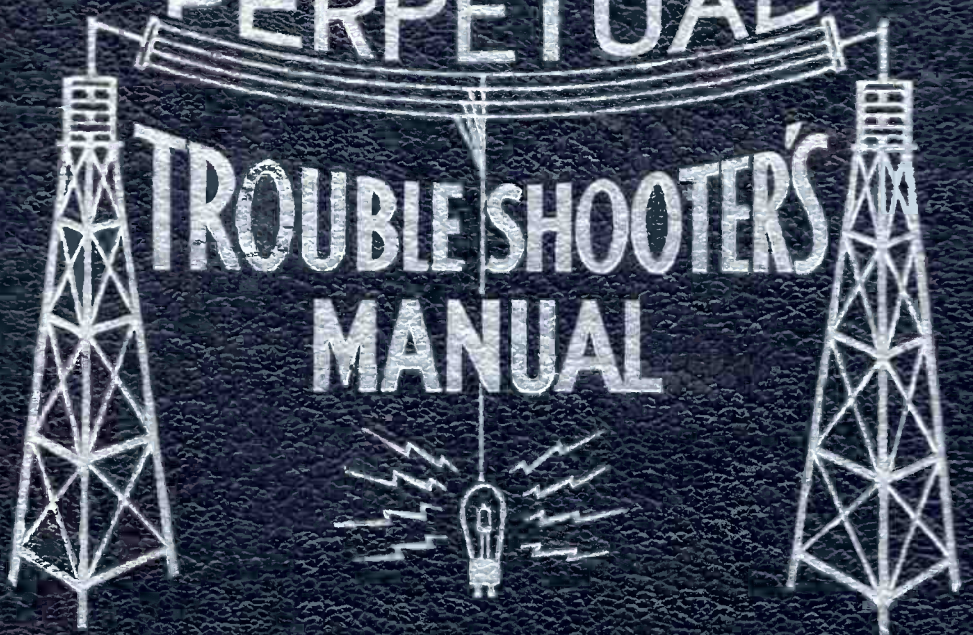
VOLUME III

PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

PERPETUAL

TROUBLE SHOOTER'S MANUAL

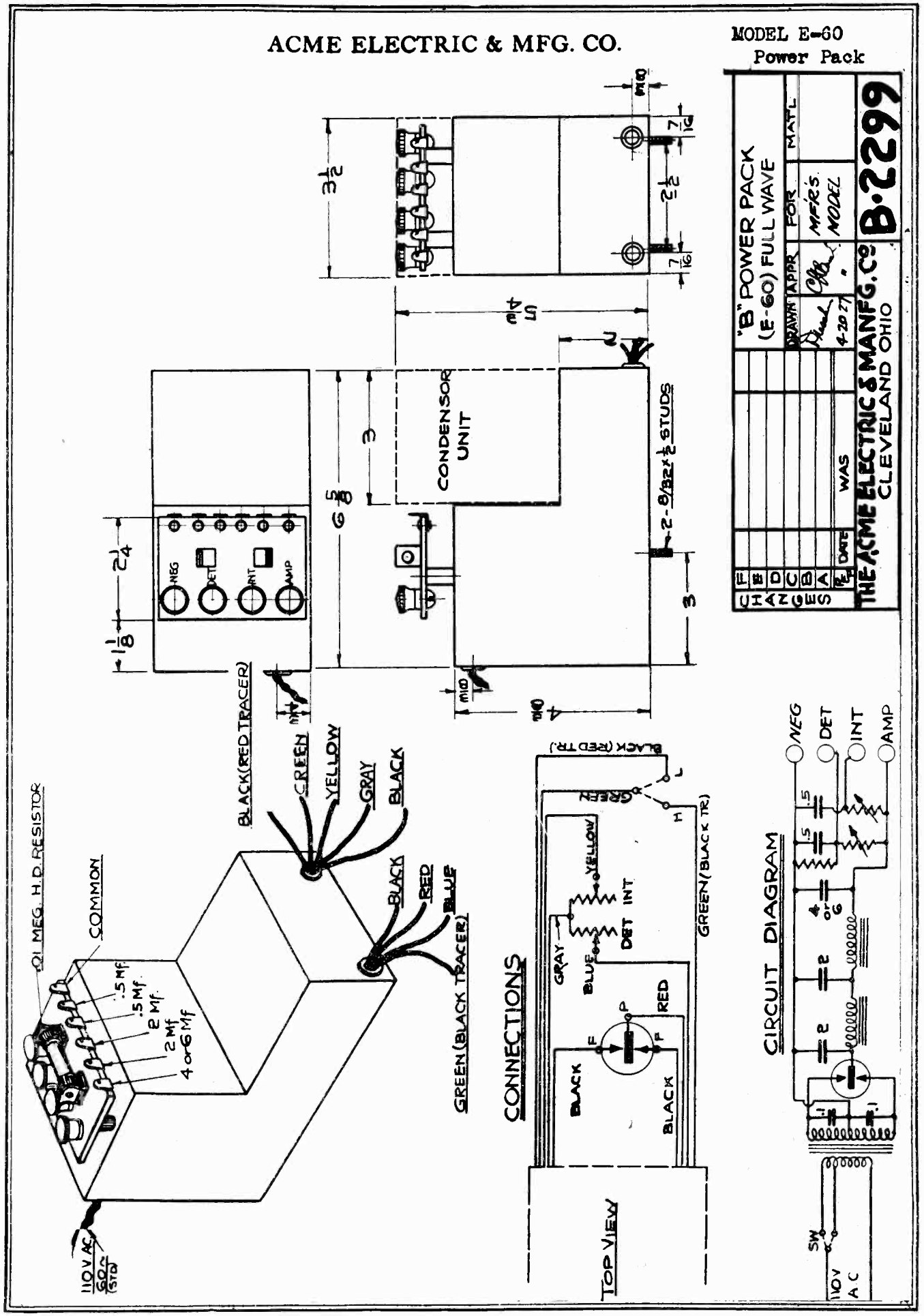
VOLUME III

by

JOHN F. RIDER

JOHN F. RIDER
1440 Broadway New York City

PRINTED IN U. S. A.

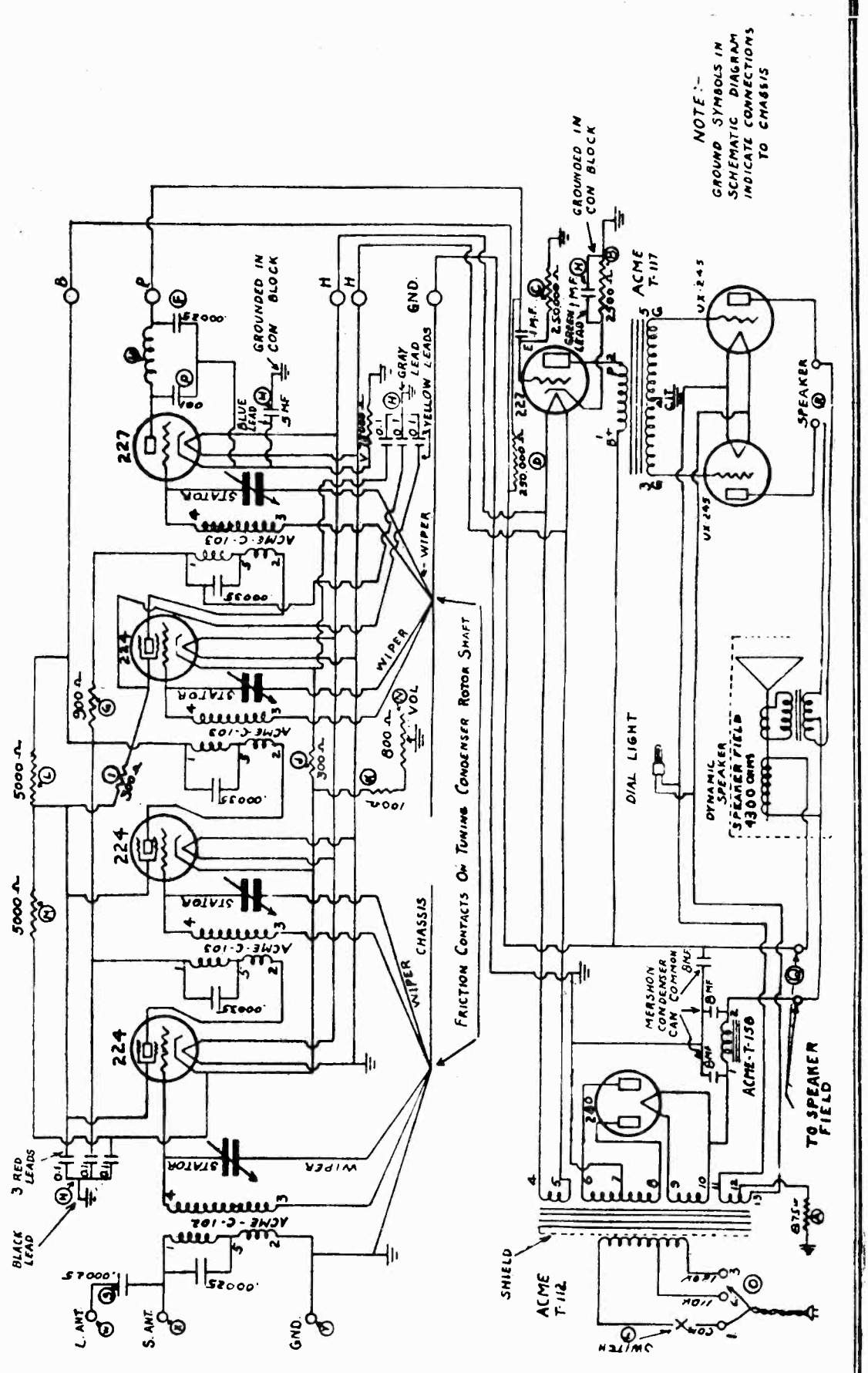


MODEL AC-98

ACME ELECTRIC & MFG. CO.

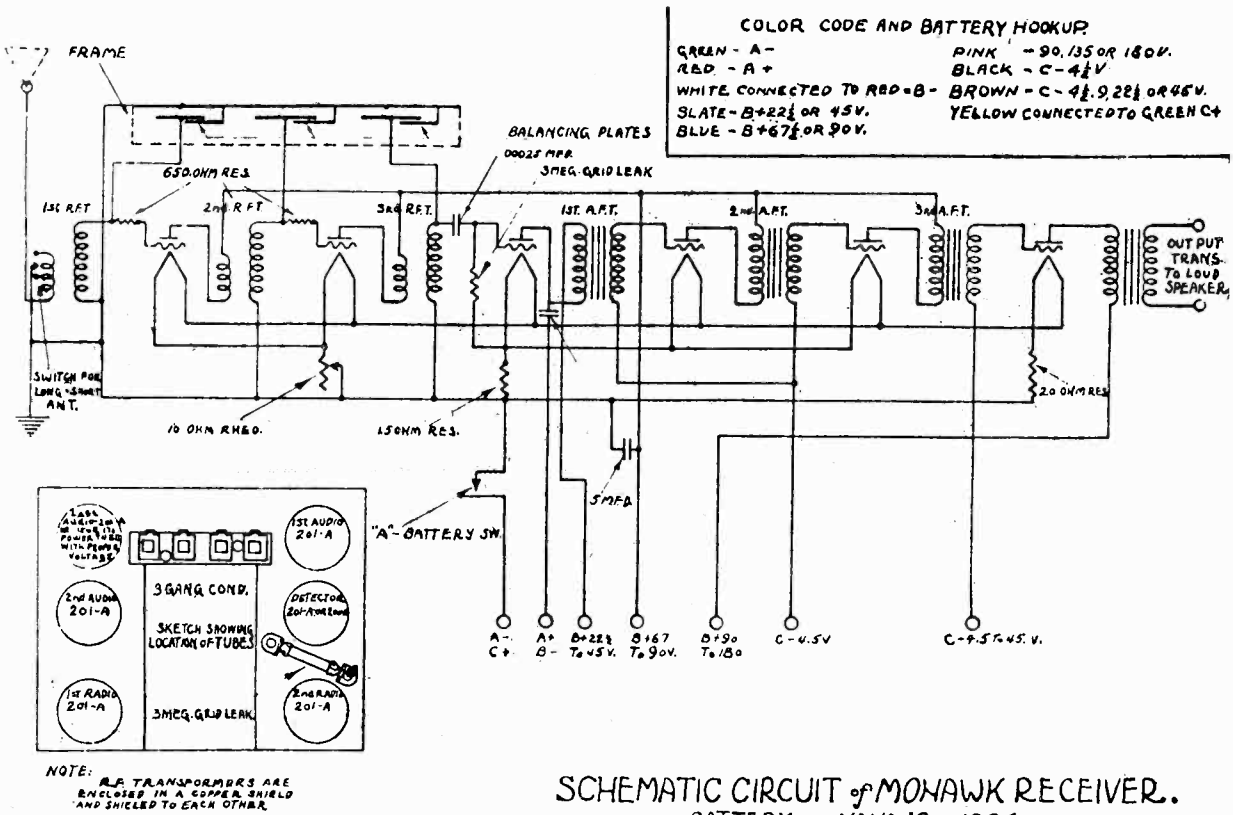
	A	B	C	Cathode	Screen	
R.F.	2.48	162	3.6	3.5	74	1.8
Det.	2.48	85	15	15		.2
1st Audio	2.48	152	15	13		6.2
P.P.	2.48	250V	52			32

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



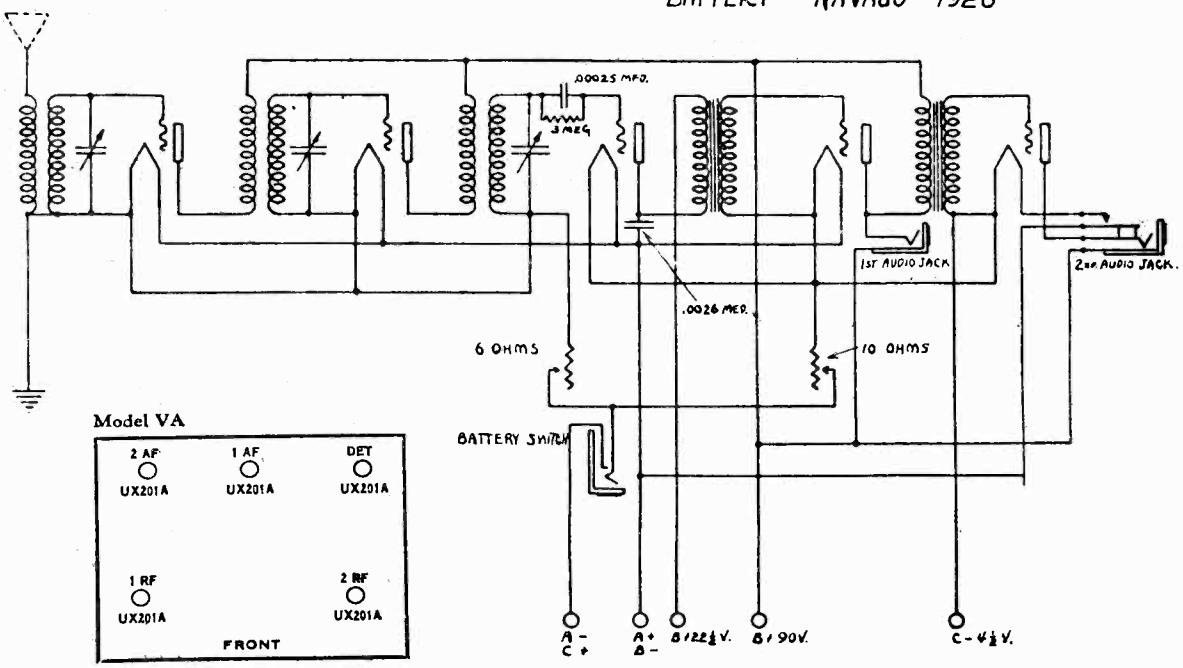
ALL-AMERICAN MOHAWK CORP.

MODEL Navajo
VA
Battery Operated



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

SCHEMATIC CIRCUIT of MOHAWK RECEIVER.
BATTERY NAVAJO 1926

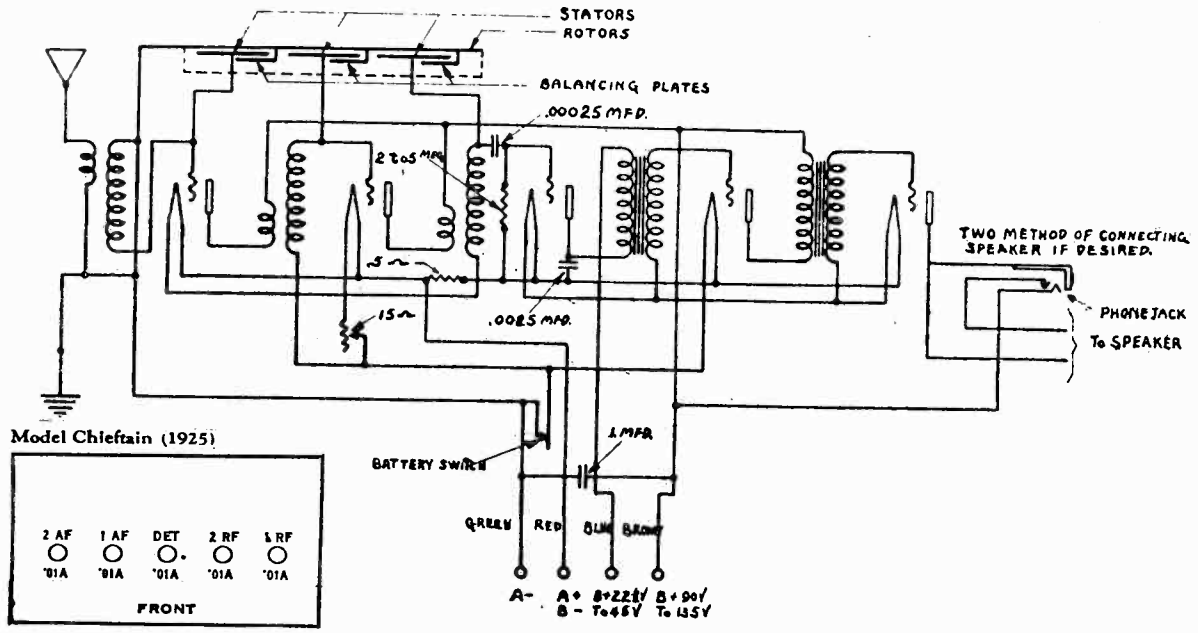


Model VA

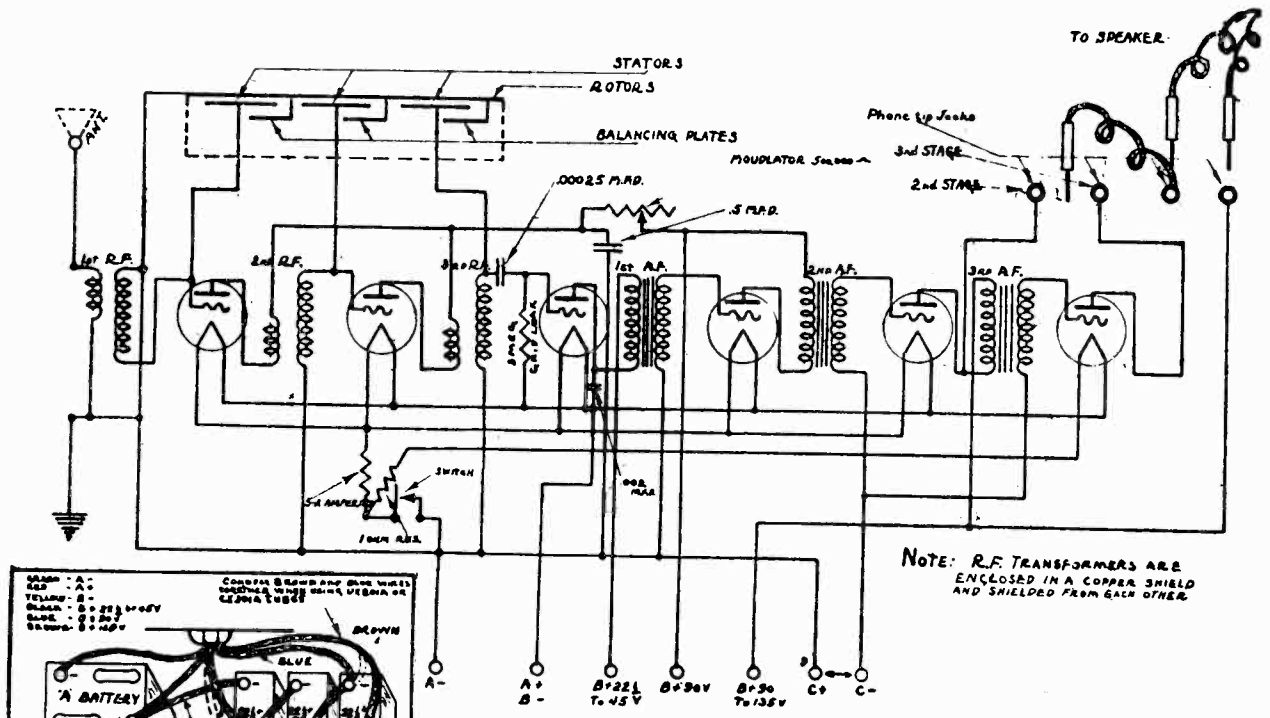
5 TUBE VA CIRCUIT -1925-26.-

MODEL CHIEFTAN
CHEROKEE
Battery Operated

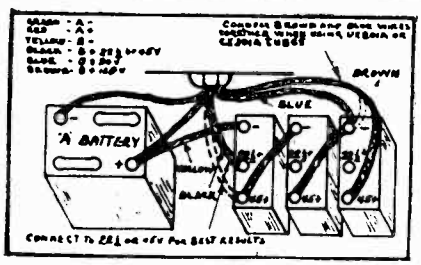
ALL-AMERICAN MOHAWK CORP.



CHIEFTAIN BATTERY OPERATED. -1925-



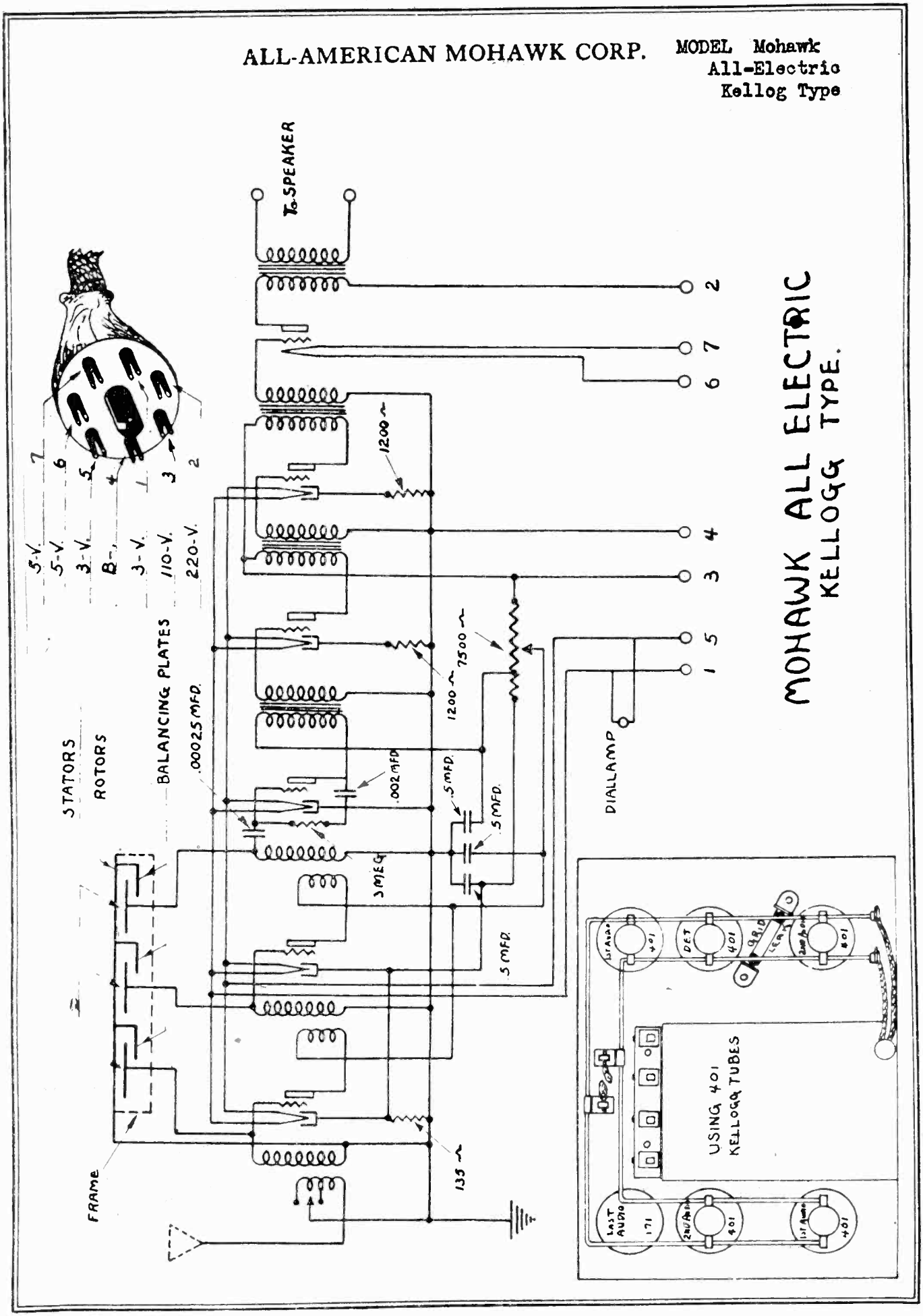
NOTE: R.F. TRANSFORMERS ARE ENCLOSED IN A COPPER SHIELD AND SHIELDED FROM EACH OTHER.



MOHAWK BATTERY OPERATED
CHEROKEE MODEL 1926

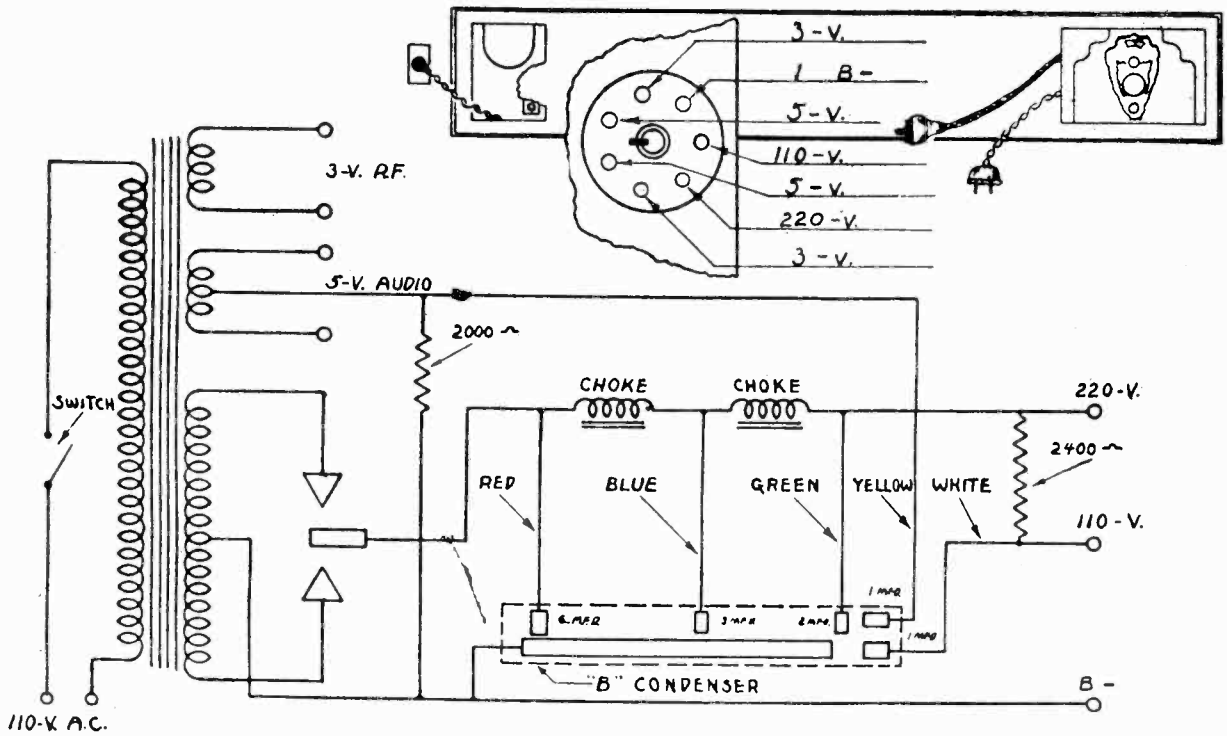
ALL-AMERICAN MOHAWK CORP.

MODEL Mohawk
All-Electric
Kellog Type

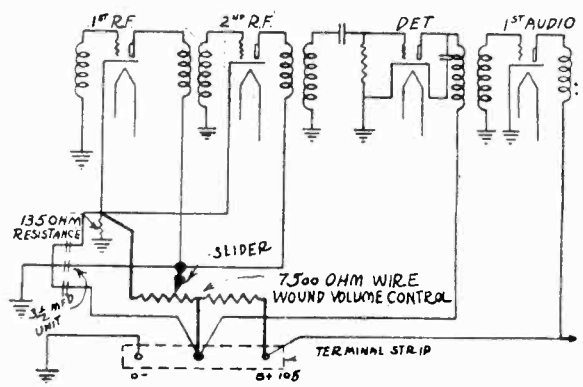


MODEL Mohawk 226
7 Contact
Power Pack and
Receiver View

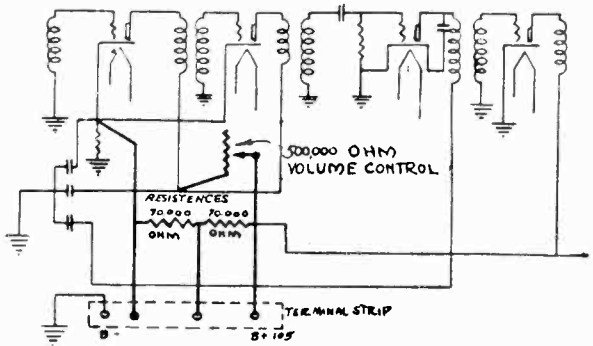
ALL-AMERICAN MOHAWK CORP.



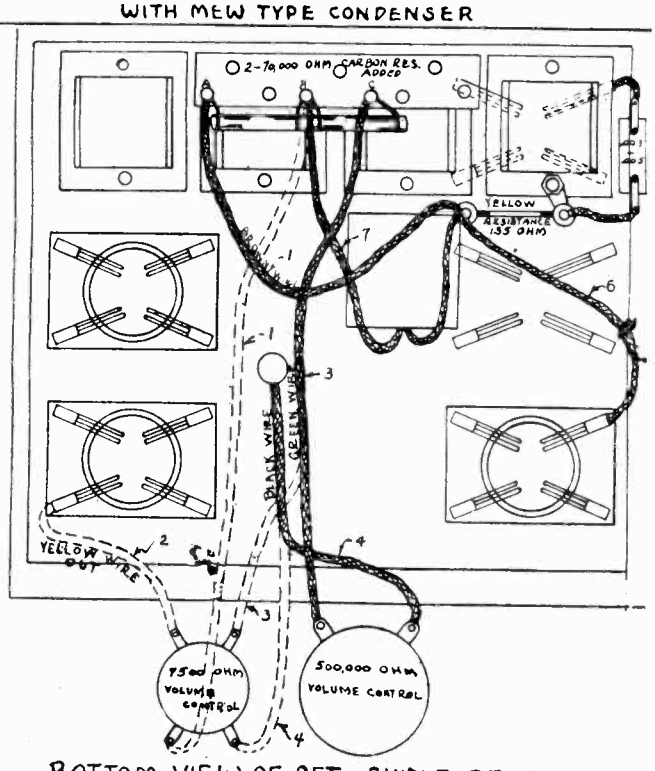
7 CONTACT POWER PACK for Mohawk 226
WITH NEW TYPE CONDENSER



CIRCUIT DIAGRAM VOLUME CONTROL AS IS

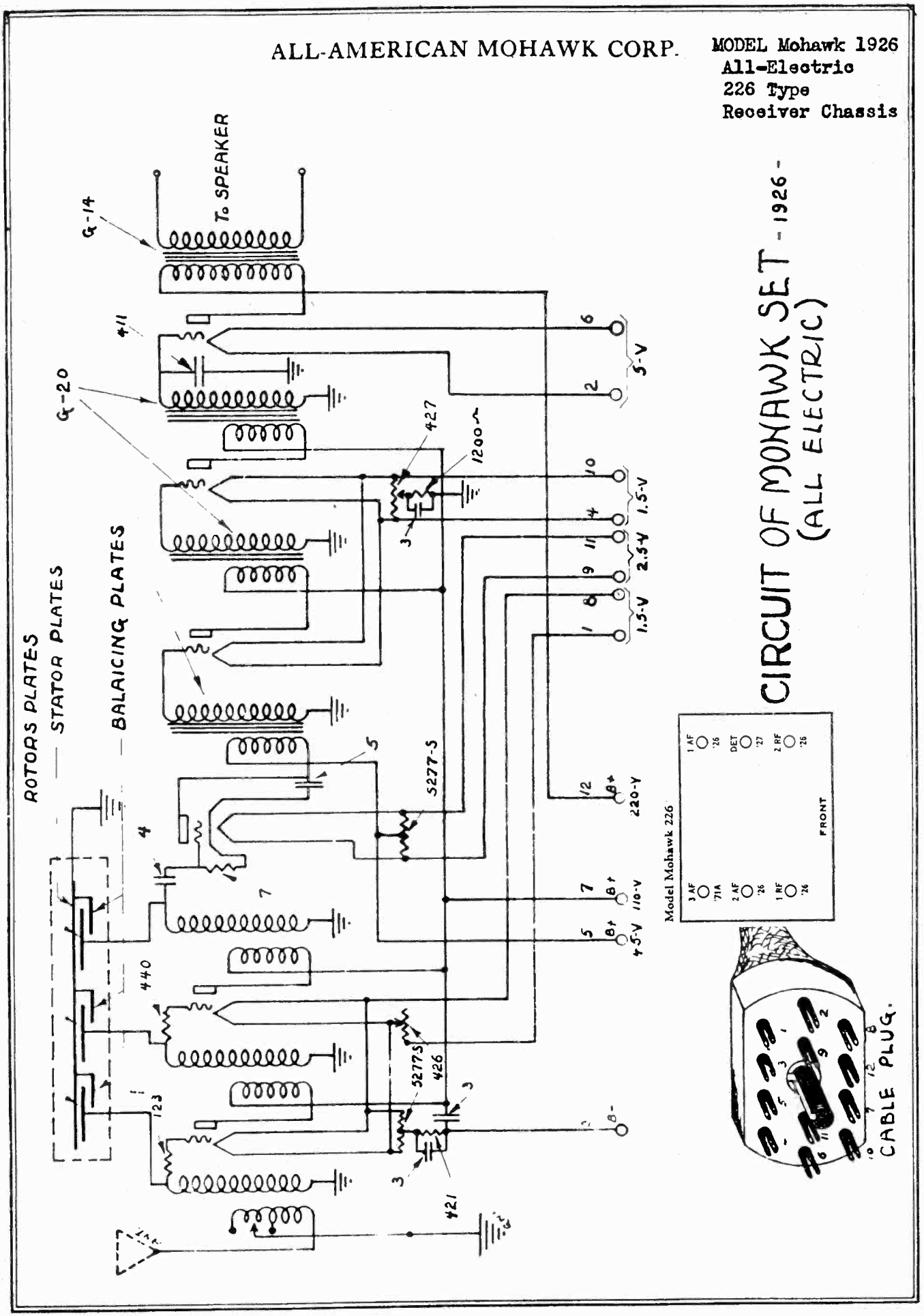


CIRCUIT DIAGRAM VOLUME CONTROL CHANGED



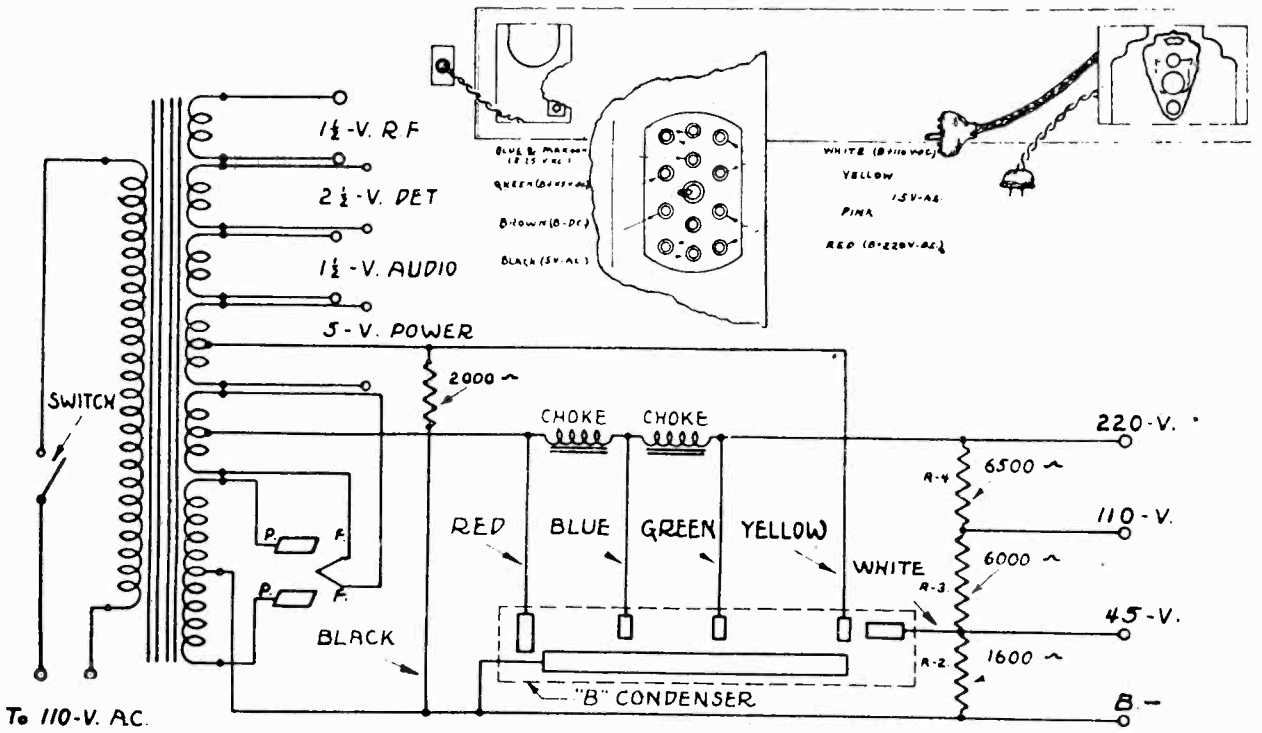
BOTTOM VIEW OF SET SHIELD REMOVED

MOHAWK RECIEVER
(KELLOGG TYPE)

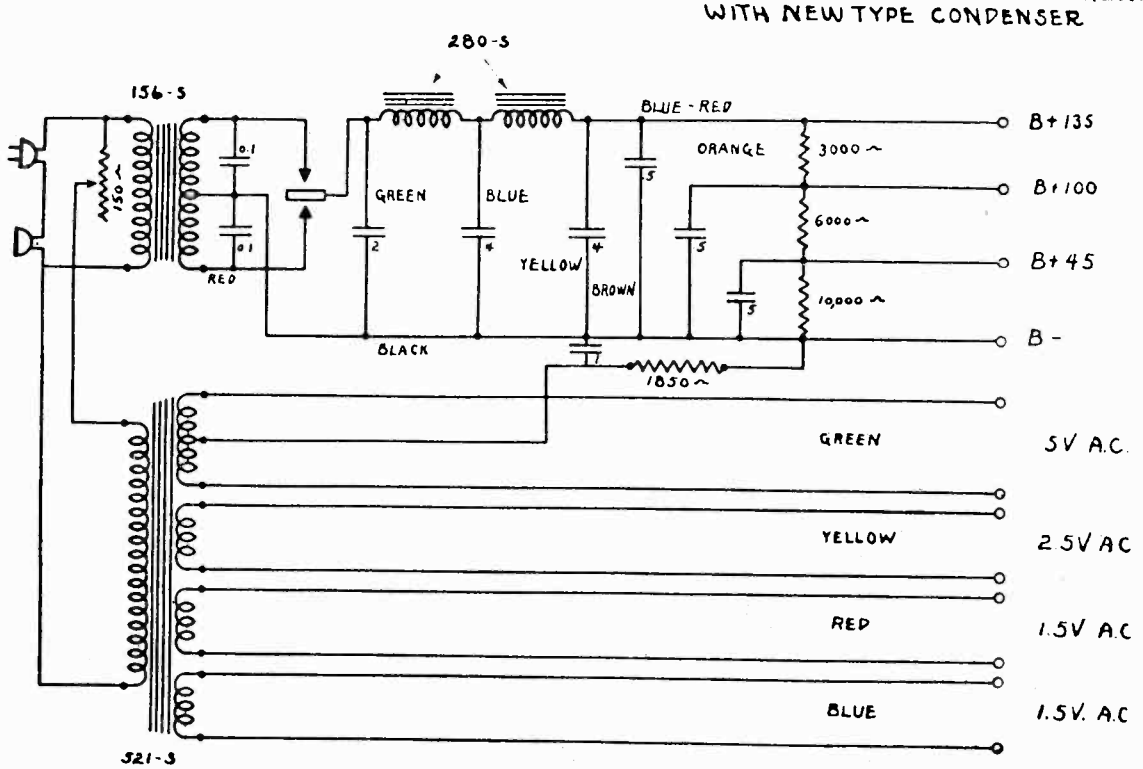


MODEL Mohawk 226
12 Contact
Power Pack
A-10 Eliminator

ALL-AMERICAN MOHAWK CORP.



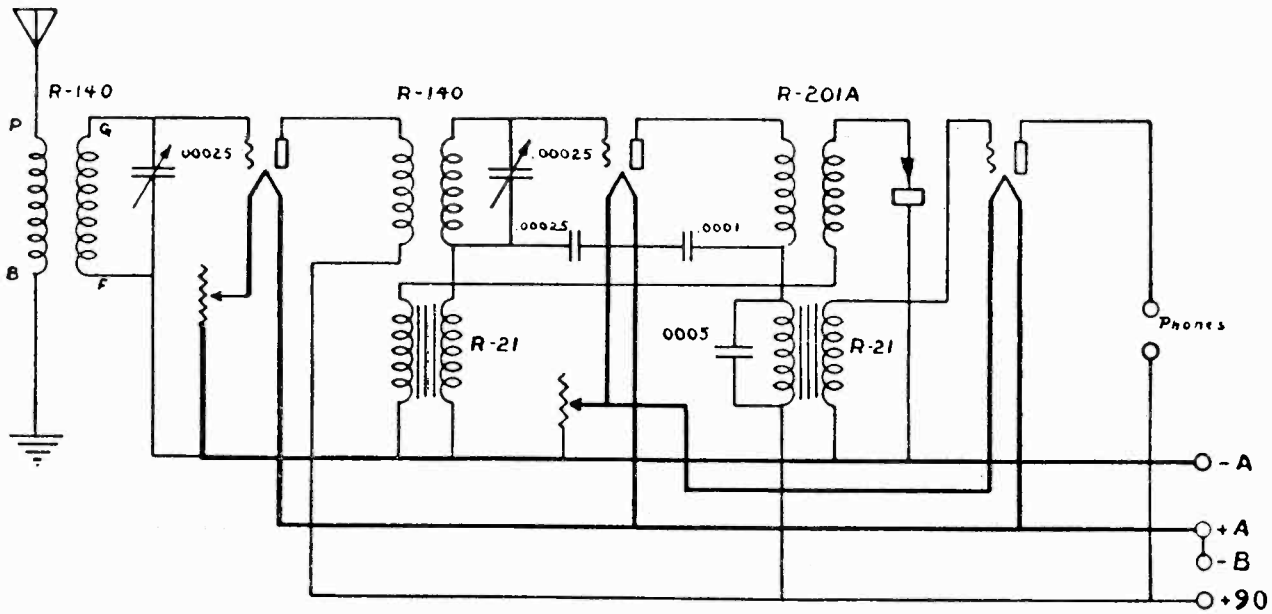
12 CONTACT POWER PACK for Mohawk 226
WITH NEW TYPE CONDENSER



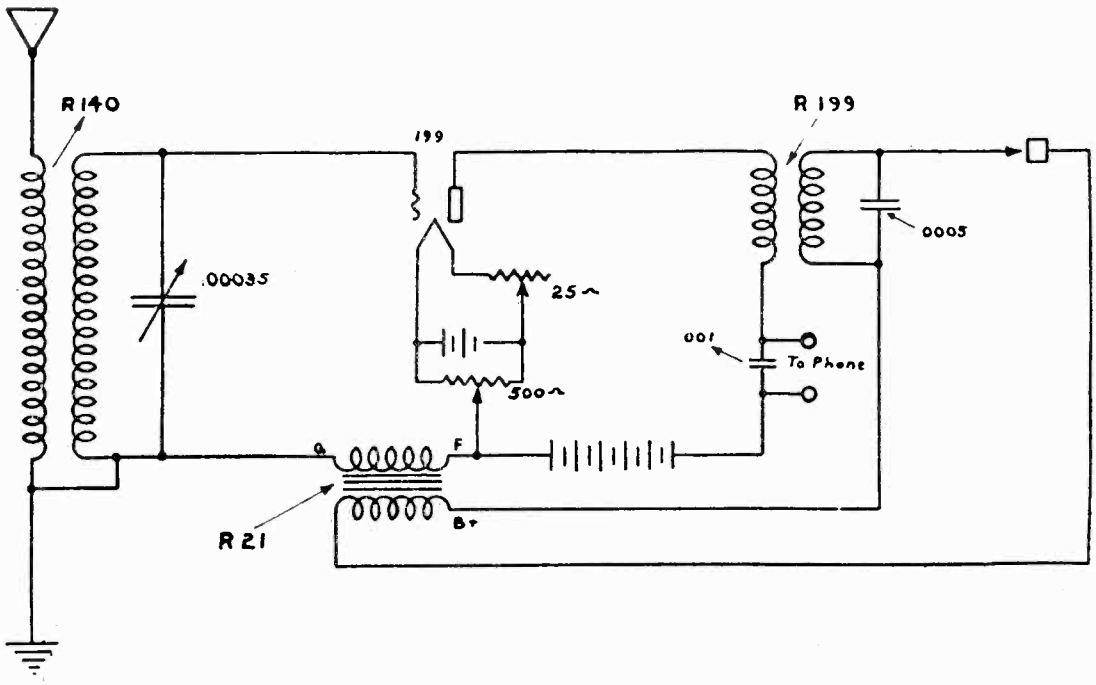
A-10 MOHAWK ELIMINATOR

ALL-AMERICAN MOHAWK CORP.

MODEL
All-Amax Junior
All-Amax Senior



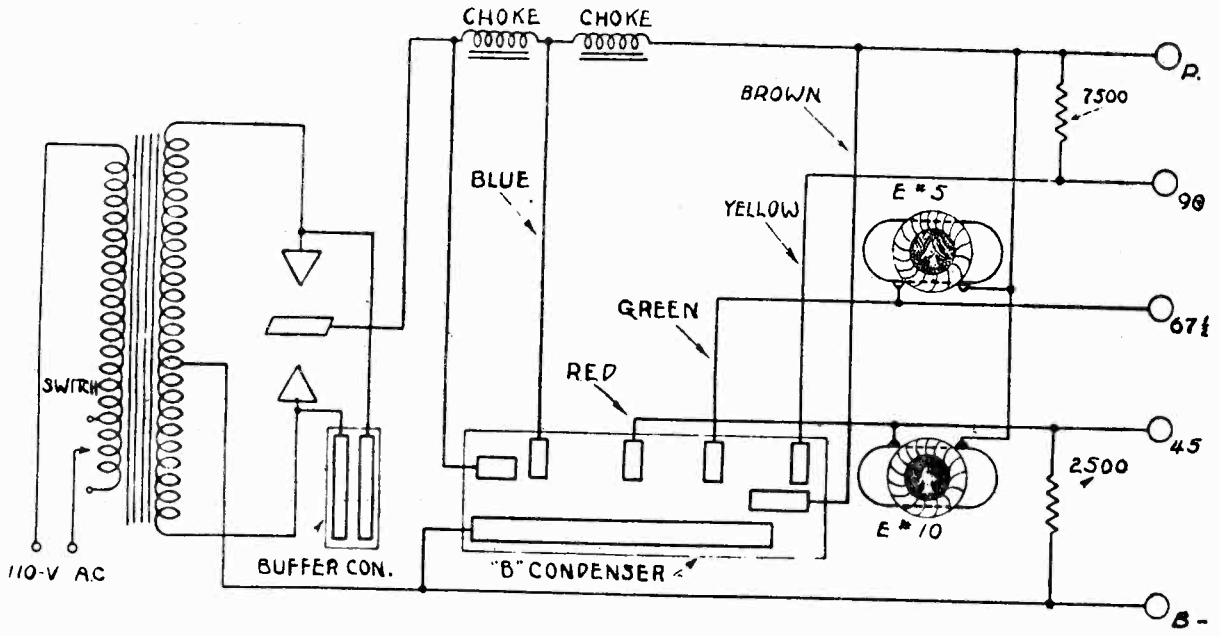
ALL-AMAX SENIOR



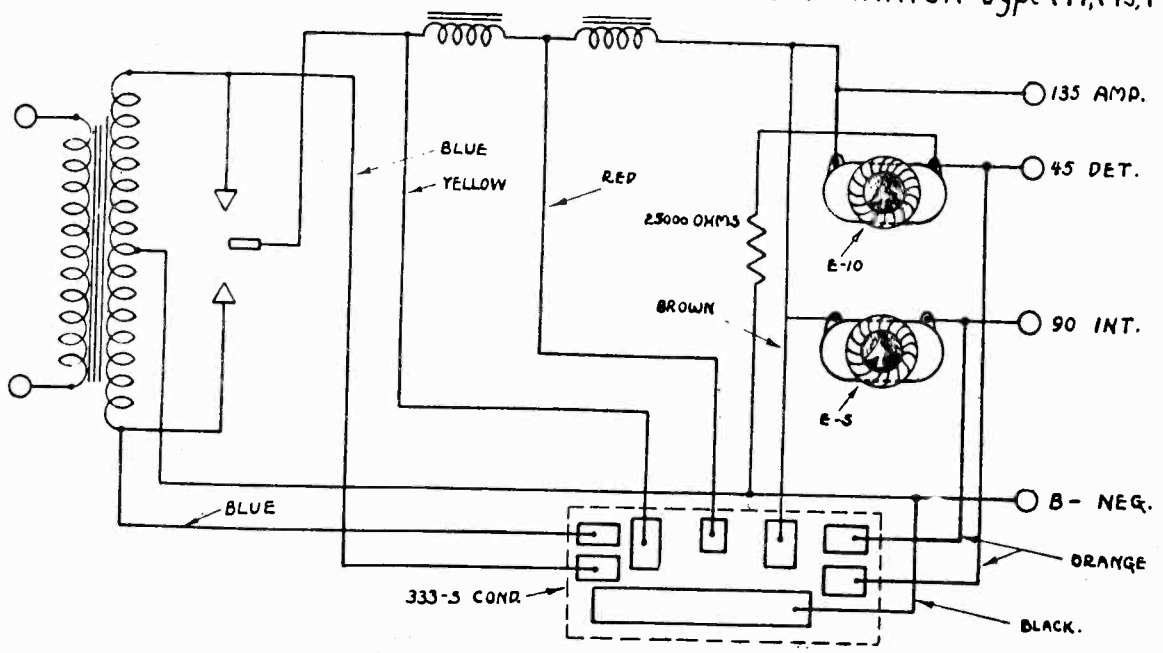
ALL-AMAX JUNIOR

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

ALL-AMERICAN MOHAWK CORP.



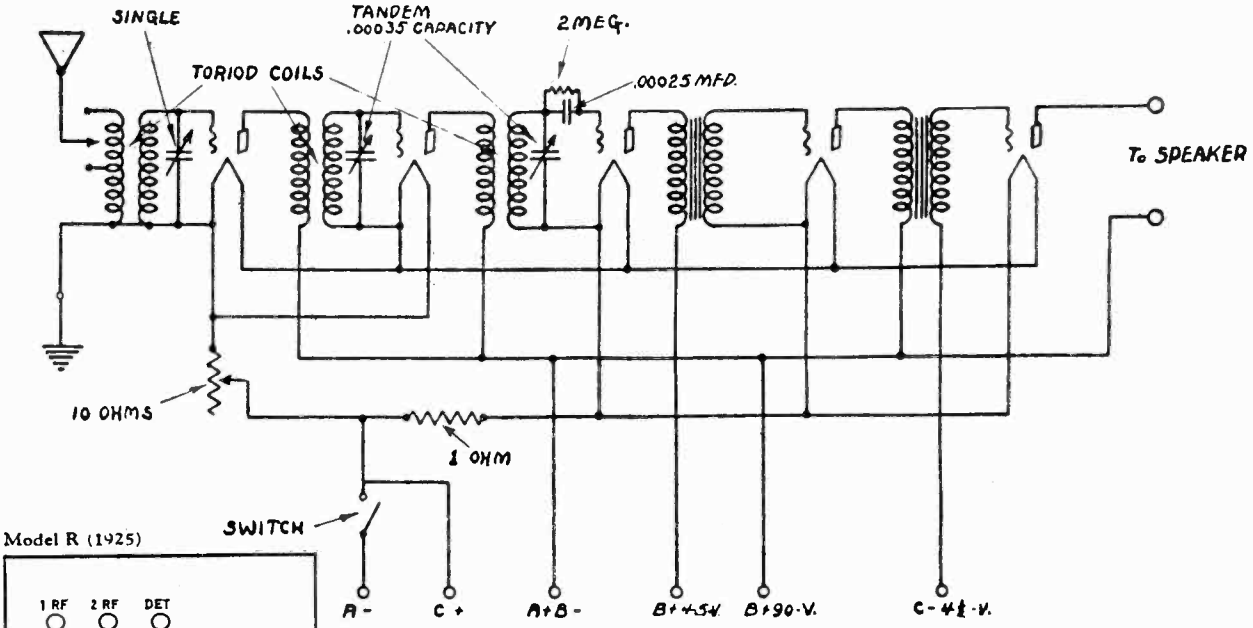
CONSTANT "B" ELIMINATOR type A1, A3, A4



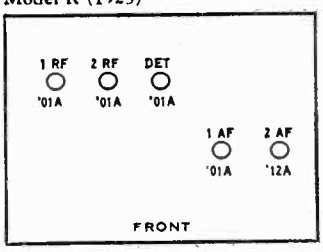
"B" ELIMINATOR TYPE A8 -1926-

ALL-AMERICAN MOHAWK CORP.

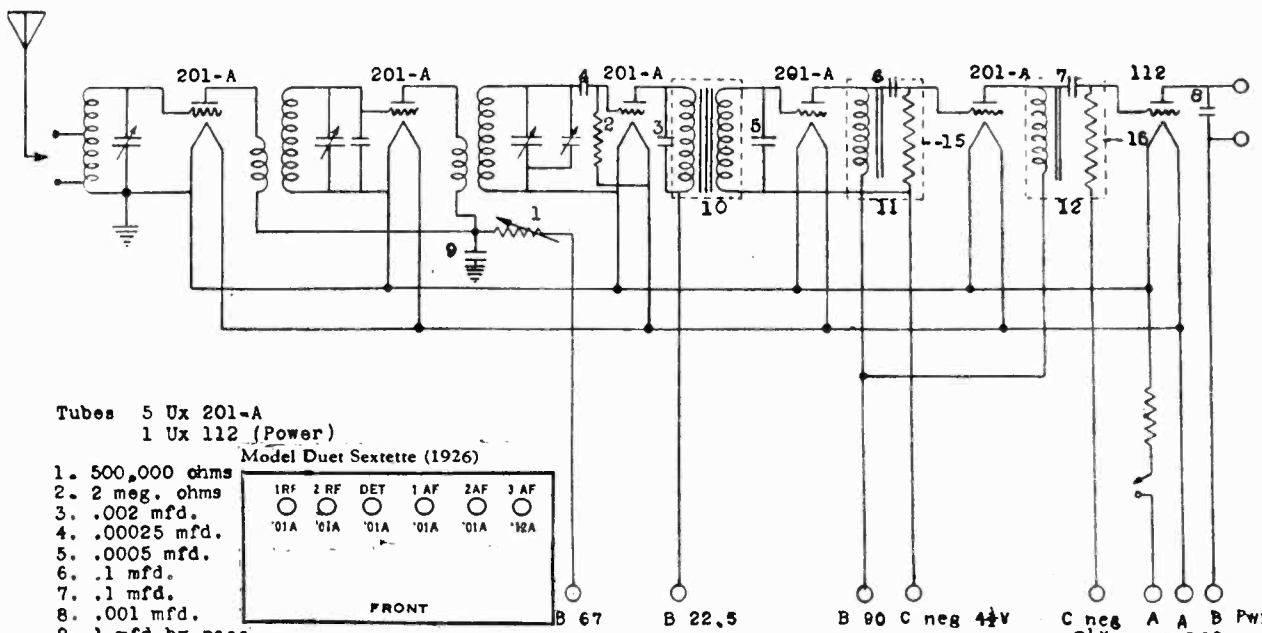
MODEL R.
6 Tube Battery
Sextette
Duet



Model R (1925)



ALL AMERICAN - Model R. 1925



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

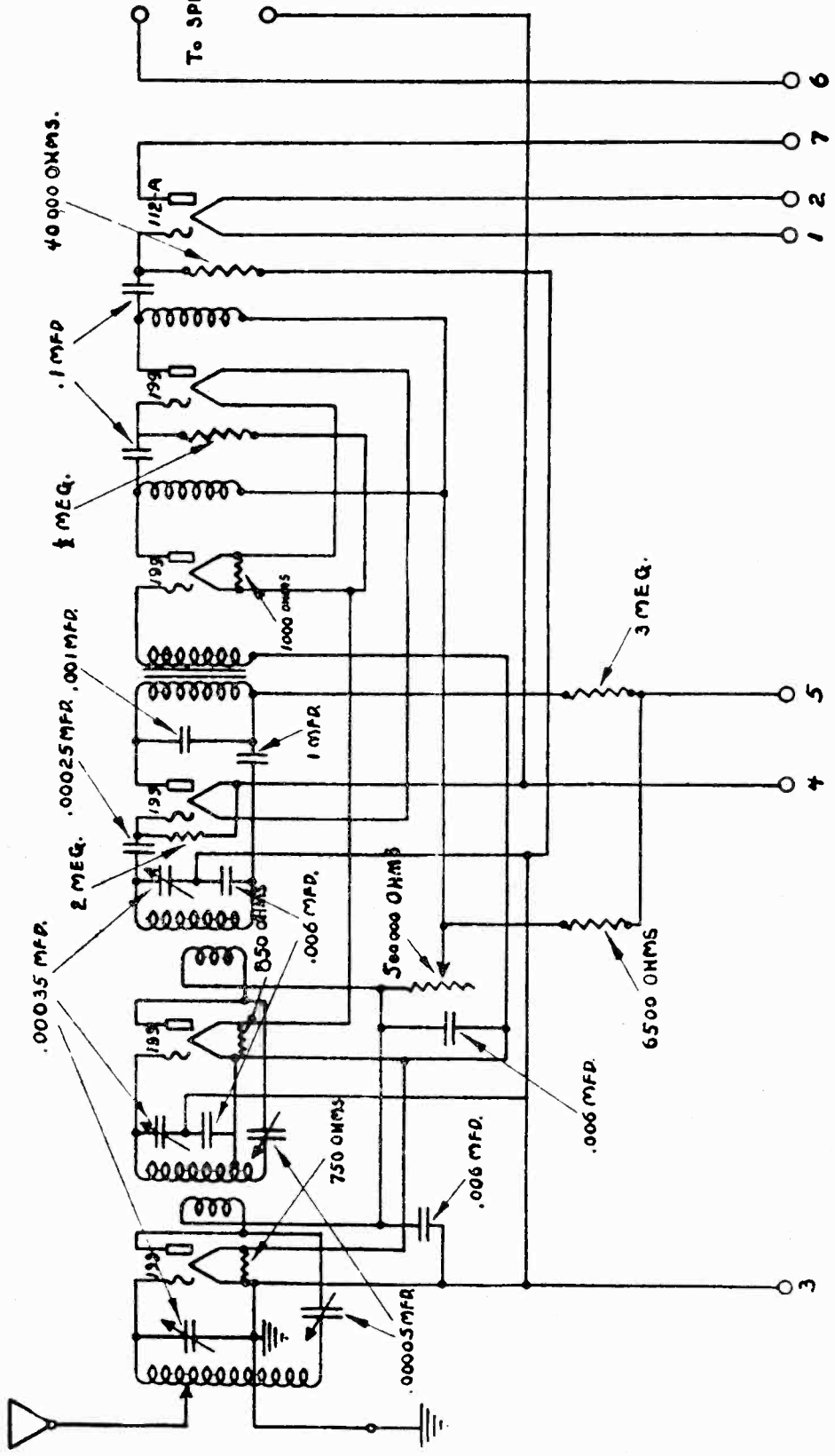
Model Duet Sextette (1926)

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. 2/3 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

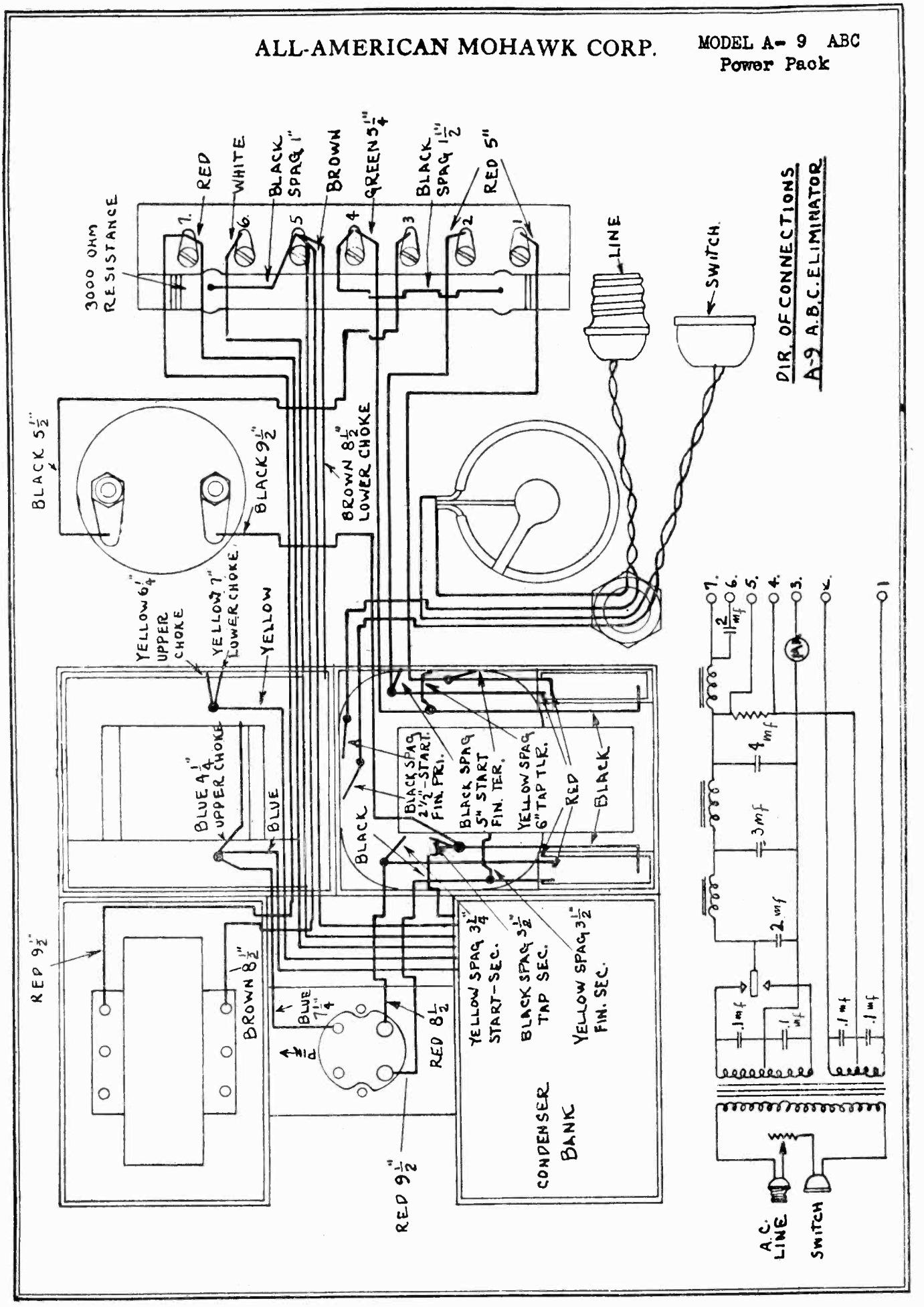
ALL AMERICAN MOHAWK CORP.



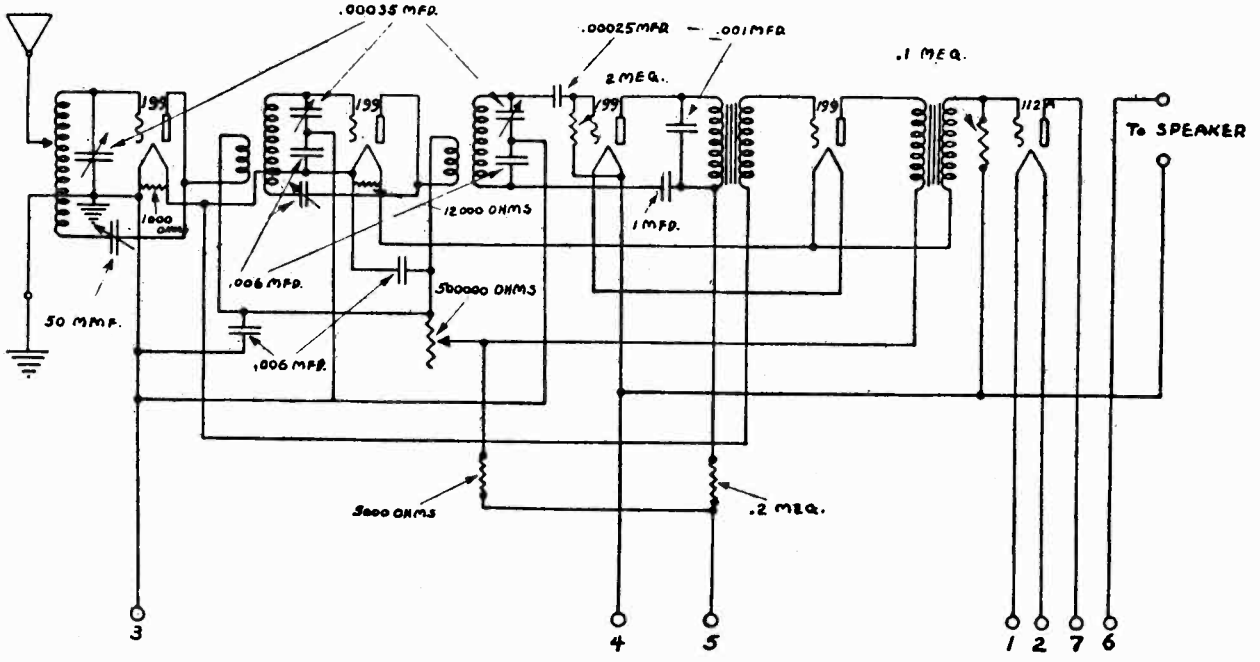
6 TUBE ALL ELECTRIC 1926
SEXTETTE MODEL

ALL-AMERICAN MOHAWK CORP.

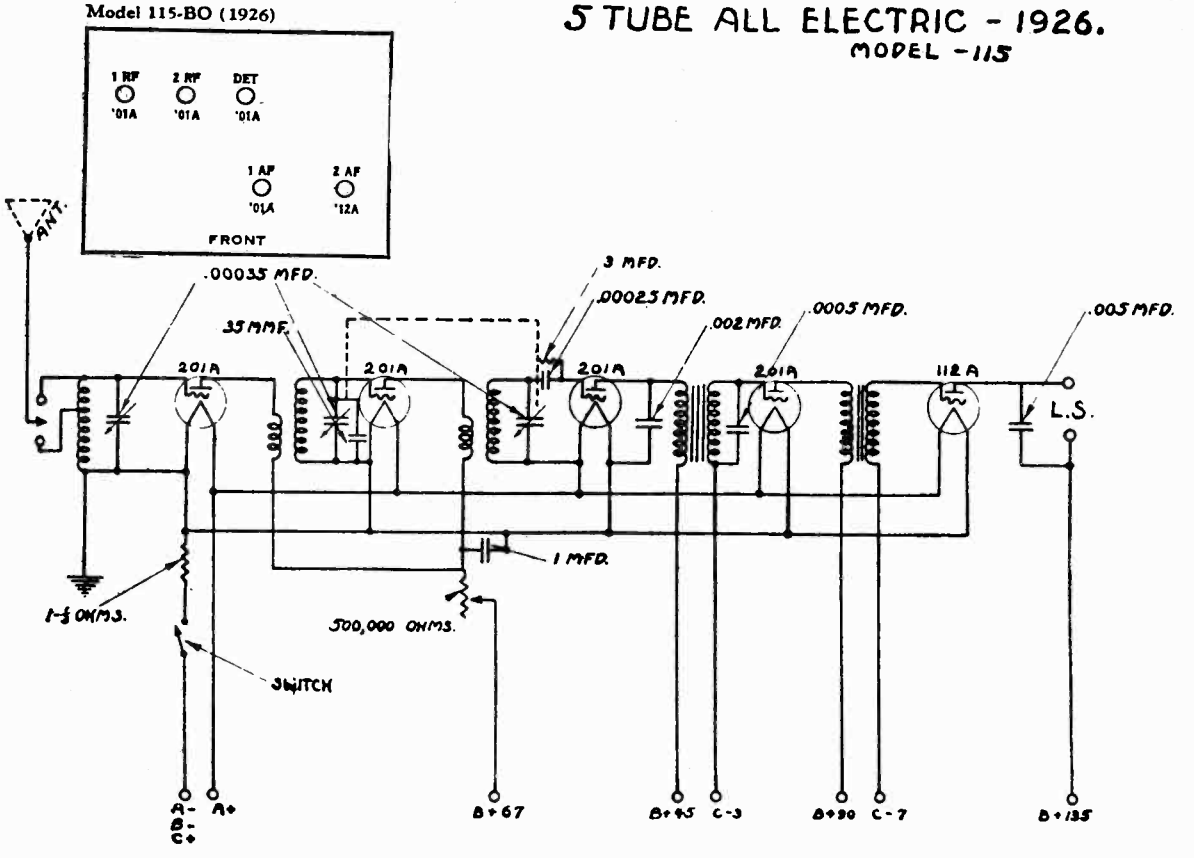
MODEL A- 9 ABC
Power Pack



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



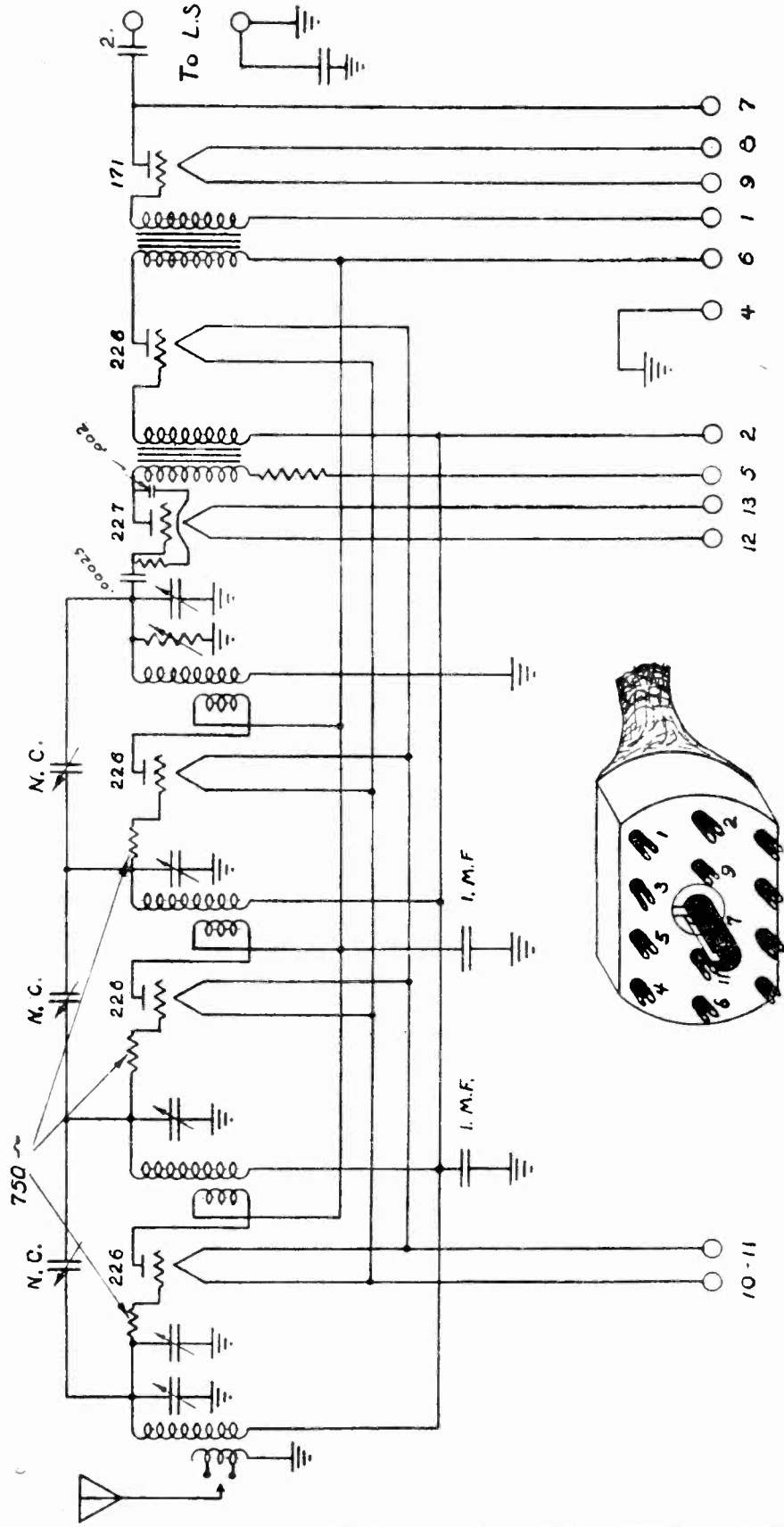
5 TUBE ALL ELECTRIC - 1926.
MODEL -115



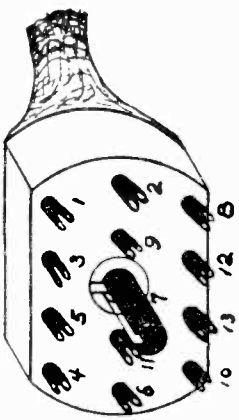
5 TUBE ALL AMERICAN BATTERY SET.
MODEL 115 - 1926-27.

ALL-AMERICAN MOHAWK CORP

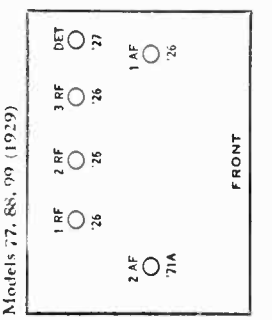
MODEL 77 Simplified
6 Tube A-C Rec.
1928-1929
Receiver Chassis

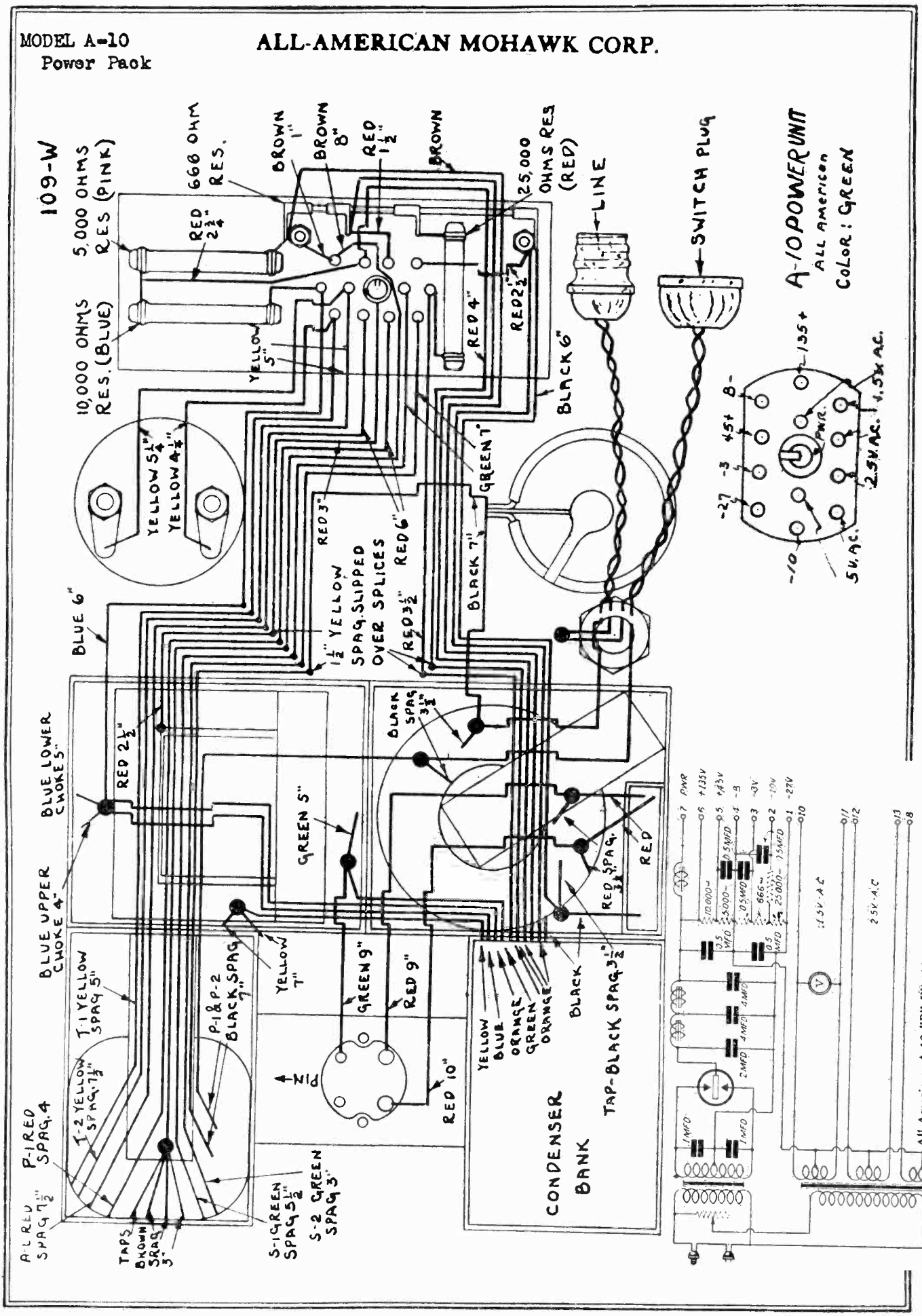


CIRCUIT DIAGRAM OF '27-'28
6 TUBE A.C. REC. (SIMPLIFIED) #77



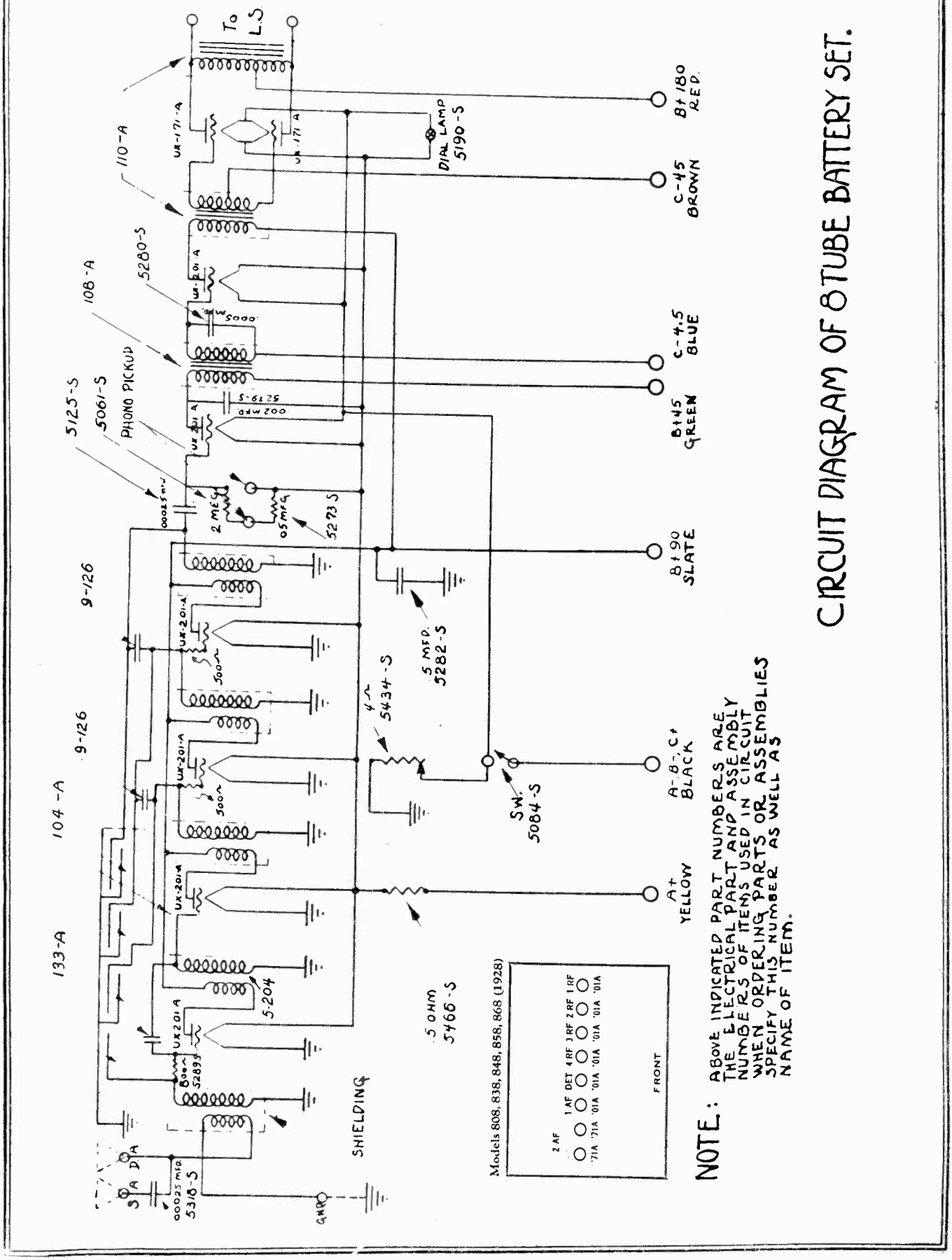
CABLE PLUG.





ALL-AMERICAN MOHAWK CORP.

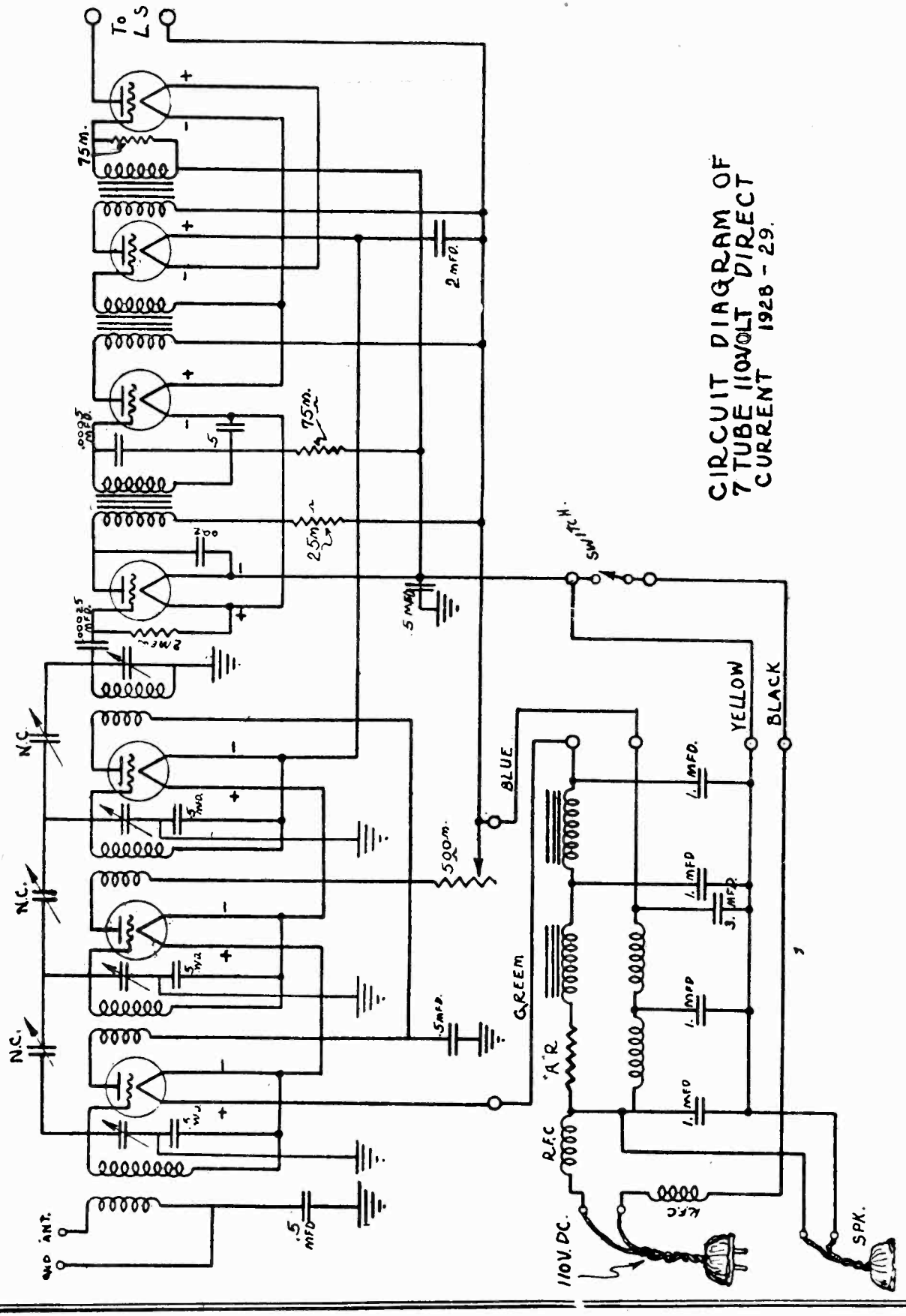
MODEL 8 Tube Battery



NOTE: ABOVE INDICATED PART NUMBERS ARE THE ELECTRICAL PART AND ASSEMBLY NUMBERS OF ITEMS USED IN CIRCUIT WHEN ORDERING PARTS OR ASSEMBLIES SPECIFY THIS NUMBER AS WELL AS NAME OF ITEM.

MODEL 7 Tube
110 V. D-C

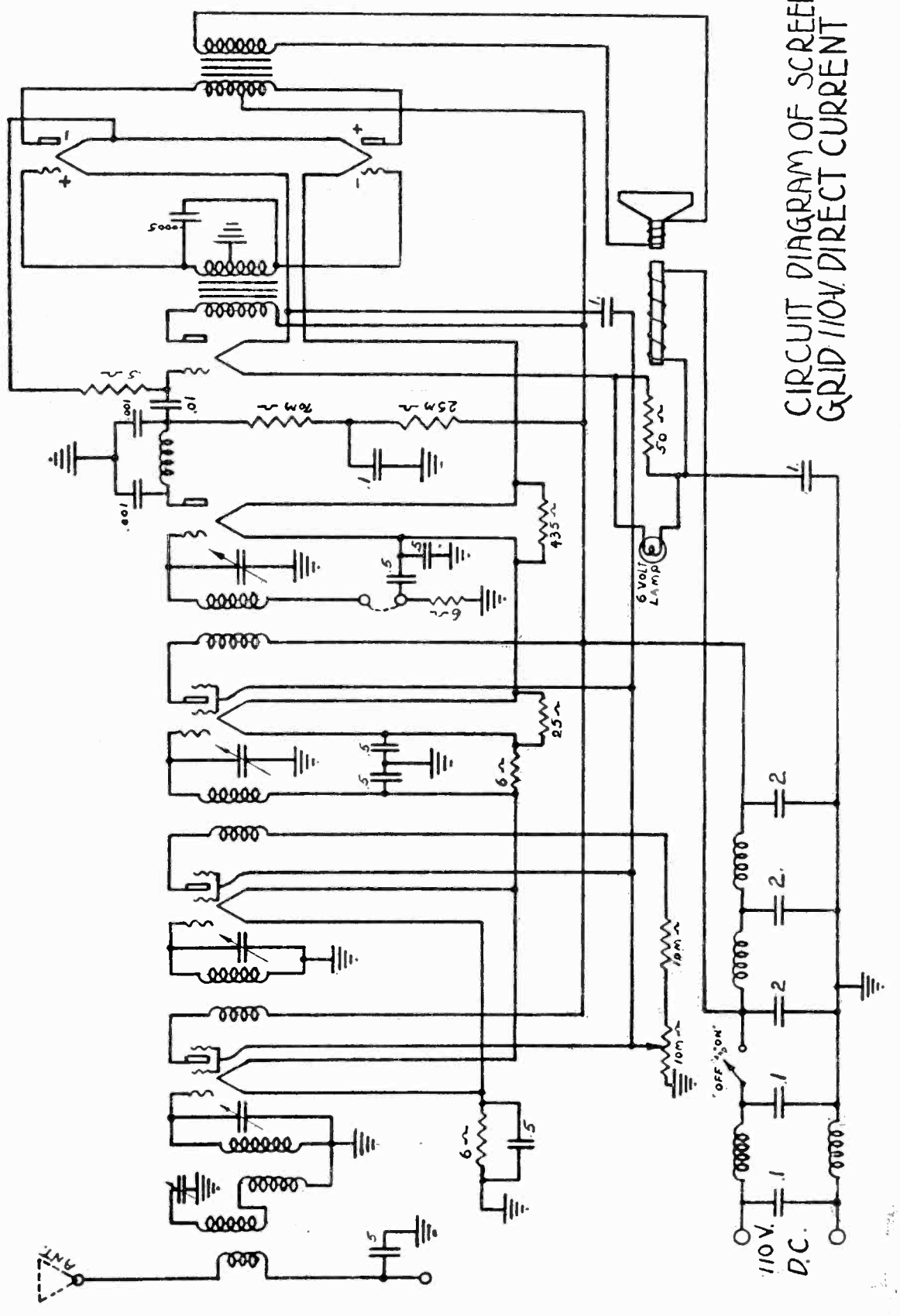
ALL-AMERICAN MOHAWK CORP.



CIRCUIT DIAGRAM OF
7 TUBE 110 VOLT DIRECT
CURRENT 1928 - 29.

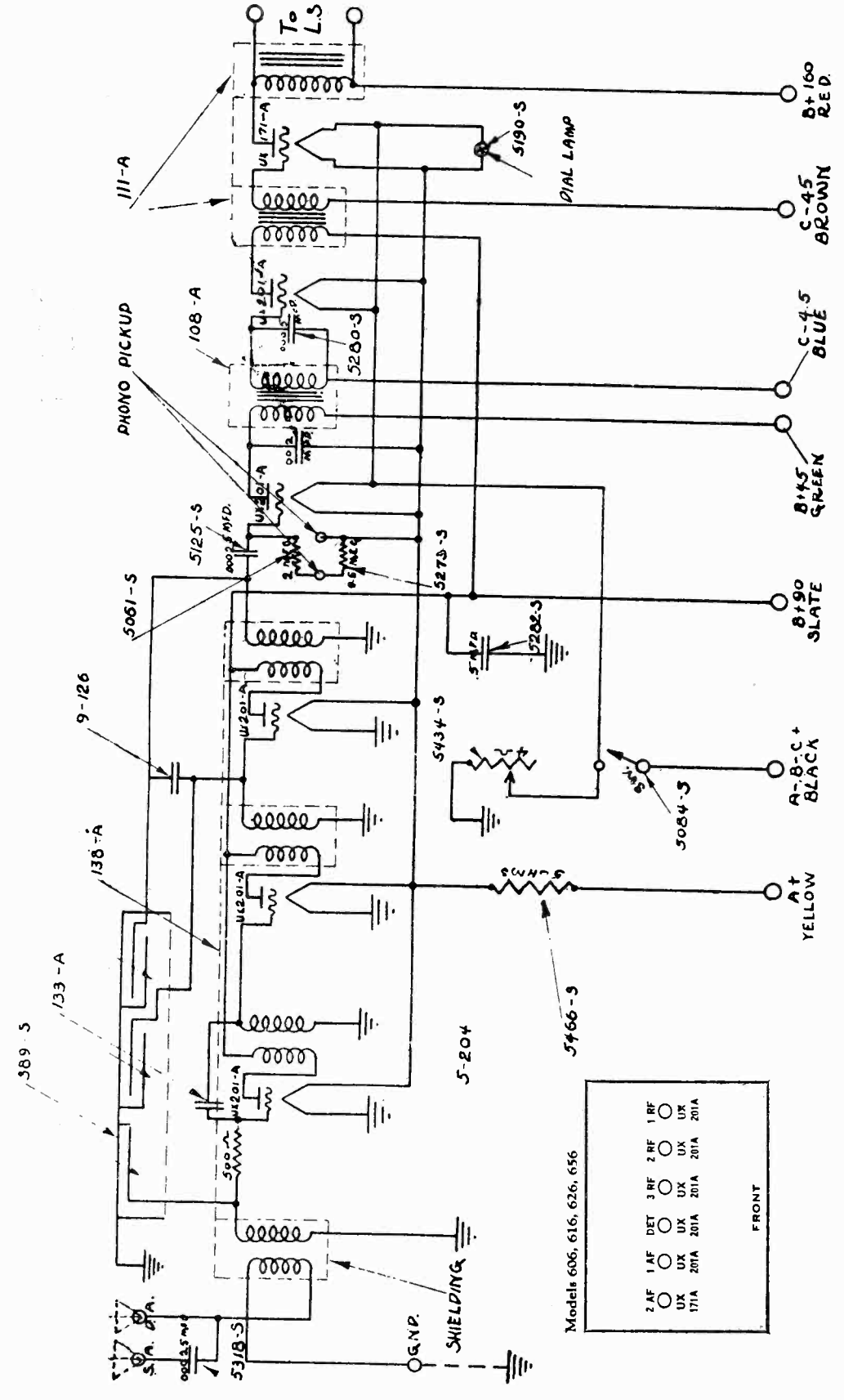
ALL-AMERICAN MOHAWK CORP.

MODEL Screen Grid
110 V. D-C



MODEL 606
6 Tube Battery

ALL-AMERICAN MOHAWK CORP.

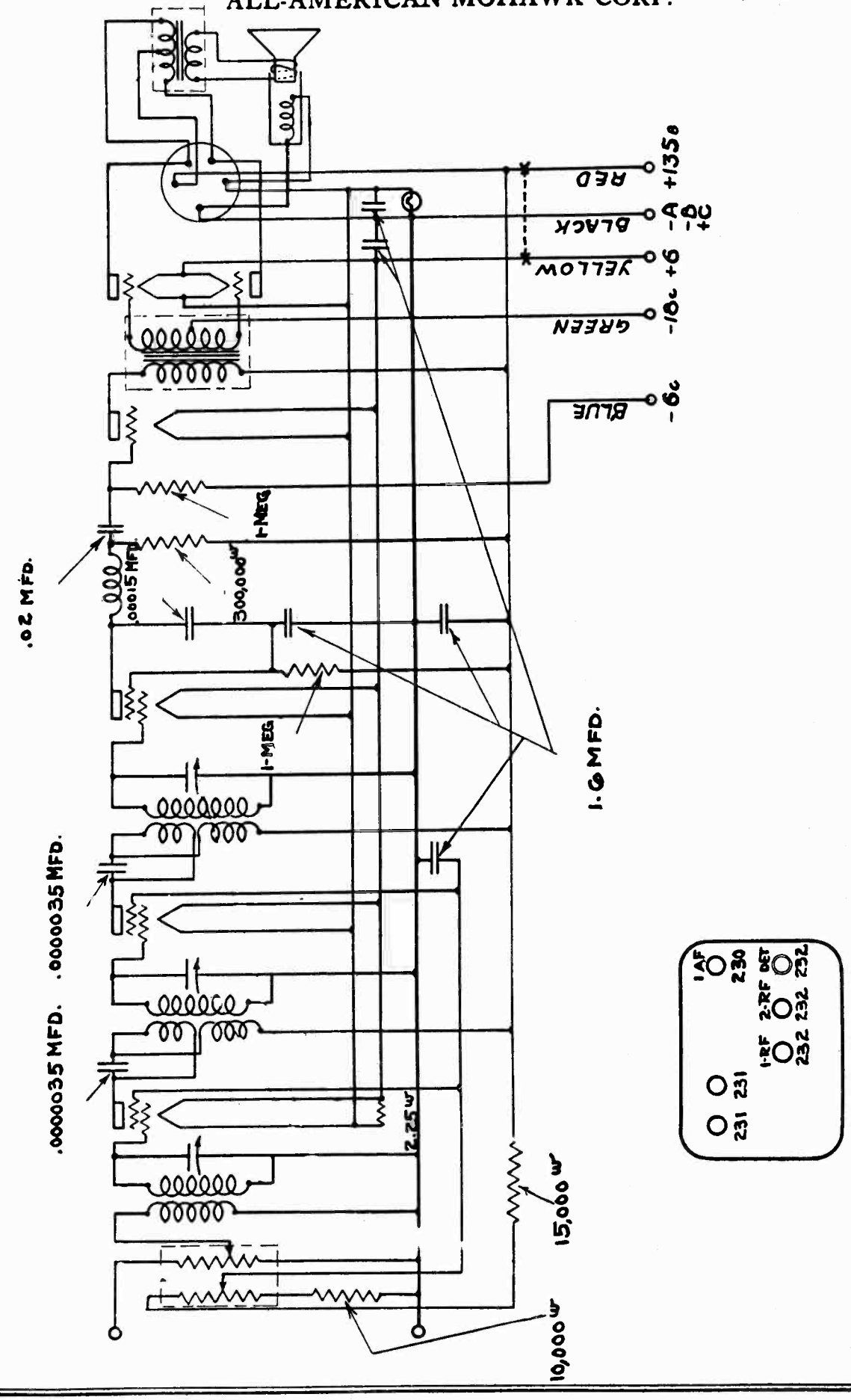


CIRCUIT DIAGRAM OF 6 TUBE BATTERY SET. MODEL 606 -28-29

NOTE: ABOVE INDICATED PART NUMBERS ARE THE ELECTRICAL PART AND ASSEMBLY NUMBERS OF ITEMS USED IN CIRCUIT. WHEN ORDERING PARTS OR ASSEMBLIES SPECIFY THIS NUMBER AS WELL AS NAME OF ITEM.

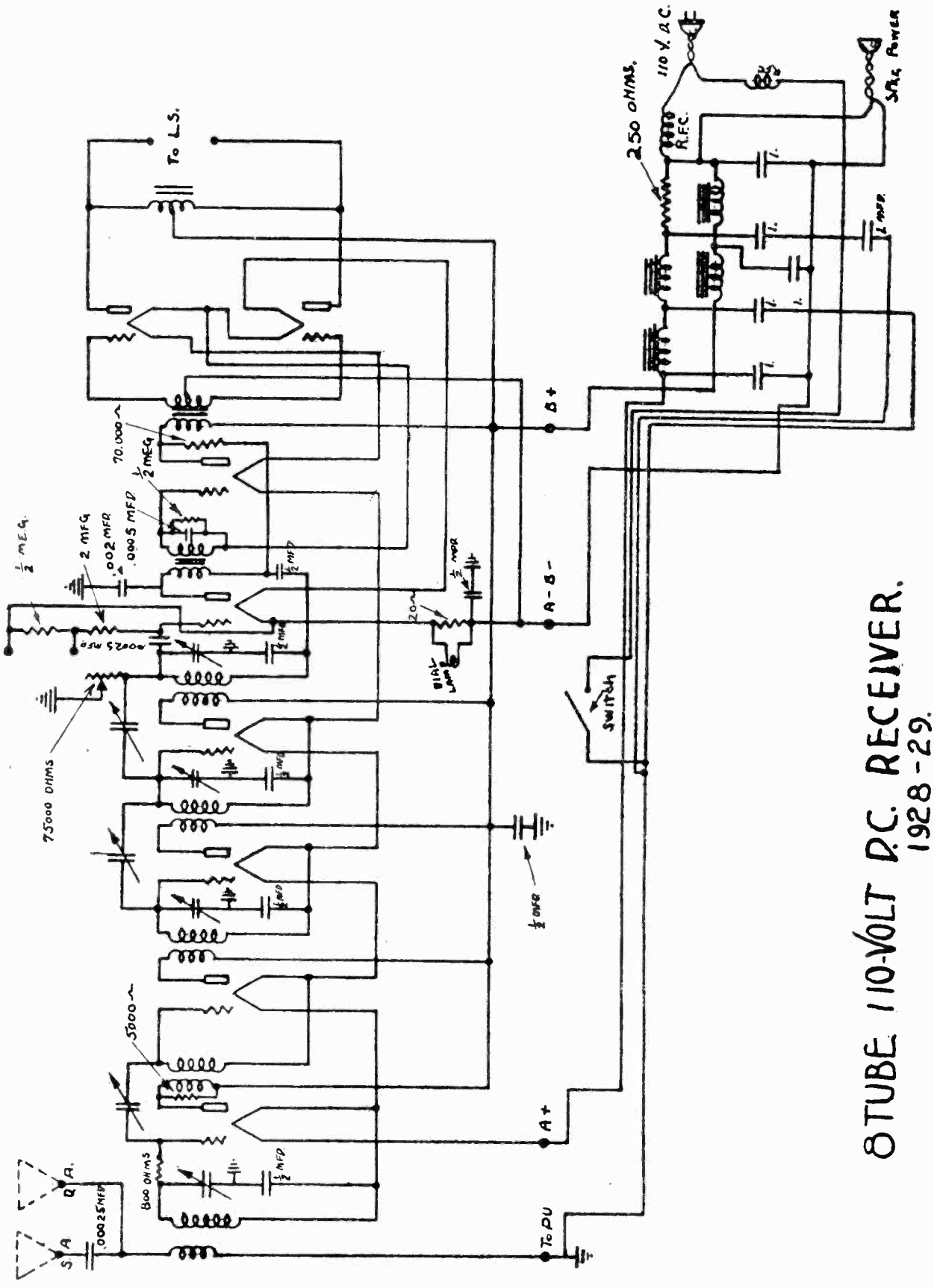
ALL-AMERICAN MOHAWK CORP.

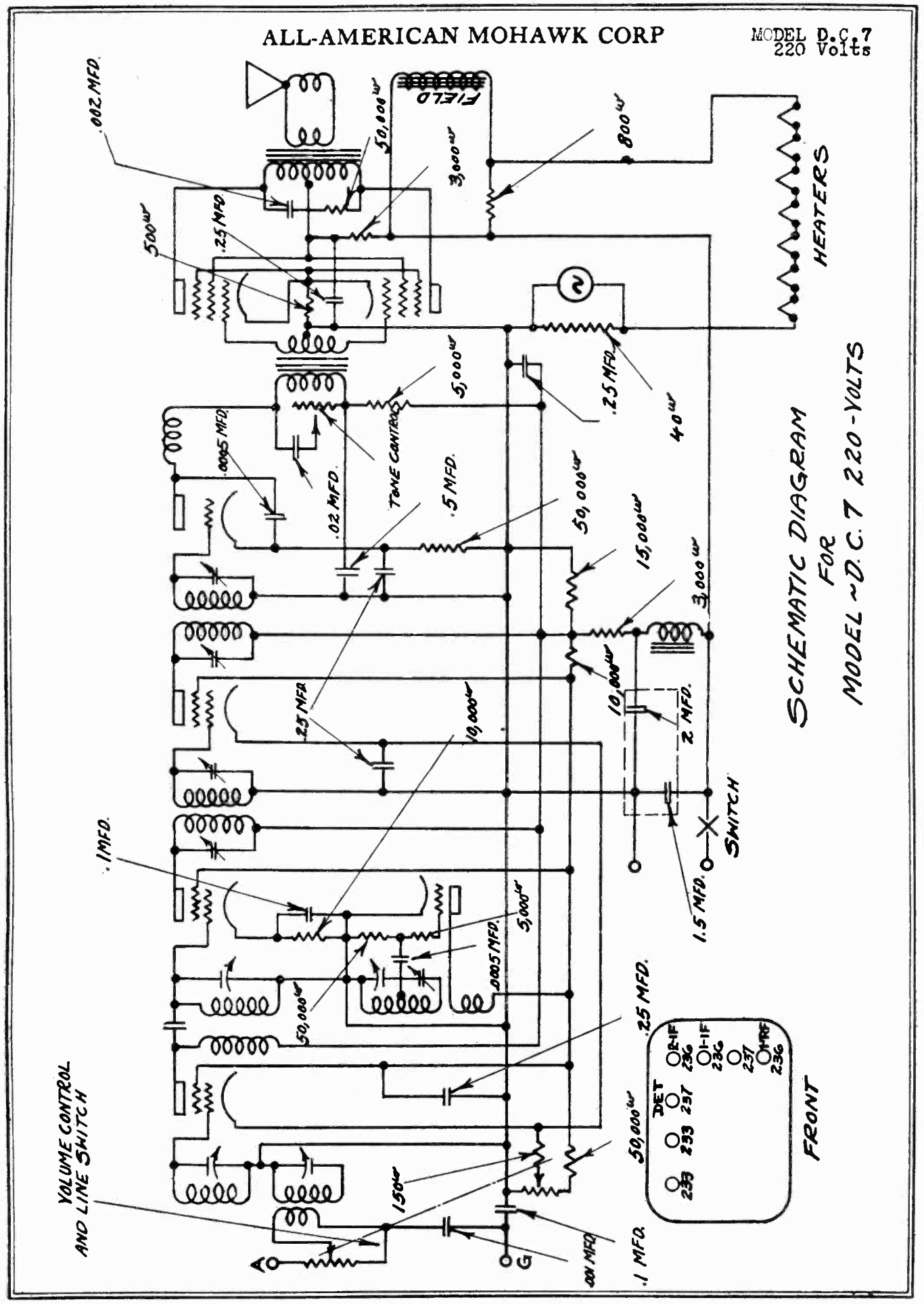
MODEL B 30-31

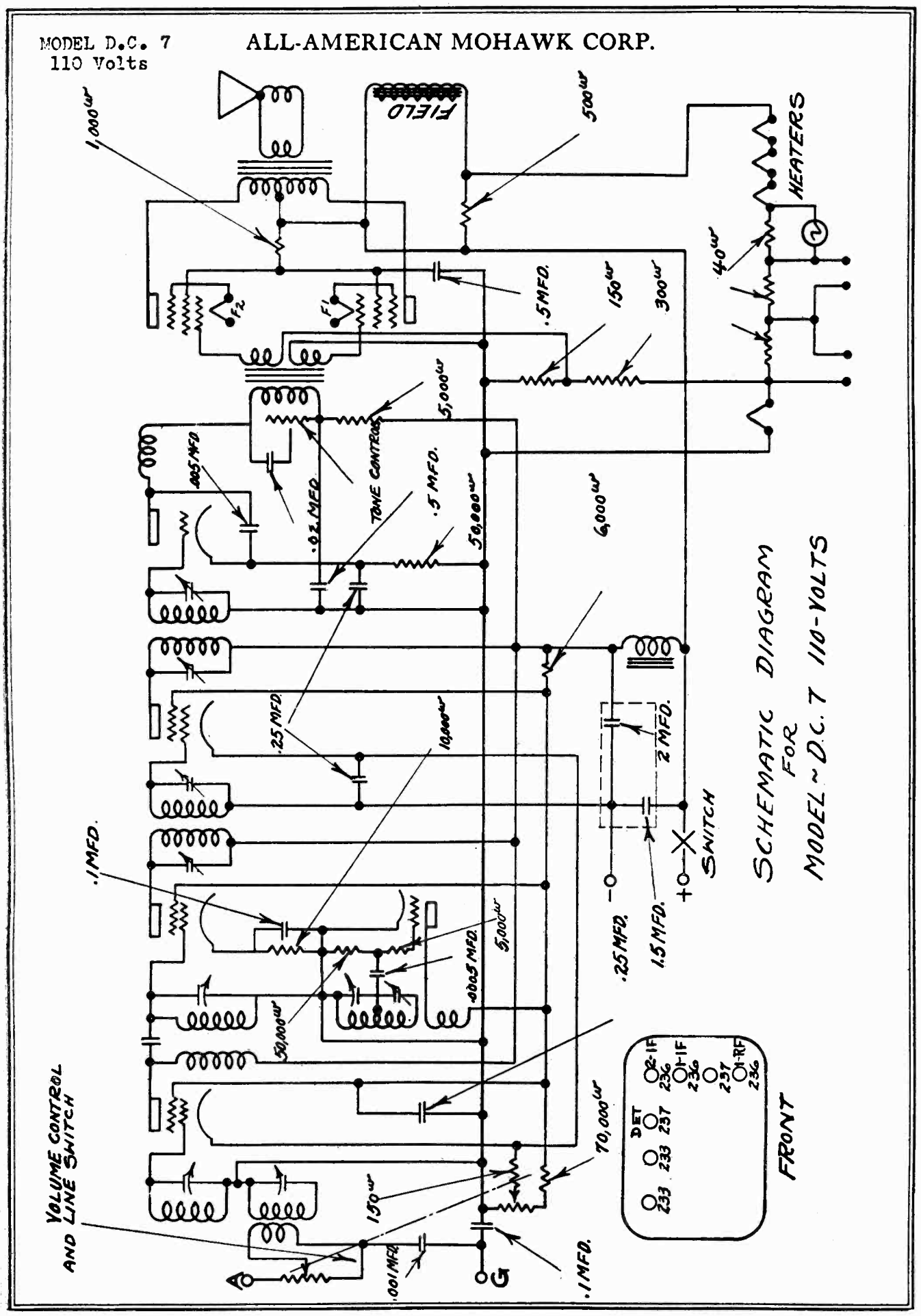


MODEL 8 Tube
110 V. D-C

ALL-AMERICAN MOHAWK CORP.

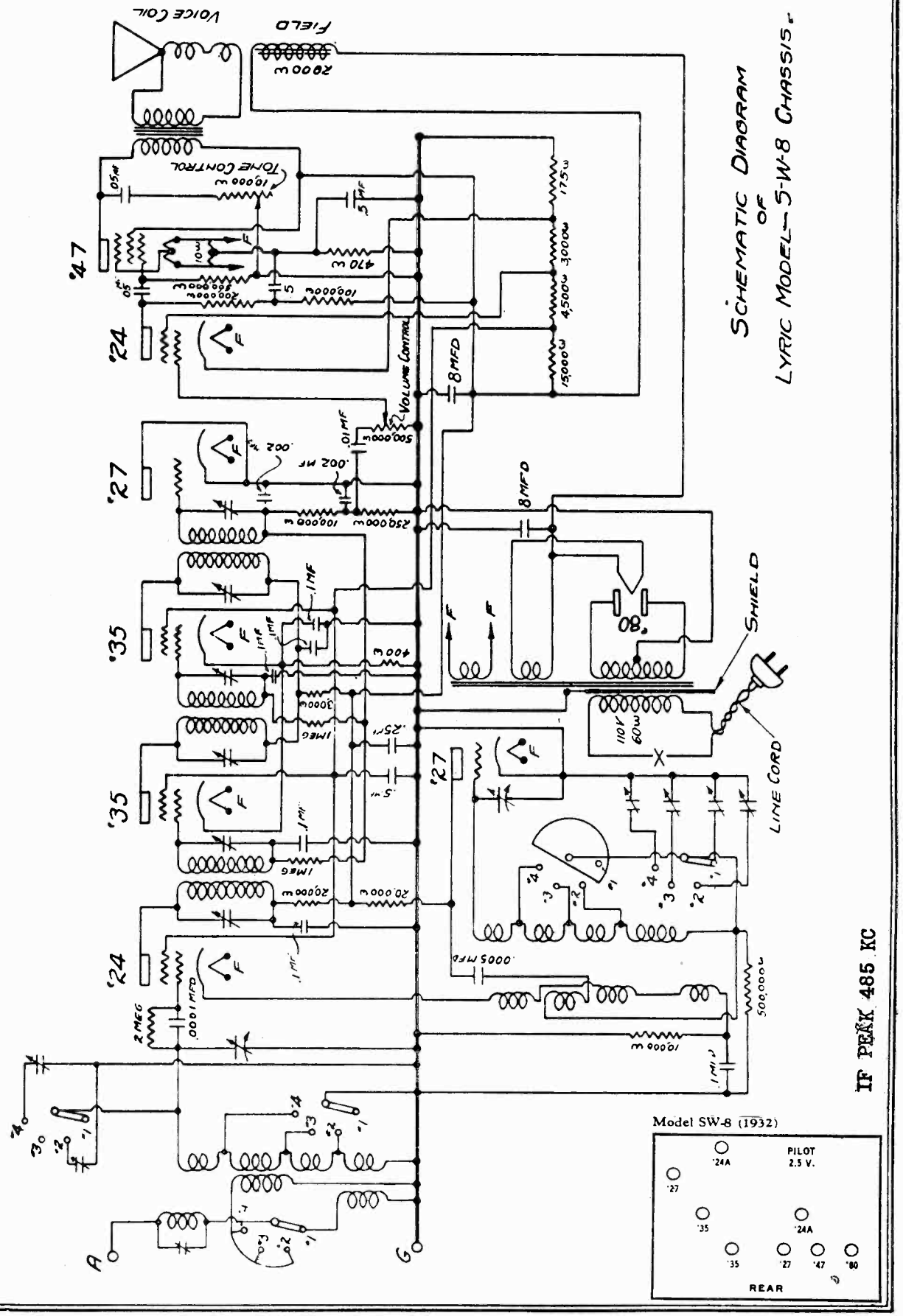






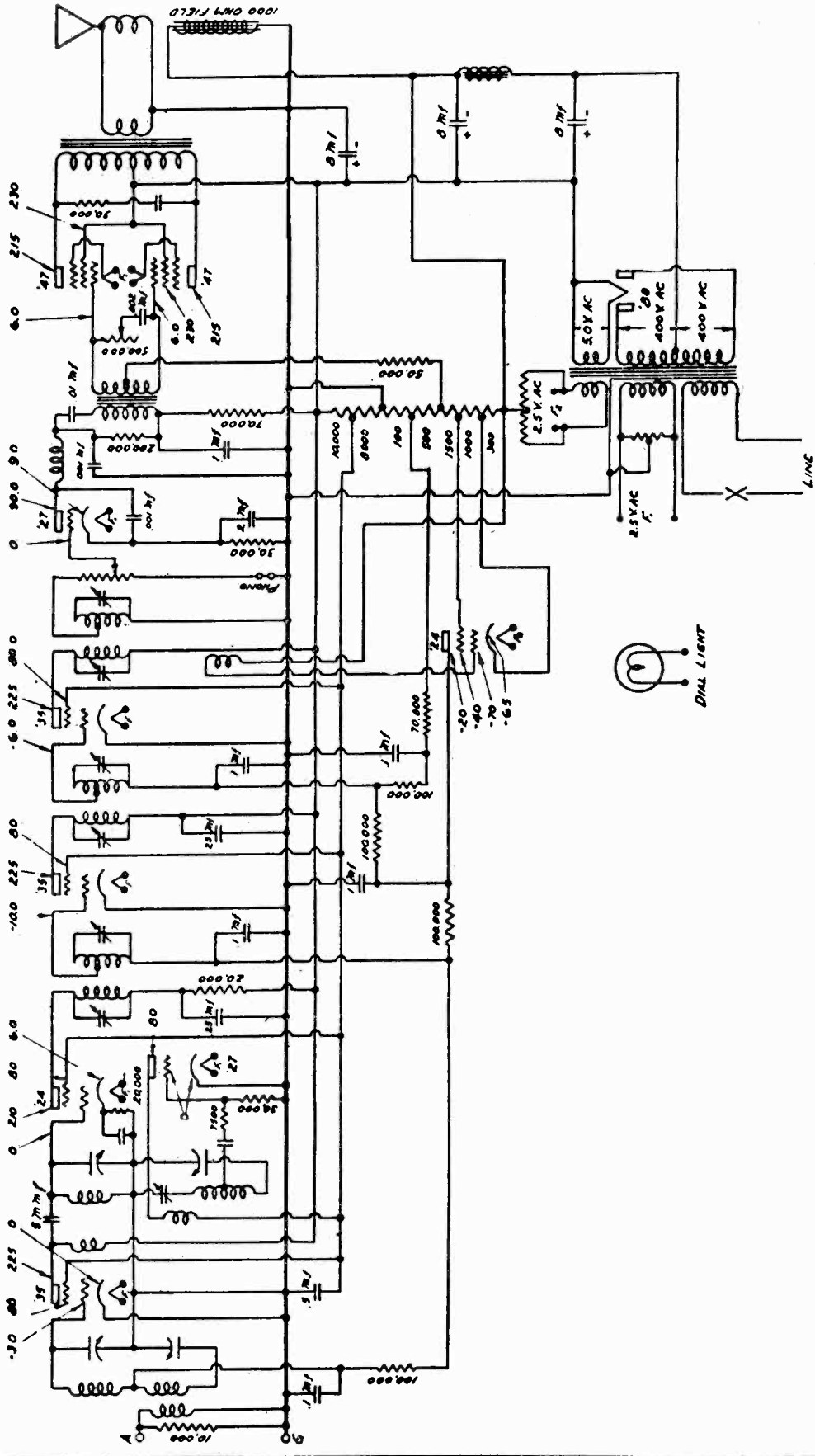
ALL-AMERICAN MOHAWK CORP

MODEL SW-8



MODEL S-10

ALL-AMERICAN MOHAWK CORP.

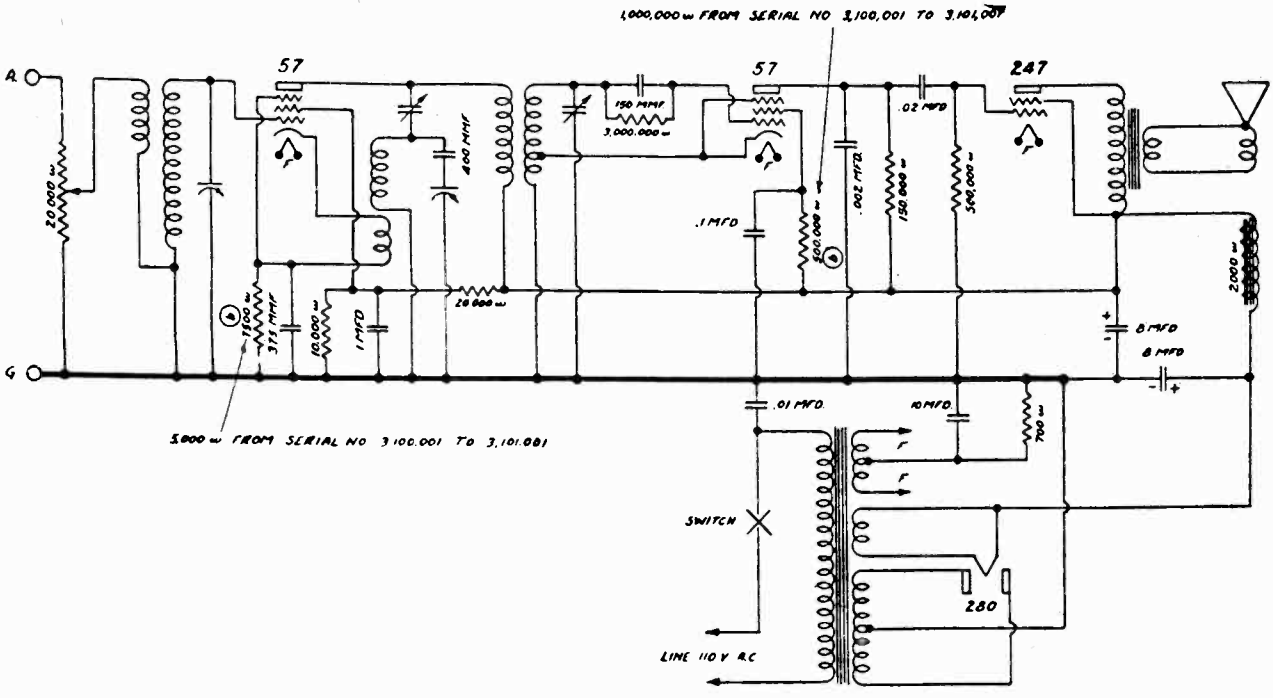


SCHEMATIC DIAGRAM OF LYRIC MODEL S-10 CHASSIS

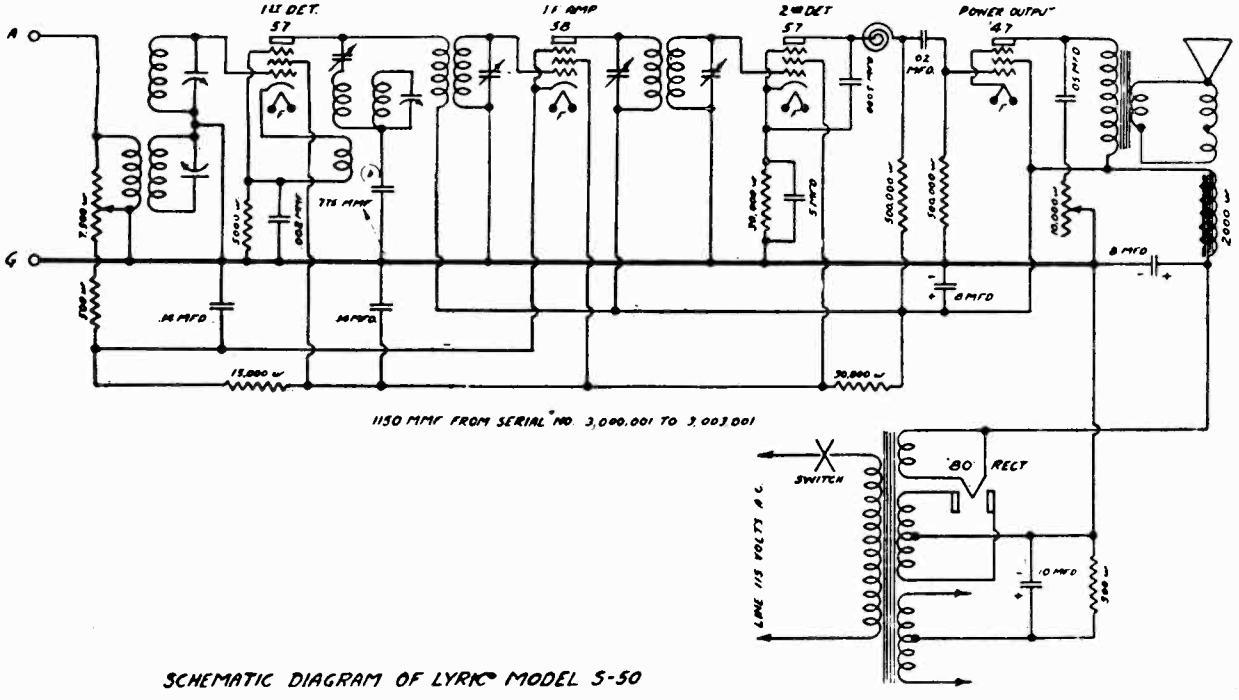
IF PEAK 175 KC

ALL-AMERICAN MOHAWK CORP.

