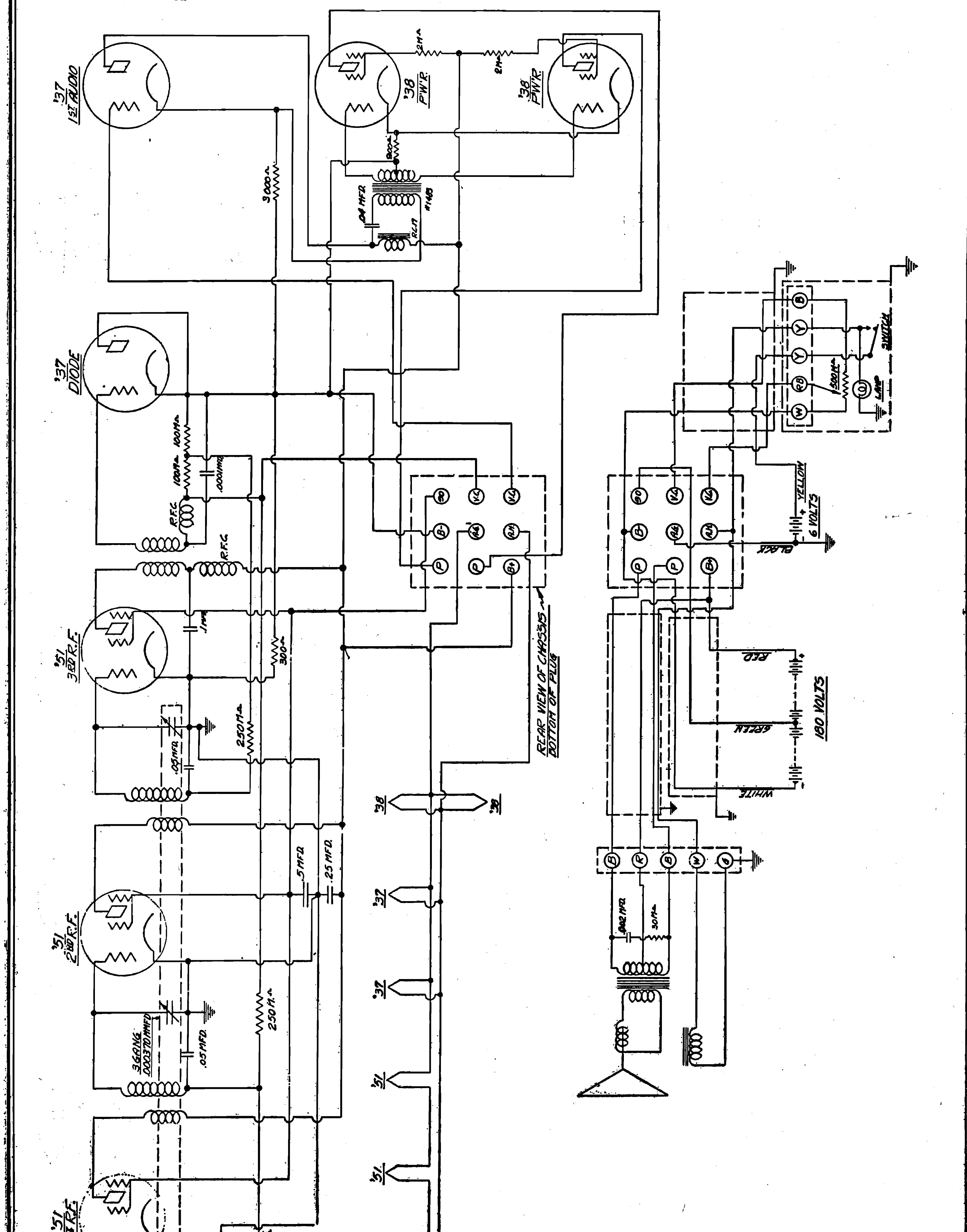




TOP VIEW OF CHASSIS

MODEL Motorola
7T-38-A

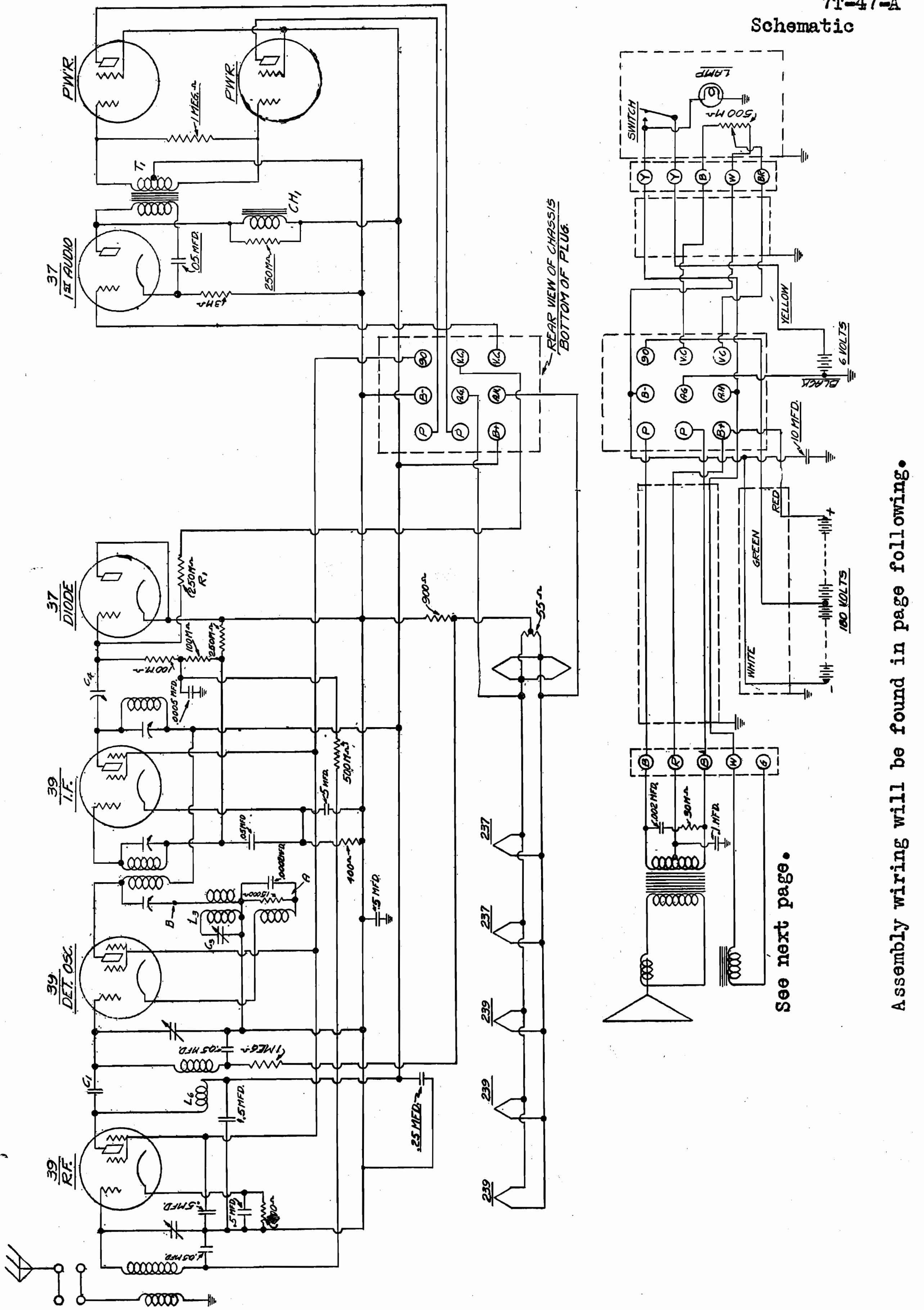
GALVIN MFG. CO.



GALVIN MFG. CO.

MODEL Motorola 7T-47-A

Schematic

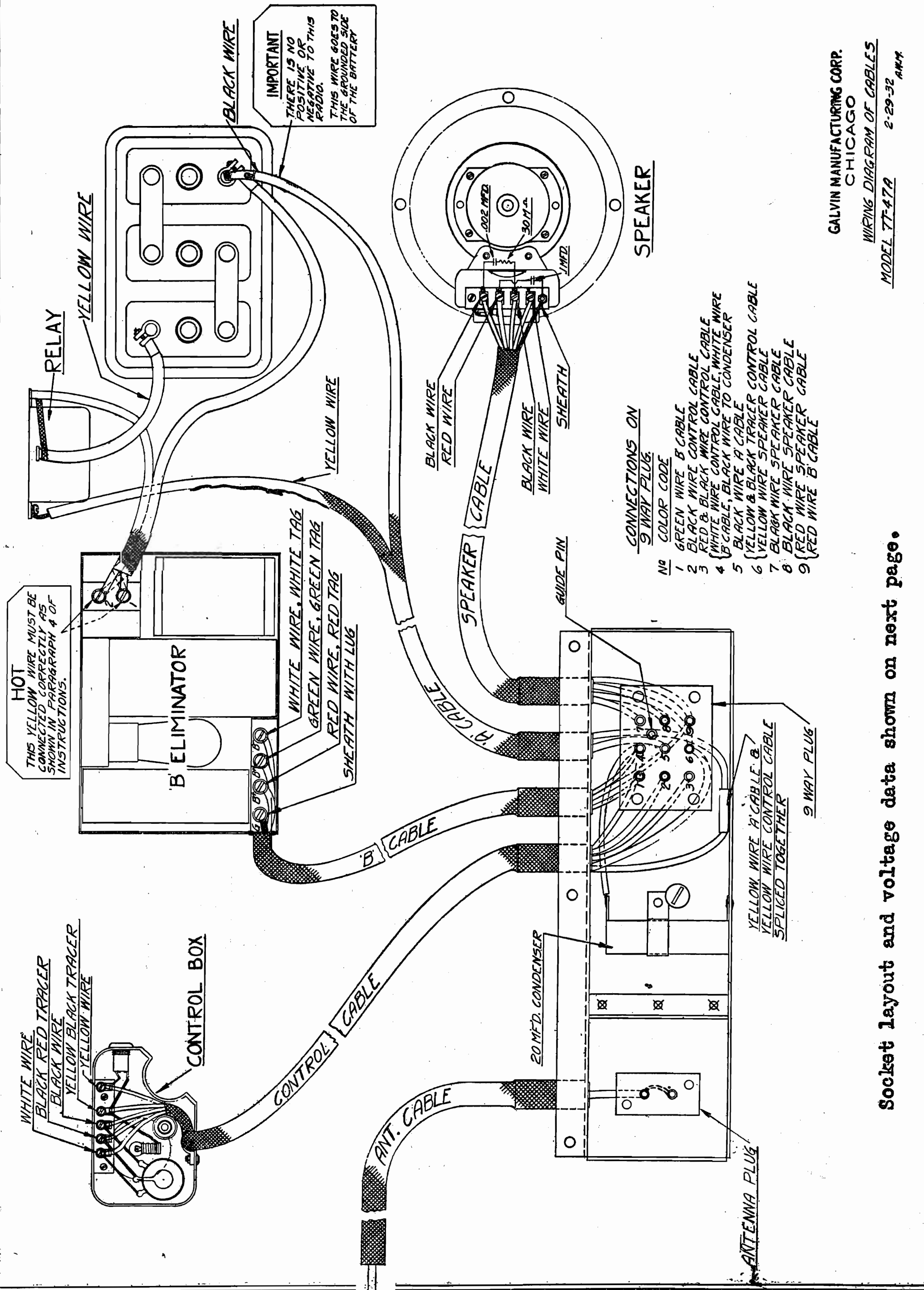


See next page.

Assembly wiring will be found in page following.

MODEL Motorola
7T-47-A
Connection Data

GALVIN MFG. CO.



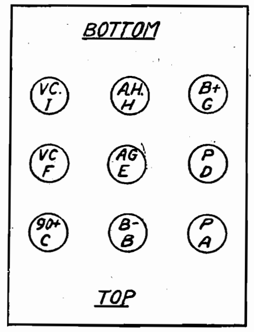
Socket layout and voltage data shown on next page.

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
+	P2	G(B+180)	43ω
•	G-2	B(B-)	1 MEG.
*	K-2	B(B-)	15Mω
+	F.G.-2	E(A.G)	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(V.C.)	250Mω
•	G-3	B(B-)	450Mω
•	G-3	G4	200Mω
+	F.G-3	E(AG)	0
+	FH-3	H(AH)	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
•	G4	B(B-)	250Mω
+	F.G.-4	E(AG)	0
+	F.H-4	H(AH)	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

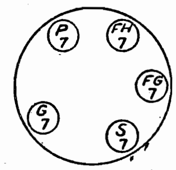
TEST	FROM	TO	READ
+	S-6	G(B+)	0
+	P-6	A(P)	0
*	G-6	B(B-)	6Mω
*	G 6	G-7	12Mω
+	F.G.-6	E(AG)	0
+	F.H-6	H(A.H.)	0

SOCKET NO 7

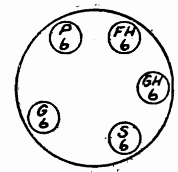
TEST	FROM	TO	READ
+	S-7	G(B+)	0
+	P-7	D(P)	0
*	G 7	B(B-)	6Mω
+	F.G.-7	E(AG)	0
+	F.H-7	H(AH)	0

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(AH)	55ω
•	F(V.C.)	GND.	OPEN
•	G(B+180)	B(B-)	OPEN
•	G(B+180)	GND.	OPEN
•	H(AH)	GND.	OPEN
•	I(V.C.)	GND.	OPEN

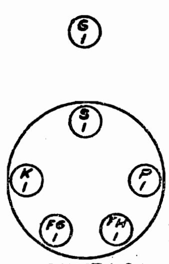


SOCKET NO. 7

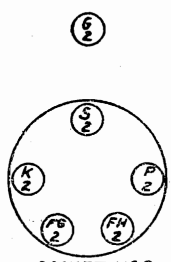


SOCKET NO. 6

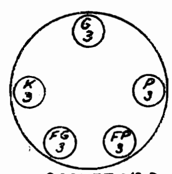
MOTOROLA CONTINUITY CHART
MODEL 7T-47-A.
GALVIN MFG CORP CHICAGO.
H.J.K. 6/17/32.



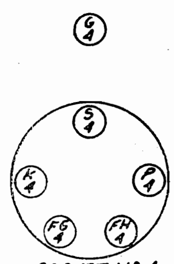
SOCKET NO 1



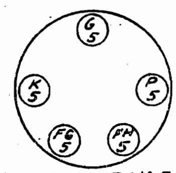
SOCKET NO 2



SOCKET NO 3



SOCKET NO 4



SOCKET NO 5

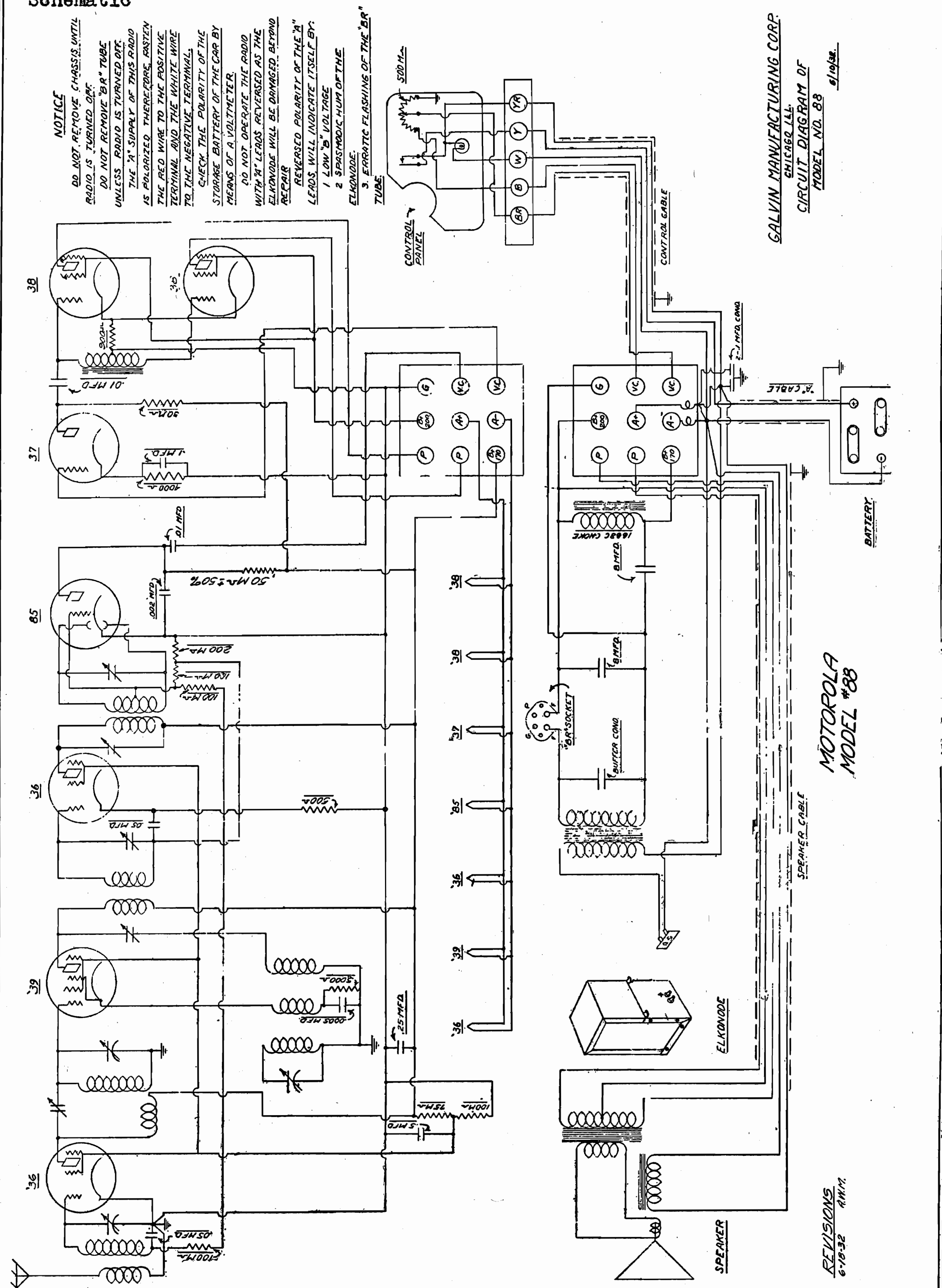
	1ST R.F.	DET. OSC.	DIODE	I.F.	1ST AUDIO	LA's
E_p	176 V.	176 V.	0	176 V.	164 V.	176 V.
I_p	4.7 MILS.	1.3 MILS.	0	1 MIL.	4.1 MILS.	7.7 MILS.
E_g	2V	8V.	0	2 V.	12 V.	18 V.
E_s	80V.	80 V.	–	80V.	–	176 V.
I_s	1.1 MILS.	.3 MILS.	–	1.2 MILS.	–	1.6 MILS. NO SIGNAL
NO SIGNAL I-CATHODE	5.8 MILS.	1.7 MILS.	.00001	5.5 MILS.	4.1 MILS.	
100-MMV. 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
Schematic

GALVIN MFG. CO.



MODEL Motorola 88
Voltage

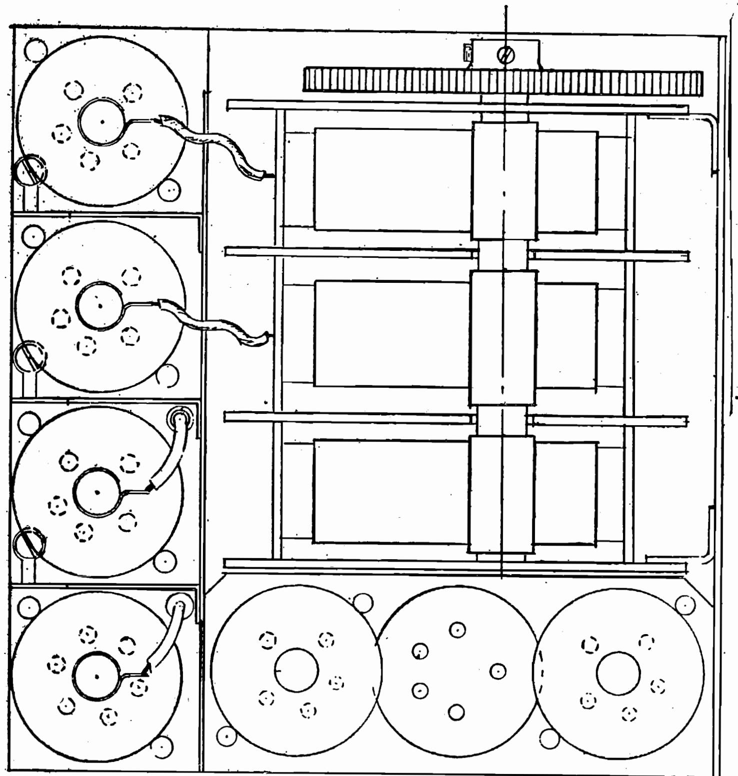
GALVIN MFG. CO.

TABLE No 2

	1st R.F.	MIXER	I.F.	DET.	2nd AUDIO	'38
I_P	2.5 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_G	0	6 V	1 V.	0	2 V.	20 V.
E_S	*60 V.	*60 V	*60 V			*200 V.
I_S	.7 MILS.	.3 MILS.	.3 MILS.			2 MILS
NO SIGNAL I CATHODE	3.4 MILS.	1.8 MILS.	2.8 MILS.			10.5 MILS
100 M.M.V. I 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 - 6.5 VOLTS AT BATTERY TERMINALS
'A' " " 5.8 " " 1st R.F. TUBE.

* APPROX. VOLTAGES



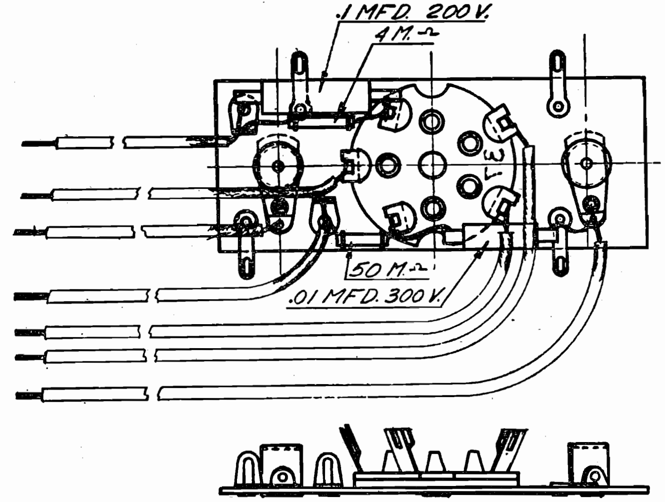


FIGURE 19

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

88

MODEL Motorola
88
Service Notes

GALVIN MFG. CO.

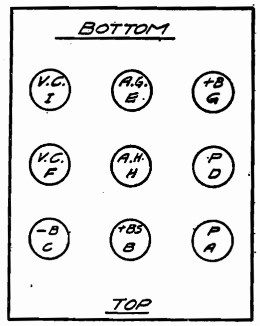
INSTRUCTIONS
USE THE TEST CIRCUIT NOTED BY THE FOLLOWING MARKERS: + LOW RESISTANCE
* HIGH RESISTANCE
• MEGOHM TEST
TEST CIRCUITS GIVEN ON RIGHT HAND SIDE OF THIS SHEET

SOCKET #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 #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 #1

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

SOCKET #2

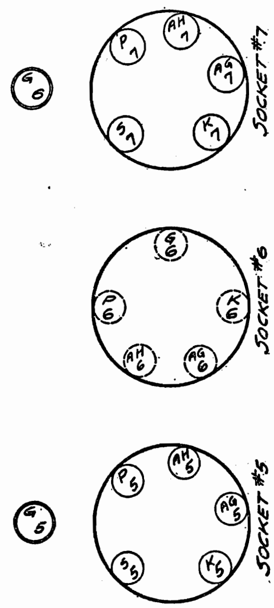
TEST	FROM	TO	READ
•	S2	G(+B)	75MΩ
+	P2	G(+B)	40Ω
+	G2	C(-B)	5Ω
*	K2	C(-B)	5MΩ
+	AG-2	E(AG)	0
+	AH-2	H(AH)	0

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

ANT.

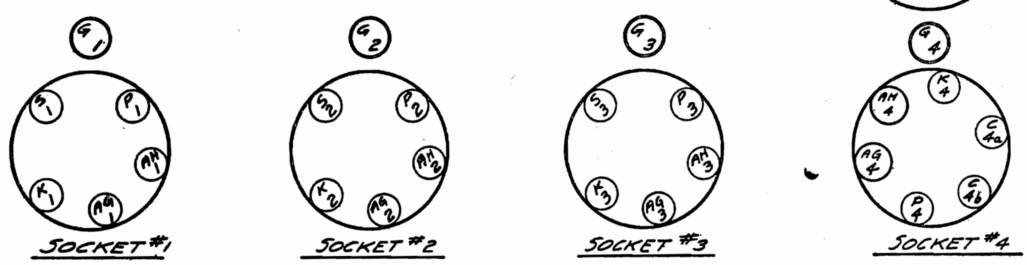
TEST	FROM	TO	READ
+	ANT.	C(-B)	5Ω



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)	"

MOTOROLA
88

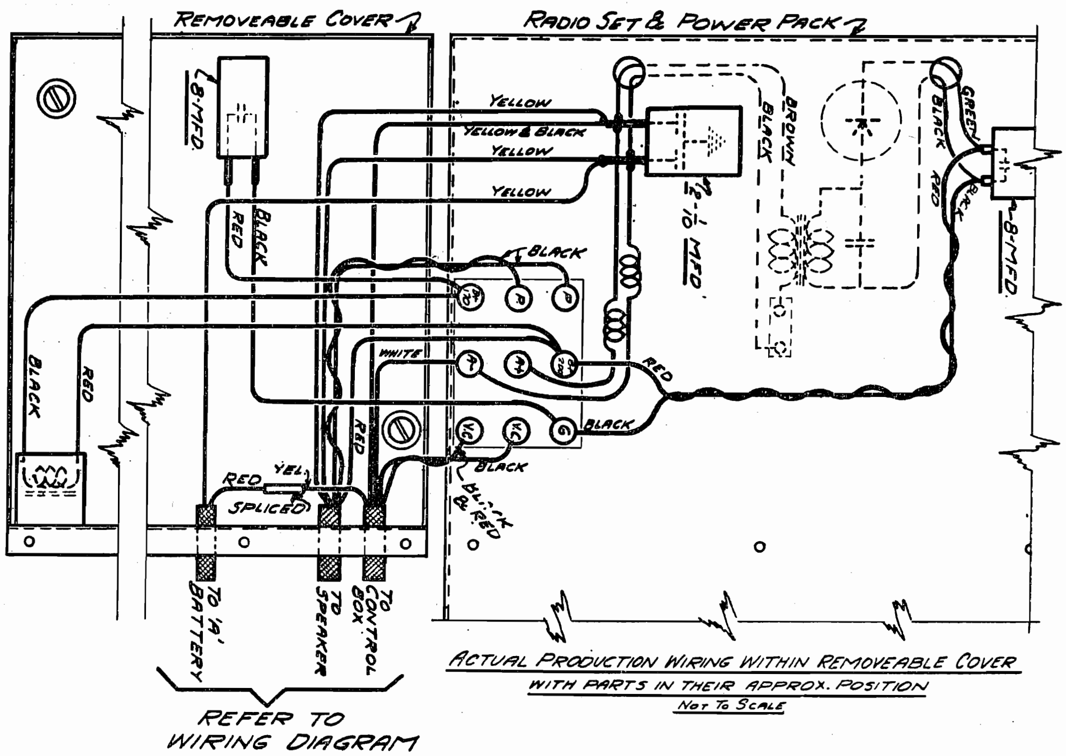


Ordinary AVC sets with normal tube hiss or noise level deliver sufficient bias to the tubes to prevent excessive plate current drain. The fourth tube, being second detector, is interchangeable with the 6 prong automotive type Wunderlich tube, Sylvania's 69 or 85 tube, or any other make of Dual Diode 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



REFER TO WIRING DIAGRAM

ACTUAL PRODUCTION WIRING WITHIN REMOVEABLE COVER WITH PARTS IN THEIR APPROX. POSITION NOT TO SCALE

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.

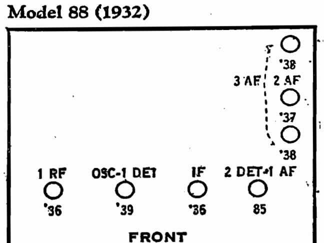
Removal of Antenna and Radio Frequency Coils - - - First remove the tube shield as previously described and unsolder all these stator connections on to the variable condenser. Remove the 160-tooth drive gear and remove the four hex-head sheet metal screws holding the variable condenser on to the brackets - 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.

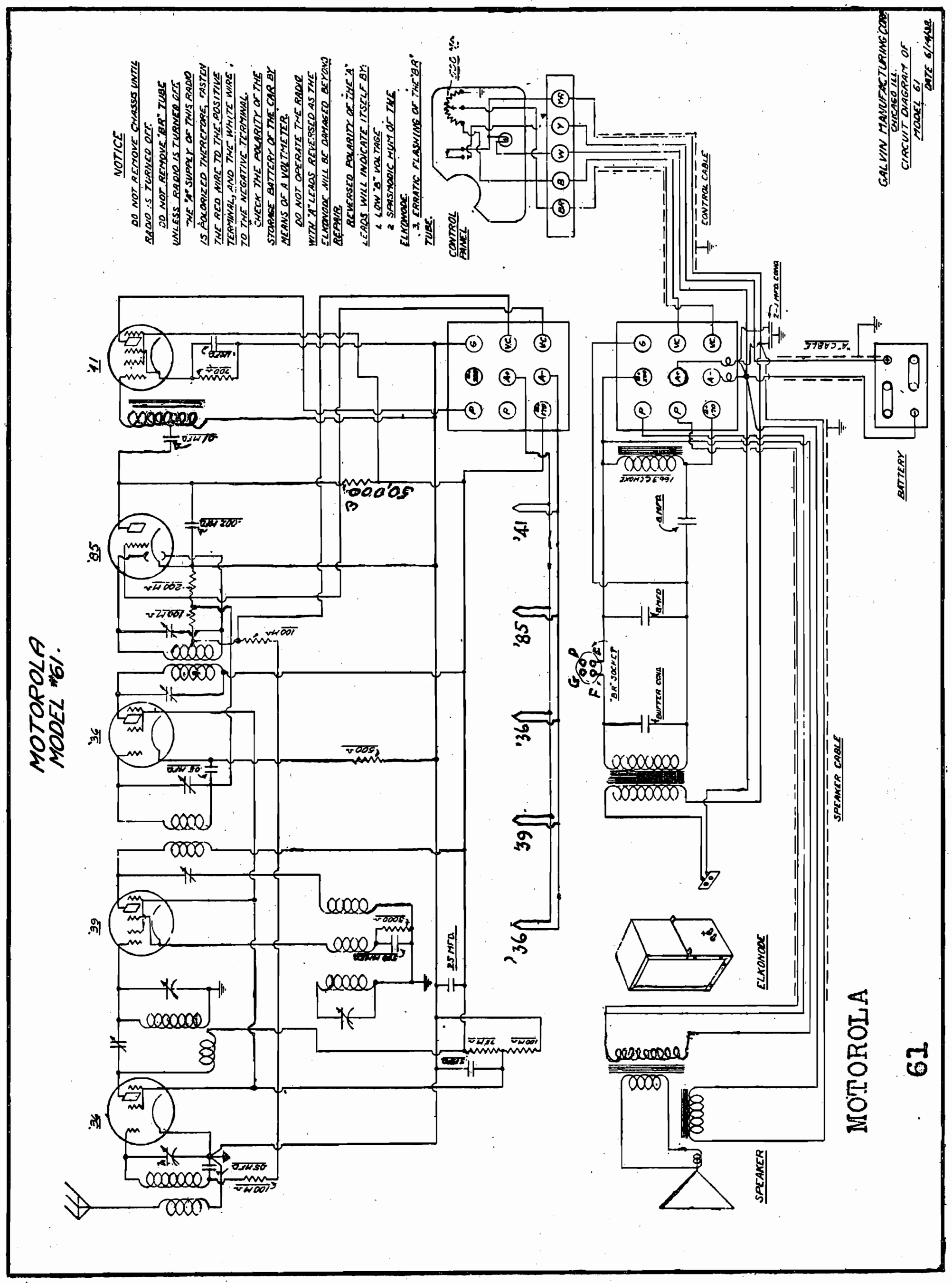
Model 88 (1932)



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.

MODEL Motorola 61

GALVIN MFG. CO.



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.

MODEL Motorola
Auto Notes

GALVIN MFG. CO.

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 piened. 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.

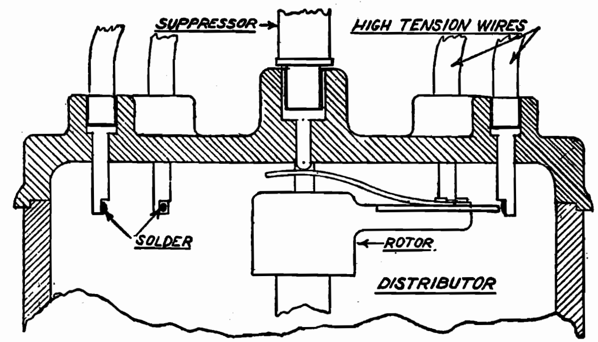


Figure 6

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.

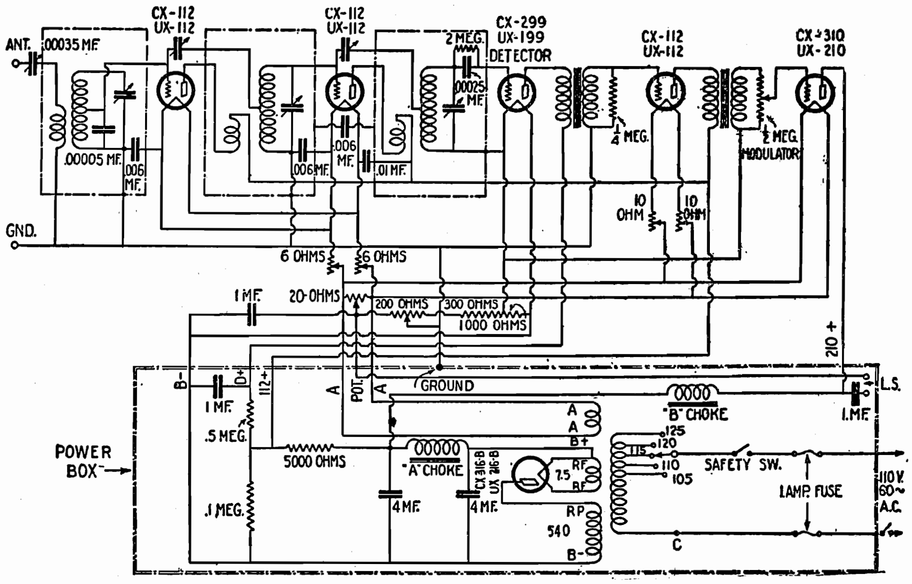
Dome light filters need to be installed in all sedans and an additional generator condenser must be applied either at the starter connection to the bulkhead or at the ammeter to the instrument board.

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.

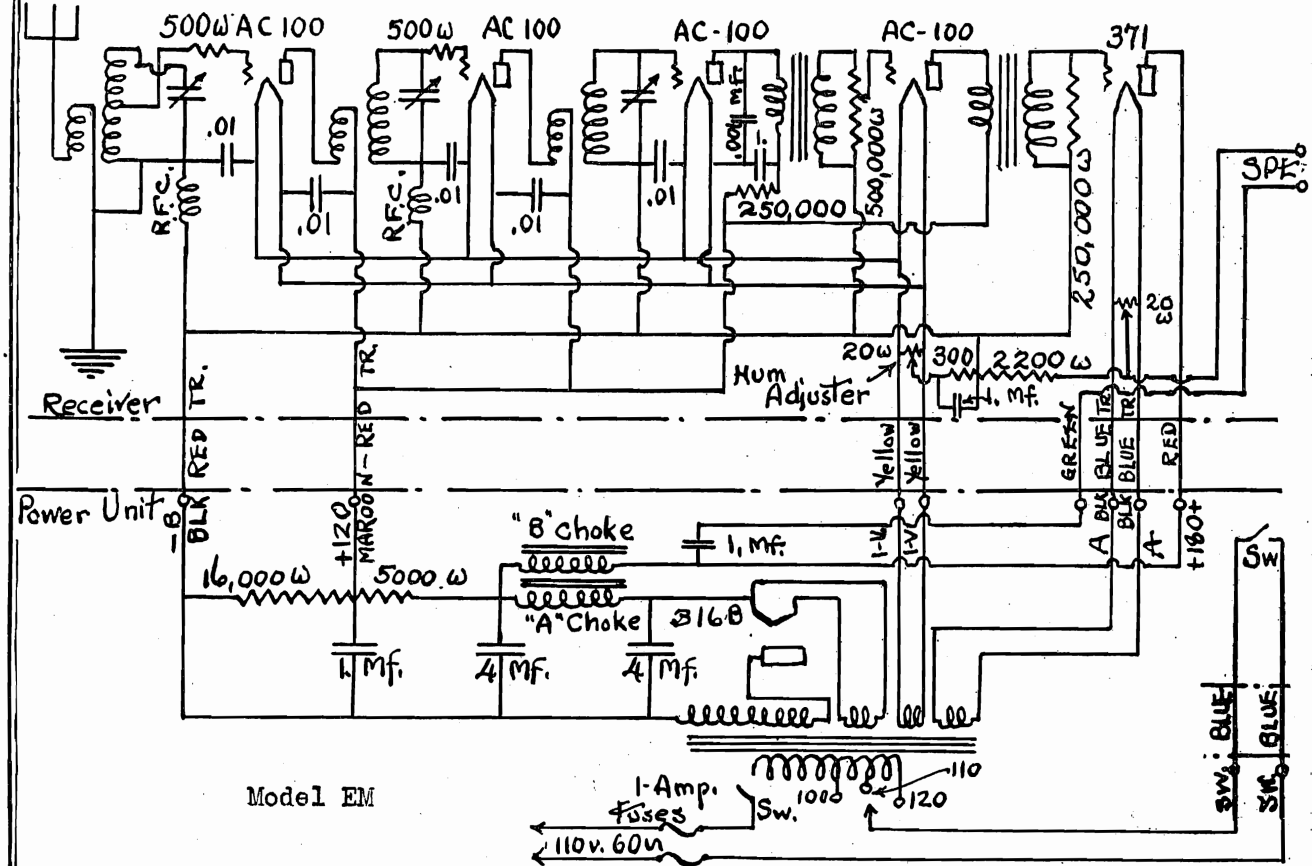
Circuit	Solid Color	Tracer
B Plus 210	Red	None
B Plus 112	Maroon	Red
B Plus Det.	Maroon	None
B Minus	Black	Red
A Plus	Yellow	None
A Minus	Black	Yellow
C Plus	Green	None
C Minus	Black	Green
Antenna	Blue	None
Ground	Black	Blue

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

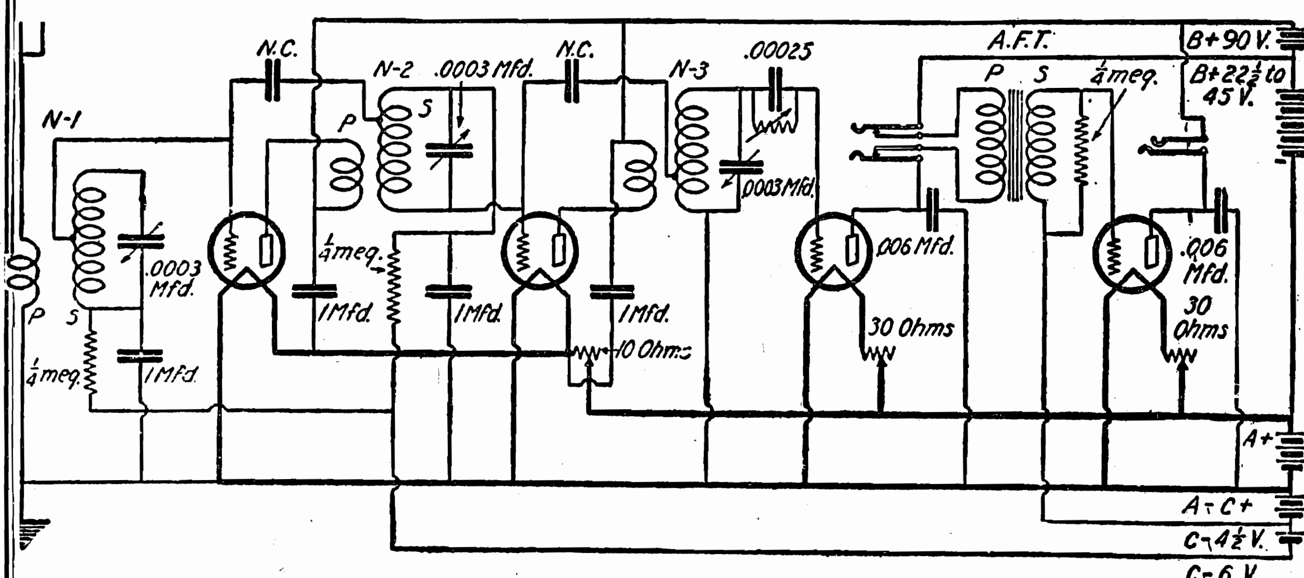
Circuit	Solid Color	Tracer
B Plus 210	Red	None
B Plus 112	Maroon	None
B Plus Det.	Maroon	Black
B Minus	Black	Red
A Plus	Yellow	None
A Minus	Black	Yellow
Pot.	Black	Blue
Antenna	Blue	None
Ground	No braid	

MODEL Garod EM
MODEL Neutrodyne

GAROD RADIO CO.



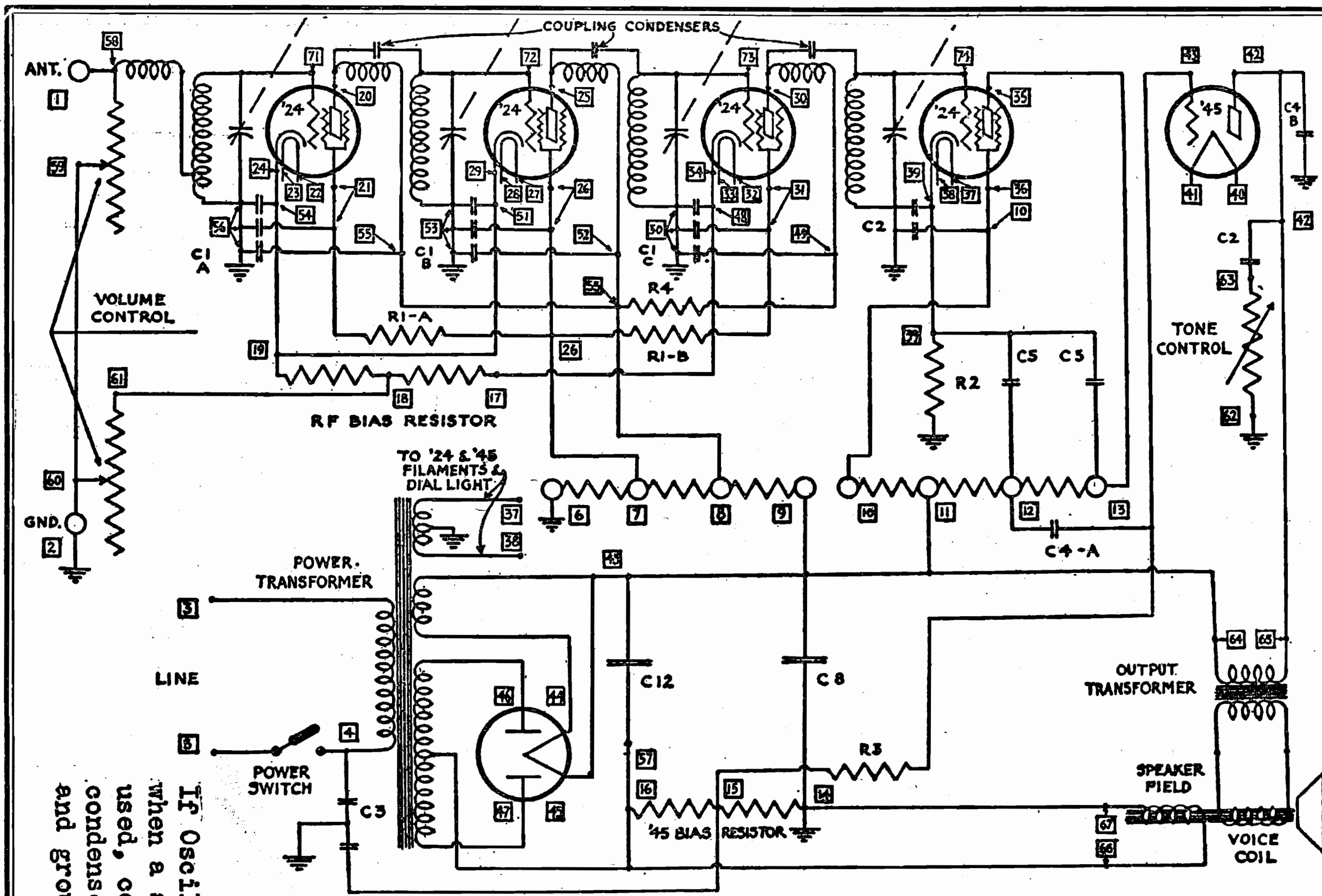
Model EM

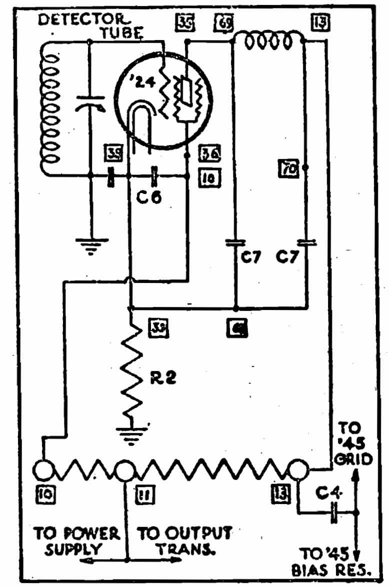


Model Garod Neutrodyne

GENERAL MOTORS RADIO CORP.

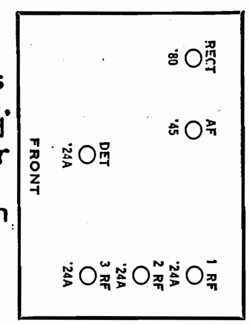
MODEL 110,180,190
Little General





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.

Models 110, 180, 190



NOTE: In Chassis with serial numbers above 23156 MA and 1611 MB, 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	
NO.	CAPACITY
C-1	.1-1-.1 Mfd.
C-2	.5-1-.25 Mfd.
C-3	.5-.1 Mfd.
C-4	.01 Mfd.
C-5	.00025 Mfd.
C-6	.5-.5 Mfd.
C-7	.0001 Mfd
C-8	8.0 Mfd.
C-12	12.0 Mfd.

SINGLE FIXED RESISTORS				
NO.	OHMS RESISTANCE	COLOR BODY	END	DOT
R 1	15,000	Brown	Green	Orange
R 2	25,000	Red	Green	Orange
R 3	500,000	Green	Black	Yellow
R 4	1,000	Insulated Resistor Wire		

VOLTAGE DIVIDER	
SECTION	RESISTANCE
6-7	22,000 Ohms
7-8	15,000 Ohms
8-9	6,000 Ohms
10-11	2 Megohms
11-12	250,000 Ohms
12-13	15,000 Ohms
On chassis with serial numbers above 23156MA	
11-13	250000 Ohms

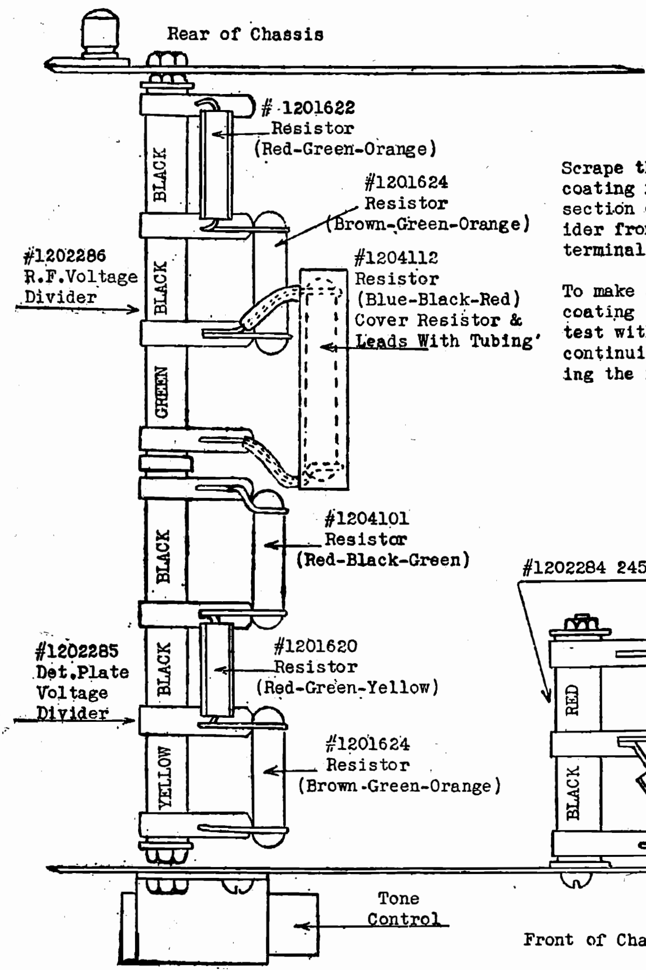
'45 BIAS RESISTOR	
SECTION	RESISTANCE
14-15	100,000
~~15-16~~	~~[illegible]~~
15-16	150,000
R.F. BIAS RESISTOR	
SECTION	RESISTANCE
17-18	1,000
18-19	500

TUBE	TYPE	FIL.	PLATE	CON.GRID	S.GRID	CATHODE	NORMAL MA.	GRID CHANGE
'24	1RF	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

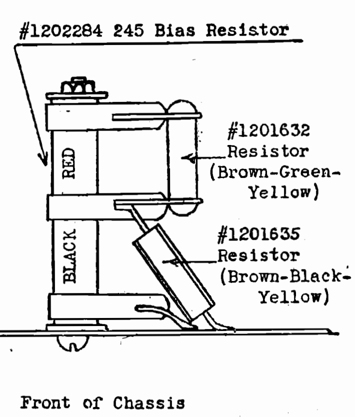
Instructions For Replacing the Voltage Dividers of Models 110, 180 and 190, Special Number 1, with Serial Numbers below 23157 MA and 1612 MB.



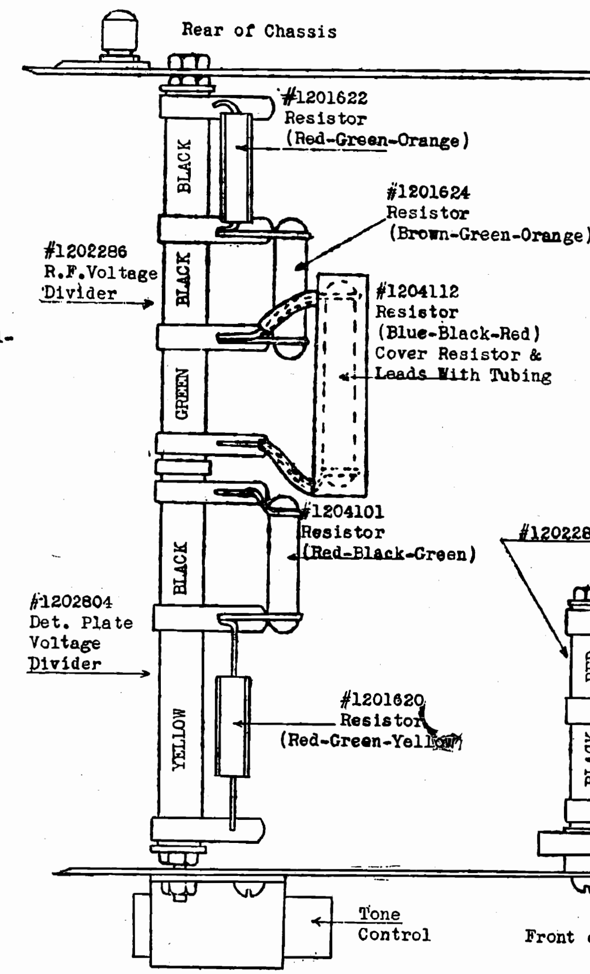
IMPORTANT

Scrape the paint and carbon coating from one side of each section of each voltage divider from terminal clip to terminal clip.

To make sure that the carbon coating is entirely removed, test with an open test or continuity meter before installing the new resistors.



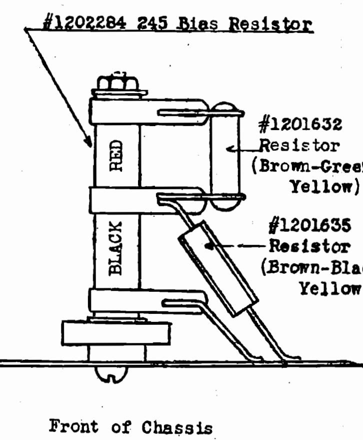
Instructions For Replacing the Voltage Dividers of Models 110, 180 and 190, Special Number 1, with Serial Numbers above 23156 MA and 1611 MB.



IMPORTANT

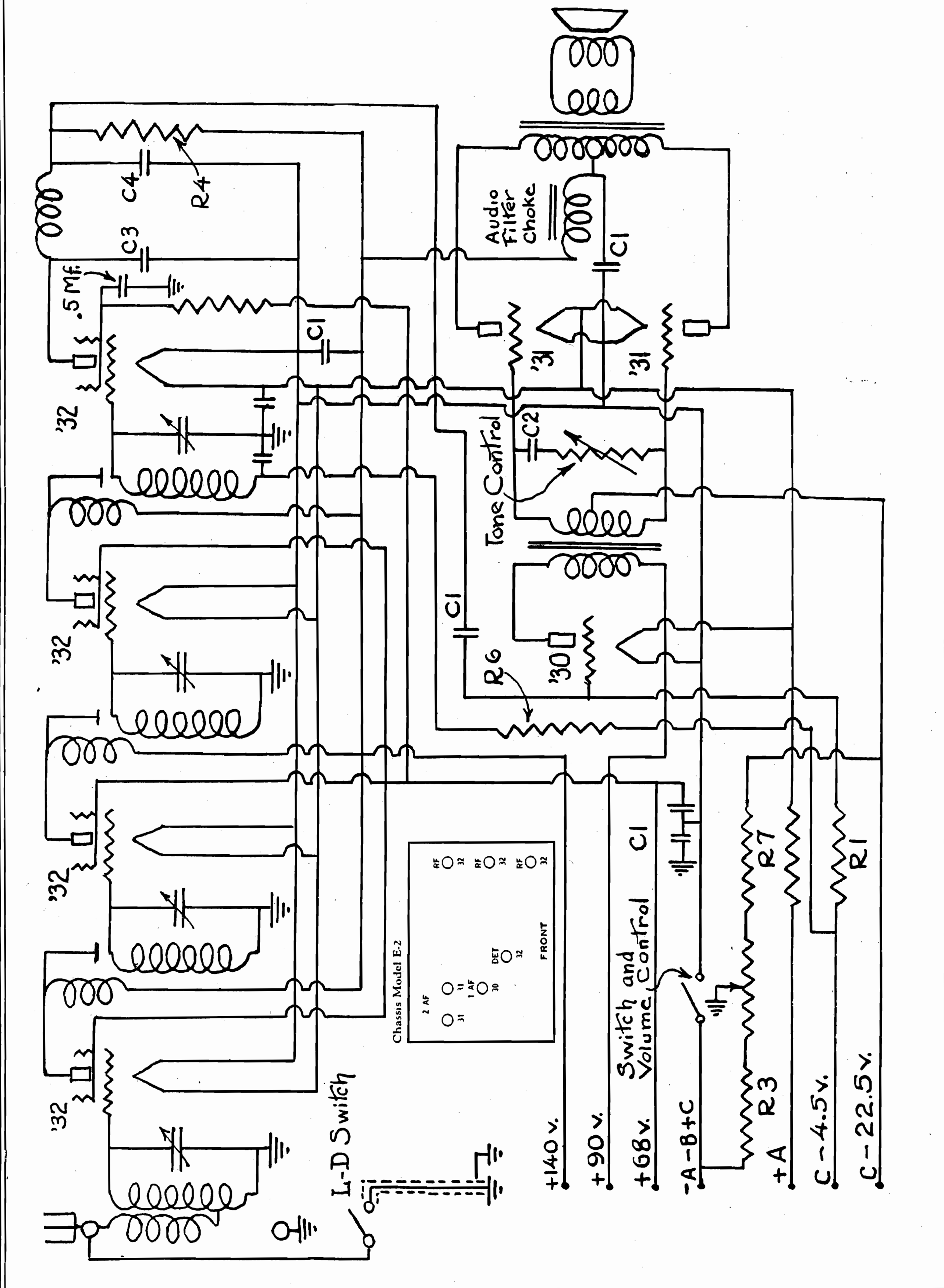
Scrape the paint and carbon coating from one side of each section of each voltage divider from terminal clip to terminal clip.

To make sure that the carbon coating is entirely removed, test with an open test or continuity meter before installing the new resistors.



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

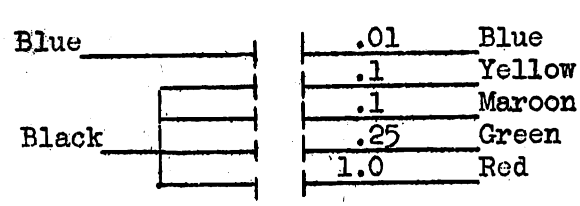
Capacities of C-1 Condenser are arranged as follows:

VOLTAGE TESTS

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

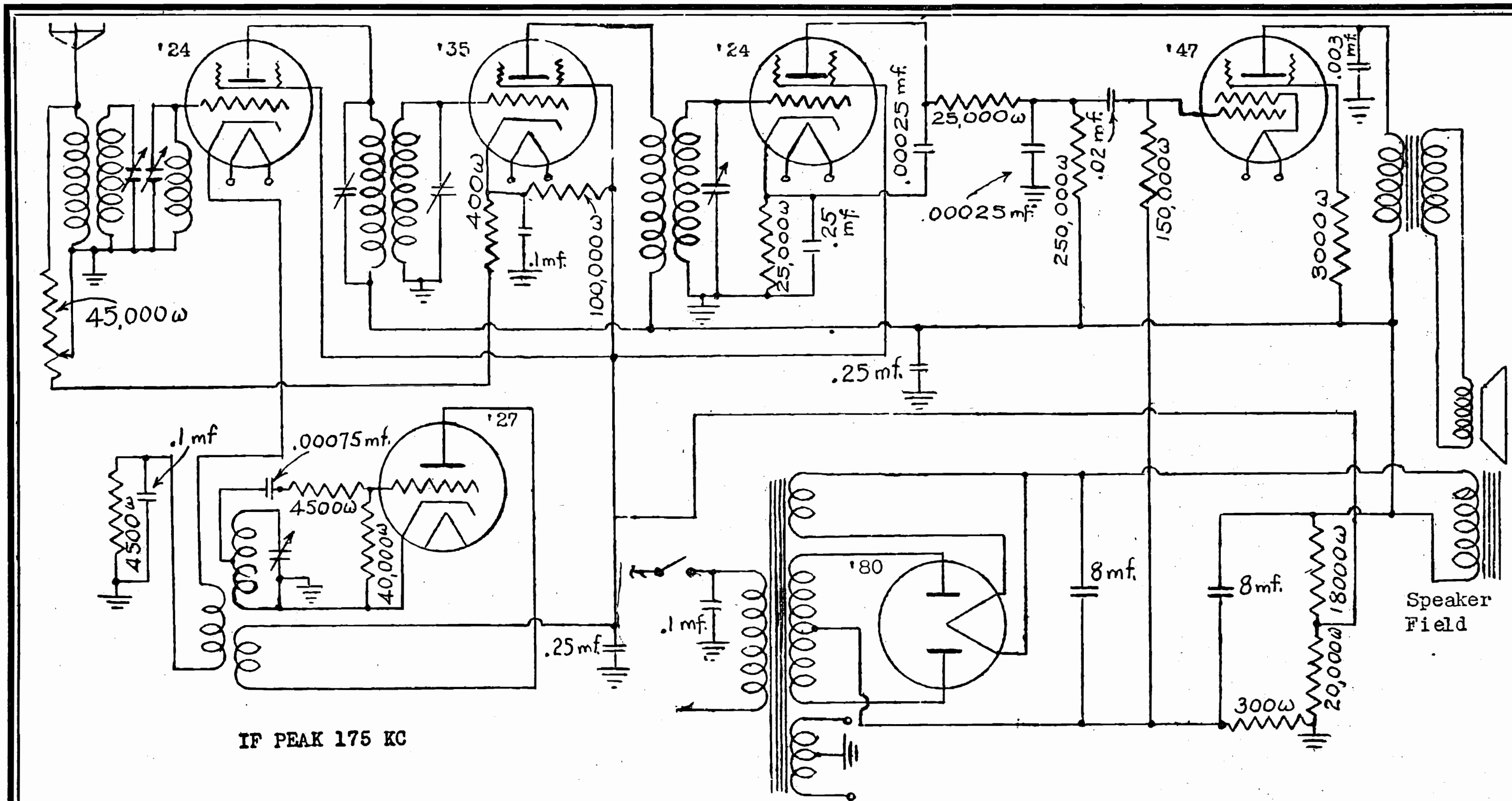
Type of Tube	Position of Tube	"A" Fil. Volts	"B" Plate Volts	"C" Control Grid Volts	Screen Volts	Normal Plate MA	Grid Change
232	1st R.F.	2	143	2	72	2	2.5
232	2nd R.F.	2	143	2	72	2	2.5
232	3rd R.F.	2	143	2	72	2	2.5
232	Detector	2	10	1	35	.2	.1
230	1st A.F.	2	90	---	--	2	3.5
231	2nd A.F.	2	135	19	--	5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

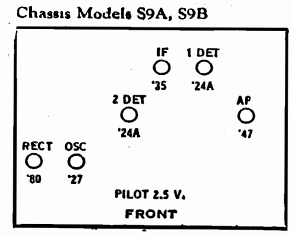


IF PEAK 175 KC

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.

Chassis Models S9A, S9B



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

GENERAL MOTORS RADIO CORP.

TRACKING PROCEDURE

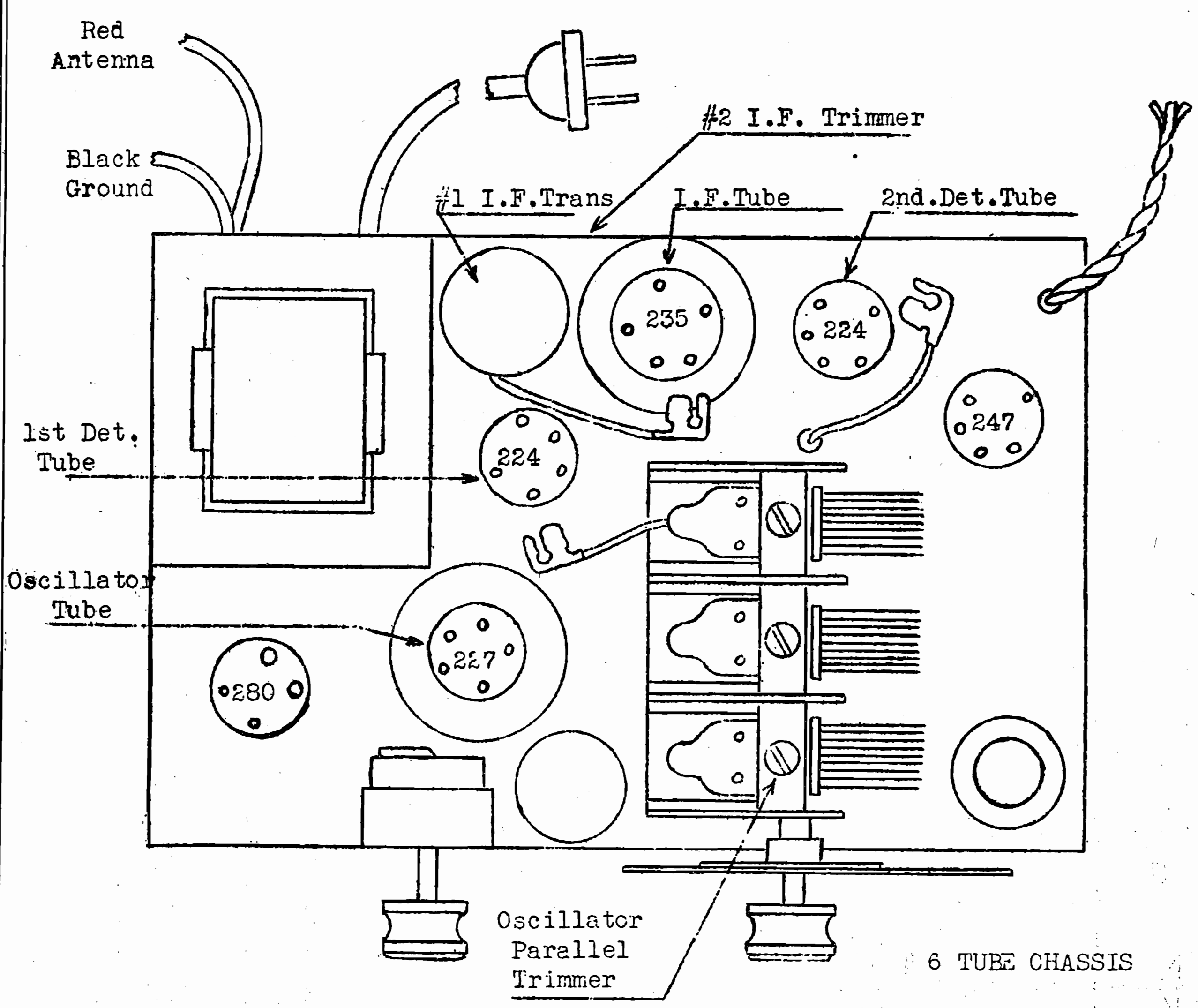
(1) Feed a signal of exactly 1400 K.C. into the chassis from the test oscillator.

(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.



6 TUBE CHASSIS

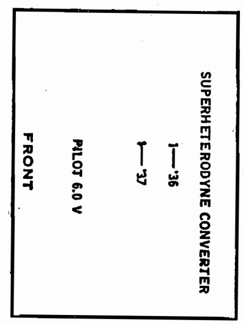
GENERAL MOTORS RADIO CORP.

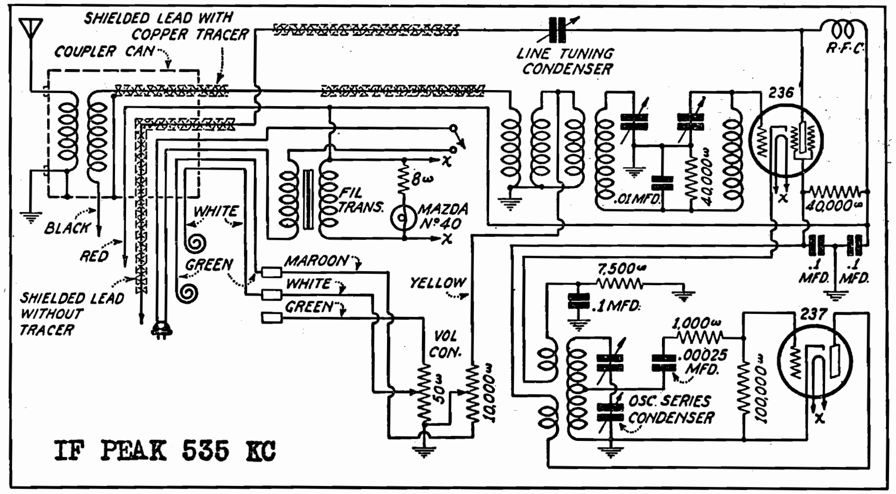
MODEL 281-(R-1A)
Converter
Schematic

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.

MODEL 281-(R-1A)
Converter
Adapter-Data

GENERAL MOTORS RADIO CORP.

GENERAL MOTORS RADIO CORPORATION RECEIVERS, Models 110, 180 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.

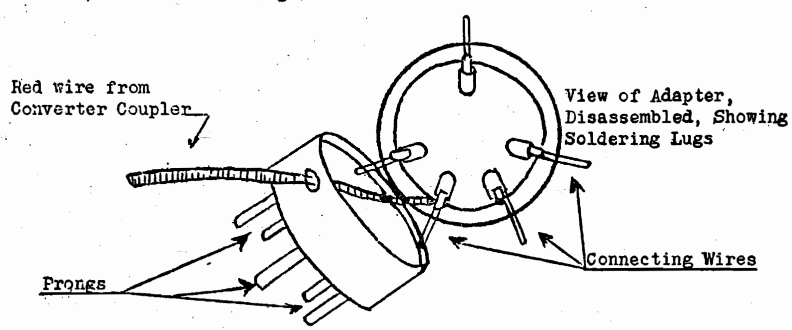


FIGURE 2.

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.

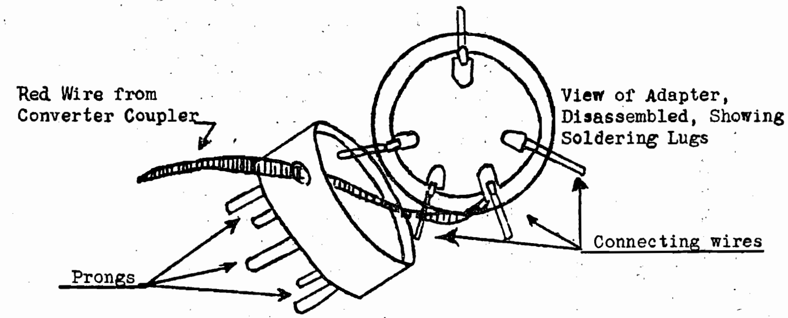


FIGURE 3.

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.

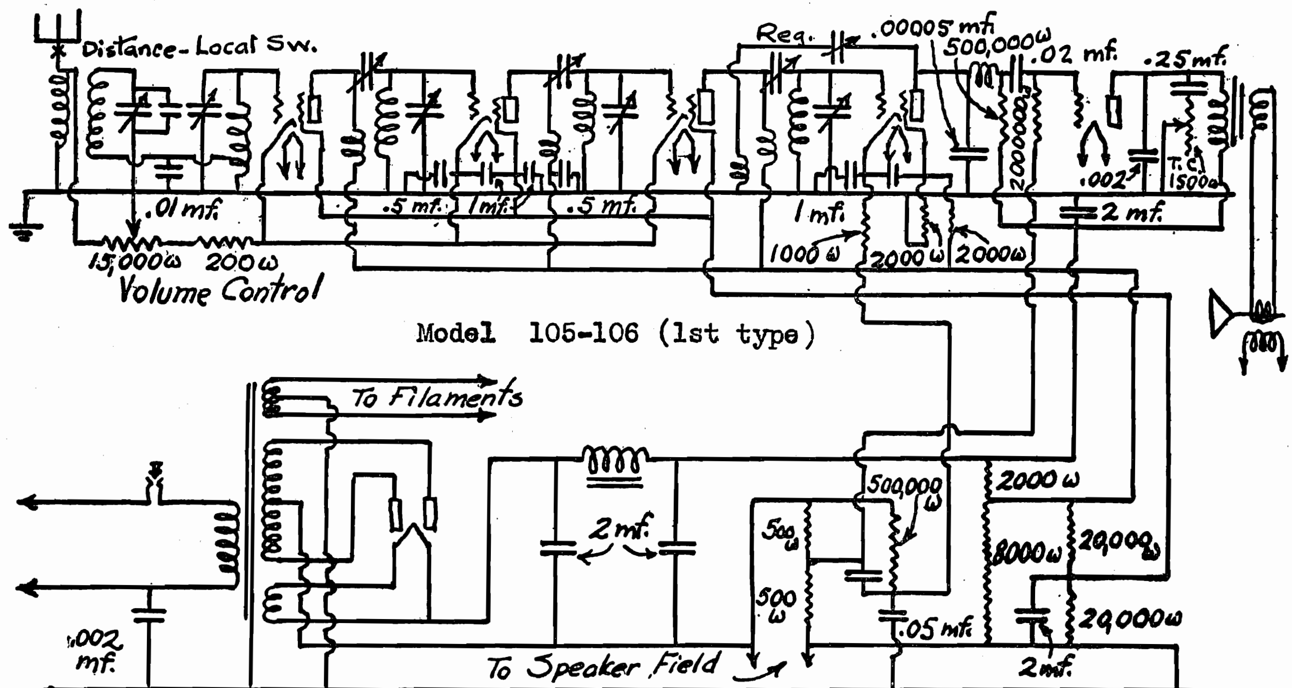
CAUTION: Do not make the connection to the plate terminal of any tube socket, nor to the prong of the speaker plug which connects to the plate of the output tubes.

"A" VOLTAGE OR FILAMENT SUPPLY:

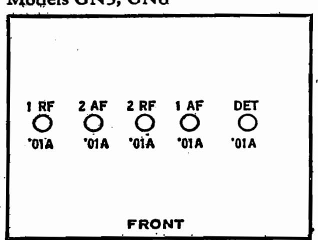
The Superheterodyne converter has, built in the base, a transformer which supplies current to heat the filaments of the two tubes in the converter. The transformer is connected to the A.C. line by inserting the power cord and plug attached to the coupler into a convenient light socket or wall receptacle 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.

GILFILLAN BROS.

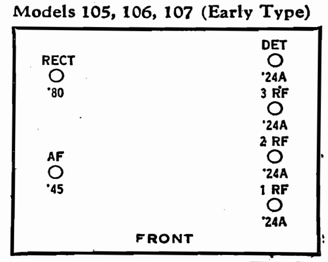
MODEL GN-6
MODEL 105-106 (1st type)

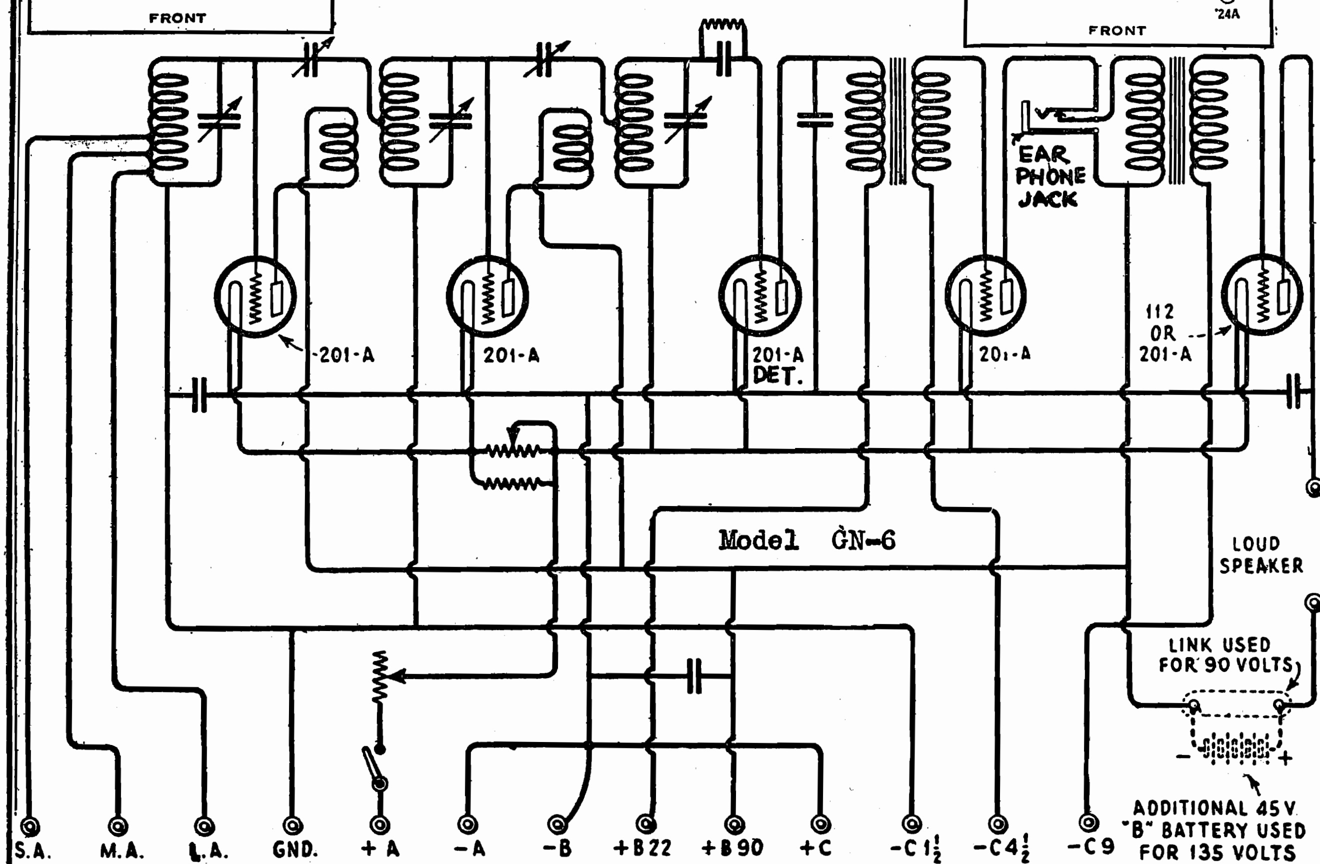


Models GN5, GN6



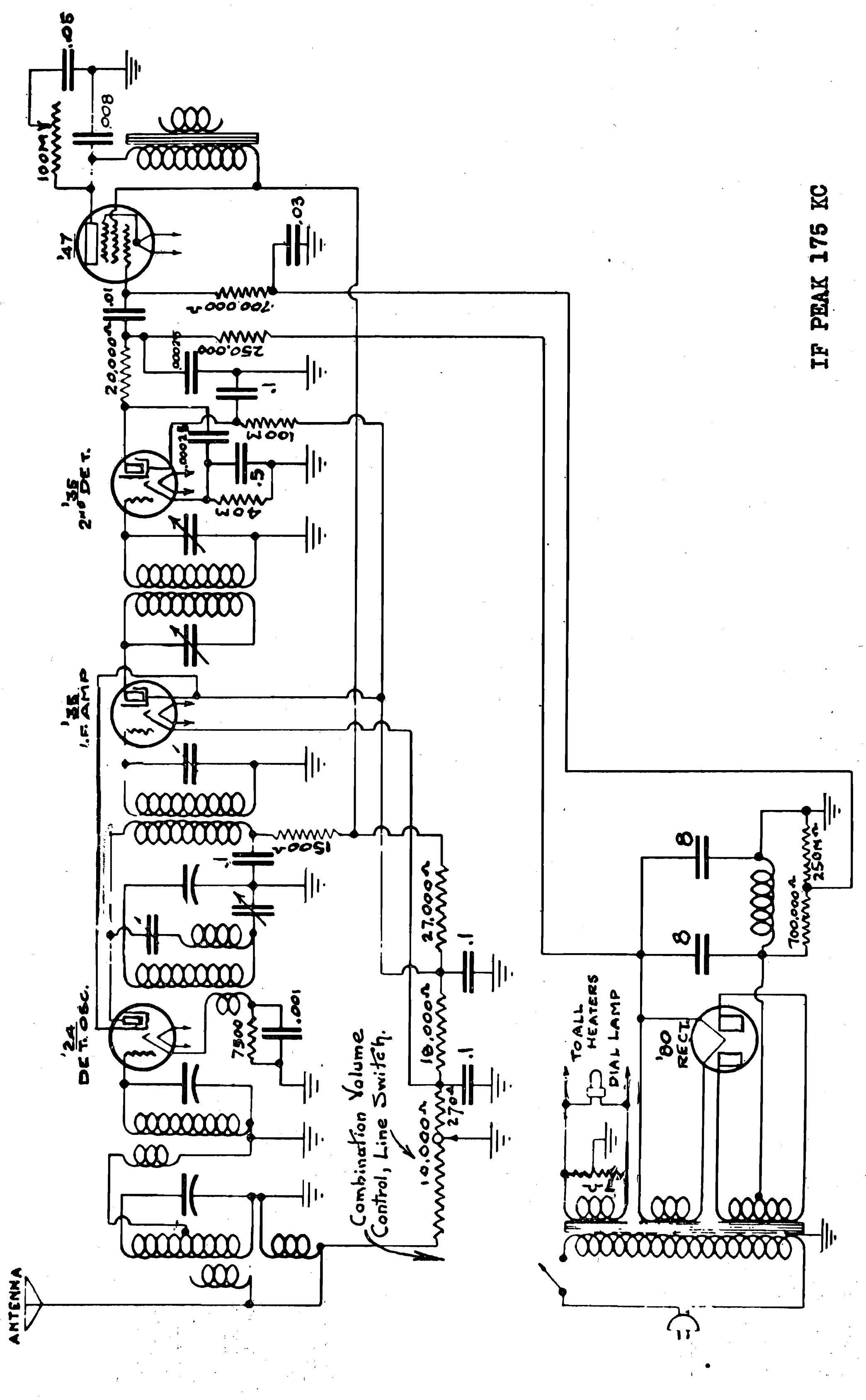
Models 105, 106, 107 (Early Type)





MODEL HS-3

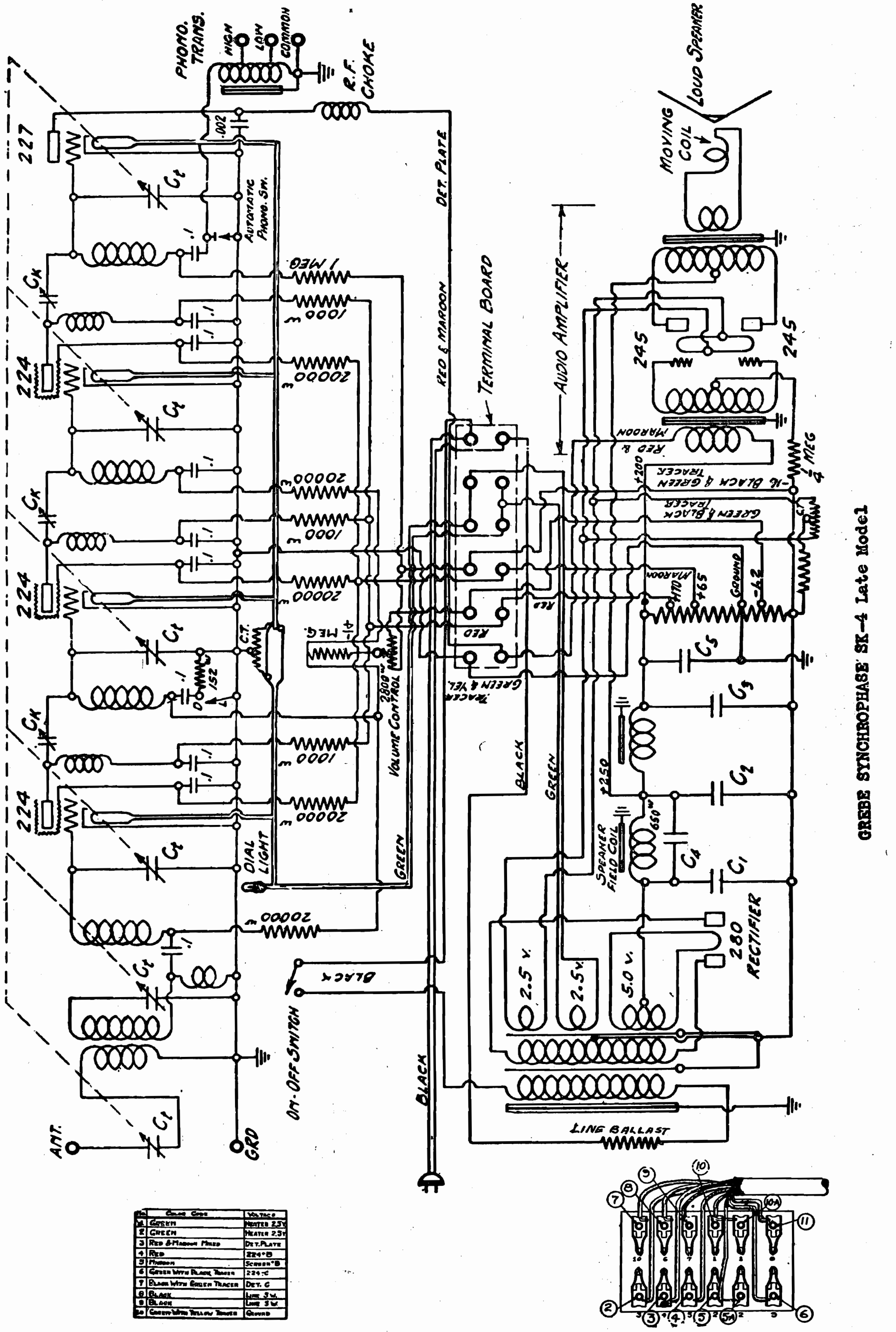
A. H. GREBE & CO.



IF PEAK 175 KC

MODEL Synchrophase SK-4
Late Model
Schematic

A. H. GREBE & CO.

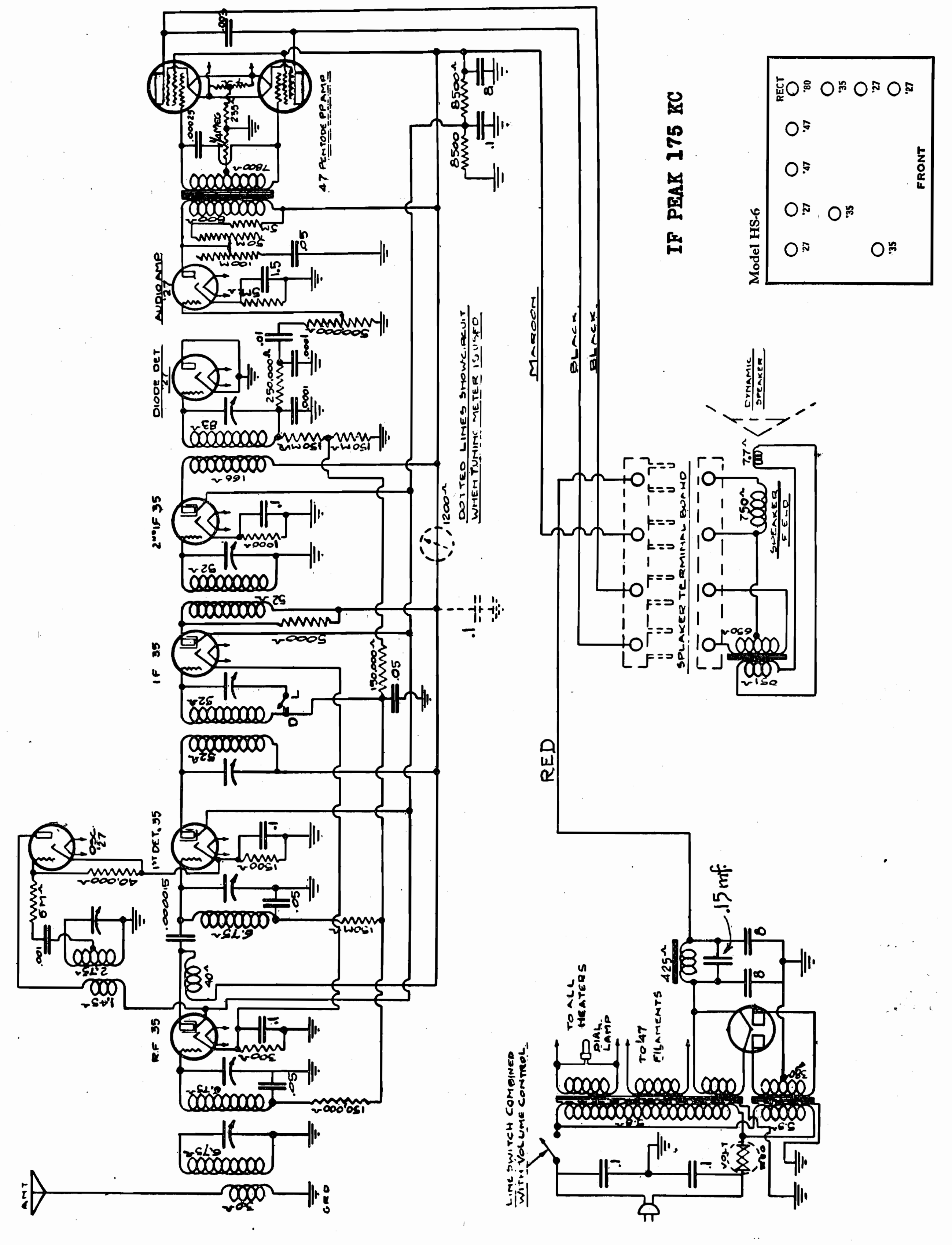


No.	Color Code	Voltage
1	Green	Heater 2.5V
2	Green	Heater 2.5V
3	Red & Maroon Mixed	Det. Plate
4	Red	224 +B
5	Maroon	Screen +B
6	Green With Black Tracer	224 -C
7	Black With Green Tracer	Det. C
8	Black	Line Sw.
9	Black	Line Sw.
10	Green With Yellow Tracer	Ground

GREBE SYNCHROPHASE SK-4 Late Model

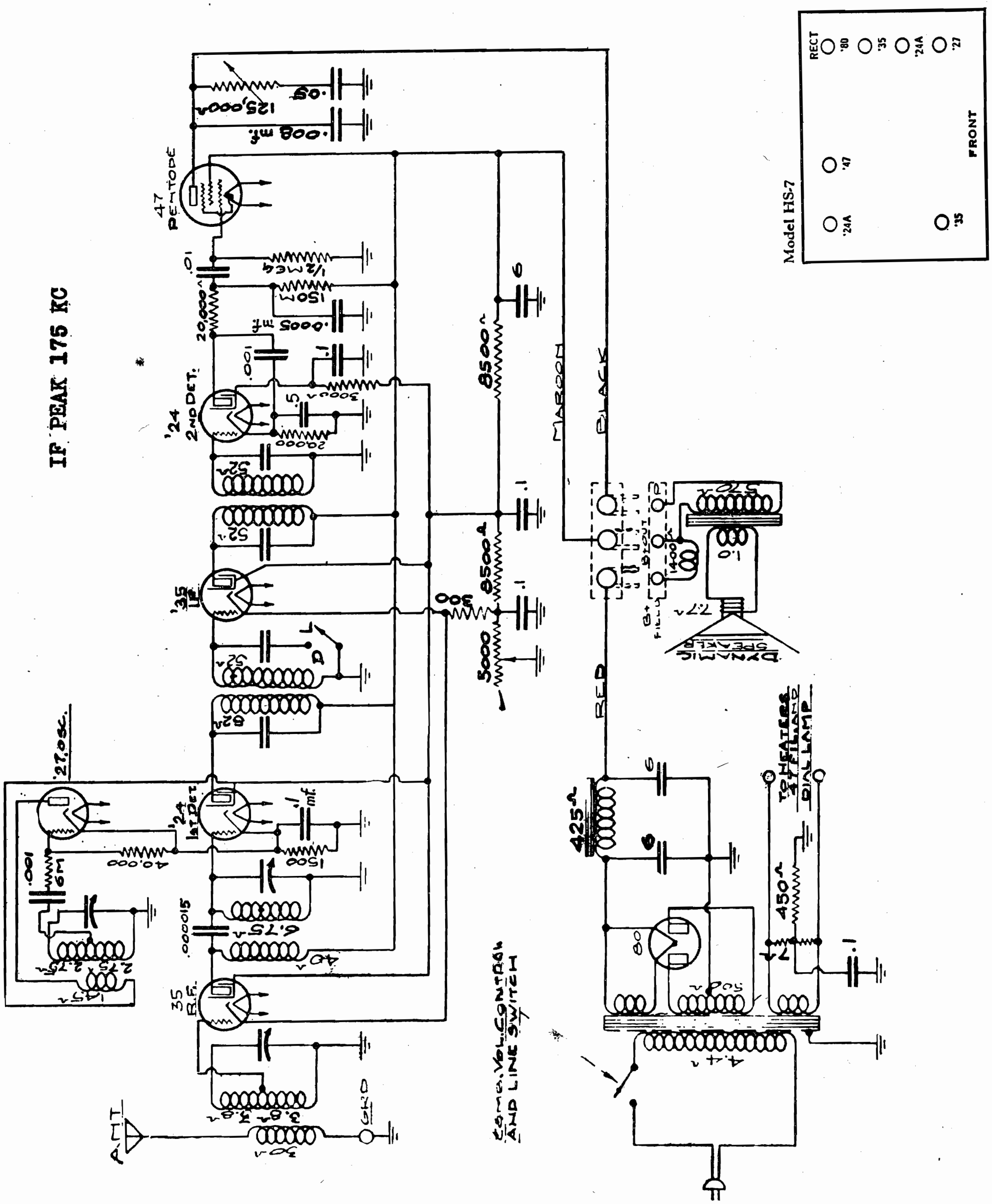
A. H. GREBE & CO.

MODEL HS-6



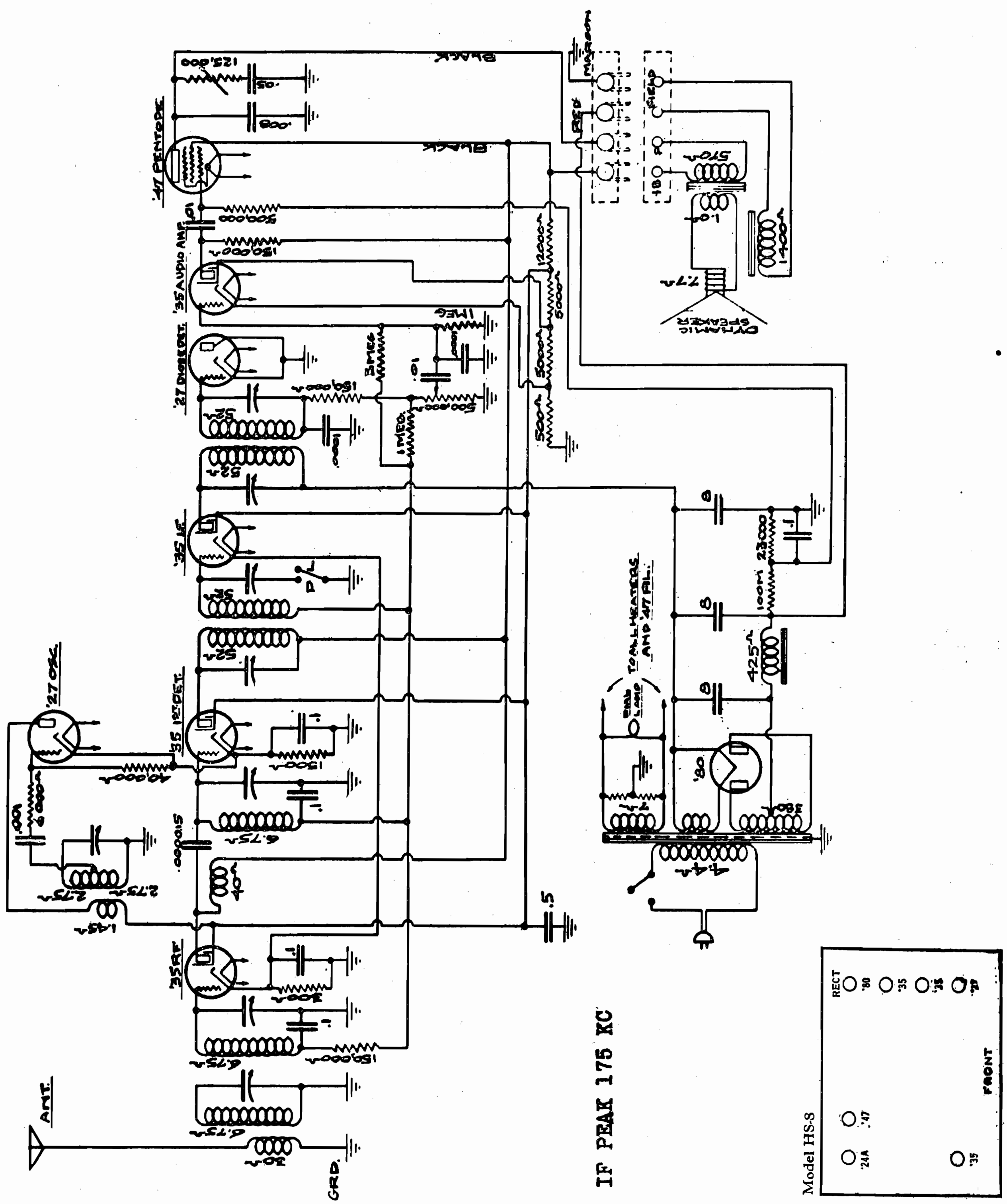
MODEL HS-7

A. H. GREBE & CO.



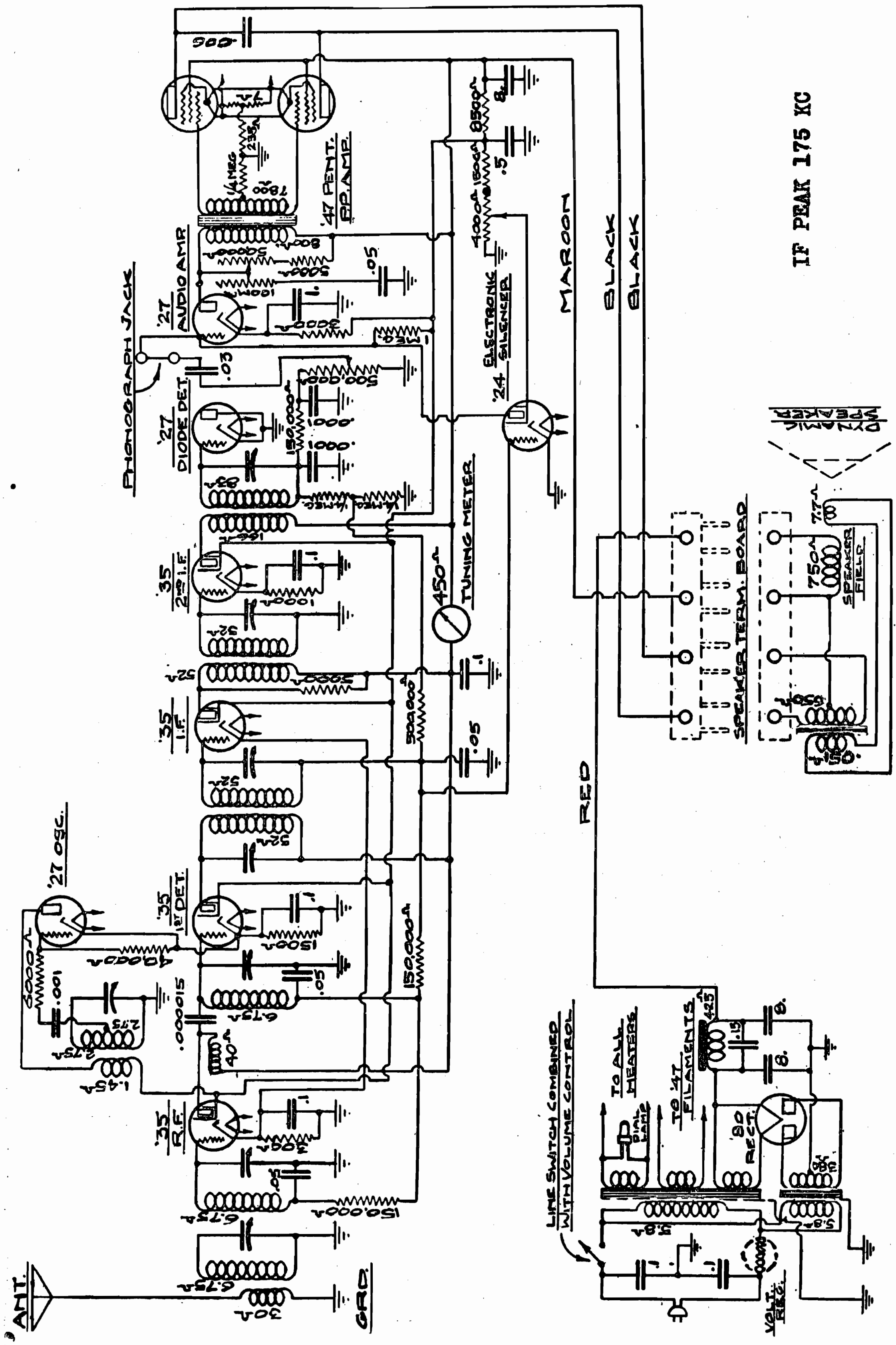
A. H. GREBE & CO.

MODEL HS-8



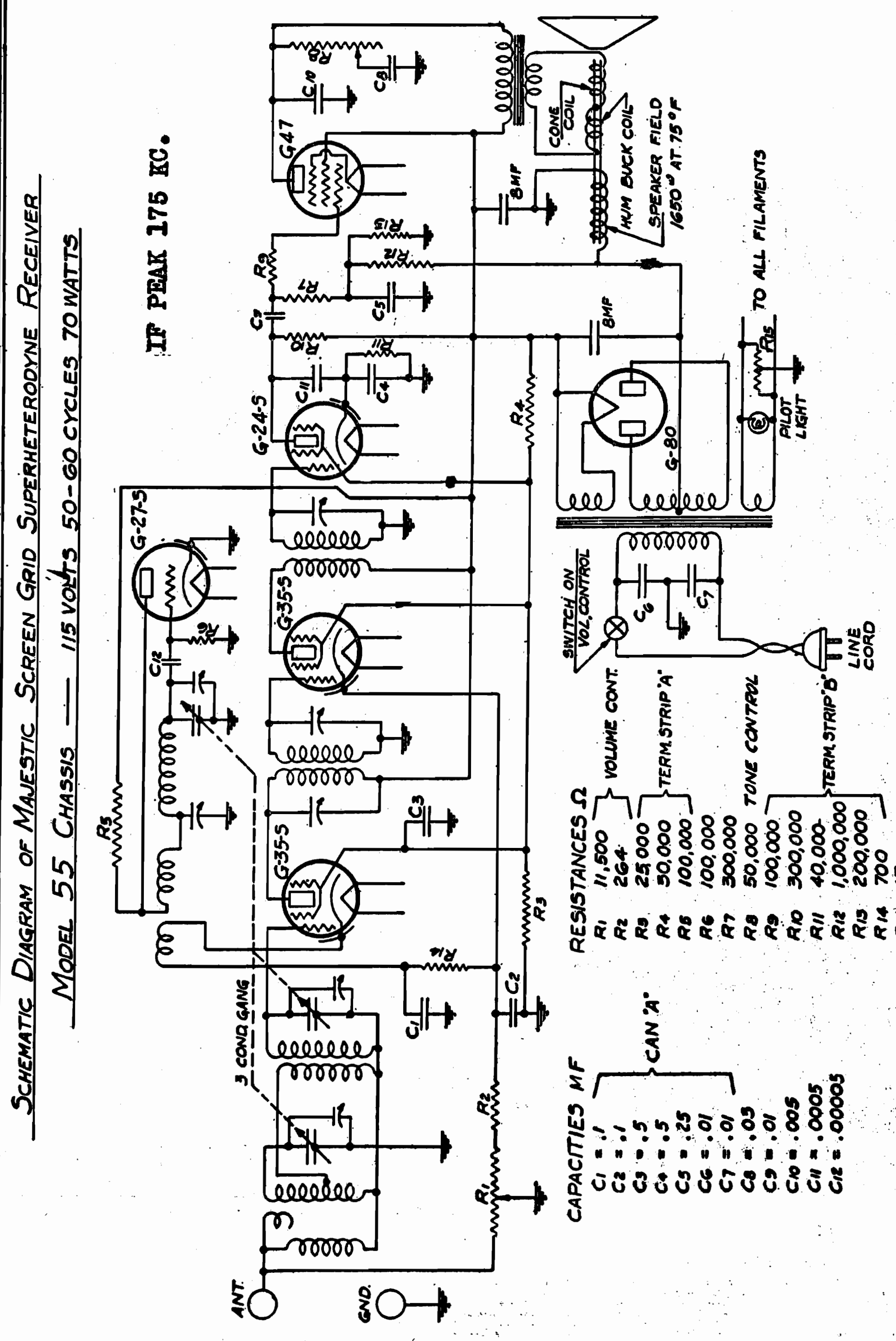
MODEL HS-12

A. H. GREBE & CO.



GRIGSBY - GRUNOW CO.

MODEL 55
Schematic



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.

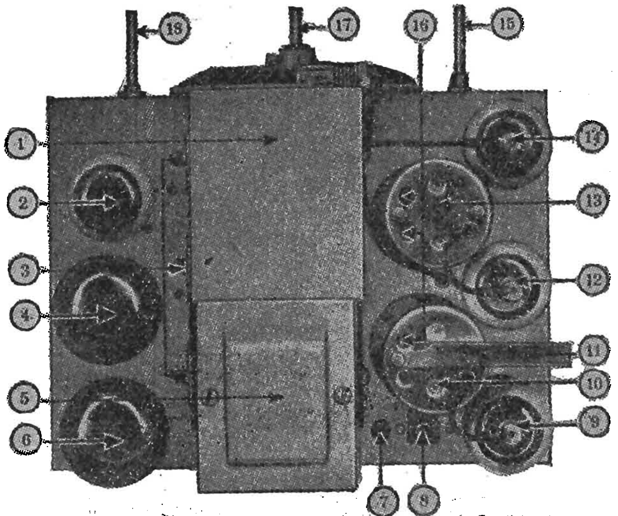
Model 55 Chassis Is Employed in the Ardmore, Berkshire and Viking Models.

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

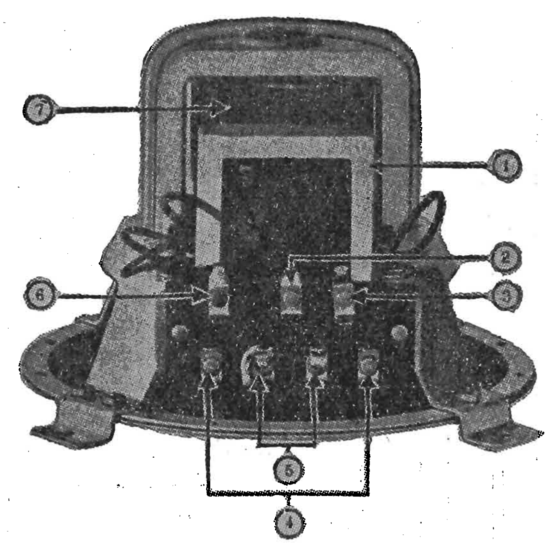
MODEL 55
Chassis Views

GRIGSBY-GRUNOW CO.



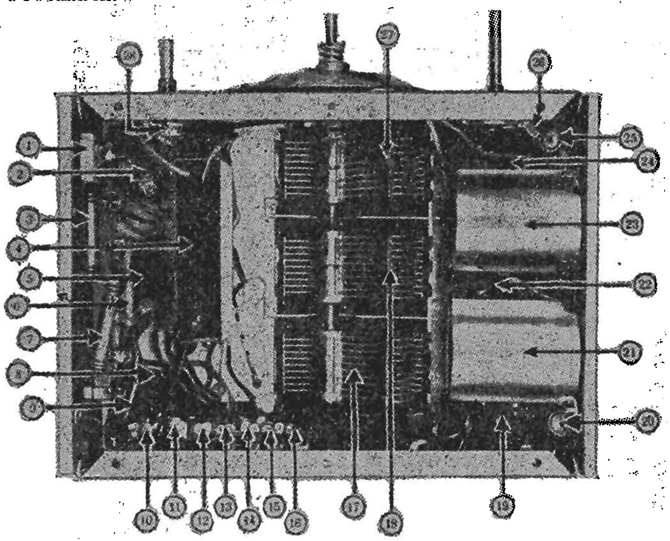
Top View of Model 55 Chassis

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-35-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_3
4. By Pass Condenser Assembly
5. G-35-S I. F. Amplifier Tube Socket
6. 100,000 ohm Resistor R_5
7. 30,000 ohm Resistor R_4
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_{10}
13. 100,000 ohm Resistor R_8
14. 300,000 ohm Resistor R_7
15. 1,000,000 ohm Resistor R_{13}
16. 200,000 ohm Resistor R_{12}
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_6
25. .03 mfd. Condenser C_6
26. Volume Control R_1 and R_2
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

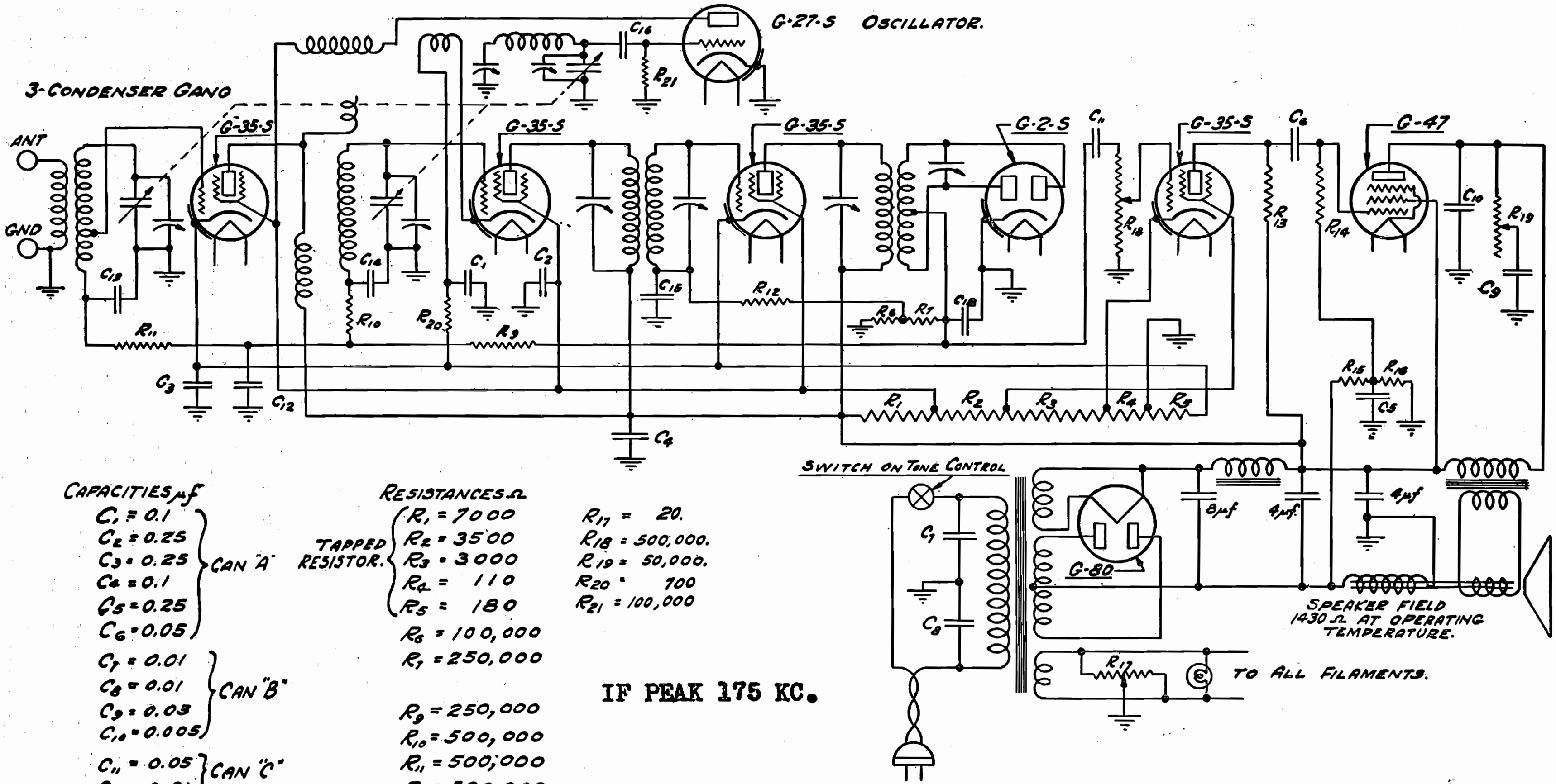
Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A.-D. C.	Screen Voltage D. C.
G-27-S	2.5	65	.01	0	3.4	
G-35-S	2.5	265	.01	6	3.5	85
G-35-S	2.5	265	.01	2	10.5	85
G-24-S	2.5	85	.01	10	.4	85
G-47	2.5	250	.01		35	265
G-80	5.0		265		65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

LINE VOLTAGE—115 VOLTS. VOLUME CONTROL—MAXIMUM

MODEL 200
Schematic

GRIGSBY - GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC SCREEN GRID SUPERHETERODYNE AUTOMATIC VOLUME CONTROL RECEIVER — MODEL 200 CHASSIS.



CAPACITIES µf

C1 = 0.1
C2 = 0.25
C3 = 0.25
C4 = 0.1
C5 = 0.25
C6 = 0.05
(C1–C6: CAN "A")

C7 = 0.01
C8 = 0.01
C9 = 0.03
C10 = 0.005
(C7–C10: CAN "B")

C11 = 0.05
C12 = 0.01
(C11–C12: CAN "C")

C13 = 0.01
C14 = 0.01
C15 = 0.01
C16 = 0.00005

C18 = 0.0008

RESISTANCES Ω

TAPPED RESISTOR:
R1 = 7000
R2 = 3500
R3 = 3000
R4 = 110
R5 = 180

R6 = 100,000
R7 = 250,000

R9 = 250,000
R10 = 500,000
R11 = 500,000
R12 = 500,000
R13 = 100,000
R14 = 300,000
R15 = 1,000,000
R16 = 200,000

R17 = 20.
R18 = 500,000.
R19 = 50,000.
R20 = 700
R21 = 100,000

IF PEAK 175 KC.

115 VOLTS — 60 CYCLES — 85 WATTS.

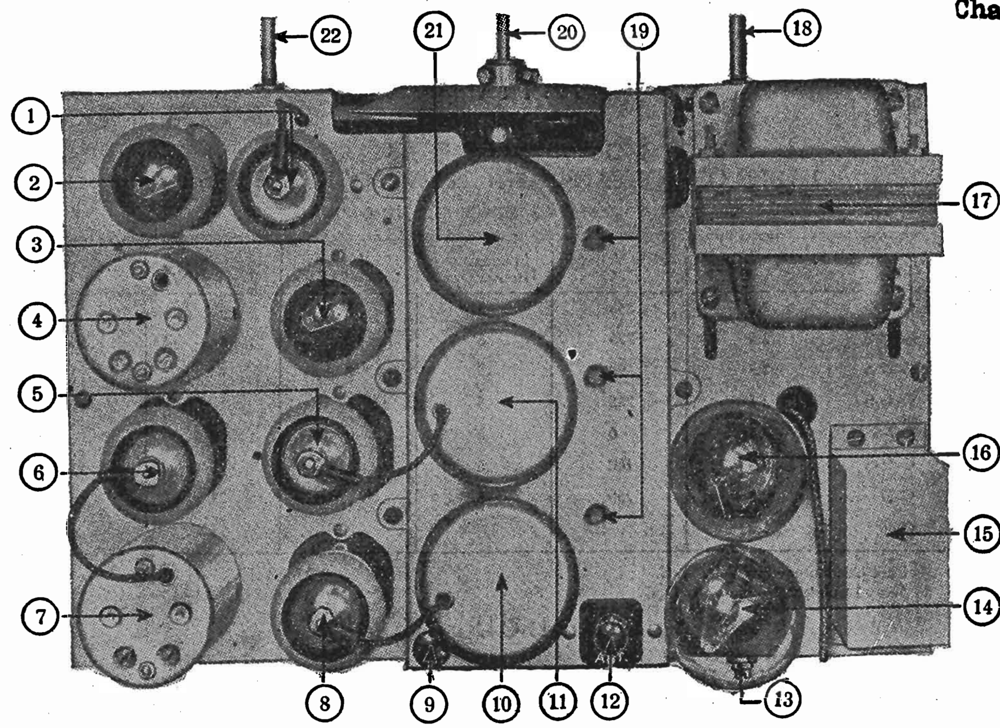
GRIGSBY-GRUNOW CO.
CHICAGO U.S.A.

J.L.H. 12-15-31

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

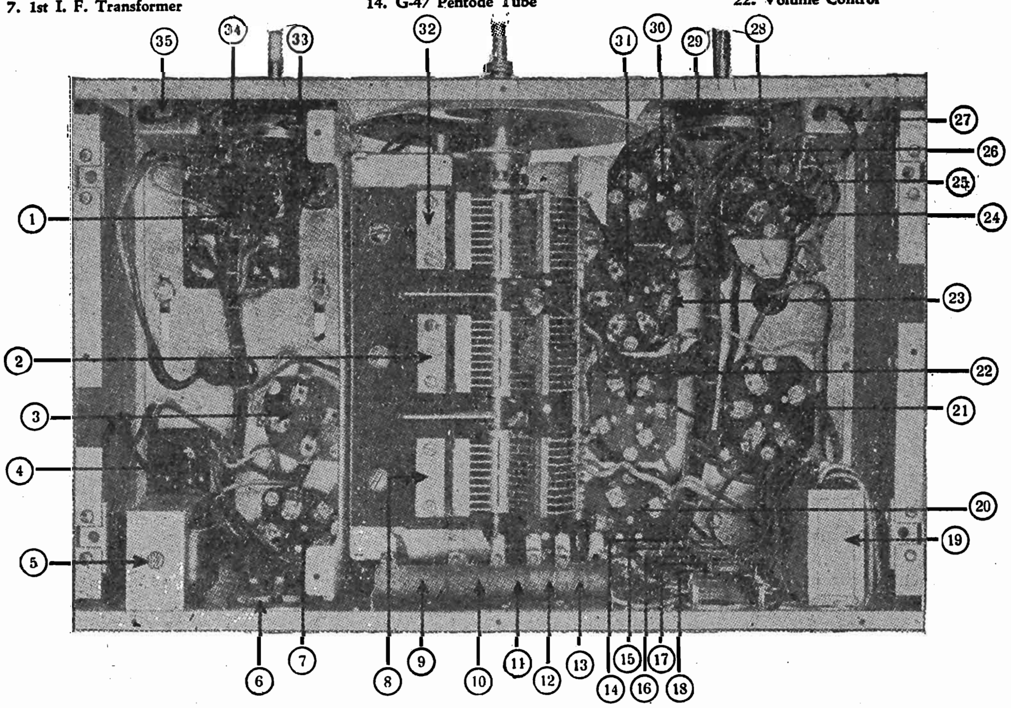
GRIGSBY - GRUNOW CO.

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_{15}
16. 300,000 ohm Resistor R_{14}
17. 700 ohm Resistor R_{20}
18. 100,000 ohm Resistor R_{13}
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_9
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

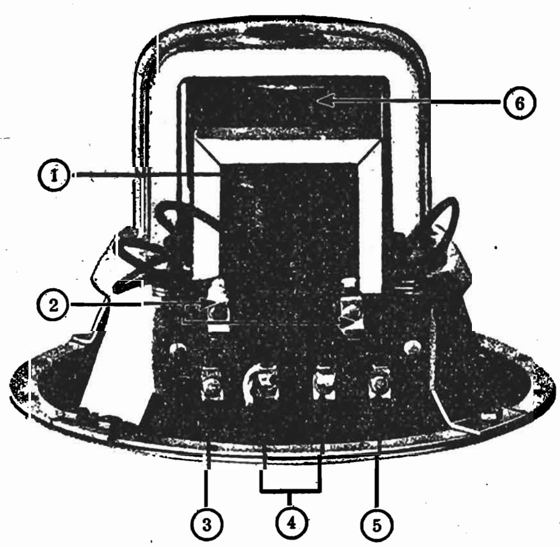
Tube Purpose	Type Tube	Filament Voltage A. C.	Plate Voltage D. C.	Filament to Ground D. C.	Cathode to Ground D. C.	Plate Current M. A.-D. C.	Screen Voltage D. C.	Screen Current M. A.-D. C.
R. F.	G-35-S	2.5	255	.5	3	5.	96	.1
1st Det	G-35-S	2.5	255	.5	11	4.	96	.4
Osc	G-27-S	2.5	98	.5	0	9.5	....	....
I. 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

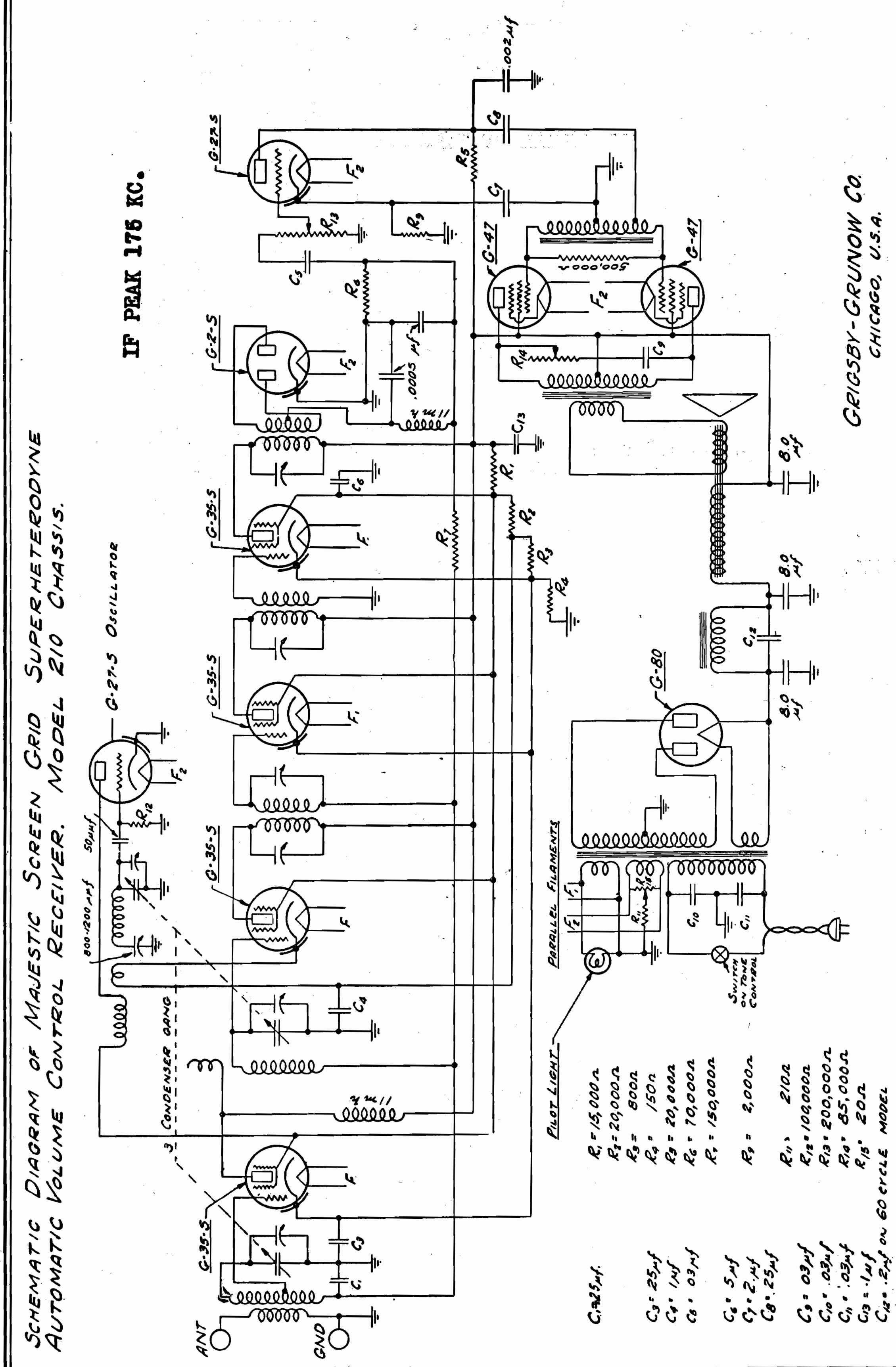
1. Output Transformer
2. Primary Plate Lead Terminals (Blue—Blue)
3. Field Coil Terminal (Black)
4. Voice Coil and Output Secondary Junction
5. Field Coil and Primary Tap Junction (Red)
6. Field Coil

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

MODEL 210
Schematic

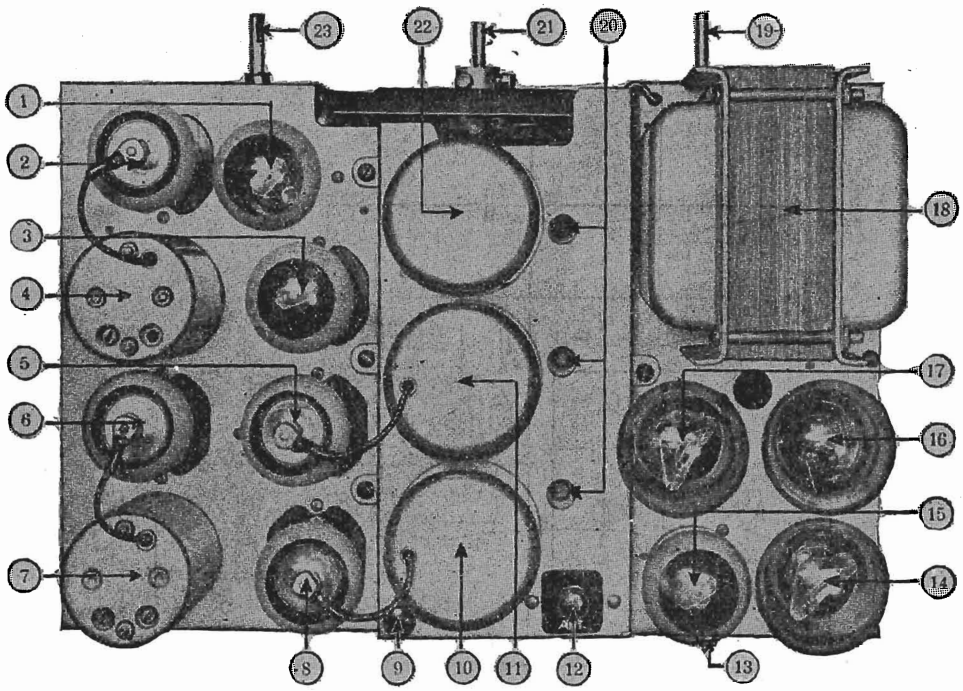
GRIGSBY - GRUNOW CO.



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

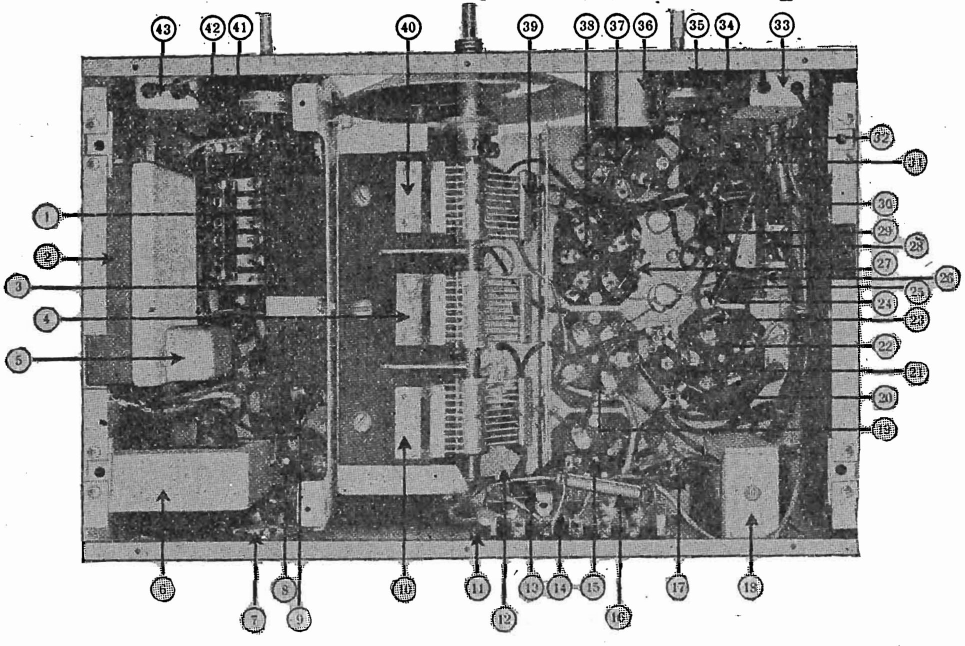
MODEL 210
Chassis Views

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_{15}
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_6, C_7, C_8
15. G-35-S R. F. Tube Socket
16. 20,000 ohm Resistor R_5
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_7
24. 70,000 ohm Resistor R_6
25. .0005 mfd. Condenser
26. 150 ohm Resistance R_4
27. 100,000 ohm Resistor R_{12}
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_4
34. 3rd I. F. Aligning Condenser
35. Volume Control R_{13}
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_9, C_{10}, C_{11}

MODEL 210
Voltage
Speaker Data

GRIGSBY - GRUNOW CO.

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

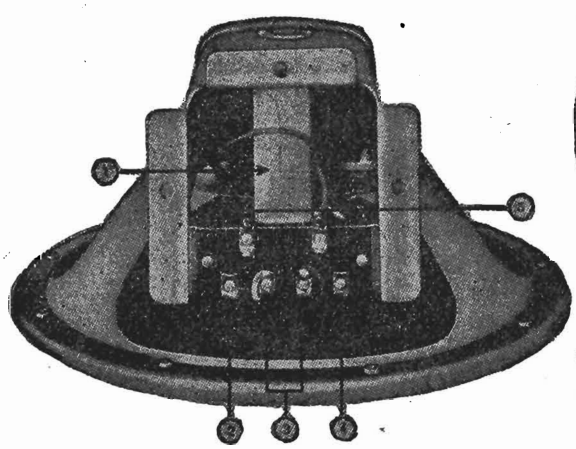
TABLE OF VOLTAGE AND CURRENT READINGS

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	[illegible]	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	....	....

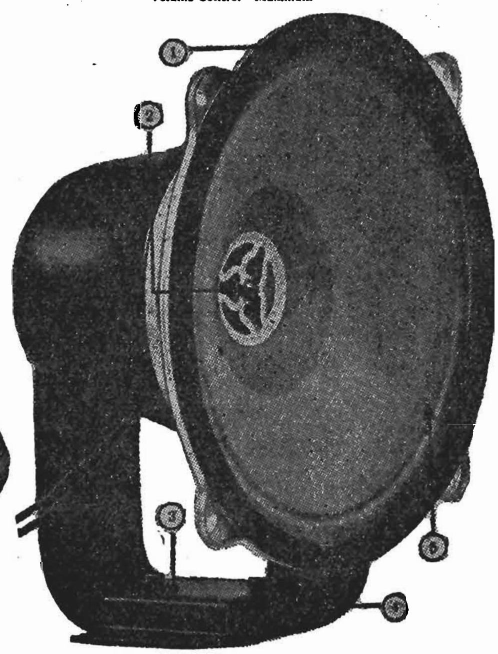
First Condenser—400 Volts D. C.
Second Condenser—375 Volts D. C.
Third Condenser—315 Volts D. C.

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)

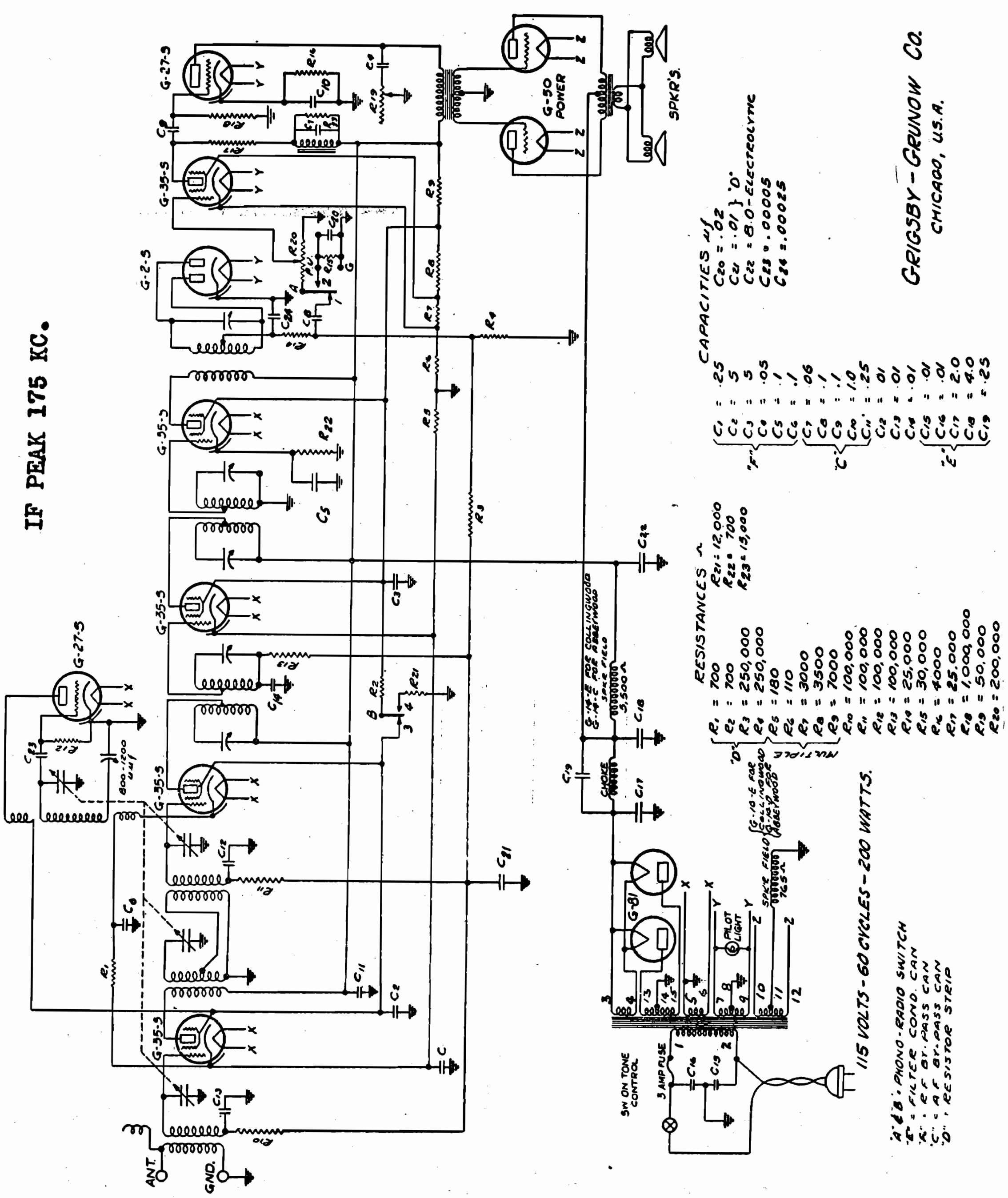


Permanent Magnet Speaker Employed in Croydon Model

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

MODEL 220
Schematic

GRIGSBY - GRUNOW CO.



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

TRANSFORMER CODINGS

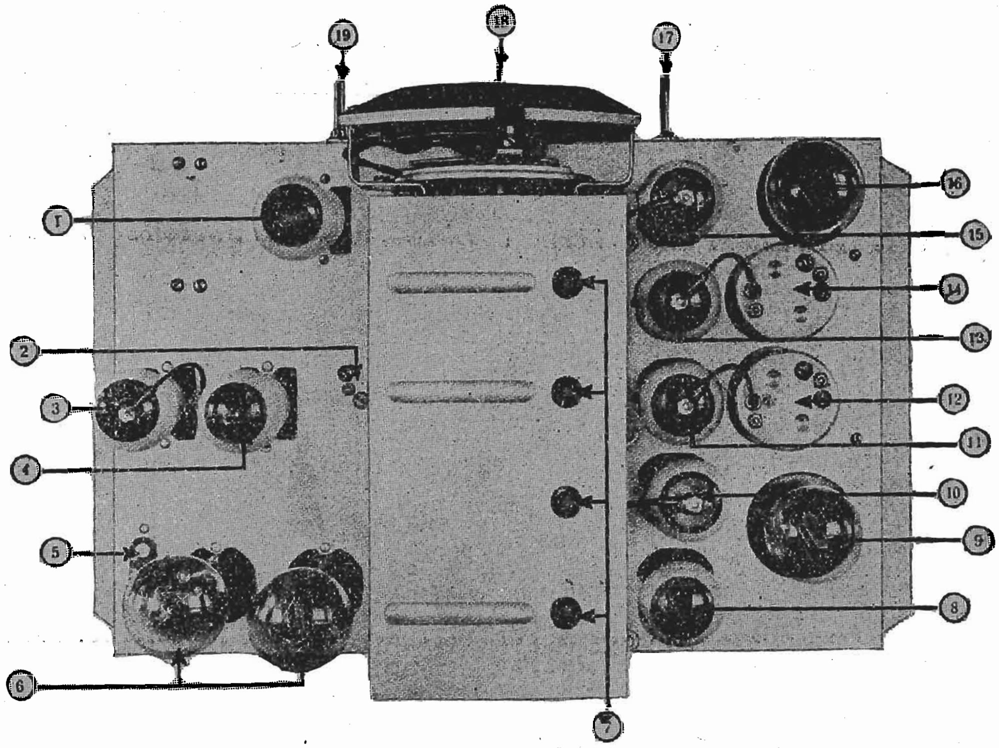
1-Blk. 2-Yel. 3-Blk. 4-Blk. 5-Yel. 6-Yel. 7-Blk. 8-Red. 9-Blk. 10-Yel. 11-Brn. 12-Yel. 13-Red. 14-Blk. 15-Red

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.

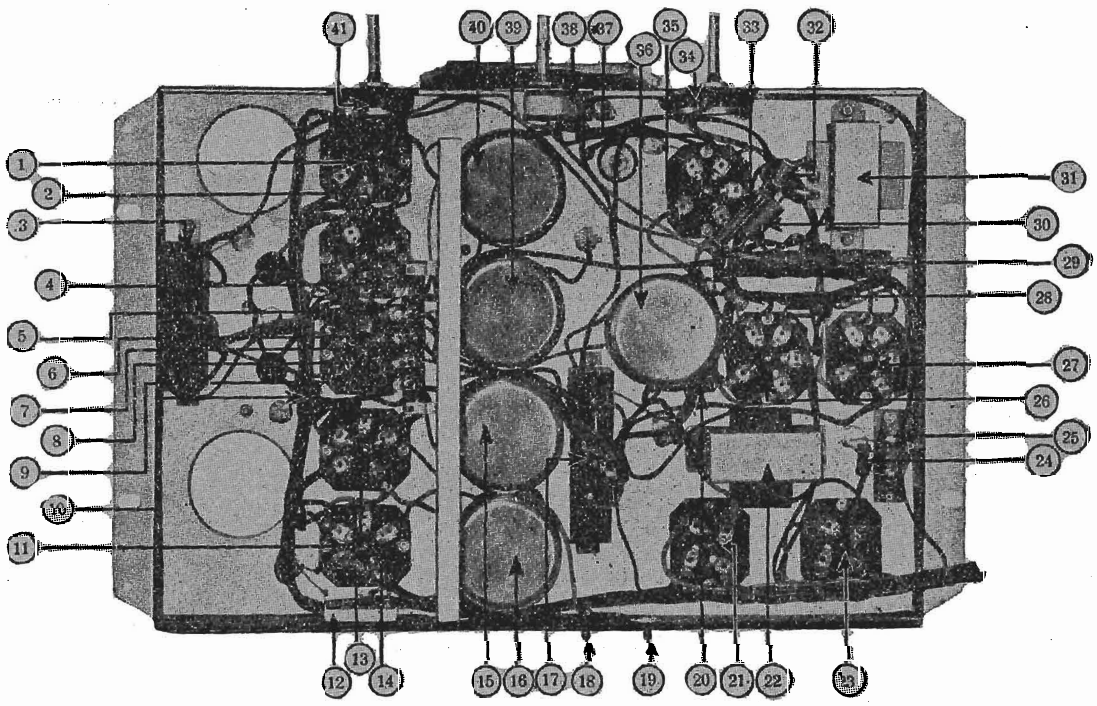
MODEL 220
Chassis Views

GRIGSBY - GRUNOW CO.



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_2
5. .01 mfd. Condenser C_{21}
6. 250,000 ohm Resistor R_3
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_{22}
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_5 to R_9
30. .01 mfd. Condenser
31. 1st Audio Plate Choke
32. 25,000 ohm Resistor R_{17}
33. 50,000 ohm Resistor R_{23}
34. Volume Control R_{20}
35. G-2-S Second Detector Tube Socket
36. 3rd I. F. Transformer Assembly
37. 12,000 ohm Resistor R_{27}
38. Radio Phonograph Switch
39. 1st R. F. Coil
40. 2nd R. F. Coil
41. Acoustic Control and Line Switch R_{19}

MODEL 220 (223)
Speaker Data
Record Changer
Notes

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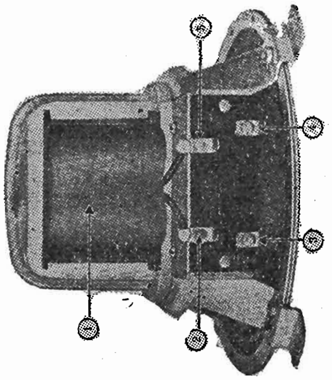
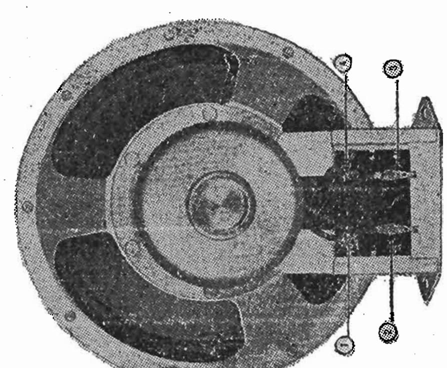


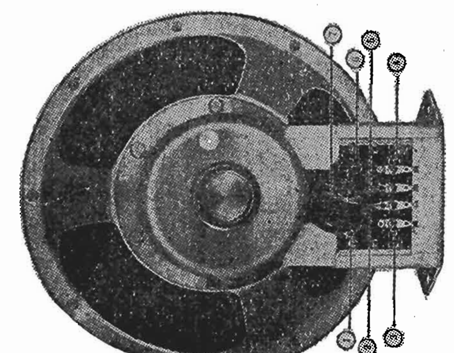
Model G-10-E Speaker Employed in Collingwood Model 221

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)



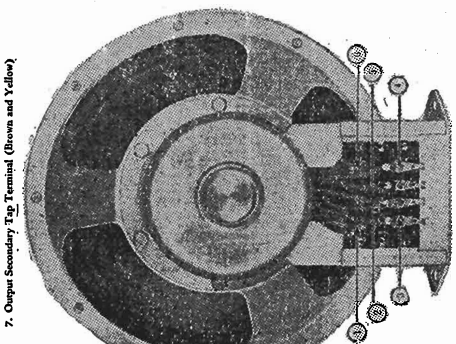
Model G-14-D Speaker Employed in Abbeywood Model 223

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 isa 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.

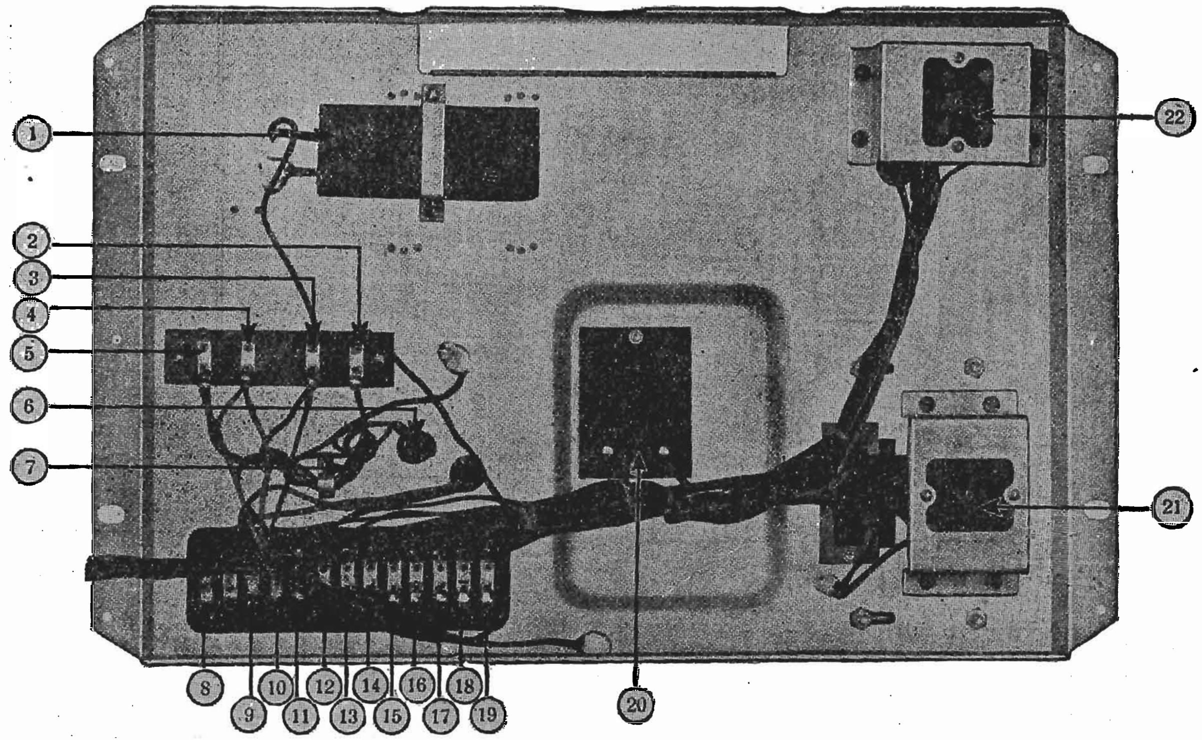
3. Set the dial at 550 K.C. and adjust oscillator tracking condenser for maximum sensitivity with 550 K.C. feeding into the input of the receiver. For each adjustment of the oscillator tracking condenser, there will be a different dial setting for maximum sensitivity. The combination of tracking condenser 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

GRIGSBY - GRUNOW CO.

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_{18} Terminal
12. G-81 Filament, Choke and C_{17} Terminal
13. Primary of Power Transformer and Switch Terminal
14. 15. } 2.5 Volt Heater Terminal (Audio)
16. 17. } 7.5 Volt Filament Terminal (G-50)
18. 19. } 2.5 Volt Heater Terminal (R. F.)
20. Fuse Block
21. G-81 Rectifier Tube Socket
22. G-81 Rectifier Tube Socket

MODEL 220 CHASSIS TABLE OF VOLTAGE AND CURRENT READINGS

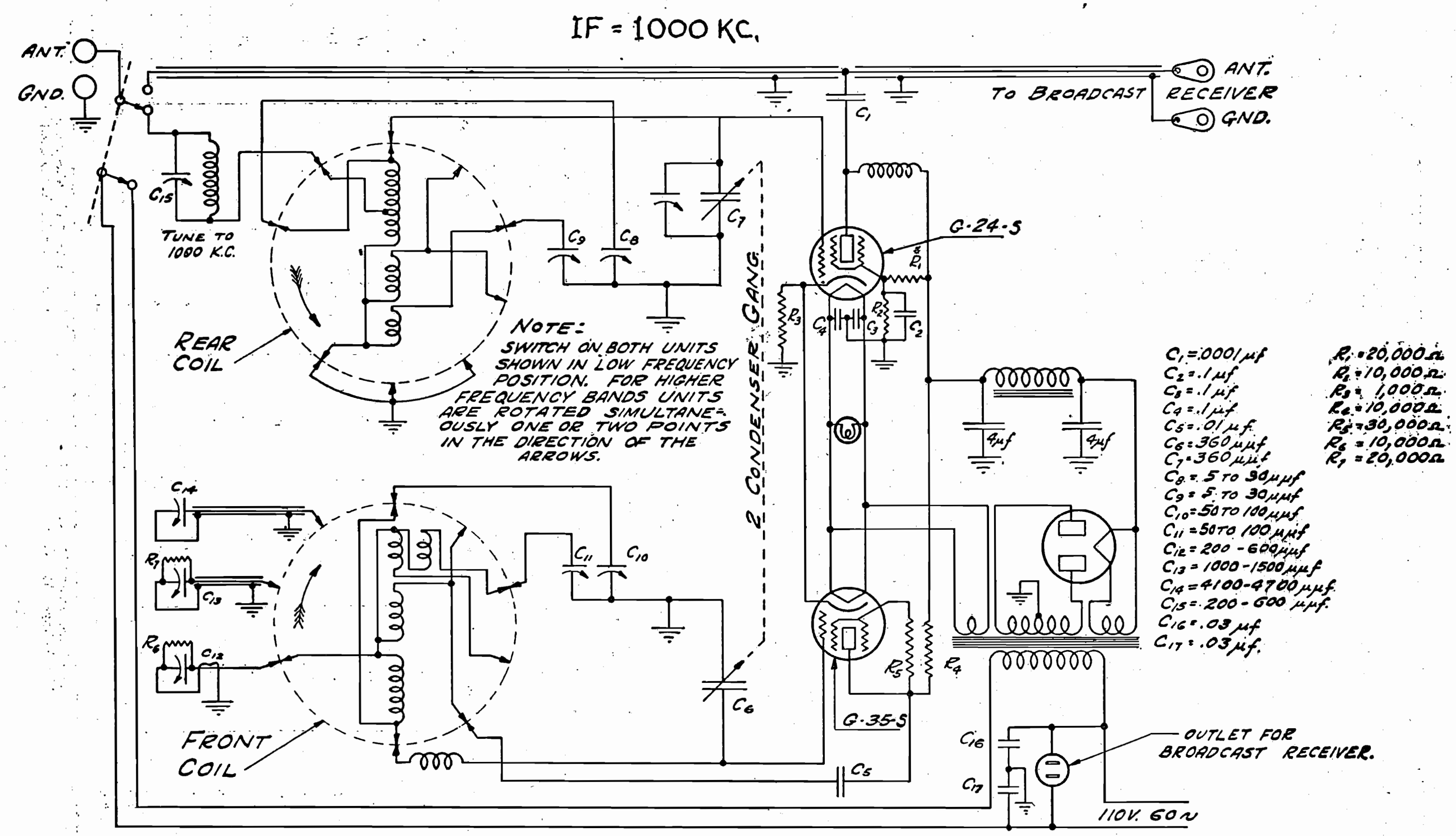
ALL D. C. VOLTAGE READINGS ARE TO GROUND

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

GRIGSBY - GRUNOW CO.



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.

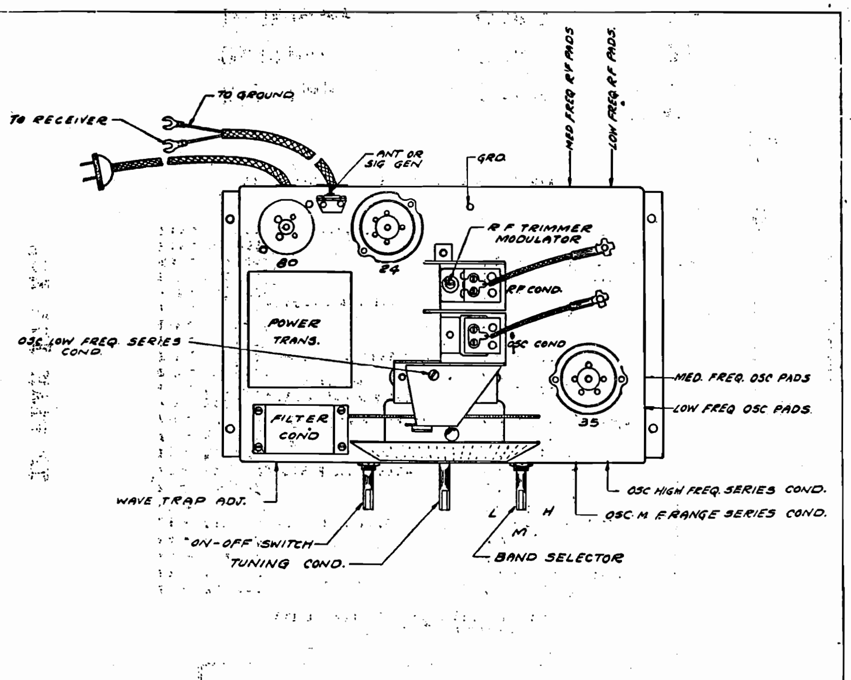
MODEL 10
Alignment Notes

GRIGSBY - GRUNOW CO.

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.

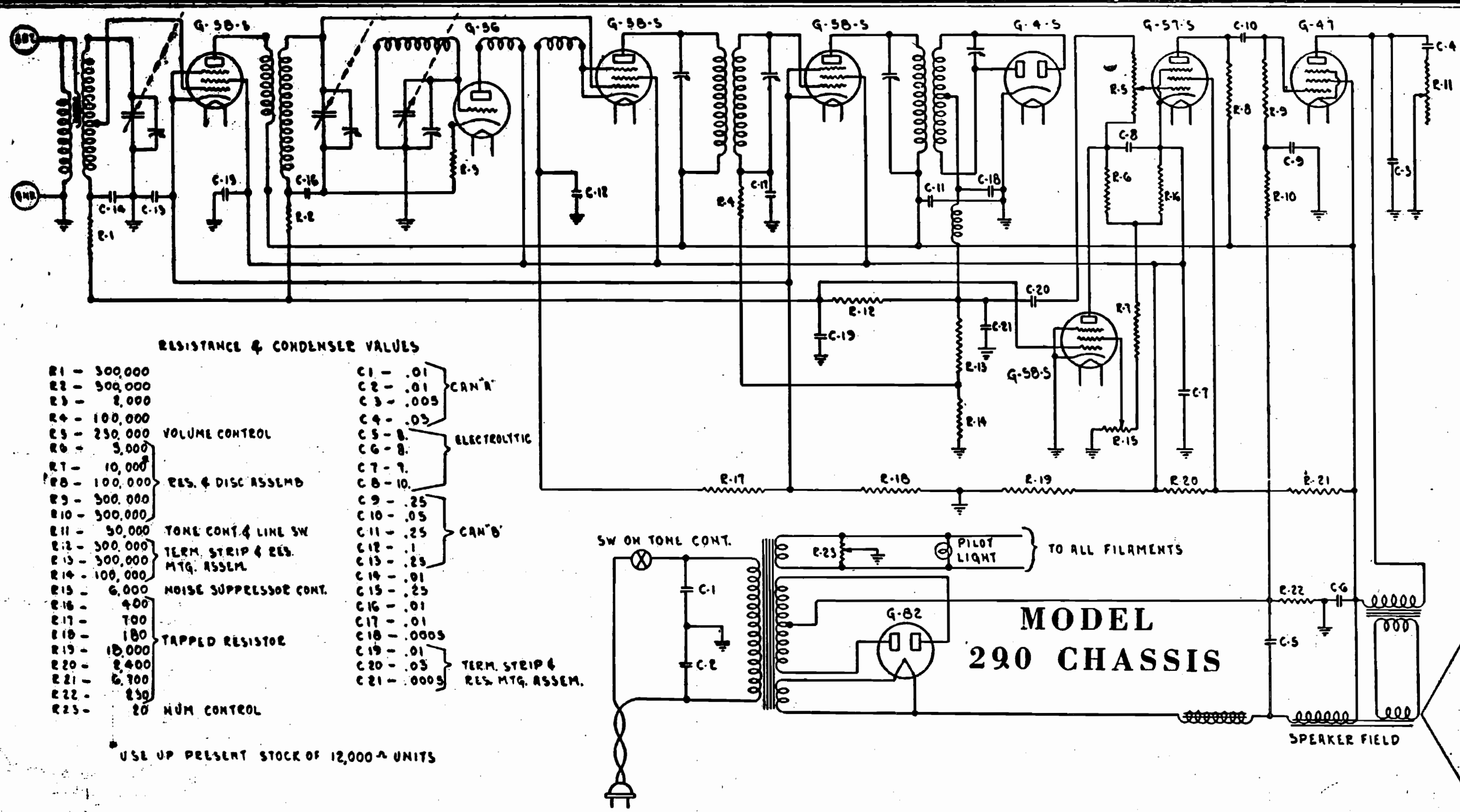
11 Supply a *1,500 K.C. signal from the oscillator used in aligning broadcast receivers, to th converter. Set the converter at 1.5 and adjust the oscillator low frequency series condenser f maximum output

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

When adjusting for a peak with the modulation on, keep the volume of the receiver employe for an amplifier, down as low as possible; just enough to have a reading on the scale of the outpu meter. In this way the peak will be sharper than it would be if a great deal of volume were used o 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.



RESISTANCE & CONDENSER VALUES

R1 - 300,000		C1 - .01 (CAN "A")
R2 - 300,000		C2 - .01 (CAN "A")
R3 - 2,000		C3 - .005 (CAN "A")
R4 - 100,000		C4 - .05 (CAN "A")
R5 - 250,000	VOLUME CONTROL	C5 - 8. (ELECTROLYTIC)
R6 - 5,000*	RES. & DISC ASSEMB.	C6 - 8. (ELECTROLYTIC)
R7 - 10,000*	RES. & DISC ASSEMB.	C7 - 7. (ELECTROLYTIC)
R8 - 100,000	RES. & DISC ASSEMB.	C8 - 10. (ELECTROLYTIC)
R9 - 300,000	RES. & DISC ASSEMB.	C9 - .25 (CAN "B")
R10 - 300,000	RES. & DISC ASSEMB.	C10 - .05 (CAN "B")
R11 - 50,000	TONE CONT. & LINE SW.	C11 - .25 (CAN "B")
R12 - 300,000	TERM. STRIP & RES. MTG. ASSEM.	C12 - .1 (CAN "B")
R13 - 300,000	TERM. STRIP & RES. MTG. ASSEM.	C13 - .25 (CAN "B")
R14 - 100,000	TERM. STRIP & RES. MTG. ASSEM.	C14 - .01
R15 - 6,000	NOISE SUPPRESSOR CONT.	C15 - .25
R16 - 400	TAPPED RESISTOR	C16 - .01
R17 - 700	TAPPED RESISTOR	C17 - .01
R18 - 180	TAPPED RESISTOR	C18 - .0005
R19 - 10,000	TAPPED RESISTOR	C19 - .01 (TERM. STRIP & RES. MTG. ASSEM.)
R20 - 2,400	TAPPED RESISTOR	C20 - .05 (TERM. STRIP & RES. MTG. ASSEM.)
R21 - 6,700	TAPPED RESISTOR	C21 - .0005 (TERM. STRIP & RES. MTG. ASSEM.)
R22 - 250	TAPPED RESISTOR	
R23 - 20	HUM CONTROL	

* USE UP PRESENT STOCK OF 12,000 Ω UNITS

IF PEAK 175 KC.

		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.

GRIGSBY GRUNOW CO.

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.

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 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:

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

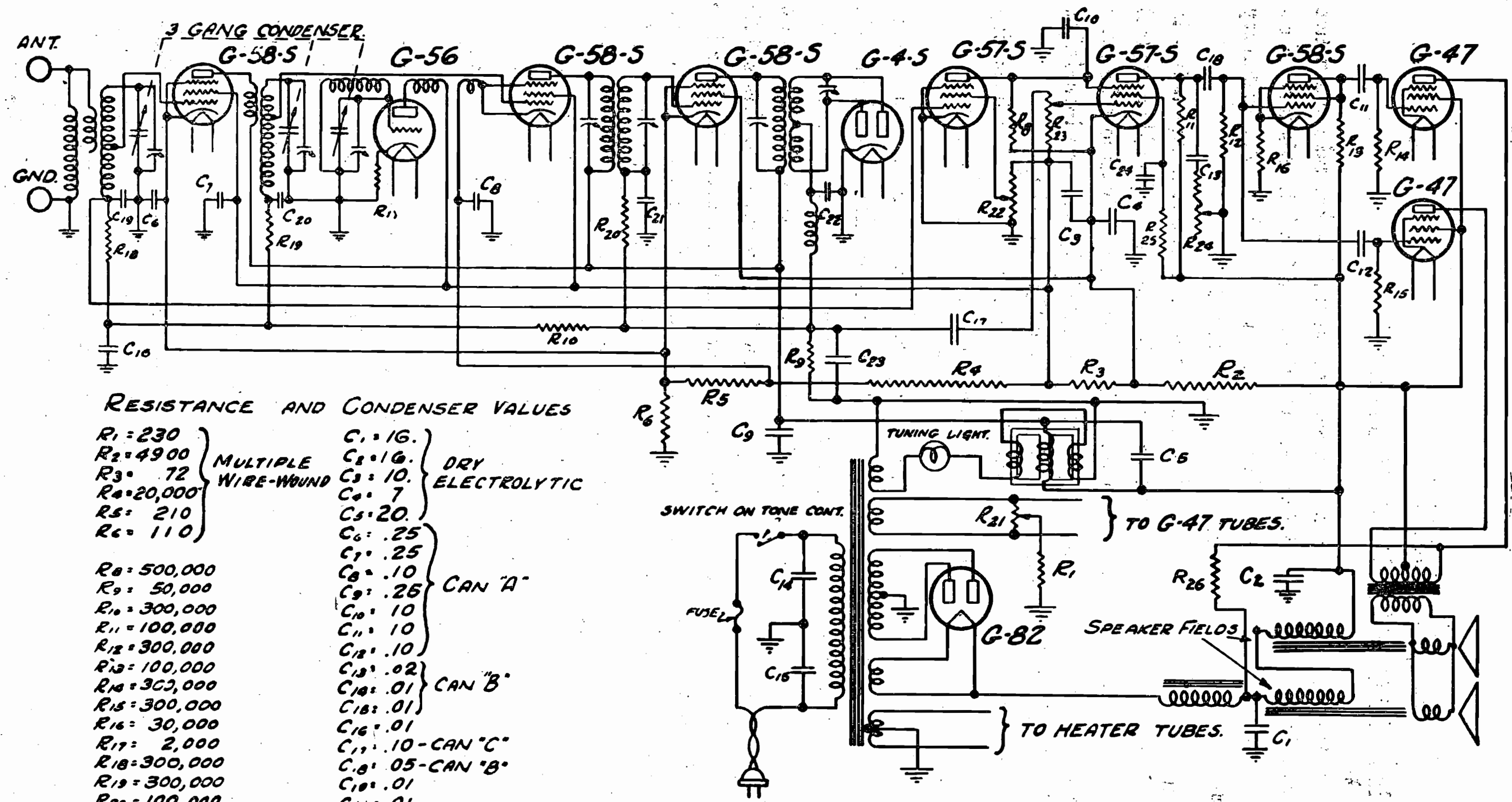
Tune receiver to a position off of the broadcasting station, preferably near the low frequency end of the dial.

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

RESISTANCE AND CONDENSER VALUES

R_1 = 230 } MULTIPLE WIRE-WOUND	C_1 = 16. } DRY ELECTROLYTIC
R_2 = 4900	C_2 = 16.
R_3 = 72	C_3 = 10.
R_4 = 20,000	C_4 = 7
R_5 = 210	C_5 = 20.
R_6 = 110	C_6 = .25 } CAN "A"
R_8 = 500,000	C_7 = .25
R_9 = 50,000	C_8 = .10
R_{10} = 300,000	C_9 = .25
R_{11} = 100,000	C_{10} = .10
R_{12} = 300,000	C_{11} = .10
R_{13} = 100,000	C_{12} = .10
R_{14} = 300,000	C_{13} = .02 } CAN "B"
R_{15} = 300,000	C_{14} = .01
R_{16} = 30,000	C_{15} = .01
R_{17} = 2,000	C_{16} = .01
R_{18} = 300,000	C_{17} = .10 - CAN "C"
R_{19} = 300,000	C_{18} = .05 - CAN "B"
R_{20} = 100,000	C_{19} = .01
R_{21} = 20 HUM CONT	C_{20} = .01
R_{22} = 20,000 SUPPRESSOR	C_{21} = .01
R_{23} = 200,000 VOL CONT.	C_{22} = .0005
R_{24} = 250,000 TONE CONT.	C_{23} = .0005
R_{25} = 500,000 R_{26} = 100,000	C_{24} = .25 - CAN "C"

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.

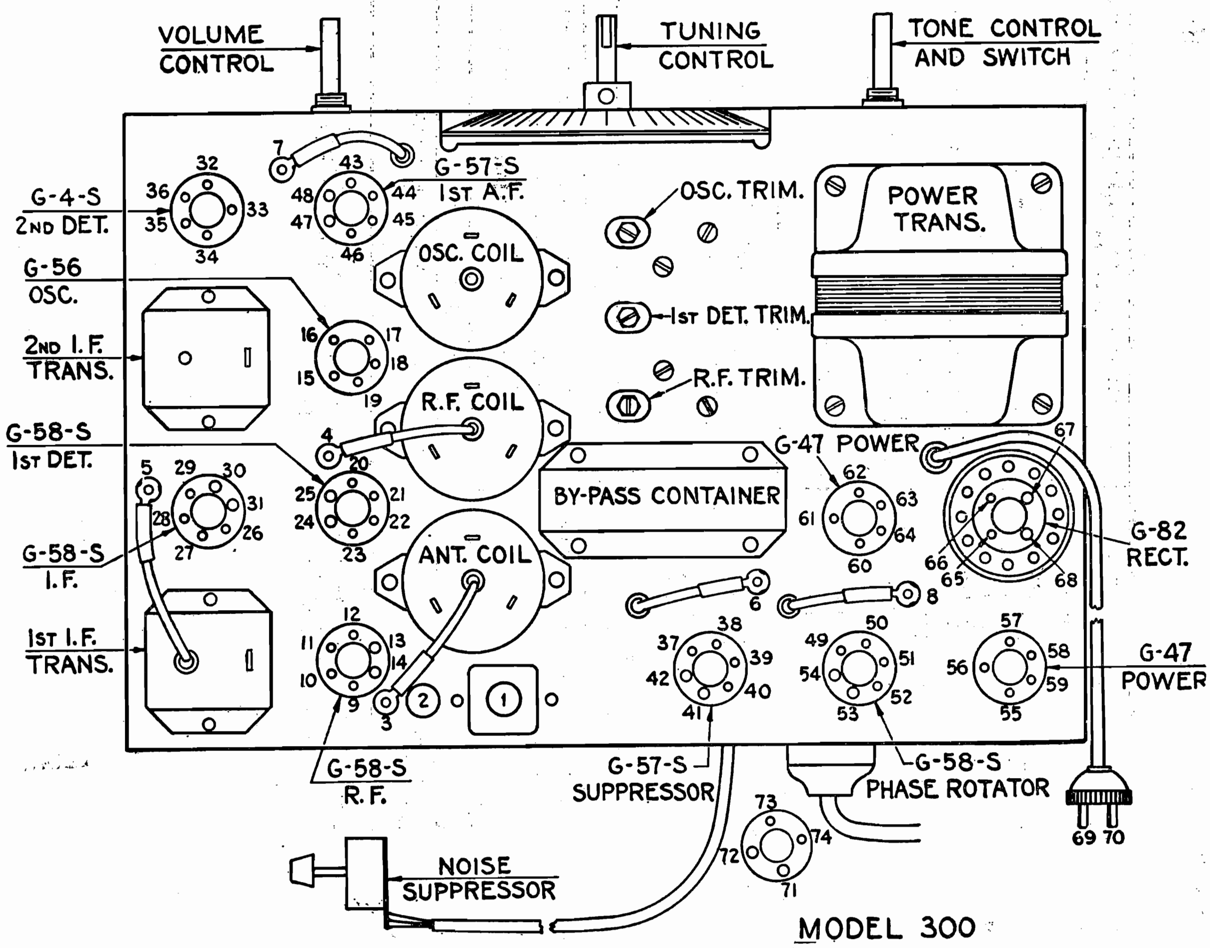
POWER TRASFORMER CODE

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.

MODEL 300 Series
Test Data

GRIGSBY - GRUNOW CO.

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,R18,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 (#7-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	

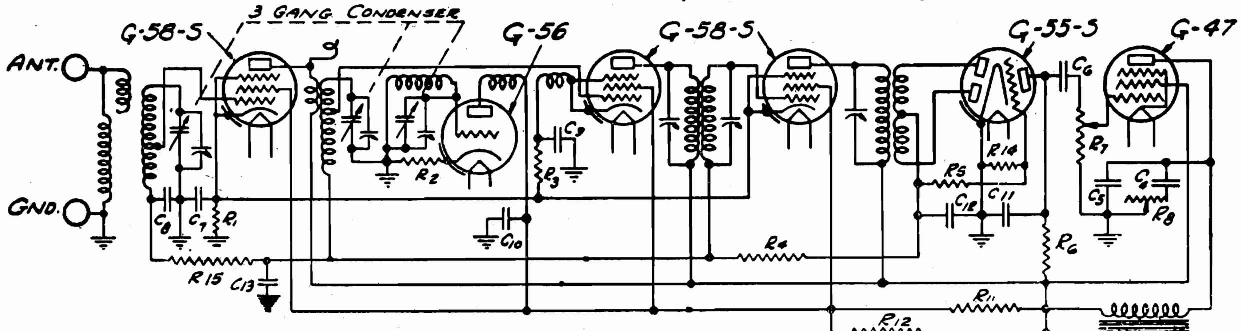
NOTE - If the above tests show normal conditions, it will be necessary to inspect and test the various units and wiring in the circuit where the particular difficulty has been previously localized.

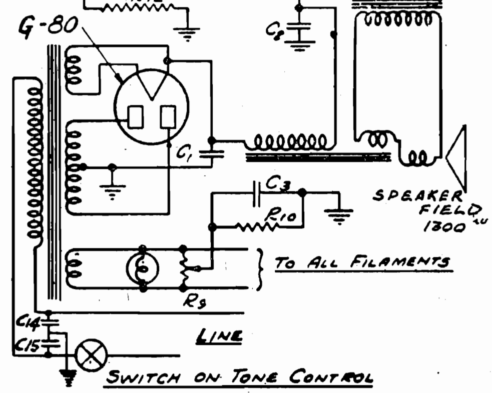
GRIGSBY - GRUNOW CO

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

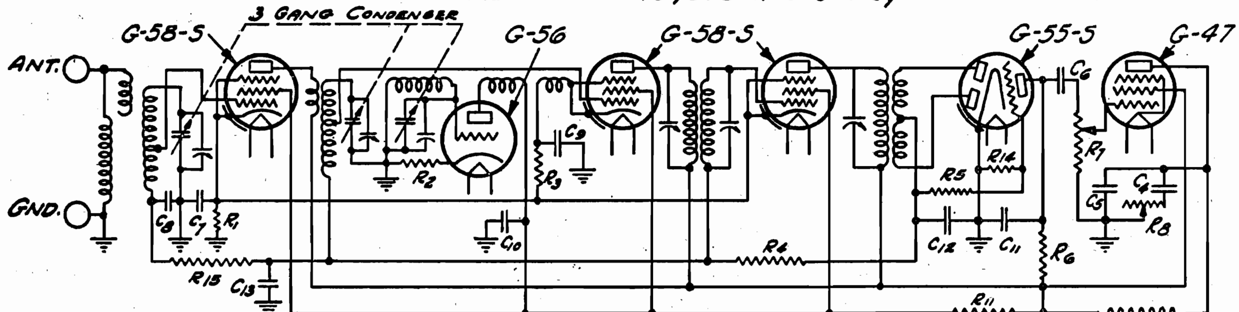
R_1 = 140, R_2 = 2000, R_3 = 500 } MULTIPLE WIRE WOUND
R_4 = 100,000
R_5 = 10,000
R_6 = 30,000
R_7 = 200,000 VOLUME CONT.
R_8 = 50,000 TONE CONTROL
R_9 = 20 HUM BALANCER
R_{10} = 400
R_{11} = 10,000
R_{12} = 25,000
R_{14} = 40,000
R_{15} = 100,000

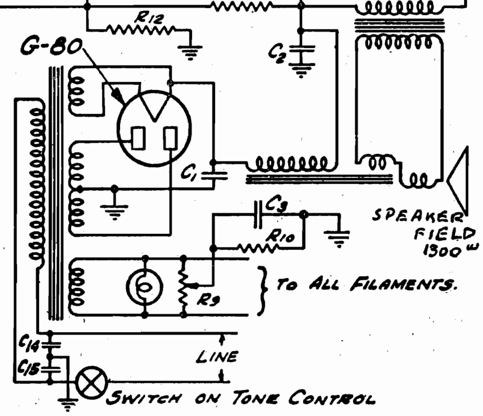
C_1 = 16, C_2 = 8 } DUAL ELECTROLYTIC
C_3 = 20. ELECTROLYTIC
C_4 = .03, C_5 = .006, C_6 = 03, C_7 = 25, C_8 = .1, C_9 = 1, C_{10} = .25 } BLOCK
C_{11} = 0005 MICA
C_{12} = 004 TUBULAR
C_{13} = .5 IN BLOCK
C_{14} = .01, C_{15} = .01 } IN SMALL CAN

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.

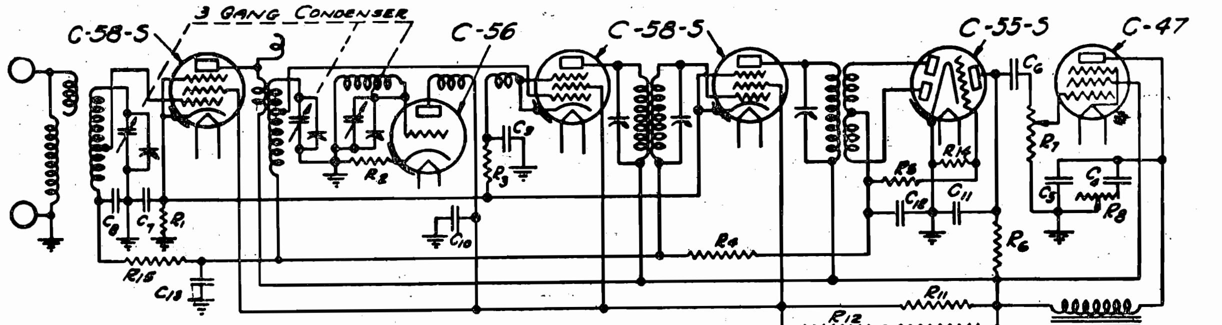
R_1 = 140, R_2 = 2000, R_3 = 500 } MULTIPLE WIRE WOUND
R_4 = 99,000
R_5 = 10,000
R_6 = 30,000
R_7 = 200,000 VOLUME CONT.
R_8 = 50,000 TONE CONTROL
R_9 = 20, R_{10} = 400 } HUM BALANCER
R_{11} = 10,000
R_{12} = 25,000
R_{14} = 40,000
R_{15} = 99,000

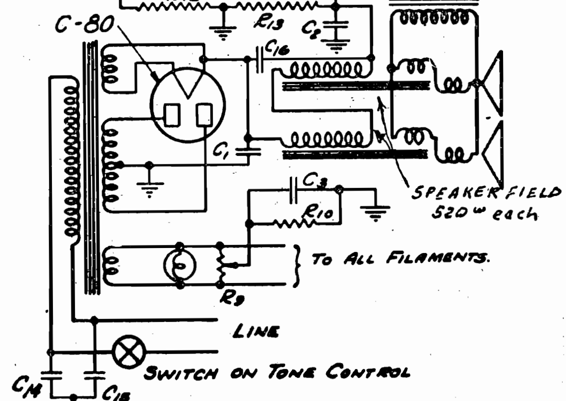
C_1 = 16., C_2 = 8. } DUAL ELECTROLYTIC
C_3 = 20. ELECTROLYTIC
C_4 = .03, C_5 = .006, C_6 = .03, C_7 = .25, C_8 = .1, C_9 = .1, C_{10} = .25 } BLOCK
C_{11} = .0005 MICA.
C_{12} = .004 TUBULAR
C_{13} = .5 IN BLOCK
C_{14} = .01, C_{15} = .01 } IN SMALL CAN

MODEL 310-B
Two Types
Schematic

GRIGSBY - GRUNOW CO.

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





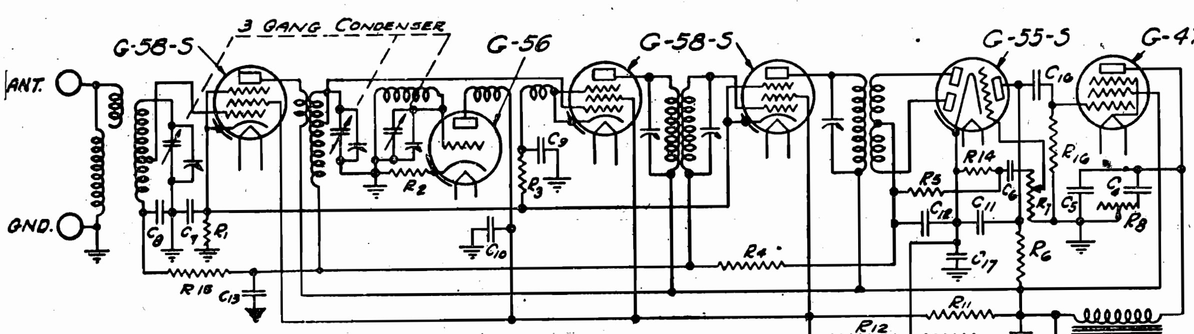
RESISTANCE AND CONDENSER VALUES

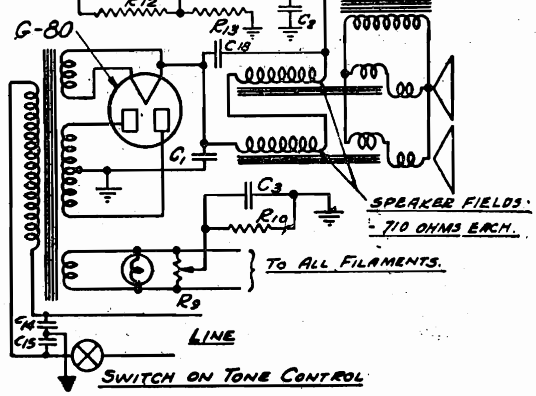
R1 = 140 } MULTIPLE
R2 = 2000 } WIRE WOUND
R3 = 500 }
R4 = 99,000
R5 = 10,000
R6 = 30,000
R7 = 200,000 VOLUME CONT.
R8 = 50,000 TONE CONTROL
R9 = 20 HUM BALANCER
R10 = 400
R11 = 10,000
R12 = 25,000
R13 = 25,000 WIRE WOUND
R14 = 40,000
R15 = 99,000

C1 = 16. } DUAL ELECTROLYTIC
C2 = 8. }
C3 = 20. ELECTROLYTIC
C4 = .03 }
C5 = .006 }
C6 = .03 }
C7 = .25 } BLOCK
C8 = .5 }
C9 = .1 }
C10 = .25 }
C11 = .0005 MICA
C12 = .004 TUBULAR
C13 = .5 IN BLOCK
C14 = .01 } IN SMALL CAN
C15 = .01 }
C16 = .1 TUBULAR

IF PEAK 175 KC.

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





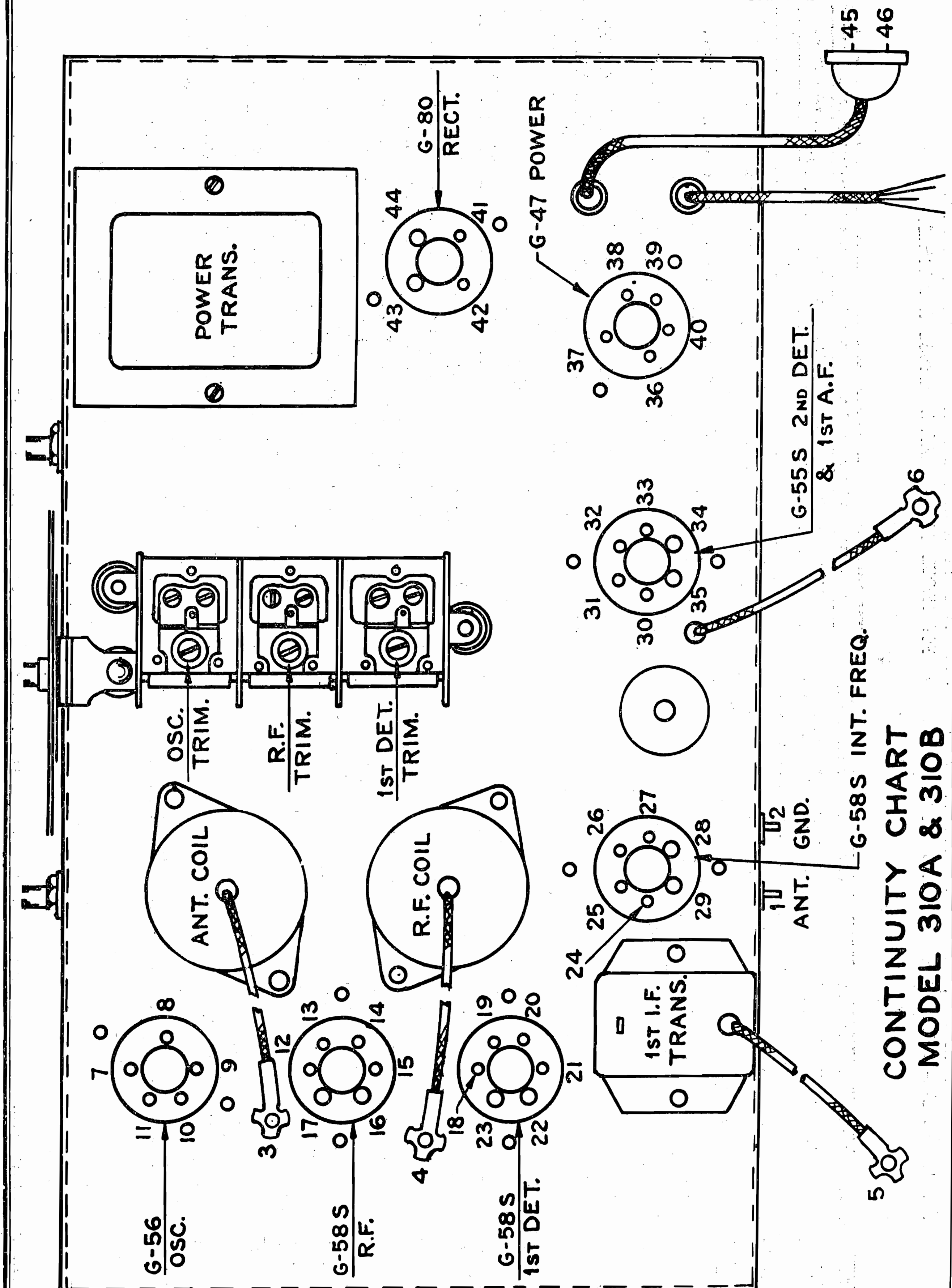
RESISTANCE AND CONDENSER VALUES

R1 = 350 } MULTIPLE
R2 = 2000 } WIRE WOUND
R3 = 500 }
R4 = 300,000
R5 = 10,000
R6 = 100,000
R7 = 200,000 VOLUME CONT.
R8 = 50,000 TONE CONTROL
R9 = 20 } HUM BALANCER
R10 = 400 }
R11 = 8,000
R12 = 9,000
R13 = 350
R14 = 40,000
R15 = 99,000
R16 = 300,000

C1 = 16. } DUAL ELECTROLYTIC
C2 = 8. }
C3 = 20. ELECTROLYTIC
C4 = .03 }
C5 = .006 }
C6 = .03 }
C7 = .25 } BLOCK
C8 = .1 }
C9 = .1 }
C10 = .25 }
C11 = .0005 MICA
C12 = .004 TUBULAR
C13 = .5 IN BLOCK
C14 = .01 } IN SMALL CAN
C15 = .01 }
C16 = .03 TUBULAR.
C17 = 10. ELECTROLYTIC
C18 = .07 TUBULAR

MODEL 310-A, 310-B
Chassis

GRIGSBY - GRUNOW CO



MODEL 310-A
Test Data

GRIGSBY - GRUNOW CO.

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.

Terminal No.	Resistance in Ohms	If Resistance differs greatly from value shown, check the following:
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 #12305 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 #36

GRIGSBY - GRUNOW CO.

MODEL 310-B
Test Data

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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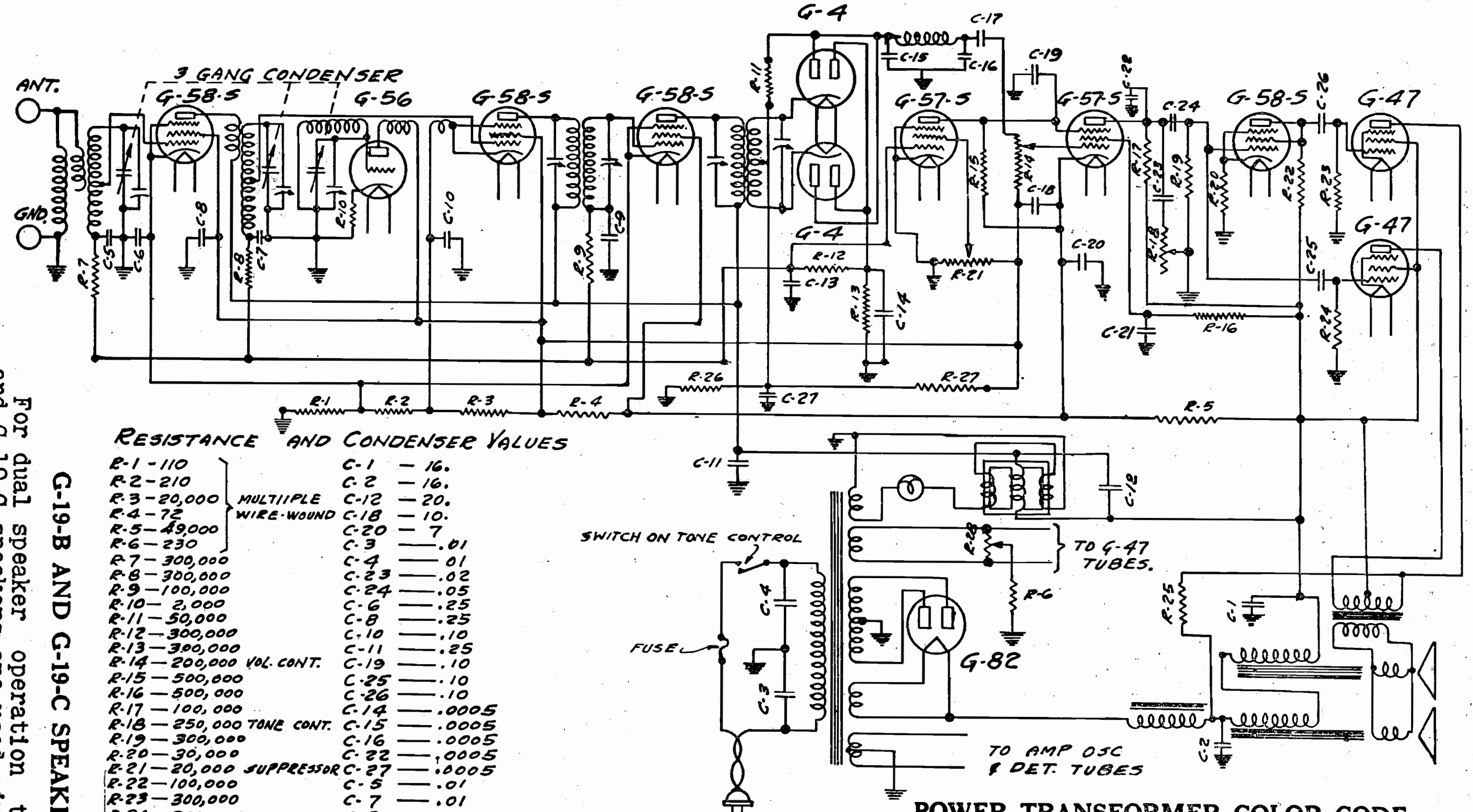

RESISTANCE AND CONDENSER VALUES

R-1 - 110	MULTIPLE WIRE-WOUND	C-1 — 16.
R-2 - 210		C-2 — 16.
R-3 - 20,000		C-12 — 20.
R-4 - 72		C-18 — 10.
R-5 - 49,000		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.	

IF PEAK 175 KC.

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

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.

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.

MODEL 320
Chassis

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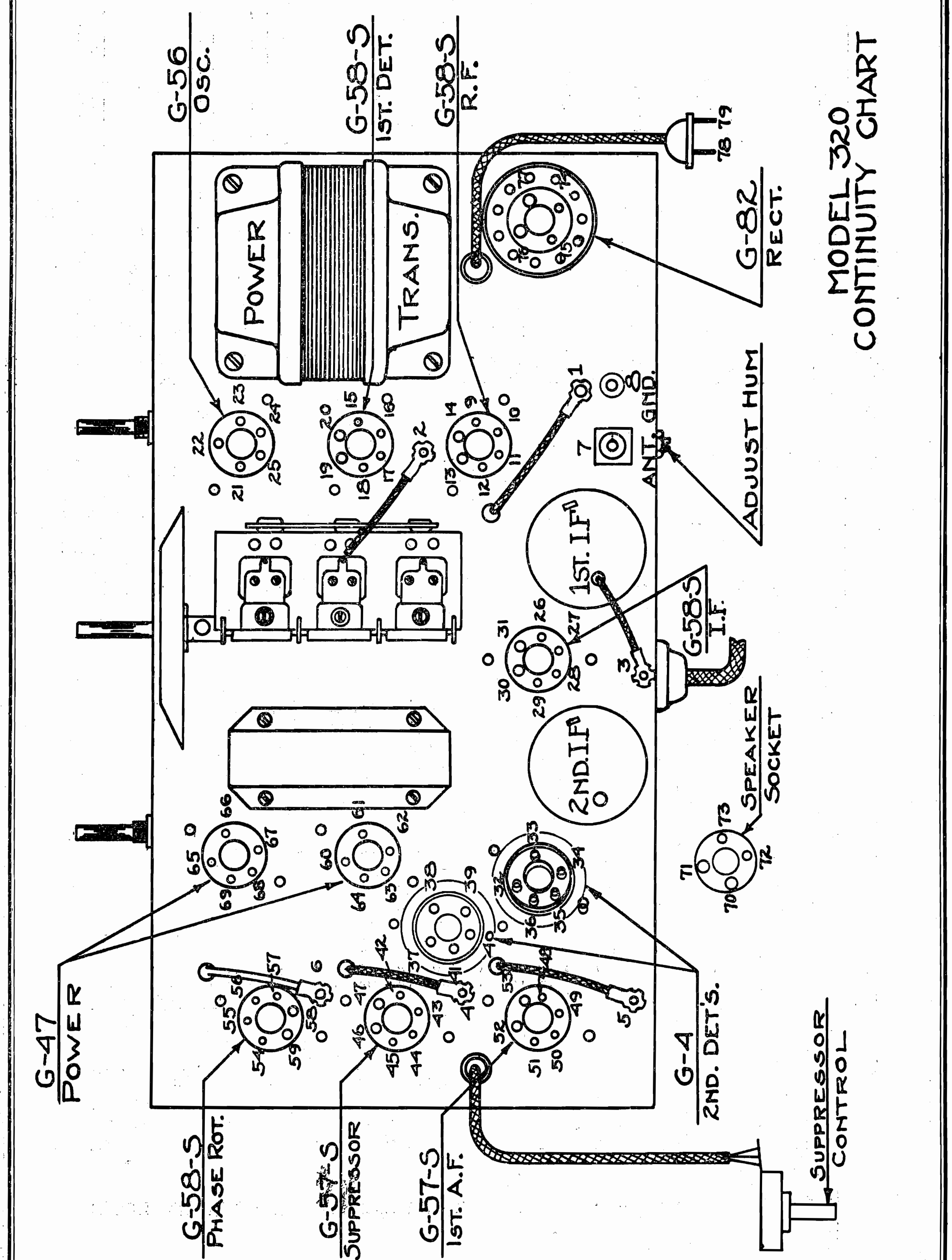

MODEL 320
Test Data

GRIGSBY - GRUNOW CO.

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	9268	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	54,783	R11 and test #32
34	300,000	R13,C14 and tests #1,#2 and #5
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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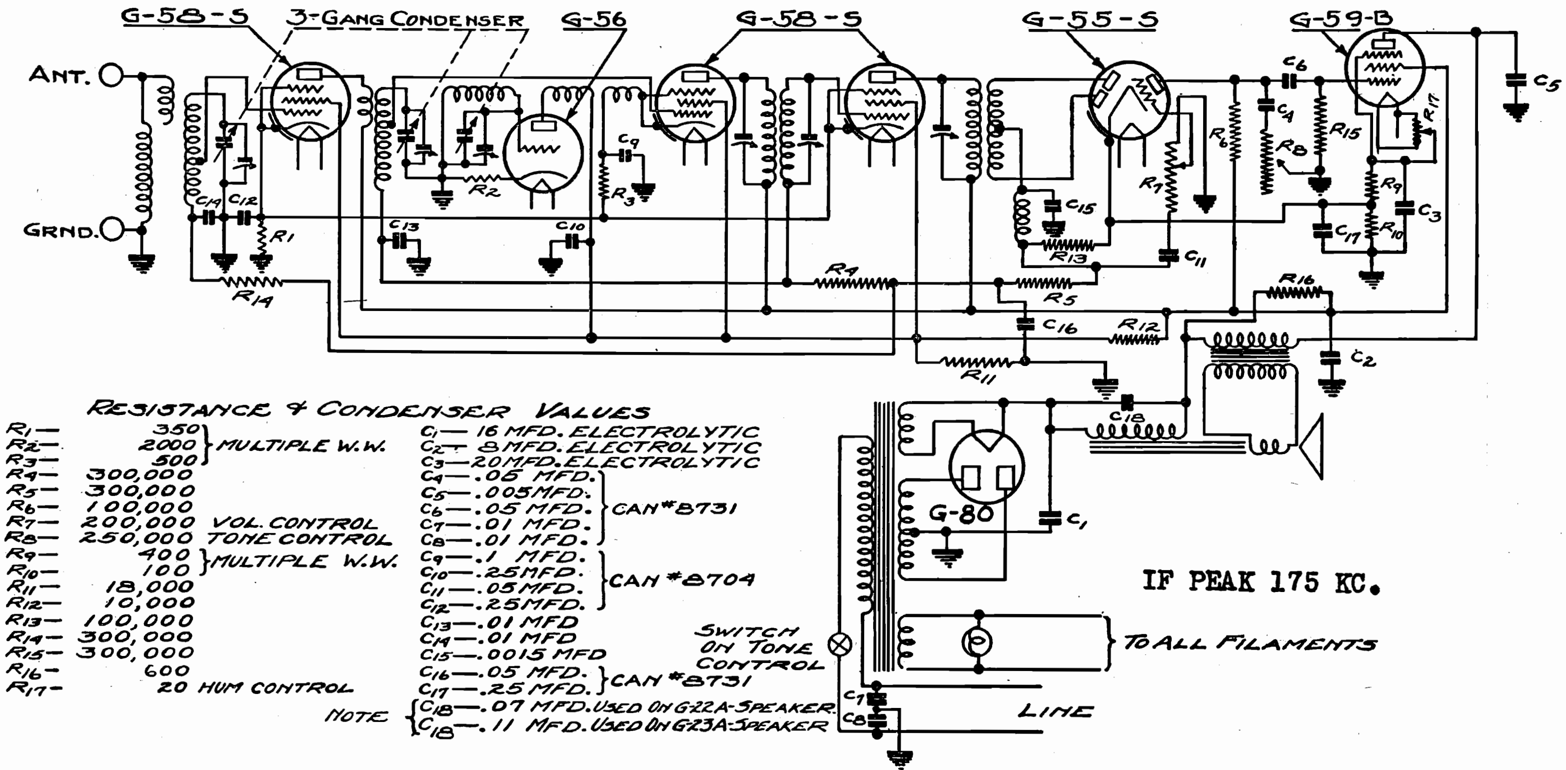
MODEL 330 Series
Schematic- Data



RESISTANCE & CONDENSER VALUES

R1 — 350	MULTIPLE W.W.	C1 — 16 MFD. ELECTROLYTIC	
R2 — 2000	MULTIPLE W.W.	C2 — 8 MFD. ELECTROLYTIC	
R3 — 500	MULTIPLE W.W.	C3 — 20 MFD. ELECTROLYTIC	
R4 — 300,000		C4 — .05 MFD.	CAN #8731
R5 — 300,000		C5 — .005 MFD.	CAN #8731
R6 — 100,000		C6 — .05 MFD.	CAN #8731
R7 — 200,000	VOL. CONTROL	C7 — .01 MFD.	CAN #8731
R8 — 250,000	TONE CONTROL	C8 — .01 MFD.	CAN #8731
R9 — 400	MULTIPLE W.W.	C9 — .1 MFD.	CAN #8704
R10 — 100	MULTIPLE W.W.	C10 — .25 MFD.	CAN #8704
R11 — 18,000		C11 — .05 MFD.	CAN #8704
R12 — 10,000		C12 — .25 MFD.	CAN #8704
R13 — 100,000		C13 — .01 MFD	
R14 — 300,000		C14 — .01 MFD	
R15 — 300,000		C15 — .0015 MFD	
R16 — 600		C16 — .05 MFD.	CAN #8731
R17 — 20	HUM CONTROL	C17 — .25 MFD.	CAN #8731
	NOTE	C18 — .07 MFD. USED ON G22A-SPEAKER	
	NOTE	C18 — .11 MFD. USED ON G23A-SPEAKER	

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 C.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 dynamic speaker is a "Best" D-65, with a field coil rated at 1070 ohms hot.

MODEL 330 Series
Chassis-Test Data

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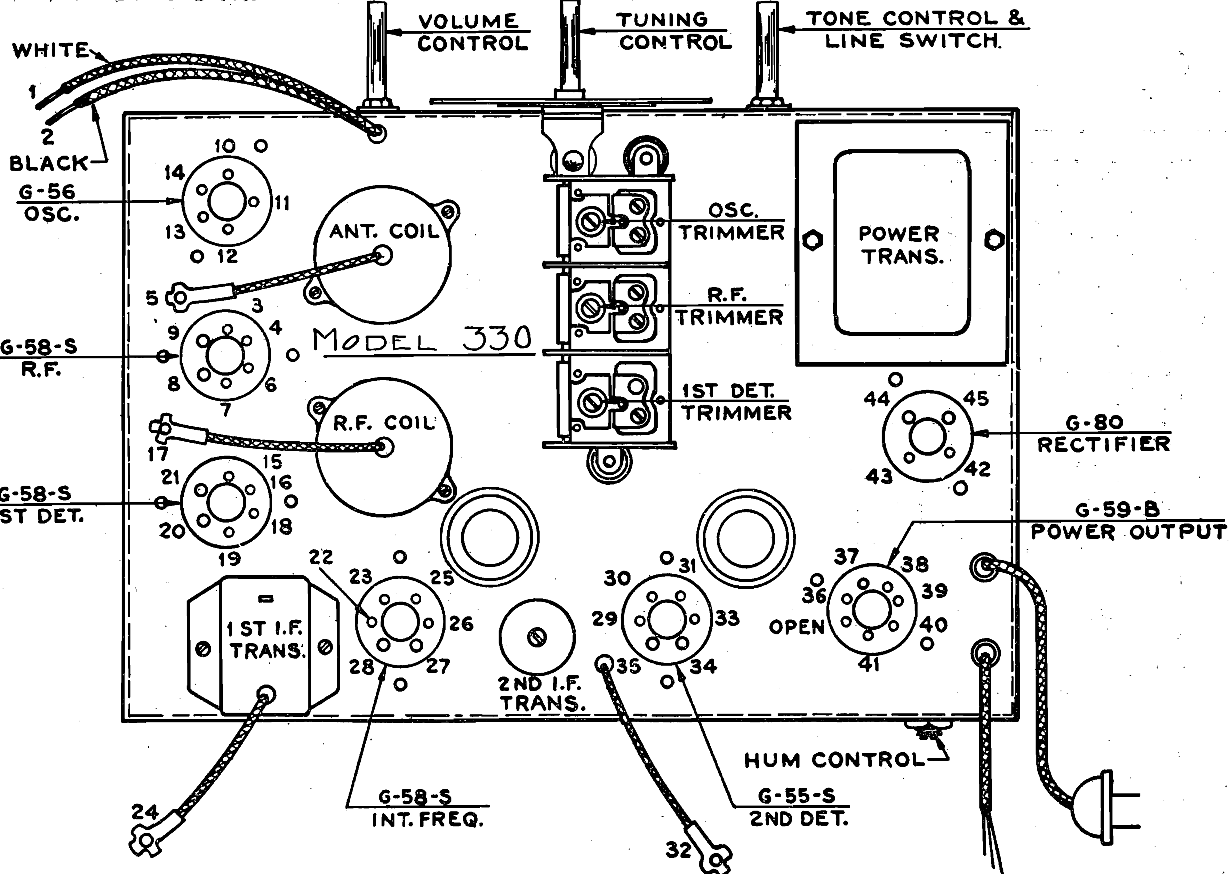


TEST DATA

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.

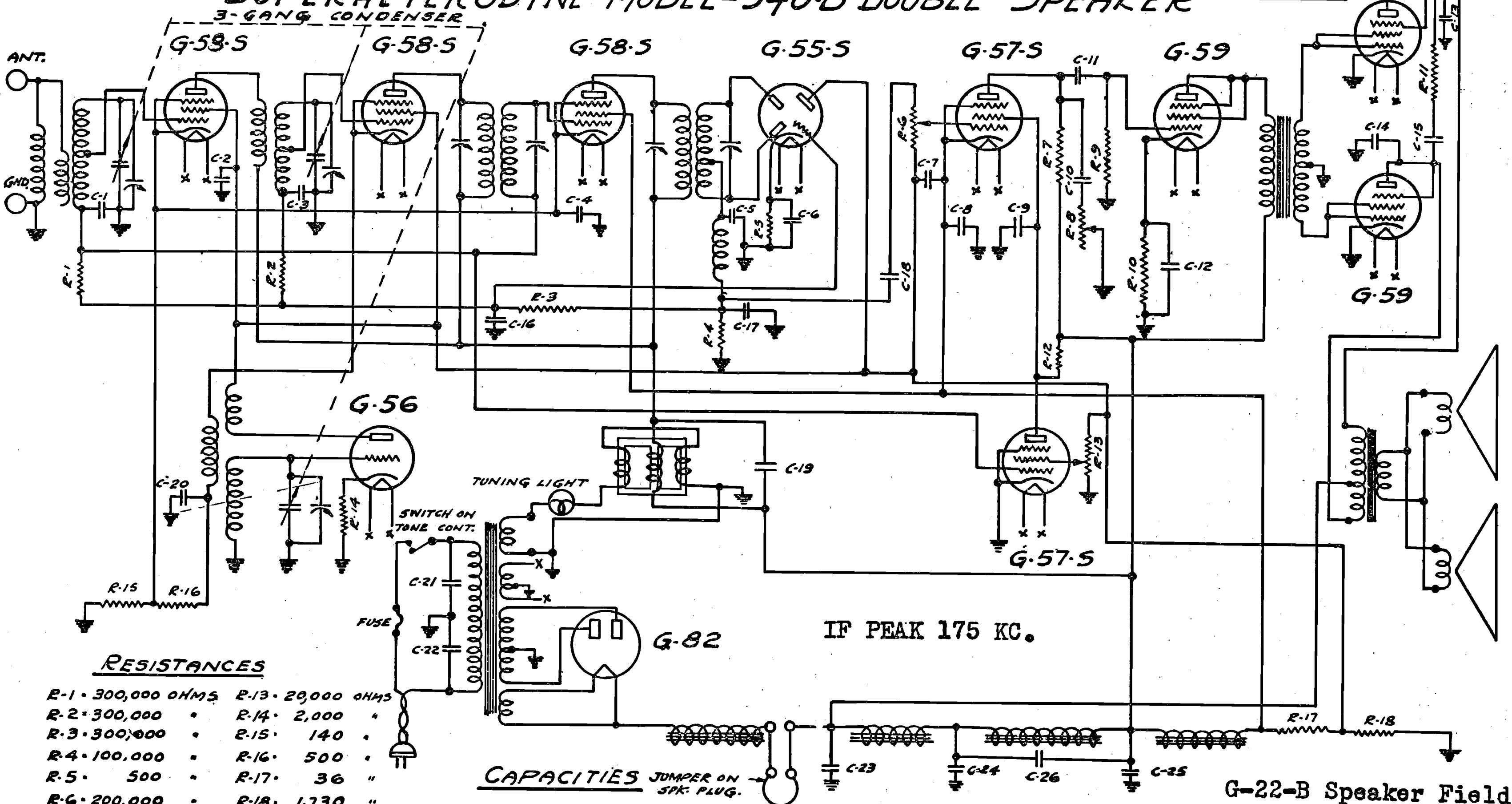
Terminal Number		Resistance in Ohms
1	Antenna Lead	Very low resistance
2	Ground Lead	Short circuit
3	R. F. Cathode	350
4	R. F. Suppressor	Same as #3
5	R. F. Grid	700,100
*6	R. F. Screen	18,000
*7	R. F. Plate	28,000
*8	R. F. Filament	510
9	R. F. Filament	Same as #8
10	Oscillator Cathode	2,000
11	Oscillator 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

GRIGSBY - GRUNOW CO.

MODEL 340 Series
Schematic

SUPERHETERODYNE MODEL-340-B DOUBLE SPEAKER



RESISTANCES

R-1 · 300,000 OHMS	R-13 · 20,000 OHMS
R-2 · 300,000 "	R-14 · 2,000 "
R-3 · 300,000 "	R-15 · 140 "
R-4 · 100,000 "	R-16 · 500 "
R-5 · 500 "	R-17 · 36 "
R-6 · 200,000 "	R-18 · 1,730 "
R-7 · 150,000 "	
R-8 · 250,000 "	
R-9 · 100,000 "	
R-10 · 1,000 "	
R-11 · 4,500 "	
R-12 · 500,000	

CAPACITIES

C-1 · 0.01 MFD.	C-9 · 0.10 MFD.	C-17 · 0.0005 MFD	C-25 · 16. MFD
C-2 · 0.25 "	C-10 · 0.02 "	C-18 · 0.05 "	C-26 · 1. "
C-3 · 0.01 "	C-11 · 0.15 "	C-19 · 20. "	
C-4 · 0.25 "	C-12 · 20. "	C-20 · 0.10 "	
C-5 · 0.0005 "	C-13 · 0.001 "	C-21 · 0.01 "	
C-6 · 0.10 "	C-14 · 0.001 "	C-22 · 0.01 "	
C-7 · 10. "	C-15 · 0.005 "	C-23 · 8. "	
C-8 · 7. "	C-16 · 0.05 "	C-24 · 8. "	

G-22-B Speaker Field is 970 Ohms.
G-22-C Speaker Field is 2200 Ohms.

Primary ---- Yellow lead
Primary ---- Yellow lead
Heater ----- Lugs #4 and #7
Heater C.T. Lug #1
Heater ----- Lugs #5 and #8

High Voltage ---- Red lead
High voltage C.T. Black lead
High voltage ---- Red lead

Rectifier Filament ---Blue Lead
Rectifier Filament ---Blue Lead
Tuning Light ---------Lug #10
Tuning Light ---------Lug #11

MODEL 340
Chassis
Voltage
Test Data

GRIGSBY - GRUNOW CO.

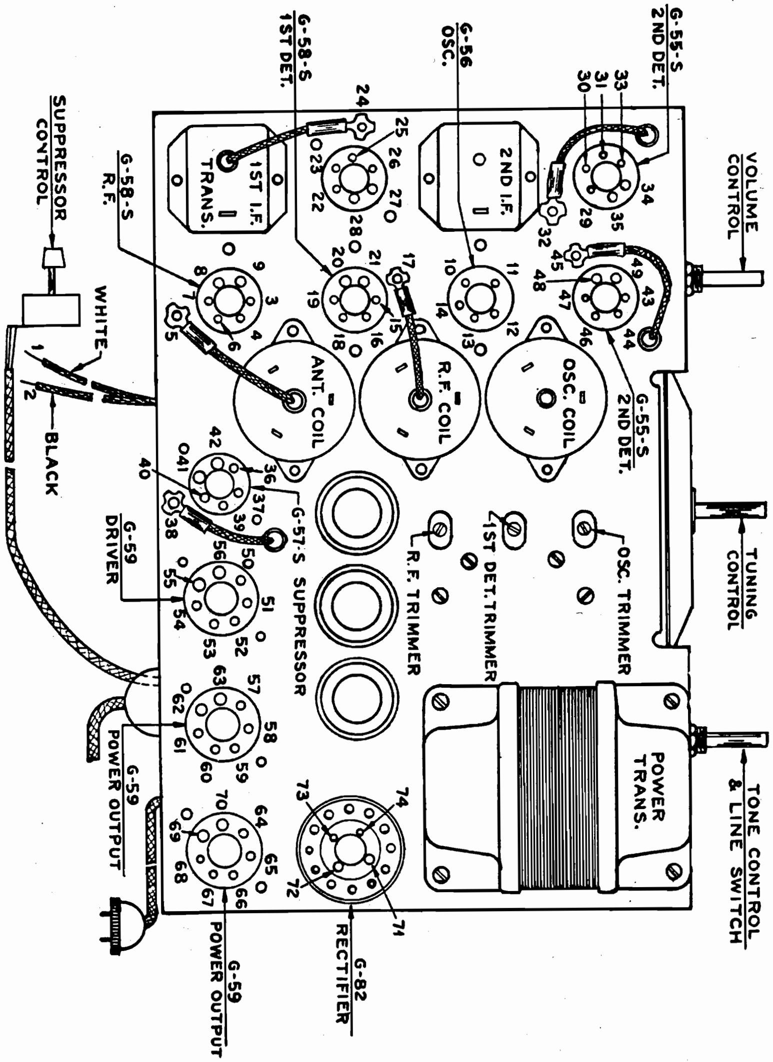
All readings are taken from designated point to ground unless otherwise specified. Volume control at maximum clockwise position. All tubes removed. Speaker in circuit.
*Readings vary according to polarity of test leads due to electrolytic units.

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			
2nd Det.	2.5	80	—	1.1	—
1st AF	2.5	105	100	82.2	82.2
Supp.	2.5	100	*0	0	*0
Driver	2.5	225	225	22.	225.
Output	2.5	360	0	0	360
Rectifier	2.5	—	—	—	—

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	503,828
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	5,036
*72 Rectifier Filament	Same as #71
73 Rectifier Plate	Approximately 125
74 Rectifier Plate	Same as #73



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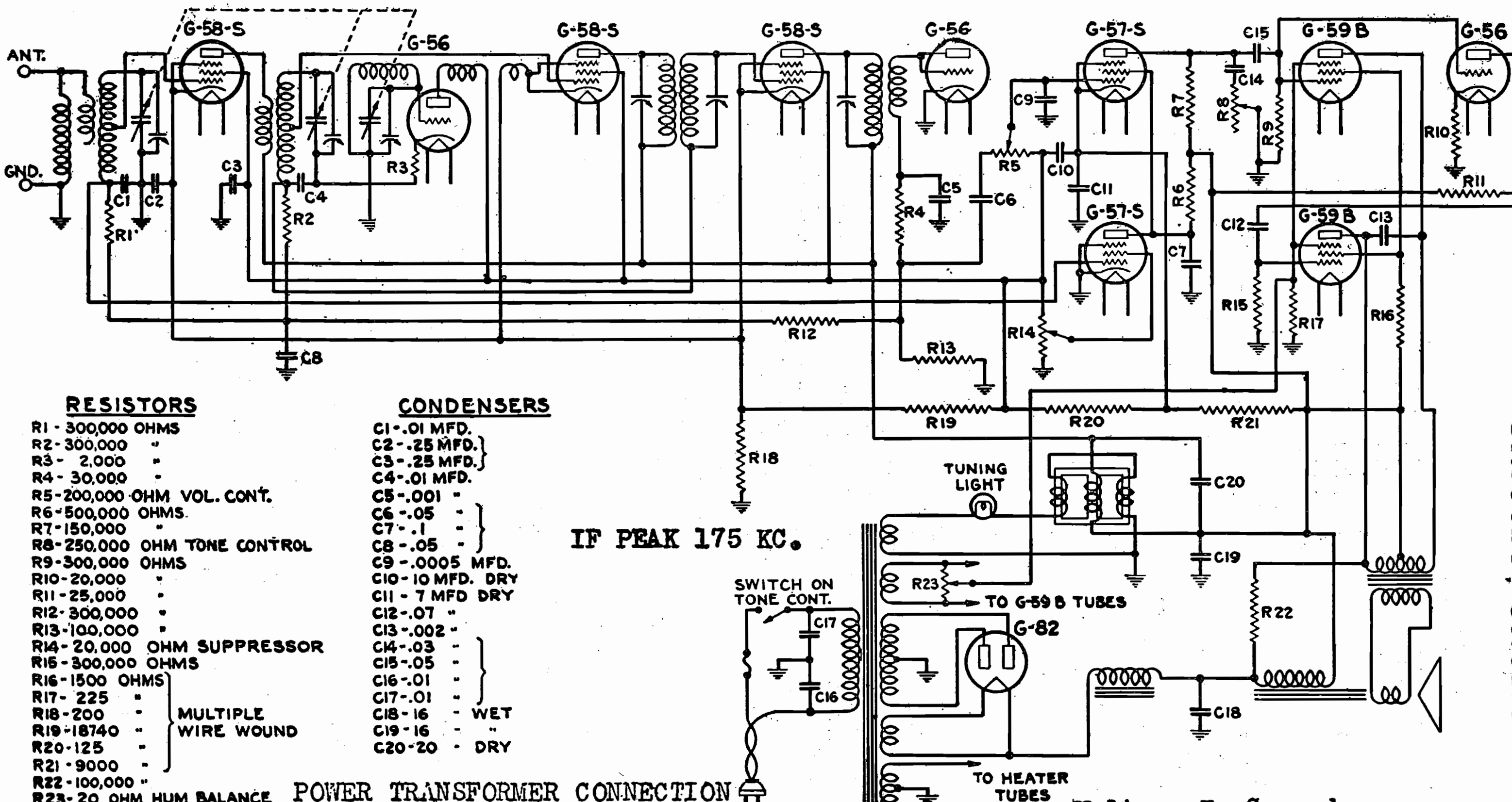
MODEL 360
Schematic
Voltage



RESISTORS

R1 - 300,000 OHMS
R2 - 300,000 "
R3 - 2,000 "
R4 - 30,000 "
R5 - 200,000 OHM VOL. CONT.
R6 - 500,000 OHMS
R7 - 150,000 "
R8 - 250,000 OHM TONE CONTROL
R9 - 300,000 OHMS
R10 - 20,000 "
R11 - 25,000 "
R12 - 300,000 "
R13 - 100,000 "
R14 - 20,000 OHM SUPPRESSOR
R15 - 300,000 OHMS
R16 - 1500 OHMS }
R17 - 225 " } MULTIPLE
R18 - 200 " } WIRE WOUND
R19 - 18740 " }
R20 - 125 " }
R21 - 9000 " }
R22 - 100,000 "
R23 - 20 OHM HUM BALANCE

CONDENSERS

C1 - .01 MFD.
C2 - .25 MFD. }
C3 - .25 MFD. }
C4 - .01 MFD.
C5 - .001 "
C6 - .05 " }
C7 - .1 " }
C8 - .05 " }
C9 - .0005 MFD.
C10 - 10 MFD. DRY
C11 - 7 MFD DRY
C12 - .07 "
C13 - .002 "
C14 - .03 " }
C15 - .05 " }
C16 - .01 " }
C17 - .01 " }
C18 - 16 " WET
C19 - 16 " "
C20 - 20 " DRY

IF PEAK 175 KC.

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	--	-	-	-	-

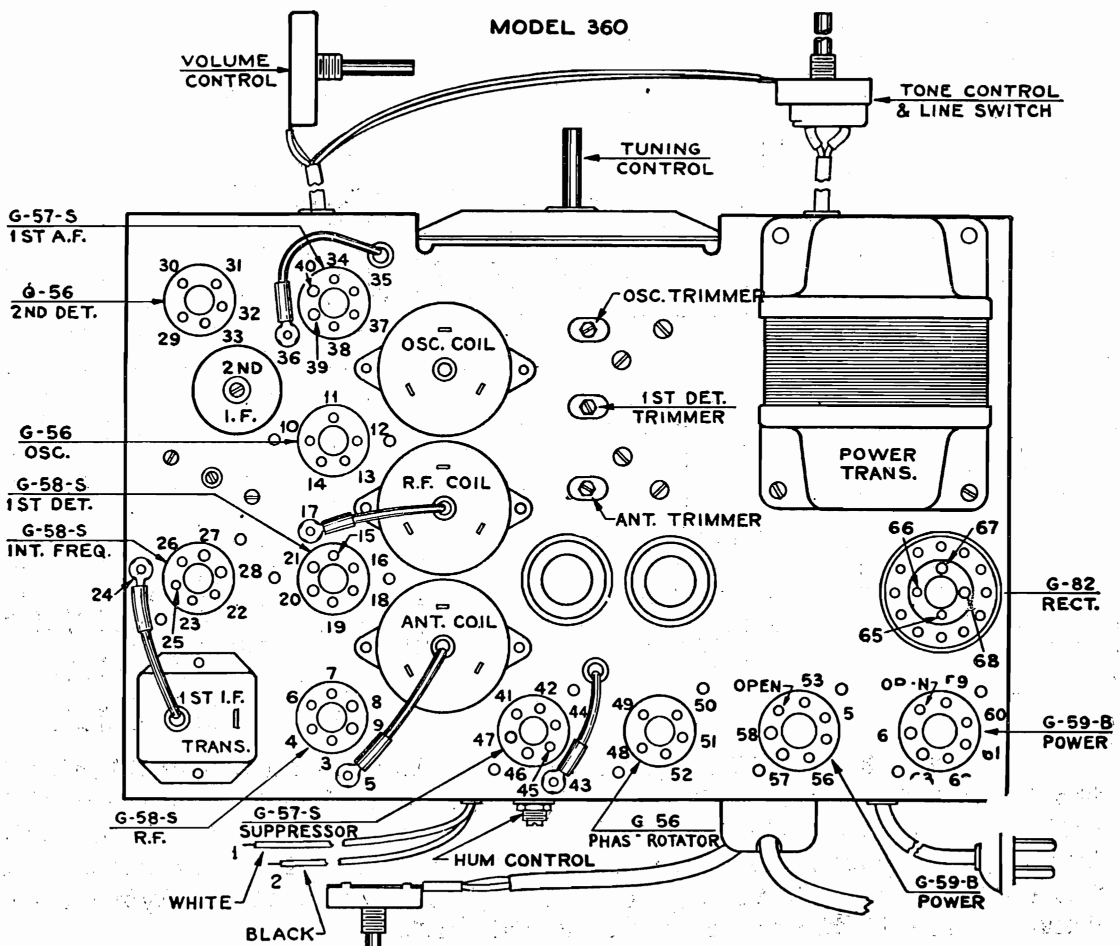
* K= Cathode. Line voltage 115 V... V.C. Max.
Synchro-Silent Tuner- Clockwise

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

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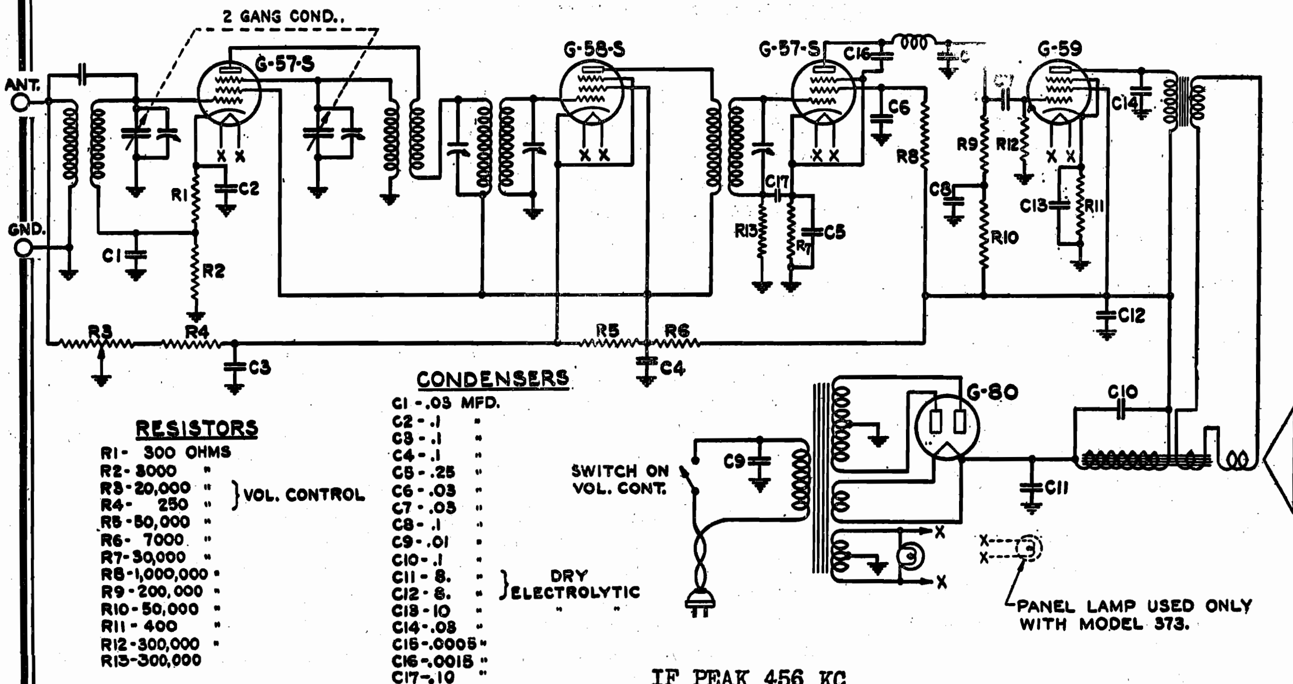

RESISTORS

R1 - 300 OHMS
R2 - 3000 "
R3 - 20,000 " } VOL. CONTROL
R4 - 250 "
R5 - 50,000 "
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 - .03 MFD.
C2 - .1 "
C3 - .1 "
C4 - .1 "
C5 - .25 "
C6 - .03 "
C7 - .03 "
C8 - .1 "
C9 - .01 "
C10 - .1 "
C11 - 8. " } DRY ELECTROLYTIC
C12 - 8. " "
C13 - 10 "
C14 - .03 "
C15 - .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 $5\frac{1}{4}$ 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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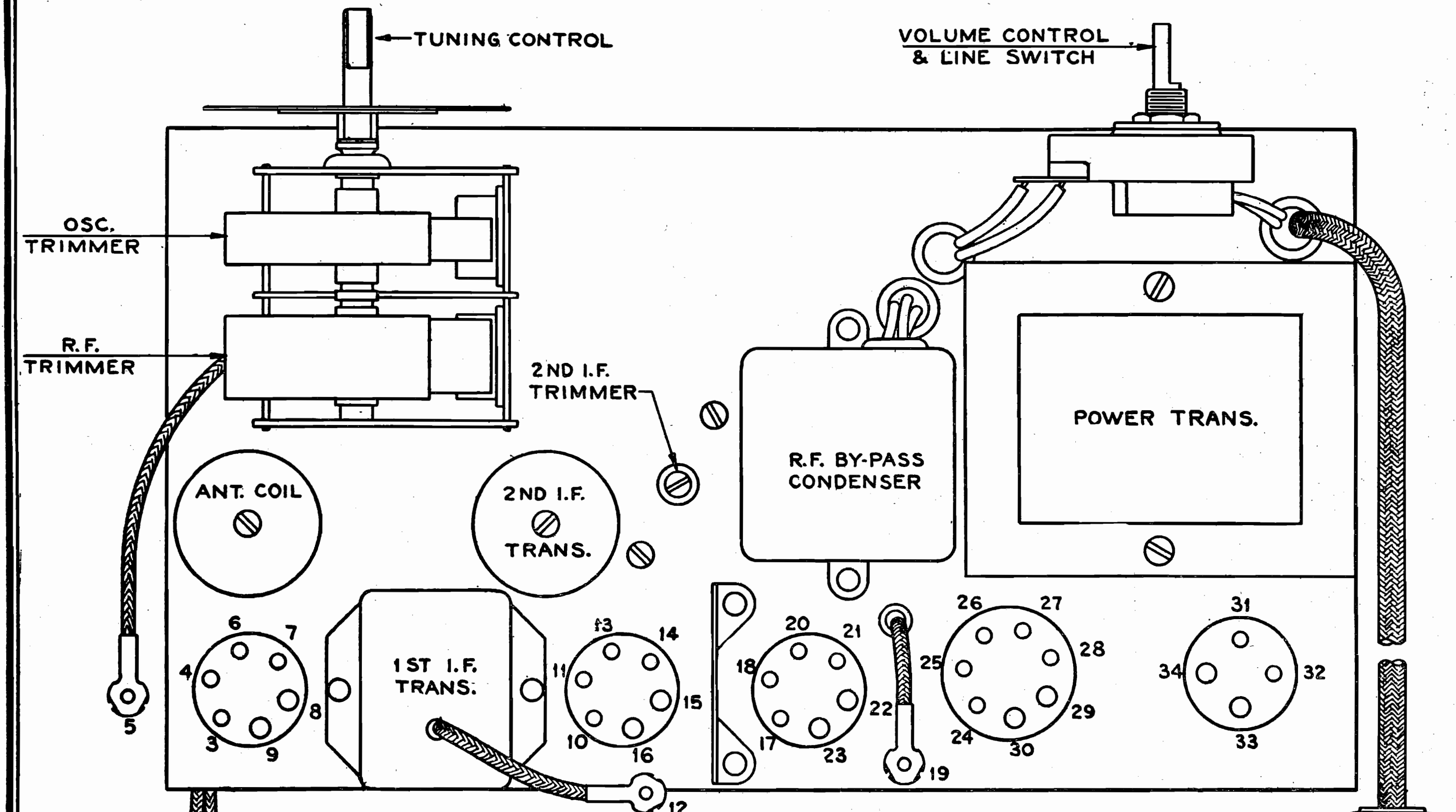
MODEL 370 Series
Chassis
Voltage



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

GRIGSBY - GRUNOW CO.

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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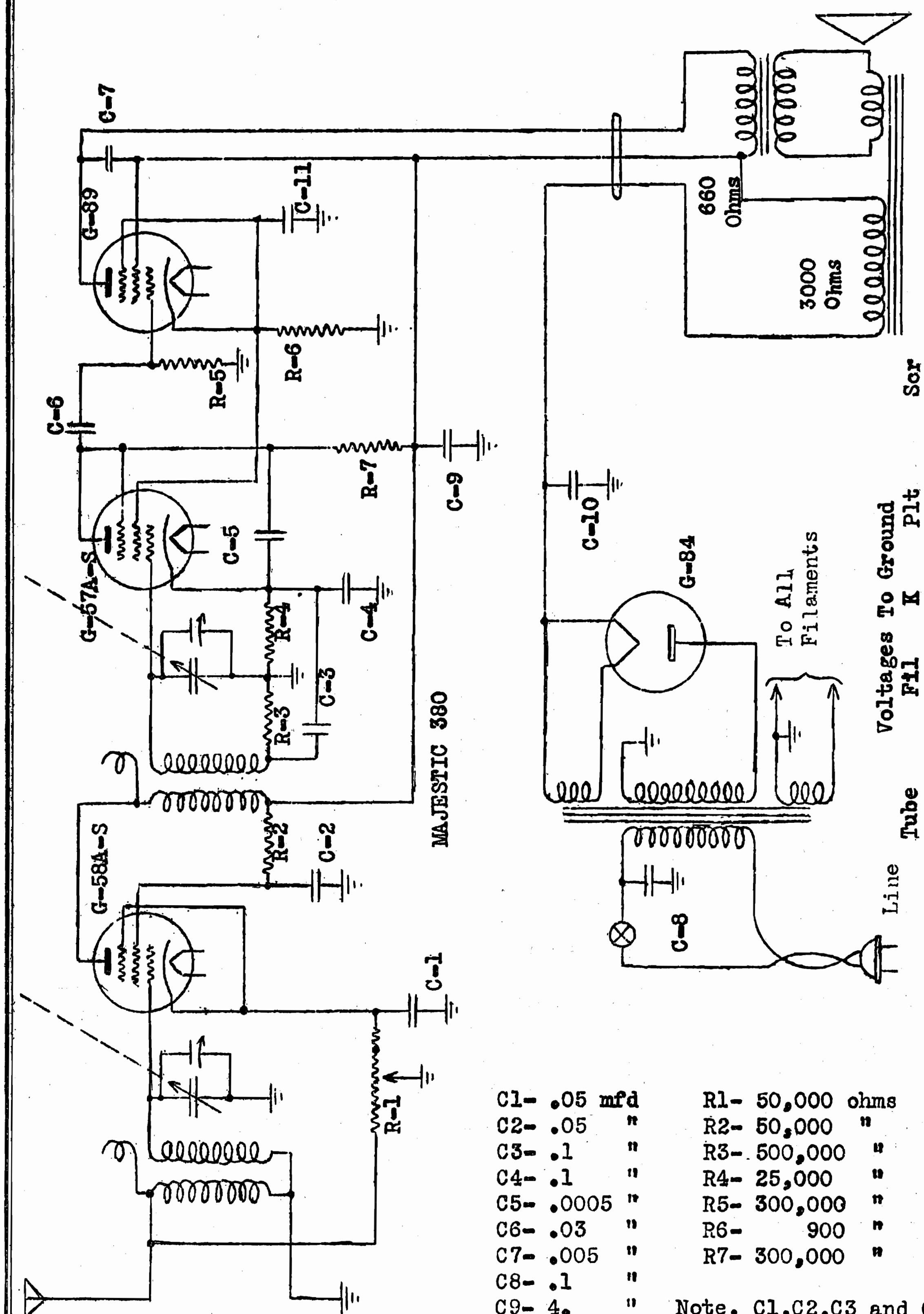
MODEL 380
Schematic
Voltage



C1- .05 mfd
C2- .05 "
C3- .1 "
C4- .1 "
C5- .0005 "
C6- .03 "
C7- .005 "
C8- .1 "
C9- 4. "
C10-8. "
C11-10. "

R1- 50,000 ohms
R2- 50,000 "
R3- 500,000 "
R4- 25,000 "
R5- 300,000 "
R6- 900 "
R7- 300,000 "

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

Voltages To Ground

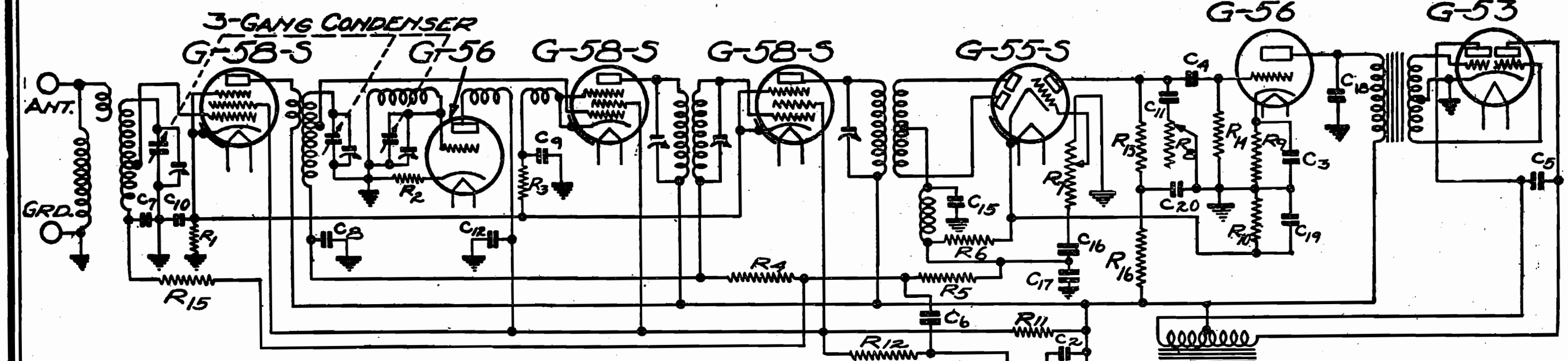
Tube	Fil	K	Plt	Scr
RF Amp	5.9	2.5	178	--
Det.	5.9	1.4	80	18.4
Output	5.9	18.4	171	183.
Rect	2.4		350 AC	--

Line voltage 115 Volts. K, Cathode

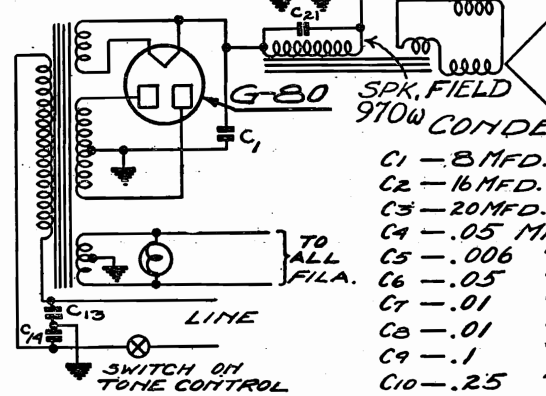
TRANSFORMER
Primary---Stranded Yellow
High Voltage--Red
Rect. Filament--Black
Heaters--- Solid Yellow

MODEL 390 Series
Schematic
Voltage

GRIGSBY - GRUNOW CO.



IF PEAK 175 KC.



Filter Condensers

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

RESISTANCE VALUES

R1 — 350	OHMS	R10 — 2.000	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

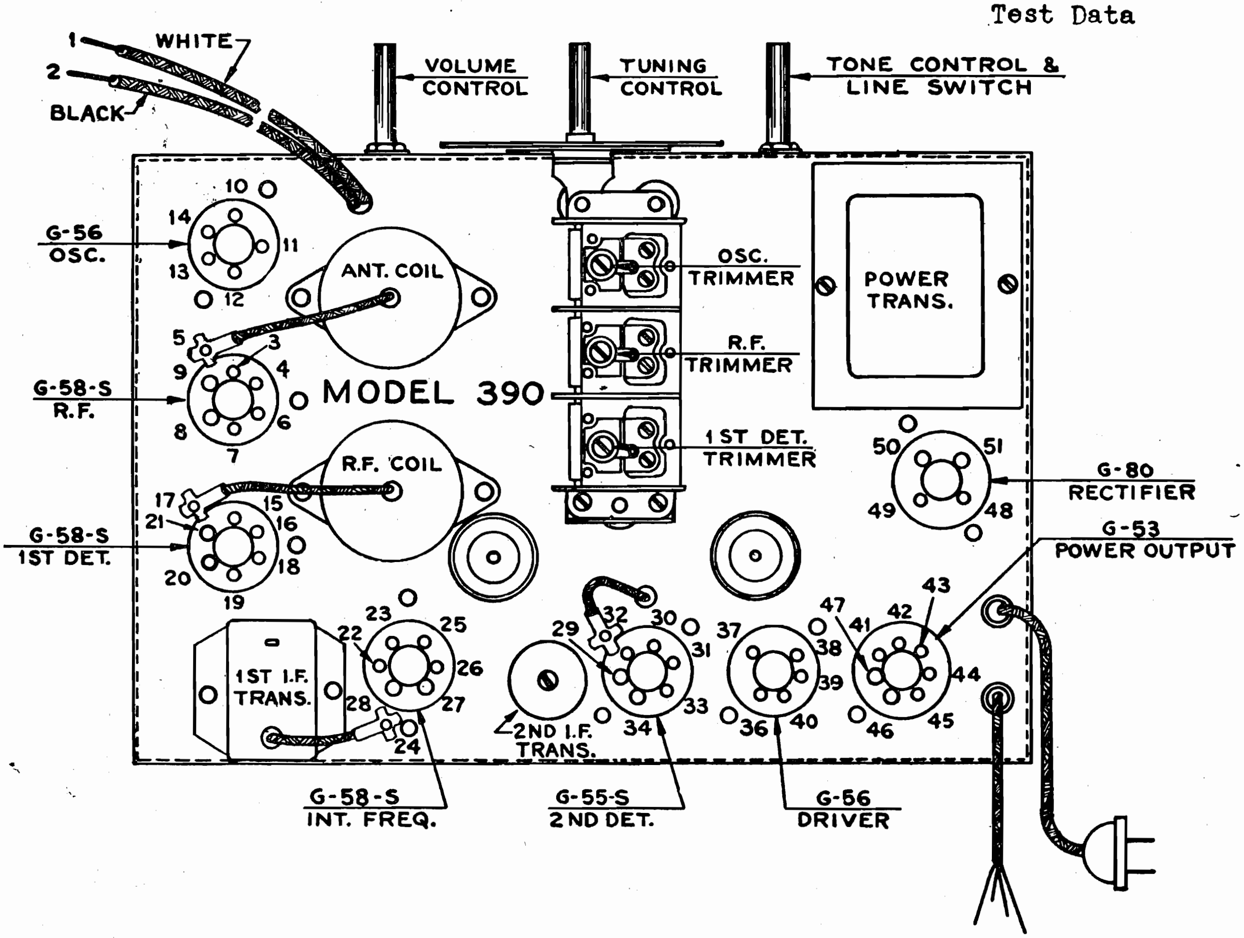
Voltage To Ground

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.

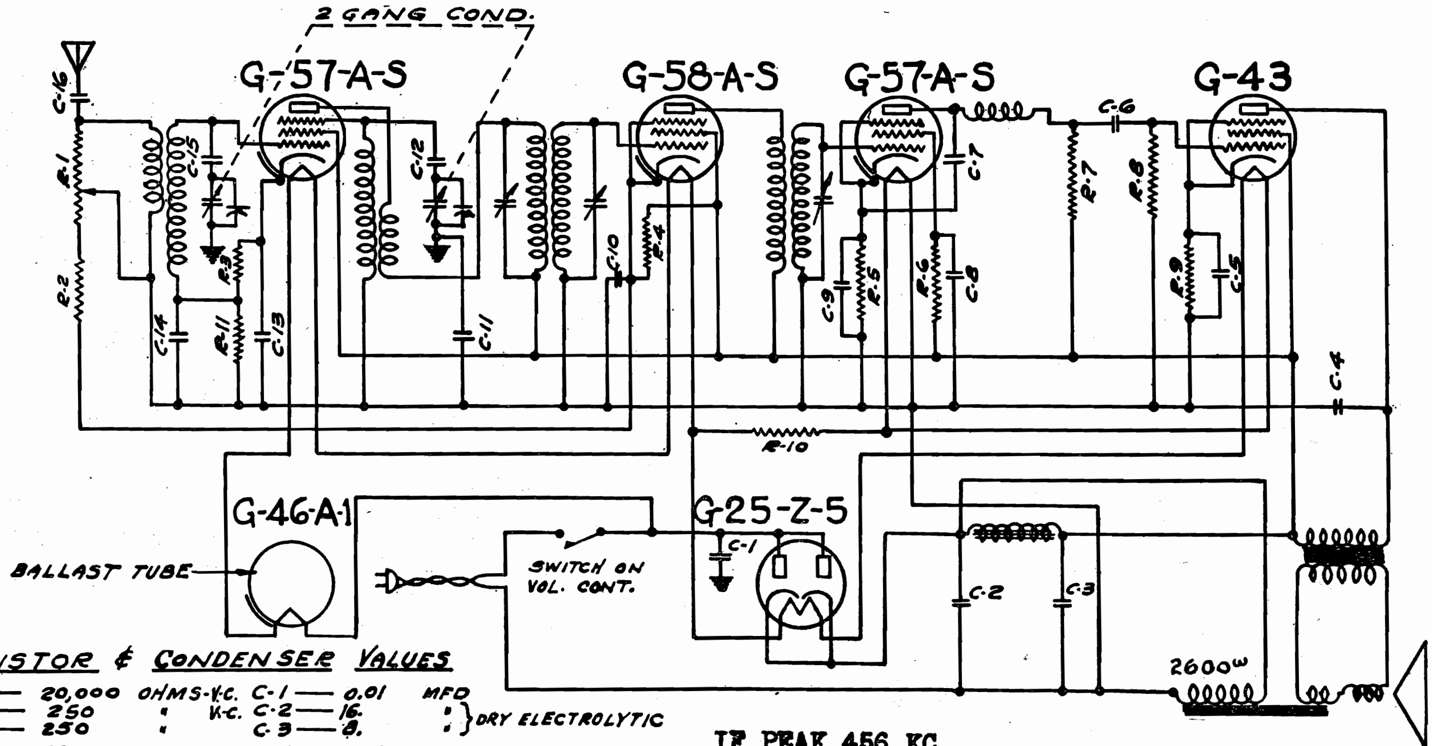
MODEL 390 Series
Chassis
Test Data



Terminal Number	Resistance in Ohms	Terminal Number	Resistance in Ohms
1 Antenna	Very low resistance	28 I. F. Fil.	Same as #8
2 Ground	Short Circuit	*29 2nd Det. Cathode	2,000
3 R. F. Cathode	350	*30 2nd Det. Diode Plate	102,100
4. R. F. Suppressor	Same as #3	*31 2nd Det. Diode Plate	Same as #30
*5 R. F. Grid	702,000	32 2nd Det. A.F. Grid	200,000
		33 2nd Det. A.F. Plate	162,000
6 R. F. Screen	6,000	34 2nd Det. Filament	Same as #8
*7 R. F. Plate	12,000	35 2nd Det. Filament	Same as #8
8 R. F. Filament	Very low resistance	*36 1st A.F. Cathode	2,700
9 R. F. Filament	same as #8	37 1st A.F. Grid	300,000
10 Osc. Cathode	2,000	*38 1st A.F. Plate	12,500
11 Osc. Grid	Very low resistance	39 1st A.F.Filament	Same as #8
12 Osc. Plate	6,000	40 1st A.F.Filament	Same as #8
13 Osc. Filament	same as #8	41 Power Cathode	Short Circuit
14 Osc. Filament	same as #8	42 Power Grid #1	150
15 1st Det. Cathode	850	43 Power Grid #2	Same as #42
16 1st Det. Suppressor	Same as #15	*44 Power Plate #1	12,200
*17 1st Det. Grid	702,000	45 Power Plate #2	Same as #44
18 1st Det. Screen	Same as #6	46 Power Filament	Same as #8
*19 1st Det. Plate	12,100	47 Power Filament	Same as #8
20 1st Det. Fil.	Same as #8	48 Rectifier Plate	Approx. 160
21 1st Det. Fil.	Same as #8	49 Rectifier Plate	Same as #48
22 I. F. Cathode	Same as #3	*50 Rectifier Filament	13,000
23 I. F. Suppressor	Same as #3	51 Rectifier Filament	Same as #50
*24 I. F. Grid	702,100	44 to 45	Aprox 270
25 I. F. Screen	Same as #6	33 to 37	462,000
*26 I. F. Plate	12,100	50 to 51	Low resistance
27 I. F. Fil.	Same as #8	8 to 9	Very low resistance
		Between line cord leads	Very low resistante
		Line cord leads to ground	Open

MODEL 400 Series

GRIGSBY - GRUNOW CO.



RESISTOR & CONDENSER VALUES

R-1 — 20,000	OHMS-V.C.	C-1 — 0.01	MFD
R-2 — 250	" V.C.	C-2 — 16.	" } DRY ELECTROLYTIC
R-3 — 250	"	C-3 — 8.	" } DRY ELECTROLYTIC
R-4 — 60,000	"	C-4 — 0.01	"
R-5 — 50,000	"	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 — 0.25	"
		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	FIL.	PLATE	SCR.	CATHODE
Mod. & 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.

GRIGSBY - GRUNOW CO.

MODEL "Duro-Mite Power Supply for Model 116

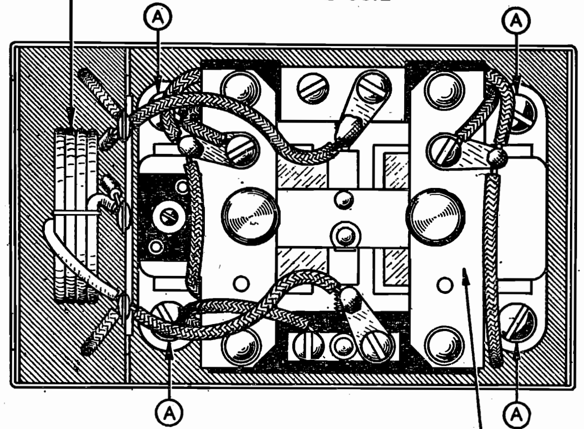


Fig. 11

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 procedure 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.

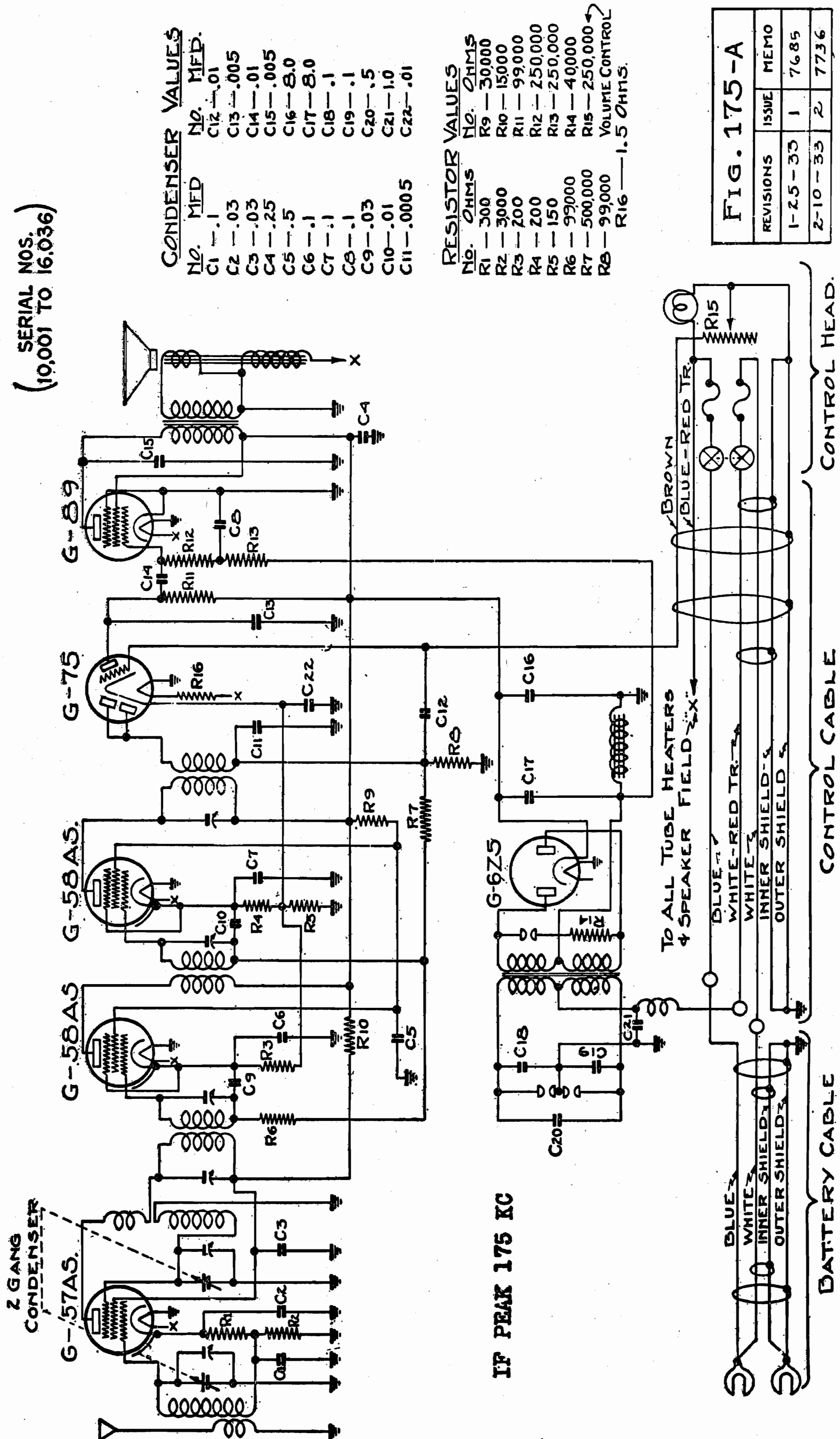
TUBES

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.

MODEL 116 Schematic Type 1

GRIGSBY - GRUNOW CO.



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	.01

RESISTOR VALUES

No.	OHMS	No.	OHMS
R1	300	R9	30,000
R2	3000	R10	15000
R3	200	R11	99,000
R4	200	R12	250,000
R5	150	R13	250,000
R6	99,000	R14	40,000
R7	500,000	R15	250,000 VOLUME CONTROL
R8	99,000		

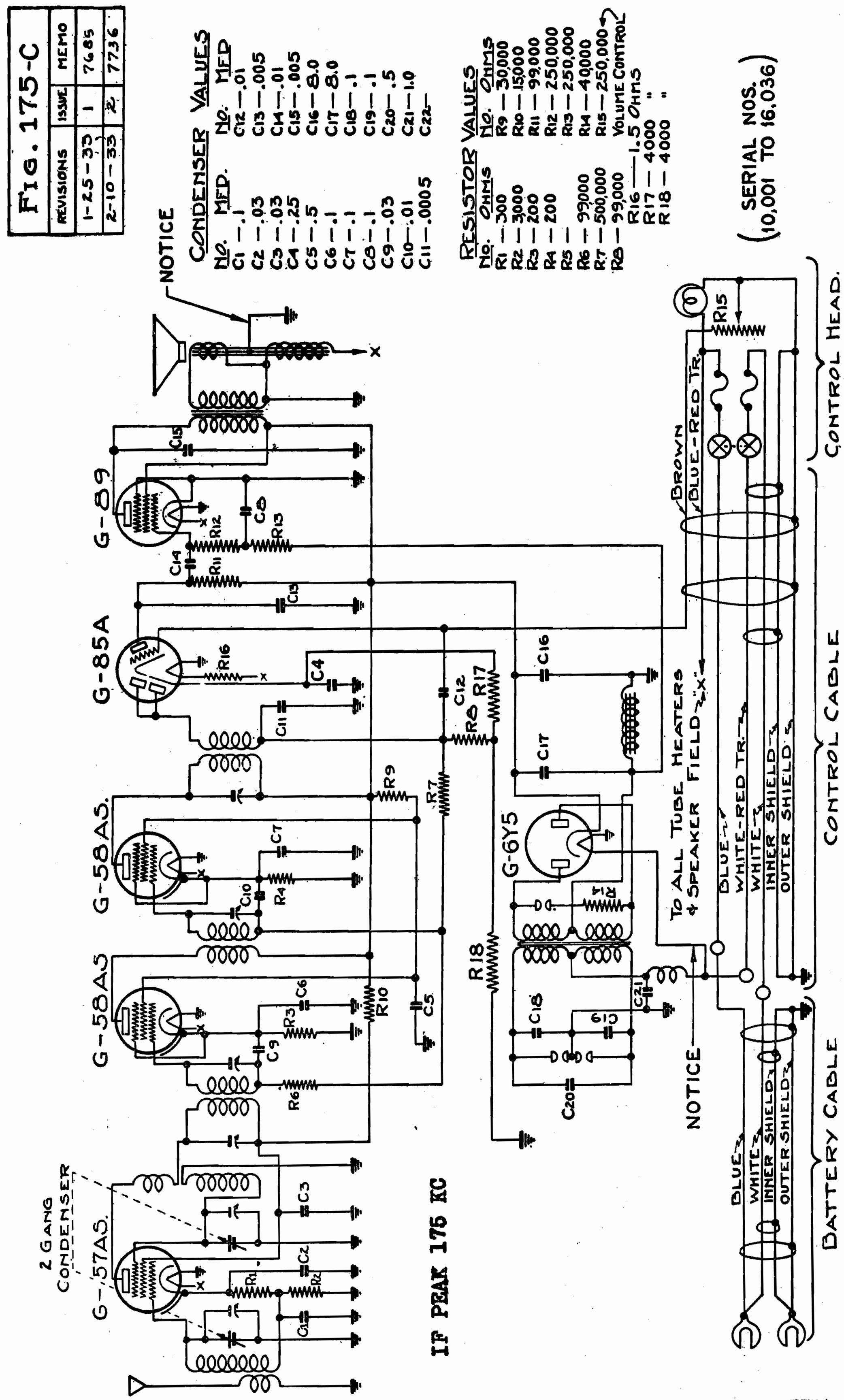
R16 — 1.5 OHMS.

FIG. 175-A

REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736

MODEL 116
Schematic
Type 3

GRIGSBY - GRUNOW CO.



MODEL 116
Schematic
Type 4

GRIGSBY - GRUNOW CO.

CONDENSER VALUES

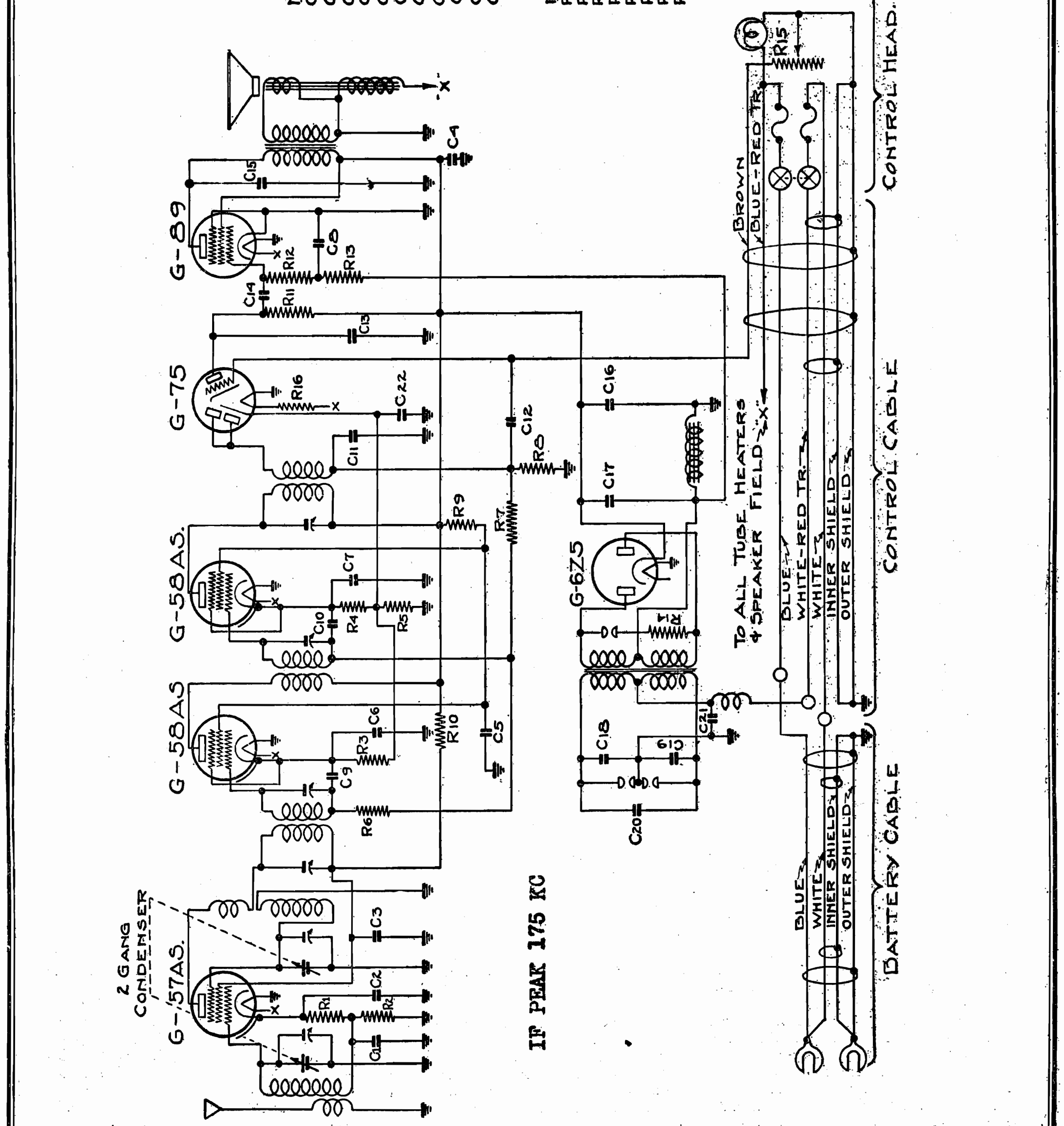
No.	MFD.	No.	MFD.
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.25	C15	.005
C5	.5	C16	8.0
C6	.1	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	1.0
C11	.0005	C22	.01

RESISTOR VALUES

No.	OHMS	No.	OHMS
R1	300	R9	30,000
R2	3,000	R10	15,000
R3	200	R11	99,000
R4	200	R12	250,000
R5	150	R13	250,000
R6	99,000	R14	40,000
R7	500,000	R15	250,000 VOLUME CONTROL
R8	99,000	R16	1.5 OHMS.

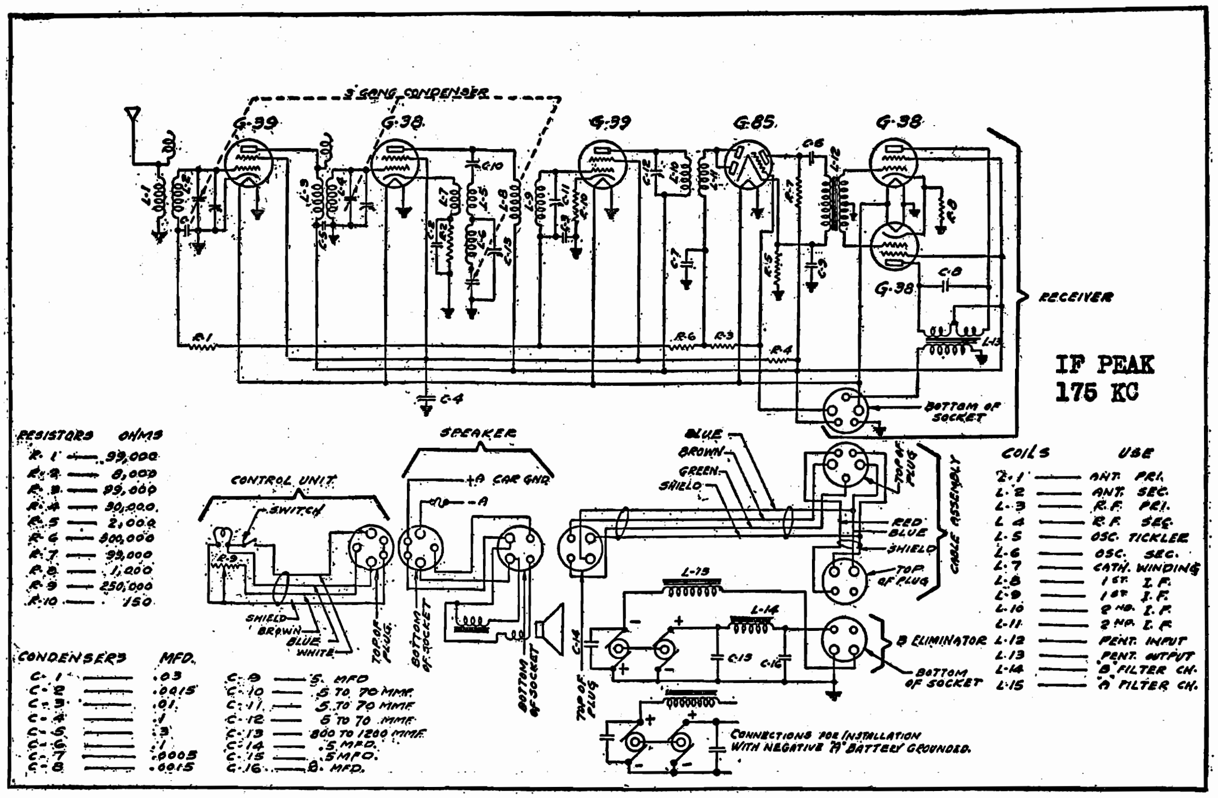
FIG. 175

REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736



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.

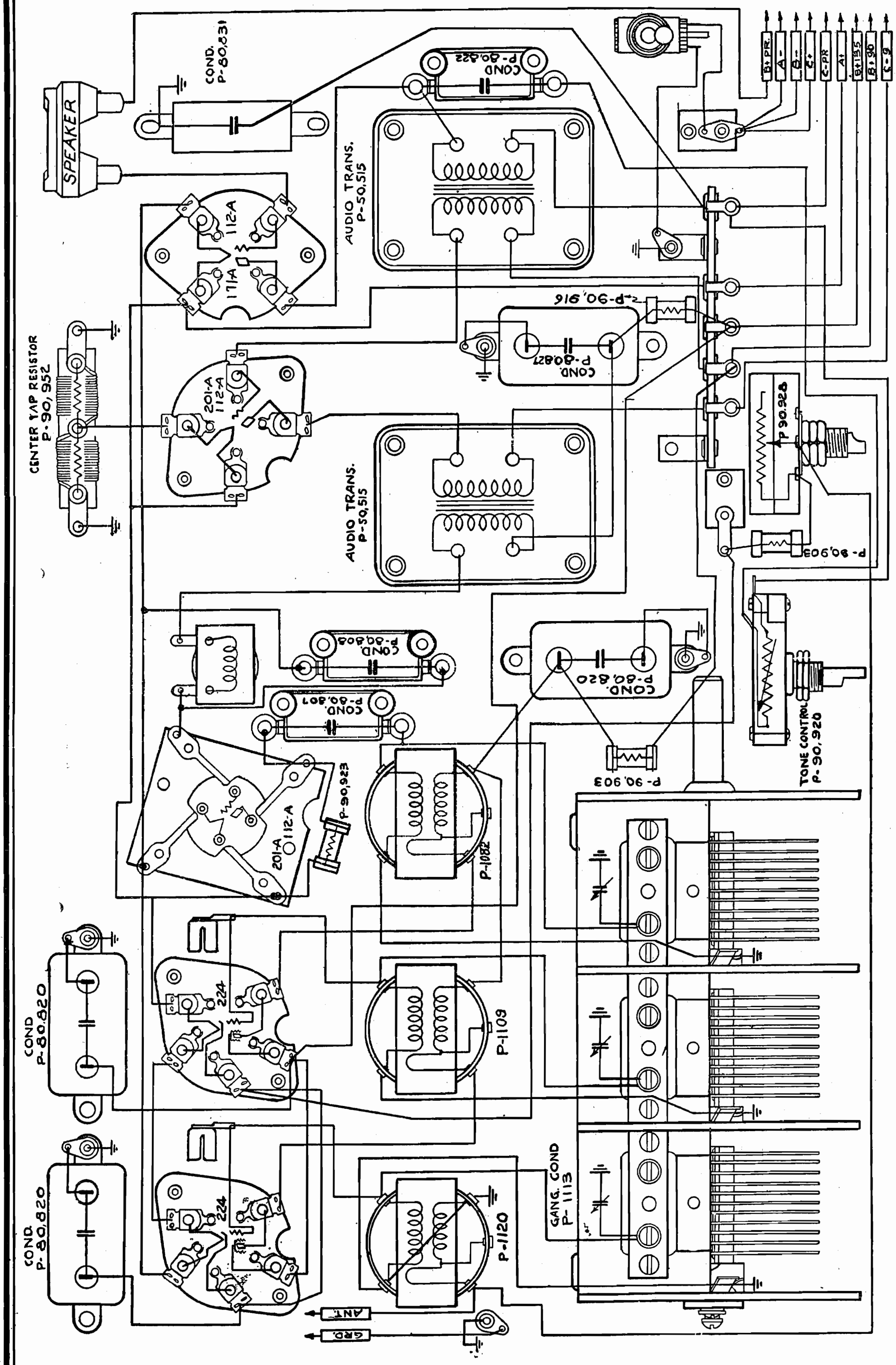
BATTERY CONNECTION

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.

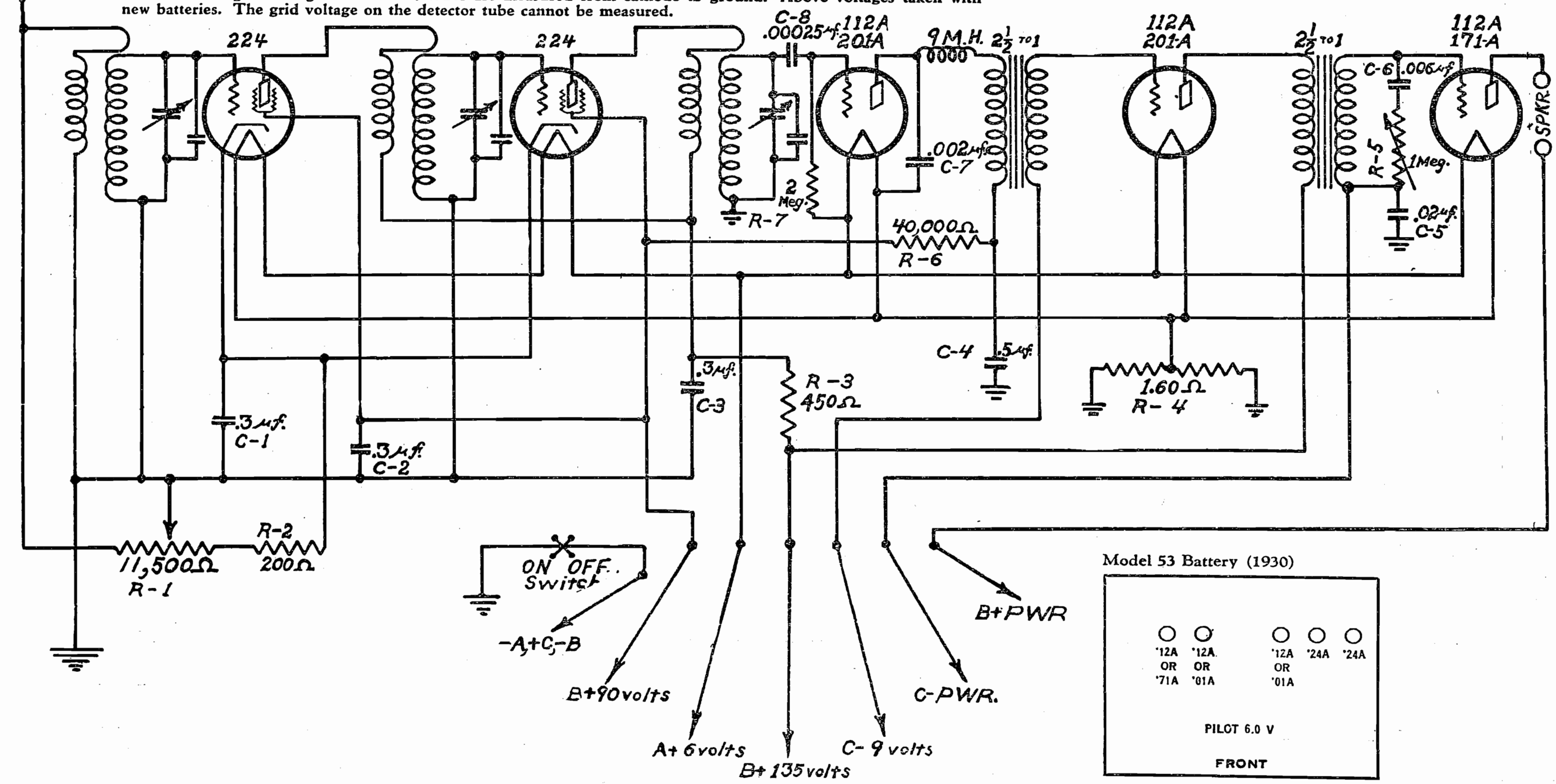
Volume Control Full on—Taken with a 1,000 Ohm Per Volt Voltmeter
Connect Antenna and Ground Leads Together

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.

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.



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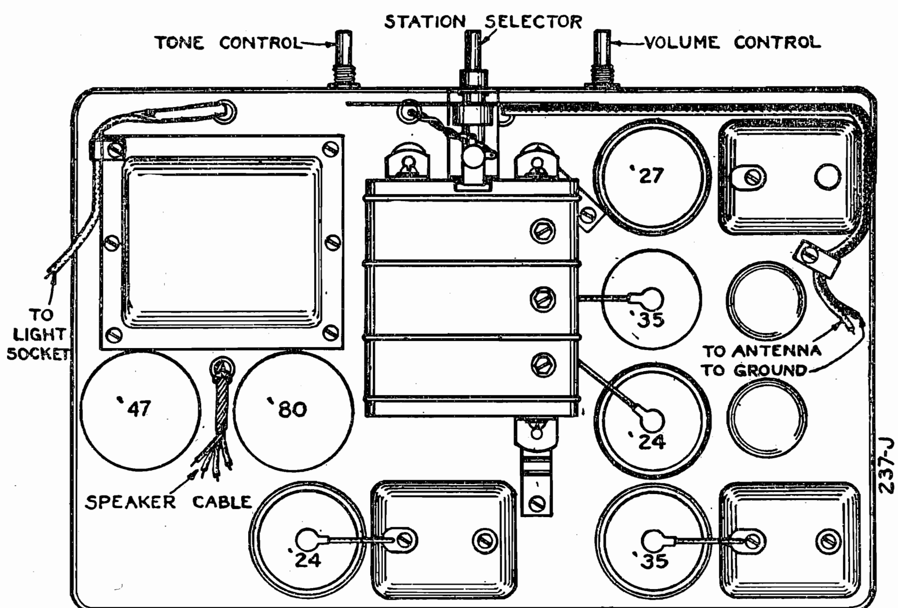
MODEL 10 Series Voltage Data

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

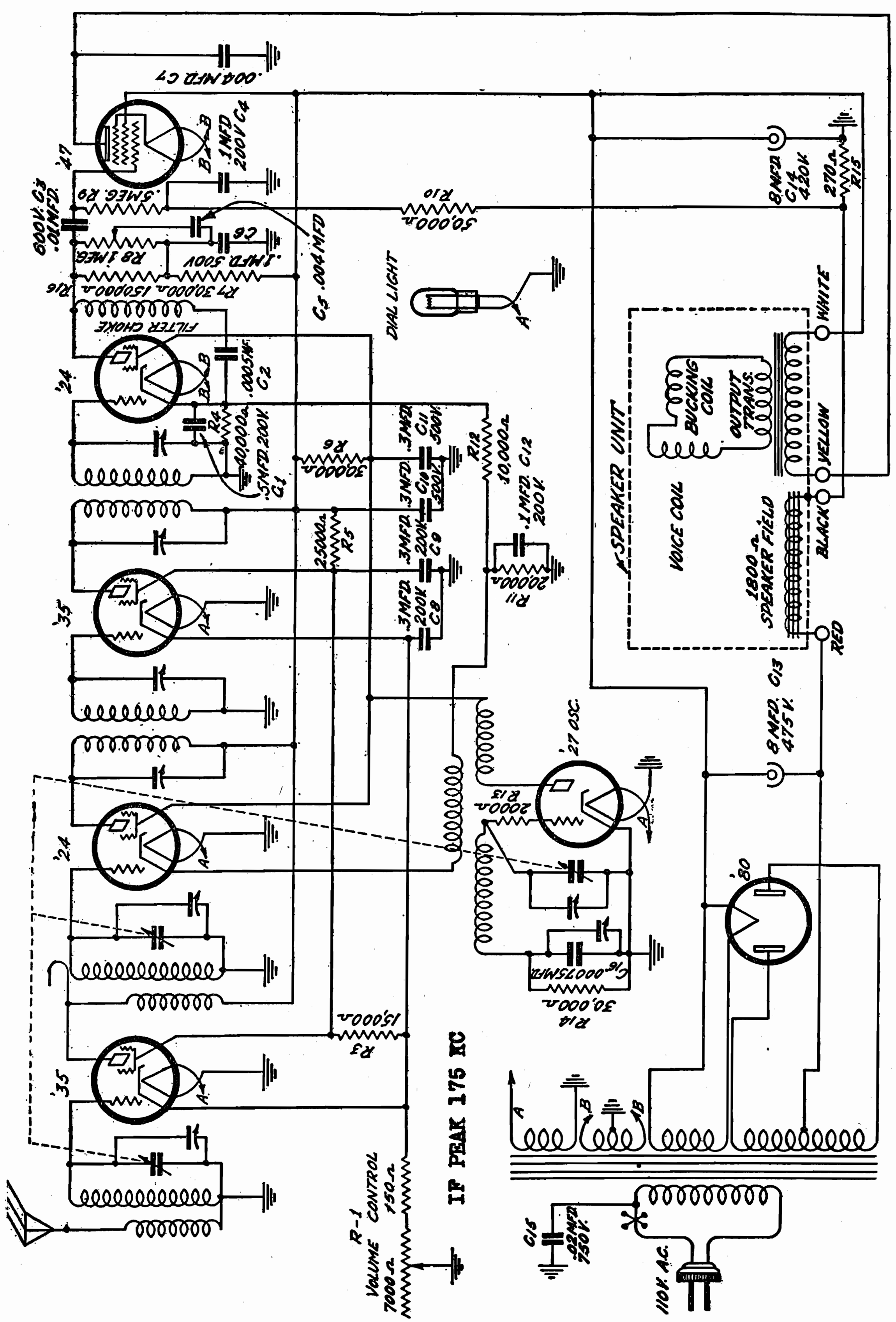
Couple the test oscillator output to the antenna, (white wire), on the receiver.

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.

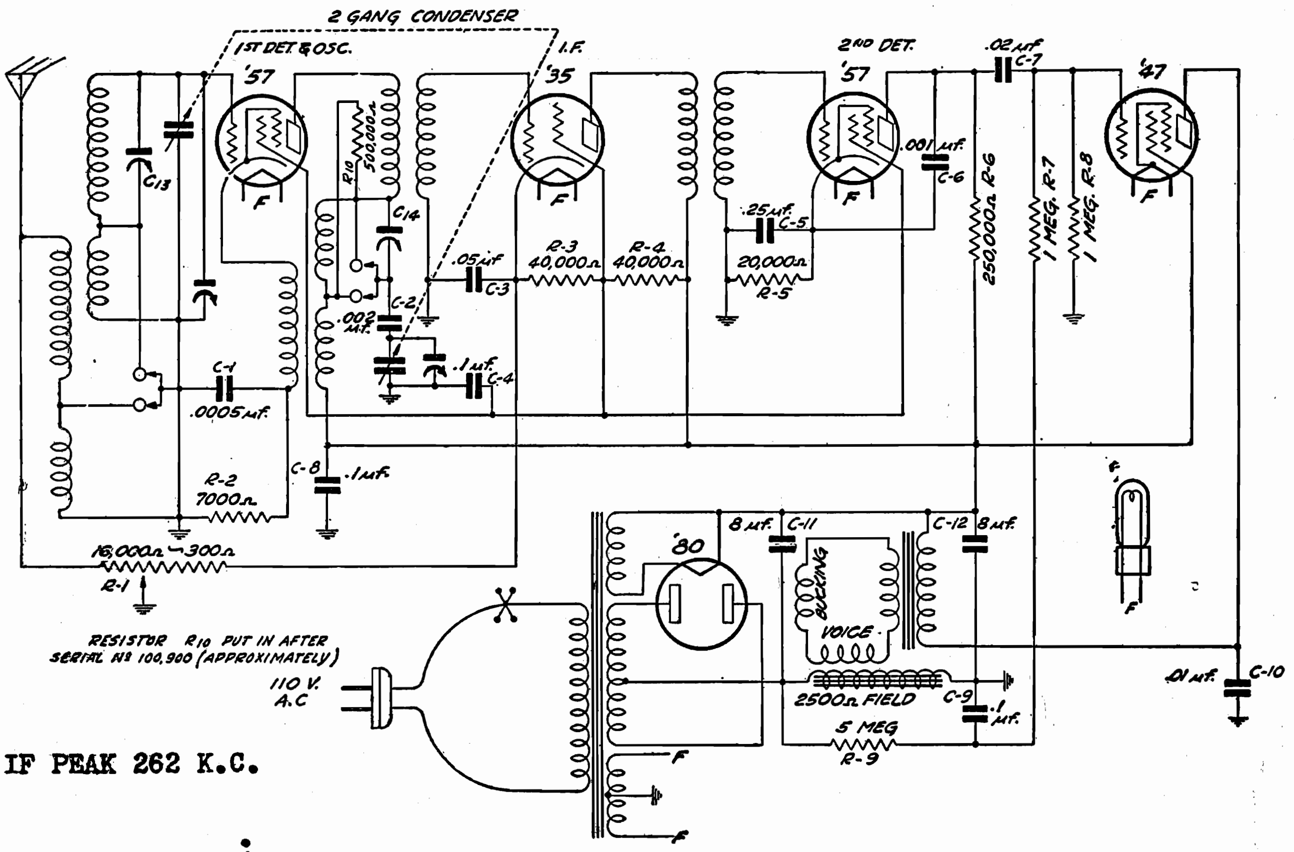
MODEL 10 Series
Schematic

GULBRANSEN CO.



MODEL 352
Schematic
Voltage

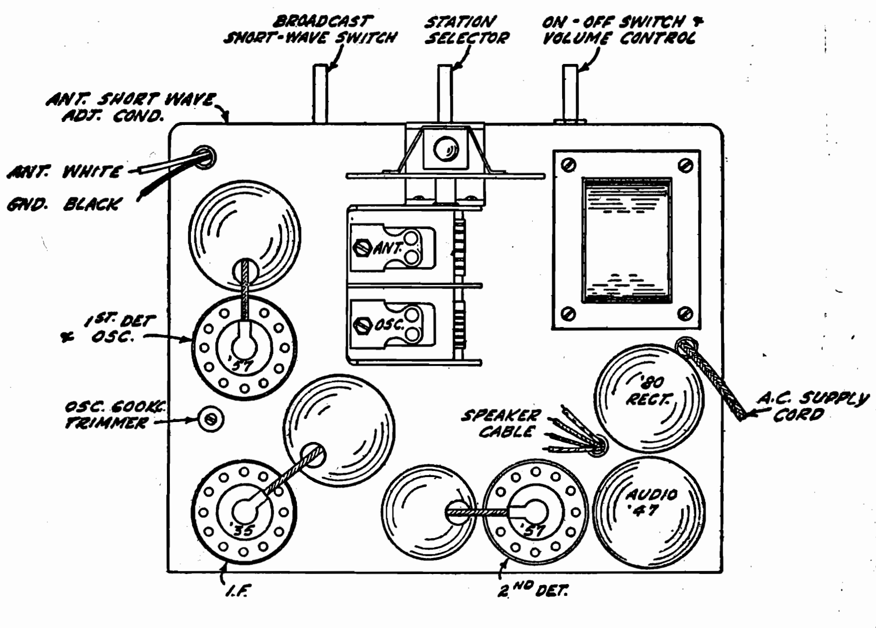
GULBRANSEN CO.



IF PEAK 262 K.C.

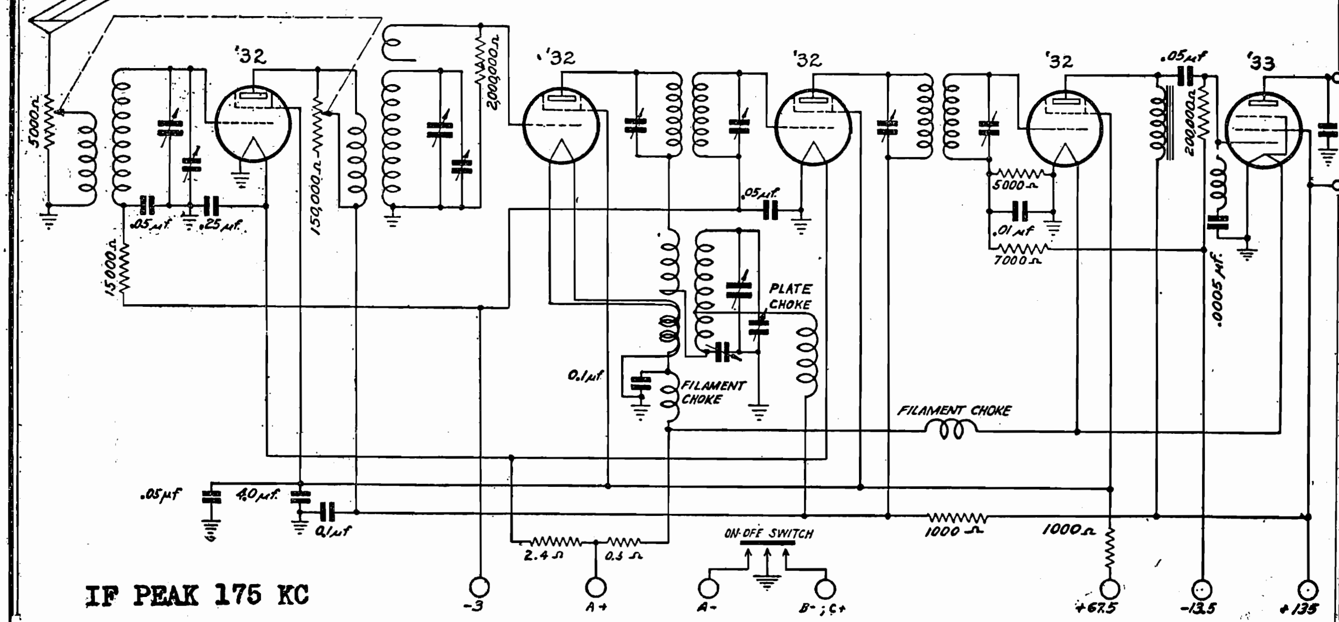
Tube	Fil.	Plate to Cathode	Screen to Cathode	Grid to Cathode	Plate Crnt.
1st Det	2.15	225	90	4.	.5
IF Amp	2.15	230	90	3.2*	6.2
2nd Det	2.15	170	90	4.3	.2
Audio	2.15	225	240	14.**	23.
Rect.	4.75	620 volts AC from plate to plate			

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

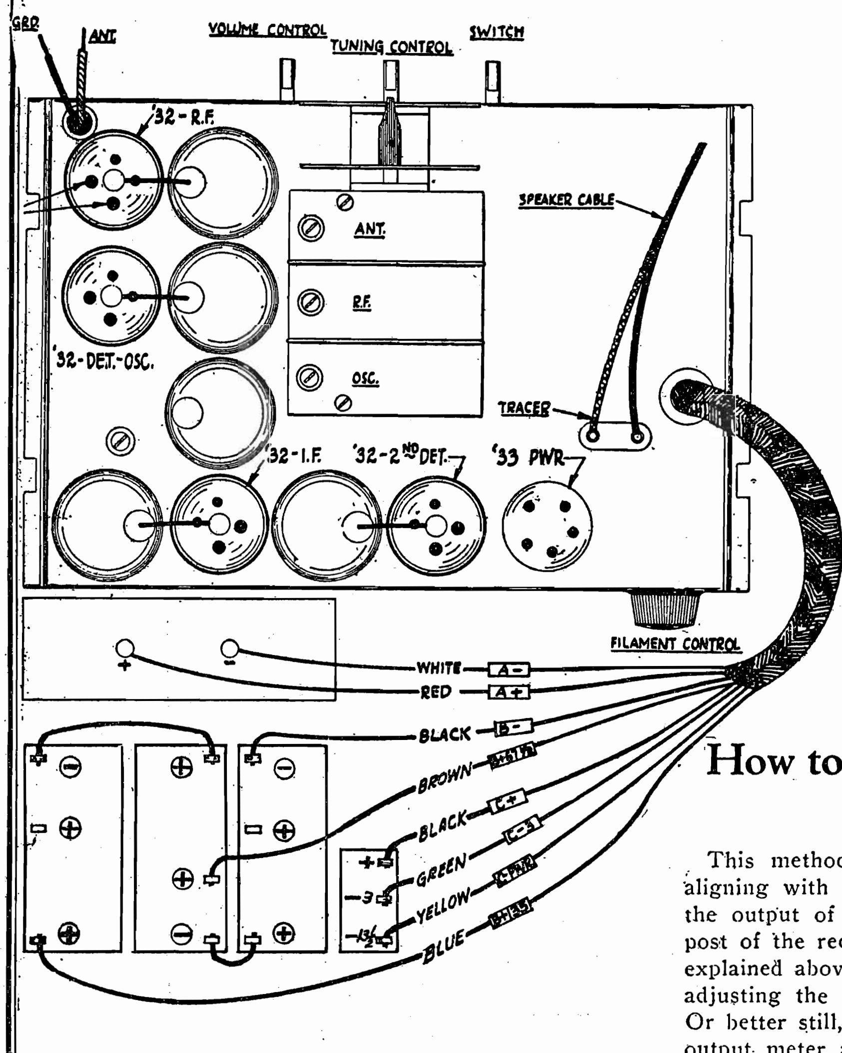


MODEL 92, 93
Schematic
Data

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
P-1280	Escutcheon	.40
P-1415	Pilot Light Socket	.15
P-20528	Tube Shield	.35
P-20315	Wing Nuts for Tube Shield	.10

RESISTORS

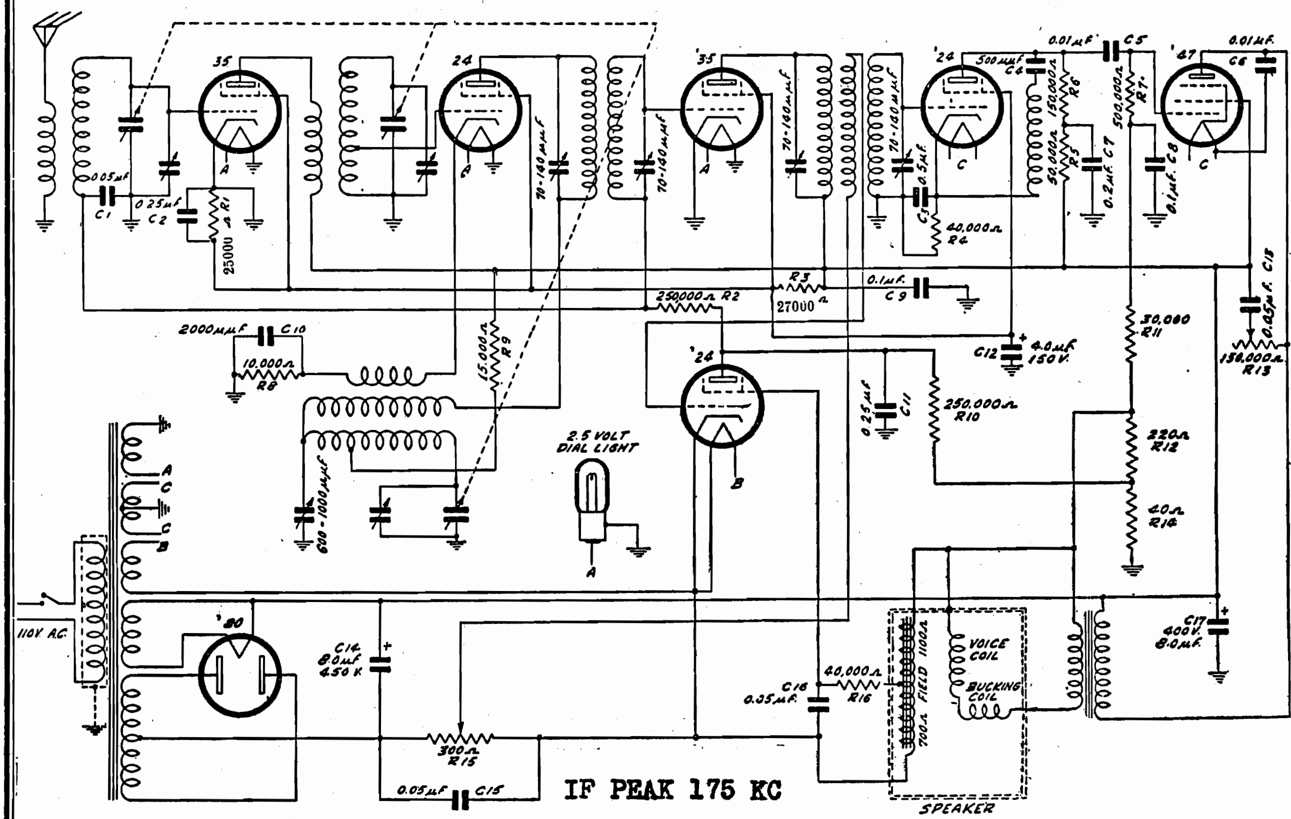
Part No.	Code	Capacity Voltage	Type	List Price
P-91019	R-1	Volume Control & 110 V. A.C.	Switch	$1.40
P-A-90979	R-2	7,000 ohm	Carbon	.25
P-B-91021	R-3	40,000 ohm	Carbon	.25
P-B-91021	R-4	40,000 ohm	Carbon	.25
P-A-90959	R-5	20,000 ohm	Carbon	.20
P-A-90954	R-6	250,000 ohm	Carbon	.20
P-A-90948	R-7	1,000,000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

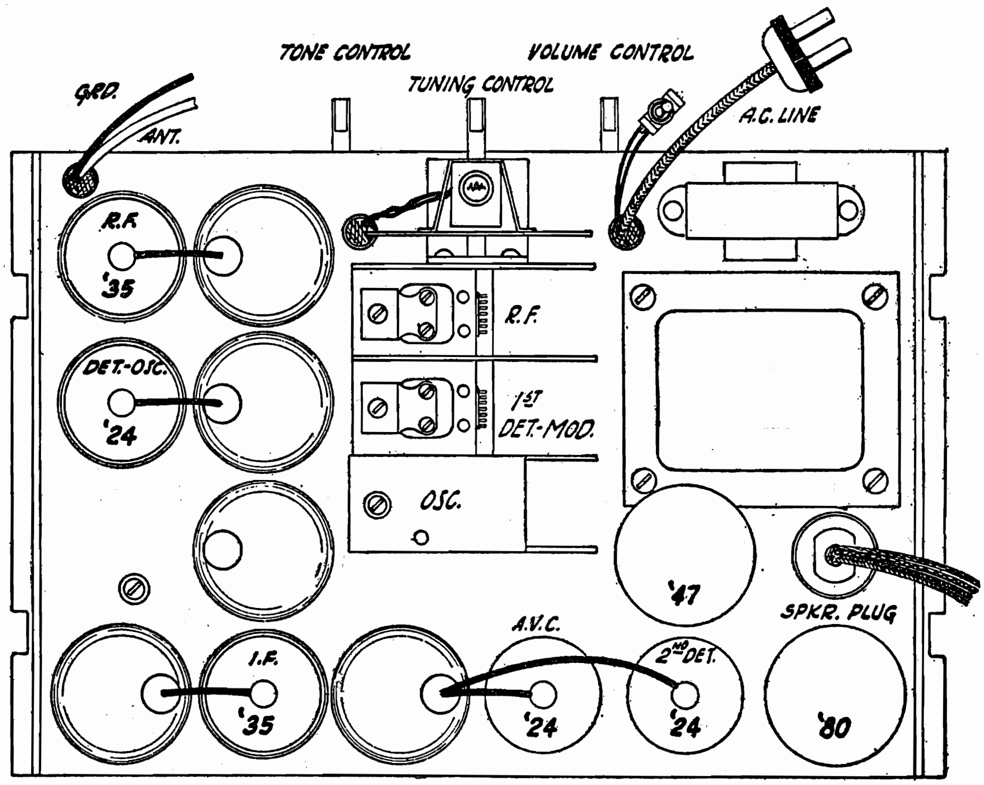
CONDENSERS

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 / C-12	8.0 mfd., 450 V. / 8.0 mfd., 450 V.	Electrolytic Block	2.85
		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		3.03

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 Candohm 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.	Screen-Grid	70	78	85	92
'35	Plate	192	213	234	256
Det.-Modulator	Screen-Grid	70	78	85	92
'24	Plate	192	213	234	256
I. F	Screen-Grid	70	78	85	92
'35	Plate	192	213	234	256
2nd Detector	Screen-Grid	70	78	85	92
'24	Plate	154	171	187	204
Audio	Accelerating Grid	199	221	244	267
'47	Plate	181	200	220	240
A. V. C.	Grid	12.3	13.7	15.1	16.5
'24	Screen-Grid	34.5	38.5	42	46
Rectifier	Plate to Plate	308	342	376	410
'80	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

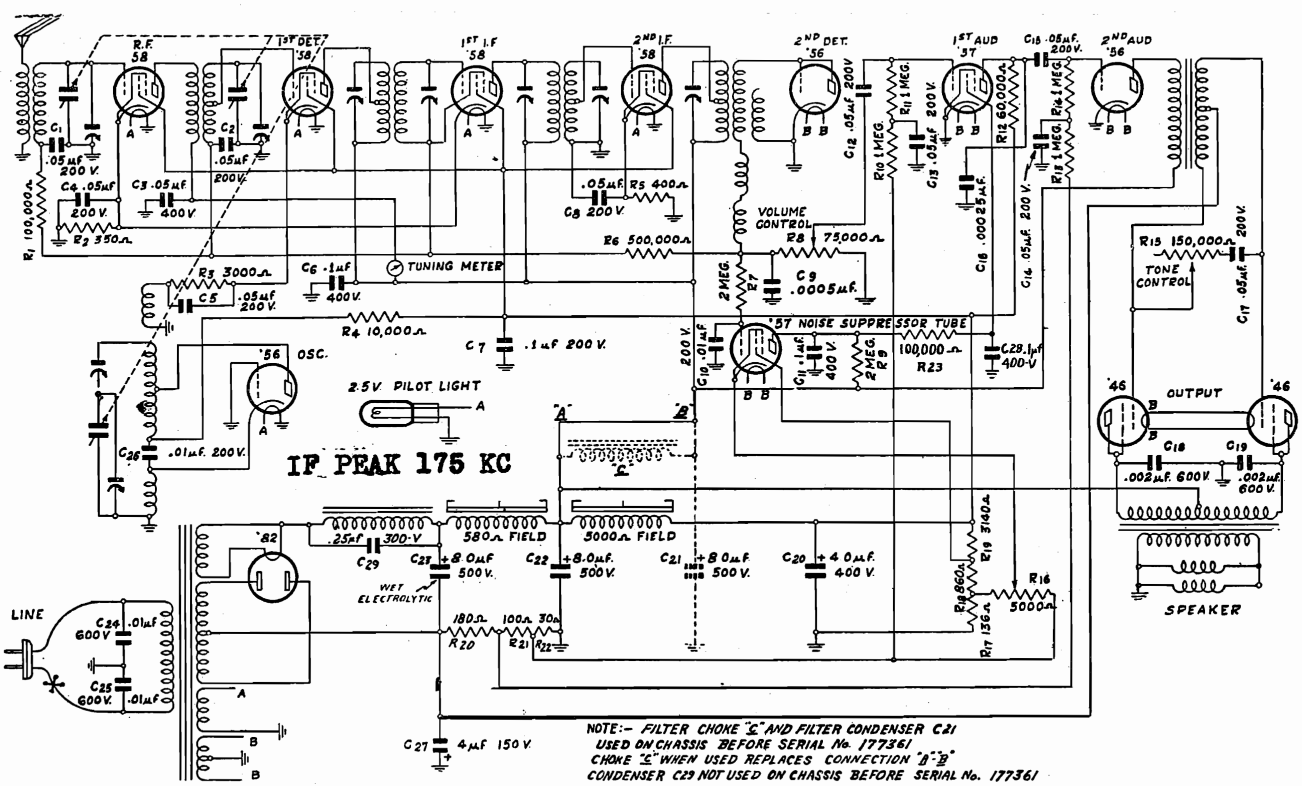
Part No.	Key No.	Resistance	Type	Price
P-90954-B	R-2	250,000 ohm	Carbon	$0.20
P-90916-C	R-4	40,000 ohm	Carbon	.25
P-90941	R-5	50,000 ohm	Carbon	.20
P-90963-B	R-6	150,000 ohm	Carbon	.25
P-90938-B	R-7	500,000 ohm	Carbon	.25
P-90930-D	R-8	10,000 ohm	Carbon	.20
P-90905-C	R-9	15,000 ohm	Carbon	.25
P-90954-B	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 C-17	8.0 mfd. 8.0 mfd.	Dry Electrolytic (Dual)	450 V.	2.85
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 C-7 C-11 Choke	.5 mfd. .2 mfd. .25 mfd.	Block	160 V. White 400 V. White-red 160 V. White-green Yellow	1.60
P-1385	Osc.	600 K.C.	Tracking Condenser		.85
P-80882	Gang Condenser (no shield)				5.70

GULBRANSEN CO.

MODEL 322 Schematic Data



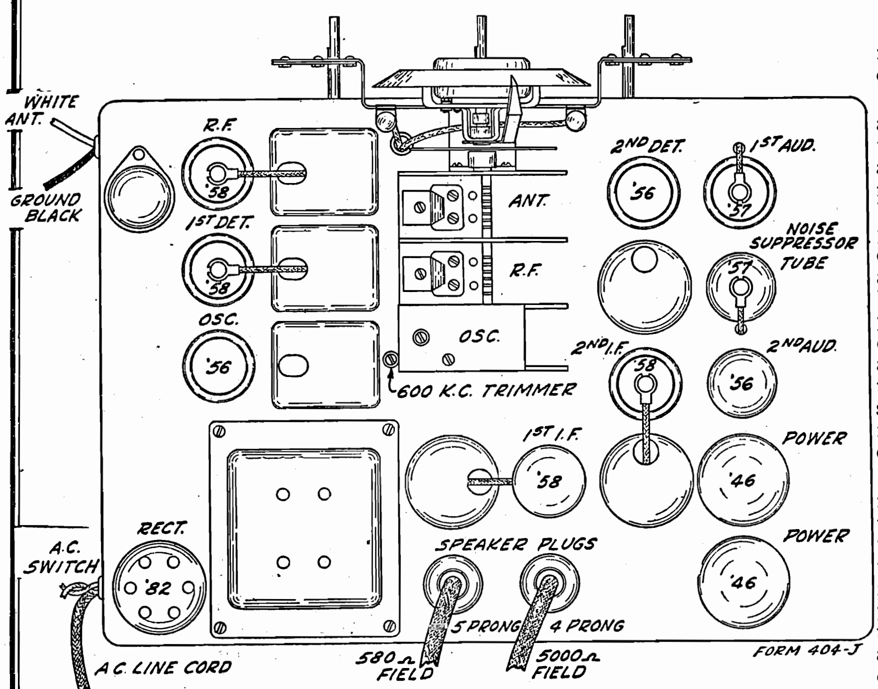


Fig. 2—Top View of Chassis

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 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

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.

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.

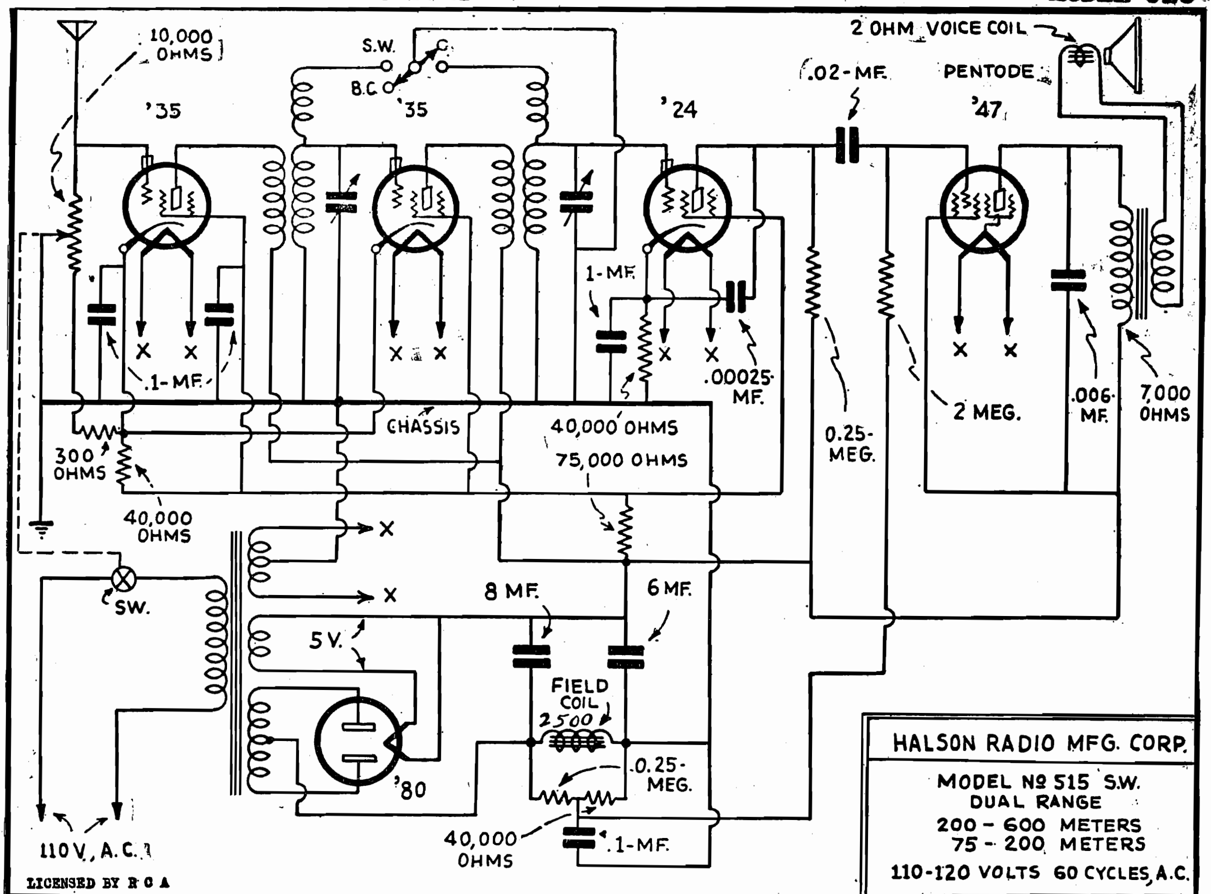
When tuning in local stations the knob may be turned well toward the left hand or "Quiet" position, as the station signals are very powerful compared with the noise signals.