MODEL S-40
S-50



SCHEMATIC DIAGRAM MODEL S-40

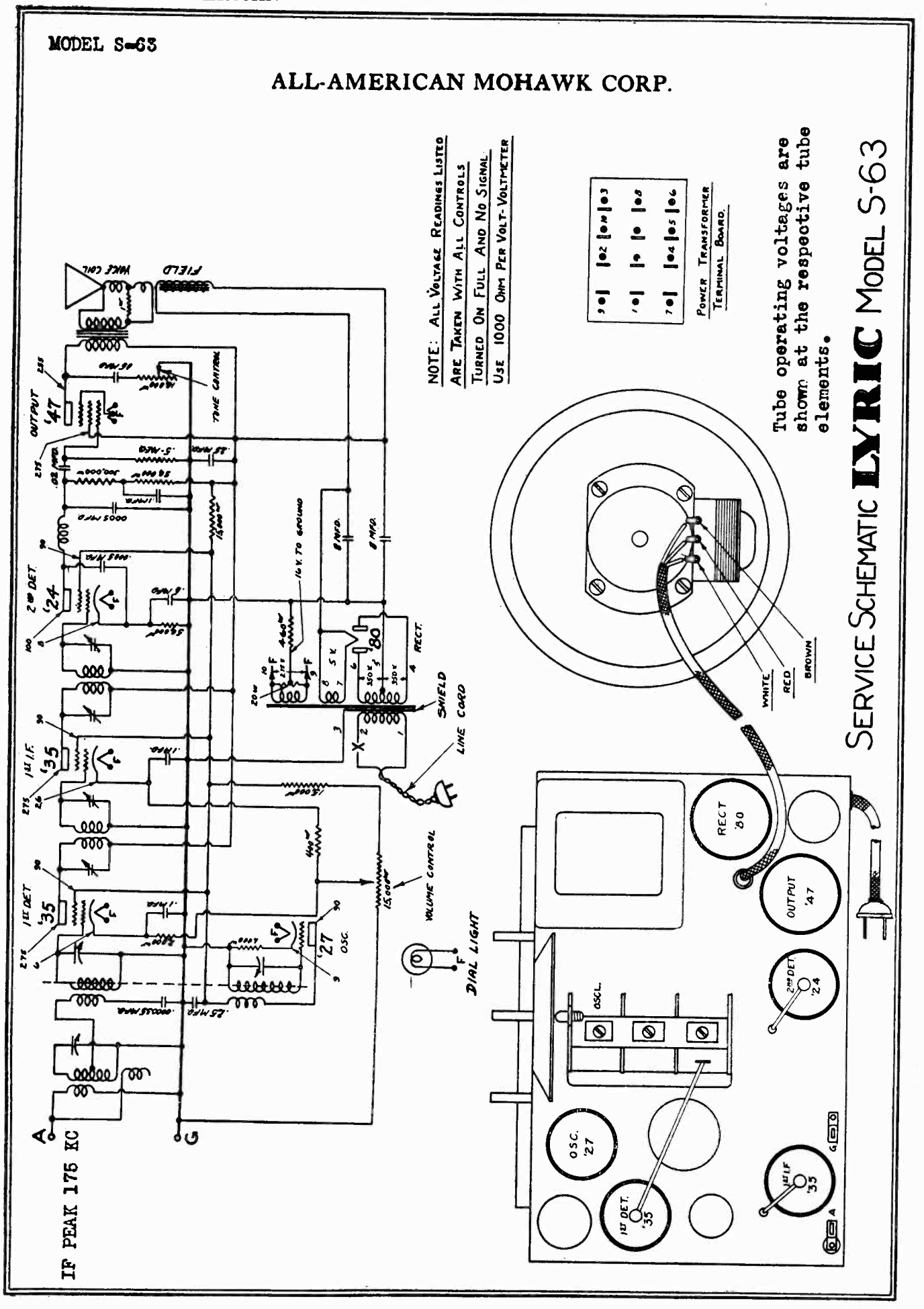


SCHEMATIC DIAGRAM OF LYRIC® MODEL S-50

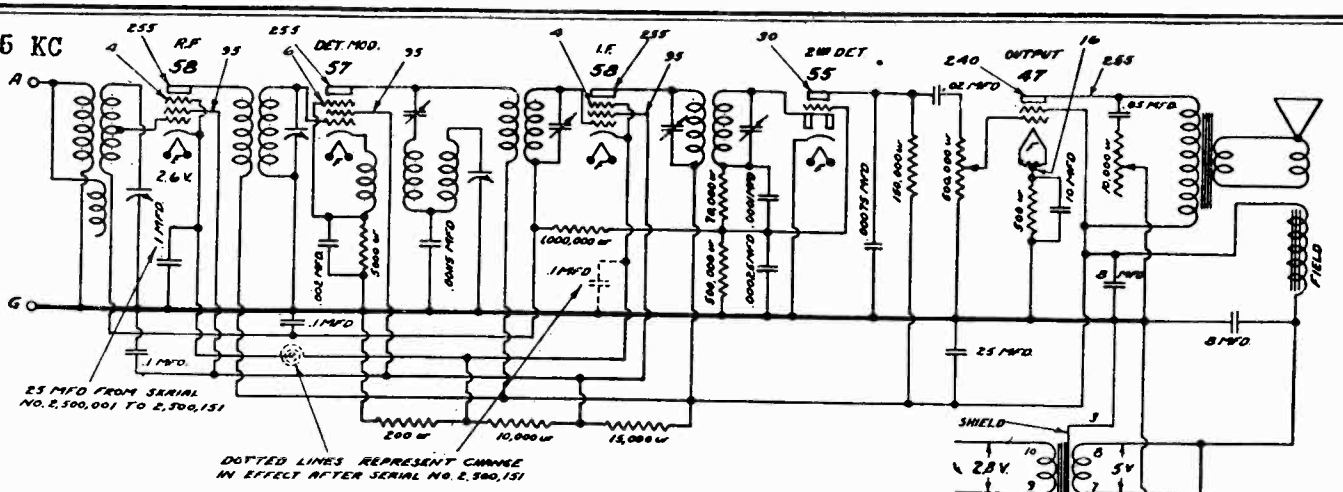
IF PEAK 175 KC

MODEL S-63

ALL-AMERICAN MOHAWK CORP.

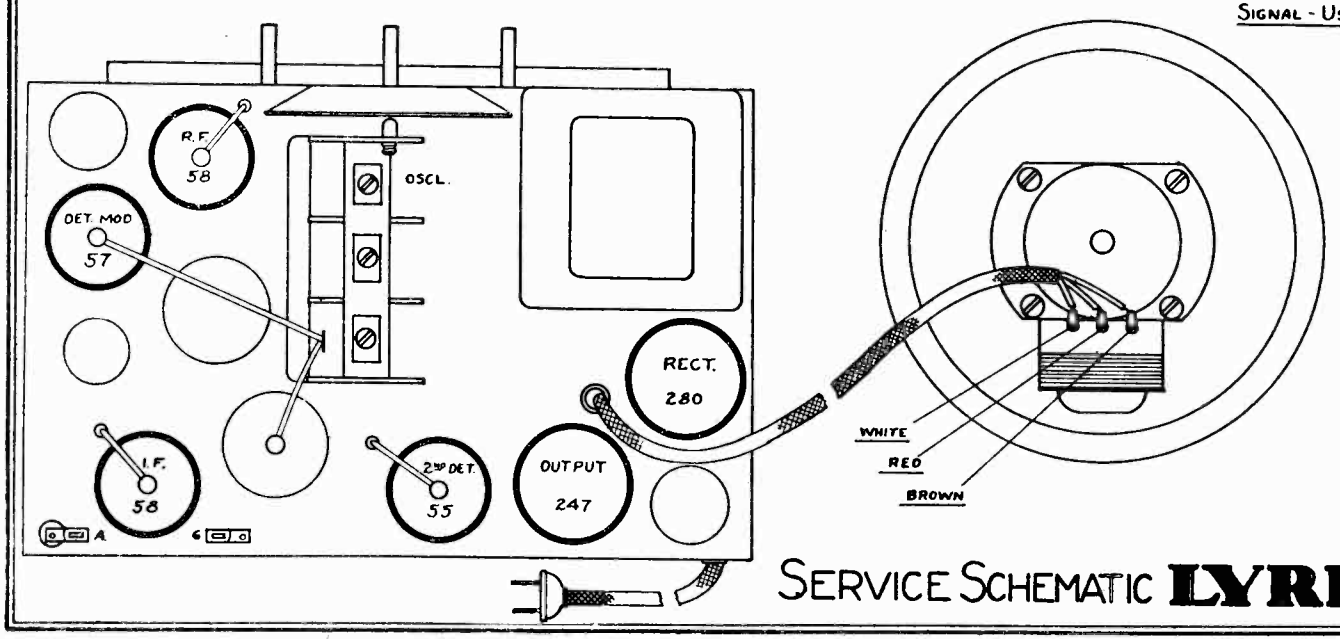


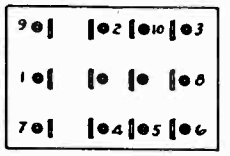
IF PEAK 175 KC



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 1000ᵂ PER VOLT - VOLTMETER.



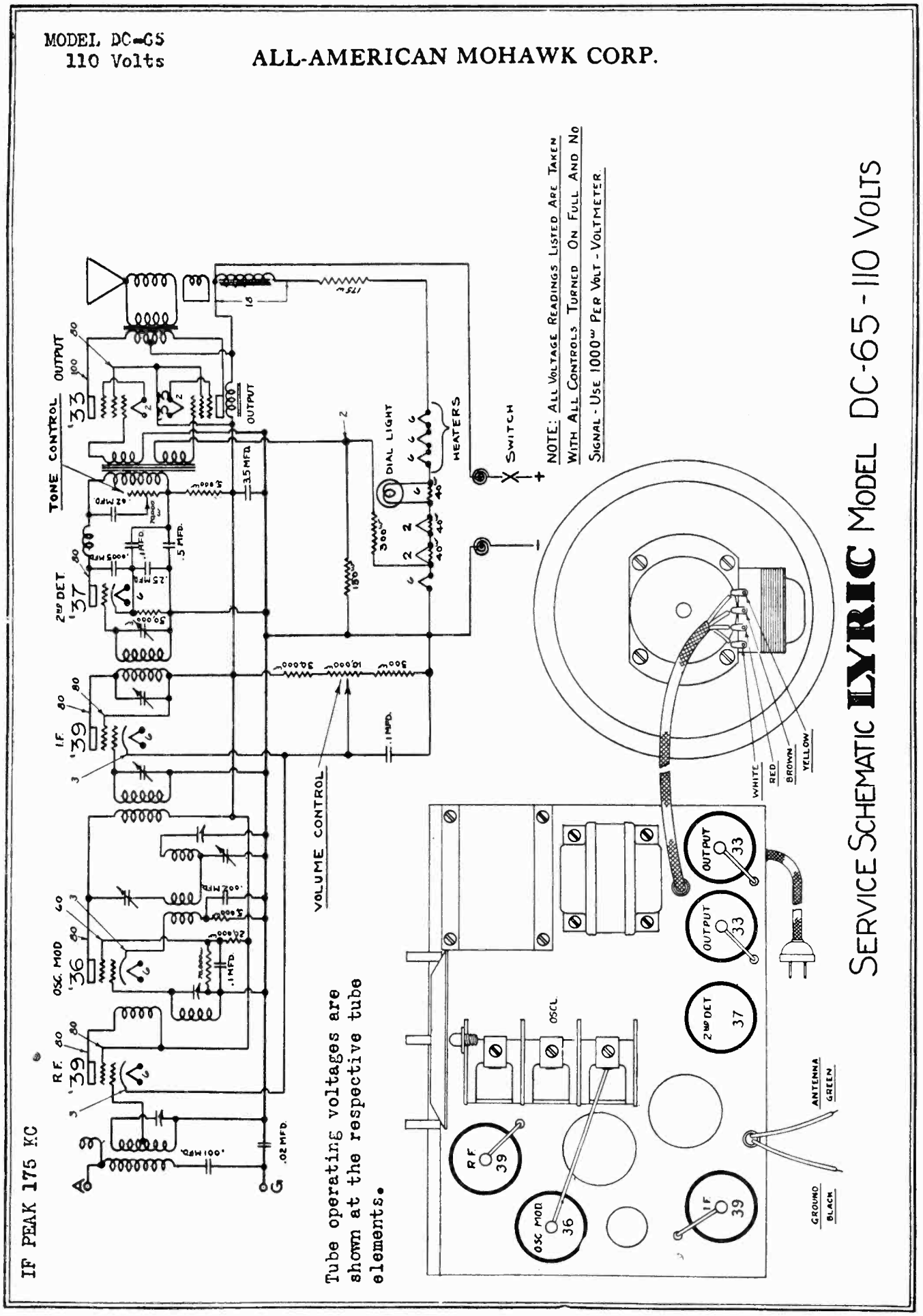


POWER TRANSFORMER TERMINAL BOARD

SERVICE SCHEMATIC **LYRIC** MODEL SA-65

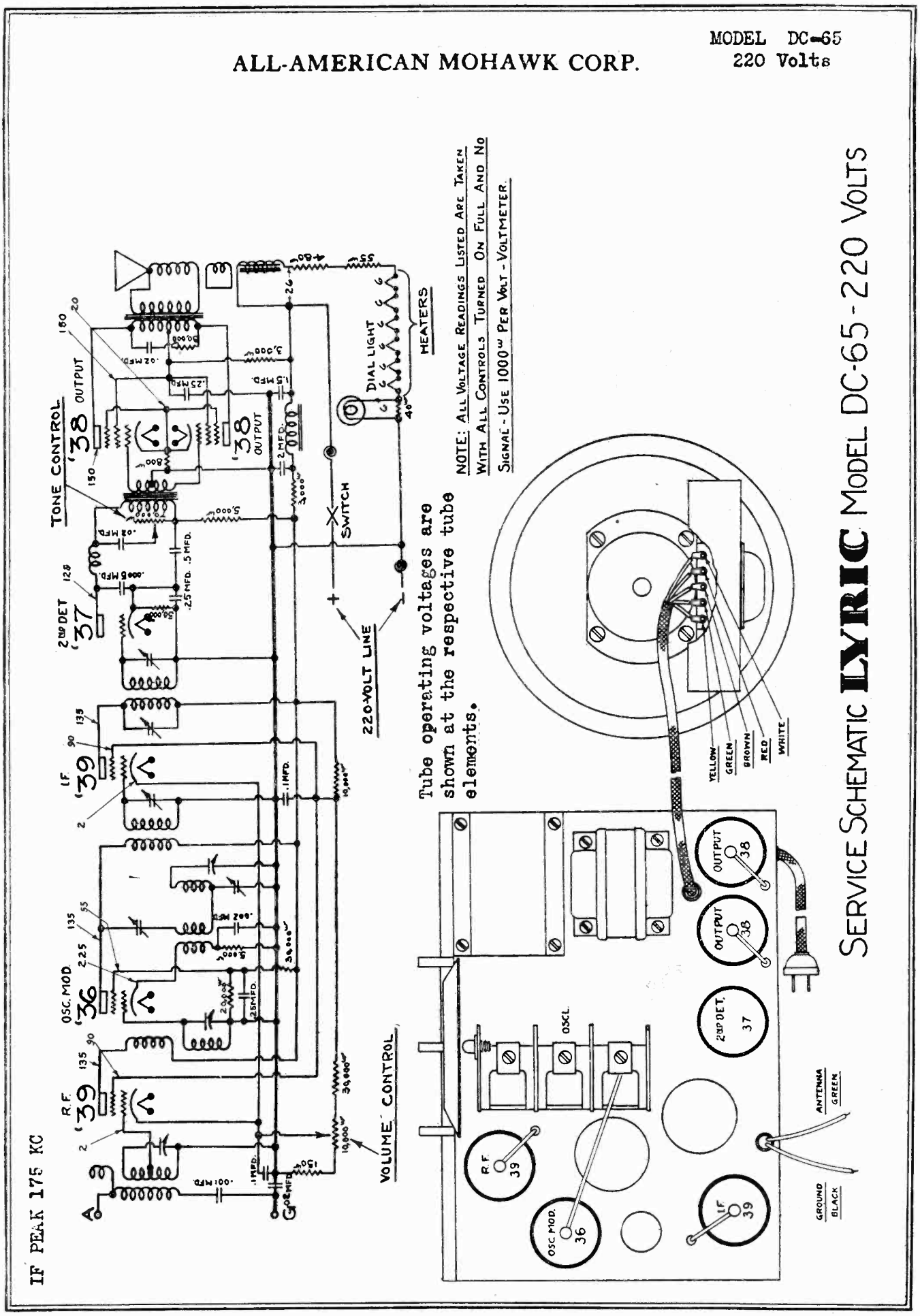
ALL AMERICAN MOHAWK CORP.

MODEL SA-65



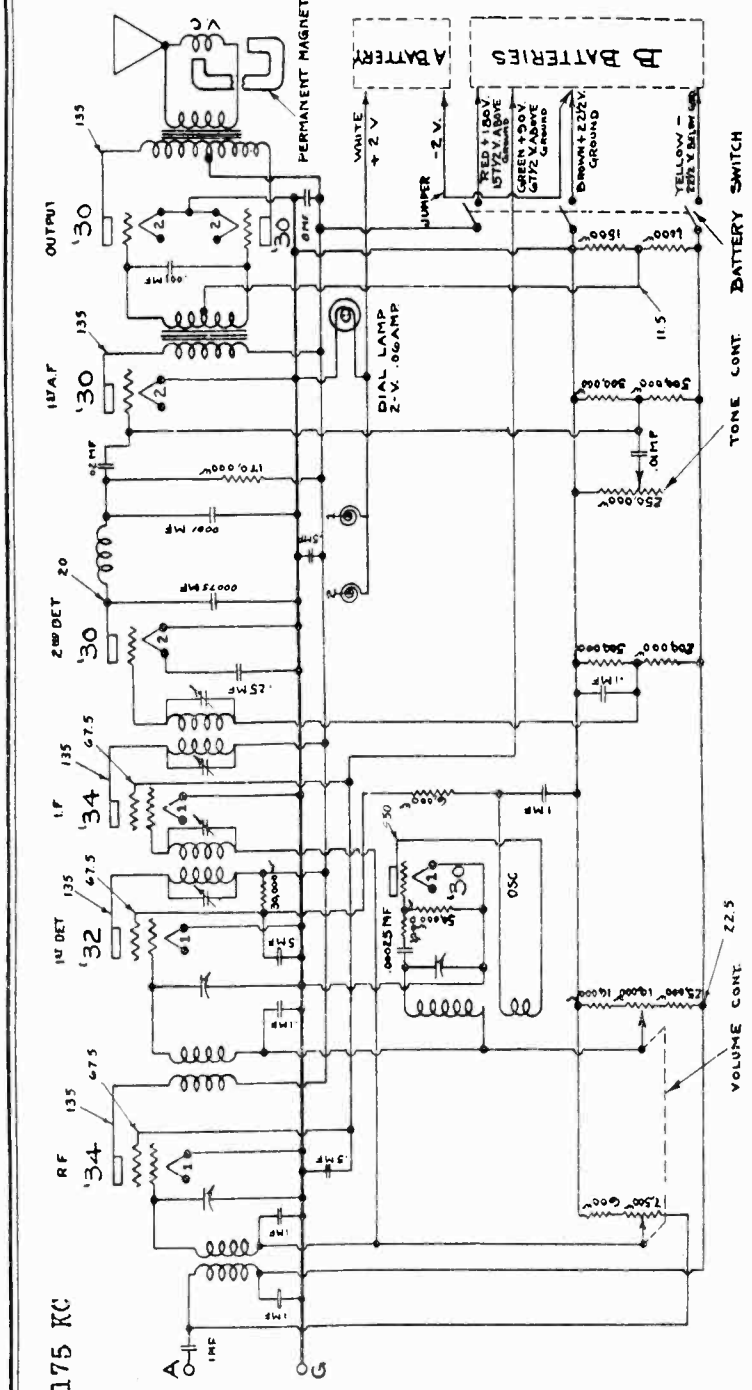
ALL-AMERICAN MOHAWK CORP.

MODEL DC-65
220 Volts



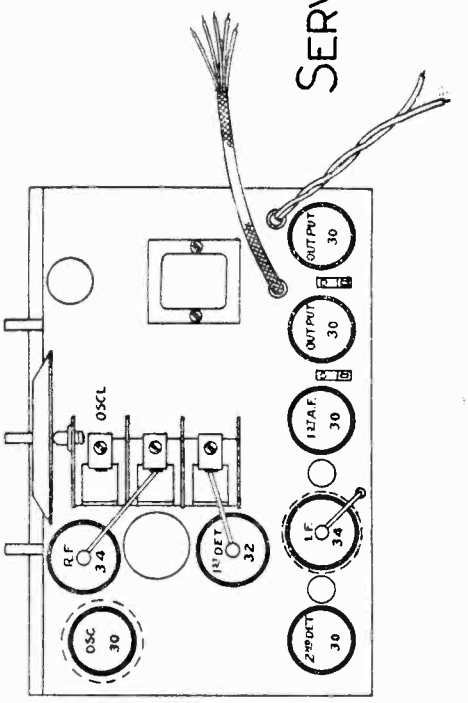
MODEL B-80

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.

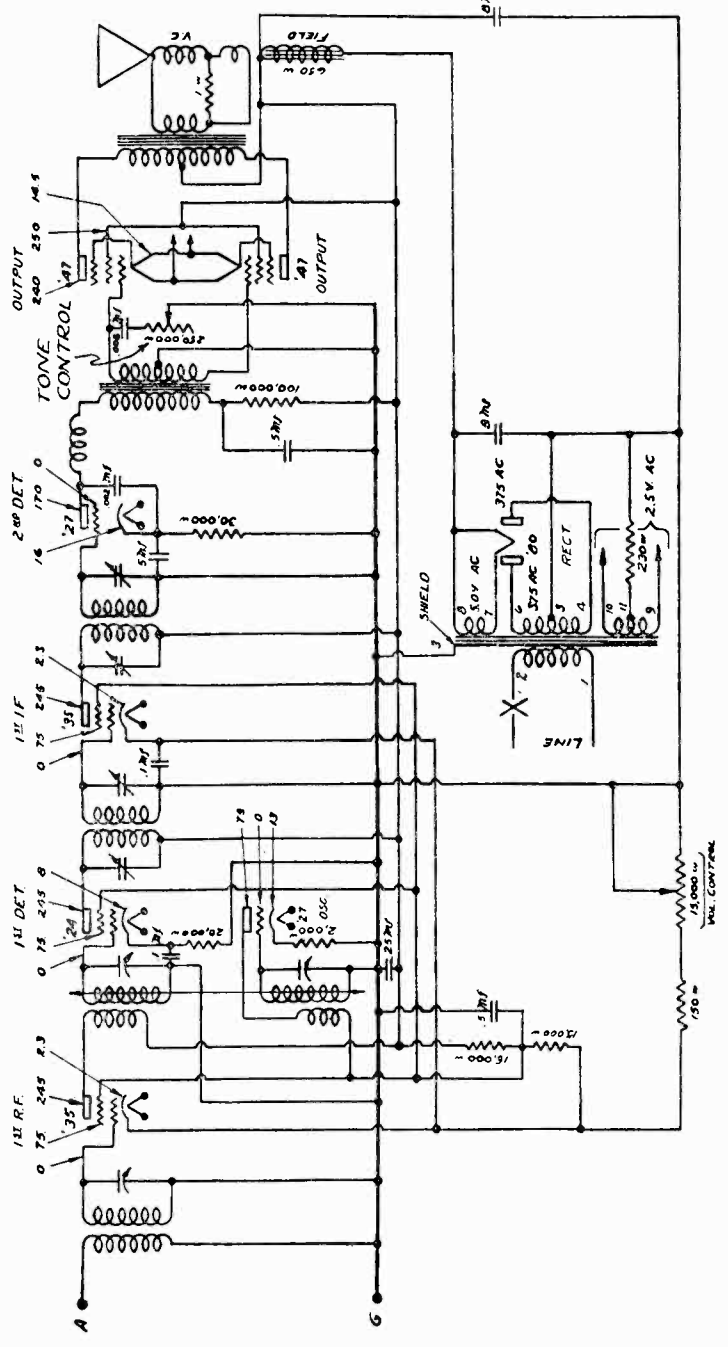


SERVICE SCHEMATIC LYRIC MODEL B-80

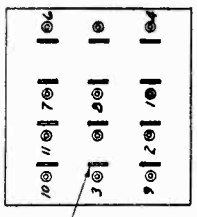
IF PEAK 175 KC

MODEL S-80

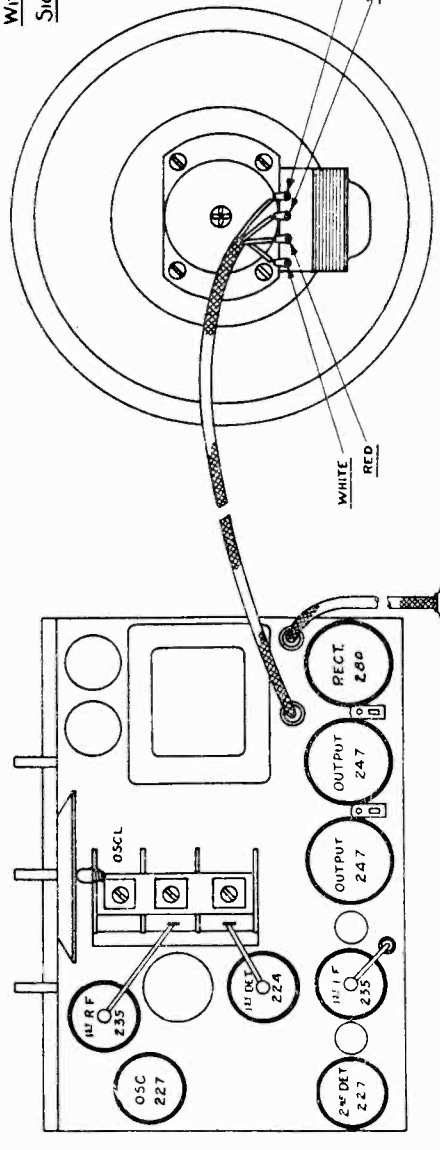
ALL-AMERICAN MOHAWK CORP.



NOTE: ALL VOLTAGE READINGS LISTED ARE TAKEN WITH ALL CONTROLS TURNED ON FULL AND NO SIGNAL - USE 1000~ PER VOLT - VOLTMETER.



POWER TRANSFORMER TERMINAL BOARD



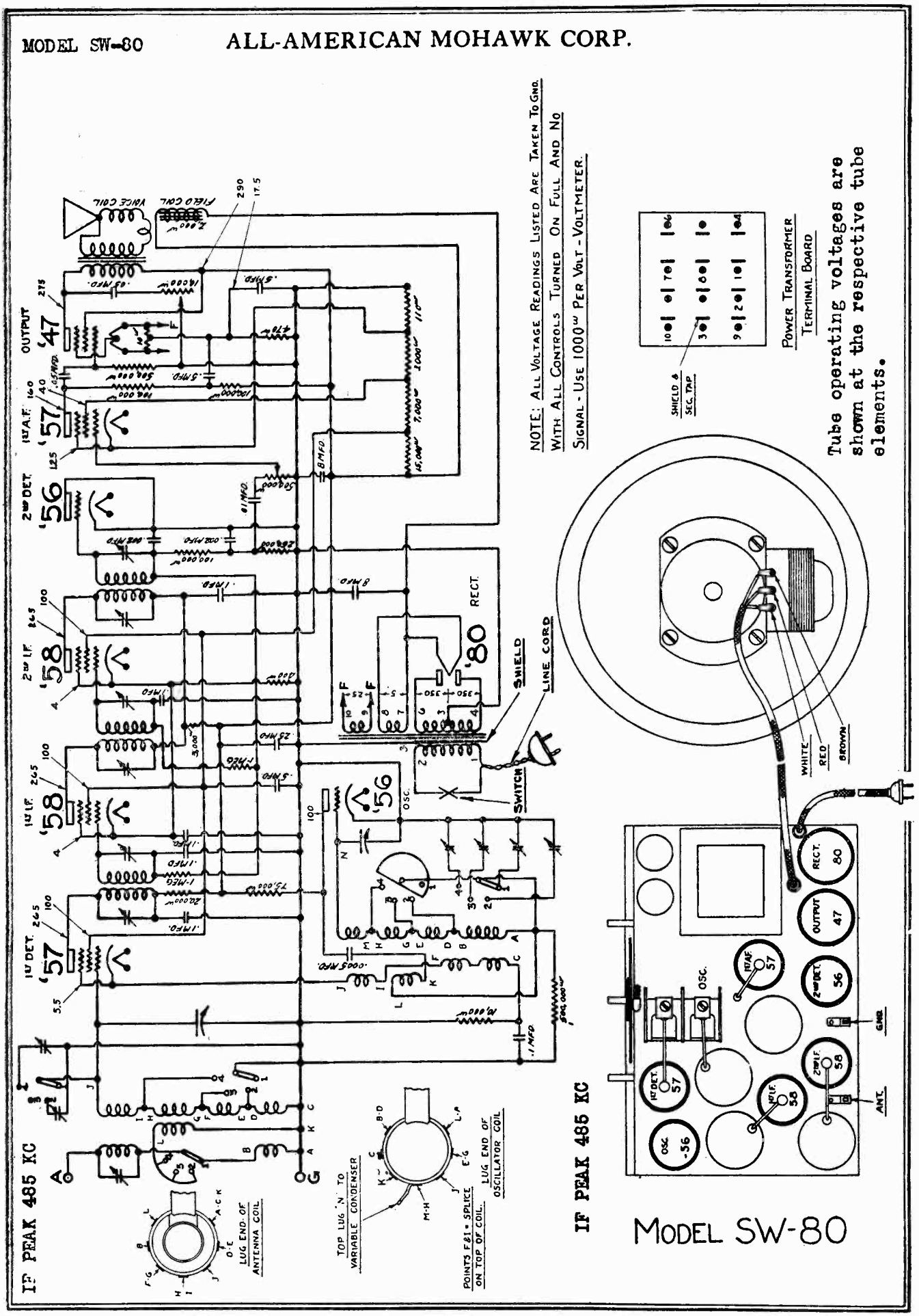
Tube operating voltages are shown at the respective tube elements.

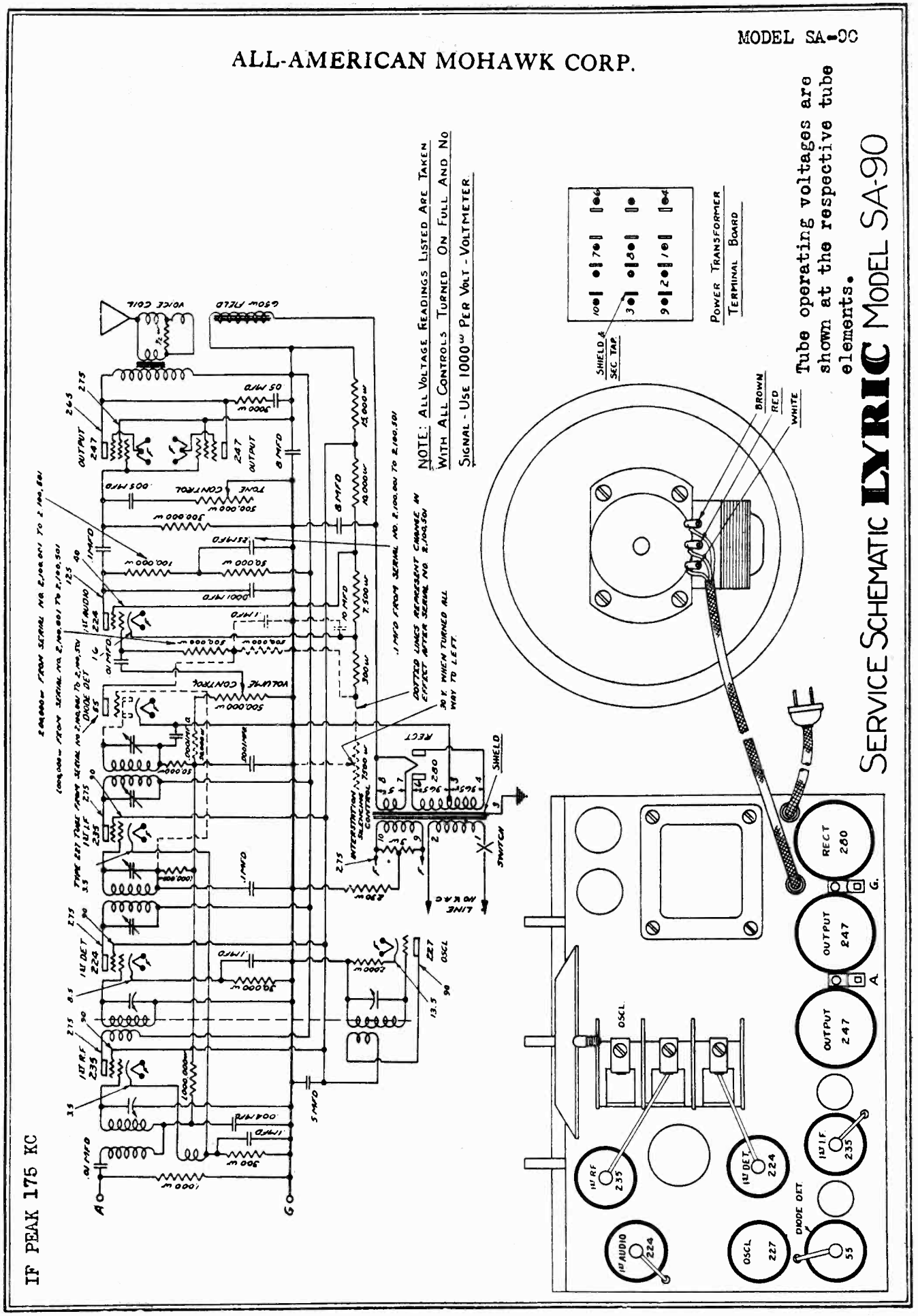
IF PEAK 175 KC

SERVICE SCHEMATIC FOR LYRIC MODEL S-80

MODEL SW-80

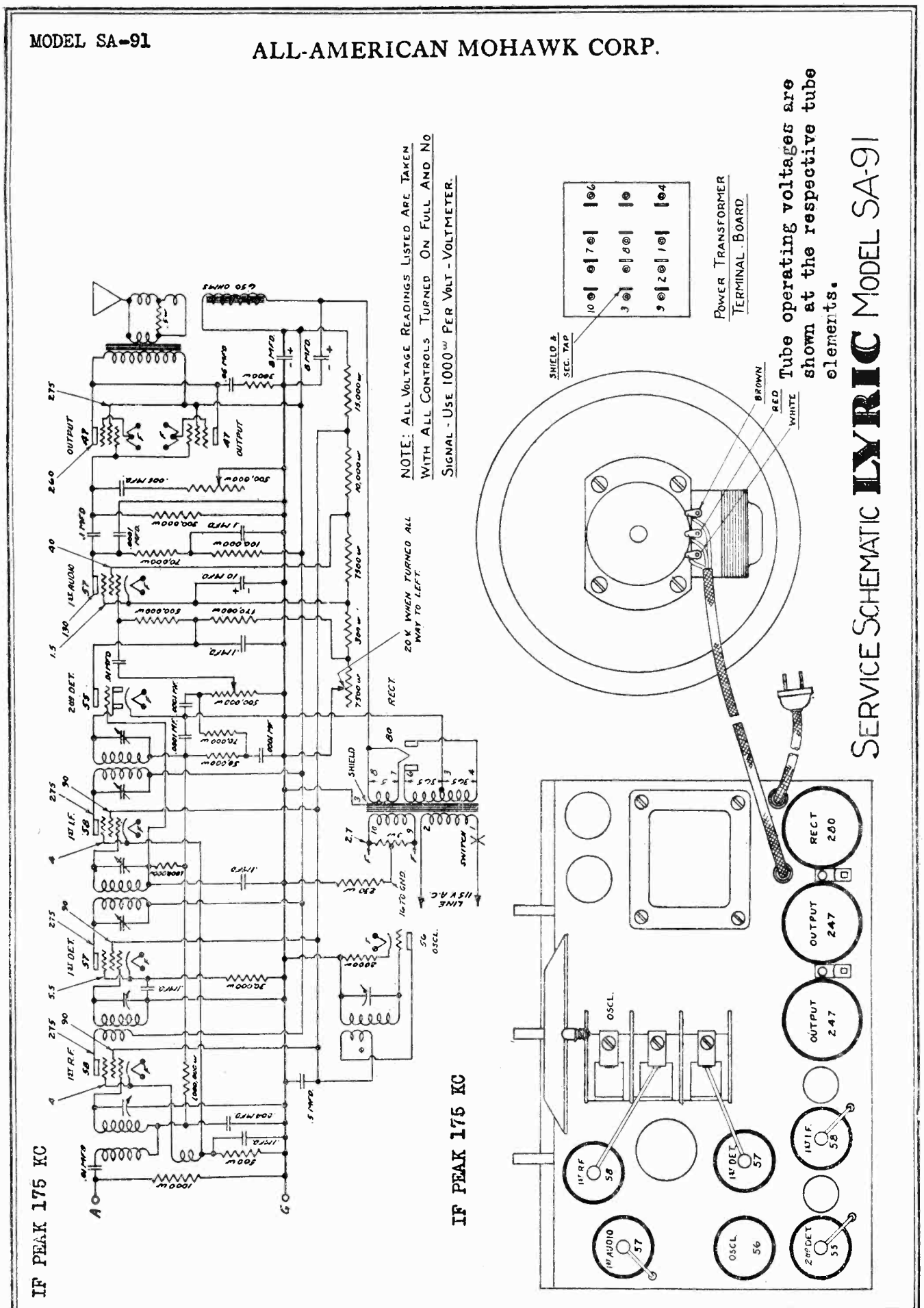
ALL-AMERICAN MOHAWK CORP.





MODEL SA-91

ALL-AMERICAN MOHAWK CORP.



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 resistance 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 oscillator 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.

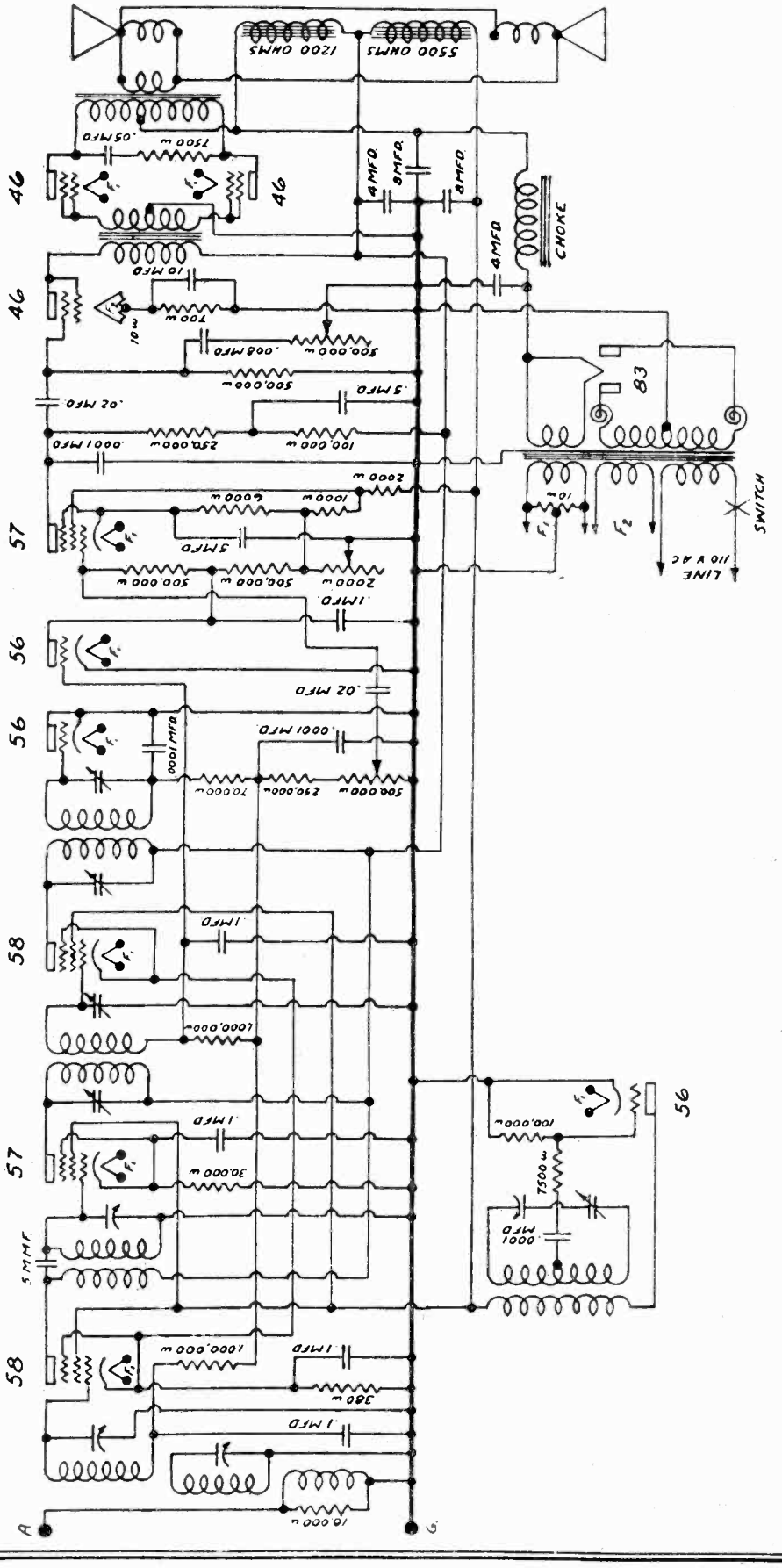
To align the RF circuits the test oscillator should first be set to some known frequency between 1400 and 1500 Kc. and the set tuned so that the dial pointer indicates this frequency. The trimmer condenser of the oscillator section of the variable condonser (front section) should then be tuned until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

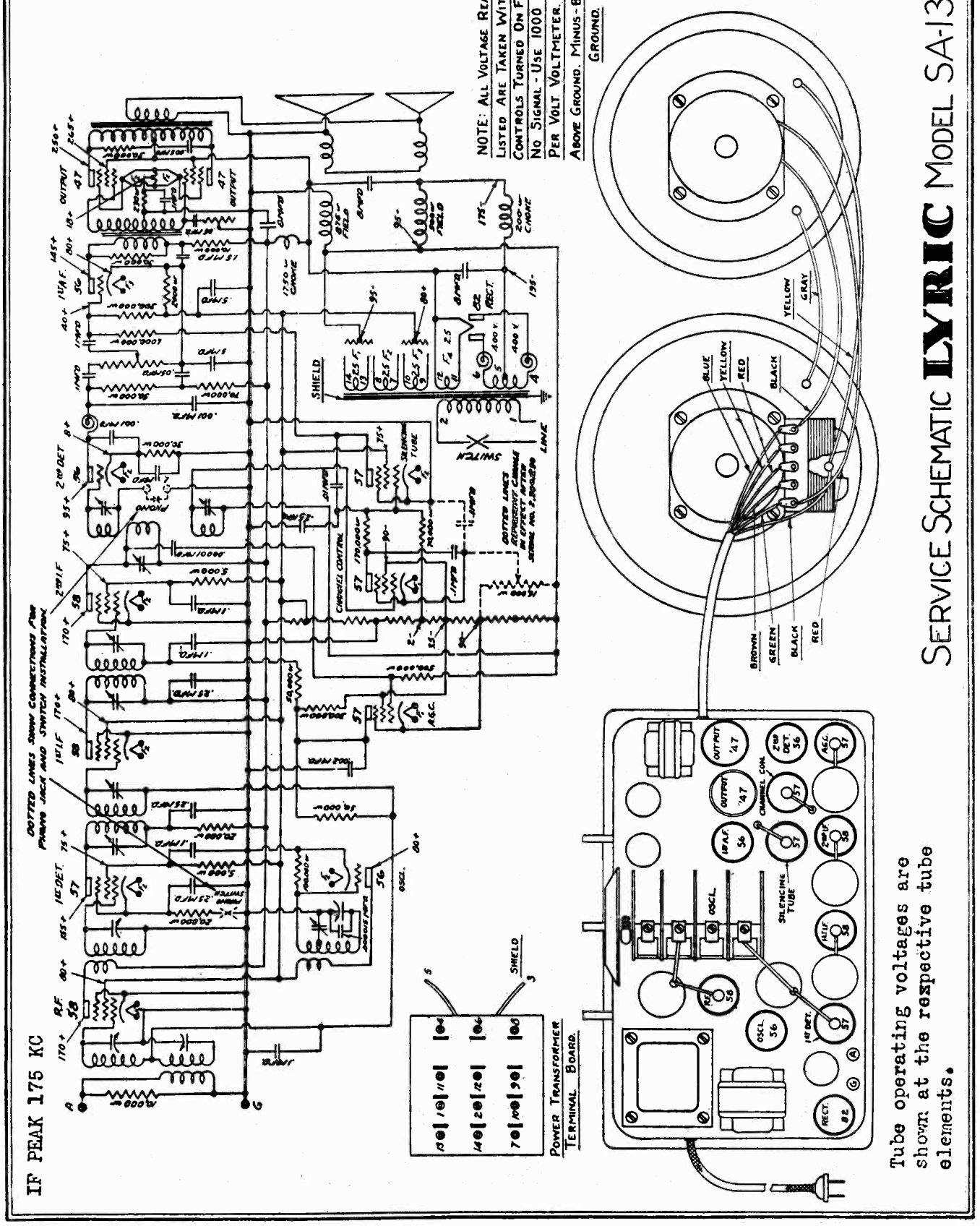


SCHEMATIC DIAGRAM OF LYRIC MODEL SA-110

IF PEAK 175 KC

MODEL SA-130

ALL-AMERICAN MOHAWK CORP.



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:

3	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
   Philedelphia, 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.

SERVICE NOTES

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.

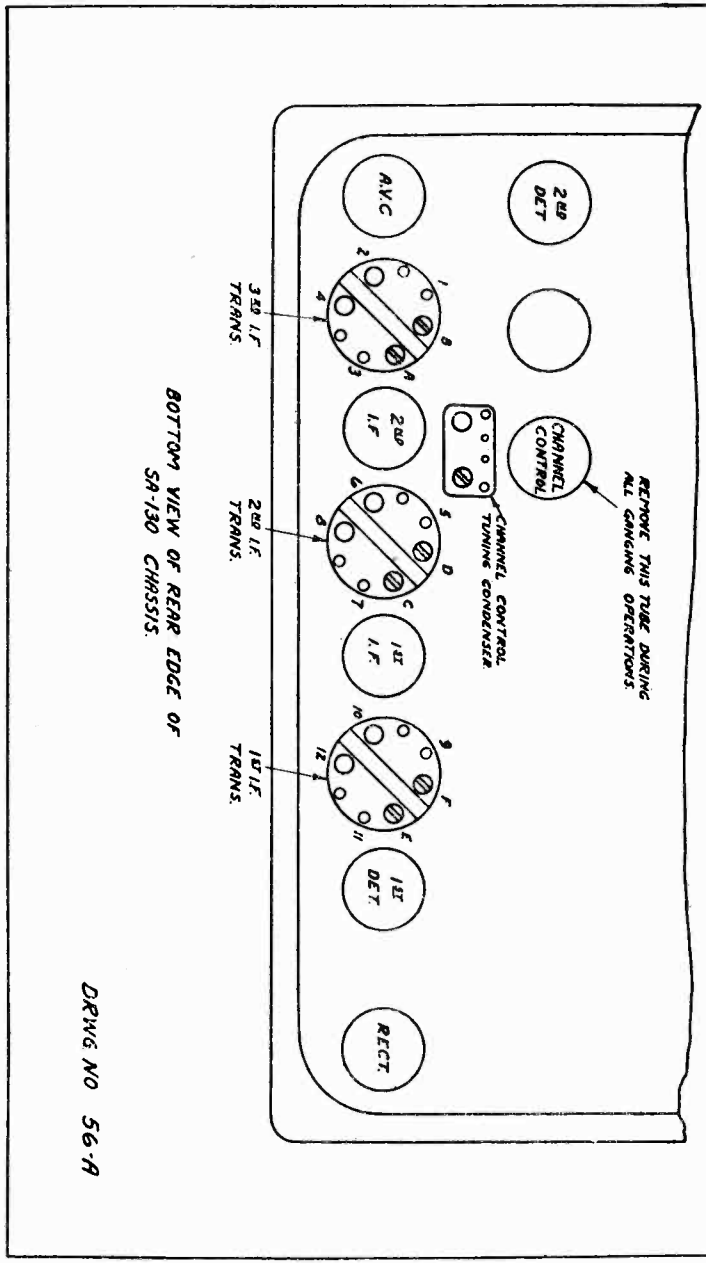
2. Set test oscillator to some known frequency between 550 and 600 Kc. Tune variable condenser so that pointer indicates this frequency on dial scale and adjust padding condenser until signal is heard with maximum output.

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.

ALL-AMERICAN MOHAWK CORP. MODEL SA-130 Service Notes

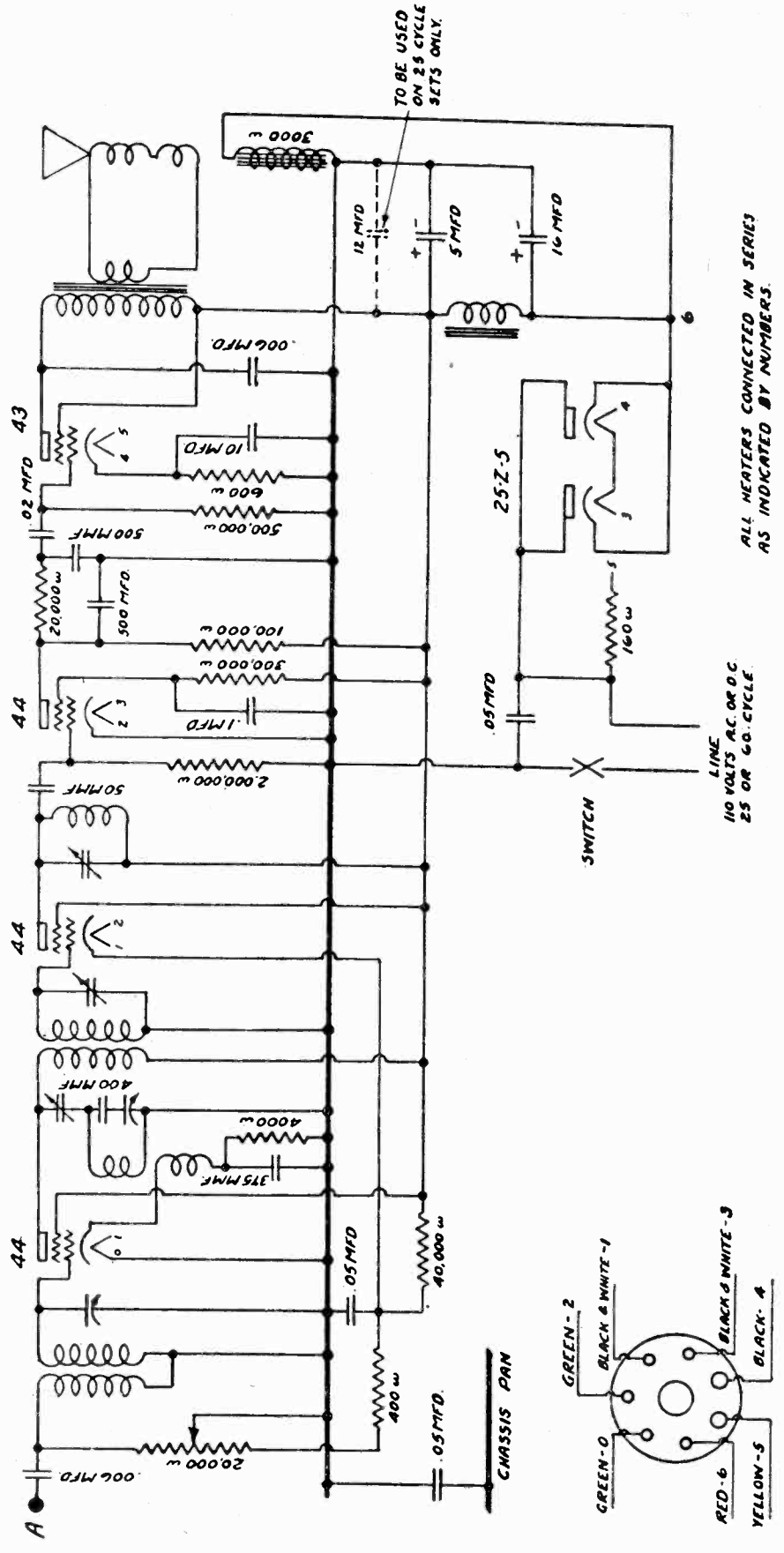


BOTTOM VIEW OF REAR EDGE OF SA-130 CHASSIS.

DRWG NO 56-A

MODEL U-55

ALL-AMERICAN MOHAWK CORP.

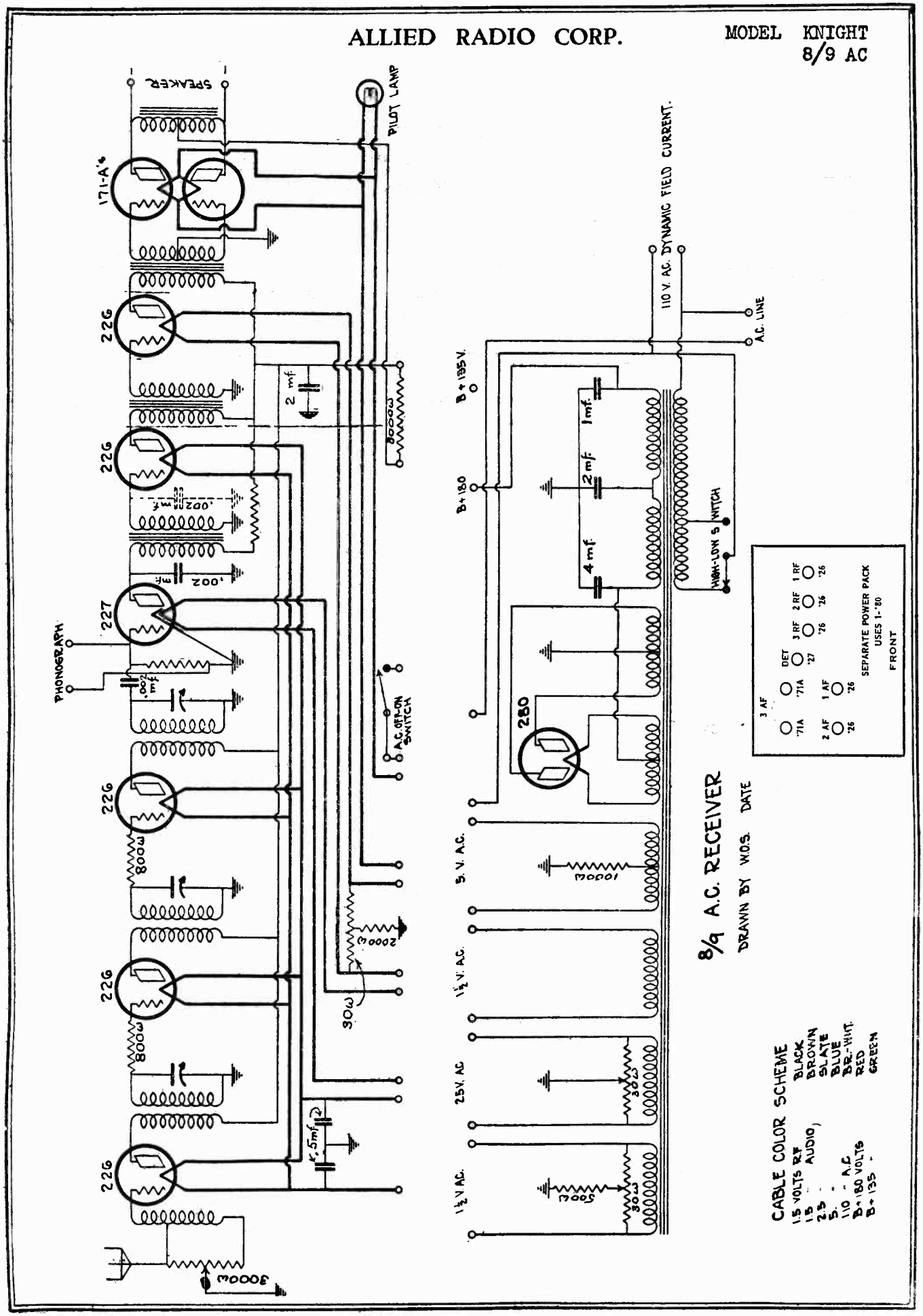


SCHEMATIC DIAGRAM MODEL U-55

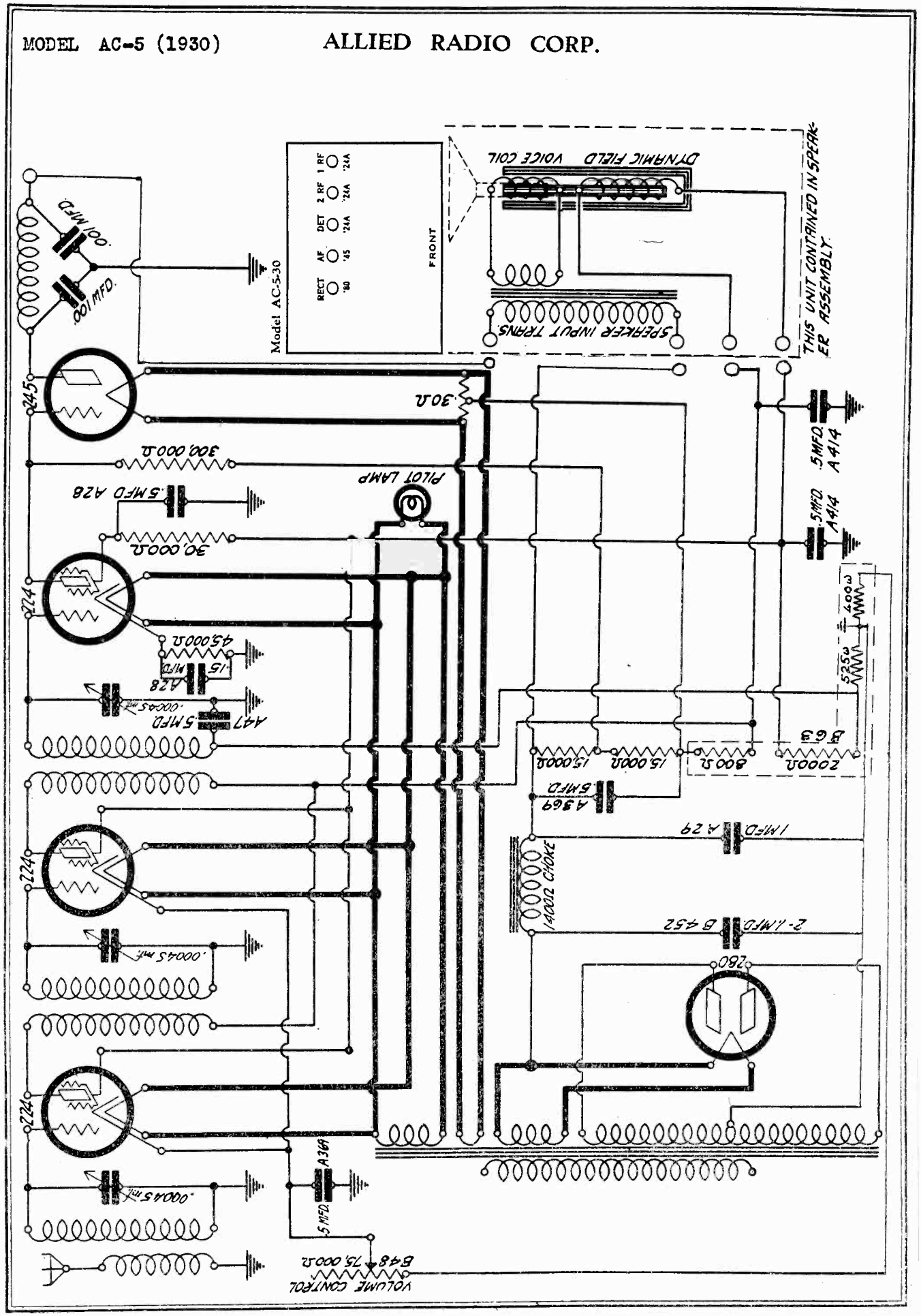
IF PEAK 485 KC

ALLIED RADIO CORP.

MODEL KNIGHT
8/9 AC



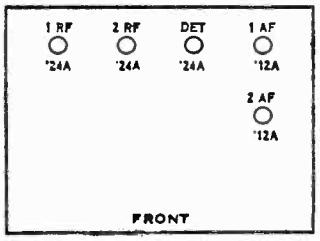
MODEL AC-5 (1930) ALLIED RADIO CORP.



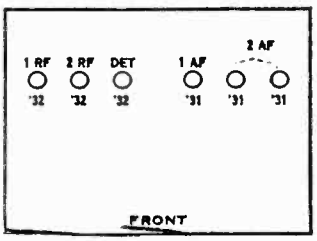
ALLIED RADIO CORP.

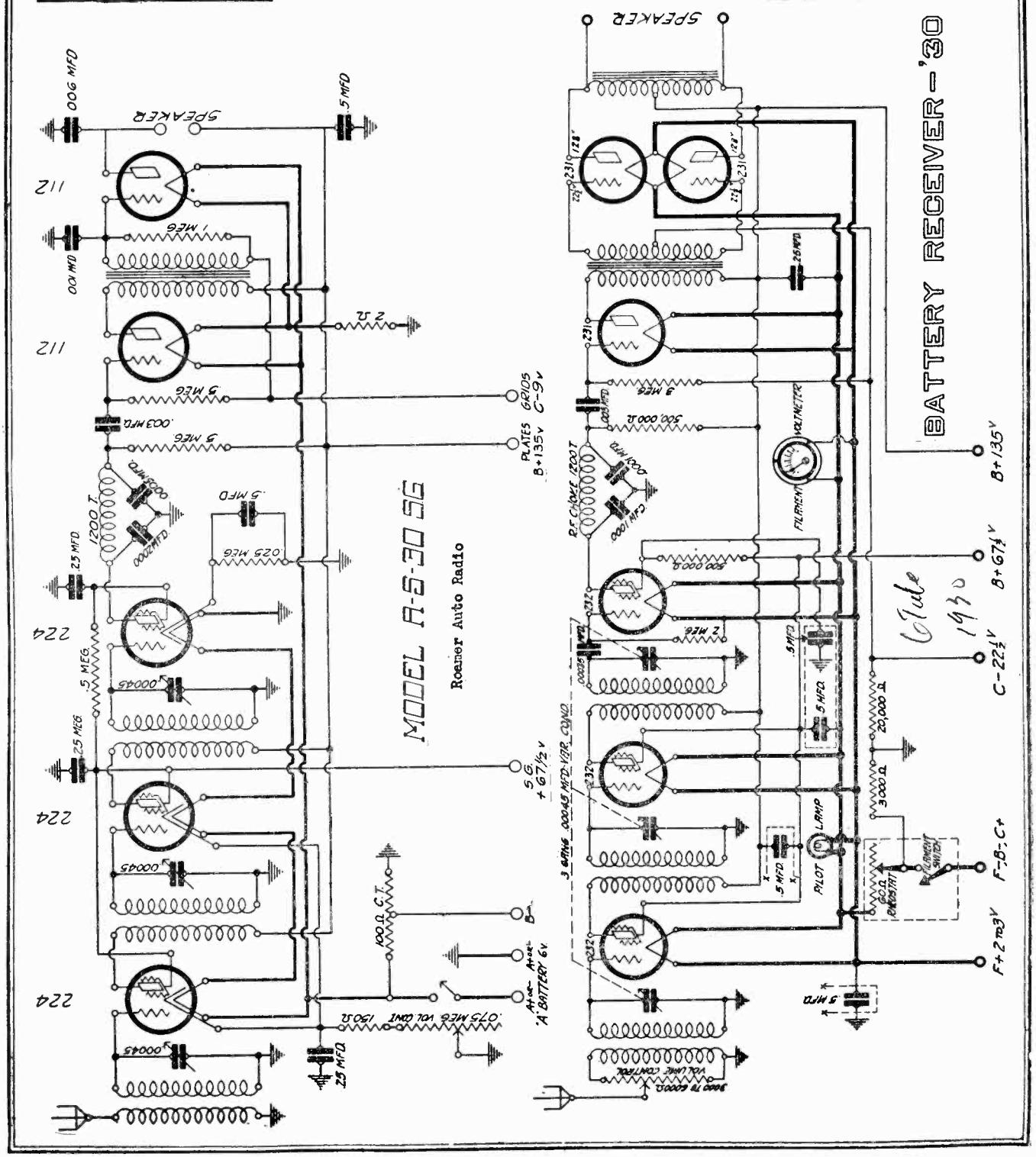
MODEL Roamer Auto Set
6 Tube "B" '30

Model A-5-30 SG



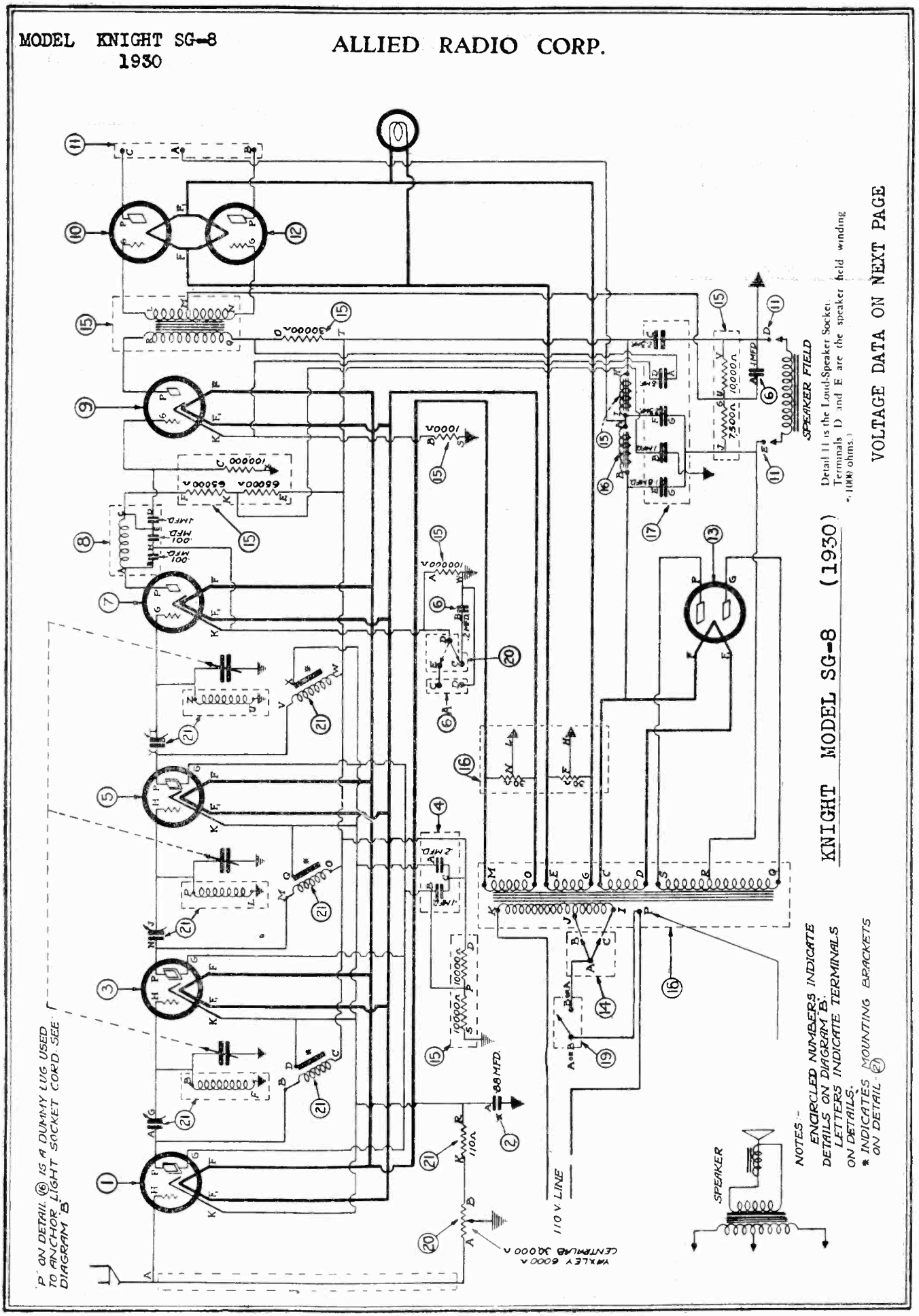
Model B-6-30





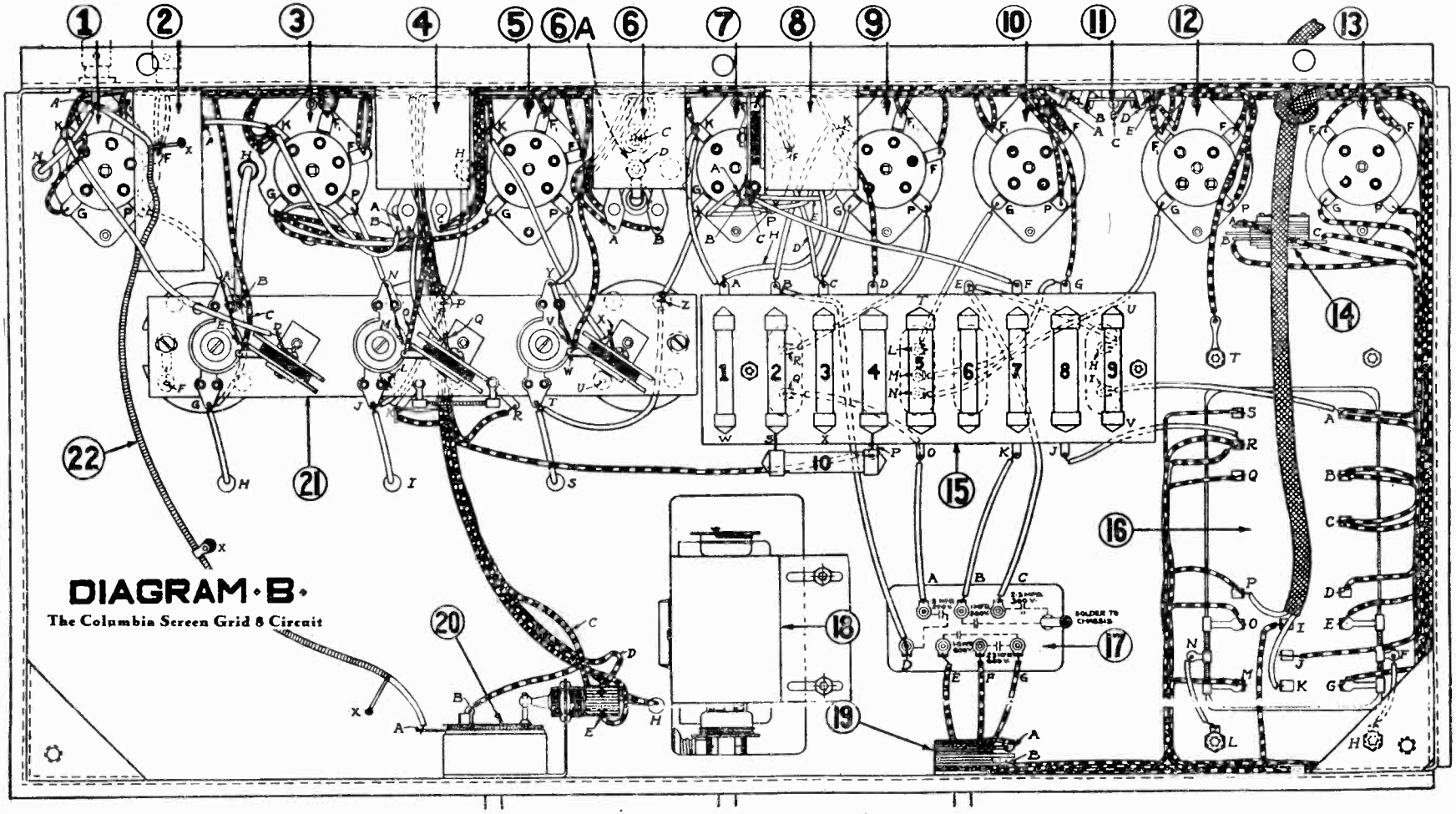
MODEL KNIGHT SG-8
1930

ALLIED RADIO CORP.



ALLIED RADIO CORP.

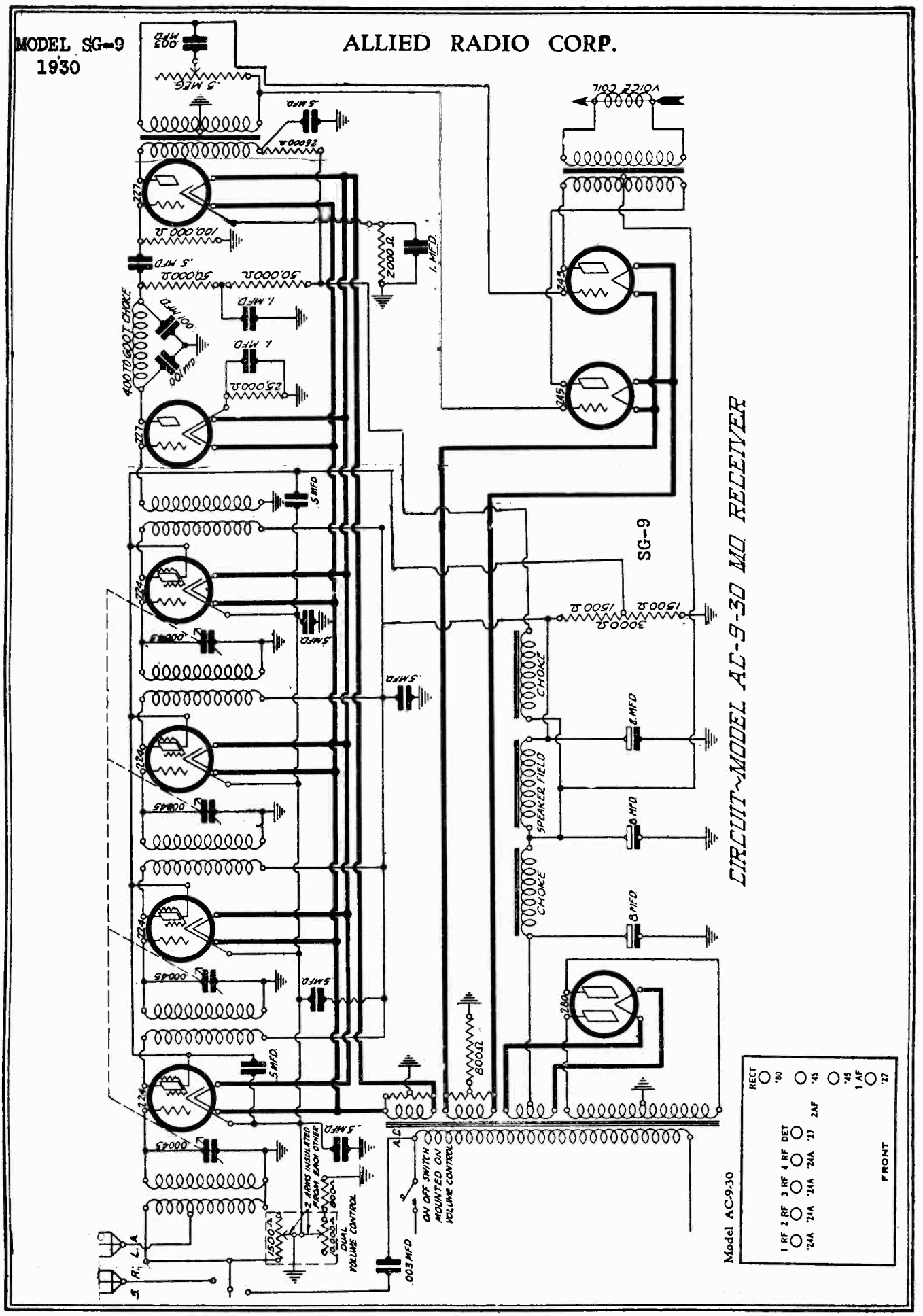
MODEL KNIGHT SG-8
Bottom View



KNIGHT MODEL SG-8 BOTTOM VIEW

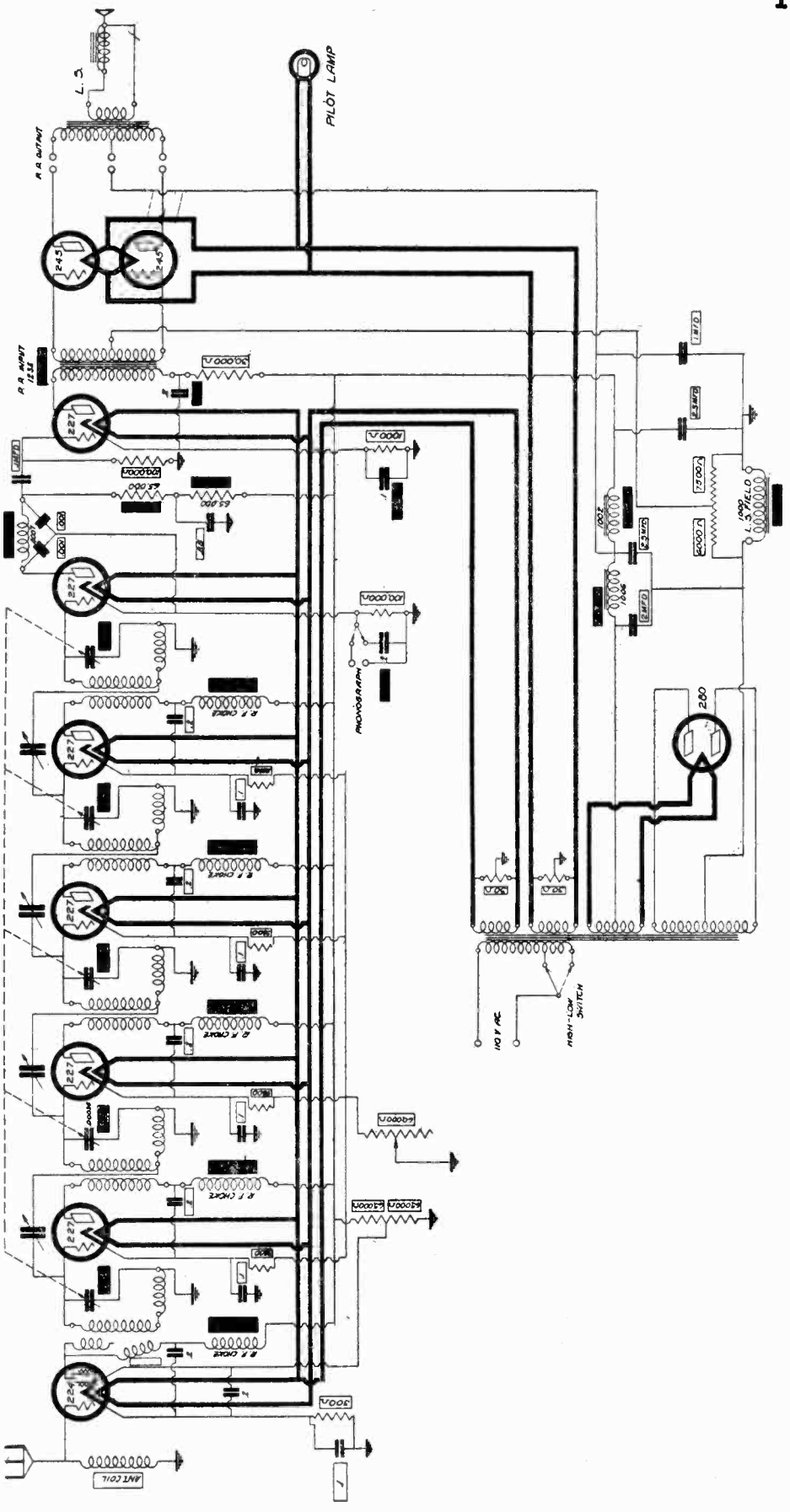
Tube No. In Order (1)	Type Of Tube (2)	Position of Tube 1st. R.F. Det., Etc. (3)	Readings, Plug In Socket Of Set: Tube Out A Volts (4)	Tube Out B Volts (5)	Tube In Tester A Volts (6)	Tube In Tester B Volts (7)	Tube In Tester C Volts (Control (8) Grid)	Tube In Tester Cathode —Heater Volts (9)	Tube In Tester Normal Plate M.A. (10)	Tube In Tester Plate M.A.Grid Test (11)	Tube In Tester Plate Change M.A. (12)	Tube In Tester 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.



ALLIED RADIO CORP.

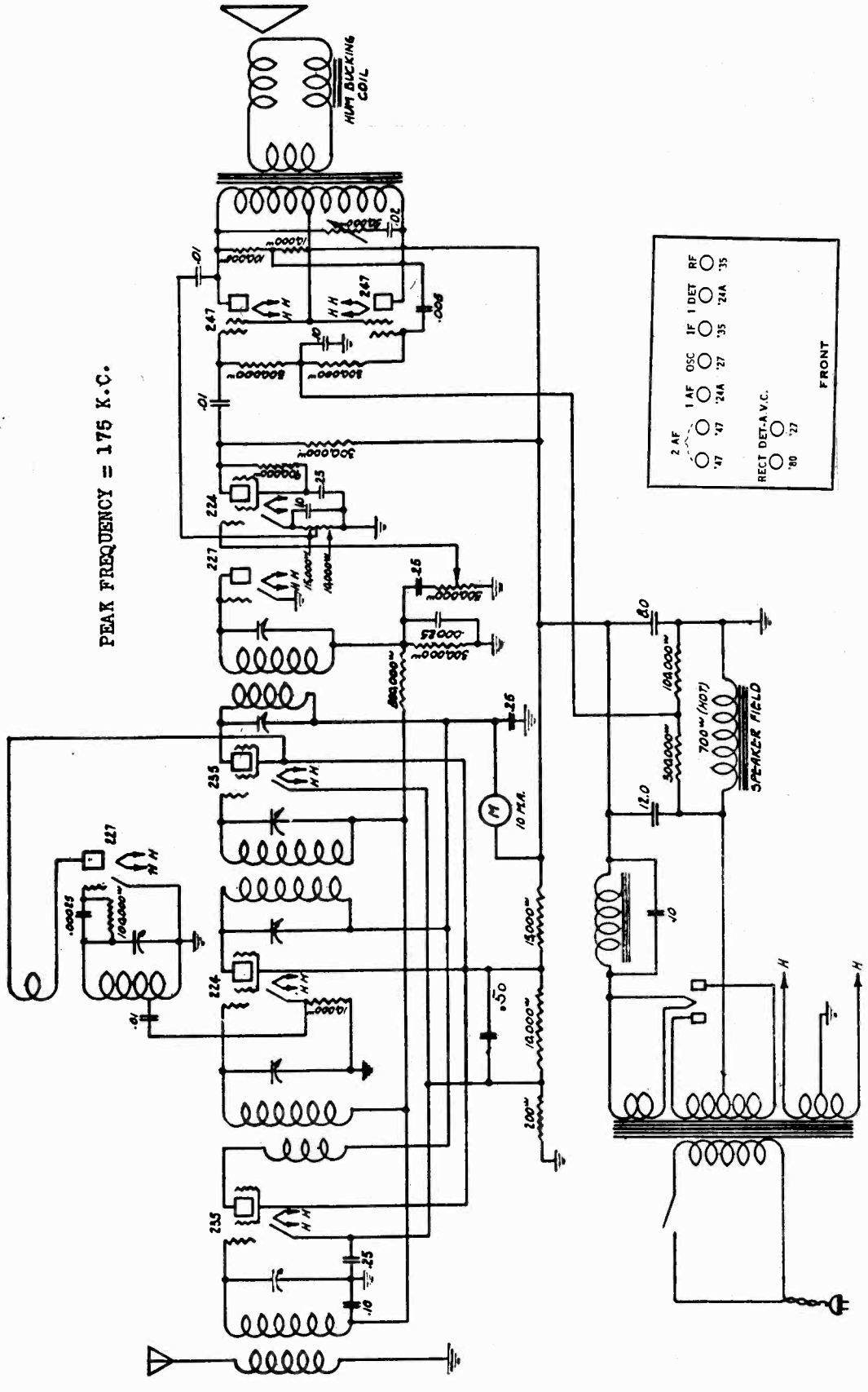
MODEL KNIGHT SG-10
1930



RECEIVER SG-10 (1930)

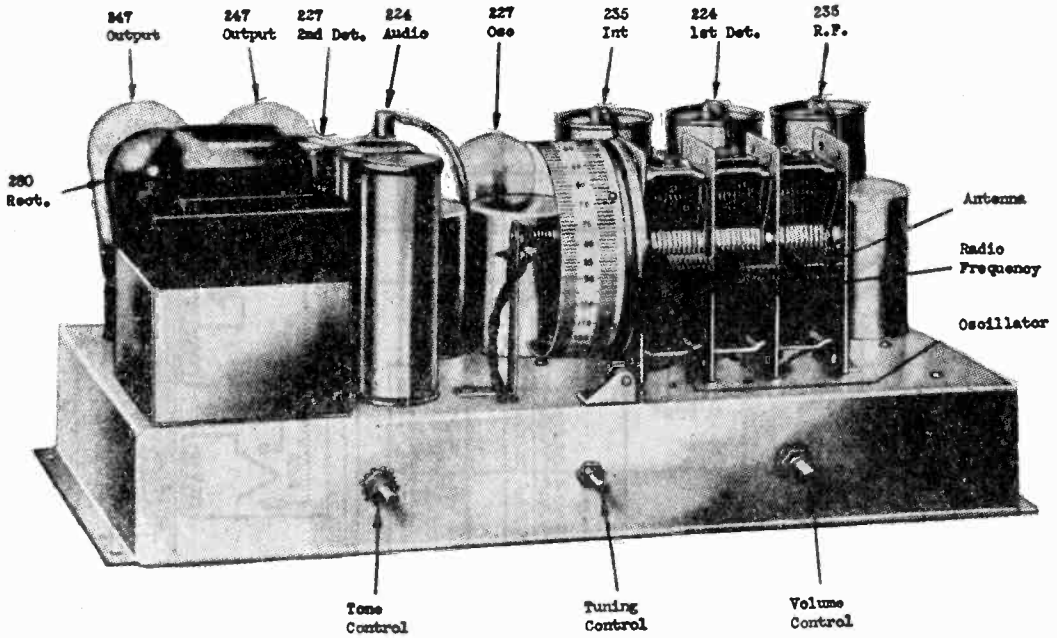
MODEL KNIGHT 118
AVC Super 1930

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 kilocyles 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.

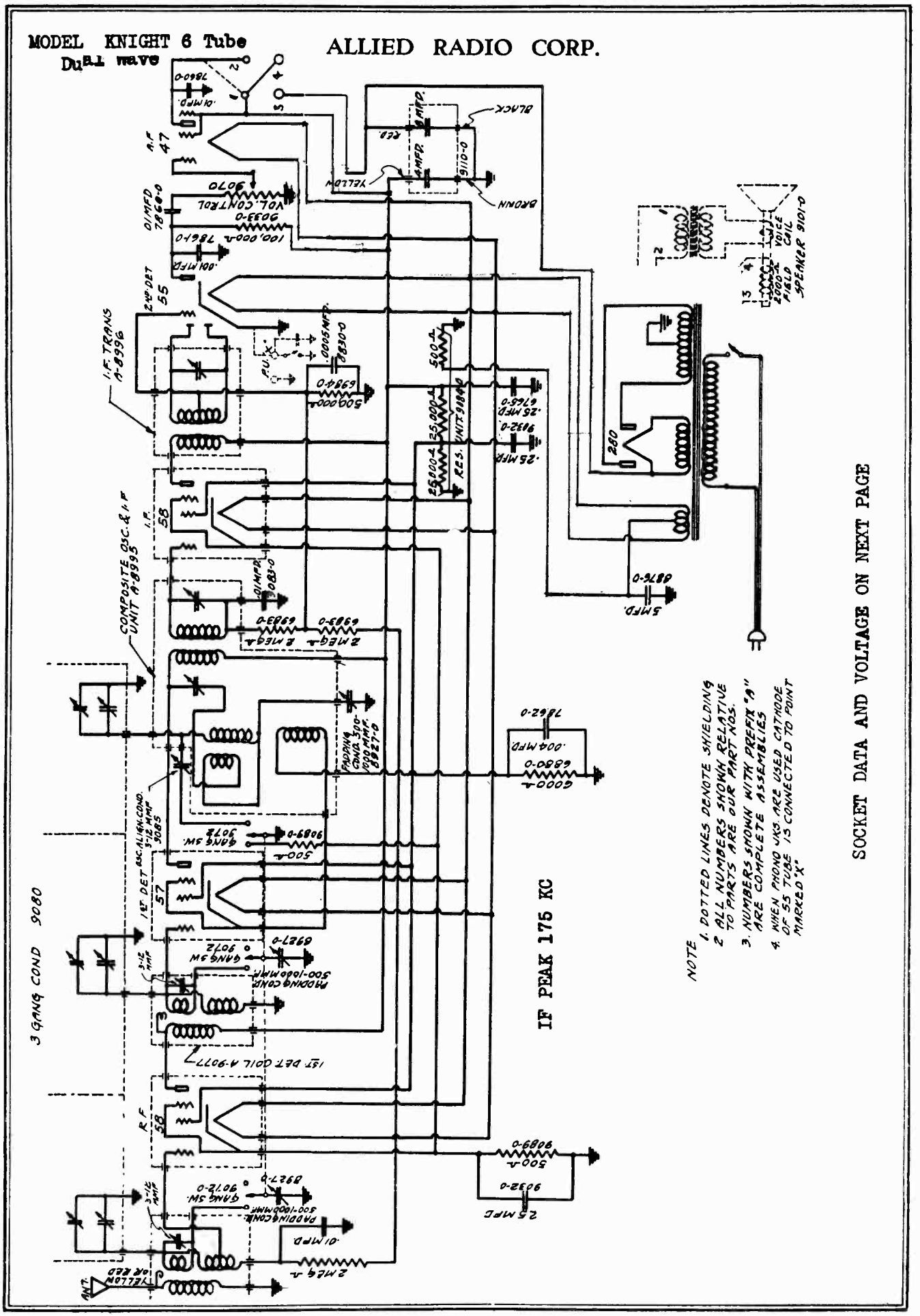
Tube Voltages

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

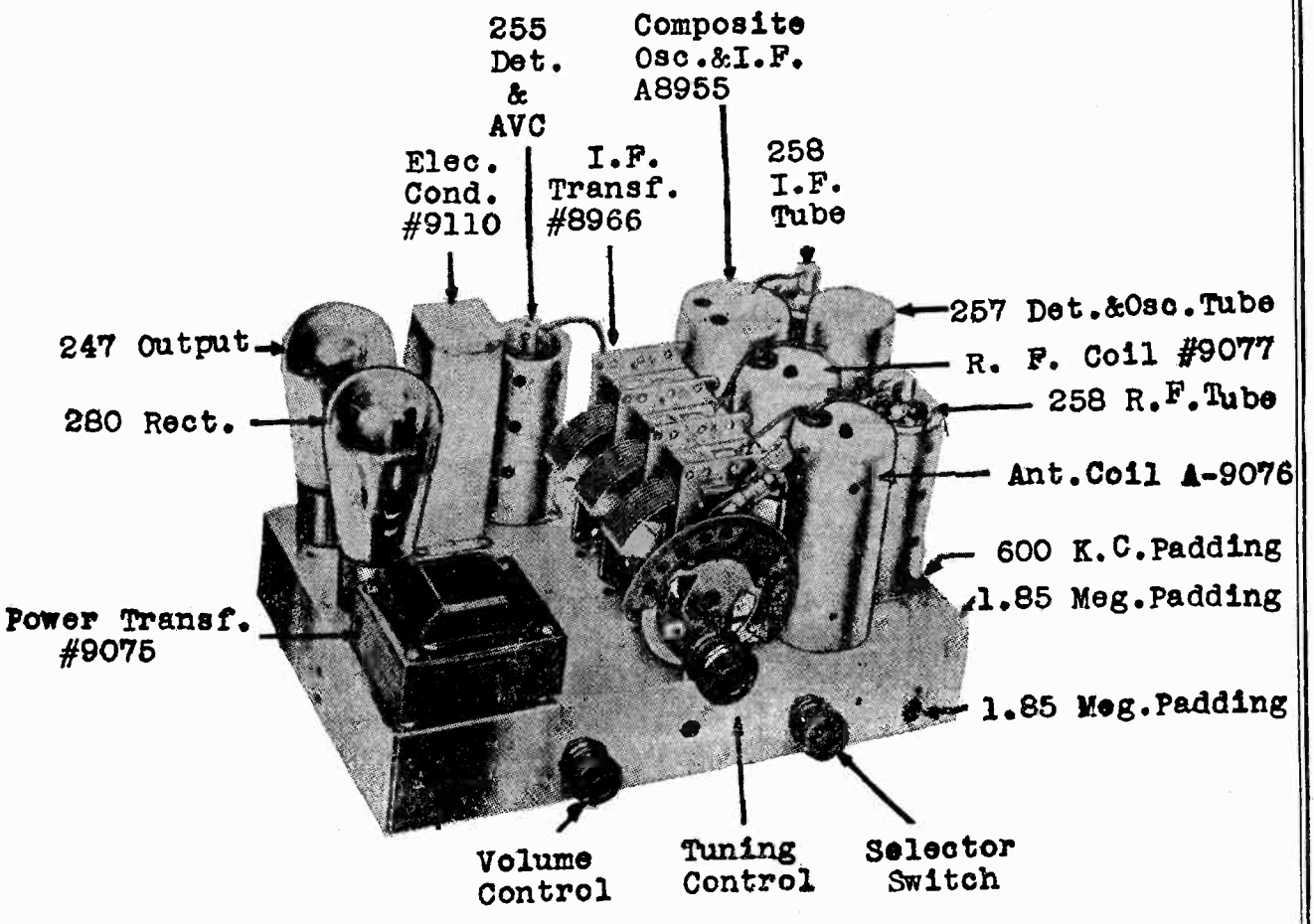
**To read the 247 bias, read between 247 grid and ground.

*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.



ALLIED RADIO CORP.

MODEL KNIGHT 6 Tube
Dual Wave



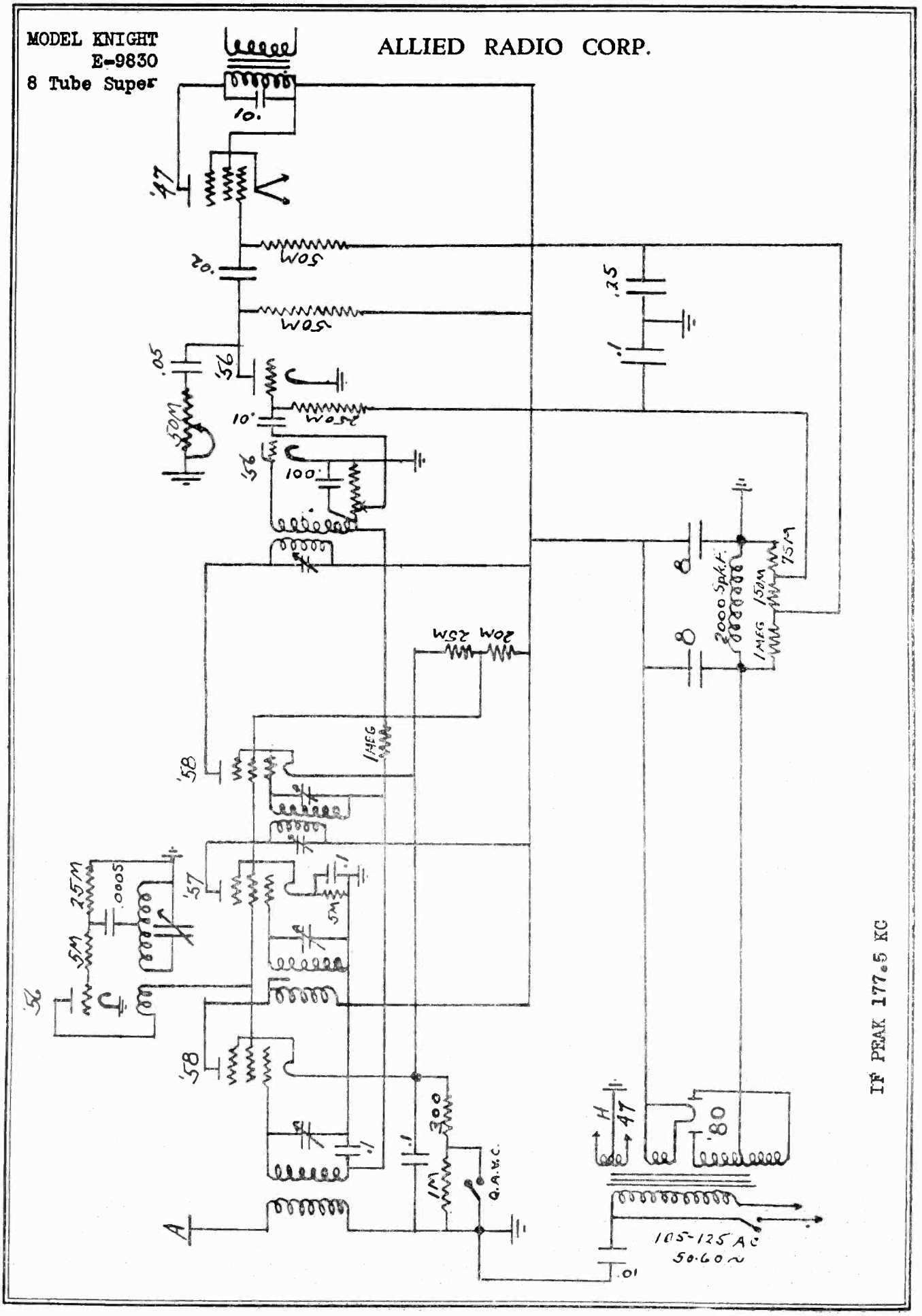
VOLTAGE TABLE:
Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table given below is taken at 115 volts line. It must be remembered that the voltage readings vary directly as the line voltage and also with the accuracy of the meters used. A variation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

Type of Tube	Position of tube	TUBE VOLTAGES 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.)

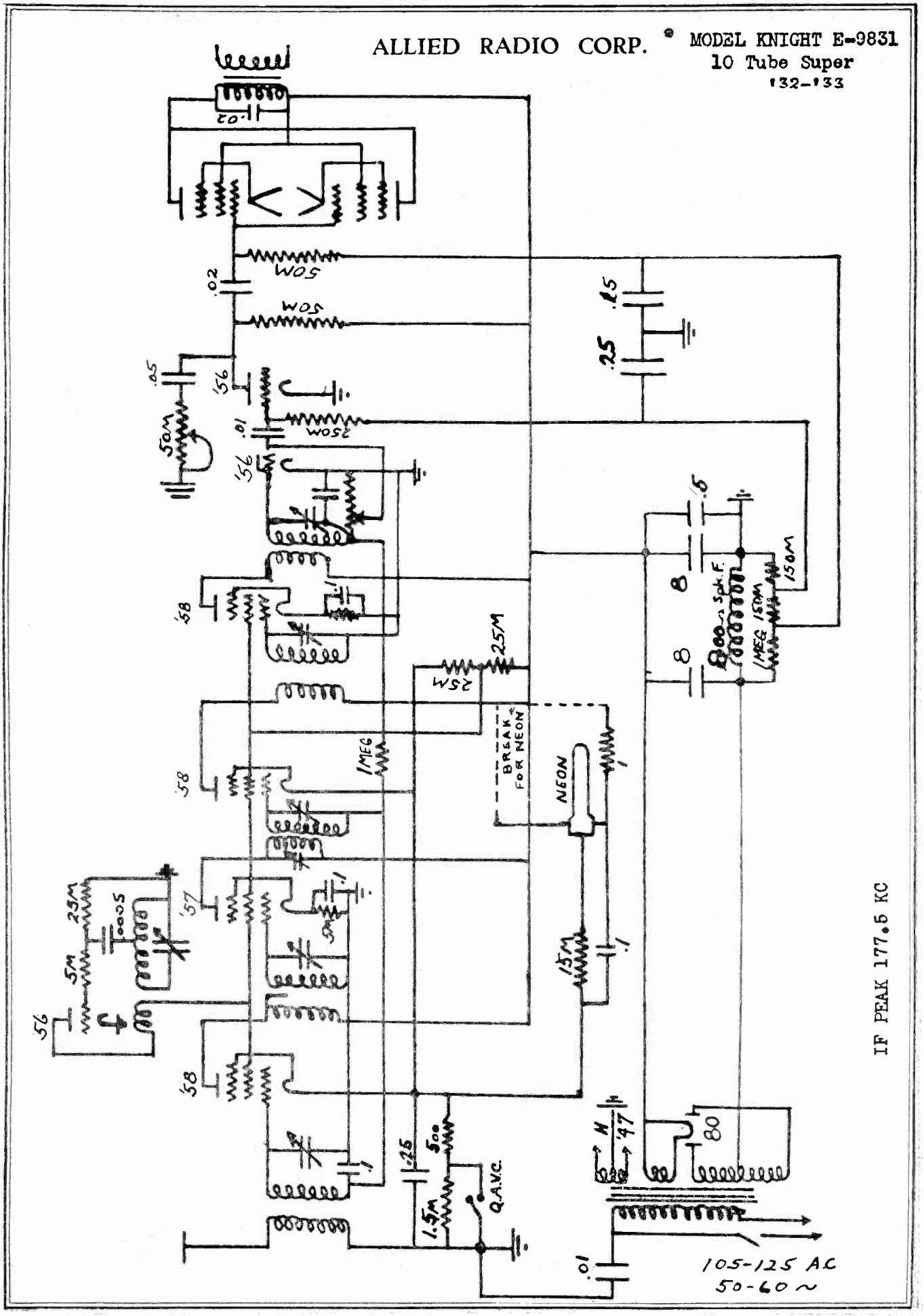
The ground side of the test oscillator should be connected to either the ground lead of the set or to the chassis. Set oscillator at 175 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. If during the alignment, the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



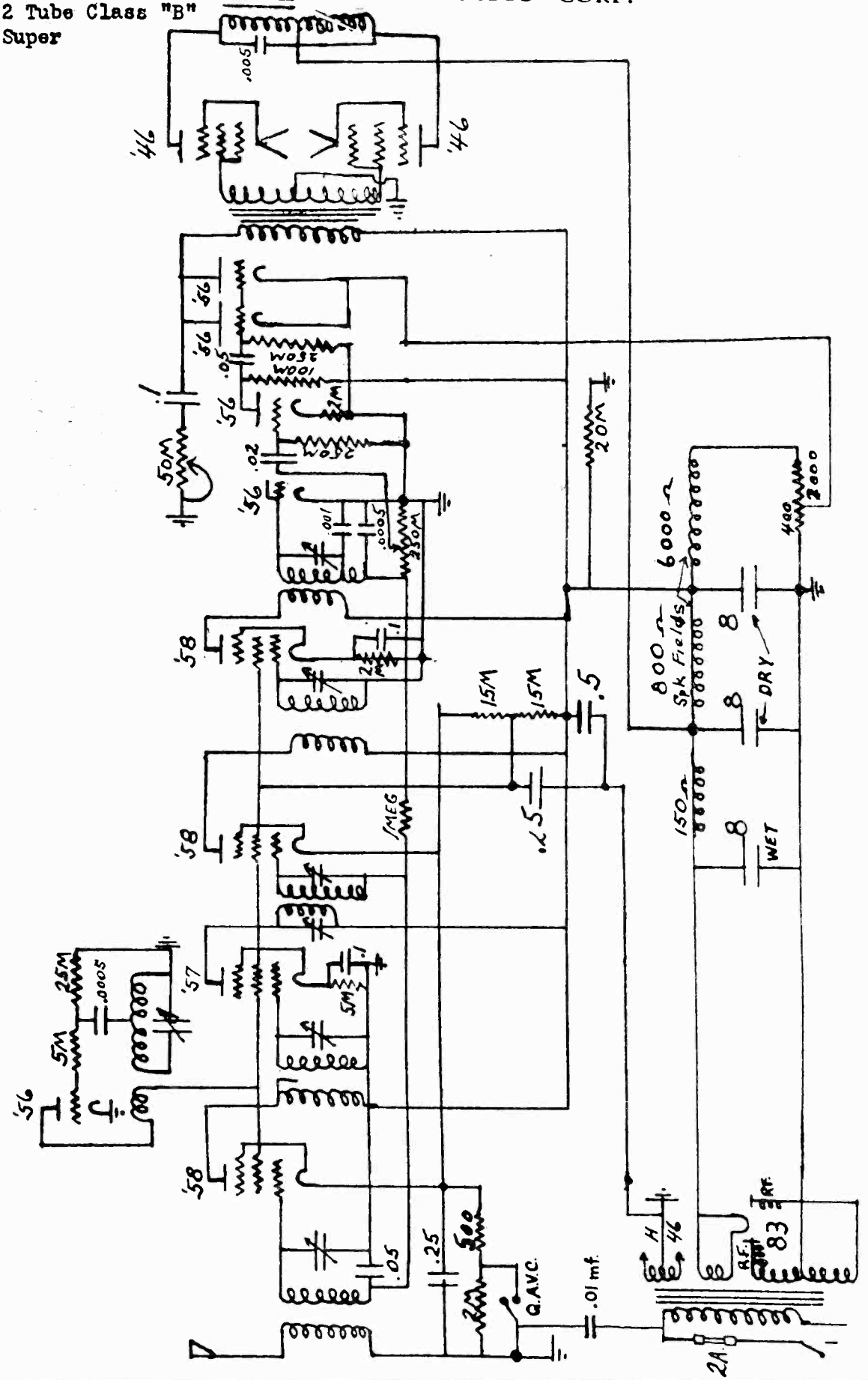
ALLIED RADIO CORP.

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



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

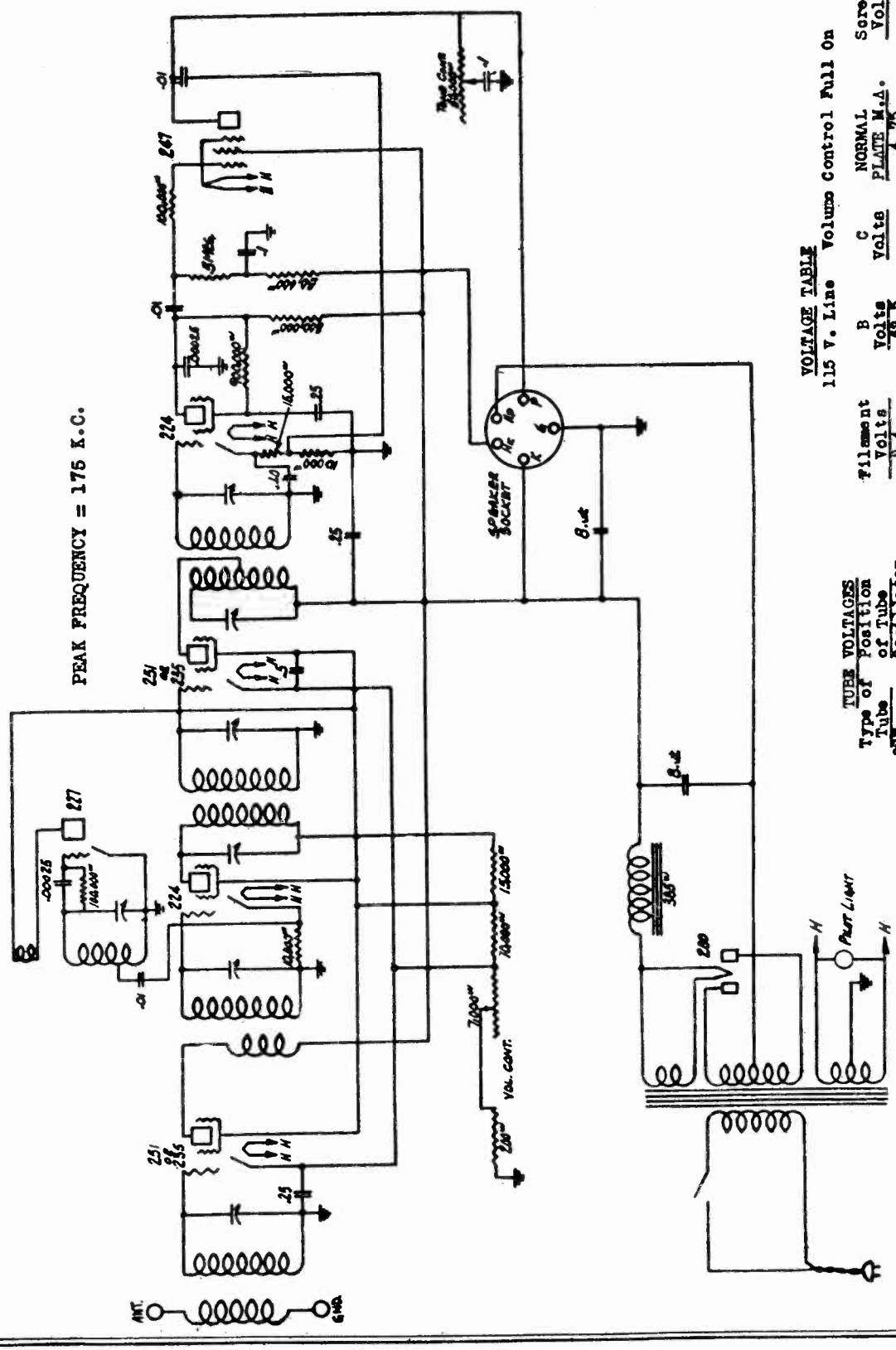
ALLIED RADIO CORP.



IF PEAK 177.5 KC

ALLIED RADIO CORP.

MODEL KNIGHT 7 Tube
Superhet '32



VOLTAGE TABLE
115 V. Line Volume Control Full On

TUBE VOLTAGES Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	NORMAL PLATE M.A.	Screen Volts
227	Oscillator	2.4	82.5		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	

*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.

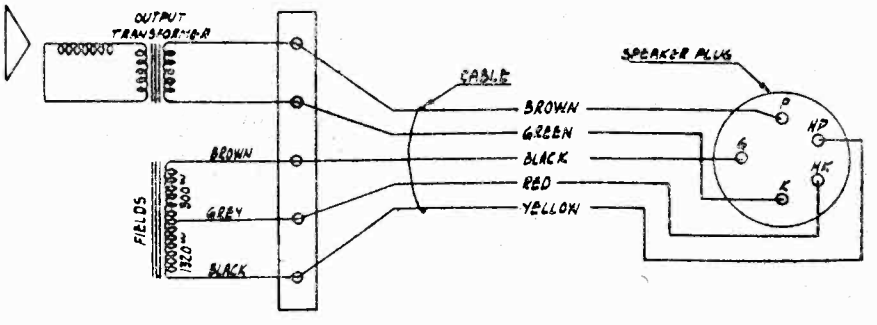
KNIGHT 7 TUBE SUPERHETERODYNE 1932 MODEL

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.

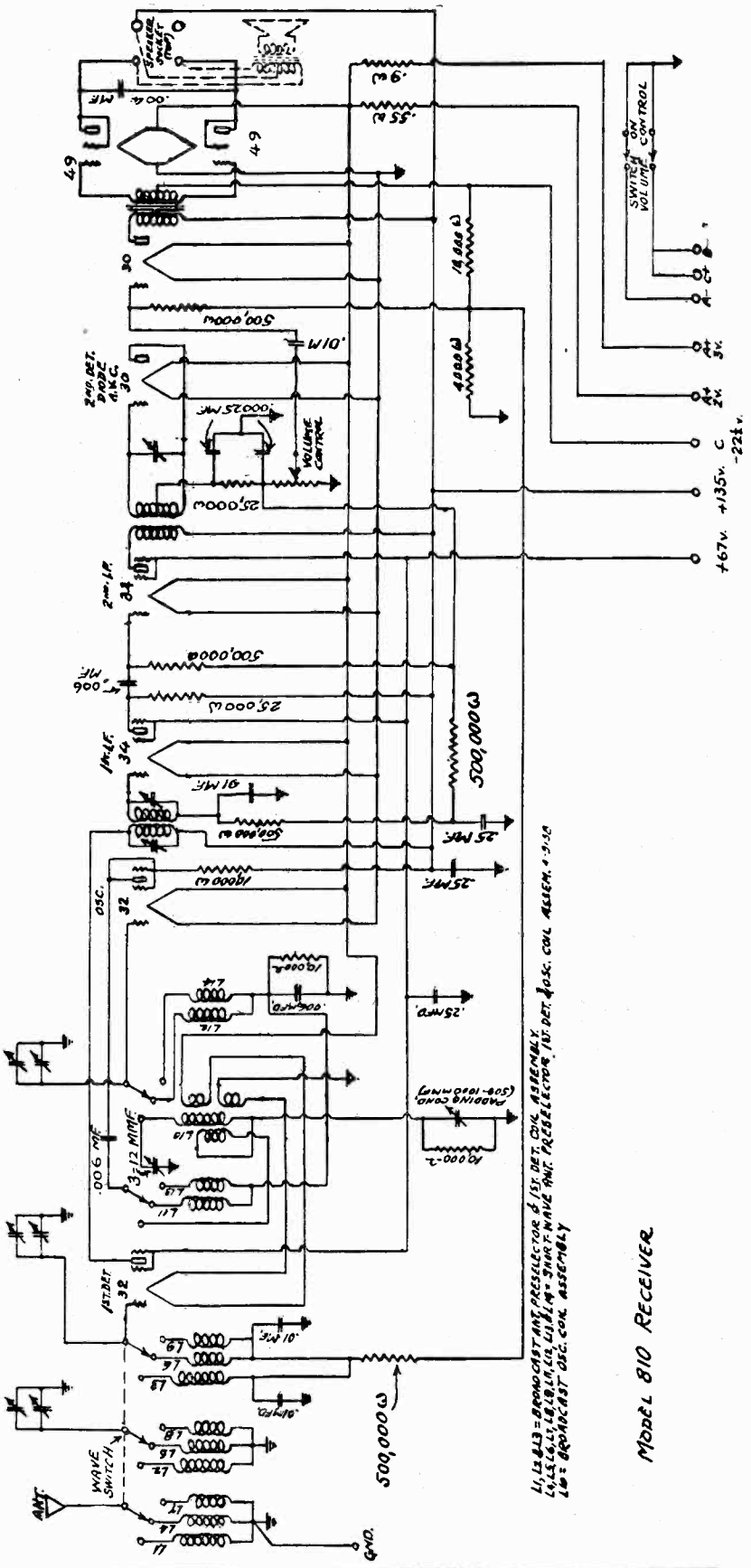
Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver 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

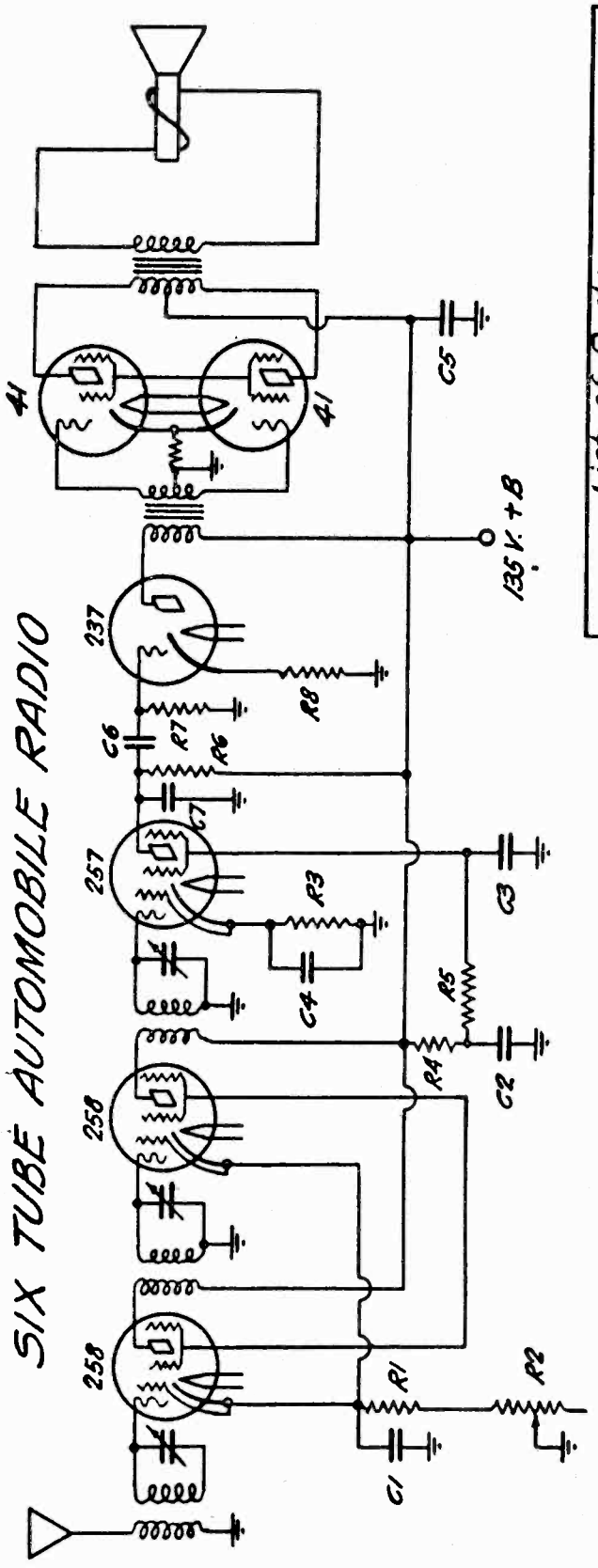


MODEL 810 RECEIVER

MODEL KNIGHT 8 Tube
All Wave Battery

MODEL KNIGHT
Auto Set

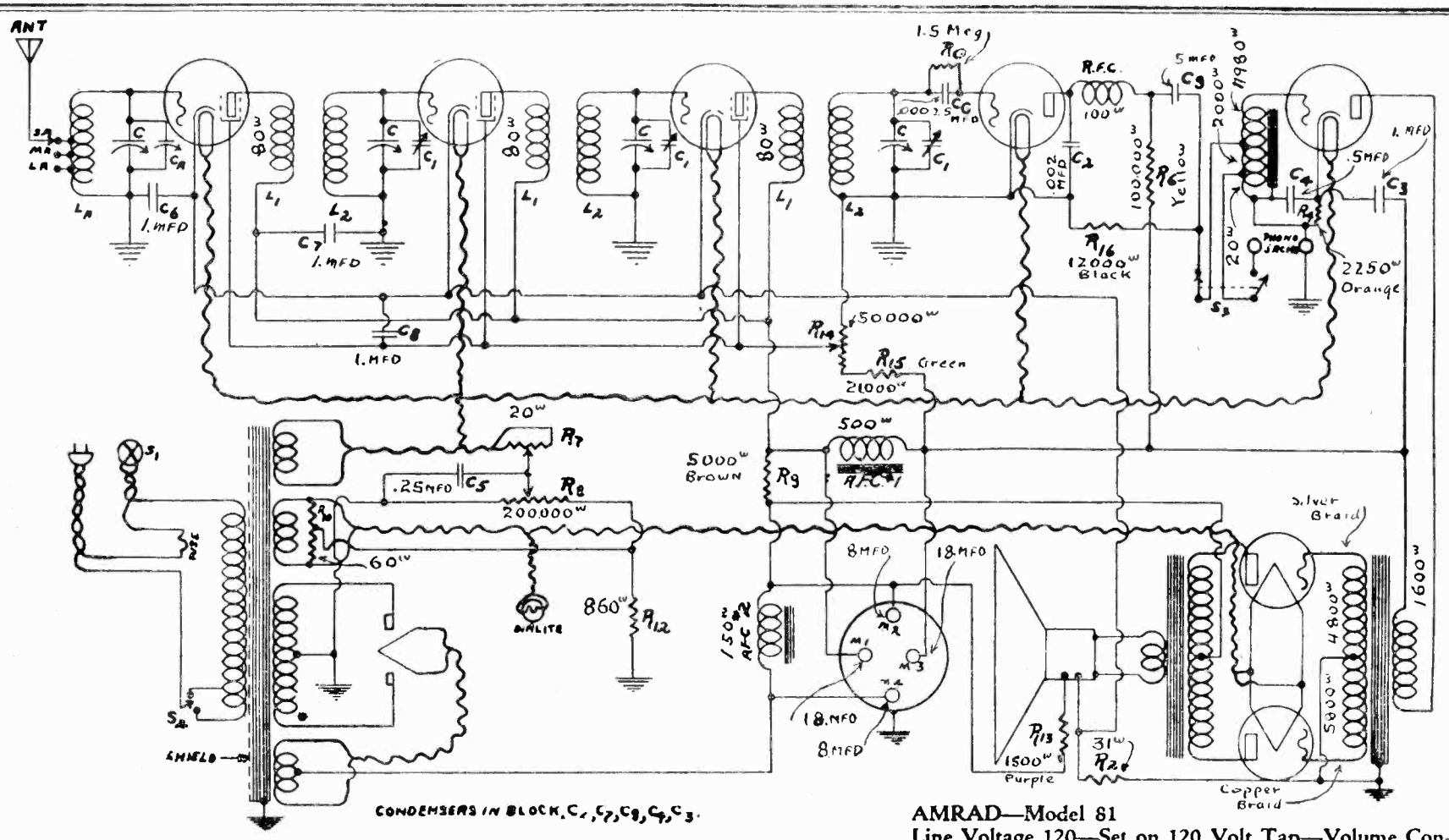
ALLIED RADIO CORP.



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
1935



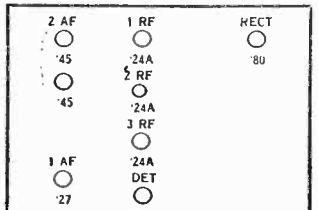
AMRAD—Model 81

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	TYPE OF TUBE	POSITION OF TUBE	READINGS, PLUG IN SOCKET OF SET									
			TUBE OUT		TUBE IN TESTER							
			A VOLTS	B VOLTS	A VOLTS	B VOLTS	C VOLTS (CONTROL GRID)	CATHODE - HEATER VOLTS	NORMAL PLATE M A	PLATE M A GRID TEST	PLATE CHANGE M A	SCREEN GRID VOLTS
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	3nd AF	2.32	300	2.25	250	50	-	28	32	.4	-
8	280	Rect.		-	4.65	-	-	-	110	-	-	-
9												
10												

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



BEL - CANTO SERIES

Aria, Minuett
Serenata, Duet
Symphony

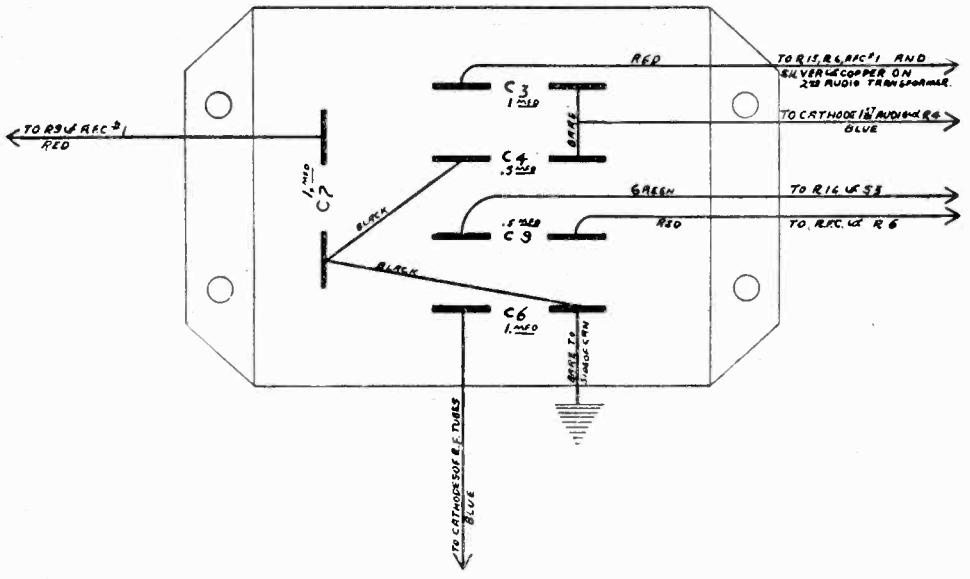
RCA Speaker
0.8 Ohm
Secondary
410 Ohm Primary
7000 Ohm Field

Peerless Speaker
Single turn
Secondary
550 Ohm Primary

Condenser Data on next page.