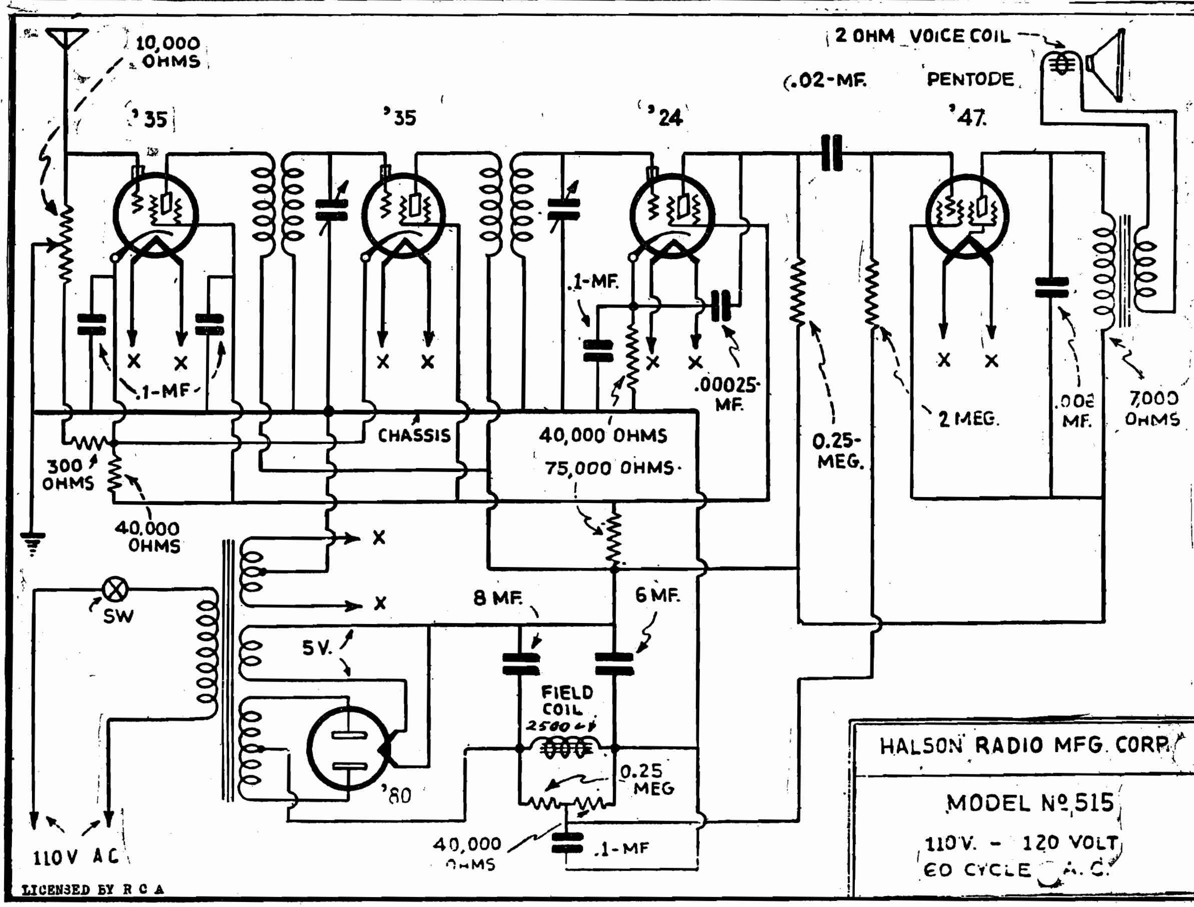
If the signal of a station is distorted, turn the noise suppressor knob to the right until the signal becomes clear.

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.

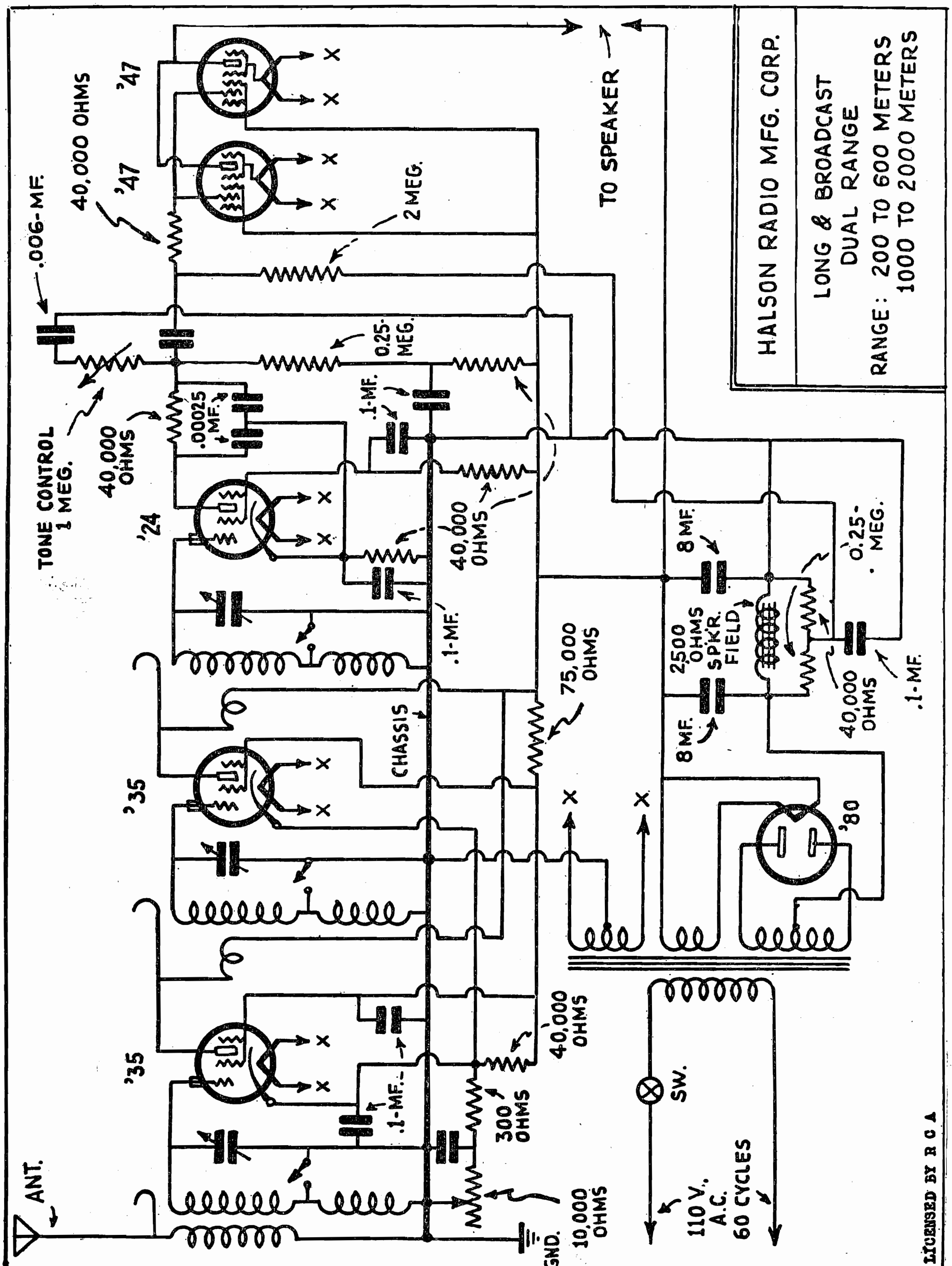
MODEL 515
MODEL 515-SW





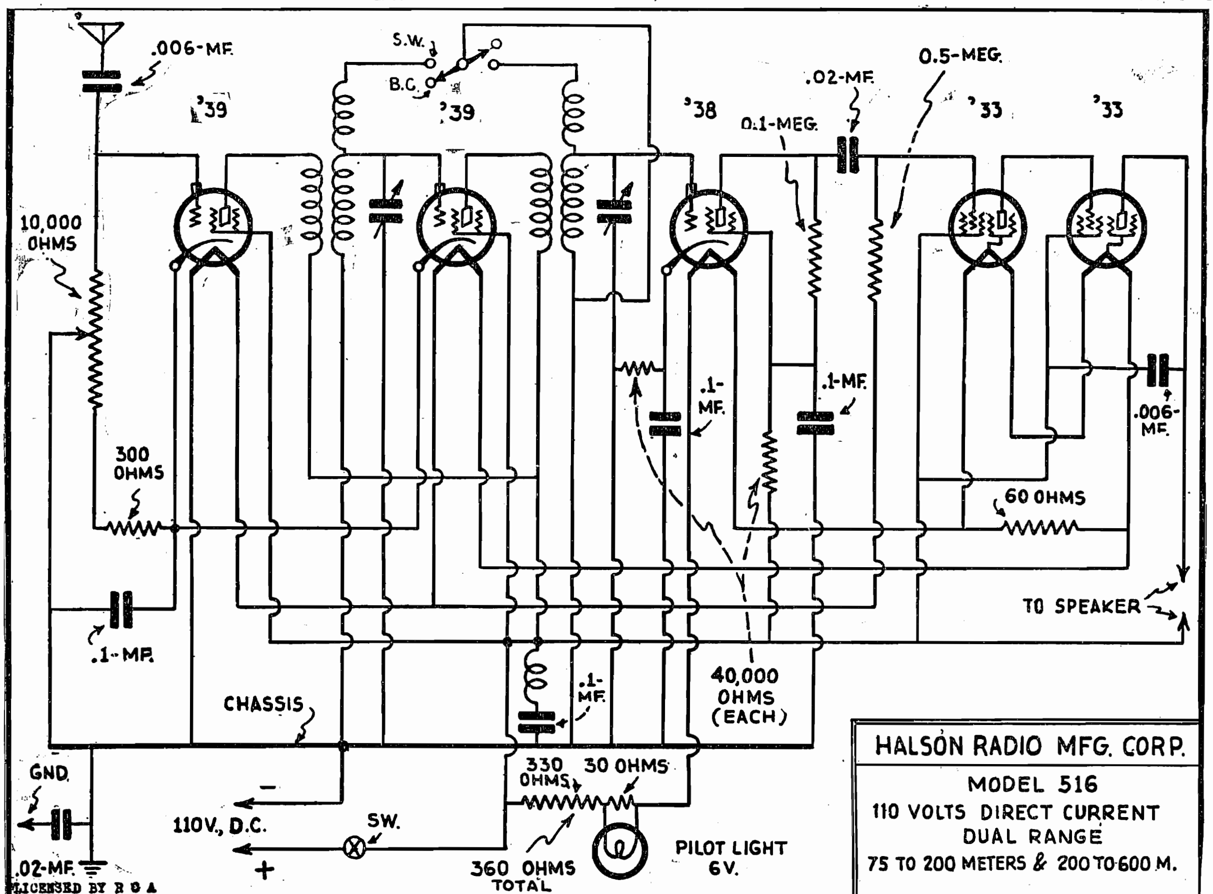
MODEL Dual Range Long-Broadcast

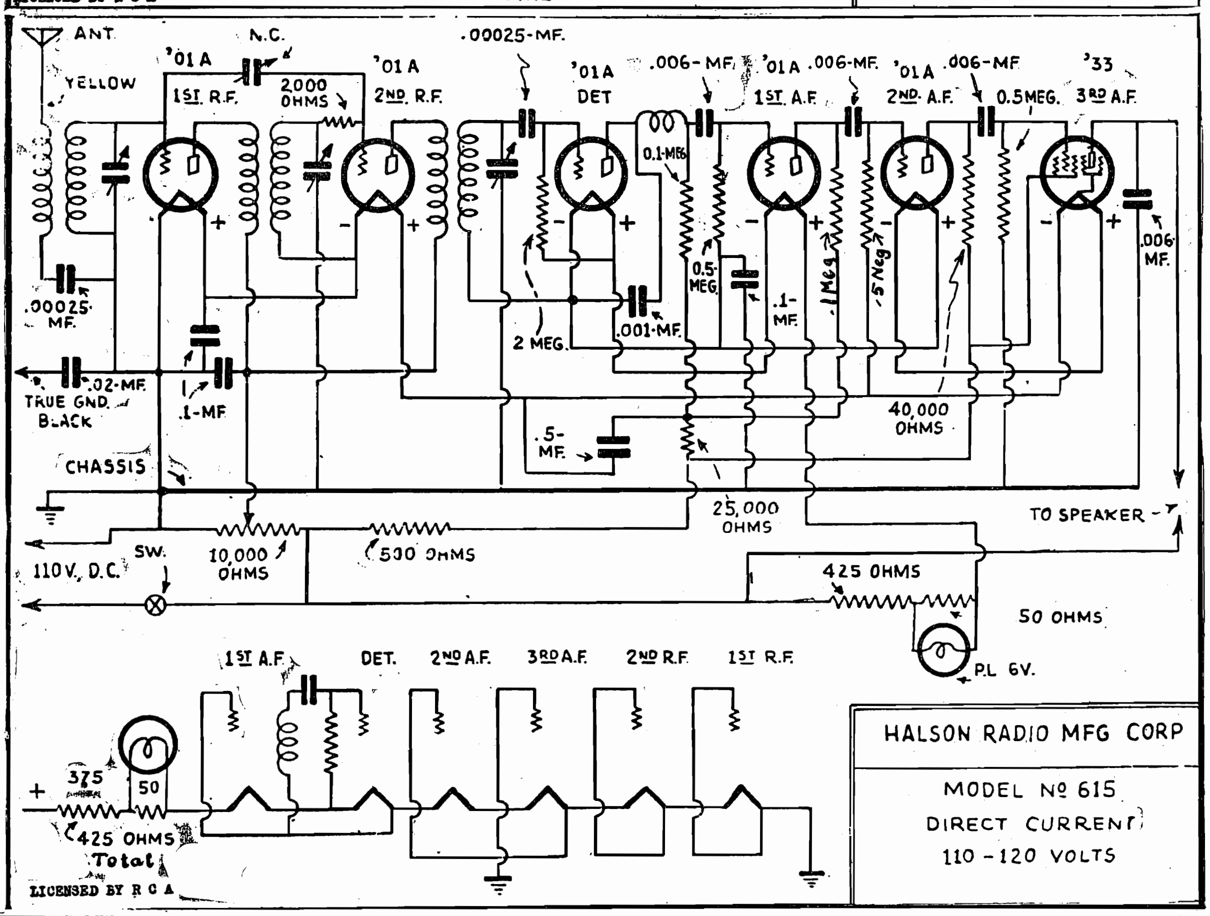
HALSON RADIO CORP.



MODEL 516
MODEL 615

HALSON RADIO CORP.

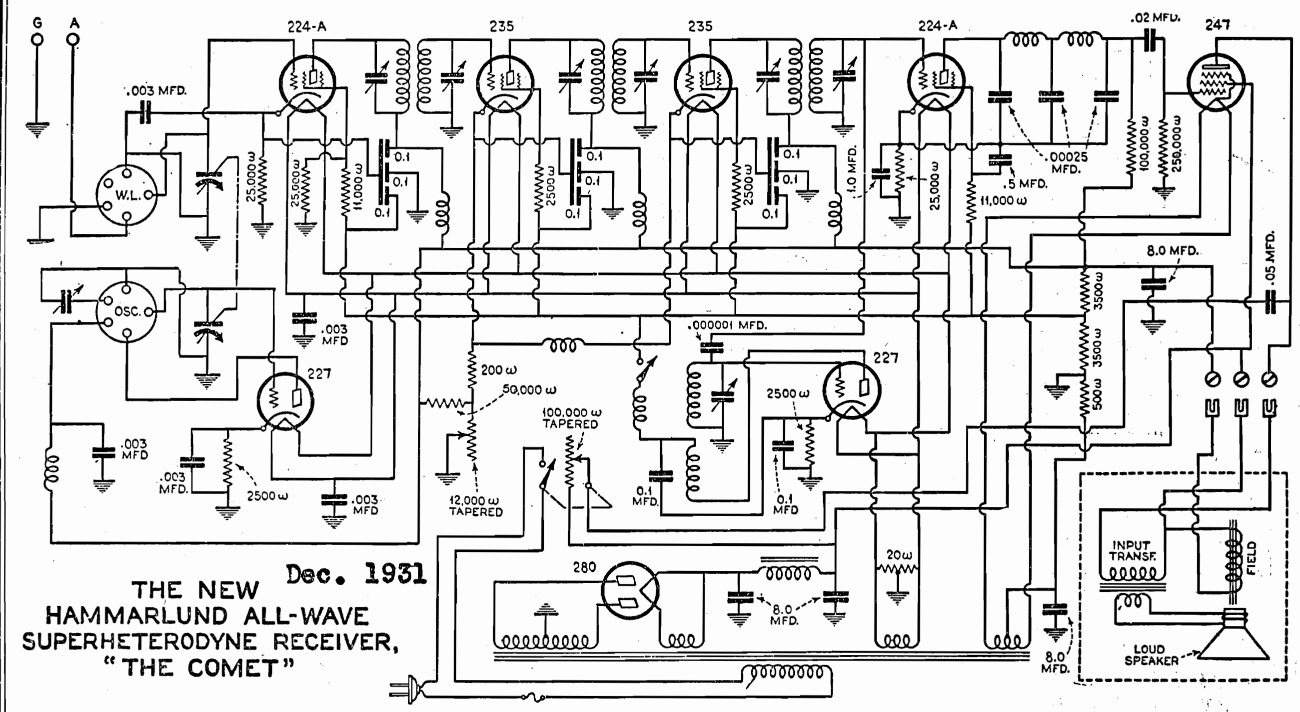




HAMMARLUND MFG. CO.

MODEL Comet Pro
December 1931
July 1932

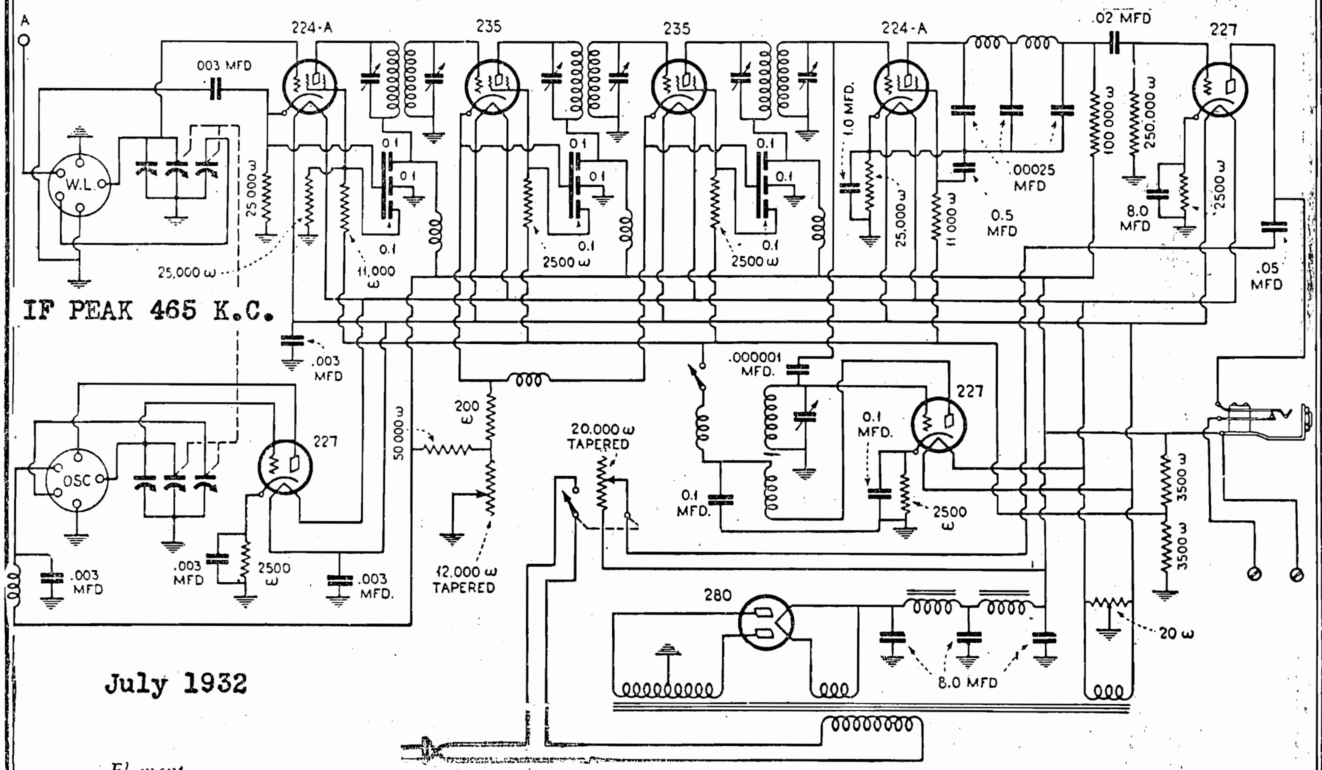
IF PEAK 465 K.C.



Dec. 1931

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

IF PEAK 465 K.C.



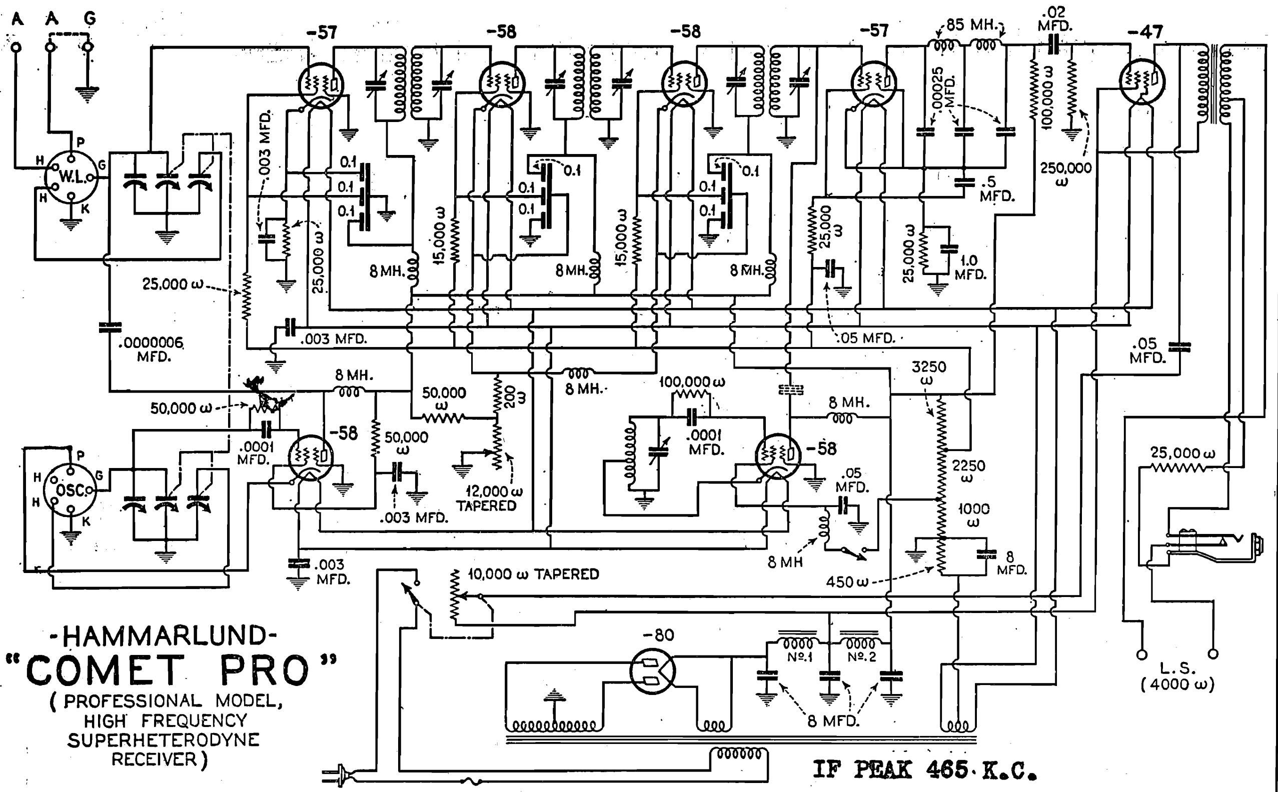
July 1932

Element

Element	Volts
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.	
P terminal of H-F. Osc., 1st and 2nd I-F., 1st Det. and 1st A-F (With phones or speaker connected)	110
	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

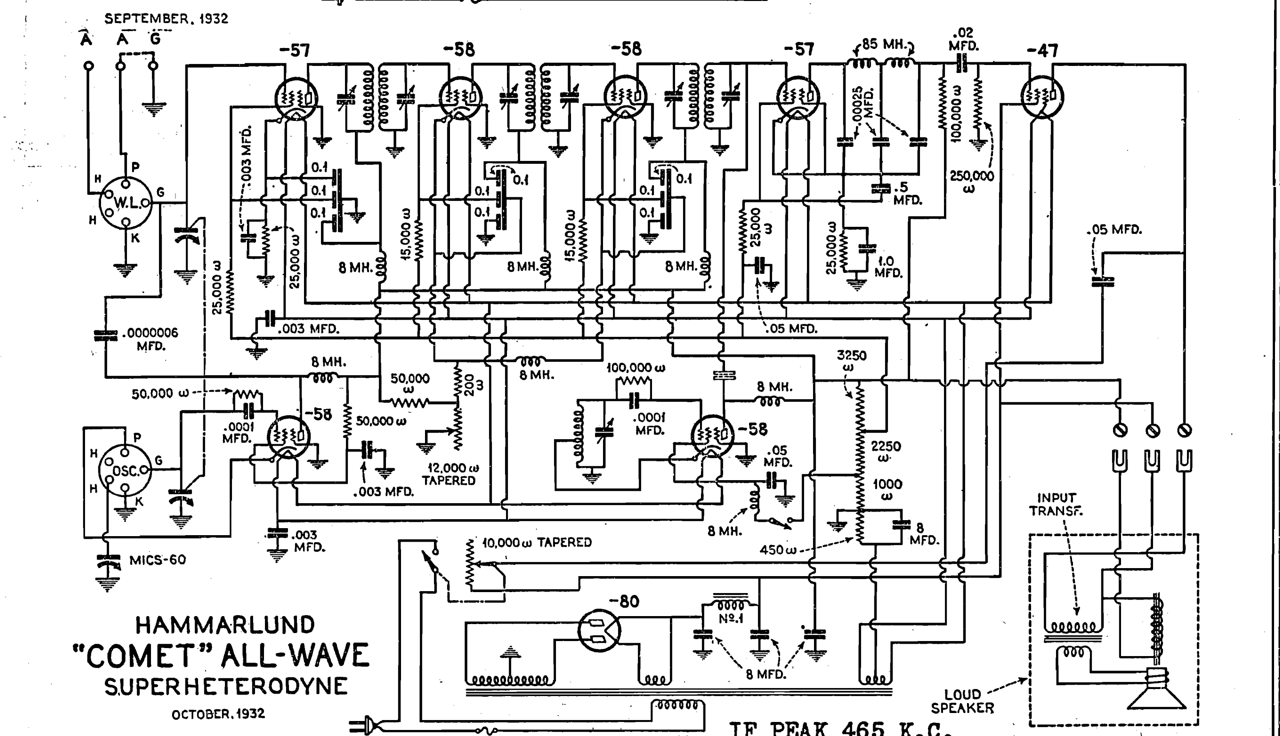
HAMMARLUND MFG. CO.



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

IF PEAK 465 K.C.

SEPTEMBER, 1932



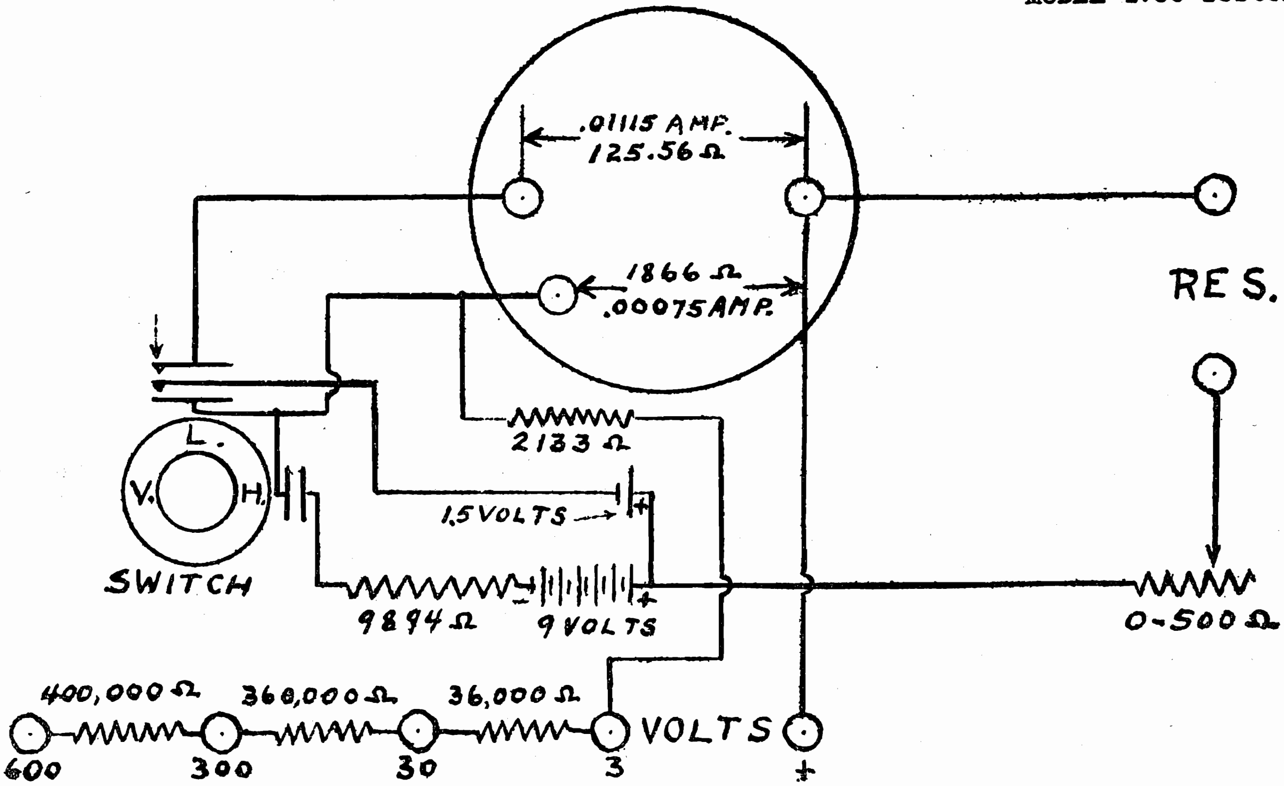
HAMMARLUND
"COMET" ALL-WAVE
SUPERHETERODYNE
OCTOBER, 1932

IF PEAK 465 K.C.

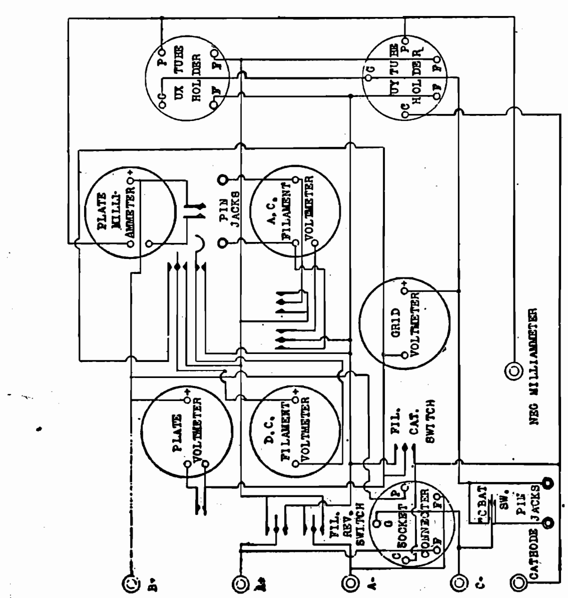
	Volts (Approximate)
Top terminal of voltage divider	200 "
Second terminal of voltage divider	100 "
Third terminal of voltage divider	30 "
Fourth terminal of voltage divider	0 "
Bottom terminal of voltage divider	20 "
K terminal of first detector	5 "
K terminal of first and second I.F. (Max.)	35 "
(Varies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

HICKOK ELECT. INSTRUMENT CO.

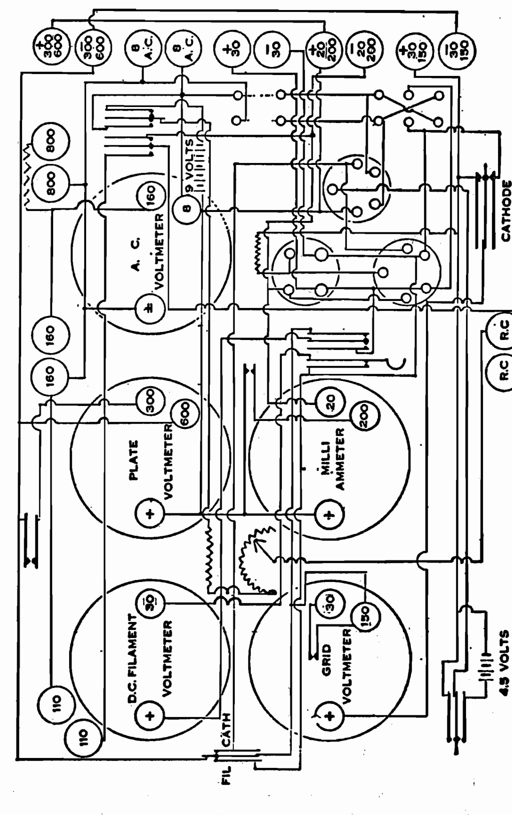
MODEL 48 Volt-Ohm Meter
MODEL 4600 Tester
MODEL 4700 Tester



Model 48 Volt-Ohm Meter



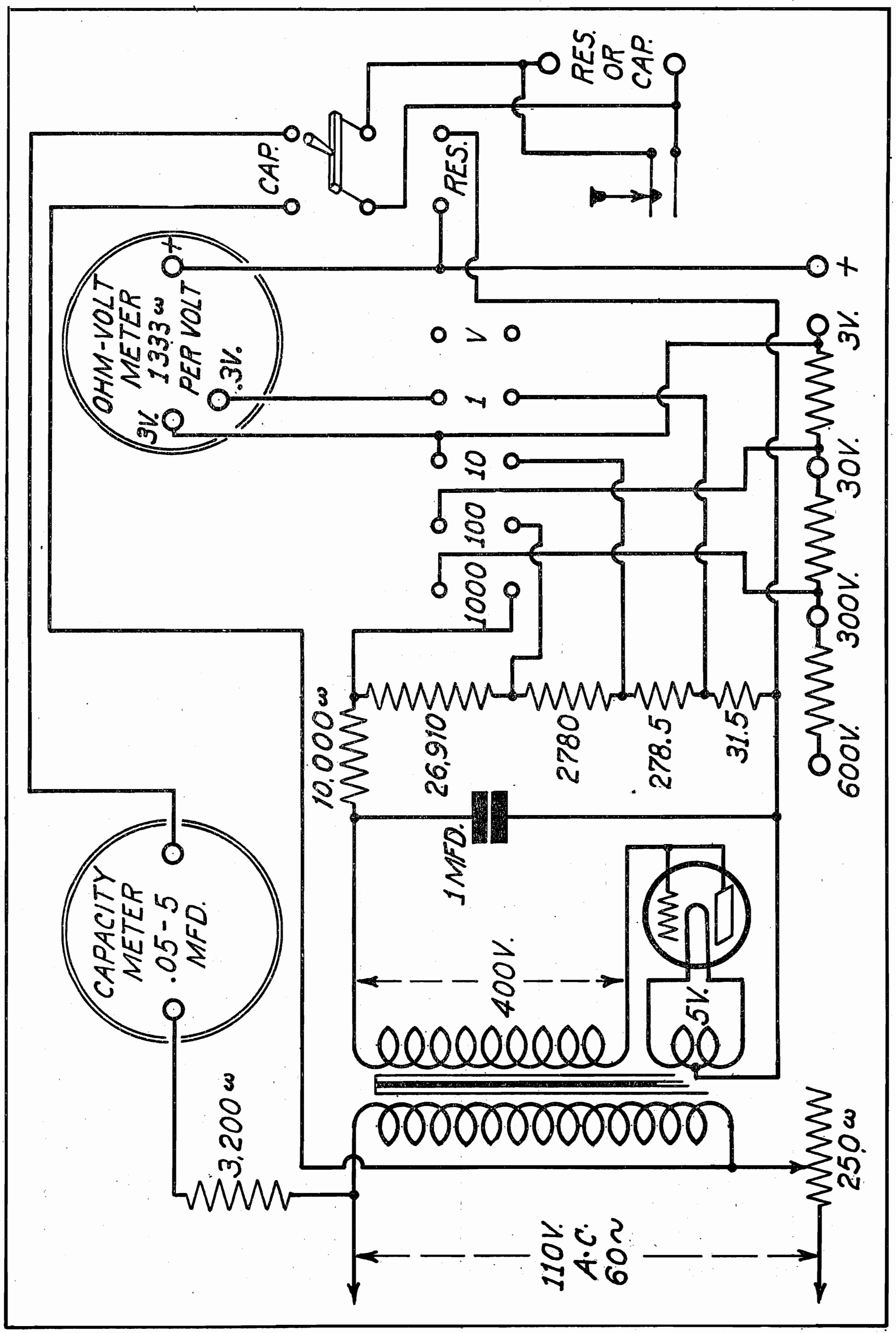
Model 4600 Tester



Model 4700 Tester

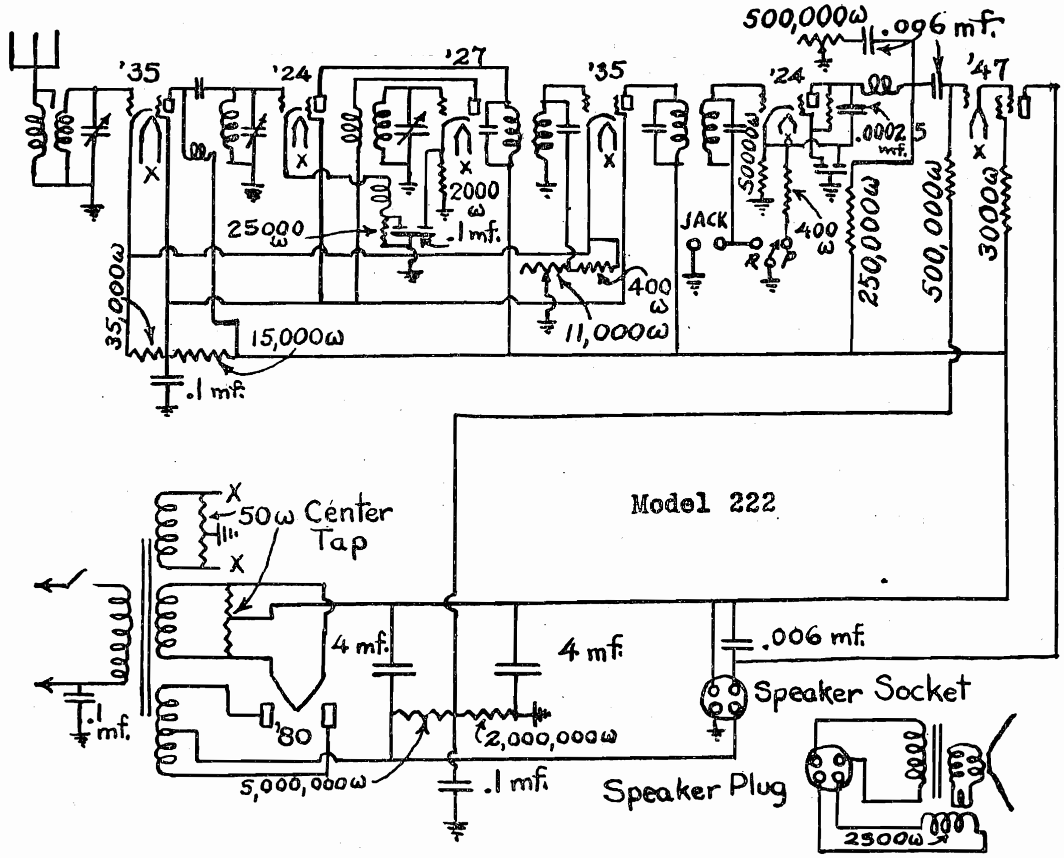
MODEL 4949
Volt-Ohm
Capacity Meter

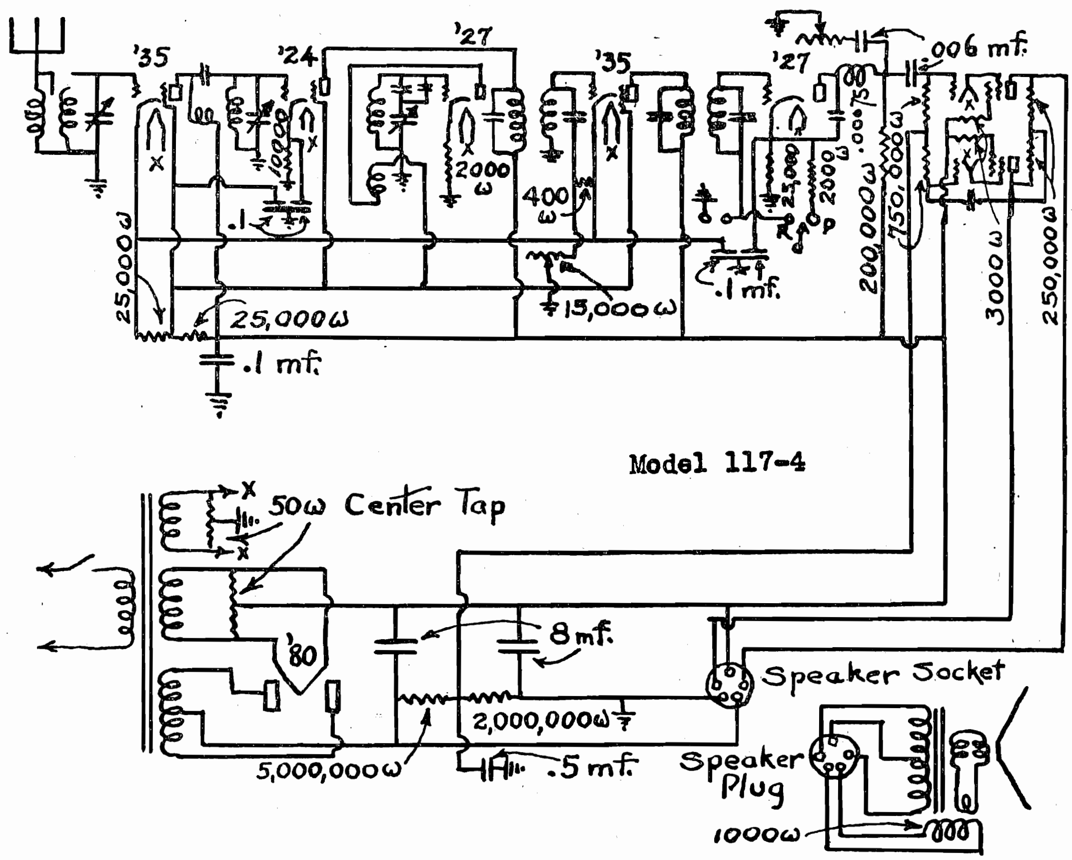
HICKOK ELECT. INSTRUMENT CO.



HIGH FREQUENCY LABORATORIES

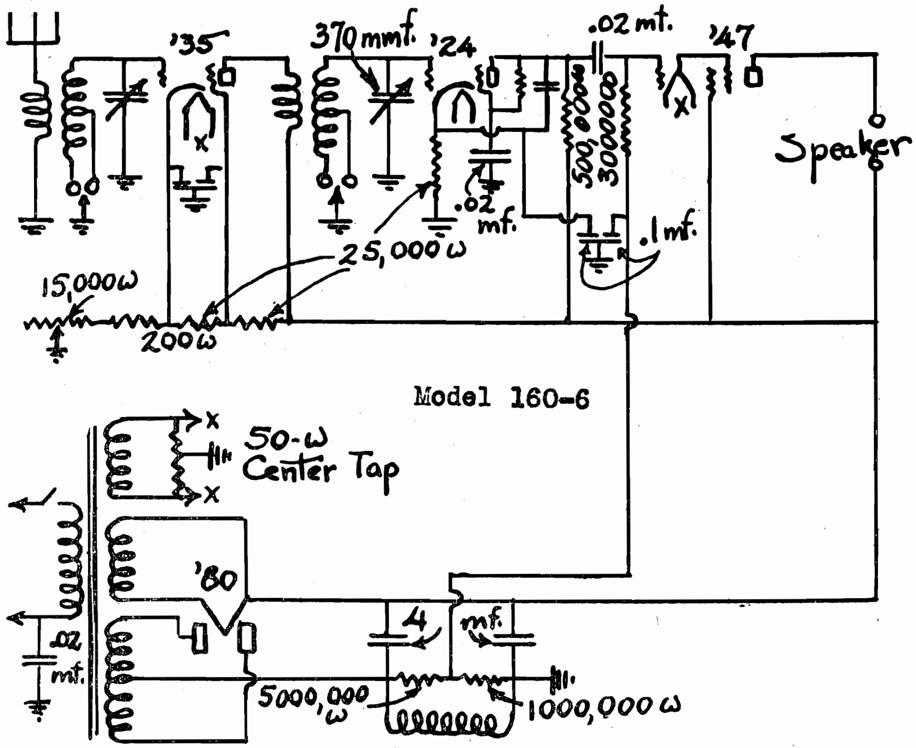
MODEL 222
MODEL 117-4



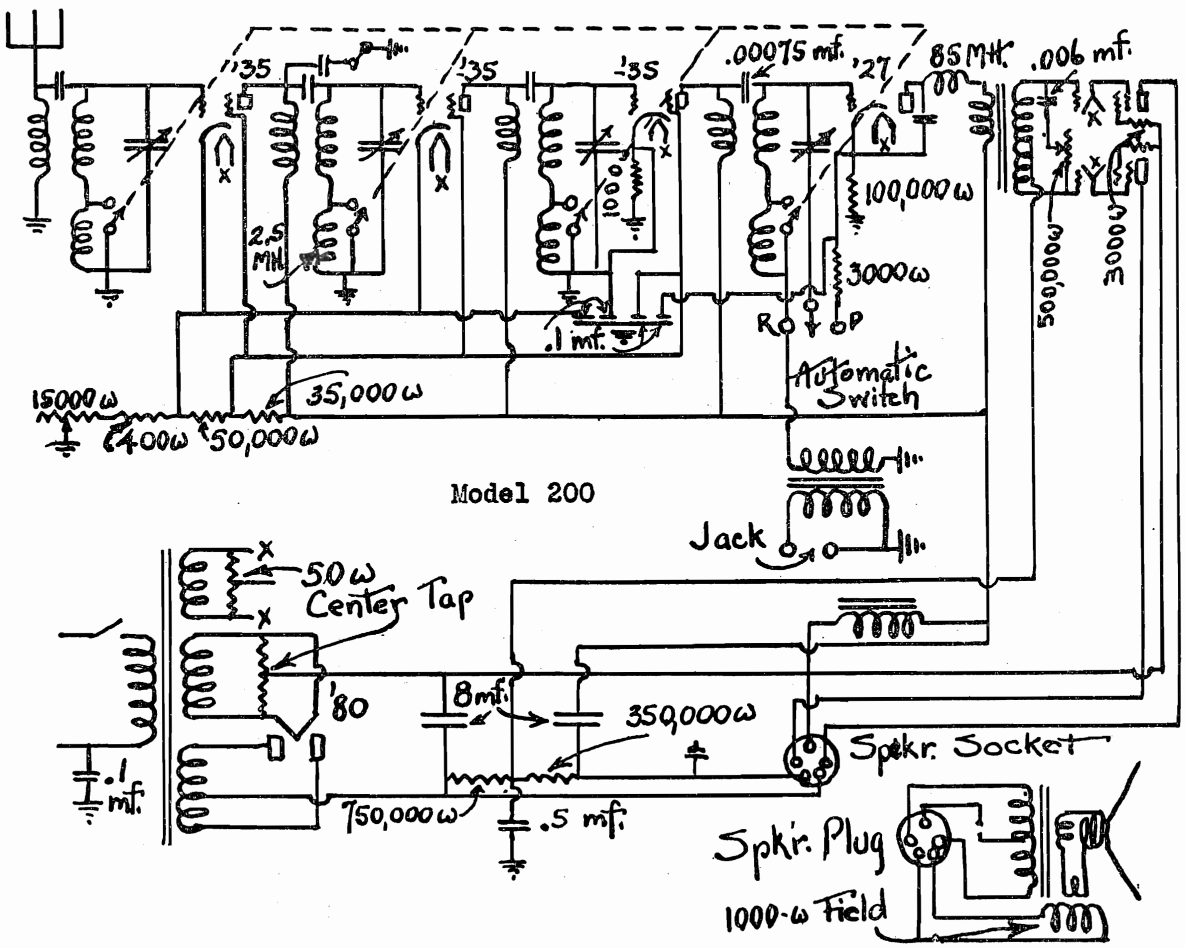


MODEL 160-6
MODEL 200

HIGH FREQUENCY LABORATORIES



Model 160-6

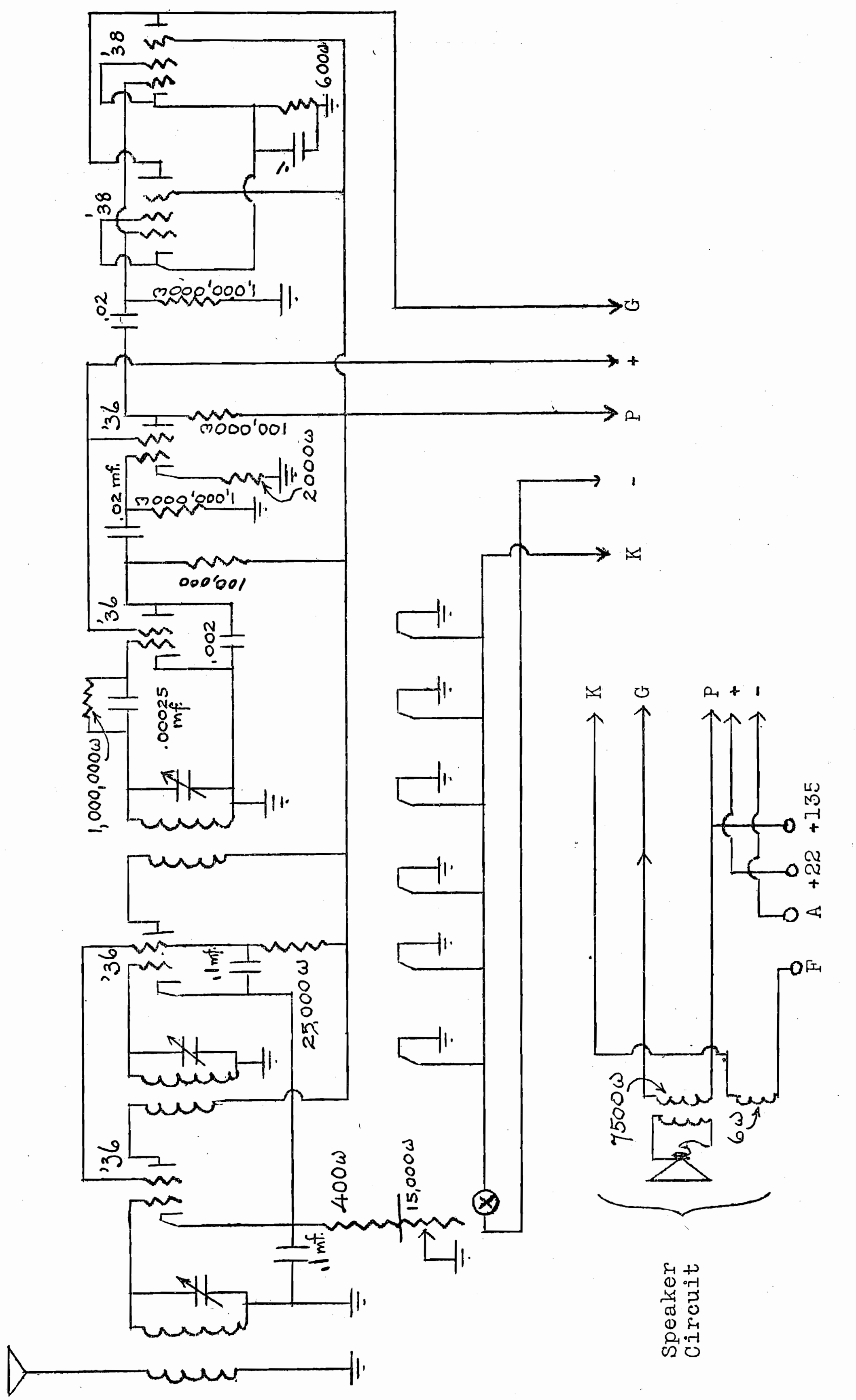


Model 200

CHARLES HOODWIN CO. MODEL A Aero Pentode Auto

AERO PENTODE AUTO RADIO MODEL A 1932

BEFORE NOVEMBER 10,1931

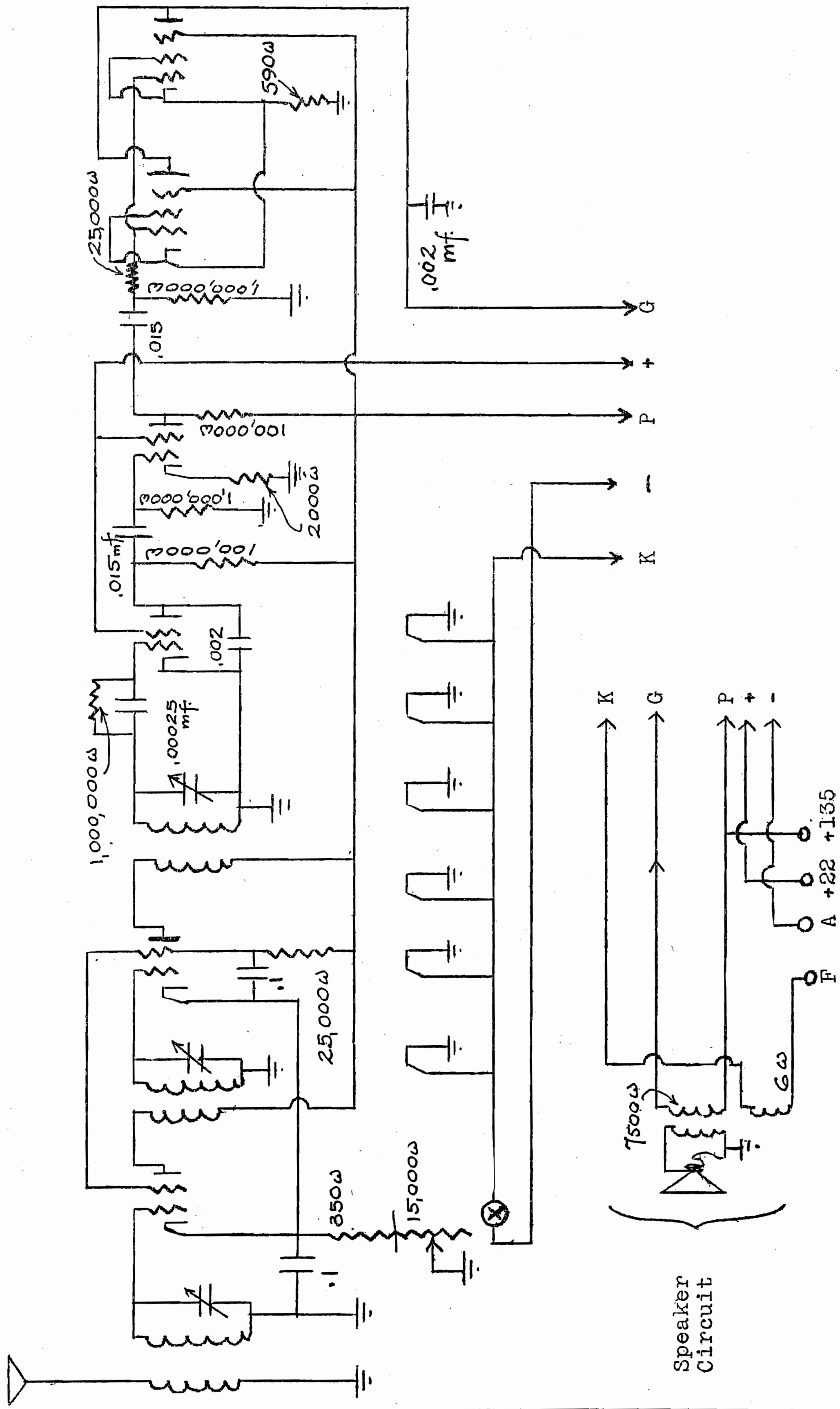


MODEL B Aero Pentode Auto

CHARLES HOODWIN CO.

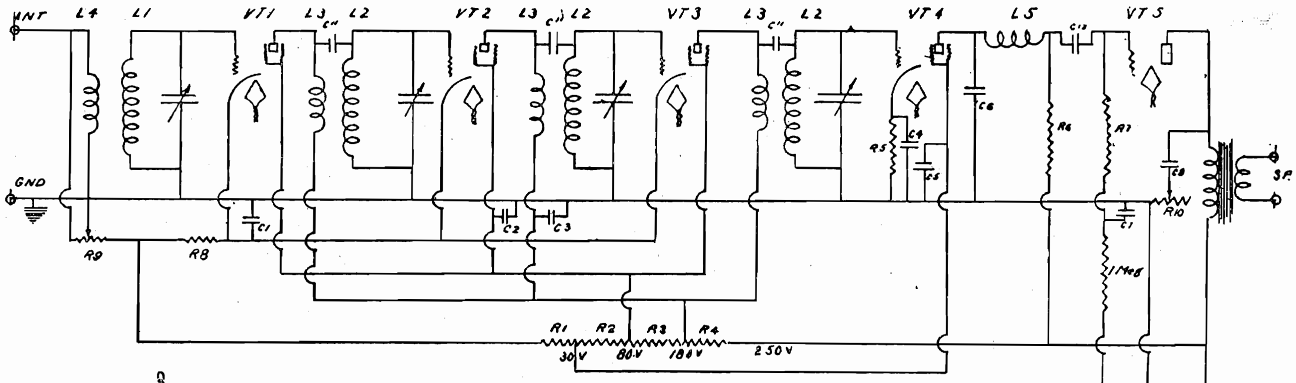
AERO PENTODE AUTO RADIO MODEL B 1932

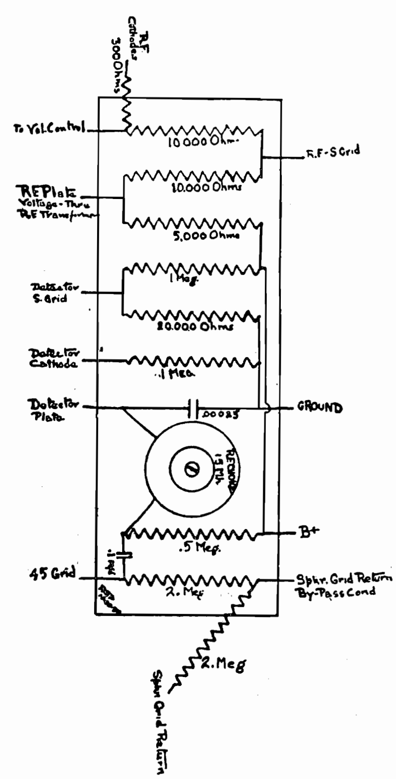
AFTER NOVEMBER 10,1931

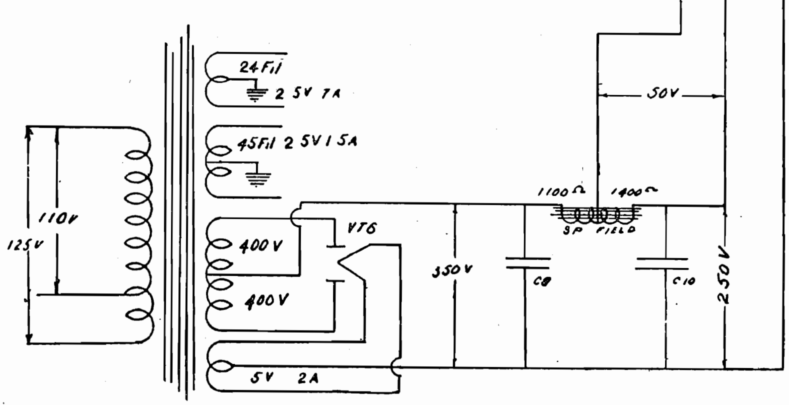


HERBERT H. HORN

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.

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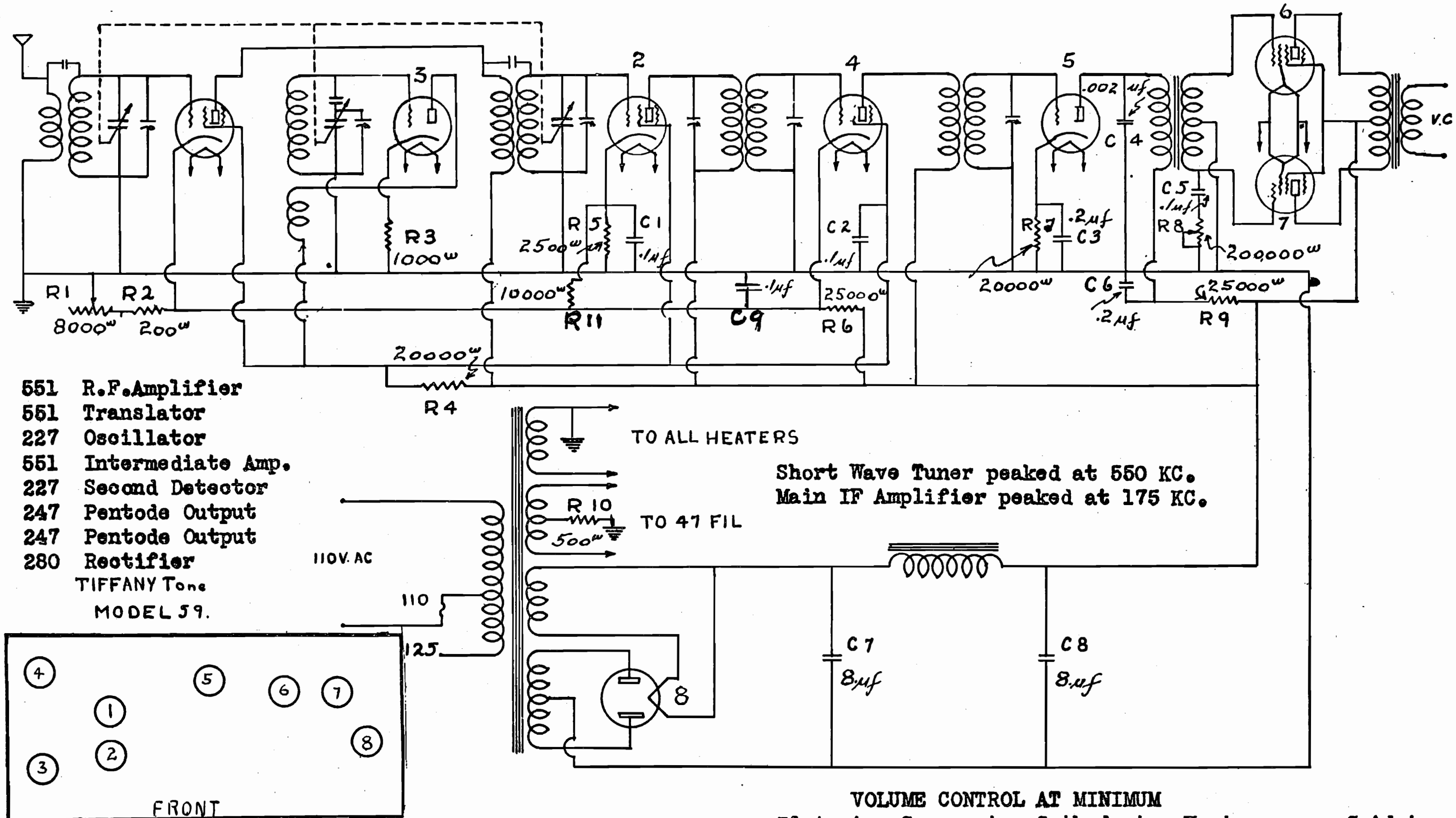
MODEL Tiffany Tone 59,69,90
Schematic
Voltage



1 551 R.F.Amplifier
2 551 Translator
3 227 Oscillator
4 551 Intermediate Amp.
5 227 Second Detector
6 247 Pentode Output
7 247 Pentode Output
8 280 Rectifier

TIFFANY Tone
MODEL 59.

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

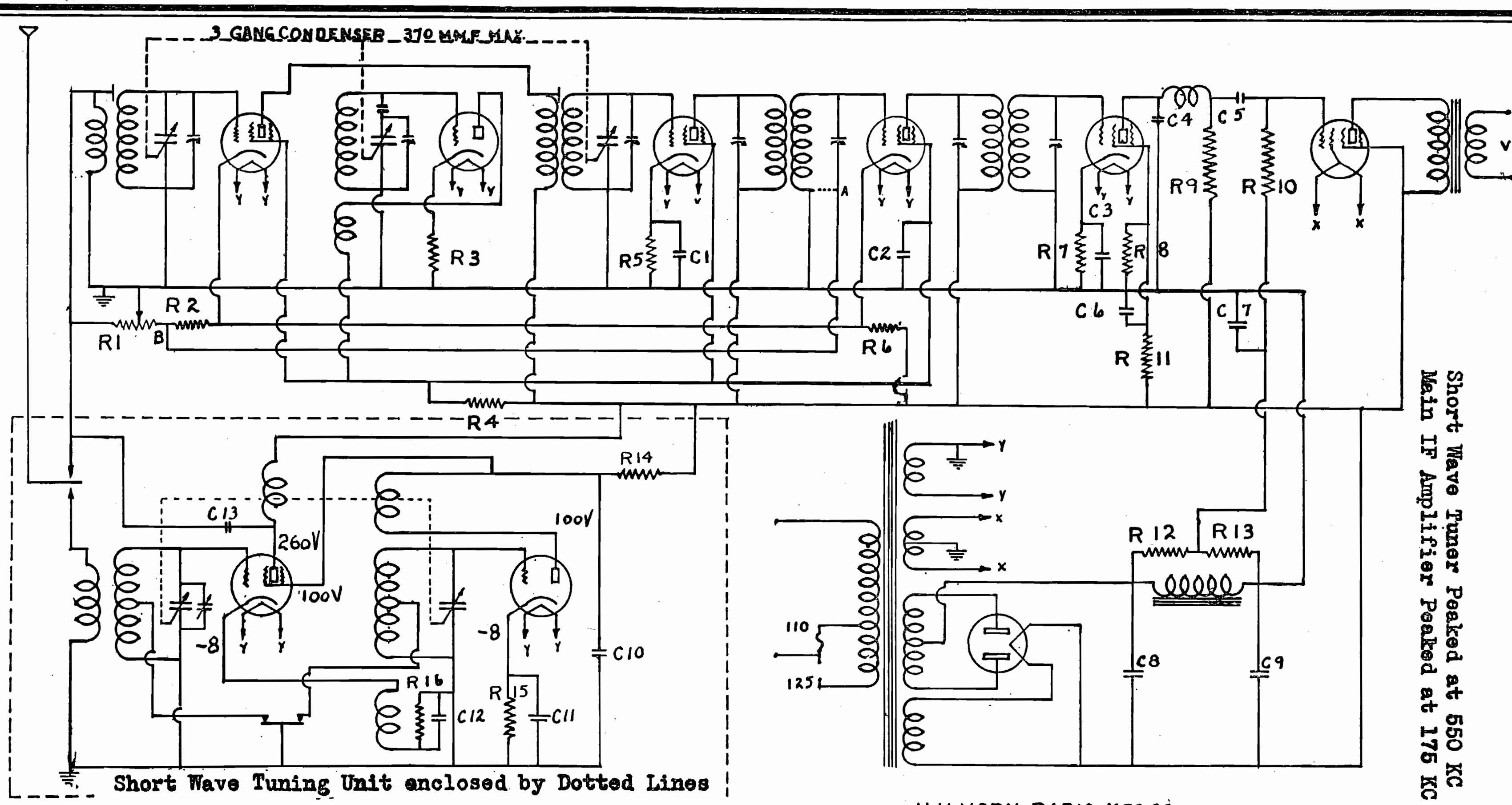
No.	Position	Plate to Ground	Screen to Ground	Cathode to Ground	Heater or Fil.Voltage	Grid to Ground
1	R.F.Amp.	240	105	*26	2.4 AC	0
2	Translator	240	105	*15	2.4 AC	0
3	Oscillator	105			2.4 AC	0
4	Int. Amp.	240	105	*26	2.4 AC	0
5	Detector	180		*22	2.4 AC	0
6-7	Power Tubes	230	240	Fil*16	2.4 AC	0
8	Rectifier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

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

MODEL Tiffany Tone 70,71
Schematic

HERBERT H. HORN

Short Wave Tuner Peaked at 550 KC
Main IF Amplifier Peaked at 175 KC



Short Wave Tuning Unit enclosed by Dotted Lines

Voltage Data on Next Page

H H HORN RADIO MFG.CO.
MODEL 71 8-15-2.

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.

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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

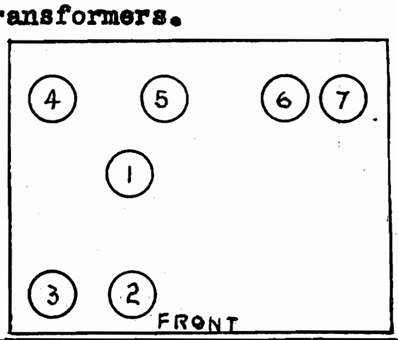
VOLUME CONTROL AT MINIMUM

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.

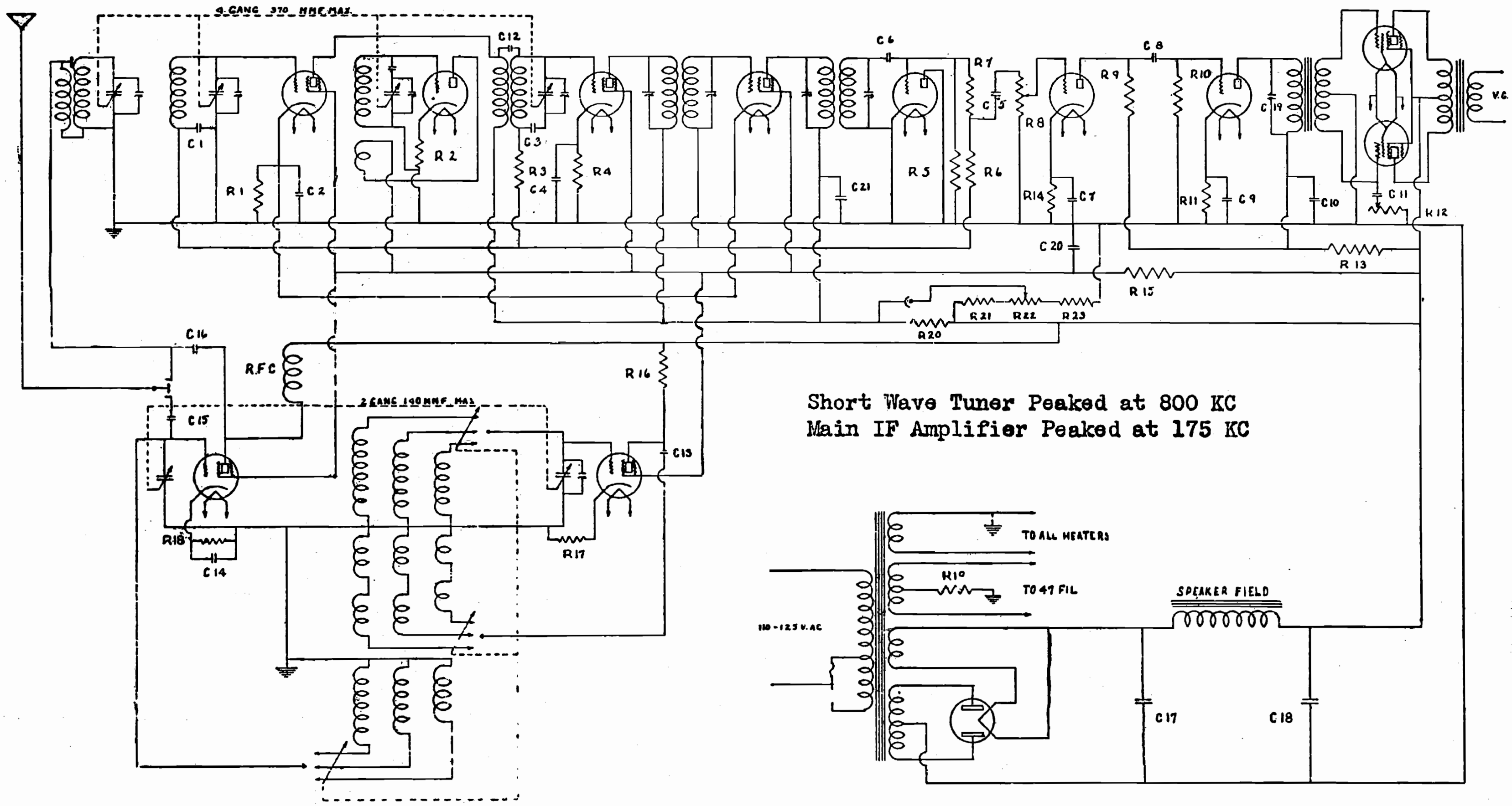
IF Trimmers are accessible from the underside of the porcelain base of both IF Transformers.



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



Short Wave Tuner Peaked at 800 KC
Main IF Amplifier Peaked at 175 KC

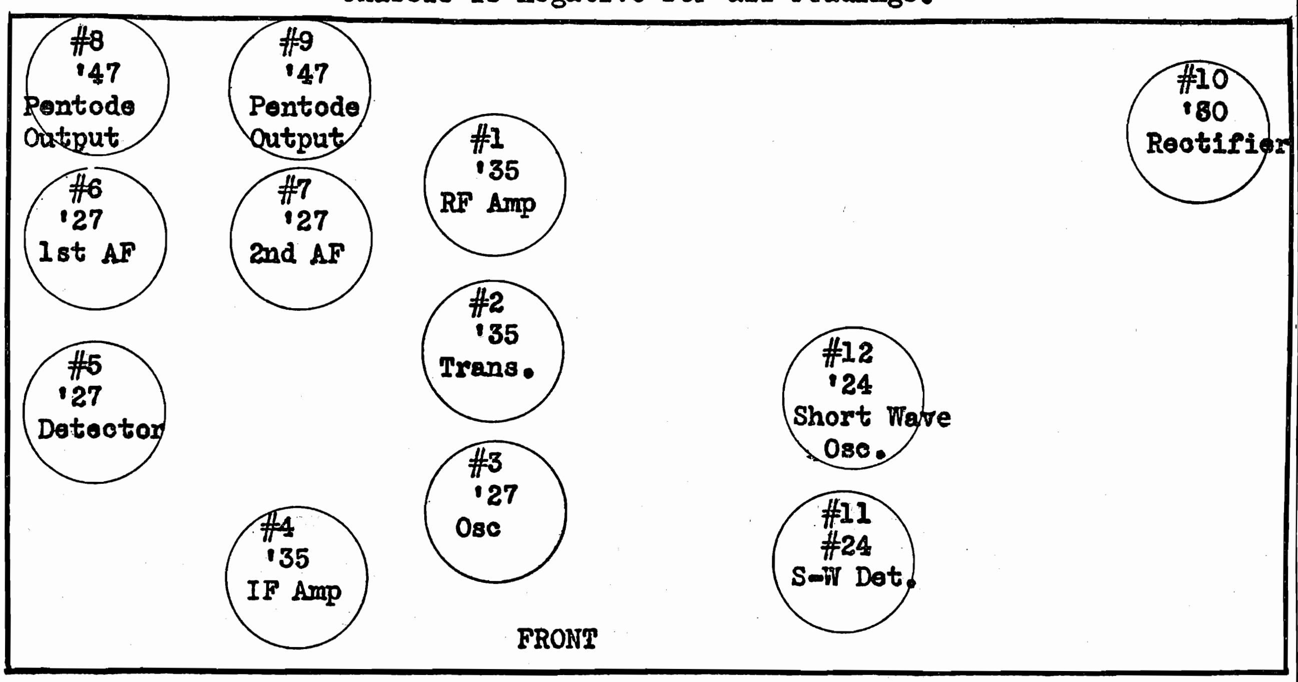
C1 - .02	mfd.	C13 - .02	mfd.	R1	- 200	ohms		R13	- 20,000	"	1 watt
C2 - .1	"	C14 - .02	"	R2	- 1,000	"	1 watt	R14	- 2,500	"	"
C3 - .1	"	C15 - 10	mmfd.	R3	- 500,000	"	"	R15	- 20,000	"	"
C4 - .1	"	C16 - .00025	mfd.	R4	- 1,500	"	"	R16	- 20,000	"	"
C5 - .02	"	C17 - 8	mfd.	R5	- 500,000	"	"	R17	- 2,000	"	"
C6 - 15	mmfd.	C18 - 8	"	R6	- 500,000	"	"	R18	- 10,000	"	"
C7 - .25	mfd.	C19 - .002	"	R7	- 250,000	"		R19	- 300	"	3 "
C8 - .02	"	C20 - .1	"	R8	- 500,000	"	Variable	R20	- 2,500	"	1 "
C9 - .25	"	C21 - .1	"	R9	- 100,000	"	1 watt	R21	- 50,000	"	1 "
C10 - 2.0	"			R10	- 2 Megohm		"	R22	- 10,000	"	Variable
C11 - .1	"			R11	- 2,500	ohms	"	R23	- 5,000	"	1 watt
C12 - 12	mmfd.			R12	- 500,000	"	Variable				

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.

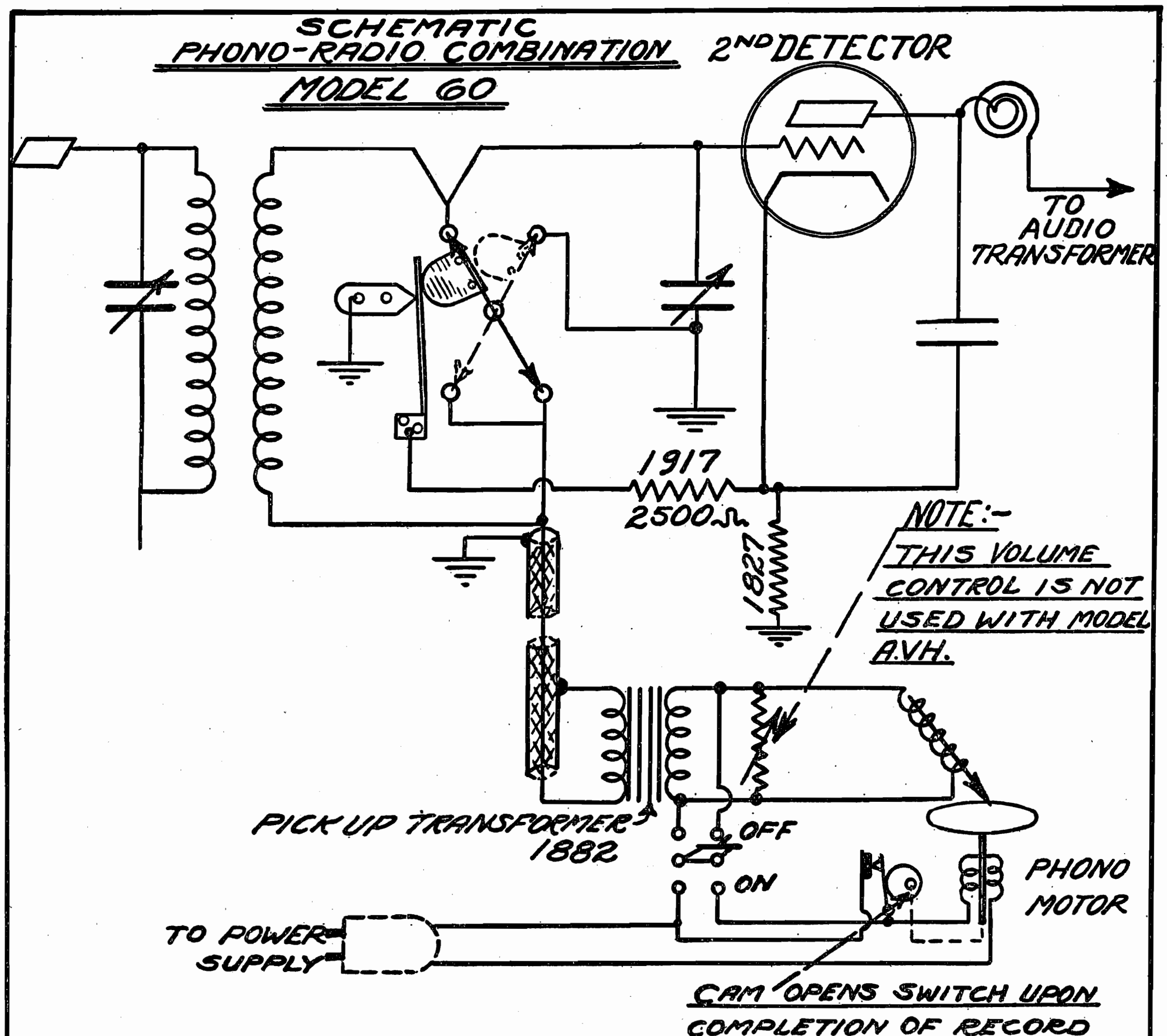
Connect the output of the oscillator through the dummy antenna to the antenna and ground posts of the receiver. Connect the milliammeter as before. Set the oscillator at 1200 KC and the dial on the set at 1200 KC. Then adjust the oscillator section trimmer, translator, R.F.; and pre-selector output. 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

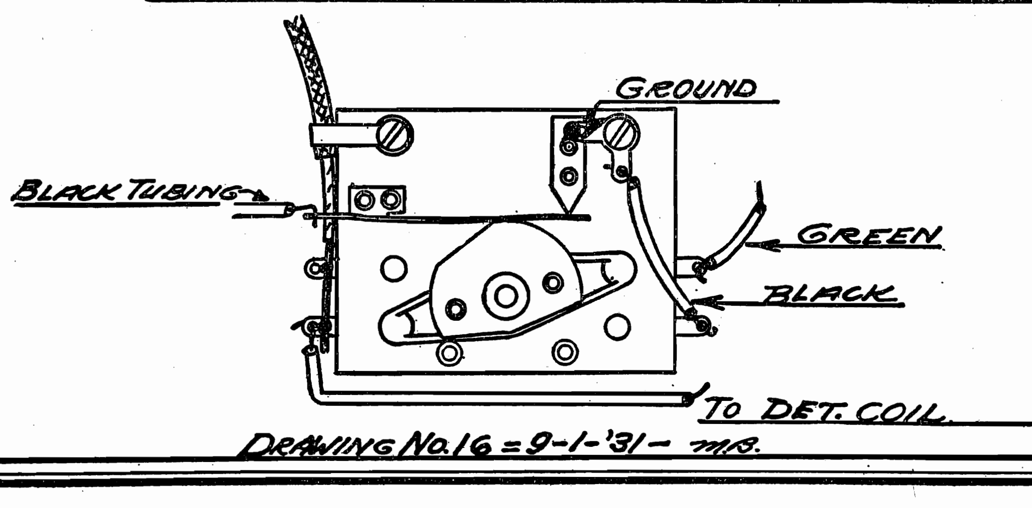
To balance - Turn the dial to 800 KC with the band selector on broadcast, then switch to the green shortwave band and set the dial near 6.2 megacycles. At this point rosonance may be obtained by varying the trimmer on the shortwave oscillator gang (the rear section of the two gang condenser) until maximum 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



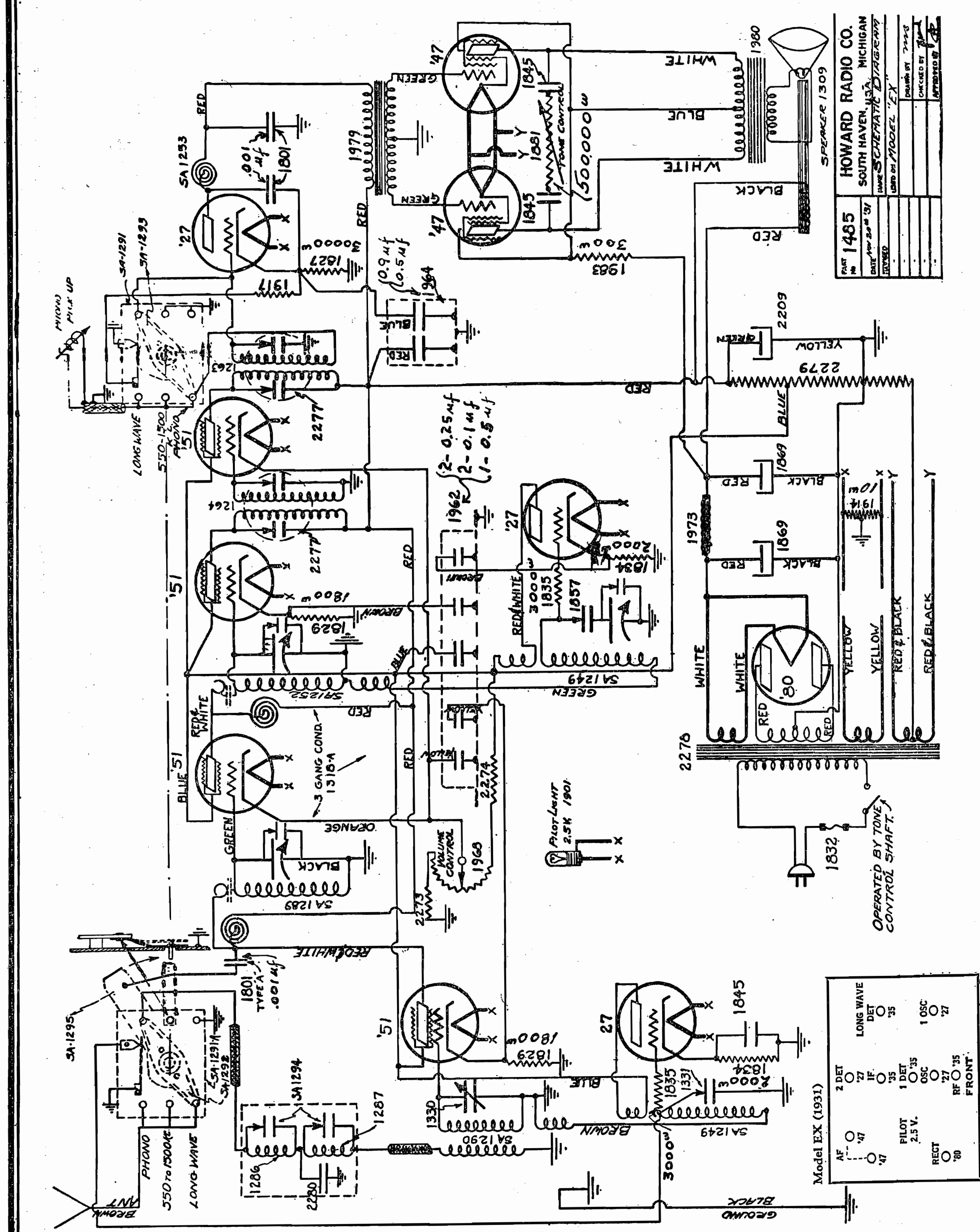
PICTORIAL VIEW OF THE ABOVE SWITCH ACTION:-



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

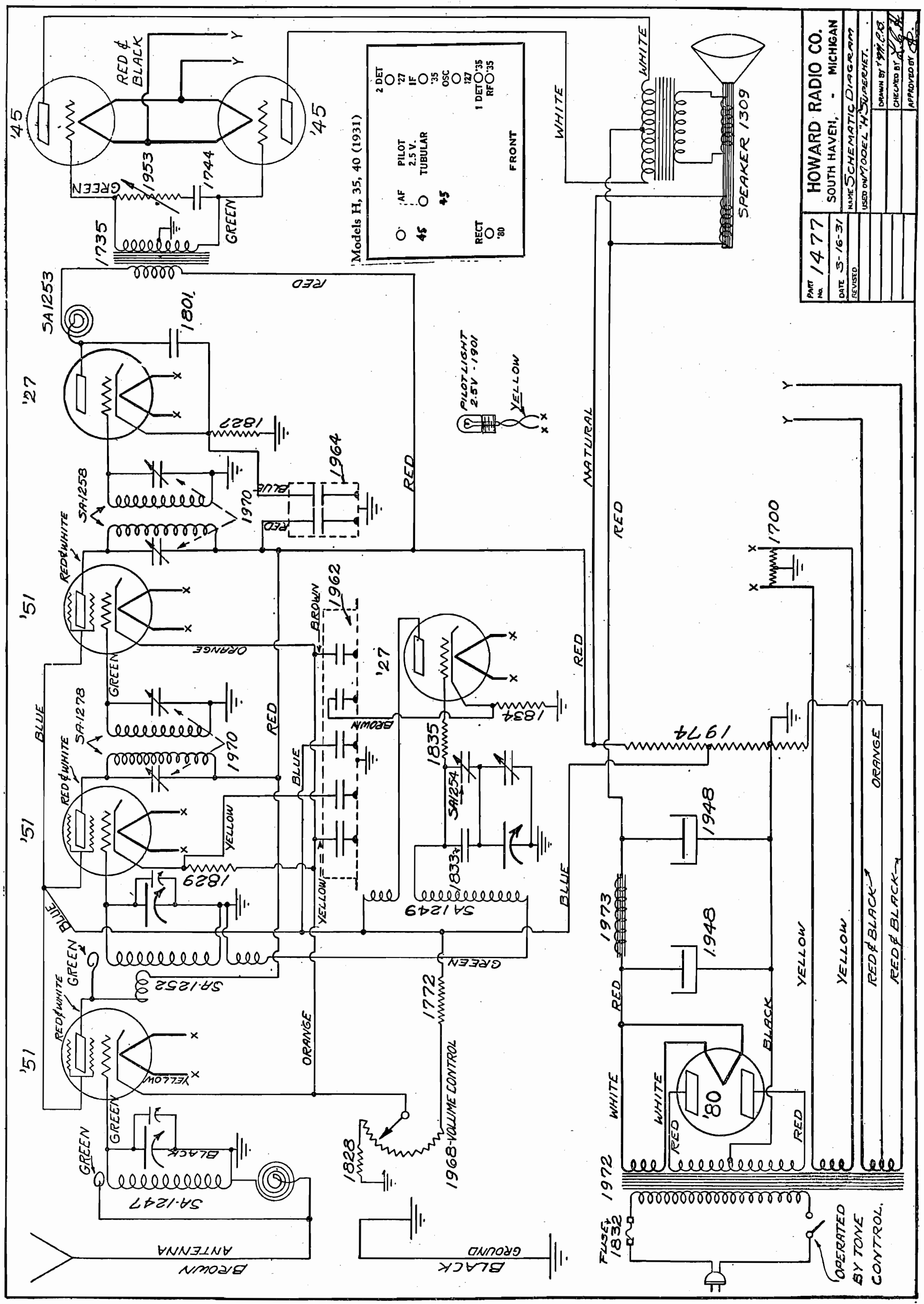
MODEL EX
Dual Range
Schematic

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.

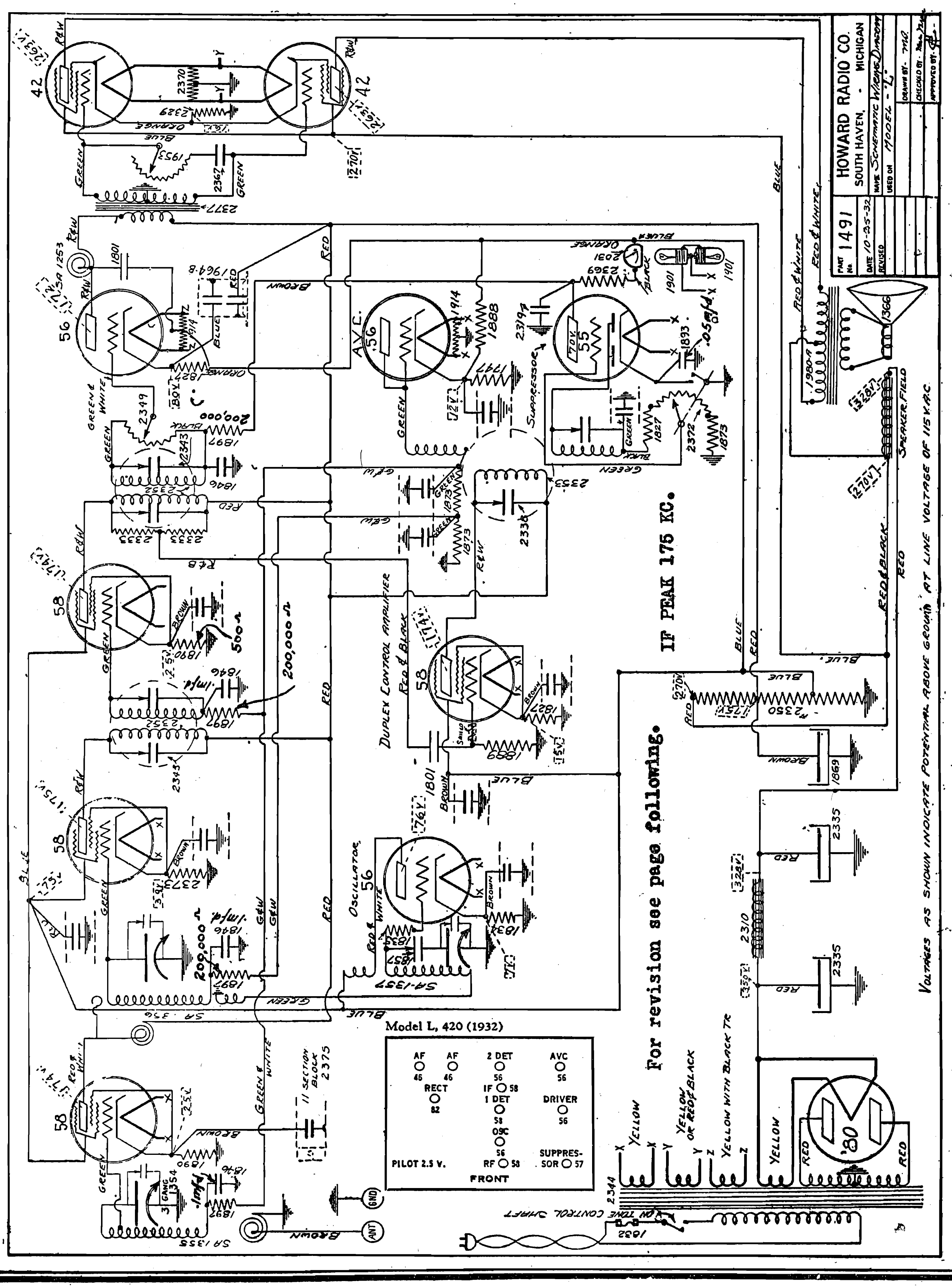
Now tune the Test Oscillator to 1000 kcs. and tune the set to 1000 kcs. Try adjusting the antenna trimmer condenser to determine whether the oscillator aligns at this frequency. If the antenna trimmer must increase capacity to give maximum deflection of output meter the oscillator tuning condenser serated 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.

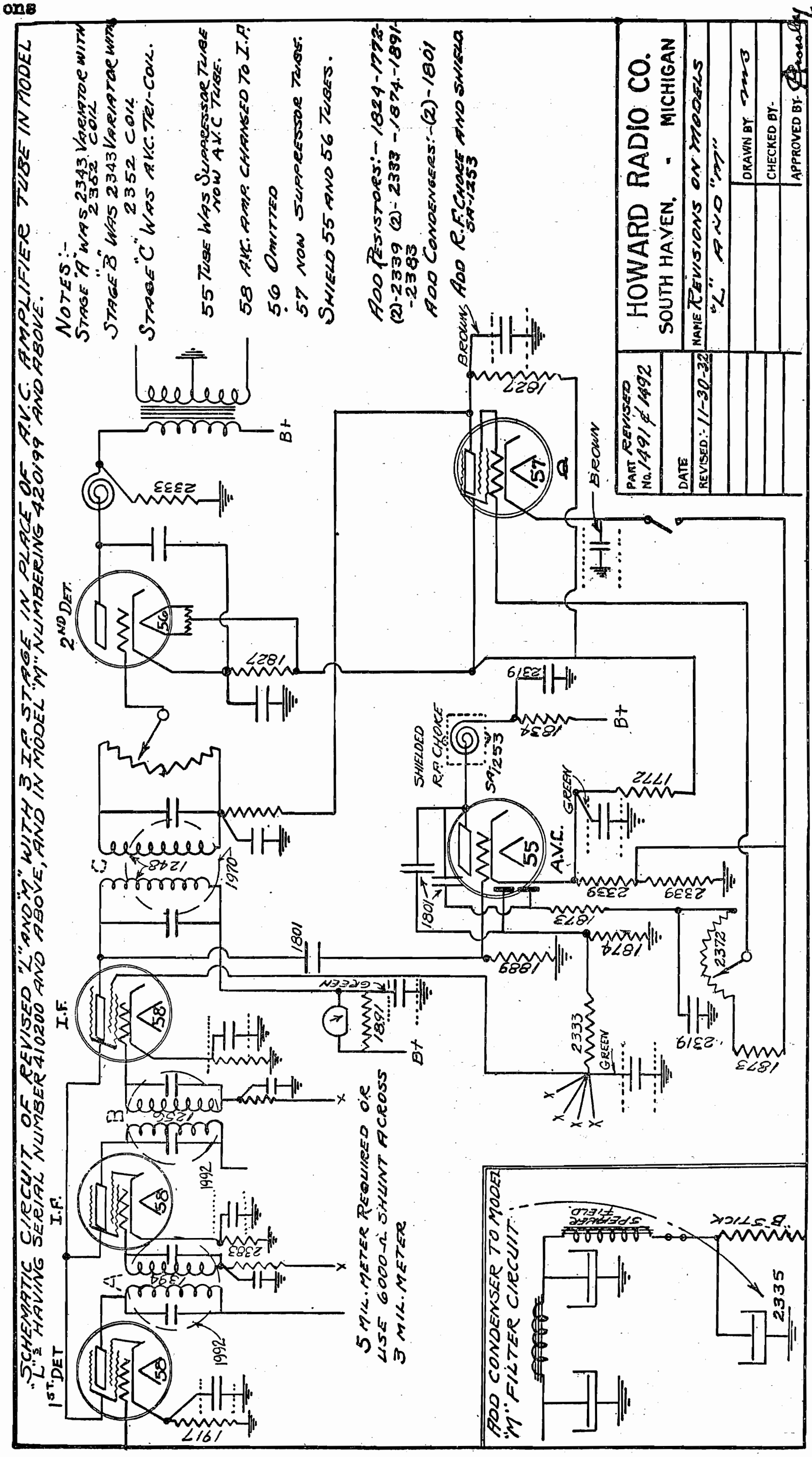
HOWARD RADIO CO.

MODEL 420 1st type (Chassis L)



MODEL L Chassis
Revisions
MODEL M Chassis
Revisions

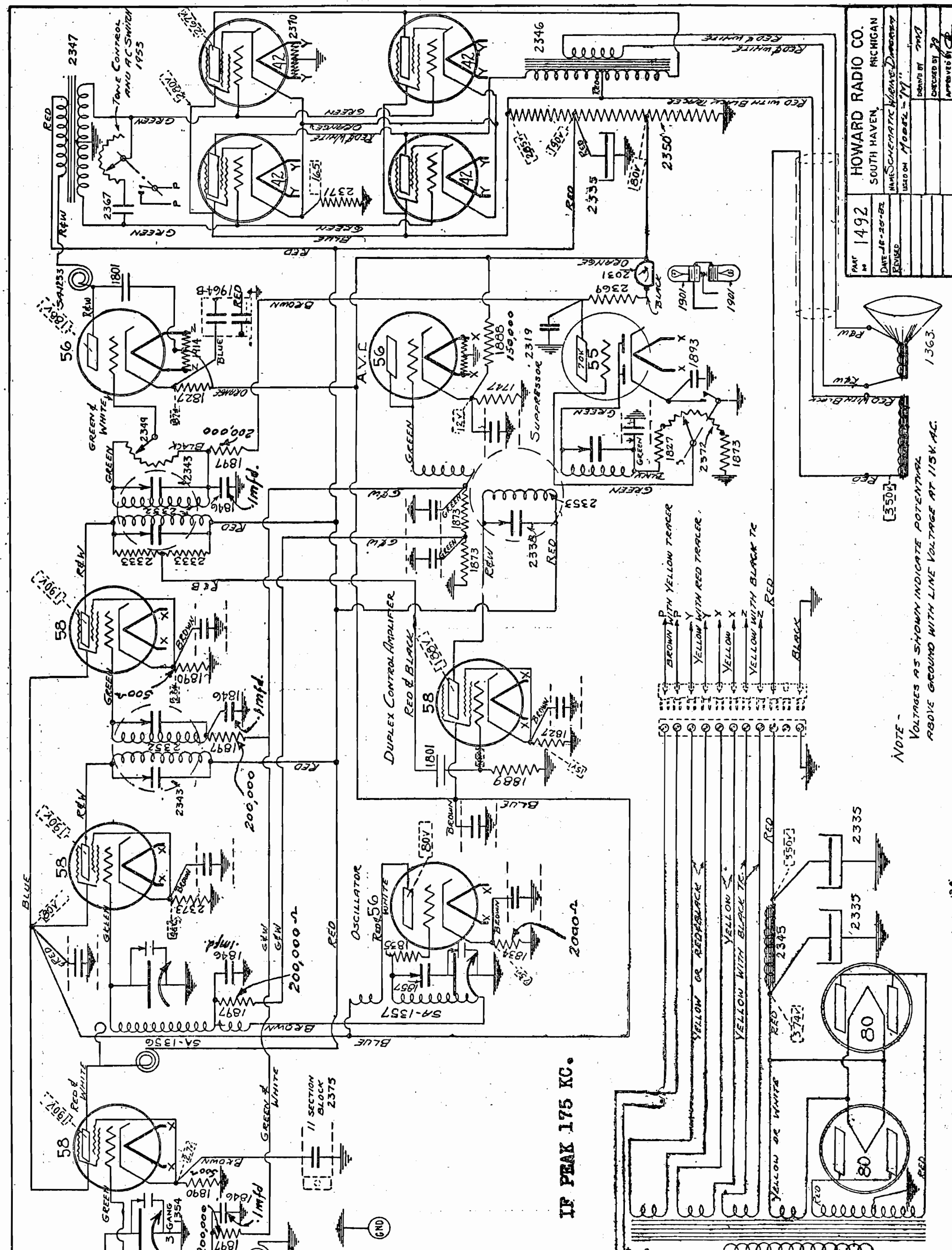
HOWARD RADIO CO.



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.

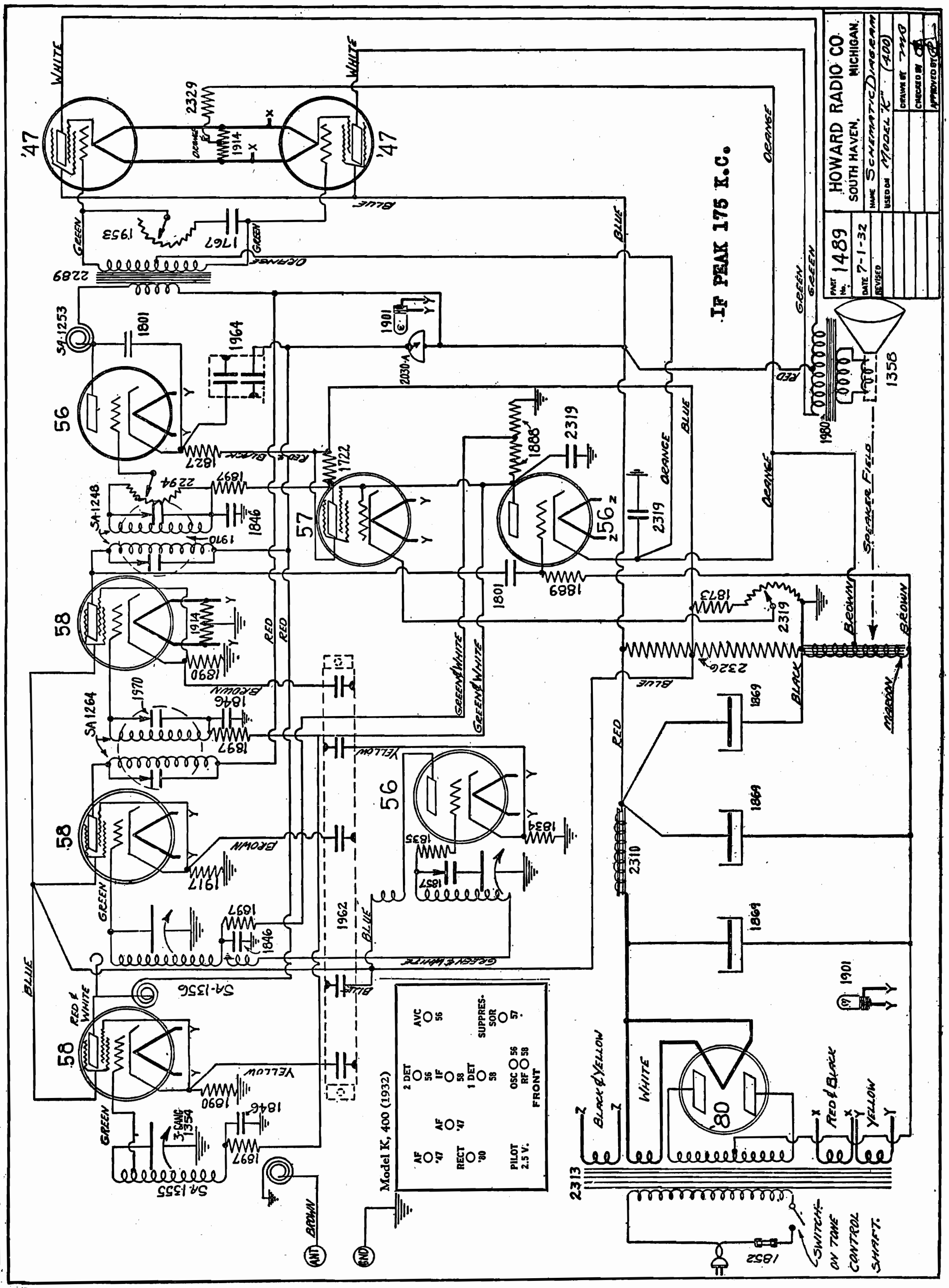
MODEL M Chassis
1st type.
Schematic



For revision see page preceding.

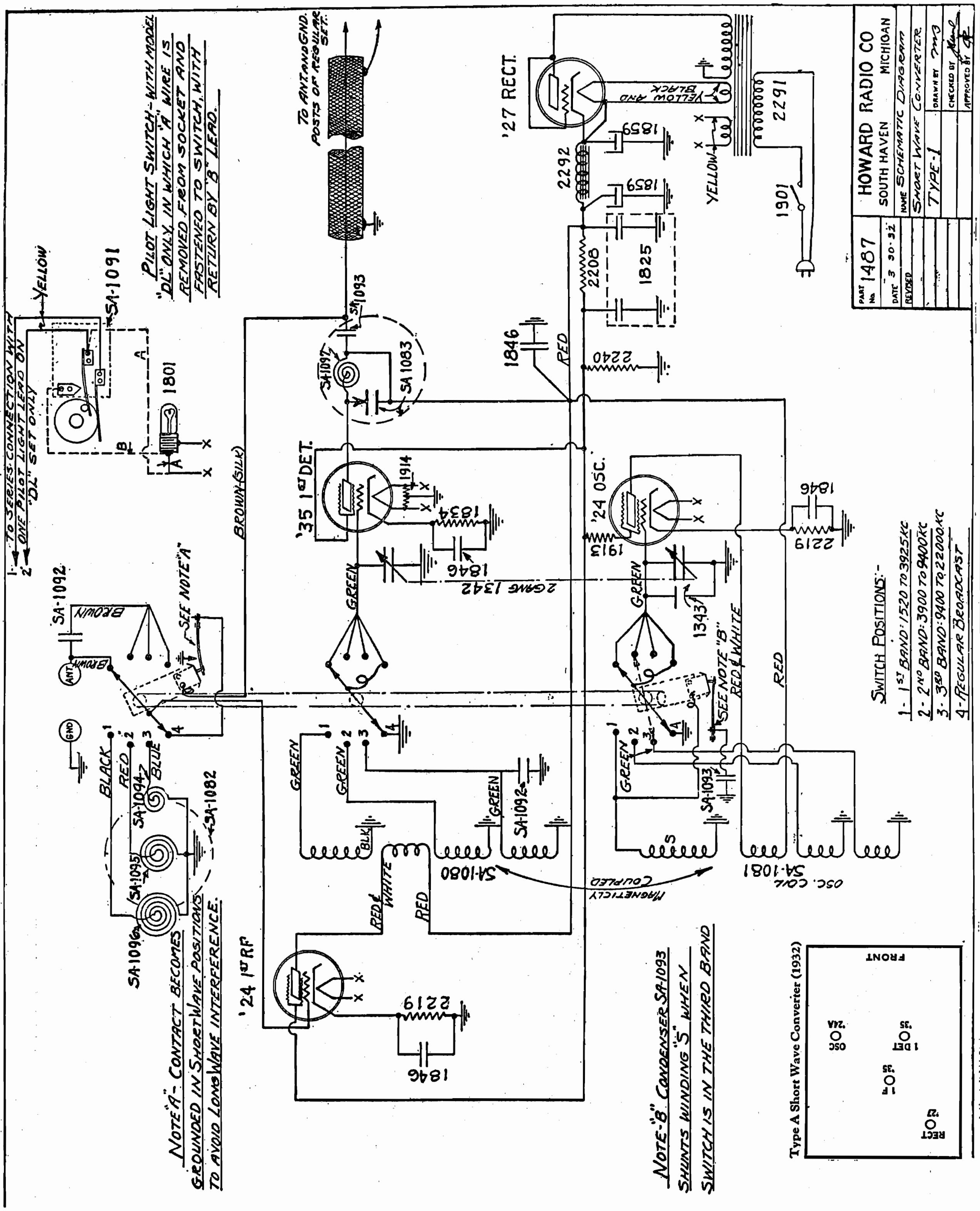
MODEL 400
Chassis K

HOWARD RADIO CO.



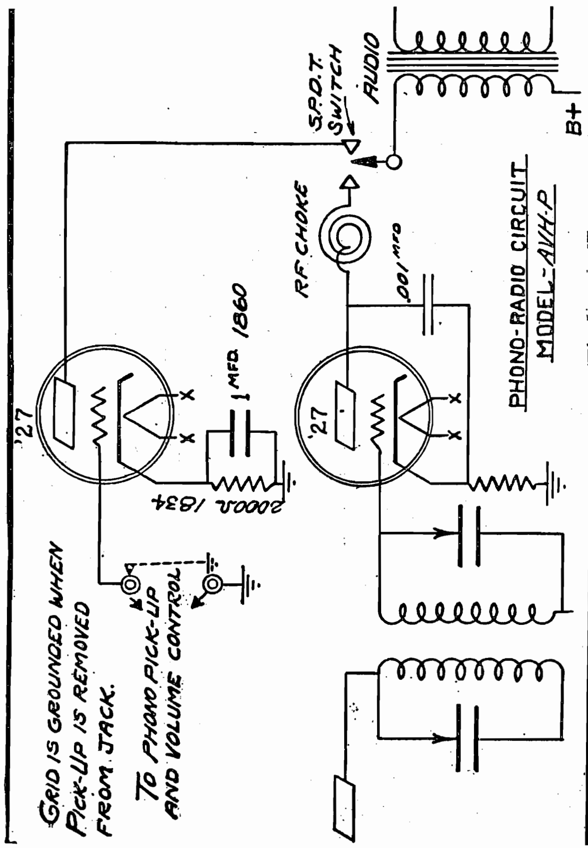
HOWARD RADIO CO.

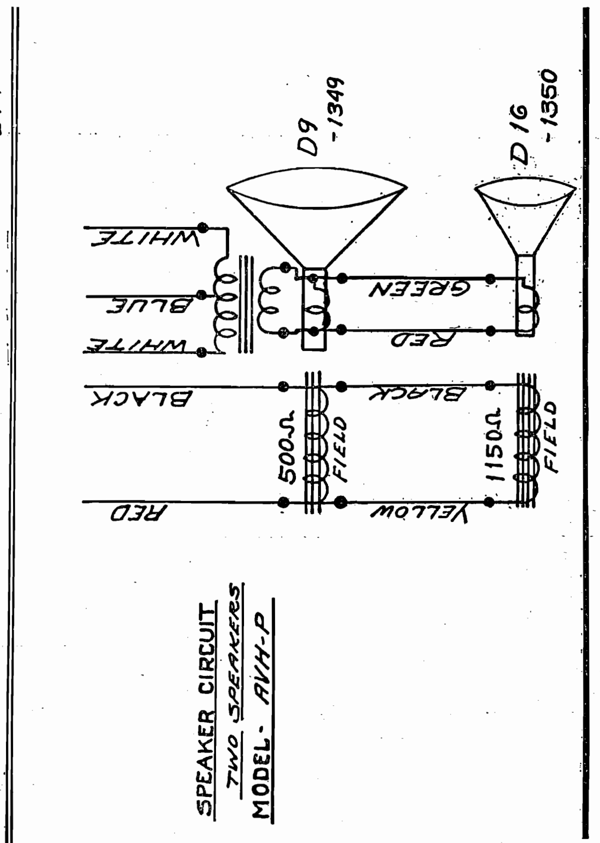
MODEL A
SW Converter

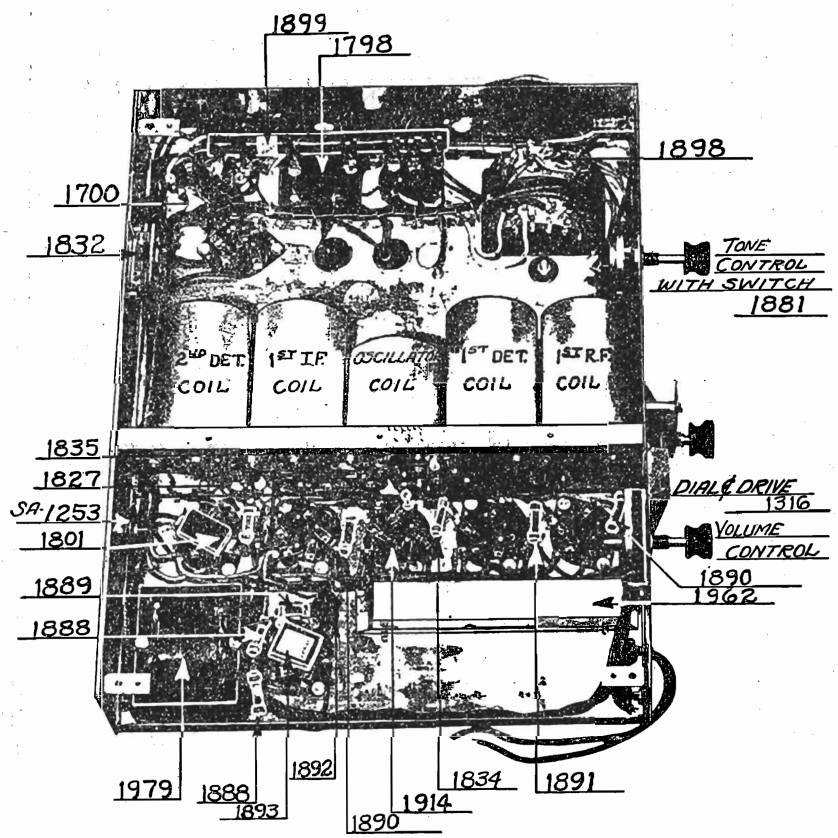


MODEL AVH-P
Data
MODEL AVH
Chassis

HOWARD RADIO CO.

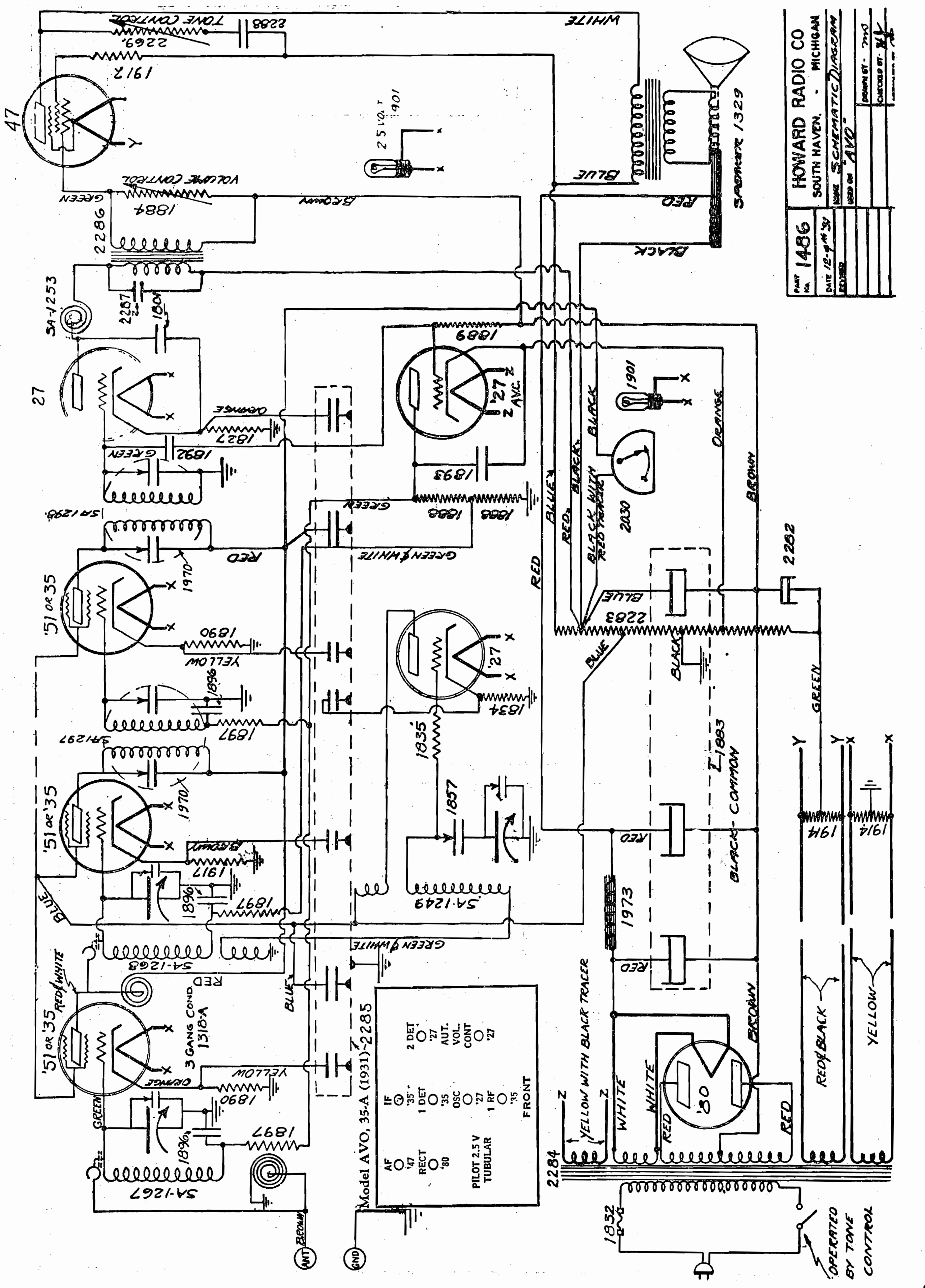






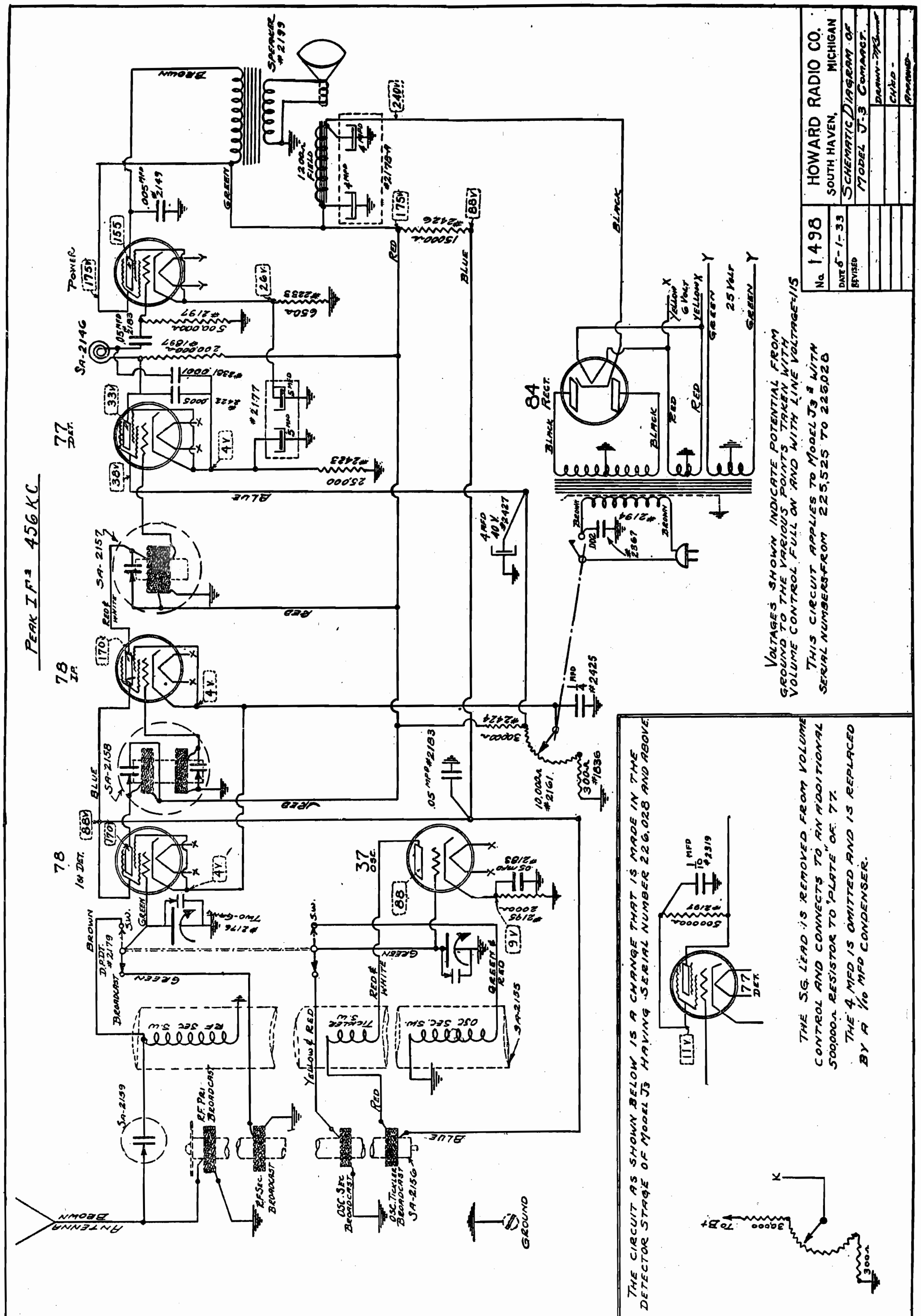
HOWARD RADIO CO.

MODEL 35-A
Chassis AVO



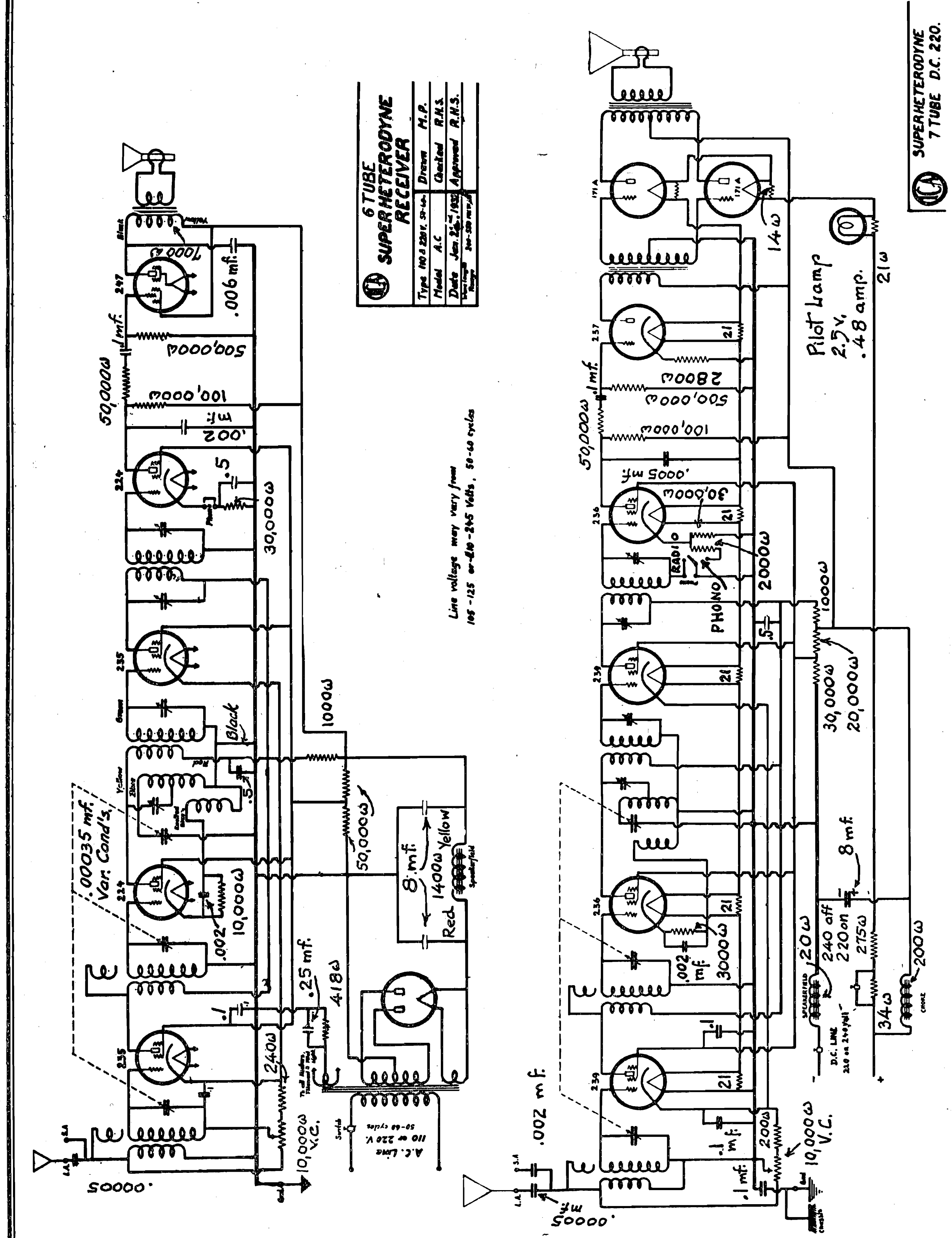
MODEL J-3 Compact

HOWARD RADIO CO



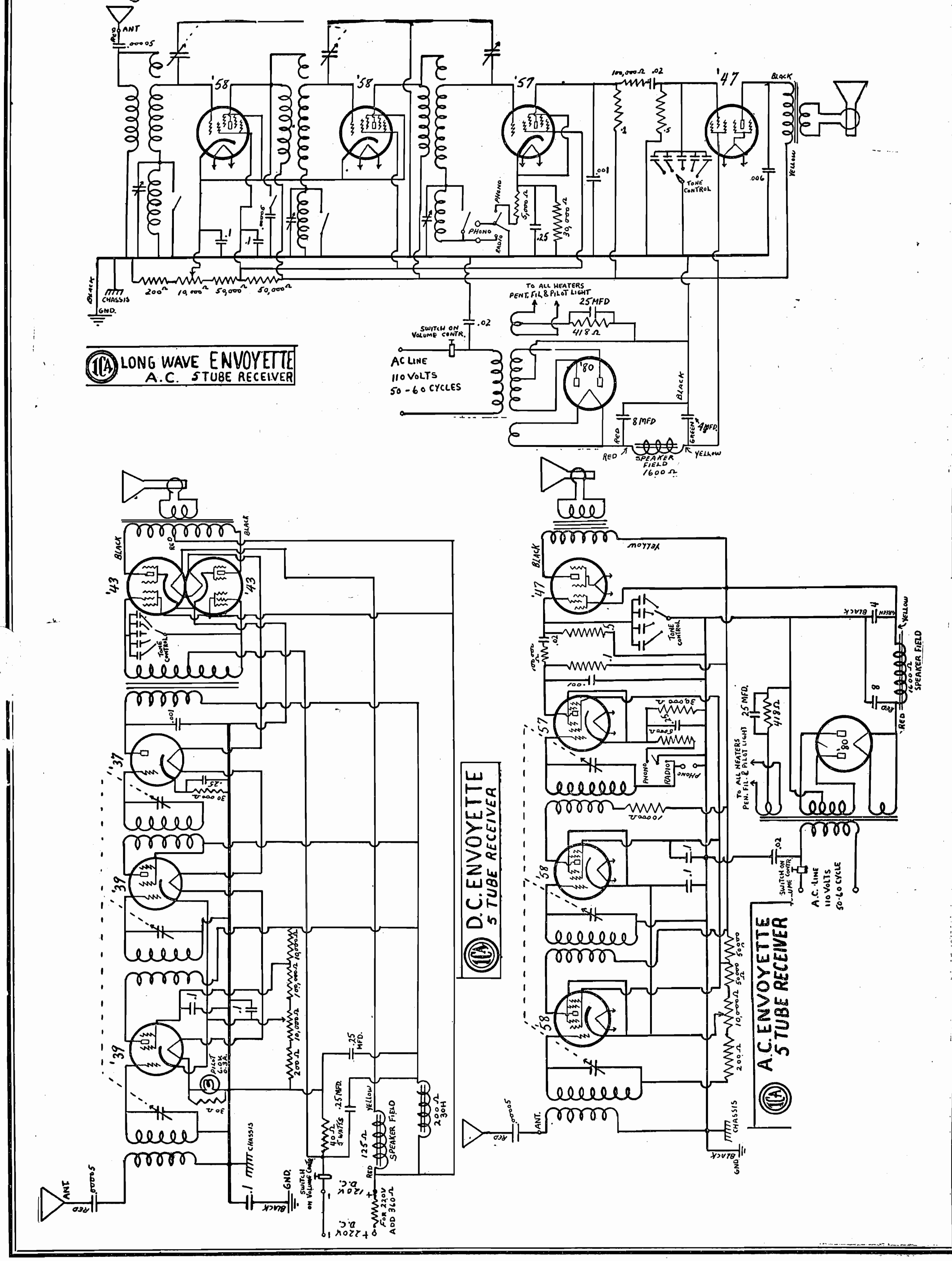
INSULINE CORP. OF AMERICA

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



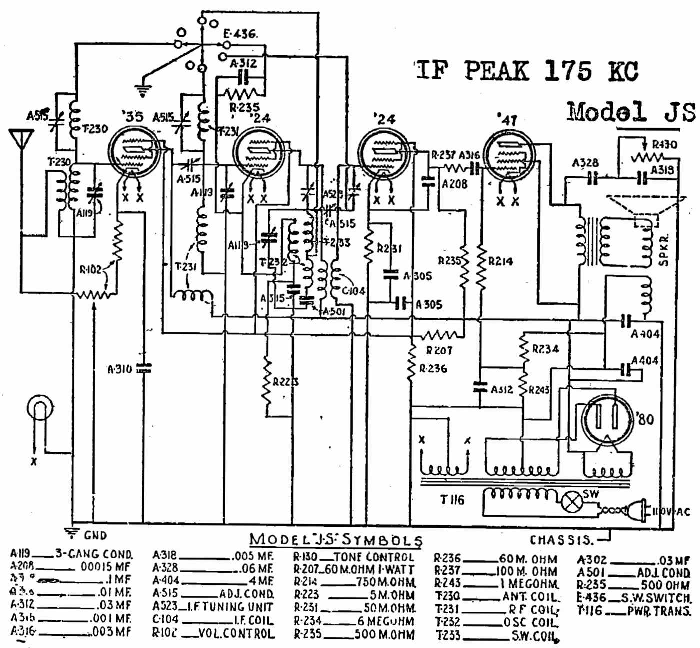
MODEL Envoyette
5 Tube AC
5 Tube DC
Long Wave AC

INSULINE CORP. OF AMERICA



INTERNATIONAL RADIO CORP.

MODEL JS
MODEL KS
Schematic
Data



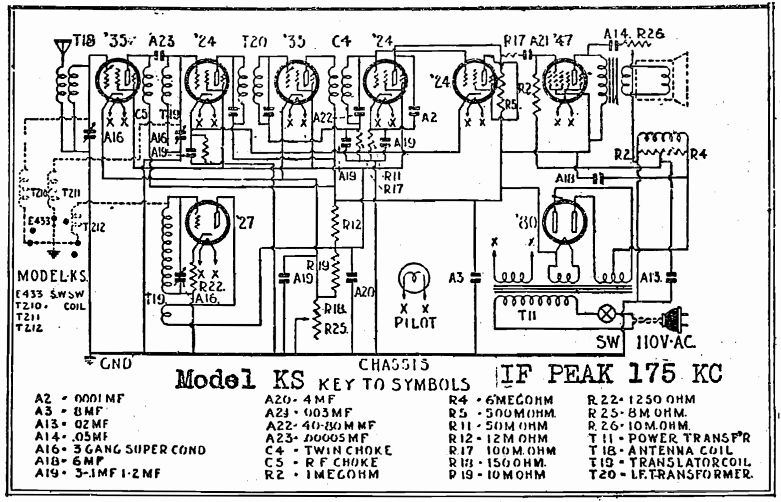
The following are average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage.

	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:

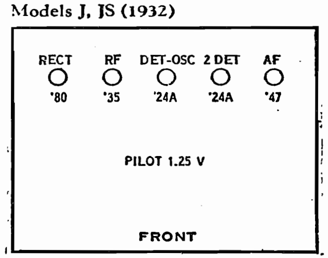
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.



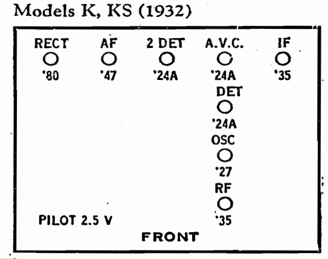
Test Voltages: Measured with volume control on full position measured with D. C. voltmeter having at least 1000 ohms per volt. Line voltage 115.

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)



MODEL JS
Short Wave
Trimmer Data
MODEL Kadette
Schematic

INTERNATIONAL RADIO CORP.

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:

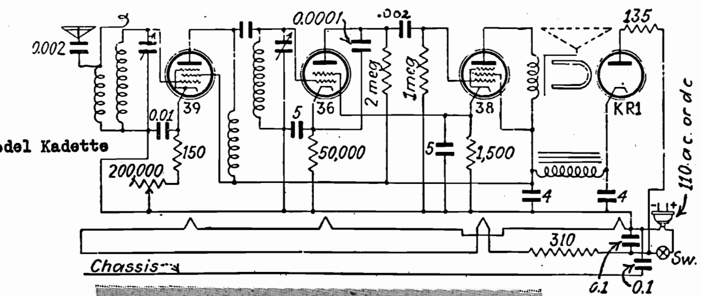
Turn the switch to the long wave position.

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

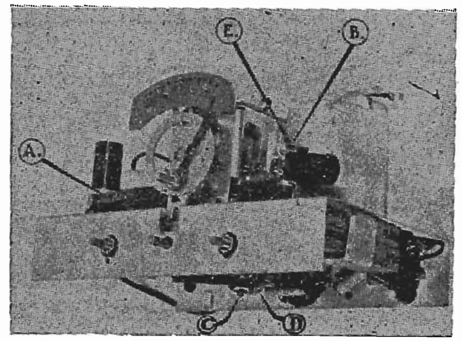
Tune in a station around 1400 KC (215 meters).

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.



Model Kadette



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.

MODEL CS
Short Wave
Trimmer Data

INTERNATIONAL RADIO CORP.

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.

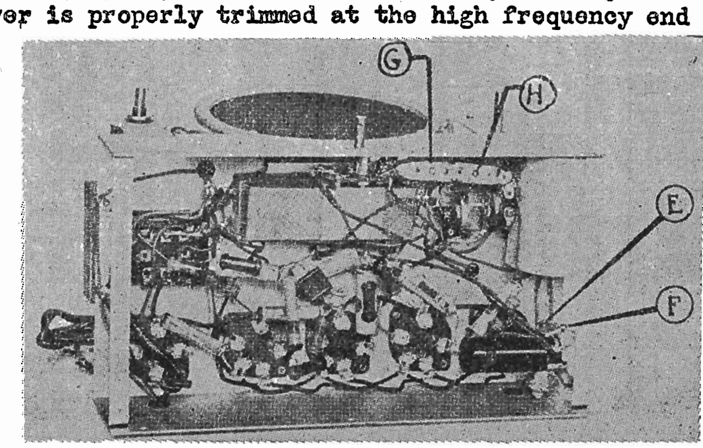
Adjust trimmer (E) mounted on the detector coil beneath the chassis for maximum signal strength.

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.

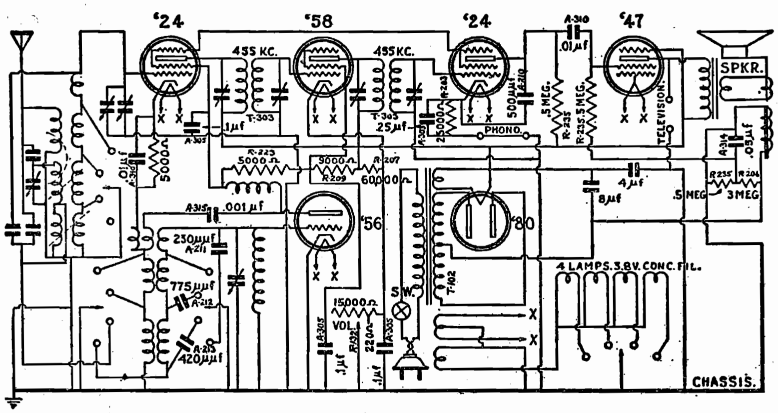
The set is now properly aligned on the high frequency (low wave) end of the band.

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
MODEL CS
Schematic
Data

INTERNATIONAL RADIO CORP.



Model AW-55

IF PEAK 445 KC

VOLTAGE READINGS:

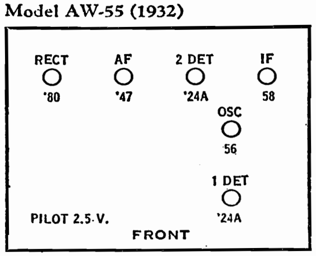
NOTE: Voltages should be measured with volume control all the way "ON" and the range selector in position 3 (broadcast). Use a 250-volt D. C. meter with a resistance of 1000 ohms per volt.

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.

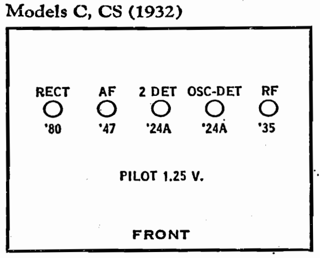
	Plate	Screen	Cathode
'47 Tube —ground to	235	245	------
'24 Tube —ground to (Tube next to '47)	70	40	6
58 Tube —ground to	240	100	3
'24 Tube —ground to	240	40	8
56 Tube —ground to	40	------	0

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)

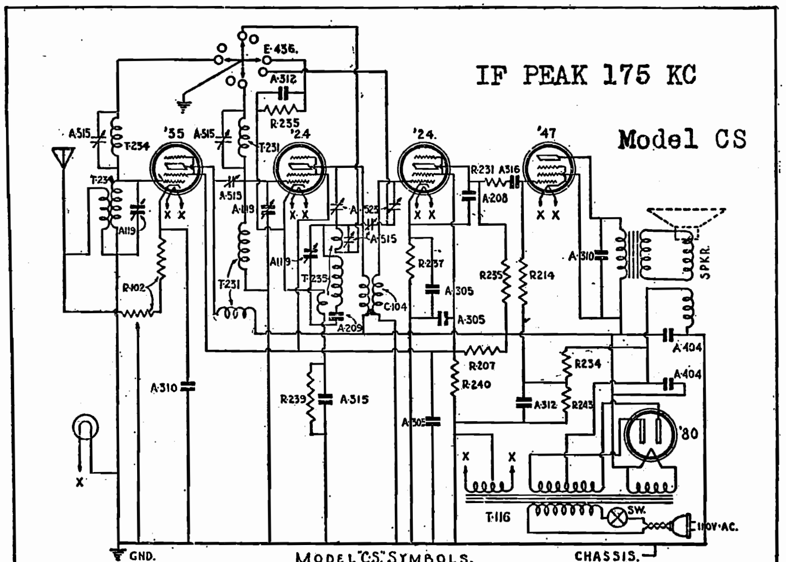


Models C, CS (1932)



IF PEAK 175 KC

Model CS



MODEL "CS." SYMBOLS.

A119	3-GANG COND.	A318	.005 MF.	R235	500 M. OHM.	R240	37 M. OHM.	A302	.03 MF.
A208	.00015 MF.	A328	.06 MF.	R207	60 M. OHM 1-WATT.	R237	100 M. OHM.	A209	1050 MMF. PAD.
A305	.1 MF.	A404	4 MF.	R214	750 M. OHM.	T231	R.F. COIL.		
A310	.01 MF.	A515	ADJ. COND.	R239	6500 OHM.	T234	ANT. COIL.		
A312	.03 MF.	A523	I.F. TUNING UNIT.	R231	50 M. OHM.	T235	OSC. COIL.		
A315	.001 MF.	C104	I.F. COIL.	R234	6 MEGOHM.	T116	PWR. TRANS.		
A316	.003 MF.	R102	VOL. CONTROL.	R243	1 MEGOHM.	E436	SW. SWITCH.		

Voltage Readings:

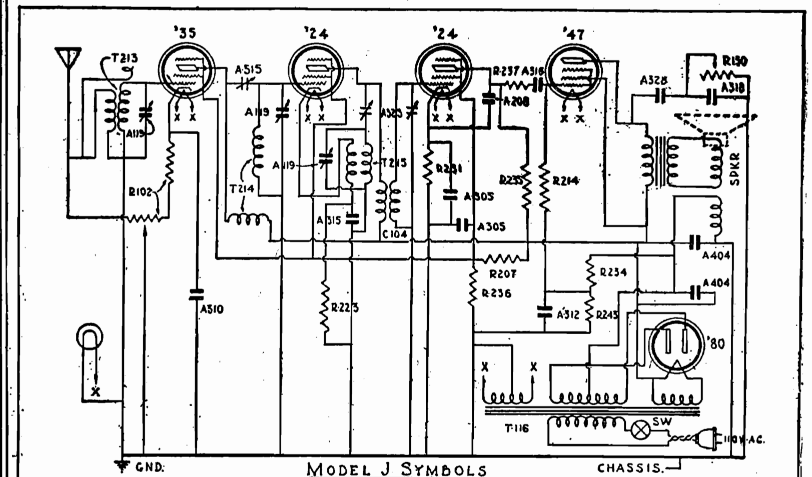
NOTE: Voltages should be measured with volume control all the way "ON" and the band selector switch at the "long" wave position using zero to 250 volt D. C. voltmeter with resistance of 1,000 ohms per volt.

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.	R237	100M. OHM.
A305	1 MF	A404	4 MF	R214	750M OHM.	R243	1 MEGOHM.
A310	.01 MF	A515	ADJ. COND.	R223	.5M. OHM.	T213	ANT. COIL
A312	.03 MF	A523	I.F. TUNING UNIT	R251	50M. OHM.	T214	R.F. COIL.
A315	.001 MF.	C104	I.F. COIL.	R234	6 MEGOHM.	T215	OSC. COIL.
A316	.003 MF	R102	VOL CONTROL.	R235	500 M.OHM.	T116	PWR TRANS.

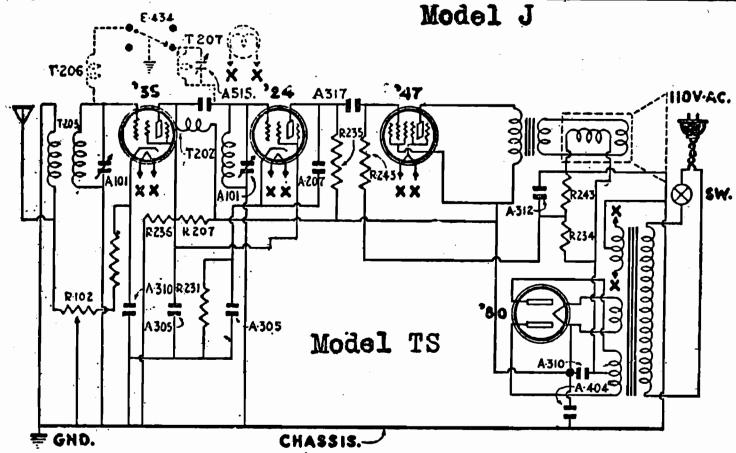
Model J

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

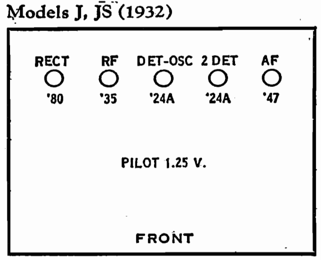
		Plate	Screen	Cathode
Pentode tube	—ground to	240	245	None
235 R. F. tube	—ground to	245	70	2.5
224 1st. Detector tube (center tube)	—ground to	245	70	7
224 2nd. Detector	—ground to	75	70	10

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.



Model TS

Models J, JS (1932)



MODEL T SYMBOLS.

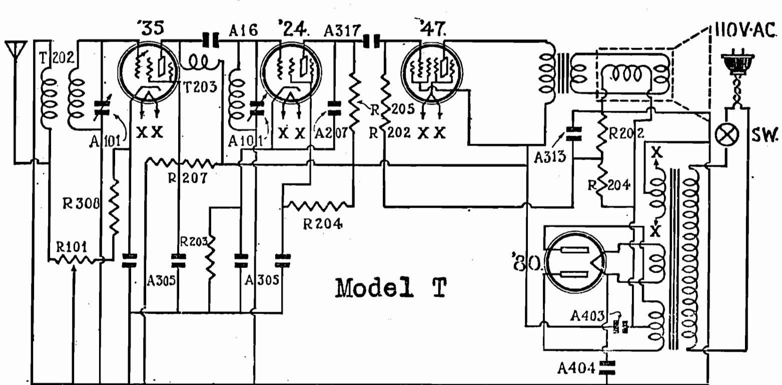
A101. 2-GANG VAR. COND.
A207. .0001 MF.
A310. .01 MF.
A404. 4 MF.
A312. .03 MF.
A317. .006 MF.
A305. .1 MF.
R102. 8020 OHM.
R243. 1 MEGOHM.
R231. 80 M.OHM.
R234. 6 MEGOHM.
R235. .5 MEGOHM.
R236. 60 M.OHM.
R207. 60 M.OHM.
T202. RF COIL.
T203. ANTENNA COIL.

MODEL TS.

A515. ADJ. COND.
E434. SHORT WAVE SWITCH.
T206. S.W. ANT. COIL.
T207. S.W. RF. COIL.

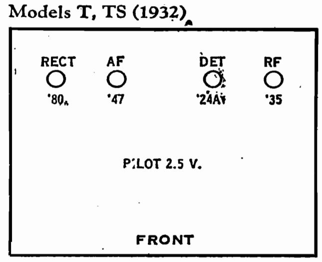
Model T, TS

		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)



MODEL K-40 Regal (M)

INTERNATIONAL RADIO CORP.

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

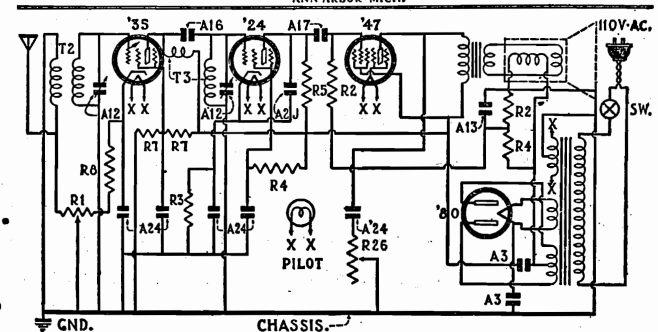
The selectivity of any set with two tuned stages depends considerably upon a slight amount of regeneration being introduced over the entire band. The above mentioned adjustment takes care of most of this but if the set is too "hot" at some one point, the regeneration can be smoothed out by turning the 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.

REGAL·MODEL·M.
INTERNATIONAL RADIO CORP.
ANN ARBOR·MICH.



KEY·TO·SYMBOLS.

A12 = 2 GANG VAR. COND.
A2J = .0001 MF.
A3 = 8 MF.
A4 = 4 MF.
A13 = .02 MF.
A16 = 16 M.MF.
A17 = .006 MF.
A24-A24 = .1 MF.-.05 MF.
R1 = 8020 OHM.
R2 = 1 MEGOHM.
R3 = 25 M.OHM.
R4 = 6 MEGOHM
R5 = .5 MEGOHM.
R7 = 60 M.OHM.
R8 = 200 OHM.
R26 = 10 M.OHM.
T2 = ANTENNA COIL.
T3 = R.F. COIL.

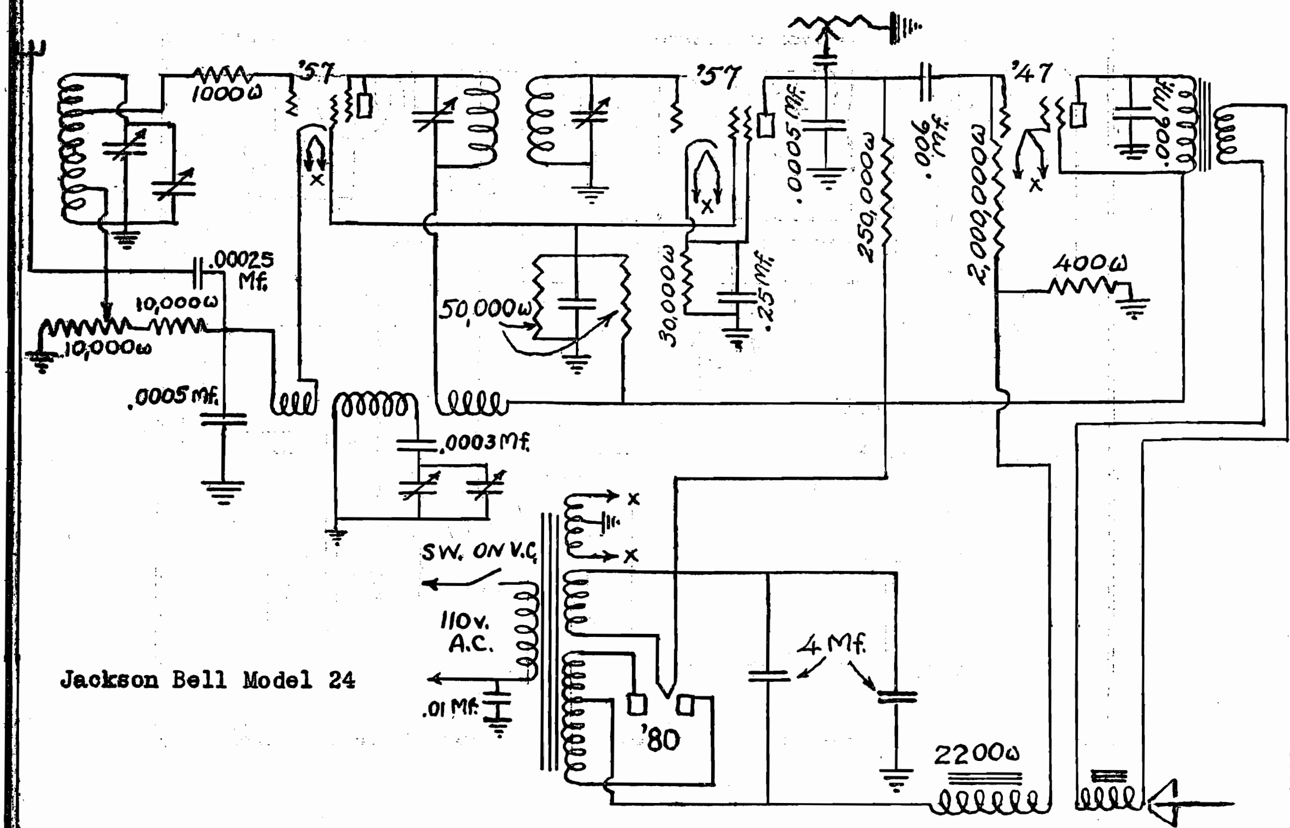
Following are the average voltages taken on 118 volts 60 cycle A. C. line. A slight variation is allowable for variation in meters and line voltage:

	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.

JACKSON-BELL CO., LTD.

MODEL 24
MODEL 205
(Auto)



Jackson Bell Model 24

Model 205 Data

The tuning range of the receiver is 550 to 1,750 kc., and reception of the 2,480-kc. police signals as an image frequency. The intermediate frequency used is 465 kc

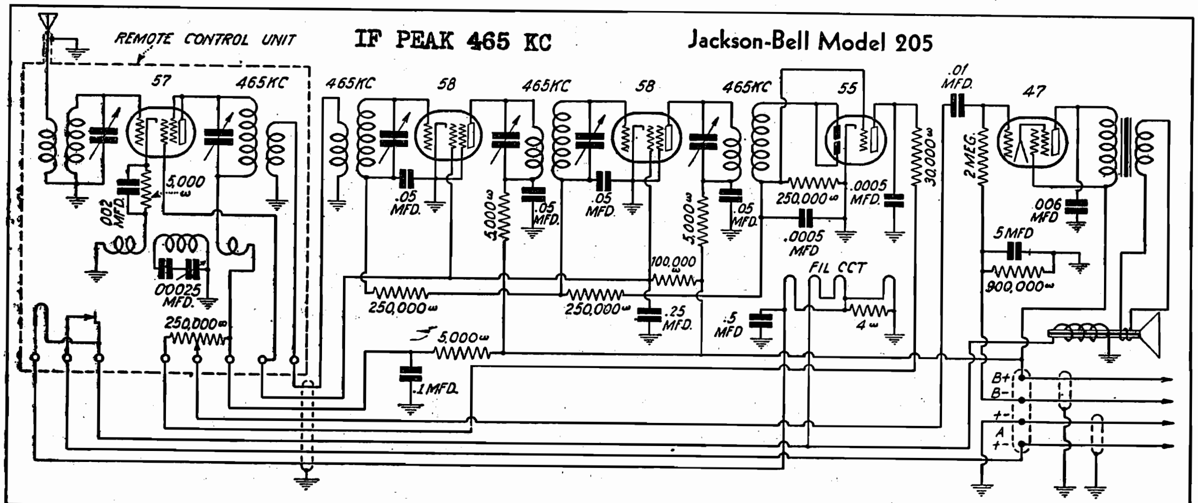
The most interesting feature of this receiver is the control unit which, instead of merely consisting of the usual remote tuning dial and volume control, actually contains the type '57 combination first detector and oscillator tube together with the associated units. This unit is then coupled to the intermediate-frequency amplifier by an i-f. transmission line contained in a shield along with the "A" and "B" feed wires, etc. The intermediate frequency and audio units are in a case with an eight-inch Lansing speaker, making the whole a two-unit job with remote control and no flexible shafts.

The i-f. feed line has at each end a coil composed of three turns of wire around a standard i-f. bobbin, and the line may be 15 feet long without causing appreciable loss . . . the loss with a 15-foot run being about 5 db.

The two type '58 tubes in the intermediate-frequency stages are used as standard r-f pentodes. AVC is provided by the type '55 second detector tube which feeds the type '47 output pentode Total plate current is 18 ma at 180 volts

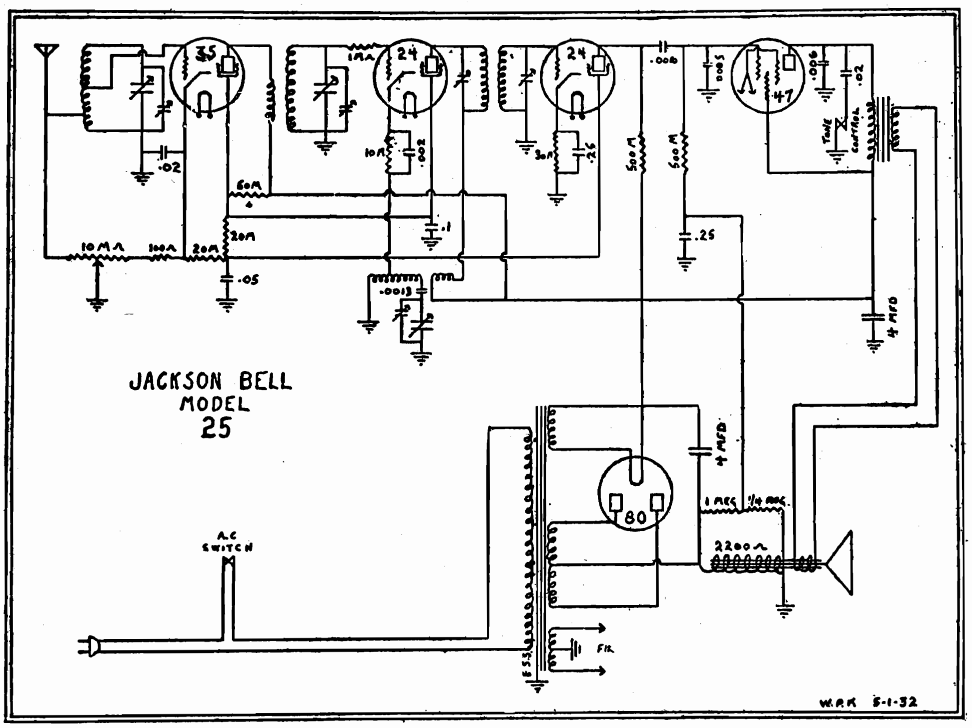
Care should be taken with the B + terminal as it is inclined to short to the chassis, in which case the 900-ohm bias resistor for the '47 tube will blow, as well as the electrolytic condenser shunting it

The plate winding on the oscillator coil in the control unit suffers seriously from electrolysis



MODEL 25
Schematic
Data

JACKSON-BELL CO., LTD.



Make all adjustments with volume control at maximum. Before aligning set make sure all tubes are in correct position and primary on oscillator and R.F. coils are well down towards grid end of coil.

TO ALIGN 175 KC ALIGNMENT.

Put set in operation and set tuning condenser to full 100 degree position. Next, remove the screen grid cap from the autodyne oscillator and apply 175 modulated signal to this tube. (Looking at rear of set this tube is the fourth on the extreme right.) Next, remove license plate and adjust trimmers for maximum out-put.

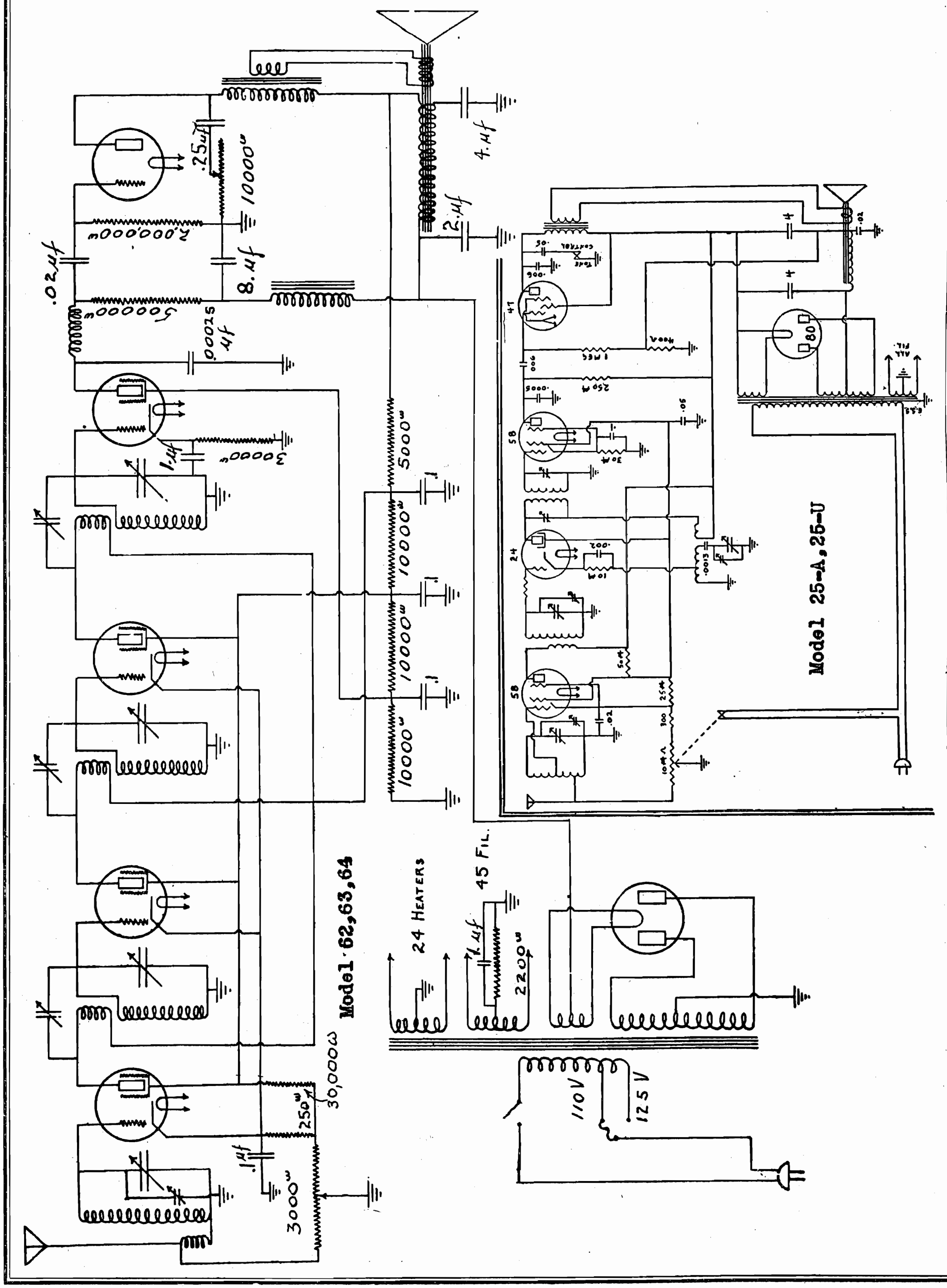
BROADCAST ALIGNMENT.

With external modulated signal generator set at approximately 1710 KC (Police frequency). The dial should be set at approximately 5 degrees past minimum. Adjust oscillator trimmer on variable and resonate the other 2 trimmers from maximum out-put at this position. Apply 855 KC modulated signal and align set at this point by bending plates of variable. Do not readjust trimmers. Repeat this operation at 600 KC.

With set at 600 KC readjust trimmers on I.F. transformers, for maximum output. If set oscillates when properly aligned, shift external ground lead from center section of variable to point where oscillation ceases.

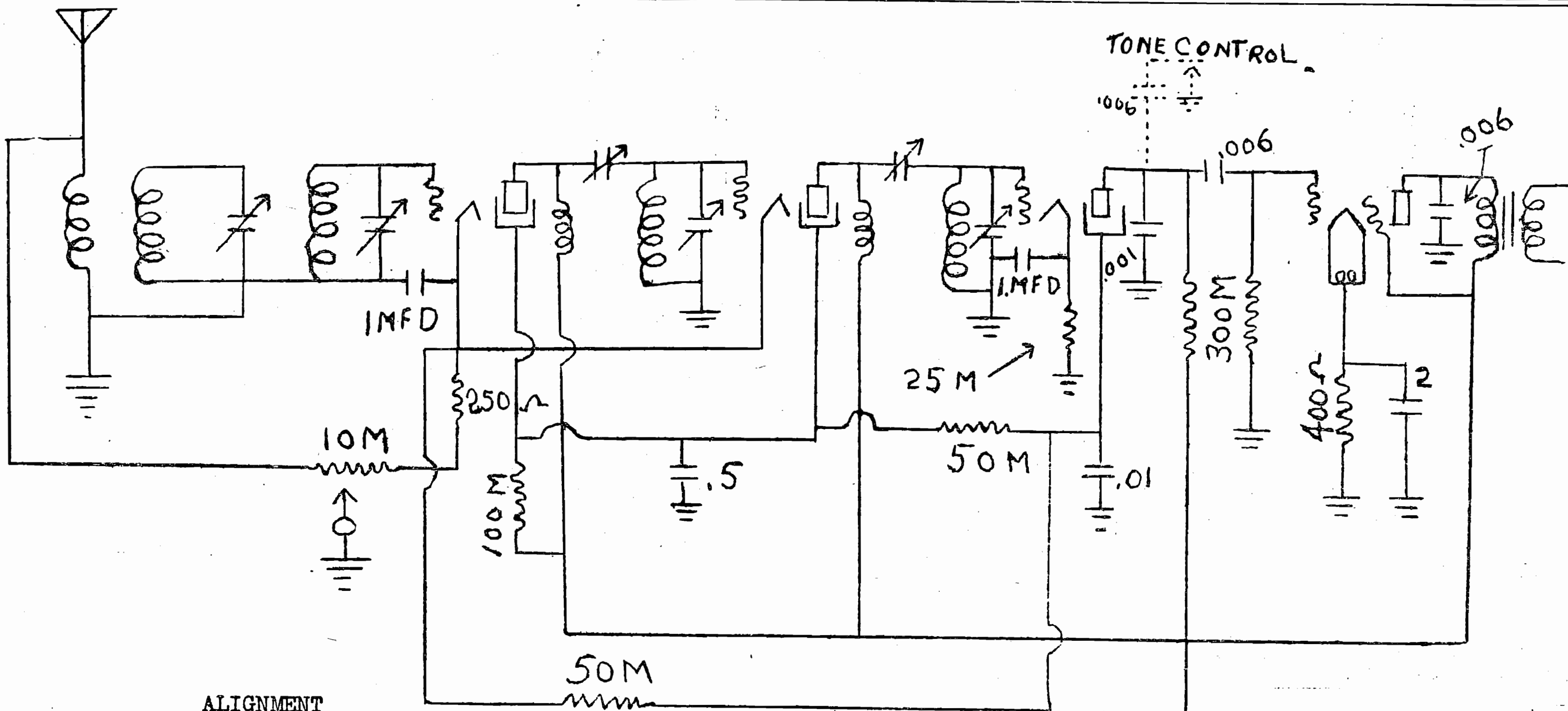
JACKSON-BELL CO., LTD.

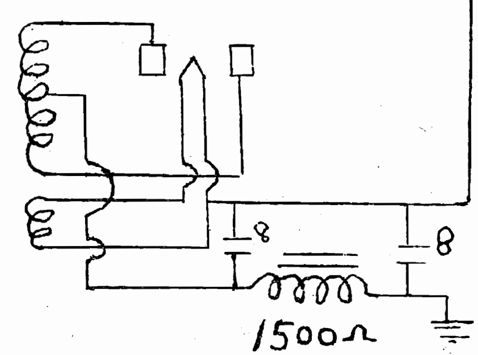
MODEL 25-A, 25-U
MODEL 62, 63, 64



MODEL 26
Schematic
Alignment

JACKSON-BELL CO., LTD.





ALIGNMENT

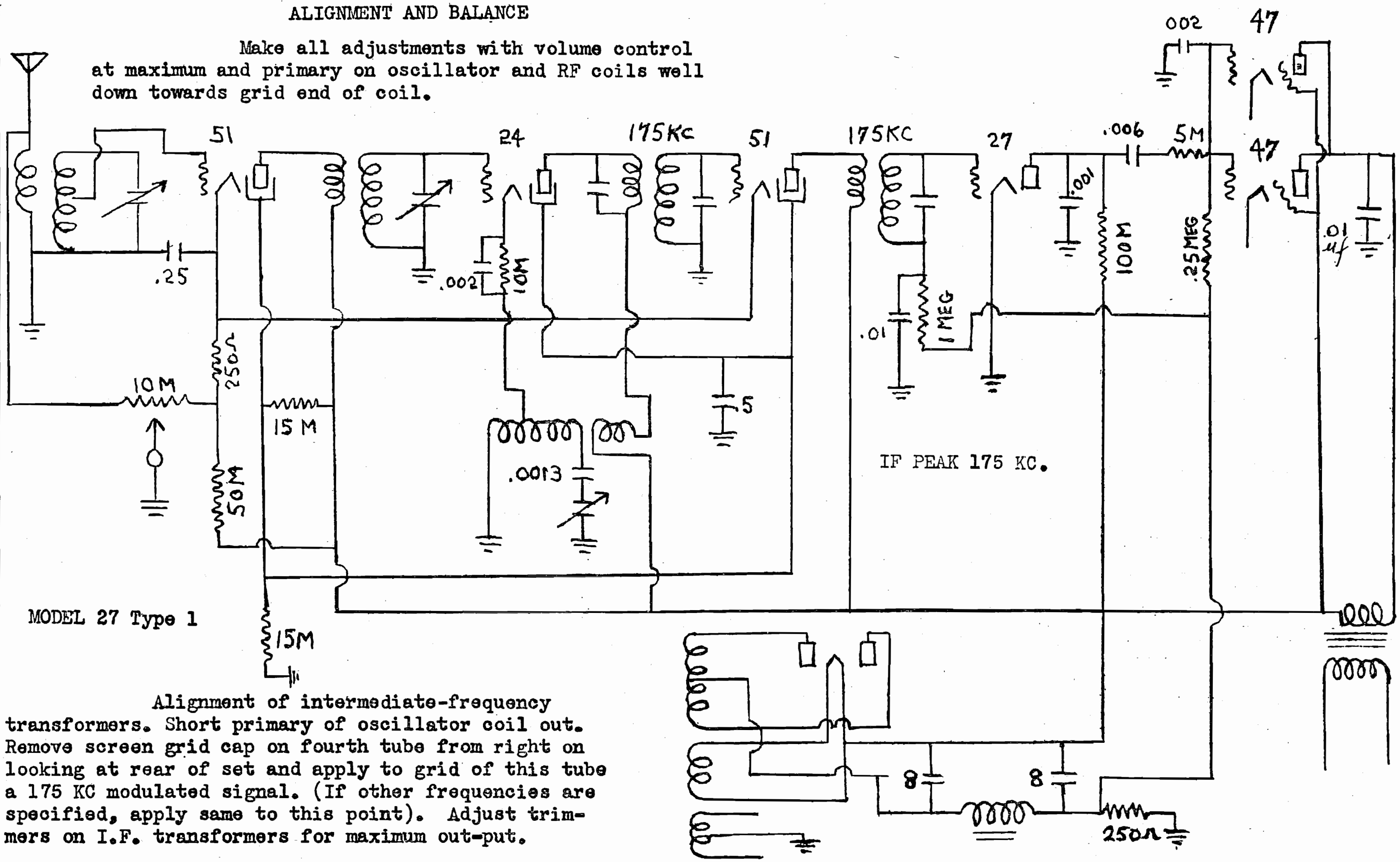
With external signal generator or grid dip oscillator adjust trimmers on R.F. and detector coil (shielded coils). The trimmers on these two should be tightened to maximum and loosened one full turn. With variable condenser at minimum, resonate these circuits for maximum out-put. (If set does not resonate without much variance in capacity of trimmer, remove shield cans and look for shorted turns in coil.) Reset variable at 5 degrees toward maximum and adjust trimmers on antenna and band pass coils, for maximum output. Set signal generator at 900 KC and resonate by bending plates on variable condenser. Repeat this operation at 655 KC and 550 KC. If set oscillates after balancing loosen gain screws and R.F. and detector coils $1\frac{1}{4}$ turns and repeat above operation.

JACKSON-BELL CO., LTD.

MODEL 27 Type 1

ALIGNMENT AND BALANCE

Make all adjustments with volume control at maximum and primary on oscillator and RF coils well down towards grid end of coil.



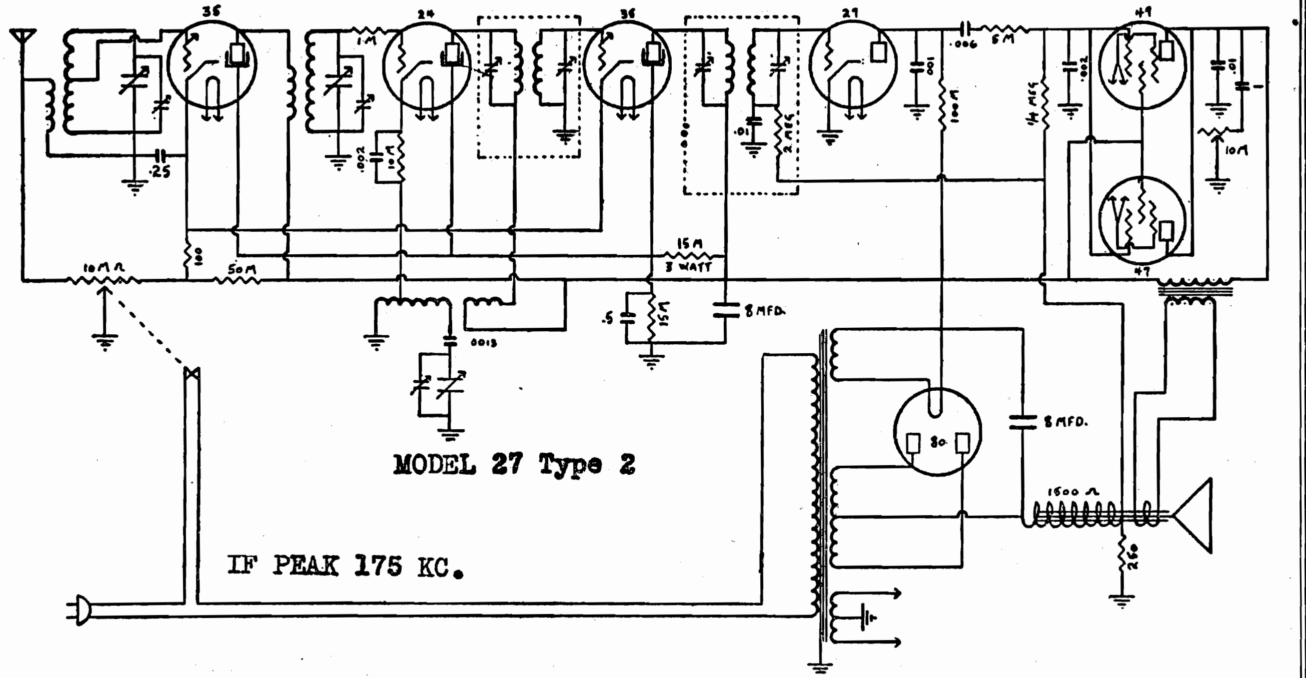
MODEL 27 Type 1

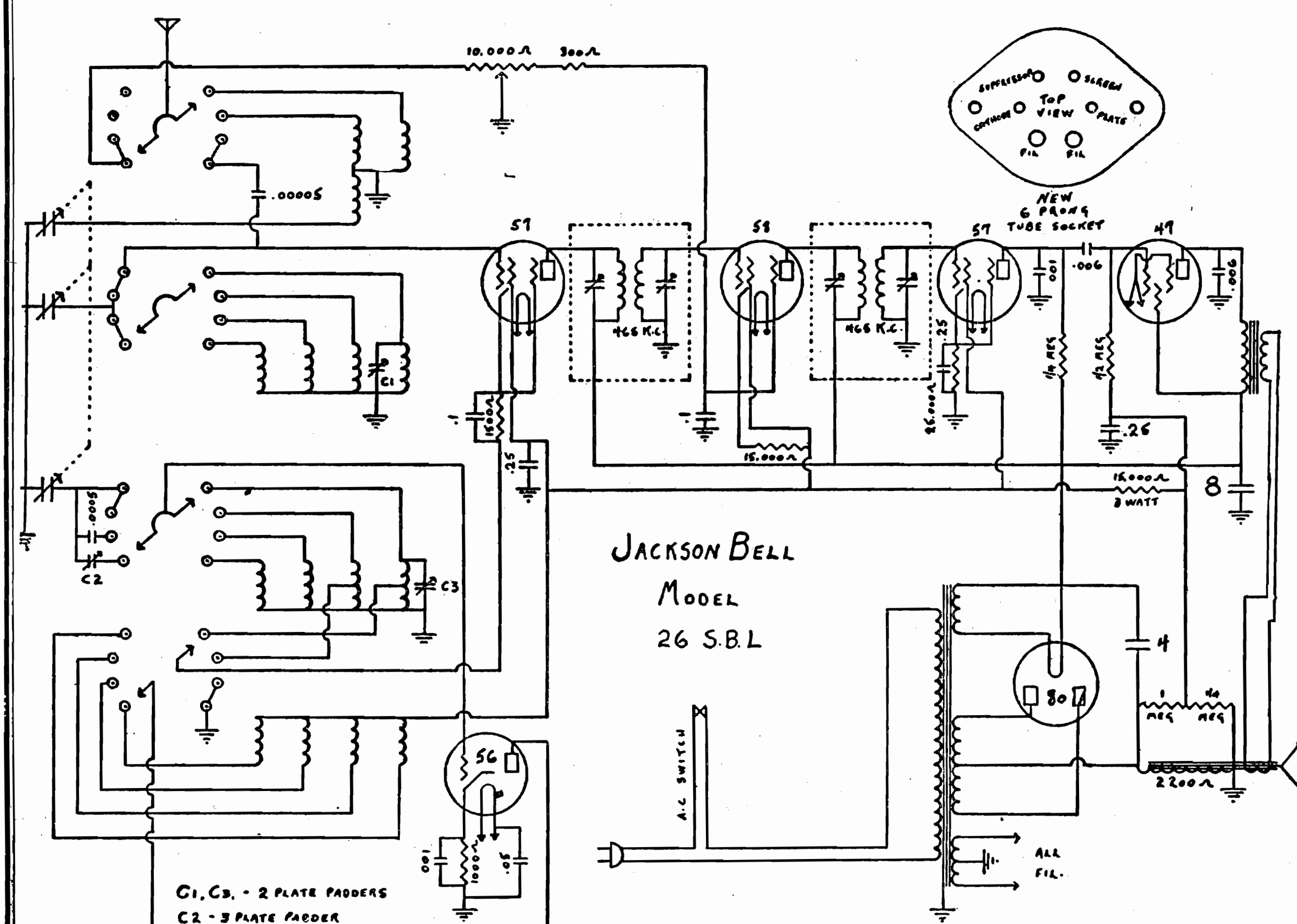
Alignment of intermediate-frequency transformers. Short primary of oscillator coil out. Remove screen grid cap on fourth tube from right on looking at rear of set and apply to grid of this tube a 175 KC modulated signal. (If other frequencies are specified, apply same to this point). Adjust trimmers on I.F. transformers for maximum out-put.

If set oscillates, slide primary coil of oscillator towards ground end until oscillation ceases. If this does not cure the trouble, readjust intermediates with variable set at 600 KC. Also, check grid suppressor for open or short in grid lead of RF.

MODEL 26-SBL
MODEL 27 Type 2

JACKSON-BELL CO., LTD.





JACKSON-BELL CO., LTD.

MODEL 28
Schematic
Service Notes

POOR QUALITY.

Usually caused by $\frac{1}{2}$ meg. resistor in grid of 47 tube grounded to chassis, bad coupling condenser or resistor reversed in drop across speaker-field. Be sure 100M resistor is in ground end of drop.

In all the above cases there will be a noticeable increase in hum.

All resistors should be checked for accuracy.

If tone is too deep with tone control off, check same making sure it opens up in off position.

MOTORBOATING

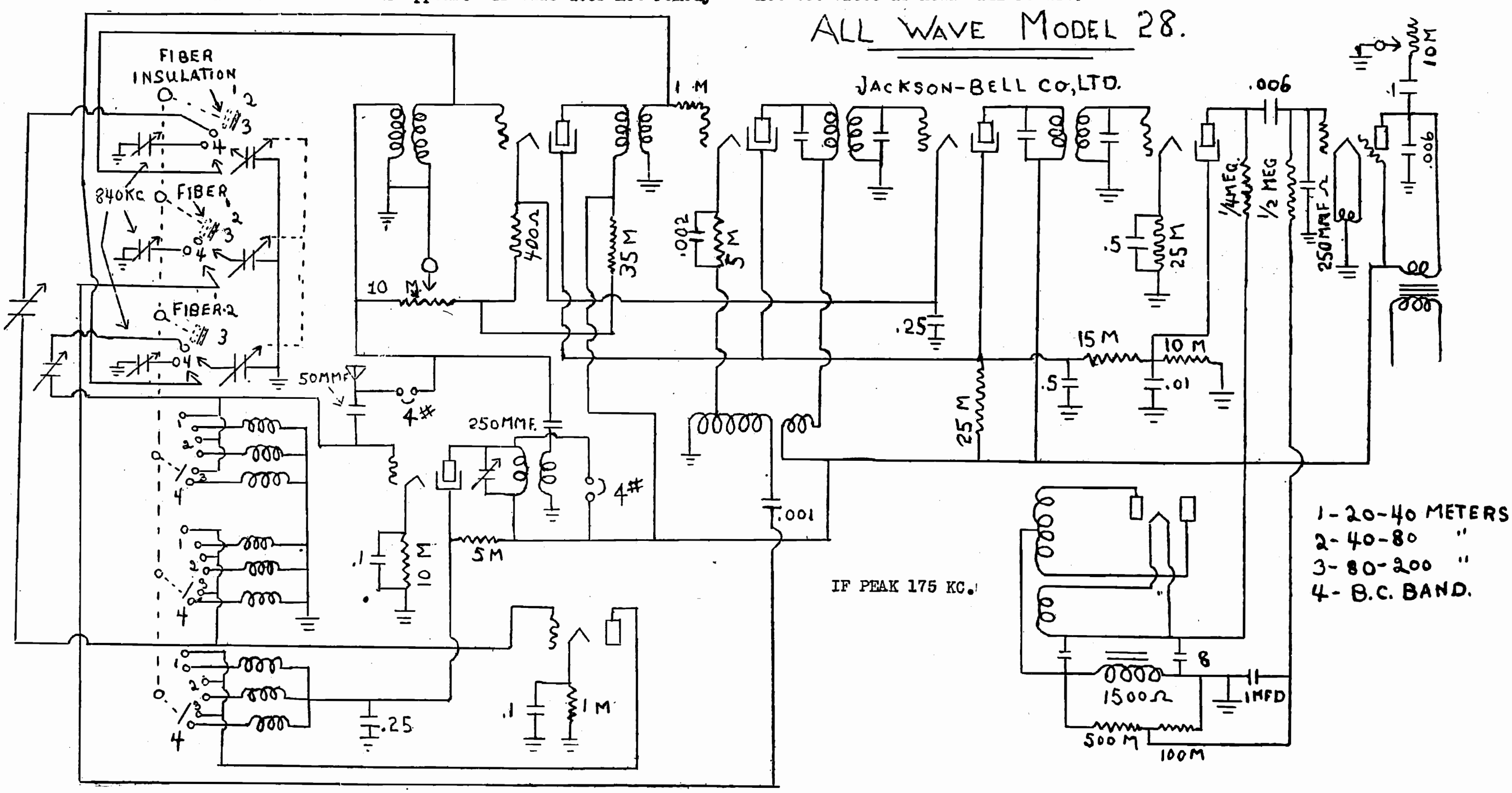
This condition usually occurs at high frequency end of broadcast band, with variable at minimum position. Change oscillator tube and trouble will in most cases disappear. If this does not remedy trouble, move primary on oscillator coil slightly toward grid end of coil.

At all times make sure lead from first section of variable to switch is as far towards front of set as possible to prevent inter-coupling.

HOWL

Make sure set is not pushed too far forward in cabinet or resonate howl will occur. Loosen bolts in bottom of cabinet and slide chassis as far back in cabinet as shafts will permit. If this does not cure trouble, remove chassis and loose bolts holding variable, making sure rubber supports holding same are intact and variable is floating in same.

If set has been realigned be sure plates in variable are not too close as howl will result.



MODEL 28
Alignment Data

JACKSON-BELL CO., LTD.

ALIGNMENT AND BALANCE

MODEL 28 ALL-WAVE SUPER-HETERODYNE

1st.

Make all adjustments with volume control at maximum.

To align 175 KC I.F. stage -
Set switch in broadcast position and short out middle, or oscillator section of variable condenser. Apply 175 KC modulated signal to front section of variable condenser or grid cap. Chassis must be grounded to 175 KC oscillator. Remove 27 and 24 short-wave tube beside I.F. transformer and adjust all I.F. trimmers to maximum output. This should be checked by an output meter.

2nd.

To align Broadcast Band.
Close variable condenser and set dial at last division marker past 550 KC. Open variable condenser to 1350 KC and with 1350 KC modulated oscillator signal. Adjust middle or oscillator section trimmer of variable condenser to maximum response. R.F. and antenna section of trimmers are adjusted likewise at this frequency. Signal generator at 850 KC. Set dial at 850 KC and resonate by bending of slit plates on variable condenser. Repeat above at 650 KC and 550 KC.

3rd.

To align 840 KC Short-wave I.F.
Place the type 24 and 27 short-wave tubes back in the chassis, and after they have warmed up, turn wave selector, short-wave, to any one of the short-wave positions. Connect output of 840 KC modulated signal generator to grid cap of short-wave 24 tube. Note:- When short-wave is in short-wave position the variable condenser no longer tunes the broadcast coils. These are tuned to 840 KC by means of large trimmer condensers, adjusted from top of chassis beside variable condenser. Each 840 KC trimmer is beside the section of the variable condenser which it substitutes for. Note:- In location where a broadcast station is on or too close to 840 KC, adjust above or below if interference is encountered.

4th.

To align short-wave oscillator and modulator.
Note:- In the short-wave bands the front and rear of the variable tuning condenser, are connected in series with semi-variable padding condensers. These reduce the effective tuning cap of the tuning condenser to the low value necessary for tuning the short-wave coils.

In the absence of the short-wave signal generator, the broadcast signal generator may be set to 1000 KC. This will give harmonics on short-wave at 150 Meters, 100, 75, 60, 50, 42.8, 37.5, 33.3 and 30 meters. The best harmonic to use is the 75 meter one as it is just below the amateur 85 meters phone band.

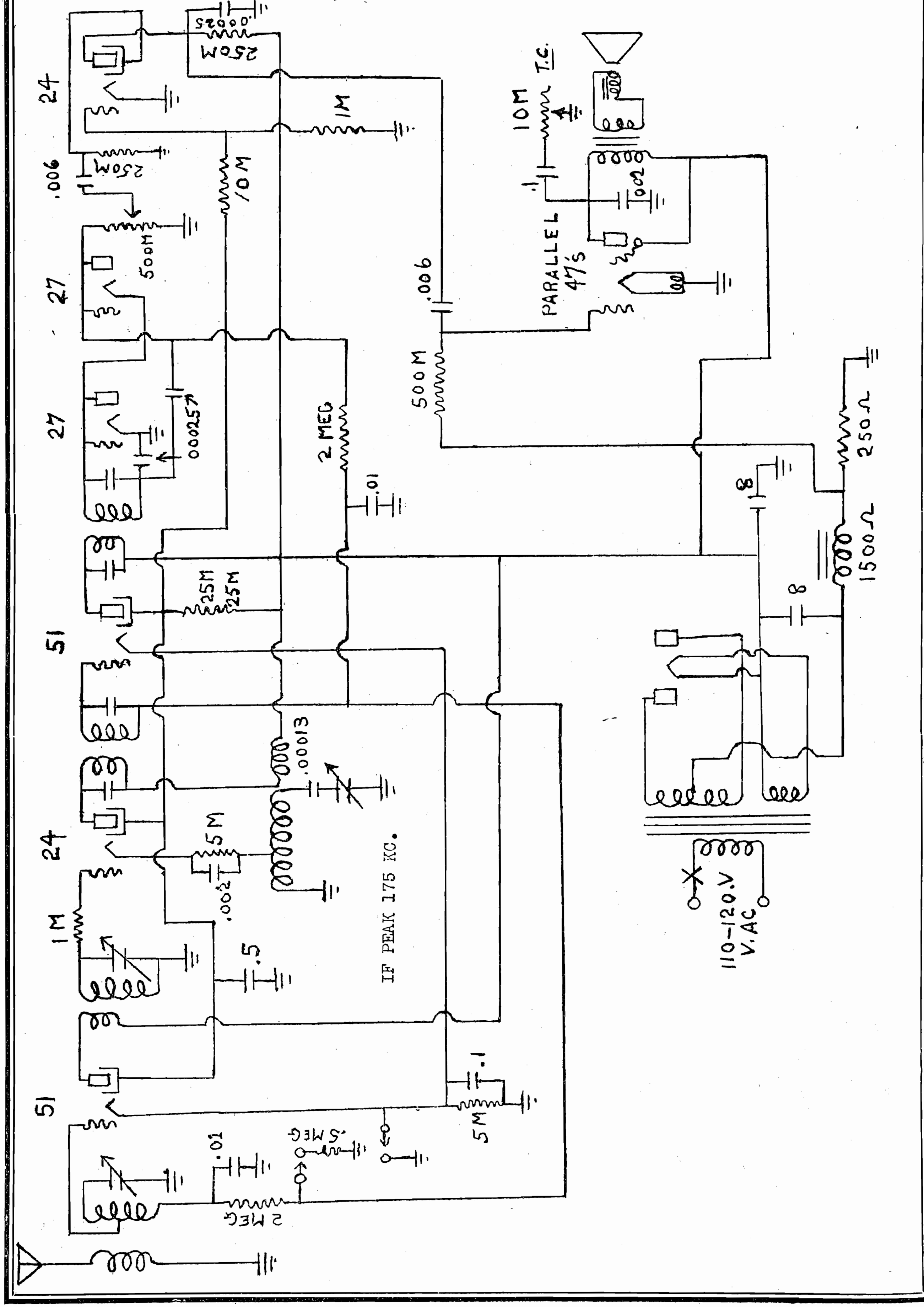
Lift front of chassis up until set lays on its back. Three trimmer condensers will be seen in upper left hand corner of chassis. These are reading from top to bottom. The short-wave oscillator padder (in series with front section of tuning condenser). The short-wave modulator padder (in series with the rear section of tuning condenser), and last the trimmer tuning the modulator plate choke to 840 KC.

With the wave selector short-wave in 40 to 80 meters position and signal generator at 1000 KC. Adjust the top or short-wave oscillator padding condenser until the harmonics appear in their proper places at 75, 60 and 50 meters. Note:- Disregard weaker intermediate harmonics. Then adjust the short-wave modulator padder for maximum response. Note:- The tuning condenser must be swung back and forth across the signal when this is being done as it effects the oscillator tuning. The tuned choke trimmer is then packed on any signal.

The harmonics in the 20-40 meter band will be only approximately correct because of extremely high frequencies involved. However, they will be within one meter correct on this band.

MODEL 29
Schematic

JACKSON-BELL CO., LTD.



MODEL 29
Alignment Data

JACKSON-BELL CO., LTD.

POOR QUALITY. Poor quality may also be due to defective tubes or in case all tubes are O.K. check the ½ meg. ohm resistor in the grid circuit of the 47 tubes, as this value is extremely critical. Check coupling condenser for open short or leakage. If tone is too deep you will find the by-pass condenser on plate of 47 tube will be incorrect. This value should be .002. Check by-pass condenser on plate of first audio tube to ground, which value is .00025. If tone is too deep you will find a .002 in PZ plates to ground either short or leaky. Check .1 condenser from plate of 47 tubes to tone control. This will also cause a lack of bass if condensers are open. Check tone control for short, open or ground.

HOWL. Make sure set is not pushed too far forward in cabinet or resonant howl will occur. Loosen bolts in bottom of cabinet, slide chassis as far back as shaft will permit. If this does not cure trouble, remove chassis and loosen bolts holding variable making sure same is free floating. Make sure shield is not making contact with variable as shield is insulated from variable by rubber grommet. If set has been realigned be sure plates in variable are not too close as a howl will result when volume is turned up.

ALIGNMENT AND BALANCE. Make all adjustments with volume control at maximum. Before aligning set, be sure all tubes are in their correct position, primary on oscillator and R.F. coil are well down towards grid end of coil.

1st. Alignment of intermediate frequency transformer.
Put set in operation, short primary of oscillator coil out. Remove screen grid cap on fourth tube from the right looking at rear of set. Apply at this point 175KC modulated signal. (If other frequencies are desired apply same to this point). Adjust trimmers on I.F. transformers for maximum out-put. Adjust trimmers on second I.F. transformer first.

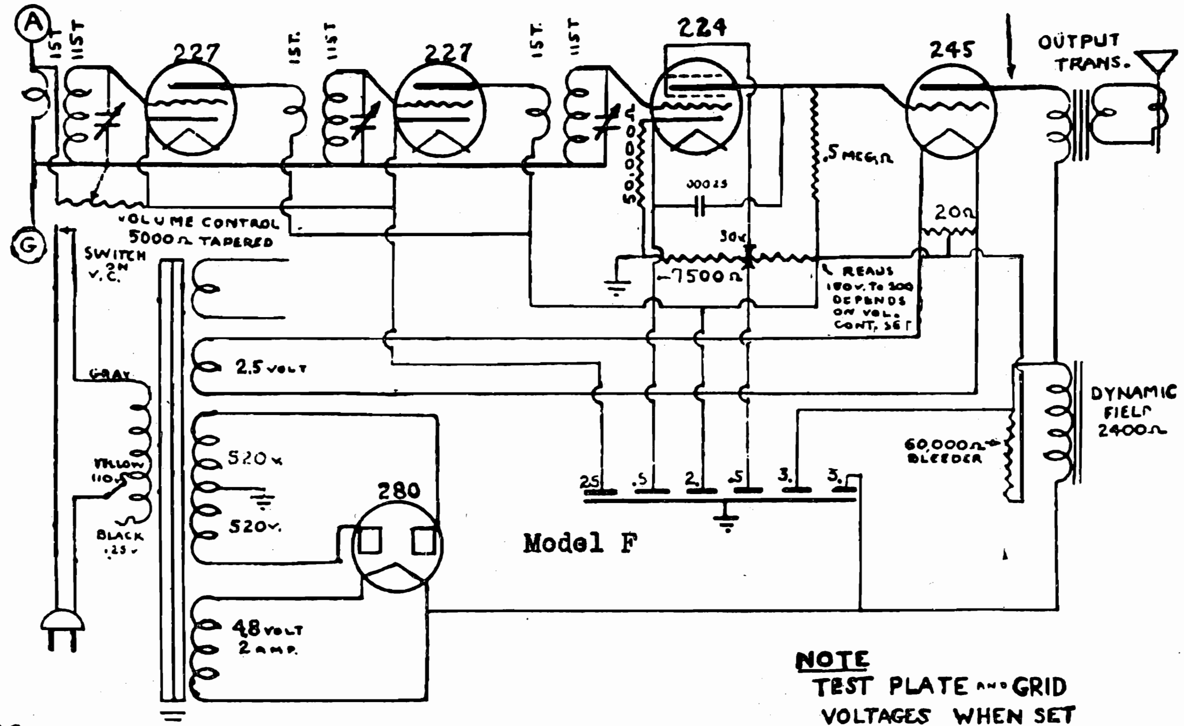
2nd. Broadcast alignment.
With intermediate aligned to their proper frequency remove wire shorting primary of oscillator coil, placing grid cap back on oscillator tube. Set dial marker at last division on minimum side of scale. With external signal generator adjust trimmers at 1350 KC. Adjust oscillator trimmer first and resonate other two trimmers for maximum out-put. Set signal generator at 850 KC and bend plates of variable to bring set in resonance at this point. Repeat this operation at 700 KC and again at 575 KC.

If set oscillates check all connections, slide primary coil to oscillator towards ground end until oscillation ceases. If this does not cure the trouble, readjust intermediate trimmers with variable set at 600 KC. Also check grid suppressor for open or short in grid lead of R.F. All above adjustments in using a signal generator with meter in out-put should be made with selector switch on distance, or number three position.

In case signal generator is not used place out-put meter from .C as heretofore described to ground and balance set on incoming signals for maximum out-put.

KELLER-FULLER

MODEL F
MODEL M



SERIALS # 10000 to # 10998 USE ONE FILAMENT WINDING

10999 up HAS SEPARATE WINDING FOR 245

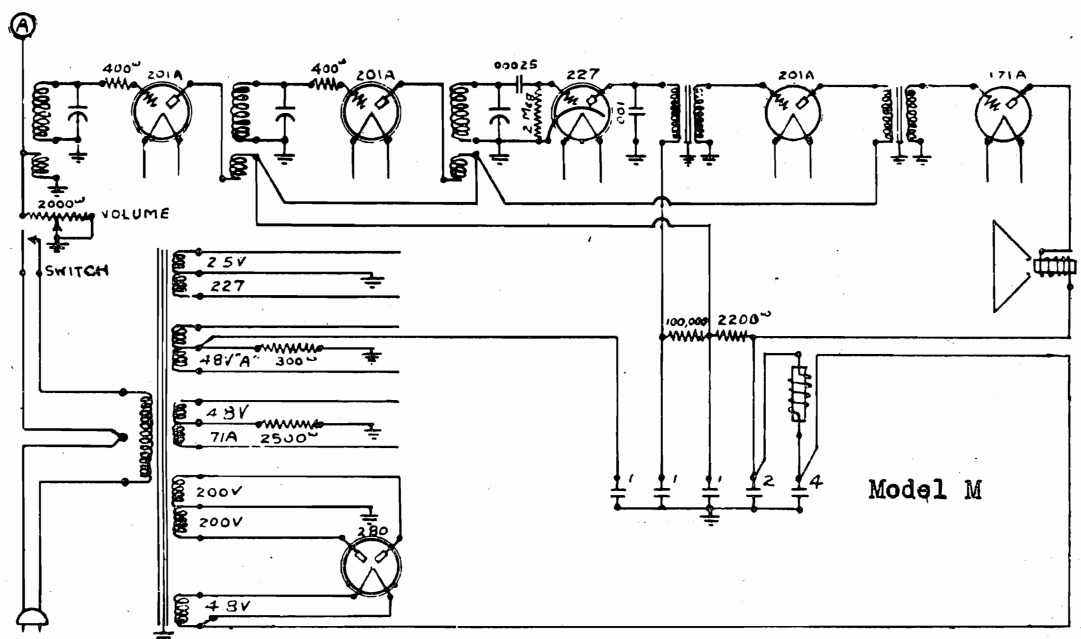
NOTE

TEST PLATE AND GRID VOLTAGES WHEN SET IS IN RESONANCE

USE HIGH RESISTANCE VOLTMETER

HETZEL

JUNE 1930



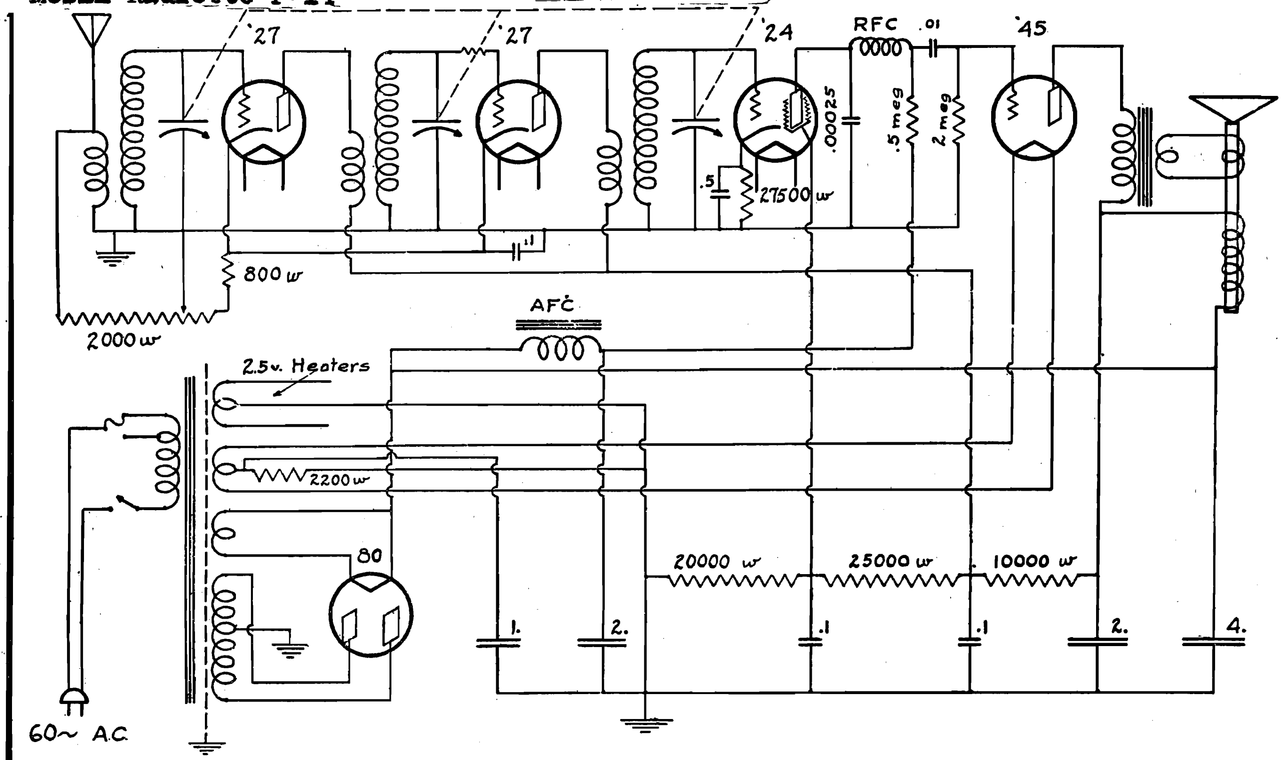
ORIGINAL
MODEL – M

ccc

JAN – 1930

MODEL Radiette F-12
MODEL Radiette F-14

KELLER-FULLER

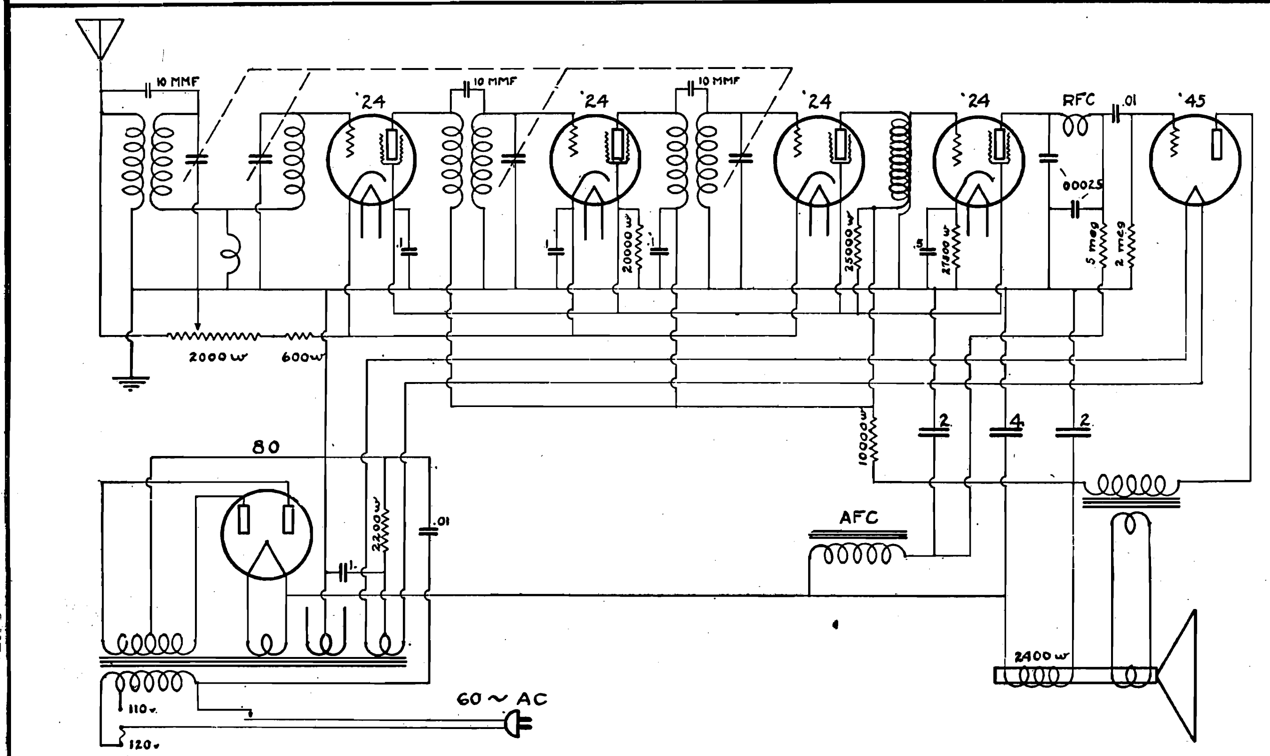


MODEL
F-12

RADIETTE
KELLER FULLER MFG. CO. LTD.
LOS ANGELES, CALIF.

July 14, 1930

Drawn	7-14	CEM
Checked	7-14	AVD
Traced	7-15	CEM



MODEL
F 14

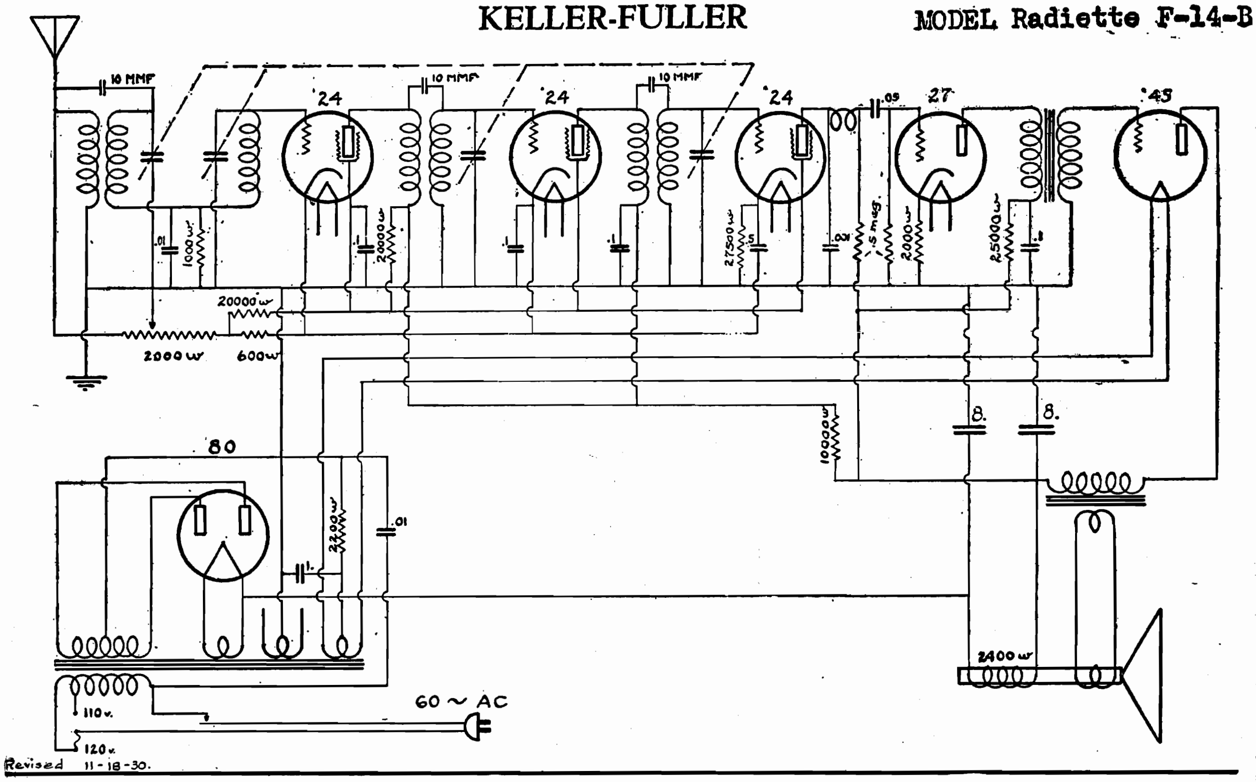
RADIETTE
KELLER FULLER MFG. CO. LTD.
LOS ANGELES, CALIFORNIA.

SEPTEMBER 30, 1930

Drawn	9	30	CEM
Checked	9	30	AVD
Traced	10	1	CEM

MODEL Radiette F-14-A
MODEL Radiette F-14-B

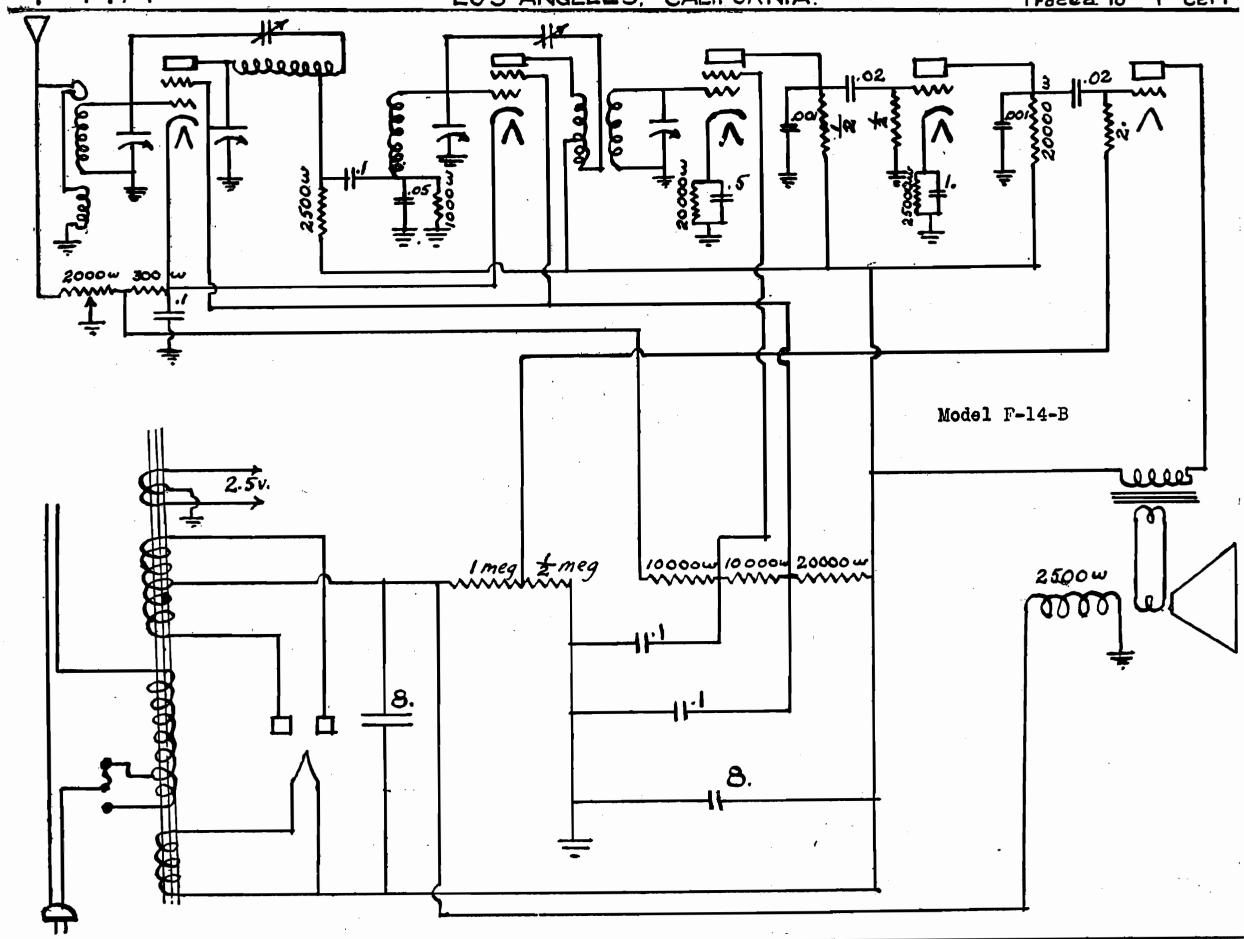
KELLER-FULLER



MODEL F 14 A

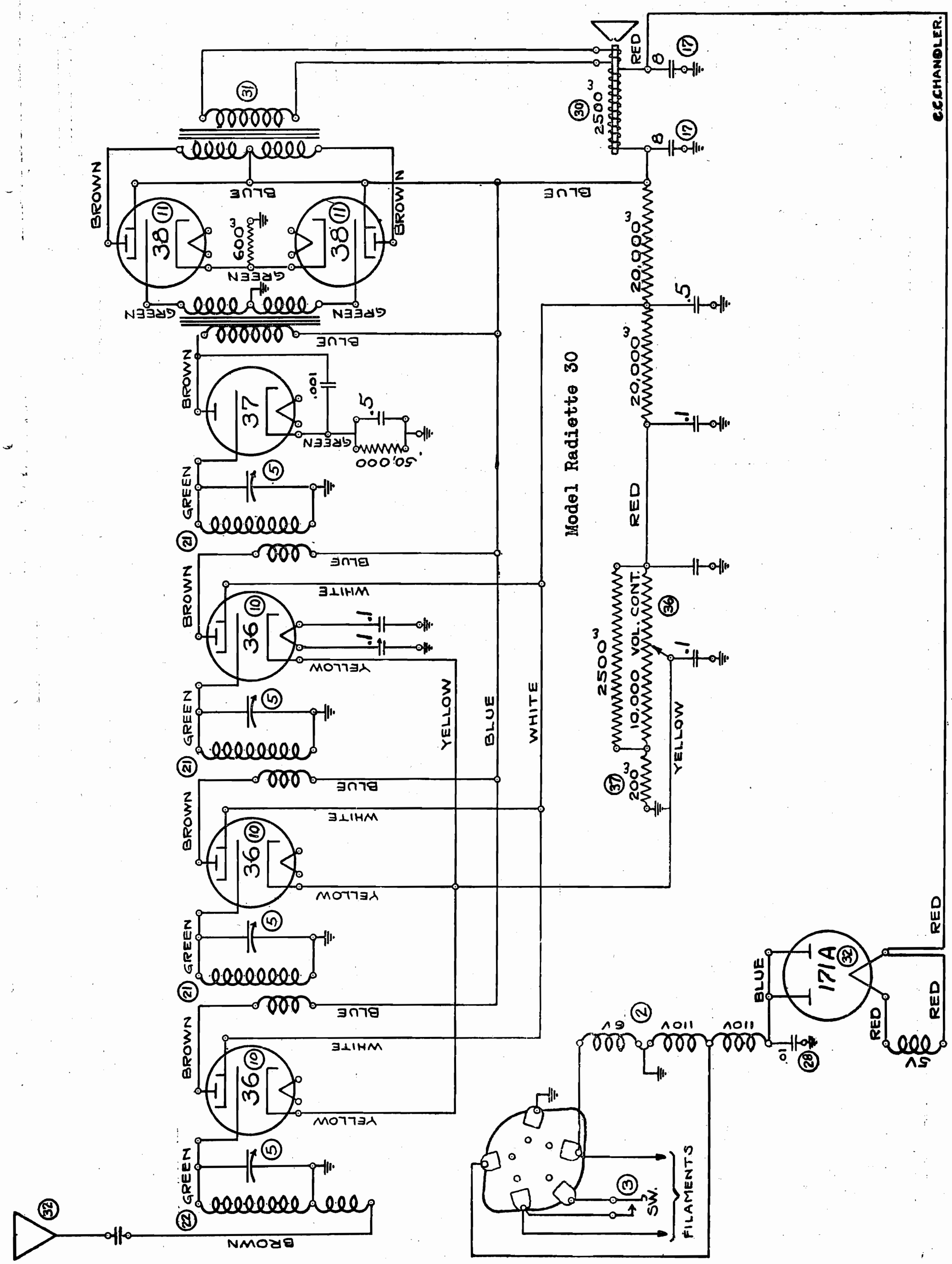
RADIETTE
KELLER FULLER MFG. CO. LTD.
LOS ANGELES, CALIFORNIA.

SEPTEMBER 30, 1930
Drawn 9 30 CEM
Checked 9 30 AVD
Traced 10 1 CEM



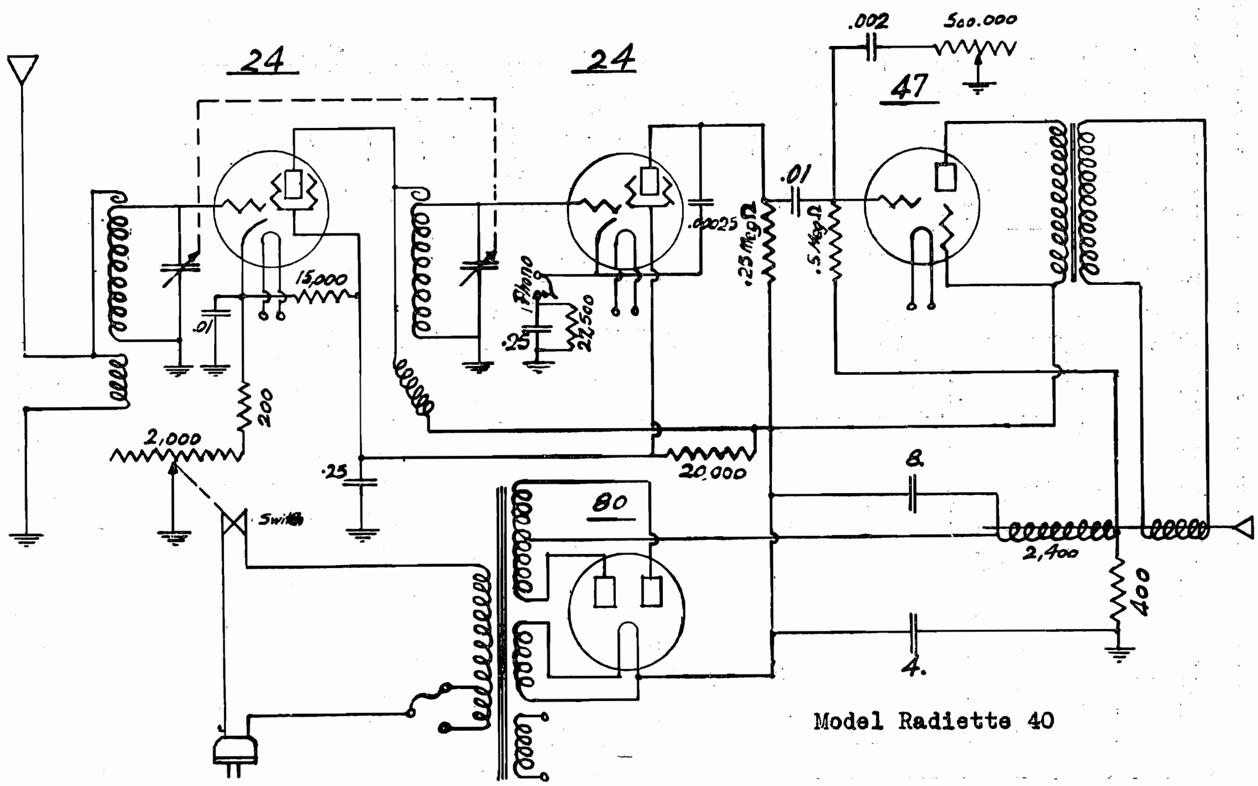
MODEL Radiette 30

KELLER-FULLER

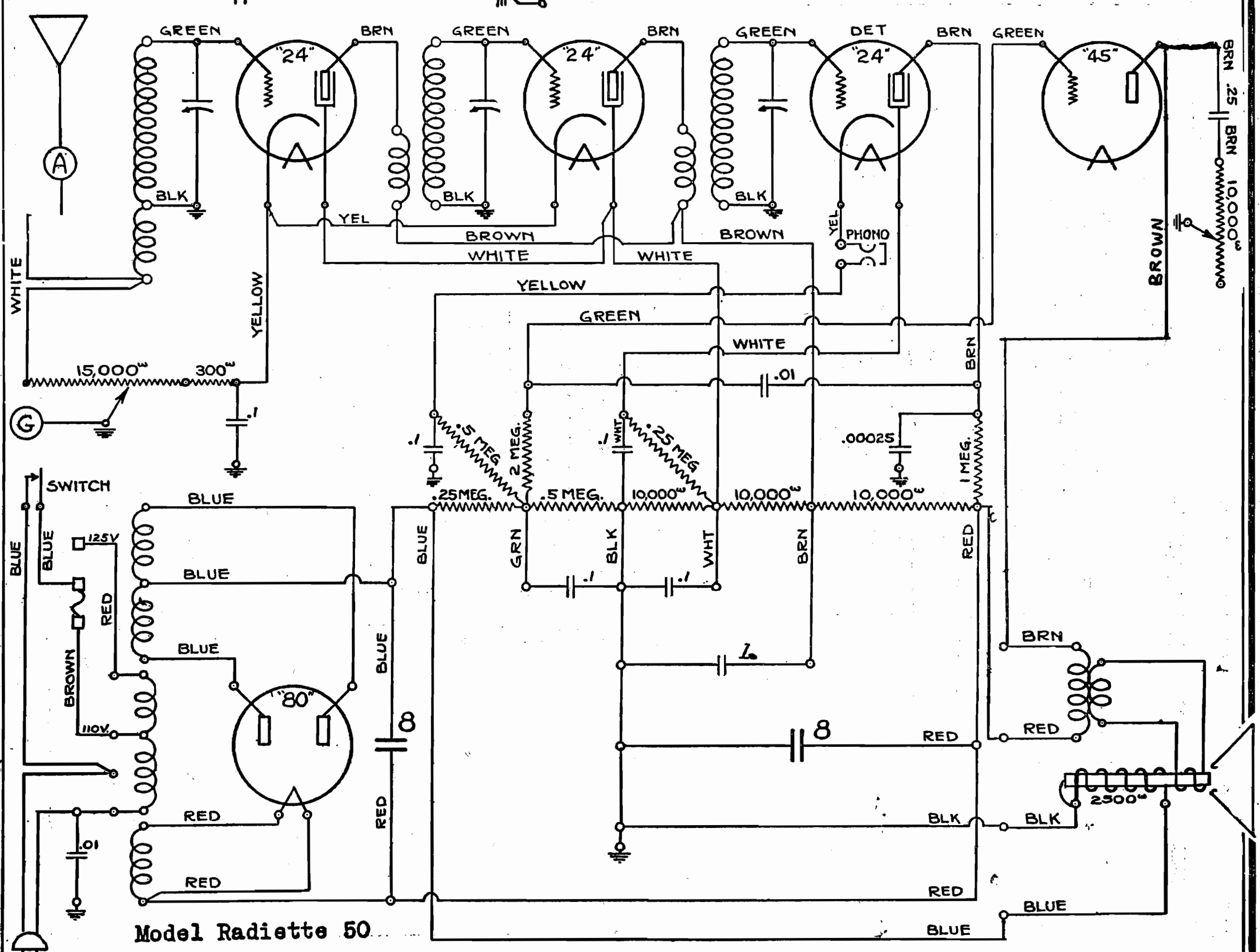


KELLER-FULLER

MODEL Radiette 40
MODEL Radiette 50



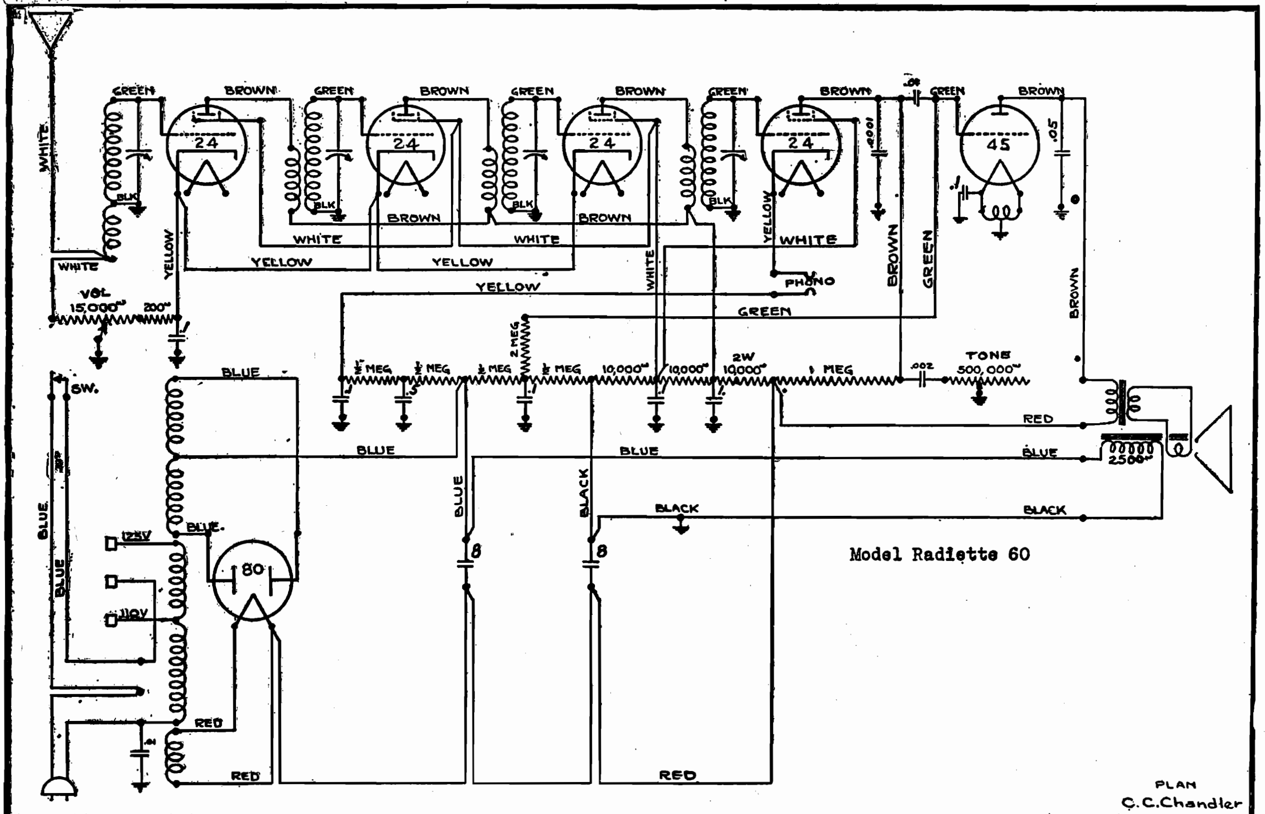
Model Radiette 40

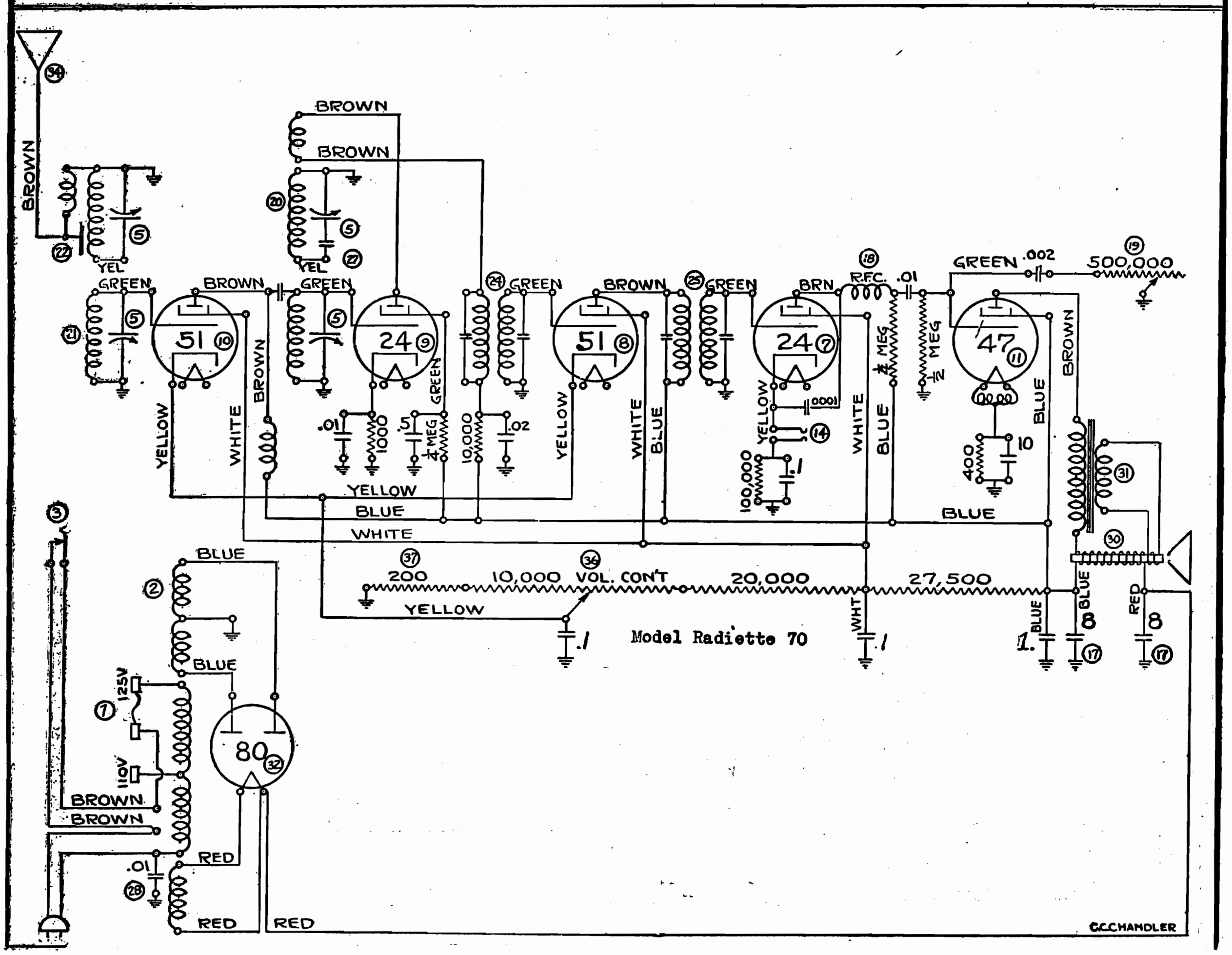


Model Radiette 50

MODEL Radiette 60
MODEL Radiette 70

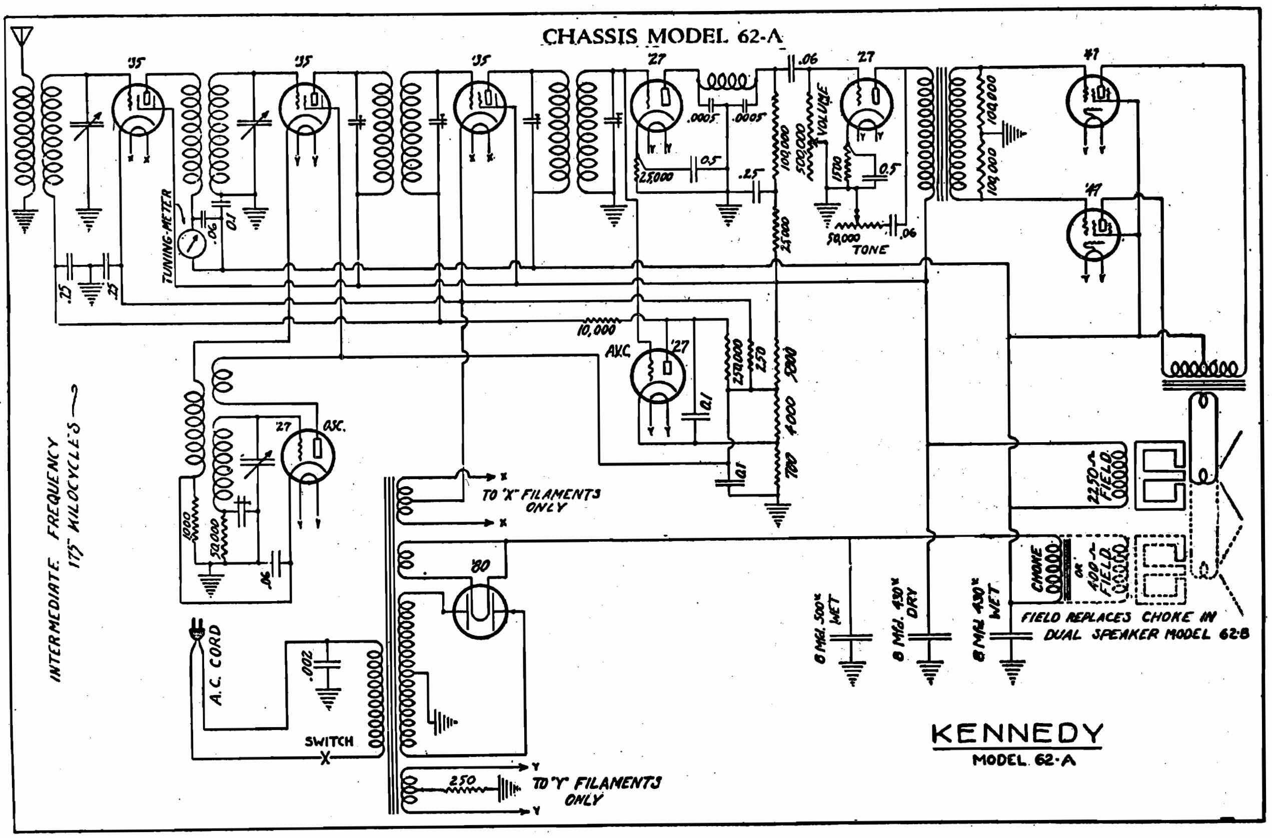
KELLER-FULLER





MODEL 62-A
Schematic

COLIN B. KENNEDY CORP.



The tubes employed are as follows, and are operated at normal voltages and biases:

Radio frequency	235	Second detector	227
Mixer	235	Automatic Vol. Control ..	227
Intermediate frequency	235	First Audio	227
Oscillator	227	Power	247

Rectifier 280

To accommodate the automatic circuits it will be noted that the long wave R.F. and I.F. tube filaments and cathodes are biased positively about 100 volts above ground. When the AVC tube receives a signal it draws current (being normally biased to cut-off) through the 250,000 ohm resistor. The voltage drop across this resistor is then applied to the automatically controlled grids as additional bias. An inspection of the circuit diagram will clarify this simple and efficient AVC action.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is most readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the station if the oscillator is correct. Other "harmonic" points may also be tried.

MODEL 62-A
Alignment
Socket

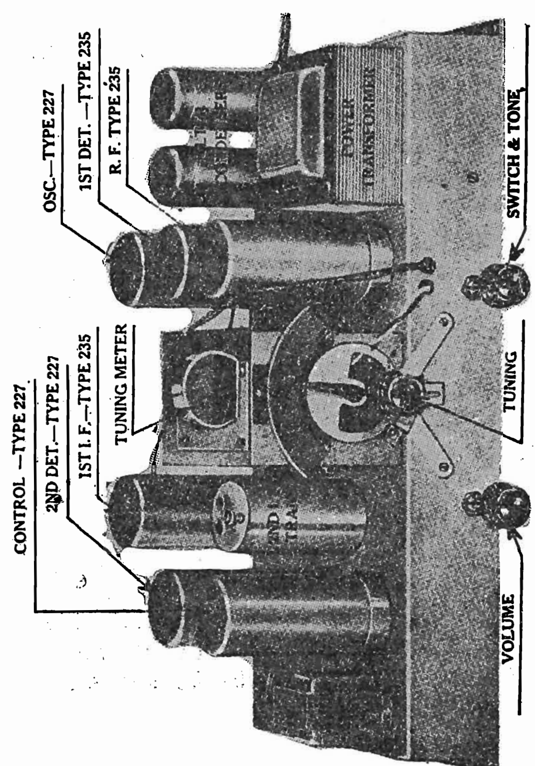
COLIN B. KENNEDY CORP.

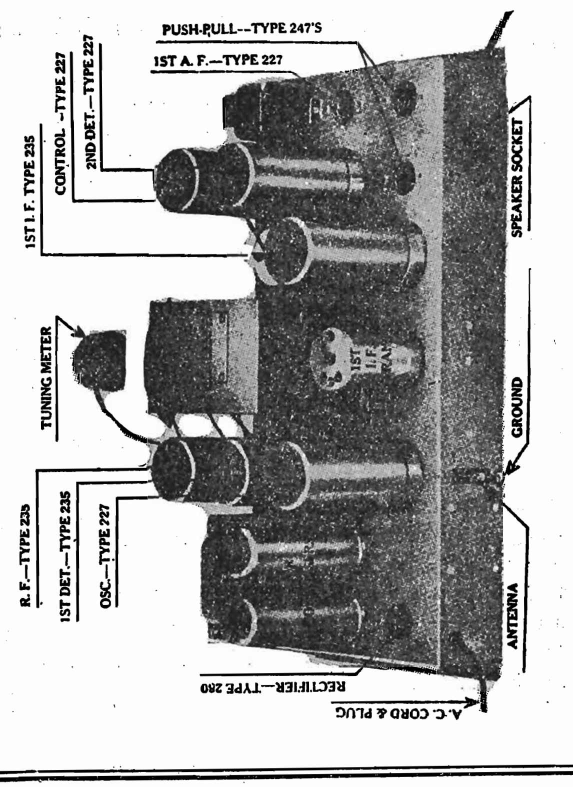
Remove the grid clip from the top of the first detector tube and fasten a short length of wire to the grid terminal of this tube. Lay this wire sufficiently near the 175 K.C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K.C., adjust the trimmers in the tops of the I.F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale", move oscillator farther from set and wire, thereby reducing input energy. If these I.F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the 1st I.F. tube and adjust the second transformer alone, at first, then moving wire to detector grid and proceed as above.

The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering the broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire.

The receiver and oscillator are first tuned to approximately 1,500 kilocycles, and by watching the output indicator, the three condenser trimmers (reached through three holes in top-right of condenser shield, or, in some cases, through removable plate) are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

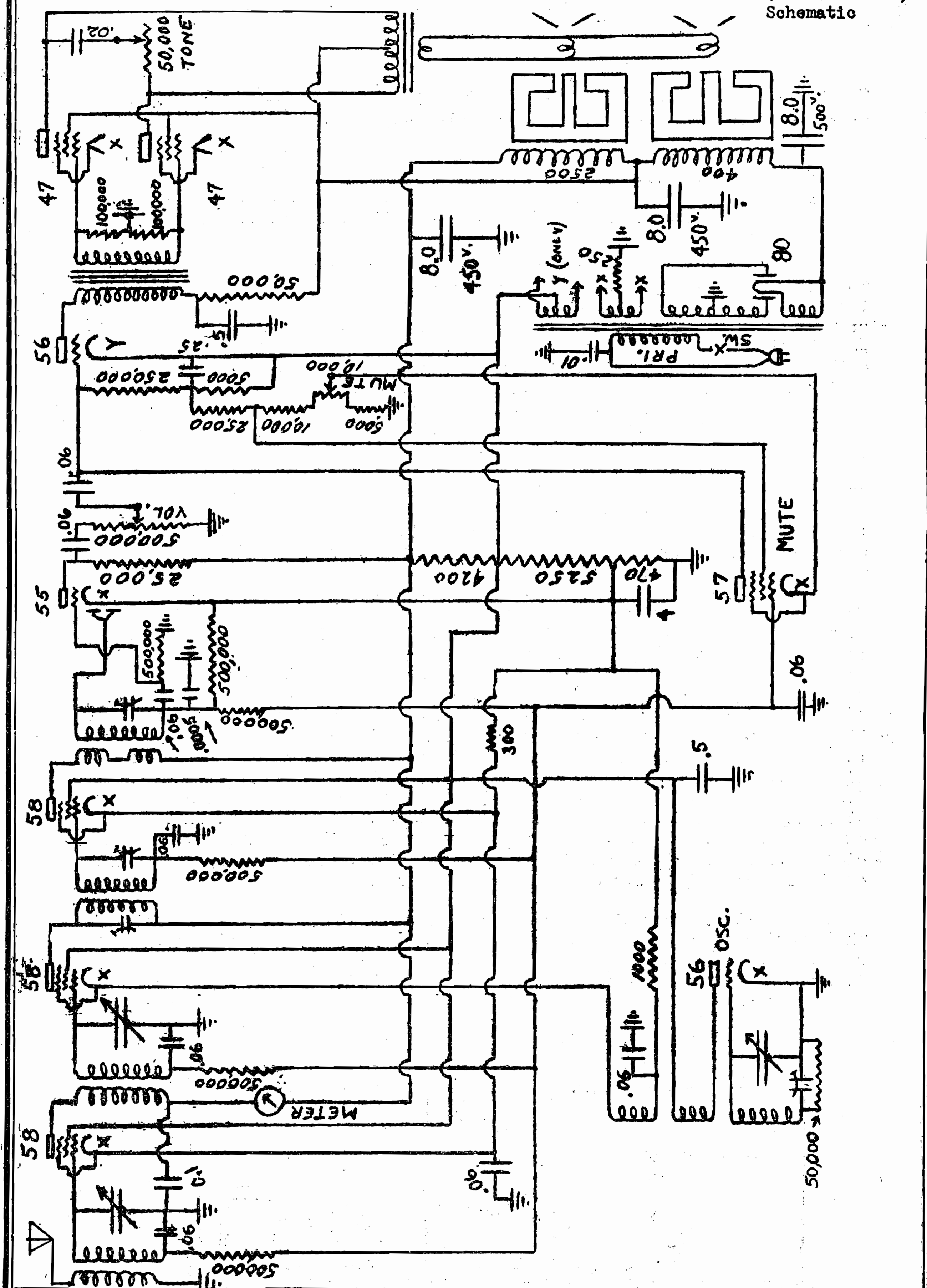
The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser (through hole in rear of condenser shield) for maximum response. If necessary to adjust the two R.F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band", it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.





COLIN B. KENNEDY CORP.

MODEL 882-62D
(Chassis 62-D)
Schematic



MODEL 882-62D
(Chassis 62-D)
Alignment
Socket

COLIN B. KENNEDY CORP.

The tubes employed are as follows, and are operated at normal voltages and biases (except the noise suppression, or muting, tube):

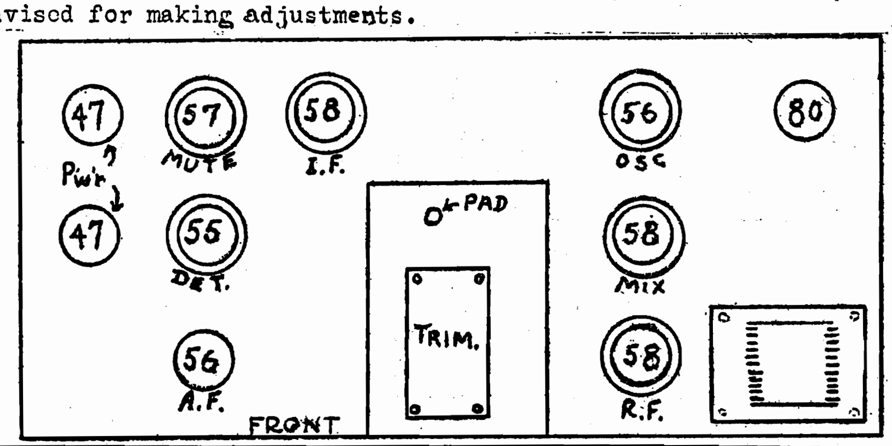
Radio frequency	58	Second Detector & A.V.C.	55
Mixer	58	First audio	56
Intermediate frequency...	58	Power	247
Oscillator ....,	56	Rectifier	280

Noise Suppressor ... 57

To accommodate the "Hush", or noise suppressor, circuit it will be noted that the filament and cathode of the first audio tube are biased positively about 95 volts above ground. Automatic volume control is obtained from the type 55 second detector, the voltage drop across the 500,000 ohm resistor (between Cath. and I.F. coil secondary) which is caused by the rectified signal being applied, through suitable filtering resistors, to the grids of the R.F., mixer, and I.F. tubes. The A.V.C. voltage generated also actuates the noise suppressor tube. When no signal is tuned in, there is no A.V.C. voltage applied to the grid of the suppressor tube, permitting it to draw plate current. The plate current thus drawn comes from the cathode of the first audio tube (cathode being positively biased) through the 5,000 ohm resistor and 250,000 ohm grid leak, causing a sufficiently high bias to be applied to the grid of the audio tube (voltage drop across grid leak) to completely stop plate current and thus all noise. Variation in the amount of suppression is obtained by manually varying the bias on the suppressor tube.

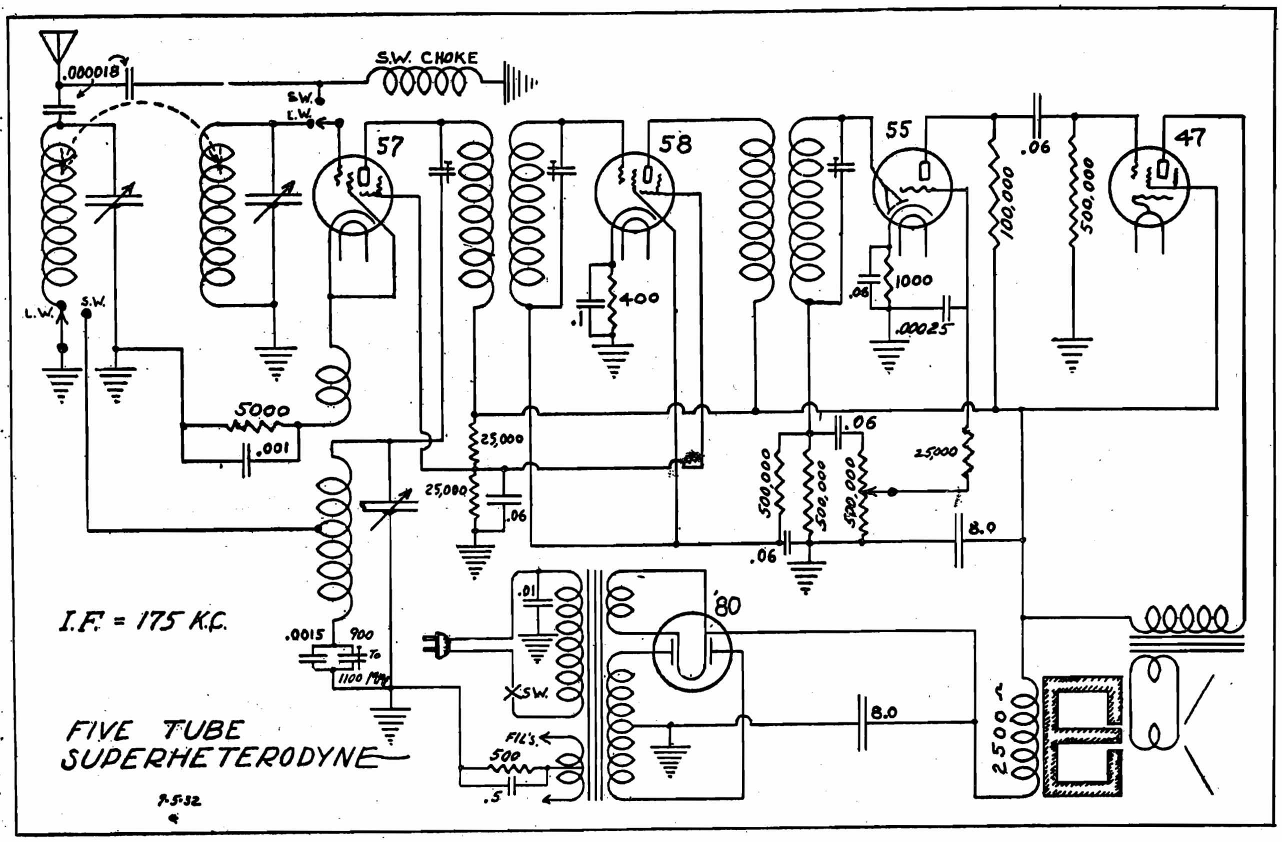
In aligning, first properly adjust the intermediate frequency transformers - preferably with a 175 K.C. oscillator fed into grid circuit of first detector, or mixer, and adjusting for maximum reading of an output meter. The tuning circuits may next be adjusted, using an oscillator covering the broadcast band (feeding into antenna circuit) and the output meter. Tune receiver and oscillator first to some point near 1,500 K.C., and adjust the three condenser "trimmers" through large hole in condenser shield for maximum reading of output meter. Then retune receiver and oscillator to point near 550 K.C. and adjust oscillator "pad" condenser (through hole in rear of condenser shield) for maximum output. (Do not touch condenser trimmers after first adjustment at 1,500 K.C.) If further adjustment at 550 K.C. is necessary, bend slotted condenser end plates. Alignment at the two ends of the scale is usually sufficient. If desired to align at intermediate points, bend the proper sections of the slotted plates for maximum output reading.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments, particularly when altering capacities connected with the oscillator circuit. A bakelite, or non-metalic, screwdriver is advised for making adjustments.



COLIN B. KENNEDY CORP.

MODEL 563-A
(Chassis 63,63-A)
Schematic



The tubes employed are as follows, and are operated at rated voltages and biases:

Oscillator and Mixer 57
Intermediate frequency ... 58
Second Detector 55
Output 247
Rectifier 280

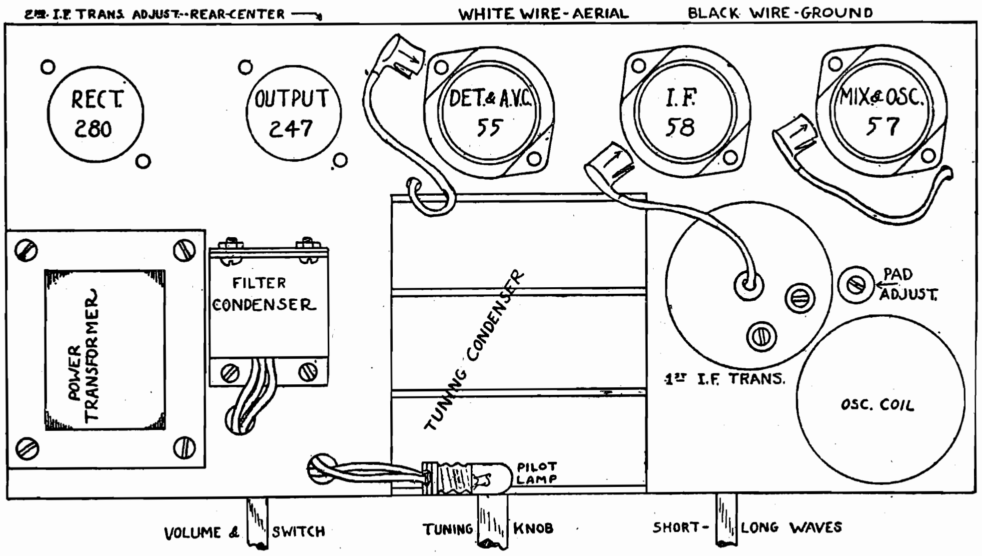
This receiver employs a combination oscillator and first detector, or mixer. The second detector is the new dual diode-triode, the diode portion acting as detector and providing automatic volume control - acting on the grid of the type 58 I.F. tube. The triode portion of the second detector is operated as an individually biased A.F. amplifier.

The first two variable tuned circuits are not electrically coupled. They are mutually coupled by being placed close together and left unshielded. In all other respects the circuits are entirely conventional.

In aligning, it is first desirable to see that the I.F. transformers are properly set. The first I.F. transformer is on top of the base and has two adjustments. The second is inside the base but its single adjustment may be reached through a hole in the rear-center of the base. The intermediate frequency is 175 K.C.

MODEL 563-A
(Chassis 63,63-A)
Alignment
Socket

COLIN B. KENNEDY CORP.



The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by means of an oscillator and output meter. The oscillator should cover the band from 550 to 1500 K.C. The energy from the oscillator is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire. The receiver and oscillator are first tuned to approximately 1500 K.C., and by watching the output indicator, the three condenser trimmers are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

The next step is to tune both receiver and oscillator to some point near 550 K.C. Here the alignment is made by adjusting the oscillator "pad" condenser for maximum response. It may be reached through hole in base near the first I.F. transformer. If necessary to adjust the two R.F. condenser sections, it may be done by bending the condenser end plates. If necessary to align at points other than the ends of the "band" it may be done by bending portions of the slotted end plates of the condenser rotor sections. Alignment of the two ends of the scale is usually quite sufficient.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit. Use an insulated or bakelite screw driver. No aligning, other than the I.F. transformers, is necessary for the short wave band (75 to 200 meters) as no attempt has been made to tune more than the oscillator.

Be certain that a good 57 tube is used in the first socket.

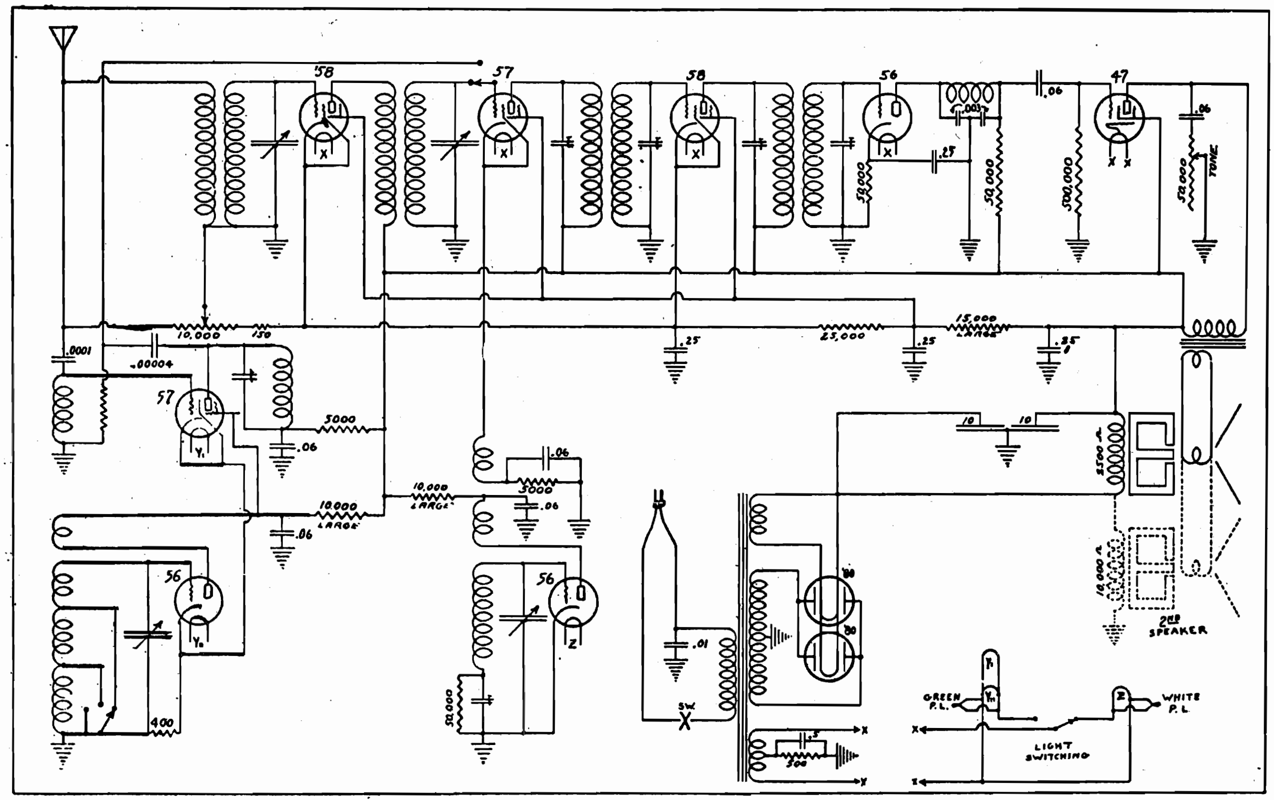
Service parts may be obtained by supplying a description of the part desired, as well as the model and serial numbers of the receiver.

MODEL 164-B
(Chassis 64-B)
Schematic

COLIN B. KENNEDY CORP.

Kennedy 10 Tube Long *and* Short Wave Receiver

CHASSIS MODEL 64 B



The tubes employed are as follows, and are operated at normal voltages and biases:

Short wave mixer	57	Long wave oscillator	56
Short wave oscillator .	56	Intermediate frequency ..	58
Radio frequency	58	2nd Detector	56
Long wave mixer	57	Output	247

Rectifier ...... 280's

For short wave reception the long wave mixer becomes an I.F. amplifier, while the long wave oscillator filament goes out. For long wave reception, the short wave oscillator and mixer filaments go out. These circuits are indicated above. The intermediate frequency used throughout is 175 K.C.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is more readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the

MODEL 164-B
(Chassis 64-B)
Alignment
Socket

COLIN B. KENNEDY CORP.

station if the oscillator is correct. Other "harmonic" points may also be tried. With the receiver switched to short wave position, remove the grid clip from the top of the S.W. mixer tube and fasten a short length of wire to the grid terminals of this tube. Lay this wire sufficiently near the 175 K.C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K.C., adjust the trimmers in the tops of the I.F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale", move oscillator farther from set and wire, thereby reducing input energy. If these I.F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the long wave mixer and adjust the last two transformers alone, at first, then moving wire back to S.W. mixer and proceed as before. It will be noted that the first I.F. transformer has but one adjustment.

The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering a broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire.

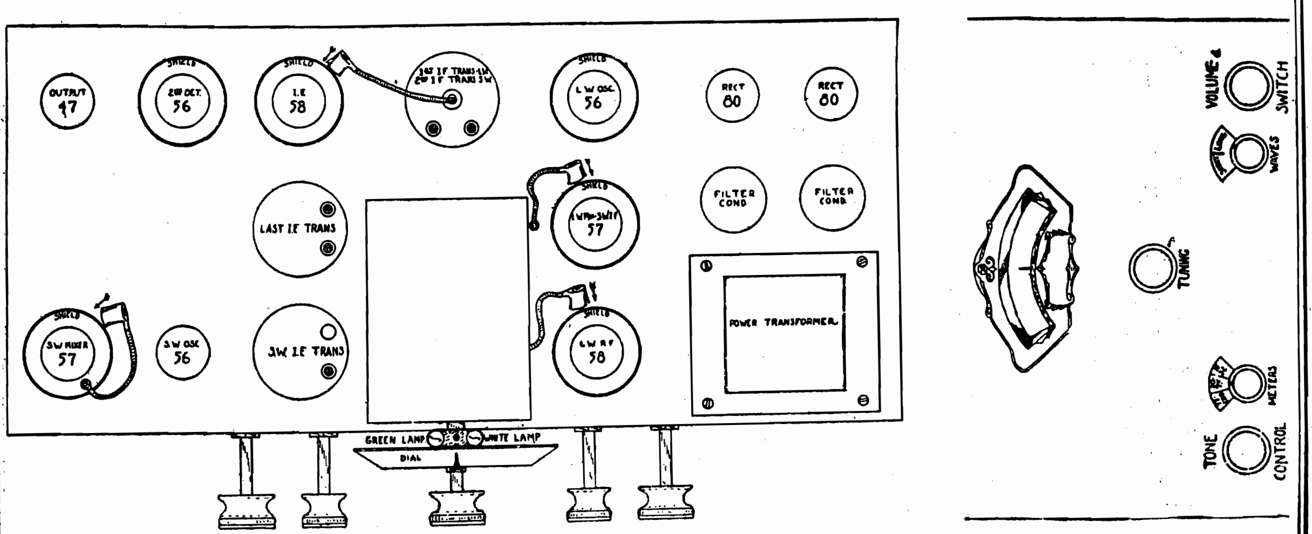
The receiver and oscillator are first tuned to appriximately 1500 kilocycles, and by watching the output indicator, the three condenser trimmers, reached through the removable plate, are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser for maximum response. It may be reached through hole in rear center of chassis base.

If necessary to adjust the two R.F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band", it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.

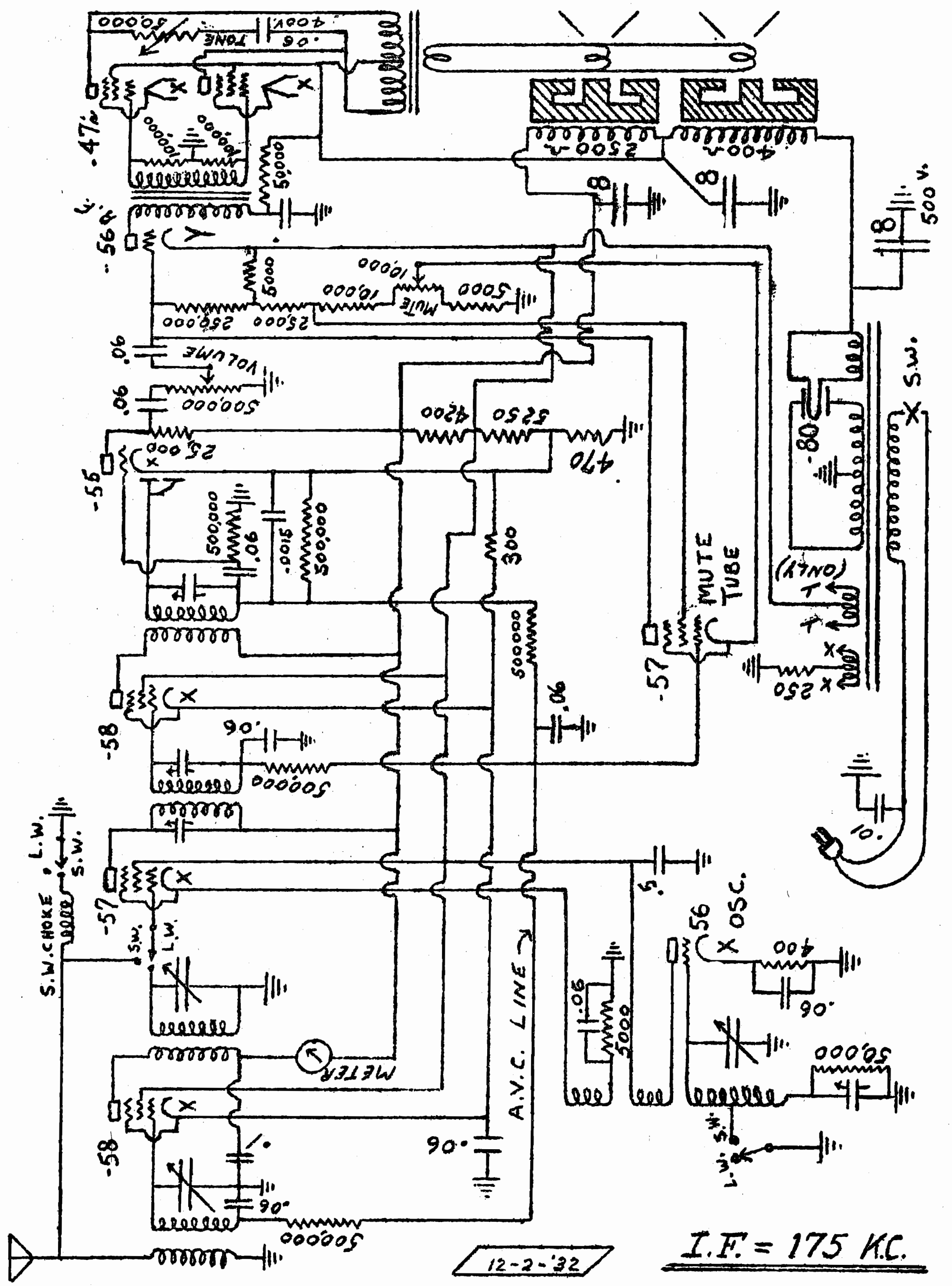
IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit. An insulated or bakelite screw driver (containing little, if any, metal) is advised for use in adjusting "trimmer" or "padding" condensers.

The front section of the tuning condenser is for short wave use only. Unless accidientally shorted it requires no adjustment.



COLIN B. KENNEDY CORP.

MODEL 882- 64C
Schematic



MODEL 882- 64C
Alignment

COLIN B. KENNEDY CORP.

The tubes employed are as follows, and are operated at normal voltages and biases (except the noise suppression, or muting, tube):

Radio frequency	58	Second Detector & A.V.C.	55
Mixer	57	First Audio	56
Intermediate frequency .	58	Power	247
Oscillator	56	Rectifier	280

Noise Suppressor ... 57

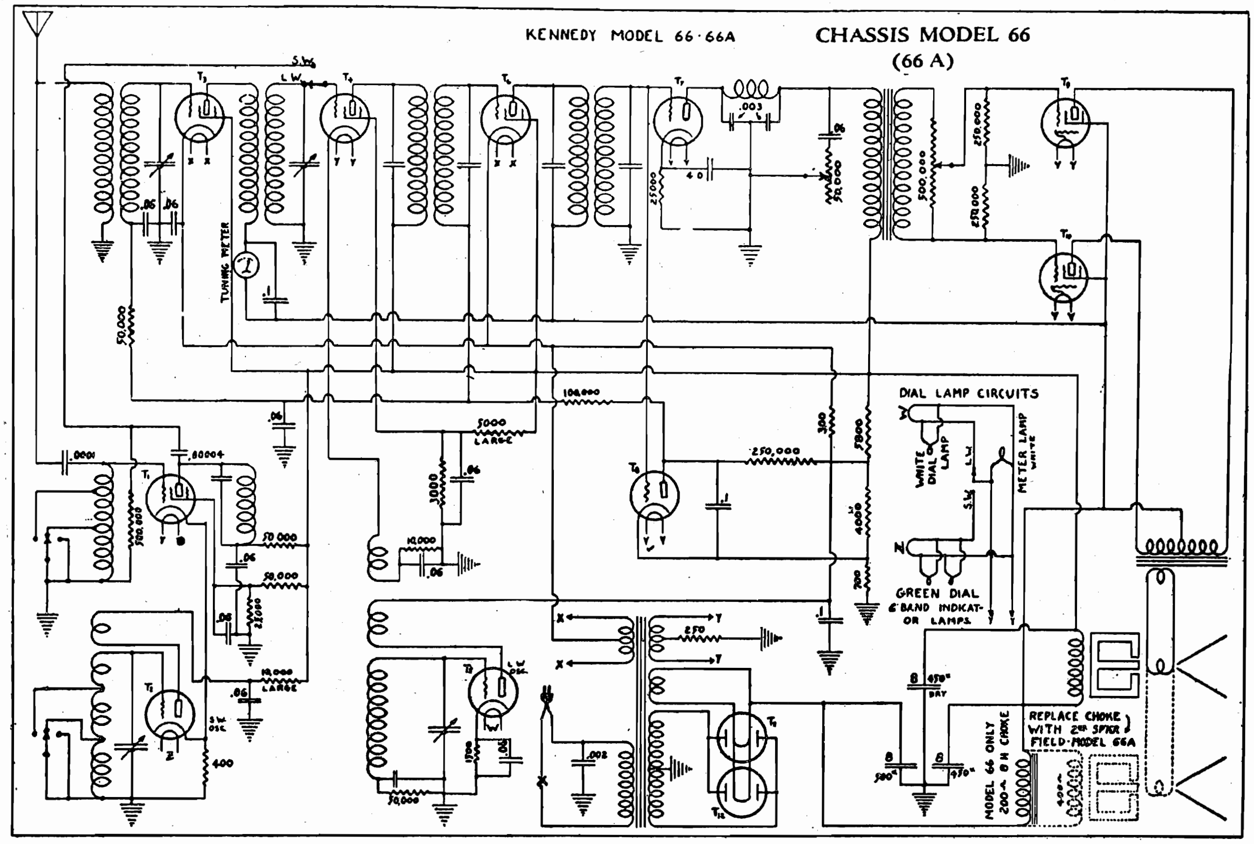
To accommodate the "Hush", or noise suppressor circuit it will be noted that the filament and cathode of the first audio tube are biased positively about 95 volts above ground. Automatic volume control is obtained from the type 55 second detector, the voltage drop across the 500,000 ohn resistor (between Cath. and I.F. coil secondary) which is caused by the rectified signal being applied, through suitable filtering resistors, to the grids of the R.F. and I.F. tubes. The A.V.C. voltage generated also actuates the noise suppressor tube. When no signal is tuned in, there is no A.V.C. voltage applied to the grid of the suppressor tube, permitting it to draw plate current. The plate current thus drawn comes from the cathode of the first audio tube (cathode being positively biased) through the 5,000 ohm resistor and 250,000 ohm grid leak, causing a sufficiently high bias to be applied to the grid of the audio tube (voltage drop across grid leak) to completely stop plate current and thus all noise. Variation in the amount of suppression is obtained by manually varying the bias on the suppressor tube.

In aligning, first properly adjust the intermediate frequency transformers - preferably with a 175 K.C. oscillator fed into grid circuit of first detector, or mixer, and adjusting for maximum reading of an output meter. The tuning circuits may next be adjusted, using an oscillator covering the broadcast band (feeding into antenna circuit) and the output meter. Tune receiver and oscillator first to some point near 1,500 K.C., and adjust the three condenser "trimmers" through large hole in condenser shield for maximum reading of output meter. Then retune receiver and oscillator to point near 550 K.C. and adjust oscillator "pad" condenser (through hole in rear of condenser shield) for maximum output. (Do not touch condenser trimmers after first adjustment at 1,500 K.C.) If further adjustment at 550 K.C. is necessary, bend slotted condenser end plates. Alignment at the two ends of the scale is usually sufficient. If desired to align at inter mediate points, bend the proper sections of the slotted plates for maximum output reading.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments, particularly when altering capacities connected with the oscillator circuit. A bakelite, or non-metalic, screw-driver is advised for making adjustments. The short wave police band circuits require no aligning other than the I.F. transformers.

MODEL 66,66-A
Schematic

COLIN B. KENNEDY CORP.



The tubes employed are as follows, and are operated at normal voltages and biases:

T1	Short wave mixer	224	T6	Intermediate frequency	235
T2	Short wave oscillator	227	T7	Second Detector	227
T3	Radio frequency	235	T8	Automatic Vol. Control	227
T4	Long Wave Mixer	224	T9-10	Power tubes	247
T5	Long Wave oscillator.	227	T11-12	Rectifiers	280

To accommodate the automatic circuits it will be noted that the long wave R.F. and I.F. tube filaments and cathodes are biased positively about 100 volts above ground. When the AVC tube receives a signal it draws current (being normally biased to cut-off) through the 250,000 ohm resistor. The voltage drop across this resistor is then applied to the automatically controlled grids as additional bias. An inspection of the circuit diagram will clarify this simple and efficient AVC action.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is most readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the station if the oscillator is correct. Other "harmonic" points may also be tried.

With the receiver switched to short wave position, remove the grid clip from the top of the S.W. mixer tube and fasten a short length of wire to the

MODEL 66,66-A
Alignment
Socket

COLIN B. KENNEDY CORP.

grid terminal of this tube. Lay this wire sufficiently near the 175 K.C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K.C., adjust the trimmers in the tops of the I.F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale", move oscillator farther from set and wire, thereby reducing input energy. If these I.F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the long wave mixer and adjust the last two transformers alone, at first, then moving wire back to S.W. mixer and proceed as before. It will be noted that the first I.F. transformer has but one adjustment.

The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering the broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire.

The receiver and oscillator are first tuned to approximately 1,500 kilocycles, and by watching the output indicator, the three condenser trimmers, reached through the removable plate, are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

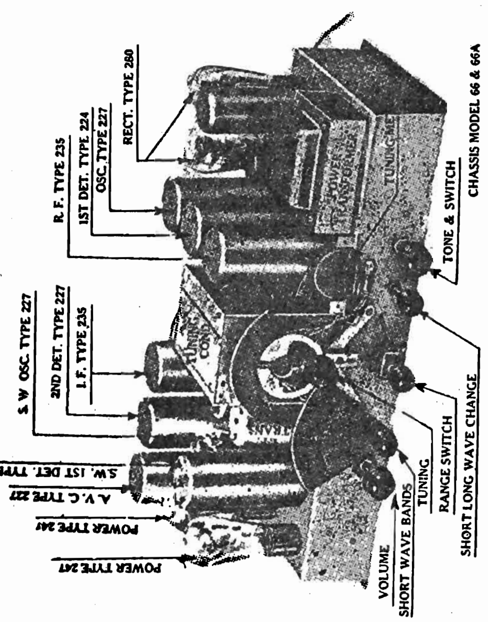
The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser for maximum response. It may be reached through hole in rear center of chassis base.

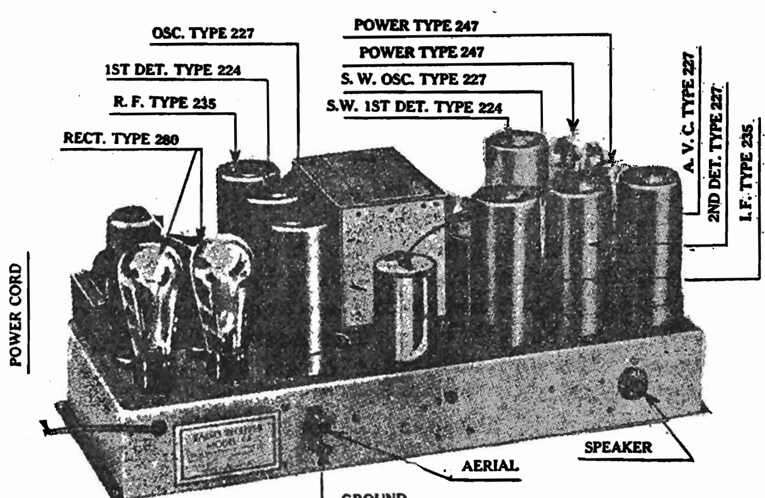
If necessary to adjust the two R.F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band", it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit. An insulated or bakelite screw driver (containing little, if any, metal) is advised for use in adjusting "trimmer" or "padding" condensers.

The front section of the tuning condenser is for short wave use only. Unless accidentally shorted it requires no adjustment.

Service parts may be ordered by giving model and serial numbers, and description.

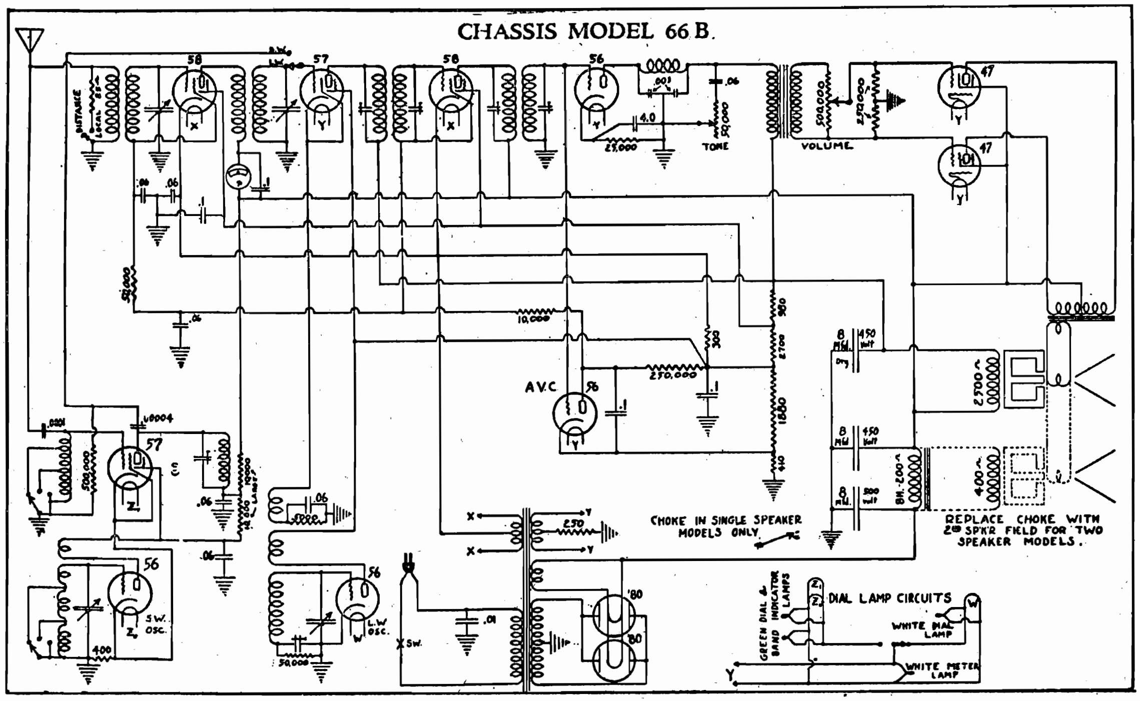




CHASSIS MODEL 66 & 66A

COLIN B. KENNEDY CORP.

MODEL 266-B,366-B
(Chassis 66-B)
Sohematic



The tubes employed are as follows, and are operated at normal voltages and biases:

Short wave mixer 57	Intermediate frequency ... 58
Short wave oscillator . 56	Second detector 56
Radio frequency 58	Automatic Vol. Control ... 56
Long wave mixer 57	Power tubes 247
Long wave oscillator .. 56	Rectifiers 280

To accomodate the automatic circuits it will be noted that the long wave R. F and I.F. tube filaments and cathodes are biased positively about 100 volts above ground. When the AVC tube receives a signal it draws current (being normally biased to cut off) through the 250,000 ohm resistor. The voltage drop across this resistor is then applied to the automatically controlled grids as additional bias. An inspection of the circuit diagram will clarify this simple and efficient AVC action.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is most readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the station if the oscillator is correct. Other "harmonic" points may also be tried.

With the receiver switched to <u>short wave</u> position, remove the grid clip from the top of the S.W. mixer tube and fasten a short length of wire to the

MODEL 266-B,366-B
(Chassis 66-B)
Alignment
Socket

COLIN B. KENNEDY CORP.

grid terminals of this tube. Lay this wire sufficiently near the 175 K.C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K.C., adjust the trimmers in the tops of the I.F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale", move oscillator farther from set and wire, thereby reducing input energy. If these I.F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the long wave mixer and adjust the last two transformers alone, at first, then moving wire back to S.W. mixer and proceed as before. It will be noted that the first I.F. transformer has but one adjustment.

The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering the broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire.

The receiver and oscillator are first tuned to approximately 1,500 kilocycles, and by watching the output indicator, the three condenser trimmers, reached through the removable plate, are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

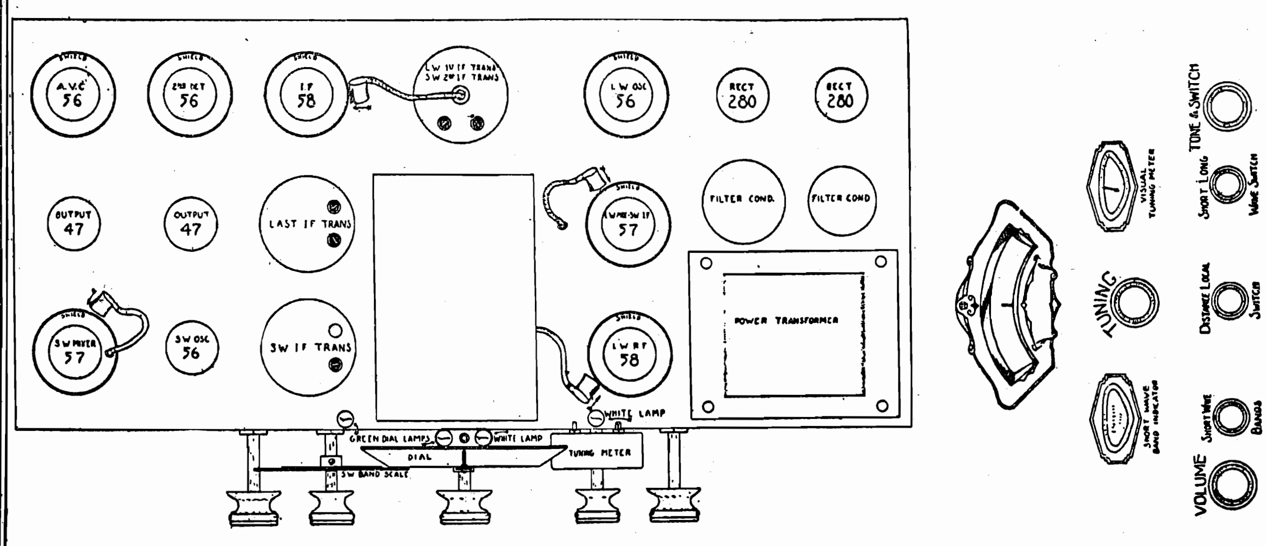
The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser for maximum response. It may be reached through hole in rear center of chassis base.

If necessary to adjust the two R.F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band", it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit. An insulated or bakelite screw driver (containing little, if any, metal) is advised for use in adjusting "trimmer" or "padding" condensers.

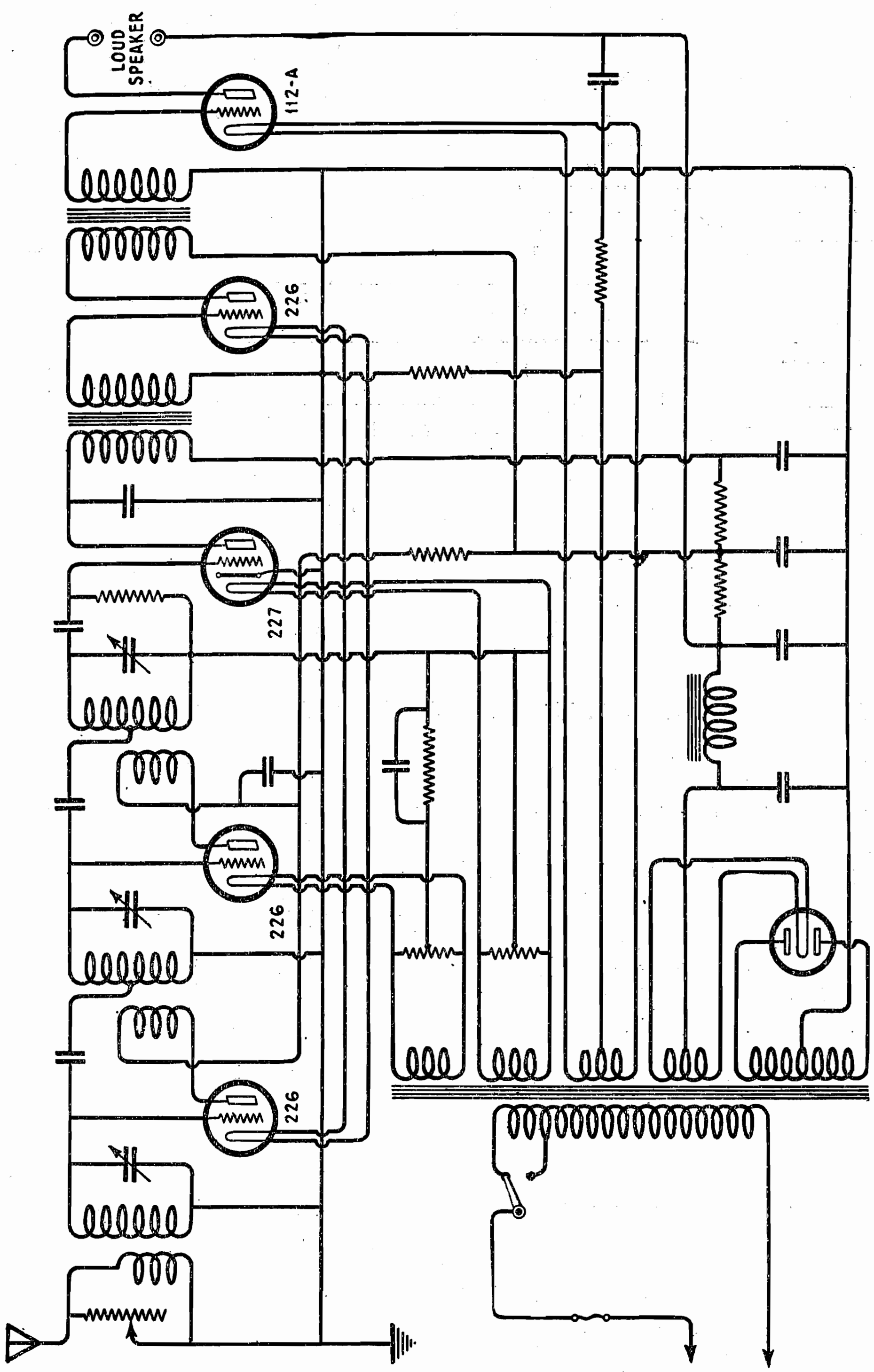
The front section of the tuning condenser is for short wave use only. Unless accidentally shorted it requires no adjustment.

Service parts may be ordered by giving model and serial numbers, and description.

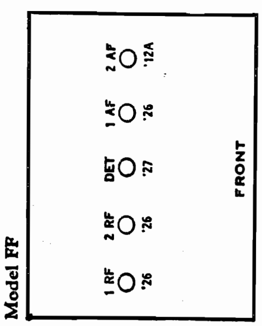


MODEL FF

KING MFG. CORP.



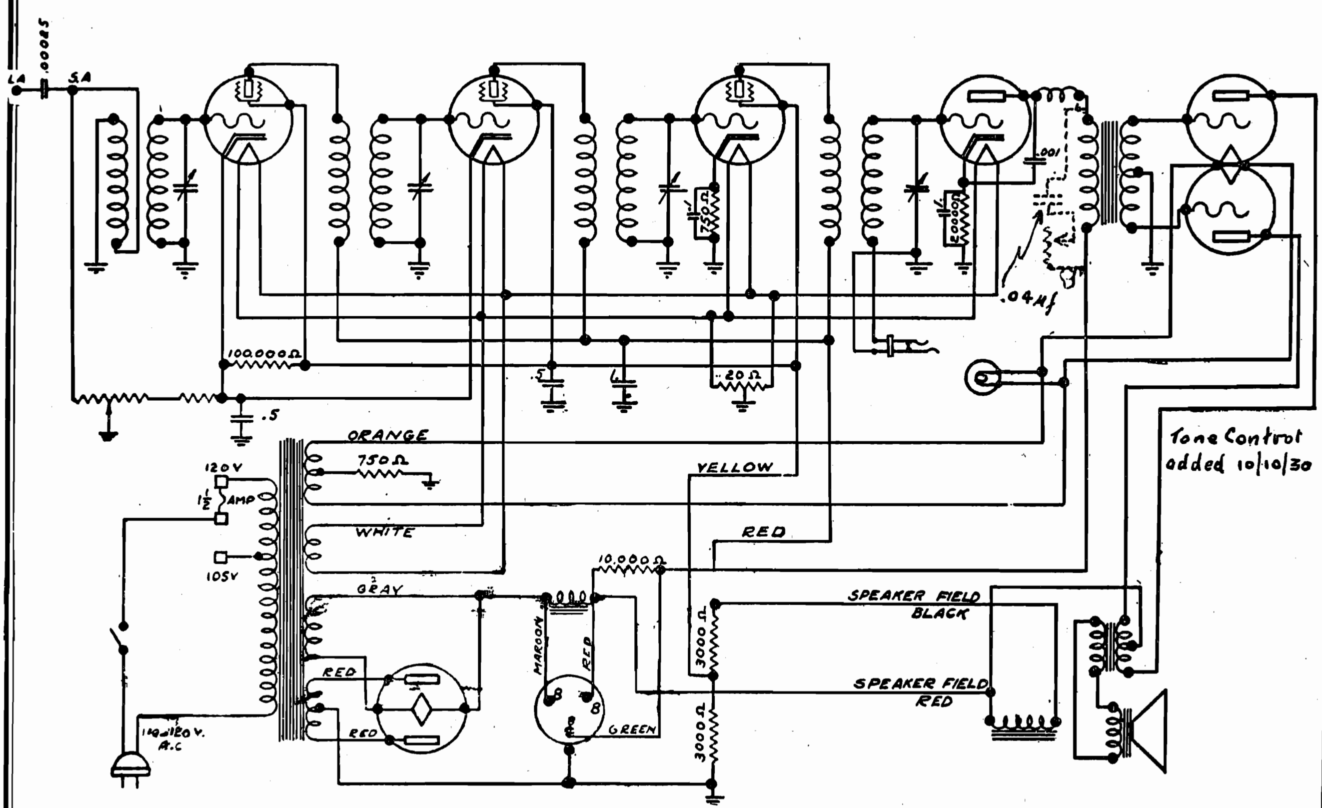
KING—MODEL FF



Model FF

MODEL 218

KING MFG. CORP.

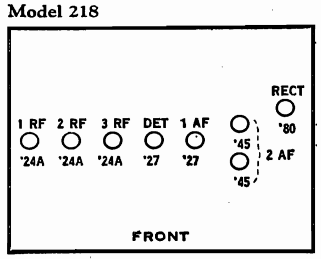


READINGS WITH PLUG IN SET SOCKET AND TUBE IN TESTER SOCKET

Tube No. in Order	Position of Tube	Type of Tube	A Volts	B Volts	C Volts	Cathode	Plate M.A.	Screen Grid Volts
1	1st R.F.	224	2.4	178	3.4	3.4	3.5	85
2	2nd R.F.	224	2.4	178	3.4	3.4	3.5	85
3	3rd R.F.	224	2.4	178	3.4	3.4	3.5	85
4	DET.	227	2.4	240	23.	2.5	1.1	
5	Push-Pull	245	2.4	235	45		27	
6	Push-Pull	245	2.4	235	45		27	
7	RECT.	280	5.	310				

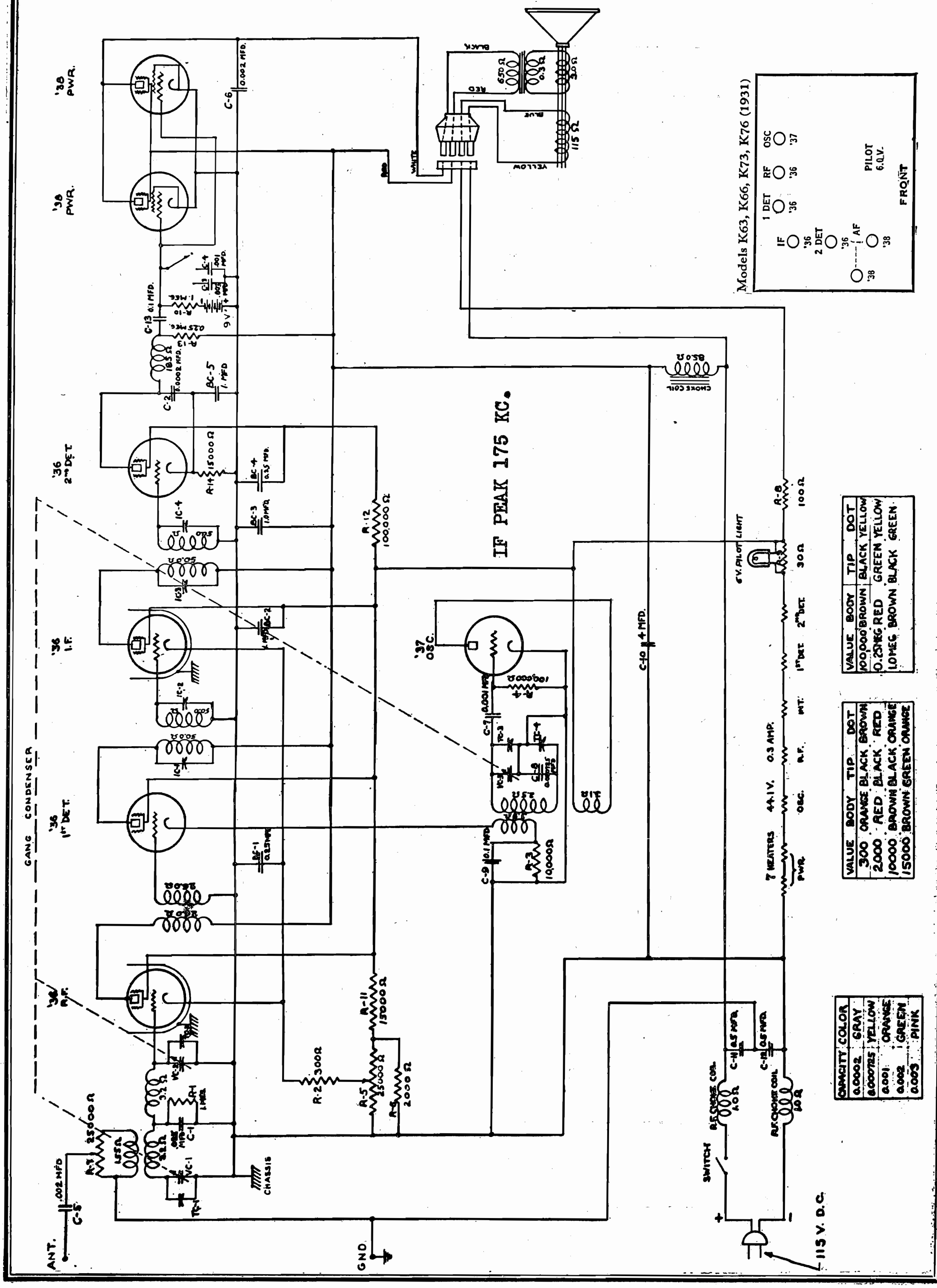
Line Voltage 120 Set On 120 Volt Tap Volume Control FULL ON

Model 218



KOLSTER RADIO, INC.

MODEL K-63,K-73,K-103



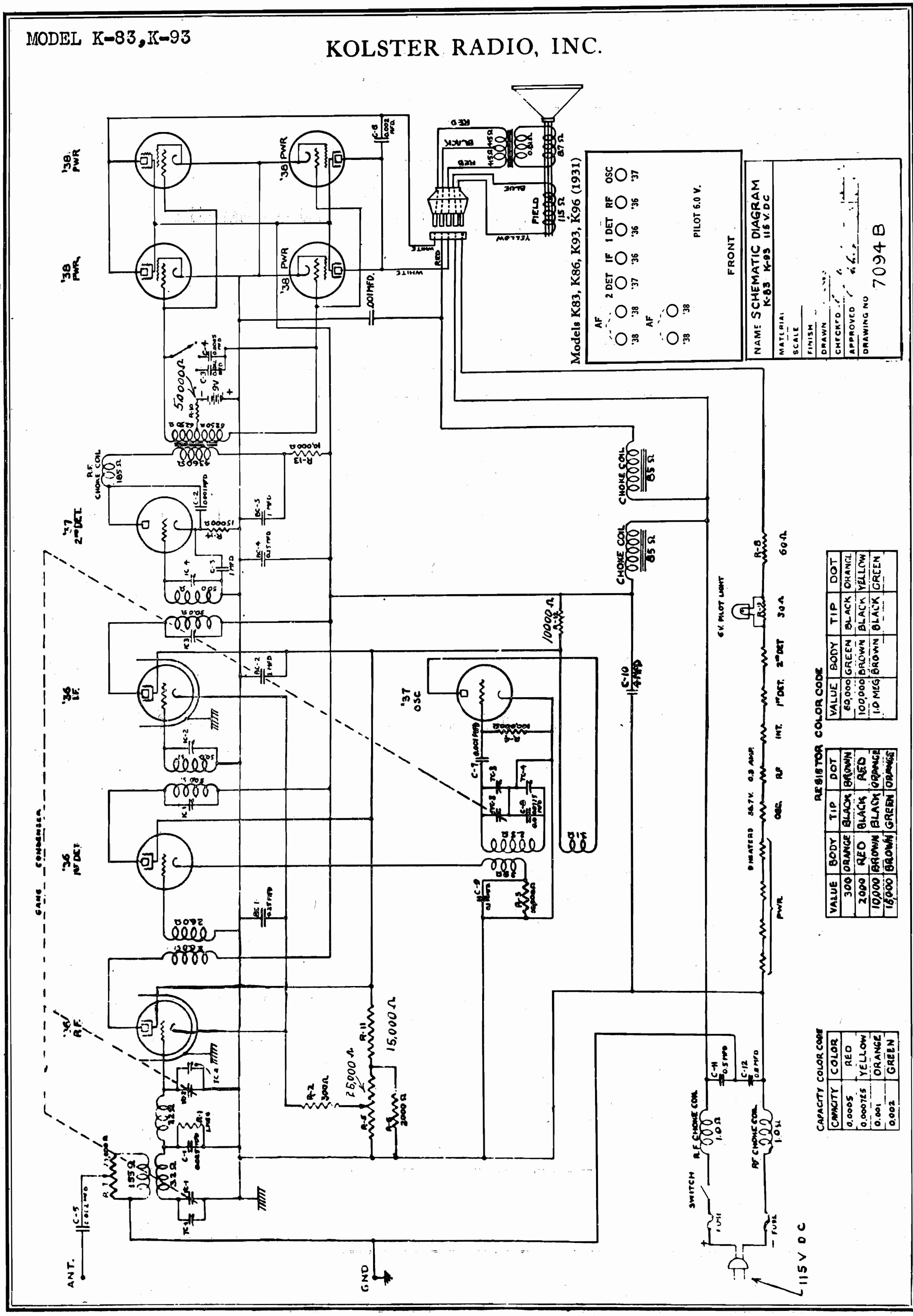
CAPACITY	COLOR
0.0002	GRAY
0.000725	YELLOW
0.001	ORANGE
0.002	GREEN
0.003	PINK

VALUE	BODY	TIP	DOT
300	ORANGE	BLACK	BROWN
2,000	RED	BLACK	RED
10000	BROWN	BLACK	ORANGE
15000	BROWN	GREEN	ORANGE

VALUE	BODY	TIP	DOT
100,000	BROWN	BLACK	YELLOW
0.25 MEG	RED	GREEN	YELLOW
1.0 MEG	BROWN	BLACK	GREEN

MODEL K-83, K-93

KOLSTER RADIO, INC.



RESISTOR COLOR CODE

VALUE	BODY	TIP	DOT
300	ORANGE	BLACK	BROWN
2000	RED	BLACK	RED
10,000	BROWN	BLACK	ORANGE
15,000	BROWN	GREEN	ORANGE

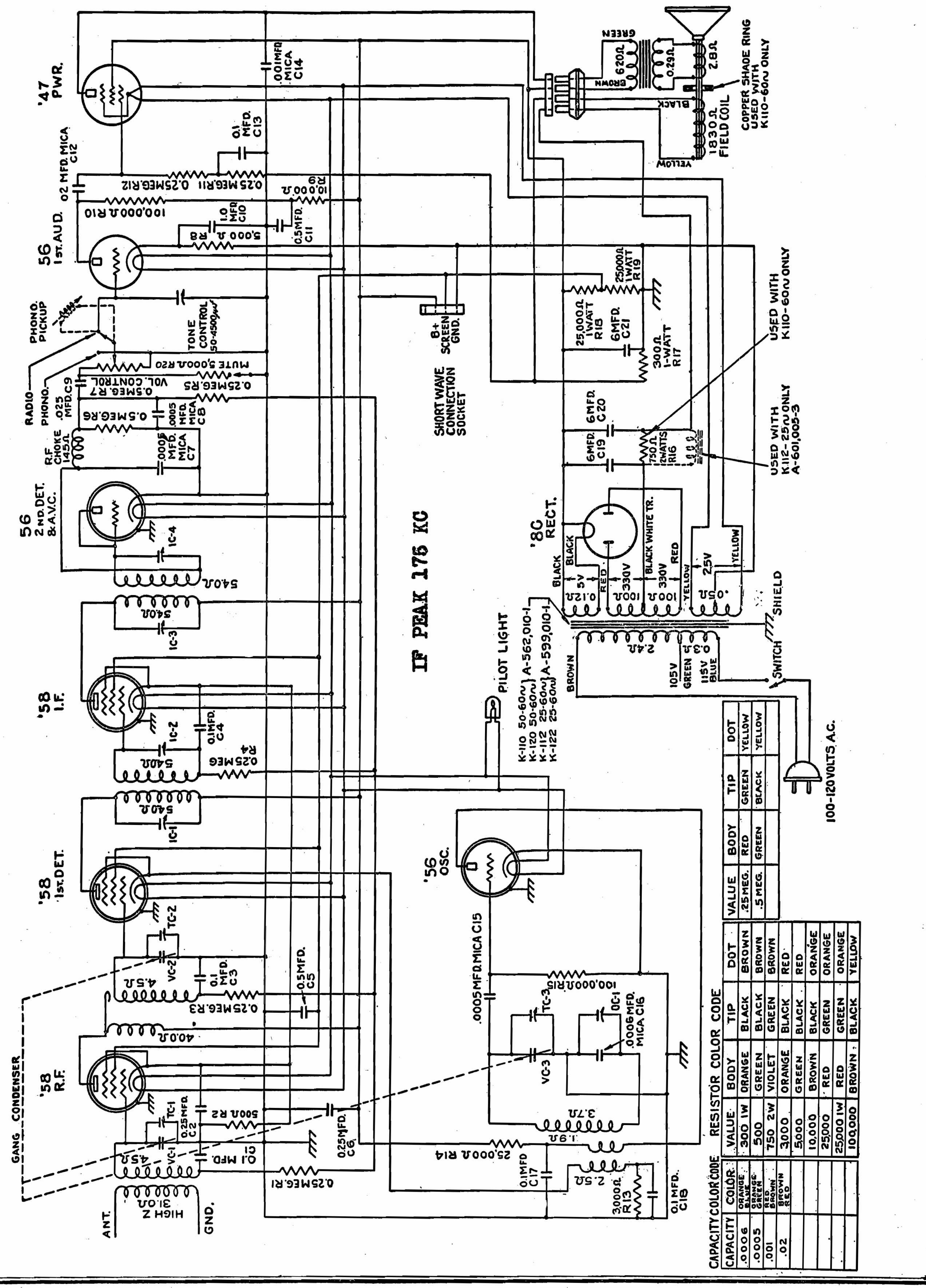
VALUE	BODY	TIP	DOT
60,000	GREEN	BLACK	ORANGE
100,000	BROWN	BLACK	YELLOW
1.0 MEG	BROWN	BLACK	GREEN

CAPACITY COLOR CODE

CAPACITY	COLOR
0.0005	RED
0.00075	YELLOW
0.001	ORANGE
0.002	GREEN

KOLSTER RADIO, INC.

MODEL K-110, K-120, K-122



VALUE	BODY	TIP	DOT
.25 MEG.	RED	GREEN	YELLOW
.5 MEG.	GREEN	BLACK	YELLOW

RESISTOR COLOR CODE

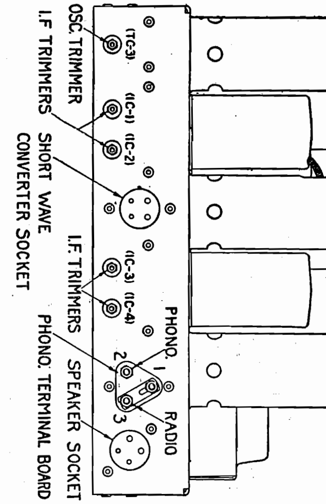
VALUE	BODY	TIP	DOT
300 1W	ORANGE	BLACK	BROWN
500	GREEN	BLACK	BROWN
750 2W	VIOLET	GREEN	BROWN
3000	ORANGE	BLACK	RED
5000	GREEN	BLACK	RED
10,000	BROWN	BLACK	ORANGE
25000	RED	GREEN	ORANGE
25,000 1W	RED	GREEN	ORANGE
100,000	BROWN	BLACK	YELLOW

CAPACITY COLOR CODE

CAPACITY	COLOR
.0006	ORANGE BLUE
.0005	ORANGE GREEN
.001	RED BROWN
.02	BROWN RED

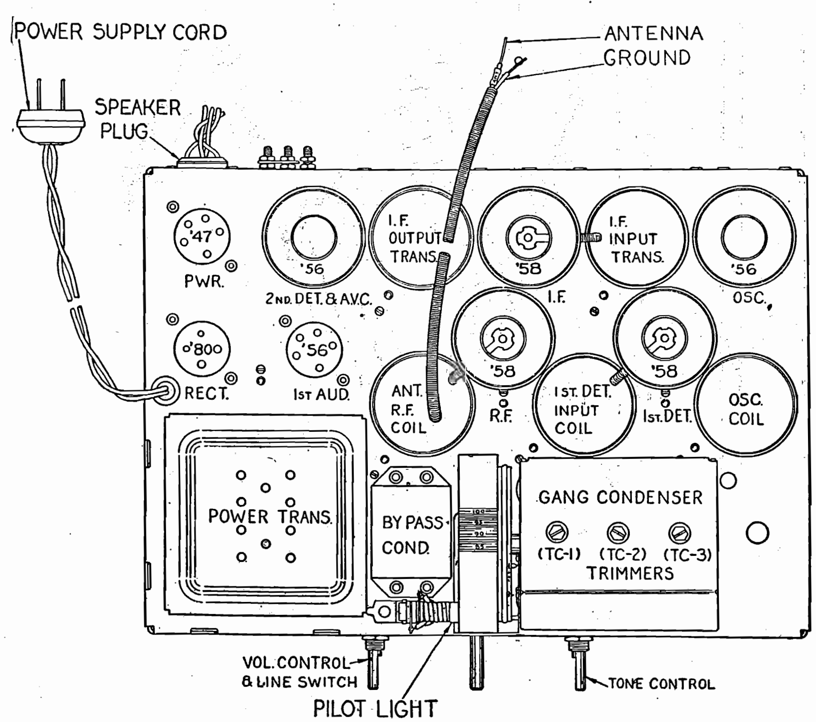
MODEL K-110, K-120, K-122
Chassis, Voltage
Circuit Adjustments

KOLSTER RADIO, INC.



TUBE	KV.	CGV	SGV	PV	PC	SGC
RF	3	-.2	72	205	2.5	.6
1st Det.	6	-.8	70	205	1.7	.4
Osc.*	0	-2	-	90	5.0	-
IF.	3	-3	70	205	2.5	.8
2nd Det.	0	-1	-	0	0	-
1st AF.	5	-1**	-	95	1.2	-
2nd AF.	-	-2	210	190	22	6.5
Rect.	-	-	-	-	27	-

*Ground Grid to Chassis
**Vol. Cont. maximum. When control is at Minimum reading is -5.
Line Voltage 115 volts.
All voltages will vary with changes in tubes.
Readings taken with DC meter having a resistance of 1000 ohms per volt.



ADJUSTMENT FOR CALIBRATION ALIGNMENT OF TUNING POINTER

Rotate the tuning knob clockwise to the limit of rotation. Loosen the dial pointer adjustment screw and adjust the dial scale pointer to the stop line beyond the 550 K.C. setting. Tighten adjustment screw. Do not attempt to bend the bracket up or down as this will bend the pointer away from the horizontal. The pointer should press forward against the scale sufficiently to smooth it out, presenting a surface uniformly spaced from the escutcheon when tuned to any station. Make sure that the dial lamp socket is firmly mounted and pressed down into its proper position during these adjustments.

I.F., R.F. AND OSCILLATOR CIRCUIT ADJUSTMENTS

Obviously unsatisfactory performance of this set due to improper adjustment or misadjustment of the I.F., R.F. and oscillator circuits will not be indicated by any readings made with a set analyzer. Although tuning adjustments can be made by utilizing a received signal, such adjustments are at best inaccurate and inefficient. It is imperative that the Service Department of each dealer and distributor be equipped with some form of signal generator and output device which may be either purchased or constructed by the Service Department.

The signal generator consists essentially of a modulated oscillator covering the entire broadcast frequency band with accurate adjustments at 600 kilocycles and 1400 kilocycles. It should also incorporate a 175 kilocycle output capable of accuate adjustment. The output indicating device may be any one of the several standard output meters obtainable, a current squared galvanometer or a low range A.C. voltmeter connected across the secondary of the output transformer.

It is impossible to secure satisfactory trimmer adjustments without using a special insulated socket wrench. Proper results cannot be obtained using a metallic socket wrench due to capacity effects and the fact that several of the adjustment nuts are above ground potential. A special combination bakelite socket wrench and screw driver may be obtained from the factory at cost.

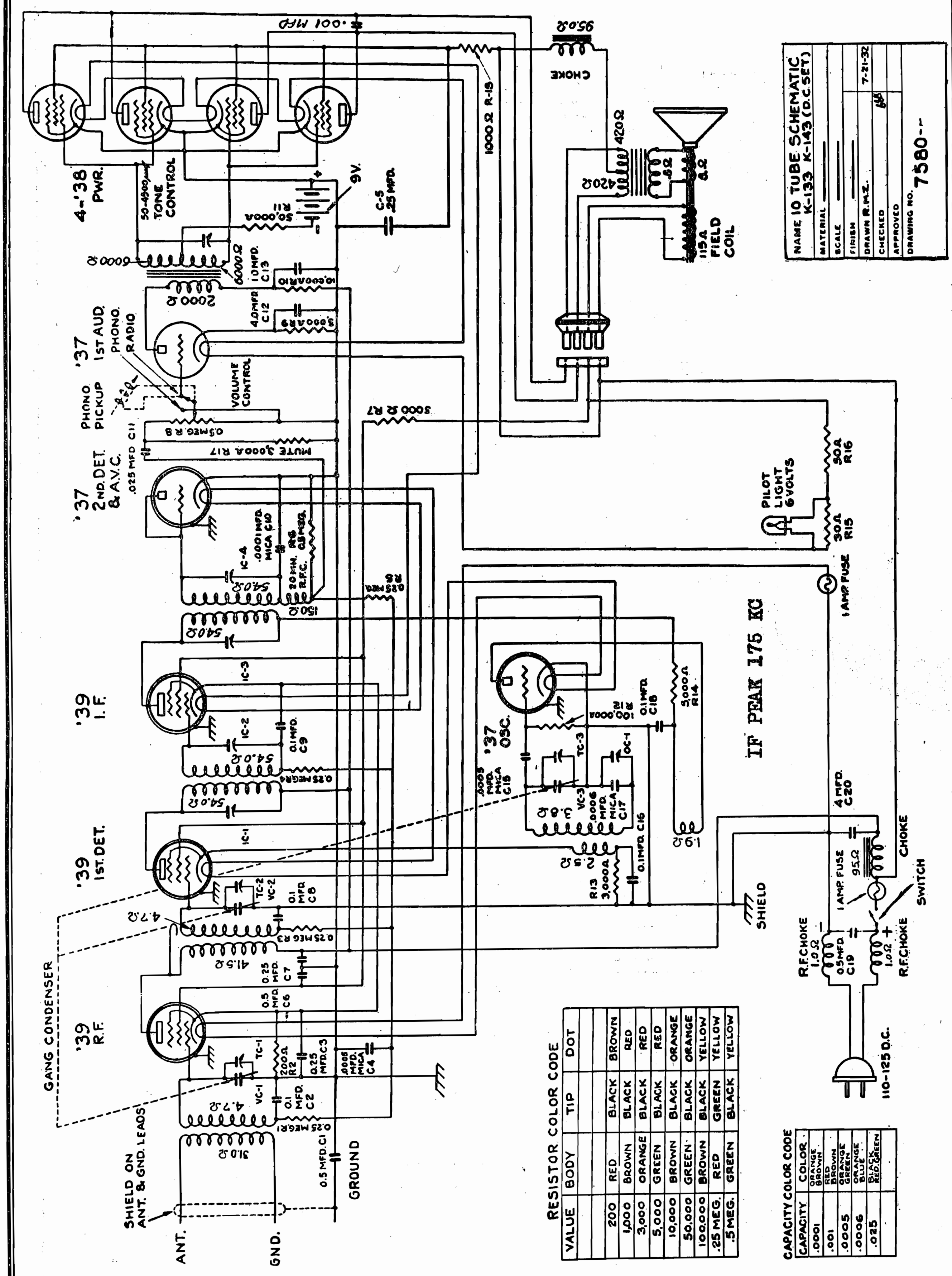
It is not necessary to remove the chassis from the cabinet to adjust the I.F., R.F. and oscillator circuits, as this set has been designed to make all trimmer adjustments readily accessible.

Turn tuning knob clockwise to its limit of rotation and if necessary adjust the dial scale pointer as previously described. Rotate the tuning knob counter-clockwise to the other extreme limit and leave it in this position during the following I.F. adjustments:

1. Remove the '56 oscillator tube and the tube shield and grid clip from the '58 I.F. tube.
2. Couple the output of a modulated oscillator to the control grid of this tube and clip the other oscillator lead to the chassis frame. Do not connect this lead to either of the antenna coil leads. Set the modulated oscillator to 175 K.C.
3. Adjust IC-3 and IC-4 to maximum output.
4. Replace the I.F. grid clip and tube shield. Remove the first detector tube shield and grid clip and couple the oscillator output to the grid of the '58 first detector tube.
5. Adjust IC-1 and IC-2 for maximum output. It is advisable to recheck the adjustment of IC-3 and IC-4 while the oscillator is coupled to the first detector. Adjust all four condensers several times to assure accuracy.
6. Replace the first detector grid clip and tube shield and oscillator tube and shield.
7. Couple the output of the signal generator to the antenna and ground leads. Do not run a third lead to the chassis frame. Adjust the signal generator to 1400 K.C.
8. Set the tuning dial to 1400 K.C. Adjust the oscillator trimmer TC-3 until the signal generator is picked up in the set. Adjust RC-1 and TC-2 to obtain maximum R.F. amplification. Recheck adjustments of TC-1, TC-2 and TC-3 several times for best results.
9. Reset the signal generator to 600 K.C.
10. Tune the set to 600 K.C. Rock the tuning condenser slowly back and forth either side of this point while adjusting OC-1 for maximum output.
11. It is advisable to recheck 1400 and 600 K.C. settings after the first adjustment to assure accuracy.

MODEL K-133, K-143

KOLSTER RADIO, INC.



RESISTOR COLOR CODE

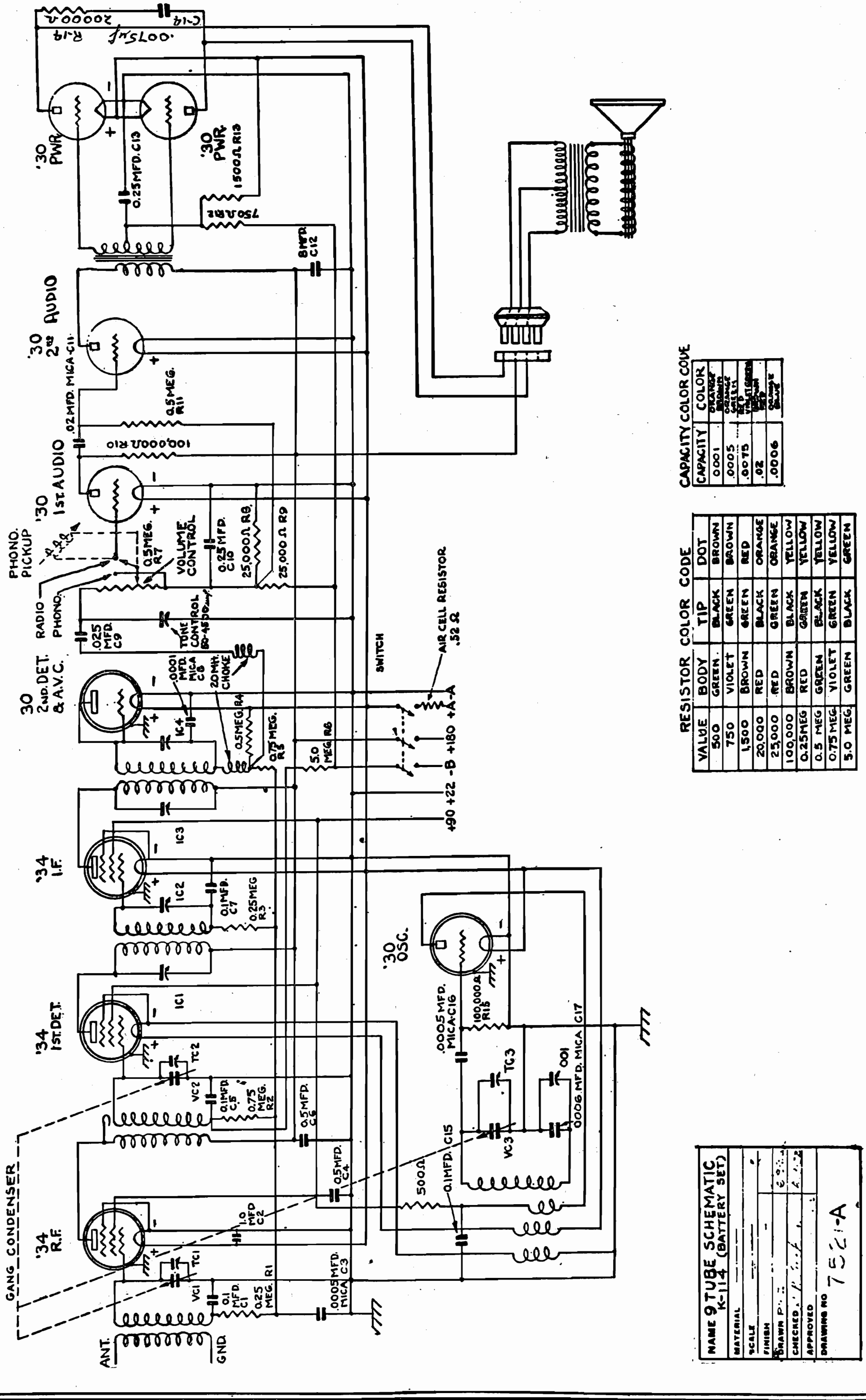
VALUE	BODY	TIP	DOT
200	RED	BLACK	BROWN
1,000	BROWN	BLACK	RED
3,000	ORANGE	BLACK	RED
5,000	GREEN	BLACK	RED
10,000	BROWN	BLACK	ORANGE
50,000	GREEN	BLACK	ORANGE
100,000	BROWN	BLACK	YELLOW
.25 MEG.	RED	GREEN	YELLOW
.5 MEG.	GREEN	BLACK	YELLOW

CAPACITY COLOR CODE

CAPACITY	COLOR
.0001	ORANGE BROWN
.001	RED BROWN
.0005	ORANGE GREEN
.0006	ORANGE BLUE
.025	BLACK RED GREEN

MODEL K-114

KOLSTER RADIO, INC.



RESISTOR COLOR CODE

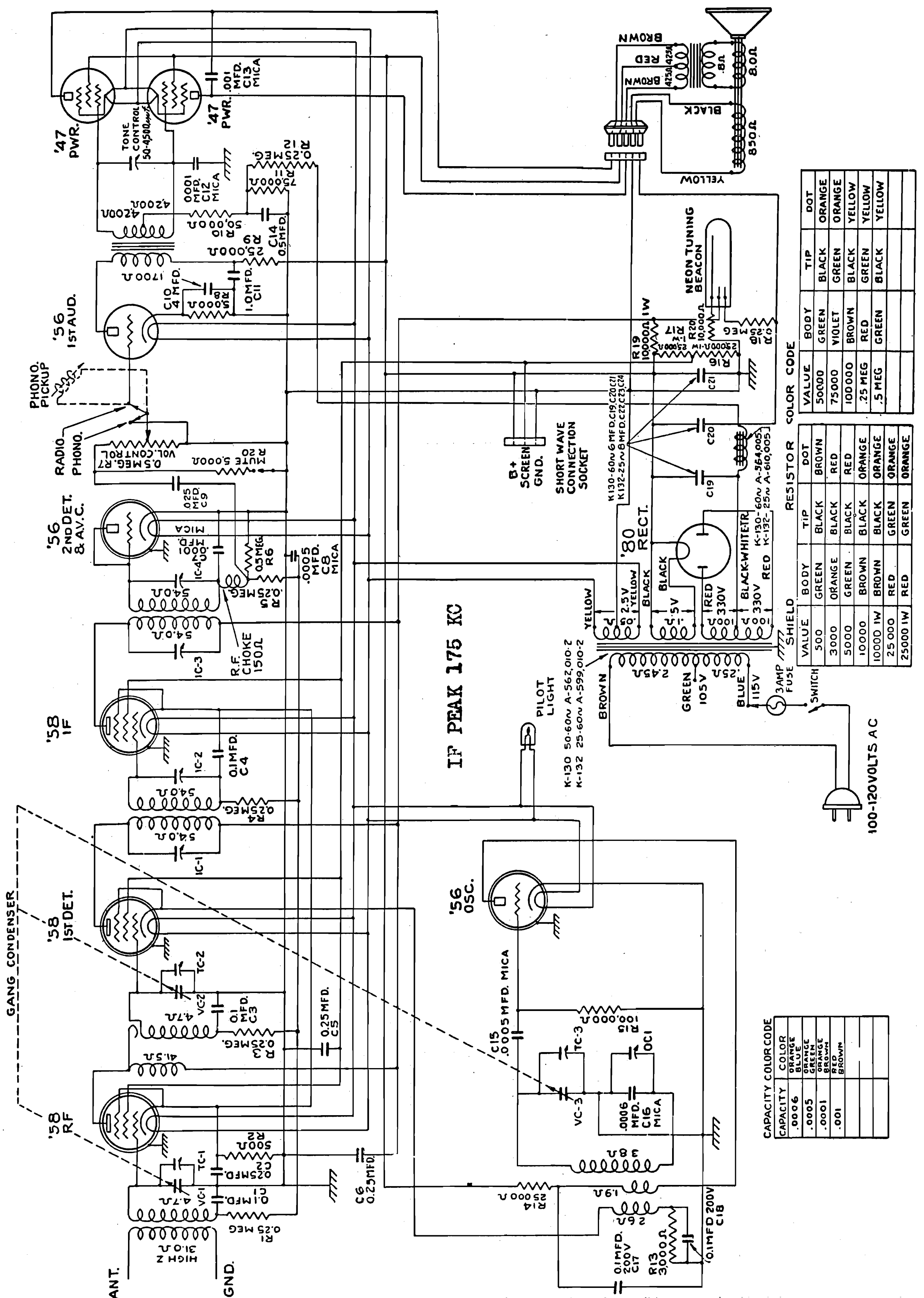
VALUE	BODY	TIP	DOT
500	GREEN	BLACK	BROWN
750	VIOLET	GREEN	BROWN
1,500	BROWN	GREEN	RED
20,000	RED	BLACK	ORANGE
25,000	RED	GREEN	ORANGE
100,000	BROWN	BLACK	YELLOW
0.25MEG	RED	GREEN	YELLOW
0.5 MEG	GREEN	BLACK	YELLOW
0.75 MEG	VIOLET	GREEN	YELLOW
5.0 MEG	GREEN	BLACK	GREEN

CAPACITY COLOR CODE

CAPACITY	COLOR
.0001	ORANGE BROWN
.0005	ORANGE GREEN
.0075	[illegible]
.02	[illegible]
.0006	ORANGE BLUE

KOLSTER RADIO, INC.

MODEL K-130, K-132



RESISTOR COLOR CODE

VALUE	BODY	TIP	DOT
500	GREEN	BLACK	BROWN
3000	ORANGE	BLACK	RED
5000	GREEN	BLACK	RED
10000	BROWN	BLACK	ORANGE
10000 1W	BROWN	BLACK	ORANGE
25000	RED	GREEN	ORANGE
25000 1W	RED	GREEN	ORANGE

VALUE	BODY	TIP	DOT
50000	GREEN	BLACK	ORANGE
75000	VIOLET	GREEN	ORANGE
100000	BROWN	BLACK	YELLOW
.25 MEG	RED	GREEN	YELLOW
.5 MEG	GREEN	BLACK	YELLOW

CAPACITY COLOR CODE

CAPACITY	COLOR
.0006	ORANGE BLUE
.0005	ORANGE GREEN
.0001	ORANGE BROWN
.001	RED BROWN

MODEL K-130, K-132
Chassis, Voltage
Circuit Adjustments

KOLSTER RADIO, INC.

Obviously unsatisfactory performance of this set due to improper adjustment or misadjustment of the I.F., R.F. and oscillator circuits will not be indicated by any readings made with a set analyzer. Although tuning adjustments can be made by utilizing a received signal, such adjustments are at best inaccurate and inefficient. It is imperative that the Service Department of each dealer and distributor be equipped with some form of signal generator and output device which may be either purchased or constructed by the Service Department.

The signal generator consists essentially of a modulated oscillator covering the entire broadcast frequency band with accurate adjustments at 600 kilocycles and 1400 kilocycles. It should also incorporate a 175 kilocycle output capable of accurate adjustment. The output indicating device may be any one of the several standard output meters obtainable, a current squared galvanometer connected across the secondary of the output transformer or a low range A.C. voltmeter connected across the speaker voice coil.

It is impossible to secure satisfactory trimmer adjustments without using a special insulated socket wrench. Proper results cannot be obtained using a metallic socket wrench due to capacity effects and the fact that several of the adjustment nuts are above ground potential. A special combination bakelite socket wrench and screw driver may be obtained from the factory at cost.

It is not necessary to remove the chassis from the cabinet to adjust the I.F., R.F. and oscillator circuits, as this set has been designed to make all trimmer adjustments readily accessible.

Turn tuning knob clockwise to its limit of rotation and if necessary adjust the dial scale pointer as previously described. Rotate the tuning knob counter-clockwise to the other extreme limit and leave it in this position during the following I.F. adjustments:

1. Remove the '56 oscillator tube and tube shield and grid clip from the '58 I.F. tube.

2. Couple the "Ant." lead of the modulated oscillator to the control grid of this tube and clip the other oscillator lead to the chassis frame. Do not connect this lead to either of the antenna coil leads. Set the modulated oscillator at 175 K.C.

*3. Adjust IC-4 to maximum output.

4. Replace the I.F. grid clip and tube shield. Remove the first detector tube shield and grid clip and couple the oscillator output to the grid of the '58 first detector tube and replace tube shield.

5. Adjust IC-1 and IC-2 for maximum output. If the set has a tendency to oscillate due to the grid clip being removed, reduce the volume control setting until self-oscillation stops. It is advisable to recheck the adjustment of IC-3 and IC-4 while the oscillator is coupled to the first detector. Adjust all four condensers several times.

6. Replace the first detector grid clip and tube shield and oscillator tube and shield.

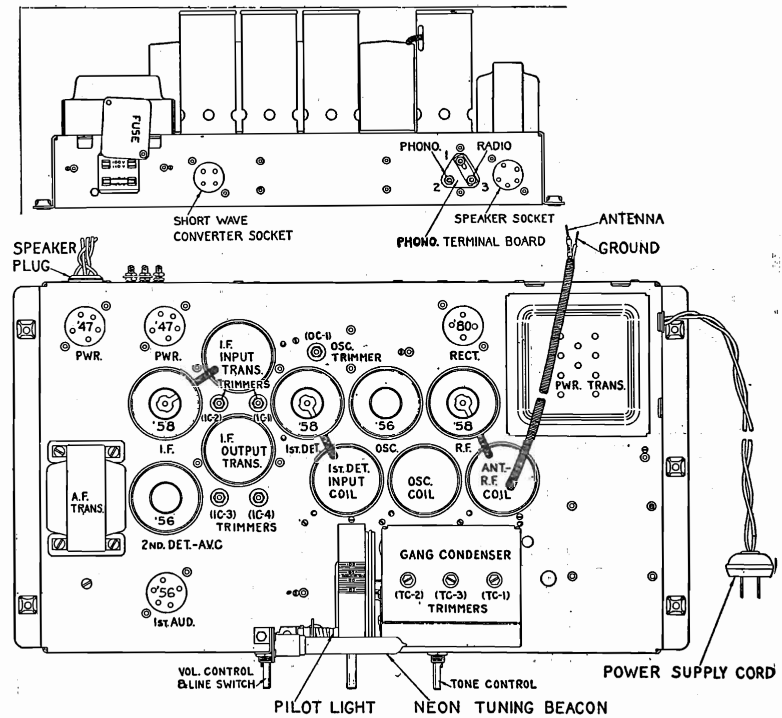
7. Couple the output of the signal generator to the antenna and ground leads. Do not run a third lead to the chassis frame. Adjust the signal generator to 1400 K.C.

8. Set the tuning dial to 1400 K.C. Adjust the oscillator trimmer TC-3 until the signal generator note is picked up in the set. Adjust TC-1 and TC-2 to obtain maximum R.F. amplification. Recheck adjustments of TC-1, TC-2 and TC-3 several times for best results.

9. Reset the signal generator to 600 K.C.

10. Tune the set to 600 K.C. Rock the tuning condenser slowly back and forth either side of this point while adjusting OC-1 for maximum output.

11. It is advisable to recheck the 1400 and 600 K.C. settings after the first adjustment to assure accuracy.



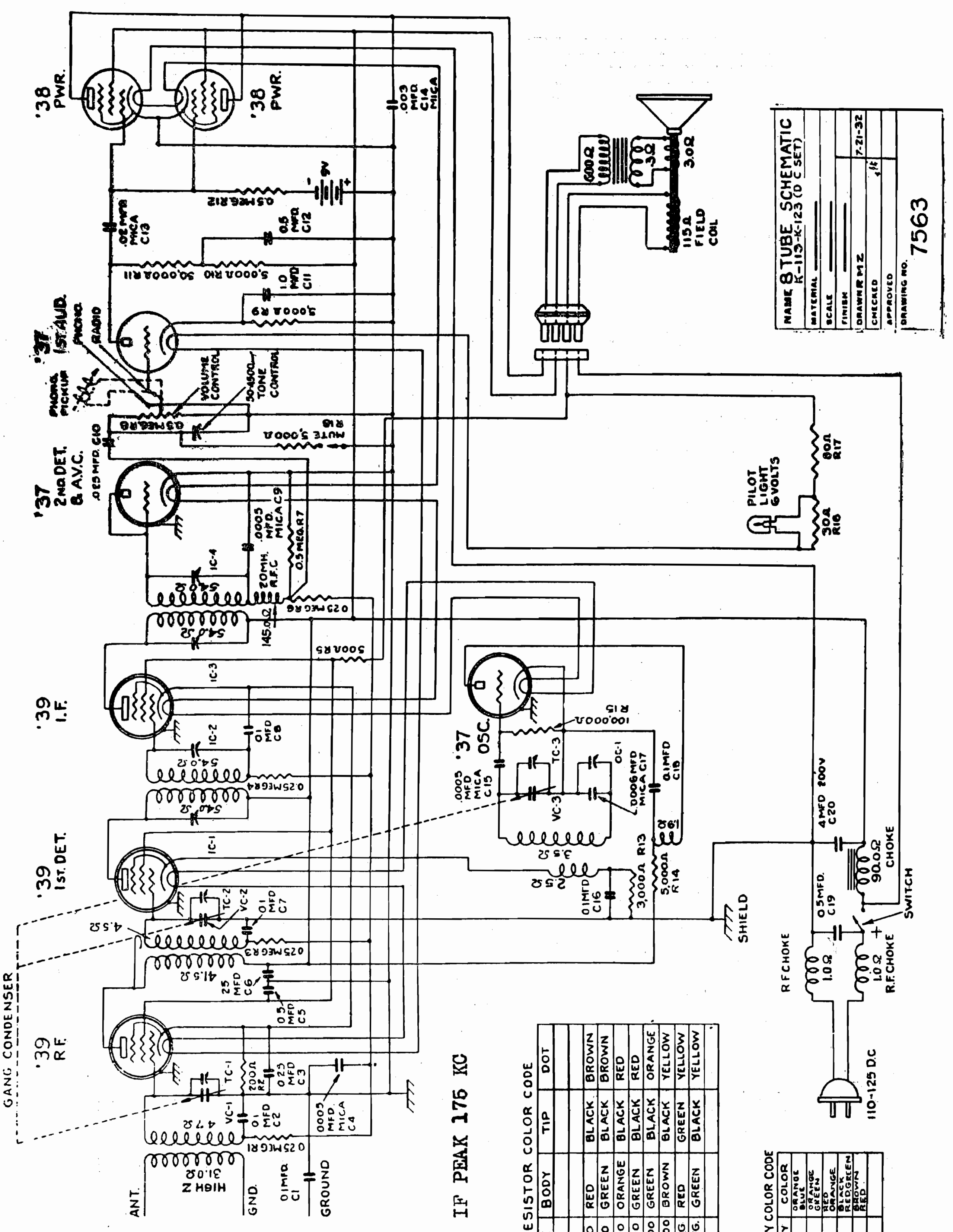
KOLSTER K-130—K-132 VOLTAGE READING CHART

Tube	Cathode to Heater Volts D.C.	Cathode or Filament to Control Grid Volts, D.C.	Cathode or Filament to Screen Grid Volts, D.C.	Cathode or Filament to Plate Volts D.C.	Plate Current M.A.	Screen Grid Current M.A.	Filament Volts A.C.
'58 R.F.	4.	– .2	80.	145	3.	.7	2.2
'56 Osc.	0	–2.	–	90	5.5	–	2.2
'58 1st Det.	7.	– .8	77.	145	18	.6	2.2
'58 I.F.	1.5	–5.	95.	180	1.7	1.	2.2
'56 2nd Det.	0	– .2	–	0	0	–	2.2
'56 1st Audio	9.5	–1.* –9.**	–	165	2.	–	2.2
'47 Power	–	–4.	235	215	24	5.	2.2
'47 Power	–	–4.	235	215	24	5.	2.2
'80 Rect.	(Plate to Plate A.C. Volts 580)				45 each plate	–	4.7

*Volume control at maximum.
**Volume control at minimum.
Line voltage 115 volts.
All voltages will vary with change in tubes.
All readings were taken with a standard set analyzer equipped with a D.C. meter having a resistance of 1000 ohms per volt. Some of these readings are not actual voltages due to current consumed by the meter, but they do correspond to results obtainable in the field.

KOLSTER RADIO, INC.

MODEL K-113,K-123



RESISTOR COLOR CODE

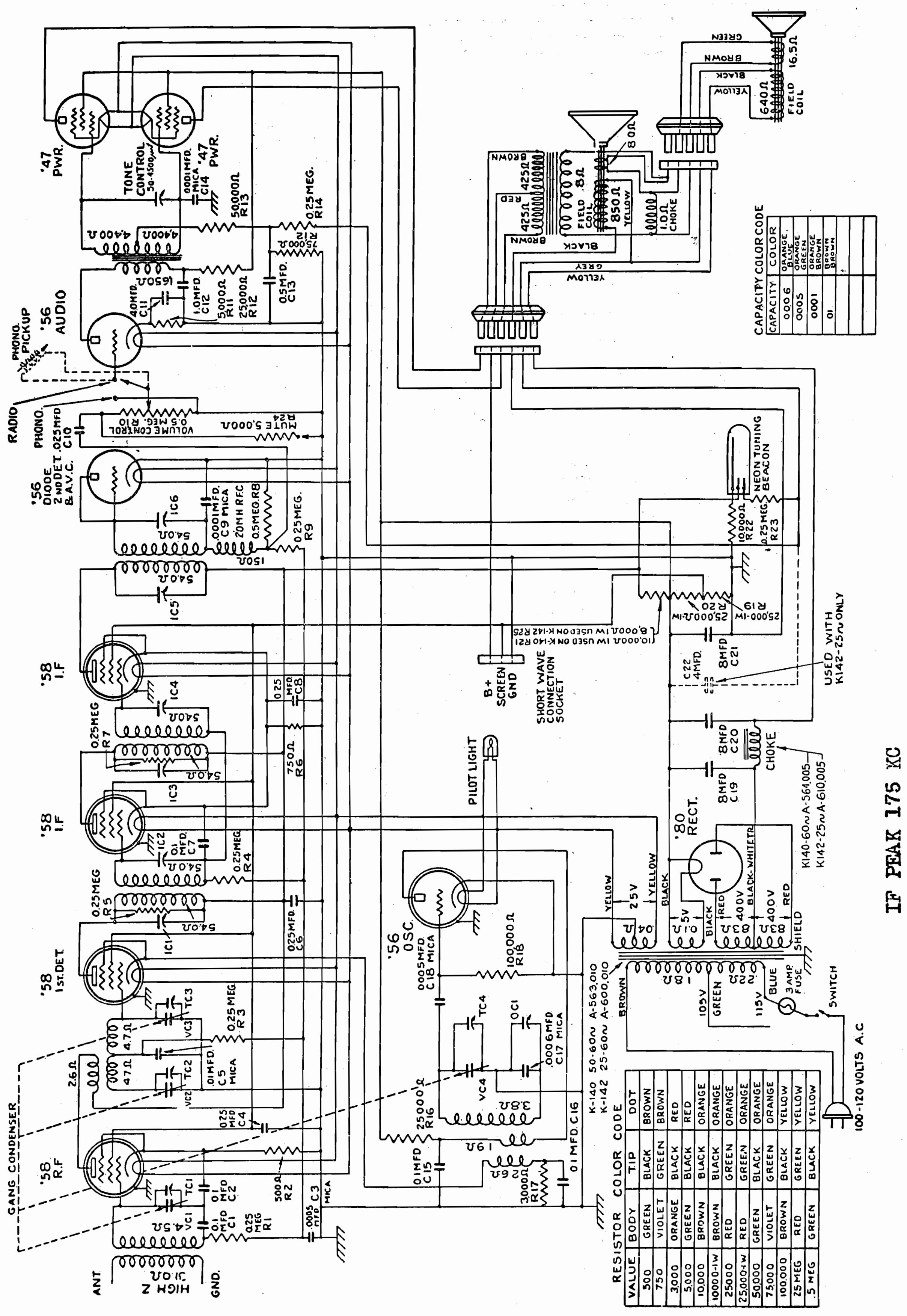
VALUE	BODY	TIP	DOT
200	RED	BLACK	BROWN
500	GREEN	BLACK	BROWN
3,000	ORANGE	BLACK	RED
5,000	GREEN	BLACK	RED
50,000	GREEN	BLACK	ORANGE
100,000	BROWN	BLACK	YELLOW
.25MEG	RED	GREEN	YELLOW
.5MEG.	GREEN	BLACK	YELLOW

CAPACITY COLOR CODE

CAPACITY	COLOR
.0006	ORANGE BLUE
.0005	ORANGE GREEN
.003	RED ORANGE
.025	BLACK RED GREEN
.02	BROWN RED

MODEL K-140, K-142

KOLSTER RADIO, INC.



RESISTOR COLOR CODE

VALUE	BODY	TIP	DOT
500	GREEN	BLACK	BROWN
750	VIOLET	GREEN	BROWN
3,000	ORANGE	BLACK	RED
5,000	GREEN	BLACK	RED
10,000	BROWN	BLACK	ORANGE
10000-1W	BROWN	BLACK	ORANGE
25000	RED	GREEN	ORANGE
25,000-1W	RED	GREEN	ORANGE
50,000	GREEN	BLACK	ORANGE
75,000	VIOLET	GREEN	ORANGE
100,000	BROWN	BLACK	YELLOW
.25 MEG	RED	GREEN	YELLOW
.5 MEG	GREEN	BLACK	YELLOW

CAPACITY COLOR CODE

CAPACITY	COLOR
.0006	ORANGE BLUE
.0005	ORANGE GREEN
.0001	ORANGE BROWN
.01	BROWN BROWN

MODEL K-140, K-142
Chassis, Voltage
Circuit Adjustments

KOLSTER RADIO, INC.

I.F., R.F. AND OSCILLATOR CIRCUIT ADJUSTMENTS

The Kolster Model K-140 receiver employs a highly developed circuit incorporating broadly tuned I.F. and R.F. circuits. These receivers are adjusted at the factory with a special visual indicator to a perfect ten kilocycle selectivity characteristic over the entire broadcast frequency range. Such a characteristic is essential not only for ten kilocycle selective tuning but also for full realization of tone response from the double speakers.

It should not be necessary to readjust these circuits in the field as all the trimmers are mechanically protected and of rugged construction. In exceptional cases, however, when a set has been severely jarred in rough handling, when coils have been replaced, or when the set has been tampered with, it may become necessary to realign the I.F., R.F. and oscillator circuits.

Any attempts to adjust the K-140 in the conventional manner, using a modulated oscillator and trimming for maximum output, will be unsuccessful resulting in instability and poor overall fidelity.

First be certain that other sources of trouble, defective tubes, faulty antenna construction, etc., are eliminated. Check over line and socket voltages. If it is then evident that poor response is due to improper circuit adjustment it will be necessary to realign the set. In most cases the improperly tuned circuit can be found and readjusted without going through the entire following procedure.

It will be necessary to have a modulated oscillator with accurate adjustments at 600 K.C. and 1400 K.C. in the broadcast range, also 170, 175 and 180 K.C. in the intermediate frequency range. The chassis and speakers do not necessarily have to be removed from the cabinet as all adjustments are readily accessible from the back of same.

Connect an output meter across the secondary of the output transformer. This meter may be any one of the standard makes available, a current squared galvanometer or a low range A.C. voltmeter. The voice coil shunt connection should be removed for maximum scale deflection. Readjust the trimmers according to the following procedure:

1. Remove the oscillator tube.
2. Remove the grid clip of the 2nd I.F. tube and connect the "Ant." lead of the signal generator set at 175 K.C. to the grid cap. Adjust IC-5 and IC-6 for maximum output.
3. Replace the grid clip. Couple the signal generator output to the first I.F. tube and similarly adjust IC-3 and IC-4.
4. IC-1 and IC-2 should next be adjusted by coupling the oscillator to the first detector. With this same coupling it is advisable to go back over IC-3, IC-4, IC-5 and IC-6. These adjustments need not be made exactly as the purpose is to get an approximate 175 K.C. setting.

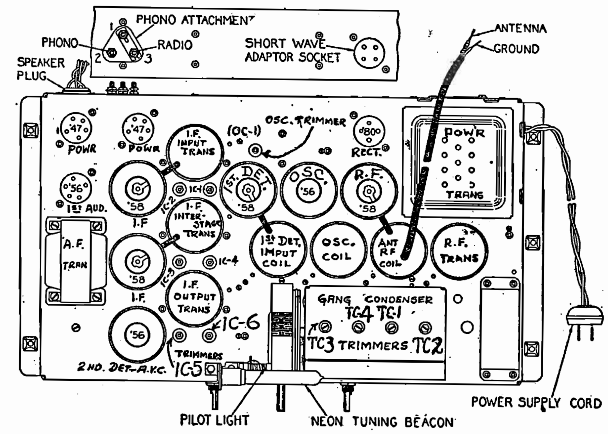
The oscillator output should be coupled directly to the grids, without a dummy antenna. If the oscillator is capacitively coupled the opened grid circuit may cause oscillation, in which case it will be necessary to place a 1000 ohm resistor between grid and chassis.

To obtain the full audio qualities from this receiver it is necessary to flatten out the 175 K.C. channel so that it presents uniform gain for frequencies between 170 and 180 K.C. This gain will not be as great with the broadly tuned circuits as it was with the peaked 175 K.C. adjustment.

5. Set the signal generator to 180 K.C. and adjust the intermediate trimmers to a preliminary output reading.
6. Set the signal generator to 170 K.C. and readjust the intermediate trimmers to the same output as was obtained at the 180 setting.
7. It will be necessary to go back over the six trimmers several times. The I.F. circuit when finally properly adjusted will show equal gain at 170 K.C. and 180 K.C. The gain should be slightly lower at 175 K.C.

In aligning the R.F. stages, it is necessary that the R.F. selectivity be super-imposed on the middle of the I.F. selectivity curve in order that the overall selectivity curve will be symmetrical.

1. Replace the oscillator tube and shield. Couple the signal generator output to the chassis "Ant.-Gnd." leads, not to the "Ant." lead and the chassis. Set the signal generator to 600 K.C.
2. The set is first aligned at 600 K.C. by adjusting the 600 K.C. oscillator trimmer condenser. The 600 K.C. trimmer should be adjusted while the drum dial is being rotated back and forth across the 600 K.C. setting until the output remains fairly constant with the shift of several kilocycles either side of 600 K.C.
3. Reset the signal generator to 1400 K.C.
4. In trimming the set at 1400 K.C. it is necessary to trim up the oscillator section first. By varying the oscillator gang trimmer at this point, it is easy to locate the two peaks and the dip in the middle. The oscillator should be trimmed for this dip. The remaining three gang trimmers are adjusted in the usual manner for maximum output. Trimming at 1400 K.C. should not affect the previous alignment at 600 K.C.



KOLSTER K-140—K-142 VOLTAGE READING CHART

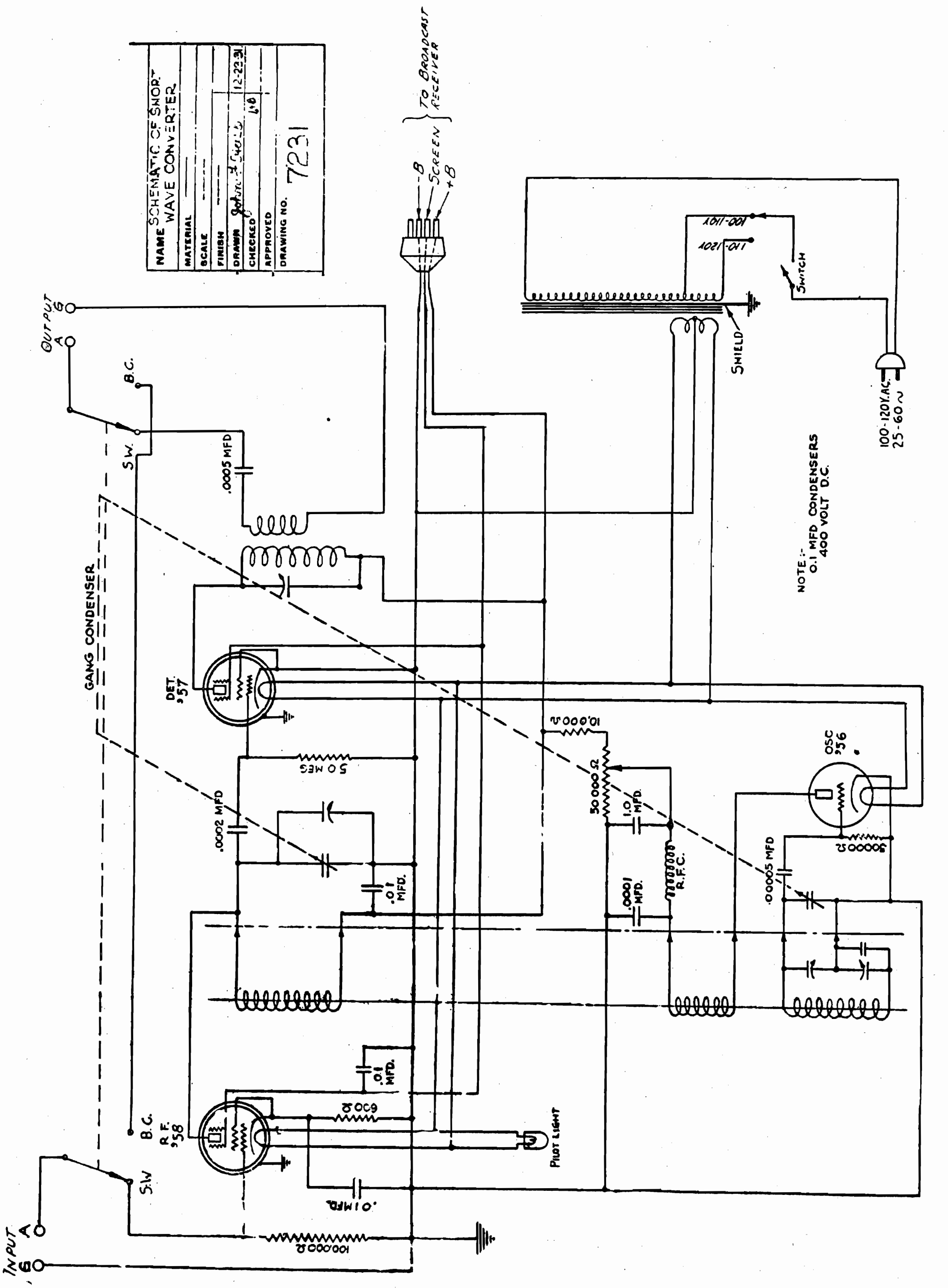
Tube	Cathode to Heater Volts D.C.	Cathode or Filament to Control Grid Volts, D.C.	Cathode or Filament to Screen Grid Volts, D.C.	Cathode or Filament to Plate Volts D.C.	Plate Current M.A.	Screen Grid Current M.A.	Filament Volts A.C.
'58 R.F.	2.5	–.2	85.	130	4.5	1.	2.3
'56 Osc.	0	–2.	–	90	6.	–	2.3
'58 1st Det.	6.	–1.	80.	120	2.	.4	2.3
'58 1st I.F.	2.5	–6.	110	175	2.2	1.1	2.3
'58 2nd I.F.	2.5	–3.6	110	180	2.	1.2	2.3
'56 2nd Det.	0	–1.	–	0	0	–	2.3
'56 1st A.F.	10	–1.* –10.**	–	175	1.9	–	2.3
'47 Power	–	–4.	245	225	26	5.	2.3
'47 Power	–	–4.	245	225	26	5.	2.3
'80 Rect.	(Plate to Plate A.C. Volts 725)				52 52	–	4.7

*Volume control at maximum.
**Volume control at minimum.
Line voltage 115 volts.
All voltages will vary with change in tubes.

All readings were taken with a standard set analyzer equipped with a D.C. meter having a resistance of 1000 ohms per volt. Some of these readings are not actual voltages due to current consumed by the meter, but they do correspond to results obtainable in the field.

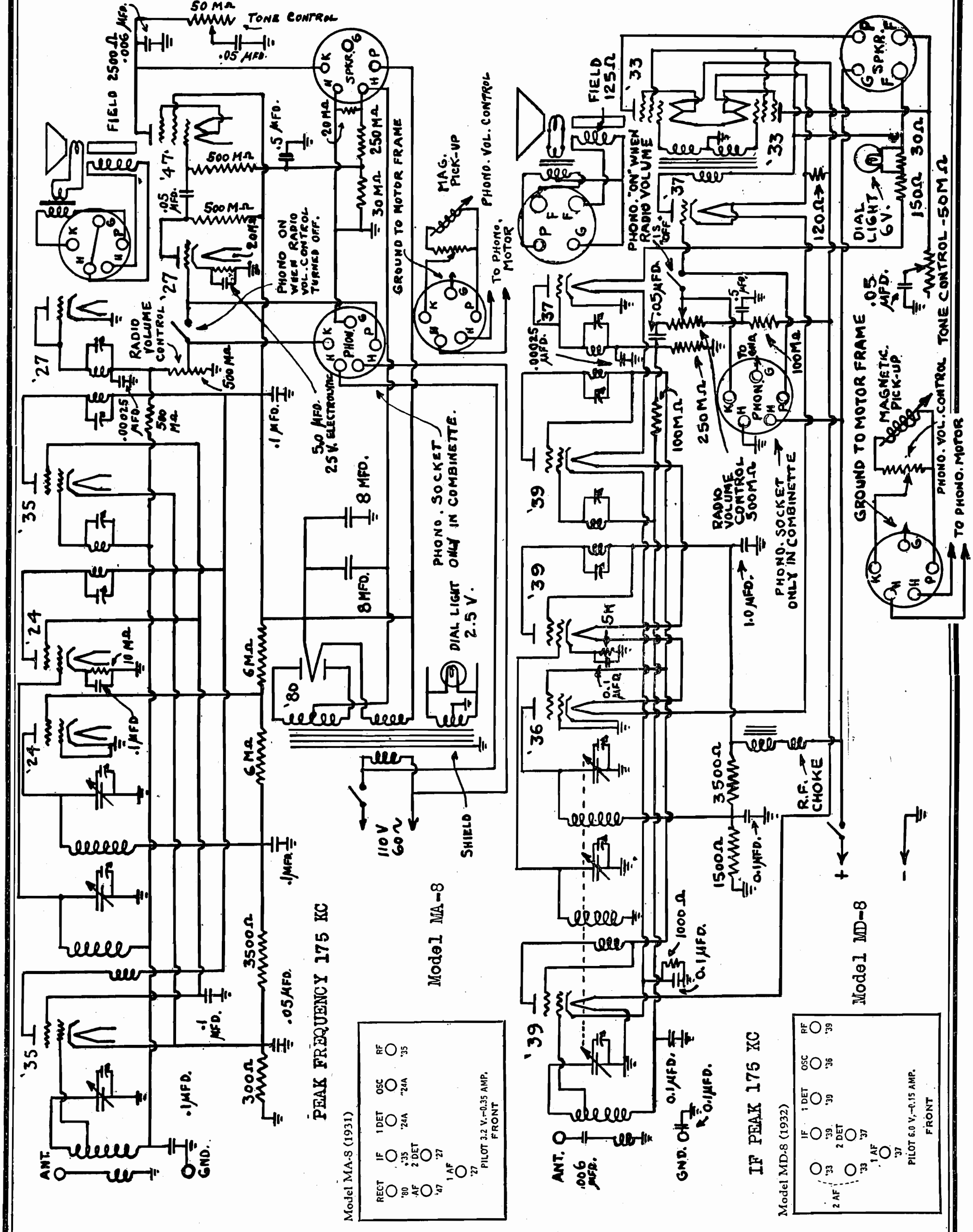
MODEL Short-Wave Converter

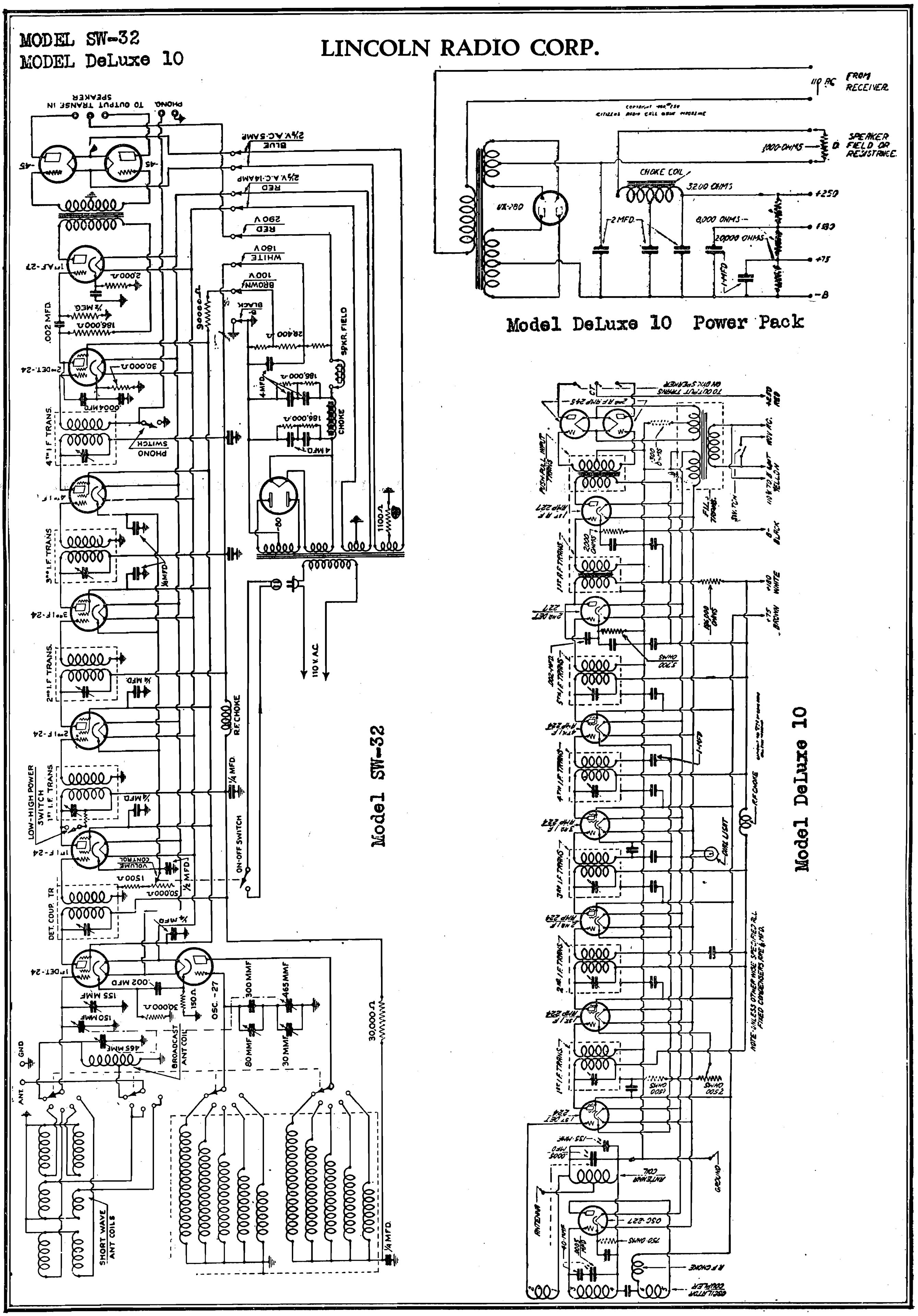
KOLSTER RADIO, INC.



MODEL MA-8
MODEL MD-8

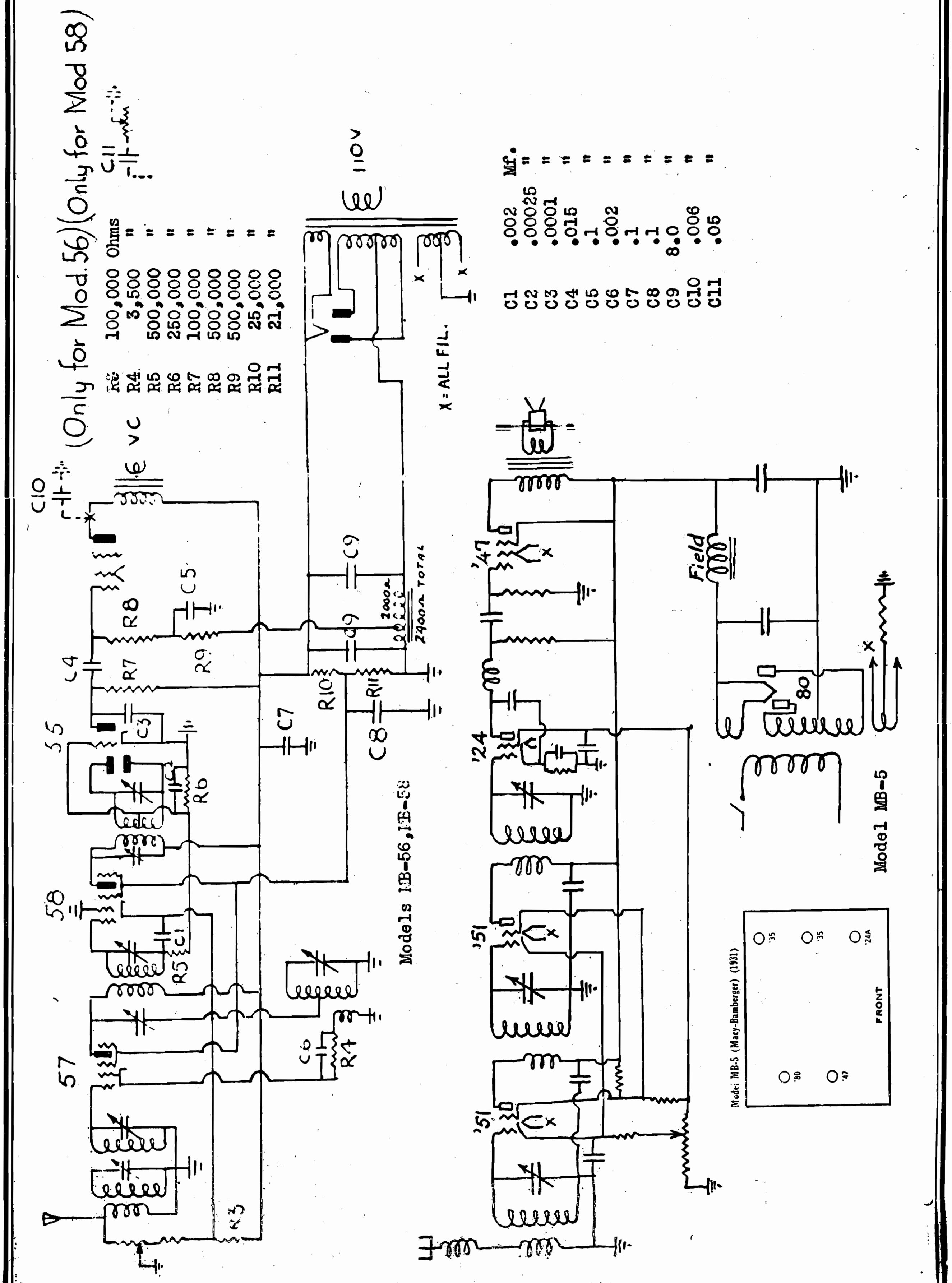
LANG RADIO CO.




MODEL SW-32
MODEL DeLuxe 10
LINCOLN RADIO CORP.
Model DeLuxe 10 Power Pack
Model SW-32
Model DeLuxe 10
110 V.A.C.
SHORT WAVE ANT COILS
BROADCAST ANT COIL
ON-OFF SWITCH
R.F. CHOKE
SPKR. FIELD
CHOKE
LOW-HIGH POWER SWITCH
DET. COUP. TR.
1st I.F. TRANS.
2nd I.F. TRANS.
3rd I.F. TRANS.
4th I.F. TRANS.
CHOKE COIL
SPEAKER FIELD OR RESISTANCE
FROM RECEIVER

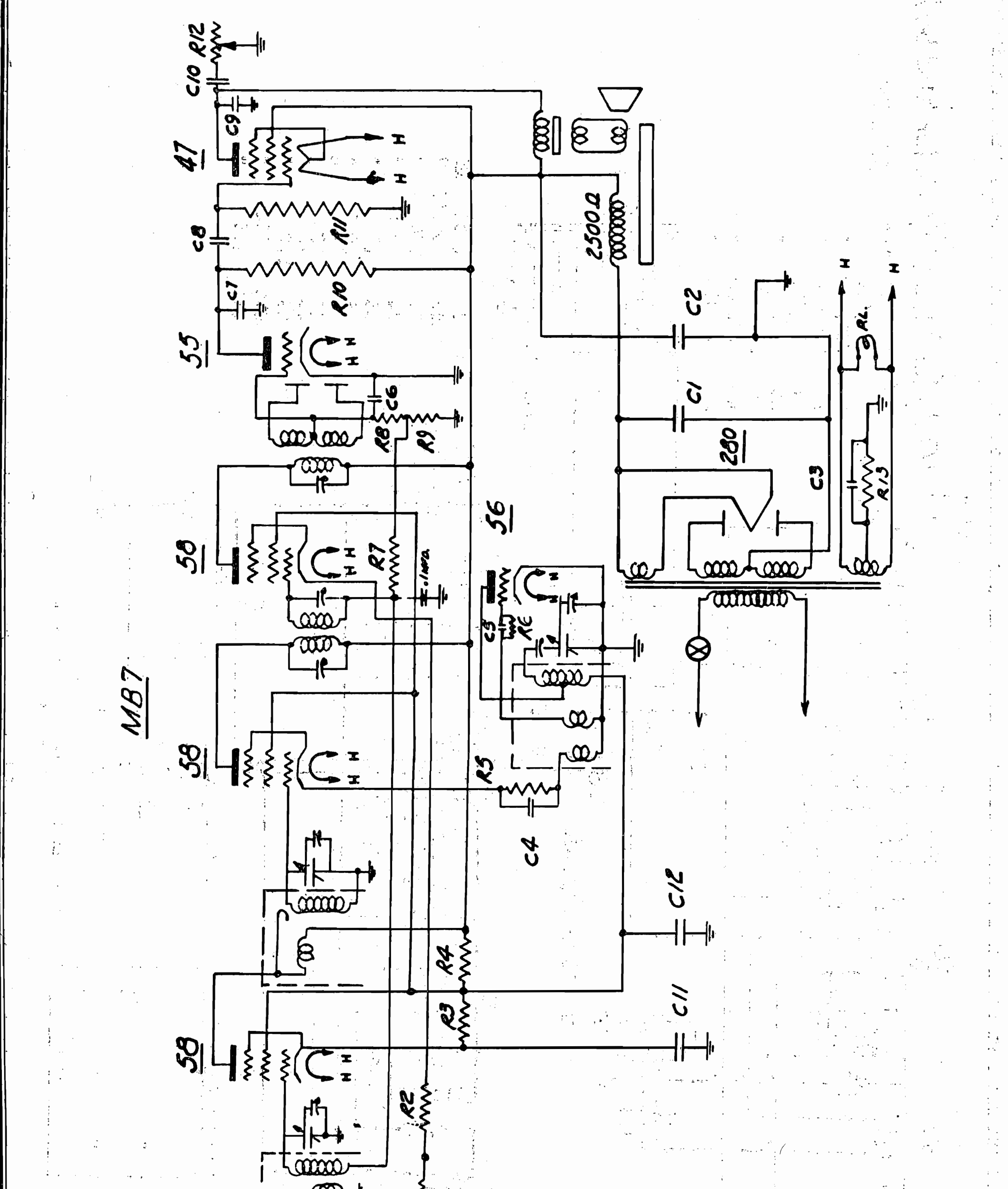
MODEL MB-5
MODEL MB-56, MB-58

R.H MACY & CO.



MODEL MB-710

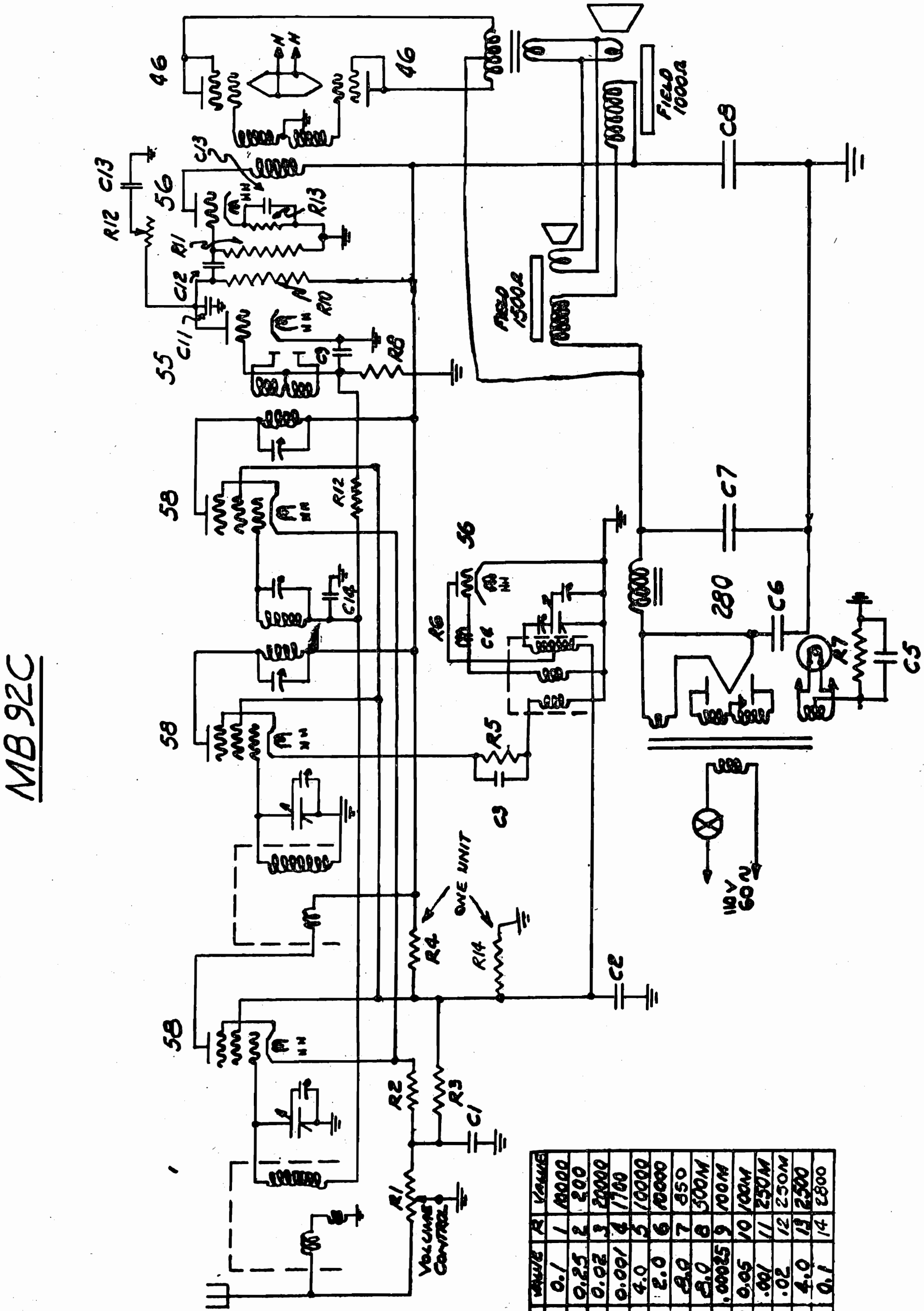
R.H MACY & CO.



	R	C
1	10000	8.0
2	200	4.0
3	30M	4.0
4	14M	.02
5	10M	.001
6	10M	.00025
7	250M	.001
8	1MEG	.02
9	250M	.001
10	100M	.05
11	250M	.1
12	100M	.1
13	42.5	

MODEL MB-92

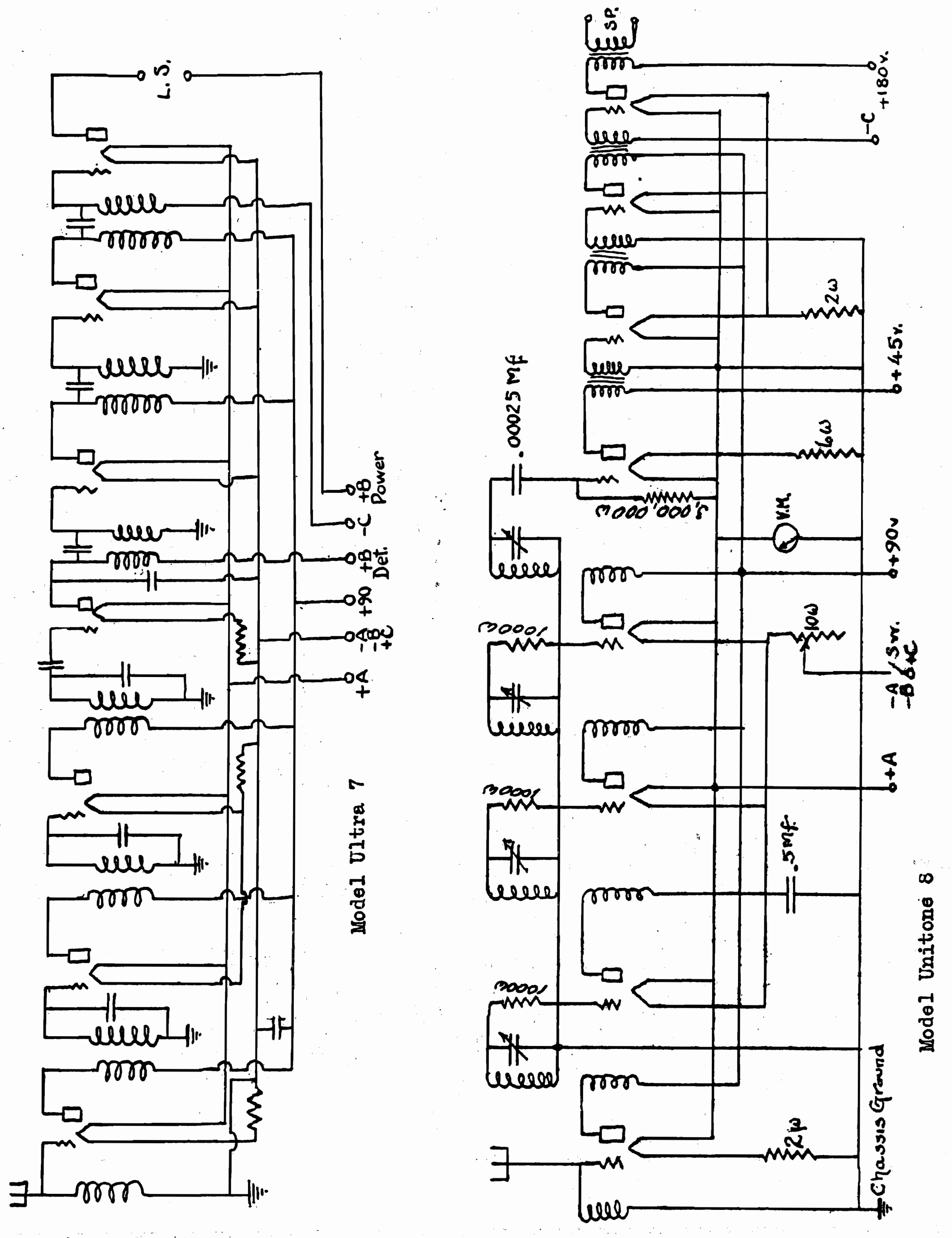
R. H. MACY & CO.



C	VALUE	R	VALUE
1	0.1	1	15000
2	0.25	2	200
3	0.02	3	20000
4	0.001	4	1700
5	4.0	5	10000
6	2.0	6	15000
7	8.0	7	850
8	8.0	8	500M
9	.00025	9	100M
10	0.05	10	100M
11	.001	11	250M
12	.02	12	250M
13	4.0	13	2500
14	0.1	14	2800

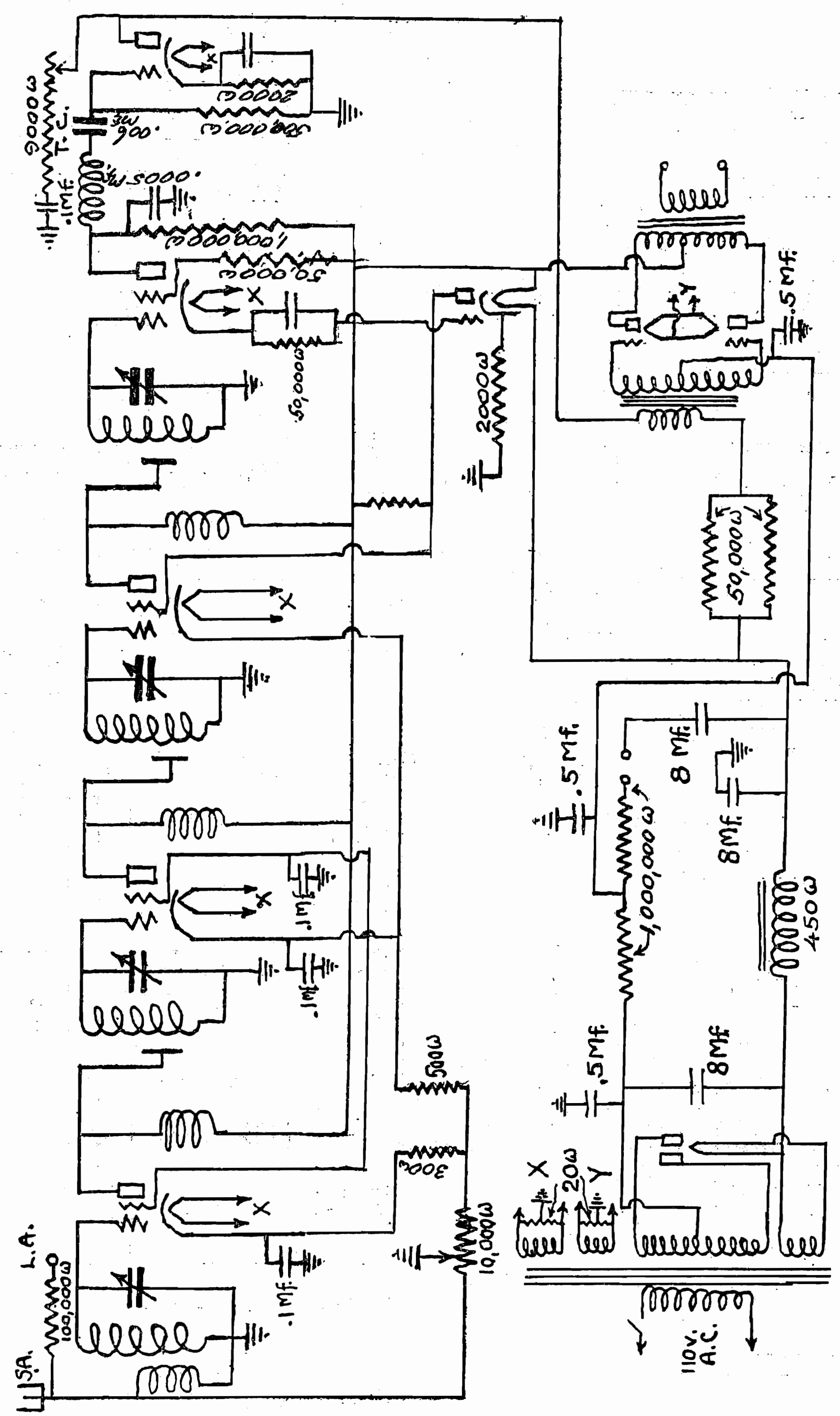
MODEL Miraco Ultra 7
MODEL Miraco Unitone 8

MID-WEST RADIO CORP.



MODEL Miraco AC9-4SG

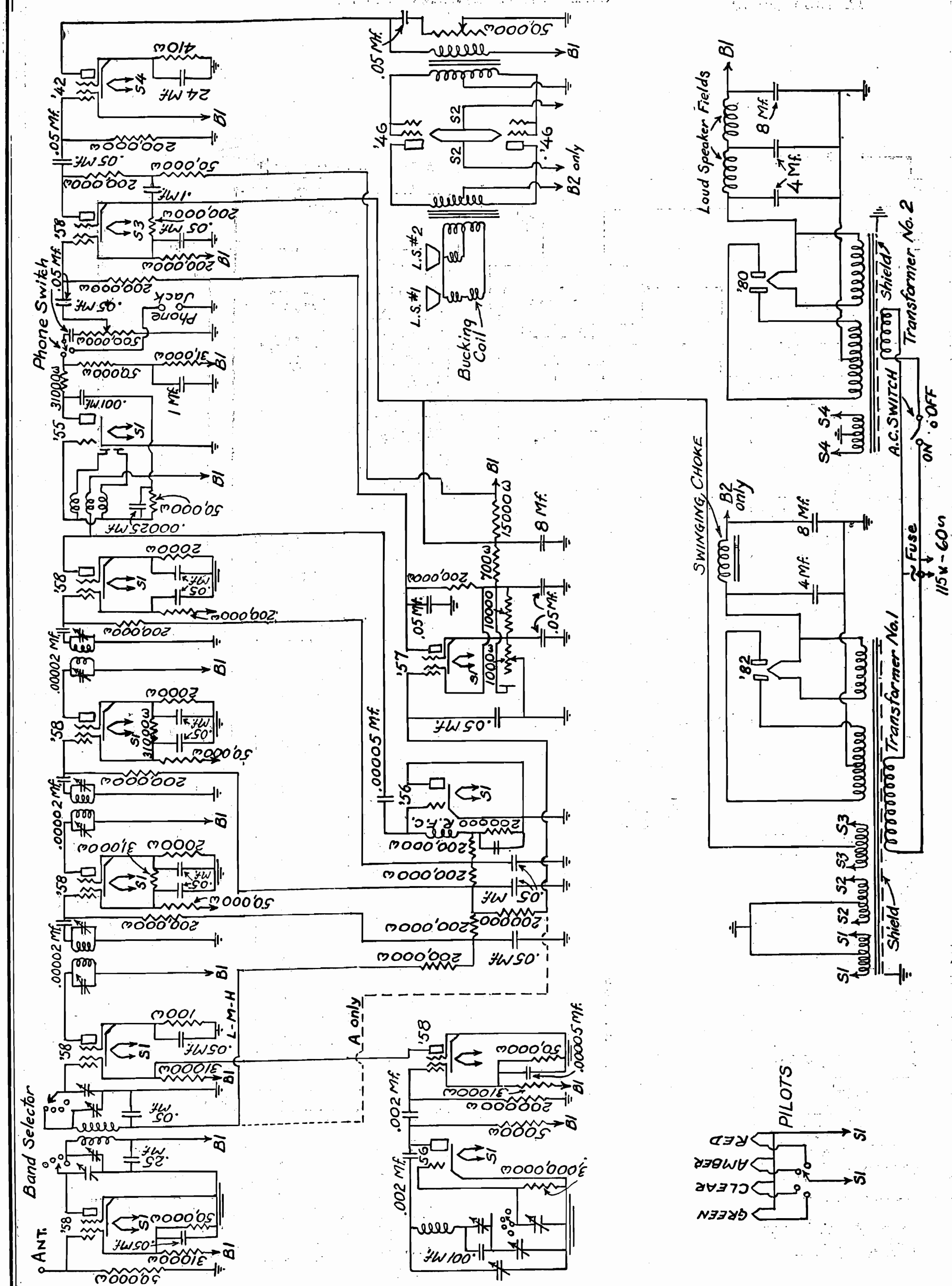
MID-WEST RADIO CORP.



Early models have coupled R-F. transformers.

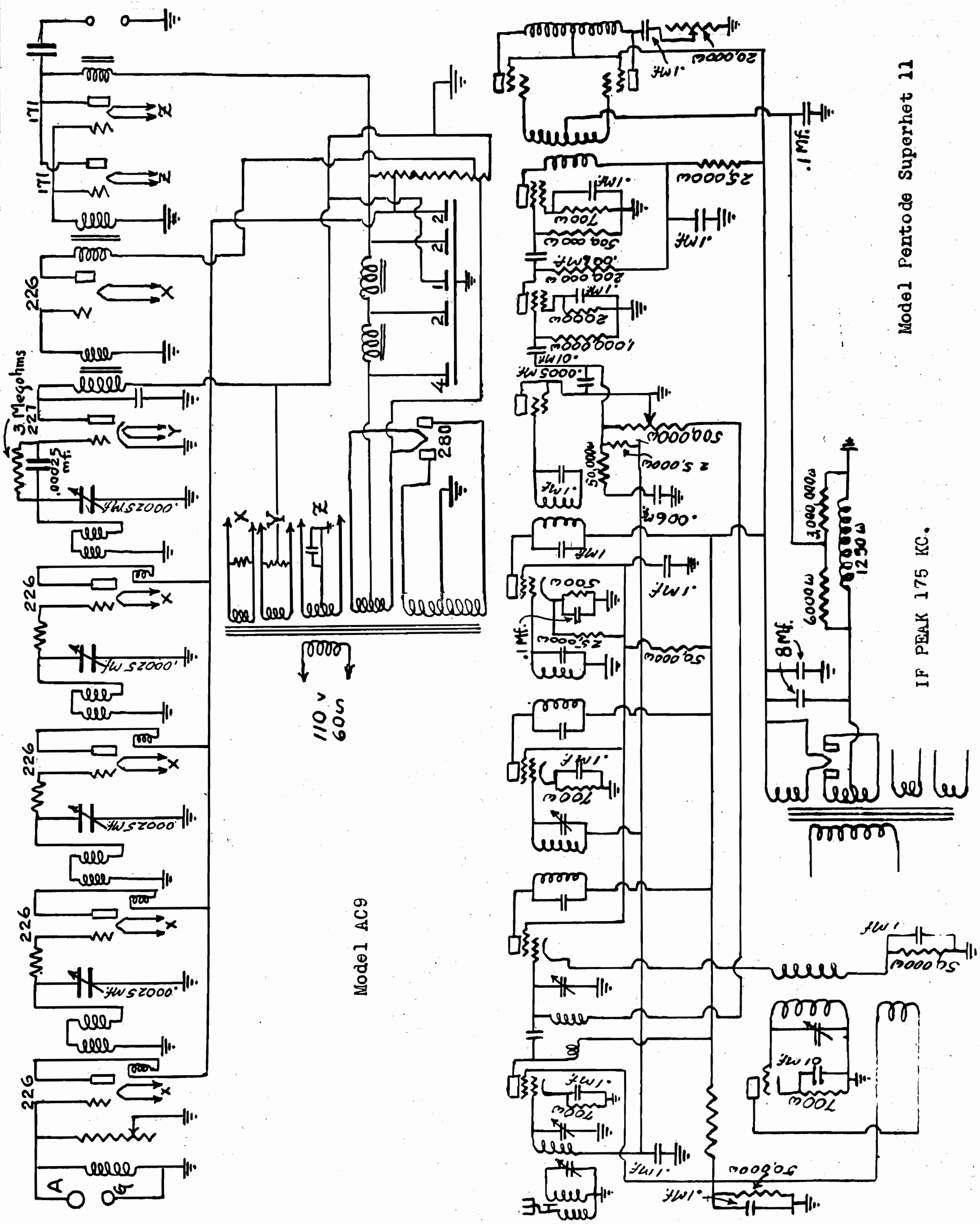
MID-WEST RADIO CORP.

MODEL Miraco 16 Tube Superhet



MODEL Miraco AC9
MODEL Miraco Pentode
11 Tube Super

MID-WEST RADIO CORP.

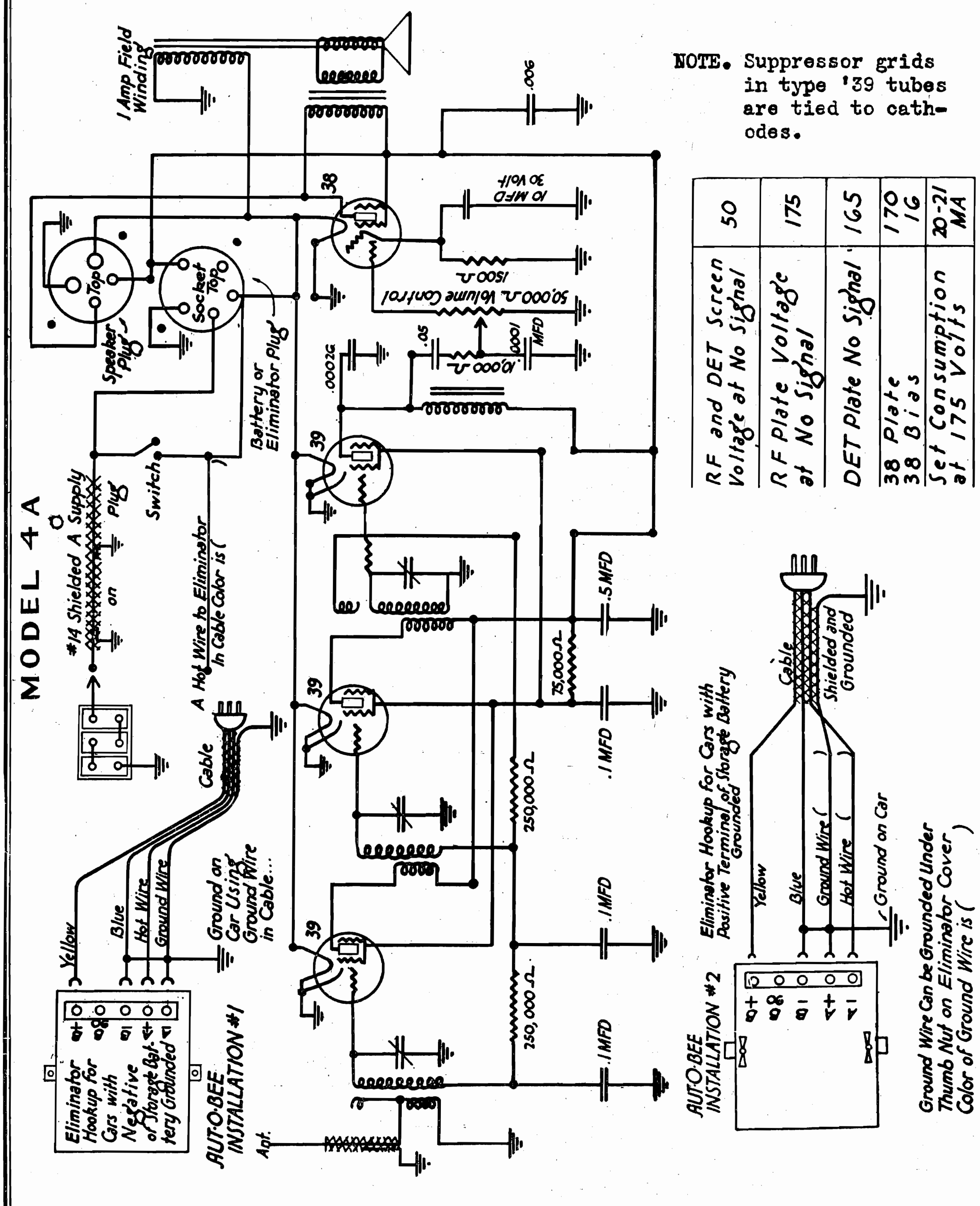


MISSION BELL RADIO MFG. CO., INC.

MODEL 4-A

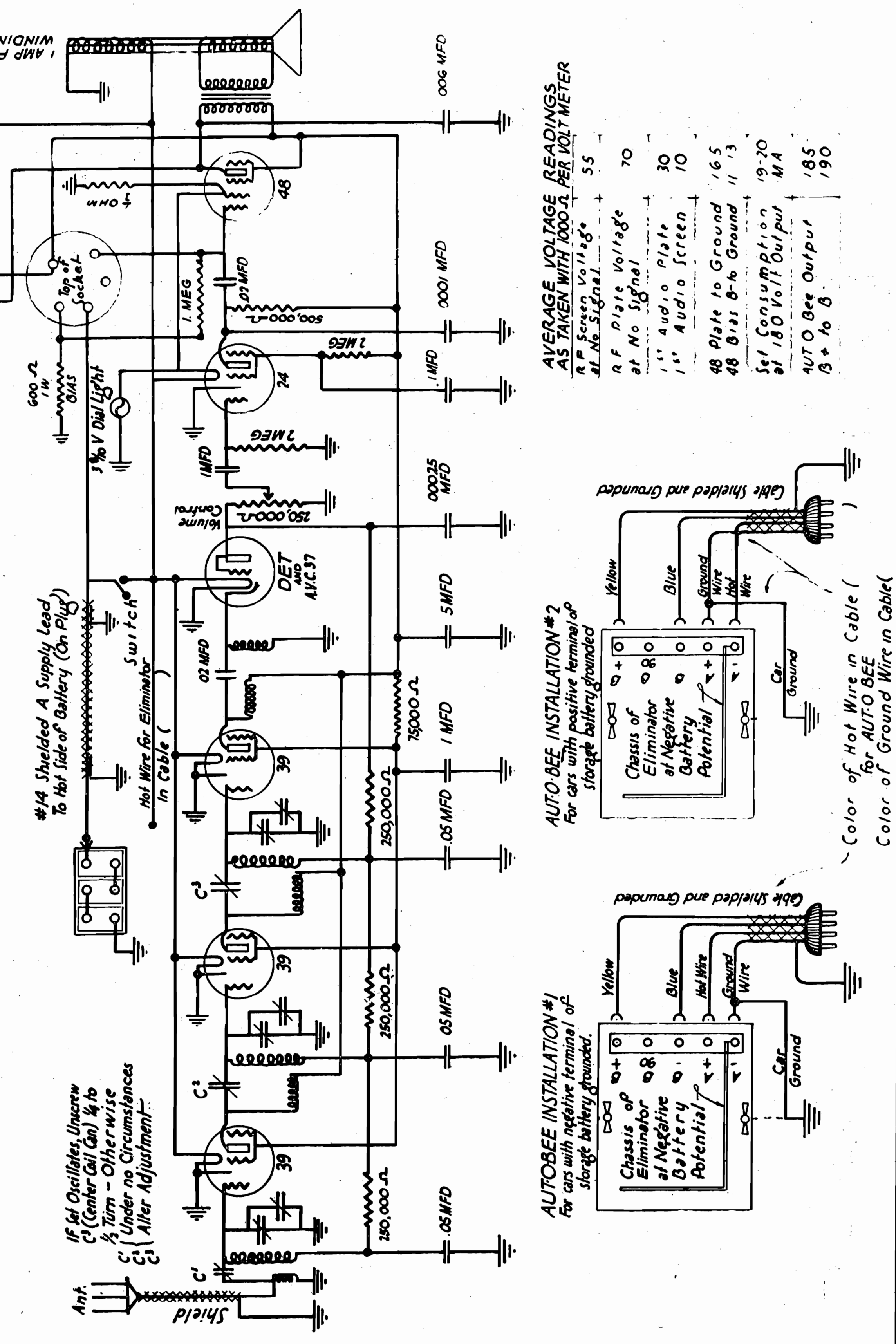
NOTE. Suppressor grids in type '39 tubes are tied to cathodes.

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



MODEL 6-A

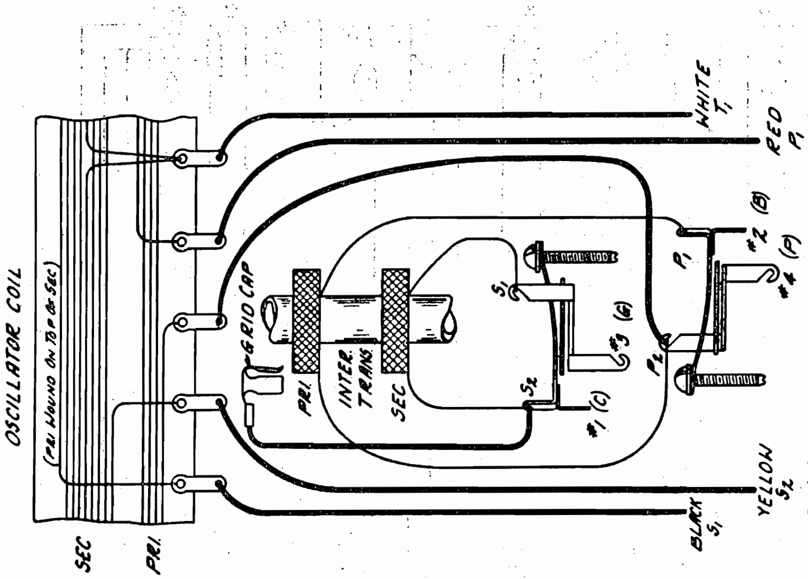
MISSION BELL RADIO MFG CO., INC.



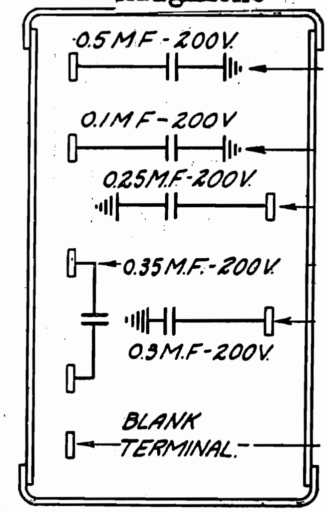
NOTE. Suppressor grids in type '39 tubes are tied to the respective cathodes.

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

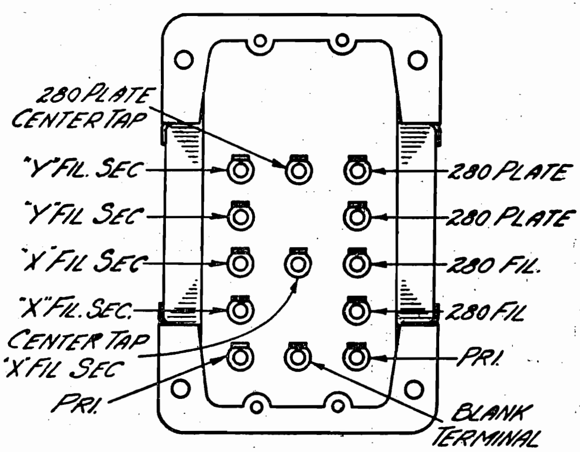
MONTGOMERY-WARD & CO.



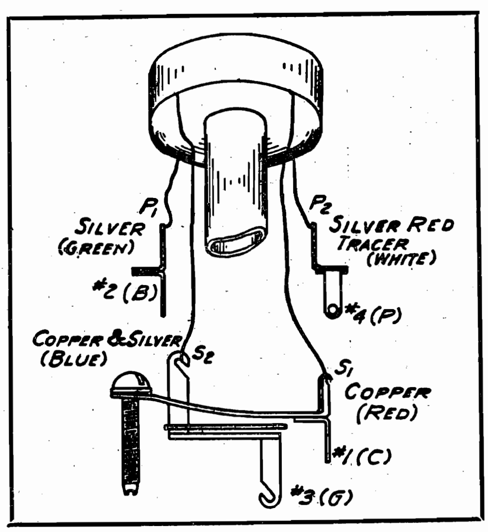
-Wiring Diagram, Osc. and I.F. Assembly



5 Section Condenser Internal Wiring



-Power Transformer Terminals



-Wiring Diagram, 2nd I.F. Assembly

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

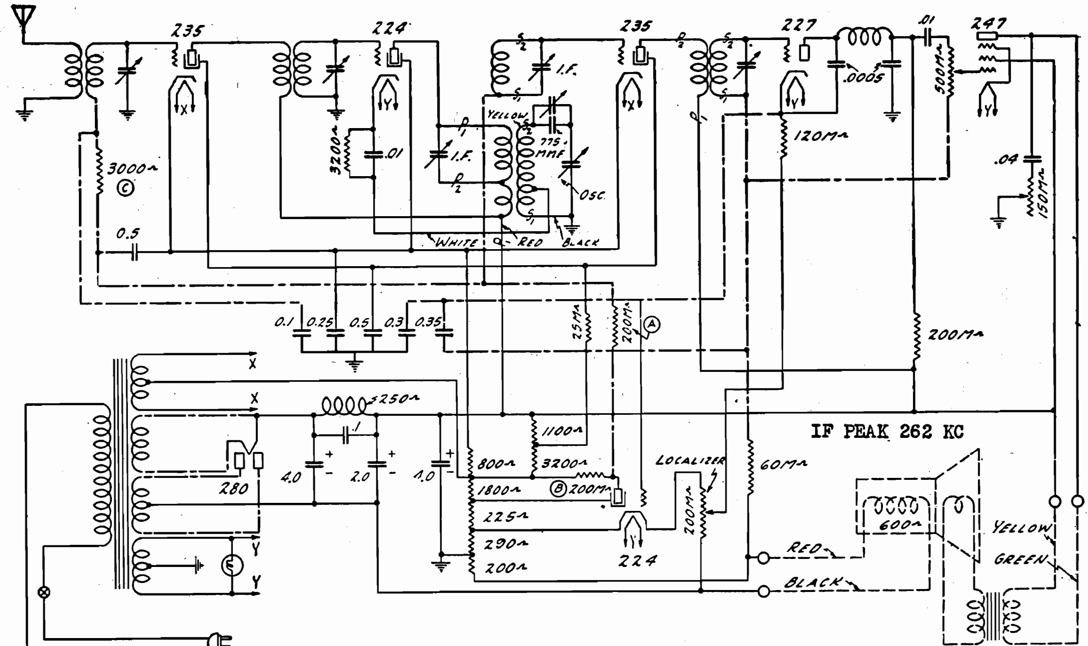
Remove the grid cap from the grid connection of the 224 1st detector tube and connect the lead from the signal generator to the grid of the 224 1st detector. The tube shield should be on and the chassis grounded. One way to make this connection is to bring the antenna lead from the signal generator through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

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

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

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

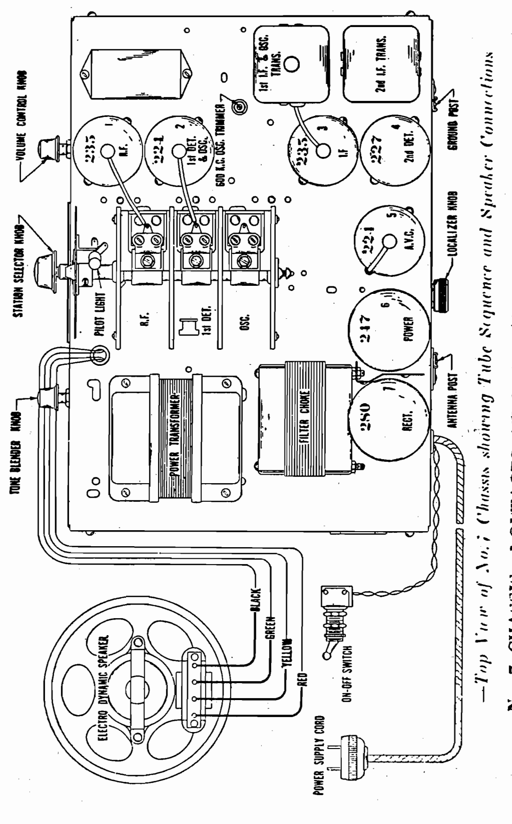
MONTGOMERY-WARD & CO.



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

— RUBBER COVERED WIRE
Ⓐ AFTER SERIAL Nº 1,062,700 RESISTOR WILL BE OMITTED.
Ⓑ AFTER SERIAL Nº 1,062,700 RESISTOR WILL BE 300M-Ω
Ⓒ AFTER SERIAL Nº 1,070,000 RESISTOR CHANGED TO 5 μ h. CHOKE.

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



—Top View of No. 7 Chassis showing Tube Sequence and Speaker Connections

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

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

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

SETTING THE LOCALIZER.

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

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

MONTGOMERY-WARD & CO.

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

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

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

The following parts are necessary:

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

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

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

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

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

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

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

Note: The new color code and method of connecting the battery cable is shown in Figure No. 3. Use this color code for connecting the batteries after the conversion is made.

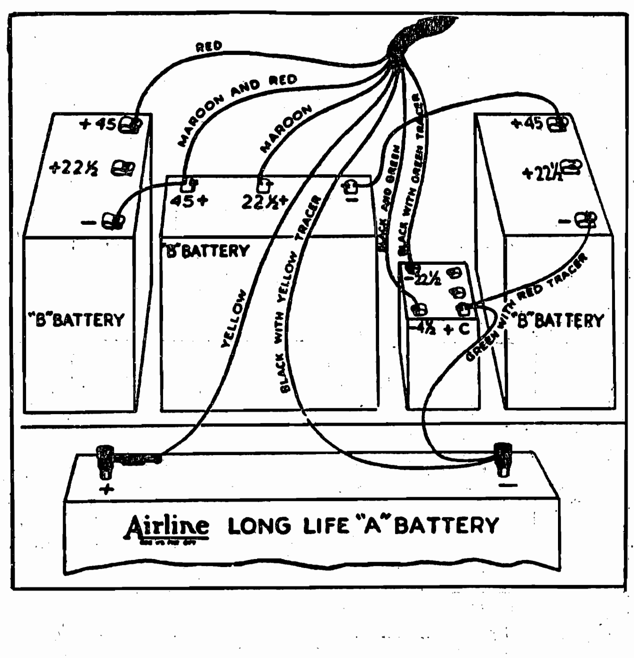
Caution: Be sure all battery connections are correct.

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

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

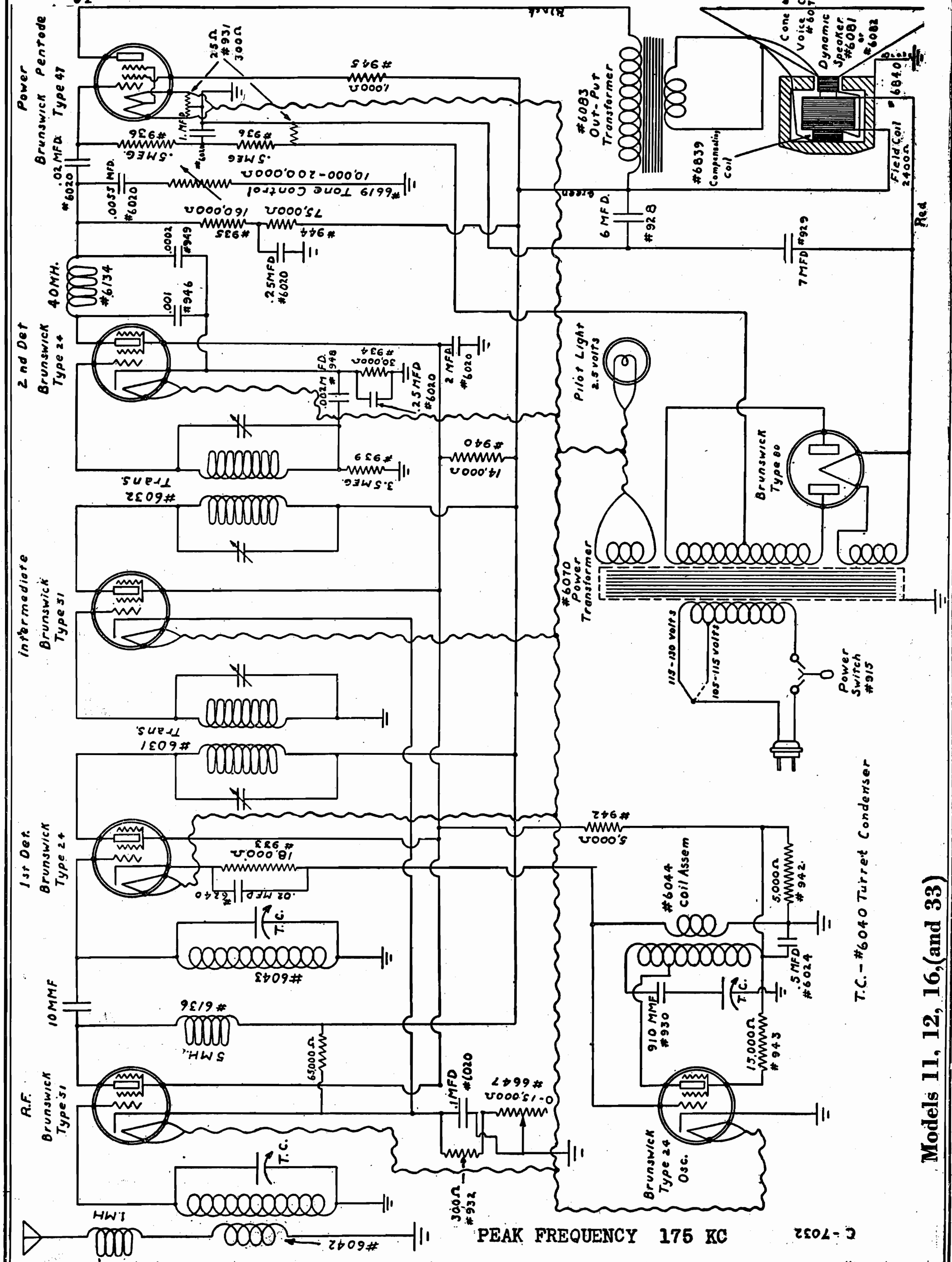
IMPORTANT NOTICE

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



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

MONTGOMERY-WARD & CO.



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

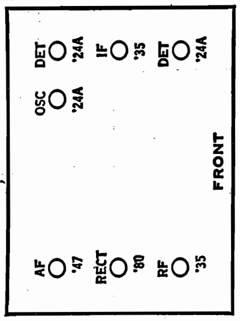
MONTGOMERY-WARD & CO.

MODELS 11, 12, & 16.

SOCKET ANALYSIS—120 VOLT LINE

Volume Control Set at Maximum—Short Antenna to Ground

Models 11, 12,



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

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

METHOD OF ALIGNING R.F. CIRCUITS

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

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

METHOD OF ALIGNING I.F. TRANSFORMERS

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

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

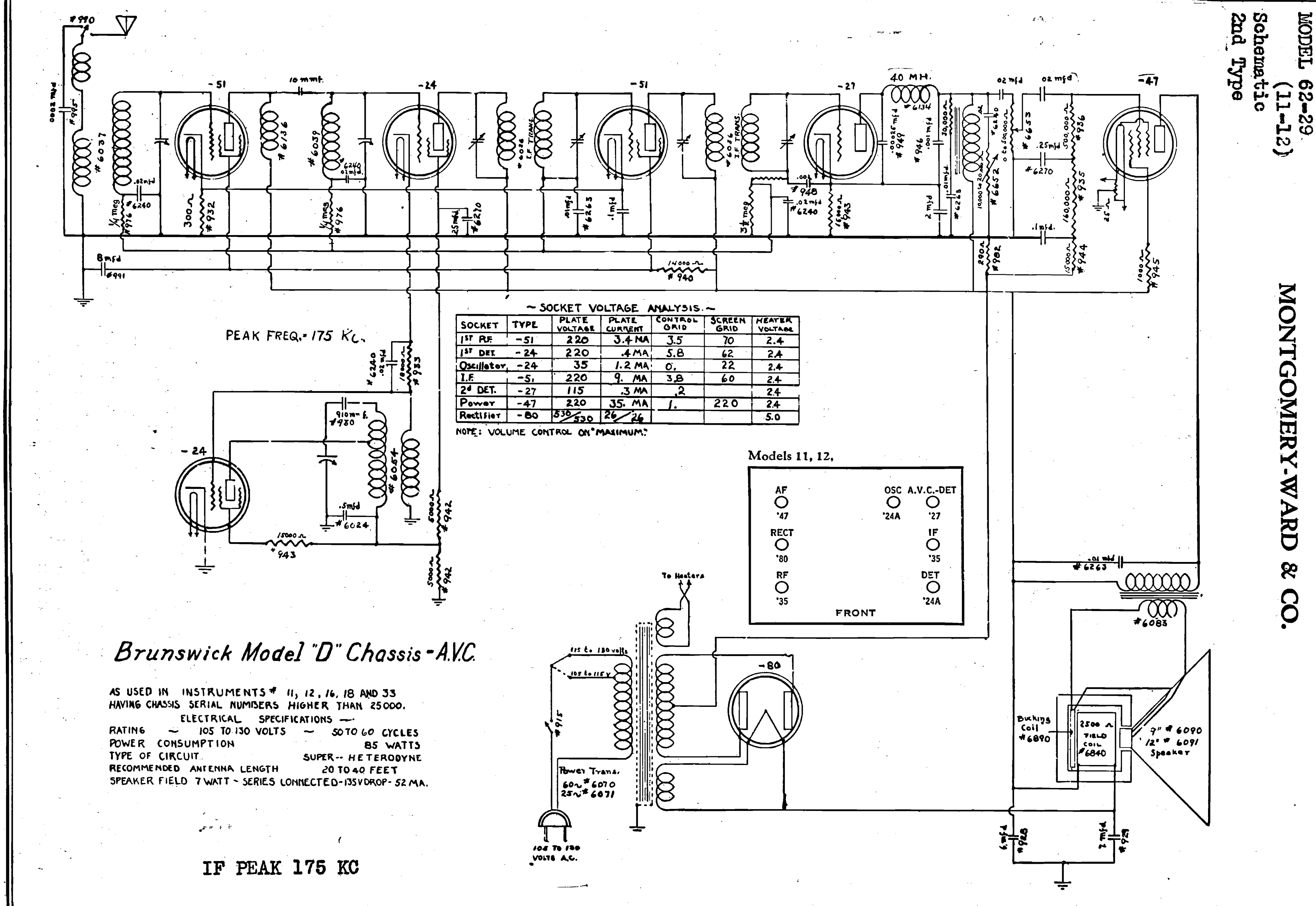
By far the best method of aligning the tuned circuits in the intermediate frequency transformers is to employ a 175 K.C. oscillator and output meter. In making this test, remove the oscillator tube and connect the output of the oscillator to the grid cap of the first detector. Usually it will not be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

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

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

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

MONTGOMERY-WARD & CO.



~ SOCKET VOLTAGE ANALYSIS. ~

SOCKET	TYPE	PLATE VOLTAGE	PLATE CURRENT	CONTROL GRID	SCREEN GRID	HEATER VOLTAGE
1ST R.F.	-51	220	3.4 MA	3.5	70	2.4
1ST DET.	-24	220	.4 MA	5.8	62	2.4
Oscillator	-24	35	1.2 MA	0.	22	2.4
I.F.	-51	220	9. MA	3.8	60	2.4
2d DET.	-27	115	.3 MA	.2		2.4
Power	-47	220	35. MA	1.	220	2.4
Rectifier	-80	530/530	26/26			5.0

NOTE: VOLUME CONTROL ON "MAXIMUM."

Brunswick Model "D" Chassis - A.V.C.

AS USED IN INSTRUMENTS # 11, 12, 16, 18 AND 33 HAVING CHASSIS SERIAL NUMBERS HIGHER THAN 25000.

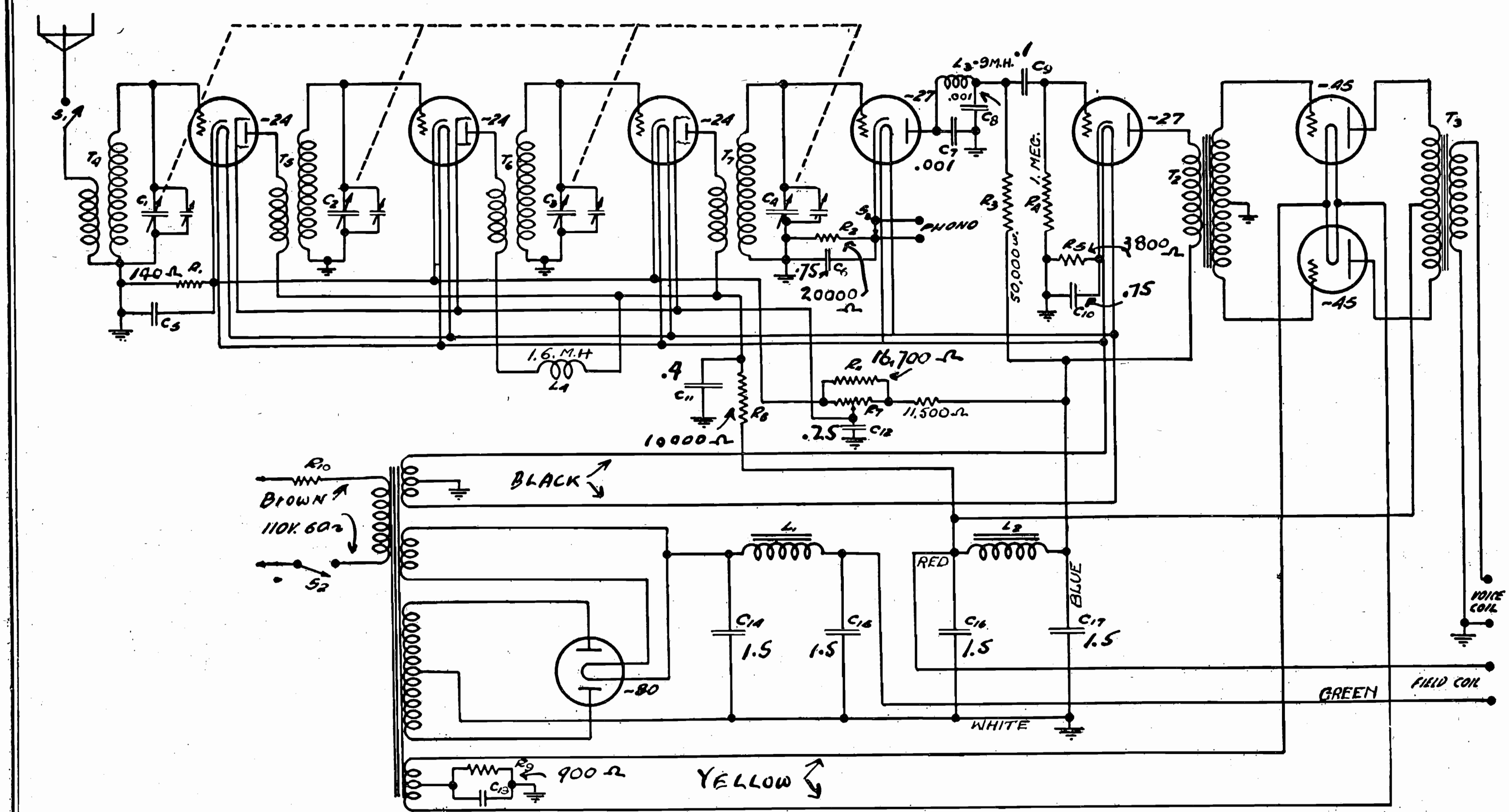
ELECTRICAL SPECIFICATIONS —

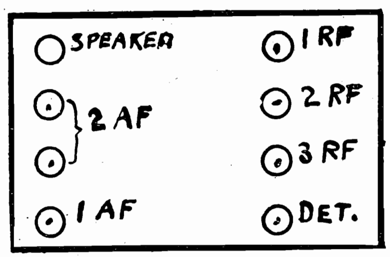
RATING	~ 105 TO 130 VOLTS ~ 50 TO 60 CYCLES
POWER CONSUMPTION	85 WATTS
TYPE OF CIRCUIT	SUPER-- HETERODYNE
RECOMMENDED ANTENNA LENGTH	20 TO 40 FEET
SPEAKER FIELD	7 WATT - SERIES CONNECTED - 135 V DROP - 52 MA.

IF PEAK 175 KC

MONTGOMERY-WARD & CO.

MODEL 62-020
(51)





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

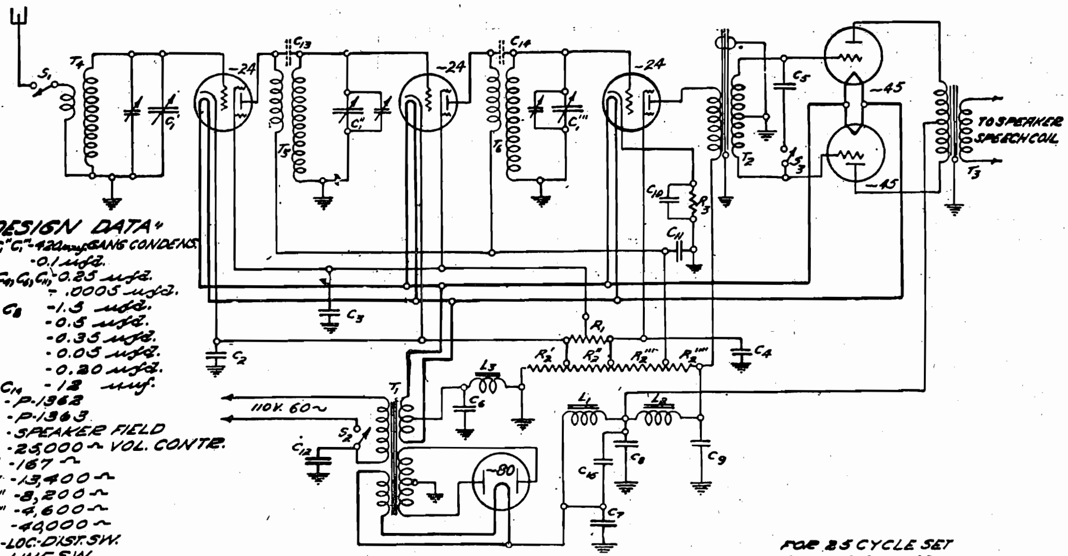
Tube No. in Order Tested (1)	Type of Tube (2)	Position of Tube in Set (3)	Meter Readings with Jewell Test Plug in Socket of Set — Operating Voltages: Filament or Heater (4)	Plate or Anode (5)	Control Grid—Space GD+ (6)	Normal Grid—Screen GD+ (7)	Cathode to Heater (8)	Milliamperes: Screen GD L. H. 80 Plate (9)	Plate R. H. 80 Plate (10)	Tube Test (11)	Plate Current Change (12)
1	224	1 R.F.	2.47	158	3	84	3	-	3.1	6.5	3.4
2	224	2 R.F.	2.47	158	3	84	3	-	3.8	7.8	4.0
3	224	3 R.F.	2.47	156	3	84	3	-	3.5	7.9	4.4
4	227	Det.	2.47	157	-	12.6	13.5	-	.8	.85	.05
5	227	1 A.F.	2.48	198	-	1.0	16	-	4.2	4.9	.7
6	245	PP-AF	2.55	227	-	42	-	-	22	26	4
7	245	PP-AF	2.55	225	-	42	-	-	27	32	5
8	280	Rect.	5.3	-	-	-	-	41	41	-	-

Line Voltage 105

Tube No. in Order Tested (1)	Type of Tube (2)	Position of Tube in Set (3)	Meter Readings with Jewell Test Plug in Socket of Set — Operating Voltages: Filament or Heater (4)	Plate or Anode (5)	Control Grid—Space GD+ (6)	Normal Grid—Screen GD+ (7)	Cathode to Heater (8)	Milliamperes: Screen GD L. H. '80 Plate (9)	Plate R. H. '80 Plate (10)	Tube Test (11)	Plate Current Change (12)
1	224	1 R.F.	2.09	146	2.43	87.5	2.43	-	2.72	5.55	2.83
2	224	2 R.F.	2.09	151	2.43	85.5	2.43	-	2.55	5.65	3.10
3	224	3 R.F.	2.09	151	2.43	87.5	2.43	-	2.75	5.8	2.92
4	227	Det.	2.09	134	-	12.2	13.15	-	.58	.78	.20
5	227	1 A.F.	2.14	170	-	1.22	13.6	-	3.31	4.08	.77
6	245	PP-AF	2.14	195	-	37.5	-	-	20.4	24.3	3.9
7	245	PP-AF	2.14	195	-	37.5	-	-	23.4	27.2	3.8
8	280	Rect.	4.51	-	-	-	-	35	35	-	-

MODEL 62-010

MONTGOMERY-WARD & CO.



DESIGN DATA

$C_1' C_1'' C_1'''$ - 420 mmf. GANG CONDENS.
C_2 - 0.1 mfd.
C_3, C_4, C_6, C_{11} - 0.25 mfd.
C_5 - .0005 mfd.
C_7, C_8 - 1.5 mfd.
C_9 - 0.5 mfd.
C_{10} - 0.35 mfd.
C_{12} - 0.05 mfd.
C_{15} - 0.20 mfd.
C_{13} C_{14} - 12 mmf.
L_1 - P-1362
L_2 - P-1363
L_3 - SPEAKER FIELD
R_1 - 25,000 Ω VOL. CONTR.
R_2' - 167 Ω
R_2'' - 13,400 Ω
R_2''' - 8,200 Ω
R_2'''' - 4,600 Ω
R_3 - 40,000 Ω
S_1 - LOC.-DIST. SW.
S_2 - LINE SW.
S_3 - TONE CONTR. TOGGLE SW.
T_1 POWER TRANS.
T_2 INPUT TRANS.
T_3 OUTPUT TRANS.
T_4 - ANT. SELECT. COIL
T_5 - T_6 - R.F. COILS

FOR 25 CYCLE SET
C_{11} - 0.6 mfd.
C_7 - 2.0 mfd.
C_8 - 1.0 mfd.

Line Volts—105 Volts

No.	Stage	Type Tube	A Volts	B Volts	Cont. Grid Volts	Cath. Volts	Ip' Norm.	Ip" G.D.	Ip"-Ip' (Diff)	SG Volts
1	1st r. f.	'24	2.05	165	2.6	44	2.1	3.6	1.5	76
2	2nd r. f.	'24	2.05	165	2.6	44	2.3	3.8	1.5	76
3	Det.	'24	2.06	196	*7.0	*26	*0.2	*1.3	*1.1	*70
4	AF	'45	2.15	230	45.0		23.	32.	4 0.	
5	AF	'45	2 15	230	45 0		25.	29.	4.0	
6	Rect.	'80	4.6							

Line Volts—125 Volts

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

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

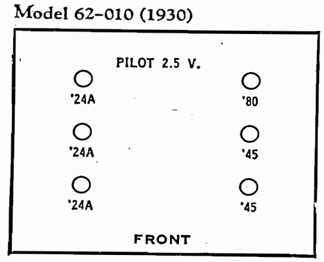
*Because of high resistance in the cathode circuit of this tube, together with the circuit used in most analysers, the readings marked with an asterisk may vary over 100% when using different meter scales.

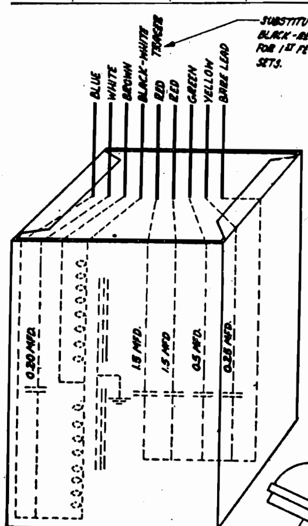
CAPACITY TABLES
Using 200 Volt Scale of A. C. Meter

(107 Volt 60 Cycle Line)

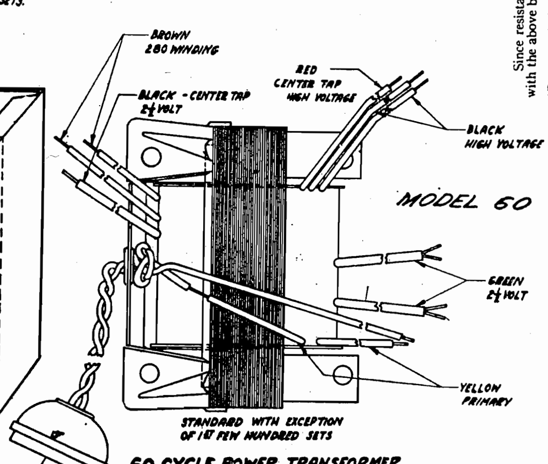
No.	Capacity	Reading	Your Reading	Part No.
C-2	0.10	45 0		G-1136
C-3	0.25	70 0		G-1136
C-11	0.35	87.0		G-1136
C-10	0.35	86.0		G-1108
C-4	0.25	78.0		G-1108
C-12	0 05	20.0		G-1108
C-15	0.20	67 0		G-1106
C-7	1.5	105 0		G-1106
C-8	1.5	105 0		G-1106
C-9	0 5	95 0		G-1106
C-6	0.25	75.0		G-1106

Model 62-010 (1930)





60 CYCLE FILTER BLOCK



60 CYCLE POWER TRANSFORMER

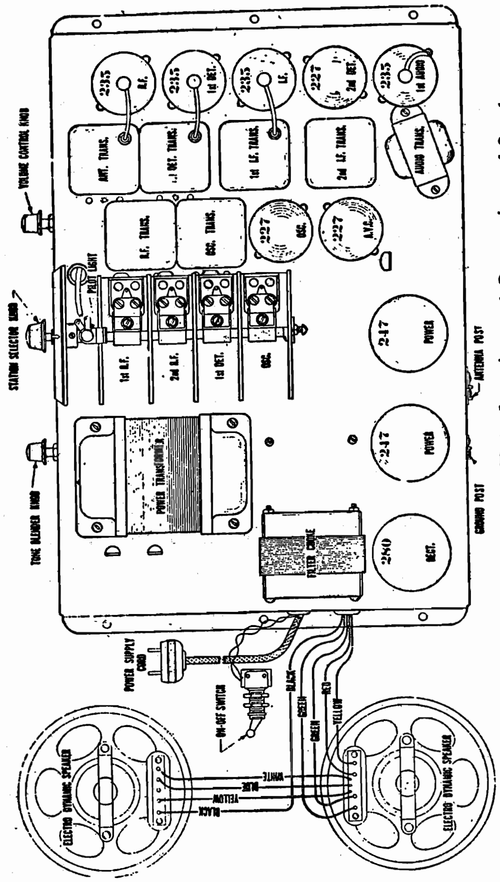
RESISTANCE TABLES
Using 6 Volt Battery with 0-10 Voltmeter
(1000 Ohms Per Volt)

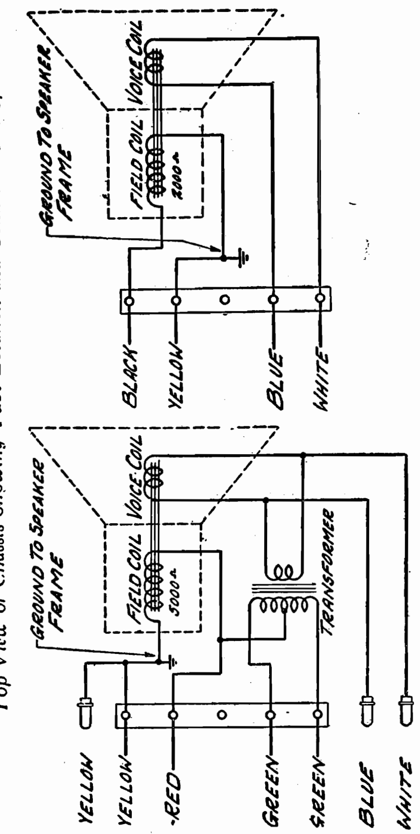
Item tested	From	To	Reads	Your Reading	Resistance (ohms)
Voltage Divider with volume control connected across taps 1-2	Ground	Tap 1	6.0		167
	Ground	Tap 2	3 3		8900
	Ground	Tap 3	2.2		17000
	Ground	Tap 4	1.9		21600
Det. Bias resist.	Ground	Det. cath. prong	1.2		40000
Volume control	Across volume control (disconnected)		1.8		25000
L. 1. filter choke	Center Tap Output Trans.	280 fil. prong	5.9		226
L. 2. filter choke	Center Tap Output Trans.	Plt. prong det.	5.0		2000

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

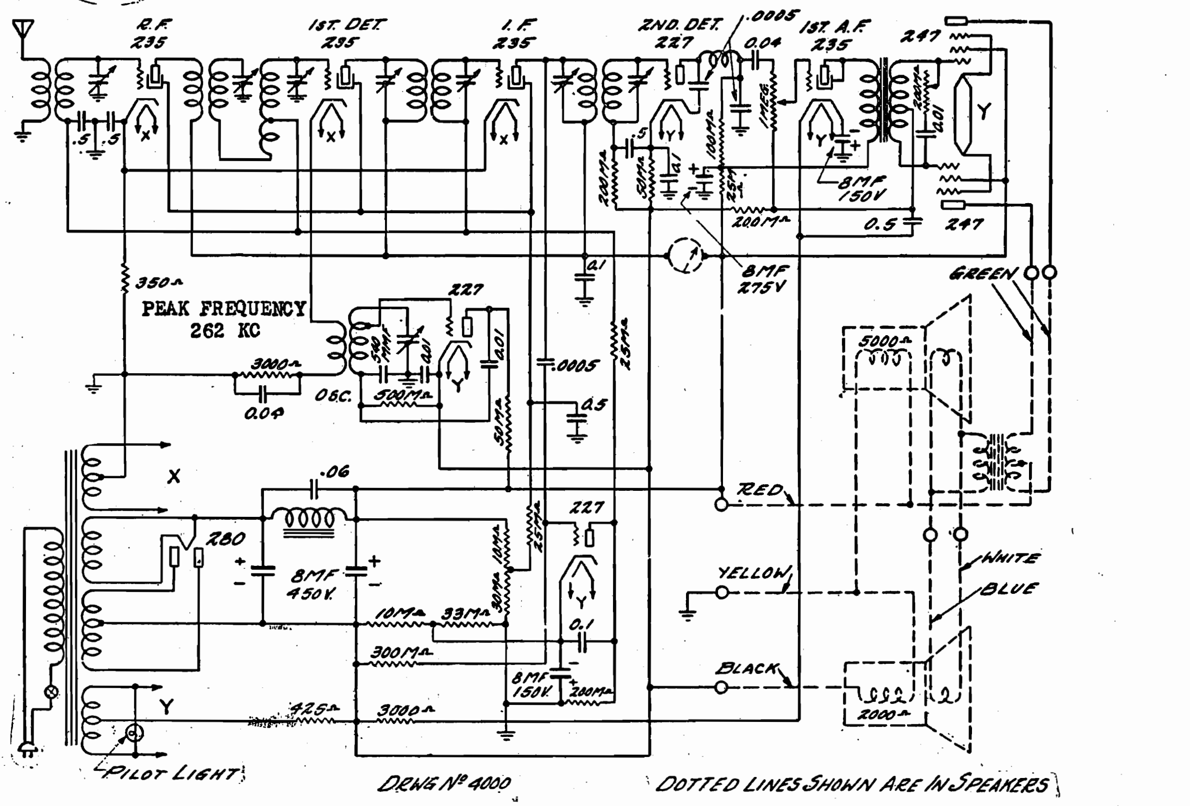
MONTGOMERY-WARD & CO.

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





Top View of Chassis Showing Tube Location and Connections of Speakers



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

MONTGOMERY-WARD & CO.

SPEAKERS

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

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

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

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

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

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

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

MICROPHONIC HOWL

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

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

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

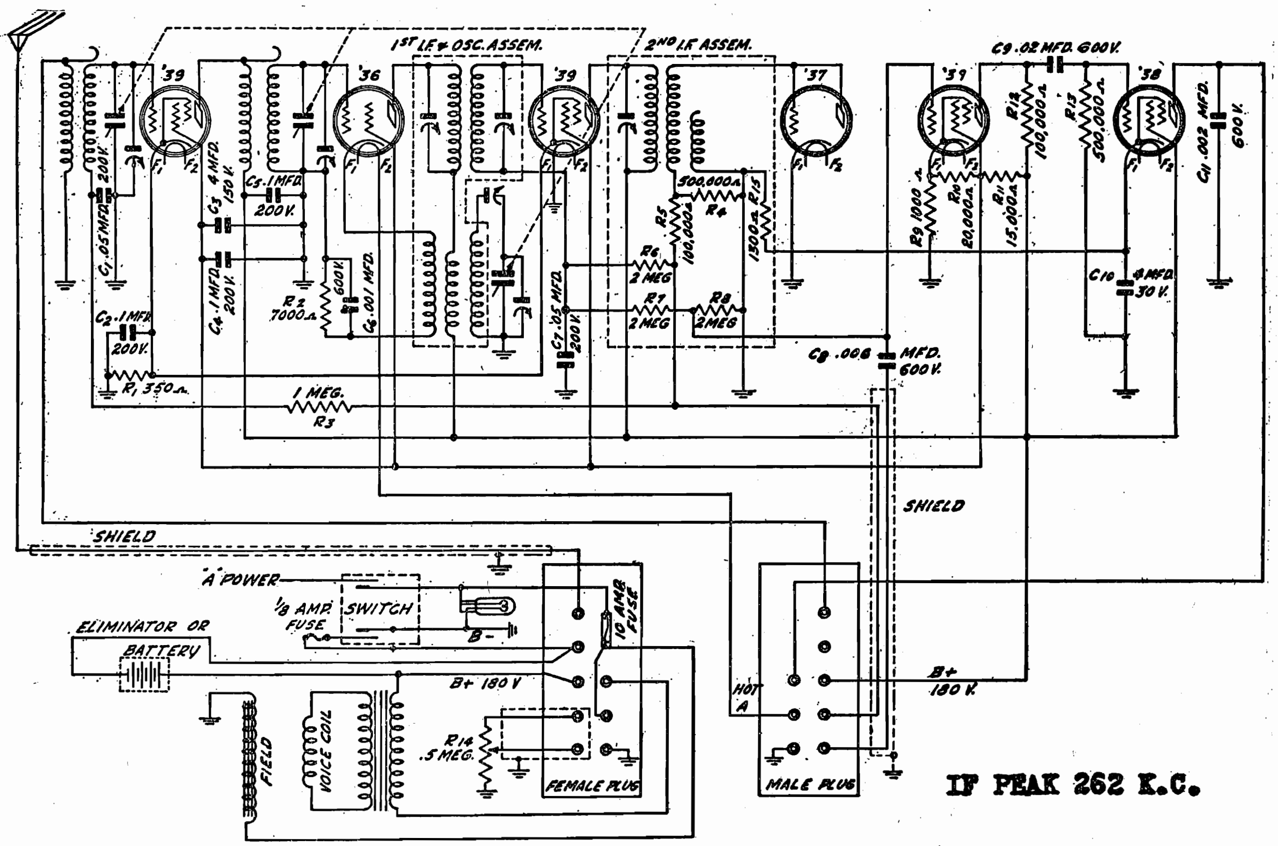
—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM

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

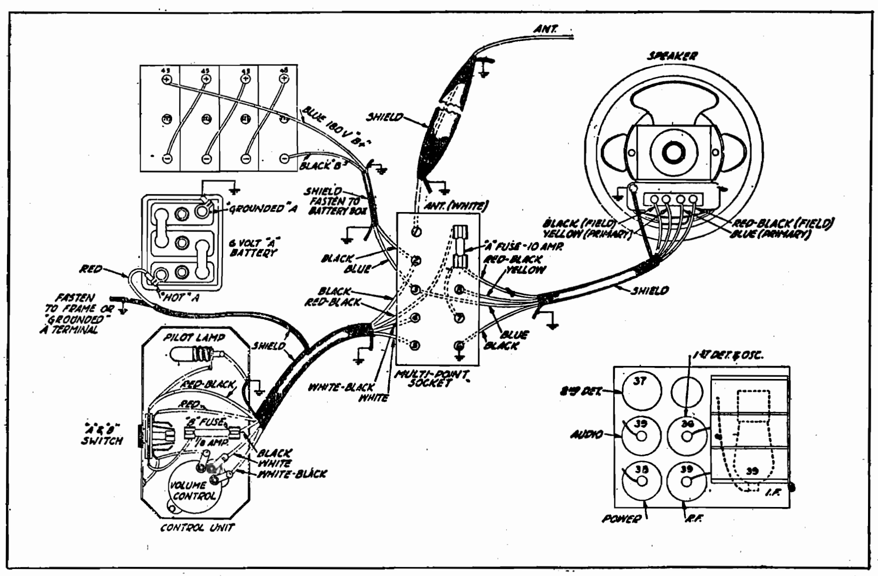
(1) Measured across 350 ohm bias resistor.
(2) Measured across 3000 ohm bias resistor. B- to Cathode.
(3) Measured across 500 M ohm osc. bias resistor. Bias voltage varies from 11 to 28 between 1500 and 550 K.C. settings of tuning condenser.
(4) Measured from B- to A.V.C. plate.
(5) Measured from B- to A.V.C. Cathode.
(6) Measured across 425 ohm bias resistor. B- to "Y" filament.

MONTGOMERY-WARD & CO.

MODEL Auto Radio



IF PEAK 262 K.C.



VOLTAGE DATA

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

* Will vary with dial setting.

MODEL Auto Radio MONTGOMERY-WARD & CO.

Mounting "B" Eliminator and Relay

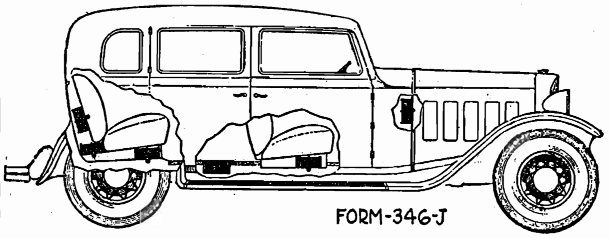


Fig. 7—"B" Eliminator Locations

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

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

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

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

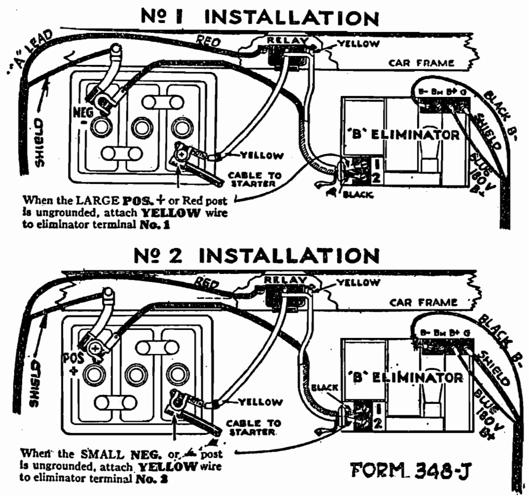


Fig. 8—"B" Eliminator Connections

Suppression of Ignition and Generator Noise

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

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

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

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

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

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

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

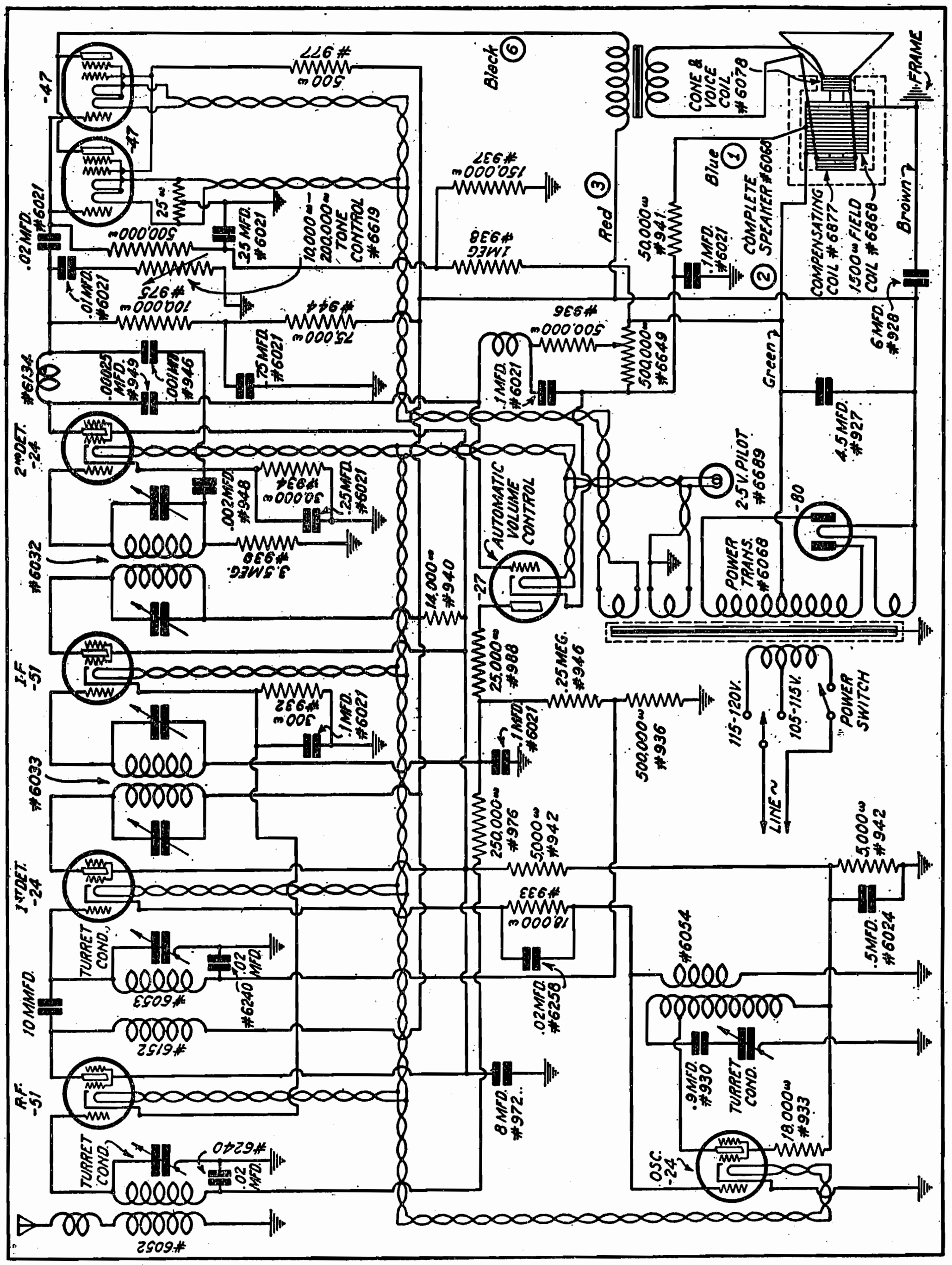
If the chassis and coil are both in back of the dash (under the cowl), take off the coil and mount it on the front of the dash (in the engine compartment). If the coil cannot be moved, place a copper can over it and ground the can at the coil mounting.

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

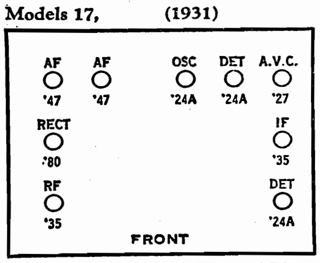
In some cases, the high and low tension leads between the coil and distributor are run close together. In some cases they are in the same conduit. If this is the case, remove the low tension lead from this conduit.

MODEL 17

MONTGOMERY-WARD & CO.



Models 17, (1931)



IF PEAK 175 KC

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

Model 62-2 Notes

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

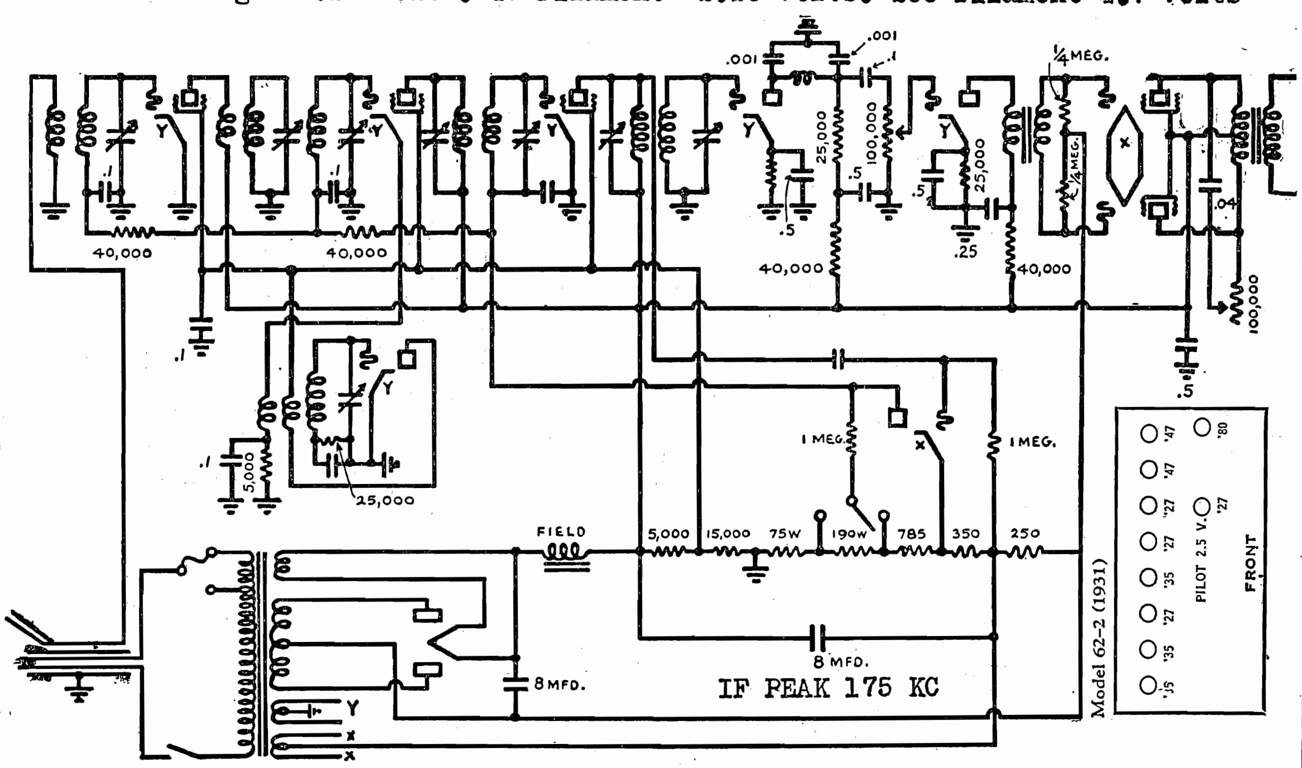
Other differences are as follows: The detector plate resistor is 25,000 ohms instead of 250,000 ohms. The operating voltages are also higher. Thus, the voltage between ground and the r-f plates is 180 volts: between ground and the r-f screens, it is 100 volts: between the ground and the oscillator plate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

Voltage For Model 62-1

All voltages measured from ground as common terminal.

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

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



IF PEAK 175 KC

MONTGOMERY-WARD & CO.

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

TERMINAL VOLTAGES

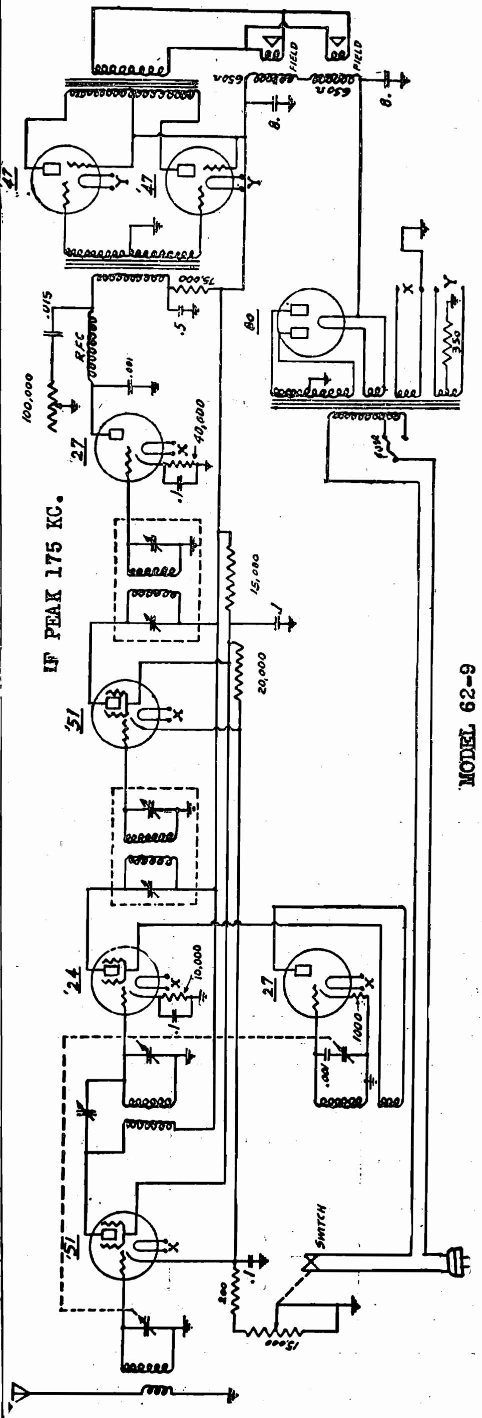
Ground to high side of field (280 Filament)	370 Volts D.C.
Ground to Pentode plates	225 Volts D.C.
Ground to Pentode screens	250 Volts D.C.
Ground to RF plates	250 Volts D.C.
Ground to Detector Plate	155 Volts D.C.
Ground to Second Detector Cathode	20 Volts D.C.
Ground to RF Screens	100 Volts D.C.
Ground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

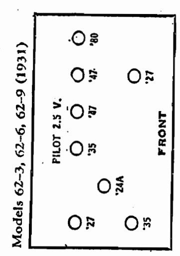
Above readings plus or minus ten per cent with fuse in 110 volt position and 110 volts on the line. Volume control at maximum.

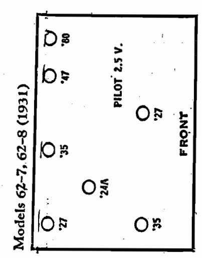
TERMINAL VOLTAGES

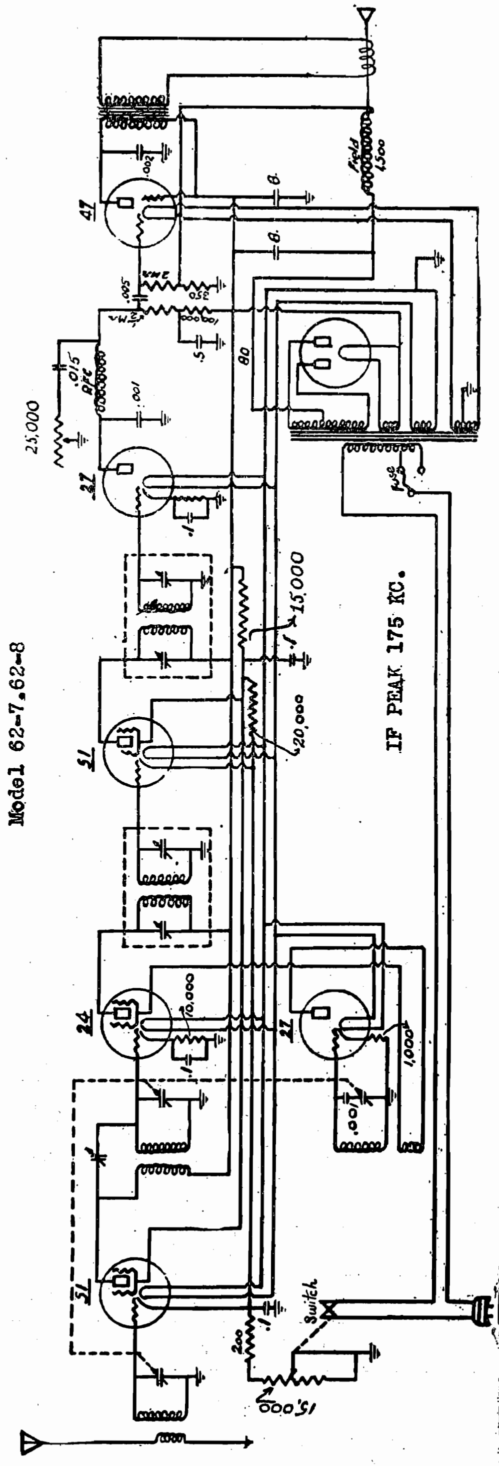
Ground to high voltage (280 Filament)	225 Volts
Ground to Pentode plate	215 Volts
Ground to Pentode screen	225 Volts
Ground to RF plates	225 Volts
Across insulated filter Condenser	325 Volts
Ground to Detector plate	55 Volts
Ground to Second Detector Cathode	10 Volts
Ground to RF Screens	100 Volts
Ground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

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



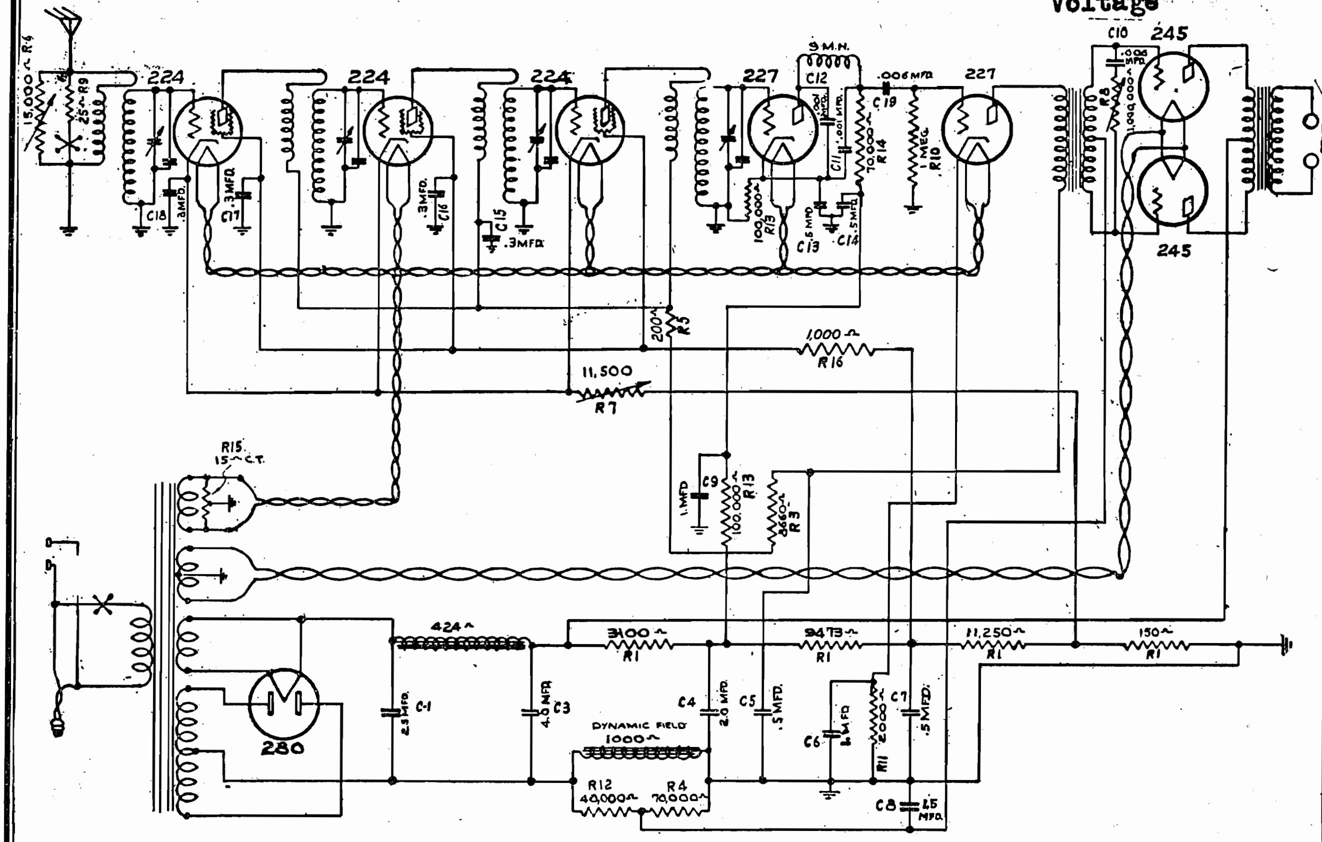






MONTGOMERY-WARD & CO.

MODEL 2955X, 2957X
25 cycles
Schematic
Voltage



Schematic Wiring Diagram, 25 Cycle Model.

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

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

APPROXIMATE OPERATING VOLTAGES

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

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

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

MODEL Musette 52,53 **MUSETTE** MODEL Musette 52,53

Circuit Constants

Each unit in the accompanying diagram carries a serial number. The values of these units are as follows:
Condensers: A-203, 8 mfd. electrolytic; A-304, .0001 mfd.; A-305, special coupling; A-306, .25 mfd.; A-307, .006 mfd.; A-308, .002 mfd.
Chokes: C-102, 505 turns; C-104, 1,200 turns.
Resistors: R-102, volume control, 6,400 ohms with 200 ohms fixed; R-103, tone control resistor, special; R-203, center tapped, 15 ohms; R-310, 25,000 ohms; R-311, one megohm; R-312, 200 ohms; R-313, .5 megohm; R-514, 100,000 ohms; R-315, 50,000 ohms; R-316, 3 megohms.

Voltage Data

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

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

Reading from:

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

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

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

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

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

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

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

Adjusting

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

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

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

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

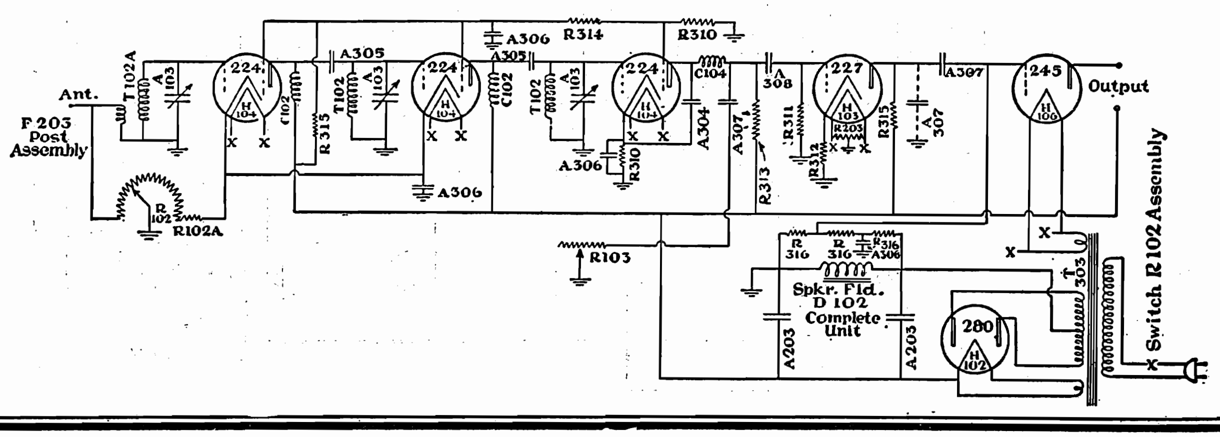
Hum Elimination

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

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

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

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



MODEL Musette 310

MUSETTE

Resonance Adjustment

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

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

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

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

Voltage Data

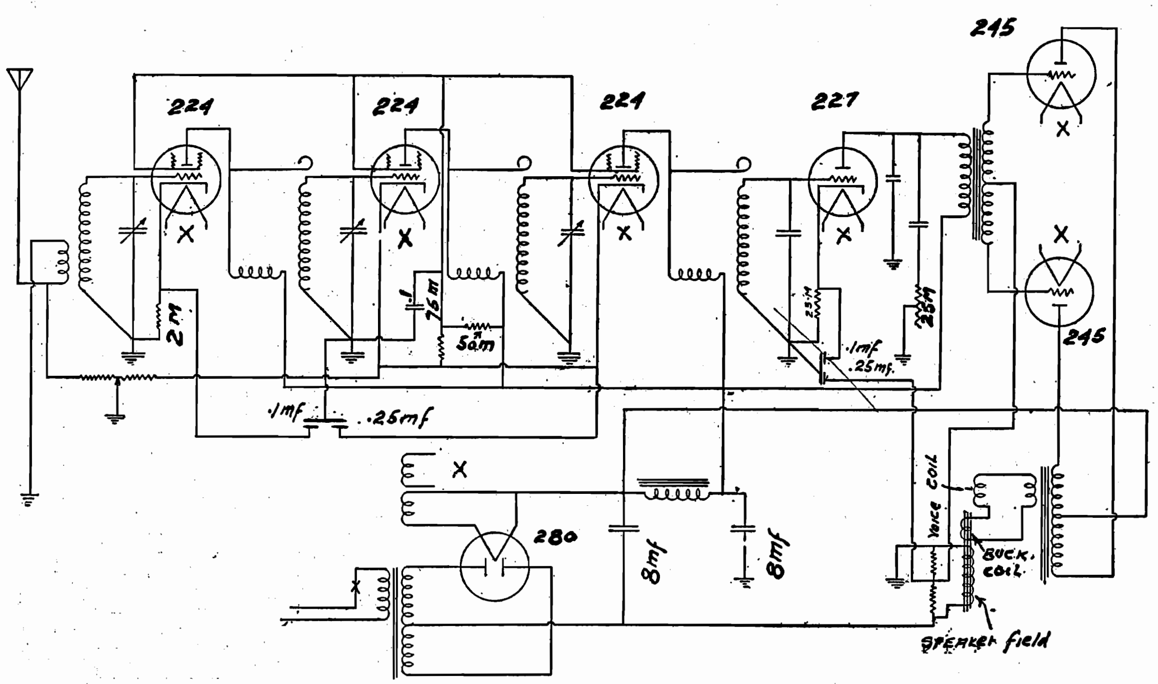
As very high resistances are used the ordinary set tester will not give correct indications on the following circuits: C bias on the '45 tubes; screen voltages on the r-f. tubes; cathode voltage on third r-f. tube.

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

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

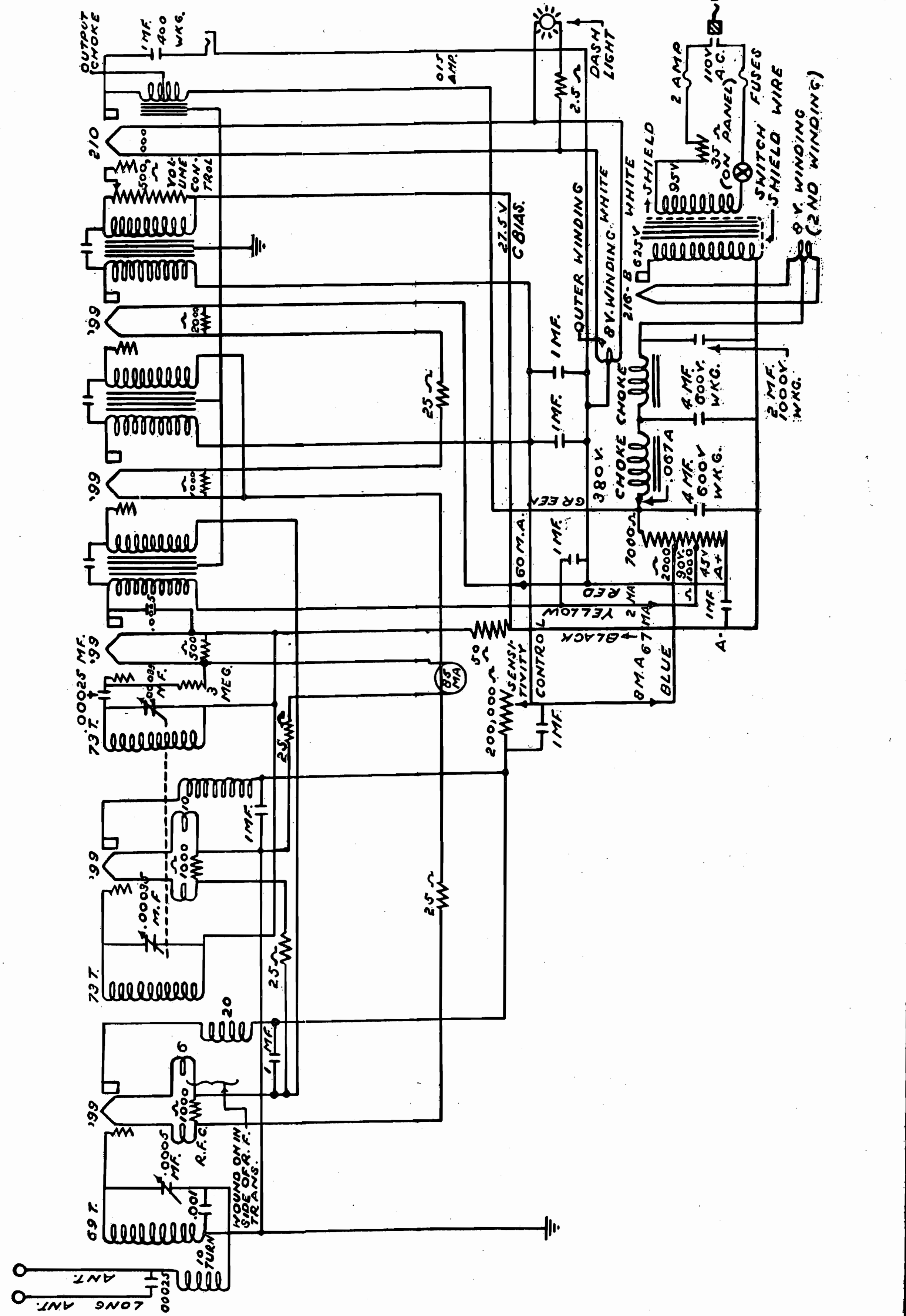
Should the filament-to-ground reading on the '80 tube exceed 230 volts, a grounded electrolytic condenser or an open biasing resistor is indicated; if no reading is obtained, a grounded plate circuit, an open high-voltage secondary, or open speaker field is indicated. If the plate circuit is grounded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

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



MODEL Nassau DLPS

NASSAU RADIO



MODEL AGS

THE NATIONAL COMPANY

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

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

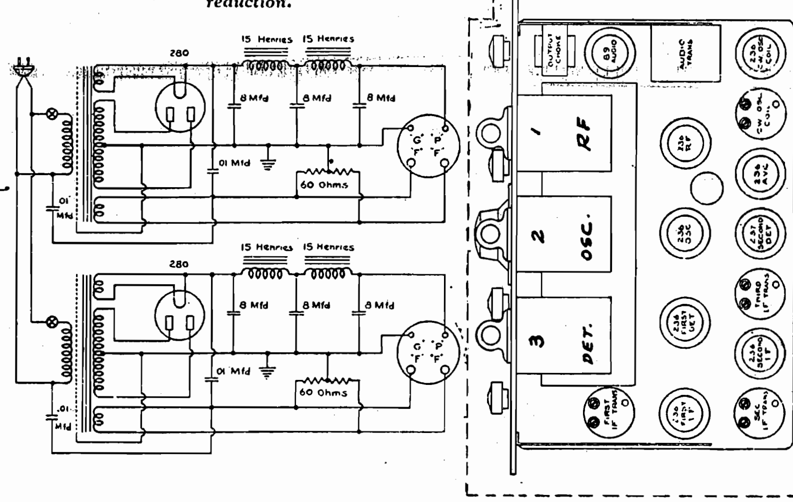
Beat-Frequency Oscillator All adjustments should be made on the beat-frequency oscillator with the volume control selector switch at "MVC." Ordinarily, the beat-frequency oscillator is set at 500 kc. by zero beating a perfectly tuned signal. However, as already suggested, additional selectivity can be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

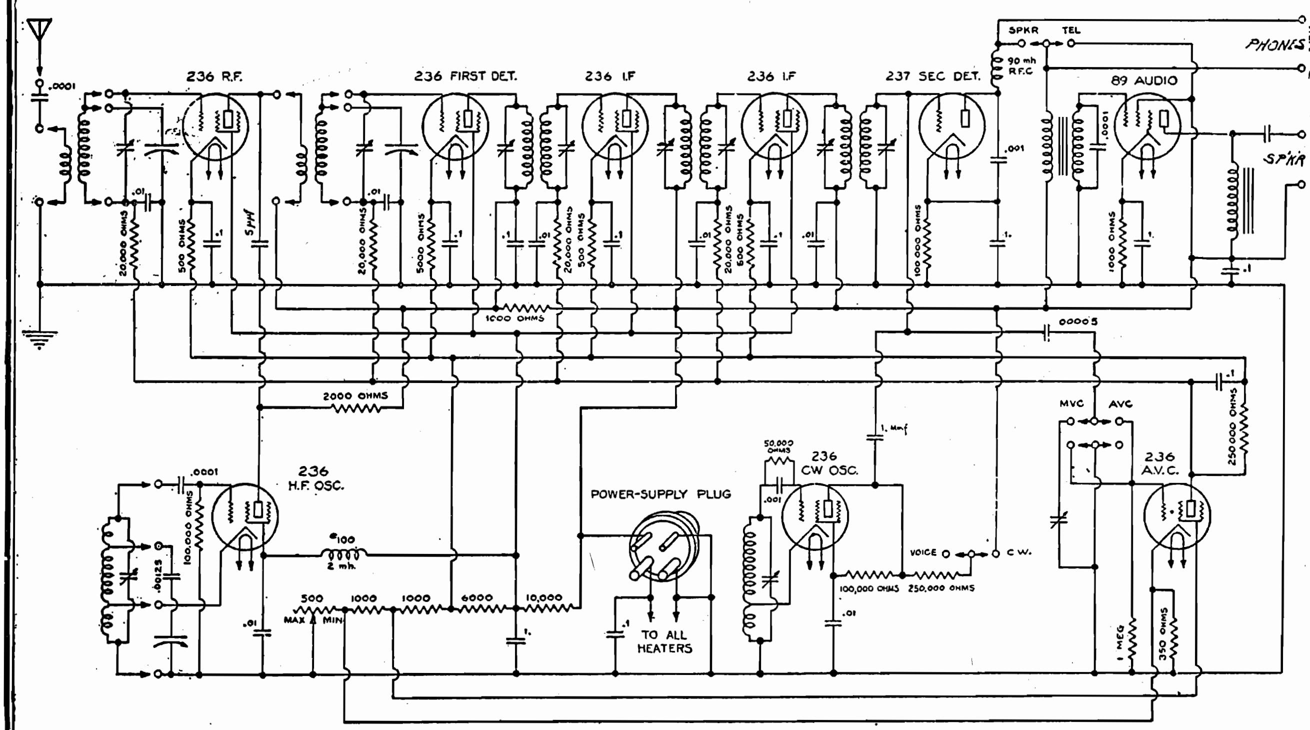
R.f. First Detector and Oscillator Should any of the high-frequency circuits be thrown out of alignment, realignment should be effected as follows:

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

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

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

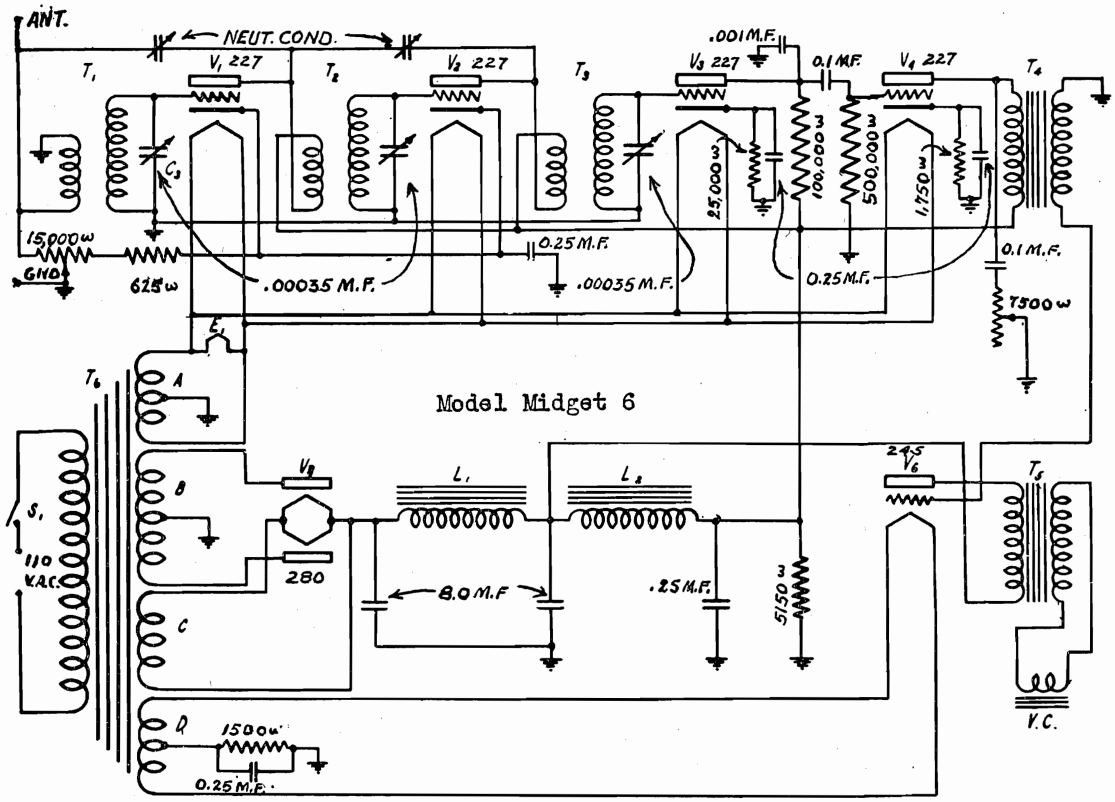




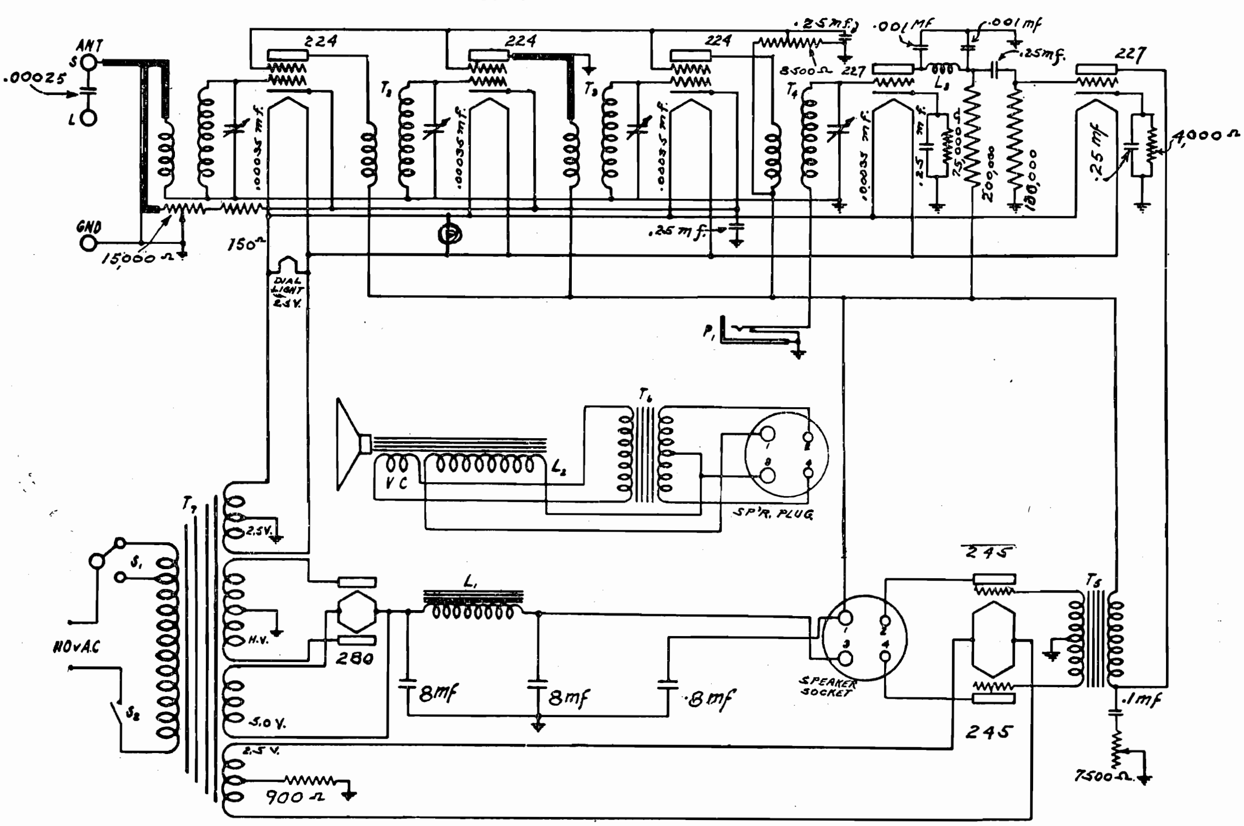
MODEL Midget 6
MODEL Screen Grid 8

NATIONAL TRANSFORMER CO.

Model Midget 6

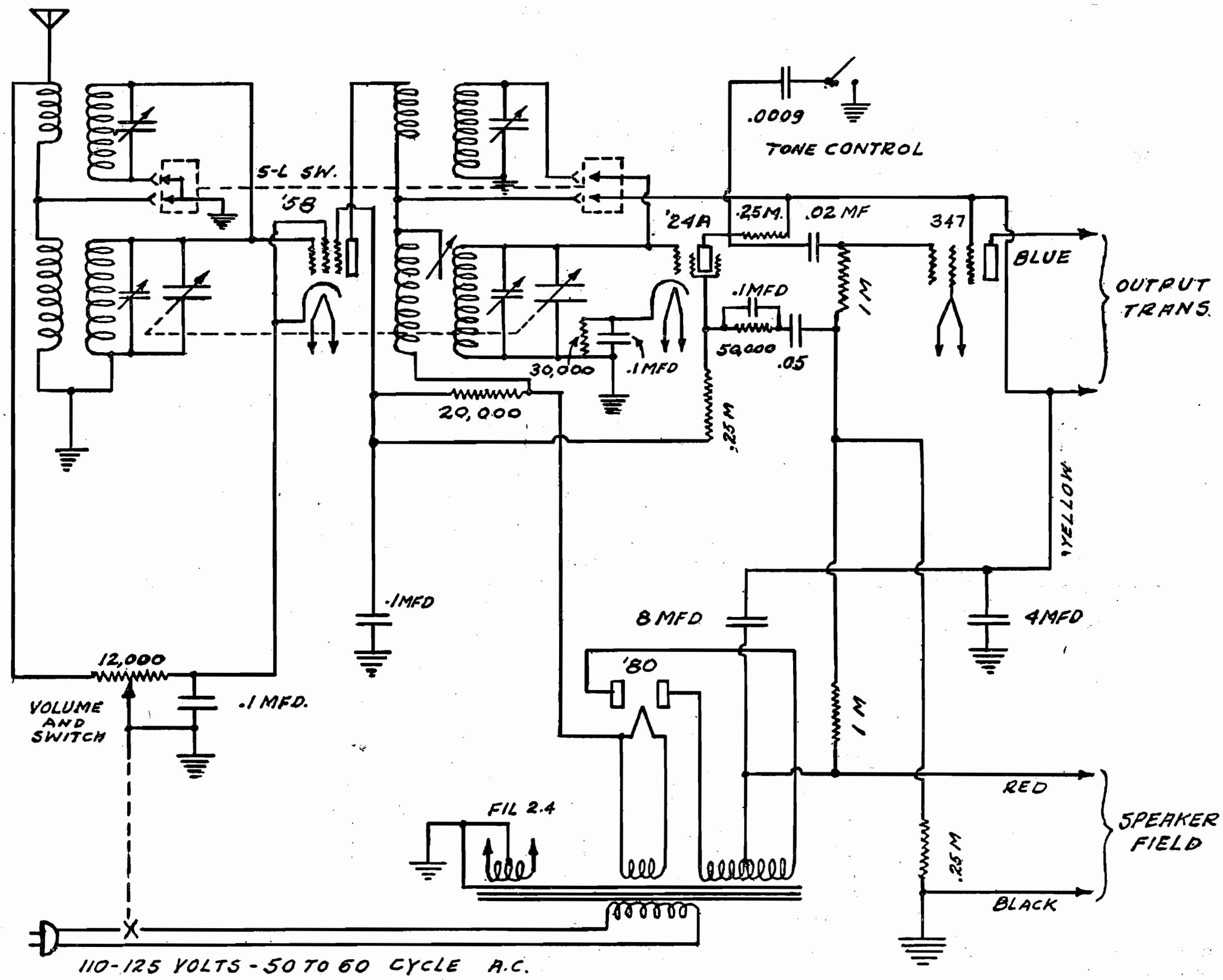


Model Screen Grid 8



MODEL 4 Combination
Dual Wave

NORCO MFG. CO.



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

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

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

The controls of the set are as follows:

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

INSTALLATION:

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

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

SERVICE DATA:

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

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

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

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

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

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

Voltage readings for servicing purposes follow:

A.C.Voltages:

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

D.C.Voltages:

From Ground to:

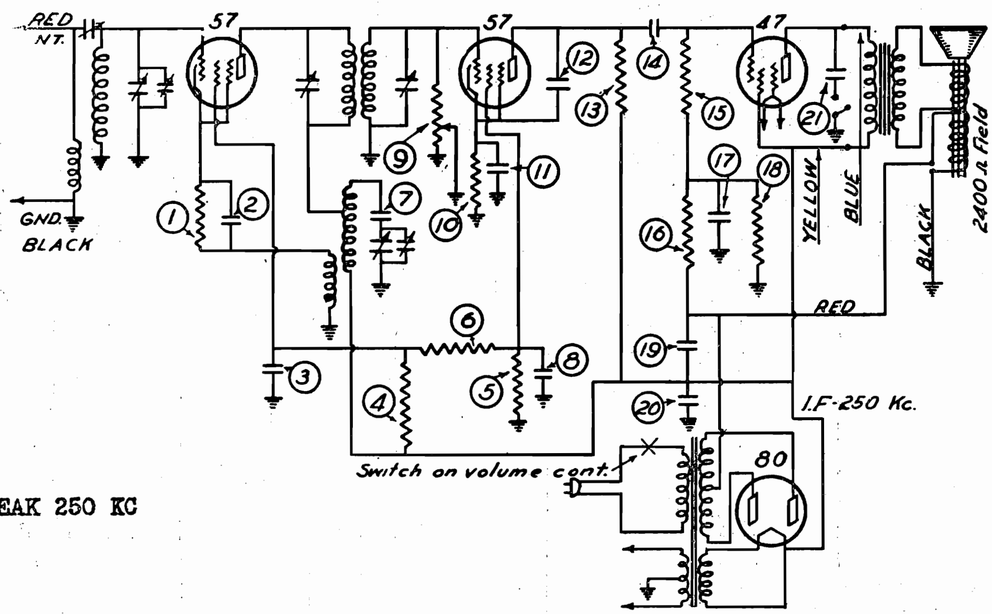
#380 tube	filament	——	250 volts
#347 "	screen grid	——	250 "
#347 "	Plate	——	245 "
#58 "	Plate	——	250 "
#58 "	screen grid	——	130 to 180 volts
	varies with position of volume control		
#324A tube	plate	——	100 volts
	measured with one mil.meter and 600,000 ohm series resister due to small current.		
#324A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

Due to small current meter readings will be inaccurate

Speaker field (Red Lead) - 100 volts negative.
Use positive side of meter to ground.

MODEL 4 Super

NORCO MFG. CO.



IF PEAK 250 KC

RESISTOR DATA

Number	Resistance
1	6000
4	25,000
6	250,000
5	50,000
9	500,000
10	25,000
13	1/4 - 1/2 Meg
15	1,000,000
16	1,000,000
18	250,000

CONDENSER DATA

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

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

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

INSTALLATION:

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

CONTROLS:

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

SERVICE DATA:

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

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

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

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

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

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

Voltage readings for servicing purposes follow:

A.C. VOLTAGES:

Line	--	118 volts
Heater filaments	--	2.5 "
Power tube filament	--	2.5 "
Rectifier filament	--	5.0 "

D.C. VOLTAGES:

From Ground to:

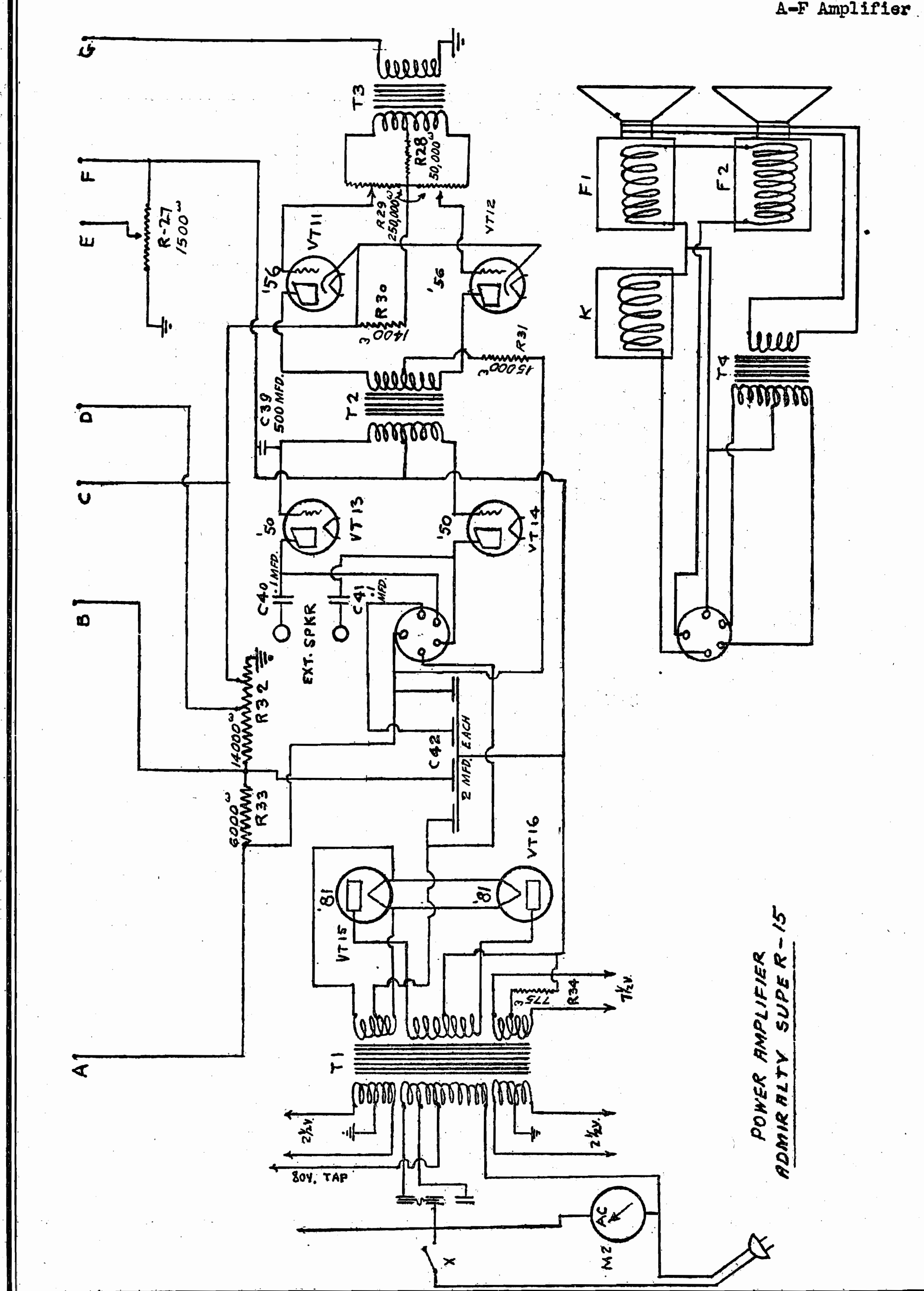
#380	Rectifier tube		filament	--	270 volts
#347	Power	"	screen grid	--	270 "
#347	"	"	plate	--	265 "
#347	"	"	grid	--	17 "
#57	Mixer-Osc.	"	plate	--	270 "
#57	"	"	screen grid	--	215 "
#57	"	"	kathode	--	12 "
#57	Detector	"	plate	--	130 "
#57	"	"	screen grid	--	30 "
#57	"	"	kathode	--	5½ "

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

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

NORDEN-HAUCK, INC.

MODEL Super 15
Power Pack and
A-F Amplifier

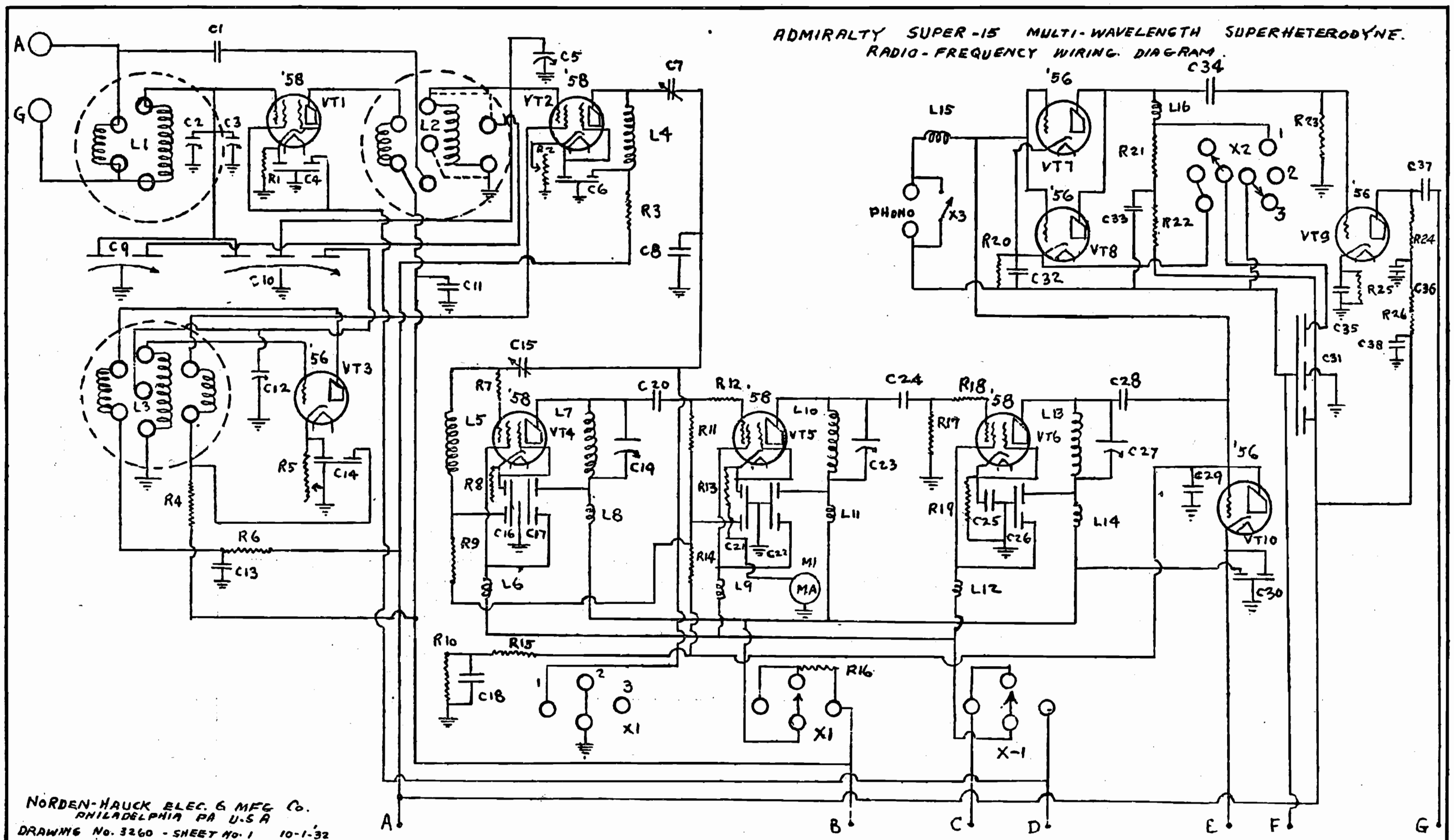


NORDEN-HAUCK, INC.

MODEL Super 15
R-F Chassis

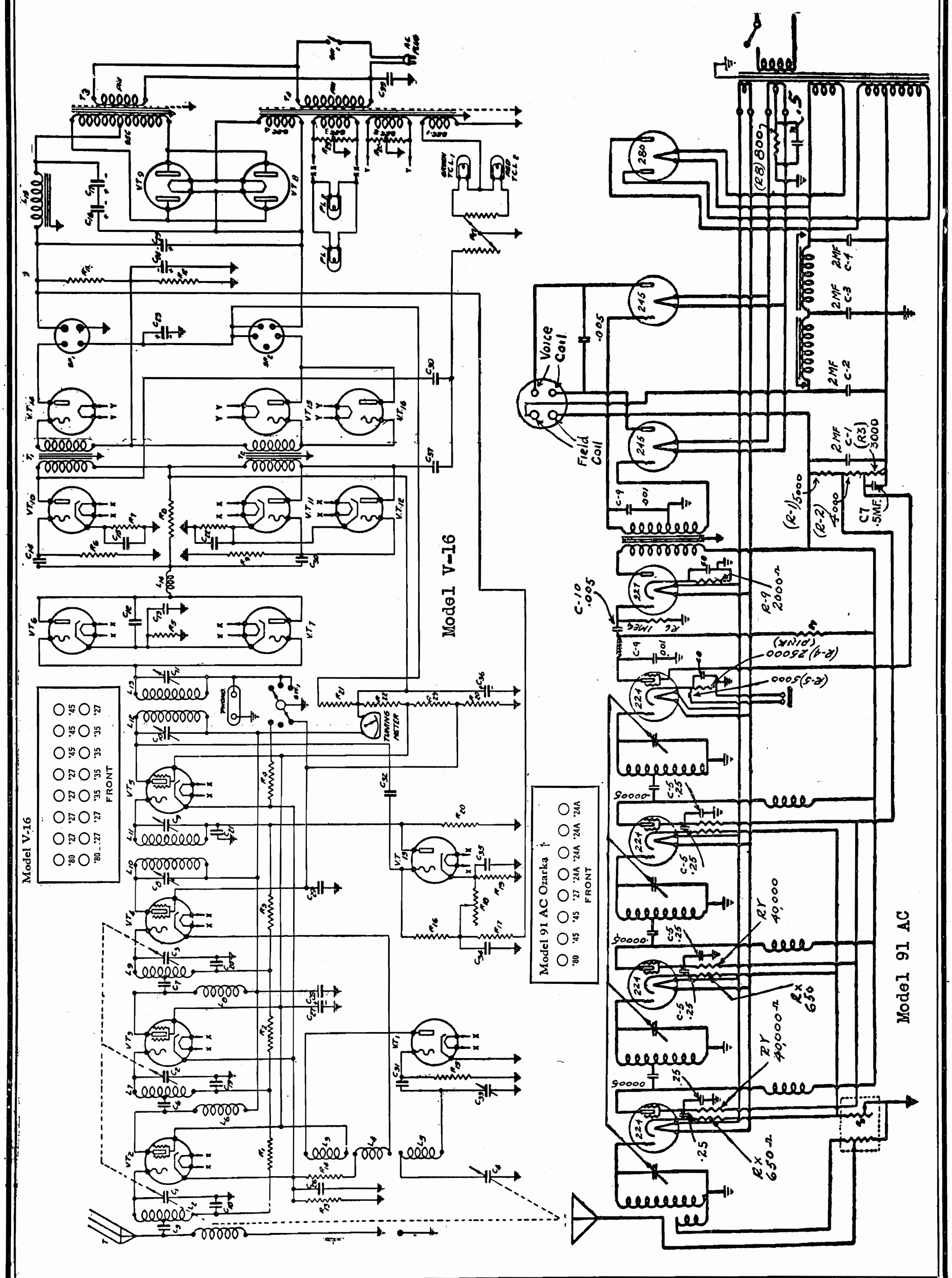
R-1	3000 Ohms	R-14	100,000 Ohms
R-2	50,000 Ohms Variable	R-15	100,000 Ohms
R-3	150,000 Ohms	R-16	30,000 Ohms
R-4	250,000 Ohms	R-17	2 Meg.
R-5	10,000 Ohms	R-18	10,000 Ohms
R-6	50,000 Ohms	R-19	750 Ohms
R-7	10,000 Ohms	R-20	50,000 Ohms
R-8	300 Ohms	R-21	50,000 Ohms
R-9	100,000 Ohms	R-22	25,000 Ohms
R-10	100,000 Ohms	R-23	150,000 Ohms
R-11	2 Meg.	R-24	50,000 Ohms
R-12	10,000 Ohms	R-25	2700 Ohms
R-13	3400 Ohms	R-26	25,000 Ohms

C- 1	15 MMF.	C- 19	100 MMF .	C- 32	.03 Mfd.
C- 4	.25 Mfd.	C- 20	100 MMF .	C- 33	1.Mfd.
C- 6	.25 Mfd.	C- 21	.25 Mfd.Each	C- 34	1.Mfd.
C- 7	100 MMF.	C- 22	2-sec. .25 Mfd.	C- 35	.25 Mfd.
C- 8	.03 Mfd.	C- 23	100 MMF.	C- 36	.25 Mfd.
C- 11	.25 Mfd.	C- 24	100 MMF.	C- 37	1.Mfd.
C- 12	65 MMF.	C- 25	.25 Mfd.	C- 38	.25 Mfd.
C- 13	.1 Mfd.	C- 26	2-sec. .25 Mfd.		
C- 14	.25 Mfd.	C- 27	100 MMF.		
C- 15	100 MMF.	C- 28	100 MMF.		
C- 16	2-sec. .25 mfd.Ea.	C- 29	1.Mfd.		
C- 17	2-sec. .25 mfd.Ea.	C- 30	2-sec. .25 Mfd.		
C- 18	.25 Mfd.	C- 31	3-sec. 1.Mfd.		



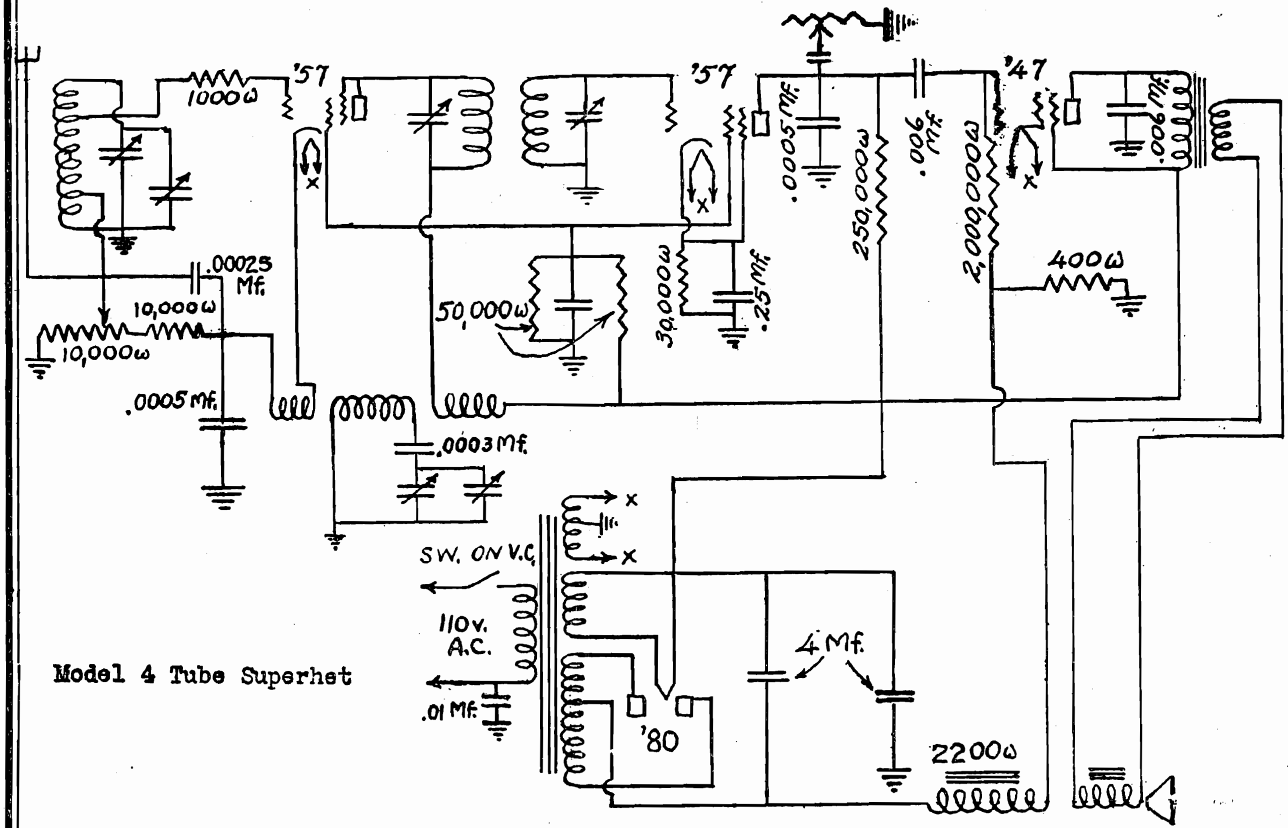
MODEL 91 AC
MODEL V-16

OZARKA, INC.



PACKARD

MODEL 4 Tube
Super
MODEL 5 Auto



Model 4 Tube Superhet

Model 5 Data

The tuning range of the receiver is 550 to 1,750 kc., and reception of the 2,480-kc. police signals as an image frequency. The intermediate frequency used is 465 kc.

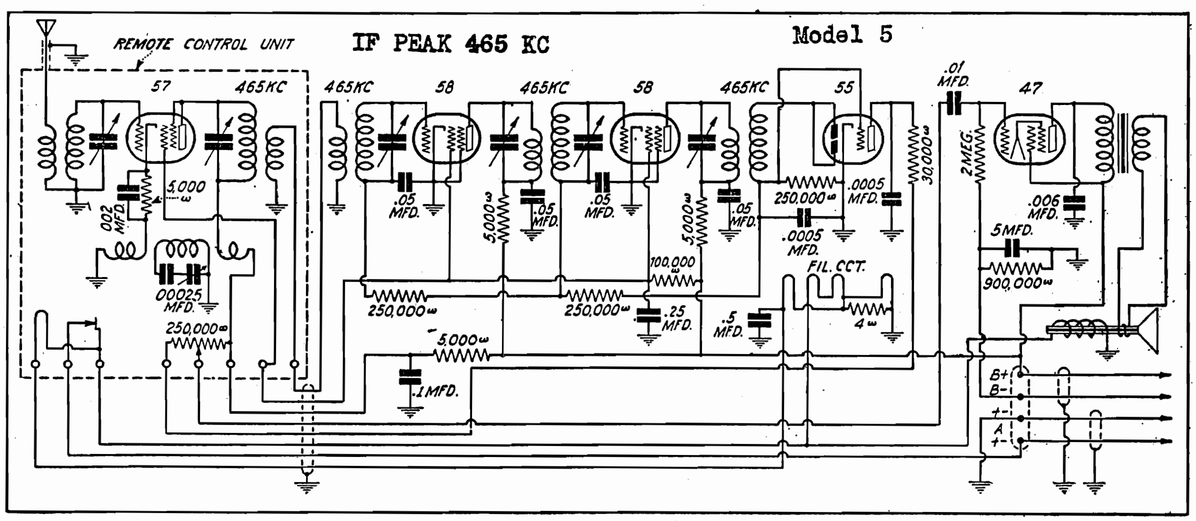
The most interesting feature of this receiver is the control unit which, instead of merely consisting of the usual remote tuning dial and volume control, actually contains the type '57 combination first detector and oscillator tube together with the associated units. This unit is then coupled to the intermediate-frequency amplifier by an i-f. transmission line contained in a shield along with the "A" and "B" feed wires, etc. The intermediate frequency and audio units are in a case with an eight-inch Lansing speaker, making the whole a two-unit job with remote control and no flexible shafts.

The i-f. feed line has at each end a coil composed of three turns of wire around a standard i-f. bobbin, and the line may be 15 feet long without causing appreciable loss . . . the loss with a 15-foot run being about 5 db.

The two type '58 tubes in the intermediate-frequency stages are used as standard r-f. pentodes. AVC is provided by the type '55 second detector tube which feeds the type '47 output pentode. Total plate current is 18 ma. at 180 volts.

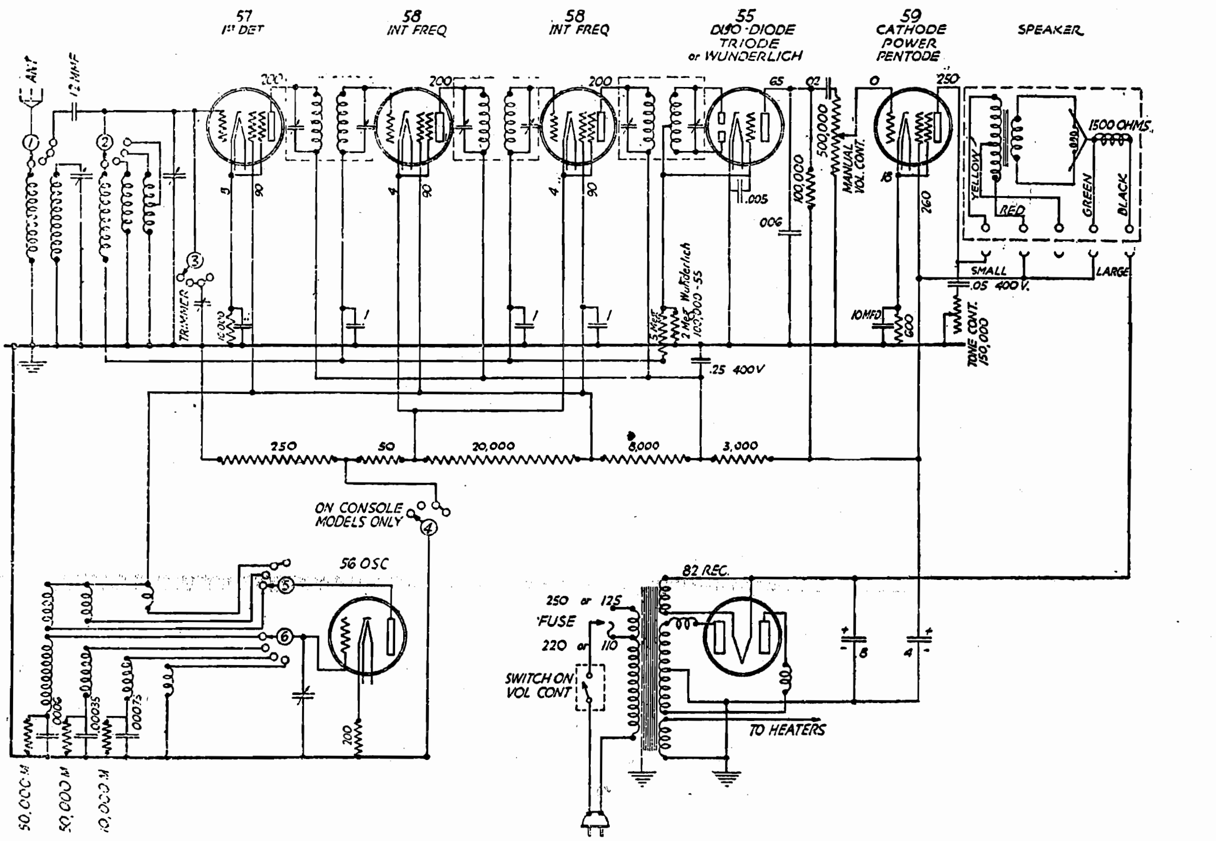
Care should be taken with the B + terminal as it is inclined to short to the chassis, in which case the 900-ohm bias resistor for the '47 tube will blow, as well as the electrolytic condenser shunting it.

The plate winding on the oscillator coil in the control unit suffers seriously from electrolysis.



PATTERSON RADIO CO.

MODEL 70-AW,107-AW, 207-AW,210-AW



IF PEAK 262 KC

The values of all the parts are given in the diagram and a close study will show that the normal voltages on the elements of the tubes,etc., are also given. Thus, the voltage at the plate of the type 55 tube is 65 volts, and so on.

The set covers the wavebands from 15 to 575 meters. The intermediate frequency employed is 262 kc.

All models have automatic volume control of the diode type, controlling the first detector as well as the i-f. amplifier tubes. This AVC makes it impossible to service and rebalance without the use of a vacuum tube voltmeter.

A defective 82 tube will cause a sharp 60 cycle r-f. pickup. This is most prominent on low frequency. Replace with a good tube.

Overloading or poor quality at low volume is more often due to an aerial of too great a length. A powerful local station will cause the i-f. tubes to block. Check this by disconnecting the antenna on the station causing the trouble. If too close to a powerful station, installing a switch in the aerial circuit helps this. In rare cases the set seems to overload and the AVC works too quickly on all stations. In such cases, check the following:

Disconnect the 5-megohm resistor from the AVC buss at the tie point. Have all tubes cold. Use a high-voltage, high-resistance ohmmeter capable of reading 25 megohms and test from ground to AVC buss for leakage. After the condensers have charged, no leakage should be shown. This must read around 100 megohms to ground.

MODEL 3
Transitone
Voltage
Electrical Values

PHILCO RADIO & TELEVISION CORP.

This Receiver has been especially designed for installation and operation in automobiles. Filament and heater currents are supplied by the automobile battery. "B" and "C" voltages are supplied by four 45-volt dry "B" batteries.

Only three battery leads are required, one to the live side of the six-volt system, one to the positive terminal of the 180-volt battery, and one to the negative terminal of the 180-volt battery.

The chassis of the Receiver when installed, is grounded or bonded to the metal work and frame of the automobile, completing the circuit to the grounded side of the storage battery.

Table No. 1—Tube Socket Readings

Tube		Voltage					Plate Milli-Amperes
Type	Circuit	Filament	Plate	Screen	Cathode	Grid	
24	1st R. F.	2 V.	150	80	2	.....	1.5
24	2nd R. F.	2 V.	150	80	2	.....	1.5
24	3rd R. F.	2 V.	150	80	2	.....	1.5
71-A	Det. Rect.	5 V.	....	..	..	.....	....
01-A	Det. Amp.	5 V.	45	..	..	—1.0	1.0
01-A	1st A. F.	5 V.	140	..	..	—2.5	3.0
71-A	2nd A. F.	5 V.	142	..	..	—32 V.	16.0

Table 2—Resistor Data

No. on Figs. 1 and 2	Terminal	Resistance in Ohms	Color
1		10,000	Black
4		100,000	Silver Gray (Yel. Tip)
14		50,000	Orange
15		25,000	Brown (Yel. Tip)
16	1–2 3–4 4–5 5–6	250 1 30 30	Flat-Wire Wound
21		1,000,000	Green (White Tip)
22		250,000	White
23		100,000	Silver Gray (Yel. Tip)
24		100,000	Silver Gray (Yel. Tip)
26		1,000,000	Green (White Tip)
28		100,000	Silver Gray (Yel. Tip)
31		250,000	White
33	1–2 2–3	500 300	Flat-Wire Wound

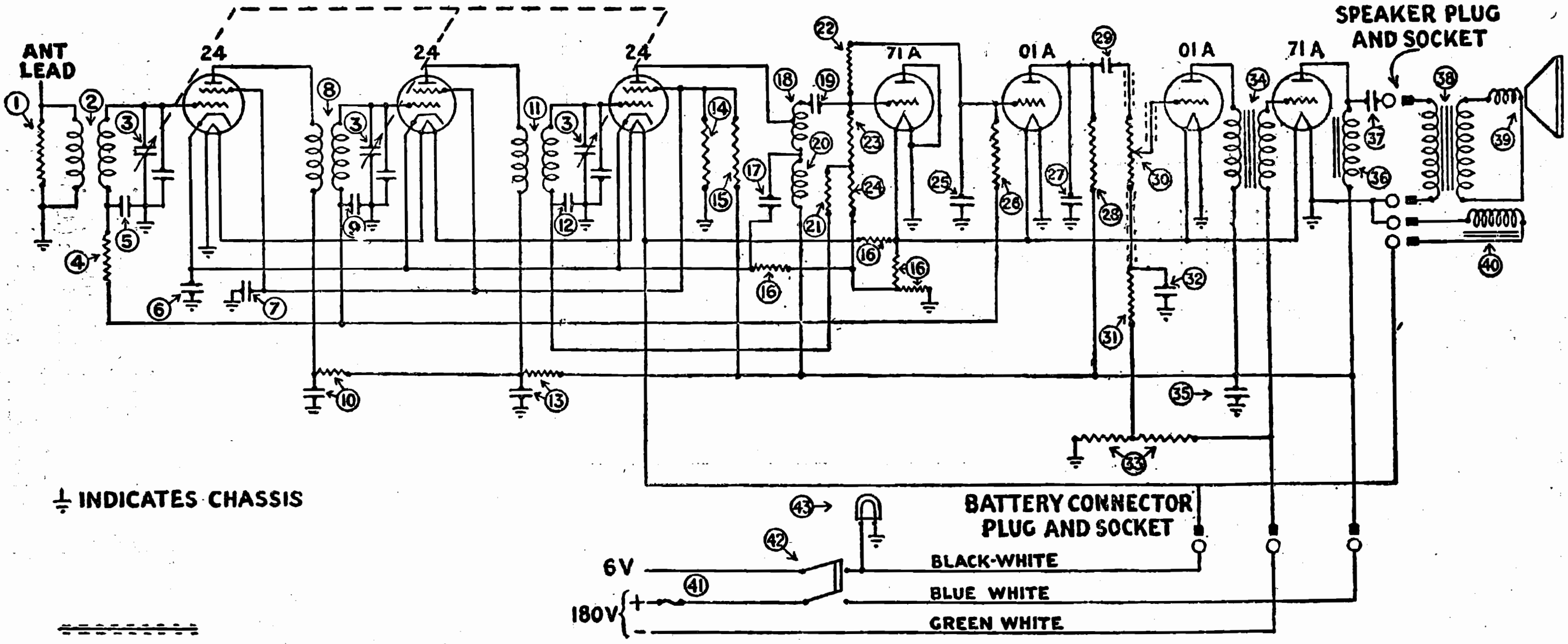
Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity MFD
5 9 12	.05
6	1.0
7	.25
10 18	.05 with 250 Ohm Resistor
17	.00025
19	.00005
25	.00025
27	.00025
29	.015
32	.25
35	2.0
37	1.0

No. on Figs. 1 and 2	Description	Part No.
1	Resistor (10,000 ohms—½ watt)	4412
2	First R. F. Transformer	4401-A
3	Tuning Condenser	4372-A
4	Resistor (100,000 ohms—1 watt)	3767
5	Condenser (.05 mfd)	3615-N
6	Condenser (1.0 mfd)	4419
7	Condenser (.25 mfd)	4487
8	Second R. F. Transformer	4401-B
9	Condenser (.05 mfd)	3615-N
10	Condenser and Resistor (.05 mfd with 250 ohms)	3615-P
11	Third R. F. Transformer	4401-B
12	Condenser (.05 mfd)	3615-N

MODEL 3
Transitone
Schematic
Parts List

PHILCO RADIO & TELEVISION CORP.



INDICATES CHASSIS

INDICATES GROUNDED SHIELDING

COMPENSATING

Compensating condensers in all Philco Transitone Receivers are carefully adjusted at the factory, and ordinarily need not be readjusted.

If necessary to readjust, a good oscillator should be used. With the Receiver and oscillator set up for operation, and the volume control of the Receiver turned on full—adjust the oscillator signal to a frequency between 1000 and 1200 kilocycles, or 100 and 120 on the Receivers. Tune the Receiver sharply to the signal and then reduce the oscillator signal so that it is barely audible in the Speaker.

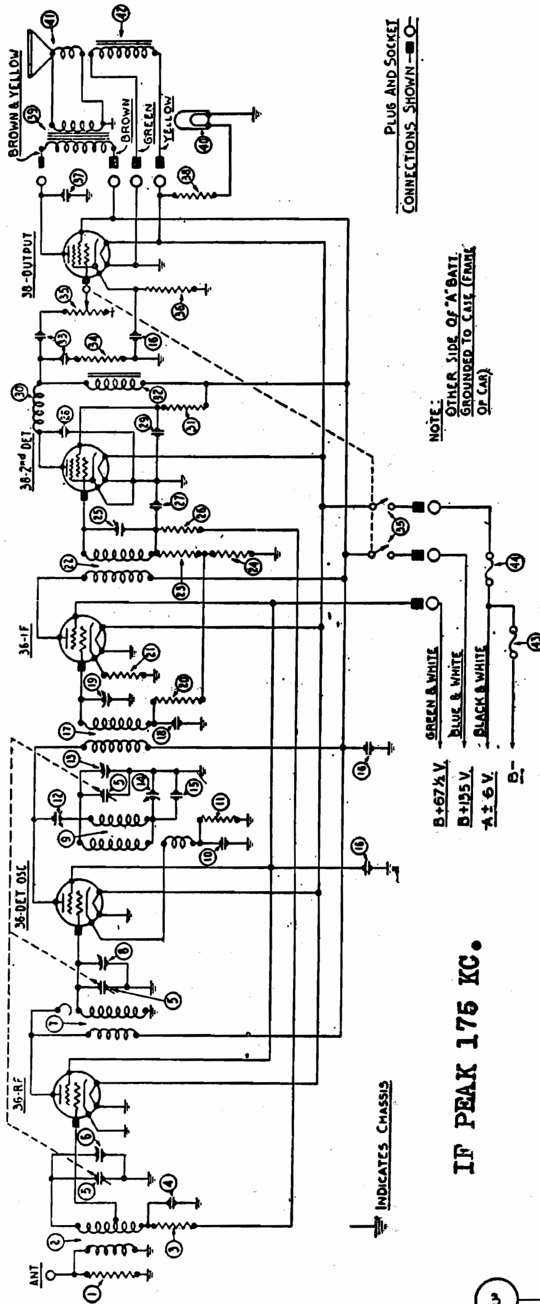
Using the special fibre wrench, adjust the third compensating condenser to that point at which the maximum signal is heard in the Speaker, then adjust the second and finally the first condenser in the same manner, always adjusting for that position which gives the maximum signal.

After the adjustments are completed tune the Receiver to several broadcast programs to make sure that the stations are tuned in at the proper place on the tuning scale.

13	Condenser and Resistor (.05 mfd with 250 ohms)	3615-C
14	Resistor (50,000 ohms—1 watt)	4237
15	Resistor (25,000 ohms—1 watt)	3656
16	Resistor (4-section)	4407
17	Condenser (.00025 mfd)	3082
18	Fourth R. F. Transformer	3775-B
19	Condenser (.00005 mfd)	3774
20	R. F. Choke	3256-A
21	Resistor (1,000,000 ohms—½ watt)	4409
22	Resistor (250,000 ohms — ½ watt)	4410
23	Resistor (100,000 ohms — ½ watt)	4411
24	Resistor (100,000 ohms — ½ watt)	4411
25	Condenser (.00025 mfd)	3082
26	Resistor (1,000,000 ohms — 1 watt)	4414
27	Condenser (.00025 mfd)	3082
28	Resistor (100,000 ohms — ½ watt)	4411
29	Condenser (.015 mfd)	3793-D
30	Volume Control	4463
31	Resistor (250,000 ohms — ½ watt)	4410
32	Condenser (.25 mfd)	4487
33	Resistor (2-section)	4408
34	Audio Transformer	3241
35	Condenser (2.0 mfd)	4418
36	Audio Choke	4485
37	Output Condenser (1.0 mfd)	4420

PHILCO RADIO & TELEVISION CORP.

MODEL 7
Transitone



IF PEAK 175 KC.

Condenser Data

Numbers on Figs. 1 and 2	Capacity Mfd.	Color
27	0.00025	Yellow
10, 15	0.0007	White and Golden Yellow
28, 37	0.002	Blue
33	0.015	Black Bakelite
4, 18	0.05	Black Bakelite
29	0.25	Metal
16	0.25; 0.5; 1.0	Metal

Tube Socket Readings

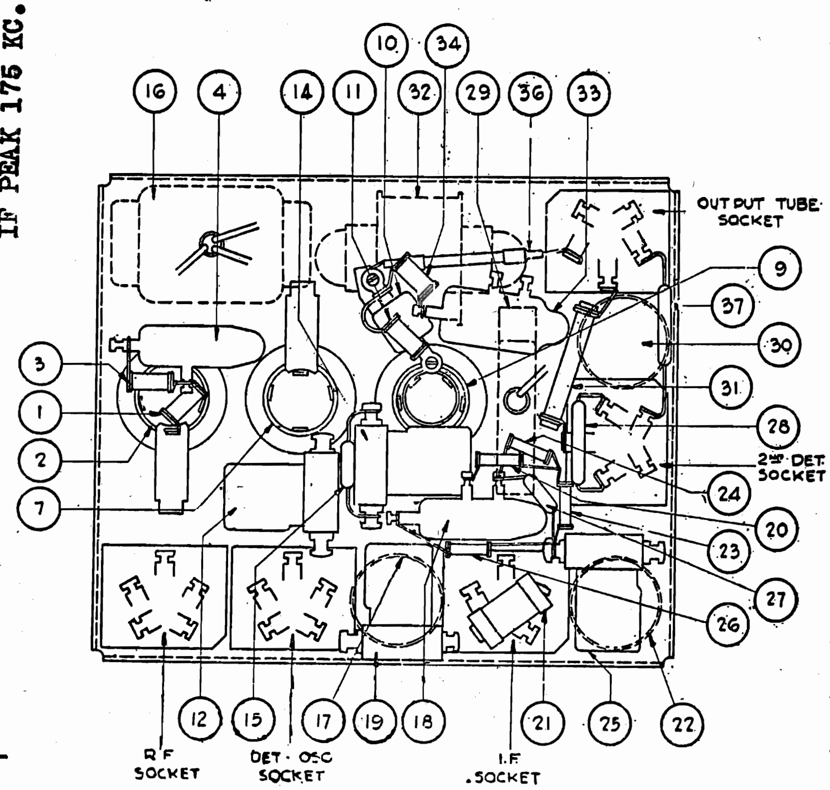
Tube	Filament Volts	Plate Volts	Cathode Volts	Screen Grid Volts	Plate Current
R.F.	6.0	129	0.0	61	2.8 ma.
Det-Osc.	6.0	129	6.0	61	0.8 ma.
I.F.	6.0	129	0.5	61	2.0 ma.
2nd Det.	6.0	115	0.0	50	6.0 ma.
Output	6.0	125	11.0	129	6.0 ma.

All voltages taken to chassis with A plus grounded. Detector-oscillator cathode readings taken with receiver tuned to 550 kc.

Resistor Data

Numbers on Figs. 1 and 2.	Resistance*** Ohms
38	7*
21	225*
36	1,250**
1, 11	5,000
31, 34	50,000
3, 23, 24	99,000
20, 26	490,000

* Flat type.
** Insulated covering.
*** Philco utilizes the RMA color coding.



Model 7—Chassis

MODEL 7
Transitone
Alignment Data

PHILCO RADIO & TELEVISION CORP.

There are certain peculiarities to be found in this receiver. Two pentode tubes are used, one as the 2nd detector or demodulator and another as the output tube. The 1st detector and oscillator functions are performed by one tube. Obviously the receiver is a superheterodyne. The oscillator system and the input to the i-f system both emanate from the plate circuit of the autodyne tube. The peak frequency of the i-f system is 175 kc.

Adjusting the R.F. Padding Condensers

In order to obtain the maximum results from the radio installation, the first and second R.F. padders should be adjusted after the installation is completed.

It will be necessary to remove the front cover plate and to set up a good oscillator capable of generating a signal of approximately 1400 K.C. Connect a six foot lead to the oscillator output terminal, simply dropping it over the back of the seat, and turn on the oscillator. Turn on the receiver and tune to approximately 140 on the receiver scale. Adjust the oscillator frequency to 1400 kc. When using an i-f oscillator, set it for the 175 kc. range and use the eighth harmonic. Turn on full volume on the receiver and adjust the output of the oscillator until the signal is barely audible. Tune the receiver sharply to the signal and cars and power lines, lack of signal under bridges and tunnels and in some cities, apparent fading at street crossings due to shielding by overhead cables and wires, are easy to explain to the customer and will not be construed as alibis which is likely to happen if the customer is told only after registering a complaint.

Adjusting Intermediate Frequency Stages

Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the receiver and oscillator turned "on", set the oscillator for 175 kc. Adjust the oscillator attenuator so that the signal is barely audible with the receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained. Using a Philco No. 3164 fibre wrench, adjust the second i-f condenser. This is numbered twenty-five on the schematic and chassis view. The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary i-f condensers, nineteen and twelve respectively. Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator

Connect the output of the oscillator to the antenna lead and the housing of the receiver. With the receiver turned on and the oscillator set for 175 kc., tune the receiver to 1400 kc., the eighth harmonic of 175 kc., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 kc., is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 kc., in order to get a strong enough signal through.

R.F. Compensators

After the detector oscillator has been padded at 1400 kc., adjust the first and second R.F. Condensers on tuning condenser at 1400 kc.

Low Frequency Condenser

Now tune the receiver to 700 kc. and adjust the condenser fourteen. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 kc again.

then adjust the first r-f padder. This is the one mounted to the extreme right on the condenser housing. Adjust this for maximum signal and then proceed with the second padder, the one in the center. Use only the standard fibre padding wrench. Replace the front panel and the adjustment is completed.

Servicing

A great number of the demands for service made by the car owners will be imaginary and can be traced largely to ignorance of what is to be expected from automobile radio.

PHILCO RADIO & TELEVISION CORP.

MODELS 8,12
Schematic
Resistor Data
MODEL EA
Schematic

Model EA Dynamotor Wiring Diagram

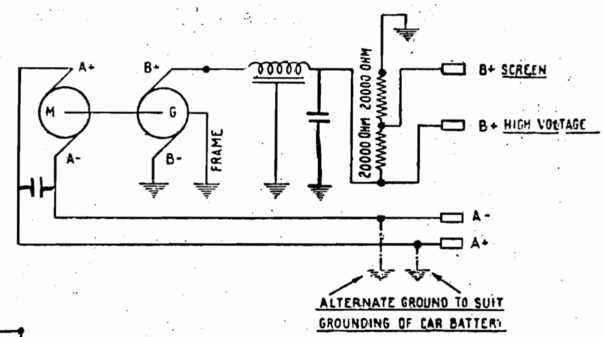


FIG. 2

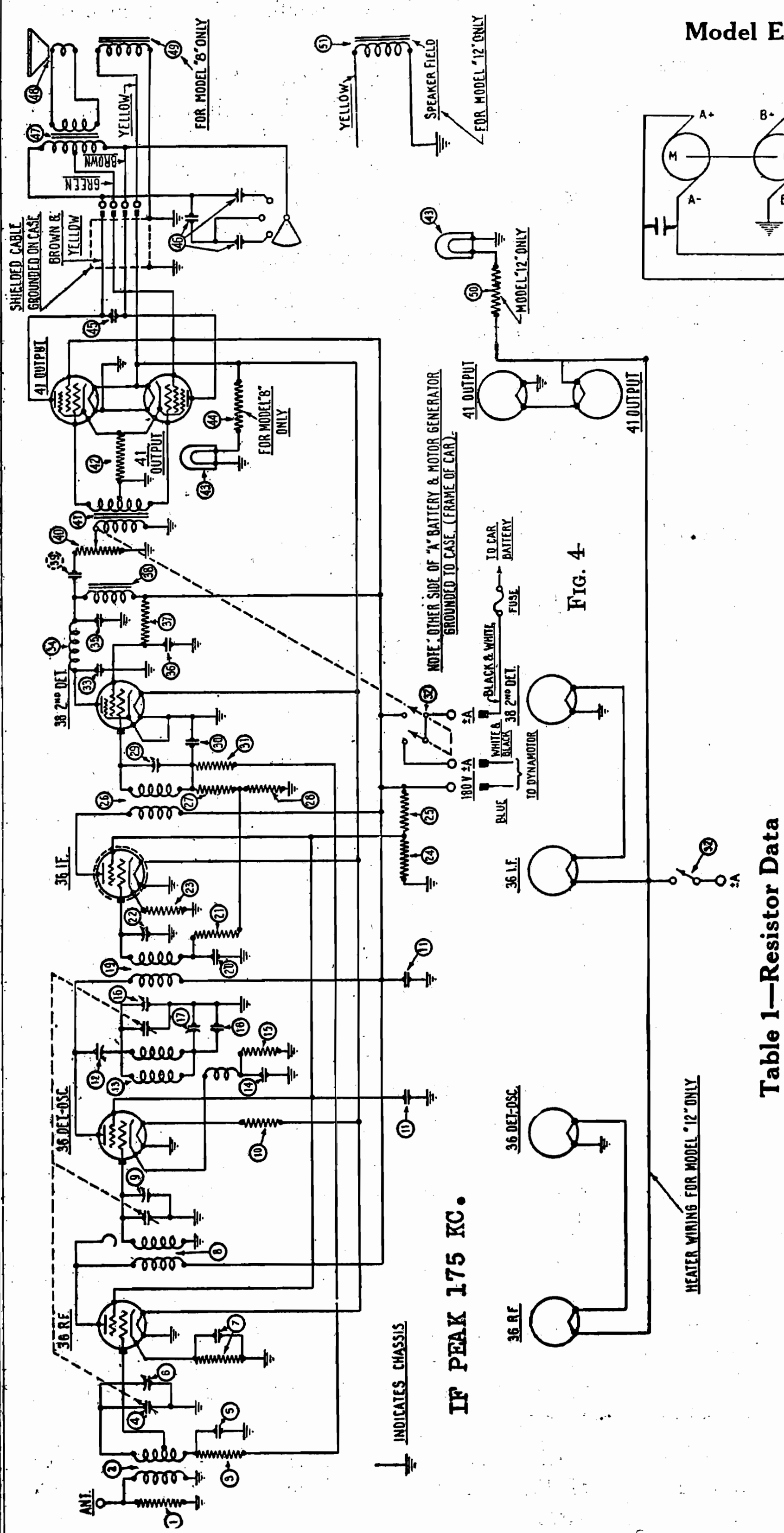


FIG. 4

Table 1—Resistor Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Resistance (Ohms)	Color: Body	Color: Tip	Color: Dot
46	10	2.7		wire resistor	
38	44	7		" "	
:	30	30		" "	
21	:	225		" "	
:	28, 7	500		" "	
36	42	700		" "	
1, 11	1, 15	5,000	Green	Black	Red
:	24, 25	20,000	Red	Black	Orange
31	37	50,000	Green	Black	Orange
3, 23, 24	3, 27, 28	99,000	White	White	Orange
20, 26	21, 31	490,000	Yellow	White	Yellow

MODELS 8,12
Chassis
Alignment
MODEL EA
Schematic

PHILCO RADIO & TELEVISION CORP.

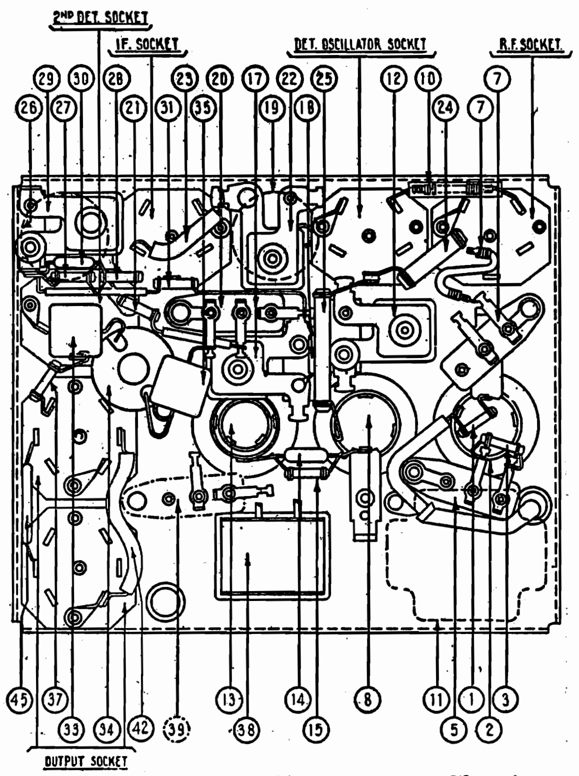
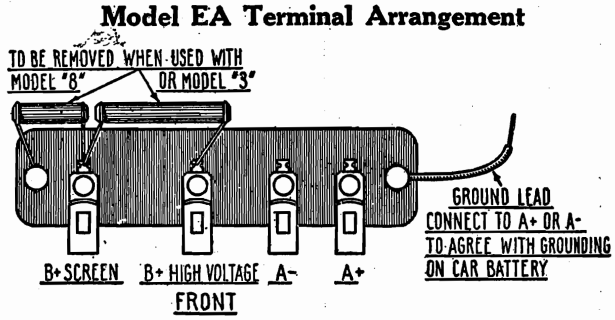


FIG. 6—**Models 8 and 12**—Chassis

Model EA Terminal Arrangement



Special Adjustments—In order to render proficient service, the installation station must be able to make the proper adjustments to the Receivers whenever they are needed. This is impossible without the use of a good service oscillator. The best and most economical oscillator for this work is the Philco Oscillator, Model 095. Complete information and instructions for its use can be had on request from your Philco Transitone distributor or from the service department at the factory.

The adjustments should be made as follows:

Intermediate Frequency or I. F. Stages—Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the Receiver and oscillator turned "on", set the oscillator for 175 K. C. Adjust the oscillator attenuator so that the signal is barely audible with the Receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained.

Using a Philco 3164 fibre wrench, adjust the second I.F. condenser. This is numbered (25) on figs. 3 and 5 and (29) on figs. 4 and 6.

The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary I.F. condensers. These are (19) and (12) respectively on figs. 3 and 5 and (22) and (12) on figs. 4 and 6.

Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator—Connect the output of the oscillator to the antenna lead and the housing of the Receiver. With the Receiver turned on and the oscillator set for 175 K. C., tune the Receiver to 1400 K. C., the eighth harmonic of 175 K. C., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 K. C. is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 K. C., in order to get a strong enough signal through.

R. F. Compensators—After the detector oscillator has been padded at 1400 K. C., adjust the first and second R. F. Condensers on tuning condenser at 1400 K. C.

Low Frequency Condenser—Now tune the Receiver to 700 K. C. and adjust the condenser (14) on figs. 3 and 5 and (17) on figs. 4 and 6. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 K. C. again.

PHILCO RADIO & TELEVISION CORP.

Table 2—Condenser Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Capacity (Mfd.)	Color
25	30	.00025	Yellow
10, 15	14, 18	.0007	White and Yellow
28, 34		.001	Green and White
..	33, 35	.00125	Blue and Orange
37	45	.002	Blue
33	39	.01	Black Bakelite
4, 18	5, 7, 20	.05	Black Bakelite
29	36	.25	Metal Can
..	11	.25, .5	Metal Can
	See Note 1	.25, .25, .5	Metal Can
16	..	.25, .5, 20.0	Metal Can

Dynamotor—The Model EA Dynamotor is supplied as standard equipment with all Model 8 Receivers and the Model EC with the Model 12 Receivers. The Model 7 will be furnished with the Model EA Dynamotor in place of batteries when specified, or the Model EA can be ordered as a replacement unit for the Model 3 and Model 7 Receivers sold previously with batteries. The Model EA is for operation on 6 volt battery systems; the Model EC on 12 volt battery systems.

The dynamotor housing or box can be conveniently located in the floor of the car. Simply cut a hole 6⅛ by 8$\frac{7}{16}$ inches in the floor and drop the box in place from the top Fasten the flange to the floor by means of screws or bolts.

It will be necessary to drill a hole in the end of the box for the battery cable. The tapered rubber bushing must be used over the hole to make it water-proof.

When used with the Model 8 Receiver, remove the two small fixed resistors at the left end of the terminal panel.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal.

Connect the blue lead to the "B+" High Voltage terminal. The dynamotor box must be grounded securely to the frame of the car by means of a heavy copper braid.

When the Model EA is used with the Model 3 Philco Transitone Receiver, remove the two resistors at the left end of the panel. The ground lead from the filter condenser must be removed from the ground terminal and must be spliced out and connected to the B+ Screen terminal.

The "B—" lead, the black lead which is grounded at the rear end of the dynamotor, must be removed from ground and must be spliced out and connected to the B+ Screen terminal also. This terminal now becomes "B—". Connect the blue-white lead to B+ High Voltage terminal and the green-white to B+ Screen terminal.

The relay switch must be used to control the dynamotor. With the relay in the same position as described above, the middle terminal must be connected to the car battery through a 15 amp. fuse. The terminal on the right must be connected to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The remaining terminal on the left must be connected to the black-white lead of the battery cable. The relay should be mounted on the frame of the car near the battery. The ground connection on the dynamotor and the shield on the cable must be connected to the other "A" terminal.

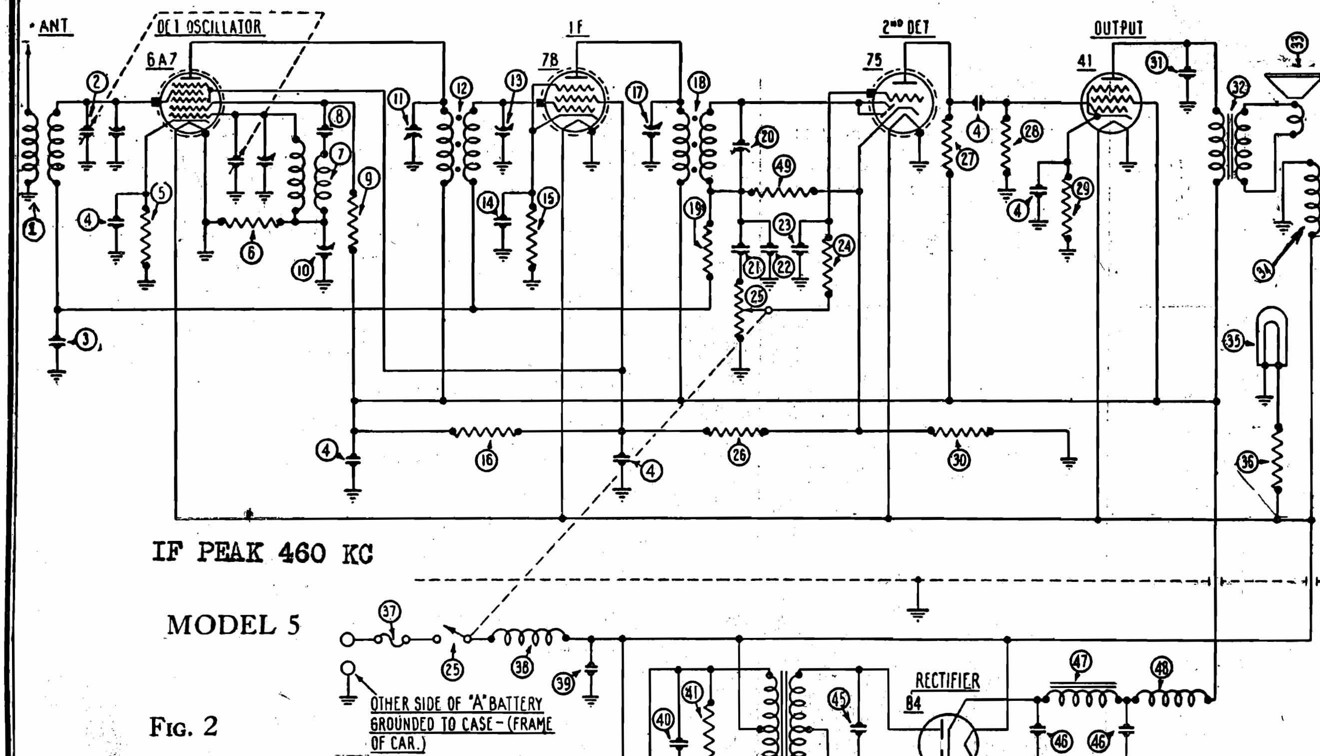
The dynamotor box must be grounded to the frame of the car by means of a heavy copper braid

The Model EC Philco Transitone dynamotor must be used only on a 12 volt battery system.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal

MODEL 5
Transitone
Schematic

PHILCO RADIO & TELEVISION CORP.



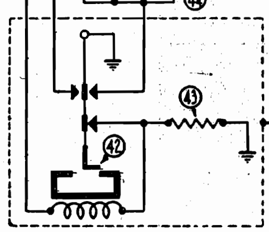
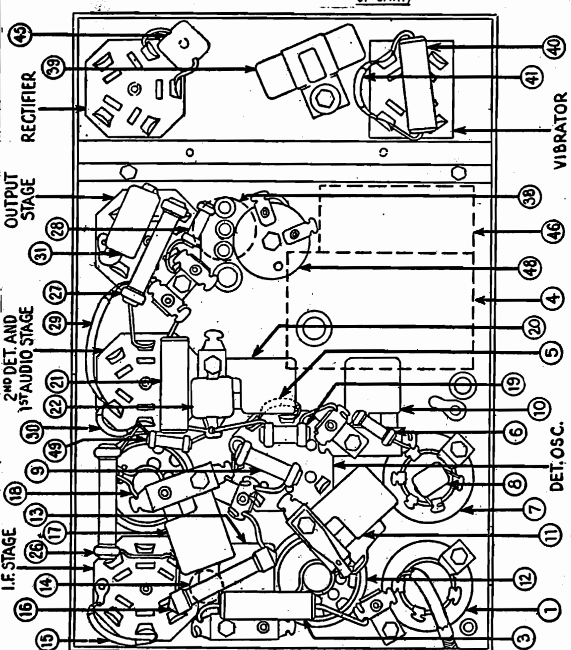


FIG. 1

NOTE.—The first condensers (30-4017) were made up having five sections. The .1 mfd. section has now been removed from the can and this section replaced with a .006 mfd. condenser (Part No. 30-1001). This condenser is located in the chassis adjacent to the grid terminal of the 41 tube socket.

FIG. 2



FILTER CONDENSER 30-4017

④ on Figs. 1 and 2

There are five sections in this filter condenser, all terminated with wire leads. The two green leads connect to the .1 mfd. section, which is used for coupling the plate output of the 75 tube to the grid of the 41 tube.

The remaining four sections are all grounded to the can on one side. The white leads connect to two .25 mfd. sections. The first section is connected to the cathode of the 6A7 tube. The second section is connected to the screen of the 78 tube.

The red lead from the .5 mfd. section is connected to the B+ side of all the plate circuits. A 20 mfd. section terminates in a black lead, which in turn is connected to the cathode of the 41 tube.

FILTER CONDENSER 30-4010

㊻ on Figs. 1 and 2

This condenser consists of two sections, a 4 mfd. section and an 8 mfd. section, both of them grounded on one side.

The 4 mfd. section terminates in a red lead which is connected to the cathode of the 84 tube. The 8 mfd. section terminates in a green lead, which is connected between the two chokes in the rectifier filter circuit.

PHILCO RADIO & TELEVISION CORP.

MODEL 5 PARTS LIST

No. on Fig. 1 and 2	Description	Part No.
1	Antenna Transformer	32–1084
2	Tuning Condenser	31–1019
3	Condenser (.05 mfd.)	30–4020
4	Filter Condenser (.25; .25; .5; 20 mfd.)	30–4017
5	Resistor (200 ohms)	7217
6	Resistor (1300 ohms)	8267
7	Oscillator Coil	32–1085
8	Condenser (.00025 mfd.)	3082
9	Resistor (15,000 ohms)	6208
10	Padder	04000–S
11	Padder	04000–J
12	First I. F. Transformer	32–1086
13	Padder	04000–Y
14	Condenser (.5 mfd.)	30–4018
15	Resistor (1,000 ohms)	33–3017
16	Resistor (10,000 ohms)	4412
17	Padder	04000–D
18	Second I. F. Transformer	32–1087
19	Resistor (1,000,000 ohms)	4409
20	Padder	04000–M
21	Condenser (.05 mfd.)	30–4020
22	Condenser (.00025 mfd.)	3082
23	Condenser (.0005 mfd.)	3910
24	Resistor (100,000 ohms)	6099
25	Volume Control and Switch	33–5009
26	Resistor (32,000 ohms)	3525
27	Resistor (250,000 ohms)	3768
28	Resistor (500,000 ohms)	6097
29	Resistor (700 ohms)	6443
30	Resistor (400 ohms)	33–3016
31	Condenser (.006 mfd.)	30–1002
32	Output Transformer	32–7005
33	Cone	36–3027
34	Field Coil	9013
35	Pilot Lamp	6608
36	Resistor (7 ohms)	7155
37	Fuse, 15 A.	7227

No. on Fig. 1 and 2	Description	Part No.
38	R. F. Choke (Low voltage)	32–1083
39	Condenser (.5 mfd.)	30–4015
40	Condenser (.05 mfd.)	30–4020
41	Resistor (200 ohms)	7217
42	Vibrator	38–5036
43	Resistor (200 ohms)	7217
44	Transformer	32–7030
45	Condenser (.006 mfd.)	30–1002
46	Condenser (4 mfd.; 8 mfd.)	30–4010
47	Filter Choke	32–7026
48	R. F. Choke (High voltage)	32–1078
49	Resistor (250,000 ohms)	4410
	Control Shaft (Tuning)	28–8006
	Control Shaft (Volume)	28–8007
	Tube Kit	34–3006
	75 Tube	8002
	78 Tube	8315
	41 Tube	6446
	84 Tube	34–2001
	6A7 Tube	34–2002
	Dial	27–5006
	Antenna Lead	L–1594
	Battery Cable (Bat. end)	38–5124
	Battery Cable (Rec. end)	38–5123
	Fuse Housing	28–1269
	Male Cap (Fuse)	28–1270
	Contact (Fuse)	27–7133
	Washer	27–7132
	Spring	28–8009
	Fuse Insulator	27–7131
	Antenna Male Cap	28–1270
	Contact (Antenna)	28–7133
	Spark Plug Resistors	4531
	Dist. Resistors	4546
	Screw Type	4851
	Interference Condenser (1 mfd.)	4522
	Interference Condenser (½ mfd.)	30–4007

MODEL EF FULL WAVE VIBRATOR

(Used With Model 6F Receiver)

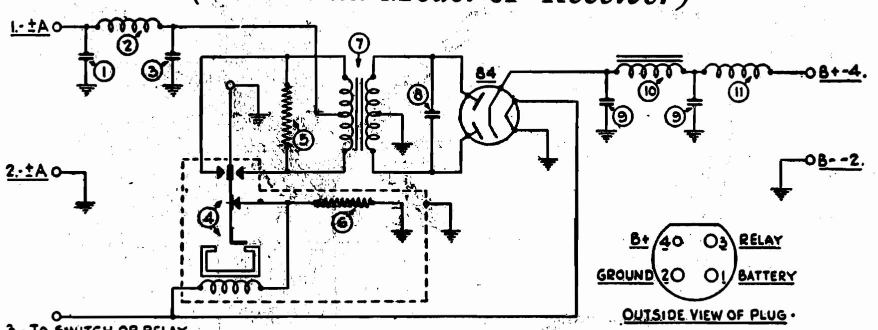


FIG. 3.

The Model EF takes the place of the EB dynamotor. The cable connection between the Vibrator and the Model 6F completes the installation of the Vibrator. Terminal 1 is connected directly to the main battery lead. Terminal 2 is the cable shield. Terminal 3 is connected to the Radio switch. Terminal 4 is the B+ high voltage lead and is connected directly to the plate circuits.

MODEL EF—PARTS LIST

No. on Fig. 3	Description	Part No.
1	Condenser (.5 mfd.)	30–4015
2	R. F. Choke (Low voltage)	32–1083
3	Condenser (.5 mfd.)	30–4015
4	Vibrator	38–5036
5	Resistor (200 ohms)	7217
6	Resistor (200 ohms)	7217
7	Transformer	32–7030

No. on Fig. 3	Description	Part No.
8	Condenser (.006 mfd.)	30–1002
9	Condenser (4 mfd.; 8 mfd.)	30–4010
10	Filter Choke	32–7026
11	R. F. Choke (High voltage)	32–1078
	84 Tube	32–2001
	Battery Cable (Model 6F)	41–3017

MODEL 15
Socket
Voltage

PHILCO RADIO & TELEVISION CORP.

The Philco Radio of the 15 series is an eleven-tube superheterodyne, employing the high efficiency 6.3-volt filament tubes, automatic volume control, superpower push-pull pentode output, and twin electro-dynamic speakers. Philco shadow tuning and the combination distance switch and power switch on the control panel are additional features. The intermediate frequency used in adjusting the superheterodyne circuit of the 15 series is 175 kilocycles. The total power consumption is approximately 115 watts.

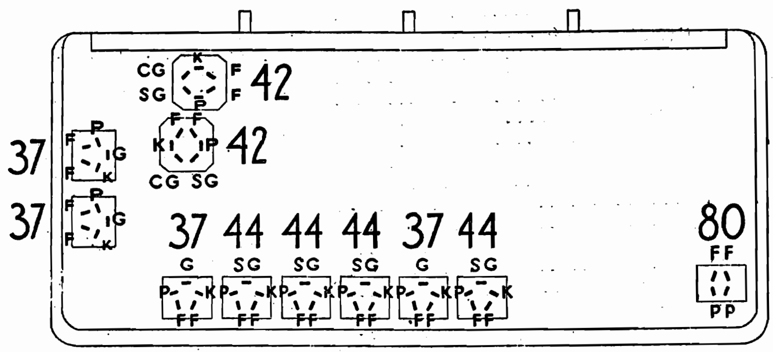


Fig.1—Tube Sockets

F Filament SG Screen Grid K Cathode
P Plate CG Control Grid

Caution: Never connect the chassis to the power supply unless the speakers are connected and all tubes are in place.

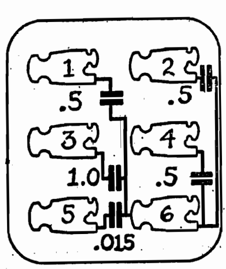
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
44	R. F.	6.3	165	55	15.	30
44	1st Det.	6.3	250	90	.85	10
37	Osc.	6.3	60	...	15	10
44	1st I. F.	6.3	250	90	.85	10
44	2nd I. F.	6.3	275	90	3.3	10
37	Det.-Rect.	6.3	0	...	.2	10
37	1st Audio	6.3	75	...	.4	10
37	2nd Audio	6.3	100	...	.2	10
42	P. P. Output	6.3	255	270	15	15
42	P. P. Output	6.3	255	270	15	15
80	Rectifier	5.0	320/Plate			

*All of the above readings were taken from the under side of the chassis using test prods and leads with a suitable A. C. volt meter for filament voltages and a high resistance multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Power switch in middle position.

Table 2—Power Transformer Data

Terminals on Figs. 3 and 4	A. C. Volts	Circuit
1-2	105 to 125	Primary
3-5	6.3	Filament
6-7	5.0	Filament of 80
8-10	720	Plates of 80
4	...	Center Tap of 3-5
9	...	Center Tap of 8-10



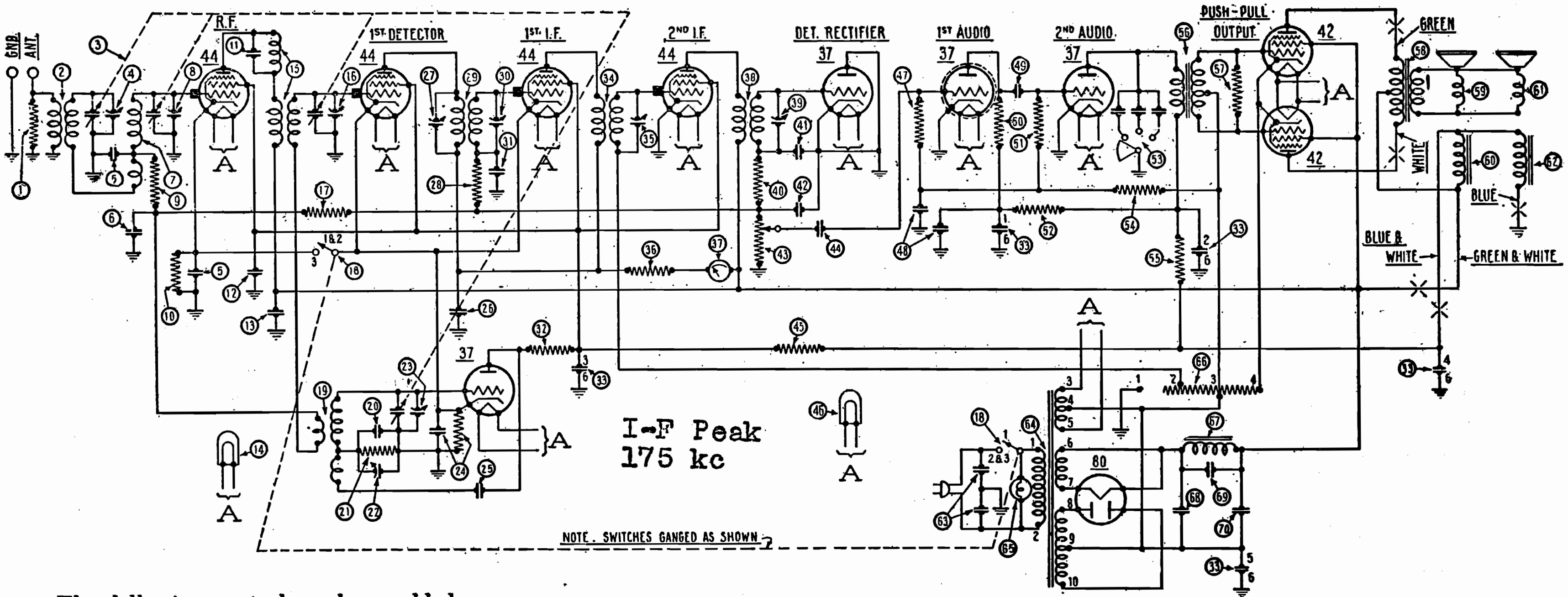
Internal Connections Filter Condenser

Table 3—Resistor Data

No. on Figs. 3 & 4	Power (Watts)	Resistance (ohms)	Terminals	COLOR Body	COLOR Tip	COLOR Dot
66	..	50 50 205	1–2 2–3 3–4	Long	Tubular	
36	.5	1000	....	Brown	Black	Red
45 55	.5	5000	....	Green	Black	Red
1 52	.5	10,000	....	Green	Black	Orange
32	1.	13,000	....	Brown	Orange	Orange
60	.5	25,000	....	Red	Green	Orange
21	.5	51,000	....	Green	Brown	Orange
40	.5	99,000	....	White	White	Orange
10	.5	160,000	....	Brown	Blue	Yellow
57	.5	240,000	....	Red	Yellow	Yellow
9 17 54 28 47	.5	490,000	....	Yellow	White	Yellow
51	.5	1,000,000	....	Brown	Black	Green

MODEL 15
Schematic Changes

PHILCO RADIO & TELEVISION CORP.



The following parts have been added:

Part number 4412, resistor 10,000 ohms; part number 6287G, condenser; **part number 4516, resistor** 25,000 ohms; part number 7625B, condenser; part number 03103, terminal block.

Below run No. 26 interchange the two outside wires of the input transformer secondary.

Below run No. 27 change 17 resistor 490,000 ohms to 1,500,000 ohms, part 7009. Change **28 resistor 1,000,000** ohms to 2,000,000 ohms, part 5872.

Below run No. 25, place a 490,000 ohm resistor, part 4517, across two outside **terminals of volume control.**

Below run No. 22 add .002 Mfd. condenser part 6853 across the plates of the **pentodes.**

Add tuning condenser drive cord, part 04916 and spring 6508.

68 Electrolytic condenser (.6 Mfd.) part 6707 changed to 4916.

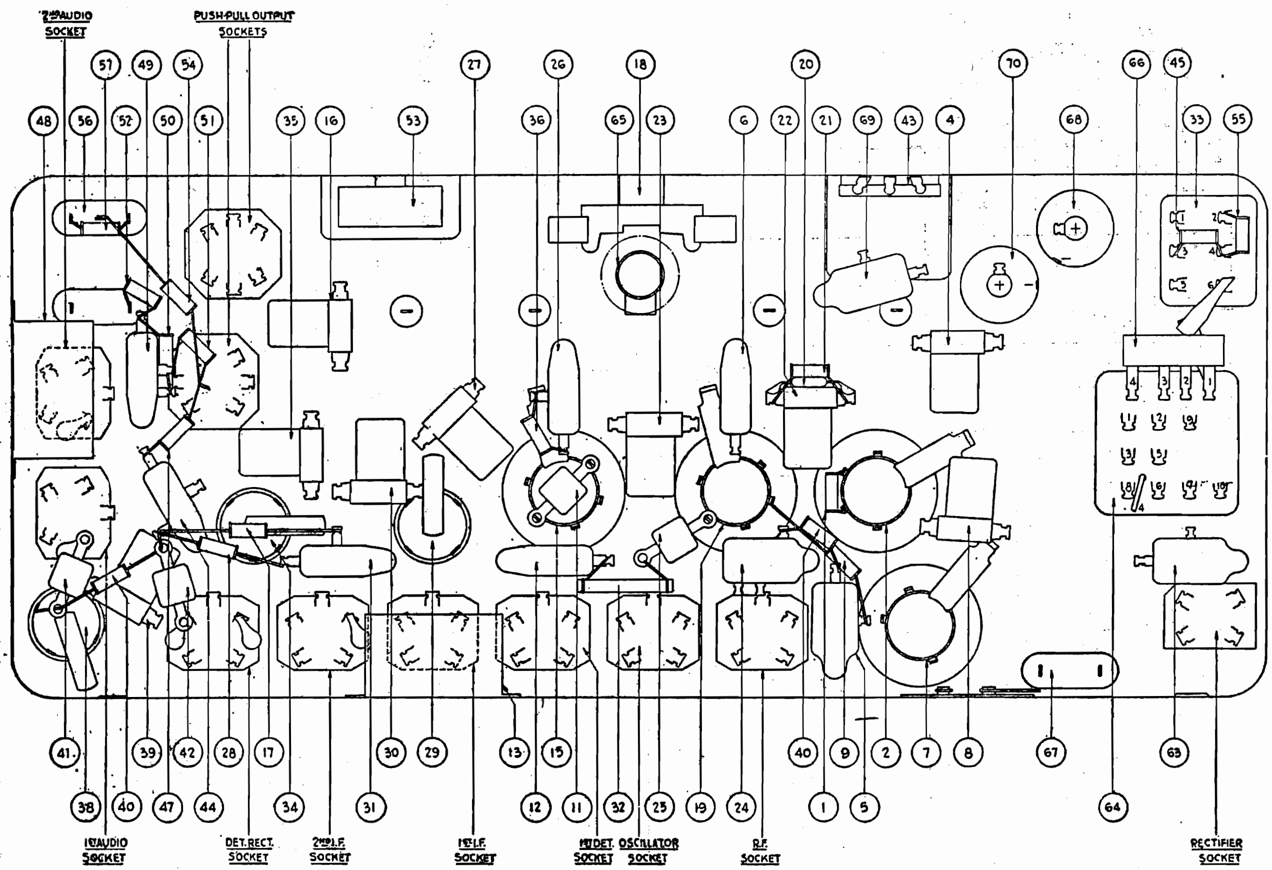
70 Electrolytic condenser (.6 Mfd.) part 6706 changed to 4916.

For 25 Cycle Models

use power transformer, part 6673. Change 68 electrolytic condenser 6 Mfd. 6707 to read 8 Mfd. 6707. Change 70 electrolytic condenser 6 Mfd. 6706 to 8 Mfd. 6707. 69 condenser .18 Mfd. not used. Change 33 filter condenser 03489 to part 05302. This new condenser contains the following capacities: .015, .5, .75, 1., 2-1.5 Mfd. The sections between terminals 2-6 and 4-6 are both raised from .5 Mfd. to 1.5 Mfd. The .75 section is brought out with two rubber covered leads, and connects across the filter choke 67 in place of the .18 Mfd. condenser 69 which was removed.

MODEL 15
Chassis
Speaker

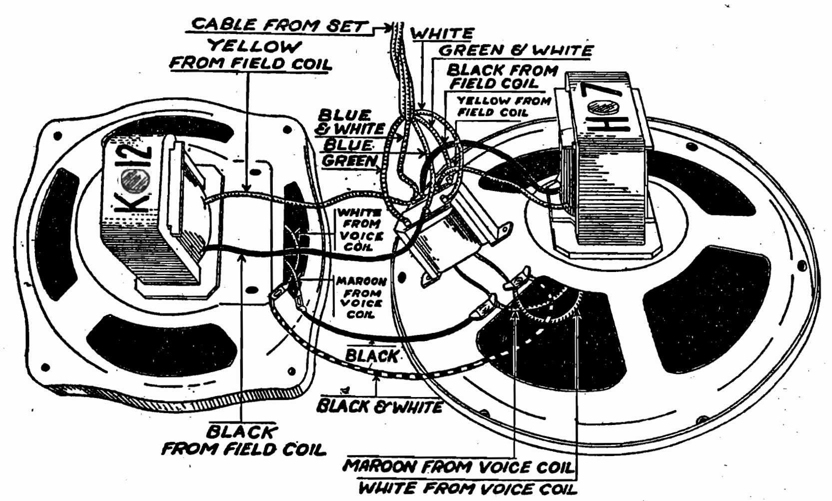
PHILCO RADIO & TELEVISION CORP.



Parts Diagram

Adjustment of Model 15 Series

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to re-adjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your distributor. The Philco Model 095 Oscillator has been especially designed for use in this work and will be found the most inexpensive and most reliable for the purpose.



Speaker Connections

PHILCO RADIO & TELEVISION CORP.

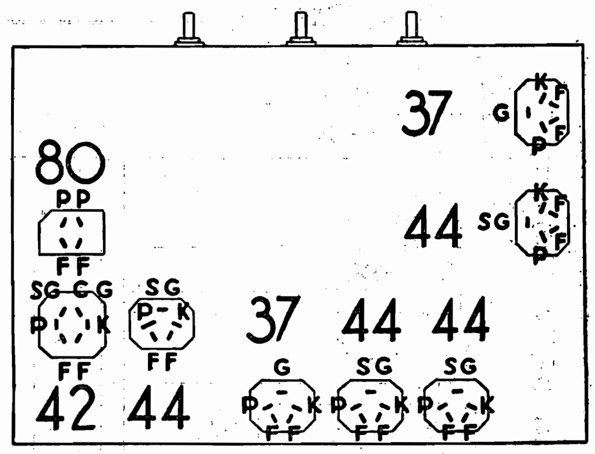
MODEL 43 AC
Socket Voltage Values

The Philco Radio of the 43 Series is an eight tube superheterodyne short wave and broadcast wave combination, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The same superheterodyne circuit is employed for both short wave and broadcast wave ranges, with an intermediate frequency of 450 kilocycles. Four tuning ranges on the dial are provided, these being controlled by the wave change switch. The ranges are as follows:

Position 1.................550 KC to 1400 KC
Position 2.................1.4 MC to 3.4 MC
Position 3.................3.3 MC to 9.0 MC
Position 4.................8.5 MC to 20.0 MC

The chassis is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code, employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chasses of one code are not interchangeable with those of another. The power consumption of the various models is as follows:

Chassis	Volts	Cycles	Watts
43-121	115	50-60	65
43-221	115	50-60	88
43-121	115	25-40	67
43-121	230	50-60	65
43-221	230	50-60	88



F—Filament
P—Plate
SG—Screen Grid
CG—Control Grid
K—Cathode

Fig. 1—Tube Sockets, Under Side of Chassis

Caution:—Never connect the chassis to the power supply unless the speakers are connected and all tubes are in place.

Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
37	Osc.	6.3	175	—	6.	—
44	1st Det.	6.3	235	80	3.0	12.0
44	1st I. F.	6.3	235	80	.2	3.0
44	2nd I. F.	6.3	235	80	3.5	3.5
37	2nd Det.	6.3	0	—	0	0
44	1st Audio	6.3	45	45	.2	2.0
42	Output	6.3	215	240	.4	15.0
80	Rectifier	5.0	350/Plate			

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. †Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adaptor will not be satisfactory.

Table 2—Power Transformer Data

Terminals	A. C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filaments	Black
6-7	5.0	Filament of 80	Blue
8-10	685	Plates of 80	Yellow
4	....	Center Tap of 3-5	Black Yellow Tracer
9	....	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

No. on Figs.	Power (Watts)	Resistance (ohms)	COLOR Body	Tip	Dot
38 43	...	500	Flexible Wire		
9	.5	1,000	Brown	Black	Red
5	.5	2,000	Red	Black	Red
8	.5	3,000	Orange	Black	Red
58 59	1.	5,000	Green	Black	Red
82	...	5,620	Long	Tubular	
28	.5	8,000	Gray	Black	Red
37	1.	10,000	Brown	Black	Orange
73	.5	10,000	Brown	Black	Orange
60	3.	13,000	Brown	Orange	Orange
64	.5	25,000	Red	Green	Orange
62	.5	70,000	Violet	Black	Orange
22 62	.5	99,000	White	White	Orange
30 63	.5	490,000	Yellow	White	Yellow
56	.5	1,000,000	Brown	Black	Green
35	.5	2,000,000	Red	Black	Green

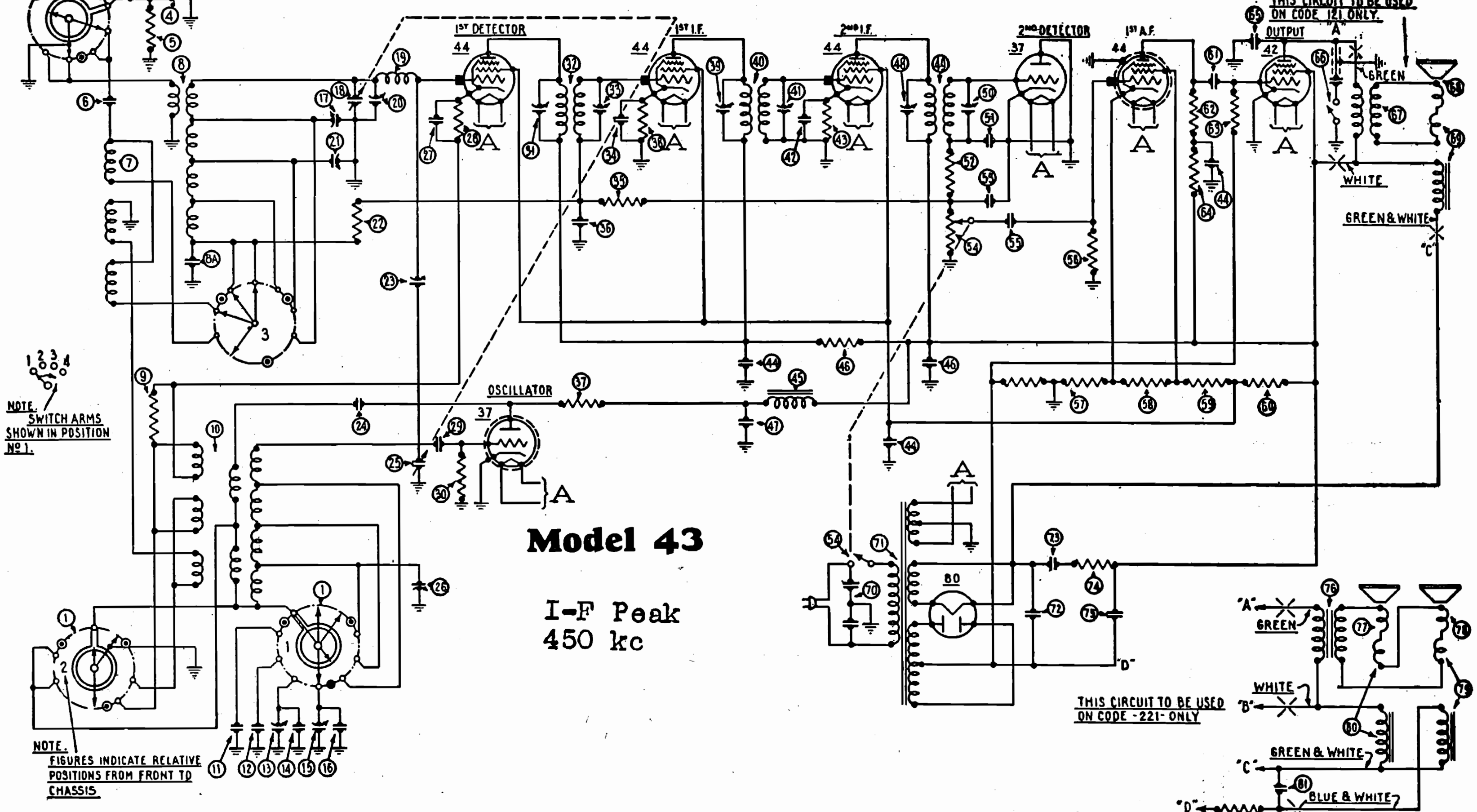
Model 43

MODEL 43
Schematic
Changes

PHILCO RADIO & TELEVISION CORP.

Resistors (700 ohms) (38) and (49) part number 6443 changed to new resistors (500 ohms) part number 6977.

Resistor (10,000 ohms) (28) part number 4412 changed to new resistor (25,000 ohms) part number 4516.



The I. F. compensating condensers are re-adjusted in the usual manner, but with the new one half plate compensating condenser (04000-C) open. After the set has been re-adjusted and placed in operation, oscillation in the broadcast band is corrected by increasing the capacity of the new one-half plate compensating condenser with the dial set slightly off the frequency of a strong signal at the low frequency end of the band until the oscillation disappears. The primary compensating condenser (31) of the first I. F. is then readjusted by decreasing capacity.

If oscillation still persists the above adjusting procedure is repeated until the sensitivity is strong and no oscillation is present.

Grid inductance coil (19) part number 05190 changed to new type, bearing same part number, identified by black paint. The first detector tube changed from type 44 to type 36.

PHILCO RADIO & TELEVISION CORP.

MODEL 43
Chassis
Speaker

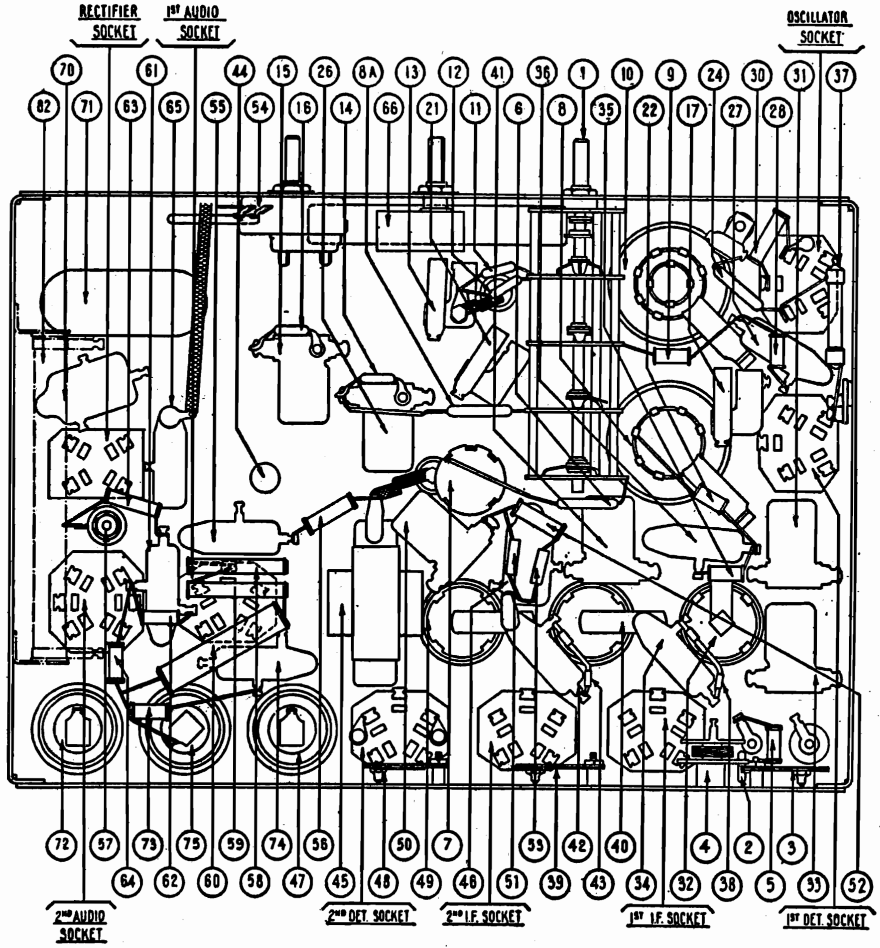


Fig. 3—Parts Diagram

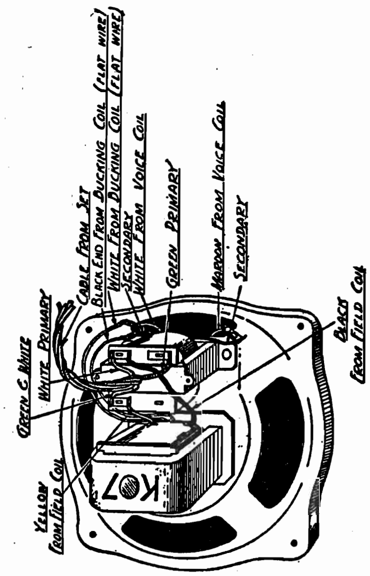


Fig. 5—Speaker Connections—121 Code

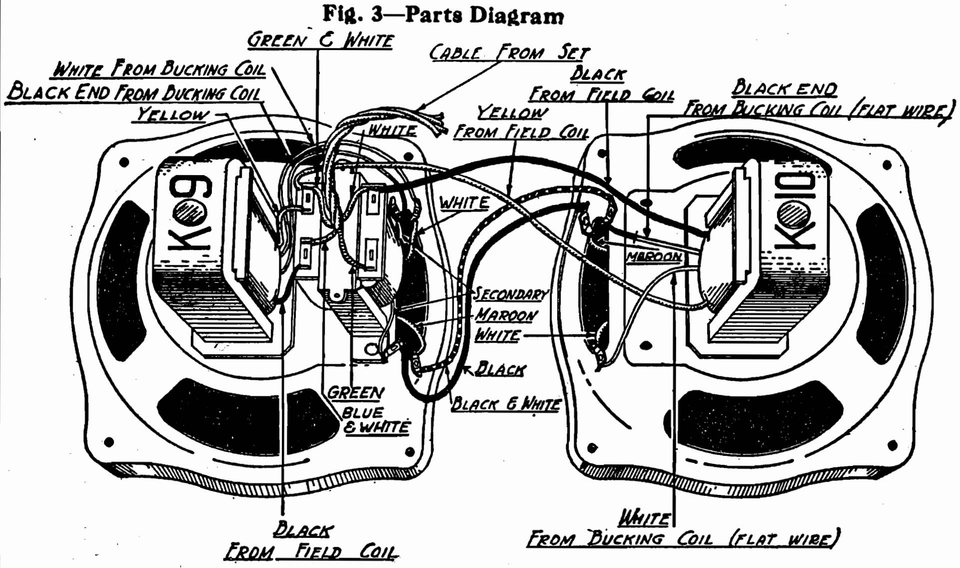


Fig. 4—Twin Speaker Connections—221 Code

Model 43-

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(32)	45	45
(40)	45	45
(45)	2100	.....
(49)	45	45
(67)	465	.....
(69)	1125	.....
(76)	465	.....
(79)	3275	.....
(80)	1125	.....
(71) Single Speaker Models	6.22	.11 Fila. .14 80 Fila. 505 80 Plate
(71) Twin Speaker Models	2.96	.10 Fila. .07 80 Fila. 143. 80 Plate

Model 43-25

The condenser ② part number 5120 was changed to new condenser part number 30-1000.

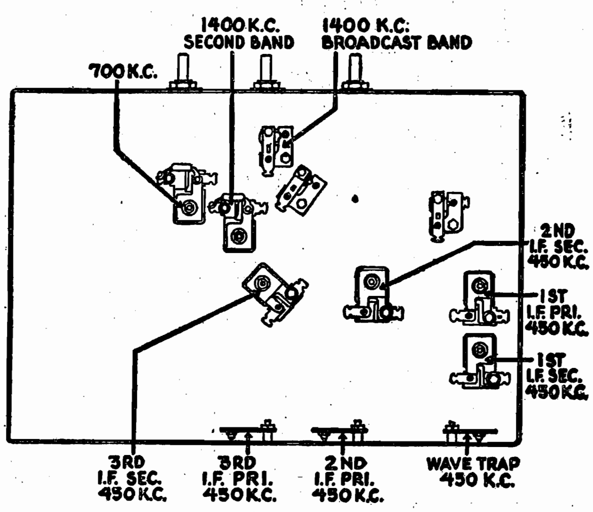
To convert the Model 43-221 chassis (two speakers) into Model 43-121 (single speaker) the following changes are necessary:—

1. Change ㉑ power transformer part number 6985 to new power transformer part number 7074.
2. Remove ㊷ BC Resistor part number 6451.

MODEL 43
Alignment
Changes

PHILCO RADIO & TELEVISION CORP.

Adjusting the Model 43



The Philco Model 43 Short Wave Combination Receiver can be adjusted by means of the Philco Model 095 B Oscillator. This oscillator provides a 450 K.C. signal which is used for adjusting the intermediate frequency amplifier stages, and it also provides 700 K.C. and 1400 K.C. signals for adjustments in the broadcast range. The other compensating condensers in the short wave range are of special construction and will not require re-adjustment. The procedure and equipment for making these adjustments are elaborate and are not practicable for use in the field. Since all gain in the receiver is obtained in the I.F. stages, it is only necessary to make the adjustments of the I.F. compensating condensers should the set ever become weak. The following procedure should be used:

(1) Remove the control grid connection from the first detector tube, and substitute the antenna connection from the Philco 095 B oscillator. Connect the output meter across the primary of the output transformer.

(2) Set the oscillator in operation at 450 K.C.

(3) Adjust all the I.F. compensating condensers for maximum output meter reading.

(4) Replace the control grid connection of the first detector tube, and connect the 450 K.C. signal to the antenna terminal of the radio set; adjust the wave trap for minimum reading in the output meter.

(5) Change the oscillator setting to 175 K.C.

(6) Tune in the fourth harmonic of this signal at 700 K.C., and adjust the 700 K.C. condenser for maximum output meter reading.

(7) Re-set the dial to 1400 K.C., and tune in the eighth harmonic of 175 K.C. at 1400 on the bottom scale; adjust the 1400 K.C. condenser for maximum output meter reading.

(8) Tune the radio set to 1400 K.C. on the second scale from the bottom, and adjust this compensating condenser for maximum output *meter reading.*

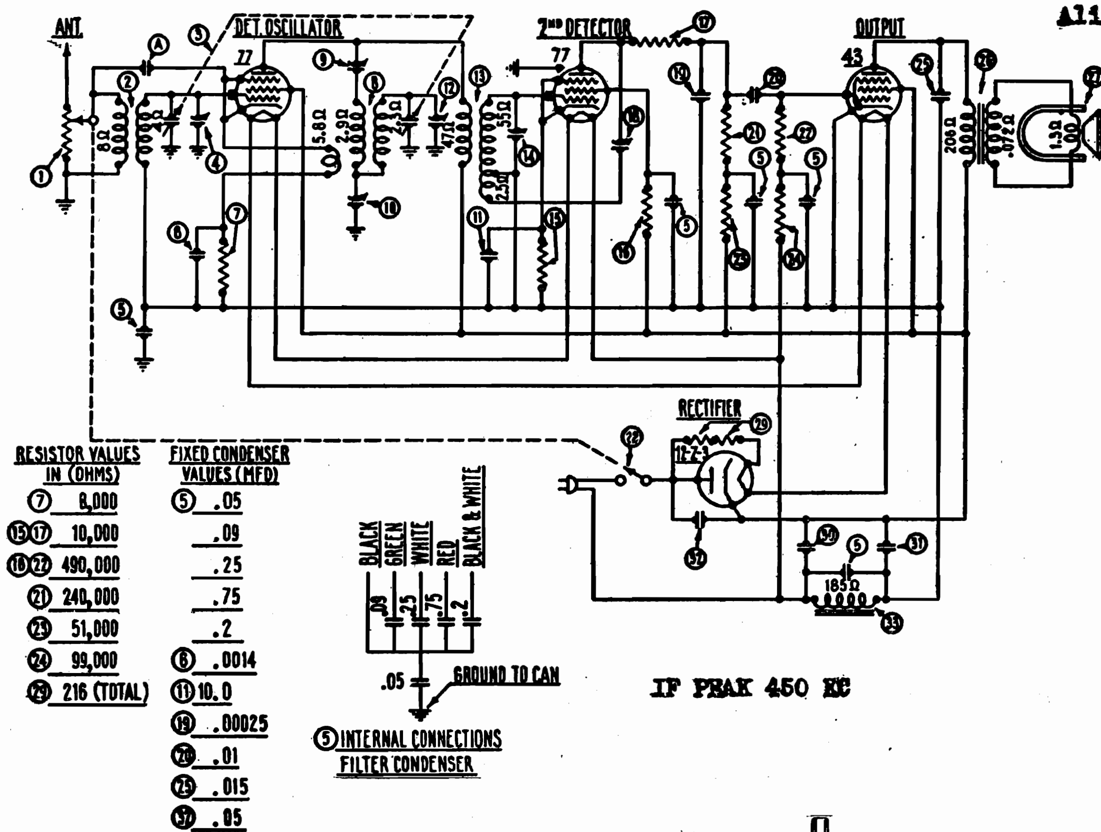
NOTE: When adjusting the 1400 and 700 compensating condensers, it may be found that the oscillator signal will be heard 10 K.C. or more off the desired dial reading. This can be corrected by alternate adjustments and re-tuning of the tuning condenser, bringing the signal nearer 700 or 1400 each time until maximum output meter reading is obtained with the correct dial scale reading.

Never attempt to make adjustments to any of the other compensating condensers in the receiver. It is important that the wires which connect between the r.f. coils and the wave change switch be so arranged that they will have maximum separation between them for minimum capacity losses.

A half plate compensating condenser part number 04000-C added; this is mounted on top of ⑰ compensating condenser part number 04000-V. An extra collar part number 3098 and a longer screw part number W443 are used for mounting. The solid plate of this new compensating condenser is connected to the plate of the first detector tube and the movable plate to a new (500 ohm) resistor part number 6977; the other end of this resistor is connected to the cathode of the first detector tube.

MODEL 53
AC–DC
Schematic
Alignment

PHILCO RADIO & TELEVISION CORP.



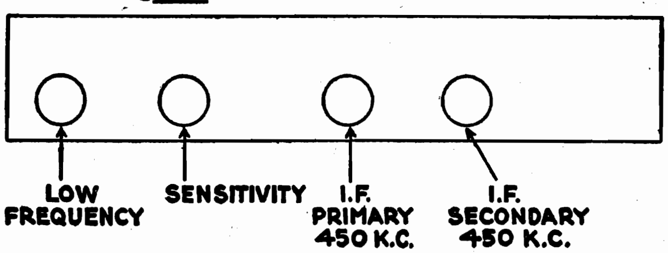


Fig. 1 Back of Model 53 Chassis showing location of Compensating Condensers

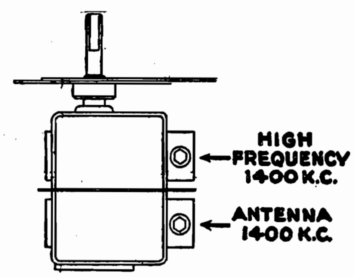


Fig. 2 Tuning Condenser, Model 53 Chassis, showing location of additional Compensating Condensers

The general method of adjusting the High Frequency and the I.F. Compensating Condensers is the same as that for other models outlined in Service Bulletin No. 120-C. The adjustment of the I.F. Compensating Condensers is completed first. This adjustment is then followed by the adjustment of the high frequency compensating condensers.

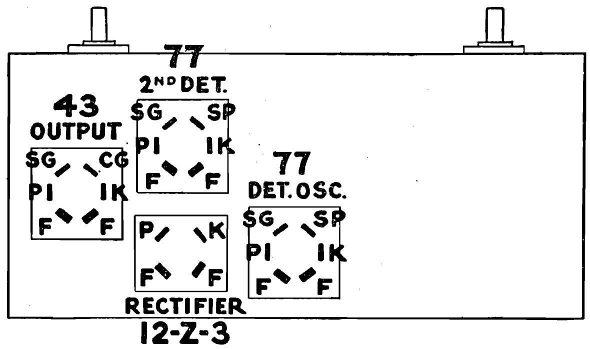
To obtain maximum sensitivity through the use of the 30′ antenna wire it will be necessary to to adjust the antenna compensating condenser, the low frequency compensating condenser and the sensitivity condenser in the following manner:—unroll the 30′ antenna wire to its full length (do not connect it to another aerial or ground while the following adjustments are being made). Tune to a station near the high frequency end of the dial (between 1400 and 1500 K.C.). With a fibre adjusting wrench cut off, adjust the antenna condenser (Fig. 2) for maximum volume. After this is completed tune to a station near the low frequency end of the dial (as near 600 as possible) and then adjust the low frequency condenser (Fig. 1) for maximum volume; retune to the high frequency station and do any necessary fine re-adjusting so as to bring in the station with maximum volume. Now check the adjustment of the sensitivity condenser (Fig. 1) with the receiver tuned to a station near the high frequency end of the dial, turn this condenser to the right as far as possible without causing an oscillation or squeal. Repeat this adjustment on a station near the low frequency end of the dial; if an oscillation or squeal appears turn the condenser to the left until this disappears.

It is necessary to have an accurately calibrated oscillater signal at 450 K.C. for adjusting the I.F. compensating condenser on the Model 53. The Philco Oscillater Model 095B is accurately calibrated for this frequency.

MODEL 53
AC-DC
Chassis
Socket

PHILCO RADIO & TELEVISION CORP.

The Philco Radio Model 53 is a four tube superheterodyne, employing the new Philco high efficiency tubes with pentode output and a permanent Field Dynamic Speaker. The set uses a Philco Type 77 tube as a first detector and oscillator, a Type 77 tube as second detector, a Type 43 tube as output, and a Type 12-Z-3 as a rectifier. The set will operate universally on either alternating or direct current, 105-125 Volts. The intermediate frequency for tuning the I.F. transformer is 450 kilocycles. The power consumption on both A. C. and D. C. is approximately 45 watts.



F	Filament	SG	Screen Grid	K	Cathode
P	Plate	CG	Control Grid	SP	Suppressor Grid

Fig. 1—Tube Sockets, Under Side of Chassis

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Circuit	Det. Osc.	2nd Det.	Out-put	Recti-fier
Type Tube	77	77	43	12-Z-3
Filament—Total 49.9 Volts A.	C. Refer	to Note.		
Plate Volts—P to K..........	95	15	94	112
Screen Grid Volts—SG to K...	94	34	102	....
Control Grid Volts—CG to K..	7	4	4	....
Cathode Volts—K to F..	18	12	10	112

NOTE:—Refer to Fig. 3. Due to filaments in series, test with suitable A. C. voltmeter across the two points indicated.

*All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltage and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Tube Socket Data*—D.C. Line Voltage 120 Volts

Circuit	Det. Osc.	2nd Det.	Out-put	Recti-fier
Type Tube	77	77	43	12-Z-3
Filament—Total 51 Volts D.C.	—Refe	r to Note.		
Plate Volts—P to K..........	95	14	94	10
Screen Grid Volts—SG to K...	93	34	100	....
Control Grid Volts—CG to K..	8	3	4	....
Cathode Volts—K to F.......	7–14	6–12	3–26	58–73

NOTE:—Refer to Fig. 3. Due to filaments in series, test with suitable D.C. Voltmeter across the two points indicated.

*All of the readings above in Table 2 were taken from the under side of chassis, using test prods and leads with a suitable high resistance, multi-range D. C. voltmeter for all readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

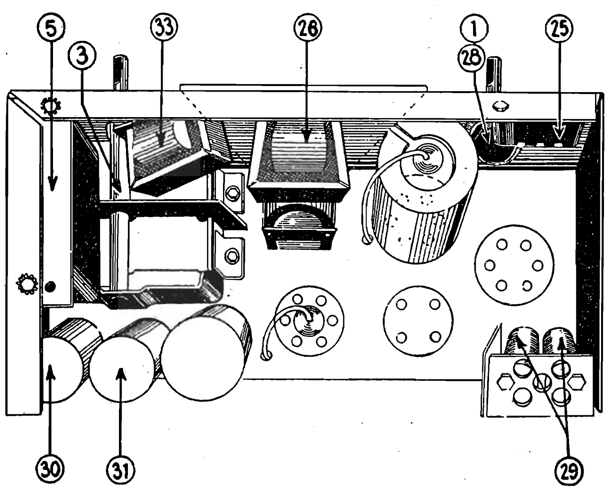


Fig. 2—Top View of Chassis, Showing Parts

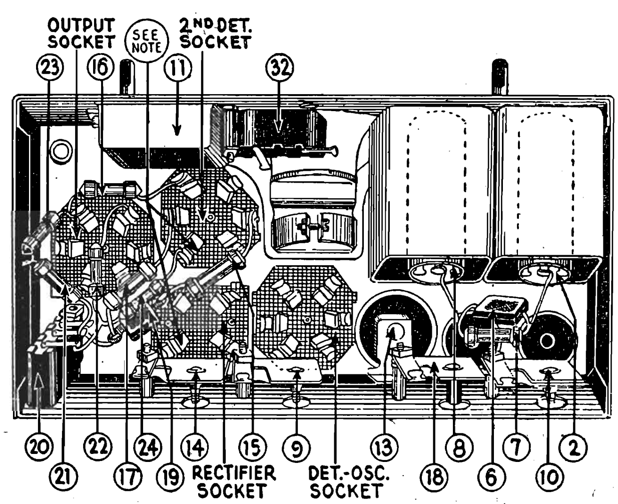
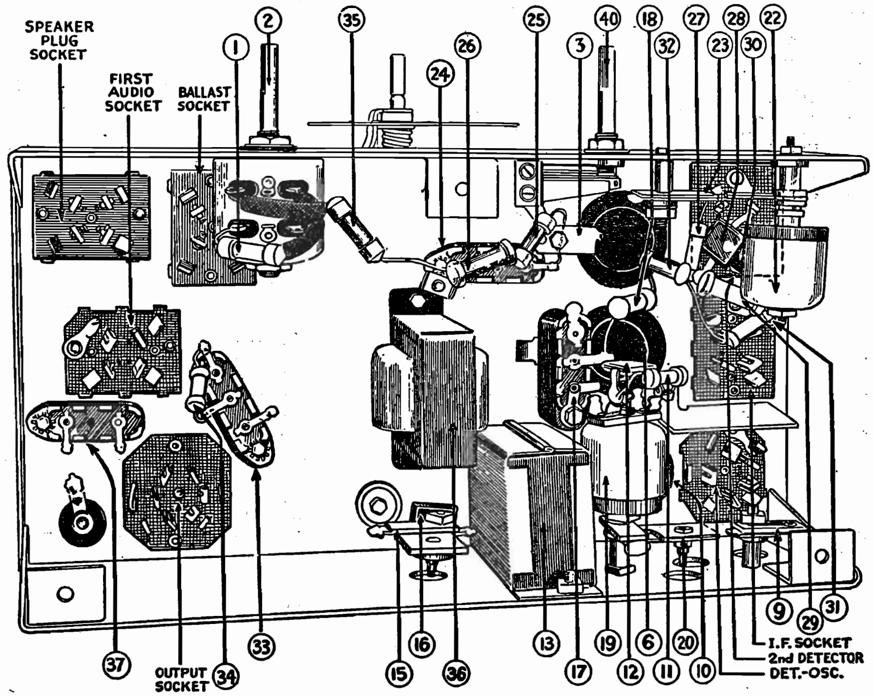
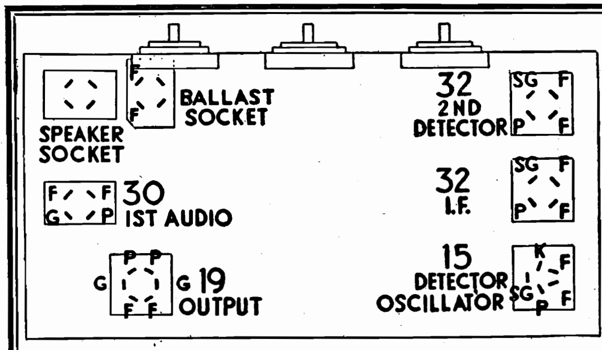


Fig. 3—Bottom View of Chassis, Showing Parts
NOTE:—Place test prods across the two points indicated to test filament voltage.

PHILCO RADIO & TELEVISION CORP.



Under view of the Philco Model 37 chassis, with all units numbered, the numbers corresponding to those given in the circuit diagram and in the tables

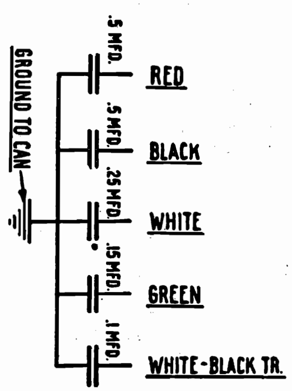


—Tube Sockets, Under Side of Chassis

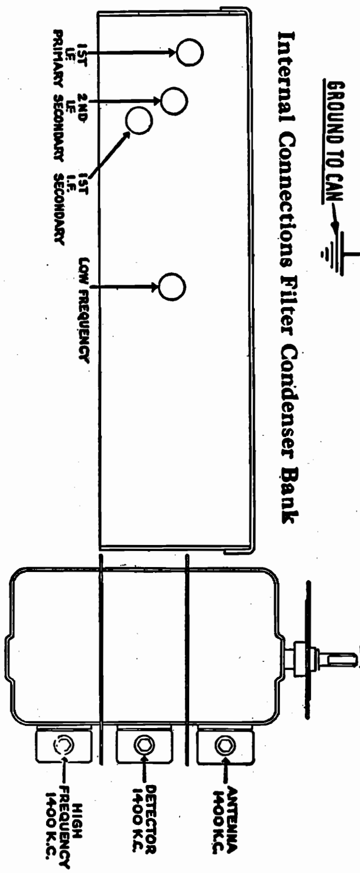
Caution.—Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

Model 37—

Key No. in Wiring Dia.	Resistance in Ohms	
	Primary	Secondary
(3)	25	6.5
(6)	26	6.2
(10)	6.8	
	4.5	5.0
(19)	160	160
(22)	160	160
(36)	330	330
(38)	670	.05
(39)	.9 Voice Coil	



Internal Connections Filter Condenser Bank



(Above) Back of Philco Model 37 chassis, showing locations of compensating condensers. The 2nd i-f. secondary condenser is mounted on the front of the chassis, but is accessible through the opening in the back, as shown. Fig. 4. (Right) Indicating the locations of the additional compensating condensers on the gang condenser

Model 37

The (99,000 ohm) resistor (27) part number 4411 was changed to new resistor (490,000 ohms) part number 4517.

The (490,000 ohm) resistor (31) part number 4517 was changed to new resistor (240,000 ohms) part number 4410.

The (99,000 ohm) resistor (32) part number 4411 was changed to new resistor (1,000,000 ohms) part number 4414.

The (51,000 ohm) resistor (25) and the (25,000 ohm) resistor (26) were removed.

The secondary lead of the second I. F. transformer connected to condenser (24) was removed and connected to the secondary lead of the first I. F. transformer on condenser (13). A (490,000 ohm) resistor part number 4517 was added between the center top of the volume control (in cathode circuit) and the secondary leads of first and second I. F. transformer connected on condenser (13).

A (15,000 ohm) resistor part number 6208 was added, connected between end of the volume control (in cathode circuit) and end of resistors (34) and (35).

MODEL 37
Schematic
Data

PHILCO RADIO & TELEVISION CORP.

The Philco Model 37 is a five tube battery operated superheterodyne receiver.

This model contains the new Philco type 15 r.f. pentode tube as detector oscillator, a type 32 screen grid intermediate frequency amplifier, a type 32 screen grid second detector, a type 30 first audio, and the new type 19 push pull (class B amplifier) output tube.

The filaments are supplied from the Philco Dry A battery. The chassis is equipped with an automatic voltage regulator tube which affords constant A voltage to the set throughout the life of the battery. The filament current drain from the A battery is 720 milliamperes.

The plates are supplied from standard Philco 45 B batteries. At 135 volts, the B battery current drain varies between 8 and 12 milliamperes.

The intermediate frequency of the superheterodyne circuit in this model is 175 kilocycles.

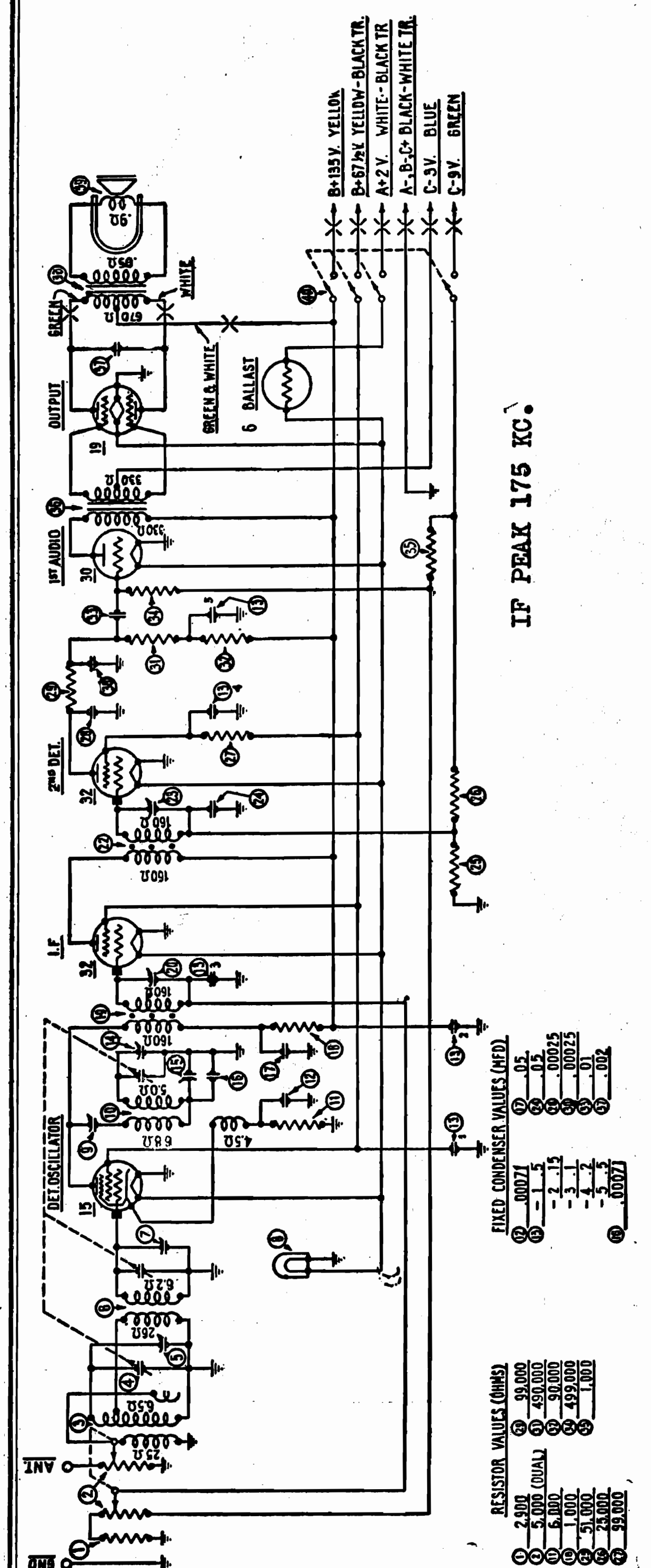


Table 1—Tube Socket Data

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to F	Screen Grid Volts SG to F	Control Grid Volts CG to F	Cathode Volts K to F
15	Det.-Osc.	1.9	120(P to K)	60(SG to K)	2.5(CG to K)	5.5
32	I.F.	1.9	120	60	2.5	..
32	2nd Det.	1.9	2.0	45	2.5	..
30	1st Audio	1.9	110	..	.4	..
19	Output	2.0	120/Plate	..	.4/Grid	..

Table 2—Resistor Data

No. in Figs. 3 and 4	Resistance (Ohms)	Color Body	Color Tip	Color Dot
18, 35	1,000	Brown	Black	Red
1	2,900	Red	White	Red
11	6,000	Blue	Black	Red
26	25,000	Red	Green	Orange
25	51,000	Green	Brown	Orange
27, 29, 32	99,000	White	White	Orange
31, 34	490,000	Yellow	White	Yellow

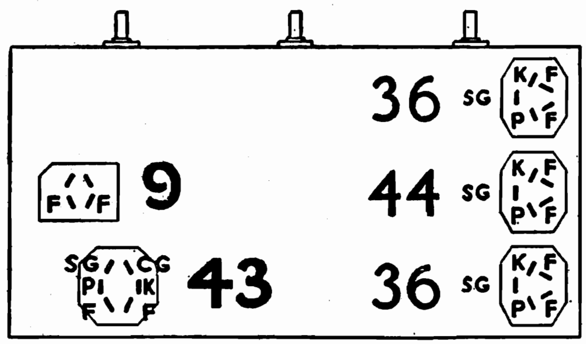
PHILCO RADIO & TELEVISION CORP.

MODEL 48
Socket
Resistor Data

The Model 48 is a four tube, 115 volt direct current operated superheterodyne receiver, designed for operation on 540 to 1500 kilocycles.

This model contains a type 36 screen grid tube for combination first detector and oscillator, a type 44 r. f. pentode tube as intermediate frequency amplifier, a type 36 screen grid tube as second detector, and a type 43 pentode tube as output. A type 9 ballast tube is used for automatic voltage regulation. All of these tubes are the new Philco high efficiency type which consume a minimum of current.

The intermediate frequency of this model is 175 kilocycles. The power consumption is 40 watts.



F—Filament
P—Plate
SG—Screen Grid
CG—Control Grid
K—Cathode

Fig. 1—Tube Sockets, Under Side of Chassis

Caution.—Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

Table 1—Tube Socket Data—D.C. Line Voltage 125 Volts

Valve		Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
Type	Circuit					
36	Det.-Osc.	6.3	100	55	3.0	.5
44	I.F.	6.3	70	70	4.5	10.
36	2nd Det.	6.3	37	35	3.0	.5
43	Output	25.0	100	105	.4	.4
9	Ballast	50	...	..	...	...

Table 2—Resistor Data

Nos. on Figs. 3 and 4	Resistance (Ohms)	Power (Watts)	Color		
			Body	Tip	Dot
26	30 & 140	...	Wire	Wound	
21	250	...	Combined with .05 Mfd. Condenser		
20	1000	.5	Brown	Black	Red
14	8000	.5	Gray	Black	Red
34	25,000	1.	Red	Green	Orange
35	32,000	1.	Orange	Red	Orange
29 31	51,000	.5	Green	Brown	Orange
25	10,000	2.	Brown	Black	Orange
32 33 41	99,000	.5	White	White	Orange
39	240,000	.5	Red	Yellow	Yellow
40	490,000	.5	Yellow	White	Yellow
9	1,000,000	.5	Brown	Black	Green

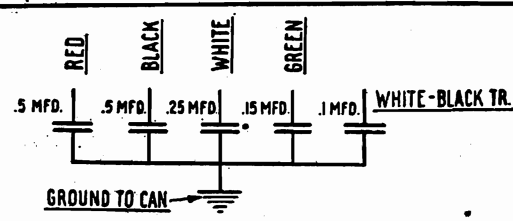


Fig. 2—Internal Connections Filter Condenser

Compensating condenser 18 part number 04000F was changed to new condenser part number 04000S.

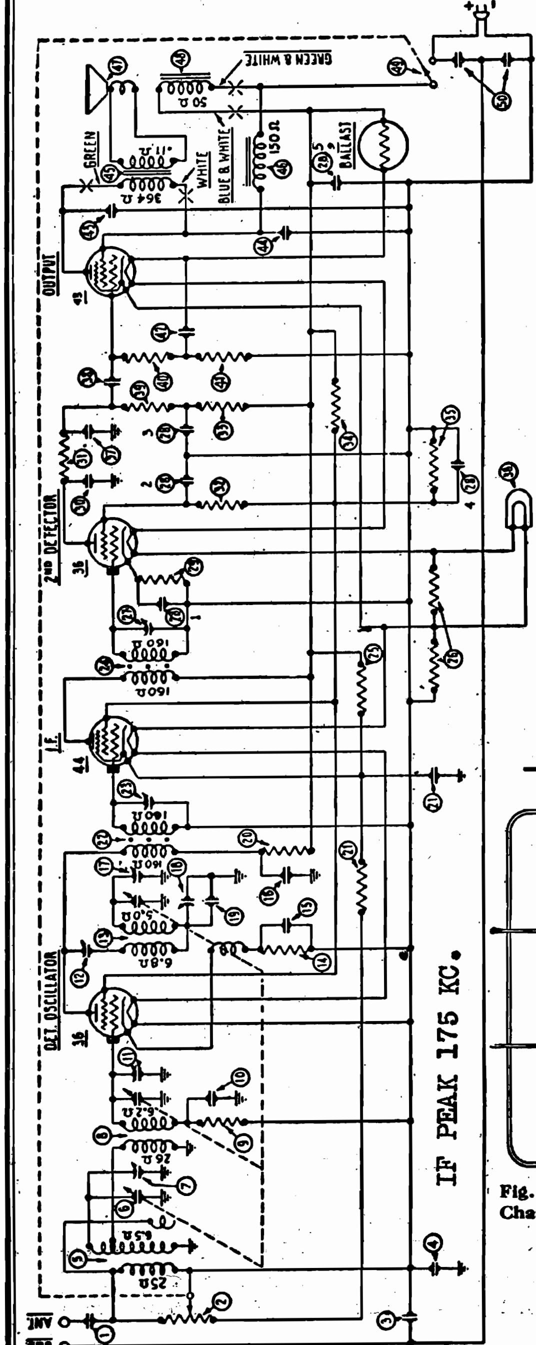
Condenser 19 part number 4520 was changed to new condenser part number 30-1000.

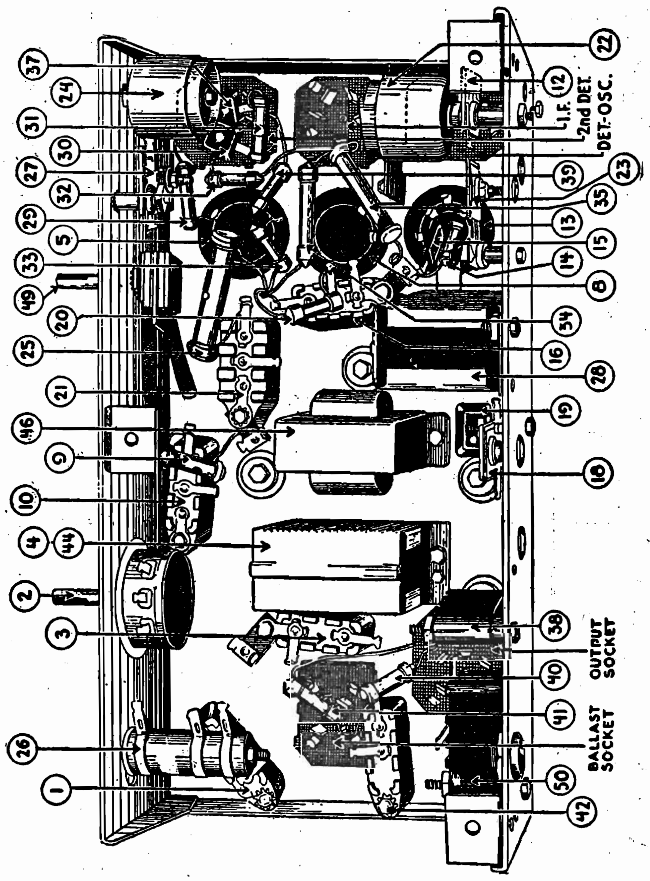
Condenser 4 listed as part number 05518 in replacement parts list, Service Bulletin 143, should read part number 4418. This condenser mounted under resistor 26 instead of being combined with condenser 44.