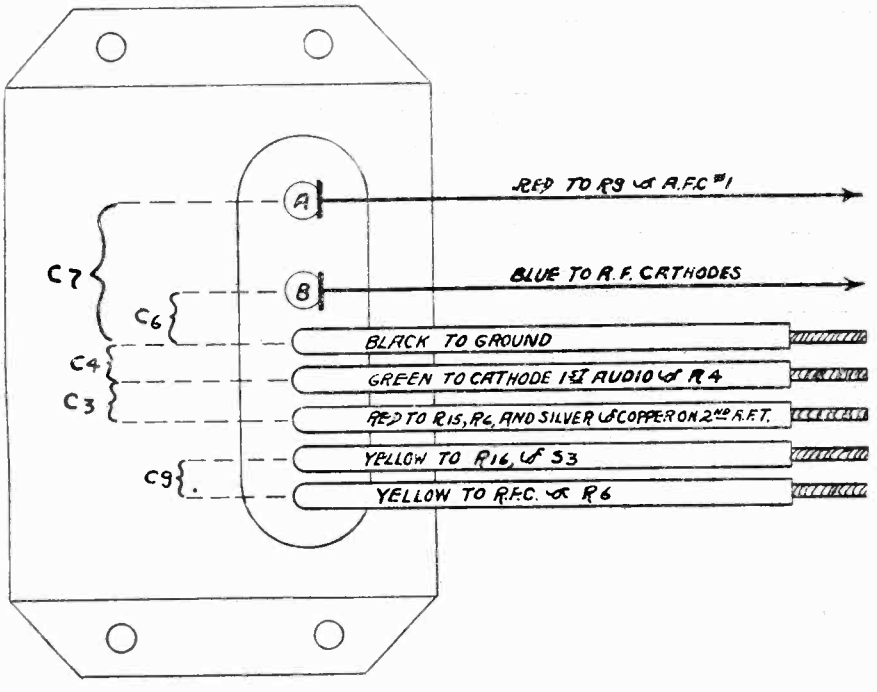
MODEL Bel-Canto 81
Condenser Data

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

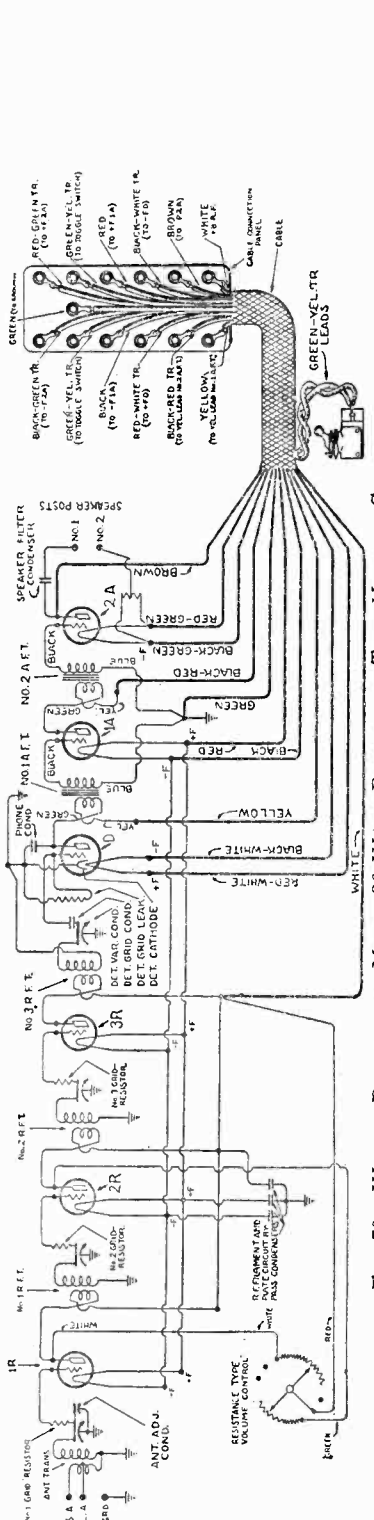
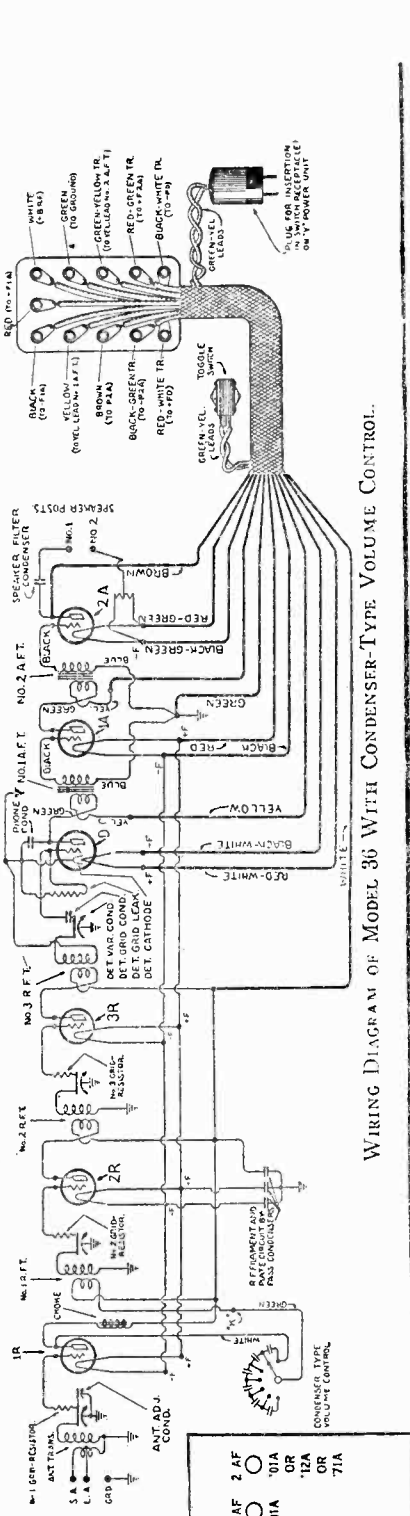
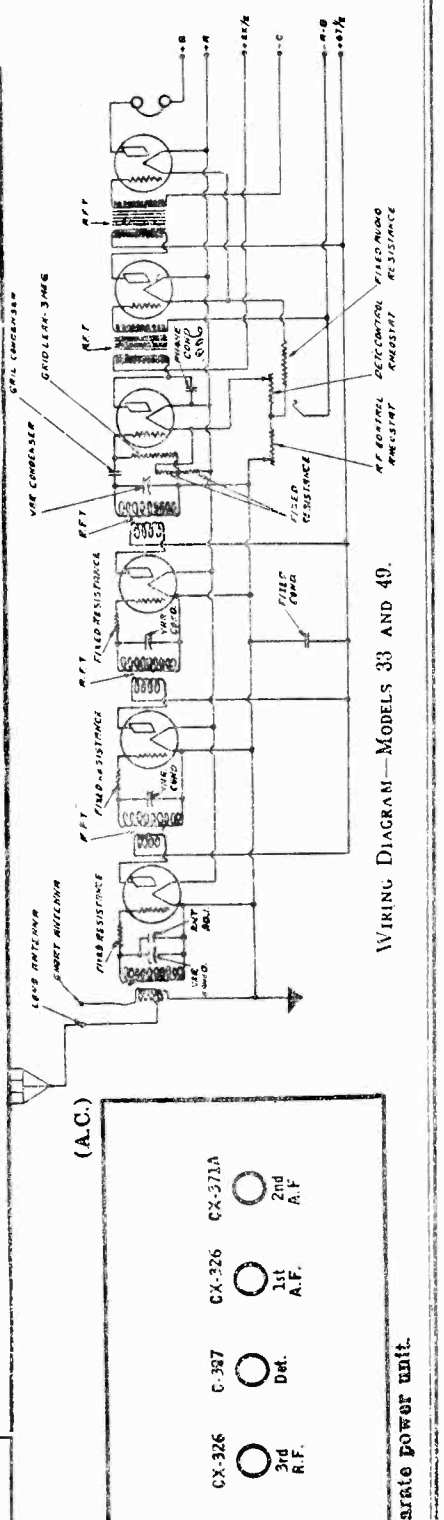


FIG. 70. WIRING DIAGRAM OF MODEL 36 WITH RESISTANCE-TYPE VOLUME CONTROL.

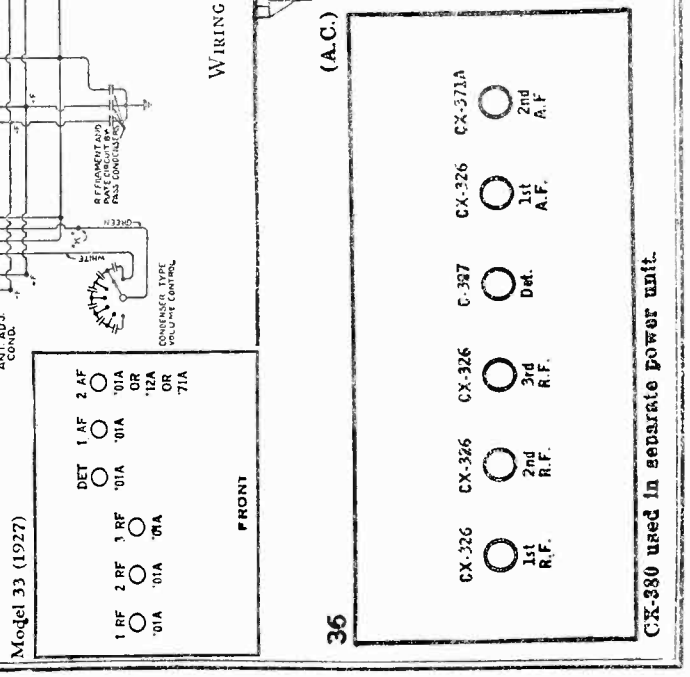
MODEL 36 BELOW SERIAL No. 2,610,000



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.

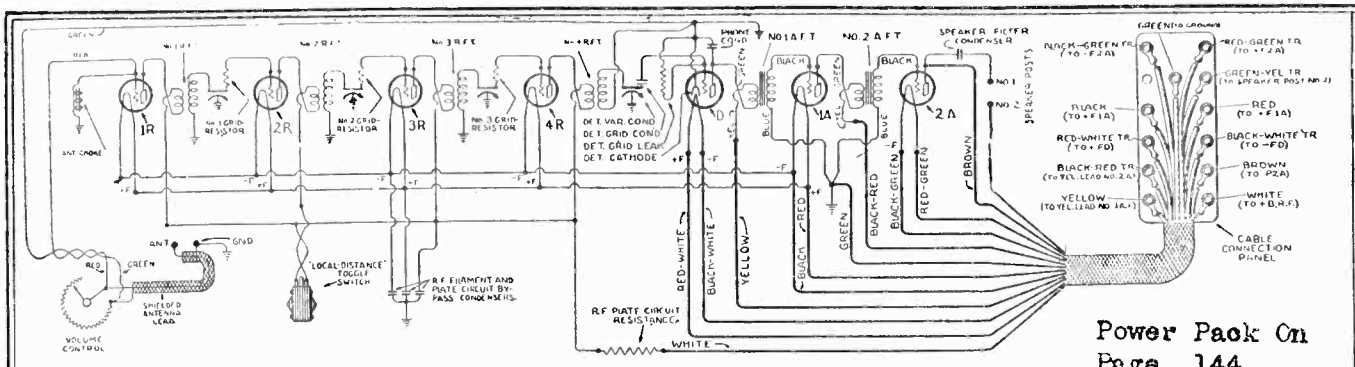
Other parts used in this receiver and to be found in the power pack are listed in connection with the power pack shown on special page 144

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.

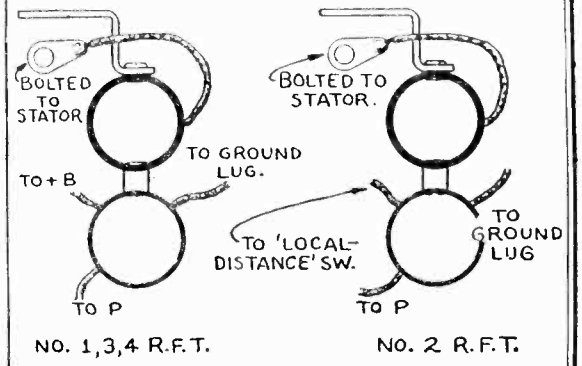
The r-f filament and r-f plate bypass condenser listed in the Atwater-Kent parts lists as # 15158 contains four individual condensers, although the receiver circuit employs only three of these units. It is possible that the fourth condenser which is of .2 mfd may be tied in with the .05 mfd unit via 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.



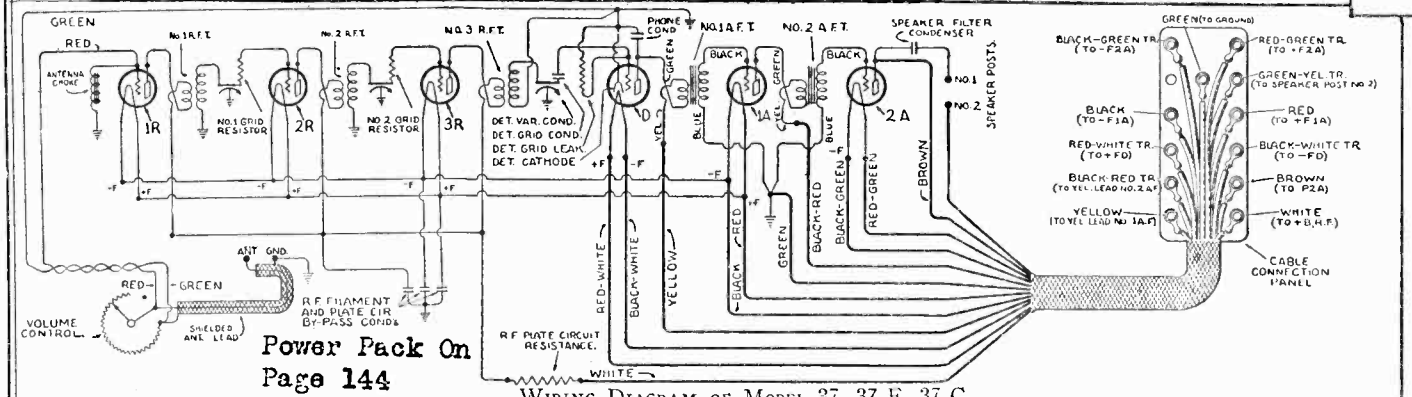
Power Pack On Page 144

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.

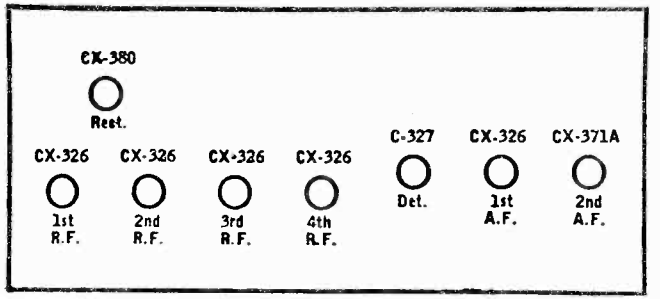
A 2nd-A F. filament-shunt resistor is used before Serial No. 1,385,000, in which case speaker post No. 2 connects to the centre-tap of this resistor, and the green-yellow tracer lead is not used. The R. F. plate circuit resistor is used after Serial No. 1,385,000.

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.

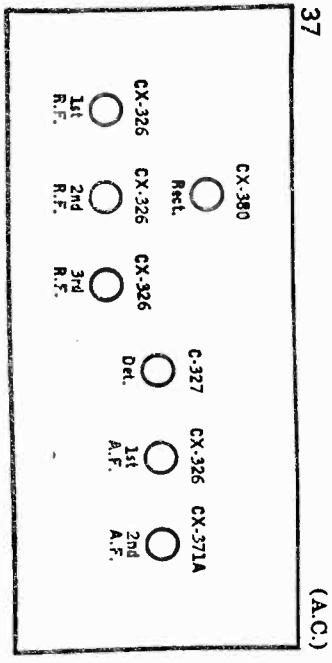
ATWATER-KENT—Models 37-38
Line Voltage 115—On Early Models "B" and "C" Voltages Are Lower Than Shown

TUBE NO IN ORDER	TYPE OF TUBE	POSITION OF TUBE (1ST. R.F., DET., ETC.)	READINGS, PLUG IN SOCKET OF SET: TUBE OUT A VOLTS	TUBE OUT B VOLTS	TUBE IN TESTER A VOLTS	TUBE IN TESTER B VOLTS	TUBE IN TESTER C VOLTS	TUBE IN TESTER CATHODE VOLTS	TUBE IN TESTER NORMAL PLATE M.A.	TUBE IN TESTER PLATE M.A. GRID TEST	TUBE IN TESTER 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											

38 (A.C.)



37 (A.C.)



ATWATER KENT MFG. CO.
MODEL 37
MODEL 38

MODEL 37
Power Pack
Early and Late
Data

Schematic

ATWATER KENT MFG. CO.

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.

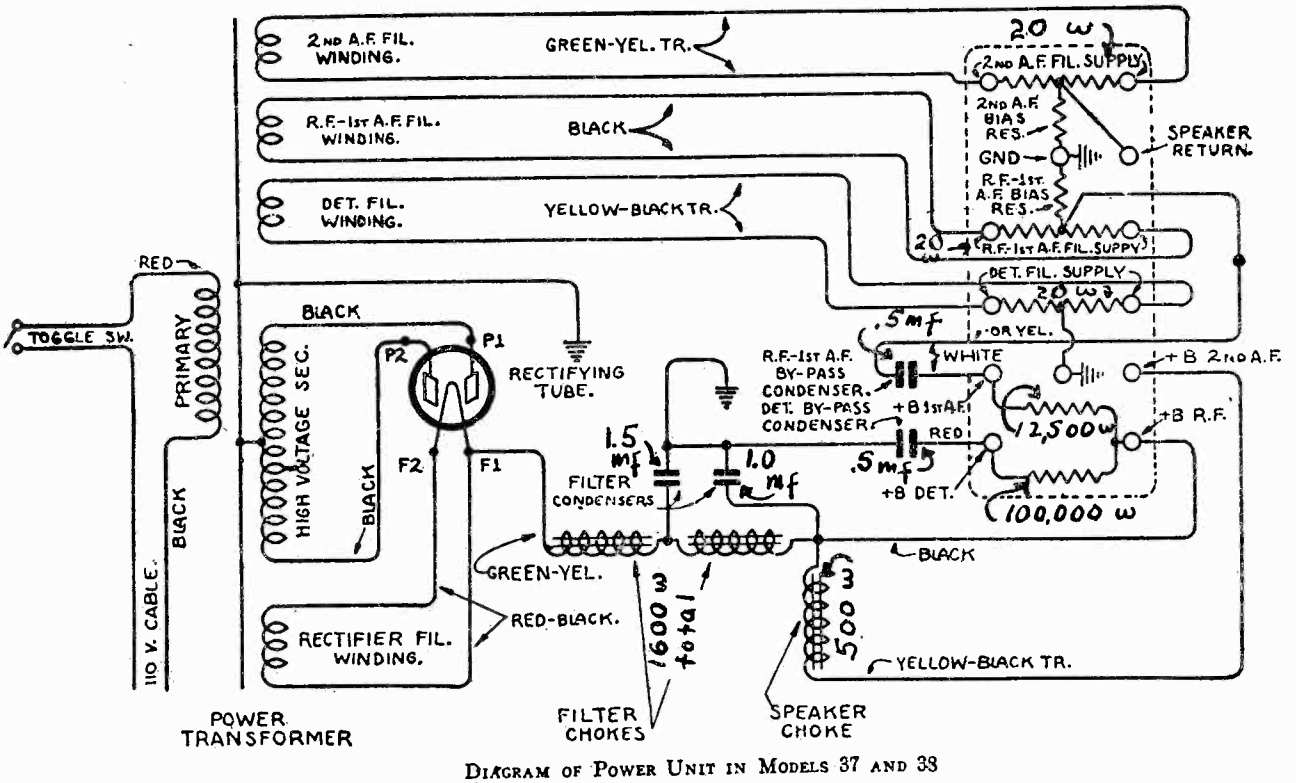


DIAGRAM OF POWER UNIT IN MODELS 37 AND 38

ATWATER KENT MFG. CO.

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

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

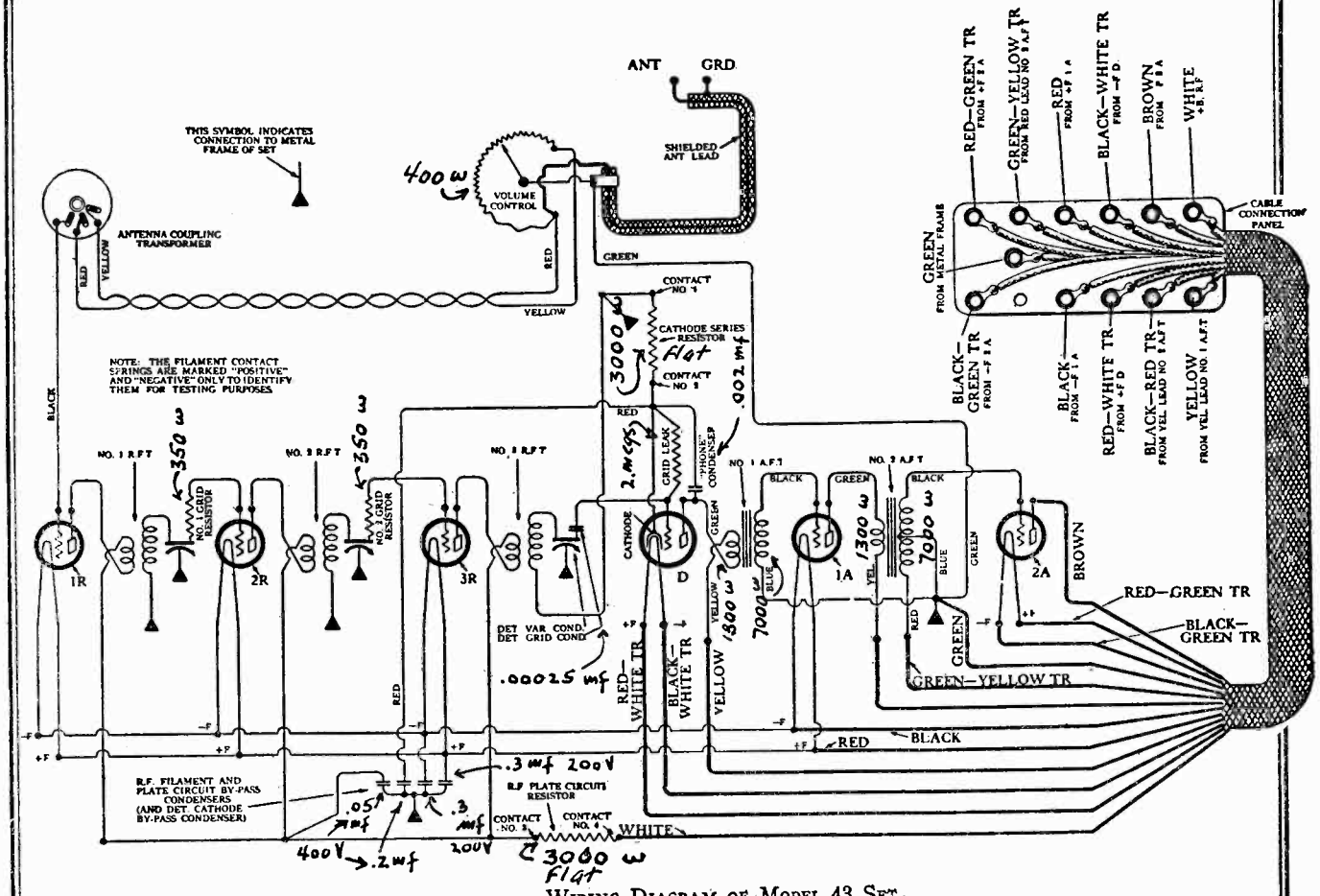
1st a-f primary	1000 ohms	# 8060	
1st a-f secondary	7000 ohms		
2nd a-f primary	900 ohms	# 14015	
2nd a-f secondary	7000 ohms		

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

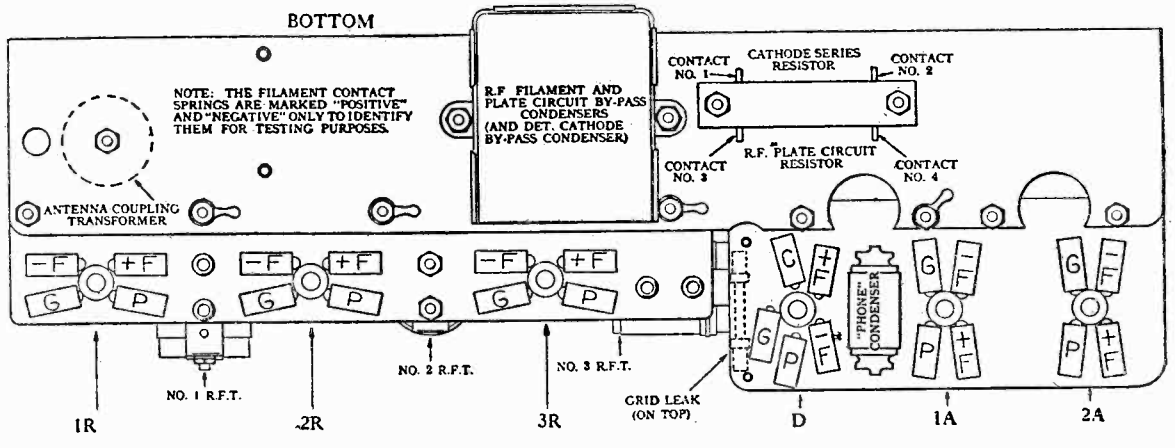
Schematic



WIRING DIAGRAM OF MODEL 43 SET.

The +B, 1st A. F. cable lead is black with a red tracer.

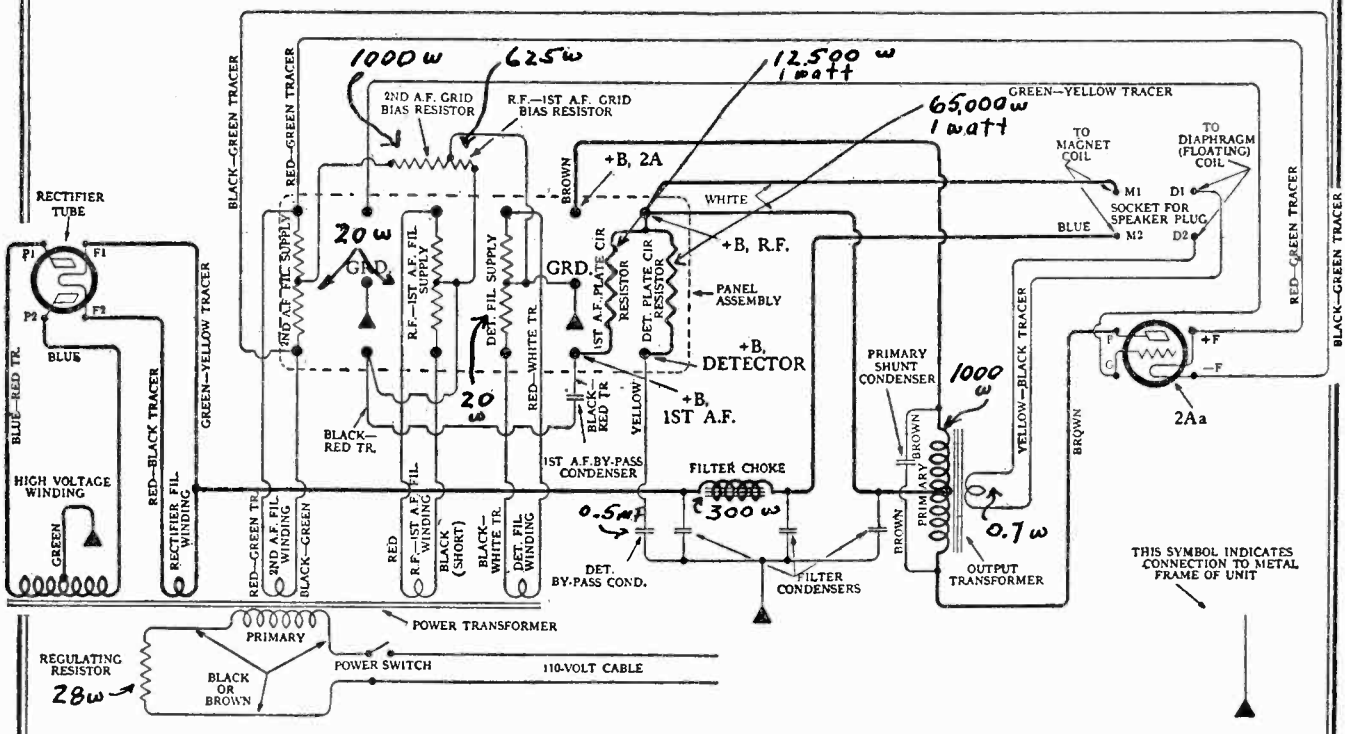
Wiring diagram of Model 43 power pack is shown on 152



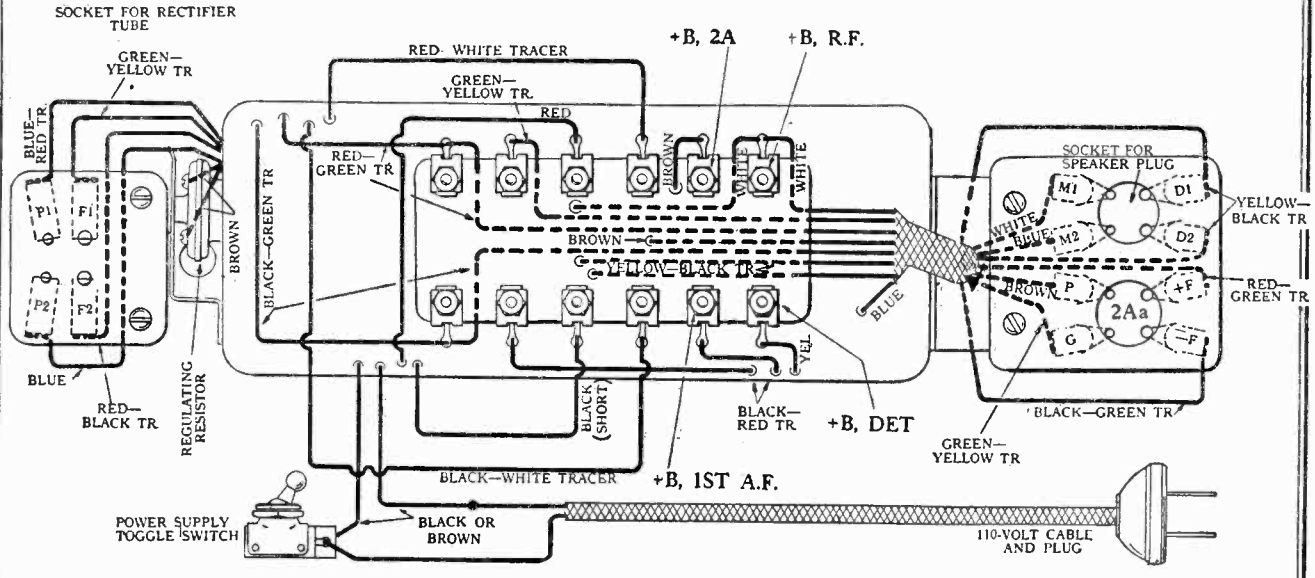
TEST CHART FOR MODEL 43.

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.

MODEL 47

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.**

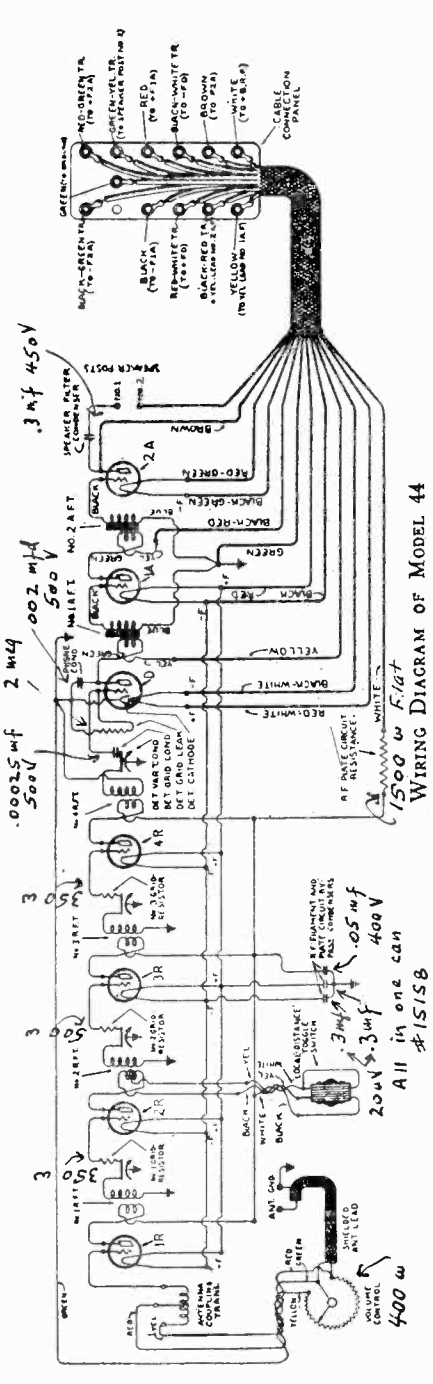
SPECIAL NOTE.

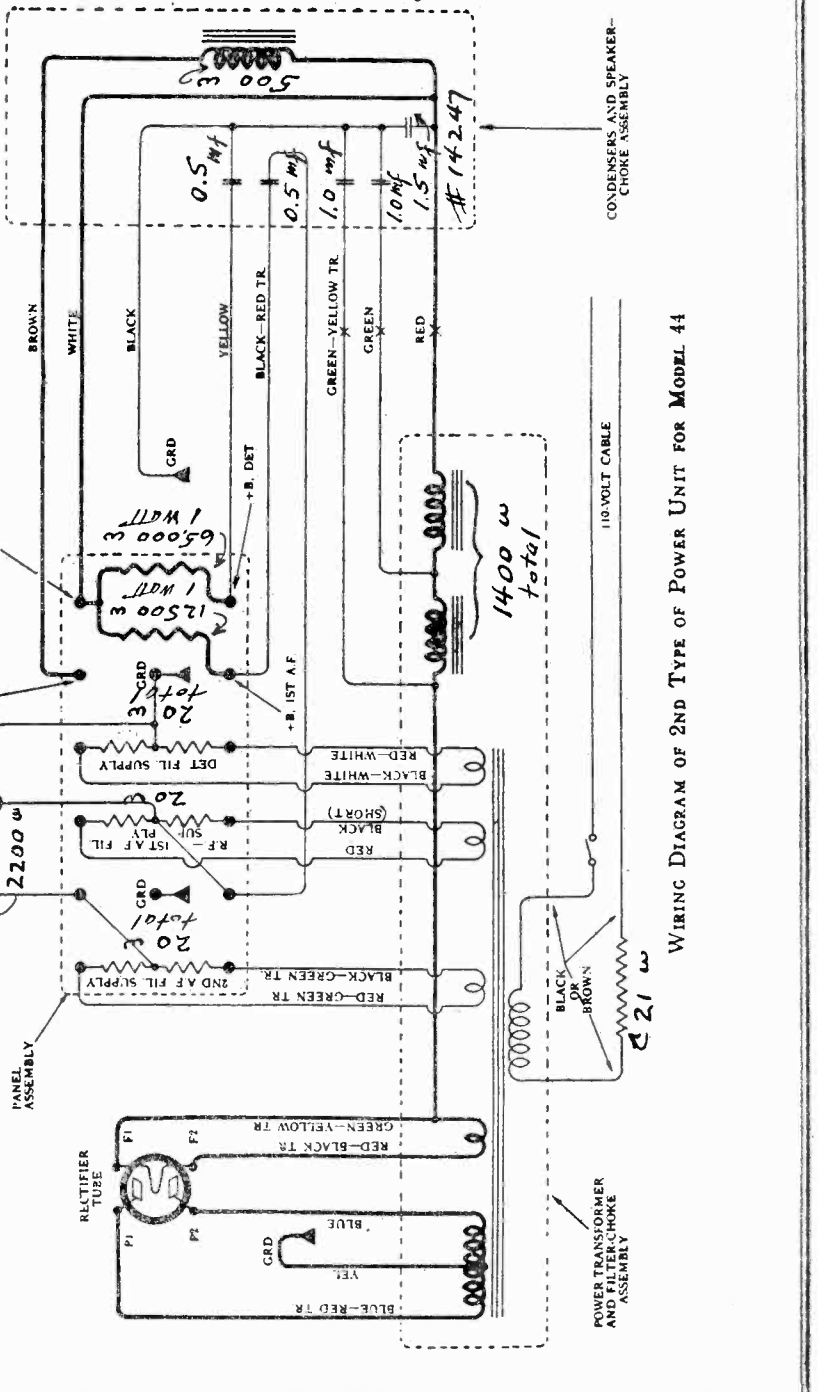
1st type power unit for Model 44 is shown on page 145. Second type power unit for Model 45 is shown on page 148.

TRANSFORMERS IN MODELS 44 and 45

1st a-f primary 1000 ohms # 8060
1st a-f secondary 7000 ohms

2nd a-f primary 1700 ohms # 7661
2nd a-f secondary 3250 ohms





Pages referred to are 3-11 and 3-12.

MODEL 50 ATWATER KENT MFG. CO. MODEL 50

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

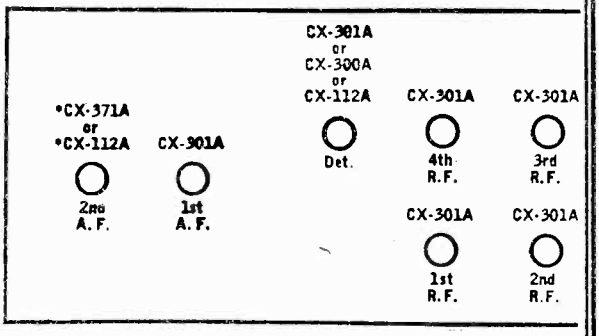
CHOKES

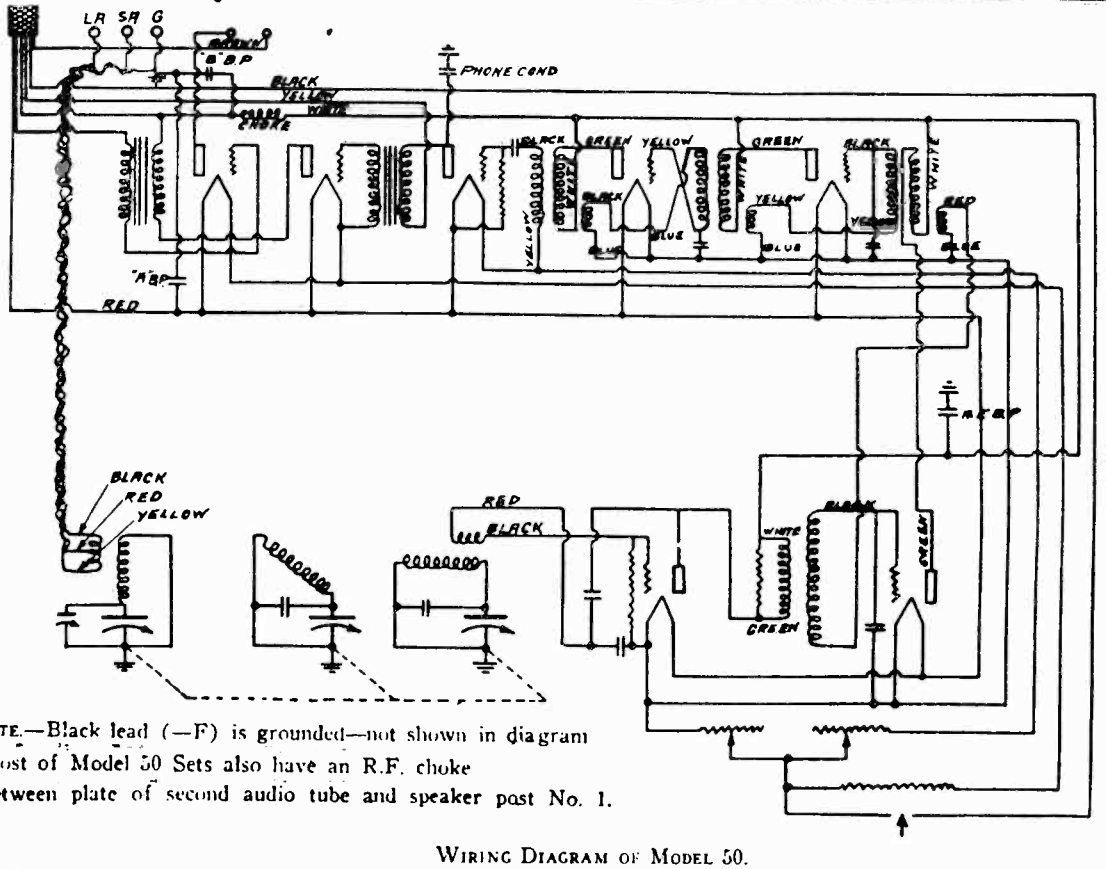
A-f plate	35 ohms	# 8232

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	

50





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.

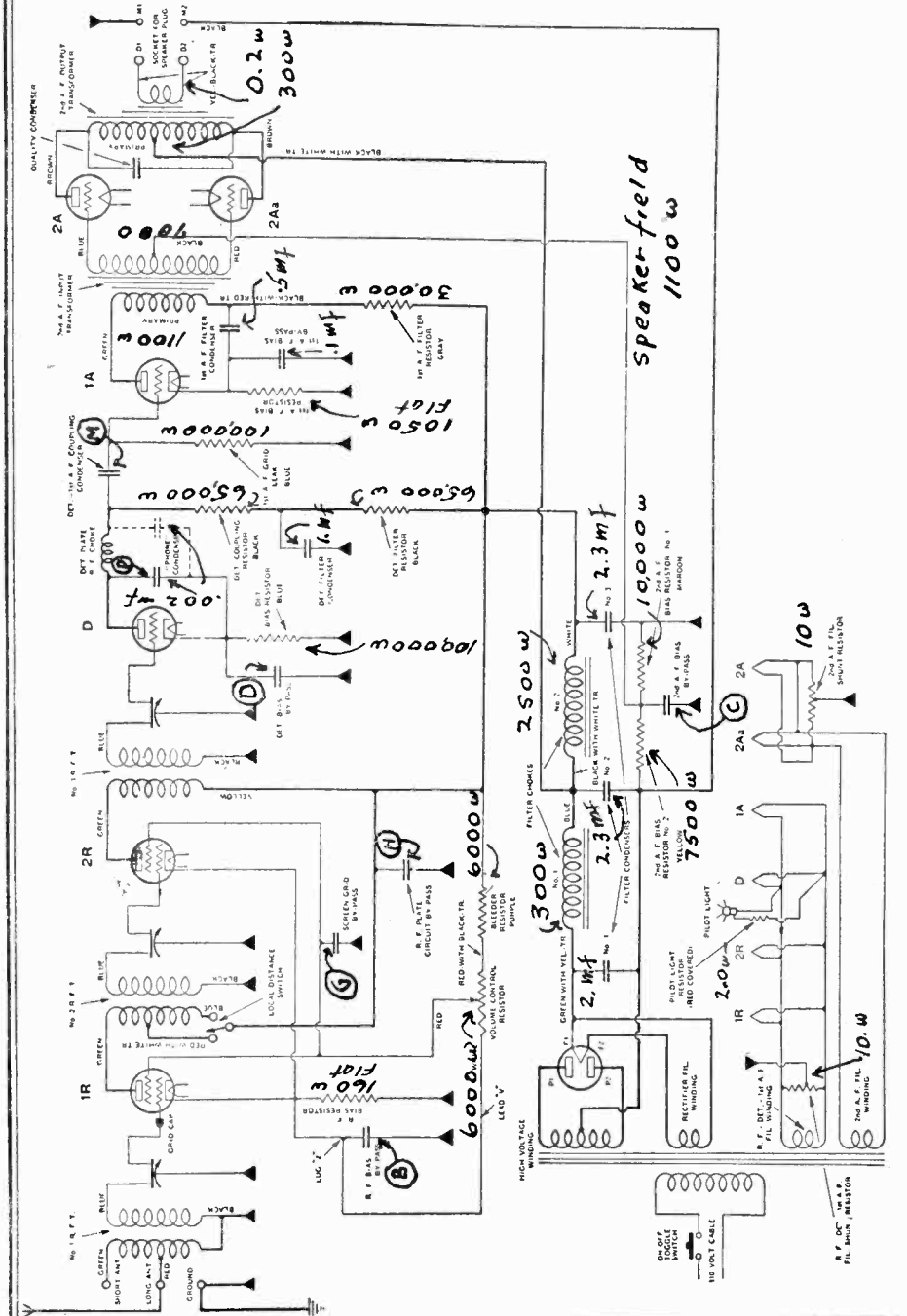
ATWATER KENT MFG. CO.

MODEL 55, 55-C
Early

VOLTAGE TABLE

Tube	Filament		Plate		Grid		Screen	
	Early	late	Early	late	Early	late	Early	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.

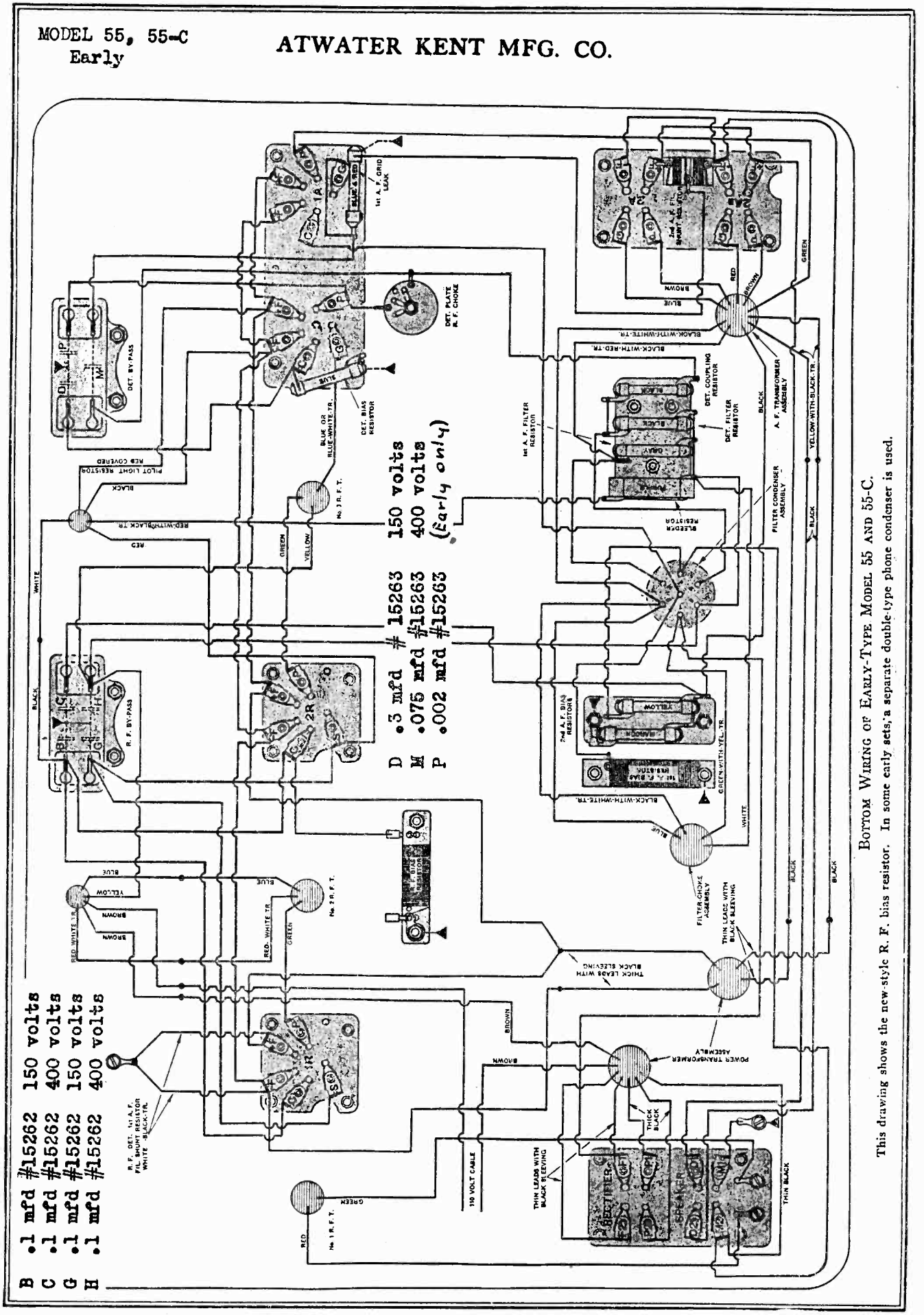


FILTER CONDENSER CONNECTIONS. See chassis
• These numbers refer to the figures shown within the circle
representing the filter condenser can.

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

ATWATER KENT MFG. CO.



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.

ATWATER KENT MFG. CO.

MODEL 55 and 55-C
Late
Schematic
Chassis

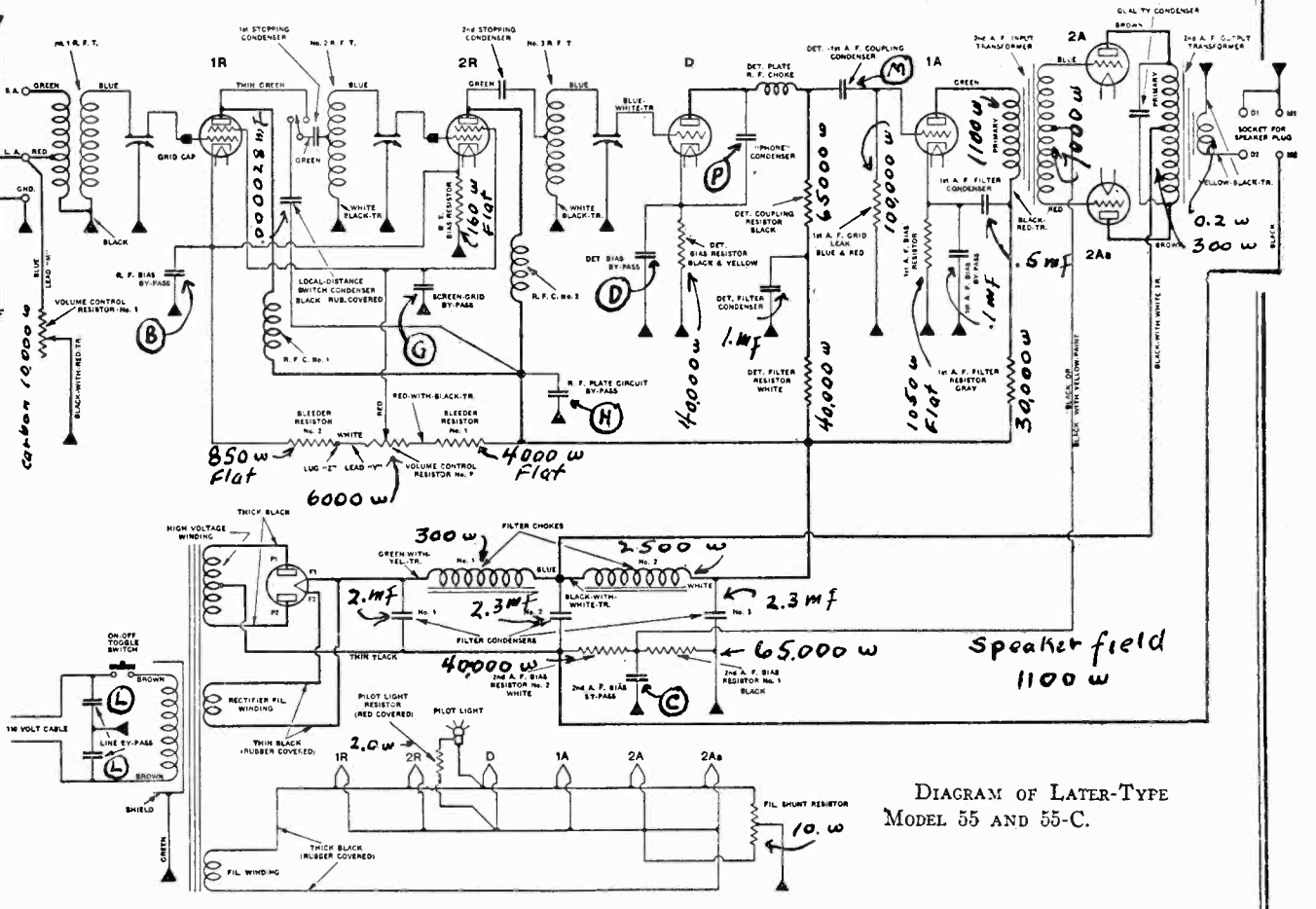
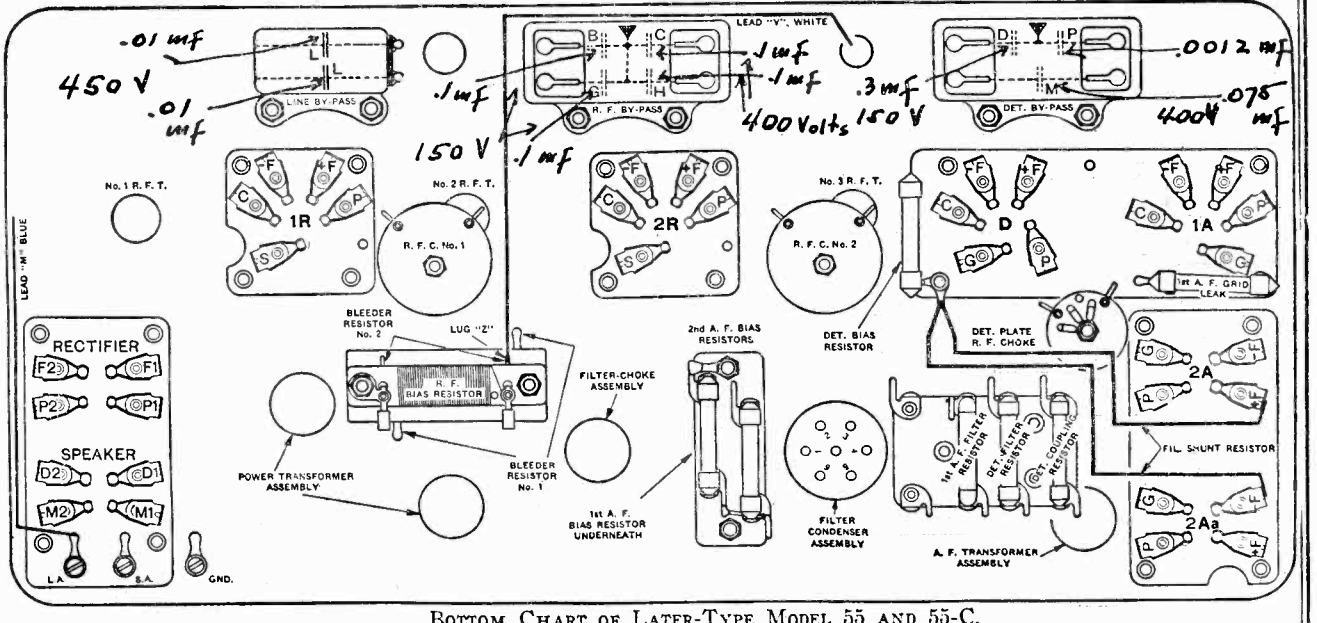


DIAGRAM OF LATER-TYPE MODEL 55 AND 55-C.



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.

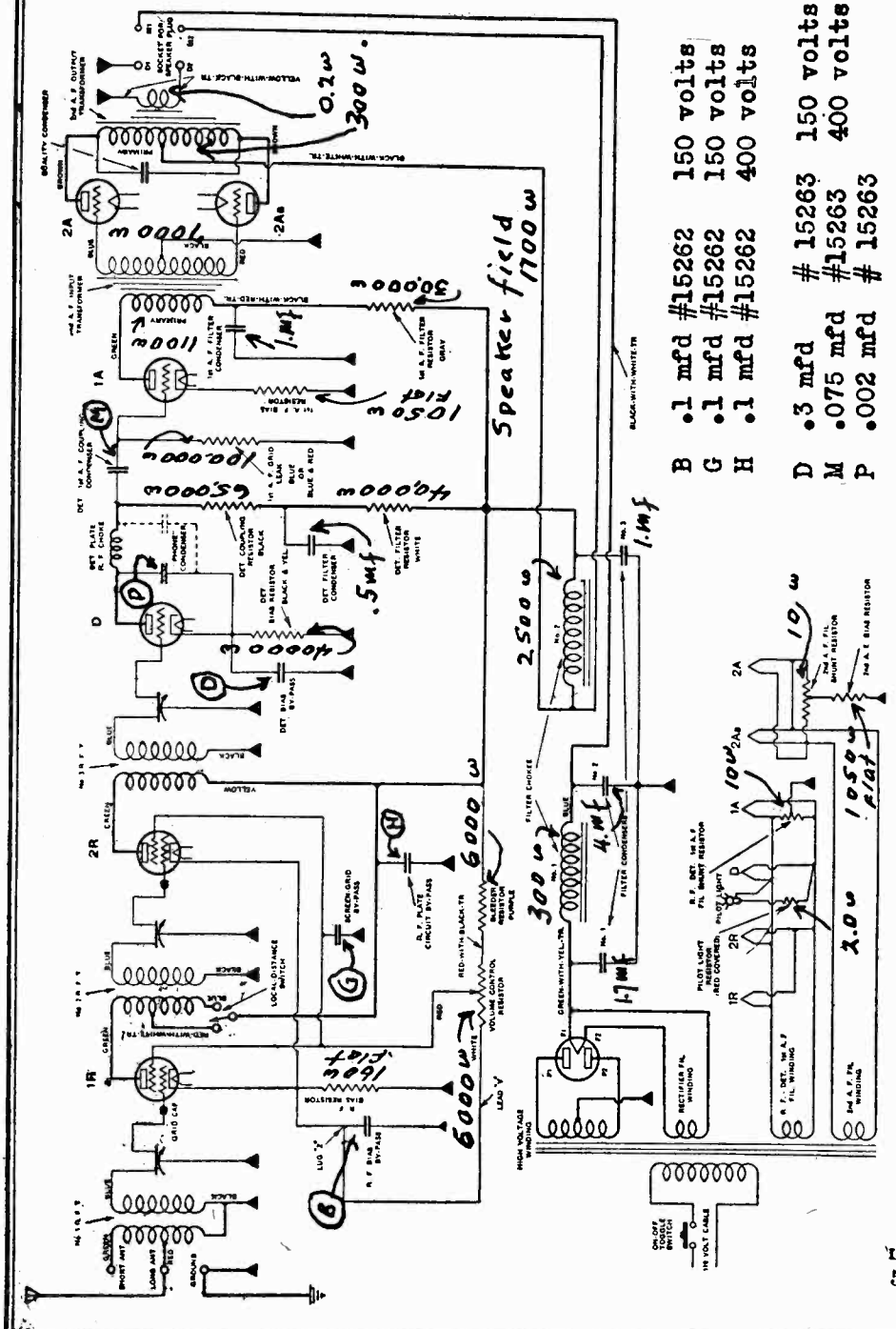


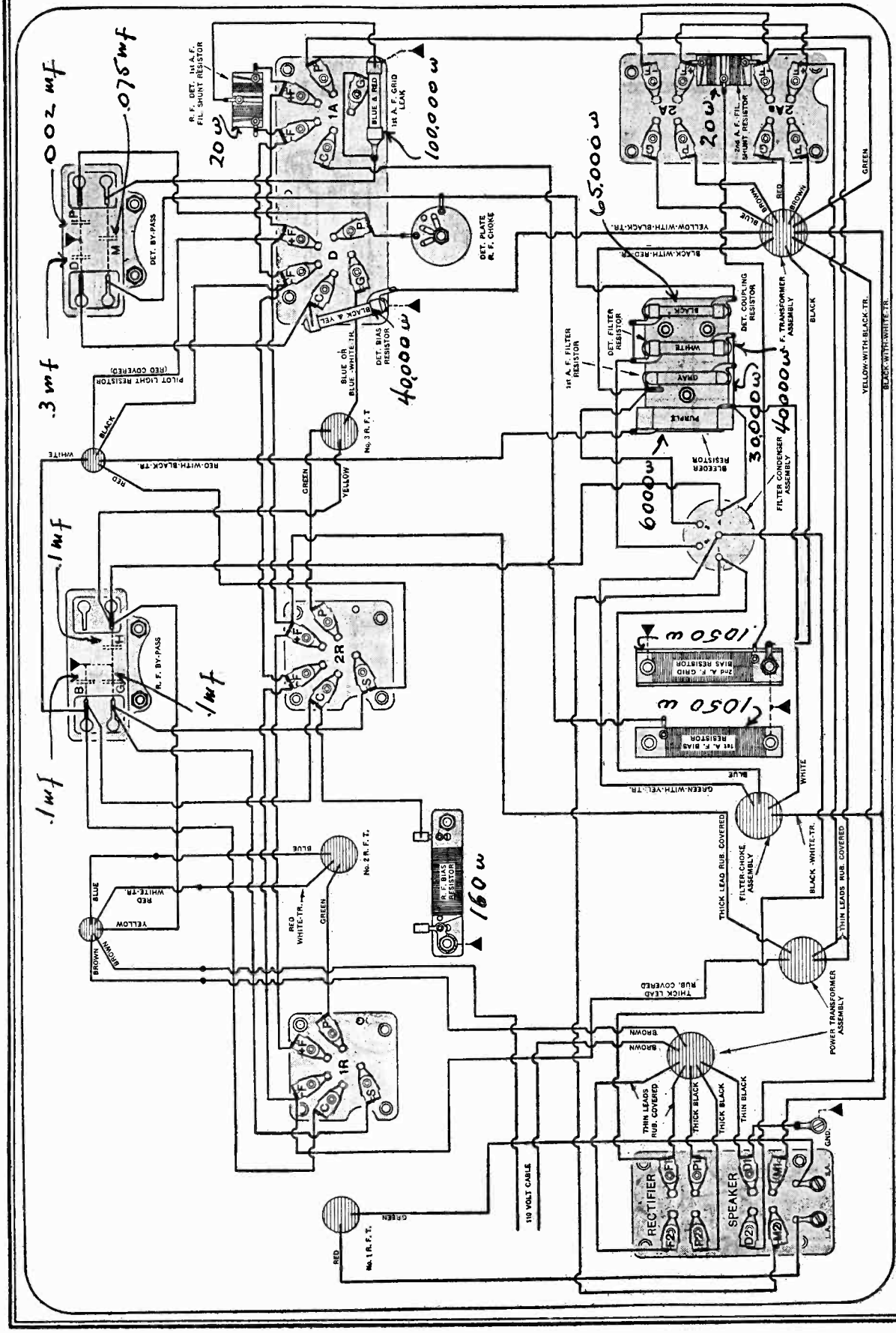
DIAGRAM OF EARLY-TYPE MODEL 55-F AND 55-F-C.

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 circle 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

ATWATER KENT MFG. CO.

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.

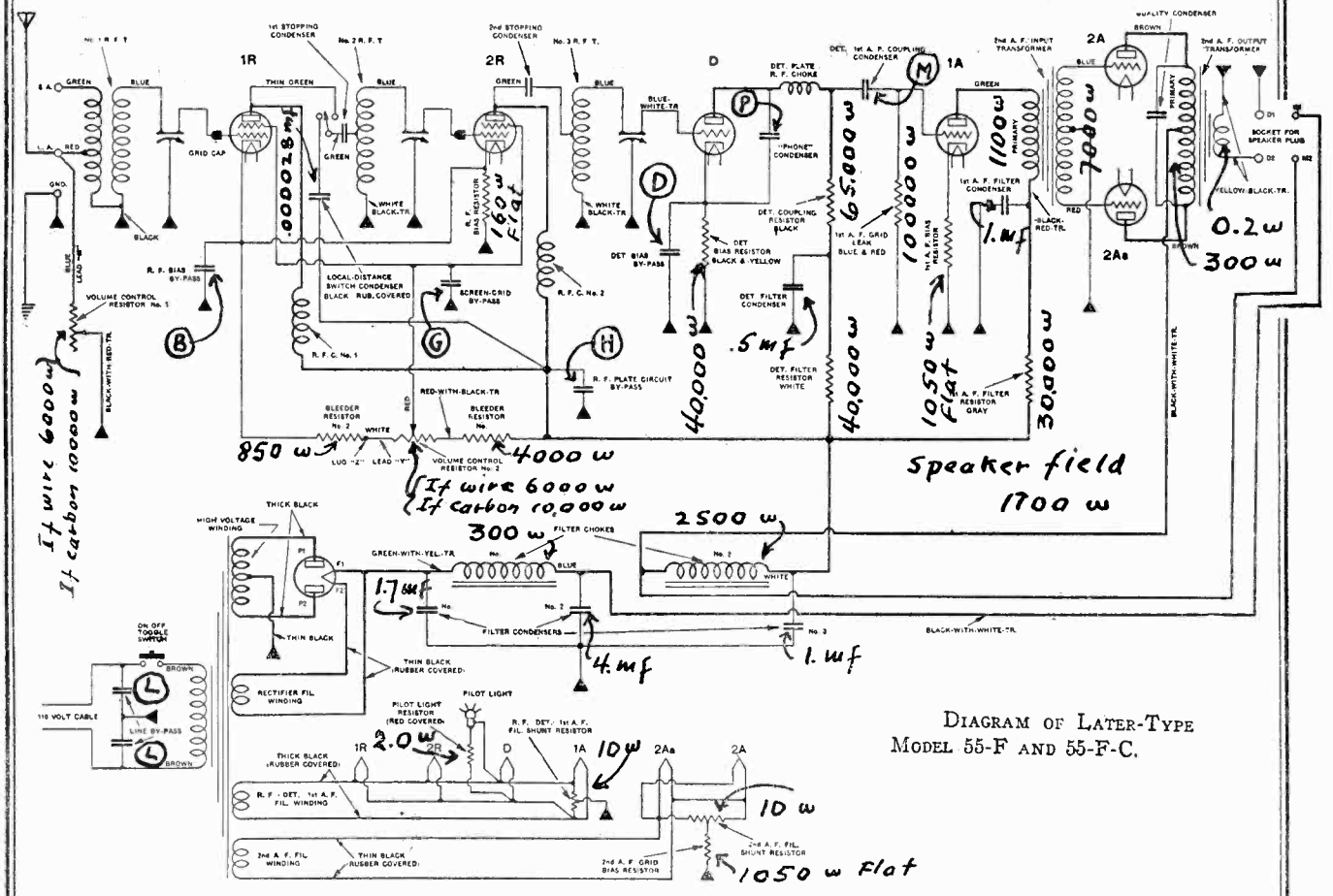
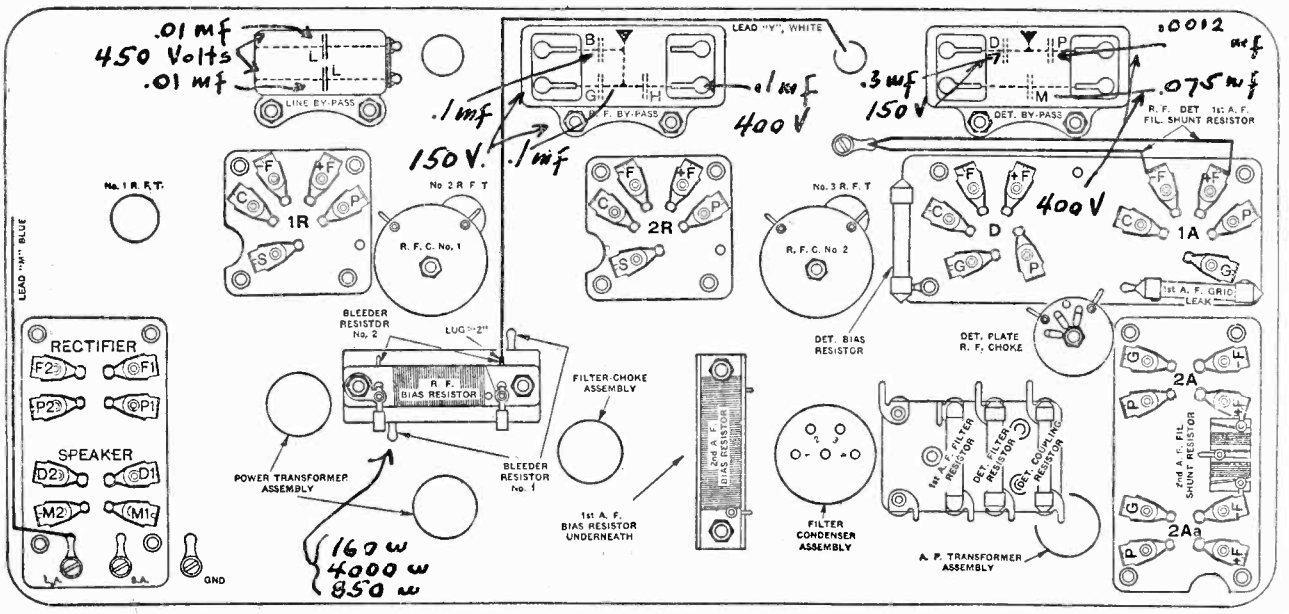


DIAGRAM OF LATER-TYPE MODEL 55-F AND 55-F-C.

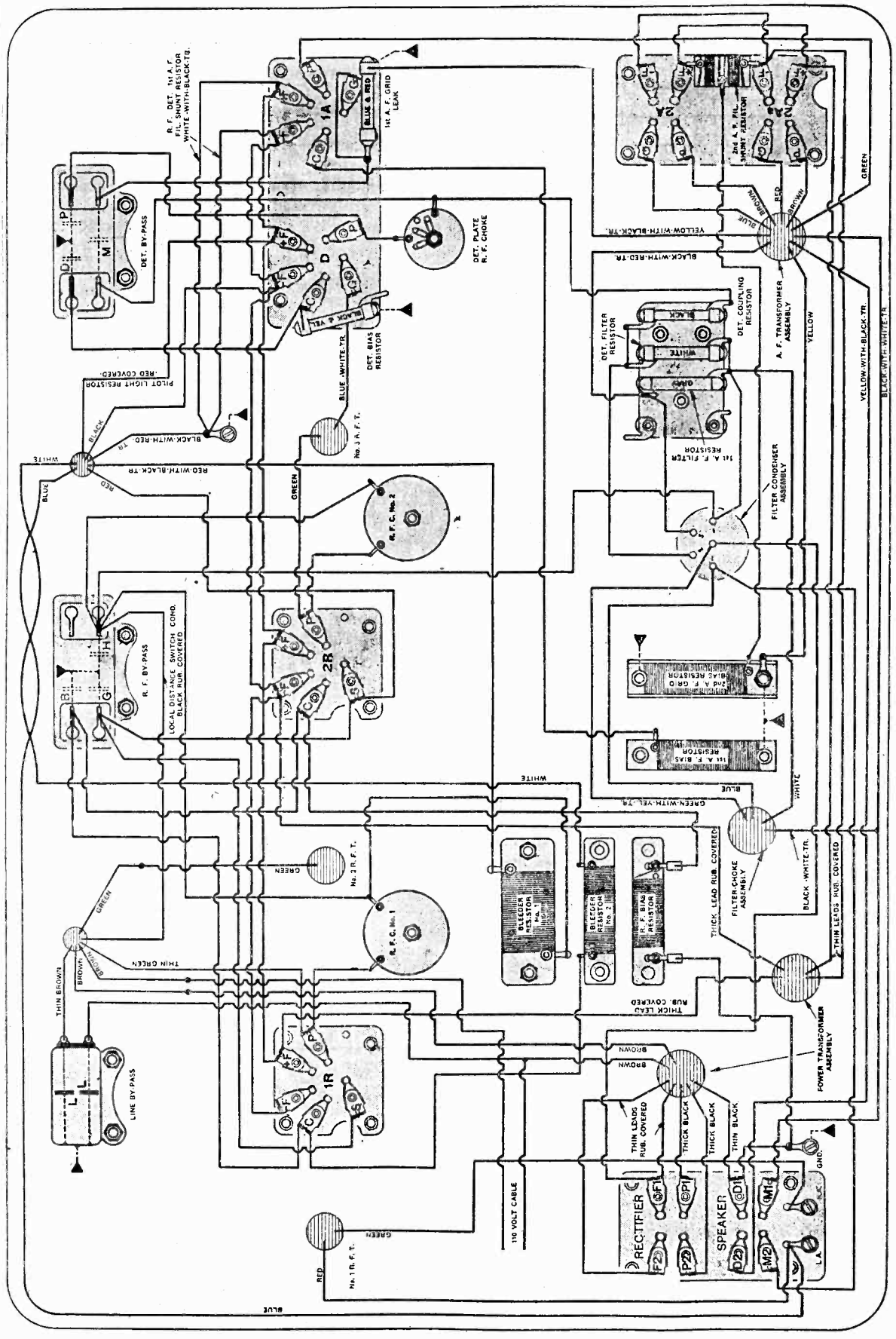


BOTTOM CHART OF LATER-TYPE MODEL 55-F AND 55-F-C.

Filter condenser reference is to page 3-24.

ATWATER KENT MFG. CO.

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.

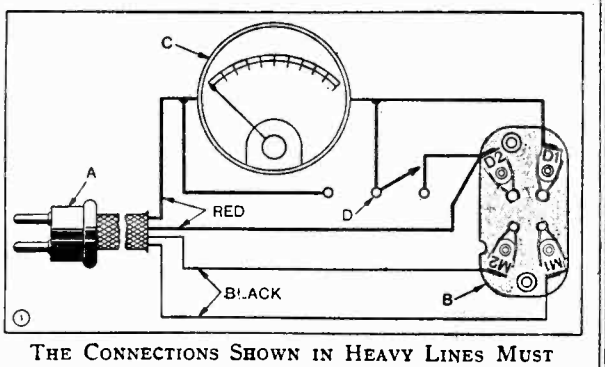
Output Measuring Circuit for Electro-Dynamic Receivers.

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.

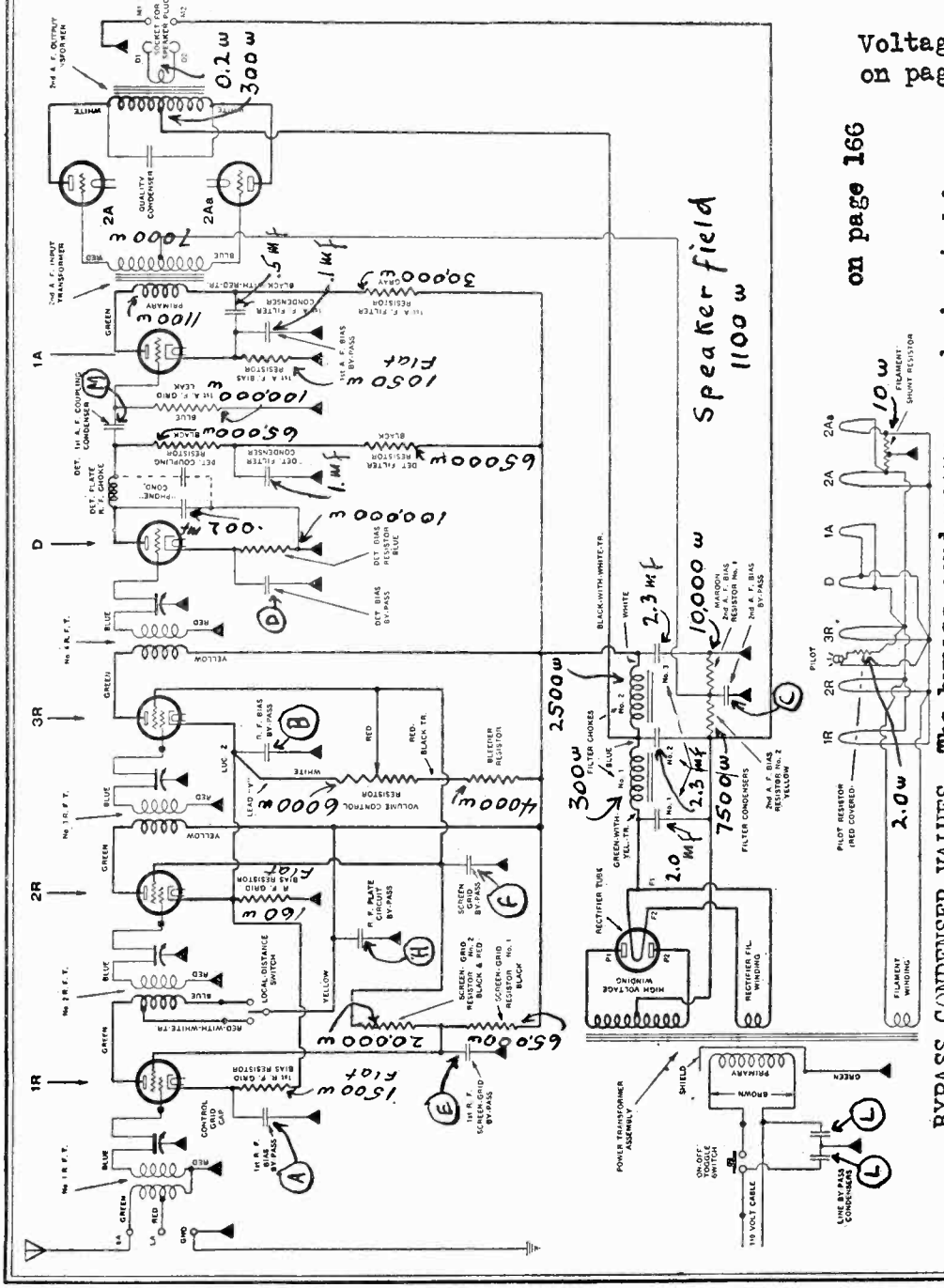
ATWATER KENT MFG. CO.

MODEL 60 and 60-C
Early
Schematic

FILTER CONDENSER CONNECTIONS. See chassis layout Data

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

on page 166

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

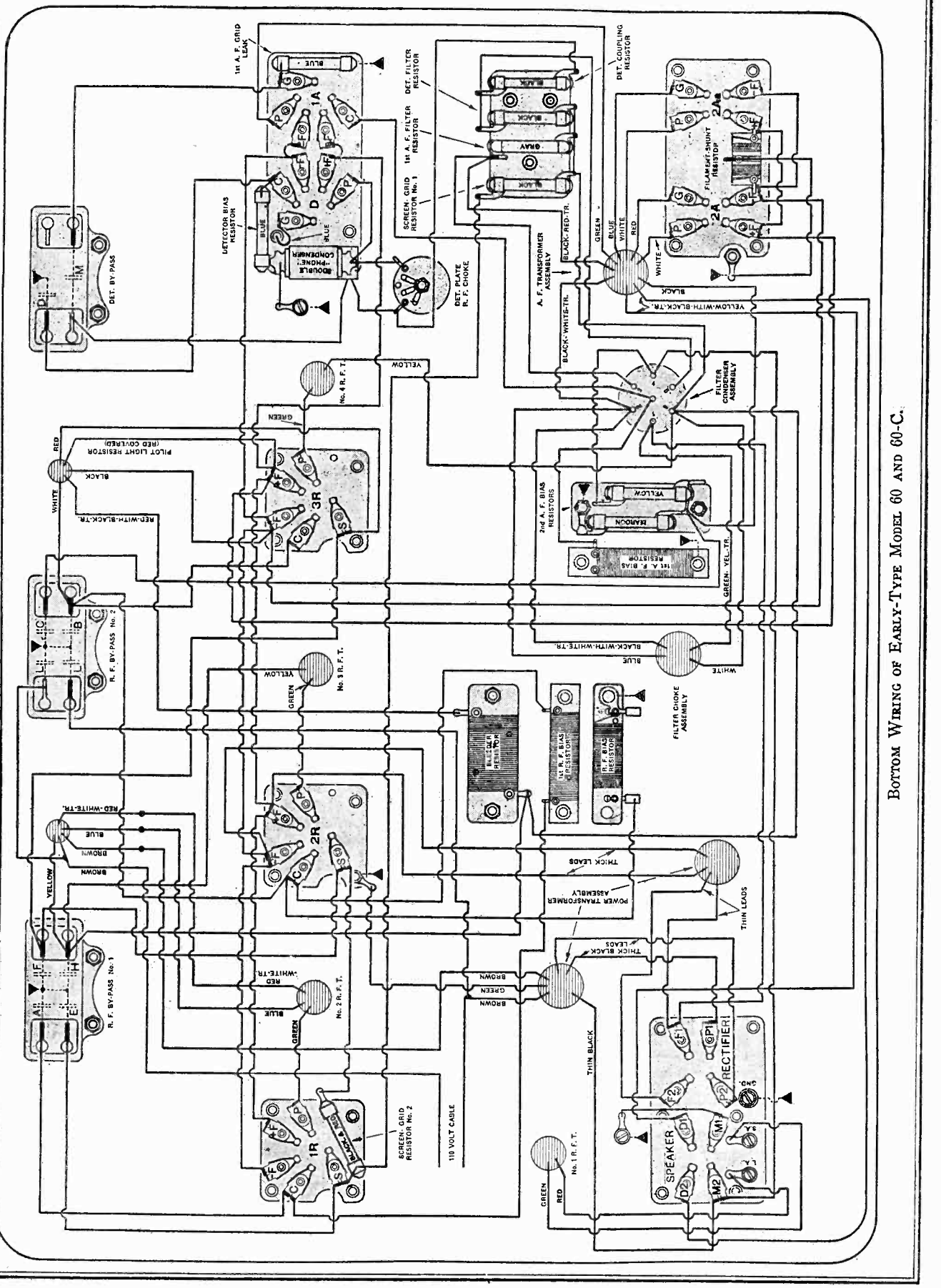
RF Bypass # 1	A	.1 mfd	150 volts	E	.1 mfd	150 volts
	F	.1 mfd	400 volts	H	.1 mfd	400 volts
RF Bypass #2	B	.1 mfd	150 volts	C	.1 mfd	150 volts
	L	.01 mfd	400 volts	L	.01 mfd	400 volts
Detector Bypass	D	.3 mfd	150 volts	M	.075 mfd	400 volts

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

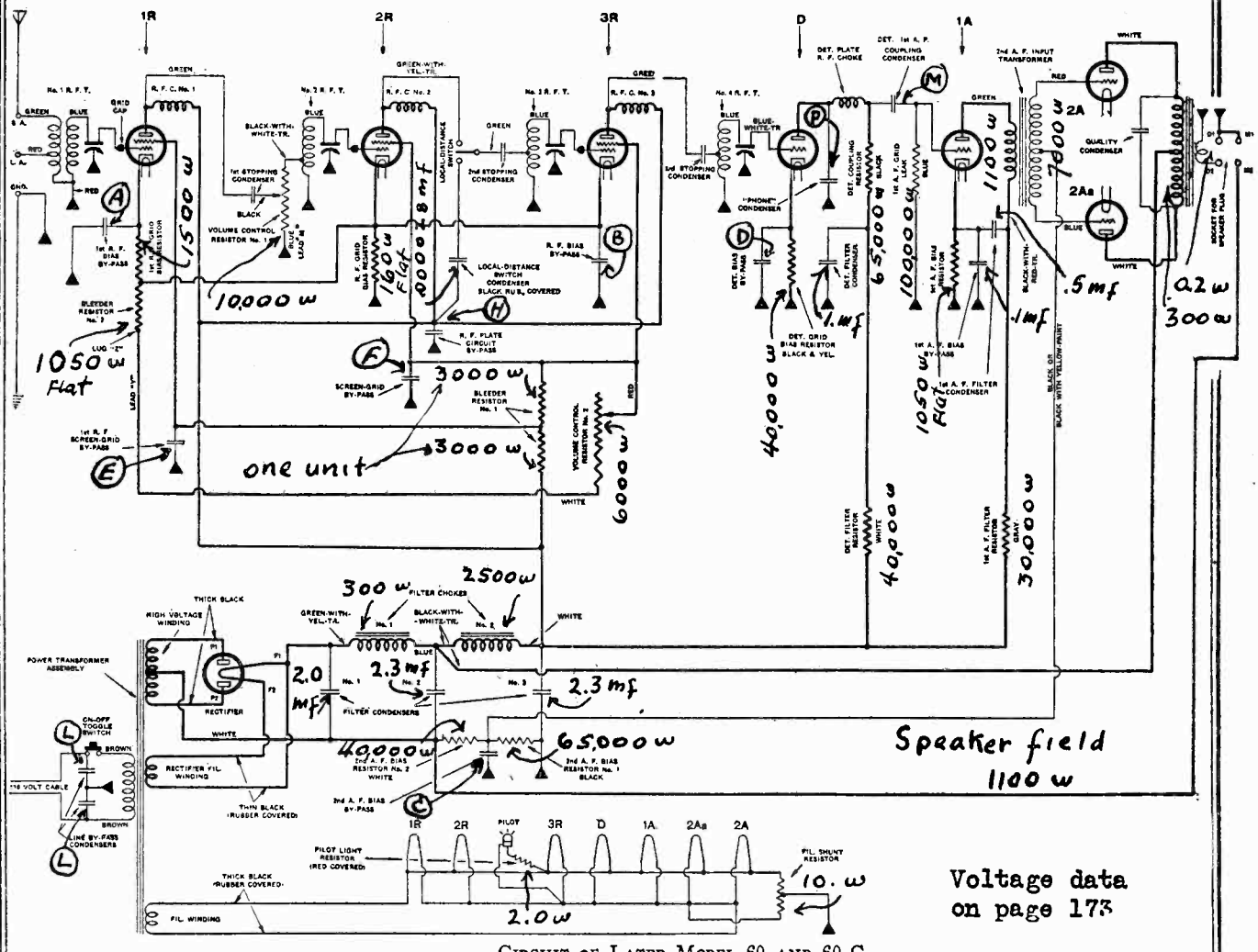
ATWATER KENT MFG. CO.



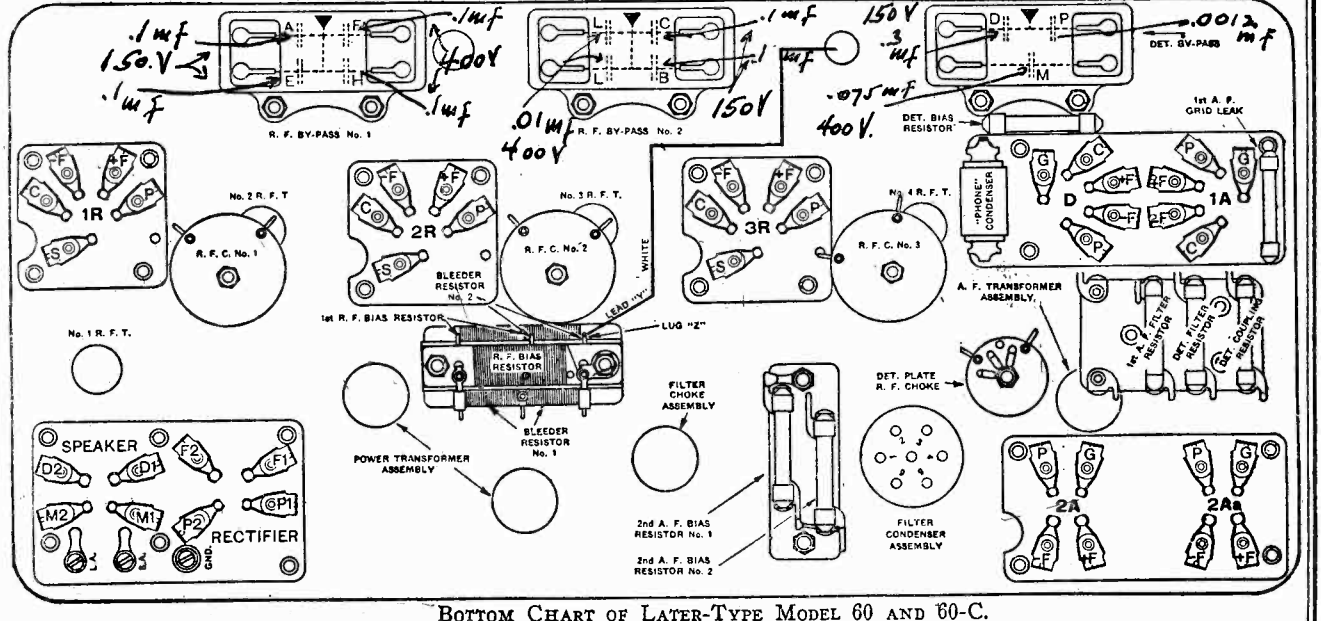
BOTTOM WIRING OF EARLY-TYPE MODEL 60 AND 60-C.

ATWATER KENT MFG. CO.

MODEL 60 and 60-C
Late
Schematic

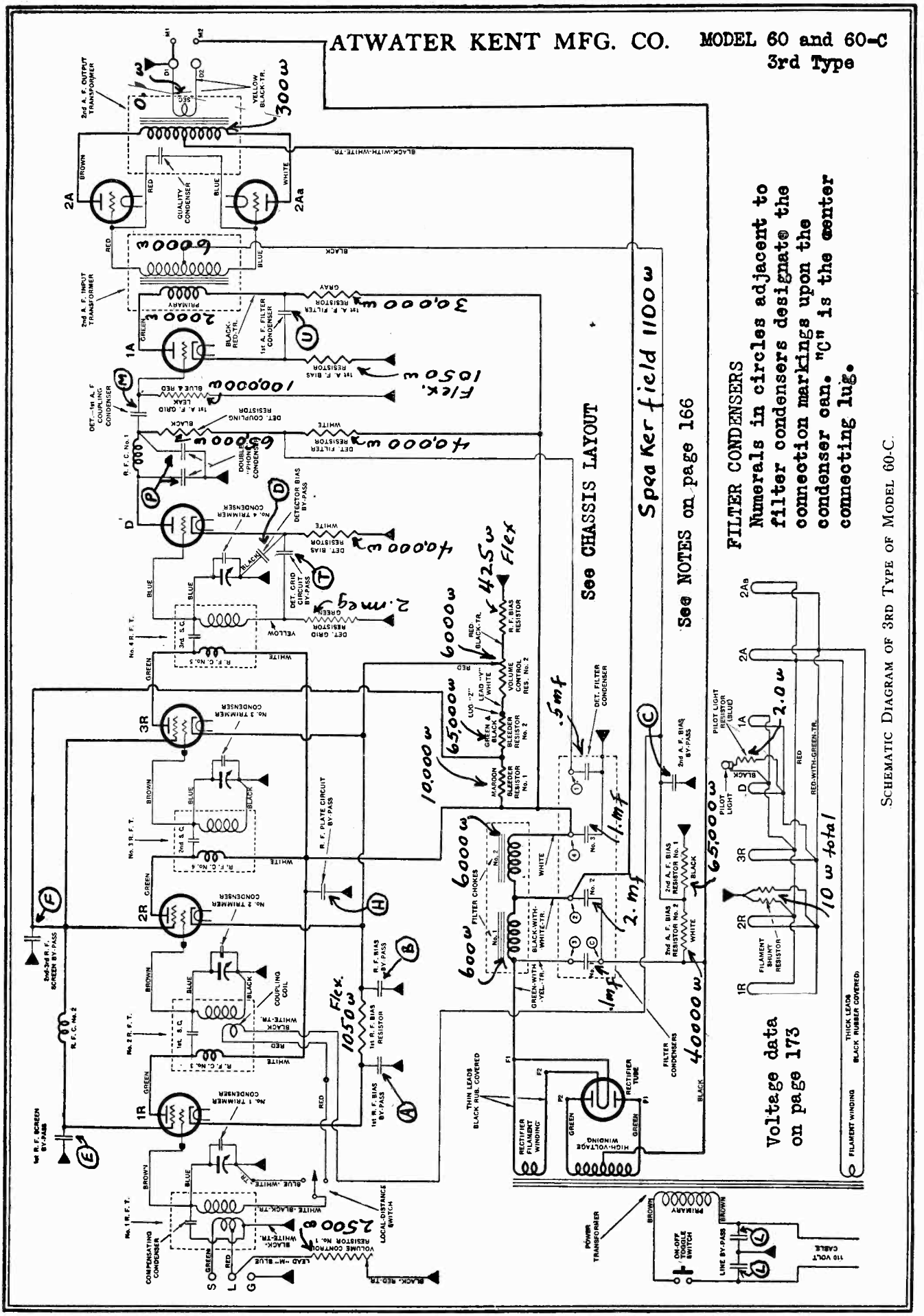


CIRCUIT OF LATER MODEL 60 AND 60-C.



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

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

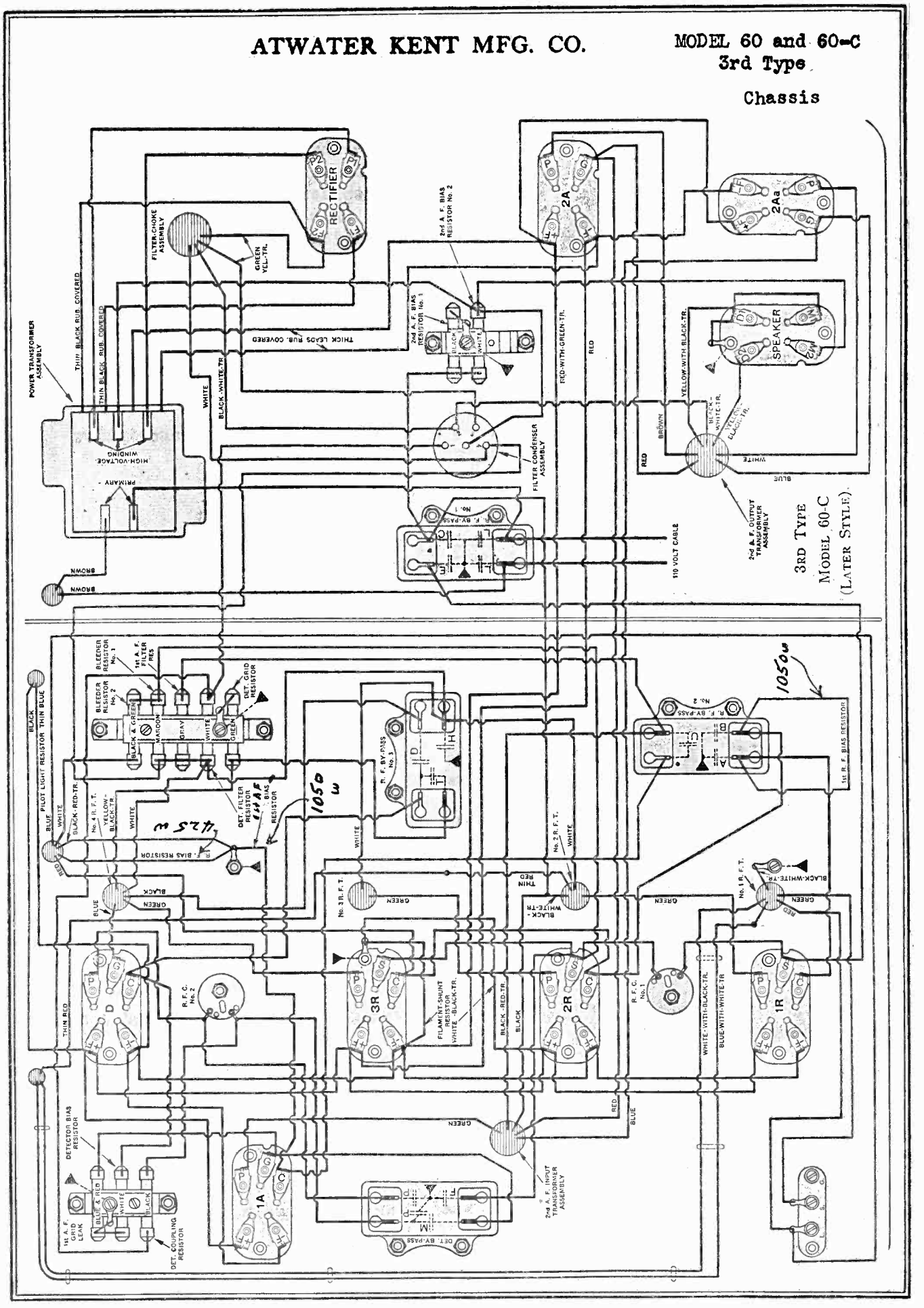


Page 166 reference is to page 3-28.

ATWATER KENT MFG. CO.

MODEL 60 and 60-C
3rd Type

Chassis



MODEL 60 and 60-C
3rd Type

ATWATER KENT MFG. CO.

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-F (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.

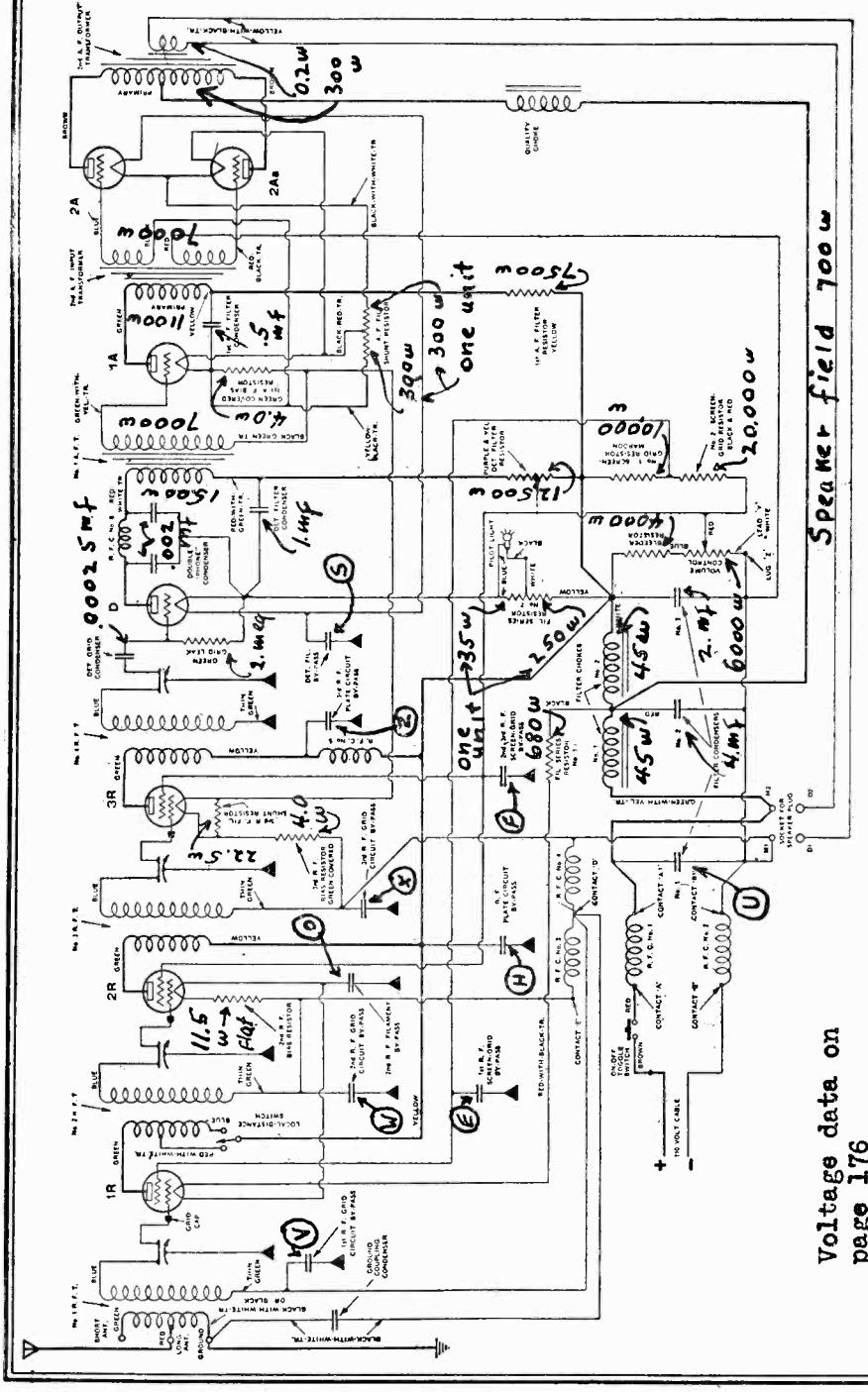


DIAGRAM OF EARLY MODEL 61 AND 61-C (DIRECT CURRENT).

Voltage data on page 176

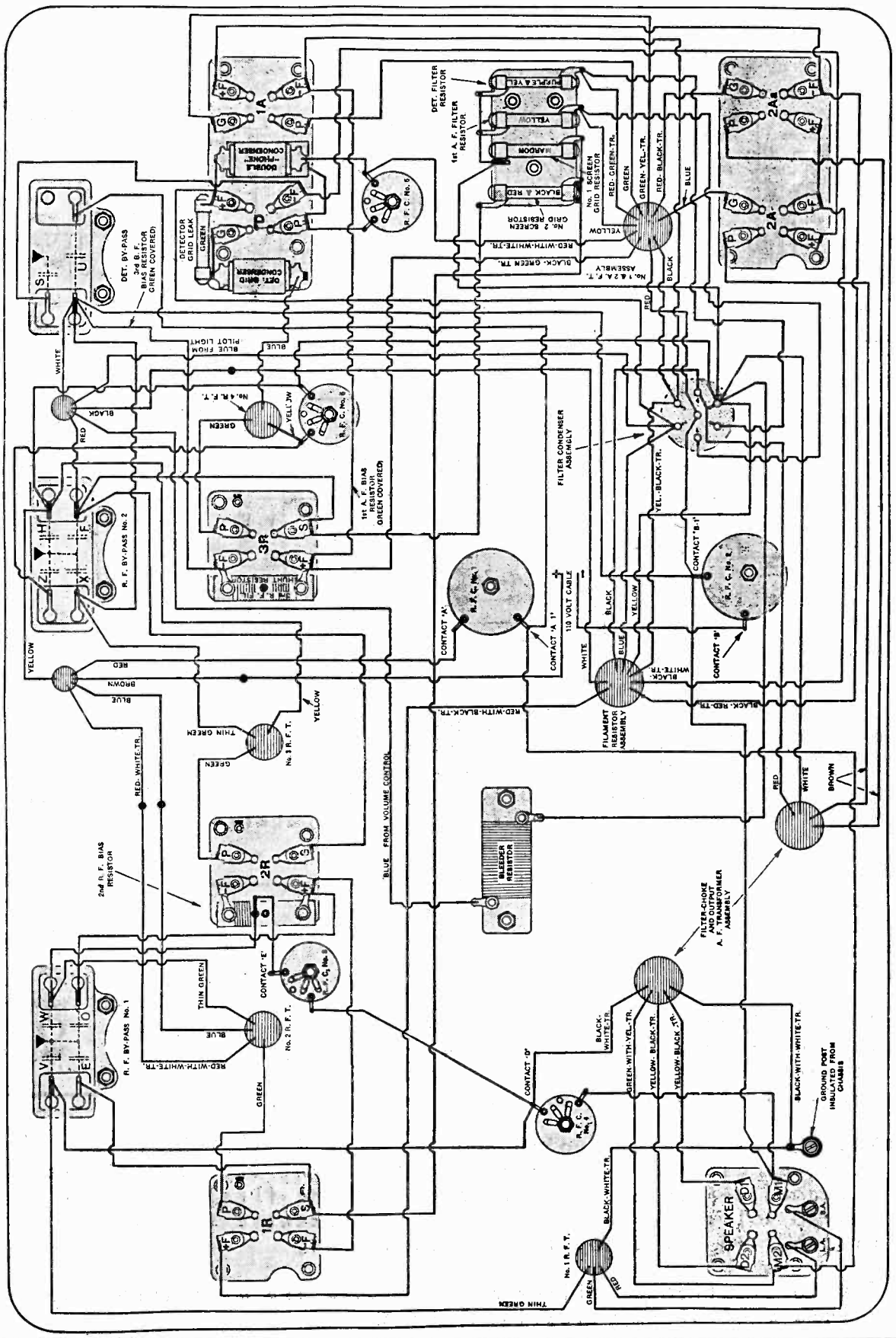
BYPASS CONDENSERS. The following designating letters are shown upon the schematic wiring diagram and also upon the chassis layout

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.

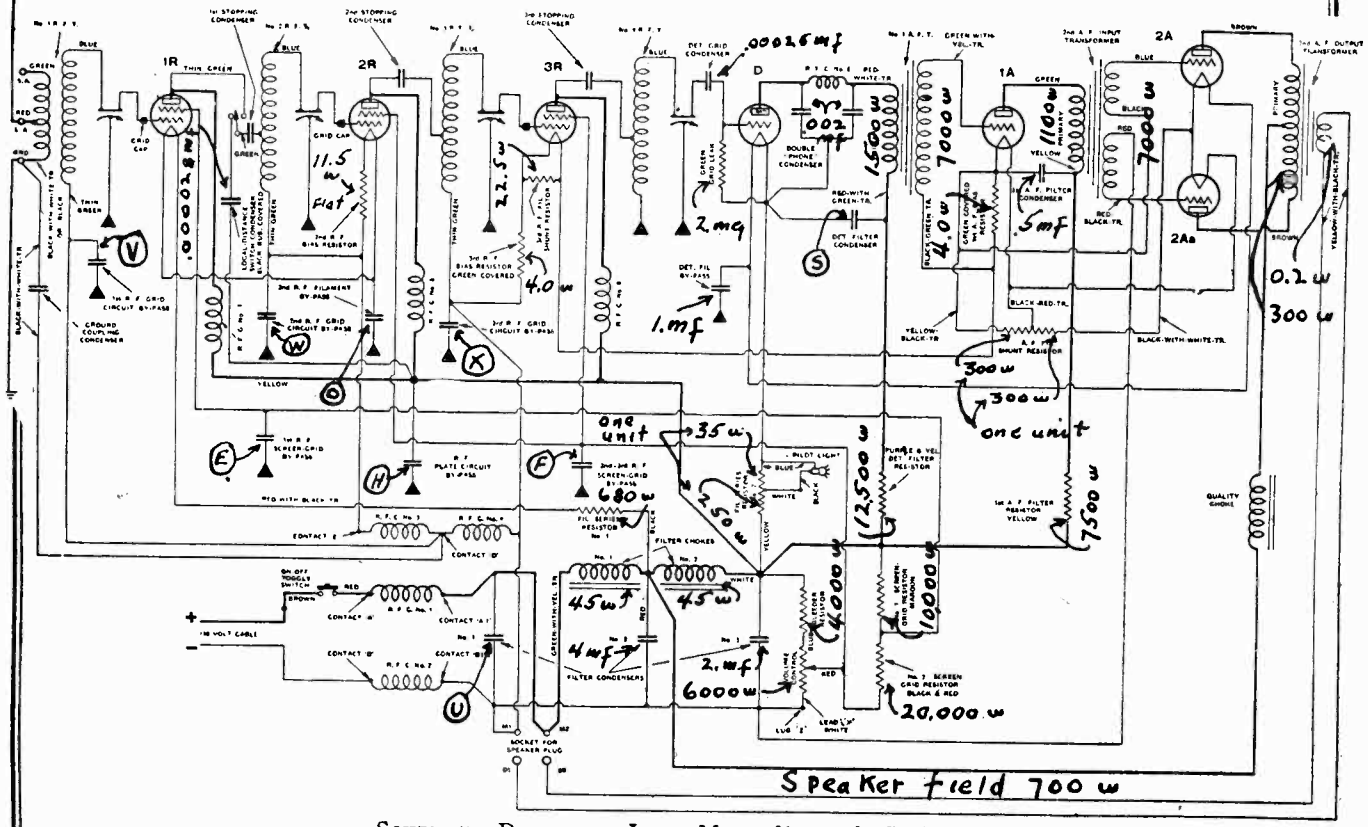
MODEL 61, 61-C
Early
Chassis



BOTTOM WIRING OF EARLY-TYPE MODEL 61 AND 61-C.

MODEL 61-61-C
Late Schematic

ATWATER KENT MFG. CO

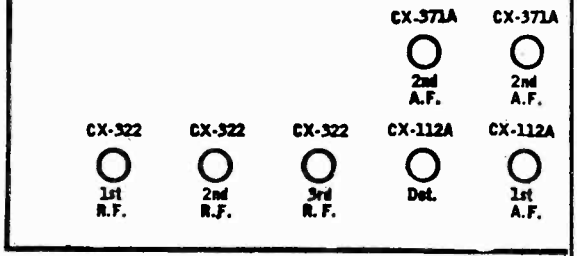


SCHEMATIC DIAGRAM OF LATER MODEL 61 AND 61-C (DIRECT CURRENT).

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

	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 volts and the 3rd R-F bias voltage is 0.9 volts.

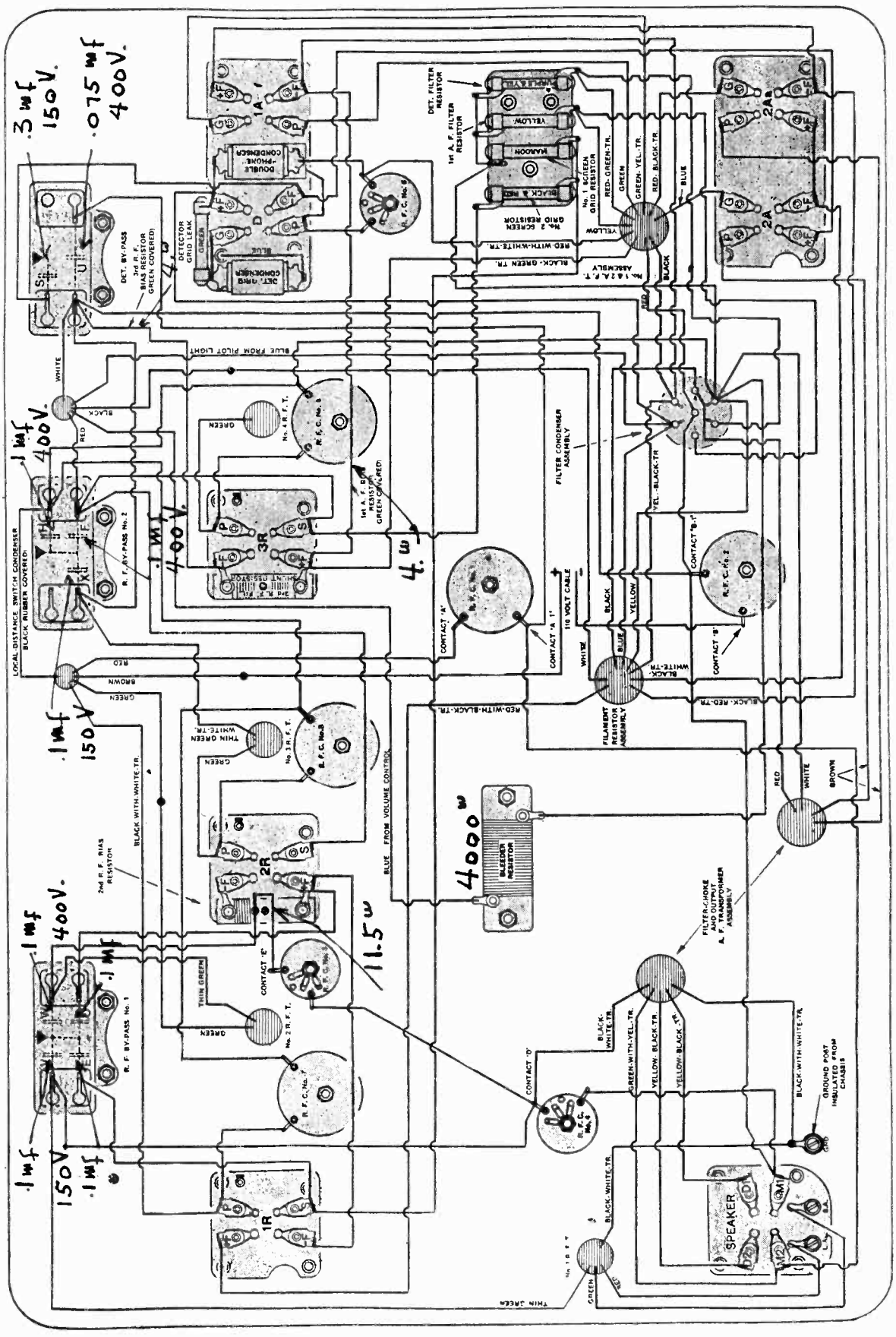
**The screen voltage quoted applies only to the third R-F tube. The other R-F tubes secure different values of screen voltage. R-F tube number 1 or rather the first R-F stage has 46 volts applied to its screen. Likewise the 2nd R-F stage has 46 volts applied to its screen.

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)



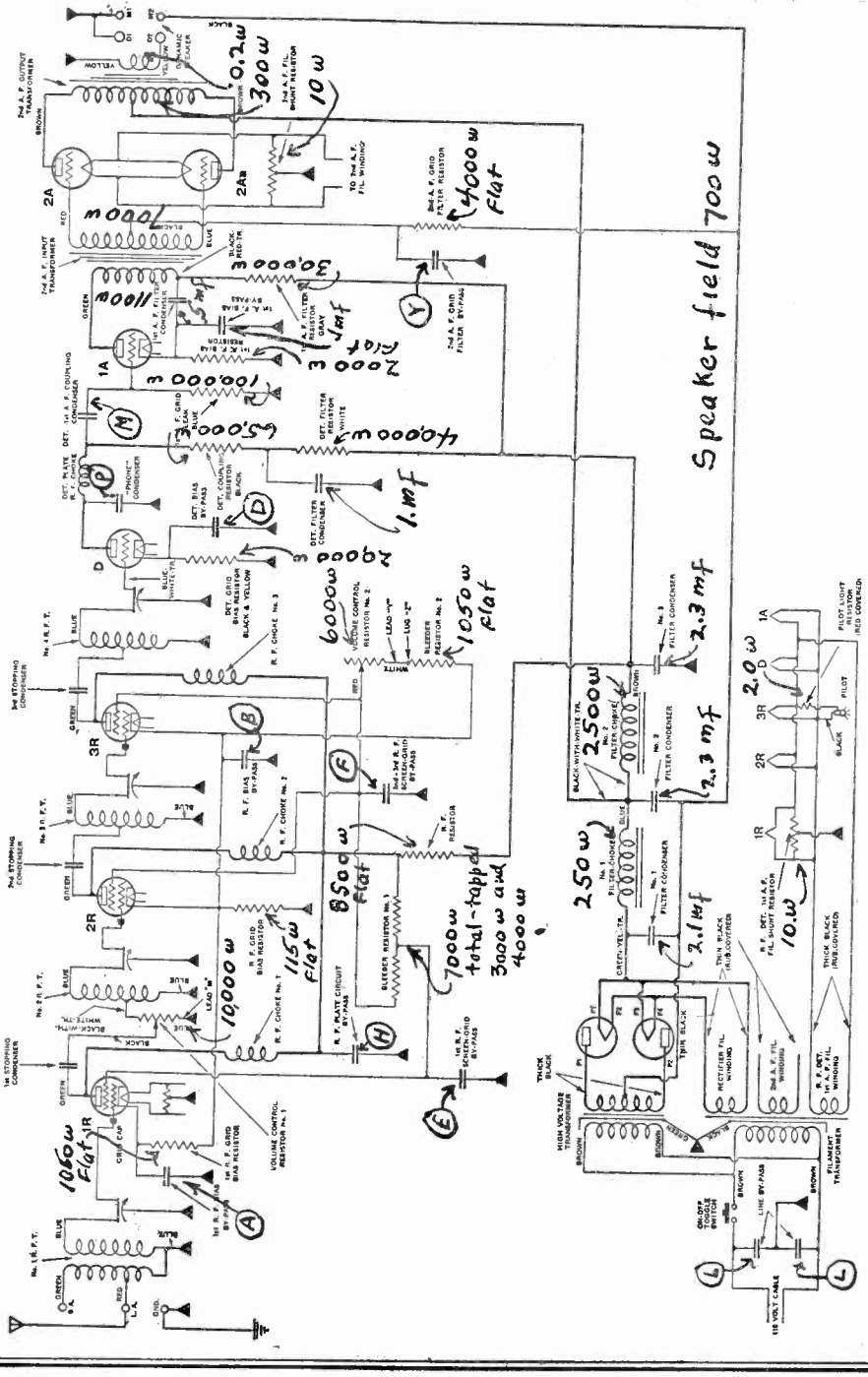
BOTTOM WIRING OF LATER-TYPE MODEL 61 AND 61-C

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)



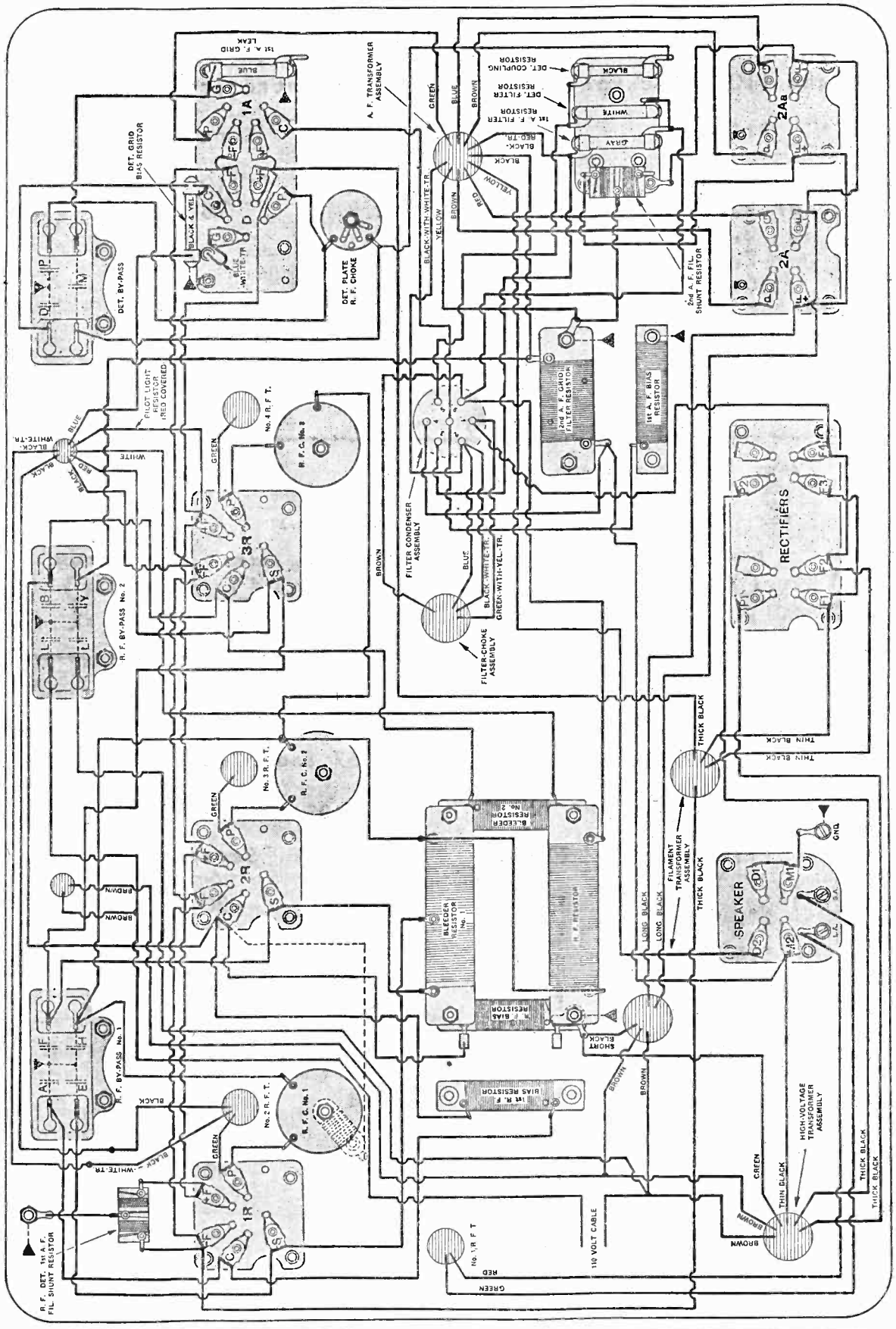
In some early Model 66, volume control resistor No. 1 is connected across the R. F. choke coil in the plate circuit of the 1st R. F. tube. The slider of this resistor is connected to a tap on No. 2 R. F. T. through a coupling condenser.

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.

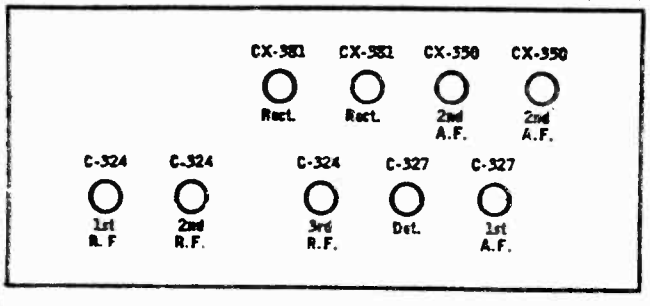
VOLTAGE DATA FOR MODEL 66

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

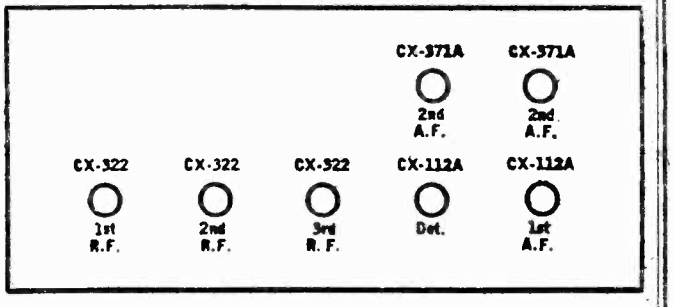
Tube	Filament	Plate	Grid	Screen
R-F (1st)	2.2	158	5.5	110
R-F (2nd-3rd)	2.2	160	2.8	78
Detector	2.2	206	23.	
A-F (1st)	2.2	137	2.8*	
A-F (2nd)	6.9	412	78.	

* 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.	3.3	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

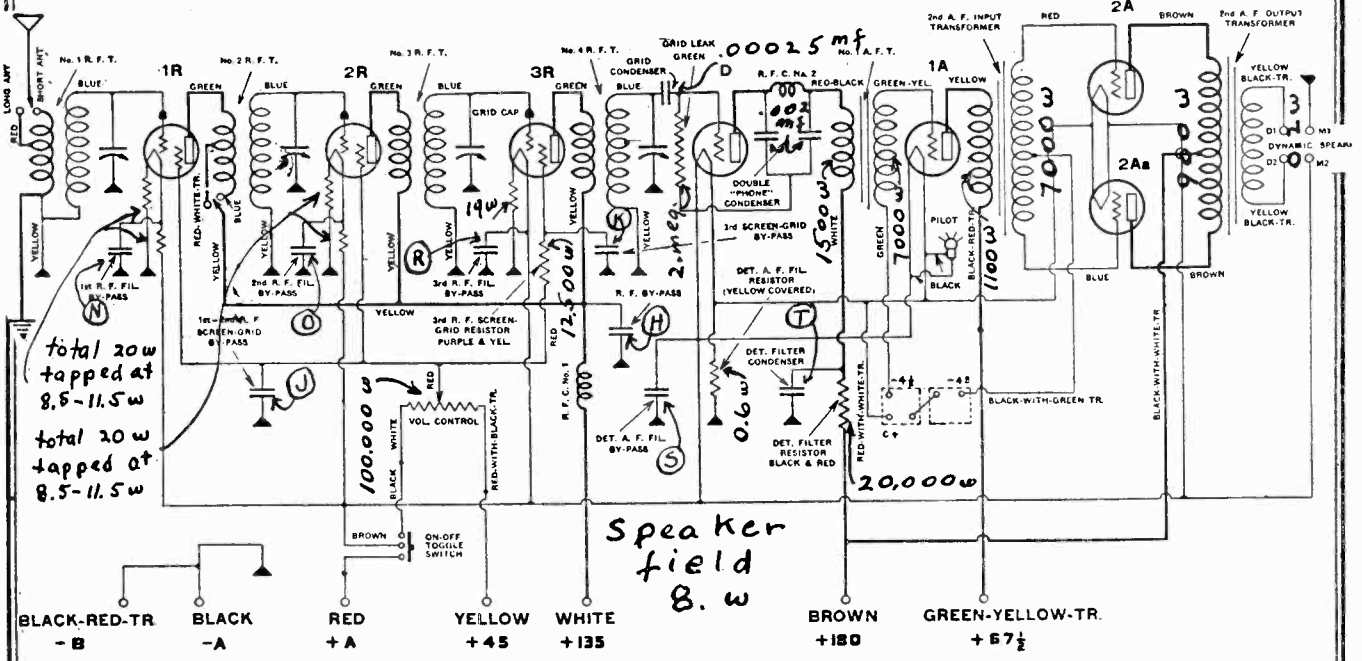


DIAGRAM OF EARLY MODEL 67 AND 67-C (BATTERY OPERATED).