The wire from the compensating condenser 28 leading to the terminal block mounted on the compensating condenser 12 was unsoldered at the terminal block and then resoldered to the lug number 3 on the detector transformer 6. The wire leading from the compensating condenser 27 to the terminal block mounted on the condenser 22 was removed and a new resistor, part number 4517 (490,000 ohms) was added in its place.

MODEL 48
Schematic
Chassis, Data

PHILCO RADIO & TELEVISION CORP.





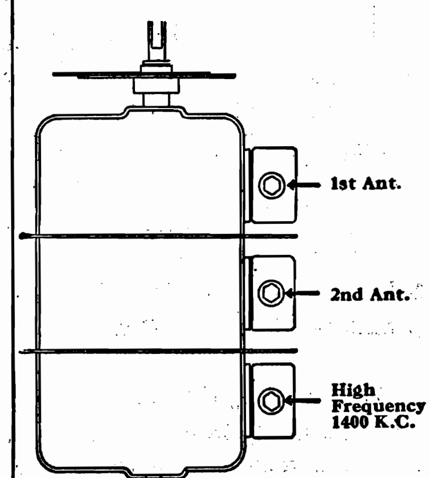


Fig. 2—Tuning Condenser, Model 48 Chassis, showing location of additional Compensating Condensers

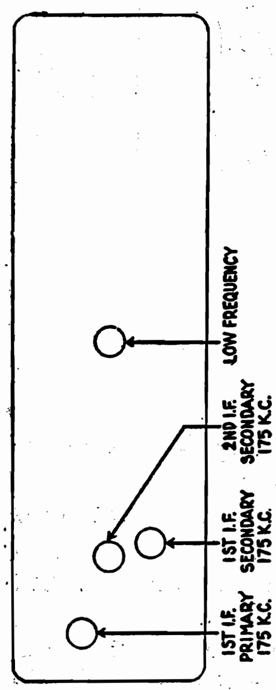


Fig. 1—Back of Model 48 Chassis, showing location of Compensating Condensers

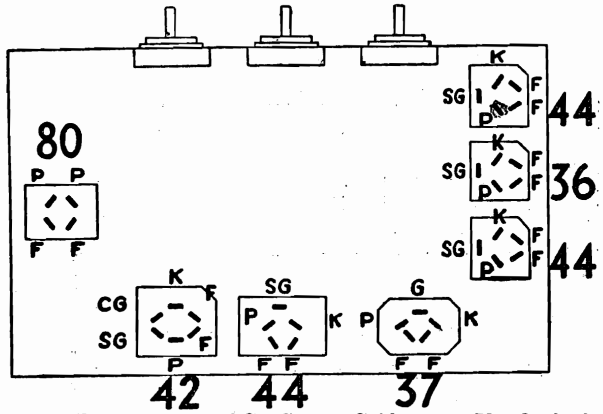
NOTE:—The 2nd I.F. Secondary Condenser is mounted on the front of the Chassis, but accessible through the opening in the back as shown

PHILCO RADIO & TELEVISION CORP.

MODEL 71-Series
Voltage, Data

The Philco Radio of the 71 series is a seven tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The chassis is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code, employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chassis of one code are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 71 series is 260 kilocycles. The power consumption of the various models is as follows:

Chassis	Volts	Cycles	Watts
71 -121	115	50-60	63
71 -221	115	50-60	80
71A-121	115	25-40	65
71A-221	115	25-40	85
71E-121	230	50-60	63
71E-221	230	50-60	80



F = Filament SG = Screen Grid K = Cathode
P = Plate CG = Control Grid

Fig. 1—Tube Sockets

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts—F to F	Plate Volts—P to K	Screen Grid Volts—SG to K	Control Grid Volts—CG to K	Cathode Volts—K to F
44	R. F.	6.3	245	90	4.	20
36	Det. Osc.	6.3	235	90	2.3	20
44	I. F.	6.3	255	90	.2	20
37	Det. Rect.	6.3	0	..	..	15
44	Audio	6.3	50	50	.3	20
42	Output	6.3	250	260	.2	15
80	Rectifier	5.0	365/plate	..	..	..

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a high resistance multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1–2	105 to 125	Primary	White
3–5	6.3	Filament	Black
6–7	5.0	Filament of 80	Light Blue
8–10	685	Plates of 80	Yellow
4	.....	Center Tap of 3–5	Black Yellow Tracer
9	.....	Center Tap of 8–10	Yellow Green Tracer

Table 3—Resistor Data

No. on Figs. 4 & 5	Power (Watts)	Resistance (Ohms)	Color Body	Color Tip	Color Dot
52	..	185 & 245	Round	Tubular	
24	.5	1,000	Brown	Black	Red
57 58	.5	5,000	Green	Black	Red
48	(Twin	Speaker) 5,620	Round	Tubular	
1 54	.5	10,000	Brown	Black	Orange
59	3.	13,000	Brown	Orange	Orange
18	.5	15,000	Brown	Green	Orange
35	.5	25,000	Red	Green	Orange
35	.5	(Twin Speaker) 51,000	Green	Brown	Orange
34	.5	70,000	Violet	Black	Orange
27	.5	99,000	White	White	Orange
37	.5	490,000	Yellow	White	Yellow
17 23 33	.5	1,000,000	Brown	Black	Green

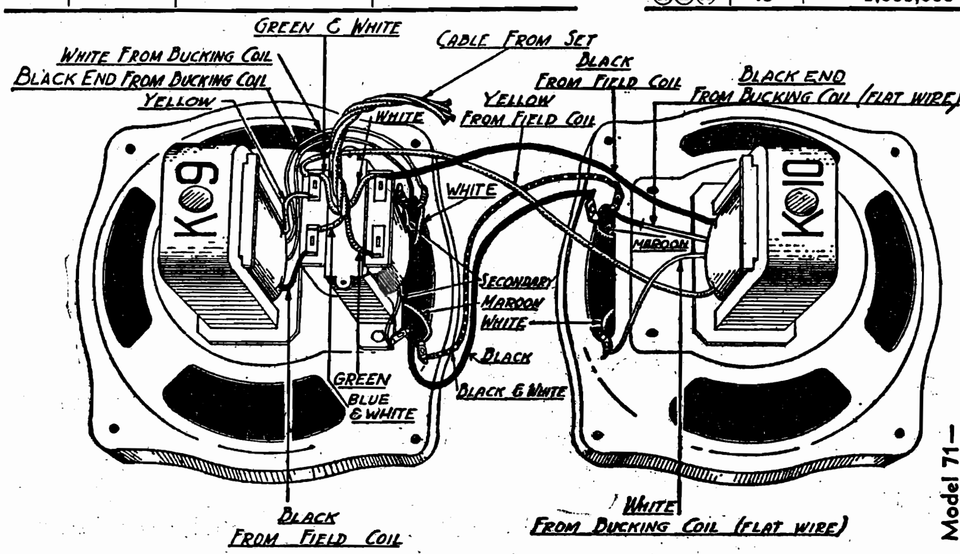


Fig. 2—Twin Speaker Connections—221 Code

Model 71—

Key No. in Wiring Dia.	Resistance in Ohms Primary	Resistance in Ohms Secondary
(2)	Inner 10.9 Outer 2.2	4.0
(8)	.....	.....
(9)	.....	3.8
(13)	Inner 5.2 Outer 5.2	15.7
(20)	55	55
(26)	67	67
(40)	465	.....
(42)	1125	.....
(43)	465	.....
(45)	1125	.....
(47)	3275	.....
(51) Single Speaker Models	7.36	.14 Fila. .13 80 Fila. 465. 80 Plate
(51) Twin Speaker Models	3.6	.13 Fila. .16 80 Fila. 185. 80 Plate

MODEL 71 Series
Schematic

PHILCO RADIO & TELEVISION CORP.

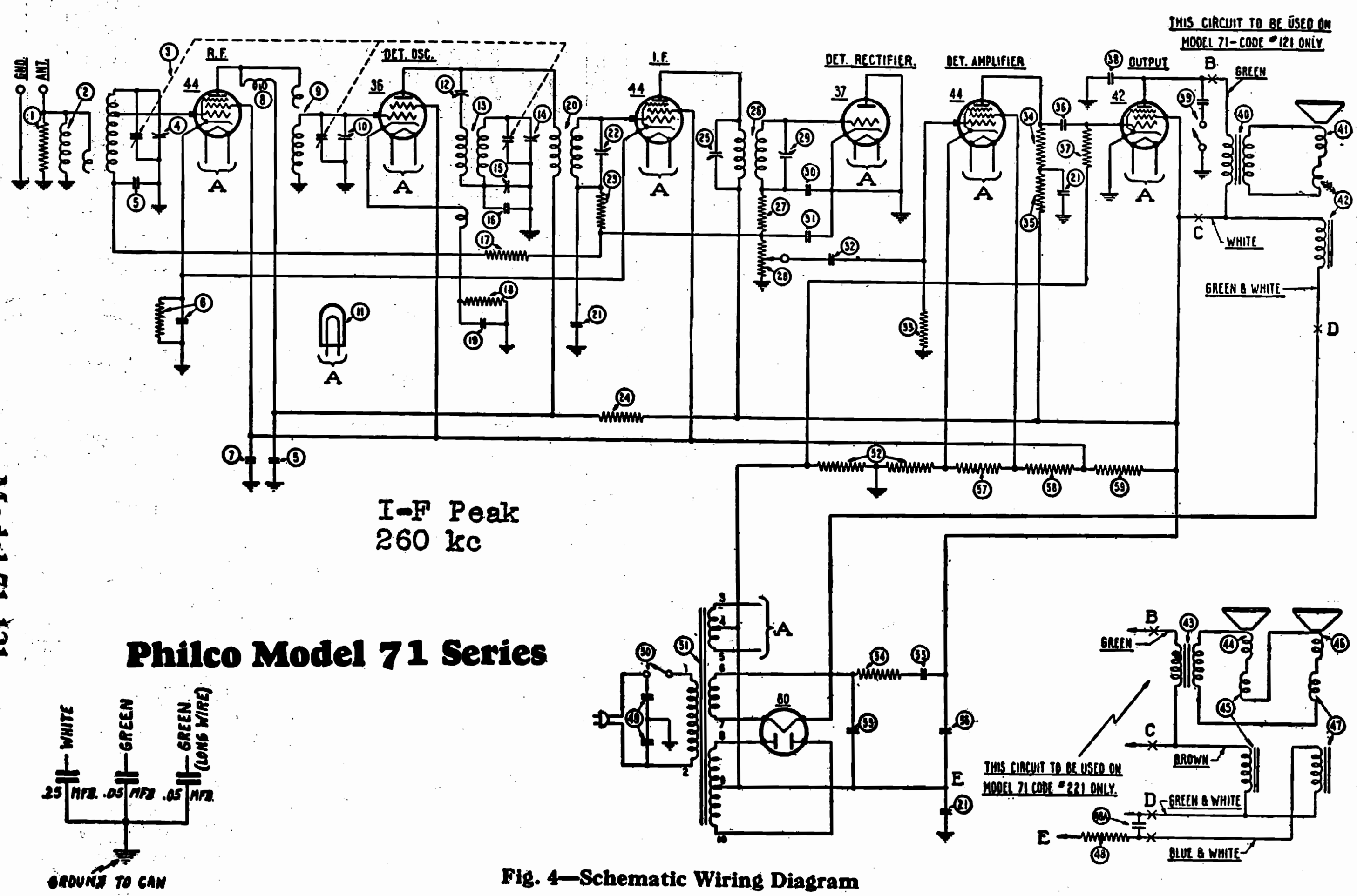


Fig. 4—Schematic Wiring Diagram

Fig. 3—Internal Connections Filter Condenser

Below run No. 4, unsolder top (ungrounded) connection of volume control (28) and substitute in the circuit a 240,000 ohm resistor, part 4410, one end grounded. Disconnect the condenser (32) .01 Mfd., part 3903-J, from the center tap of the volume control and from its common connection with the control grid of the detector amplifier tube and the ungrounded end of (33) resistor 1,000,000 ohms 4409. This resistor is no longer used, and can be removed.

Solder one side of the condenser (32) to top of volume control and other side of condenser to ungrounded end 240,000 ohm resistor. Solder the control grid lead of the detector amplifier tube to the variable arm connection of the volume control tube.

(48) A Condenser .25 Mfd. part 04997, change to .5 Mfd. part 05150.
(35) Resistor 25,000 ohms 4516 used on both 121 and 221 models.
Dial complete, part 03031, change to part 04832.
Add tuning condenser drive cord, part 04834 and spring 6508.

Model 71-121

For 25 Cycle

Use (51) power transformer 6455. Change (53) electrolytic condenser (6 Mfd.) to 8 Mfd. 6707. Change (56) electrolytic condenser (6 Mfd.) to 8 Mfd. 6706.

Model 71-221

For 25 Cycle

Use (51) power transformer 6458. Change (53) electrolytic condenser (8 Mfd.) 6707 to 10 Mfd., 6893. Change (56) electrolytic condenser (8 Mfd.) 6706 to 10 Mfd., 5142.

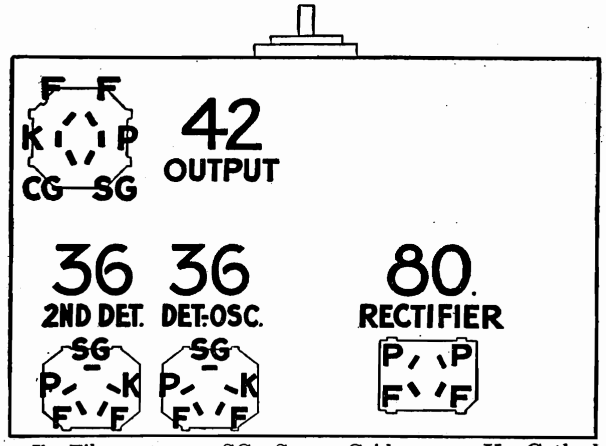
PHILCO RADIO & TELEVISION CORP.

MODEL 80
Voltage, Data

Model 80-

Key No in Wiring Dia	Resistance in Ohms Primary	Secondary
(2)	2.68	6.5
(8)	2.38	.....
	6.45	2.4
(14)	45	54.7
	.....	3.6
(28)	364	.11
(29)	93 Voice Coil	.....
(30)	.07 Bucking Coil	.....
		.....
	1250 Field	..
(33)	10 42	Fila .25
	.....	80 Fila. .15
		80 Plate 303

The intermediate frequency for tuning the I.F. transformer is 450 kilocycles. The power consumption of the Model 80 is 46 watts.



F = Filament SG = Screen Grid K = Cathode
P = Plate CG = Control Grid

Fig. 1—Tube Sockets, Under Side of Chassis

CAUTION: Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

Table 1—Tube Socket Data*—Power Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
36	Det.—Osc.	6.3	245	165	6.4	8.4
36	2nd Det.	6.3	40	15	.4	0
42	Output	6.3	240	255	4	0
80	Rectifier	5.0	340/Plate	...	...	...

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a high resistance multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament of 80	Blue
8-10	630	Plates of of 80	Yellow
4	...	Center Tap of 3-5	Black Yellow Tracer
9	...	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

Nos. on Figs. 2 and 3	Resistance (Ohms)	Power (Watts)	Color Body	Color Tip	Color Dot
㊱	325	..	Wire	Wound	
⑨	9,000	1.	White	Black	Red
⑥ ⑳	10,000	.5	Brown	Black	Orange
⑪	16,000	5.	Brown	Blue	Orange
㉒	240,000	.5	Red	Yellow	Yellow
㉖	490,000	.5	Yellow	White	Yellow
⑲	1,000,000	.5	Brown	Black	Green
⑮	4,000,000	.5	Yellow	Black	Green

The following changes made on sets above run No. 12

All tube shields were changed to new shield part number 8005.

Coil shield (square type) part number 7406 was changed to (round type) part number 7830. The following additional changes were made at the same time. Antenna coil ② part number 05831 changed to new coil part number 06888, and the oscillator coil ⑧ part number 05832 changed to new coil part number 06887; resistor ⑥ (10,000 ohms) part number 4412 and condenser ⑤ (710 Mmfd.) part number 4520 becomes part of coil assembly—(part number 06887).

Resistor ⑳ part number 4412 should be as far away from the I. F. coils as possible. The black and white lead from ⑭ I. F. coil should be placed as near the chassis as possible over the oscillator coil.

MODEL 80
Schematic
hassis

PHILCO RADIO & TELEVISION CORP.

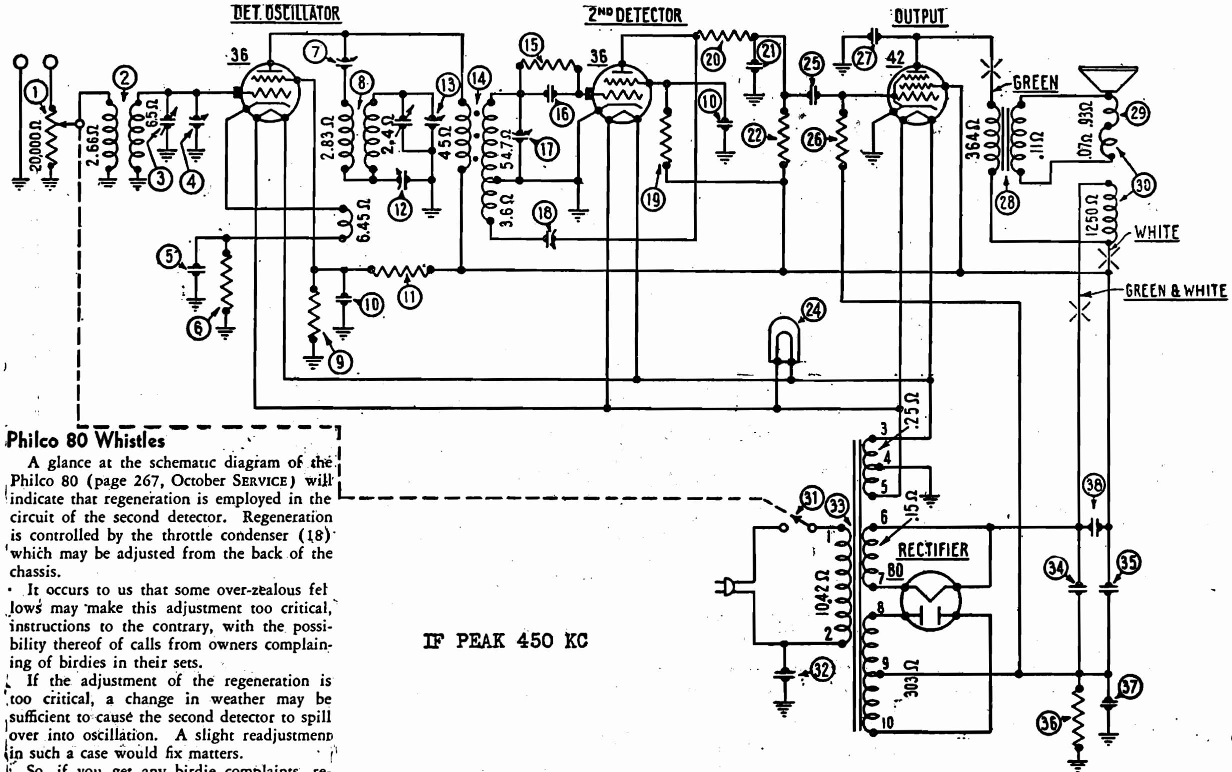


Fig. 2—Schematic Wiring Diagram

Philco 80 Whistles

A glance at the schematic diagram of the Philco 80 (page 267, October SERVICE) will indicate that regeneration is employed in the circuit of the second detector. Regeneration is controlled by the throttle condenser (18) which may be adjusted from the back of the chassis.

It occurs to us that some over-zealous fellows may make this adjustment too critical, instructions to the contrary, with the possibility thereof of calls from owners complaining of birdies in their sets.

If the adjustment of the regeneration is too critical, a change in weather may be sufficient to cause the second detector to spill over into oscillation. A slight readjustment in such a case would fix matters.

So, if you get any birdie complaints, remember condenser (18) and dive for it.

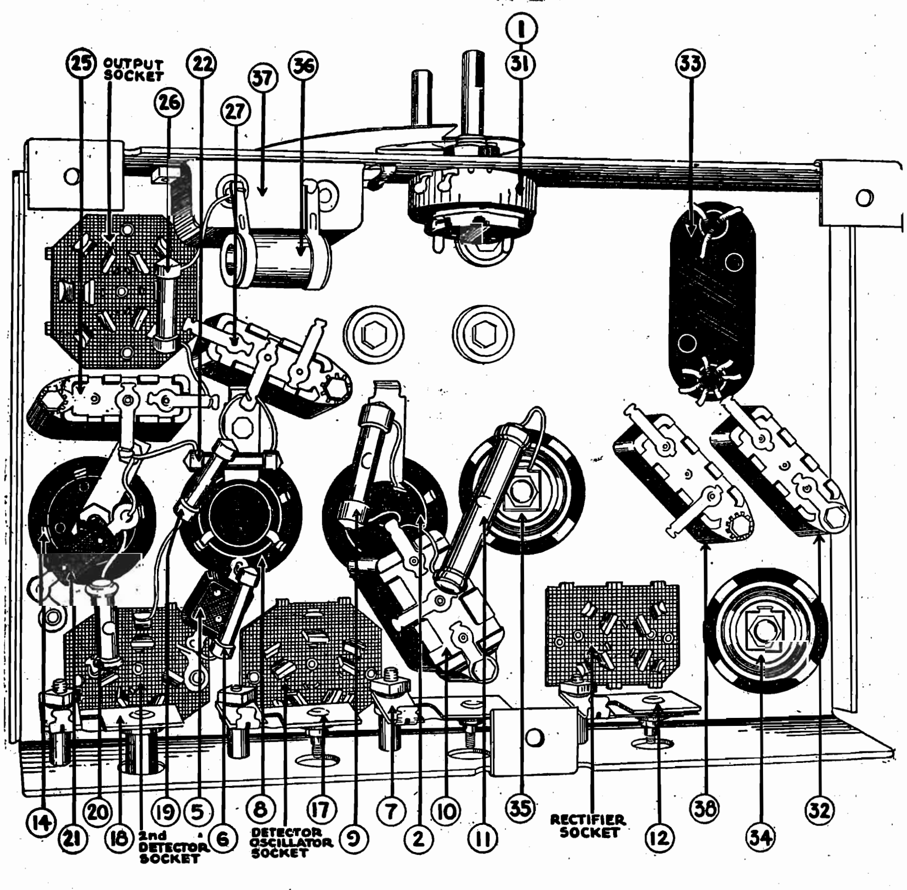


Fig. 3—Bottom View of Chassis, Showing Parts

A condenser part number 4989K was added. This condenser was connected between the electrolytic condenser (34) and the screen grid prong of the output socket.

The following changes were made to extend the frequency range of the Model 80—Tuning condenser assembly (3) part number 05794 was changed to new tuning condenser assembly part number 31-1030. The tuning scale part number 7989 was changed to new tuning scale part number 27-5009. The antenna coil (2) part number 06888 was changed to new coil part number 32-1125. The oscillator coil (8) part number 06887 was changed to new coil part number 32-1120.

The black wire with yellow tracer (filament center tap) of (33) power transformer was disconnected from ground and connected to the yellow wire with green tracer (80 plate center tap). This was connected to lug number 6 of (32) condenser.

The above effective on run number 14.

PHILCO RADIO & TELEVISION CORP.

MODEL 81
Chassis
Voltage, Data

The Philco Radio Model 81 is a four tube superheterodyne receiver combining Standard broadcast and police reception and employs the new Philco high efficiency tubes with pentode output and electro dynamic speaker. The same superheterodyne circuit is used for Standard broadcast and police reception. The intermediate frequency for tuning the I. F. transformer is 460 kilocycles. The power consumption of the Model 81 is 46 watts.

Table 1—Tube Socket Data* Power Line Voltage 115 Volts

Circuit	Det. Osc.	2nd Det.	Out-put	Rec-tifier
Type Tube	**77**	**77**	**42**	**80**
Filament Volts–F to K	6.3	6.3	6.3	5.0
Plate Volts–P to K	240	75	240	425
Screen Grid Volts–SG to K	85	40	250	..
Control Grid Volts–CG to K	5.6	.6	2.3	..
Cathode Volts–K to F	24.5	16	16.2	..

Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1–2	105–125	Primary	White
3–5	6.3	Filament	Black
6–7	5.0	Filament of 80	Blue
8–10	630	Plates of 80	Yellow
4	..	Center Tap of 3-5	Black-Yellow Tracer
9	..	Center Tap of 8-10	Yellow-Green Tracer

*All of the above readings were taken from the underside of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance multirange D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug in adapter will not be satisfactory.

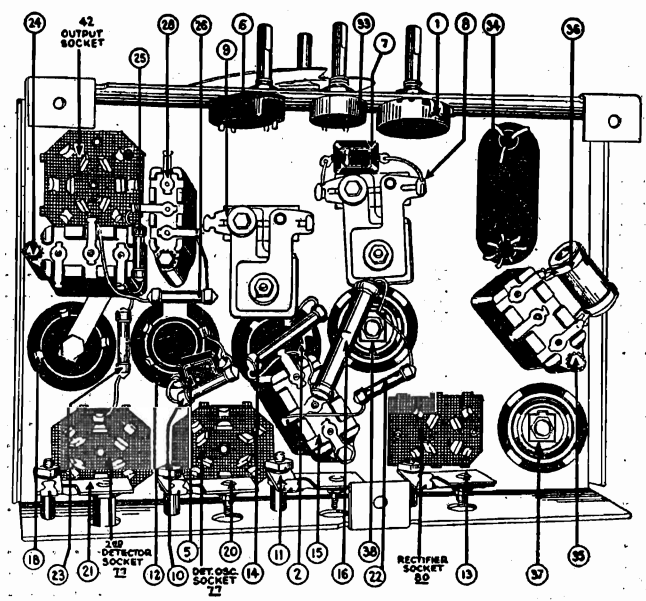
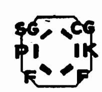
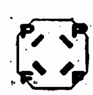


Fig. 1—Parts Diagram

77 Sockets



42 Socket



80 Socket

Terminal Arrangement of Tube Sockets Viewed from Under Side of Chassis.

MODEL 81
Schematic
Replacement List

PHILCO RADIO & TELEVISION CORP.

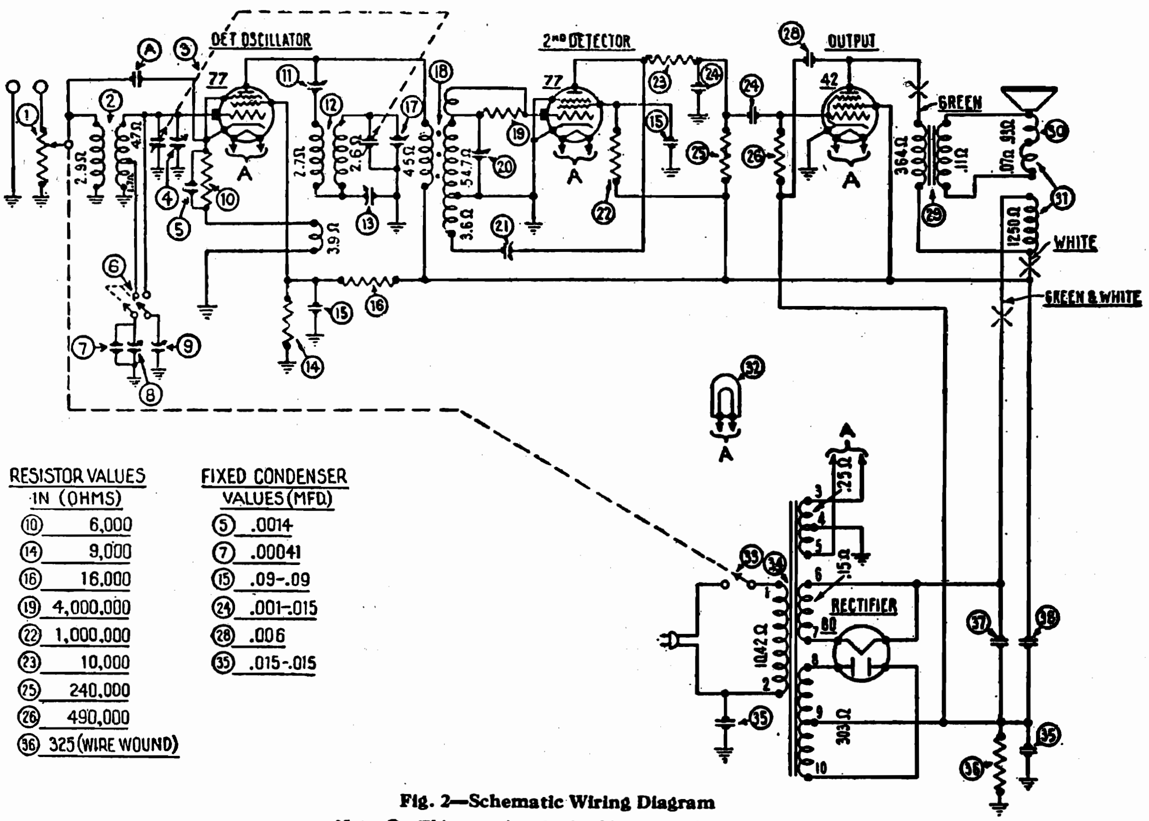


Fig. 2—Schematic Wiring Diagram
Note Ⓐ—This capacity obtained by pair twisted wires.

REPLACEMENT PARTS MODEL 81

No. on Figs.	Description	Part No.	List Price
1	Volume Control*	33-5002	.75
2	Antenna Transformer	32-1030	.50
3	Tuning Cond. Assembly	31-1006	
4	Compensating Condenser (Part of 3)		
5	Cond. (Red and Black)	7007	.25
6	Frequency Switch	42-1000	
7	Cond. (Orange and Yellow)	30-1000	.20
8	Compensating Condenser	04000-S	.25
9	Compensating Condenser	04000-X	.16
10	Resistor (Blue-Black-Red)	7352	.25
11	Compensating Condenser (I.F. Primary)	04000-A	.12
12	Oscillator Coil	32-1031	.75
13	Compensating Condenser (Low Frequency)	04000-S	.25
14	Resistor (White-Black-Red)	7501	.25
15	Condenser	4989-B	.22
16	Resistor (Brown-Blue-Orange)	7500	.40
17	Compensating Condenser (Part of 3)		
18	I.F. Transformer	06100	1.25
19	Resistor (Mounted on I.F. Transformer)	6010	.25
20	Compensating Condenser (I.F. Secondary)	04000-D	.10
21	Compensating Condenser	04000	.16
22	Resistor (Brown-Black-Green)	4409	.25
23	Resistor (Brown-Black-Orange)	4412	.25
24	Condenser (Double)	7762-B	.20
25	Resistor (Red-Yellow-Yellow)	4410	.25
26	Resistor (Yellow-White-Yellow)	4517	.25
28	Condenser	7625-B	.12
29	Output Transformer	2660	1.25
30	Voice Coil and Cone Assembly	02861	.60
31	Speaker Field and Bucking Coil (with Pot)	02667	2.00
32	Pilot Light	6608	.14
33	"On-Off" Switch*	6416-W	.40
34	Power Transformer—50-60 Cycles	7421	2.75
	Power Transformer—25-40 Cycles	7422	4.00
	Power Transformer—50-60 Cycles, 250 Volts	7423	2.75
35	Condenser (Double)	3793-R	.25
36	Resistor (Wire Wound)	7465	.12
37	Electrolytic Condenser (8 Mfd.)	7558	1.25
38	Electrolytic Condenser (4 Mfd.)	7467	1.25
	Bezel	7417	
	Tube Shield	7172	.12
	Knob (Large)	03063	.08
	Knob (Small)	03064	.06
	Knob Spring	5262	.35 per C
	Grid Clip	4897	.30 per C
	Four Prong Socket Assembly	5026	.08
	Six Prong Socket Assembly	6417	.10
	Chassis Mounting Screw	W-567	2.40 per C
	Chassis Mounting Washer	W-315	.40 per C
	Pilot Lamp Shield	5760	

*On later production (run No. 3 and above, rubber stamped in a star on back of chassis) volume control ① and on-off switch ㉝ was combined. This new volume control and on-off switch is Part Number 7439.

PHILCO RADIO & TELEVISION CORP.

MODEL 14, 91
(126-226)
Chassis
Speaker
Voltage

The Philco Radio of the 91 and 14 series is a nine-tube superheterodyne receiver combining standard broadcast, police and airplane reception and employs the high efficiency 6.3 volt filament tubes, automatic volume control, bass compensating tone control, shadow tuning, and push-pull pentode output. The chassis is made in two different types, one known as the 126 type, employing a single dynamic speaker, and the other known as the 226 type, employing twin dynamic speakers. These type numbers appear on the radio chassis as a part of the model number. Chassis of one type are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 91 and 14 series is 260 kilocycles. The power consumption of the various models is as follows: Single Speaker models, 90 watts; Twin Speaker models, 95 watts.

Table 1—Tube Socket Data* Power Line Voltage 115 Volts

Circuit	R. F.	Det. Osc.	I. F.	Det. Rect.	Det. Amp.	Audio	Output	Output	Rect.
Type Tube	44	36	44	37	37	37	42	42	80
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts—F to K	200	250	250	0	60	100	240	240	310
Screen Grid Volts—SG to K	50	80	85	..	.	..	250	250	...
Control Grid Volts—CG to K	6	10	2	2	2	0	15	15	...
Cathode Volts—K to F	25	10	5	2	2	2	15	15	...

* All of the above readings were taken from the underside of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminal	A.C. Volts	Circuit	Color
1- 2	105 to 125	Primary	White
3- 5	6.3	Filament	Black
6- 7	5.0	Filament 80	Blue
8-10	670	Plates of 80	Yellow
4	...	Center Tap of 3-5	Black—Yellow Tracer
9	...	Center tap of 8-10	Yellow—Green Tracer

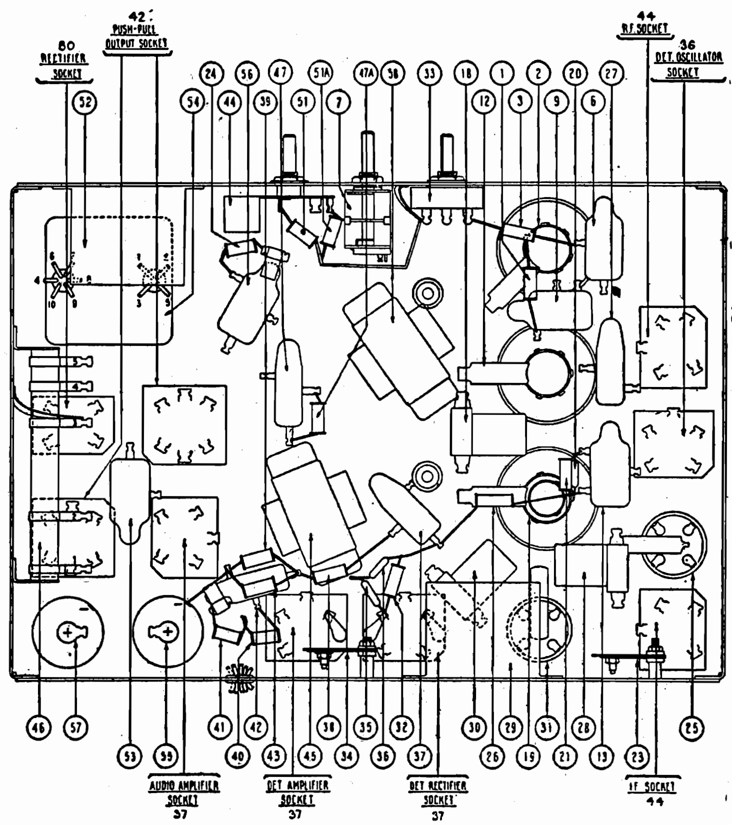
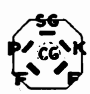
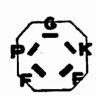


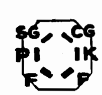
Fig. 1—Parts Diagram



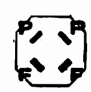
44 and 36 Sockets



37 Sockets



42 Sockets



80 Sockets

Terminal Arrangement of Tube Sockets Viewed from Under Side of Chassis

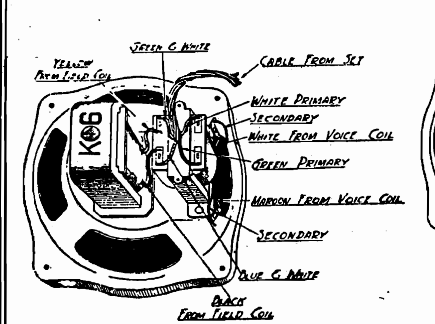


Fig. 2—Speaker Connections—126 Code

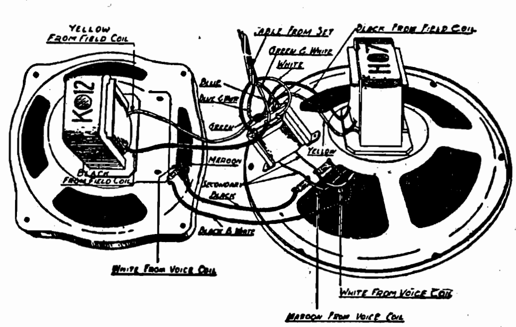


Fig. 3—Speaker Connections—226 Code

Model 91—

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(2)	Inner 24 Outer 3.3	6.6
(12)	92.	5.8
(19)	Inner 4. Outer 5.2	3.7
(25)	67	67
(31)	55	55
(45)	2000	2400
(48)	700	
(50)	3275	....
(52)	3275	
(54) Single Speaker Models	3.1	.09 Fila. .11 80 Fila. 176. 80 Plate
(54) Twin Speaker Models	2.77	.09 Fila. .11 80 Plate 128. 80 Plate
(58)	285	..

In run number 1, the (15,000 ohm) resistor (21) part number 6208 was changed to new resistor (10,000 ohms) part number 4412. Condenser (6) part number 3615AM was changed to new condenser part number 3615AF. A terminal block part number 03103 was added. This terminal block was mounted on the condenser (58) part number 4989K or 4989T.

MODEL 14,91
(126-226)
Schematic
Parts List

PHILCO RADIO & TELEVISION CORP.

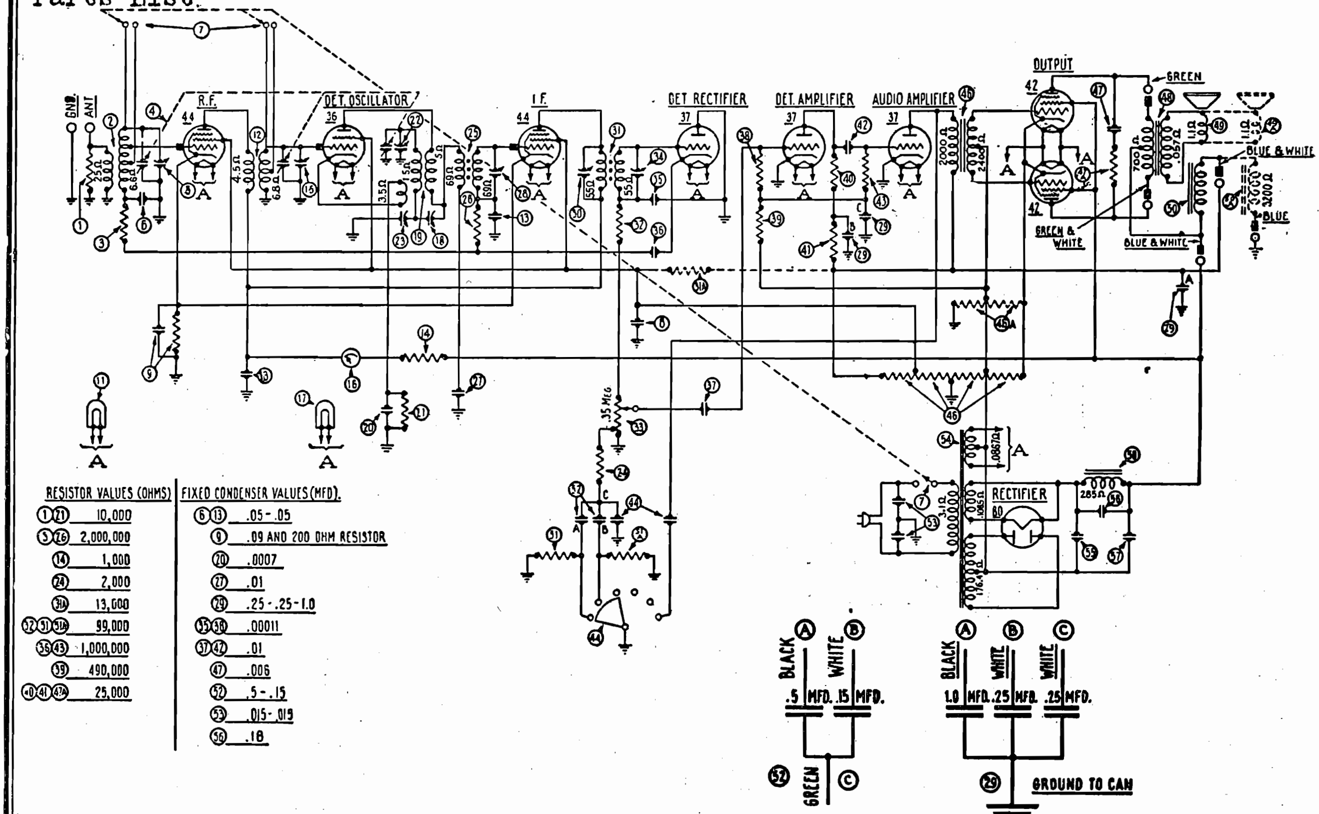
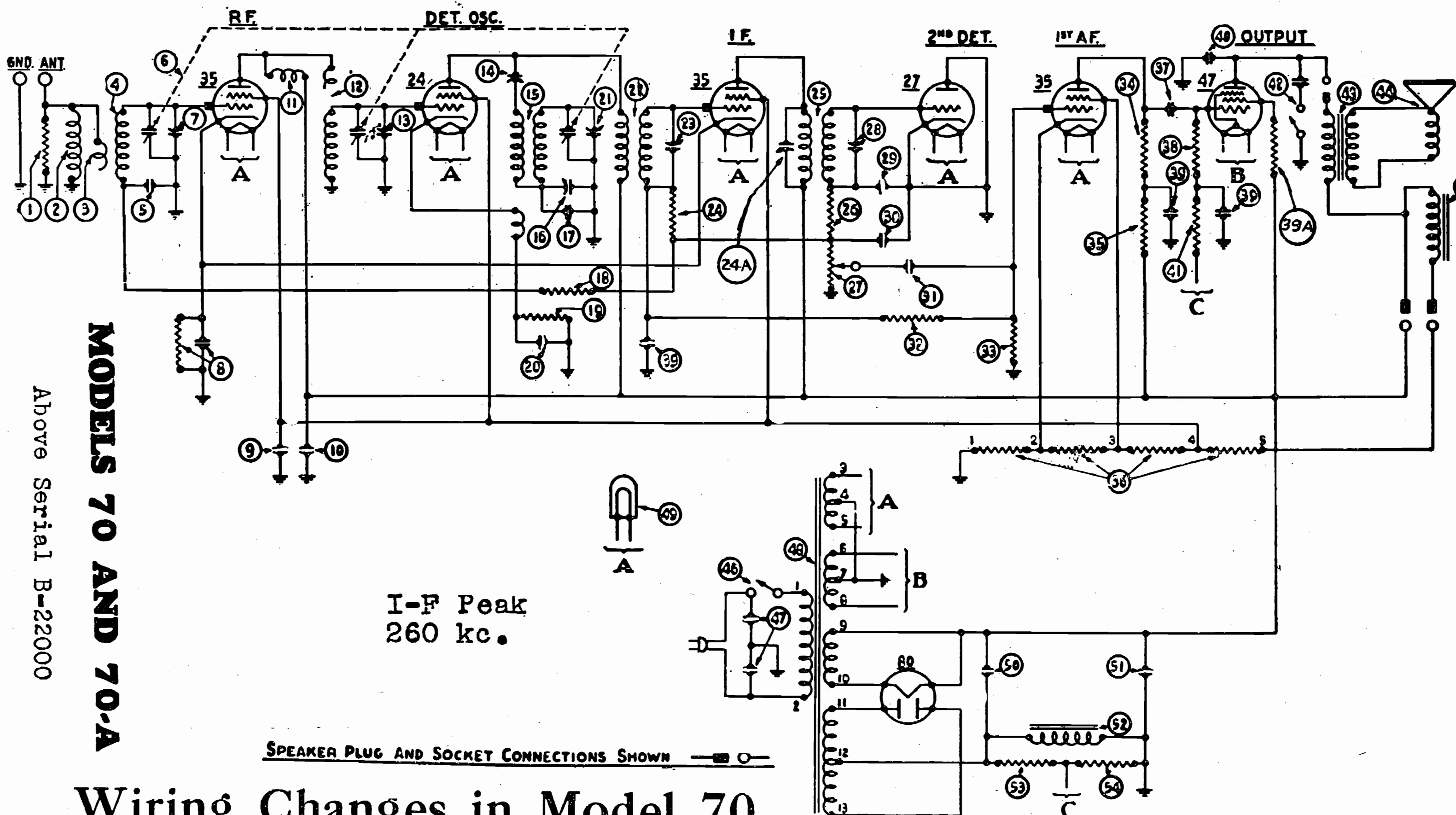


Fig. 4—Schematic Wiring Diagram

No. on Figs.	Description	Part No.	List Price
1	Resistor (Brown-Black-Orange)	4412	.20
2	R.F. Transformer	32-1069	.60
3	Resistor (Red-Black-Green)	5872	.20
4	Tuning Condenser Assembly	04790	4.25
5	Compensating Cond. (R.F.) Part of 4	....	....
6	Condenser	3615-AM	.20
7	"On-Off" and Frequency Switch	42-1002	1.00
9	Condenser (and Resistor)	6287-C	.20
11	Pilot Lamp (Philco Scale)	6608	.14
12	Detector Transformer	32-1070	.40
13	Condenser	3615-AJ	.25
14	Resistor (Brown-Black-Red)	5837	.20
15	Compensating Cond. (Detector) Part of 4	....	....
16	Tuning Meter	6497	2.25
17	Pilot Lamp (Tuning Meter)	6608	.14
18	Compensating Cond. (1st I.F. Primary)	04000-M	.16
19	Oscillator Coil	05985	.40
20	Condenser (White and Yellow)	4520	.20
21	Resistor (Brown-Black-Orange)	4412	.20
22	Comp. Cond. (High Freq.) Part of 4	....	....
23	Compensating Condenser (Low Freq.)	04000-B	.18
24	Resistor (Red-Black-Red)	6984	.20
25	First I.F. Transformer	04319	.75
26	Resistor (Red-Black-Green)	5872	.20
27	Condenser	3903-AE	.14
28	Comp. Cond. (1st I.F. Secondary)	04000-M	.16
29	Filter Condenser Bank	04830	.75
30	Comp. Cond. (2d I.F. Primary)	04000-M	.16
31	Second I.F. Transformer	04320	.75
32	Resistor (White-White-Orange)	4411	.20
33	Volume Control	8054	1.25
34	Comp. Cond. (2nd I.F. Secondary)	04000-M	.16
35	Condenser (Blue and Golden Yellow)	4519	.18
36	Condenser (Blue and Golden Yellow)	4519	.18
37	Condenser	3903-P	.20
38	Resistor (Brown-Black-Green)	4409	.20
39	Resistor (Yellow-White-Yellow)	4517	.20
40	Resistor (Red-Green-Orange)	4516	.20
41	Resistor (Red-Green-Orange)	4516	.20
42	Condenser	3903-P	.20
43	Resistor (Brown-Black-Green)	4409	.20
44	Tone Control	06698	.55
45	Push-Pull Input Transformer	6064	2.25
46	B.C. Resistor (Wire Wound)	6702	.40
46a	B.C. Resist. (Wire Wound) Twin Speaker	6808	.18
47	Condenser	7625-B	.12
47a	Resistor (Red-Green-Orange)	4516	.20
48	Push-Pull Output Trans. (Sing. Speaker)	2585	1.35
	Push-Pull Output Trans. (Twin Speaker)	2565	1.40
49	Voice Coil and Cone Assembly (K-6 and K-12)	02823	.45
49a	Voice Coil and Cone Assembly (H-7) Twin Speaker Model	02807	.65
50	Speaker Field Assembled with Pot (K-6 and K-12)	02803	2.25
50a	Speaker Field Assembled with Pot (H-7) Twin Speaker Model	02803	2.25
51	Resistor (White-White-Orange)	4411	.20
51a	Resistor (White-White-Orange)	4411	.20
52	Condenser Bank	06713	.45
53	Condenser (Double)	3793-E	.20
54	Power Trans. (50-60 cycles) Sing. Speak'r	6554	4.75
	Power Trans. (25-40 cycles) Sing. Speak'r	6555	7.25
	Power Trans. (50-60 cycles) Twin Speak'r	6804	5.50
	Power Trans. (25-40 cycles) Twin Speak'r	6805	7.50
55	Electrolytic Cond. (6 MFD) Sing. Sp'ker	4916	1.75
	Electrolytic Cond. (8 MFD) Twin Sp'ker	7464	1.25
56	Condenser	4989-T	.20
57	Electrolytic Cond. (6 MFD) Sing. Sp'ker	4916	1.75
	Electrolytic Cond. (8 MFD) Twin Sp'ker	7464	1.25
58	Filter Choke	4819	1.40
	Tube Shields	8005	.05
	Knob (Large)	03063	.08
	Knob (Medium)	03064	.06
	Knob (Small)	03437	.02
	Four Prong Socket	5026	.08
	Five Prong Socket	4956	.10
	Six Prong Socket	6417	.10
	Dial, Complete	04832	.40
	Bezel	6418	.20

PHILCO RADIO & TELEVISION CORP.

MODEL 70, 70-A
Above B-22,000
Schematic
Chassis Changes



MODELS 70 AND 70-A

Above Serial B-22000

Wiring Changes in Model 70

(Above Serial No. B-22,000)

The filter condenser (39) Fig. 1 and 2, Service Bulletin No. 57B, part No. 04194 has been changed to part No. 04559. The 1.5 Mfd. section of 04194, connected in the plate filter circuit of the first A.F. tube, is changed to .75 Mfd.; the .05 Mfd. section, connected between resistor (32) and ground, is removed from the 04194 block, and is connected externally as an .05 Mfd. condenser, part 3615L. The new condenser part 04559 still contains the .25 Mfd. section which is wired in the same manner as in 04194. The 25,000 ohm resistor (35), part 4516, is changed to 51,000 ohms, part 4518.

MODEL 70, 70-A
Above B-22,000
Voltage- Values

PHILCO RADIO & TELEVISION CORP.

Model 70 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 70A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with A.C. Set Tester—AC Line—115 volts

Tube		Filament Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
35	R. F.	2.25	250	5	70	6	4.3
24	OSC & 1st Det.	2.25	250	8	12	8	.5
35	I. F.	2.25	250	20	70	0	1.7
27	Rectifier Detector	2.25	...	0	0	0	0
35	Audio Amplifier	2.25	50	0	. 60	0	1.0
47	Output	2.25	240*	4*	255*	.	28*
80	Rectifier	4.70	260/plate	..	....	.	...

*These readings must be taken from the underside of the chassis, using test prods and leads unless the set checker is specially equipped for testing pentode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	Circuit	Color
1–2	105 to 125	Primary	White
3–5	2.5	Filament of 24 and 35's	Black
6–8	2.5	Filament of 47	Dark Green
9–10	5.	Filament of 80	Blue
11–13	700	Plates of 80	Yellow
4		Center Tap of 3–5	Black, Yellow Tracer
7		Center Tap of 6–8	Black, Green Tracer
12		Center Tap of 11–13	Yellow, Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity (mfd.)	Container
29 30	.00011	Blue and Yellow
17	.00041	Yellow and Orange
20	.0007	White and Yellow
5	.003	Orange and White
21 37 40	.01	Black Bakelite
47	.015 (Double)	Black Bakelite
5 10	.05	Black Bakelite
39	.05, .25, 1.5	Metal
8	.09 & 200 Ohms	Black Bakelite
9	.5	Metal
50 51 (50-60 cycles)	6	Electrolytic
51 (25-40 cycles)	10	Electrolytic
50 (25-40 cycles)	14	Electrolytic

Table 4—Resistor Data

Nos. on Figs. 1 and 2	Power (watts)	Resistance (ohms)	Color		
			Body	Tip	Dot
36	Terminals 1-2 2-3 3-4 4-5	26 850 1650 1060	Long Tubular		
2	.5	1,000	Brown	Black	Red
39A	.5	2,900	Red	White	Red
1 19	.5	10,000	Brown	Black	Orange
35	.5	25,000	Red	Green	Orange
53	.5	51,000	Green	Brown	Orange
34	.5	70,000	Violet	Black	Orange
28	.5	99,000	White	White	Orange
41	.5	330,000	Red	Yellow	Yellow
38 54	.5	490,000	Yellow	White	Yellow
33	.5	1,000,000	Brown	Black	Green
18 24	.5	2,000,000	Red	Black	Green
32	.5	4,000,000	Yellow	Black	Green

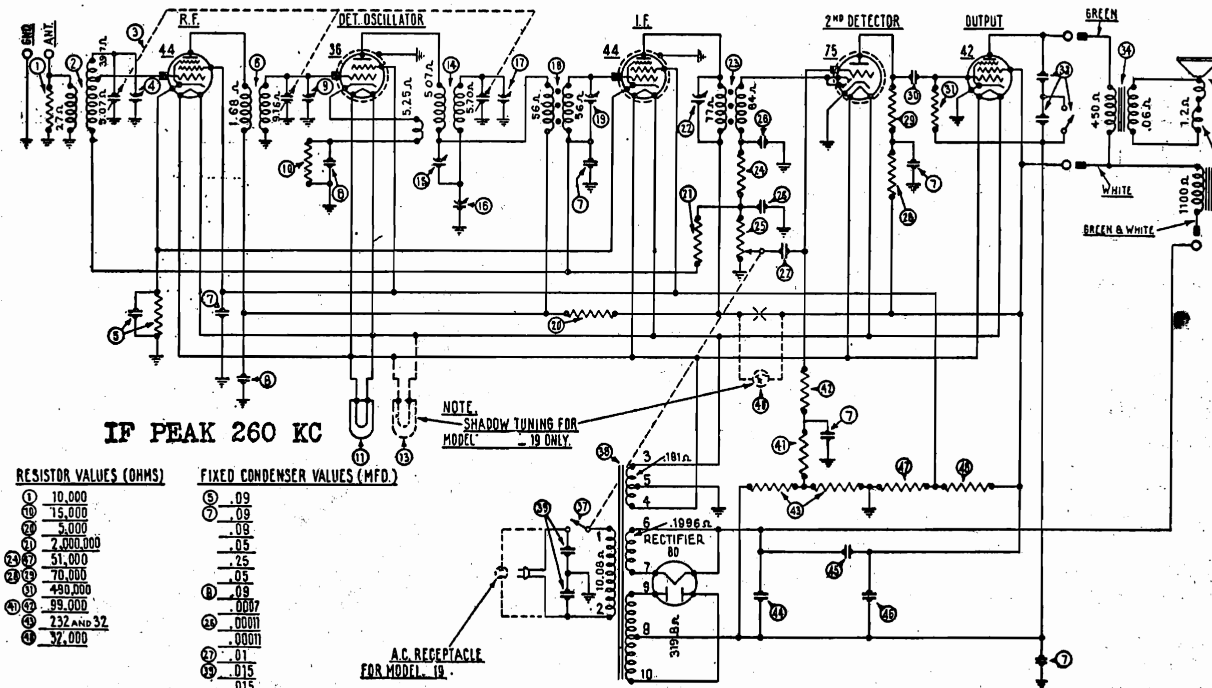
Models 70 and 70-A Receivers

(Above Serial No. B-22,000)

MODEL 89,19
Schematic
Alignment
Changes

PHILCO RADIO & TELEVISION CORP.

Models 89 and 19



RESISTOR VALUES (OHMS)	
1	10,000
10	15,000
20	5,000
21	2,000,000
24 37	51,000
28 29	70,000
31	490,000
41 42	99,000
43	232 AND 32
48	32,000

FIXED CONDENSER VALUES (MFD.)	
5	.09
7	.09
	.09
	.05
	.25
	.05
8	.09
	.0007
26	.00011
	.00011
27	.01
39	.015
	.015
45	.05

Figure 4—Schematic Wiring Diagram

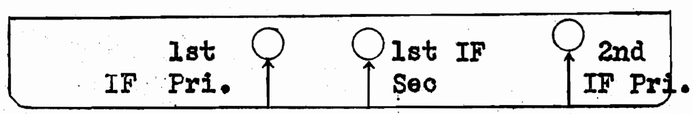


Fig. 3—Back of Model 89 and 19 Chassis, showing location of Compensating Condensers

In run number 5; the antenna coil ② part number 06619 was changed to new coil part number 32-1062. The interstage coil ⑥ part number 06662 was changed to new coil part number 32-1063. The volume control and A. C. switch ㉘ part number 33-5004 was changed to new Volume Control (only) part number 33-5007. A combined "On-Off" and frequency change switch was added, part number 42-1002. The above changes permits the police and airplane broadcast reception.

In run number 2, Model 19-121; run number 3, Model 19-122; a (2900 ohms) resistor, part number 5309 was added. This resistor was connected between ⑧ condenser, lug No. 3 to lug No. 5 on the condenser mounted between ② antenna transformer and the R. F. socket.

The following changes were made in 19-122 to make 19-123 under run No. 1:

The sub base part number 8136 was changed to new sub base part number 29-1051. The tuning condenser assembly part number 06702 was changed to new condenser assembly part number 31-1004. The dial scale 8111 was changed to new dial scale 7882. The A. C. Socket part number 5962 was removed. The bottom shield part number 8057 was removed. The two side brackets part numbers 8133 and 8134 were removed. Four new mounting feet part number 4222 were added. The two electrolytic condensers part number 8095 were changed to part numbers 8165 and 8166.

Below run number 4 on 89-121; run number 1 on 19-121; run number 2 on 19-122, the wiring on the compensating condenser ⑱ was reversed and the fibre nut, part number 7505 was changed to part number 3151 (brass nut); part number W-775 hole cover was added.

Notes for 25 cycle Model 89-A.

Use ㊳ power transformer part number 8047. Change ㊹ electrolytic condenser (6 mfd.) part number 8165 to new condenser (8 mfd.) part number 7558. Change ㊻ electrolytic condenser (6 mfd.) part number 8166 to new condenser (8 mfd.) part number 7558.

PHILCO RADIO & TELEVISION CORP.

MODEL 89,19
Chassis
Socket
Voltage

Models 89 and 19

The Philco Radio of the 89 and 19 Series is a 6 tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The intermediate frequency used in adjusting the superheterodyne circuit is 260 kilocycles. The power consumption of the models 89 and 19 is 60 watts.

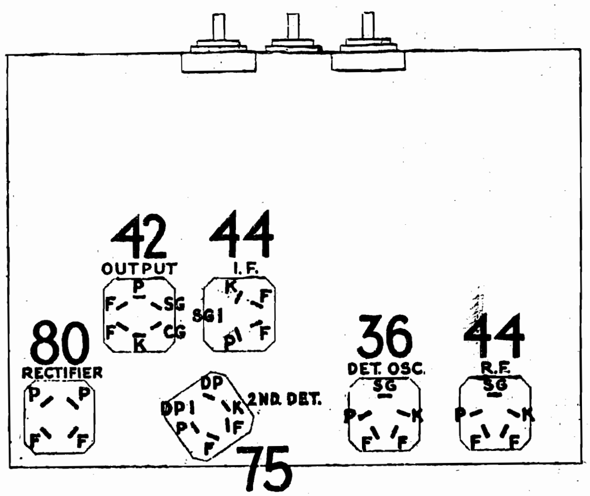
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Circuit	RF	Det. Osc.	IF	2nd Det.	Output	Rectifier
Type Tube	**44**	**36**	**44**	**75**	**42**	**80**
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts—P to K	235	230	240	175	235	350/Plate
Screen Grid Volts—SG to K	90	90	90	.....	245	....
Control Grid Volts—CG to K	.3	7.5	.3	.3	.15	....
Cathode Volts—K to F	3.5	7.8	3.5	.....	14	....
Diode Plate Volts—K to DP	.....	.....	.....	.2	.....	....

*All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1–2	105–125	Primary	White
3–4	6.3	Filaments	Black
6–7	5.0	Filament of 80	Blue
9–10	670	Plates of 80	Yellow
5	....	Center Tap of 3–4	Black-Yellow Tracer
8	....	Center Tap of 9–10	Yellow-Green Tracer



F Filament   SG Screen Grid   K Cathode
P Plate   CG Control Grid   DP Diode Plate

Figure 1—Tube Socket, Under Side of Chassis

Caution: Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

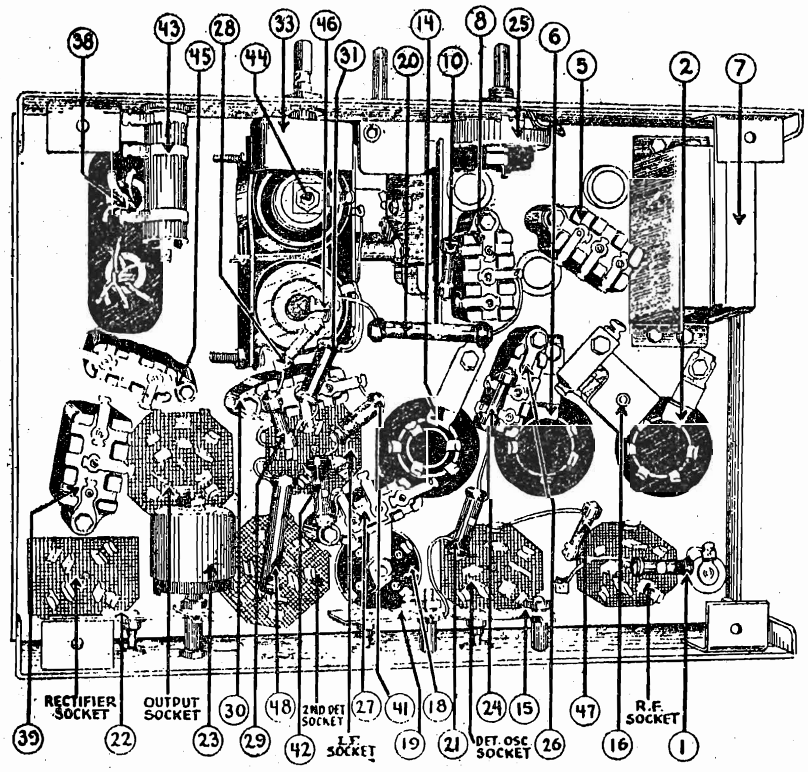


Figure 2—Bottom View of Chassis, Showing Parts

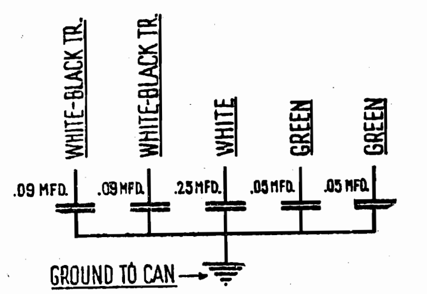


Figure 3—Internal Connections Filter Condenser.

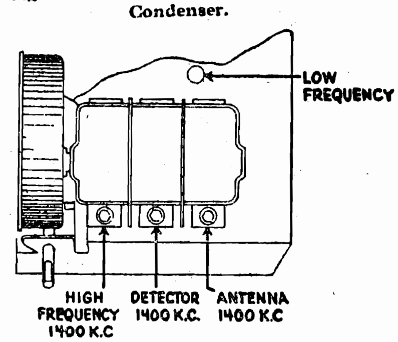
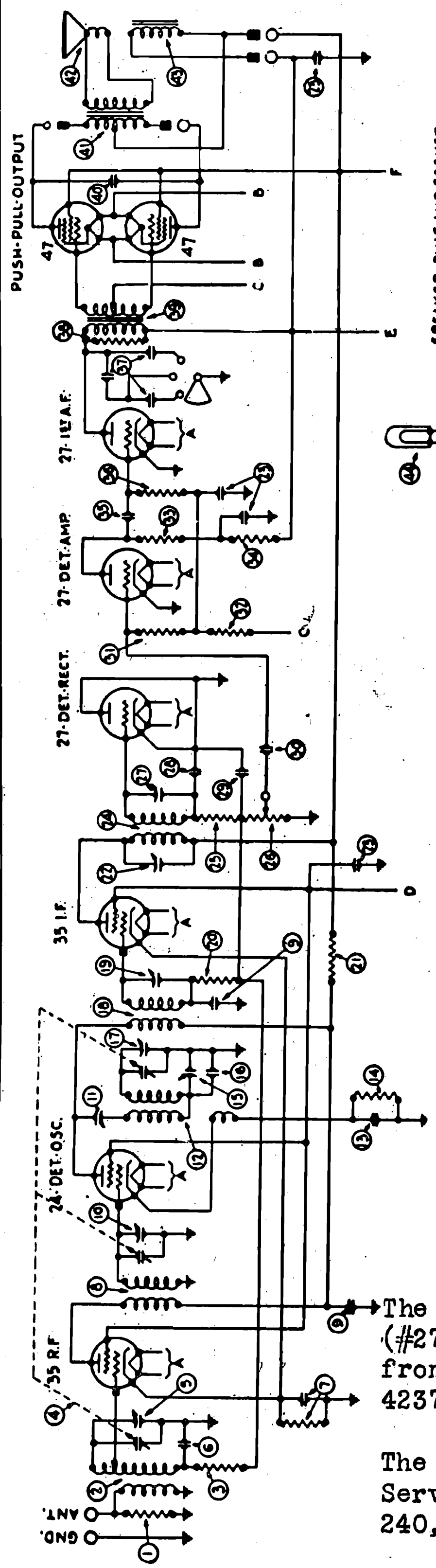
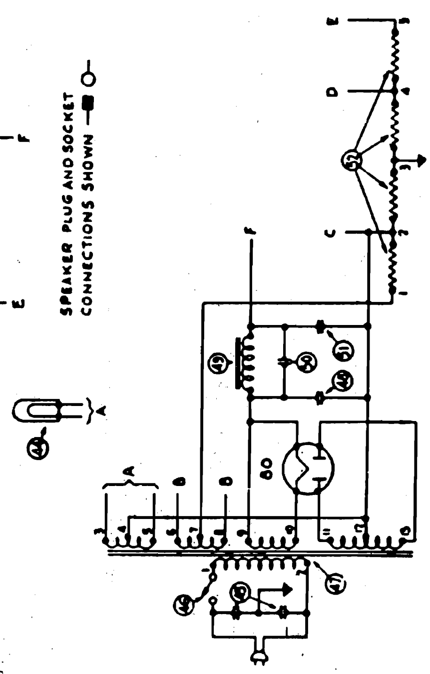


Fig. 4—Top View of Chassis showing Tuning Condensers, Models 89 and 19, also additional Compensating Condensers

MODEL 90, 90-A
(With 2-'47s)
Schematic
Changes

PHILCO RADIO & TELEVISION CORP.





PHILCO MODEL 90

Serial Nos. B-32001 to B-35000
and above B-53100

**I-F Peak
260 kc.**

New Speaker in Model 90

Attention is called to the fact that the speakers for the new Model 90 (serial nos. B-32001 to B-35,000 and above B-53,100) are not interchangeable with the speakers for the earlier Model 90 with the single pentode output tube. This is due to the fact that the output transformers are different. Part 2635 output transformer is required for the models with push pull pentode output tubes and part 2673 is required for the models with the single pentode output.

CHANGES IN MODEL 90-A (above serial No. 112,977) 25 cycle

The plate filter resistor of the last 27 tube (#27 in Service Bulletin No. 85) has been changed from 25,000 ohms, part 3656, to 51,000 ohms, part 4237.

The grid coupling resistor of the 47 tube (#29, in Service Bulletin No. 85) has been changed from 240,000 ohms, part 4410, to 99,000 ohms, part 4411.

The grid filter resistor for the last 27 and the 47 tubes (#51, in Service Bulletin No. 85) has been changed from 240,000 ohms, part 3768, to 490,000 ohms, part 3769.

MODEL 90,90-A
(With 2-'47s)
Voltage - Data

PHILCO RADIO & TELEVISION CORP.

Model 90 receivers are for operation on 100 to 130 volt, 50-60 cycle AC lines. This receiver is a nine tube superheterodyne with push-pull pentode output. Automatic volume control, 4 point tone control, super control screen grid tubes and combination first detector and oscillator tube are some of the additional features. The maximum power consumption is 100 watts.

Table 1—Tube Socket Readings Taken with A.C. Set Tester—A.C. Line 115 Volts

Tube Type	Tube Circuit	Filament Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Plate Milli-Amperes
35	R.F.	2.5	225	0	38	6	4.2
24	Det.-Osc.	2.5	215	12	40	22	.5
35	I.F.	2.5	235	10	38	10	1.0
27	Det. Rectifier	2.5	...	...	..	10	..
27	Det. Amplifier	2.5	50	0	...	1.	1.0
27	1st Audio	2.5	90	0	...	1	5.0
47	Output	2.5	210	10	225		31.
47	Output	2.5	210	10	225	...	31.
80	Rectifier	5.0	225/plate	...	...	..	....

Above readings taken with volume control at maximum and dial turned to low frequency end

Table 2—Power Transformer Voltages

Terminals Figs. 1 and 2	A.C. Volts	Circuit	Color
1–2	115	Primary	White
4	...	Center Tap Heater	Black, Yellow Tracer
3–5	2.5	Heater	Black
6–8	2.5	Filament 47's	Dark Green
7	...	Center Tap Filament 47's	Black, Green Tracer
9–10	5.0	Filament 80	Light Blue
11–13	665	Plates 80	Yellow
12	...	Center Tap Plates 80	Yellow, Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity (Mfd.)	Container
28 29	.00011	Blue and Golden Yellow
16	.00041	Yellow and Orange
13	.0007	White and Golden Yellow
40	.001	Green and White
30 35	.01	Black Bakelite
45	.015	Black Bakelite
6	.05	Black Bakelite
9	.09	Black Bakelite
7	.09 & 200 Ohms	Black Bakelite
50	.15	Black Bakelite
23	2-.25, 2-.5	Metal
46	6.	Electrolytic
51	6.	Electrolytic

Table 4—Resistor Data

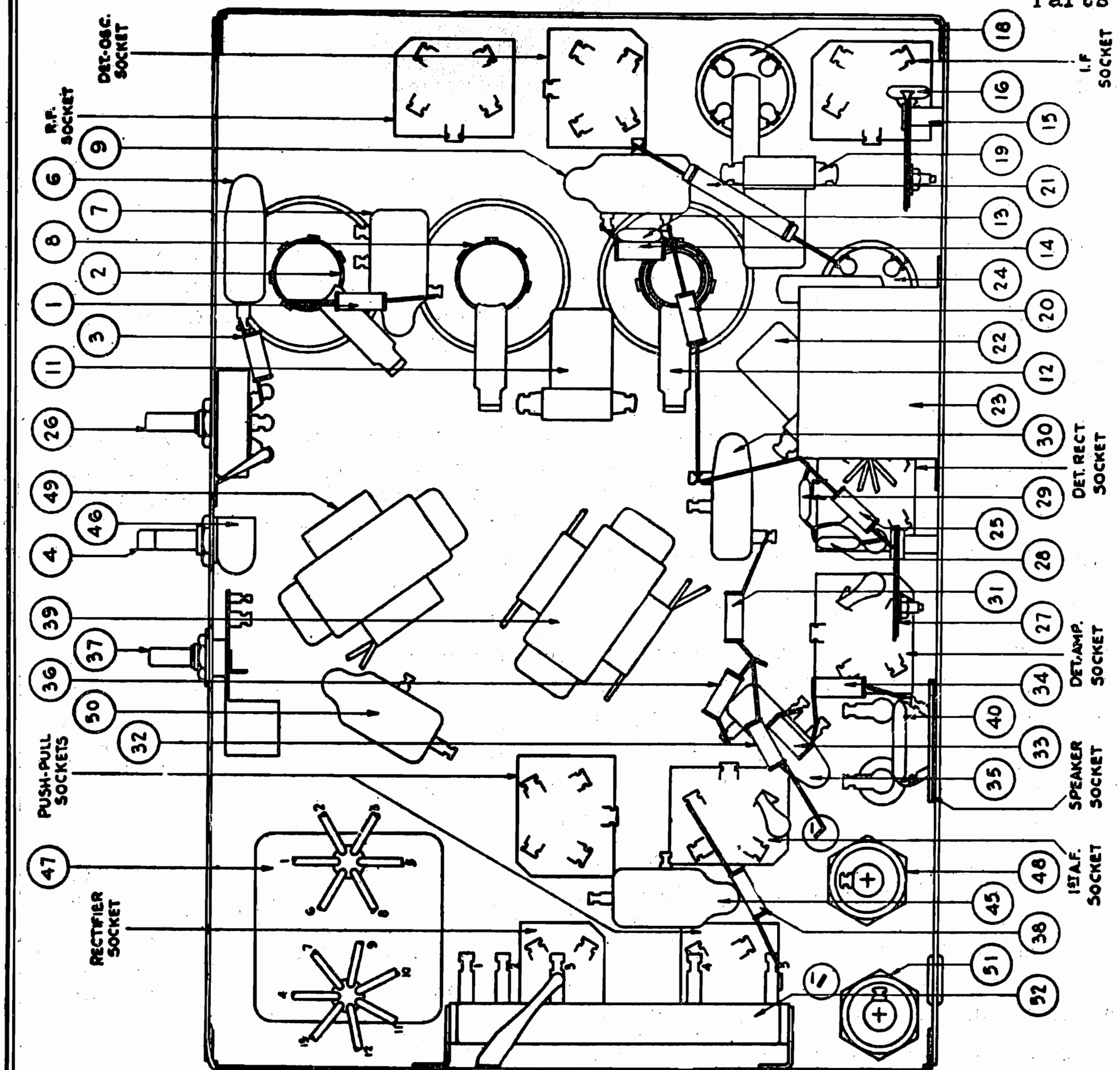
Nos. on Figs. 1 and 2	Power (Watts)	Resistance (Ohms)	Color Body	Color Tip	Color Dot
52	(Terminals)				
	1–2	205			
	2–3	95	Long	Tubular	
	3–4	2,400			
	4–5	1,200			
21	1.	1,000	Brown	Black	Red
1	.5	10,000	Brown	Black	Orange
14	.5	15,000	Brown	Green	Orange
33 34	.5	25,000	Red	Green	Orange
38	.5	51,000	Green	Brown	Orange
25	.5	99,000	White	White	Orange
32	.5	490,000	Yellow	White	Yellow
3 20 31 36	.5	1,000,000	Brown	Black	Green

Model 90

(Serial Nos. B-32,001 to B-35,000 and Above B-53,100)

PHILCO RADIO & TELEVISION CORP.

MODEL 90, 90-A
(With 2-'47s)
Chassis
Parts List



PHILCO MODEL 90

Serial Nos. B-32001 to B-35000
and above B-53100

No. on Figs. 1 and 2	Description	Part No.
1	Resistor (10,000 Ohms)	4412
2	Antenna Transformer	04317
3	Resistor (1,000,000 Ohms)	4409
4	Tuning Condenser (50–60 cycles)	04309
	Tuning Condenser (25–40 cycles)	04310
5	Compensating Condenser — Antenna — Part of Tuning Condenser Assembly	
6	Condenser (.05 Mfd.)	3615-L
7	Condenser (.09 Mfd. and 200 Ohm Resistor)	4989-L
8	Detector Transformer	04408
9	Condenser (.09 Mfd.)	3615-AJ
10	Compensating Condenser — Detector — Part of Tuning Condenser Assembly	
11	Compensating Condenser—Coupling	04000-M
12	Oscillator Coil	04409
13	Condenser (700 Mmf.)	4520
14	Resistor (15,000 Ohms)	6208
15	Compensating Condenser—Low Frequency	04000-B
16	Condenser (410 Mfd.)	5120
17	Compensating Condenser — High Frequency—Part of Tuning Condenser Assembly	
18	First I.F. Transformer	04319
19	Compensating Condenser—First I.F.	04000-M
20	Resistor (1,000,000 Ohms)	4409
21	Resistor (1,000 Ohms)	4590
22	Compensating Condenser—Second I.F Primary	04000-M
23	Condenser (2-.25, 2-.5 Mfd.)	04407
24	Second I.F. Transformer	04320
25	Resistor (99,000 Ohms)	4411
26	Volume Control	6015
27	Compensating Condenser (Second I.F. Secondary)	04000-M
28	Condenser (110 Mmf.)	4519
29	Condenser (110 Mmf.)	4519
30	Condenser (.01 Mfd.)	3903-N
31	Resistor (1,000,000 Ohms)	4517
32	Resistor (490,000 Ohms)	4516
33	Resistor (25,000 Ohms)	4409
34	Resistor (25,000 Ohms)	4409
35	Condenser (.01 Mfd.)	3903-X
36	Resistor (1,000,000 Ohms)	4409
37	Tone Control	03137
38	Resistor (51,000 Ohms)	4518
39	Push-Pull Input Transformer	6064

Shadow Tuning Adjustment

PHILCO RADIO & TELEVISION CORP.

Adjustment of Shadow Tuning

Philco shadow tuning is one of the greatest aides to correct tuning ever developed so it is important that this device be properly adjusted on each set before being placed in operation. There are no adjustments inside the shadow box, but there are a few simple adjustments of the position of the box and the position of the pilot lamp.

INSTALLATION

The shadow tuning box is purposely moved back away from the bezel during shipment so as to avoid breakage. When the set is placed in operation, and after the chassis mounting bolts have been loosened, the two mounting screws at each side of the shadow box should be loosened by means of a short screwdriver, and the box moved forward to the bezel. The position of the box can be adjusted so that the shadow is centered with respect to the bezel opening.

POSITION ADJUSTMENTS

In some cases, it may be found that the position or the intensity of the shadow on the screen is not entirely satisfactory because of slight changes during shipment. The necessary re-adjustments can be made in the manner outlined below, first turning on the radio and removing the type 80 tube.

1. **Shadow too faint.** Move and focus lamp by bending the bracket slightly to obtain a sharp shadow of the smallest possible width exactly in the center of the screen.

2. **Shadow not centered on screen.** Move and focus lamp as described above.

3. **Shadow not sharp on one side.** Pry off the lamp reflector and adjust the lamp position by turning lamp and socket in a clockwise direction until the filament supports are parallel to the back of the shadow tuning box. Ordinary pilot lamps with inverted U shaped filament will not be satisfactory since they do not produce a concentrated light and a sharply defined shadow. The new Philco pilot lamps have a relatively straight filament which gives better light concentration. It may be necessary to make a further adjustment by bending the bracket as described in 1. above.

4. **No light on screen.** Adjust reflector on pilot lamp.

5. **White light between screen and bezel opening.** Loosen shadow tuning box mounting screws, and move box forward against back of bezel. Center shadow properly with respect to bezel opening.

Replace the 80 tube after completing the above adjustments.

RADIO ADJUSTMENTS

After the above adjustments have been made, the shadow tuning box may be checked for operation by tuning in a number of stations. The following suggestions are offered in case of difficulties:

1. **No change in shadow width when tuning in weak signal.** Change first detector and first I. F. tubes in Model 15 and R. F. and I. F. tubes in Models 91 and 23.

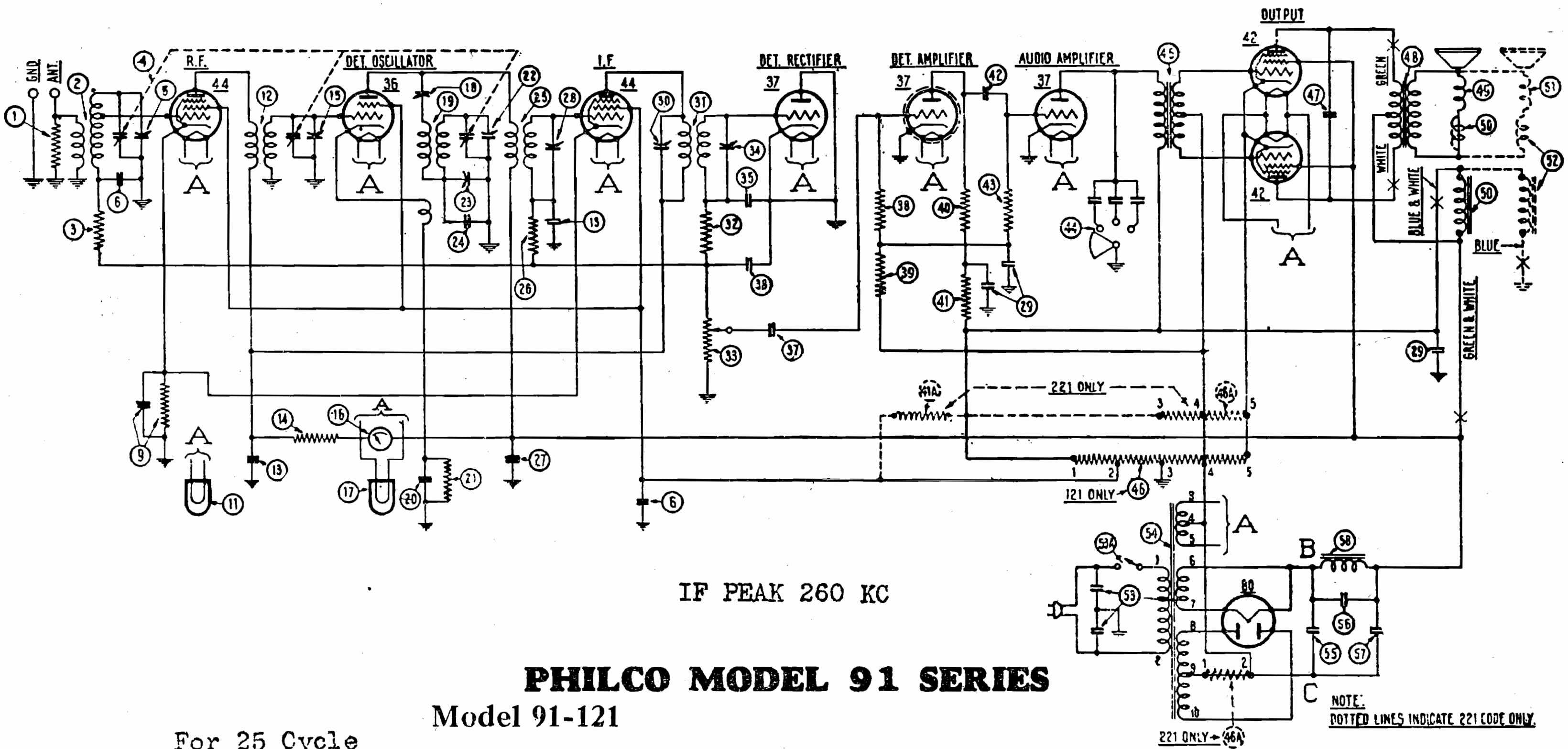
2. **Insufficient change in shadow width on all stations.** Look for faulty aerial connection or too small aerial.

3. **Shadow remains at minimum width while dial is turned several divisions.** Compensating condensers out of adjustment, causing set to be broad in tuning; station signal extremely broad

DO NOT ATTEMPT TO MAKE ANY ADJUSTMENTS INSIDE THE SHADOW BOX.

MODEL 91 (121-221) Schematic Changes

PHILCO RADIO & TELEVISION CORP.



IF PEAK 260 KC

PHILCO MODEL 91 SERIES

Model 91-121

For 25 Cycle

use 51 power transformer 6555. Change 55 electrolytic condenser (6 Mfd.) 4916 to 10 Mfd., 5142. Change 57 electrolytic condenser 4916 to 14 Mfd. 5725. Change 56 condenser (.18 Mfd.) 4989K to .5 Mfd., 05150. Change 40 resistor (25,000 ohms) 4516 to 51,000 Ohms, 4518. The physical positions of 55 and 57 are interchanged, although their electrical connections remain the same.

Model 91-221

For 25 Cycle

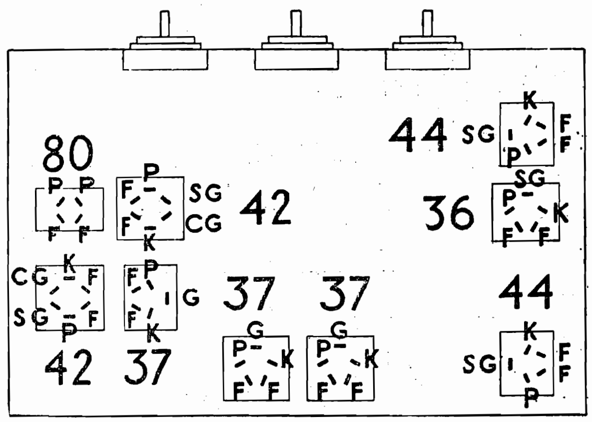
use 54 power transformer 6805. Change 46A B. C. Resistor 6807 to 6808. Change 55 electrolytic condenser (8 Mfd.) 6707 to 10 Mfd. 5142. Change 57 electrolytic condenser (8 Mfd.) 6706 to 14 Mfd. 5725. Change 40 resistor (25,000 ohms) 4516 to 51,000 ohms, part 4518. Change 58 condenser (.18 Mfd.) 4989K to .5 Mfd. and .75 Mfd. 05213. The .5 Mfd. section takes the place of 4989K and the 75 section (white wire) is connected to the blue and white lead of the speaker cord. The physical positions of 55 and 57 are interchanged, although their electrical connections remain the same.

MODEL 91
(121-221)
Socket-Data

PHILCO RADIO & TELEVISION CORP.

The Philco Radio of the 91 series is a nine tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control, shadow tuning, and push-pull pentode output. The chassis is made in two different types, one known as the 121 type, employing a single dynamic speaker and the other known as the 221 type, employing twin dynamic speakers. These type numbers appear on the radio chassis as a part of the model number. Chassis of one type are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 91 series is 260 kilocycles. The power consumption of the various models is as follows:

Model	Volts	Cycles	Watts
91-121	115	50-60	90
91-221	115	50-60	95
91A-121	115	25-40	92
91A-221	115	25-40	97
91E-121	230	50-60	90
91E-221	230	50-60	95



F = Filament
P = Plate
SG = Screen Grid
CG = Control Grid
K = Cathode

Fig. 1—Tube Sockets

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts
44	R.F.	6.3	200	50	.6	25
36	Det.—Osc.	6.3	250	80	10	10
44	I.F.	6.3	250	85	.2	5
37	Det.—Rect.	6.3	0	...	.2	2
37	Det.—Ampl.	6.3	60	...	.2	2
37	Audio	6.3	100	...	0	2
42	Output	6.3	240	250	15	15
42	Output	6.3	240	250	15	15
80	Rectifier	5.0	310/Plate	...	...	..

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament 80	Blue
8-10	670	Plates of 80	Yellow
4	...	Center Tap of 3-5	Black Yellow Tracer
9	...	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

Nos. on Figs. 4 & 5	Resistance (ohms)	Power (Watts)	Terminals	Color Body	Color Tip	Color Dot
46 Single Speaker	900	..	1-2	LONG	TUB	ULAR
	2700	..	2-3			
	95	..	3-4			
	205	..	4-5			
46a Twin Speaker	136	..	1-2	LONG	TUB	ULAR
	Blank	..	2-3			
	85	..	3-4			
	205	..	4-5			
14	1,000	.5	....	Brown	Black	Red
1	10,000	.5	....	Brown	Black	Orange
21	15,000	.5	....	Brown	Green	Orange
40 41	25,000	.5	....	Red	Green	Orange
41a	13,000	1.	....	Brown	Orange	Orange
32	99,000	.5	....	White	White	Orange
39	490,000	.5	....	Yellow	White	Yellow
43 3 38	1,000,000	.5	....	Brown	Black	Green
26	1,000,000	1.	....	Brown	Black	Green

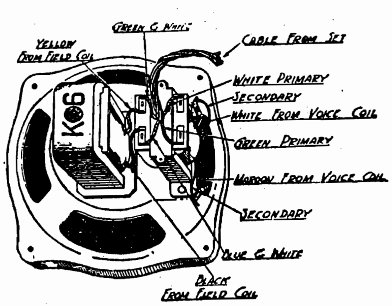


Fig. 2—Speaker Connections—121 Code

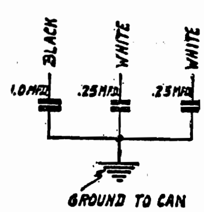


Fig. 3—Internal Connections Filter Condenser

Model 91 Series

PHILCO RADIO & TELEVISION CORP.

MODEL 91
(121-221)
Chassis
Speaker

PHILCO MODEL 91 SERIES

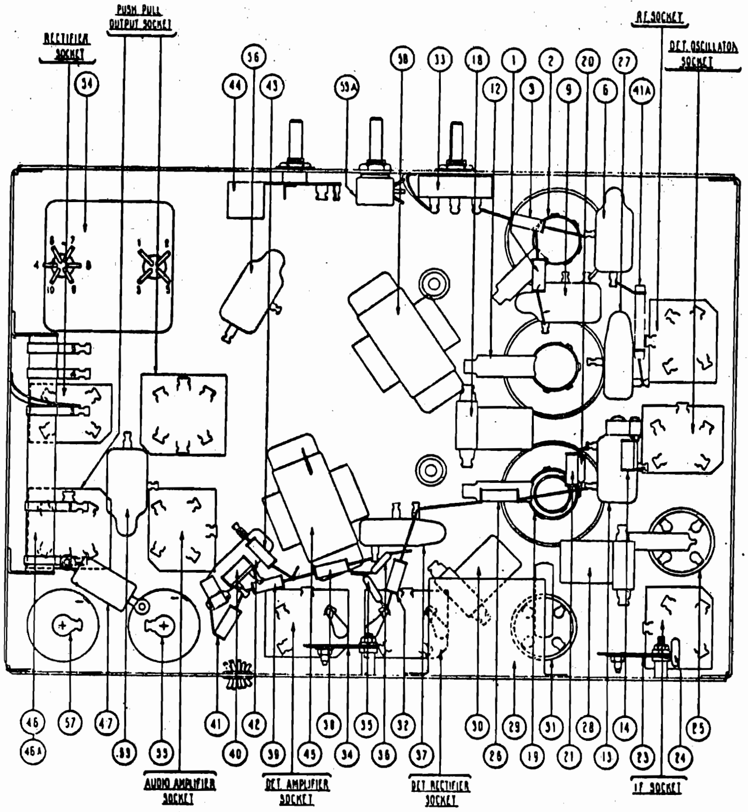


Fig. 5—Parts Diagram

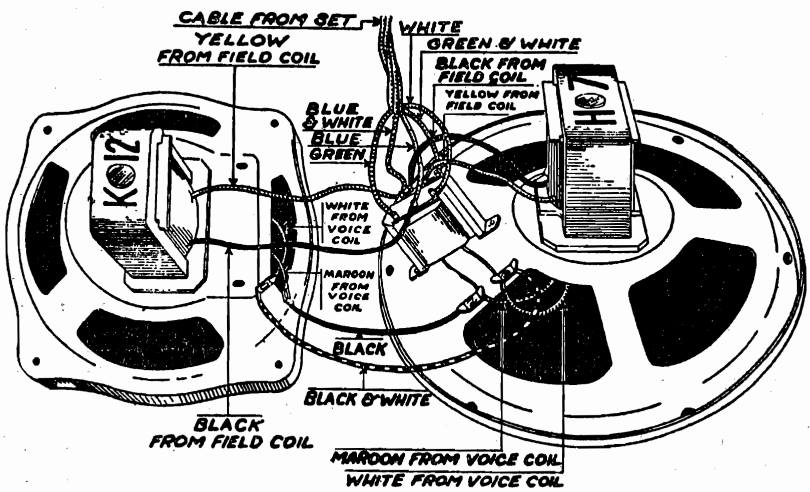


Fig. 6—Speaker Connections—221 Code

Model 91 chassis with pickup and turntable is chassis 23-X shown on page 466-Z-8

ADJUSTMENT OF MODEL 91 SERIES

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to re-adjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your distributor. The Philco Model 095 Oscillator has been especially designed for this work, and will be found the most inexpensive and most reliable for the purpose.

MODEL 91
(121-221)
Parts List

PHILCO RADIO & TELEVISION CORP.

REPLACEMENT PARTS FOR MODEL 91 SERIES

No.	Part	Part No.
1	Resistor (10,000 ohms)	4412
2	R. F. Transformer	04317
3	Resistor (1,000,000 ohms)	4409
4	Tuning Condenser (50-60 cycles)	04790
	Tuning Condenser (25-40 cycles)	04791
5	Compensating Condenser—R. F.—part of tuning condenser assembly	
6	Condenser (.05 Mfd. Double)	3615-AM
9	Condenser (.15 Mfd. and 200 ohm resistor)	6287-C
11	Pilot Lamp—Dial	6608
12	Detector Transformer	04409
13	Condenser (.05 Mfd. Double)	3615-AJ
14	Resistor (1,000 ohms)	5837
15	Compensating Condenser—Detector—Part of tuning condenser assembly	
16	Tuning meter	6477
17	Pilot Lamp—Tuning meter	6608
18	Compensating condenser—First I. F. Primary	04000-M
19	Oscillator Coil	04408
20	Condenser (700 Mmf.) (White and Yellow)	4520
21	Resistor (15,000 ohms)	6208
22	Compensating Condenser—High — Frequency — part of tuning Condenser Assembly	
23	Compensating Condenser—Low Frequency	04496
24	Condenser (410 Mmf.) (Yellow and Orange) Assembled with L. F. Condenser	04496
25	First I. F. Transformer	04319
26	Resistor (1,000,000 ohms)	4414
27	Condenser (.01 Mfd.) Single Speaker	3903-AF
	Condenser (.01 Mfd.) Twin Speaker	3903-AE
28	Compensating condenser—First I. F. secondary	04000-M
29	Filter condenser (2-.25, 1.0 Mfd.)	04830
30	Compensating Condenser—Second I. F. Primary	04000-M
31	Second I. F. Transformer	04320
32	Resistor (99,000 ohms)	4411
33	Volume Control	6499
34	Compensating Condenser—Second I. F. Secondary	04000-M
35	Condenser (110 Mmf.) (Blue and Golden Yellow)	4519
36	Condenser (110 Mmf.) (Blue and Golden Yellow)	4519
37	Condenser (.01 Mfd.)	3903-R
38	Resistor (1,000,000 ohms)	4409
39	Resistor (490,000 ohms)	4517
40	Resistor (25,000 ohms)	4516
41	Resistor (25,000 ohms)	4516
41a	Resistor (13,000 ohms)	3766
42	Condenser (.01 Mfd.)	3903-R
43	Resistor (1,000,000 ohms)	4409
44	Tone Control	04787
45	Push-pull Input Transformer	6064
46	B. C. Resistor—Single Speaker	6071
46a	B. C. Resistor—Twin Speaker	6807
47	Condenser (.001 Mfd.)	6773
48	Push-pull output transformer—single speaker Models	2585
	Push-pull output transformer—Twin speaker Models	2565
49	Voice coil and cone assembly (K-6 and K-12)	02823
50	Speaker Field Assembled with pot (K-6) single speaker Models	02803
	Speaker Field Assembled with pot (H-7) Twin speaker Models	02770
51	Voice Coil and Cone Assembly—(H-7) Twin speaker Models	02807
52	Speaker Field assembled with pot (K-12) Twin speaker Models	02803
53	Condenser (.015 Mfd. Double)	3793-E
53a	On-off Switch	6498
54	Power Transformer (50 - 60 cycles) single speaker	6554
	Power Transformer (25 - 40 cycles) single speaker	6555
	Power Transformer (50 - 60 cycles — 230 volts) single speaker	6556
	Power Transformer (50 - 60 cycles) Twin speaker	6557
	Power Transformer (25 - 40 cycles) Twin speaker	6558
	Power Transformer (50 - 60 cycles — 230 volts) Twin speaker	6559
55	Electrolytic Condenser (6 Mfd.) single speaker	4916
	Electrolytic Condenser (8 Mfd.) Twin speaker	6707
56	Condenser (.18 Mfd.)	4989-K
57	Electrolytic Condenser (6 Mfd.) Single Speaker	4916
	Electrolytic Condenser (8 Mfd.) Twin Speaker	6706
58	Filter Choke	4819
	Tube Shield (Large)	04792
	Tube Shield (Small)	5387
	Shield Plate	03646
	Knob (Large)	03063
	Knob (Medium)	03064
	Knob (Small)	03437
	Knob Spring (Large)	5262
	Knob Spring (Small)	4147

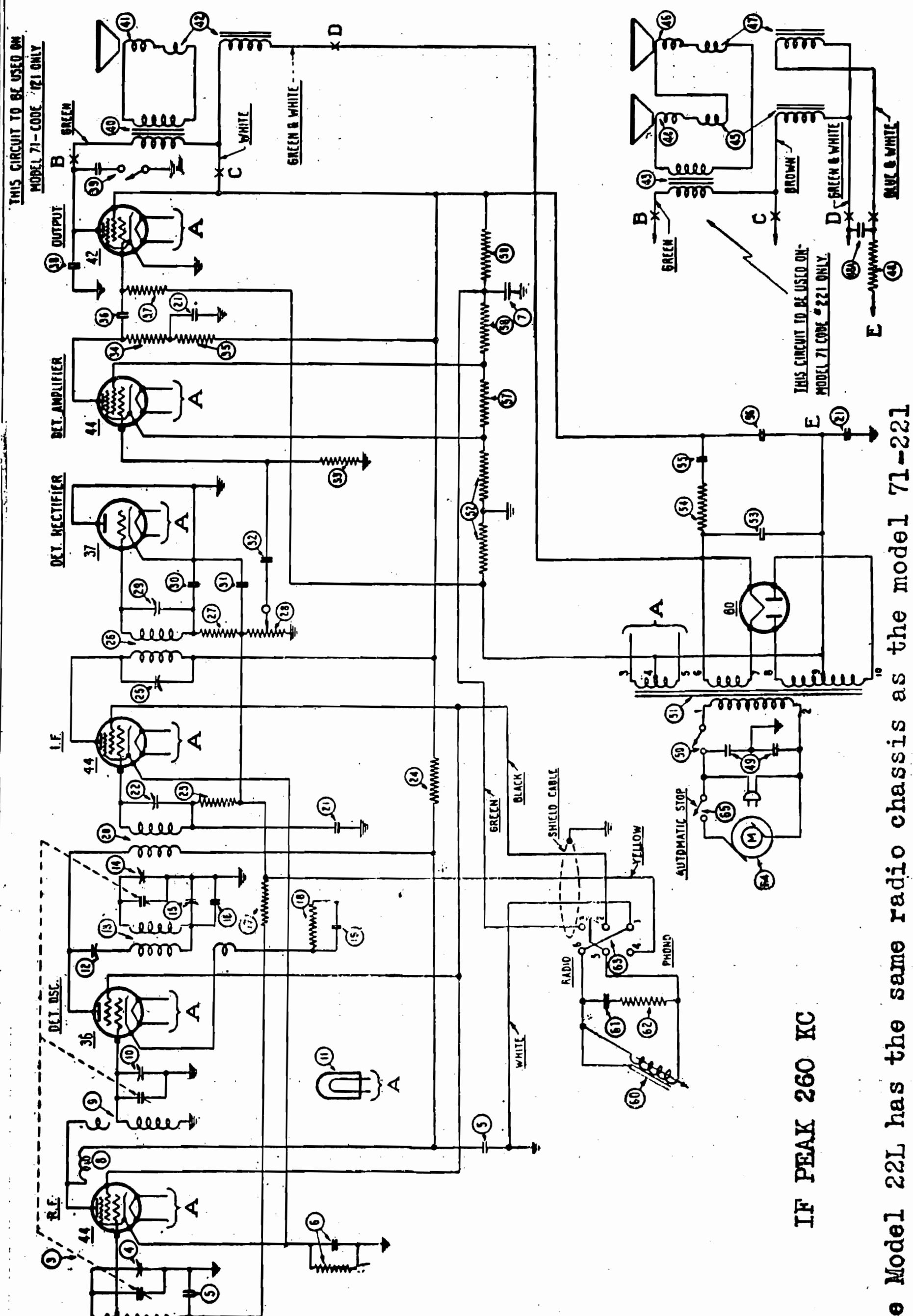
PHILCO RADIO & TELEVISION CORP.

MODEL 22-L
Schematic Changes

Below run No. 4, unsolder top (ungrounded) connection of volume control (28) and substitute in the circuit a 240,000 ohm resistor, part 4410, one end grounded. Disconnect the condenser (32) .01 Mfd., part 3903-J, from the center tap of the volume control and from its common connection with the control grid of the detector amplifier tube and the ungrounded end of (33) resistor 1,000,000 ohms 4409. This resistor is no longer used, and can be removed.

Solder one side of the condenser (32) to top of volume control and other side of condenser to ungrounded end 240,000 ohm resistor. Solder the control grid lead of the detector amplifier tube to the variable arm connection of the volume control tube.

(48) A Condenser .25 Mfd. part 04997, change to .5 Mfd. part 05150.
(35) Resistor 25,000 ohms 4516 used on both 121 an l 221 models.
Dial complete, part 03031, change to part 04832.



(61)Condenser (.015 Mfd.) 3793-G
(62)Resistor (10,000 Ohms) 4412
(63)Radio-phono Switch 04689

The Model 22L has the same radio chassis as the model 71-221 except for the additional wiring of the phonograph equipment.

All information applying to the 71-221, likewise applies to the Model 22L.

The motor is the self starting synchronous type, depending upon correct power line frequency (cycles) for correct speed. A motor for one frequency will not operate at correct speed on any other frequency. Do not attempt to do repair work on the motor. Should this part become defective, replace it with a new one, and return to the factory.

The motor should be lubricated at least once every six months. It is only necessary to remove the turntable, and place light machine oil in the oil hole on the motor top plate.

PHILCO RADIO & TELEVISION CORP.

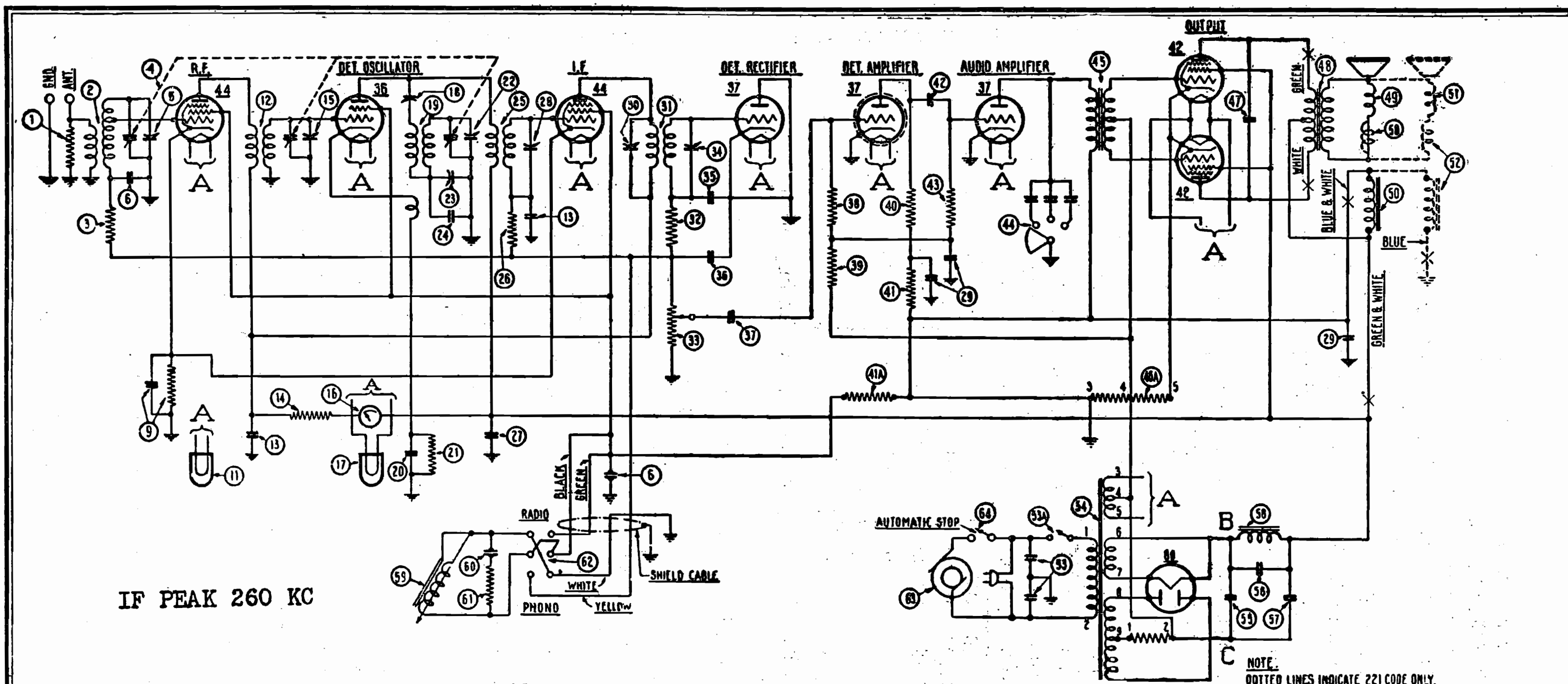
PHILCO RADIO CHASSIS DATA

MODEL		TUBES 27	24	35	47	45	80	14	17	32	33	30	2	3	71A	SPEAKER Type	Cone Assembly	Field Assembly	Output Transformer	VOLUME CONTROL Part No.	Resistance (Ohms)	TONE CONTROL Part No.	2 Point	4 Point	Capacity (Mfd.)
Early Models	70 B.G.	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	✓		2-.01
	70 H.B.	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	✓		2-.01
	270	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	✓		2-.01
	370	1	4		1		1									K-3	02996	02987	2673	5056	5000 & 210	03168	✓		2-.01
	470	2	5		1		1									K-4	02996	02987	2673	5039	5000 & 210	03140	✓		2-.01
	570	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	✓		2-.01
Automatic Volume Control	70 B.G.	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	✓		.01
	70 H.B.	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	✓		.01
	270	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	✓		.01
	370	1	1	3	1		1									K-3	02996	02987	2673	6307	1,000,000	04652	✓		.01
	470	2	2	3	1		1									K-4	02996	02987	2673	6015	1,000,000	03637	✓		.01
	570	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	✓		.01
Push Pull 45's	90 B.G.	2	4			2	1									K-2	02996	02987	2766	5039	5000 & 210	03137		✓	.015, 2-.01
	90 L.B.	2	4			2	1									H-2	02874	02988	2766	5039	5000 & 210	03137		✓	.015, 2-.01
	90 H.B.	2	4			2	1									H-2	02874	02988	2766	5039	5000 & 210	03137		✓	.015, 2-.01
Single Pentode	90 B.G.	4	3		1		1									K-3	02996	02987	2673	5724	500,000	03137		✓	.015, 2-.01
	90 L.B.	4	3		1		1									H-3	02874	02988	2673	5724	500,000	03137		✓	.015, 2-.01
	90 H.B.	4	3		1		1									H-3	02874	02988	2673	5724	500,000	03137		✓	.015, 2-.01
	490	5	4		1		1									K-4	02996	02987	2673	5724	500,000	03137		✓	.015, 2-.01
Push Pull Pentode	90 B.G.	3	1	2	2		1									K-5	02996	02987	2635	6015	1,000,000	03137		✓	.015, 2-.01
	90X	3	1	2	2		1									H-6	02874	02988	2635	6015	1,000,000	03137		✓	.015, 2-.01
	490	4	2	2	2		1									K-8	02996	02987	2635	6015	1,000,000	03137		✓	.015, 2-.01
Push Pull 45's	112	4	4			2	1									H-2	02874	02988	2766	4093	500,000	03137		✓	.015, 2-.01
	212	4	4			2	1									H-2	02874	02988	2766	4093	500,000	03137		✓	.015, 2-.01
Push Pull Pentodes	112	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		✓	.015, 2-.01
	112X	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		✓	.015, 2-.01
	212	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		✓	.015, 2-.01
	50 B.G.		3		1		1									P-2	02861*	02942	2660	5232	1750				
	50 L.B.		3		1		1									S-2	02887**	02942	2660	5232	1750				
	51 B.G.		2	1	1		1									P-2	02861	02942	2660	5839	5000				
	51 L.B.		2	1	1		1									S-2	02887	02942	2660	5839	5000				
	551		2	1	1		1									P-2	02861*	02942	2660	5839	5000				
	4	1	1				1																		
	46 B.G.							3	1				1	1 (E)	2	N-2	02996	02924	2766	4141	1750				
	46 H.B.							3	1				1	1 (E)	2	N-2	02996	02924	2766	4141	1750				
	35 B.G.									3	1	3				R-2	02887**		2646	5317	5000 (Dual)	03637	✓		.01
	35 H.B.									3	1	3				R-2	02887**		2646	5317	5000 (Dual)	03637	✓		.01

*Used with spacer washer 3316 and mounting screw W-161 when replacing cone assembly 02970.
**Used with spacer washer 2616 and mounting screw W-161 when replacing cone assembly 02949.

MODEL 23-X
Schematic
Changes

PHILCO RADIO & TELEVISION CORP.



IF PEAK 260 KC

Below run No. 5-91-121-221 and run No. 4 Model 23X change (8) resistor 1,000,000 ohms to 2,000,000 ohms, part 5872. Change (26) resistor 1,000,000 ohms to 2,000,000 ohms, part 5872.

Below run No. 4-91-121-221, run No. 3 Model 23-X, add a 490,000 ohm resistor, part 4517, across the two outside terminals of the volume control.

Below run No. 3-91-121-221, run No. 2 Model 23 X change (47) condenser .001 Mfd. part 6773 to .002 Mfd., part 6853.

Model 23X and 91-221 have the same chassis, except for the additional wiring required for the phono pickup. Service data for Model 91-221 applies to 23X

(60)	Electric Pickup	6823
(61)	Condenser (.015 Mfd.)	3793-C
(62)	Resistor 10,000 ohms	4412
(63)	Radio-phonograph switch	04589
(64)	Motor (115 volts 60 cycles)	6336
(65)	Motor Switch	6345

The motor is the self starting synchronous type, depending upon correct power line frequency (cycles) for correct speed. A motor for one frequency will not operate at correct speed on any other frequency. Do not attempt to do repair work on the motor. Should this part become defective, replace it with a new one, and return to the factory.

The motor should be lubricated at least once every six months. It is only necessary to remove the turntable, and place light machine oil in the oil hole on the motor top plate.

INCREASING Tuning

PHILCO RADIO & TELEVISION CORP.

Increasing Tuning Range and Interference Notes

CHANGES IN PHILCO MODELS FOR INCREASING LOW FREQUENCY RECEIVING RANGE

A number of changes have been made in the Models 52, 71, 91, and 47 to extend the low frequency receiving range, making these models capable of receiving the new 540 K.C. frequency assignment of the Canadian station in Windsor. The Model 52 receives down to 540 K.C. and the Models 71, 91, and 47 go down to 520 K.C., although at the present time there are no assignments lower than 540 K.C. All Models 37 and 80's shipped from the factory have been designed for reception down to 540 K.C.

The circuit changes involve new r.f. coils, new tuning condenser assembly, and new dial assembly. The following table lists all of the part number changes.

Part Changed	MODELS							
	52	540 K.C.	71	520 K.C.	91	520 K.C.	47	520 K.C.
	Old Part No.	New Part No.	Old Part No.	New Part No.	Old Part No.	New Part No.	Old Part No.	New Part No.
Antenna Coil....	03880	05726	04339	05988	04317	04984	04339	05988
Tuning Cond....	03809	05829	04733	05986	04790	05982	05098	06144
Det. Trans......	03881	05727	04185	05989	04409	05985	05093	06146
Oscill. Coil......	03882	05728	04186	05987	04408	05983	04186	05987
Dial Assembly...	04031	05811	04832	05992	04832	05992	04832	05992

On all models which are designed for the lower frequency reception the code number has been changed from 121 or 221 to 123 or 223. These numbers appear on the inspection and serial number tag attached to the packing cases.

SLIPPING OF MODEL 15 TUNING CONDENSER

CORRECTING RADIO BEACON STATION INTERFERENCE

TIGHTENING PILOT LAMP AND SHADOW TUNING LAMP SOCKETS

The spring which is used to hold the drive cable under tension has been changed from Part 6508 to Part 7776. The new spring is heavier and can be used on the earlier models if any are found in which the cable slips or the condenser rotor drops from its own weight.

The sockets used for both pilot lamps and shadow tuning lamps on all Philco models now have indentations in the threads which lock the lamps in place so that they will not be loosened by vibration. Lamps in earlier models will be held tight in their sockets if the lamp is removed and the socket flattened slightly with a pair of pliers. This will place enough pressure on the lamp base so as to prevent it from working loose.

On some of the earlier Model 70 and 90 sets, difficulty has been experienced with interference from airport radio beacon stations, transmitting at or near 260 K.C. Last year when these models were being sold, the interference was not present, but during the past year, several new beacon stations have been installed.

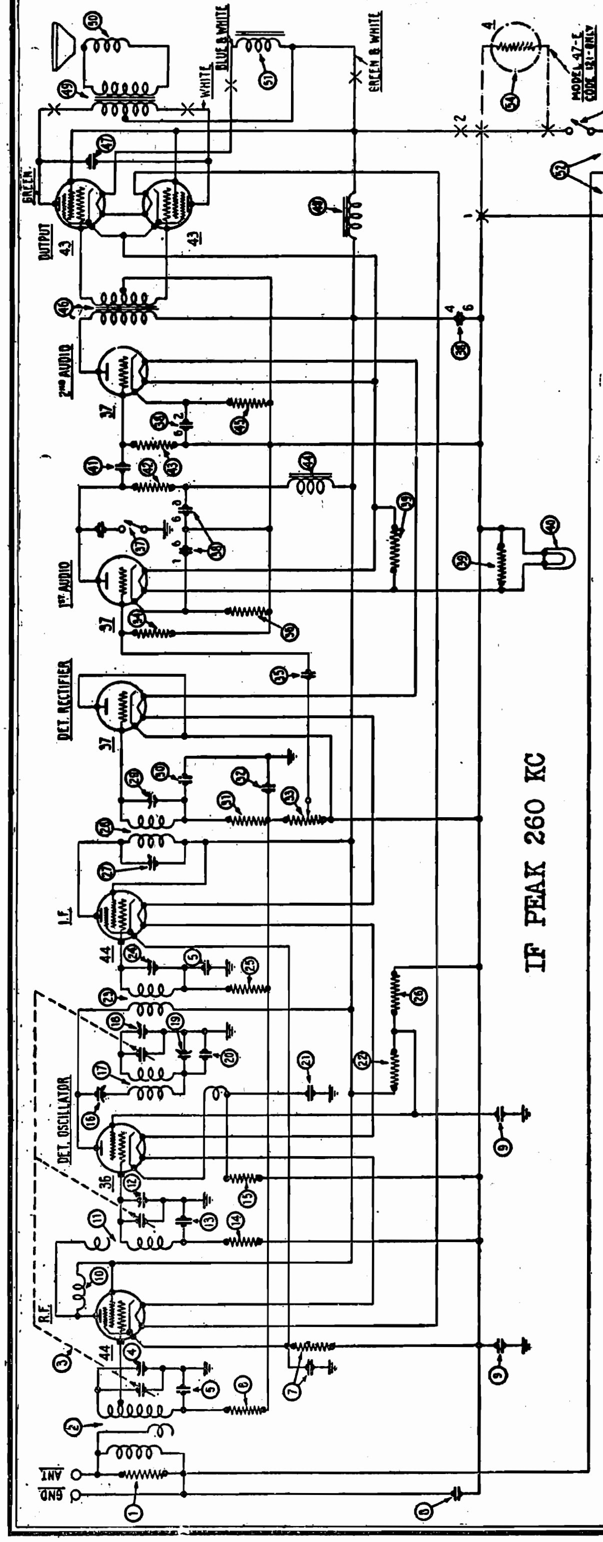
The interference can be readily eliminated by re-adjusting the I. F. compensating condensers at 250 or 270 K.C. instead of 260 K.C. The Philco 095 oscillator can be re-calibrated at 250 by tuning in a reliable broadcast station signal at 750 K.C. (third harmonic of 250 K.C.) or 1000 K.C. (fourth harmonic); substituting the oscillator for the aerial, and re-adjusting the 260 K.C. compensating condenser of the oscillator until the signal is heard and the output meter reads maximum.

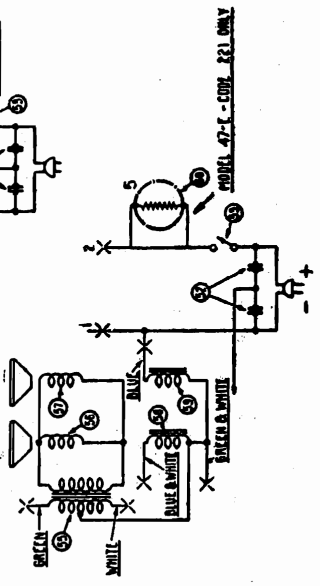
All models of the present line have been specially designed to eliminate any interference from airport radio beacon stations.

PHILCO RADIO & TELEVISION CORP.

MODEL 47 DC (121-221) Schematic Voltage

The Philco Radio of the 47 series is an eight tube direct current (D.C.) superheterodyne, employing the high-efficiency 6.3 volt filament tubes, automatic volume control, and superpower push-pull pentode output. The chassis is made for operation on 115 volts D.C. and 230 volts D.C. The complete instrument is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chassis of one code are not interchangeable with those of another. On the 230 volt models, a ballast lamp type 4 in series with one side of the power line is used on the single speaker models and a type 5 on the twin speaker models. The intermediate frequency used in adjusting the superheterodyne circuit of the 47 series is 260 kilocycles. The power consumption of the 115 volt models is 45 watts; that of the 230 volt models is 90 watts.





Model 47-

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(2)	Inner 10.9 Outer 2.2	4.0 .....
(10)	15	.....
(11)	4.7	.....
(17)	Inner 5.3 Outer 5.3	15.2
(23)	52	80
(28)	80	75
(44)	4600	
(46)	2000	2400
(48)	750	.....
(49)	165	.....
(51)	70	.....
(58)	70	.....
(59)	3200	.....

Table 2—Resistor Data

No. on Figs. 3 and 4	Resistance (Ohms)	Color Body	Tip	Dot
39	70 & 16	Round Tubular		
45	5,000	Green	Black	Red
16	8,000	Gray	Black	Red
1, 36	10,000	Brown	Black	Orange
22, 42	25,000	Red	Green	Orange
28	70,000	Violet	Black	Orange
31	99,000	White	White	Orange
6, 14, 26, 34, 43	1,000,000	Brown	Black	Green

Table 1—Tube Socket Data*—D.C. Line Voltage 115 Volts

Tube Type	Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
44	R. F.	6.3	100	100	.4	40
36	Det.-Osc.	6.3	100	65	5.0	30
44	I. F.	6.3	100	100	.4	25
37	Det.-Rect.	6.3	0	....	.2	22
37	1st Audio	6.3	75	....	.4	2
37	2nd Audio	6.3	90	....	.4	10
43	{Push-Pull	25.	110	112	10.	80
43	{Output	25.	110	112	10.	80
4	Ballast (121) 230 Volts	110	...	...	...	...
5	Ballast (221) 230 Volts	110	...	...	...	...

*All readings were taken from the under side of the chassis, using test prods and leads with a suitable high resistance multi-range D.C. voltmeter for all readings. Volume control at maximum and station selector turned to low frequency end.

MODEL 47 DC
(121-221)
Chassis
Speaker

PHILCO RADIO & TELEVISION CORP.

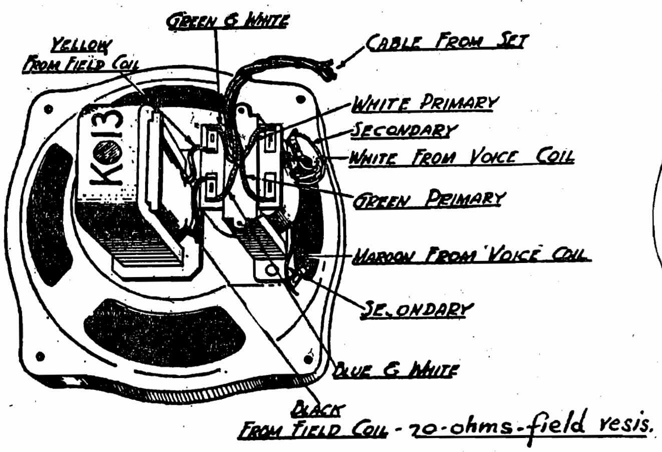


Fig. 1—Single Speaker Connections—121 Code.

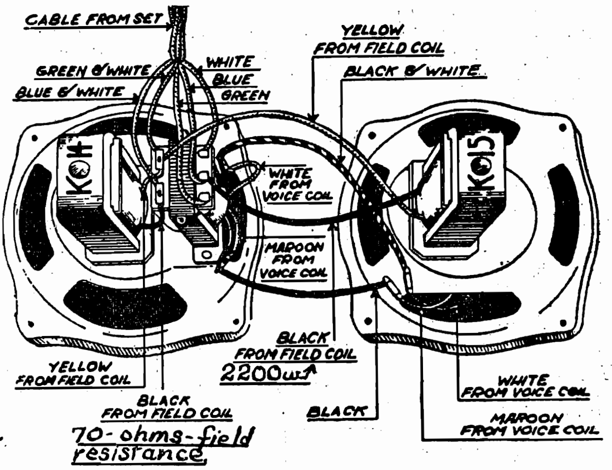
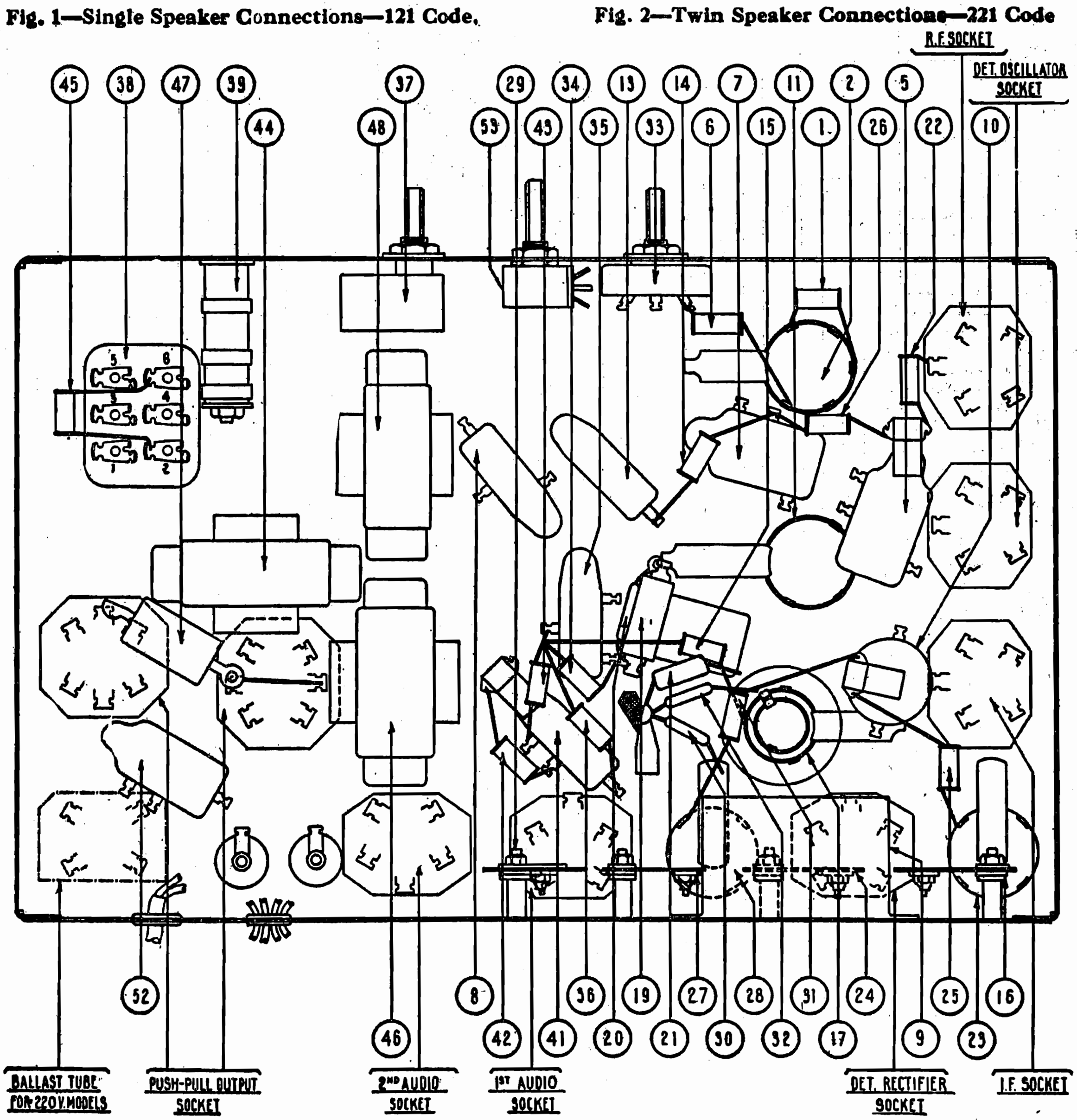


Fig. 2—Twin Speaker Connections—221 Code



PHILCO RADIO & TELEVISION CORP.

Adding 450 KC Adjusting Frequency to Philco Model 095 Oscillator

The Model 095 Oscillator can be altered to provide a suitable 450 KC signal for adjusting the intermediate frequency amplifier stages of the Philco Model 43, or other radios using an I F of 450, without interfering with the present frequencies at 175 KC and 260 KC. The following instructions should be used in making this addition.

1. *Drilling and Mounting.* A Philco compensating condenser, part 04000C and a snap switch part 3253, must be mounted on the side of the oscillator case.

A. Drill a 3/16" hole in the side of the oscillator case for mounting the additional compensating condenser.

B. Drill a second hole 9/16" in diameter 11/32" to the left and 7/8" above the first to provide an opening for the adjustment of this condenser.

C. Drill a third hole 1/2" in diameter for mounting the toggle switch.

D. Mount the compensating condenser and the switch in position.

2. *Wiring.* The wiring consists of connecting the new compensating condenser and switch in series, and connecting these two across the 260 KC compensating condenser.

A. Connect a wire between the adjustable plate terminal of the 260 KC compensating condenser (this condenser is designated on the oscillator case) and the adjustable plate terminal of the condenser just added.

B. Connect a wire from the fixed plate terminal of the 260 KC compensating condenser to one side of the toggle switch just added.

C. Connect a wire from the other side of the toggle switch to the fixed plate terminal of the new compensating condenser.

D. Mark the ON position of the new switch on the side of the oscillator case.

3. *Adjustments.* The adjustments consist of checking the 260 KC compensating condenser setting and adjusting the new compensating condenser in the manner outlined below.

A. Place a radio set in operation, tuning it exactly to a reliable station at 780, 1040, or 1300 KC. If no station signal is available at any one of these frequencies, tune the station selector of an accurately calibrated radio set to one of these points on the dial.

B. Without disturbing the radio dial setting, disconnect the antenna, and substitute the "Antenna" connection from the oscillator. Connect the ground terminal of the oscillator to the ground terminal of the set, with the ground wire still connected. Connect the output meter of the oscillator to the radio speaker connections in the usual manner.

C. Place the oscillator in operation at 260 KC, with the new switch in the "OFF" position and adjust the 260 KC compensating condenser by means of the Philco fibre wrench, part 3164, for maximum reading in the output meter.

D. Now reconnect the antenna in place of the oscillator and tune the radio set to a station at 900 KC or 1350 KC.

E. Again substitute the oscillator for the antenna, placing the 175-260 switch in the "260" KC position, and the new switch in the "ON" position.

F. Adjust the new compensating condenser for maximum reading in the output meter.

This completes the adjustments and the oscillator is now ready for use. The fundamental frequency which has been added is 225 KC. The second harmonic of this frequency at 450 KC is actually employed for making the adjustments to the new Philco radio models. The 900 KC and 1350 KC points used in adjusting the 225 KC compensating condenser are the fourth and sixth harmonics, respectively, of the 225 KC signal. When making adjustments to a Philco radio having an intermediate frequency of 450 KC, place the oscillator in operation for 260 KC and the new switch in the "ON" position.

MODEL 14-LZX, 91
23, 14, 19-
LZ, 19-LZX,
37
Changes.

PHILCO RADIO & TELEVISION CORP.

Changes in Models

It is unnecessary to alter receivers in your stock to comply with these changes.

The main purpose of these change bulletins is to enable you in ordering and supplying correct replacement parts to dealers. Mark up your copies of Service Bulletins to agree with the latest production. Your orders for parts from Philco will be filled as specified on your order.

This information is intended for your service department only.

Model 14LZX

In run number 3, the following changes were made to permit police and airplane broadcast reception; the antenna coil (2) part number 05984 was changed to new coil part number 32-1069. The interstage coil (12) part number 05984 was changed to new coil part number 32-1070. The "on-off" switch (53A) part number 6498 was removed. A combined "on-off" and frequency change switch part number 42-1002 was added.

In run number 3, the Philco Three Purpose Antenna system was added. The set transformer part number 32-1003 was mounted in the radio chassis. The antenna transformer part number 32-1005 was mounted in the speaker cabinet. In the speaker cabinet the control box part number 06617 was changed to new control box part number 38-5056.

Models 91, 23 and 14

In run number 1, the (15,000 ohm) resistor (21) part number 6208 was changed to new resistor (10,000 ohms) part number 4412. Condenser (6) part number 3615AM was changed to new condenser part number 3615AF. A terminal block part number 03103 was added. This terminal block was mounted on the condenser (58) part number 4989K or 4989T.

Models 19LZ—19LZX

In run number 4, model 19LZ; run number 3, model 19LZX; the following changes were made to permit police and airplane broadcast reception: The antenna coil (3) part number 06619 was changed to new coil part number 32-1062. The interstage coil (6) part number 06662 was changed to new coil part number 32-1063. The "on-off" switch part number 6498 was removed. A combined "on-off" and frequency change switch part number 42-1017 was added.

In run number 4, model 19LZ; run number 3, model 19LZX; rubber insulators part number 4054 were added to both ends of the 10,000 ohm resistor connected between the tone control and the tap on the volume control.

In run number 3, model 19LZX, the Philco Three Purpose Antenna system was added. The set transformer part number 32-1003 was mounted in the chassis. The antenna transformer part number 32-1005 was mounted in the speaker cabinet. In the speaker cabinet the control box part number 06798 was changed to new control box part number 38-5057.

Model 37

The (99,000 ohm) resistor (27) part number 4411 was changed to new resistor (490,000 ohms) part number 4517.

The (490,000 ohm) resistor (31) part number 4517 was changed to new resistor (240,000 ohms) part number 4410.

The (99,000 ohm) resistor (32) part number 4411 was changed to new resistor (1,000,000 ohms) part number 4414.

The (51,000 ohm) resistor (25) and the (25,000 ohm) resistor (26) were removed.

The secondary lead of the second I. F. transformer connected to condenser (24) was removed and connected to the secondary lead of the first I. F. transformer on condenser (13). A (490,000 ohm) resistor part number 4517 was added between the center top of the volume control (in cathode circuit) and the secondary leads of first and second I. F. transformer connected on condenser (13).

A (15,000 ohm) resistor part number 6208 was added, connected between end of the volume control (in cathode circuit) and end of resistors (34) and (35).

A (30 ohm) resistor part number 7155 was added across the filament of the Ballast tube. Two pieces of 1″ braid was used to protect the ends of the resistor.

PHILCO RADIO & TELEVISION CORP.

MODEL 220, 220-A
Schematic

DIFFERENT CIRCUIT ARRANGEMENT FOR MODEL 220-A

Model 220-A for use on 25-60 cycle lines is wired differently than the Model 220. The plate supply lead for the two 24 R. F. Tubes is taken from the low side of the Speaker field Coil. The lead "D" to the 24 tubes should be changed to "J" for the Model 220-A only. This will change the plate voltage from 250 volts to 115-125 volts. The plate current readings will also be lower than those given in the table.

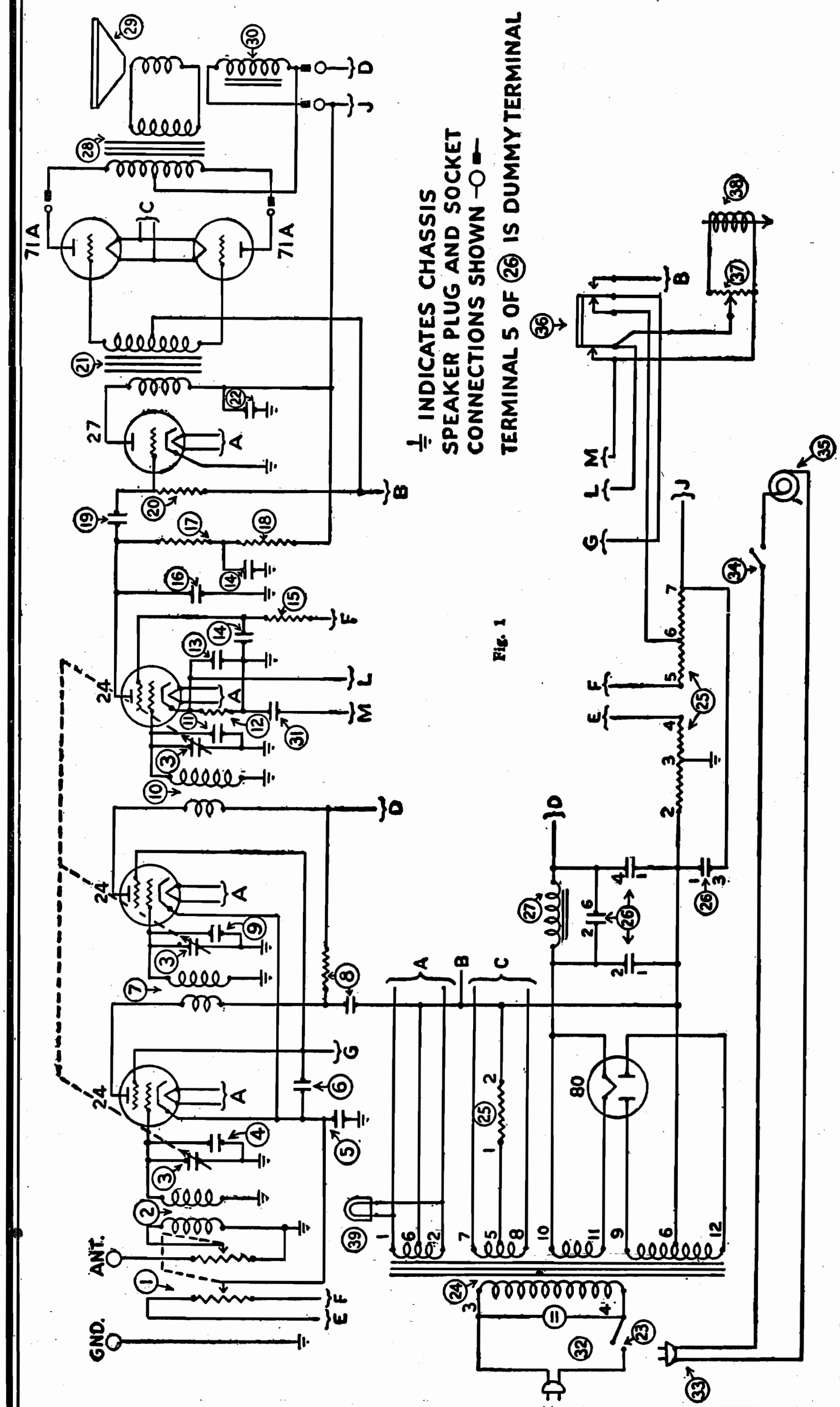
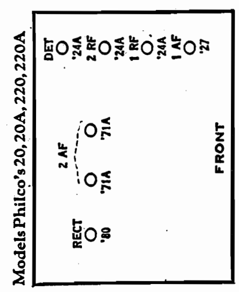


Fig. 1



NOTE 1. On the Models 220 and 220-A, 13 shown on Fig. 1 of this Bulletin is a .0005 Mfd. Condenser. On the Models 20 and 20-A, 13 is a .5 Mfd. Condenser.

MODEL 220 IS FOR USE ON 50-60 CYCLE 105-125 VOLT AC LINES
MODEL 220-A IS FOR USE ON 25-60 CYCLE 105-125 VOLT AC LINES

The chassis of the 220 and 220-A are the same as the chassis for the 20 and 20-A except for the additional wiring to the radio-phono switch and the electric turntable and pick-up.

The tube socket readings, transformer, condenser and resistor data, the filter condenser arrangement and all other information given in Bulletin No. 36 should be used for the 220 and 220-A respectively.

The parts list in Bulletin No. 36 is supplemented with the following which are the additional parts used in the Radio Phonograph.

MODEL Lazy X
Installation

PHILCO RADIO & TELEVISION CORP.

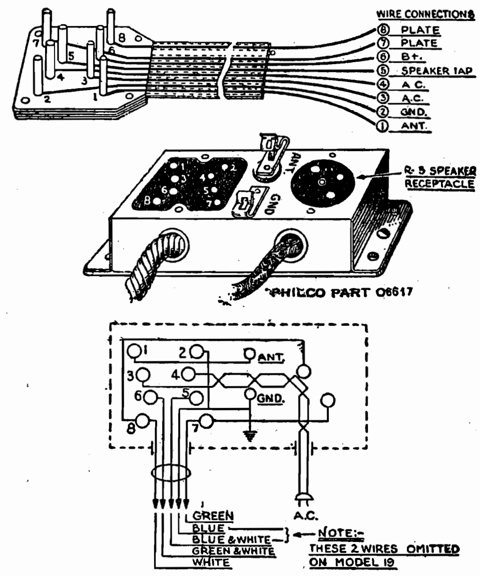
Installing the Philco Lazy X

THE Philco Lazy X Model offer many possibilities for custom-built installation, and as a result we have received many requests for further details concerning the installation. We are outlining below for the benefit of all dealers and servicemen information on the problems most frequently encountered.

Flat Cable Extension

It is often desirable to extend the length of the flat cable which connects the control cabinet with the speaker cabinet. An extension cable is available for this purpose in lengths of 25 feet. The extension cable can be obtained assembled with the plug on one end. This assembly is known as Philco Part No. 06993, and sells at a list price of $6.50.

When using this assembly, the wires should be unsoldered from the plug at the end of the LZX cable and spliced to the ends of the corresponding wires at the end of the extension cable. The flat cable only without the plug is known as Philco Part No. L-1528, and lists at $6.00 for a 25-foot length.



LZX CABLE AND PLUG CONNECTIONS

Extension Losses Eliminated

It is recommended that the total length of flat cable for any installation should be under 50 feet. There are certain losses introduced because of the close proximity of the aerial and ground wires in the cable. Up to 25 feet, the standard length supplied with the LZX Models—this loss is not noticeable, but beyond this length the loss increases, and should be compensated for by increasing the length and height of the outside antenna or by the installation of the Philco Three Purpose Antenna System. Complete instructions for the Lazy X connections are included with each Three Purpose Kit, and are also given below.

Another consideration when using more than the standard 25-foot length of cable is the excessive pickup of man-made static originating in various electric appliances and wiring within the house. Here again the use of the Philco Three Purpose Antenna System is recommended for cables in excess of 25 feet in length.

Connecting the Philco Three-Purpose Antenna System to the Lazy X Models

There are two methods of connecting the Philco Three Purpose Antenna System to the LZX Models, both of which will give equally satisfactory performance. In the first method the transmission line from the Antenna Transformer is run direct to the radio cabinet on which the set transformer is mounted. Referring to the cable and plug illustration below, it will be noted that the ground and aerial wires through the flat cable are separated by a cord about the size of a wire. Lay the LZX cabinet on its side so that chassis is in upright position on the floor. Looking from rear of chassis, first two wires from left of flat cable are antenna and ground connections, respectively. Slit the cable with a sharp knife so that enough of the "ANT" and "GND" lead is exposed to reach Set Transformer. Cut first wire from left in cable and connect end coming from chassis to "ANT" terminal of "Set" Transformer. Second wire from left must not be cut, but should be bared and short lead spliced from bared section to "GND" terminal of set Transformer This connection should be soldered and taped. Connect red wire in transmission line to "RED" terminal on "ANT" transformer and black wire to "BLK" terminal. The set Transformer should then be mounted in position in receiver cabinet.

In the second method, the transmission line from the antenna transformer runs to the speaker cabinet, and two of the wires through the flat cable are employed as a continuation of transmission line up to the radio cabinet, at which point the set transformer is mounted. In order to get a properly matched line through the flat cable and not lose all the advantage of the system up to this point, it is necessary to employ a different wire through the cable as the antenna At present the antenna wire is separated from the ground wire by a tracer cord. When making the change the antenna wire should be adjacent to the ground wire through the cable. It is simply a case of interchanging the wires on the two sides of the cable to agree with the cable and plug drawings shown above, where wires 1 and 2 become antenna and ground and wires 7 and 8 become plate connections. The antenna wire is cut a few inches from the chassis for insertion of the set transformer just the same as in the first case described above.

PHILCO RADIO & TELEVISION CORP.

6.3 VOLT SERIES

Type	Use	Base	Bulb	Type of Cathode	RATING Fil. Amps.	RATING Max. Plate Volts	RATING Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
36	R.F.	5B	ST12C	Heater	0.3	275	90	90	− 1.5	55	1.8	Not over	850	250,000	215	....	....
								135	− 1.5	67	2.8	⅓ Ip	1050	300,000	315	....	....
								180	− 3.0	90	3.5	....	1050	350,000	370	....	....
								250	− 3	90	3.4	....	1100	400,000	440	....	....
36	Det.	5B	ST12C	Heater	0.3	275	90	250	− 6	20/45	Plate c	urrent to	be adjust	ed to 0.1 M	a. with	no input s	ignal
37	Det.	5A	ST12	Heater	0.3	275	...	90	− 6	....	2.5	....	800	11,500	9.2	17,500	30
	Amp.							135	− 9	....	4.1	....	925	10,000	9.2	14,000	80
								180	−13.5	....	4.3	....	900	10,000	9.2	20,000	175
38	Power Amp.	5C	ST12C	Heater	0.3	180	180	135	−13.5	135	9.0	2.5	975	102,000	100	13,500	525
39	R.F.	5C	ST12C	Heater	0.3	275	90	90	− 3	90	4.4	1.3	960	375,000	360	....	....
								135	− 3	90	4.4	1.2	980	540,000	530	....	....
								180	− 3	90	4.5	1.2	1000	750,000	750	....	....
								250	− 3	90	4.5	1.2	1000	1,000,000	1000	....	....
41	Power Amp.	6C	ST12	Heater	0.4	200	200	125	−10	135	11.0	1.5	1400	150,000	210	13,000	650
								167.5	−12.5	167.5	16.5	2.5	1700	120,000	205	10,000	1,250
								180	−14	180	19.0	3.5	1800	120,000	215	10,000	1,500
42	Power Amp.	6C	ST16	Heater	0.65	250	250	250	−16.5	250	34	7.5	2200	100,000	220	9,000	3,000
44	R.F.	5C	ST12C	Heater	0.3	275	90	90	− 3	90	6.0	....	1010	150,000	152	....	....
	Super							135	− 3	90	6.25	....	1030	250,000	257	....	....
	Control							180	− 3	90	6.4	....	1040	410,000	426	....	....
								250	− 3	90	6.5	....	1050	600,000	630	....	....
69	Det.	6B	S12	Heater	0.3	275	...	180	− 3	....	4.5	....	1450	20,700	30	....	....
75	Det. Amp.	6D	ST12C	Heater	0.3	250	...	250	− 2	....	0.8	....	1100	91,000	100	....	....
77	R.F.	6A	ST12C	Heater	0.3	250	100	250	− 3	100	2.3	.6	1250	1,500,000	1500	....	....
77	Det.	6A	ST12C	Heater	0.3	250	100	250	− 6	100	Plate c	urrent to	be adjust	ed to 0.1 M	a. with	no input s	ignal
											Plate l	oad 250,	000 ohms				
78	R.F.	6A	ST12C	Heater	0.3	250	100	180	− 3	75	4	....	1100	1,000,000	1100	....	....
	Super							250	− 3	100	7	....	1450	800,000	1160	....	....
	Control							250	− 3	125	10.5	....	1650	600,000	990	....	....
79	Power Amp.	6F	ST12C	Heater	0.6	180	...	180	0	....	7.5	....	No appl	ied signal	....	....	....
								180	0	....	44.0	....	Class B	Operation	....	10,000	5,500
85	Det.	6D	ST12C	Heater	0.3	250	...	250	−20	....	8.0	....	1100	7,500	8.3	20,000	200
89	Power Amp.	6A	ST12C	Heater	0.4	180	180	160	20	160	17	....	1570	3,000	4.7	7,000	300*
								163	17	163	17	....	1575	99,000	125	9,000	1,250**
								180	18	180	20	....	1635	82,500	135	8,000	1,500**
								180	0	....	52.5	....	Class B	Operation	....	2,350	3,500†
6A7	Det.	Small							G4	G3&5							
	Osc.	7B	ST12C	Heater	0.3	250	100	250 ‡	− 3 ‡‡	100	....	....	....	....	....	....	....
6B7	Duplex	7C	ST12C	Heater	0.3	250	125	100	− 3	100	5.8	.3	950	300,000	285	....	....
	Diode							180	− 3	75	3.4	1.0	840	1,000,000	840	....	....
	Pentode							250	− 3	100	6.0	.8	1000	800,000	800	....	....
								250	− 3	125	9.0	.65	1125	650,000	730	....	....

*Triode connection. **Pentode connection. †Two tubes with 40 volts applied signal. ‡Voltage on plate and anode grid. ‡‡Cathode resistor for bias on G1 = 250 ohms.

2.5 VOLT SERIES

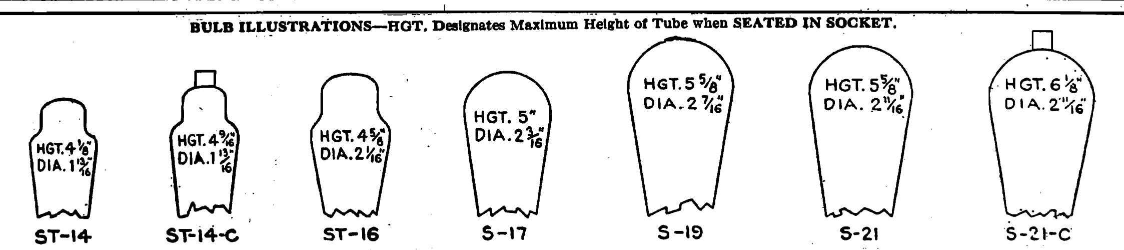
Type	Use	Base	Bulb	Type of Cathode	Fil. Amps.	Max. Plate Volts	Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
24	R.F.	5B	S14C	Heater	1.75	275	90	180	− 1.5	75	4.0	Not over	1050	400,000	420	....	....
								180	− 3	90	4.0	⅛ Ip	1000	400,000	400	....	....
								250	− 3	90	4.0		1025	600,000	615	....	....
24	Det.	5B	S14C	Heater	1.75	275	90	275	− 5	20-45	Plate c	urrent to	be adjust	ed to 0.1 M	a. with	no input s	ignal
27	Amp.	5A	S14	Heater	1.75	275	...	90	− 6	....	2.7	....	820	11,000	9.0	14,000	30
								135	− 9	....	4.5	....	1000	9,000	9.0	13,000	80
								180	−13.5	....	5.0	....	1000	9,000	9.0	18,700	165
								250	−21	....	5.2	....	975	9,250	9.0	34,000	300
35	R.F. Super	5B	S14C	Heater	1.75	275	90	180	− 1.5	75	5.8	Not over	1100	350,000	385	....	....
	Control							250	− 3.0	90	6.5	⅛ Ip	1050	350,000	370	....	....
45	Power Amp.	4A	S17	Filament	1.5	275	...	180	−34.5	....	27.0	....	1850	1,900	3.5	3,500	780
								250	−50.0	....	34.0	....	2000	1,750	3.5	3,900	1,600
46	Power Amp.	5F	S17	Filament	1.5	250 ClassA	...	250	−33	....	22.0	....	2350	2,380	5.6	6,400	1,250
						400 ClassB	...	300	0	....	4.0	Class B	Operation	....	....	1,300	16,000
								400	0	....	6.0	Class B	Operation	....	....	1,450	20,000
47	Power Amp.	5D	S17	Filament	1.5	250	250	250	−16.5	250	31	7.0	2500	60,000	150	7,000	2,500
55	Det.	6D	ST12C	Heater	1.0	250	...	250	−20.0	....	8.0	....	1100	7,500	8.3	20,000	200
56	Amp.	5A	S12	Heater	1.0	275	...	250	−13.5	....	5.0	....	1450	9,500	13.8	....	....
57	R.F. Super Control	6A	ST12C	Heater	1.0	275	100	250	− 3	100	2.0	0.6	1225	+ 1,500,000	1500	....	....
57	Det.	6A	ST12C	Heater	1.0	275	100	250	− 6	100	Plate c	urrent to	be adjust	ed to 0.1 M	a. with	no input s	ignal
											Plate l	oad 250,	000 ohms				
58	R.F.	6A	ST12C	Heater	1.0	275	100	250	− 3	100	8.2	2.0	1600	800,000	1280	....	....
59	Power Amp.	7A	ST16	Heater	2.0	250	250	250	−28	250*	26	....	2600	2,500	6	5,000	1,250
								250	−18	250**	35	....	2500	4,000	100	6,000	3,000
								400	0	....	60	....	Class B	Operation	....	6,000P	20,000
2A3	Power Amp.	4A	ST16	Filament	2.5	250	...	250	−42	....	60	....	5500	765	4.2	2,500	3,500
								300	−62	....	40 per tube	....	Push Pull	....	....	300P	15,000
2A5	Power Amp.	6C	ST14	Heater	1.75	250	250	250	−16.5	250	34	7.5	2200	100,000	165	9,000	3,000
2A7	Det.	Small							G4	G3&5							
	Osc.	7B	ST12C	Heater	1.0	250	100	250 ‡	− 3 ‡‡	100	....	....	....	....	....	....	....
2B7	Duplex	7C	ST12C	Heater	1.0	250	125	100	− 3	100	5.8	....	950	300,000	285	....	....
	Diode							180	− 3	75	3.4	....	840	1,000,000	840	....	....
	Pentode							250	− 3	100	6.0	....	1000	800,000	800	....	....
								250	− 3	125	9.0	....	1125	650,000	730	....	....

*Triode connection. **Pentode connection. ‡Voltage on plate and anode grid. ‡‡Cathode resistor for bias on G1 = 250 ohms. P-Plate to plate load.

MISCELLANEOUS PILOT LAMPS

Voltage	Current Amps.	Color of Filament Support Bead	Dimensions Overall Hight	Dimensions Overall Diam.	Philco Part Number
Special low current lamps for battery sets					
2.0	.06	Pink	1¼"	13/32"	5316
2.5	.45	White	1¼"	13/32"	3463
6.3	.15	Brown	1¼"	13/32"	4567
6.3	.25	Blue	1 3/32"	13/32"	6608
120 Grille Lamp	.09		2 5/32"	1 5/16"	6600

BULB ILLUSTRATIONS—HGT. Designates Maximum Height of Tube when SEATED IN SOCKET.



Philco Tubes

PHILCO RADIO & TELEVISION CORP.

2.0 VOLT SERIES

Type	Use	Base	Bulb	Type of Cathode	RATING Fil. Amps.	RATING Max. Plate Volts	RATING Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
15	Det. Osc.	5B	S12C	Heater	0.22	135	67.5	135	− 1.5	67.5	1.85	Not over ⅓ Ip	625	800,000	500	.....	....
19	Power Amp.	6E	ST12	Filament	0.26	135	....	135	0.0	.....	*† 27.0	Class B	Operation	....	....	P 10,000	2,100
30	Det. Amp.	4A	S12	Filament	0.06	180	....	90	− 4.5	.....	2.5	....	850	11,000	9.3	.....	....
								135	− 9.0	.....	3.0	....	900	10,300	9.0	.....	....
								180	−13.5	.....	3.1	....	900	10,300	9.3	.....	....
31	Power Amp.	4A	S12	Filament	0.13	180	....	135	−22.5	.....	8.0	....	925	4,100	3.8	7,000	185
								180	−30.0	.....	12.3	....	1050	3,600	3.8	5,700	375
32	R.F	4B	S14C	Filament	0.06	180	67.5	135	− 3	67.5	1.7	Not over ⅓ Ip	640	950,000	610	.....	....
								180	− 3	67.5	1.7		650	1,200,000	780	...	....
32	Det.	4B	S14C	Filament	0.06	180	67.5	174	− 6	67.5	Plate current to be adjusted to 0.2 Ma. with no input signal						
33	Power Amp.	5D	S14	Filament	0.26	135	135	135	−13.5	135	14.5		1450	50,000	70.0	7,000	700
34	R.F.	4B	S14C	Filament	0.06	180	67.5	67.5	− 3	67.5	2.7	Not over ⅓ Ip	560	400,000	224	.....	....
								135	− 3	67.5	2.8		600	600,000	360	.....	....
								180	− 3	67.5	2.8		620	1,000,000	620	.....	....

*†50 volts R.M.S. applied to two grids   P Plate to plate load

MISCELLANEOUS TUBES

Type	Use	Base	Bulb	Type of Cathode	Volts	Amps.	Supply	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
00A	Det.	4A	S14	Filament	5	0.25	DC	45	Grid Return To–Fil.	.....	1.5	....	666	30,000	20.0	.....	....
01A	Det. Amp.	4A	S14	Filament	5	0.25	DC	90	− 4.5	.....	2.5	....	725	11,000	8.0	11,000	15
								135	− 9.0	.....	3.0	....	800	10,000	8.0	20,000	55
10	Power Amp.	4A	S19	Filament	7.5	1.25	AC	250	−22.0	.....	10.0	....	1330	6,000	8.0	13,000	40
								350	−31.0	.....	16.0	....	1550	5,150	8.0	11,000	900
								425	−39.0	.....	18.0	....	1600	5,000	8.0	10,200	1,600
12A	Det. Amp.	4A	S14	Filament	5.0	0.25	DC	90	− 4.5	.....	5.2	....	1500	5,600	8.5	5,600	30
								135	− 9.0	.....	6.2	....	1600	5,300	8.5	8,700	115
								180	−13.5	.....	7.6	....	1700	5,000	8.5	10,800	260
12A	Power Amp.	4A	S14	Filament	5.0	0.25	DC	135	− 9	.....	6.2	....	1600	5,300	8.5	8,700	115
								180	−13.5	.....	7.6	....	1700	5,000	8.5	10,800	260
14	Amp.	5B	S14C	Heater	14.0	0.3	DC	180	− 1.5	90	4.0	Not over ⅓ Ip	1050	400,000	420	.....	....
								180	− 3.0	90	4.0		1000	400,000	400	.....	....
								250	− 3	90	4.0		1050	500,000	525	.....	....
17	Amp.	5A	S14	Heater	14.0	0.3	DC	90	− 6.0	.....	2.7	....	820	11,000	9	.....	....
								135	− 9.0	.....	4.5	....	1000	9,000	9	.....	....
								180	−13.5	.....	5.0	....	1000	9,000	9	.....	....
18	Power Amp.	6C	S17	Heater	14.0	0.7	AC	250	−16.5	250	34.0	7.5	2250	100,000	220	9,000	3,000
20	Power Amp.	4A	T8	Filament	3.3	0.132	DC	90	−16.5	.....	3.0	....	415	8,000	3.3	9,600	45
								135	−22.0	.....	6.5	....	525	6,300	3.3	6,500	110
26	Amp.	4A	S14	Filament	1.5	1.05	AC	90	− 6	.....	3.8	....	955	3,600	8.2	9,800	30
							or	135	− 9	.....	6.3	....	1135	7,200	8.2	8,800	80
							DC	180	−13.5	.....	7.4	....	1170	7,000	8.2	10,500	130
43	Power Amp.	6C	ST14	Heater	25.0	0.3	DC	95	−15.0	95	20.0	5.0	2000	45,000	90.0	4,500	900
48	Power Amp.	6C	ST16	Heater	30.0	0.4	DC	95	−20.0	95	47.0	9.0	2800	10,000	28.0	2,000	1,600
50	Power Amp.	4A	S21	Filament	7.5	1.25	AC	250	−54.0	.....	35.0	....	1900	2,000	3.8	4,600	1,600
								350	−63.0	.....	45.0	....	2000	1,900	3.8	4,100	2,400
								400	−70.0	.....	55.0	....	2100	1,800	3.8	3,670	3,400
								450	−84.0	.....	55.0	....	2100	1,800	3.8	4,350	4,600
71A	Power Amp.	4A	S14	Filament	5.0	.25	AC	90	−16.5	.....	12.0	....	1330	2,250	3.0	3,200	125
							or	135	−27.0	.....	17.5	....	1520	1,960	3.0	3,500	370
							DC	180	−40.5	.....	20.0	....	1620	1,850	3.0	5,350	700
V99	Det.	4G	T8	Filament	3.3	0.063	DC	90	− 4.5	.....	2.5	....	425	15,500	6.6	15,500	....
X99	Amp.	4A	T8	Filament	3.3	0.063	DC	90	− 4.5	.....	2.5	....	425	15,500	6.6	15,500	....
182B	Det. Amp.	4A	S17	Filament	5.0	1.25	AC	200	−29.0	.....	18.0	....	1500	3,330	5.0	.....	....
183	Power Amp.	4A	S17	Filament	5.0	1.25	AC	200	−45.0	.....	20.0	....	1500	2,000	3.0	.....	....
								250	−65.0	.....	26.0	....	2000	1,500	3.0	.....	....
485	Det. Amp.	5A	S14	Heater	3.0	1.25	AC	90	− 3.0	.....	5.0	....	1150	10,800	12.5	.....	....
								120	− 4.0	.....	6.0	....	1350	9,300	12.5	.....	....

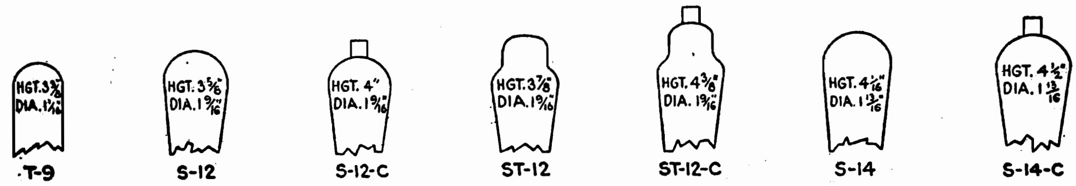
RECTIFIER SERIES

Type	Use	Base	Bulb	Type Cathode	FILAMENT RATING Volts	FILAMENT RATING Amps.	FILAMENT RATING Supply	Max. Plate Volts Per Plate	Plate Current Milliamps.	Remarks
80	Full Wave	4D	S17	Filament	5.0	2.0	AC	350 AC	125	
								400 AC	110	
								550 AC	135	With choke input only
81	Half Wave	4E	S19	Filament	7.5	1.25	AC	700 AC	85	
82	Full Wave	4D	S14	Filament	2.5	3.0	AC	500 AC	125	
83	Full Wave	4D	ST16	Filament	5.0	3.0	AC	500 AC	250	
84	Full Wave	5E	ST12	Heater	6.3	0.5	AC or DC	225 AC	50	
12Z3	Half Wave	4H	ST12	Heater	12.6	0.3	AC or DC	230 AC	60	
25Z5	Full Wave and Voltage Doubler	6G	ST12	Heater	25.0	0.3	AC or DC	230 AC	100	AC Plate voltage per plate for voltage doubling 110 volts
5Z3	Full Wave	4D	ST16	Heater	5.0	3.0	AC or DC	500 AC	250	
866	Half Wave	4F	S21C	Filament	2.5	5.0	AC	7500 AC	600	

MISCELLANEOUS BALLAST TUBES

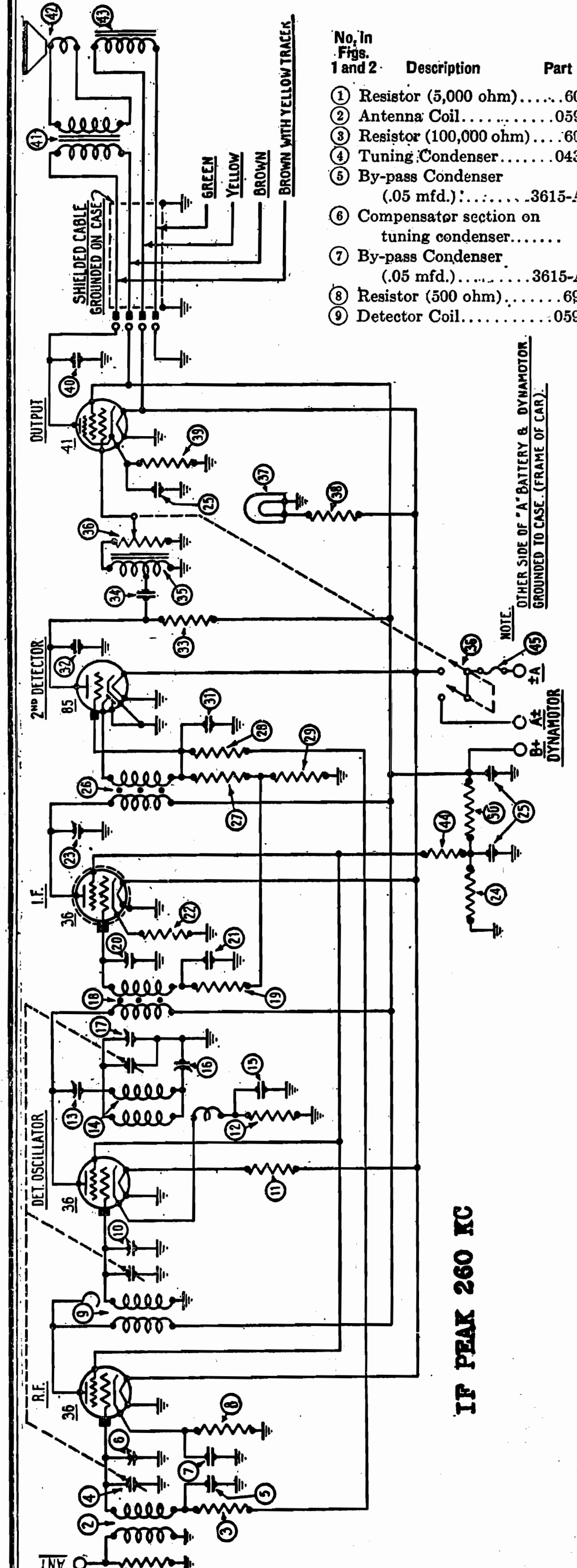
Type	Base	Bulb	For use in Philco Models	Voltage Drop Across Lamp	Filament Current
2	4C	S17	46	9.0	0.3
3	4C	S17	46E	128.0	0.3
4	4C	S17	47E single speaker	117.0	0.4
5	4C	S17	47E double speaker	117.0	0.46
6	4C	S12	36 & 37	0.6/1.4	0.7
7	4C	S17	248E	176.0	0.3
8	4C	S17	247E	132.0	0.3
9	4C	S17	48	50	0.3

BULB ILLUSTRATIONS—HGT. Designates Maximum Height of Tube when SEATED IN SOCKET.



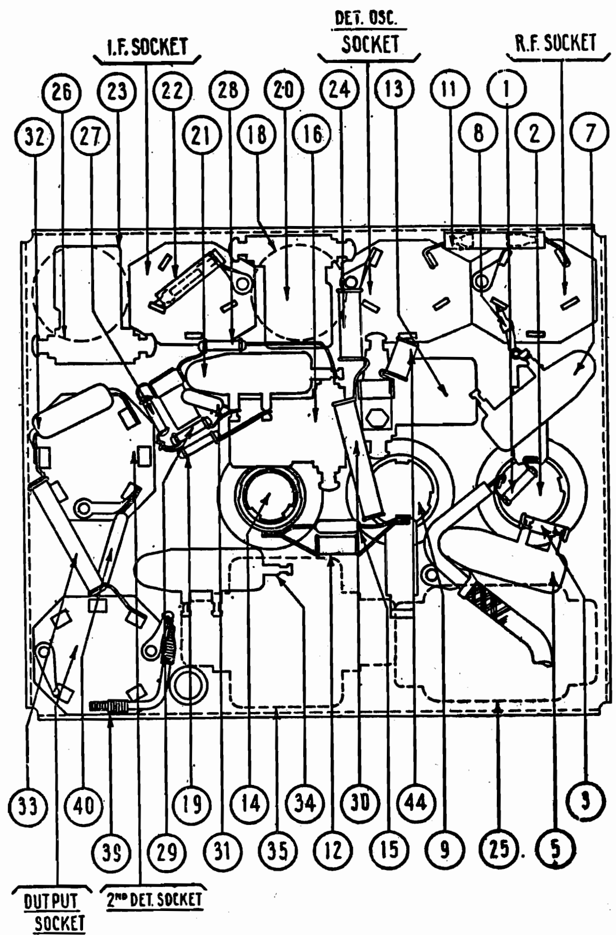
MODEL 6
Transitone

PHILCO RADIO & TELEVISION CORP.



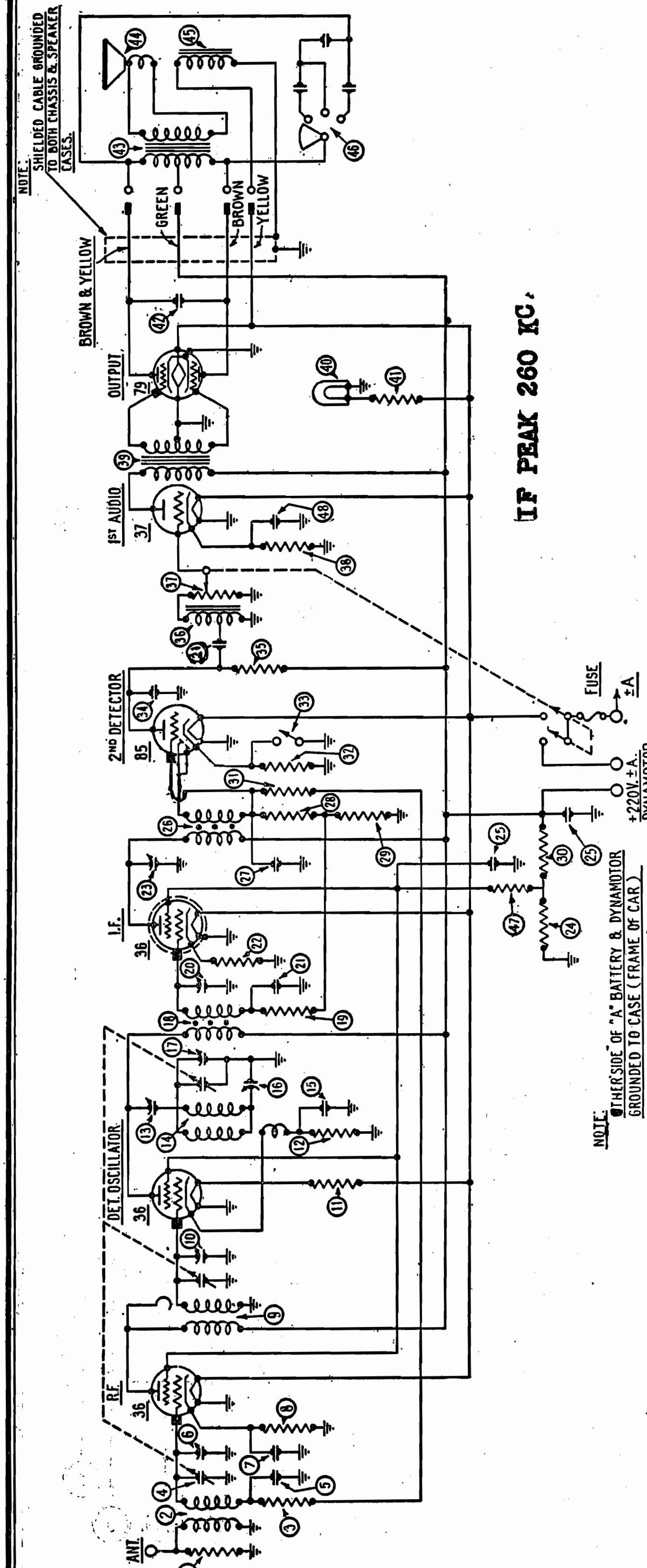
PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
1	Resistor (5,000 ohm)	6096
2	Antenna Coil	05903
3	Resistor (100,000 ohm)	6099
4	Tuning Condenser	04308
5	By-pass Condenser (.05 mfd.)	3615-AN
6	Compensator section on tuning condenser	
7	By-pass Condenser (.05 mfd.)	3615-AT
8	Resistor (500 ohm)	6977
9	Detector Coil	05902
10	Compensator section on tuning condenser	
11	Resistor (2.7 ohm)	6511
12	Resistor (8,000 ohm)	5838
13	Compensating Cond.	04000-A
14	Oscillator Coil	05975
15	Condenser (.007 mfd.)	4520
16	Compensating Cond.	04000-S
17	Compensator section on tuning condenser	
18	First I. F. Transformer	05970
19	Resistor (500,000 ohm)	6097
20	Compensating Cond.	04000-D
21	Condenser (.05 mfd.)	3615-AK
22	Resistor (500 ohm)	6977
23	Compensating Cond.	04000-D
24	Resistor (20,000 ohm)	6650
25	Condenser (.25 mfd., .5 mfd., 8 mfd.)	04354
26	Second I. F. Transformer	05901
27	Resistor (100,000 ohm)	6099
28	Resistor (500,000 ohm)	6097
29	Resistor (100,000 ohm)	6099
30	Resistor (20,000 ohm)	6649
31	Condenser (.00025 mfd.)	3082
32	Condenser (.0002 mfd.)	4059
33	Resistor (50,000 ohm)	4237
34	Condenser (.09 mfd.)	4989-Y
35	Audio Transformer	7535
36	Volume Control (500,000 ohm) and switch	7525
37	Pilot Lamp	4567
38	Resistor (7 ohm)	5110
39	Resistor (700 ohm)	6443
40	Condenser (.002 mfd.)	6853
41	Output Transformer	2598
42	Cone and Coil	02823
43	Field Coil	02794
44	Resistor (25,000 ohm)	4516
	Interstage Shield	05910
	Dynamotor EB	05389
	Dynamotor EA (for battery replacements)	05388
	Receiver Studs	6122
	Shielded Loom (18″ high tension shield)	L1387
	Shielded Loom (30″ high tension shield)	L1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistors	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cable	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	0538
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke (small unit only)	05746
	18″ Volume Control Shaft	6351
	18″ Tuning Control Shaft	6352
	32″ Volume Control Shaft	6128
	32″ Tuning Control Shaft	6129
	48″ Volume Control Shaft	6298
	48″ Tuning Control Shaft	6299
	120″ Volume Control Shaft	6355
	120″ Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 7, 8, 6)	Model 095
	Fibre Wrench	3164



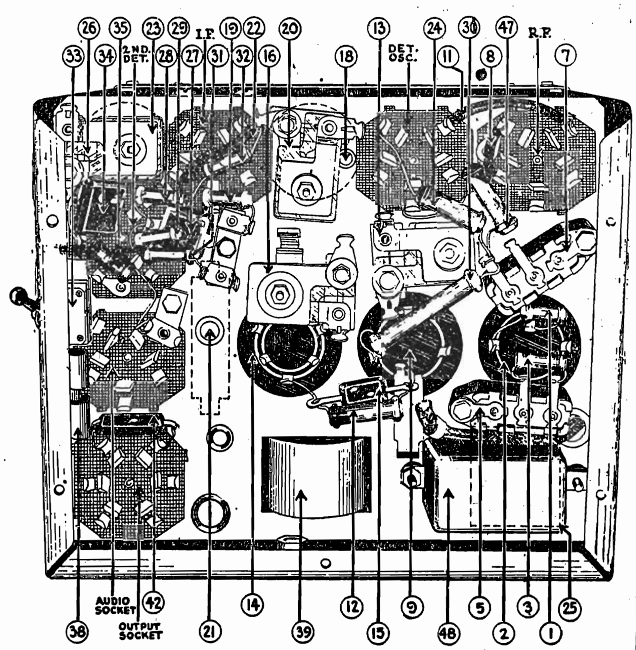
MODEL 9
Transitone

PHILCO RADIO & TELEVISION CORP.



PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
1	Resistor (5,000 ohm)	6096
2	Antenna Coil	06574
3	Resistor (100,000 ohm)	6099
4	Tuning Condenser	04308
5	By-pass Condenser (.05 mfd.)	3615-AN
6	Compensator section on tuning condenser	
7	By-pass Condenser	3615-AY
8	Resistor (500 ohm)	6977
9	R. F. Transformer	05902
10	Compensator section on tuning condenser	
11	Resistor (2.7 ohm)	6511
12	Resistor (6,000 ohm)	7352
13	Compensator	04000-A
14	Oscillator Coil	05975
15	Condenser (.0007 mfd.)	4520
16	Compensating Cond.	04000-S
17	Compensator section on tuning condenser	
18	First I. F. Transformer	05970
19	Resistor (500,000 ohm)	6097
20	Compensating Cond.	04000-D
21	Condenser (.05 mfd., .15 mfd.)	06091
22	Resistor (500 ohm)	6977
23	Compensating Cond.	04000-D
24	Resistor (20,000 ohm)	6650
25	Condenser (.5 mfd., .25 mfd.)	06088
26	Second I. F. Transformer	05901
27	Condenser (.00025 mfd.)	3082
28	Resistor (100,000 ohm)	6099
29	Resistor (100,000 ohm)	6099
30	Resistor (20,000 ohm)	6649
31	Resistor (500,000 ohm)	6097
32	Resistor (5,000 ohm)	6096
33	Switch	5462
34	Condenser (.00125 mfd.)	5886
35	Resistor (50,000 ohm)	4518
36	Audio Transformer	7552
37	Volume Control	7525
38	Resistor (2,500 ohm)	7775
39	Input Transformer	7652
40	Pilot Lamp	4567
41	Resistor (7 ohm)	5110
42	Condenser (.06 mfd.)	6359
43	Output Transformer	2515
44	Speaker Coil and Cone	02823
45	Speaker Field Pot	02795
46	Tone Control	05366
47	Resistor (25,000 ohm)	4516
49	Condenser	7774
	Complete Speaker Assembly (Model 6)	A-4
	Complete Speaker Assembly (Model 7)	A-4
	Complete Speaker Assembly (Model 8)	A-5
	Complete Speaker Assembly (Model 9)	A-7
	Complete Speaker Assembly (Model 12)	A-6
	Complete Speaker Assembly (Model B-6)	A-8
	Interstage Shield	05910
	Dynamotor ED	06084
	Dynamotor EA (for battery replacements)	05388
	Receiver Studs	6122
	Shielded Loom (18" high tension shield)	L-1387
	Shielded Loom (30" high tension shield)	L-1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistor	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cables	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	05386
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke	05723
	Battery Cable	05419-D
	18" Volume Control Shaft	6351
	18" Tuning Control Shaft	6352
	32" Volume Control Shaft	6128
	32" Tuning Control Shaft	6129
	48" Volume Control Shaft	6298
	48" Tuning Control Shaft	6299
	120" Volume Control Shaft	6355
	120" Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 6, 7, 8, 9)	095
	Fibre Wrench	3164



PHILCO RADIO & TELEVISION CORP.

MODEL 54
Voltage
Data

THE PHILCO RADIO MODEL 54 is a five-tube superheterodyne, designed for operation on 110 volts, alternating current, 25, 60 cycles, and 110 volts direct current, employing the new Philco high efficiency tubes with pentode output and an Electro Dynamic Speaker. The set uses a Philco Type 6A7 tube as a first detector and oscillator; a Type 78 tube as intermediate frequency; a Type 75 tube as a second detector; a Type 43 tube as pentode output and a Type 25-Z-5 tube as a rectifier and voltage doubler. The intermediate frequency for tuning the I. F. transformers is 460 kilocycles. The power consumption on both A. C. and D. C. is approximately 50 watts.

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Circuit	Det. Osc.	I. F.	2nd Det.	Out-put	Recti-fier
Type Tube	6A7	78	75	43	25-Z-5
Filament—Total 68—Refer to	Note.				
Plate Volts—P to K..........	84	84	38	84	146
Screen Grid Volts—SG to K...	K to G 3/5 65	52	..	90	....
Control Grid Volts—CG to K.	.15	.15	.25	.5	....
Cathode Volts—K to F......	12	12	10	10	....

NOTE—Due to filaments in series, test with suitable A. C. voltmeter across the two points on Resistor (42) marked with an X in Fig. 3.

* All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltage and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Tube Socket Data*—D.C. Line Voltage 120 Volts

Circuit	Det. Osc.	I. F.	2nd Det.	Out-put	Recti-fier
Type Tube	6A7	78	75	43	25-Z-5
Filament—Total 70—Refer to	Note.				
Plate Volts—P to K..........	90	90	40	90	....
Screen Grid Volts—SG to K....	70	70		92	....
Control Grid Volts—CG to K..	.15	.15	.25	.5	....
Cathode Volts—K to F.......	7.5	7.5	10	10	....

NOTE—Due to filaments in series, test with suitable D. C. voltmeter across the two points on Resistor (42) marked with an X in Fig. 3.

* All of the readings above in Table 2 were taken from the under side of chassis, using test prods and leads with a suitable high resistance, multi-range D. C. voltmeter for all readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

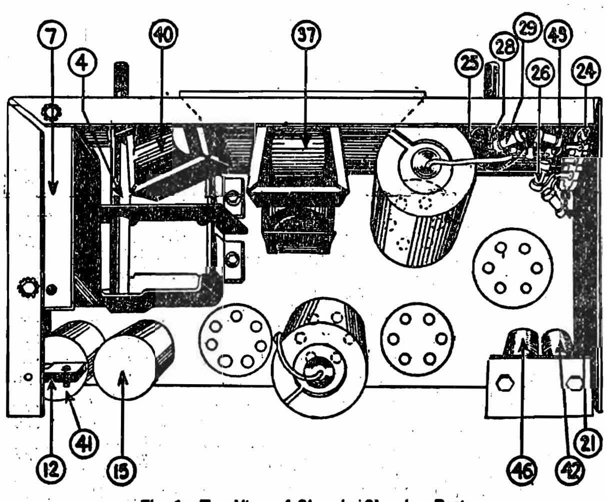


Fig. 1—Top View of Chassis Showing Parts

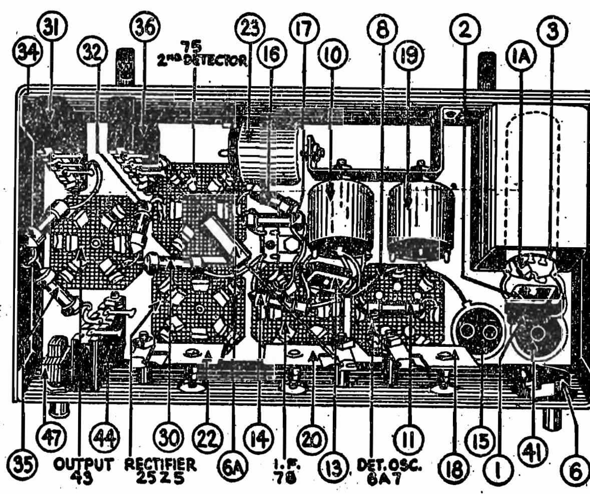
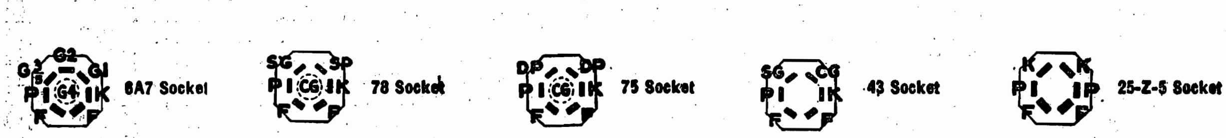


Fig. 2—Bottom View of Chassis Showing Parts



Terminal Arrangement of Tube Sockets Viewed From Under Side of Chassis.

MODEL 54
Schematic
Parts List

PHILCO RADIO & TELEVISION CORP.

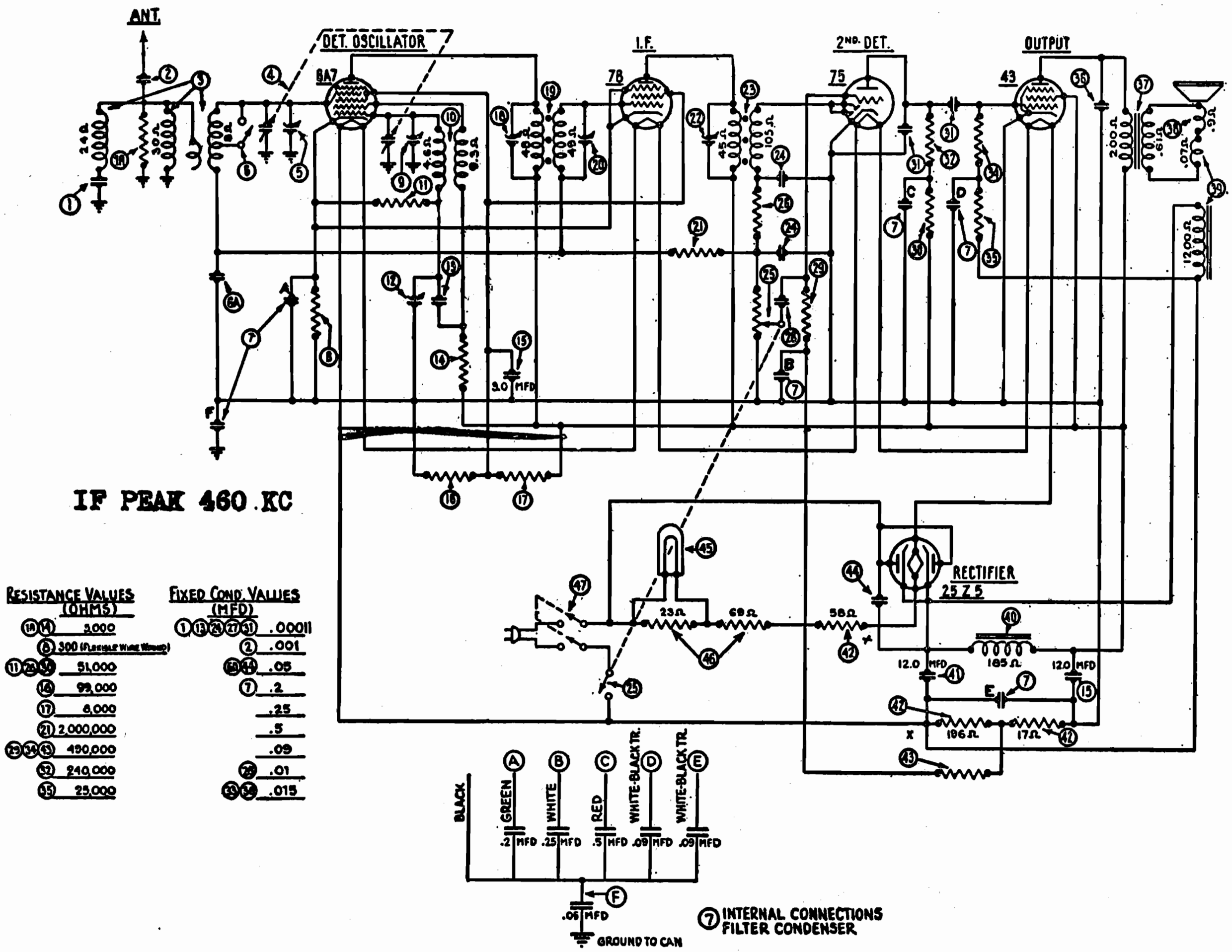


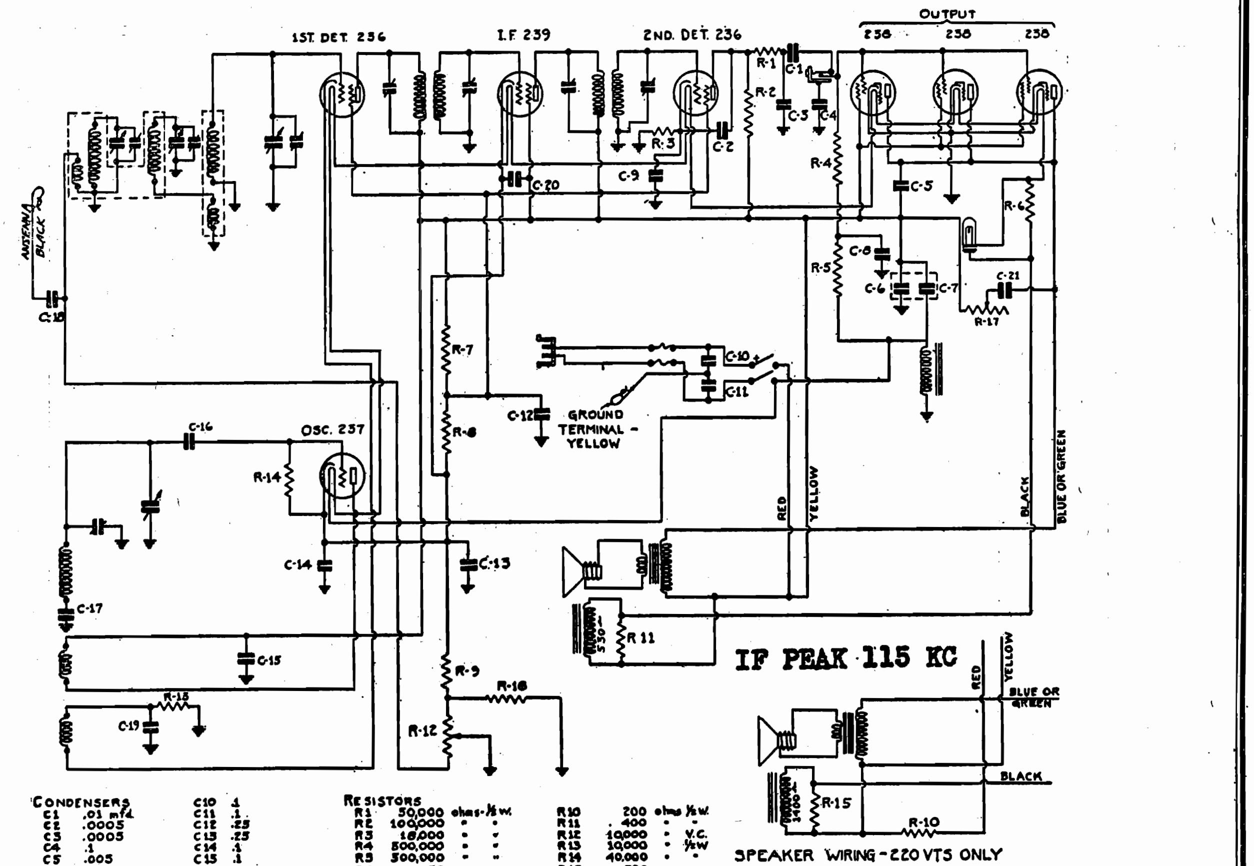
Fig. 3—Schematic Wiring Diagram

REPLACEMENT PARTS FOR MODEL 54

No. on Figs.	Description	Part No.	List Price
1	Condenser	30-1005	.16
1a	Resistor (Green-Black-Red)	6096	.20
2	Condenser	5215	.20
3	Antenna Transformer Assembly	32-1117	1.25
4	Tuning Condenser Assembly	31-1027	1.75
5	Compensating Condenser (Part of 4)	....	....
6	Wave Band Switch	42-1027	.50
6a	Condenser	30-4020	.12
7	Filter Condenser (Block)	30-4023	1.00
8	Resistor (Flexible)	33-3010	.15
9	Compensating Condenser (High Frequency 1400) Part of 4	....	....
10	Oscillator Coil	32-1118	1.00
11	Resistor (Green-Brown-Orange)	4518	.20
12	Compensating Condenser (Low Freq.)	04000-B	.19
13	Condenser	4519	.18
14	Resistor (Green-Black-Red)	5310	.20
15	Electrolytic Condenser (Double)	30-2002	1.00
16	Resistor (White-White-Orange)	4411	.20
17	Resistor (Gray-Black-Red)	5838	.20
18	Compensating Cond. (1st I. F. Primary)	04000-A	.14
19	1st I. F. Transformer	32-1115	.65
20	Compensating Condenser (1st I. F. Secondary)	04000-A	.14
21	Resistor (Red-Black-Green)	5872	.20
22	Compensating Cond. (2nd I. F. Primary)	04000-A	.14
23	2nd I. F. Transformer	32-1116	.75
24	Condenser (Double)	8035-G	.20
25	Volume Control and "On-Off" Switch	33-5010	1.00
26	Resistor (Green-Brown-Orange)	4518	.20
28	Condenser	3903AM	.20
29	Resistor (Yellow-White-Yellow)	6097	.20
30	Resistor (Green-Brown-Orange)	4518	.20
31	Condenser (Double)	8035-F	.18
32	Resistor (Red-Yellow-Yellow)	4410	.20
34	Resistor (Yellow-White-Yellow)	4517	.20
35	Resistor (Red-Green-Orange)	4516	.20
36	Condenser	3793-Y	.16
37	Output Transformer	32-7020	.80
38	Voice Coil and Cone Assembly	36-3029	....
39	Field Coil and Pot Assembly	36-3040	1.60
40	Filter Choke	32-7036	.75
41	Electrolytic Condenser	30-2001	1.25
42	Resistor (Wire Wound)	33-3012	.25
43	Resistor (Yellow-White-Yellow)	6097	.20
44	Condenser	3615-B	.30
45	Pilot Lamp	4567	.11
46	Resistor (Wire Wound)	33-3011	.25
47	Safety Switch	42-1026	1.00
	Tube Shield	28-1130	.10
	Six Prong Socket	7547	.10
	Seven Prong Socket	27-6005	.10
	Tuning Scale	27-5008	.12
	Volume Control Scale	27-5010	.12

PILOT RADIO & TUBE CORP.

MODEL 41 Series
DC Dragon



CONDENSERS	
C1	.01 mfd.
C2	.0005
C3	.0005
C4	.1
C5	.005
C6	2.5
C7	.5
C8	.25
C9	.25
C10	.1
C11	.1
C12	.25
C13	.25
C14	.1
C15	.1
C16	.0001
C17	.001480
C18	.001500
C19	.1
C20	.25
C21	.05

RESISTORS			
R1	50,000	ohms	-½w.
R2	100,000	"	"
R3	18,000	"	"
R4	500,000	"	"
R5	300,000	"	"
R6	30	"	
R7	6,000	"	-½w.
R8	10,000	"	"
R9	150	"	"
R10	200	ohms	½w.
R11	400	"	"
R12	10,000	"	V.C.
R13	10,000	"	½w
R14	40,000	"	"
R15	500	"	"
R16	10,000	"	"
R17	0-50,000	TONE CONTROL	

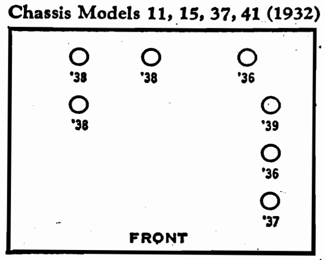
SCHEMATIC DIAGRAM
PILOT MODEL 41 SUPER HET

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

	Line Voltage — 220 D. C. — .34 Amperes								Line Voltage -- 110 D. C.						
Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	55.0	3.8
236	1st								1st						
	Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	Det.A	6.2	93	-3.8	52	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	62	-37	60	+33	*
236	2nd A	6.7	94.	-5.	75.	.05	1.7	.3	2nd A	6.2	26	-9.8	65	-4.5	0.18
	Det.B	6.8	100.	-6.	92.	.15	2.8	.26	Det.B	6.3	26	-10.7	51	-4.8	0.2
238	Out-A	7.2	118.	-	140.	1.5	-9.4	7.5	Out-A	6.2	85	-	100	-15.1	5.0
	put B	7.3	115.	-	143.	2.8	-11.8	10.0	put B	6.3	85	-	103	-15.7	6.5

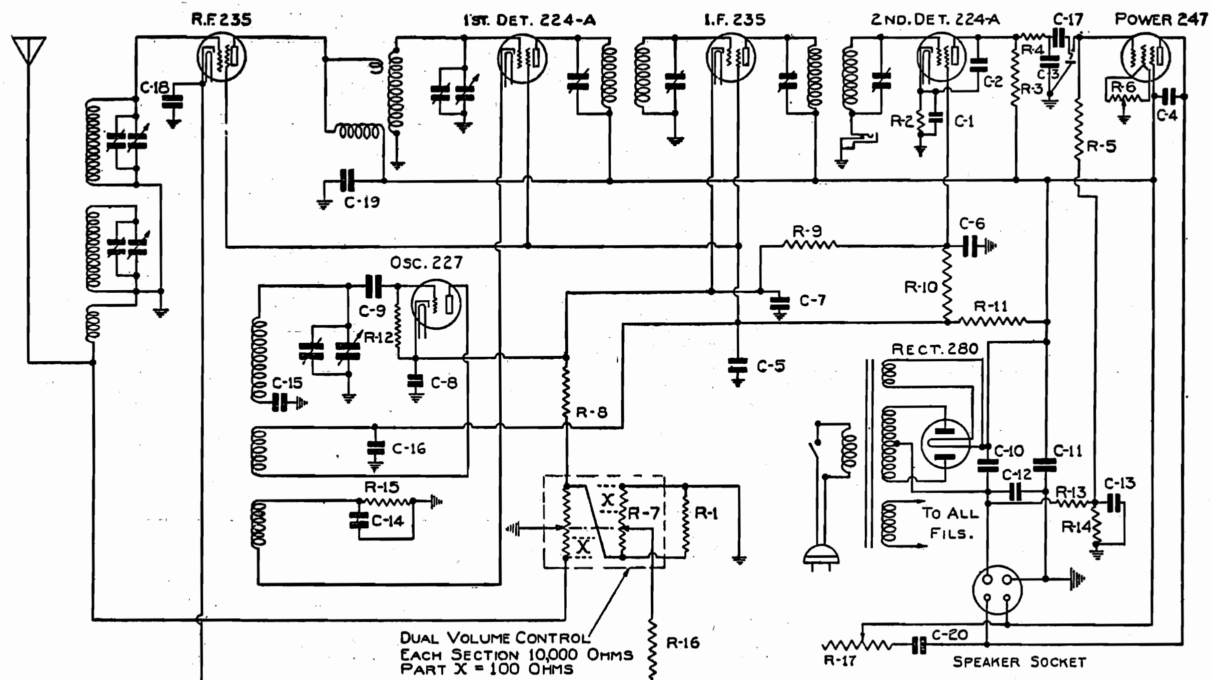
A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

Chassis Models 11, 15, 37, 41 (1932)

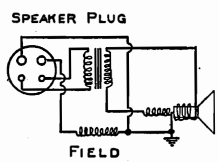


MODEL 39 Series

PILOT RADIO & TUBE CORP.



IF PEAK 115 KC



CONDENSERS		RESISTORS	
C1 — .25 mfd.	C9 — .0001	R1 — 10,000 ohms-½ W	R9 — 10,000 ohms ½ W
C2 — .0005	C10 — 8	R2 — 40,000 " "	R10 — 10,000 " "
C3 — .0005	C11 — 8	R3 — 250,000 " "	R11 — 14,000 " 3 W
C4 — .01	C12 — .035	R4 — 50,000 " "	R12 — 40,000 " ½ W
C5 — .25	C13 — .25	R5 — 500,000 " "	R13 — 500,000 " "
C6 — .25	C14 — .1	R6 — Center Tap Resistor	R14 — 120,000 " "
C7 — .25	C15 — .001480	R7 — 10,000 ohms-VC	R15 — 10,000 " "
C8 — .1	C16 — .1	R8 — 250 " ½ W	R16 — 300 " "
	C17 — .01		R17 — 0-50,000 " TC
	C18 — .1		
	C19 — 25		
	C20 — .05		

VOLTAGE TABLE FOR CHASSIS MODEL NO. 10 (A-B-F & FJ)

Type Tube	Tube Position	Fil. A.C.	Plate + to Cath. —	Cath. + to Control Grid —	Screen Grid + to Cath. —	Screen Current	Cath. Vts.	Plate Current
227	Osc. (a)	2.3	73	3.4*			3.2	5.8
	(b)	2.3	68	2.4*			36	5.4
224-A	1st (a)	2.3	225	8.4	58	.1	9.6	1.25
	Det. (b)	2.3	234	8.7	86	.18	9.8	1.85
235	R.F. (a)	2.3	237	1.7	77	.76	1.5	5.3
	(b)	2.3	214	34	75	.5	34.	.6
235	I.F (a)	2.3	234	3.3	75	.53	3.5	4.0
	(b)	2.3	216	36.	73	.11	36.	.5
224-A	2nd (a)	2.3	200+	4.1	30	.05	5.0	.12
	Det. (b)	2.3	200+	4.9	50	.04	4.5	.1
247	Power (a)	2.3	214	7.5‡	240	8.2		28
	(b)	2.3	218	7.5‡	255	8.8		33
280	Rect. (a)	4.9	590	* Too small				32.0 per anode
	(b)	4.9	590	to read.				29 per anode

RE-ALIGNMENT ON BROADCAST BAND

To re-align the I.F. and broadcast band trimmers, the service station must be equipped with a modulated oscillator and output meter. The oscillator must be able to supply a modulated output at 1,400 K.C. and 600 K.C.

To adjust the set with this equipment, the procedure is as follows:

1. Remove the chassis from the cabinet.

2. Connect the output meter across the primary of the loudspeaker input transformer. If the meter is not equipped with a multiplier, connect it across the secondary of the speaker transformer.

3. Plug the loudspeaker into the chassis.

4. Connect the output of the oscillator across the grid circuit of the first detector. In other words, clip one output lead to the control grid of the first detector and the other output lead to the chassis.

5. Adjust the oscillator to 600 K.C., tune in the 600 K.C. signal, turning down the volume control of the set, or the attentuator of the oscillator, until a normal output is registered on the output meter. Tune the set carefully to the position which gives the maximum deflection of the output meter. Then adjust the four trimmers of the I.F. transformers for maximum output.

6. Connect the output of the oscillator to the antenna and ground connection of the set. Tune the oscillator to 1,400 K.C. and turn the dial of the receiver until the signal is accurately tuned in. Then adjust the broadcast trimmer R.F. and the pre-selector trimmers until maximum output is recorded on the meter. Go over the adjustments of these trimmers several times to make sure that the circuits are properly lined up with the oscillator.

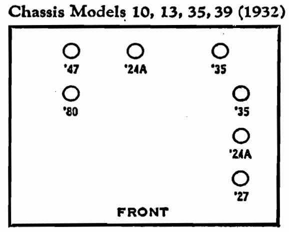
RE-ALIGNMENT

The sensitivity and selectivity of the Pilot DX Super largely depend upon the proper adjustment of the various trimmer condensers. Before sets leave the factory, these trimmers are carefully tuned and every precaution is taken to insure the permanence of the adjustments.

If a set appears to be insensitive, it is possible that rough handling in transit has changed the positions of some of the trimmers. In this case, the sensitivity can be restored by re-aligning the set. It is understood, of course, that the tubes have been checked and other tests made, as suggested in the foregoing sections, to make sure that the insensitivity is not due to other causes.

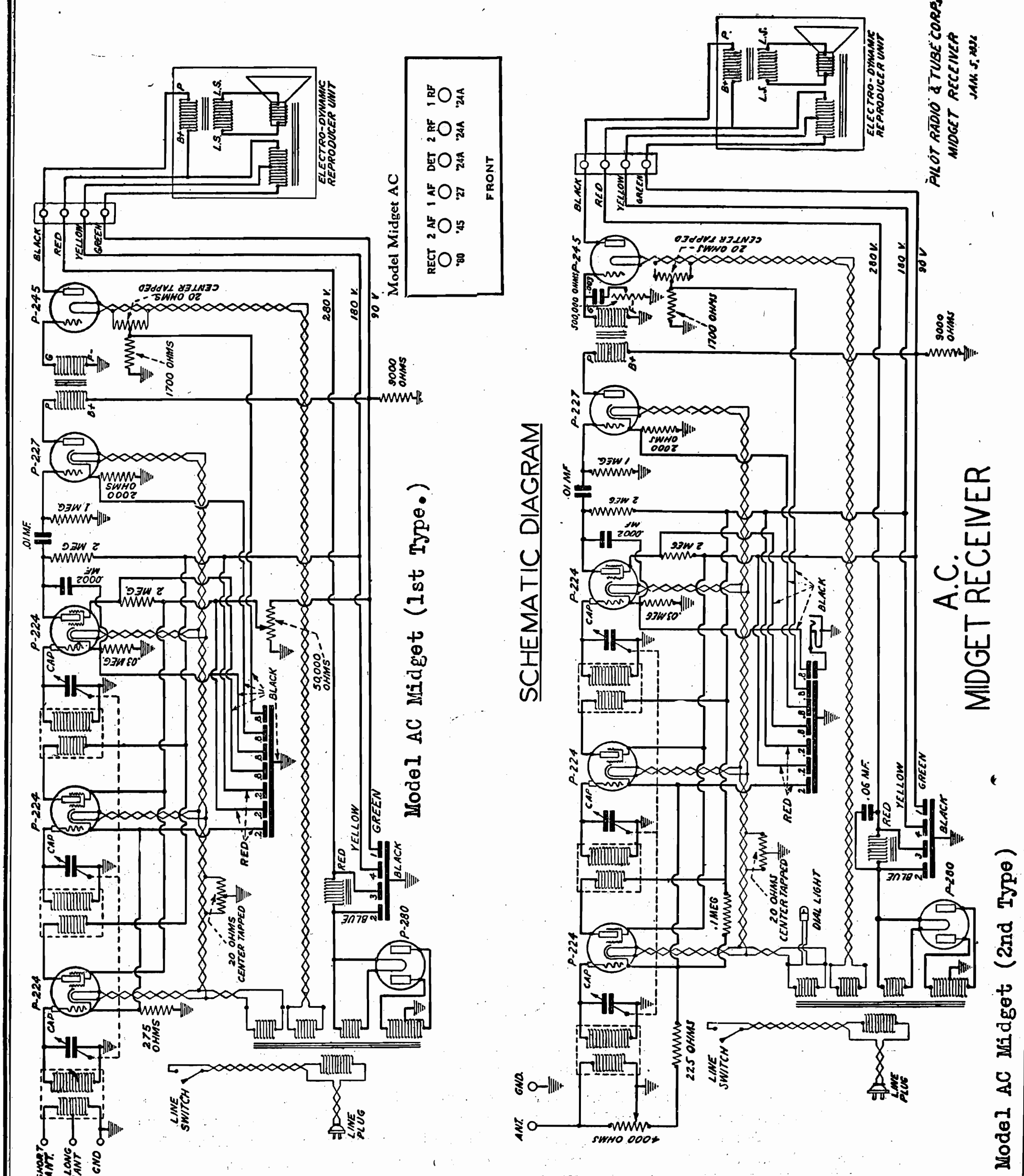
The best method of adjusting the I.F. trimmers is by means of a signal generator, or modulated oscillator, tuned to 115 K.C. The output of the oscillator is connected across the grid circuit of the first detector and the two I.F. Transformers are lined up to resonance with the 115 K.C. signal.

Chassis Models 10, 13, 35, 39 (1932)



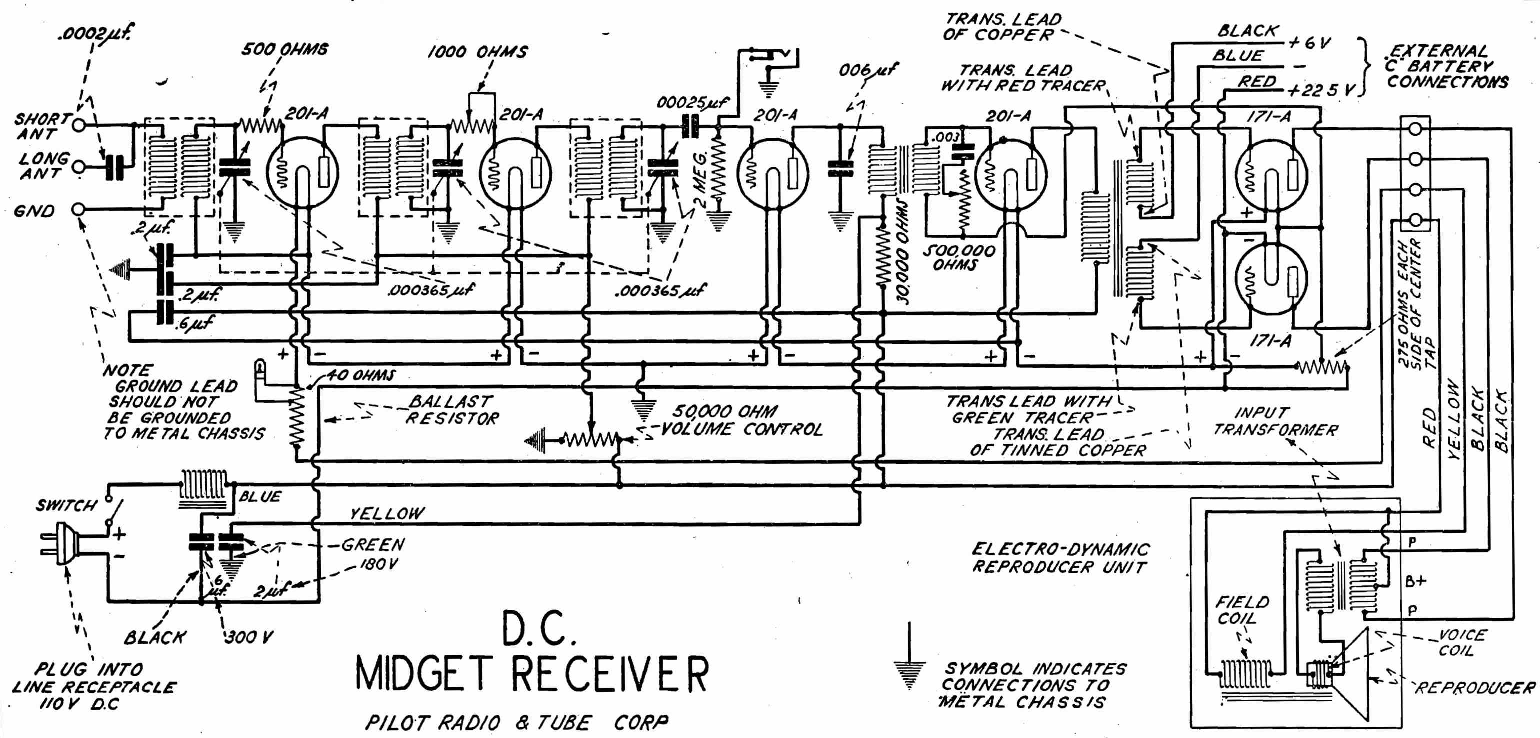
PILOT RADIO & TUBE CORP.

MODEL AC Midget
S-155, S-155-A,
S-155-B, S-155-F,
C-157, C-157-A,
C-157-B, C-157-F



MODEL DC Midget
S-156, S-158

PILOT RADIO & TUBE CORP.



NOV 20, 1930

OSCILLATION CONTROL

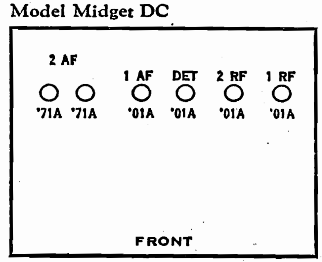
Oscillation adjustment is provided by means of the variable grid suppresser mounted in back of the main tuning condenser. The set will tend to oscillate more easily as the adjustment screw is turned in. It should be adjusted for best results with the tuning dial set at about 1000 kilocycles In some cases greater sensitivity can be obtained by the use of 112-A tubes instead of 201-A tubes in the R.F. and detector circuits. If these are used, the grid suppressor must again be adjusted.

The dial light is a six volt flashlight bulb. It is connected across part of the ballast resistor, which is the long unit mounted on the under side of the chassis in front of the tone control.

The phonograph pick-up is connected directly across the grid leak of the detector tube.

Every direct current receiver shipped from the factory is supplied with a heavy lead cap which should be placed over the detector tube to prevent microphonic howling. Some tubes are more susceptible to howling than others, so it is a good idea to switch the 201-A's around until the quietest one is found.

Model Midget DC

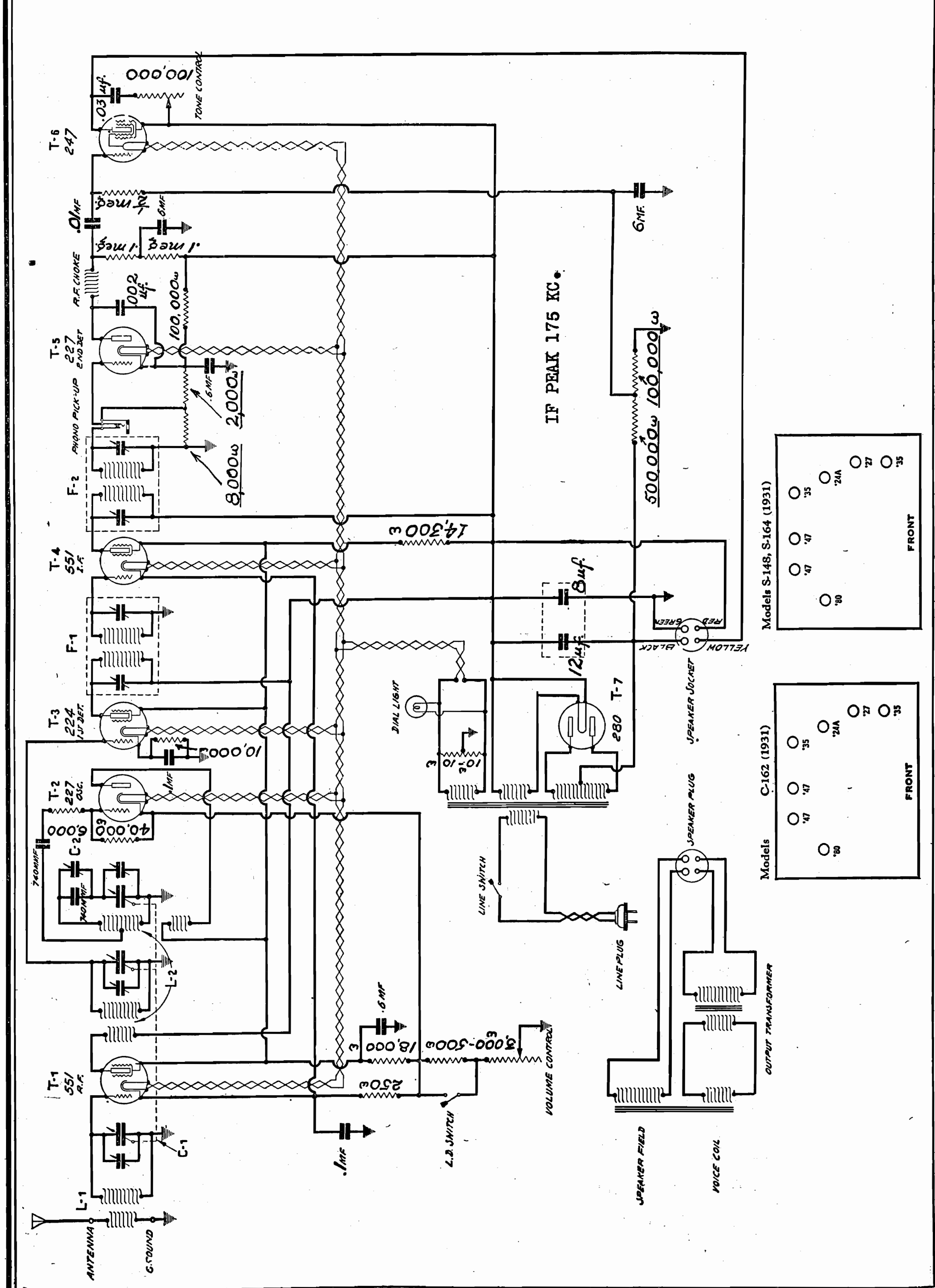


SPECIAL NOTE

A slight change was made in the D C. set. The ground binding post has been **replaced by a red** flexible wire 3 ½ feet long, to which the ground wire should be spliced. This arrangement will prevent accidental contact of the ground wire with the chassis, which always results **in one** or more blown out tubes. The **receiver otherwise** is exactly the same as **before.**

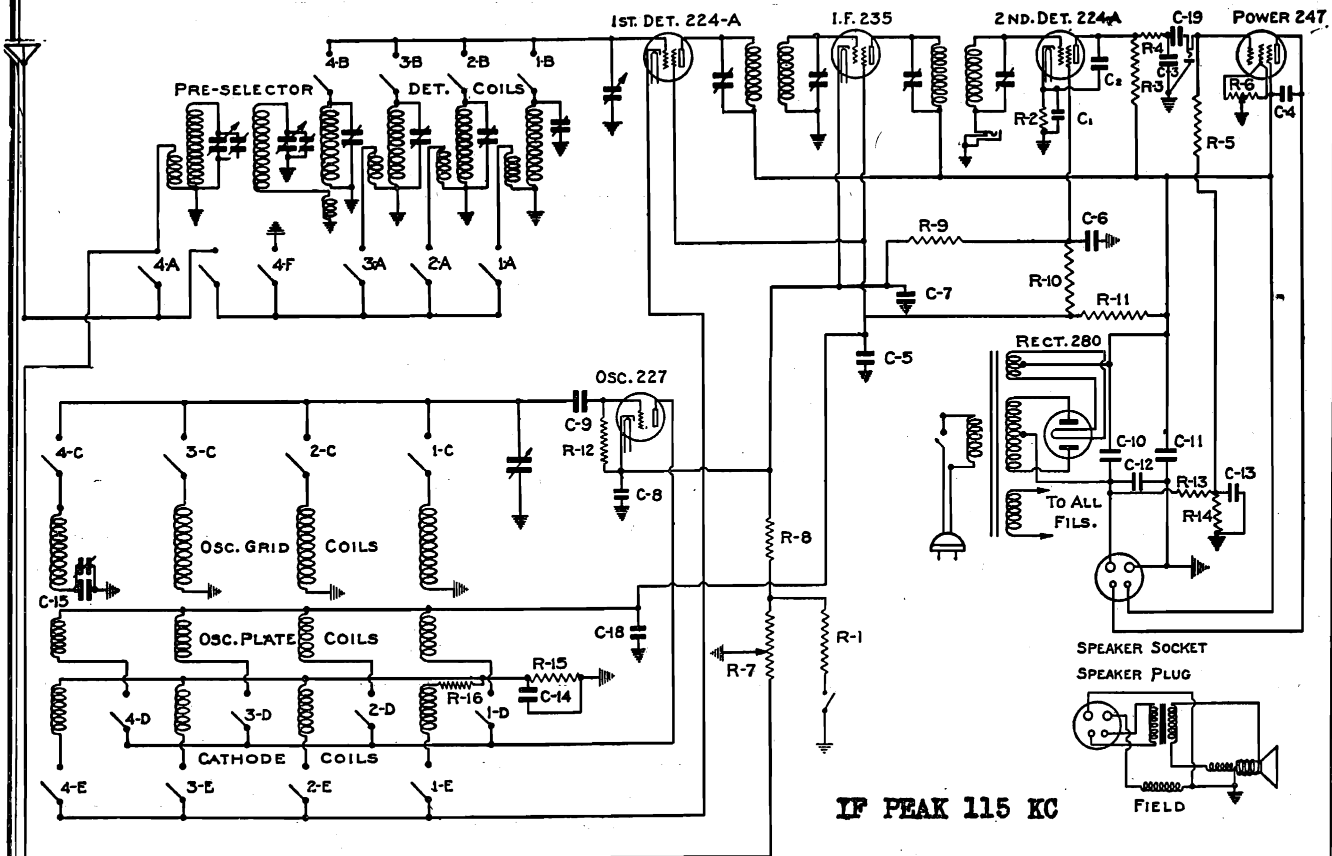
MODEL S-148, S-164
C-162, C-165

PILOT RADIO & TUBE CORP.



MODEL 1010
All Wave Dragon

PILOT RADIO & TUBE CORP.



IF PEAK 115 KC

VOLTAGES AT SOCKETS

As measured with a standard Weston Model 566 Tester—Line Voltage 115 Volts A.C.

Type Tube	Tube Position		A Vts.	B Vts.	C Vts.	Screen Vts.	Screen Current	Cath. Vts.	Plate Current
227	OSC	(a)	2.35	75	3.5*	......	......	4.	6.
		(b)	2.35	65	2.2*	......	......	36.	6.
224	1st DET	(a)	2.35	230	10	75	0.13	10	0.9
		(b)	2.35	236	11.5	100	0.15	11.5	1.0
235	I.F.	(a)	2.35	237	4.	80	1.95	4.	5.5
		(b)	2.35	212	36.	80	0	36	0.2
224	2nd DET	(a)	2.35	200†	5.	40	0.05	5.	0.1
		(b)	2.35	200†	7.5	65	0.07	7.5	0.13
247	Power	(a)	2.35	210	7.5‡	245	6.5	0	31.
		(b)	2.35	215	7.5‡	250	7.2	0	34.
280	Rect.	(a)	4.8	600					31.0 per anode
		(b)	4.8	600					29.0 per anode

(a)—Volume Control at Maximum.
(b)—Volume Control at Minimum.
*—Only when set is tuned to higher than 700 KC on B.C. band. No voltage reading on short wave bands.
†—On 1000 Volt Scale.
‡—On 250 Volt Scale. Not true bias but reading due to series resistance.

CONDENSERS

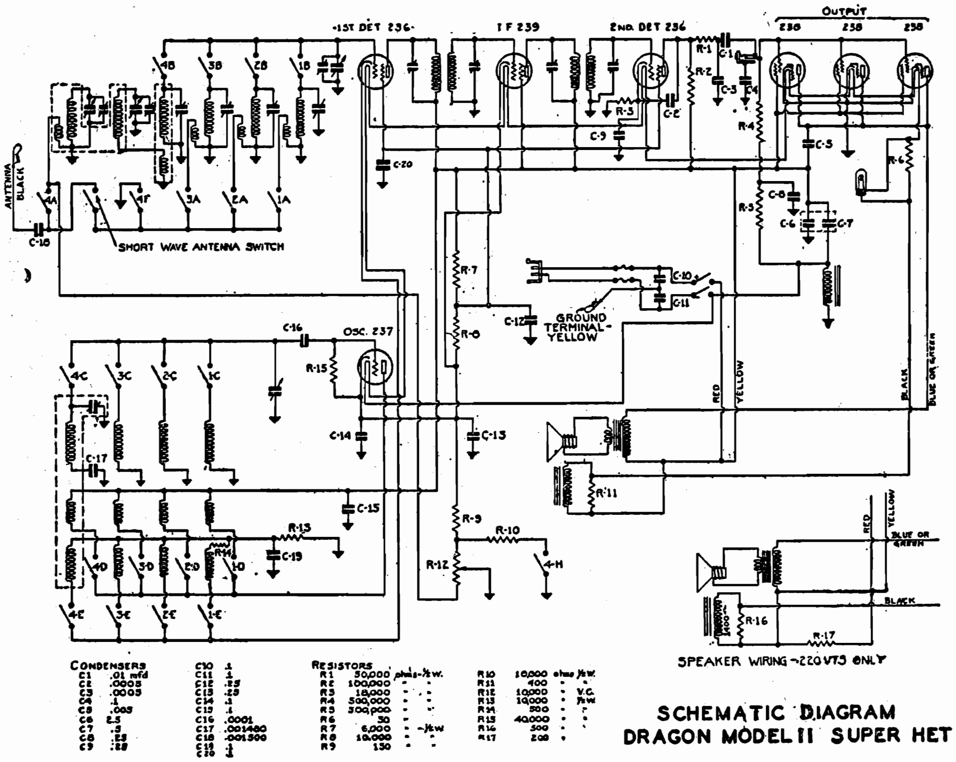
C1—.25 mfd.	C10—8.0
C2—.0005	C11—8.0
C3—.0005	C12—.035
C4—.01	C13—.25
C5—.25	C14—.10
C6—.25	C15—.00148
C7—.25	C18—.1
C8—.10	C19—.01
C9 —.0001 mfd.	

RESISTORS

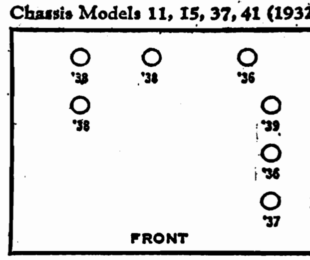
R1— 6,000 ohms ½ W.	R9 — 10,000 ohms ½ W.
R2— 40,000 " ½ W.	R10— 10,000 " ½ W.
R3—250,000 " ½ W.	R11— 14,000 " 3 W.
R4— 50,000 " ½ W.	R12— 40,000 " ½ W.
R5—500,000 " ½ W.	R13—500,000 " ½ W.
R6—Center tap resistor	R14—120,000 " ½ W.
R7—10,000 ohms	R15— 10,000 " ½ W.
R8 — 250 ohms ½ W.	R16— 500 " ½ W.

MODEL 11 Dragon DC.

PILOT RADIO & TUBE CORP.



Chassis Models 11, 15, 37, 41 (1932)



SCHEMATIC DIAGRAM DRAGON MODEL II SUPER HET

IF PEAK 115 KC

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

Line Voltage -- 220 D. C. -- .34 Amperes | Line Voltage -- 110 D. C.

Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	55.0	3.8
236	1st Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	1st Det.A	6.2	93	-3.8	52	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	62	-37	60	+33	*
236	2nd A	6.7	94.	-5.	75.	.05	1.7	.3	2nd A	6.2	26	-9.8	65	-4.5	0.18
	Det.B	6.8	100.	-6.	92.	.15	2.8	.26	Det.B	6.3	26	-10.7	51	-4.8	0.2
238	Out-A	7.2	118.	-	140.	1.5	-9.4	7.5	Out-A	6.2	85	-	100	-15.1	5.0
	put B	7.3	115.	-	143.	2.8	-11.8	10.0	put B	6.3	85	-	103	-15.7	6.5

A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

RE-ALIGNING THE SHORT WAVE BANDS

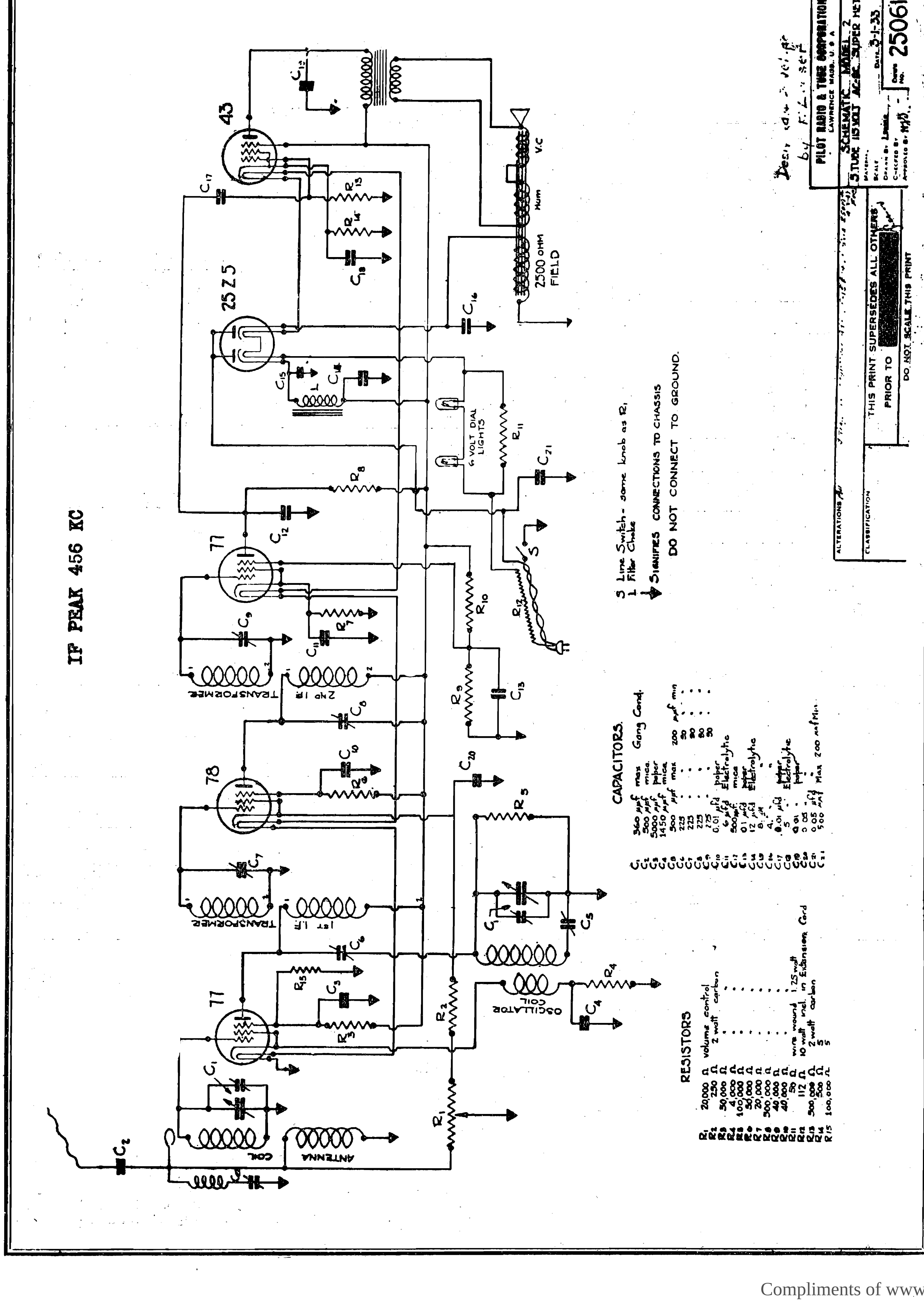
To re-align the short-wave bands, the service station should be equipped with a short-wave signal generator or oscillator, supplying a modulated output at 12,000 KC., 9,000 KC. and 3,500 KC. The first band is lined up at 12,000 KC., the second band at 9,000 KC. and the third band at 3,500 KC. In each case, the detector trimmer is adjusted to give best sensitivity. The method is the same on each band and may be described as follows:-

MICROPHONIC HOWL - may be due to:

1. Microphonic tubes. Replace all tubes with tested tubes.
2. Oscillation. Locate and remove cause.
3. Vibration of gang condenser. Check the rubber mountings and see that the gang condenser is properly cushioned. Make sure that the dial or dial shaft is not touching the cabinet or escutcheon.

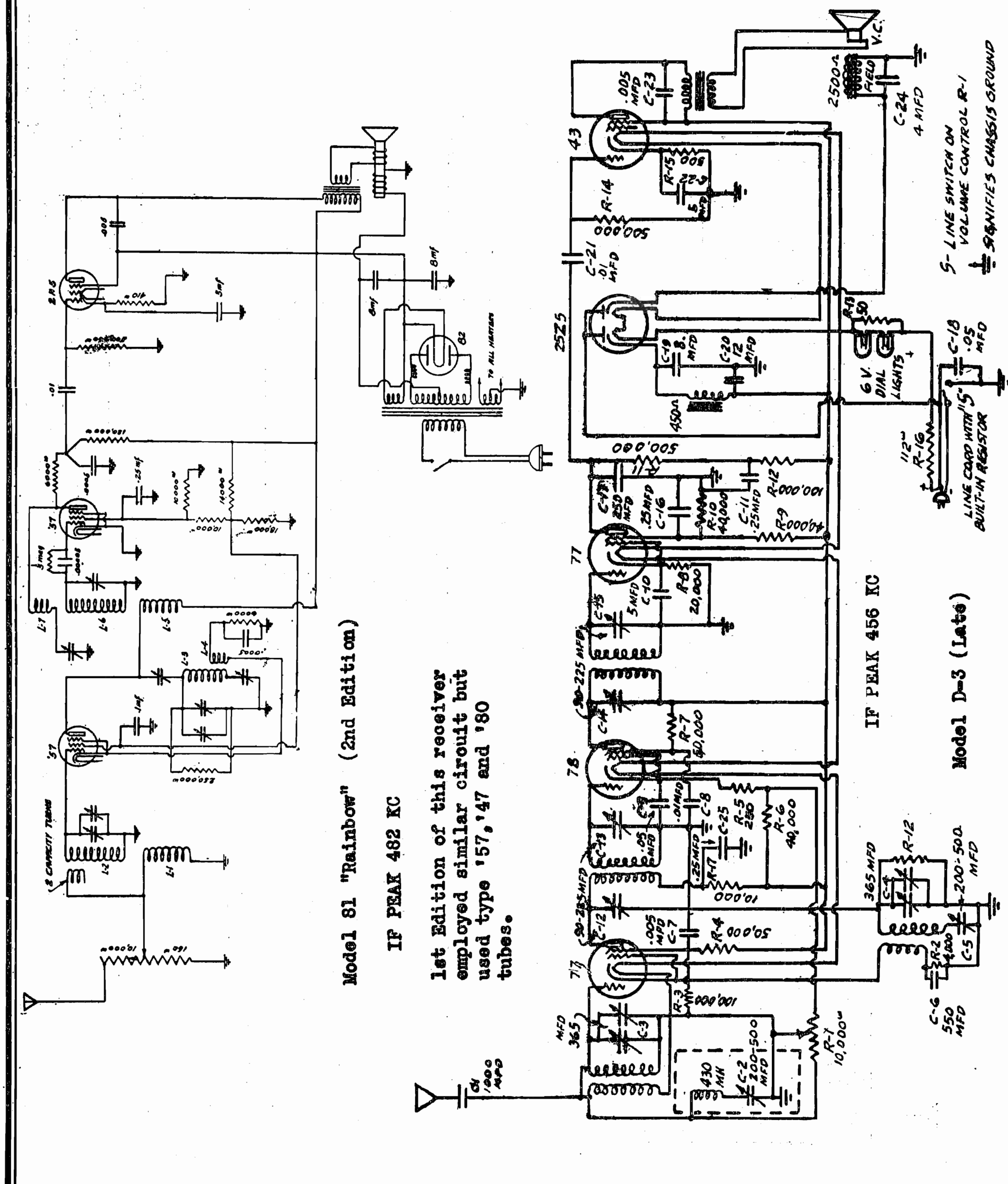
MODEL B-2
Standard.

PILOT RADIO & TUBE CORP.



PILOT RADIO & TUBE CORP.

MODEL **81 Rainbow**
2nd Edition
MODEL **D-3 AC-DC**
Late



Model 81 "Rainbow" (2nd Edition)

IF PEAK 482 KC

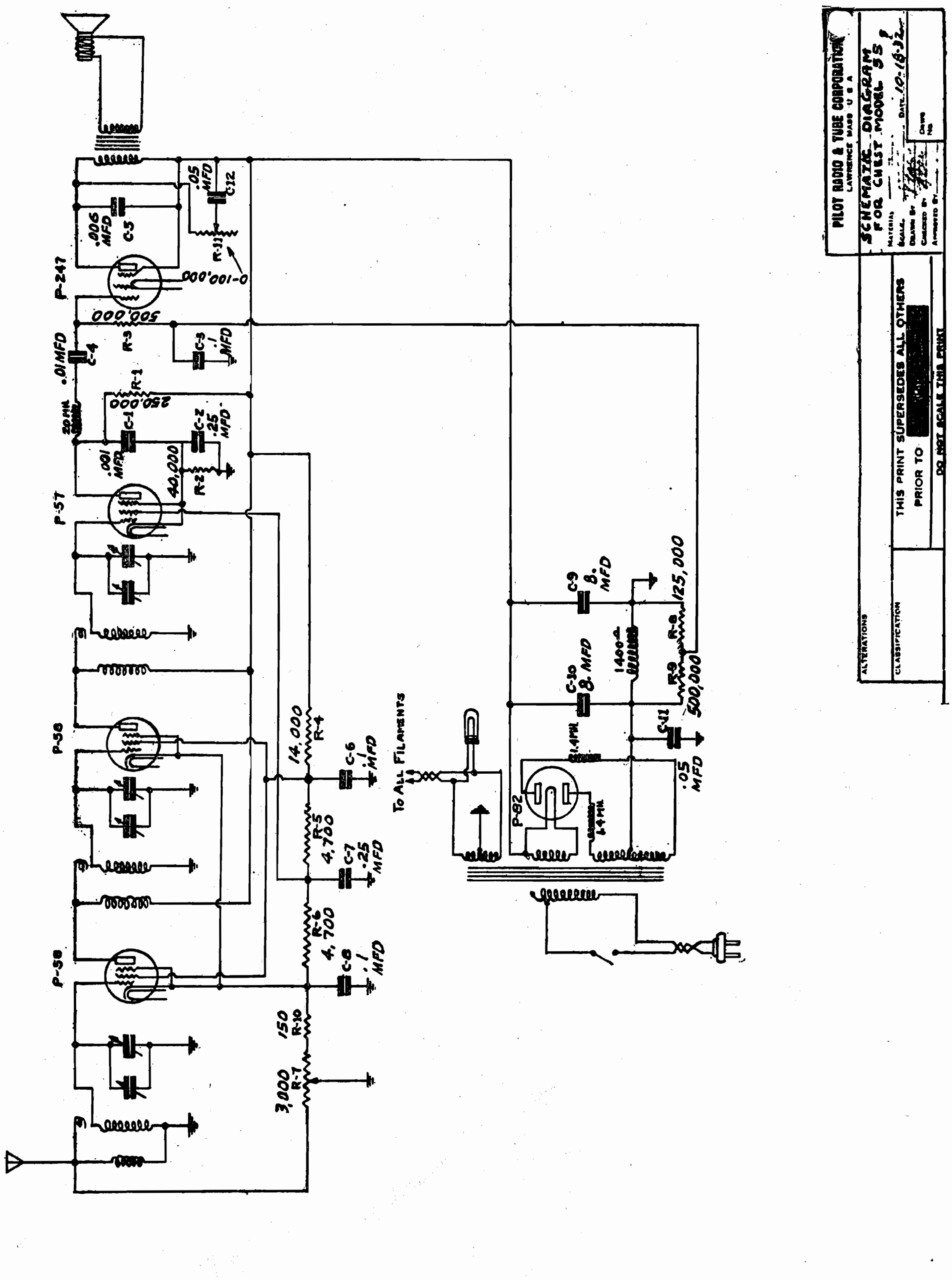
1st Edition of this receiver employed similar circuit but used type '57, '47 and '80 tubes.

IF PEAK 456 KC

Model D-3 (Late)

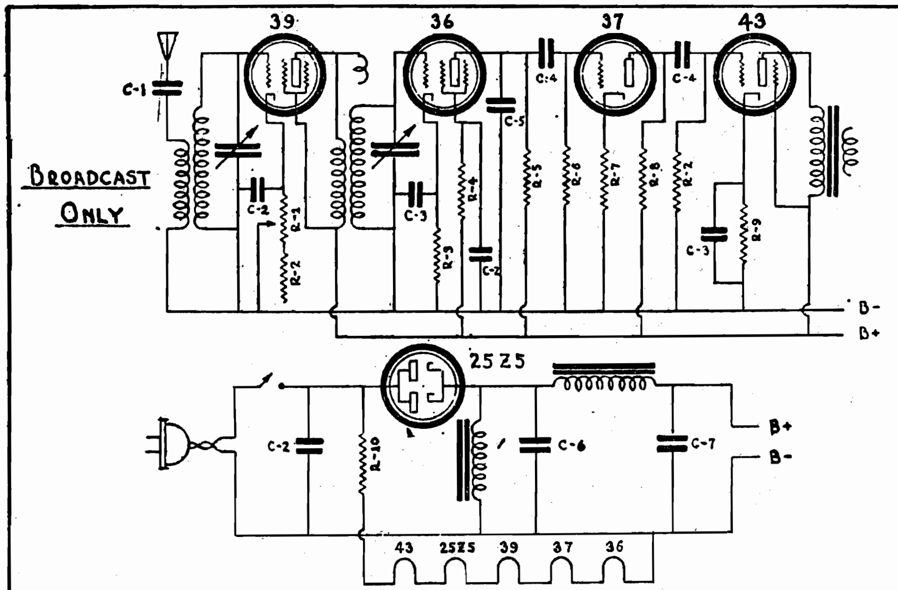
MODEL 55
Capt. Kidd
Chest

PILOT RADIO & TUBE CORP.



MODEL 49-A
MODEL 549

PLAZA MUSIC CO.



-: LEGEND :-

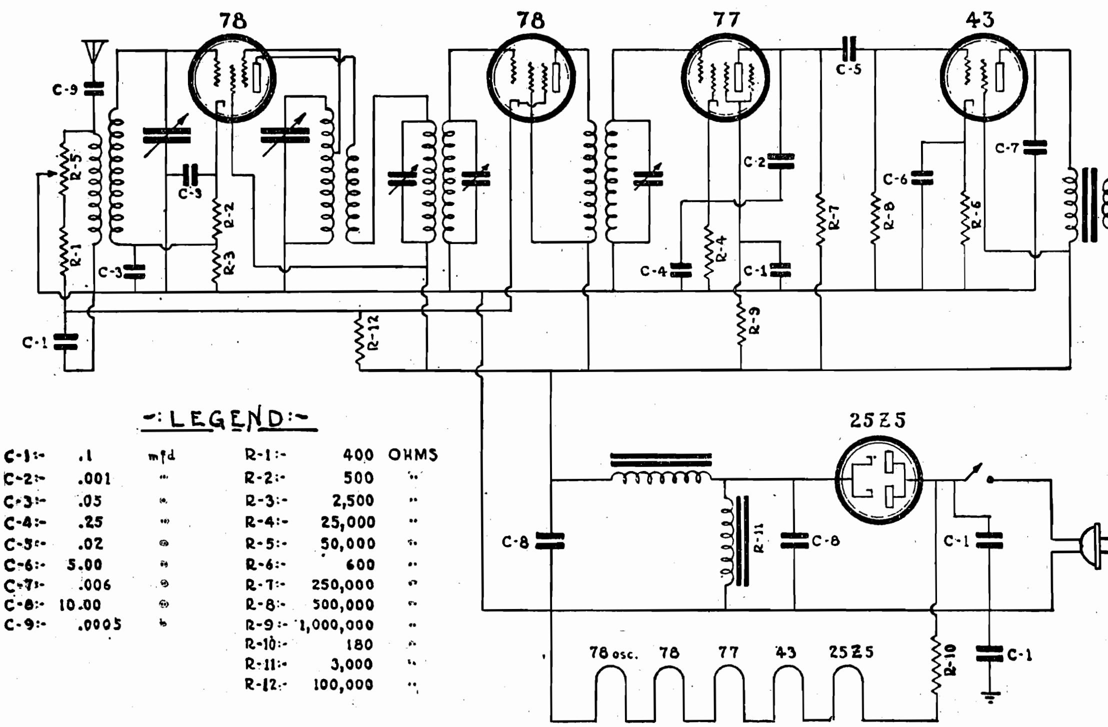
C-1 :-	.002	mfd
C-2 :-	.1	"
C-3 :-	5.	"
C-4 :-	.01	"
C-5 :-	.0005	"
C-6 :-	8.	"
C-7 :-	4.	"

5 TUBE T.R.F.

MODEL 49-A

DATE:-4-22-33

R-1 :-	400	OHMS
R-2 :-	100,000	"
R-3 :-	30,000	"
R-4 :-	5,000,000	"
R-5 :-	350,000	"
R-6 :-	250,000	"
R-7 :-	3,000	"
R-8 :-	50,000	"
R-9 :-	600	"
R-10 :-	180	"



-: LEGEND :-

C-1 :-	.1	mfd	R-1 :-	400	OHMS
C-2 :-	.001	"	R-2 :-	500	"
C-3 :-	.05	"	R-3 :-	2,500	"
C-4 :-	.25	"	R-4 :-	25,000	"
C-5 :-	.02	"	R-5 :-	50,000	"
C-6 :-	5.00	"	R-6 :-	600	"
C-7 :-	.006	"	R-7 :-	250,000	"
C-8 :-	10.00	"	R-8 :-	500,000	"
C-9 :-	.0005	"	R-9 :-	1,000,000	"
			R-10 :-	180	"
			R-11 :-	3,000	"
			R-12 :-	100,000	"

IF PEAK 456 KC

5 TUBE SUPER

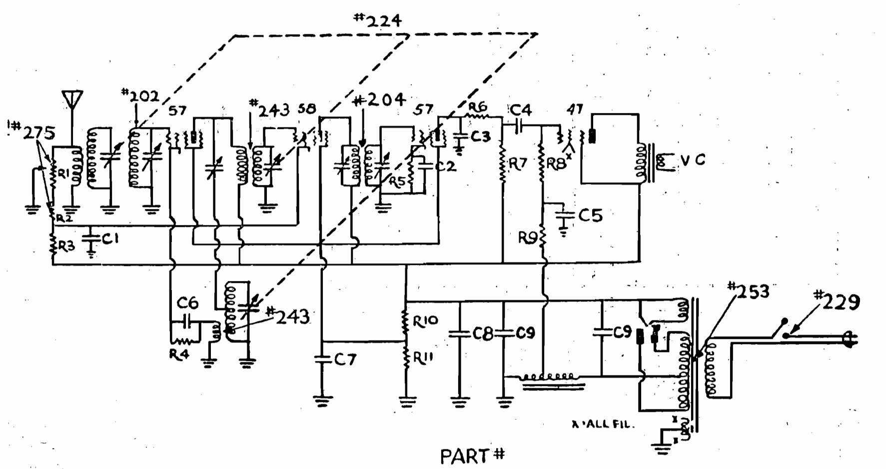
456 K.C.

DRAWING:-439 DATE:-3-29-33

MODEL 549

MODEL 711 Super
MODEL 711 Junior
MODEL 6 Tube Long Wave

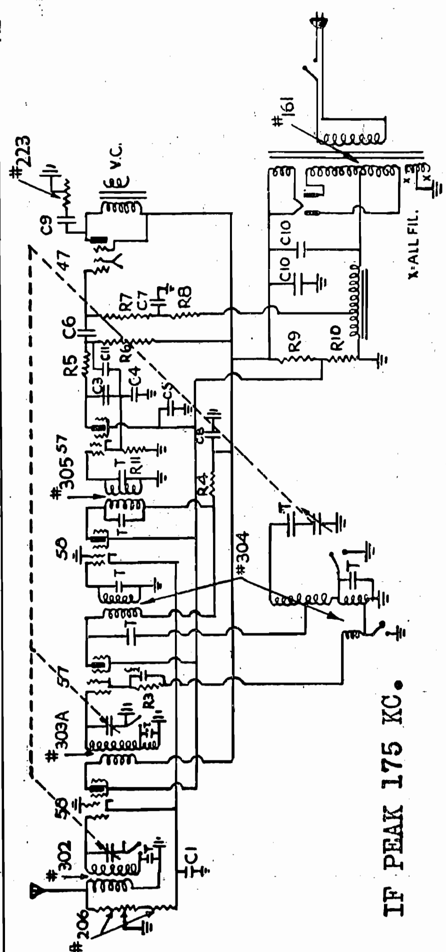
PLAZA MUSIC CO.



R1	15 000Ω	C1	.1 MFD.	PART #	
R2	250Ω	C2	.1 MFD	145 BS	- Speaker
R3	100 000Ω	C3	.001 MFD.	227	- Dial
R4	3500Ω	C4	.015 MFD.	278	- Tube shields only
R5	35 000Ω	C5	.1 MFD.	276	" " Base
R6	11 000Ω	C6	.002 MFD		
R7	250 000Ω	C7	.1 MFD.		
R8	500 000Ω	C8	.1 MFD.		
R9	500 000Ω	C9	8. MFD.		
R10	25 000Ω				
R11	21 000Ω				

IF PEAK 175 KC.

711 5 TUBE SUPER
DWG. # 286

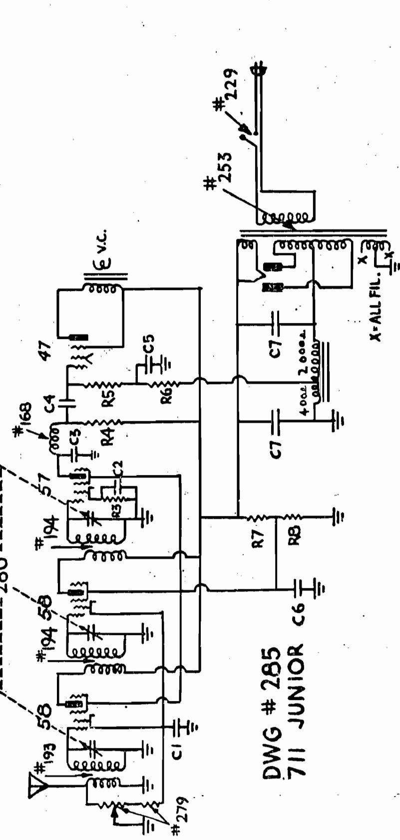


IF PEAK 175 KC.

R3	7000Ω ½w.	C1	.25 MFD.
R4	1000Ω ½w.	C2	.001 MFD.
R5	25000Ω ½w.	C3	.0005 MFD.
R6	150000Ω 1w.	C4	.5 MFD.
R7	500000Ω ½w.	C5	.5 MFD.
R8	100000Ω ½w.	C6	.015 MFD.
R9	21000Ω 3w.	C7	.25 MFD.
R10	15000Ω 1w.	C8	.1 MFD.
R11	25000Ω ½w.	C9	.05 MFD.
		C10	8. MFD.
		C11	.00025 MFD.

PART #
212 - Dial and Pilot Light Assembly
126S - Speaker
227 - Tube Shields Only
226 " " Base
334 Taden Trimmer (T)

6 TUBE LONG WAVE
DWG. # 335



DWG # 285
711 JUNIOR

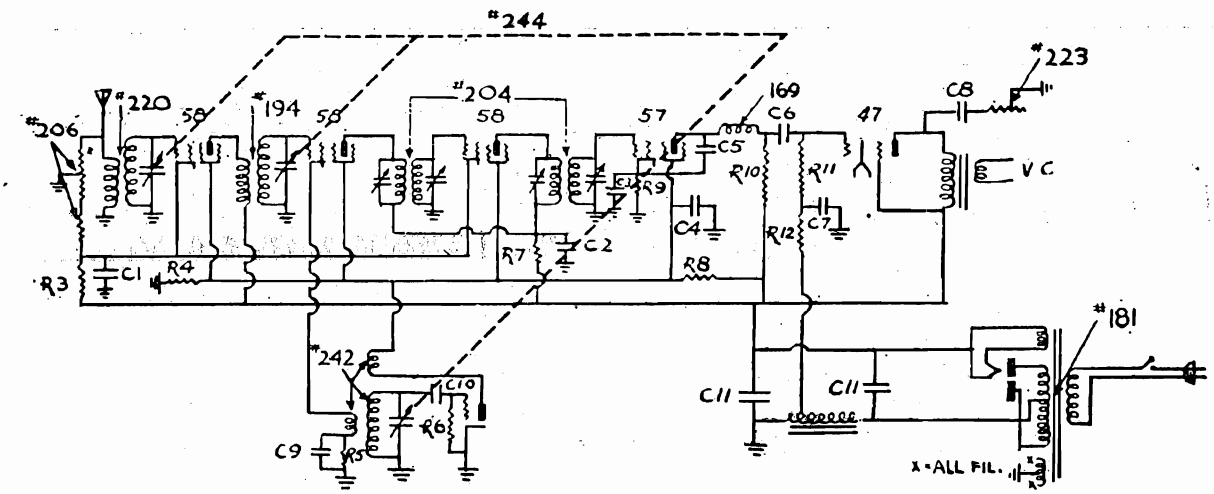
R3	- 35000Ω
R4	- 250000Ω
R5	- 500000Ω
R6	- 500000Ω
R7	- 25000Ω
R8	- 32000Ω

C1	.1 MFD.
C2	.1 "
C3	.001 "
C4	.015 "
C5	.1 "
C6	.1 "
C7	8. "

PART #
145-BS - Speaker
227 - Dial
277 - Tube Shield Only
276 - " " Base
239 - Tone Control
284 - Switch & Vol. Control

PLAZA MUSIC CO.

MODEL 6 Tube TRF
MODEL 7 Tube Super

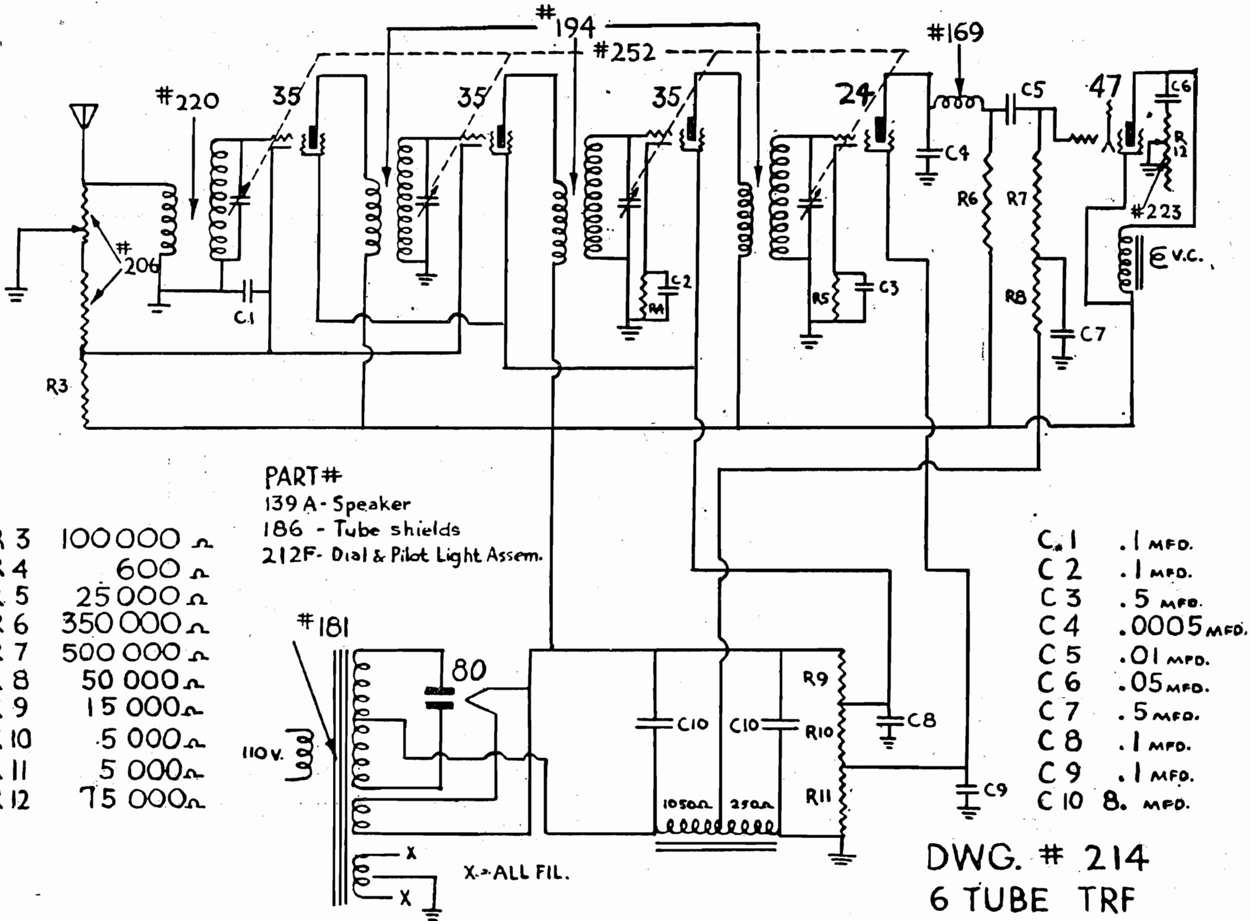


R3	100 000 Ω 1 w.	C1	.1 MFD.
R4	17 000 Ω 1 w.	C2	.1 MFD.
R5	3 500 Ω ½ w.	C3	.5 MFD.
R6	100 000 Ω ½ w.	C4	.5 MFD.
R7	1 000 Ω ½ w.	C5	.0005 MFD.
R8	11 000 Ω 3 w.	C6	.015 MFD.
R9	35 000 Ω ½ w.	C7	.5 MFD.
R10	250 000 Ω ½ w.	C8	.05 MFD.
R11	500 000 Ω ½ w.	C9	.1 MFD.
R12	100 000 Ω ½ w	C10	.00009 MFD.
		C11	8. MFD.

PART #
126 S - Speaker
278 - Tube Shields Only
276 - " " Bases
212 F - Dial and Pilot Lamp Assembly

DWG. # 330

I.F. PEAK 175 KC.



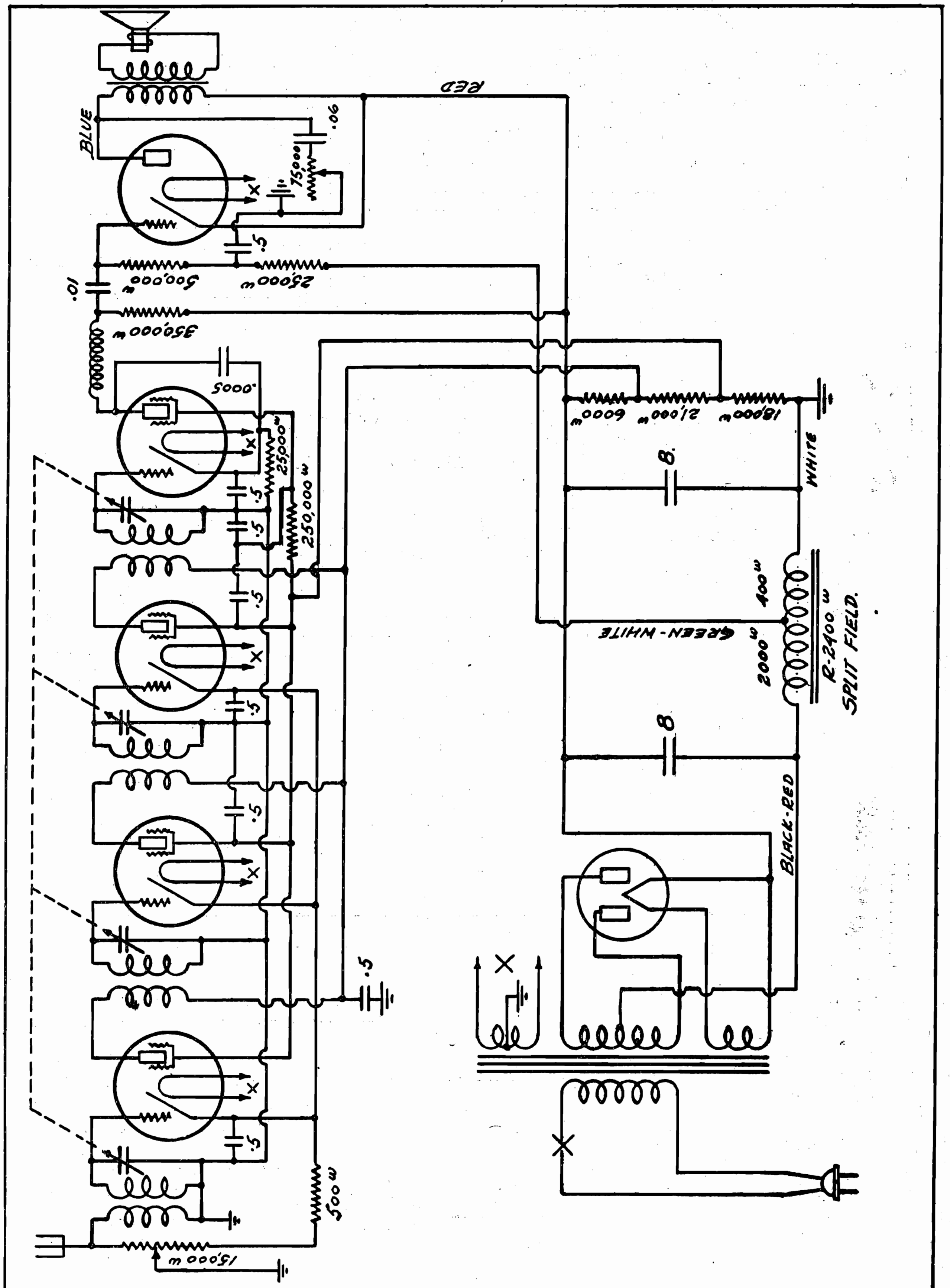
PART #
139 A - Speaker
186 - Tube shields
212F - Dial & Pilot Light Assem.

R 3	100000 Ω	C 1	.1 MFD.
R 4	600 Ω	C 2	.1 MFD.
R 5	25000 Ω	C 3	.5 MFD.
R 6	350000 Ω	C 4	.0005 MFD.
R 7	500 000 Ω	C 5	.01 MFD.
R 8	50 000 Ω	C 6	.05 MFD.
R 9	15 000 Ω	C 7	.5 MFD.
R 10	5 000 Ω	C 8	.1 MFD.
R 11	5 000 Ω	C 9	.1 MFD.
R 12	75 000 Ω	C 10	8. MFD.

DWG. # 214
6 TUBE TRF

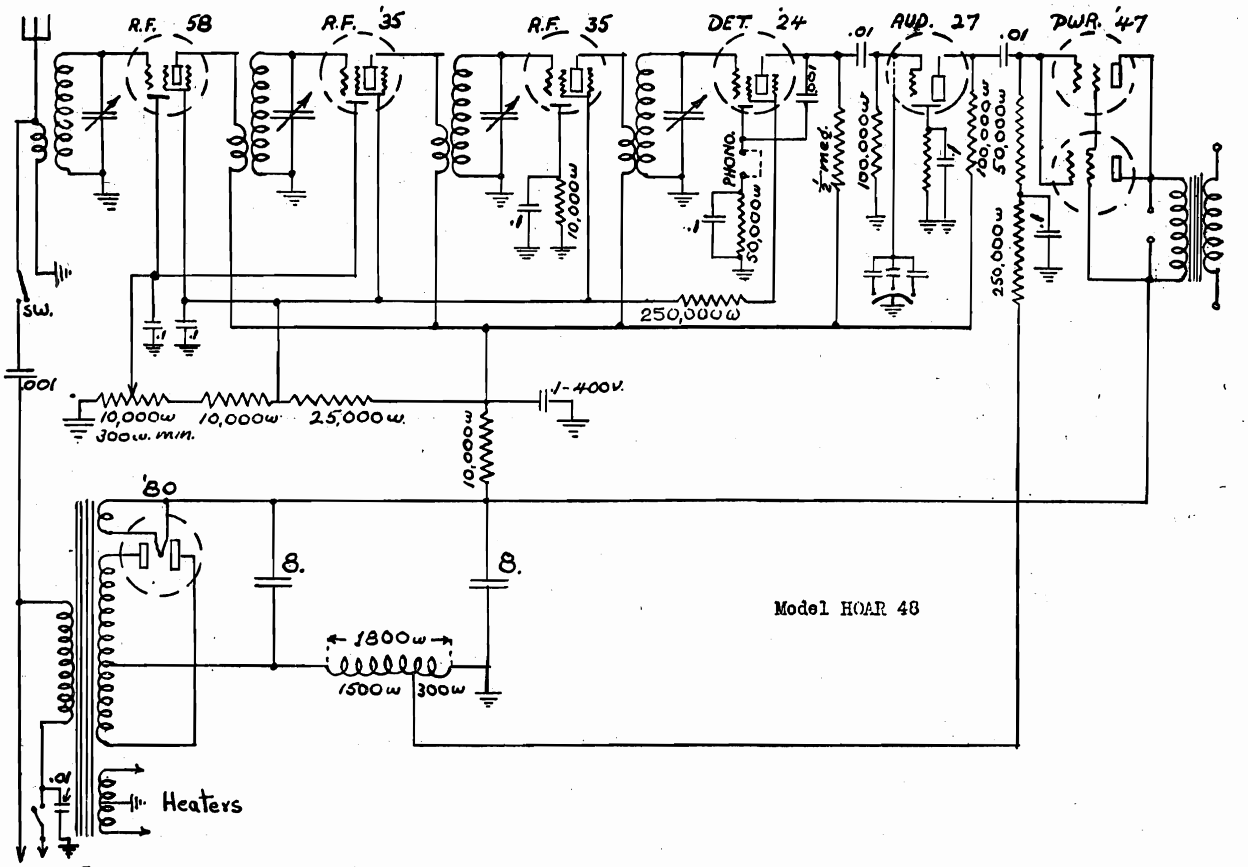
MODEL 24 Standard

PLAZA MUSIC CO.

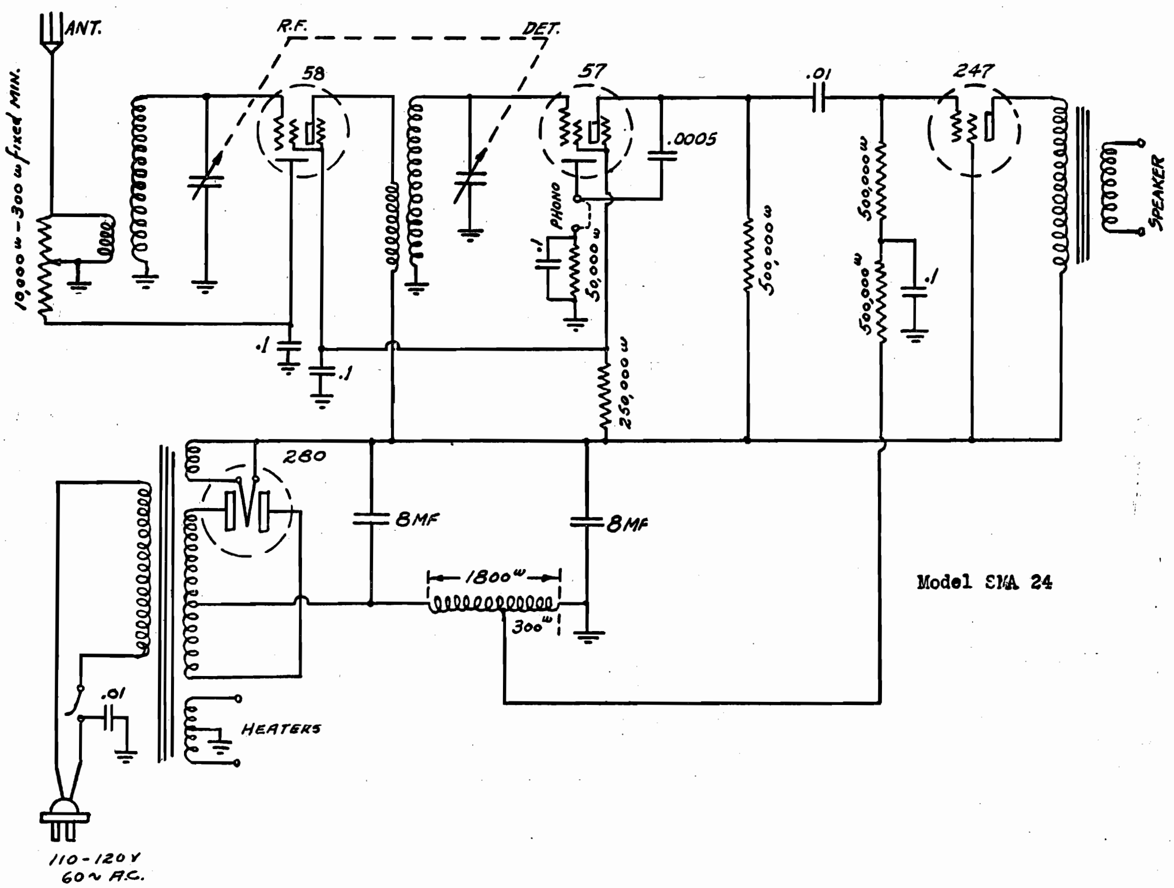


RADIO CHASSIS, INC.

MODEL HOAR 48
MODEL SMA 24



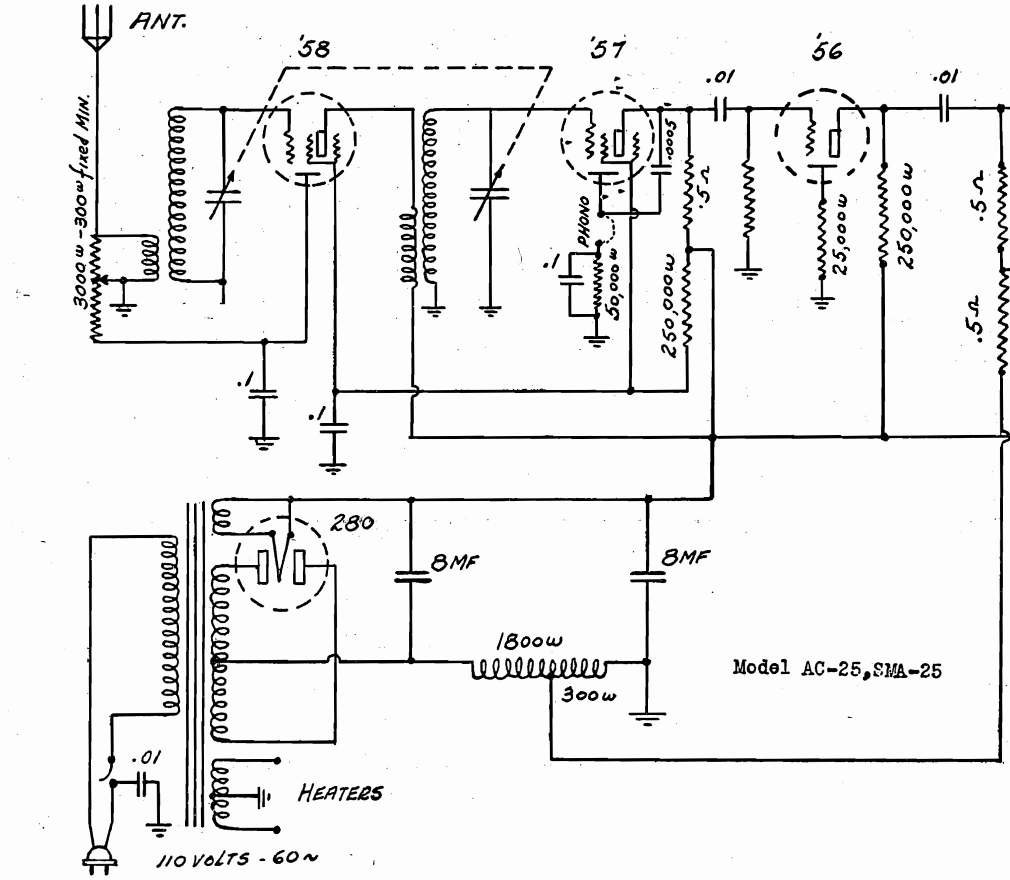
Model HOAR 48



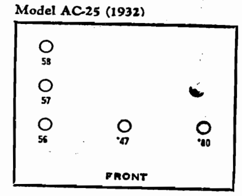
Model SMA 24

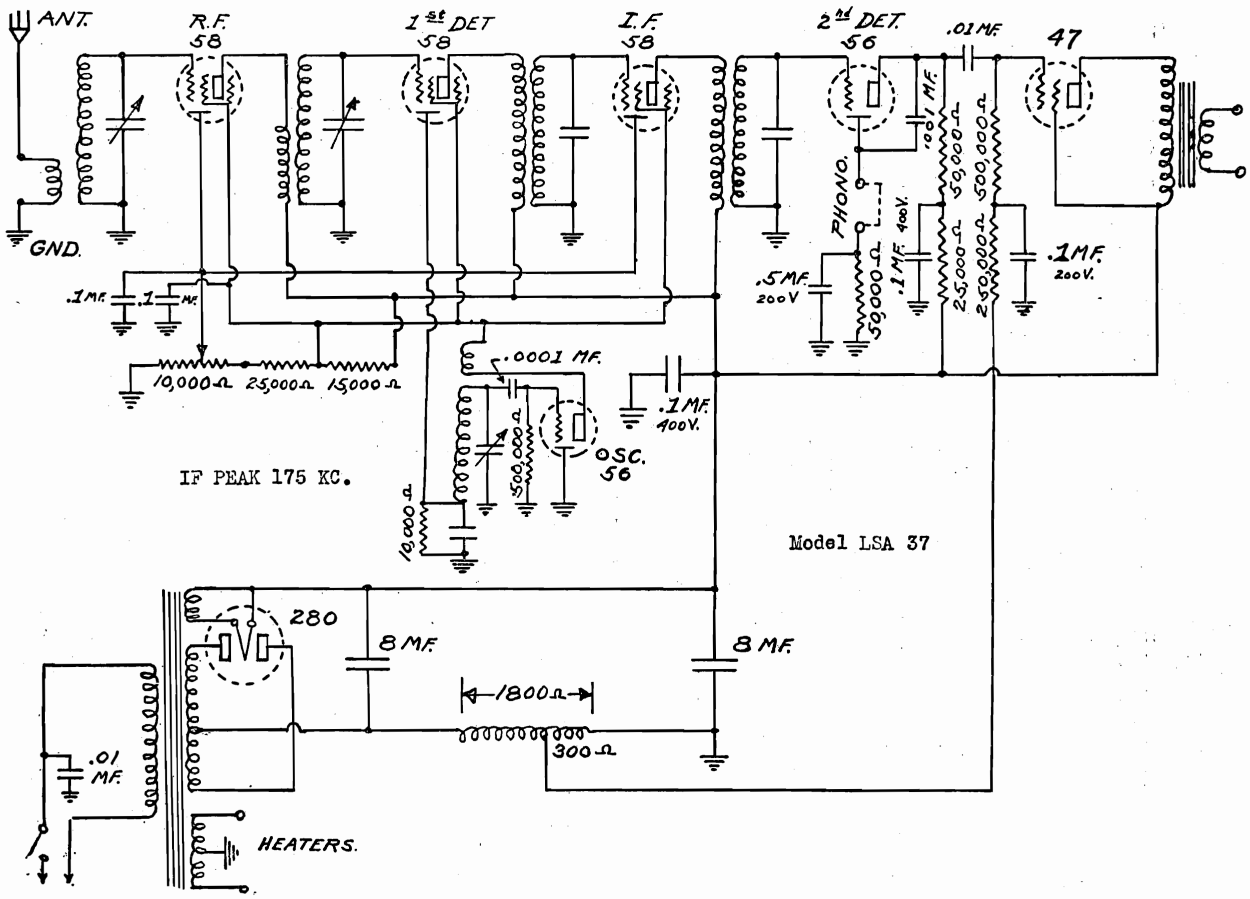
MODEL LSA 37
MODEL AC-25,SMA-25

RADIO CHASSIS, INC.



Model AC-25,SMA-25



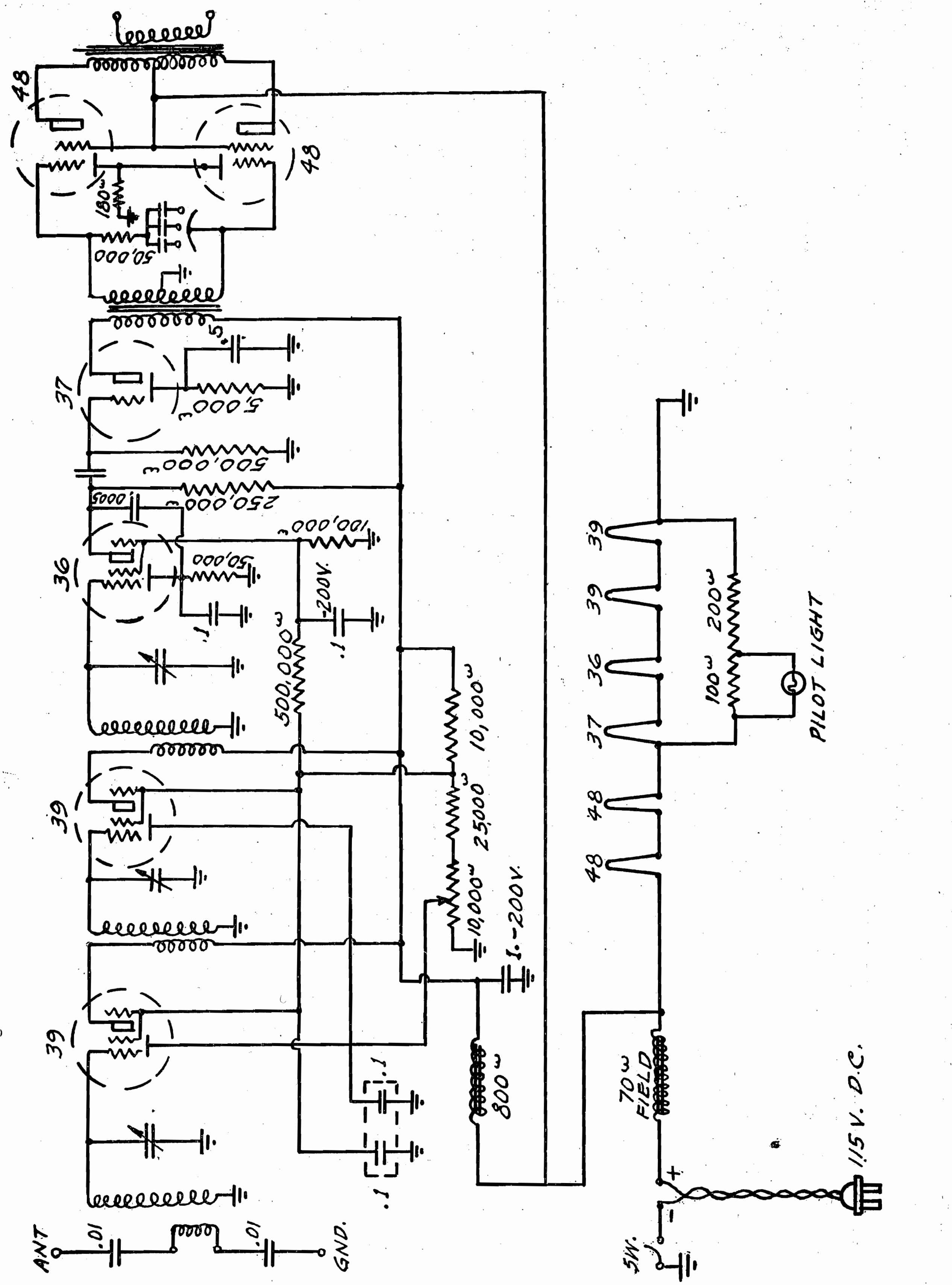


IF PEAK 175 KC.

Model LSA 37

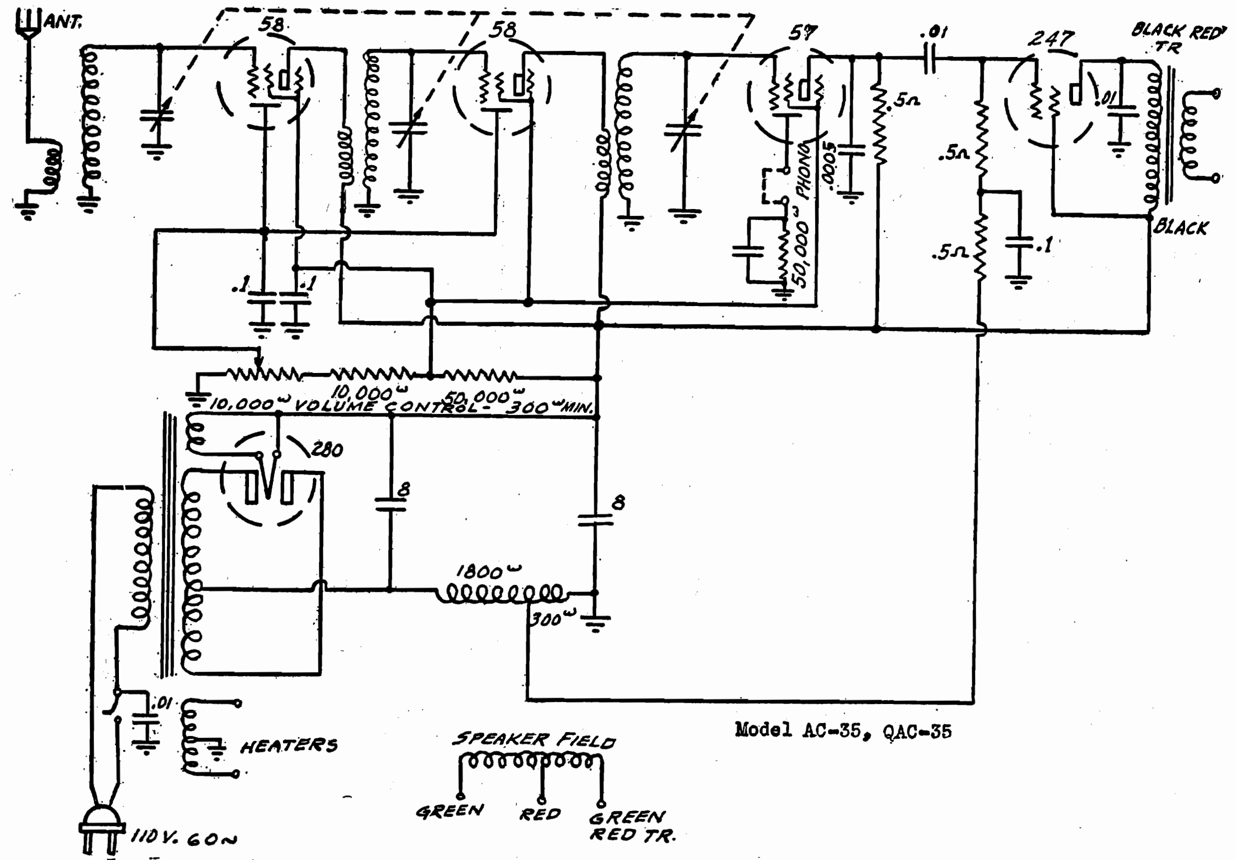
RADIO CHASSIS, INC.

MODEL SDC-36

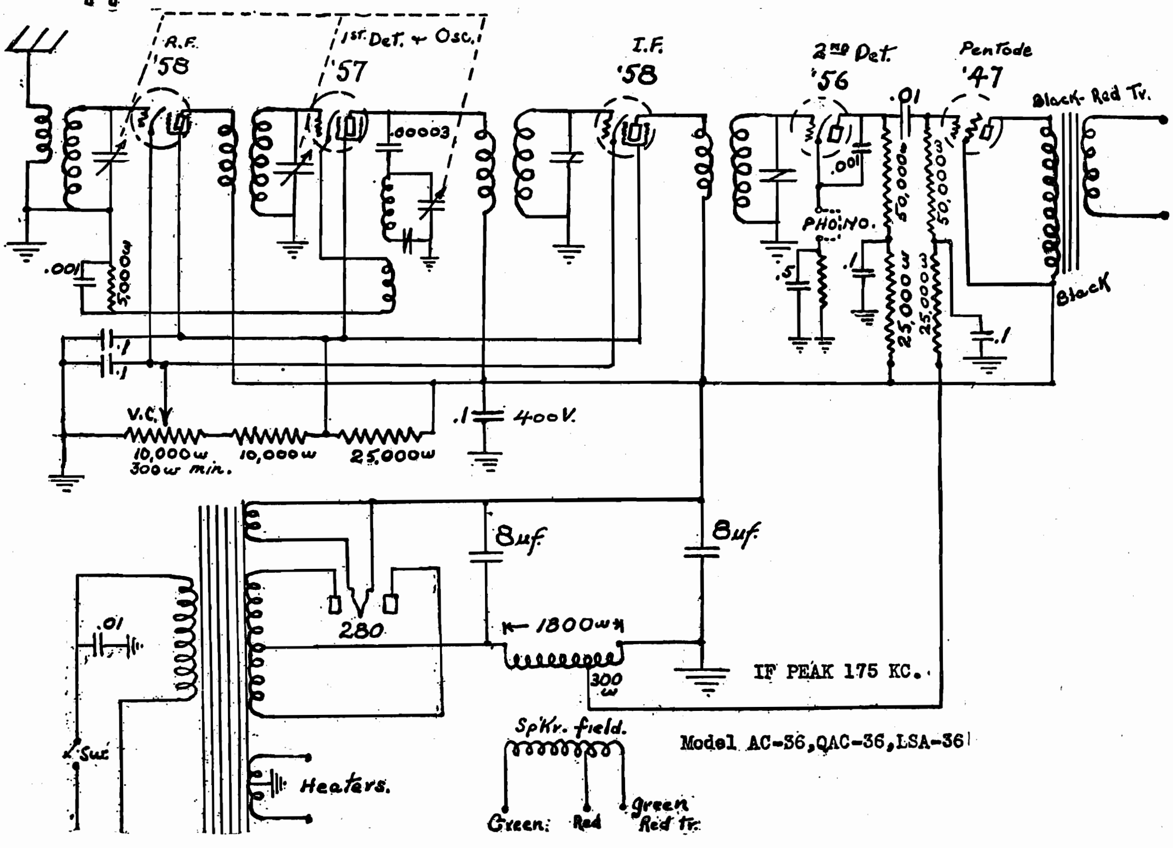


MODEL AC-36, QAC-36, LSA-36
MODEL AC-35, QAC-35

RADIO CHASSIS, INC.



Model AC-35, QAC-35

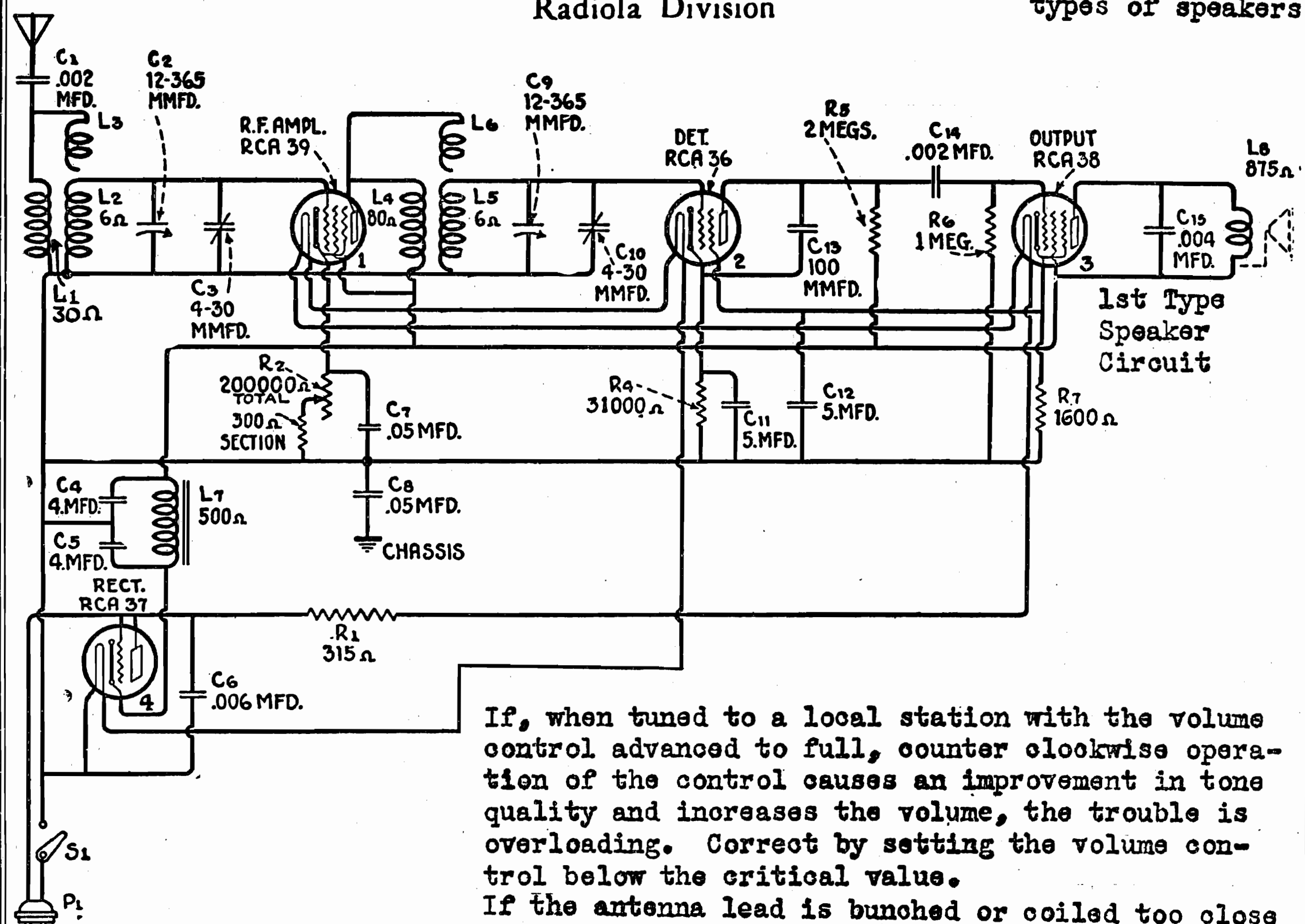


IF PEAK 175 KC.

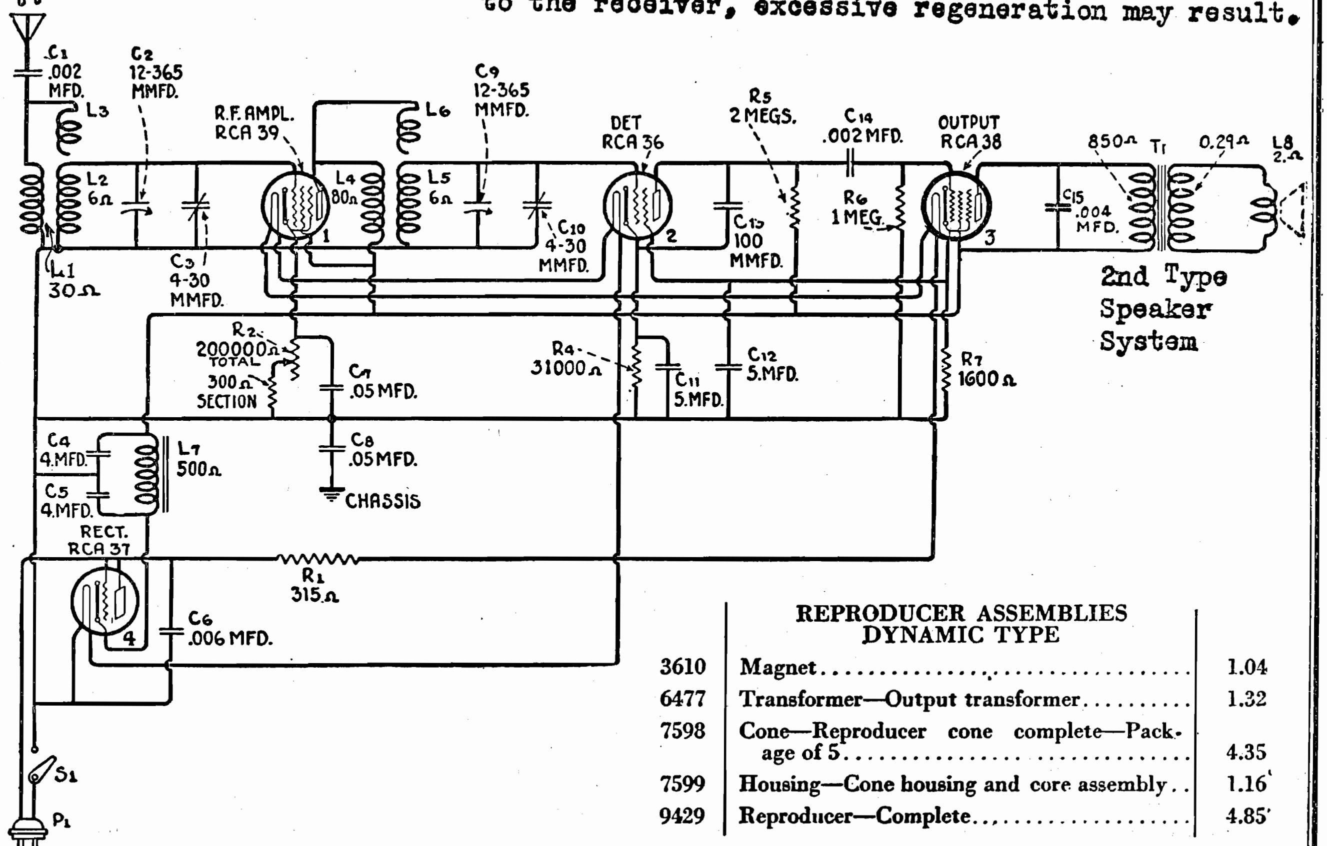
Model AC-36,QAC-36,LSA-36

R. C. A. VICTOR CO., INC.
Radiola Division

MODEL R-27 AC-DC
Schematic with 2 types of speakers



If, when tuned to a local station with the volume control advanced to full, counter clockwise operation of the control causes an improvement in tone quality and increases the volume, the trouble is overloading. Correct by setting the volume control below the critical value.
If the antenna lead is bunched or coiled too close to the receiver, excessive regeneration may result.

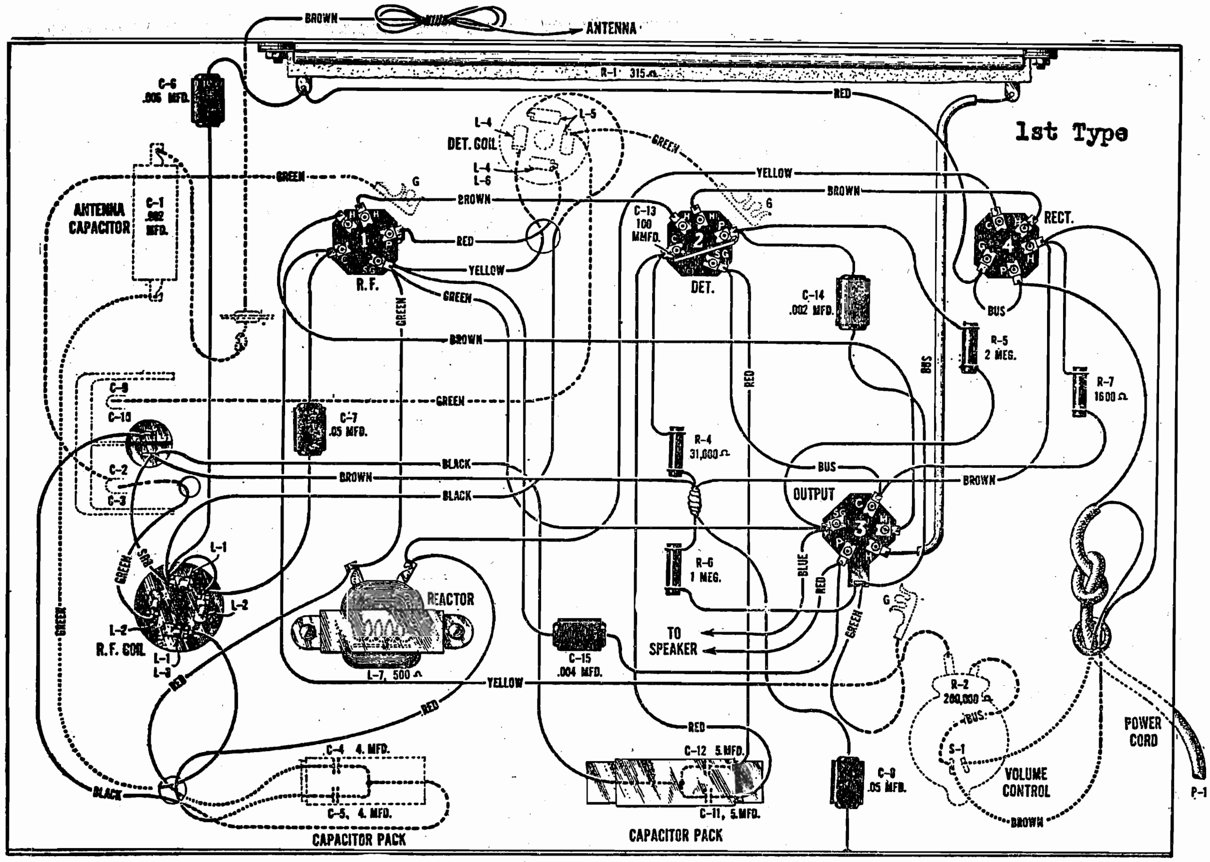


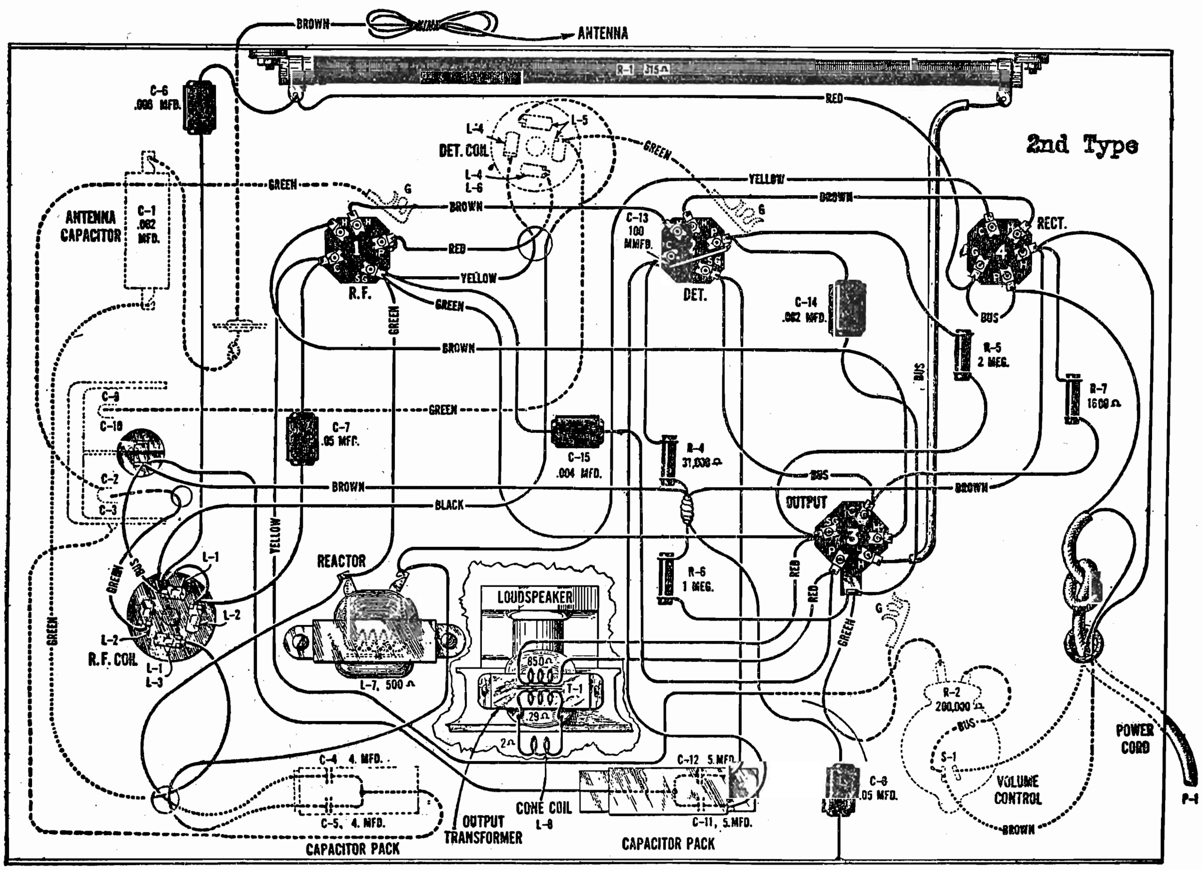
REPRODUCER ASSEMBLIES
DYNAMIC TYPE

3610	Magnet	1.04
6477	Transformer—Output transformer	1.32
7598	Cone—Reproducer cone complete—Package of 5	4.35
7599	Housing—Cone housing and core assembly	1.16
9429	Reproducer—Complete	4.85

MODEL R-27 AC-DC
Chasses. Two Types

R. C. A. VICTOR CO., INC.





MODEL R-27 AC-DC
Voltage- Parts List

R. C. A. VICTOR CO., INC.

SERVICE DATA

Electrical Specifications

Voltage Rating..105–120 Volts, 25–133 Cycles A. C. or D. C.
Power Consumption............................40 Watts
Frequency Range...................540 K. C.–1700 K. C.
Type and Number of Radiotrons—
1 RCA-36, 1 RCA-37, 1 RCA-38, 1 RCA-39—Total 4

This receiver is an A. C.–D. C. table model tuned R. F. broadcast receiver. Features such as universal operation of both A. C. and D. C., wide tuning range, excellent performance and compact construction characterize this instrument. Figures A and B show the schematic and wiring diagrams respectively. The voltage readings and replacement parts are given below.

RADIOTRON SOCKET VOLTAGES

Measured at Maximum Volume—115 Volt A. C. Line
All Voltages on D. C. will be slightly lower

Radiotron No.	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid, Volts	Cathode or Filament to Plate, Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-39 R. F.	3.0	105	105	7.0	6.0
2. RCA-36 Det.	*0.75	11.0	*60	.025	6.0
3. RCA-38 Output	11.0	100	95	5	6.0
4. RCA-37 Rect.	—	—	115	15	6.0

*Impossible to measure on ordinary voltmeter

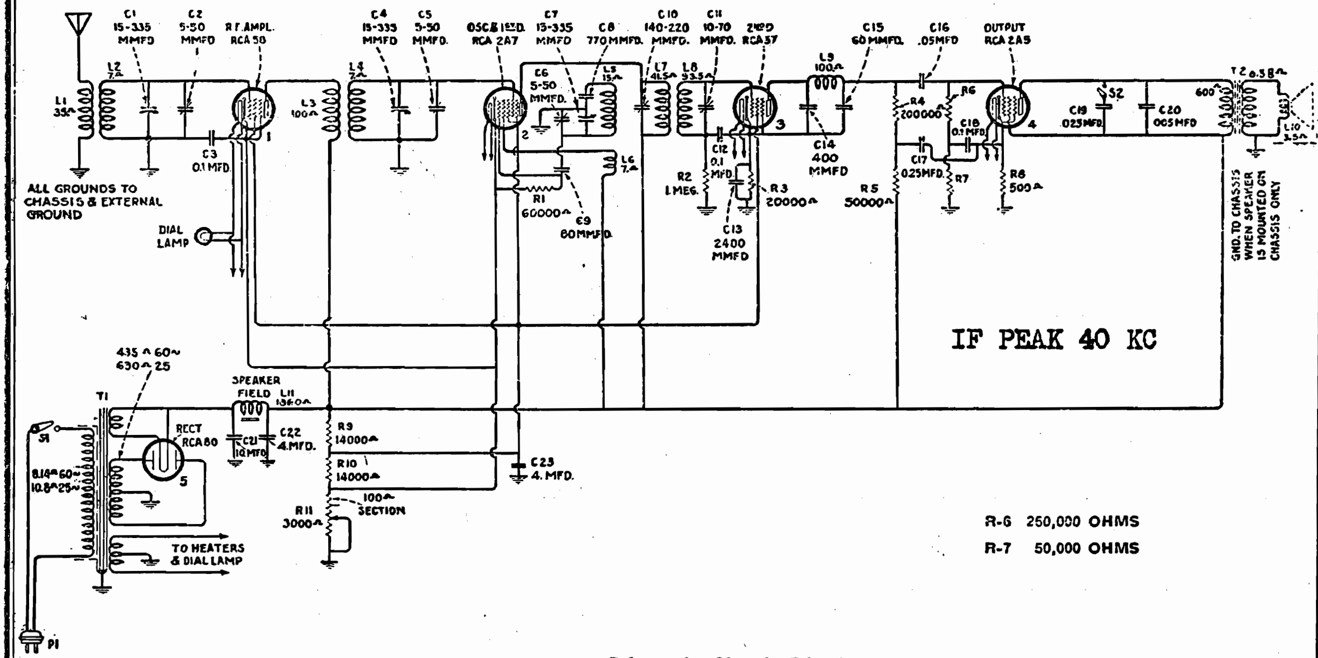
REPLACEMENT PARTS

(Replacement parts may be purchased from authorized Distributors or Dealers only)

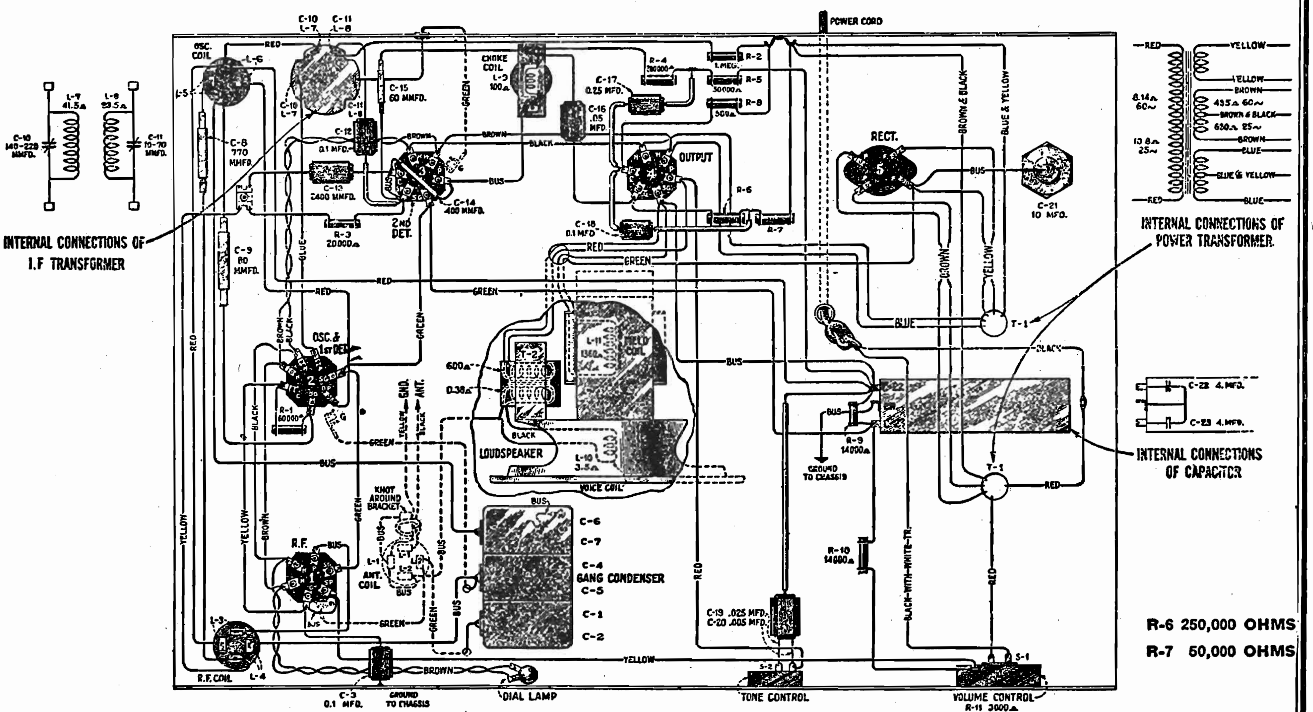
Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
3076	Resistor—1 megohm—Carbon type—Package of 5	$2.50
3456	Capacitor—.05 mfd.	.44
3536	Capacitor—Filter capacitor—Two 5.0 mfd. capacitors	1.10
3537	Reactor—Filter reactor	1.10
3538	Capacitor—Filter capacitor—Two 4.0 mfd.	1.18
3539	Coil—R. F. coil complete	1.08
3540	Coil—Detector coil	.98
3541	Resistor—Filament resistor—315 ohms	1.00
3542	Volume control—Complete with mounting nut	1.18
3557	Capacitor—0.002 mfd.	.30
3559	Resistor—31,000 ohms—Carbon type—½ watt—Package of 5	1.00
3560	Resistor — 1,600 ohms — Carbon type— ½ watt—Package of 5	1.00
3561	Capacitor—0.004 mfd.	$0.42
3562	Capacitor—0.006 mfd.	.42
3567	Escutcheon—Station selector escutcheon	.42
3568	Escutcheon—Volume control escutcheon	.42
3569	Knob—Station selector or volume control knob—Package of 5	.65
6188	Resistor—2 megohm—Carbon type—½ watt —Package of 5	2.00
6451	Condenser—Two gang variable tuning condenser	2.04
7484	Socket—Radiotron socket—5 contact	.65
10405	Capacitor—Antenna series capacitor—.002 mfd.	.50
10820	Capacitor—100 mmfd.	.50
	REPRODUCER ASSEMBLIES	
9426	Reproducer—Complete	4.38

MODEL R-28
Schematic
Chassis

R. C. A. VICTOR CO., INC.



Schematic Circuit Diagram



Wiring Diagram

R. C. A. VICTOR CO., INC.

MODEL R-28
Voltage
Parts List

SERVICE DATA

Voltage Rating..........................105–125 Volts
Frequency Rating..........25–40 Cycles and 50–60 Cycles
Power Consumption..........................70 Watts
Number and Types of Radiotrons..............1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output..........................1.75 Watts
Frequency Range..............540 K. C. to 1500 K. C.

This receiver is a five-tube Super-Heterodyne incorporating a Dynamic Loudspeaker as a part of the chassis; two-point tone control; single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer only using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K. C. The I. F. frequency is 175 K. C. and the two circuits that comprise it are adjusted for maximum output at 175 K. C.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

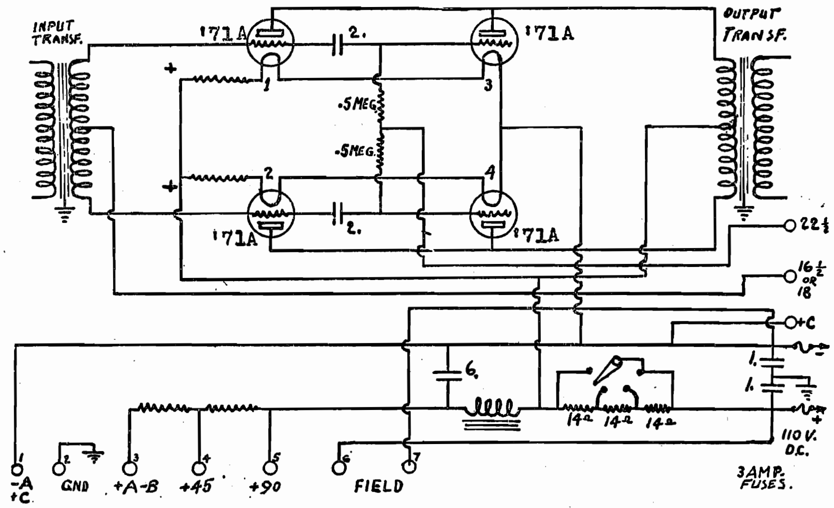
Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

REPLACEMENT PARTS

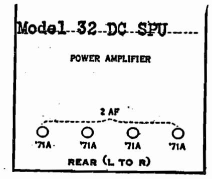
Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2747	Contact cap—Package of 5	$0.50
2749	Capacitor—2,400 mmfd	1.60
3050	Resistor—14,000 ohms—Carbon type—3 watts	.60
3456	Capacitor—0.05 mfd	.44
3459	Capacitor—80 mmfd	.44
3472	Capacitor—0.0024 mfd	.32
3514	Resistor—250,000 ohms—Carbon type—½ watt—Package of 5	1.00
3572	Socket—Radiotron 7 contact socket	.38
3573	Socket—Radiotron 4 contact socket	.32
3574	Coil—Choke coil	.68
3575	Socket—Dial lamp socket and bracket	.34
3584	Ring—R. F. or oscillator coil retaining ring—Package of 5	.40
3590	Escutcheon—Station selector escutcheon—Package of 5	1.40
3591	Escutcheon—Name plate escutcheon—Package of 5	1.40
3592	Knob—Station selector, operating switch or volume control knob—Package of 5	.80
3593	Screw—Chassis mounting screw—Package of 10	.30
3594	Resistor—50,000 ohms—Carbon type—½ watt—Package of 5	1.00
3596	Capacitor—60 mmfd	.36
3597	Capacitor—0.25 mfd	.40
3598	Capacitor—0.1 mfd	.36
3601	Coil—Choke coil	.68
3602	Resistor—60,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3603	Resistor—500 ohms—Carbon type—1 watt—Package of 5	1.10
3604	Capacitor—400 mmfd	.30
3605	Capacitor—770 mmfd	.30
3606	Capacitor—Comprising one 0.005 mfd. and one 0.25 mfd. capacitors	.40
6143	Resistor—40,000 ohms—Carbon type—¼ watt—Package of 5	$2.00
6228	Resistor—200,000 ohms—Carbon type—½ watt—Package of 5	2.50
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6464	Transformer—I. F. transformer	1.88
6465	Volume control—Complete with mounting nut	1.22
6466	Switch—Tone control switch	.45
6470	Coil—Antenna coil	1.08
6471	Coil—Oscillator coil assembly	.74
6472	Coil—R. F. coil assembly	.94
6473	Scale—Dial scale assembly	.50
7485	Socket—Radiotron 6 contact socket	.70
7487	Shield—Radiotron tube shield	.50
7588	Condenser—3 gang variable tuning condenser	2.85
7589	Capacitor—Filter capacitor—Two 4.0 mfd. in container	1.64
7590	Capacitor—10 mfd	1.40
8985	Transformer—Power transformer—105–120 volts—50–60 cycles	4.26
8986	Transformer — Power transformer — 200–250 volts — 60 cycles	4.38
9002	Transformer—Power transformer—105–125 volts—25–50 cycles	6.00
	REPRODUCER ASSEMBLIES	
6467	Transformer—Output transformer	1.44
8987	Cone—Reproducer cone—Package of 5	5.00
8988	Coil assembly—Comprising field coil, magnet and cone support	2.35

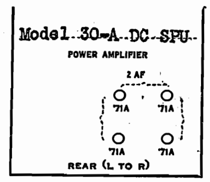
MODEL Radiola 30-A DC Socket Power Unit
MODEL Radiola 32 DC Socket Power Unit
MODEL 104 DC Speaker

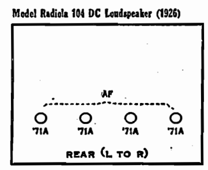
R. C. A. VICTOR CO., INC.

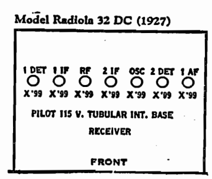


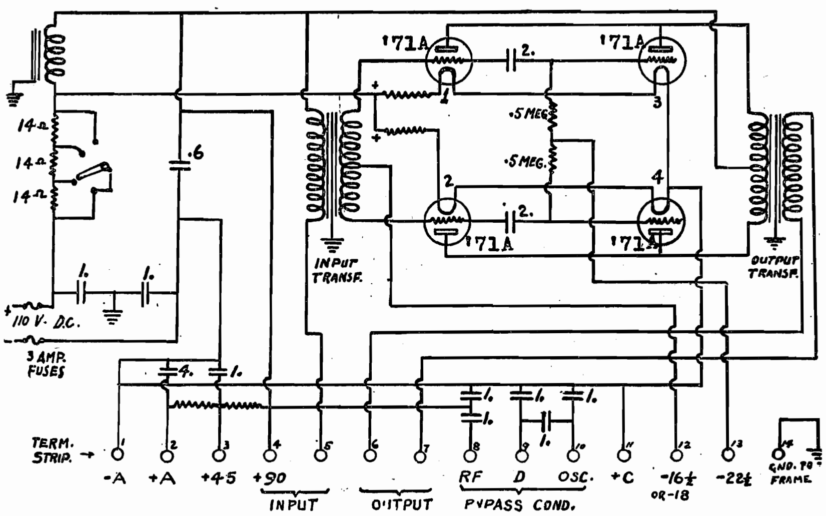
Model 32 DC Socket Power Unit



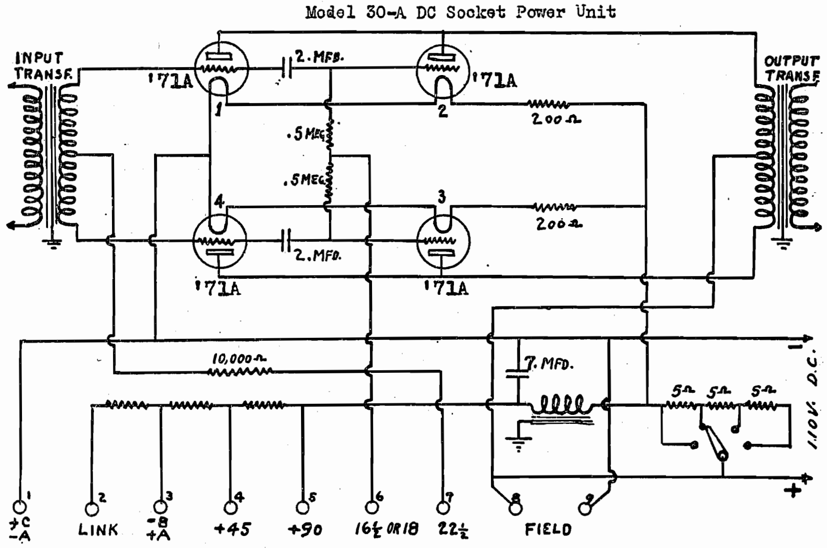








Model 30-A DC Socket Power Unit



Model 104 DC Speaker

D.C. SOCKET POWERED LOUDSPEAKER 104 may be used with RADIOLAS 25 and 28 by using the regular A.C.Package supplied for this purpose. However when making an installation of this kind the following deviations from the procedure outlined in A.C.Package Instruction Book should be observed.

1) Resistor Unit UP-591 is not used.
2) Instead of opening the link as on an A.C. machine, the position of the link is changed to terminals # 2 and 3.

RADIOLAS 30-A D.C., 32 D.C. and LOUDSPEAKER 104 D.C.
(Socket Power Operated)

RADIOLAS 30-A and 32, together with R.C.A.LOUDSPEAKER model 104, are supplied in models designed for direct current socket operation.
These D.C.models differ from the A.C.models only in the construction of the newer unit.

R. C. A. VICTOR CO., INC.

MODEL 30-A DC SPU
MODEL 32 DC SPU
MODEL 104 DC Speaker
General Service Notes
Voltages

PART I - GENERAL SERVICE DATA

The power stage in all D. C. models consist of four Radiotrons UX-171A connected in a push-pull amplifying circuit using the 110-volt D.C line as plate and filament supply and an external battery for grid voltage supply. Due to the greater filament current consumption, the old Radiotrons UX-171 are not interchangeable with the Radiotrons UX-171A used in the D. C. Radiolas. The output of this push-pull amplifier is equal to that of similar A.C. models.

A series parallel filament connection is used, one tube on each side of the amplifier being connected in series and the two series circuits paralleled together. In this circuit arrangement if a filament of one tube burns out the other tube connected in series with it will also go out, thus throwing the load on the other two tubes of the parallel circuit. In some Radiolas 30A and 32 the result will be a louder signal caused by the increased filament voltage of the two remaining tubes. However, their useful life will be rapidly destroyed under such conditions. In the R.C.A. 104 Loudspeaker and later models of Radiola 30A and 32, due to a different arrangement of the resistance units, the remaining tubes will not receive excessive filament voltage. Filament burn-out in one 171A Radiotron will affect the loudspeaker reproduction only slightly, though the tone quality is not so good. While damage to the two tubes will not be apparent at once, the set should not be operated until the defective Radiotrone is replaced. When any D.C. installation is made the customer should be made fully aware of these conditions so as to prevent unnecessary damage to the Radiotrons.

All socket power D.C. model Radiolas and Loudspeakers are provided with a switch for compensating various line voltages. The range over which satisfactory operation is secured is from 105 to 125 volts. There are four positions of the switch, 100, 105-110, 110-115, 115-120 and 120-125. On making an installation, the voltage of the line should be measured with an accurate voltmeter and the switch set at the correct position for that particular line. On connecting a D. C. Radiola or Loudspeaker to the D. C. lines it will be noticed that at one position of the input plug the set operates correctly and at the other position complete silence results. The correct position must be found be experiment.

An external "C" battery is used to supply the correct negative grid potential to the Radiotrons UX-171A. This is--16½ or --18 volts on the tubes already receiving a five-volt bias through the adjacent tube filaments and--22½ volts for the other two tubes. The correct connections are noted in the schematic circuits on the following pages. It is very important when installing a socket power D.C. Radiola or Loudspeaker to connect these two biasing voltages correctly. Incorrectly connected they will operate apparently O.K. until two of the tubes lose their omission and then the reproduction becomes very poor. As this does not occur immediately the man installing the Radiola should give attention to these connections and make certain they are correct.

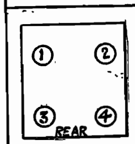
On Radiolas 30A and 32 there is provided a link by which the lines may be grounded through two condensers. Experimenting with the two positions of this link will determine which position gives the better results with least pick-up noise.

PART II -- D.C. SOCKET POWERED RADIOLA 30A

D. C. socket powered Radiola 30A is identical to the A.C.Model in all respects with the exception of the Socket Power Unit consisting of four Radiotrons UX-171A connected in a push-pull amplifying circuit. The output transformer is designed for use with RCA Loudspeaker 100A.

VOLTAGE READINGS

The following voltage readings should be obtained at the terminal strip located at the rear of the Socket Power Unit. The terminal numbered consecutively from left to right, facing the rear of the Radiola.



Terminals	Correct Effect
1 to 2	31 volts with all Radiotrons lit and battery setting near "Soft"
2 to 3	21.5 volts normally
3 to 4	41 volts normally
11 to 12	16½ or 18 volts with new "C" battery
11 to 13	22½ volts with new "C" battery. If this voltage is below 20, the "C" battery should be replaced.

PART III -- D. C. SOCKET POWERED RADIOLA 32

D.C. Socket powered Radiola 32 is identical to the regular A.C. model with the exception of the socket power unit. In the D.C. Model the power amplifier consists of four Radiotrons UX-171A connected in a parallel push-pull circuit, giving an output equal to the Radiotron UX-210 used in the A.C. Models. Parts other than S.P.U. are identical in both models and any service information needed will be found in the regular "Radiola 32 Service Notes".

VOLTAGE READINGS

The following voltages should be obtained at the terminal strip of the Socket Power Unit. The terminals noted in the first column of the tabulated text refer to the terminal viewed from the rear of the S.P.U. counting from left to right and omitting the first four terminals which are for the input and output of the S.P.U.

Terminals	"	Correct Voltage
1 to 3	"	31.0 volts, normally with all Radiotrons lit and battery setting near "Soft"
3 to 4	"	21.5 volts normally
4 to 5	"	41 volts normally

The "C" battery terminals are located on the fuse block. A check of the voltages should be made as indicated at the terminals. If the 22½ volt terminal reads less than 20 volts the battery should be replaced.

R. C. A. D.C. SOCKET POWERED LOUDSPEAKER 104

RCA D.C. Socket Powered Loudspeaker 104 is identical to the regular A.C. model with the exception that the Socket Power Unit is designed to operate from the regular 110-volt D.C. lines. This loudspeaker contains a power amplifier consisting of four Radiotrons UX-171A connected in a push-pull circuit and furnished a "B" voltage supply to any receiver and complete plate grid and filament voltages for Radiolas 25 or 28 when used in conjunction with the proper A.C. Package.

VOLTAGE READINGS

The following voltages should be obtained at the terminal strip located at the rear of the Socket Power Unit. The terminal strip numbers are located consecutively from left to right when facing the Loudspeaker from the rear, omitting the first four terminals which are for the input and output of the loudspeaker. With the loudspeaker and receiver in normal operation the following readings should be obtained on a D.C. voltmeter.

VOLTAGES FOR LOUDSPEAKERS SUPPLYING "B" CURRENT ONLY. LINK BETWEEN TERMINALS 1 AND 2

Terminals	"	Correct Voltage
1 to 4	"	45
1 to 5	"	90
1 to 6	"	16½ or 18
1 to 7	"	22½

VOLTAGES FOR LOUDSPEAKER SUPPLYING "A", "B" AND "C" POWER TO RADIOLAS 25 or 28. LINK BETWEEN TERMINALS 2 AND 3

Terminals	"	Correct Voltage
1 to 3	"	31
3 to 4	"	21.5
4 to 5	"	41
1 to 6	"	16½ or 18
1 to 7	"	22½

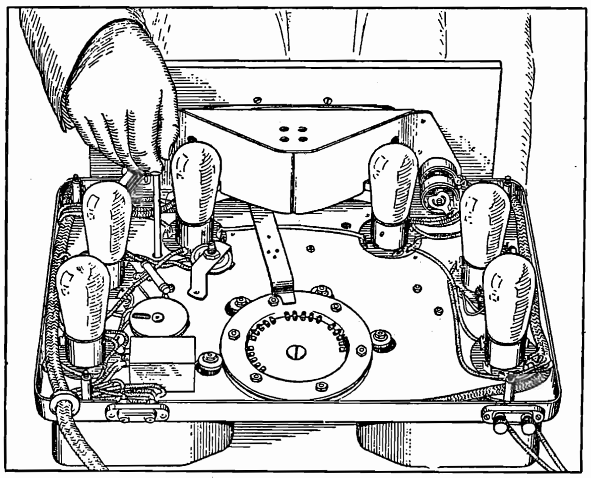
Should the readings on the "C" battery terminals 1 to 7, show less that 20 volts replace the "C" battery.

R. C. A. VICTOR CO., INC.

MODEL R-32, RE-45
R, 52
Alignment

SPECIAL ADJUSTMENTS

1. NEUTRALIZING—Improper neutralization is characterized by oscillation and lack of sensitivity. First be sure that the instrument has a good ground connection, since a poor ground will also cause oscillation. If oscillation still persists, the set should be neutralized in the following manner, using a dummy tube, made by cutting off one of the filament prongs of a UX-226, and a neutralizing screw driver such as Part 18460.



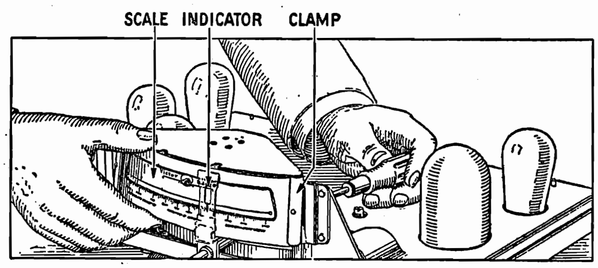
—Method of Neutralizing Victor Radio

a. Remove the four hex nuts which hold the plate.

b. Tune in a powerful local station, preferably near the high frequency end of the scale. If such a signal is not available, a modulated oscillator, can be used to supply the signal. If the oscillator is used, it should be placed near the radio set and approximately three feet of wire used as an antenna on the set.

c. Remove the UX-226 from the first tuned R. F. stage (socket No. 2, Fig. 5), replace with the dummy UX-226, and adjust the corresponding neutralizing condenser to give minimum signal in the loudspeaker. The volume control may be set to obtain a signal loud enough for accurate neutralization, but not so loud as to cause the minimum to be blurred.

d. Replace the UX-226 in socket No. 2, and repeat the procedure for sockets 3, 4 and 5, adjusting the corresponding neutralizing condenser in each case. After completing the neutralization in this manner, turn back the neutralizing condenser for socket No. 5 approximately ¼ turn counter-clockwise.
Note:—The first UX-226, antenna coupling stage, is not neutralized.
If the instrument continues to oscillate, the condensers are out of alignment. This adjustment requires special attention, and *it is recommended that you consult your distributor before making any changes in the setting.*



—Replacing Station Selector Dial

There are five r-f tubes and four tuned circuits which must be neutralized. The antenna coupling stage is untuned and does not require neutralization. A dummy tube or adaptor must be provided. A good 226 tube with one filament cit off at the base or insulated or a UX adaptor with one open filament prong may be used. The latter method is preferred as the receiver can be neutralized with the individual tubes to the used. By doing this the actual grid-plate capacity is balanced out instead of the average capacity. In no case use a dummy plug.

A strong local signal such as that obtained from a local modulated r-f test oscillator tuned to about 1200 KC should be tuned in on the receiver. With the signal tuned in and the dummy tube in the first r-f socket (not the antenna coupling tube) adjust the trimmer condenser for the minimum signal. Increase the signal input to the receiver until a satisfactory minimum point can be determined. Unless this is done a "no signal" position may be reached due to low signal input, but the stage will not be neutralized. Proceed with second, third and fourth stages in like manner. No 4 trimmer, when minimum signal position is reached, should be turned back (to the left) about 1/4 turn. This 1/4 turn will increase the output by a great amount but the tube will not spill over.

The receiver should be neutralized first and then aligned; after which repeat both processes for greater accuracy.

Schematic on page 522, Vol. I.

MODEL M-34
Auto Radio
Assembly Wiring
Notes

R. C. A. VICTOR CO., INC.

Instructions for

RCA Victor M-34

Automobile Receiver

INTRODUCTION

Mechanical simplicity and high-quality performance are keynotes of this automobile radio receiver. The instrument consists of a superheterodyne chassis, a loudspeaker, and a vibrator-type "B" battery eliminator mounted in a single case. It is operated entirely from the car storage battery.

A remote control unit, mounted on the steering column and connected to the receiver through a flexible shaft and cable, places all controls convenient to the driver. This unit contains the station selector control, a glare-proof illuminated dial (calibrated in station channels) and a combined volume control and "key-lock" power switch.

Equipment for the suppression of ignition interference is provided. The use of a roof (built-in or interior type) antenna is recommended.

PART I—INSTALLATION

Procedure

1. Unpack the set from carton and check equipment. (See "Equipment Furnished"—page 4.)
2. Remove tube packing inside receiver case and examine tubes. (See details under "Mounting of Units"—page 5.) *Do not replace case cover.*
3. **CHECK POLARITY OF AUTOMOBILE STORAGE BATTERY SUPPLY.** If the negative (—) side is grounded to car frame, make changes to chassis connections shown in Figure 1. *Do not disturb these connections if positive (+) side is grounded.* (See details under "Mounting of Units"—page 5.) Replace case cover.
4. Determine most satisfactory mounting position (see details under "Location of Units"—page 4), spot mounting-bolt location and drill ½" diameter hole. Insert bolt through dash and assemble support plate and nuts on engine side. Hang receiver over bolt head and tighten nuts. (See Figure 1 and details under "Mounting of Units"—page 5.)
5. Attach remote control unit to steering column by means of mounting bracket and strap. (See Figure 1 and details under "Mounting of Units"—page 5.)
6. Assemble flexible shaft to receiver and remote control unit. (See Figure 1 and details under "Mounting of Units"—page 6.)
7. Connect metal-shielded lead from receiver to antenna by means of coupling connector. (See notes on antennas under "Location of Units"—pages 4 and 5—and details of lead-in under "Connections"—pages 6 and 7.)
8. Connect terminal at end of *black* lead from cable to binding-post of automobile ammeter (see Figure 1 and details under "Connections"—page 7). The ignition by-pass capacitor (equipped with two leads) should be installed at this time. (See Figure 1 and paragraph 4 under "Suppression of Ignition Interference"—page 7.)
9. Install spark-plug and distributor suppressors; also generator by-pass capacitor (see Figure 1 and paragraphs 1, 2 and 3 under "Suppression of Ignition Interference"—page 7).
10. Push knob over shaft protruding through front of remote control unit. Observing the dial scale, rotate knob slowly—first to stop position slightly beyond "150" and then reverse to other stop position slightly beyond "55."
11. Insert key in lock on remote control unit and turn to extreme clockwise position. Dial should become illuminated immediately but the tubes will not reach proper operating temperature until after approximately 45 seconds. (See details under "PART II—OPERATION" and "PART III—MAINTENANCE.")

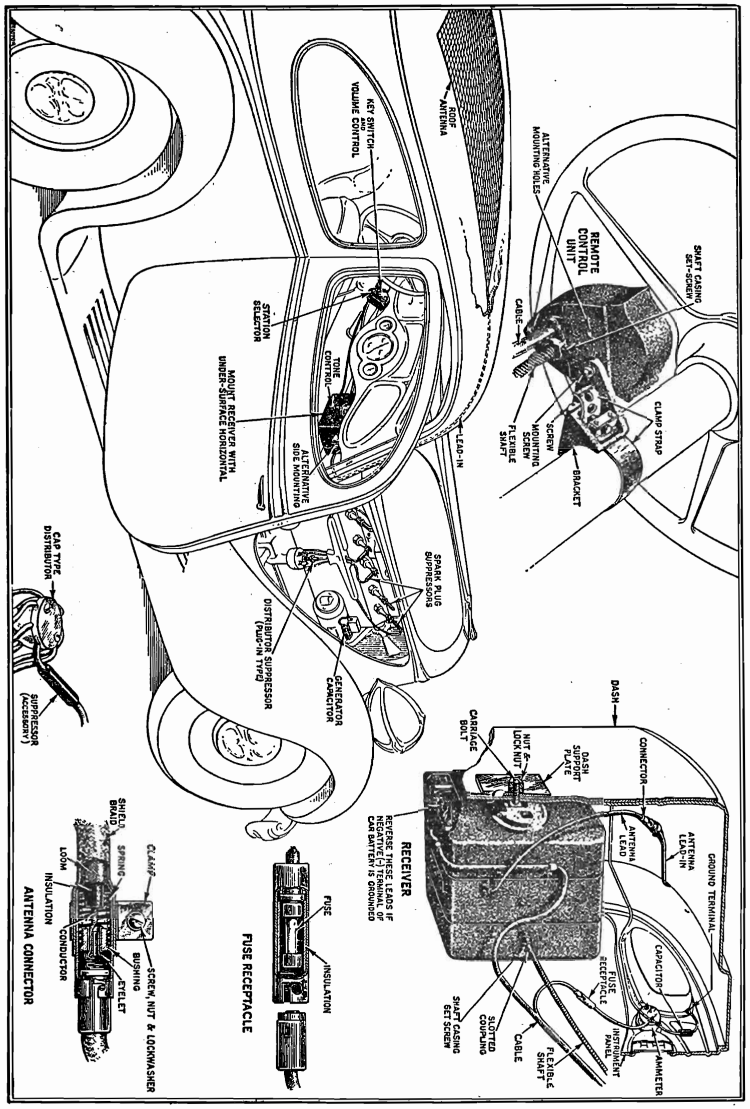


Figure 1

MODEL M-34
Auto Radio
Notes

R. C. A. VICTOR CO., INC.

Equipment

A. Equipment Furnished:

1. *Receiver Package*—Includes the receiver and remote control units joined by the wiring cable.

(a) The receiver contains one each of the following Radiotrons installed in sockets: RCA-78, RCA-6A7, RCA-6B7, RCA-89.

(b) The remote control unit contains one dial lamp (6-8 volts).

(c) The wiring cable includes one fuse (20 amperes) installed in attached fuse receptacle

2. *Outfit Package*—Containing:

(a) Flexible shaft (33⅜ inches long).

(b) Receiver unit mounting bolt (1/16 inch diameter), dash support plate, and nuts (2)

(c) Steering column bracket for remote control unit with strap, screws (2) and lockwasher (1).

(d) Shield clamp for antenna lead-in wire with screw (1), lockwasher (1) and nut (1).

(e) Key (1) and knob (1) for remote control unit and eyelets (2) for antenna connector packed in small envelope.

(f) Ignition Interference Suppression Equipment:

6 Spark plug type suppressors (additional obtainable from your dealer).

1 Distributor type suppressor.

2 Capacitors.

(g) Instruction Book.

B. Additional Equipment Required:

1. *Antenna*—One of the following types:

(a) Roof (built-in) type—recommended.

(b) Roof (interior) type for attachment to head-lining inside car—also recommended. A special antenna of this type complete with pin-hooks and lead-in wire may be purchased from your dealer

(c) Plate (sub-mounted) type for attachment to channel members of car chassis—alternative. An efficient plate antenna completely equipped for mounting and a specially-designed shielded lead-in wire also are obtainable from the dealer.

Location of Units

Receiver and Remote Control Units—The arrangement of units shown in Figure 1 is recommended and will be found applicable to the majority of automobiles. Consideration should be given to the possibility of interference of the receiver with other equipment beneath the instrument panel or of the mounting bolt with apparatus on the engine side of the dash. By placing the receiver unit toward the right-hand side of the dash, the flexible shaft will be of correct length as furnished in practically all cases. This position, however, may be considered impractical because of its universal preference for heating devices, necessitating installation of the receiver unit either near the center or at the extreme left-hand side of the dash and the use of a shorter flexible shaft. In such cases, the shaft may be either shortened (as described under "Mounting of Units") or exchanged for one of proper length by the dealer.

NOTE—Two support brackets are attached to the receiver case, one on the rear surface and the other on the right-hand side viewing the loud-speaker opening. The side bracket must be used when the unit is mounted at the extreme left-hand end of the dash in order to avoid sharp bends in the flexible shaft and resultant unsatisfactory operation.

As furnished, the remote control unit is equipped for attachment to the steering column of the car. Its clamp bracket is so designed that the driver may select from a wide variety of possible mounting positions for maximum accessibility. The associated bracket strap will be found to accommodate practically any diameter steering column. If considered desirable, however, the remote control unit may be supported upon the instrument panel by means of an accessory bracket procurable from the dealer.

Antenna:

(a) *Roof (Built-in) Type*—Best results will be obtained by use of a built-in roof antenna. The majority of modern automobiles (closed body types only) are already equipped with such an antenna installed at the factory, the lead-in wire from which will usually be found coiled up beneath the instrument panel. Many other earlier cars employ a piece of metallic screen—for top material support—which, if ungrounded (not in electrical contact with the metallic frame), may be readily utilized as an antenna.

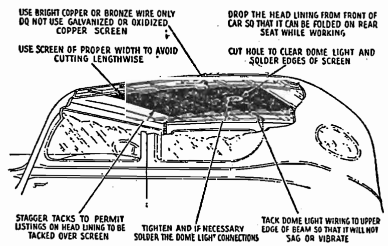


Figure 2

NOTE—The presence of a top support screen and of grounds in that screen may be determined without removing any portion of the inside fabric (head-lining). First procure any sharp-pointed metallic tool, push the point through the fabric (at several points if necessary) and feel around in an attempt to scrape the screen surface—being careful not to puncture the weather-proof top. If a screen is found, connect an ordinary dash or head-lamp between either terminal of the automobile ammeter and the tool, re-insert the tool through the head-lining and make contact with the screen. If the lamp lights, however dimly, it shall be assumed that the screen is grounded.

In order to use an ungrounded support screen, first release the head-lining at the front corner nearest the receiver. Then connect a flexible rubber-insulated lead to the corner of the screen and solder the joint. Feed the free end of the lead down the adjacent pillar-post of the car into the driving compartment and replace the head-lining.

If the top support screen is grounded, or if no screen is present, it will be necessary to drop the entire head-lining (see Figure 2). In the former case, the screen may be insulated by removal of a strip several inches from all edges and from the dome light fixture. The possibility of subsequent shifting may be eliminated by tacking the screen to one or more of the ribs and by lacing the sides with cord. Where no support screen is used, a copper screen having a total area of at least ten square feet should be inserted. It should be located as far to the rear as possible and insulated from all metallic parts grounded to the frame of the car. The antenna finally should be tested for grounds (see the foregoing "NOTE" for test procedure). If satisfactory, attach the lead-in wire and replace the head-lining of the car.

NOTE—Since a degree of skill—only acquired by experience—is necessary in removing and replacing the top fabric material, such work should be allotted to a competent "trim" man.

(b) *Roof (Interior) Type*—The accessory interior-type roof antenna also will provide very satisfactory performance and, in addition, is extremely simple to install. It may be quickly attached to the head-lining inside the car (preferably as far to the rear as possible) by means of pin-hooks, thereby precluding removal of the fabric. An antenna of this type, however, should not be used in any automobile having *a grounded* top material support screen since the proximity of that screen would seriously reduce its efficiency. Before purchase, therefore, it will be advisable to check this possibility, following the test procedure described under "*Roof (Built-in) Type.*"

As furnished, the interior-type antenna is equipped with a sufficient length of lead-in wire ready-attached. The effective antenna wire is enclosed by long-wearing paper procurable either in "gray" or "tan" finish as desired to harmonize with the car upholstery.

(c) *Plate Type*—For those cases where the installation of a built-in roof antenna is considered too costly and the interior roof antenna impractical, good reception from local or semi-distant powerful stations may be procured with the special plate-type antenna also obtainable as an accessory. This unit should be clamped to the frame of the chassis as far to the rear as possible. It is adjustable in length and may be mounted either lengthwise or crosswise of the chassis, which position should be selected with due regard to the prevention of overcrowding. The plate must be placed as close to the ground as possible, but not below the lowest portion of the chassis at the desired location, as sufficient road clearance must be retained. It is also important to avoid any position in which the plate will impede free motion of chassis parts such as springs, drive shaft, or axles in order to prevent damage to the antenna.

Mounting of Units

Details of mounting the various units are shown in Figure 1 The following procedures are recommended:

Receiver Unit—The rear cover of the receiver unit case (held in place by six screws) must be removed and all packing material (inserted for protection of the Radiotrons during shipment) withdrawn. Make certain that all Radiotrons are in the proper sockets and that the control grid clips are pressed down firmly over the respective dome terminals as shown by the diagram printed on the label affixed to the inside of the cover.

NOTE—At this point, it will be advisable to determine the electrical polarity of the storage battery supply. This may be done most conveniently by making an examination of the battery connections and ascertaining which terminal is grounded (that is, connected to the frame of the car). The positive terminal is usually marked (+) and tends to form corrosion far more rapidly than the negative (—). If the positive terminal is grounded, no change in the electrical connections of the receiver unit will be required. However, if the opposite is true, the two leads (equipped with spade terminals) located beneath the radio chassis as shown in Figure 1 must be reversed.

Now replace the rear cover and support the assembled unit against the dash in the chosen location. Allowing a clearance of at least two inches above the top surface, where possible, to permit subsequent removal of the case from the mounting bolt head, mark with a pencil or crayon on the dash four points corresponding to the corners of the adjacent case surface. Then determine the exact center of the area bounded by those four points (by drawing diagonal lines between opposite corners) and mark that position with a center-punch. Next drill a ½ inch hole at the center-punch mark and insert the mounting bolt. The support plate and the two nuts then should be assembled upon the bolt from the engine side of the dash as shown but should not be tightened. Finally hang the receiver over the bolt head, align sides vertically and tighten the nuts in place.

Remote Control Unit—In attaching the remote control unit to the steering column of the car, it will be advisable first to examine the detailed view (in Figure 1) showing the assembly of its mounting bracket. Four small holes are contained in the associated flexible strap at distances proper for use with steering columns of the most common diameters (1½, 1⅝, 1¾, 1⅞ inches) but the strap length will be found sufficient to permit the insertion of an additional hole if necessary to accommodate a 2 inch column. The proper hole may be determined by wrapping the clamp strap tightly around the column, inserting the machine screw furnished through that hole found to be nearest in alignment with the tapped hole in the clamp bracket. Three tapped holes are provided in the back of the remote control unit, permitting support of that unit either at the right- or left-hand side or above the steering column

MODEL M-34
Auto Radio
Notes

R. C. A. VICTOR CO., INC.

Flexible Shaft—Insert that end of the flexible shaft to which is attached the slotted coupling through the bushed opening in the left side of the receiver unit. Then rotate the shaft from the free end until the coupling slot is felt to engage over the pin contained in the tuning mechanism and slide the shaft forward to the full depth of the slot. With the shaft held in this position, insert the opposite end of the shaft through the bushing at the rear of the remote control unit and push forward until the flatted portion of the shaft protrudes through the front cover. Then proceed to tighten the external set-screw (located at the bottom of the case—see Figure 3) adjusting the shaft position as necessary until the screw is felt to engage in the groove. Tighten the screw fully to the bottom of the slot and then loosen it approximately one-quarter of a turn. Finally, secure the flexible casing in place by tightening the set-screws at each end.

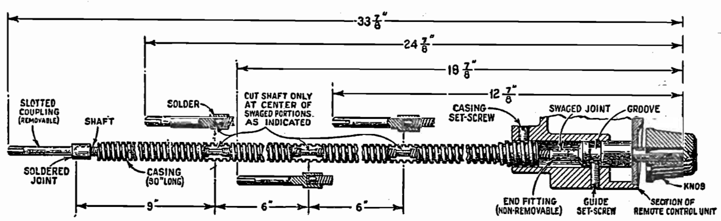


Figure 3

NOTE—In many installations it will be found necessary or desirable to use a flexible shaft of shorter length than 33⅞ inches. While it is simplest to procure a shaft of proper length from the dealer as mentioned heretofore, very little difficulty should be experienced in shortening the original part if deemed expedient. To shorten the shaft, refer to Figure 3 and proceed as follows:

1. Determine the minimum shaft length permissible for the installation.
2. Remove the slotted coupling (using a soldering iron) and withdraw the shaft from its casing.
3. Cut the shaft only at the center of a swaged joint, selecting that joint which allows at least the required length.
4. Cut from the shaft casing a length equal to the amount of shaft removed. (This operation may be simplified by placing the casing between wooden blocks in a vice so that the block ends will serve to guide the hack saw blade.)
5. Replace the shaft in its casing and solder the slotted coupling to the end of the shaft.

Connections

Refer to Figure 1 and make connections as follows:

Antenna to Receiver—For least ignition interference, any portion of the antenna lead-in wire which extends behind the instrument panel or into the engine compartment of the car should be fully shielded and cut to eliminate excessive slack when attached to the receiver antenna connector. Before connecting the antenna to the receiver, the following comments applying to the particular type of antenna adopted should be observed:

(a) *Roof Antenna* (Built-in Type)—The lead-in wire from a factory-installed built-in roof antenna usually is unshielded and often is of insufficient length to reach the receiver. If necessary, an extra length of insulated wire may be spliced to the existing lead-in, in which case the joint must be soldered and wrapped with tape. In general, it will be advisable to shield the exposed length of lead-in wire, procuring for this purpose from your dealer a length of shield braid and an equivalent length of insulating loom (or rubber tubing) sufficient to extend between the end of the lead-in wire and its point of entrance from the body pillar post. Slip the loom over the lead-in wire and the shield braid over the loom.

(b) *Roof Antenna* (*Interior Type*)—If an interior type antenna is used, the lead-in wire should be brought down the outside of that front pillar post nearest the receiver.

(c) *Plate Type Antenna*—With the plate type antenna, the fully-shielded end of the special cable should be brought into the automobile driving compartment through a ½ inch hole drilled in the toe-board (if no other opening is available). This end is to be connected to the receiver unit antenna lead (as explained in following paragraphs) and the opposite (unshielded) end then cut off as required to eliminate excessive slack upon connection to the plate. The pigtail extension from the end of the shield must be soldered or bonded to the frame of the car.

Refer to the detailed view of the antenna connector shown in Figure 1 and proceed to attach the lead-in wire (if shielded) as follows: First, cut the end of the lead-in so that the internal insulated wire and loom (if present) are flush with the end of the shield covering and push back the shield approximately 1½ inches. Cut the loom to the end of the shield and then remove sufficient insulation to expose one inch of clean bare-conductor. Now disconnect the female portion of the connector attached to the receiver antenna lead and remove the small internal bushing and spring.

To assemble, slip the bared conductor through the female portion of the connector and then through the spring and bushing, making certain that the insulation enters the end of the connector. Bend over and spread the strands of the conductor against the forward end of the bushing and then force one of the eyelets (packed in small envelope in outfit package) into the bushing to hold the conductor in position. Cut off the ends of the conductor strands approximately ⅛ inch beyond the edge of the eyelet and bend the strands over toward the center of the eyelet. The assembly may be now attached to the receiver portion of the connector and the shield covering on the lead-in wire pushed forward to cover the adjacent end of the female portion. Finally, bond the shield to the connector by means of the small clamp furnished. **No soldering operations are required.**

NOTE—An unshielded lead-in wire (as in the case of the interior-type antenna) may be attached to the antenna connector as described above except that all references to the shield braid and loom may be neglected.

Power Supply to Receiver—The power input lead (*black* wire with fuse receptacle and terminal, extending from the receiver cable) must be connected electrically to the ungrounded side of the car storage battery. This connection preferably may be made at the battery terminal of the ammeter (usually the terminal with only one lead attached—consult wiring diagram in instruction book for automobile) and any slack length remaining should be taped securely behind the instrument panel.

Suppression of Ignition Interference

1. Disconnect all wires from the spark plugs. Fasten one spark plug suppressor to the top of each plug and re-attach the wires to the free ends of the suppressors. These suppressors may be mounted either in line with or at right angles to the plugs (as shown in Figure 1) in order to avoid interference with metallic parts grounded to the engine or frame.

2. If the distributor is of the plug-in type, disconnect the center wire from the head. Plug the distributor suppressor into the distributor head and insert the wire in the free end of the suppressor.

NOTE—For cap-type distributors, exchange the distributor suppressor at your dealer's for one of a special type. Cut the wire leading from the distributor to the coil and screw the suppressor into the end attached to the distributor. Screw the other end of the wire (leading to the coil) into the opposite end of the suppressor.

3. Clamp the generator by-pass capacitor against the generator frame. The screw holding the cut-out ordinarily may be utilized for securing this unit. Connect the capacitor lead to the terminal on the generator side of the cut-out switch. (In some cases, interference will be reduced by connecting the capacitor lead to the opposite side of the cut-out. The most suitable position for this lead must be determined by trial.)

4. The other by-pass capacitor must be connected between the battery terminal of the ammeter and any convenient screw on the instrument panel In certain cases, interference will be reduced still further by connecting an additional capacitor (obtainable from your dealer) between the battery side of the ignition coil and the car frame

PART II—OPERATION

The instrument should be operated as follows:

1. Insert the key in the lock on the remote control unit and turn it clockwise to the extremity of its rotation.

NOTE—This key serves to operate both the power switch and the volume control. A slight rotation clockwise will turn the power "on" and the remainder of the range permits adjustment of volume. The dial scale should become illuminated when the power is "on."

2. Rotate the Station Selector knob in either direction until a desirable station program is heard.

NOTE—The dial scale is calibrated in channels to aid in station identification. Add one cipher to the scale marking to obtain the actual frequency in kilocycles.

3. After receiving a signal, turn the Volume Control counter-clockwise until the volume is reduced to a low level. Now, readjust the Station Selector to the position midway between the points where the quality becomes poor or the signal disappears. This operation insures the best quality of reproduction.

4. Finally, advance the Volume Control (clockwise) until the desired level is obtained. Except on weak signals, the automatic volume control will maintain the volume substantially at the latter level, thereby precluding further manual adjustments. (Fading of the signal may be experienced in extreme cases, as when passing under bridges or other metallic structures, since such structures almost completely shield the antenna.)

5. Set the Tone Range Switch (located on the front of the receiver unit) for the preferred tone quality. This switch has two positions. In the counter-clockwise position, high-frequency (treble) response and static interference (when present) are decreased.

6. When through operating, turn the key to the "off" position, counter-clockwise. The instrument is then locked by removing the key.

MODEL M-34
Auto Radio
Notes-Voltage

R. C. A. VICTOR CO., INC.

PART III—MAINTENANCE

Noisy or weak reception may be due to one of the following causes:

Radiotrons—The Radiotrons should be tested periodically and replaced if necessary in order to maintain best performance. The efficiency of each Radiotron may be checked by comparison with a new one of the same type in its place. Spare Radiotrons of each type should be kept on hand.

Fuses—This installation is protected by one fuse (rated 20 amperes) which is mounted in the fuse receptacle contained in the power input lead. If the set fails to operate and the dial lamp does not light, this fuse should be removed for examination. If found to be burned out, the wiring should be inspected for short-circuits or grounds and all tubes tested prior to insertion of a new fuse. **The replacement fuse must be of the same ampere rating.**

"B" Battery Eliminator—This unit should operate satisfactorily with little or no attention. With the power turned "on," a slight buzz should should be noticed to emanate from the receiver This buzz should be taken as indicative of proper operation of the "B" Battery Eliminator vibrator. Failure to observe this buzz, accompanied by repeated necessary replacement of the fuse, will denote a faulty condition, and, in such cases, the complete receiver should be taken to the dealer for inspection. **Do not attempt to adjust the vibrator yourself!**

Antenna—A properly installed roof antenna of the built-in or interior-type should require no attention. When the plate antenna is employed, the insulator bushings should be cleaned occasionally to prevent grounding.

Ignition System—The ignition system of the car must be kept in good condition. Fouled plugs or plugs with improperly adjusted gaps will affect the operation of the receiver as well as of the automobile. Burned or improperly adjusted breaker points will also impair the performance. It will be advisable to advance the generator charging rate in order to compensate for the additional drain on the car storage battery imposed by this instrument.

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PART IV—SERVICE DATA

Type and Number of Radiotrons Used...........1 RCA-89, 1 RCA-78, 1 RCA-6A7, 1 RCA-6B7—Total, 4
Total Battery Current........................5.5 Amperes
Undistorted Output............................2.0 Watts
Loudspeaker Field Current..................1.35 Amperes
Maximum Output D. C. Voltage from Rectifier....250 Volts
Total Plate Current............................53 M. A.

This four tube Superheterodyne Automobile Receiver is of compact construction and gives excellent performance. Features such as unit construction (one unit contains the receiver, plate supply unit and loudspeaker), ease of installation, freedom from ignition noise and excellent sensitivity, selectivity and tone quality characterize this instrument.

Plate Supply Unit

This receiver uses a vibrator type Inverter and rectifier that provides a source of direct current voltage for use as plate and grid supply for all Radiotrons. *This unit is accurately adjusted at the factory and service adjustments should not be attempted.* Any difficulties with this unit should be referred to the nearest Distributor handling these instruments who has instructions for servicing this item.

Line-up Capacitor Adjustments

The three R. F. line-up capacitors and two I. F. tuning capacitors are accessible and may require adjustments. The R. F. adjustments are made at 1400 K. C. and the I. F. adjustments at 175 K. C. The R. F. adjustments can be made with the receiver in its case, access to the adjusting screws being obtained through a slot in the bottom of the case. For the I. F. adjustments, however, it is necessary to remove the rear cover in order to couple the oscillator to the first detector. The following procedure should be used for either adjustments:

R. F. Adjustment

The three R. F. line-up capacitors are adjusted at 1400 K. C. Proceed as follows:

(a) A fairly accurate adjustment can be made by using the ear for an indicating device, thus eliminating the need of an output meter and the necessity of removing the rear cover to connect it.

(b) Procure a modulated oscillator giving a signal at 1400 K. C. and a non-metallic screw driver.

(c) Couple the output of the oscillator from antenna to ground, set the dial at 140, and the oscillator at 1400 K. C.

(d) Place the oscillator and receiver in operation and adjust the oscillator output so that a weak signal is obtained in the loudspeaker when the volume control is at its maximum position.

(e) Then adjust the three line-up capacitors until maximum sound in the speaker is obtained. Readjust these capacitors a second time as there is a slight interlocking of adjustments.

For a more accurate adjustment, the use of an output meter is recommended. However, this will require the removal of the rear cover in order to connect the output meter across the cone coil. Also the bottom and Radiotron side of the chassis must be shielded together with the transformer so that vibrator noise will not be obtained, due to the removal of the case shielding.

I. F. Adjustments

In order to make the I. F. adjustments, it is necessary to remove the rear cover, due to the fact that the external oscillator must be connected between the control grid of the first detector and ground. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver and an output meter.

(b) Remove the receiver from its case, shield the transformer and Radiotrons as described under R. F. adjustments, place the receiver in operation and connect the oscillator output between the first detector grid and ground. Connect the output meter across the voice coil of the loudspeaker. Then connect the antenna lead to ground and adjust the tuning capacitor so that no signal except the I. F. oscillator is heard at maximum volume. With the volume control at maximum, reduce the external oscillator output until a small deflection is obtained. Unless this is done, the action of the A. V. C. will make it impossible to obtain correct adjustments.

(c) Each transformer has but one winding that is tuned by means of an adjustable capacitor, the other windings being untuned. The capacitors should be adjusted for maximum output.

At the time I. F. adjustments are made it is good practice to follow this adjustment with the R. F. adjustments, due to the interlocking that always occurs. The reverse of this, however, is not always true.

Practical Hints on Installation

The following suggestions may prove useful when making installations on the particular cars mentioned.

Chevrolet 1933—Mount chassis on left side, end against car bulkhead and use short flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors. Place a copper screen under the toe board on right side, 10" x 10" to prevent the body from radiating ignition interference which may be picked up by the antenna. This screen must be grounded.

Plymouth 1933—Mount chassis on left side, back against car bulkhead and use 33⅜" flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors.

Ford V-8 1932—Mount chassis on left side, end against car frame and use short flexible shaft. Use one capacitor, connected to the generator. Install eight spark plug type suppressors only, no distributor suppressor being necessary.

The majority of cars will be found to be entirely free from ignition noise when the standard equipment is used. Usually mounting the chassis on the right side of the bulkhead will be found most desirable, although if a heater is used, the left side will be preferable.

RADIOTRON SOCKET VOLTAGES

6.3 Volt Battery

Radiotron No.		Cathode to Ground	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
RCA-78 R. F.		3.7	92	253	7.0	6.06
RCA-6A7	First Detector	3.7	92	253	12.0 Total	6.06
	Oscillator	0	—	253		
RCA-6B7 Second Detector		3.2	92	236	6.0	6.06
RCA-89 Power		26.5	230	217	27.5	6.06

MODEL M-34
Auto Radio
Vibrator Notes

R. C. A. VICTOR CO., INC.

SERVICE DATA FOR VIBRATOR UNIT

The vibrator unit used in this receiver is of excellent design and sturdy construction. It functions as a combined A. C. generator and mechanical rectifier. Referring to Figure C, it will be noted that the primary and secondary of the transformer are center tapped. By connecting the outside of each winding to the contacts of the vibrator and using the arms and center taps of the windings as sources of input and output voltage, a combined generating and rectifying action is obtained.

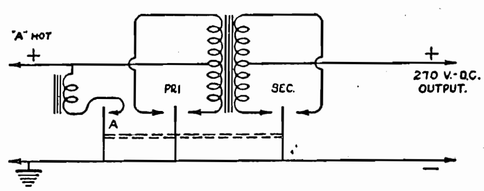


Figure C—Schematic of Vibrator Unit

When the switch is turned "on" the vibrator makes and breaks contact at point "A." This constitutes the driving action of the unit, and is in no way connected with the other circuits. The primary vibrator functions to connect the input low voltage current first across one-half and then across the other half of the primary of the transformer. This results in a pulsating direct current applied to the primary in an alternating direction. The result is an A. C. voltage emanating from the secondary of the transformer; as the transformer has a step-up ratio the A. C. secondary voltage is considerably greater than the primary. The secondary vibrator functions in a similar manner as that on the primary side, so that by reversing the alternations applied to the load, a pulsating D. C. is obtained. After filtering, this is used as plate and grid supply to all Radiotrons.

(1) Spring and Contact Adjustment Limits.

Proper adjustments of the various contacts are made in the following order and manner:

1. With 8 and 10, Figure D, firmly held against their respective stops and with 3 and 5 in contact with 8 and 10 respectively, the air gap between 1, 6 and 2, 7 shall be 0.015" plus or minus 0.005". On no particular unit however, shall the differences between the two air gaps exceed 0.005".

2. Adjust the buzzer screw, 11, Figure D, so that when the position of the armature is such that 1 and 2 are just making contact with 6 and 7 respectively, the contact between 4 and 9 shall just be breaking.

(2) Adjustment for the Reduction of Sparking.

If any pair of contacts show excessive sparking, the following procedure will in general reduce the sparking to a minimum.

For example, consider the case where excessive sparking is occurring between 6 and 1. Sparking will be reduced to a minimum by bending the armature spring on that side (secondary side) away from 6 and toward 8. (See Figure D.) If the bend is too small, only a small change will be noted. However, if an excessive bend is made, the sparking will be transferred from 6, 1 to 8, 3.

The same method may be applied to any pair of contacts. Usually only a slight bend will be necessary. Although after bending, no change in the position of the armature contacts may be noted, a sufficient change in the initial force requirements will have been made to reduce sparking.

(3) Output Voltage.

When connected to a 6 volt primary source, the output voltage across a 5,000 ohm resistor (connected in place of the receiver load at the output of the filter), must be 240 volts or greater.

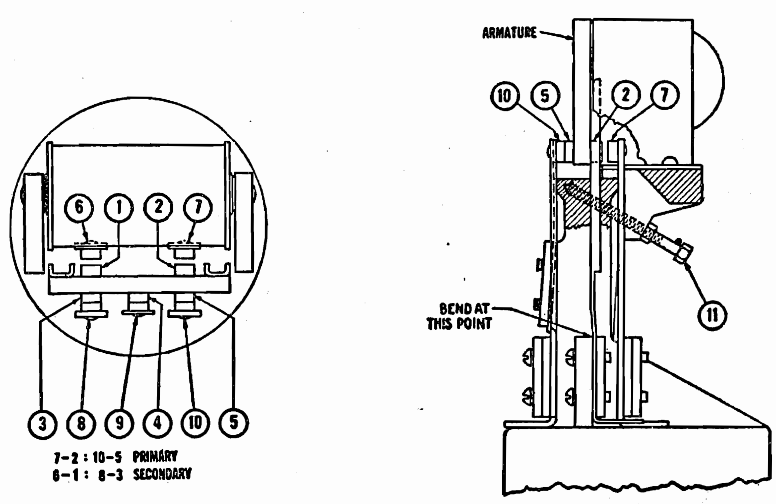


Figure D—Vibrator Contacts

MODEL M-34
Auto Radio
Schematic
Chassis

R. C. A. VICTOR CO., INC.

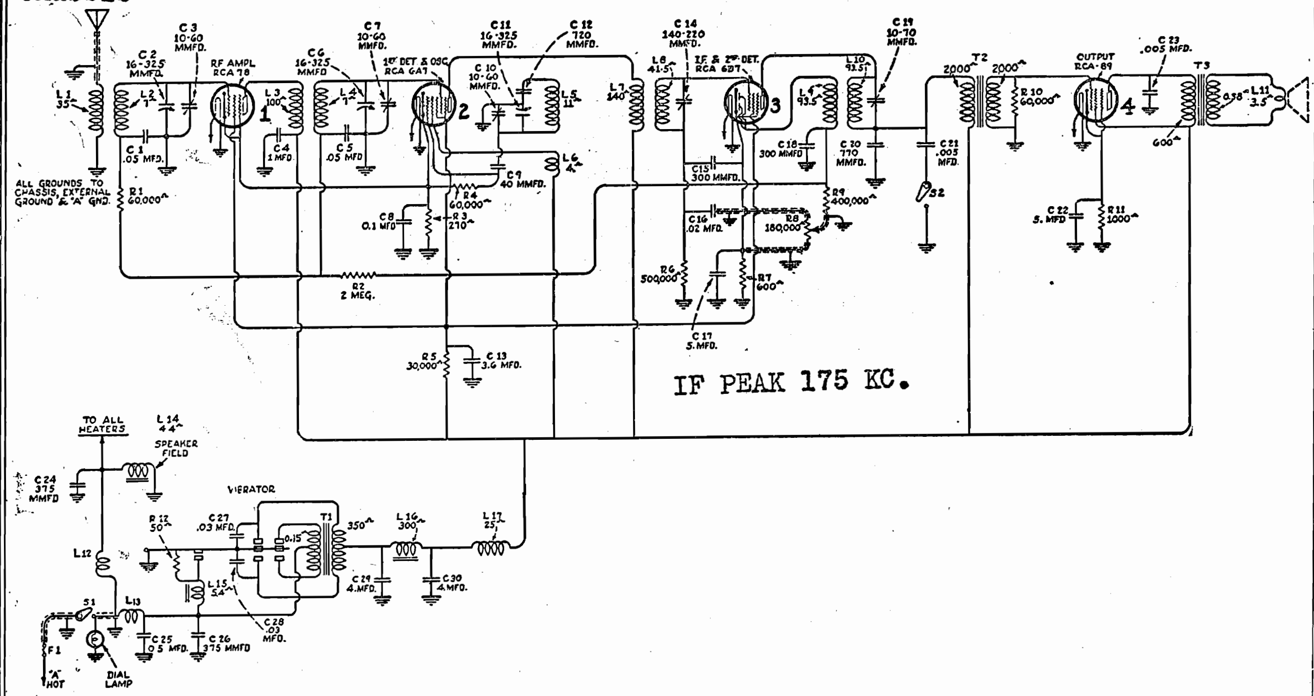


Figure A—Schematic Diagram

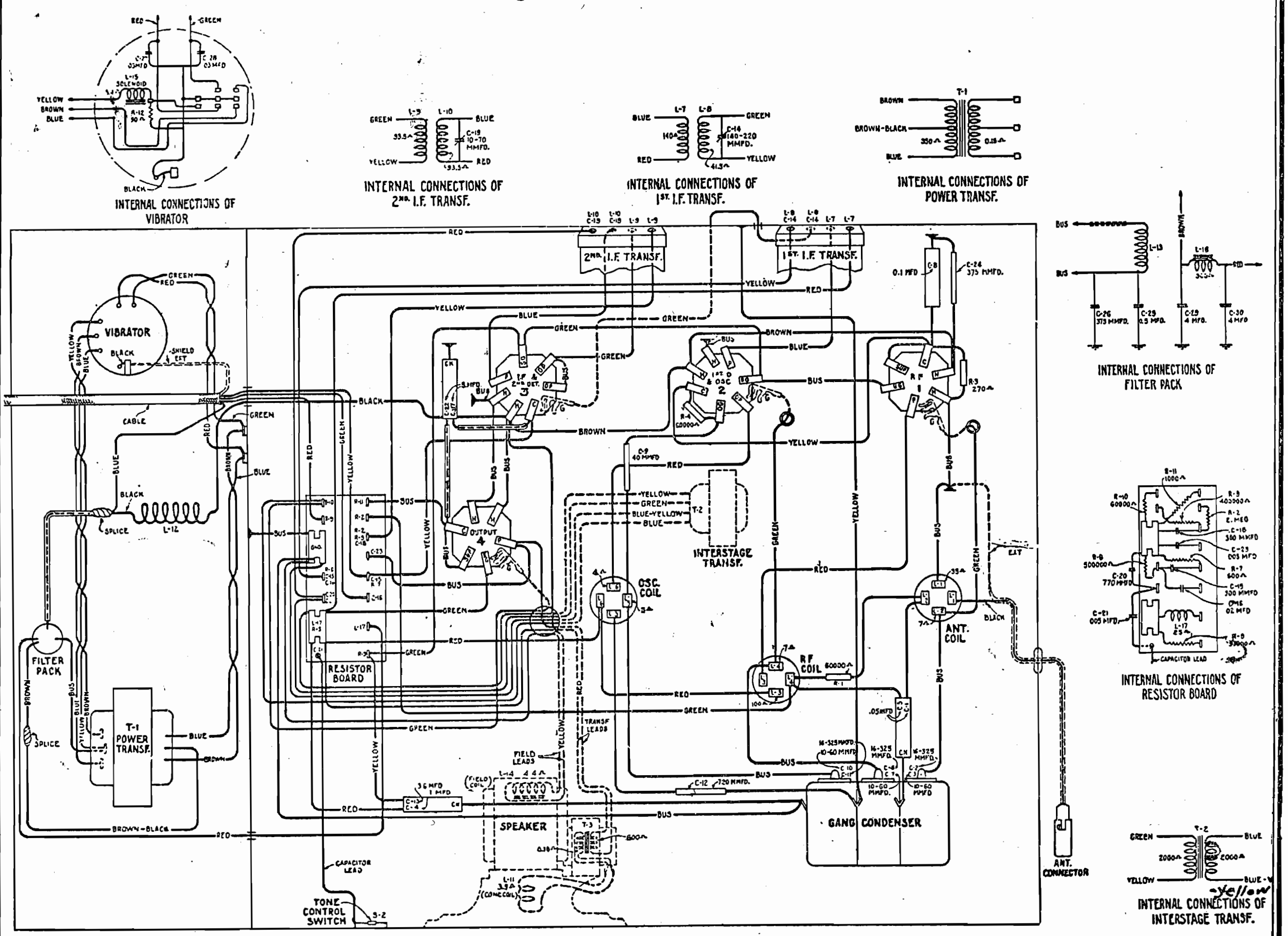
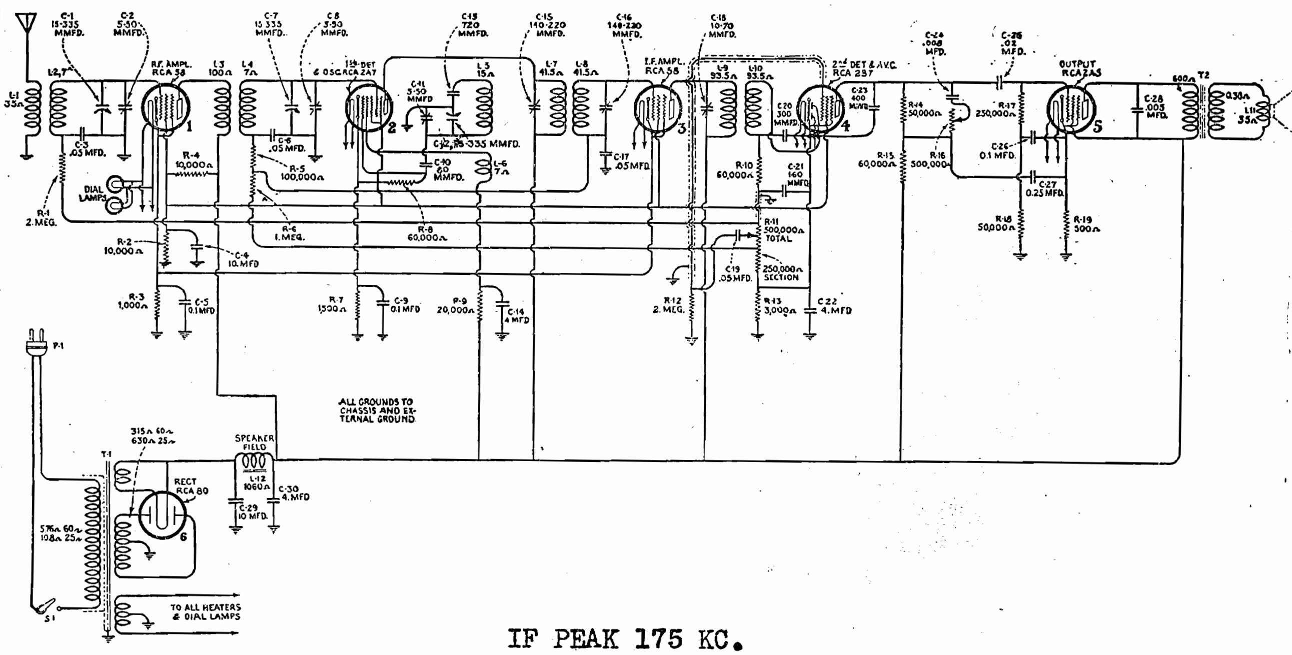


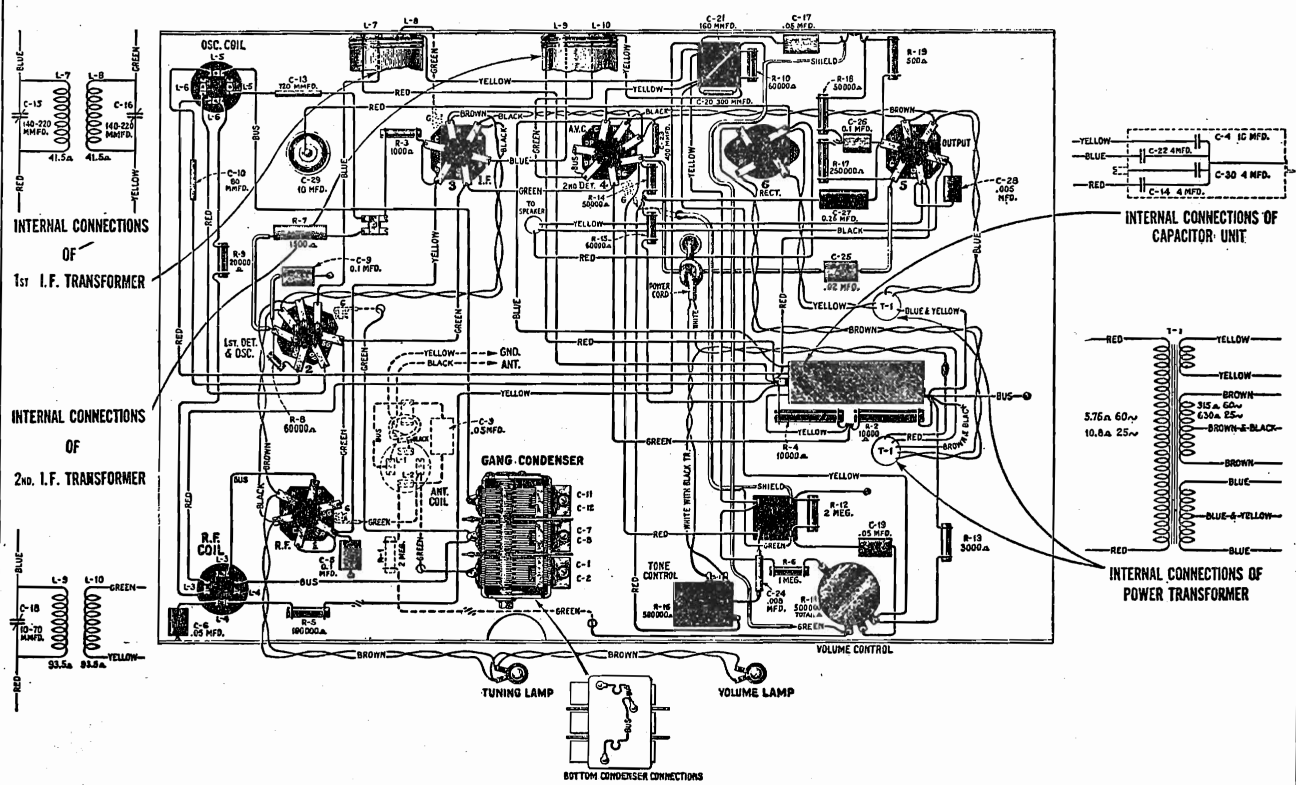
Figure B—Wiring Diagram

R. C. A. VICTOR CO., INC.

MODEL R-37, R-38
Schematic



IF PEAK 175 KC.



MODEL R-37, R-38
Voltage-Data

R. C. A. VICTOR CO., INC.

SERVICE DATA

Electrical Specifications

Voltage Rating ....115 Volts
Frequency Rating ....25–60 and 50–60 Cycles
Power Consumption ...60 Cycle 75 Watts, 25 Cycle 80 Watts
Number and Types of Radiotrons ..2 RCA-58, 1 RCA-2A7, 1 RCA-2B7, 1 RCA-2A5, 1 RCA-80—Total 6
Undistorted Output ....1.75 Watts
Frequency Range ....540 K. C. to 1500 K. C.

This receiver is a six tube Superheterodyne incorporating a Dynamic Loudspeaker as a part of the chassis, automatic volume control, single heater type Pentode output tube, continuosly variable type tone control and the inherent sensitivity, selectivity and tone quality of the Superheterodyne.

The circuit consists of an R. F. stage using Radiotron RCA-58, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage using Radiotron RCA-58, an RCA-2B7 functioning a combined second detector and automatic volume control, an output stage using the new heater Pentode RCA-2A5 and the RCA-80 functioning as a rectifier.

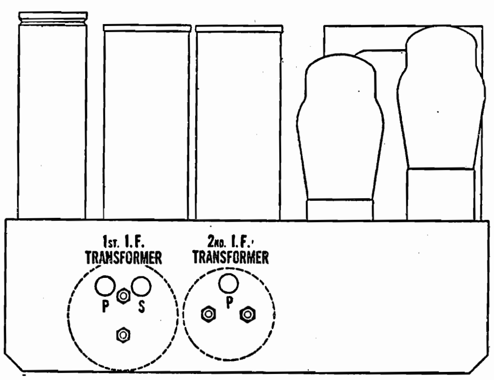


Figure C—Location of I. F. Line-up Adjustment Screws

Service work in conjunction with this receiver will be similar to that of other Superheterodyne receivers incorporating a similar type automatic volume control.

Line-up Adjustments

I. F. Tuning Adjustments—Two transformers comprising three tuned circuits (the secondary of the second transformer is untuned) are used in the intermediate amplifier. These are tuned to 175 K. C. and the adjustment screws are accessible as shown in Figure C. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.

(b) Short-circuit the antenna and ground leads and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the chassis.

(c) Connect the oscillator output between the 1st detector control grid and chassis ground. Connect the output meter across the voice coil of the loudspeaker and adjust the oscillator output so that with the receiver volume control at maximum, a slight deflection is obtained in the output meter.

(d) Adjust the primary of the second, and the secondary and primary of the first I. F. transformers until a maximum deflection is obtained. Keep the oscillator output at a low value so that only a slight deflection is obtained on the output meter at all times. Go over these adjustments a second time as there is a slight interlocking of adjustments. This completes the I. F. Adjustments.

R. F. and Oscillator Adjustments—The three gang capacitor screws are accessible at the top of the chassis. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 1400 K. C., a non-metallic screw driver such as Stock No. 7065 and au output meter.

(b) Connect the output of the oscillator to the antenna and ground lead of the receiver. Check the dial at the extreme maximum position of the tuning capacitor. The indicator should be at the last division. Then set the dial at 140, the oscillator at 1400 K. C. and connect the output meter across the cone coil. Adjust the oscillator output so that a slight deflection is obtained when the receiver volume control is at maximum.

(c) Adjust the three tuning condenser line-up capacitors until maximum deflection is obtained in the output meter.

When making both the I. F. and R. F. adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

RADIOTRON SOCKET VOLTAGES

115 Volts. A. C. Line—No Signal

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current M. A.	Heater Volts
1. RCA-58 R. F.	3.0	95	255	5.0	2.31
2. RCA-2A7 1st Det. Osc.	3.0*	95*	255*	3.0*	2.31
3. RCA-58 I. F.	3.0	95	255	5.0	2.31
4. RCA-2B7 2nd Det. A. V. C.	7.5	92	60	2.0	2.31
5. RCA-2A5 Power	20.0	250	235	33.0	2.31
6. RCA-80 Rect.	700/350 Volts - 75 M.A. Total Current				4.82

*The Voltages and current refer to the detector part of the tube. The total cathode current is 10 M. A.

R. C. A. VICTOR CO., INC.

MODEL RE-40
Schematic
Chassis

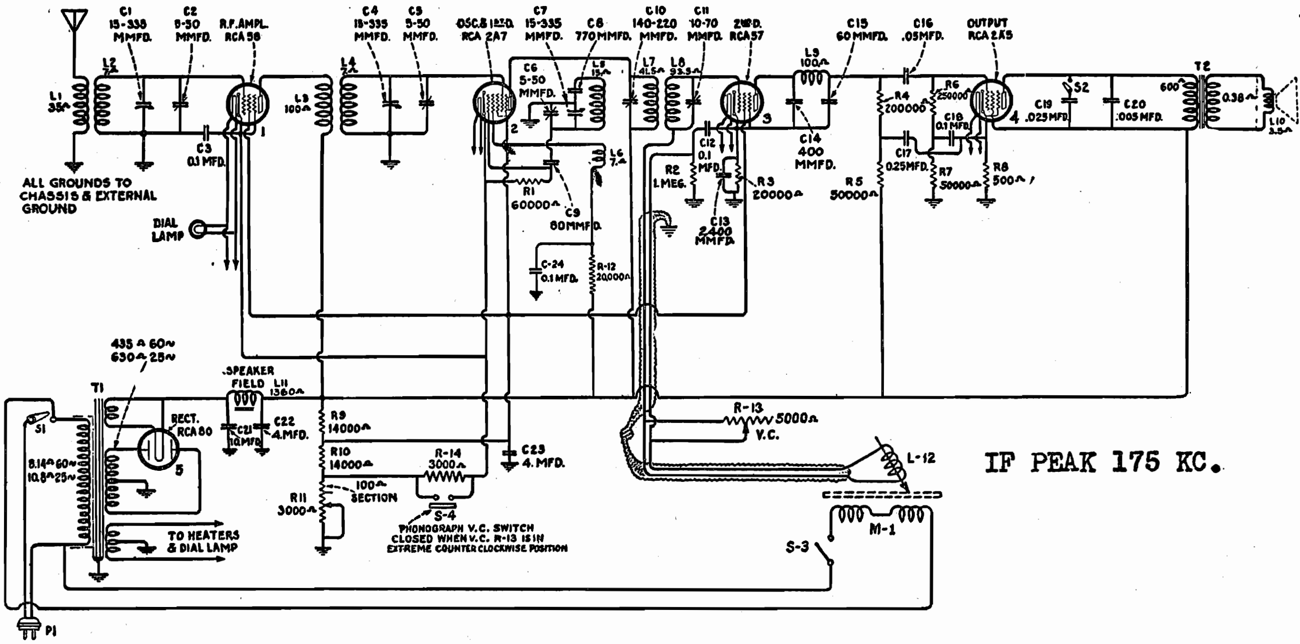


Figure C—Schematic Circuit

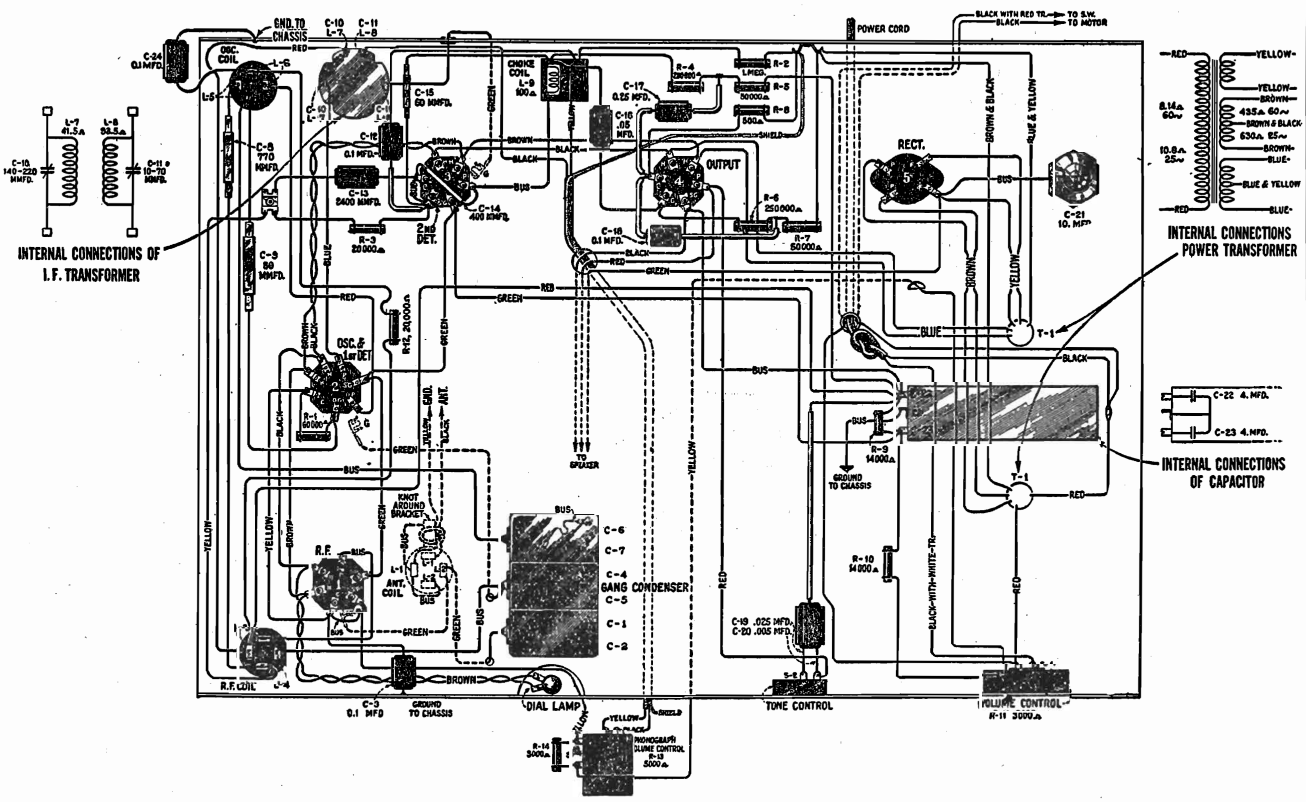


Figure D—Wiring Diagram

MODEL RE-40
Voltage

R. C. A. VICTOR CO., INC.

SERVICE DATA

Voltage Rating............................105–125 Volts
Frequency Rating.............25, 30, 40, 50 and 60 Cycles
Power Consumption..................60 Cycles, 95 Watts
Number and Types of Radiotrons...............1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output...........................1.75 Watts
Frequency Range.................540 K. C. to 1500 K. C.

This combination radio-phonograph instrument uses a five-tube Super-Heterodyne receiver incorporating a dynamic loudspeaker, two-point tone control, single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The standard RCA Victor two speed motor board equipment is used and the entire assembly enclosed in a table type cabinet.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer only, using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K. C. The I. F. frequency is 175 K. C. and the two circuits that comprise it are adjusted for maximum output at 175 K. C.

Service data for the magnetic pickup is included below.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

SERVICE DATA ON MAGNETIC PICKUP

This magnetic pickup is of a new design that results in excellent reproduction. While in physical appearance, it is similar to that of the older type, details of construction are considerably different. It consists of essentially a chromium steel magnet, two thin pole pieces, a mechanism support and bracket, a coil, and an armature.

REPLACING MAGNET COIL, PIVOT RUBBERS, OR ARMATURE

In order to replace a defective magnet coil or hardened pivot rubbers, it is necessary to proceed as follows:

(a) Remove the pickup cover by removing the center holding screw and needle screw.

(b) Remove the pickup magnet and the magnet clamp by pulling them forward.

(c) Unsolder the coil leads and remove the mechanism assembly from the back plate by releasing the two mounting screws.

(d) Remove screws A and B, Figure A, and then remove the mechanism assembly from the pole pieces.

(e) The coil or the front pivot rubber may now be removed and replaced. If it is desired to replace the rear pivot rubber, then the end of the armature soldered to the mechanism support must be unsoldered.

(f) The mechanism should now be reassembled except for the magnet which must be magnetized. After being magnetized the mechanism—with the pole pieces upward, should be placed so that the magnet may be slid from the magnetizer onto the pole pieces without breaking physical contact. After placing the pole pieces on the magnet, the entire assembly should be remagnetized thoroughly, being careful not to change polarity.

(g) After reassembling to the mechanism, the entire assembly should be fastened to the back plate by means of the two screws provided, making sure support is down against pads on back. At the same time, the metal dust cover must be placed in position.

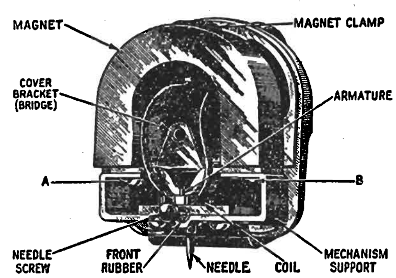


Figure A—View of Pickup showing parts

(h) After remagnetizing, it is necessary to correctly center the armature. This may be done quite accurately by feeling its play after the needle is inserted. A little practice will quickly show which way an adjustment is necessary to have the armature centered properly. The adjustment is made by loosening screws A and B (Figure A), and sliding the mechanism slightly in relation to the pole pieces.

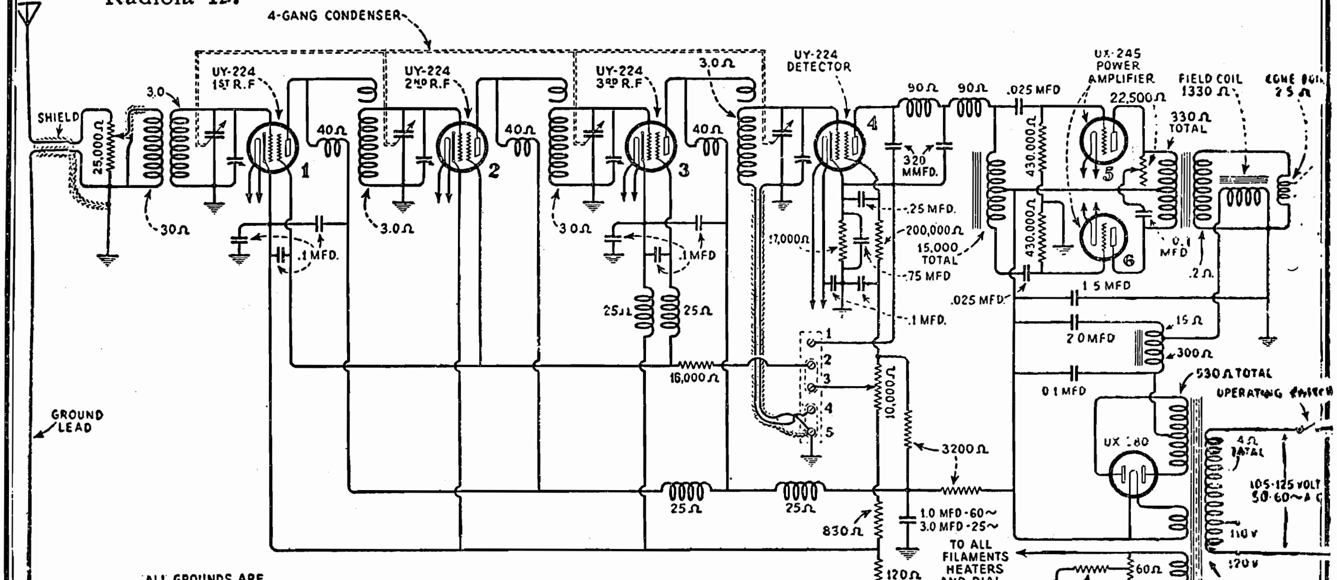
(i) The cover may be now replaced over the entire assembly, and the pickup returned to the tone arm.

Only rosin core solder should be used for any soldering in conjunction with the pickup. However, if great care to wipe clean and use as small amount as possible is exercised, paste or liquid flux may be used for soldering the end of the spring.

Radiola 42 Schematic
Model R-43 Notes

R. C. A. VICTOR CO., INC.

All the information contained in the Radiola 48 Service Notes will therefore apply to the Radiola 42.



Model Radiola 42

It will be noted that a new volume control is used. The antenna section of this unit has a value of 25,000 ohms instead of 50,000 ohms as used in the Radiola 48. This volume control is also being used as a replacement in Radiola 48. The screen grid voltage section has a value of 10,000 ohms and the 12,000 ohm shunt resistor is not used. The 0.005 mfd. condenser across the plates of Radiotrons UX-245 has been omitted due to the connection of the tone control in the same position. When making replacements of the condenser and reactor unit it will be necessary to clip the two leads that are connected to the .005 mfd. condenser close to the container. The reason for this is that the replacement unit supplied is suitable for either the Radiola 42 or 48.

Model R-43 Service Notes

The RCA Victor Console, R-43 is an eight tube screen grid battery operated Super-Heterodyne radio receiver.

Three Radiotrons RCA-232 are used in the R.F., 1st detector and I.F. stages respectively. Five Radiotrons RCA-230 are used in the Oscillator, 2nd detector, 1st audio and push-pull power stage.

A reference to the RCA Victor Radiola Superette Service Notes will give the details of circuit operation up to and including the second detector. The audio circuits of the R-43 are however, considerably different from the R-7. A discussion of their function follows:

The first audio stage operates in the usual manner, its output being fed into the grid circuit of the push-pull stage. The output stage is of the push-pull type, in which the tubes are biased to substantially plate current cut-off. The arrangement is such that the output stage may deliver substantially four times the output that would be obtained with the same tubes operated in the usual circuit. This system is very economical due to there being but a small amount of residual plate current flowing in the output stage. Current is drawn only when a modulated signal is being received.

An extra winding, shunted by a capacitor, is placed on the output transformer. The purpose of this circuit is to provide a high frequency cut-off for the audio amplifier.

A tone control is provided, which consists of a 0.1 mfd. capacitor and a 50,000 Ohm variable resistor connected across one half of the secondary of the input transformer. This circuit functions to reduce the high frequency output as the resistance is decreased.

The permanent magnet dynamic loudspeaker used with this receiver is a new development and gives all the fine quality and life-like reproduction inherent in this type of reproducer.

The receiver is designed for use with the new Eveready Aircell "A" battery which provides a life in excess of 600 ampere hours. The receiver draws but .48 amperes, giving approximately 1200 hours life from a single filament battery.

The plate and grid supply for all Radiotrons is furnished from four heavy duty "B" batteries. Due to the low current drain—8 to 15 M.A.—excellent life is obtained from this source of current.

SERVICE DATA

A reference to the RCA Victor Superette, R-7 Service Notes will give complete details on R.F., oscillator and I.F. adjustments as well as the usual service information required with this type of receiver.

BATTERIES

The Eveready Aircell "A" battery must be kept clean and the plates covered with water at all times. Operation at temperatures of 40 degrees Fahrenheit or lower is not recommended and if attempted will result in damage to the battery. Having the battery idle at this temperature does not in any way affect it. If it is essential that an installation be made where the receiver is to be operated at 40 degrees Fahrenheit or less, a single cell storage battery should be used. Due to the low current drain, excellent life from one charging will be obtained.

"B" batteries should be replaced when their output voltage has dropped 25% under load.

SPECIAL NOTE*** Material within border very important information

Schematic of Model R-43 on page 504-6, Vol. I.

MODEL Radiola 64
Alignment

R. C. A. VICTOR CO., INC.

ADJUSTMENT OF R. F. COMPENSATING CONDENSER

A cause of insensitivity may be a poor tube in the tuned R.F. stage or incorrect adjustment of the R.F. compensating condenser. Try changing tubes first to improve the sensitivity and if not successful adjust the compensating condenser. A step-by-step procedure for making proper adjustment follows:

(a) Procure a non-metallic screwdriver
(b) Connect a resistance of about 1.5 ohms across the cone coil leads. This will prevent damage to the cone spider should the Radiola go into oscillation.
(c) Place Radiola in operation and tune in a station, preferably at about the center of the dial scale.
(d) Locate the position of the compensating condenser.
(e) With the volume control at its maximum position and the sensitivity control set near minimum, adjust the screw of the condenser until the Radiola goes into oscillation. This will cause a whistle whenever a signal is tuned in. Then turn the screw in the opposite direction until the set just goes out of oscillation and no howl is experienced when receiving stations at any part of the scale. The condenser is now in correct adjustment.
(f) After the adjustment of the R.F. compensating condenser has been made the tube in the second socket should not be interchanged.

ADJUSTMENT OF OSCILLATOR TRIMMING CONDENSERS

Two trimming condensers are provided for adjusting the oscillator circuit so that the beat note will always be 180 K.C. throughout the tuning range of the receiver.

The most noticeable symptom of the oscillator trimming condensers being out of adjustment is insensitivity of the Radiola in some sections or throughout the tuning range. To check the adjustment of the trimming condensers as a possible cause of any noticeable insensitivity in the receiver proceed in the following manner:

(a) Procure the following equipment:

A modulated oscillator giving signals at 1,400 and 600 Kilocycles.

A non-metallic screwdriver.

(b) Open the rear doors of the Radiola. Remove the two wood screws that hold the tuning meter in place and release the meter lead clamp so the meter can be dropped below the baffle board and pulled out to read the scale from the rear of the Radiola.
(c) With the Radiola in operation, place the oscillator in operation at 1,400 K. C., close to the antenna lead, and tune the Radiola by adjusting the station selector until a deflection caused by the external oscillator is obtained in the tuning meter.
(d) Now adjust the oscillator trimming condenser on the right with the non-metallic screw-driver until a maximum deflection is obtained in the tuning meter.
(e) Adjust oscillator for 600 K.C. Tune in the Radiola with station selector and then adjust the trimming condenser to the left for maximum deflection of the tuning meter.
(f) Now readjust at 1,400 K.C. as indicated in (c) and (d).

With this adjustment the trimming condensers are correctly adjusted for maximum efficiency, that is, so adjusted that the beat signal will be 180 K.C. throughout the tuning range.

(g) Remount tuning meter in its original position.

ADJUSTMENT OF I. F. TRANSFORMERS

The three I.F. transformers used in Radiola 64 are of the air core, tuned primary and tuned secondary type. The primary condenser is of the fixed type, while the secondary is adjustable. Also in each assembly an adjustable condenser is provided for neutralizing the I.F. stage. Figure 17 illustrates the internal connections.

Schematic on page 498, Vol. I.

R. C. A. VICTOR CO., INC.

MODEL Radiola 64
Trimmer Data

(a) Remove receiver assembly from cabinet Do not remove chassis from shelf and do not disconnect cable at S.P.U. terminals.
(b) Remove main tuning condenser assembly
(c) Replace screw holding ground lead on under side of receiver assembly and make certain that ground lead makes good contact with the chassis frame.
(d) Remove the two wood screws that hold down the tuning meter in place and release meter lead clamp. Slip the meter down below the baffle board and out to a position convenient for reading.
(e) Now place the coupling coil from the Driver under the center coil of the R.F. and Oscillator assembly. This is the transformer between the tuned R.F. stage and the first detector. Replace all Radiotrons except the Oscillator (No. 6) and turn operating switch "ON."
(f) Place Driver in operation by turning switch "ON," and set switches and vernier condenser at 180 K.C. The note from the Driver will then be heard in the reproducer unit of the receiver.

The I.F. transformer tuning condensers may now be adjusted
(a) Adjust the tuning condensers successively on the third, second and first I.F. transformers (Figure 19) for maximum signal in the loudspeaker and maximum reading on the tuning meter. After making one adjustment on the transformers it is a good plan to repeat, as slight changes may have occurred in tuning the other circuits. No signal, or a loud howl indicates neutralizing condensers are at either extreme, and should be readjusted.

A maximum reading by adjusting all three tuning condensers indicates correct tuning of the intermediate stages.

Neutralization of I-F Stages

Leave all adjustments and apparatus in position on completion of tuning. Connect a pair of phones across the cone coil of the reproducer unit. Turn the power off while making this connection. Place dummy Radiotron in first I.F. socket. Now adjust the neutralizing condenser on the first I.F. transformer (Figure 19) for the position of minimum or no signal. This is easily identified and the adjustment is not critical.

Replace the first I.F. tube and place "dummy" tube in second I.F. stage. Repeat the same adjustment as in (a) only adjusting with the neutralizing condenser on the second I.F. transformer. It will be noted that the two condensers on the third transformer are connected in parallel for tuning. This stage does not require neutralizing.

The approximate transformer primary D.C. resistance is 20 ohms; secondary 100 ohms. Due to the circuit arrangement (See Figure 17) it will only be possible to get a reading of 50 ohms on the secondary as the end connection goes to the neutralizing condenser and the reading must be made at the center tap connection. This test can be made from the underside of the chassis. (See wiring diagram

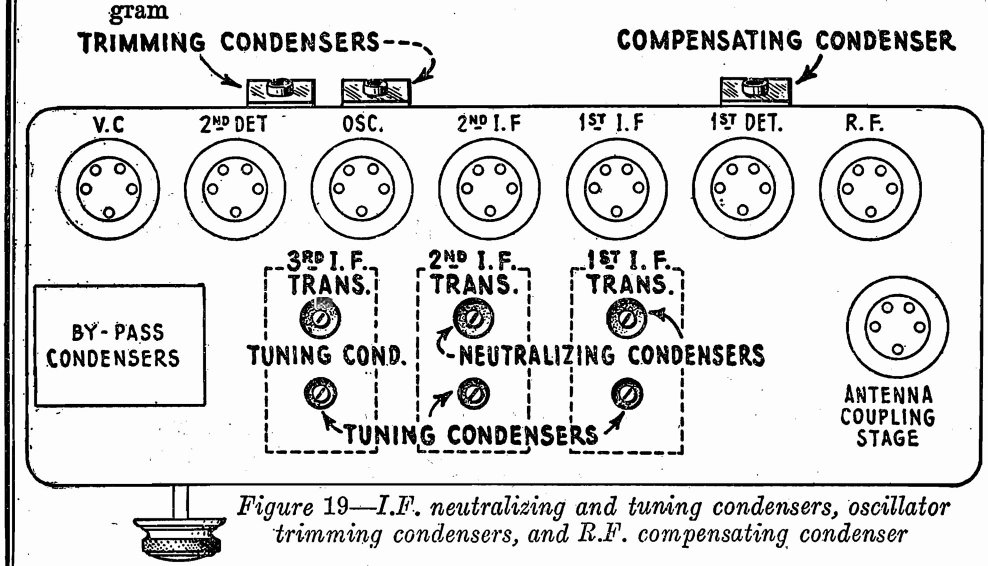


Figure 19—I.F. neutralizing and tuning condensers, oscillator trimming condensers, and R.F. compensating condenser

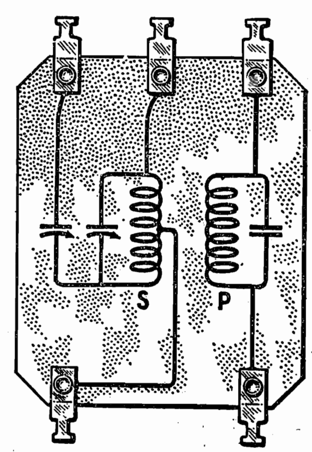
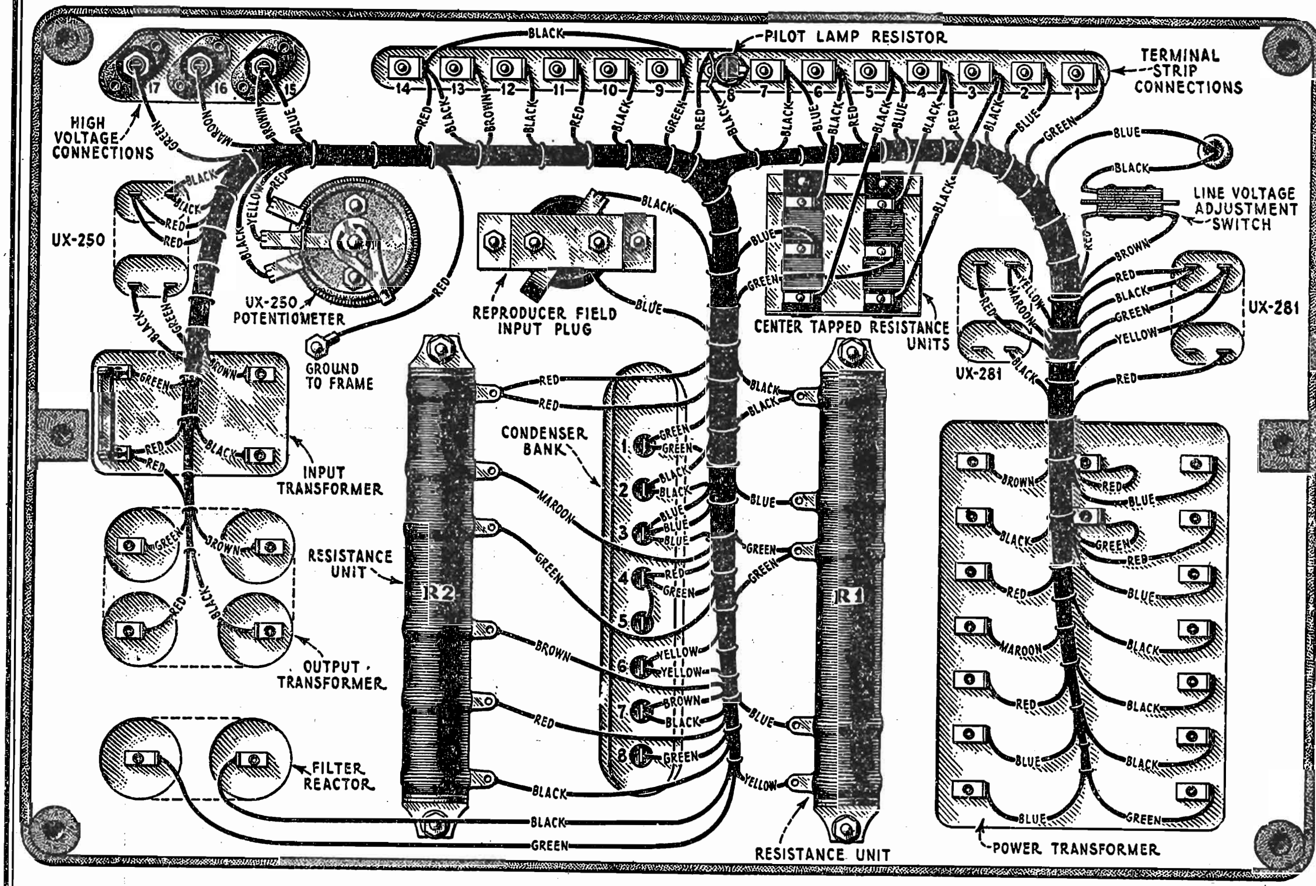


Figure 17—Internal connections of I.F. transformers

MODEL Radiola 64
SPU Chassis
AVC Data

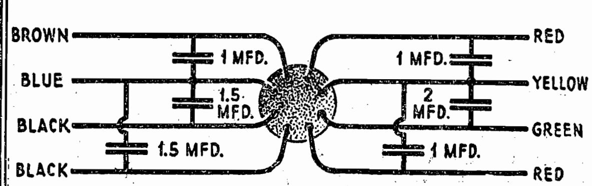
R. C. A. VICTOR CO., INC.



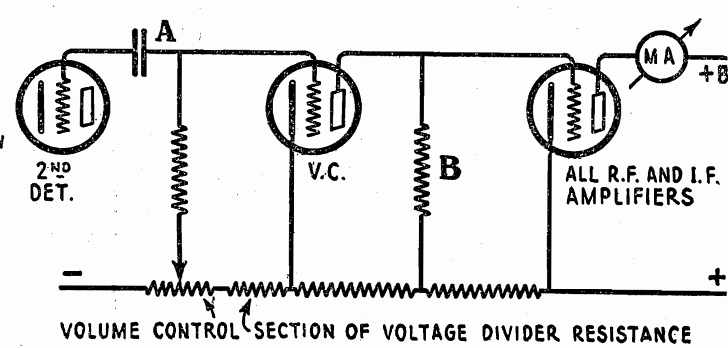
Wiring diagram of the socket power unit

OPERATION OF TUNING METER

In the foregoing explanation it is evident that practically all incoming signals will cause an increased negative bias on the radio frequency amplifying tubes. This increased bias will naturally cause a decrease in the plate current of these tubes. Placing a milliammeter in the plate circuit of these four tubes and tuning in a signal will cause a decreased reading. In Radiola 64 the milliammeter is a reversed scale instrument with a maximum rating equal to the total plate current of these four tubes. By having a reversed reading scale, turning the current on and not tuning in a station the meter will read maximum current or zero scale reading. Tuning in a station and thus registering a smaller amount of plate current the meter will give an increased reading. The amount of this increased reading will depend on the accuracy of tuning and the setting of the volume control.



Internal connections of the receiver by-pass condensers



Schematic of automatic volume control system

MODEL Radiola 67
Voltage
Socket- Data

R. C. A. VICTOR CO., INC.

VOLTAGE READINGS AT RADIOTRON SOCKETS

"Radio-Record" Switch in Radio Position—Volume Control at Minimum

Socket No.	Cathode to Heater Volts	Cathode to Grid Volts	Cathode to Plate Volts	Plate Current Milamps.	Filament or Heater Volts (rms.)
1 (R.F.)	19.	—35.	160.	0.0	2.40
2 (No. 1 Det.)	14.	—8.	68.	1.2	2.35
3 (No. 1 I.F.)	19.	—35.	160.	0.0	2.40
4 (No. 2 I.F.)	19.	—35.	160.	0.0	2.40
5 (Osc.)	14.	0.0	68.	6.2	2.35
6 (No. 2 Det.)	14.	—28.	215.	0.7	2.35
7 (V.C.)	0.	—1.5*	25.*	0.7	2.35
UX-250	—	—65.	435.	49.	7.2
Volume Control at Maximum					
1	16.	—8.	120.	4.5	2.40
2	14.	—8.	73.	1.5	2.35
3	16.	—8.	120.	4.5	2.40
4	16.	—8.	120.	4.5	2.40
5	14.	0.0	73.	5.8	2.35
6	14.	—29.	235.	0.6	2.35
7	0.	—2.5*	78.*	0.0	2.35
UX-250	—	—80.	440.	55.	7.2
Switch in "Record" Position					
6	14.	—20.	200.	1.8	2.35
7	0.	—1.5*	25.*	0.7	2.35

*Readings will vary considerably depending on resistance of voltmeter used.

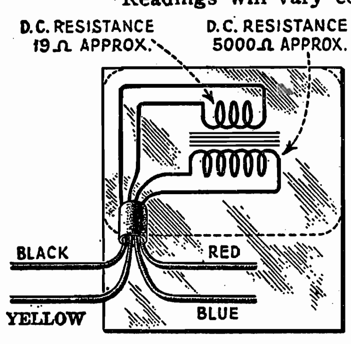


Figure 6—Internal connections of phonograph input transformer

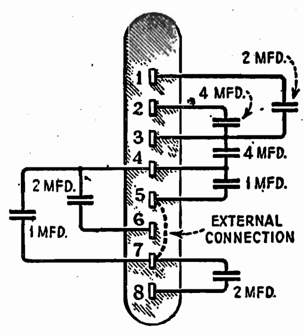


Figure 7—Internal connections of SPU filter condensers

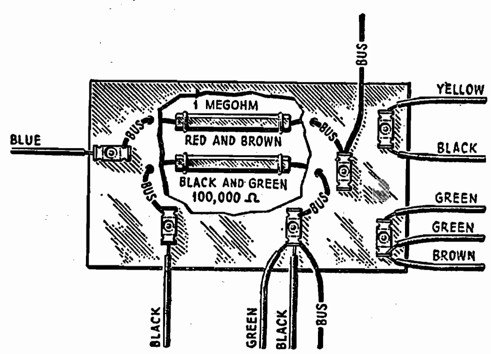
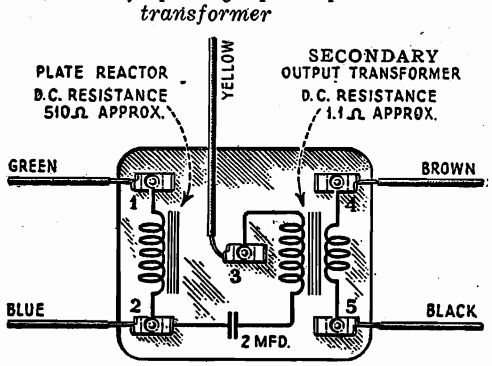
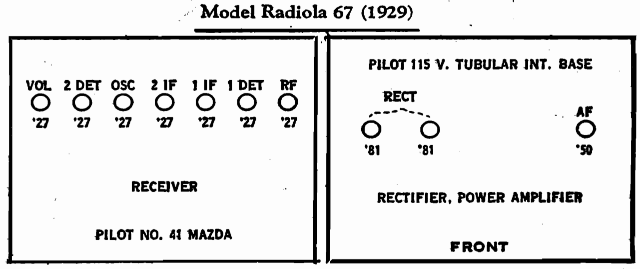


Figure 8—Connections of volume control resistors



-Output coupling device

Model Radiola 67 (1929)



Schematic on page 500, Vol. I.

R. C. A. VICTOR CO., INC.

RCA Victor Models R-71 and R-72

ELECTRICAL SPECIFICATIONS

Voltage Rating .... 105–125 Volts
Power Consumption .... 25–40 Cycles, 90 Watts; 50–60 Cycles, 80 Watts
Type of Circuit .... Super-Heterodyne
Type and Number of Radiotrons .... 3 RCA-58, 3 RCA-56, 1 RCA-247, and 1 UX-280—Total 8
Number of R. F. Stages .... One
Number of I. F. Stages .... One
Type of Second Detector .... Power Self Biasing
Type of Tone Control .... Variable resistance in series with condenser that tunes secondary of interstage transformer at "low" position
Type of Automatic Volume Control .... RCA-56 controlling R. F. and I. F. stages by means of drop across resistor in plate circuit constituting bias on R. F. and I. F. stages. Manual volume control varies grid bias on A. V. C. tube
Number of Audio Stages .... One—Single Pentode
Type of Rectifier .... Full Wave, UX-280
Undistorted Output .... 2.25 Watts

PHYSICAL SPECIFICATIONS—R-71

Height .... 18 11/16 Inches
Depth .... 10 21/32 Inches
Width .... 14 Inches
Weight Alone .... 34 Pounds
Weight Packed for Shipment .... 42 Pounds

PHYSICAL SPECIFICATIONS—R-72

Height .... 38½ Inches
Depth .... 11 11/16 Inches
Width .... 23 Inches
Weight Alone .... 58 Pounds
Weight Packed for Shipment .... 79 Pounds

RCA Victor Models R-71 and R-72 are eight tube Super-Heterodyne radio receivers incorporating such features as Automatic Volume Control, Pentode output, New R. F. Super Control Pentodes, High Efficiency General Purpose Radiotrons and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-Heterodyne.

Model R-71 is a table type receiver and the R-72 is of the Console type. Except for the loudspeaker, both models are identical. The R-71 uses a six inch speaker while the R-72 uses an eight inch unit.

A reference to the Service Notes already published on the R-11 and R-7 will give details of any service information required on these receivers. Figure 1 shows the schematic diagram and Figure 2 the wiring. The voltage readings are listed below and the replacement parts on the following pages.

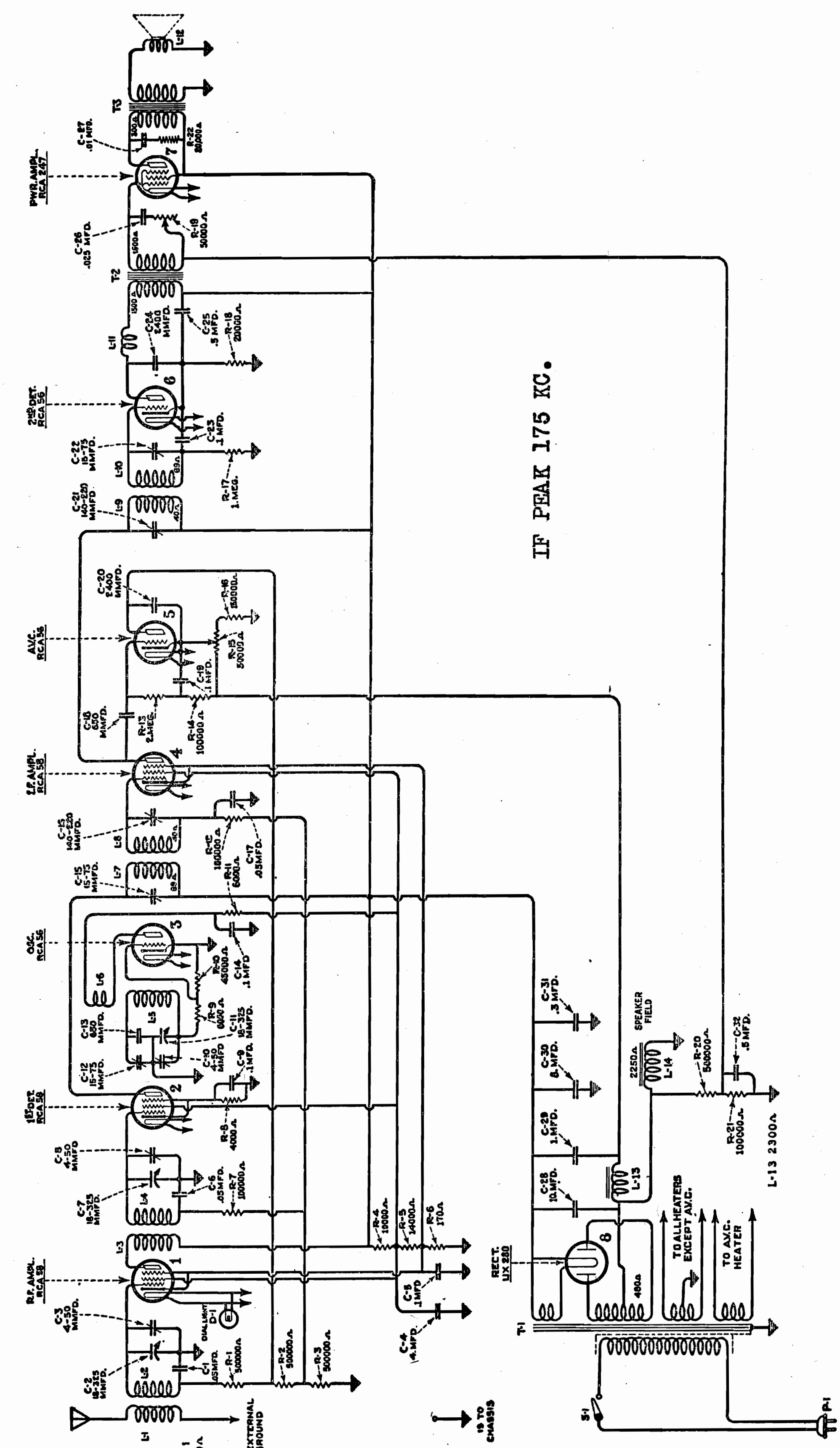
120 VOLT A. C. LINE

Radiotron No.	Cathode to Heater, Volts, D. C.	Cathode or Filament to Control Grid, Volts, D. C.	Cathode or Filament to Screen Grid, Volts, D. C.	Cathode or Filament to Plate, Volts, D. C.	Plate Current, M. A.	Heater or Filament, Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1—R. F.	**2.0	*1.2	110	280	0	2.5
2—1st Det.	0	*1.5	110	280	0	2.5
3—Osc.	—	—	—	90	5.5	2.5
4—I. F.	**2.0	*2.0	110	280	0	2.5
5—A. V. C.	—	1.0	—	10	0	2.5
6—2nd Det.	—	6.0	—	260	1.0	2.5
7—Pwr.	—	20.0	275	265	35.0	2.5
VOLUME CONTROL AT MAXIMUM						
1—R. F.	**4.0	*0.1	100	260	5.0	2.5
2—1st Det.	**10.0	*1.0	95	250	2.0	2.5
3—Osc.	—	—	—	75	4.5	2.5
4—I. F.	**4.0	*1.8	100	260	3.0	2.5
5—A. V. C.	—	2.0	—	20	0	2.5
6—2nd Det.	—	7.0	—	240	1.0	2.5
7—Pwr.	—	20.0	275	265	30.0	2.5

*On 5 Volt, 1000 Ohm per Volt Meter.
**On 50 Volt, 1000 Ohm per Volt Meter

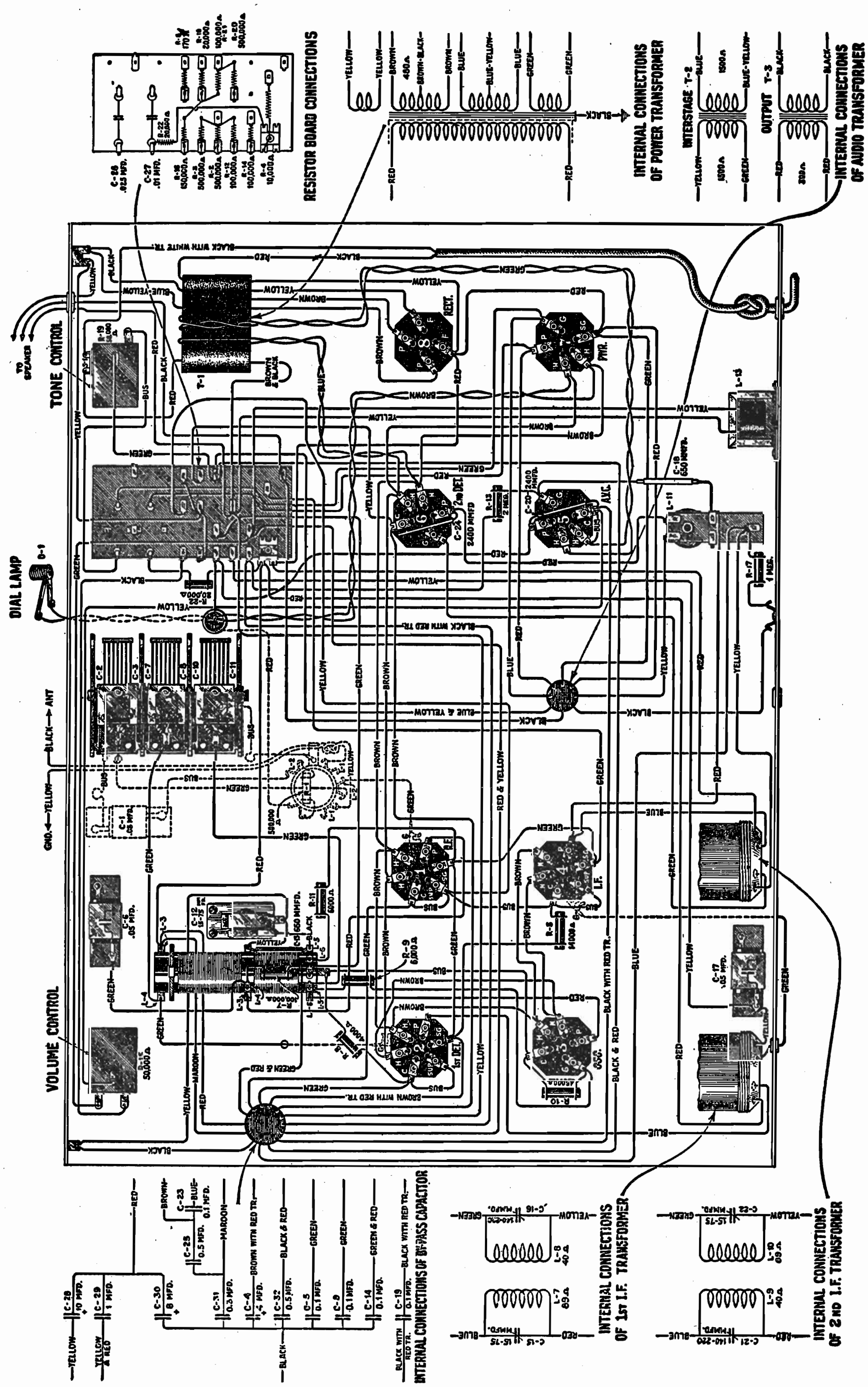
MODEL R-71, R-72
Schematic

R. C. A. VICTOR CO., INC.



R. C. A. VICTOR CO., INC.

MODEL R-71, R-72
Chassis



R. C. A. VICTOR CO., INC.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2563	Resistor—6,000 ohms—Carbon type—1 watt—Package of 5	$3.00
2746	Socket—Dial lamp socket	.50
2747	Cap—Grid connector cap—Package of 5	.50
2749	Capacitor—2,400 mmfd.	1.50
3003	Cushion—Sponge rubber cushion for mounting receiver chassis—Package of 4	.50
3048	Resistor—500,000 ohms—Carbon type—½ watt—Package of 5	2.50
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	2.50
3252	Resistor—100,000 ohms—Carbon type—½ watt—Package of 5	2.75
3360	Resistor—150,000 ohms—Carbon type—½ watt—Package of 5	2.50
6142	Resistor—6,000 ohms—Carbon type—½ watt—Package of 5	2.00
6186	Resistor—500,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	2.00
6192	Spring—Condenser drive cord tension spring—Package of 10	.50
6250	Resistor—4,000 ohms—Carbon type—½ watt—Package of 5	2.00
6288	Knob—Station selector—Volume control or tone control knob—Package of 5	1.50
6298	Cord—Tuning condenser drive cord—Package of 5	1.00
6300	Socket—4 prong radiotron socket—1 used	.55
6301	Reactor—Filter reactor	2.00
6302	Bracket—Dial lamp bracket assembly	.50
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6304	Resistor—170 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6307	Tone control complete with mounting nut	1.60
6308	Coil—R. F. coil	1.90
6309	Transformer—1st intermediate transformer	3.00
6310	Transformer—2nd intermediate transformer	3.00
6311	Board—Resistor board less resistors and capacitors	1.75
6312	Capacitor—650 mmfd.—Oscillator series capacitor—Package of 5	2.50
6315	Resistor—45,000 ohms—Carbon type—½ watt—Package of 5	2.50
6317	Capacitor—0.05 mfd. capacitor	.70
6318	Resistor—10,000 ohms—20 watt	1.00
6319	Capacitor—0.01 mfd.—Located on resistor board	.60
6321	Coil—2nd detector plate choke coil	1.10
6322	Volume control complete with mounting nut	1.65
6323	Shaft—Tuning condenser drive shaft complete with one flat washer and two "C" washers—Package of 2	.85
7054	Cord—Power cord	1.00
7062	Capacitor—Adjustable capacitor—15 to 70 mmfd.	1.00
7362	Capacitor—0.025 mfd.—Located on resistor board	1.00
7439	Drum—Dial drum with set screws	.50
7440	Scale—Tuning dial scale	.75
7484	Socket—5 contact radiotron socket—4 used	.65
7485	Socket—6 prong radiotron socket—3 used	.70
7487	Shield—Radiotron shield—6 used—Plain Finish	.50
7488	Shield—Radiotron shield top—1 used—Plain Finish	.50
7501	Capacitor—3 gang variable tuning capacitor—Less drive shaft and drum	$5.20
7502	Capacitor pack—Comprising one 10. mfd., one 1 mfd., two 0.5 mfd., one 8. mfd., five 0.1 mfd., one 0.3 mfd., and one 4. mfd. capacitors in metal container	8.25
7504	Coil—1st detector and oscillator coil complete with mounting bracket	3.50
8837	Support—Receiver chassis metal mounting support—Package of 4	.70
8917	Transformer—Audio transformer assembly comprising interstage and output transformer in metal container	4.50
8918	Transformer—Power transformer—110-120 volts—50-60 cycles	8.00
8922	Transformer—Power transformer—110-120 volts, 25-50 cycles	10.00
8923	Transformer—Power transformer—220-240 volts, 50-60 cycles	7.00
	R-71 CABINET ASSEMBLIES (Prices Furnished Upon Application)	
X118	Baffle board and grille cloth	
X119	Cabinet—Complete less equipment	
6113	Foot—Cabinet felt foot—Package of 15	
7441	Escutcheon—Station selector escutcheon with mounting screws	
	R-72 CABINET ASSEMBLIES (Prices Furnished Upon Application)	
X64	Foot—Cabinet foot	
X109	Top—Cabinet top	
X110	Panel—Control panel	
X111	Stretcher assembly—Comprising 1 center and 2 end rails	
X112	Board—Baffle board and grille cloth	
X113	Moulding—Control panel moulding	
X114	Moulding—Front end rail moulding—1 pair	
X115	Ornament—Control panel ornament—1 pair	
X116	Moulding—Control panel bottom moulding	
X117	Cabinet—Complete less equipment	
7441	Escutcheon—Station selector escutcheon	
	R-71 REPRODUCER ASSEMBLIES	
2975	Rivet—Cone retaining ring mounting rivet—Package of 100	.50
3237	Screw assembly—Reproducer mounting screw assembly—Comprising 4 screws, 8 nuts, 4 washers, and 4 eyelets—Package of 1 set	.50
6182	Board—Terminal board with three terminals—Package of 5	.50
8702	Ring—Cone retaining ring	.80
8921	Cone—Reproducer cone with voice coil—Package of 5	7.50
9417	Coil—Reproducer field coil assembly—Comprising coil, cone housing and magnet	6.00
	R-72 REPRODUCER ASSEMBLIES	
3237	Screw assembly—Reproducer mounting screw assembly—Comprising 4 screws, 8 nuts, 4 washers, and 4 eyelets—Package of 1 set	.50
6184	Board—Terminal board—3 terminals	.50
8919	Cone—Reproducer cone complete with voice coil—Package of 5	12.50
8920	Ring—Cone retaining ring	.50
9416	Coil—Reproducer field coil—Comprising coil, cone housing, and magnet	5.00

MODEL R-71-B
Voltage
Data

R. C. A. VICTOR CO., INC.

RCA Victor Model R-71-B

ELECTRICAL SPECIFICATIONS

"A" Batteries Required........Eveready Aircell "A" Battery
"B" Batteries Required........Four 45 Volt Blocks, Preferably of Heavy Duty Type
"A" Battery Current........0.48 Amperes
Average "B" Battery Current........18 M. A.
Type of Circuit........Super-Heterodyne with A. V. C., Class "B" Output Stage and Compensated Volume Control
Type and Number of Radiotrons........3 RCA-234, 1 RCA-232, 4 RCA-230—Total 8
Number of R. F. Stages........One
Number of I. F. Stages........One
Type of Second Detector........Pentode, Combining Detector, A. V. C. and Audio Amplification
Number of Audio Stages........Two
Undistorted Output........1.00 Watt

PHYSICAL SPECIFICATIONS

Height........18 11/16 Inches
Depth........10 21/32 Inches
Width........14 Inches
Weight Alone........34 Pounds
Weight Packed for Shipment........40 Pounds

RCA Victor Model R-71-B is an eight tube battery operated Super-Heterodyne radio receiver incorporating such features as Super-Control R. F. Amplifier Pentode Radiotrons in the R. F. and I. F. stages, automatic volume control, combination Pentode second detector, compensated Class "B" audio amplifier and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-Heterodyne. The chassis and permanent magnet dynamic loudspeaker are enclosed in a standard R-71 cabinet. The performance of this receiver is comparable in all respects to the A. C. model of the same designation, except in output volume.

SERVICE DATA

Except for different chassis design the circuit used in the R-71-B is very similar to that of the P-31 Portable Radiola. A reference to this Service Note should therefore be made for a description of the circuit and manner of making adjustments. The voltage readings are given below and the replacement parts on page 3. Figure 1 shows the schematic circuit diagram and Figure 2 the chassis wiring diagram.

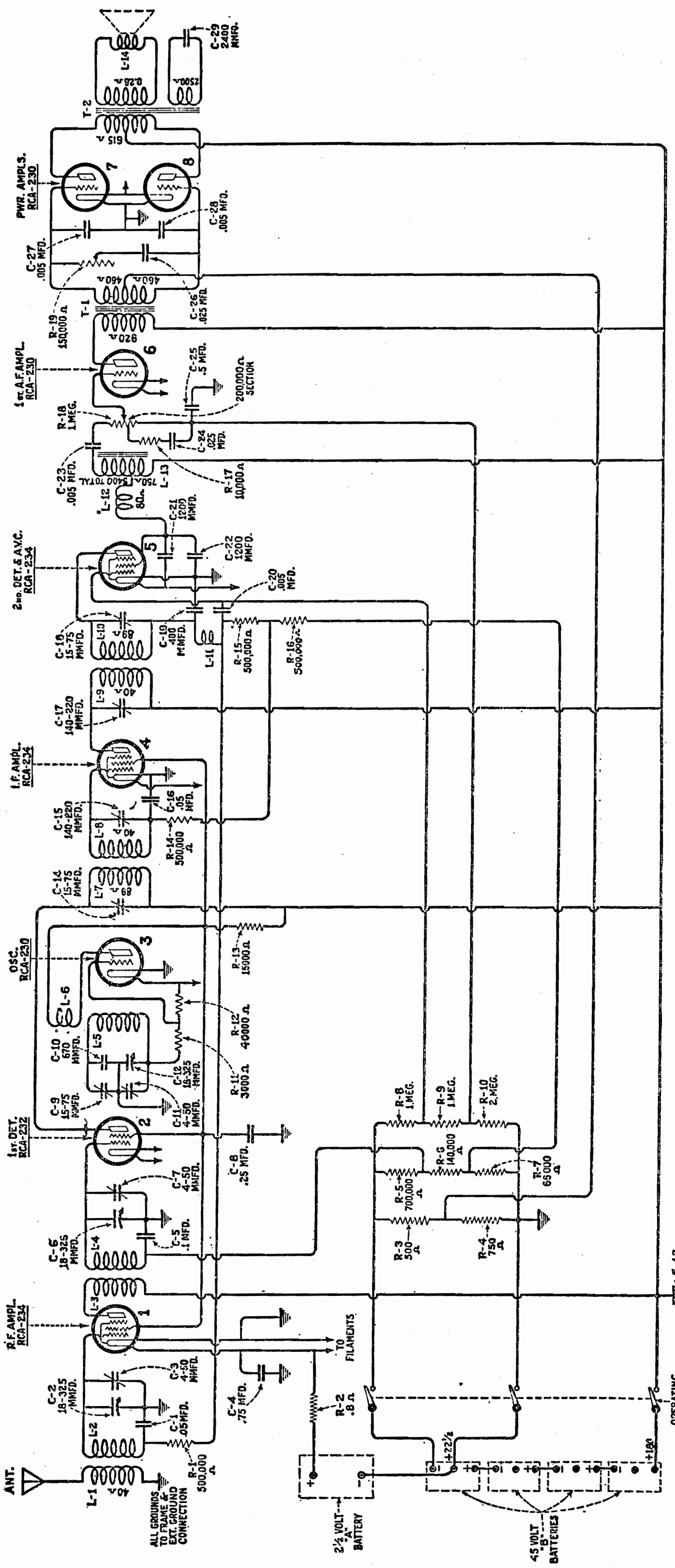
RADIOTRON SOCKET VOLTAGES

(No signal being received)

Radiotron No.	Control Grid to Filament Volts	Screen Grid to Filament Volts	Plate to Filament Volts	Screen Current M. A.	Plate Current M. A.	Filament Volts
1. R. F.	0.2	65	157	1.0	3.0	2.0
2. 1st Detector	0.5	65	157	0.1	0.2	2.0
3. Oscillator	1.0	—	65	—	4.0	2.0
4. I. F.	0.5	65	157	1.0	3.0	2.0
5. 2d Detector	2.0	155	0	4.0	0	2.0
6. 1st A. F.	1.0	—	155	—	2.5	2.0
7. Power	14.0	—	155	—	1.2	2.0
8. Power	14.0	—	155	—	1.2	2.0

MODEL R-71-B
Schematic

R. C. A. VICTOR CO., INC.



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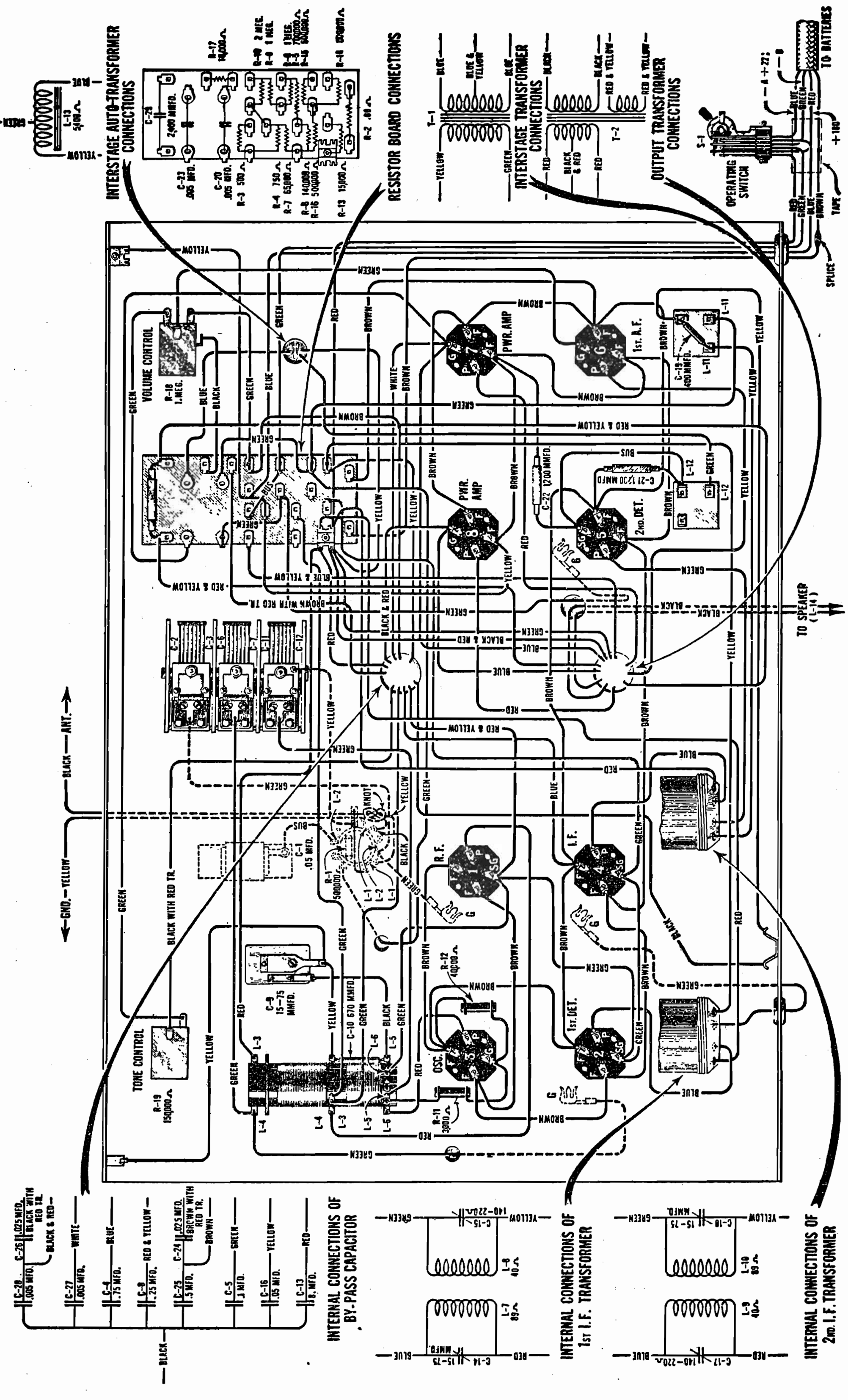
The circuit used in this receiver is very similar to that used in the Model P-31 battery operated portable receiver. However, the chassis arrangement is different.

R. C. A. VICTOR CO., INC.

MODEL R-71-B Chassis



Chassis Wiring Diagram of R-71-B

MODEL R-71-B
Parts List

R. C. A. VICTOR CO., INC.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2012	Capacitor—1200 mmfd. capacitor	$0.55
2747	Contact cap—Package of 5	.50
2749	Capacitor—2400 mmfd.	1.50
2962	Capacitor—0.005 mfd. capacitor	.75
3003	Cushion—Sponge rubber chassis support cushions—Package of 4	.50
3033	Resistor—1 megohm—¼ watt—Carbon type—Package of 5	2.00
3043	Resistor—0.8 ohms—Wire wound	.50
3085	Capacitor—400 mmfd. capacitor	.60
3088	Knob—Operating switch knob—Package of 5	.50
3238	Screw—Set screw for switch knob No. 3088—Package of 10	.50
3252	Resistor — 100,000 ohms — ½ watt — Carbon type—Package of 5	2.75
3358	Resistor—3,000 ohms—½ watt—Carbon type—Package of 5	2.50
3380	Board—Resistor board—Less resistors and capacitors	1.00
3381	Resistor—10,000 ohms—¼ watt—Carbon type—Package of 5	2.00
3382	Resistor—750 ohms—½ watt—Carbon type—Package of 5	2.50
3383	Resistor—500 ohms—½ watt—Carbon type—Package of 5	2.50
6176	Escutcheon—Operating switch escutcheon—Engraved "OFF—ON"—Package of 5	.50
6186	Resistor — 500,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6192	Spring—Condenser drive cord tension spring—Package of 10	.50
6241	Resistor — 140,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6242	Resistor—2 megohm—¼ watt—Carbon type—Package of 5	2.00
6244	Resistor — 700,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6245	Resistor — 65,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6279	Resistor — 15,000 ohms — ½ watt — Carbon type—Package of 5	2.50
6285	Choke coil—2nd detector plate choke coil	1.10
6288	Knob—Station selector, volume control or tone control knob—Package of 5	1.50
6298	Cord—Tuning condenser drive cord—Package of 5	1.00
6300	Socket—4 prong Radiotron socket	.55
6308	Coil—R. F. coil complete with mounting bracket	1.90
6317	Capacitor—0.05 mfd. capacitor	$0.70
6320	Capacitor — 670 mmfd. capacitor — Package of 5	2.50
6323	Shaft—Tuning condenser drive shaft with one flat washer and two "C" washers—Package of 2	.85
6326	Transformer — 1st intermediate frequency transformer	3.00
6327	Transformer — 2nd intermediate frequency transformer	3.00
6328	Volume control—Complete with mounting nut	1.60
6329	Tone control—Complete with mounting nut	1.90
6330	Scale—Tuning dial scale	.90
6331	Shield—Radiotron shield	.50
6332	Switch—Operating switch	1.60
6333	Cable—Battery connecting cable	1.50
7062	Capacitor—Adjustable trimming capacitor—15 to 70 mmfd.	1.00
7439	Drum—Dial drum with set screws	.50
7501	Capacitor—3 gang variable capacitor, less drive shaft and drum	5.20
7524	Coil—Detector and oscillator coil complete with mounting bracket	3.50
7525	Capacitor pack—Comprising one 8.0 mfd., one 0.05 mfd., one 0.1 mfd., one 0.5 mfd., one 0.25 mfd., one 0.75 mfd., two 0.005 mfd. and one 0.025 mfd. capacitors in metal container	6.00
7526	Transformer—Audio input transformer	3.50
7527	Transformer—Audio transformer pack comprising interstage and output transformers in metal container	4.50
	CABINET ASSEMBLIES (Prices furnished upon request)	
6113	Felt—Cabinet felt foot—Package of 15	
7523	Escutcheon—Station selector escutcheon	
X118	Baffle board and grille cloth	
X146	Cabinet—Complete less equipment	
	REPRODUCER ASSEMBLIES	
2975	Rivet—Eyelet rivet for mounting cone—Package of 100	.50
6166	Board—Terminal board with two terminals—Package of 5	1.00
8702	Ring—Cone retaining ring	.80
8828	Bracket—Cone bracket and magnet assembly	4.60
8921	Cone—Reproducer cone complete with voice coil—Package of 5	7.50

R. C. A. VICTOR CO., INC.

MODEL R-74, R-76, R-77
Schematic

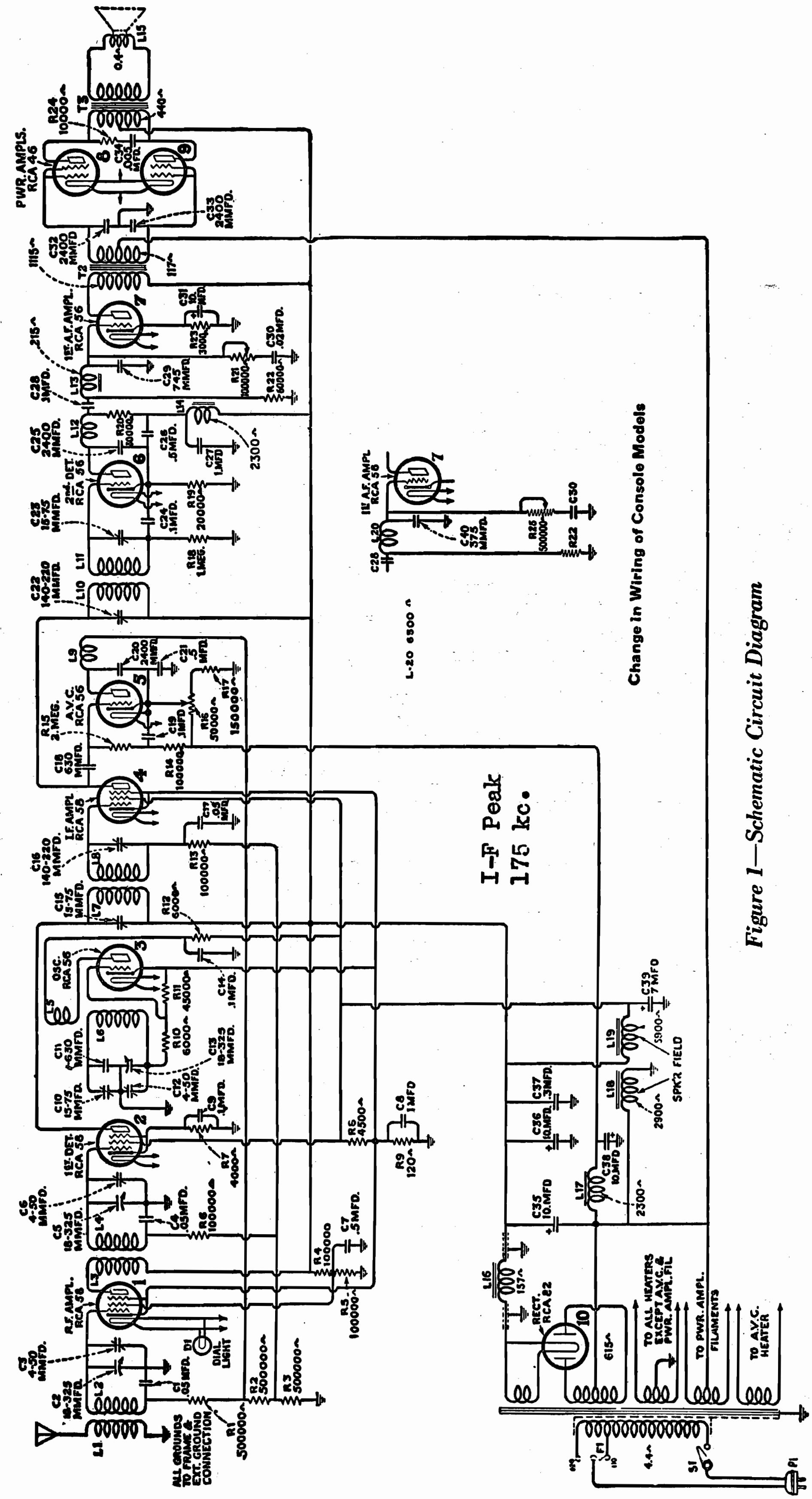
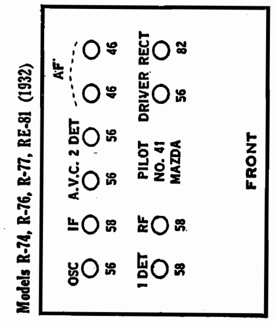


Figure 1—Schematic Circuit Diagram



Take note of the fact that a wiring change is to be found in the console model.

MODEL R-74
Chassis

R. C. A. VICTOR CO., INC.

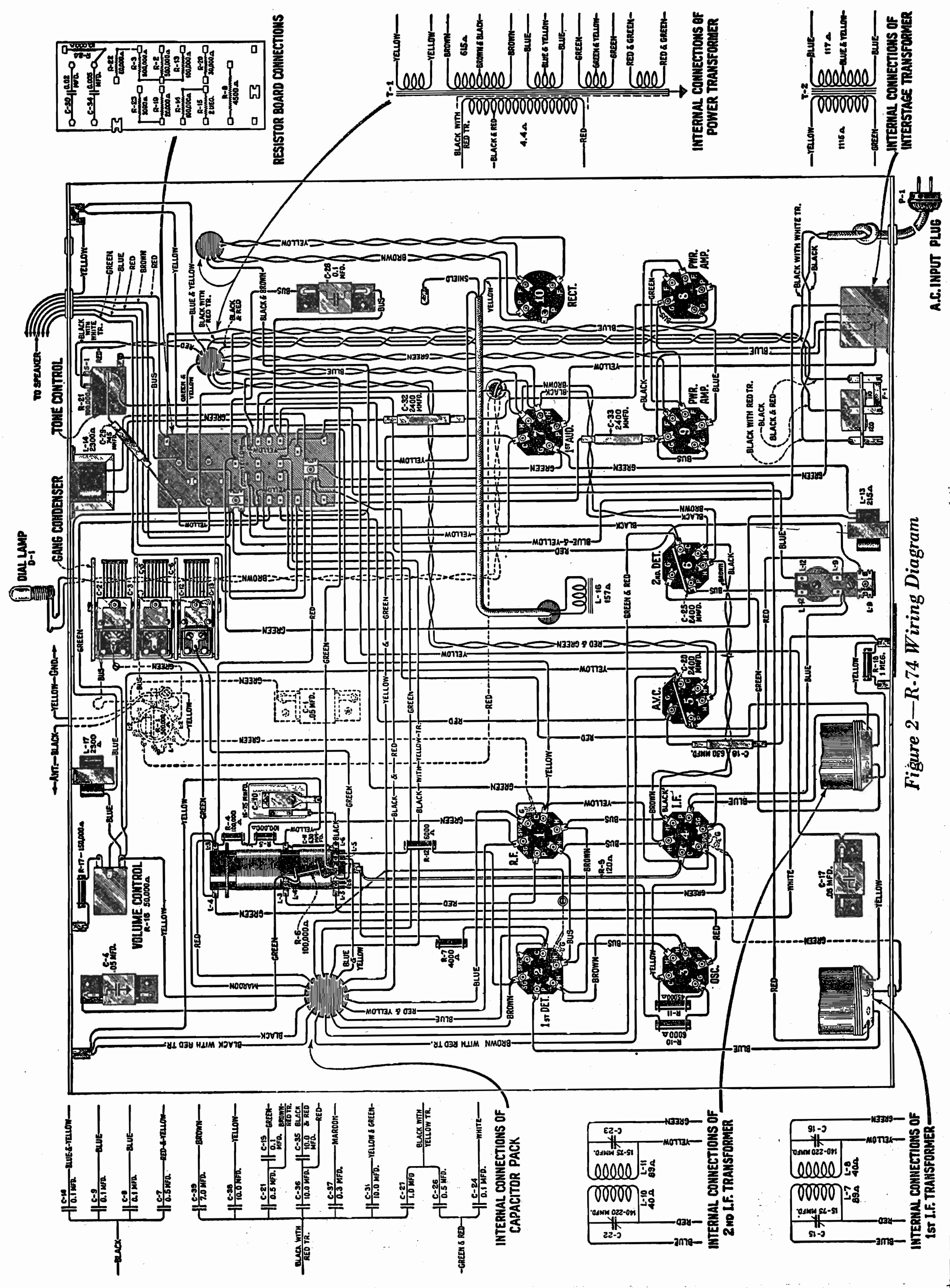


Figure 2—R-74 Wiring Diagram

R. C. A. VICTOR CO., INC.

MODEL R-74, R-76, R-77
Voltage Data

SERVICE DATA

Service data in conjunction with these receivers will be found to be similar to that of other RCA Victor Super-Heterodyne receivers employing automatic volume control. A dummy Radiotron RCA-56 should replace the tube normally in the A. V. C. socket when making R. F., oscillator and I. F. adjustments. The Radiotron socket voltages are given below and the Replacement Parts on Pages 7 and 8.

Figure 1 shows the schematic diagram for all models. Figures 2 and 4 show the wiring diagrams while Figure 3 shows the loudspeaker wiring. Figures 5, 6, and 7 show various magnetic pickup connections and Figure 8 gives the correct manner of attaching the RCA Victor Short Wave Adaptor.

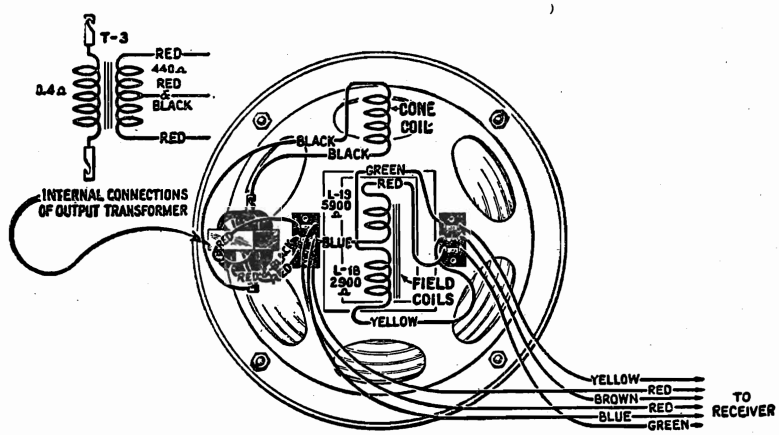


Figure 3—Loudspeaker Wiring

RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line
(No Signal Being Received—Antenna Lead Grounded to Chassis)

Radiotron No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current, M. A.	Heater or Filament Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1. R. F.	+4	1.0	90	280	0	2.4
2. 1st Det.	0	1.2	90	275	0	2.4
3. Osc.	+4	0	—	55	5.0	2.4
4. I. F.	+3	1.8	90	280	0	2.4
5. A. V. C.	0	0	—	5	0	2.4
6. 2nd Det.	+15	3.0	—	225	1.0	2.4
7. 1st A. F.	+14	10.0	—	260	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4
VOLUME CONTROL AT MAXIMUM						
1. R. F.	+4	0	70	250	4.5	2.4
2. 1st Det.	+6	0.6	75	235	2.0	2.4
3. Osc.	+4	0	—	50	5.0	2.4
4. I. F.	+4	1.5	84	250	4.5	2.4
5. A. V. C.	0	0	—	15	0	2.4
6. 2nd Det.	+15	3.0	—	210	1.0	2.4
7. 1st A. F.	+14	10.0	—	240	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4

MODEL R-76, R-77 Chassis

R. C. A. VICTOR CO., INC.

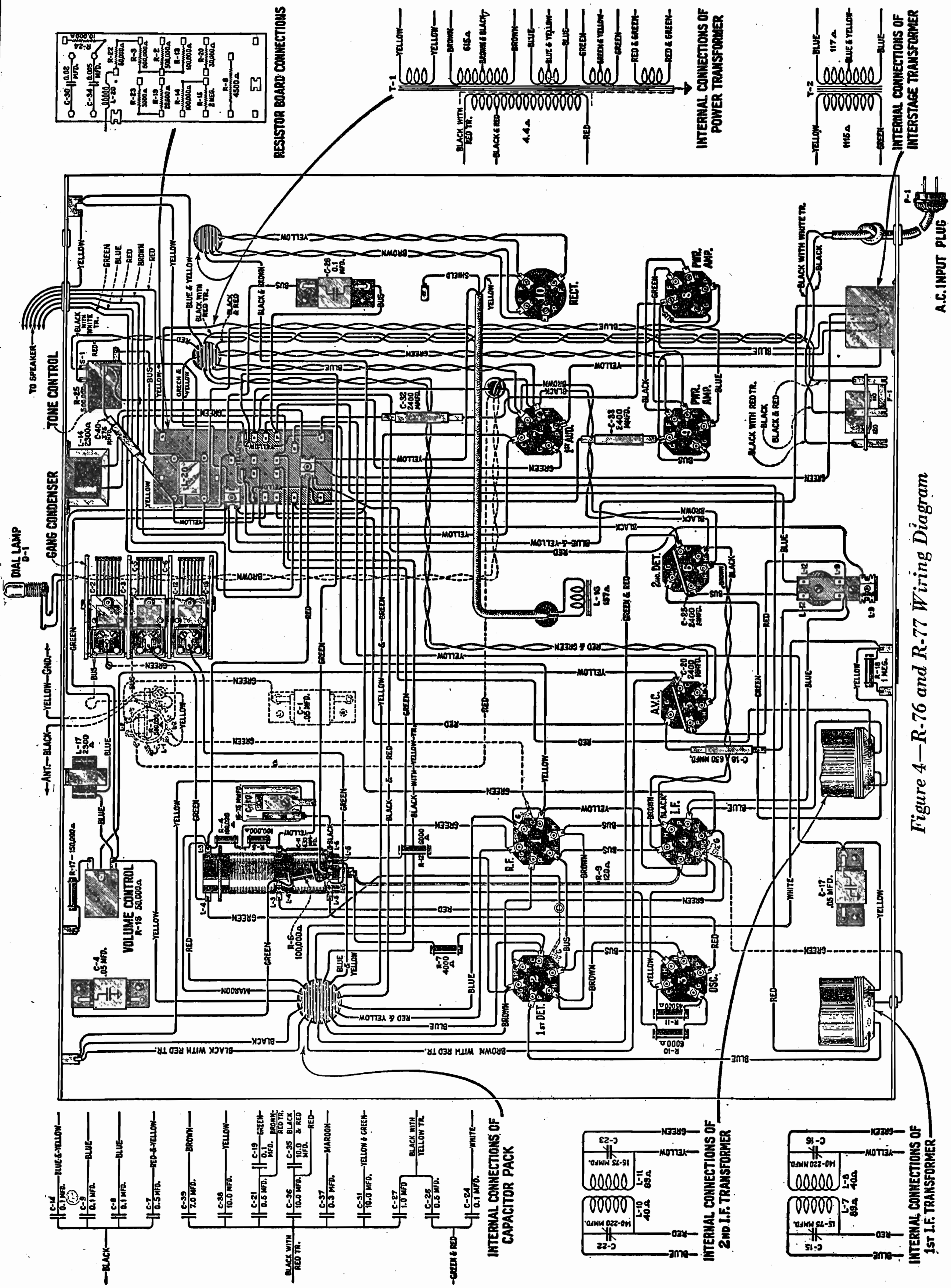


Figure 4—R-76 and R-77 Wiring Diagram

RCA Victor R-78

(Bi-Acoustic Super-Heterodyne)

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating....105–125 Volts
Frequency Rating....50–60 Cycles
Power Consumption....110 Watts Average
(The input wattage may vary from 70 to 130 watts depending on the output volume being used)
Recommended Antenna Length....25–100 Feet
Type of Circuit..Super-Heterodyne with A.V.C., Compensated A.F. system and Class "B" output stage
Type and number of Radiotrons....4 RCA-58, 5 RCA-56, 2 RCA-46, and 1 RCA-82, Total 12
Number of R. F. Stages....One
Type of first detector....Exponential with control grid voltage varied by A.V.C. tube
Number of Intermediate Stages....Two, one for signal and one for A.V.C.
Type of Second Detector....Power Grid Bias
Number of A. F. Stages....Two, one Push-Pull driver and one Class "B" output
Type of tone control....Reactor capacitor and variable resistor for reducing high frequency response
Type of Rectifier....Mercury vapor full wave RCA-82
Undistorted output....Approximately 20 watts Maximum

PHYSICAL SPECIFICATIONS

Height....43 inches
Width....28¼ inches
Depth....14 inches
Weight Packed for Shipment....168 Lbs.

The RCA Victor R-78 is a 12-tube Bi-Acoustic Super-Heterodyne Radio Receiver incorporating all the usual Super-Heterodyne features, together with the New RCA Victor Automatic Volume Control, Compensated Audio System and Class "B" output amplifier. These features, mainly evidenced by the greatly improved tone quality and high output, give the R-78 a degree of performance not obtainable with any existing type of Radio Receiver.

In order to economically build the R-78 several new types of Radiotrons have been produced. These are namely the RCA-58, a new R. F. Amplifier Pentode, the RCA-56, a high efficiency general purpose tube similar to the UY-227, the RCA-46, a new output tube designed for Class "B" operation and the RCA-82, a new mercury vapor rectifier Radiotron giving the degree of voltage regulation necessary for a Class "B" Amplifier.

A brief technical description of this remarkable new receiver follows. Figure 2 shows the schematic wiring diagram.

In order to understand the reasons for many of the design features of the R-78 it is necessary to first review some of the requirements of a radio receiver. These may be listed in the following order:

Sensitivity. The primary requirement for any Radio receiver is its ability to bring in a station. The R-78 has sensitivity that reaches into the noise level even in a quiet location.

Selectivity. The ability of a receiver to separate stations even on adjacent channels is that quality known as selectivity. The R-78 has the ability to separate stations on adjacent channels even though one is a local station. In addition, the Automatic Volume Control is so designed that it does not tend to spread the band of any particular station due to its action.

Fidelity. Fidelity is that quality of a radio receiver that determines how exact the reproduced sound follows that produced in the broadcasting studio, of course, excepting any distortion that may originate in the transmitting station. Fidelity must cover every quality of a set from input to sound pressure output. Not only must the receiver and amplifier be considered but also the loudspeaker and cabinet, the latter being very important. Fidelity also includes distortion that occurs at reduced volume due to certain characteristics of the human ear. These will be discussed later.

The Automatic Volume Control used in the new R-78 has a very definite relation to sensitivity and selectivity. It is of the two-element (diode) type and has a special I. F. stage to drive it. This volume control is many times more effective than any existing type. Due to its action the R. F. voltage applied to the Second Detector is substantially constant, for a signal of from 100 microvolts input to that of several volts. Such regulation, in addition to being desirable from an entertainment viewpoint is also essential in this receiver due to the location of the volume control. Since there is no danger of overload on the detector grid the volume control may therefore be located in the audio circuit.

Referring to the schematic circuit Figure 2, it will be noted that the A.V.C. functions in the following manner:

The input signal voltage for the I.F. Amplifier is applied also to the A.V.C. amplifier tube due to the grids of both being coupled together by means of the 300 mmfd. capacitor C-19. The output of the I.F. amplifier is applied to the Second Detector through a sharply tuned transformer. However, the output of the A.V.C. amplifier is coupled to the A.V.C. tube through a broadly tuned transformer. The reason for the location of the A.V.C. and coupling it in this manner is due to two reasons. First, too much selectivity ahead of the A.V.C. is not desirable as it introduces excessive distortion and overload as a station is tuned in. However, a certain amount of selectivity is essential, otherwise the A.V.C. will be caused to function by a local station when it is desired to tune in a weaker station on an adjacent channel. It will be noted that the grid and plate of the A.V.C. tube are tied together.

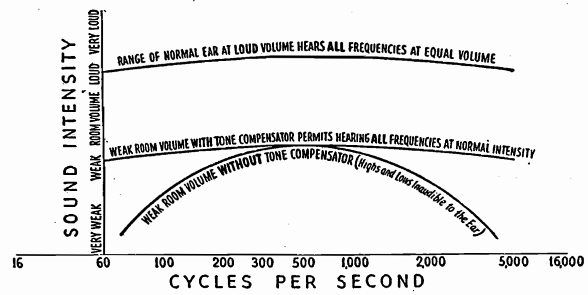


Figure 3—Graph Showing Compensation Used in R-78

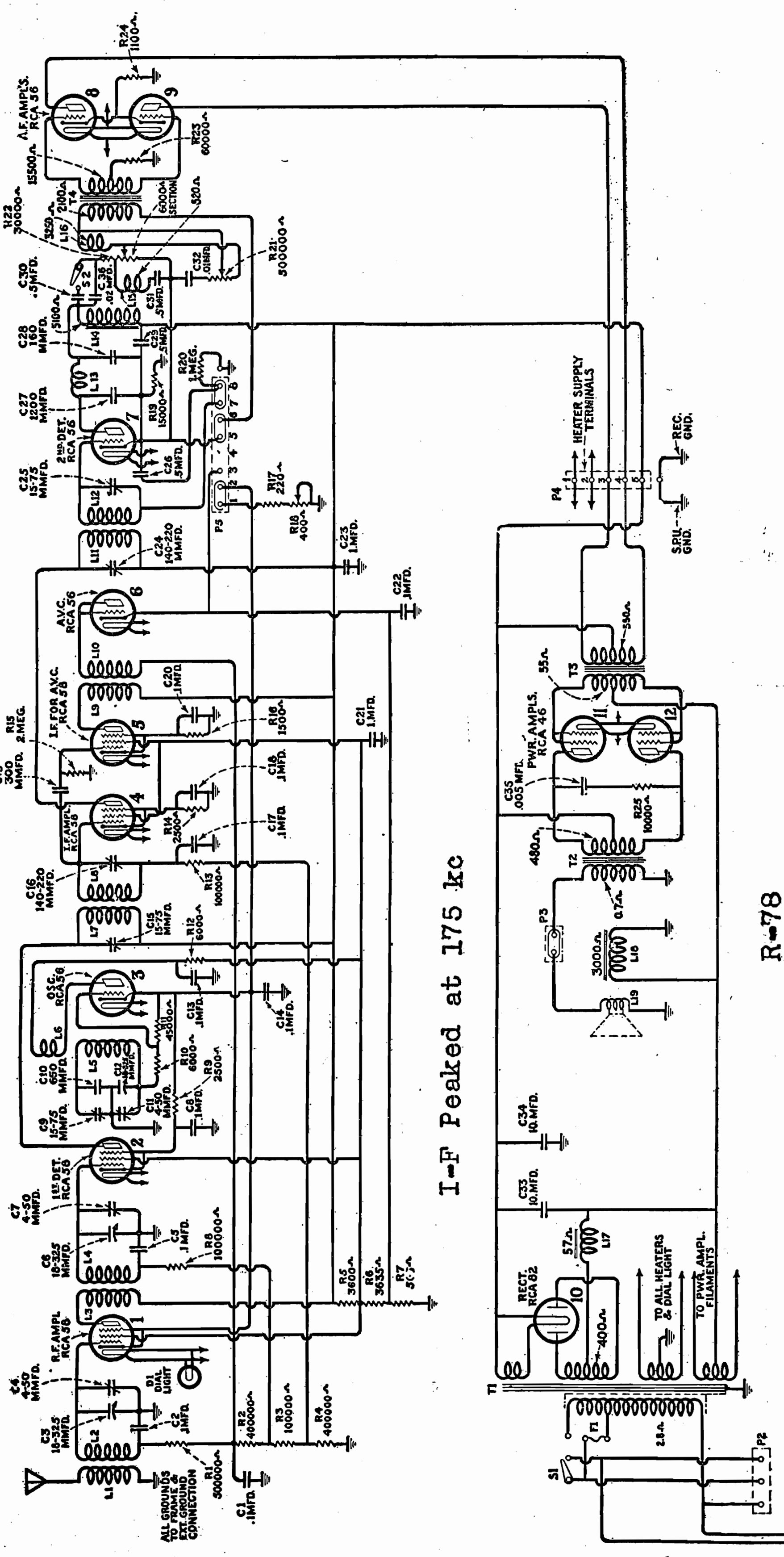
This gives a straight rectifier action and the drop across Resistors R-2, R-3, and R-4 gives the bias for the R.F. Stage. The drop across R-3 and R-4 comprises the grid voltage for the First Detector, and that across R-4, the grid voltage for the I. F. Amplifier. As the drop in these Resistors is due to the signal voltage applied to the A.V.C. tube and this voltage is in turn dependent on the bias of the R.F., 1st Detector and I.F. Amplifier, an automatic action is obtained. The reason for the greater voltage applied to the R.F. stage and first detector than that applied to the I.F. is to prevent overloading of these tubes on the side of a strong carrier.

We may now bring our attention to the audio stage and manual volume control. Both of these features are of entirely new design. However, before discussing them it is well to review a few of the requirements of a receiver that is to have good quality. First, the receiver must have good fidelity. That is, it must be capable of reproducing the very low notes as well as the high ones. The R-78 covers the range from approximately 35 cycles to 5000 cycles. Second, the receiver must have a large undistorted output otherwise signals of high amplitude will overload the output stage. The R-78 has between ten and twenty Watts undistorted output, the exact maximum depending on the percentage of modulation of the incoming signal. Third, the fidelity of the receiver must be changed with different settings of the volume control to compensate for the sensitivity of the ear in relation to different frequencies at various intensities. The ear is far less sensitive to both low and high frequencies at low degrees of volume than it is to the middle register. The R-78 volume control tends to bring up the low and high frequency response in relation to the middle frequencies as the volume is reduced. This greatly improves the quality of output at a room volume. The manner in which this is done follows:

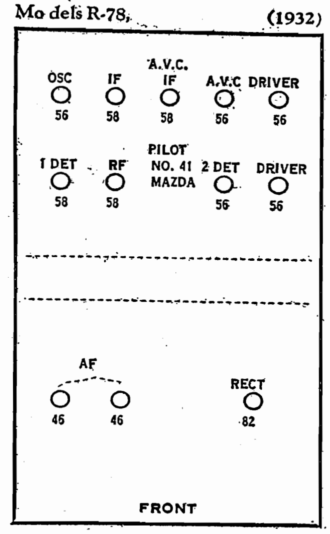
The output of the Second Detector is coupled to the grid circuit of the driver stage by means of impedance-transformer coupling. The plate supply to the Detector is fed through the coupling reactor L-14 and the audio component passes through the 0.5 mfd. coupling Capacitor C-30 and the .02 mfd. capacitor C-36. The volume control is located between these stages and functions to reduce the voltage applied to the primary of the interstage transformer. It will be noted that the first section of the volume control is 30,000 ohms and at this point a trap circuit consisting of reactor L-15 and capacitor C-31 are directly in the output circuit of the Detector.

MODEL R-78
Schematic

R. C. A. VICTOR CO., INC.



Models R-78, (1932)



R. C. A. VICTOR CO., INC.

The trap circuit tunes to approximately the middle of the audio response range and causes greater attenuation of the middle register than at either end as the volume is reduced. The effect as this point is reached is to reduce the general volume level but the middle register a greater amount than at the low and high ends. From this point to the minimum position the volume control acts as a potentiometer across the trap circuit and reduces the volume without changing the response to any greater degree. One has to but use this volume control to appreciate its great advance over existing types. Figure 3 gives an illustration of the manner in which this compensation is made.

The foregoing description applies only to one section of the volume control. Actually there are two sections, the other being between the R.F. and 1st detector cathodes and varying the overall sensitivity. This control prevents all noises and signals of a very weak character from being received and only functions over last 20° of the angular movement of the volume control. However if such signals are desired it is only necessary to advance the volume control in the usual manner to its maximum position.

It will be noted that the value of the coupling capacitors in the circuit varies, depending on the position of the switch S-2. The purpose of this switch is to decrease the low frequency output when receiving stations that have carrier waves with an excessive hum component. Also a certain amount of low frequency growl due to heterodyning of stations may be eliminated by this switch.

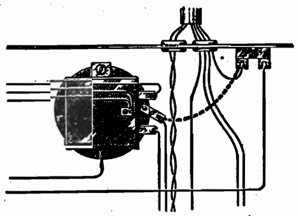


Figure 4—Wiring Change for Altering Volume Control Action (Dotted Line Indicates Position of New Wire)

Two Radiotrons RCA-56 act as a driver stage for the output Class "B" Amplifier. In order to properly understand it, let us review the general principals of the Class "B" Amplifier.

There are two general types of audio amplifiers, namely, the Class "A" and the Class "B." Up to the present practically all modern radio receivers use the Class "A" Amplifier either in single or in a push-pull connection. In the Class "A" Amplifier the grid bias is so adjusted that either a positive or a negative voltage impressed on the grid will cause an equal increase or decrease in the normal plate current flowing. This increase and decrease is but a fraction of the total plate current and is the only useful part of it. Therefore, the major portion of plate circuit is entirely of a wasted nature.

In the Class "B" Amplifier, the grid bias is so adjusted that very little plate current is flowing, it virtually being biased to cut-off. As the grid swings negative there is very little reduction possible so that the practical effect is nil. However, as the grid swings positive the plate current increases tremendously and this is entirely of an A.C. character, there being no residual current. Due to the use of two tubes both sides of the cycle are taken care of, first by one tube and then by the other. This gives an output greatly in excess of the Class "A" Amplifier because less energy is dissipated as losses in the tube and not appearing as useful output. The R-78 uses the new dual grid output tube RCA-46 in which the grids are tied together which in effect acts as a high bias resulting in plate current cut-off even though the tubes are operated at zero bias. Due to the grids only functioning on the positive half of the cycle considerable grid current flows on the positive half signal waves and a low impedance input circuit is necessary. The transformer between the driver stage and the power stage is therefore a step-down transformer with a low resistance secondary. The limit of power output is determined by the point at which the driver stage overloads. On a highly modulated signal, the maximum undistorted output may exceed 20 watts.

From the above description it is obvious that the load on the plate supply system will be highly variable. In order to provide suitable regulation for such a load the new mercury rectifier RCA-82 has been provided. The internal drop in this tube remains constant for practically all loads. The output current peaks therefore have no appreciable effect on the output voltage.

The loudspeaker has been designed to handle the increased power output and is designed to have increased frequency range.

The cabinet has two sound chambers that nullify the effect of cabinet resonance. This, together with the large baffle area of the cabinet, gives the loudspeaker and amplifier full expression to their high quality output.

SERVICE DATA

(1) HUM

It is very important that a good ground always be connected to the yellow lead of the Receiver Chassis. Unless this is done excessive hum and noise will be obtained, even at low volume, from the RCA-82. Also lack of a good twist in the volume control leads will cause an undue amount of hum due to the pickup by the tone control reactor.

(2) CHANGE IN RECEIVER ASSEMBLY FOR LOW INTENSITY STATIONS

The automatic volume control in the R-78 is so designed that it maintains a constant output only on signals in excess of 100 microvolts. In the vast majority of locations this action is entirely satisfactory as stations rarely drop below this value. Having it work at a low value would greatly increase the noise between stations.

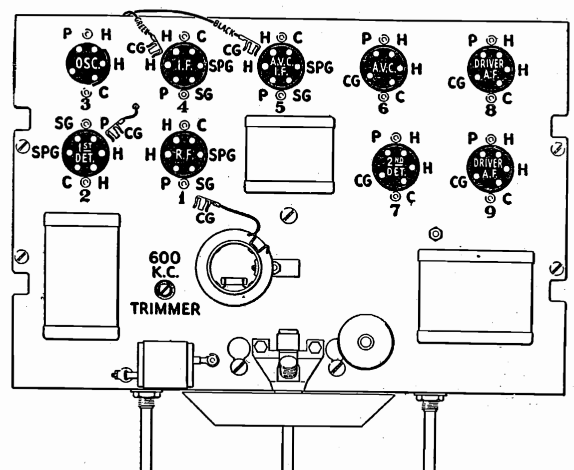


Figure 5—Radiotron Socket Layout

However if the receiver is to be operated in a locality remote from stations where the usual signal intensity is low, a slight change may be made in the receiver chassis that will extend the A.V.C. action to signals of much lower input. This may be done by removing the chassis and connecting a wire from the terminal on the 400 ohm section of the volume control to ground. Figure 4 shows the details of this change. It should be remembered when making this change that the noise level between stations will greatly increase when the change is made, due to the secondary section of the volume control not being in the circuit.

(3) R.F. AND OSCILLATOR LINE-UP CAPACITOR ADJUSTMENTS

Four adjustable capacitors are provided for aligning the R.F. circuits and adjusting the oscillator frequency so that the oscillator will maintain a constant frequency — 175 K.C.— difference from that of the incoming signal. Poor quality, insensitivity, poor A.V.C. action and possible inoperation of the receiver may be caused by these capacitors being out of adjustment

If the other adjustments have not been tampered with — the intermediate transformer tuning capacitors — the following procedure may be used for aligning these capacitors.

(a) Procure an R.F. Oscillator giving a modulated signal at 600 K.C. and 1400 K.C. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0-5 milliammeter connected in series with the plate supply to the second detector or a low range A.C. voltmeter connected across the reproducer unit cone coil.

MODEL R-78
Chassis

R. C. A. VICTOR CO., INC.

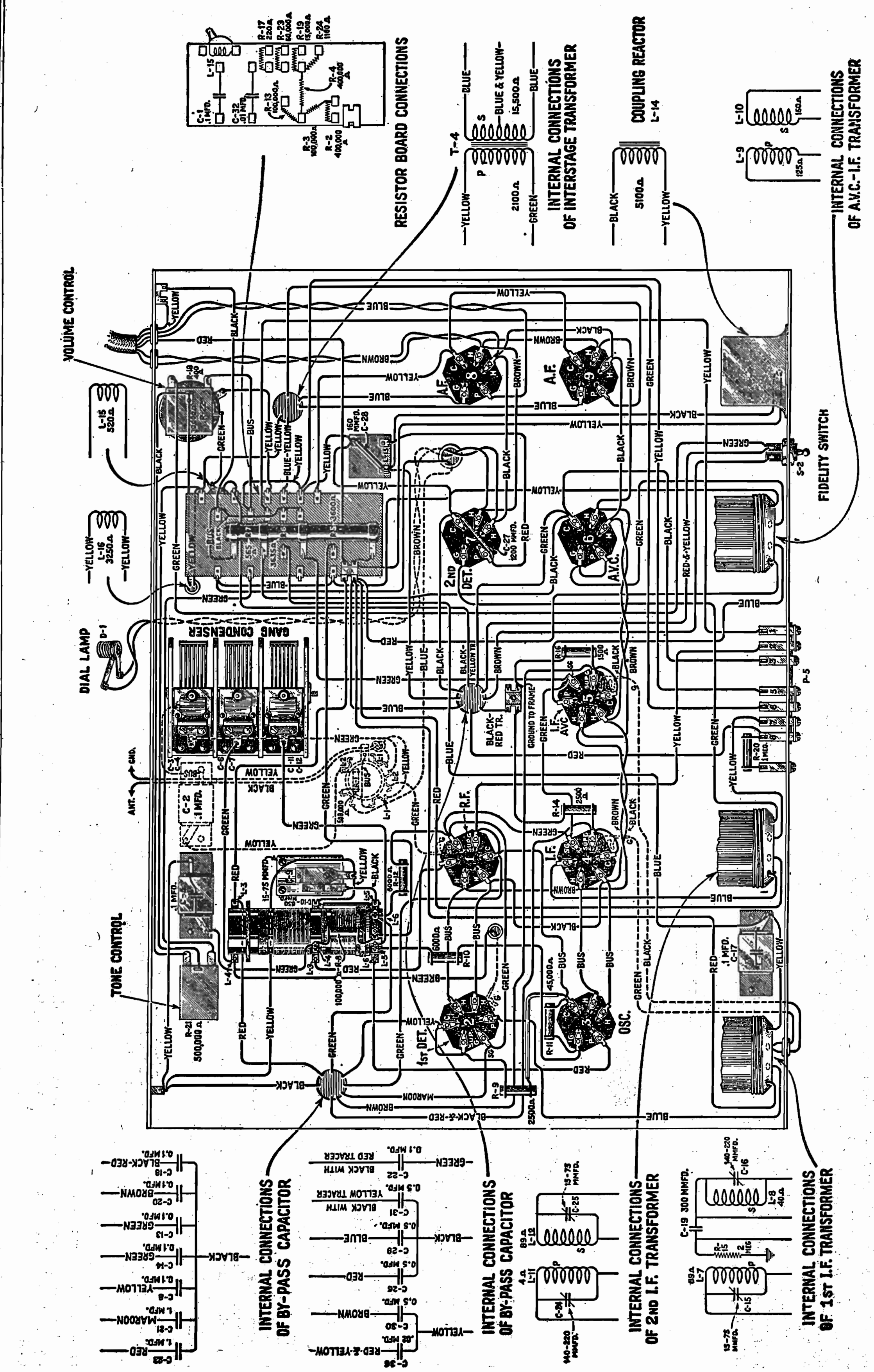


Figure 6—Receiver Assembly Wiring Diagram

R. C. A. VICTOR CO., INC.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A.V.C. socket. This should be a tube that is otherwise normal in all respects but having one heater prong removed. Insert this tube in the A.V.C. socket.

(d) First check the chassis and carefully ascertain that the dial pointer reads exactly at the short line on the scale when the tuning capacitor rotor plates are fully meshed with the stator plates.

(e) Place the oscillator in operation at exactly 1400 K.C. and couple its output to the antenna. Set the dial scale at exactly 1400. Connect the output meter to the set and place the volume control at its maximum position. Adjust the oscillator input so that an excessive reading on the output meter is not obtained.

(f) With a suitable socket wrench — the nuts are at ground potential — adjust the oscillator, first detector and R.F. line-up capacitors, until a maximum deflection is obtained in the output meter. These capacitors are accessible through holes located in the bottom cover of the chassis, the one to the front being the R.F., the detector next and the oscillator to the rear.

(g) Set the oscillator at 600 K.C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K.C. series capacitor, Figure 5, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.

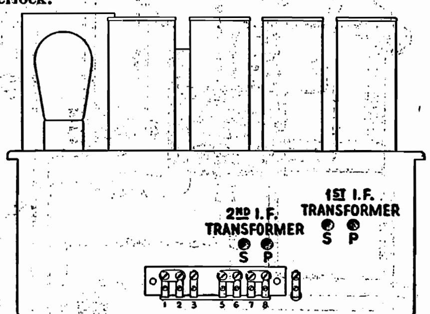


Figure 7—Location of I. F. Tuning Capacitors

(h) Change the frequency of the oscillator to 1400 K.C. and set the dial at 1400. Again make the adjustments given under (f) and (g).

So adjusted, the R.F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R.F. signal.

(4) I.F. TUNING CAPACITOR ADJUSTMENTS

Although this receiver has two I.F. stages, one for the second detector and one for the A.V.C., only two of the three I.F. transformers are tuned by adjustable capacitors and require adjustment. The stage used for the A.V.C. is broadly tuned and does not require any adjustment.

The transformers are all tuned to 175 K.C. and the circuits broadly peaked.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R.F. oscillator that gives a modulated 175 K.C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0-5 milliammeter connected in series with the plate supply to the second detector or a low range A.C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A.V.C. socket.

(d) Remove the oscillator tube, see Figure 5, and make a good ground connection to the chassis. Place the oscillator in operation and couple its output from the control grid of the first detector to ground. Adjust the oscillator output, with the receiver volume control at maximum, until a deflection is obtained in the output meter.

(e) Refer to Figure 7. Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

When the adjustments are made the set should perform at its maximum efficiency. However due to the interlocking of adjustments, it is good practice to follow the I.F. adjustments with the R.F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the preceding section.

(5) VOLTAGE READINGS

The following voltages taken at each Radiotron socket with the receiver operating but no signal being received should prove of value when checking with the usual set analyzer. The plate currents given are not necessarily accurate for each tube due to the cable in the test box causing some circuits to oscillate. Small variations may be caused by different tubes and line voltages. Therefore the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the socket numbers shown in Figure 5.

It will be noted that the present type set analyzers do not have provision for the new six prong Radiotrons. In such cases a set of adapters will be necessary in order to take suitable readings.

RADIOTRON SOCKET VOLTAGES

120 Volt A.C. Line

No signal being received — Volume Control at minimun

Tube No.	Cathode to Heater Volts D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current M. A.	Heater or Filament Volts, A. C.
1—R.F.	7.0	0	100	210	3.0	2.5
2—1st Det.	10.0	0	95	210	1.5	2.5
3—Osc.	7.0	0	—	70	5.0	2.5
4—I.F.	8.0	0	95	210	2.5	2.5
5—A.V.C.—I.F.	7.0	0	95	210	3.0	2.5
6—A.V.C.	15.0	0	—	0	0	2.5
7—2nd Det.	12.0	12.0	—	200	1.0	2.5
8—A.F.	11.0	8.0	—	210	5.0	2.5
9—A.F.	11.0	8.0	—	210	5.0	2.5
10—Pwr.	—	0	—	400	6.0	2.5
11—Pwr.	—	0	—	400	6.0	2.5

(6) MAGNETIC PICKUP CONNECTIONS

Due to the audio system of the receiver being designed to compensate for the radio end of the receiver, its characteristics must be altered slightly for phonograph operation. It is therefore necessary to use the auxiliary switches, resistors and capacitors with the T-5 and PT-33 shown in Figures 9 and 10 as well as the complete switching shown in Figure 11 when making connections to magnetic pickups. When using these devices, the usual record volume control should be set at maximum and the volume adjusted by means of the "Radio" volume control. In some cases a slight reduction of the high frequencies by means of the tone control may prove desirable. If the degree of compensation is too great—too many highs and lows—this may be remedied by reducing the record volume control setting and advancing the radio volume control.

(7) SHORT WAVE ADAPTOR CONNECTIONS

Figure 12 shows the correct connections for attaching the Short Wave Adaptor SW-2 to the R-78.

It will be noted that the Wafer Connector is not used due to the output rectified voltage being too high. The output voltage from terminal No. 5 on the amplifier is approximately 230 volts and is therefore suitable for this use.

MODEL R-78
A-F Chassis
Attachments

R. C. A. VICTOR CO., INC.

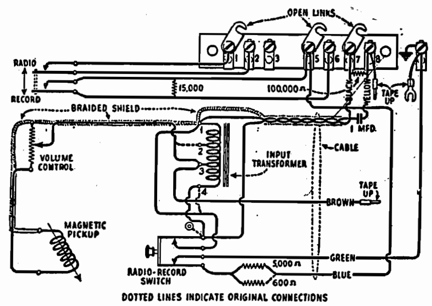


Figure 9—Connections for Attaching End Table Model T-5

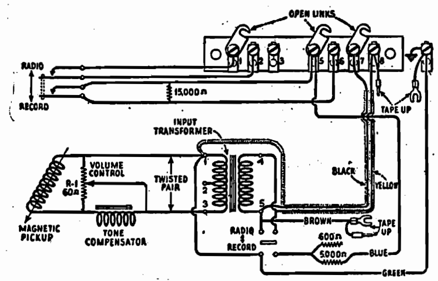


Figure 10—Connections for Attaching Portable Turntable Model PT-23

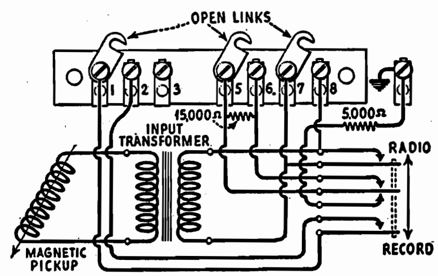


Figure 11—Connections for Attaching Magnetic Pickup

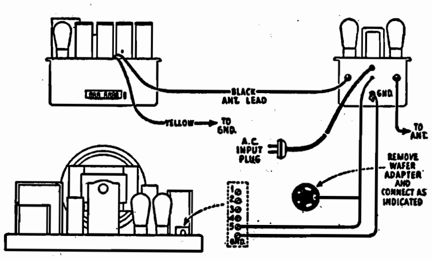


Figure 12—Connections for Attaching Short Wave Convertor Model SW-2

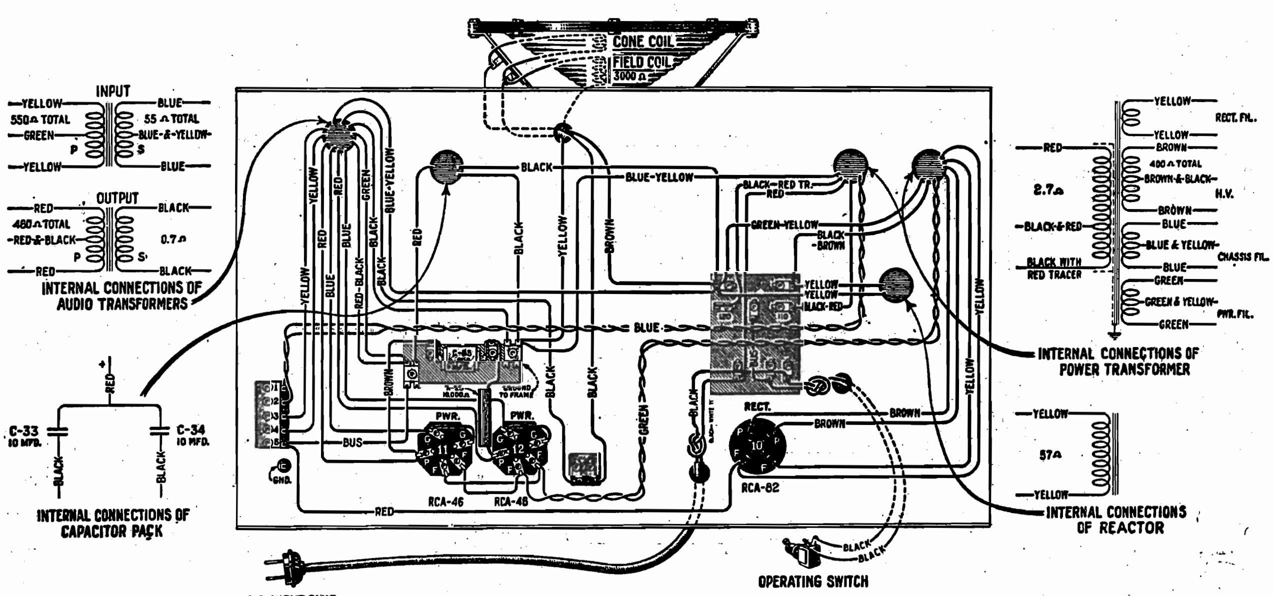


Figure 8—Amplifier Wiring Diagram

R. C. A. VICTOR CO., INC.

SERVICE NOTES

for

RCA Victor Model RE-81

ELECTRICAL SPECIFICATIONS

Voltage Rating........105–125 Volts
Frequency Rating........25, 30, 50 and 60 Cycles
Power Consumption........25, 135 Watts; 30, 130 Watts; 50, 139 Watts; 60, 135 Watts
Recommended Antenna Length........25–100 Feet
Type of Circuit........Super-Heterodyne with A. V. C. and Class "B" Output Stage
Type and Number of Radiotrons........4 RCA-56, 3 RCA-58, 2 RCA-46, 1 RCA-82—Total 10
Number of R. F. Stages........One
Number of I. F. Stages........One
Number of A. F. Stages........Radio: Two, One Single and One Class "B" RCA-46
Record: Three, Two Single and One Class "B" RCA-46
Recording: Three, Two Single and One Class "B" RCA-46
Type of A. V. C........RCA-56
Grid voltage supplied by output of I. F. Drop across resistor in plate circuit of A. V. C. constitutes bias voltage for R. F., 1st detector and I. F. Manual volume control adjusts grid bias of A. V. C. tube
Type of Second Detector........Power Grid Bias
Type of Tone Control........Variable Resistor and capacitor for reducing high frequency output of driver A. F. stage
Type of Rectifier........Mercury Vapor Full Wave RCA-82
Undistorted Output........7.0 Watts
Type of Microphone........Carbon Two Button
Type of Phonograph Motor........Induction Running at Synchronous Speed
Diameter of Turntable........12 Inches
Turntable Speed........33⅓ and 78 R. P. M.
Type of Speed Reducer........Ball Bearing Giving Very Smooth Operation
Type of Pickup and Tone Arm........Low Impedance Pickup with Inertia Type Tone Arm

PHYSICAL SPECIFICATIONS

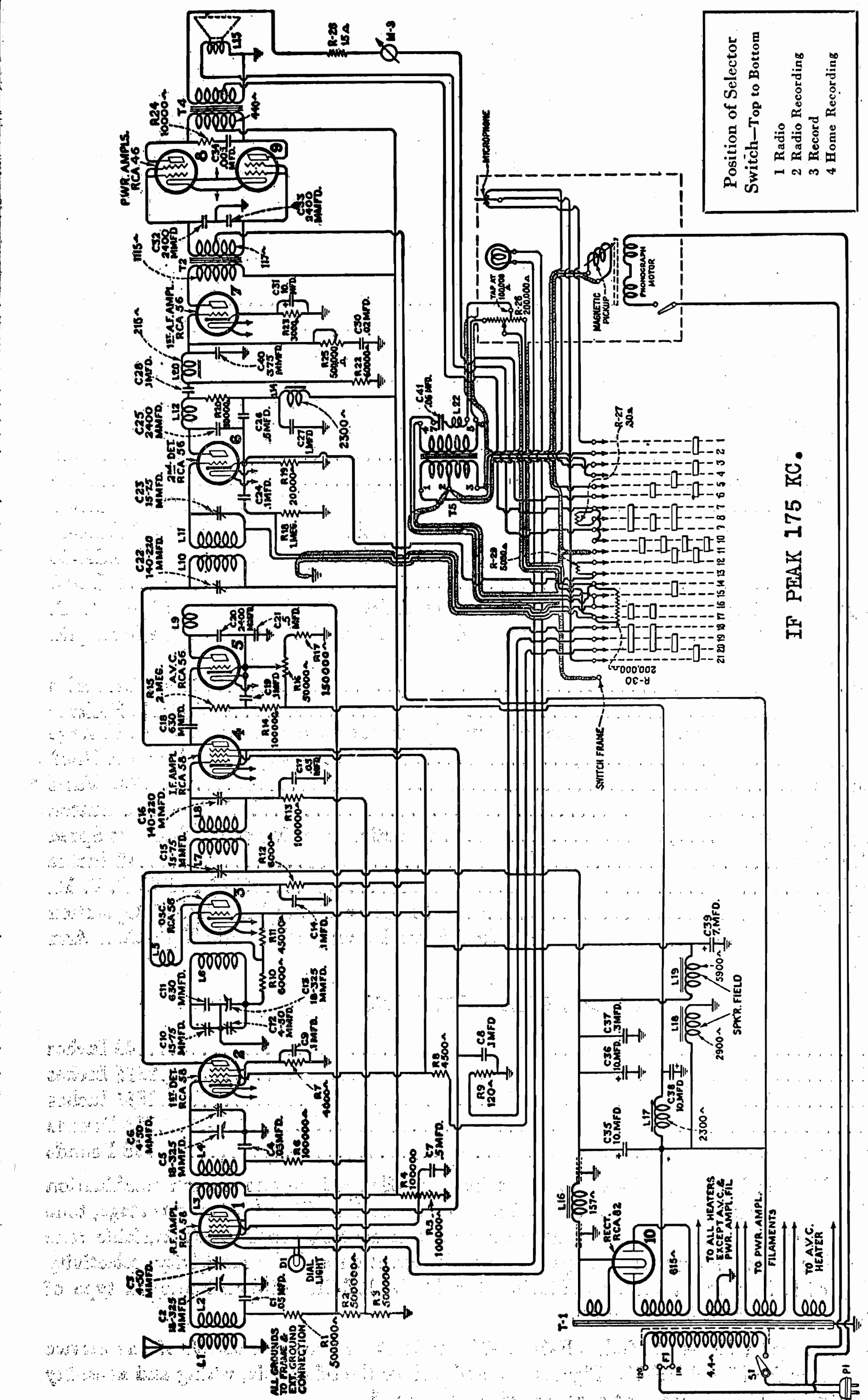
Height........43 Inches
Width........25⅞ Inches
Depth........15¼ Inches
Weight Alone........113 Pounds
Weight Packed for Shipment........158 Pounds

RCA Victor Radiola Electrola RE-81 is a ten tube Super-Heterodyne phonograph combination instrument using the chassis of Model R-76 and R-77. Features such as Class "B" output stage, tone chambers for eliminating cabinet resonance, automatic volume control, continuously variable tone control, ball bearing speed reducer for two-speed turntable operation and the sensitivity, selectivity and tone quality of RCA Victor receivers are included in Model RE-81. Also an improved type of home recording is incorporated in this model.

A reference to Service Notes of Models R-74, R-76 and R-77 will give the details of any service information necessary for Model RE-81. Figures 1, 2 and 3 show the schematic, wiring and assembly diagrams respectively. The replacement parts are given on page 5.

MODEL RE-81
Schematic

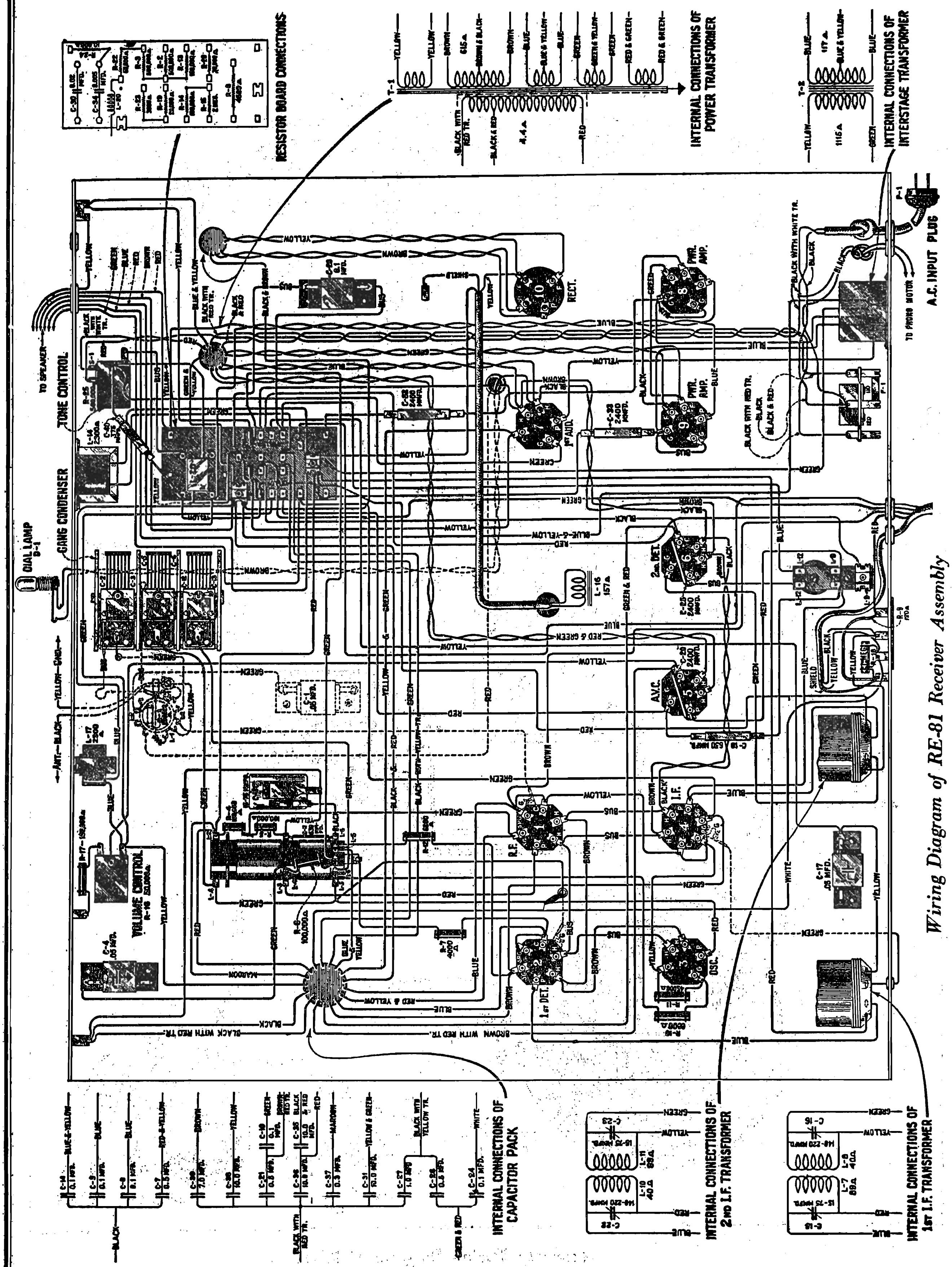
R. C. A. VICTOR CO., INC.



Schematic Diagram of RE-81

MODEL RE-81
Chassis

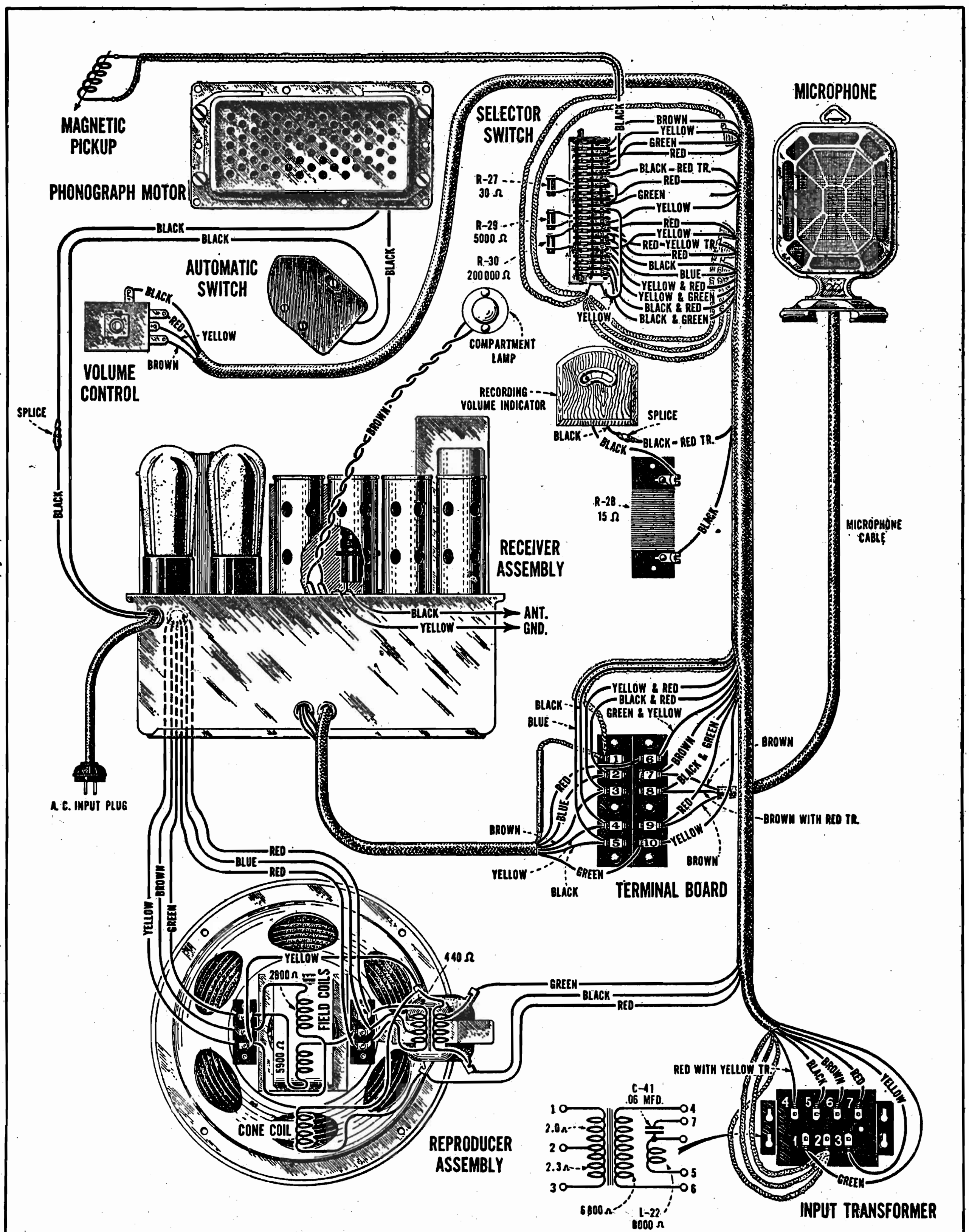
R. C. A. VICTOR CO., INC.



Wiring Diagram of RE-81 Receiver Assembly

MODEL RE-81
Assembly Wiring

R. C. A. VICTOR CO., INC.



Assembly Wiring Diagram of RE-81

R. C. A. VICTOR CO., INC.

MODEL RAE-84
Schematic

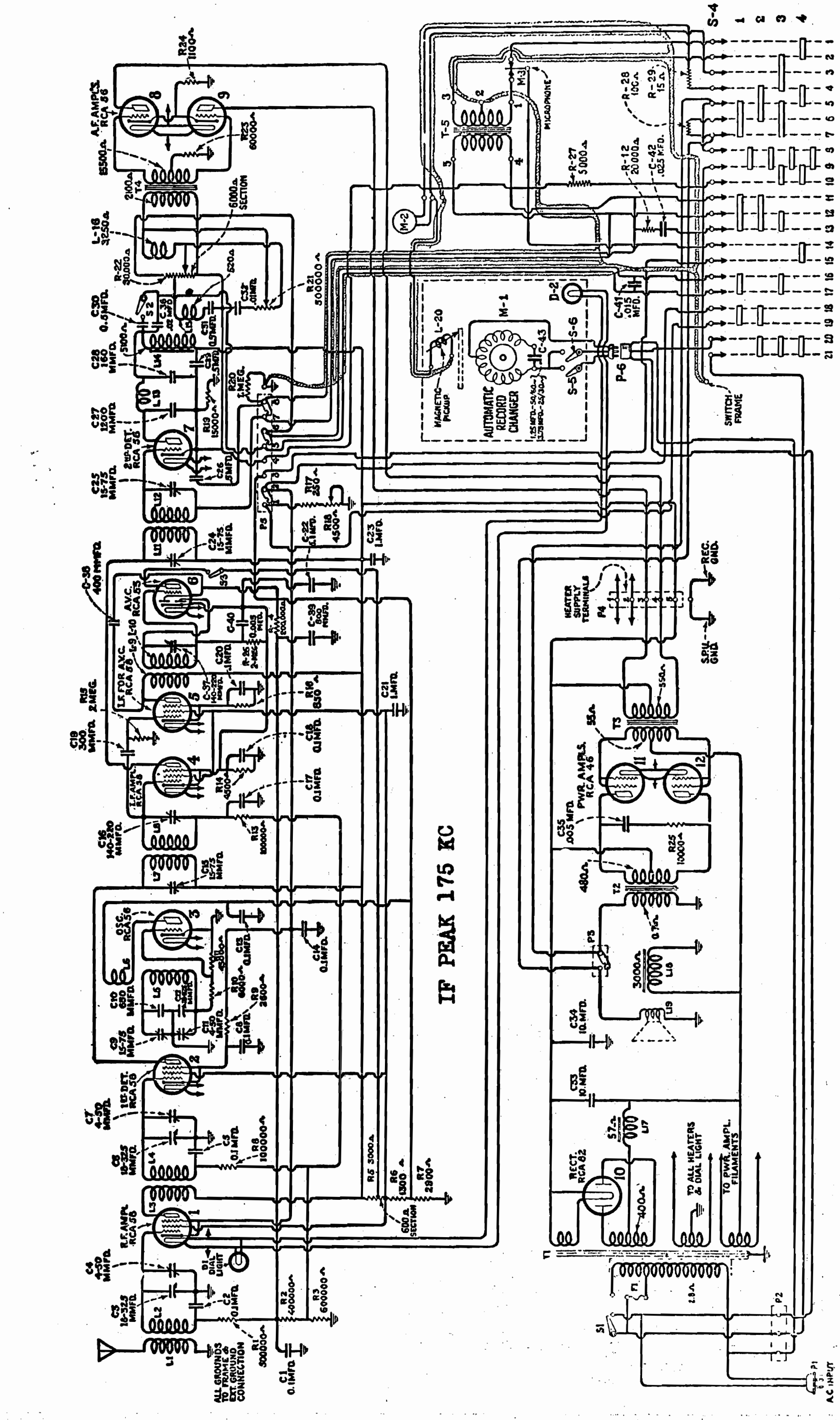


Figure 1—Schematic Wiring Diagram of RAE-84

MODEL RAE-84
Receiver Chassis

R. C. A. VICTOR CO., INC.

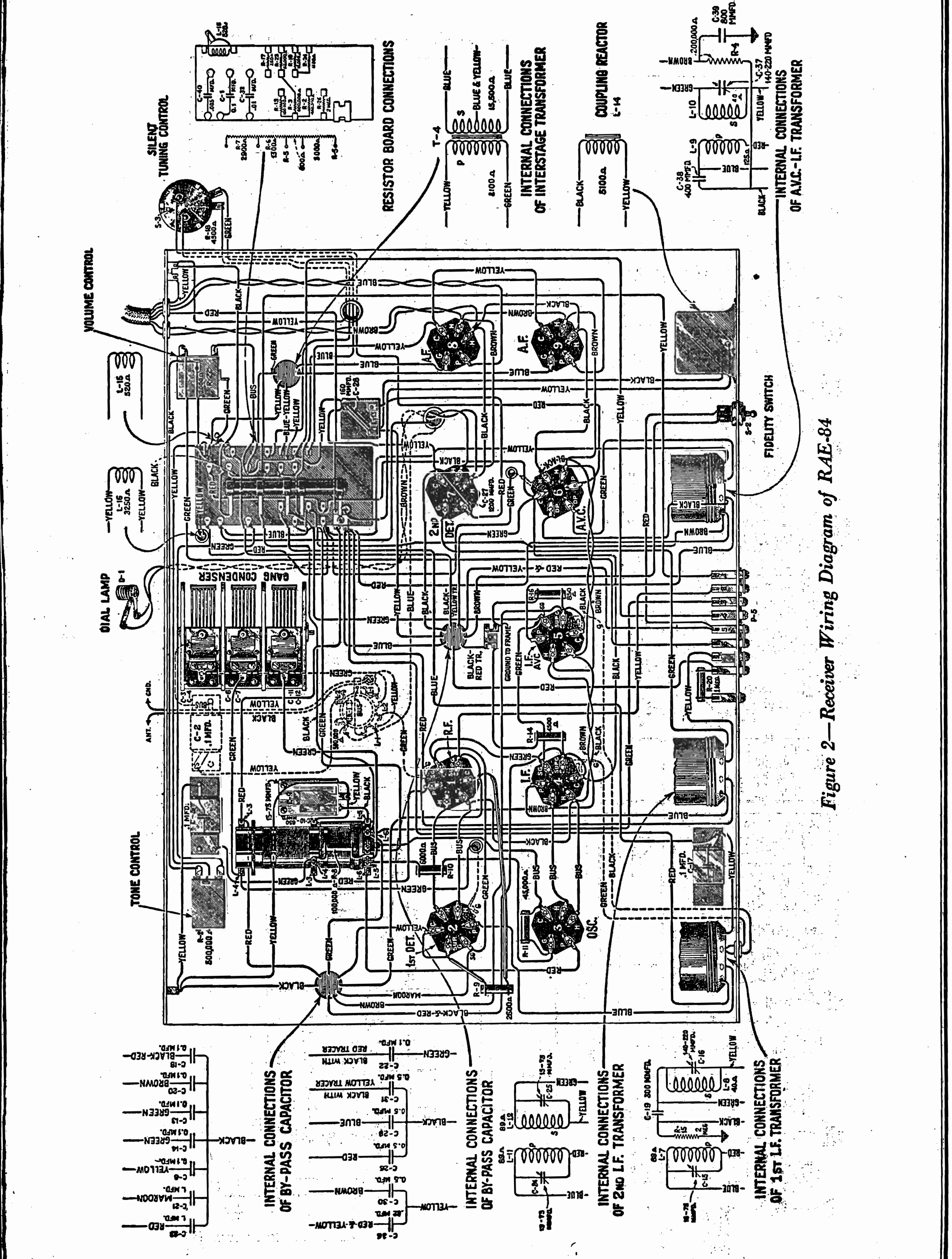


Figure 2—Receiver Wiring Diagram of RAE-84

R. C. A. VICTOR CO., INC.

RCA Victor RAE-84

(BI-ACOUSTIC PHONOGRAPH COMBINATION)

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating....105–125 Volts
Frequency Rating....50–60 Cycles
Power Consumption....130 Watts Average
(The input wattage may vary from 90 to 150 watts depending on the output volume being used)
Recommended Antenna Length....25–100 Feet
Type of Circuit....Super-Heterodyne with A. V. C., Compensated A. F. System, Class "B" Output Stage and Noise Suppressor
Type and Number of Radiotrons..1 RCA-55, 4 RCA-58, 4 RCA-56, 2 RCA-46, 1 RCA-82—Total 12
Number of R. F. Stages....One
Type of First Detector....Exponential with Control Grid Voltage Varied by A. V. C. Tube
Number of Intermediate Stages....Two, One for Signal and One for A. V. C. and Noise Suppressor
Type of Second Detector....Power Grid Bias
Number of A. F. Stages....Radio: Two, One Push-Pull Driver and One Class "B" Output
Record: Three, One Single, One Push-Pull Driver and One Class "B" Output
Home Recording: Three, One Single, One Push-Pull Driver and One Class "B" Output
Type of Tone Control....Reactor Capacitor and Variable Resistor for Reducing High Frequency Response
Type of Rectifier....Mercury Vapor Full Wave RCA-82
Undistorted Output....Approximately 20 Watts Maximum
Type of Record Changer....Perfected RCA Victor Ten 10-Inch Record Continuous Type
Type of Pickup and Tone Arm....Low Impedance Pickup with Inertia Tone Arm
Type of Microphone....Two Button Carbon

PHYSICAL SPECIFICATIONS

Height....46 Inches
Width....29¼ Inches
Depth....20¾ Inches
Weight Alone....198 Pounds
Weight Packed for Shipment....263 Pounds

RCA Victor Radiola Automatic Electrola Model RAE-84 is a twelve tube Bi-Acoustic Radio Phonograph combination. A brief description of its four major functions follows:

Radio. The radio receiver, amplifier and loudspeaker are identical to that used in the famous RCA Victor R-78. This unit is characterized by its excellent performance in respect to sensitivity, selectivity and sensational tone quality. This latter feature is taken a step further in the RAE-84 due to the large area of the cabinet. This results in increased baffle area for the loudspeaker with the resulting greater and smoother low frequency response. A new feature of the RAE-84 is the inclusion of a noise suppression circuit in conjunction with the new Radiotron RCA-55. This feature eliminates background noises when tuning from station to station. The degree of suppression is adjustable by means of the sensitivity control.

Phonograph. The phonograph mechanism of the RAE-84 consists of the perfected RCA Victor continuous type record changing mechanism together with the low impedance pickup and tone arm. The output of the pickup is fed through the same amplifier and speaker as the radio receiver and gives an even greater degree of fidelity of reproduction. The automatic record changing mechanism is similar to that used in other RCA Victor combinations but has a number of improvements. These improvements are: turntable trip for manual operation that is operated by both concentric and eccentric groove records, 10-inch automatic trip for Brunswick and Columbia records that may be used to start and stop while playing manually by moving the tone arm, safety shift lever that prevents jamming while attempting to change from automatic to manual operation when the mechanism is in cycle and a record light to provide better illumination. The tone arm is mounted on rubber which gives a greater degree of freedom from motor vibration.

Recording. Facilities of the RAE-84 make it the ideal instrument for home recording. This may be either voice, music or other sounds directed into the microphone or a radio program being broadcast on the air. The records so made are of practically studio quality. A feature of the home recording is the inclusion of a recording level meter which gives a visual indication of the output current so that the optimum value is used for making records. This gives a uniform quality to the records which heretofore has been impossible to maintain.

SERVICE DATA—RADIO

A reference to the R-78 Service Notes gives the details of any service data necessary in conjunction with this receiver. It will be noted that an additional terminal has been added to the terminal strip at the rear of the receiver chassis. This will be included in later models of the R-78 as well as all models of the RAE-84. Figures 1, 2 and 3 show the schematic, receiver wiring and amplifier diagrams respectively while Fig. 5 showing the assembly wiring. The amplifier and loudspeaker are identical with that used in the R-78. The replacement parts are shown on pages 10 and 11.

Due to the use of the noise suppressor circuit, which is not included in the older models of the R-78, a brief description of the functioning of this circuit follows:

The function of the noise suppressor circuit is to reduce noise, by greatly decreasing the sensitivity of the receiver when no carrier waves are being received. A manually operated sensitivity control is also provided so that the overall sensitivity of the receiver may be adjusted, thereby eliminating the reception of signals having too great a noise level. This feature operates without introducing distortion, a quality not present in other type noise suppressor circuits.

A reference to the schematic diagram, Figure 1, will show the circuit used in conjunction with the Radiotron RCA-55 for obtaining the noise suppressor action.

The two channel intermediate amplifiers are similar in operation to the older model R-78 with one channel supplying the signal voltage to the second detector and the other supplying signal voltage to the A. V. C. and noise suppressor circuit.

The untuned intermediate I. F. transformer used in the older model R-78 has been changed to a natural period plate coil L-9 and a sharply tuned secondary coil L-10. Coil L-9 supplies the voltage to operate the A. V. C. circuit, while Coil L-10 supplies that used to operate the suppressor circuits. An examination of this circuit will show that with no signal voltage impressed on Coil L-10, no current is rectified in the Diode plate and hence the grid of the Radiotron RCA-55 operates at zero bias. The plate current is then at a maximum value—approximately 10 M. A.—and since the cathodes of the Radiotron RCA-55 and the signal channel I. F. tube are common, the I. F. tube is biased to cut-off. This, therefore, prevents signal voltage from reaching the second detector.

When the receiver is tuned to a signal, the signal voltage is amplified in the A. V. C. amplifier and impressed on coils L-9 and L-10.

On the positive half of the signal voltage, the signal is rectified in the suppressor circuit which generates a negative potential on the grid of the Radiotron RCA-55. The plate current is thereby reduced to approximately zero which releases the high bias potential on the signal channel I. F. amplifier. Signal voltage will then be impressed on the second detector.

A. V. C. bias for the R. F., first detector and I. F. tubes will be generated when the I. F. voltage on the A. V. C. Diode overcomes and exceeds the positive potential on the cathode of the Radiotron RCA-55. This bias is approximately 10 volts when the receiver is tuned to signal.

The second I. F. transformer feeding the second detector has been changed to two high impedance circuits in order to provide the proper amplification with the increased bias resistor in the I. F. cathode circuit.

The suppressor circuit L-10 has been designed to be a sharp circuit so that the action of the suppressor comes as near the center of the carrier as possible.

The sensitivity control is in the cathode circuit of the R. F. and first detector and reduces the sensitivity of the receiver by increasing the residual bias on these Radiotrons. One end of the sensitivity control has a switch which is provided so that the noise suppression circuit may be cut out. Under this condition, the full sensitivity of the receiver is obtained.

MODEL RAE-84
I-F, Voltage Notes

R. C. A. VICTOR CO., INC.

(1) I. F. TUNING ADJUSTMENTS

Although this receiver has two I. F. stages, one for the second detector and one for the A. V. C., only five of the circuits are tuned by adjustable capacitors and require adjustment. The coil used for the A. V. C. is broadly tuned and does not require any adjustment, while the one used for the noise suppressor circuit is sharply tuned. Refer to Figure 4 for location of the adjusting screws.

The transformers are all tuned to 175 K. C., and adjustments are made for maximum output.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R. F. oscillator that gives a modulated 175 K. C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvanometer connected to the secondary of the output transformer instead of the cone coil, or a low range A. C. voltmeter connected across the reproducer unit cone coil.

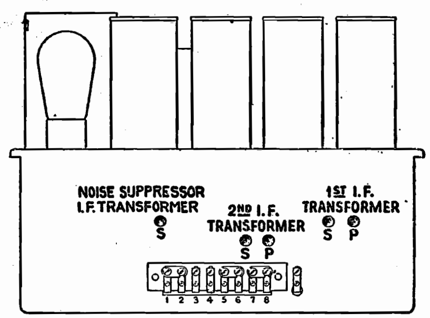


Figure 4—Location of I. F. Capacitors

(c) Remove the oscillator tube and make a good ground connection to the chassis. Place the test oscillator in operation and couple its output from the control grid of the first detector to ground. With the receiver volume control at maximum, the noise suppressor control at its extreme counter-clockwise position and the noise suppressor switch open, adjust the oscillator output until a deflection is obtained in the output meter.

(d) Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

(e) Then close the noise suppression control switch by advancing slightly clockwise, but do *not* advance the control beyond the snapping of the switch. The single noise suppressor circuit should then be adjusted for maximum output.

The points to remember when making these adjustments are that no dummy Radiotron is used and a minimum of input signal is necessary. An excessive signal will make it impossible to get correct adjustments of the signal channel I. F. and especially the suppressor circuit.

It is necessary, when adjusting the suppressor circuit, that the input signal be kept just as low as possible so that the output meter follows every change in the adjustment of the suppressor I. F. circuit.

When the adjustments are made the set should perform at its maximum efficiency. However, due to the interlocking of adjustments, it is good practice to follow the I. F. adjustments with the R. F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the R-78 Service Notes.

(2) RADIOTRON SOCKET VOLTAGES

Due to the wide variation in Set Analyzers, the RCA Victor Company will, in the future, list the actual voltages at which the Radiotrons operate, rather than those that will be obtained with a particular Set Analyzer. It is therefore necessary that the serviceman allow corrections for circuits having high resistance and for meter scales having a relative low resistance. Usually an application of Ohms Law will give an approximate value of the voltage that will be read on a particular meter, assuming that the resistance of the meter is known.

RADIOTRON SOCKET VOLTAGES

120 Volt Line—Fuse at 120 Volt Tap—Antenna Shorted to Ground—No Signal

Radiotron No.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts D. C.	Cathode or Filament to Plate Volts D. C.	Diode Plate No. 1 to Cathode Volts D. C.	Diode Plate No. 2 to Cathode Volts D. C.	Plate Current M. A.	Heater or Filament Volts D. C.
1. RCA-58—R. F.	—3.5	106	212	—	—	6.5	2.5
2. RCA-56—Osc.	—	—	65	—	—	4.5	2.5
3. RCA-58—1st Det.	—9	101	206	—	—	1.8	2.5
4. RCA-58—I. F.	—12	98	203	—	—	2.0	2.5
5. RCA-58—A. V. C. I. F.	—5	106	210	—	—	4.0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Minimum)	0	—	0	0	—12	0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Maximum)	0	—	69	0	36	8.0	2.5
7. RCA-56—2nd Det.	—15	—	200	—	—	1.0	2.5
8. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
9. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
10. RCA-46—Power	0	0	400	—	—	6.0	2.5
11. RCA-46—Power	0	0	400	—	—	6.0	2.5
12. RCA-82—Rectifier	462.5 Volts R. M. S. Each Plate—72 M. A. Total Plate Current.						

SERVICE DATA—AUTOMATIC MECHANISM

The automatic mechanism used in the RAE-84 is similar to that used in other RCA Victor automatic combinations such as Models RAE-26, 59 or 79. Several minor changes have been made in these machines as follows:

1. Concentric Groove Trip. A trip so that either Brunswick or Columbia records may be mixed with Victor records in the automatic magazine has been provided.

2. An automatic starting switch, operated by pulling the tone arm to the right has been added for manual playing.

3. A trip to stop the motor when playing either 10- or 12-inch records manually has been added.

4. An interlock has been provided so that the manual lever cannot be moved while the mechanism is in cycle. This prevents jamming due to improper operation.

5. A ball race speed reducer is used for changing the turntable speed from 78 to 33⅓ R. P. M. This is simple in operation and gives a greater freedom from "wows" than the gear type reducers.

6. Needle Lamp. A small electric lamp is provided so that proper illumination of the record and pickup is obtained. This assists in properly inserting the needle into the pickup as well as lowering the needle onto the record.

Service in conjunction with this mechanism will therefore be practically the same as that of the older type automatic record changing mechanisms. However due to the new trips several additional adjustments are now included.

(1) ADJUSTMENT OF AUTOMATIC SWITCH

The automatic switch should be adjusted so that the contacts are at least 0.025 inches apart when the switch mechanism has been tripped. This is important as otherwise arcing at the switch may occur.

(2) ADJUSTMENT OF 10-INCH AUTOMATIC SPIRAL GROOVE TRIP LEVER

The 10-inch automatic spiral groove trip lever should be adjusted by means of the screw assembled thereon. Proper adjustment is obtained when it forces the four finger lever out of contact with the clutch pawl, which trips the mechanism, when the needle is between a $1^{27}/_{32}$ inch and a 1⅞ in. radius from the center of the turntable spindle.

(3) ADJUSTMENT OF 12-INCH ATOMATIC SPIRAL GROOVE SWITCH

The 12-inch automatic spiral groove switch should be adjusted by means of the adjusting screw assembled in the trip lever so that it forces the switch lever out of contact with the switch trip lever causing the latter to open the switch when the needle is between a $1^{27}/_{32}$ inch and a 1⅞ inch radius from the center of the turntable spindle.

(4) LUBRICATION

The mechanism will seldom require lubrication. The motor gears run in grease. Unless gear replacements are made, it should not be necessary to relubricate this section. RCA Victor motor oil should be placed in the oil wells at each end of the motor occasionally. Wicks in these wells hold sufficient oil for normal operation from six months to one year. Oil should also be placed on the gear bearings, visible when the turntable is removed, and on the elevator shafts. RCA Victor motor grease should be placed on the slide and the mechanism gears once every six months.

R. C. A. VICTOR CO., INC.

MODEL RAE-84
A-F Chassis
Assembly Wiring

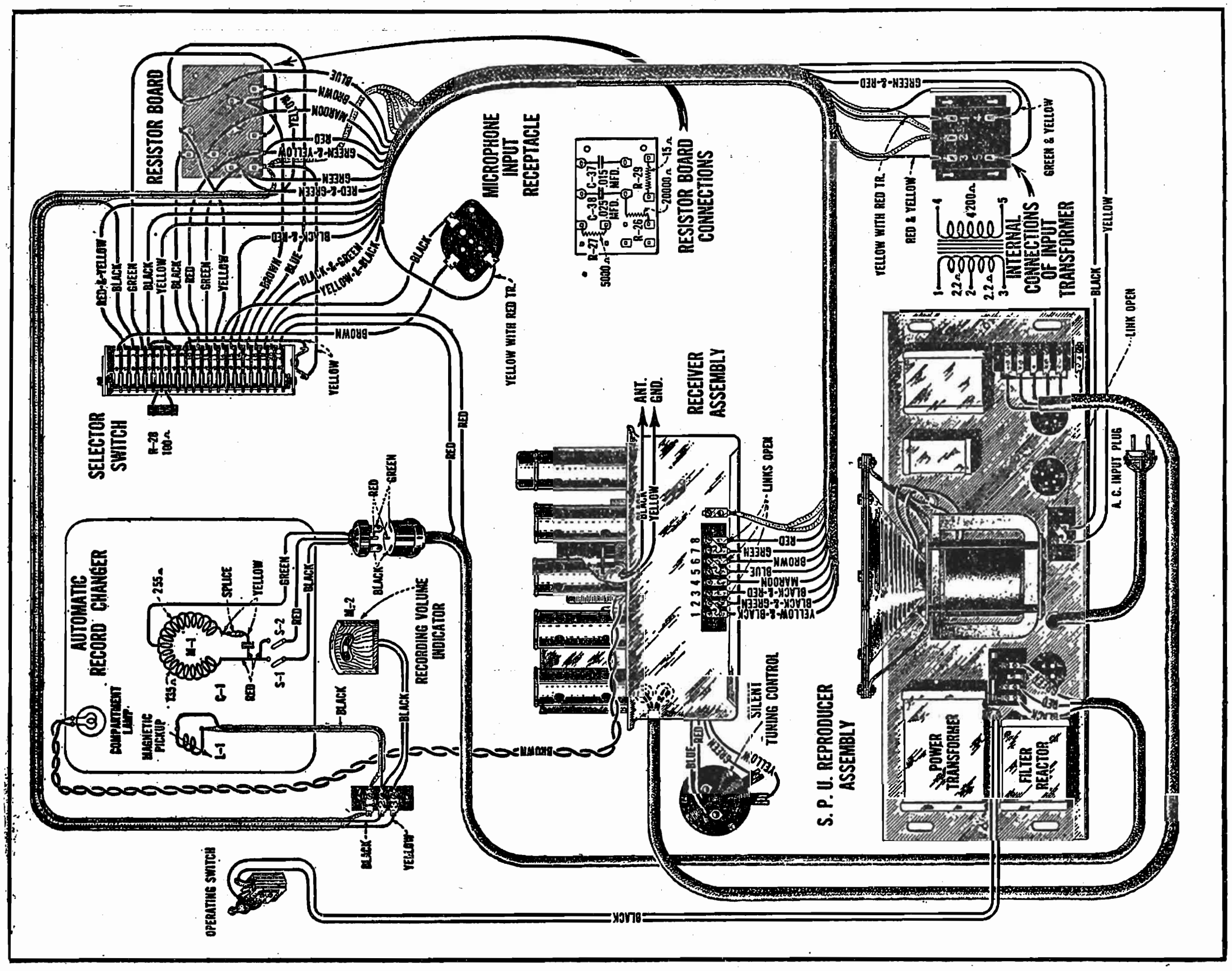


Figure 5—Assembly Wiring Diagram of RAE 84

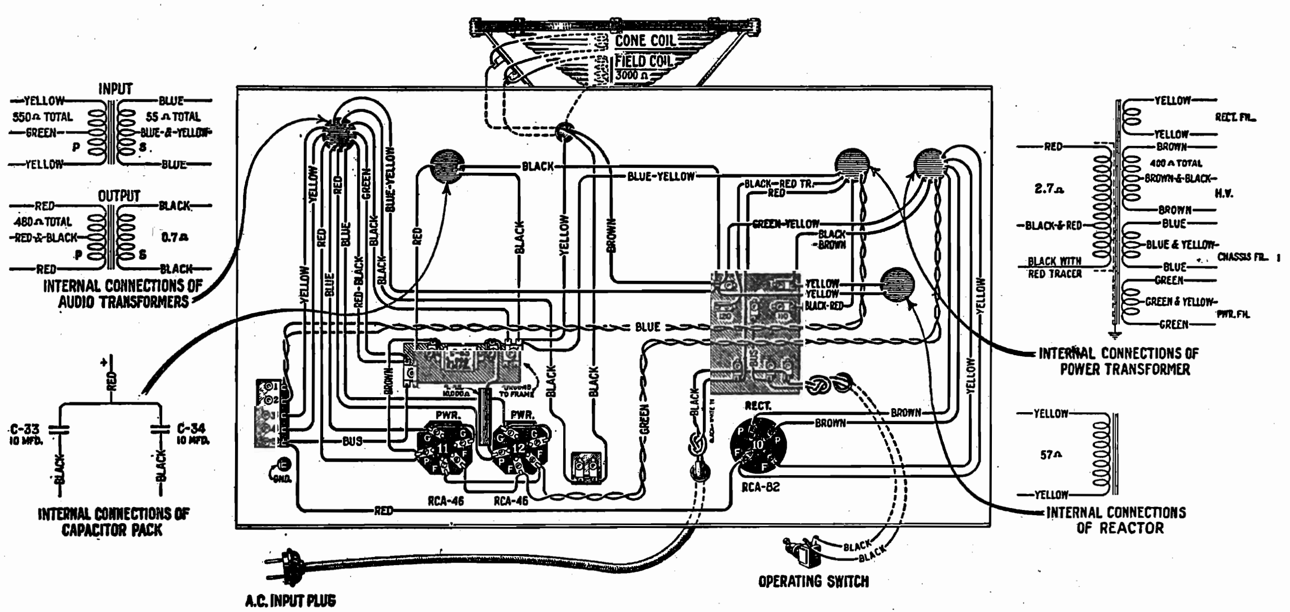


Figure 3—Amplifier Wiring Diagram of RAE 84

MODEL RAE-84
Parts List

R. C. A. VICTOR CO. INC.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2723	Switch—Fidelity switch—Package of 5	$3.00
2746	Socket—Dial lamp socket	.50
2747	Contact cap—Package of 5	.50
3047	Resistor—1,500 ohms—Carbon type—½ watt—Package of 5	2.50
3055	Cushion—Sponge rubber chassis support cushions—Package of 4	.50
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	2.50
3252	Resistor—100,000 ohms—Carbon type—½ watt—Package of 5	2.75
3435	Resistor—250 ohms—Carbon type—½ watt—Package of 5	2.50
3437	Knob—Noise suppressor rheostat knob	.60
3439	Resistor—600,000 ohms—Carbon type—1 watt—Package of 5	2.50
3440	Resistor—4,500 ohms—Carbon type—½ watt—Package of 5	2.50
3441	Resistor—850. ohms—Carbon type—½ watt—Package of 5	2.50
6142	Resistor—6,000 ohms—Carbon type—½ watt—Package of 5	2.00
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	2.00
6189	Bracket—Dial lamp bracket and indicator—Package of 2	.65
6192	Spring—3 gang tuning capacitor drive cord tension spring—Package of 10	.50
6251	Capacitor—1200 mmfd.—Package of 5	2.30
6276	Tone Control—Complete with mounting nut and washer	2.10
6277	Capacitor—0.1 mfd. capacitor—Located in back of oscillator tube socket	.75
6279	Resistor—15,000 ohms—Carbon type—½ watt—Package of 5	2.50
6280	Resistor—400,000 ohms—Carbon type—½ watt—Package of 5	2.50
6281	Resistor—1,100 ohms—Carbon type—½ watt—Package of 5	2.50
6282	Resistor—60,000 ohms—Carbon type—½ watt—Package of 5	2.50
6284	Reactor—Tone control reactor	1.35
6285	Choke coil—Second detector plate choke coil	1.10
6288	Knob—Station selector, tone control, radio or phonograph, volume control knob—Package of 5	1.50
6298	Cord—3 gang tuning capacitor drive cord—Package of 5	1.00
6308	Coil—R. F. coil complete with mounting bracket	1.90
6312	Capacitor—650 mmfd.—Oscillator series—Package of 5	2.50
6314	Capacitor—160 mmfd.—Package of 5	2.50
6315	Resistor—45,000 ohms—Carbon type—½ watt—Package of 5	2.50
6316	Resistor—2,500 ohms—Carbon type—½ watt—Package of 5	2.50
6323	Shaft—Tuning condenser drive shaft with one flat washer and two "C" washers—Package of 2	.85
6351	Resistor—Voltage divider resistor	1.00
6352	Transformer—Third intermediate transformer	3.00
6353	Transformer—Second intermediate transformer	3.00
6354	Rheostat—Noise suppressor rheostat	1.90
6355	Volume control—Complete with mounting nut	1.90
6356	Capacitor—0.1 mfd. capacitor—Located on resistor board	.70
7062	Capacitor—Adjustable trimming capacitor—15 to 70 mmfd.	1.00
7065	Screw driver—Non-metallic screw driver for oscillator and I. F. adjustments	1.10
7298	Capacitor—0.01 mfd. capacitor—Located on resistor board	.80
7438	Capacitor—3 gang variable tuning capacitor complete with mounting screws and washers	5.20
7439	Drum—Dial drum with set screws and 3 dial mounting nuts	.50
7440	Scale—Dial and dial scale	.75
7477	Capacitor pack—Comprising two 1.0 mfd. and five 0.1 mfd. capacitors in metal container	2.90
7478	Capacitor pack—Comprising four 0.5 mfd., one 0.02 mfd., and one 0.1 mfd. capacitors in metal container	3.00
7479	Transformer—Interstage audio transformer in metal container	$3.90
7480	Transformer—First intermediate frequency transformer	3.15
7483	Reactor—Compensating reactor	1.00
7484	Socket—UY type Radiotron socket—4 used	.65
7485	Socket—Radiotron six contact socket—5 used	.70
7486	Board—Phonograph terminal board—8 terminals and 3 links	1.00
7490	Board—Resistor board—Less resistors and capacitors	1.10
7498	Reactor—Coupling reactor	2.50
7500	Cable—Six conductor—From receiver to S. P. U.	1.50
7505	Shield—Tube shield top—1 used—Maroon	.50
7506	Shield—Radiotron tube shield—7 used—Maroon	.55
7540	Coil—Detector and oscillator coil complete with mounting bracket	3.50
	AMPLIFIER ASSEMBLIES	
2725	Fuse—1.5 ampere—Cartridge type fuse—Package of 5	.50
2731	Resistor—10,000 ohms—1 watt—Carbon resistor—Package of 5	2.00
2757	Strip—Terminal strip—2 terminals	.50
3032	Socket—UX type Radiotron socket with insulator	.50
3056	Shield—Radiotron tube shield—Package of 2	.50
3099	Capacitor—0.005 mfd. capacitor	.75
3147	Cover—Fuse cover with bushing and insulator	.95
6289	Strip—Terminal strip—5 terminals	.85
6290	Board—Terminal board complete with terminals, fuse clips, and insulator	1.00
6291	Board—Terminal board complete with terminals and insulator—Less capacitor	.90
6292	Switch—Operating switch	1.25
7054	Cord—Power cord	1.00
7370	Cover—Terminal strip cover with insulator—5 terminals	.55
7491	Socket—UY type Radiotron socket with insulator	.70
8910	Capacitor pack—Comprising two 10 mfd. capacitors in metal container	7.00
8911	Reactor—Filter reactor	4.75
8912	Transformer—Audio transformer pack comprising input and output transformer in metal container	6.50
8913	Transformer—Power transformer—105-125 volts, 50-60 cycles	12.50
8914	Transformer—Power transformer—105-125 volts, 25-50 cycles	1600
8915	Transformer—Power transformer—200-250 volts, 50-60 cycles	13.50
10907	Fuse—3 ampere fuse (for 25 cycle use)—Package of 5	.50
	REPRODUCER ASSEMBLIES	
7292	Screw assembly—Comprising two screws, two nuts, two lock washers, and one plate—For mounting speaker to amplifier	.95
8559	Ring—Cone retaining ring	.80
8916	Cone—Reproducer cone complete with voice coil—Package of 5	15.00
9418	Coil assembly—Comprising field coil, magnet, and cone support	12.00
	AUTOMATIC RECORD CHANGING MECHANISM ASSEMBLIES	
2893	Spring—Eccentric and spiral trip lever tension spring—Package of 10	.60
2894	Pulley—Cable pulley complete with mounting stud—Mounted horizontally—Package of 5	.50
2896	Spring—Cable lever adjustment spring—One end fastened to adjustment stud—Package of 10	.50
2904	Lever—Front elevator actuating lever	.50
2905	Screw—Gear and bracket mounting screw—Package of 10	.50
2906	Spring—Check lever spring—Package of 10	.50
2907	Screw—Gear and ratchet set screw—Package of 10	.50
2909	Spring—Four finger lever spring—1⅛" long—Package of 10	.60
2910	Spring—Four finger extension lever tension spring—1⅛" long—Package of 10	.60
2911	Screw—Slide bracket mounting screw—Package of 10	.50
2912	Roller—Slide roller complete with screw and stud—Package of 5	1.50
2913	Spring—Cable lever tension spring—Package of 10	.60
2914	Spring—Flat spring and screw for locating lever—Package of 10	.50

SO 759332

REPLACEMENT PARTS—(Continued)

Stock No.	DESCRIPTION	List Price
2916	Plate—Four finger lever and motor switch latch plate with mounting screws—Package of 5	$ .60
2917	Washer—Spring "C" washer for locating, cable, four finger levers and manual index levers—Package of 10	.50
2918	Spring—Locating and extension lever tension spring—Package of 10	.50
2919	Screw and nut—Locating lever stop screw with nut—Package of 10	.50
2920	Washer—Friction washer for slide and elevator actuating lever—Package of 10	.50
2929	Lever—Rear elevator actuating lever—Package of 2	.50
3214	Pulley—Cable pulley with mounting stud—Mounted vertically—Package of 5	.50
3217	Lever—Check lever	.50
3322	Switch—Motor switch complete	1.40
3401	Spring—Automatic trip lever tension spring—Package of 10	.50
3402	Screw—Elevator pad screw—Package of 10	.75
3403	Spring—Clutch pawl spring—Package of 10	.65
3404	Spring—Brake lever tension spring—Located on motor starting switch plate—Package of 10	.50
6340	Lever—Automatic trip lever	.90
6341	Lever—Manual index lever	90
6342	Pawl—Clutch pawl complete	2.00
6343	Gear—Gear and ratchet with set screw	2.10
6344	Lever—Eccentric and spiral trip lever complete—For manual position	1.50
7186	Gear—Gear and bracket	1.40
7188	Bracket—Slide bracket with roller	.75
7189	Lever—Front and rear elevator cam lever—Package of 5	2.20
7190	Lever—Locating lever	.85
7191	Lever—Cable lever	.60
7192	Cam—Cam gear and cam	1.50
7321	Lever—Tone arm cable guide lever with pulley	.90
7363	Pad—Front elevator rubber pad—Package of 10	.50
8646	Slide	2.20
8647	Lever—Four finger lever	1.20
	MOTOR BOARD ASSEMBLIES	
2779	Pointer—Selector switch pointer—Package of 10	.50
3262	Screw and nut—Record transfer lever adjusting screw and nut—Package of 10	.60
3394	Socket and base assembly—For compartment lamp	.80
3395	Shade—Compartment lamp shade	.50
3405	Spring—Record transfer lever spring—Package of 10	.50
3406	Escutcheon—Engraved "AUTOMATIC"	.50
3407	Escutcheon—Engraved "MANUAL"	.50
3408	Escutcheon—Engraved "33⅓—78"	.50
3409	Post—Roller post assembly for supporting record magazine	.75
3410	Suspension spring and washer for motor board—Comprising 1 bolt, 1 top spring, 1 bottom spring, 2 cup washers, 1 "C" washer and 1 nut	.90
3431	Escutcheon—Selector switch escutcheon	1.00
6288	Knob—Selector control switch knob—Package of 5	1.50
6345	Lever—Record transfer lever assembly complete	1.65
7535	Switch—Selector control switch complete, less knob and escutcheon	6.40
	TURNTABLE ASSEMBLIES	
3338	Ring—Clamp ring assembly—Comprising spring, latch lever and stud	.60
3340	Washer—Thrust washer—Package of 2	.60
3341	Pin—Groov-Pin—Package of 2	.60
3411	Sleeve—Sleeve assembly complete with ball race	3.05
8950	Turntable—Turntable complete	8.50
	MAGAZINE ASSEMBLIES	
2900	Screw—Magazine lever set screw—Package of 10	.50
3210	Lever—Magazine lever	.65
6172	Washer—Metal Washer located under record magazine—Package of 20	.50
8951	Magazine—Record magazine	4.00
	PICKUP, ARM, MICROPHONE AND VOLUME INDICATOR ASSEMBLIES	
3183	Socket—Microphone socket—Package of 5	2.00
3204	Cable—Pickup arm cable—Package of 5	1.50
3215	Plug—Microphone cord plug	.50
3216	Cushion—Microphone rubber cushion—Package of 6	.50
3385	Coil—Pickup coil	.50
3386	Cover—Pickup cover	.75
3387	Screw assembly—Pickup mounting screw assembly, comprising one screw, one nut and one washer—Package of 10	.60
3388	Screw—Pickup needle holding screw	.80
3389	Rod—Automatic brake trip rod with lock nut—Package of 5	.50
3390	Escutcheon—Pickup arm escutcheon complete with mounting rivets	.65
3412	Board—Volume indicator meter and pickup terminal board	.60
3417	Armature—Pickup armature	.75
3418	Cushions—Pickup rubber cushions—Comprising one damper, two spacer cushions and 1 damper bushing—Package of 5 sets	1.25
3419	Screw—Pickup cover mounting screw—Package of 10	.50
6335	Pickup—Pickup unit complete	12.00
6336	Weight—Home recording weight	1.40
6346	Back—Pickup housing back	.65
7532	Meter—Home recording volume indicator meter	2.50
7533	Mechanism—Microphone mechanism—Less housing	7.50
7534	Cord—Microphone cord	1.10
7538	Arm—Pickup arm complete less escutcheon, pickup, pickup mounting screw and washer	6.00
	MOTOR ASSEMBLIES	
3398	Motor mounting washer assembly—Comprising 2 cup washers, 4 springs and 1 "C" washer—One set	.75
7330	Capacitor—Motor capacitor—3.75 mfd.—For 25 cycle operation	4.00
8644	Capacitor—Motor capacitor—1.25 mfd.—For 50 or 60 cycle operation	1.40
8952	Motor—Motor complete—105-125 volts—60 cycles	32.00
8953	Motor—Motor complete—105-125 volts—25 cycles	48.30
8954	Motor—Motor complete—105-125 volts—50 cycles	44.60
8955	Rotor and shaft for 60 cycle motor	9.00
8956	Rotor and shaft for 50 cycle motor	9.00
8957	Rotor and shaft for 25 cycle motor	6.00
8958	Spindle—Turntable spindle with fibre gear for 60 cycle motor	7.00
8959	Spindle—Turntable spindle with fibre gear for 50 cycle motor	7.00
8960	Spindle—Turntable spindle with fibre gear for 25 cycle motor	8.00
	MISCELLANEOUS PARTS	
2737	Escutcheon—Operating switch escutcheon—Package of 5	.80
2857	Plug—Three prong (male section) connector plug for power cable	.70
3173	Plug—Three prong (female section)—connector plug for power cable	1.30
3413	Resistor—5,000 ohms—Carbon type—½ watt—Package of 5	2.50
3414	Resistor—15 ohms—Porcelain type—20 watt	.90
3415	Receptacle—Needle receptacle	.60
3416	Box—Needle box with lid	.60
3432	Capacitor—0.025 mfd.	.60
3433	Capacitor—0.015 mfd.	.60
3442	Resistor—100 ohms—Carbon type—½ watt—Located on selector switch—Package of 5	2.50
6292	Switch—Operating switch—Toggle type located on side of cabinet	1.25
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6348	Cable—Power three conductor power cable	1.90
6349	Cable—Shielded two conductor cable—From selector switch and resistor board to indicator meter and pickup terminal board	.60
7312	Transformer—Phonograph input transformer	6.55
7536	Cable—Braid covered interconnecting cable from receiver terminal strip to phonograph input transformer, S. P. U. terminal strip, selector switch and resistor board assembly	2.30
	CABINET ASSEMBLIES (PRICES FURNISHED UPON REQUEST)	
2776	Catch assembly—Door catch and strike with nails	
6924	Hinges—Door hinges—One set of 4 hinges with mounting screws	
8949	Board—Motor board, less equipment	
X161	Panel—Control panel	
X162	Grille	
X163	Lid—Cabinet lid	
X164	Leg—Cabinet leg	
X165	Foot—Cabinet foot	
X166	Doors—Record compartment—One pair	
X167	Baffle board and grille cloth	
X168	Escutcheon—Station selector escutcheon	
X169	Support—Lid support with mounting screws	
X170	Doors—Cabinet center doors—One pair	
X171	Knob—Record compartment door knob with mounting screw	
X172	Pull—Door pull with mounting screw	
X173	Hinge—Lid hinge with mounting screw—Package of 2	

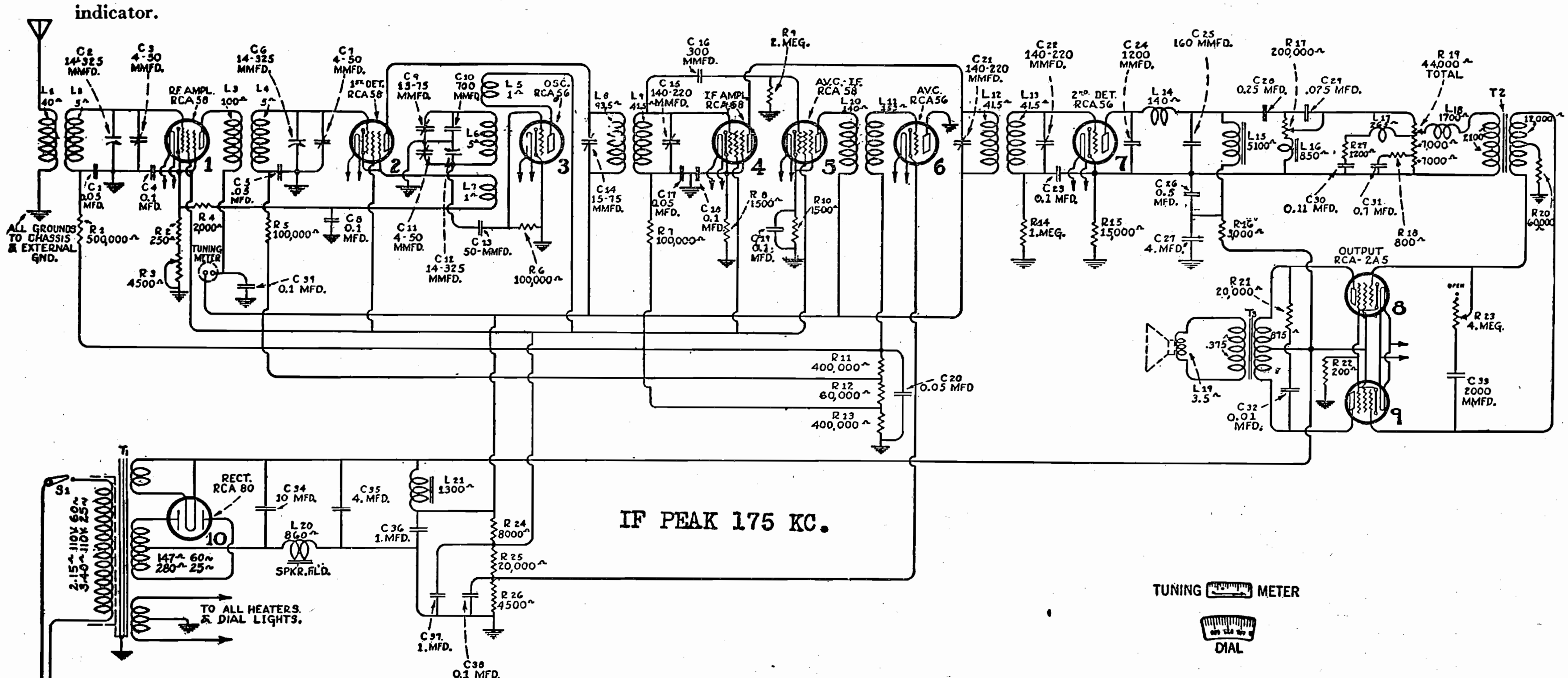
R. C. A. VICTOR CO., INC.

MODEL R-90
Schematic

To reduce the high-frequency (treble) response, or to decrease the background noise (static) interference *on station settings*, turn the right-hand tone control knob counter-clockwise. The extent of high-frequency cut-off thus obtained is indicated by shading of the *yellow* illumination at the right-hand side of the tone color indicator.

To reduce the low-frequency (bass) response, or to decrease low pitched hum present on the signals of some stations, turn the left-hand tone control knob clockwise. The extent of low-frequency cut-off thus obtained is indicated by shading of the *blue* illumination at the left-hand side of the tone color indicator.

The *red* illumination at the center of the tone color indicator represents the middle range of musical response. This illumination is not cut off by rotation of either of the tone control knobs as described in the preceding paragraphs (a) and (b).



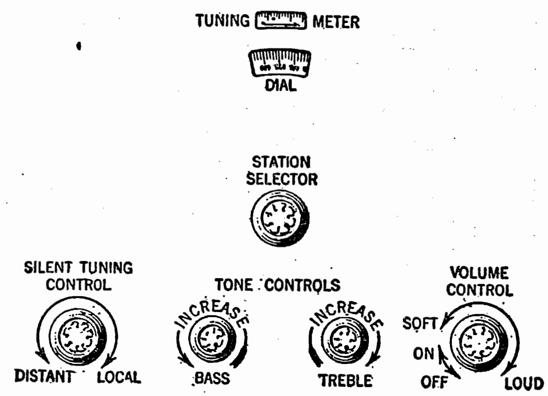


Figure A—Schematic Diagram

Adjust the Station Selector carefully to the position at which the indicator of the tuning meter travels furthest to the right (as designated by the arrow on the meter scale). When receiving a powerful local station, the Station Selector dial should be set at the *center* of the scale *range* for which the meter deflection is maximum (this range may be narrowed somewhat by turning the Silent-Tuning Control clockwise).

MODEL R-90
Voltage
I-F Trimmers
Notes

R. C. A. VICTOR CO., INC.

SERVICE DATA

Electrical Specifications

Voltage Rating..105–125 Volts
Power Consumption..120 Watts
Type and Number of Radiotrons..........................3 RCA-56, 4 RCA-58, 1 UX-280, 2 RCA-2A5—Total, 10
Frequency Range..............................540 K. C.–1500 K. C.
Undistorted Output..4.0 Watts

This receiver is a ten tube Super-Heterodyne radio receiver. Features such as illuminated control, improved automatic volume control, noise suppressor, compensated volume control, heater pentode output tubes operated as a push-pull stage, acoustically correct cabinets and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne are included in this instrument.

Figure A shows the schematic circuit, Figure B the wiring diagram, Figure C the location of the adjustable capacitors and Figure D, the loudspeaker wiring. The Radiotron socket voltages, the line-up procedure and the replacement parts are given on the following pages.

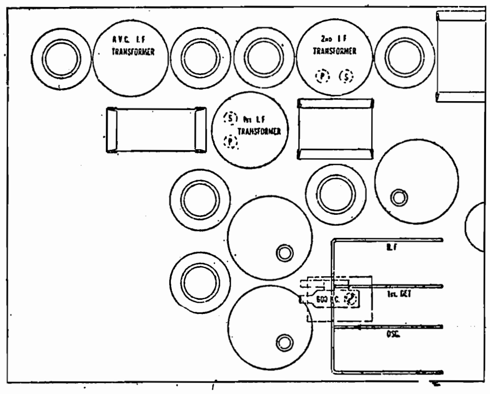


Figure C—Location of Adjustable Capacitors

R. F. And Oscillator Line-Up Capacitor Adjustments

Four adjustable capacitors are provided for aligning the R. F. circuits and adjusting the oscillator frequency so that the oscillator will maintain a constant frequency—175 K. C.—difference from that of the incoming signal. Poor quality, insensitivity, poor A. V. C. action and possible inoperation of the receiver may be caused by these capacitors being out o adjustment.

If the other adjustments have not been tampered with—the intermediate transformer tuning capacitors—the following procedure may be used for aligning these capacitors.

(a) Procure an R. F. Oscillator giving a modulated signal at 600 K. C. and 1400 K. C. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket. This should be a tube that is otherwise normal in all respects but having one heater prong removed. Insert this tube in the A. V. C. socket.

(d) First check the chassis and carefully ascertain that the dial pointer reads exactly at the first line on the scale when the tuning capacitor rotor plates are fully meshed with the stator plates.

(e) Place the oscillator in operation at exactly 1400 K. C. and couple its output to the antenna. Set the dial scale at exactly 1400. Connect the output meter to the set and place the volume control and suppressor control, if noise level will permit, at its maximum position. Adjust the oscillator input so that an excessive reading on the output meter is not obtained.

(f) With a suitable socket wrench—the nuts are at ground potential—adjust the oscillator, first detector and R. F. line-up capacitors, until a maximum deflection is obtained in the output meter.

(g) Set the oscillator at 600 K. C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K. C. series capacitor, Figure C, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.

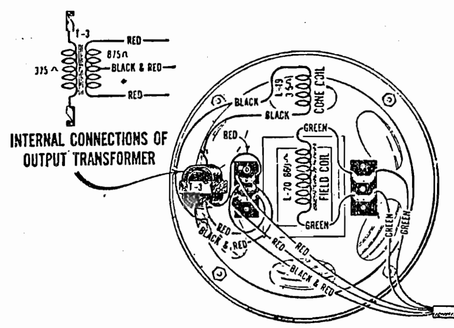


Figure D—Loudspeaker Wiring

(h) Change the frequency of the oscillator to 1400 K. C. and set the dial at 1400. Again make the adjustments given under (f) and (g).

So adjusted, the R. F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R. F. signal.

I. F. Tuning Capacitor Adjustments

Although this receiver has two I. F. stages, one for the second detector and one for the A. V. C., only two of the three I. F. transformers are tuned by adjustable capacitors and require adjustment. The stage used for the A. V. C. is broadly tuned and does not require any adjustment.

The transformers are all tuned to 175 K. C. and the circuits broadly peaked.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R. F. Oscillator that gives a modulated 175 K. C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket.

(d) Remove the oscillator tube and make a good ground connection to the chassis. Place the oscillator in operation and couple its output from the control grid of the first detector to ground. Adjust the oscillator output, with the receiver volume control at maximum, until a deflection is obtained in the output meter.

(e) Refer to Figure C. Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

When the adjustments are made the set should perform at its maximum efficiency. However, due to the interlocking of adjustments, it is good practice to follow the I. F. adjustments with the R. F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the preceding section.

RADIOTRON SOCKET VOLTAGES

120 Volt, A. C. Line—No signal being received—Volume Control at minimum

Radiotron No.	Cathode to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current, M. A.	Heater or Filament Volts, A. C.
1. R. F.	3.0	100	230	7.0	2.4
2. 1st Detector	8.0	95	220	2.5	2.4
3. Oscillator	—	—	105	6.0	2.4
4. I. F.	7.5	100	225	2.5	2.4
5. A. V. C.—I. F.	7.5	100	225	2.5	2.4
6. A. V. C.	20.0	—	0	—	2.4
7. 2nd Detector	17.0	—	250	1.2	2.4
8. Power	18.0	255	245	33.0	2.4
9. Power	18.0	255	245	33.0	2.4

MODEL CE-29
Schematic

R. C. A. VICTOR CO., INC.

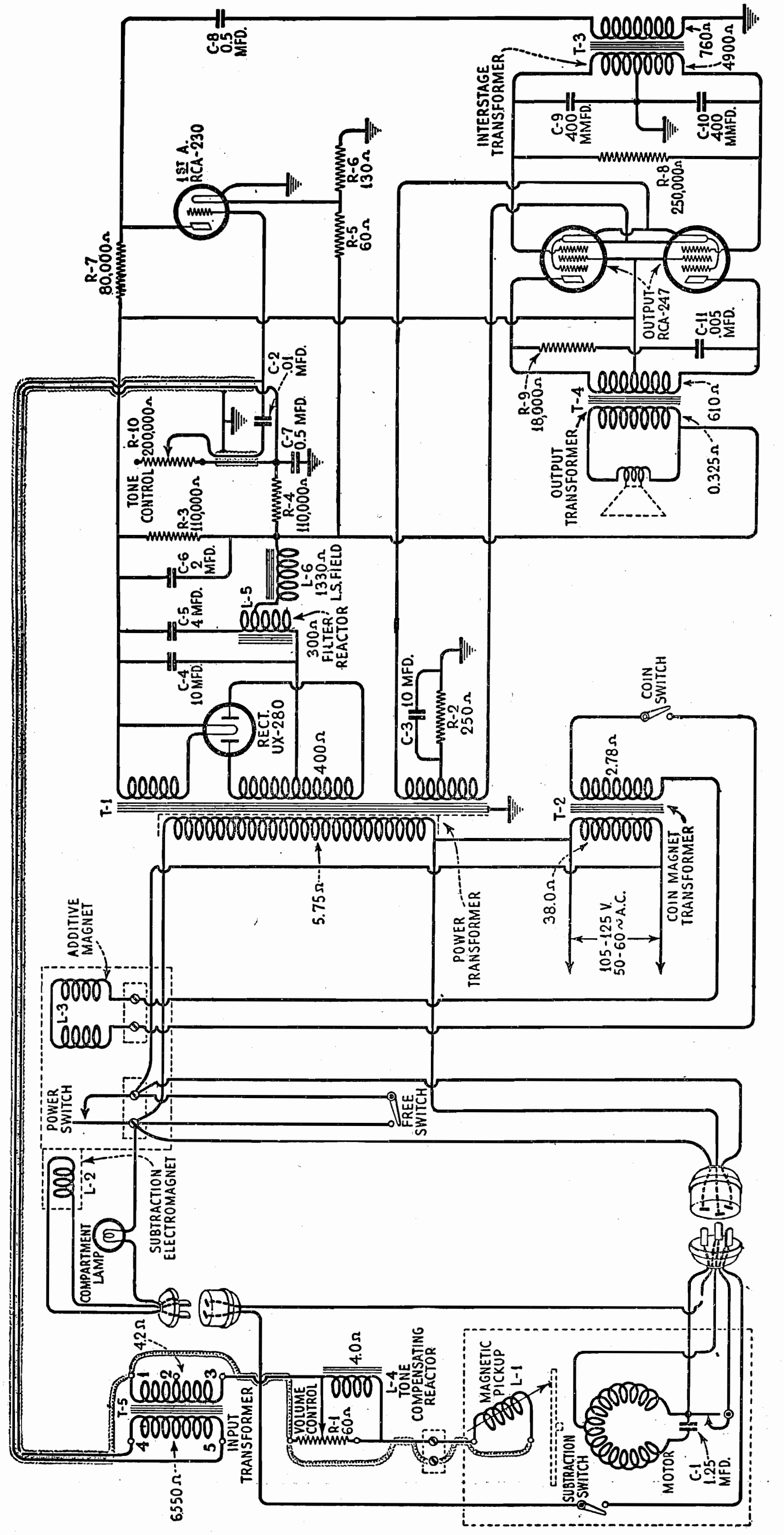
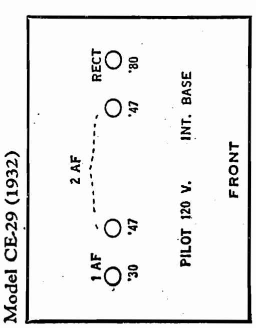


Figure 1—Schematic Circuit

RCA CE-29 Coin Operated Automatic Electrola



Basically this unit is an audio amplifier and the usual service routine applied to an audio amplifier is applicable to this system.

MODEL CE-29
Chassis

R. C. A. VICTOR CO., INC.

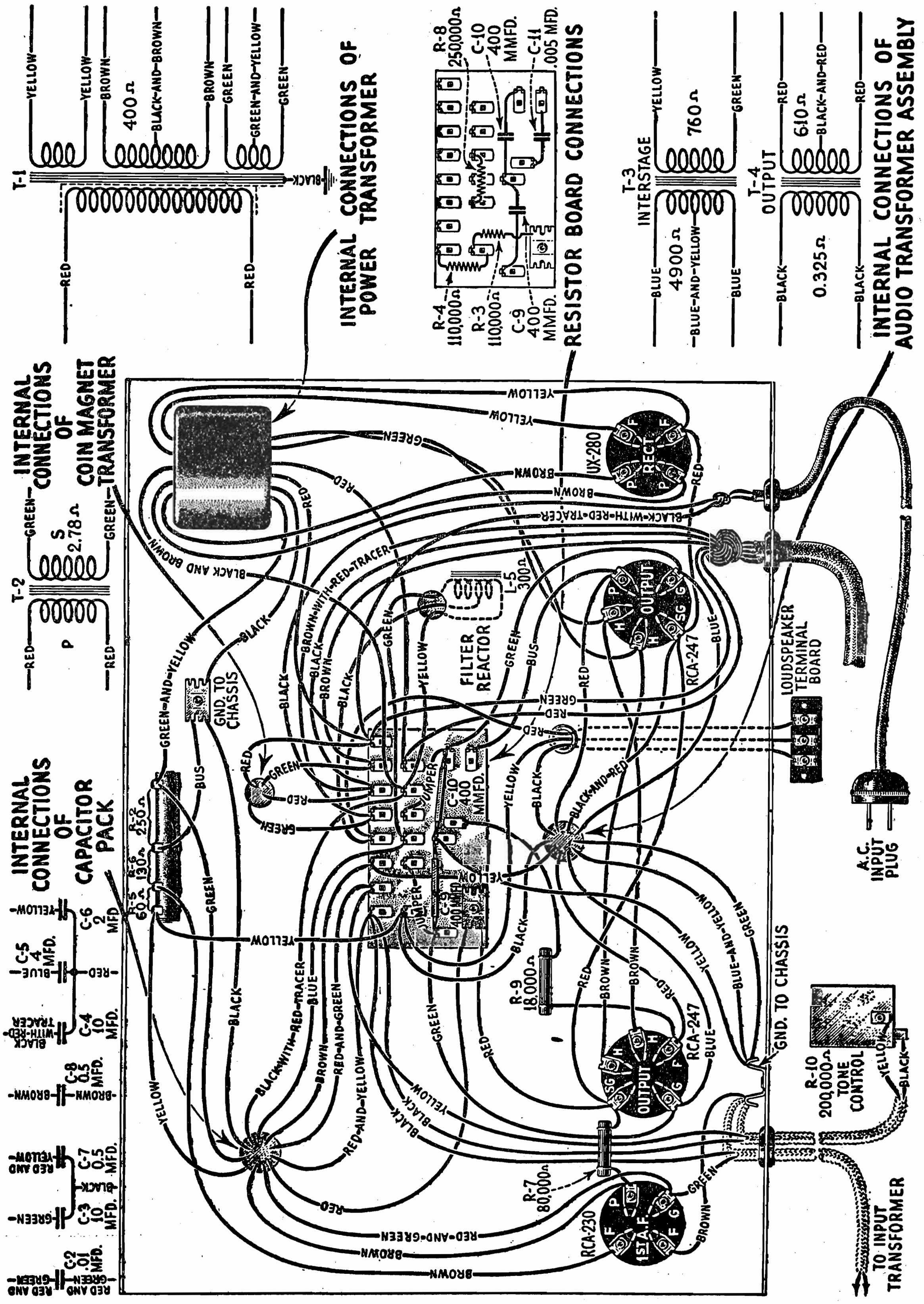


Figure 2—Amplifier Wiring Diagram

R. C. A. VICTOR CO., INC.

SERVICE NOTES

for

RCA Victor Model CE-29

(Coin Operated Automatic Electrola)

ELECTRICAL SPECIFICATIONS

Voltage Rating .... 105–125 Volts
Frequency Rating .... 25, 50 and 60 Cycles
Power Consumption .... 130 Watts
Type of Circuit .... Two Stage Audio Amplifier (Push-Pull Power Stage)
Type and Number of Radiotrons .... One RCA-230, Two RCA-247, One UX-280—Total 4
Type of Magnetic Pickup and Tone Arm .... Low Impedance Pickup with Inertia Type Tone Arm
Type of Record Changer .... RCA Victor Continuous Type, Playing One Side of Ten 10-inch Records and Repeating Indefinitely
Turntable Speed .... 78 or 33⅓ R. P. M.
Type of Phonograph Motor .... Induction, Operating at Synchronous Speed
Turntable Diameter .... 8 Inches
Type of Rectifier .... Full Wave, UX-280
Type of Loudspeaker .... Dynamic
Wattage Dissipation in Loudspeaker Field .... 10 Watts
Undistorted Output .... 4.0 Watts
Capacity of Coin Box .... Approximately 300 Coins—Maximum of 23 May Be Inserted at Once

PHYSICAL SPECIFICATIONS

Height .... 46½ Inches
Depth .... 19$\frac{5}{16}$ Inches
Width .... 28⅜ Inches
Weight Packed for Shipment .... 200 Pounds

The RCA Victor Coin Operated Automatic Electrola Model CE-29 consists of a standard RCA Victor automatic record changing mechanism that holds ten 10-inch records, a two stage audio amplifier using Radiotrons RCA-247 as a push-pull output amplifier, a coin box with the necessary switches for controlling operation, an eight-inch dynamic type loudspeaker and a continuously variable tone control. Due to the large area of the cabinet, excellent low frequency reproduction is obtained.

The following description covers the technical features of the equipment. Refer to the Schematic Diagram, Figure 1.

The output of the magnetic pickup is connected directly across the volume control potentiometer. The arm and one side of the potentiometer are connected to the primary of the input transformer. It should be noted that a reactor is connected across the unused portion of the volume control. The The purpose of this reactor is to increase the volume of the lower frequencies—from 400 cycles down —at low volume. This compensates for the lesser sensitivity of the ear for low frequencies at low volume.

The secondary of the input transformer is connected to the grid circuit of the first stage audio amplifier, Radiotron RCA-230. The filament of this Radiotron is heated by rectified and filtered current from the UX-280. The reason for using this tube instead of the usual heater type tube is due to the thermal inertia of the latter type. Although the UX-226 would be suitable in this respect, its filament must be heated from A. C. and this would produce excessive hum.

The power stage consists of two Radiotrons RCA-247 connected in push-pull. A 200,000 ohm variable resistor connected in series with a 0.01 mfd. capacitor across the secondary of the input transformer provides a continuously variable tone control. Transformer coupling is used between the two stages as well as between the output stage and loudspeaker.

The Radiotron UX-280 provides a means of rectifying the high voltage output of the transformer which after suitable filtering is used as plate and grid supply for all Radiotrons and filament supply for the RCA-230.

Figure 3 shows a detail view of the coin mechanism with its adjacent schematic wiring. A detailed explanation of its functioning follows.

A coin inserted in the coin slot makes a momentary contact of the coin switch and thereby energizes the additive magnet. This magnet is energized by a small transformer, having a 16 volt secondary winding, the primary being permanently connected across the line.

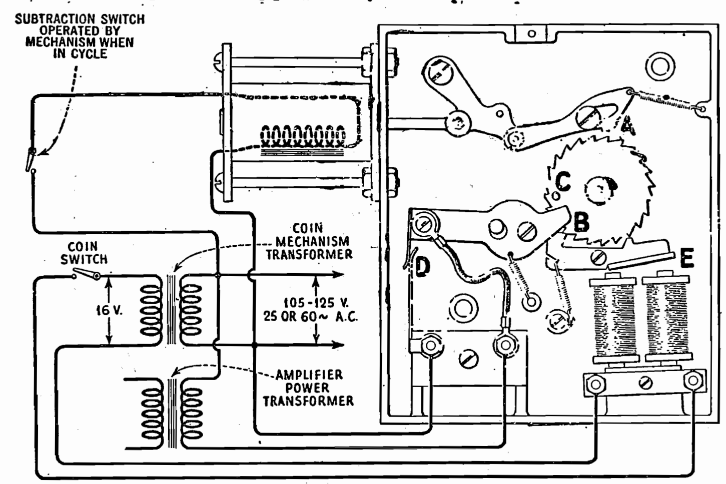


Figure 3—Coin Box Wiring

The energizing of the magnet pulls the lever "E" to the magnet and releases it after momentary contact of the coin switch. This closes the contact "D" by releasing the pressure on the contact arm by the pin "C." Also the lever "E" moves the ratchet due to its contact at "B." The ratchet will therefore move one notch for each nickel placed in the slot up to 23 nickels, it having only 23 teeth. As the contact "D" closes the power to the amplifier and turntable as soon as one nickel is inserted in the slot, the machine begins operation.

Upon completing one record the subtraction switch closes momentarily and energizes the solonoid which pulls lever "A" sufficiently to move the ratchet back one notch. If only one nickel has been inserted, the pin "C" will engage the contact lever and open the switch "D." However if more than one nickel has been inserted, the machine must go through an equal number of cycles before the pin "C" will engage the contact arm and open the circuit.

SERVICE DATA

Service work in conjunction with Model CE-29 will be similar to that of the usual amplifier and will consist of the location and replacement of parts that may prove defective. The amplifier wiring is shown in Figure 2, the assembly wiring in Figure 4 and the voltage readings and Replacement Parts on the following pages.

RADIOTRON SOCKET VOLTAGES

120 VOLT A. C. LINE

Radiotron No.	Control Grid to Filament Volts, D. C.	Screen Grid to Filament Volts, D. C.	Plate to Filament Volts, D. C.	Plate Current M. A.	Screen Current M. A.	Filament Volts
RCA-230	**2.0	—	80	2.0	—	*2.0 D. C.
RCA-247	17	270	250	30	6.0	2.6 A. C.
RCA-247	17	270	250	30	6.0	2.6 A. C.

*The filament voltage of the RCA-230 may vary considerably due to variations in filament resistance. The current however should be very close to 60 M. A. Measuring the current will give a much more accurate indication of correct operation than measuring voltage.
**This actual voltage is 4.5. Different resistance meters will give varying readings, the above value being approximate.

MODEL CE-29
Assembly Wiring

R. C. A. VICTOR CO., INC.

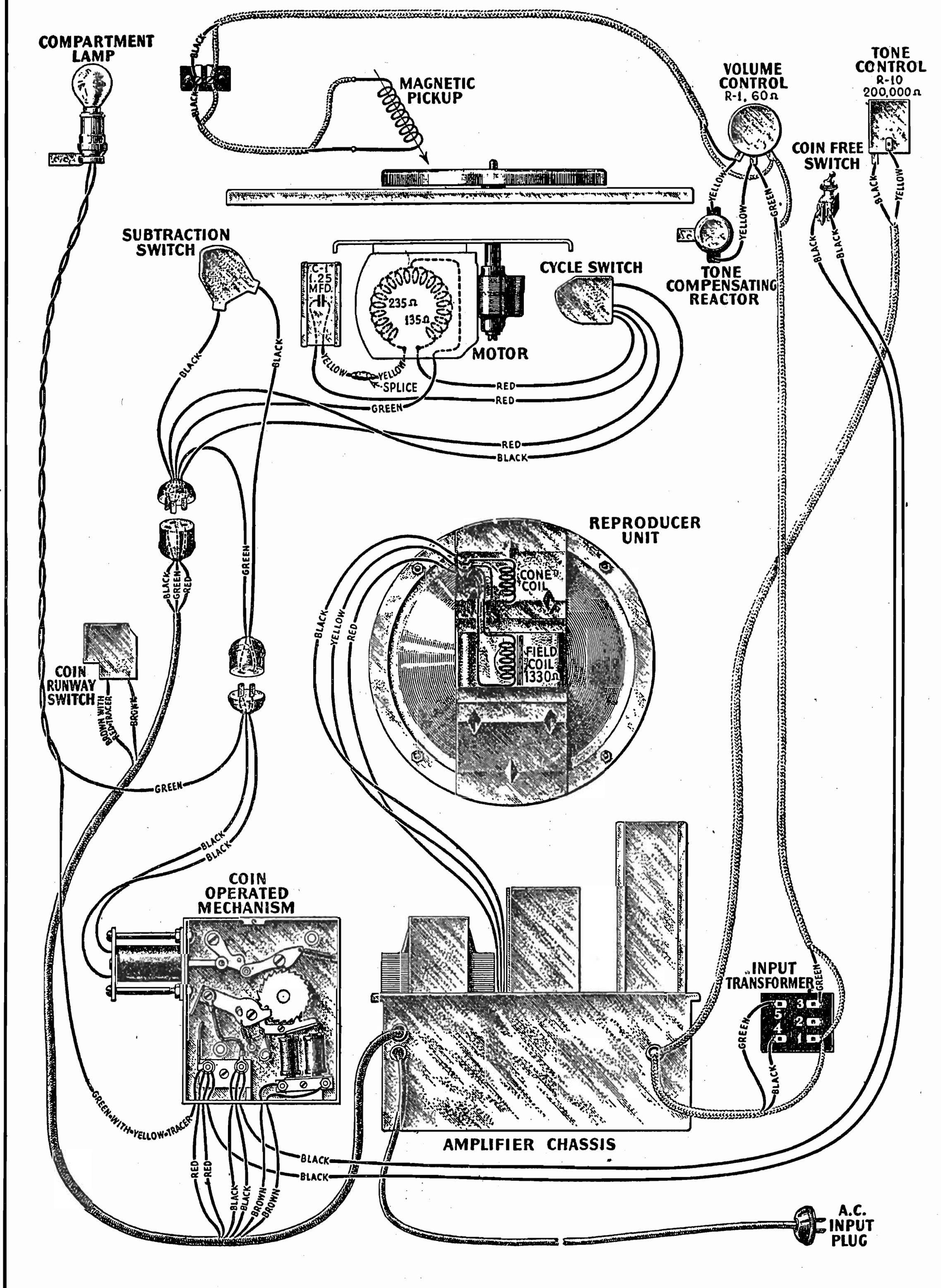


Figure 4—Assembly Wiring Diagram

MODEL PT-15
Turntable
Schematic

R. C. A. VICTOR CO., INC.

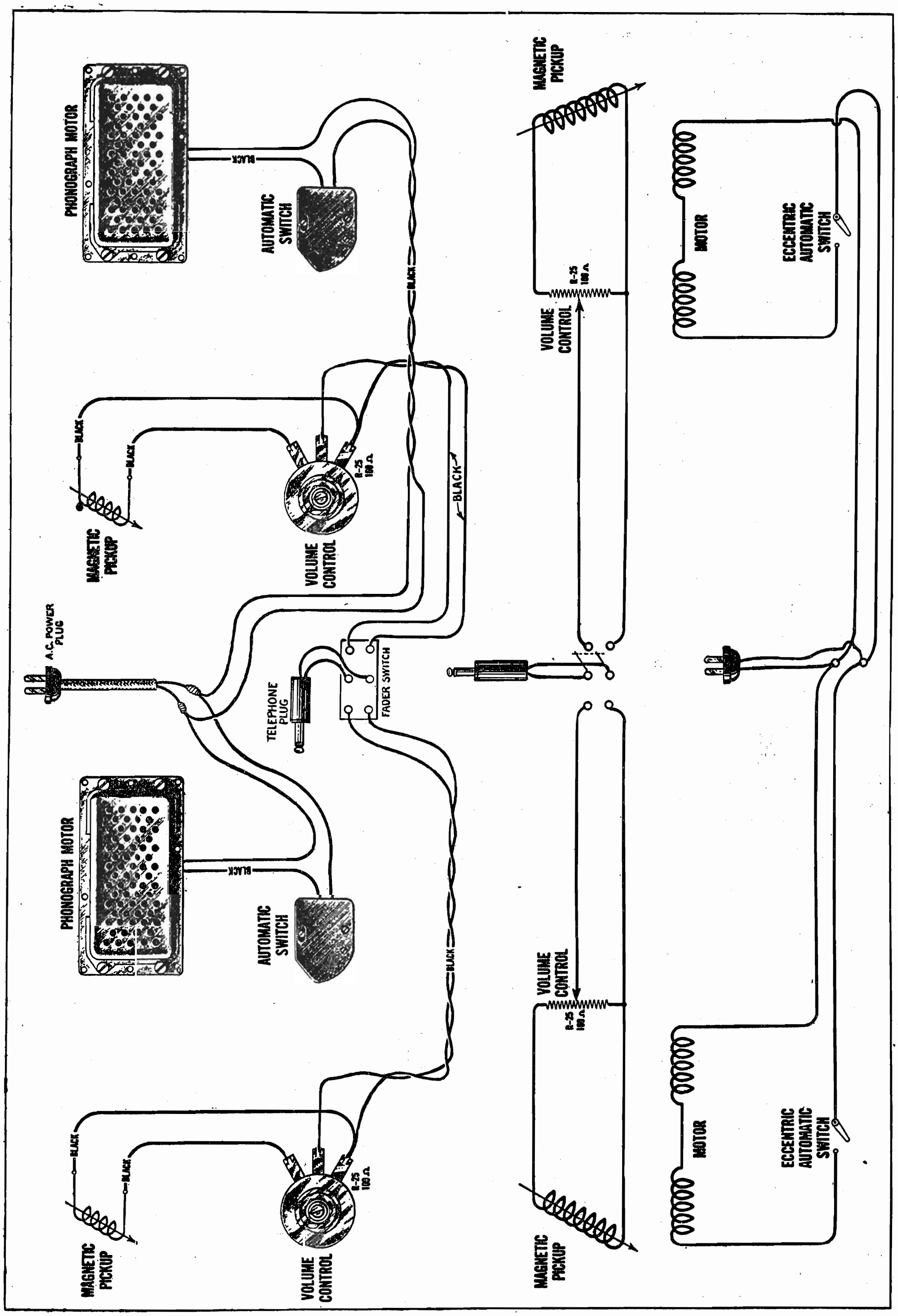


Figure 1—Wiring and Schematic Diagrams

MODEL PG-62
Public Address
Schematic

R. C. A. VICTOR CO., INC.

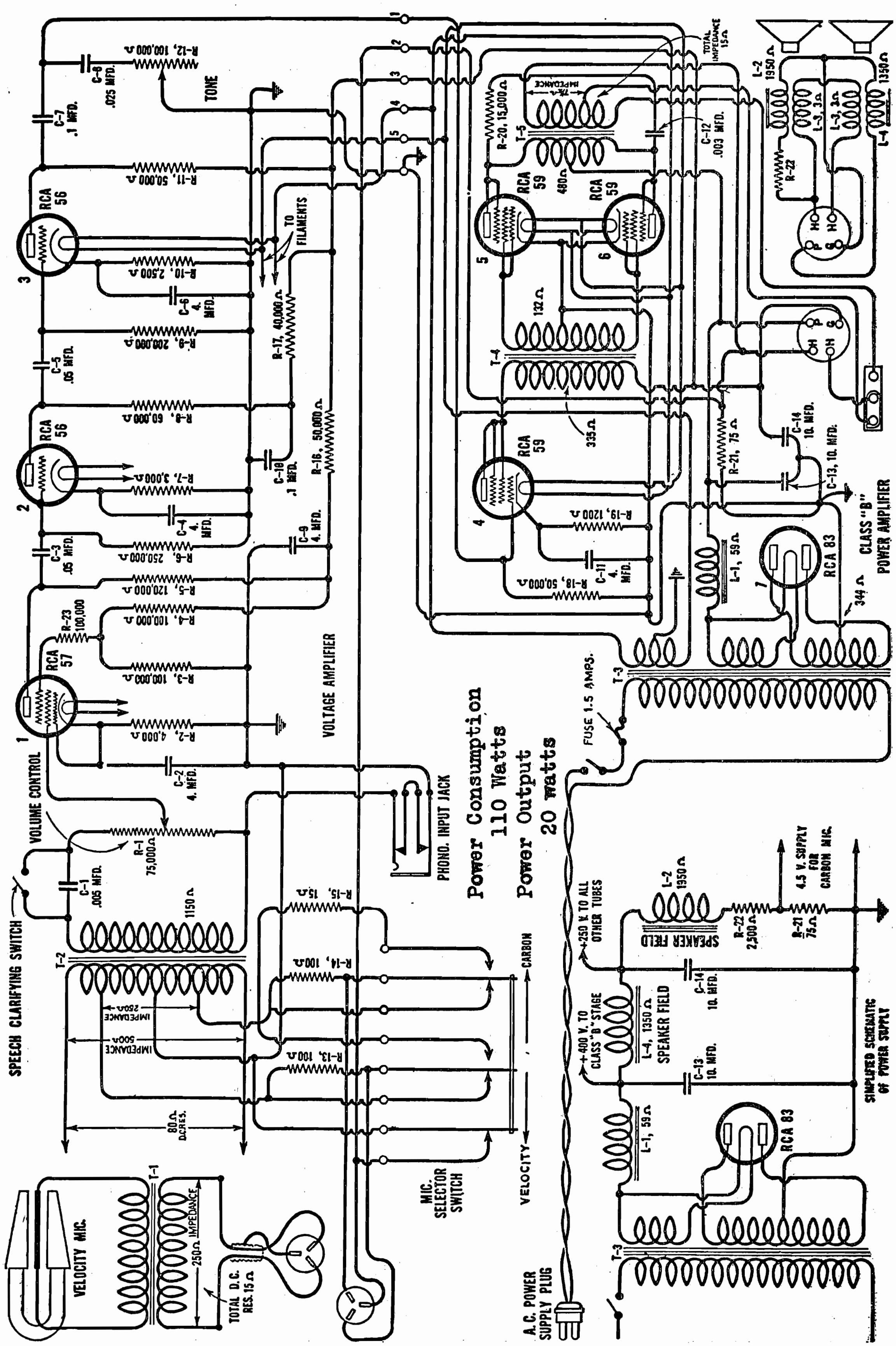


Figure 4—Schematic Circuit Diagram

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MODEL PG-62
Public Address Chassis

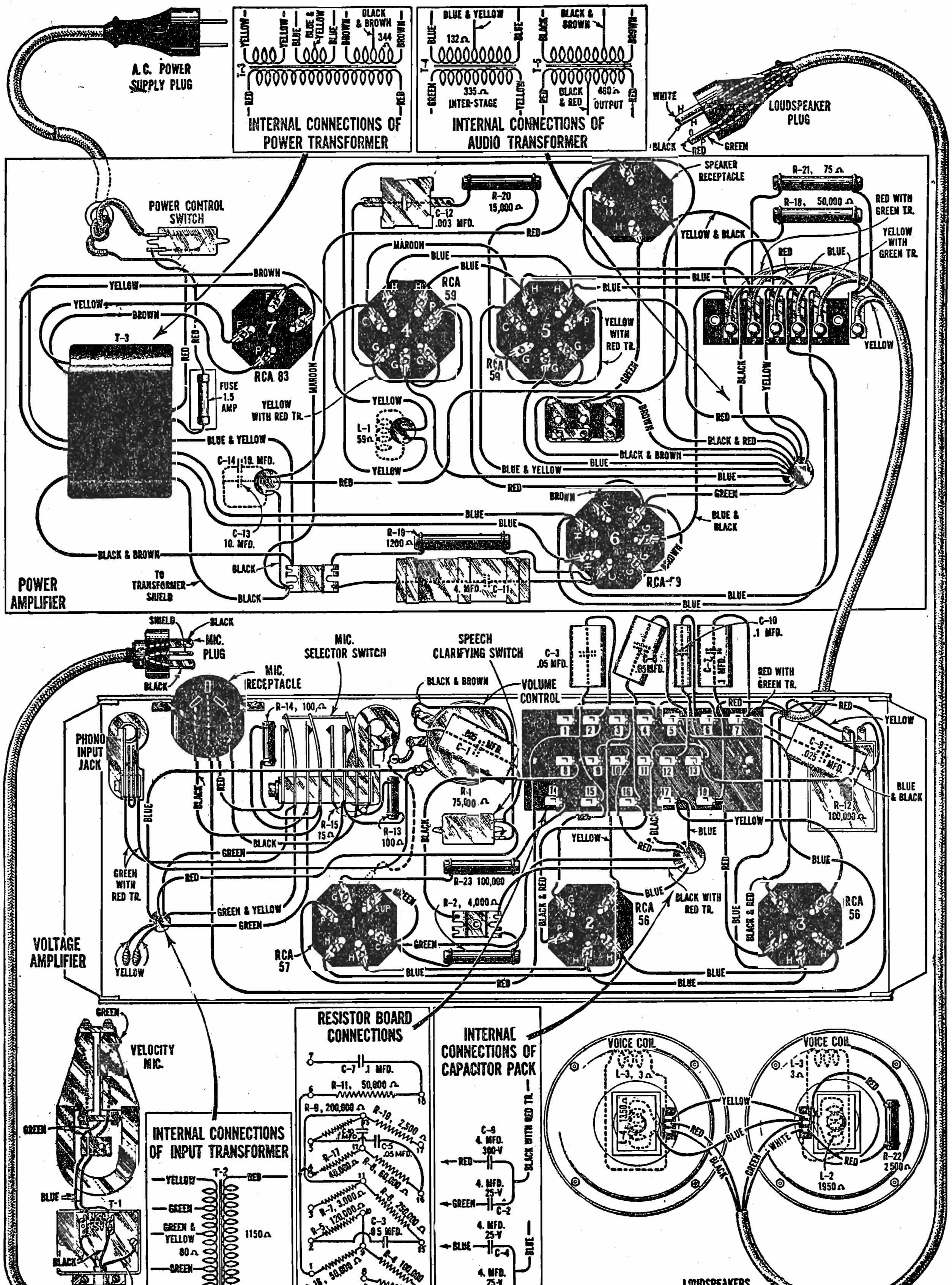


Figure 5—Wiring Diagram

MODEL PG-62
Public Address
Voltage- Notes

R. C. A. VICTOR CO., INC.

The RCA-57 is resistance coupled to the RCA-56 in the second stage and this RCA-56 is in turn resistance coupled to the RCA-56 in the third stage of the voltage amplifier. The last stage of the voltage amplifier is coupled to the single RCA-59 which is the driver for two Radiotrons RCA-59 in the Class "B" output stage. The output stage supplies power to two loudspeakers through a step-down transformer. This transformer has an output impedance of 15 ohms with a tap at 7½ ohms.

Thr power supply for both the voltage and power amplifiers is obtained from the RCA-83 and a filter system located on the power amplifier base. The field coil of one loudspeaker is used as a filter reactor in the power supply system in the power amplifier.

(2) CARBON MICROPHONE CONNECTIONS

The amplifier equipment is designed so that it will operate with a double button carbon microphone of 250 ohms impedance. A three-pole plug, similar to that employed with the velocity microphone, should be used. Each button on the microphone should be connected to each of the symmetrical poles on the plug. The remaining pole on the plug should be used to connect to the mid-point of the microphone. When using the carbon microphone the microphone selector switch should be placed at the "Carbon" position.

(3) PHONOGRAPH CONNECTIONS

An input jack is provided in the grid circuit of the RCA-57 which permits the use of a phonograph turntable Type PT-14. The instructions for operation of the turntable are included with the phonograph equipment.

(4) WIRING

The schematic and wiring diagrams for the amplifier equipment are shown in Figure 4. The wiring diagram for the complete equipment is shown in Figure 5.

(5) RADIOTRON SOCKET VOLTAGES

The Radiotron socket voltages given in the following tabulation are the actual values at which each Radiotron should operate. In circuits containing high resistance, voltages read on a set analyzer will not agree with the values in the table, due to the relatively low resistance of the meter employed. Therefore, a correction must be applied to the meter reading to obtain the correct voltage at each socket. Usually, an application of Ohms Law will give an approximate value of the voltages at which each Radiotron is operating, assuming that the resistance of the meter is known.

RADIOTRON SOCKET VOLTAGES

115 VOLT A. C. LINE—NO INPUT SIGNAL VOLTAGE

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-57	1.0	80	145	.25	2.5
2. RCA-56	3.5	—	120	1.2	2.5
3. RCA-56	4.0	—	165	1.6	2.5
4. RCA-59	2.8	—	242	23.0	2.5
5. RCA-59	0	—	390	13.0	2.5
6. RCA-59	0	—	390	13.0	2.5

CAUTION: Whenever the Radiotron RCA-83 rectifier is removed from or installed in its socket, the A. C. power control switch should be in the "off" position.

MODEL ER-1240-A2
Schematic

R. C. A. VICTOR CO. INC.

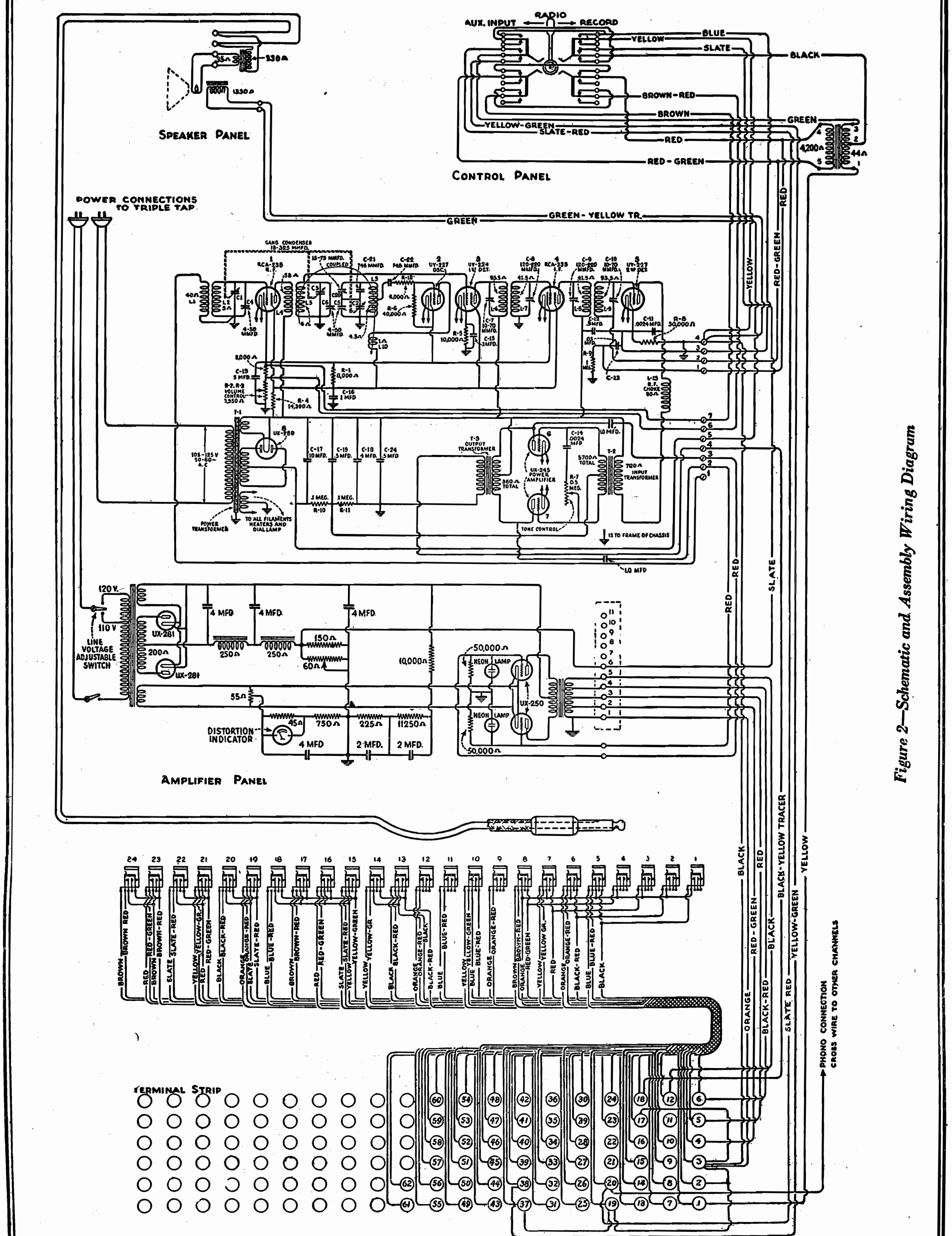


Figure 2—Schematic and Assembly Wiring Diagram

MODEL ER-1240-A2
Socket
Notes

R. C. A. VICTOR CO., INC.

5—The next panel is that of the jack strip. The jacks provide for connecting external inputs, monitoring loudspeaker and segregrating the various loads so that a failure in any section of the load may be localized and disconnected from the other circuits until repaired. The terminal strip for correcting this external wiring is also located on this panel.

6—Two blank panels are provided for additional amplifiers if they are required. They are located directly below the jack panel.

It should be noted that the model ER-1240-A2 Panel is similar to the model ER-1240-A and the ER-1240 except for the receiver used and slight wiring changes. The Service Notes for these models should therefore be consulted for information other than the wiring diagrams and voltage readings of the receiver unit. The schematic, wiring, and assembly diagrams as well as voltage readings and replacement parts are given on the following pages.

Socket No.	Radiotron Type
1	RCA-235
2	UY-227
3	UY-224
4	RCA-235
5	UY-227
6	UX-245
7	UX-245
8	UX-280

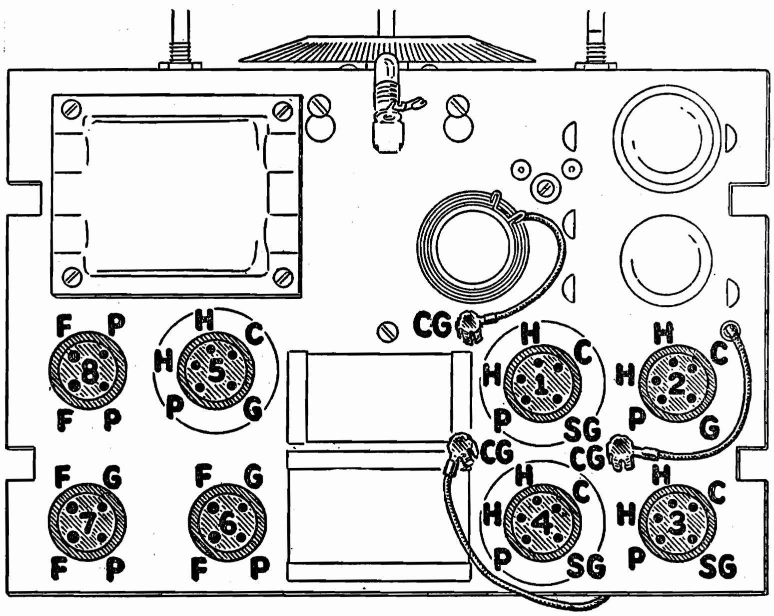


Figure 3—Socket Location and Contact Position of Receiver Assembly

ER-1240-A2 PROPORTIONAL DISTRIBUTION OF REPRODUCERS

VOLUME LEVEL	FOR USE IN	Maximum Number of Reproducer Units (with or without Vol. Cont.)
1	Auditoriums, ballrooms, etc.—Electro-Dynamic Triplet (3 Reproducers)	1
1	Auditoriums, ballrooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	20
1	Auditoriums, ballrooms, etc.—Electro-Dynamic Speakers (Model AF-6175 Terms. 1 and 5 to line)	15
2	Apartment or small assembly rooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	40
2	Apartment or small assembly rooms, etc.—Electro-Dynamic Speakers (Model AF-6175. Terms 1 and 5 to line)	30
3	Private hotel rooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	125
3	RCA Victor Radio Pillows	200
4	Head telephones or RCA Victor Radio Pillows	2500

R. C. A. VICTOR CO., INC.

MODEL ER-1240-A2
A-F Amplifier Chassis
Electrical Specs.

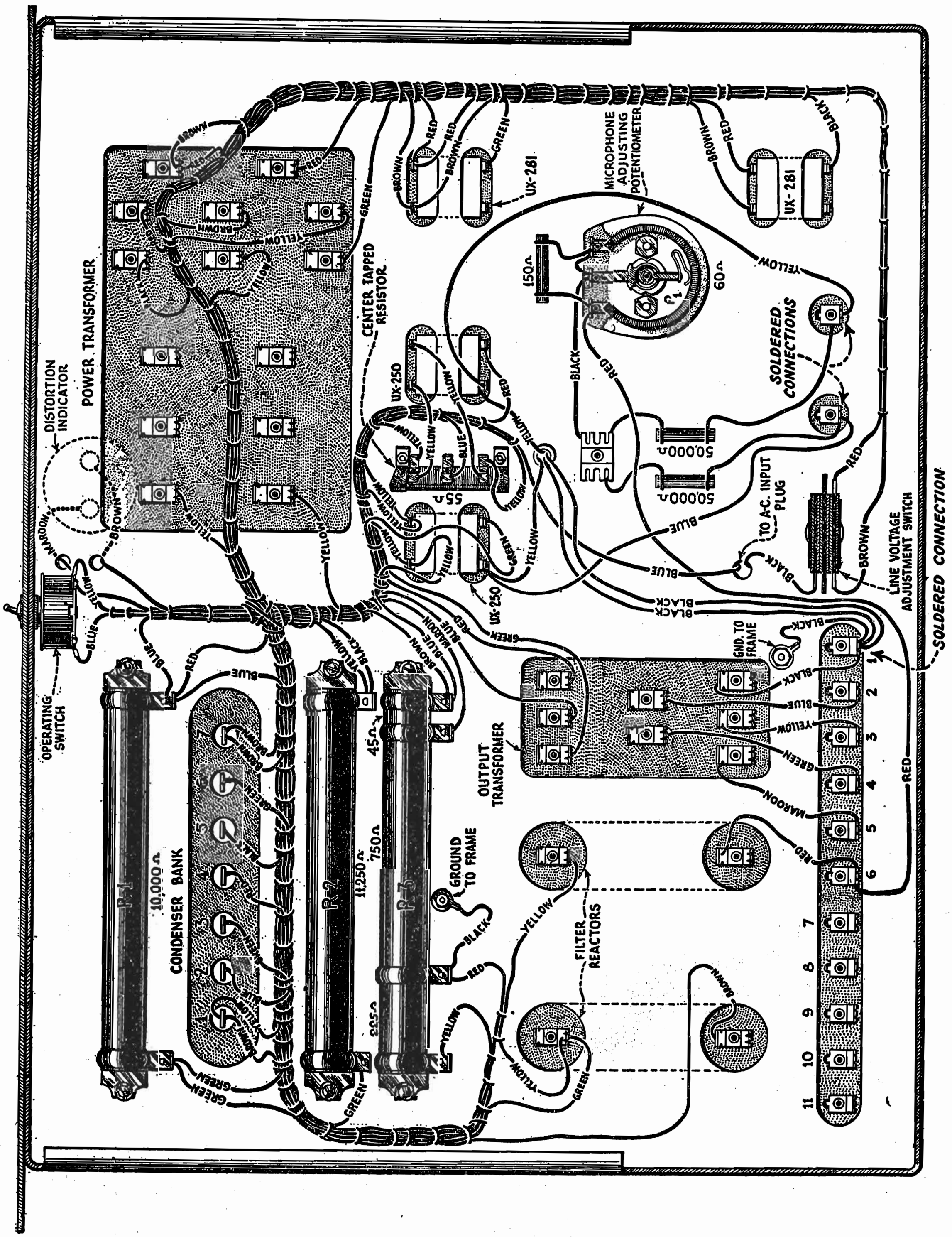


Figure 5—Wiring Diagram of Power Amplifier

ELECTRICAL SPECIFICATIONS

Voltage Rating.......................................105-125 Volts
Frequency Rating.......................................50 and 60 cycles
Power consumption—With 10 watt amplifier.......................................255 watts
With extra 10 watt amplifier.......................................415 watts
With extra 50 watt amplifier.......................................655 watts

MODEL ER-1240-A2
Receiver Chassis

R. C. A. VICTOR CO., INC.

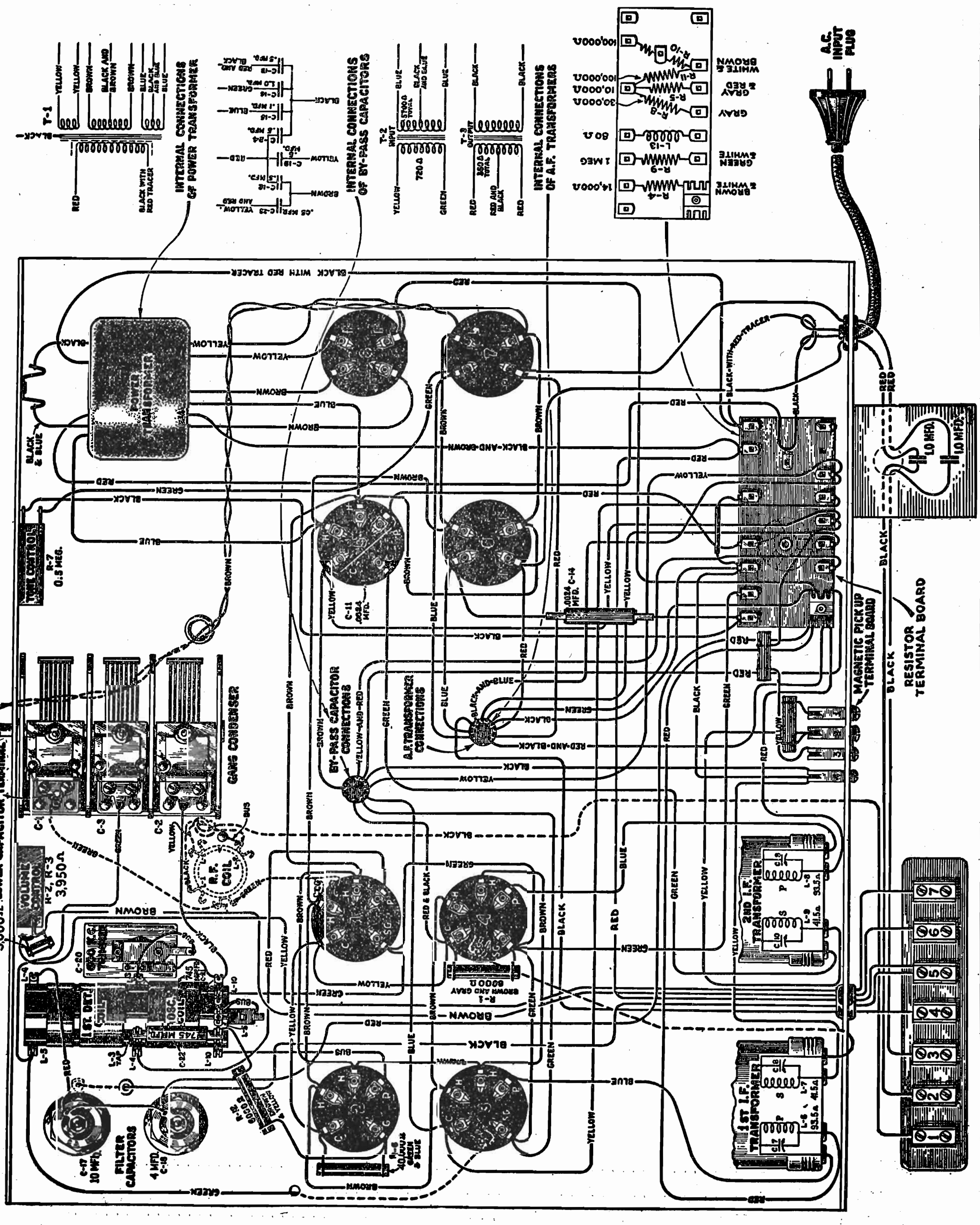


Figure 4—Wiring Diagram of Receiver Assembly

MODEL ER-1240-A2
Voltage

R. C. A. VICTOR CO., INC.

VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron socket with the receiver in operating condition should prove of value when checking with test sets such as the Weston Model 547, Type 3, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the cable in the test set will cause some circuits to oscillate, due to its added capacity. Small variations of voltages will be caused by different tubes and line voltages. Therefore, the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the tube socket numbers shown in Figure 3.

RADIOTRON SOCKET VOLTAGES—RECEIVER ASSEMBLY
120 VOLT LINE

Tube No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts, A. C.
VOLUME CONTROL AT MINIMUM							
1	40	40	55	200	0	0	2.4
2	40	0	—	50	4.0	—	2.4
3	8.0	7.0	90	240	0.5	0.25	2.4
4	40	40	55	200	0	0	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30.0	—	245	30.0	—	2.4
7	—	*30.0	—	245	30.0	—	2.4
VOLUME CONTROL AT MAXIMUM							
1	3.5	3.5	70	240	5.0	**0.7	2.4
2	2.5	0	—	65	5.5	—	2.4
3	5.0	5.0	70	235	0.5	0.25	2.4
4	3.5	3.5	70	240	5.0	**0.7	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30	—	245	25.0	—	2.4
7	—	*30	—	245	25.0	—	2.4

*Not true reading due to resistance in circuit.
**This reading may be + or − depending on age of tube.

RADIOTRON SOCKET VOLTAGES—POWER AMPLIFIER
120 VOLT LINE

VOLUME CONTROL AT ZERO—NO STATION TUNED IN				
Tube	Cathode or Filament to Grid—Volts	Cathode or Filament to Plate—Volts	Plate Current Milliamperes	Filament or Heater—Volts
Either UX-250	86.5	460	55.0	7.5
Either UX-281	—	630	75.0	7.5

MODEL Photophone PG 29
Schematic

R. C. A. VICTOR CO., INC.

The RCA Victor Photophone Reproducing Equipment Type PG-29 is a 35 mm. "non-theatrical" unit, and is portable. PG-29s are being used a great deal for special lecturing purposes and you may run into one of them any day.

The equipment consists of three separate units, namely, the projector, the audio amplifier and the dynamic speaker. Carrying cases are provided for each unit, making them adapted for transportation.

The amplifier unit employs a 224 which is impedance-coupled to a 227. This tube in turn is transformer-coupled to a pair of 245s in push-pull. The rectifier is a 280.

Cables and plugs are provided so that when desired two projector units may be used alternately, by the throw of a fader switch, so that the showing of the film is uninterrupted.

The PG-29 Photophone is a portable 35 mm. talking motion-picture unit, with sound on film. Though, admittedly, there are not many of them being used in homes, nevertheless this equipment is being employed extensively by lecturers, etc., and one may turn up in your vicinity at any time with a cry for servicing.

Fig. 1 shows the schematic diagram of the audio amplifier with the connections to the projector, loudspeaker and power sources. Polarizing voltage for the photoelectric cell is provided by the power supply in the amplifier unit.

The output of the photocell is coupled to a high-impedance primary of an auto-transformer located in the projector housing. The secondary of this transformer is then coupled to the '24 audio amplifier tube. A 500,000-ohm potentiometer in the grid circuit of the '27 tube functions as the volume control.

A separate cable supplies the power to the projection lamp. Power for this purpose may be either a-c. or d-c. at 110 volts. Fifty or sixty-cycle a-c. power is supplied through another cable to the projector drive motor, the exciter lamp transformer and the threading lamp. The exciter lamp transformer steps down the voltage to 10 volts at which rating the exciter lamp operates. The maximum current through the exciter lamp should not exceed 7½ amperes, as a very slight increase in current above this value will greatly reduce the lamp life.

A toggle switch marked 110V-120V is provided on the top of the amplifier chassis to compensate for small line-voltage variations. If the voltage at the power source is greater than 115 volts, the switch should be set on the 120-volt position, while if less than 115 volts, the switch should be left on the 110-volt position.

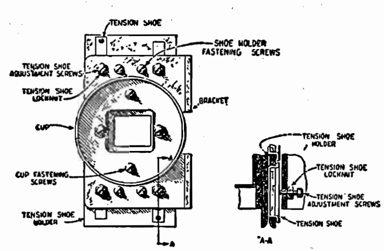


Fig. 3. Front section of the picture gate, showing the location of adjustment screws

A single pole, double throw toggle switch is provided on the base of the amplifier for fading sound from one projector to the other when two projectors are used. A special input jack is connected across the primary circuit of the input transformer, and is used for coupling a turntable or similar device to the amplifier.

A hum adjustment potentiometer, connected across the filament supply transformer for the '24 and '27 tubes is provided with a slotted shaft for adjustment with a screw driver. Adjust for minimum hum with volume control set at maximum.

Since the field winding of the dynamic speaker serves as a choke in the power supply filter unit, it should be connected at all times when the power supply is on . . . otherwise the amplifier may be seriously injured.

The tube socket voltages for the various tubes in the amplifier unit are given in Table 1. The filament voltages are normal for the tubes used.