Voltage data on page 180

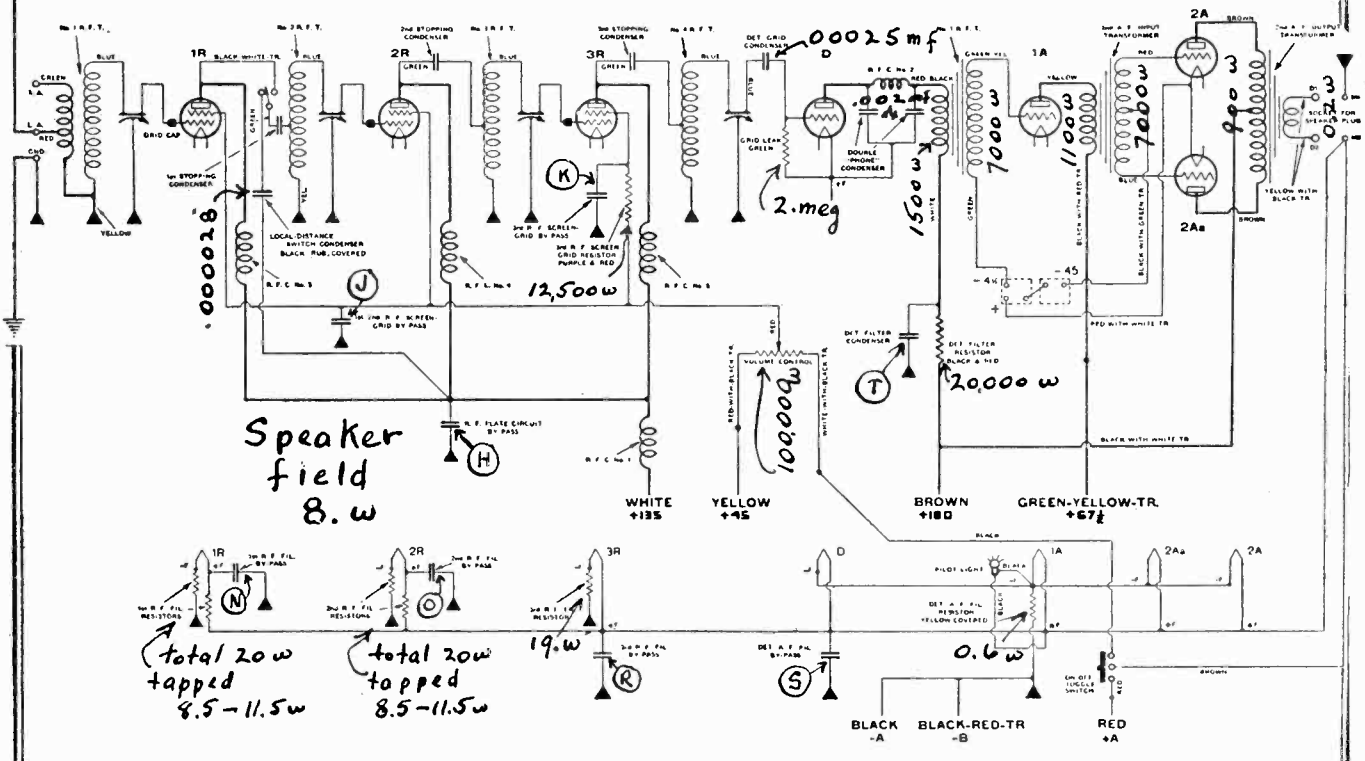


DIAGRAM OF LATER MODEL 67 AND 67-C (BATTERY OPERATED).

Voltage reference page 3-42.

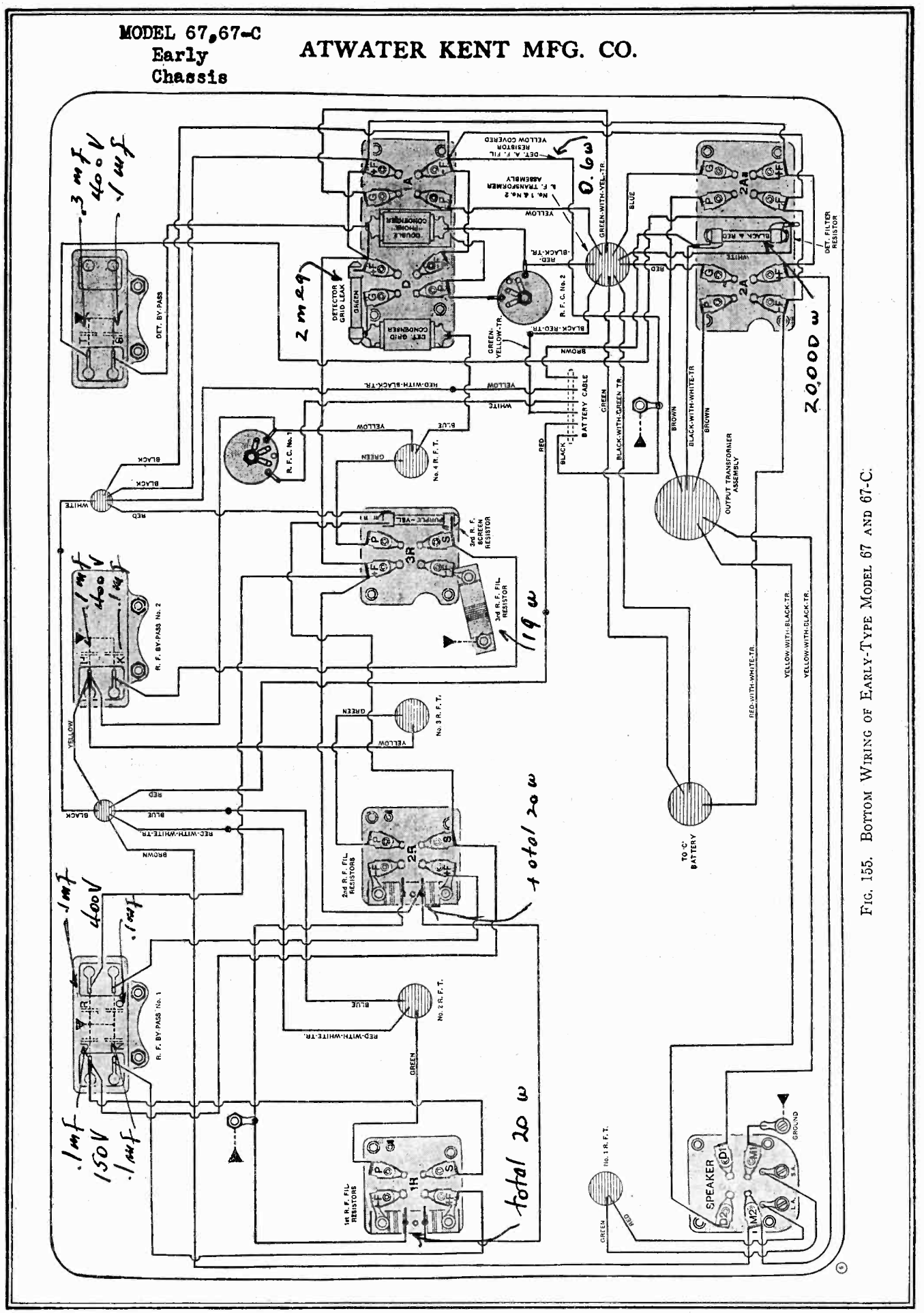
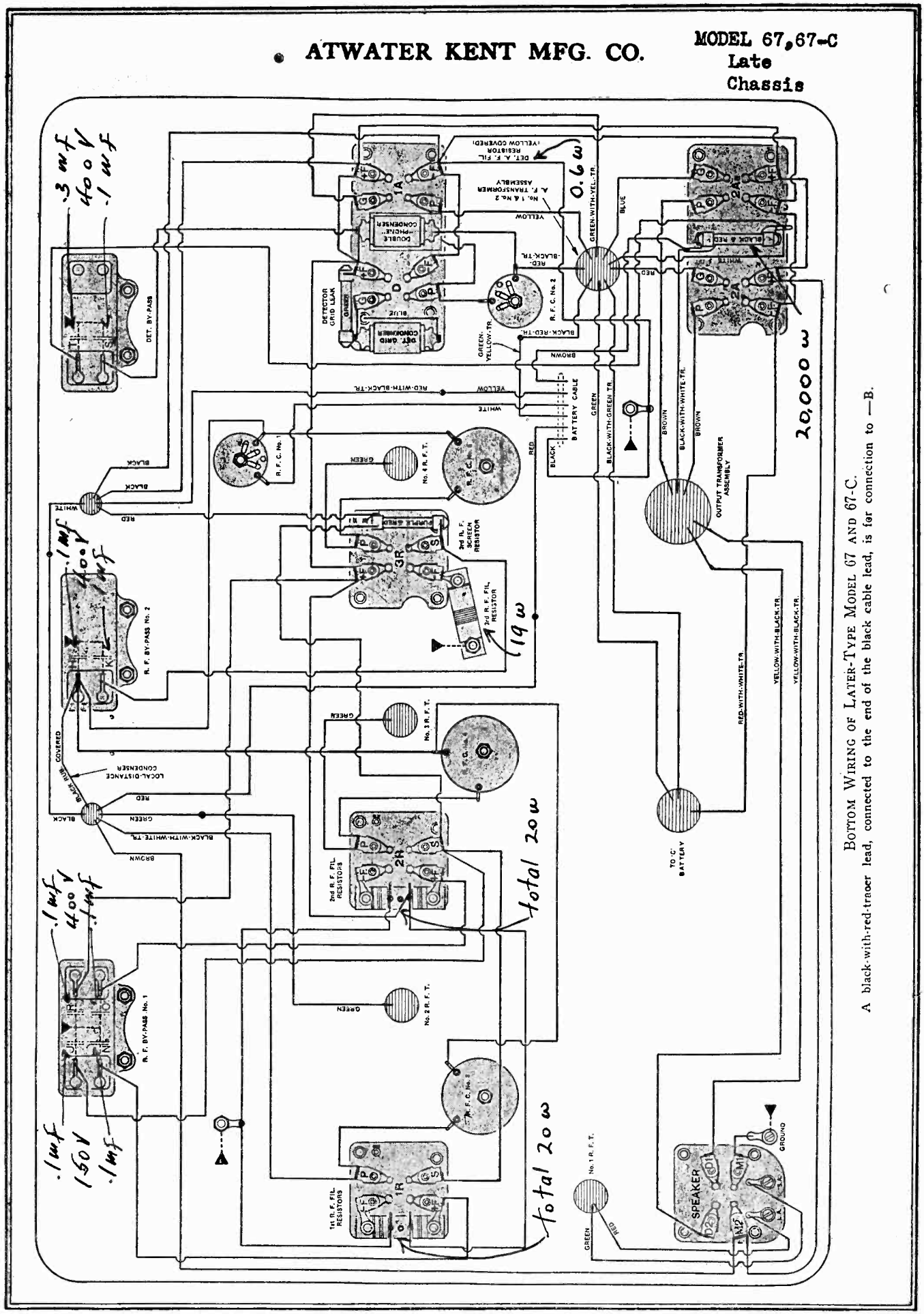


FIG. 155. BOTTOM WIRING OF EARLY-TYPE MODEL 67 AND 67-C.



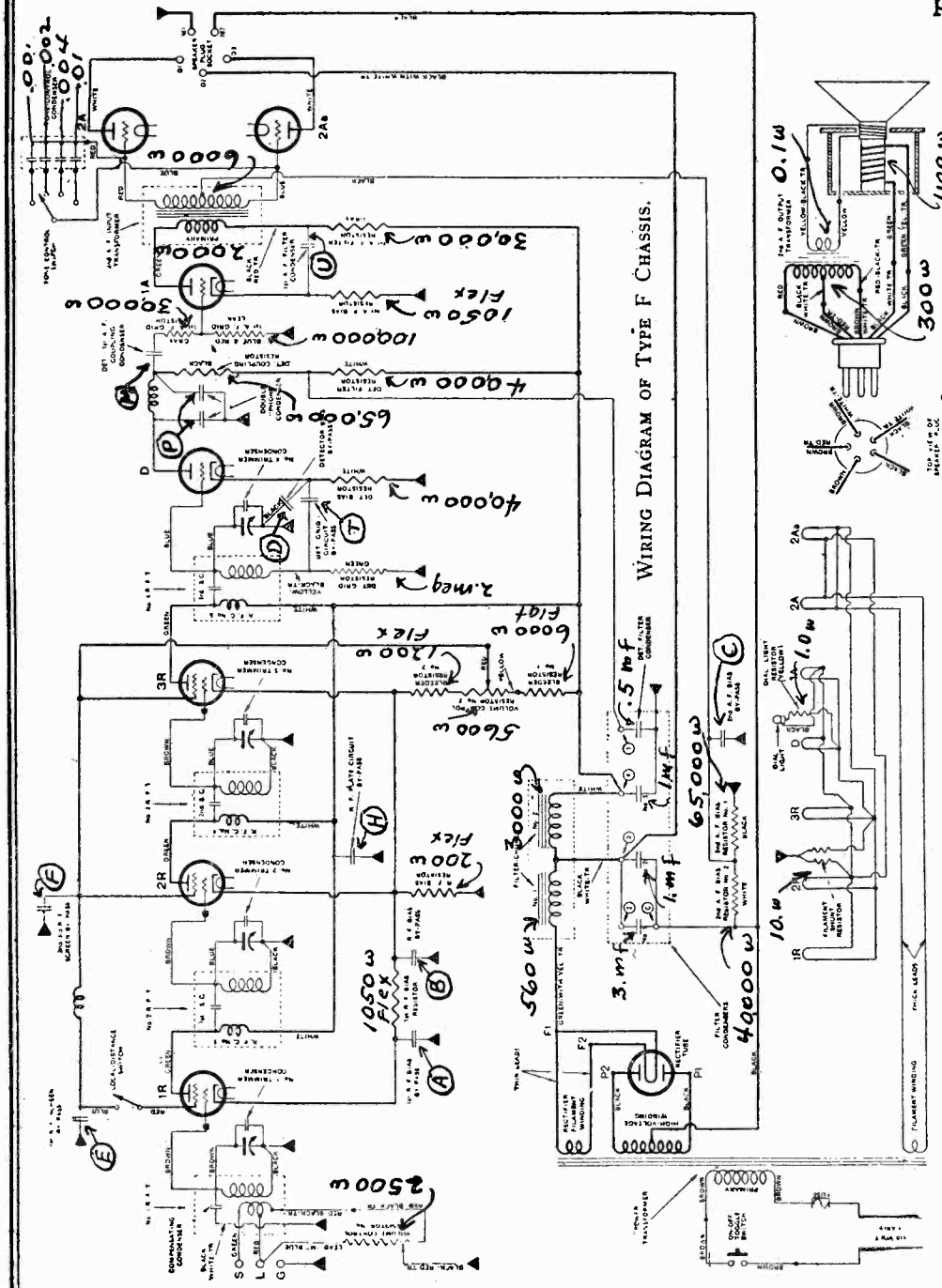
BOTTOM WIRING OF LATER-TYPE MODEL 67 AND 67-C.

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



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**	**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**					

Voltage reference page 3-48.

ATWATER KENT MFG. CO.

MODEL 70, 74, 76
Chassis D

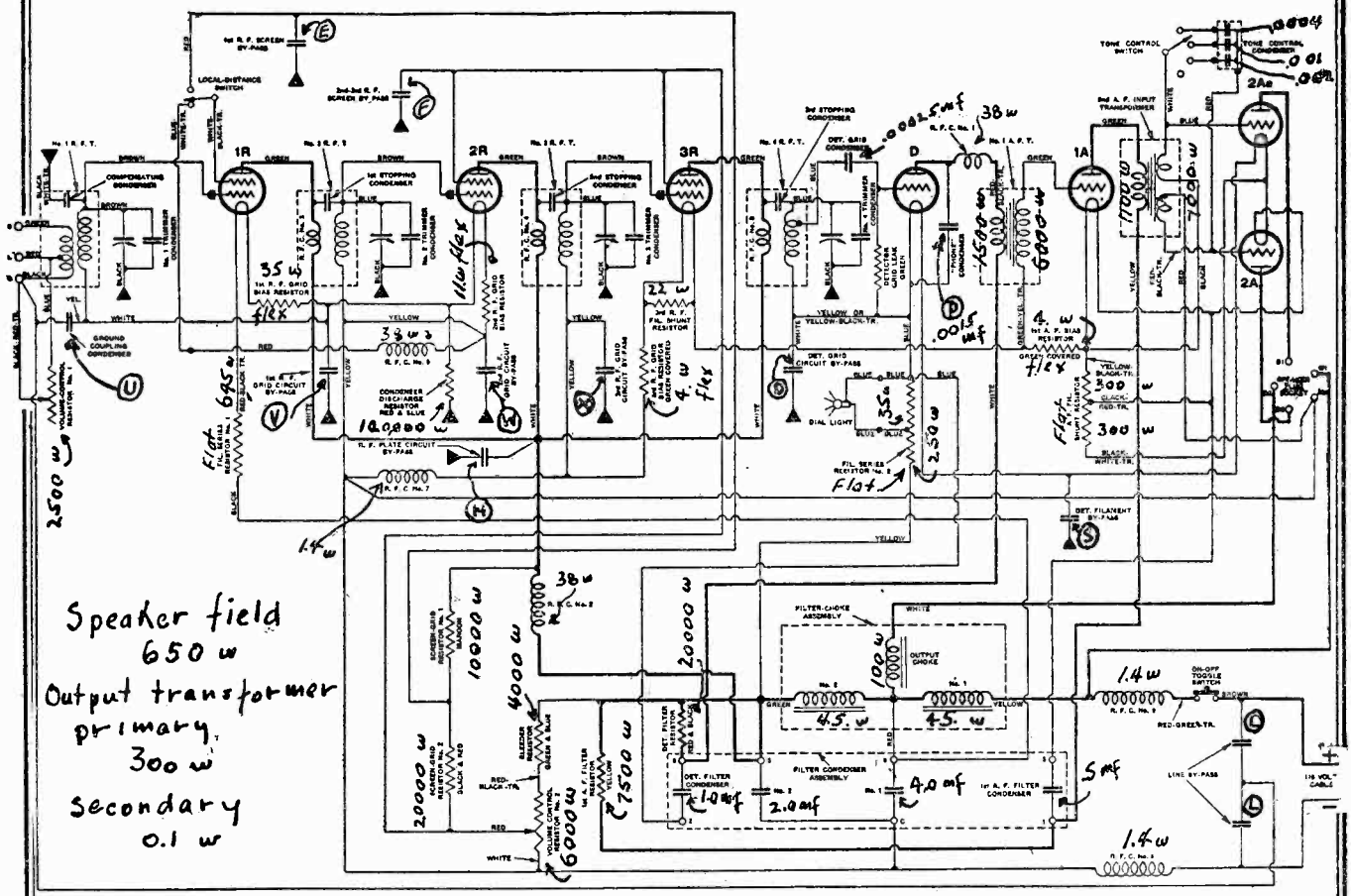


DIAGRAM OF D-1 CHASSIS.

BYPASS CONDENSERS. The letters within the circles adjacent to the various bypass 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

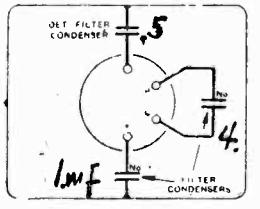
Use High Resistance D C Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages
Use A. C Voltmeter to Measure Filament Voltages

APPROX. VOLTAGES, USING 120 V. LINE

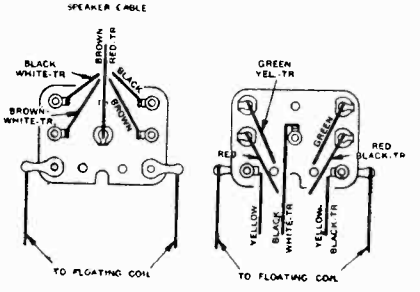
TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	2.5	180	6	92
2nd-R.F.	2.5	180	4	93
3rd-R.F.	2.5	180	4	93
Detector	2.5	117	30**	—
1st-A.F.	2.4	70	2	—
2A	2.7	250	55*	—
2Aa	2.7	250	55*	—

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.

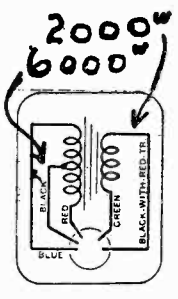
This condenser is used in late production.

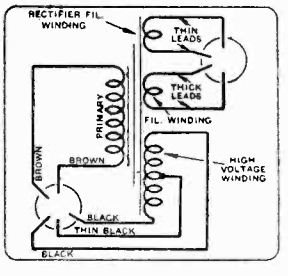


FILTER CONDENSER UNIT

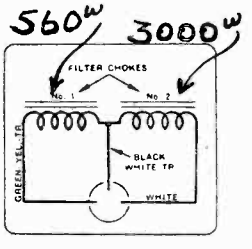


SPEAKER PANEL CONNECTIONS



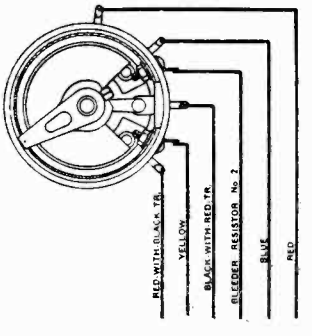


POWER TRANSFORMER

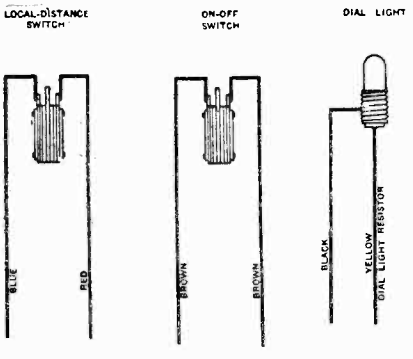


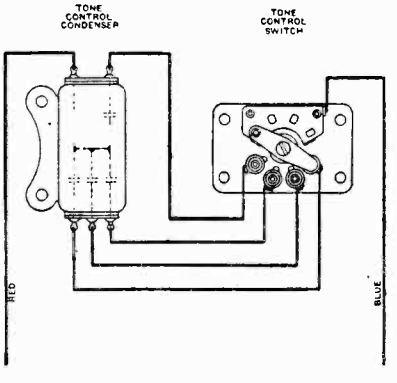
FILTER CHOKE UNIT

DUAL VOLUME CONTROL



2nd A. F. INPUT TRANSFORMER





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

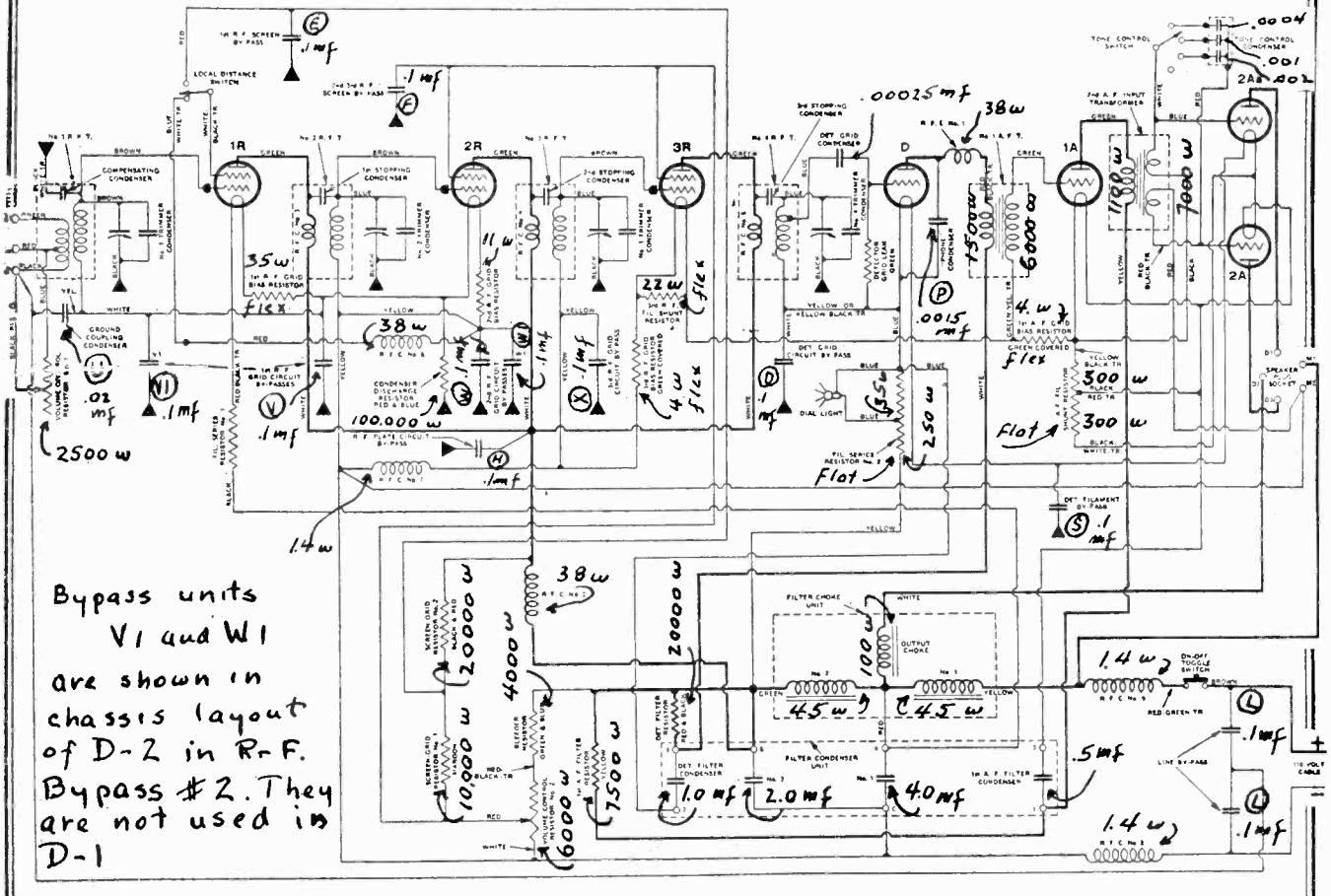
A—1st-R.F. bias by-pass
B—R.F. bias by-pass.
U—1st-A.F filter condenser

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

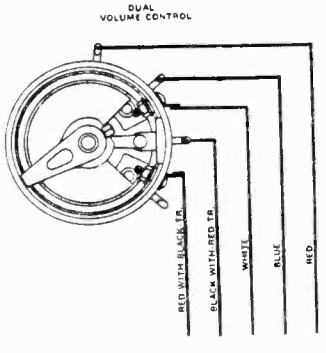
Set in operation. Volume control at maximum.
L-D switch at distance.

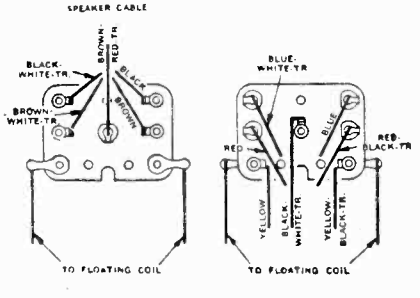
Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

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

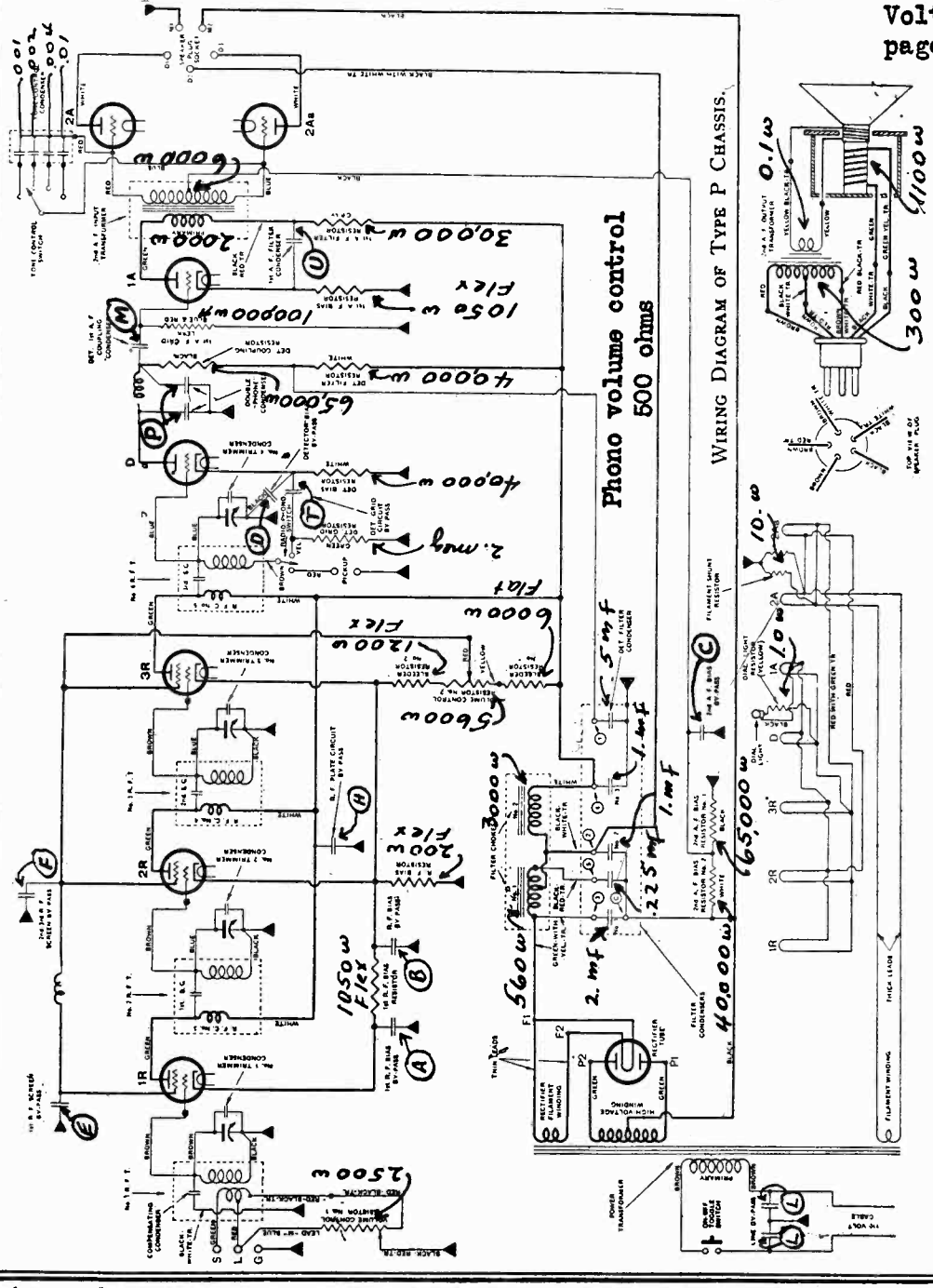
MODEL 76
Chassis P

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.

ATWATER KENT MFG. CO.

MODEL 70 Series
Service Notes
"L-1"
Voltage

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						

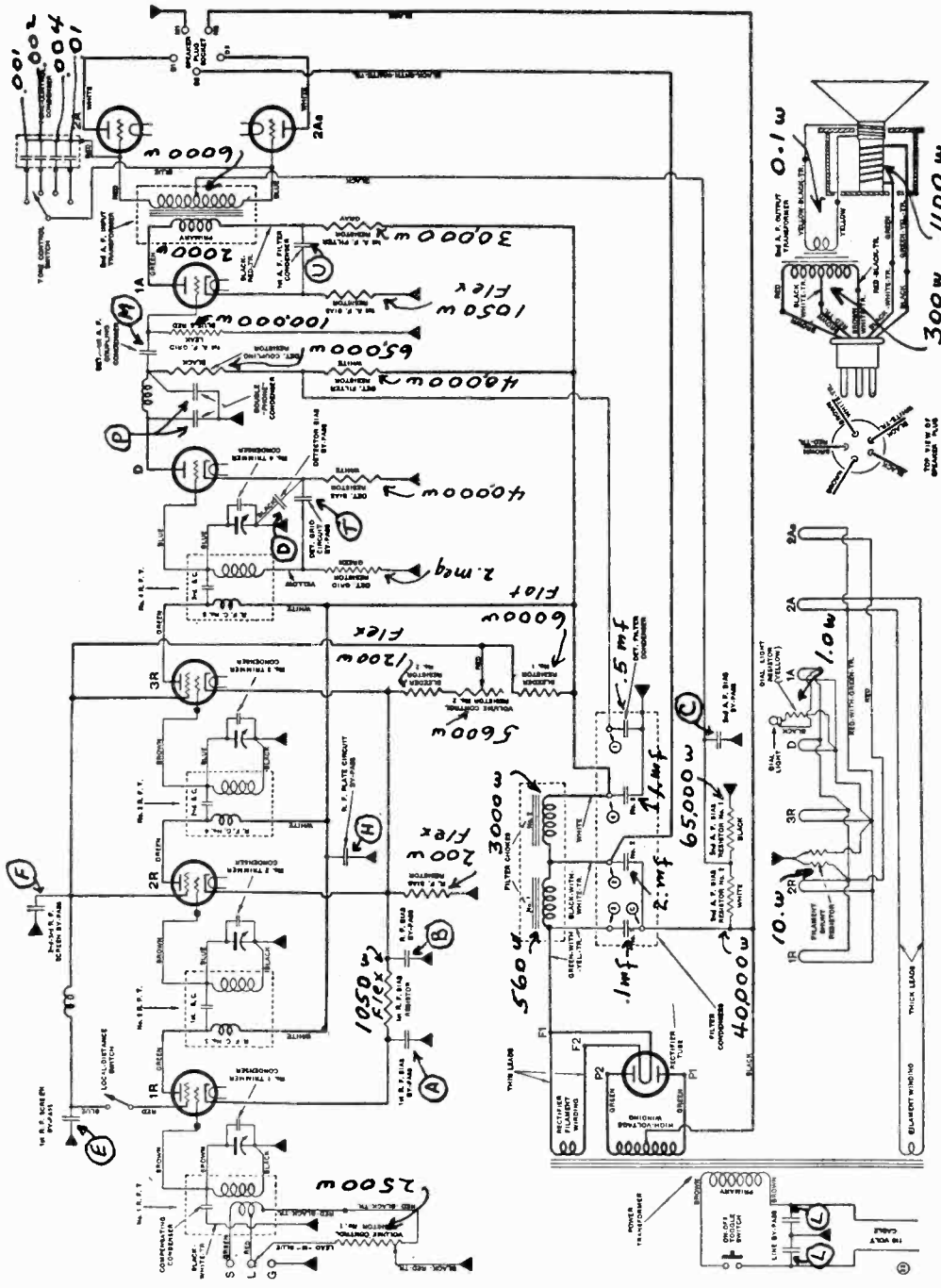


DIAGRAM OF L-1 CHASSIS.

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						

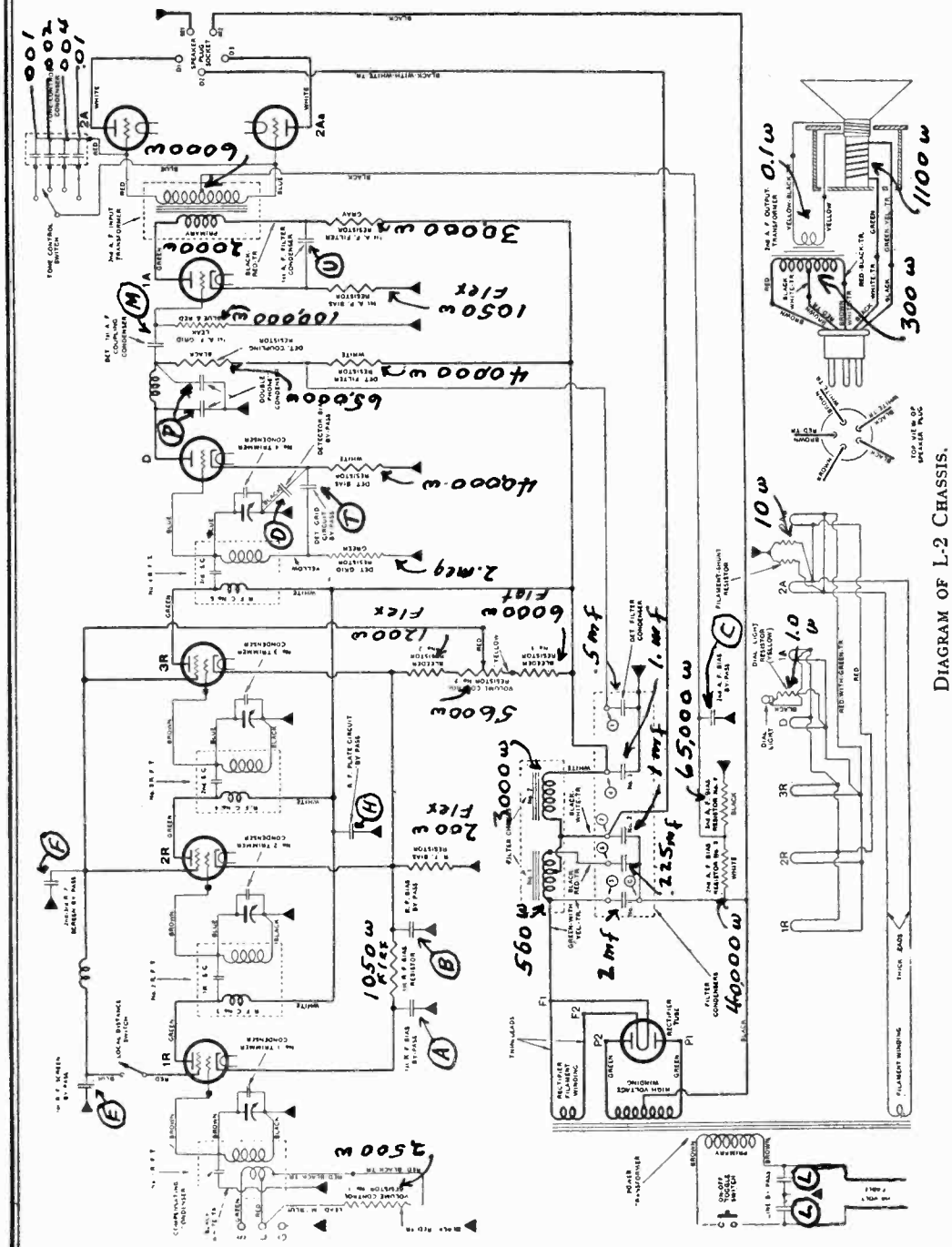


DIAGRAM OF L-2 CHASSIS.

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.

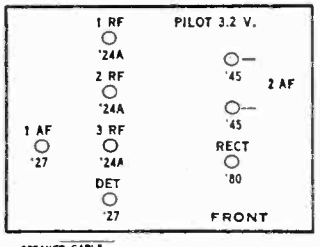
Use High Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages.
Use A. C. Voltmeter to Measure Filament Voltages.

APPROX. VOLTAGES, USING 120 V. LINE

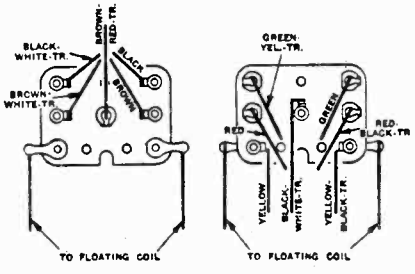
TUBE	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
1st-R.F.	2.4	180	5	85
2nd-R.F.	2.35	180	4.5	86
3rd-R.F.	2.35	180	4.5	86
Detector	2.35	110	14**	—
1st-A.F.	2.35	70	2	—
2A	2.45	250	55*	—
2Aa	2.45	250	55*	—
Rectifier	5.	—	—	—

* 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.

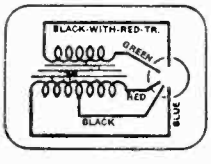
Models 75P, 70, 74, 76, 60 (3rd type) (1930)



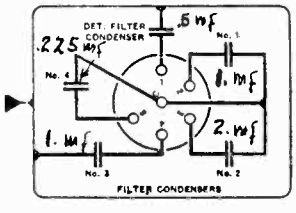
SPEAKER CABLE



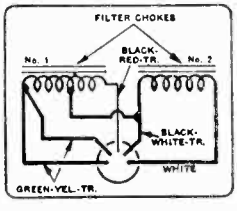
SPEAKER PANEL CONNECTIONS



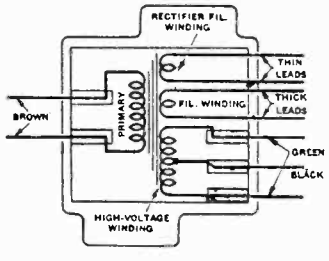
INPUT
A. F. TRANSFORMER
ASSEMBLY



FILTER CONDENSER
ASSEMBLY

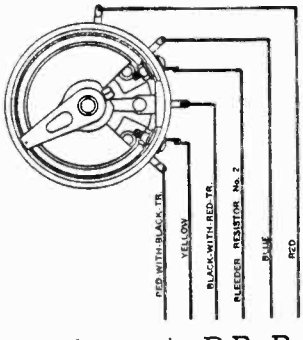


FILTER-CHOKE
ASSEMBLY



POWER TRANSFORMER
ASSEMBLY

DUAL
VOLUME CONTROL



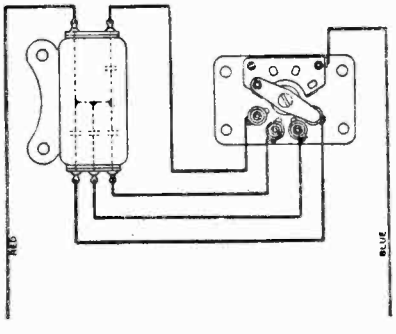
LOCAL-DISTANCE
SWITCH

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.

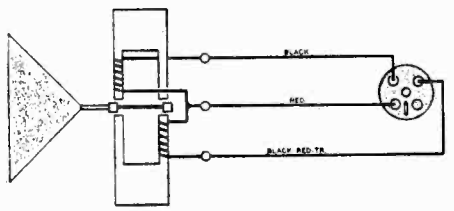
CONNECTION OF UNITS IN TYPE L-2 CHASSIS, AND, AT RIGHT, CONNECTIONS TO TERMINAL PANEL OF TYPE N SPEAKER.

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.

TUBE	FILAMENT VOLTAGE	180 VOLTS "B" BATTERY 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

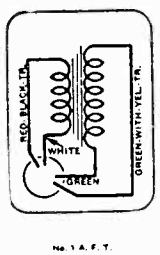
G—R.F. screen by-pass.
V—1st-R.F. grid-circuit by-pass.
Y—Output filter condenser.
N—1st-R.F. filament by-pass.

R.F. By-Pass No. 2*

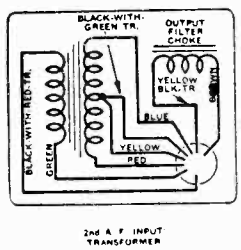
H—R.F. plate-circuit by-pass.
T—Detector filter condenser.
P—"Phone" condenser.
P—"Phone" condenser.

R.F. By-Pass No. 3

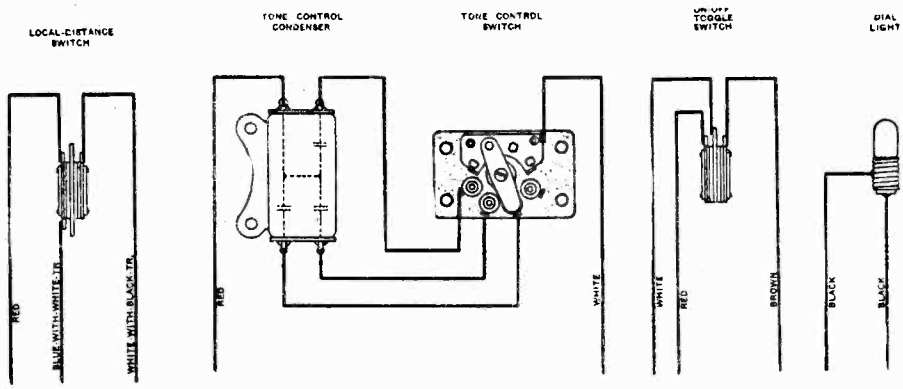
S—Detector filament by-pass.
R—3rd-R.F. filament by-pass.
R—3rd-R.F. filament by-pass.
O—2nd-R.F. filament by-pass.



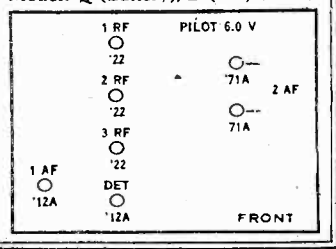
No. 1 A. F. T.



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.

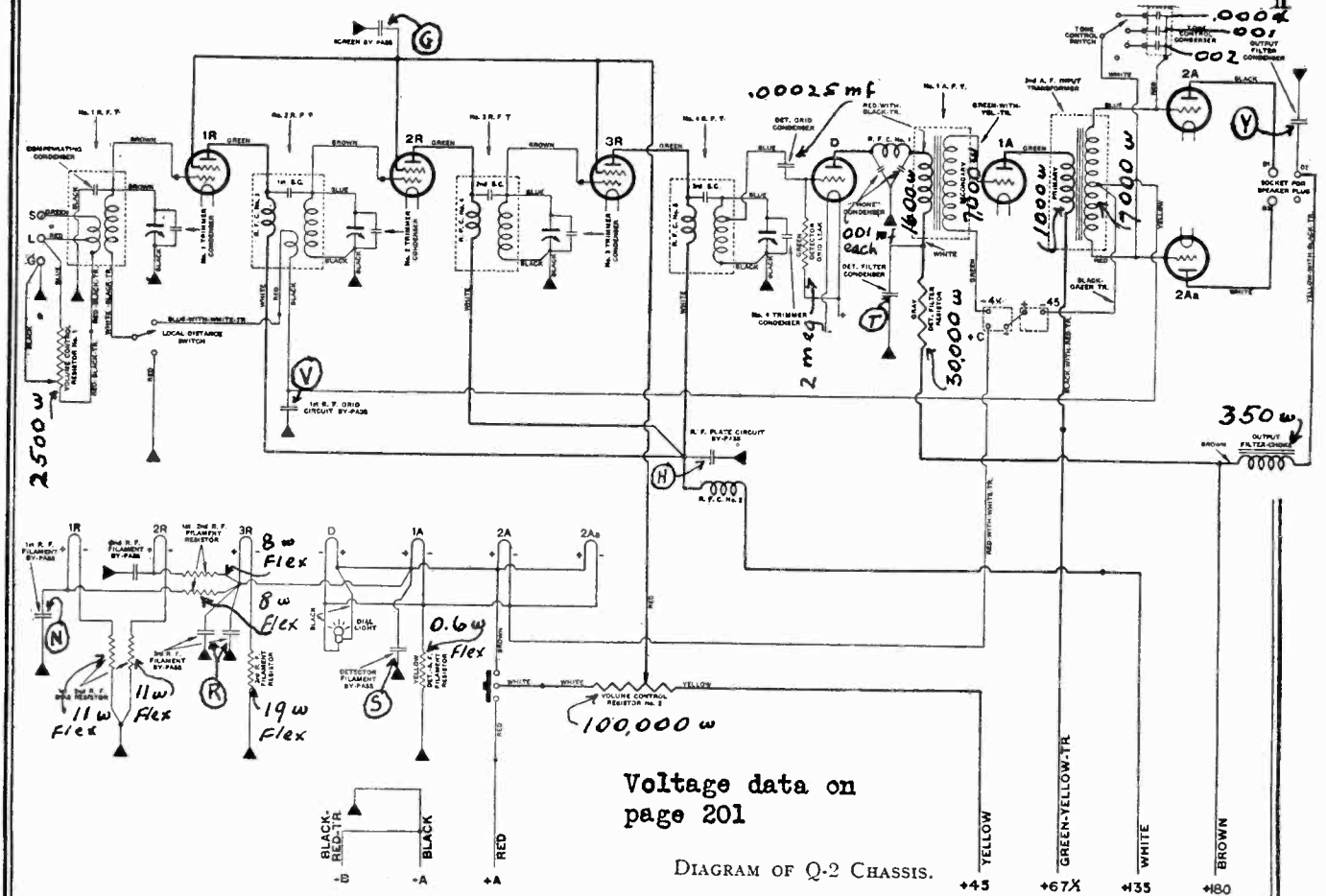
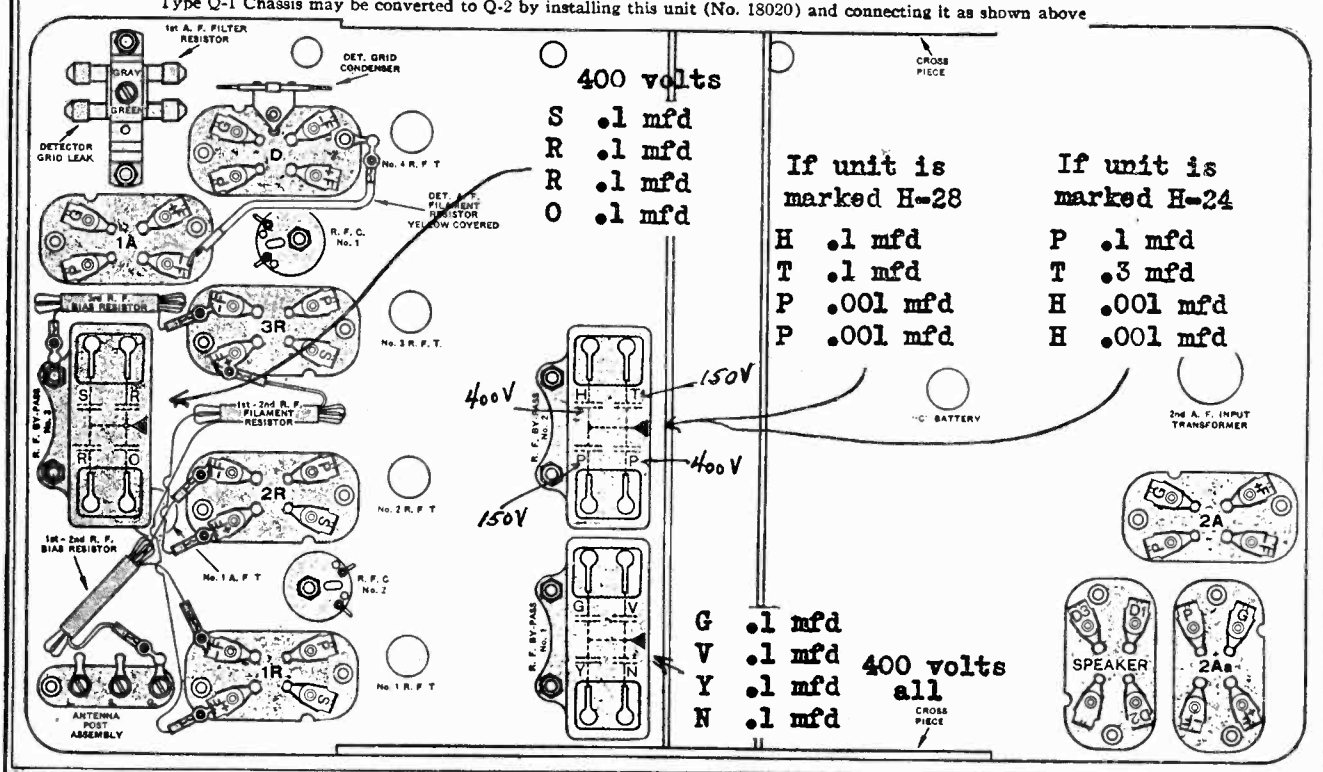
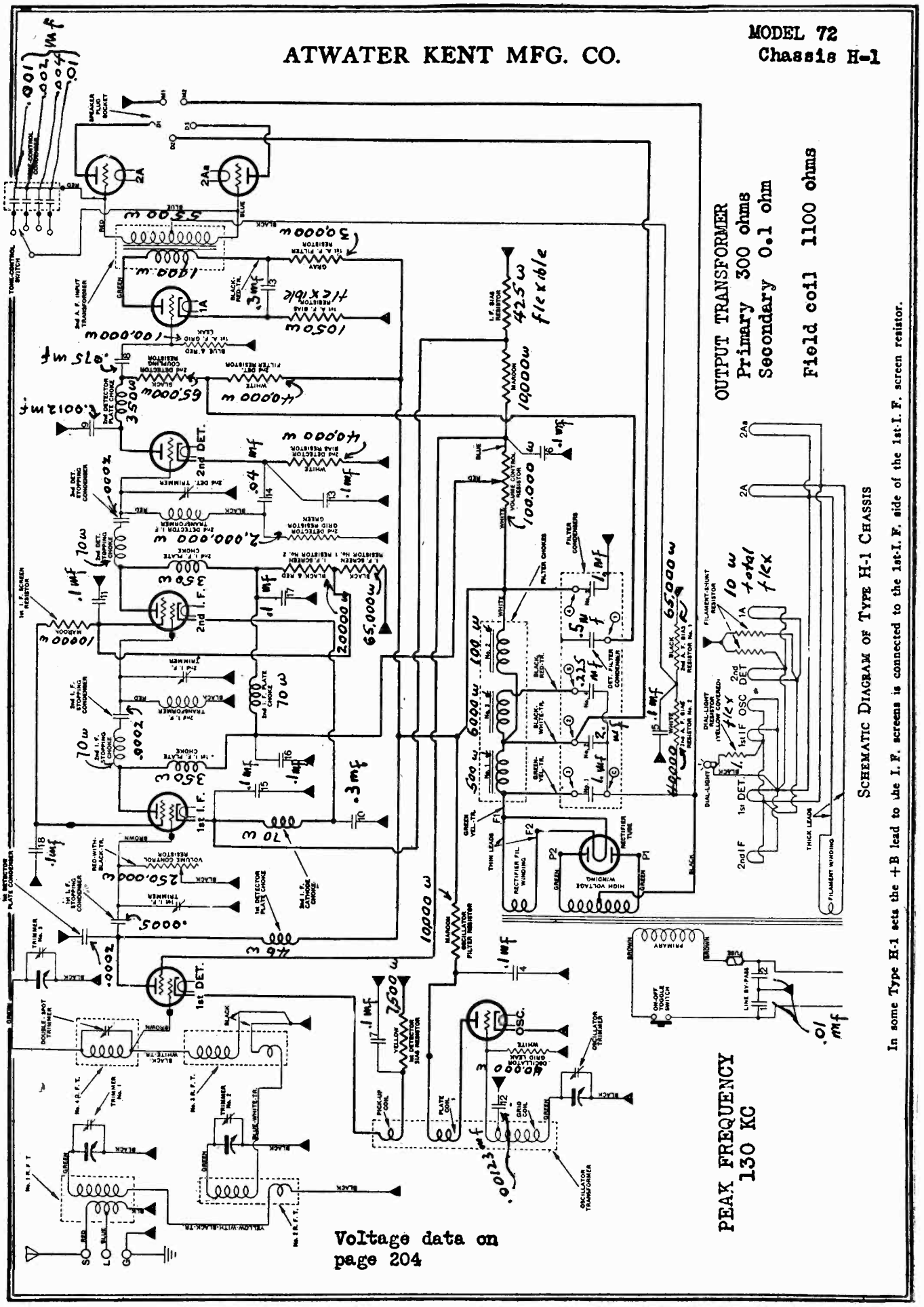


DIAGRAM OF Q-2 CHASSIS.

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.



Voltage reference page 114-O, Vol. I.

ATWATER KENT MFG. CO.

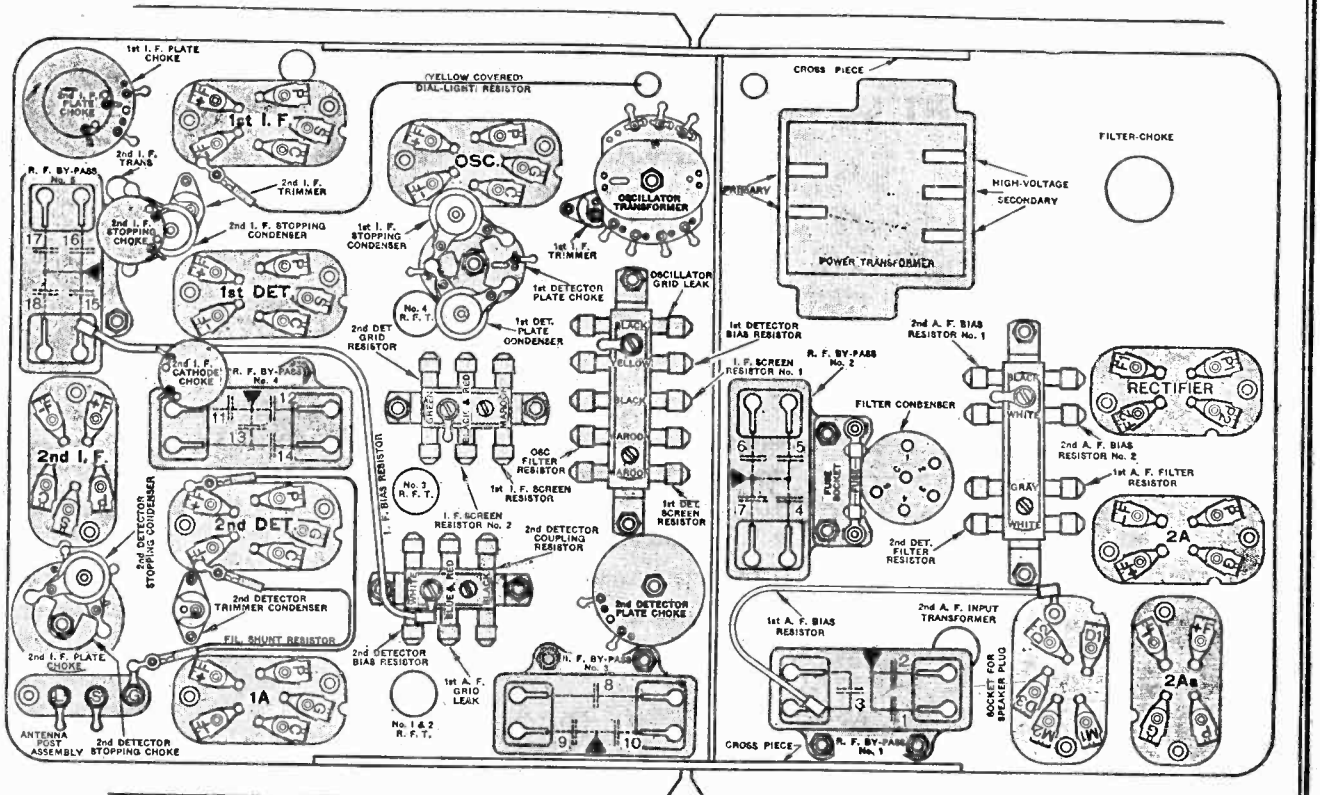
MODEL 72
Chassis H-1
Below serial
5,855,201

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

ATWATER KENT MFG. CO.

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.

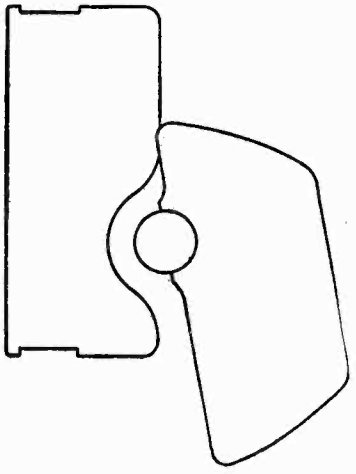
5. **One No. 17295 coil shield with a half-inch hole cut in the top.** This is used in place of the regular No. 17295 shield to cover No. 4 R. F. T., in order to make the double-spot trimmer accessible.

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 ¼" 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.**

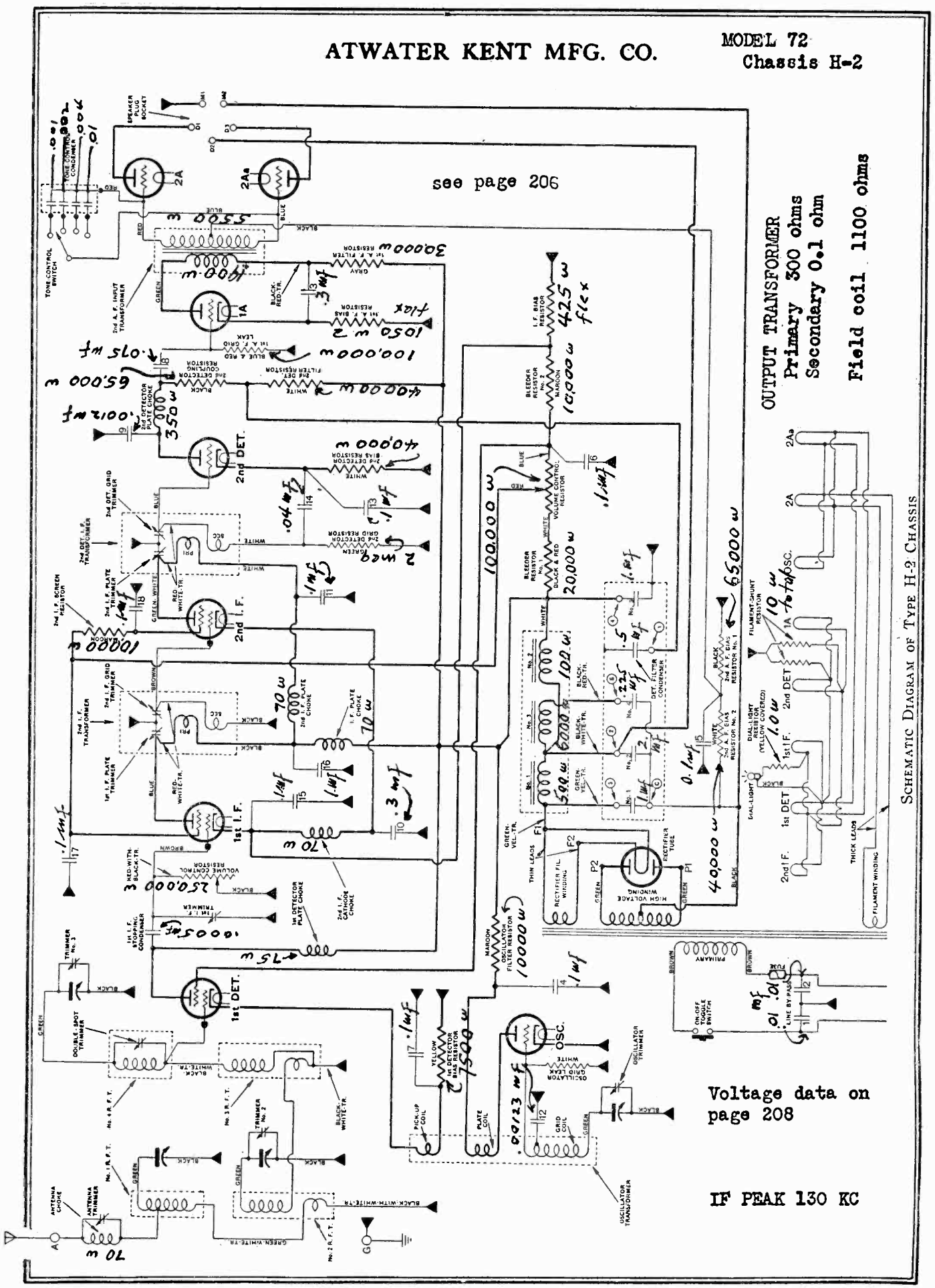
(q) Switch on the normal-strength 1500 K. C. signal and tune it in at 150. Adjust trimmer No. 3 to give maximum output.

(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.



Voltage reference page 114-R, Vol. I.

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

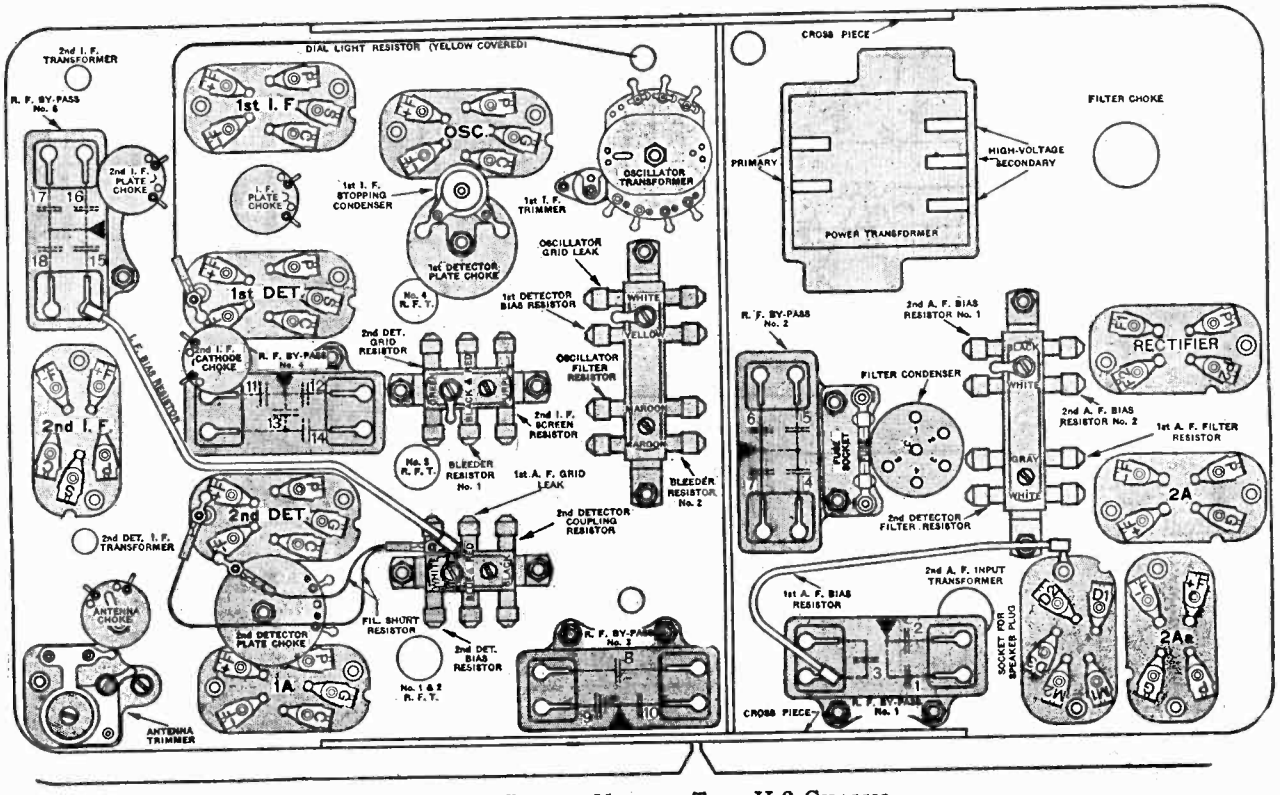
ATWATER KENT MFG. CO.

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.

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.

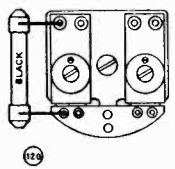
(c) Connect the output measuring circuit shown to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left. Put S4 on the second tap.

(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.

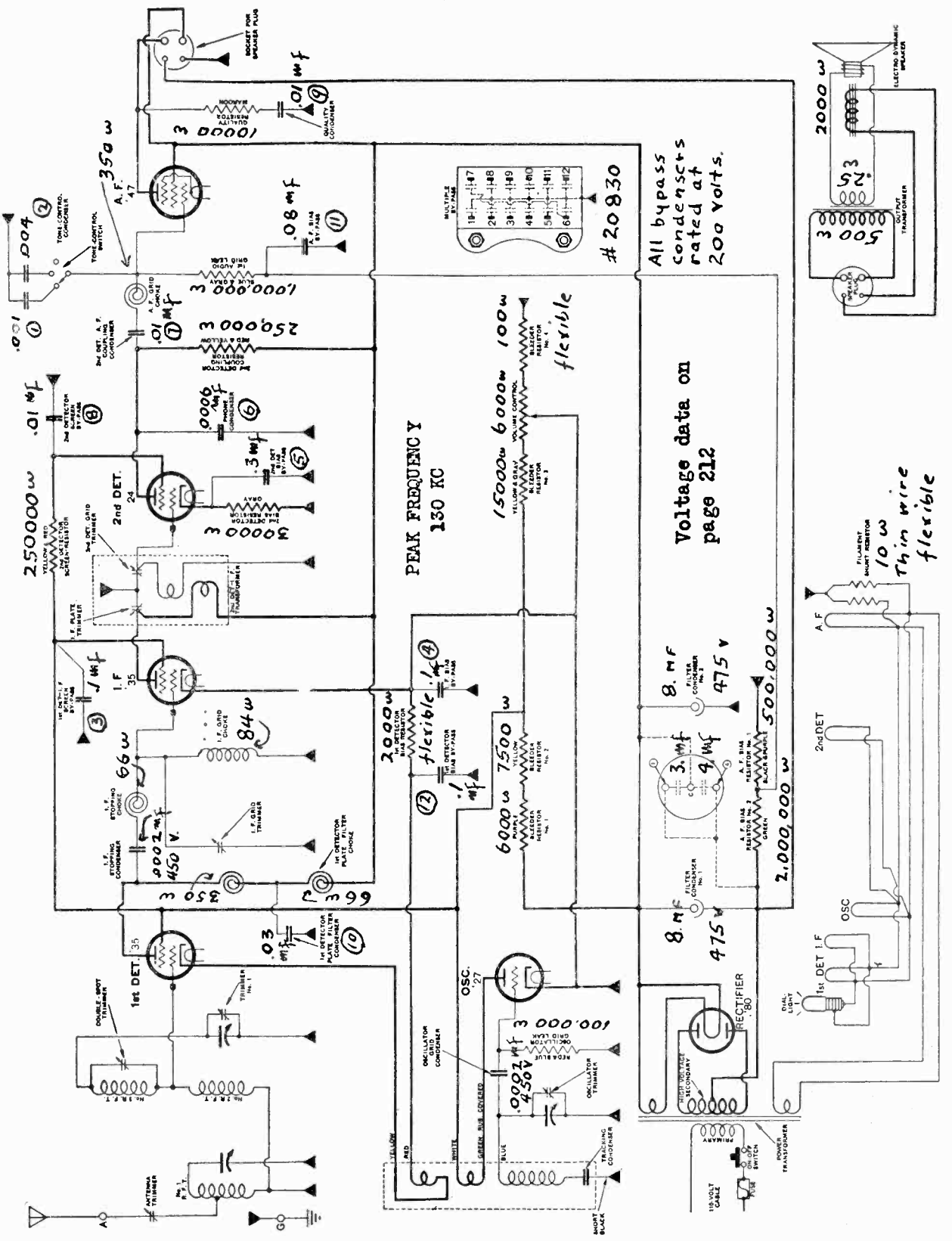
		MODEL 80	MODEL 81	MODEL 82	MODEL 82-D	MODEL 82-Q	MODEL 83	MODEL 84	MODEL 84-D	MODEL 84-Q	MODEL 85	MODEL 85-Q	MODEL 86	MODEL 87	MODEL 89
	LINE VOLTAGE	110	—	110	112	—	110	110	120	—	110	—	115	110	110
	TOTAL "B" VOLTAGE	—	135	—	—	125	—	—	—	125	—	125	—	—	—
R. F. TUBE**	FILAMENT	—	5.5	—	—	2	—	—	—	2	—	—	2.4	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	—	—	—	—	—	—	*	—	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, 2nd and 3rd R. F. tubes in Model 81. †This is the detector tube in Model 81.

MODEL 80, 80-F
83, 83-F

ATWATER KENT MFG. CO.

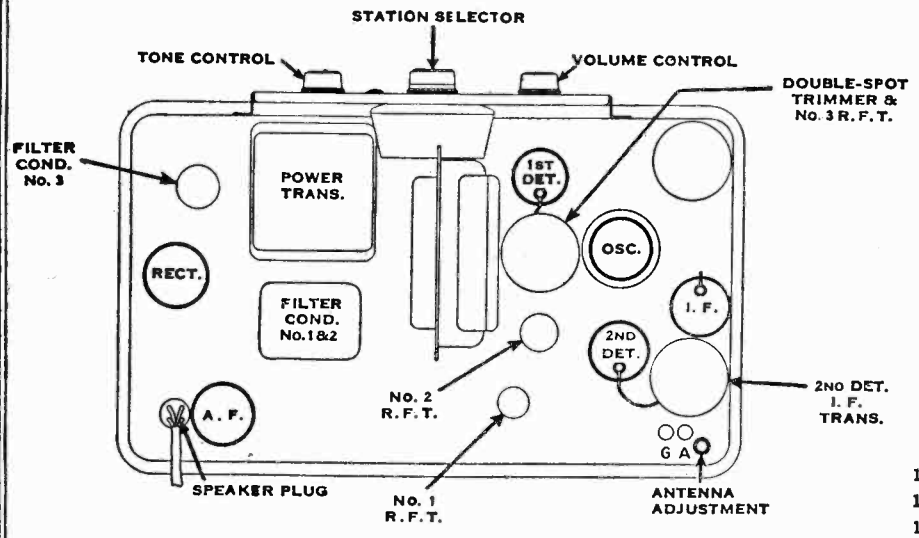


In Model 83 and 83-F, a filter-condenser unit is used and it is connected as shown in dotted lines. This unit is NOT used in Model 80 and 80-F. In Model 83, 83-F, the electrolytic filter condenser No. 1 is not used, and the filament circuit is slightly different.

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.

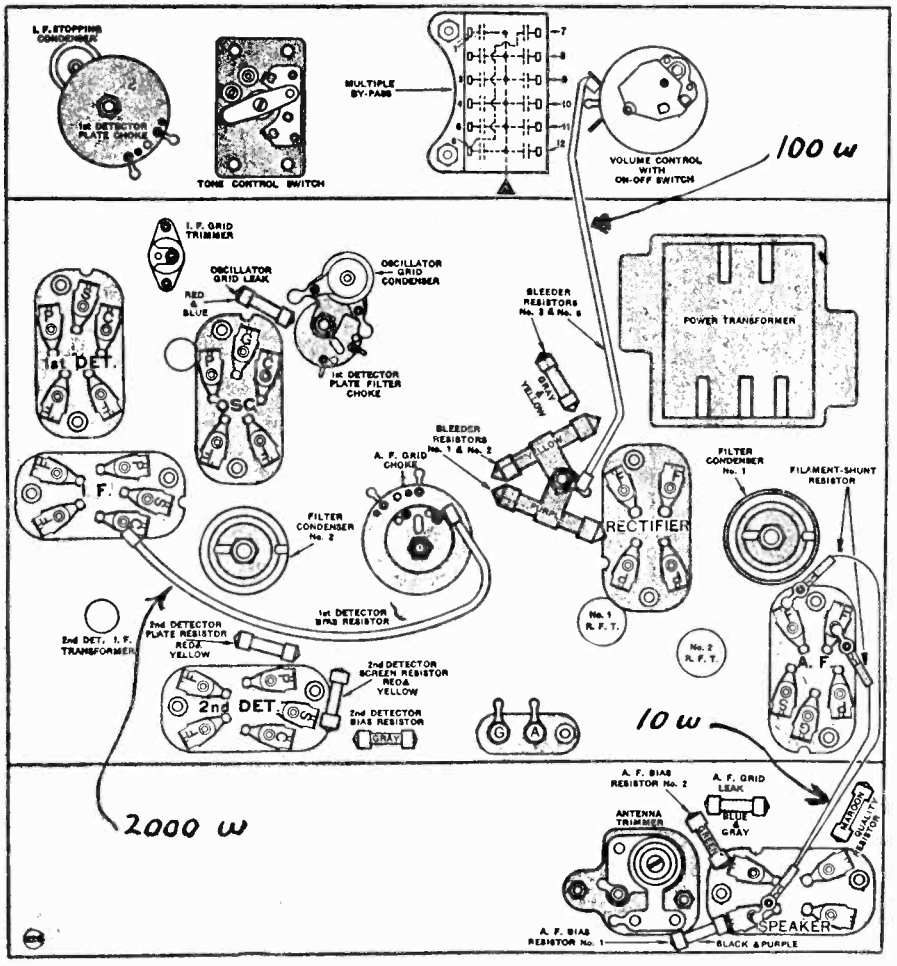


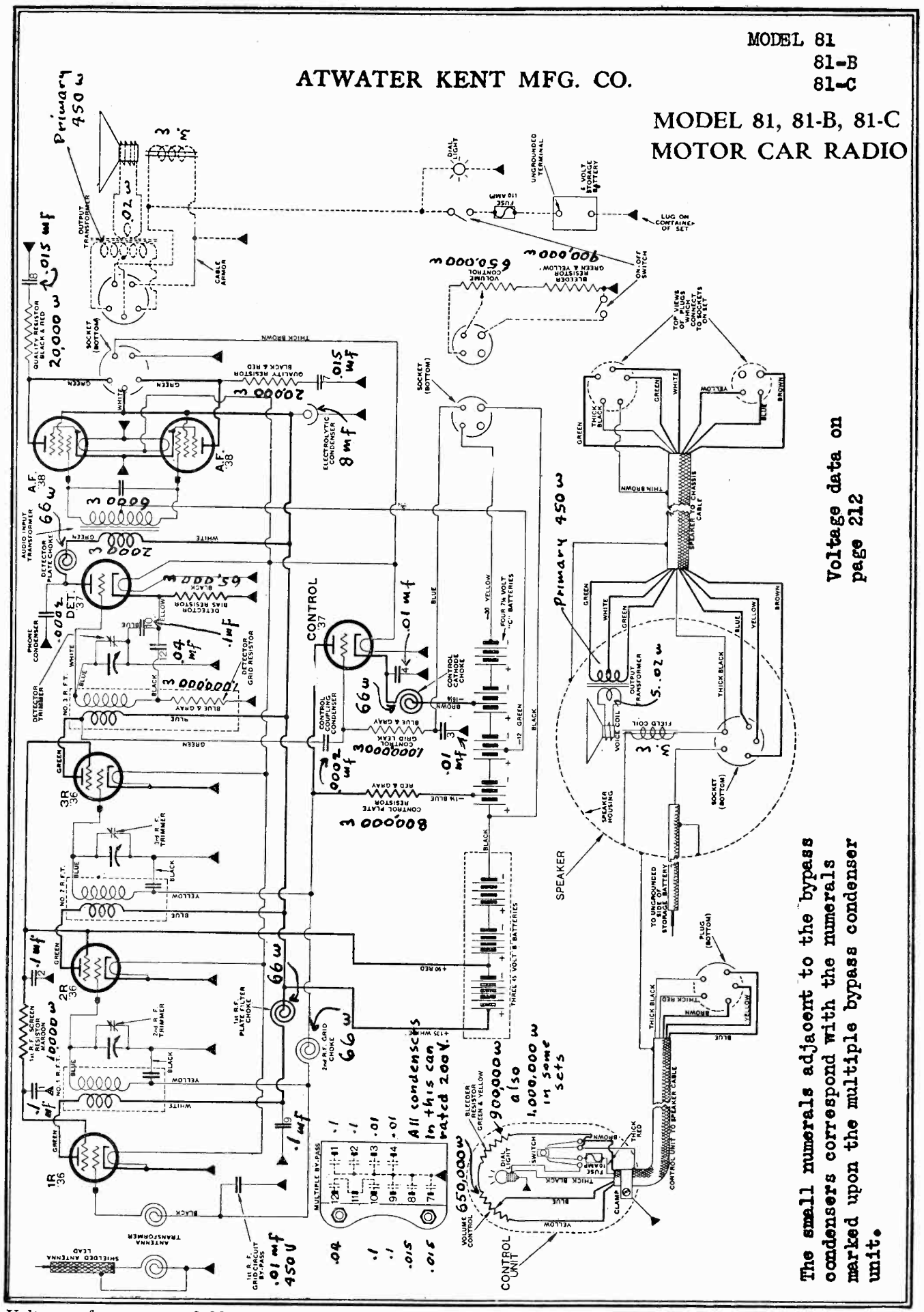
CHART OF MODEL 80, 80-F.

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		*

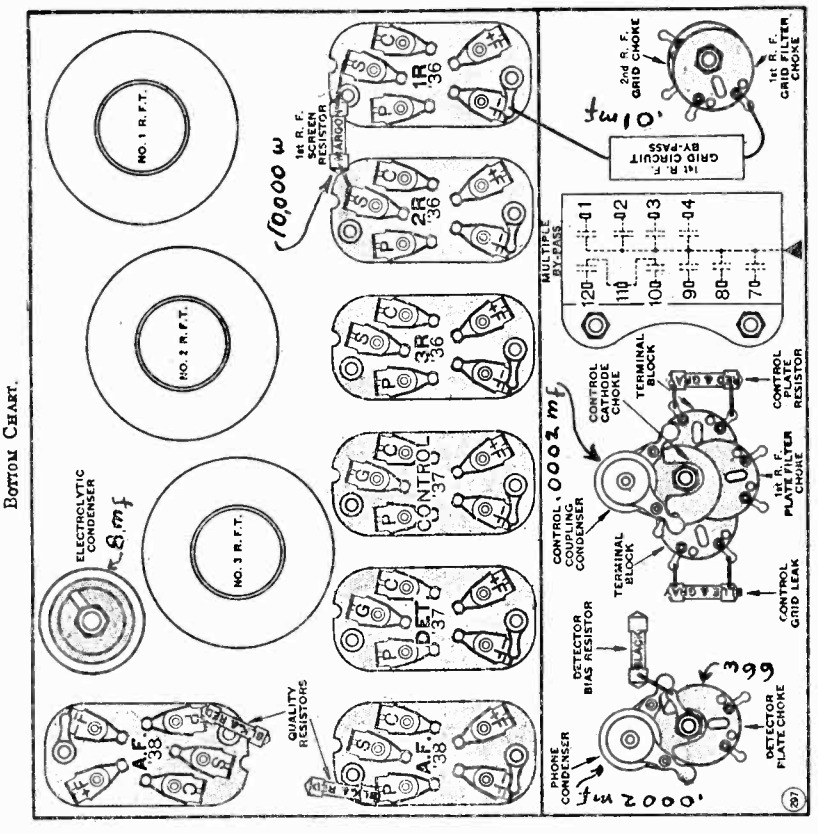
* A variable depending upon several factors. Capacity of voltmeter leads may cause oscillator tube to cease functioning.

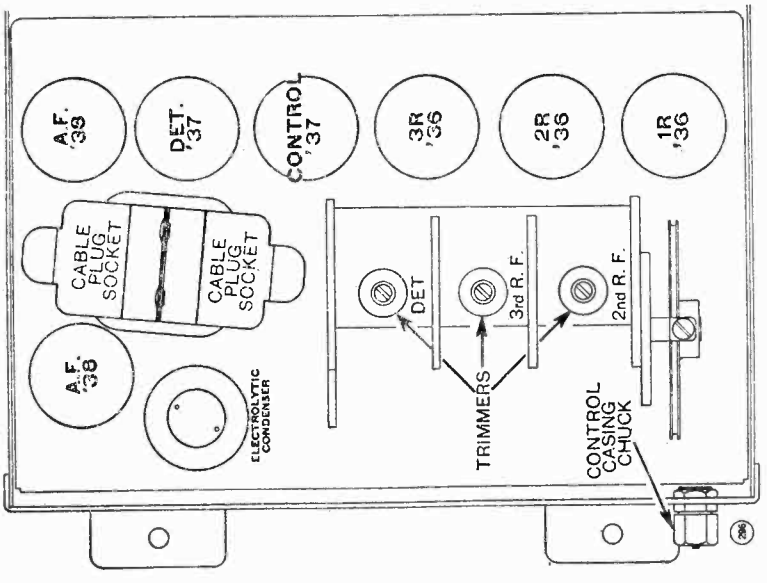


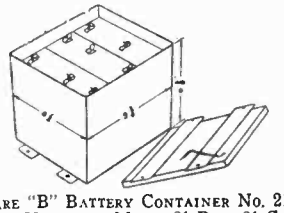
Voltage reference page 3-66.

MODEL 81
81-B
81-C

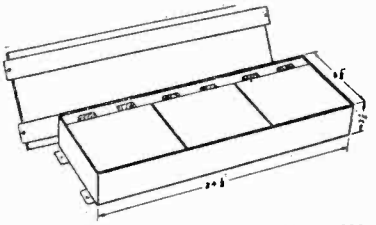
ATWATER KENT MFG. CO.



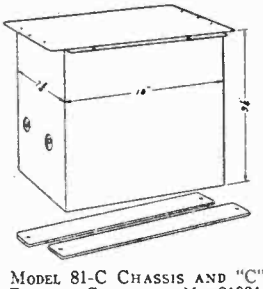




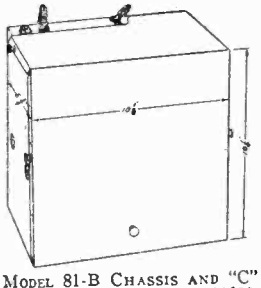
SQUARE "B" BATTERY CONTAINER No. 21933
FOR USE WITH MODEL 81-B OR 81-C.



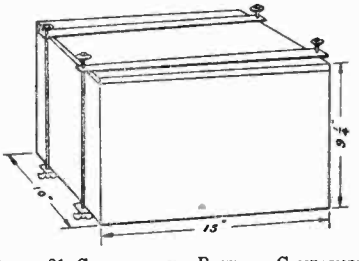
LONG "B" BATTERY CONTAINER No. 21932
FOR USE WITH MODEL 81-B OR 81-C.



MODEL 81-C CHASSIS AND "C" BATTERY CONTAINER No. 21931.
(Mounted under floor or through hole cut in floor.)

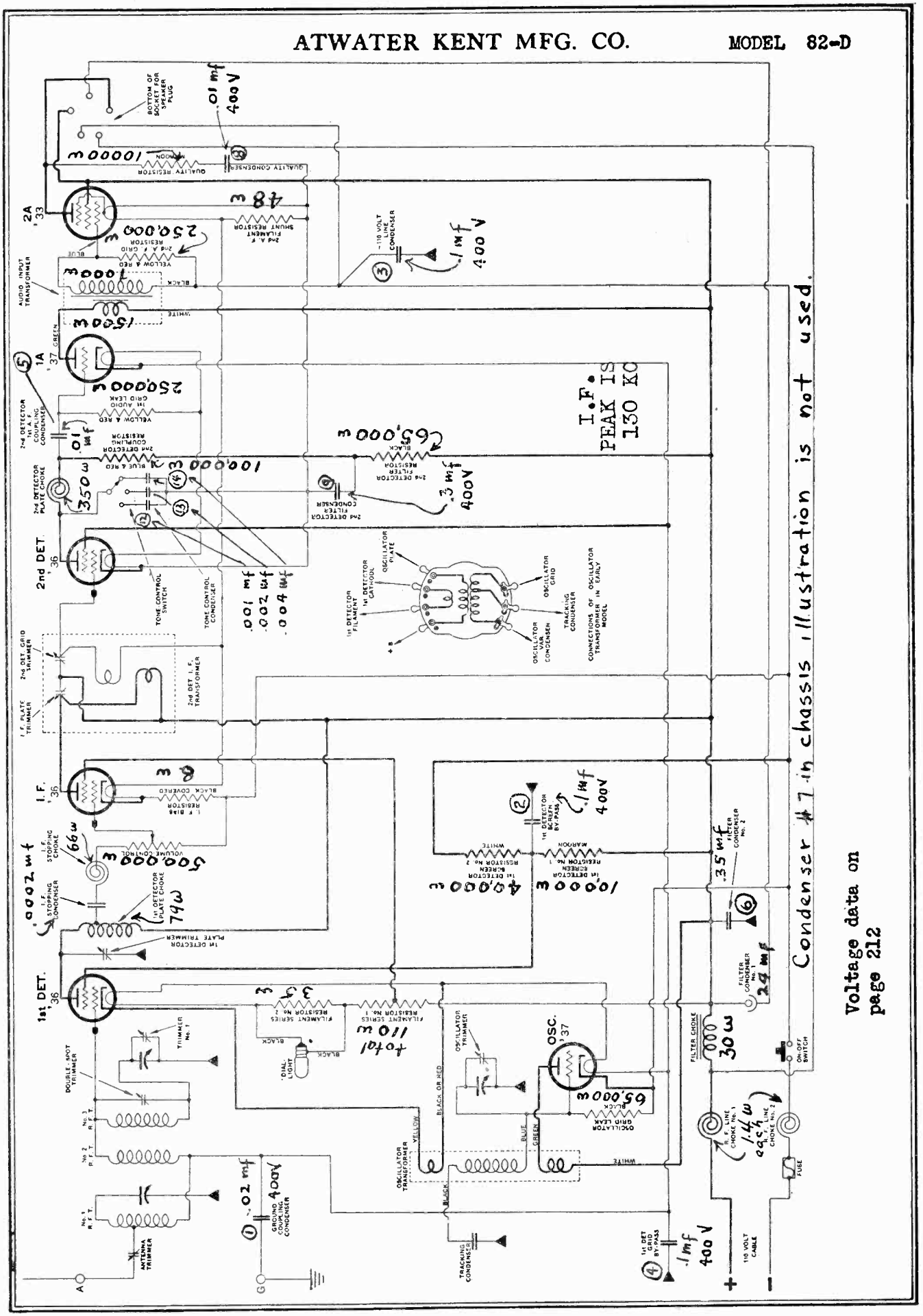


MODEL 81-B CHASSIS AND "C" BATTERY CONTAINER No. 21929.
(For dash mounting.)



MODEL 81 CHASSIS AND BATTERY CONTAINER.
(For under-floor mounting.)

Wiring diagram is shown on reverse side of this page.

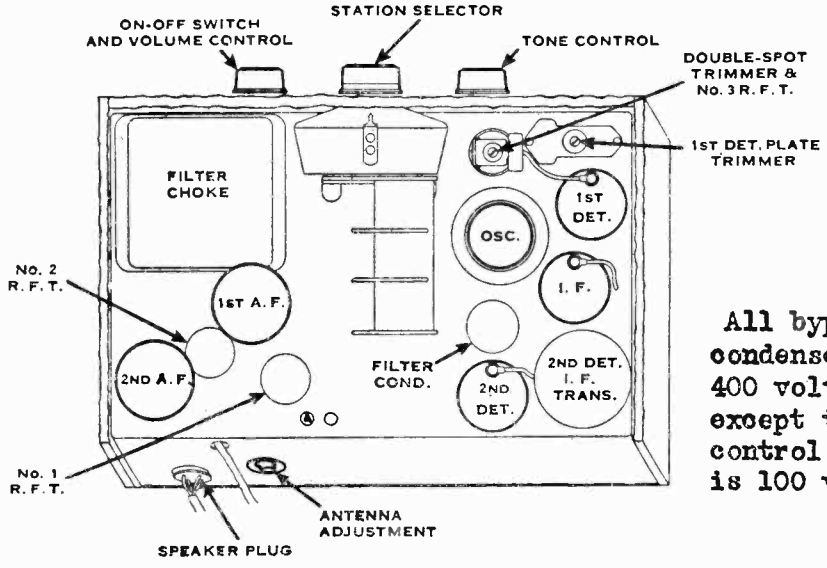


Voltage reference page 3-66.

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.

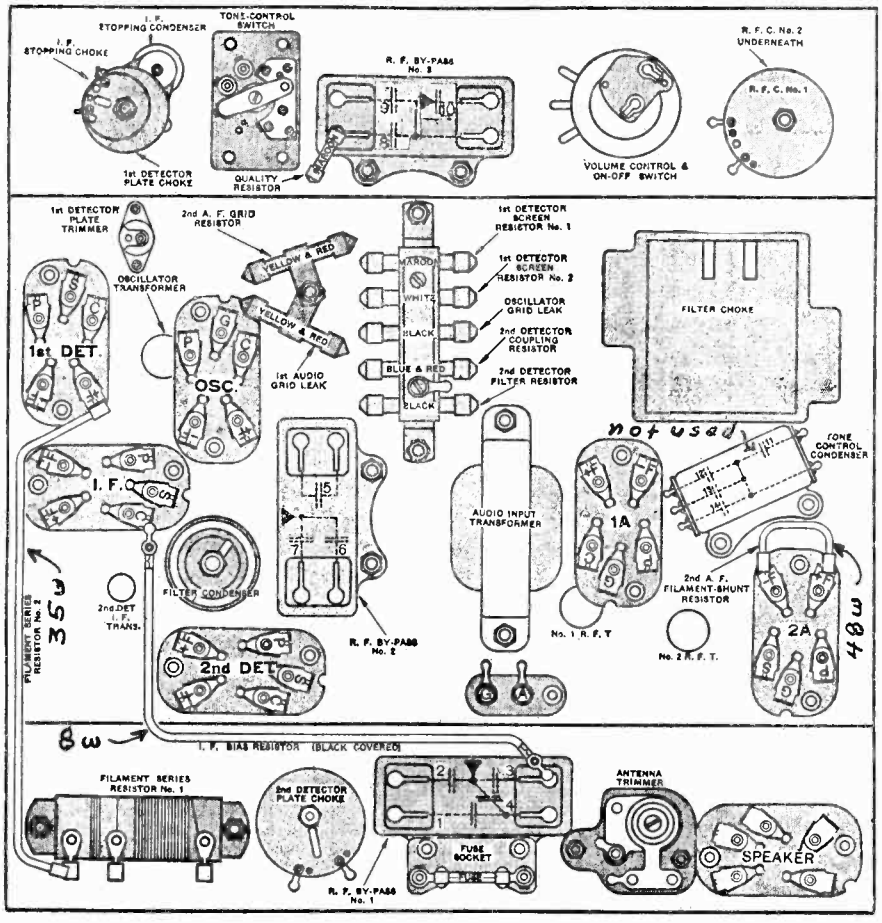
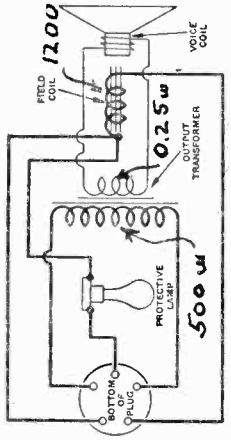


Chart of Model 82-D.



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.

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

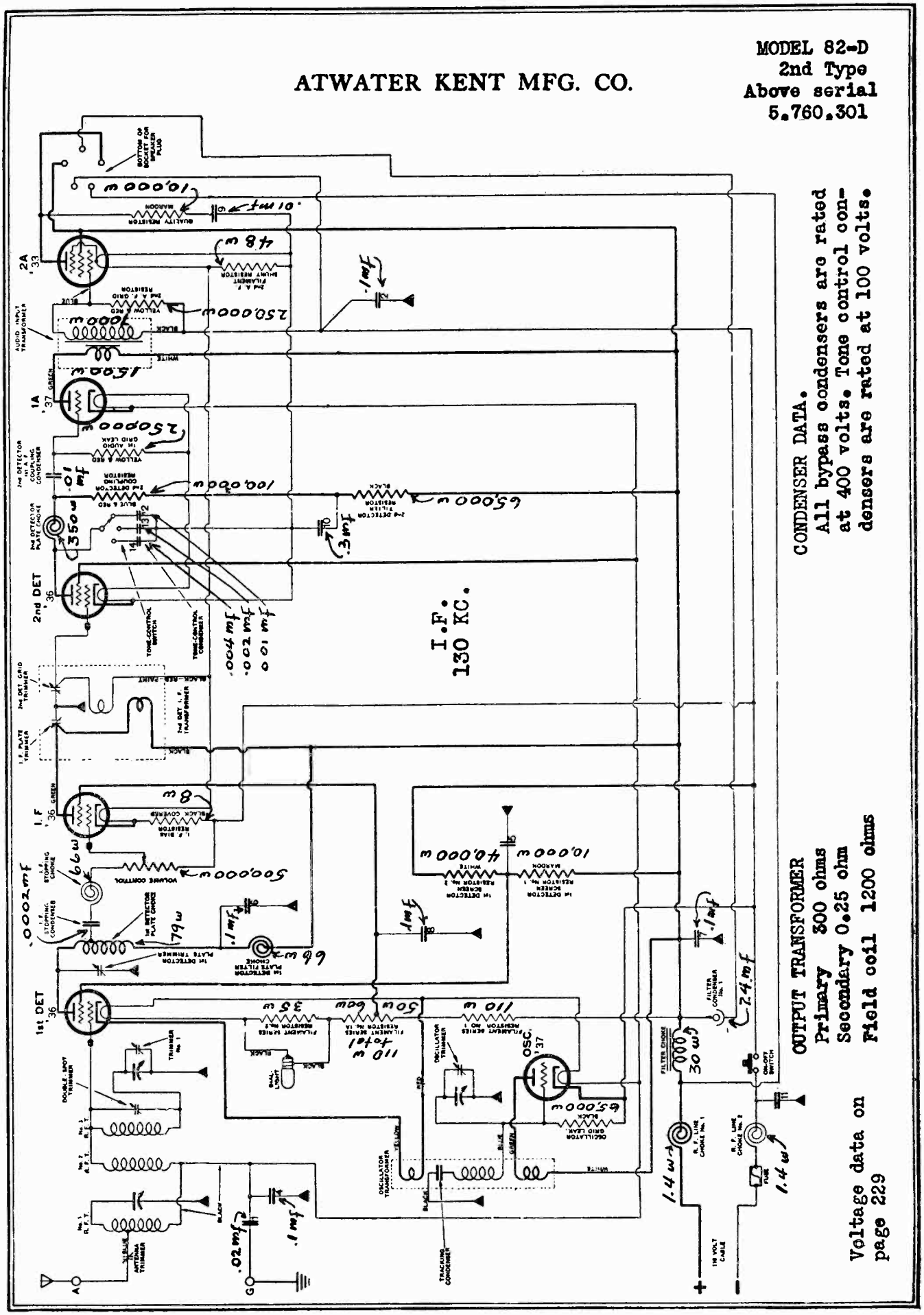
5—2nd-detector—1st-A.F. coupling condenser
6—Filter condenser No. 2.
7—Not used.

R. F. By-pass No. 3

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

Tone-control Condenser

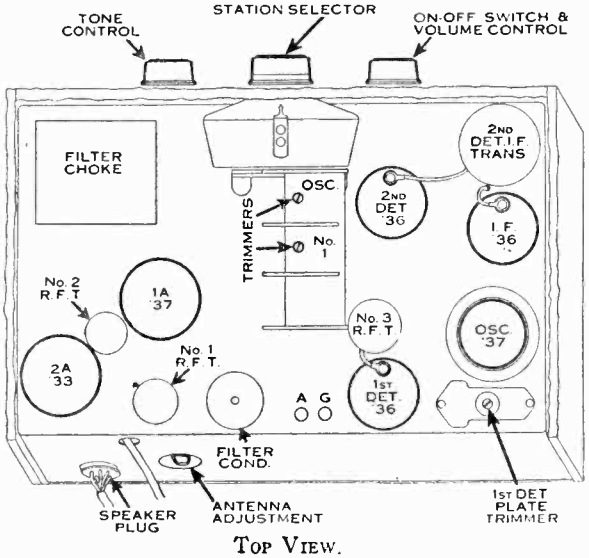
11—Not used.
12—Tone condenser.
13—Tone condenser.
14—Tone condenser.



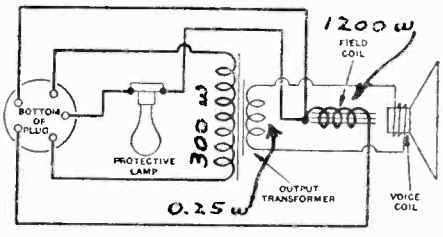
Voltage reference page 3-83.

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.

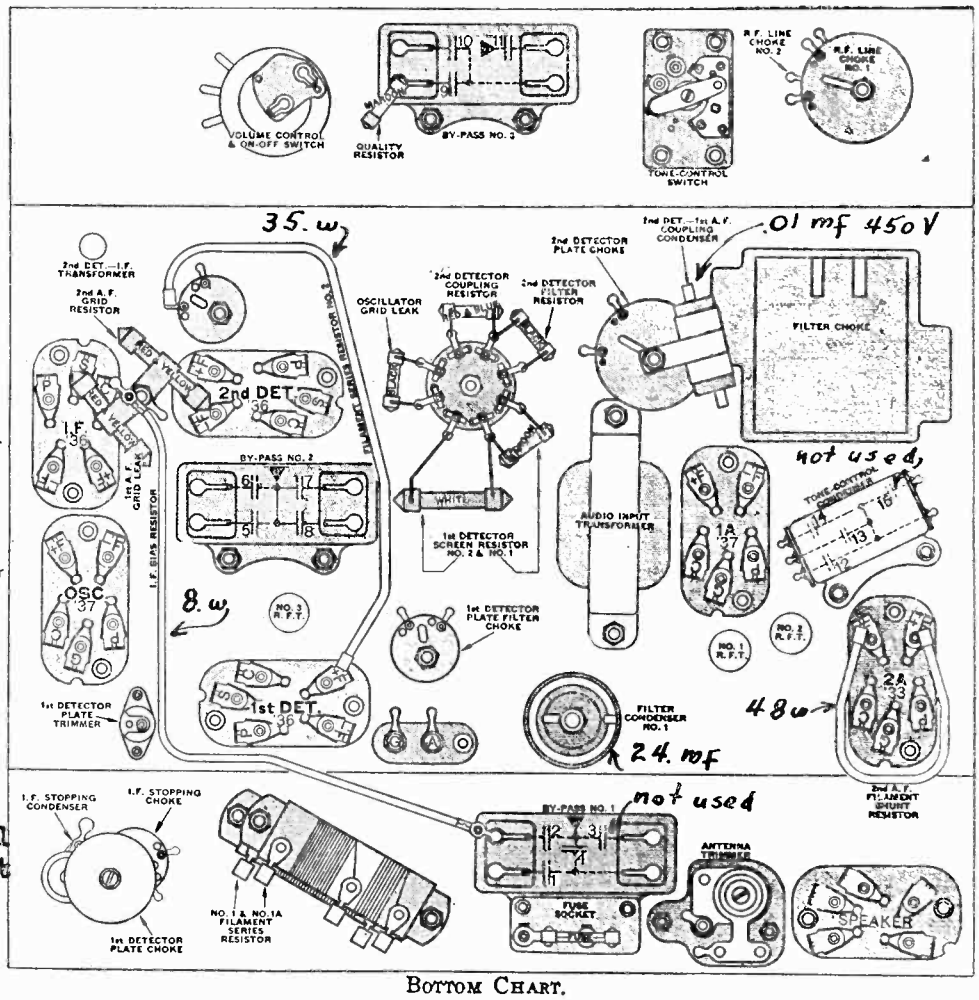
By-pass No. 3

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.

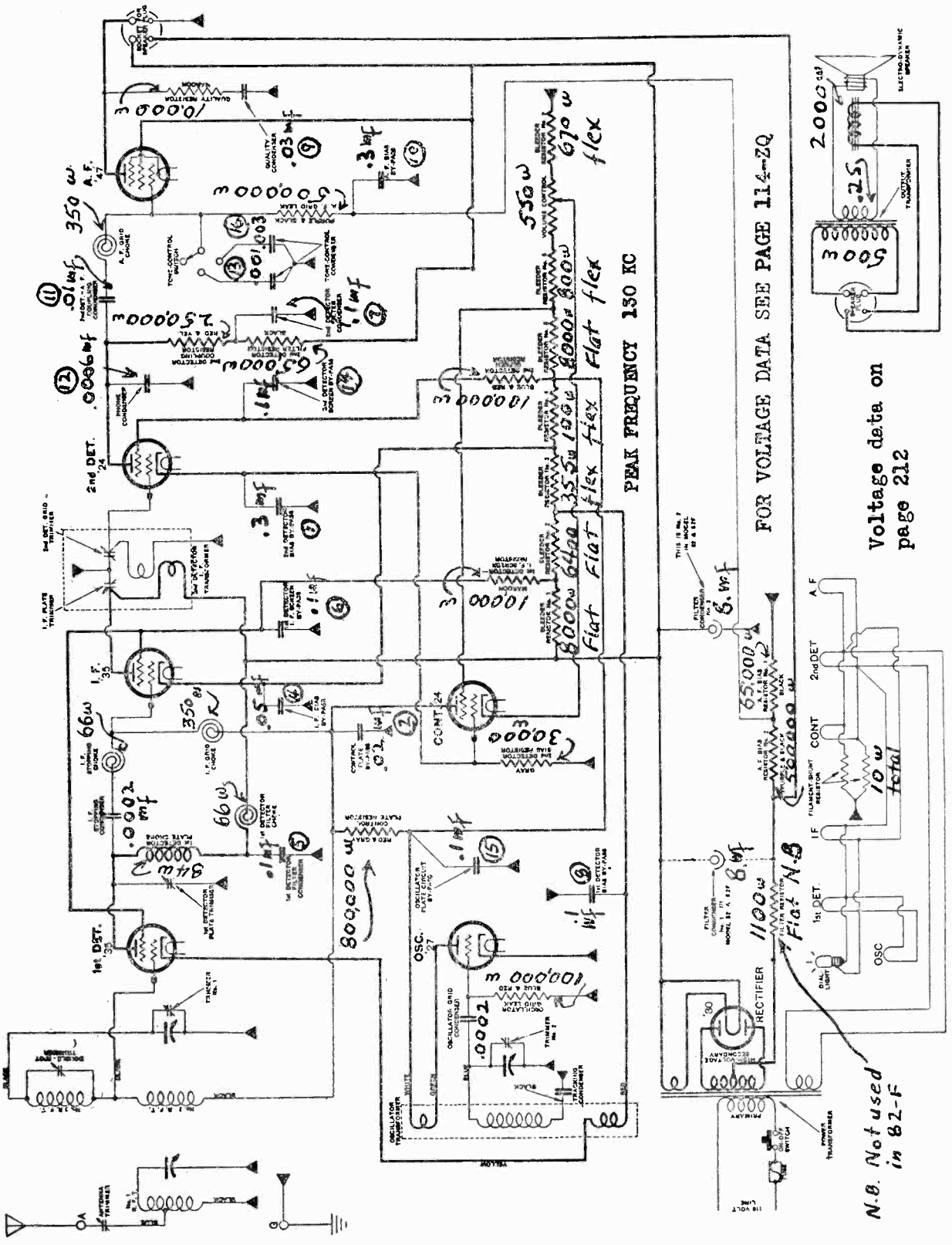
All bypass condensers rated at 400 volts. Tone control condensers rated at 100 volts



BOTTOM CHART.

MODEL 82, 82-F

ATWATER KENT MFG. CO.

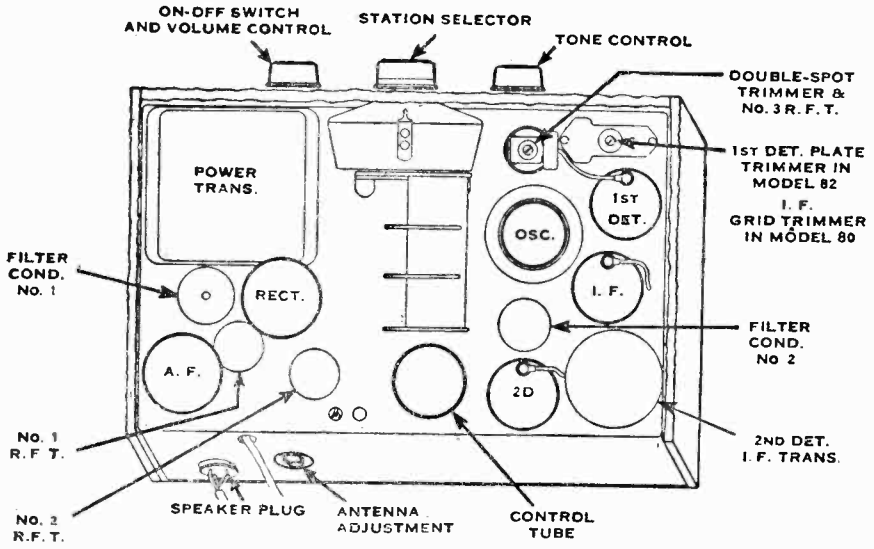


Numerals adjacent to bypass condensers designate units shown upon parts layout on next page within multiple condensers. Condenser voltage ratings are shown upon next page.

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.

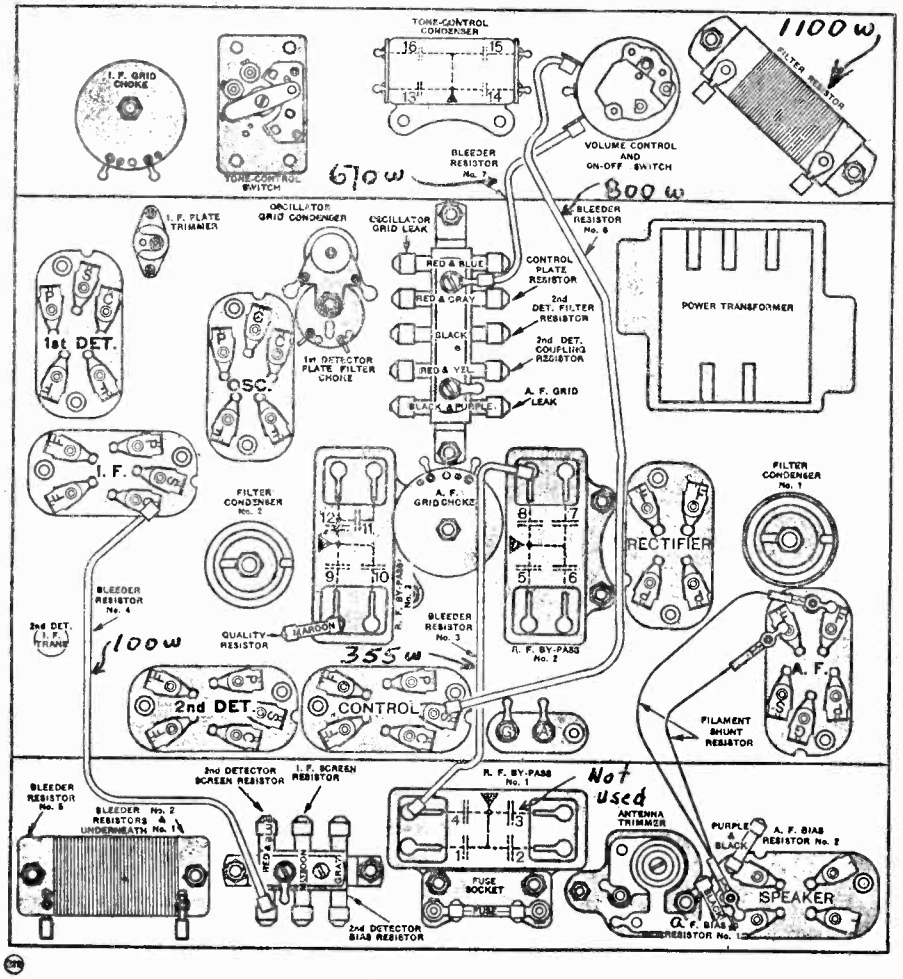


CHART OF MODEL 82, 82-F.

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

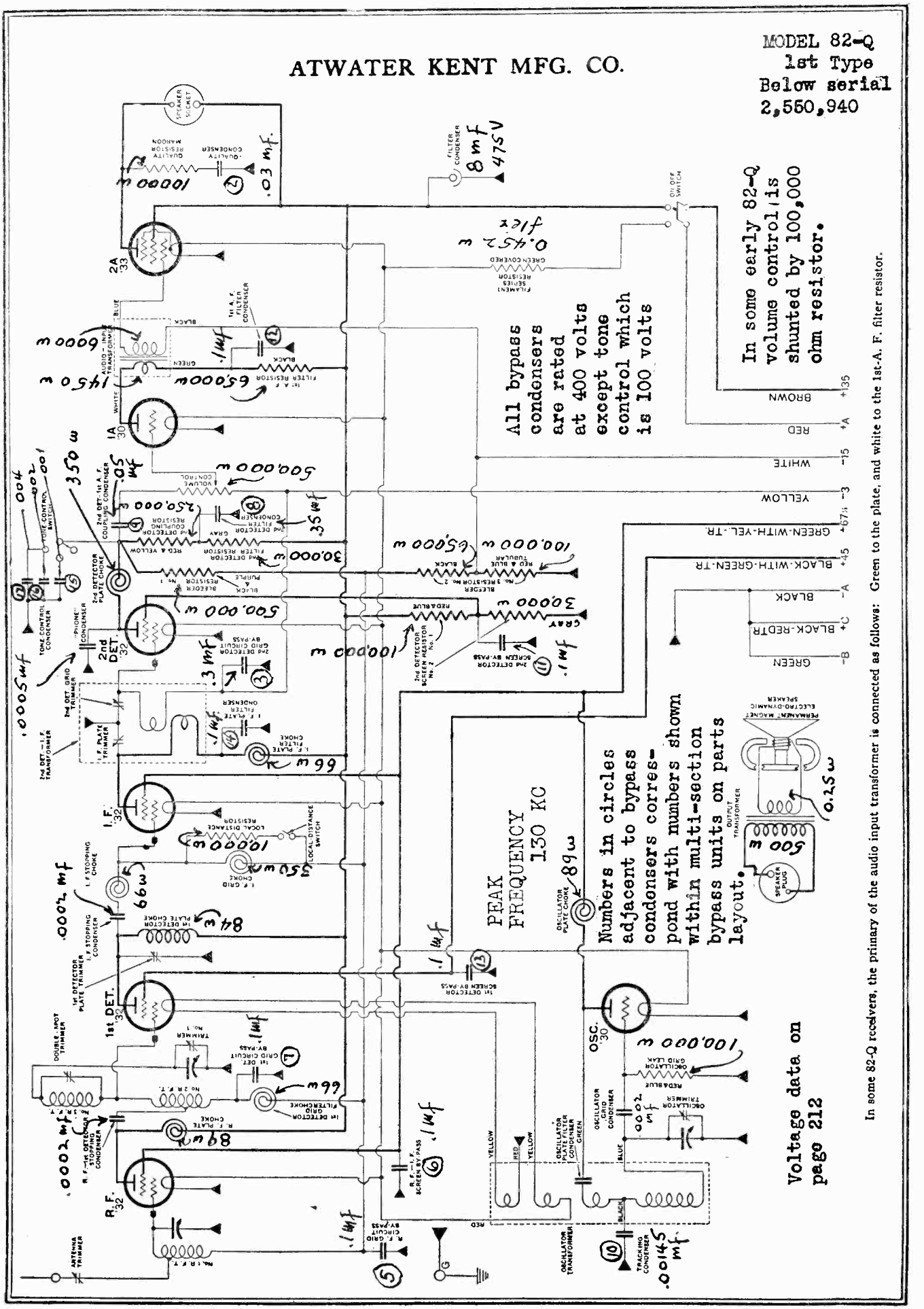
5—1st-detector filter condenser.
6—1st-detector—I. F. screen by-pass.
7—2nd-detector filter condenser.
8—1st-detector bias by-pass.

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

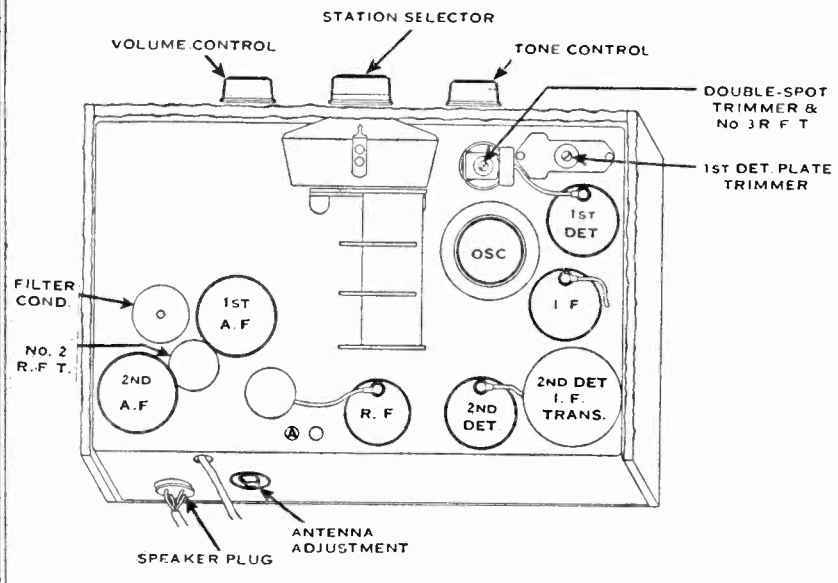
13—Tone condenser.
14—2nd-detector screen by-pass.
15—Oscillator plate-circuit by-pass.
16—Tone condenser.



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.

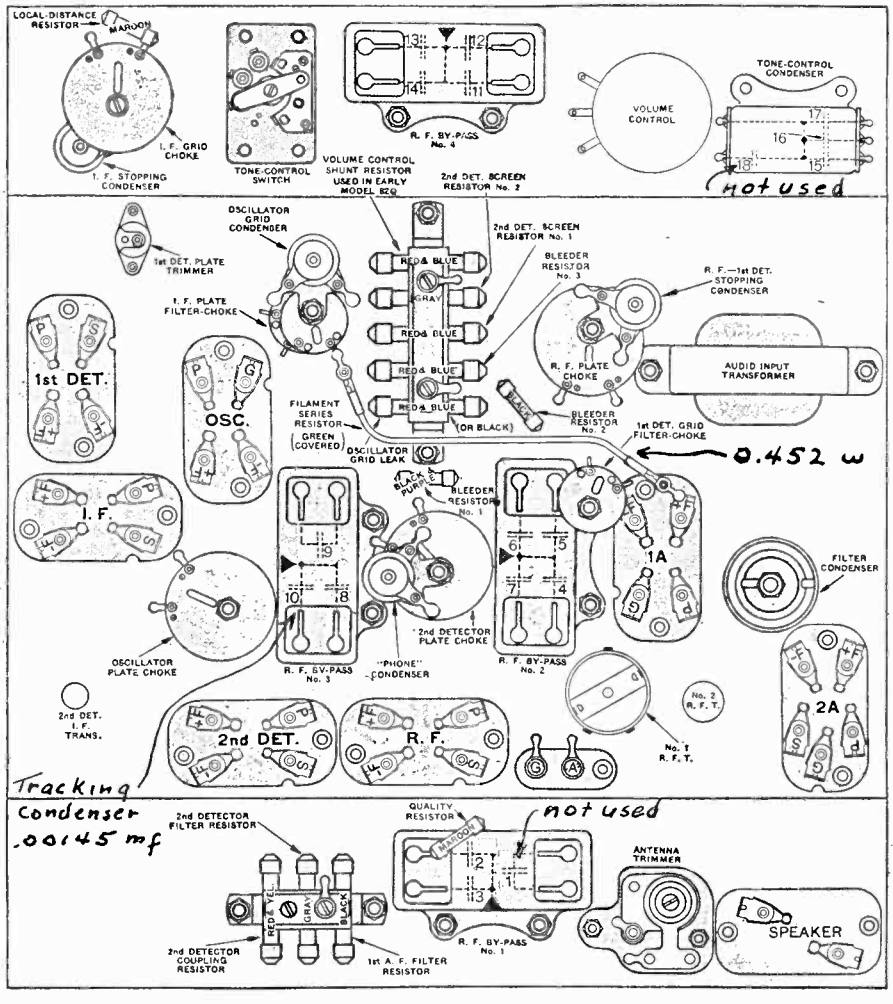
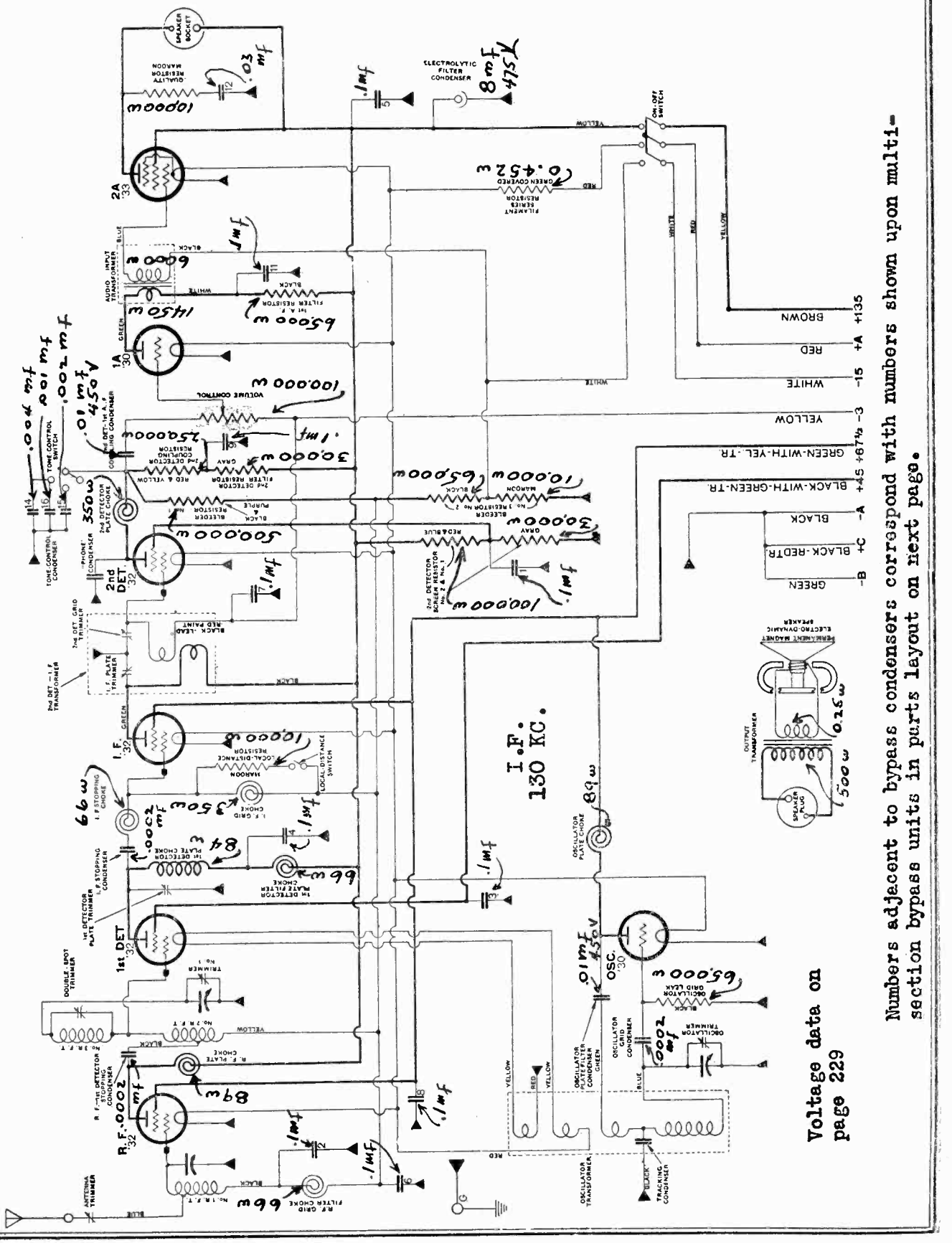


CHART OF MODEL 82-Q.

ATWATER KENT MFG. CO

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

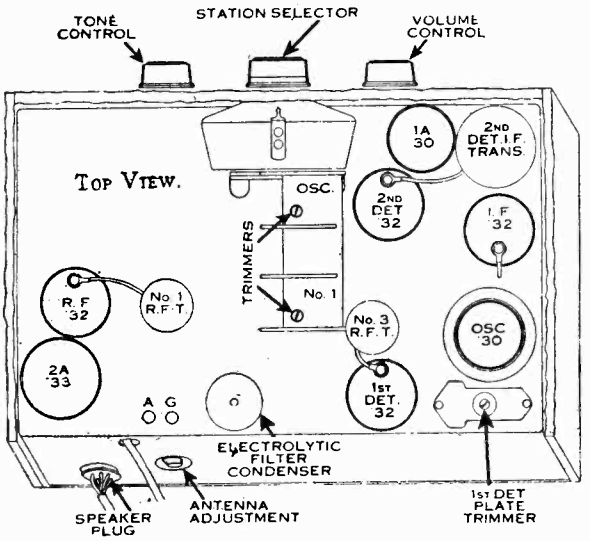


Voltage reference page 3-83.

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

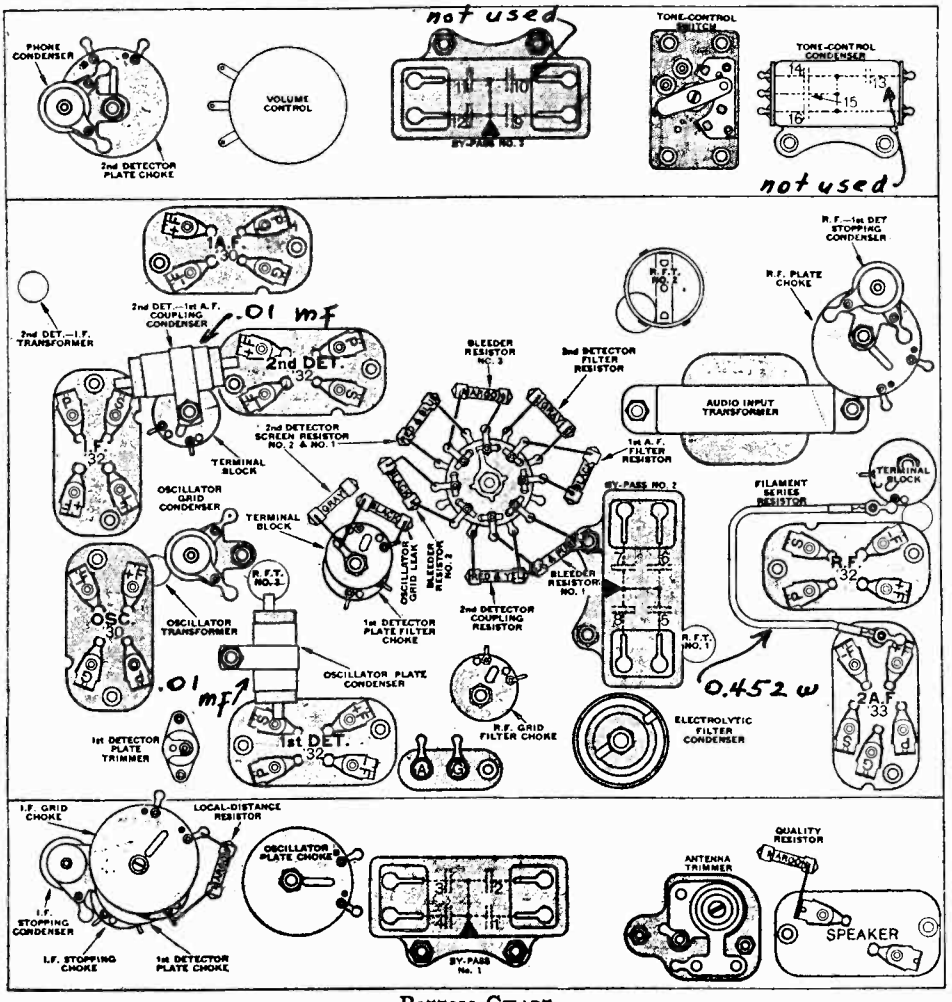
9—2nd-detector plate filter condenser.
10—Not used.
11—1st-A. F. plate filter condenser.
12—Quality condenser.

All 400 volts

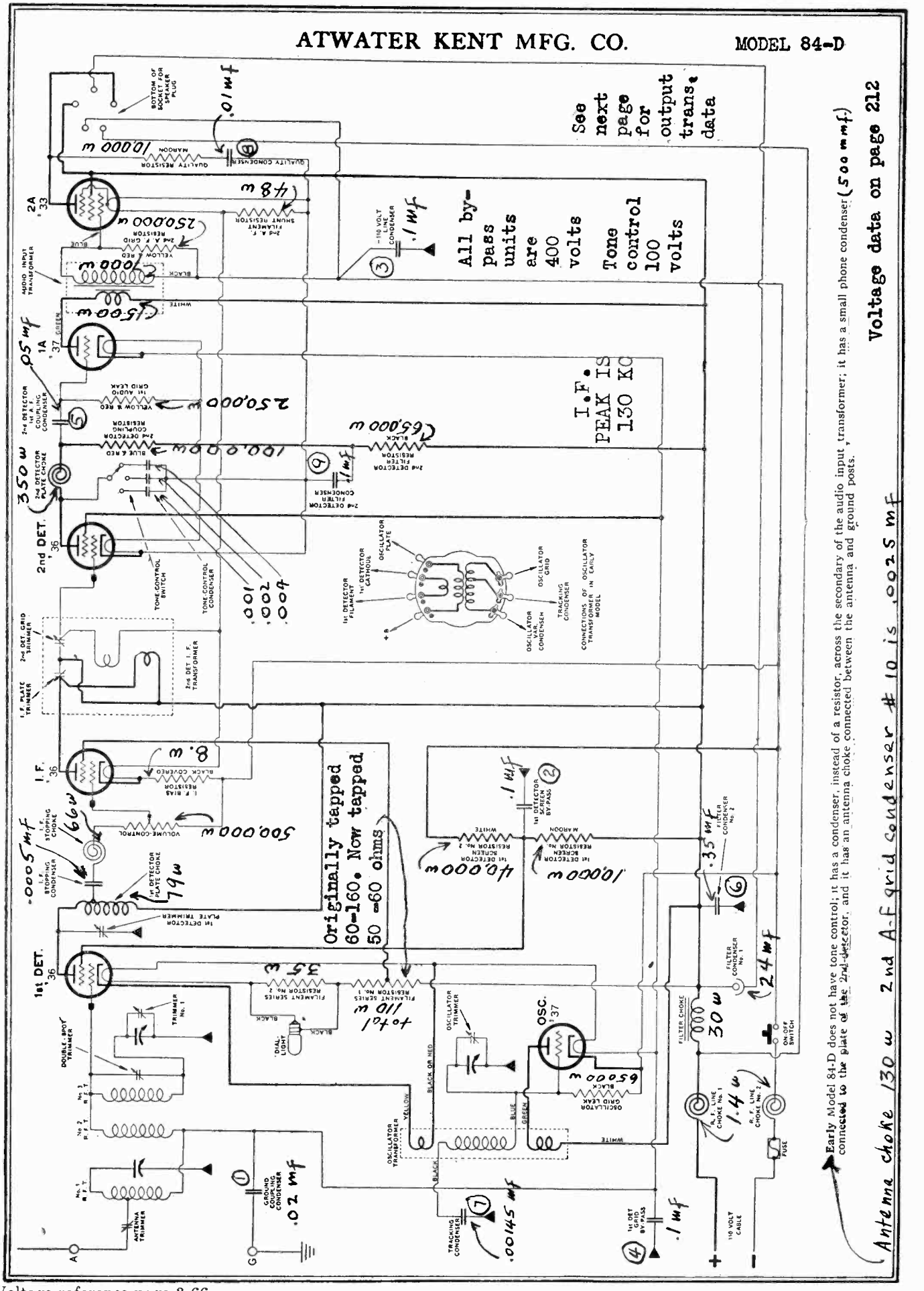
Tone-control Condenser

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

All 100 volts



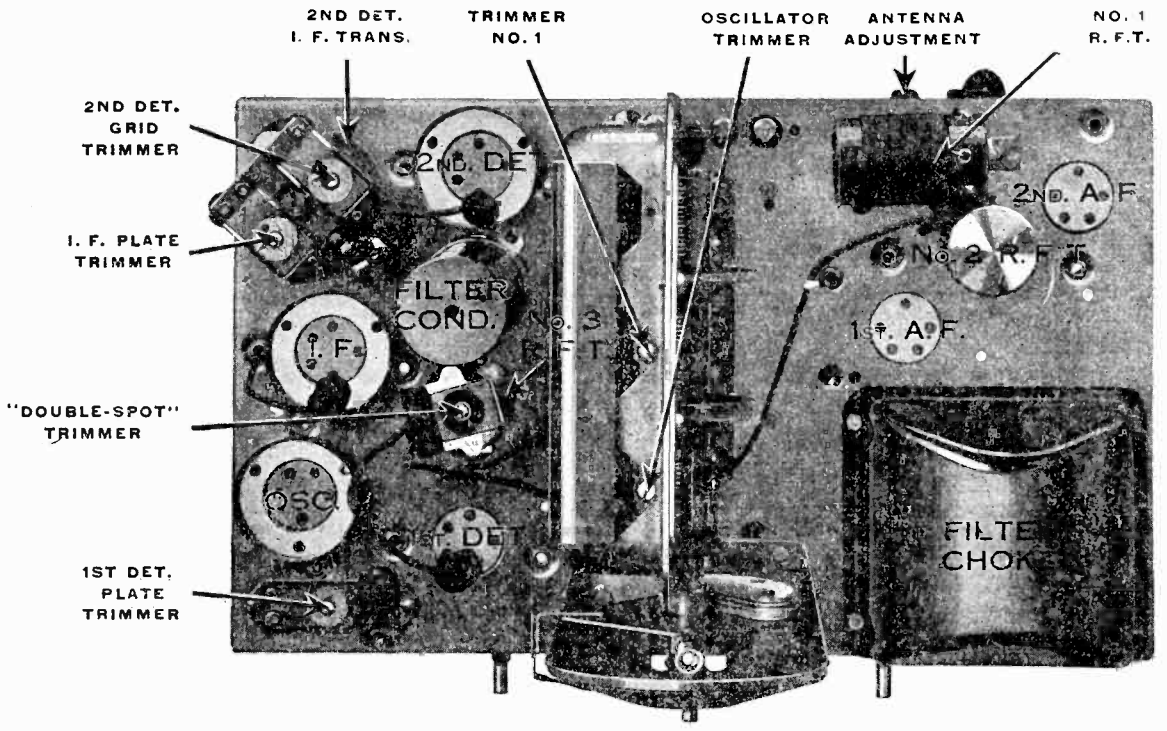
BOTTOM CHART.



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.

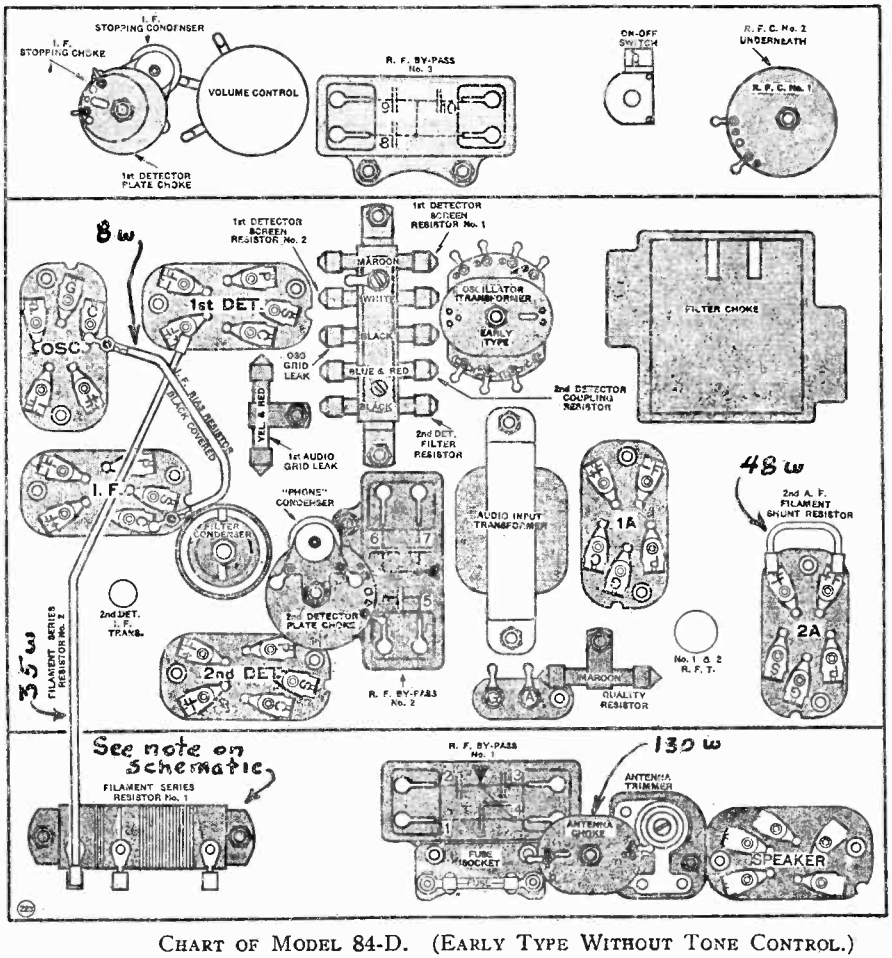


Chart of Model 84-D. (Early Type Without Tone Control.)

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	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	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	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	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	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	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	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.

ATWATER KENT MFG. CO.

A.-K. PAGE 3-83

MODEL 84,84-F
Early

ATWATER KENT MFG. CO.

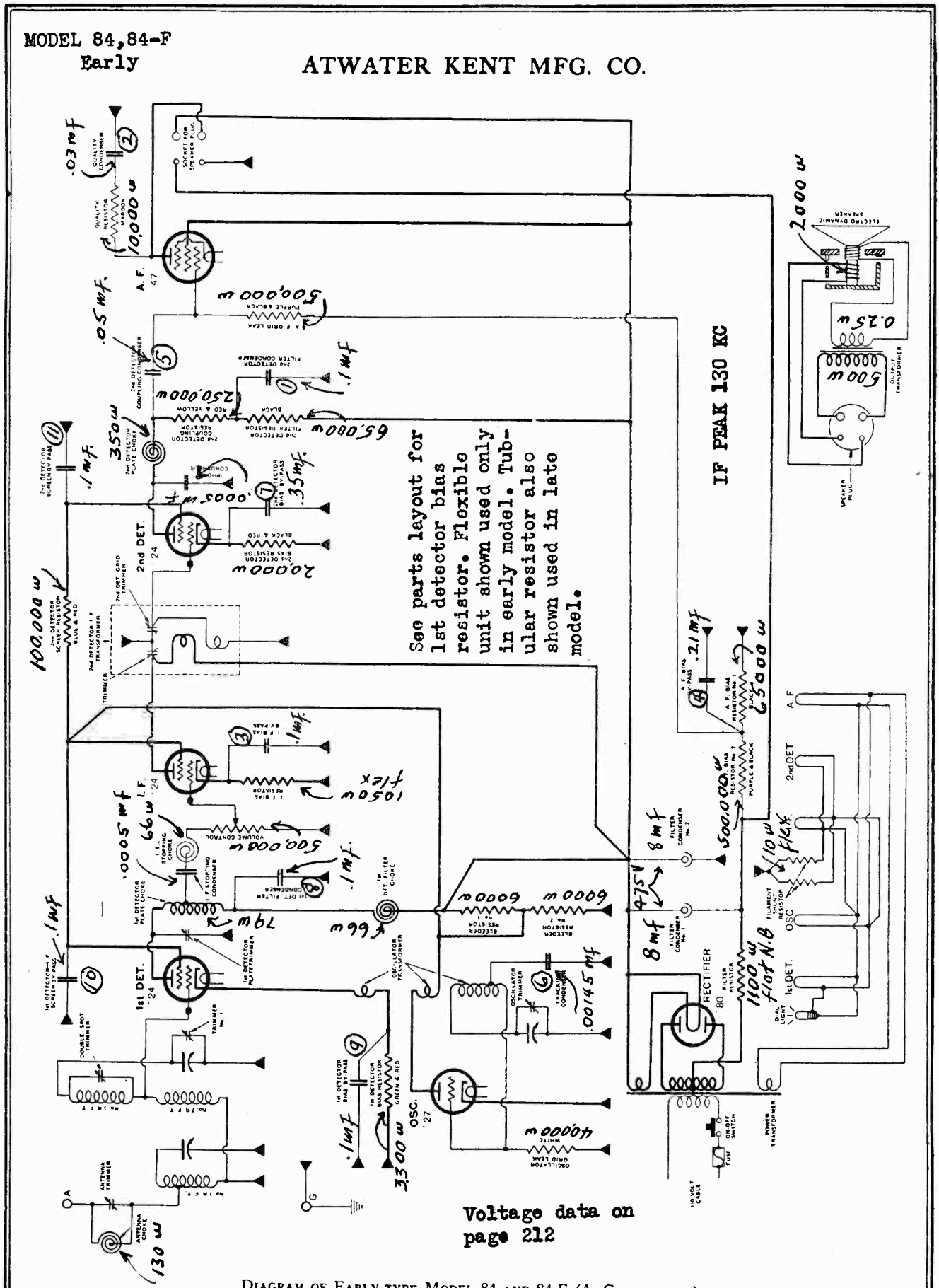


DIAGRAM OF EARLY-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).

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

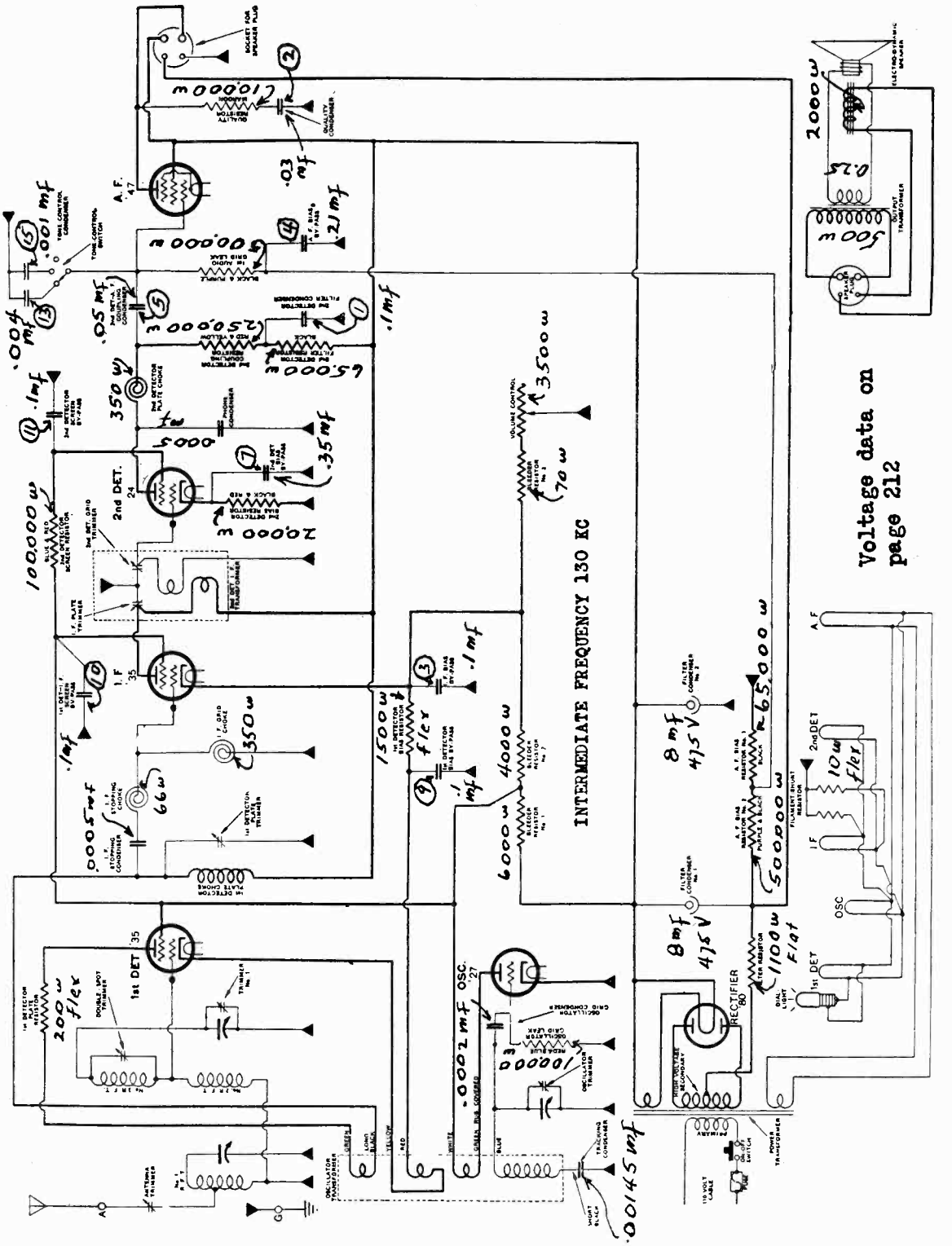


DIAGRAM OF LATE-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).

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.

MODEL 84, 84-F CHARTS

MODELS 84, 84-F
Early and Late

ATWATER KENT MFG. CO.

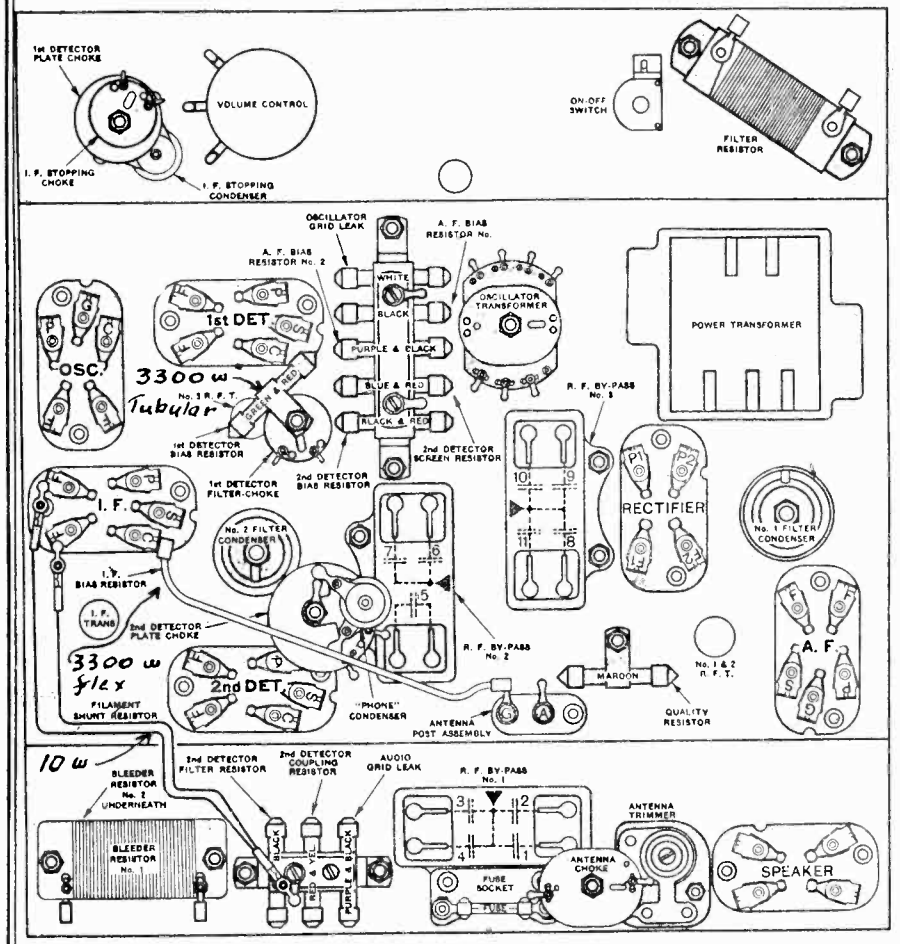


CHART OF EARLY-TYPE MODEL 84, 84-F.

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

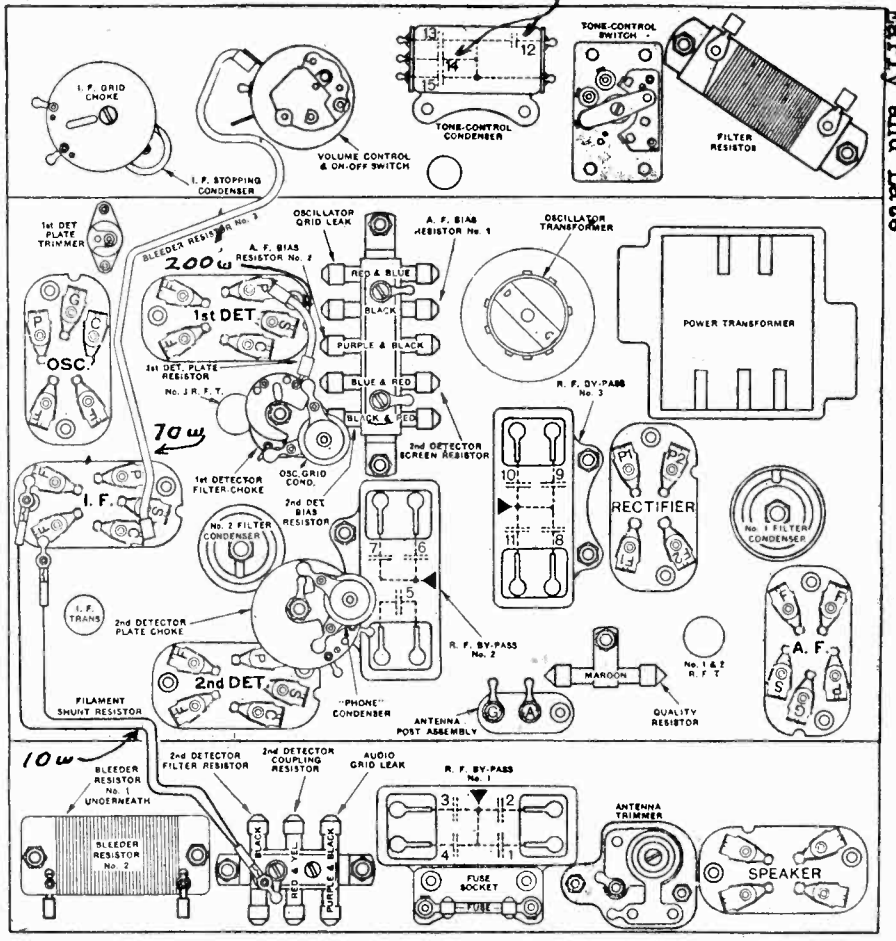


CHART OF LATE-TYPE MODEL 84, 84-F.

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

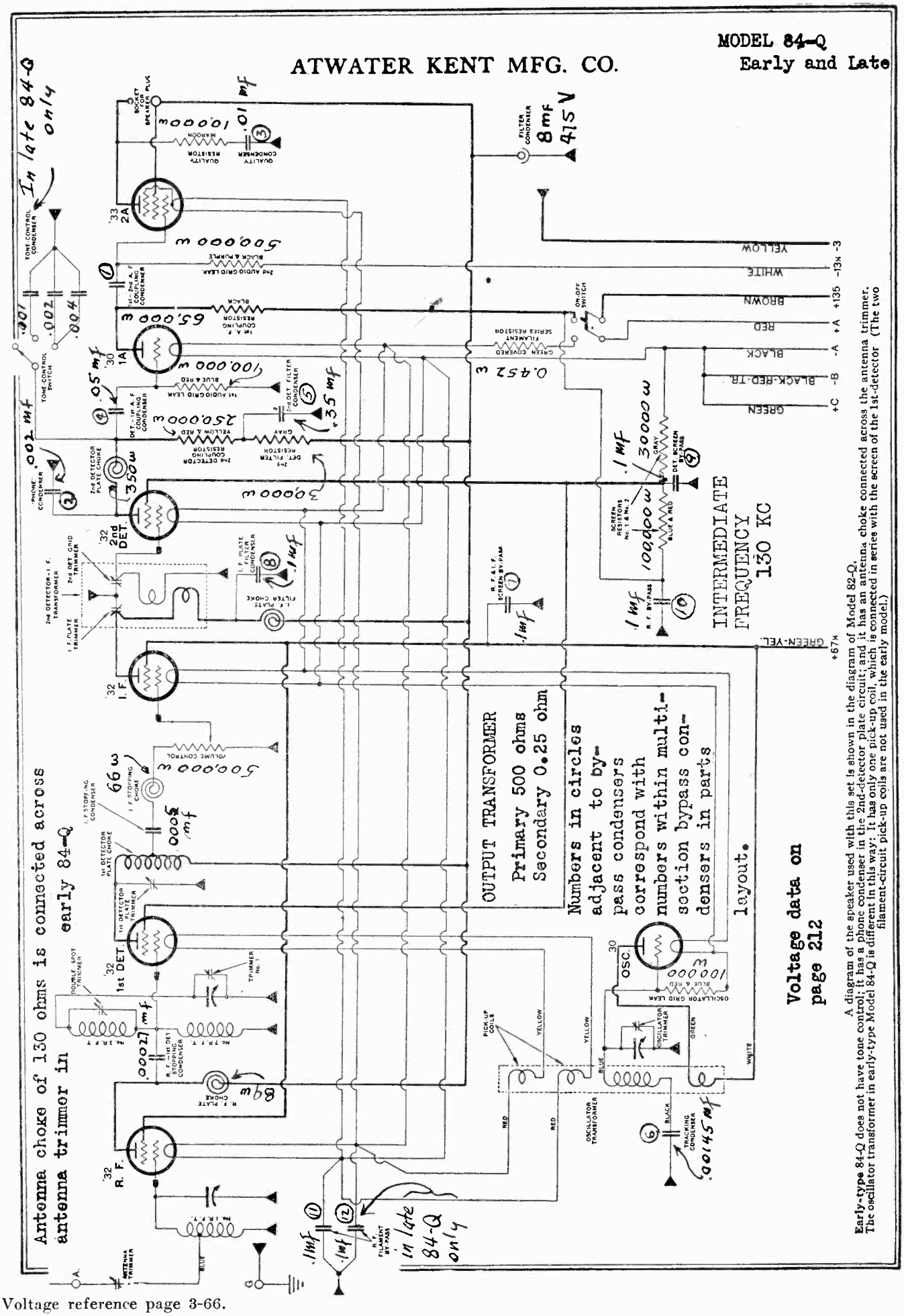
8—1st-detector filter condenser.
9—1st-detector bias by-pass.
10—1st-detector—I. F. screen by-pass.
11—2nd-detector screen by-pass.

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.



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.

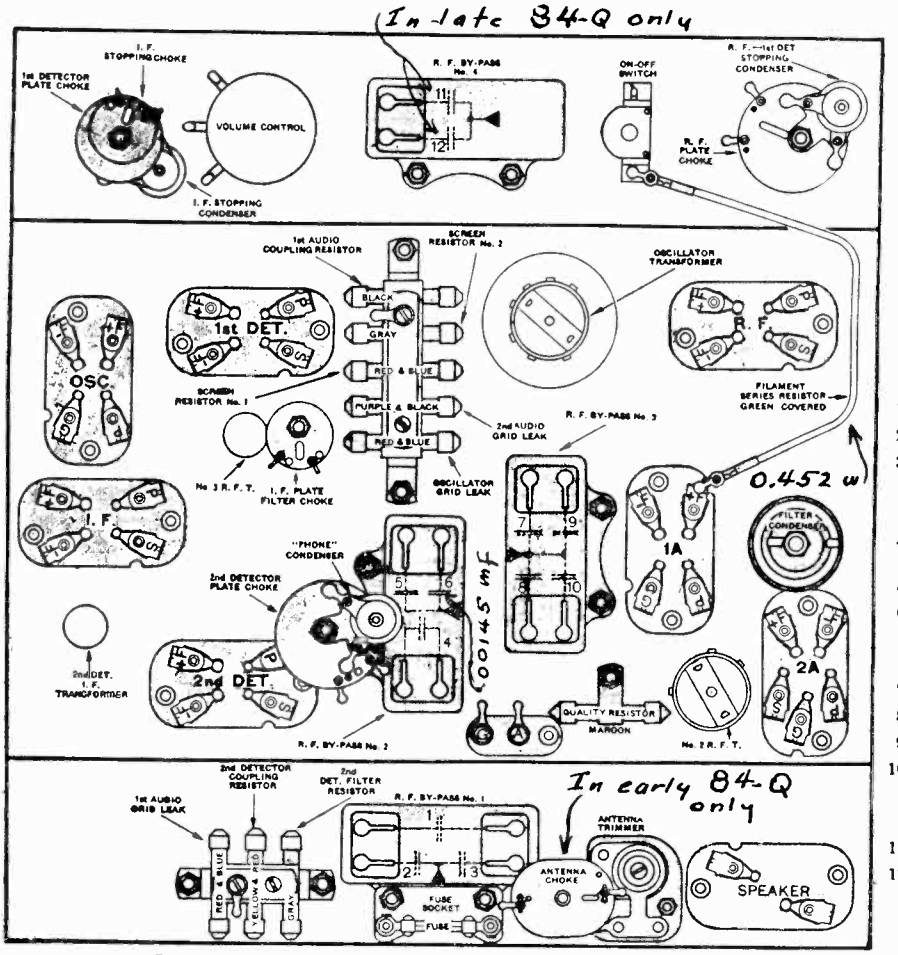


CHART OF MODEL 84-Q. (EARLY TYPE WITHOUT TONE CONTROL.)

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.

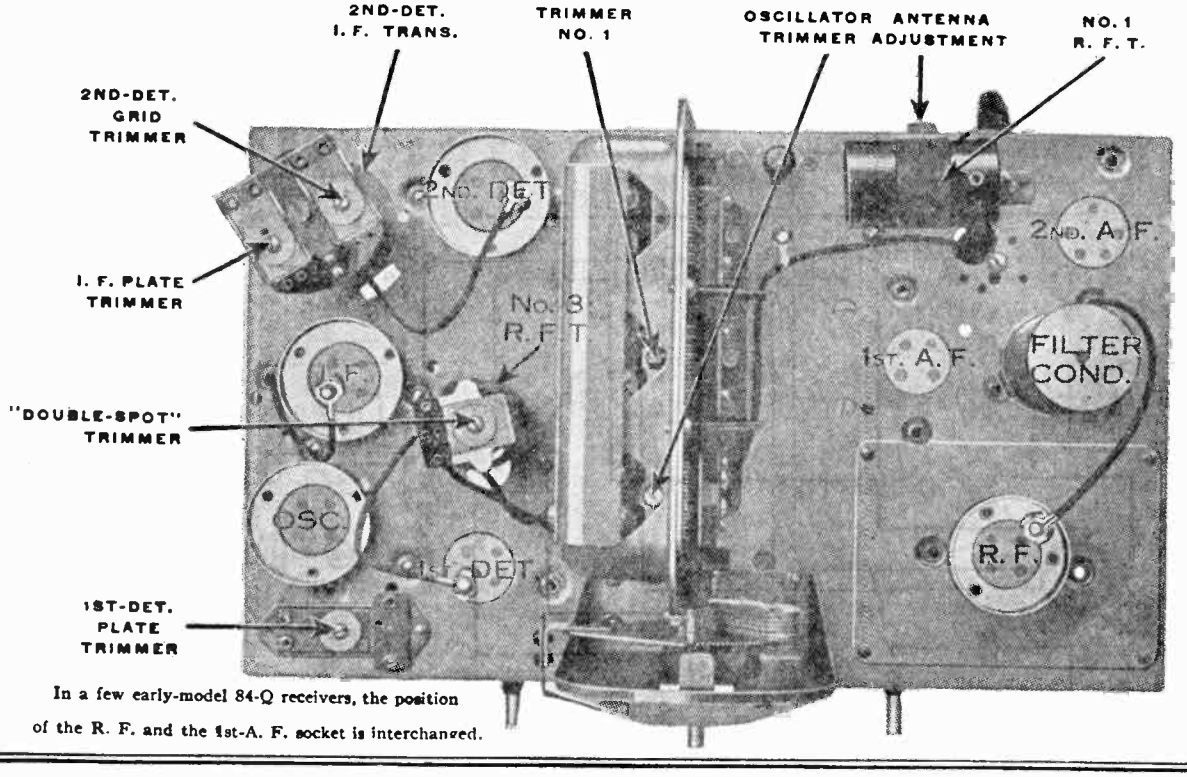
400 Volts

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

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

400 Volts

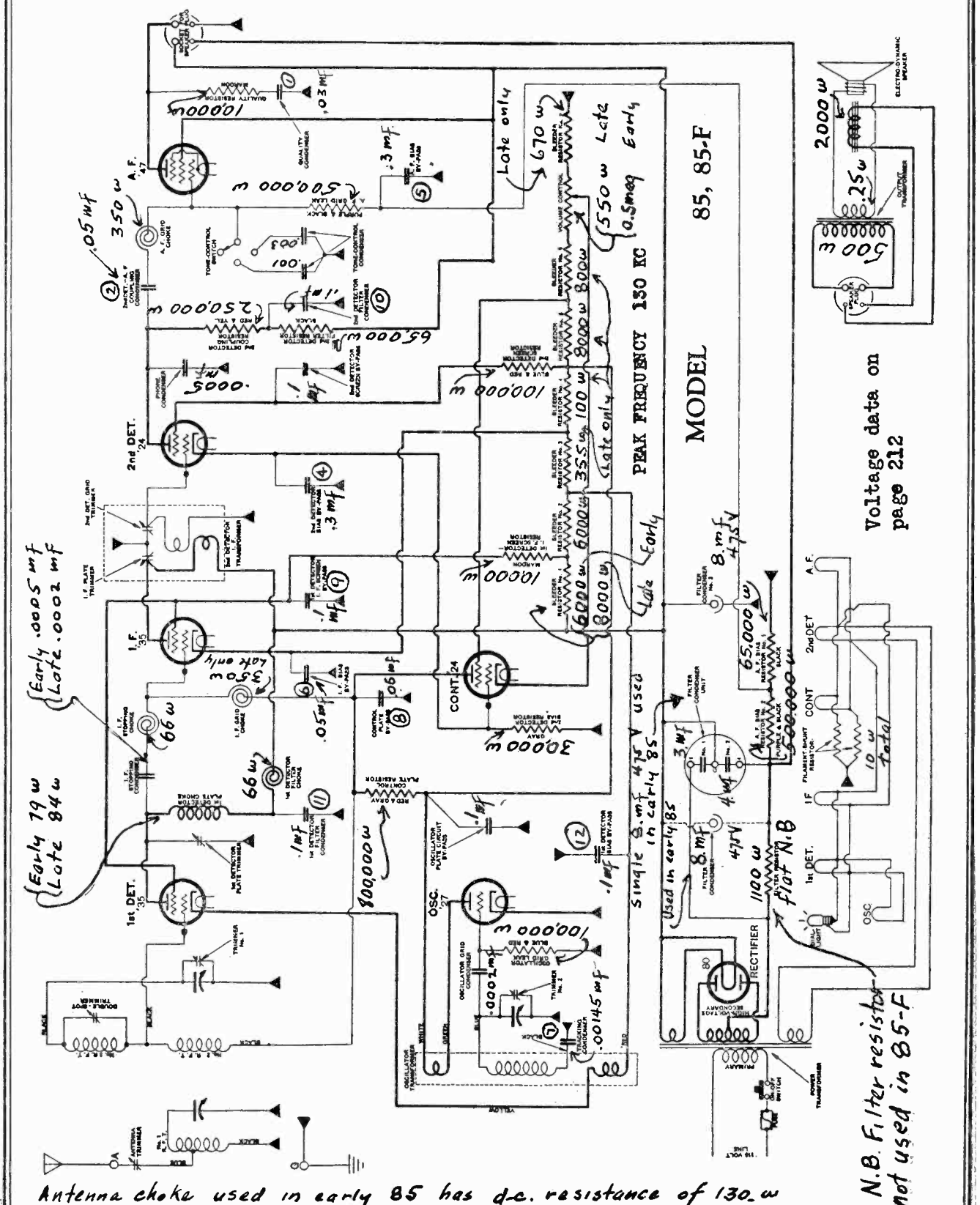
Tone control is 100 V.



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.

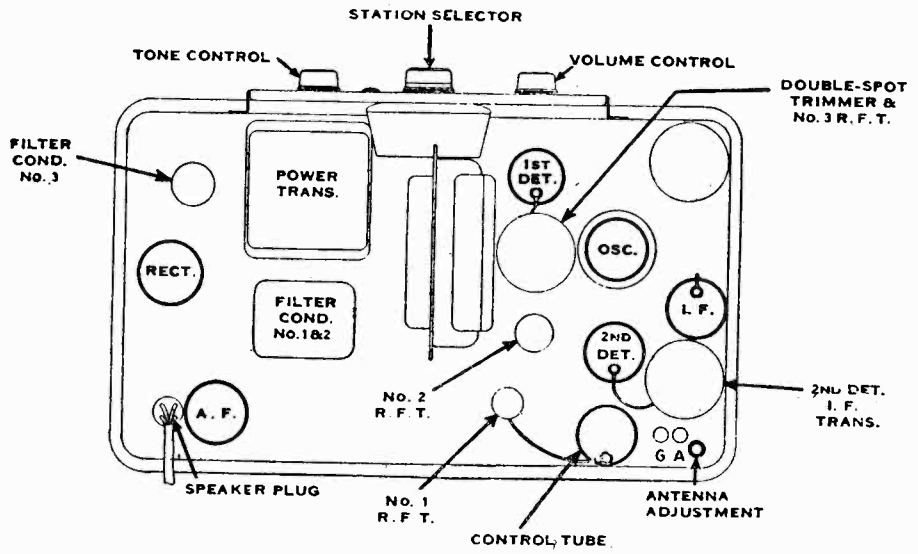


A few early-type Model 85 do not have automatic volume control; they have three electrolytic filter condensers; the circuit of these early Model 85 sets is similar to Model 80. The tracking condenser is mounted on the oscillator transformer in Model 82 and some 85 sets. The filament circuit of Model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

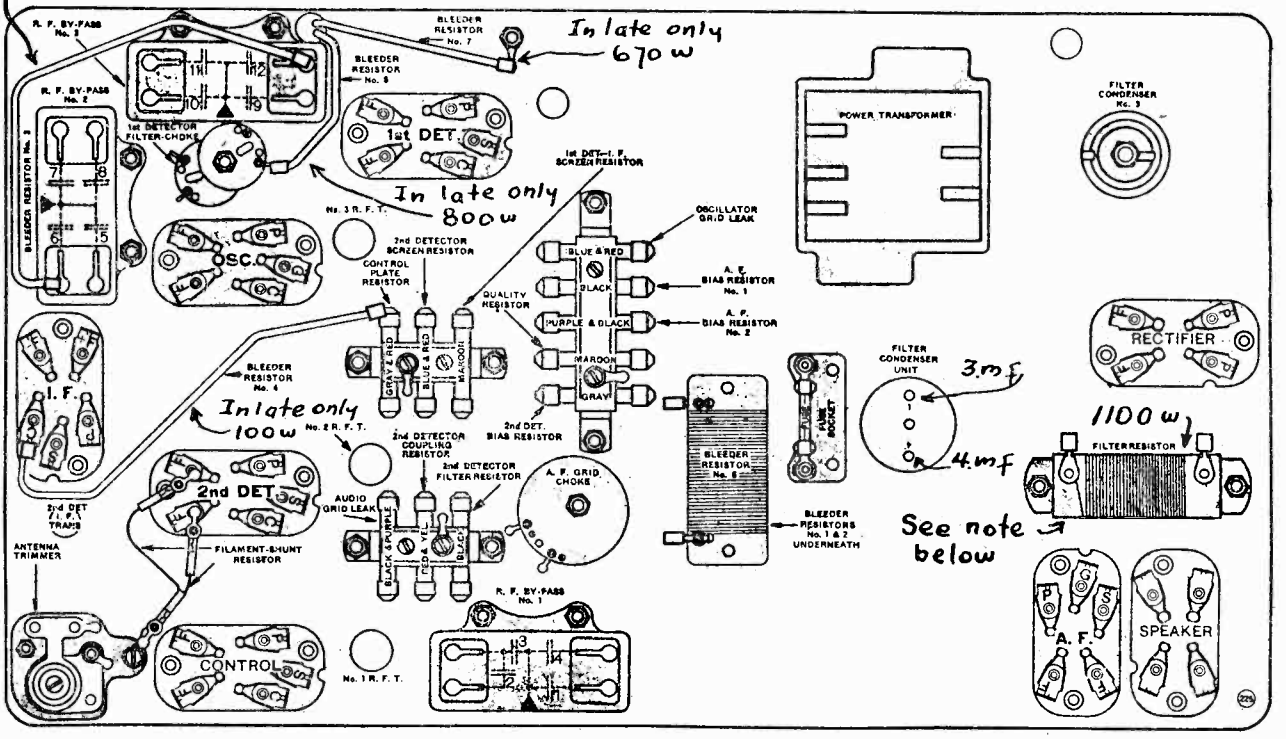


CHART OF MODEL 85, 85-F.

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

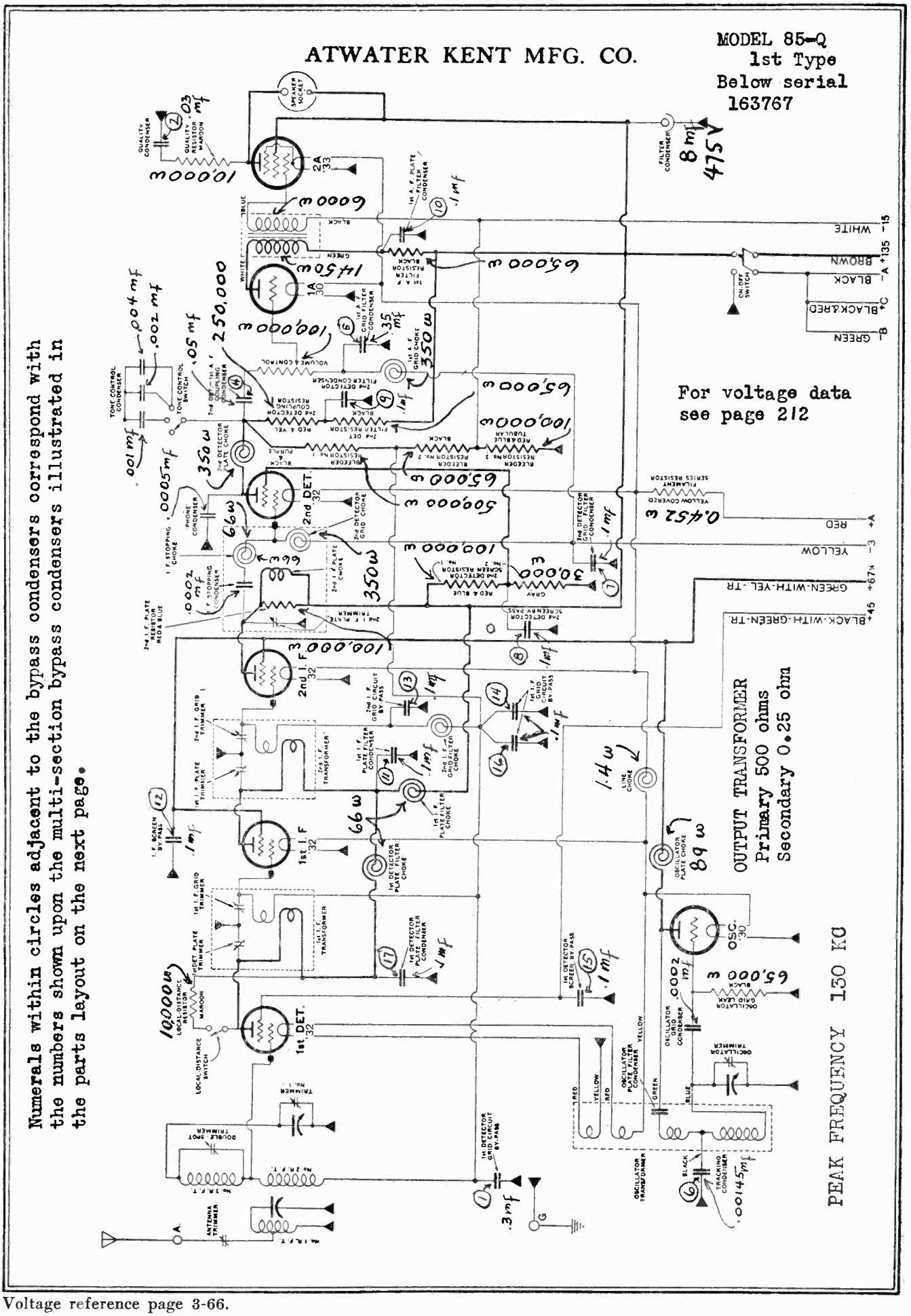
5—A. F. bias by-pass.
6—I. F. bias by-pass.
7—Tracking condenser.
8—Control-plate by-pass.

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.

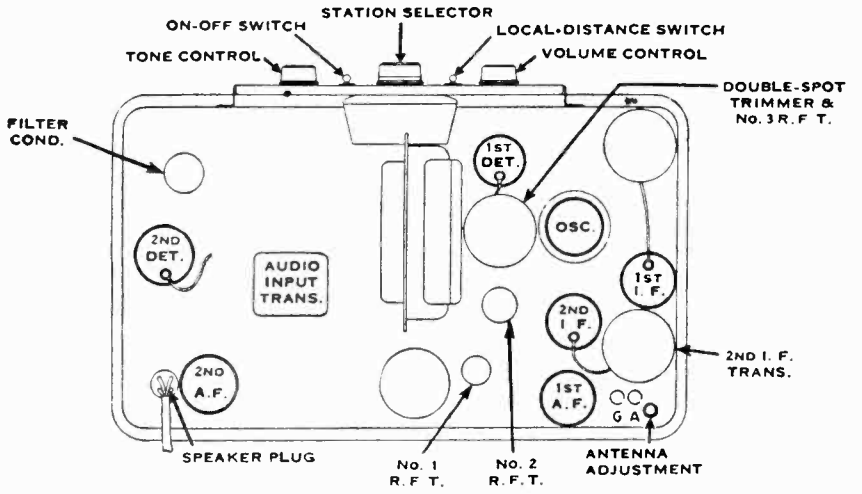


Numerals within circles adjacent to the bypass condensers correspond with the numbers shown upon the multi-section bypass condensers illustrated in the parts layout on the next page.

Voltage reference page 3-66.

MODEL 85-Q
1st Type
Below serial
163767

ATWATER KENT MFG. CO.



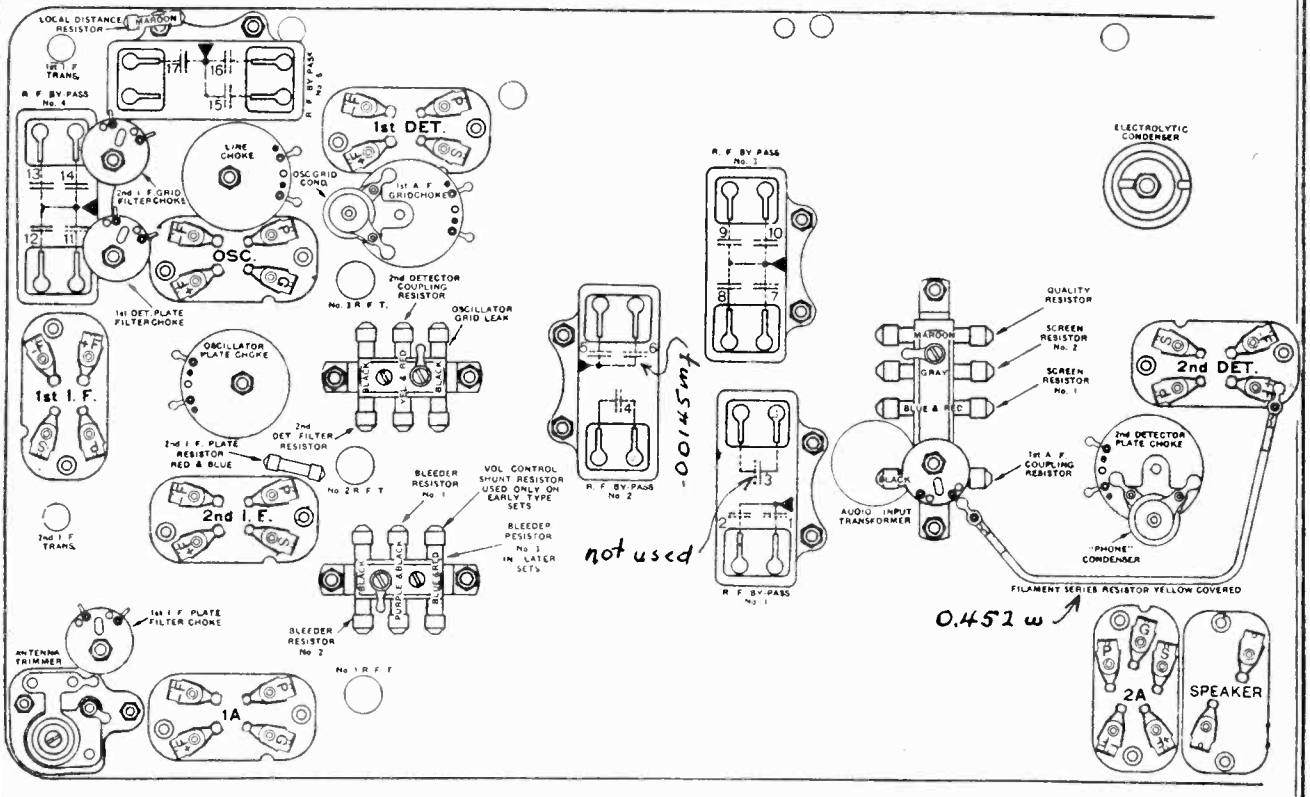
TOP VIEW OF MODEL 85-Q.

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.

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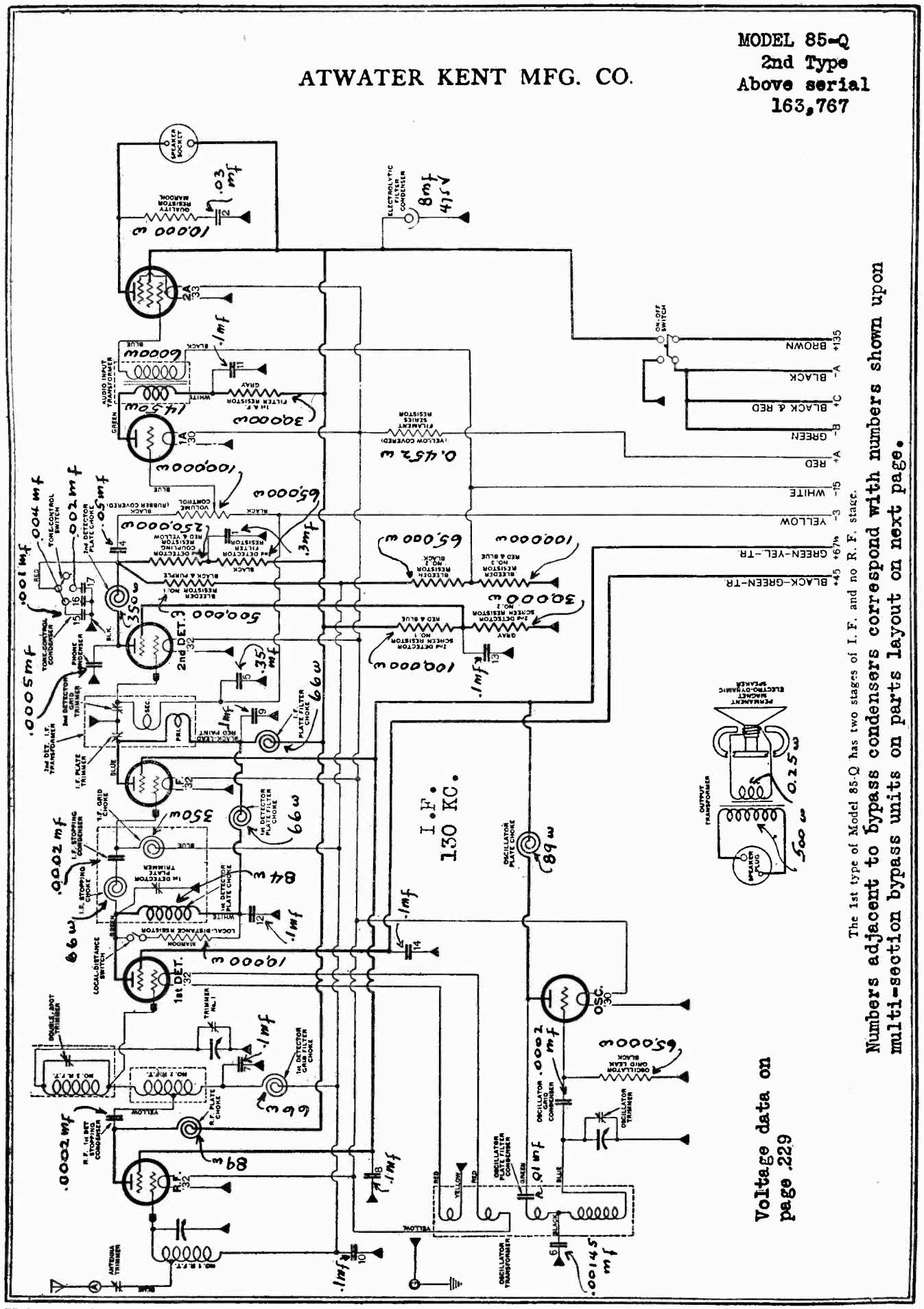
MODEL 85-Q
2nd Type
Above serial
163,767



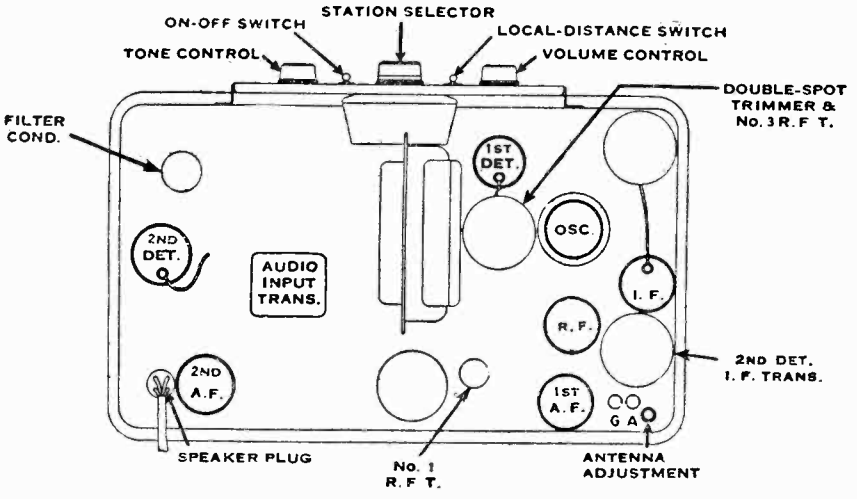
Voltage reference page 3-83.

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

ATWATER KENT MFG. CO.

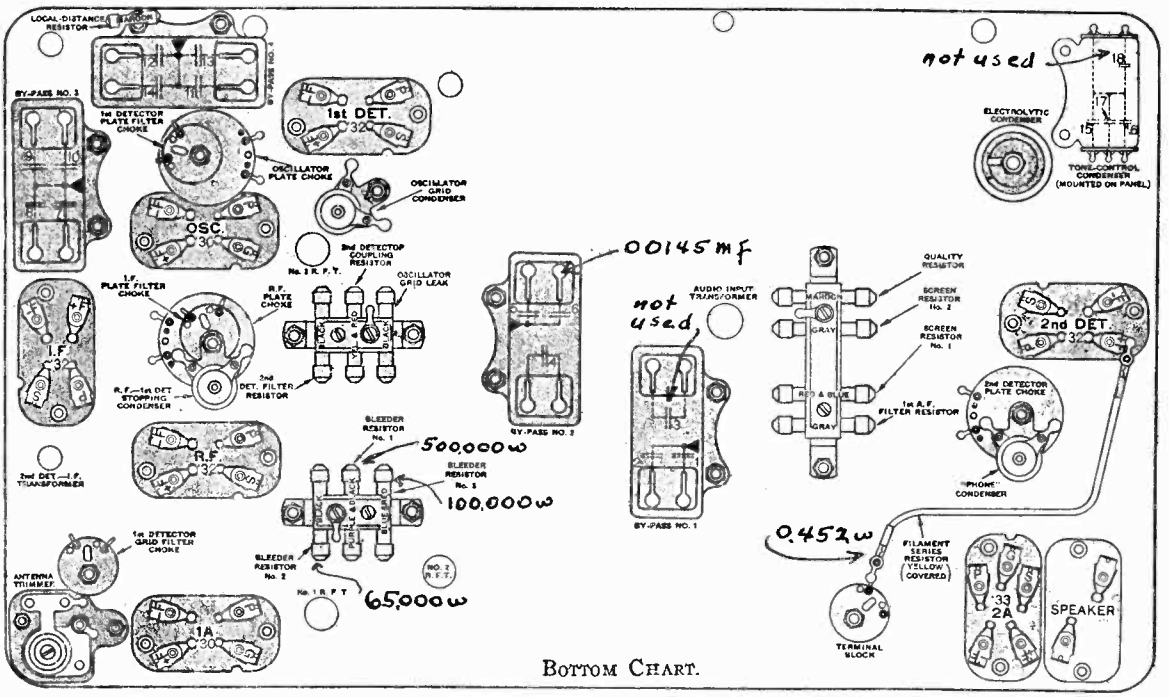
TUBES

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

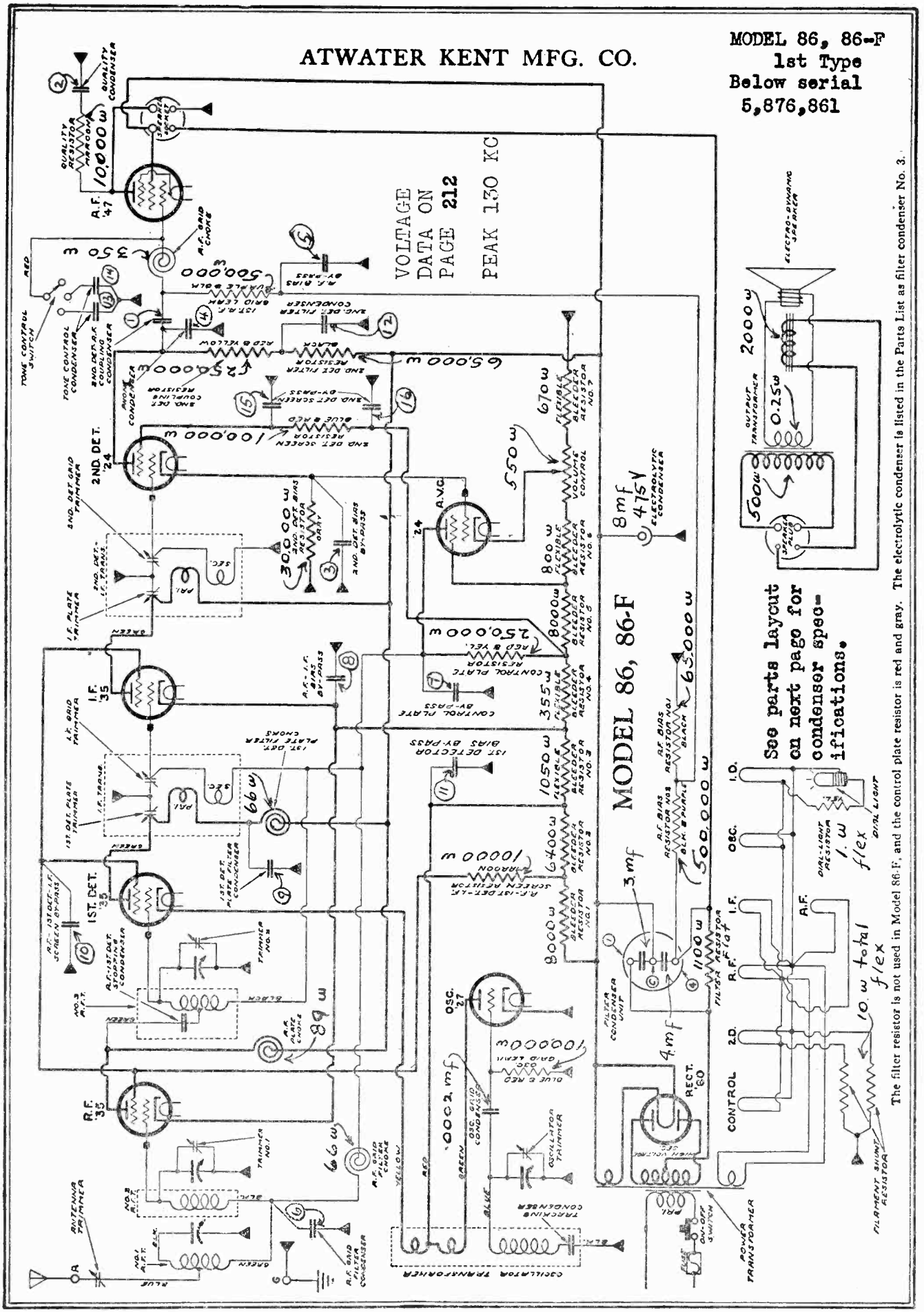
By-pass No. 1
1—2nd-detector plate filter condenser.
2—Quality condenser.
3—Not used.

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	

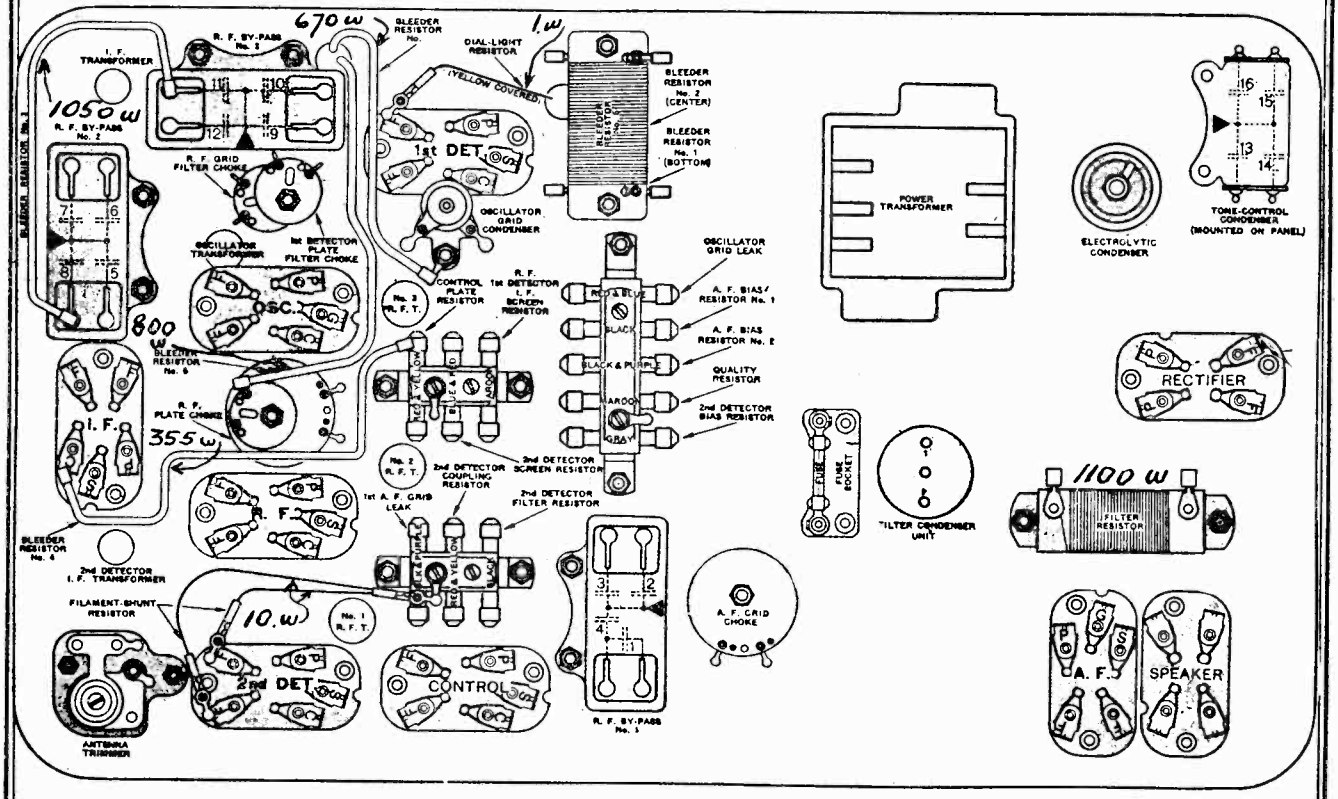


CHART OF MODEL 86, 86-F.

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

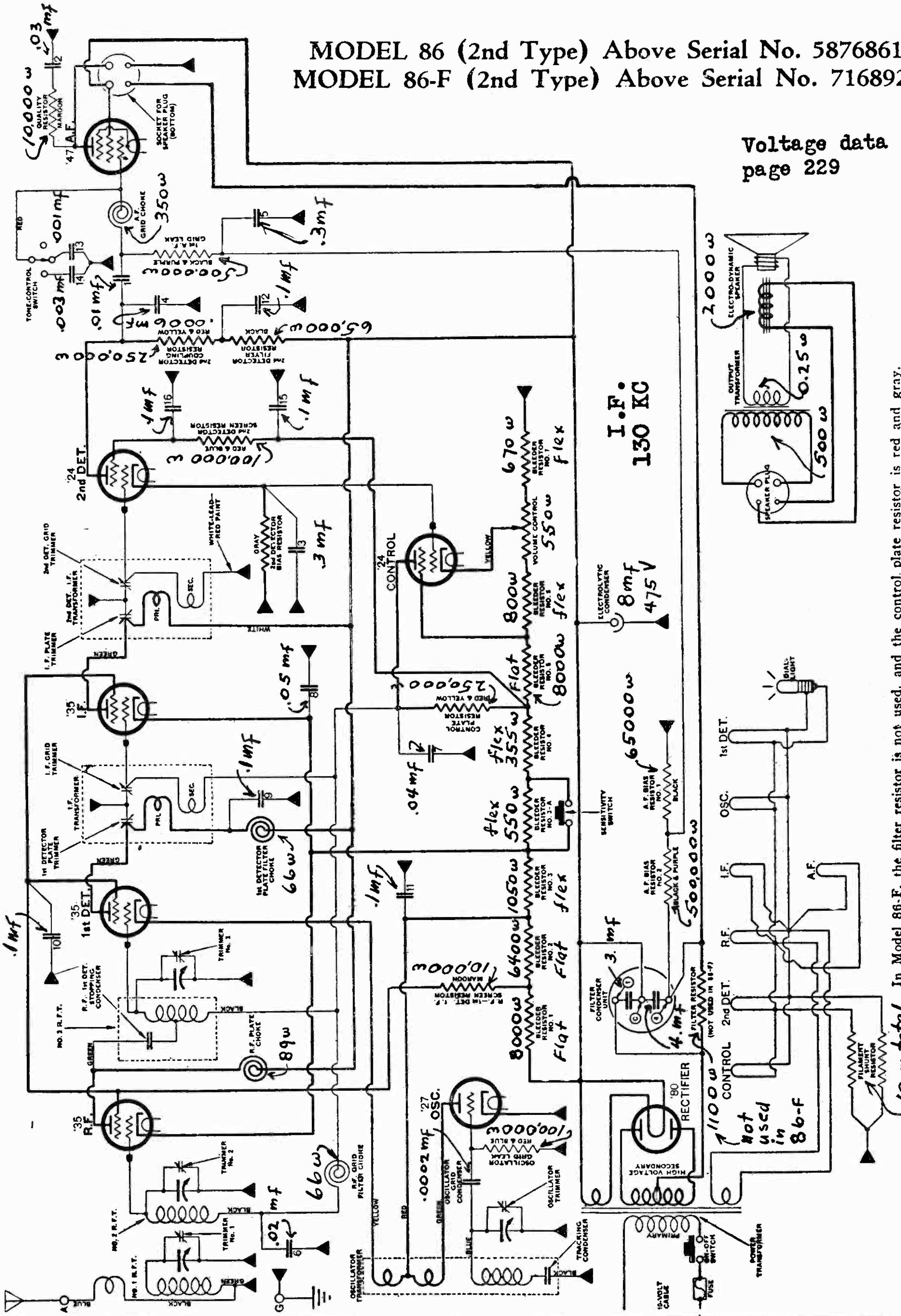
13—Tone-control condenser.
14—Tone-control condenser.
15—2nd-detector screen by-pass.
16—2nd-detector screen by-pass.

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.

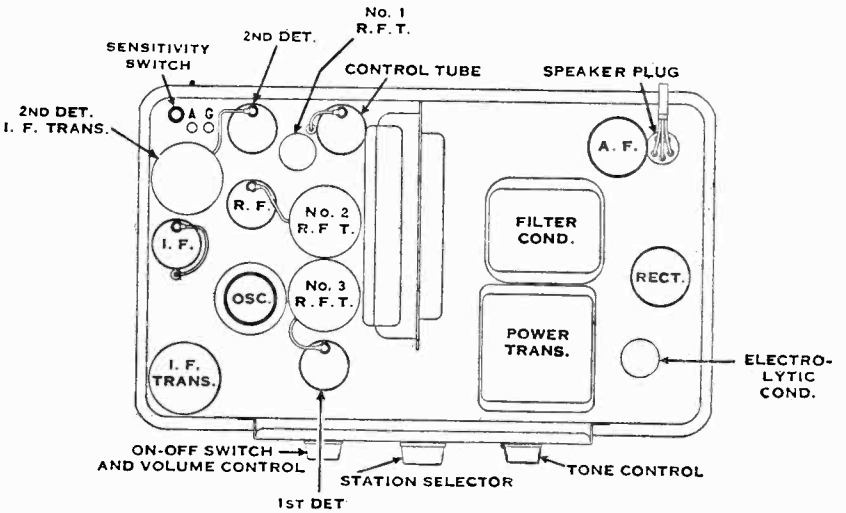
MODEL 86, 86-F
2nd Type

ATWATER KENT MFG. CO.

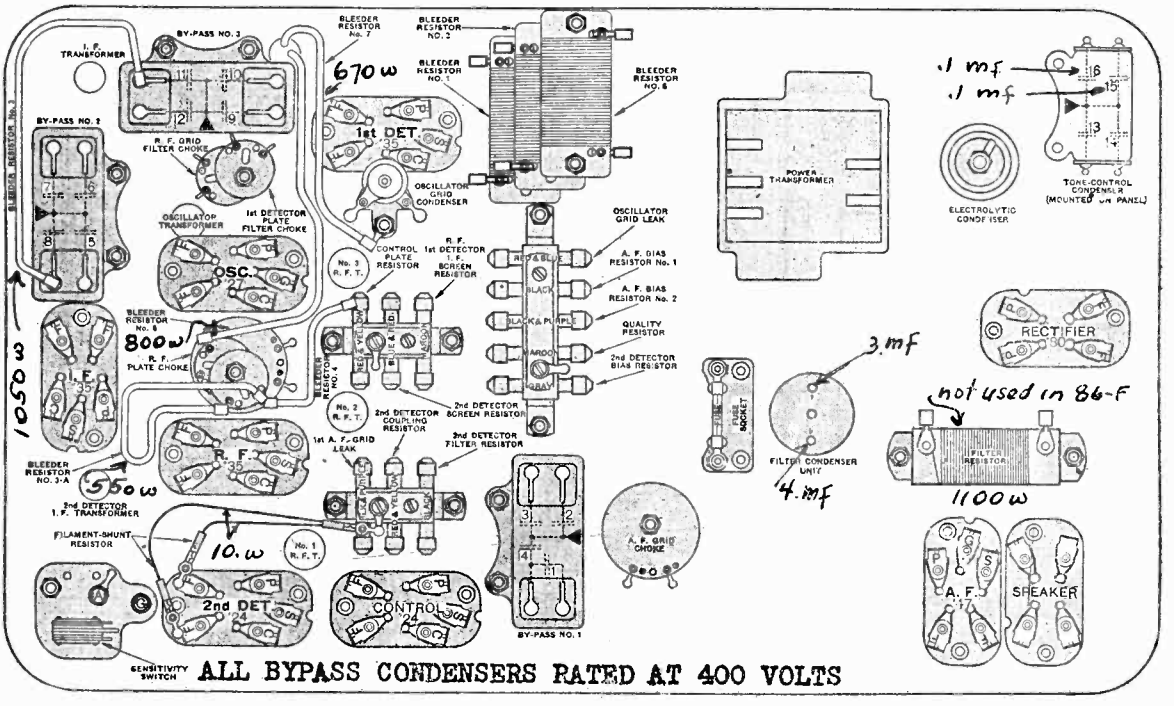
MODEL 86 (2nd Type) Above Serial No. 5876861
MODEL 86-F (2nd Type) Above Serial No. 7168925

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.

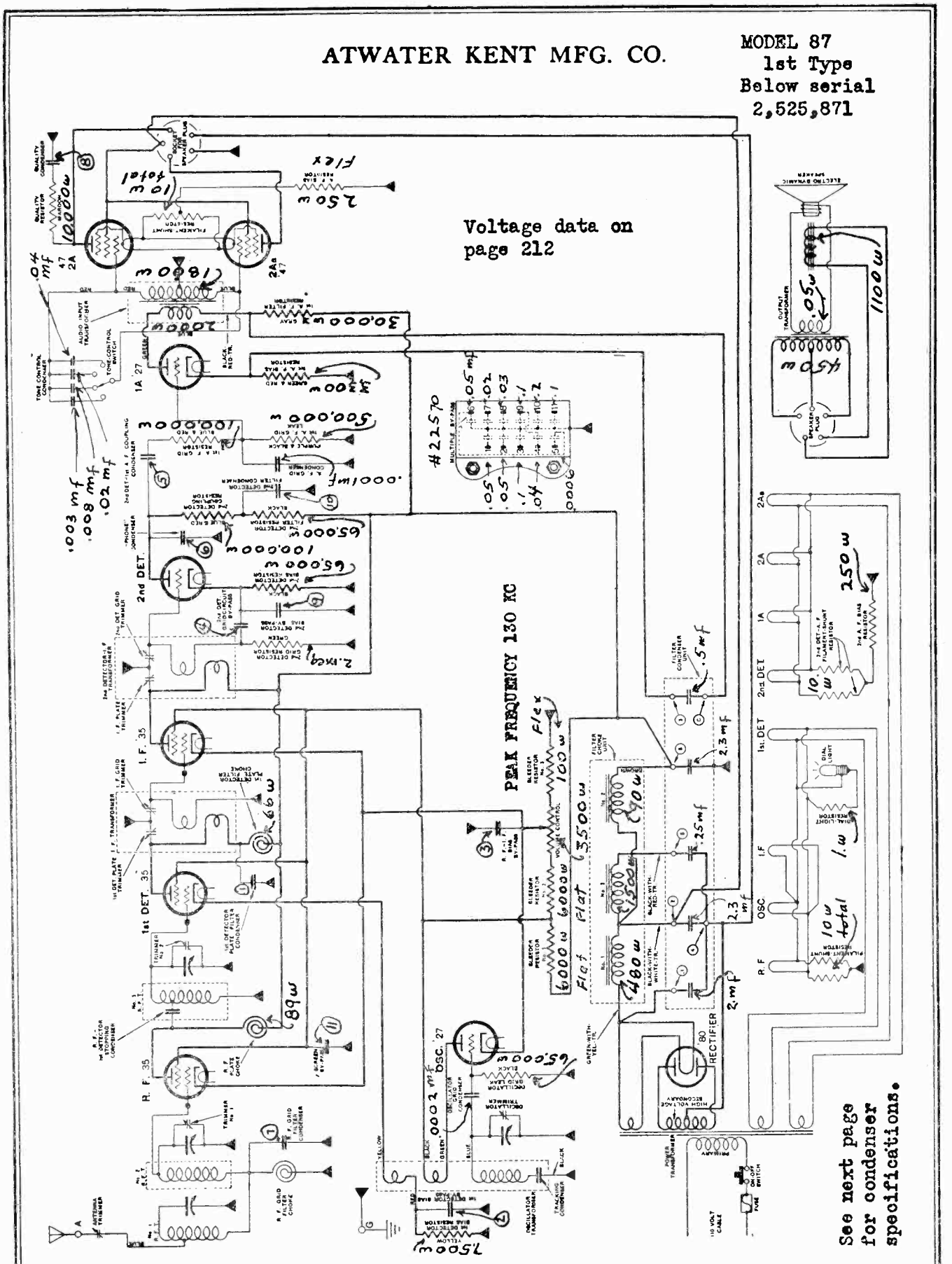


DIAGRAM OF MODEL 87 (A. C.-OPERATED).

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.

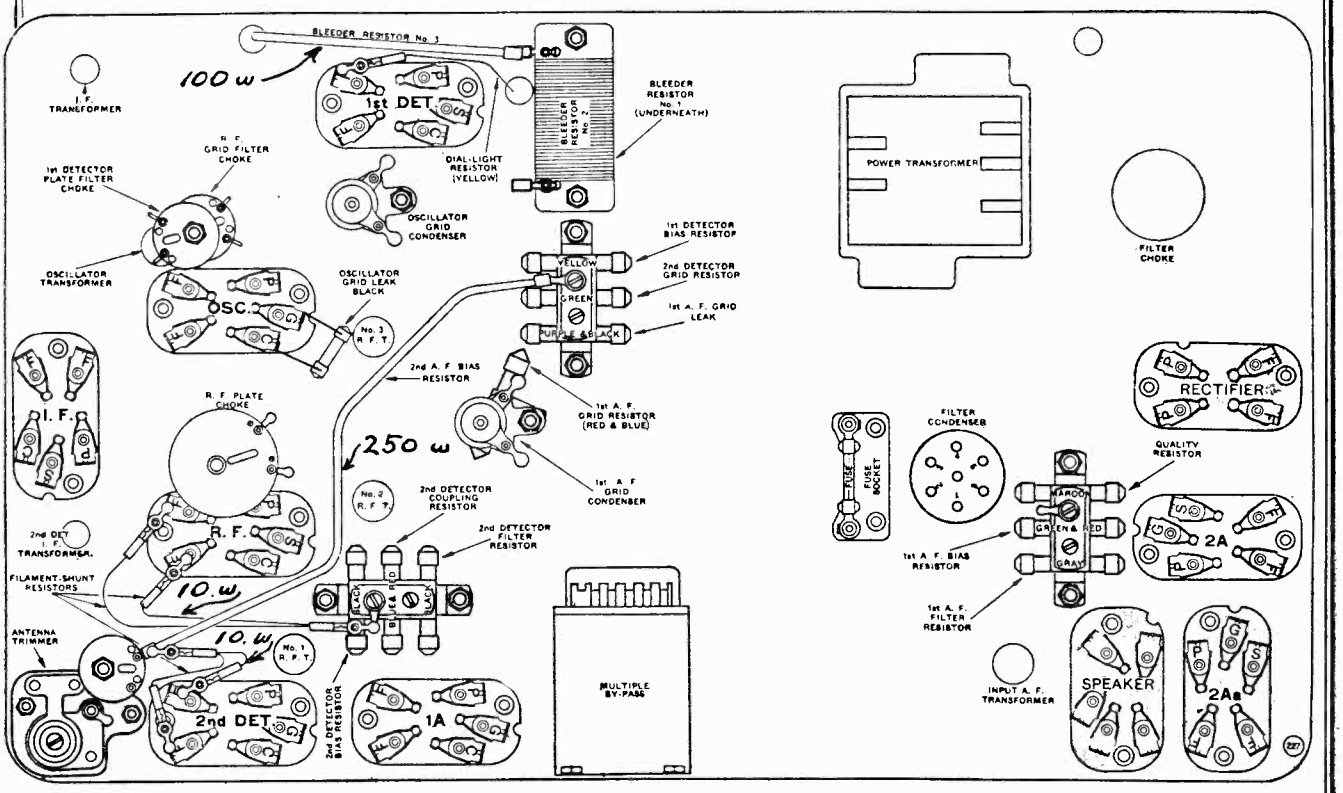
MODEL 87
1st Type
Below serial
2,525,871

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.

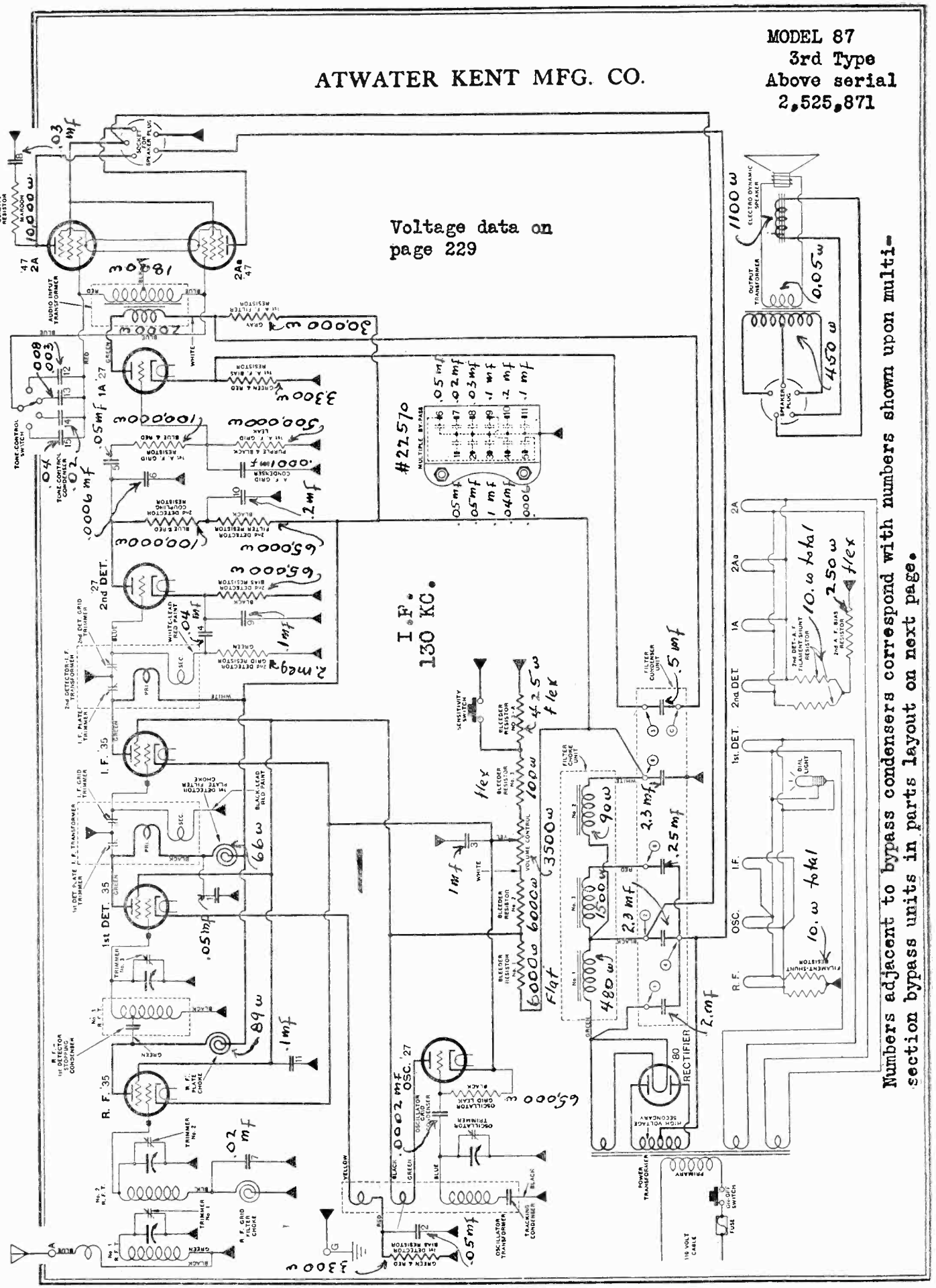
Filter # 1	2.0 mfd connected between terminals (1) and (4)
Filter # 2	2.3 mfd connected between terminals (2) and (4)
Filter # 3	2.3 mfd connected between terminal (6) and can
1st A-F Bias	.5 mfd connected between terminal (3) and center stud
Hum	.25 mfd connected between terminals (4) and (5)
	.1 mfd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



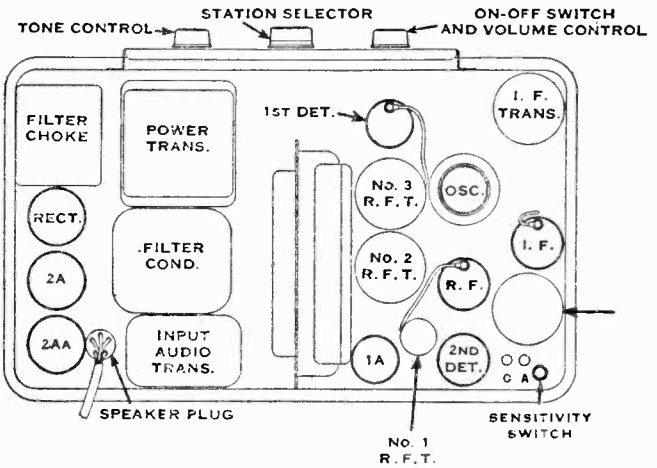
Voltage reference page 3-83.

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

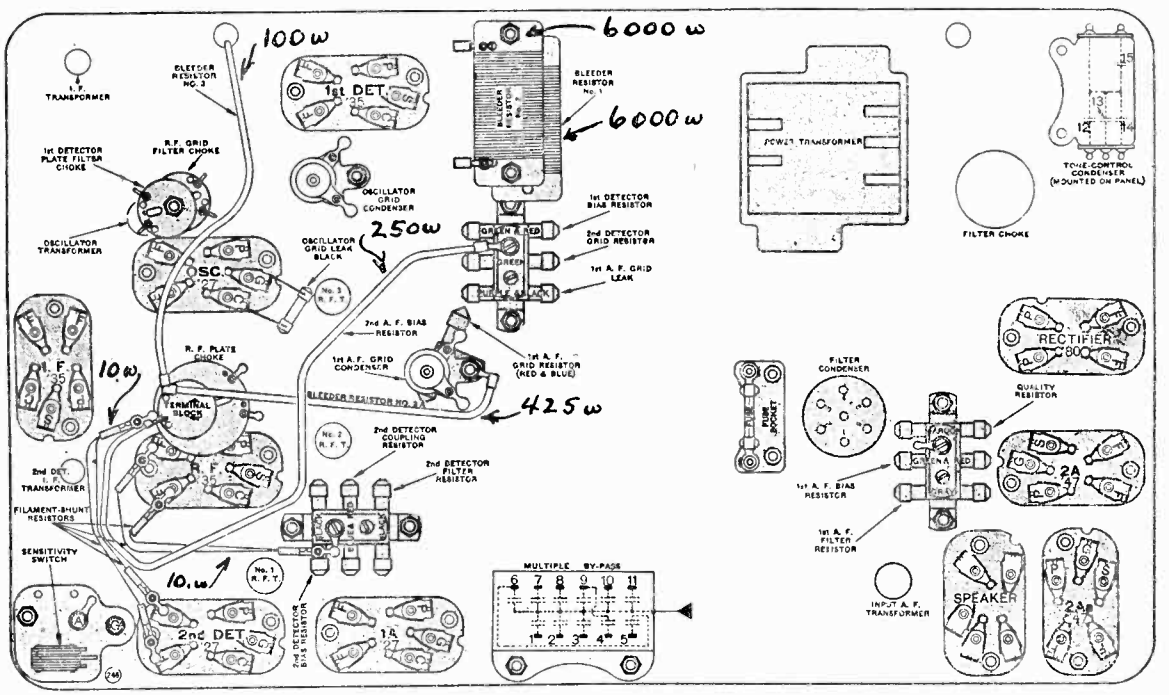
ATWATER KENT MFG. CO.

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

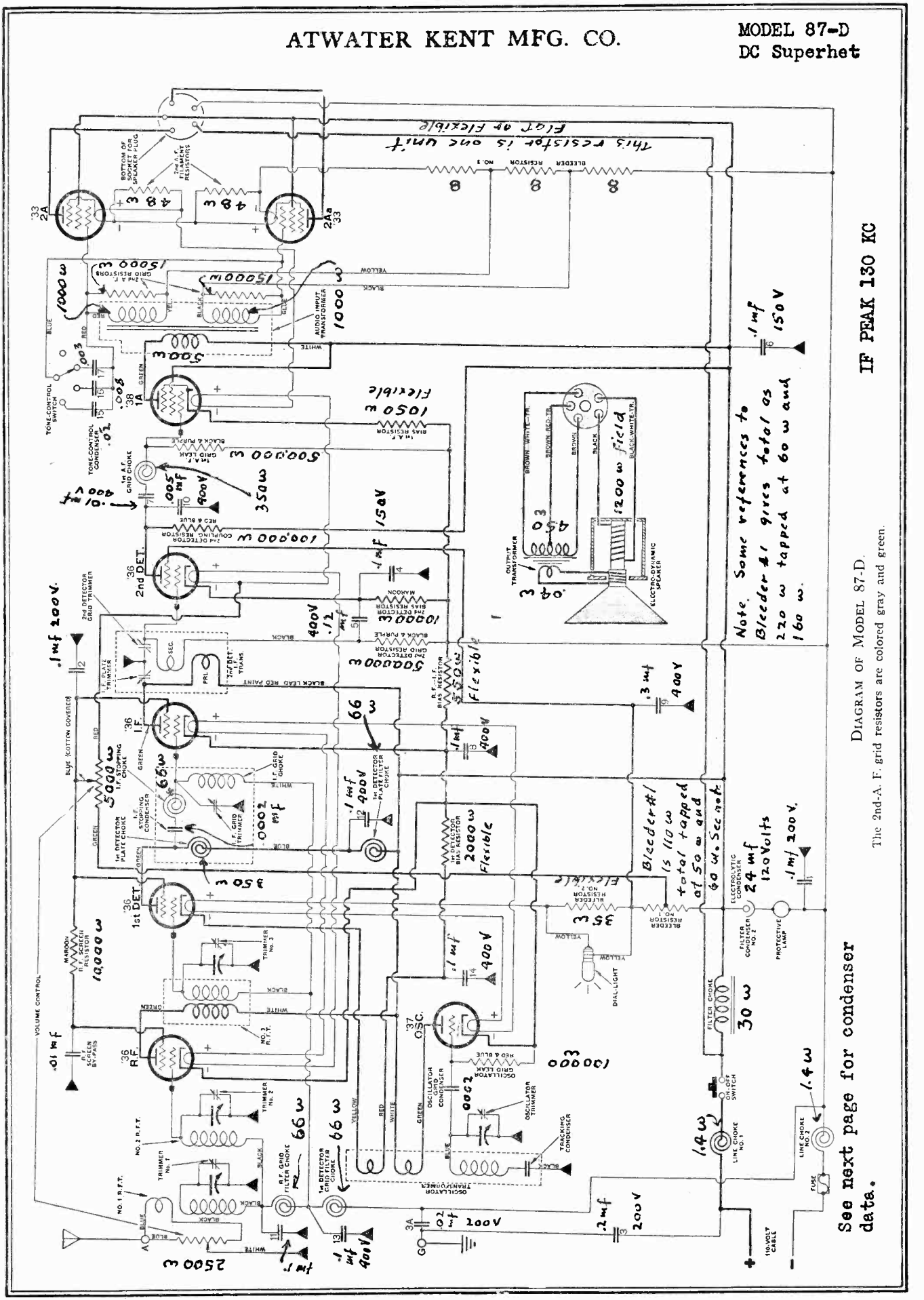
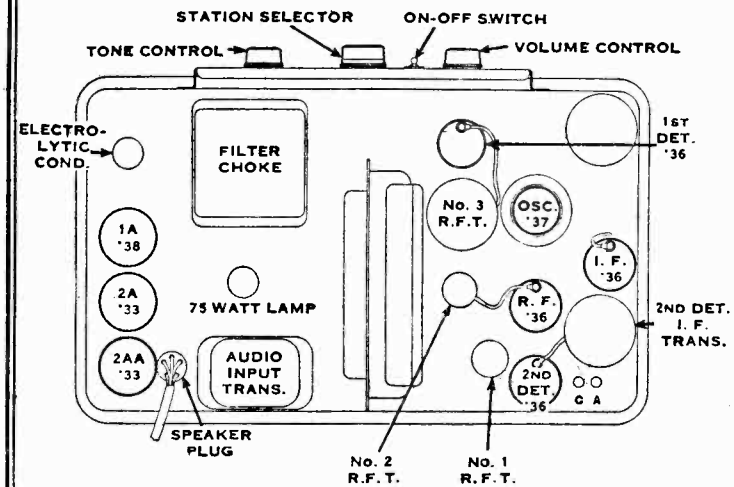


DIAGRAM OF MODEL 87-D.

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

MODEL 87-D
D.C.SUPERHET.

ATWATER KENT MFG. CO.



TOP VIEW OF MODEL 87-D.

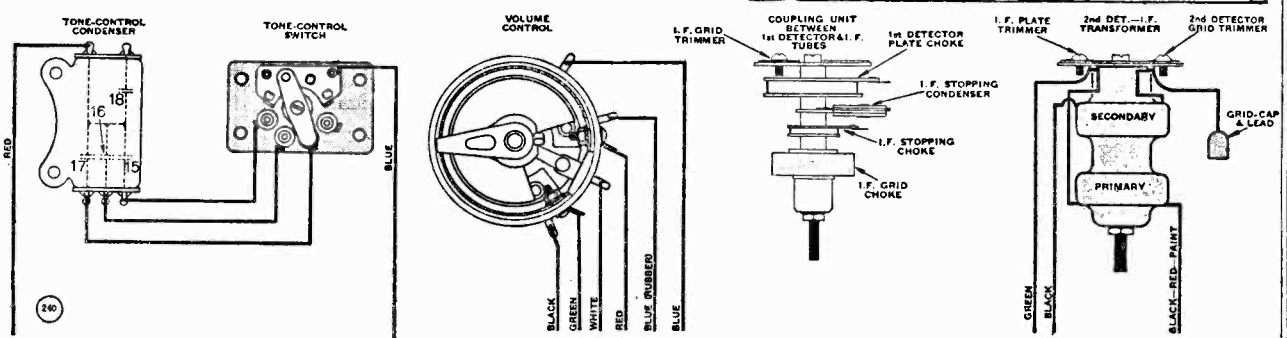
The circle in the top right-hand corner indicates the shield for the coupling unit between the 1st-detector and the I. F. tube.

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.

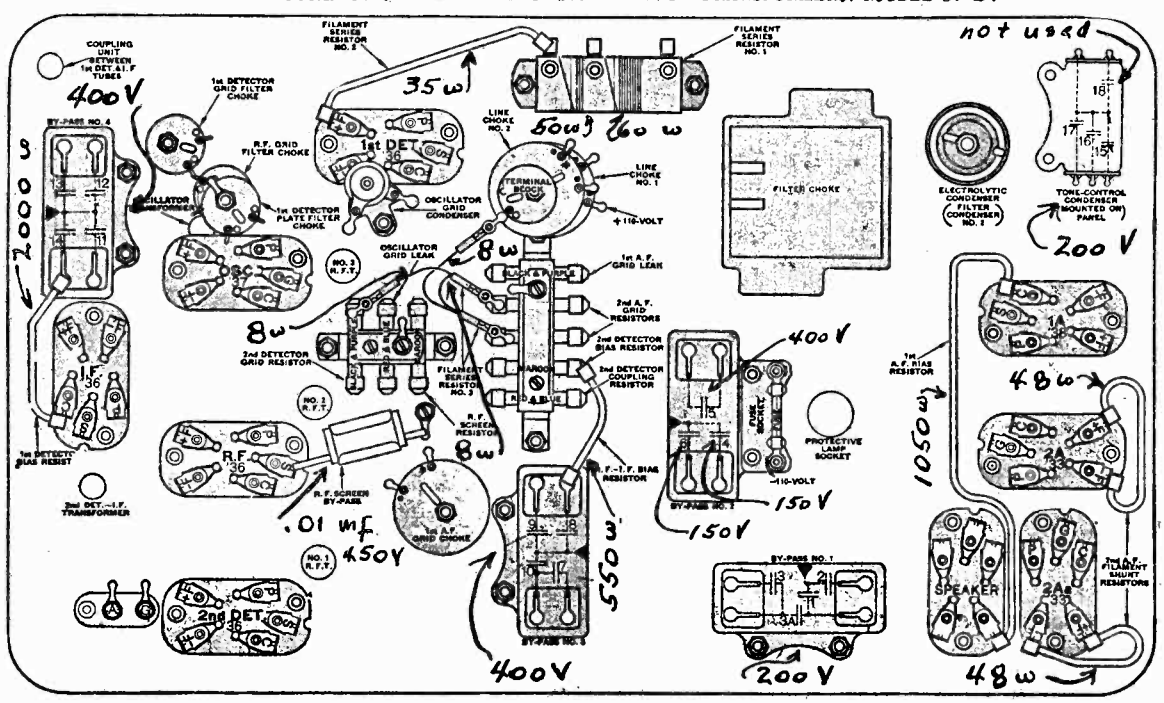
Voltage Table for Model 87-D

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. P.	6	93	98	4
2ND-A. P.	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.

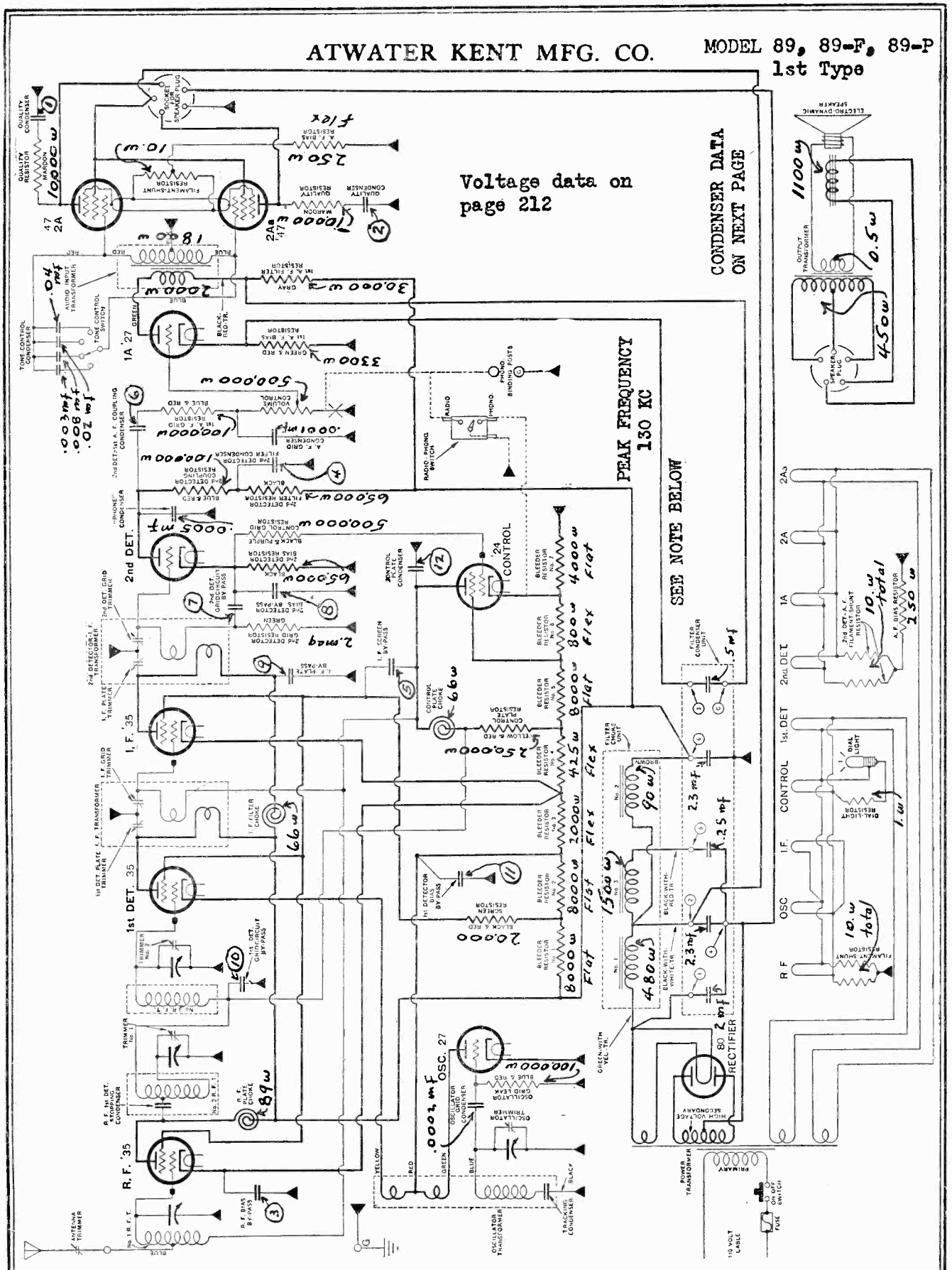


DIAGRAM OF MODEL 89, 89-F, AND 89-P (A. C.-OPERATED).

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	

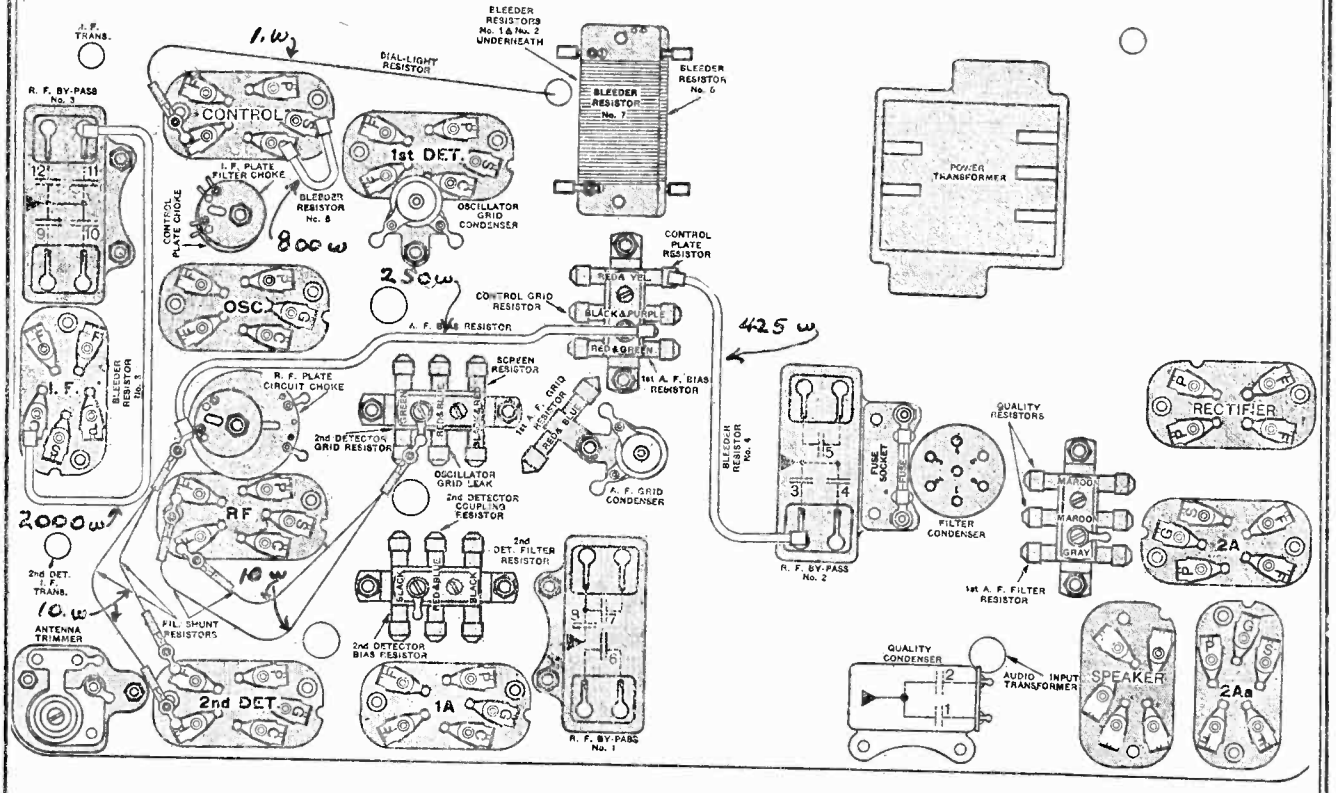


CHART OF MODEL 89, 89-F.

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-pase 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.

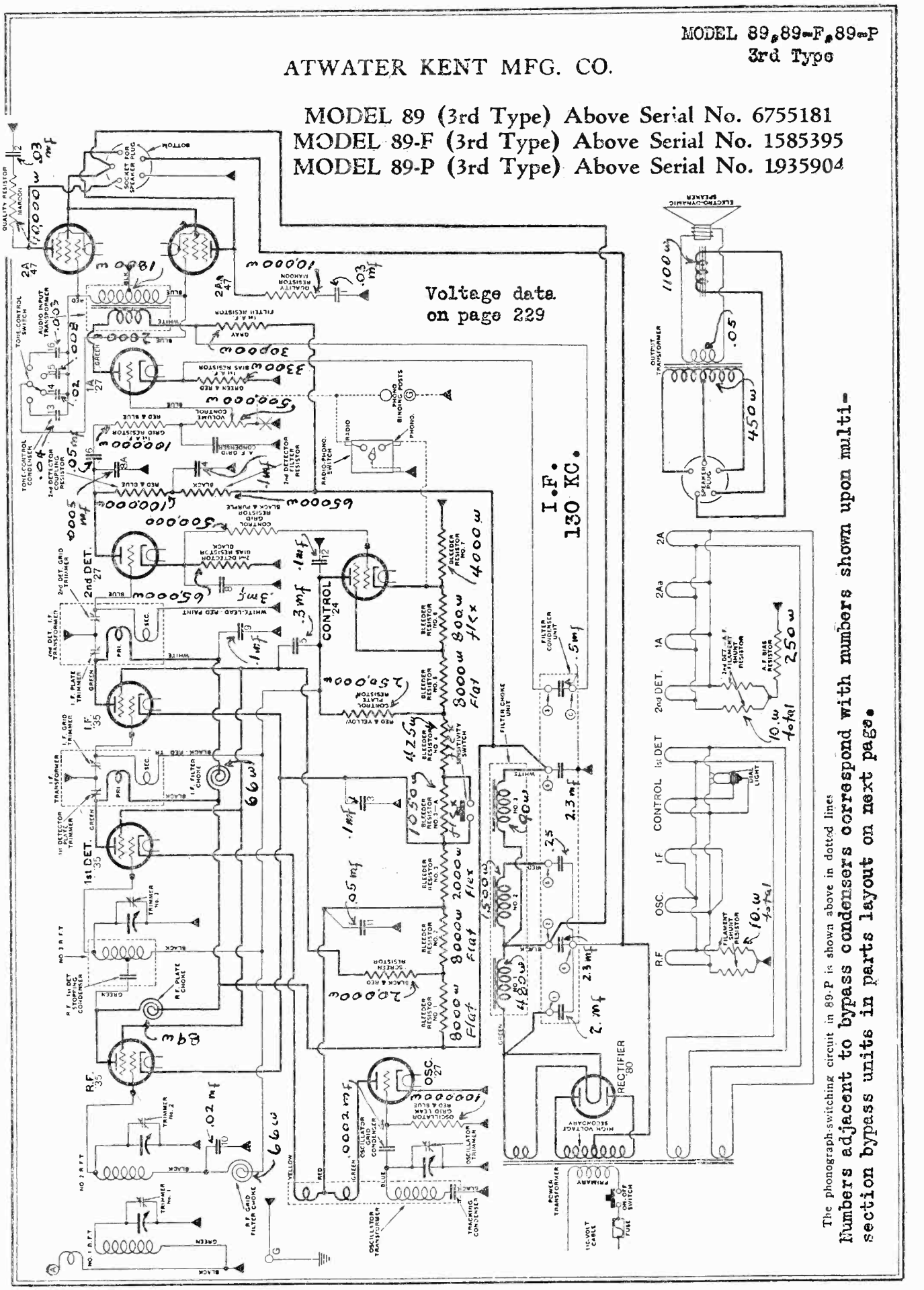
R. F. By-pass No. 3

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



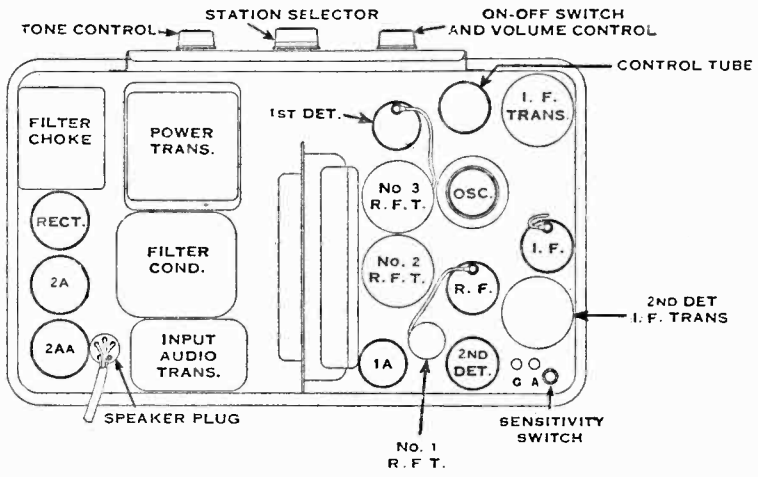
Voltage reference page 3-83.

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

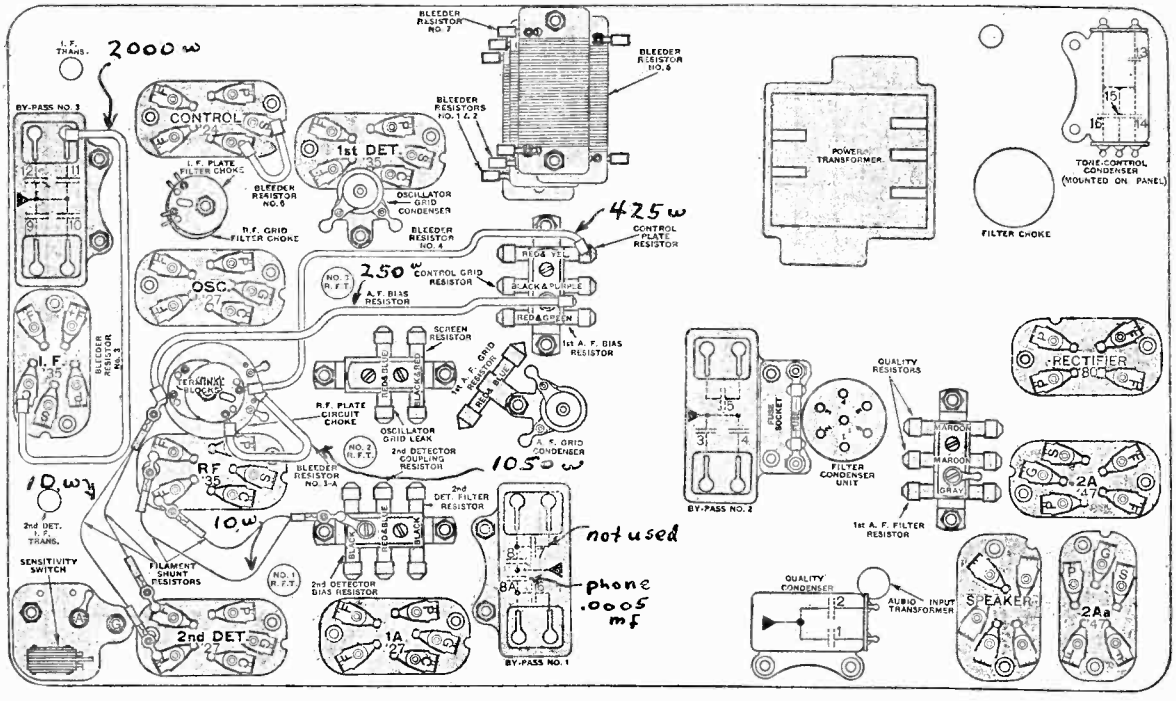


TOP VIEW.

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.

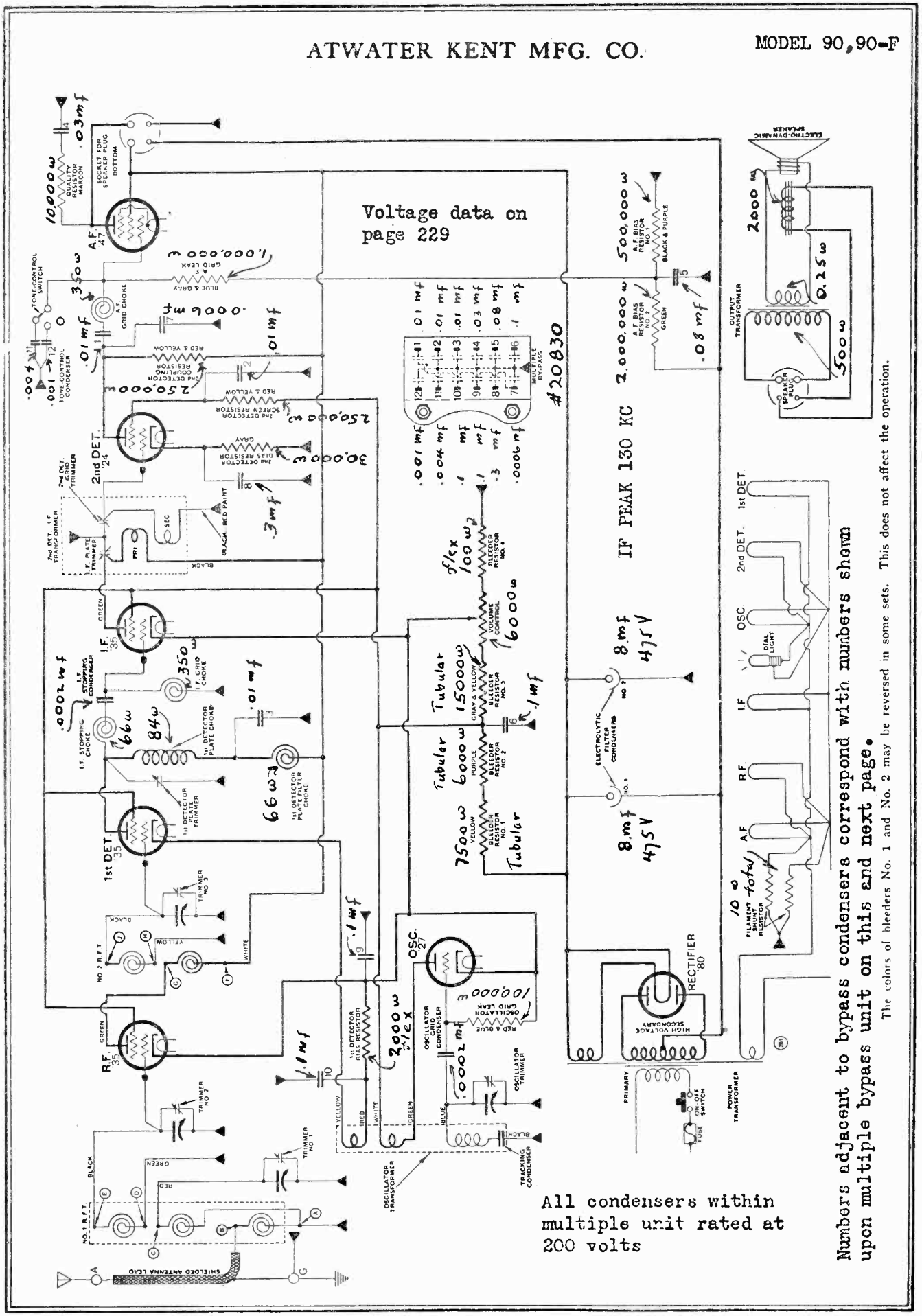
By-pass Condensers

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.

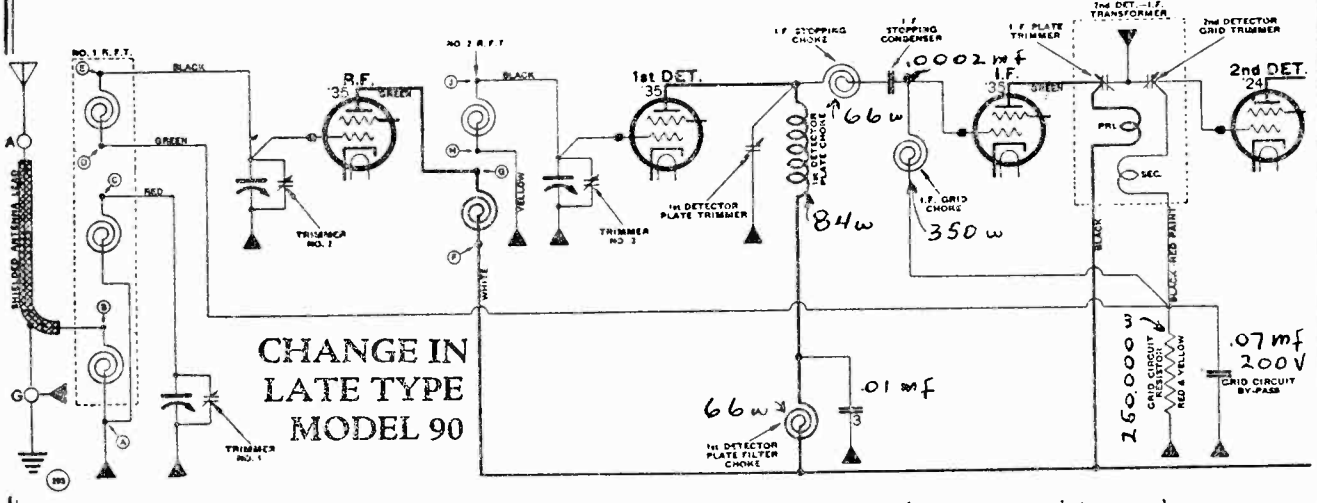
Tone-control Condenser
13—Tone-control condenser.
14—Tone-control condenser.
15—Tone-control condenser.
16—Tone-control condenser.



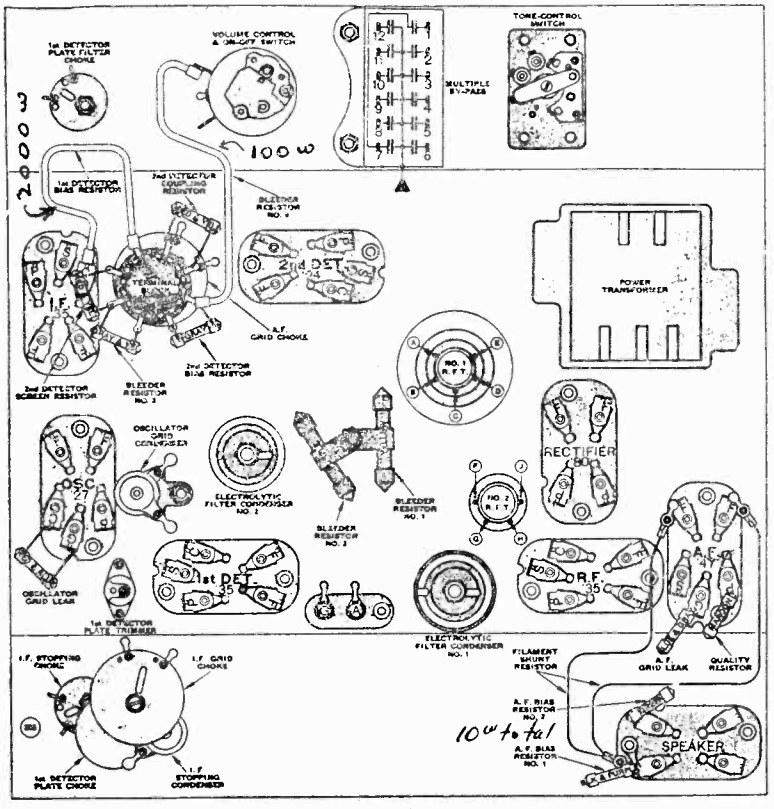
Voltage reference page 3-83.

MODEL 90, 90-F
Early and Late

ATWATER KENT MFG. CO.



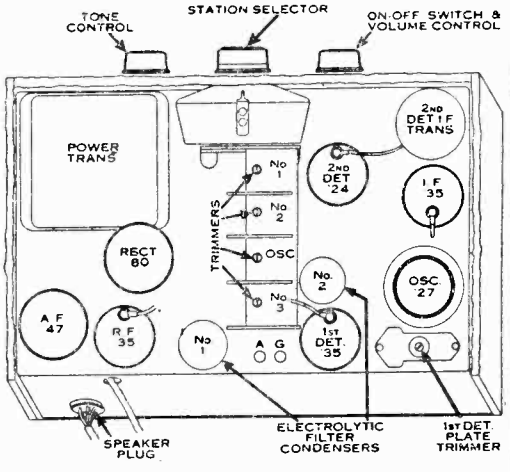
In late type Model 90, the grid returns of the R. F., I. F., and 2nd-detector tubes are connected to ground through a red-and-yellow resistor as shown above.



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.