ADJUSTMENTS

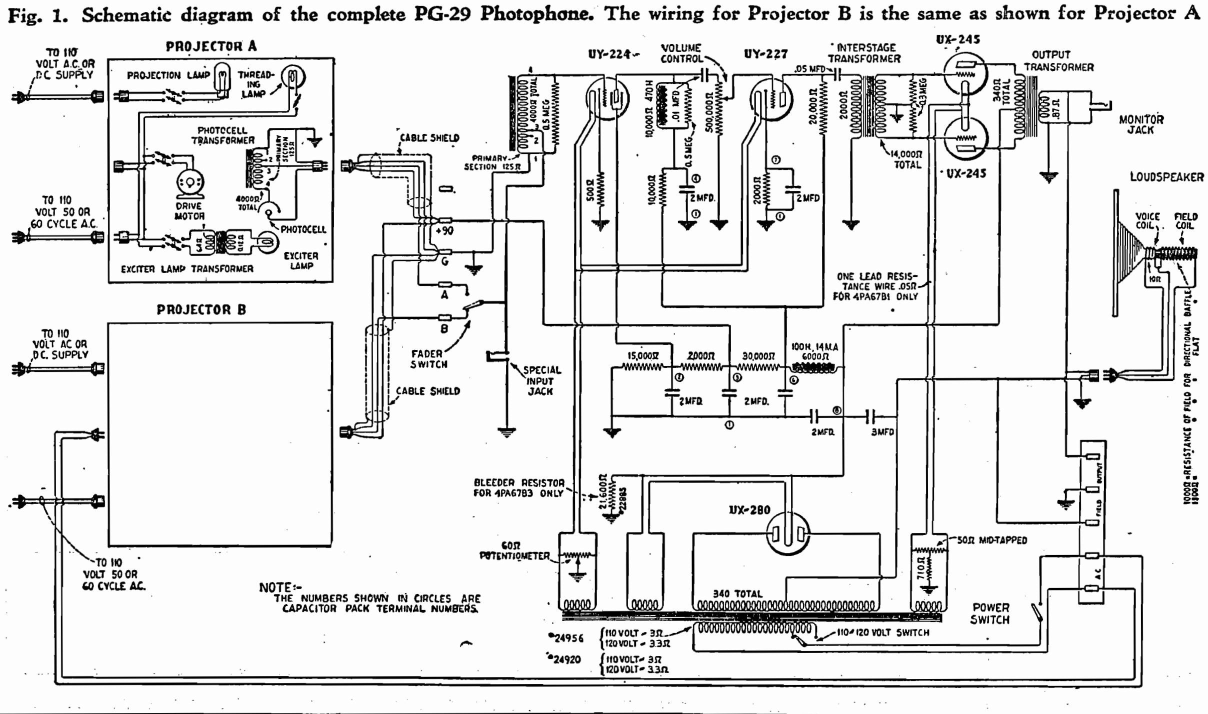
Aside from the usual reasons, low volume from the amplifier may be due to the following: Defective photocell; exciter lamp current low due to low a-c. line voltage; exciter lamp old or dirty; exciter lamp out of adjustment; optical system partially obstructed, in which case inspect the optical system lenses and sound gate for foreign material, such as dirt, oil, film emulsion, etc.

No sound whatsoever may be due to one or more of the following: Burned out exciter lamp; optical system completely obstructed, in which case inspect sound gate and objective lens of the optical system for oil, dirt or film emulsion; defective photocell; inter-

TABLE 1

Tube	Control Grid	Screen Grid	Plate	Plate Current
224	1.8	50	180	2
227	6.0	—	128	4
245	44.0	—	248	30
245	44.0	—	248	30
280	—	—	—	42-50

Fig. 1. Schematic diagram of the complete PG-29 Photophone. The wiring for Projector B is the same as shown for Projector A



connecting cable plugs not securely attached to receptacles, inoperative fader switch.

Noise or motorboating may be due to dirty contacts on tubes or photocell, in which case clean with No. 00 sandpaper, or the sprocket holes or frame lines of film interrupting the light beam. The latter will require an adjustment of the sound gate lateral guide roller.

If low volume is due to the exciter lamp being out of adjustment, remove the photocell cap, and with the exciter lamp lighted adjust the position of the lamp in its socket so that the light spot is centrally located and evenly illuminated on the plate of the photocell.

Sound Gate

The adjustment of the sound gate lateral guide roller is not difficult. The idea is to adjust this roller so that it will keep the film in lateral alignment as the sound track passes the reproducer light beam.

For this adjustment it is necessary to obtain a section of test film (Stock No. 22898) with a "buzz-track" edge. This track consists of two chopper tracks so spaced that neither will effect the light if the film is in lateral alignment. If the film is not in alignment, one or the other of the chopper tracks will come into the line of the light and cause a fluctuation of the beam to the photocell and result in a sound in the loudspeaker. One of the chopper tracks will give a 700-cycle note and the other will give a 300-cycle note, thus giving an indication as to the direction the guide roller should be moved to correct the alignment.

When using the buzz-track film to make the lateral adjustment of the guide roller, use the following procedure.

Remove the magazines from the projector and thread the projector in the usual manner with the loop of buzz-track film. (The film being in the form of a loop can then be run continuously through the machine.)

With the exciter lamp lighted and the equipment connected for the reproduction of sound, start the projector and listen for a 300-cycle or 700-cycle note from the loudspeaker. If neither note is heard the guide roller is in proper adjustment. If either of the two notes is heard, loosen the lock nut (See Fig. 2) at the end of the guide roller assembly. Make the lateral adjustment while the film is in motion by turning the large hexagonal nut at the end of the guide roller assembly until no signal is heard. If the 300-cycle note is heard, the nut should be turned counterclockwise. If the 700-cycle note is heard, the nut should be turned clockwise. In any case, attempt to arrive at the midway position between the two signal notes.

The picture gate lateral roller (See Fig. 3) should be adjusted so as to align the film picture horizontally with the picture gate aperture. To make the adjustment, project a sound film on the screen and note whether or not a light streak shows on either side of the screen picture. If a light streak is noticed, loosen the lock nut at the end of the guide-roller-post and screw the adjustment nut in to eliminate a streak on the right-hand side of the picture, or out to eliminate a streak on the left-hand side of the picture.

"Sound Focusing"

To properly focus the sound optical system a 9,000-cycle parallel line sound track (Stock No. 22898) is used. Proceed as follows.

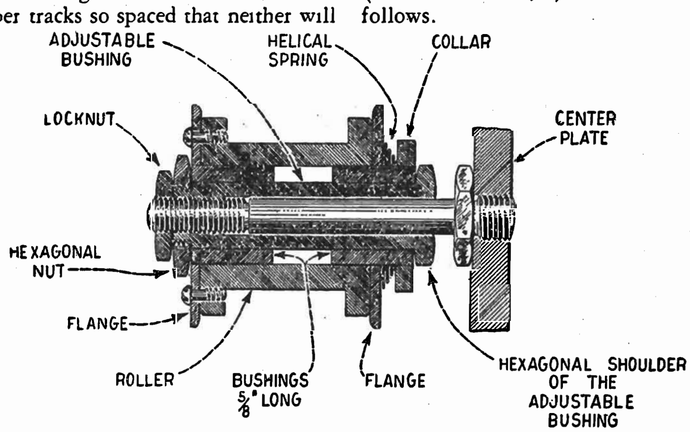
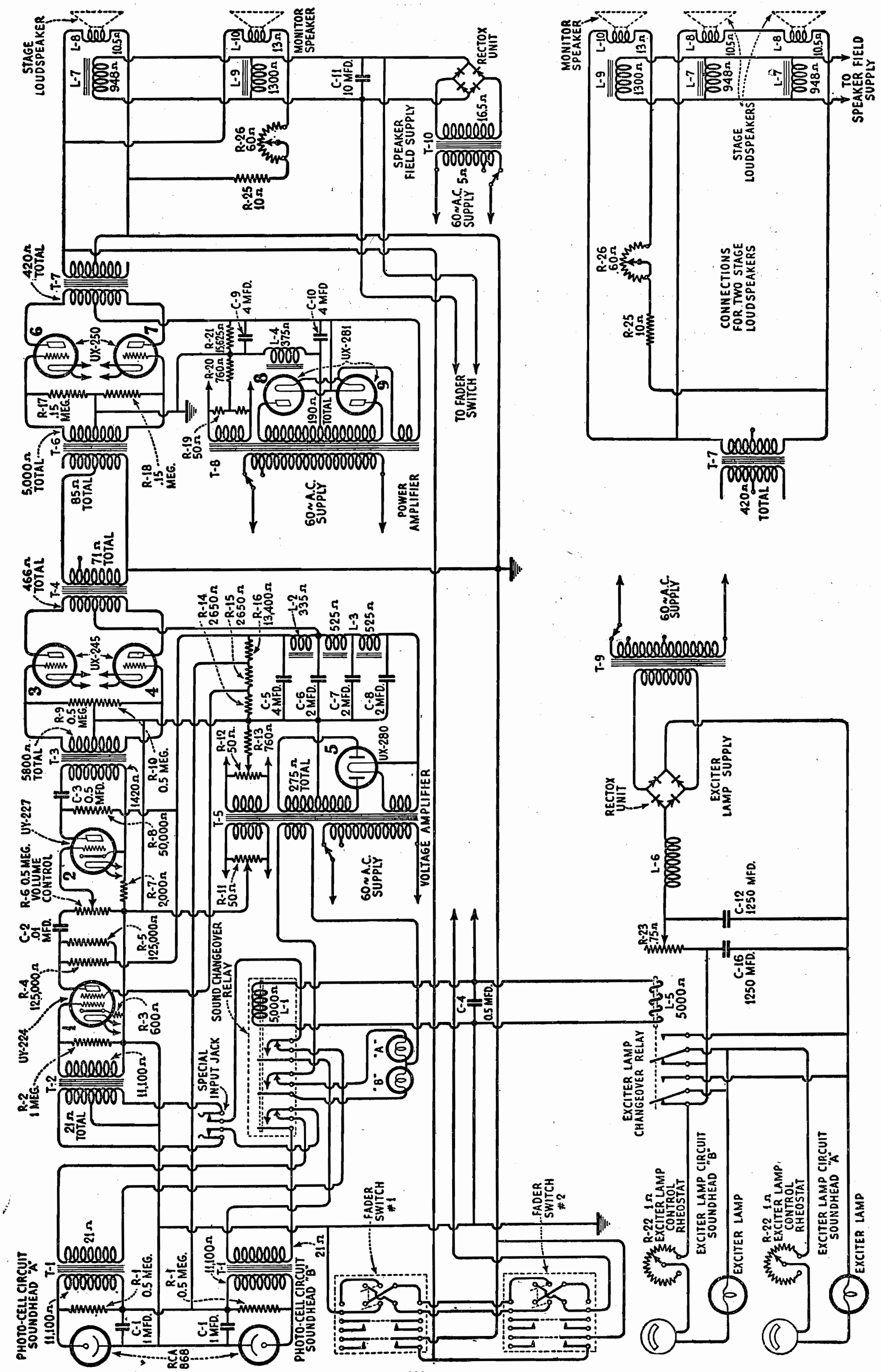


Fig. 2. A cross-sectional view of the sound gate. The proper adjustments are made by turning the hexagonal nut (held by locknut) at the left

Thread the projector with the film loop so that the 9,000-cycle recording is in front of the optical system, and be sure the emulsion side of the film is toward the optical system objective lens. Now, turn on the exciter lamp, and be sure it has been adjusted, as already described. Then remove the photocell and place a white card in the photocell shield so that the projected light spot is visible on the card. When this is O.K. pull the film very slowly by hand along the line it normally travels between the idler-roller and constant-speed sprocket. Note the direction of motion of the 9,000-cycle parallel line shadows across the light circle on the card. If the shadows move downward, loosen the optical barrel clamping screw and turn the knurled adjustment ring so that the lens system is moved closer to the film. If the shadows move upward move the lens system away from the film. When one parallel line of the film completely covers the light beam the optical system is in proper focus. This condition is indicated on the card when the light circle is alternately completely shadowed and lighted as the film is slowly moved. Also at this point there should be no apparent upward or downward motion of the shadow on the light circle.

R. C. A. VICTOR CO., INC.

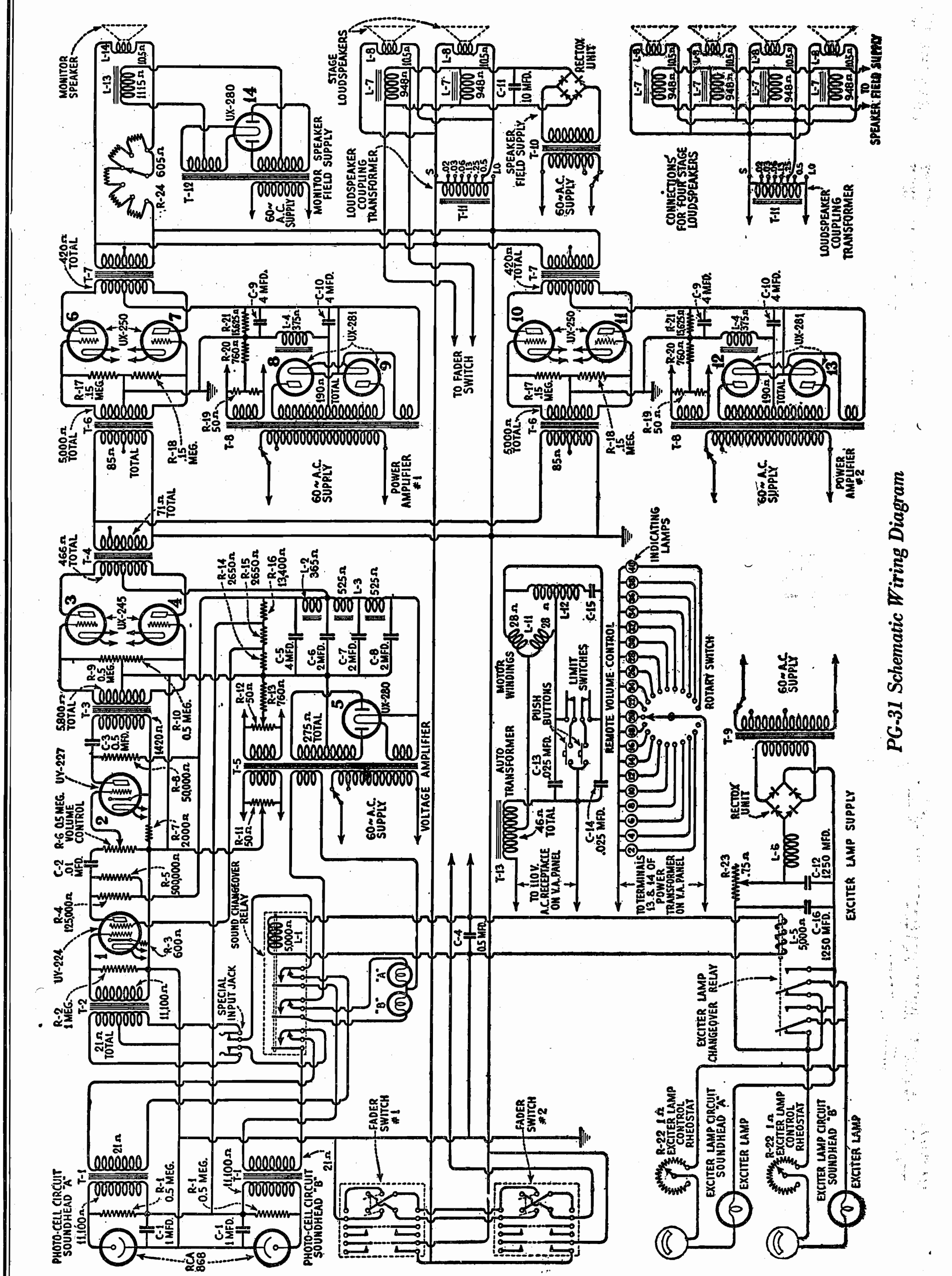
MODEL Photophone PG-30
Schematic 1st Type



PG-30 Schematic Wiring Diagram

R. C. A. VICTOR CO., INC.

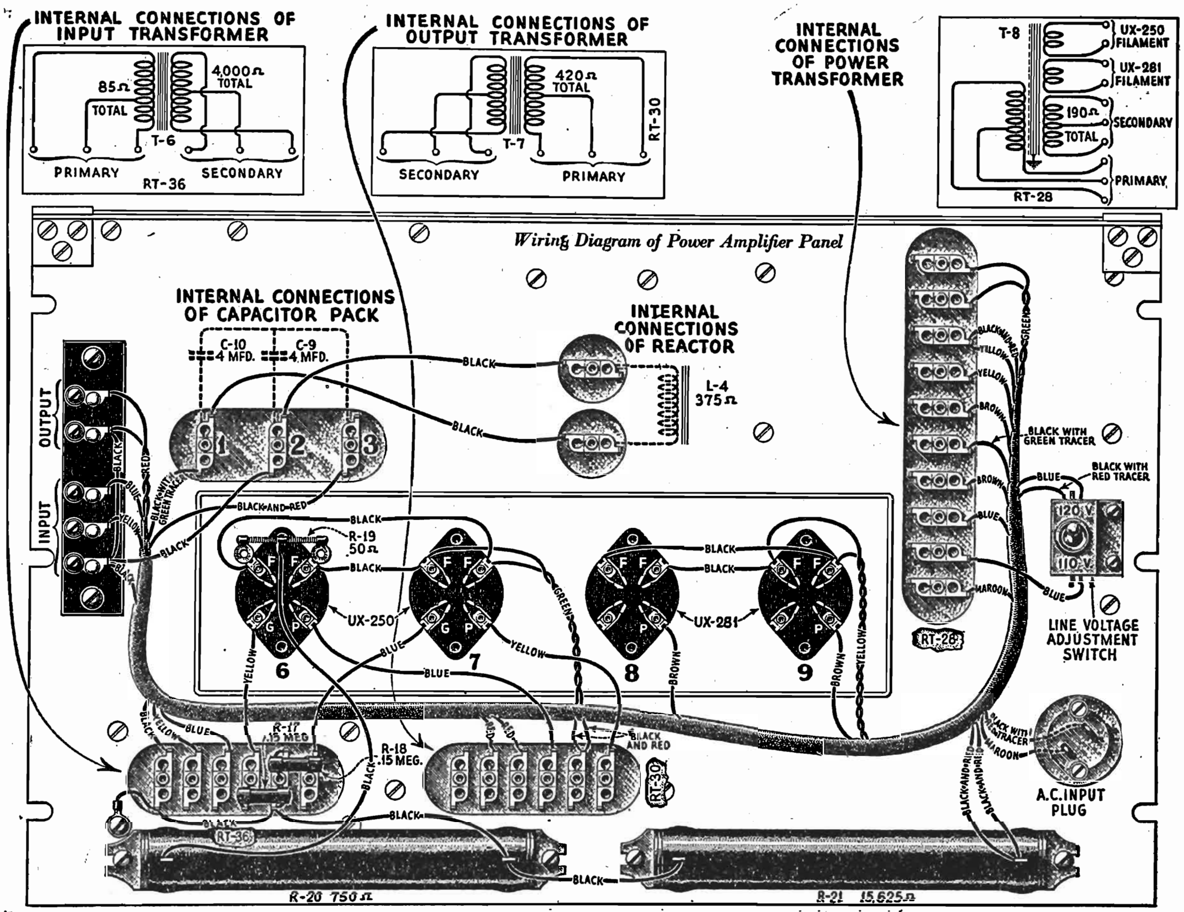
MODEL Photophone PG-31
Schematic 1st Type

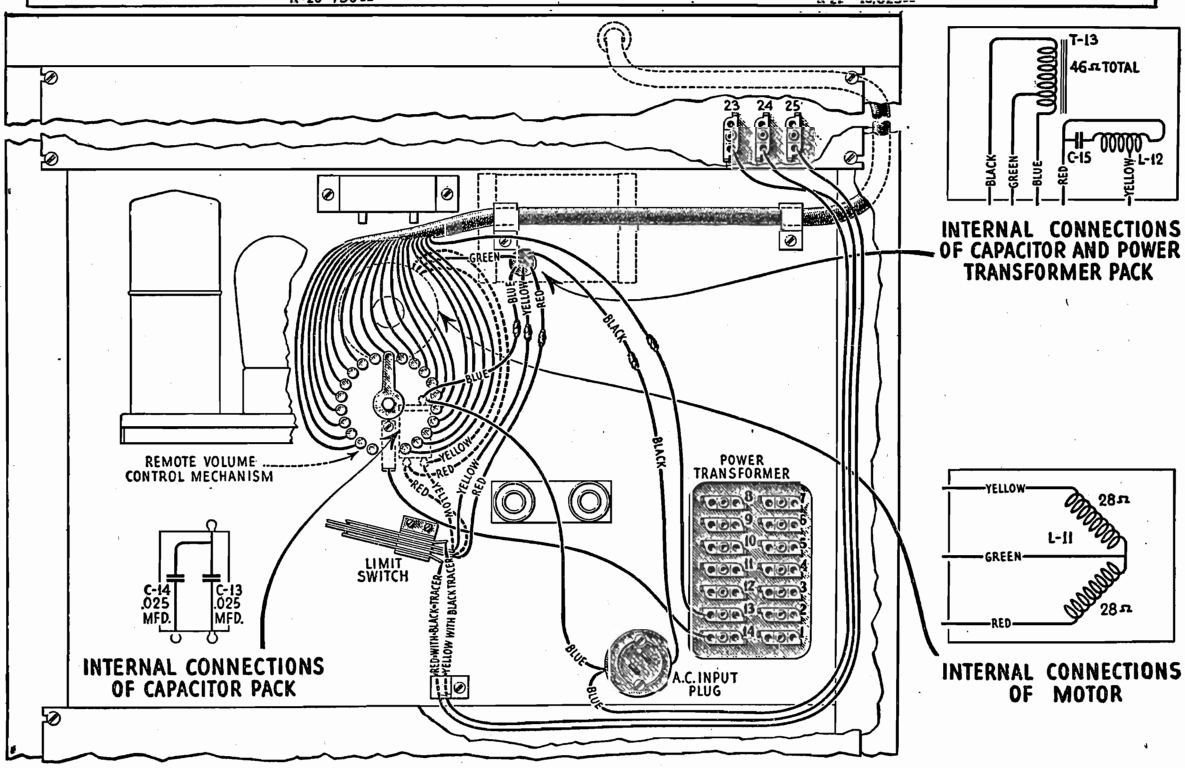


PG-31 Schematic Wiring Diagram

R. C. A. VICTOR CO., INC.

MODEL Photophone PG-30,31 Remote Volume Control Power Amplifier Chasses

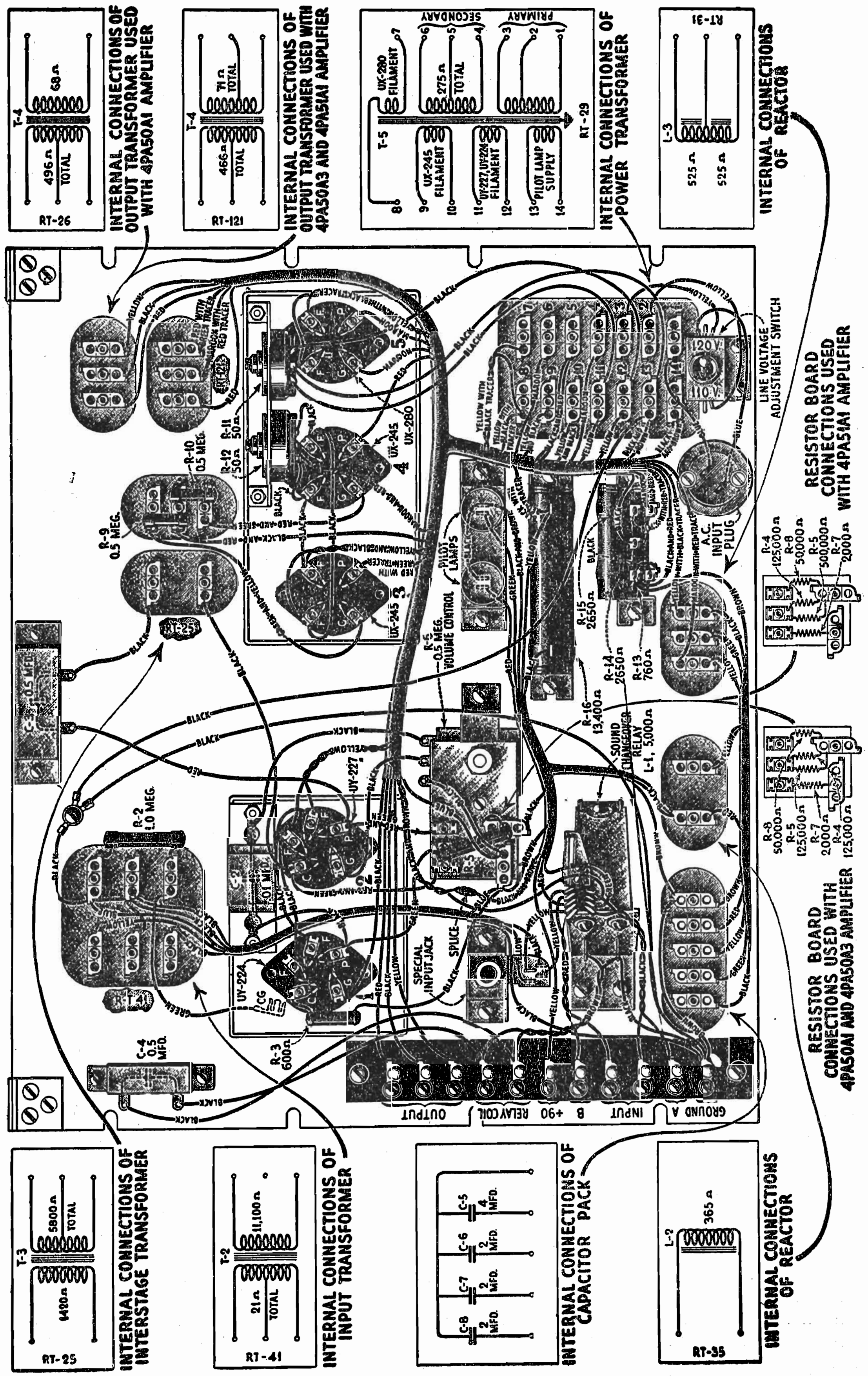




Wiring Diagram of Remote Volume Control Panel

R C. A. VICTOR CO., INC.

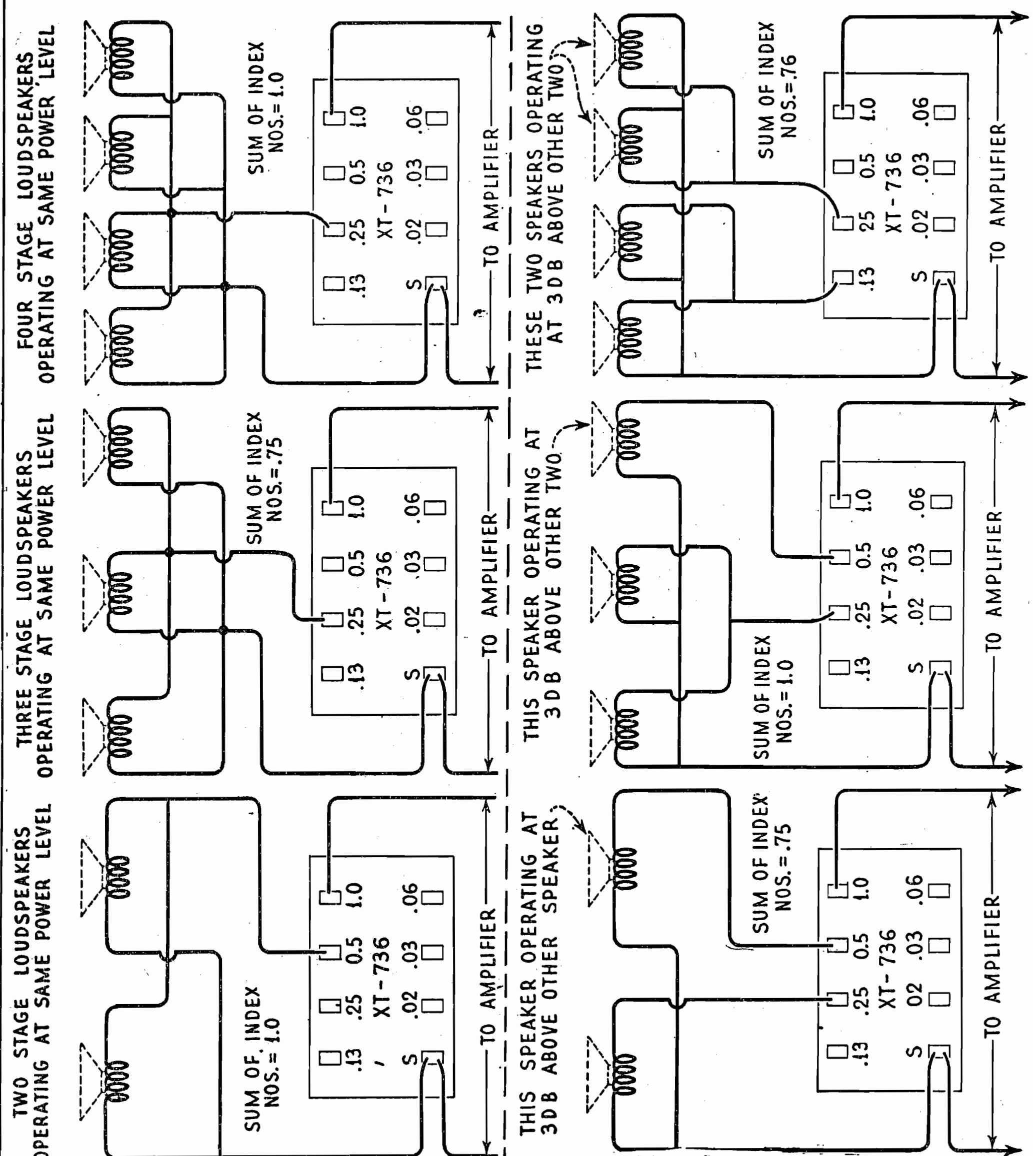
MODEL Photophone PG-30,31
Voltage Amplifier
Chassis



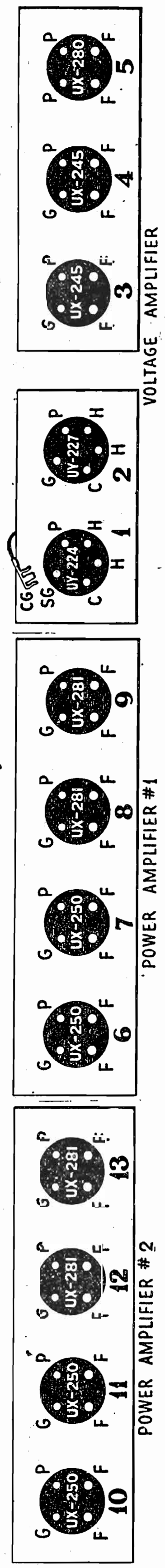
Wiring Diagram of Voltage Amplifier Panel

MODEL Photophone PG-30, PG-31
Voltage - Socket
Speaker Connections

R. C. A. VICTOR CO., INC.



Typical Connections to Coupling Transformer XT-736



Radiotron Socket Layout

RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line

VOLTAGE AMPLIFIER

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1—UY-224	0.6	30	175	1.0	2.25
2—UY-227	7.5	—	100	3.0	2.25
3—UX-245	48	—	230	33.0	2.5
4—UX-245	48	—	230	33.0	2.5
5—UX-280	—	—	—	45.0	5.0

POWER AMPLIFIER No. 1

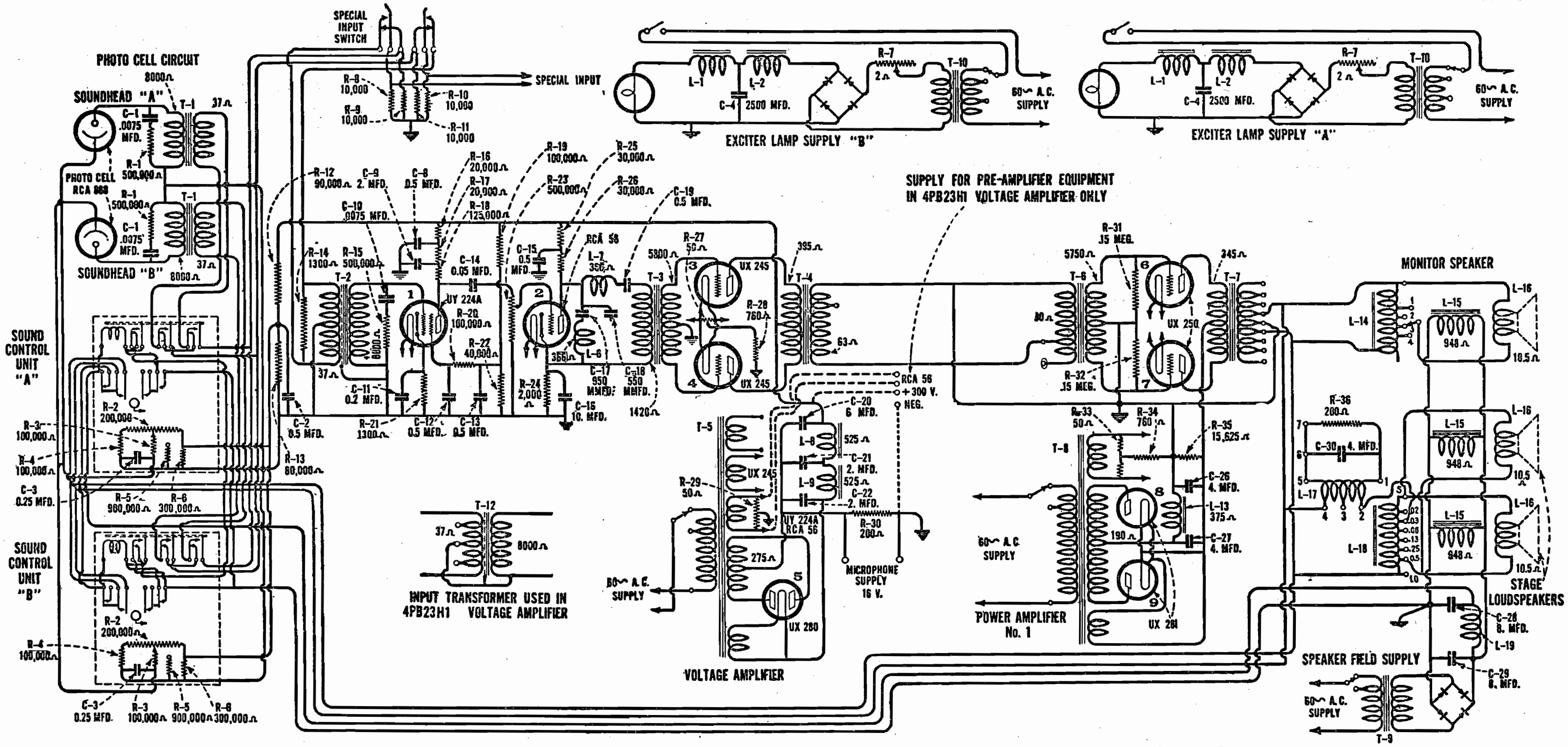
6—UX-250	80	—	450	55.0	7.5
7—UX-250	80	—	450	55.0	7.5
8—UX-281	—	—	—	75.0	7.5
9—UX-281	—	—	—	75.0	7.5

POWER AMPLIFIER No. 2—PG-31 ONLY

10—UX-250	80	—	450	55.0	7.5
11—UX-250	80	—	450	55.0	7.5
12—UX-281	—	—	—	75.0	7.5
13—UX-281	—	—	—	75.0	7.5

R. C. A. VICTOR CO., INC.

MODEL Photophone PG-30
High Fidelity
Schematic



RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line

VOLTAGE AMPLIFIER

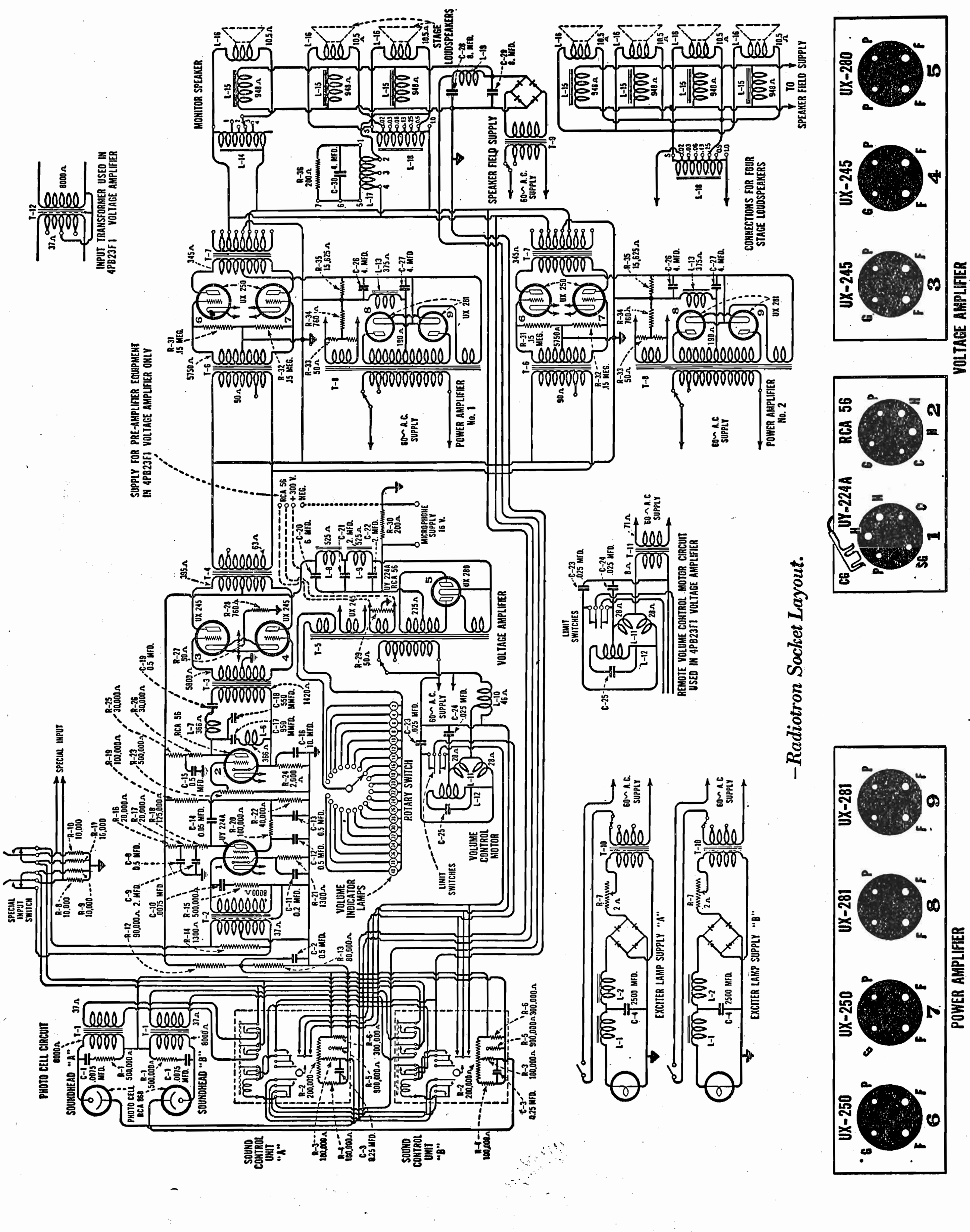
Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1. UY-224-A	1.3	45	185	.7	2.5
2. RCA-56	6.0	—	130	2.3	2.5
3. UX-245	48.0	—	250	30.0	2.5
4. UX-245	—	—	250	30.0	2.5
5. UX-280	—	—	—	50.0	5.0

POWER AMPLIFIER

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
6. UX-250	80	—	450	55.0	7.5
7. UX-250	80	—	450	55.0	7.5
8. UX-281	—	—	—	75.0	7.5
9. UX-281	—	—	—	75.0	7.5

MODEL Photophone PG-31
High Fidelity
Schematic

R. C. A. VICTOR CO., INC.



R.C.A. RADIOTRON CO.

Detectors Amplifiers

DETECTORS AND AMPLIFIERS

TYPE	PURPOSE	BASE	SOCKET CONNECTIONS	DIMENSIONS MAX. OVERALL LENGTH	DIMENSIONS MAX. OVERALL DIAM.	CATHODE TYPE	RATING FILAMENT (OR HEATER) VOLTS	RATING FILAMENT (OR HEATER) AMPERES	RATING FILAMENT (OR HEATER) SUPPLY	RATING PLATE MAX. VOLTS	RATING SCREEN MAX. VOLTS	PLATE SUPPLY VOLTS	NEGATIVE GRID BIAS VOLTS D C ON FIL.	NEGATIVE GRID BIAS VOLTS A C ON FIL.	SCREEN VOLTS	PLATE CURRENT MILLI-AMP.	SCREEN CURRENT MILLI-AMP.	A C PLATE RESISTANCE OHMS	MUTUAL CONDUCTANCE MICROMHOS	VOLTAGE AMPLIFICATION FACTOR	OHMS LOAD FOR STATED POWER OUTPUT	POWER OUTPUT MILLIWATTS
RCA-2A7	RADIO FREQ. CONVERTER×	SMALL 7-PIN	FIG. 20	4 17/32"	1 9/16"	HEATER	2.5	0.8	A C or D C	250	100	250	3.0	3.0	100	4.0	2.0	300000	Anode-Grid (#2) 250 Max. Volts, 3.5 Ma. Oscillator Grid (#1) Resistor, 50000 Ohms Conversion Conductance, 475 Micromhos			
RCA-2B7	DIODE-DETECTOR R-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 17/32"	1 9/16"	HEATER	2.5	0.8	A C or D C	250	125	100 250	3.0 3.0	3.0 3.0	100 125	5.8 9.0	1.7 2.3	300000 650000	950 1125	285 730	—	—
RCA-2B7	DIODE-DETECTOR A-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 17/32"	1 9/16"	HEATER	2.5	0.8	A C or D C	250	125	250✠	4.5	4.5	50	0.65	0.15	—	—	—	—	—
RCA-6A7	RADIO FREQ. CONVERTER×	SMALL 7-PIN	FIG. 20	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	100	250	3.0	3.0	100	4.0	2.0	300000	Anode-Grid (#2) 250 Max. Volts, 3.5 Ma. Oscillator Grid (#1) Resistor, 50000 Ohms Conversion Conductance, 475 Micromhos			
RCA-6B7	DIODE-DETECTOR R-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	125	100 250	3.0 3.0	3.0 3.0	100 125	5.8 9.0	1.7 2.3	300000 650000	950 1125	285 730	—	—
RCA-6B7	DIODE-DETECTOR A-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	125	250✠	4.5	4.5	50	0.65	0.15	—	—	—	—	—
UX-201-A	DETECTOR,* AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16"	1 13/16"	FILAMENT	5.0	0.25	D C	135	—	90 135	4.5 9.0	—	—	2.5 3.0	—	11000 10000	725 800	8.0 8.0	—	—
UX-112-A	DETECTOR,* AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16"	1 13/16"	FILAMENT	5.0	0.25	D C	180	—	90 135	4.5 9.0	—	—	5.0 6.2	—	5400 5100	1575 1650	8.5 8.5	—	—
RCA-22	RADIO FREQ. AMPLIFIER	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 13/16"	FILAMENT	3.3	0.132	D C	135	67.5	135 135	1.5 1.5	—	45 67.5	1.7 3.7	0.6* 1.3*	725000 325000	375 500	270 160	—	—
RCA-24-A	RADIO FREQ. AMPLIFIER	MEDIUM 5-PIN	FIG. 9	5 1/32"	1 13/16"	HEATER	2.5	1.75	A C or D C	275	90	180 250	3.0 3.0	3.0 3.0	90 90	4.0 4.0	1.7 max.	400000 600000	1000 1050	400 630	—	—
RCA-24-A	BIASED DETECTOR	MEDIUM 5-PIN	FIG. 9	5 1/32"	1 13/16"	HEATER	2.5	1.75	A C or D C	275	90	275‡	5 approx.	5 approx.	20 to 45	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA-26	AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16"	1 13/16"	FILAMENT	1.5	1.05	A C or D C	180	—	135 180	9.0 13.5	10.0 14.5	—	5.5 6.2	—	7600 7300	1100 1150	8.3 8.3	—	—
UY-227	AMPLIFIER	MEDIUM 5-PIN	FIG. 8	4 11/16"	1 13/16"	HEATER	2.5	1.75	A C or D C	275	—	135 250	9.0 21.0	9.0 21.0	—	4.5 5.2	—	9000 9250	1000 975	9.0 9.0	—	—
UY-227	BIASED* DETECTOR	MEDIUM 5-PIN	FIG. 8	4 11/16"	1 13/16"	HEATER	2.5	1.75	A C or D C	275	—	275§	33.0 approx.	33.0 approx.	—	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA-30	DETECTOR,* AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/4"	1 9/16"	FILAMENT	2.0	0.06	D C	180	—	90 135 180	4.5 9.0 13.5	—	—	2.5 3.0 3.1	—	11000 10300 10300	850 900 900	9.3 9.3 9.3	—	—
RCA-32	RADIO FREQ. AMPLIFIER	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 13/16"	FILAMENT	2.0	0.06	D C	180	67.5	135 180	3.0 3.0	—	67.5 67.5	1.7 1.7	0.4 max.	950000 1200000	640 650	610 780	—	—
RCA-32	BIASED DETECTOR	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 13/16"	FILAMENT	2.0	0.06	D C	180	67.5	180⌘	6 approx.	—	67.5	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA-34	SUPER-CONTROL R-F AMPLIFIER	MEDIUM 4-PIN	FIG. 4A	5 1/32"	1 13/16"	FILAMENT	2.0	0.06	D C	180	67.5	135 180	3.0 min.	—	67.5 67.5	2.8 2.8	1.0 1.0	600000 1000000	600 620	360 620	—	—
RCA-35	SUPER-CONTROL R-F AMPLIFIER	MEDIUM 5-PIN	FIG. 9	5 1/32"	1 13/16"	HEATER	2.5	1.75	A C or D C	275	90	180 250	3.0 min.	3.0 min.	90 90	6.3 6.5	2.5 max.	300000 400000	1020 1050	305 420	—	—
RCA-36	RADIO FREQ. AMPLIFIER	SMALL 5-PIN	FIG. 9	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	180	90	135 180	1.5 3.0	1.5 3.0	67.5 90	3.0 3.1	1.7 max.	300000 350000	1050 1050	315 370	—	—
RCA-36	BIASED DETECTOR	SMALL 5-PIN	FIG. 9	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	180	67.5	180‡	6.0 approx.	6.0 approx.	67.5	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA-37	AMPLIFIER	SMALL 5-PIN	FIG. 8	4 1/4"	1 9/16"	HEATER	6.3	0.3	A C or D C	180	—	90 135 180	6.0 9.0 13.5	6.0 9.0 13.5	—	2.6 4.3 4.7	—	11500 10000 10000	780 900 900	9.0 9.0 9.0	—	—
RCA-37	BIASED* DETECTOR	SMALL 5-PIN	FIG. 8	4 1/4"	1 9/16"	HEATER	6.3	0.3	A C or D C	180	—	90 180	10.0 20.0	10.0 20.0	—	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA-39	SUPER-CONTROL R-F AMPLIFIER	SMALL 5-PIN	FIG. 9A	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	180	90	90 135 180	3.0 3.0 3.0	3.0 3.0 3.0	90 90 90	4.4 4.4 4.5	1.3 1.2 1.2	375000 540000 750000	960 980 1000	360 530 750	—	—
RCA-44	SUPER-CONTROL R-F AMPLIFIER	SMALL 5-PIN	FIG. 9A	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	90	250	3.0 min.	3.0 min.	90	5.8	1.4	600000	1050	630	—	—
RCA-55	DIODE-DETECTOR AMPLIFIER■	SMALL 6-PIN	FIG. 13	4 17/32"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	—	250	20	20	—	8.0	—	7500	1100	8.3	20000	350
RCA-56	AMPLIFIER	SMALL 5-PIN	FIG. 8	4 1/4"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	—	250	13.5	13.5	—	5.0	—	9500	1450	13.8	—	—
RCA-56	BIASED* DETECTOR	SMALL 5-PIN	FIG. 8	4 1/4"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	—	250§	20 approx.	20 approx.	—	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA-57	RADIO FREQ. AMPLIFIER	SMALL 6-PIN	FIG. 11	4 15/16"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	100	250	3.0	3.0	100	2.0	0.5	exceeds 1.5 meg.	1225	exceeds 1500	—	—
RCA-57	BIASED DETECTOR	SMALL 6-PIN	FIG. 11	4 15/16"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	100	275‡	6.0 approx.	6.0 approx.	100		Plate current to be adjusted to 0.1 milliampere with no signal.					
RCA-58	SUPER-CONTROL R-F AMPLIFIER	SMALL 6-PIN	FIG. 11	4 15/16"	1 9/16"	HEATER	2.5	1.0	A C or D C	250	100	250	3.0 min.	3.0 min.	100	8.2	2.0	800000	1600	1280	—	—
RCA-75	DIODE-DETECTOR AMPLIFIER■	SMALL 6-PIN	FIG. 13	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	—	250⌘	2.0	2.0	—	0.8	—	91000	1100	100	—	—
RCA-77	RADIO FREQ. AMPLIFIER	SMALL 6-PIN	FIG. 11	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	100	250	3.0	3.0	100	2.3	0.6	1500000	1250	1500	—	—
RCA-77	BIASED DETECTOR	SMALL 6-PIN	FIG. 11	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250‡	100	250	7.0 approx.	7.0 approx.	100	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA-78	SUPER-CONTROL R-F AMPLIFIER	SMALL 6-PIN	FIG. 11	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	100	180 250 250	3.0 min.	3.0 min.	75 100 125	4.0 7.0 10.5	1.1 2.0 3.0	1000000 800000 600000	1100 1450 1650	1100 1160 990	—	—
RCA-85	DIODE-DETECTOR AMPLIFIER■	SMALL 6-PIN	FIG. 13	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	250	—	135 180 250	10.5 13.5 20.0	10.5 13.5 20.0	—	3.7 6.0 8.0	—	11000 8500 7500	750 975 1100	8.3 8.3 8.3	25000 20000 20000	75 160 350
UV-199 UX-199	DETECTOR,* AMPLIFIER	SMALL 4-NUB SMALL 4-PIN	FIG. 10 FIG. 1	3 1/4" 4 1/8"	1 1/16" 1 3/16"	FILAMENT	3.3	0.063	D C	90	—	90	4.5	—	—	2.5	—	15500	425	6.6	—	—
RCA-864	AMPLIFIER	SMALL 4-PIN	FIG. 1	4"	1 3/16"	FILAMENT	1.1	0.25	D C	135	—	135	9.0	—	—	3.5	—	12700	645	8.2	—	—

*For Grid-leak Detection—plate volts 45, grid return to + filament or to cathode.
†Applied through plate coupling resistor of 250000 ohms.
×Grids #3 and #5 are screen. Grid #4 is signal-input control-grid.
*Maximum.
§Applied through plate coupling resistor of 50000 ohms.
⌘Applied through plate coupling resistor of 100000 ohms.
☒Characteristics are for Pentode Unit only.
‡Applied through plate coupling resistor of 250000 ohms or 500 henry choke shunted by 0.25 megohm resistor.
■Characteristics are for Triode Unit only.
✠Applied through plate coupling resistor of 200,000 ohms.

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

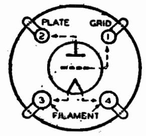


FIG. 1

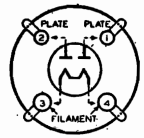


FIG. 2

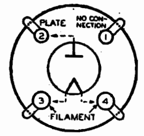


FIG. 3

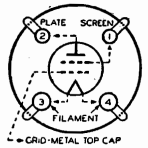


FIG. 4

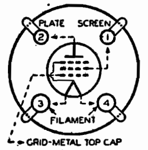


FIG. 4A

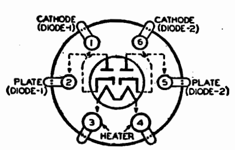


FIG. 5

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

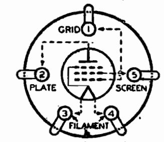


FIG. 6

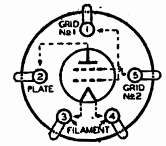


FIG. 7

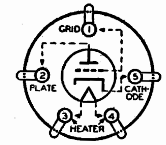


FIG. 8

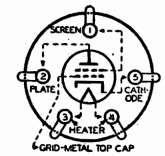


FIG. 9

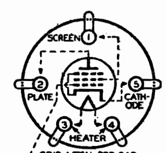


FIG. 9A

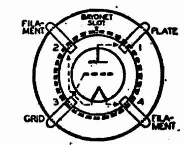


FIG. 10

Power Amplifiers
Rectifiers
Photo Tubes

R.C.A. RADIOTRON CO.

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

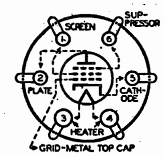


FIG.11

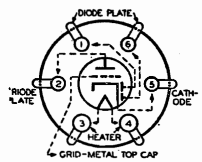


FIG.13

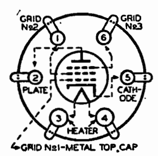


FIG.14

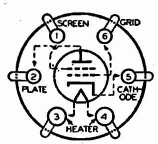


FIG.15

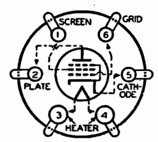


FIG.15A

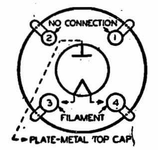


FIG.16

POWER AMPLIFIERS

TYPE	PURPOSE	BASE	SOCKET CONNEC-TIONS	DIMENSIONS MAX. OVERALL: LENGTH	DIMENSIONS MAX. OVERALL: DIAM.	CATHODE TYPE	RATING: FILAMENT (OR HEATER) VOLTS	RATING: FILAMENT (OR HEATER) AMPERES	RATING: FILAMENT (OR HEATER) SUPPLY	RATING: PLATE MAX. VOLTS	RATING: SCREEN MAX. VOLTS	PLATE SUP-PLY VOLTS	NEGATIVE GRID BIAS VOLTS: D C ON FIL.	NEGATIVE GRID BIAS VOLTS: A C ON FIL.	SCREEN VOLTS	PLATE CUR-RENT MILLI-AMP.	SCREEN CUR-RENT MILLI-AMP.	A C PLATE RESIS-TANCE OHMS	MUTUAL CON-DUC-TANCE MICRO-MHOS	VOLTAGE AMPLIFI-CATION FACTOR	OHMS LOAD FOR STATED POWER OUTPUT	POWER OUT-PUT MILLI-WATTS
RCA-2A3	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 3/8"	2 1/16"	FILAMENT	2.5	2.5	A C or D C	250	—	250	43.0	45.0	—	60.0	—	800	5200	4.2	2500	3500
RCA-2A5	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	2.5	1.75	A C or D C	250	250	250	16.5	16.5	250	34.0	6.5	100000	2200	220	7000	3000
RCA- 10	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 5/8"	2 3/16"	FILAMENT	7.5	1.25	A C or D C	425	—	350 425	27.0 35.0	31.0 39.0	—	16.0 18.0	—	5150 5000	1550 1660	8.0 8.0	11000 10200	900 1600
UX - 20	POWER AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/8"	1 3/16"	FILAMENT	3.3	0.132	D C	135	—	90 135	16.5 22.5	—	—	3.0 6.5	—	8000 6300	415 525	3.3 3.3	9600 6500	45 110
RCA- 31	POWER AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/4"	1 9/16"	FILAMENT	2.0	0.130	D C	180	—	135 180	22.5 30.0	—	—	8.0 12.3	—	4100 3600	925 1050	3.8 3.8	7000 5700	185 375
RCA- 33	POWER AMPLIFIER	MEDIUM 5-PIN	FIG. 6	4 11/16"	1 13/16"	FILAMENT	2.0	0.26	D C	135	135	135	13.5	—	135	14.5	3.0	50000	1450	70	7000	700
RCA- 38	POWER AMPLIFIER	SMALL 5-PIN	FIG. 9A	4 17/32"	1 9/16"	HEATER	6.3	0.3	A C or D C	135	135	100 135	9.0 13.5	9.0 13.5	100 135	7.0 9.0	2.0 2.5	84000 102000	950 975	80 100	8500 13500	200 525
RCA- 41	POWER AMPLIFIER	SMALL 6-PIN	FIG. 15A	4 1/4"	1 9/16"	HEATER	6.3	0.4	A C or D C	180	180	125.0 167.5	10.0 12.5	10.0 12.5	125.0 167.5	11.0 17.0	2.0 3.0	100000 85000	1525 1800	150 150	11000 9500	650 1250
RCA- 42	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	6.3	0.7	A C or D C	250	250	250	16.5	16.5	250	34.0	6.5	100000	2200	220	7000	3000
RCA- 43	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	25.0	0.3	A C or D C	135	135	95 135	15.0 20.0	15.0 20.0	95 135	20.0 34.0	4.0 7.0	45000 35000	2000 2300	90 80	4500 4000	900 2000
RCA- 45	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 5/8"	2 3/16"	FILAMENT	2.5	1.5	A C or D C	275	—	180 250	30.0 48.5	31.5 50.0	—	31.0 34.0	—	1650 1610	2125 2175	3.5 3.5	2700 3900	825 1600
RCA- 46	POWER AMPLIFIER CLASS A ⊙	MEDIUM 5-PIN	FIG. 7	5 5/8"	2 3/16"	FILAMENT	2.5	1.75	A C or D C	250	—	250	31.5	33.0	—	22.0	—	2380	2350	5.6	6400	1250
RCA- 46	POWER AMPLIFIER CLASS B ●	MEDIUM 5-PIN	FIG. 7	5 5/8"	2 3/16"	FILAMENT	2.5	1.75	A C or D C	400	—	300 400	0 0	0 0	Power output values are for 2 tubes operating at indicated plate-to-plate load. For other characteristics, refer to Manual text.						5200 5800	16000 20000
RCA- 47	POWER AMPLIFIER	MEDIUM 5-PIN	FIG. 6	5 5/8"	2 3/16"	FILAMENT	2.5	1.75	A C or D C	250	250	250	15.0	16.5	250	31.0	6.0	60000	2500	150	7000	2700
RCA- 48	POWER AMPLIFIER TETRODE	MEDIUM 6-PIN	FIG. 15	5 3/8"	2 1/16"	HEATER	30.0	0.4	D C	125	100	95 125	20.0 22.5	—	95 100	47.0 50.0	9.0 9.0	10000 10000	2800 2800	28 28	2000 2000	1600 2500
RCA- 49	POWER AMPLIFIER CLASS A ⊙	MEDIUM 5-PIN	FIG. 7	4 11/16"	1 13/16"	FILAMENT	2.0	0.12	D C	135	—	135	20.0	—	—	5.7	—	4000	1125	4.5	6000	170
RCA- 49	POWER AMPLIFIER CLASS B ●	MEDIUM 5-PIN	FIG. 7	4 11/16"	1 13/16"	FILAMENT	2.0	0.12	D C	180	—	180	0	—	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						12000	3500
UX - 50	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	6 1/4"	2 11/16"	FILAMENT	7.5	1.25	A C or D C	450	—	350 450	59.0 80.0	63.0 84.0	—	45.0 55.0	—	1900 1800	2000 2100	3.8 3.8	4100 4350	2400 4600
RCA- 59	POWER AMPLIFIER TRIODE ¶	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	250	—	250	28.0	28.0	—	26.0	—	2400	2600	6.0	5000	1250
RCA- 59	POWER AMPLIFIER PENTODE ◒	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	250	250	250	18.0	18.0	250	35.0	9.0	40000	2500	100	6000	3000
RCA- 59	POWER AMPLIFIER CLASS B ⊕	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	400	—	300 400	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						4600 6000	15000 20000
RCA- 71-A	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16"	1 13/16"	FILAMENT	5.0	0.25	A C or D C	180	—	135 180	27.0 40.5	29.5 43.0	—	17.3 20.0	—	1820 1750	1650 1700	3.0 3.0	3000 4800	400 790
RCA- 79	TWIN AMPLIFIER CLASS B	SMALL 6-PIN	FIG. 19	4 17/32"	1 9/16"	HEATER	6.3	0.6	A C or D C	180	—	180	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						7000	5500
RCA- 89	POWER AMPLIFIER TRIODE ¶	SMALL 6-PIN	FIG. 14	4 17/32"	1 9/16"	HEATER	6.3	0.4	A C or D C	180	—	160 180	20.0 22.5	20.0 22.5	—	17.0 20.0	—	3000 2750	1570 1700	4.7 4.7	7000 6500	300 400
RCA- 89	POWER AMPLIFIER PENTODE ◒	SMALL 6-PIN	FIG. 14	4 17/32"	1 9/16"	HEATER	6.3	0.4	A C or D C	180	180	163 180	17.0 18.0	17.0 18.0	163 180	17.0 20.0	2.5 3.0	79000 82500	1575 1635	125 135	9000 8000	1250 1500
RCA- 89	POWER AMPLIFIER CLASS B ⊕	SMALL 6-PIN	FIG. 14	4 17/32"	1 9/16"	HEATER	6.3	0.4	A C or D C	180	—	180	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						13600 9400	2500 3500

● Two grids tied together. ⊙ Grid next to plate tied to plate.
◒ Grid #1 is control grid. Grid #2 is screen. Grid #3 tied to cathode.
¶ Grid #1 is control grid. Grids #2 and #3 tied to plate.
⊕ Grids #1 and #2 connected together. Grid #3 tied to plate.

RECTIFIERS

TYPE	PURPOSE	BASE	SOCKET CONNEC-TIONS	LENGTH	DIAM.	CATHODE TYPE	VOLTS	AMPERES	SUPPLY	
RCA-5Z3	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8"	2 1/16"	FILAMENT	5.0	3.0	A C	Maximum A-C Voltage per Plate....500 Volts, RMS Maximum D-C Output Current....250 Milliamperes
RCA-25Z5	FULL-WAVE RECTIFIER	SMALL 6-PIN	FIG. 5	4 1/4"	1 9/16"	HEATER	25.0	0.3	A C or D C	Maximum A-C Voltage per Plate....125 Volts, RMS Maximum D-C Output Current....100 Milliamperes
RCA- 1	HALF-WAVE ◆ RECTIFIER	SMALL 4-PIN	FIG. 22	4 1/4"	1 9/16"	HEATER	6.3	0.3	A C or D C	Maximum A-C Voltage per Plate....350 Volts, RMS Maximum D-C Output Current, Continuous.... 50 Milliamperes Maximum Peak Inverse Voltage..1000 Volts Maximum Peak Plate Current.... 400 Milliamperes
RCA- 80	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 5/8"	2 3/16"	FILAMENT	5.0	2.0	A C	A-C Voltage per Plate (Volts RMS).... 350 400 550 D-C Output Current (Maximum MA.).... 125 110 135 The 550 volt rating applies to filter circuits having an input choke of at least 20 henries.
UX - 81	HALF-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 3	6 1/4"	2 7/16"	FILAMENT	7.5	1.25	A C	Maximum A-C Plate Voltage....700 Volts, RMS Maximum D-C Output Current.... 85 Milliamperes For d-c output voltage delivered to filter of typical rectifier circuit refer to curves in Manual.
RCA- 82	FULL-WAVE ◆ RECTIFIER	MEDIUM 4-PIN	FIG. 2	4 11/16"	1 13/16"	FILAMENT	2.5	3.0	A C	Maximum A-C Voltage per Plate....500 Volts, RMS Maximum D-C Output Current, Continuous....125 Milliamperes Maximum Peak Inverse Voltage....1400 Volts Maximum Peak Plate Current.... 400 Milliamperes
RCA- 83	FULL-WAVE ◆ RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8"	2 1/16"	FILAMENT	5.0	3.0	A C	Maximum A-C Voltage Per Plate....500 Volts, RMS Maximum D-C Output Current, Continuous....250 Milliamperes Maximum Peak Inverse Voltage....1400 Volts Maximum Peak Plate Current....800 Milliamperes
RCA- 84	FULL-WAVE RECTIFIER	SMALL 5-PIN	FIG. 23	4 1/4"	1 9/16"	HEATER	6.3	0.5	A C or D C	Maximum A-C Voltage per Plate....350 Volts, RMS Maximum D-C Output Current.... 50 Milliamperes
RCA-866	HALF-WAVE ◆ RECTIFIER	MEDIUM 4-PIN	FIG. 16	6 5/8"	2 7/16"	FILAMENT	2.5	5.0	A C	Maximum Peak Inverse Voltage....7500 Volts Maximum Peak Plate Current.... 0.6 Ampere For additional information refer to Technical Bulletin.

◆ Mercury Vapor Type. Tube Voltage drop is 15 volts, approx.

PHOTOTUBES

TYPE	PURPOSE	BASE	SOCKET CONNEC-TIONS	LENGTH	DIAM.	
RCA-868	PHOTOTUBE	SMALL 4-PIN	FIG. 1 See Note→	4 1/8"	1 3/16"	Max. Anode Supply Voltage....90 Volts. Max. Anode Current....20 Microamperes. Static Sensivity....55 Microamperes per Lumen. Dynamic Sensitivity....50 and 48 Microamperes per Lumen at 1000 and 5000 Cycles per second, Respectively. Note: Pins #1 and #3—No Connection, Pin #2—Anode (+), Pin #4—Cathode (−). Refer to FIG. 1 for Pin Numbers.

The first digits of many type numbers have been dropped. These types are identified now by the last two digits only.

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

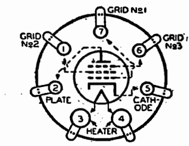


FIG.18

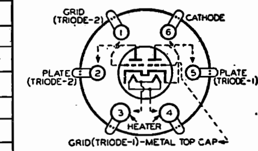


FIG.19

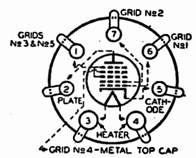


FIG.20

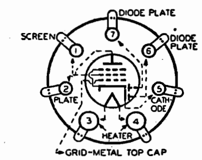


FIG.21

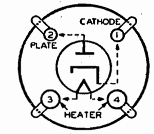


FIG.22

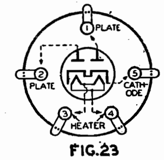


FIG.23

MODEL R-5 DC

R. C. A. VICTOR CO., INC.

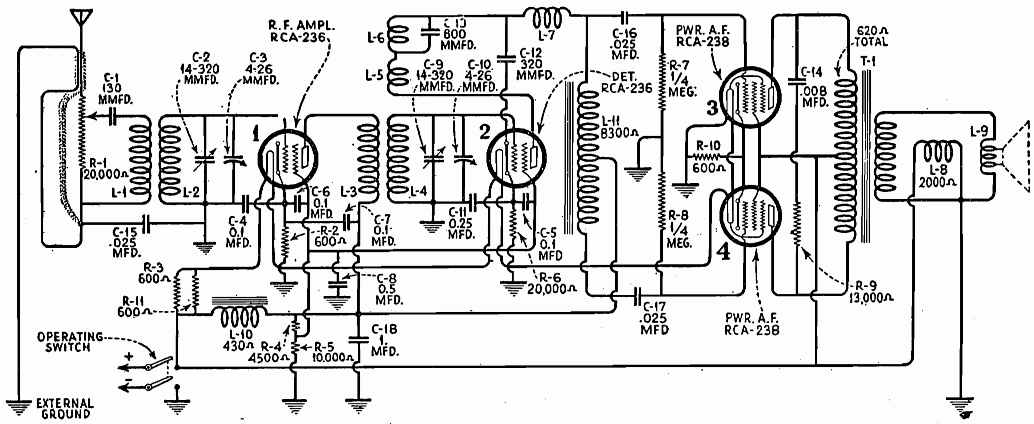


Figure 1—Schematic Circuit Diagram

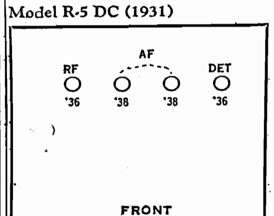
RADIOTRON SOCKET VOLTAGE

110 VOLT D. C. LINE

These readings are obtained with the usual set analyzers and are not true readings of the voltage at which the Radiotrons operate.

Radiotron No.	Cathode to to Control Grid Volts	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
1	1.5	62	98	2.0	6.0
2	3.2	54	92	0.2	6.0
3	0.3	99	95	5.5	6.0
4	0.3	99	95	5.5	6.0

Model R-5 DC (1931)



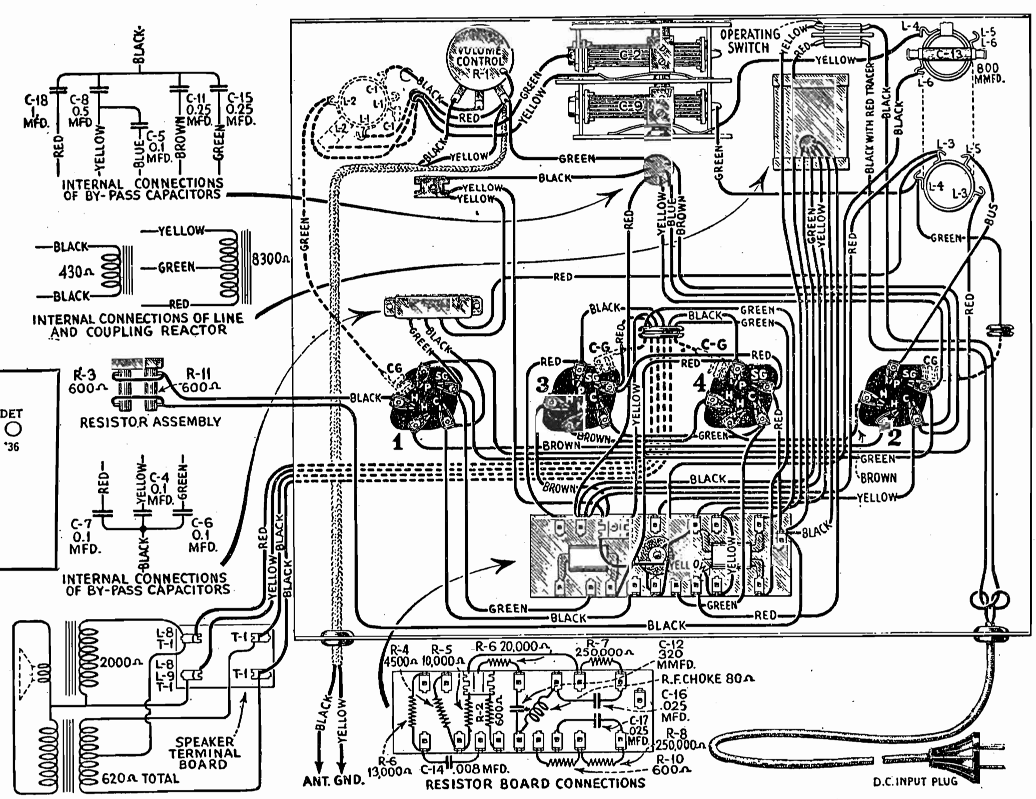
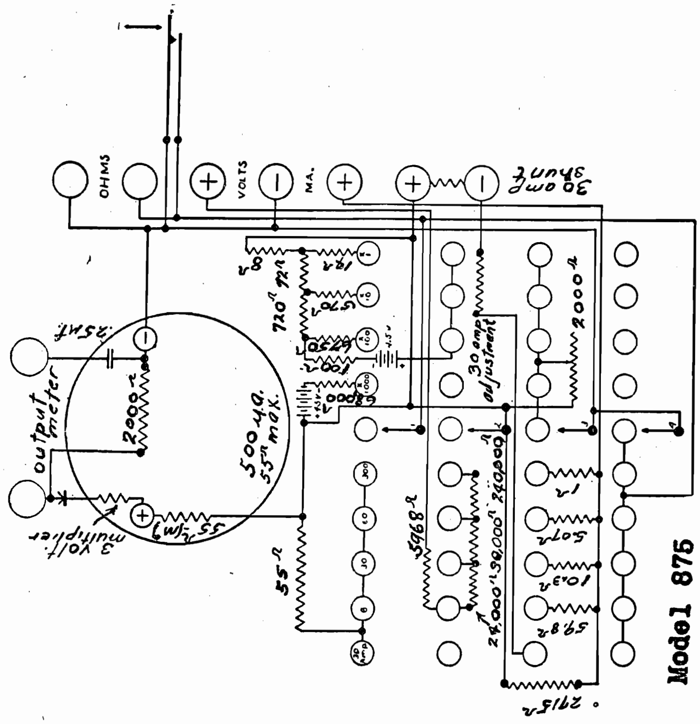


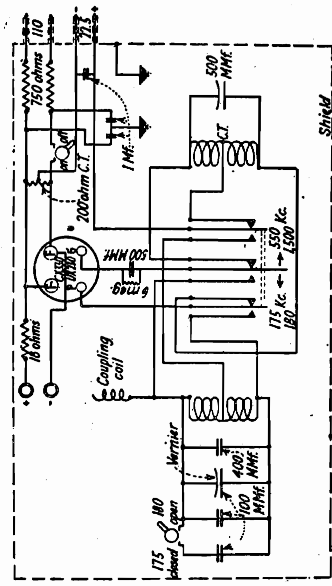
Figure 2—Wiring Diagram

RADIO PRODUCTS CO.

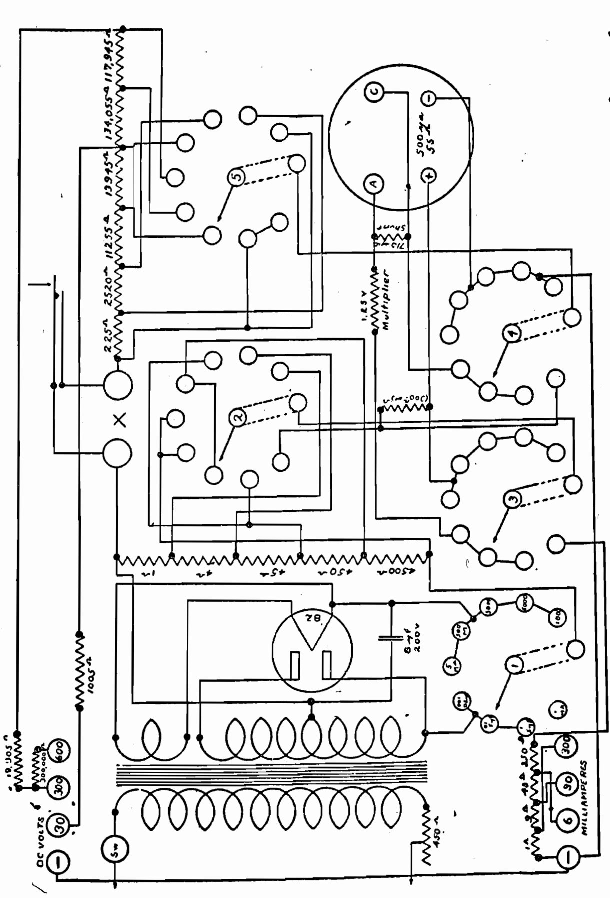
MODEL Dayrad 180
MODEL Dayrad HR
MODEL Dayrad 870
MODEL Dayrad 875



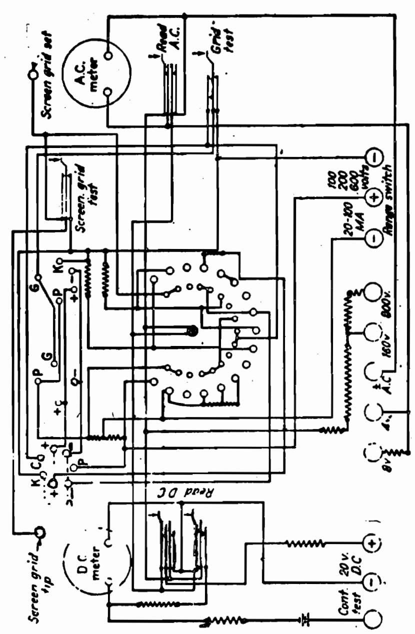
Model 875



DayRad (Type 180)



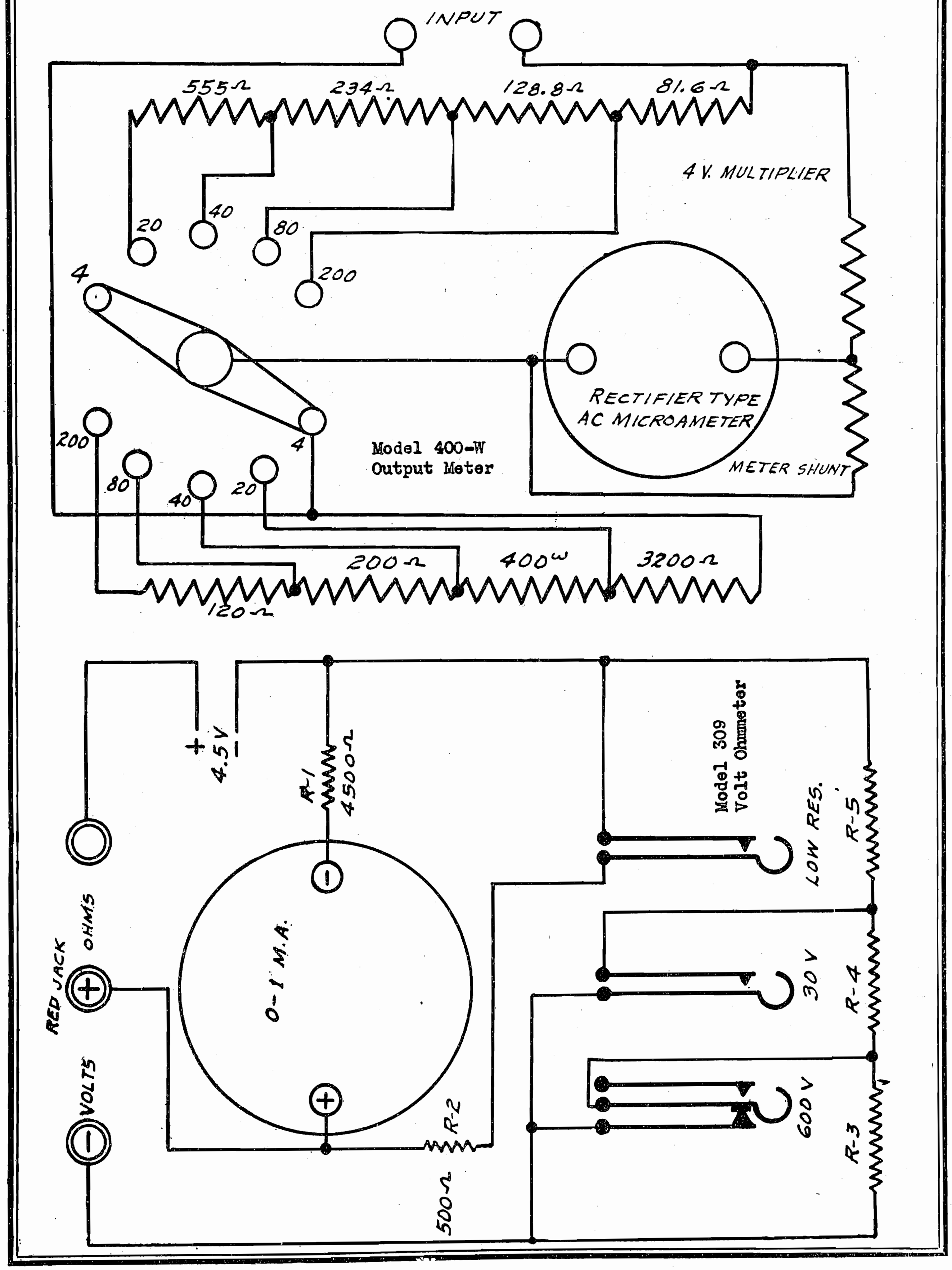
Schematic diagram of the Dayrad Type 870 Test Meter, which operates from the 110-volt, 60-cycle line. All values are given



Dayrad HR

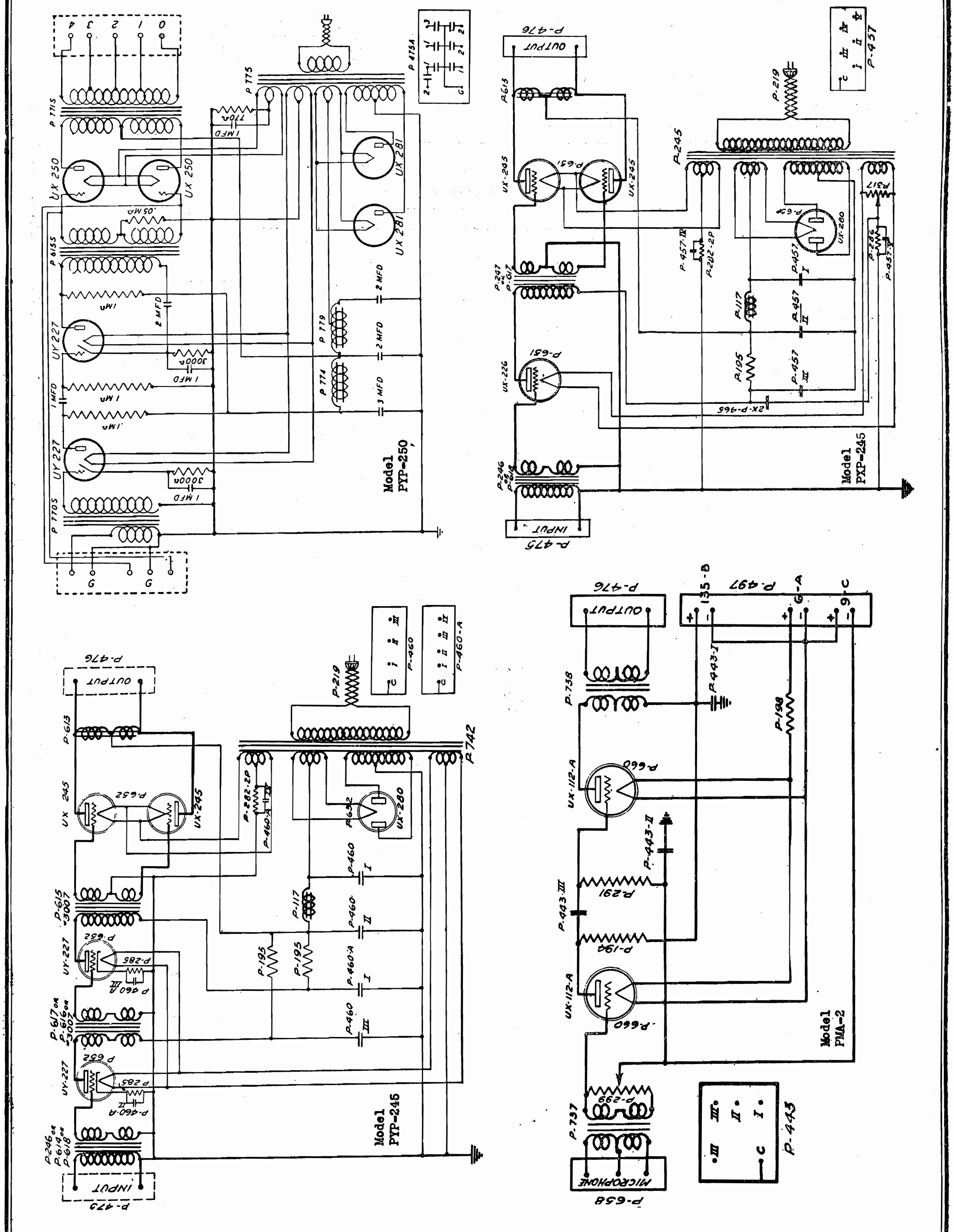
MODEL Dayrad 309
Volt-Ohmmeter
MODEL Dayrad 400-W
Output Meter

RADIO PRODUCTS CO.



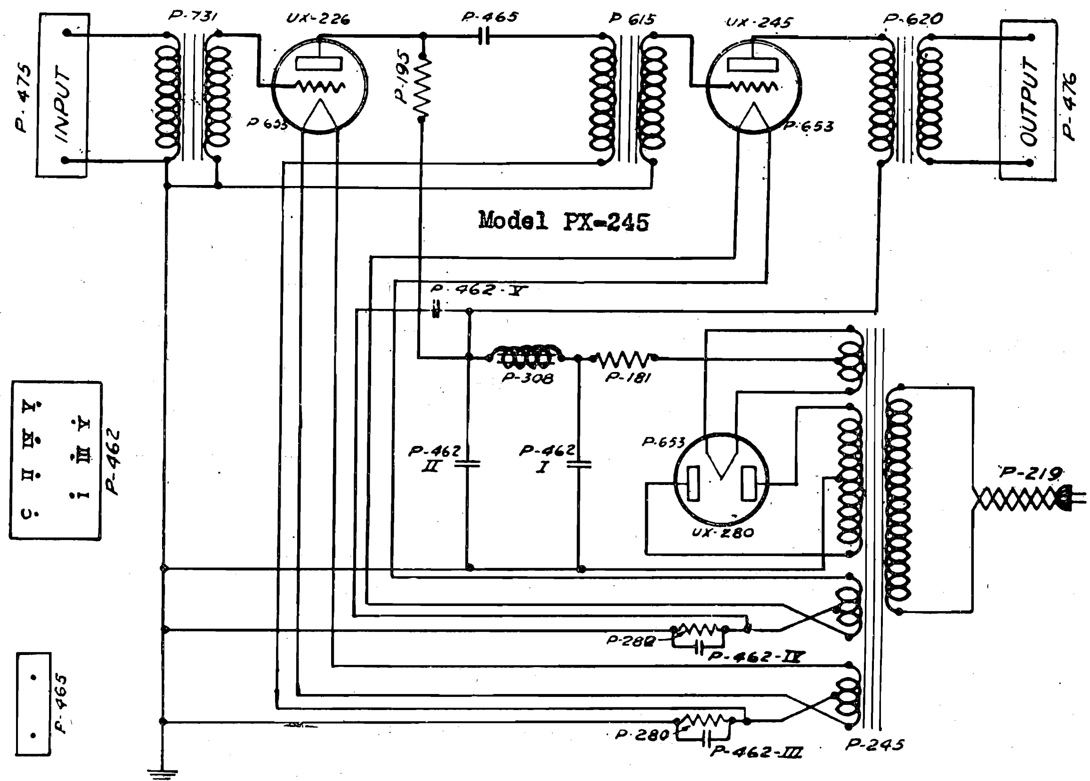
RADIO RECEPTOR CO.

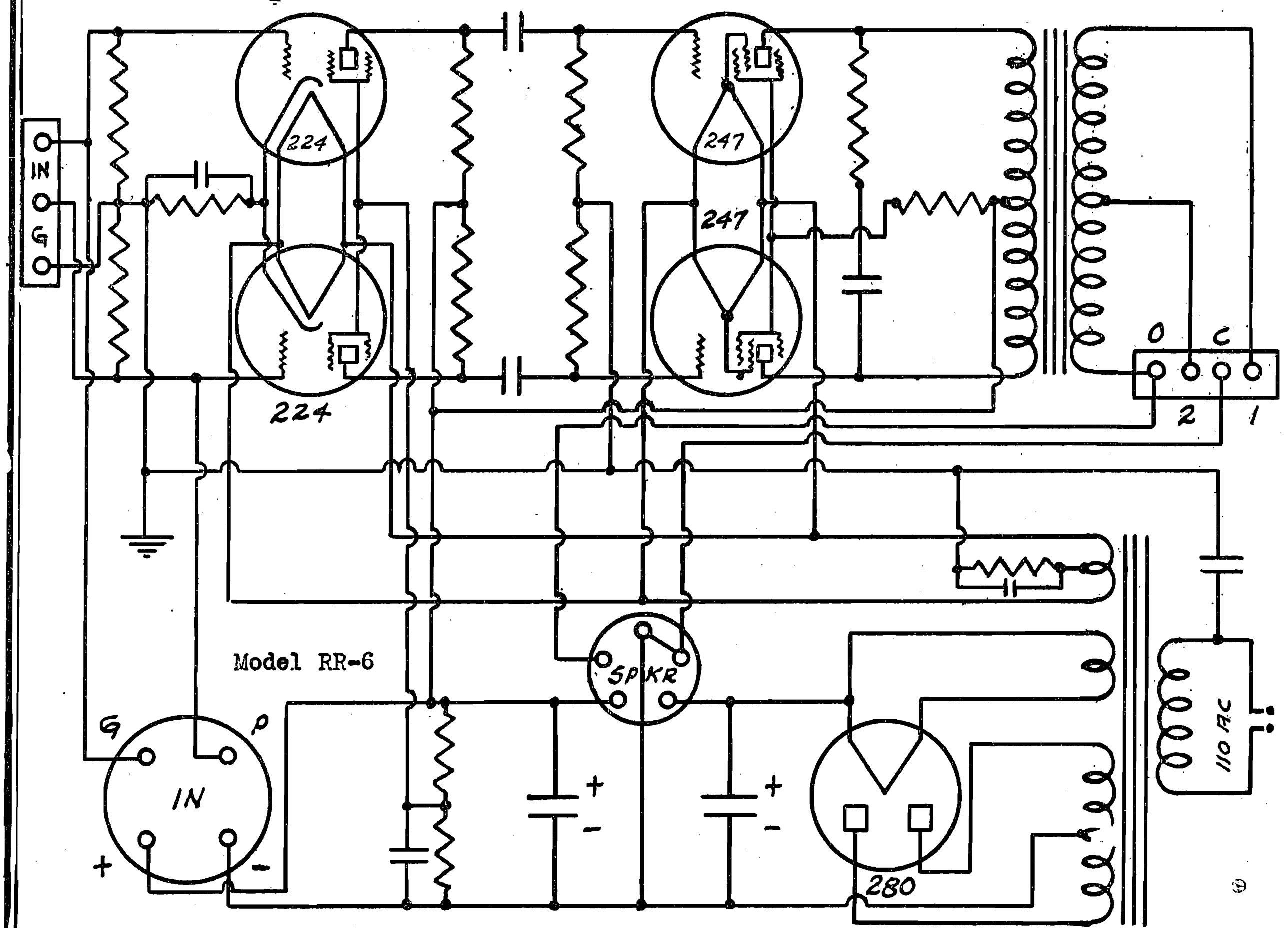
MODEL PMA-2
MODEL PYP-245
MODEL PYP-250
MODEL PXP-245



MODEL RR-6
MODEL PX-245

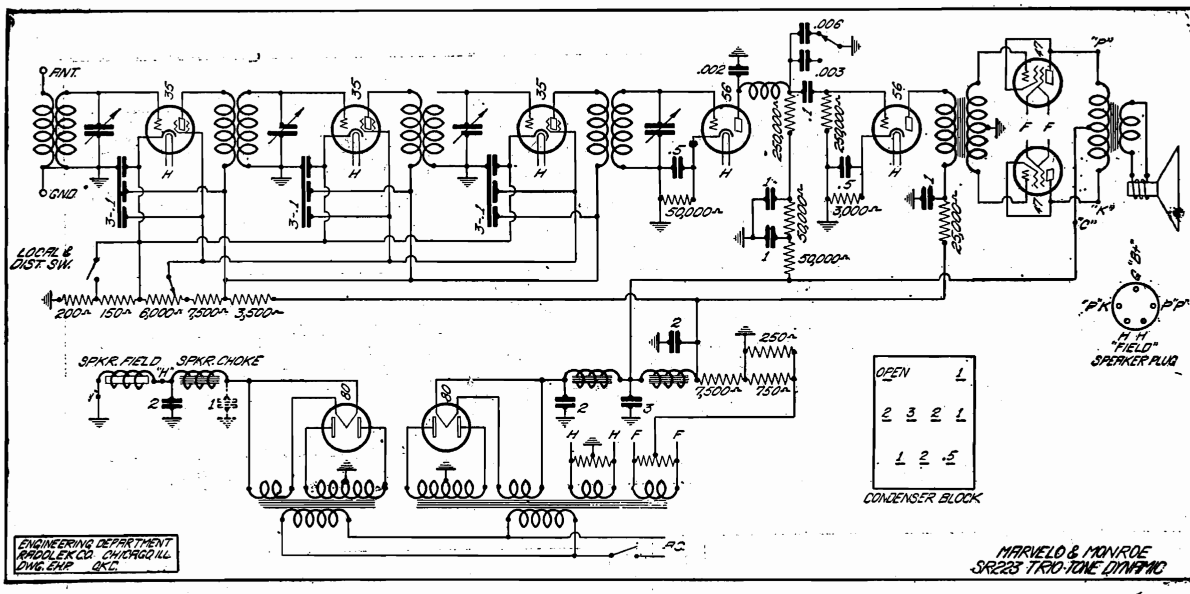
RADIO RECEPTOR CO.

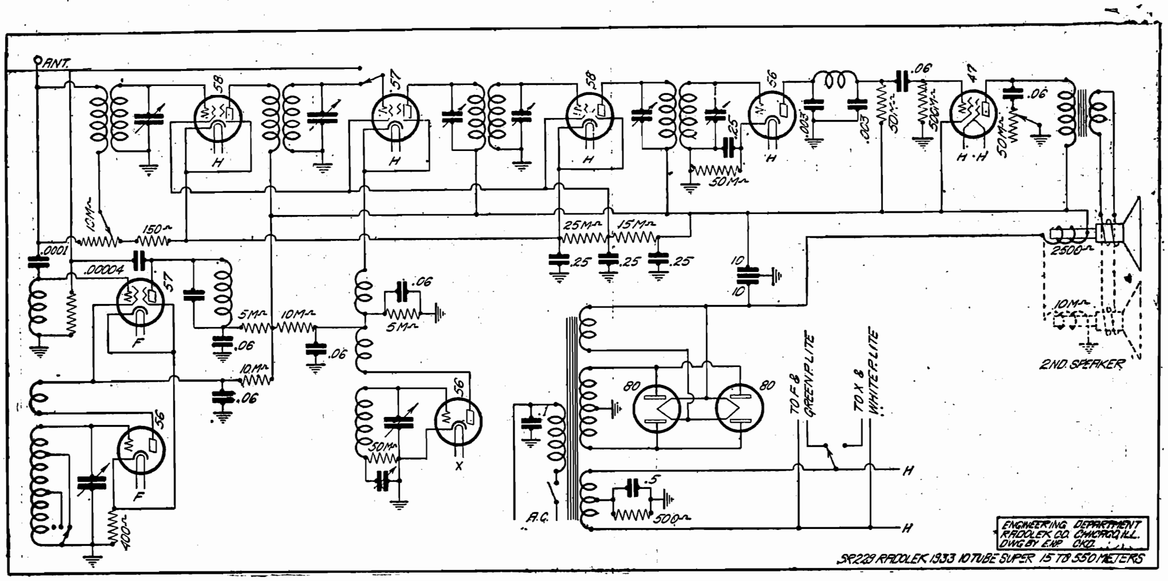


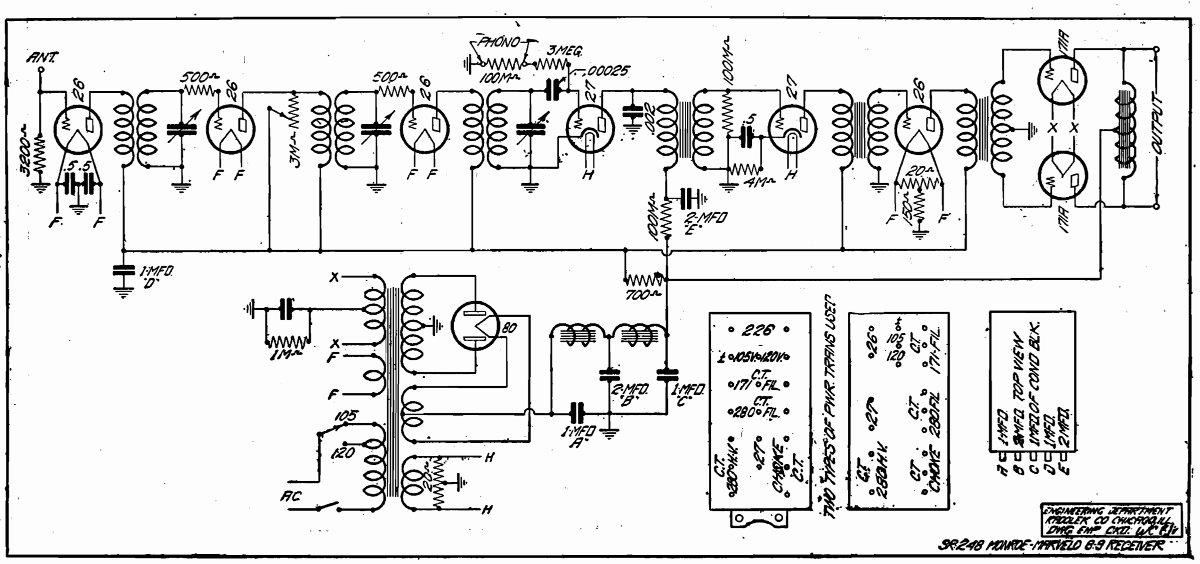


RAD OLEK

MODEL Monroe-Marvelo Trio-Tone
MODEL Radolek 10 Tube Super
MODEL Monroe-Marvelo 8-9

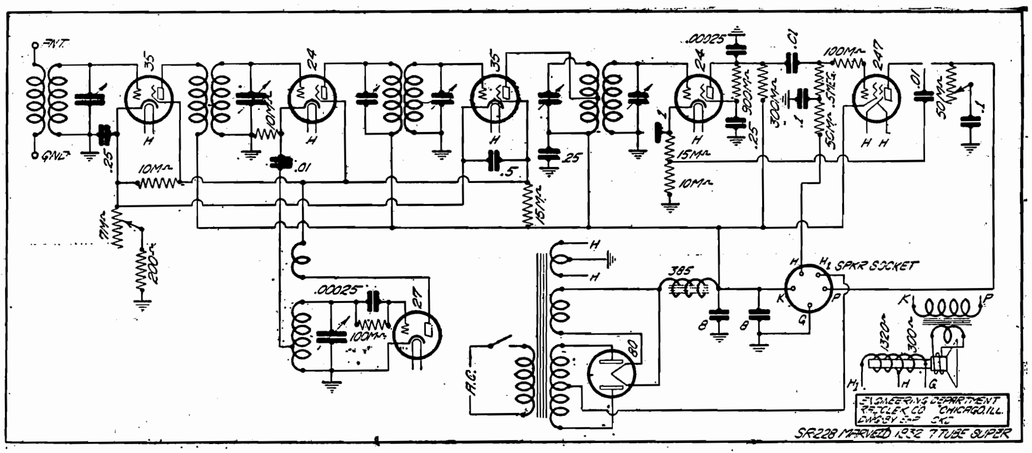


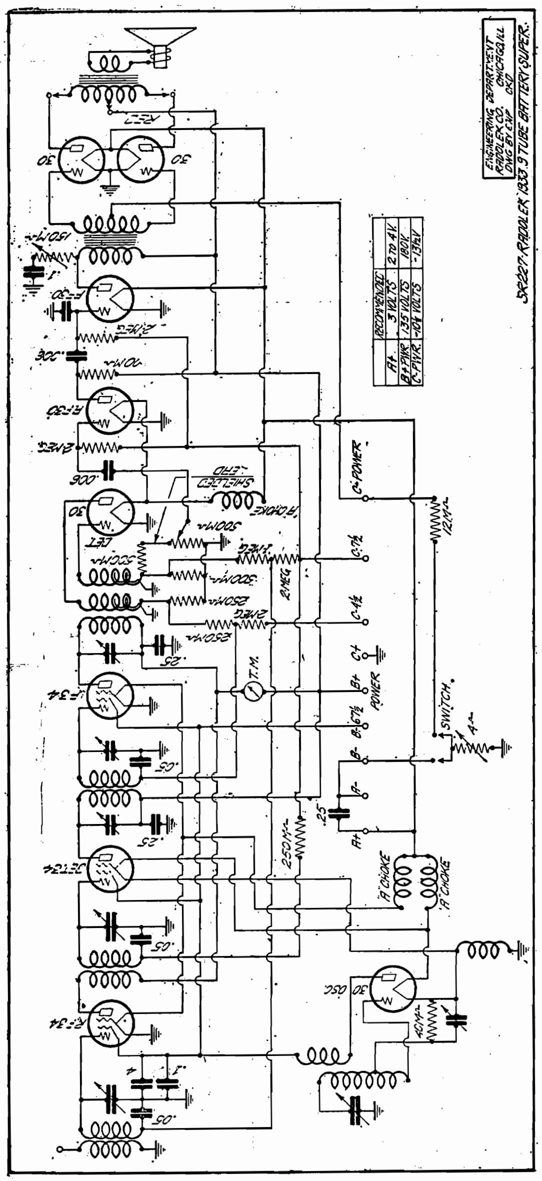


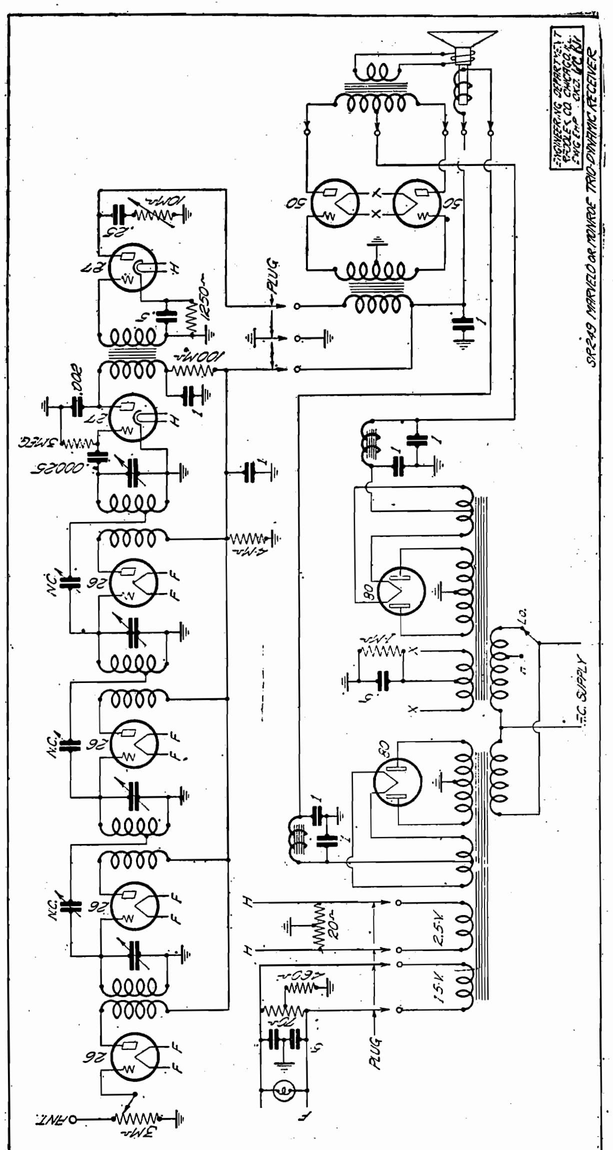


MODEL Marvelo 7 Tube Super
MODEL 9 Tube Battery Super
MODEL Marvelo-Monroe Trio-Dynamic

RAD OLEK

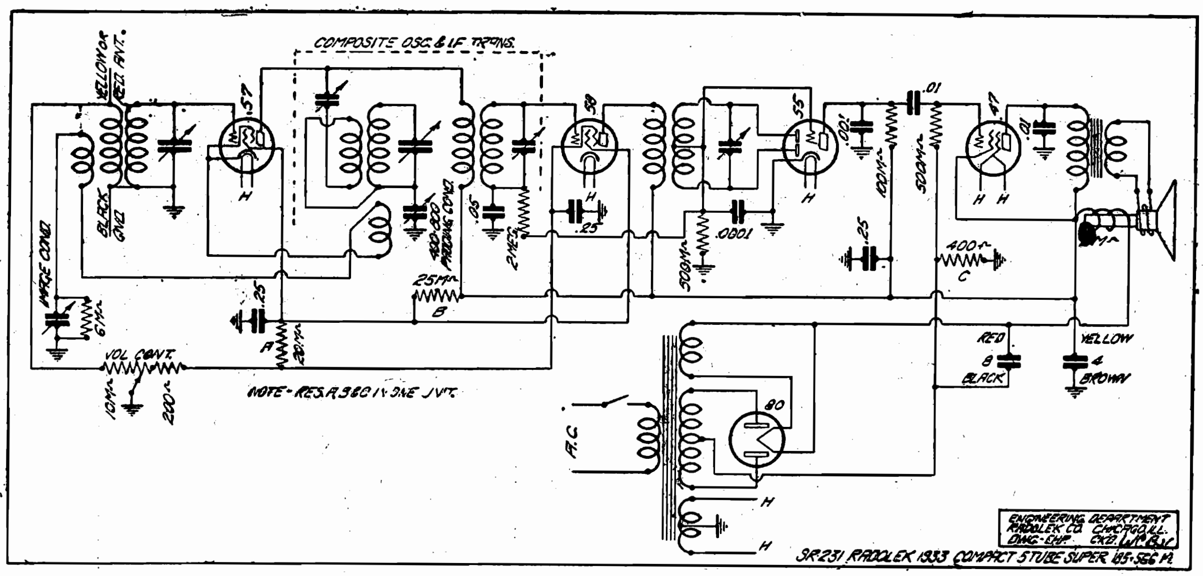


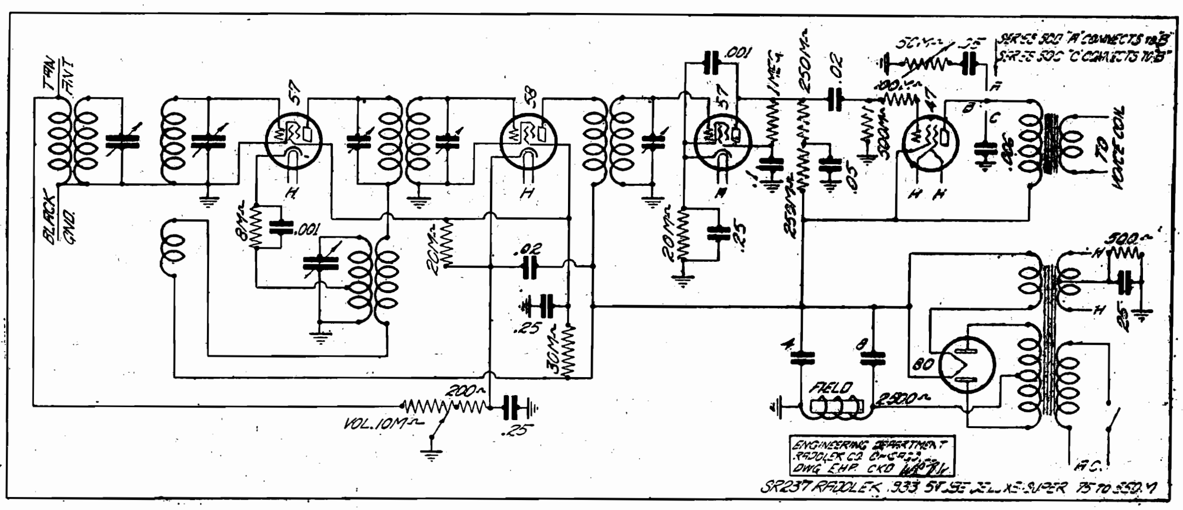


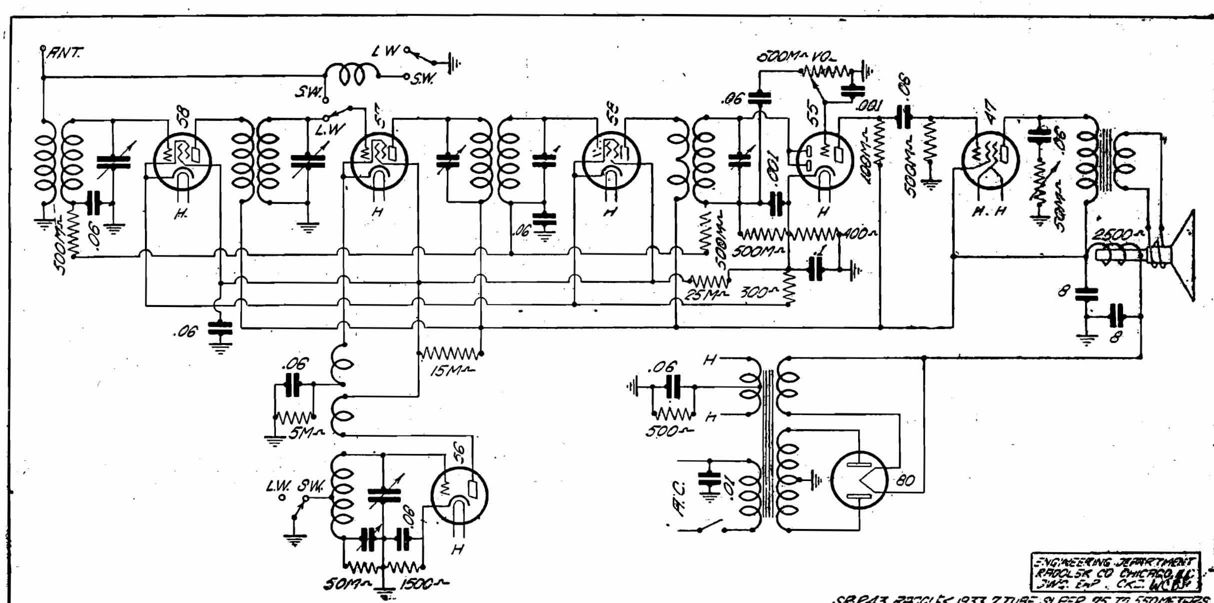


RADOLEK

MODEL Radolek 5 Tube Super Compact
MODEL Radolek 5 Tube De Luxe
MODEL Radolek 7 Tube Super

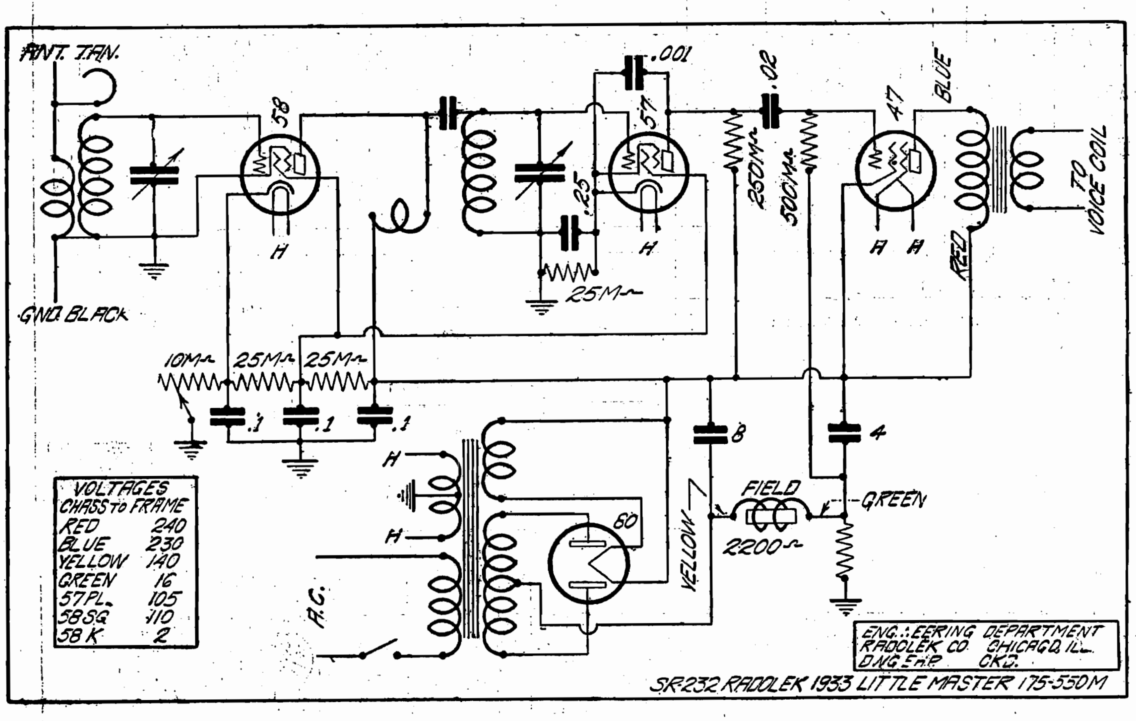


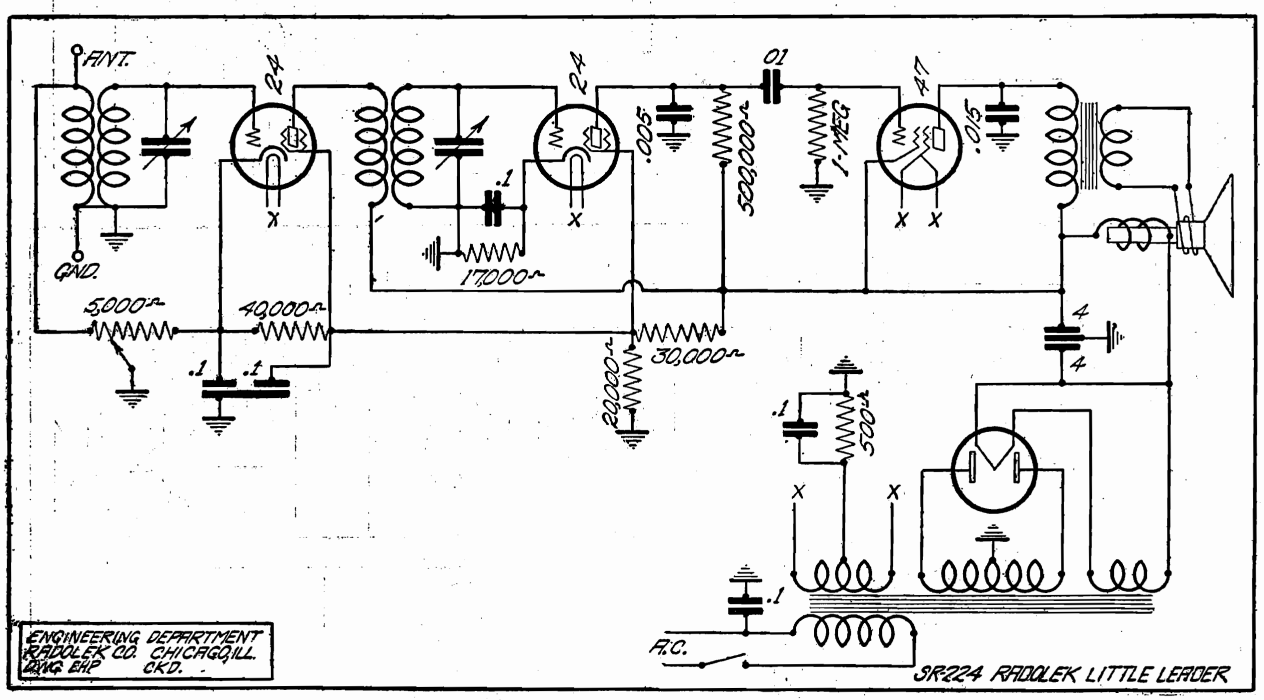




MODEL Radolek Little Master
MODEL Radolek Little Leader

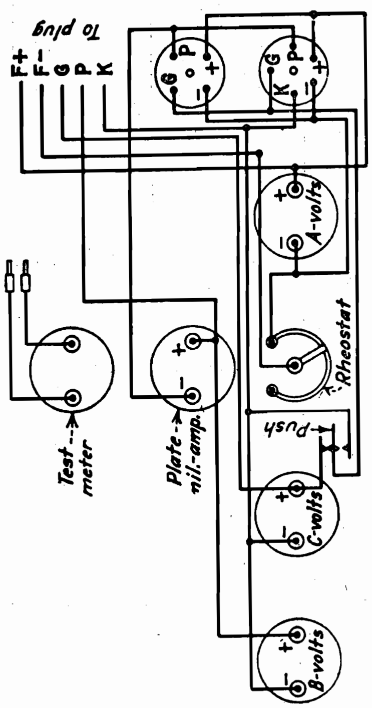
RADOLEK



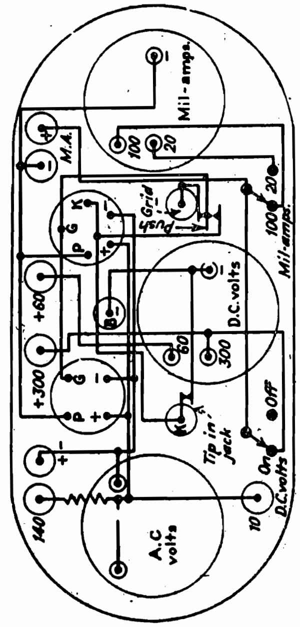


READRITE METER WORKS

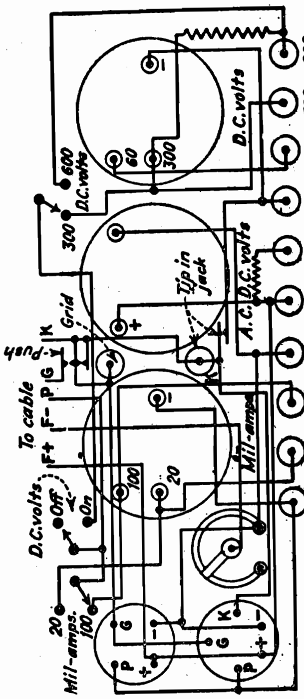
MODEL 6
MODEL 15
MODEL 245
MODEL 610-710
MODEL 1000



Readrite 6



Readrite 15



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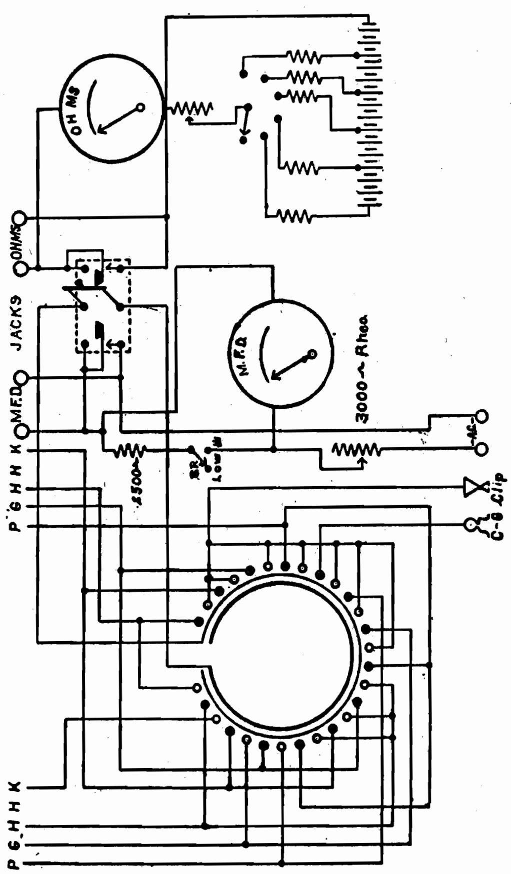
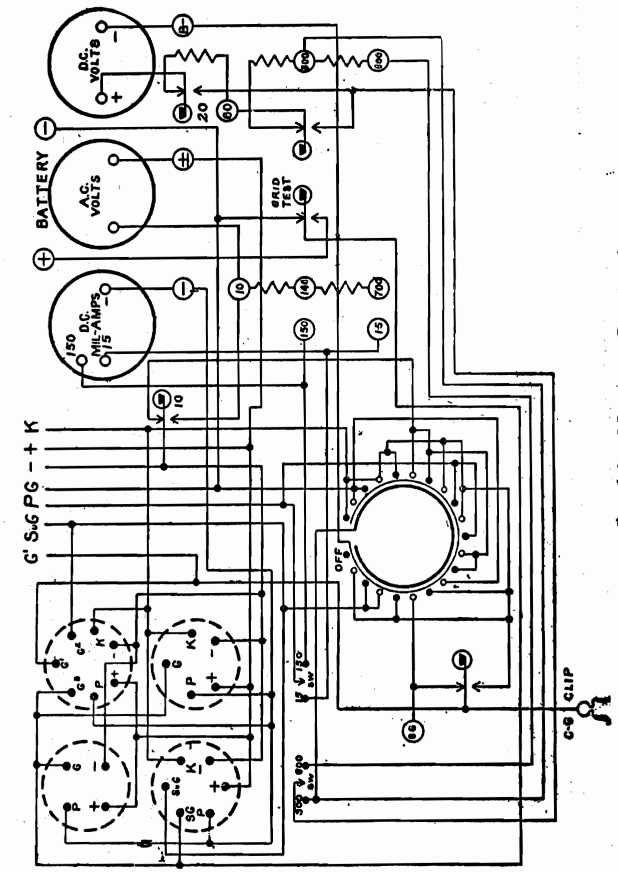


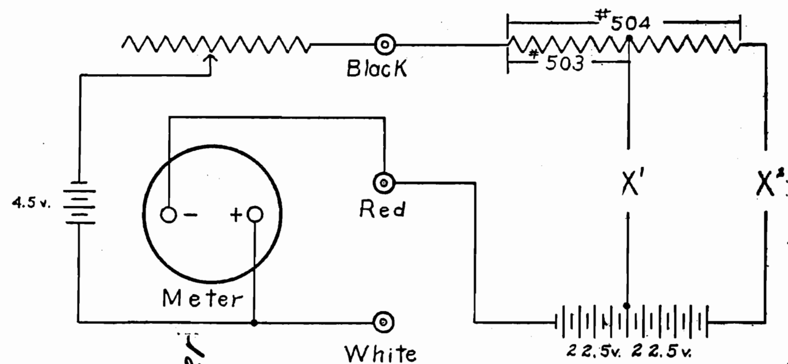
Readrite No. 1000 Set Tester.



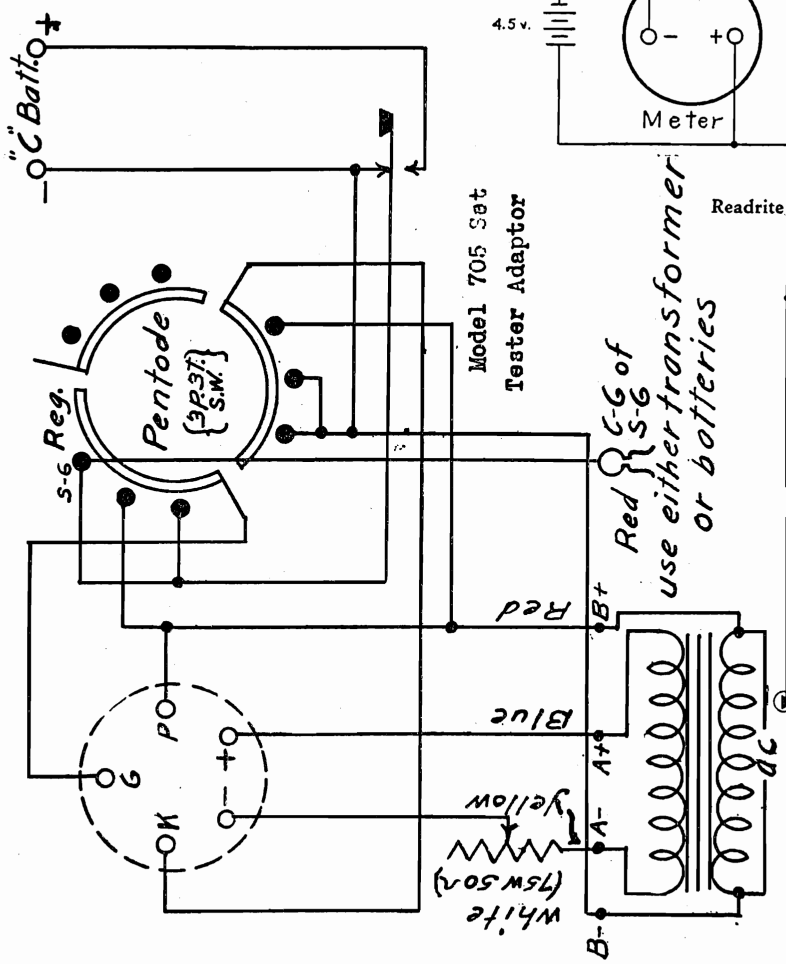
Readrite No. 710 Set Analyzer

MODEL 407 Tube Tester
MODEL 502 Ohmmeter
MODEL 705 Set Tester Adaptor
MODEL 900 Electric Refrigerator Tester

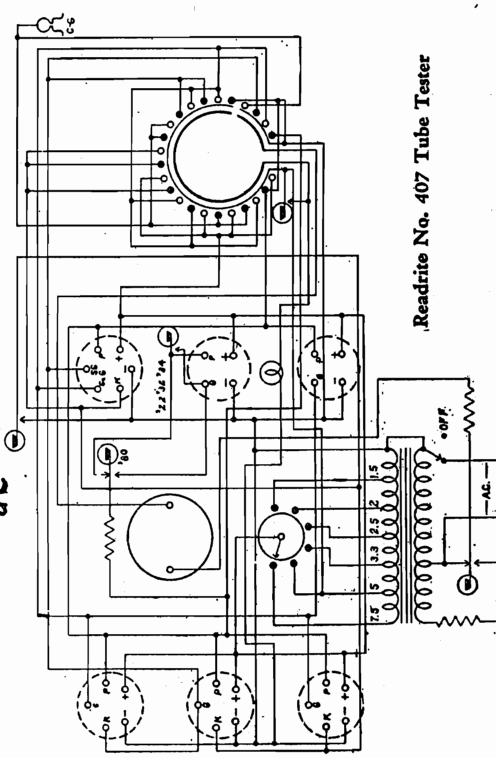
READRITE METER WORKS



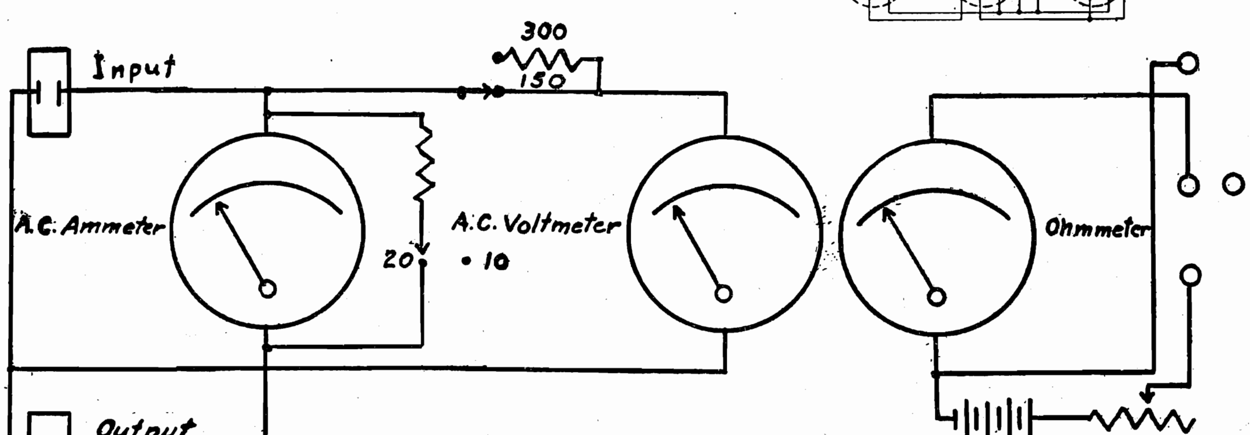
Readrite No. 502 Ohmmeter.



Model 705 Set Tester Adaptor



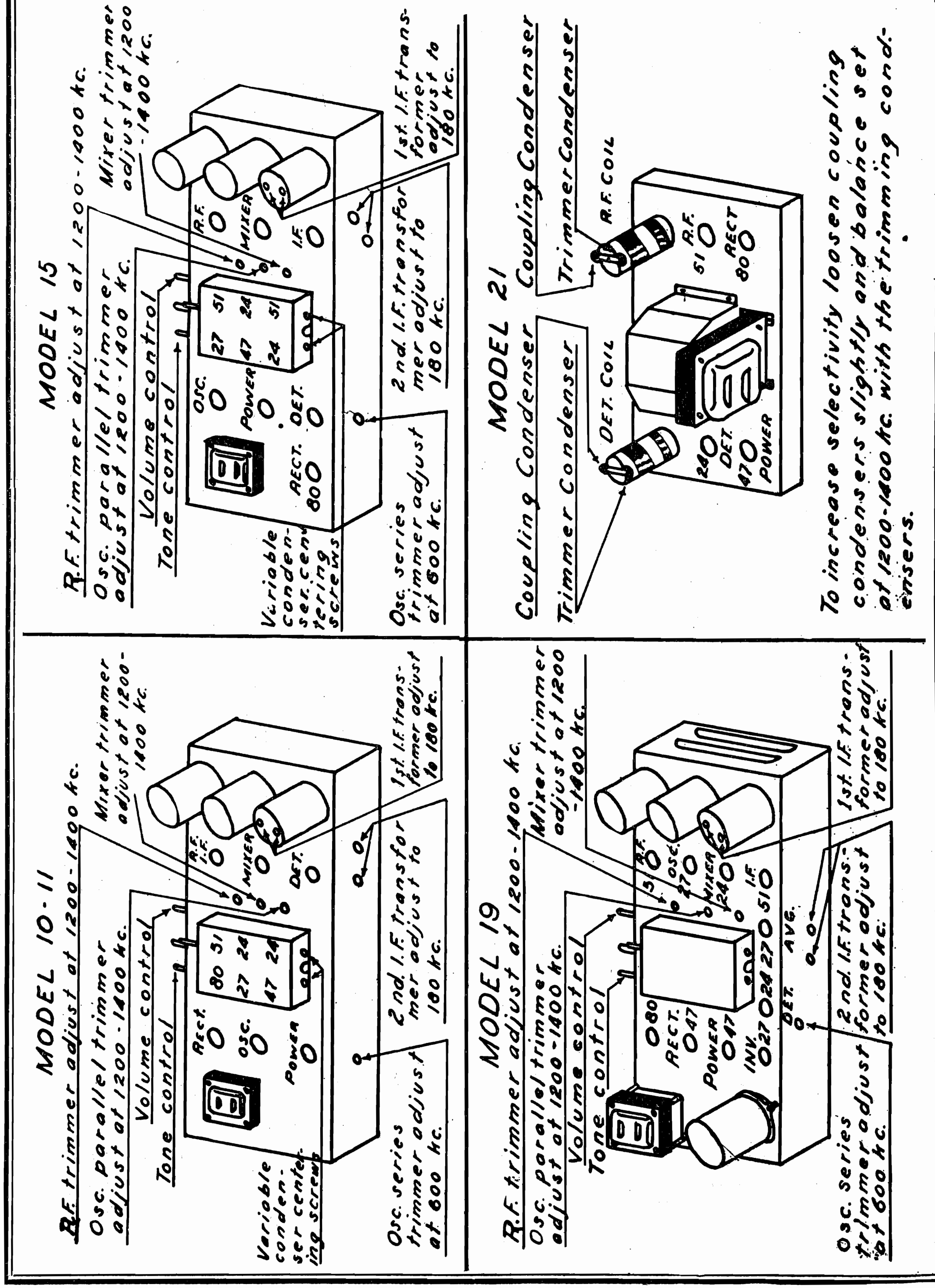
Readrite No. 407 Tube Tester



Model 900 Electric Refrigerator Tester

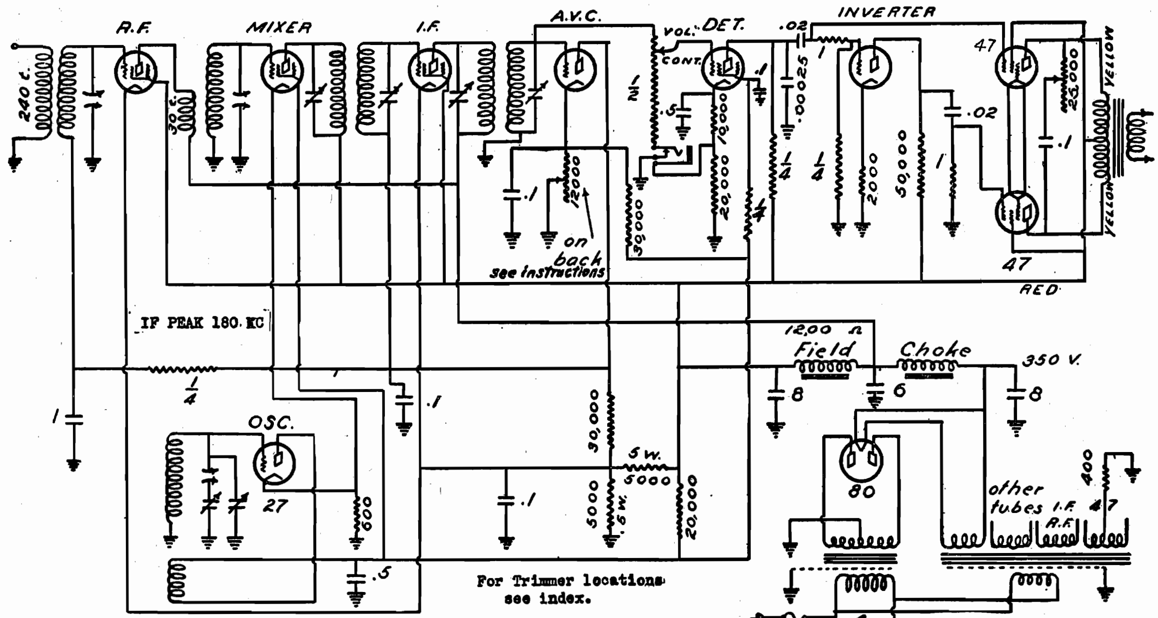
REMLER COMPANY, LTD.

MODELS 10,11,15, 19;21 Supers
Socket-Trimmers



MODEL 10
MODEL 19

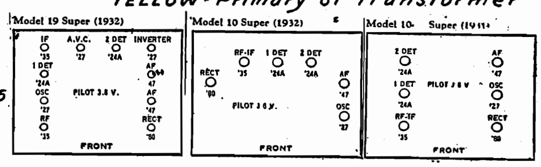
REMLER COMPANY, LTD.

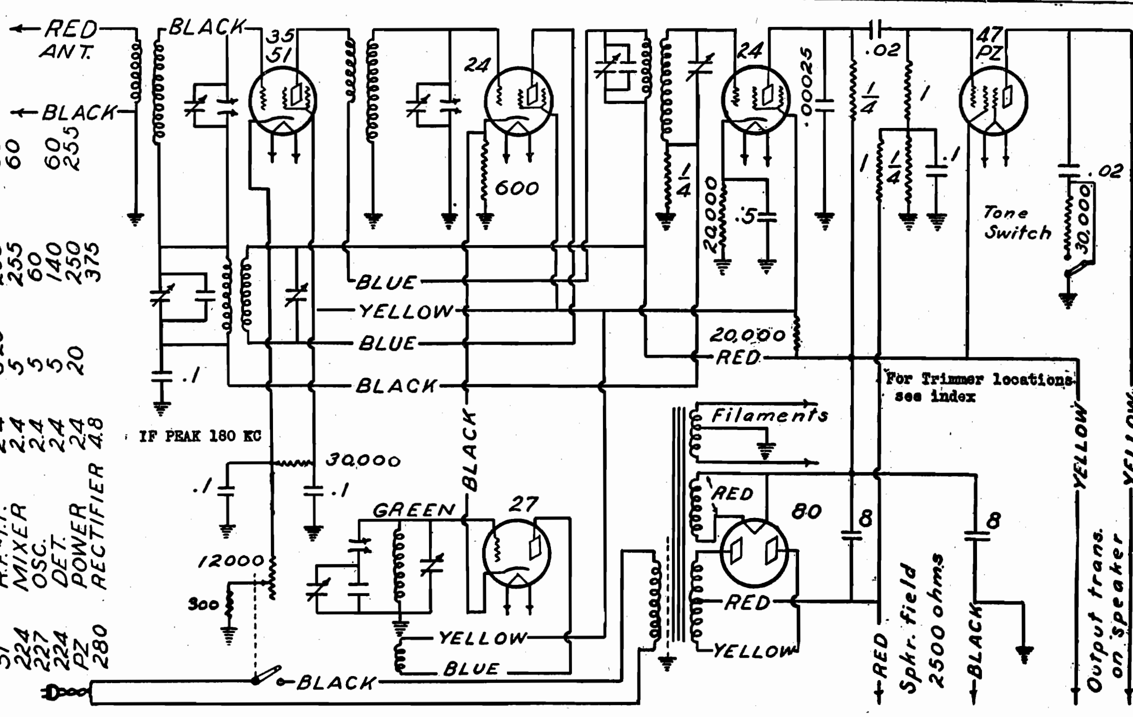


VOLTAGE TABLE
LINE 119 V. 60 ~

TUBE	POSITION	FIL.V.	GRID. V.	PLATE V.	S.G.V.
35	R.F.	2.4	3-30	175	75
24	MIXER	2.4	5	225	65
27	OSC	2.4	5	65	X
35	I.F.	2.4	3-30	175	75
27	A.V.C.	2.4	15	135	X
24	DET.	2.4	5	120	65
27	INVERTER	2.4	5	80	X
47	POWER	2.5	16	205	215
80	RECTIFIER	4.8			

SPEAKER LEADS
RED - Field and center tap trans.
BLUE - Field
YELLOW - Primary of transformer



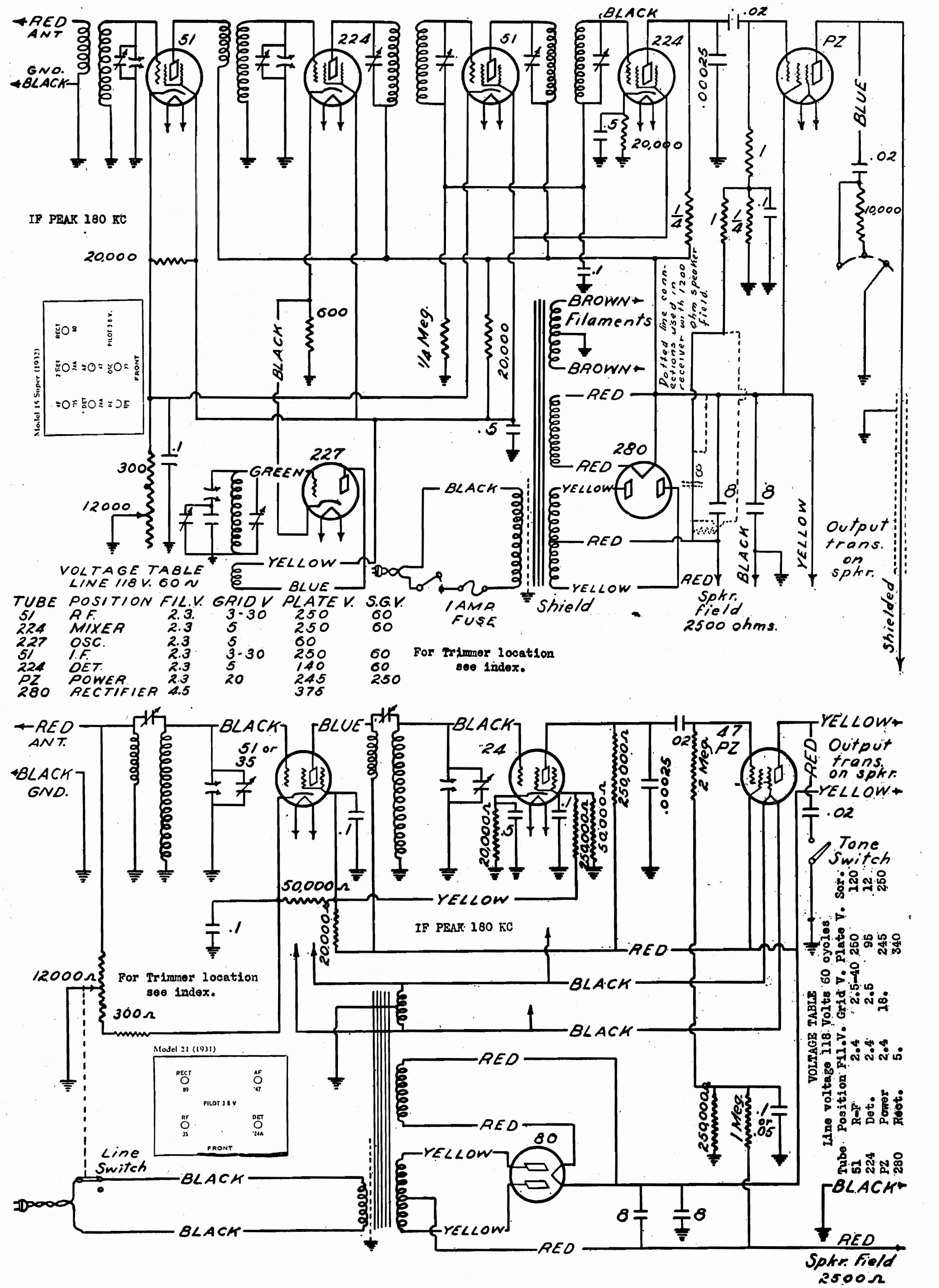


VOLTAGE TABLE
LINE 118 V. 60 ~

TUBE	POSITION	FIL.V	GRID.V.	PLATE.V.	SG
51	R.F.-I.F.	2.4	3-25	255	60
224	MIXER	2.4	5	255	60
227	OSC.	2.4	5	60	
224	DET.	2.4	5	140	60
PZ	POWER	2.4	20	250	255
280	RECTIFIER	4.8		375	

REMLER COMPANY, LTD.

MODEL 15
MODEL 21



VOLTAGE TABLE
LINE 118 V. 60 ~

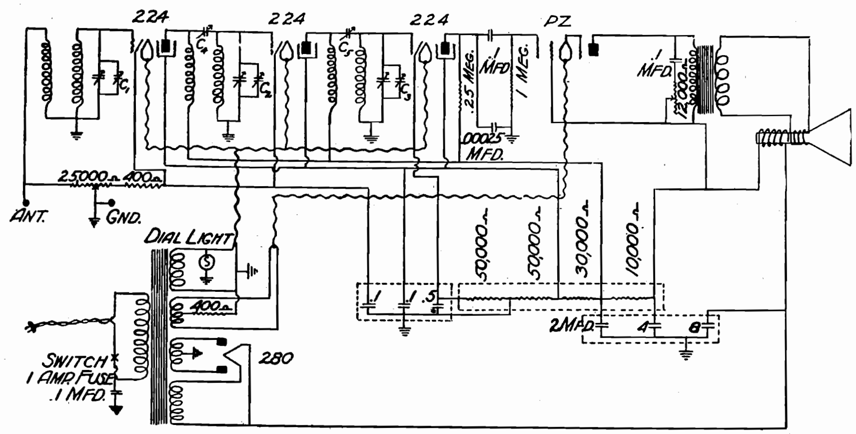
TUBE	POSITION	FIL.V.	GRID V	PLATE V.	S.G.V.
51	R.F.	2.3	3-30	250	60
224	MIXER	2.3	5	250	60
227	OSC.	2.3	5	60	
51	I.F.	2.3	3-30	250	60
224	DET.	2.3	5	140	60
PZ	POWER	2.3	20	245	250
280	RECTIFIER	4.5		375	

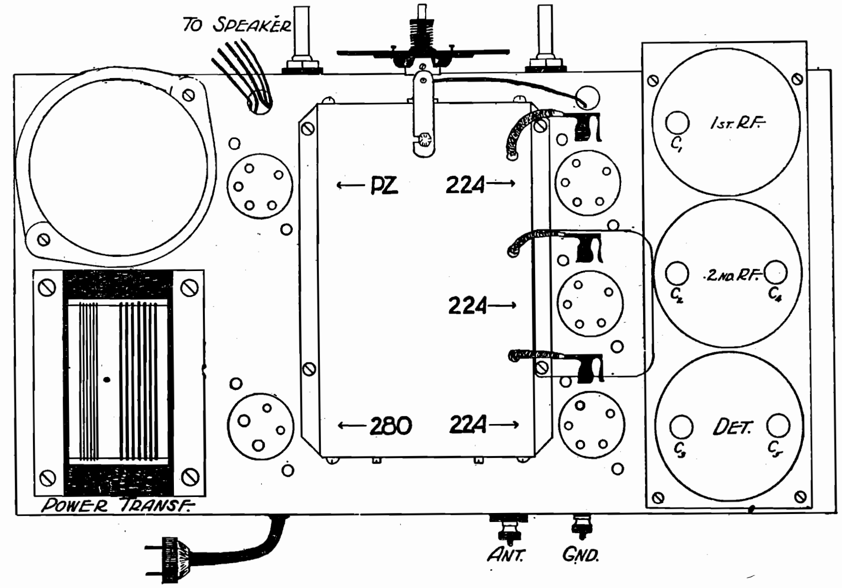
VOLTAGE TABLE
Line voltage 118 Volts 60 cycles

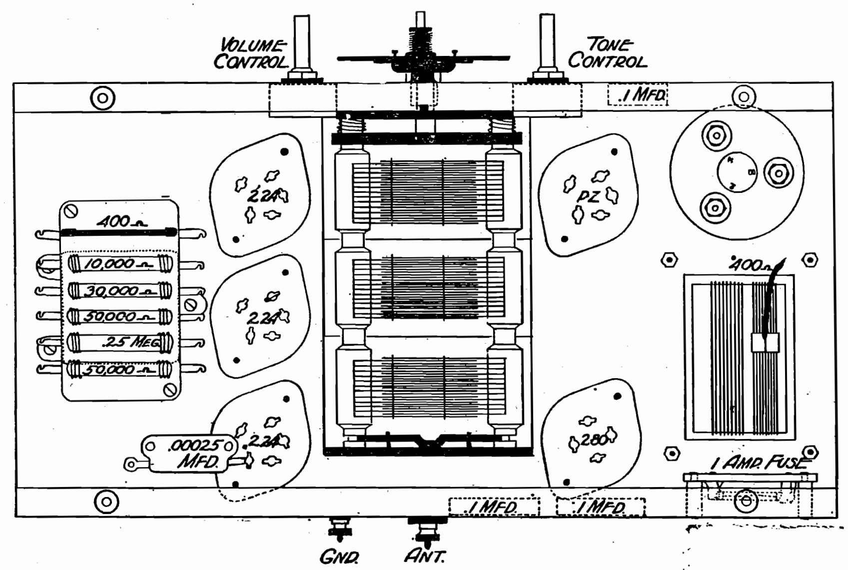
Tube	Position	Fil.V.	Grid V.	Plate V.	Scr.
51	R.F.	2.4	2.5-40	250	120
224	Det.	2.4	2.5	95	12
PZ	Power	2.4	18.	245	250
280	Rect.	5.		340	

MODEL 11

REMLER COMPANY, LTD.







WIRE COLOR CODE

RED - FIL. RECT. - CATHODE R.F. - B + A.F. - PLATE R.F. SPEAKER FIELD

BLUE - FIL. A.F. - PLATE DETECTOR - B + R.F.

YELLOW - SHIELD GRID - PLATES OF RECTIFIER - PLATE A.F.

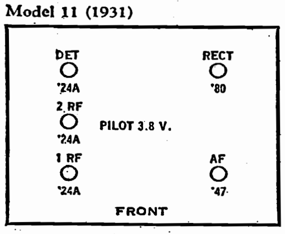
BLACK - FILAMENT - LINE SWITCH - DETECTOR CATHODE GROUND SPEAKER FRAME

VOLTAGE TABLE

LINE 115 V. 60 CYCLE

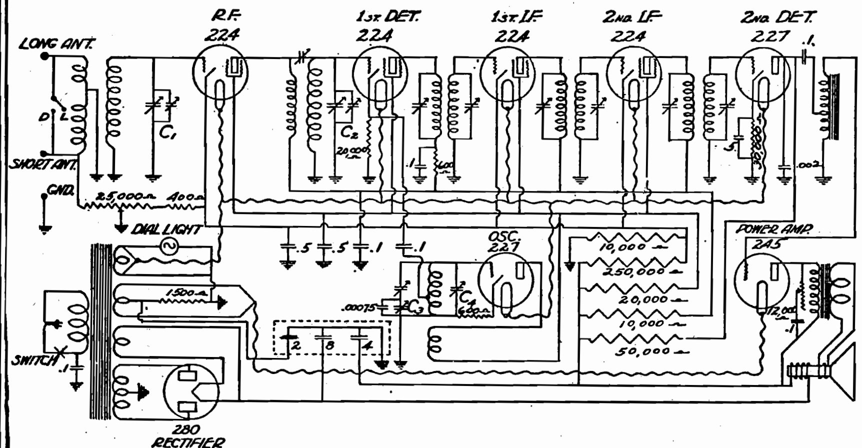
TUBE	POSITION	FIL. V.	GRID V.	PLATE V.	S.G. VOLTS
224	1st. R.F.	2.3	3-9	160-185	85-125
224	2nd. R.F.	2.3	3-9	160-185	85-125
224	DET.	2.3	48-8	75-115	85-125
PZ.	POWER	2.4	16	230	240
280	RECTIFIER	4.9		400	

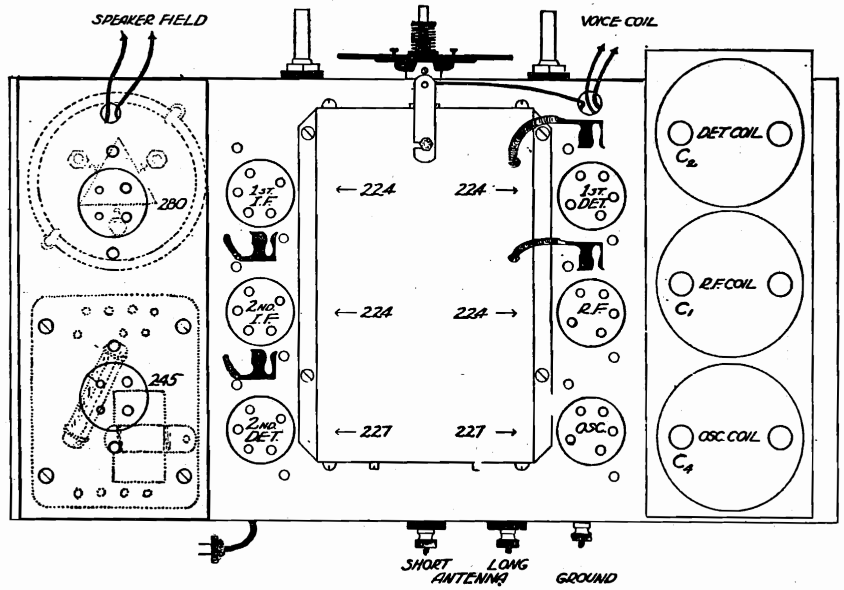
Model 11 (1931)

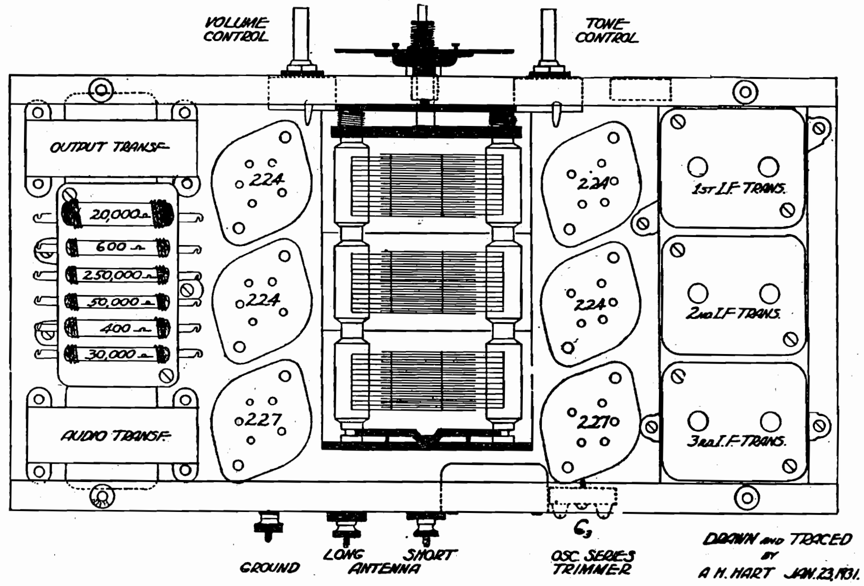


REMLER COMPANY, LTD.

MODEL 17







WIRE COLOR CODE

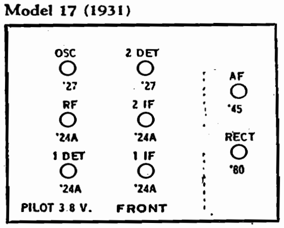
RED - FIL. RECT. - KATHODE I.F. & R.F. - +B 1st DET. - +B POWER AMP. - +B OSCILLATOR - SPEAKER FLD. - ANTENNA
BLUE - FIL. POWER TUBE - PLATE R.F. - PLATE OSC. - PLATE 2nd DET.
GREEN - GRID POWER AMPLIFIER
BROWN - FIL. R.F. - FIL. I.F. TUBES - FIL. DETECTORS
BLACK - KATHODE 2nd DET. - PLATE POWER AMPLIFIER - GROUND - VOICE COIL
YELLOW - SHIELD GRID - PLATE RECTIFIER - +B I.F

VOLTAGE TABLE

LINE 120 V. 60 CYCLE

TUBE	POSITION	FIL. V.	GRID V.	PLATE V.	S.G. VOLTS
224	R.F.	2.4-2.5	3-11	200-275	80-100
224	1st DET.	2.4-2.5	6-10	200-275	80-100
224	1st I.F.	2.4-2.5	3-11	200-275	80-100
224	2nd I.F.	2.4-2.5	3-11	200-275	80-100
227	2nd DET.	2.4-2.5	25-30	180-200	
227	OSC.	2.4-2.5	3-4	80-100	
245	POWER TUBE	2.4	40-50	205-220	
280	RECTIFIER	4.9		380	

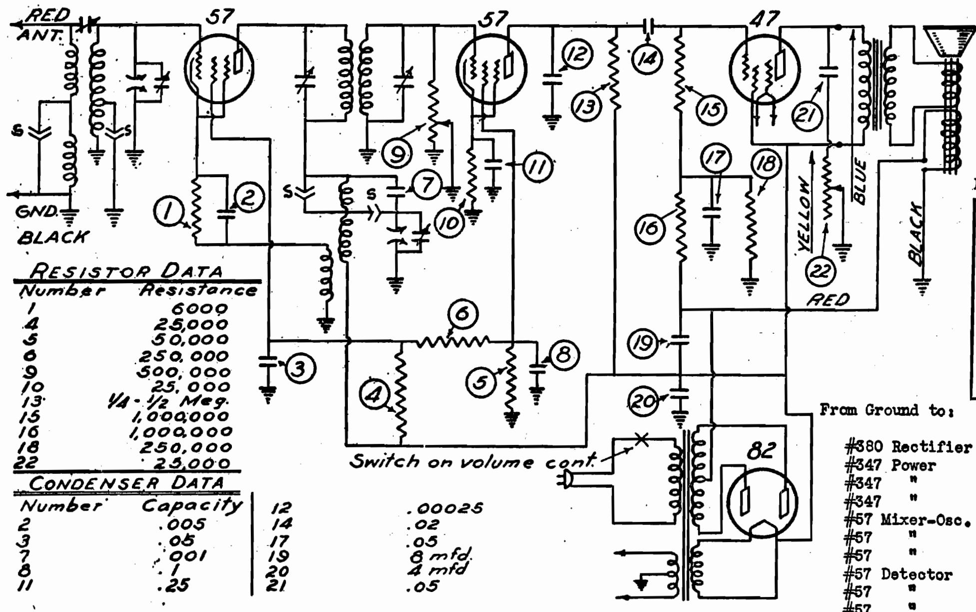
Model 17 (1931)



IF PEAK 180 KC

MODEL 21-3.
MODEL 26 AC-DC

REMLER COMPANY, LTD.



RESISTOR DATA

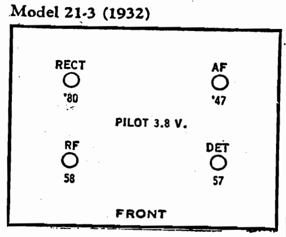
Number	Resistance
1	6000
4	25,000
5	50,000
6	250,000
9	500,000
10	25,000
13	1/4 - 1/2 Meg.
15	1,000,000
16	1,000,000
18	250,000
22	25,000

CONDENSER DATA

Number	Capacity		
2	.005	12	.00025
3	.05	14	.02
7	.001	17	.05
8	.1	19	8 mfd.
11	.25	20	4 mfd
		21	.05

IF PEAK 250 KC

Model 21-3 (1932)



From Ground to:

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

Model 21-3

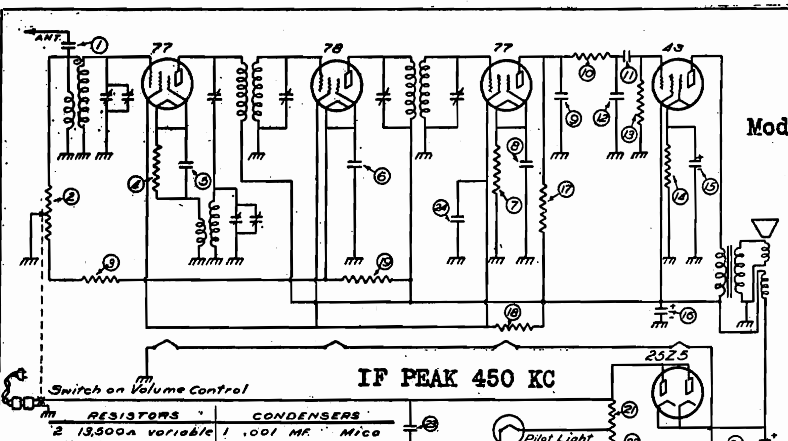
Due to small current, meter readings will be inaccurate on detector plate and power tube grid.

A.C. VOLTAGES:

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

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

Model 26



IF PEAK 450 KC

RESISTORS			CONDENSERS			
2	19,500Ω	variable	1	.001	MF.	Mica
3	300 "	.5 watt	5	.005	"	600 V.
4	5,000 "	"	6	.05	"	600 V.
7	25,000 "	"	8	.25	"	200 V.
10	50,000 "	"	9	.0003	"	Mica
13	.5 Meg.	"	11	.02	"	600 V.
14	600 Ω	2 watt	12	.003	"	Mica
17	.25 Meg.	.5 watt	15	10.	"	25 V.
18	50,000 Ω	"	16	8.	"	200 V.
19	50,000 "	"	20	8.	"	200 V.
21	170 "	50 watt	23	.05	"	600 V
22	30 "	"	24	.5	"	200 V

Speaker Field 600 ohms

VOLTAGE READINGS: (When operated on AC)

Line	120 volts
Filaments:	
43 and 2525	24 "
77, 78, 77 each	6 "
Across series resistor	54 "

(Filament voltages may vary with tubes)

DC Voltages - On full volume - No signal

From Chassis to:-

2525 Rectifier tube	cathode	140 volts
43 Power "	plate	123 "
43 " "	screen grid	124 "
43 " "	cathode	16 "
77 Mixer Osc. "	plate	123 "
77 " "	screen grid	73 "
77 " "	cathode	5 "
78 I.F. "	plate	123 "
78 " "	screen grid	73 "
78 " "	cathode	4 "
* 77 Detector "	plate	50 "
77 " "	screen grid	73 "
77 " "	cathode	5 "

*Due to small current, meter readings will be inaccurate on detector tube plate.

DC voltage readings when connected to a DC source of 120 volts will be slightly less than those above.

INSTALLATION:

This set is designed to operate from a power supply of 110 to 125 volts AC or DC. Best results will be obtained when connected to a twenty foot antenna attached to the black wire extending from the back of the cabinet. No ground connection is provided.

SERVICE DATA:

The plate supply is rectified directly from the power source and the filaments of the tubes are connected in series and thru a series resistor to this source. The chassis is directly connected to the power line, and contact between chassis and ground should be avoided.

To take the chassis out of the cabinet, first, remove the knobs, then the back, and finally the hold down screw in the base of the cabinet. To replace tubes it is only necessary to remove the back.

The back may be plugged on the chassis after removal from the cabinet for testing and aligning.

The mixer coil is in the aluminum shield can in back of the variable condenser and is trimmed by the back section trimmer on the variable condenser.

The oscillator coil is inside the chassis and is trimmed with the front section trimmer on the variable condenser.

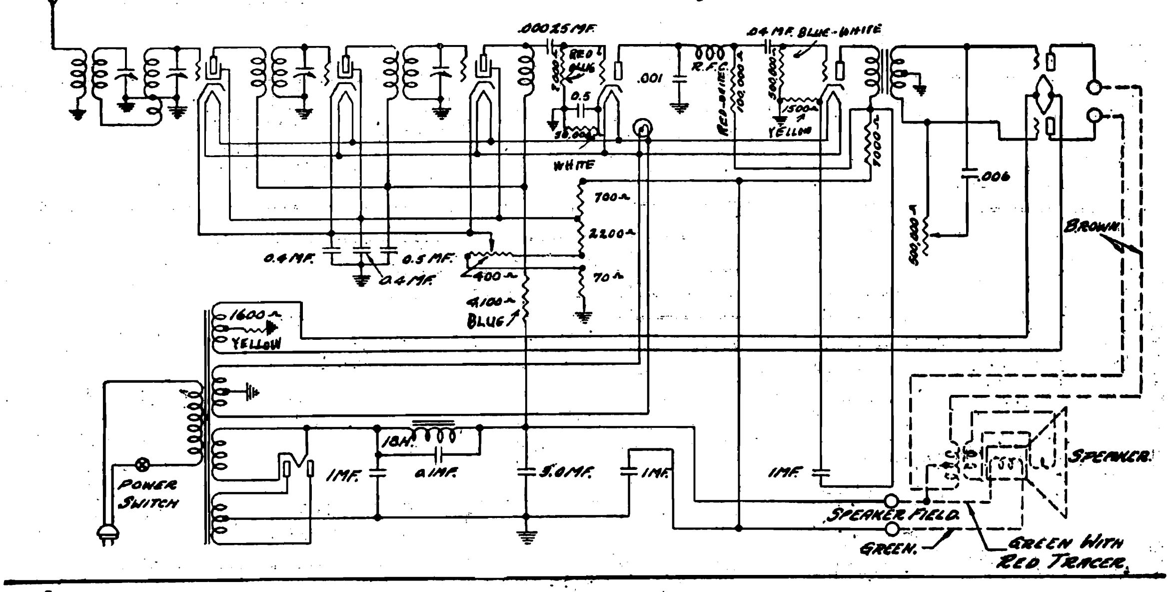
Mounted inside the oscillator coil is the first I.F. coil which is trimmed by the condensers accessable from the back of the chassis.

The second I.F. transformer is also located within the chassis and may be trimmed by the condensers located under the holes in the chassis bottom.

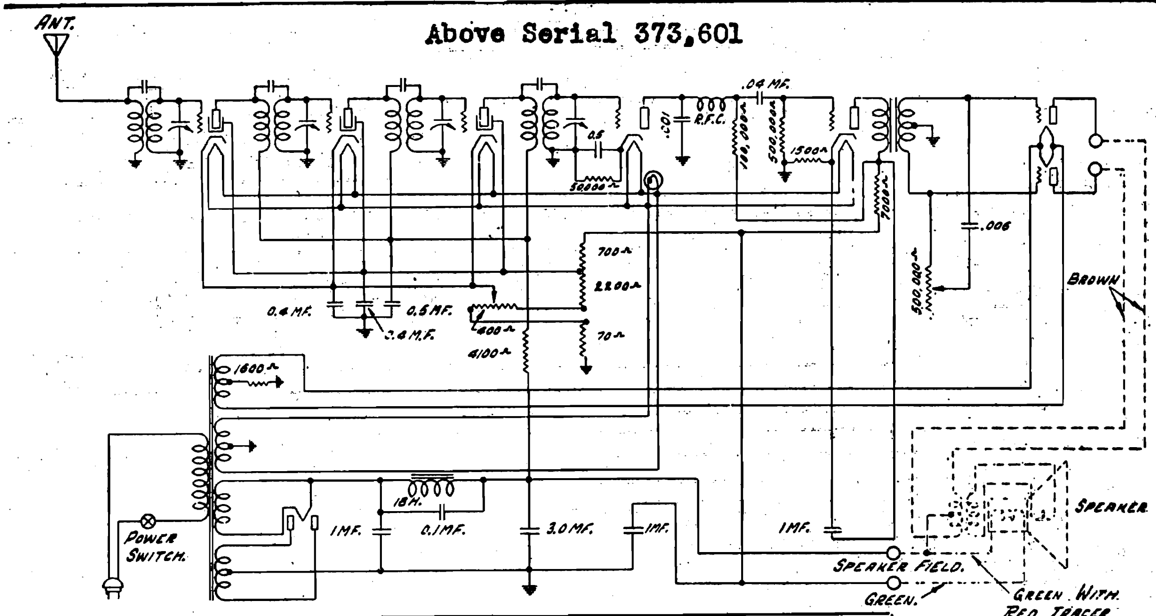
MODEL S-2
Two Types

RADIOTROPE

Below Serial 373,601



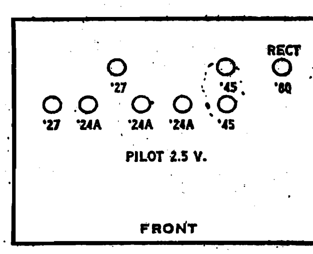
Above Serial 373,601



DOTTED LINES SHOWN ARE IN SPEAKER.

VOLTAGES AT SOCKETS — VOLUME CONTROL AT MAXIMUM — LINE VOLTAGE, 115 — PLUG IN SOCKET OF RECEIVER — TUBE IN TEST SET

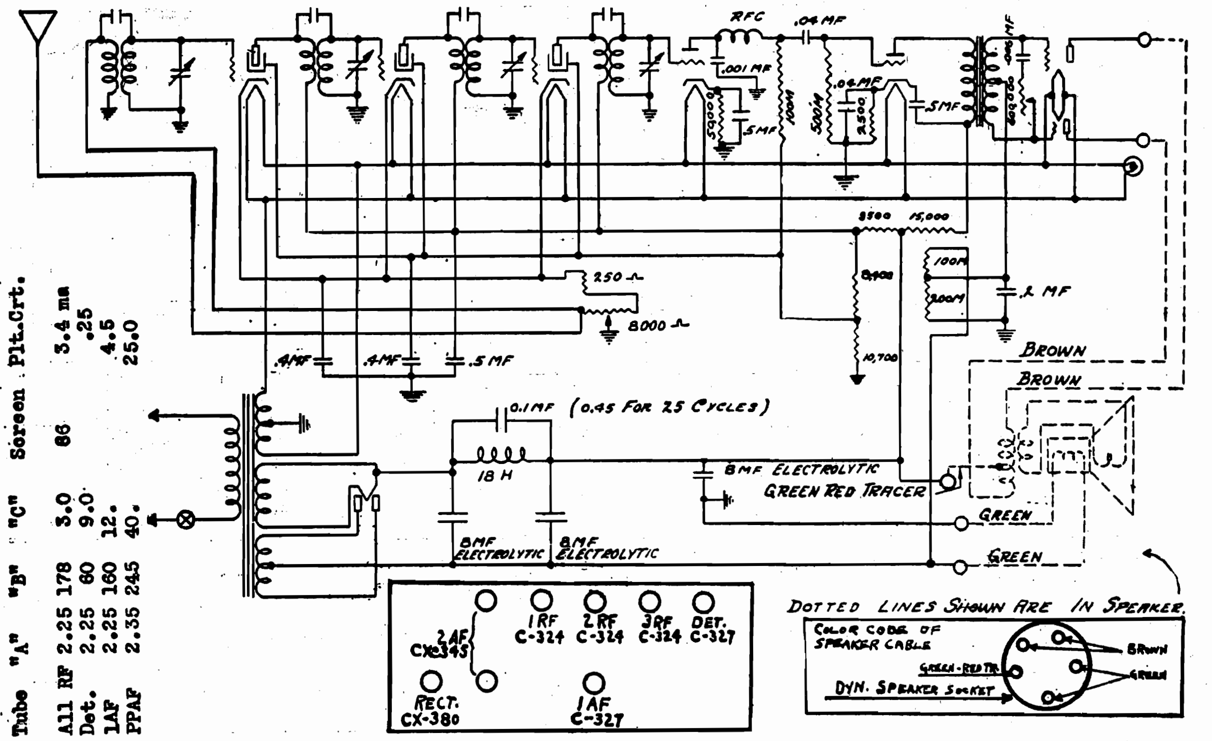
Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
224	2	2nd Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
224	3	3rd Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
227	4	Detector	2.25	60	8			8	.2	.3
227	5	1st Audio	2.25	90	6			6	3.5	4.5
245	6	2nd Audio	2.35	185	40				12.5	15.0
245	7	2nd Audio	2.35	185	40				12.5	15.0
280	8	Rectifier	5.0						38 Per Plate	



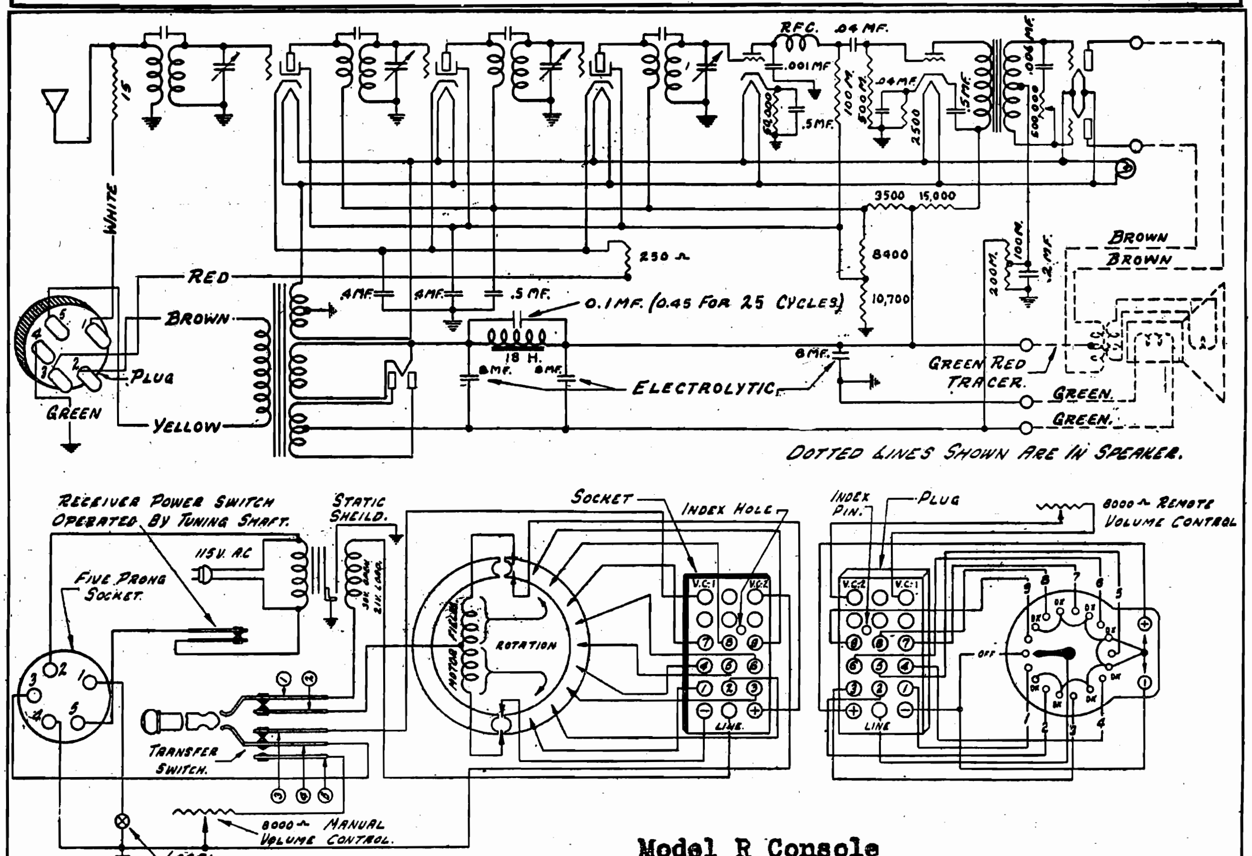
MODEL G Console
MODEL R Console

RADIOTROPE

Model G Console



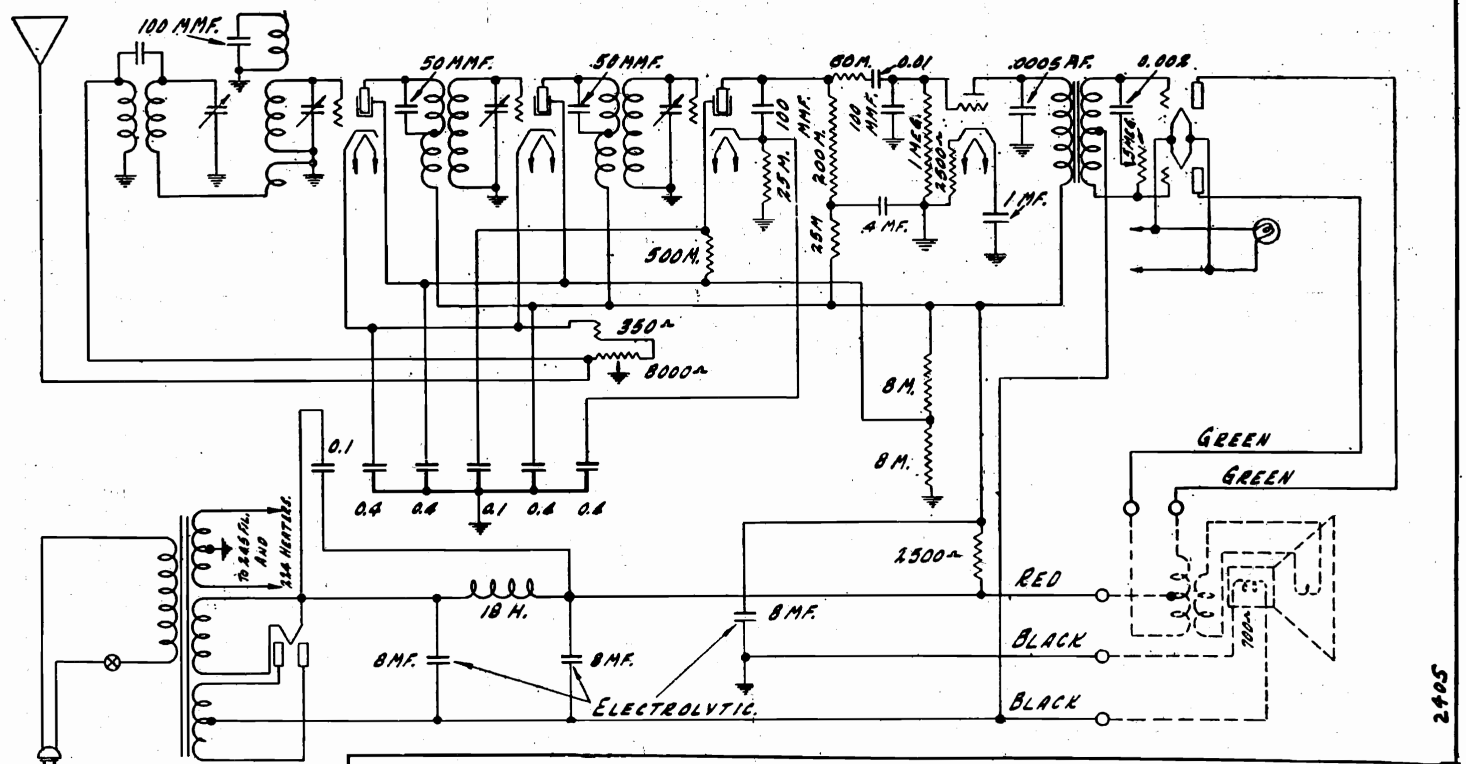
Tube	"A"	"B"	"C"	Screen	Plt.Crt.
All RF	2.25	178	3.0	86	3.4 ma
Det.	2.25	60	9.0		.25
1AF	2.25	160	12.		4.5
PPAF	2.35	245	40.		25.0



Model R Console

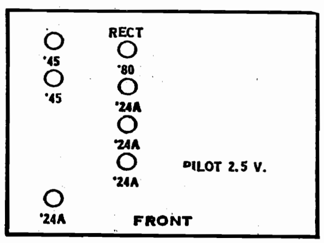
MODEL 62, 64

RADIOTROPE



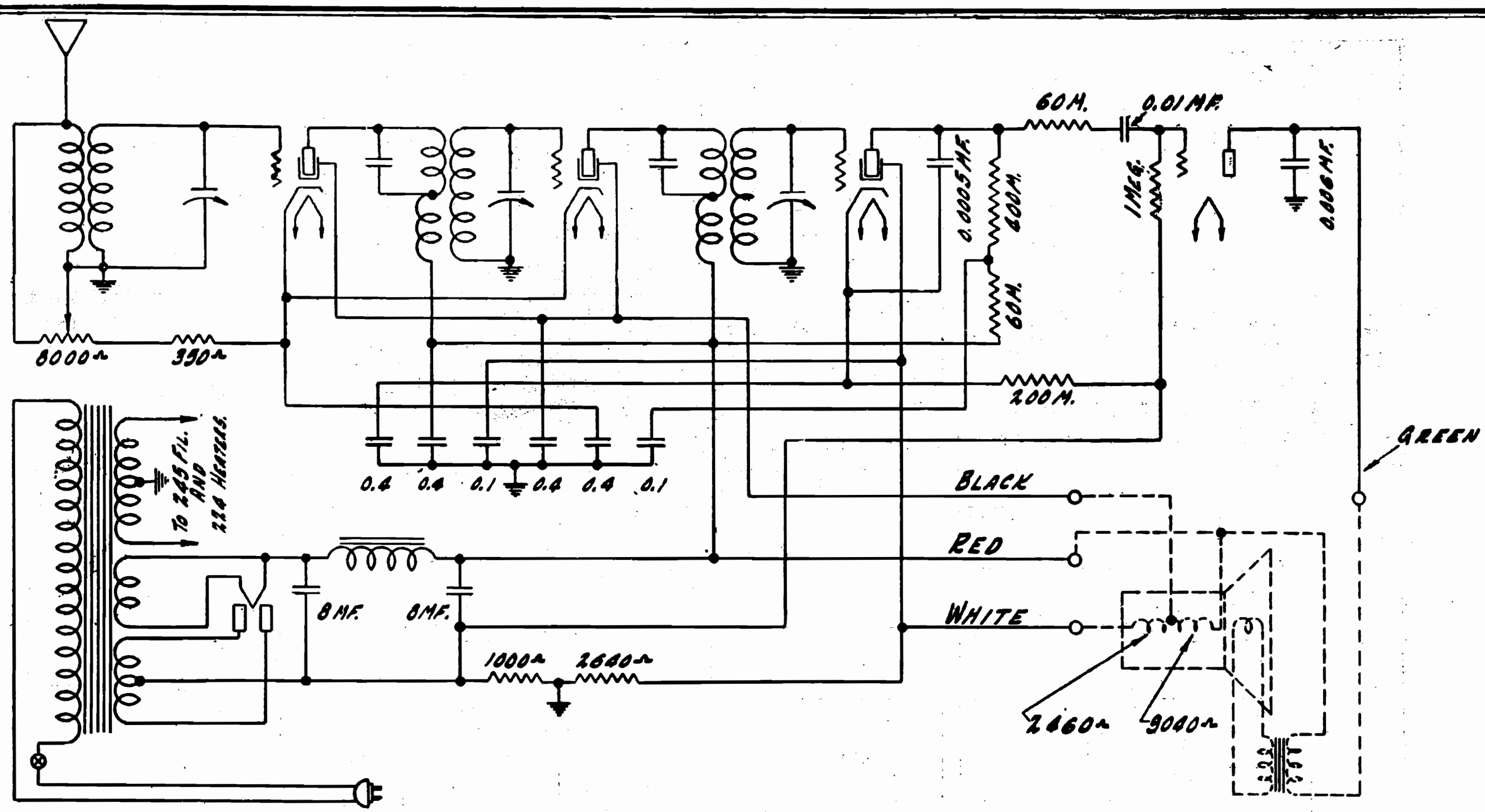
—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM
LINE VOLTAGE, 115—PLUG IN SOCKET OF RECEIVER—TUBE IN TEXT SET

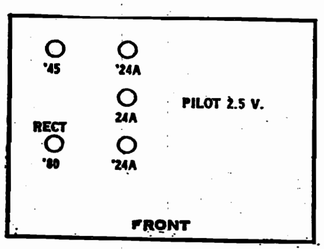
Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Radio	2.3	198	3.	88	.9	3.	3.5	6.
224	2	2nd Radio	2.3	198	3.	88	.9	3.	3.5	6.
224	3	Detector	2.3	150	6.	45	.1	6.	.25	.4
227	4	1st Audio	2.3	180	12.5			12.5	5.	6.1
245	5	2nd Audio	2.4	255	55.				26.	31.
245	6	2nd Audio	2.4	255	55.				26.	31.
280	7	Rectifier	5.						36. Per Plate	



MODEL 74-R (1st Type)

RADIOTROPE



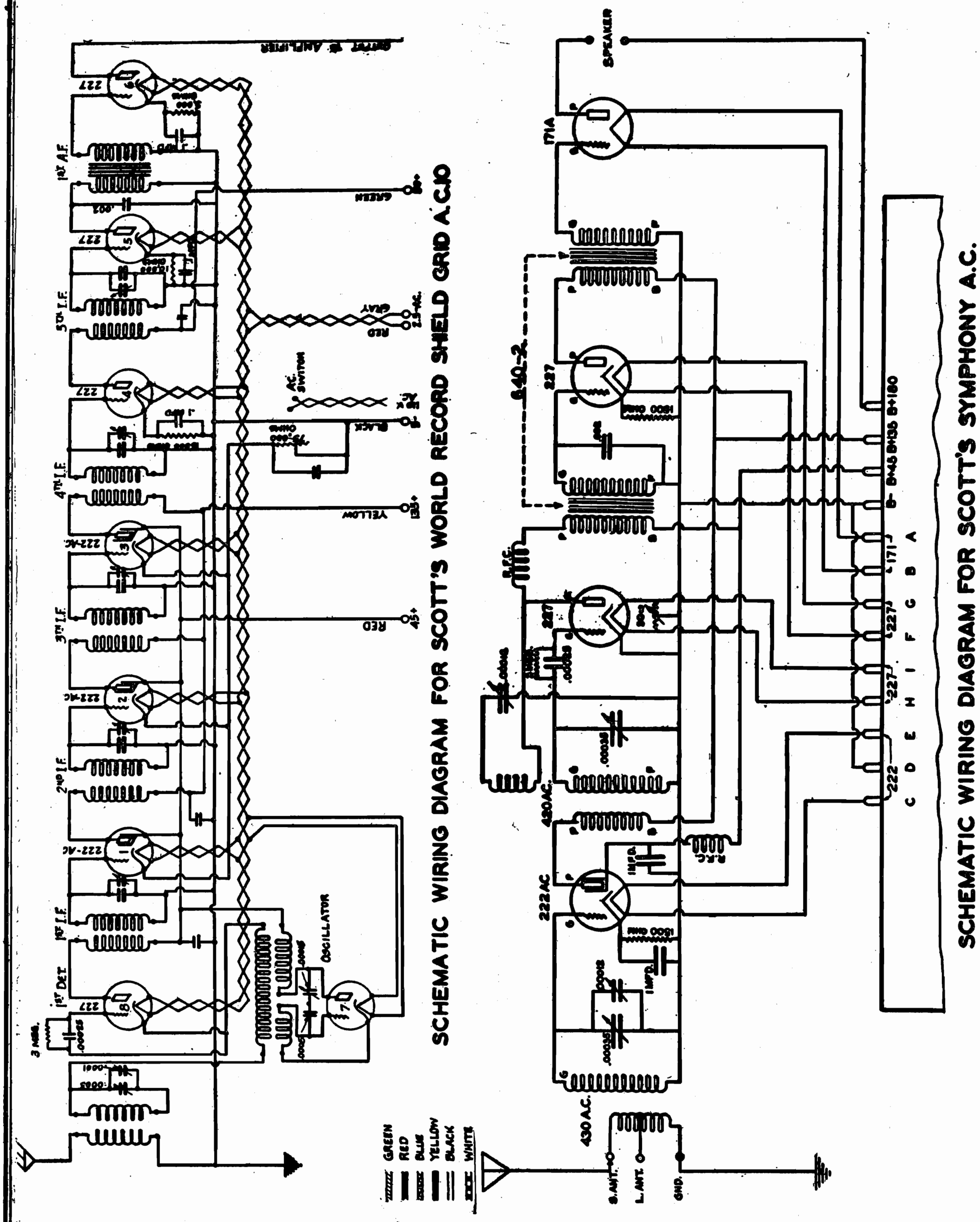


—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM
LINE VOLTAGE, 115—PLUG IN SOCKET OF RECEIVER—TUBE IN TEST SET

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

MODEL "World Record"
Shield Grid 10
MODEL Scotts Symphony AC

SCOTT TRANSFORMER CO.

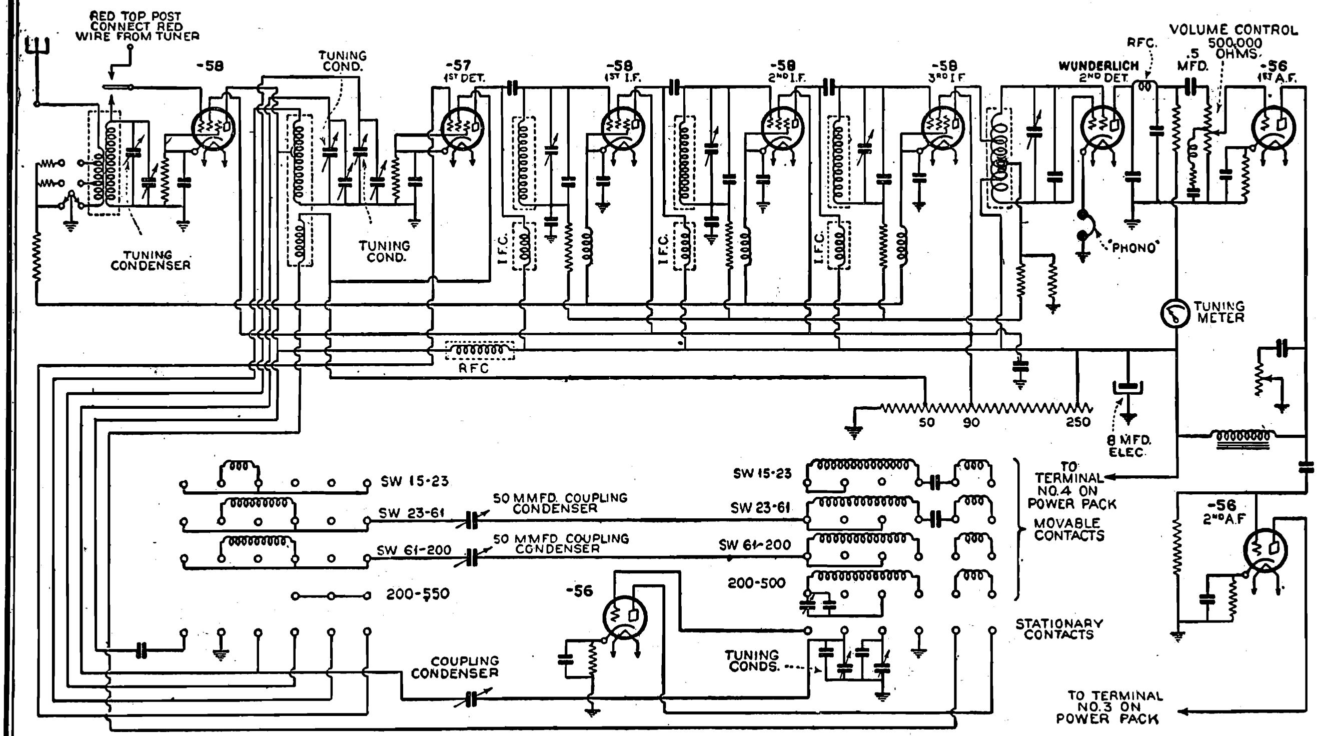


SCHEMATIC WIRING DIAGRAM FOR SCOTT'S WORLD RECORD SHIELD GRID A.C.10

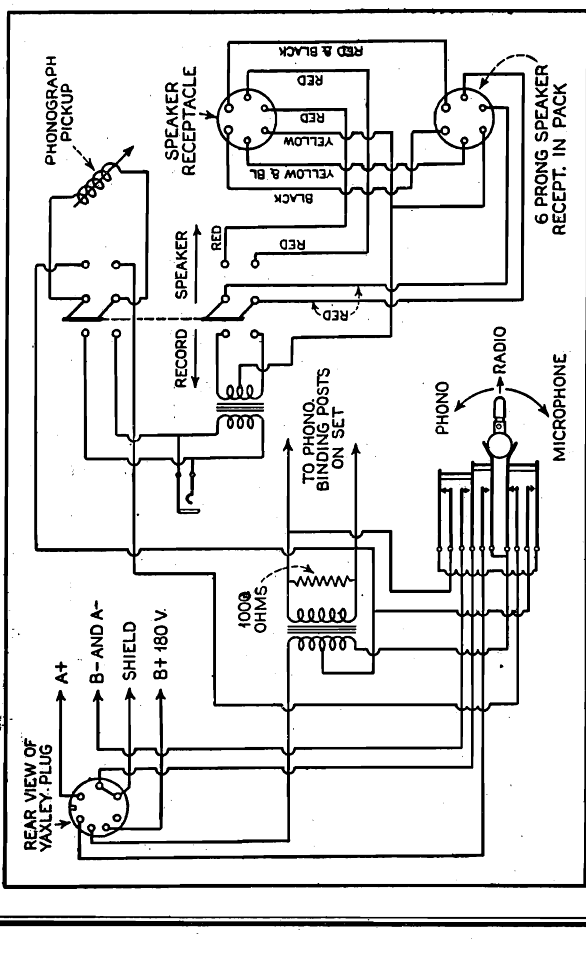
SCHEMATIC WIRING DIAGRAM FOR SCOTT'S SYMPHONY A.C.

MODEL "1933 De Luxe" AVC Super
Schematic
Power Supply
Recording

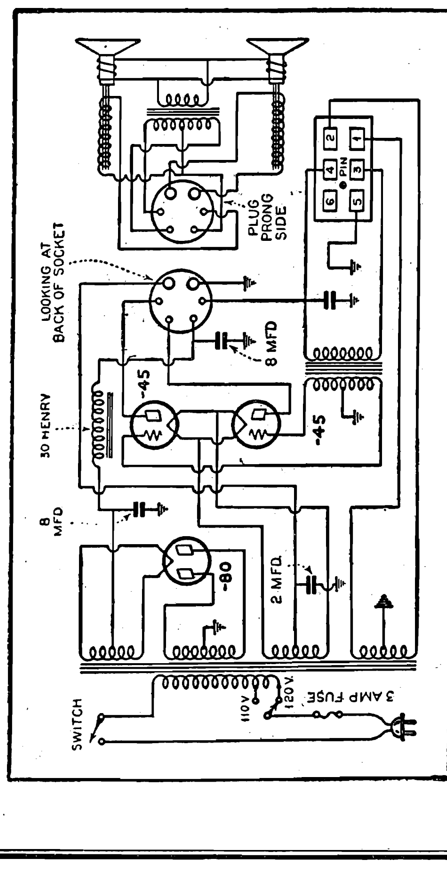
SCOTT TRANSFORMER CO.



Model Scott DeLuxe AVC Super 1933



Recording and Reproducing mechanism for Scott Imperial 1933 Super



Power Pack for De-Luxe 1933 Super

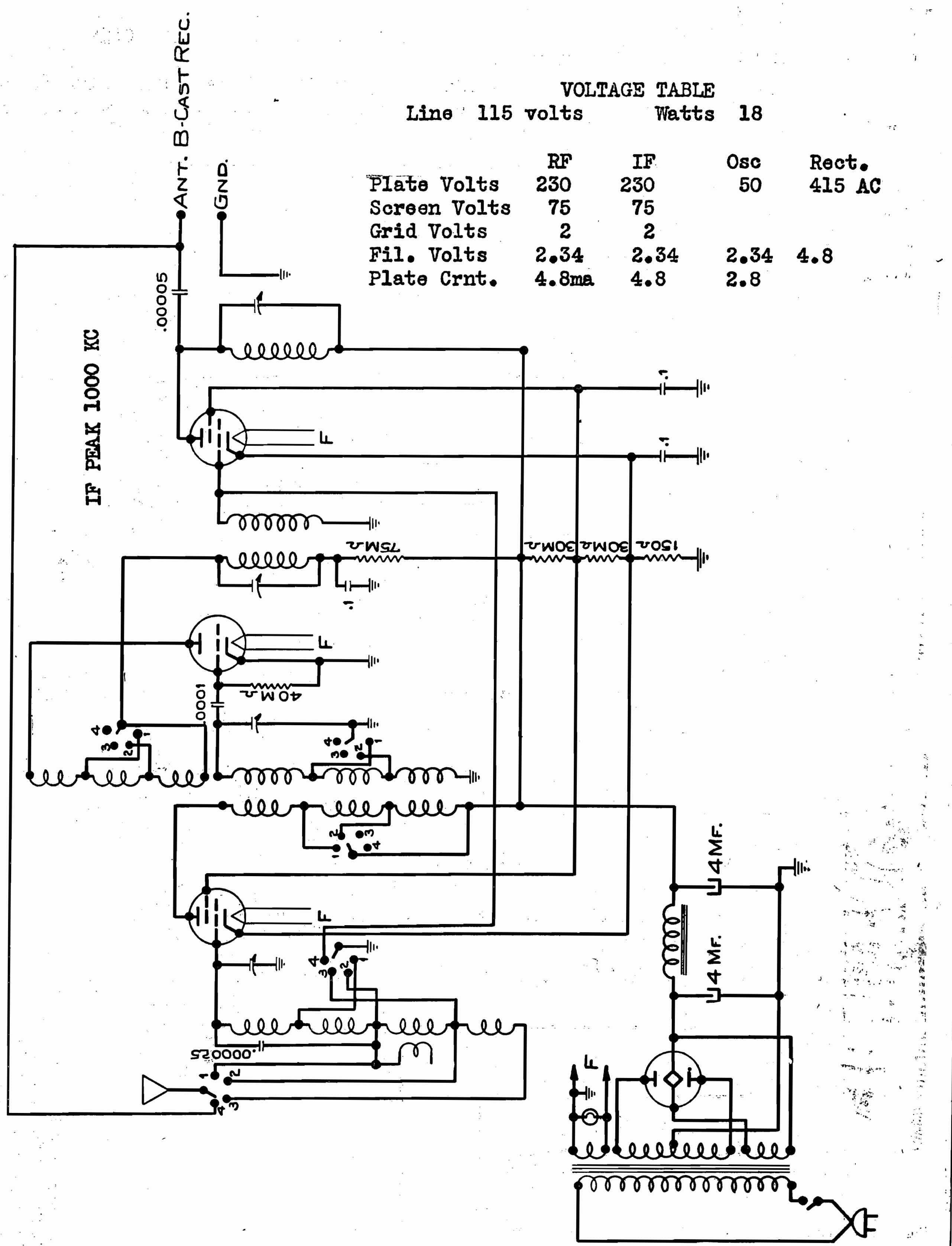
SEARS-ROEBUCK & CO.

MODEL 1600
Schematic

VOLTAGE TABLE

Line 115 volts Watts 18

	RF	IF	Osc	Rect.
Plate Volts	230	230	50	415 AC
Screen Volts	75	75		
Grid Volts	2	2		
Fil. Volts	2.34	2.34	2.34	4.8
Plate Crnt.	4.8ma	4.8	2.8	

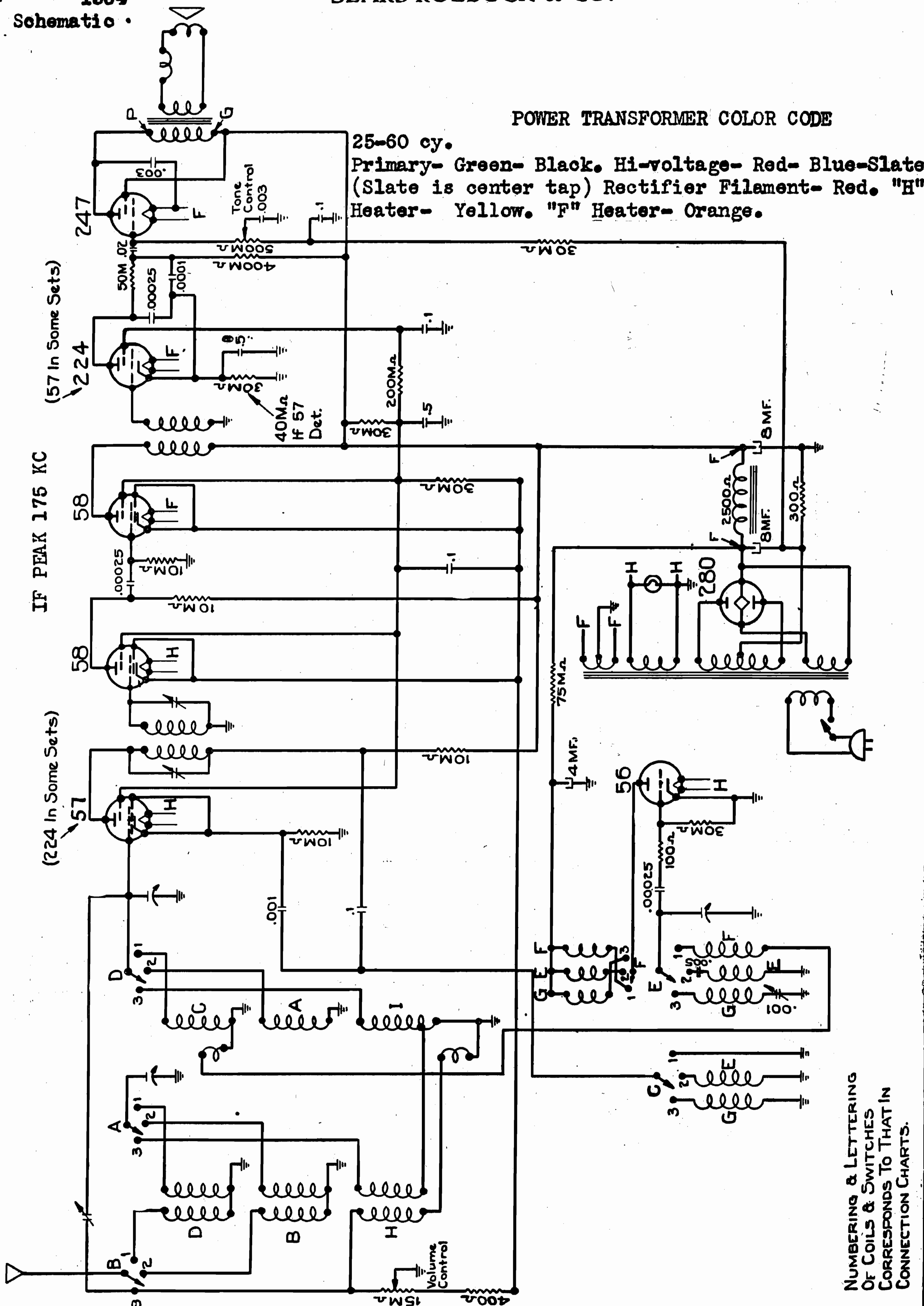


MODEL 1580,1582, 1584
Schematic

SEARS-ROEBUCK & CO.

POWER TRANSFORMER COLOR CODE

25-60 cy.
Primary- Green- Black. Hi-voltage- Red- Blue-Slate (Slate is center tap) Rectifier Filament- Red. "H" Heater- Yellow. "F" Heater- Orange.

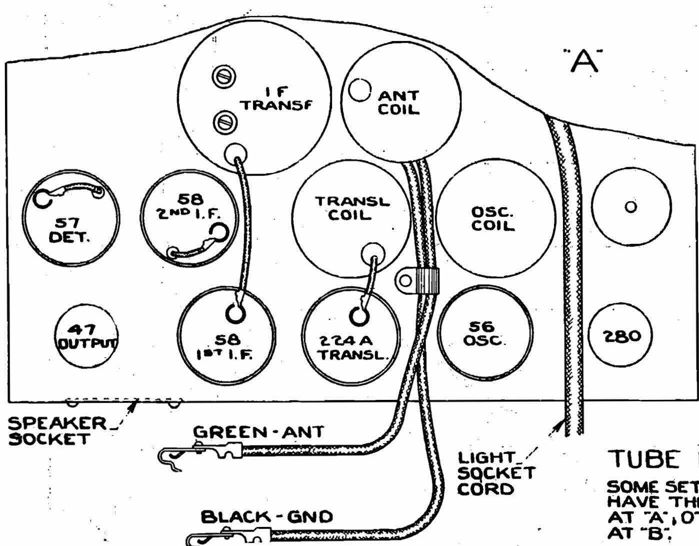


SEARS-ROEBUCK & CO.

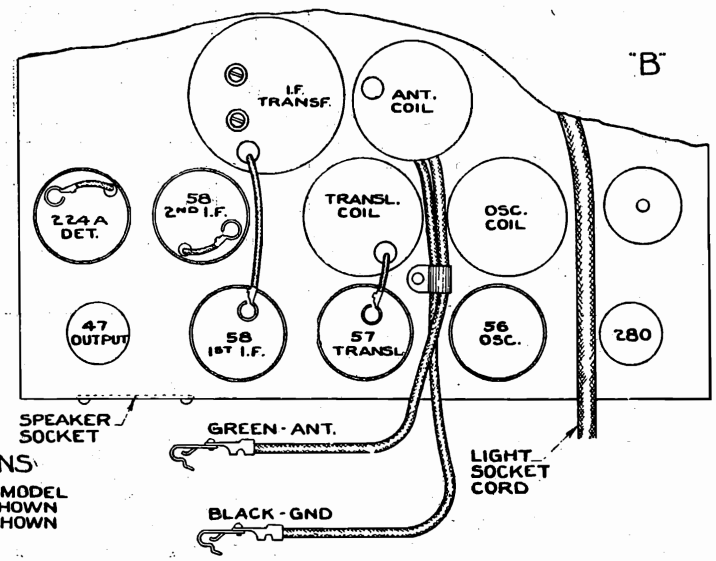
MODEL 1580, 1582, 1584
Voltage - Socket

TUBE	Fil. Volt.	Plate Volt. Vol. Max.	Plate Volt. Vol. Min.	Screen Volt. Vol. Max.	Screen Volt. Vol. Min.	Control Grid V. Vol. Max.	Control Grid V. Vol. Min.	Plate Current Vol. Max.	Plate Current Vol. Min.	Screen Current Vol. Max.	Screen Current Vol. Min.
224 - Translator *** 57 - Translator	2.5 2.5	215 215	215 215	75 75	125 125	-6 -5	-10 -7.5	.5 .5	.8 .5	.2 .25	.2 .25
58 - First I.F.	2.5	175	175	75	75	-4	-45	3.5	0	1	0
58 - Second I.F.	2.5	220	180	80	80	-4	-45	4.5	0	1	0
57 - Second Detector*** 224 - Second Detector	2.5 2.5	75 64	75 64	40 40	70 70	-3 -3.6	-5 -4.6	.1 .25	.1 .25	.05 .05	.05 .05
247 - Output	2.5	215	225	250	260	**	**	26.5	32	5.5	6.75
56 - Oscillator	2.5	40 - 60 *						4			
280 - Rectifier	4.8	Max. DC Volts - 350						25 M.A. Each Plate			

* 40 Volts when not oscillating; 60 Volts when oscillating. Stop from oscillating by touching finger to grid. Line - 117 Volts; Watts - 65.



TUBE POSITIONS
SOME SETS OF THIS MODEL HAVE THE LAYOUT SHOWN AT "A", OTHERS AS SHOWN AT "B".

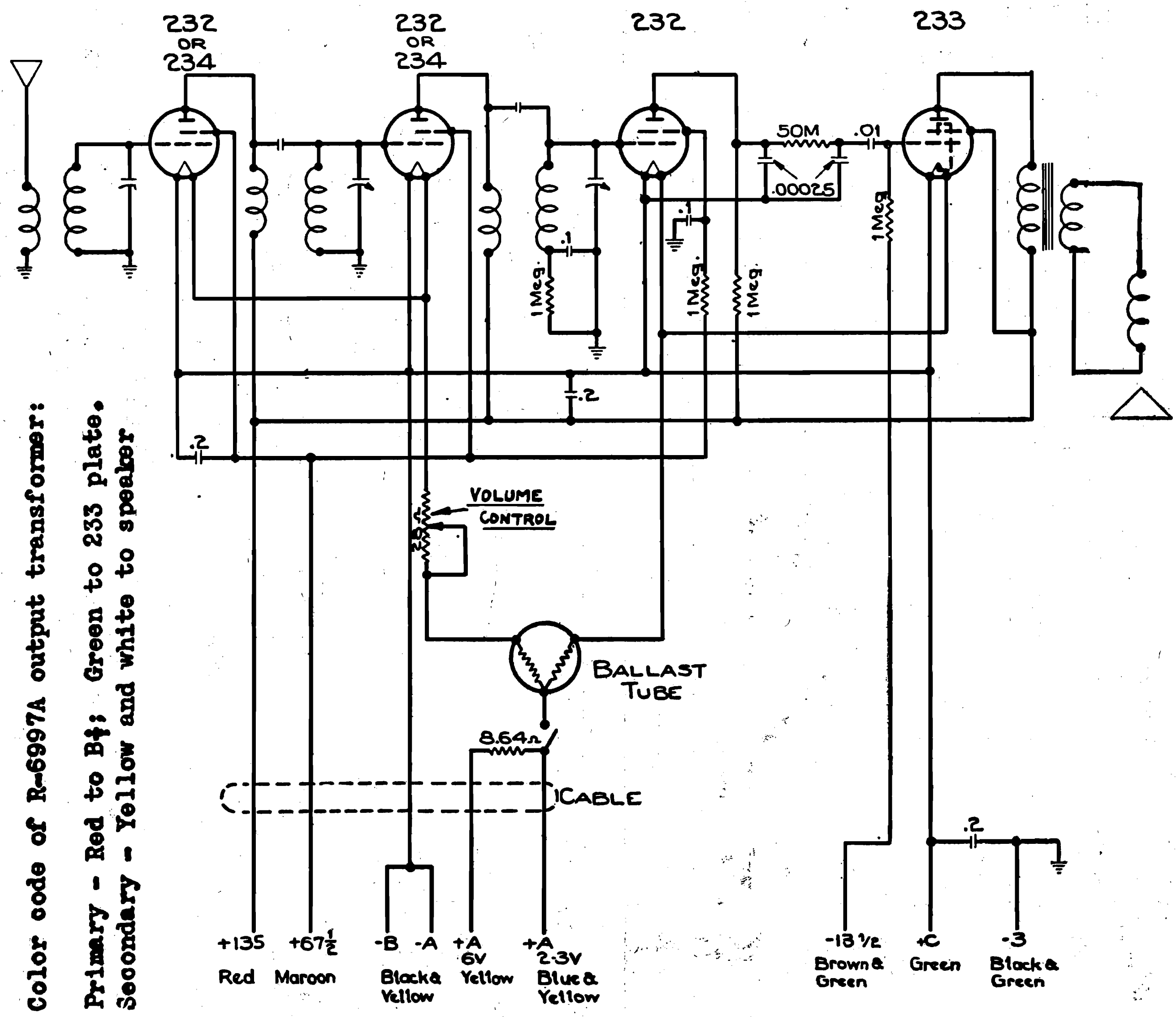


** 530,000 ohms in series.

*** Some of these sets have a 224 translator and a 57 detector. Others have a 57 translator and a 224 detector.

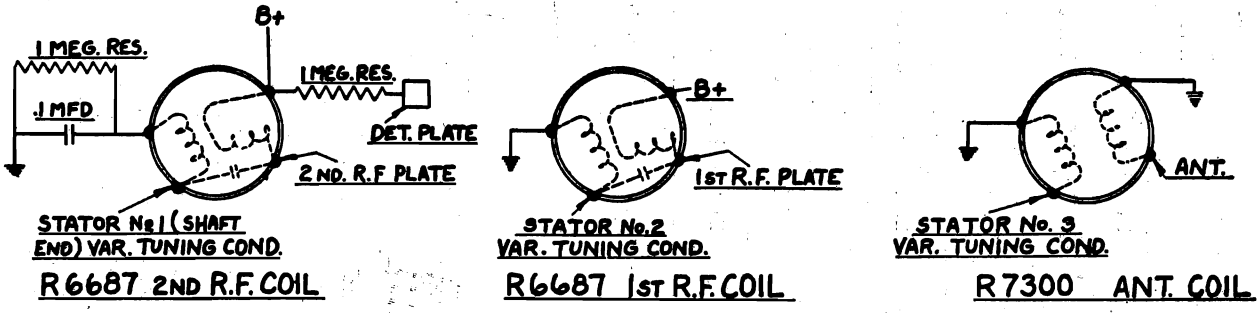
MODEL 1620,1622
Schematic

SEARS-ROEBUCK & CO.



Color code of R-6997A output transformer:

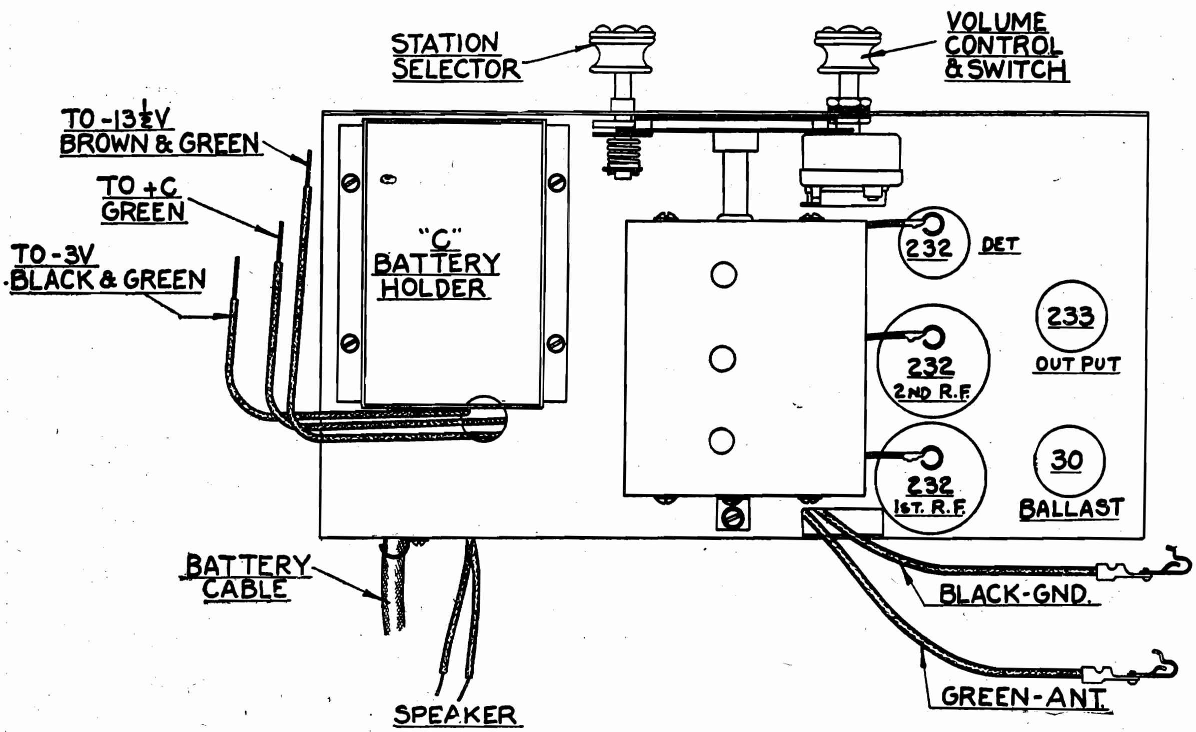
Primary - Red to B+; Green to 233 plate.
Secondary - Yellow and white to speaker



COIL CONNECTIONS
VIEWED FROM BOTTOM OF CHASSIS

MODEL 1620,1622
Voltage - Socket

SEARS-ROEBUCK & CO.



TUBE POSITIONS

TUBE	Filament Voltage	Plate Voltage	Screen Voltage	Control Grid V.	Plate Current	Screen Current
232 - First R.F.	2.1	135	67	-3	1.7	.125
232 - Second R.F.	2.1	135	67	-3	1.7	.125
232 - Detector	2.05	27*	13.5*	*	.05	Too low to read
233 - Output	2.05	135	135	*	14	4

Total "B" current drain - 22.4 M.A.
Total "A" current drain - 440 M.A.

* 1 Meg. resistor in series.

Grid, plate and screen voltages taken between negative side of filament and respective element. Volume Control at maximum.

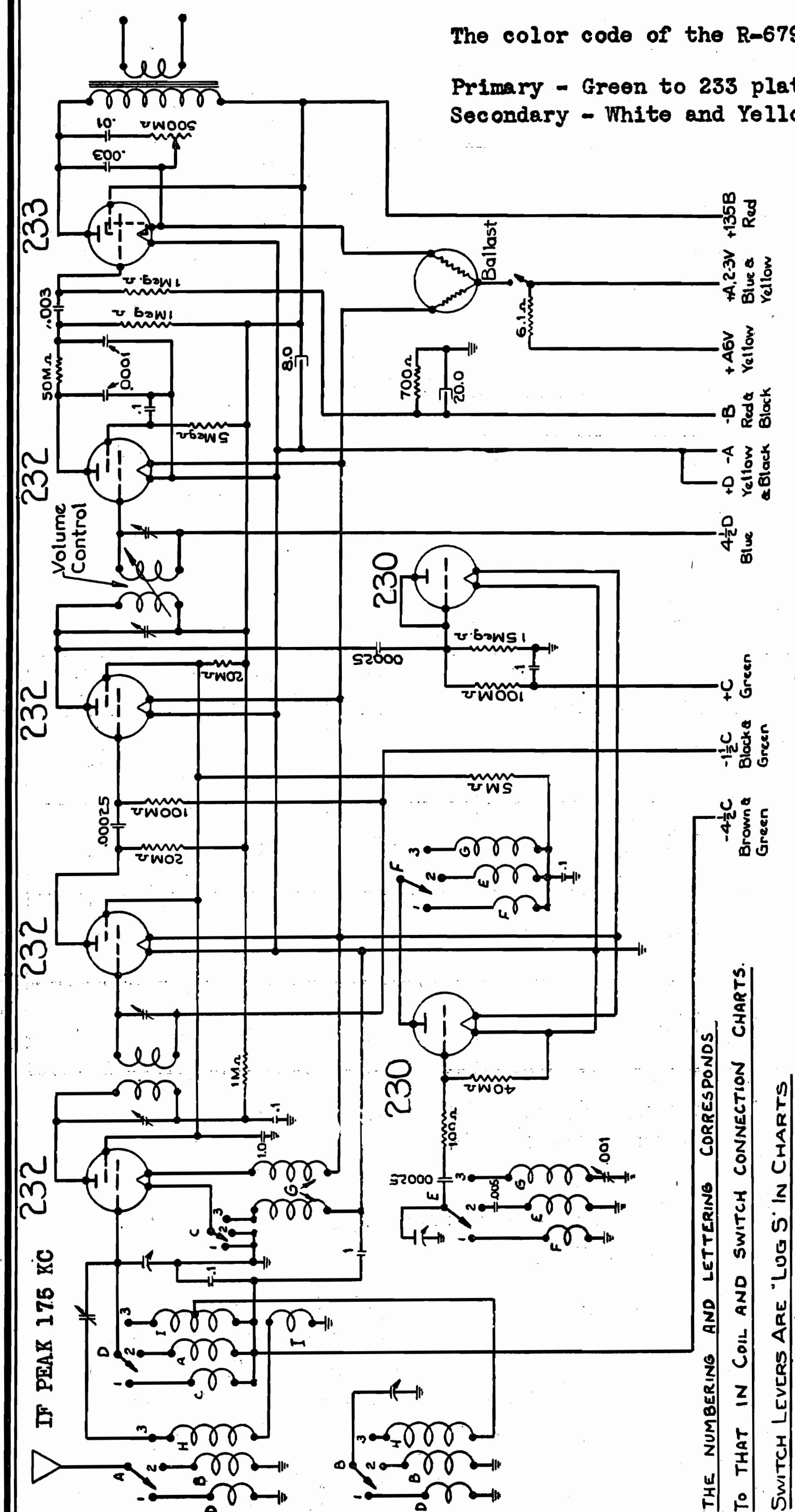
Control grid readings taken on 7.5 volt scale of 1000 ohms per volt meter; others on 250 volt scale. These are average values. Usually, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at rated plate voltage will serve as an indication of proper Grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of the cable may cause the circuit to oscillate and give erratic readings. Usually touching a finger to the grid will stop oscillation.

MODEL 1570, 1572, 1574
Schematic

SEARS-ROEBUCK & CO.

The color code of the R-6790A output transformer is:

Primary - Green to 233 plate; Red to B+
Secondary - White and Yellow to speaker jacks.



THE NUMBERING AND LETTERING CORRESPONDS TO THAT IN COIL AND SWITCH CONNECTION CHARTS.

SWITCH LEVERS ARE 'LOG S' IN CHARTS

Should the IF transformers be replaced, it will be necessary to retune them. This can be done only if the service man has a 175 kc oscillator of reasonable accuracy. An insulated adjusting screw driver must be used since the primary tuning condensers are at high d.c. potential with respect to the chassis. Further, the automatic volume control must be shorted out by a connection from C+ to the chassis. The first stage IF transformer is mounted on top of the chassis and the adjusting screws are accessible through the holes in the top of the transformer shield can. The adjusting screws for the 2nd IF stage tuning condensers are accessible through the holes in the chassis to the right of the first IF transformer, facing the front of the chassis.

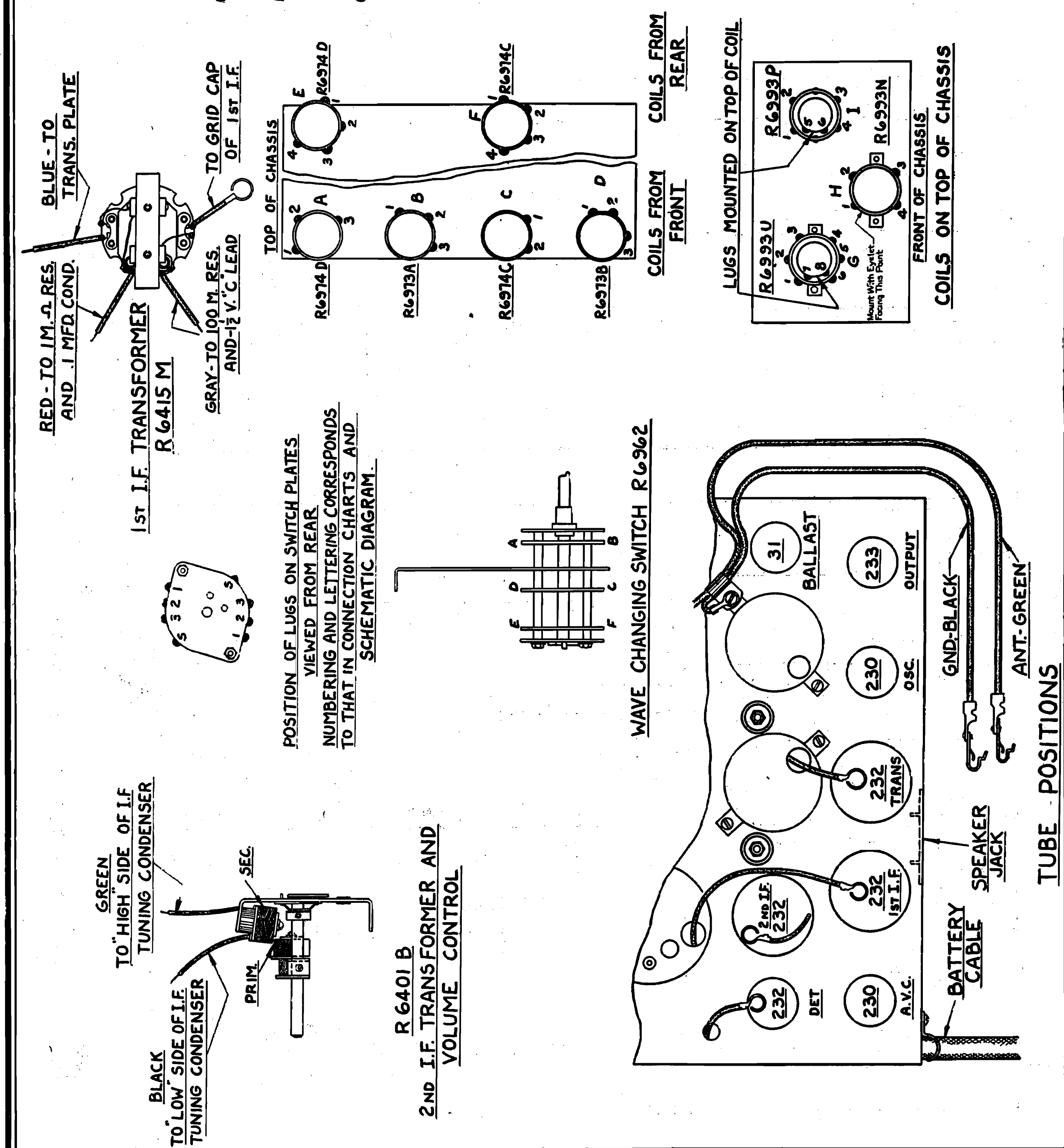
SEARS-ROEBUCK & CO.

MODEL 1570,1572, 1574
Voltage - Socket

	Fil.	Plate	Screen	C.Grid	Plt. Crnt	Scr. Crnt
232 Translator	2.	118	50	1.	.6 ma	.05 ma
232 1st IF	2.	78	50	*	2.	.4
232 2nd IF	2.	118	50	*	1.5	.1
232 Detector	2.	15*	4*	-4.5	Too low to read	
233 Output	2.	112	120	*	11.	3.
230 Oscillator	2.	44-50**	--	--	2.5 - 2**	--
230 AVC	2.	Used as rectifier with plate and grid joined.				

* High resistance in series.

**Second value applies when tube is not oscillating. Stop oscillation by touching finger to grid.



MODEL 1590,1592
Schematic-Voltage

SEARS-ROEBUCK & CO.

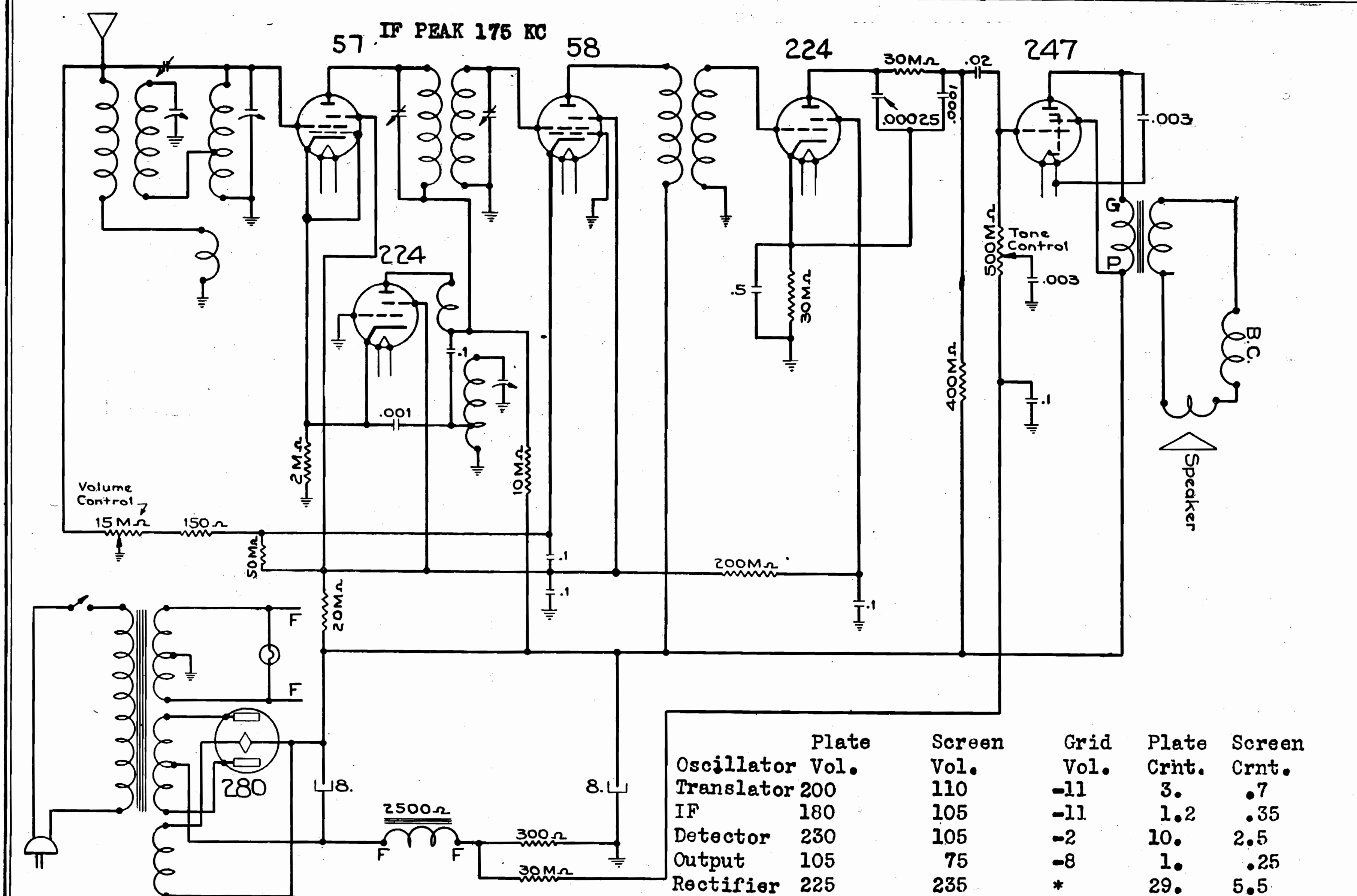


	Plate Vol.	Screen Vol.	Grid Vol.	Plate Crnt.	Screen Crnt.
Oscillator Translator	200	110	-11	3.	.7
IF	180	105	-11	1.2	.35
Detector	230	105	-2	10.	2.5
Output	105	75	-8	1.	.25
Rectifier	225	235	*	29. 27. per anode	5.5

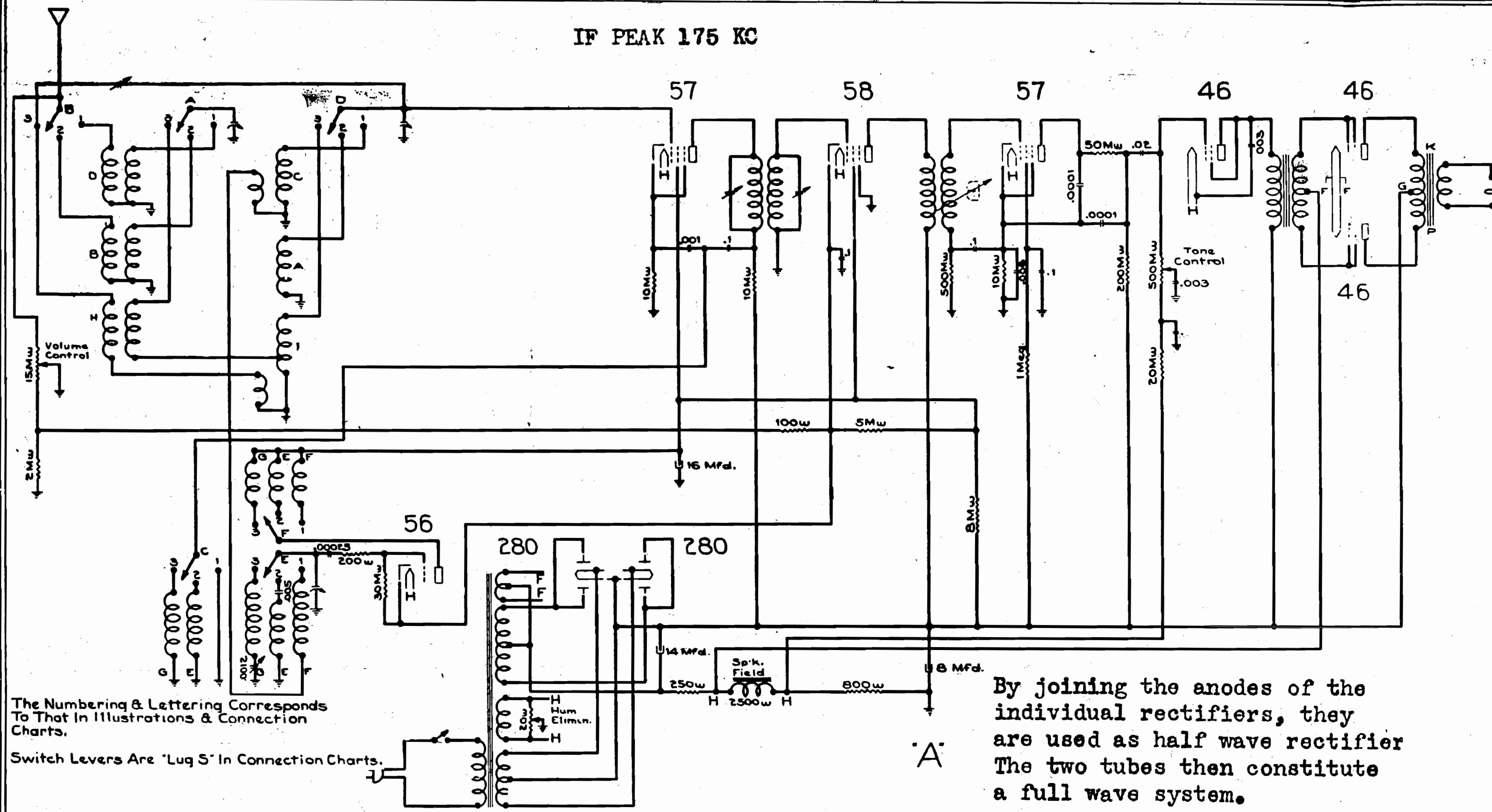
This receiver tunes from 1765 kc to 520 kc.

* 530,000 ohms in series. Volume control at maximum.

SEARS-ROEBUCK & CO.

MODEL 1630
Schematic #1

IF PEAK 175 KC



By joining the anodes of the individual rectifiers, they are used as half wave rectifier The two tubes then constitute a full wave system.

Power Transformer
Primary ---Green and Black
Hi-Voltage---Red and Blue with
Slate for center tap.
Rectifier Fil.--Red. Solid wire.
Cutput Fil.---Orange. Solid wire.
Heater.---Yellow. Solid wire.

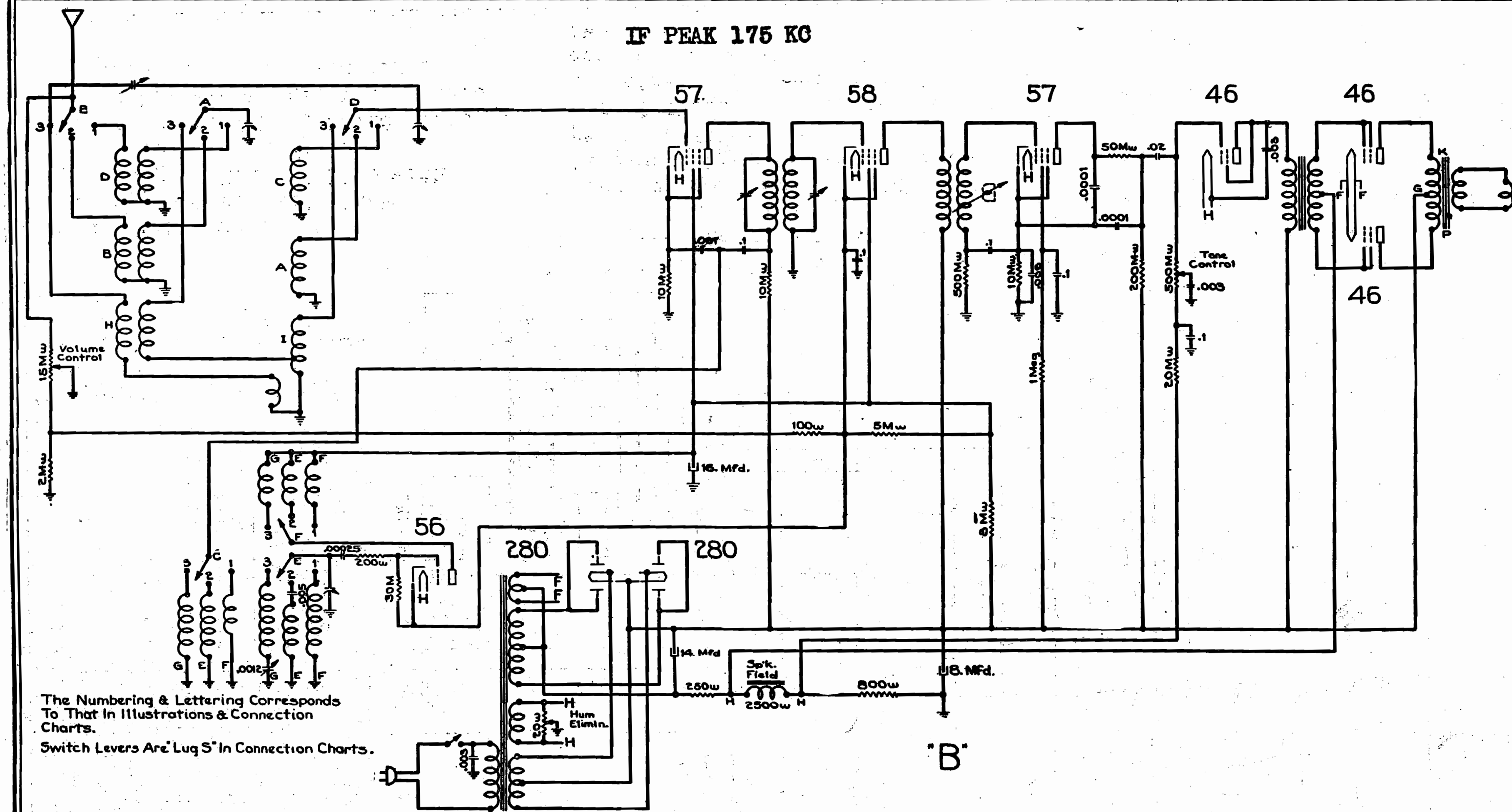
AF Transformer (Input)
Primary--- Black to driver plate.
Red to B plus.
Secondary --- Green to grid. Slate is center tap. In some sets the green lead has a tracer. Further, one of these leads (green) comes out singly from one side of the coil and connects to the grid of the 46 next to the translator.

AF Transformer (Output)
Green and Blue to 46 plates.
Red is center tap to B plus.
See schematic for connections to speaker plug.
Secondary.-- #16 enamelled wire leads to voice coil.

Speaker Field... Black and Slate.

MODEL 1630
Schematic #2

SEARS-ROEBUCK & CO.



The Numbering & Lettering Corresponds To That In Illustrations & Connection Charts.

Switch Levers Are "Lug 5" In Connection Charts.

Some sets of this model are wired as in Schematic "A"; others as in "B". Those wired as in "A" have four lugs on coil "F"; those wired as in "B" have five lugs.

Because constants must be correct for proper operation, substitute parts should not be used when replacements are needed. The polarity of the AF transformers is critical and must be maintained as shown in the illustration and Connection Chart when new transformers are installed.

By joining the anodes of the individual rectifiers, they are used as half wave rectifiers. The two tubes then constitute a full wave system.

SEARS-ROEBUCK & CO.

MODEL 1630
Voltage - Data

INSTRUCTIONS FOR ALIGNING SHORT WAVE COILS

It sometimes happens that all-wave receivers which are in perfect alignment at broadcast frequencies are out of alignment on short waves. Reception of the same station at two points a few divisions apart on the dial, or poor sensitivity, results. This condition will be most liable to occur on the shortest wave-range, for two reasons. First, the required accuracy of alignment is much greater on this range. For instance, assume a receiver tuned to 600 kc. with its oscillator high in its frequency setting by .2%. That means the IF signal generated will be 176.55 kc. instead of 175 kc. Satisfactory reception still is possible. Now suppose the receiver is tuned to 15,000 kc. The IF signal then becomes 205 kc and reception is impossible, although the oscillator is still "out" only the same .2%. The second reason is that the coils for the shortest wave-range have the fewest turns and lowest inductance. Consequently, a change in the position of a single turn means a change in a comparatively large percentage of the total turns on the coil, with resultant effect on frequency. If a coil with ten turns has one shifted, 10% of the total are thereby shifted. But if a coil has a hundred turns and one is shifted, only 1% of the total are shifted. Thus it is apparent why realignment most often is necessary on the shortest wave-range.

When realignment is called for, it can be done as follows: Tune in a station at about 6200 kc. If the station is heard at two points, tune to the one of higher frequency. If none can be picked up, the noise level will serve as an indication of sensitivity. Then shift an end turn of wire toward or away from the other turns on the high-range translator and band-pass coils until maximum signal or noise is heard. These coils are the lower two of the four mounted on the switch plate. (Coils "C" and "D" in Service Manual illustrations) When the best spacing of the turn for maximum volume is found, the wire should be secured in place with amberoid or similar substance.

If the receiver is equipped with automatic volume control, this should be rendered inoperative or else a small signal input used. One method is to twist the antenna lead-in around the receiver's antenna lead for a few inches instead of connecting it directly to the antenna lead clip. The input can then be varied by changing the length for which the leads are twisted.

	Plate Vol.	Screen Vol.	Grid Vol.	Plate Crnt.	Screen Crnt.
56 Oscillator	75	-	-8	5	-
57 Translator	240	70	-6	.4	.1
58 IF	240	70	-2	9	2.
57 Detector	115	80	-2	.5	.1
46 Driver	240	240	-10*	12	2.5
46 Class "B"s	385	7	+7	30-65**	1.7-15**
280 Rectifier	Max. d.c.	390 volts		25 ma per plate of each tube	

* 520,000 ohms in series

** Second value applies when a very loud signal is being received. Grid current is for both grids. Values are per tube.

Touching a finger to the grid of a tube will cause it to cease oscillating.

MODEL 1640
Schematic

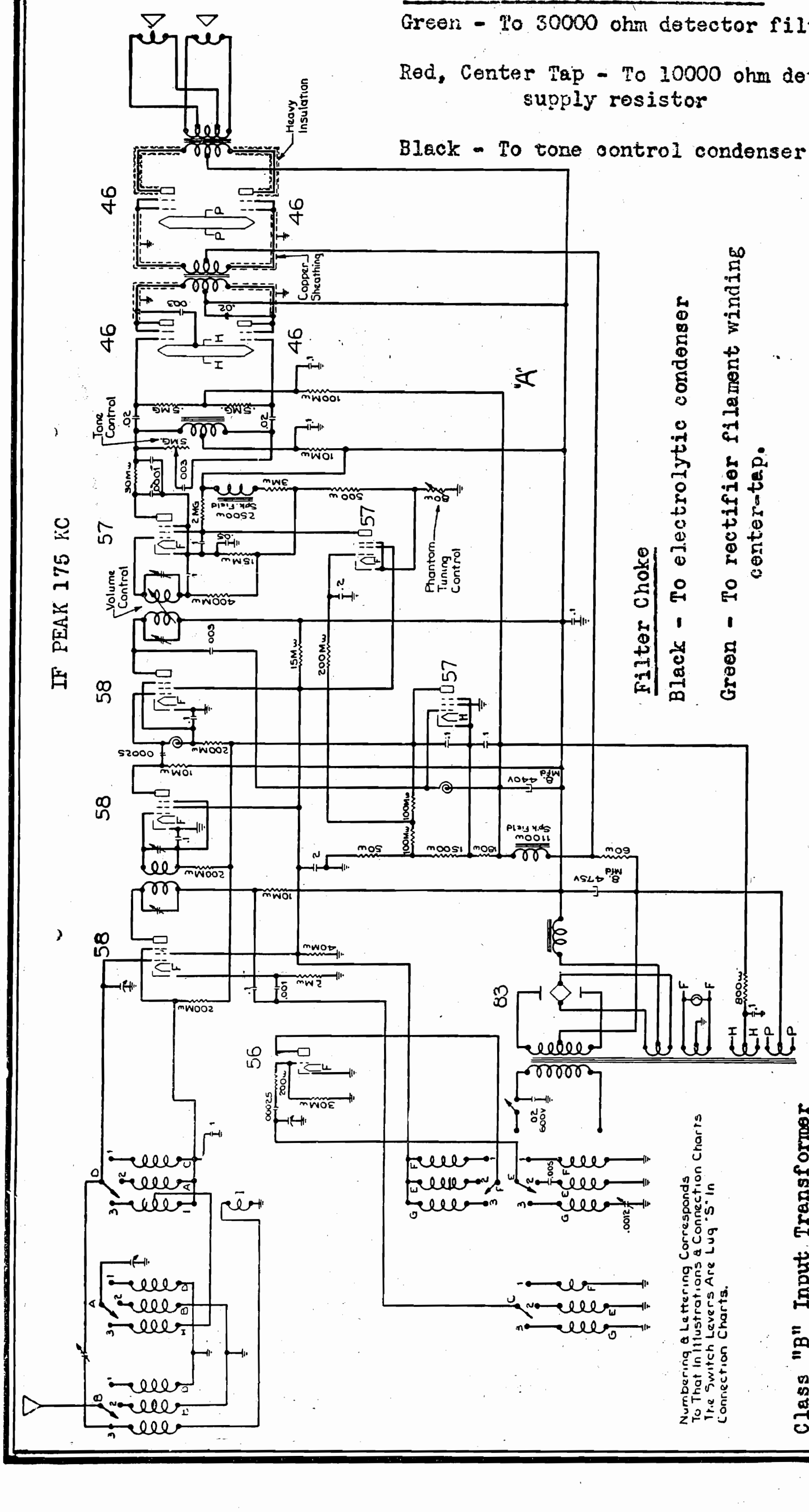
SEARS-ROEBUCK & CO.

<u>Driver Input Auto-Transformer</u>

Green - To 30000 ohm detector filter resistor

Red, Center Tap - To 10000 ohm detector plate supply resistor

Black - To tone control condenser



<u>Filter Choke</u>

Black - To electrolytic condenser

Green - To rectifier filament winding center-tap.

<u>Class "B" Input Transformer</u>

<u>Primary;</u>

Black, in Shielded Lead - To plate of the Driver tube next to A.V.C. tube.

Red, Center Tap - To B +

Black with Tracer, in Shielded Lead - To plate of the Driver tube next to Translator tube.

Shield Pigtail - To ground

<u>Secondary;</u>

Green in Shielded Lead - To grid of the Class "B" tube next to rectifier tube.

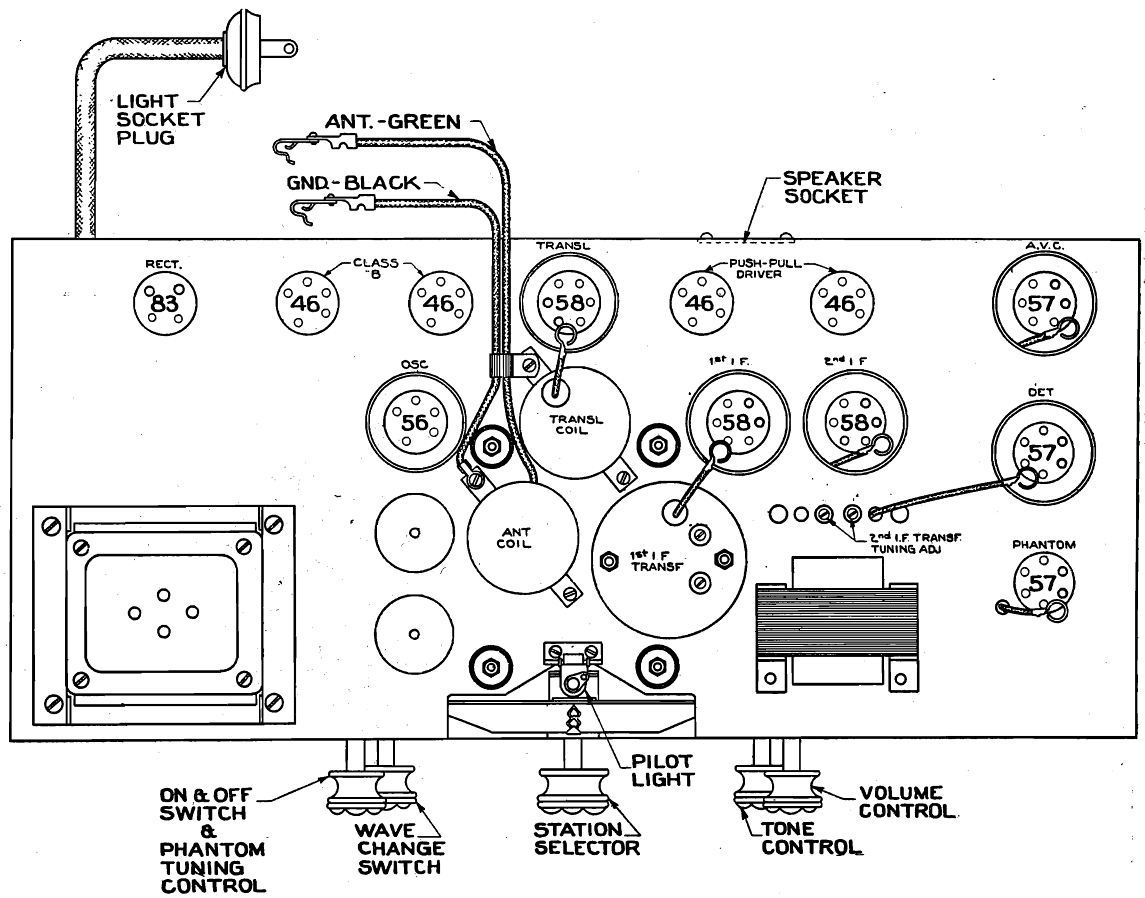
Slate, Center Tap - To 60 ohm bias resistor and heater prong of speaker socket.

Green with Tracer, in Shielded Lead - To grid of the Class "B" tube next to Translator tube.

Shield Pigtail - To ground.

SEARS-ROEBUCK & CO.

MODEL 1640
Voltage-Socket



TUBE VOLTAGE and CURRENT CHART

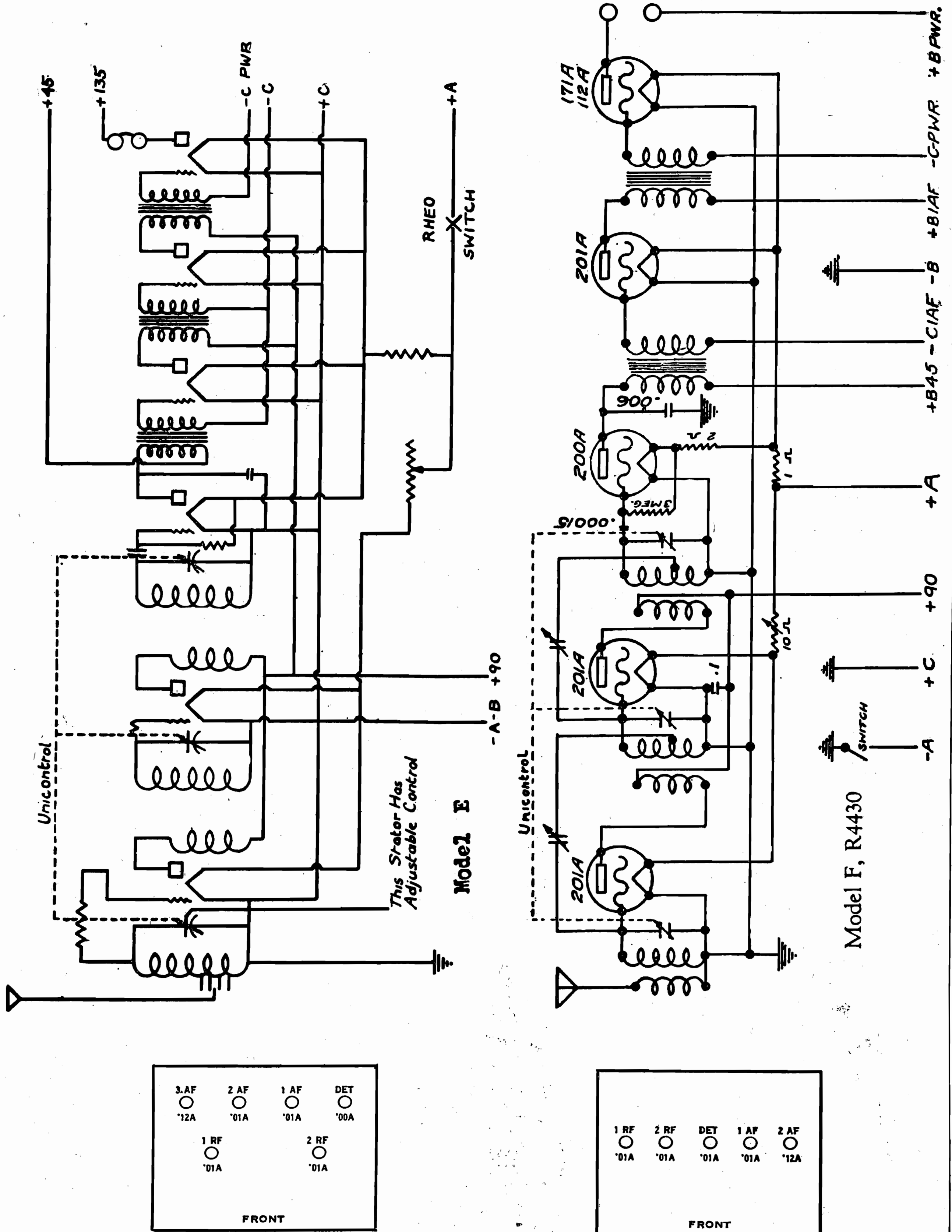
MODEL 71

TUBE	PLATE VOLTAGE	SCREEN VOLTAGE	GRID VOLTAGE	PLATE M.A.	SCREEN M.A.	GRID M.A.
58 - Translator	190	60	-5	.4	.2	
56 - Oscillator	65	--	-10	4	--	
58 - 1st IF	170	65	*	3	.8	
58 - 2nd IF	200	65	*	4.5	1	
57 - Detector	170	40a	*	.2a	b	
46 - Drivers	250	250	-10*	18	3.5	
46 - Class "B"	370	5	+5	21-50c	.5-5c	1.8-11c
57 - A.V.C.	50	80	-10	b	b	
57 - Phantom	45a	65a	*	b	1.25d	
83 - Rectifier	Max. d.c. - 390 Volts			70 m.a. each plate		

* High resistance in series
a "Phantom Tuning Control" knob turned all the way to the right
b Too low to read.
c The latter value when a loud signal is being received.
d "Phantom Turning Control" knob turned all the way to the left,
(but not so far as to switch set off).

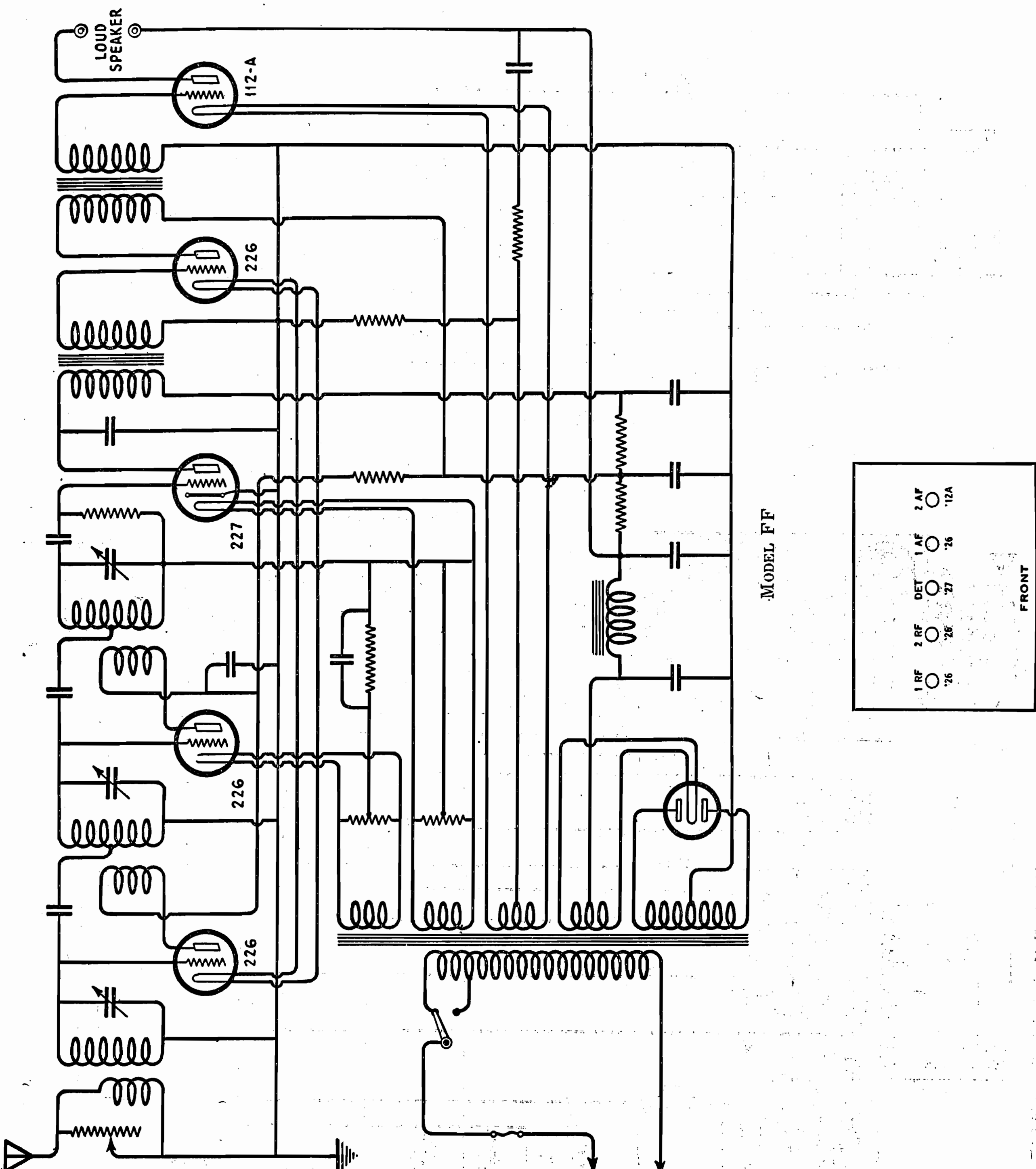
MODEL Silvertone E
MODEL Silvertone F

SEARS-ROEBUCK & CO.



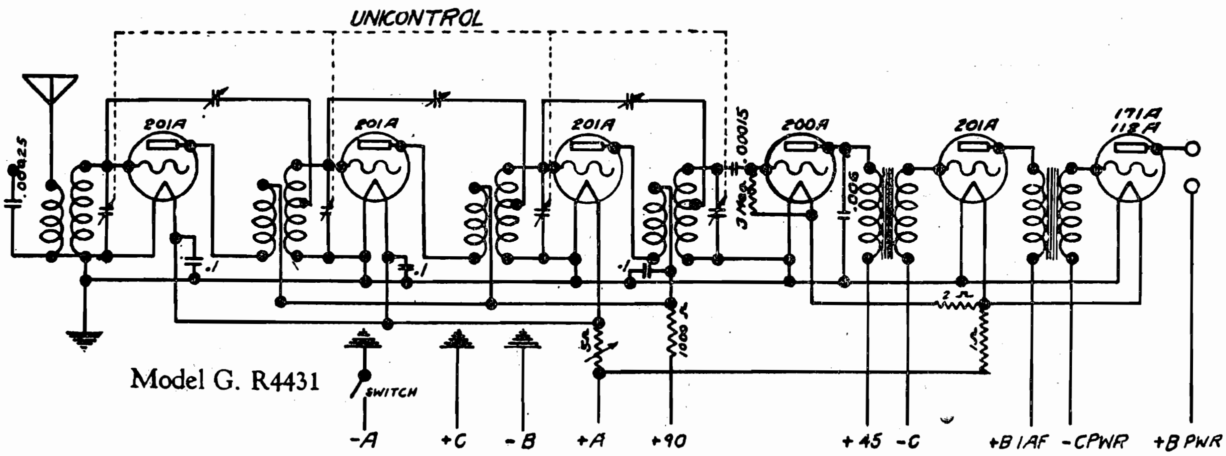
MODEL Silvertone FF

SEARS-ROEBUCK & CO.

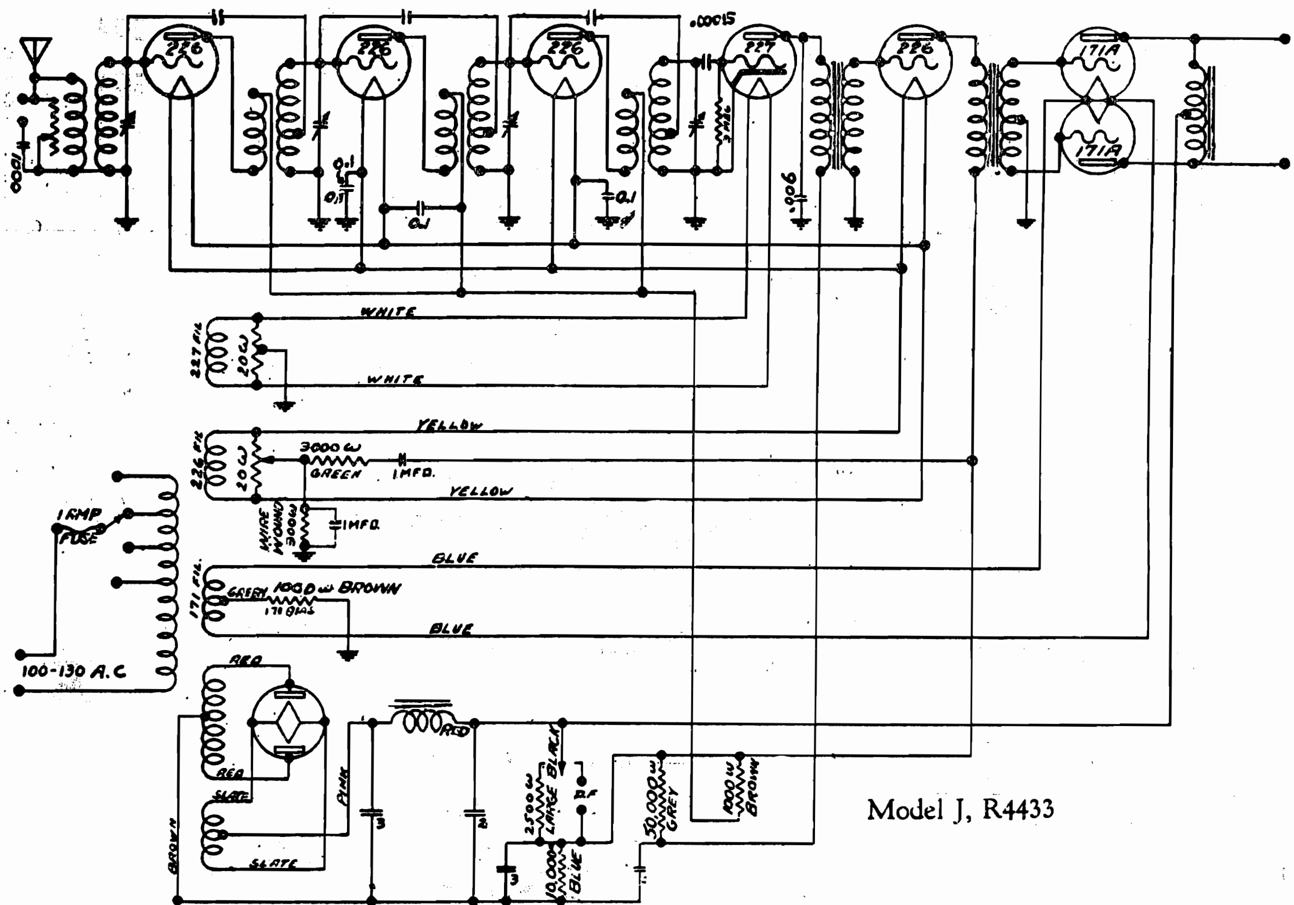


MODEL Silvertone G
MODEL Silvertone J

SEARS-ROEBUCK & CO



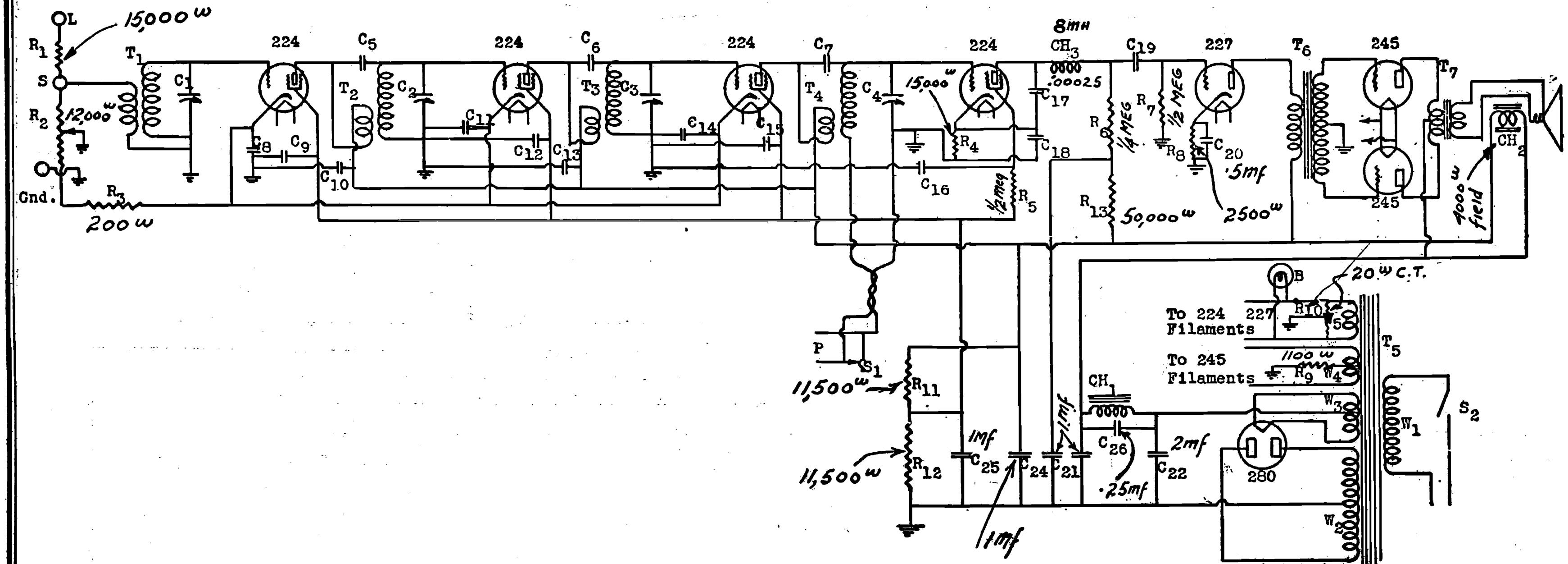
Model G. R4431



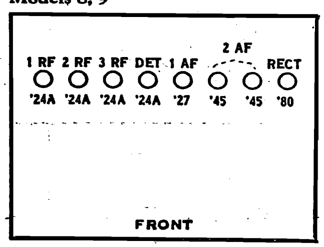
Model J, R4433

SENTINEL RADIO CORP.

MODEL 8, 9
Schematic
Voltage



Models 8, 9



—Tube Voltages—

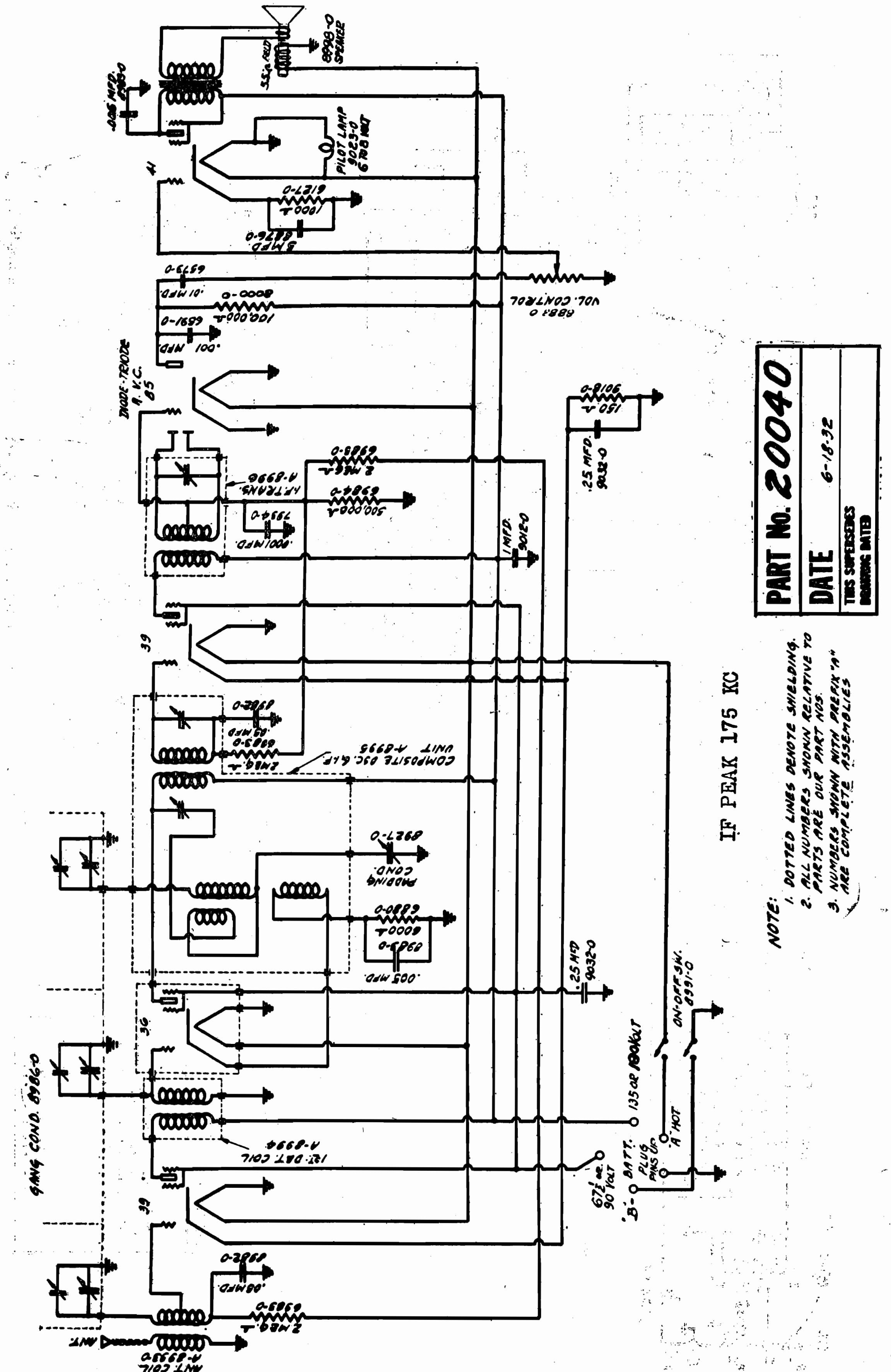
Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	Normal Plate M. A.	Screen Volts
224	1st R. F.	2.25	190	2.5	4.0	89
224	2nd R. F.	2.25	190	2.5	4.0	89
224	3rd R. F.	2.25	190	2.5	4.0	89
224	Detector	2.25	80*	4.2	.2	10*
227	1st Audio	2.25	170	12	4.5	
245	Output	2.35	250	50	30	
245	Output	2.35	250	50	30	
280	Rectifier	4.75			55*x	

*These readings are only comparative and are not true voltages applied. The volt meter when readings are taken at these points is in series with a very high resistance.

*x 55 M. A. drain each plate.

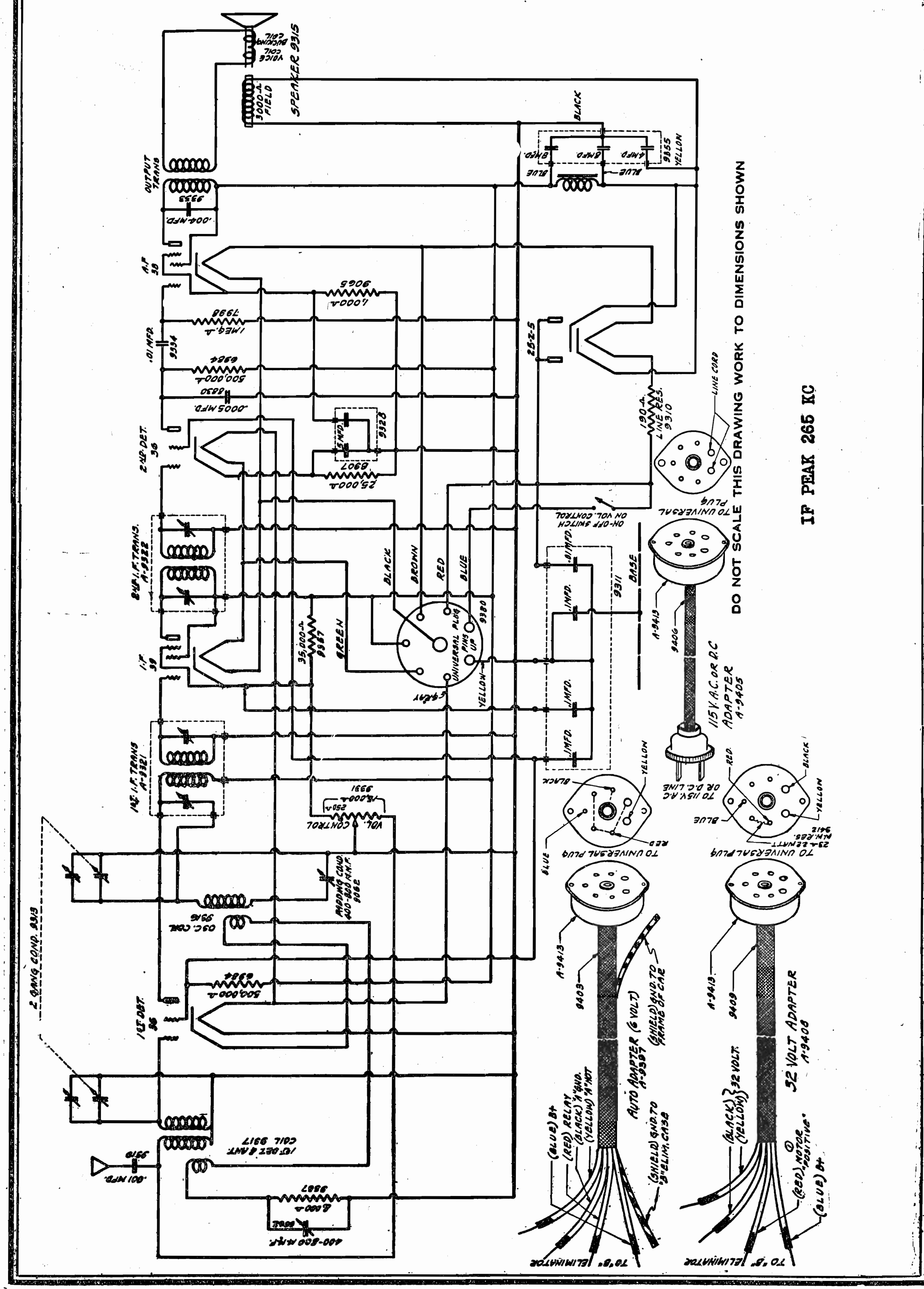
MODEL 261

SENTINEL RADIO CORP.



SENTINEL RADIO CORP.

MODEL 560,561
Schematic



MODEL 560,561
Installation
Notes

SENTINEL RADIO CORP.

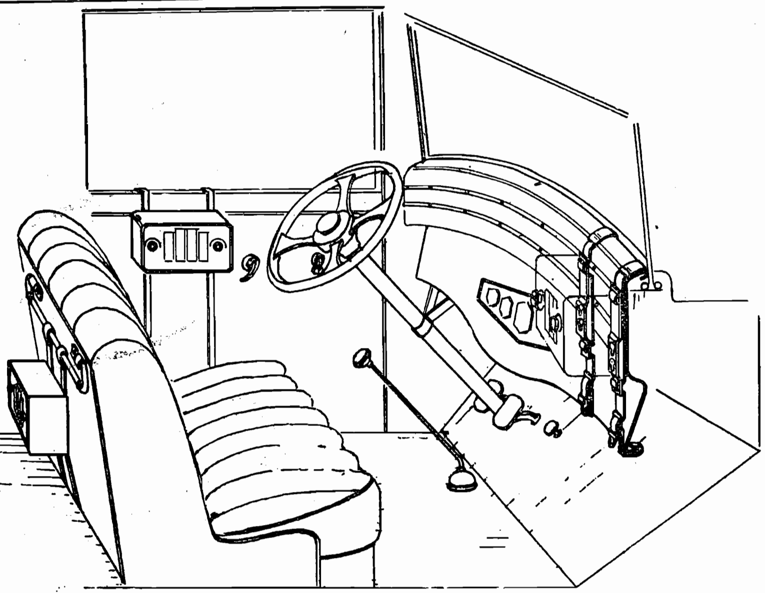
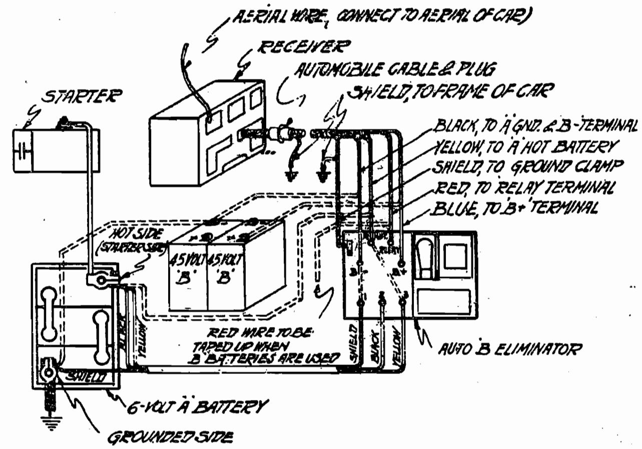
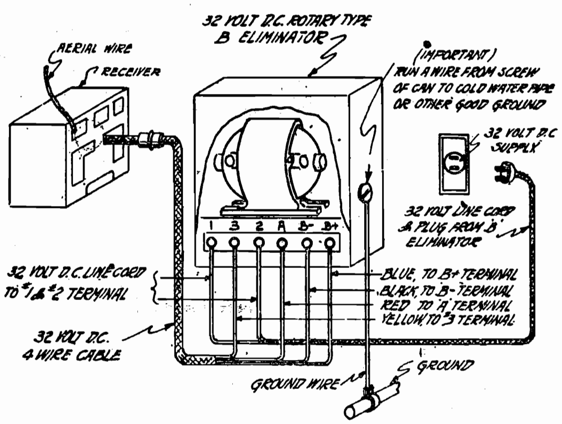


FIG.1 SKETCH SHOWING VARIOUS MOUNTING OF RECEIVER



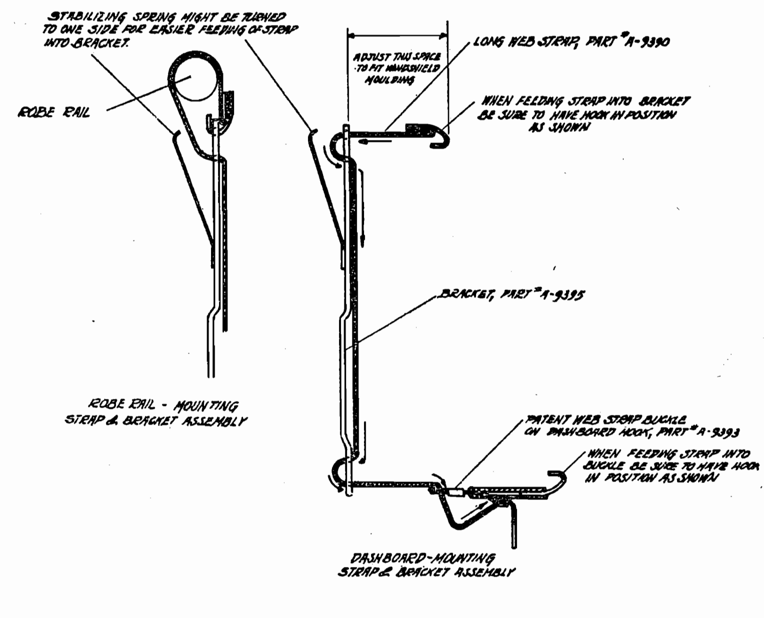
NOTE:- DOTTED LINES SHOW CONNECTIONS TO B BATTERIES WHEN B ELIMINATOR IS NOT USED

FIG. #2 SKETCH SHOWING CABLE CONNECTIONS TO B ELIMINATOR OR B BATTERIES FOR 6 VOLT A AUTO OPERATION



NOTE:- IF B BATTERIES ARE USED INSTEAD OF B ELIMINATOR, CONNECT THEM TO SET CABLE WIRES AS SHOWN IN DOTTED LINES IN FIG #2. THE YELLOW AND BLACK CABLE WIRES ARE CONNECTED TO LINE CORD & PLUG FOR 32 VOLT SOCKET CONNECTION.

FIG #3 SKETCH SHOWING CABLE CONNECTIONS TO B ELIMINATOR FOR 32 VOLT D.C. OPERATION



METHOD OF FEEDING STRAP INTO BRACKET & BUCKLE

FIG. #4

MODEL 560,561
Voltage Data
Part 1

SENTINEL RADIO CORP.

SERVICE NOTES
for the
FIVE TUBE AC-DC SUPERHETERODYNE
(110 V. AC-DC, 6 V. Storage Batteries & 32 V. DC)

VOLUME CONTROL: The volume control is located on the left hand side of the chassis. It is a fifteen thousand ohm potentiometer and attenuates by controlling the bias on the intermediate frequency tube and also attenuates in the anntena circuit, by shunting the input. The off and on switch is controlled by the volume control knob. When the volume control is turned to the maximum counter-clockwise position the receiver is turned off and is placed in operation by the reversed action. The quality of the reproduced signal is not affected by the setting of the volume control, except if it is too far advanced to the right on strong local signals the detector tube will naturally overload. This condition will be indicated by the volume decreasing and the tone quality being impaired. Retarding volume control in the counter-clockwise direction will increase volume and eliminate distortion. This is natural and does not indicate a defect in the receiver or a defective volume control. A double peak will be noticed when the detector is overloaded, that is the station will be heard on either side of the correct tuning point with more volume than at the correctly tuned position. If an extremely long aerial is used the overloading position of the volume control will be further towards the minimum volume position than if a short antenna is used likewise local signals will overload the detector more readily than distant reception.

INTERMEDIATE TRANSFORMERS: The intermediate transformers are tuned to 265 kilocycles. The intermediate frequency transformer trimmers are rigidly mounted and the transformers are so constructed that the transformer rarely becomes detuned. FOR THIS REASON IT SHOULD NEVER BE NECESSARY TO RETRACK THE INTERMEDIATE TRANSFORMERS UNLESS ONE OF THE TRANSFORMERS HAS BECOME DEFECTIVE AND REQUIRES REPLACEMENT. The first and second intermediate transformers have two trimmers each which are accessible through the small holes in the side of the shield can.

ELECTRO DYNAMIC SPEAKER: The speaker has a DC field resistance of 3000 ohms.

OSCILLATOR: The 36 tube is used as a modulator (1st detector) and oscillator by a method which sacrifices none of the qualities of either function. The combined circuit is such that it is not super-critical and special selection of 36 tube is not required. Any good 36 tube with correct characteristics will work satisfactorily in this stage. If the receiver only operates over a portion of the broadcast band, (long wave length) the trouble may be due to a tube which does not have proper characteristics. The remedy is, of course, to replace the 36 tube.

ANTENNA: Approximately 25 feet of aerial wire wound on a fibre spool is provided with the receiver. The winding spool or the contact lug on spool should not be destroyed and the aerial wire should be rewound on the spool when transporting the receiver. This will prevent kinks and knots in the wire and in this way prevent the insulation from breaking down. In most locations running the aerial wire provided around the moulding of the room will provide satisfactory reception. Where distant daylight reception is desired especially in isolated communities it may be necessary to attach an additional aerial to the antenna spool contact lug. In some locations where it is inconvenient to install an additional aerial improved reception may be obtained by attaching the contact lug to a steam radiator, water pipe, electrical conduit, curtain rod, etc. Always be sure that the lug makes firm contact otherwise noisy reception will result. This will not work satisfactorily in all locations. The results can only be determined by actual experimentation.

Where the set is to be used in buildings constructed with a large amount of steel, running the aerial around the room will generally prove unsatisfactory. Dropping the aerial out of the window may improve reception considerably. If this does not improve results it will be necessary to install an additional outside antenna. Another condition which may require an outside aerial is in DC installations because when operating the receiver on DC it will be found that in most instances the noise interference is greater than when the receiver is used on AC current. DC appliances such as motors, fans, etc. as a general rule, cause more interference than similar AC equipment. Unfortunately this interference can only be eliminated at the source of the interference. By connecting the antenna to an outside aerial the interference can generally be minimized as the increased volume obtained with the longer aerial permits a lower minimum volume control setting and a consequent apparent reduction in noise interference.

TUBES: The receiver utilizes the following tubes:

One (1) Type 36 as a composite oscillator and modulator tube.
One (1) Type 39 intermediate frequency amplifier tube.
One (1) Type 36 (second) detector.
One (1) Type 38 output tube.
One (1) Type 25z5 rectifier tube.

The receiver is shipped with tubes in their respective sockets. While it is possible to remove or install some of the tubes by removing the back of the cabinet it is suggested that the set be removed from the cabinet whenever the tubes are to be checked. To do this remove the back of the cabinet, volume control and tuning control knobs, and the four screws which hold the set to the cabinet. This will permit removal of the chassis from the cabinet by sliding the chassis outward through the back of the cabinet. Excessive hum when tuning in stations may be caused by a defective 36, 39 or 25z5 tube. Installing new tubes will indicate the defective tube or tubes. Be sure when replacing tubes that the new AC type (humless type heaters) be used. Otherwise the hum level may be high. In a great many cases considerable difference in hum will be noticed even between tubes made by the same manufacturer.

VOLTAGE TABLE: Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table #1 is taken at 115 volts (AC) line with the volume control in the full on position. It must be remembered that the voltage readings vary directly as the line voltage and also with the accuracy of the meters used. A variation of 10% plus or minus is permissible. THE VOLTAGES WILL BE APPROXIMATELY AS GIVEN FOR EITHER DC OR AC OPERATION.

TUBE VOLTAGES — Table #1

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.5	108	21*	2.5
39	Intermediate Frequency	5.6	108	108	2.5
36	Detector	5.7	27*	21*	2.5
38	Output	5.8	103	108	1.5*
25z5	Rectifier	29.0	52.5 MA		

MODEL 560,561
Voltage Data
Part 2

SENTINEL RADIO CORP.

The voltage table #2 is for 6 volt battery operation with a B eliminator which is especially designed for the model #561 receiver. The voltages as given will be correct for 32 volt DC operation in conjunction with a B eliminator of the recommended factory type. It will be found that on certain types of eliminators which do not have sufficient output or a low 6 volt battery, the readings will be lower than that given in the voltage table.

TUBE VOLTAGES — Table #2

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.8	112	25*	2.5
39	Intermediate Frequency	5.8	112	112	2.9
36	Detector	5.8	28*	25*	2.0
38	Output	5.8	108	112	1.5*
25z5	Rectifier	52.5 MA			

* These readings for both Table #1 and #2 are only comparative and are not true voltages applied. The voltmeter, when readings are taken at these points, is in series with a very high resistance.

IMAGE SUPPRESSION: Occasionally in some locations interference in the form of whistles or stations which are tuned in on dial settings other than the station's frequency may be encountered. This is a rare occurrence and is called image interference caused by two signals whose frequencies differ by twice the intermediate frequency. This should not be confused with heterodyne whistles which are caused by two stations being received whose frequencies are the same nor by local stations whose frequencies are close to some out-of-town stations frequency which might result in reception from both stations. To overcome this possibility of image interference an image suppression circuit is incorporated in the receiver. The image adjusting condenser is mounted on the back of the chassis below the first IF transformer shield and is accessible through the hole in the chassis. If a whistle or interfering station is received on a frequency other than its fundamental, tune the receiver to this interference and adjust the image suppression condenser until the interference disappears or until the interference is at the minimum point. UNLESS THERE IS AN ACTUAL IMAGE INTERFERENCE DO NOT ATTEMPT TO ADJUST THE IMAGE SUPPRESSION CIRCUIT.

INTERMEDIATE FREQUENCY ALIGNMENT: Only when an intermediate transformer has become defective, due to an open or burned out winding, should it be necessary to readjust the intermediate stages. Should this occur it is necessary that an oscillator be used with some type of output measuring device so as to correctly tune the transformers. To align the intermediate transformers connect the high side of the oscillator output to the control grid of the 36 oscillator modulator tube leaving the grid cap disconnected from the tube. The ground side of the test oscillator should be connected to the gang condenser frame and MUST NOT OTHERWISE BE GROUNDED. Set the oscillator at 265 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Align the first intermediate transformer by turning the intermediate frequency trimmer screw up and down until maximum reading is obtained on the output motor. Both the primary and secondary trimmer screws should be adjusted in this manner. It is always best to recheck the grid side of the intermediate frequency transformer adjustment to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate transformer. After both intermediate transformers are adjusted the alignment of the intermediate stage is complete and the trimmer should not be further disturbed, and the grid cap should be connected to the grid of the 36 tube.

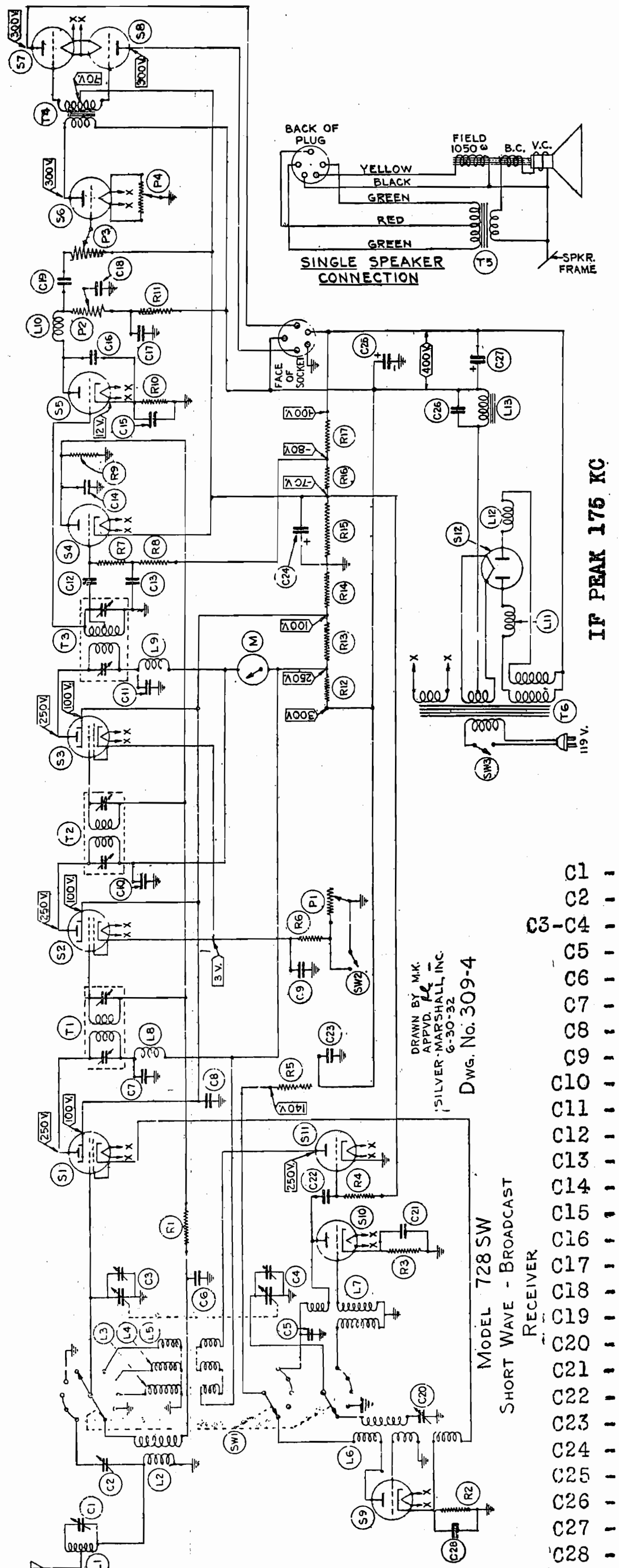
VARIABLE CONDENSER ALIGNMENT: If the intermediate frequency stage has been realigned or if an antenna or oscillator coil requires replacement it will be necessary to realign the variable condenser. The front section of the variable condenser (looking at the front of the receiver) is the oscillator section, the other section tunes the antenna stage. Tune the receiver to 1720 kilocycles on the dial and set the oscillator at this frequency. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Next adjust the trimmer screws of the oscillator and antenna sections which are mounted on top of the variable condensers so as to obtain maximum output reading. It will be found that the oscillator section trimmer condenser will in most cases have to be adjusted to minimum capacity and in some instances it may be necessary to remove the trimmer screw entirely. After the trimmers have been correctly adjusted, at this frequency, tune the receiver to 600 kilocycles and adjust the oscillator to 600 K.C. Next, adjust the oscillator padding condenser (which is located directly below the variable condenser and accessible through the hole in the front of the chassis) to obtain maximum reading on the output meter. If the above is correctly followed the receiver will now track correctly over the entire band from 1720 KC to 550 KC. It is always advisable to align the receiver, whenever possible, with the tubes that are to be used in the set.

AUTO INSTALLATION: The receiver may be mounted in any convenient place in the automobile such as the robe rail in back of the front seat, between the dashboard and windshield frame or on the under side of the dashboard head. It is well to remember that the further away from the motor the less the ignition noise is likely to be. The receiver should be so mounted that it does not strike the body through bouncing or road jars as the cabinet may be damaged if the set is permitted to swing freely. The mounting brackets have lugs on both ends which should be hooked between the windshield frame or robe rail or wherever the set is to be mounted and the bottom lug hooked to some part of the body or body bolts and the slack in the straps taken up by adjusting the adjusting buckle so that the set is held rigidly in position. The four studs provided should be screwed into the four threaded holes in the back of the chassis. Each of the strap mounting brackets has two holes into which the stud should be inserted and by pulling upward on the straps the stud will be locked into position. Pushing the strap downward will unlock the studs and permit removal of the brackets.

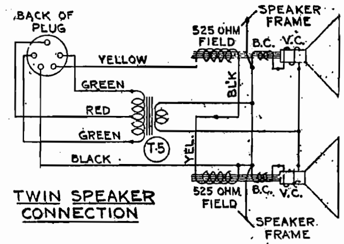
CAR ANTENNA: It is very important that a good aerial be used as an insufficient or ineffective aerial will result in poor reception. A simple aerial installation that will give good results can be had by using about 50 feet of stranded insulated wire, running the wire under the car back and forth between the two running boards, using care not to stretch the wire too tightly as the bouncing of the car will break the wire. An aerial in the top of the car insulated from the body will in most instances be an excellent one. Many of the latest model automobiles are factory equipped with this type aerial. A strap type or plate type antenna mounted beneath the automobile will generally be an effective antenna. The closer to the ground this type of aerial is permitted to extend the greater its efficiency.

MODEL 728 SW

SILVER - MARSHALL, INC.



SINGLE SPEAKER CONNECTION



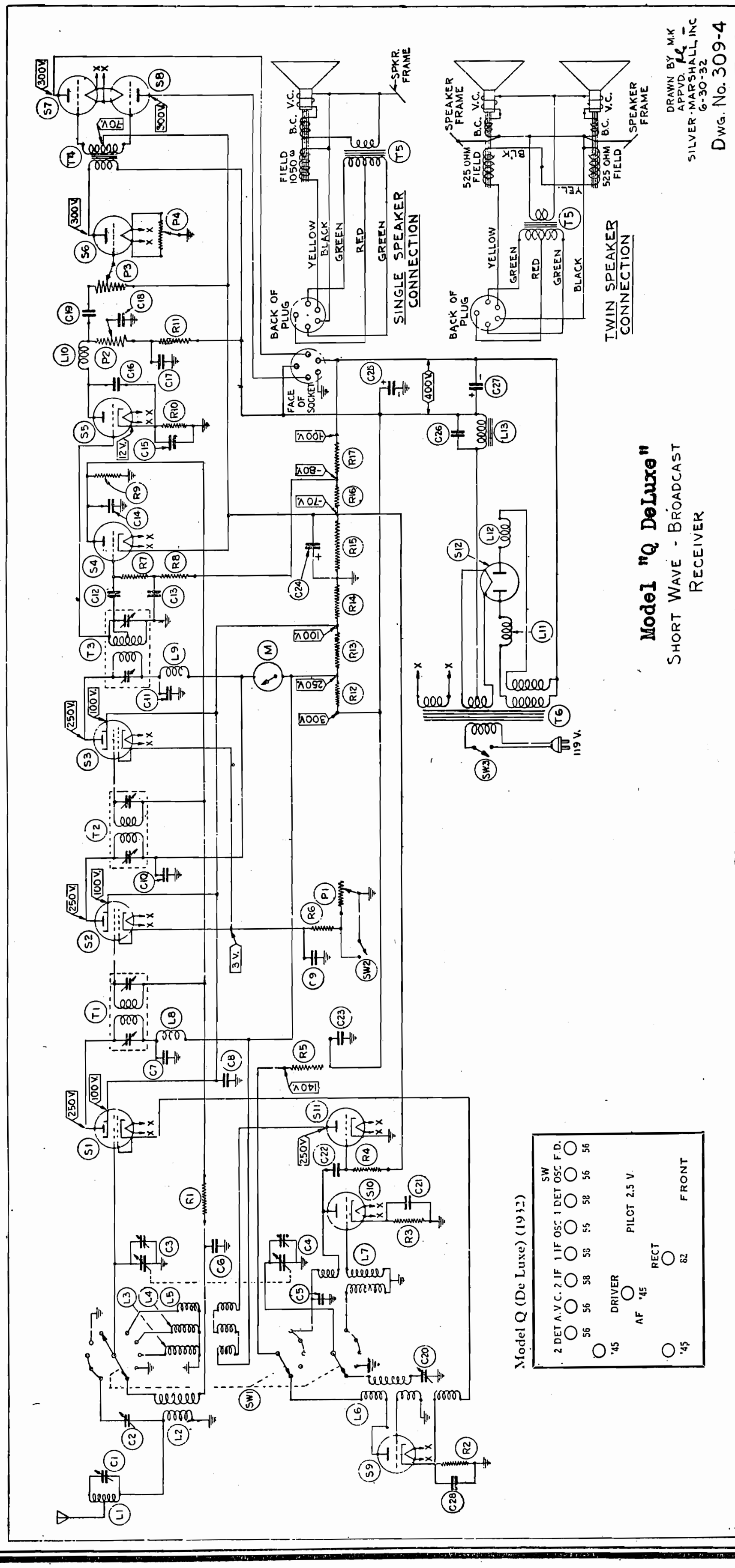
TWIN SPEAKER CONNECTION

P1 - 3000 ohm variable resis
P2 - 100,000 ohm tone control
P3 - 375,000 ohm pot.
P4 - 40 ohm hum balance

R1 - 25,000 ohm Resistor
R2-R3 - 1,000 ohm Resistor
R4 - 1 megohm Resistor
R5 - 6,500 ohm Resistor
R6 - 200 ohm Resistor
R7-R8 - 1 megohm Resistor
R9 - .5 megohm Resistor
R10 - 30,000 ohm Resistor
R11 - 25,000 ohm Resistor
R12 - 1,405 ohms)
R13 - 8,720 ohms)
R14 - 7,315 ohms)
R15 - 14,000 ohms)
R16 - 2,000 ohms)
R17 - 4,000 ohms)
C1 - 60-120 mmfd. antenna trimmer condenser
C2 - 200 mmfd. variable trimmer condenser
C3-C4 - 2 gang variable condenser - 365 mmfd.
C5 - .002 mfd. mica condenser
C6 - .1 mfd. condenser - Sprague 200 v.
C7 - .1 mfd. condenser - Sprague 400 v.
C8 - .25 mfd. condenser - Sprague 200 v.
C9 - .5 mfd. condenser - Sprague 200 v.
C10 - .1 mfd. condenser - Sprague 400 v.
C11 - .1 mfd. condenser - Sprague 400 v.
C12 - .0005 mfd. condenser - Sprague
C13 - .1 mfd. condenser - Sprague 200 v.
C14 - .5 mfd. condenser - Sprague 200 v.
C15 - .5 mfd. condenser - Sprague 200 v.
C16 - .0005 mfd. condenser - Sprague
C17 - .5 mfd. condenser - Sprague 400 v.
C18 - .025 mfd. condenser - Sprague 400 v.
C19 - .05 mfd. condenser - Sprague 400 v.
C20 - 275-550 mmfd. osc. trimmer condenser
C21 - .05 mfd. condenser - Sprague 400 v.
C22 - .00025 mfd. condenser - Sprague
C23 - .25 mfd. condenser - Sprague 400 v.
C24 - 8 mfd. dry electrolytic cond. 75 v.
C25 - 4 mfd. dry electrolytic cond. 450 v.
C26 - .15 mfd. condenser - Sprague 400 v.
C27 - 12 mfd. dry electrolytic cond. 450 v.
C28 - .1 mfd. condenser - Sprague 200 v.

MODEL Q DeLuxe

SILVER - MARSHALL, INC.



SILVER - MARSHALL, INC.

MODEL Q DeLuxe Parts List

C1	60-120 mmfd. antenna trimmer condenser	6182
C2	200 mmfd. variable trimmer condenser	3283
C3-C4	2 gang variable condenser - 365 mmfd.	3189
C5	.002 mfd. mica condenser	3311
C6	.1 mfd. condenser - Sprague 200 v.	3277
C7	.1 mfd. condenser - Sprague 400 v.	3278
C8	.25 mfd. condenser - Sprague 200 v.	3269
C9	.5 mfd. condenser - Sprague 200 v.	3266
C10	.1 mfd. condenser - Sprague 400 v.	3278
C11	.1 mfd. condenser - Sprague 400 v.	3278
C12	.0005 mfd. condenser - Sprague	7052
C13	.1 mfd. condenser - Sprague 200 v.	3277
C14	.5 mfd. condenser - Sprague 200 v.	3266
C15	.5 mfd. condenser - Sprague 200 v.	3266
C16	.0005 mfd. condenser - Sprague	7052
C17	.5 mfd. condenser - Sprague 400 v.	3273
C18	.025 mfd. condenser - Sprague 400 v.	3333
C19	.05 mfd. condenser - Sprague 400 v.	13127
C20	275-550 mmfd. osc. trimmer condenser	16179
C21	.05 mfd. condenser - Sprague 400 v.	13127
C22	.00025 mfd. condenser - Sprague	3330
C23	.25 mfd. condenser - Sprague 400 v.	3230
C24	8 mfd. dry electrolytic cond. - 75 v.	13326
C25	4 mfd. dry electrolytic cond. - 450 v.	13177
C26	.15 mfd. condenser - Sprague 400 v.	13145
C27	12 mfd. dry electrolytic cond. 450 v.	3162
C28	.1 mfd. condenser - Sprague 200 v.	3277

L1	209 Antenna choke coil
L2	208 Antenna coil
L3	517 short wave coil (4800- 1550 kilocycles)
L4	518 short wave coil(10,000- 3600 kilocycles)
L5	519 short wave coil(25,350- 9600 kilocycles)
L6	207 Broadcast oscillator coil
L7	516 Short wave oscillator coil
L8-L9-L10	283 choke coils
L11-L12	281 choke coils
L13	10238 Filter choke coil

M	Tuning meter - 20 ma.	
P1	3000 ohm variable resistance	4430
P2	100,000 ohm tone control	14438
P3	375,000 ohm pot.	4360
P4	40 ohm hum balance	4445
R1	25,000 ohm Resistor - 1 watt carbon	4697
R2-R3	1,000 ohm Resistor - wire wound	4688
R4	1 megohm Resistor - 1 watt carbon	4759
R5	6,500 ohm Resistor - Ohmite Red Devil	14777
R6	200 ohm Resistor - wire wound	4722
R7-R8	1 megohm Resistor - 1 watt carbon	4759
R9	.5 megohm Resistor - 1 watt carbon	4772
R10	30,000 ohm Resistor - 1 watt carbon	14693
R11	25,000 ohm Resistor - 1 watt carbon	4697
R12	1405 ohms)	
R13	8720 ohms)	
R14	7315 ohms) Ohmite Red Devil Resistor	4752
R15	14,000 ohms)	
R16	2,000 ohms)	
R17	4,000 ohms)	

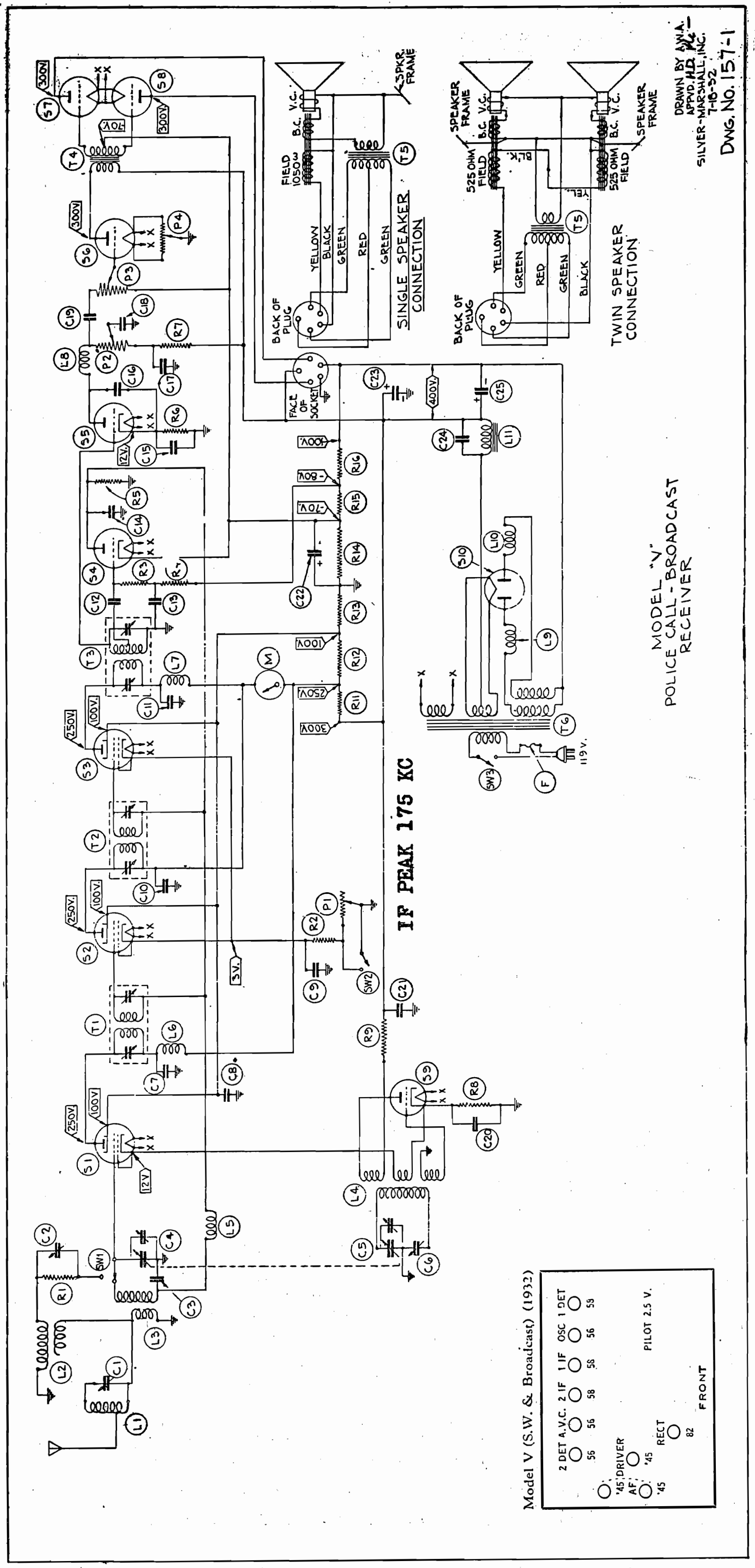
S1-S2-S3 - '58 tubes
S4-S5-S9-S10-S11 - '56 tubes
S6-S7-S8 - '45 tubes
S12 - '82 tubes.