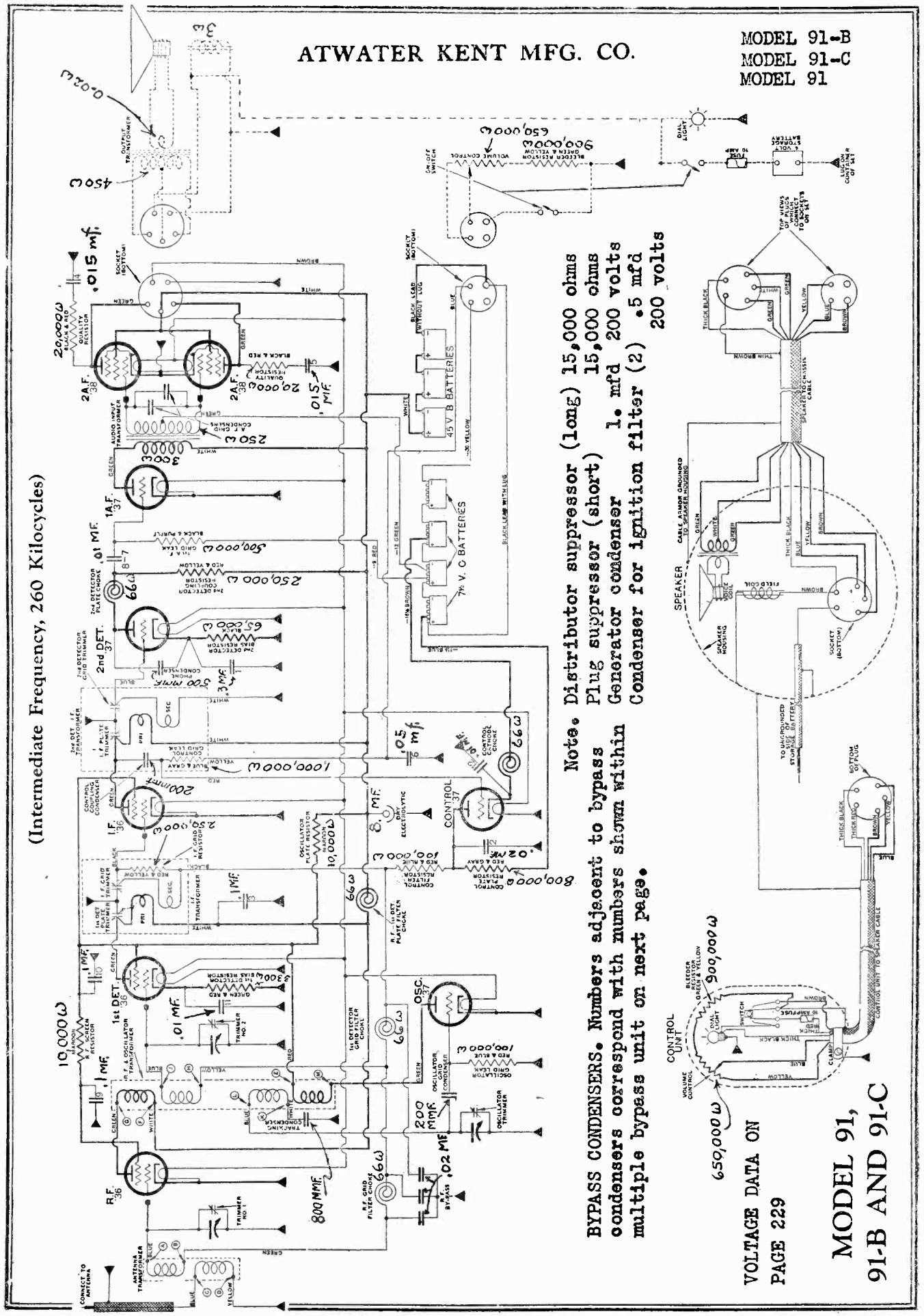


TOP VIEW.

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.

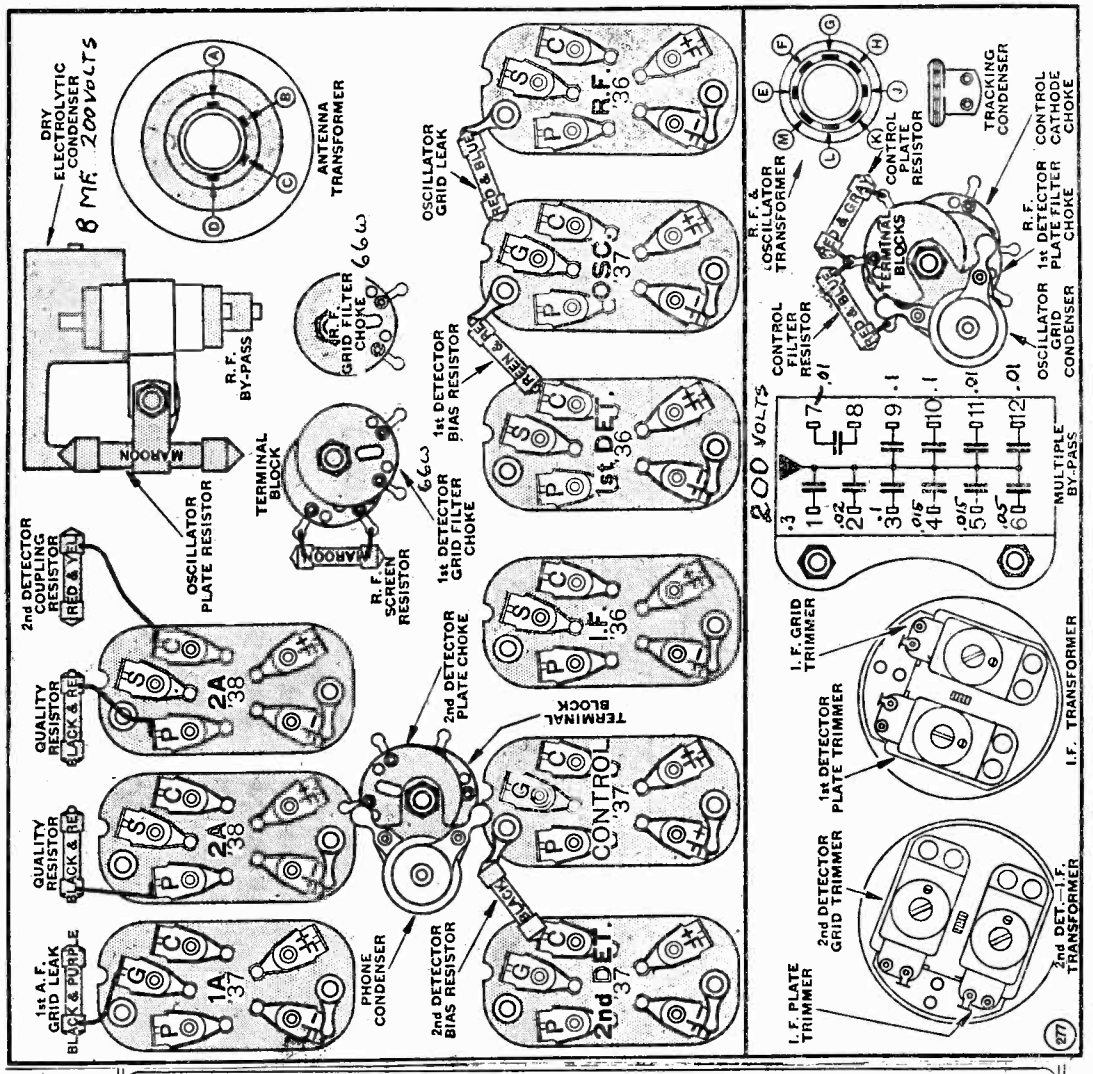


MODEL 91-B
MODEL 91-C
MODEL 91

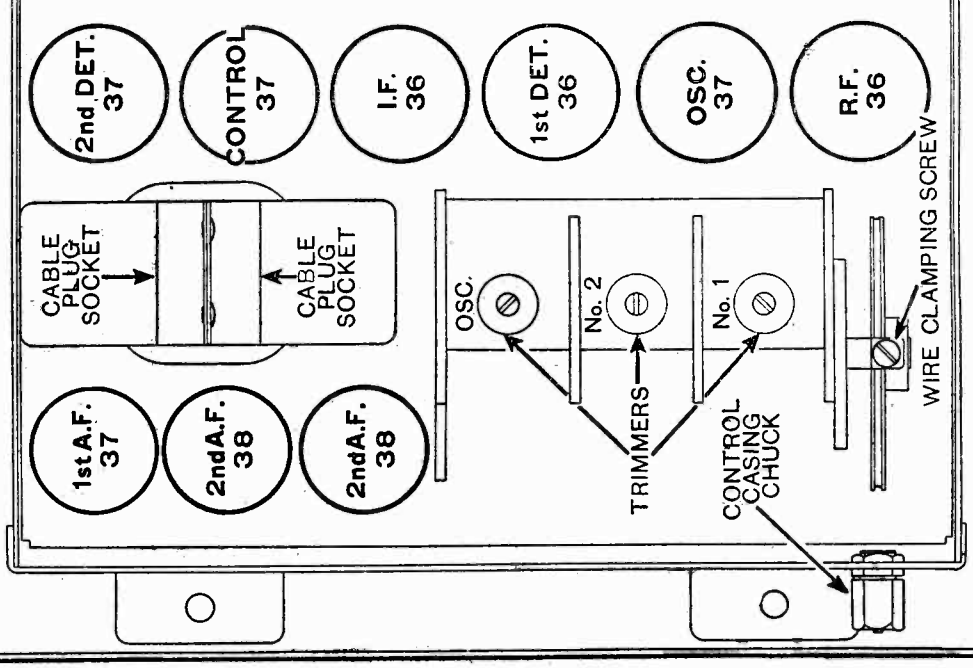
ATWATER KENT MFG. CO.

MODEL 91, 91-B, 91-C

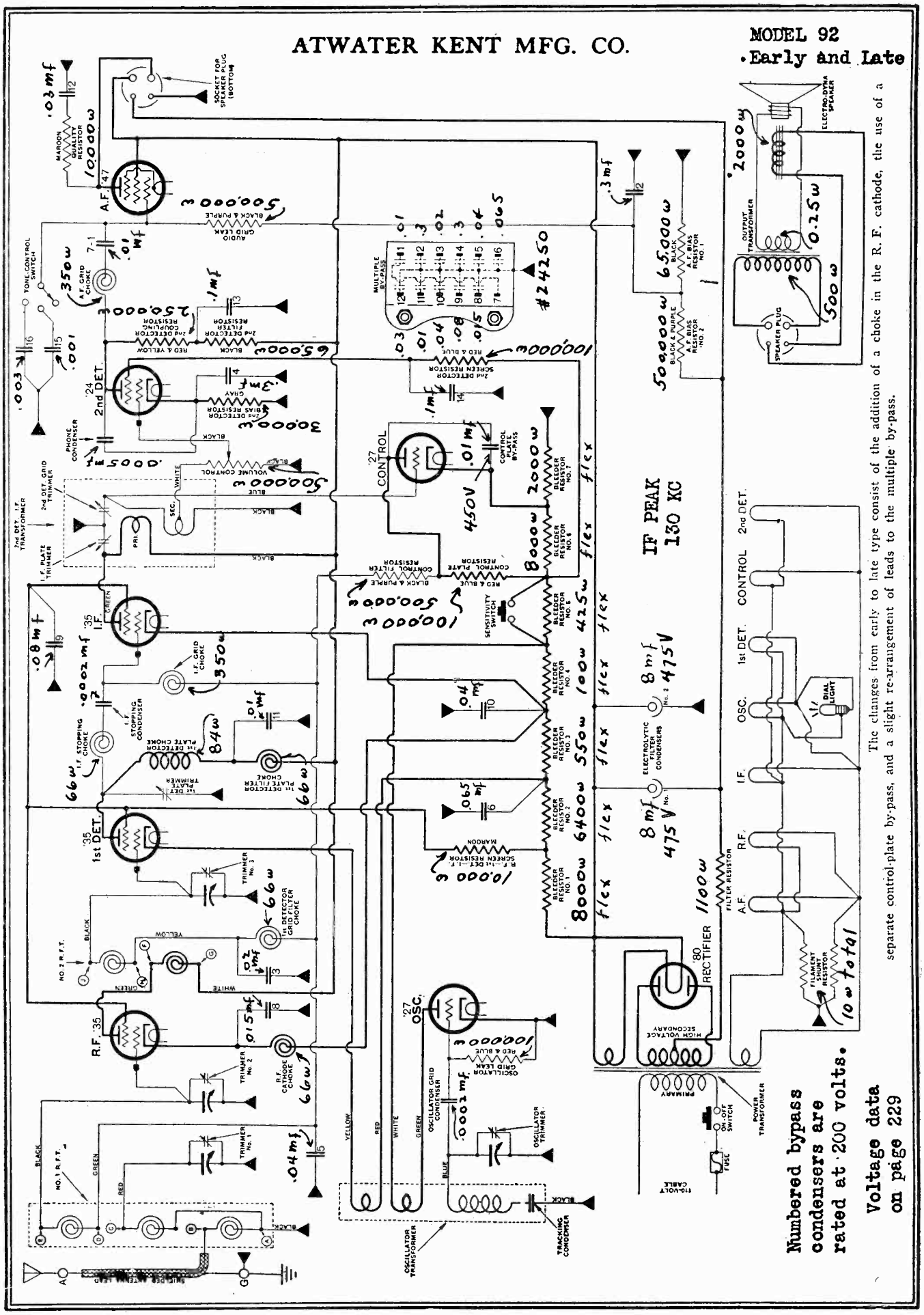
(Intermediate Frequency, 260 Kilocycles)



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



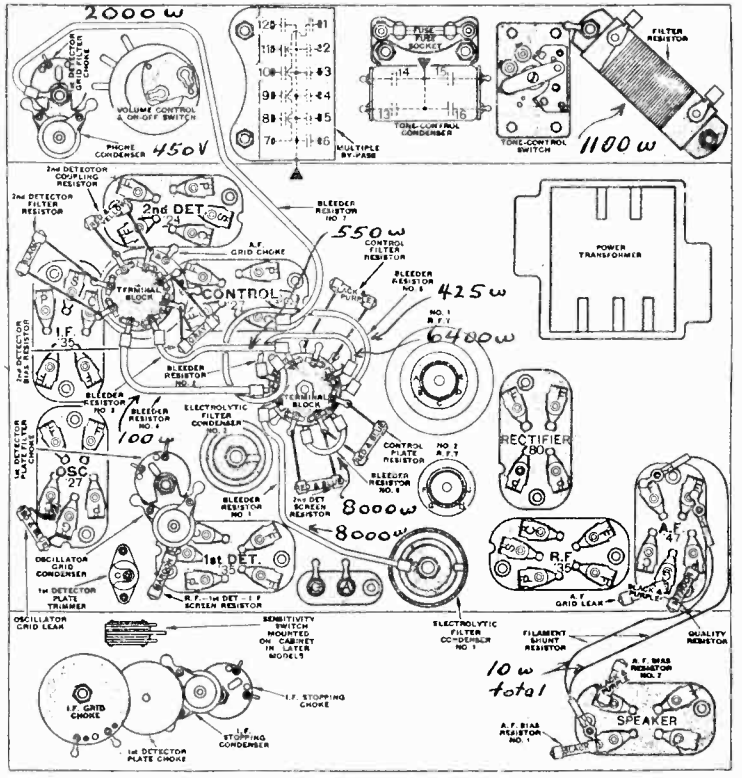
Top View of Model 91, 91-B and 91-C Chassis Showing Location of Tubes.



Voltage reference page 3-83.

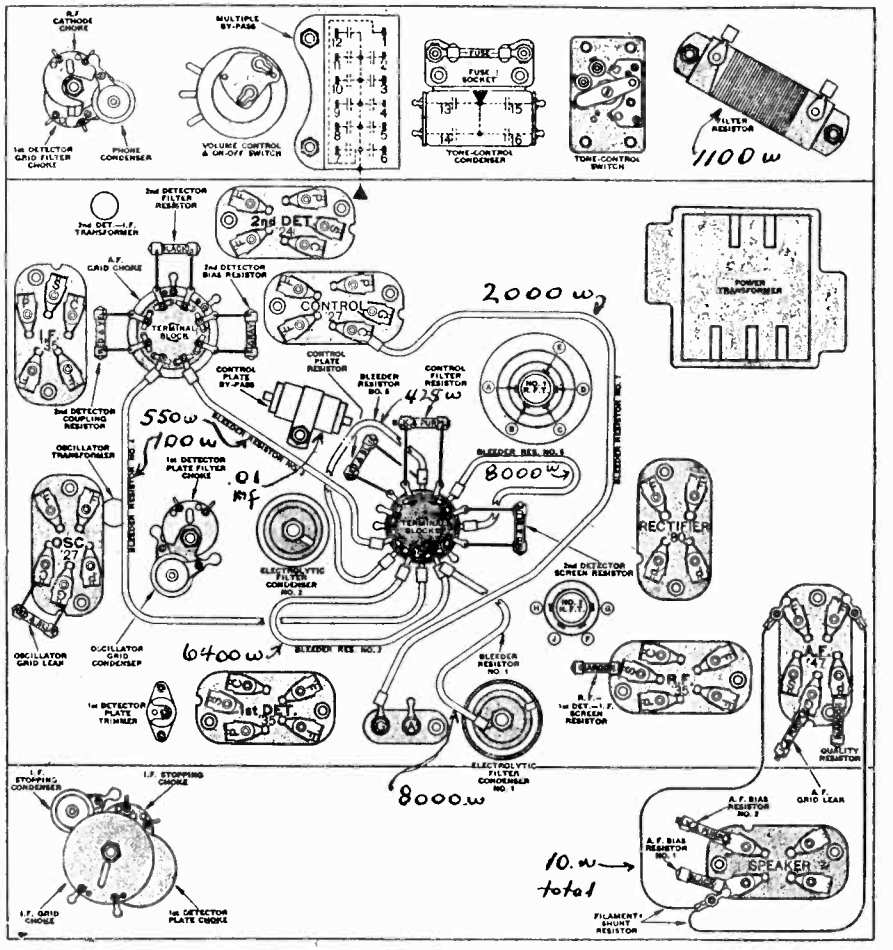
MODEL 92
Early and Late

ATWATER KENT MFG. CO.



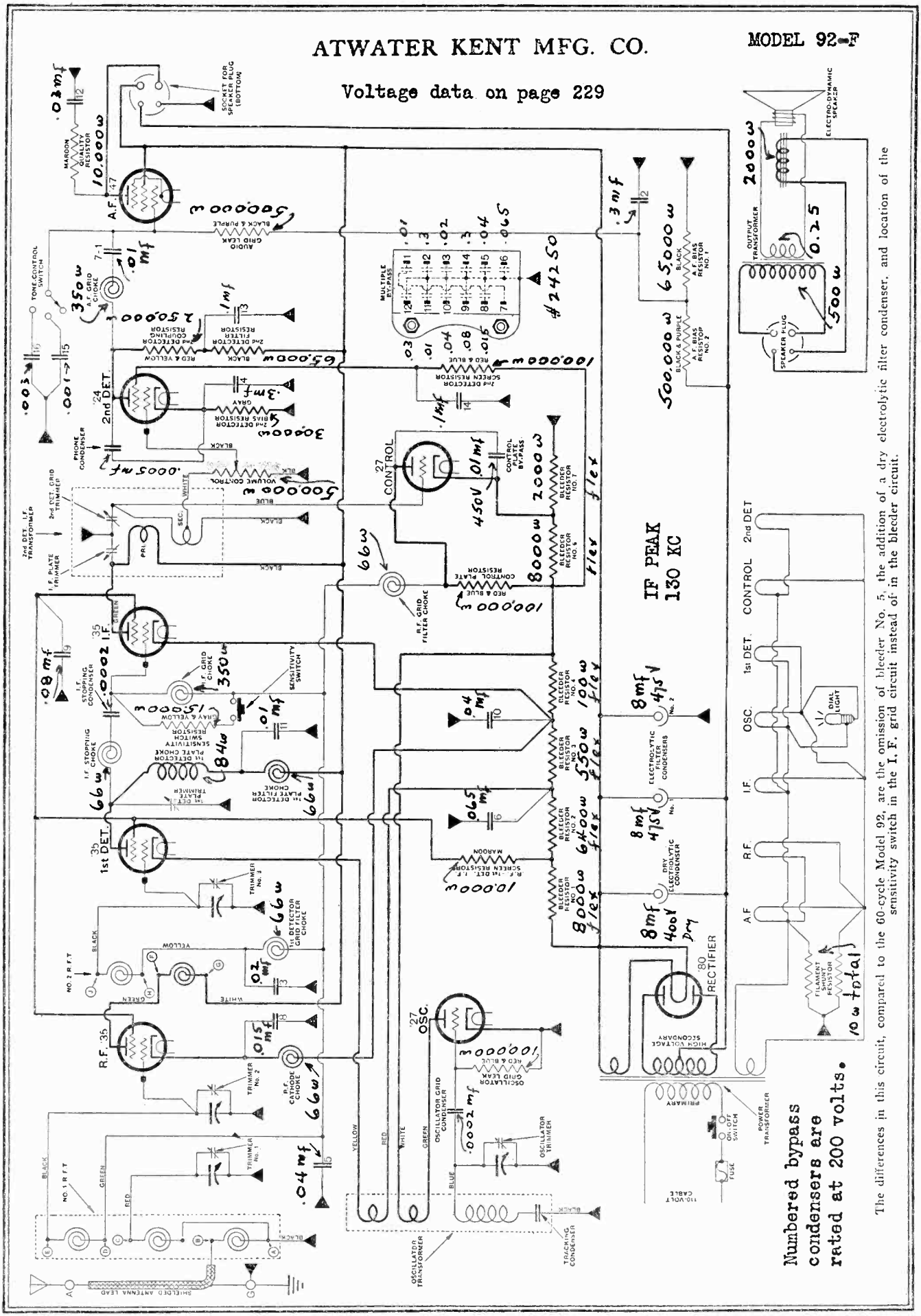
By-pass Condensers in Early-Type Model 92

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.



Voltage reference page 3-83.

MODEL 92
MODEL 92-F

ATWATER KENT MFG. CO.

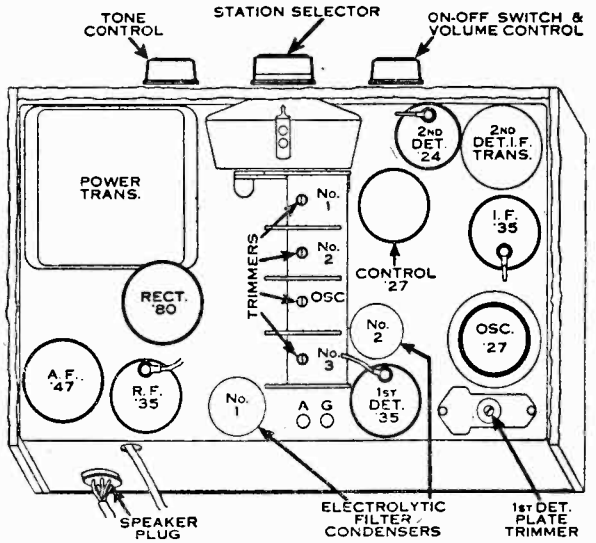
By-pass Condensers in Late-Type 92 and 92-F

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.

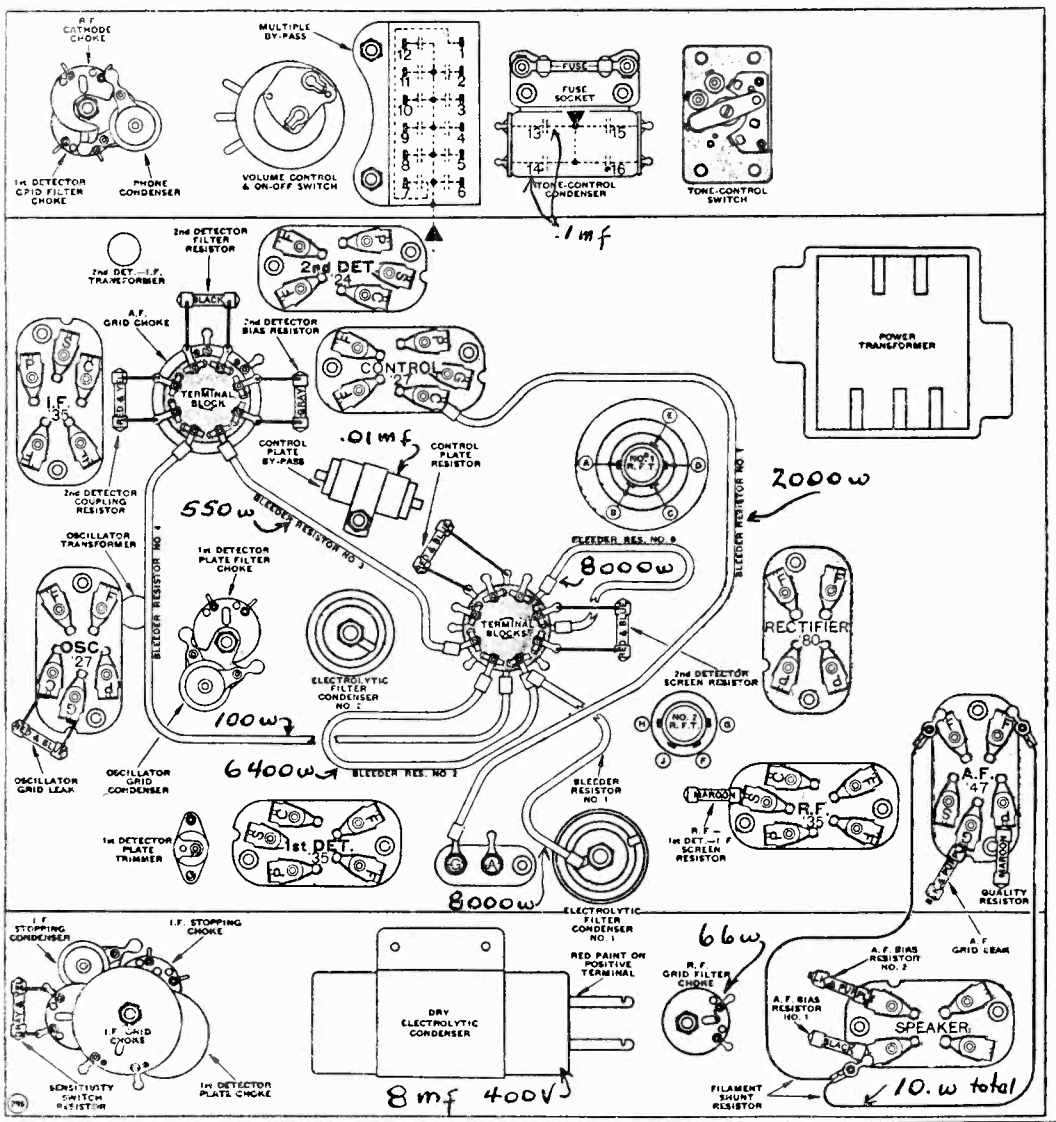
Tone-control Condenser

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

MODEL 92, 92-F TOP VIEW

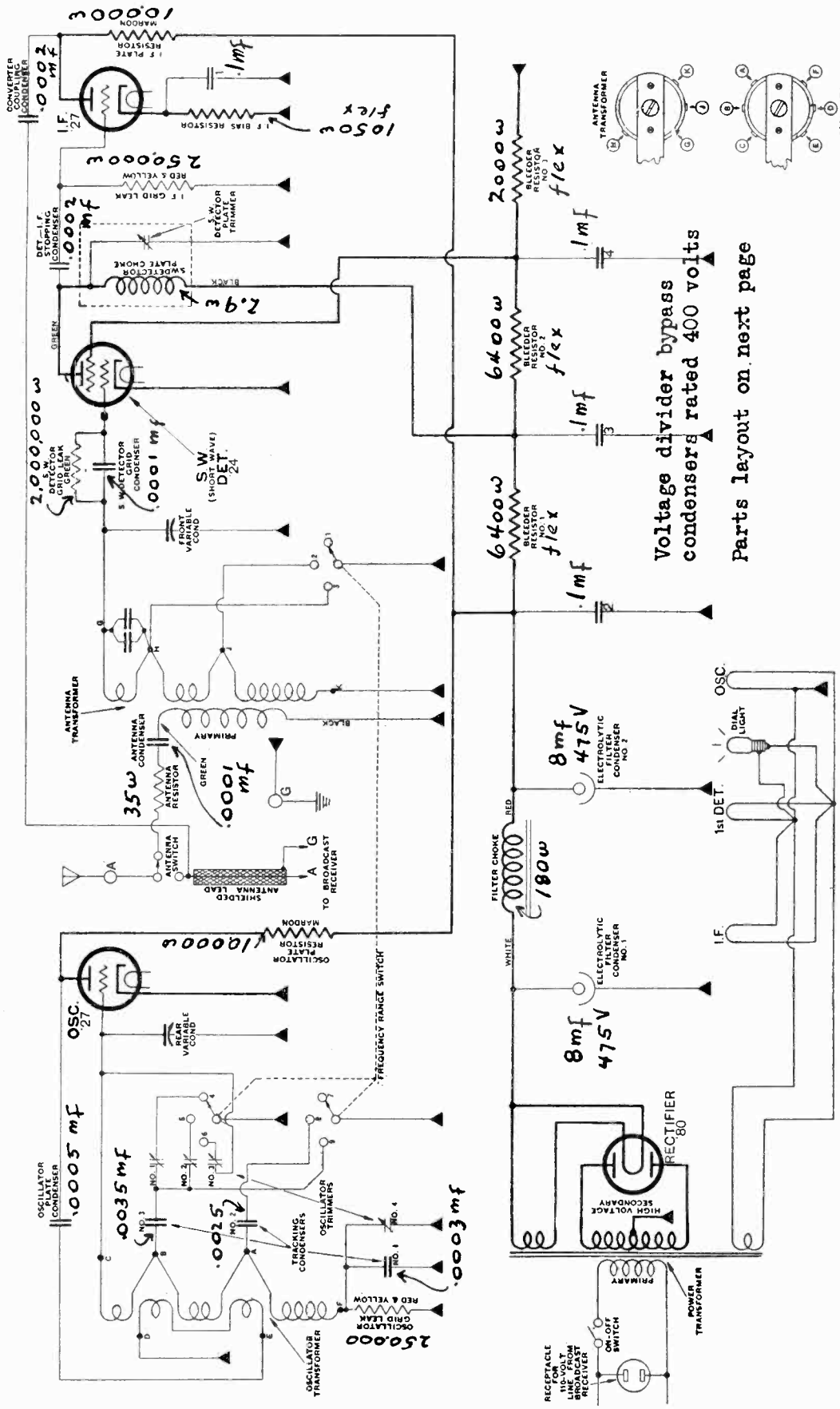


MODEL 92-F CHART



ATWATER KENT MFG. CO.

MODEL 93
Short Wave
Converter

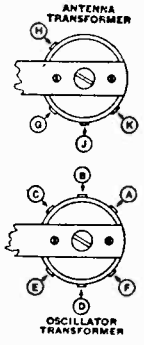


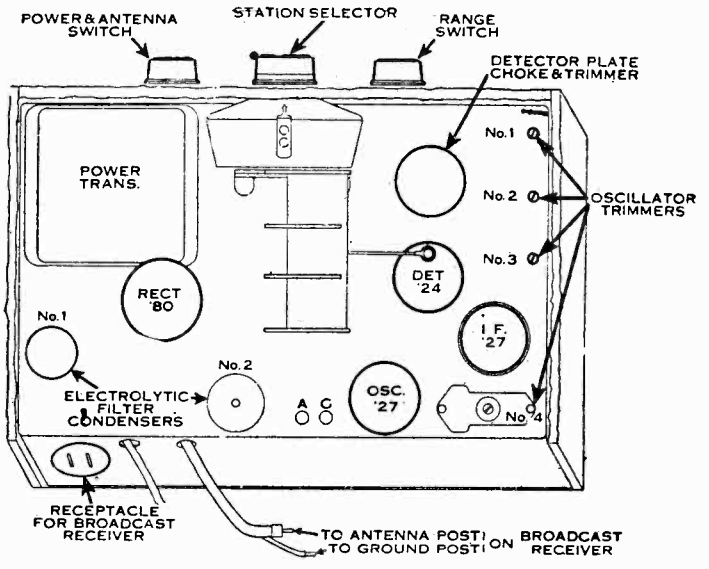
Voltage reference page 3-83.

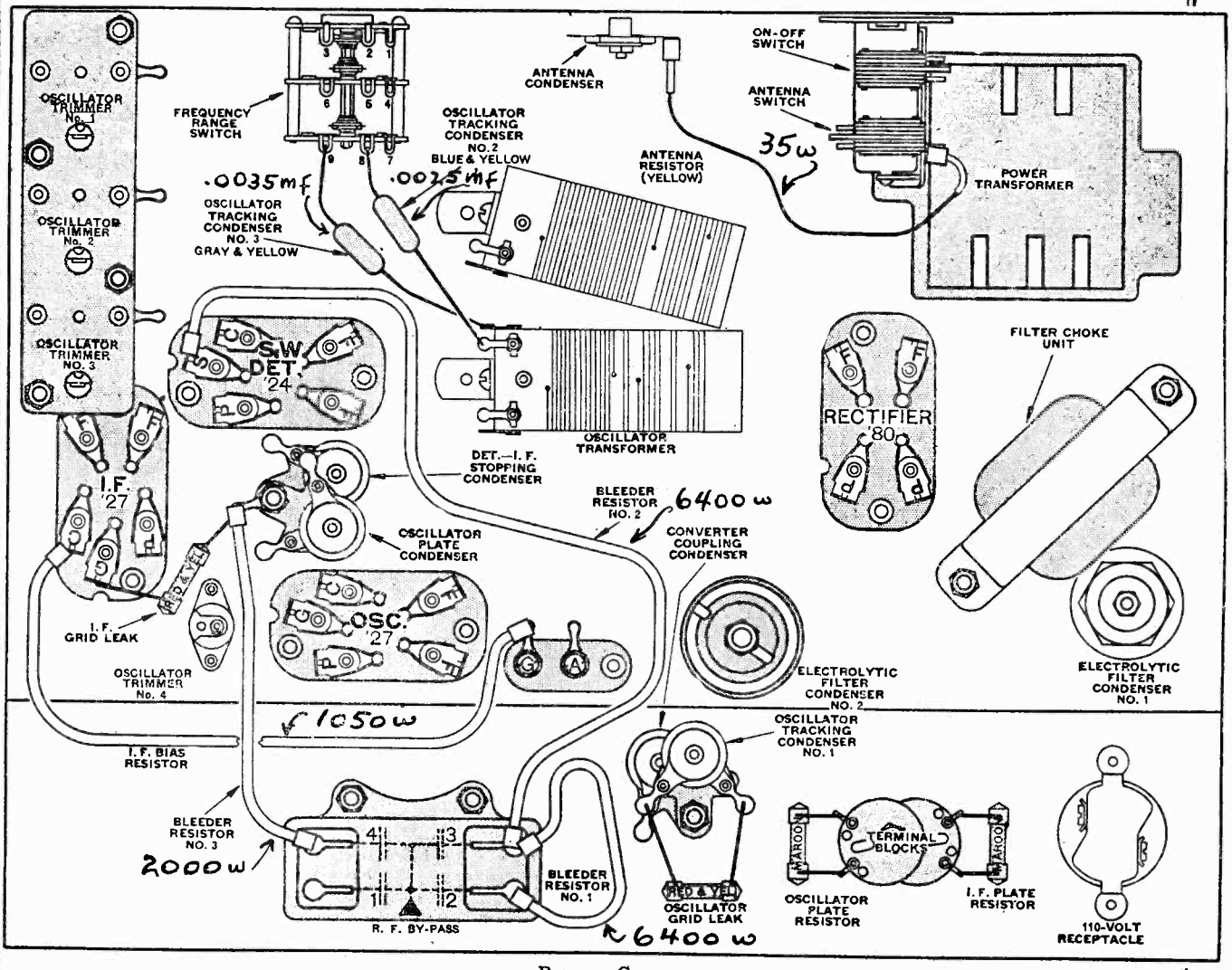
MODEL 93
Short Wave
Converter

ATWATER KENT MFG. CO.

SHORT WAVE CONVERTER





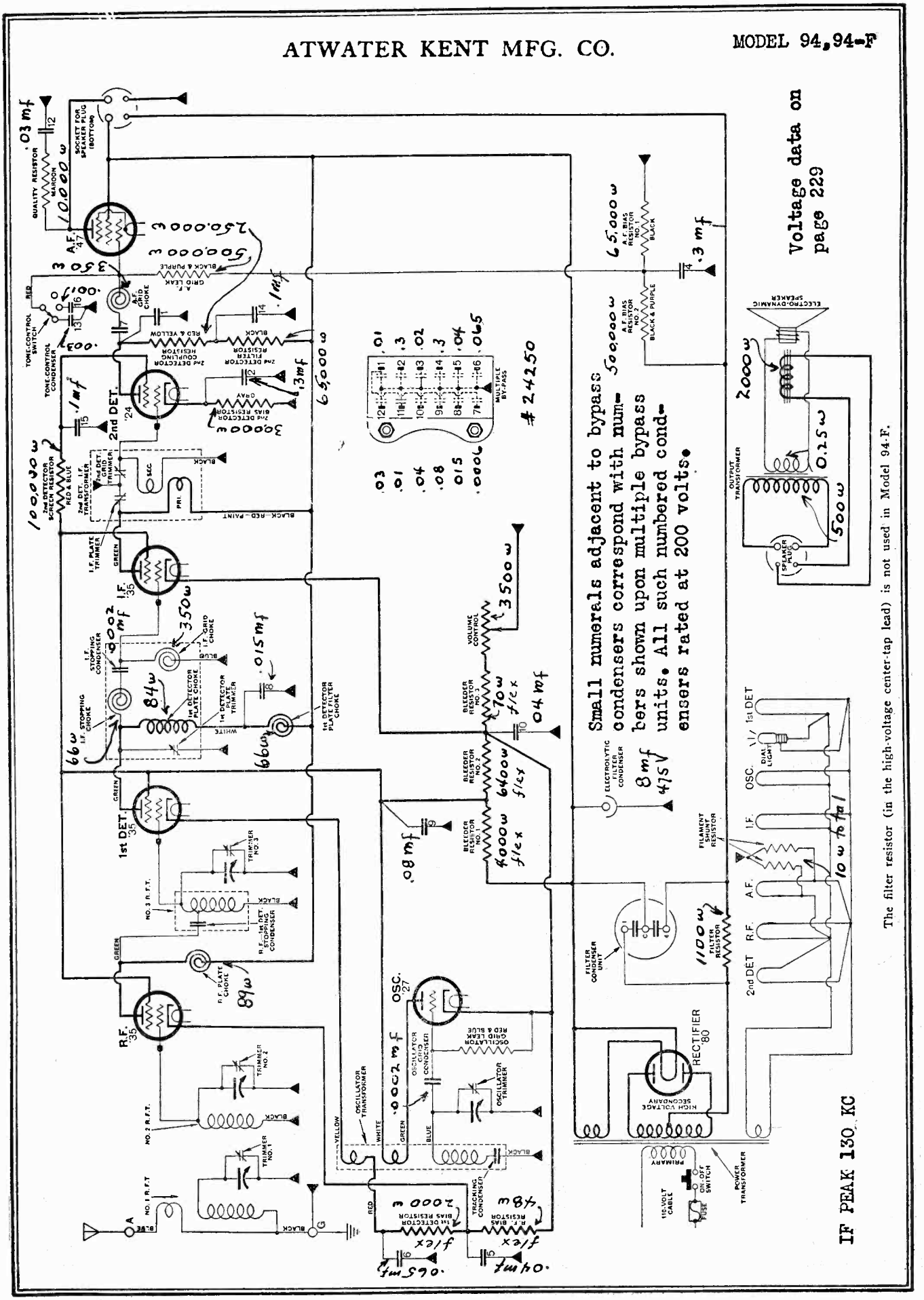


BOTTOM CHART.

In servicing this converter, do not change the original position of the wiring as it will disturb 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.

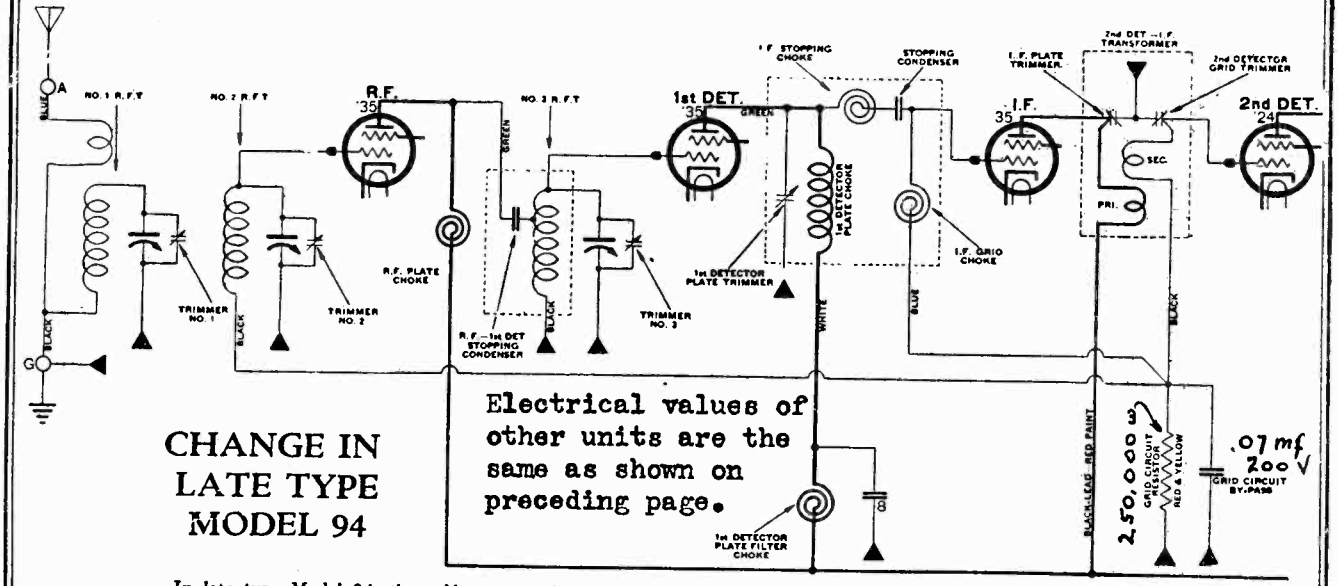
MODEL 94, 94-F



Voltage reference page 3-83.

MODEL 94, 94-F

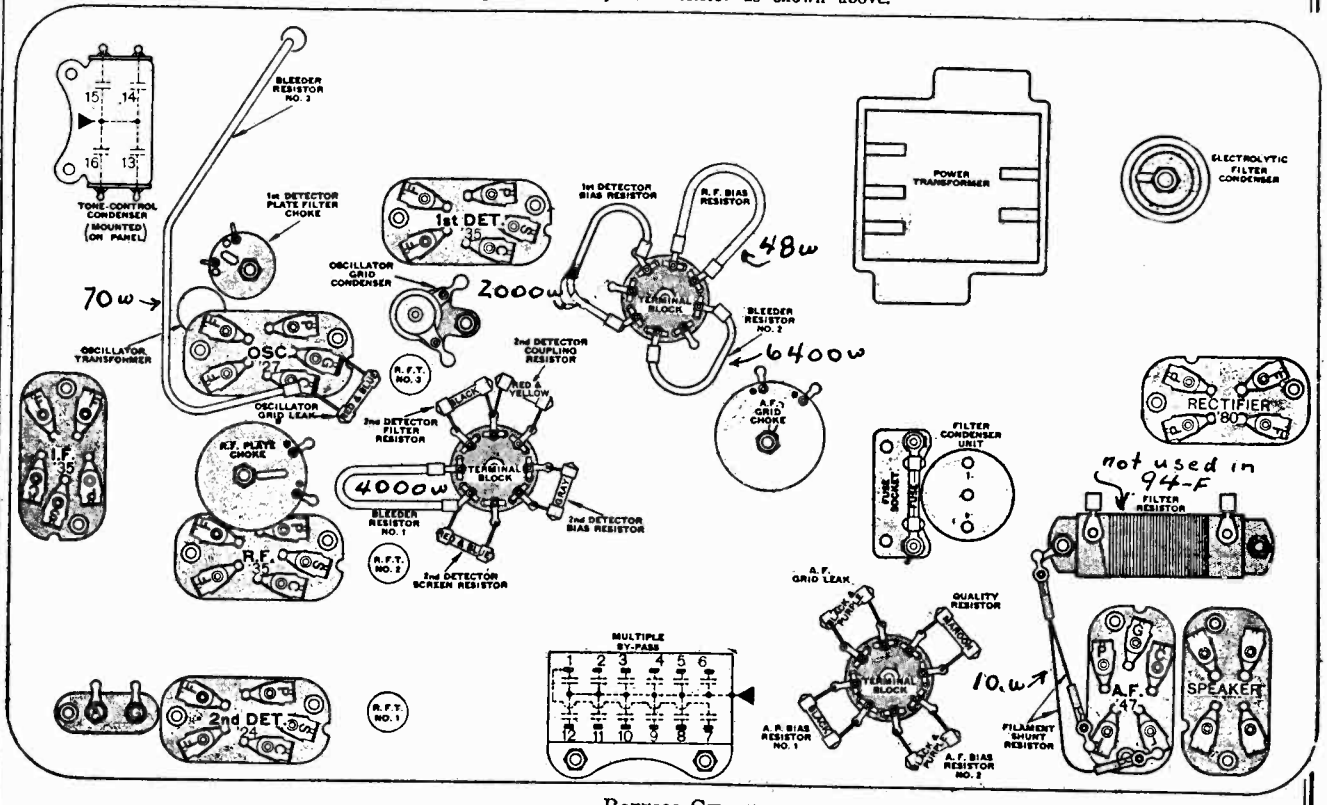
ATWATER KENT MFG. CO.



CHANGE IN LATE TYPE MODEL 94

Electrical values of other units are the same as shown on preceding page.

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.

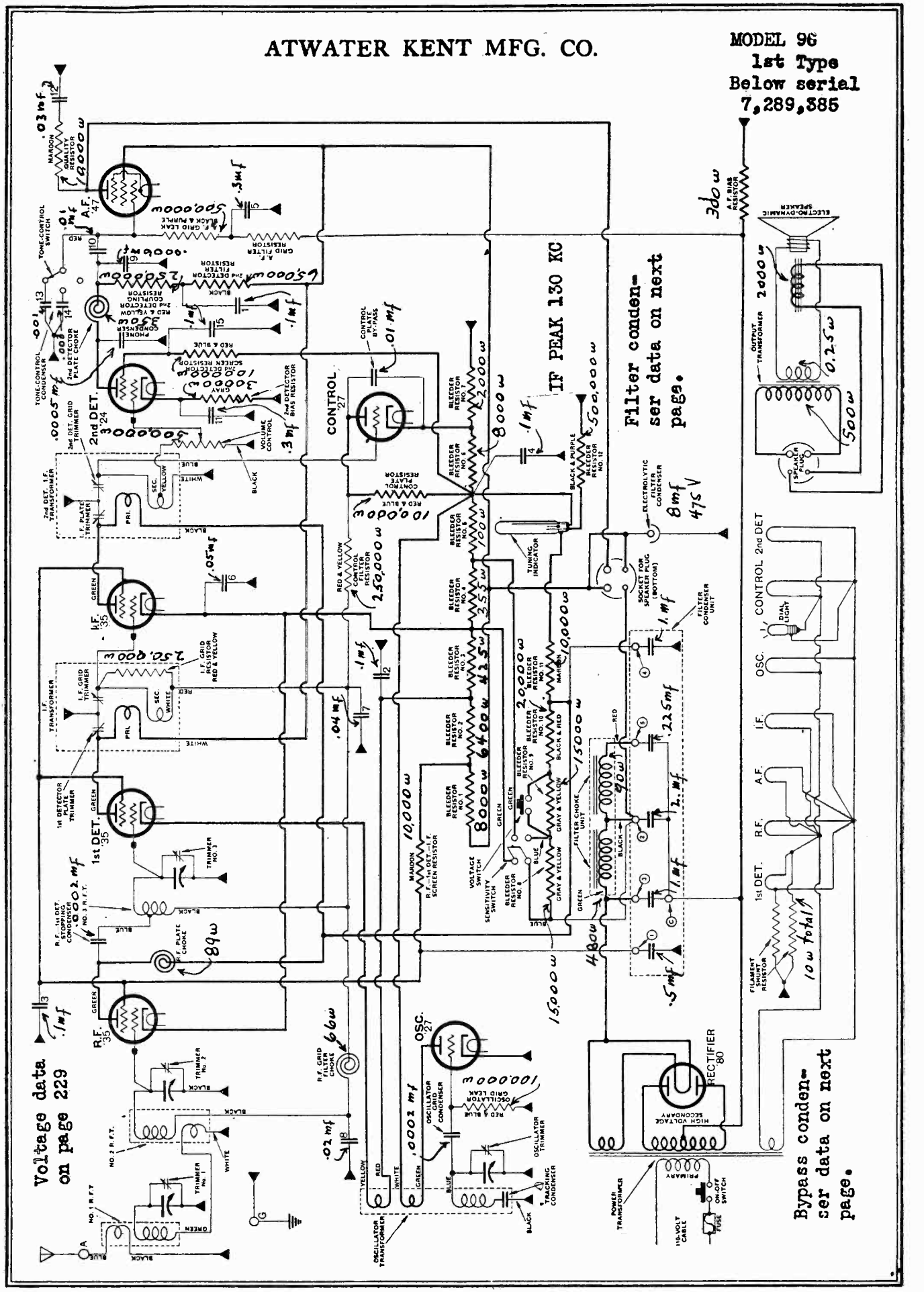
The filter resistor is not used in Model 94-F.

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.

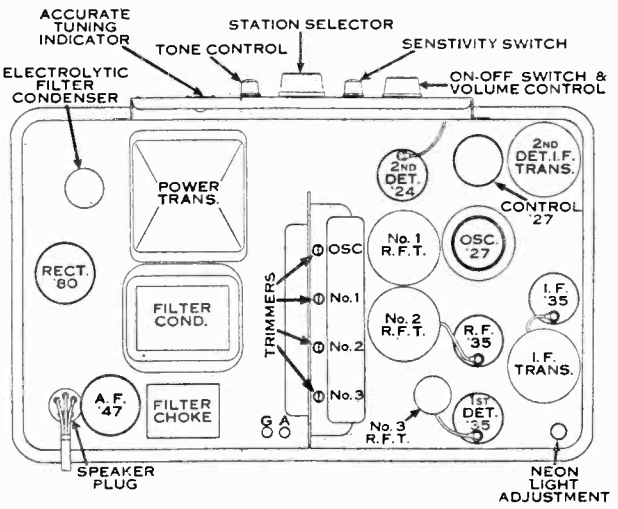


Voltage reference page 3-83.

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.

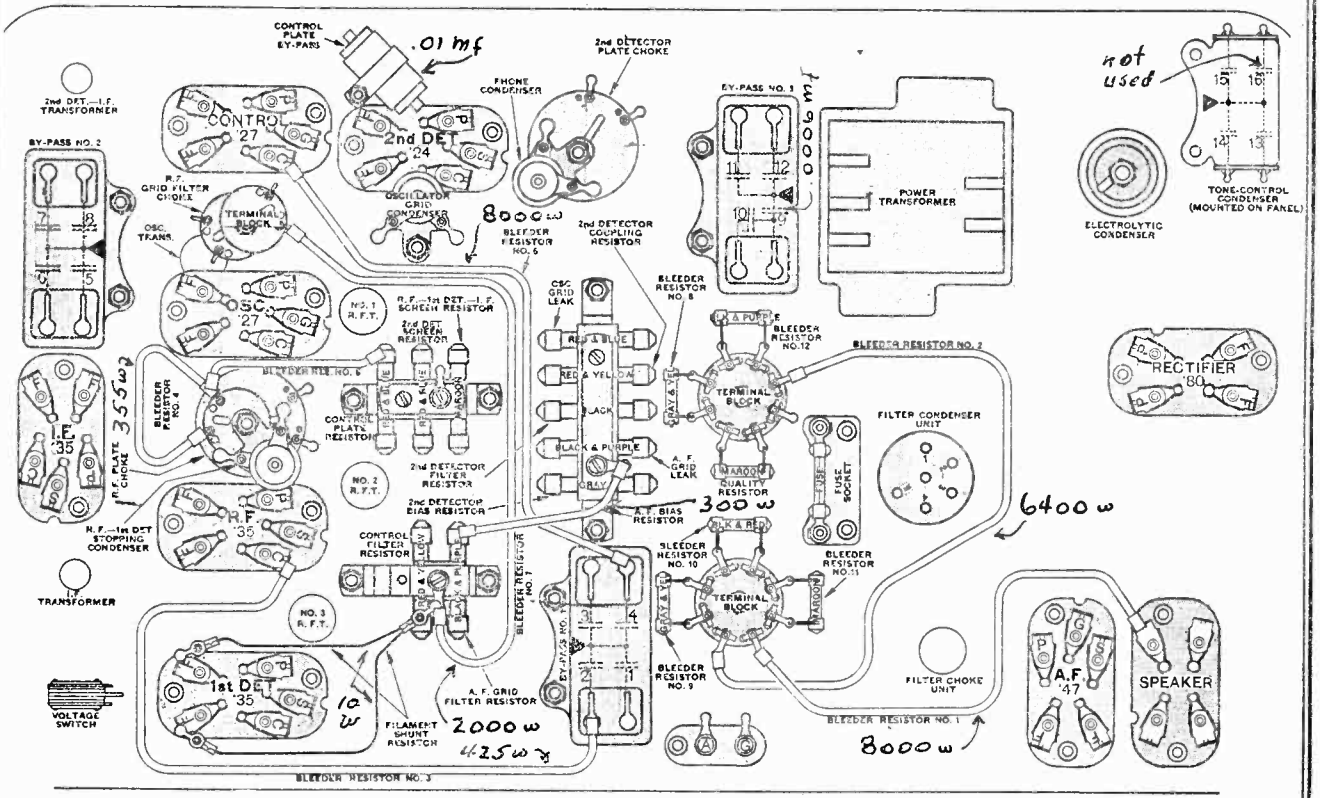
Tone-control Condenser (on panel)

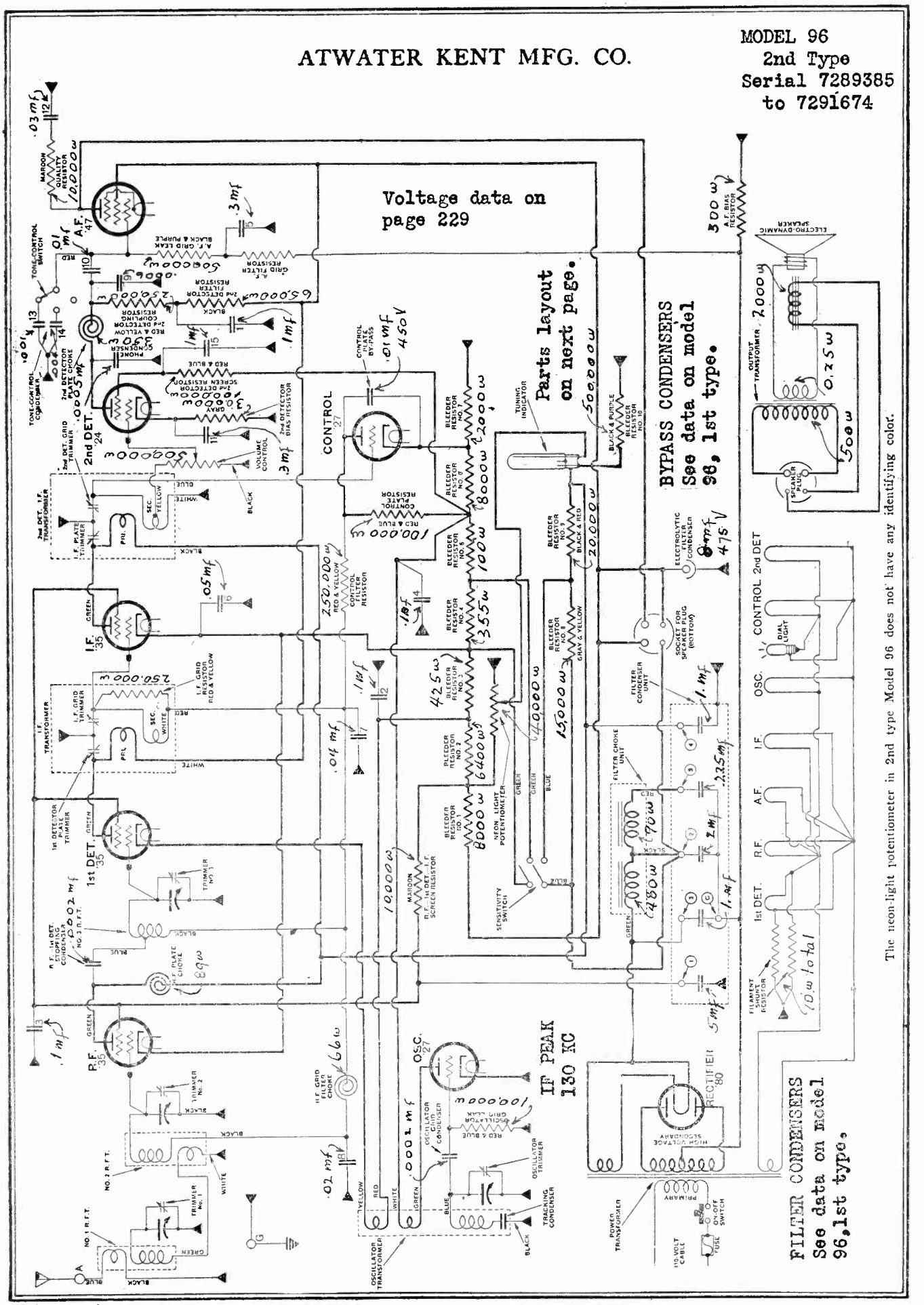
13—Tone condenser.
14—Tone condenser.
15—2nd-detector screen by-pass.
16—Not used.

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





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

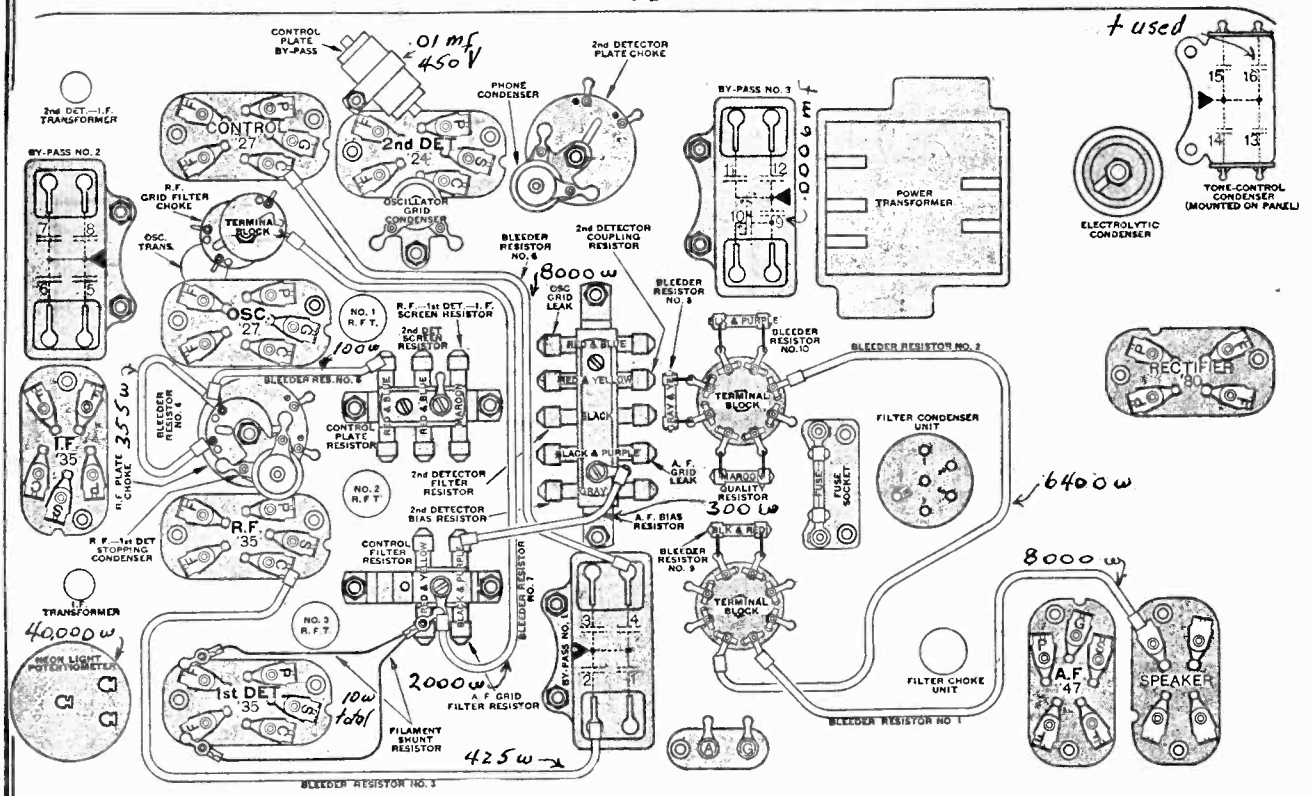
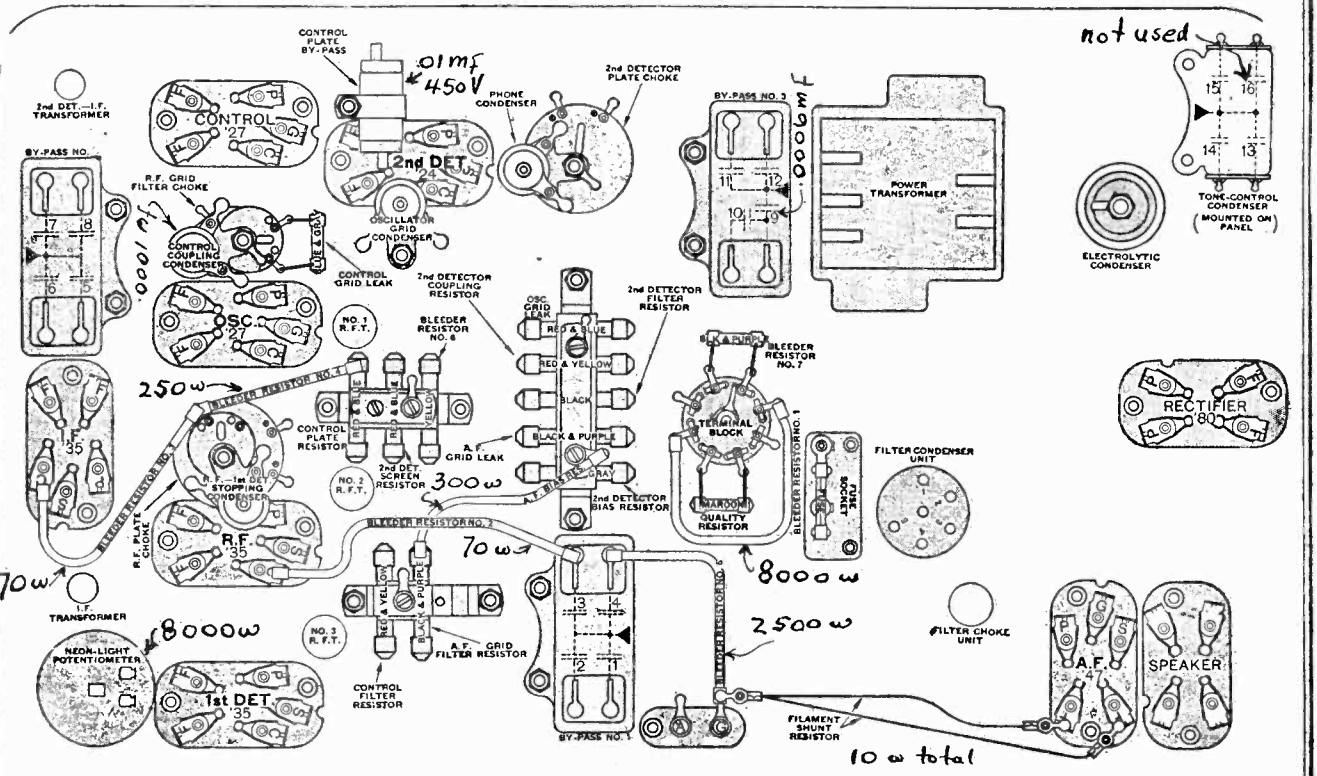
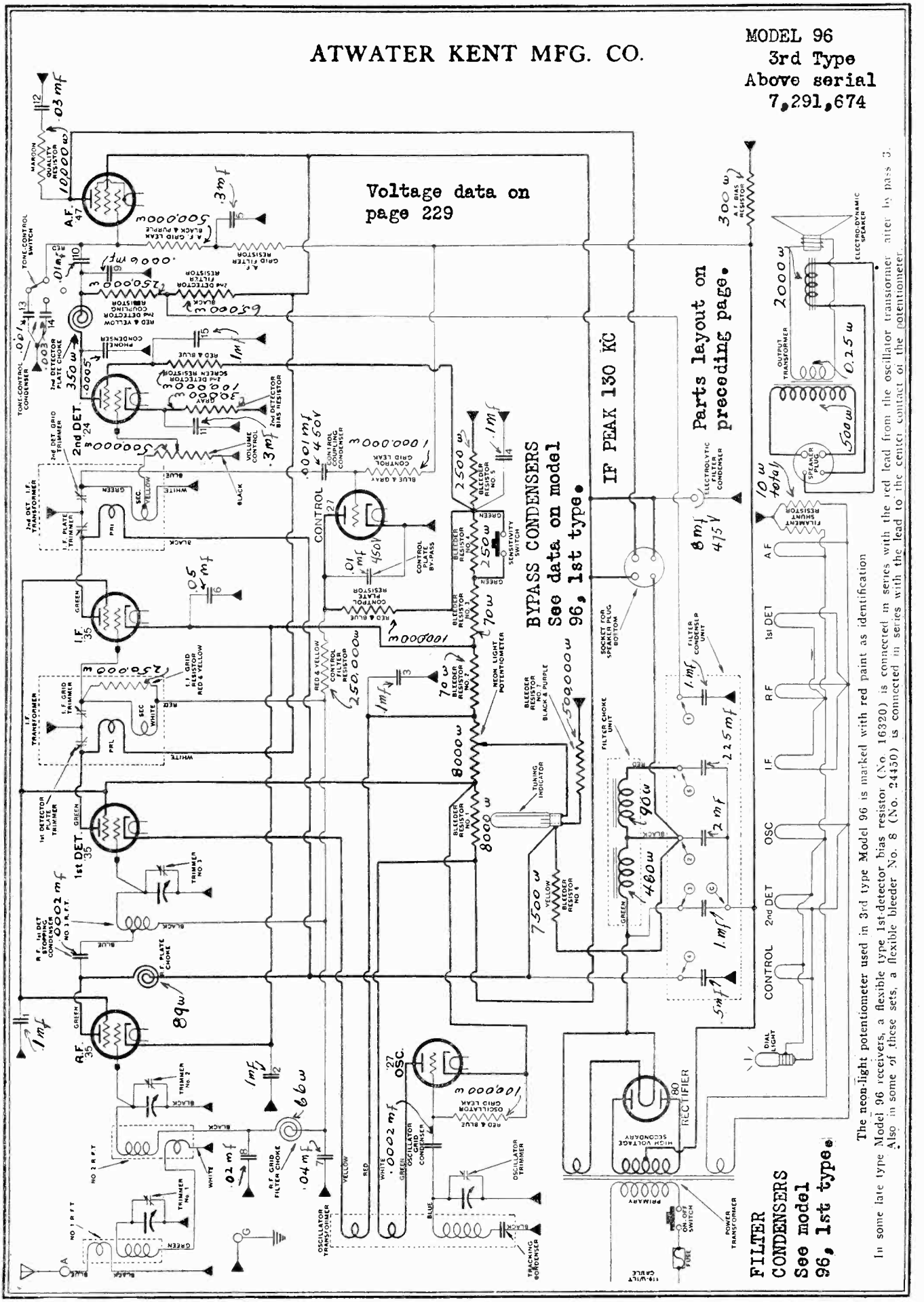


CHART OF MODEL 96 (3rd Type) Above Serial No. 7291674



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.



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

VOLTAGES ACROSS BLEEDER AND BIAS RESISTORS

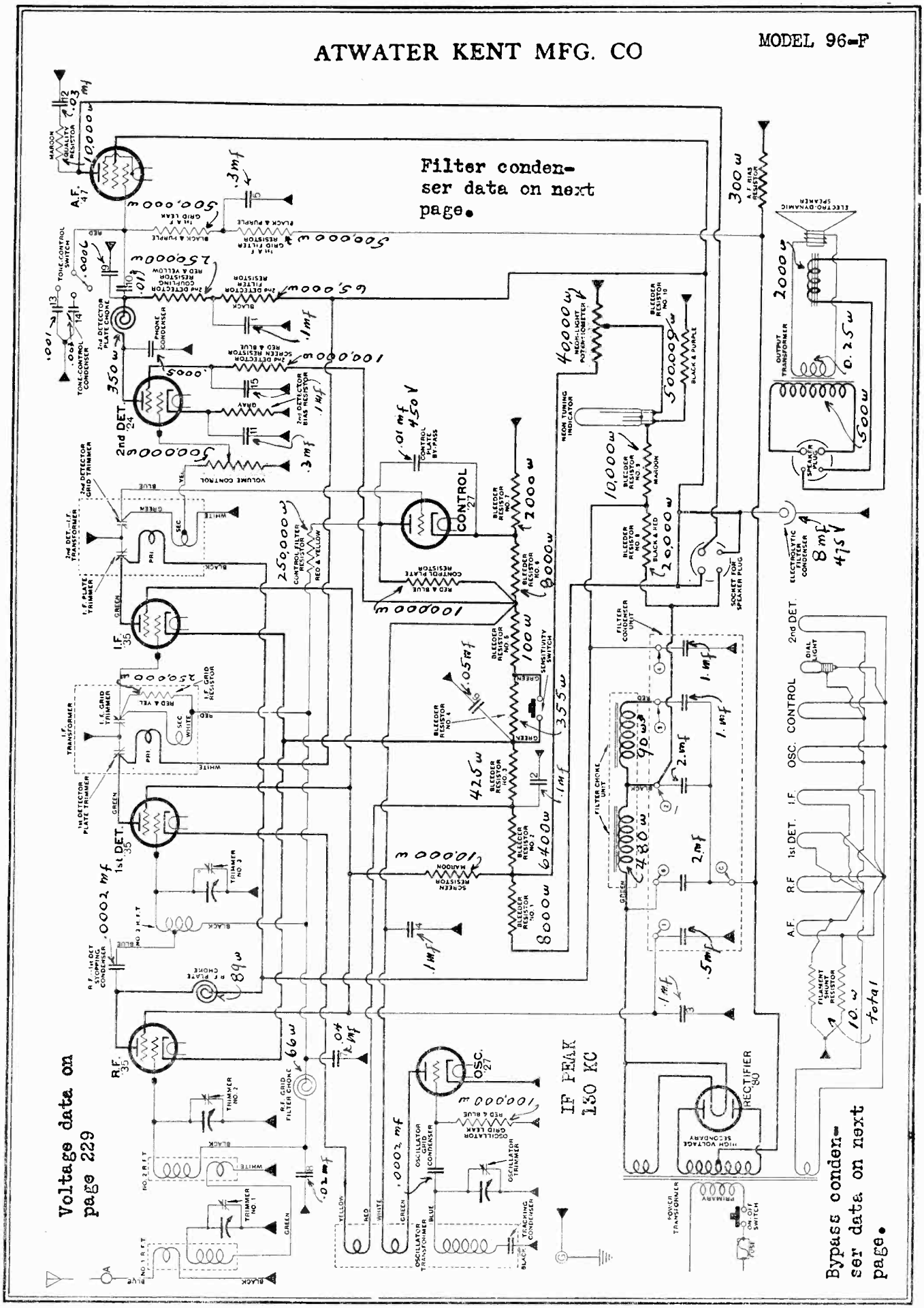
RESISTOR	188 188-F	260 260-F 1st type	260 260-F 2nd type	469 469-F
Bleeder No. 1	50	92	90	50
Bleeder No. 2	85	108	75	110
Bleeder No. 3	70	73	55	8
Bleeder No. 4	11	20	15	12
Bleeder No. 5	—	88	30	Slight
Bleeder No. 6	—	50	85	35
Bleeder No. 7	—	—	—	55
1st-detector bias	5	2	1	3
R. F.-I. F. bias No. 1	Slight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

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

* 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

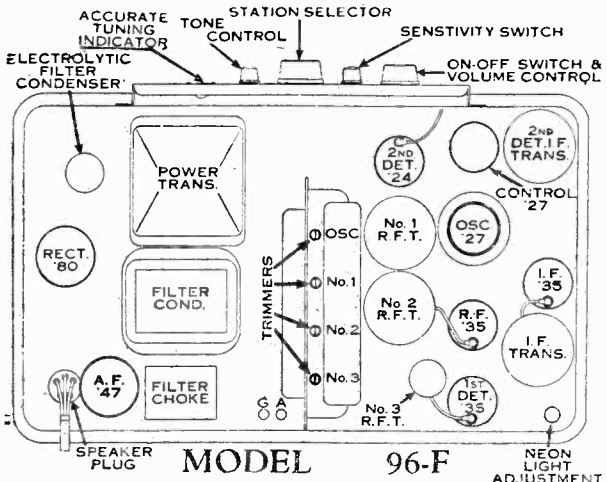
MODEL 96-F



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)

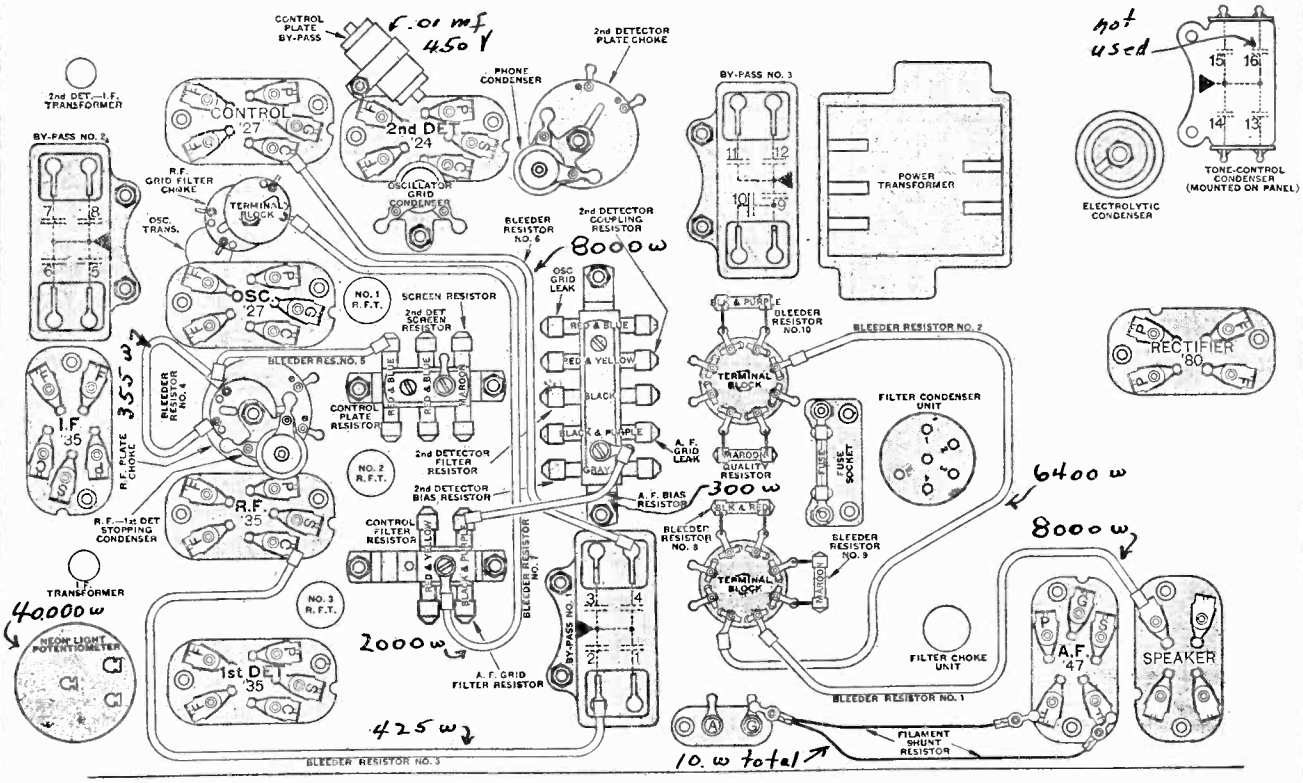
13—Tone condenser.
14—Tone condenser.
15—2nd-detector screen by-pass.
16—Not used.

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

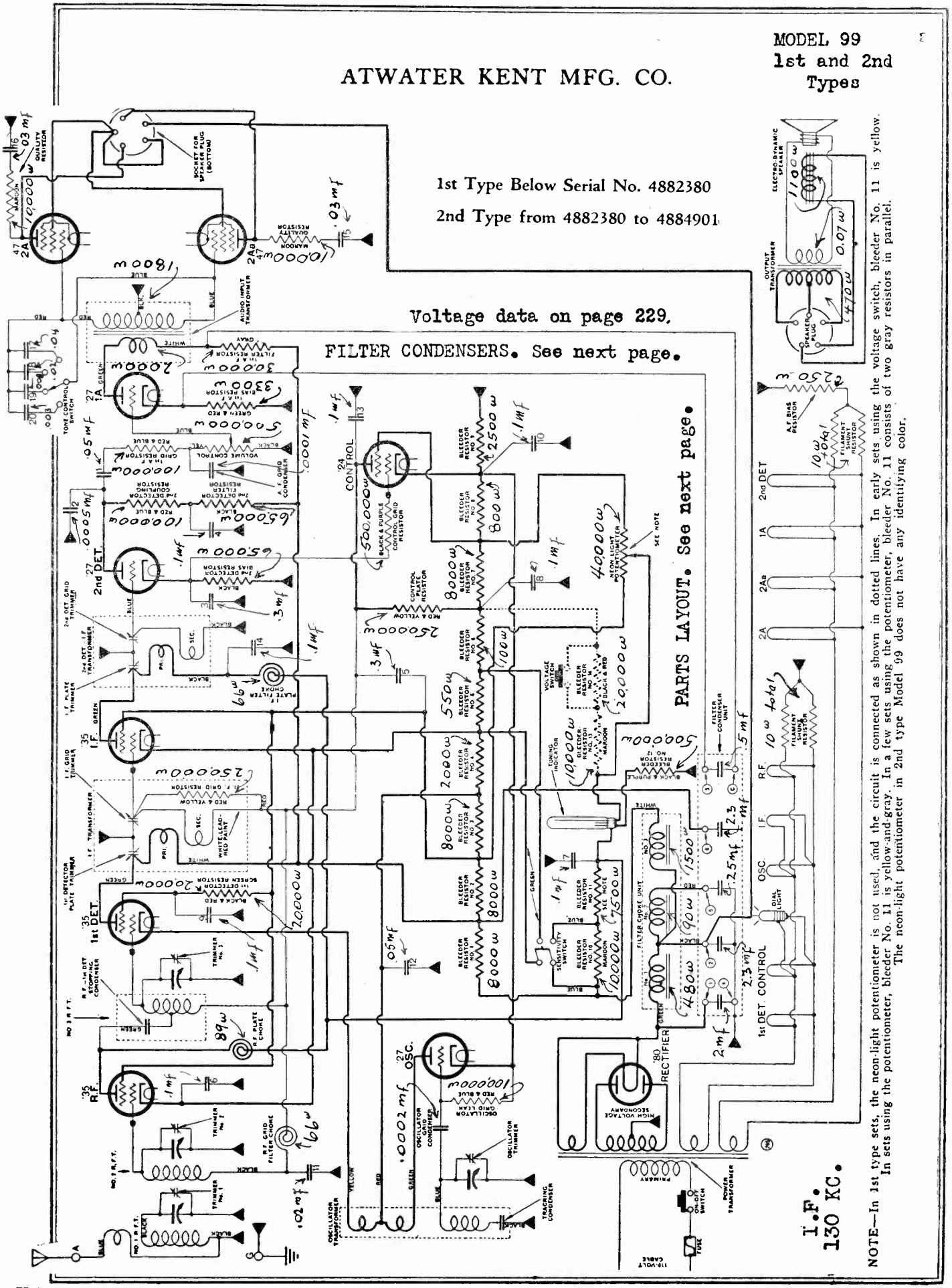
1st Type Below Serial No. 4882380

2nd Type from 4882380 to 4884901

Voltage data on page 229.

FILTER CONDENSERS. See next page.

PARTS LAYOUT. See next page.



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

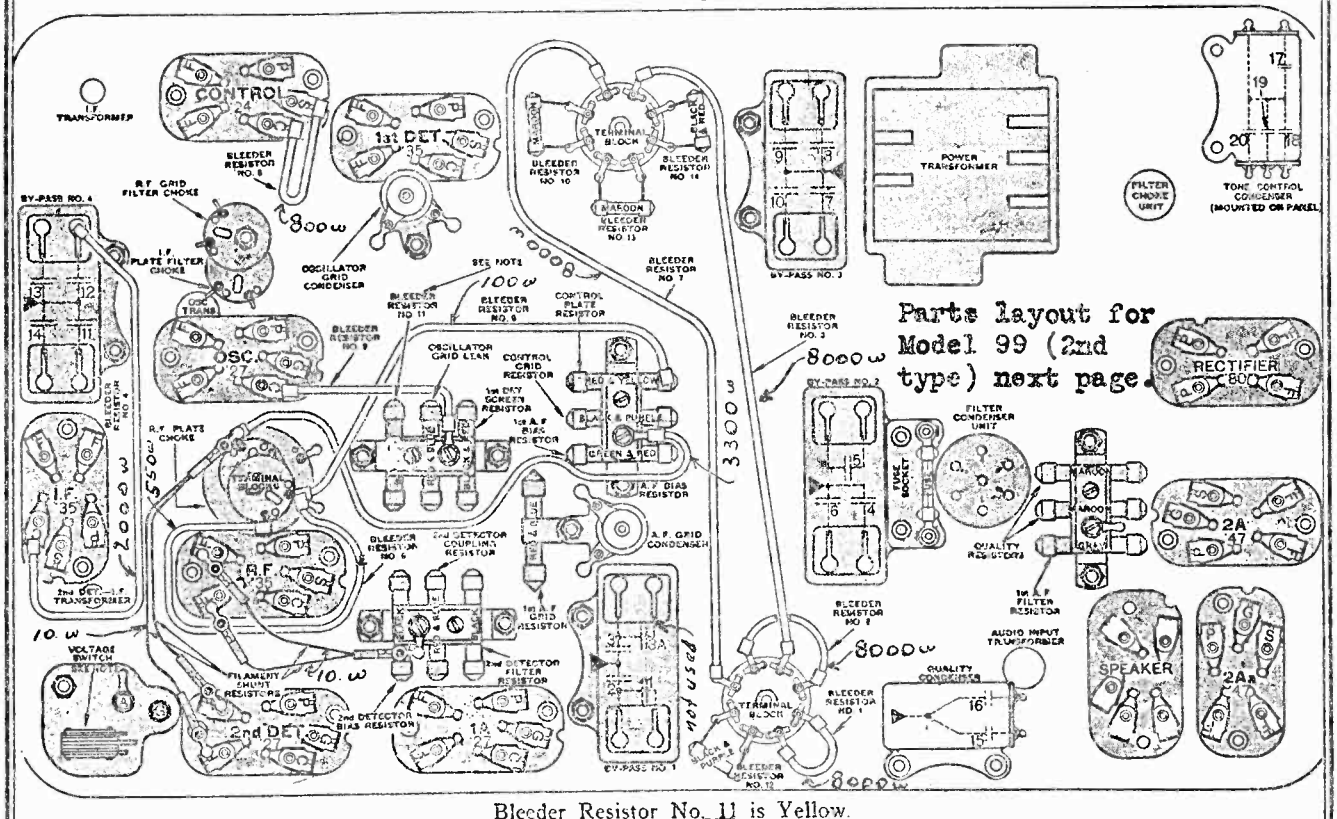
ATWATER KENT MFG. CO.

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



Parts layout for Model 99 (2nd type) next page.

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 #21450

Quality Condenser

15—Quality condenser
16—Quality condenser.

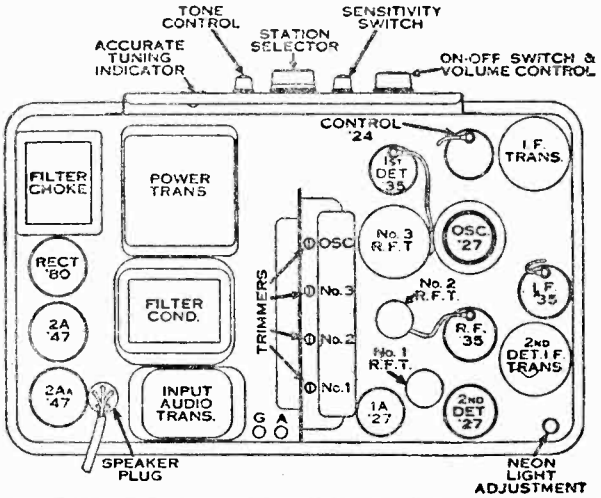
450 volts #21450

Tone-control Condenser (on panel)

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

200 volts #21530

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

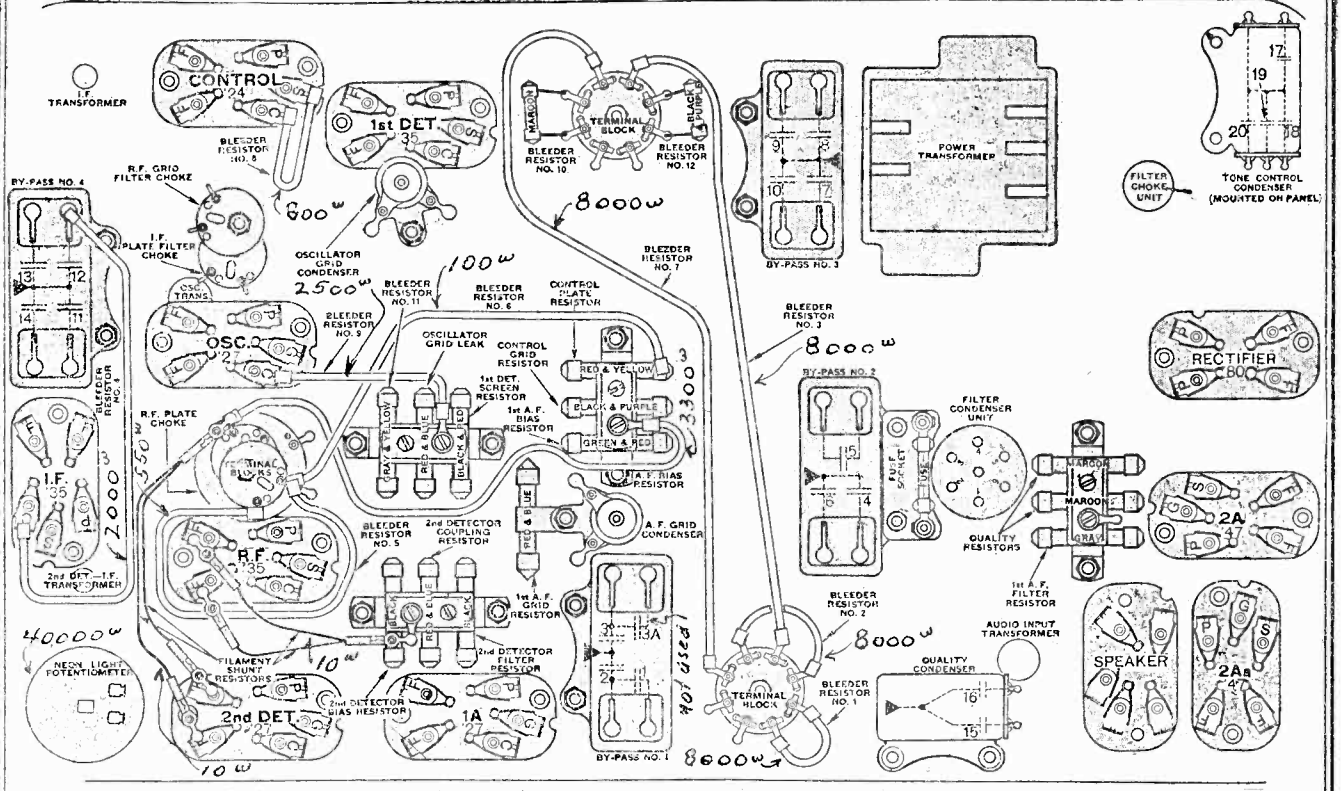
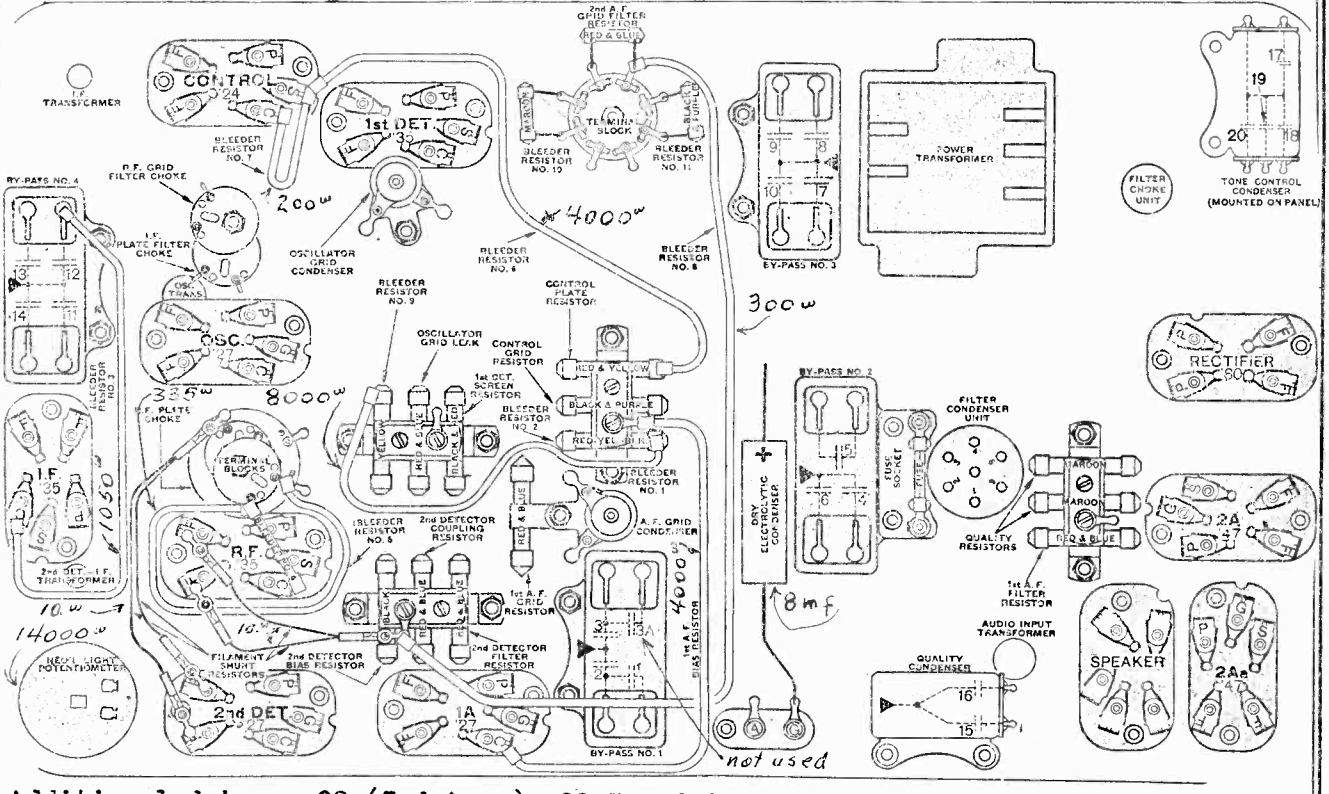


CHART OF MODEL 99 (3rd Type) Above Serial No. 4884901
MODELS 99-F AND 99-P

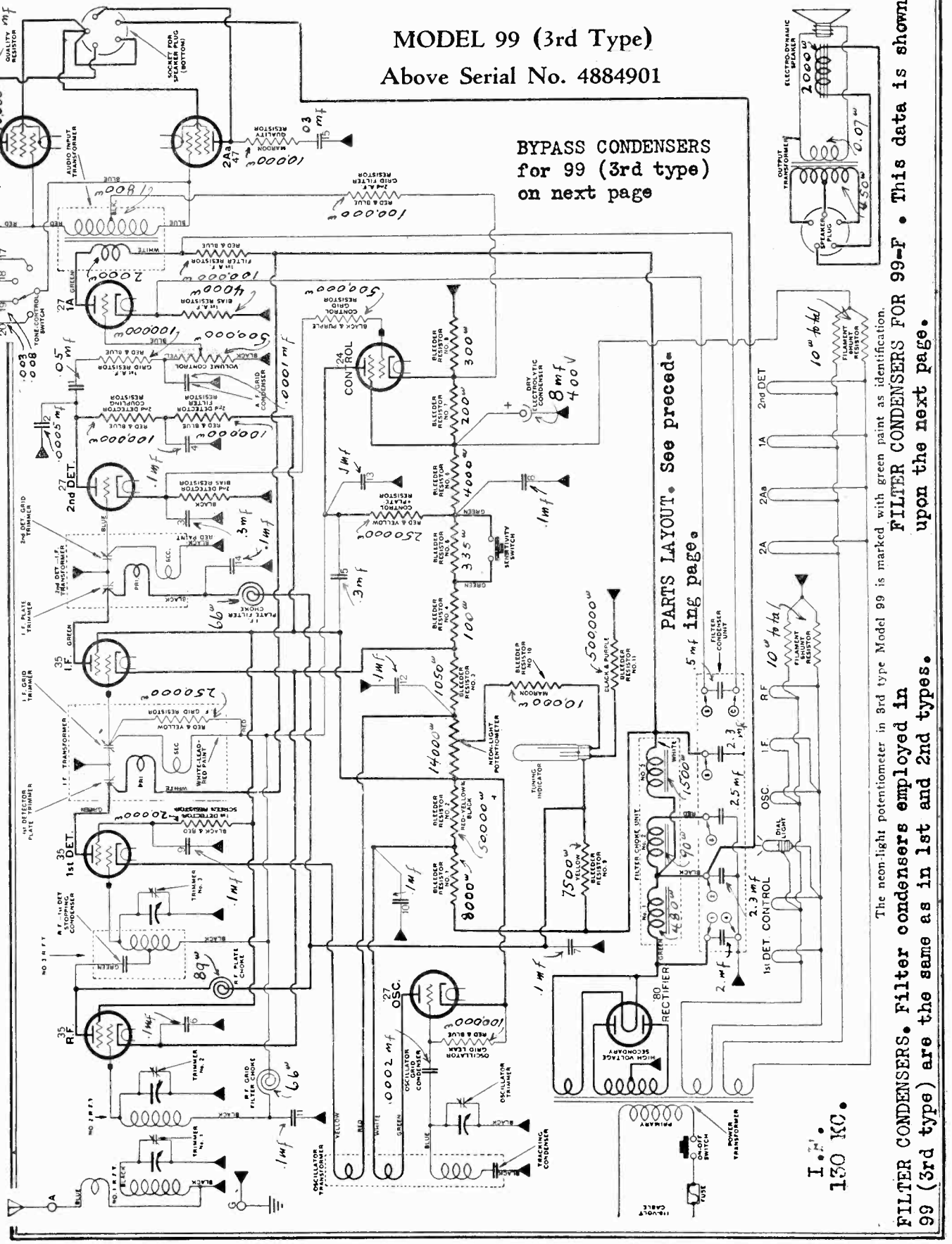


Additional data on 99 (3rd type), 99-F and 99-P will be found on the next page. Also filter condenser data for 99-F will be found on the same page.

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

ATWATER KENT MFG. CO.

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

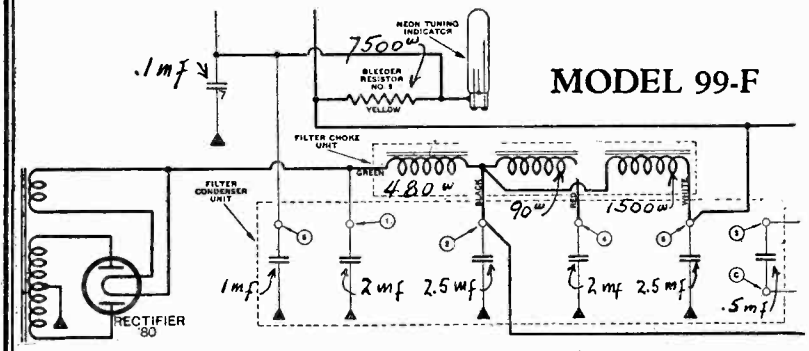


MODEL 99-F
99-P

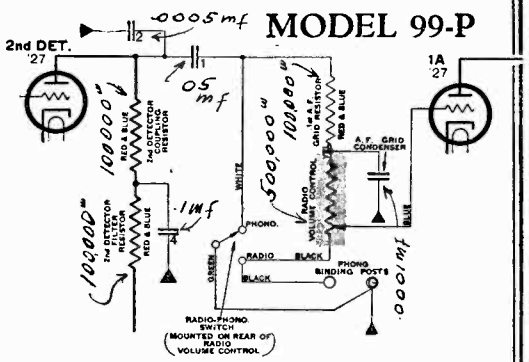
ATWATER KENT MFG. CO.

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

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	0	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

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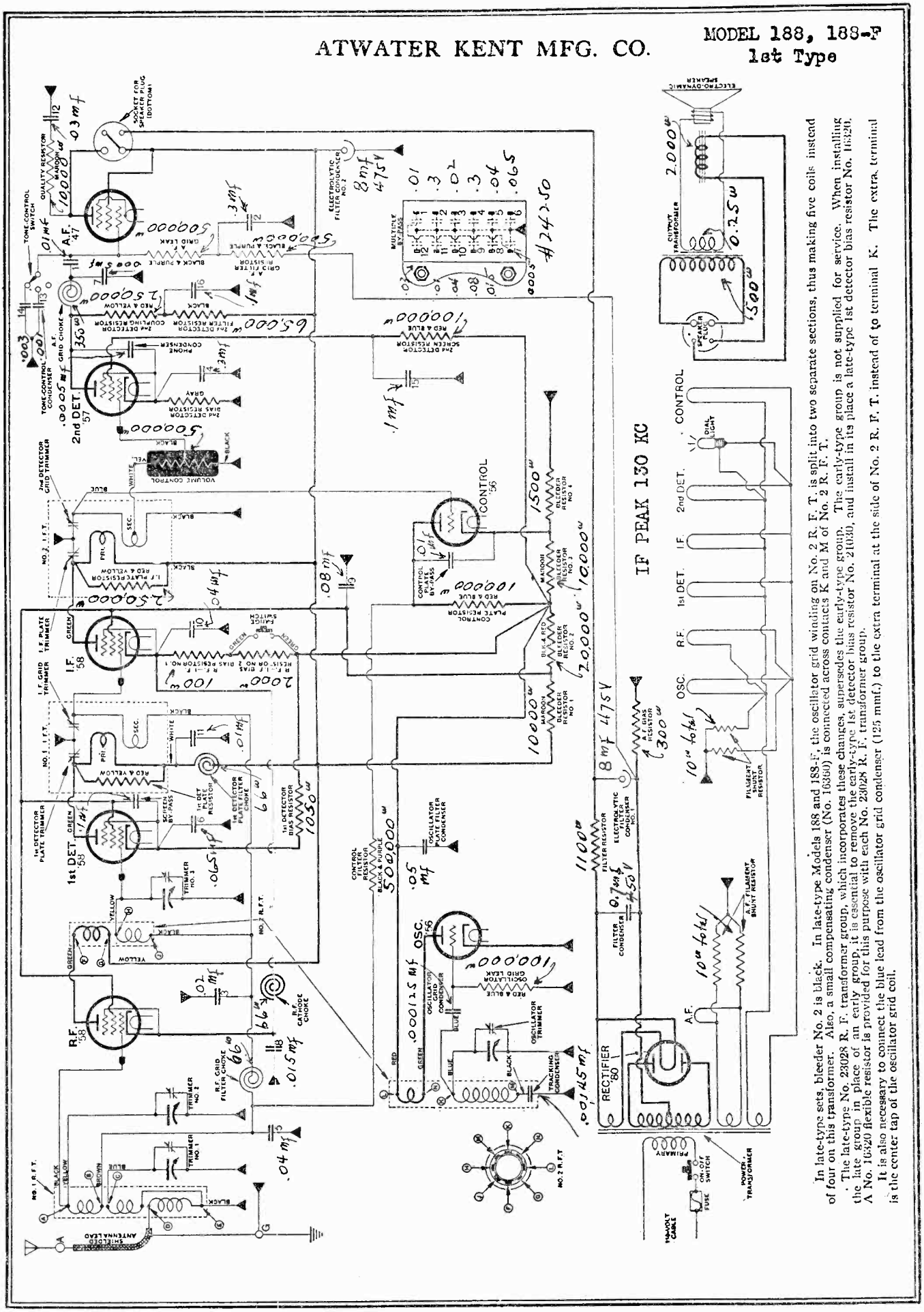
MODEL 188, 188-F
1st Type



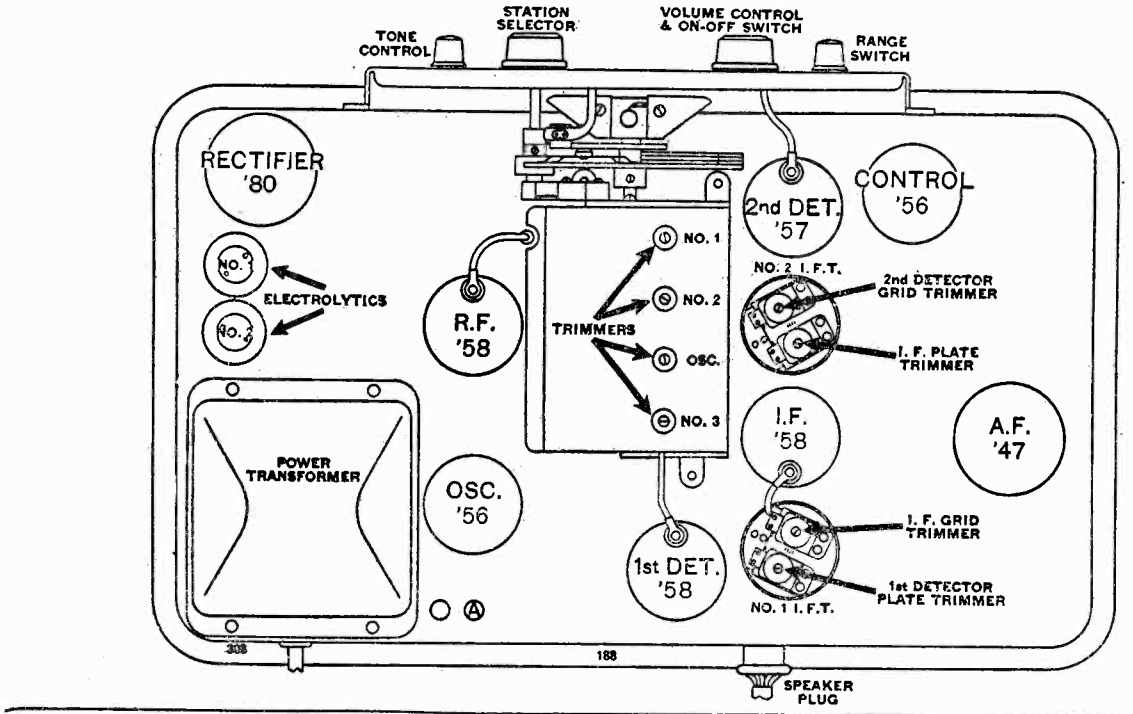
In late-type sets, bleeder No. 2 is black. In late-type Models 188 and 188-F, the oscillator grid winding on No. 2 R. F. T. is split into two separate sections, thus making five coils instead of four on this transformer. Also, a small compensating condenser (No. 16360) is connected across contacts K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

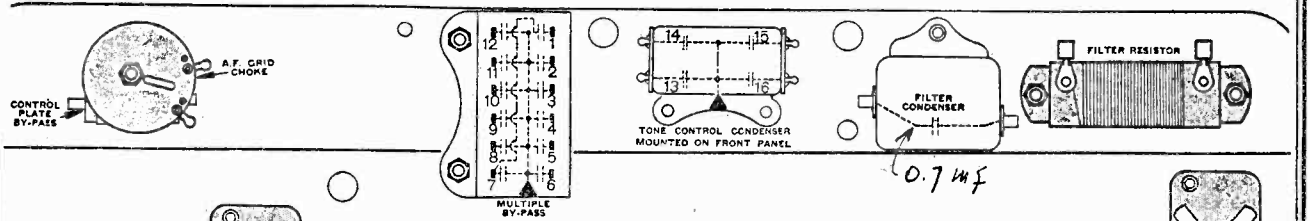
The late-type No. 23028 R. F. transformer group, which incorporates these changes, supersedes the early-type group. The early-type group is not supplied for service. When installing the late group in place of an early group, it is essential to remove the early-type 1st detector bias resistor No. 21030, 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.

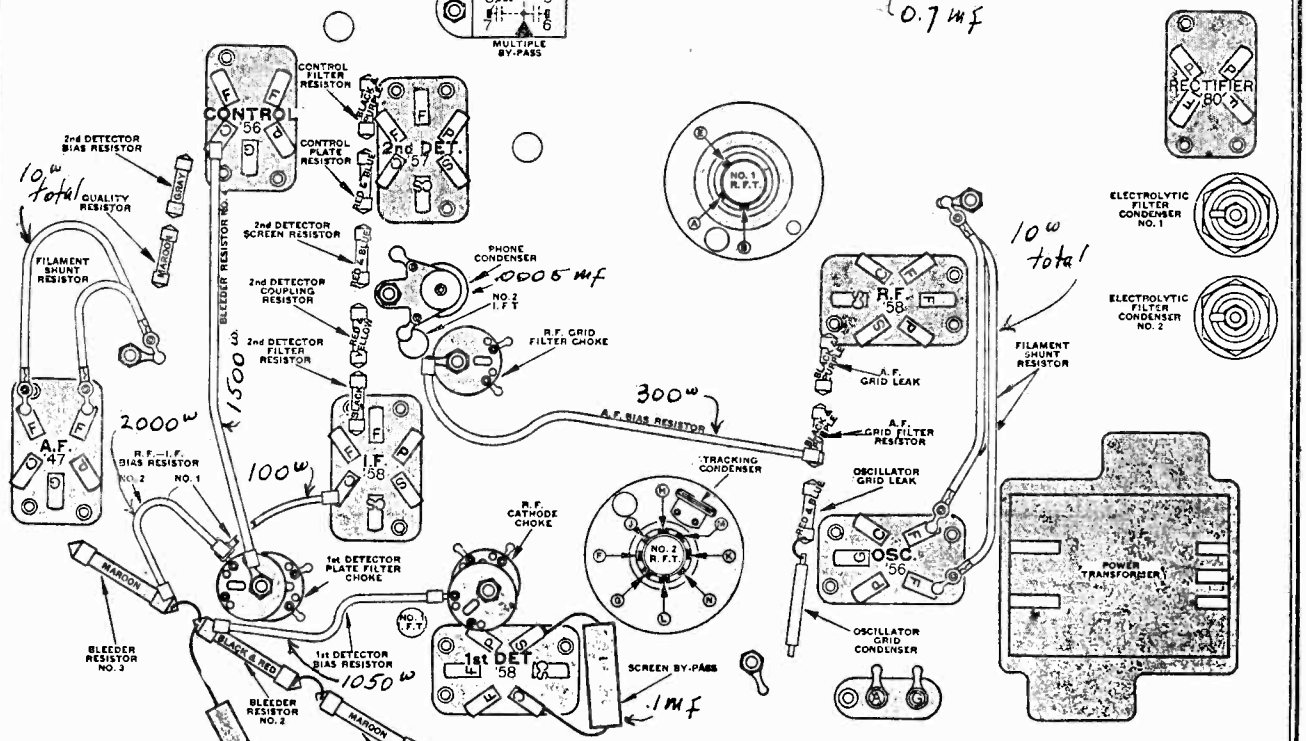
It is also necessary to connect the blue lead from the oscillator grid condenser (125 mmf.) to the extra terminal at the side of No. 2 R. F. T. instead of to terminal K. The extra terminal is the center tap of the oscillator grid coil.

MODEL 188,188-F
1st Type

ATWATER KENT MFG. CO.





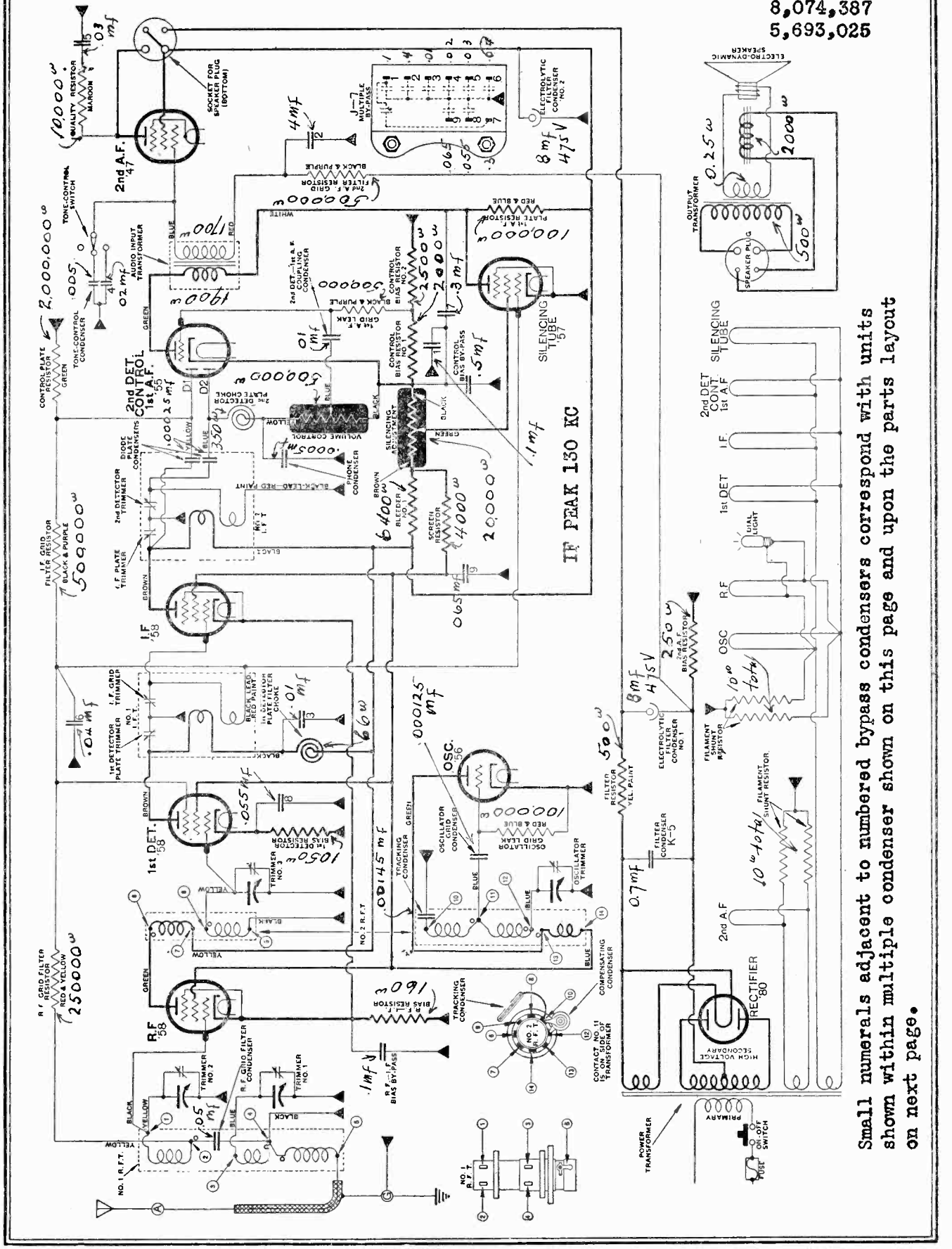


No. 2 R. F. T. includes the oscillator transformer.

MODEL 188, 188-F

ATWATER KENT MFG. CO.

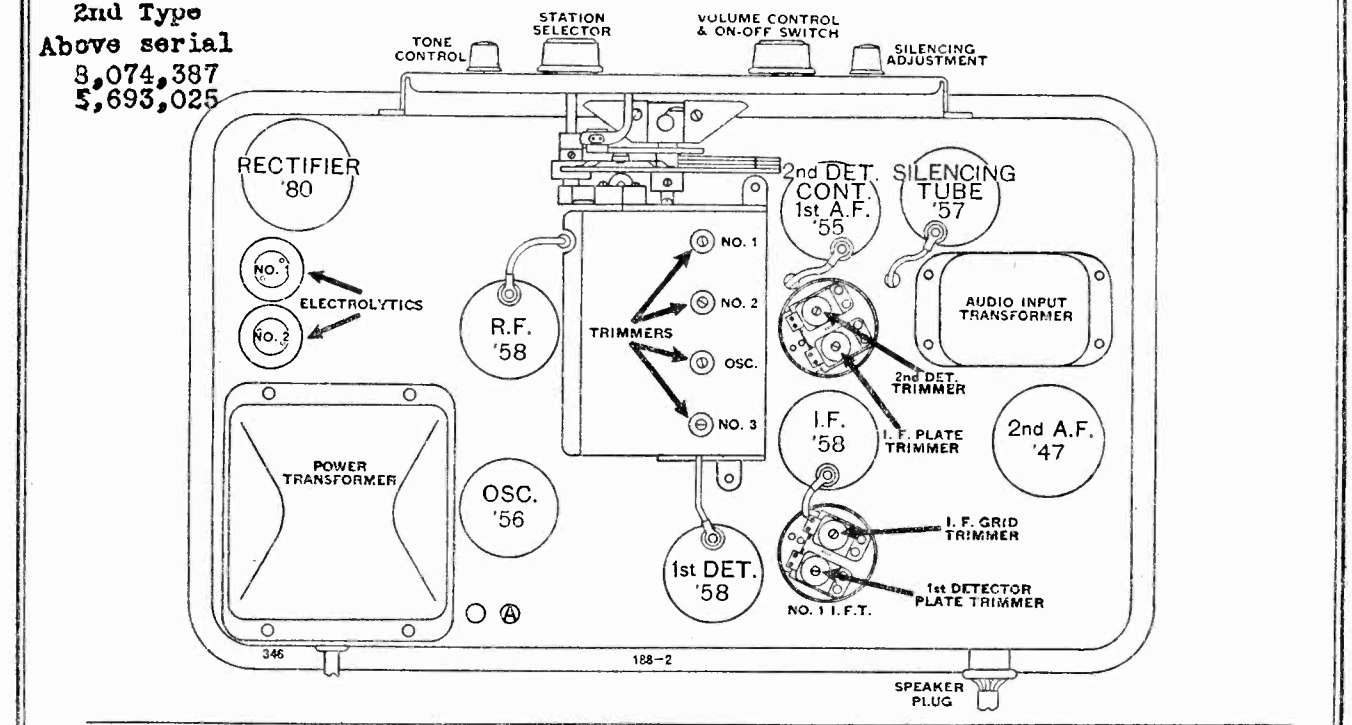
MODEL 188,188-F
2nd Type
Above serial
8,074,387
5,693,025

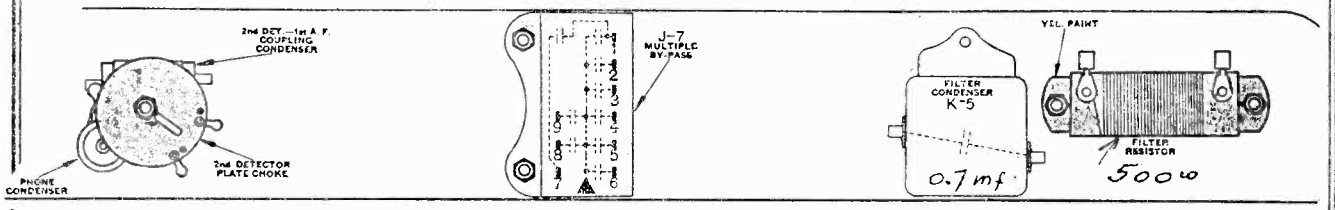


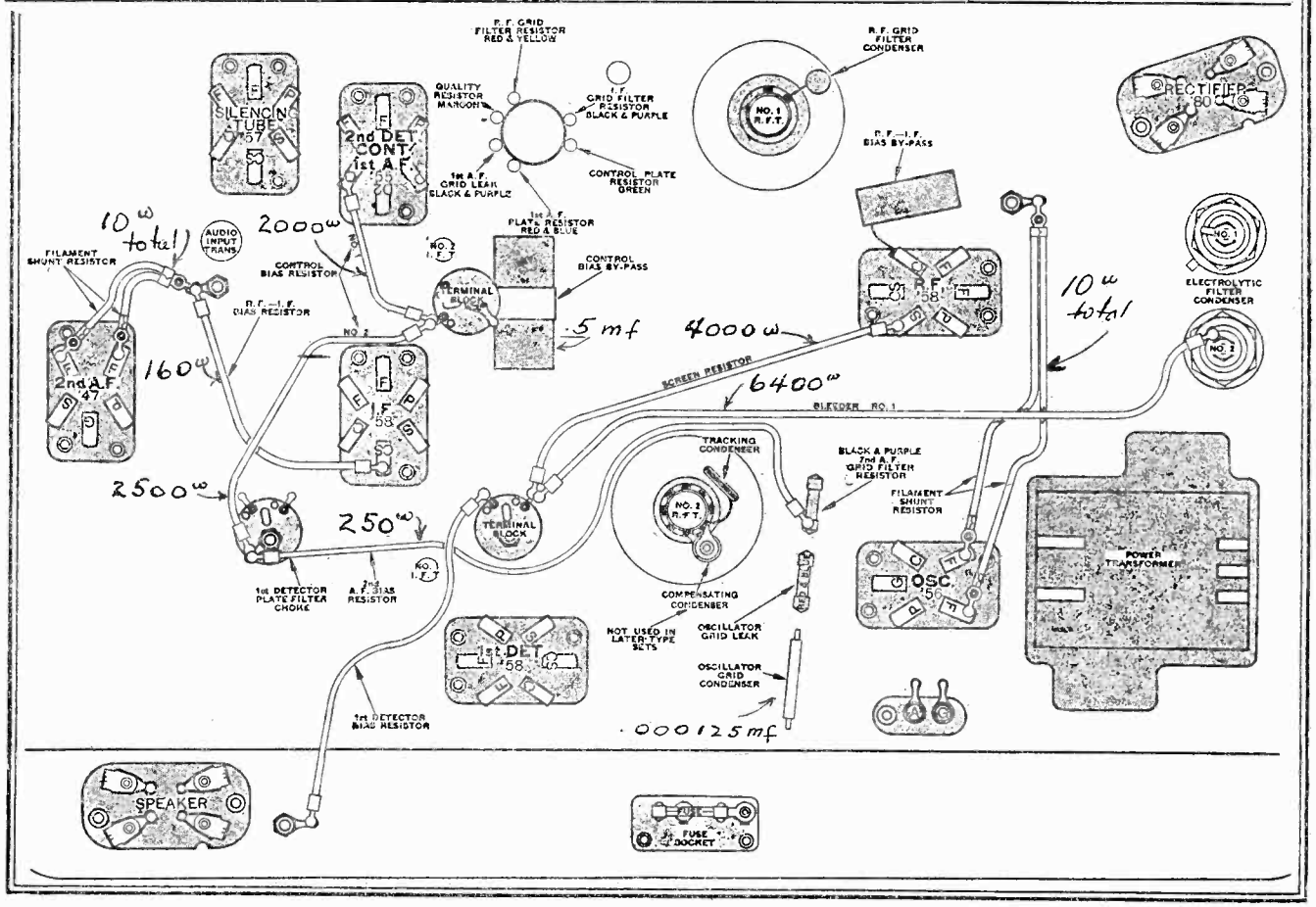
Small numerals adjacent to numbered bypass condensers correspond with units shown within multiple condenser shown on this page and upon the parts layout on next page.

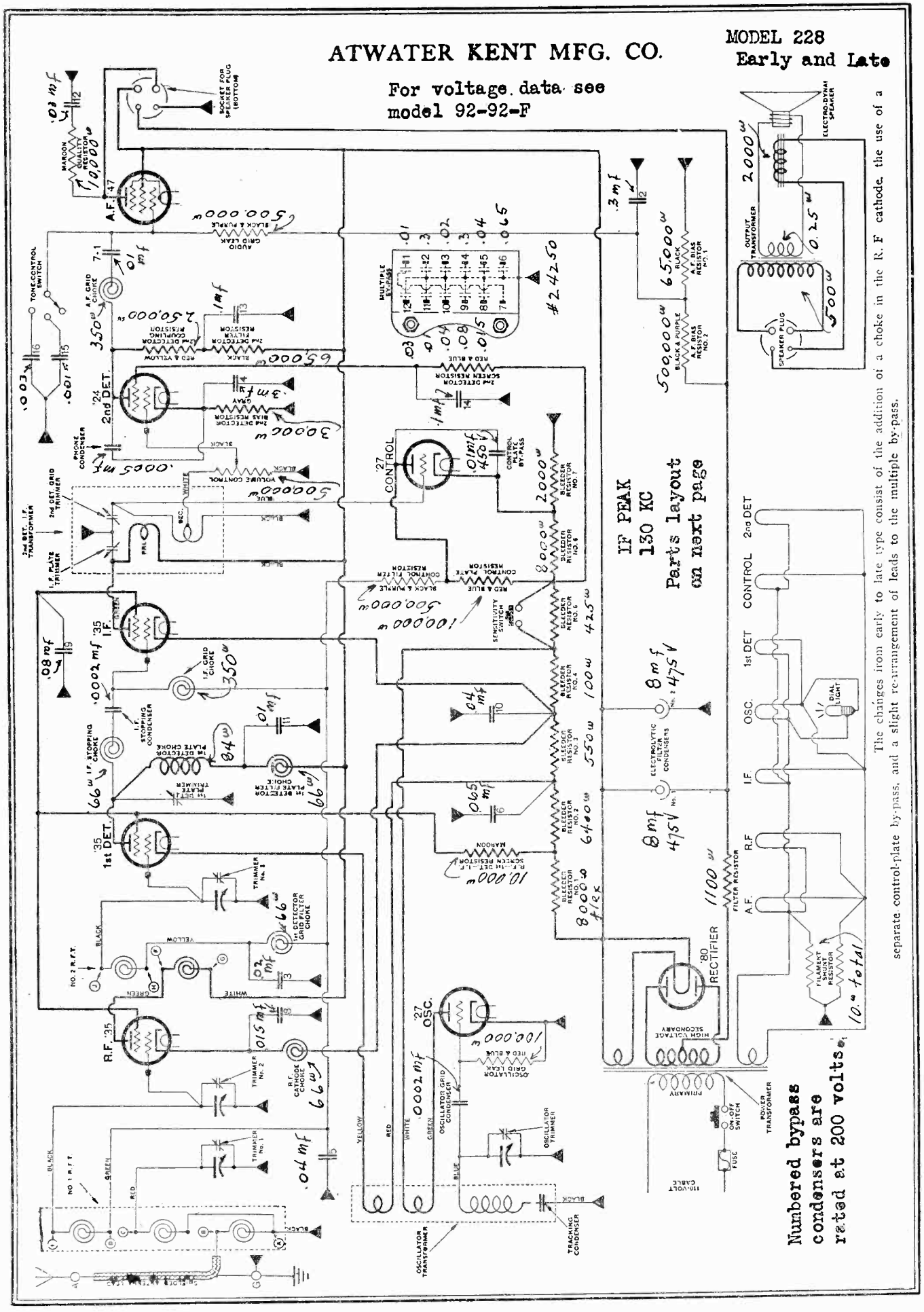
MODEL 188,188-F
2nd Type
Above serial
8,074,387
5,693,025

ATWATER KENT MFG. CO.



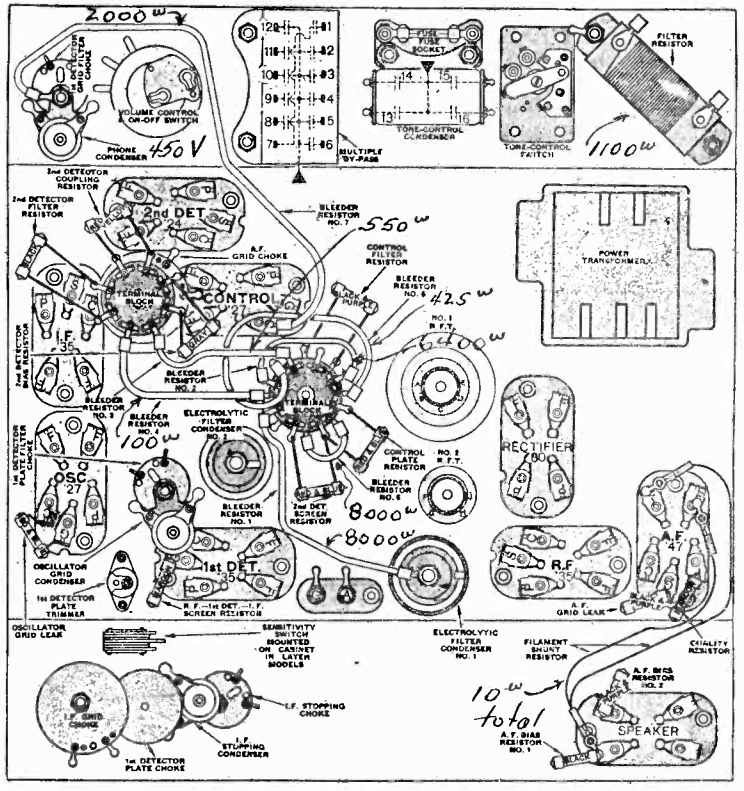






MODEL 228
Early and Late

ATWATER KENT MFG. CO.



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

PARTS LAYOUT

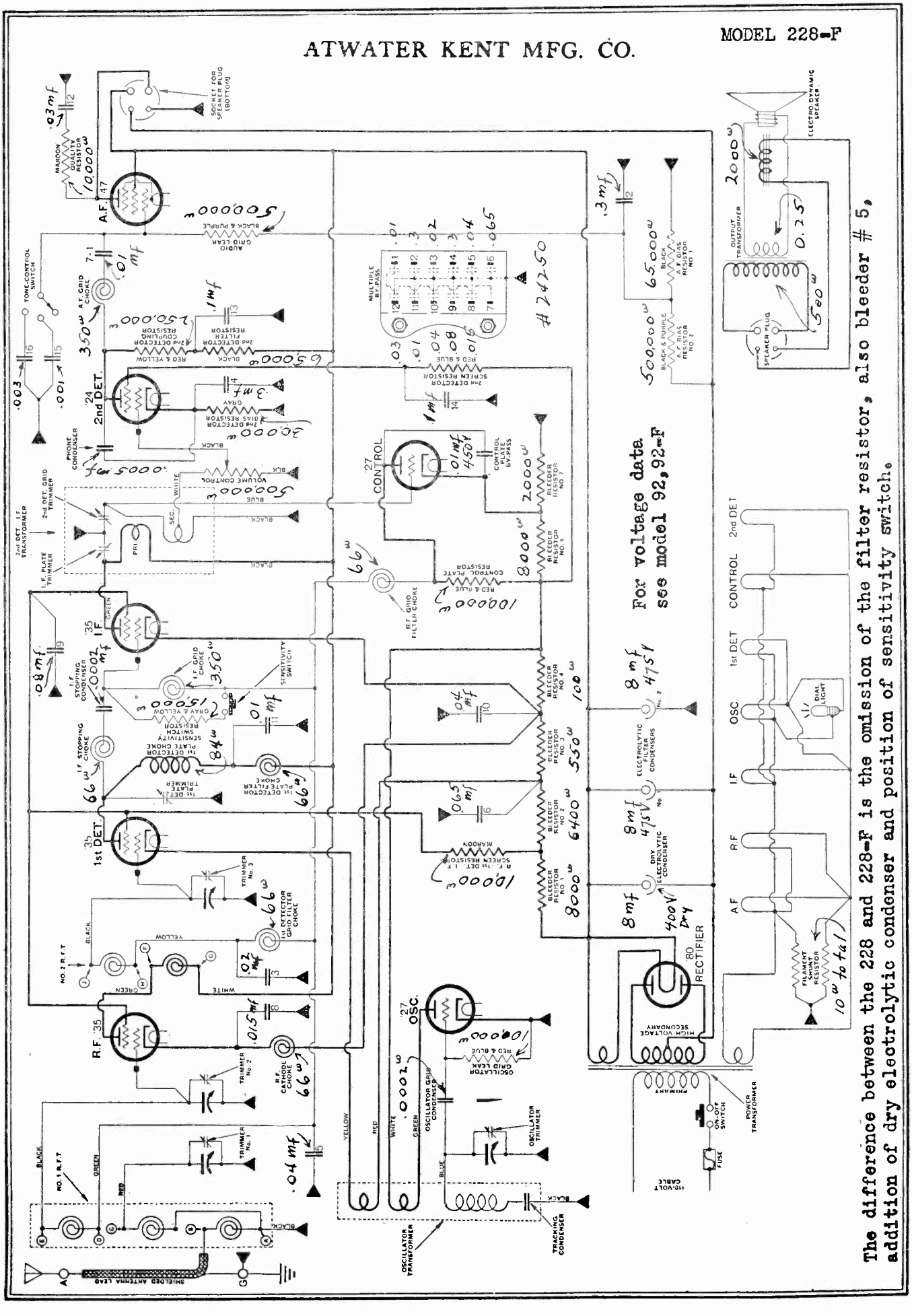
228 · Early

228 Late

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

ATWATER KENT MFG. CO.

MODEL 228-F



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

ATWATER KENT MFG. CO.

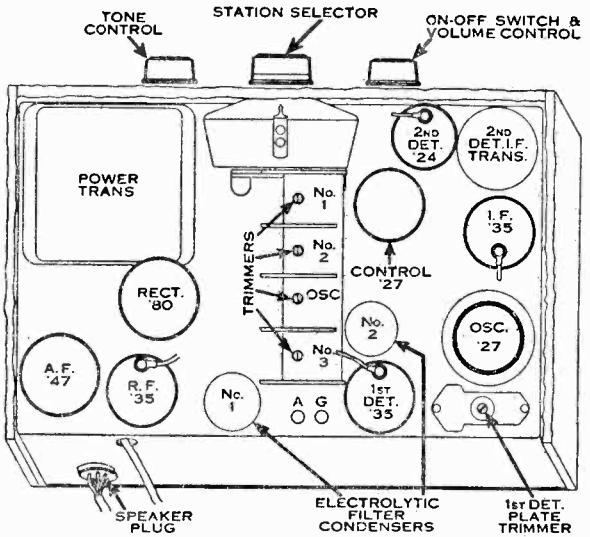
By-pass Condensers in Late-Type

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.

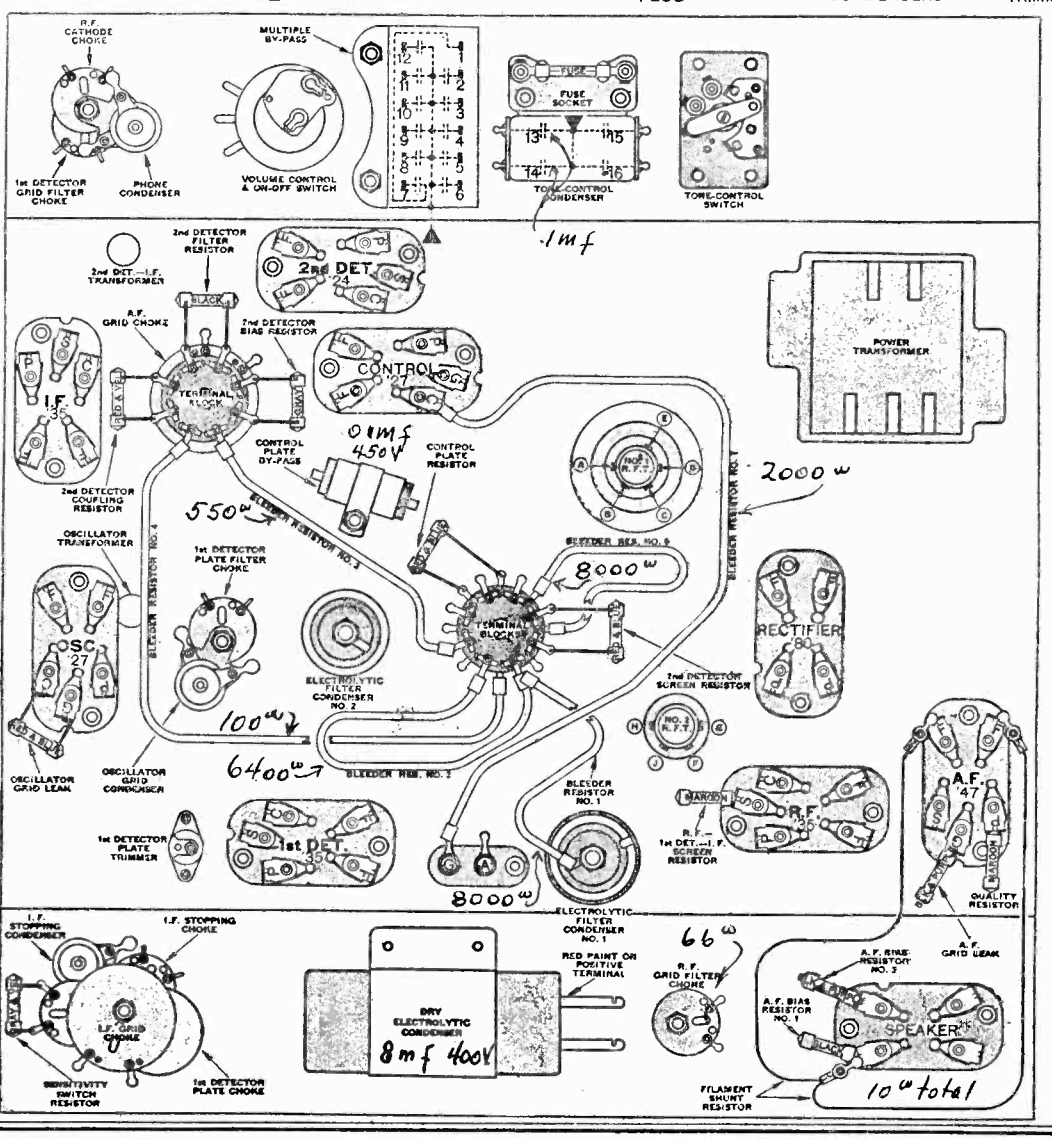
Tone-control Condenser

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

TOP VIEW

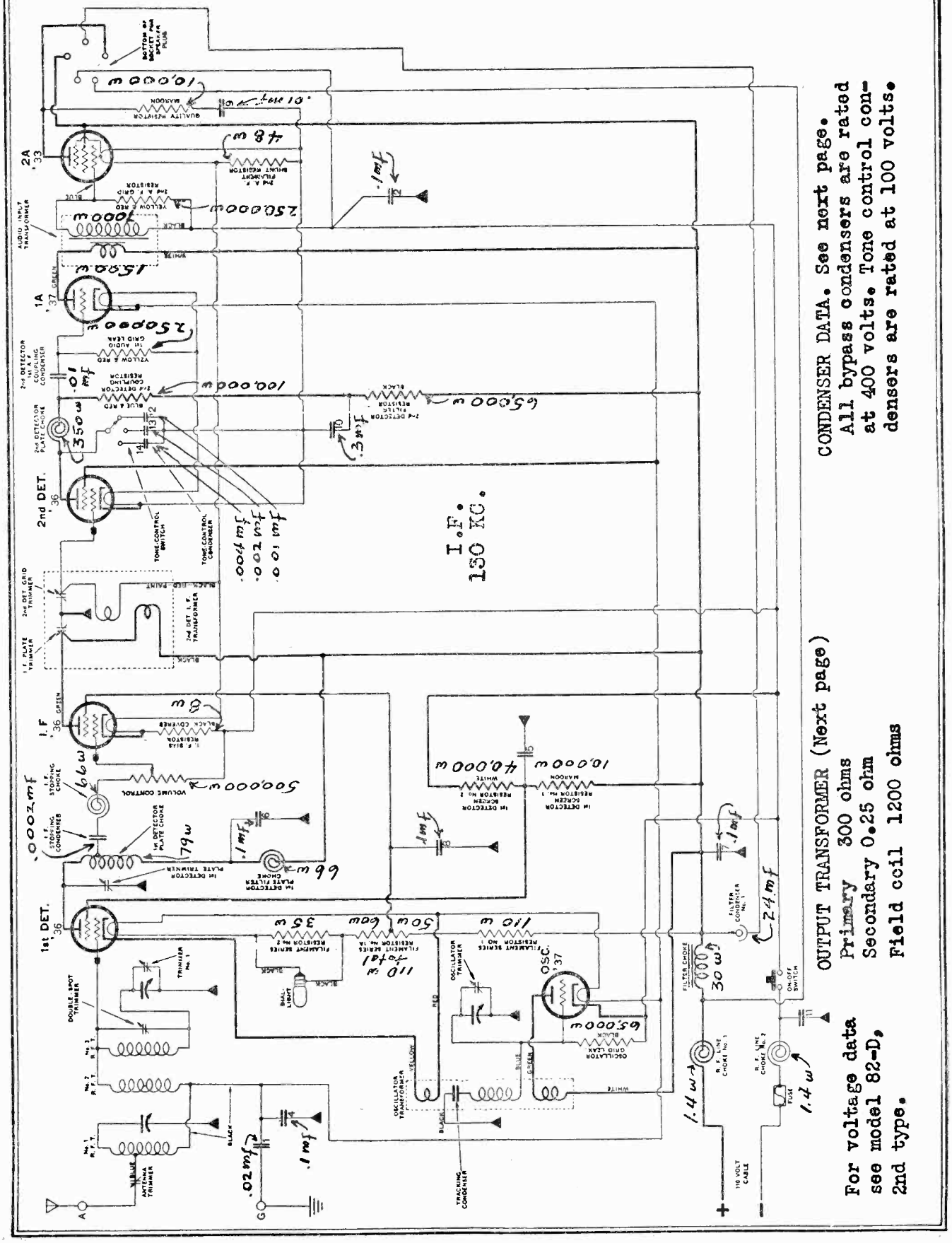


MODEL 228-F CHART



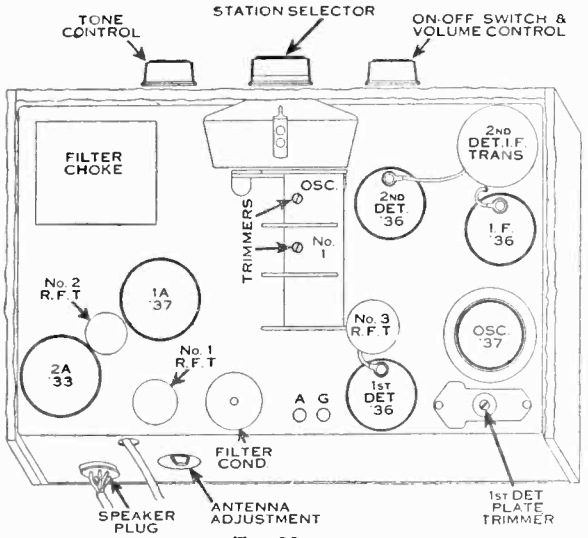
MODEL 228-D

ATWATER KENT MFG. CO.

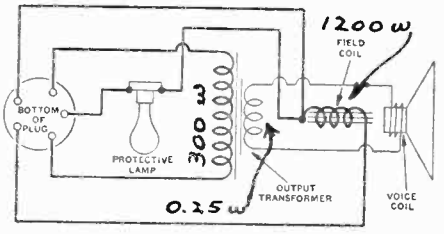


MODEL 228-D

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.

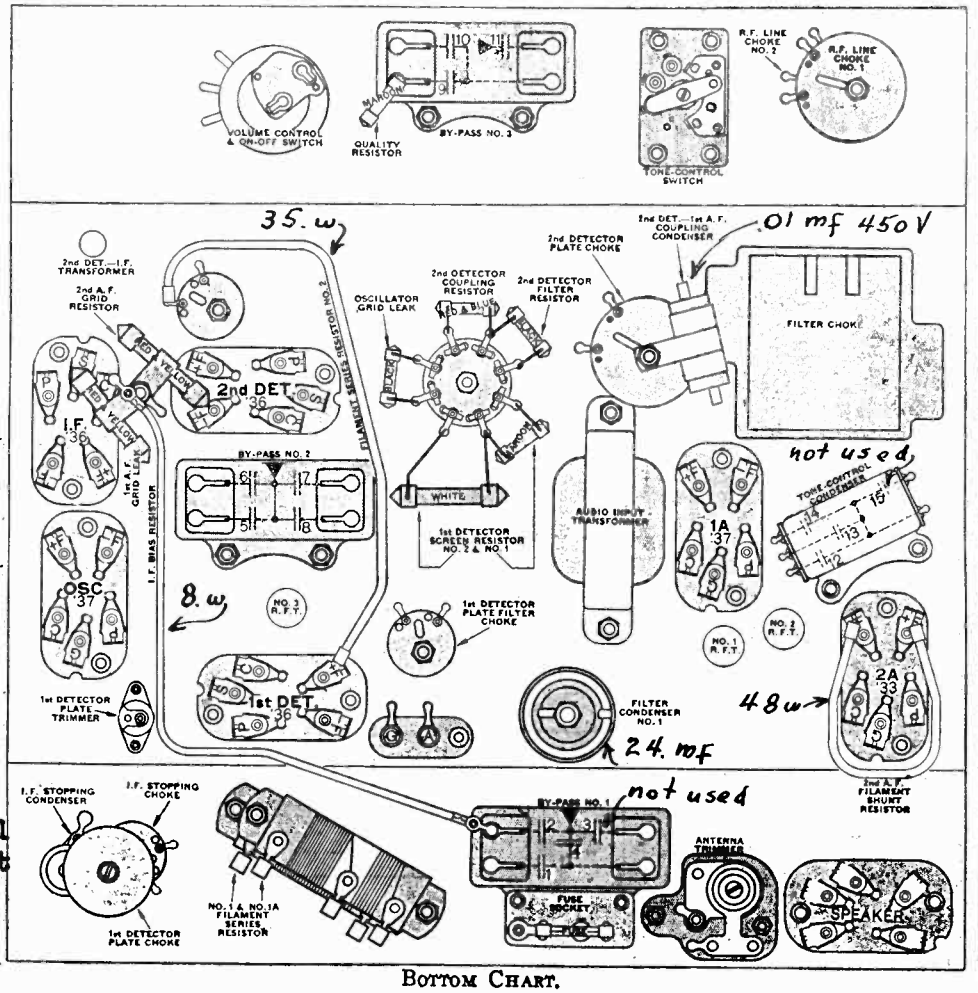
By-pass No. 3

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.

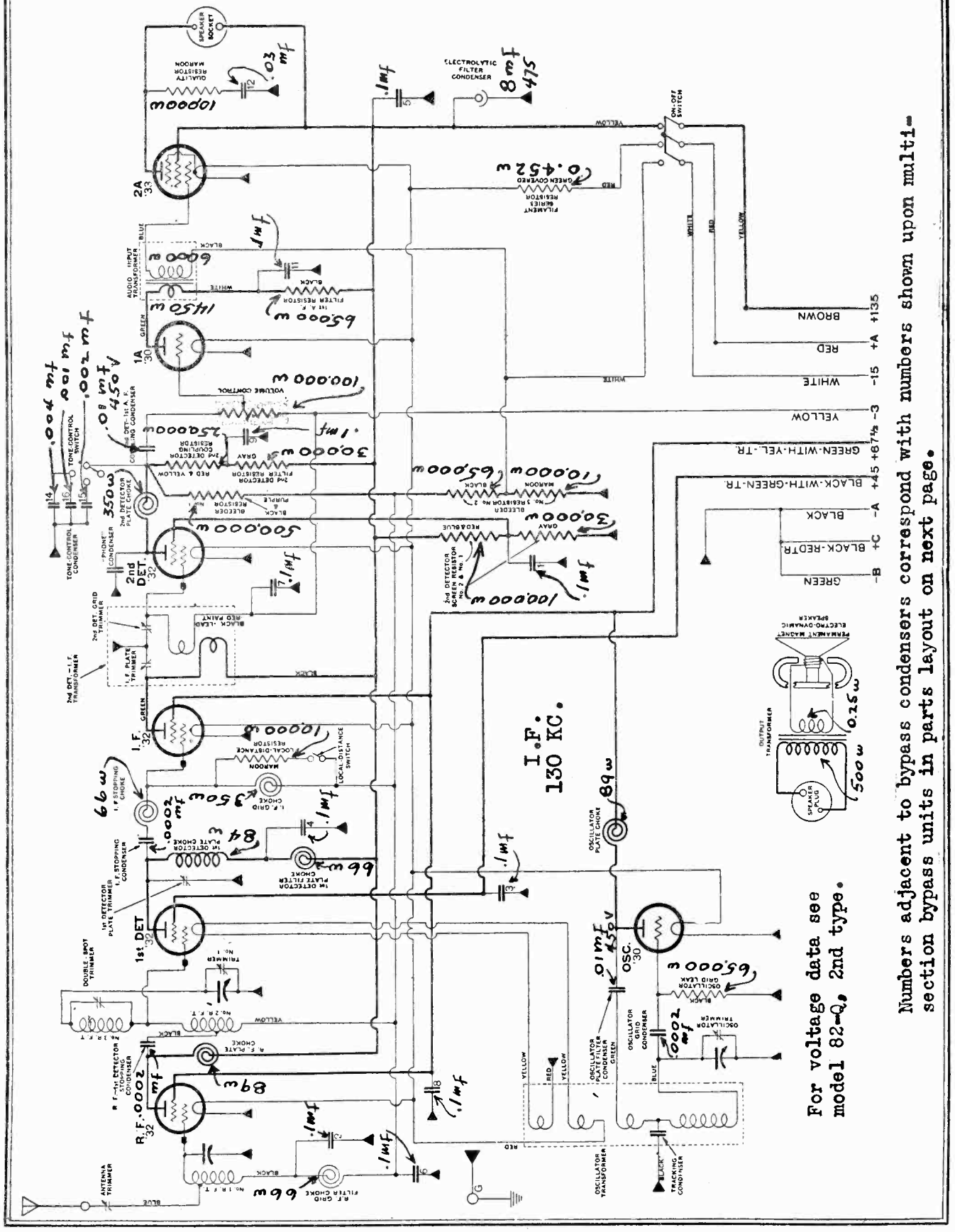
All bypass condensers rated at 400 volts. Tone control condensers rated at 100 volts



Bottom Chart.

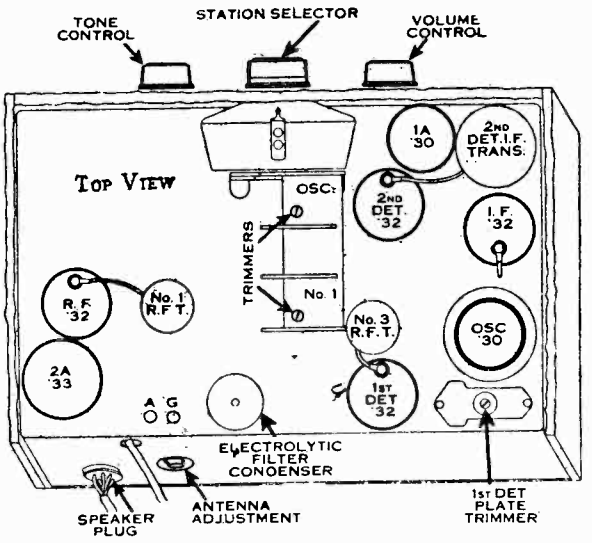
MODEL 228-Q

ATWATER KENT MFG. CO



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

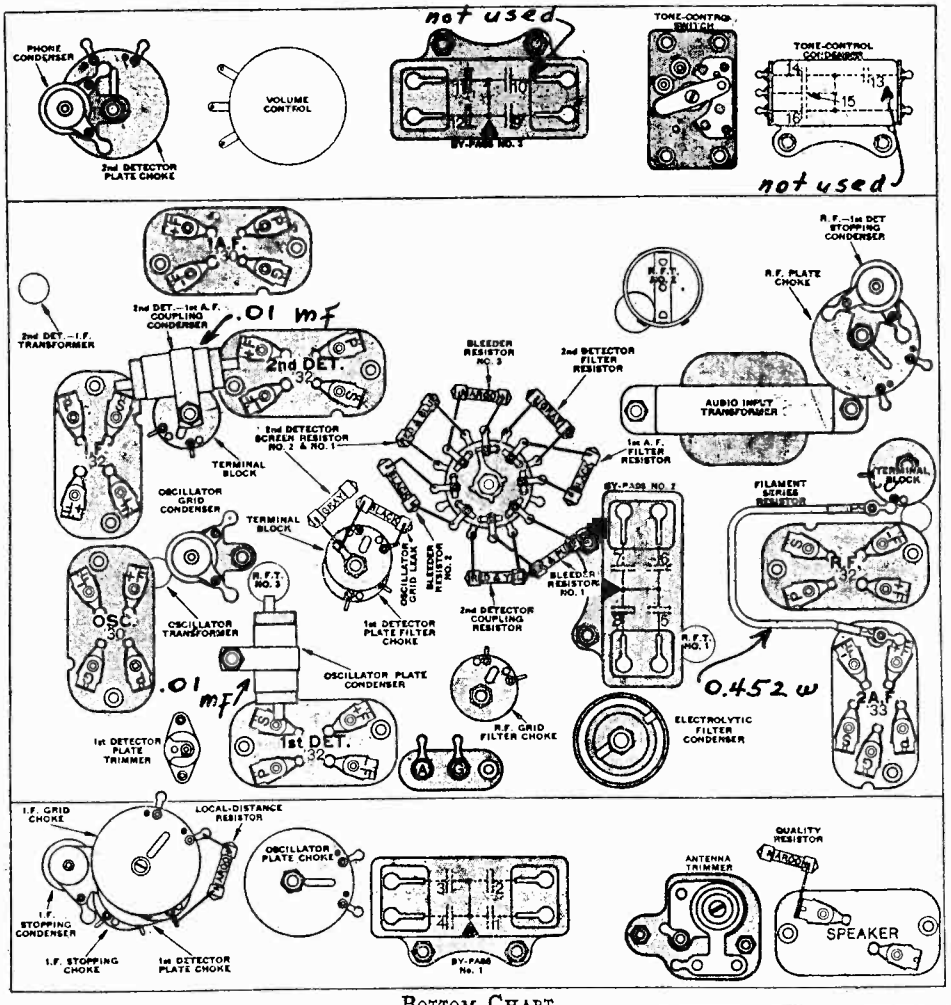
9—2nd-detector plate filter condenser.
10—Not used.
11—1st-A. F. plate filter condenser.
12—Quality condenser.

All 400 volts

Tone-control Condenser

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

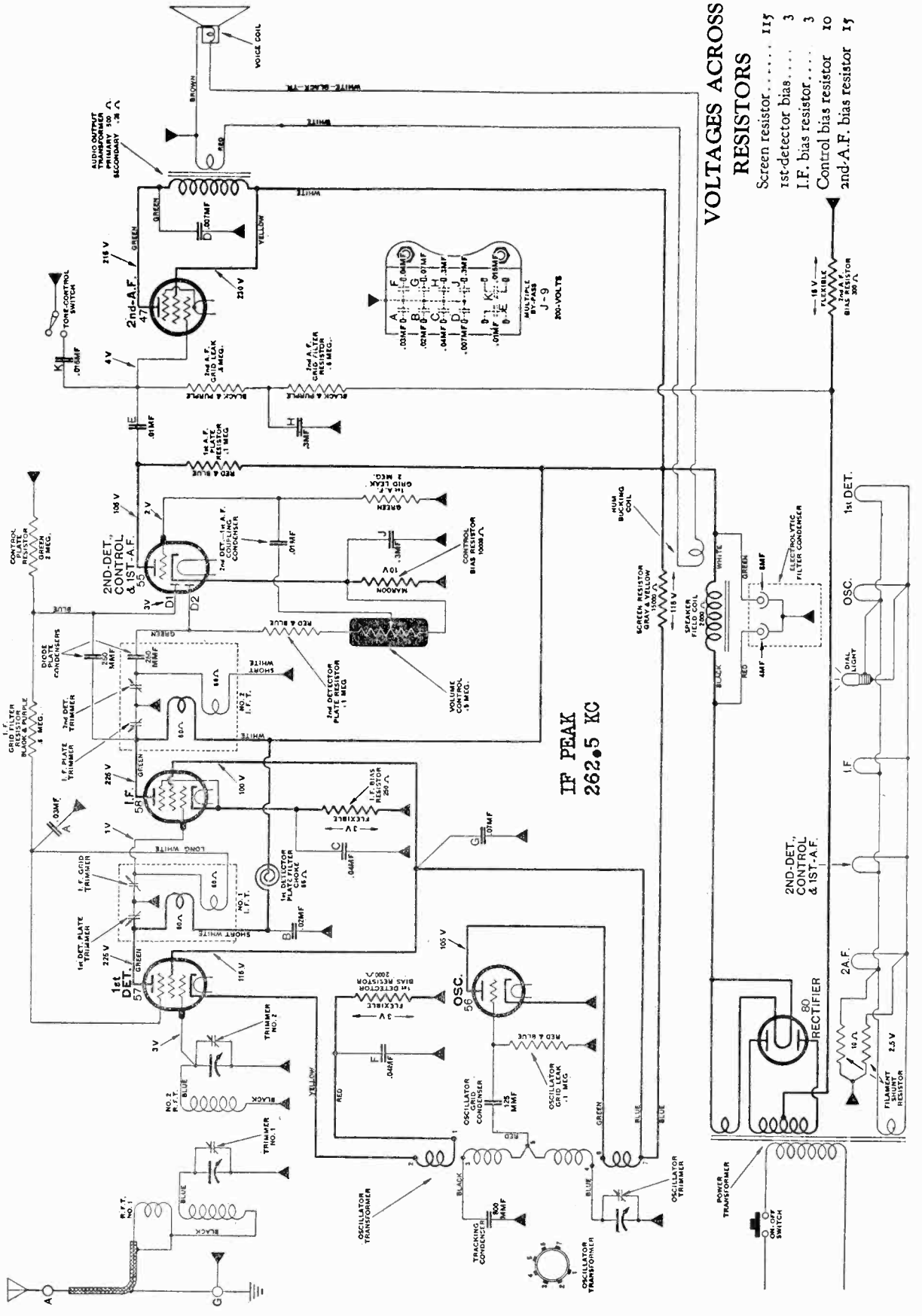
All 100 volts



BOTTOM CHART.

ATWATER KENT MFG. CO.

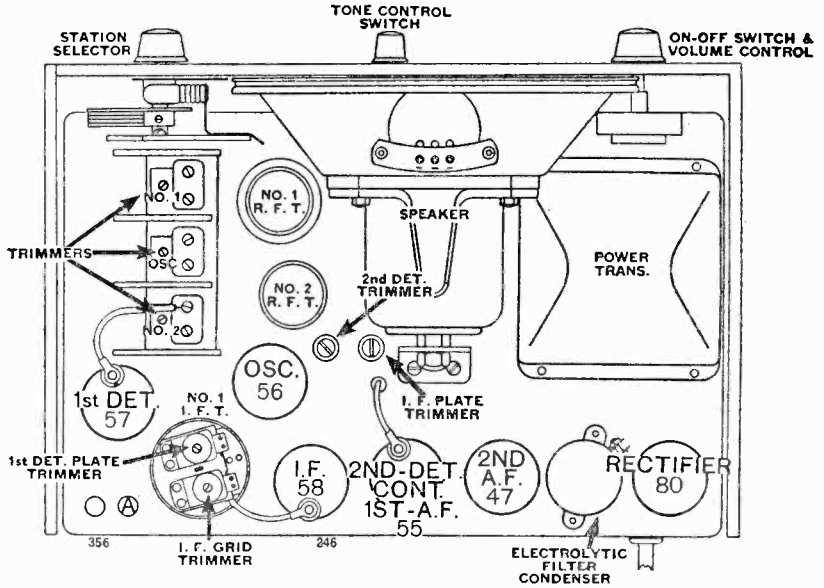
MODEL 246



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.

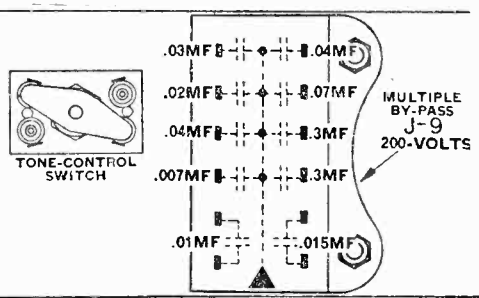


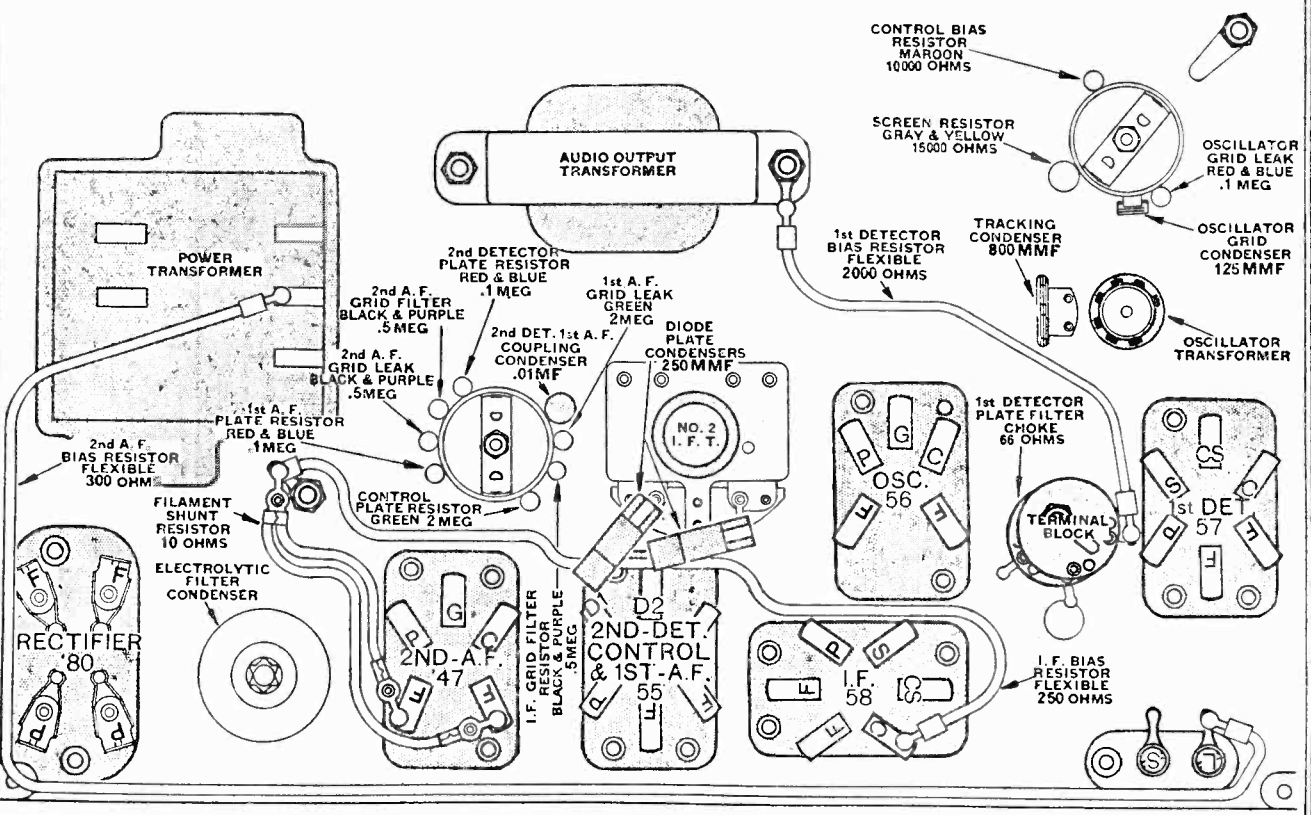
VOLTAGE TABLE FOR MODEL 246

All measurements made from cathode.

Line Voltage, 110 volts

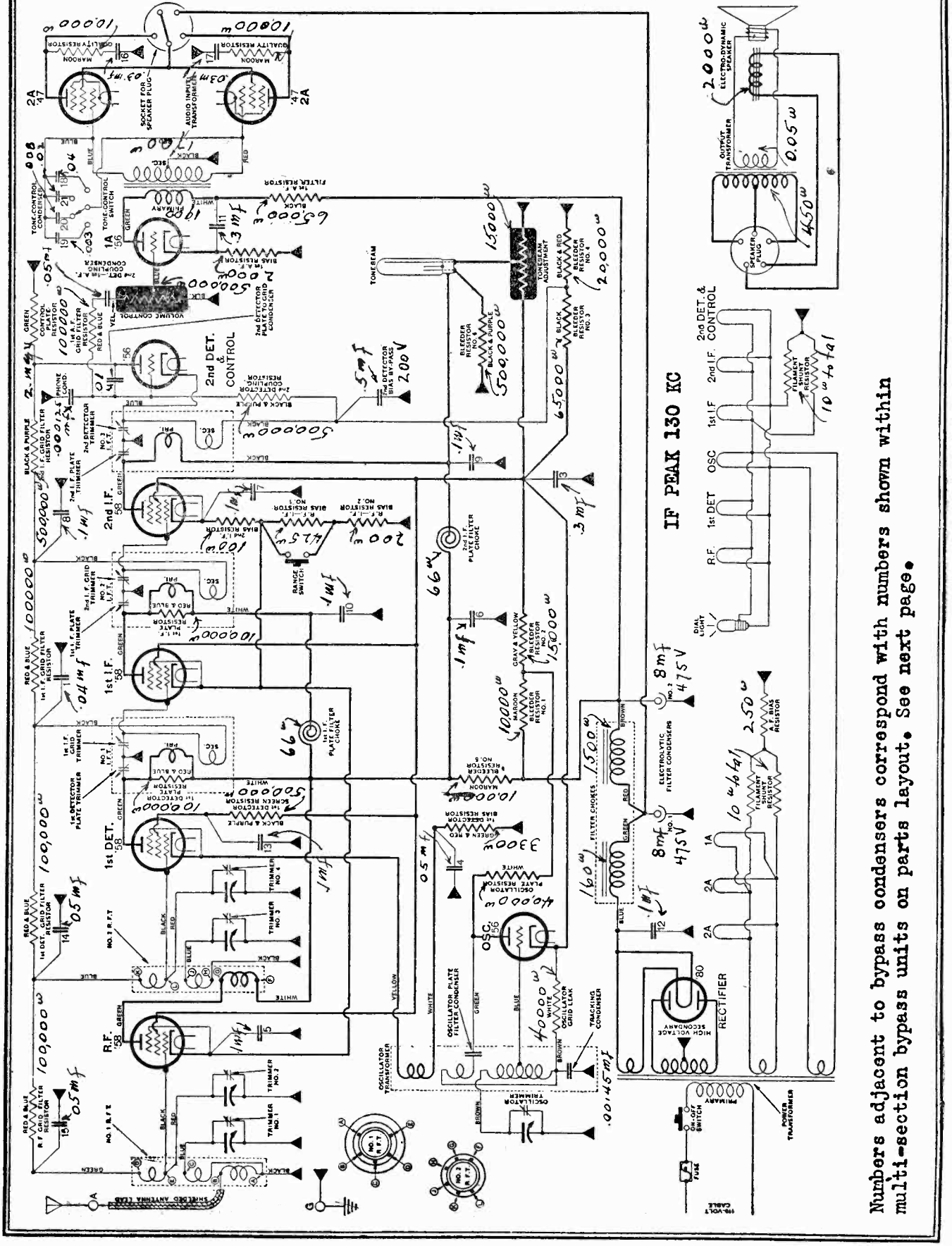
1st Det. tube	Filament	2.4		2.4
	Plate	225	55 tube	105
	Screen	115		3
	Grid	3		**
	D2			2
I.F. tube	Filament	2.4	2nd A.F. tube	2.4
	Plate	225		215
	Screen	100		230
	Grid	1		4
Osc. tube	Filament	2.4		*The oscillator grid voltage varies.
	Plate	105		**The voltage from 2D to cathode is zero when no signal or noise is being picked up.
	Grid	8*		





ATWATER KENT MFG. CO.

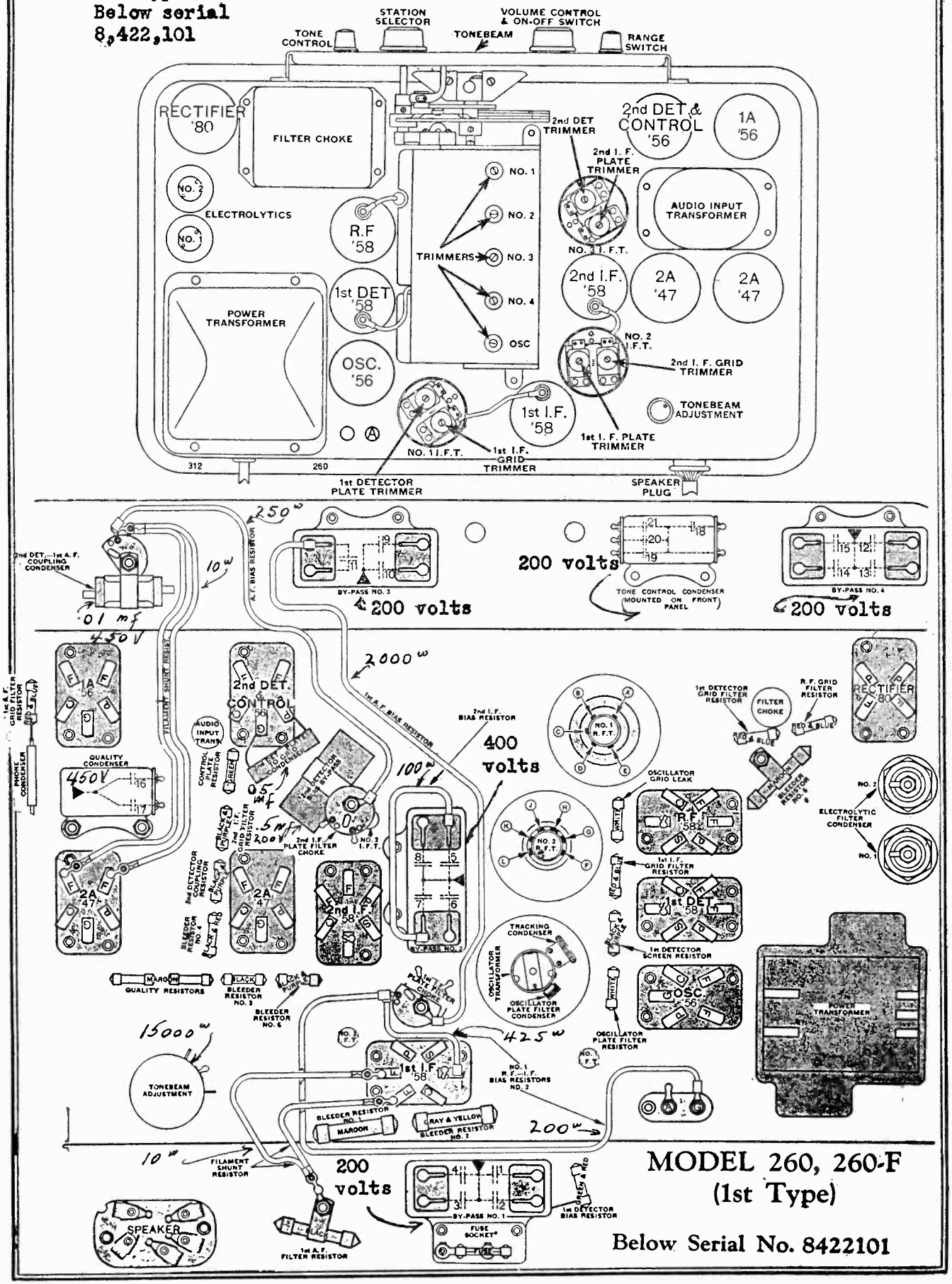
MODEL 260,260-F
1st Type
Below serial
8,422,101



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.

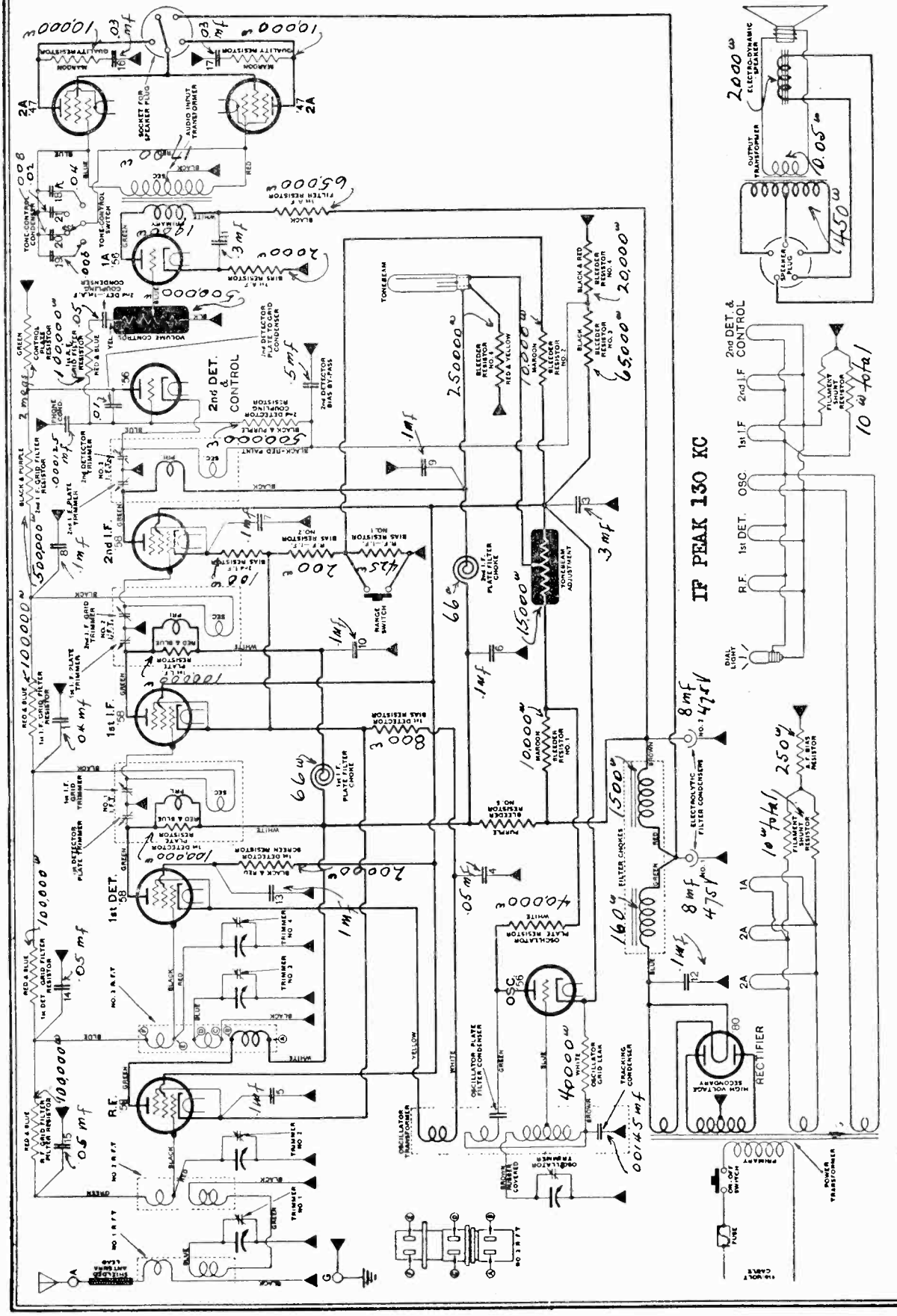


MODEL 260, 260-F
(1st Type)

Below Serial No. 8422101

ATWATER KENT MFG. CO.

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

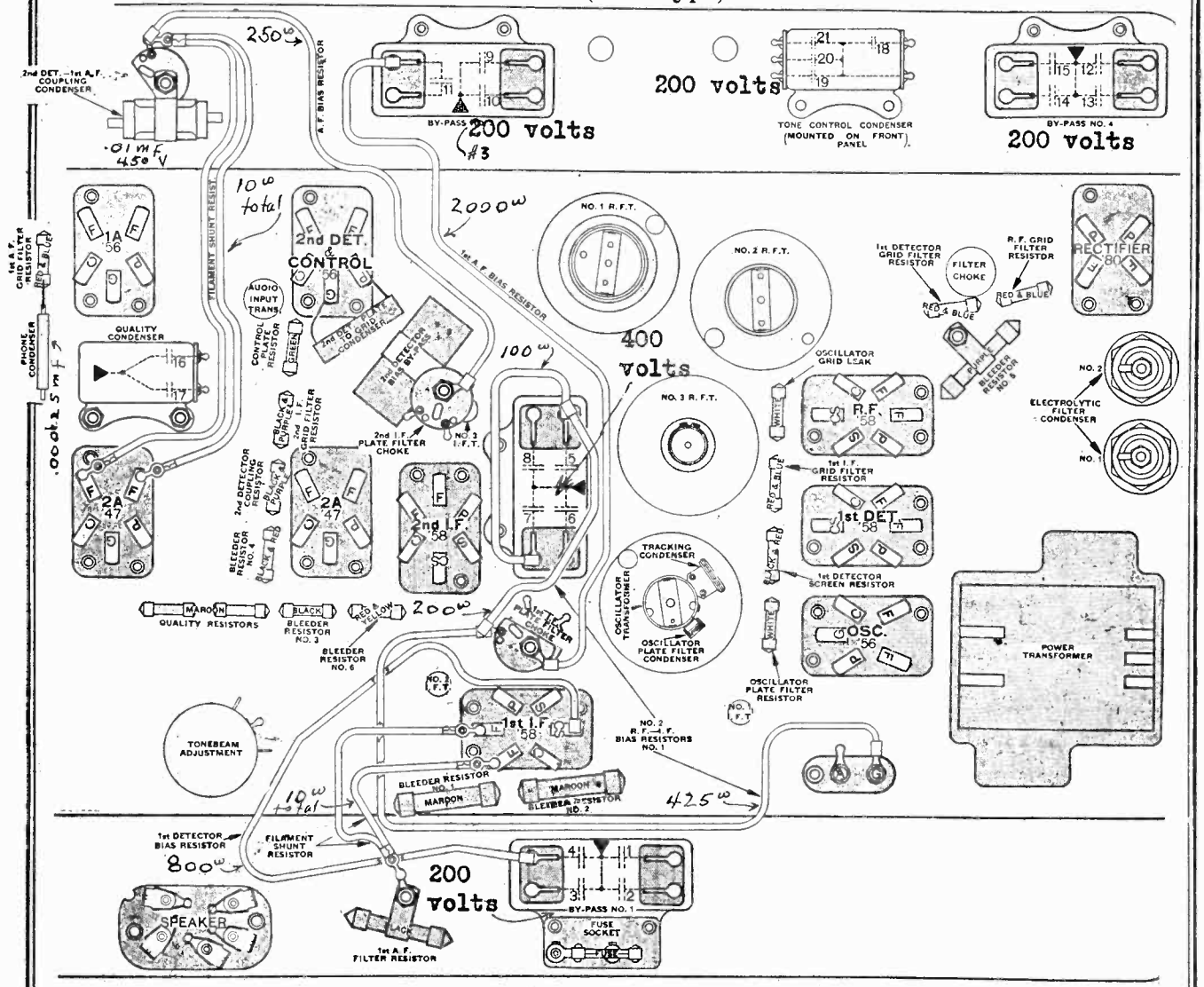


Numbers adjacent to bypass condensers correspond with numbers shown within multi-section bypass condensers on parts layout. See next page.

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.

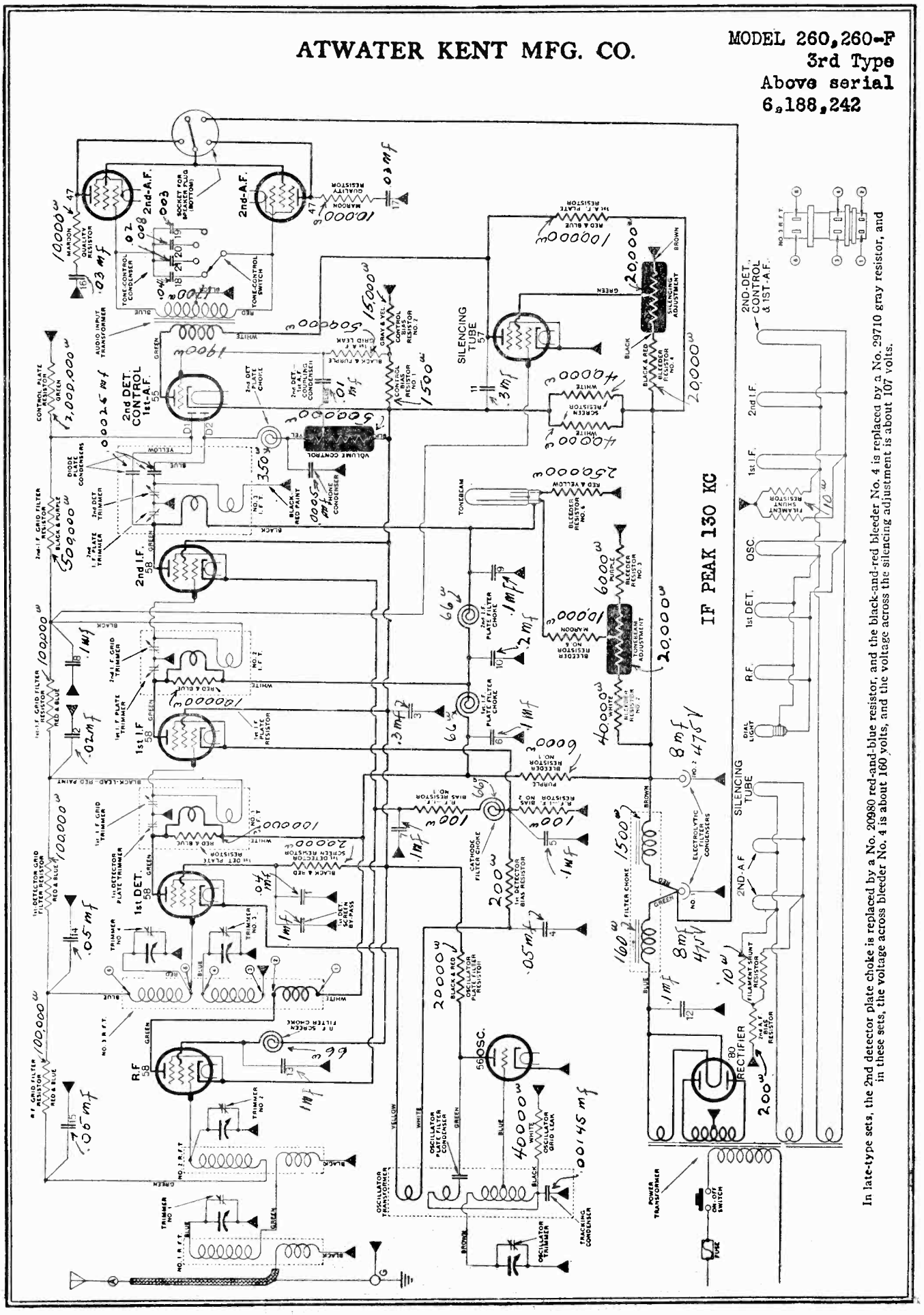
BYPASS CONDENSERS

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

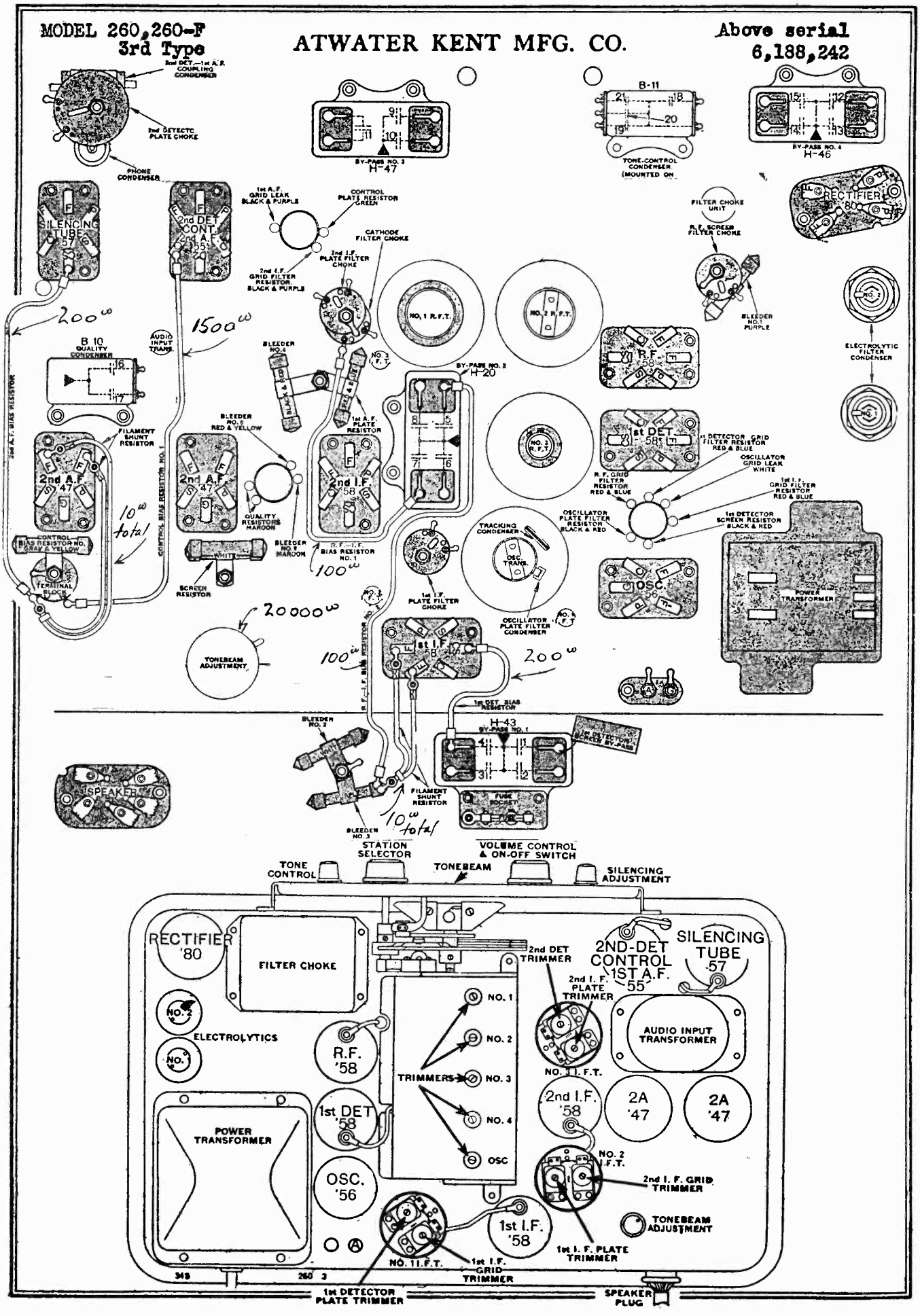


In late-type sets, the 2nd detector plate choke is replaced by a No. 20980 red-and-blue resistor, and the black-and-red bleeder No. 4 is replaced by a No. 29710 gray resistor, and in these sets, the voltage across bleeder No. 4 is about 160 volts, and the voltage across the silencing adjustment is about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

MODEL 260, 260-F
3rd Type

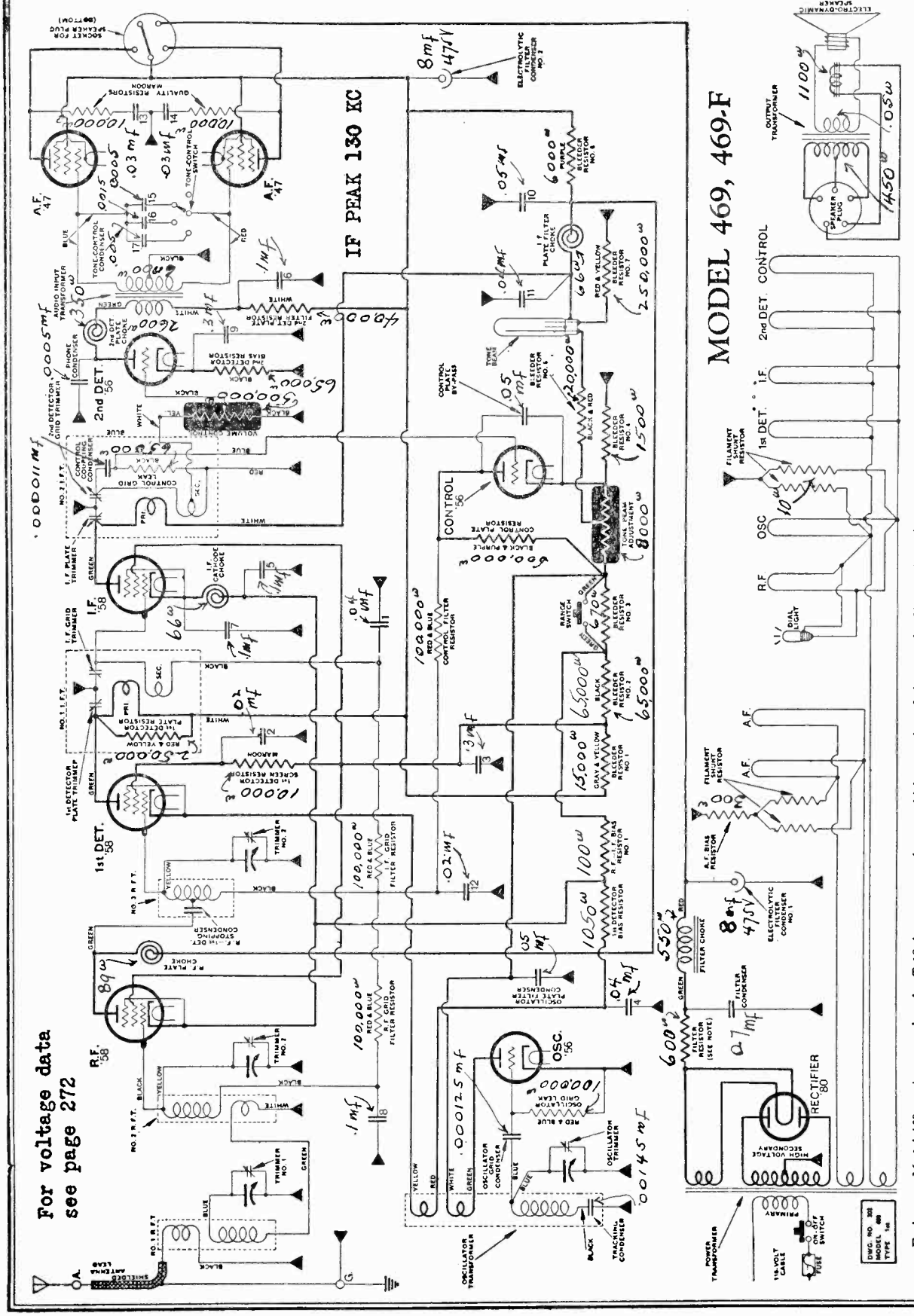
ATWATER KENT MFG. CO.

Above serial
6,188,242



ATWATER KENT MFG. CO.

MODEL 469, 469-F
1st Type

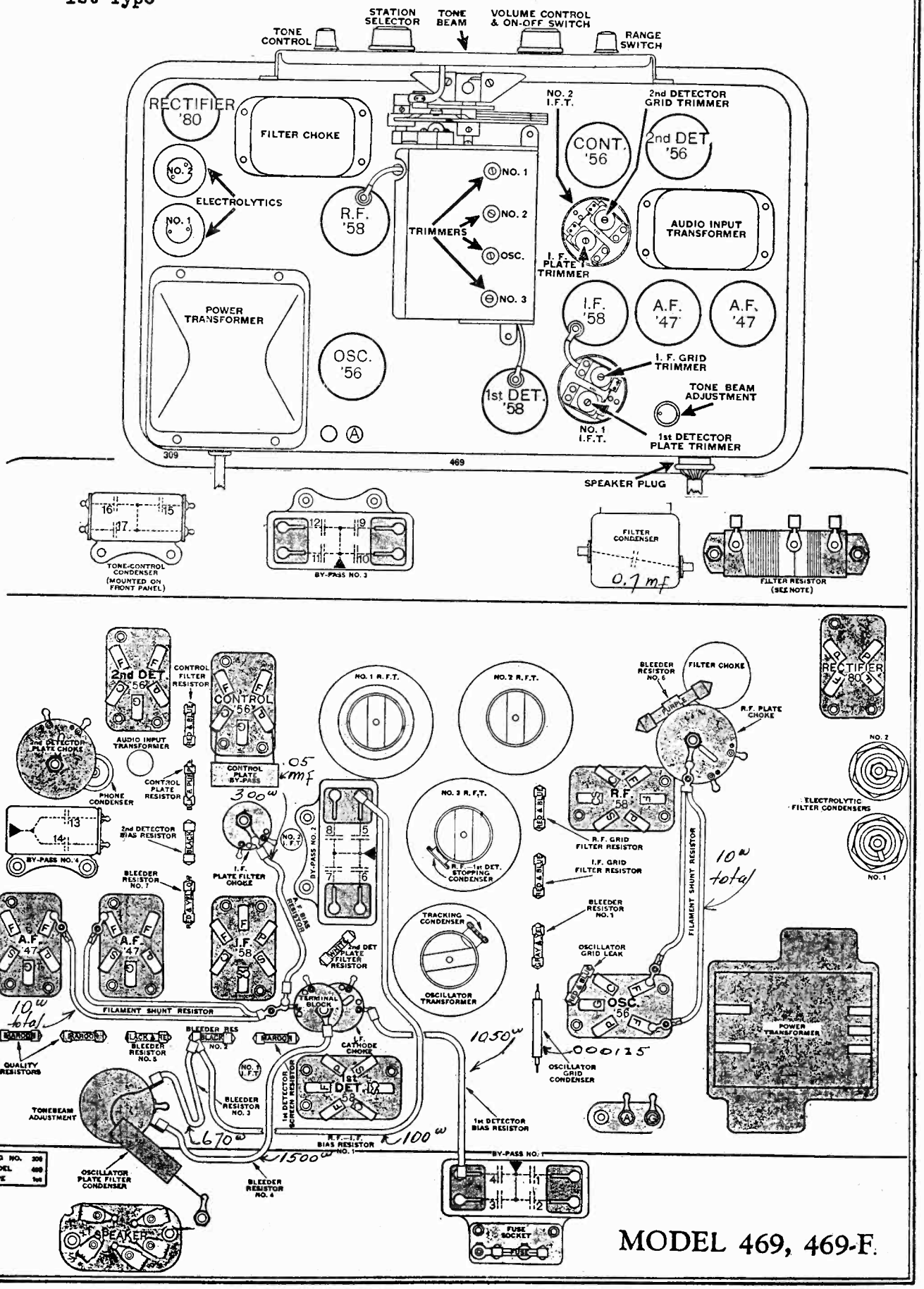


Early-type Model 469 receivers employed a T-12-A power transformer which necessitated the use of a filter resistor (No. 19180-X) as shown above. Later types of this model use a T-23 power transformer which does not require the filter resistor. The T-12-A transformer is not supplied for service, being 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

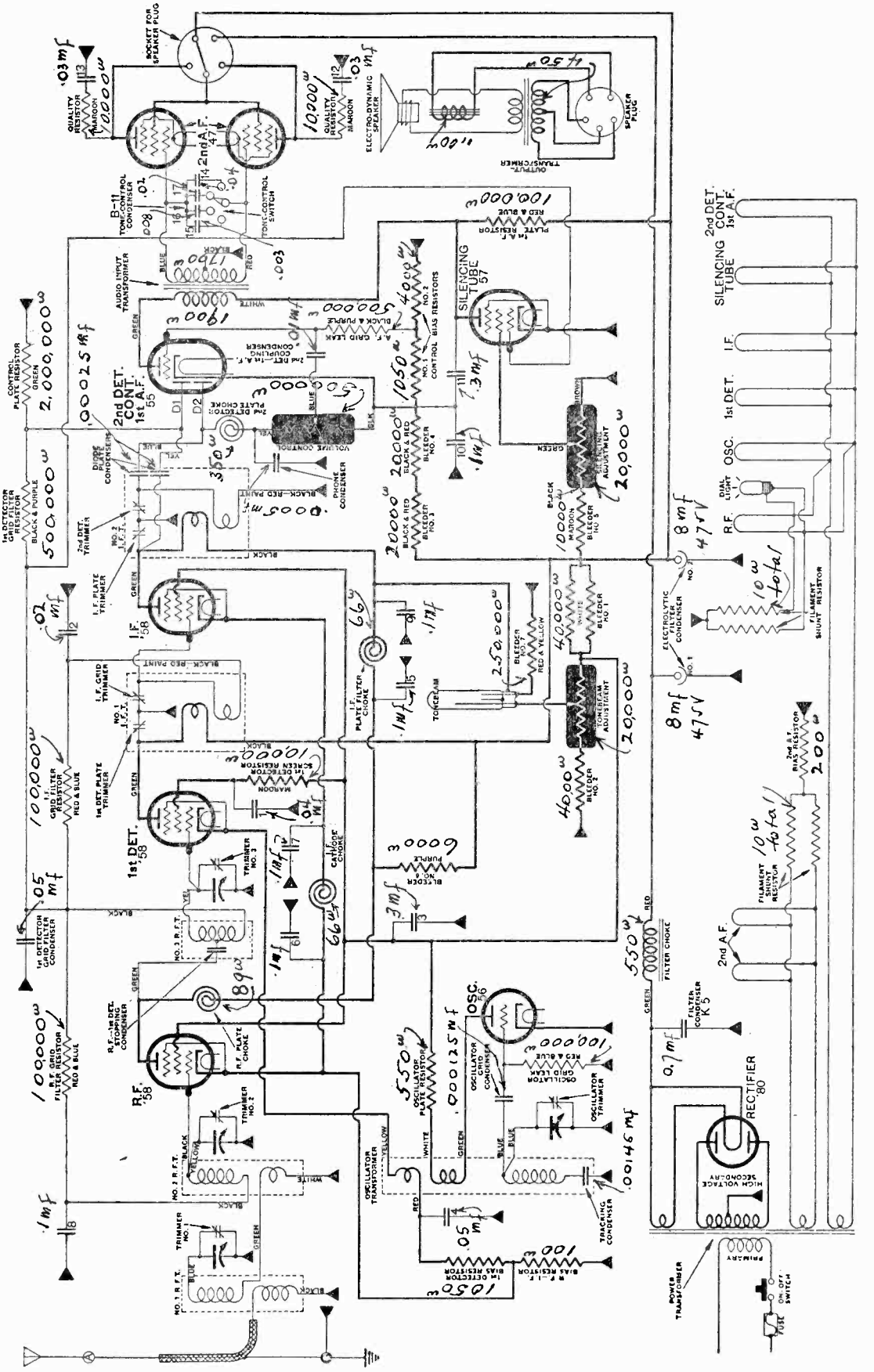
ATWATER KENT MFG. CO.



MODEL 469, 469-F.

ATWATER KENT MFG. CO.

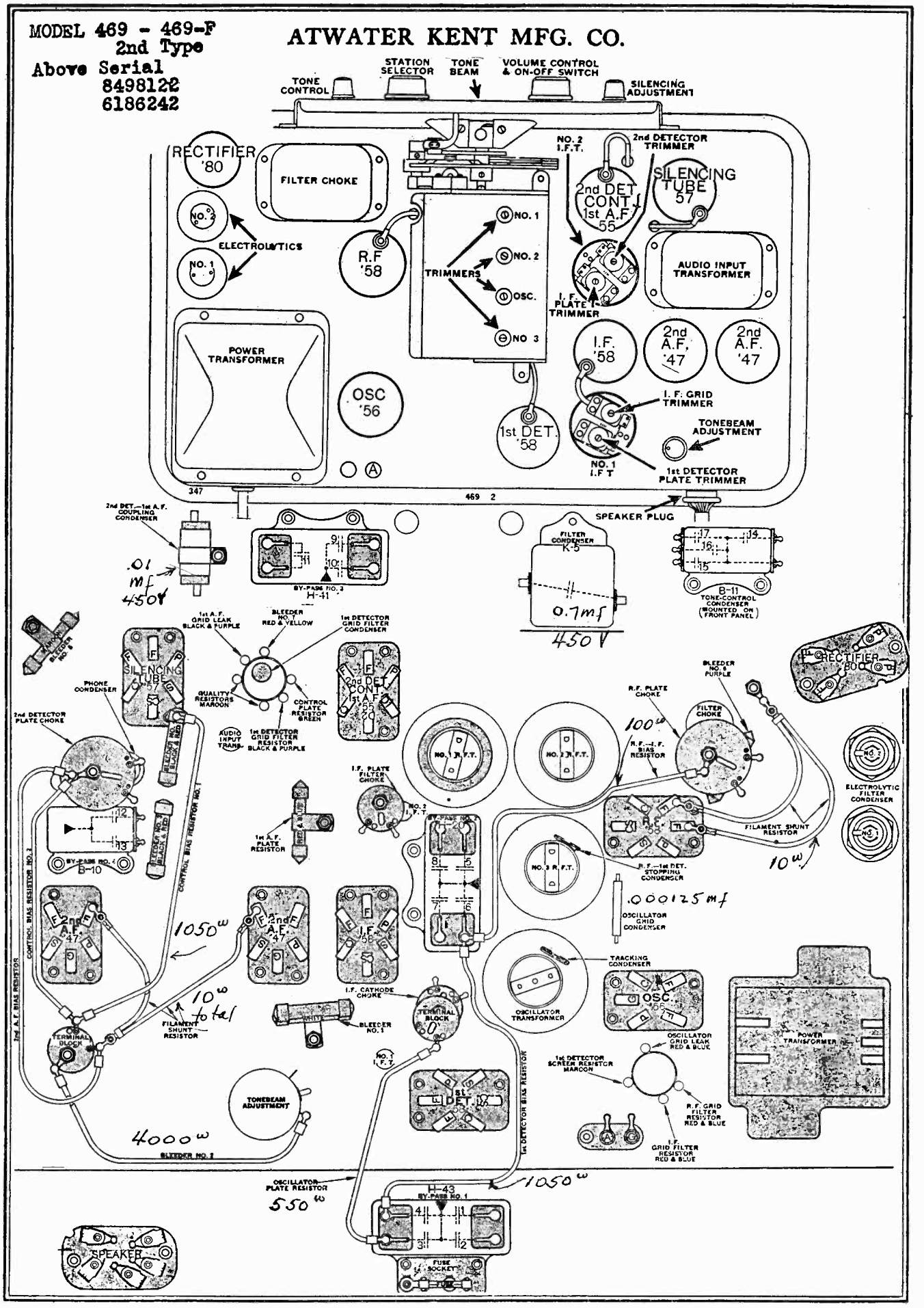
MODEL 469 - 469-F
Second Type
Above Serial
8498122
6186242



Voltage reference page 3-134.

MODEL 469 - 469-F
2nd Type
Above Serial
8498122
6186242

ATWATER KENT MFG. CO.

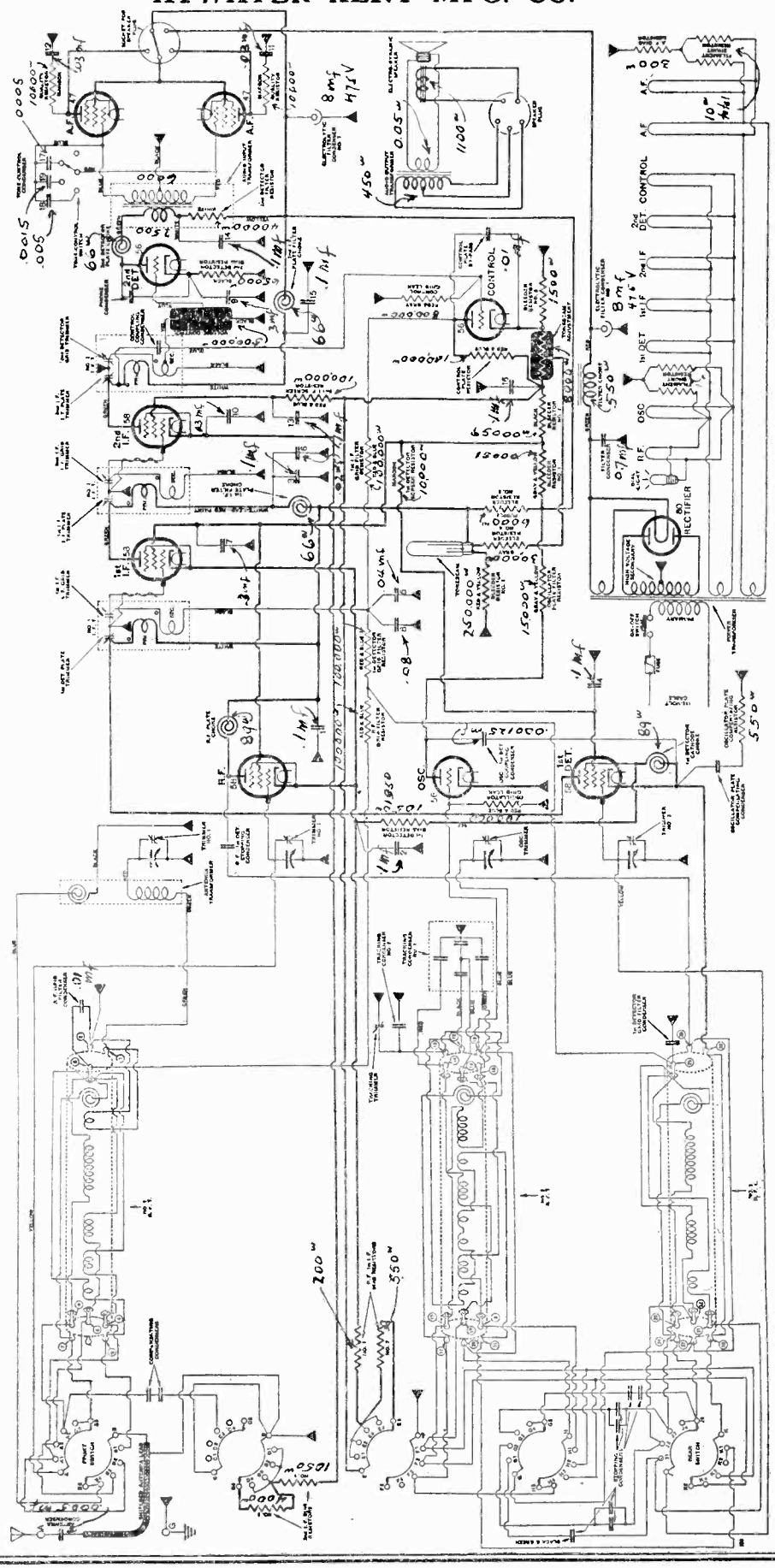


ATWATER KENT MFG. CO.

MODEL 480

MODEL 480

(Intermediate Frequency, 472½ Kilocycles)



BYPASS CONDENSERS. See parts layout on next page.

Voltage data on page 280

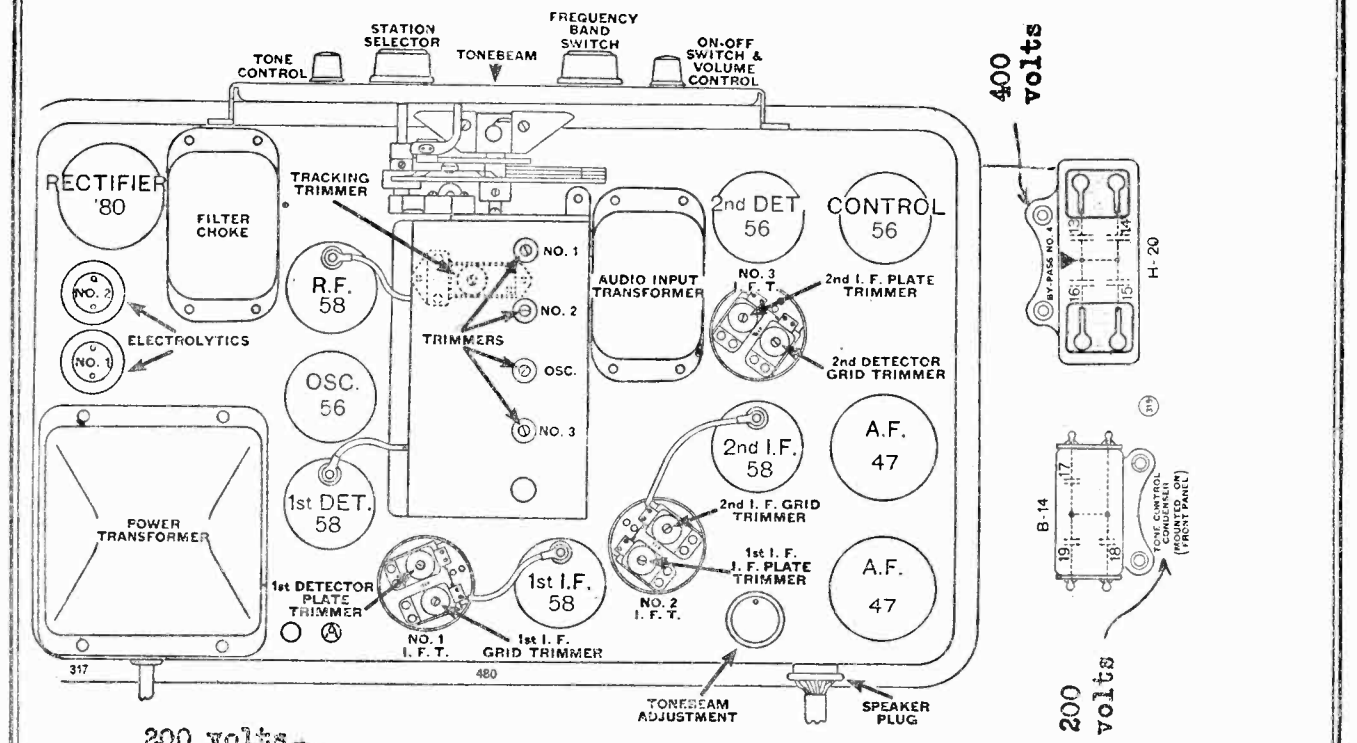
In some early-type Model 480 receivers the circuit arrangement and contacts of the frequency-band switch are different from that shown above.

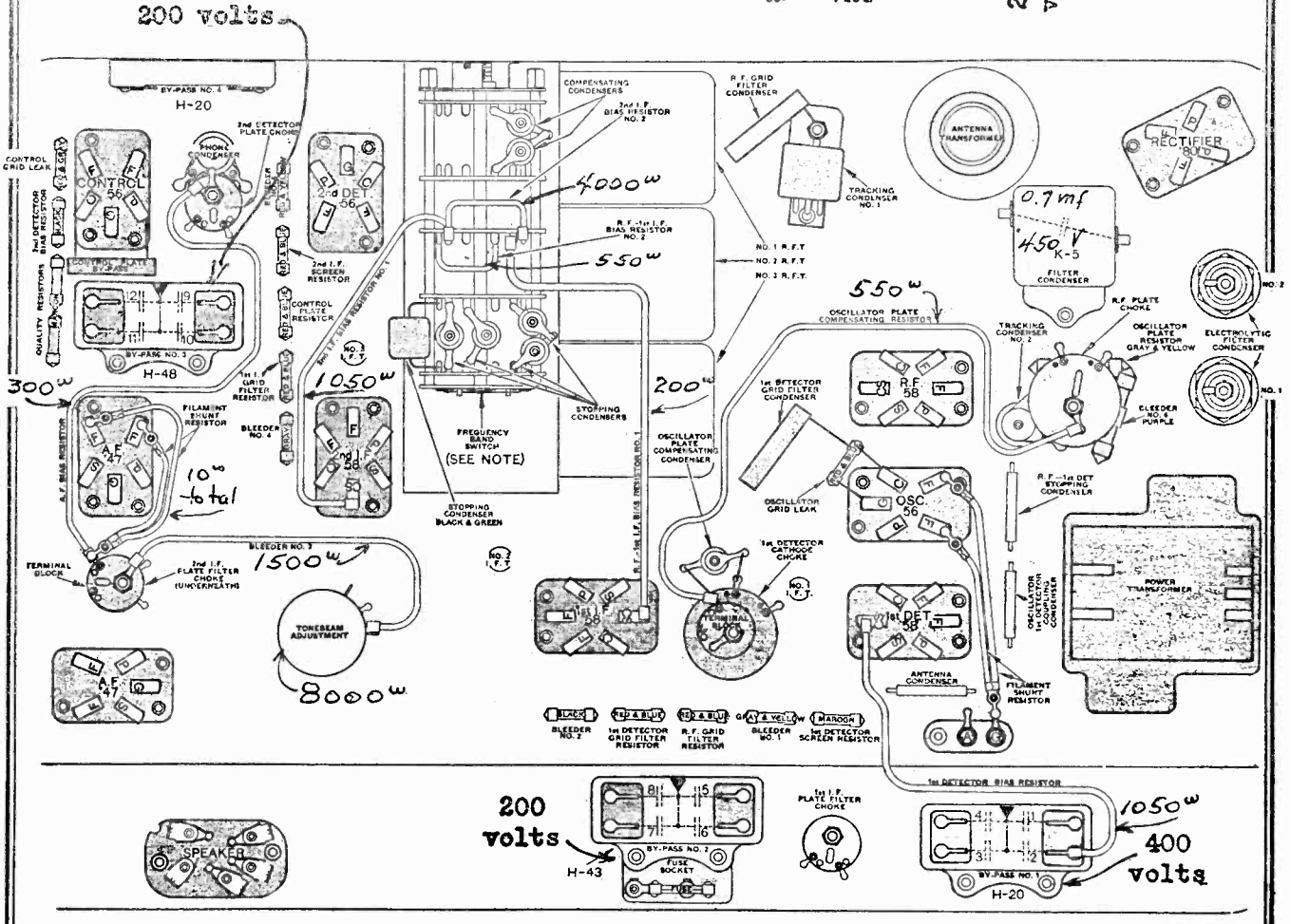
IMPORTANT: In late-type Model 480, the control-coupling condenser and the control grid leak are omitted, and there is no blue lead from No. 3 I. F. T. In these late sets, the grid of the control tube is connected to the yellow lead from No. 3 I. F. T.

Voltage reference page 3-134.

MODEL 480

ATWATER KENT MFG. CO.



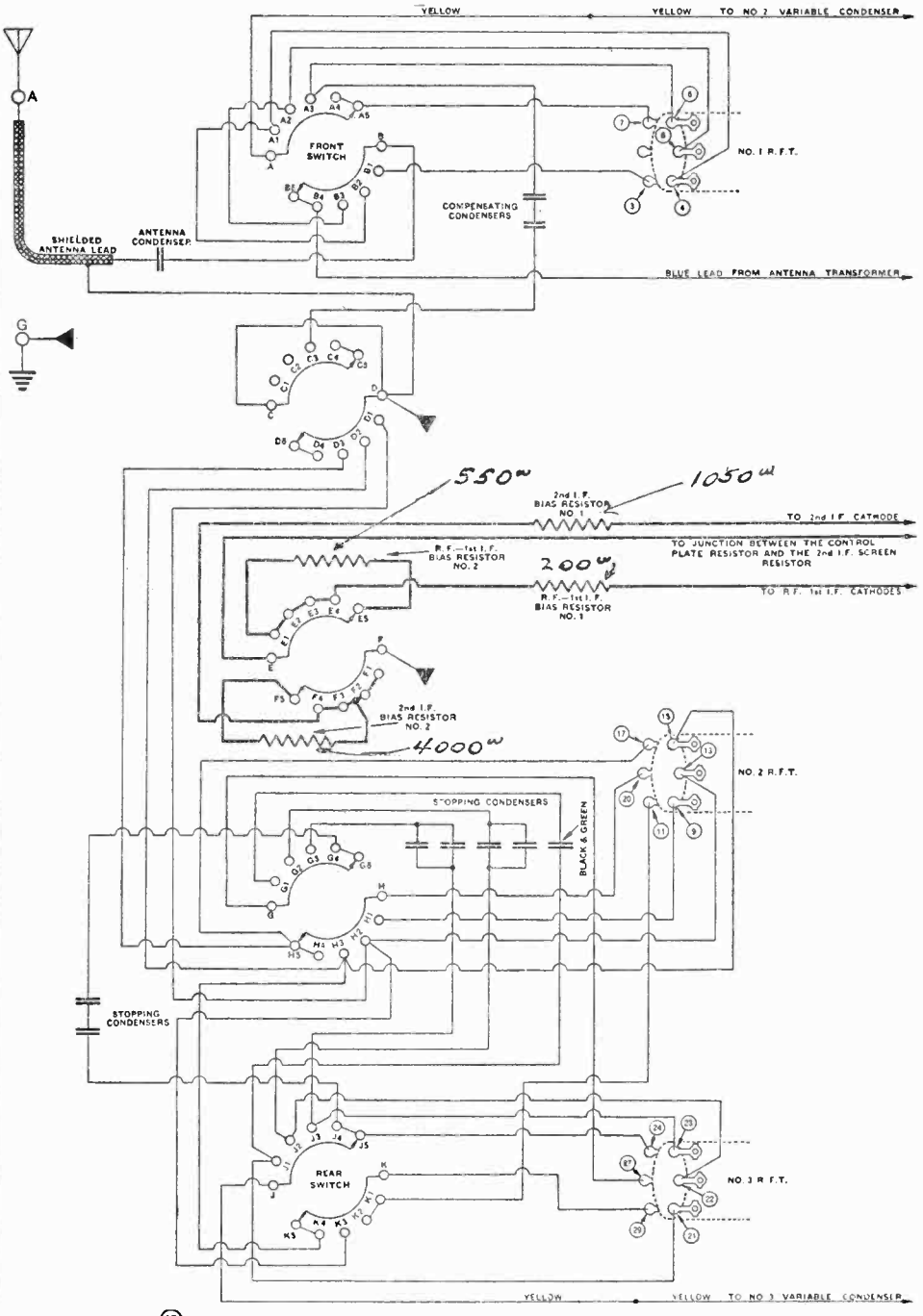


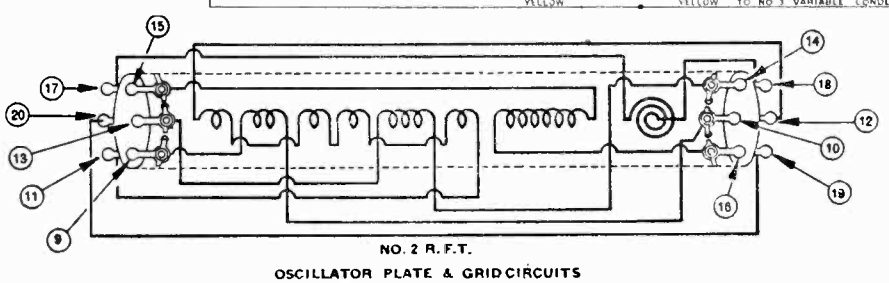
In late-type Model 480 receivers, the arrangement of the frequency-band switch is different from that shown above. The late arrangement is shown in the diagram on page 409.

MODEL 480

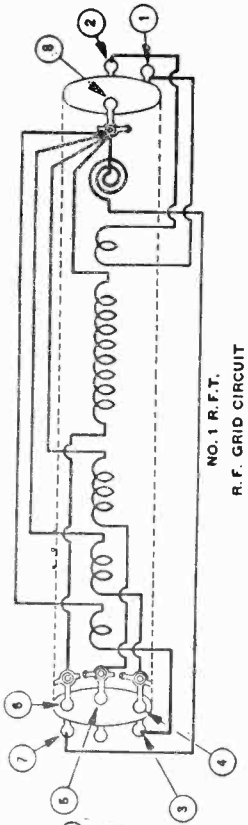
ATWATER KENT MFG. CO.

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

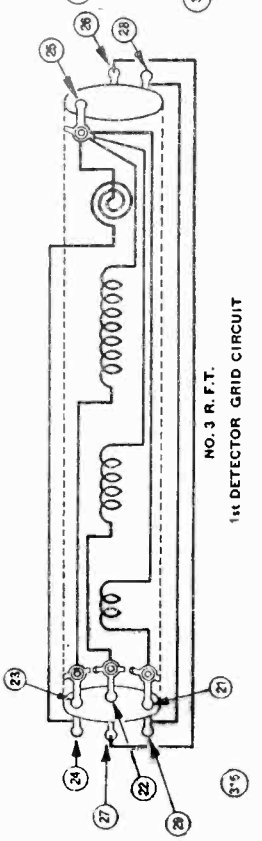




NO. 2 R.F.T.
OSCILLATOR PLATE & GRID CIRCUITS



NO. 1 R.F.T.
R.F. GRID CIRCUIT

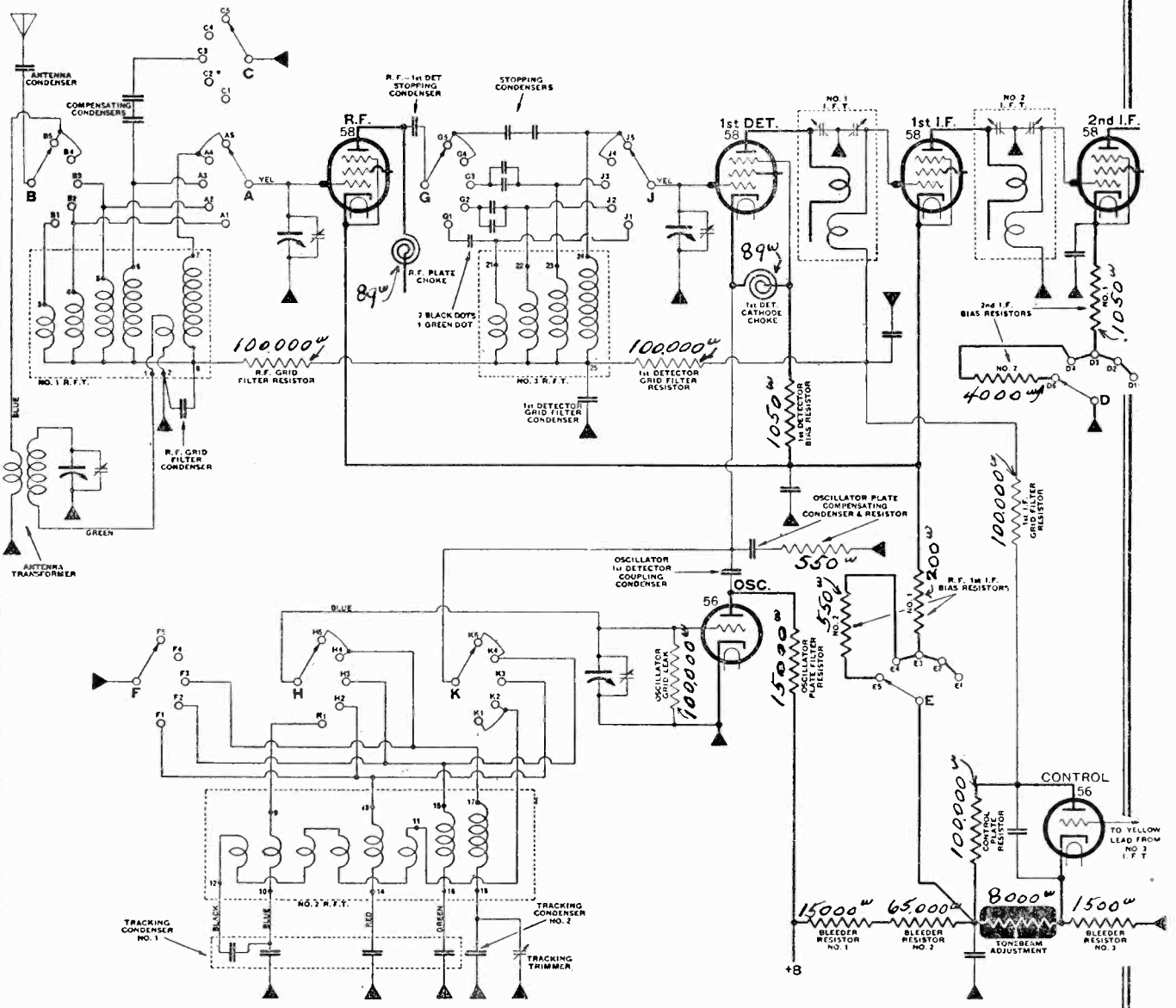


NO. 3 R.F.T.
1st DETECTOR GRID CIRCUIT

MODEL 480

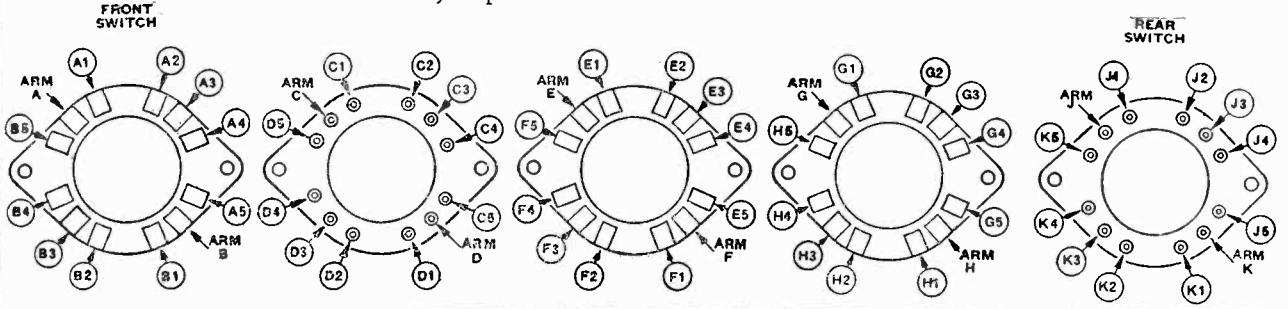
ATWATER KENT MFG. CO.

MODEL 480 SIMPLIFIED SCHEMATIC



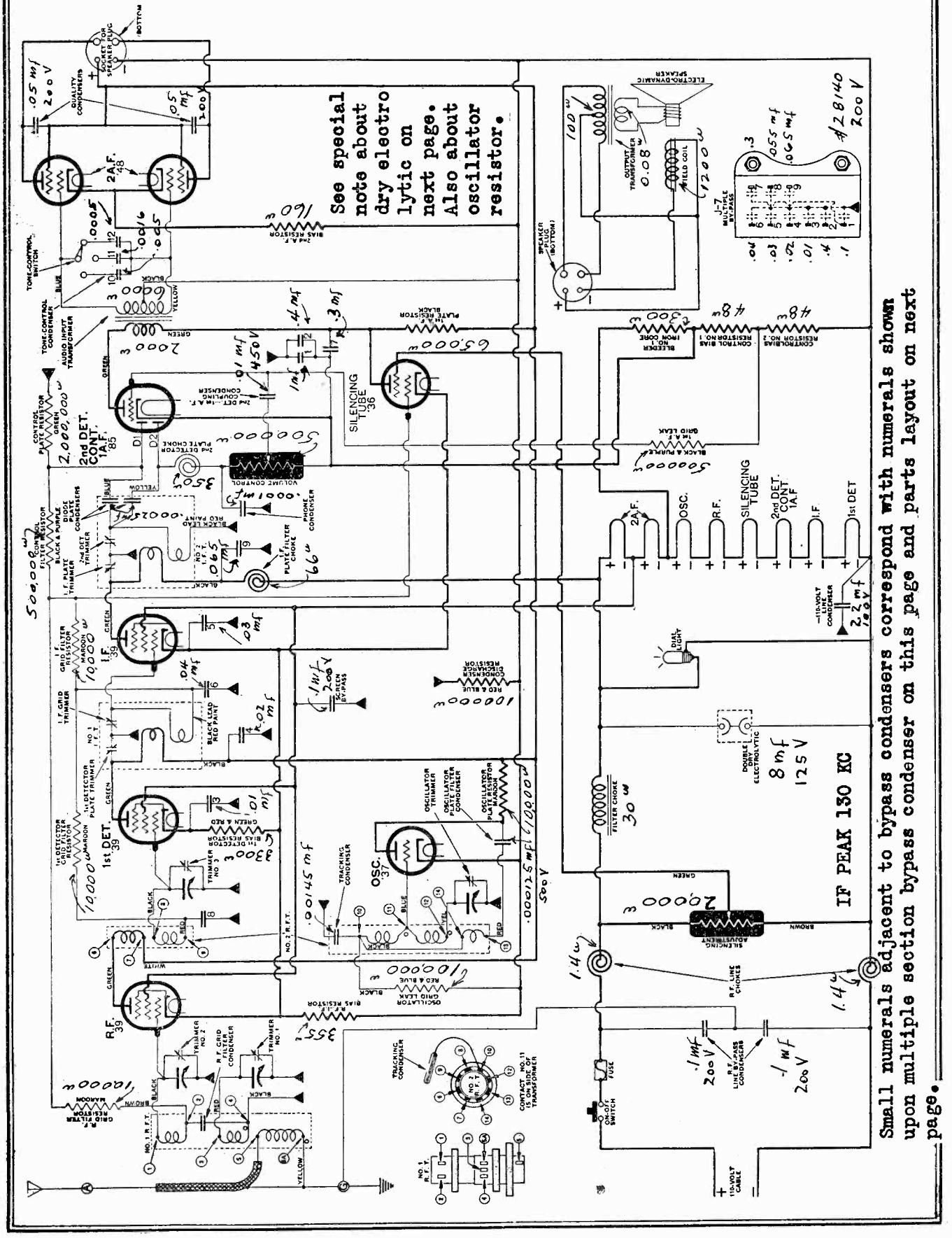
The frequency-range switch in Model 480 has five positions as follows:

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.



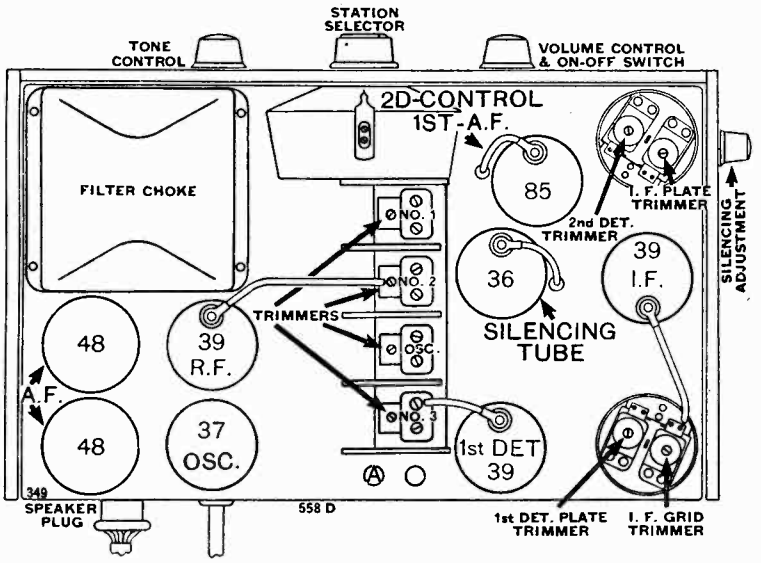
ATWATER KENT MFG. CO.

MODEL 469-D
MODEL 558-D

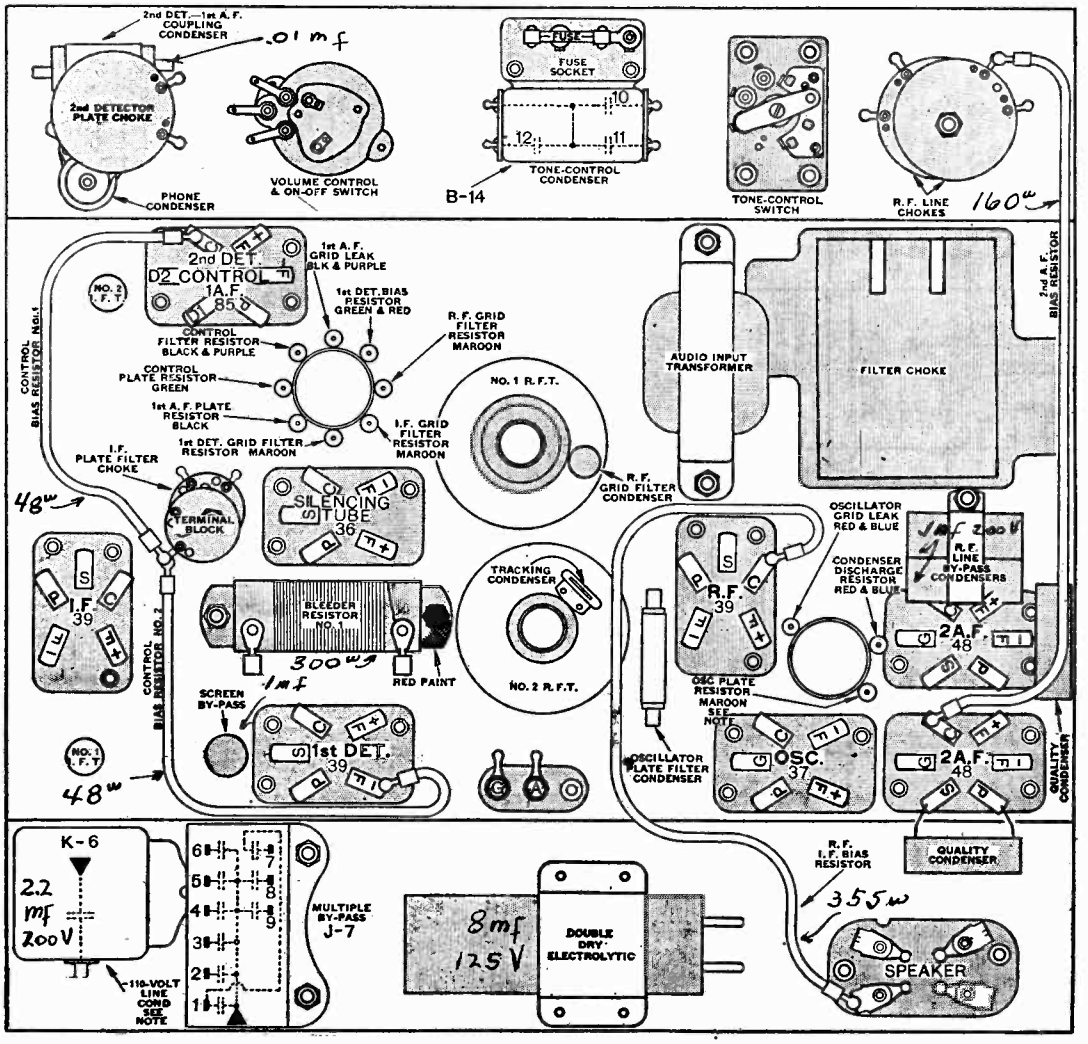


MODEL 469-D
MODEL 558-D

ATWATER KENT MFG. CO.

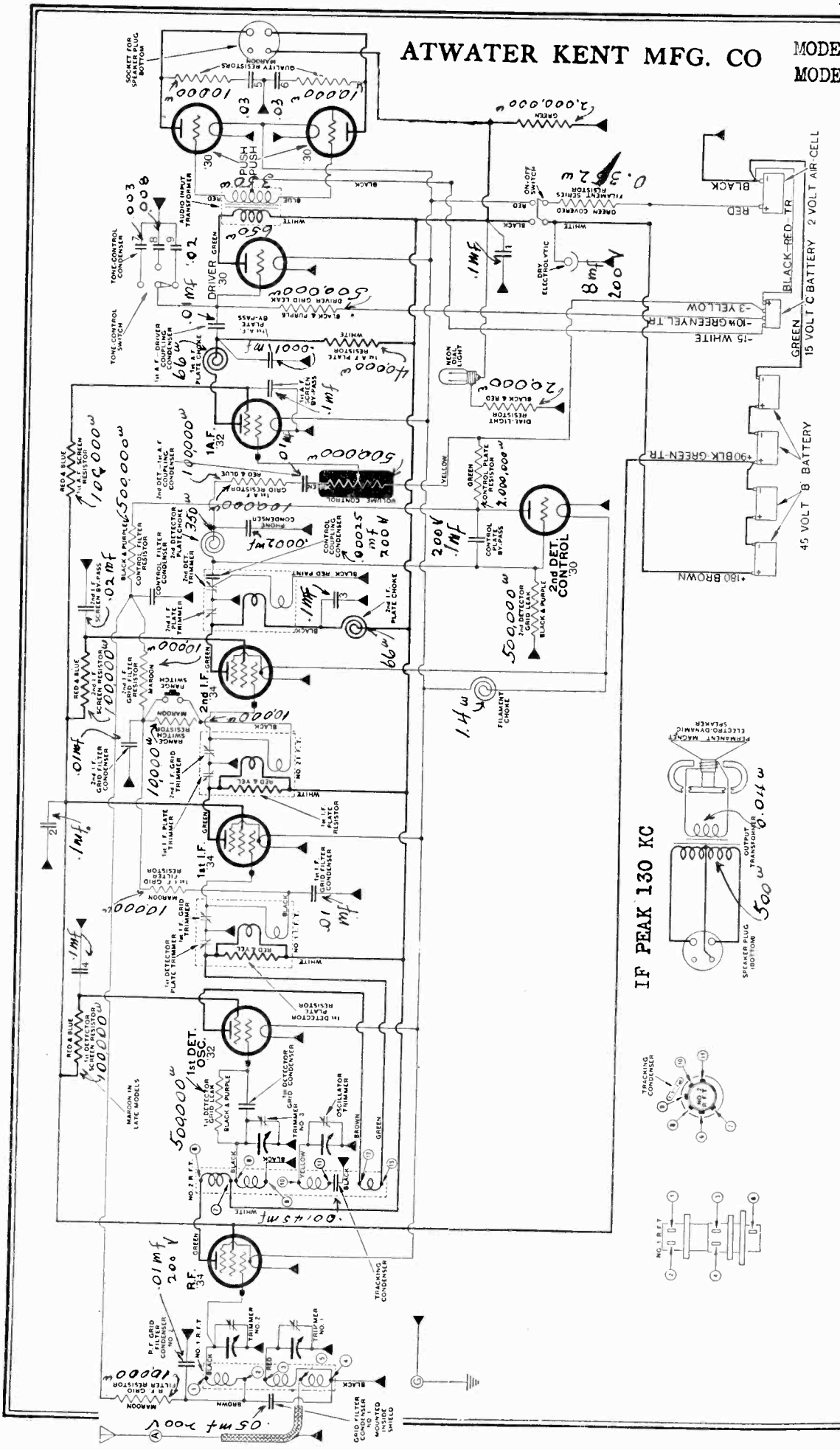


All condensers within multiple section unit are rated at 200 volts. Also a black resistor is connected across the maroon oscillator plate filter resistor.
In some of these sets a tubular dry electrolytic is used as the 110 volt line condenser.



ATWATER KENT MFG. CO

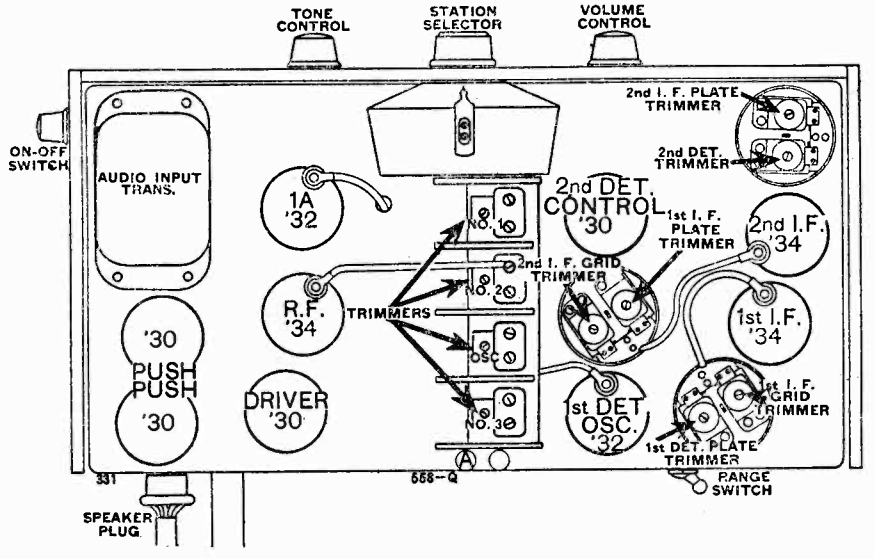
MODEL 469-Q
MODEL 558-Q



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

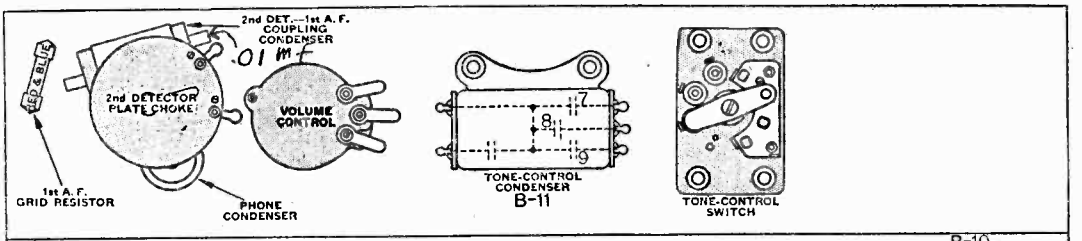
ATWATER KENT MFG. CO.

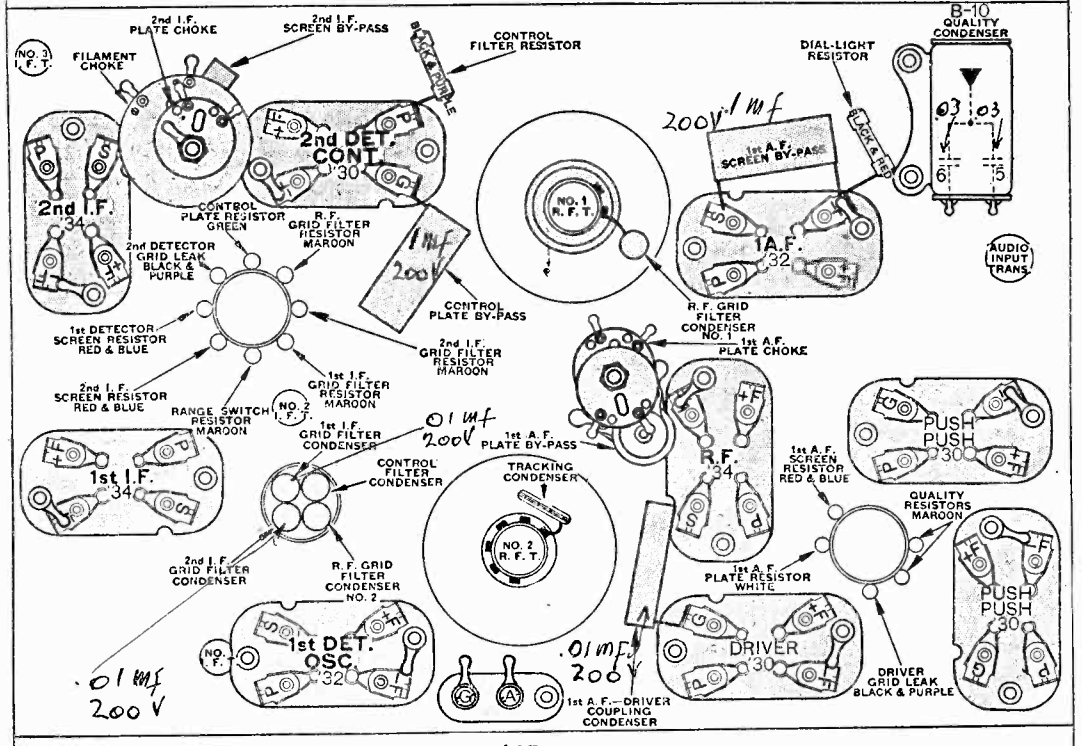


NUMBER
BYPASS CONDENSERS
400 VOLTS

QUALITY 450 VOLTS

TONE 200 VOLTS

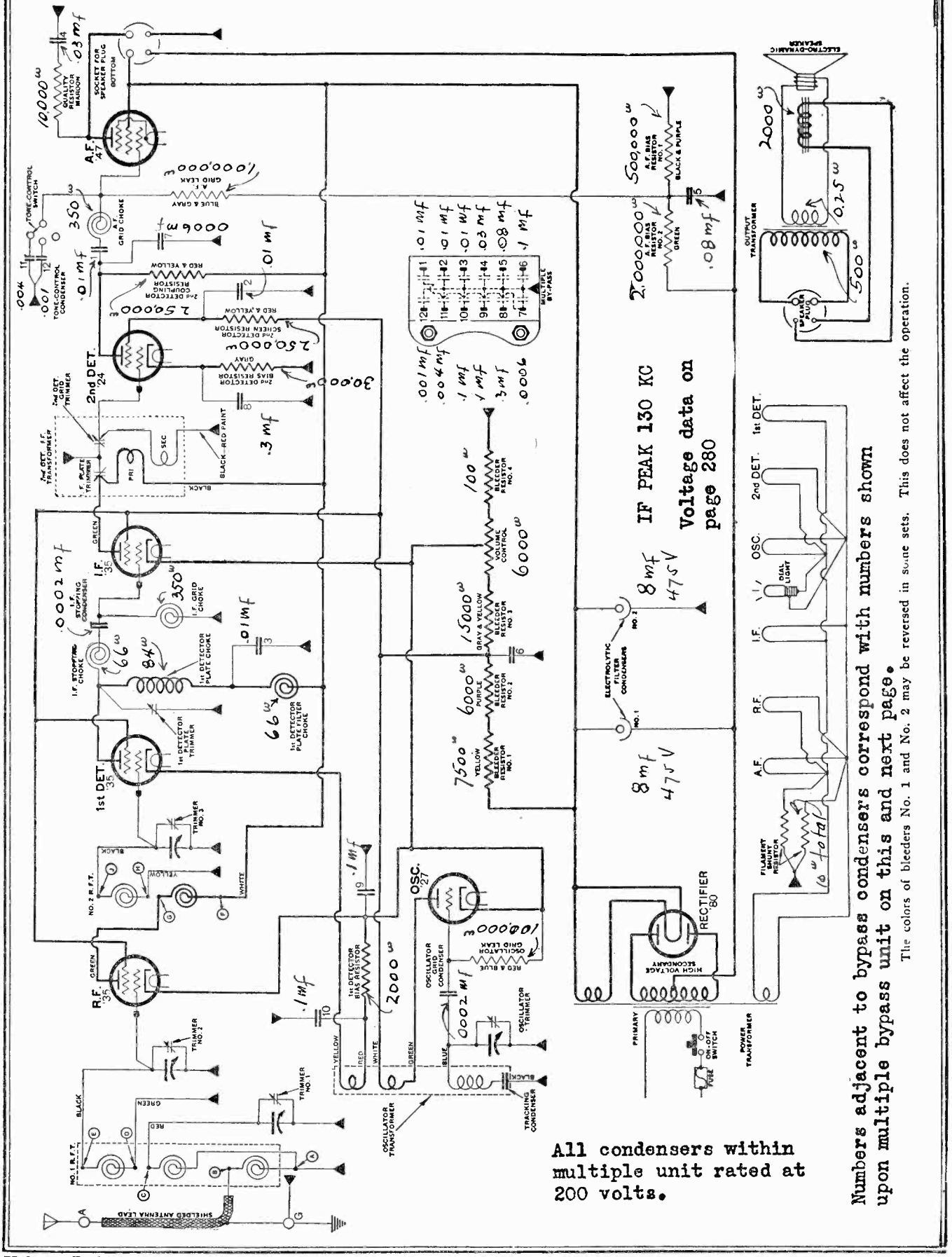




DWG NO. 343
MODEL 558-Q
TYPE 2nd

ATWATER KENT MFG. CO.

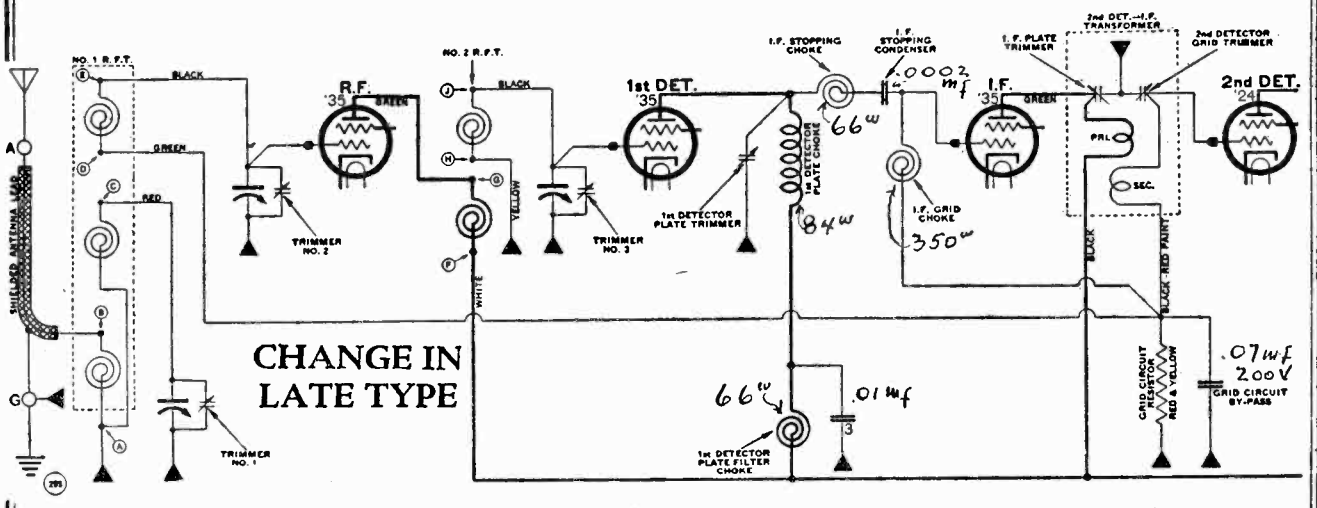
MODEL 567, 567-F



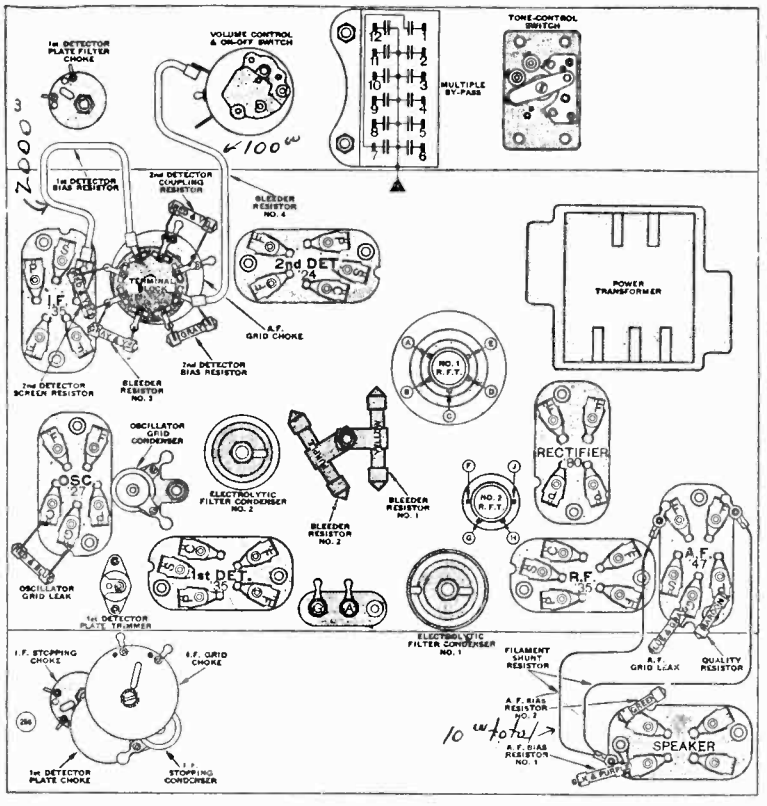
Voltage Reference page 3-134.