SW1	Tandem Band Selector Switch	15348
SW2	Noise Control Switch	5121
SW3	A.C.Switch (combined with volume control)	

T1	V1 I.F.Transformer
T2	V2 I.F.Transformer
T3	V3 I.F.Transformer
T4	10268 Driver transformer
T5	Output transformer (10244 for Single speaker (10245 for Two speakers
T6	10231 Power transformer

MODEL V
S.W.-Broadcast

SILVER-MARSHALL, INC.



MODEL V
Parts List

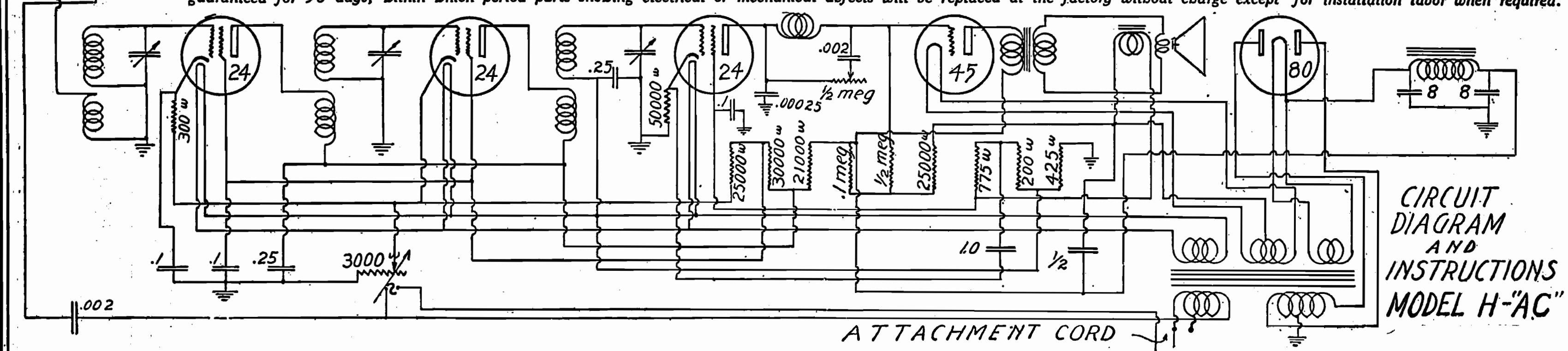
SILVER-MARSHALL, INC.

C1	50-125 mmfd. antenna trimmer condenser (1 Plate)	6182
C2	120-325 mmfd. police coil trimmer condenser (2 Plate)	16041
C3	.1 mfd. condenser - Sprague 200V.	3277
C4-C5	2 Gang variable condenser - 365 mmfd.	3189
C6	250-525 mmfd. osc. trimmer condenser (3 Plate)	16179
C7	.1 mfd. condenser - Sprague 400V.	3278
C8	.25 mfd. condenser - Sprague 200 V.	3269
C9	.5 mfd. condenser - Sprague 200V.	3266
C10	.1 mfd. condenser - Sprague 400V.	3278
C11	.1 mfd. condenser - Sprague 400V	3278
C12	.0005 mfd. Mica condenser	7052
C13	.1 mfd. condenser - Sprague 200V	3277
C14	.5 mfd. condenser - Sprague 200V	3266
C15	.5 mfd. condenser - Sprague 200V	3266
C16	.0005 mfd. Mica condenser	7052
C17	.5 mfd. condenser - Sprague 400V	3273
C18	.025 mfd. Condenser - Sprague 400V	3333
C19	.05 mfd. condenser - Sprague 400V	13127
C20	.1 mfd. condenser - Sprague 200V	3277
C21	.25 mfd. condenser - Sprague 400V	3230
C22	8 mfd. dry electrolytic cond. 75V	13326
C23	4 mfd. dry electrolytic cond. 450V	13177
C24	.15 mfd. condenser - Sprague 400V	13145
C25	12 mfd. dry electrolytic cond. 450V	3162
F	3 ampere fuse	3501
L1	209 Antenna choke coil	
L2	520 Police coil	
L3	208A-S Antenna coil	
L4	207A-S Oscillator coil	
L5-L6-L7-L8	283 Choke coils	
L9-L10	281 Choke coils	
L11	10238 Filter choke coil	
M	Tuning meter - 20 M.A.	13928
P1	3000 ohm variable resistance	4430
P2	100,000 ohm tone control	14438
P3	375,000 ohm pot. (volume control combined with A.C. switch)	4360
P4	40 ohm hum balance	
R1	1 megohm resistor - 1 watt carbon	4759
R2	200 ohm resistor - wire wound	4723
R3-R4	1 megohm resistor - 1 watt carbon	4759
R5	.5 megohm resistor - 1 watt carbon	4772
R6	30,000 ohm resistor - 1 watt carbon	14693
R7	25,000 ohm resistor - 1 watt carbon	4697
R8	1,000 ohm resistor - Wire wound	4688
R9	6,500 ohm resistor - Ohmite Red devil	14777
S1-S2-S3-	'58 Tubes	
S4-S5-S9	'56 Tubes	
S6-S7-S8	'45 Tubes	
S10	'82 Tube	
SW1	Change-over switch	15363
SW2	Noise control switch	5121
SW3	A.C. Switch (combined with volume control)	
T1	V2 I.F. Transformer	
T2	V2 I.F. Transformer	
T3	V3 I.F. Transformer	
T4	10268 Driver Transformer	
T5	Output Transformer (10244 for Single speaker (10245 for Two speakers	
T6	10231 Power Transformer.	

SIMPLEX RADIO CO.

MODEL H (AC) Schematic
MODEL K Schematic

CAUTION! Do not attempt to operate on current other than that noted on instrument. Fifty feet of aerial is usually enough for efficient operation. More may be used if desired. If no aerial available, connect "ANT" to "BL'T-in-ANT" and operate with or without ground. The right hand knob is a combination switch and volume control. The left hand knob is a tone control. This instrument is provided for Television apparatus which may be readily connected by (1st), disconnecting wire from plate terminal of 245 power tube, (2nd) connecting an A. F. choke between plate terminal of power tube and that terminal of filter choke farthest from front of panel, and (3rd) connecting a 1 mfd. 400 D. C. W. V. condenser in series with the plate terminal of the 245 power tube, two binding posts, or other terminals, and the center tap of the filament winding of the 245 tube. The binding posts will then be the point to connect the input of the television amplifier. Phonograph may be connected by installing a small single pole toggle switch in the center of the rear flange of chassis and connecting in series with number three R. F. coil by breaking the lead to the lower end of secondary and soldering to switch terminal along with pickup leads. *This instrument is guaranteed for 90 days, within which period parts showing electrical or mechanical defects will be replaced at the factory without charge except for installation labor when required.*



CIRCUIT DIAGRAM AND INSTRUCTIONS MODEL H-"AC"

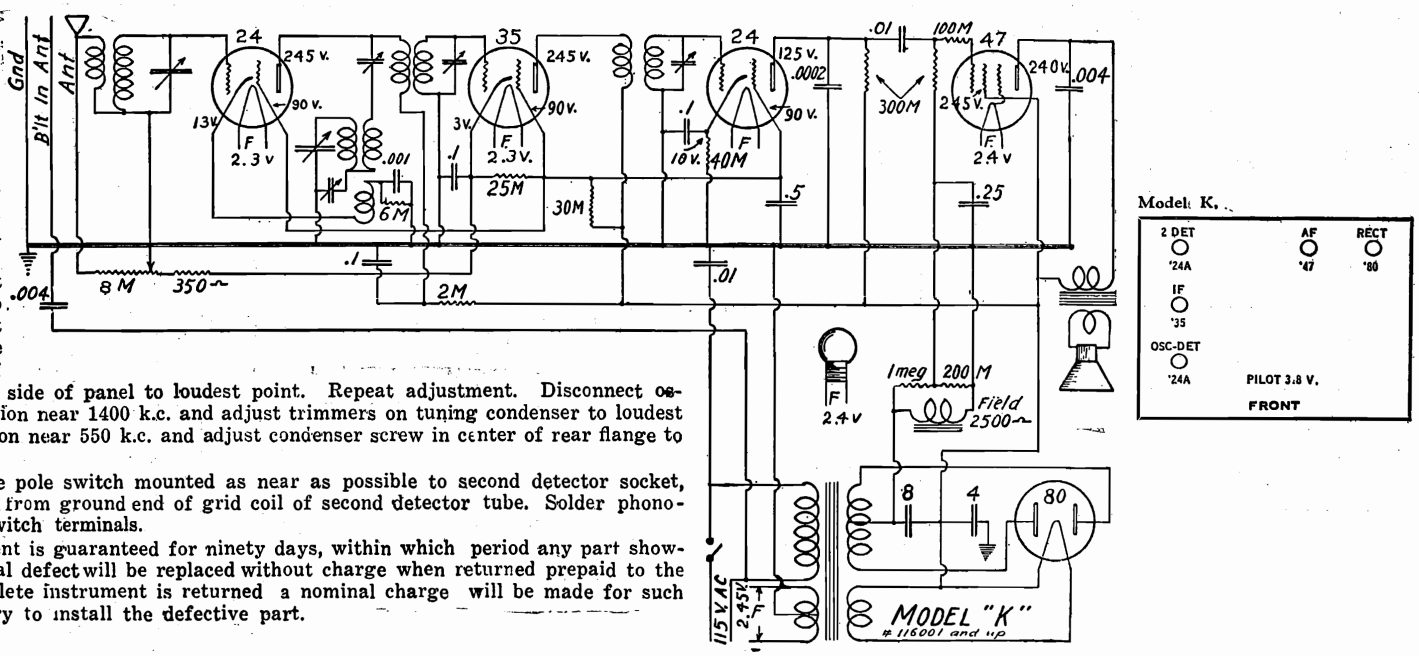
CAUTION: *DO NOT ATTEMPT TO OPERATE ON CURRENT OTHER THAN THAT NOTED ON INSTRUMENT.*

INSTALLATION: "Ant" lead may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs or any large metal object, if desired.

BALANCING: Attach output of 175 k.c. oscillator to grid of 224 tube at front of chassis. Adjust the condenser screws in top of tall can and one in under side of panel to loudest point. Repeat adjustment. Disconnect oscillator. Turn dial to station near 1400 k.c. and adjust trimmers on tuning condenser to loudest signal. Turn dial to station near 550 k.c. and adjust condenser screw in center of rear flange to loudest point.

PHONOGRAPH: Use a single pole switch mounted as near as possible to second detector socket, connect in series with lead from ground end of grid coil of second detector tube. Solder phonograph pickup leads to switch terminals.

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory, but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part.



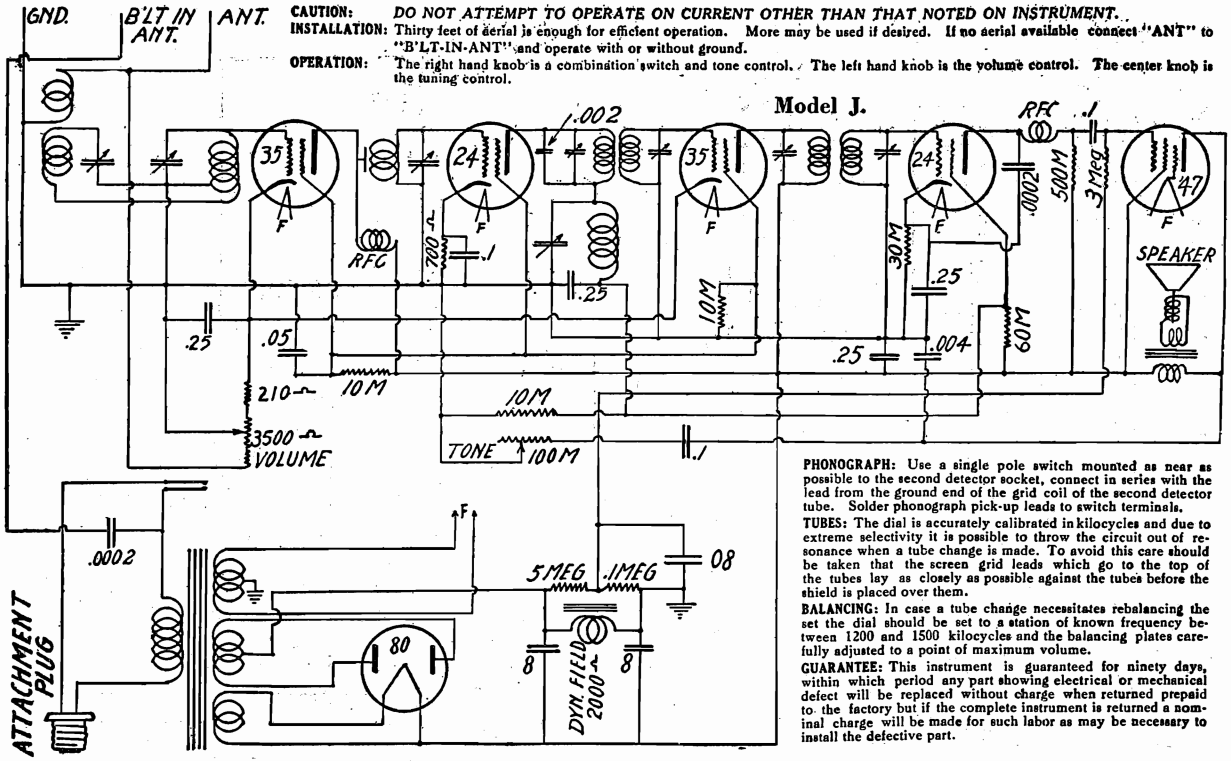
MODEL J Schematic
MODEL L Schematic

SIMPLEX RADIO CO.

CAUTION: *DO NOT ATTEMPT TO OPERATE ON CURRENT OTHER THAN THAT NOTED ON INSTRUMENT.*

INSTALLATION: Thirty feet of aerial is enough for efficient operation. More may be used if desired. If no aerial available connect "ANT" to "B'LT-IN-ANT" and operate with or without ground.

OPERATION: The right hand knob is a combination switch and tone control. The left hand knob is the volume control. The center knob is the tuning control.



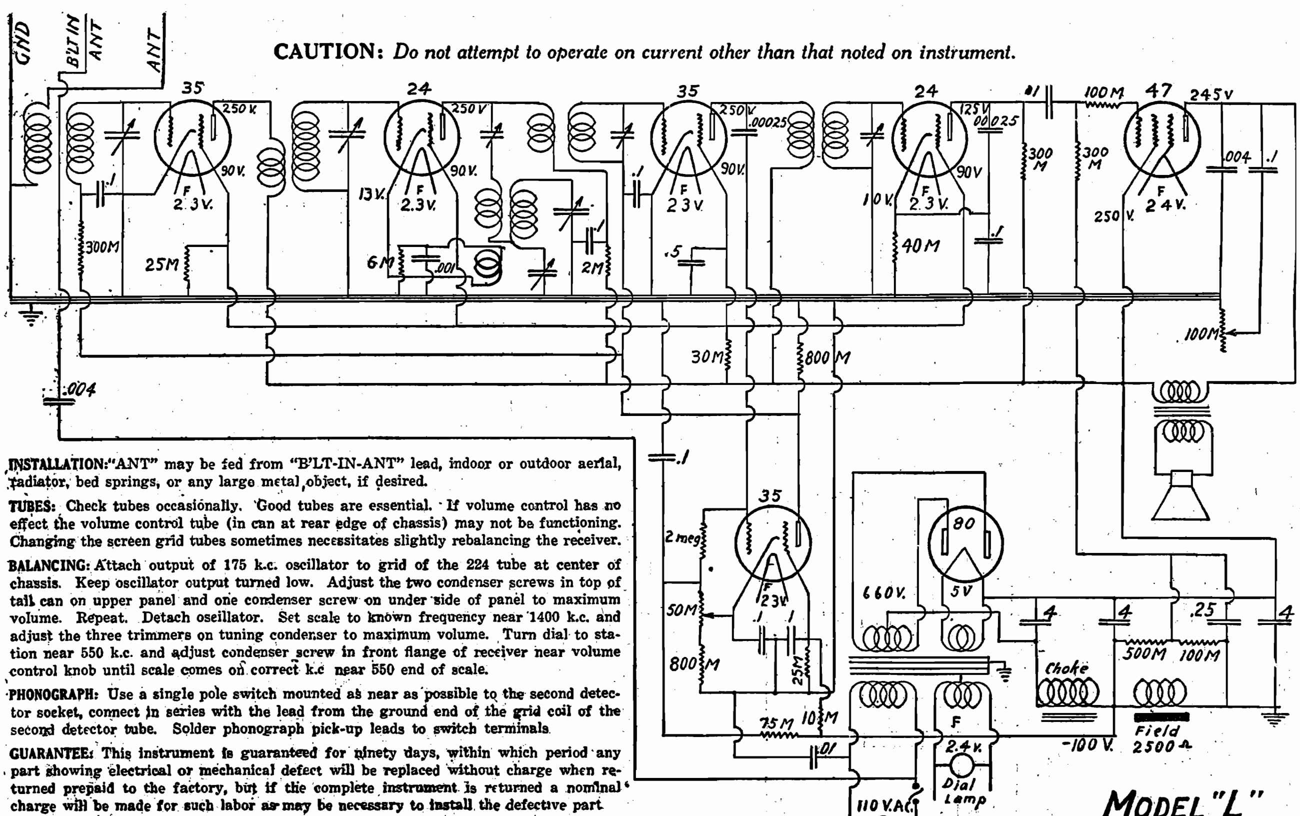
PHONOGRAPH: Use a single pole switch mounted as near as possible to the second detector socket, connect in series with the lead from the ground end of the grid coil of the second detector tube. Solder phonograph pick-up leads to switch terminals.

TUBES: The dial is accurately calibrated in kilocycles and due to extreme selectivity it is possible to throw the circuit out of resonance when a tube change is made. To avoid this care should be taken that the screen grid leads which go to the top of the tubes lay as closely as possible against the tubes before the shield is placed over them.

BALANCING: In case a tube change necessitates rebalancing the set the dial should be set to a station of known frequency between 1200 and 1500 kilocycles and the balancing plates carefully adjusted to a point of maximum volume.

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part.

CAUTION: *Do not attempt to operate on current other than that noted on instrument.*



INSTALLATION: "ANT" may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs, or any large metal object, if desired.

TUBES: Check tubes occasionally. Good tubes are essential. If volume control has no effect the volume control tube (in can at rear edge of chassis) may not be functioning. Changing the screen grid tubes sometimes necessitates slightly rebalancing the receiver.

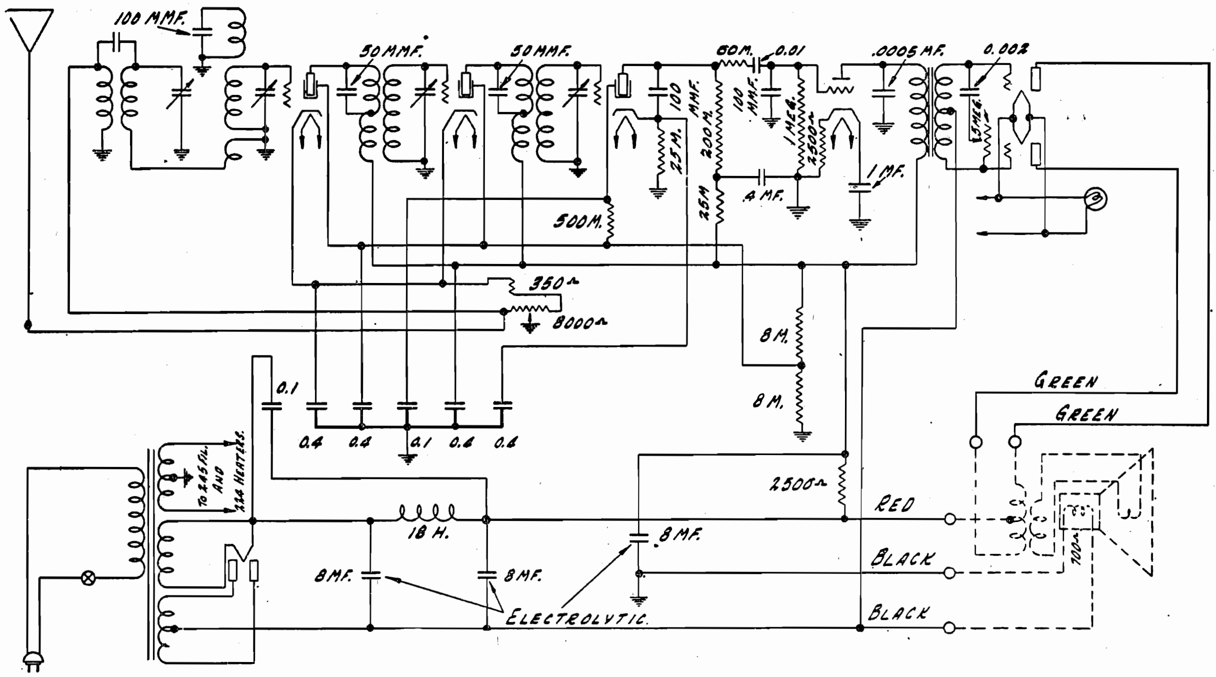
BALANCING: Attach output of 175 k.c. oscillator to grid of the 224 tube at center of chassis. Keep oscillator output turned low. Adjust the two condenser screws in top of tall can on upper panel and one condenser screw on under side of panel to maximum volume. Repeat. Detach oscillator. Set scale to known frequency near 1400 k.c. and adjust the three trimmers on tuning condenser to maximum volume. Turn dial to station near 550 k.c. and adjust condenser screw in front flange of receiver near volume control knob until scale comes on correct k.c near 550 end of scale.

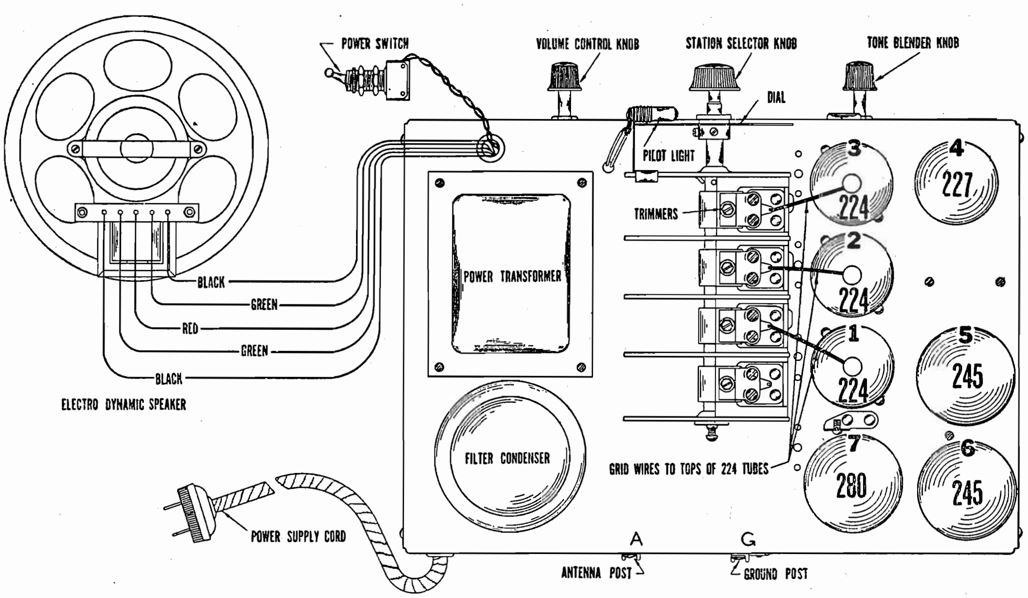
PHONOGRAPH: Use a single pole switch mounted as near as possible to the second detector socket, connect in series with the lead from the ground end of the grid coil of the second detector tube. Solder phonograph pick-up leads to switch terminals.

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory, but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part.

SONORA

MODEL 64





Chassis showing Tube Sequence and Speaker Connections

—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM LINE VOLTAGE, 115—PLUG IN SOCKET OF RECEIVER—TUBE IN TEXT SET

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Radio	2.3	198	3.	88	.9	3	3.5	6.
224	2	2nd Radio	2.3	198	3.	88	.9	3.	3.5	6.
224	3	Detector	2.3	150	6.	45	.1	6.	25	.4
227	4	1st Audio	2.3	180	12.5			12 5	5.	6.1
245	5	2nd Audio	2.4	255	55.				26.	31.
245	6	2nd Audio	2.4	255	55.				26.	31
280	7	Rectifier	5.						36. Per Plate	

MODEL 74

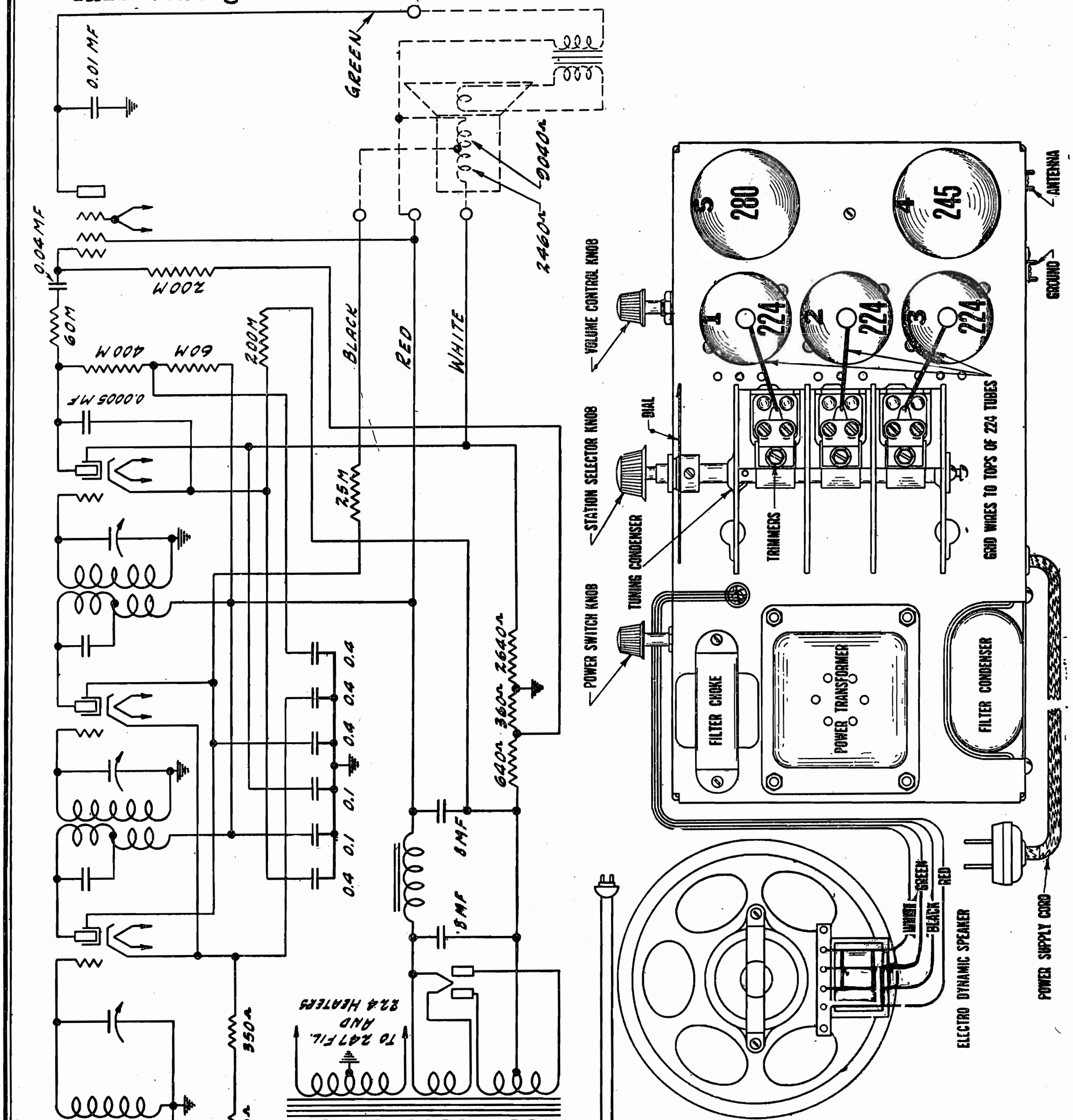
SONORA

Volume Control at maximum. Line Voltage 115

Tube	"A"	"B"	"C"	Screen	Cathode	Plt. Crn't
1st RF	2.2	250	2.	55.*	2.	2.1 ma
2nd RF	2.2	250	2.	55.*	2.	2.1
Det	2.2	130	2.8	40.*	2.8	.25
AF	2.3	238	18.**	250.		27.
Rect	4.65					28 per anode

* Reading with 250000 ohm meter. Reading will be less with lower meters

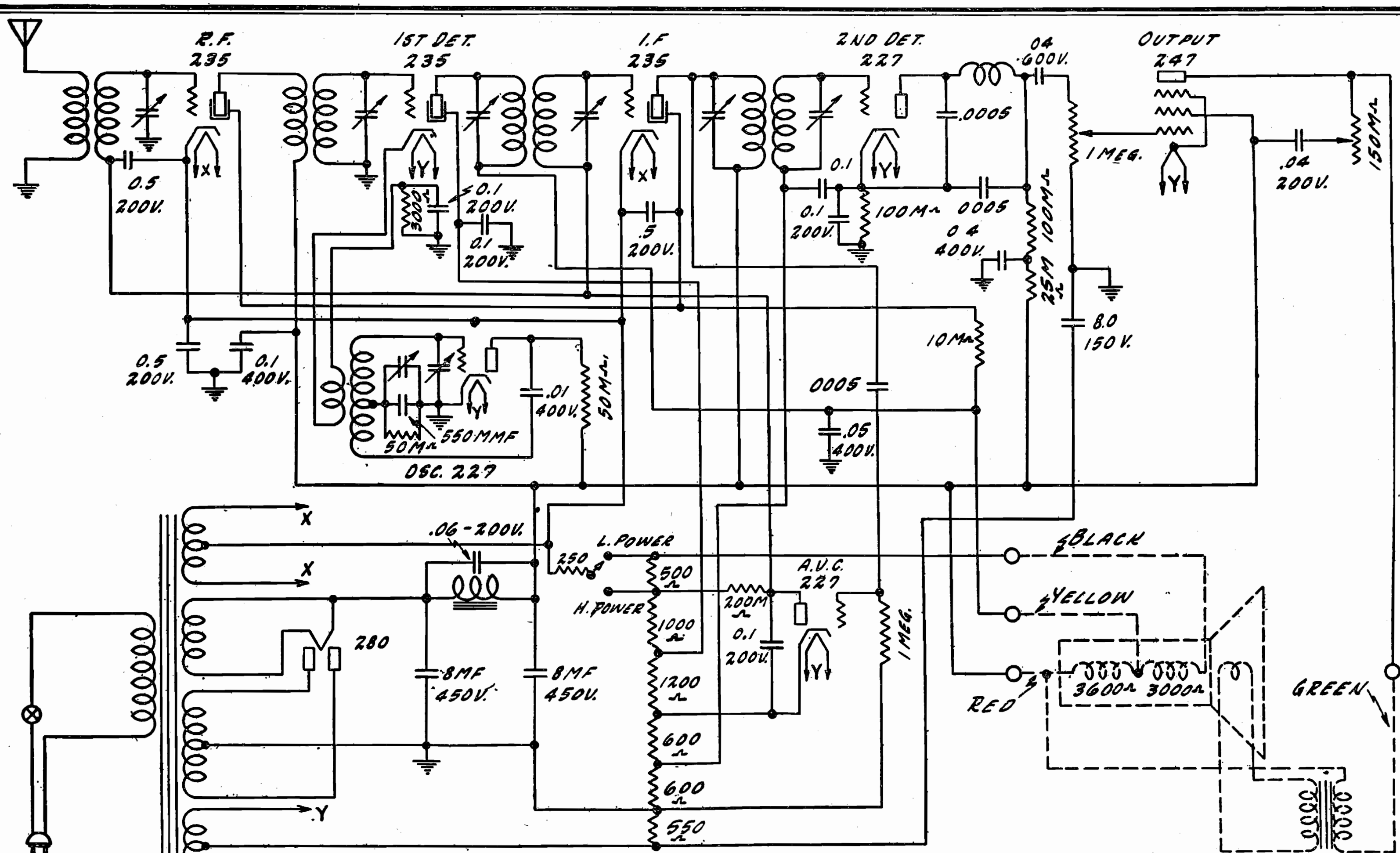
**This voltage read across 360 ohm section of shunt resistance.



Top View of Chassis showing Tube Sequence and Speaker Connections

MODEL 70
Schematic
Notes

SONORA



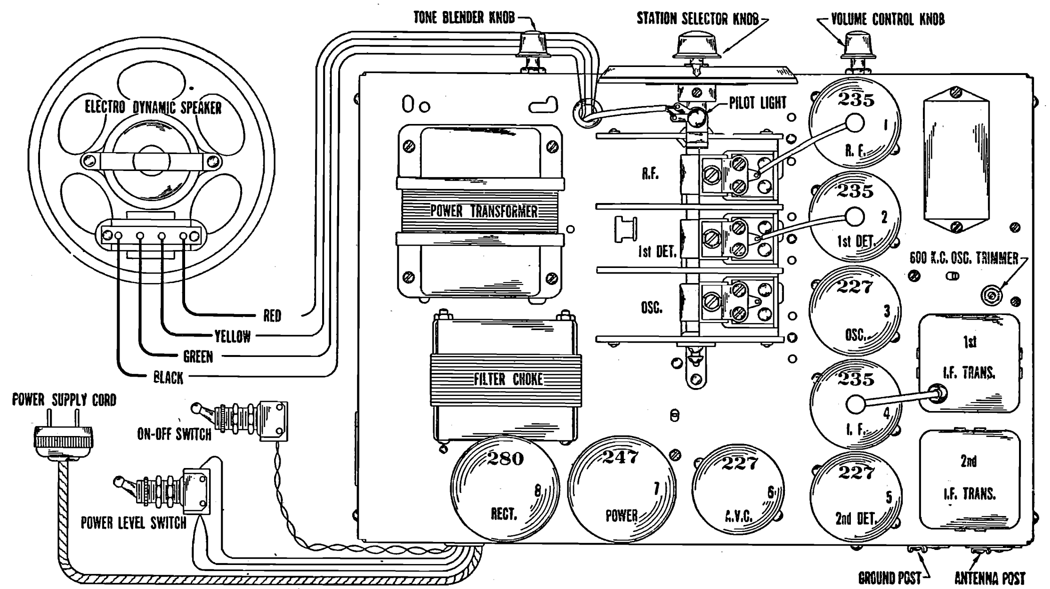
PEAK FREQUENCY 262 KC

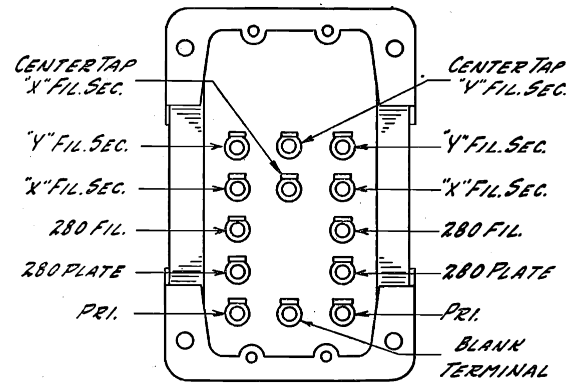
DOTTED LINES SHOWN ARE IN SPEAKER

The Super-heterodyne is a receiver of exceptional selectivity and sensitivity and accurate alignment of the I.F., R.F. and oscillator condensers is of the greatest importance. A local and accurately calibrated signal generator as well as an output indicating meter is absolutely essential for correct alignment. This signal generator must provide a signal at the broadcast frequencies of from 550 to 1500 K.C. and in addition a signal of 262 K.C. for the intermediate frequency. The broadcast band signals of the signal generator must be accurately known as the dial scale of the receiver is calibrated in kilocycles and alignment of the gang tuning condenser must be made at definite frequencies in order to have the pointer at the correct location on the scale for the various frequencies. The intermediate frequency signal of the signal generator must likewise be accurate in order to align the I.F. stages at 262 K.C.

MODEL 70
Socket
Voltage
Notes

SONORA



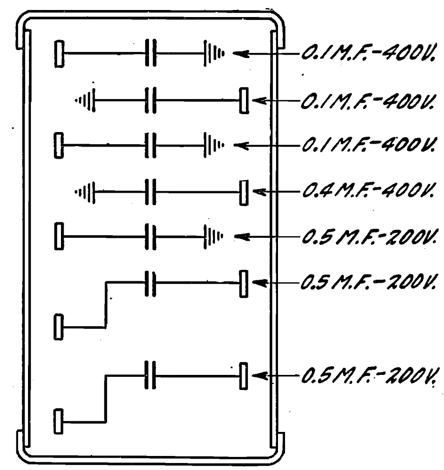


Power Transformer Terminals

VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM—POWER LEVEL SWITCH HIGH POWER

Type of Tube	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Volts*	*Screen Current MA*	*Cathode Volts*	*Plate MA*	*Grid Test MA*
235	R.F.	2.3	190	2.3 (1)	68	1.0	0.	3.8	6.5
235	1st Det.	2.3	190	6.5	70	.35	14.	2.0	4.9
227	Osc.	2.3	80	15–50 (2)			20.	4.7	4.8
235	I.F.	2.3	190	2.3 (1)	68	.6	0.	3.6	6.0
227	2nd Det.	2.3	150	20.			20.	.4	.4
227	A.V.C.	2.3	65 (3)	40. (4)			20.	0.	0.
247	Power	2.35	260	20. (5)	280	7.		32.	36.
280	Rectifier	5.						41. Per Plate	

(1) Measured across 250 ohm series resistor.
(2) Bias voltage varies from 15 to 50 between 1500 and 550 K.C. settings of tuning condenser.
(3) Measured across 1000 and 1200 ohm sections of shunt resistor.
(4) Measured across two 600 ohm sections of shunt resistor.
(5) Measured across 550 ohm series resistor.



Section Condenser Internal Wiring

MODEL 27
Chassis
Voltage

SPARKS WITHINGTON CO.

Sparton Model 27 Super-Heterodyne Schematic Diagram and Voltage Analysis

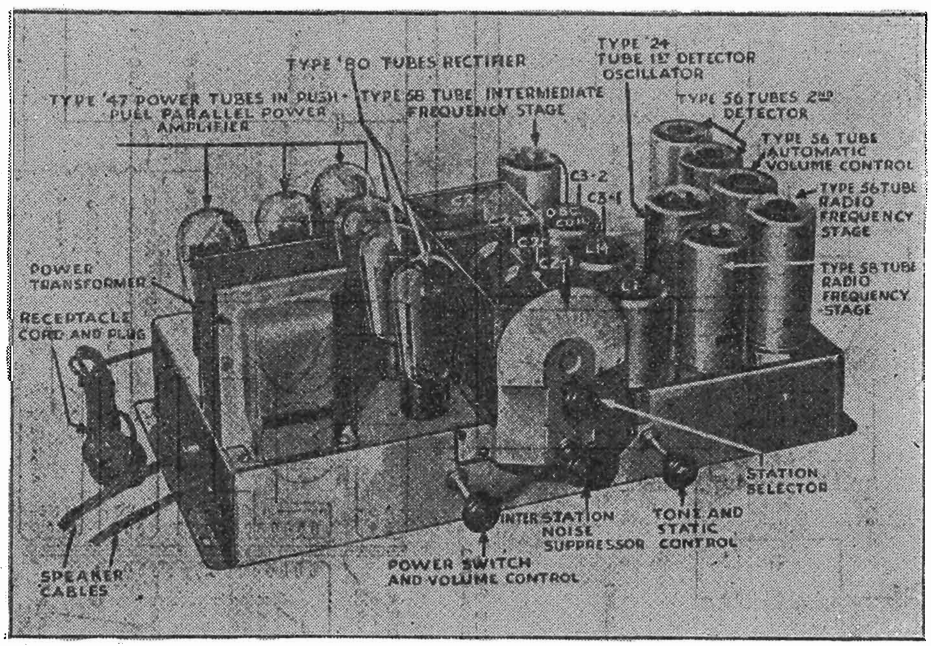
VOLTAGE ANALYSIS

Line Voltage 115—Position of Voltage Compensator 100-115—Position of Volume Control Full

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
58	R. F. Stage	2.2—2.5	155-190	2.2—2.6	85—108	4.5—8.0
'24	1st Det.-Osc.	2.2—2.5	155-190	5.0—9.0	85—108	0.8—1.4
58	I. F. Stage	2.2—2.5	155-190	2.2—2.6	85—108	4.5—8
56	2nd Det.	2.2—2.5	*	*	——	*
56	2nd Det.	2.2—2.5	*	*	——	*
56	A. F. Stage	2.2—2.5	145—180	7—11	——	4—7
56	AVC	2.2—2.5	30— 50	50—80	——	Zero
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'80	Rectifier	4.2—5.0	320—375	——	——	33-45 per Plate
'80	Rectifier	4.2—5.0	320—375	——	——	33-45 per Plate

* Present only when signal is applied.

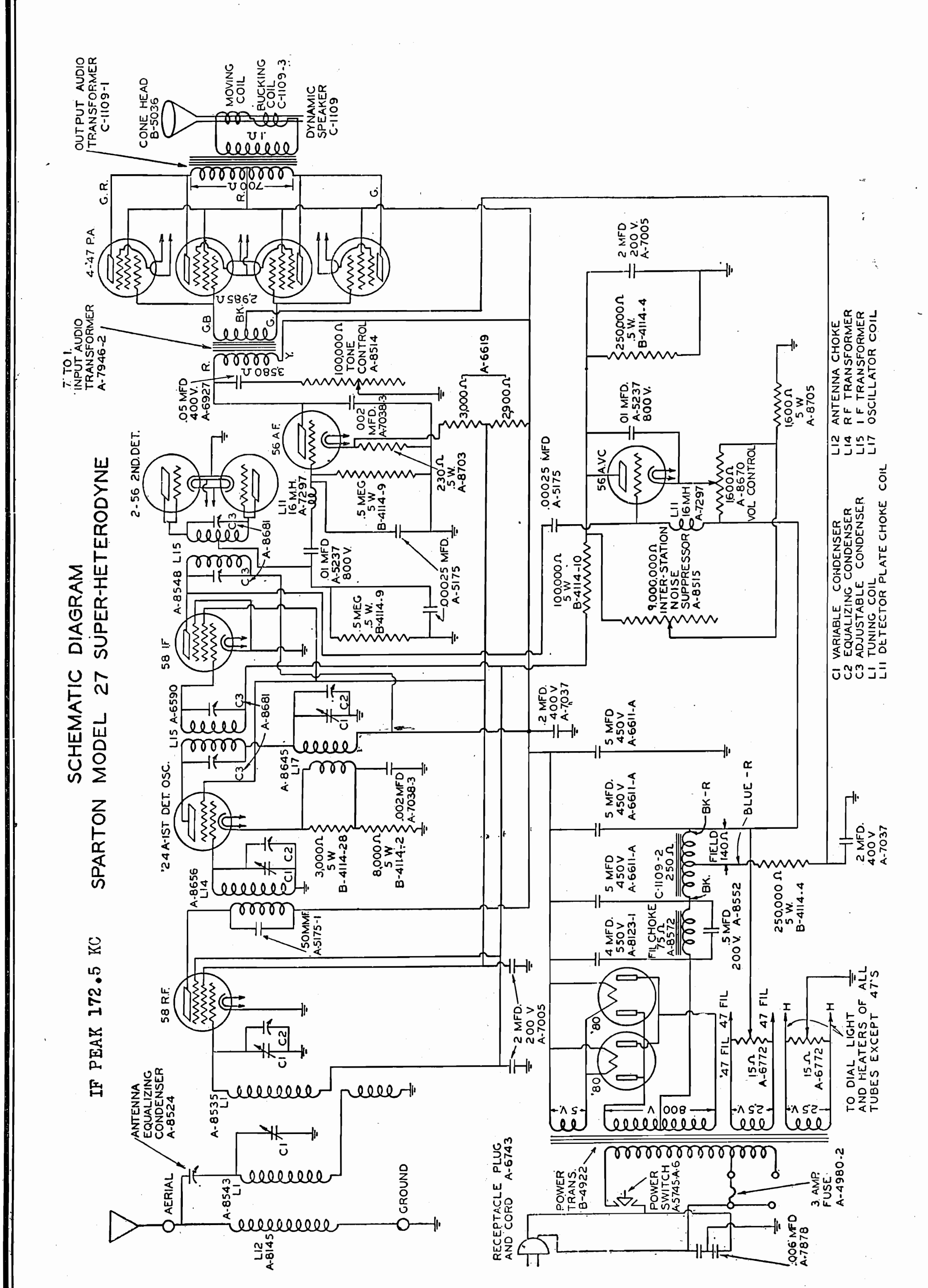
MODEL 27 CHASSIS



C2-1 Antenna Equalizing Condenser
C2-2 R. F. Stage Equalizing Condenser
C2-3 1st Detector Equalizing Condenser
C2-4 Oscillator Equalizing Condenser
C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L1 1st Tuning Coil
L14 R. F. Transformer

MODEL 27
Schematic

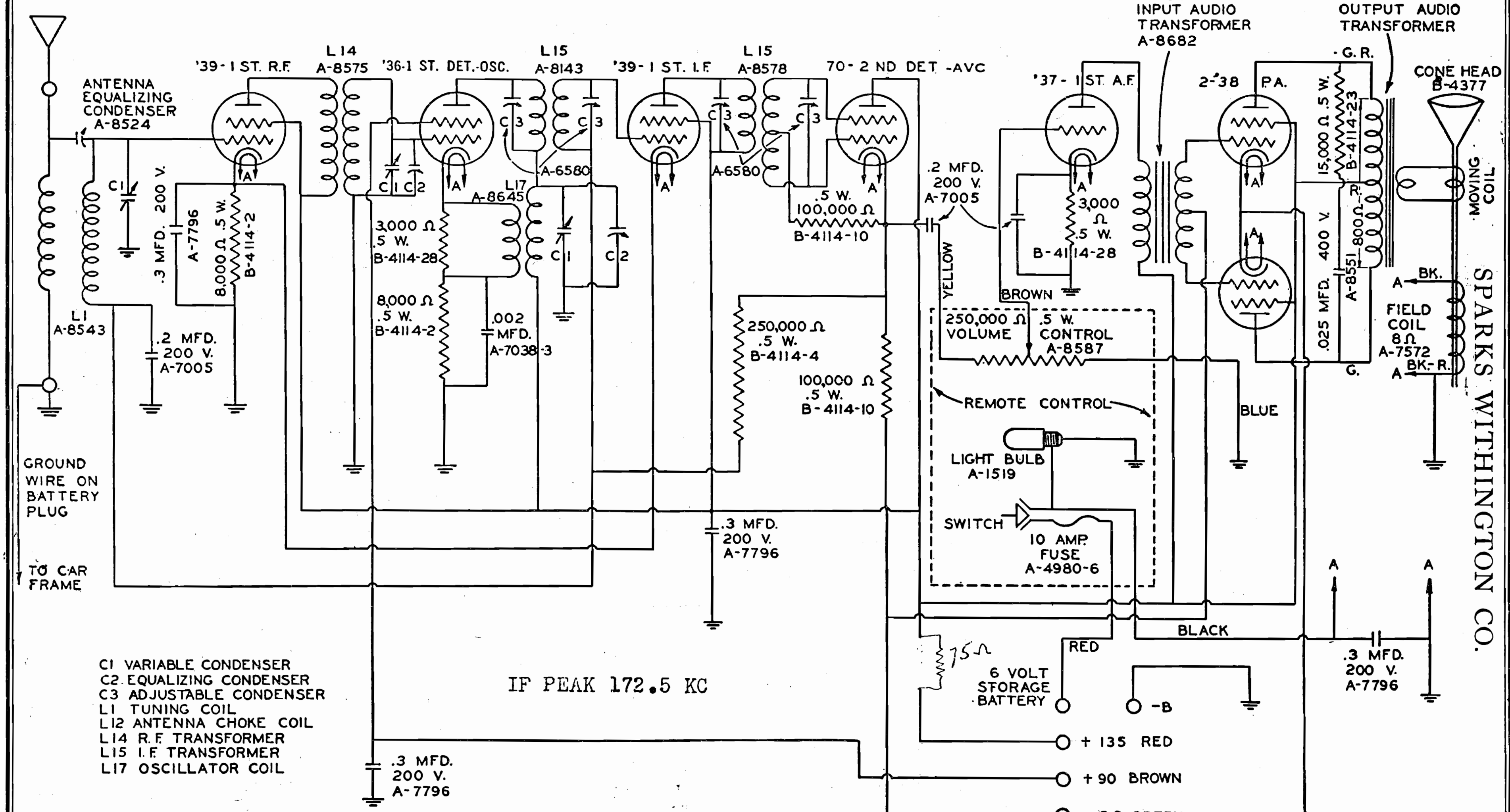
SPARKS WITHINGTON CO.



MODEL 34
Schematic

SPARKS WITHINGTON CO.

SCHEMATIC DIAGRAM
SPARTON MODEL 34 SUPER-HETERODYNE



If high notes predominate and the pitch of the speaker is to be lowered, replace the 150,000 ohm resistor in series with the .025 mfd condenser connected across the output transformer primary with a 15,000 ohm resistor. The condenser remains as heretofore

MODEL 34
Chassis
Voltage

SPARKS WITHINGTON CO.

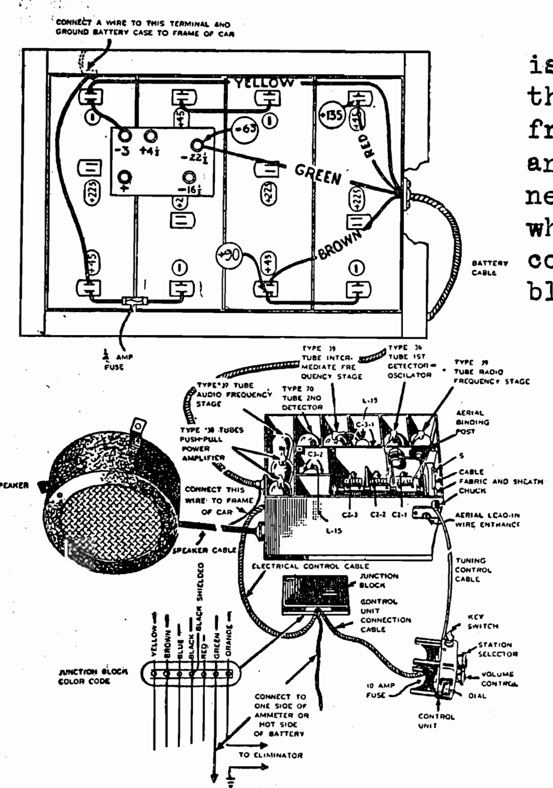
Sparton Model 34 Super-Heterodyne Schematic Diagram and Voltage Analysis

VOLTAGE ANALYSIS

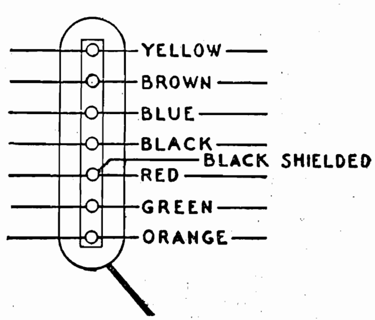
Condition of "A" Battery—Good
Condition of "B" Battery—Good
Condition of "C" Battery—Good
Position of Volume Control—Full with No Signal

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
'39	R. F. Stage	6.3	90	3.0	90	4.0
'36	1st Det.-Osc.	6.3	120	15	90	2.0
'39	I. F. Stage	6.3	90	3.0	90	4.0
70	2nd Det.-AVC	6.3	180	——	——	1.0
'37	A. F. Stage	6.3	125	10	——	4.0
'38	Power Stage	6.3	180	19.5	180	8.0—10
'38	Power Stage	6.3	180	19.5	180	8.0—10

MODEL 34 CHASSIS and associated equipment



The black shielded "A" battery wire is shown connected to the center terminal on the Junction Block to which the black wire from the control unit also connects. This is an error. The black shielded wire should connect to the terminal on the Junction Block to which the red wire from the control unit is connected. The following diagram shows the black shielded wire properly connected.

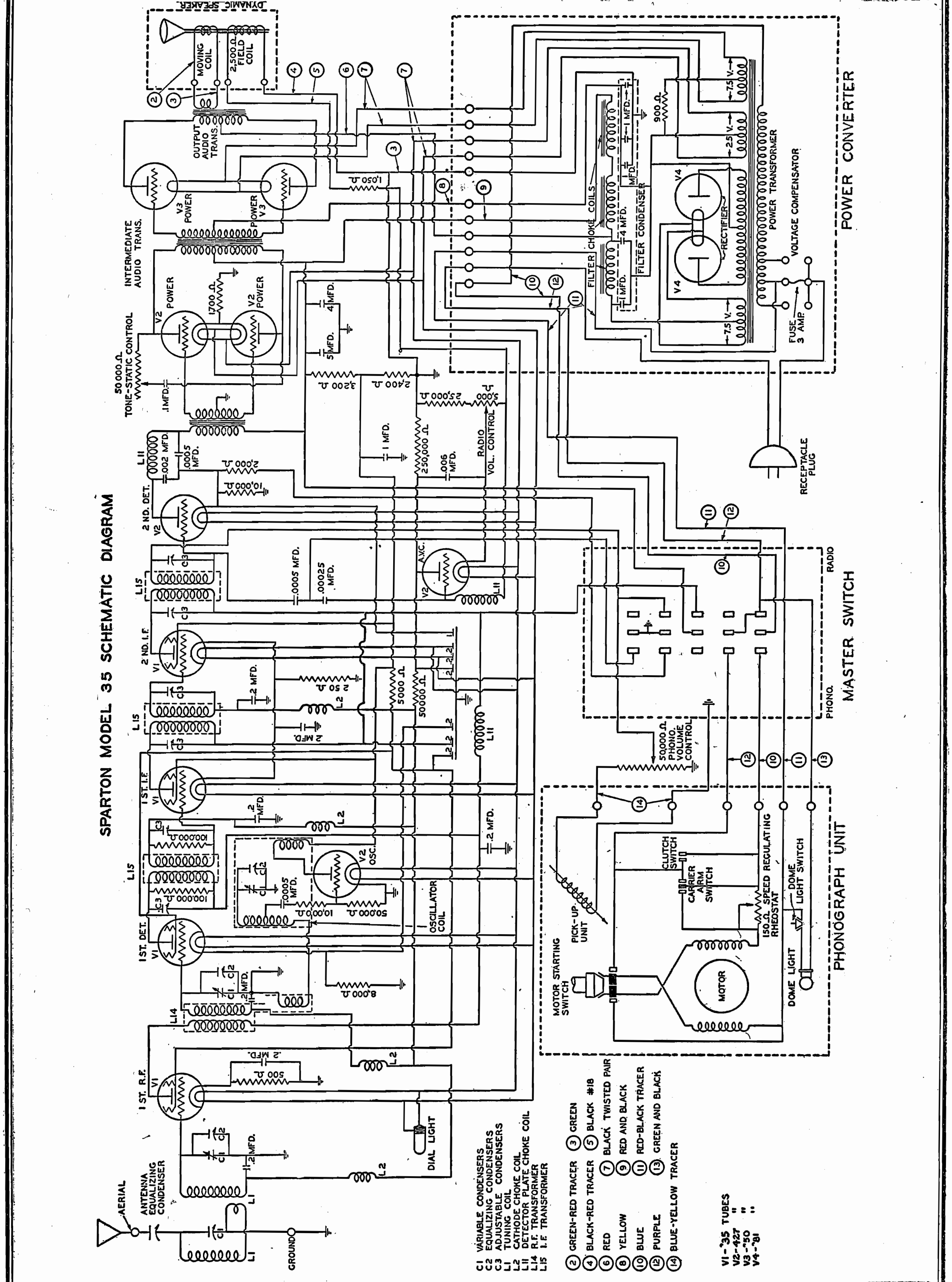


C2-1 Antenna Equalizing Condenser
C2-2 1st Detector Equalizing Condenser
C2-3 Oscillator Equalizing Condenser

C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L15 I. F. Transformer

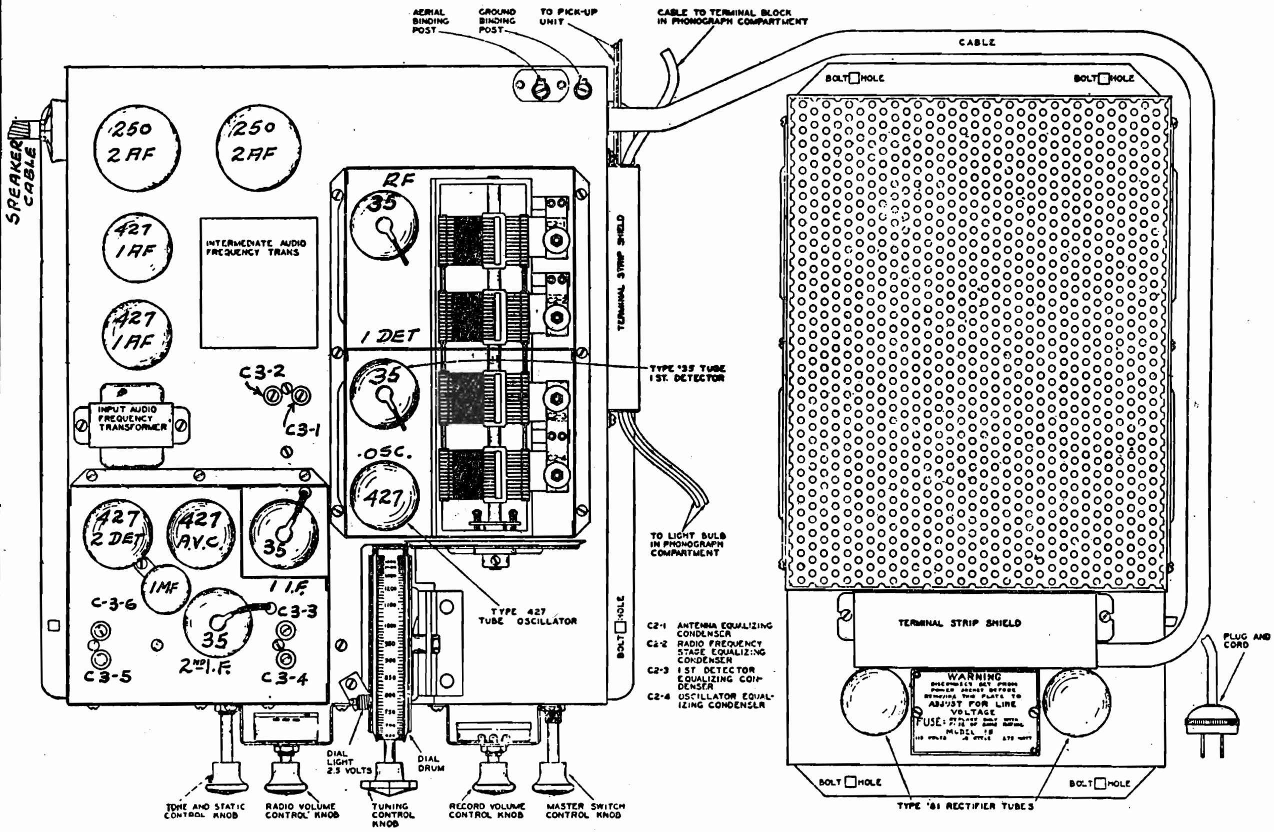
SPARKS WITHINGTON CO.

MODEL 35
Schematic



MODEL 35
Chassis
Voltage

SPARKS WITHINGTON CO.

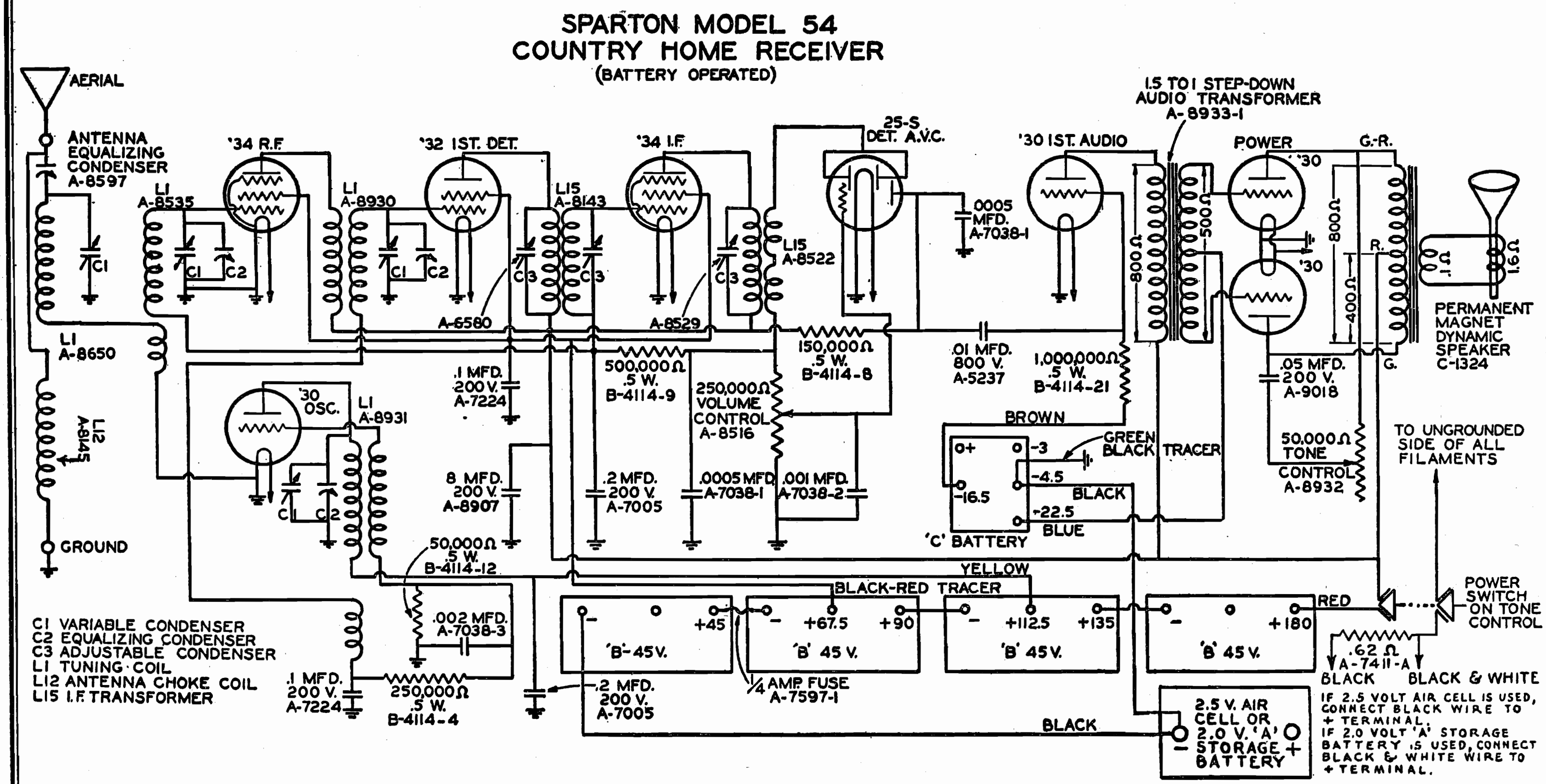


C3-1 I. F. Stage First Adjustable Condenser
C3-2 I. F. Stage Second Adjustable Condenser
C3-3 I. F. Stage Third Adjustable Condenser
C3-4 I. F. Stage Fourth Adjustable Condenser
C3-5 I. F. Stage Fifth Adjustable Condenser
C3-6 I. F. Stage Sixth Adjustable Condenser

Tube	Location	Grid	Plate	Fil.	Screen	Plate Current
35	1st RF	190-230	2-4	2.2	70-95	1-7 ma
35	1st Det	190-230	'6-14	2.2	70-95	'.8-1.8
35	1st IF	190-230	2-4	2.2	70-95	4-8
35	2nd IF	190-230	2-4	2.2	70-95	4-8
427	2nd Det	185-225	14-22	2.2		.7 -1.1
427	Osc.	70-95	**	2.2		⌿
427	AVC	*	30-50	2.2		Zero
427	1st Pwr	190-230	14-22	2.2		5-8
427	1st Pwr	190-230	14-22	2.2		5-8
50	2nd Pwr	350-420	60-90	7.0		36-48
50	2nd Pwr	350-420	60-90	7.0		36-48
81	Rect.	440-560	---	7.0		65-85
81	Rect.	440-560	---	7.0		65-85

*Test from grid prong to ground approx. 125 volts
'Remove oscillator tube.
**Tube generates own bias when oscillating
⌿ Test with plug in second detector socket and tube in analyzer

MODEL 54
Schematic



The voltage rating of Part A-9018, .05 Mfd condenser in the tone control circuit is shown as 200 volts. This value should be 400 volts.

MODEL 54
Voltage
Socket

SPARKS WITHINGTON CO.

Sparton Model 54 Super-Heterodyne Schematic Diagram and Voltage Analysis

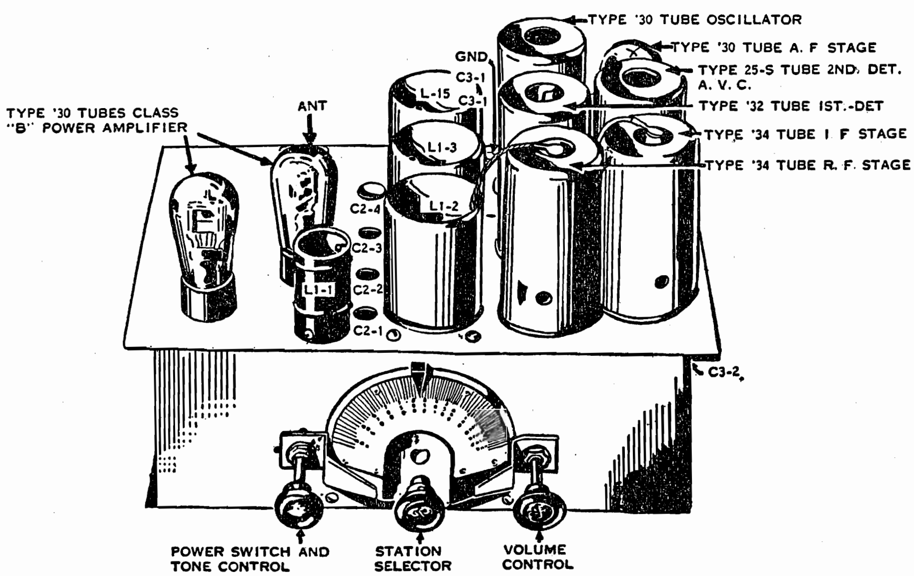
VOLTAGE ANALYSIS

Condition of "A" Battery—Good
Condition of "B" Battery—Good
Condition of "C" Battery—Good
Position of Volume Control—Full with No Signal

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
'34	R. F. Stage	2.0	180	†—	67½	3.0
'32	1st Det.	2.0	180	†—	67½	0.5
'30	Oscillator	2.0	112½	†—	—	‡1.0—2.0
'34	I. F. Stage	2.0	180	†—	67½	3.0
25-S	2nd Det.-AVC	2.0	*—	†—	—	0.5
'30	A. F. Stage	2.0	180	12	—	0.2
'30	Power Stage	2.0	180	18	—	1.0
'30	Power Stage	2.0	180	18	—	1.0

* 180 Volts through 150,000 ohm plate resistor.
† These biases supplied either by oscillator or by AVC tube—through very high resistances. Cannot be measured with a test kit.
‡ This current varies with frequency of oscillation. Cannot be measured in a test kit.

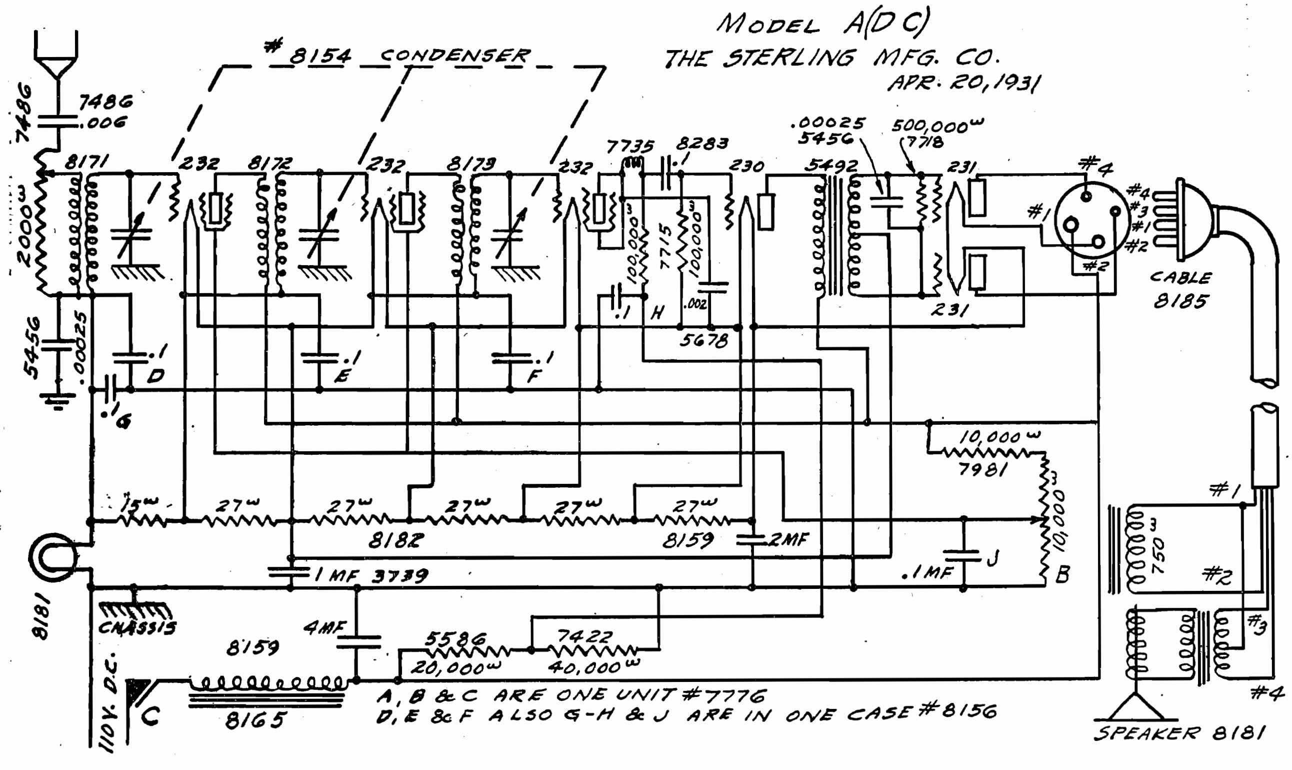
MODEL 54 CHASSIS

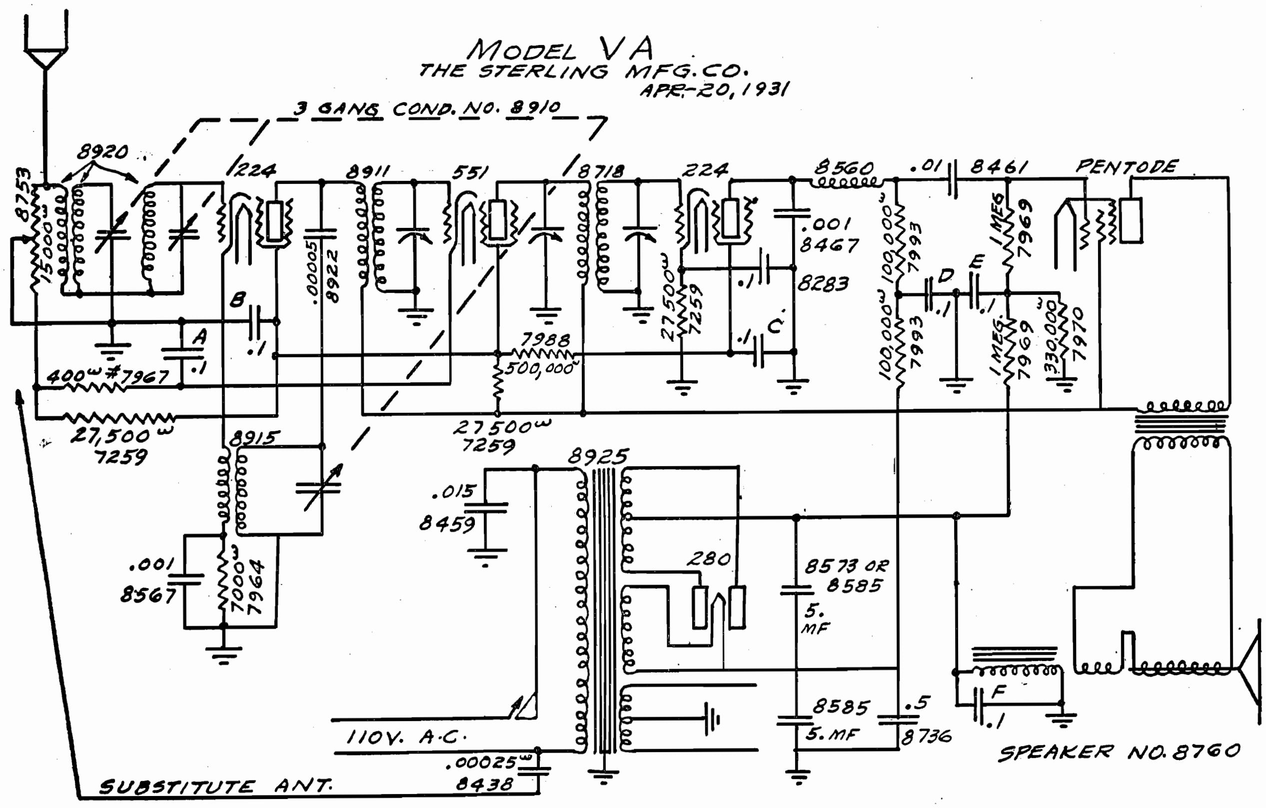


C2-1 Antenna Equalizing Condenser
C2-2 R. F. Stage Equalizing Condenser
C2-3 1st Detector Equalizing Condenser
C2-4 Oscillator Equalizing Condenser
C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L1 1st Tuning Coil
L2 Second Tuning Coil
L14 R. F. Transformer
L15 I. F. Transformer

MODEL A (DC)
MODEL VA

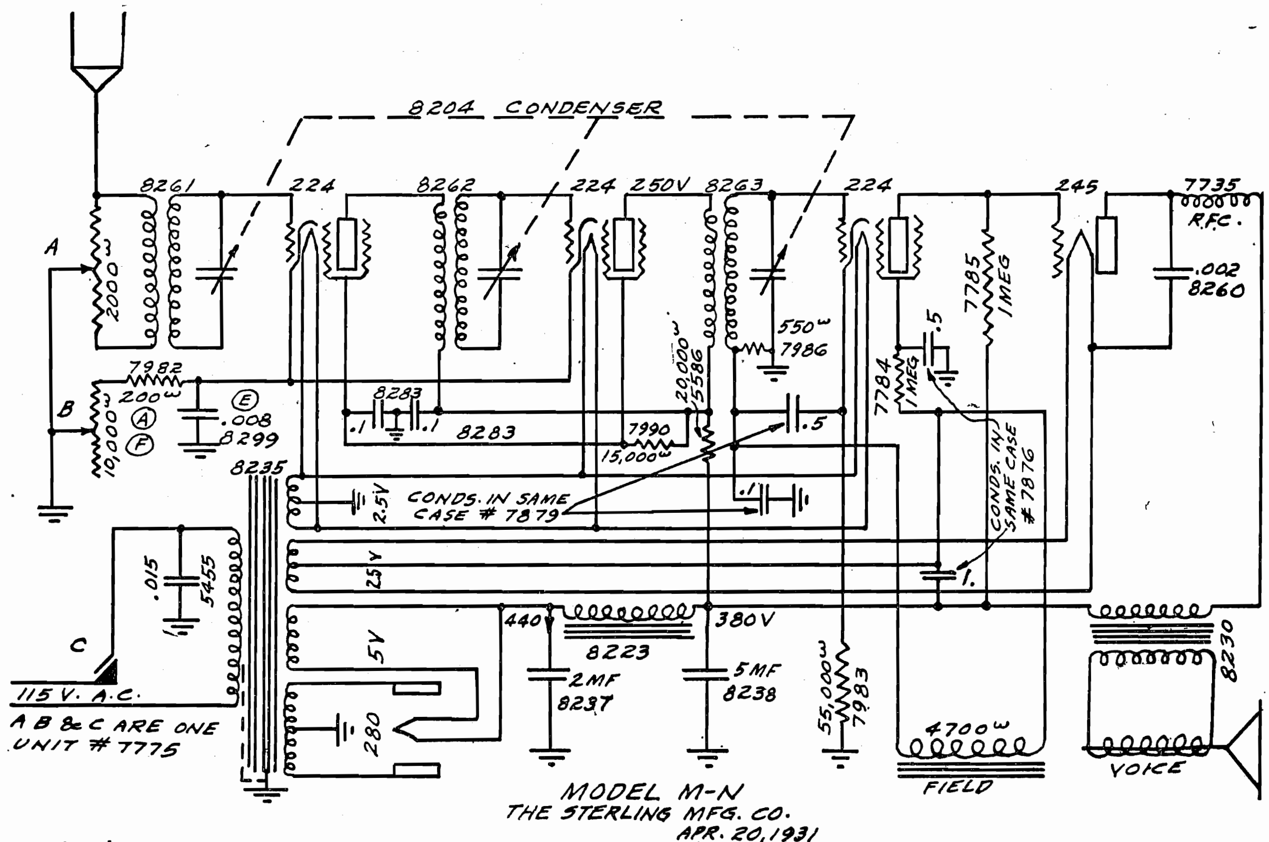
STERLING MFG. CO.

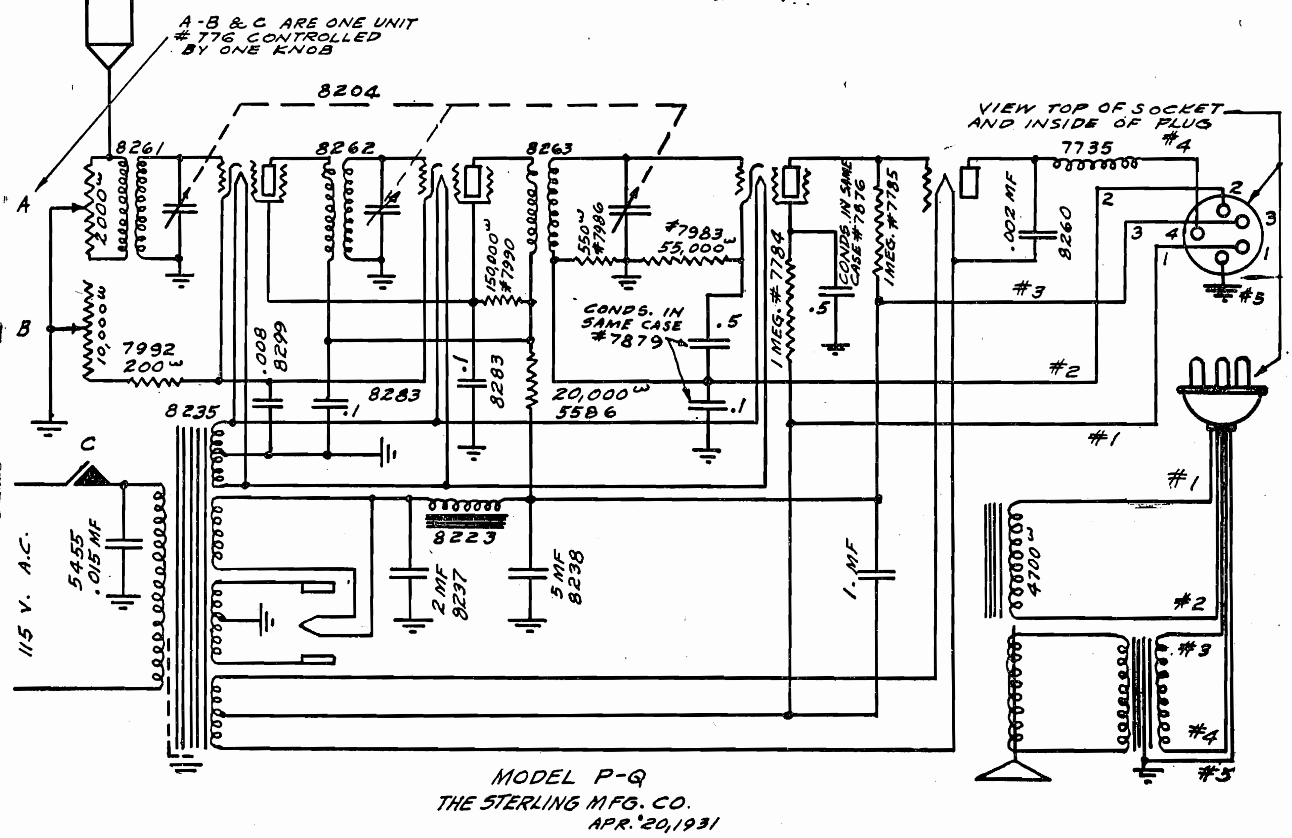




STERLING MFG. CO.

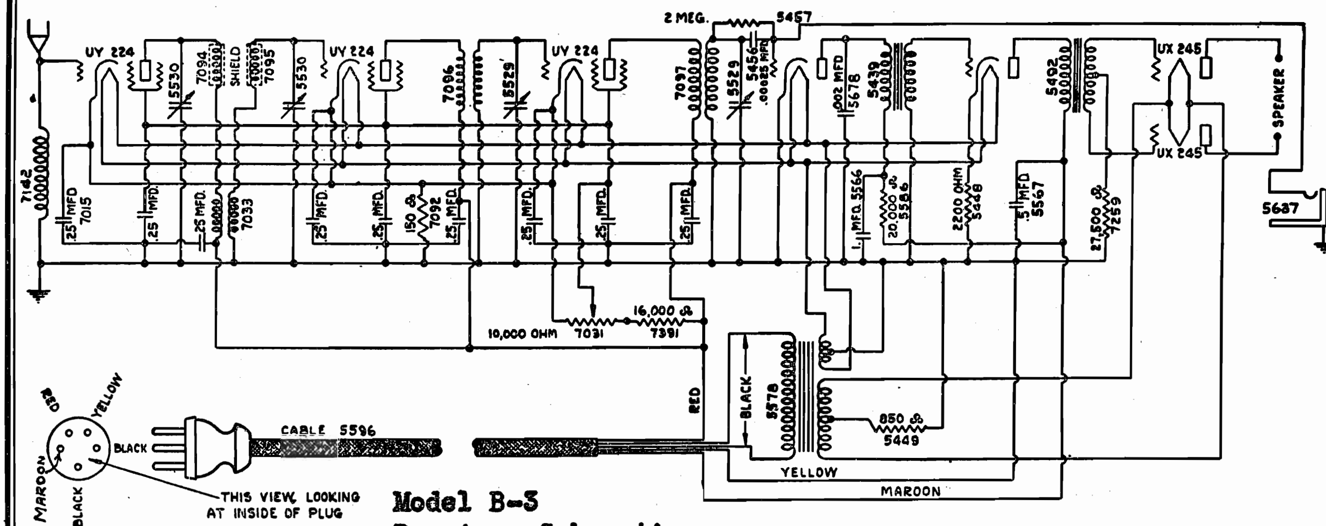
MODEL M-N
MODEL P-Q



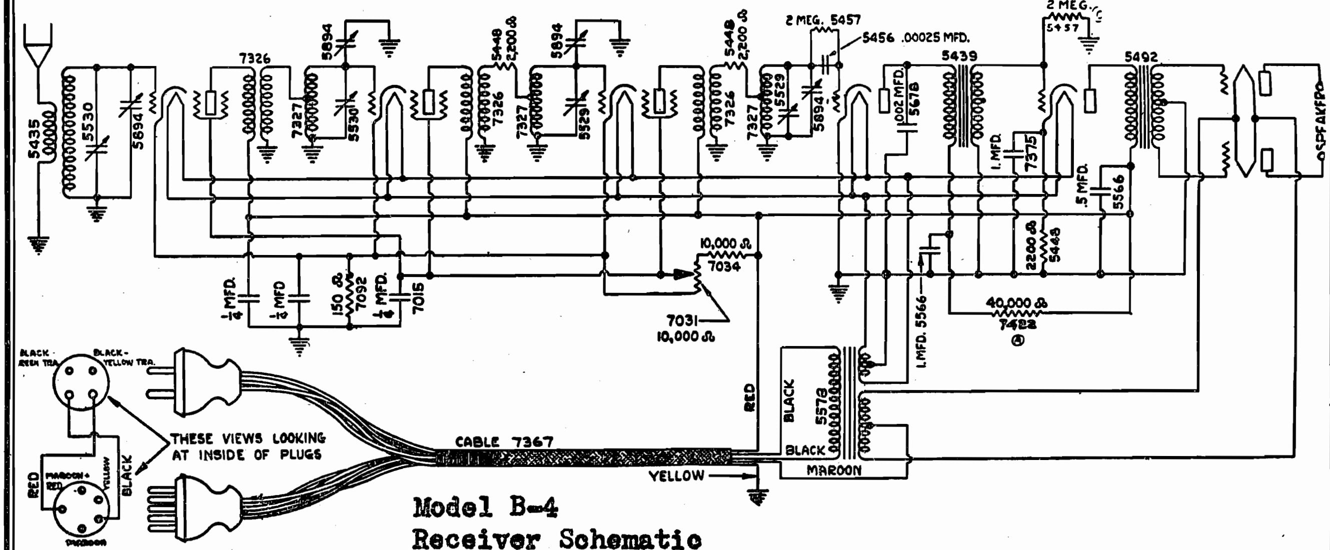


STERLING MFG. CO.

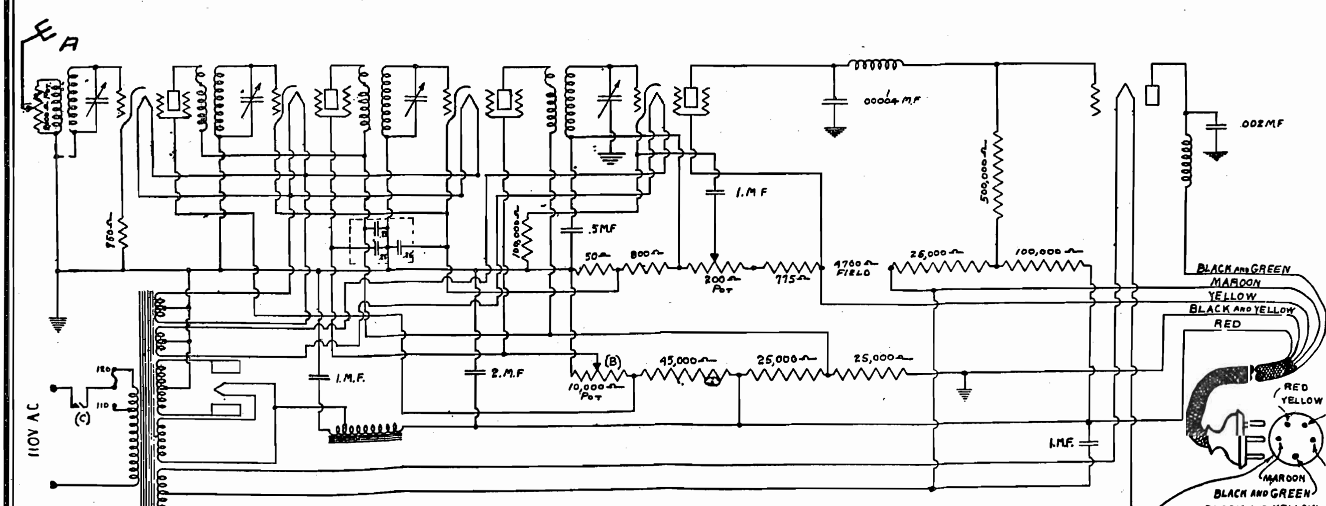
MODEL B-3 Receiver Sch.
MODEL B-4 Receiver Sch.
Model C



Model B-3 Receiver Schematic



Model B-4 Receiver Schematic

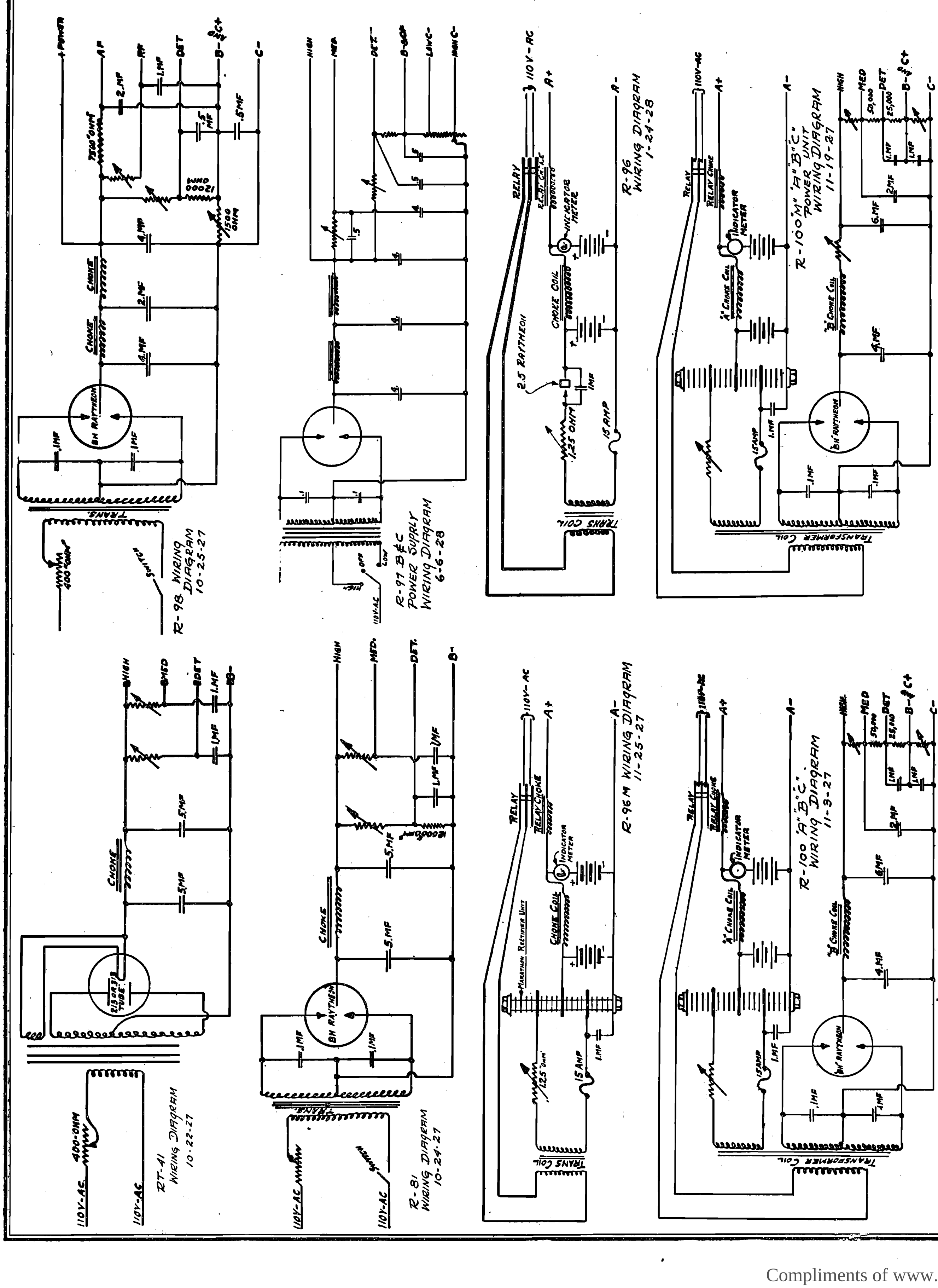


NOTE - (A) VOLUME CONTROL, (B) VOLUME CONTROL, (C) A.C. SWITCH, ARE ONE UNIT CONTROLED BY ONE KNOB.

Model C

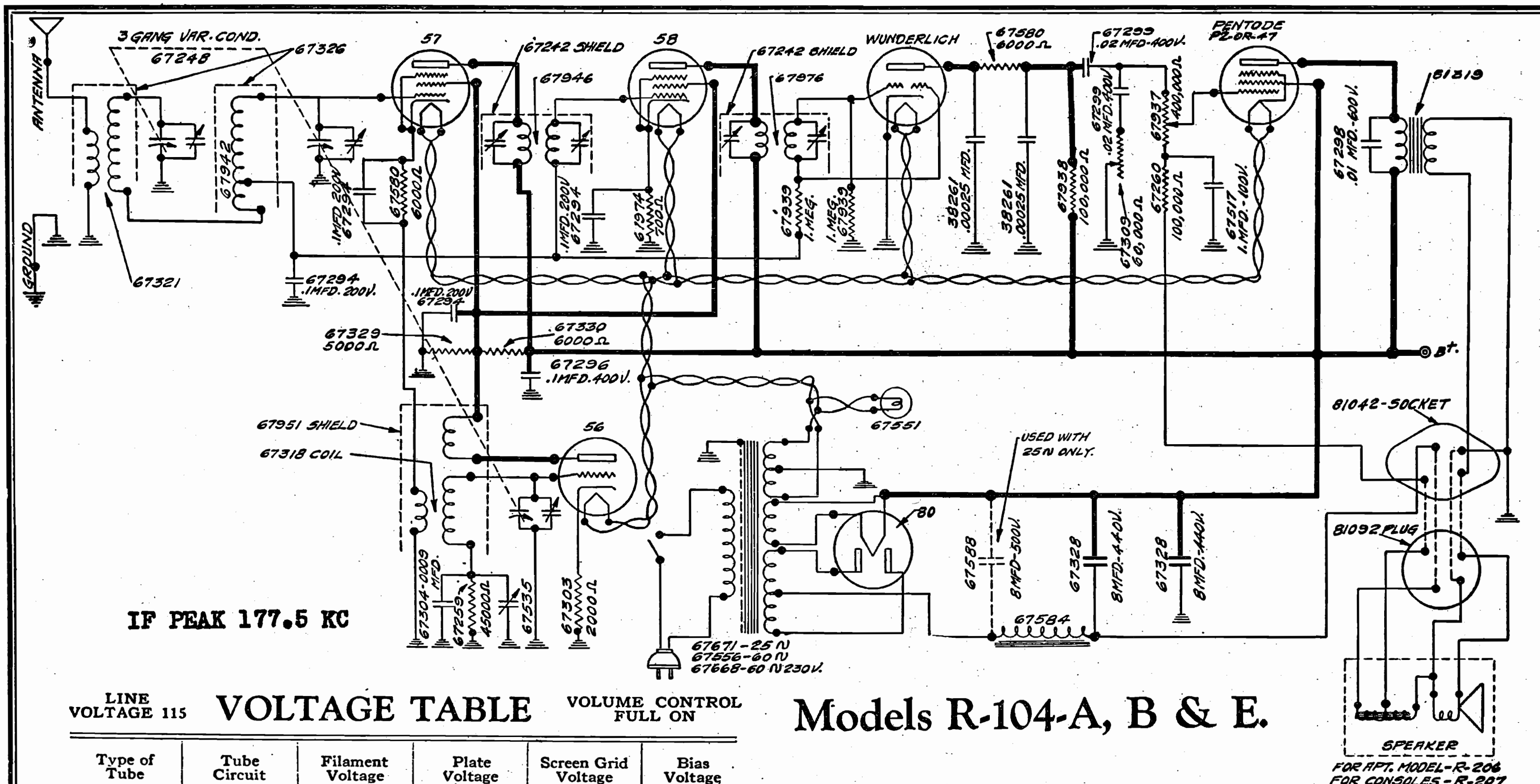
MODELS RT-41, R-81, R-96M,
R-96, R-97, R-98,
R-100, R-100M

STERLING MFG. CO.



MODEL R-104-A,B & E
Sohematic,Voltage

STEWART-WARNER CORP.



IF PEAK 177.5 KC

Models R-104-A, B & E.

LINE VOLTAGE 115

VOLTAGE TABLE

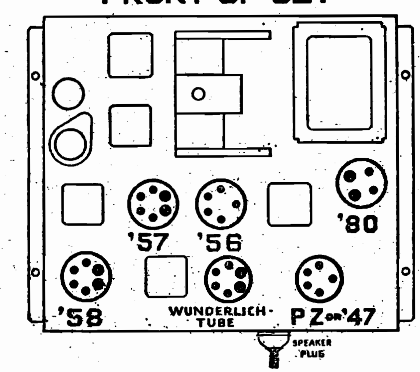
VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
'57	1st Det.	2.57	256	100	4.5
'56	Osc.	2.57	100		7.8
'58	I. F.	2.56	256	100	3.9
Wunderlich	2nd Det.	2.56	37.		
P. Z. or '47	Output	2.56	239	256	15.75 ‡
'80	Rect.	4.9			

All D. C. voltages measured with respect to ground, using high resistance voltmeter of 1000 ohms per volt. Readings will vary, depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltages.

‡This reading obtained between ground and that prong of speaker socket situated furthest from other three. Direct reading from grid to ground or reading taken with a set tester will show about 3 volts because of high resist ance in grid circuit.

FRONT OF SET



MODEL 104 Chassis
Service Data

STEWART-WARNER CORP.

SERVICE DATA ON MODEL 104 CHASSIS

CIRCUIT DESCRIPTION OF 104 CHASSIS

The Model 104 Stewart-Warner Radio Chassis makes use of a six-tube superheterodyne circuit embodying automatic volume control (A.V.C.) thru the action of its Wunderlich-type detector tube. An incoming signal is tuned first by a pre-selector circuit to increase selectivity and reduce image frequency interference and then fed into a tuned first detector stage, where it beats with the output of a local oscillator to produce a 177.5 K. C. intermediate frequency signal. This odd frequency is chosen to reduce further any image frequency interference. The I.F. signal is amplified in an exceptionally high gain stage and then fed into the Wunderlich tube which performs the triple functions of detection, amplification, and automatic volume control. As a result of the A.V.C. action of this tube a voltage varying in value in direct relationship to the strength of the incoming signal, appears across the 1 megohm resistor connected between one of its grids and ground. This resistor is also in the grid return circuit of both the first detector and I.F. tubes, so that their biases increase in direct relationship to the strength of the incoming signal. This action results in an automatic control of sensitivity.

The plate circuit audio output of the detector tube is impressed across the 400,000 ohm variable resistor in the grid circuit of the pentode tube. Volume is controlled by using this variable resistor as a voltage divider to feed any desired audio voltage from zero to the maximum available across the pentode grid circuit.

ALIGNING THE 104 CHASSIS

Alignment can be carried out intelligently only if the service man knows the general layout of the set, and how each circuit is affected during the process of alignment. The simplified top view of the chassis appearing on the other side of this sheet gives the layout of the receiver and indicates the names and locations of the various aligning adjustments. The following brief discussion of what actually happens during alignment should be carefully read, using the sketch as a basis before commencing the actual work.

LOCATION AND FUNCTION OF ALIGNING ADJUSTMENTS

The incoming signal is tuned first by the pre-selector "A" stage and then fed into the first detector "B" circuit, where it is tuned again to improve selectivity. These circuits are brought into exact alignment by the two trimmer condensers "A" and "B," pointed out in the attached sketch. The tuned oscillator circuit is so designed that it tunes to a frequency exactly 177.5 K.C. higher than the incoming signal. This circuit is kept in exact step by means of two adjustments, the oscillator condenser trimmer "O," and the padding condenser "P," which can be reached thru a small hole in the chassis base just in front of the "O" condenser.

THE "O" TRIMMER IS MAINLY EFFECTIVE AT THE HIGH FREQUENCY END OF THE DIAL, AND THE PADDING CONDENSER "P" AT THE LOW FREQUENCY END. The alignment routine which will be outlined takes this into consideration.

The two intermediate frequency (I. F.) transformers are of the tuned input,—tuned output type and each winding is tuned by a separate trimmer condenser, making a total of four additional adjustments. The first I. F. transformer is in the steel shield at the right side of the set, while the second I. F. transformer is at the rear of the chassis. The I. F. trimmer adjusting screws can easily be reached thru two small holes at the base of each shield, the primary circuit adjustment in each case being at the left and the secondary adjustment at the right.

PRELIMINARY STEPS IN ALIGNING

In aligning the Model 104 it is essential to use a high grade oscillator and sensitive output meter. The R. F. signal fed into the receiver must be very weak or it will cause the A.V.C. circuit to function, making correct alignment impossible. The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment procedure see that the volume control is full on, and the output meter connected either between the pentode plate and ground **thru a .25 mfd condenser** or across the voice coil, depending upon its sensitivity.

ALIGNING PROCEDURE

With this preliminary discussion clearly in mind, the actual alignment can be started. The following step-by-step routine should be followed for satisfactory results.

1. Remove the grid clip leading from the variable condenser to the cap of the first detector tube.
2. Set up the oscillator, and tune it to exactly 177.5 K.C. (This frequency can be accurately determined by tuning in a station at either 710 or 1420 K.C. and beating the 4th or 8th harmonic of the oscillator 177.5 K.C. signal against it. To be sure that you have the harmonic of the 177.5 K.C. signal, instead of some other frequency, tune in the other 177.5 harmonics on the broadcast dial. These should come in 177.5 K.C. on either side of the original setting. **Do not use the oscillator calibration curve to determine this intermediate frequency.)** Connect the oscillator output between the grid cap and grid clip of the first detector tube.
3. Adjust the oscillator output to give about one-half full scale deflection of the output meter.

Adjusting the I. F. Circuits

1. Adjust all four I. F. trimmer condensers, in each case tuning carefully to make sure that maximum deflection is obtained on the output meter.

IT IS VERY IMPORTANT THAT ABSOLUTELY NO INWARD PRESSURE BE APPLIED TO THE ALIGNMENT TOOL, OR THE CONDENSER MAY SPRING BACK TO A DIFFERENT SETTING AS SOON AS THE TOOL IS REMOVED.

2. Go back and repeat all four adjustments since the adjustment of each I. F. trimmer affects the others to a certain extent, thus necessitating readjustment.

Adjusting R. F. and Oscillator Circuits

1. Replace the grid cap on the first detector tube.
2. Twist the aerial and ground wires of the set together to reduce noise pick-up. Connect the aerial wire to the output of the oscillator and **ground both set and oscillator.** Adjust the oscillator frequency to 1400 K.C. and carefully tune the receiver to give maximum output. Adjust the oscillator output to produce about one-half full scale deflection of the output meter.
3. Carefully tune the "A" trimmer till the output meter reading reaches a maximum.
4. Note the wire leading from the grid cap of the 57 first detector tube (see tube layout diagram on the reverse side of this sheet), to the tuning condenser. The section of the condenser gang to which this lead is soldered is the "B" section. **Altho this "B" section is shown as the center condenser section on the diagram, some sets were manufactured with the "B" section in the rear.**

Retune the set and adjust the "B" trimmer for maximum output. The third, or "O" trimmer should not be touched unless the set is badly out of calibration at the high frequency end of the dial.

5. Set the oscillator at 600 K.C. and tune the set carefully to this frequency.
6. Adjust the oscillator padding condenser "P" for maximum output, RETUNING THE SET AFTER EACH CHANGE IN ADJUSTMENT. This is important.
7. Turn back the oscillator to 1400 K.C., tune the set to the same frequency, and very carefully readjust the "A" and "B" trimmer condensers to produce maximum output.

The receiver should now be perfectly aligned.

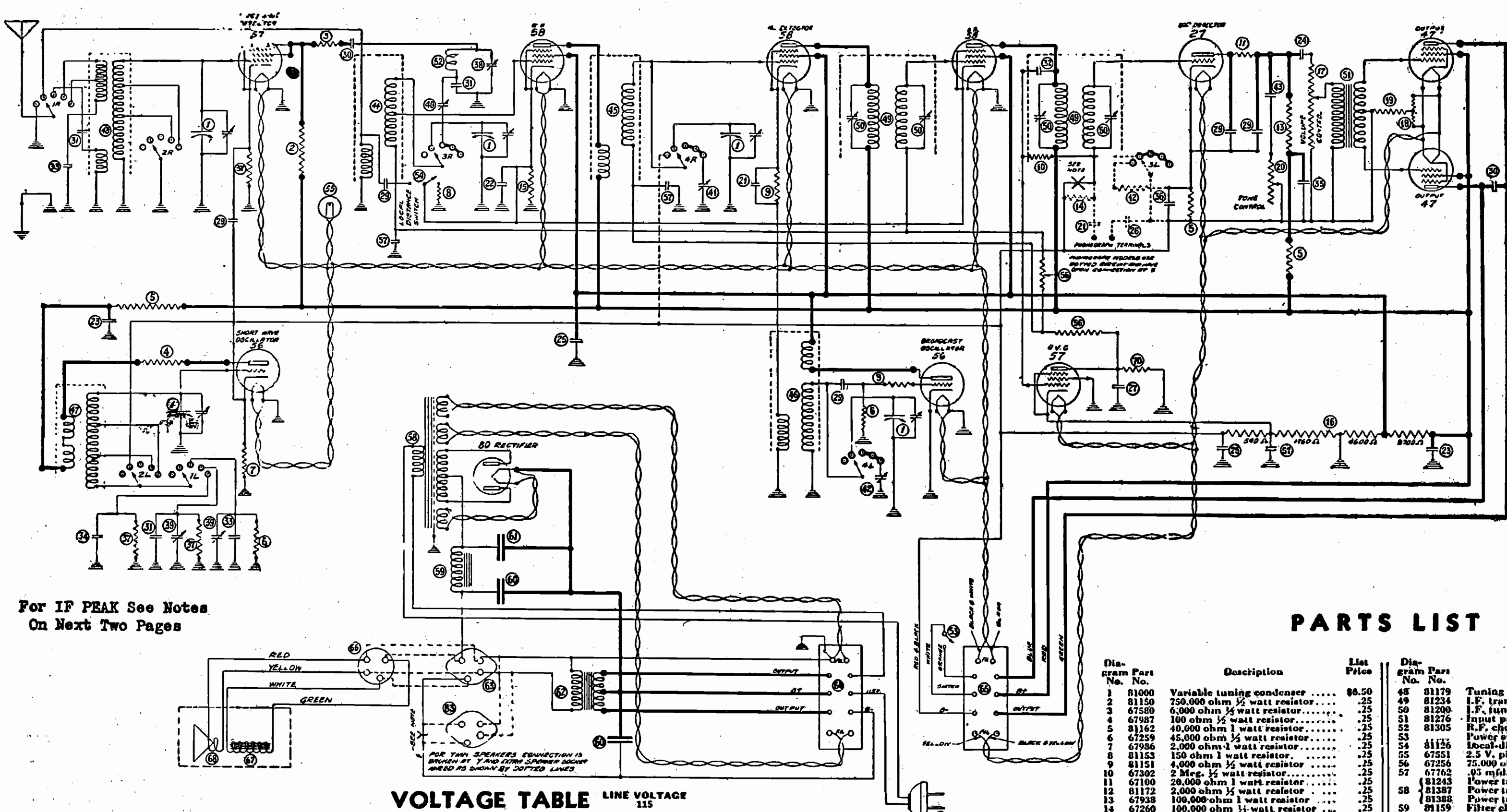
104 PARTS LIST

Part No.	Description	List Price
38261	.00025 mfd. condenser	$0.35
67240	Speaker diaphragm and voice coil assembly	1.85
67242	I.F. coil shield	.25
67248	Main tuning condenser	5.50
67259	45000 ohm, 1/3 watt resistor	.25
67260	100,000 ohm, 1/3 watt resistor	.25
67291	.1 mfd. 200 volt condenser	.30
67296	.1 mfd. 400 volt condenser	.40
67298	.01 mfd. 600 volt condenser	.30
67299	.02 mfd. 400 volt condenser	.30
67303	2000 ohm, 1/3 watt resistor	.25
67304	.0009 mfd. padding condenser	.30
67309	60,000 ohm tone control	1.50
67318	Oscillator tuning coil	1.25
67321	"A" tuning coil	1.00
67326	R.F. coil shield	.50
67328	8 mfd. 440 volt electrolytic condenser	1.75
67329	5000 ohm vitreous resistor	.50
67330	6000 ohm vitreous resistor	.50
67517	1. mfd. 100 volt condenser	.75
67535	Oscillator pad trimmer condenser	.45
67551	2.5 volt pilot light	.25
67556	115 volt 60 cycle power transformer	5.50
67580	6000 ohm, 1/3 watt resistor	.25
67581	Speaker field coil	3.50
67584	Filter choke coil	2.00
67588	8 mfd. 500 volt electrolytic condenser	1.80
67671	115 volt 25 cycle power transformer	8.00
67937	400,000 ohm volume control	.95
67938	100,000 ohm, 1 watt resistor	.25
67939	1 megohm, 1/2 watt resistor	.25
67942	"B" tuning coil	.75
67946	67946 1st I.F. transformer	2.00
	67481 coil only	.75
	67536 trimmer only	.65
67951	Oscillator coil shield	.75
67974	700 ohm, 1 watt resistor	.25
67976	67976 2nd I. F. transformer	2.00
	67481 coil only	.75
	67536 trimmer only	.65
81042	Speaker socket	.20
81092	81092 Speaker plug only	.20
	67972 Cable and plug	.60
	67971 Cable only	.40
81459	230 volt 60 cycle power transformer	10.00
	PARTS NOT SHOWN ON DIAGRAM	
67532	Rubber dial drive bushing	.02
67953	Escutcheon plate	.50
81412	Volume or tone control knob	.25
81413	Tuning knob	.25

STEWART-WARNER CORP.

MODEL 105 Series
Schematic, Voltage
Parts List

CIRCUIT DIAGRAM OF SERIES 105 CHASSIS



For IF PEAK See Notes On Next Two Pages

PARTS LIST

Diagram No.	Part No.	Description	List Price
1	81000	Variable tuning condenser	$6.50
2	81150	750,000 ohm ½ watt resistor	.25
3	67580	6,000 ohm ⅓ watt resistor	.25
4	67987	100 ohm ½ watt resistor	.25
5	81162	40,000 ohm 1 watt resistor	.25
6	67259	45,000 ohm ⅓ watt resistor	.25
7	67986	2,000 ohm 1 watt resistor	.25
8	81153	150 ohm 1 watt resistor	.25
9	81151	4,000 ohm ½ watt resistor	.25
10	67302	2 Meg. ½ watt resistor	.25
11	67100	20,000 ohm 1 watt resistor	.25
12	81172	2,000 ohm ⅓ watt resistor	.25
13	67938	100,000 ohm 1 watt resistor	.25
14	67260	100,000 ohm ⅓ watt resistor	.25
15	81427	1,200 ohm 1 watt resistor	.25
16	81205	Bleeder Vitreous Resistor	1.50
17	81419	60,000 ohm volume control	1.45
18, 19	81131	20 ohm resistor, 220 ohm resistor } on one form	.50
20	81437	100,000 ohm tone control	1.50
21	81190	.1 Mfd. 200 V. fixed condenser	.35
22	67294	.1 Mfd. 200 V. fixed condenser	.30
23	67296	.1 Mfd. 400 V. fixed condenser	.40
24	81191	.1 Mfd. 400 V. fixed condenser	.45
25	67297	.25 Mfd. 200 V. fixed condenser	.40
26	81345	.25 Mfd. 200 V. fixed condenser	.45
27	67299	.02 Mfd. 400 V. fixed condenser	.30
28	81333	.02 Mfd. 400 V. fixed condenser	.35
29	81156	.001 Mfd. fixed condenser	.30
30	81415	.002 Mfd. fixed condenser	.35
31	81155	.0005 Mfd. fixed condenser	.25
32	81157	.00025 Mfd. fixed condenser	.30
33	81158	.0001 Mfd. fixed condenser	.25
34	81282	.003 Mfd. fixed condenser	.50
35	81081	.5 Mfd. 400 V. fixed condenser	.50
36	81083	.1 Mfd. 100 V. fixed condenser	.75
37	81152	10,000 ohm ⅓ watt resistor	.25
38	81306	Trimmer Condenser	.50
39	81231	Trimmer Condenser	.50
40	81202	Trimmer Assembly	.40
41, 42	81201	Double trimmer condenser, Double trimmer condenser } one unit	.60
43	81445	.02 Mfd. 400 V. fixed condenser	.40
44	81189	"A" Tuning coil	1.00
45	81188	"B" Tuning coil	1.00
46	81406	"C" Tuning coil	1.00
47	81178	Tuning coil	1.50
48	81179	Tuning coil	1.70
49	81234	I.F. transformer coils	1.0[illegible]
50	81200	I.F. tuning condensers	[illegible]
51	81276	Input push-pull transformer	5.[illegible]
52	81305	R.F. choke coil	[illegible]
53	[illegible]	Power switch part of 81237	
54	81126	Local-distant switch	.00
55	67551	2.5 V. pilot lamp	.25
56	67256	75,000 ohm, ¼ watt resistor	.2[illegible]
57	67762	.05 mfd. 200v. condenser	.3[illegible]
58	81243	Power transformer, 115 V. 60 cyc.	10.75
58	81387	Power transformer, 115 V. 25 cyc.	12.75
58	81388	Power transformer, 230 V. 60 cyc.	14.00
59	81159	Filter choke	2.70
60	67328	8 Mfd. 440 V. Electrolytic cond.	1.75
61	81347	8 Mfd. 485 V. (for 60 cycles)	1.75
61	81367	10 Mfd. 475 V. (for 25 cycles)	2.00
62	81160	Output transformer, single speaker	2.75
62	81291	Output transformer, twin speaker	2.75
63	81042	Speaker socket	.15
64	81095	Power supply terminal socket	.50
65	81094	Receiver power terminal plug	.45
66	81100	Speaker cord and plug	.60
66	81098	Speaker cord only	.35
66	81092	Speaker plug only	.20
67	81265	Field coil Model R-208-A (460 ohms)	3.50
67	81266	Field coil Models RL-209-A or RH-209-A (230 ohms)	3.50
68	81274	Diaphragm Assembly (Model R-208-A)	2.75
68	81274	Diaphragm Assembly (Model RL-209-A)	2.75
68	81279	Diaphragm Assembly (Model RH-209-A)	2.75
69	81246	Cord and plug	.60
70	81509	¼ Meg. ⅓ watt resistor	.25

Miscellaneous Parts

Part No.	Description	List Price
81232	Range switch	$4.00
81084	Tuning knob	.30
81085	Tone or Volume Control knob	.30
81086	Range switch lever	.30
81011	Escutcheon plate	.65
81408	Celluloid dial	.60
81109	Small rubber drive bushing	.03
81111	Large rubber drive bushing	.04

VOLTAGE TABLE

LINE VOLTAGE 115

Tube Circuit	Type of Tube	Filament Voltage	Plate to Chassis	Screen Grid Chassis	Cathode to Chassis
Short Wave Oscillator	56	2.4	81		5.2
Short Wave Detector	57	2.4	21	2	1.9
R F	58	2.4	188	102	2.4
Broadcast Oscillator	56	2.4	102		0
First Detector	58	2.4	188	102	9
I F	58	2.42	188	102	2.2
A V C	57	2.44	0	0	−89
Second Detector	27	2.42	70		−92
Output	47	2.4	177	188	Fil to chassis −97; Fil to grid 16.8
Rectifier	80	4.9			

CAUTION

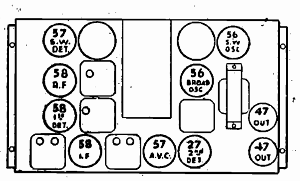
Reading must be taken with the set tuned to one of the short wave ranges, and the local-distance switch pulled out.

All D.C. voltages are measured between the tube socket terminal and chassis, using a high resistance voltmeter of 1000 ohms per volt. Readings will vary depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for all detector and oscillator D.C. voltages.

Readings taken with set testers plugged into tube sockets may deviate considerably from the values given in this table, due to their internal circuit arrangements.

TUBE LOCATIONS

FRONT OF SET



NOTE: Use an 80 tube in the Power Unit.

MODEL 105 Series
Service Data
Part 1

STEWART-WARNER CORP.

SERVICE DATA
for
STEWART-WARNER 105 SERIES CHASSIS

CIRCUIT DESCRIPTION OF 105 RECEIVER

GENERAL:

The Model 105 Stewart-Warner Radio Receiver is an 11-tube all wave receiver, using a double superheterodyne circuit, which thru the use of a multi-section range switch permits the use of any one of four tuning ranges or phonograph hook-up as desired.

CIRCUIT LAYOUT:

Thru the use of the range switch radio signals are made to follow one of two general circuit paths, depending on their wave lengths. If the signal is in the broadcast band, it is fed directly to the tuned input circuit of the R.F. tube, and from there on amplified in the usual way. During broadcast reception interference from short wave stations is prevented by applying a very high negative bias on the short wave oscillator tube, preventing it from functioning.

When the set is switched over to any one of the three short wave ranges, the following circuit changes are made:

1. The antenna is switched to the tuned input circuit of the short wave detector.
2. The bias on the short wave oscillator tube is reduced so that it can function.
3. The tuning condenser sections in the R.F., first detector, and broadcast oscillator stages are cut out of the circuit and replaced by fixed trimmer condensers which are adjusted to tune these circuits to pass a 1525 K.C. signal. This frequency is used to prevent pickup of broadcast band stations during short wave reception.

The received short wave signal passes thru the short wave detector, where it is converted to 1525 K.C. by the action of the short wave oscillator and it is then amplified at this frequency in the broadcast section of the receiver.

Input to the second detector tube is kept constant regardless of variation in signal strength by means of an A.V.C. circuit using a separate 57 tube. Volume is regulated by means of a variable resistor acting as a voltage divider to feed the primary of the input push-pull transformer.

EXPLANATION OF RANGE SWITCH:

The range switch consists of eight independent switch sections, each section being provided with five contacts. Ordinarily only seven sections of the eight, and only four contacts of the five per switch are used, the remainder being wired in on phonograph models only.

In the circuit diagram these different switch sections are labelled 1R, 1L, 2R, etc., and for the sake of simplicity are shown in different locations in the diagram, altho they are all parts of the master range switch assembly located in the center of the chassis. With the chassis bottom-side up and controls pointing away from you 1R is the front right hand section, 1L is the front left hand section, 2R is the second right-hand section counting from the front of the chassis, and so on.

Switch contact positions are arranged in the following order reading in a clockwise direction.

1. PHONOGRAPH. — This contact is used on phonograph models only. On all other sets, the switch lever cannot be moved to this position.
2. BROADCAST RANGE. — In non-phonograph models a stop has been placed to prevent the switch from turning on to Point No. 1 so that No. 2 is really the first switch position.
3. 180-80 METER SHORT WAVE RANGE.
4. 80-33 METER SHORT WAVE RANGE.
5. 33-14 METER SHORT WAVE RANGE.

As the range switch is rotated in a clockwise direction the following circuit changes are effected.

POSITION 1. Phonograph. **(This position is available on phonograph models only.)** Switch 1R grounds the aerial, while switch 4R biases the first detector to cut off, thus rendering it inoperative. These circuit changes prevent radio interference while the phonograph is being used. Switch 3L which is wired in on phonograph models only, makes the necessary connections to bias the second detector as an amplifier instead of a detector.

POSITION 2. Broadcast Band. **(This is the first position in use on non-phonograph models.)** In this position switch 2L biases the short wave oscillator to stop it from oscillating so that the short wave section cannot cause interference when receiving stations on the broadcast band. Switch 1R connects the aerial to the primary of the R.F. coil. Switch 3R connects the third section of the variable condenser gang across the secondary of the R.F. coil. Switch 4R connects the fifth section of the variable condenser gang across the secondary of the first detector coil. Switch 4L connects the fourth section of the variable condenser gang across the secondary of the broadcast oscillator circuit. In phonograph models only, switch 3L connects the secondary of the second I.F. transformer direct to B minus.

POSITION 3. 180 to 80 Meter Short Wave Band. In this position switch 1R connects the aerial to one of the two tuned primaries of the short wave detector. Switch 3R connects the output of the short wave detector to the secondary of the R.F. coil, and also connects an adjustable trimmer condenser across the secondary of this coil to tune it to 1525 K.C. Switch 4R connects an adjustable trimmer across the secondary of the first detector coil to tune it to 1525 K.C. Switch 4L connects a variable trimmer across the secondary of the broadcast oscillator to tune it to 1702.5 K. C., thus giving an I.F. of 177.5 K.C. Switch 1L connects an adjustable padding circuit in series with the secondary of the short wave oscillator coil, thus permitting proper tracking of this circuit in this short wave band. In phonograph models only, switch 3L connects the secondary of the second I.F. transformer directly to B minus.

POSITION 4. 80 to 33 Meter Short Wave Band. In this position switch 1R connects the aerial to the second of the two primaries of the short wave detector coil. Switch 2R shorts out a portion of the secondary of the short wave detector coil, thus enabling it to tune to the 33 to 80 meter band. Connections to switches 3R, 4R and 4L remain the same as in position 3, tuning the R.F. section to 1525 K.C. Switch 1L connects a different adjustable padding circuit in series with the secondary of the short wave oscillator coil, thus permitting proper tracking of this circuit in this short wave band. Switch 2L shorts out part of the secondary of the short wave oscillator coil so that it will tune to wave lengths between 33 and 80 meters. In phonograph models only, switch 3L connects the secondary of the second I.F. coil directly to B minus.

POSITION 5. 33 to 14 Meter Short Wave Band. In this position switch 1R connects the aerial thru a tap to the second primary of the short wave detector coil. Switch 2R shorts out a larger section of the secondary of the short wave detector coil so that this circuit can be tuned from 14 to 33 meters. Connections thru switches 3R, 4R, 3L and 4L remain as in positions 3 and 4. Switch 1L connects a non-adjustable padding circuit in series with the secondary of the short wave oscillator coil. Switch 2L shorts out a larger portion of the secondary of the short wave oscillator coil, thus permitting this tuned circuit to cover the 14 to 33 meter band.

LOCAL-DISTANCE SWITCH:

The local-distance or "quiet" switch, which is operated by an in-and-out motion of the tone control knob, functions in the following manner. In the "in" or local position, the primary of the R.F. coil is shunted by a fixed condenser, thus by-passing part of the signal to ground and reducing the signal input into this circuit. The R.F. and I.F. tubes are operated at a high negative bias to reduce their amplification. In the "out" or distance position, the by-passing condenser is cut out of the circuit and a fixed resistor is connected in parallel with the bias resistor of the R.F. and I.F. tubes, thus reducing the bias on these tubes to its normal value, permitting them to operate at maximum sensitivity.

STEWART - WARNER CORP.

MODEL 105 Series
Service Data. Part 2

SPEAKER:

Three different types of speakers are used with the 105 set.

(1) R-208-A. This is the standard model for single speaker receivers.
(2) RL-209-A. This is the LOW unit of a twin speaker set. Its field coil resistance is less than that of the R-208-A.
(3) RH-209-A. This is the HIGH unit of a twin speaker set. Its field coil resistance is the same as that of the RL-209-A.

Replacement diaphragms for RL-209-A and RH-209-A are marked 67208 and 81268 respectively.

POWER UNIT

Altho the chassis are the same, different power units are used for the single and twin speaker sets. The twin speaker power unit has two speaker sockets instead of one, and a different output transformer, designed to handle two speakers.

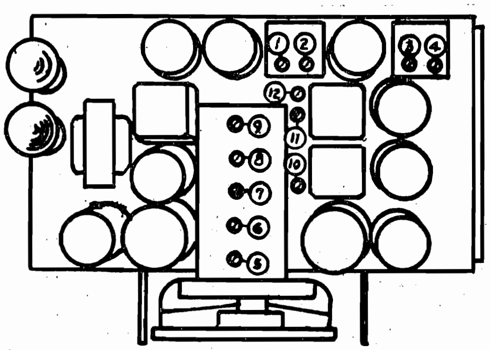
ALIGNING THE MODEL 105 RECEIVER

There are five distinct circuits to be aligned in the 105 receiver. **The order in which they are given below is the order in which they must be aligned.**

(1) Intermediate Frequency Amplifier (177.5 K.C.)
(2) Broadcast Tuning Circuit (540-1550 K.C.)
(3) Short Wave Intermediate Frequency Amplifier (1525 K.C.)
(4) First Short Wave Circuit (180 to 80 meters)
(5) Second Short Wave Circuit (80 to 33 meters)

NOTE: The third short wave circuit requires no aligning since both condensers will be in step if short wave circuits (4) and (5) are properly aligned.

In aligning the Model 105 it is essential to use a high grade oscillator and a sensitive output meter. The R.F. signal fed



into the receiver must be very weak or it will cause the A.V.C. circuit to function, making correct alignment impossible. The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment of the set, see that the **volume control is full on, the local-distance switch pulled out,** and the output meter connected to the pentode plates thru .25mfd. condensers, or to the voice coil of the speaker. The tone control should be turned all the way to the right. This last step is helpful in reducing the tube "shish" and makes aligning easier.

(1) ALIGNING THE I. F. CIRCUITS AT 177.5 K. C.

Remove the grid clip from the first detector tube and connect the two output terminals of the oscillator in series with the grid clip and grid cap of the tube. Set the oscillator to exactly 177.5 K.C. and adjust its output to give about one-half scale deflection of the output meter.

Carefully adjust the four I.F. trimmers Nos. 1, 2, 3 and 4 (see diagram) until output is at a maximum. After all four trimmers have once been adjusted, go back and readjust them again in the same order, since any change made in one affects the others to some extent so that readjustment is necessary. If any static is coming thru the receiver so that the output meter fluctuates, pull out the broadcast oscillator tube to prevent this interference from coming thru.

(2) ALIGNING BROADCAST R. F. CIRCUITS

Before starting this alignment procedure, it is necessary to check the calibration of the set on the broadcast band, since this band must subsequently be used as a reference point in aligning the three short wave bands. **This calibration check is very important.** It can easily be done by disconnecting the test oscillator and tuning in some broadcast station between 1000 and 1400 K.C. whose frequency is definitely known.

If the dial reading of the set corresponds to the broadcast frequency of the station, the set is in calibration. If the dial reading is incorrect, set the dial pointer to the proper frequency and carefully adjust trimmer No. 8 until the station is tuned in with maximum volume.

After the receiver is calibrated it must be aligned. To do this connect the test oscillator to the set aerial and ground terminals and set it to approximately 1400 K.C. Tune the set to this signal. Carefully adjust trimmers No. 7 and No. 9 for maximum output. Retune the set, which is thrown out of resonance when trimmers No. 7 and No. 9 are adjusted, and once more adjust these trimmers. Repeat this procedure until you are certain the output cannot be increased by further adjustment.

(3) ALIGNING SHORT WAVE I. F. AT 1525 K. C.

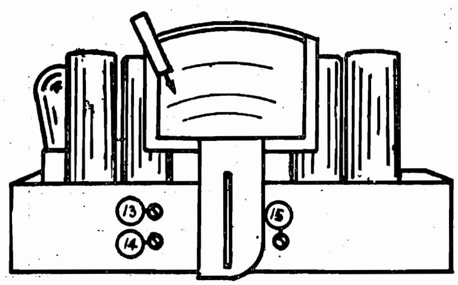
Adjust the test oscillator to exactly 1525 K.C. by setting the broadcast receiver to this frequency and tuning the oscillator until the signal comes thru with maximum volume. Now shift the tuning range of the set to the second short wave band (80 to 33 meters). Adjust the oscillator output to give about one-half full scale deflection. If static is bad, causing the output meter needle to jump about, remove the short wave oscillator tube.

Using a Bakelite screwdriver, adjust trimmers Nos. 10, 11 and 12 to give maximum output.

NOTE: It should never be necessary to adjust the following short wave circuits unless the short wave trimmers or coils have been changed or tampered with. Alignment procedure as a rule should not go beyond this point.

(4) ALIGNING 180-80 METERS SHORT WAVE BAND

The following alignment procedure is extremely critical. Tune the receiver to exactly 800 K.C. and adjust the output frequency of the test oscillator until its signal is a maximum at this frequency. Shift to the first short wave band of the set, and turn the pointer as far as it will go to the left. This tunes the set to 1600 K.C., which is the second harmonic of



the test oscillator signal. Adjust trimmer No. 14 until this signal comes thru with maximum output. If static noises of sufficient intensity to affect the A.V.C. action of the set are being picked up, substitute for the A.V.C. tube a 57 with an open filament or with one of its filament prongs cut off.

Again using the calibrated broadcast band, set the test oscillator output to exactly 975 K.C., shift back to the first short wave band, and turn the pointer **as far as it will go to the right.** Adjust trimmer No. 5 until the oscillator signal (4th harmonic of 975 K.C.) is picked up with maximum output. If it has been necessary to change the adjustment of trimmer No. 5 appreciably, go back to trimmer No. 14 and adjust it again as outlined at the beginning of this section. **This second readjustment is important.**

(5) ALIGNING 80-33 METERS SHORT WAVE BAND

Set the test oscillator to exactly 925, K.C. using the method previously outlined for 800 K.C. and 975 K.C. Shift the tuning range of the set to the second short wave band (80-33 meters) and turn the pointer as far as it will go to the left. Adjust trimmer No. 13 until the fourth harmonic of the 925 K.C. signal comes thru with maximum output.

Set the test oscillator at 1500 K.C., using the method previously outlined. Tune in the signal at approximately 50 meters, which is the 4th harmonic of 1500 K.C. and adjust trimmers Nos. 6 and 15 until the oscillator signal comes thru with maximum output. Retune set and readjust trimmers 6 and 15. Trimmer No. 15 is not at all critical in its action.

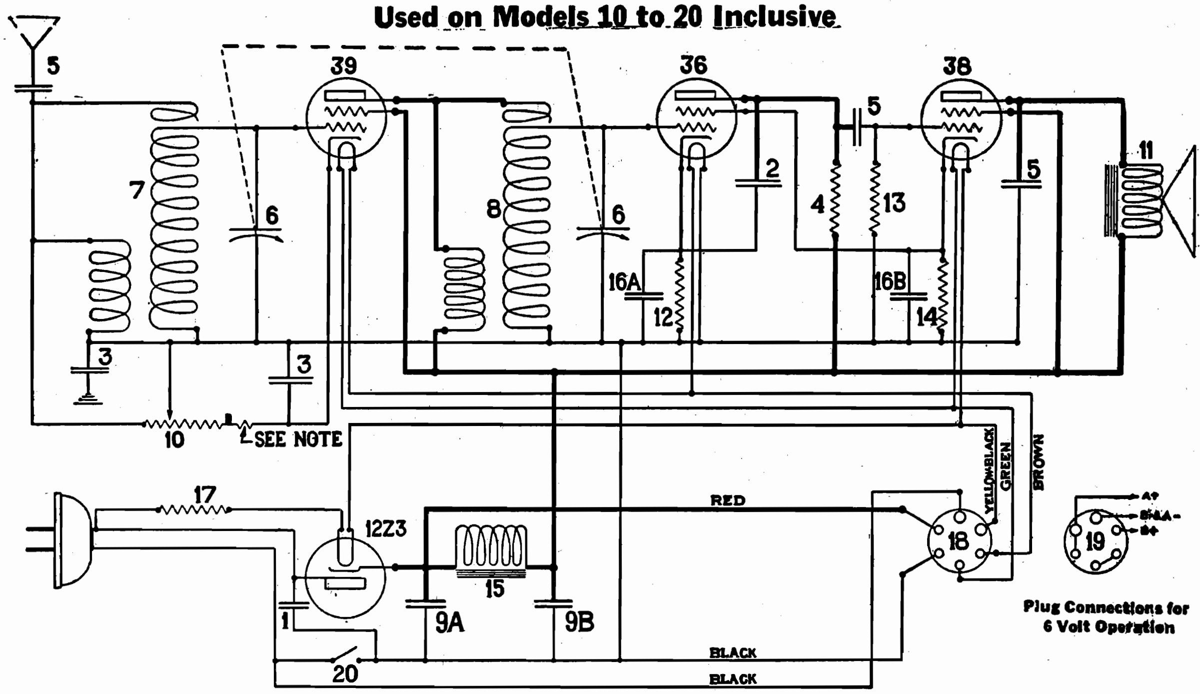
NOTE: It is very important that the aligning frequencies given in sections 3, 4 and 5 be exact, otherwise both the calibration and sensitivity, particularly at the third short wave band, will be badly off.

MODEL 108, 108-X
(Models 10 to 20 inc.)

STEWART-WARNER CORP.

Circuit Data for Stewart-Warner Chassis Series 108 and 108-X

Used on Models 10 to 20 Inclusive



NOTE: In some receivers, a 140 ohm, ¼ watt carbon resistor, part 81646 is connected in series with the volume control; in other sets this resistor is built into the volume control.

LINE VOLTAGE 115 VOLTS A. C. ★ Voltage Table ★ VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament to Condenser	Plate to Condenser	Screen Grid to Condenser	Cathode to Condenser
39	R. F.	** (See Note)	107	107	1.5
36	Det.	** (See Note)	1.3‡	9	1.3
38	Output	** (See Note)	103	107	9
12Z3	Rect.	** (See Note)	...	....	122

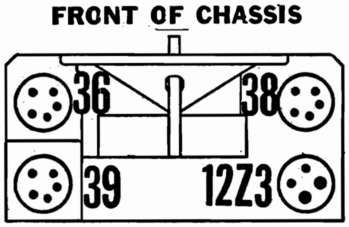
IMPORTANT NOTE

★These voltages will be obtained when the set is operated at 115 volts, 60 cycles A. C. For D. C. operation, voltages will be somewhat lower. All voltage readings have been taken between tube prongs and the variable condenser frame, *not the chassis*. The chassis cannot be used in this receiver as a reference point for voltage readings.

**Filament voltage readings will vary widely, depending upon the resistance of the A. C. voltmeter. With high resistance rectifier type meters, voltage readings will be approximately 6.3 for the detector and amplifier tubes, and 12.6 for the 12Z3 rectifier. With ordinary A. C. Voltmeters, readings will be very much less.

‡This reading is obtained with a 30-volt scale, one thousand ohms per volt instrument. Higher resistance meters or higher scale readings will give greater voltage readings.

FRONT OF CHASSIS



PARTS LIST

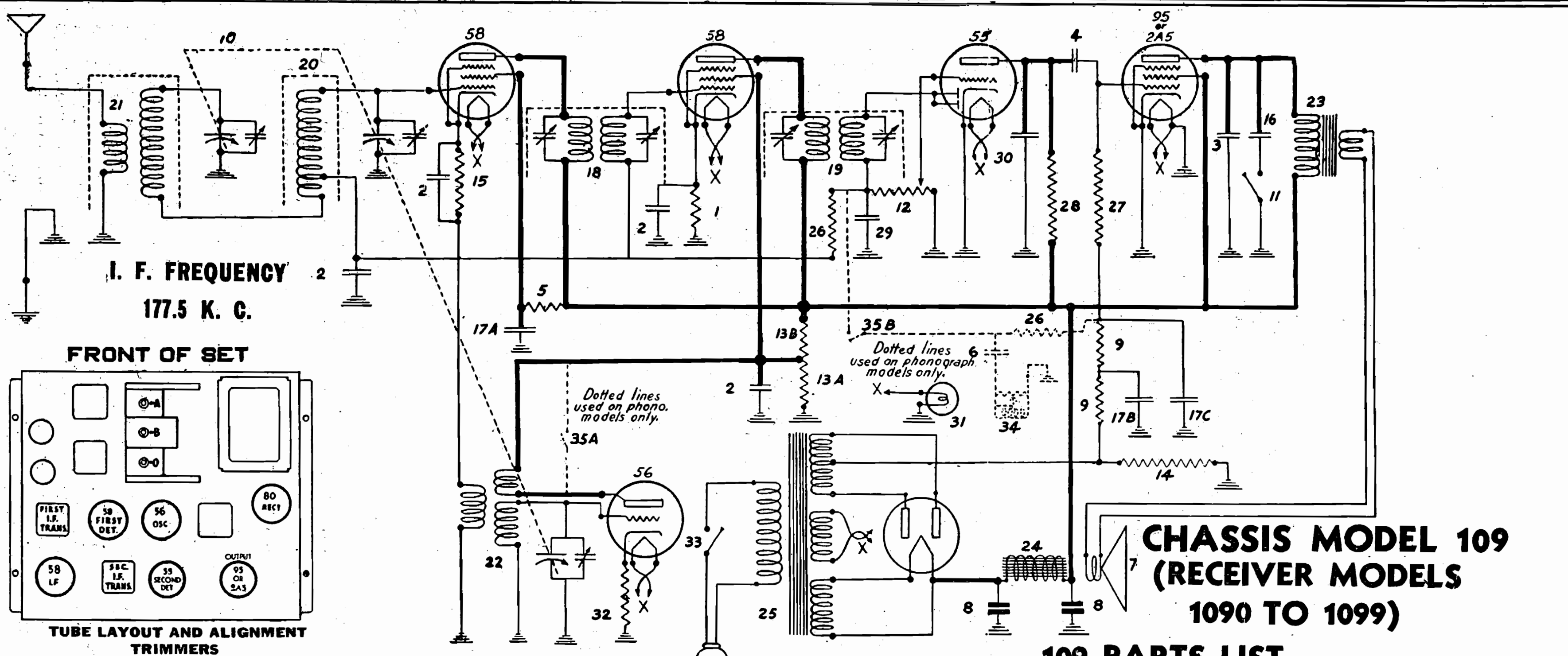
Diag. No.	Part No.	Description
1	67298	.01 mfd. 600 V cartridge condenser
2	81158	.0001 mfd. mica condenser
3	81630	.1 mfd. 100 V cartridge condenser
4	81644	2.1 meg. ¼ W. carbon resistor
	81646	140 ohm ¼ W. carbon resistor
5	81657	.003 mfd. mica condenser
6	81662	Variable condenser
7	81664	Antenna Coil
8	81666	Detector Coil
9A, 9B	81678	4 mfd. 150 V dry electrolytic condensers (in one unit)
10	81679	250,000 ohm volume control and switch
11	81680	Speaker
12	81681	29,000 ohm ¼ W. carbon resistor
13	81682	1.1 meg. ¼ W. carbon resistor
14	81683	1600 ohm ½ W. carbon resistor
15	81694	Filter choke
16A, 16B	81698	5 mfd. 20 V dry electrolytic condensers (in one unit)
17	81785	Power cord assembly
18	81834	Battery cable socket
19	81861	6 volt battery cable
	81863	12 volt battery cable
	81865	32 volt battery cable
20	....	Switch on back of 81679

USING MODEL 108-X IN AUTOMOBILE

Two #81884 brackets and a #81861 6-volt adaptor cable are needed. The plug at the cable's end fits the socket at the rear of set. Clip the yellow A lead to the positive terminal of storage battery and the yellow-black wire labeled -A to the negative terminal of battery. Connect these leads to battery terminals instead of ammeter or other convenient connection points.

STEWART-WARNER CORP.

MODELS 1090 to 1099 (Chassis 109) Schematic, Voltage



FRONT OF SET

TUBE LAYOUT AND ALIGNMENT TRIMMERS

CHASSIS MODEL 109 (RECEIVER MODELS 1090 TO 1099)

109 PARTS LIST

Diag. No.	Part No.	Description	List Price
1	67257	500 ohm, ¼ watt resistor	$0.25
2	67294	.1 mfd., 200 volt condenser	.30
3	67298	.01 mfd., 600 volt condenser	.30
4	67299	.02 mfd., 400 volt condenser	.30
5	67938	100,000 ohm, ½ watt resistor	.25
6	81190	.1 mfd., 200 v. cond. Phono model only	.35
7	81274	Speaker diaphragm assembly	2.75
8	81347	8 mfd., 485 volt electrolytic cond.	1.75
9	81381	150,000 ohm, ½ watt resistor	.25
10	81700	Variable condenser	5.00
11	81721	Tone control switch	.45
12	81722	500,000 ohm, vol. control & A. C. switch	1.25
	81870	Vol. control & phonograph switch unit	2.10
13A, 13B	81724	10,000 ohm, resistor, 7,500 ohm, resistor (Wound in one unit)	.60
14	81725	315 ohm, wire wound resistor	.30
15	81727	1000 ohm, ¼ watt resistor	.20
16	81739	.04 mfd, 600 volt condenser with bracket	.35
17A, 17B, 17C	81756	.5 mfd., 200 volt; .25 mfd., 100 volt; .25 mfd., 100 volt (in one cell)	1.50
18	81757	First I. F. Transformer	2.00
19	81758	Second I. F. Transformer	2.00
20	81764	First detector tuning coil	1.00
21	81768	Antenna coil	1.25
22	81770	Oscillator coil	1.35
23	81774	Output transformer	3.00
24	81779	Speaker field coil	4.00
25	81800	110 volt 60 cy., power transformer	6.00
	81850	230 volt 60 cy., power transformer	6.25
26	81808	980,000 ohm ½ watt resistor	.20
27	81809	160,000 ohm ½ watt resistor	.20
28	81810	110,000 ohm 1 watt resistor	.20
29	81811	.00026 mfd., condenser	.25
30	81812	.00051 mfd., condenser	.25
31	81822	2.5 volt pilot light	.25
32	81829	1500 ohm ¼ watt resistor	.20
..	81850	230 volt 60 cy. powertransf. (see 81800)	6.25
33	81869	Line Switch. (Separate unit used in phonograph chassis only. Part of volume control on standard chassis)	.40
..	81870	Phono chassis type volume control (See 81722)	2.00
34	......	Phonograph pickup.	
35	......	Phonograph switch; mounted on back volume control in phonograph models.	

MISCELLANEOUS PARTS NOT SHOWN IN DIAGRAM

Part No.	Description	List Price
67236	Rubber tuning drive bushing	.02
81039	4-prong socket	.12
81040	5-prong socket	.12
81043	6-prong socket	.20
81608	R. F. coil shield	.50
81625	Tube shield	.20
81723	Ground clip	.10
81805	Tuning dial and gear assembly (see 81879)	.60
81817	First I. F. coil shield	.50
81819	Second I. F. coil shield	.50
81879	Celluloid tuning dial	.30
35459	Steel washer (Used for rubber mounting variable condenser.)	.10 dz.
39393	Lock washer (Used for rubber mounting variable condenser.)	.50 per C
67711	Rubber washer (Used for rubber mounting variable condenser.)	.05
67712	Rubber bushing (Used for rubber mounting variable condenser.)	.05
67713	Steel bushing (Used for rubber mounting variable condenser.)	.05

VOLTAGE TABLE

LINE VOLTAGE 115 — VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
56	Osc.	2 40	88		9 6
58	1st Det.	2 40	208	92	5
58	I. F.	2 40	208	92	3 4
55	2nd Det.	2 42	18		
95 or 2A5	Output	2 38	200	208	16 5*
80	Rect.	5 00			

All D. C. voltages measured with respect to ground, using high resistance voltmeter of 1000 ohms per volt. Readings will vary, depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltages.

*This reading taken across metal clad bias resistor

MODELS 1090 to 1099
(Chassis 109)
Service Data

STEWART-WARNER CORP.

SERVICE DATA FOR MODEL 109 CHASSIS

CIRCUIT DESCRIPTION OF 109 CHASSIS

The Model 109 Stewart-Warner Radio Chassis makes use of a six-tube superheterodyne circuit embodying automatic volume control (A.V.C.) through the action of its type 55 detector tube. An incoming signal is tuned first by a pre-selector circuit to increase selectivity and reduce image frequency interference and then fed into a tuned first detector stage, where it beats with the output of a local oscillator to produce a 177.5 K.C. intermediate frequency signal. This odd frequency is chosen to reduce further any image frequency interference.

The I.F. signal is amplified in an exceptionally high gain stage, and then fed to the diode section of the 55 tube where it is rectified. This rectified signal appears across the 500,000 ohm potentiometer (No. 12 in the diagram) not only at radio frequencies but also as an audio voltage. Any desired portion of this audio voltage is picked up by the sliding arm of the potentiometer and fed to the triode section of the 55 tube, which functions purely as a standard A.F. amplifier. Thus this potentiometer is made to act as the volume control.

The necessary A.V.C. operating potential is developed by virtue of the radio frequency drop across the potentiometer resistance. This potential is smoothed out by an appropriate resistance-capacity filter and applied as a bias to the grids of the first detector and I.F. tubes. Thus as the incoming signal increases or decreases in strength the bias is raised or lowered proportionately and the audio output of the set maintained constant.

Excellent tone quality is realized in this set because of the superior design of the resistance network coupling the triode section of the 55 to the output pentode.

ALIGNING THE 109 CHASSIS

Alignment can be carried out intelligently only if the service man knows the general layout of the set, and how each circuit is affected during the process of alignment. The simplified top view of the chassis appearing on the other side of this sheet gives the layout of the receiver and indicates the names and locations of the various aligning adjustments. The following brief discussion of what actually happens during alignment should be carefully read, using the sketch as a basis before commencing the actual work.

LOCATION AND FUNCTION OF ALIGNING ADJUSTMENTS

The incoming signal is tuned first by the pre-selector "A" stage and then fed into the first detector "B" circuit, where it is tuned again to improve selectivity. These circuits are brought into exact alignment by the two trimmer condensers "A" and "B," pointed out in the attached sketch. The tuned oscillator circuit is so designed that it tunes to a frequency exactly 177.5 K.C. higher than the incoming signal. This circuit is kept in exact step with the other two by means of the oscillator condenser trimmer "O."

The two intermediate frequency (I.F.) transformers are of the tuned input-tuned output type and each winding is tuned by a separate trimmer condenser, making a total of four additional adjustments. The first I.F. transformer is in the steel shield at the right side of the set, while the second I.F. transformer is at the rear of the chassis. The I.F. trimmer adjusting screws can easily be reached through two small holes at the base of each shield, the primary circuit adjustment in each case being at the left and the secondary adjustment at the right.

PRELIMINARY STEPS IN ALIGNING

In aligning the Model 109 it is essential to use a high grade oscillator and sensitive output meter The R.F. signal fed into the receiver must be very weak or it will cause the A.V.C. circuit to function, making correct alignment impossible. The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment procedure see that the volume control is full on, and the output meter connected either between the pentode plate and ground through a .25 mfd condenser or across the voice coil, depending upon its sensitivity.

ALIGNING PROCEDURE

With this preliminary discussion clearly in mind, the actual alignment can be started. The following step-by-step routine should be followed for satisfactory results.

1. Set up the oscillator, and tune it to exactly 177.5 K.C. (This frequency can be accurately determined by tuning in a station at either 710 or 1420 K.C. and beating the 4th or 8th harmonic of the oscillator 177.5 K.C. signal against it. To be sure that you have the harmonic of the 177.5 K.C. signal, instead of some other frequency, tune in the other 177.5 harmonics on the broadcast dial. These should come in 177.5 K.C. on either side of the original setting. **Do not use the oscillator calibration curve to determine this intermediate frequency.)**

2. Connect the oscillator output between the grid cap of first detector tube and chassis.

Adjusting R. F. and Oscillator Circuits

1. Twist the aerial and ground wires of the set together to reduce noise pick-up. Connect the aerial wire to the output of the oscillator and ground both set and oscillator. Adjust the oscillator frequency to 1400 K.C. and carefully tune the receiver to give maximum output. Adjust the oscillator output to produce about one-half full scale deflection of the output meter.

2. Carefully tune the "A" trimmer till the output meter reading reaches a maximum.

Due to the fact that the variable condenser is mounted on rubber cushion supports, pressure of the aligning tool will usually cause it to shift slightly and throw it out of tune. **It is therefore necessary to retune the set repeatedly while adjusting any variable condenser trimmer.**

3. Retune the set and adjust the "B" trimmer for maximum output.

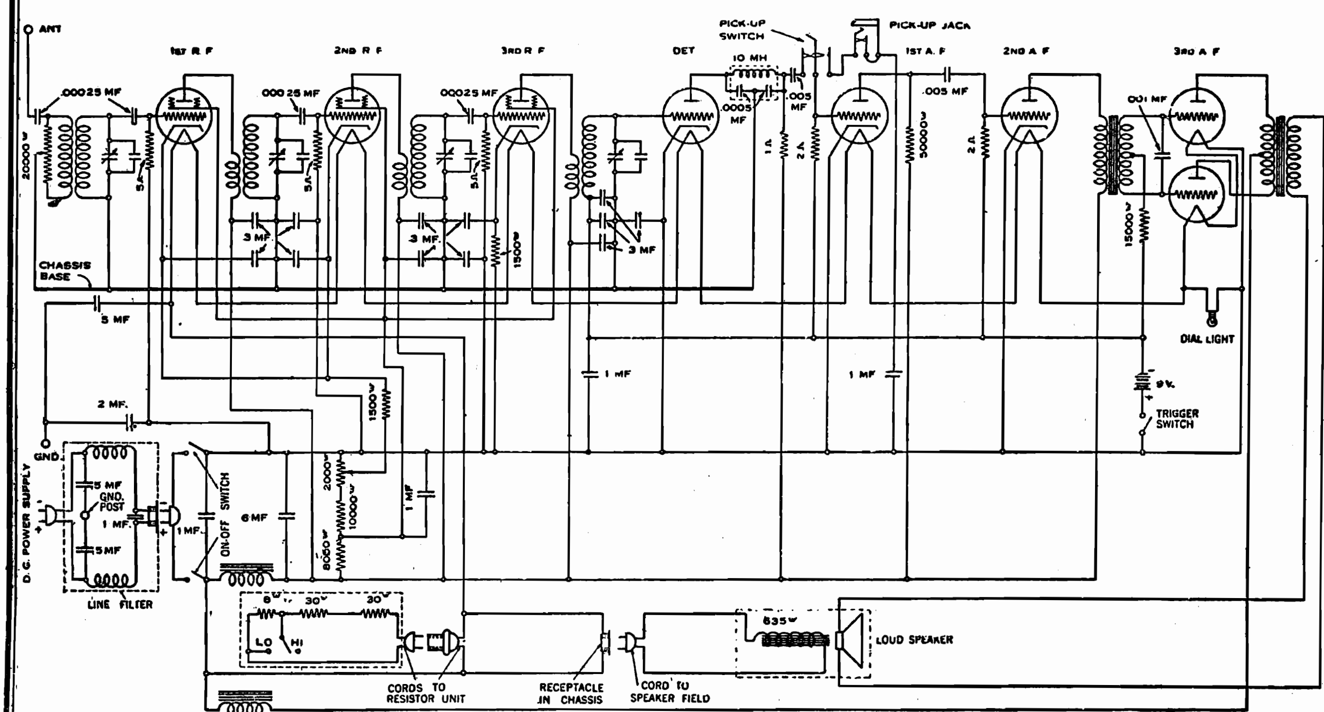
The third, or "O" trimmer should not be touched unless the set is badly out of calibration at the high frequency end of the dial.

If the set is out of calibration, it can be re-calibrated as follows: Set the tuning dial at the frequency reading of some station between 1200 and 1500 kilocycles only, whose exact frequency is known and which can be picked up without any difficulty. Adjust the oscillator trimmer "O" until this station is brought in with maximum volume. Re-adjust the "A" and "B" trimmers again, since these are always affected by any change in the oscillator tuned circuit.

The receiver should now be perfectly aligned.

MODEL 645 DC
Schematic

STROMBERG - CARLSON TEL. MFG. CO.

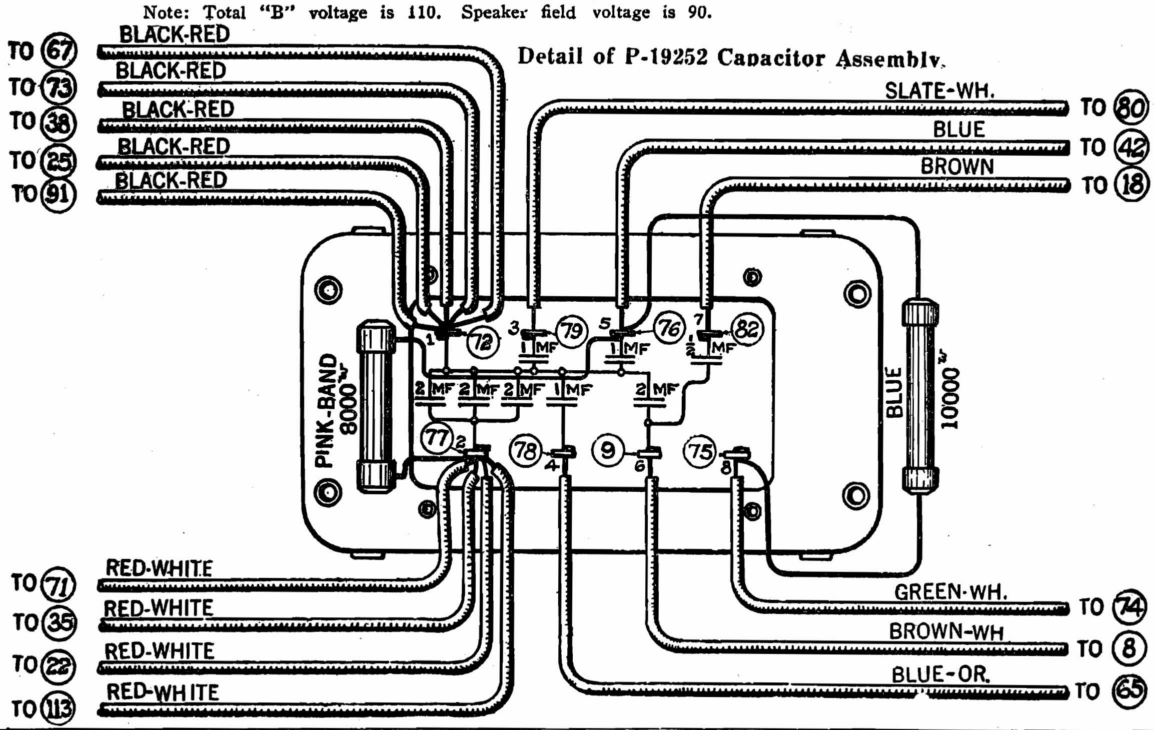


STROMBERG-CARLSON NO. 645 VOLTAGES

Tube	*Fil.*	*Plate*	*Grid*	*Screen*	"B"	"C"
1st R-F.	2.4	105	(Variable)	60		
2nd R-F.	2.4	105	(Variable)	60		
3rd R-F.	2.4	105	1.5	60		
Det.	2.4	22	9.0		110	9.0
1st A-F.	2.4	80	1.0		110	9.0
2nd A-F.	2.4	80	1.0		110	9.0
Each '45	5.5	100	7.0		110	9.0

Note: Total "B" voltage is 110. Speaker field voltage is 90.

Detail of P-19252 Capacitor Assembly.



MODEL 37
Schematic

STROMBERG - CARLSON TEL. MFG. CO.

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Type and Number of Tubes	4 No. 58, 2 No. 56, 2 No. 45, 1 No. 80
Voltage Rating	115 volts
Frequency Rating	60 cycles and 25-60 cycles
Power Consumption	110 watts
Undistorted Electrical Power Output of Chassis	3.2 watts

CIRCUIT DESCRIPTION

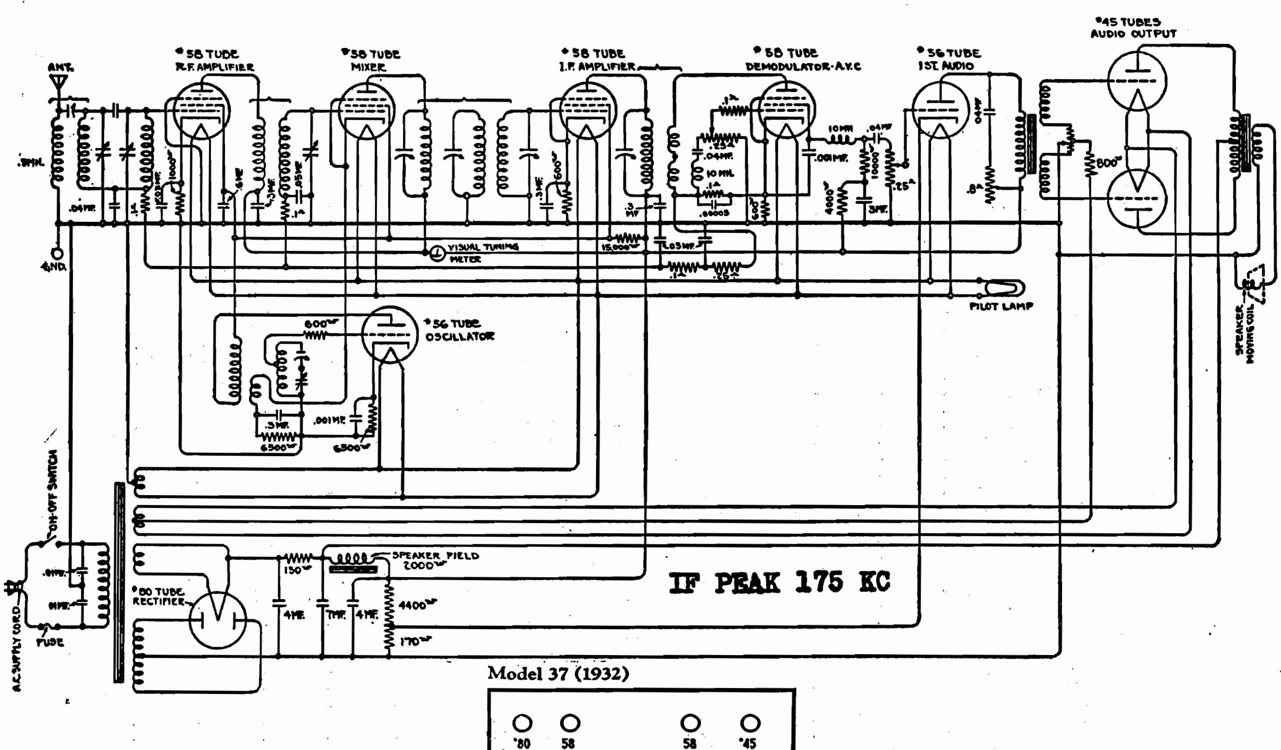
The four No. 58 triple-grid tubes are used as R. F. Amplifier, Mixer, I. F. Amplifier, and Demodulator-AVC. The two No. 56 tubes are used as Oscillator and First Audio Amplifier. The two No. 45 tubes are used in the push-pull output stage. The No. 80 is used as the rectifier in the power supply.

A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent any cross modulation. The R. F. amplifier is coupled to the mixer by an ordinary tuned R. F. transformer. This gives three tuning circuits (four gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is exceedingly high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into a Tri-resonator (three tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the diode-triode demodulator-AVC tube by a single tuned circuit transformer.

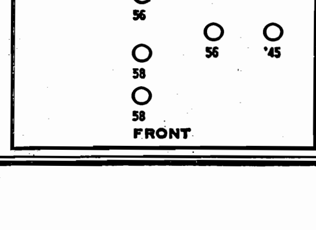
The AVC voltage and the rectified audio voltage are built up across the diode load resistor. The AVC voltage is fed back to the grids of the first two tubes through a suitable filter. The audio voltage is fed to the first potentiometer of the dual volume control and from there applied through the movable contact to the grid of the triode portion of the diode-triode. The screen of the tube acts as the plate of the triode portion of the system, thus forming a triode audio amplifier in conjunction with the diode rectifier.

The output of this "plate" circuit is coupled to the second unit of the dual volume control which feeds the grid of the first audio tube. The output of this first audio stage is coupled to the push-pull output triodes. The Adjustable Automatic Clarifier system is connected across the primary of the push-pull input transformer. The output transformer feeds the signal from the power triodes to the high quality electro-dynamic speaker.

The power supply system employs two stages of filter; the first being of the resistance type, and the second using the field of the speaker as a choke. The plate supply for the output tubes is tapped off between these filter sections, while the remainder of the voltages are supplied from the voltage divider resistor.



Model 37 (1932)



MODEL 37
Parts List
Voltage

STROMBERG - CARLSON TEL. MFG. CO.

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts. The dial should be set at about 1,000 kc. D. C. voltages are measured with a 1,000 ohms per volt meter.

Voltage	Meter	Scale	Where Measured	Approx. Value in Volts
Heater Voltages No. 56 and No. 58 Tubes	A. C.	0–4	Across Heater Terminals of Sockets	2.5
Filament Voltages No. 245 Tubes	A. C.	0–4	Across Filament Terminals of Audio Output Sockets	2.5
Filament Voltage No. 80 Tube	A. C.	0–8	Across Filament Terminals of No. 80 Rectifier Socket	5.06
Plate Voltage Radio Amplifier Tube	D. C.	0–250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	160
Plate Voltage Mixer Tube	D. C.	0–250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (—)	160
Plate Voltage Oscillator Tube	D. C.	0–250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (—)	85
Plate Voltage I. F. Tube	D. C.	0–250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (—)	165
Plate Voltage Demodulator Tube	D. C.	0–250	Between Plate Terminal of Demodulator Socket (+) and Chassis Base (—)	2.5
Plate Voltage First Audio Tube	D. C.	0–250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (—)	150
Plate Voltages Audio Output Tubes	D. C.	0–750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (—)	295
"C" Voltage R. F. Amplifier Tube	D. C.	0–10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	.5
"C" Voltage Mixer Tube	D. C.	0–10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (—)	10
"C" Voltage Oscillator Tube	D. C.	0–250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (—)	20
"C" Voltage I. F. Tube	D. C.	0–10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (—)	3
"C" Voltage Demodulator Tube	D. C.	0–10	Between Cathode Terminal of Demodulator Socket (+) and Chassis Base (—)	3
"C" Voltage First Audio Tube	D. C.	0–10	Between Cathode Terminal of First Audio Socket (+) and Chassis Base (—)	6.5
"C" Voltage Audio Output Tube	D. C.	0–250	Across 800 ohm Biasing Resistor	50
Screen Voltages R. F., Mixer, and I. F. Tubes	D. C.	0–250	Between Screen Terminals on Sockets (+) and Chassis Base (—)	80
"Screen" Voltage Demodulator Tubes	D. C.	0–250	Between Screen Terminal on Demodulator Socket (+) and Chassis Base (—)	90
"B" Voltage R. F., Mixer, I. F. First Audio, and Demodulator Tube	D. C.	0–250	Between High Side of Voltage Divider (+) and Chassis Base (—)	160
"B" Voltage Audio Output Tubes	D. C.	0–750	Between Mid-Tap of Output Transformer (+) and Chassis Base (—)	300
Speaker Field Volts -	D. C.	0–250	Across Small Pins on Speaker Connector Socket	140
Plate Voltage A. C. per Anode No. 80 Rectifier Tube	A. C.		Between Plate Terminals of No. 80 Rectifier Socket and Chassis Base	340

REPLACEMENT PARTS

Piece Number	Part	Description of Part	Required per Receiver
22692	Audio Transformer Assembly	Output Transformer Assembly	1
22693	Audio Transformer Assembly	Input Transformer Assembly	1
22679	Binding Post	Antenna and Ground	1
21663	Bracket Assembly	Voltage Divider Mounting	2
22353	Capacitor	Oscillator Series Aligner	1
22701	Capacitor	Filter Capacitor Assembly	1
21334	Capacitor	.001 Mfd.	2
19597	Capacitor	.042 Mfd.	1
22706	Capacitor Assembly	.042 Mfd.	1
21535	Capacitor	2– .01 Mfd.	1
22411	Capacitor	.042 Mfd.	2
22535	Capacitor	.01 Mfd.	1
22556	Capacitor	Aligner in Tri-Resonator	1
22702	Capacitor	By-Pass Capacitor Assembly	1
22549	Coil	Volume Control Circuit and Demodulator Plate Circuit	2
22687	Coil Assembly	1st Preselector	1
22359	Coil Assembly	2nd Preselector	1
22688	Coil Assembly	Interstage	1
22361	Coil Assembly	Oscillator Coil	1
22716	Coil Assembly	Tri-Resonator (I. F.)	1
21566	Fuse	1.5 Amperes	1
19630	Grid Clip		4
22699	I. F. Transformer		1
22390	Knob	Selector Knob	1
22391	Knob	Volume Control and Clarifier Switch Knob	2
22351	Meter	Visual Tuning Meter (Weston No. 654)	1
19617	Potentiometer	Hum Adjuster	1
22593	Potentiometer	Clarifier and Off-On Switch	1
22696	Potentiometer	Dual Volume Control	1
22550	Resistor, 150 ohms	Filter Resistor	1
22596	Resistor, 5,370 ohms	Voltage Divider	1
21621	Resistor, 1,000 ohms, Type C	Carbon Resistor, Brown, Black, and Red	1
22329	Resistor, 6,500 ohms, Type C	Carbon Resistor, Blue, Green, and Red	2
22327	Resistor, 600 ohms, Type C	Carbon Resistor, Blue, Black and Brown	3
22328	Resistor, 4,000 ohms, Type C	Carbon Resistor, Yellow, Black, and Red	1
22330	Resistor, 10,000 ohms, Type C	Carbon Resistor, Brown, Black, and Orange	1
22331	Resistor, 15,000 ohms, Type C	Carbon Resistor, Brown, Green, and Orange	1
22333	Resistor, 100,000 ohms, Type D	Carbon Resistor, Brown, Black, and Yellow	3
21280	4 Contact Socket		4
22570	5 Contact Socket		2
22571	6 Contact Socket		4
22671	Transformer	Power, 60 cycle, 110 volts	1
22672	Transformer	Power, 25-60 cycle, 110 volts	1

MODEL 38,39,40,41
2nd Type
Schematic

STROMBERG - CARLSON TEL. MFG. CO.

ELECTRICAL SPECIFICATIONS

Type of Circuit........ Superheterodyne
Type and Number of Tubes........ 3 No. 58, 1 No. 57, 1 No. 56, 2 No. 55, 2 No. 45, 1 No. 80
Voltage Rating........ 105-125 volts
Frequency Rating........ 60 cycles and 25-60 cycles
Power Consumption........ 110 watts
Undistorted Electrical Power Output of Chassis........ 3.2 watts

CIRCUIT DESCRIPTION

The three No. 58 tubes are used as R. F. amplifier, Mixer, and I. F. amplifier. The No. 57 tube is used as the "relay" tube in the "Q" circuit. The No. 56 tube is used as the oscillator. The two No. 55 tubes are used as Demodulator-AVC and audio amplifier. The two No. 45 tubes are used in the push-pull output stage. The No. 80 rectifier is used in the power supply.

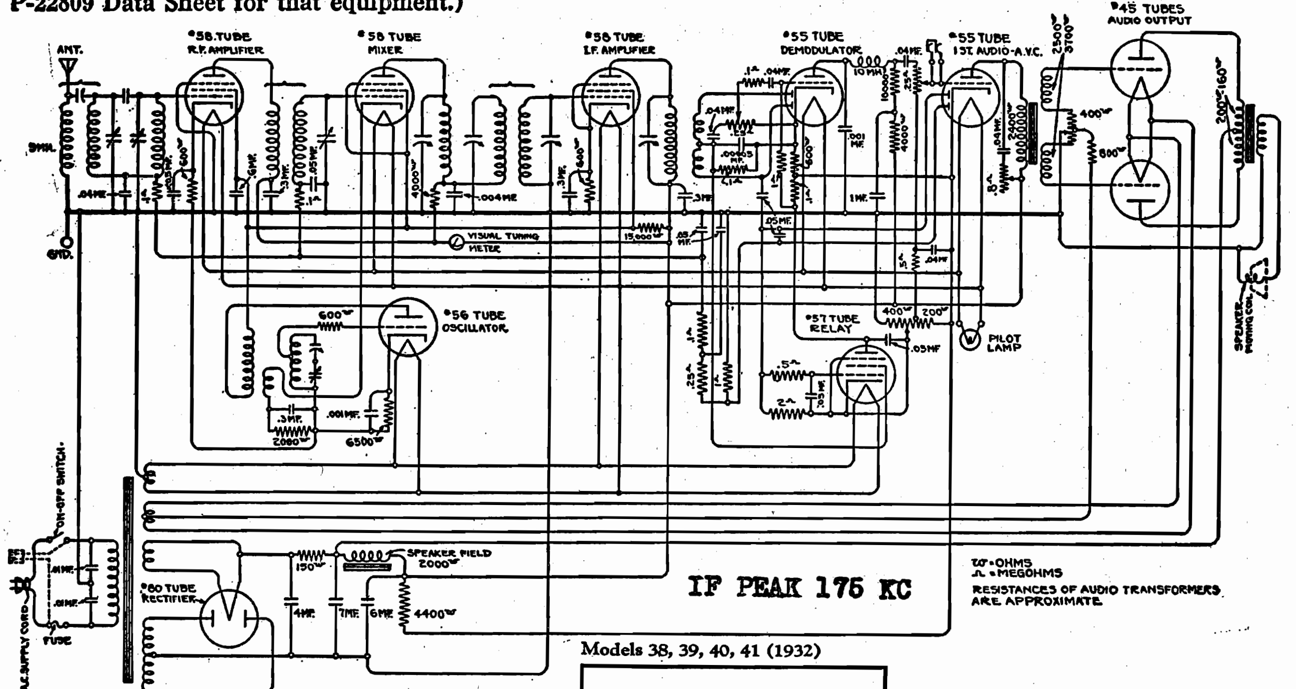
A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent any cross modulation. The R. F. amplifier is coupled to the mixer by an ordinary tuned R. F. transformer. This gives three tuning circuits (four gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is exceedingly high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into a Tri-resonator (three tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the No. 55 demodulator tube by a single tuned circuit transformer. The resistor unit of the first potentiometer of the dual volume control forms part of the load of the diode of this No. 55 tube. The audio voltage is applied to the control grid of the triode portion of this tube through the movable contact of the potentiometer. The output of this triode is connected to the grid of the triode of the First Audio-AVC tube through a resistance coupling which includes the second potentiometer of the volume control. The AVC voltage is obtained from one of the diodes in this No. 55 First Audio-AVC tube which is connected to the last I. F. transformer. This voltage is fed back to the first two tubes through a suitable filter.

The "Q" circuit for providing quiet operation for tuning between stations consists of the other diode of this First Audio-AVC tube in conjunction with the No. 57 Relay tube. When there is no carrier coming in, the action of this circuit is to put high negative potentials on the diode system and the control grid of the triode of the Demodulator tube, thus preventing reception of inter-station noise when tuning. When a carrier of suitable strength comes in these negative potentials are removed and the signal is received. An adjustment is provided so that this "Q" circuit can be set for the noise level of the location in which the receiver is used. This adjustment is controlled by the small knurled metal knob in the back of the chassis.

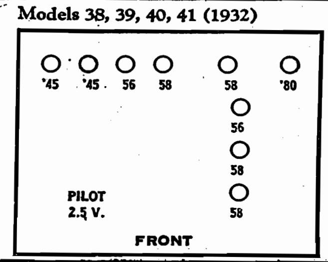
From the triode portion of the First Audio-AVC tube the audio signal is coupled to the push-pull output triodes by a transformer. The Adjustable Automatic Clarifier system is connected across the primary of this push-pull input transformer. The output transformer feeds the signal from the power triodes to the high quality electro-dynamic speaker.

The power supply system employs two stages of filter; the first being of the resistance type, and the second using the field of the speaker as a choke. The plate supply for the output tubes is tapped off between these filter sections, while the remainder of the voltages are supplied from the voltage divider resistor.

(The servicing instructions for the Multi-Record Phonograph in the No. 41 Radio-Phonograph are in P-22809 Data Sheet for that equipment.)

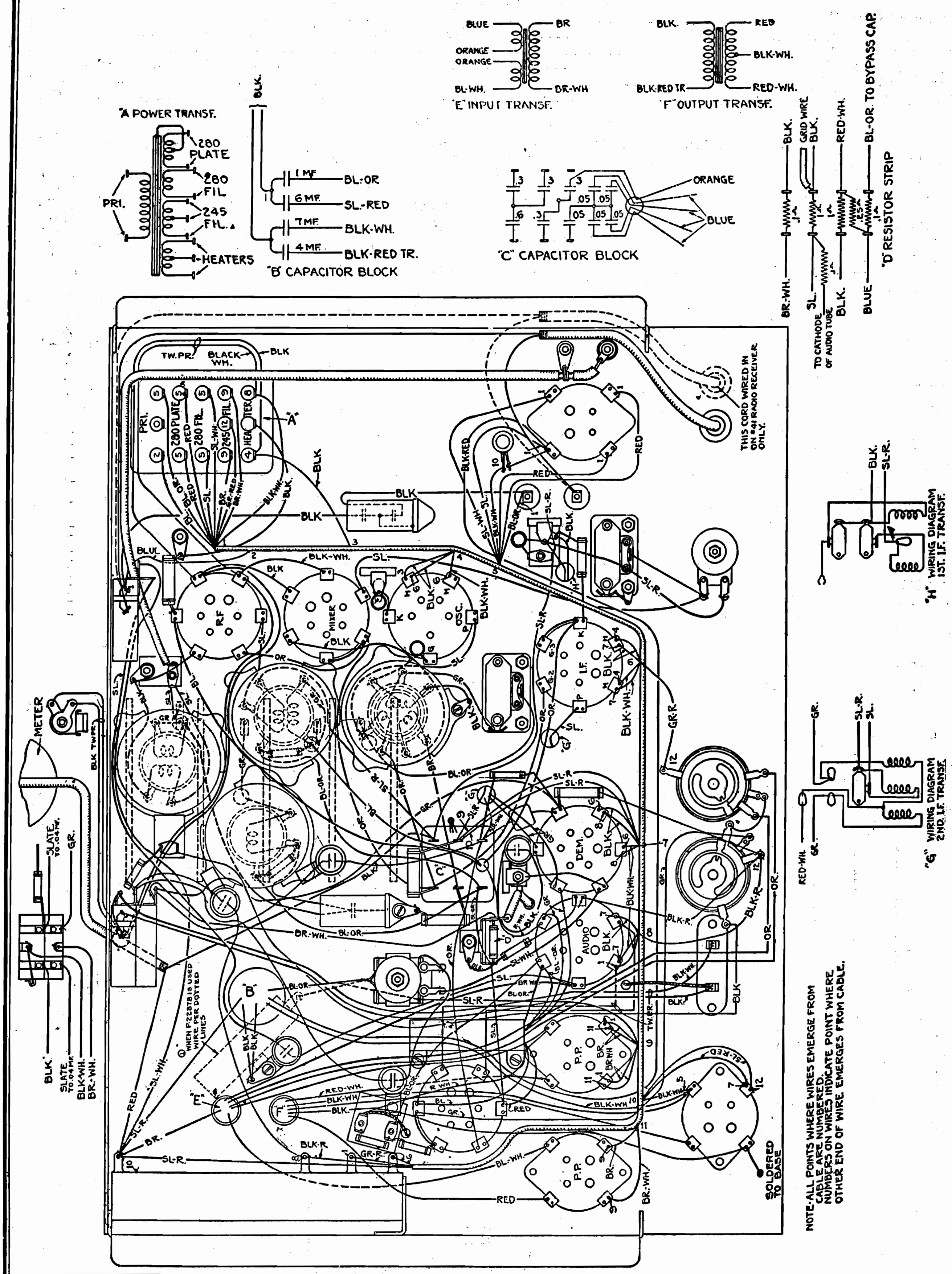


Models 38, 39, 40, 41 (1932)



MODEL 38, 39, 40, 41
2nd Type
Chassis Wiring

STROMBERG - CARLSON TEL. MFG. CO.



MODEL 38,39,49,41
2nd Type
Parts List,
Voltage

STROMBERG - CARLSON TEL. MFG. CO.

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts.

Voltage	Meter	Scale	Where Measured	Appro. Value in Volts
Heater Voltages No. 55, 56, 57, and No. 58 Tubes	A. C.	0-4	Across Heater Terminals of Sockets	2.5
Filament Voltages No. 245 Tubes	A. C.	0-4	Across Filament Terminals of Audio Output Sockets	2.5
Filament Voltage No. 280 Tube	A. C.	0-8	Across Filament Terminals of No. 280 Rectifier Socket	5.
Plate Voltage Radio Amplifier Tube	D. C.	0-250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	165
Plate Voltage Mixer Tube	D. C.	0-250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (—)	155
Plate Voltage Oscillator Tube	D. C.	0-250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (—)	80
Plate Voltage I. F. Tube	D. C.	0-250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (—)	170
Plate Voltage Demodulator Tube	D. C.	0-250	Between Plate Terminal and Demodulator Socket (+) and Chassis Base (—)	104
Plate Voltage First Audio Tube	D. C.	0-250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (—)	160
Plate Voltages Audio Output Tubes	D. C.	0-750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (—)	295
"C" Voltage R.F. Amplifier Tube	D. C.	0-10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	3
"C" Voltage Mixer Tube	D. C.	0-10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (—)	7
"C" Voltage Oscillator Tube	D. C.	0-250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (—)	25
"C" Voltage I. F. Tube	D. C.	0-10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (—)	3
"C" Voltage Demodulator Tube	D. C.	0-10	Between Cathode Terminal of Demodulator (+) and Chassis Base (—)	26
"C" Voltage First Audio Tube	D. C.	0-10	Between Cathode Terminal of First Audio Socket (+) and Chassis Base (—)	27
"C" Voltage Audio Output Tube	D. C.	0-250	Across 800 ohm Biasing Resistor	49
Grid Voltage Triode of Demodulator Tube	D. C.	0-10	Between Cathode Terminals of Demodulator Socket (+) and 1st Audio Socket (—)	2.5
Grid Voltage First Audio Tube	D. C.	0-10	Between Cathode of 1st Audio Socket (+) and Tap on Q Potentiometer (—)	8.5
Screen Voltages R. F. Mixer and I. F. Tubes	D. C.	0-250	Between Screen Terminals on Sockets (+) and Chassis Base (—)	90
"B" Voltage R. F. Mixer, I. F. First Audio and Demodulator Tube	D. C.	0-250	Between High Side of Voltage Divider (+) and Chassis Base (—)	170
"B" Voltage Audio Output Tubes	D. C.	0-750	Between Mid-Tap of Output Transformer (+) and Chassis Base (—)	300
Speaker Field Volts	D. C.	0-250	Across Small Pins on Speaker Connector Socket	125
Plate Voltage A. C. per Anode No. 280 Rectifier Tube	A. C.		Between Plate Terminals of No. 280 Rectifier Socket and Chassis Base	340

REPLACEMENT PARTS

Piece Number	Part	Description of Part	Required per Receiver
P-22540	Audio Transformer Assembly	Input and Output Push-Pull Transformer	1
P-21663	Bracket Assembly	Voltage Divider Mounting	1
P-22353	Capacitor	Oscillator "Series Aligner"	1
P-21334	Capacitor	.001 Mfd.	2
P-22557	Capacitor	.004 Mfd.	1
P-19597	Capacitor	.04 Mfd.	1
P-21535	Capacitor	2—.01 Mfd.	1
P-22411	Capacitor	.04 Mfd.	2
P-22556	Capacitor	Aligner in Tri-Resonator	1
P-22565	Capacitor Assembly	R. F. and I. F. By-Pass Capacitors	1
P-22849	Capacitor Assembly	Filter Capacitor Assembly	1
P-22706	Capacitor Assembly	.042 Mfd.	3
P-22855	Capacitor Assembly	4—.05 Mfd.	1
P-22549	Coil	Tri-Resonator Circuit and Demodulator Plate Circuit	2
P-22358	Coil Assembly	First Coil of Bi-Resonator	1
P-22359	Coil Assembly	Second Coil of Bi-Resonator	1
P-22360	Coil Assembly	R. F. Transformer	1
P-22361	Coil Assembly	Oscillator Coil	1
P-21623	Coil Assembly	Antenna Inductor	1
P-21566	Fuse	1.5 Amperes	1
P-19630	Grid Clip		1
P-21704	Grid Clip Assembly		2
P-22872	Grid Clip Assembly		2
P-22532	I. F. Transformer	First I. F. Transformer	1
P-22533	I. F. Transformer	Second I. F. Transformer	1
P-21277	Knob	Antenna Aligner	1
P-22390	Knob	Selector Knob	1
P-22391	Knob	Volume Control and Clarifier Switch	2
P-22351	Meter	Visual Tuning Meter (Weston No. 654)	1
P-19617	Potentiometer	Hum Adjuster	1
P-22862	Potentiometer	"Q" Adjuster	1
P-22593	Potentiometer	Clarifier and On-Off Switch	1
P-22546	Potentiometer	Dual Volume Control and Phonograph Switch	1
P-22550	Resistor, 150 Ohms	Filter Resistor	1
P-22596	Resistor, 5370 Ohms	Voltage Divider	1
P-21621	Resistor, 1,000 Ohms, "C" Type	Carbon Resistor, Brown, Black, and Red	1
P-21521	Resistor, 2,000 Ohms, "C" Type	Carbon Resistor, Red and Black	1
P-22329	Resistor, 6,500 Ohms, "C" Type	Carbon Resistor, Blue, Green, and Red	1
P-22327	Resistor, 600 Ohms, "C" Type	Carbon Resistor, Blue, Black, and Brown	4
P-22328	Resistor, 4,000 Ohms, "C" Type	Carbon Resistor, Yellow, Black, and Red	2
P-22330	Resistor, 10,000 Ohms, "C" Type	Carbon Resistor, Brown, Black, and Orange	1
P-22331	Resistor, 15,000 Ohms, "C" Type	Carbon Resistor, Brown, Green, and Orange	1
P-22333	Resistor, 100,000 Ohms, "D" Type	Carbon Resistor, Brown, Black and Yellow	6
P-22334	Resistor, 250,000 Ohms, "D" Type	Carbon Resistor, Red, Green, and Yellow	1
P-22335	Resistor, 500,000 Ohms, "D" Type	Carbon Resistor, Green, Black, and Yellow	2
P-22561	Resistor, 1 Megohm, "D" Type	Carbon Resistor, Brown, Black, and Green	1
P-21280	4 Pin Socket		4
P-22570	5 Pin Socket		1
P-22571	6 Pin Socket		6
P-22529	Transformer	Power, 60 Cycle, 110 Volts	1
P-22530	Transformer	Power, 25-60 Cycles, 110 Volts	1

MODEL 48,49,50,51

STROMBERG - CARLSON TEL. MFG. CO. Data

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Type and Number of Tubes	3 No. 58, 1 No. 57, 3 No. 56, 1 No. 55, 2 No. 2A3, 1 No. 5Z3
Voltage Rating	105-125 Volts
Frequency Rating	60 Cycles and 25-60 Cycles
Power Consumption (Maximum at 125 Volts)	160 watts

CIRCUIT DESCRIPTION

The three No. 58 tubes are used as R. F. amplifier, mixer, and I. F. amplifier. The No. 57 is used as the "relay" tube in the "Q" circuit. One No. 56 tube is used as the oscillator and the other two as the push-pull first audio amplifier. The No. 55 tube is used as the demodulator. The two No. 2A3 super-triode tubes are used in the push-pull power output stage. The No. 5Z3 rectifier is used in the power supply.

A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent cross modulation. The R. F. amplifier is coupled to the mixer by a regular tuned R. F. transformer. This gives three tuning circuits (four-gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is extremely high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into Tetro-resonator (four-tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the No. 55 demodulator tube by a single-tuned circuit transformer.

The resistor unit of the volume control potentiometer forms part of the load of the "audio" diode of the No. 55 tube, and the audio voltage is applied to the triode portion of this tube through the movable contact of this potentiometer. The potentiometer is double, the rear unit being used in the low level tone compensation circuit, which increases the response to bass frequencies and high frequencies in proper amount as the volume level is reduced. The output of the triode portion of the No. 55 tube is fed through a transformer to the push-pull first audio stage. The "Bass Control" circuit apparatus is connected across the primary of this transformer. The "Bass Control" switch is provided to remove the bass compensation by opening this circuit when it is desired to secure extremely high levels of sound output for dancing, etc. The AVC voltage is obtained from the other diode of the No. 55 tube, and is fed back to the first two tubes through a suitable filter.

The "Q" circuit for providing quiet operation for tuning between stations consists of the No. 57 relay tube connected to the "AVC" diode of the No. 55 tube. When there is no carrier coming in, the action of this circuit is to put high negative potentials on the "audio" diode and the control grid of the triode of the No. 55 tube, thus preventing reception of inter-carrier noise when tuning. When a carrier of suitable strength comes in, these negative potentials are removed and the signal is received. A switch in the rear of the chassis is provided, so that this "Q" circuit can be rendered inoperative if it is desired to use the maximum sensitivity of the receiver.

From the push-pull first audio stage the signal is coupled by a transformer to the super-triode push-pull power output stage. The "Adjustable Treble Control" circuit apparatus is connected across the primary of this coupling transformer to enable the user to adjust the proportion of high frequencies in the reproduction as he desires. Used in conjunction with the "Bass Control" a wide range of variation in the response characteristics can be obtained.

A large output transformer, large on account of the high audio power available in the system, is used to couple the super-triode tubes to the high quality electro-dynamic speaker.

The power supply employs three stages of filter; the first being of the resistance type, and the other two of the choke type. The speaker field is used as the choke in the third stage. The plate supply for the output tube is tapped off between the second and third stages of filter, while the remainder of the voltages are supplied from the voltage divider resistor.

(The servicing instructions for the Multi-Record Phonograph in the No. 51 Radio-Phonograph are in P-23221 Data Sheet.)

ALIGNMENT OF RECEIVERS

Realignment of the R. F. and Oscillator Tuning circuits when necessary may be accomplished in the following manner:

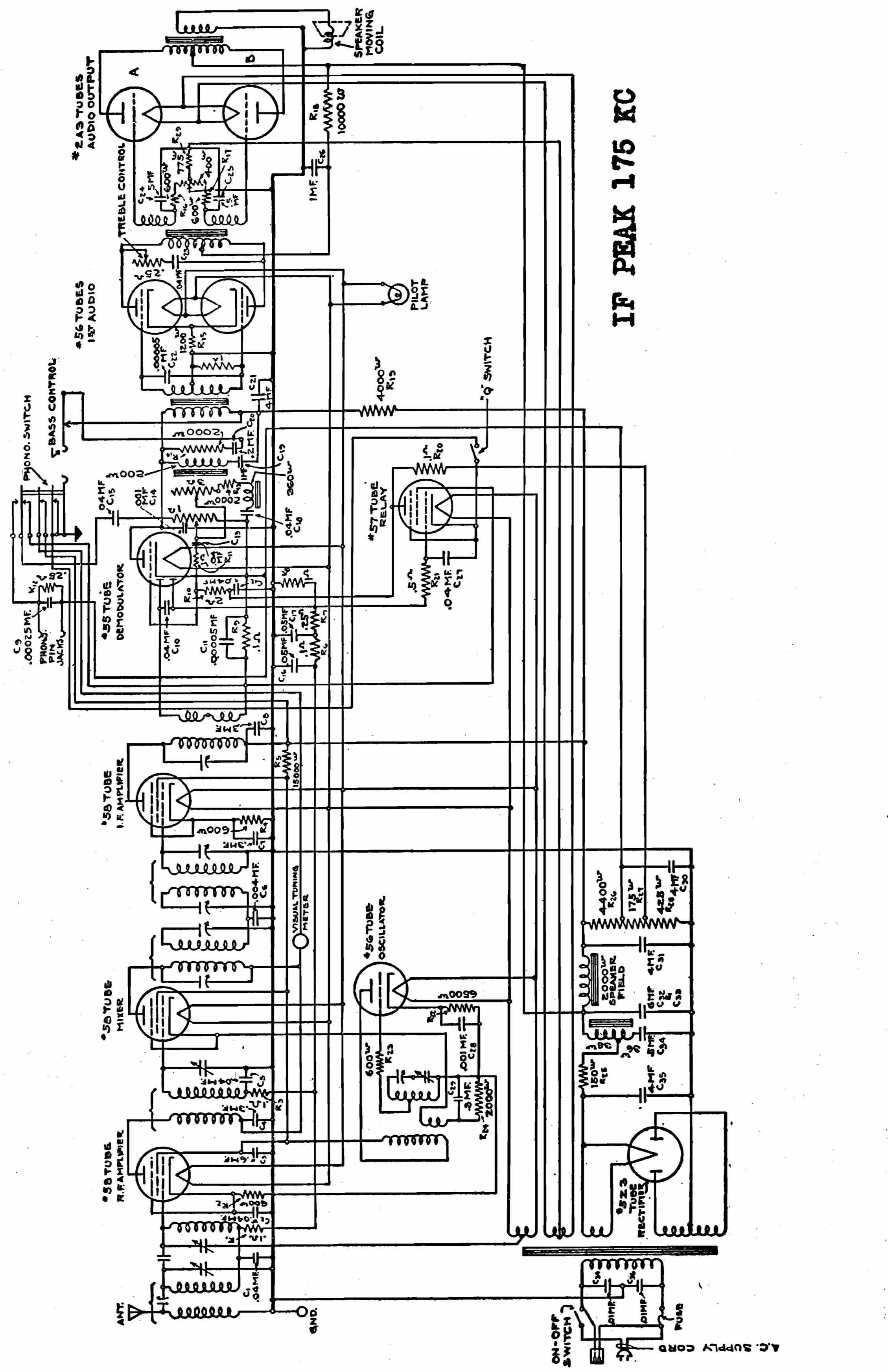
If a test oscillator and output meter are used, the signal strength applied to the receiver should be low enough so that the automatic volume control is not operated in order to avoid apparent broad adjustment. If broadcast signals are used, moderately strong signals which swing the meter pointer about half the distance back toward the "Off" position should be used.

With whichever method is used, the receiver should be tuned to a 1400 kc. signal first, and the Antenna, R. F. and Oscillator Shunt Aligners adjusted for best setting. Next the receiver should be set at 600 kc. on the dial, and the Oscillator Series Aligner ONLY adjusted for best position for maximum background noise. After this is done re-check the Oscillator Shunt Aligner at 1400 kc., using same dial setting as previously. The receiver should be left turned "On" for about fifteen minutes before aligning.

The Intermediate Amplifier circuits are aligned on oscillographs to obtain the proper shape of resonance curves having "steep" sides to get proper selectivity and fidelity. "Peak" methods of alignment (with oscillator and meter) do not give the desired curve, as it may be broad and unsymmetrical although a high peak is indicated. The adjustment of these circuits is very stable as shown by field experience and Proving Division tests. Therefore, as these adjustments cannot be duplicated exactly without the oscillograph equipment, it is recommended that the I. F. circuits never be adjusted by a service man.

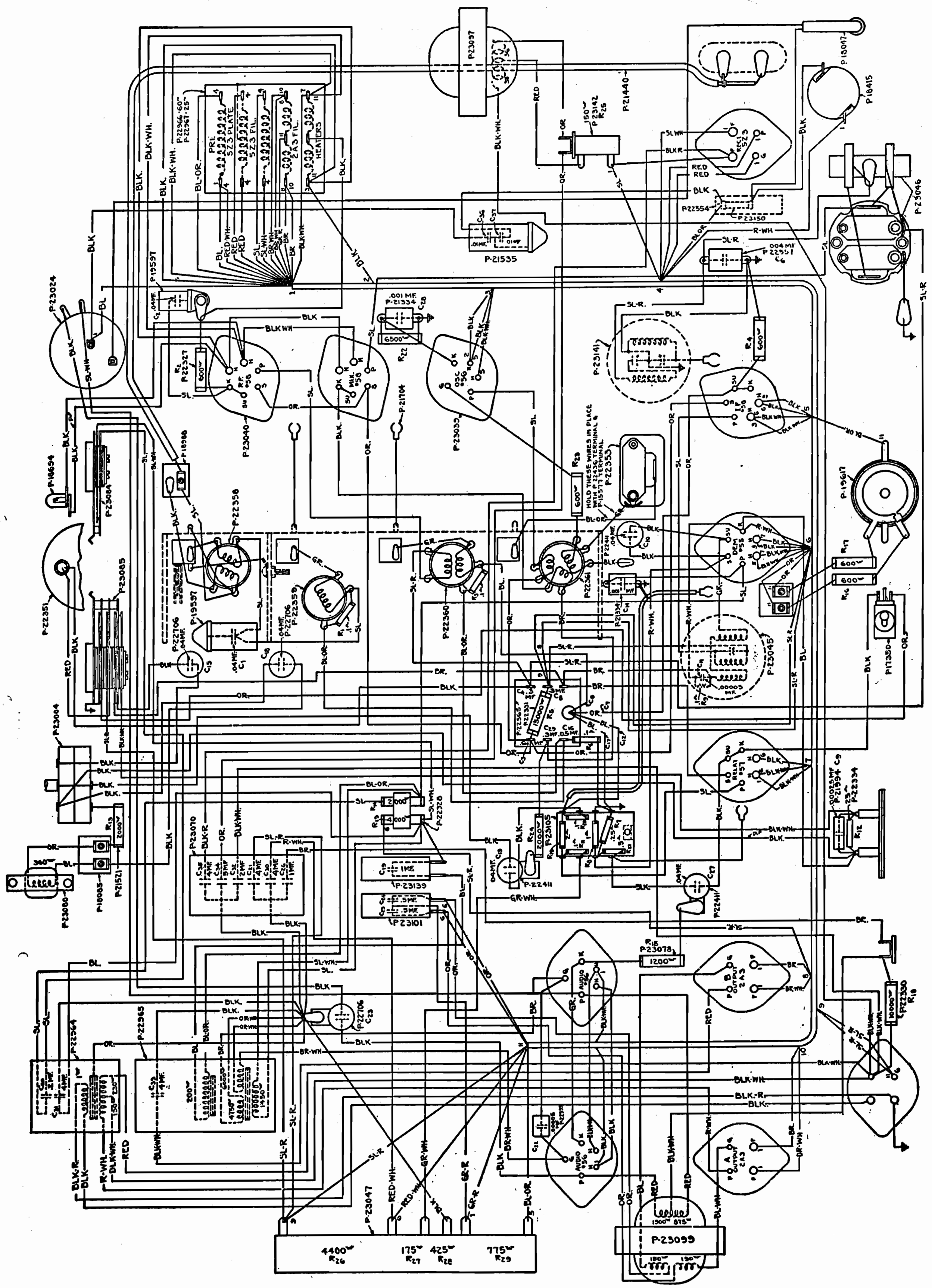
MODEL 48,49,50,51
Data

STROMBERG - CARLSON TEL. MFG. CO.



MODEL 48, 49, 50, 51
Chassis Wiring

STROMBERG - CARLSON TEL. MFG. CO.



MODEL 48,49,50,51
Voltage
Resistance Data

STROMBERG - CARLSON TEL. MFG. CO.

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts. When voltages are measured, proper allowances should be made for a difference in line voltage above or below 120 volts. Be sure to make these readings with the Meter and Scale indicated, otherwise the results will not agree with those tabulated. Alternating voltages are indicated in italics. The dial should be set at about 1000 kc. The "Q" switch should be set in the "Up" position so that the "Q" circuit is not operating.

Voltage	Meter	Scale	Where Measured	Approx. Value in Volts
Heater Voltages Nos. 55, 56, 57, and 58 Tubes	A. C.	0–4	Across Heater Terminals of Sockets	*2.5*
Filament Voltages Nos. 2A3 Tubes	A. C.	0–4	Across Filament Terminals of Audio Output Sockets	*2.5*
Filament Voltage No. 5Z3 Tube	A. C.	0–8	Across Filament Terminals of No. 280 Rectifier Socket	*5.*
Plate Voltage Radio Amplifier Tube	D. C.	0–250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	200
Plate Voltage Mixer Tube	D. C.	0–250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (−)	200
Plate Voltage Oscillator Tube	D. C.	0–250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (−)	95
Plate Voltage I. F. Tube	D. C.	0–250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (−)	200
Plate Voltage Demodulator Tube	D. C.	0–250	Between Plate Terminal and Demodulator Socket (+) and Chassis Base (−)	170
Plate Voltage First Audio Tubes	D. C.	0–250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (−)	220
Plate Voltages Audio Output Tubes	D. C.	0–750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (−)	345
"C" Voltage R. F. Amplifier Tube	D. C.	0–10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	4
"C" Voltage Mixer Tube	D. C.	0–10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (−)	8
"C" Voltage Oscillator Tube	D. C.	0–250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (−)	25
"C" Voltage I. F. Tube	D. C.	0–10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (−)	4
"C" Voltage First Audio Tubes	D. C.	0–250	Between Cathode Terminal of First Audio Sockets (+) and Chassis Base (−)	12
"C" Voltage Audio Output Tube	D. C.	0–250	Across 775-ohm Biasing Resistor	60
Grid Voltage Triode of Demodulator Tube	D. C.	0–250	Between Cathode Terminals of Demodulator Socket (+) and Tap No. on "B" Stick (−)	8
Screen Voltages R. F. Mixer and I. F. Tubes	D. C.	0–250	Between Screen Terminals on Sockets (+) and Chassis Base (−)	95
"B" Voltage R. F. Mixer, I. F. First Audio and Demodulator Tube	D. C.	0–250	Between High Side of Voltage Divider (+) and Chassis Base (−)	200
"B" Voltage Audio Output Tubes	D. C.	0–750	Between Mid-Tap of Output Transformer (+) and Chassis Base (−)	350
Speaker Field Volts	D. C.	0–250	Across Small Pins on Speaker Connector Socket	145
Plate Voltage A. C. per Anode No. 5Z3 Rectifier Tube	A. C.		Between Plate Terminals of No. 5Z3 Rectifier Socket and Chassis Base	*380*

CONTINUITY READINGS OF CHASSIS

All readings taken from designated terminal to chassis base unless otherwise specified and are indicated in ohms
The G terminals of the Nos. 55, 57, and 58 tubes are connected to the top caps.

Tube	H	H	K	SU	S	P	G
R. F. (58)	0	0	600	600	20,000	5,000	1,450,000
Mix (58)	0	0	2000	2000	20,000	5,000	1,450,000
OSC (56)	0	0	6500			20,000	600
I. F. (58)	0	0	600	600	20,000	5,000	70
Demod. (55)	0	0	600	100,000	1,000,000	10,450	2,100,000
Relay (57)	0	0	See Note B Open—0		100,600	100,425	See Note A 1,500,000
1st (1st Aud.) (56)	0	0	1200			See Note C 11,065	5,000
2nd (1st Aud.) (56)	0	0	1200			See Note C 11,690	6,500
	F	F					
1st (2nd Aud.) (2A3)	975	975				See Note C 340	1,100
2nd (2nd Aud.) (2A3)	975	975				See Note C 420	1,100
Rect. (2Z3)	See Note D 340 — 420					27	27

Remarks

SU and S terminals of Demodulator Socket are diode plates.

NOTE A
With phono switch on, Res. is from 1 megohm to 400,000 ohms, varying with volume control.

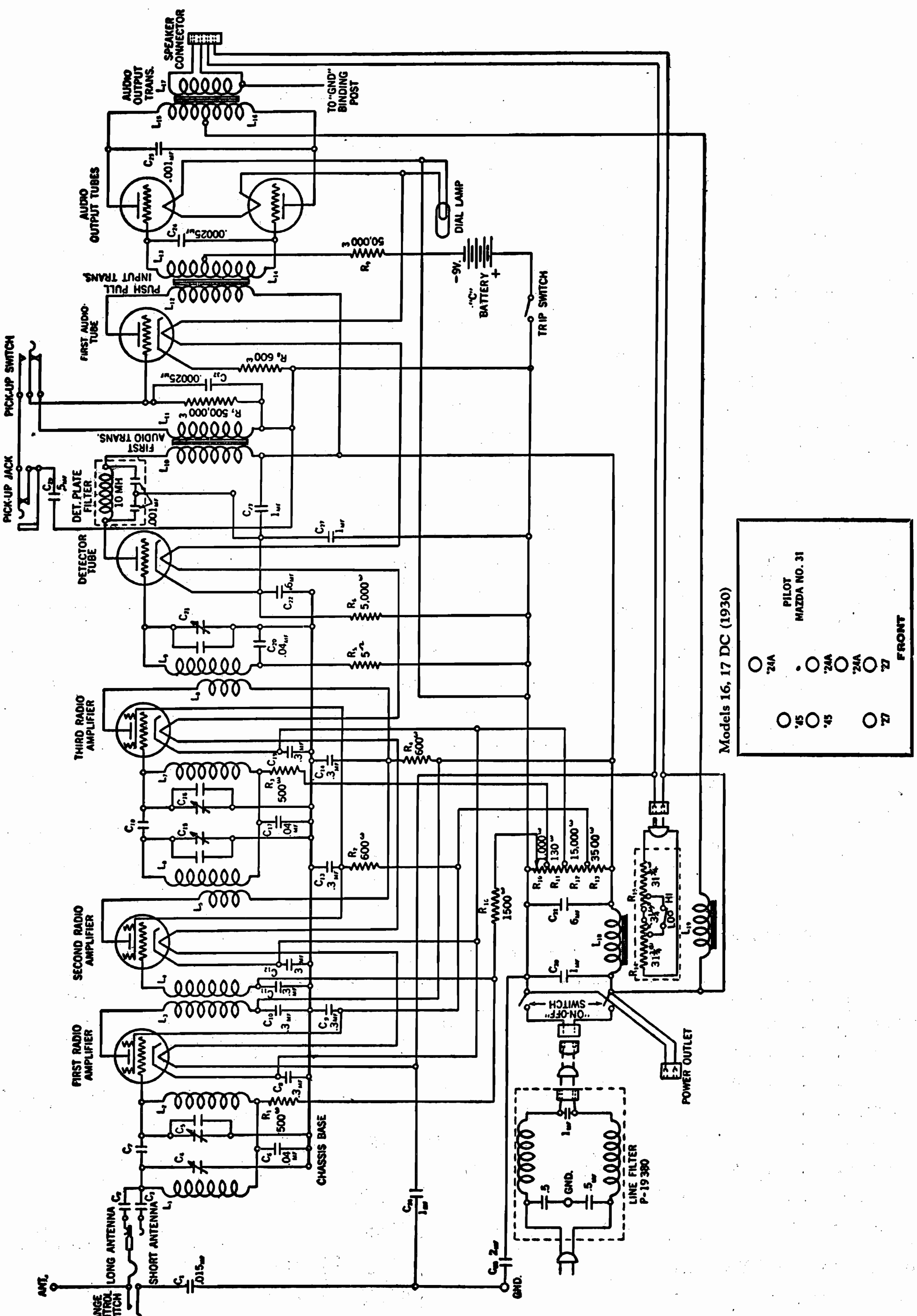
NOTE B
Open when switch is in up position, 600 ohms when switch is in down position and relay tube is operating.

NOTE C
Readings taken from designated terminal to either "H" terminal of rectifier (5Z3) socket.

NOTE D
Taken from H-H terminals to either P terminal of 2nd audio (output) sockets.

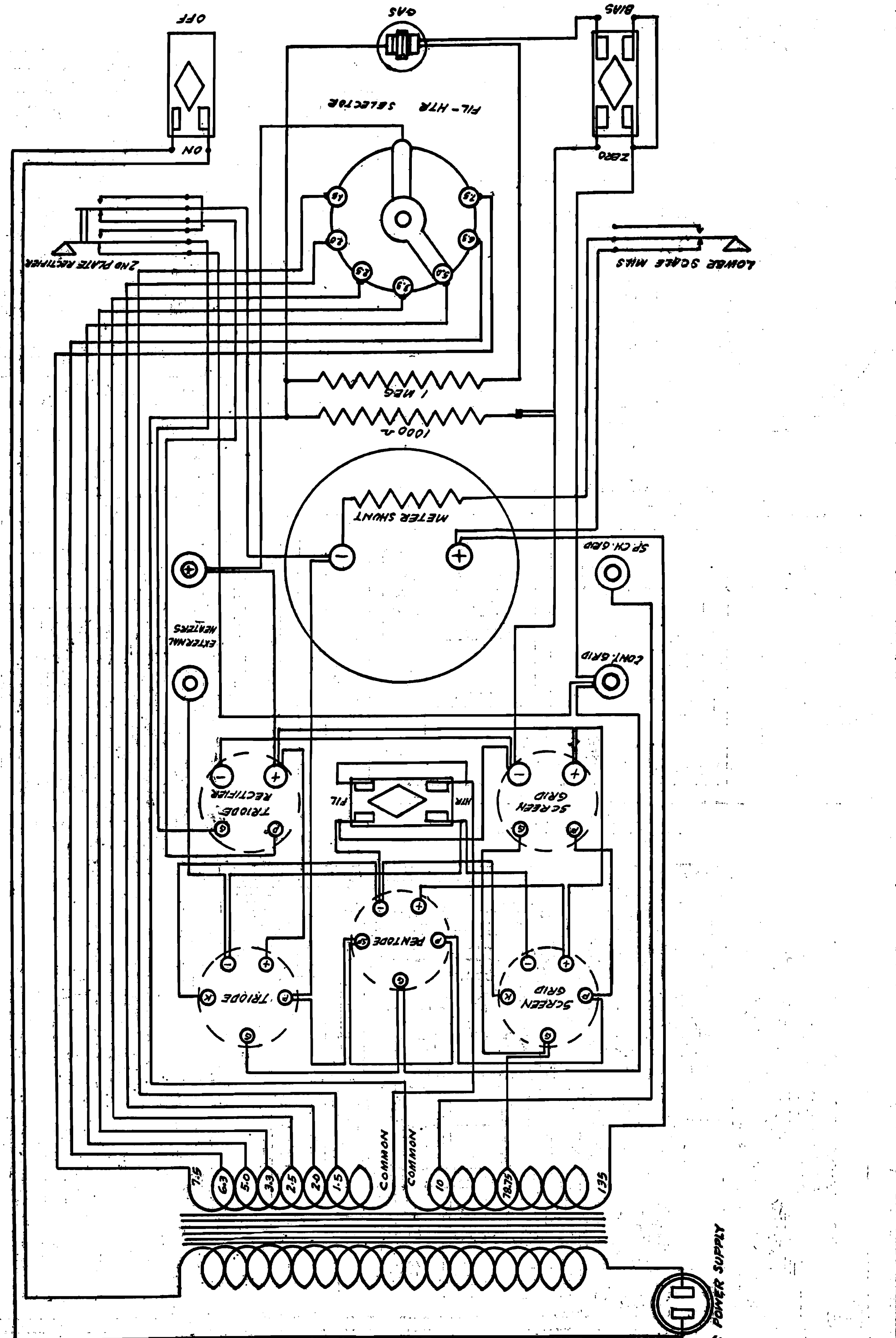
MODEL 16,17 DC
Schematic

STROMBERG - CARLSON TEL. MFG. CO.



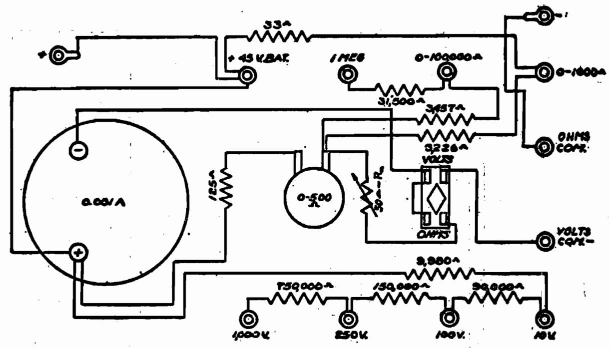
MODEL 40 Tube Checker

SUPREME INSTRUMENTS CORP.

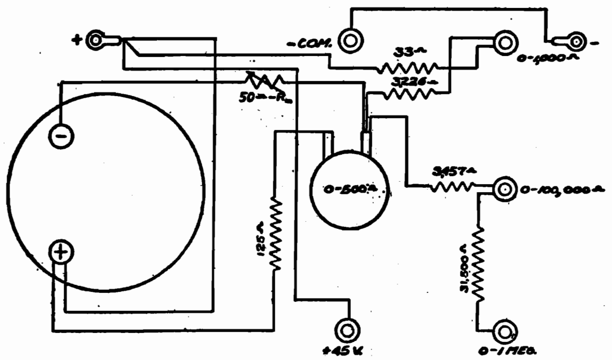


MODEL 33 Ohmmeter
MODEL 44 Volt-Ohmmeter
MODEL 60 Oscillator
MODEL 62 Tube Testing Unit
MODEL 75 AC-DC Volt-Ohm Milliammeter

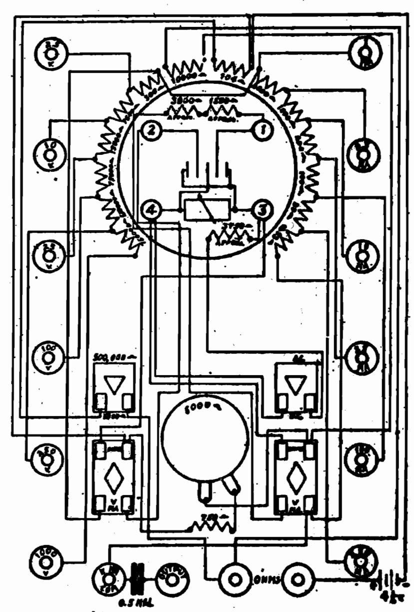
SUPREME INSTRUMENTS CORP.



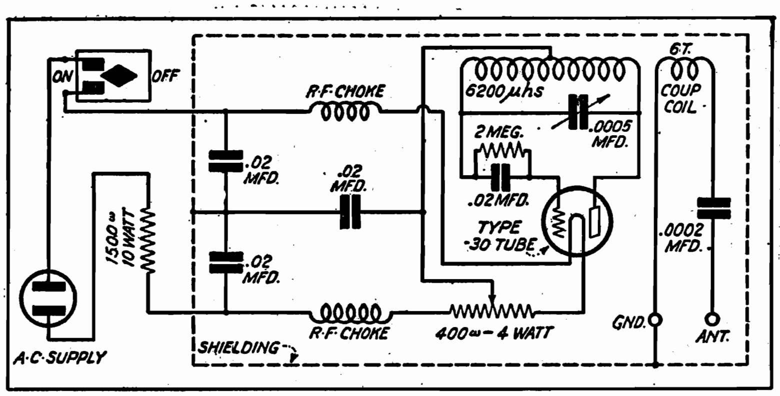
Model 44 Volt-Ohmmeter



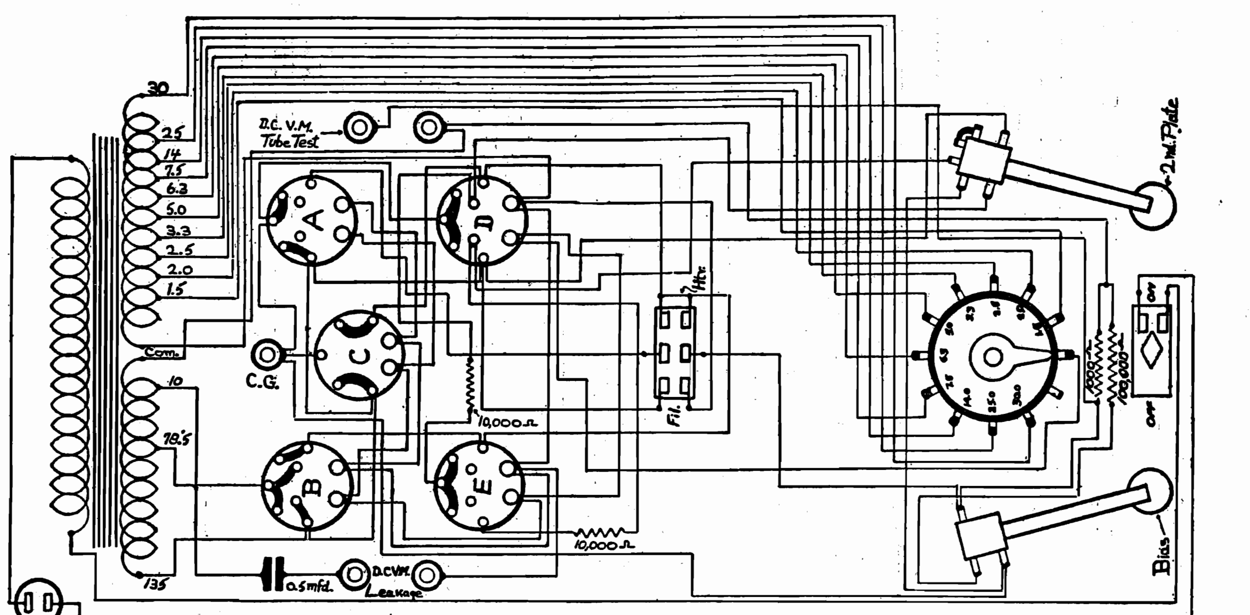
Model 33 Ohmmeter



Model 75 AC-DC Volt-Ohm Milliammeter



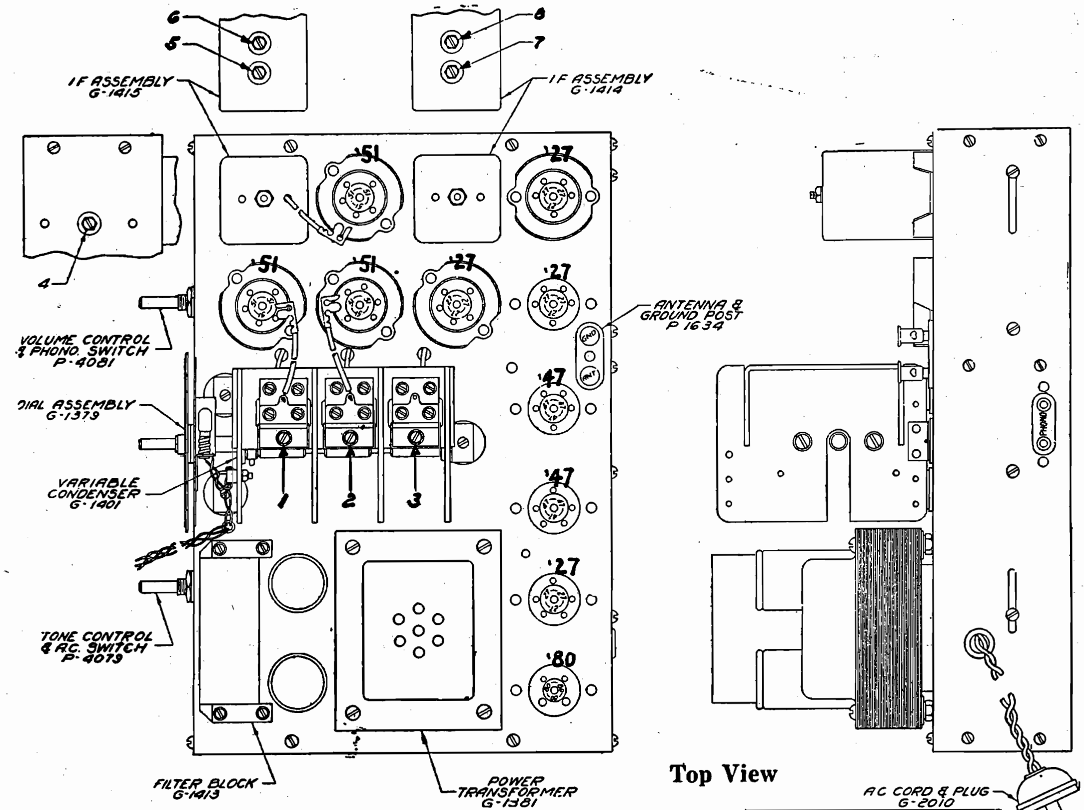
Model 60 Oscillator



Model 62 Tube Testing Unit Adapter

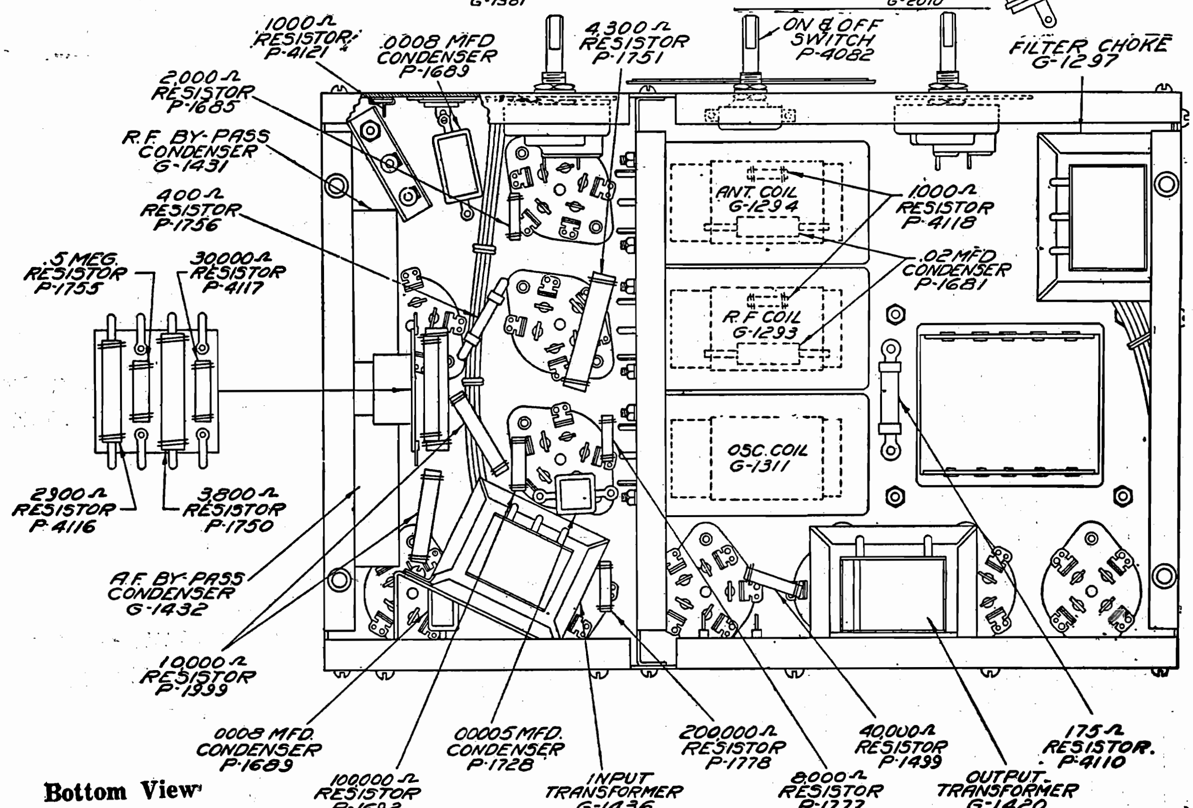
TRANSFORMER CORP. OF AMERICA

MODEL AC-160, 25-160
Chassis Views



Top View

Numbers 1 to 8 in TOP VIEW diagram refer to trimmer condensers and correspond to identical numbers for models 84 and 85.



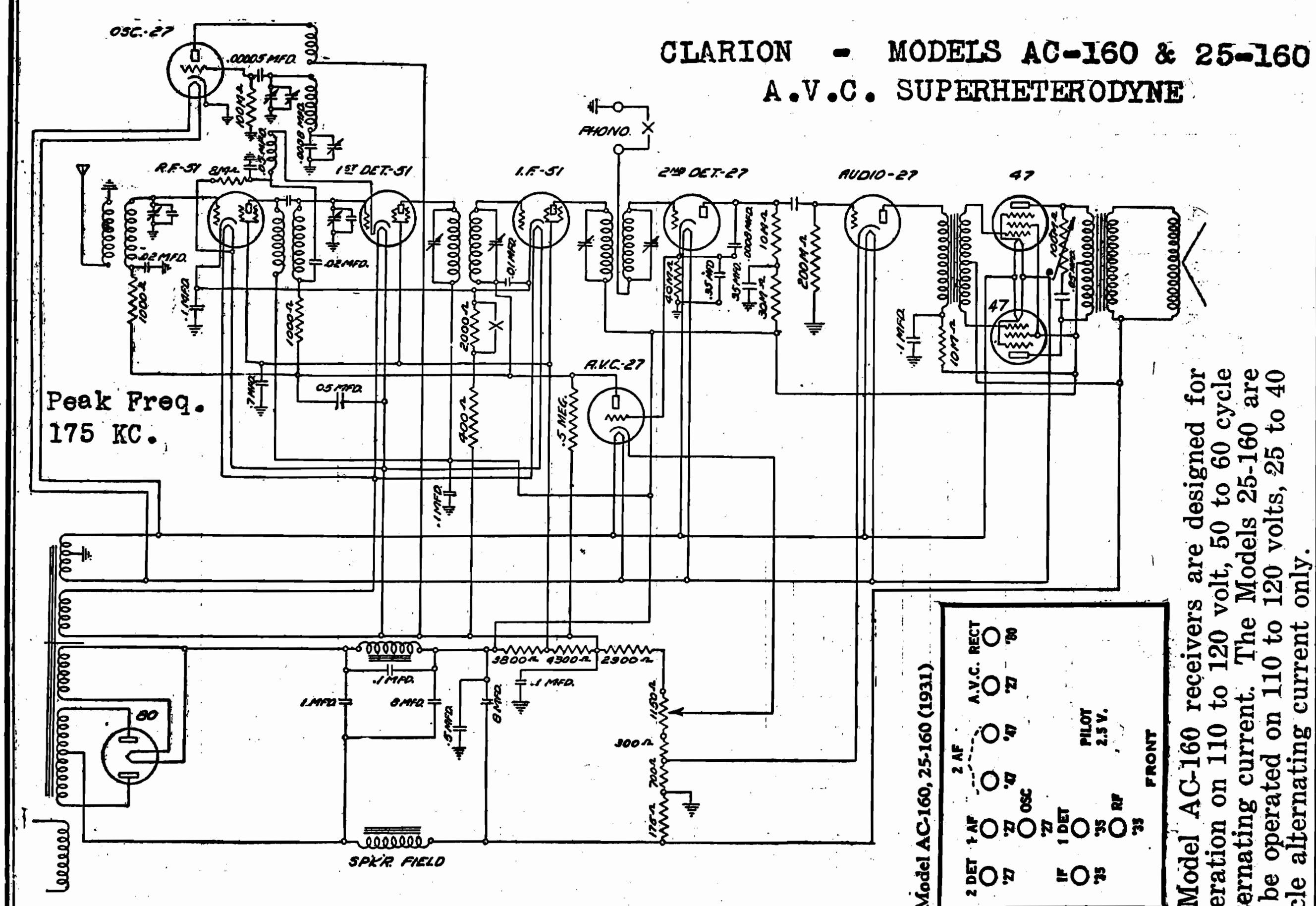
Bottom View

Due to the high audio gain of this receiver, special precautions had to be taken in design to eliminate hum. You will see by examination of the under side of the chassis that the input audio transformer is supported on a bracket. The angle on this bracket has been carefully calculated to minimize hum, and if for any reason, this transformer is replaced, be sure to retain the bracket and see that it is not accidently distorted or twisted out of its original angle.

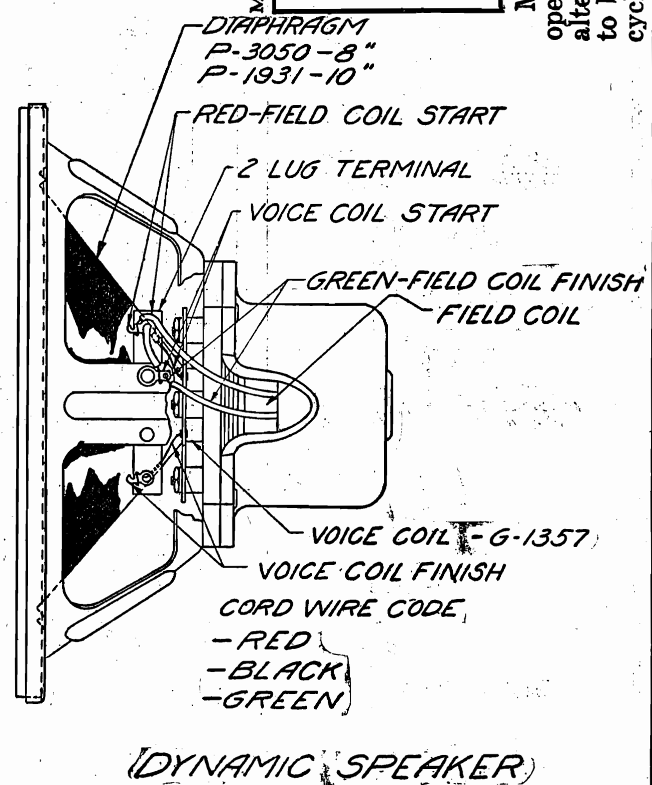
MODEL AC160, 25-160
Schematic - Voltage

TRANSFORMER CORP. OF AMERICA

CLARION - MODELS AC-160 & 25-160
A.V.C. SUPERHETERODYNE



Model AC-160 receivers are designed for operation on 110 to 120 volt, 50 to 60 cycle alternating current. The Models 25-160 are to be operated on 110 to 120 volts, 25 to 40 cycle alternating current only.



(DYNAMIC SPEAKER)
G-1360-8"
G-1370-10"

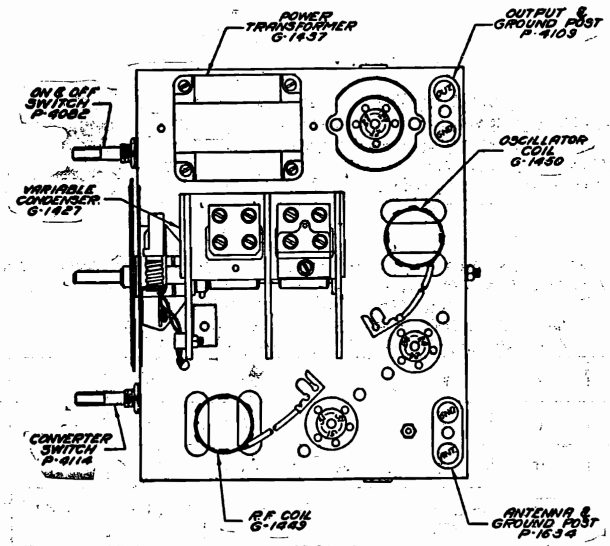
READINGS TAKEN WITH WESTON 565 ANALYSER
Vol. control position "full on" Super-sensitive switch "to right"

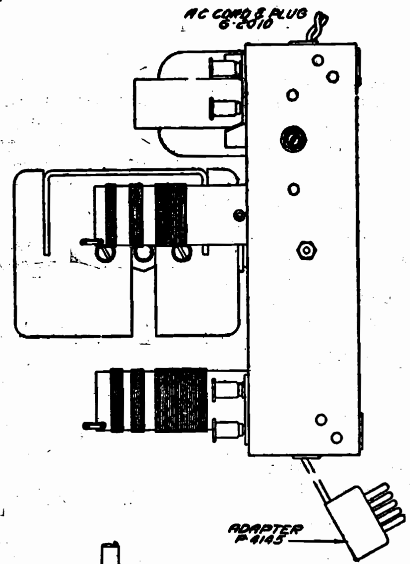
No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid Volt	Cath. Volts	S.G. Volts	Ip. Norm
1	R. F.	51	2.2	151	2	3	75	3.
2	1st Det.	51	2.2	140	5.7	9	70	1.2
3	I. F.	51	2.2	151	2	3	75	2.5
4	Osc.	27	2.1	115	0	0	0	9.5
5	2nd Det.	27	2.1	192	0	0	0	5
6	1st Aud.	27	2.1	230	8	15	0	5.5
7 & 8	P.P. Pentodes	47	2.3	250	16.5	0	255	27
9	A. V. C.	27	2.2	15	20	45	0	0
10	Rect.	80	4.9	0	0	0	0	47

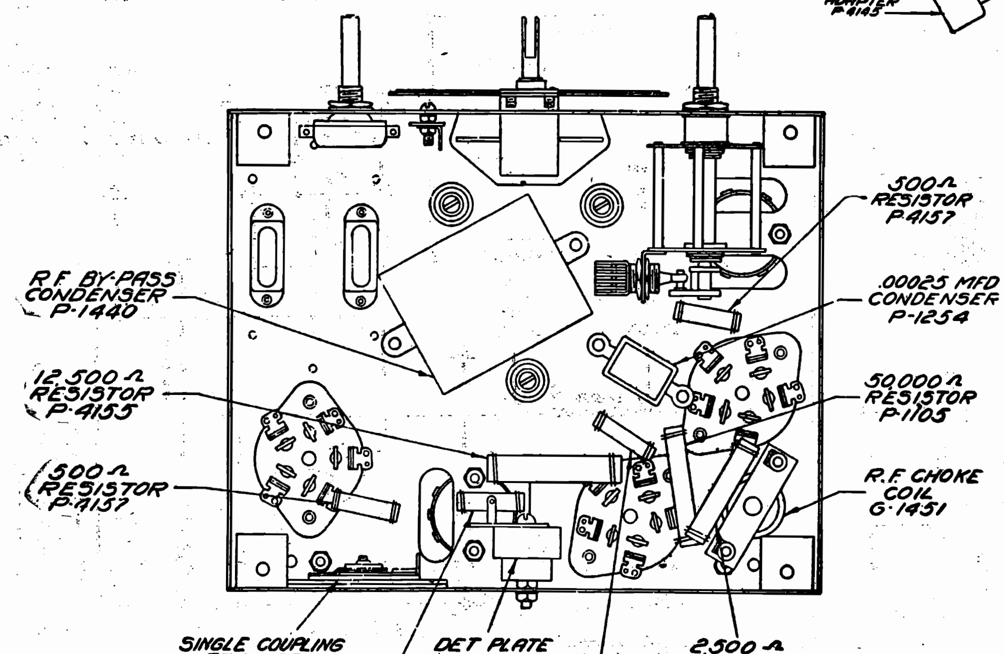
TRANSFORMER CORP. OF AMERICA

MODEL 200
Chassis Views

CLARION SERIES 200 SHORT WAVE CONVERTER





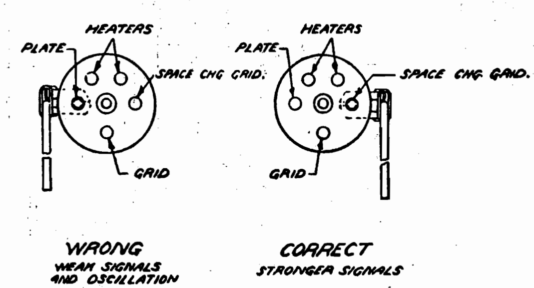


G-200 CHASSIS BOTTOM VIEW

CONNECTING THE SET

On the right hand rear of the chassis, there are two binding posts marked GND and OUT respectively. A short length of braided, shielded wire is supplied with the unit, and this wire should be connected to the "OUT" or output binding post. The outer metal shield has a small piece of wire soldered to it, and this wire should be connected to the "GND" binding post. The other ends of these wires should connect to the antenna and ground binding posts respectively of the broadcast receiver.

The adapter plug at the left hand side of the unit should be inserted into the pentode tube socket of the broadcast receiver, and the pentode tube plugged into the adapter. This supplies "B" power for the unit. The filaments of the tubes in the unit are fed separately through the small transformer located at the front right of the chassis. It should be noted that in the wafer type adapter, *the lug connection can easily become reversed by mis-handling,* and an improper connection here, would mean that *the "B" power for the short wave unit, would be taken from the plate prong of the pentode tube* rather than from the space charge grid prong *and the result would be weakness of signals, and oscillation.*



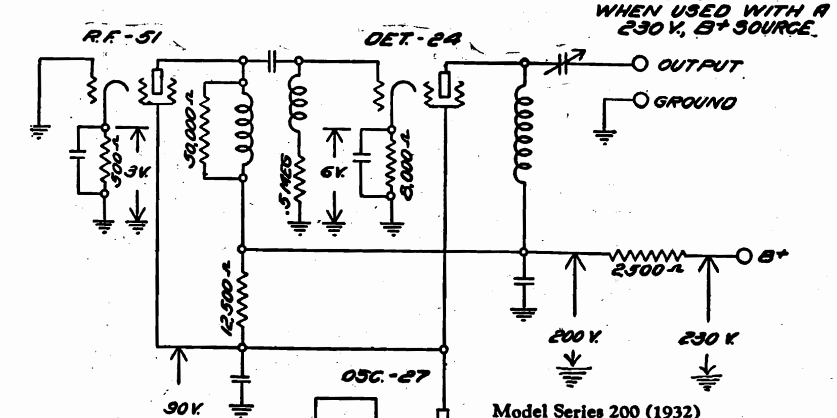
THE RIGHT AND WRONG WAY THE LUG CAN BE INSERTED IN THE ADAPTER WAFER

The trimmer adjustment screw on the right rear of the chassis is intended to adjust the output impedance of the unit to the antenna coil of the broadcast receiver into which it operates. This adjusting screw need not be moved if the unit is connected to a model 100 receiver.

MODEL 200
Schematic
Voltage - Data
Breakdown

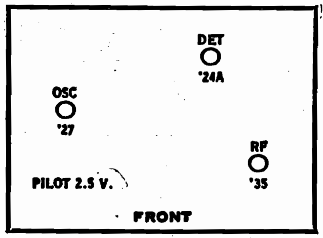
TRANSFORMER CORP. OF AMERICA

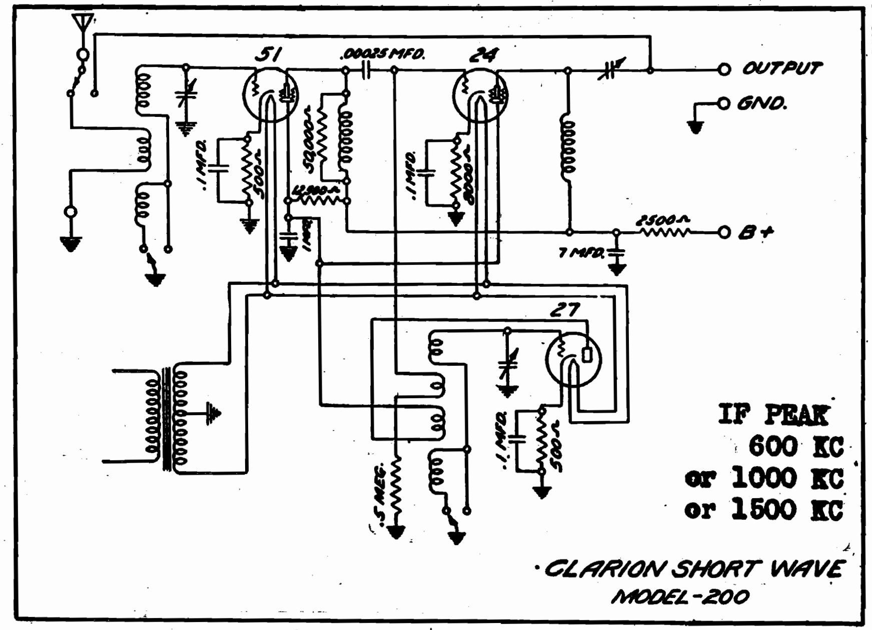
BREAKDOWN ANALYSIS FOR MODEL-200 WHEN USED WITH A 230 V. B+ SOURCE



NOTE: VOLTAGES AND CURRENT VALUES GIVEN ARE FOR VOLUME CONTROL AT MINIMUM RESISTANCE OR MAXIMUM VOLUME POSITION.

Model Series 200 (1932)





CLARION SHORT WAVE MODEL-200

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grind Volt	Cath. Volts	S. G. Volts	Ip. Norm.
1	R. F.	51	2.3	190	1.	1.	50	3.
2	Osc.	27	2.3	155	0	0	0	6.
3	Det.	24	2.3	180	.4	3	50	.4

Readings Taken With Western 565 Analyser
Line Voltage 115. Switch Position 55,000 K. C. Band.
(Broadcast Volume Control Full On)

Since resistance tolerances in the sets are plus or minus ten per cent and tubes may vary over twenty per cent, your readings may disagree with the above by plus or minus, thirty per cent.

In making an analyzer test of this unit, it should be remembered that the "B" power for the short wave set is drawn through the adapter plug under the pentode tube from the broadcast receiver, and any erroneous current or voltage reading shown by an analyzer test of the short wave unit should always be traced back to determine if the cause is not in the broadcast set itself or the adapter plug.

The series 200 Short Wave unit was designed and is intended for use with the series 100 superheterodyne, six tube receiver, and as such comprises the model 140 series broadcast-short wave superheterodyne.

Filament power for the unit is turned on by turning the right hand switch or knob over to the right. The broadcast receiver operating in conjunction with this short wave unit should be adjusted to 600 K. C. to maintain accurate calibration on the short wave unit. Since the sensitivity of various broadcast receivers will differ over the broadcast range, ***it is advisable to try adjusting the broadcast receiver to 600 K. C., then to 1000 K. C., then to 1500 K. C.***, and select that setting which gives loudest signals from any short wave station. This will have no effect on the short wave set's operation that will be detrimental, but will merely shift the calibration of your short wave receiver between five and seven points over to the right, or higher frequency.

This unit covers a frequency range of from 1500 K. C. to 15000 K. C. For normal broadcast reception, when the unit is working into a standard broadcast receiver, it is only necessary to turn the "Band Switch" [which is controlled by the lower right hand knob and is marked broadcast 550 to 1500 (left) 1500 to 5500 (center), and 5500 to 15,000 (right)], to the extreme left position and then tune the broadcast receiver. When it is desired to pick up short wave stations between 1500 and 5500 K. C., such as police, aeroplane, television and amateur phones, the band switch should be turned to the center or "up" position. To receive signals between 5500 and 15,000 K. C., such as foreign stations, the band switch should be thrown all the way over to the right.

TRANSFORMER CORP. OF AMERICA

MODEL AC 220
Voltage - Adapter
Resistance Data
Trimmer Locations

CIRCUIT RESISTANCE ANALYSIS

Model 220 Socket to ground

Stage	Grid	Cath-ode	Heater	Plate	Screen G	Suppr. G	Space G
R.F.	4.5	220	.1	19,500	8,400	......	......
Auto-dyne.	1,000	5,000	.1	19,500	8,400	......	......
I.F.	60	220	.12	19,500	8,400	......	......
2nd. det.	70	40,000	.1	270,000	260,000	40,000	......
Output	500,000	......	.1	19,600	....	......	19,400
Recti-fier.	....	......	19,500	..1,870	....	......	......

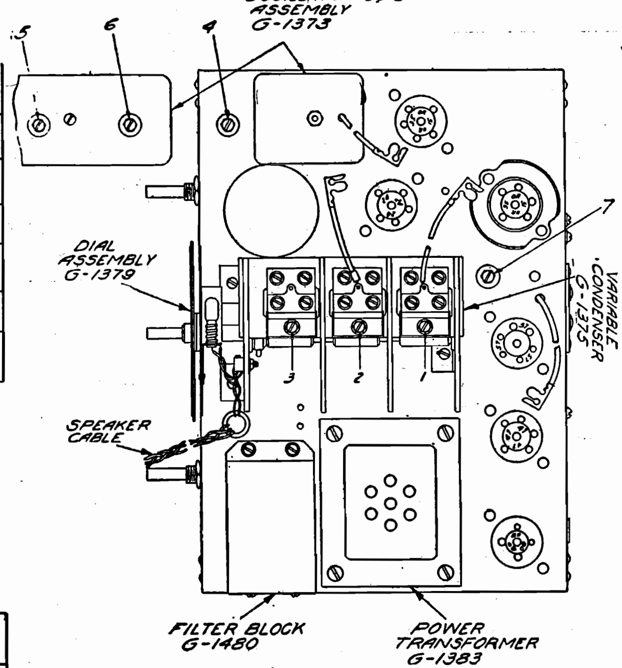
Note: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohm meter in each reading; the individual resistance in the circuit can be readily checked upon removal of chassis.

VOLTAGE ANALYSIS

Model 220

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid	Cath. Volts	Screen Volts	Ip. Norm.	Misc.
1	R.F.	51	2.15	245	3.4	3.1	81	5.	
2	Auto-dyne 1st. Det.	24	2.15	240	4.4	5.0	85	1.6	
3	I.F.	51	2.15	245	4.4	3.5	84	7.	
4	2nd. Det.	57	2.25	106	1.8	3.	43	.1	Suppressor Grid 3
5	Out-put.	47	2.25	245	15.	0.	0	31.	Pent-space Charge-Grid 250
6	Rect.	80	4.8	300	0.	0.	0	68.	

Vol. control "full on".
Tested with Weston model 565 analyzer.
Line: 115 Volts.



Number 1 is the antenna trimmer.

Number 2 is the gang condenser trimmer tuning the grid of the Super-autodyne.

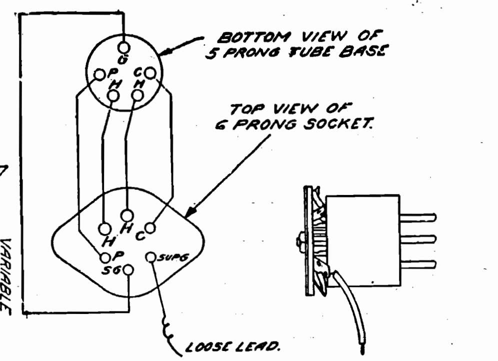
Number 3 is the gang condenser trimmer tuning the plate (or oscillator of the super-autodyne).

Number 4 is the oscillator padding trimmer.

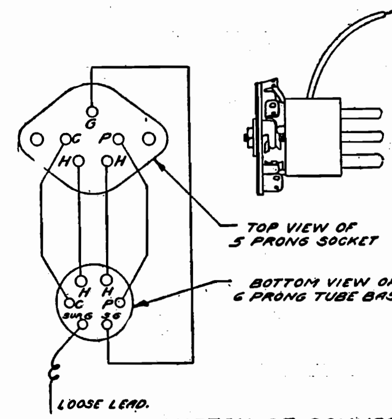
Number 5 is the Super-autodyne plate trimmer.

Number 6 is the I. F. grid trimmer.

Number 7 is the second detector grid trimmer.

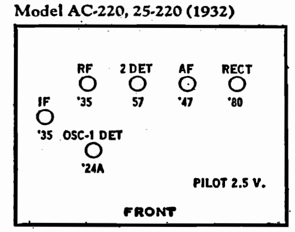


SKETCH OF CONNECTIONS FOR ADAPTER TO PLUG INTO ANALYZER.



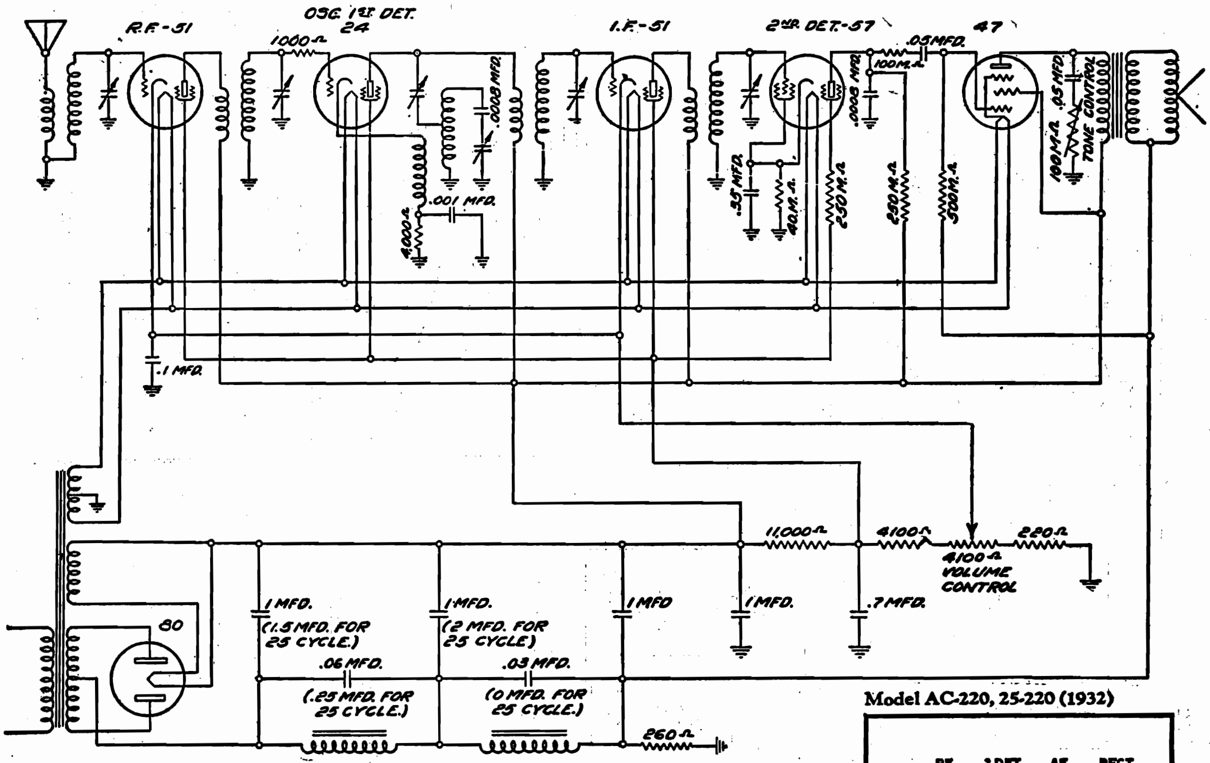
SKETCH OF CONNECTIONS FOR ADAPTER TO PLUG INTO SET

Model AC-220, 25-220 (1932)

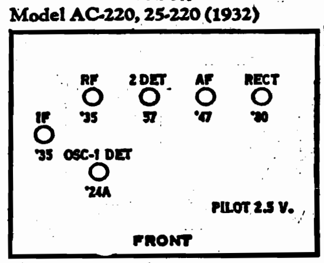


MODEL AC 220
Schematic
Chassis View

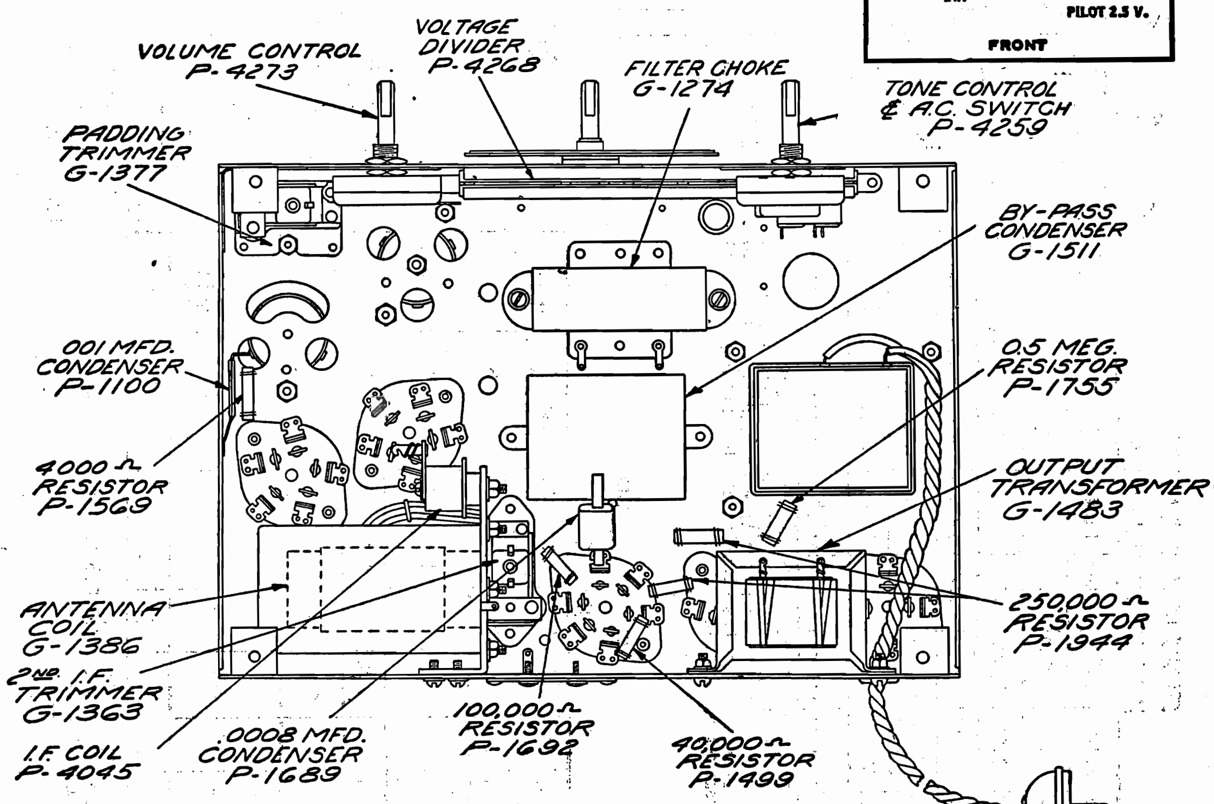
TRANSFORMER CORP. OF AMERICA



Model AC-220, 25-220 (1932)



IF PEAK 175 KC



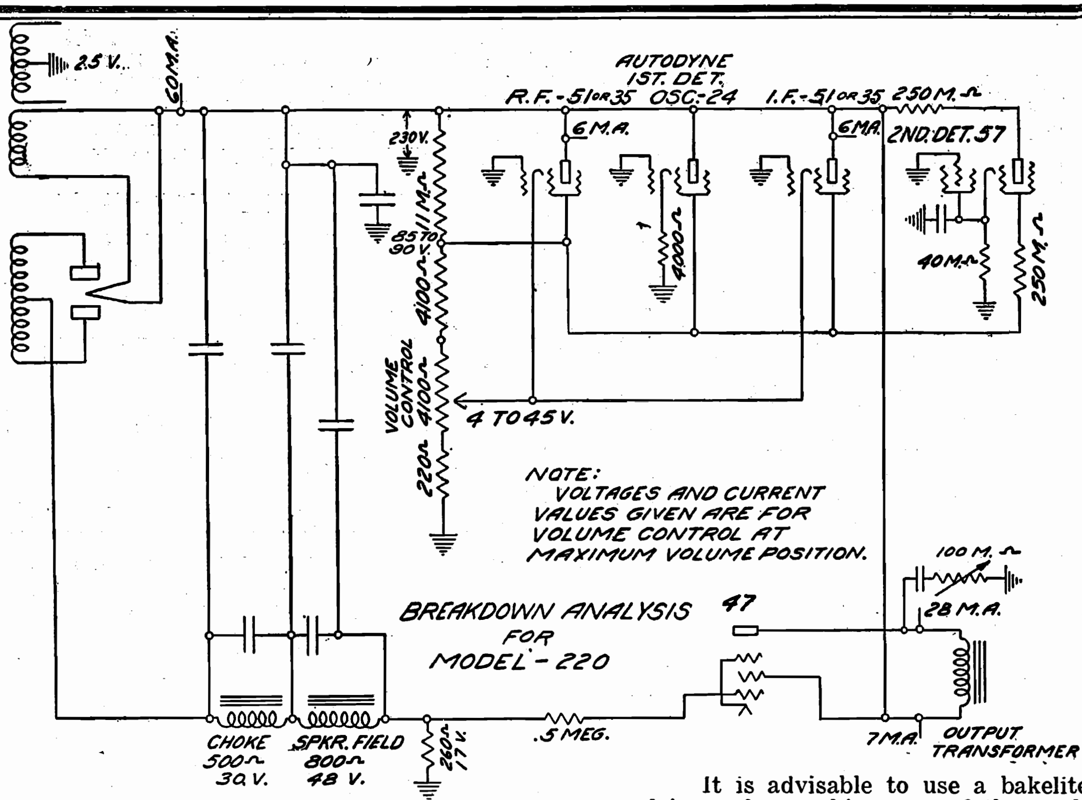
MODEL-220

DRAWN BY: J.M. CHECKED:
APPROVED: DATE: 6-3-32

G-220 CHASSIS
BOTTOM VIEW

MODEL AC 220
Alignment
Breakdown

TRANSFORMER CORP. OF AMERICA



READJUSTING TRIMMERS

The most important advice we can give you in regard to the adjustment of trimmers would be "don't make 'em." It has been proven conclusively to us that the Factory adjustment of these trimmers will not vary even when the set is severely jarred or dropped. However, if a customer were to tamper with their settings, a readjustment may have to be made. First, let us explain the location of the various trimmers. Diagram No. 3, top view of the series 220 chassis, shows each trimmer numbered. You should be acquainted intimately with each adjustment. A customer would not have to change the settings very much to ruin the sensitivity of the receiver. Further, if a readjustment appears to be necessary, it is imperative to know which circuit is being adjusted when a trimmer is being turned.

It is advisable to use a bakelite screwdriver when making any of these adjustments.

First, connect the 175 k. c. oscillator output leads from the control grid cap of the super-autodyne tube to ground. Do not remove any of the tubes from the sockets, and it is not necessary to disconnect the grid cap clip from the tube. Reset trimmers numbers 5, 6 and 7 for maximum output. While this test oscillator is working into the intermediate frequency stages, no adjustment of the tuning condenser on the receiver will have any effect, inasmuch as the intermediate frequency stage is fixed tuned.

If your test oscillator is properly designed, it will supply exactly 175 k. c., and when trimmers number 5, 6 and 7 are set for maximum output, they will be correctly adjusted and should be sealed.

Next, disconnect the 175 k. c. test oscillator and connect to the antenna binding post of the receiver, the output lead from your broadcast test oscillator, or tune in a broadcast signal around 1400 k. c., then reset trimmers numbers 2 and 1 respectively for maximum output. This adjustment will track the super-autodyne grid circuit of the R. F. stage.

To check the calibration of the receiver, whether it be high or low, trimmer number 3 should be reset until a station of known high frequency is brought in on the correct dial marking with peak volume. If your broadcast test oscillator is accurately calibrated, it might be used in place of the broadcasting station signal. In this adjustment, a broadcast station or test oscillator signal at about 1400 k. c. should be chosen. The setting of the trimmer at 1400 k. c. is more critical than it would be at 600 k. c.; calibration, therefore more accurate.

The next adjustment is important and not easily explained in writing, so pay close attention to the following instruction. We will now balance the oscillator to the r. f. and first detector stages.

Tune the external broadcast test oscillator and the receiver both to 600 k.c., then slowly increase or decrease the capacity of No. 4 (oscillator padding trimmer), at the same time and continuously tuning back and forth across the signal with the receiver tuning condenser gang. The output meter needle will now be swinging up and down in step with the variation in tuning. Watch the peak of this swinging closely and readjust No. 4 trimmer until the swinging needle reaches its highest peak.

Retune the receiver and broadcast test oscillator to 1400 k.c. and re-check trimmer No. 3 to make sure that the adjustment of No. 4 has not thrown the receiver out of calibration. If it has, then readjust No. 3 until the calibration is correct, (as previously explained), and check on trimmers No. 2 and No. 1, to make sure that the adjustment of No. 4 has not reduced the sensitivity.

MODEL AC 280
Resistance Data
Voltage
Breakdown Chart
Chassis View

TRANSFORMER CORP. OF AMERICA

CIRCUIT RESISTANCE ANALYSIS

Model 280 Socket to ground

Stage	Grid	Cathode	Heater	Plate	Screen G	Suppr. G	Space G
R.F. . . .	Infinity	500	.1	19,200	9,100	.....	......
1st.det. .	4.	10,000	.1	19,200	9,000	.1	......
Oscillator	100,000	.1	.1	9,100	......	.....	......
I.F. . . .	Infinity	500	.1	19,200	9,100	.....	......
A.V.C.det.	250,000	500	.1	500	......	.....	......
A.V.C.det.	250,000	500	.1	500	......	.....	......
Audio. . .	Infinity	1,000	.1	20,300	......	.....	......
Output . .	1,940	......	.1	19,200	......	.....	19,100
Output . .	1,940	......	.1	19,200	......	.....	19,100
Output . .	1,740	......	.1	19,200	......	.....	19,100
Output . .	1,740	......	.1	19,200	......	.....	19,100
Rectifier.	....	......	19,100	1,640	......	.....	......

Note: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohm meter in each reading; the individual resistance in the circuit can be readily checked upon removal of chassis.

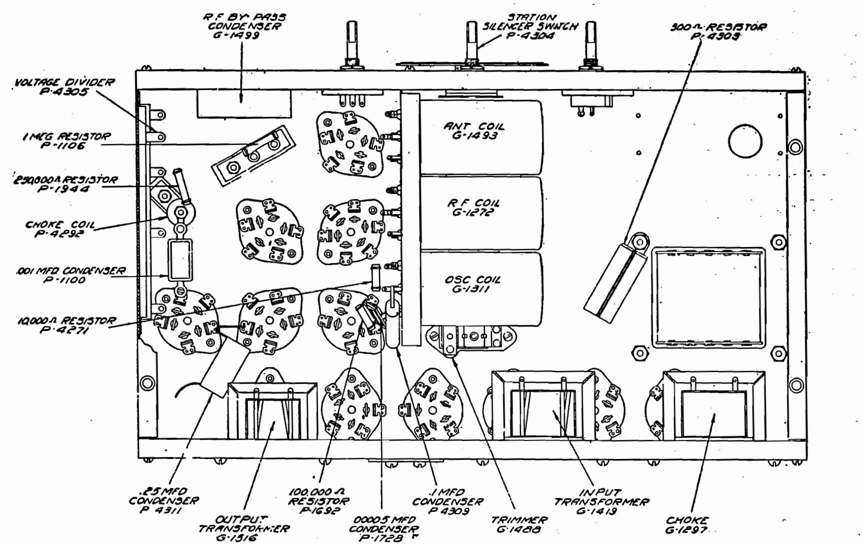
VOLTAGE ANALYSIS

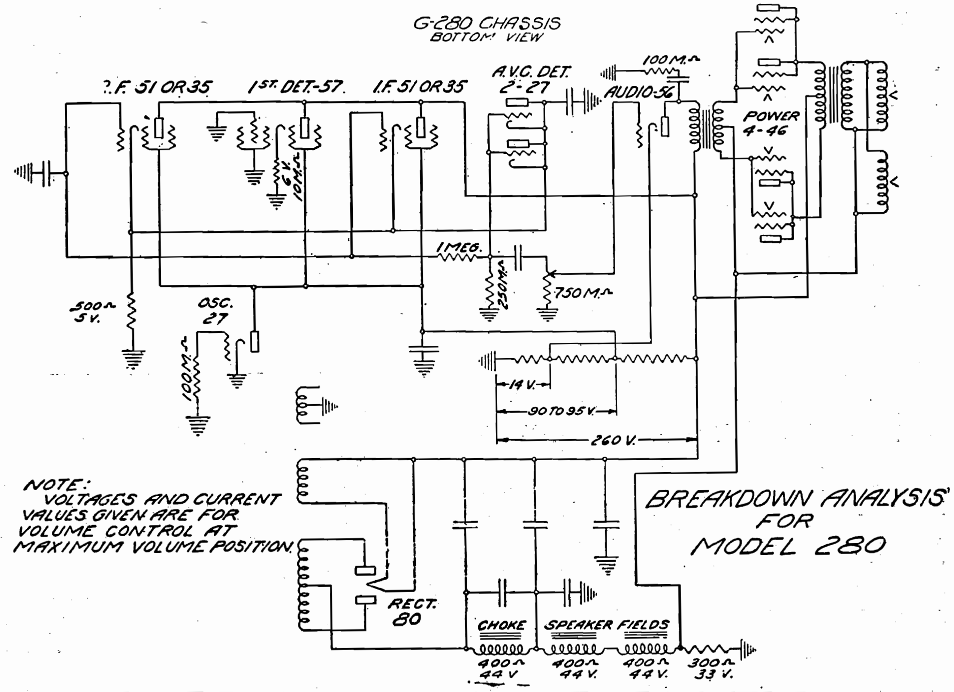
Model 280

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid Volts	Cath. Volts	Screen Volts	Ip. Norm.	Misc.
1	R.F. . . .	51	2.2	250	.2	4.	77	4.	....
2	1st.Det. .	57	2.3	242	4.	5.	85	.25	Suppressor Grid 0
3	I.F. . . .	51	2.2	249	.2	4.	77	2.	......
4	Osc. . . .	27	2.2	110	.05	0	0	8.	......
5	Duo.Det. .	27	2.2	0	2.	5.	0	0	......
6	Duo.Det. .	27	2.2	0	2.	5.	0	0	......
7	1st.Aud. .	56	2.3	237	3.	9.5	0	3.	......
8	Output P.P.	46	2.4	245	32.	...	...	3.	Outer Grid Volts 245
9	Output P.P.	46	2.4	245	32.	...	...	3.	245
10	Output P.P.	46	2.4	245	32.	...	...	3.	245
11	Output P.P.	46	2.4	245	32.	...	...	3.	245
12	Rect . . .	80	4.9	340	.....	...	...	108.	......

Line Voltage 115. Volume Control "Full On". Muting Switch "Out". Tested with Weston Model 565 Analyser.

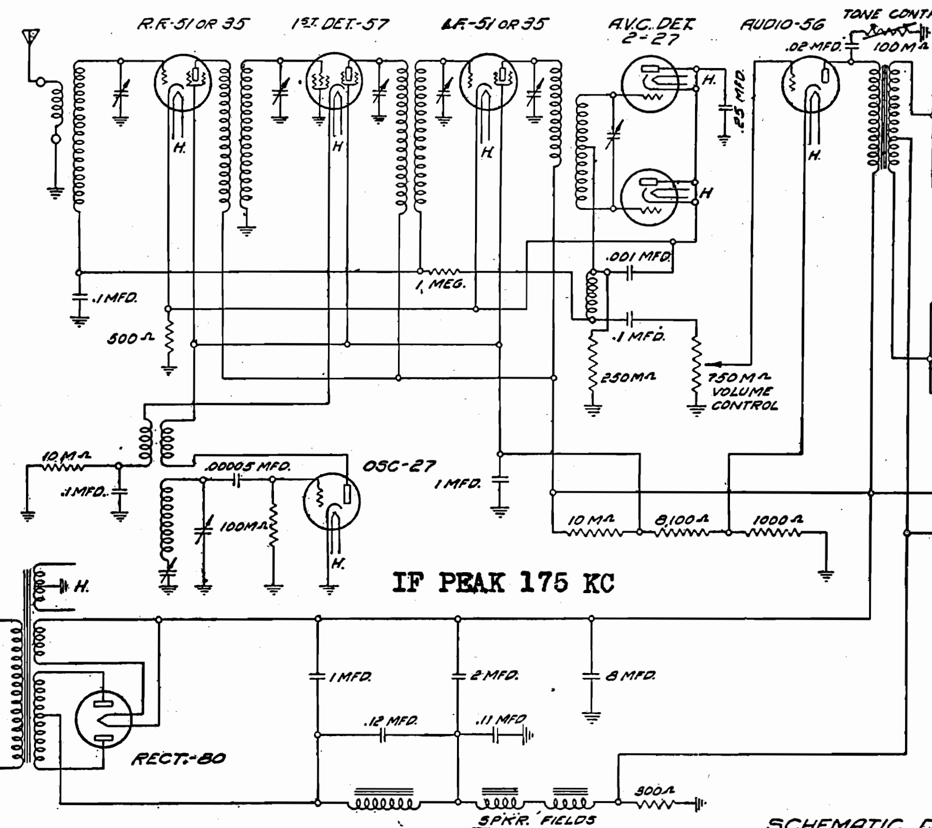
A whistle similar to oscillation is introduced on the side bands of strong stations by too long an aerial. Reducing the physical length of the aerial or connecting a .00025 to .002 microfarads condenser in series with the lead-in, will eliminate this trouble.



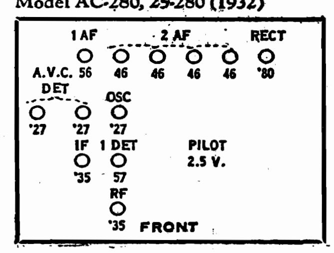


TRANSFORMER CORP. OF AMERICA

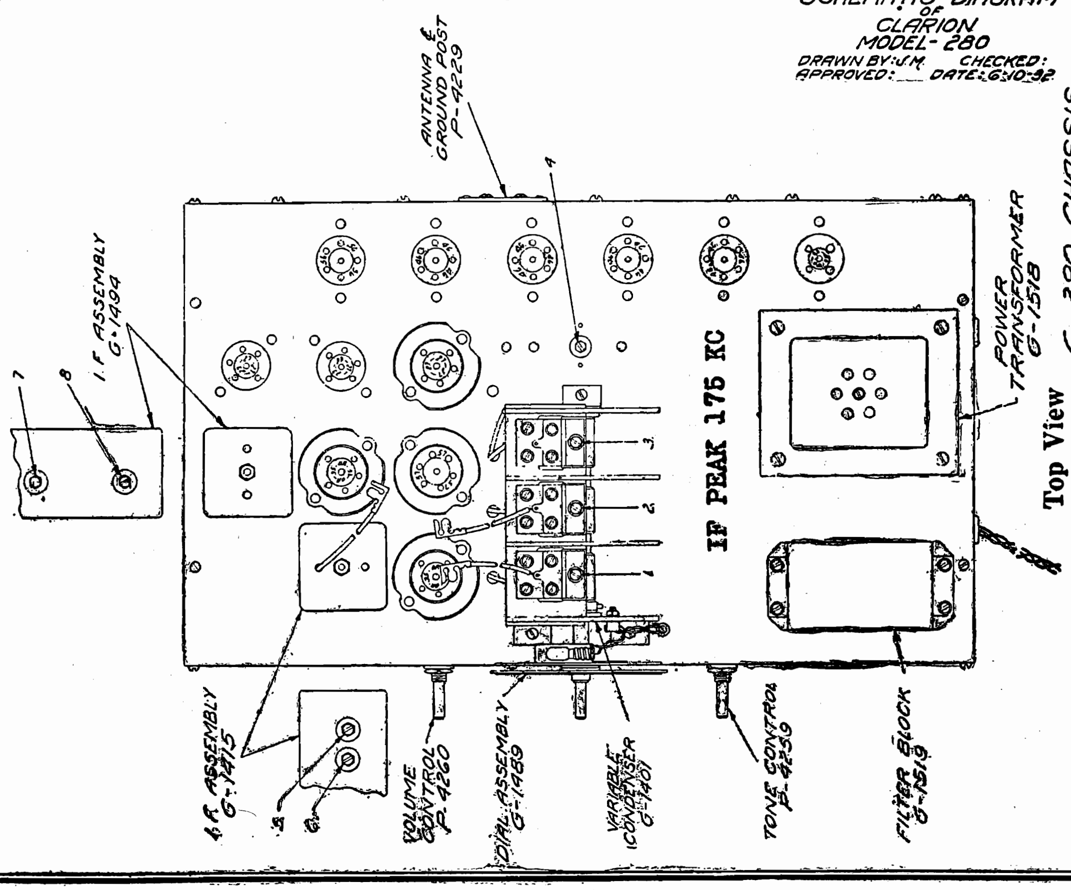
MODEL AC 280
Schematic
Trimmers



Model AC-280, 25-280 (1932)



SCHEMATIC DIAGRAM OF CLARION MODEL-280
DRAWN BY: J.M. CHECKED:
APPROVED: DATE: 6-10-32

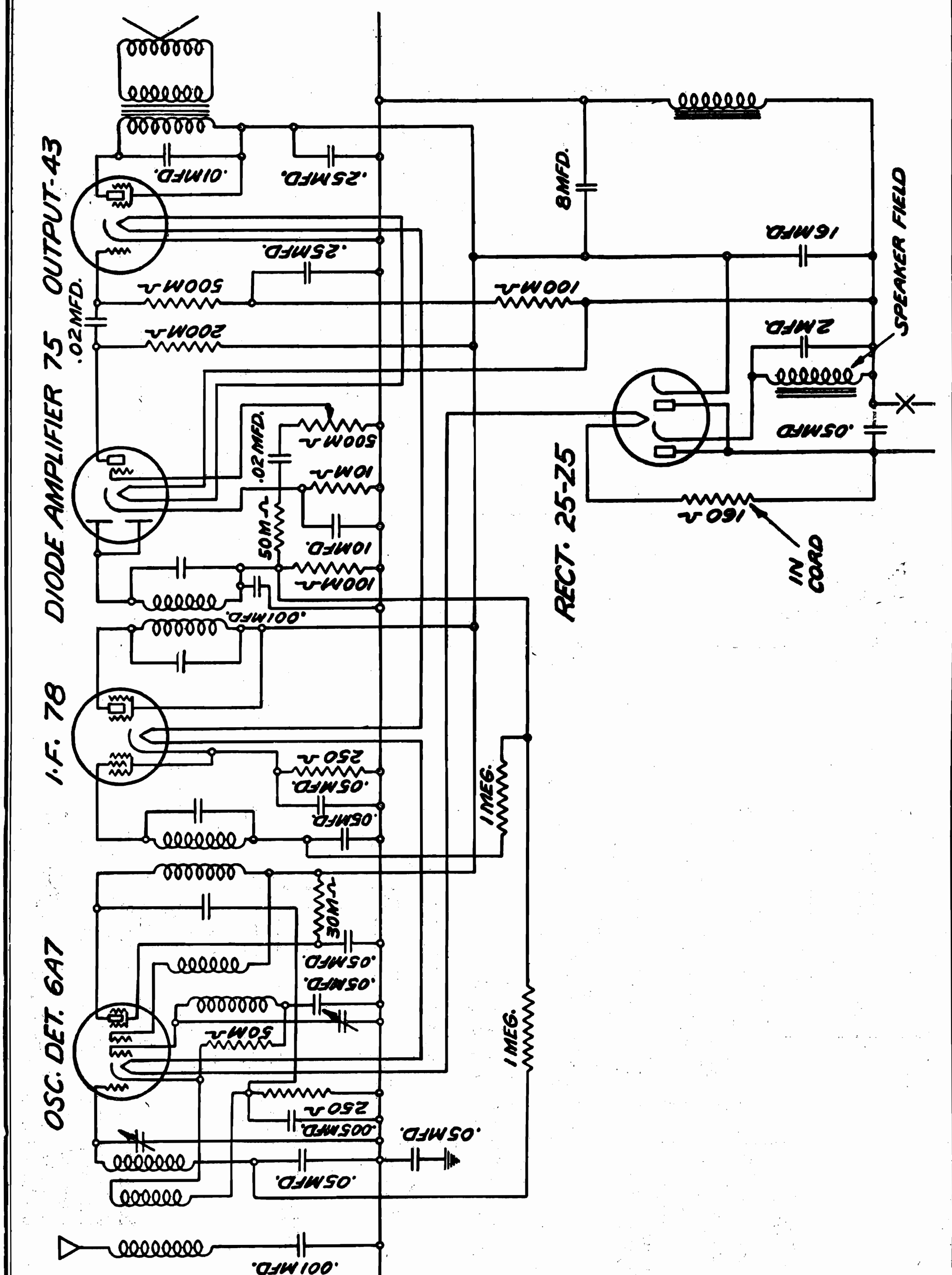


Top View G-280 CHASSIS

No. 1 is the antenna trimmer, No. 2 first detector trimmer, No. 3 oscillator gang trimmer, No. 4 oscillator padding trimmer, No. 5 second detector grid trimmer, No. 6 second detector plate trimmer, No. 7 intermediate frequency grid trimmer, No. 8 intermediate frequency plate trimmer.

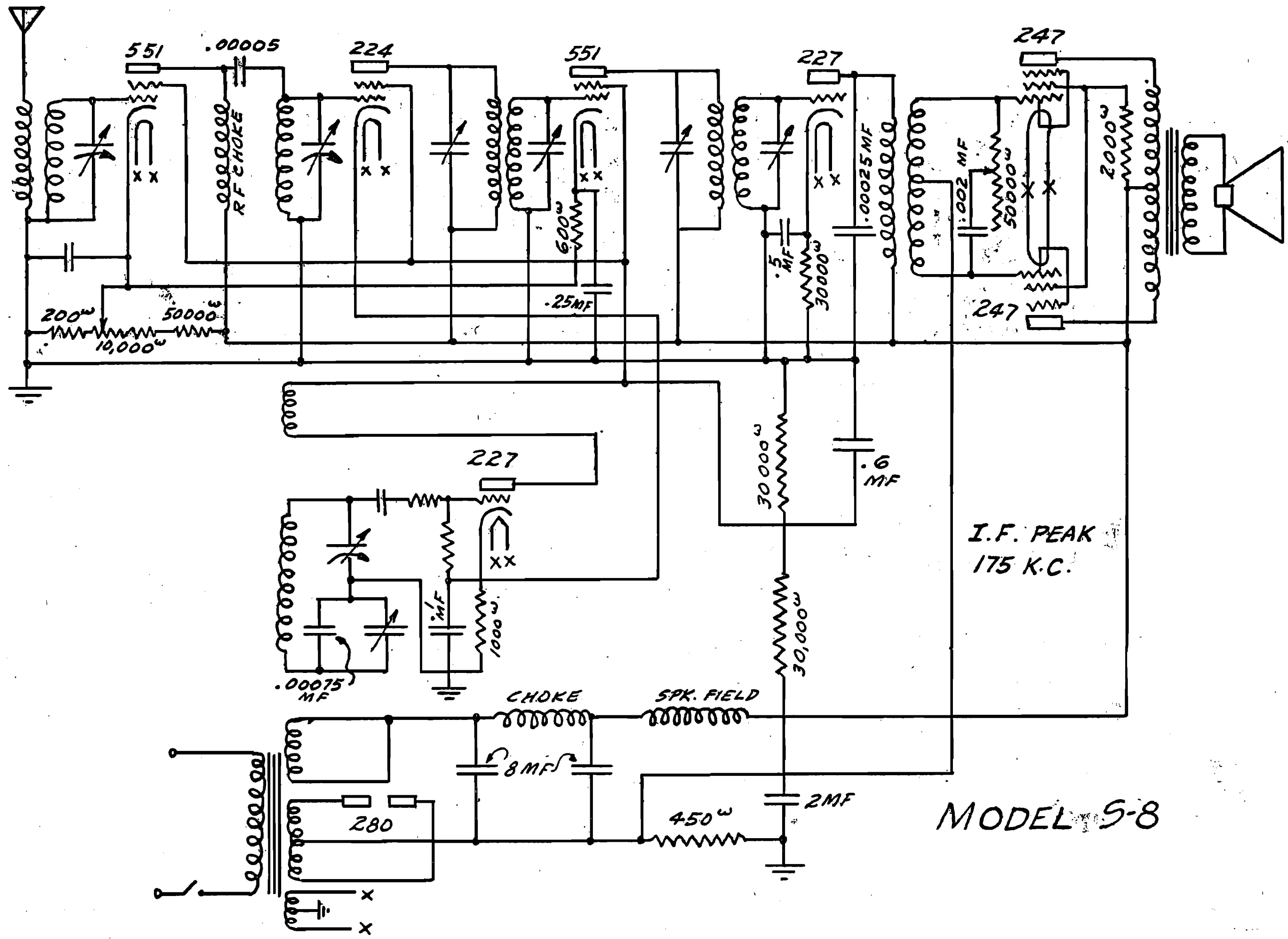
MODEL AC 420

TRANSFORMER CORP. OF AMERICA

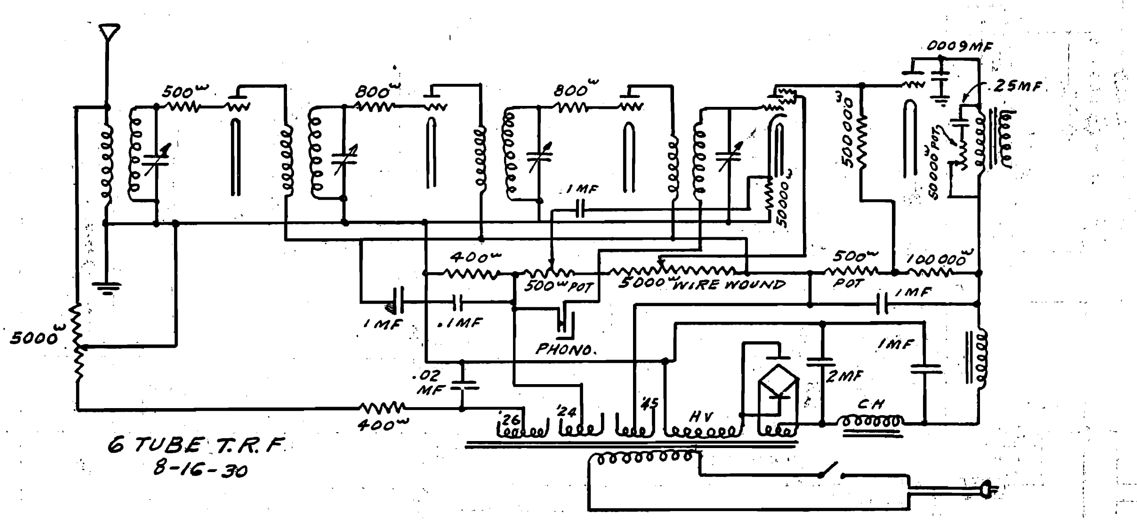


TRAV-LER RADIO & TELEVISION CORP.

MODEL S-8
MODEL 6 Tube TRF



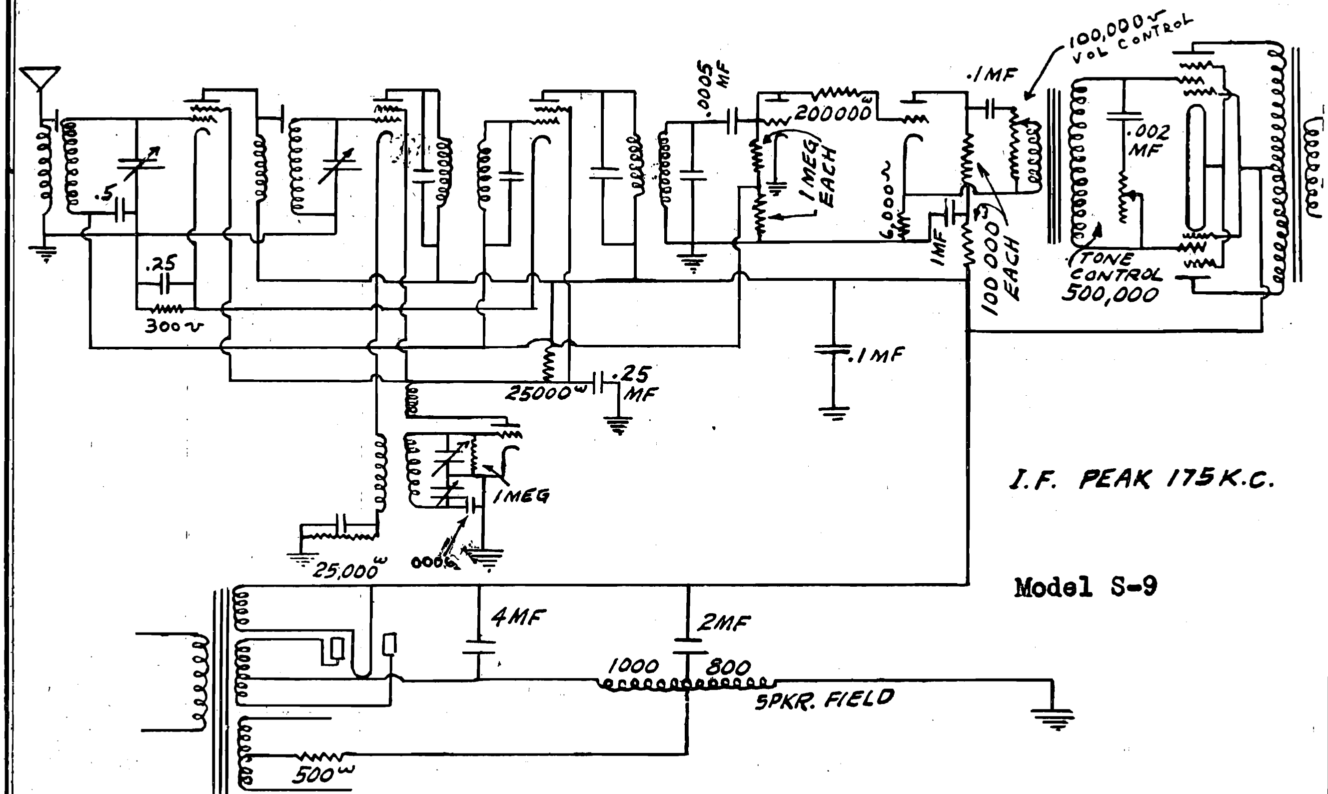
MODEL S-8



6 TUBE T.R.F
8-16-30

MODEL S-9
MODEL SG DC

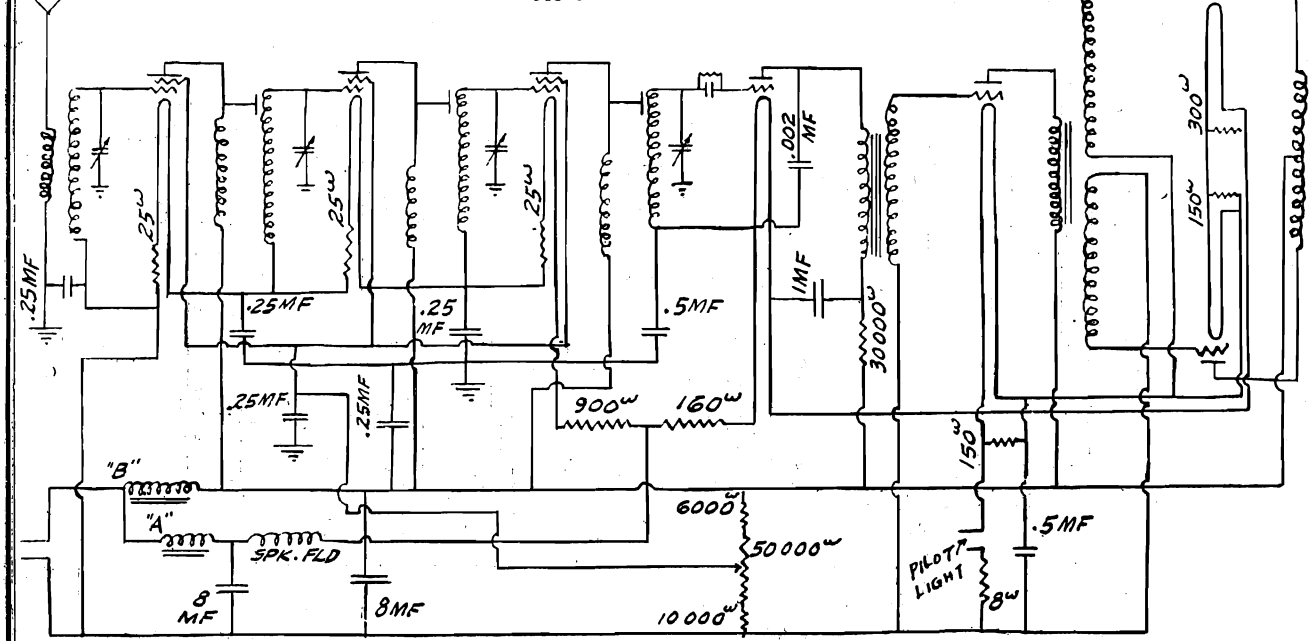
TRAV-LER RADIO & TELEVISION CORP.



I. F. PEAK 175 K.C.

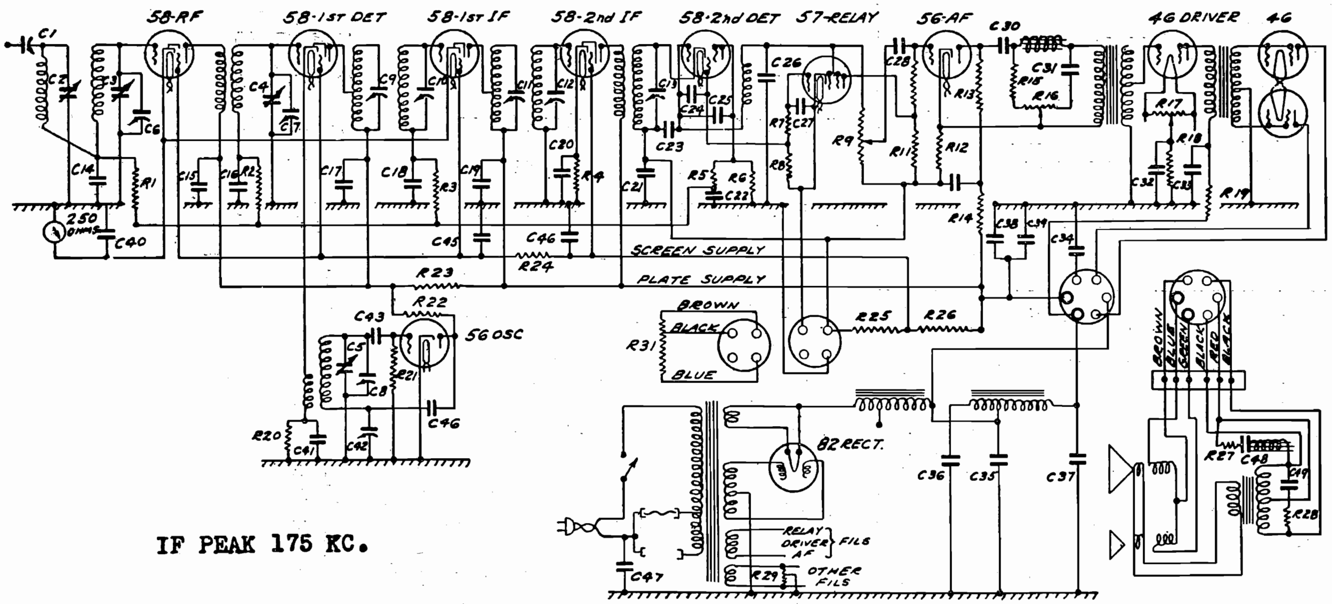
Model S-9

Model SG DC



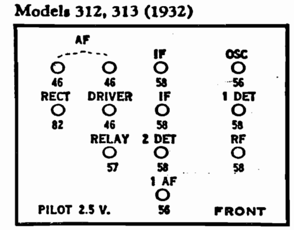
UNITED AMERICAN BOSCH CORP.

MODEL 312,313
Schematic,Voltage



IF PEAK 175 KC.

Models 312, 313 (1932)



Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
1st R.F.	58	2.4	180	85	3-6	0
1st Det.	58	2.4	180	90	4.5-10	0
1st I.F.	58	2.4	195	90	3.5-6	0
2nd I.F.	58	2.4	195	90	3.5-6	0
2nd Det.	58	2.4	0	2	40	0
Relay	57	2.4	2	25	0-45	0
1st A.F.	56	2.4	120	1	45	0
Driver	46	2.4	290	290	-	30
Output	46	2.4	430	0	-	0
Output	46	2.4	430	0	-	0
Osc.	56	2.4	75	-	-	-
Rect.	82	2.4	-	-	-	-

Note: These values are readings of a high resistance voltmeter from each socket terminal to ground. The filament voltages are, of course, an exception. Cathode readings are given for those tubes having the grid at ground. The values are only approximate and will vary with the line voltage and the type of meter employed.

R1 - 100,000 ohms
R2 - 100,000 ohms
R3 - 100,000 ohms
R4 - 500 ohms
R5 - 500,000 ohms
R6 - 1 megohm
R7 - 1 megohm
R8 - 2 megohm
R9 - 500,000 ohms
R10 - 1 megohm
R11 - 1 megohm
R12 - 1000 ohms
R13 - 10,000 ohms
R14 - 10,000 ohms
R15 - 10,000 ohms
R16 - 100,000 ohms
R17 - Center Tap
R18 - 1500 ohms
R19 - 5000 ohms
R20 - 5000 ohms

R21 - 100,000 ohms
R22 - 30,000 ohms
R23 - 1000 ohms
R24 - 1000 ohms
R25 - 2800) ohms
R26 - 2400)
R27 - 3000 ohms
R28 - 10,000 ohms
R29 - Mid Tap
R30 - 2100 ohms

C1 - Trimmer
C2 - Tuning
C3 - Tuning
C4 - Tuning
C5 - Tuning
C6 - Alignment
C7 - Alignment
C8 - Alignment
C9 - Alignment

C10 - Alignment
C11 - Alignment
C12 - Alignment
C13 - Alignment
C14 - .05 mfd.
C15 - .05 mfd.
C16 - .05 mfd.
C17 - .05 mfd.
C18 - .05 mfd.
C19 - .05 mfd.
C20 - .05 mfd.
C21 - .05 mfd.
C22 - .05 mfd.
C23 - 100 mmf.
C24 - .05 mfd.
C25 - .05 mfd.
C26 - 100 mmf.
C27 - .1 mfd.
C28 - .05 mfd.
C29 - .5 mfd.

C30 - .1 mfd.
C31 - .05 mfd.
C32 - 8. mfd.
C33 - 4.)
C34 - 4.) mfd.
C35 - 8.)
C36 - 4.)
C37 - 8.) mfd.
C38 - 4.)
C39 - 4.)
C40 - .05 mfd.
C41 - .05 mfd.
C42 - Alignment
C43 - 100 mmf.
C44 - .05 mfd.
C45 - .05 mfd.
C46 - .05 mfd.
C47 - .01 mfd.
C48 - 2. mfd.
C49 - .01 mfd.

MODEL MU-6 Ed 1
Magmotor
Schematic -Data

UNITED AMERICAN BOSCH CORP.

To use MU6 180 Ed. 1 with Model 7 Philco Receivers:

(a) Use Philco "B" shielded cable which comes with that set. Cut away the black and white lead at the fuse and discard the two fuse blocks and attached wires.

(b) Remove cover of chassis and unsolder the wire in the large prong (diagonally opposite the smaller prong) and solder on an insulated wire of large gauge sufficiently long to reach the 6-volt battery. Ground the prong from which the above wire was removed.

(c) Attach a large gauge wire insulated to the socket prong which is first in the "High A" circuit.

(d) Connect the blue-white wire of the Philco "B" cable to the +180 terminal of the Magmotor, the green-white wire to the +90 terminal and the black-yellow wire to the –B terminal.

(e) Connect wire under "c" to +A terminal of Magmotor.

(f) Connect wire added under "b" to ungrounded terminal of "A" battery.

(g) Plug all cables into receiver, switch should operate receiver and Magmotor simultaneously.

(h) Connect 2 mfd. of Magmotor between "180" and "–B".

To use MU6 180 Ed. 1 with Model 3 Philco Transitone Receiver:

(a) Connect to that terminal in the receiver which carries high A from the control head, a large gauge copper wire of sufficient length to reach the Magmotor. Drape this wire through a corner of the chassis housing.

(b) Attach to side of chassis housing a dry electrolytic condenser 4 mfd. in this container 3/4" x 1 3/8" x 4 1/4". Connect plus side of this condenser to +B terminal in receiver and minus side to high A terminal which is the same terminal as noted under "c" for Super Deluxe Motorola.

(c) Arrange 2 mfd. condenser of Magmotor between +B brush and –B terminal of Magmotor structure.

To use MU6 180 Ed. 1 with Model 7T47A Super Deluxe Motorola:

(a) Remove cable terminal cover from back of receiver chassis and find "AH" (A high) terminal which is designated on connection diagram in the cover of the chassis housing. Bare the larger of the two wires connected to "AH" and attach additional wire of large gauge and of sufficient length to reach Magmotor. Tape up joint.

(b) Drill a hole in end of cable terminal cover and pass wire which was attached as above. The loose end of this wire should be connected to the "A" terminal of the Magmotor.

(c) Connect a 4 mfd. dry electrolytic condenser (approximately 3/4" x 1 3/8" x 4 1/4") metal case between +B and –B terminals as they are designated in diagram in chassis housing cover. Polarity of this condenser must be correctly arranged when making connections. This condenser must be supported on the back of the housing and wires run through holes to put into side of cable terminal cover.

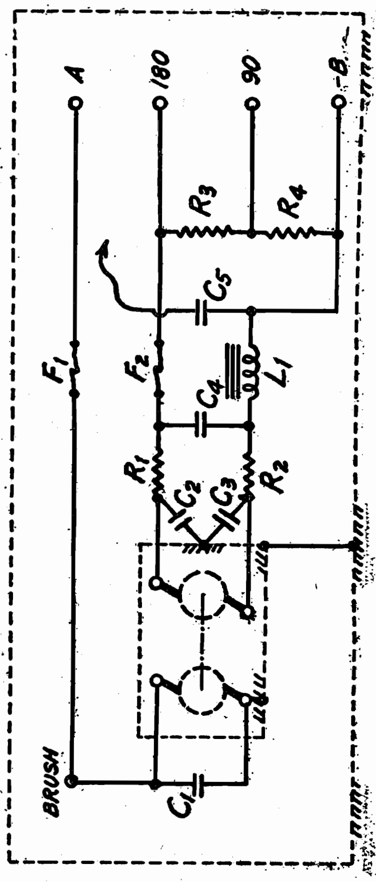
(d) Connect the "B" cable wires to proper terminals of Magmotor red to +180, green to +90, white to –B.

(e) Connect 2 mfd. of Magmotor between "180" and "–B".

To use MU6 180 Ed. 1 with American Bosch Model 100

(a) Apply American Bosch standard shielded Magmotor cable which has been equipped with spade tips at Magmotor end. Ground shield through band clamp to housing base.

(b) Connect 2 mfd. of Magmotor filter between +B terminal and –B terminal.



R1	50 ohms
R2	50 ohms
R3	15000 ohms
R4	20000 ohms
L1	60 ohms
F1	10 amp.
F2	1/8 amp.
C1	.5 mfd.
C2	.05 mfd.
C3	.05 mfd.
C4	.5 mfd.
C5	2. mfd.

UNITED AMERICAN BOSCH CORP.

INSTRUCTIONS for INSTALLING and OPERATING

THE AMERICAN BOSCH MAGMOTOR

Type MU 6 180 Ed. 1

A. GENERAL DESCRIPTION

The American Bosch Magmotor is a rotating device for converting 6 volts direct current, as supplied from a storage battery, to 180 volts direct current for use as a plate supply for motor car radio sets.

The Magmotor is essentially a dynamotor having a double commutator armature which has two separate independent windings, one wound for 6 volts as a motor winding, and the other wound for 180 volts as the generator winding. Both of these windings occupy the same armature slots and thus form a very compact and efficient unit since only two sets of bearings are required. The 6 volt winding is connected to a 7 bar commutator which is supplied with current from two copper graphite brushes. The high voltage winding is connected to a 14 bar commutator which delivers current to two high resistance carbon brushes. The two pole field structure is magnetically excited by means of an ordinary horse shoe magnet, very similar to that used on magnetos. This has the advantage of compactness and higher efficiency since the field current is eliminated.

The complete magmotor assembly is mounted on a steel base with four brackets which support the cover and provide the means for mounting the unit on the car. The power unit is insulated from its mounting by means of rubber cushions which permits the motor to run freely and quietly, completely eliminating vibration and noise.

B. INSTALLATION

1. Before mounting the magmotor on the car it must first be determined whether the car battery is grounded from the positive (+) or negative (—) terminal. The connections on the magmotor are made for operation with the plus terminal of the battery grounded as the battery connections on most cars are arranged in this manner, but if the minus terminal of the battery is grounded the connections to the plus and minus terminals on the magmotor must be reversed. This is important.

When the minus terminal of the battery is grounded proceed as follows: Remove the cover from the magmotor. Disconnect the black (grounded) wire from the terminal clip on top of the magmotor at the magnet end. Disconnect the red (positive) wire from the terminal clip at the bottom of the magmotor at the magnet end and reverse the position of these two wires. The supporting clip crimped to the red wire and fastened by the brush mounting screw should also be transferred. The use of this clip is important as it will prevent vibration and possible breakage of the red wire.

2. Position and Mounting:

The magmotor must be mounted in a horizontal position and absolutely level to avoid bearing thrust in any direction. Whenever possible the unit should be placed in a position where it will be readily accessible and will permit removal of the cover. It can be mounted on the bulkhead, in the engine compartment or under the front seat, wherever most convenient and the length of the connecting cable to the receiver will permit. The magmotor is secured by means of four studs passed through holes drilled in the support. The four holes are spaced 2-1/16" by 6-3/4". After the holes have been drilled use the nuts and lock washers provided to fasten the unit in place.

C. SERVICE INFORMATION

1. Lubrication:

It is very important that the efficiency of the magmotor should be as high as possible and for this reason, friction losses such as bearing friction and brush friction, should be at a minimum. The ball bearings must run very freely and must not, under any circumstances, be lubricated with vaseline or ball bearing grease, such as is ordinarily used in magnetos, as these lubricants will materially increase the friction load. The ball bearings should be free from all traces of grease and dirt and should spin freely.

Two or three drops of Bosch US506 oil on the bearings about once a year is sufficient lubrication.

2. Brushes:

The Magmotor has four brushes, two in the input (magnet) end and two in the output (filter) end. The brushes in the input end are made of copper graphite and carbon brushes are used in the output end. The brushes in the input end can be distinguished by their copper color, and under no circumstances must these brushes be interchanged with the carbon brushes. When new brushes are required the complete brush holder assembly should be replaced. It is very important that the proper grade of brushes are used and no brushes should be used except those furnished by the United American Bosch Corporation.

3. Ball Bearings:

The ball bearings are held in place by means of set screws (7 Fig. 1) located in the top of each end plate. Extreme care must be exercised when these set screws are tightened because if they are screwed down too tightly it is possible to distort the ball bearing sufficiently to increase the friction in the bearing. The set screws should be carefully tightened while the armature is rotating and with an ammeter in circuit so that the current drain may be observed. There are two set screws in each end cap, the top one locking the lower one in place. Both of the set screws must be removed when disassembling the unit.

4. Magnetizing:

The magnet should retain its original magnetic strength for an indefinite period but there are factors that may cause dissipation of the magnetism as, for example, the removal of the armature. It is advisable, therefore, to remagnetize the magnet after any work has been done on the power unit especially if the armature has been taken out. The unit should be completely assembled when magnetizing in order to obtain the proper field excitation. This can be done on a standard Bosch or American Bosch Magnetizing Stand.

5. Testing:

Current Input and Output:

The current input on the 6 volt side, without any load on the high voltage side, should be between 0.8 and 1.1 ampere maximum. When the power unit only without the filter system is tested the unit should give an output of 200 volts D.C. 40 milliamperes, with an input of 2.6 to 2.8 amperes at 6 volts. With the filter system in circuit the terminal voltage should not be less than 160 volts with a load of 40 milliamperes and a maximum input of 2.8 amperes at 6 volts.

6. Resistors and Condensers:

The position in which the resistors and condensers are placed has a direct bearing on the efficiency of the magmotor and if it is necessary to replace any of these parts it is of the utmost importance that they be placed in exactly the same position as the part removed. The leads must also be of the same length and gauge, or larger and must be placed in the same position as the ones removed.

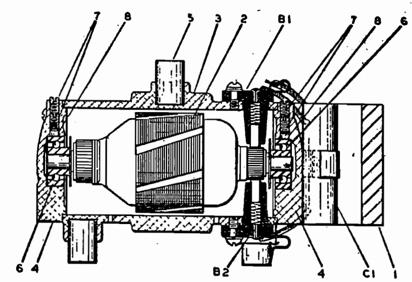


Fig. 1
Cross Sectional View of Magmotor Power Unit

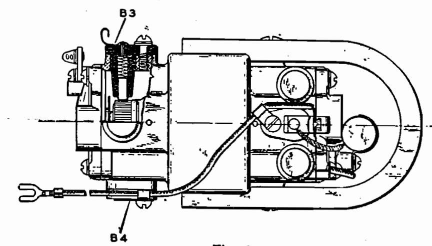


Fig. 2
Cross Sectional View of Magmotor Power Unit viewed from bottom

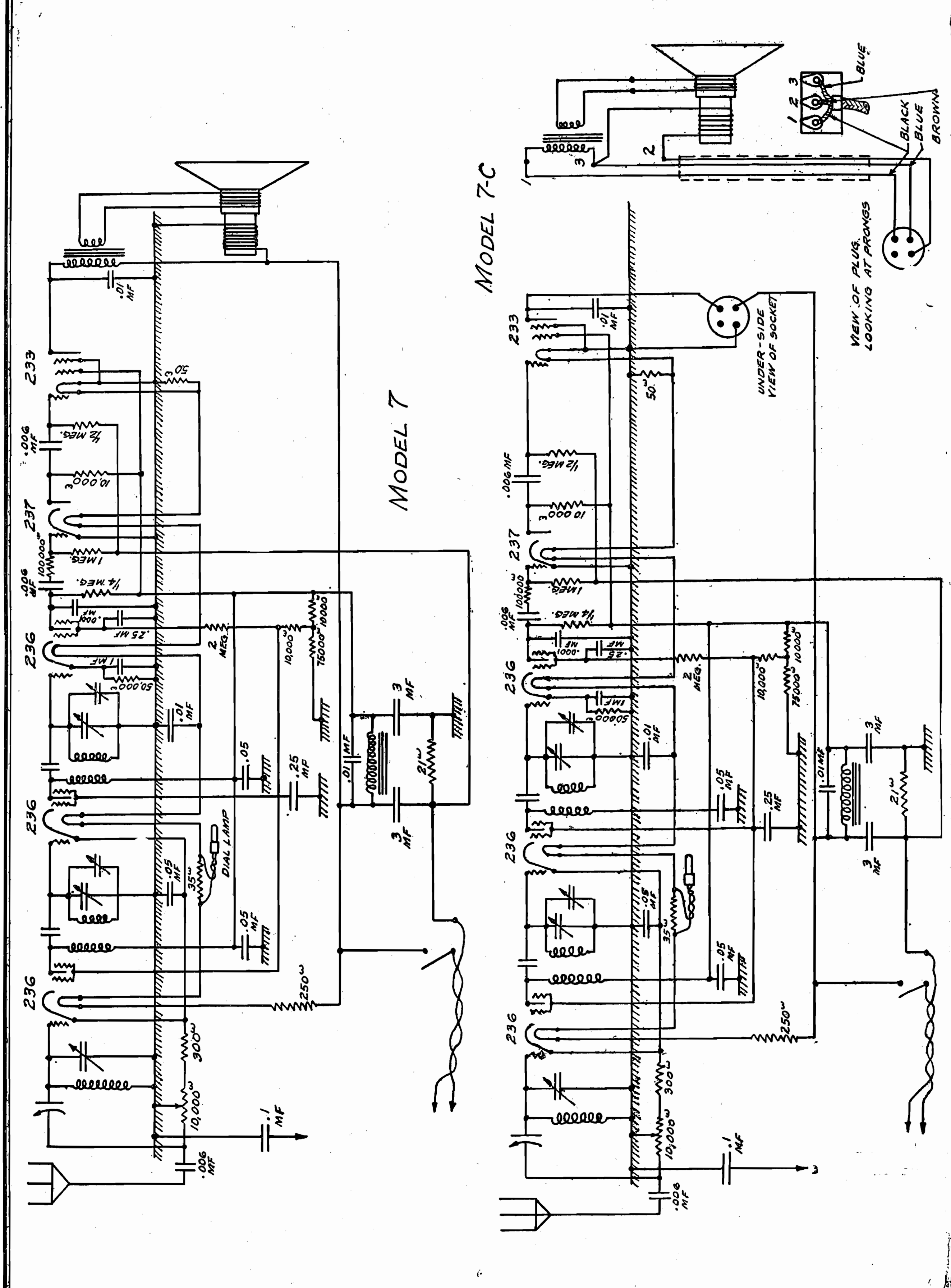
4. Nomenclature:

1. Magnet
2. Armature
3. Magmotor frame
4. End plates
5. Rubber cushions
6. Ball bearings
7. Ball bearing set screws
8. Felt plug

C1. Condenser
B1. Brush holder
B2. Brush holder
B3. Brush holder
B4. Brush holder

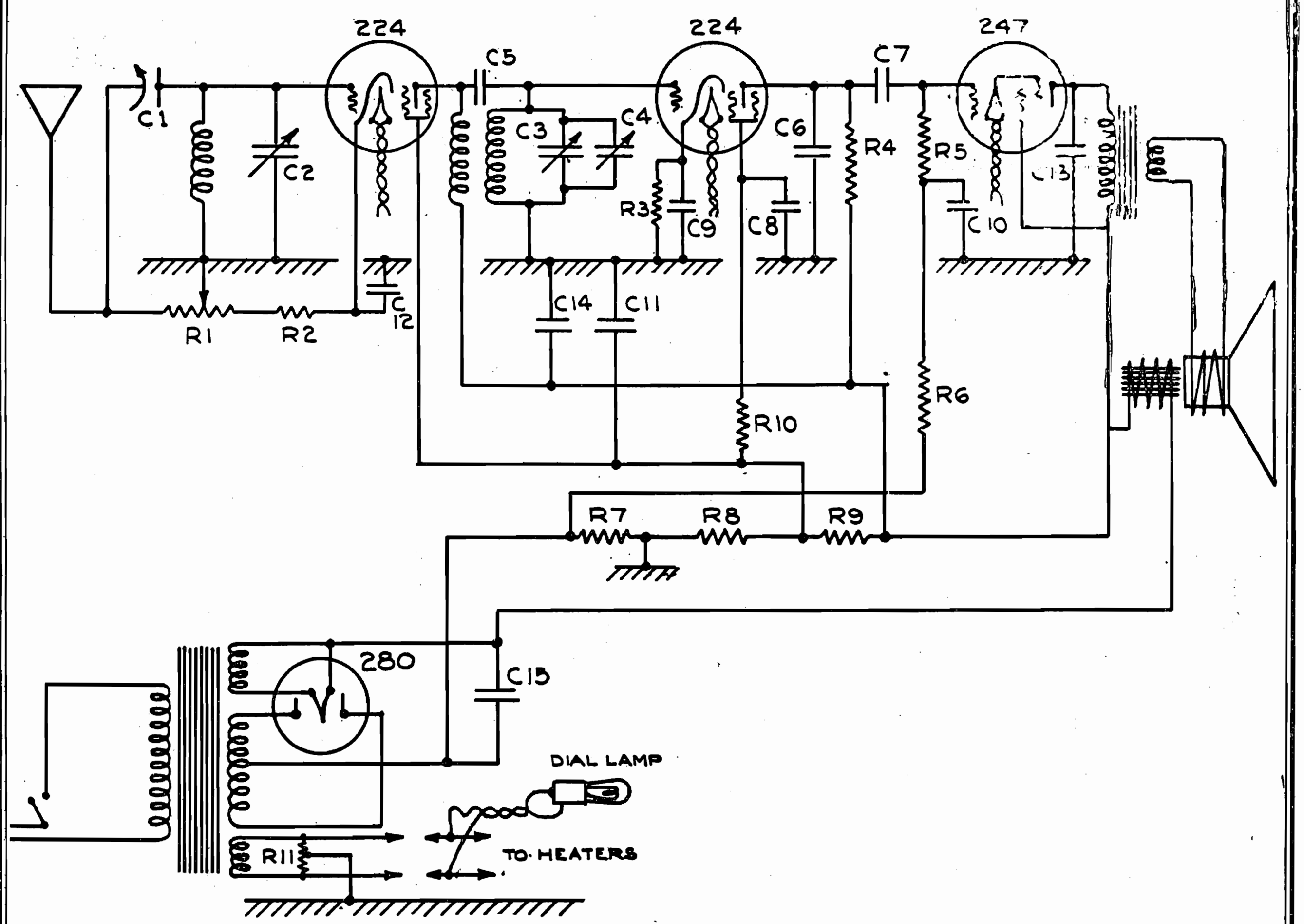
MODEL 7
MODEL 7-C

UNITED AMERICAN BOSCH



MODEL 4 (Essex)
Schematic
Voltage

UNITED AMERICAN BOSCH CORP.



Schematic Wiring Diagram - Model 4 Receiver

R1 - Volume Control
R2 - 600 ohms
R3 - 50,000 ohms
R4 - 1 megohm
R5 - 1/2 megohm
R6 - 100,000 ohms
R7 - 400)
R8 - 11,500)ohms
R9 - 19,000)
R10 - 2 megohms
R11 - Center Tap
C1 - Antenna Trimmer
C2 - Condenser Gang

C3 - Condenser Gang
C4 - Condenser Gang
C5 - Coupling Capacity
C6 - .0001 mfd. mica
C7 - .005 3 ply)
C8 - .25 2 ply)
C9 - .25 2 ply)
C10 - .05 2 ply) By-pass unit
C11 - .05 2 ply)
C12 - .05 2 ply)
C13 - .01 3 ply)
C14 - 8 mfd.) Filter unit
C15 - 4 mfd.)

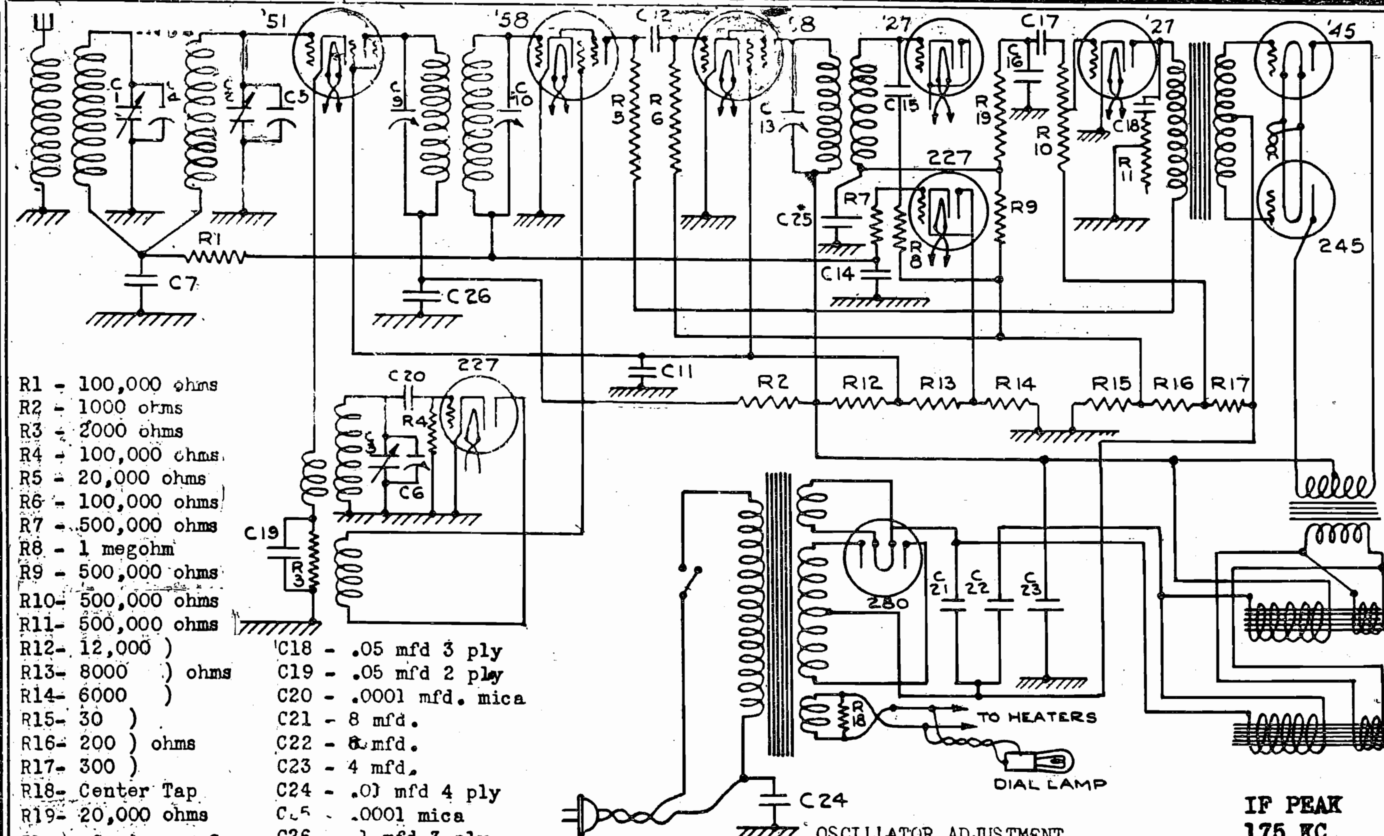
Socket Voltage Readings - Model 4 Receiver

	224 1st RF	224 Det.	247 Audio	280 Rect.
Filament	2.2	2.2	2.2	4.5
Plate	250	250	250	-
Screen	90	90	250	-
Bias	2.5	-	45	-

MODEL 10 (Essex)
Schematic
Voltage

UNITED AMERICAN BOSCH CORP.

	Osc. '27	1st Det. 551	1st IF 58	2nd IF 58	AVC 227	2nd Det. 227	AF 227	AF '45	Rect. 280
Fil	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	4.5
Plate	85	228	105	232	36	-	225	225	-
Screen	-	85	85	85	-	-	-	-	-
Bias	7	2.6	2.6	-	-	-	19	45	-



IF PEAK
175 KC

R1 - 100,000 ohms
R2 - 1000 ohms
R3 - 2000 ohms
R4 - 100,000 ohms
R5 - 20,000 ohms
R6 - 100,000 ohms
R7 - 500,000 ohms
R8 - 1 megohm
R9 - 500,000 ohms
R10 - 500,000 ohms
R11 - 500,000 ohms
R12 - 12,000)
R13 - 8000) ohms
R14 - 6000)
R15 - 30)
R16 - 200) ohms
R17 - 300)
R18 - Center Tap
R19 - 20,000 ohms
C1 - Condenser Gang
C2 - Condenser Gang
C3 - Condenser Gang
C4 - Condenser Gang
C5 - Condenser Gang
C6 - Condenser Gang
C7 - .04 mfd. 3 ply
C8 - .05 mfd. 3 ply
C9 - 7 to 70 mmf.
C10 - 7 to 70 mmf.
C11 - .5 mfd.
C12 - .0005 mfd.
C13 - 7 to 70 mmf.
C14 - .05 mfd. 2 ply
C15 - .0001 mfd mica
C16 - .0001 mfd mica
C17 - .05 mfd 2 ply
C18 - .05 mfd 3 ply
C19 - .05 mfd 2 ply
C20 - .0001 mfd. mica
C21 - 8 mfd.
C22 - 8 mfd.
C23 - 4 mfd.
C24 - .01 mfd 4 ply
C25 - .0001 mica
C26 - .1 mfd 3 ply

OSCILLATOR ADJUSTMENT

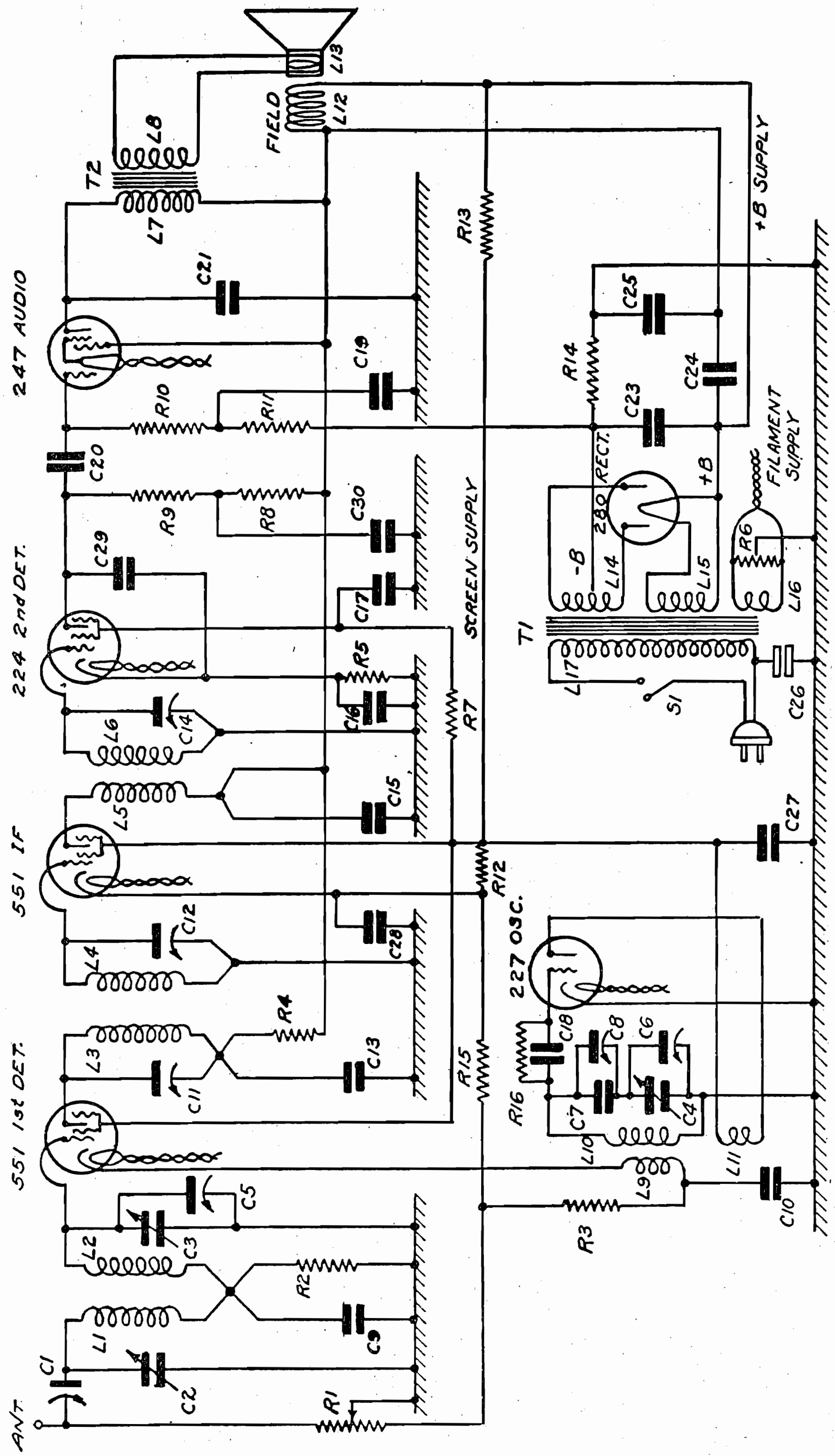
1. Adjust scale so that the indicator will be on the second line from the left, when the gang is entirely closed.
2. Connect ant. lead of the R. F. Oscillator to the grid of the 1st Detector.
3. Set the oscillator and set scale at 1400 Kilocycles.
   a) Peak the oscillator condenser on the second signal heard, when turning the condenser out. The osc. condenser is the front align. cond. on the variable condenser gang.
4. Connect ant. lead of the R. F. oscillator to the antennae lead of the set.
   a) Without touching the oscillator condenser, align the R. F. and ant. alignment condensers to the 1400 Kilocycle signal, until maximum sensitivity is obtained.
5. Check sensitivity at 1400 Kilocycles. Limit is 20 microvolts.
   Check sensitivity at 1000 Kilocycles. Limit is 20 microvolts.
   Check sensitivity at 550 Kilocycles. Limit is 20 microvolts.
6. If set lacks sensitivity at 600 or 550, the plates of the condenser gang should be adjusted until the set will reach the sensitivity limits.
7. If set does not track at 600, readjust plates of osc. section of gang condenser.

I. F. ADJUSTMENT

Connect five leads to speaker.
Set Volume Control at max.,
Tone Control on base, and ground antenna lead. Connect the 175KC osc. to the grid of the 2nd IF tube.
(a) Align the 2nd IF trans. for max. sensitivity. 20,000 u.v.
(a) Align the 1st and 2nd IF coils for max. sens. Limit: 500 u.v.

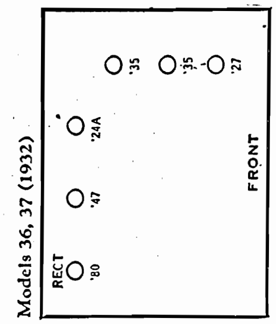
MODEL 36, 37 AC
Schematic
Transformer Data

UNITED AMERICAN BOSCH CORP.



—Schematic Wiring Diagram of Model 36 Receiver

IF PEAK 175 KC



Resistors are RMC Coded.

Power Transformer Leads

Primary- Stranded wires. Terminal strip side.

'24 and '27 Filaments:- Heavy wires. Terminal strip side.

'80 Filament:- Small wires. Opposite side.

'80 Plates:- Stranded wires. Opposite sides.

'80 Center tap.-Stranded wire nearest rear of set. Opposite side.

Line Voltage

The model 36 receiver is designed for use on 50 to 60 cycle alternating current, 105 to 120 volts. The model 37 is designed for 25 to 50 cycle, 105 to 120 volt alternating current.

MODEL 36, 37 AC
Alignment
Voltage
Electrical Values

UNITED AMERICAN BOSCH CORP.

Loud Speaker

The electro-dynamic speaker consists of four principal assemblies, diaphragm with moving coil and centering spring—frame—field magnet and pole—field coil.

The construction of the speaker is so simple that the method of replacing any part is self evident. The pole of the field magnet is centered exactly in the opening of the frame by four small steel dowel pins which accurately relocate these two parts after the speaker has been disassembled. It is essential that the air gap around the pole piece is exactly uniform. The moving coil must also be centered exactly in the air gap. If the diaphragm is replaced this adjustment is best made by placing four strips of thick paper or card in the space between the outside of the moving coil and the frame before tightening the screw holding the bronze diaphragm centering spring against the end of the pole piece.

A rattle in the speaker may be the result of a wire touching against the diaphragm, a loose part in the receiver, or the diaphragm incorrectly centered. In the latter case it must be centralized as described in the preceding paragraph.

Alignment Instructions:

The following instructions for the alignment of the condensers in the models 36 and 37 describe the operation as done with any type of special oscillator designed for the adjustment of superheterodyne receivers. Such an oscillator is essential for anyone who handles more than a small amount of service work. Such oscillators are designed to provide ordinary broadcast frequencies, and in addition, a 175 kilocycle for the alignment of the intermediate frequency (I. F.) stages.

There are seven alignment adjustments on the receiver. The location, together with the schematic diagram reference numbers, are given below.

Antenna Alignment (C1)—on rear of condenser gang.

Oscillator Shunt Condenser (C6)—on front stator of condenser gang.

Oscillator Series Condenser (C8)—on side of base, near front.

Preselector Alignment (C5)—on middle stator of condenser gang.

1st IF Alignment (Plate) (C14)—on side of base, lower rear.

1st IF Alignment (Grid) (C12)—on side of base, upper rear.

2nd IF Alignment (C14)—on coil can over speaker.

1—Connect 175 KC output of oscillator to grid terminal of 1st detector (unshielded type 551 tube) and set dial at 55. Align 2nd IF condenser C14.

2—With input and dial setting as above, align 1st IF condensers C11 and C12

3—With input and dial setting as above, recheck step No. 1.

4—With input on grid of 1st detector set dial at 140 and align oscillator shunt condenser C6. Align on the second peak out from maximum capacity of condenser

5—Connect input of oscillator to antenna. Align antenna trimmer C1 and preselector condenser alignment C5.

6—Set receiver at 60 and tune in oscillator input. Adjust oscillator series condenser C8 by "max-max" method (Move condenser gang slowly back and forth and at the same time adjust oscillator series condenser C8 for maximum response).

7—Set dial at 1400 and tune oscillator to set. Align oscillator shunt condenser C6, preselector condenser C5, and antenna trimmer.

IMPORTANT

The trimmer condenser mounted on the condenser gang must be adjusted for maximum volume.

No tubes should be removed from the set while it is in operation. To do so will damage the 247 tube.

NOMENCLATURE

R1—Volume Control—10,000 ohms
R2—Coupling Resistor—1000 ohms
R3—1st Det Cathode Resistor 5000 ohms
R4—1st. Det. Plate Resistor 1000 ohms
R5—2nd Det Cathode Resistor—25,000 ohms
R6—Mid Tap Resistor
R7—2nd Det. Screen Resistor— .5 megohms
R8—2nd Det Plate Resistor— .1 megohm
R9—2nd Det. Plate Desistor— .5 megohms
R10—Audio Grid Resistor—½ megohm
R11—Audio Grid Resistor—100,000 ohms
R12—Divider Resistor—20,000 ohms
R13—Screen Supply Resistor—30,000 ohms
R14—Audio Bias Resistor—350 ohms
R15—Cathode Resistor—300 ohms
R16—Oscillator Grid Resistor—100,000 ohms

C1—Antenna Trimmer
C2—Tuning Condenser
C3—Tuning Condenser
C4—Oscillator Tuning Condenser
C5—Alignment Condenser
C6—Oscillator Tuning Alignment
C7—Oscillator Tuning Condenser 1350 mmf.
C8—Oscillator Alignment
C9—RF Coupling Condenser .05 mfd.
C10—Cathode By-pass Condenser .05 mfd.
C11—I. F. Alignment Condenser
C12—I. F. Alignment Condenser
C13—1st Det. Plate By-pass 05 mfd.
C14—Alignment Condenser
C15—I. F. Plate By-pass .05 mfd
C16—2nd Det. Cathode By-pass 5 mfd.
C17—2nd Det. Screen By-pass .25 mfd.
C18—Oscillator Grid Condenser .0001 mfd.
C19—Audio De-coupling Condenser .05 mfd.
C20—Audio Coupling Condenser 01 mfd.
C21—Audio Plate Condenser .006 mfd
C23—Filter Condenser 8 mfd.
C24—Field Tuning Condenser .05 mfd
C25—Filter Condenser 4 mfd.
C26—Buffer Condenser .01 mfd.
C27—Screen By-pass Condenser 8. mfd.
C28—I. F. Cathode By-pass .02 mfd.
C29—2nd Det. Plate By-pass .0001 mfd.
C30—2nd Det. Plate By-pass .01 mfd.

T1—Power Transformer
T2—Output Transformer

L1—RF Coil
L2—RF Coil
L3—I.F. Coil (Primary)
L4—I.F. Coil (Secondary)
L5—I F. Coil (Primary)
L6—I.F. Coil (Secondary)
L7—Audio Transformer (Primary)
L8—Audio Transformer (Secondary)
L9—Oscillator Coupling Coil
L10—Oscillator Grid Coil
L11—Oscillator Plate Coil
L12—Speaker Field
L13—Speaker Voice Coil
L14—Filament Winding } Power Transformer
L15—Filament Winding } Power Transformer
L16—Plate Winding } Power Transformer

SOCKET VOLTAGES

Stage	Tube	Plate	Screen	Cathode	Grid	Fil.	Plate MA
1st Det.	551	250	80	35	8	2.2	2
Oscillator	227	75	..	*0	*0	2.2	8
I.F.	551	250	80	3	3	2.2	4
2nd Det.	224	60	*5	2	2	2.2	*.1
Audio	247	250	250	..	*3	2.2	32
Rectifier	280					4.8	29-29

Line voltage—115 volts

Volume control fully "on"

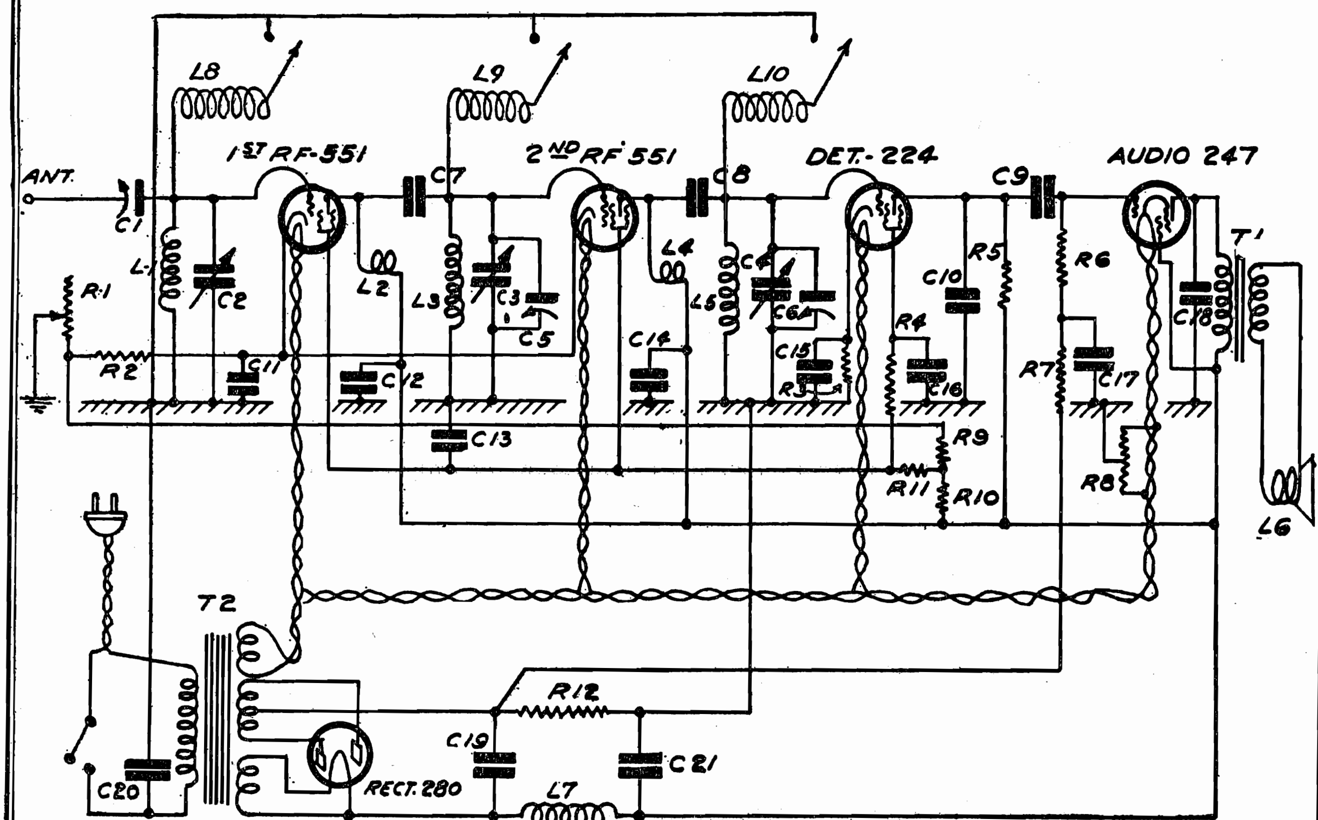
* These values will vary considerably with the type of test kit employed, due to the high resistance in the circuit

Filter Condenser

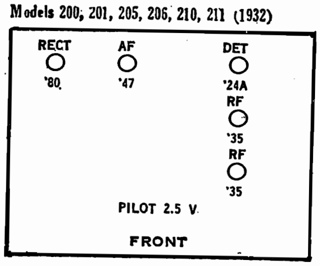
Black-To centre tap of '80 winding.
Green-To filament terminal of '80 tube.
Red-To plus B connection of terminal strip.

MODEL 200,201
Schematic
Parts List

UNITED AMERICAN BOSCH CORP.



Models 200, 201, 205, 206, 210, 211 (1932)



Schematic Diagram of Model 200 Receiver

ELECTRICAL VALUES

R1 - 10,000 ohms	R11 - 10,000 ohms	C9 - .006 mfd.	C19 - 8. mfd.
R2 - 200 ohms	R12 - 400 ohms	C10 - .0001 mfd.	C20 - .01 mfd.
R3 - 50,000 ohms	C1 - Trimmer	C11 - .05 mfd.	C21 - 4 mfd.
R4 - 2 megohms	C2 - Tuning	C12 - .05 mfd.	L1 - Ant. Coil
R5 - 1 megohm	C3 - Tuning	C13 - .25 mfd.	L2 - Primary
R6 - 500,000 ohms	C4 - Tuning	C14 - .01 mfd.	L3 - Secondary
R7 - 100,000 ohms	C5 - Alignment	C15 - 1. mfd.	L4 - Primary
R8 - Center Tap	C6 - Alignment	C16 - .25 mfd.	L5 - Secondary
R9 - 20,000 ohms	C7 - Coupling	C17 - .05 mfd.	L6 - Voice Coil
R10 - 15,000 ohms	C8 - Coupling	C18 - .01 mfd.	L7 - Field Coil

Note: Electrolytic filter condensers C19 and C21 are a single assembly. Condensers C11 to C18 inclusive are also a single assembly contained in the square can underneath the base plate.

MODEL 200,201
Voltage
Data

UNITED AMERICAN BOSCH CORP.

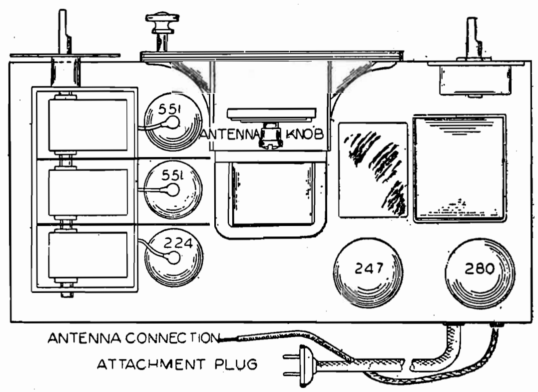
STAGE	TUBE	FIL.	PLATE	SCREEN	CATHODE	GRID	PLATE MA
1st RF	551	2.3	250	90	2.5	3.0	4.5
2nd RF	551	2.3	250	90	2.5	3.0	4.5
Det.	224	2.3	*150	*20	3.0	1.5	.5
Audio	247	2.3	250	250	-	*16	32
Rect.	280	4.8		Plate current of each plate			20

The readings were made with the volume control in the full "on" position.

*These voltages are the correct values altho the average test kit will probably give much lower readings (as low as 1/10 of these values) due to the high resistance included in the detector plate and screen circuits, and the audio grid circuit.

RESISTOR COLOR CODE

200 ohms ------- Red -----Black -- Brown
400 ohms ------- Yellow --Black -- Brown
10,000 ohms ---- Brown ---Black -- Orange
15,000 ohms ---- Brown ---Green -- Orange
20,000 ohms ---- Red -----Black -- Orange
50,000 ohms ---- Green ---Black -- Orange
100,000 ohms --- Brown ---Black -- Yellow
500,000 ohms --- Green ---Black -- Yellow
1 megohm ------- Brown -- Black -- Green
2 megohms ------ Red ---- Black -- Green



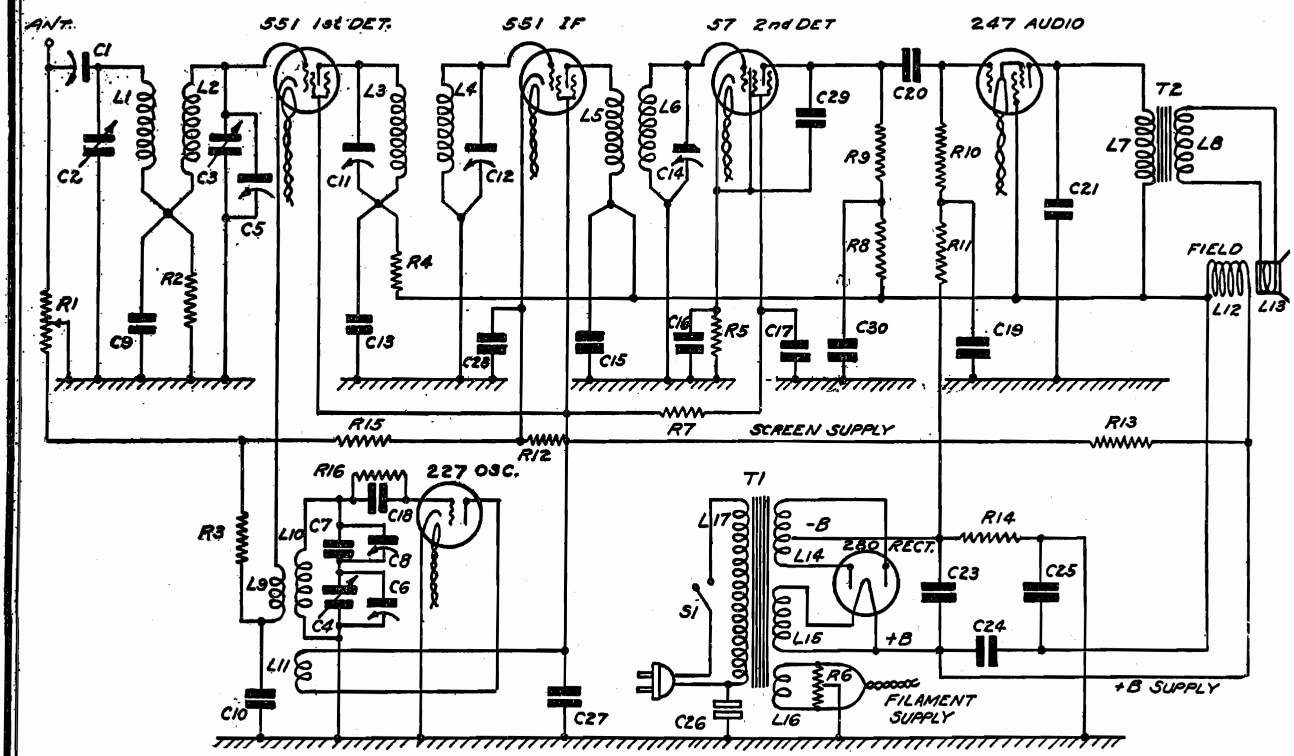
MAIN ASSEMBLIES
103491 Chassis(with tubes)
102280 Speaker
103876 Cabinet (Model "A")
103877 Cabinet (Model "B")
COILS
101858 Field Coil (speaker)
103494 R. F. Coil
103497 R. F. primary coil
103495 Antenna coil
CONDENSERS
102178 By-pass condenser
102022 Antenna trimmer
101143 Fixed (.0001 mfd.)
100705 Fixed (.006 mfd.)
101881 Large filter
103695 Condenser (.01 mfd.)
KNOBS
102445 Volume and tuning
103751 Knob for switch
100929 Trimmer knob

MISCELLANEOUS PARTS
101895 Dial and scale
102282 Diaphragm (speaker)
98713 Lamp for dial
RESISTORS
103706 Volume control
102314 Resistor (200 ohms)
102177 Resistor (400 ohms)
100825 Resistor (10,000 ohms)
101404 Resistor (15,000 ohms)
100813 Resistor (20,000 ohms)
100512 Resistor (50,000 ohms)
100727 Resistor (100,000 ohms)
100194 Resistor (1/2 megohm)

RESISTORS
100815 Resistor (1 megohm)
100196 Resistor (2 megohm)
99412 Resistor (mid tap)
SOCKETS
101890 Socket for dial light
103686 Tube socket (4 prong)
103514 Tube socket (5 prong)
SWITCHES
103703 Switch with nuts
103725 Switch (police)
TRANSFORMERS
102561 Out-put transformer
101939 Power transformer

MODEL 236,237
Schematic,Voltage

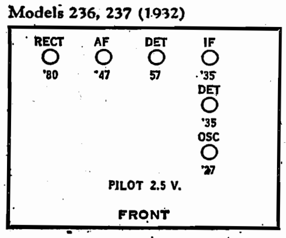
UNITED AMERICAN BOSCH CORP.



Schematic Diagram of Model 236 Receiver

IF PEAK 175 KC.

Models 236, 237 (1932)



RESISTORS

300 ohms	-	Orange, Black, Brown
350 ohms	-	Orange, Green, Brown
1,000 ohms	-	Brown, Black Red
5,000 ohms	-	Green, Black, Red
20,000 ohms	-	Red, Black, Orange
25,000 ohms	-	Red, Green, Orange
30,000 ohms	-	Orange, Black, Orange
.1 megohm	-	Brown, Black Yellow
.5 megohms	-	Green, Black, Yellow

ELECTRICAL VALUES

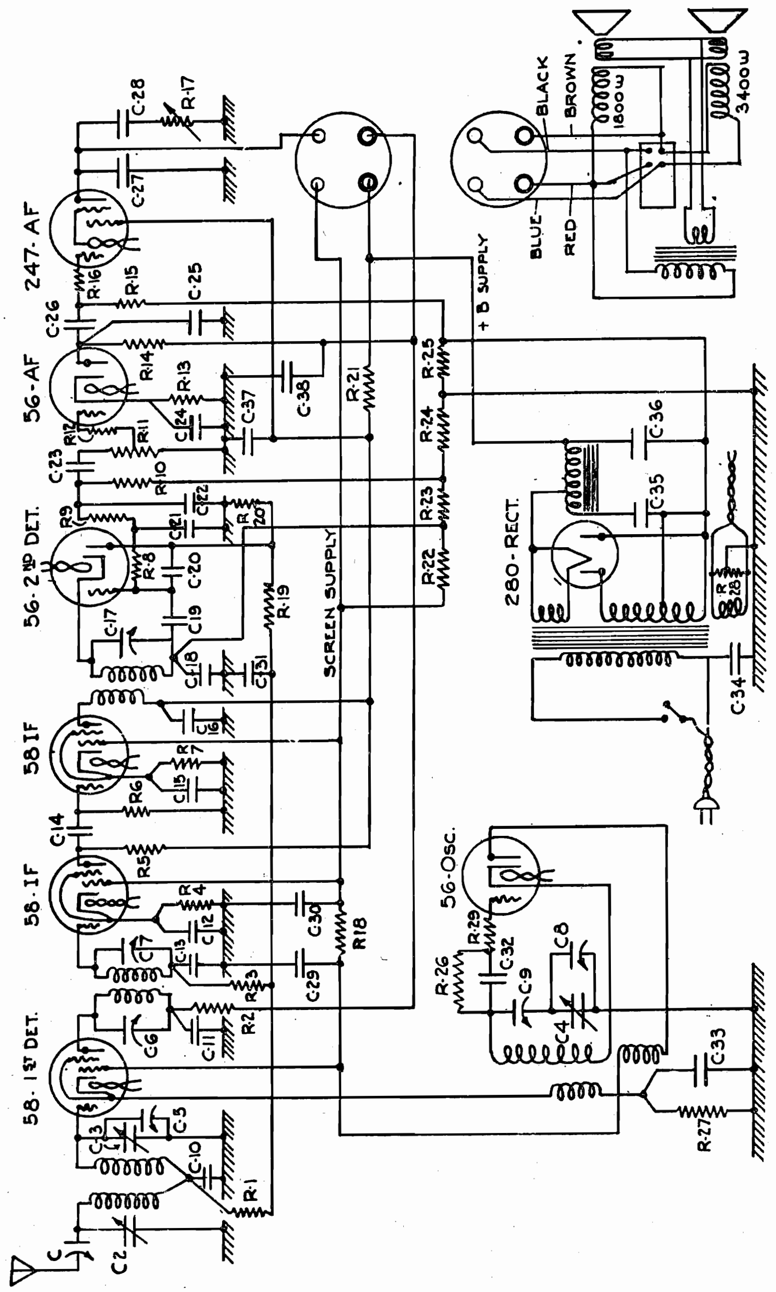
R1 - 10000 ohms	C1 - Trimmer	C17 - .25 mfd.
R2 - 1000 ohms	C2 - Tuning	C18 - .0001 mfd.
R3 - 5000 ohms	C3 - Tuning	C19 - .05 mfd.
R4 - 1000 ohms	C4 - Tuning	C20 - .01 mfd.
R5 - 25000 ohms	C5 - Alignment	C21 - .006 mfd.
R6 - Mid Tap	C6 - Alignment	C23 - 8. mfd.
R7 - .5 megohm	C7 - Alignment	C24 - .05 mfd.
R8 - .1 megohm	C8 - Alignment	C25 - 4. mfd.
R9 - .5 megohm	C9 - .05 mfd.	C26 - .01 mfd.
R10- .5 megohm	C10- .05 mfd.	C27 - 8. mfd
R11- .1 megohm	C11- Alignment	C28 - .02 mfd.
R12- 20000 ohms	C12- Alignment	C29 - .0001 mfd.
R13- 30000 ohms	C13- .05 mfd.	C30 - .01 mfd.
R14- 350 ohms	C14- Alignment	
R15- 300 ohms	C15- .05 mfd.	T1 - Power Trans.
R16- .1 megohm	C16- .5 mfd	T2 - Audio Trans.

STAGE	TUBE	PLATE	SCREEN	CATHODE	GRID	FIL.	PLATE MA
1st Det.	551	250	80	35	8	2.2	2
Osc.	227	75	--	* .1	* .1	2.2	8
I.F.	551	250	80	3	3	2.2	4
2nd Det.	57	60	*5	2	2	2.2	*.1
Audio	247	250	250	-	*3	2.2	32
Rect.	280					4.8	29

* These values will vary considerably with the type of test kit employed, due to the high resistance in the circuit.

MODEL 242,243
Schematic, Voltage

UNITED AMERICAN BOSCH CORP.

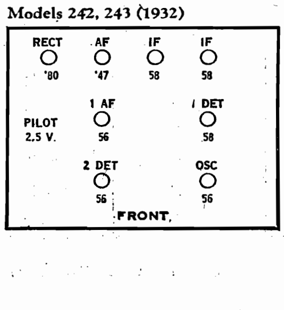


IF PEAK 175 KC

SCHEMATIC DIAGRAM OF MODEL 242 RECEIVER

C1 - Antenna Trimmer
C2 - Tuning
C3 - Tuning
C4 - Osc. Tuning
C5 - Alignment
C6 - IF Alignment
C7 - IF Alignment
C8 - Osc. Alignment
C9 - Osc. End Cond.
C10 - .05 mfd. 2 ply
C11 - .05 mfd. 2 ply
C12 - .05 mfd. 2 ply
C13 - .05 mfd. 2 ply
C14 - 1100 mmf.
C15 - .05 mfd. 2 ply
C16 - .05 mfd. 3 ply
C17 - IF Alignment
C18 - .05 mfd. 2 ply
C19 - .0001 mfd.
C20 - .05 mfd. 2 ply
C21 - .0001 mfd.
C22 - .0001 mfd.
C23 - .05 mfd. 2 ply
C24 - 25 mfd.
C25 - .01 mfd. 3 ply
C26 - 1100 mmf.
C27 - .002 mfd. 4 ply
C28 - .05 mfd. 3 ply
C29 - .05 mfd. 2 ply
C30 - .05 mfd. 2 ply
C31 - .05 mfd. 2 ply
C32 - .0001 mfd.
C33 - .05 mfd. 2 ply
C34 - .01 mfd. 4 ply
C35 - 4 mfd. (60
C35 - 8 mfd. (25
C36 - 8 mfd.
C37 - 4 mfd.
R1 - 10,000 ohms
R2 - 1000 ohms
R3 - 10,000 ohms
R4 - 600 ohms
R5 - 25,000 ohms
R6 - 100,000 ohms
R7 - 600 ohms
R8 - 15,000 ohms
R9 - 15,000 ohms
R10 - 500,000 ohms
R11 - 500,000 ohms
R12 - 100,000 ohms
R13 - 5000 ohms
R14 - 75,000 ohms
R15 - 500,000 ohms
R16 - 100,000 ohms
R17 - 500,000 ohms
R18 - 1000 ohms
R19 - 500,000 ohms
R20 - 1 megohm
R21 - 1500 ohms
R22 - 2500
R23 - 150
R24 - 1400
R25 - 250
R26 - 100,000 ohms
R27 - 5000 ohms

Models 242, 243 (1932)

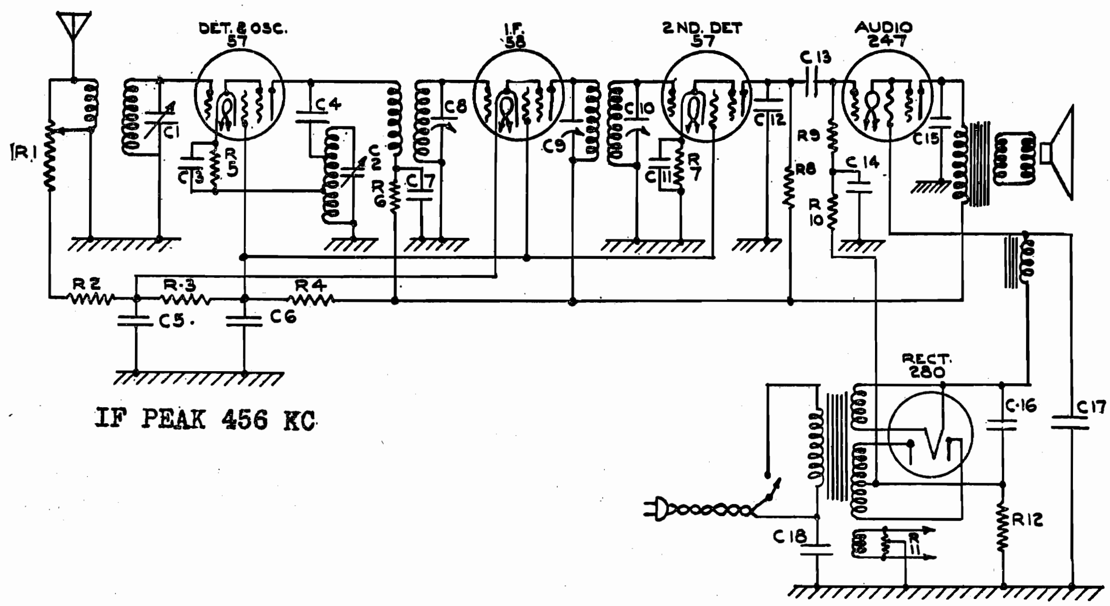


Stage	Tube	Fil.	Plate	Screen	Cathode
1st Det.	58	2.4	200	90	7 - 10
1st IF	58	2.4	115	95	4
2nd IF	58	2.4	115	95	3.4
2nd Det.	56	2.4	0	-	38
Osc.	56	2.4	95	-	2 - 4
Output	247	2.4	260	265	20
Rect.	280	4.8	-	-	-

Note: These values are readings of a high resistance voltmeter to ground, with the exception of filament voltages; Cathode voltages are given instead of grid voltages, inasmuch as the grid is at ground potential.

UNITED AMERICAN BOSCH CORP.

MODEL 305-A
Schematic
Resistor Color Code



SCHEMATIC WIRING DIAGRAM - MODEL 305A

Electrical Values

C-1)	Vari.cond.	C-11	.5 - 2 ply	R3	25,000 ohms
C-2)		C-12	.0004 mica	R4	30,000 ohms
C-3	.002 mica	C-13	.005 - 3 ply	R5	7,500 ohms
C-4	70 to 140 mmf.	C-14	.05 - 2 ply	R6	2,000 ohms
C-5	.05 - 2 ply	C-15	.005 - 3 ply	R7	25,000 ohms
C-6	.25- 2 ply	C-16	8 mfd.	R8	500,000 ohms
C-7	.01 - 3 ply	C-17	4 mfd.	R9	500,000 ohms
C-8	70 to 140 mmf.	C-18	.01 4 ply	R10	100,000 ohms
C-9	7 - 80 mmf.	R1	volume control	R11	5 ohms (mid tap)
C-10	7-80 mmf.	R2	300 ohms	R12	400 ohms

RESISTOR COLOR CODE

300 ohms	orange	black	brown
400 ohms	yellow	black	brown
2000 ohms	red	black	red
7500 ohms	violet	green	red
25,000ohms	red	green	orange
30,000 ohms	orange	black	orange
100,000 ohms	brown	black	yellow
500,000 ohms	green	black	yellow

MODEL 305-A
Voltage
Adjustments

UNITED AMERICAN BOSCH CORP.

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
Detc. & Osc.	57	2.47	245	95	7	0
2nd Det.	57	2.48	48	95	5	0
I. F.	58	2.47	248	95	3.3	0
Output	47	2.5	235	248	0	17
Rect.	80	5	360	-	-	-

Note: These values are readings of a high resistance voltmeter from each socket terminal to ground. The filament voltages are, of course, an exception. Cathode readings are given for those tubes having the grid at ground. The values are only approximate and will vary with the line voltage and the type of meter employed.

ALIGNING INSTRUCTIONS --- MODEL 305-A

I. F. ADJUSTMENT: 456 K. C.

1. Connect volume indicator to speaker.
2. Set volume control on max.
3. Connect generator to grid of 1st I. F. tube, and adjust both condensers on coil nearest the back of set to max. output.
4. Sensitivity should be 3200 m. v.
5. Connect signal generator to grid of 1st det.; adjust both condensers on forward coil to max. output.
   Sensitivity should be 30 m. v. with gang closed.
6. Check I. F. stability.

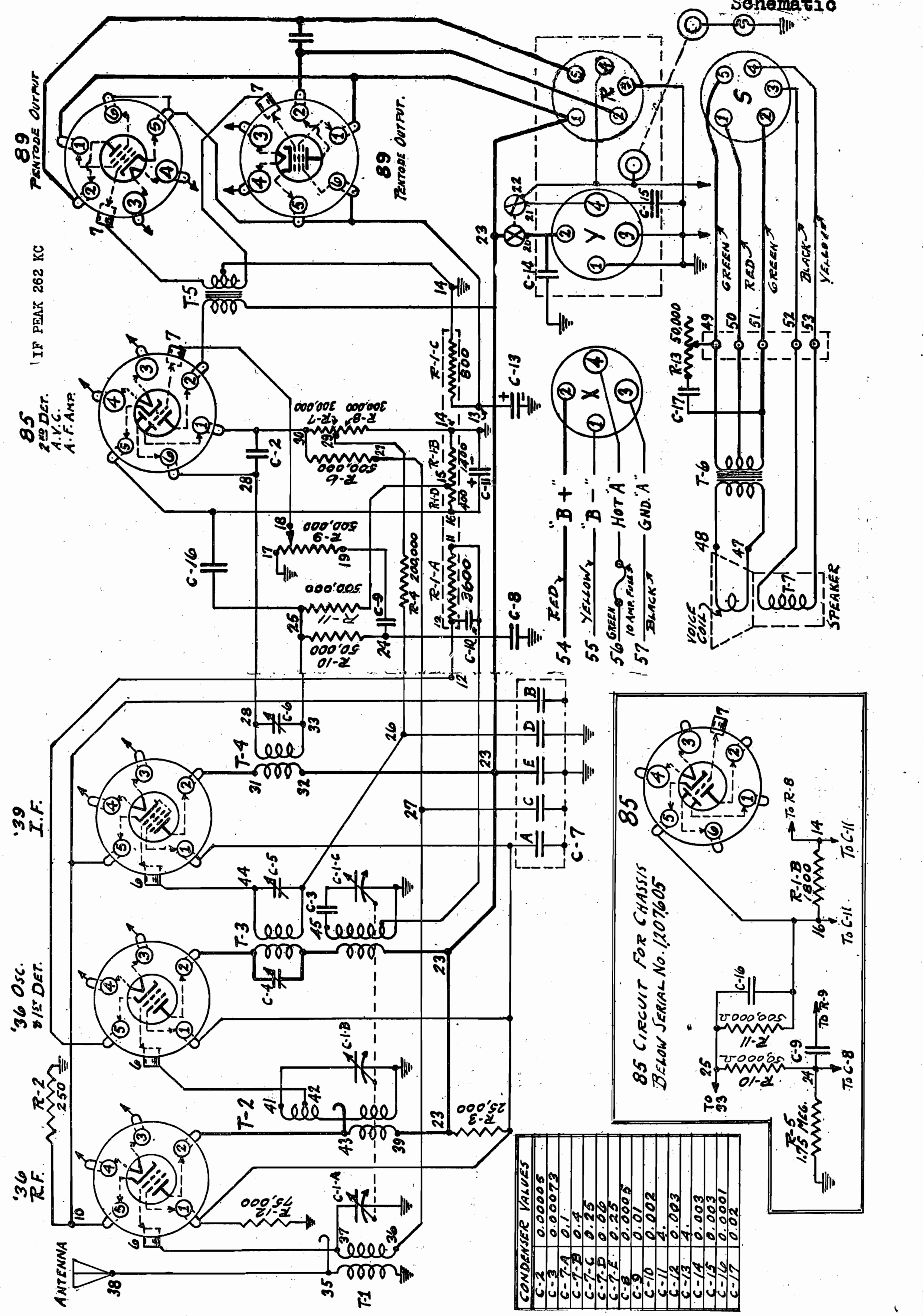
OSCILLATOR ADJUSTMENT

1. Connect R. F. signal generator to antenna lead.
2. Set scale to 100 with gang closed tight.
3. With generator set at 1400 K. C. and dial scale at 21, peak the oscillator trim condenser. This condenser is the back alignment condenser on gang.
4. Check sensitivity at 1400 K. C. Limits 5 m. v.
   Set dial 50 1000 K. C. Limits 10 m. v.
   Set dial 89 600 K. C. Limits 30 m. v.
   Set dial 800 K. C. Limits 20 m. v.

If it is necessary to improve sensitivity at 600 or 1000 K. C., adjust plates until the set reaches the sensitivity limits. If bending plates does not help, change tubes.

UNITED MOTORS SERVICE

MODEL 2035
Revised Circuit Schematic



CONDENSER VALUES	
C-2	0.00005
C-3	0.00073
C-7-A	0.1
C-7-B	0.4
C-7-C	0.25
C-7-D	0.06
C-7-E	0.25
C-8	0.0005
C-9	0.01
C-10	0.002
C-11	4.
C-12	0.003
C-13	4.
C-14	0.003
C-15	0.003
C-16	0.0001
C-17	0.02

MODEL 2035
Revised Circuit
Voltage Tests

UNITED MOTORS SERVICE

LOCATING TROUBLES ISOLATED BY VOLTAGE TESTS

(By Means of Resistance Measurements)

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
A. No. Filament (A) Voltage at any Socket	1. Hot "A" Lead	X4	Zero	Fuse, or Green
	2. Ground	Y4	*Zero	Lead of "A" Cable Switch or Wiring
B. No. Plate (B) Voltage at any Socket	1. 54	X2	*Zero	"B" Cable
	2. 23	Y2	*Zero	Switch ("B" Sec.)
	3. Ground	Y2	100,000	C-14 Condenser
	4. Ground	23	100,000	C-7-E Condenser
C. "89" Sockets				
a. Plate Voltage	1. R2	R5	Open	C-12 Condenser
	2. S2	S5	900	T6 Transformer
	3. S2	S1	450	T6 Transformer
b. Screen Voltage	1. R1	A1	Zero	Wiring
	2. R1	B1	Zero	Wiring
c. Cathode Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
d. Supressor Grid Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
D. 85 Socket				
a. Plate Voltage	85 Det. #2	23	2600	T5 Transformer
b. A.V.C. Plate or Det. Plate Voltage	1. 85 Det. #6	25	5	T4 Transformer
	2. 24	25	50,000	R10 Resistor
	3. 85 Det. #5	25	500,000	R11 Resistor or C-16 Condenser
	4. 85 Det. #1	29	300,000	R-7 (Encl. in T4)
	5. 29	14	300,000	R-8 Resistor
	6. 15	16	400	R-1-D Resistor
	7. 15	14	1,400	R-1-B Resistor
	**8. 14	16	1,800	R-1-B Resistor
	9. 85 Det. #1	28	1,100,000	C-2 Condenser
	10. Ground	26	500,000	C-7-D Condenser
	11. 24	19	Open	C-9 Condenser
	12. 24	GND	551,000	C-8 Condenser

* Switch--on
** Disconnect C-11 Electrolytic Condenser and Test separately

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
F. 39 I. F. Socket				
a. Plate Volts	I.F. #2	23	5	T-4 Transformer
b. Screen Volts	1. I.F. #1	23	25,000	R-3 or C-7-A
	2. I.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	I.F. #5	GRD	250	R-2 or C-7-B
F. Osc. & 1st. Det.				
a. Plate Volts	Osc. #2	23	5	T-3 Coil
b. Screen Volts	1. Osc. #1	23	25,000	R-3 or C-7-A
	2. Osc. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	Osc. #5	11	*3,600	R-1-A or C-10
G. 236 R. F. Socket				
a. Plate Volts	R.F. #2	23	5	T-2 Coil
b. Screen Volts	1. R.F. #1	23	25,000	R-3 or C-7-A
	2. R.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	R.F. #5	GRD	250	R-2 or C-7-B
H. Speaker				
a. Weak	S3	S4	6	T-7 Speaker Field
b. Distorted	1. S1	S5	900	T-6, C-17 or R-13
	2. 46	49	50,000	R-13 Resistor

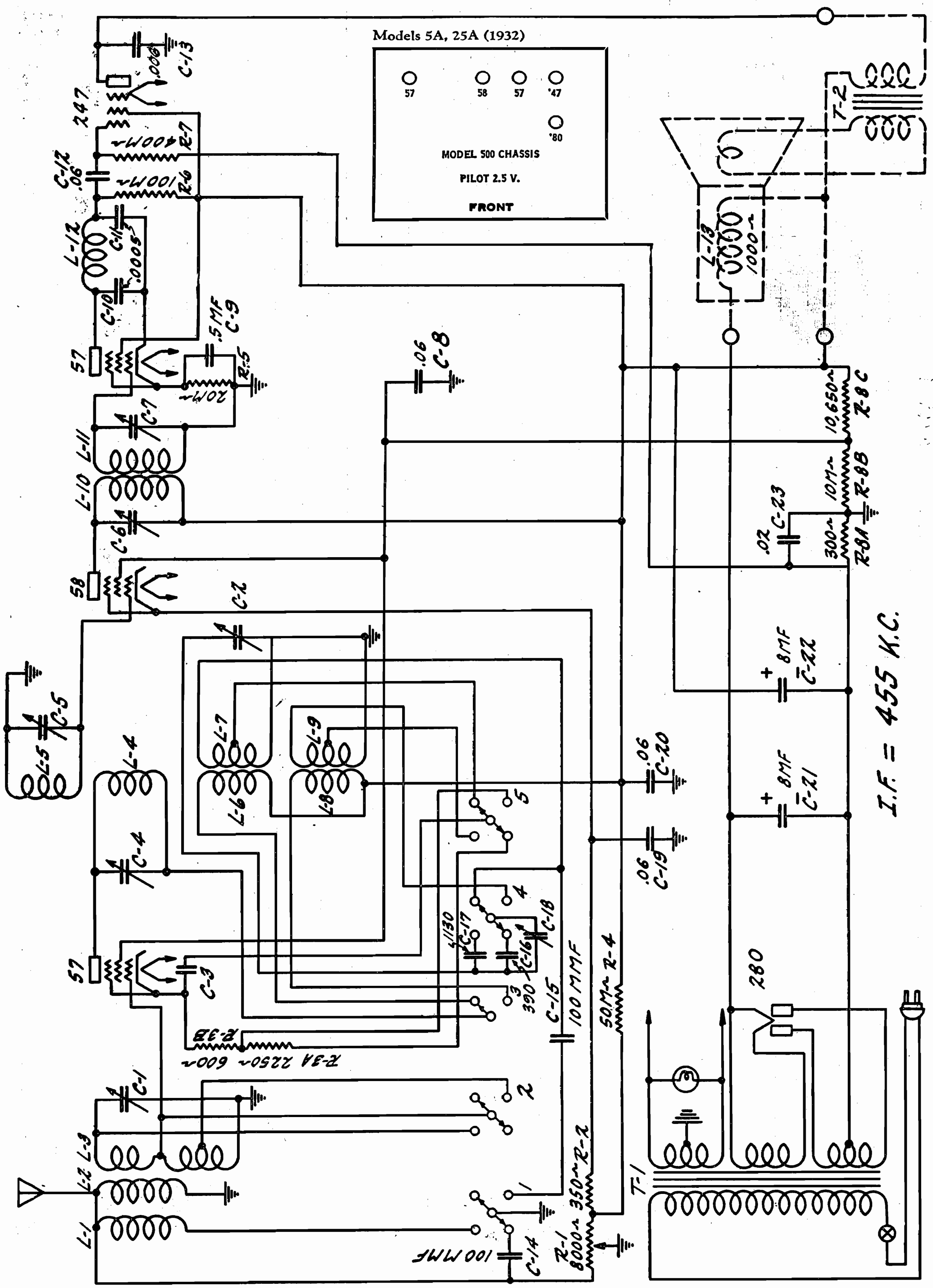
NOTE: It will be necessary to disconnect one lead of C-2, C-7 (All Sections), C-10, C-11, C-14, C-16, C-17 Condensers in order to test them accurately.

Refer to "Testing Electrolytic Filter Condensers" for details on testing C-11 and C-13 condensers.

* R-1-A Resistor originally measured 4200 ohms. This was changed to 3150 ohms at Serial No. 1207605, to 4000 ohms at Serial No. 1207761 and finally to 3600 ohms at Serial No. 1222409.

MODEL 5-A
Schematic

U. S. RADIO & TELEVISION CORP.



MODEL 5-A
Resistance Data
Voltage

U. S. RADIO & TELEVISION CORP.

Volume Control at Maximum—Switch in Broadcast Position

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna Post	21	8000 0	Open L-2 Shorted C-14
1st Detector Control Grid	5	1.2 Open	Shorted C-1 or Trimmer Open L-3
1st Detector Cathode	2,850	Open .4	Open R-3 Shorted C-3
1st Detector Screen Grid	8,600	0 10,000	Shorted C-8 Open R-8C
1st Detector Plate	14,400	18.5 50,000	Shorted C-20 Open R-8B or R-8C
I. F. Control Grid	28	Open 0	Open L-4 Shorted C-5
I. F. Cathode	350	Open 0	Open R-2 Shorted C-19
I. F. Plate	14,000	20 50,000 Open	Shorted C-20 Open R-8B or R-8C Open R-4 or L-10
2nd Detector Control Grid	20	0 Open	Shorted C-7 Open L-11
2nd Detector Cathode	20,000	0 Open	Shorted C-9 Open R-5
2nd Detector Screen Grid	14,000	Open 0 300 1,300	Open R-4 or R-8 Shorted C-20 Shorted C-22 Shorted C-21
2nd Detector Plate	114,000	Open 150,000 120,650 20,000	Open R-6 Open R-8 Open R-4 Shorted C-10 or C-11
Audio Control Grid	400,300	Open	Open R-7 or R-8A
Audio Screen Grid	14,200	20,650 0 50,000	Open R-4 Shorted C-20 Open R-8B or R-8C
Audio Plate	14,900	0 50,000 Open	Shorted C-13 Open R-8B or R-8C Open Pri. T-2
Rectifier Either Plate	600	300 Open	Shorted C-23 Open Secondary T-2 or Open R-8A
Rectifier Either Filament	15,000	Open 300 1,300	Open L-13 or R-8 Shorted C-21 Shorted C-22

NO. 502 CHASSIS—VOLTAGES AT SOCKETS
LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Grid Volts	Screen Grid Current M A	Cathode Volts	Plate M A	Grid Test M A
57	1	1st Det. & Osc.	2.15	245	4.3-5.9(1)	100	.6	4.3-5-9(1)	.95	2.0
58	2	I. F.	2.15	240	3.0	100	1.5	3.0	6.6	10.4
57	3	2nd Det.	2.15	166	9.0	235	.1	9.0	.35	.45
247	4	Audio	2.15	215	17.0(2)	240	8.0		30.	48.
280	5	Rect.	4.6						30. Per Plate	

(1) Varies with frequency setting of dial approximately as shown.
(2) Measured across 300 ohm section of voltage divider resistor.

REFERENCE POINT—B (AUDIO SCREEN CONTACT)

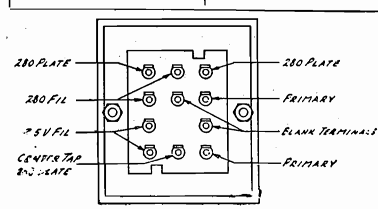
Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector Screen Grid	10,650	Open	Open R-8C
1st Detector Plate	18.5	2 Open	Shorted C-4 Open L-4 or L-6
I. F. Plate	20	Open 0	Open L-10 Shorted C-6
2nd Detector Screen Grid	0	Open	Open Connection
2nd Detector Plate	100,070	Open	Open R-6 or L-12
Audio Plate	700	Open	Open Pri. T-2
Rectifier Plate	14,800	Open	Open R-8 or Sec. T-1
Rectifier Filament	1,000	Open	Open L-13

MISCELLANEOUS

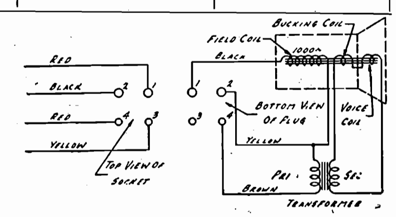
Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
2nd Detector Plate to Audio Grid	Open	70	Shorted C-12
2nd Detector Plate to 2nd Detector Cathode	170,000	0 70	Shorted C-10 Shorted C-11
Rectifier Plate to Plate	600	Open	Open Secondary T-1
Rectifier Filament to Filament	Very Low	Open	Open Fil Winding T-1
Between Filament Contacts of Other Sockets	Very Low	Open	Open Heater Winding
Across A. C. Plug	9	Open	Open Pri. T-1
Across Secondary T-2 (Unsolder Voice Coil Lead)	.8	Open	Open Sec. T-2
Across Voice Coil	1.8	Open	Open Voice Coil
Across C-15	Open	0	Shorted C-15
Chassis to Common Connection C-16 and C-17	Open	0	Shorted C-2 or Trimmer
Stator C-2 to Cathode 1st Detector	Open	2,854	Shorted C-16 or C-18

BAND SELECTOR SWITCH IN SHORT WAVE POSITION

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Chassis to Antenna Binding Post	3.5	4 21	Open L-2 Open L-1
Chassis to Control Grid 1st Detector	1.6	0	Shorted C-1 or Trimmer
Chassis to Cathode 1st Detector	600	Open .3	Open R-3B or L-9 Shorted C-3
Audio Screen to 1st Detector Plate	18	Very Low Open	Shorted C-4 Open L-4 or L-8



Power Transformer Terminals

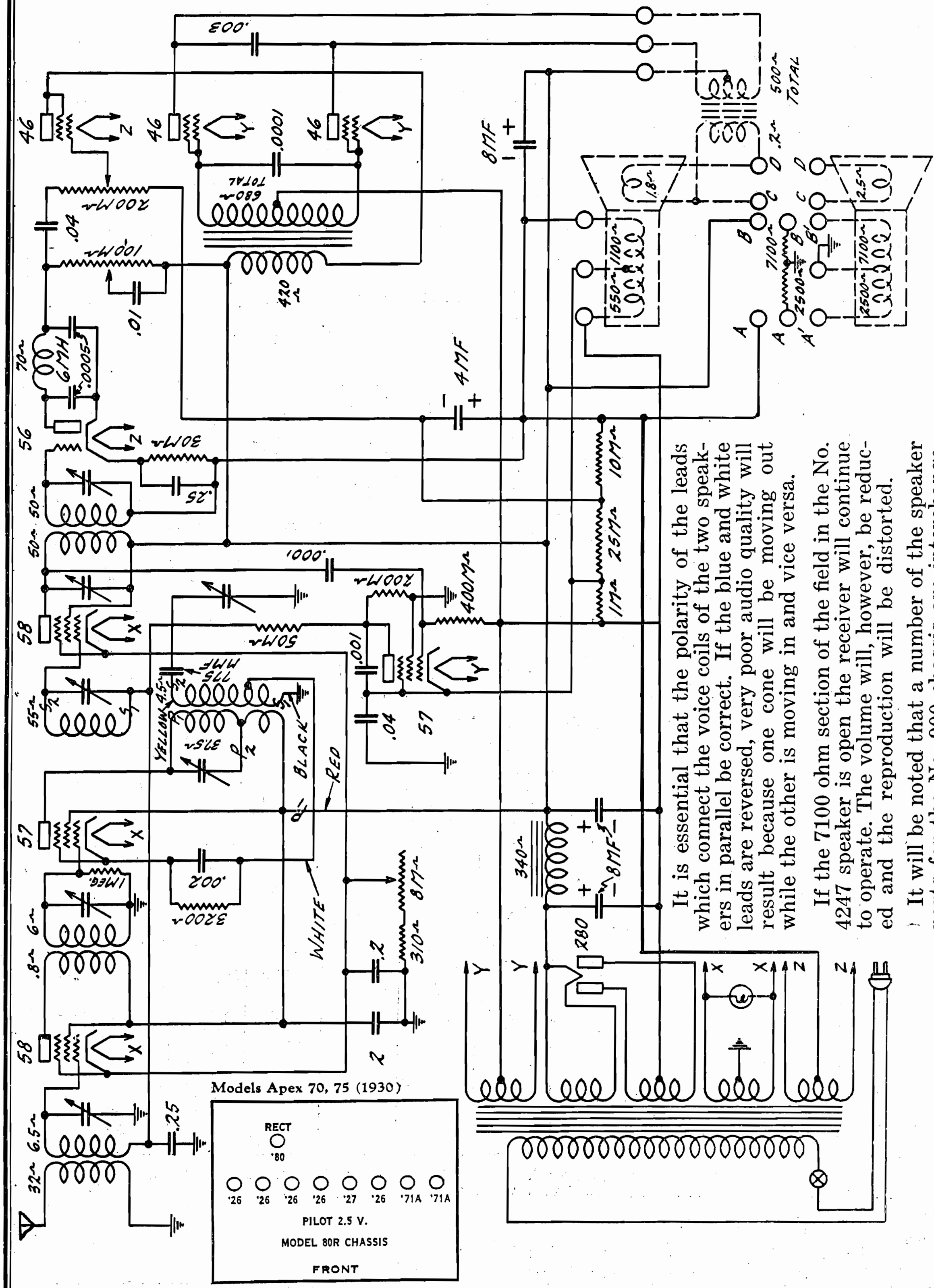


Electrodynamic Speaker and Connections.

U. S. RADIO & TELEVISION CORP.

MODEL 9 and 19
Class "B"
Chassis 900,902
Schematic

CONNECT A TO A AND B TO B FOR SINGLE SPEAKER.
CONNECT A' TO A, B' TO B, C TO C AND D TO D FOR DUAL SPEAKERS.



It is essential that the polarity of the leads which connect the voice coils of the two speakers in parallel be correct. If the blue and white leads are reversed, very poor audio quality will result because one cone will be moving out while the other is moving in and vice versa.

If the 7100 ohm section of the field in the No. 4247 speaker is open the receiver will continue to operate. The volume will, however, be reduced and the reproduction will be distorted.

It will be noted that a number of the speaker parts for the No. 900 chassis are interchangeable with parts used in the No. 4246 speaker with the No. 902 chassis. Therefore, it has not been thought necessary to make a repetition of these part numbers in the accompanying list of the changes in parts for the No. 902 chassis.

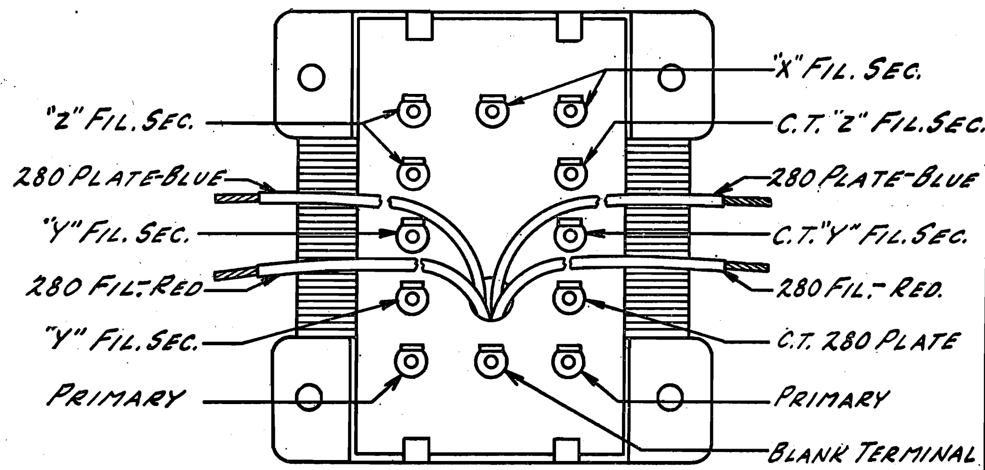
IF PEAK 262 KC

MODEL 9 and 19
Class "B"
Chassis 900,902
Voltage - Data

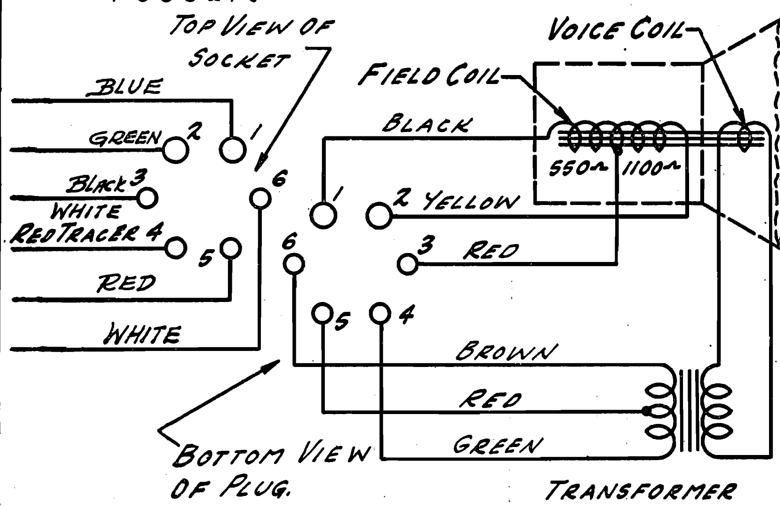
U. S. RADIO & TELEVISION CORP.

FLUTTERING OR MOTORBOATING

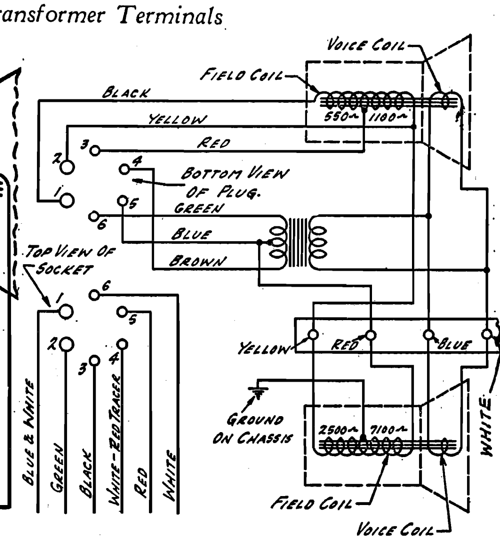
The tube shield and cover must be on, otherwise motorboating may result. Still other causes are open or defective grid circuits or open bypass condensers. Fluttering is very often due to I.F. oscillation and the causes for such a condition should be investigated in line with the information given in the section on "Oscillation."



Power Transformer Terminals



No. 4245 Electrodynamic Speaker and Connections



No. 4246 and 4247 Electrodynamic Speakers and Connections

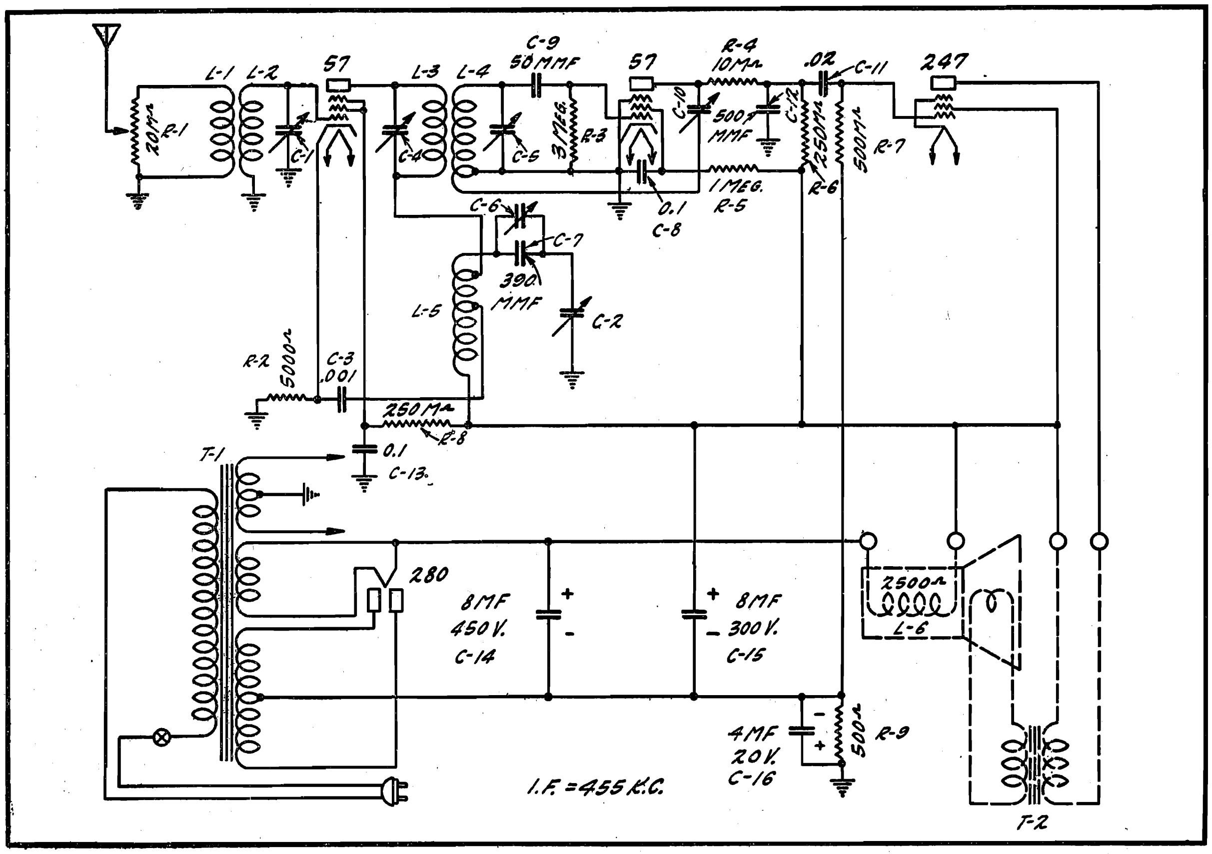
No. 900 and No. 902 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM—"Q" CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
58	1	R.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	2	1st Det	2.25	125	5.0(2)	125	.3(2)	5.0(2)	1.2(2)	2.0
58	3	I.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	4	AVC	2.25	100(3)	24.0(4)	145	0	24.0	0	0
56	5	2nd Det.	2.25	150	12.0			12.0	.4	.5
46	6	Driver	2.25	215	19.0(5)				25.0	30.0
46	7	Power	2.25	320					5.0(6)	13.0
46	8	Power	2.25	320					5.0(6)	13.0
280	9	• Rect.	4.8						41 Per Plate	

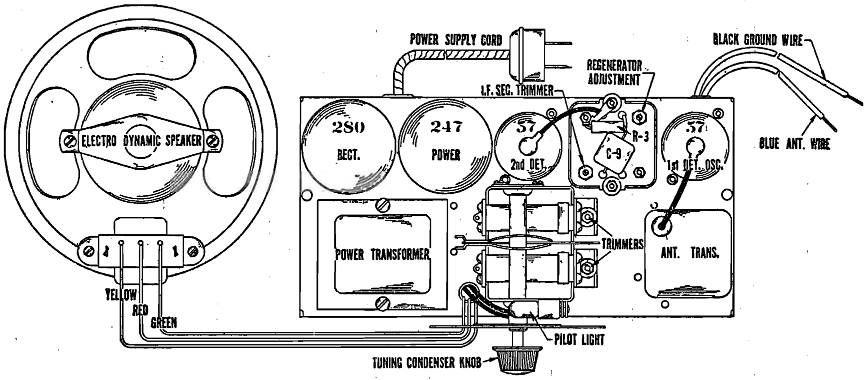
(1) Measured from movable arm of "Q" control to ground. Reads 26 volts with "Q" control at minimum.
(2) Values read with analyzer plug in socket. Actual values different as analyzer prevents oscillator from oscillating.
(3) Measured with 600,000 Ohm Meter.
(4) Measured across 1000 Ohm Resistor.
(5) Measured across 10,000 Ohm Carbon Voltage Divider Resistor.
(6) Plate current at no signal. At full output plate current is 60 to 70 MA.

MODEL 24
Chassis 400
Schematic
Voltage - Data

U. S. RADIO & TELEVISION CORP.



—*Schematic Circuit Diagram of No.* 400 *Chassis*



—*Top View of Chassis Showing Tube Location and Speaker Connections*

No. 400 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Cathode Volts*	*Plate Current MA*
57	1	1st Det. & Osc.	2.4	235	8	120	—(1)	8	—(1)
57	2	2nd Det.	2.3	45(2)	0	20(2)	.2	0	.7
247	3	Audio	2.3	235	1.0(3)	245	5.2		26
280	4	Rect.	4.8						16 Per Plate

(1) Can only be read with special adapter.
(2) Voltage as read with 600,000 ohm meter.
(3) Not true reading. Actual voltage across 500 ohm resistor—17 volts.

MODEL 24
Chassis 400
Resistance Data

U. S. RADIO & TELEVISION CORP.

CONTINUITY TEST CHART

NO. 400 CHASSIS

Remove all tubes and disconnect power cord. Disconnect antenna and ground and turn Volume Control to maximum. Read from Reference Points to each Measurement Point until defect is isolated.

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna (Vol. Control Maximum)	3	20,000	Open L-1
1st Detector Control Grid	4	0 Open	Shorted C-1 or Trimmer Open L-2
1st Detector Cathode	5000	Open	Open R-2
1st Detector Screen Grid	Open	255,000 0 253,000 250,500	Shorted C-3 Shorted C-13 Shorted C-14 Shorted C-15
1st Detector Plate	Open	5031 3034 534	Shorted C-3 Shorted C-14 Shorted C-15
2nd Detector Control Grid	3,000,000	31 Open	Shorted C-9 Open R-3
2nd Detector Cathode	0	Open	Open Connection
2nd Detector Screen Grid	Open	0	Shorted C-8
2nd Detector Plate	Open	Very Low 10,000	Shorted C-10 Shorted C-12
Audio Grid	500,500	500,000 Open	Shorted C-16 Open R-7 or R-9
Audio Screen Grid	Open	3000 500	Shorted C-14 Shorted C-15
Audio Plate	Open	3520 1020	Shorted C-14 Shorted C-15
Rectifier Filament	Open	500 3000	Shorted C-14 Shorted C-15
Rectifier Plate	875	375 Open	Shorted C-16 Open Secondary or Power Trans.
Coil Side of C-9	31	0 Open	Shorted C-5 Open L-4
Negative Terminal of Filter Condenser	500	Open 0	Open R-9 Shorted C-16

CONTINUITY TEST CHART

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Stator C-2	Open	0	Shorted C-2 or Trimmer

REFERENCE POINT—+B (RED SPEAKER LEAD)

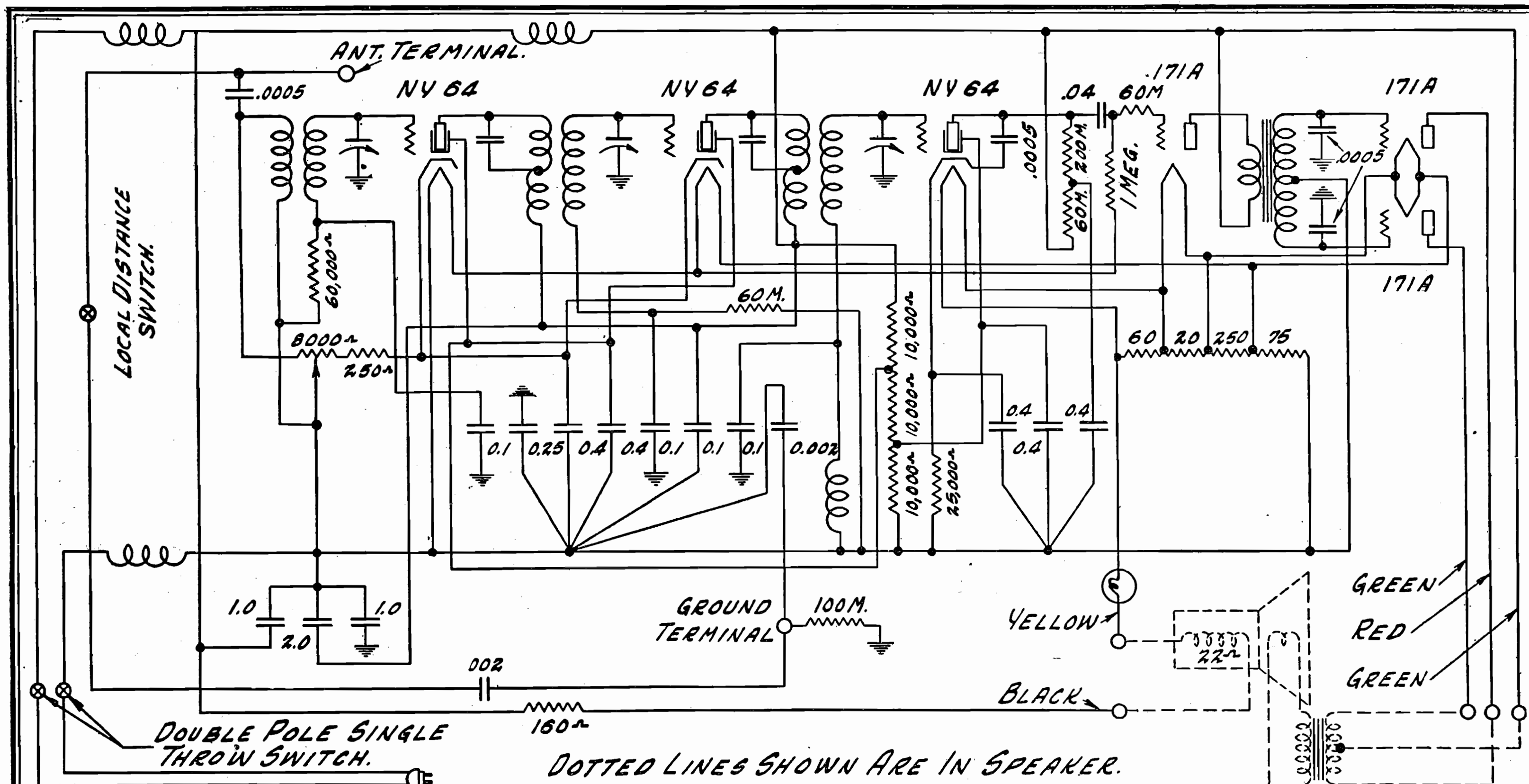
Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector Plate	34	Open 3	Open L-3 or L-5 Shorted C-4
1st Detector Screen Grid	250,000	Open	Open R-8
1st Detector Cathode	Open	1.5	Shorted C-8
2nd Detector Plate	260,000	Open	Open R-4 or R-6
2nd Detector Screen Grid	1,000,000	Open	Open R-5
Audio Plate	530	Open	Open Primary T-2
Rectifier Filament	2500	Open	Open Speaker Field

MISCELLANEOUS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Plate to Plate Rectifier	750	Open	Open High Voltage Secondary
Filament to Filament Rectifier	Very Low	Open	Open 280 Fil. Winding
Between Filament Contacts of Other Sockets	Very Low	Open	Open Heater Winding
Across AC Plug	17	Open	Open Primary Power Transformer
2nd Det. Plate to Audio Grid	Open	10,000	Shorted C-11
1st Det. Plate to Stator C-2	Open	31	Shorted C-6 or C-7
2nd Det. Plate to Insulated Terminal On Back Panel	10,000	Open	Open R-4
Across Secondary T-2 (Unsolder Voice Coil Lead)	.6	Open	Open Sec. T-2
Across Voice Coil (Unsolder Voice Coil Lead)	2.2	Open	Open Voice Coil
Across Volume Control (Unsolder Black Ground Lead)	20,000	Open	Open R-1

MODEL 33 DC Schematic Speaker

U. S. RADIO & TELEVISION CORP.



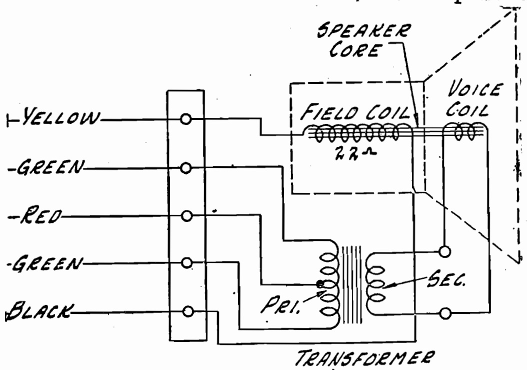
The field has a resistance of 22 ohms and there is a drop across it of 11 volts.

No. 33 Chassis.

DRWG. No 2663

NY64 TUBES

With the No. 33 chassis there is introduced a new tube, the NY64. This tube is of the screen grid heater type. The characteristics are the same as the type 224 tube except for the heater. The heater of the NY64 tube takes .4 amps. and is rated by the manufacturer at 6.3 volts. In the No. 33 chassis, however, it is operated satisfactorily at 6 volts. Since the heater operates the 6 volts this tube lends itself satisfactorily to the D.C. powered receiver in which the heater voltages are obtained by a series connection from the line.



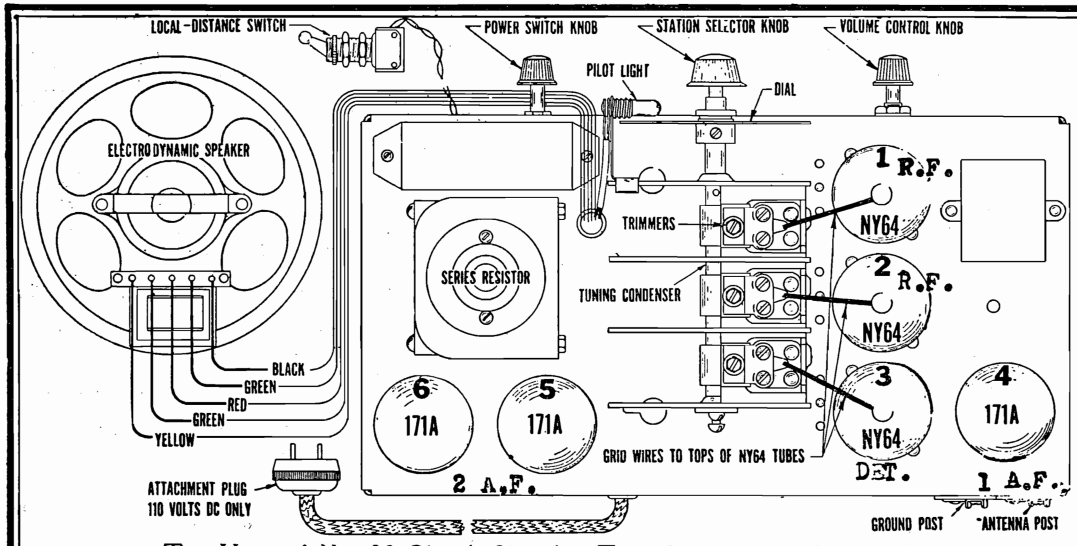
Electrodynamic Speaker and Connections.

Model 33 is a 6-tube Direct Current power line-operated screen grid receiver. It will operate satisfactorily on a D.C. line voltage of from 100 to 125 volts. At a line voltage of 118 the drain is approximately .56 Amps.

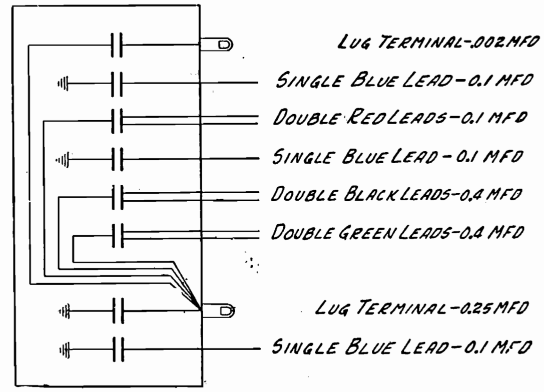
The chassis is similar in appearance and performance to the No. 26 chassis. Electrically, however, it is radically different.

MODEL 33 DC
Socket- Notes
Voltage

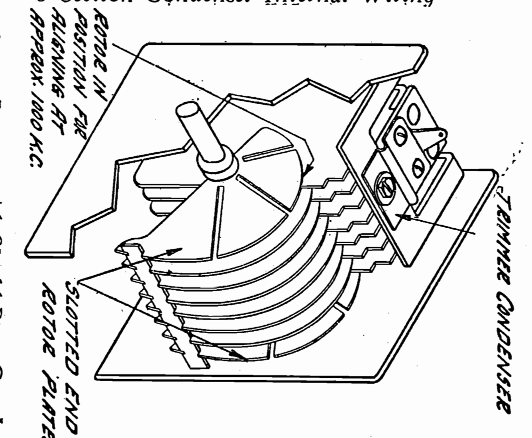
U. S. RADIO & TELEVISION CORP.



Top View of No. 33 Chassis Showing Tube Sequence and Speaker Connections



8 Section Condenser Internal Wiring



Condenser Section with Shield Plate Cut Away

No. 33 CHASSIS—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM LINE VOLTAGE, 118—PLUG IN SOCKET OF RECEIVER—TUBE IN TEST SET

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Plate MA	Grid Test MA
NY64	1	1st Radio	5.9	114	2.5 (1)	65	.6	3.2	4.5
NY64	2	2nd Radio	5.9	114	2.5 (1)	65	.6	3.2	4.5
NY64	3	Detector	5.9	60	5. (2)	30	.05	:2	.4
171A	4	1st Audio	5.0	90	11. (3)			20.	27.
171A	5	2nd Audio	5.0	96	12.			22.	29.
171A	6	2nd Audio	5.0	96	12.			22.	29.

(1) This voltage read from – line to R. F. Cathode.
(2) This voltage read from – line to detector cathode.
(3) This voltage read from center point of R.F. heaters to negative 1st audio filament leg.

CAUTION—Certain precautions should be observed when installing and servicing receivers using the No. 33 chassis. Never connect or disconnect the antenna or ground with the power on. Do not turn on the power switch unless all tubes are in the sockets. Do not use any other type of tubes than the ones specified with the receiver.

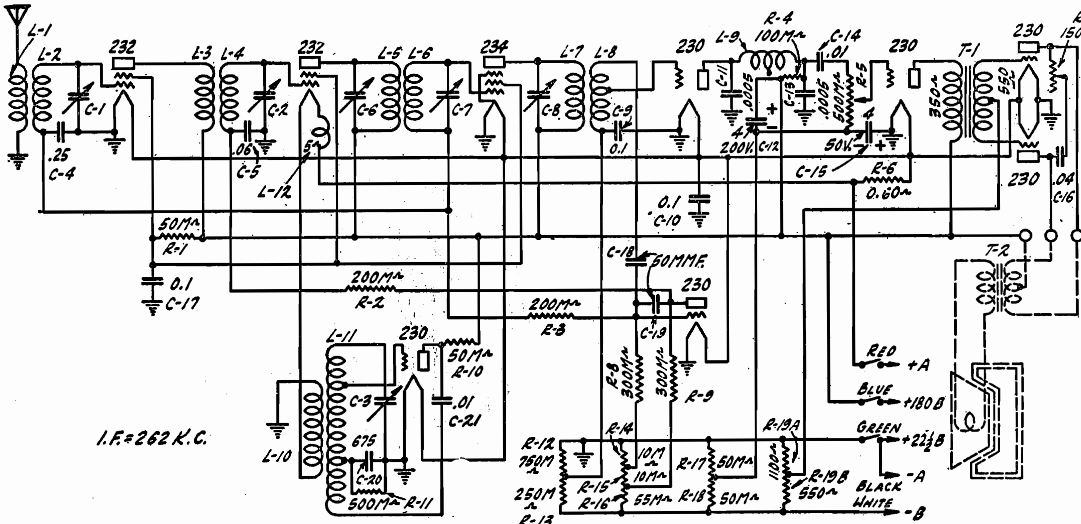
Before reading voltages disconnect the antenna and ground. It is advisable to have the tube shield on while the voltages are being read as there will be oscillation if the shield is off. To read the NY64 voltages pass the tester plug cable through the slot in the shield. The grid wire from the condenser stator is bent up and the clip on the wire from the set tester is attached to the grid cap.

Be sure that the grid cap or clip does not touch the tube shield or the condenser shield plate. Turn off switch when transferring tubes between chassis and analyzer.

The following table gives the tube voltages with all the 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. The voltages as shown are figured for a line voltage of 118. Differences in line voltage will also cause variation in voltages at socket. All voltage readings as shown are taken with a 1,000-ohm per volt meter of suitable range.

U. S. RADIO & TELEVISION CORP.

MODEL 69
Chassis 906
Voltage
Schematic
Alignment

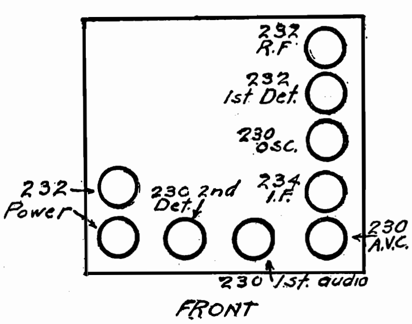


Schematic Circuit Diagram of No. 906 Chassis

No. 906 CHASSIS—VOLTAGES AT SOCKETS
AIR CELL "A" BATTERY—180 VOLTS "B" BATTERY

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Plate Current MA*
232	1	R. F.	2.0	152	.2 (1)	54 (2)	.5	1.4
232	2	1st Det.	2.0	150	3.0 (1)	54 (2)	.3	1.1
230	3	Osc.	2.0	63	4.0-5.0 (3)			1.8
234	4	I. F.	2.0	150	.2 (1)	54 (2)	1.2	2.1
230	5	AVC	2.0	3.5 (4)	1.8 (2)			0
230	6	1st Audio	2.0	150	2.0 (2)			4.1
230	7	2nd Det.	2.0	125 (5)	6.0 (2)			.1
230	8	Power	2.0	152	14.5			.9 (6)
230	9	Power	2.0	152	14.5			.9 (6)

(1) Voltage as read with 60,000 Ohm meter.
(2) Voltage as read with 120,000 Ohm meter.
(3) Varies with frequency approximately as indicated.
(4) Reversed reading—plate negative with respect to filament.
(5) Voltage as read with 600,000 Ohm meter.
(6) Plate current with no signal applied to receiver.



ALIGNMENT

In order to properly align the R. F. and I. F. circuits of the No. 906 chassis a signal generator is necessary. The generator must be capable of producing an I. F. signal at 262 K. C., as well as R. F. signals throughout the broadcast band of 540 to 1500 K. C. An output meter is also necessary to determine accurately the maximum output of the receiver.

The need for realignment will be evidenced by low sensitivity accompanied by poor selectivity, but realignment should never be undertaken until all other causes for this same condition, such as defective tubes, improper antenna installation or weak batteries have been checked and eliminated as the cause of the trouble.

During the following alignment procedure the 230 A. V. C. tube should be replaced with a dummy tube (Tube with one filament prong removed) in order that there will no possibility of A. V. C. action which would make determination of the output peak difficult.

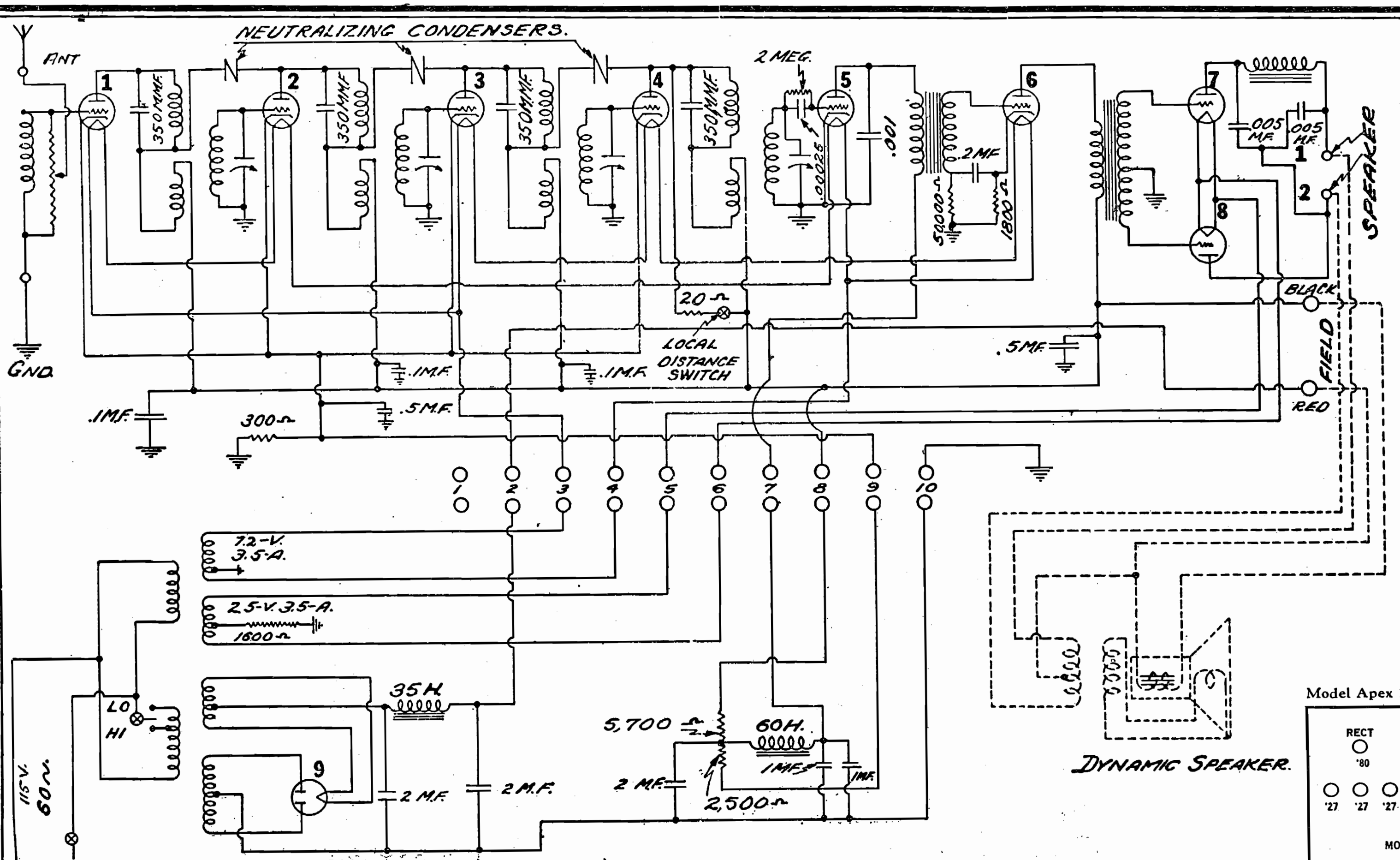
Aligning Intermediate Condensers—The oscillator tube should be removed from its socket during I. F. alignment. Place the signal generator in operation at 262 K. C. and connect its output to the grid contact of the 230 first detector tube. The tube shield should be in position to prevent oscillation of the receiver.

Then adjust the three intermediate condenser screws until maximum output is indicated on the output meter. After all three have been adjusted the first time go over them again and check the setting for maximum output. The intermediate condenser screws are accessible from beneath the chassis and protrude through the porcelain bases of the I. F. Transformers.

Aligning R. F. and Oscillator Condensers—Replace the oscillator tube in its socket and place the signal generator in operation at exactly 1400 K. C. The output of the signal generator should be connected to the antenna binding post at the back of the chassis. Tune the receiver to exactly 1400 K. C. upon the dial chart and adjust the three trimmer condensers which are located on the tuning condenser. Adjust the oscillator 1400 K. C. trimmer condenser (One located nearest back of chassis) first. Then set the signal generator for signals of 1,000, 750 and 600 K. C., and check the R. F. and Oscillator Condensers for resonance. Bend the slotted rotor plate sections of each of these three condensers which are less in mesh, in or out until maximum output is obtained.

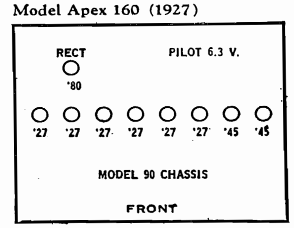
Model 160, 250
Chassis 90

U. S. RADIO & TELEVISION CORP.



Line Voltage 115

Model Apex 160 (1927)



VOLTAGES AT SOCKETS

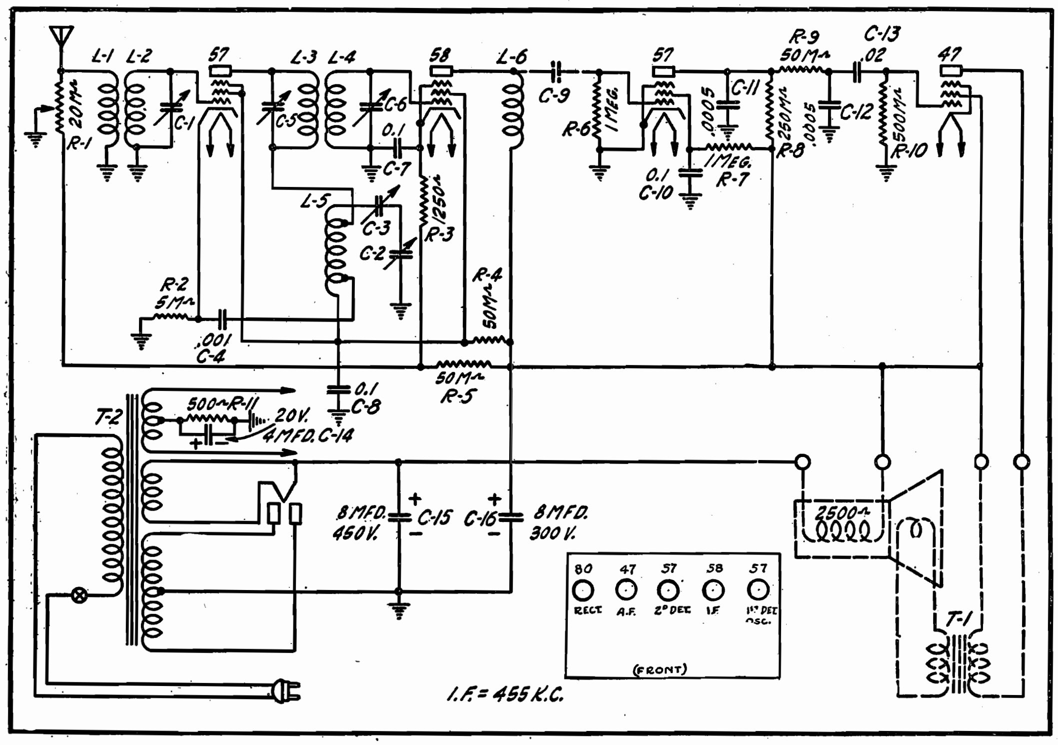
Type of Tube	Tube No.	"A" Volts	"B" Volts	Control Grid "C" Volts	Cathode Volts	Plate Current Milliamps
227	1	2.4	140	10.0	10.0	3.4
227	2	2.4	140	10.0	10.0	3.4
227	3	2.4	140	10.0	10.0	3.4
227	4	2.4	140	10.0	10.0	3.4
227	5	2.4	30	0.0	0.0	2.4
227	6	2.4	140	6.0	6.0	4.6
245	7	2.3	180	40.00		11.0
245	8	2.3	180	40.00		11.0
280	9	4.5				40.0 per plate

VOLTAGES AT TERMINAL STRIP

Terminals	Voltage	Circuit
3 to 4	7.2	227 Filament
5 to 6	2.3	245 Filament
8 to 9	140	227 R. F. & A. F. Plate
10 to 7	30	227 Detector Plate
2 to 5	180	245 Plate
10 to 9	10	227 Grid
5 to 10	40	245 Grid

U. S. RADIO & TELEVISION CORP.

MODEL 3040, 3056
Chassis 506
Schematic
Resistance Data



Schematic Wiring Diagram of No. 507 Chassis

CONTINUITY CHART

NO. 507 CHASSIS

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna	31	20,000	Open L-1
1st Detector Control Grid	3.6	0 Open	Shorted C-1 or Trimmer Open L-2
1st Detector Cathode	5,000	Open	Open R-2
1st Detector Screen Grid or I. F. Screen Grid	100,000	0 5,000 50,000 52,500 Open	Shorted C-8 Shorted C-4 Shorted C-16 Shorted C-15 Open R-4 or R-5
1st Detector Plate	100,034	34 5,034	Shorted C-8 Shorted C-4
I. F. Control Grid	30	0 Open	Shorted C-6 Open L-4
I. F. Cathode	1,250	0 Open	Shorted C-7 Open R-3
I. F. Plate	50,048	48 2,548 Open	Shorted C-16 Shorted C-15 Open L-6
2nd Detector Control Grid	1,000,000	0 Open	I. F. Coil Screen Grounded Open R-6
2nd Detector Cathode	0	Open	Open Connection
2nd Detector Screen Grid	1,050,000	0 Open	Shorted C-10 Open R-5 or R-7
2nd Detector Plate	300,000	0 43,000 Open	Shorted C-11 Shorted C-12 Open R-5 or R-8
Audio Control Grid	500,000	206,000 Open	Shorted C-13 Open R-10
Audio Screen Grid	50,000	0 2,500 Open	Shorted C-16 Shorted C-15 Open R-5
Audio Plate	50,520	520 3,020 Open	Shorted C-16 Shorted C-15 Open R-5 or Pri. T-1
Rectifier Either Plate	400	Open	Open Sec. T-2
Rectifier Either Filament	52,500	0 2,500 Open	Shorted C-15 Shorted C-16 Open R-5 or Speaker Field
Filament of 247, 57, or 58	500	0 Open	Shorted R-11 or C-14 or Grounded Pilot Light Socket Open R-11
Antenna (L-1 disconnected)	20,000	Open	Open R-1

REFERENCE POINT—+B (RED SPEAKER LEAD)

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector or I. F. Screen Grid	50,000	30,000 Open	Shorted C-8 Open R-4
1st Detector Plate	50,034	Open	Open L-3, L-5 or R-4
I. F. Plate	48	Open	Open L-6
2nd Detector Screen Grid	1,000,000	50,000 Open	Shorted C-10 Open R-7
2nd Detector Plate	250,000	Open	Open R-8
Audio Plate	520	Open	Open Pri. T-1

MISCELLANEOUS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Det. Screen Grid to Stator C-2	Open	3	Shorted C-3
1st Det. Screen Grid to 1st Det. Plate	34	3 Open	Shorted C-5 Open L-3 or L-5
2nd Det. Plate. to Audio Control Grid	Open	50,000	Shorted C-13
Across A. C. Plug	17	Open	Open Pri. T-2
Rectifier Plate to Plate	800	Open	Open Sec. T-2
Rectifier Filament to Filament	Very Low	Open	Open 280 Fil. Sec. T-2
Filament to Filament Other Sockets	Very Low	Open	Open Heater Sec. T-2

MODEL 3040, 3056
Chassis 507
Voltage
Alignment
Transformers

U. S. RADIO & TELEVISION CORP.

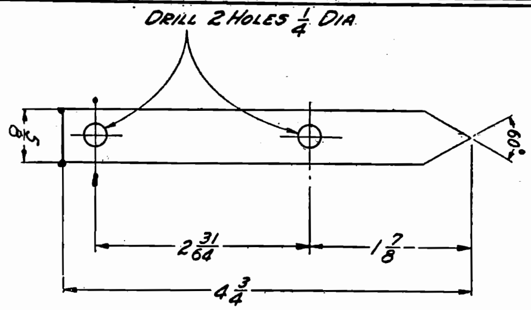


FIG. 5—*Dial Indicator for R. F. Alignment*

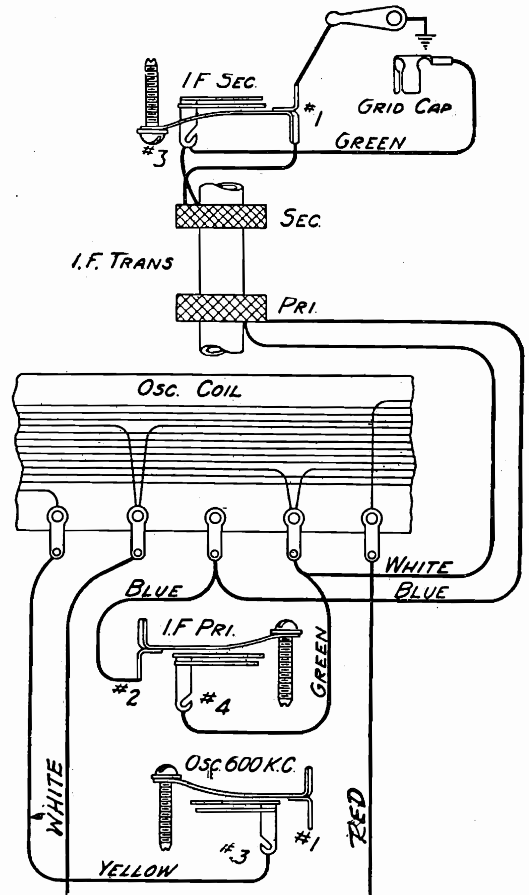
Aligning R. F. and Oscillator Condensers—During alignment of these condensers it will be necessary to provide an indicator for the dial in order that the tuning condenser can be set for the proper frequencies. A simple indicator for this purpose can be made from sheet brass as shown in Fig. 4. The indicator is mounted by slipping it over the volume control and tuning condenser shafts so that the point is over the dial scale.

Turn the tuning condenser until the rotor plates are fully meshed with the stator plates. If the lowest frequency mark is not directly beneath the indicator loosen the set screw which holds the dial in place on the shaft and turn the dial to its correct position taking care not to move the condenser rotor. Tighten the set screw.

Then turn the tuning condenser until the dial is set at 1400 K. C. and connect the signal generator output to the antenna circuit. Place the signal generator in operation at 1400 K. C. and adjust the oscillator and R. F. trimmers to give maximum output. The oscillator trimmer (nearest back of chassis) should be adjusted first.

Then set the signal generator for a signal of 600 K. C. and tune in this signal on the receiver. Next adjust the oscillator 600 K. C. trimmer which is located on the base of the Oscillator-I. F. assembly nearest the back of the chassis. The tuning condenser should be turned slowly back and forth through the resonant point while the 600 K. C. trimmer is being adjusted and the deflection of the output meter noted for each change of the 600 K. C. trimmer. The setting of this trimmer which gives greatest deflection when the tuning condenser passes through resonance is correct.

Set the signal generator again for a frequency of 1400 K. C. and check the setting of the tuning condenser trimmers for maximum output. Then set the signal generator for a signal of 1000 K. C. and turn the tuning condenser rotor until the output meter shows maximum deflection. Then bend the slotted rotor plate sections of each tuning condenser which are last in mesh with the stator, in or out until maximum output is obtained. Follow the same procedure with signals of 750 and 600 K. C. Do not change the setting of the oscillator 600 K. C. trimmer after it has been once set as explained above.

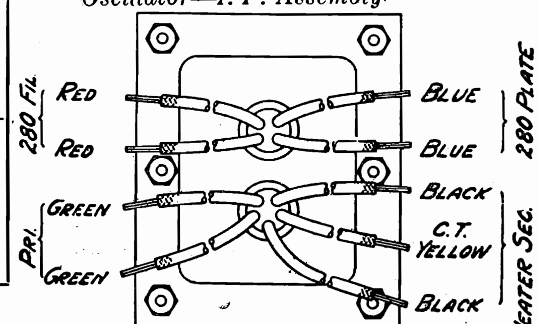


Oscillator—I. F. Assembly

VOLUME CONTROL AT MAXIMUM
No. 507 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Grid Volts	Screen Grid Current MA	Cathode Volts	Plate Current MA
57	1	1st Det. & Osc.	2.3	125	5.0	120	—(1)	12.0	——(1)
58	2	I. F.	2.3	230	7.0	120	1.0	10.0	4.2
57	3	2nd Det.	2.3	40(2)	0	24(2)	.2	17.0	.7
247	4	Audio	2.3	210	1.5(3)	225	5.2		25.0
280	5	Rect.	4.7						22 Per Plate

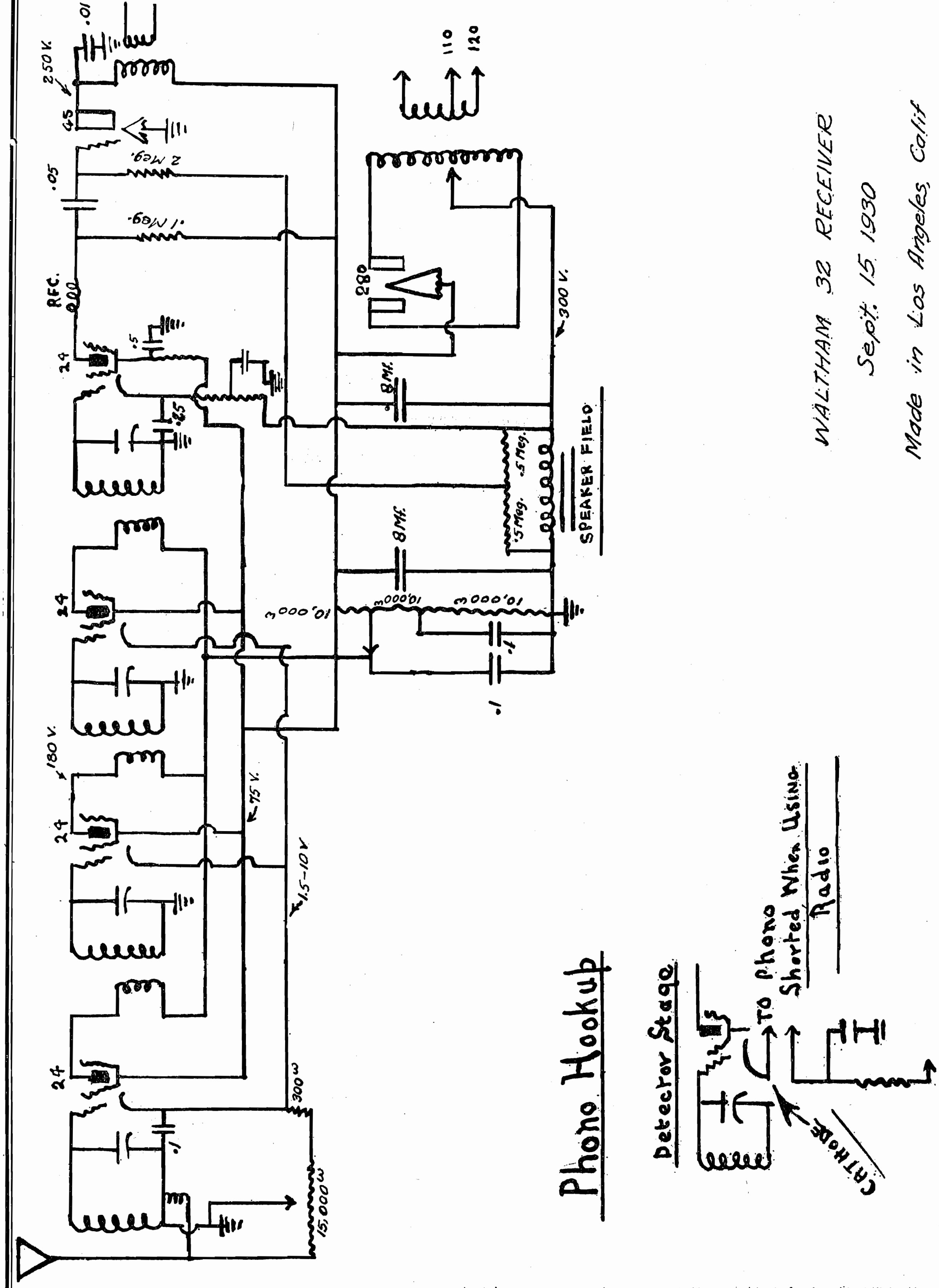
(1) Can only be read with special adapter.
(2) Voltage as read with 600,000 ohm meter.
(3) Not true reading. Actual voltage across 500 ohm resistor—17 volts.



Power Transformer Lead Identification

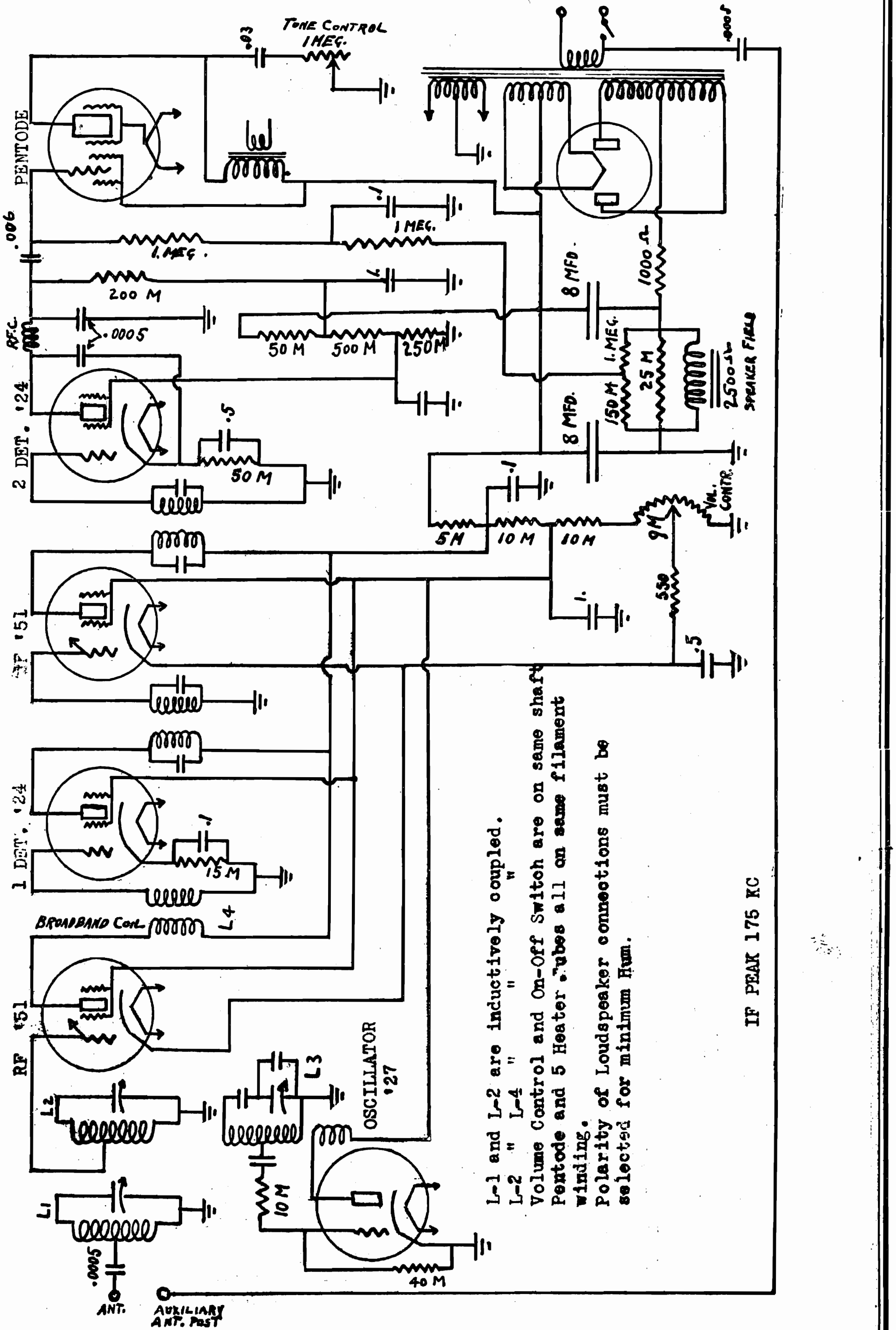
MODEL Waltham '32

WALTHAM



MODEL SBB

WARE MANUFACTURING CORP.

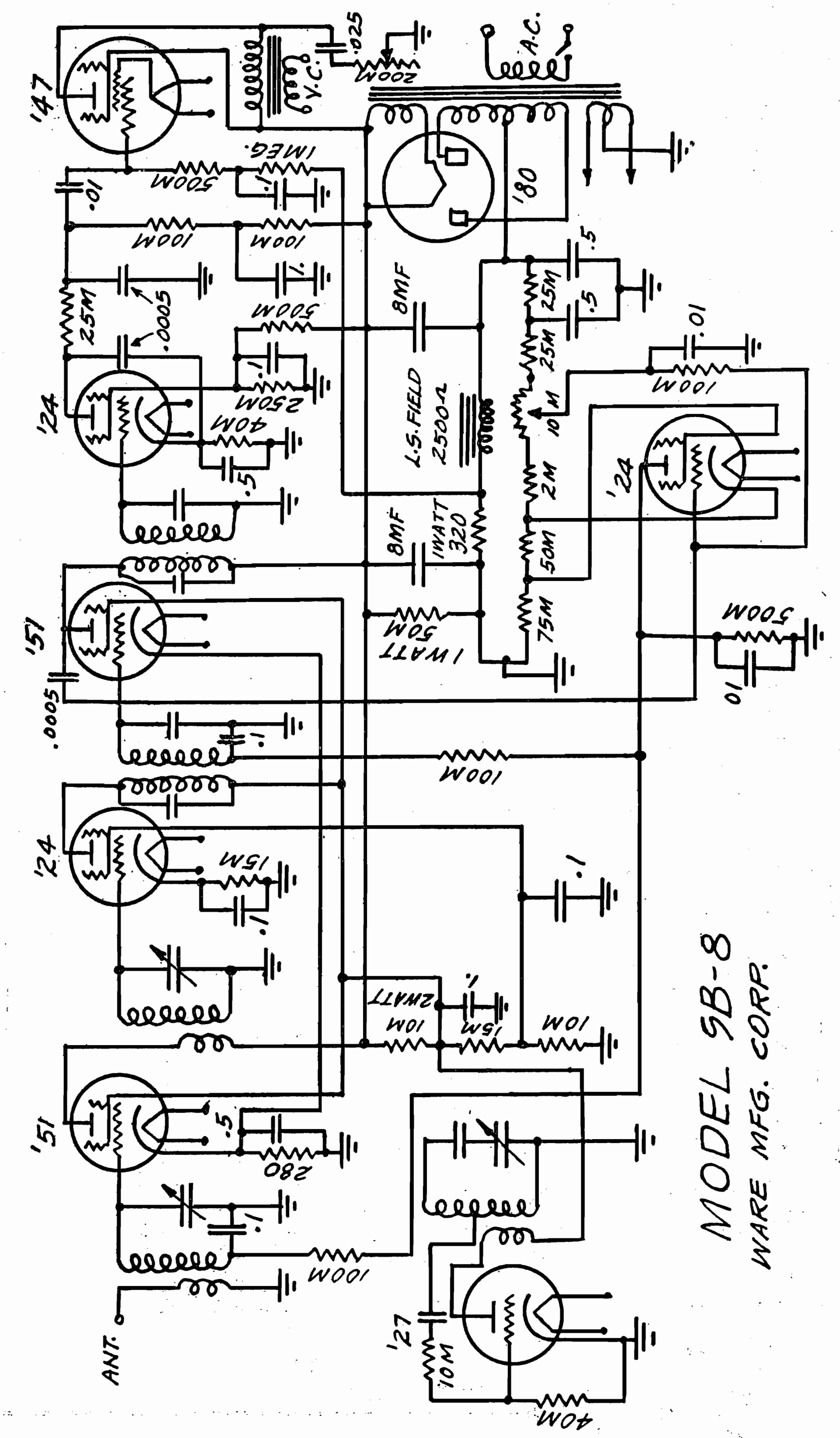


L-1 and L-2 are inductively coupled.
L-2 " L-4 " "
Volume Control and On-Off Switch are on same shaft
Pentode and 5 Heater Tubes all on same filament winding.
Polarity of Loudspeaker connections must be selected for minimum Hum.

IF PEAK 175 KC

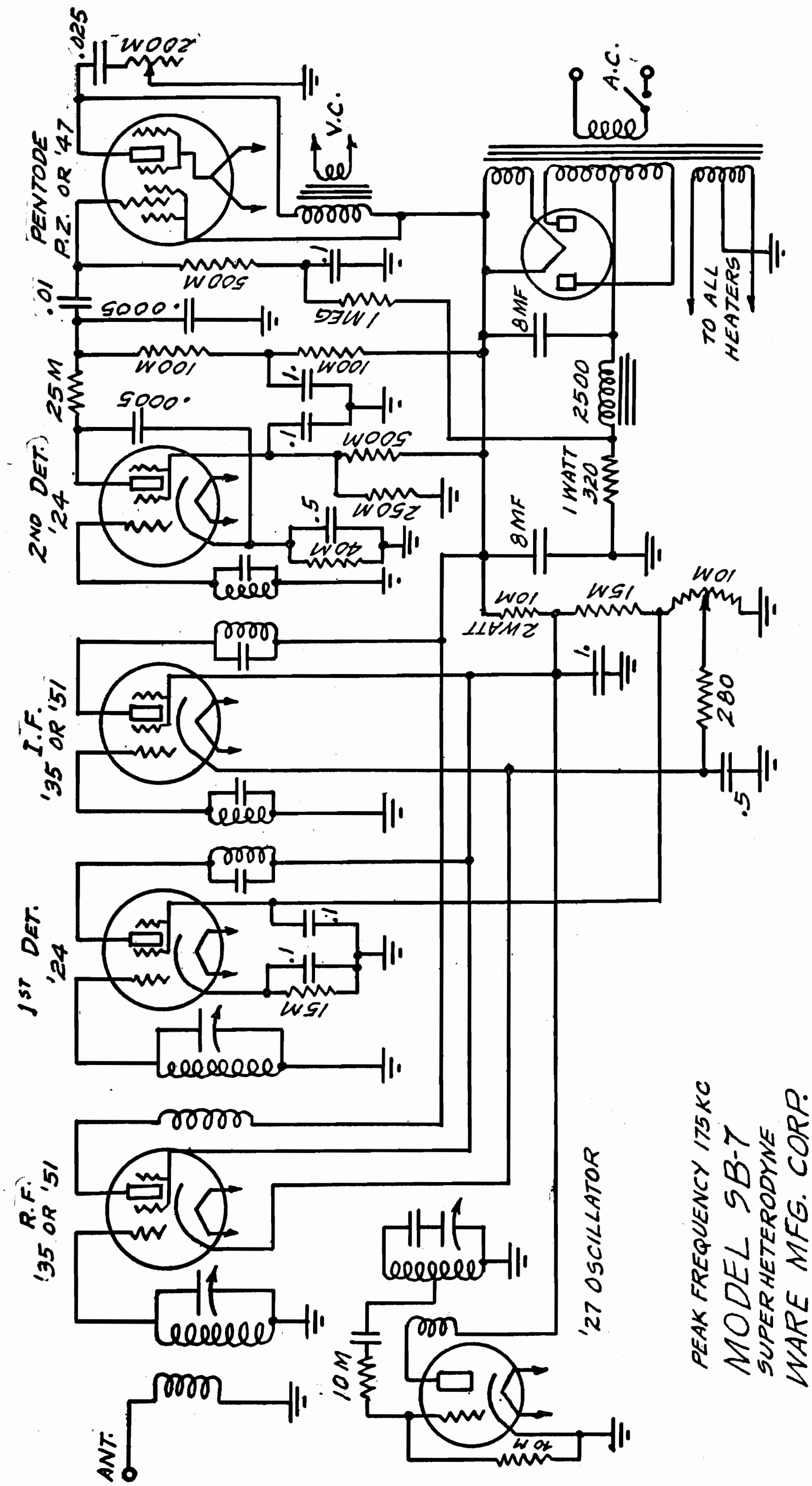
MODEL SB-8

WARE MANUFACTURING CORP.



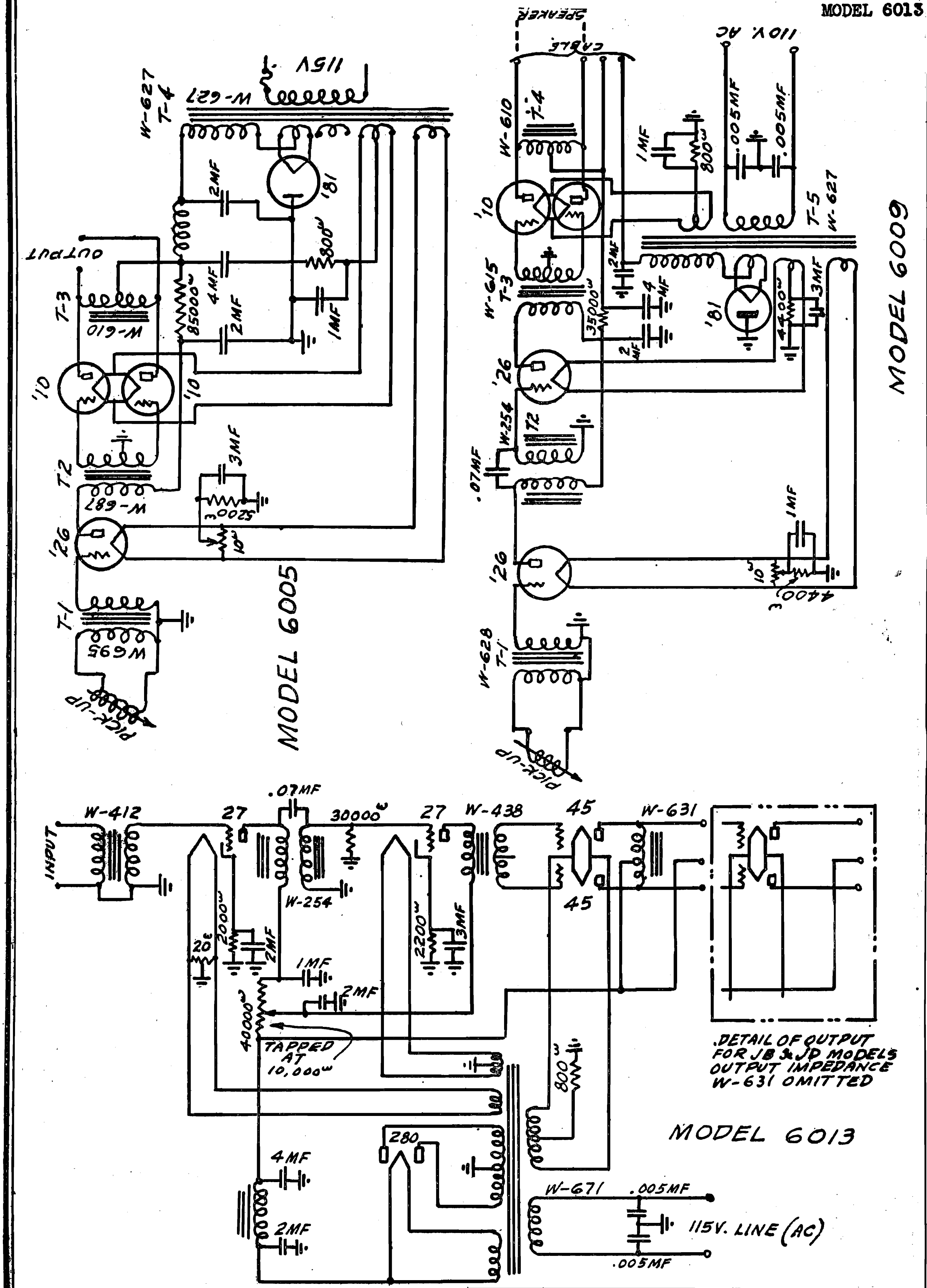
MODEL SB-7

WARE MANUFACTURING CORP.



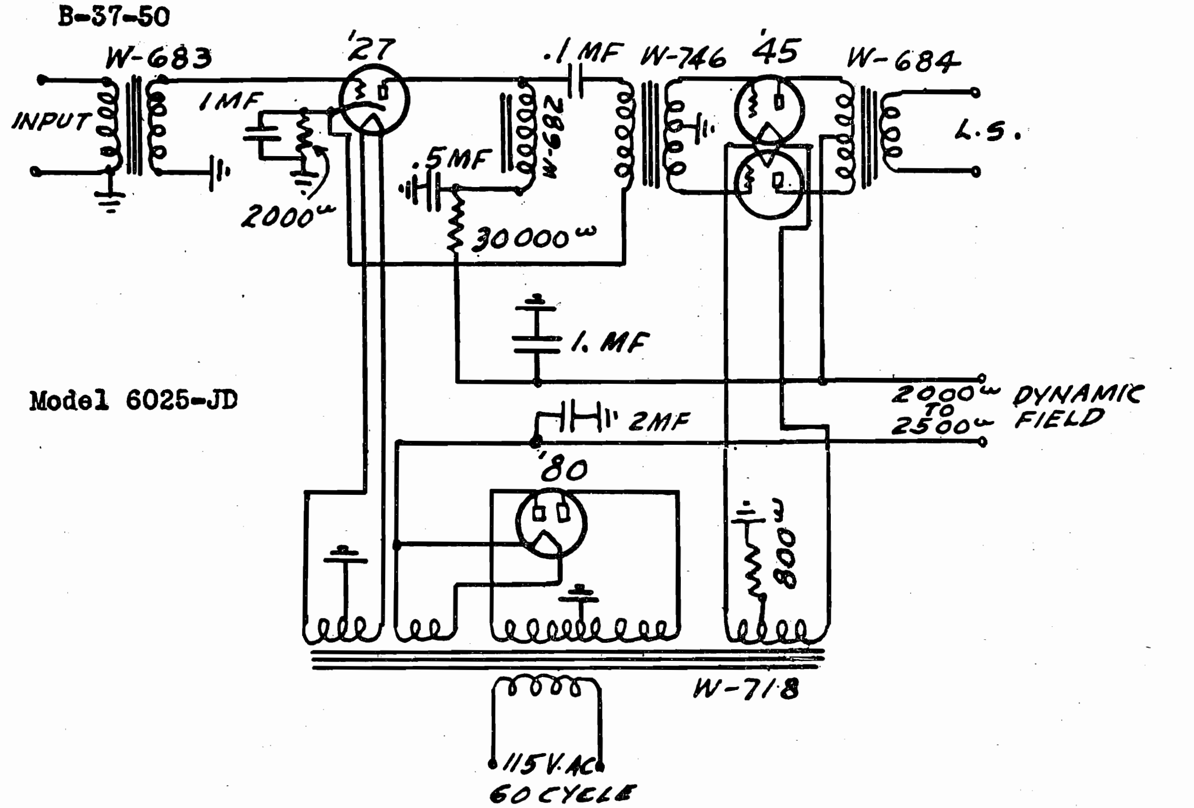
WEBSTER ELECTRICAL CORP.

MODEL 6005
MODEL 6009
MODEL 6013

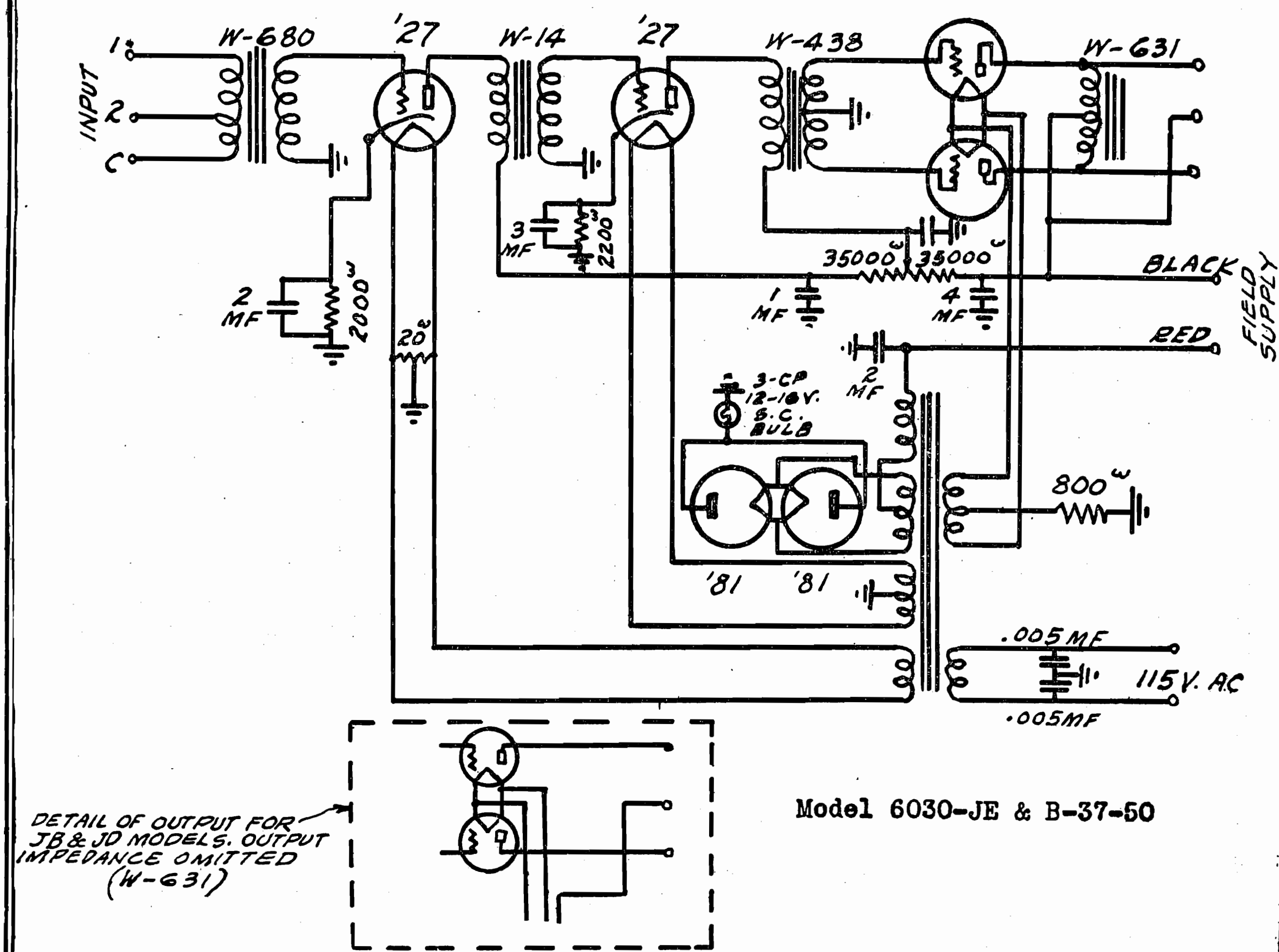


MODEL 6025-JD
MODEL 6030-JE
B-37-50

WEBSTER ELECTRICAL CORP.



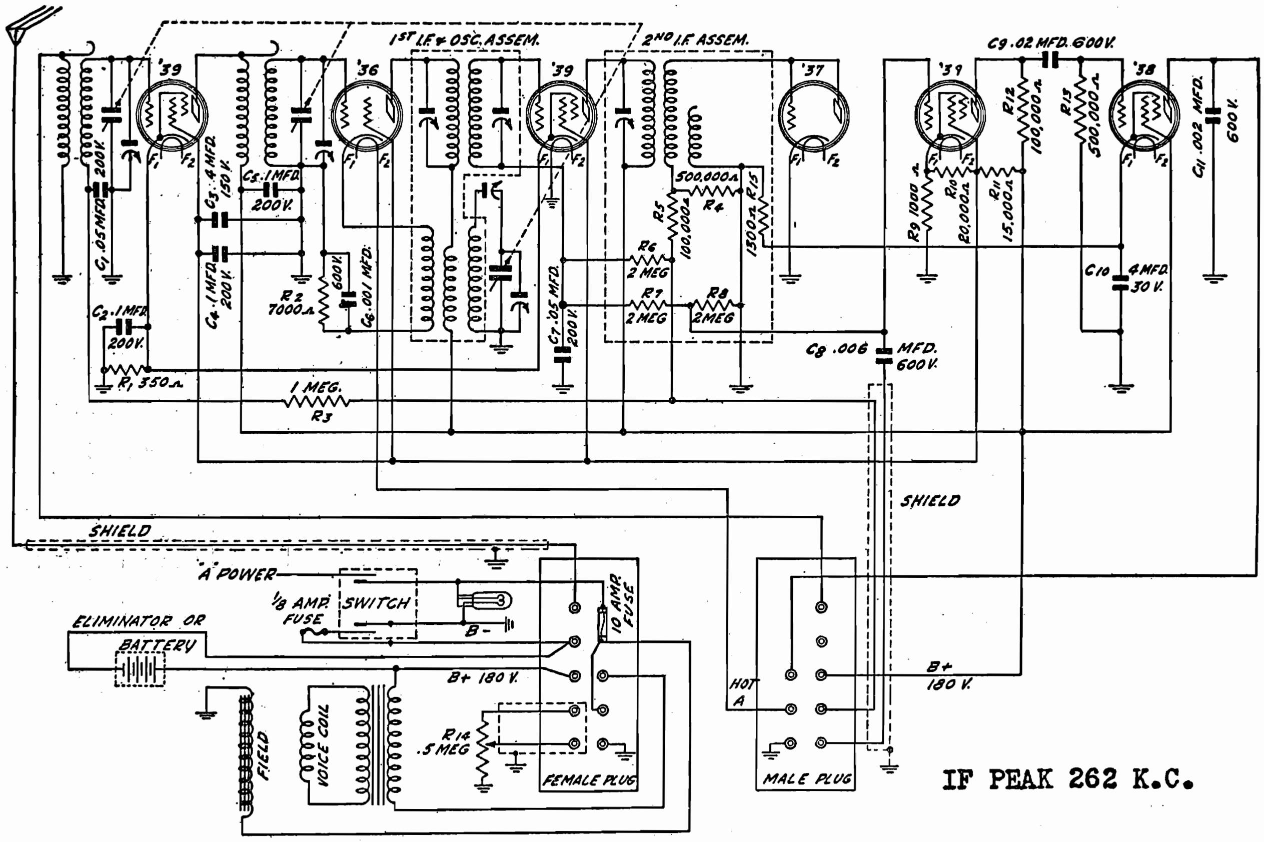
Model 6025-JD



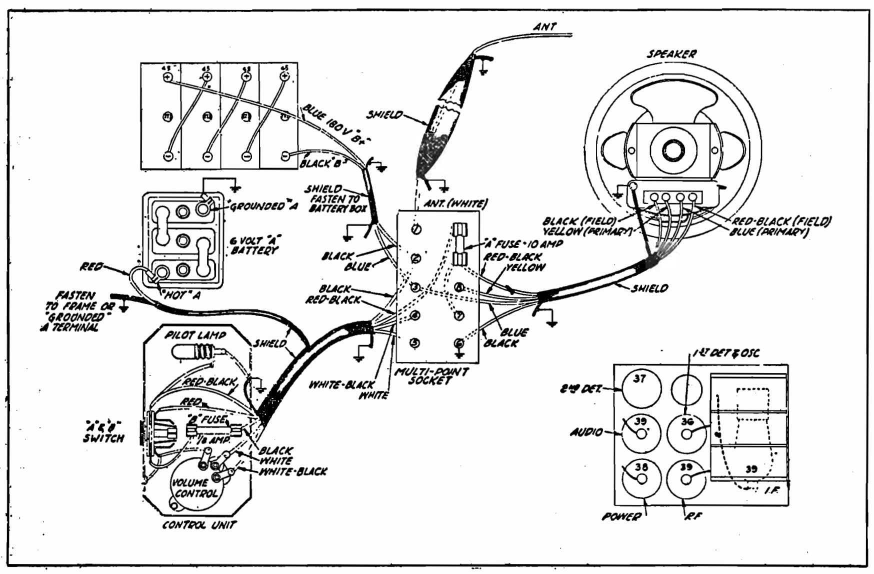
Model 6030-JE & B-37-50

MODEL 062 Auto Radio Schematic

WELLS - GARDNER & CO.



IF PEAK 262 K.C.



VOLTAGE DATA

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

* Will vary with dial setting.

MODEL 092 Series

WELLS - GARDNER & CO.

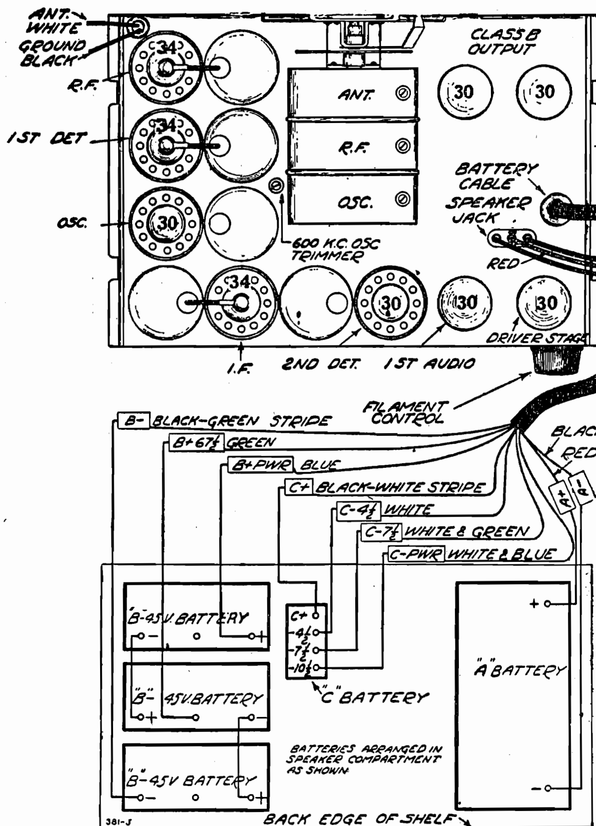


Fig. 2—Tube Arrangement and Battery Connections

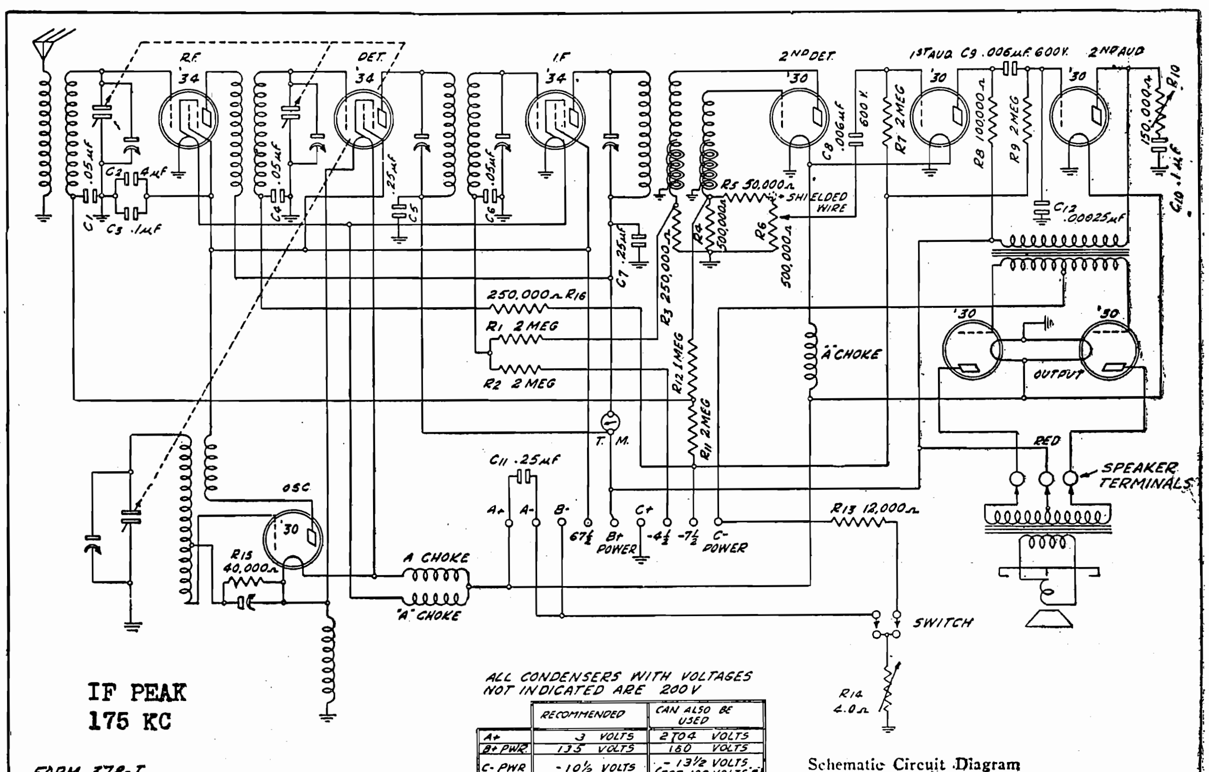
Voltages at Sockets

"B" AND "C" BATTERIES UP TO RATED VOLTAGE—FILAMENT CONTROL KNOB SET SO THAT FILAMENT VOLTAGE IS 2—ANTENNA LEAD SHORTENED TO GROUND—VOLTAGES READ FROM NEGATIVE FILAMENT LEG

Type of Tube	Function	Across Filament	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
'34	R.F	2.0	125	65	2.88 (1)	2.3
'34	1st Det.	2.0	130	65	7.5 (1)	1.4
'30	Osc.	2.0	67		4-15 (2)	1.6-4 (2)
'34	I.F	2.0	120	65	2.38 (1)	2.4
'30	2nd Det.	2.0	0		0	0
'30	1st Audio	2.0	85		7.5 (1)	.5
'30	Driver	2.0	125		7.5 (1)	4.0
'30	Output	2.0	130		10.	1.1

(1) Computed figure—cannot be read with ordinary voltmeter because of high resistance in this circuit. See article "Voltages" for further information

(2) Subject to variation with dial setting.

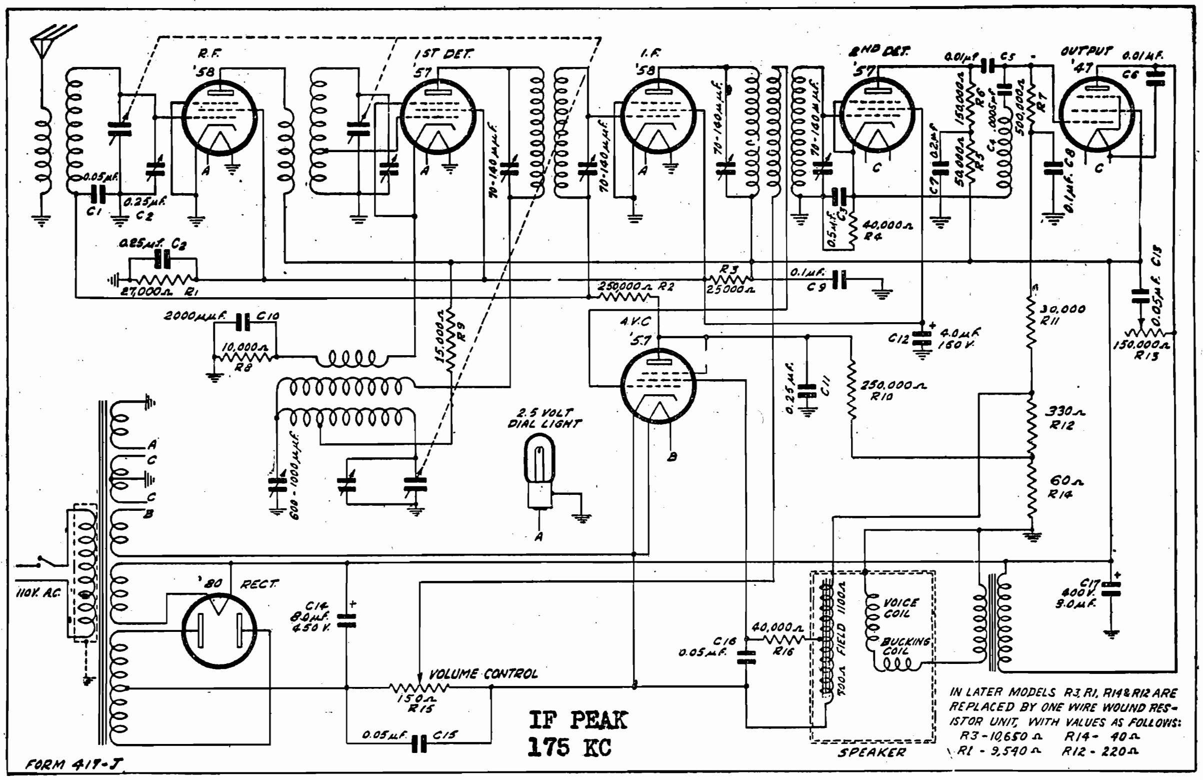


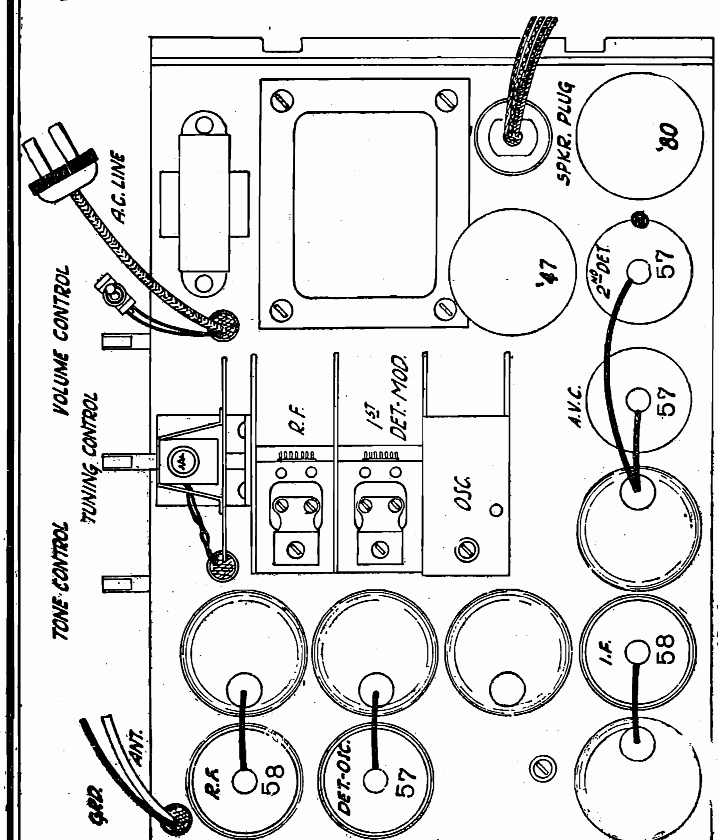
	RECOMMENDED	CAN ALSO BE USED
A+	3 VOLTS	2 TO 4 VOLTS
B+ PWR	135 VOLTS	180 VOLTS
C- PWR	-10½ VOLTS	-13½ VOLTS (FOR 180 VOLTS B)

Schematic Circuit Diagram

WELLS - GARDNER & CO.

MODEL 572
Schematic
Changes
Socket





Change in Later Models

In the first models of this chassis, resistors R-1 and R-3 were carbon resistors of the values as shown in Fig 1. Resistors R-12 and R-14, were in one vitreous enamel unit The voltages for the sets with these resistors are shown in the voltage chart on Page 4 at the left.

In later models the four above mentioned resistors were replaced by one armored wire wound resistor unit New values are used as follows

Code	Resistance
R-12	220 ohms
R-14	40 ohms
R-1	9,540 ohms
R-3	10,650 ohms

The voltages for the sets with the four-section wire wound resistor are shown in the second voltage chart on Page 4 at the right.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer and an additional filter condenser are used Also, a slight change is made in the power unit wiring In the twenty-five cycle set, condenser C-17 the dry electrolytic unit is put in parallel with condenser C-14 An 8.0 mfd wet electrolytic condenser is put in place of con denser C-17

The twenty five cycle chassis can be operated satisfactorily from a sixty cycle power supply However, the reverse is not true that is the sixty cycle chassis cannot be operated from a twenty-five cycle power supply

A 110-220 volt 40-60 cycle power transformer is also available for this model.

MODEL 572
Parts List
Voltage
Alignment

WELLS - GARDNER & CO.

REPAIR PARTS LIST FOR 7 TUBE SUPERHETERODYNE RECEIVER

When ordering parts, the part number and the serial number of chassis 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-1677	No. 57 Tube Socket	$1.15
P-1678	No. 58 Tube Socket	.15
P-1468	No. 47 Tube Socket	.15
P-1474	No. 80 Tube Socket	.15
P-1479	Speaker Socket	.15
P-40426	Aluminum Tube Shield	.20
P-40425	Tube Shield Base	.10
P-40411	Aluminum Coil Shield—R.F. Coils	.20
P-1476	Three-Lug Insulated Terminal Strip	.10
P-1513	Eleven-Lug Insulated Terminal Strip	.15
P-1054	"On-Off" Switch	.80
P-20529	Drive Shaft	.10
P-10224	Rubber Drive Pinion	.10
P-30374	Brass Bushing for Rubber Pinion	.10
P-10191	Rubber Cushions for Channel Brackets	.10
P-1273	Pilot Lamp 2.5 Volt	.25
P-5062	Antenna R.F. Transformer Assembly	.80
P-5057	Interstage R.F. Transformer Assembly	.80
P-5058	Oscillator Coil Assembly	.95
P-5059	1st I.F. Transformer Assembly, complete with can	2.25
P-5060	2nd I.F. Transformer Assembly, complete with can	2.50
P-50541	Output Transformer Assembly	1.75
P-50542	Power Transformer, 60 cycle, 110 volt	5.25
P-50543	Power Transformer, 25 cycle, 110 volt	8.50
P-50545	Power Transformer, 40-60 cycle, 110 volt	8.00
P-1497	Pilot Light Bracket and Drive Gear Assembly	.45
P-1383-C	Drive Bracket and Bearing	.30
P-1684	Celluloid Dial Strip	.20

CONDENSERS

Part No.	Code	Capacity	Voltage	Type	List Price
P-80862-C	C-1	.05 mfd.	200 V.	Tubular	$ .30
P-80888-A	C-2	.25 mfd.	200 V.	Tubular	.40
P-80886-C	C-3 / C-7 / C-11	.5 mfd. / .2 mfd. / .25 mfd.	200 V. / 400 V. / 200 V.	Block	1.60
P-80867	C-4	.0005 mfd.	600 V.	Molded	.25
P-80872-B	C-5	.01 mfd.	600 V.	Tubular	.25
P-80872-B	C-6	.01 mfd.	600 V.	Tubular	.25
P-80864-D	C-8	.1 mfd.	200 V.	Tubular	.25
P-80887-B	C-9	.1 mfd.	400 V.	Tubular	.40
P-80914	C-10	.002 mfd.	600 V.	Tubular	.20
P-80891-B	C-12	4.0 mfd.	150 V.	Electrolytic	.85
P-80890-B	C-13	.05 mfd.	400 V.	Tubular	.20
P-80894-B	C-14 / C-17	8.0 mfd. / 8.0 mfd.	450 V. / 450 V.	Electrolytic Block	2.85
P-80862-C	C-15	.05 mfd.	200 V.	Tubular	.30
P-80862-C	C-16	.05 mfd.	200 V.	Tubular	.30
P-80849		8.0 mfd.	450 V.	Wet Electrolytic (25 Cycle only)	2.20
P-1385-B	600 K.C Trimmer Condenser				.75
P-80882	Three-Gang Condenser				5.70

RESISTORS

Part No.	Code	Resistance	Wattage	Type	List Price
*P-91003	R-1	27,000 ohms	.5 Watts	Carbon	$ .25
P-90954	R-2	250,000 ohms	.2 Watts	Carbon	.25
*P-91002	R-3	25,000 ohms	1.0 Watts	Carbon	.25
P-90916	R-4	40,000 ohms	.2 Watts	Carbon	.25
P-90941	R-5	50,000 ohms	.2 Watts	Carbon	.25
P-90963	R-6	150,000 ohms	.2 Watts	Carbon	.25
P-90929	R-7	500,000 ohms	.2 Watts	Carbon	.25
P-90930	R-8	10,000 ohms	.2 Watts	Carbon	.20
P-90905	R-9	15,000 ohms	.2 Watts	Carbon	.25
P-90954	R-10	250,000 ohms	.2 Watts	Carbon	.25
P-90956	R-11	30,000 ohms	.2 Watts	Carbon	.25
*P-91040	R-12 / R-14	330 ohms / 60 ohms		Vitreous Enamel	.50
P-90993	R-13	150,000 ohms		Tone Control	.90
P-91041	R-15	150 ohms		Volume Control	.80
P-90916	R-16	40,000 ohms	.2 Watts	Carbon	.25
†P-91048	R12 / R14 / R1 / R3	220 ohm / 40 ohm / 9540 ohm / 10650 ohm	1.0 Watts / .2 Watts / 1.0 Watts / 2.5 Watts	Armored Wire-wound Resistor	1.05

* Used in early models—in later models these resistors are replaced by resistor P-91048.
† See above.

Voltages at Sockets

LINE VOLTAGE 115—ANTENNA LEAD SHORTED TO GROUND—VOLUME CONTROL AT MAXIMUM

			For early Models with 2-section vitreous enamel resistor.				For later Models with 4-section armoured wire-wound resistor.			
Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
'58	R.F.	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	1st Det.	2.4	270	100	5	.4	250	103	5	.4
'58	I.F.(2)	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	A.V.C.	2.4	90	40	9.5	0	103	45	10	0
'57	2nd Det.	2.4	207	98	6	.15	190	101	6	.15
'47	Audio	2.4	262	280	24(3)	31	242	260	17(3)	30
'80	Rect.	4.8				30 per plate				34 per plate

(1) Read Across R-14.
(2) If I.F. readings are made with a cord and plug, ground the control grid through a condenser to prevent oscillation.
(3) Read Across R12 and R14.

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 four 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.

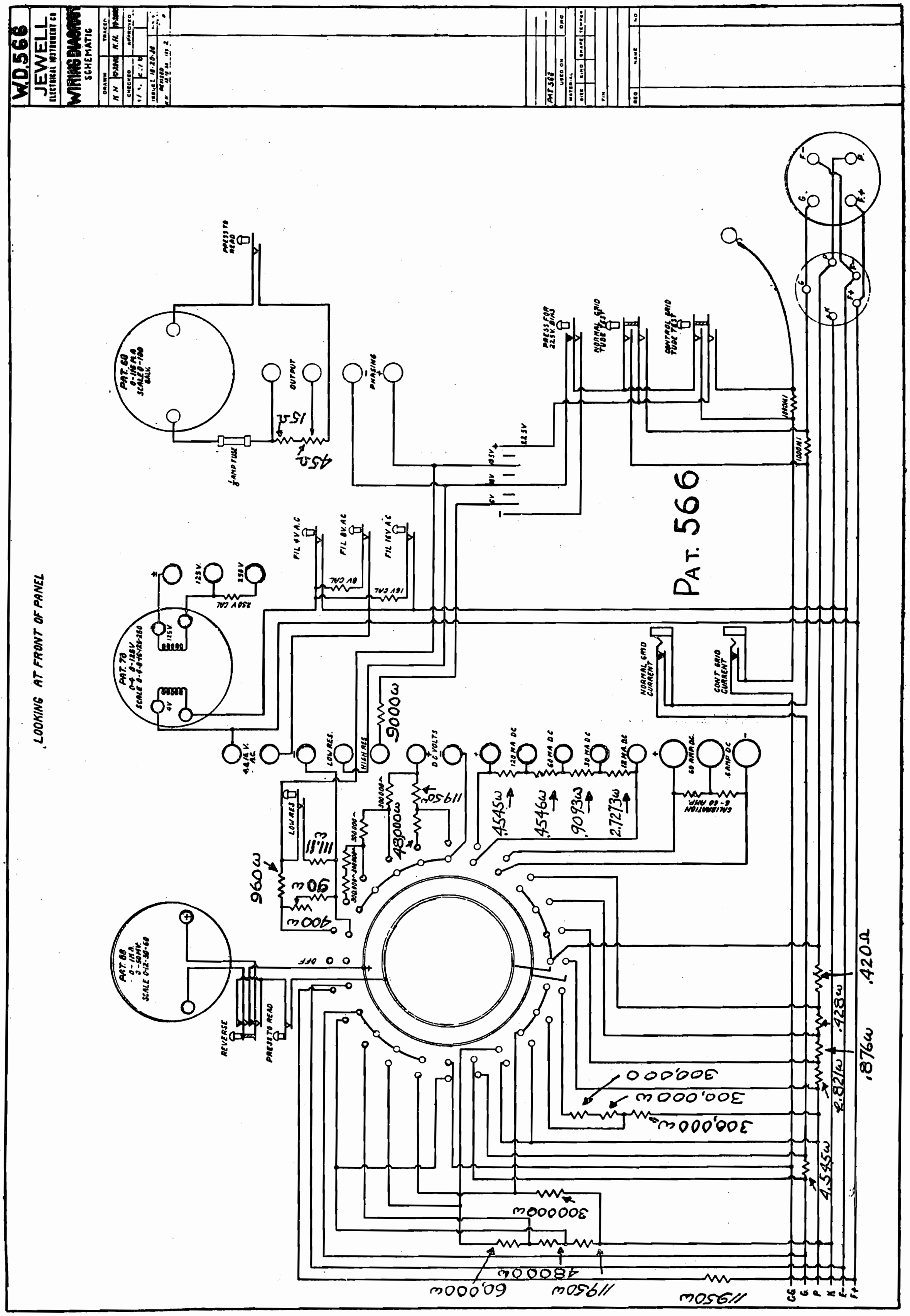
Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached from the top of the chassis and is between the I.F. and oscillator coil cans.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condensor 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.

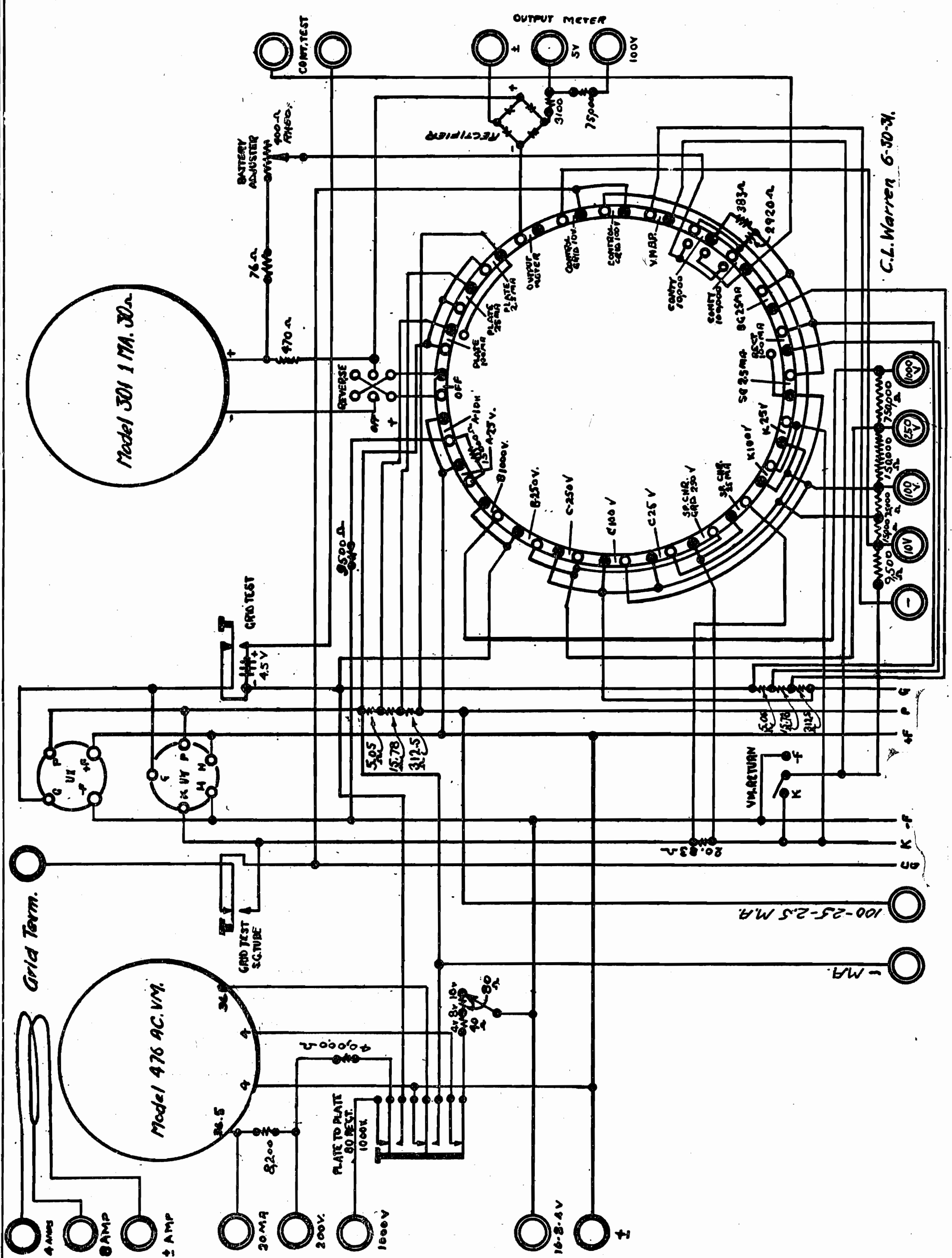
WESTON ELECTRICAL INSTRUM'T CORP.

MODEL Jewell
W D 566



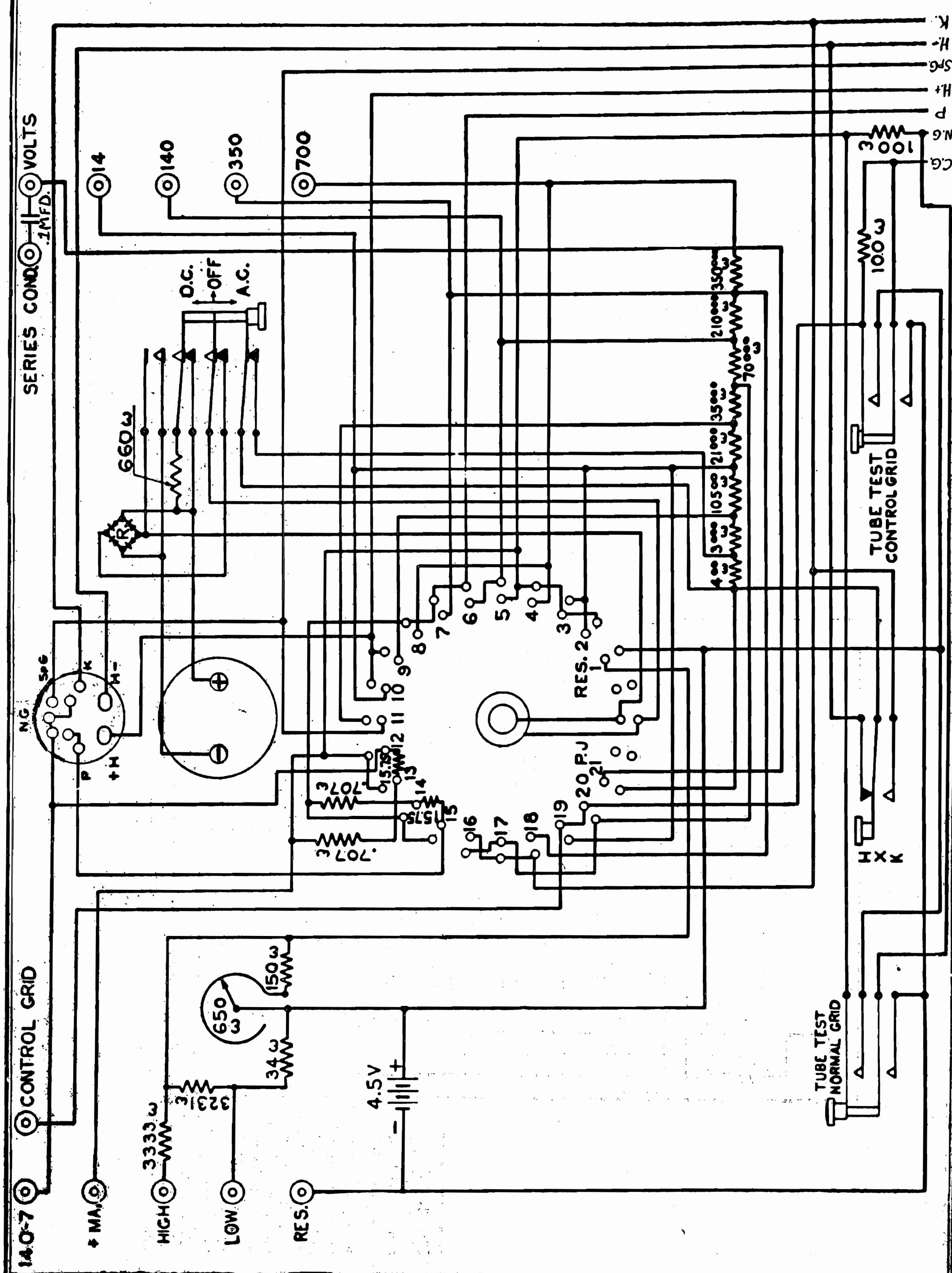
MODEL Weston 566
Type 3

WESTON ELECTRICAL INSTRUM'T CORP.



MODEL Weston 660

WESTON ELECTRICAL INSTRUM'T CORP.



MODEL Weston 662
MODEL Weston 663

WESTON ELECTRICAL INSTRUM'T CORP.

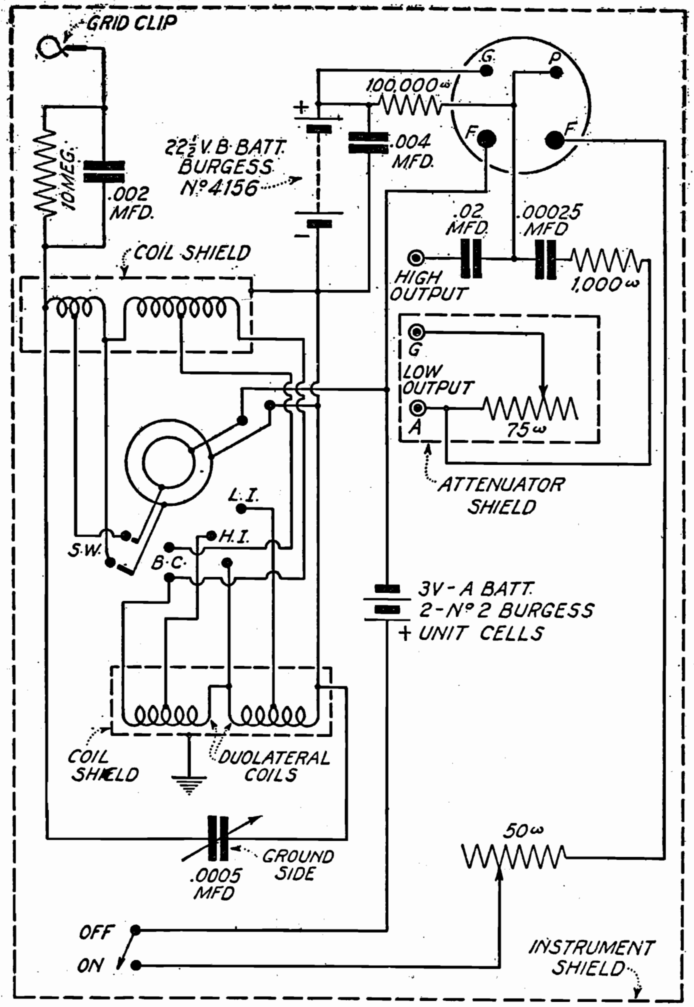
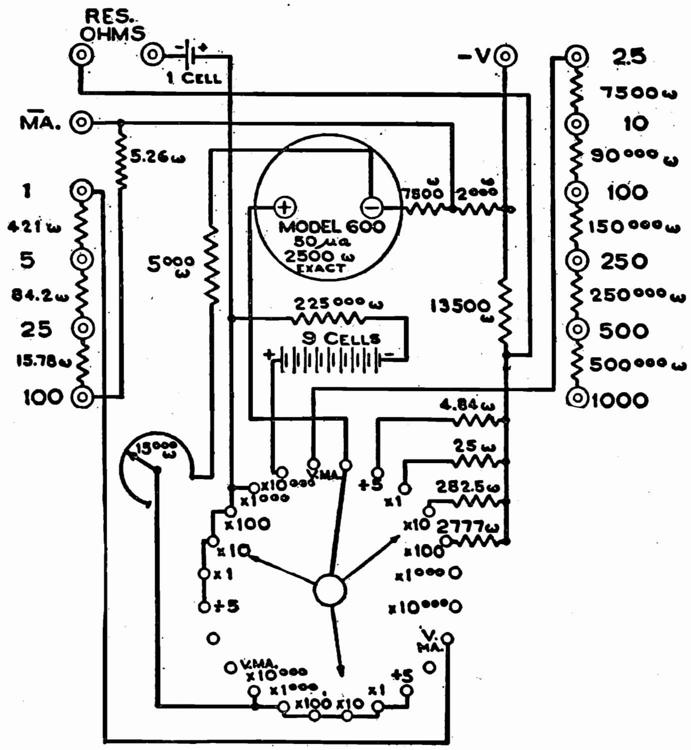


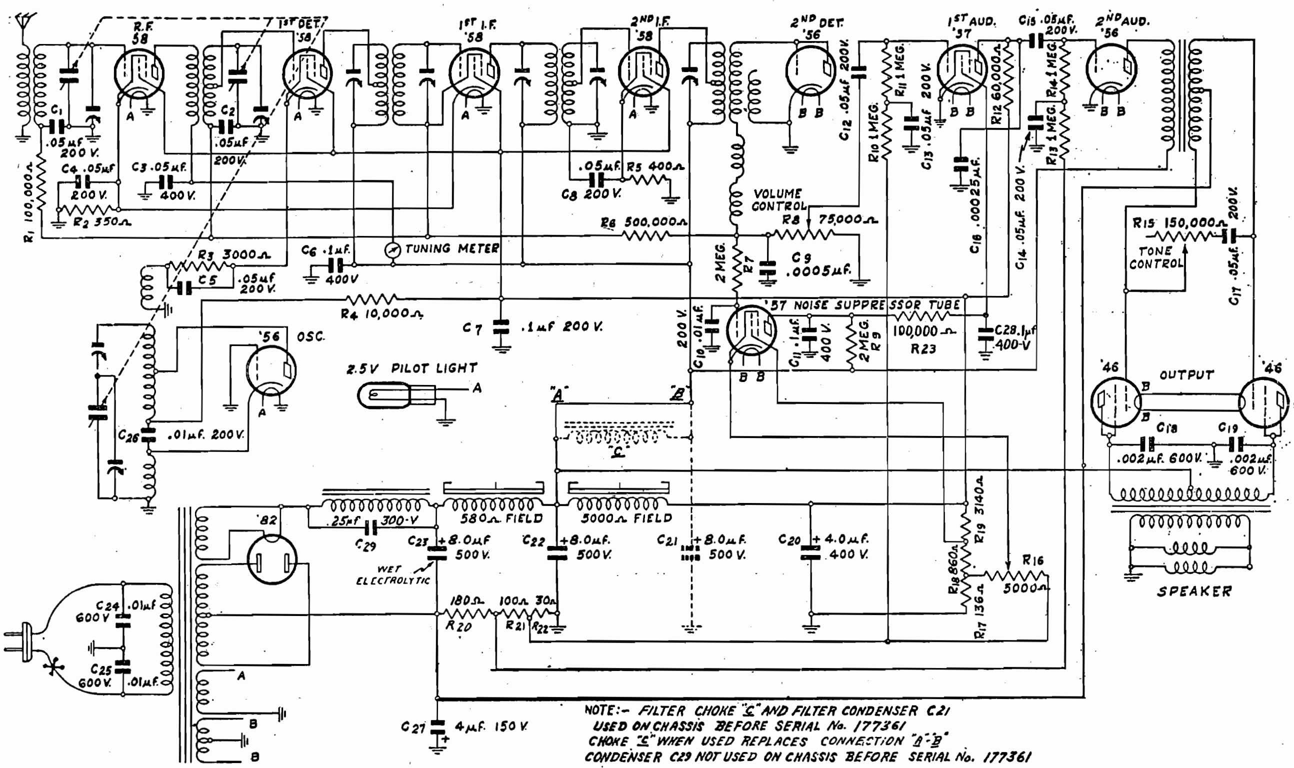
Fig. 1. Schematic diagram of Weston Model 662 Oscillator. Though not shown, both "A" and "B" batteries are securely fastened inside the case, the latter fitting into a cast aluminum frame. The batteries used are of standard type, procurable anywhere. Note "Low Output" and "High Output" pin-jacks



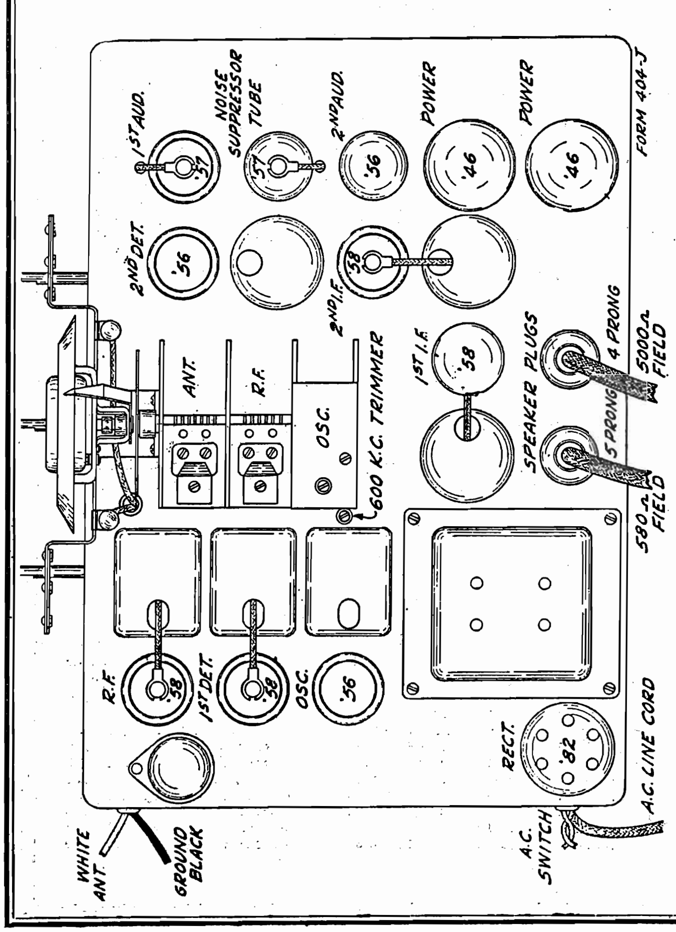
The schematic diagram of the Weston Model 663 Volt-Ohmmeter. The value of each resistor is given as well as the various terminal markings which will be found on the panel of the instrument

WHOLESALE RADIO SERVICE CO., INC.

MODEL L-1
Schematic
Chassis Layout
Voltage



I.F. Peak 175 KC



Voltages at Sockets

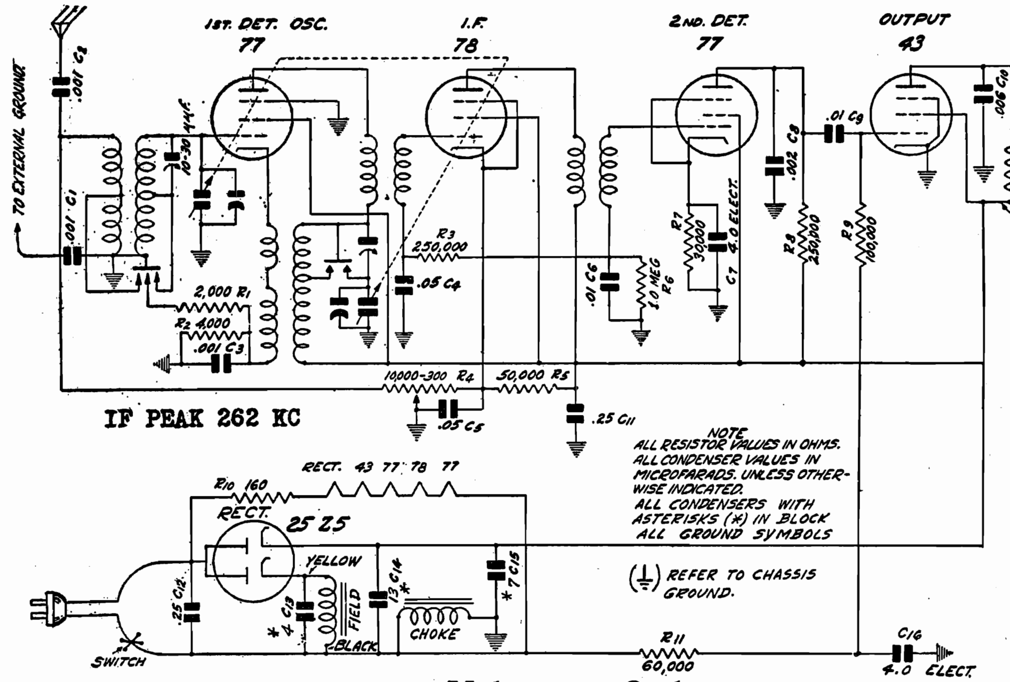
LINE VOLTAGE 115—ANTENNA SHORTED TO GROUND—NOISE SUPPRESSOR AT MAXIMUM CLOCKWISE POSITION

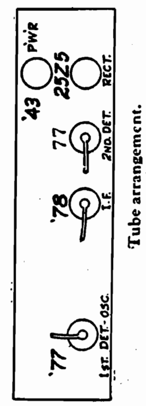
Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
58	R.F.	2.4	242	90	4 (1)	4
58	1st Det.	2.4	250	86	7 (1)	2
56	Osc.	2.4	24		0	8
58	1st I.F. (2)	2.4	252	90	4 (1)	4
58	2nd I.F. (2)	2.4	254	91	3	5.7
56	2nd Det.	2.4	0		0	0
57	1st Audio	2.4	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.

MODEL L-20
05A Series

WHOLESALE RADIO SERVICE CO., INC.





Tube arrangement.

Voltages at Sockets

Antenna lead connected to ground lead (not external ground).—Volume Control at Maximum.
CAUTION—Do not put chassis on any grounded surface or let chassis touch any ground.

		A.C. Line Voltage—115. Use High Resistance A.C. Meter, Rectifier Type, for Heater Voltage Measurements					D.C. Line Voltage—110. Use High Resistance D.C. Meter for Heater Voltage Measurements				
Type of Tube	Function	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
77	1st Det. Osc.	5.8	106	106	5.2	.8	5.6	87	87	4.3	.6
78	I.F.	5.8	108	108	3.0 (1)	7.4	5.6	88	88	2.4 (1)	6.0
77	2nd Det.	5.8	65 (2)	104	6.0 (3)	.14	5.6	58 (2)	82	5.0 (3)	.11
43	Output	24.	95	110	18.0 (4)	22.0	23.0	80	90	15.0 (4)	17.0
25Z5	Rect.	24.	110 } 155 } (5)			84.0 Total	23.0	5.0 } 6.0 } (5)			74.0 Total

(1) Cathode to Ground.
(2) With 1,000,000 ohm meter—reading will be lower with lower resistance meter.
(3) Cathode to ground—read with 100,000 ohm meter.
(4) Read across filter choke.
(5) Readings from plate to two cathodes with 250,000 ohm meter

A signal generator that will provide accurately calibrated signals over the broadcast band and an output indicating meter are advisable. The procedure is as follows:

As the I.F. stages are self-tuned, no I.F. aligning at the intermediate frequency of 262 K.C. is required.

First set the signal generator for a signal of exactly 1400 K.C. Connect the antenna lead from the signal generator to the antenna lead of the receiver and the ground lead of the signal generator to the ground of the receiver. Then turn the tuning condenser rotor until the marker is at 1400 K.C. on the dial scale. In order to do this, it will be necessary to put the chassis back in the cabinet. Adjust the two trimmers on the tuning condenser for maximum

CONDENSERS

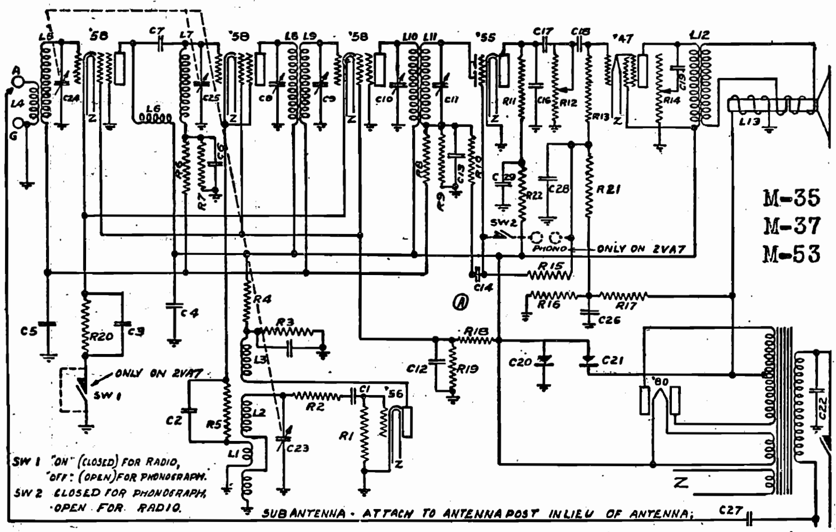
Part No.	Code	Capacity	Voltage	Type	List Price
P-80821-B	C-1	.001 mfd.	600 V.	Moulded	$0.25
P-80821-B	C-2	.001 "	600 V.	Moulded	.25
P-80905-A	C-3	.001 "	400 V.	Tubular	.15
P-80862-C	C-4	.05 "	200 V.	Tubular	.30
P-80862-C	C-5	.05 "	200 V.	Tubular	.30
P-80872-B	C-6	.01 "	600 V.	Tubular	.25
P-80936-C	C-7	4.0 "	30 V.	Electrolytic	.65
P-80914	C-8	.002 "	600 V.	Tubular	.20
P-80872-B	C-9	.01 "	600 V.	Tubular	.25
P-80898	C-10	.006 "	600 V.	Tubular	.15
P-80888-A	C-11	.25 "	200 V.	Tubular	.35
P-80888-A	C-12	.25 "	200 V.	Tubular	.35
P-80944	C-13	4.0 "	150	Elec. Block	2.15
	C-14	13.0 "	150		
	C-15	7.0 "	150		
P-80878-C	C-16	4.0 "	150 V.	Electrolytic	.80
P-1539	600 K.C. Trimmer Cond.				.45
P-80951	Short-wave antenna Trimmer				.25
P-80943	2-gang Condenser—Direct Drive (Used on early Sets)				2.25
P-80954	2-gang Condenser—Gear Drive				2.25

RESISTORS

Part No.	Code	Resistance	Type	List Price
P-A-90906	R-1	2,000 ohm	Carbon	$0.20
P-A-90947	R-2	4,000 ohm	Carbon	.20
P-A-90954	R-3	250,000 ohm	Carbon	.20
P-91019C	R-4	300-10,000 ohm	Vol. Contr. & Switch	1.40
P-A-90941	R-5	50,000 ohm	Carbon	.20
P-A-90948	R-6	1 Megohm	Carbon	.25
P-A-90956	R-7	30,000 ohm	Carbon	.20
P-A-90954	R-8	250,000 ohm	Carbon	.20
P-A-90912	R-9	100,000 ohm	Carbon	.25
P-91064	R-10	160 ohm	Armored Wire Wound	.50
P-A-91036	R-11	60.000 ohm	Carbon	.20

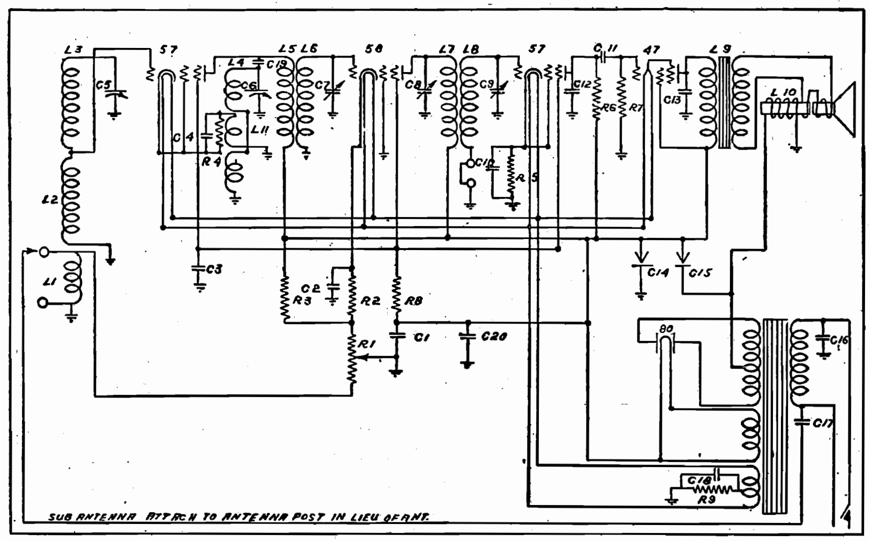
WHOLESALE RADIO SERVICE CO., INC.

MODEL M-35,37,53
MODEL M-31



Part No.		
200	R1	100,000 Ohm Oscillator Grid Resistor
475	R2	1,000 Ohm Oscillator Grid Suppressor Resistor
192	R3	40,000 Ohm Oscillator Plate Bleeder Resistor
278	R4	20,000 Ohm Oscillator Plate Resistor
282	R5	2,000 Ohm First Detector Cathode Resistor
198	R6	1 Megohm First Detector Grid Feed Resistor
91	R7	250,000 Ohm First Detector Grid Bleeder Resistor
201	R8	500,000 Ohm Diode Resistor
201	R9	500,000 Ohm Diode Resistor
200	R10	100,000 Ohm Diode Resistor
200	R11	100,000 Ohm Second Detector Plate Resistor
535	R12	500,000 Ohm Volume Control
201	R13	500,000 Ohm 47 Grid Bias Resistor
534	R14	¼ Meg. Tone Control
201	R15	500,000 Ohm Second Detector Grid Resistor
200	R16	100,000 Ohm 47 Grid Bias Network Resistor
198	R17	1 Meg. 47 Grid Bias Network Resistor
337	R18	20,000 Ohm Screen Grid Resistor (Type E)
192	R19	40,000 Ohm Screen Grid Bleeder Resistor
539	R20	150 Ohm First R.F. & First I.F. Cathode Resistor
201	R21	500,000 Ohm Grid Bias Resistor
200	R22	100,000 Ohm Second Detector Plate Resistor
339	C1	.0001 MFD. Oscillator Grid Feed Condenser
269	C2	.01 MFD. First Detector Cathode Condenser
272	C3	.1 MFD. First R.F. and First I.F. Cathode Condenser 200 Volt D.C.
266	C4	1 MFD. B+ Supply Condenser 300 Volt D. C., Paper
272	C5	.1 MFD. R.F. and I F. Grid Isolation Condenser 200 V. D.C. Paper
272	C6	.1 MFD. First Detector Grid Isolation Consender 200 V. D.C. Paper
347	C7	.00001 MFD. First R.F. Feed Condenser
	C8	75 - 150 MMFD. I.F. Tuning Condenser
	C9	75 - 150 MMFD I.F. Tuning Condenser
	C10	75 - 150 MMFD I.F. Tuning Condenser
	C11	75 - 150 MMFD. I.F. Tuning Condenser
272	C12	.1 MFD. Screen Grid By-pass Condenser 200 Volt D.C.
307	C13	.0005 MFD. Diode Condenser
269	C14	.01 MFD. Audio Feed Condenser 400 Volt D.C. Paper
339	C15	.0001 MFD. R.F. By-pass Condenser
544	C16	.001 MFD. Plate Filter Condenser 350 Volt D.C. Mica
269	C17	.01 MFD. Audio Feed Condenser
269	C18	.01 MFD. Audio Feed Condenser
552	C19	.1 MFD. Tone Control Condenser (300 V.)
533	C20	4 MFD. Electrolytic Condenser 500 Volt
533	C21	4 MFD. Electrolytic Condenser 500 Volt
269	C22	.01 MFD. 110 Primary By-pass Condenser
547	C23	350 Oscillator Variable Condenser
547	C24	365 Preselector Variable Condenser
547	C25	365 First Detector Variable Condenser
267	C26	.5 MFD. 247 Grid Bias By-pass (200 Volt)
307	C27	.0005 MFD. Subantenna Condenser
272	C28	.1 MFD. 200 Volt Grid Bias By-pass Condenser
272	C29	.1 MFD. 200 Volt Second Detector Plate By-pass
549	L1	30 Turns #36 Oscillator Coupling Winding
549	L2	83 Turns #32 Oscillator Secondary Tapped at 30 Turns
549	L3	20 Turns #36 Oscillator Plate Winding
582	L4	10 Turns #36 Ant. Coil Pri.
582	L5	115 Turns #32 Ant. Coil Sec.
179	L6	5.5 M.H. Choke Coil
588	L7	115 Turns First Detector Coil Secondary
260	L8	6,000 M.H. First I.F. Primary
260	L9	6,000 M.H. First I.F. Secondary
260	L10	6,000 M.H. Second I.F Primary
260	L11	6,000 M.H. Second I.F. Secondary
	L12	Output Transformer
	L13	2,500 Ohm Speaker Field

Model M-31



RESISTORS

Part No.		
534	R1	10,000 Ohm Potentiometer Volume Control
279	R2	500 Ohm First I.F. Cathode Resistor
494	R3	75,000 Ohm Screen Bleeder Resistor
280	R4	5,000 Ohm Cathode First Detector Cathode Resistor
192	R5	40,000 Ohm Second Detector Cathode Resistor
199	R6	100,000 Ohm Second Detector Plate Resistor
201	R7	500,000 Ohm 247 Grid Resistor
91	R8	250,000 Ohm Screen Grid Resistor
279	R9	500 Ohm 247 Grid Bias Resistor

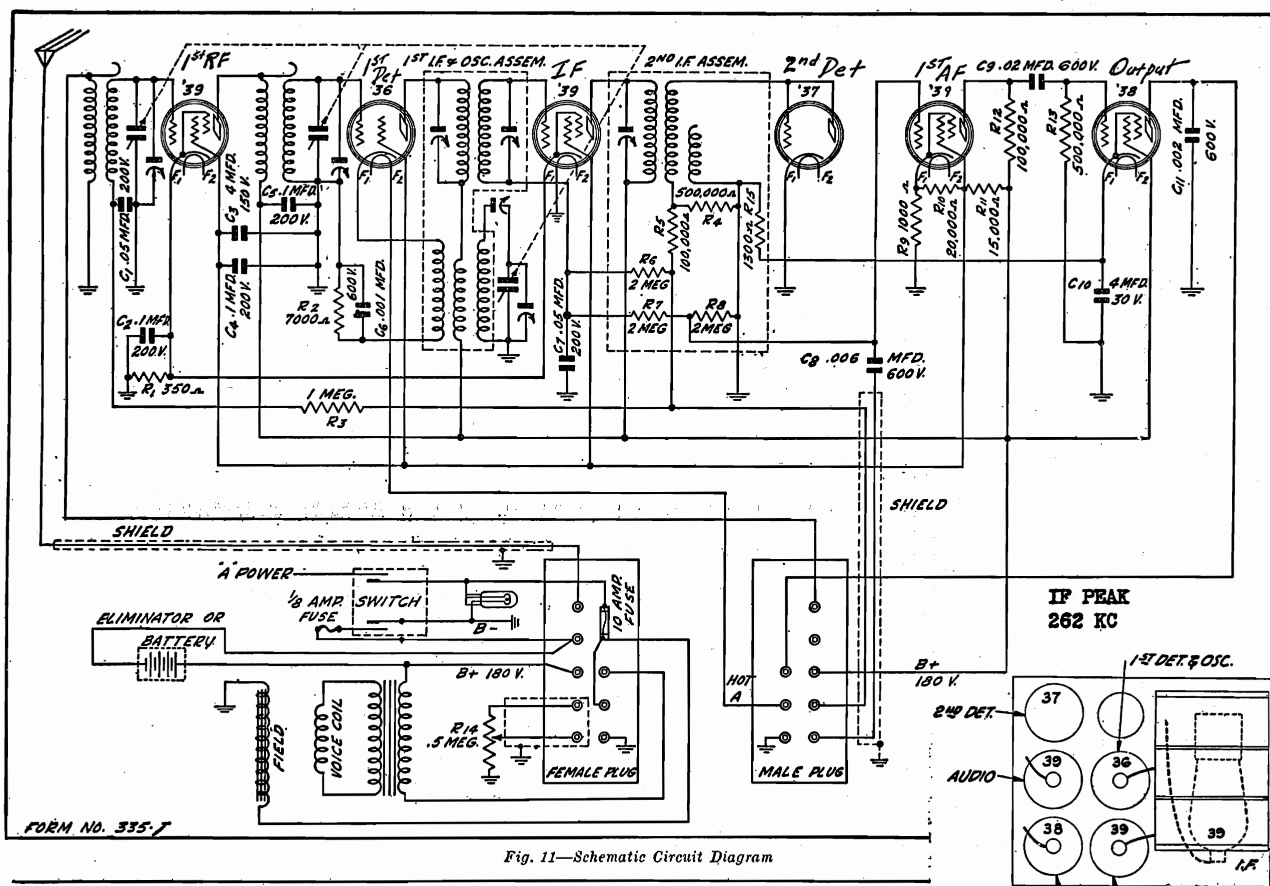
CONDENSERS

345	C1	.5 Mfd. B. Supply By-pass (300 V.)
272	C2	.1 Mfd. First I.F. Cathode Condenser
272	C3	.1 Mfd. Screen Grid By-pass Condenser
265	C4	.001 First Detector Cathode By-pass Condenser
313	C5	365 Mfd. Preselector Coil Variable Condenser
313	C6	350 Mfd. Oscillator Coil Variable Condenser
	C7	75 - 150 Mfd. Adjustable I.F. Condenser
	C8	75 - 150 Mfd. Adjustable I.F. Condenser
	C9	75 - 150 Mfd. Adjustable I.F. Condenser
183	C10	.2 Mfd. Second Detector By-pass Condenser (200 V.)
269	C11	.01 Audio Feed Condenser
265	C12	.001 Second Detector Plate By-pass Condenser
544	C13	.001 Mfd. 247 Plate By-pass Condenser
271	C14	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
271	C15	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
269	C16	.01 Primary of Power Pack By-pass Condenser
307	C17	.0005 Subantenna Feed Condenser
502	C18	.5 Mfd. 247 Grid Bias Condenser (200 V.)
339	C19	.0001 R.F. Feed Condenser
569	C20	.5 Mfd. B Supply By-pass Condenser (300 V.)

INDUCTANCE

574	L1	First Preselector Coil Primary 30 Turns No. 36 Enamel Wire
574	L2	First Preselector Coil Secondary 53 Turns No. 32 Enamel Wire
574	L3	Second Preselector Coil Secondary 52 Turns No. 32 Enamel Wire
576	L4	Oscillator Coil Secondary 87 Turns tapped at 30 Turns Spaced at ¼"
259	L5	First I.F. Transformer Primary 6 M.H.
259	L6	First I.F. Transformer Secondary 6 M.H.
260	L7	Second I.F. Transformer Primary 6 M.H.
260	L8	Second I.F. Transformer Secondary 6 M.H.
	L9	Output Transformer
	L10	Speaker Field 1,000 Ohm
	L11	Oscillator Coil Primary 10 Turns No. 36 Enamel Wire

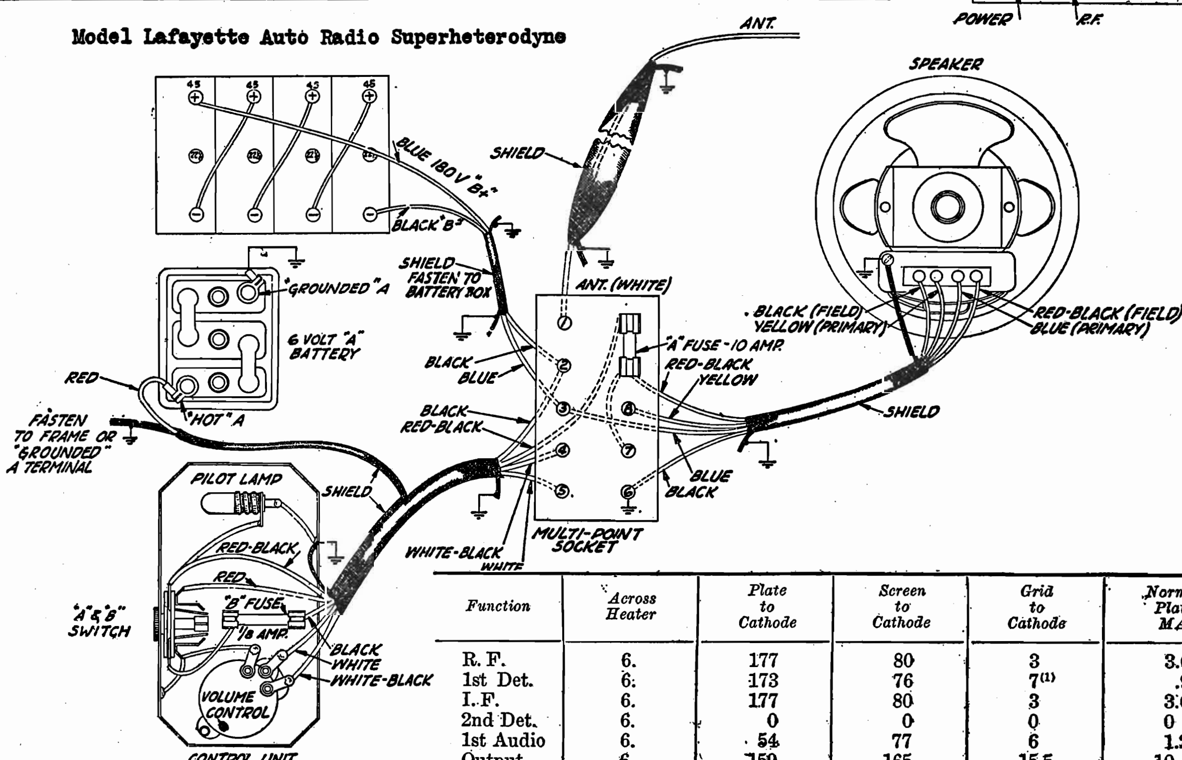
MODEL Auto Radio
Superheterodyne WHOLESALE RADIO SERVICE CO., INC.



IF PEAK
262 KC

Fig. 11—Schematic Circuit Diagram

Model Lafayette Auto Radio Superheterodyne

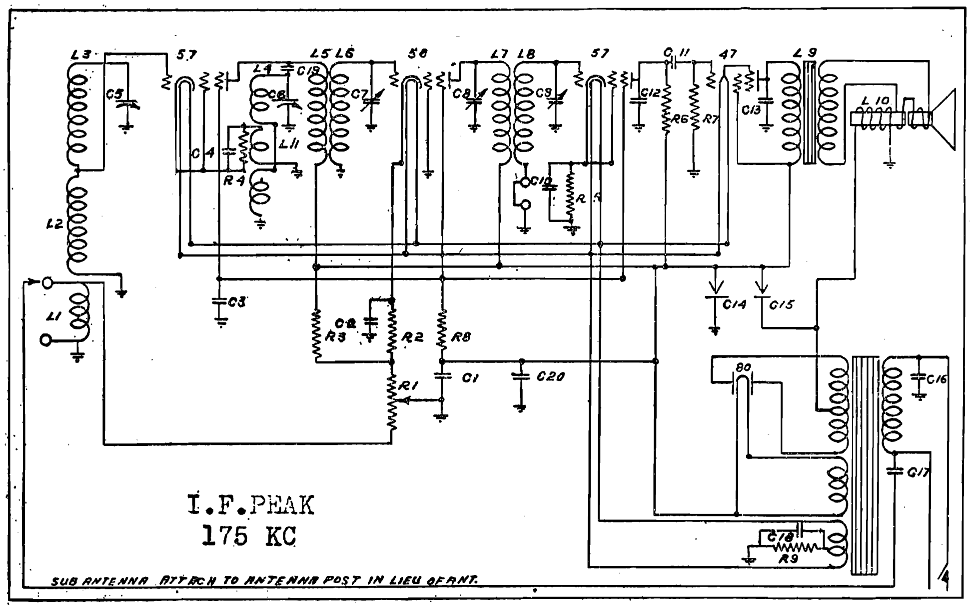


Function	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
R. F.	6.	177	80	3	3.6
1st Det.	6.	173	76	7 (1)	.9 (1)
I. F.	6.	177	80	3	3.6
2nd Det.	6.	0	0	0	0
1st Audio	6.	54	77	6	1.2
Output	6.	159	165	15.5	10

(1) Will vary with dial setting.
NOTE: All bias voltages must be read from cathode to ground.

MODEL 2-S-5

WILCOX-GAY CORP.



RESISTORS

Part No.		
534	R1	10,000 Ohm Potentiometer Volume Control
279	R2	500 Ohm First I.F. Cathode Resistor
494	R3	75,000 Ohm Screen Bleeder Resistor
280	R4	5,000 Ohm Cathode First Detector Cathode Resistor
192	R5	40,000 Ohm Second Detector Cathode Resistor
199	R6	100,000 Ohm Second Detector Plate Resistor
201	R7	500,000 Ohm 247 Grid Resistor
91	R8	250,000 Ohm Screen Grid Resistor
279	R9	500 Ohm 247 Grid Bias Resistor

CONDENSERS

345	C1	.5 Mfd. B. Supply By-pass (300 V.)
272	C2	.1 Mfd. First I.F. Cathode Condenser
272	C3	.1 Mfd. Screen Grid By-pass Condenser
265	C4	.001 First Detector Cathode By-pass Condenser
313	C5	.365 Mfd. Preselector Coil Variable Condenser
313	C6	350 Mfd. Oscillator Coil Variable Condenser
	C7	75 - 150 Mfd. Adjustable I.F. Condenser
	C8	75 - 150 Mfd. Adjustable I.F. Condenser
	C9	75 - 150 Mfd. Adjustable I.F. Condenser
183	C10	.2 Mfd. Second Detector By-pass Condenser (200 V.)
269	C11	.01 Audio Feed Condenser
265	C12	.001 Second Detector Plate By-pass Condenser
544	C13	.001 Mfd. 247 Plate By-pass Condenser
271	C14	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
271	C15	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
269	C16	.01 Primary of Power Pack By-pass Condenser
307	C17	.0005 Subantenna Feed Condenser
502	C18	.5 Mfd. 247 Grid Bias Condenser (200 V.)
339	C19	.0001 R.F. Feed Condenser
569	C20	.5 Mfd. B Supply By-pass Condenser (300 V.)

INDUCTANCE

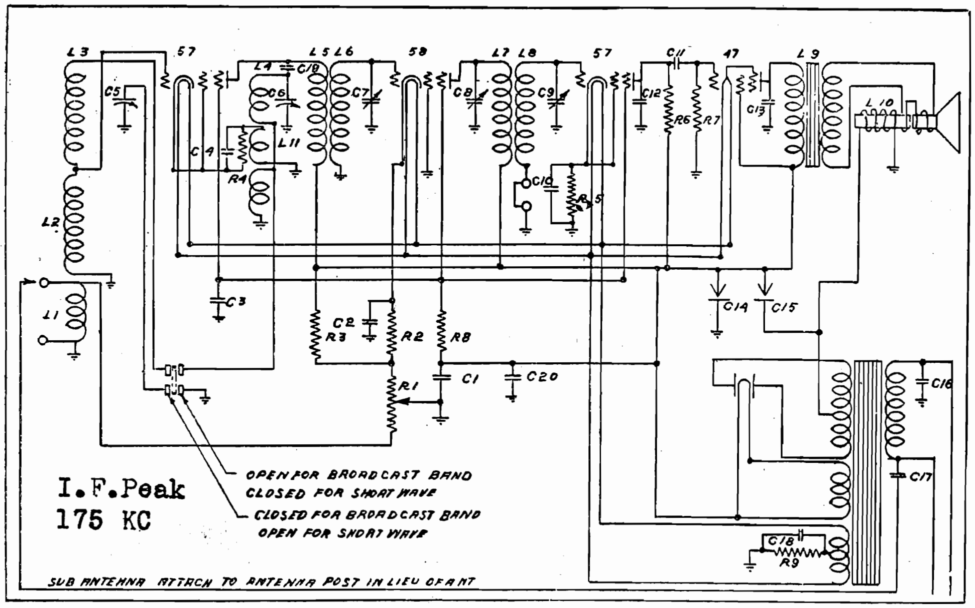
574	L1	First Preselector Coil Primary 30 Turns No. 36 Enamel Wire
574	L2	First Preselector Coil Secondary 53 Turns No. 32 Enamel Wire
574	L3	Second Preselector Coil Secondary 52 Turns No. 32 Enamel Wire
576	L4	Oscillator Coil Secondary 87 Turns tapped at 30 Turns Spaced at ¼"
259	L5	First I.F. Transformer Primary 6 M.H.
259	L6	First I.F. Transformer Secondary 6 M.H.
260	L7	Second I.F. Transformer Primary 6 M.H.
260	L8	Second I.F. Transformer Secondary 6 M.H.
	L9	Output Transformer
	L10	Speaker Field 1,000 Ohm
	L11	Oscillator Coil Primary 10 Turns No. 36 Enamel Wire

Connection to the speaker assembly is made through the means of four wires extending from the chassis to the speaker. These wires are color-coded and are attached to the speaker terminal panel as follows:

Black	- - -	Field and ground terminal
Red	- - -	Input Transformer Primary (B+)
White	- - -	Input Transformer Primary (Pentode Plate)
Yellow	- - -	Field

MODEL 2-T-5

WILCOX-GAY CORP.



RESISTORS

Part No.		
534	R1	10,000 Ohm Potentiometer Volume Control
279	R2	500 Ohm First I.F. Cathode Resistor
494	R3	75,000 Ohm Screen Bleeder Resistor
280	R4	5,000 Ohm Cathode First Detector Cathode Resistor
192	R5	40,000 Ohm Second Detector Cathode Resistor
199	R6	100,000 Ohm Second Detector Plate Resistor
201	R7	500,000 Ohm 247 Grid Resistor
91	R8	250,000 Ohm Screen Grid Resistor
279	R9	500 Ohm 247 Grid Bias Resistor

CONDENSERS

345	C1	.5 Mfd. B. Supply By-pass (300 V.)
272	C2	.1 Mfd. First I.F. Cathode Condenser
272	C3	.1 Mfd. Screen Grid By-pass Condenser
265	C4	.001 First Detector Cathode By-pass Condenser
313	C5	365 Mfd. Preselector Coil Variable Condenser
313	C6	350 Mfd. Oscillator Coil Variable Condenser
	C7	75 - 150 Mfd. Adjustable I.F. Condenser
	C8	75 - 150 Mfd. Adjustable I.F. Condenser
	C9	75 - 150 Mfd. Adjustable I.F. Condenser
183	C10	.2 Mfd. Second Detector By-pass Condenser (200 V.)
269	C11	.01 Audio Feed Condenser
265	C12	.001 Second Detector Plate By-pass Condenser
544	C13	.001 Mfd. 247 Plate By-pass Condenser
271	C14	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
271	C15	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
269	C16	.01 Primary of Power Pack By-pass Condenser
307	C17	.0005 Subantenna Feed Condenser
502	C18	.5 Mfd. 247 Grid Bias Condenser (200 V.)
339	C19	.0001 R.F. Feed Condenser
569	C20	.5 Mfd. B Supply By-pass Condenser (300 V.)

INDUCTANCE

574	L1	First Preselector Coil Primary 30 Turns No. 36 Enamel Wire
574	L2	First Preselector Coil Secondary 53 Turns No. 32 Enamel Wire
574	L3	Second Preselector Coil Secondary 52 Turns No. 32 Enamel Wire
576	L4	Oscillator Coil Secondary 87 Turns tapped at 30 Turns Spaced at ¼"
259	L5	First I.F. Transformer Primary 6 M.H.
259	L6	First I.F. Transformer Secondary 6 M.H.
260	L7	Second I.F. Transformer Primary 6 M.H.
260	L8	Second I.F. Transformer Secondary 6 M.H.
	L9	Output Transformer
	L10	Speaker Field 1,000 Ohm
	L11	Oscillator Coil Primary 10 Turns No. 36 Enamel Wire

Connection to the speaker assembly is made through the means of four wires extending from the chassis to the speaker. These wires are color-coded and are attached to the speaker terminal panel as follows:

Black - - -	Field and ground terminal
Red - - -	Input Transformer Primary (B+)
White - - -	Input Transformer Primary (Pentode Plate)
Yellow - - -	Field

ZENITH RADIO CORP.

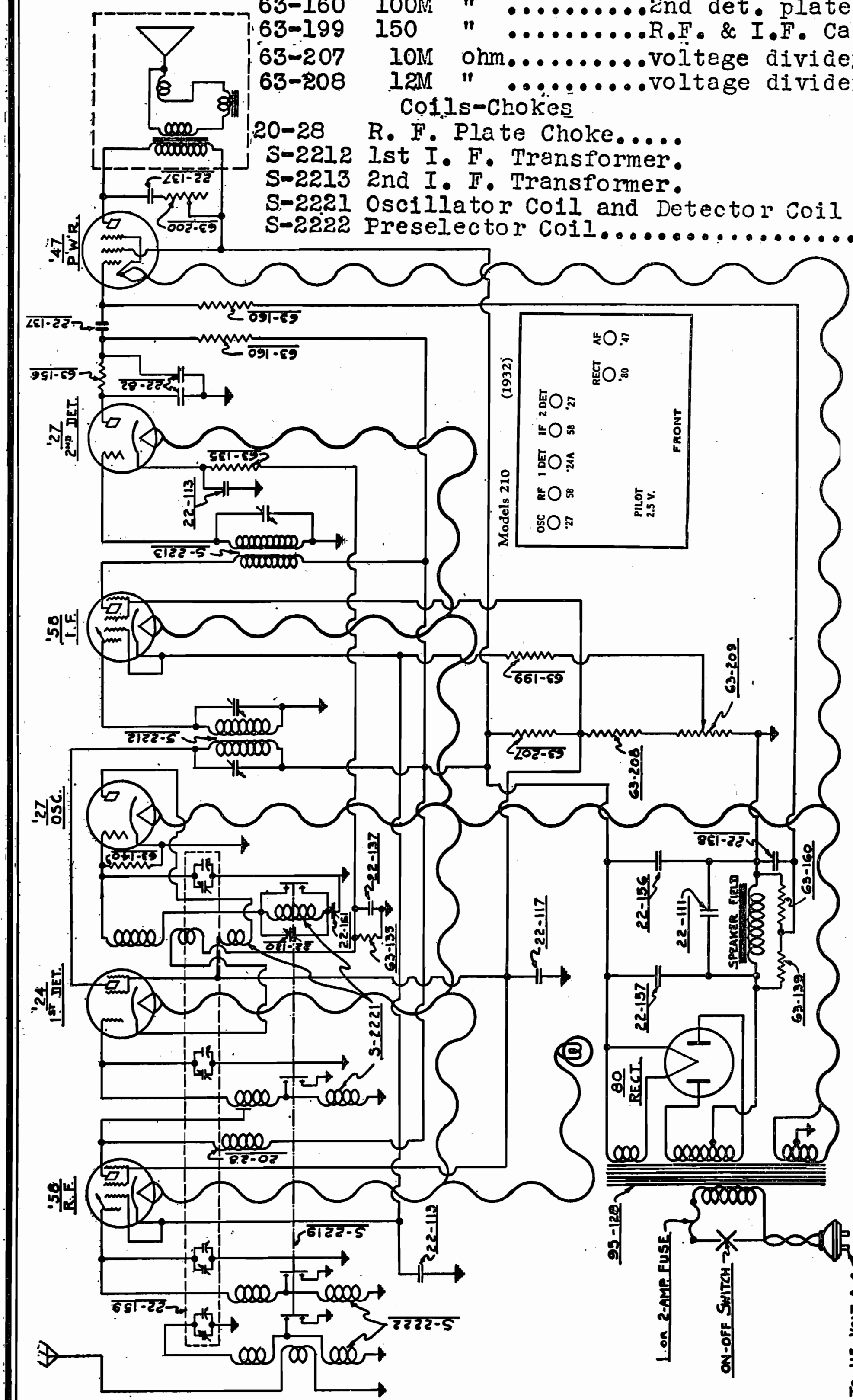
MODELS 210-5, 211-5, 270-5
Schematic

Resistors

63-135	25M	ohm	1st & 2nd Det. Cathode
63-139	500M	"	power grid
63-140	1 meg		oscillator grid
63-156	10M	ohm	2nd det. plate
63-160	100M	"	2nd det. plate power grid
63-199	150	"	R.F. & I.F. Cathode
63-207	10M	ohm	voltage divider
63-208	12M	"	voltage divider

Coils-Chokes

20-28	R. F. Plate Choke
S-2212	1st I. F. Transformer.
S-2213	2nd I. F. Transformer.
S-2221	Oscillator Coil and Detector Coil (below chassis)
S-2222	Preselector Coil (above chassis)



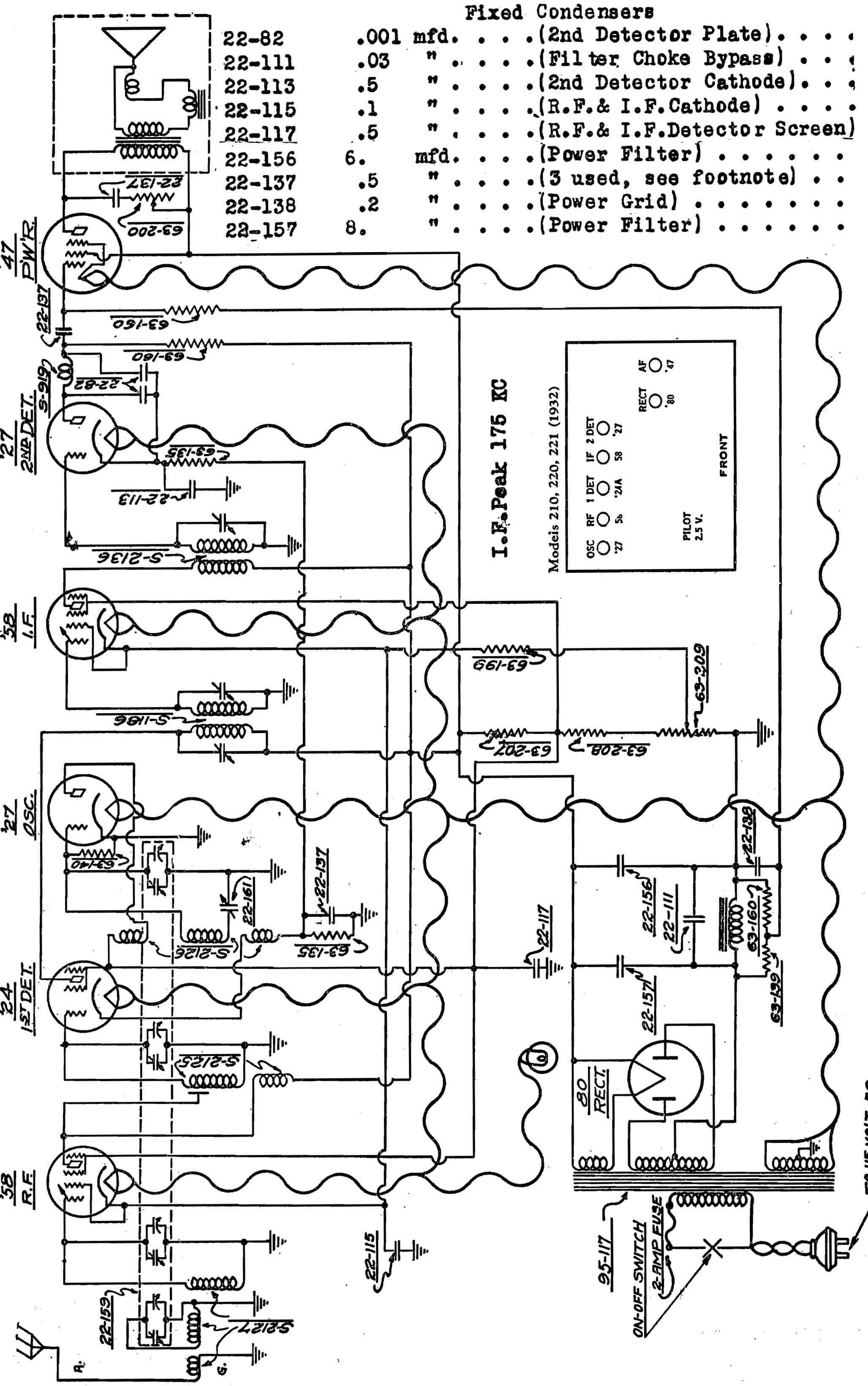
PEAK FREQUENCY
125 K.C.
200 - 2100 METERS
STANDARD AND LONG WAVE
MODELS 210-5 211-5 270-5

Condensers

22-82	.001 mfd.	500 volt	two used, 2nd det. plate
22-111	.03 "	600 "	speaker field.
22-113	.5 "	200 "	two used.
22-117	.5 "	300 "	1st Det. Screen & R.F.
22-137	.5 mfd.	400 volt	three used.
22-138	.2 "	200 "	power grid.
22-156	6. "	450 "	filter
22-157	8. "	450 "	filter
22-159	Four Gang Variable		

MODELS 210,220
Schematic

ZENITH RADIO CORP.



Fixed Condensers

22-82	.001 mfd.	(2nd Detector Plate)
22-111	.03 "	(Filter Choke Bypass)
22-113	.5 "	(2nd Detector Cathode)
22-115	.1 "	(R.F.& I.F.Cathode)
22-117	.5 "	(R.F.& I.F.Detector Screen)
22-156	6. mfd.	(Power Filter)
22-137	.5 "	(3 used, see footnote)
22-138	.2 "	(Power Grid)
22-157	8. "	(Power Filter)

Resistors

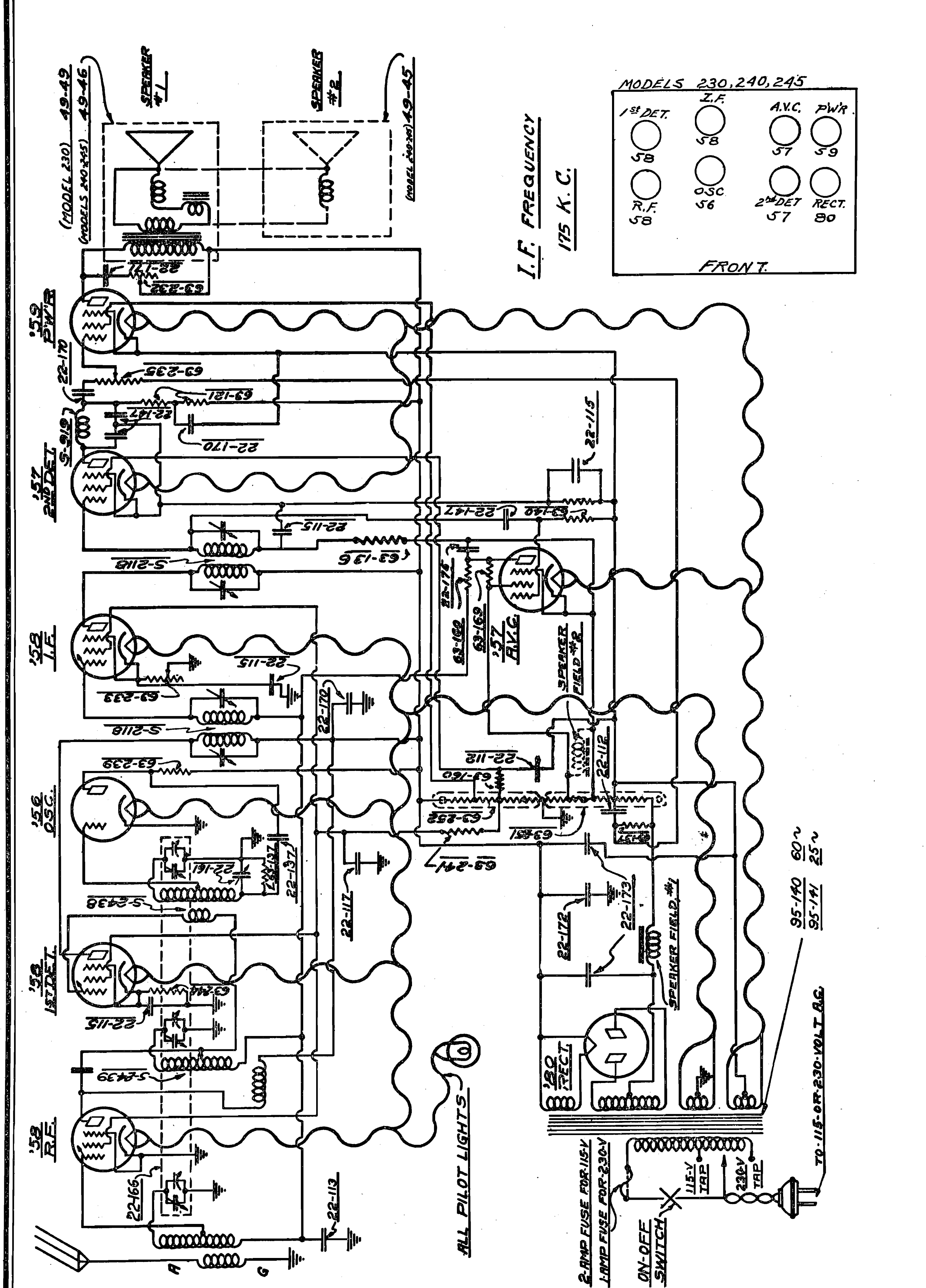
63-135	25M ohm	(1st,2nd Detector Cathode)
63-139	500M "	(Power Grid)
63-140	1meg "	(Oscillator Grid)
63-160	100M "	(2nd Det. Plate & Power Grid)
63-199	150 "	(R.F.& I.F. Cathode, Flexible)
63-207	10M ohm	(Voltage Divider, Wire Wound)
63-208	12M "	(V oltage Divider)

Coils

S-919	2nd Detector choke
S-2127	R.F.Pre-selector
S-2126	Oscillator coil
S-2125	Detector coil
S-1186	1st I.F. transformer (175 K.C.)
S-2136	2nd I.F. " (175 K.C.)

ZENITH RADIO CORP.

MODELS 230, 240, 245
Schematic



MODELS 230,240,245
Voltage
Parts List

ZENITH RADIO CORP.

Socket Voltages

Models 230-240-245

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	190	0	95	0	7.
Z-58	1st Det.	2.4	190	2.3	95	2.3	4.
Z-56	Osc.	2.4	100	0	-	-	4.
Z-58	I.F.	2.4	190	0	90	0	2.
Z-57	2nd Det.	2.4	90	-60	70	-60	.2
Z-57	A.V.C.	2.4	-10	-65	-2	-65	0
Z-59	Power	2.4	175	-70	165	-70	25
Z-80	Rect.	5.	*350	-	-	-	*36

Line 115 Volts

All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.

Resistors

63-121	100M ohm 1 Watt	(2nd Detector Plate)	.25
63-135	25M " $\frac{1}{3}$ "	(2nd Detector Cathode)	.25
63-136	50M " $\frac{1}{3}$ "	(2nd Detector Grid Return)	.25
63-137	250M " $\frac{1}{3}$ "	(Oscillator & Power Grid)	.25
63-140	1 meg " $\frac{1}{3}$ "	(A.V.C. Screen)	.25
63-160	100M " $\frac{1}{3}$ "	(A.V.C. Plate, 2nd Detector Screen)	.25
63-169	400M " $\frac{1}{3}$ "	(A.V.C. Grid)	.25
63-239	24M ohm 1 Watt	(Oscillator Plate)	.25
63-241	5M " 1 "	(R.F., 1st Detector., I.F. Screen)	.25
63-244	500 " $\frac{1}{4}$ "	(1st Detector Cathode)	.25
63-251	Voltage Divider	(six tap)	.65
63-252	Voltage Divider	(five tap)	.60

Condensers

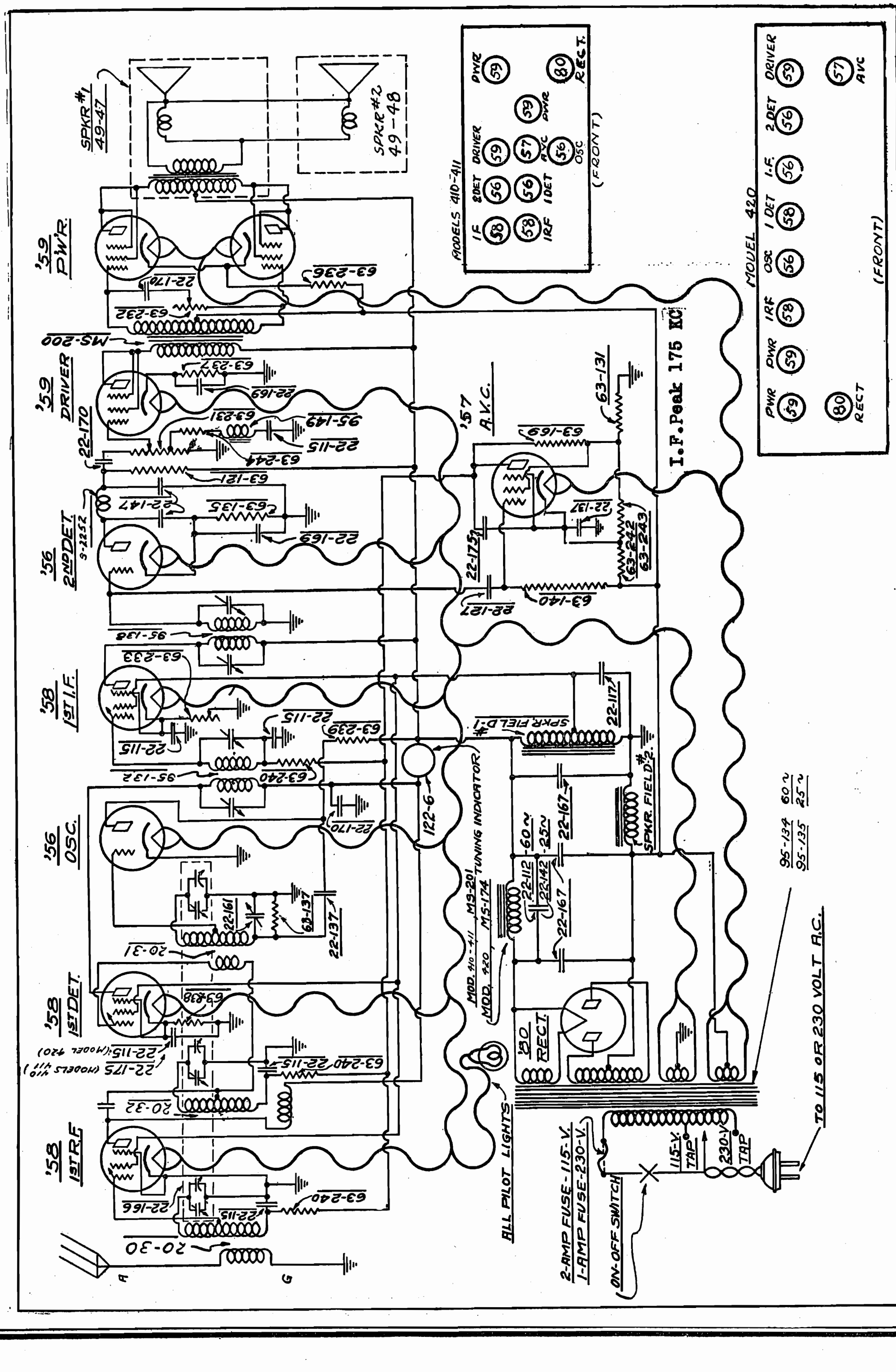
22-112	.1 mfd 300 V.	(2nd Detector Screen & Power Grid)	.25
22-113	.5 "	(R.F.1st Detector & I.F.Grid Return)	.35
*22-115	.1 " 200 V.	(Four used, see below)	.35
22-117	.5 "	(R.F.1st Detector, & I.F. Screen)	.50
22-137	.05 " 400V.	(Oscillator Plate)	.25
22-147	.0005" 600 V.	(2nd Detector Plate & AVC Screen)	.25
22-166	Three Gang Variable		3.50
22-170	.1 mfd 400 V.	(R.F. & 1st Detector Plate, 2nd Det. Plate)	.35
22-171	.05 " 600 V.	(Tone Control)	.25
22-172	2. " 450 V.	(Filter)	.60
22-173	8. " 500 V.	(Filter)	1.25
22-175	.002 " 600 V.	(A.V.C. Plate)	.25

Chokes and Coils

S-2118	I.F. Coil Assembly	1.75
S-2437	Antenna Coil Assembly	.75
S-2438	Oscillator Coil Assembly	.85
S-2439	Detector Coil Assembly	.30
S-2252	Plate Choke and Bracket Assembly	.50
S-919	2nd Detector Choke Assembly	.60

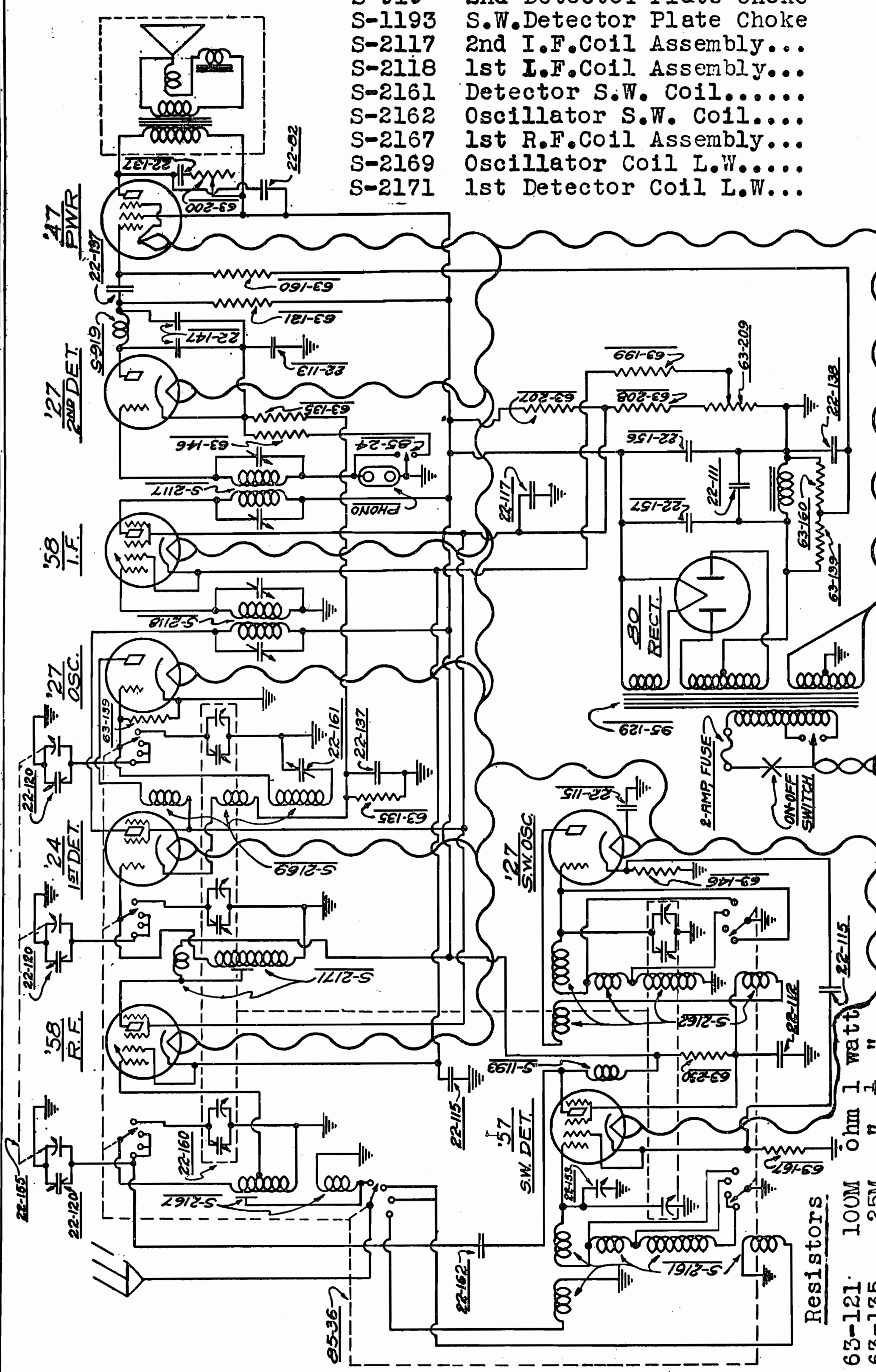
ZENITH RADIO CORP.

MODELS 410,411,420
Schematic



MODELS 250,260,272
Standard & Short-Wave
Schematic

ZENITH RADIO CORP.



Coils - Chokes

S-919	2nd Detector Plate Choke
S-1193	S.W.Detector Plate Choke
S-2117	2nd I.F.Coil Assembly...
S-2118	1st I.F.Coil Assembly...
S-2161	Detector S.W. Coil......
S-2162	Oscillator S.W. Coil....
S-2167	1st R.F.Coil Assembly...
S-2169	Oscillator Coil L.W.....
S-2171	1st Detector Coil L.W...

I.F. Peak 175.K C
S.W. 1000 K C

Resistors

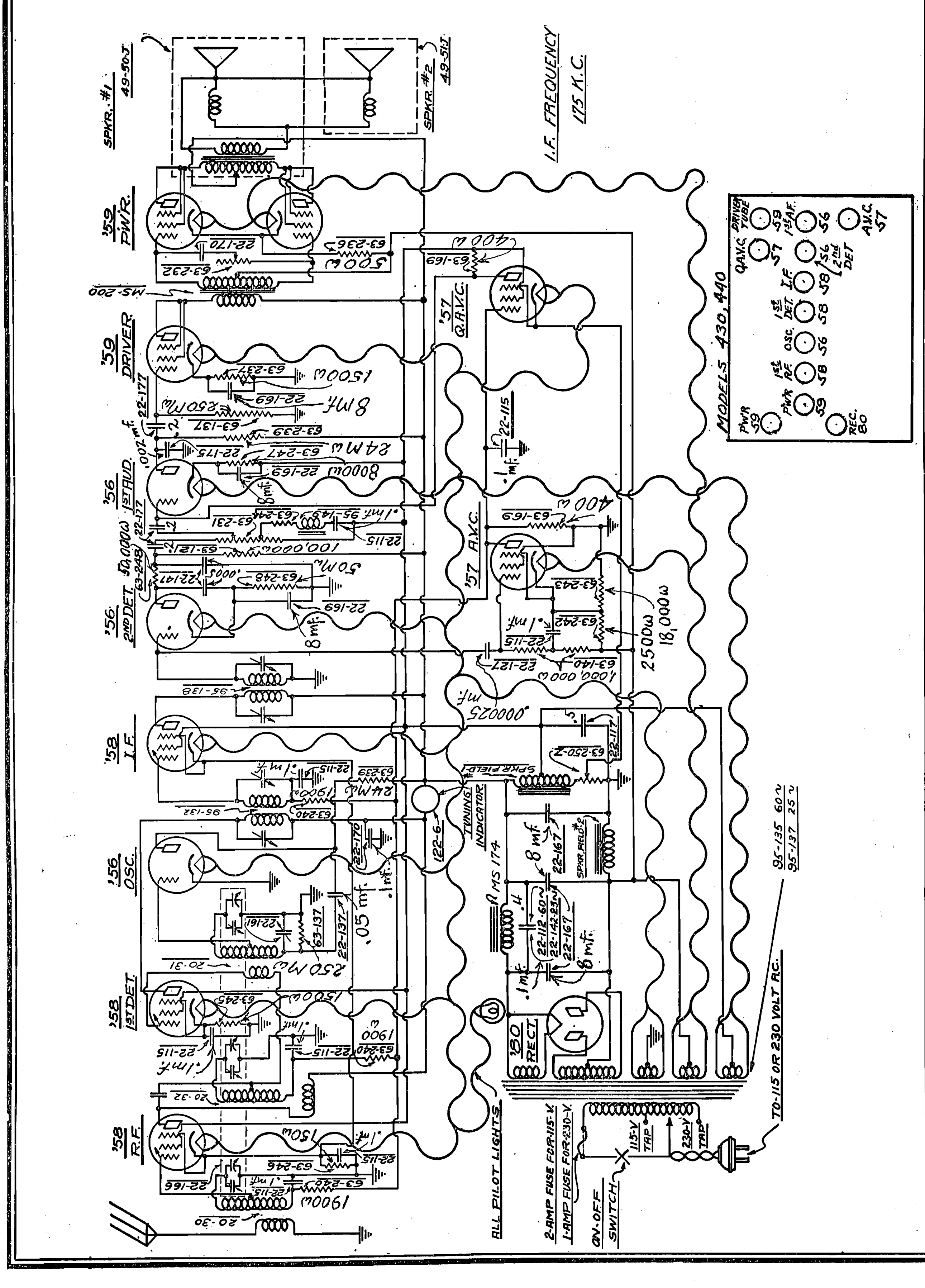
63-121	100M	ohm 1 watt
63-135	25M	" "
63-139	500M	" "
63-146	2M	" "
63-160	100M	" "
63-167	8M	" "
63-199	150	" "
63-207	10M	ohm ½ watt
63-208	12M	"
63-230	15M	ohm

Condensers

22-82	.001 mfd. 500 volt	22-137	.05 " 400 "
22-111	.03 " 600 "	22-138	.2 " 200 "
22-112	.1 " 300 "	22-147	.0005 " 600 "
22-113	.5 " 200 "	22-156	6. mfd. Electrolytic.
22-115	.1 " 200 "	22-157	8. " Electrolytic.
22-117	.5 " 300 "	22-162	.0001 mfd. 600 volt.

ZENITH RADIO CORP.

MODELS 430, 440
Schematic



MODELS 410,411,420
Chasses 2030-2043
Voltage, Data

ZENITH RADIO CORP.

Condensers

22-112	.1 mfd 300 volt	(Filter)	
22-115	.1 " 200 "	(Six used, see footnote)	
22-117	.5 " 200 "	(Filter)	
22-127	.000025 600 "	(A. V. C. Grid)	
22-137	.05mfd 400 "	(Oscillator Plate)	
22-142	.4 " 300 "	(Filter 25 Cycle Only)	
22-147	.0005 600 "	(2nd Detector Plate)	
22-167	8. mfd 500 volt	(Filter)	
22-169	8. " 50 "	(2nd Det. and Driver Cathodes)	
22-170	.1 " 400 "	(1st Det. plate, Audio Coup., Tone Control)	
22-175	.002" 600 "	(1st Det. cathode - Models 410-411 only)	

Resistors

63-121	100M ohm	1 watt	(2nd Detector Plate)
63-135	50M "	1 "	(2nd Detector Cathode)
63-137	250M "	½ "	(Oscillator Grid)
63-140	1 meg"	½ "	(A. V. C. Grid)
63-169	400 "	½ "	(A. V. C. Plate)
63-236	500 ohm		(Power Bias) (Wide Metal)
63-237	1500 "		(Driver Bias) (Narrow Metal)
63-238	1M "	¼ watt	(1st Detector Cathode)
63-239	24M "	1 "	(Oscillator Plate)
63-240	1900 "	¼ "	(R.F., 1st Detector and I.F. Grids)
63-242	2500 "	½ "	(A. V. C. Cathode)
63-243	18M "	1 "	(A. V. C. Cathode)
63-244	500 "	¼ "	(Acoustic Filter)

Socket Voltages — Models 410-411-420

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.5	220	0	100	0	5.2
Z-58	1st Det.	2.5	220	+2	100	+2	3.
Z-56	Osc.	2.5	120	0	0	*	4.
Z-58	I.F.	2.5	220	0	100	0	6.
Z-56	2nd Det.	2.5	120	20	0	*	.75
Z-57	A.V.C.	2.5	-40	-75	-2	-75	0
Z-59	Driver	2.5	220	+25	220	+220	8.2
Z-59	Power	2.5	230	-65	230	+230	25.
Z-59	Power	2.5	230	-65	230	+230	25.
Z-80	Rect.	5.0	400*				62.5*

Line 115 Volts — All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter).

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.

MODEL 701 AC-DC
Schematic, Chassis
Parts List, Notes

ZENITH RADIO CORP.

OPERATING INSTRUCTIONS

1. Carefully remove antenna wire from its compartment and stretch out full length. A properly erected well insulated outdoor antenna about 75 feet in length, including lead-in is recommended for permanent installations. A GROUND IS NOT REQUIRED.
2. After making certain that power supply is 110 volts, insert plug in receptacle.
3. Rotating VOLUME control clockwise (right) from off position turns power switch on; continued rotation increases volume. IF SET DOES NOT OPERATE IN ONE MINUTE ON DIRECT CURRENT REVERSE PLUG IN RECEPTACLE.
4. Advance volume control three-quarter turn, then select the desired station. Tune this station to the loudest point on the scale, then raise or lower volume with VOLUME control. Never regulate volume by detuning station selector; always adjust VOLUME control.

FIVE TUBES, 2—6D6, 1—75, 1—43, 1—25Z5.

SERVICE SUGGESTIONS

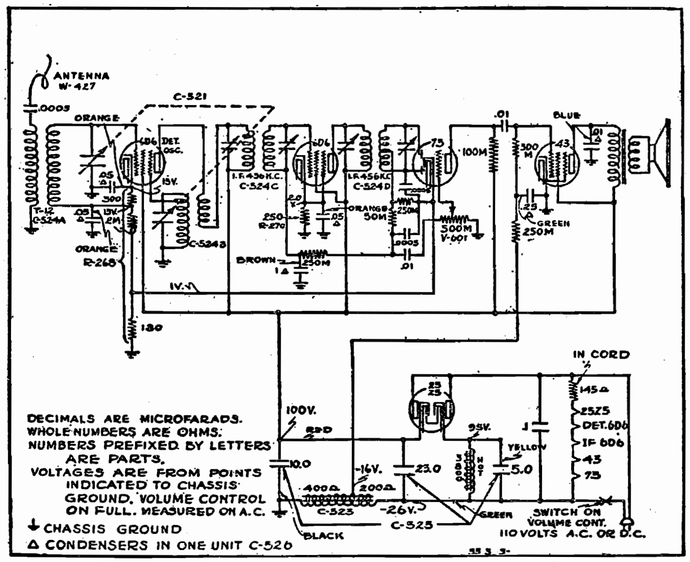
NOTE—CONNECTING CORD OF SET GETS WARM IN NORMAL OPERATION. DO NOT BECOME ALARMED.

Make sure that all tubes are pushed firmly in their proper sockets and that the clips are securely fastened to the caps on the tops of the tubes.

That the aerial is stretched out and that the connections to an outdoor antenna (if used) are good.

If necessary to change tubes or service chassis, UNDER NO CIRCUMSTANCES REMOVE BACK OR CHASSIS WITHOUT FIRST REMOVING PLUG FROM LIGHT SOCKET.

To remove chassis from cabinet, pull off knobs from front, remove back (held with screws to case) Remove four mounting screws, then chassis can be slipped out of case.



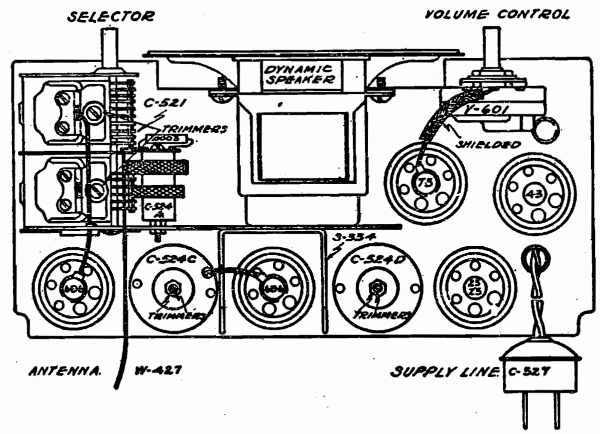
Schematic circuit diagram Model 701 AC-DC Superheterodyne, with automatic volume control

Should it be necessary, at any time, to rebalance this set the procedure is as follows: Attach a 456 kilocycle oscillator to the grid of the 6D6 tube in back of the variable condenser and adjust the trimming condensers of the I. F. transformers to maximum deflection on an output meter connected across the primary of the speaker input transformer. While adjusting these trimmers, the variable condenser should be at the maximum capacity position—at the extreme right of its rotation.

Next disconnect the antenna wire and connect an oscillator in series with a 75 mmf. condenser to the antenna coil. Rotate the condenser plates to the minimum capacity position—extreme left turn, and adjust the trimmer condenser of the rear section of the variable condenser to resonance with an oscillator set at 1725 kilocycles, then adjust the condenser of the front section of the variable condenser to resonance. Align at 1400—1200—1000—800—600—530 kilocycles, bend slotted plates of variable condenser if necessary.

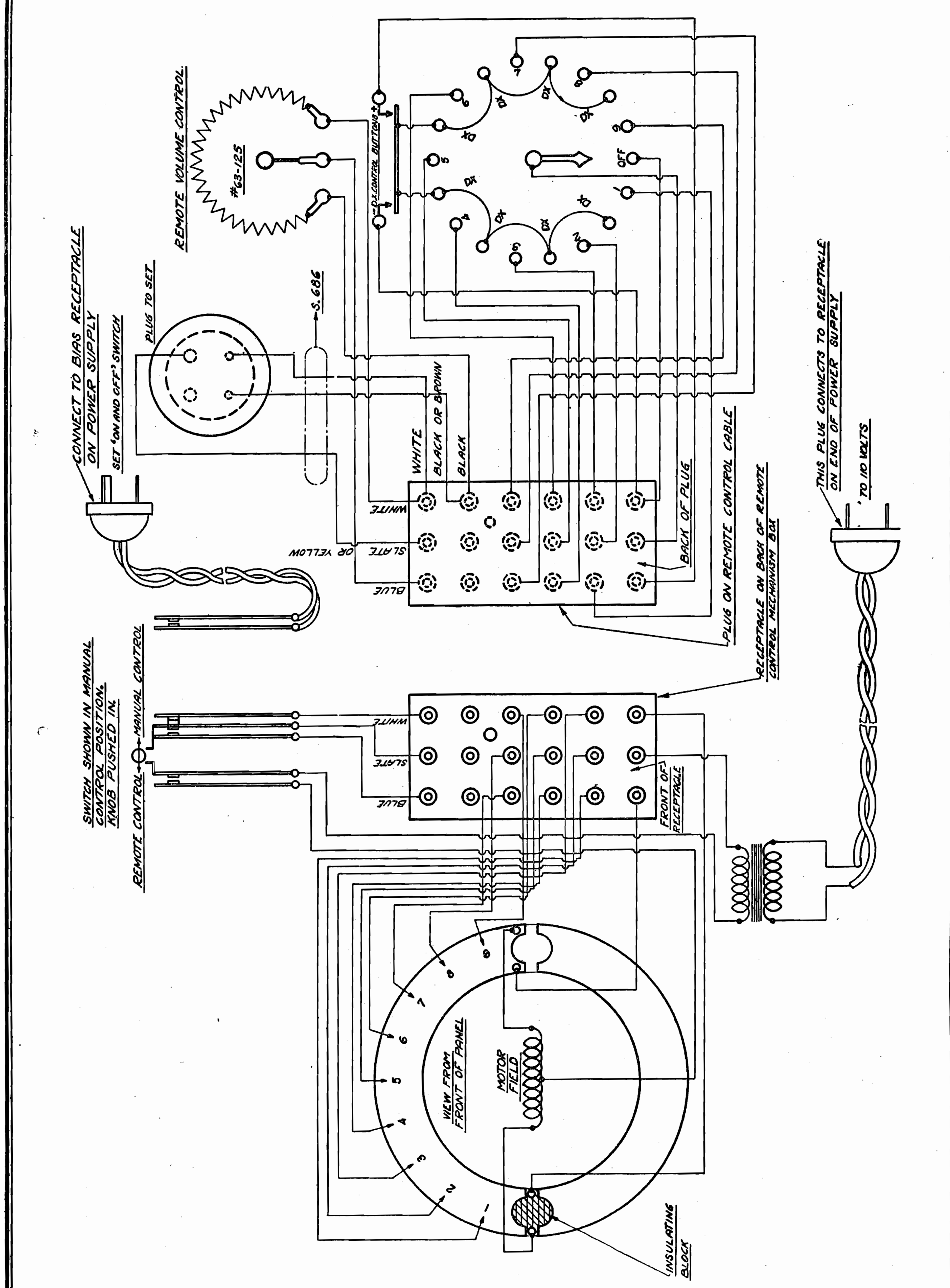
PARTS LIST

Part No.	Description	List Price
A 103	Same	
C 145	.1—300 Volt Condenser	$0.25 ea.
C 155	.0005 Mica Condenser	.20 ea.
C 521	Two Gang Condenser	2.50 ea.
C 522	.01—400 Volt Condenser	.25 ea.
C 523	600 Ohm Choke Coil	1.25 ea.
C 524A	Antenna Coil	.80 ea.
C 524B	Oscillator Coil	.70 ea.
C 524C	I. F. Transformer	1.25 ea.
C 524D	I. F. Transformer	1.25 ea.
C 525	5-25-10 Electrolytic Condenser	2.00 ea.
C 526	By-Pass Condenser Block	1.50 ea.
C 527	Special Cord and Plug	1.25 ea.
K 214	Knobs	.40 ea.
R 268	2480 Ohm Resistor	.50 ea.
R 270	250 Ohm—Wire Wound Resistor	.25 ea.
V 601	Volume Control	1.35 ea.
W427	Antenna Wire	.30 ea.
	All carbon resistors	.20 ea.
	All sockets	.20 ea.
	Dynamic speakers	5.00 ea.
	Cabinets	2.50 ea.
	Carrying cases	2.00 ea.
	Adapters for 220 volt operation	2.25 ea.



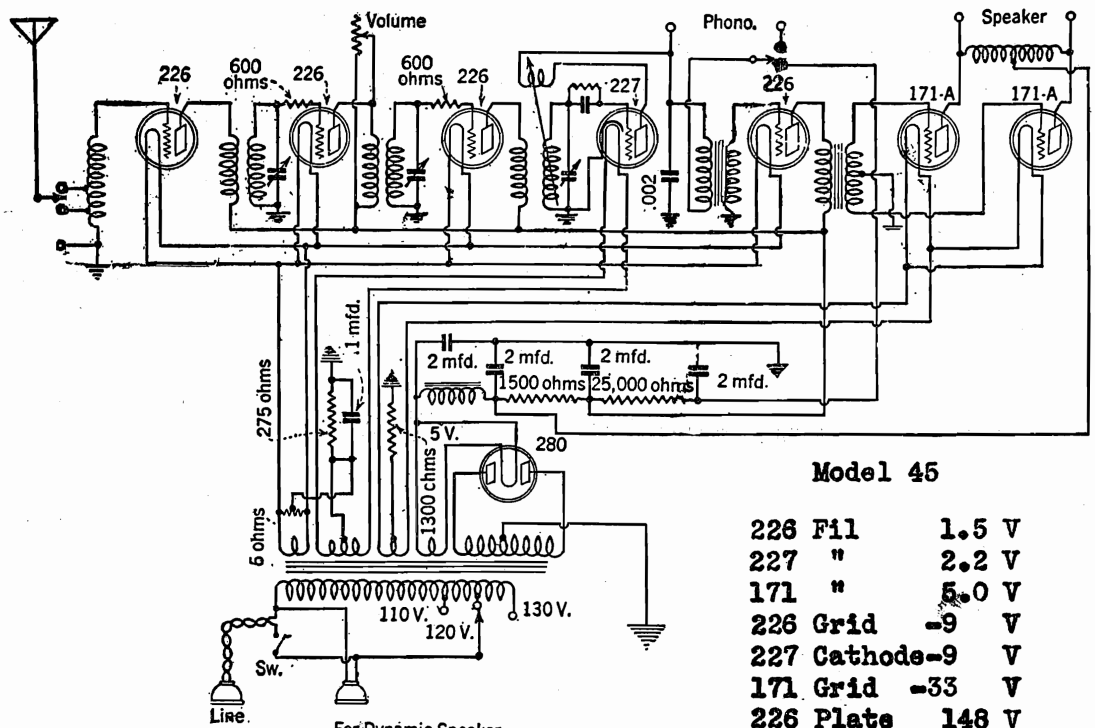
Zenith Remote Control
Schematic

ZENITH RADIO CORP.



ARBORPHONE

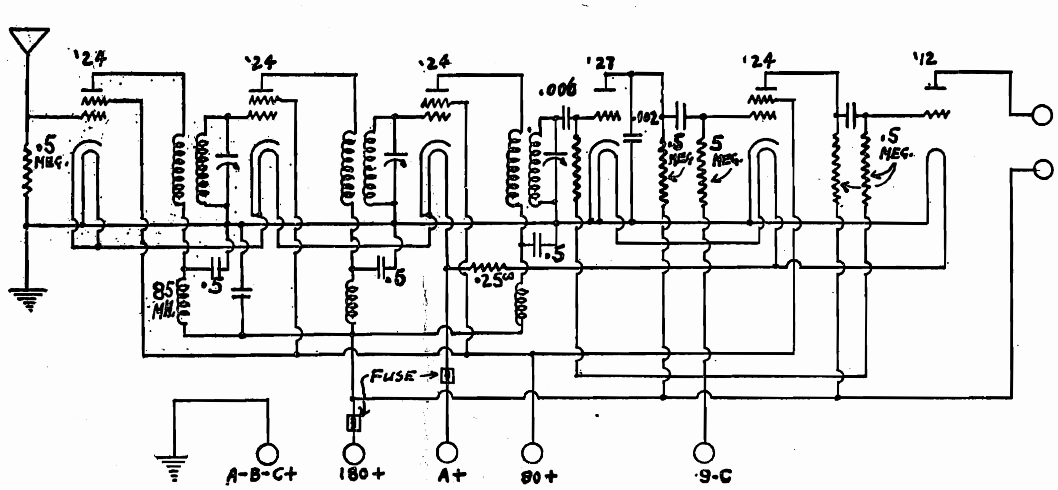
CONTINENTAL WIRELESS SUPPLY CORP.



Model Arborphone 45

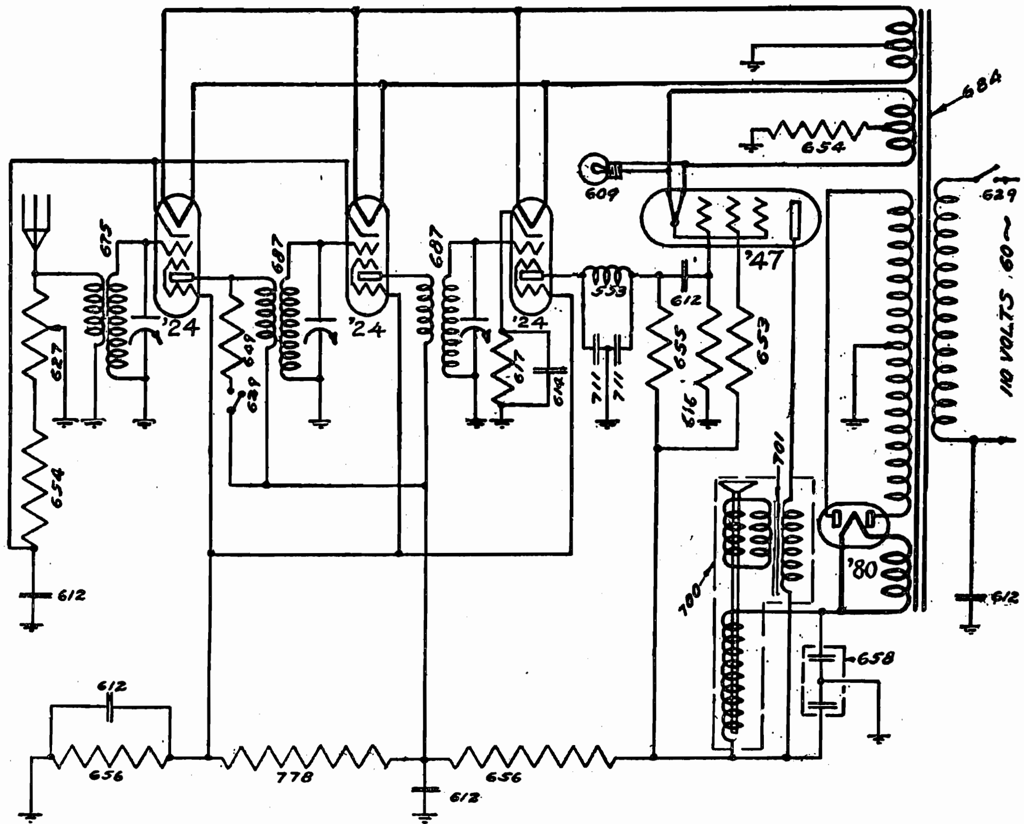
Model 45

226 Fil		1.5 V
227 "		2.2 V
171 "		5.0 V
226 Grid		-9 V
227 Cathode		-9 V
171 Grid		-33 V
226 Plate		148 V
227 "		48 V
171 "		160 V



Model "Voice of the Road"

AZTEC RADIO CO.



OPERATING VOLTAGES

All voltages are read from chassis (ground)to the respective tube elements as named.

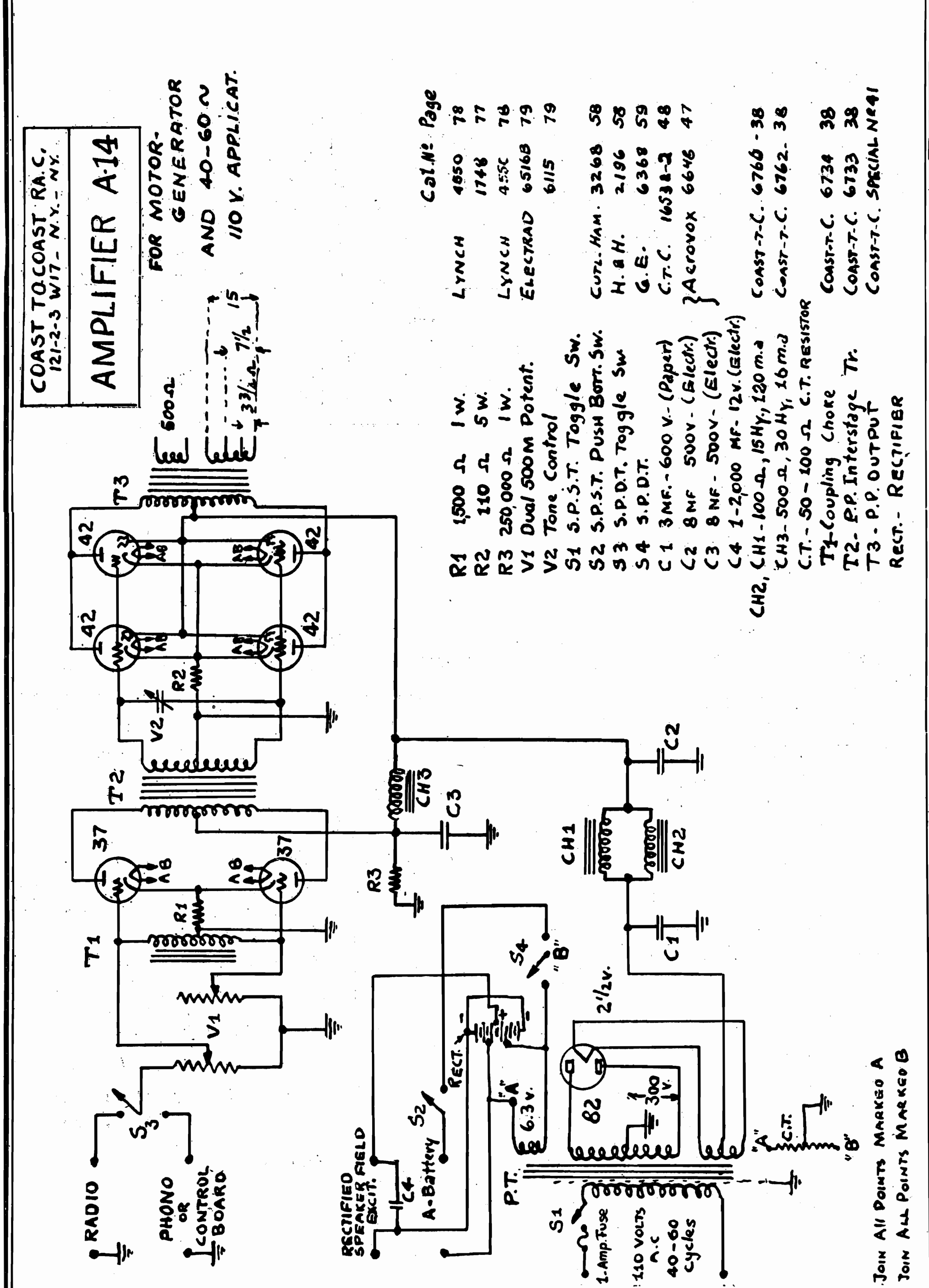
To plates of r-f tubes	130 to 150 volts
screen of r-f tubes	45 to 65 volts
cathode of r-f tubes	1.5 to 2.5 volts
plate of detector	75 to 95 volts
screen of detector	45 to 65 volts
cathode of detector	4 to 6 volts
plate of output tube	215 to 235 volts
screen of output tube	215 to 235 volts
output tube filament center tap	14 to 18 volts

R-f, Detector and Output tube filament voltage 2.3 to 2.5 volts
Rectifier filament 4.8 to 5.1 volts
Ground to rectifier plates approx. 375 volts

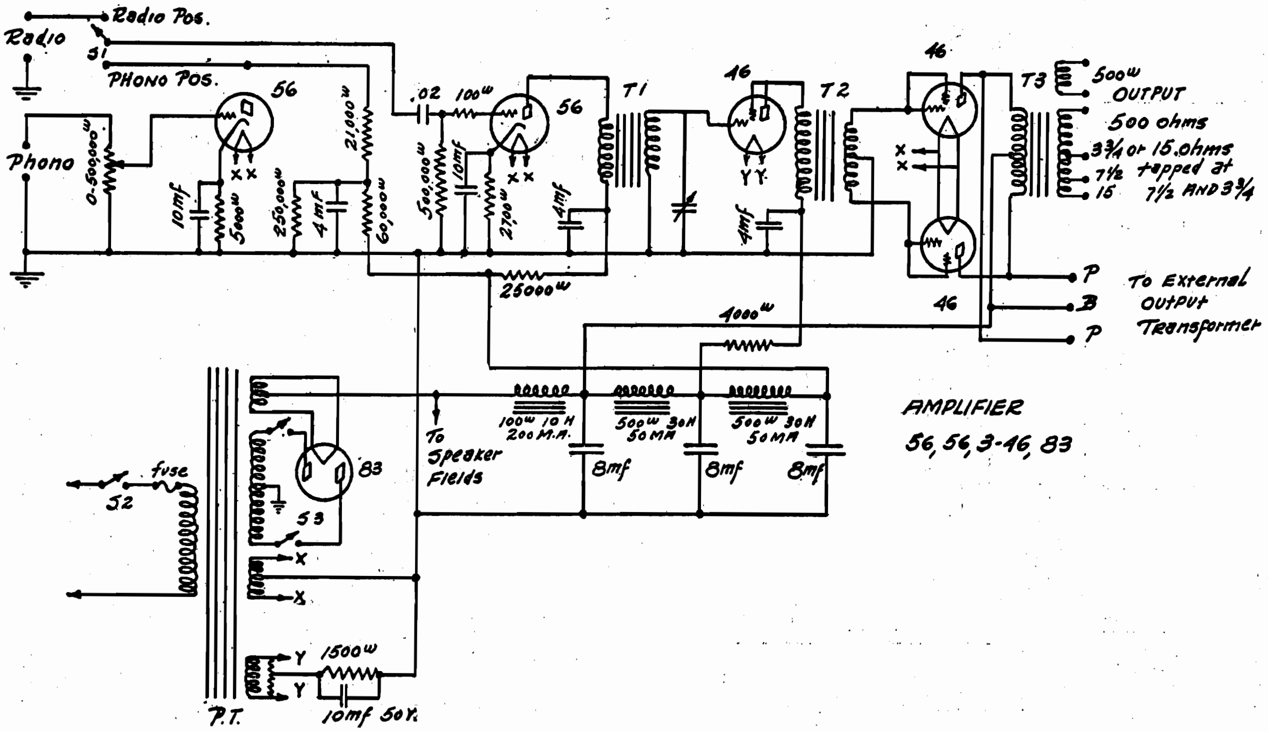
PARTS LIST

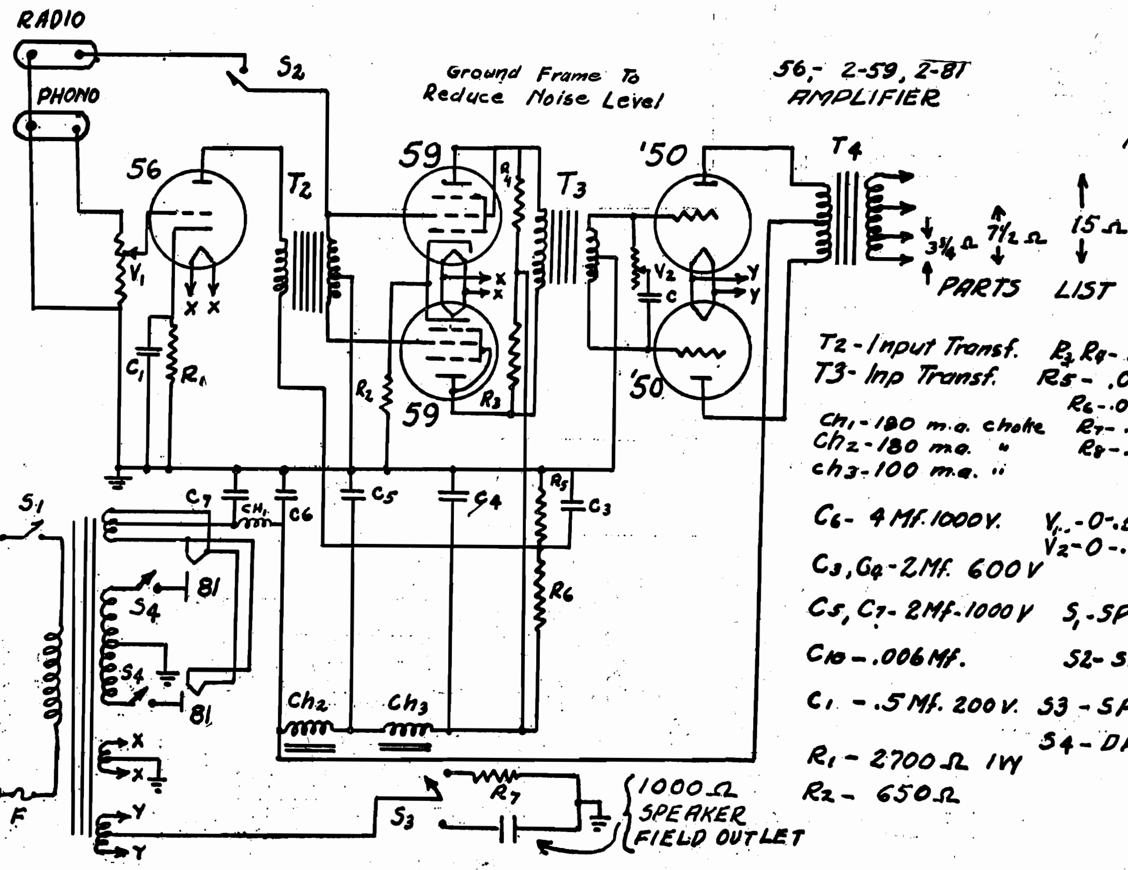
553- Choke: 609 - 2.5 volt lamp: 612 - .1 mfd: 614 - 1. mfd: 616 - 2. meg: 617 - .01 meg: 627 - .01 meg: 647 - 900 ohms: 653 - 2000 ohms : 654 - 400 ohms : 655 - .25 meg: 656 - 17,000 ohms : 658 - 16 mfd : 711 - .0001 mfd: 778 - 28,000 ohms.

COAST TO COAST



COAST TO COAST





PARTS LIST

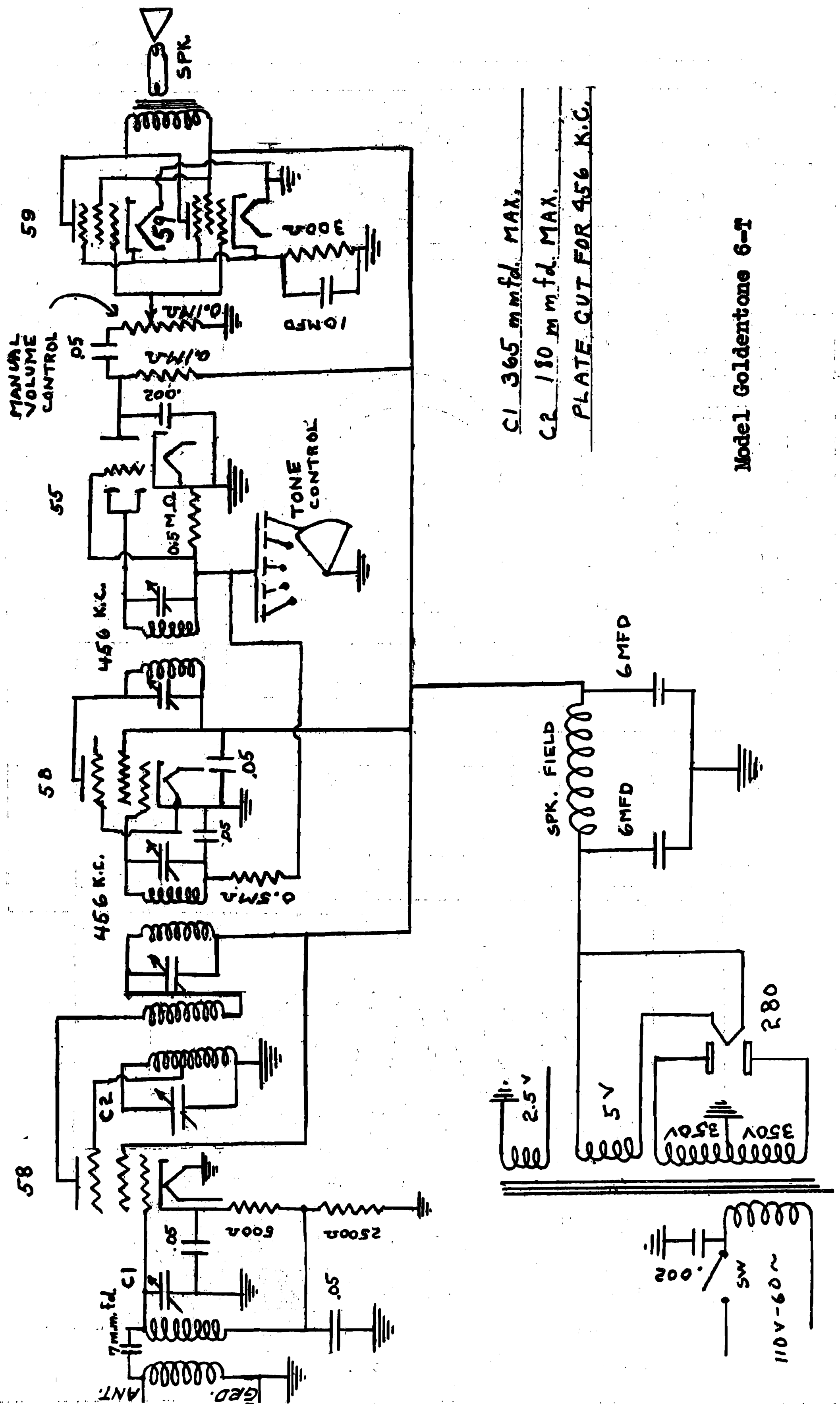
T2 - Input Transf.
T3 - Inp Transf.
Ch1 - 180 m.a. choke
Ch2 - 180 m.a. "
ch3 - 100 m.a. "

R_3, R_4 - .01M - 5W.
R_5 - .017M - 4W.
R_6 - .0075M - 5W
R_7 - .001 M - 10W.
R_8 - .010M - 1W.

C_6 - 4 Mf. 1000V.
C_3, C_4 - 2Mf. 600V
C_5, C_7 - 2Mf - 1000V
C_{10} - .006Mf.
C_1 - .5 Mf. 200V.
R_1 - 2700 Ω 1W
R_2 - 650 Ω

V_1 - 0-.5M
V_2 - 0-.25M
S_1 - SPST
S2 - SPST
S3 - SPDT
S4 - DPDT

FORDSON RADIO MFG. CO.



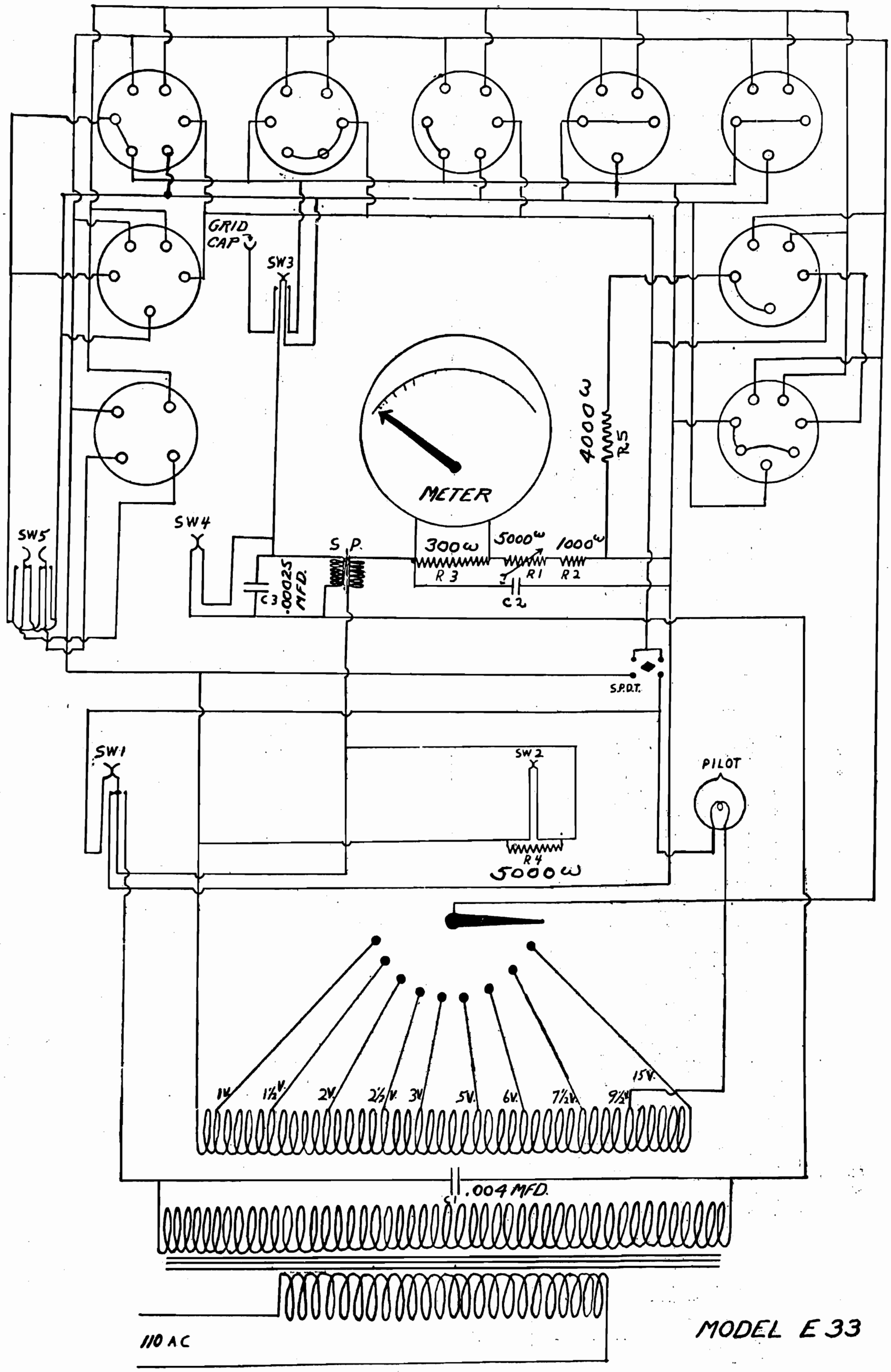
C1 365 mmfd. MAX.

C2 180 mmfd. MAX.

PLATE CUT FOR 456 K.C.

Model Goldentone 6-T

L & L ELECTRIC COMPANY



MODEL E 33

REPUBLIC INDUSTRIES

Model MS & Jr.

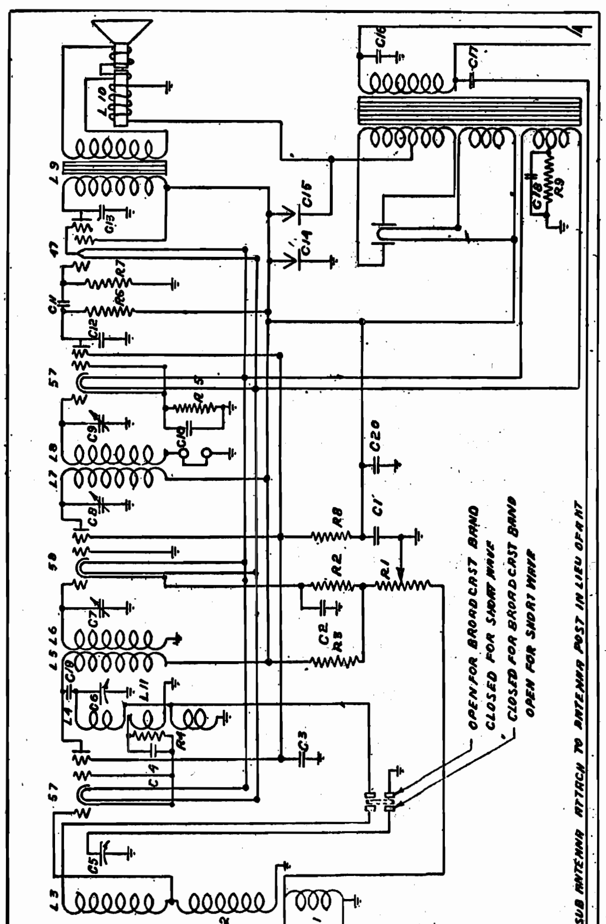
In spite of the use of full size standard parts throughout, a very compact chassis is made possible by mounting the filter system as a part of the speaker. The speaker itself is a standard dynamic type with an 800 ohm field and a neutralizing coil for the reduction of hum. The impedance of the input transformer is matched to that of the single pentode output tube used in this set. Connection to the speaker assembly is made through the means of four wires extending from the chassis to the speaker. These wires are color-coded and are attached to the speaker terminal panel as follows:

Black - - - Field and ground terminal
Red - - - Input Transformer Primary (B+)
White - - - Input Transformer Primary (Pentode Plate)
Yellow - - - Field

Adjustments

There are five adjustable condensers on this radio set. Two of these are variable condenser trimmers located at the top of the condenser. The other three tune the intermediate transformer windings and the adjusting screws are reached through openings in the transformer shields from the back of the chassis.

These condensers are carefully set at the factory and ordinarily will need no further adjustment throughout the life of the set. In any case the owner should allow no one except a highly skilled service man equipped with the necessary apparatus to make an adjustment of any of these condensers.



RESISTORS

Part No.		
534	R1	10,000 Ohm Potentiometer Volume Control
279	R2	500 Ohm First I.F. Cathode Resistor
494	R3	75,000 Ohm Screen Bleeder Resistor
280	R4	5,000 Ohm Cathode First Detector Cathode Resistor
192	R5	40,000 Ohm Second Detector Cathode Resistor
199	R6	100,000 Ohm Second Detector Plate Resistor
201	R7	500,000 Ohm 247 Grid Resistor
91	R8	250,000 Ohm Screen Grid Resistor
279	R9	500 Ohm 247 Grid Bias Resistor

CONDENSERS

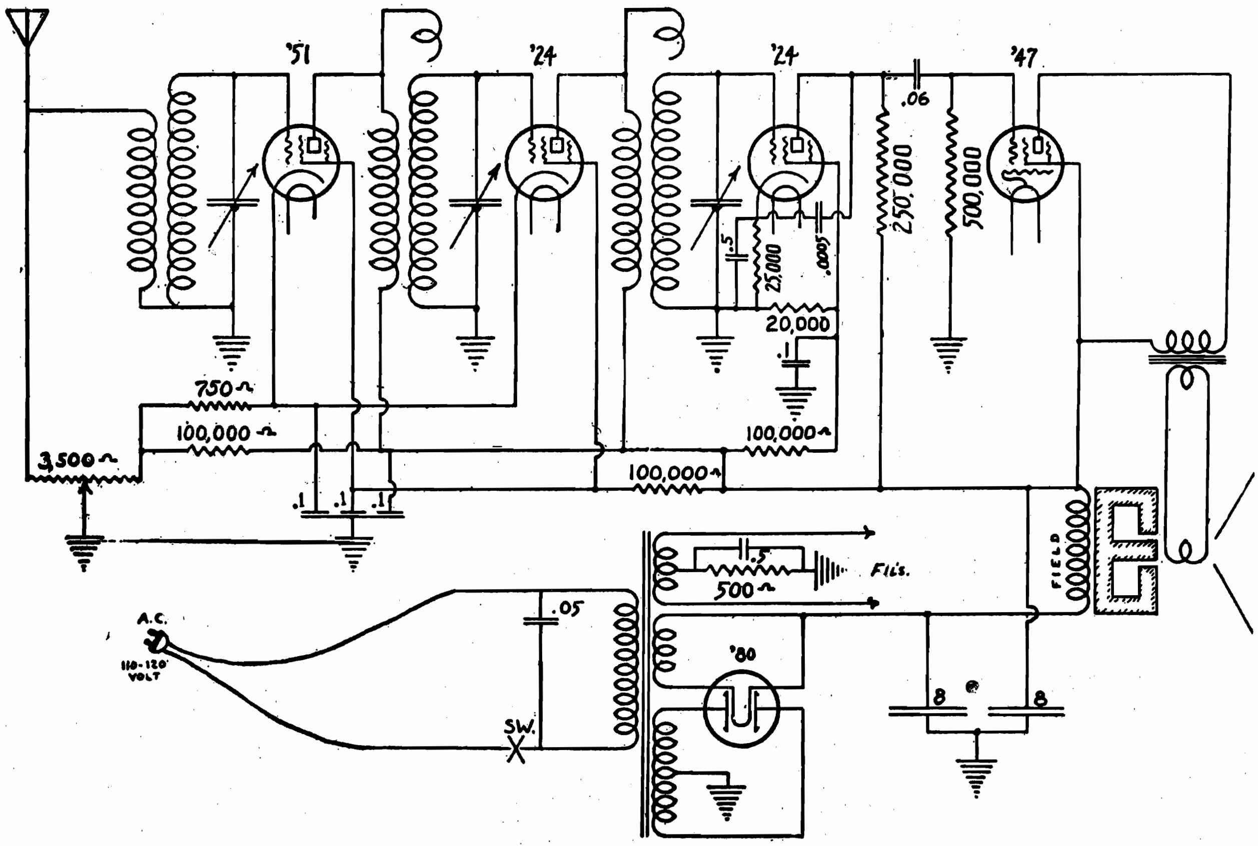
Part No.		
345	C1	.5 Mfd. B. Supply By-pass (300 V.)
272	C2	.1 Mfd. First I.F. Cathode Condenser
272	C3	.1 Mfd. Screen Grid By-pass Condenser
265	C4	.001 First Detector Cathode By-pass Condenser
313	C5	365 Mfd. Preselector Coil Variable Condenser
313	C6	350 Mfd. Oscillator Coil Variable Condenser
	C7	75 - 150 Mfd. Adjustable I.F. Condenser
	C8	75 - 150 Mfd. Adjustable I.F. Condenser
	C9	75 - 150 Mfd. Adjustable I.F. Condenser
183	C10	.2 Mfd. Second Detector By-pass Condenser (200 V.)
269	C11	.01 Audio Feed Condenser
265	C12	.001 Second Detector Plate By-pass Condenser
544	C13	.001 Mfd. 247 Plate By-pass Condenser.
271	C14	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
271	C15	4 Mfd. Filter Dry Electrolytic Condenser 450 Volt
269	C16	.01 Primary of Power Pack By-pass Condenser
307	C17	.0005 Subantenna Feed Condenser
502	C18	.5 Mfd. 247 Grid Bias Condenser (200 V.)
339	C19	.0001 R.F. Feed Condenser
569	C20	.5 Mfd. B Supply By-pass Condenser (300 V.)

INDUCTANCE

Part No.		
574	L1	First Preselector Coil Primary 30 Turns No. 36 Enamel Wire
574	L2	First Preselector Coil Secondary 53 Turns No. 32 Enamel Wire
574	L3	Second Preselector Coil Secondary 52 Turns No. 32 Enamel Wire
576	L4	Oscillator Coil Secondary 87 Turns tapped at 30 Turns Spaced at ¼"
259	L5	First I.F. Transformer Primary 6 M.H.
259	L6	First I.F. Transformer Secondary 6 M.H.
260	L7	Second I.F. Transformer Primary 6 M.H.
260	L8	Second I.F. Transformer Secondary 6 M.H.
	L9	Output Transformer
	L10	Speaker Field 1,000 Ohm
	L11	Oscillator Coil, Primary 10 Turns No. 36 Enamel Wire

STUDEBAKER LABORATORIES

Model 31

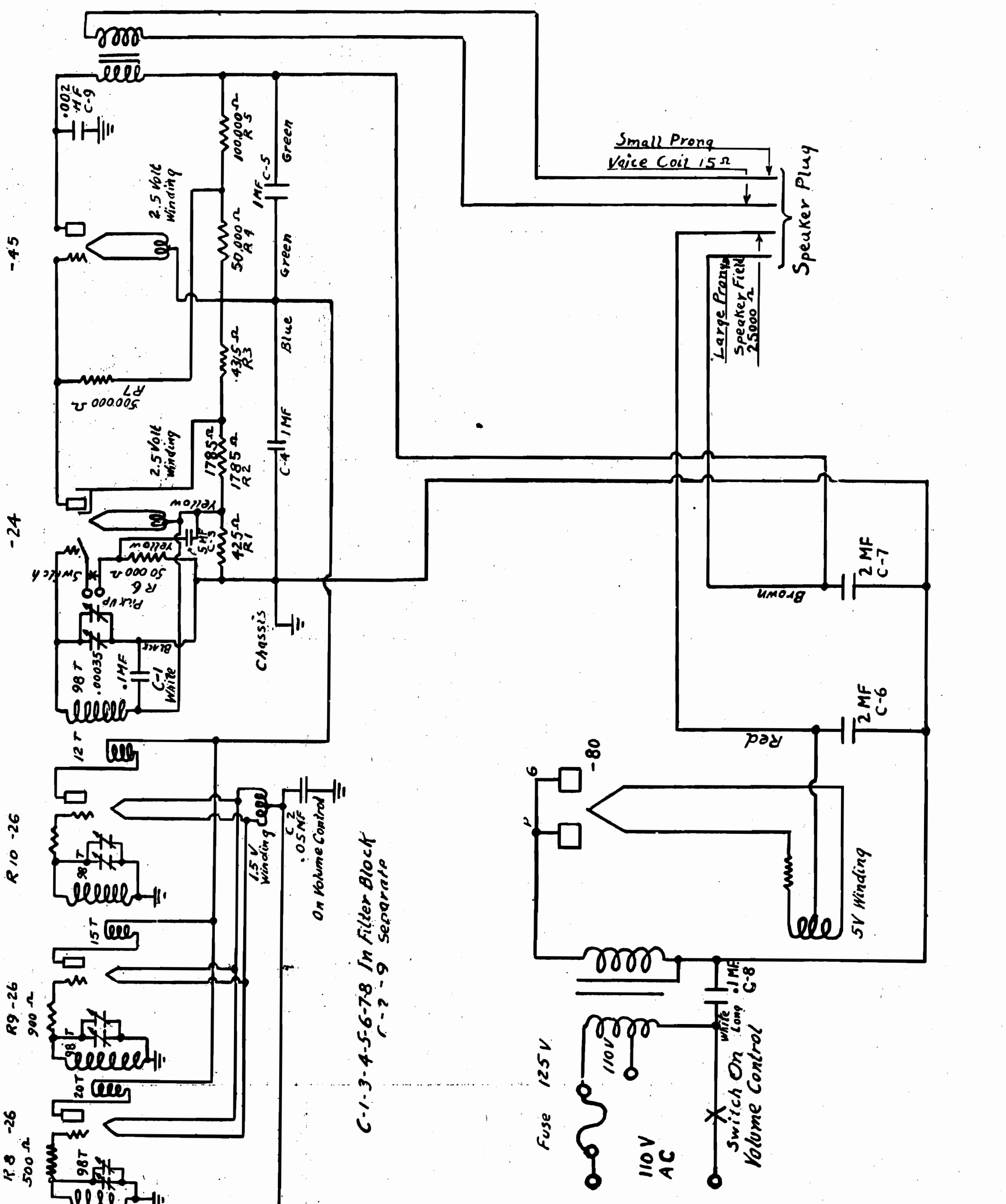


No	Name	No	Name
P100	Coils (Set 3 matched)	P112	Resistor (20,000 & 500,000)
P101	Condenser (3 gang, tuning)	P113	" (100,000 & 250,000)
P102	" (By Pass bank)	P114	" (25,000 & 500)
P103	" (.06 Coupling)	P115	" (100,000)
P104	" (.0005 By Pass)	P116	" (750)
P105	" (.05 Line)	P117	Socket (551)
P106	" (8 Mfd. Filter)	P118	" (224)
P107	Dial Plate	P119	" (247 Pent)
P108	Knobs	P120	" (280)
P109	Pilot Lamp	P121	Speaker
P110	Posts (Ant. and Grd.)	P122	Transformer (Power)
P111	Resistor (100,000 & 50,000)	P123	Volume Control and Switch

Tube	Fil.	Plate	Screen	Bias "On"	Bias "Off"
1st. R. F.	2.5	185	88	5	16
2nd R. F.	2.5	176	89	5	16
Det.	2.5	120*	32	4*	4
Pentode	2.5	192	208	16	16
Rect.	5.0	.....	.....	....	....

MODEL "Mighty Midget" (50 and 70)

MASTER RADIO MFG. CO., LTD.



Normal Voltages. (Readings on Supreme 400-B N4 Diagnometer)

	Plate V.	Grid V.	Plate Ma.	S.G.V.
1st R.F.	150	- 6.0	4.0	
2nd " "	do	do	do	
3rd " "	do	do	do	
Det.	13.	- 2.0	.5	plus 45.0
Output	250	-47.0	35.0	

WARNER ENGINEERING CORP., LTD.

MODEL
Qualiphone R-34