MODEL 567, 567-F

ATWATER KENT MFG. CO.



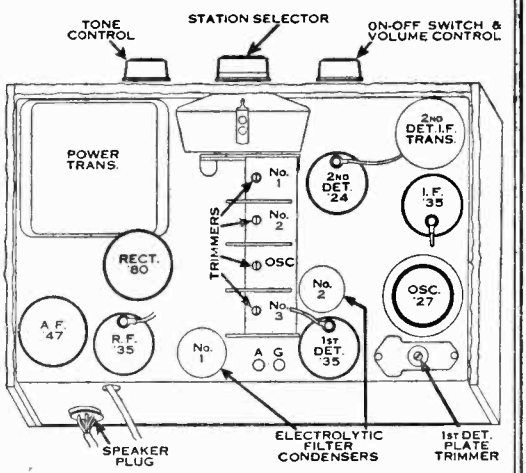
In late type the grid returns of the R. F., I. F., and 2nd-detector tubes are connected to ground through a red-and-yellow resistor as shown above.



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.

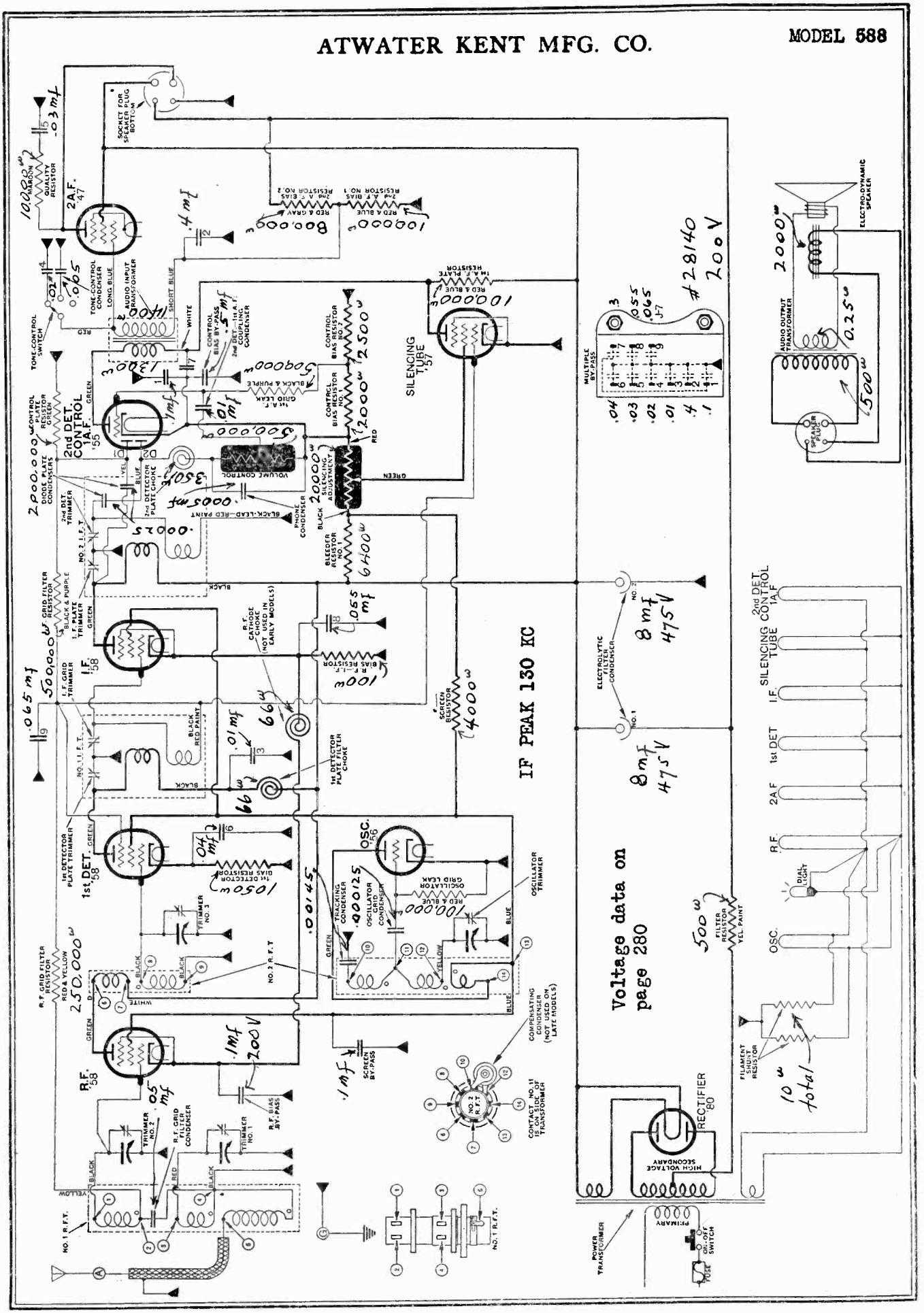
All numbered bypass condensers are rated at 200 volts.

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.

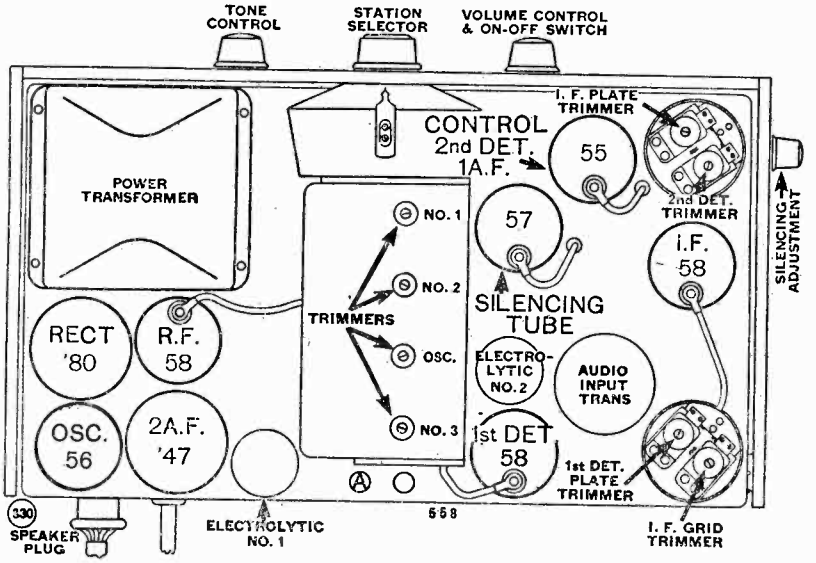
MODEL 588

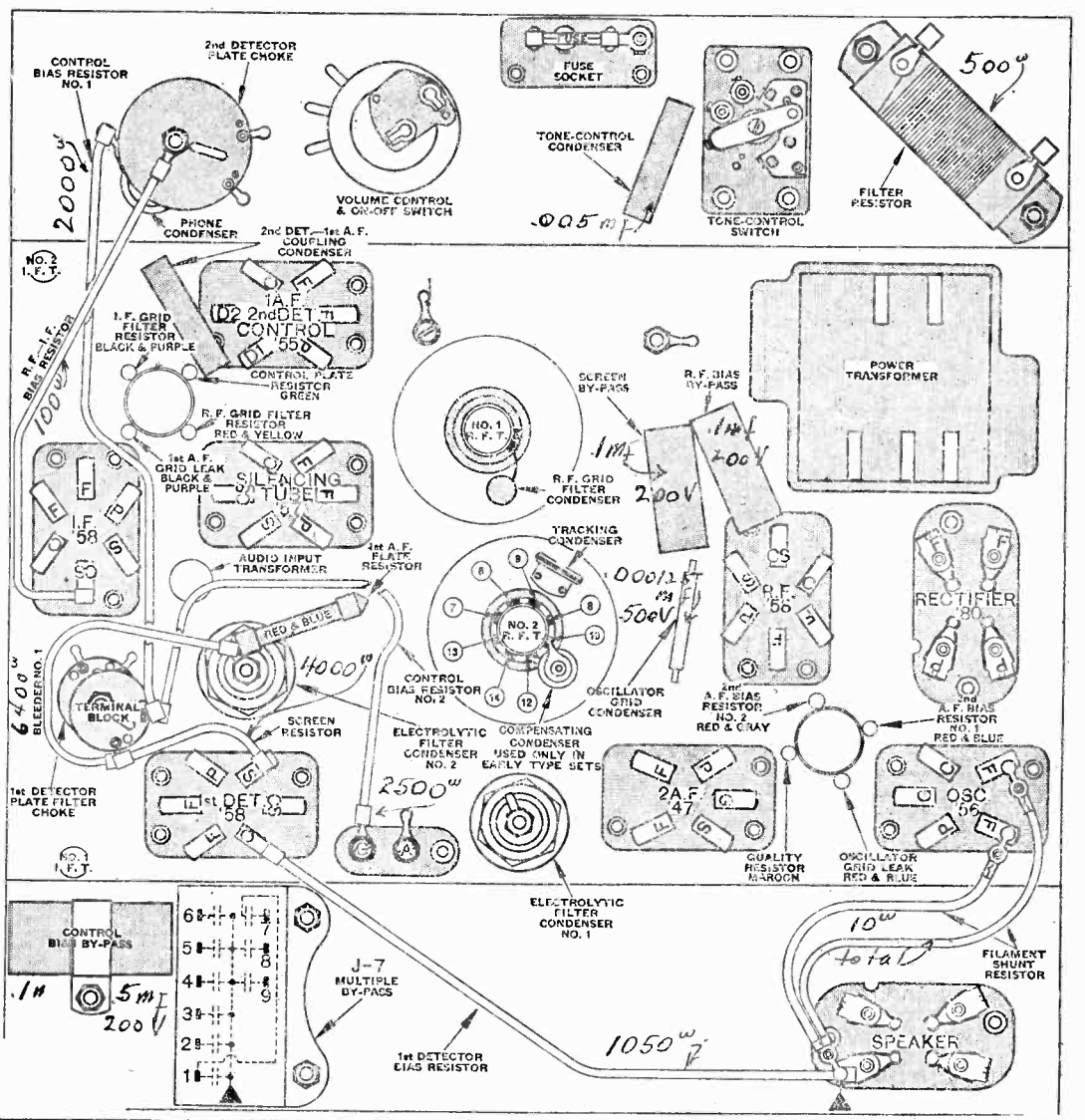


Voltage Reference page 3-134.

MODEL 588

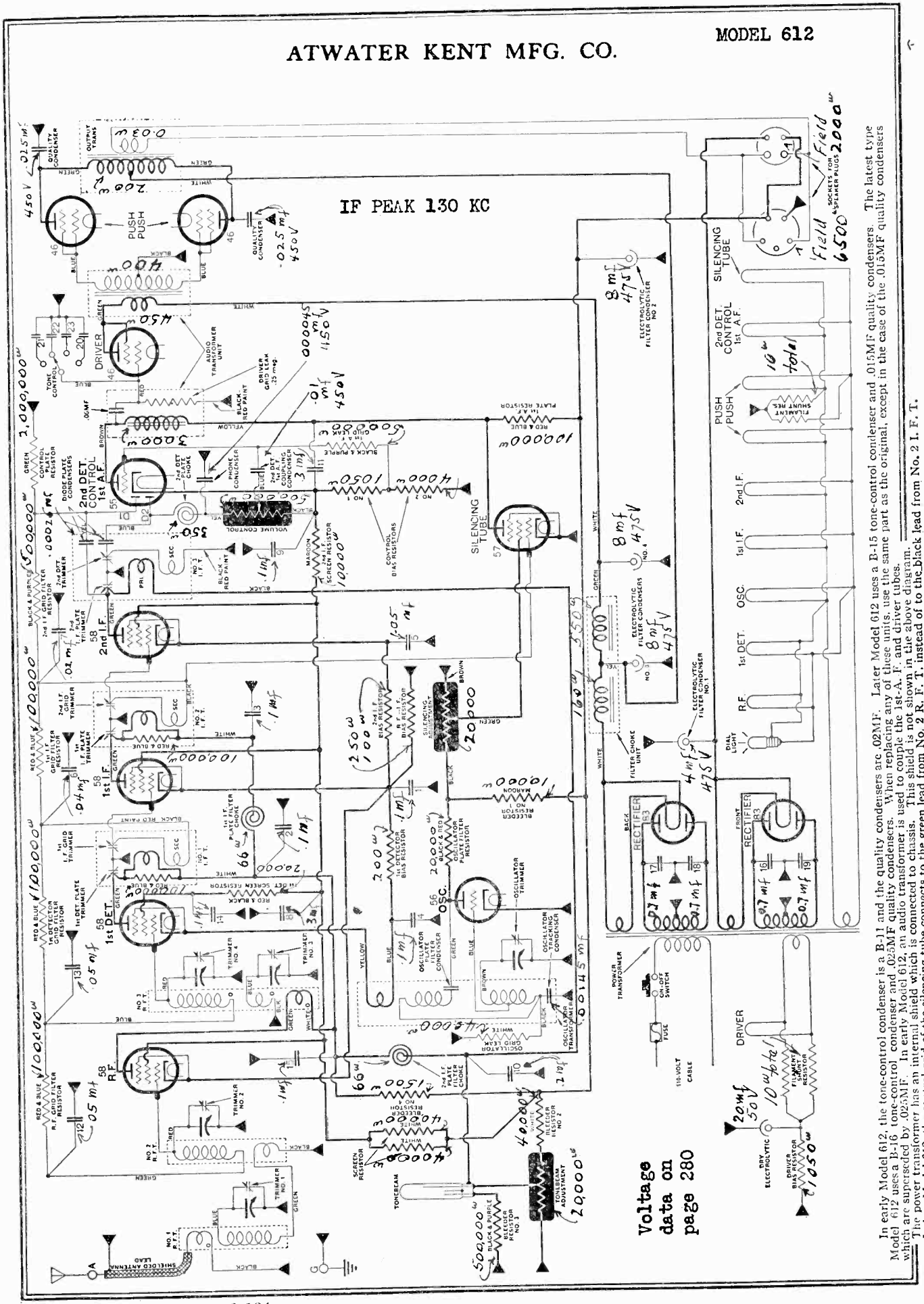
ATWATER KENT MFG. CO.





ATWATER KENT MFG. CO.

MODEL 612

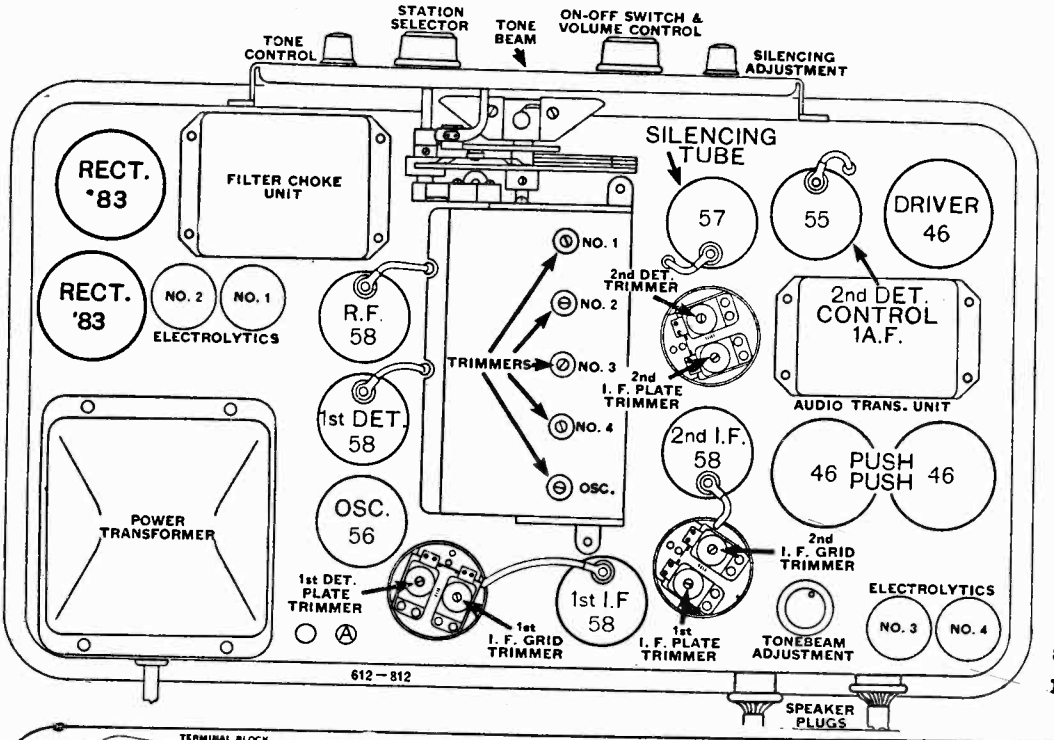


In early Model 612, the tone-control condenser is a B-11 and the quality condensers are .02MF. Later Model 612 uses a B-15 tone-control condenser and .015MF quality condensers. The latest type Model 612 uses a B-16 tone-control condenser and .025MF quality condensers. When replacing any of these units, 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-49 for replacement.

Voltage Reference page 3-134.

MODEL 612

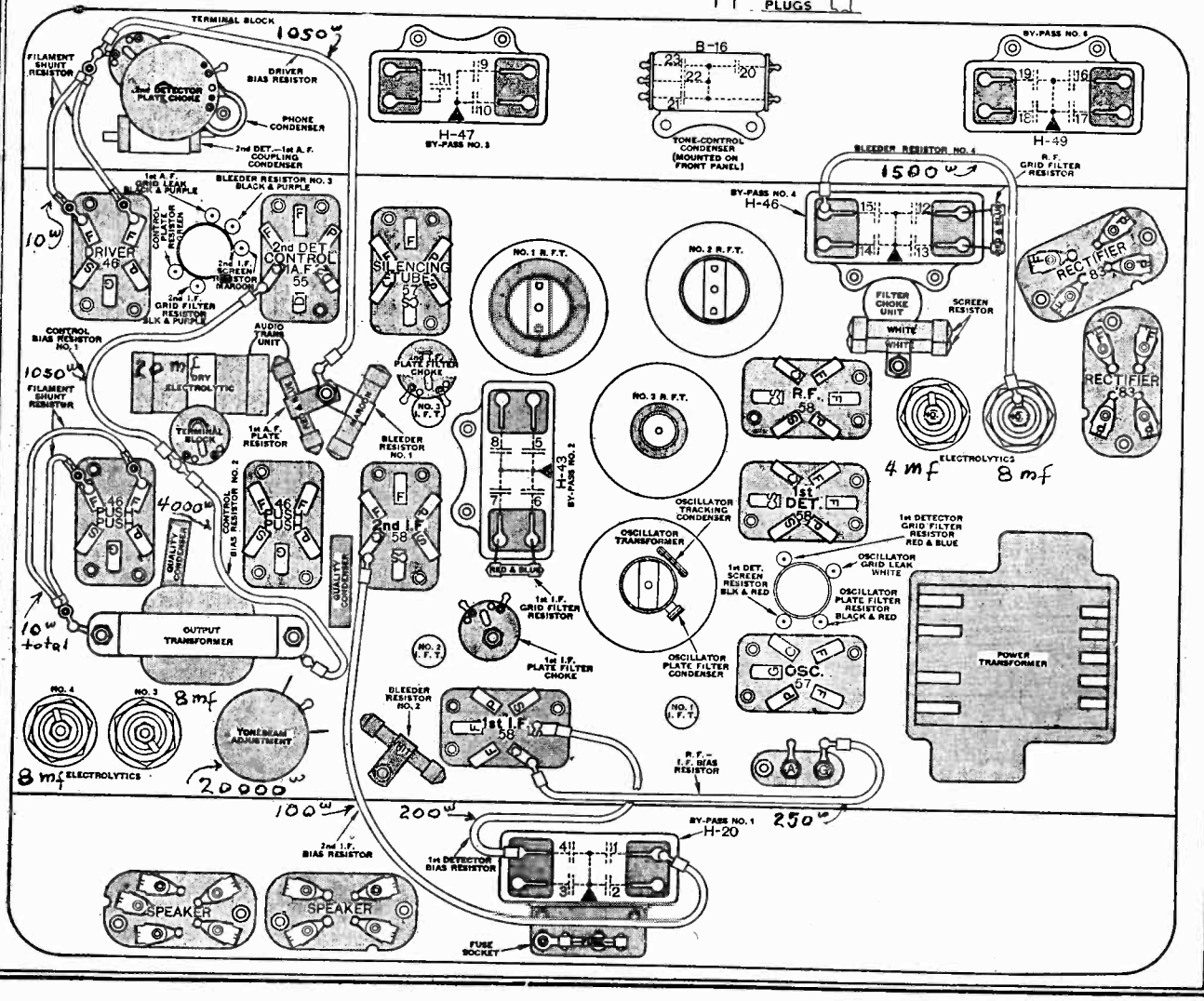
ATWATER KENT MFG. CO.

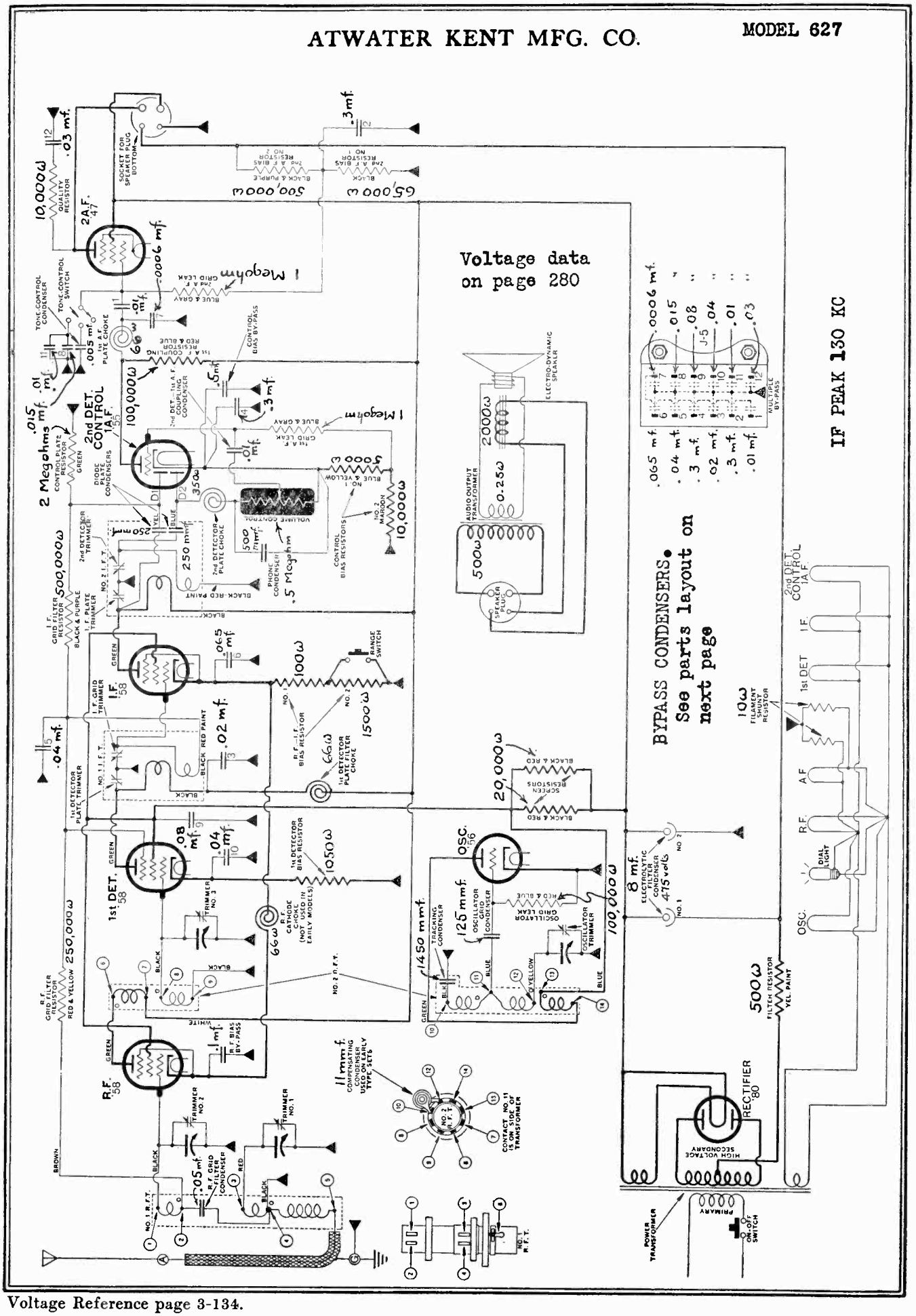


BYPASS CONDENSERS

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.

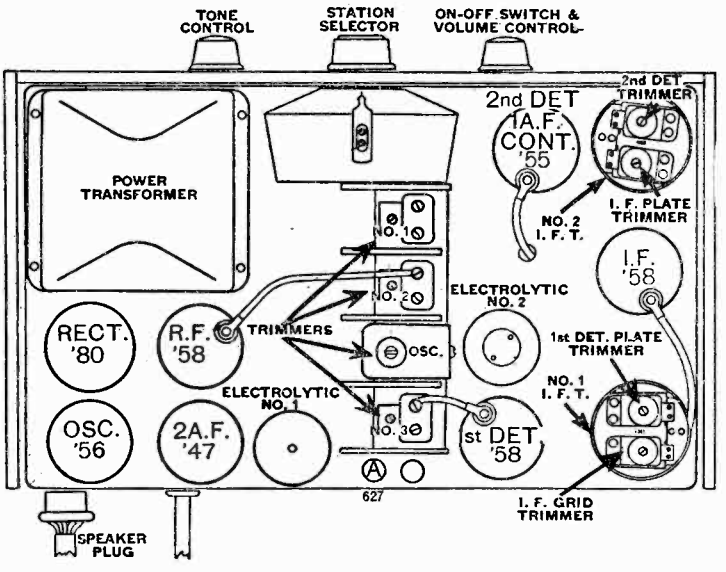


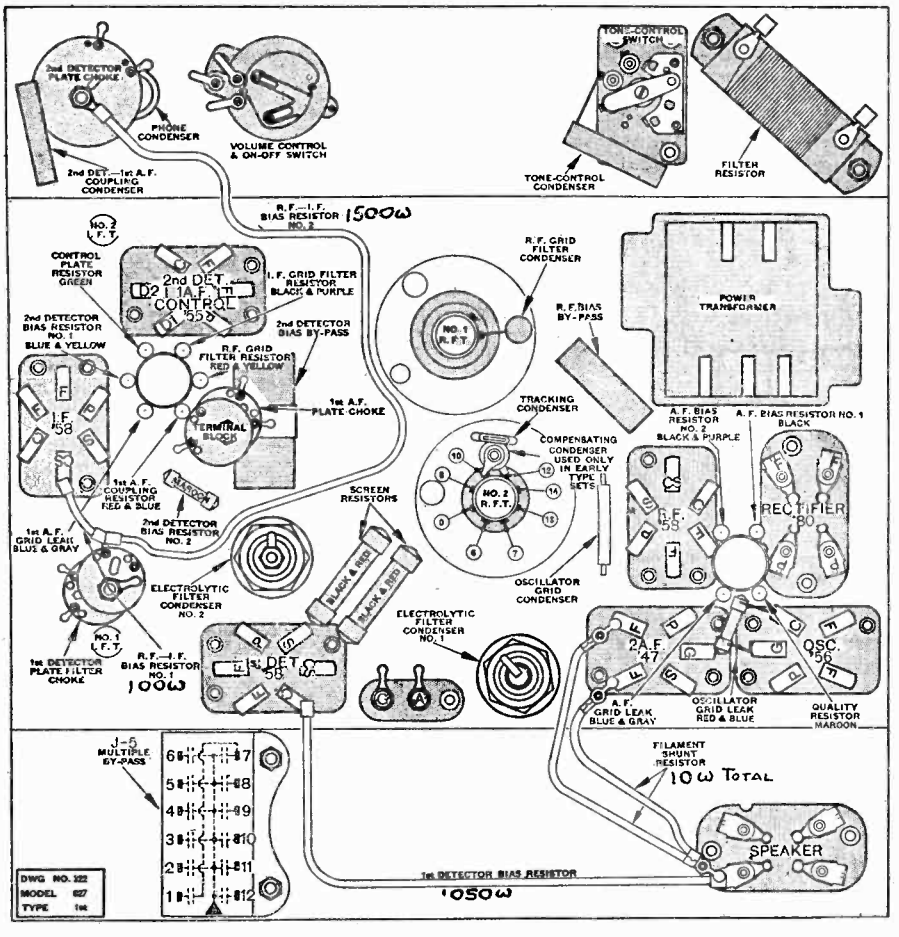


Voltage Reference page 3-134.

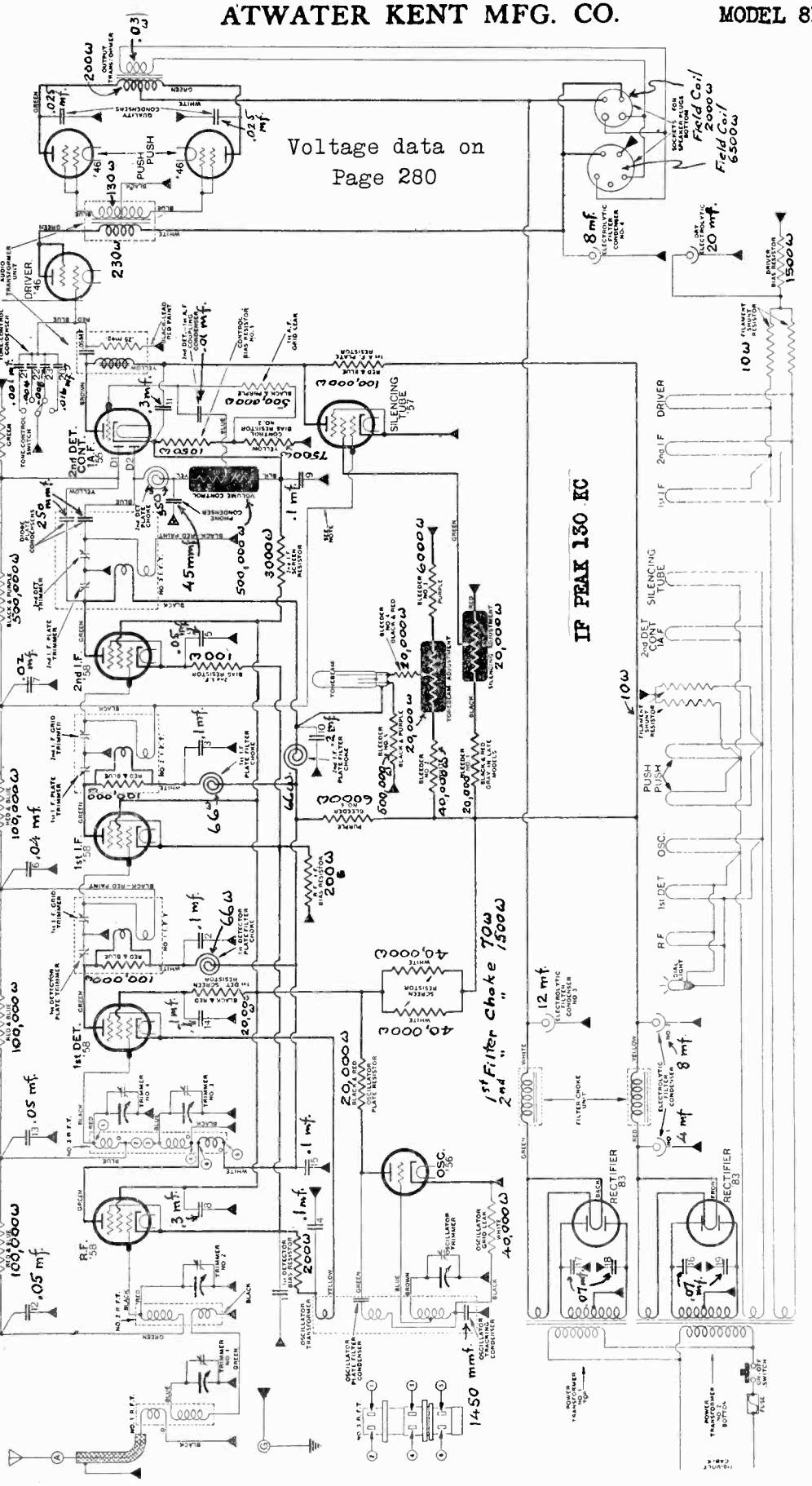
MODEL 627

ATWATER KENT MFG. CO.





ATWATER KENT MFG. CO. MODEL 812

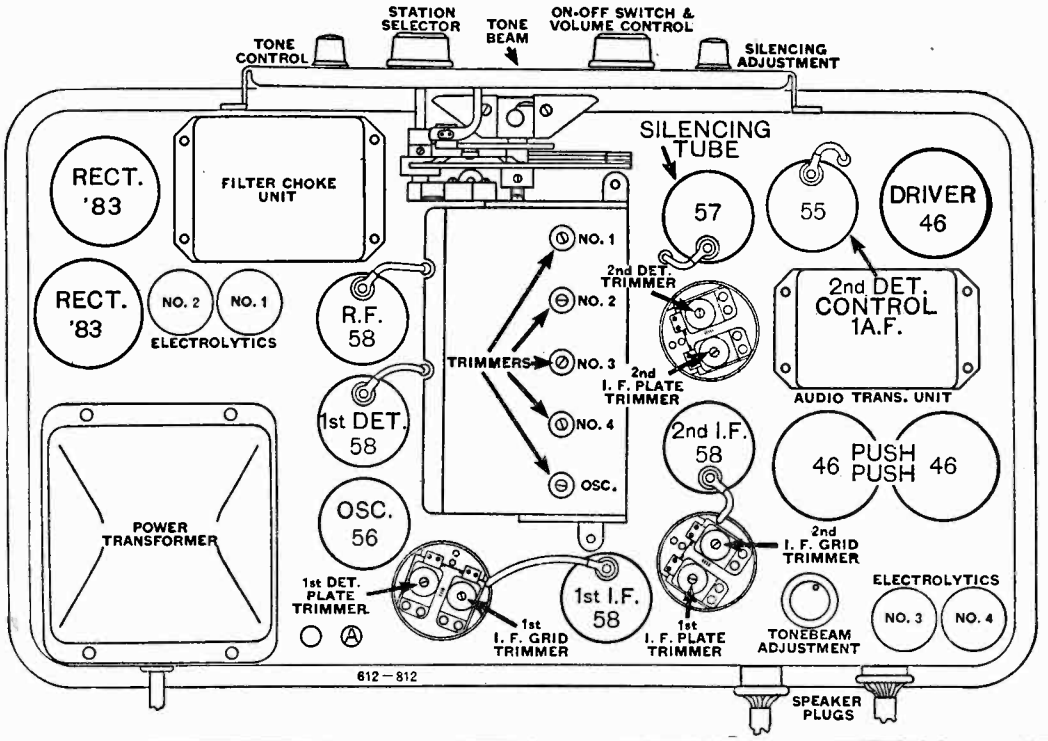


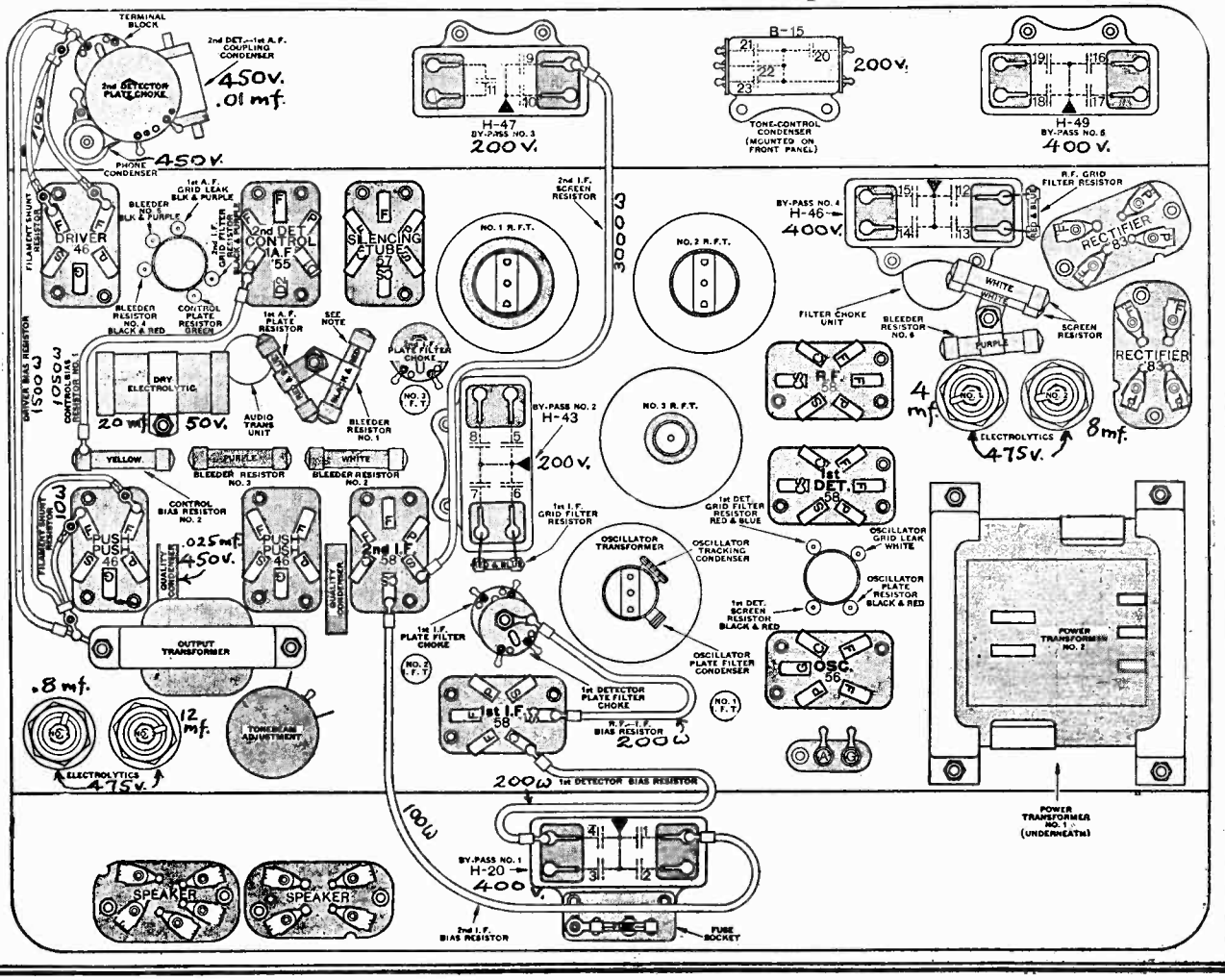
In early Model 812, the tone-control condenser is a B-11 and the quality condensers are .02MF. Later Model 812 uses a B-15 tone-control condenser and .015MF quality condensers. The latest type Model 812 uses a B-16 tone-control condenser and .025MF quality condensers. When replacing any of these units, 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-19 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

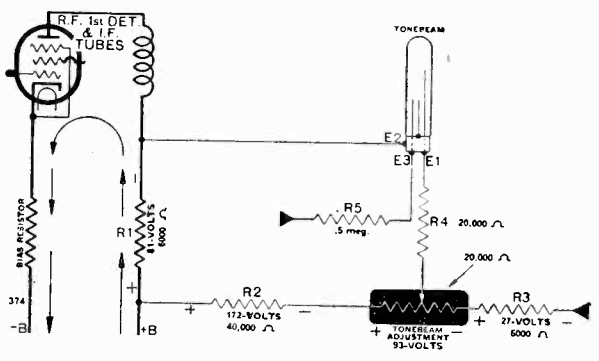
The Atwater Kent tonebeam is a neon light-column that indicates visually when the set is tuned correctly to resonance with the incoming signal.

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.

ATWATER KENT MFG. CO. RESISTOR DATA

TUBULAR RESISTORS

(When replacing a tubular resistor, use a resistor of the same identifying color and size)

½ WATT

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

1 WATT

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

1½ WATT

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

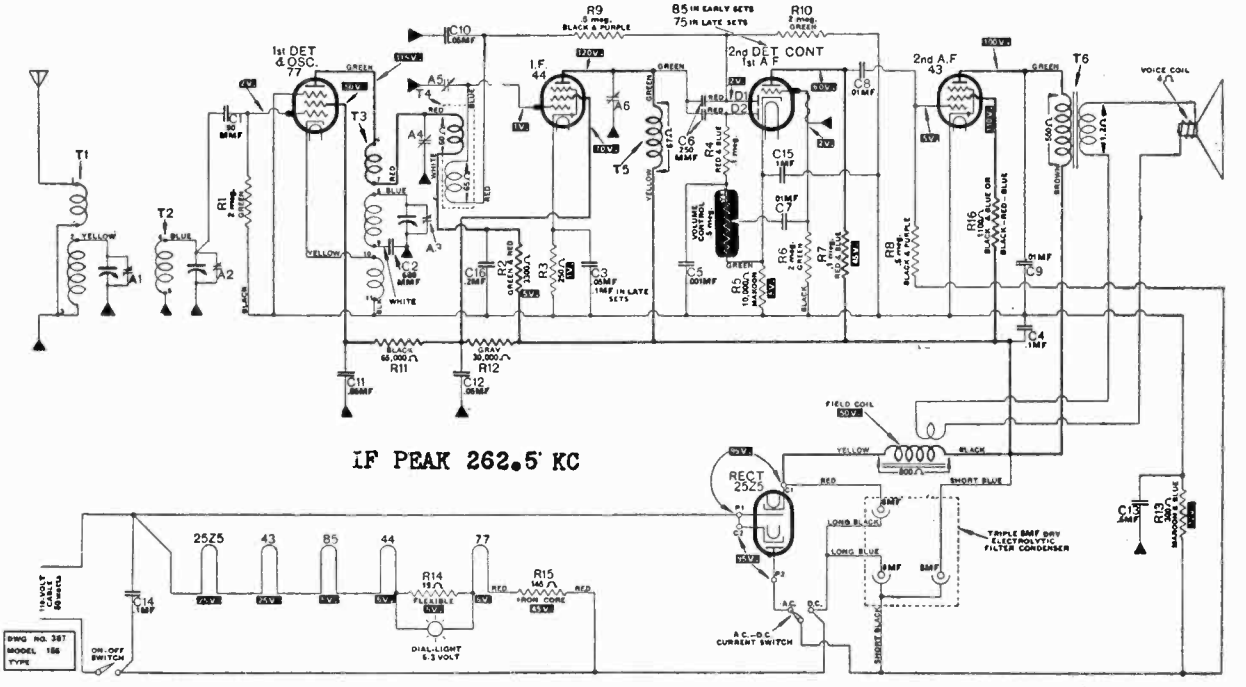
The resistors shown above are of the tubular type, that is designated and illustrated as such. The wattage rating are shown in the illustrations. In order to avoid confusion, by listing the wattage rating of the various tubular resistors upon each wiring diagram and parts layout, such information is 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



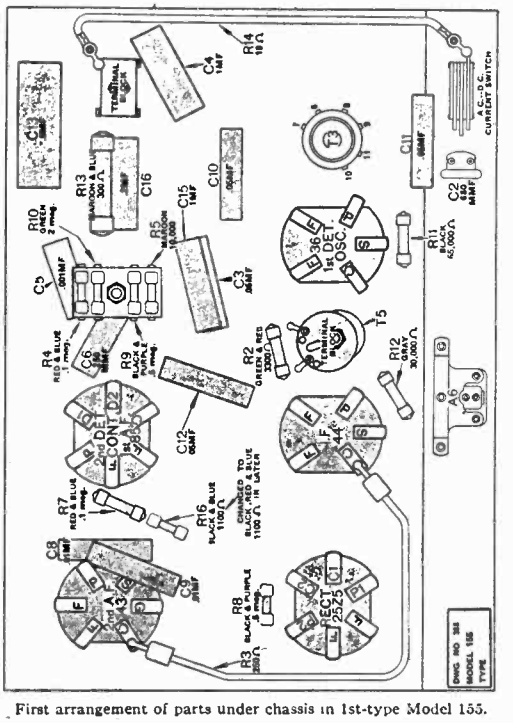
The type 75 tube is not used in any 1st-type Model 155. The 2nd-type 155, which uses the 75 tube, will be described in a later supplement.

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.

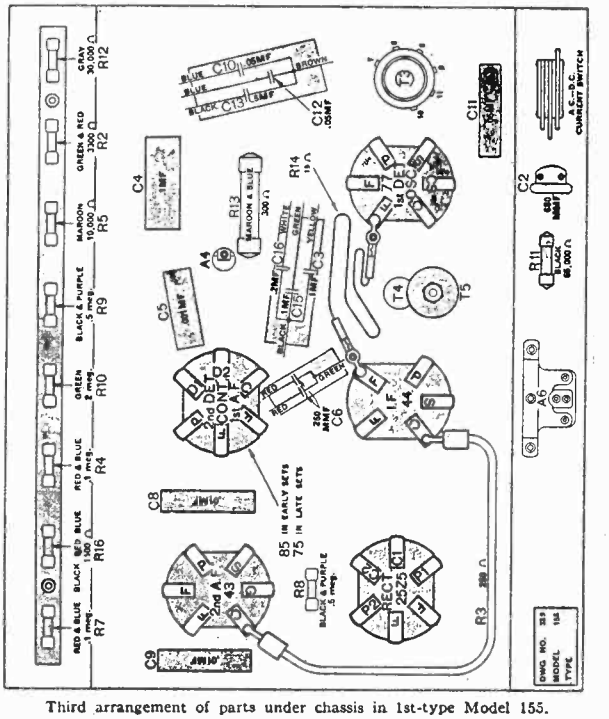
In early 1st-type Model 155, the 1st-detector and oscillator is a type '36 tube.

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.



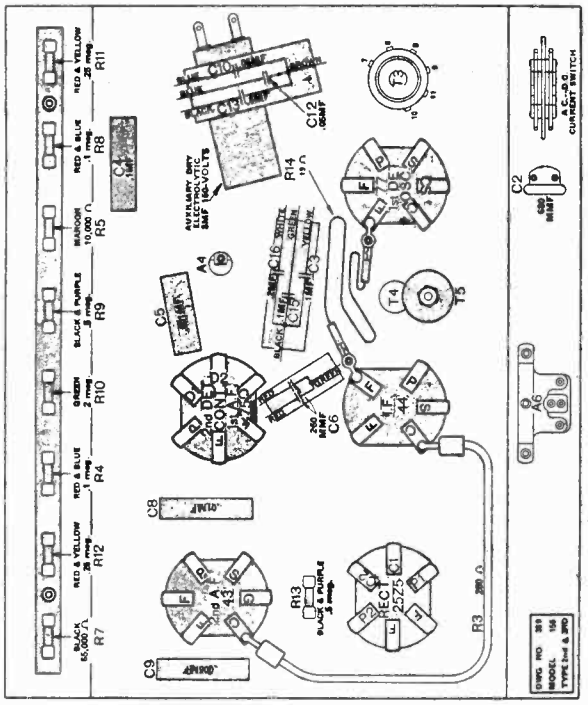
First arrangement of parts under chassis in 1st-type Model 155.



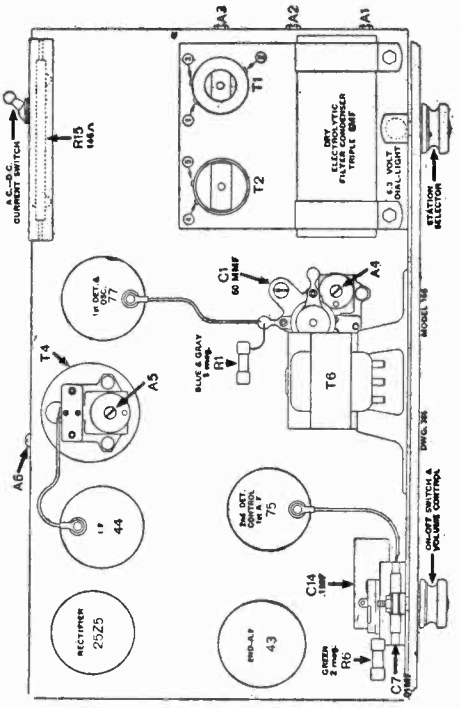
Third arrangement of parts under chassis in 1st-type Model 155.

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.

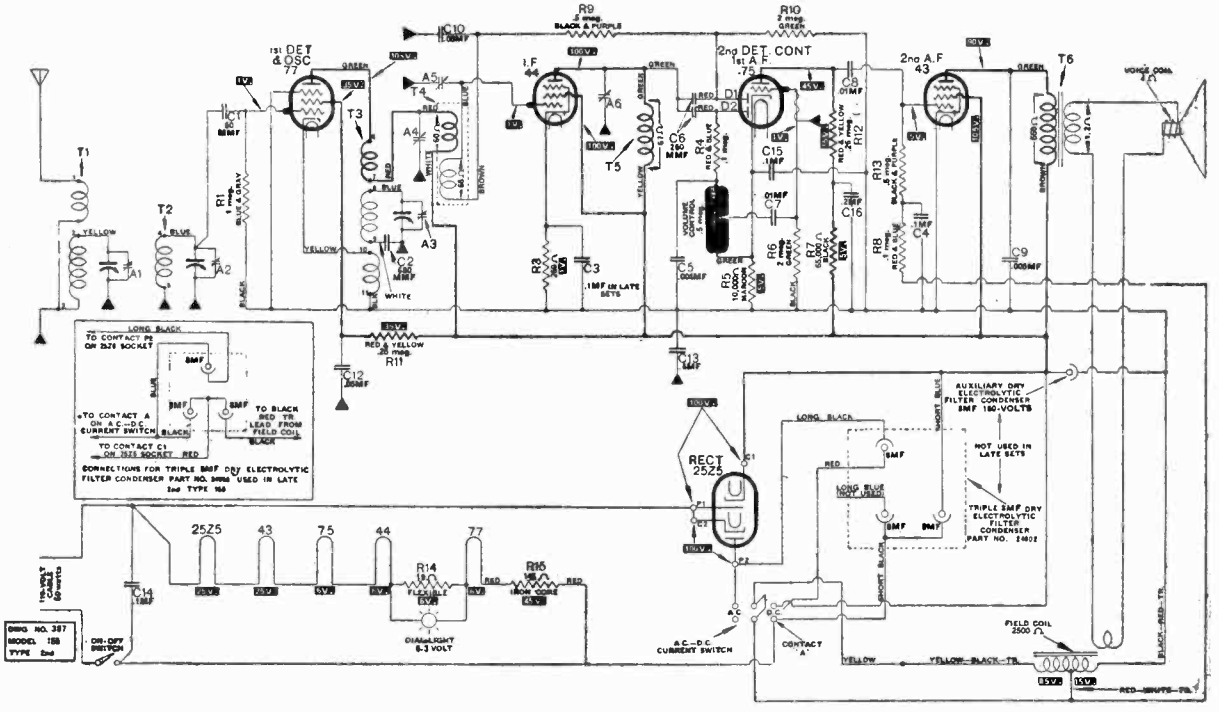
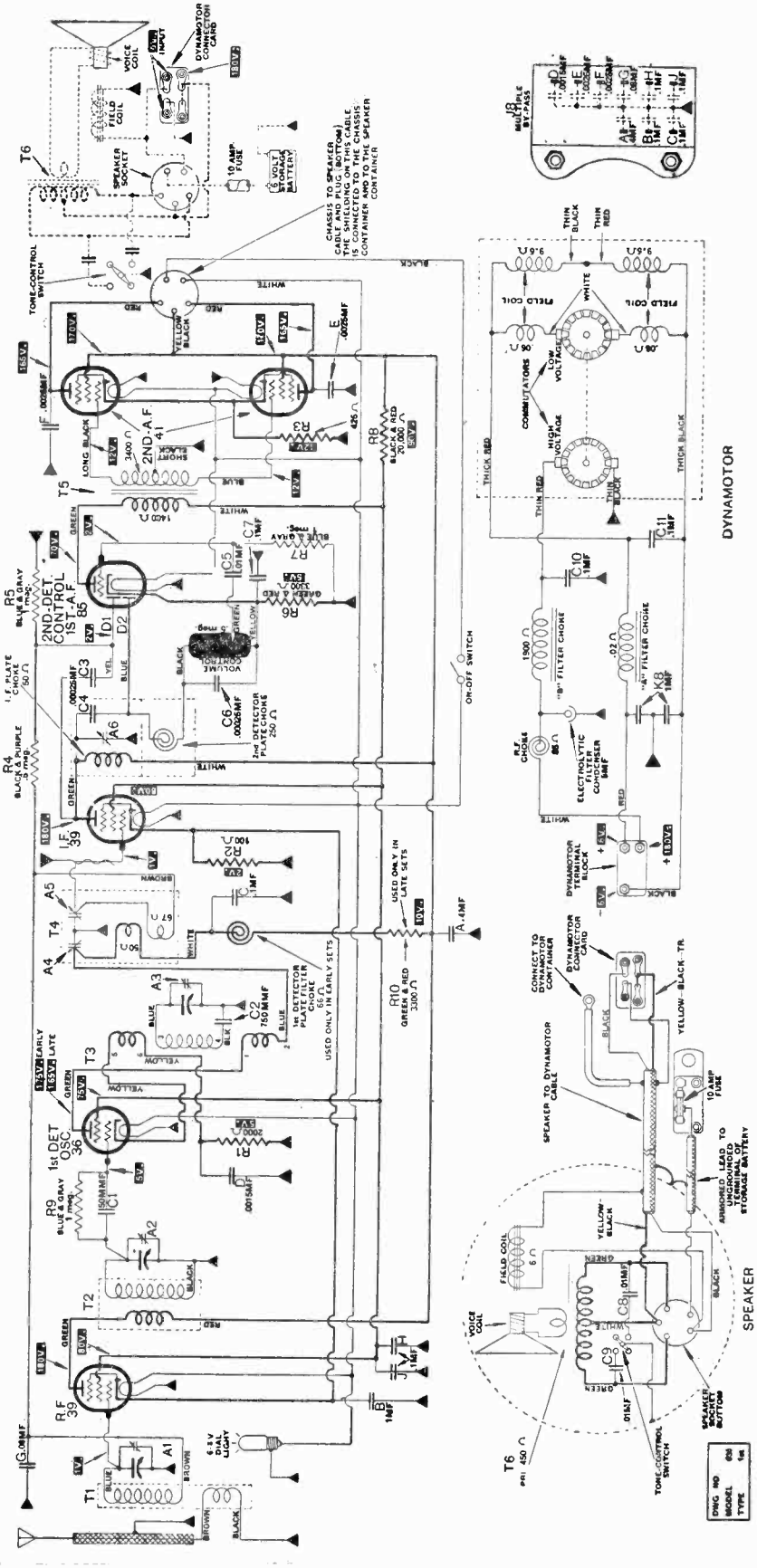


Diagram of 2nd-type Model 155 above Serial No. 7086900. Voltages shown above are for a line supply of 110-volts A.C.

ATWATER KENT MFG. CO.

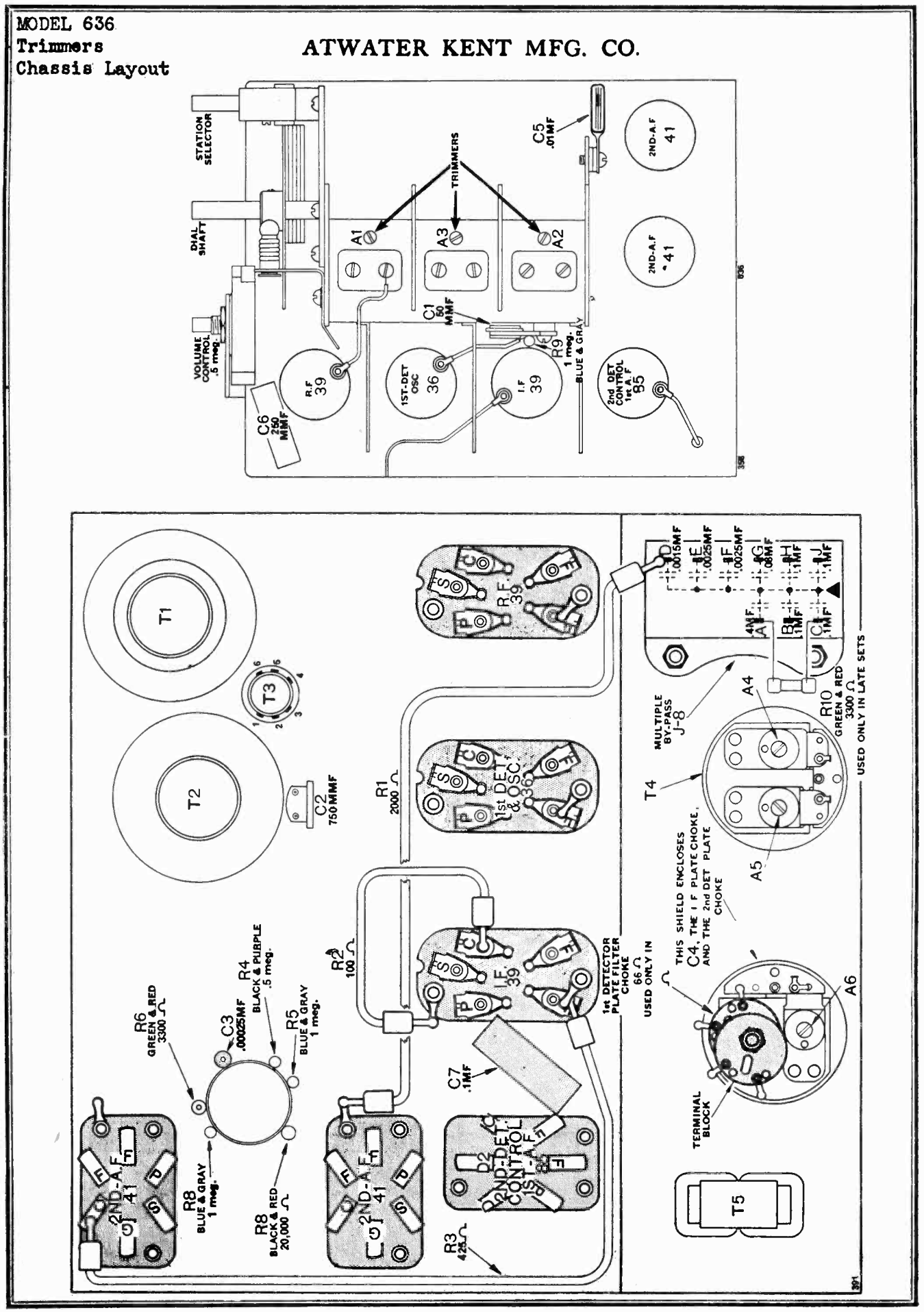
MODEL 636
Schematic

(Intermediate frequency, 262½ kilocycles)



MODEL 636
Trimmers
Chassis Layout

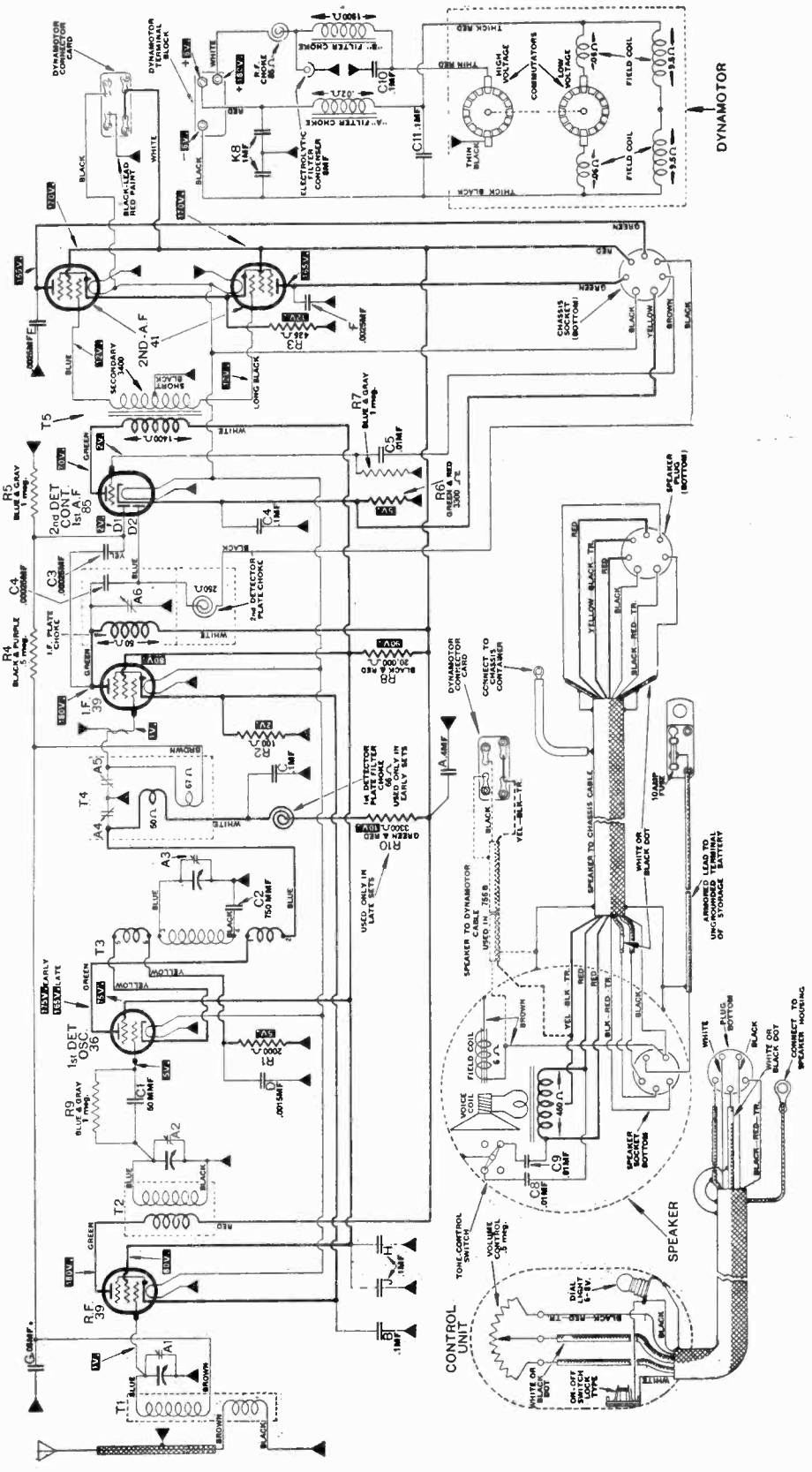
ATWATER KENT MFG. CO.



ATWATER KENT MFG. CO.

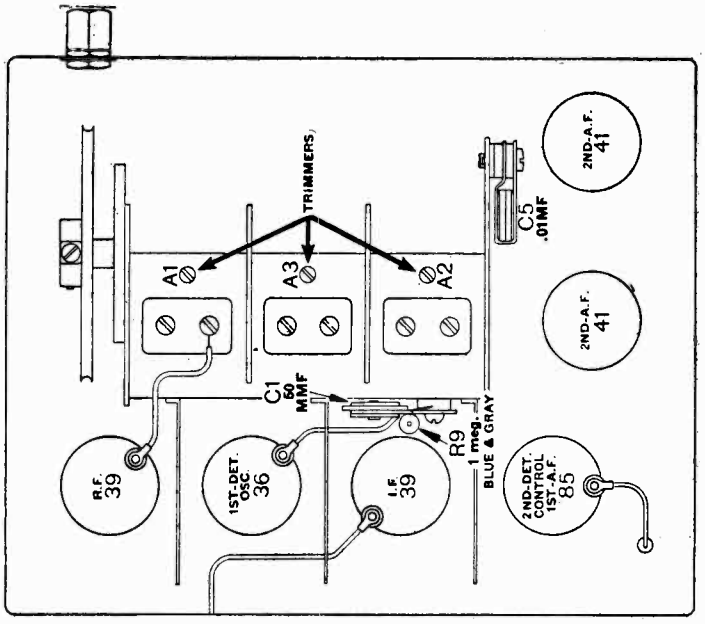
MODEL 756, 756-B
Schematic

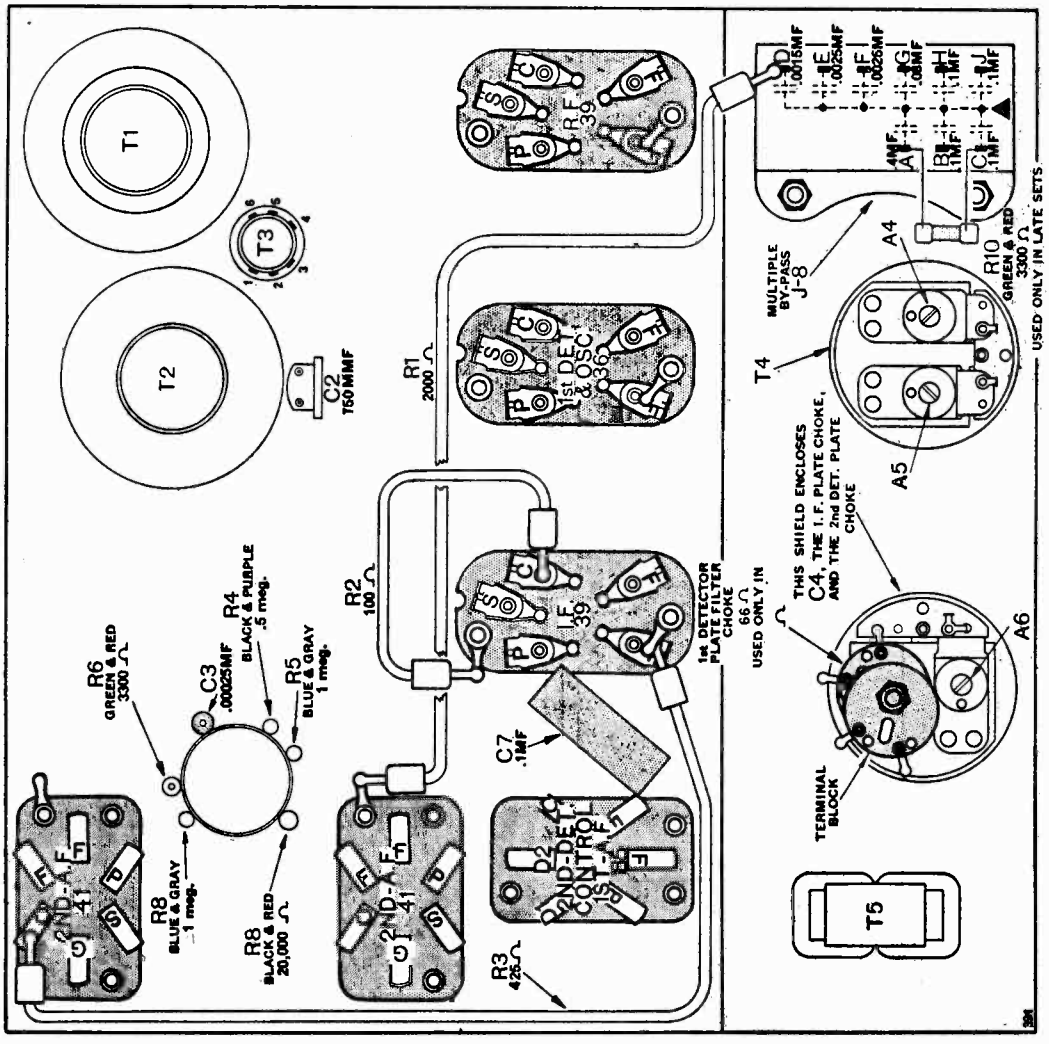
(Intermediate frequency, 262½ kilocycles)



MODEL 756, 756-B
Chassis Layout
Trimmers

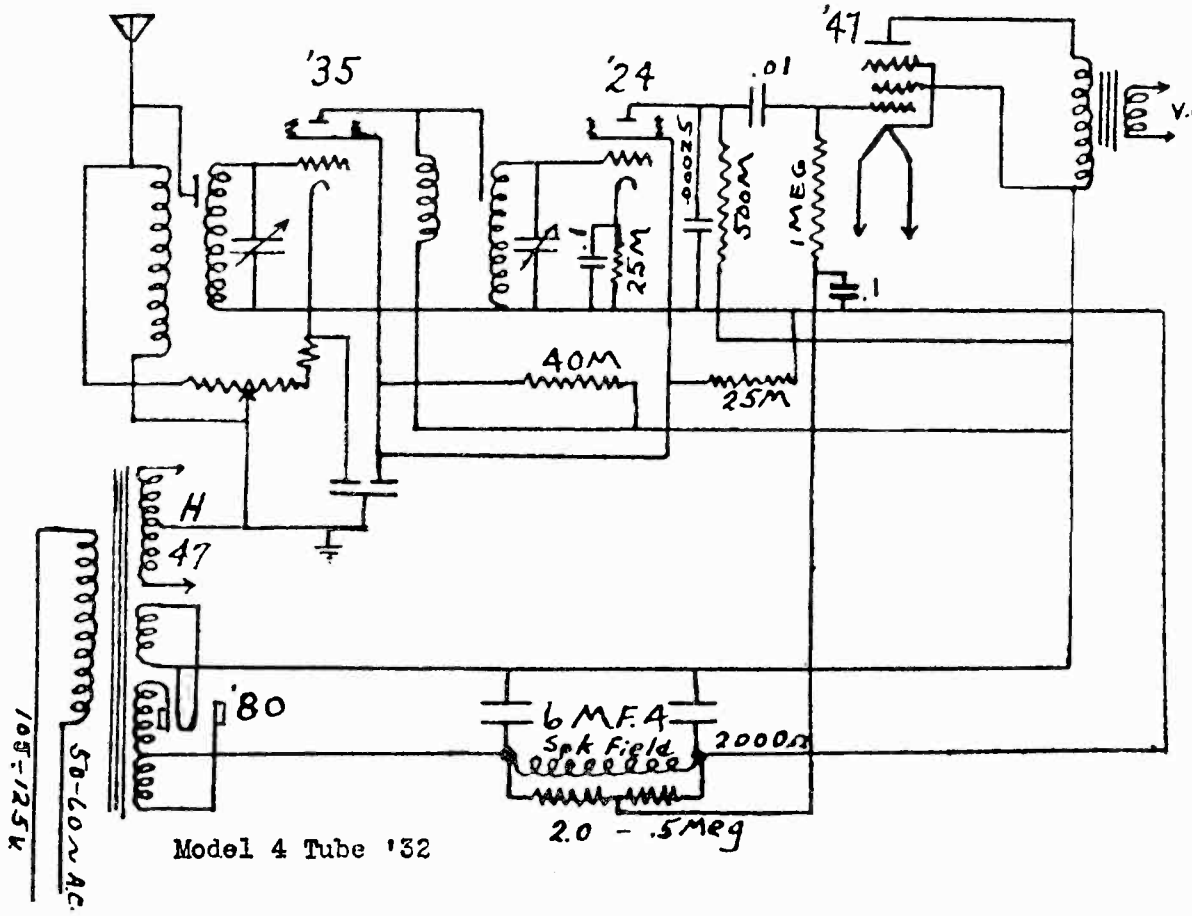
ATWATER KENT MFG. CO.



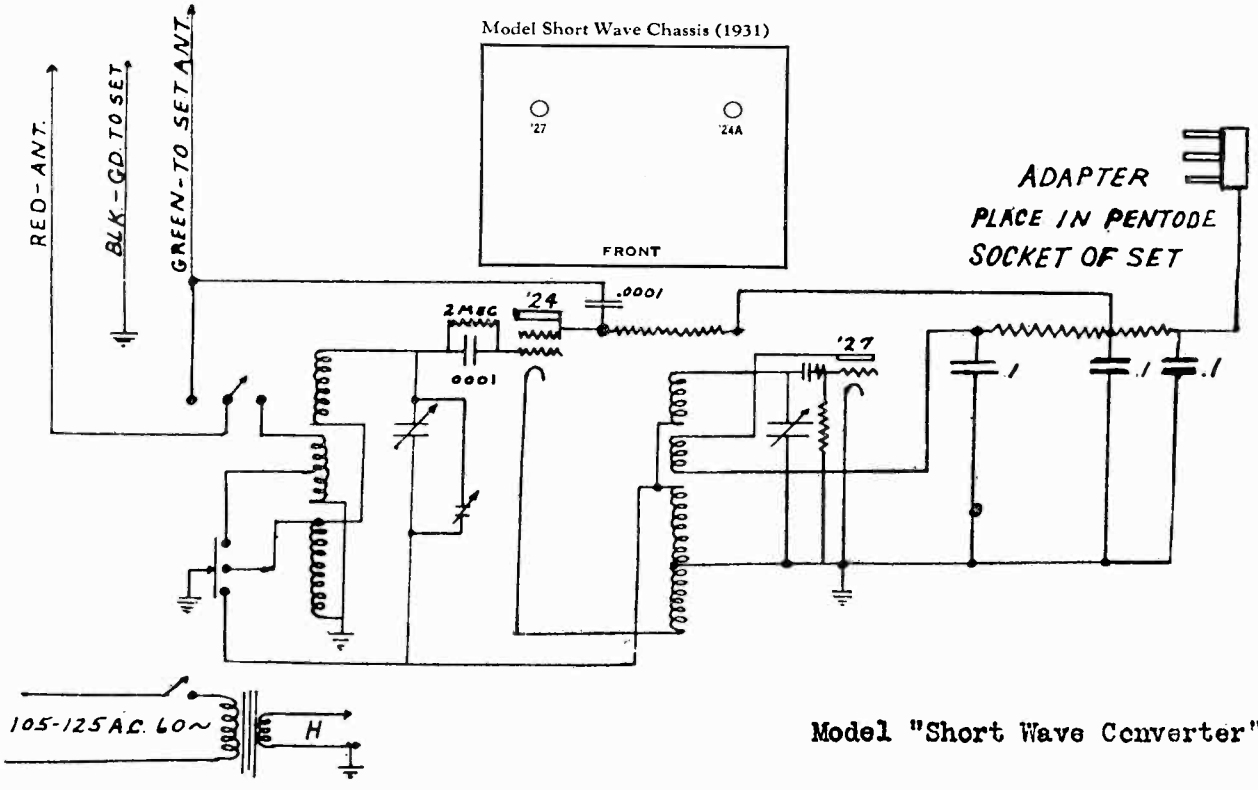


AUDIOLA RADIO CO.

MODEL 4-Tube '32
MODEL "Short Wave
Converter"



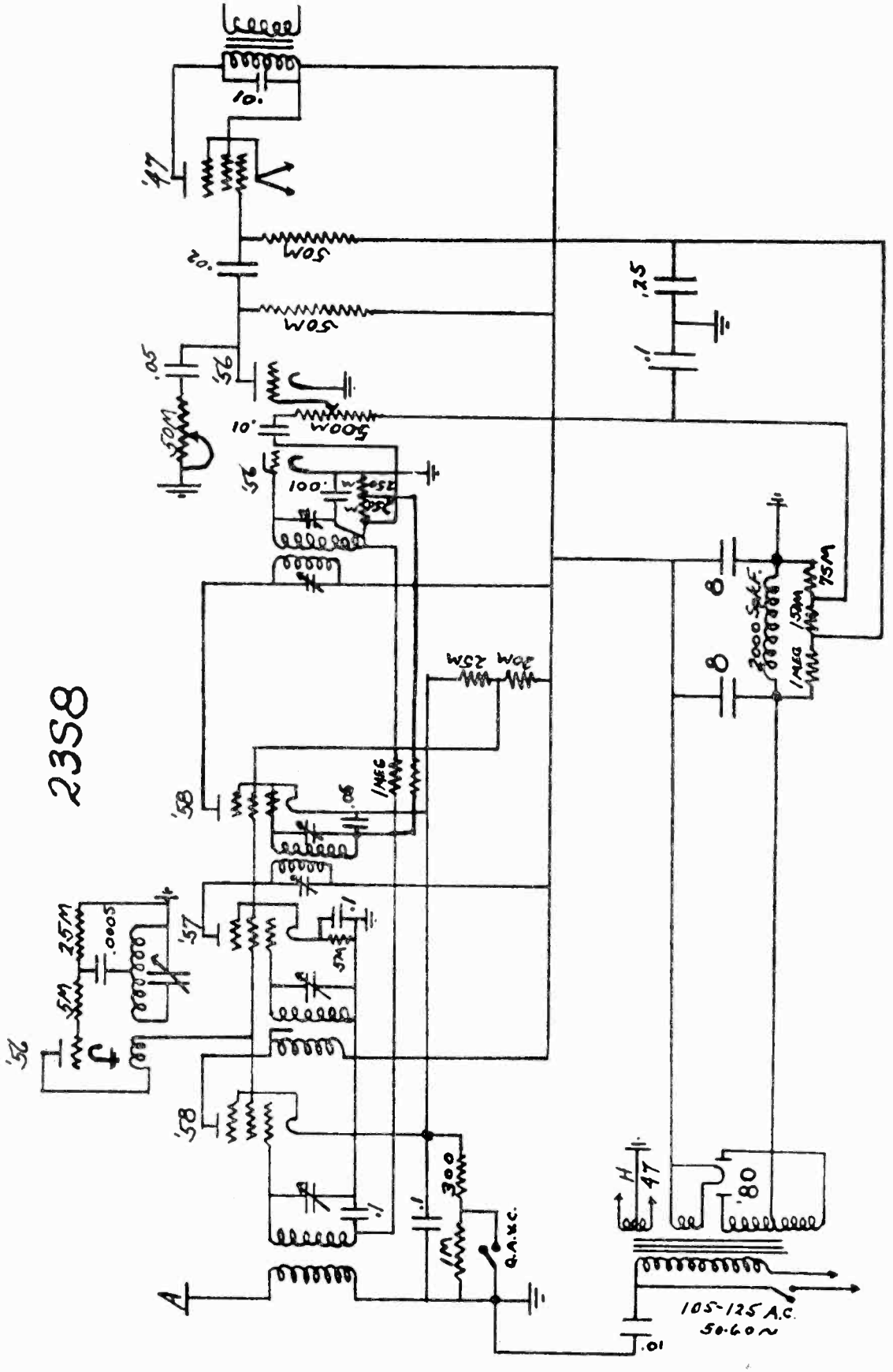
Model 4 Tube '32



Model "Short Wave Converter"

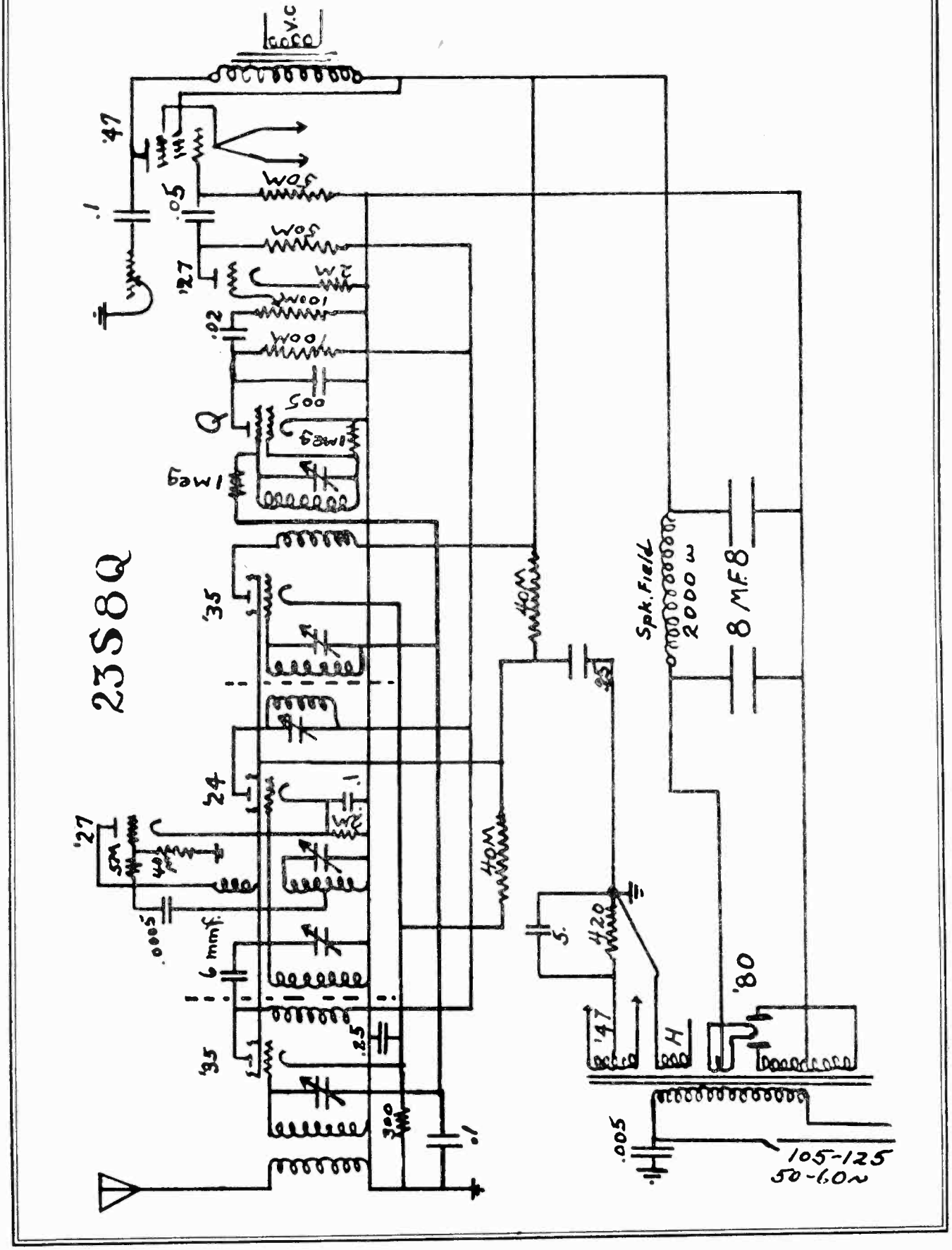
MODEL 23-S-8

AUDIOLA RADIO CO.



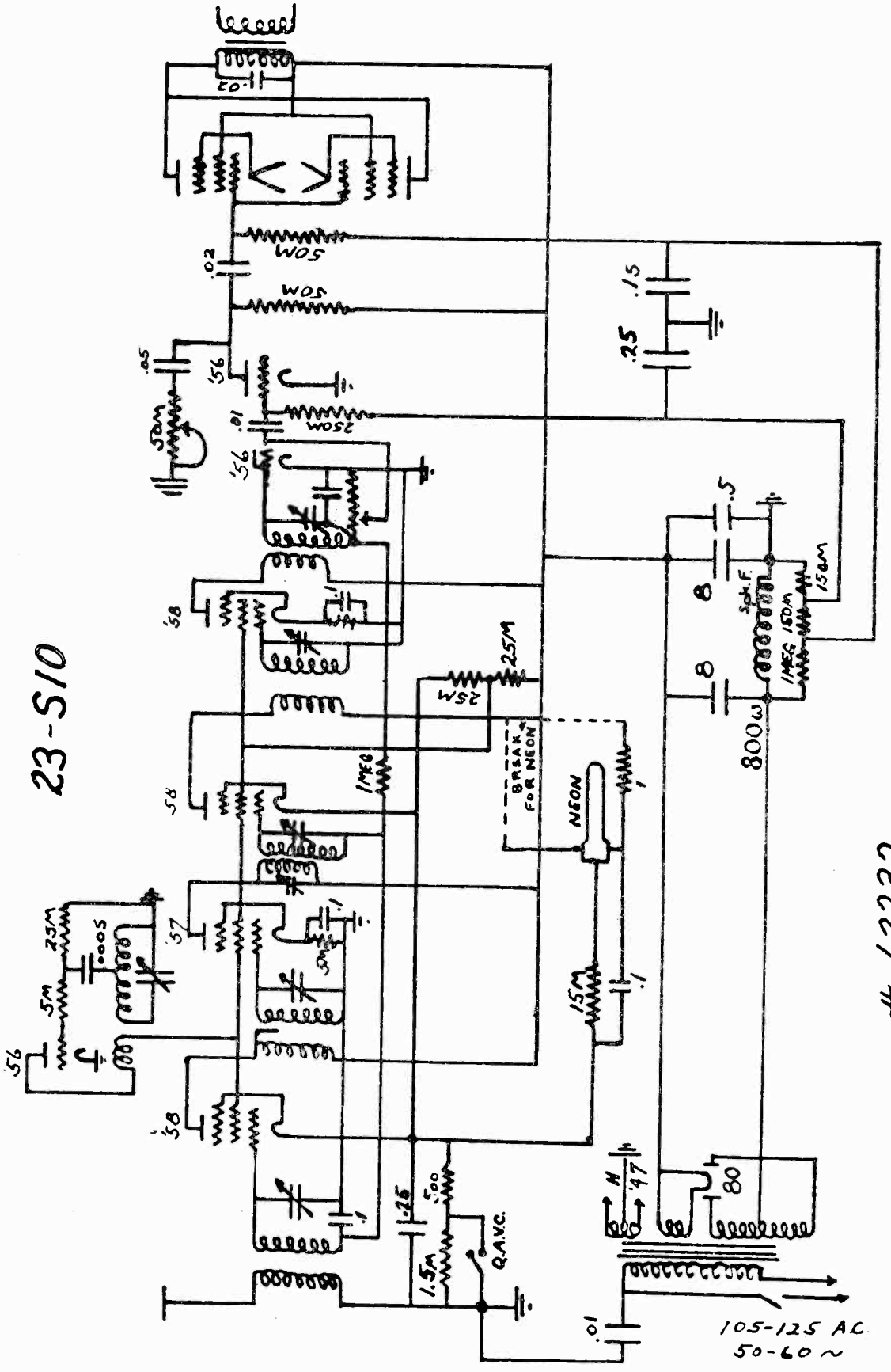
AUDIOLA RADIO CO.

MODEL 23-S-8Q



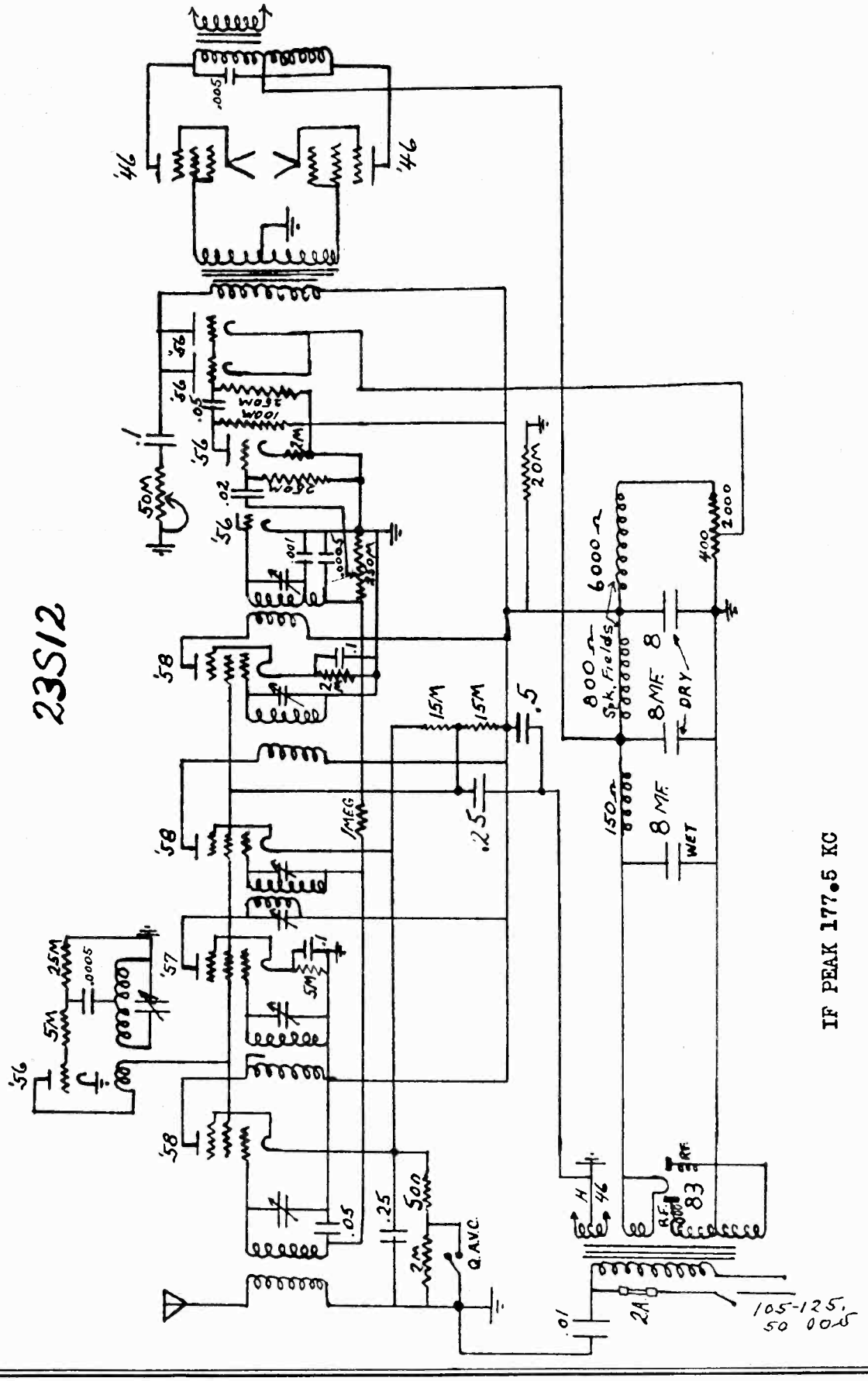
MODEL 23-S-10

AUDIOLA RADIO CO.



AUDIOLA RADIO CO.

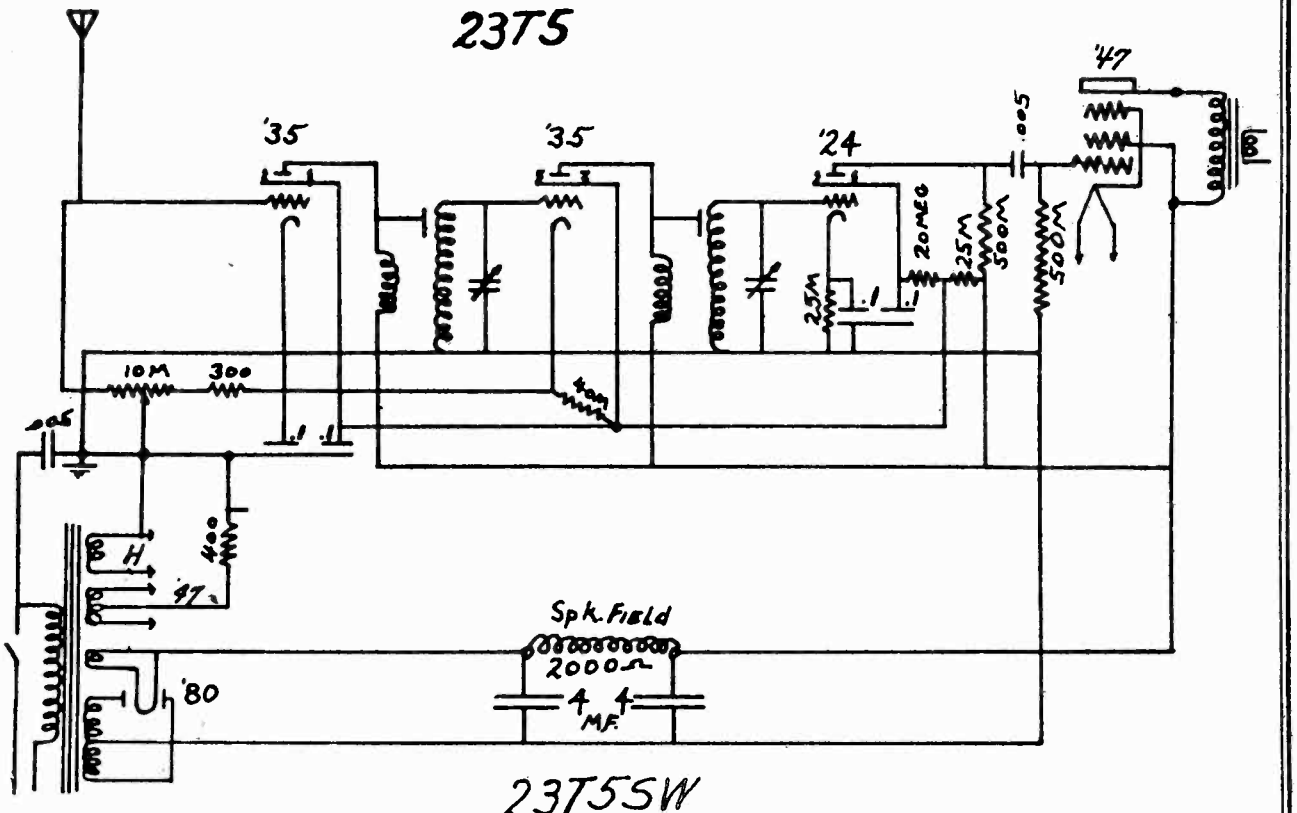
MODEL 23-S-12



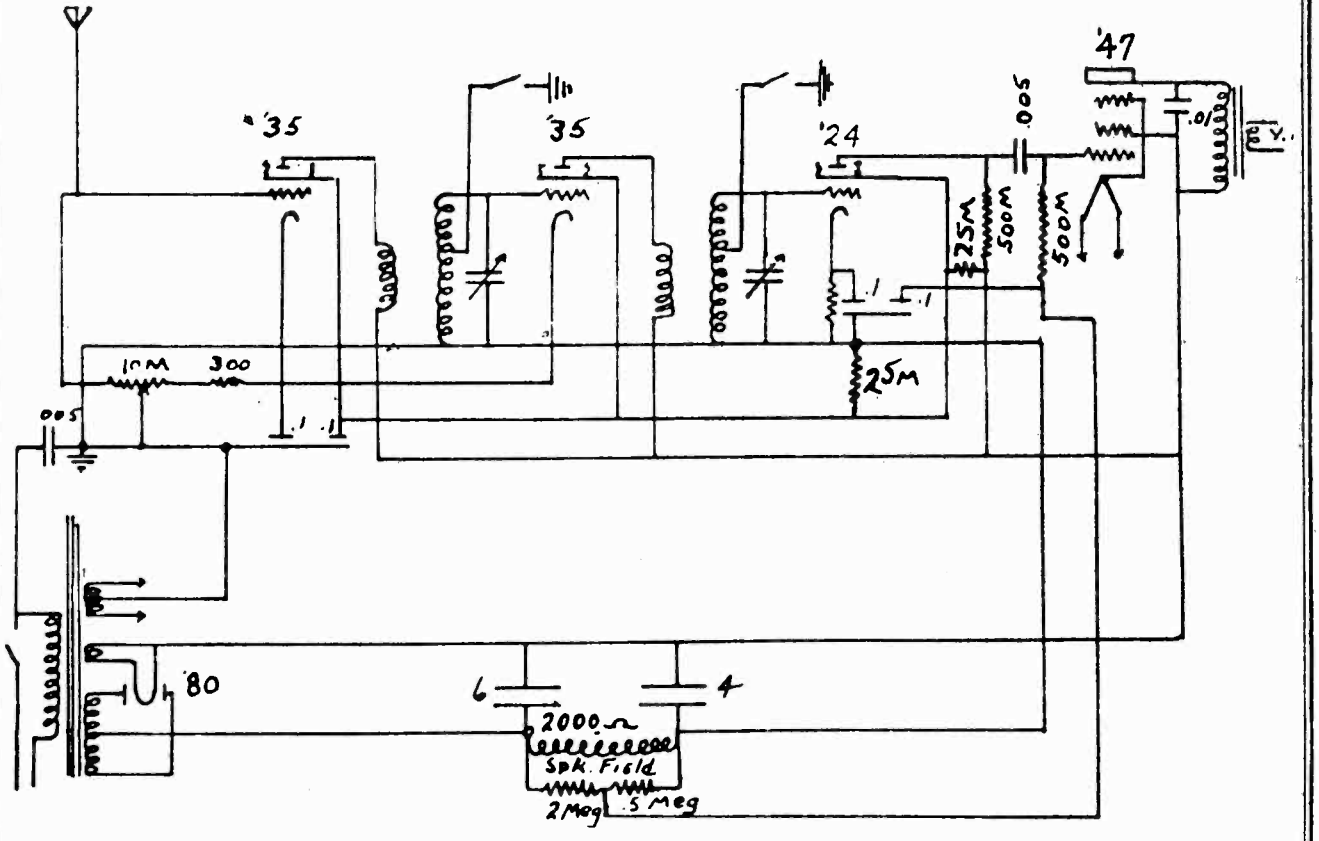
MODEL 23-T-5
MODEL 23-T-5-SW

AUDIOLA RADIO CO.

23T5

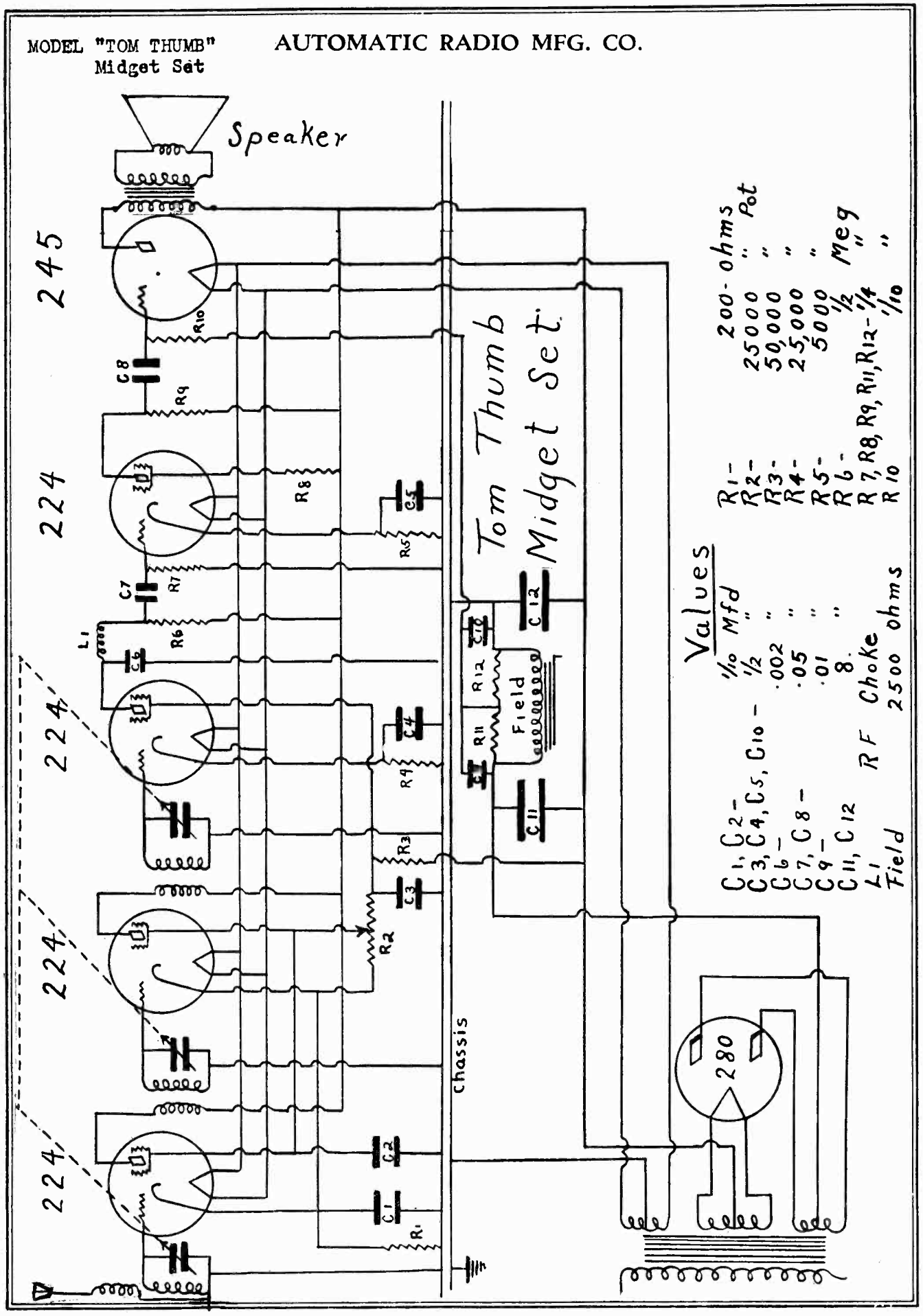


23T55W



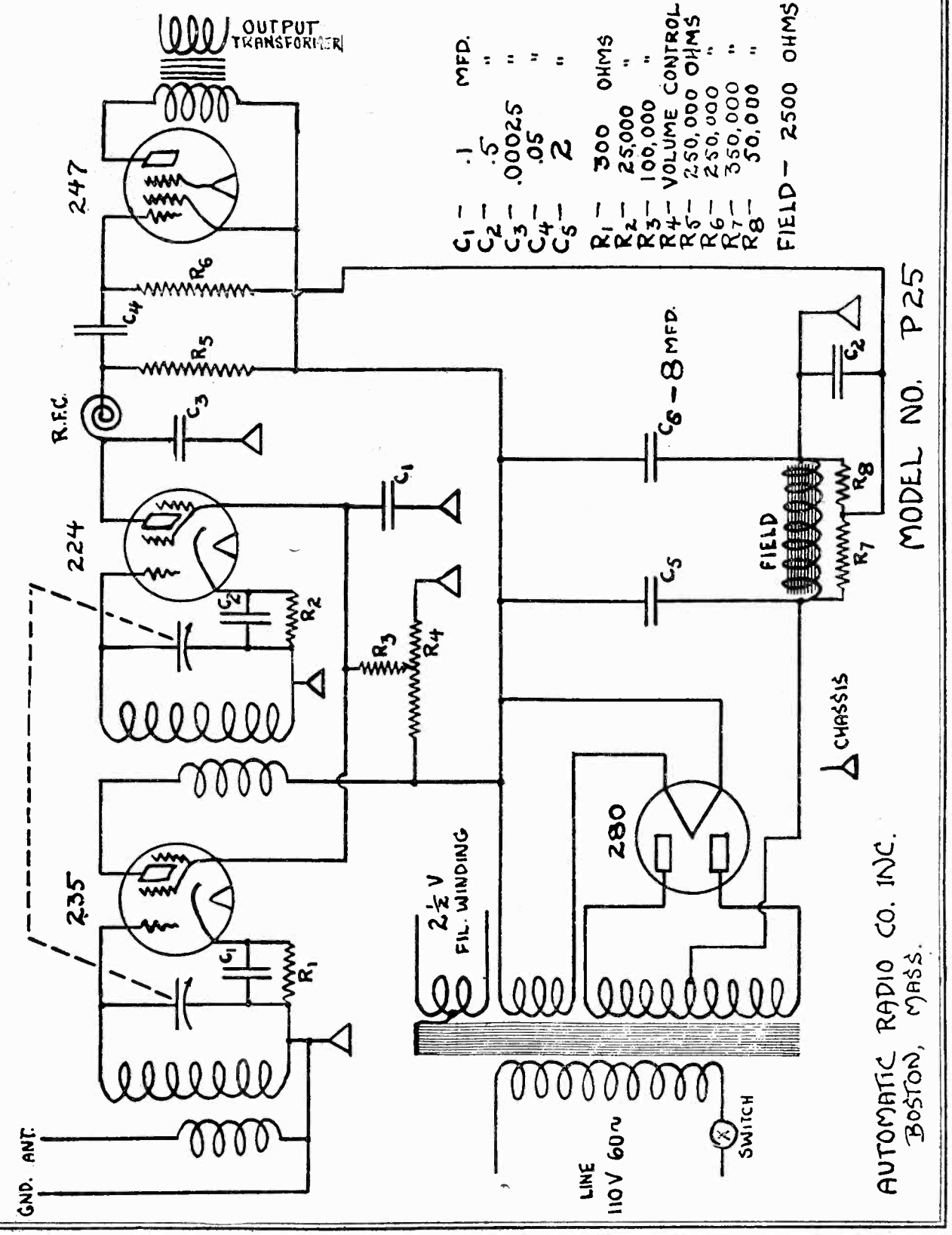
MODEL "TOM THUMB"
Midget Set

AUTOMATIC RADIO MFG. CO.



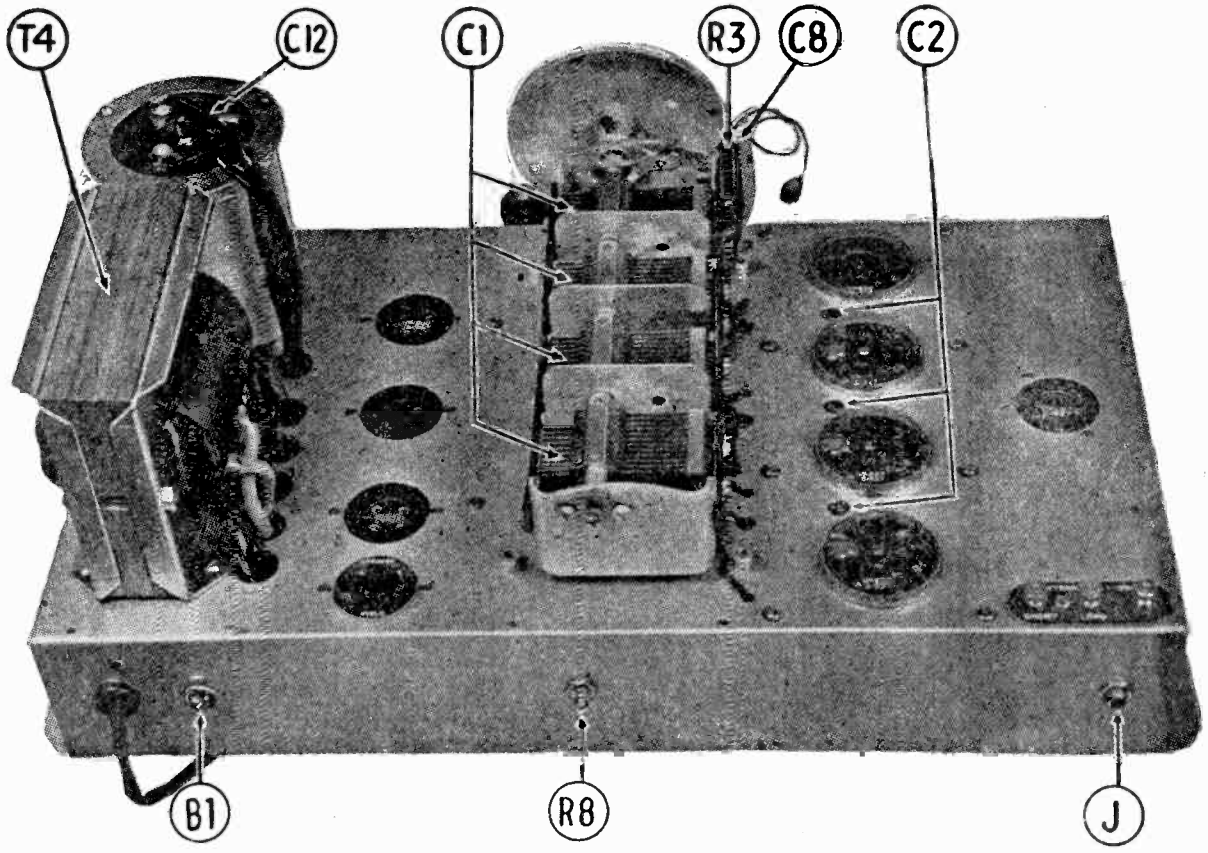
AUTOMATIC RADIO MFG. CO.

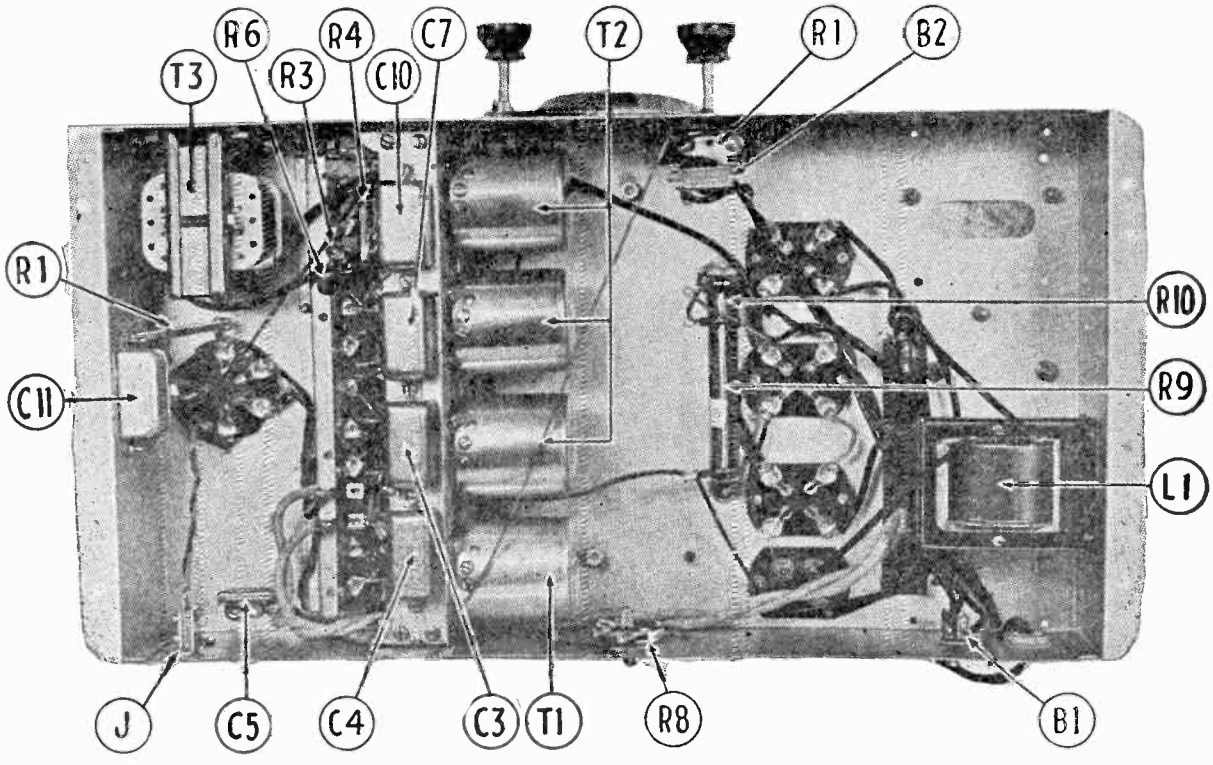
MODEL P-25



MODEL "F"

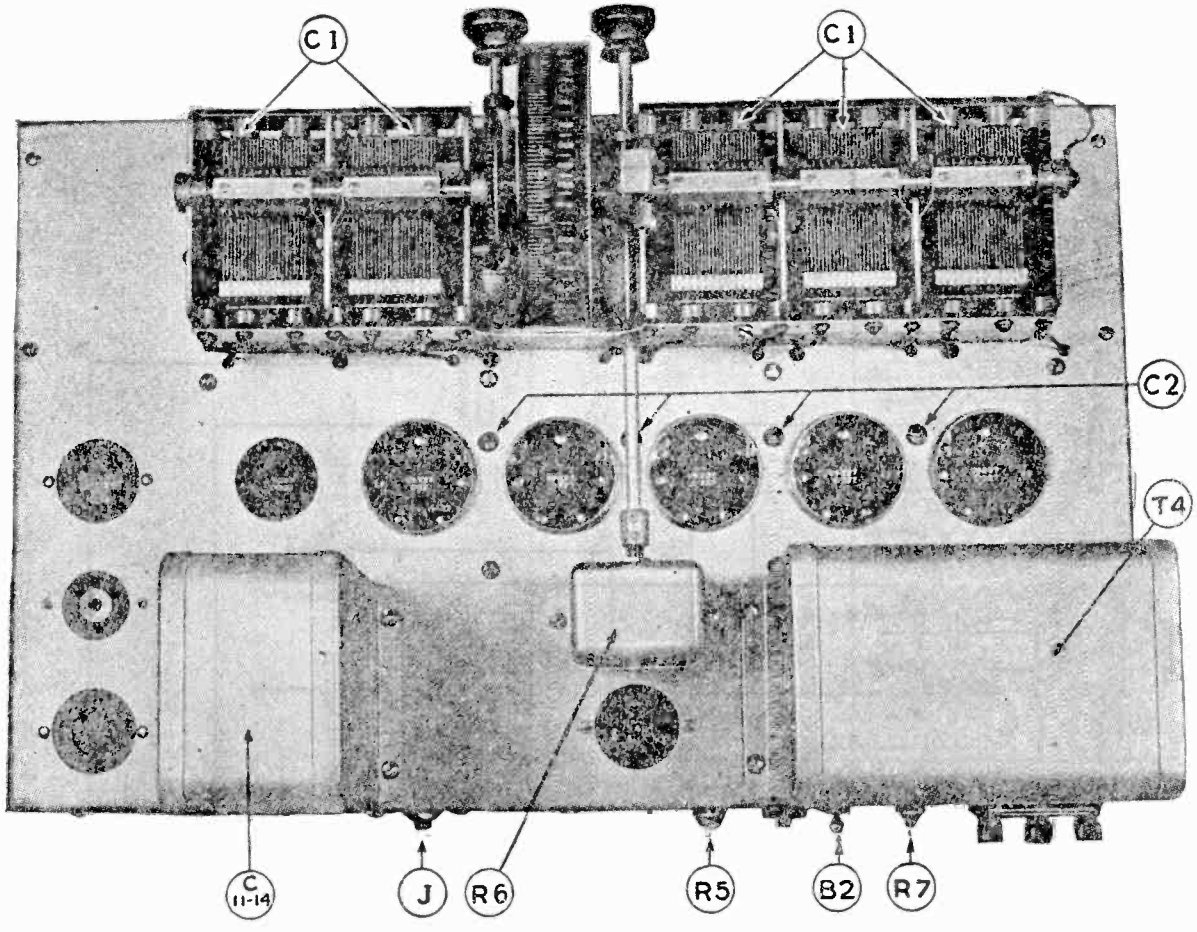
BALKEIT RADIO CO.

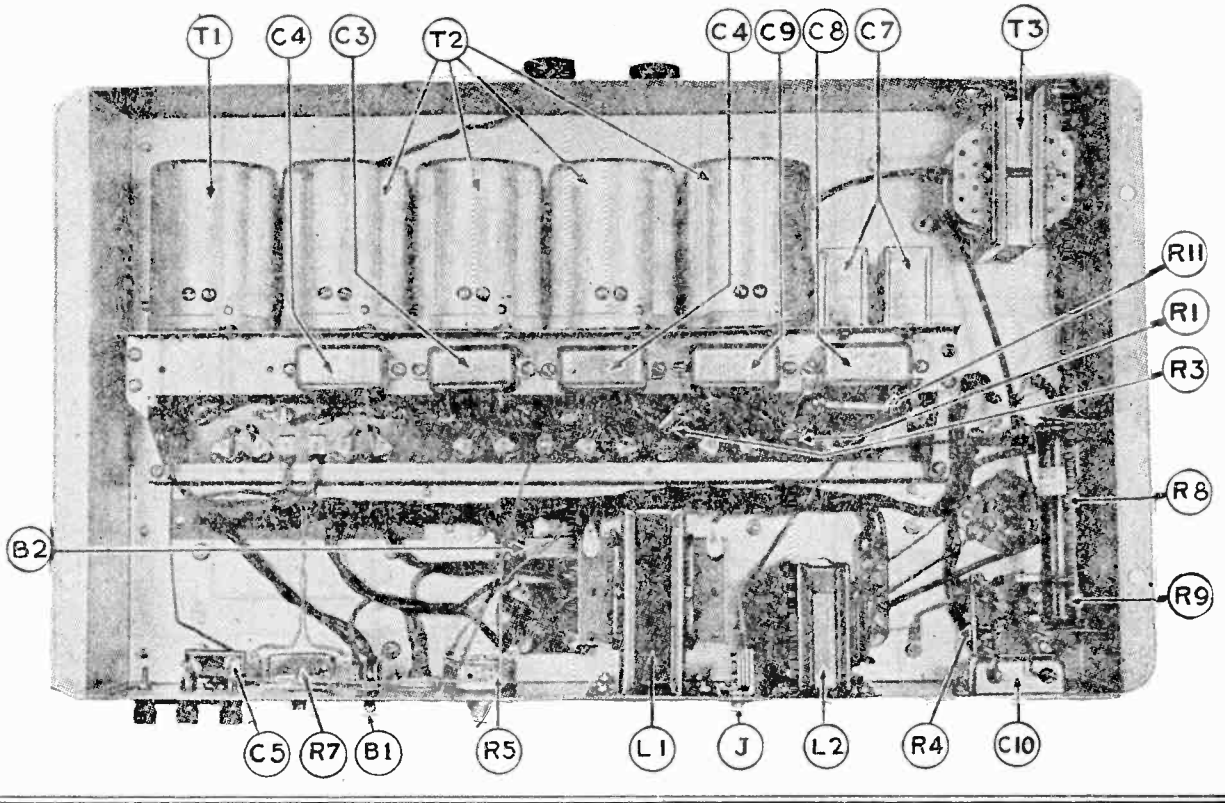




BALKEIT RADIO CO.

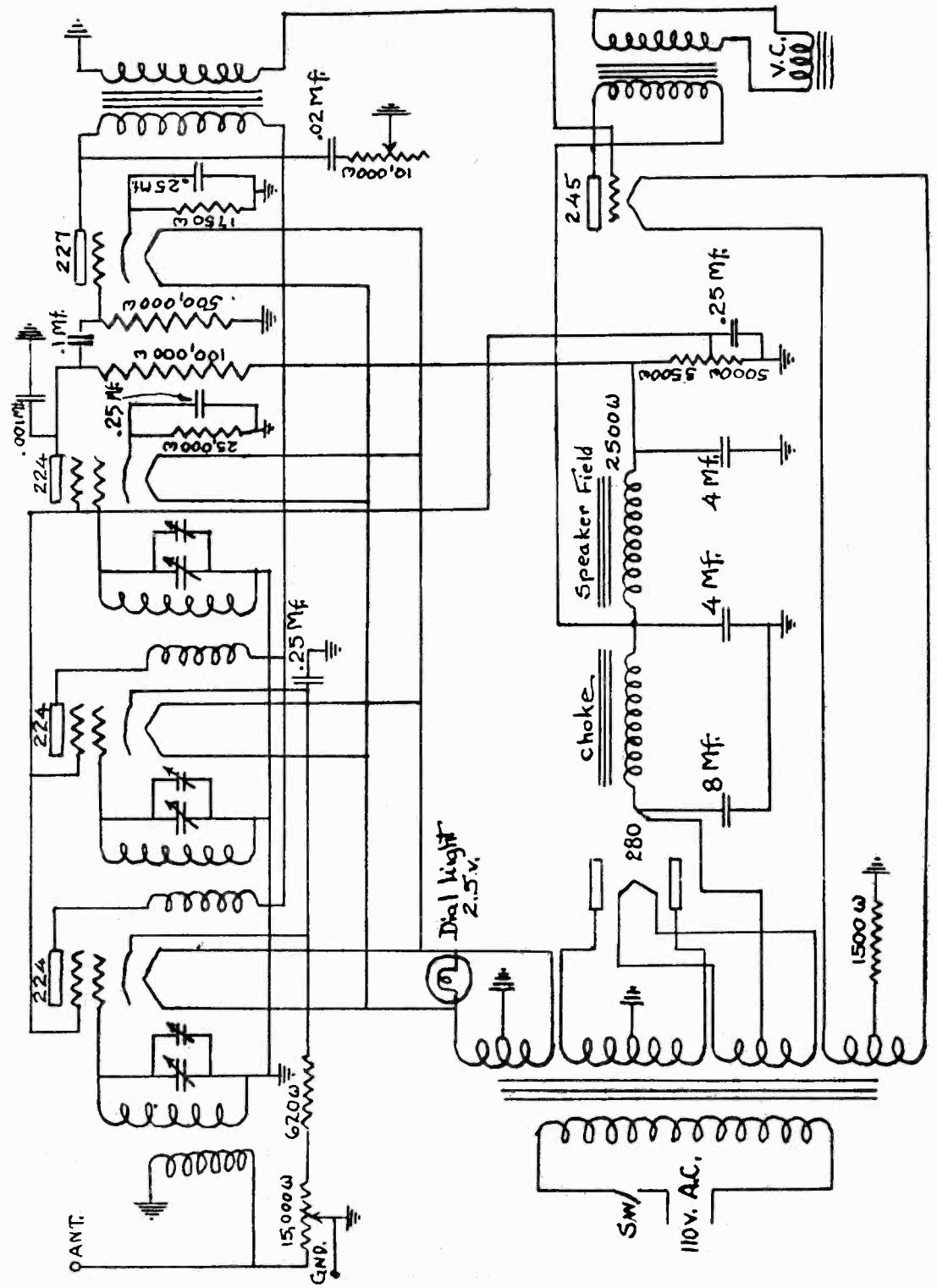
MODEL "C"





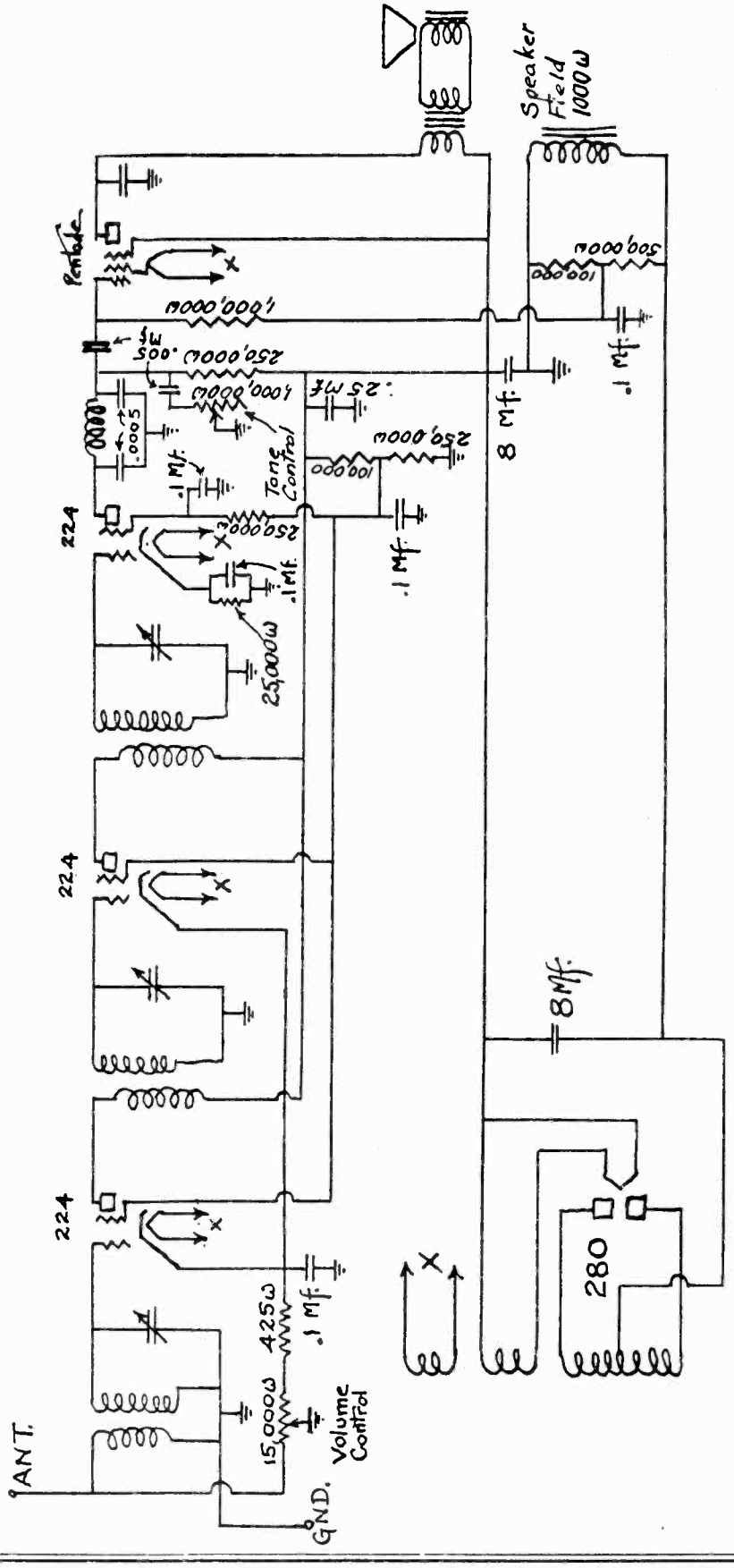
MODEL "E"

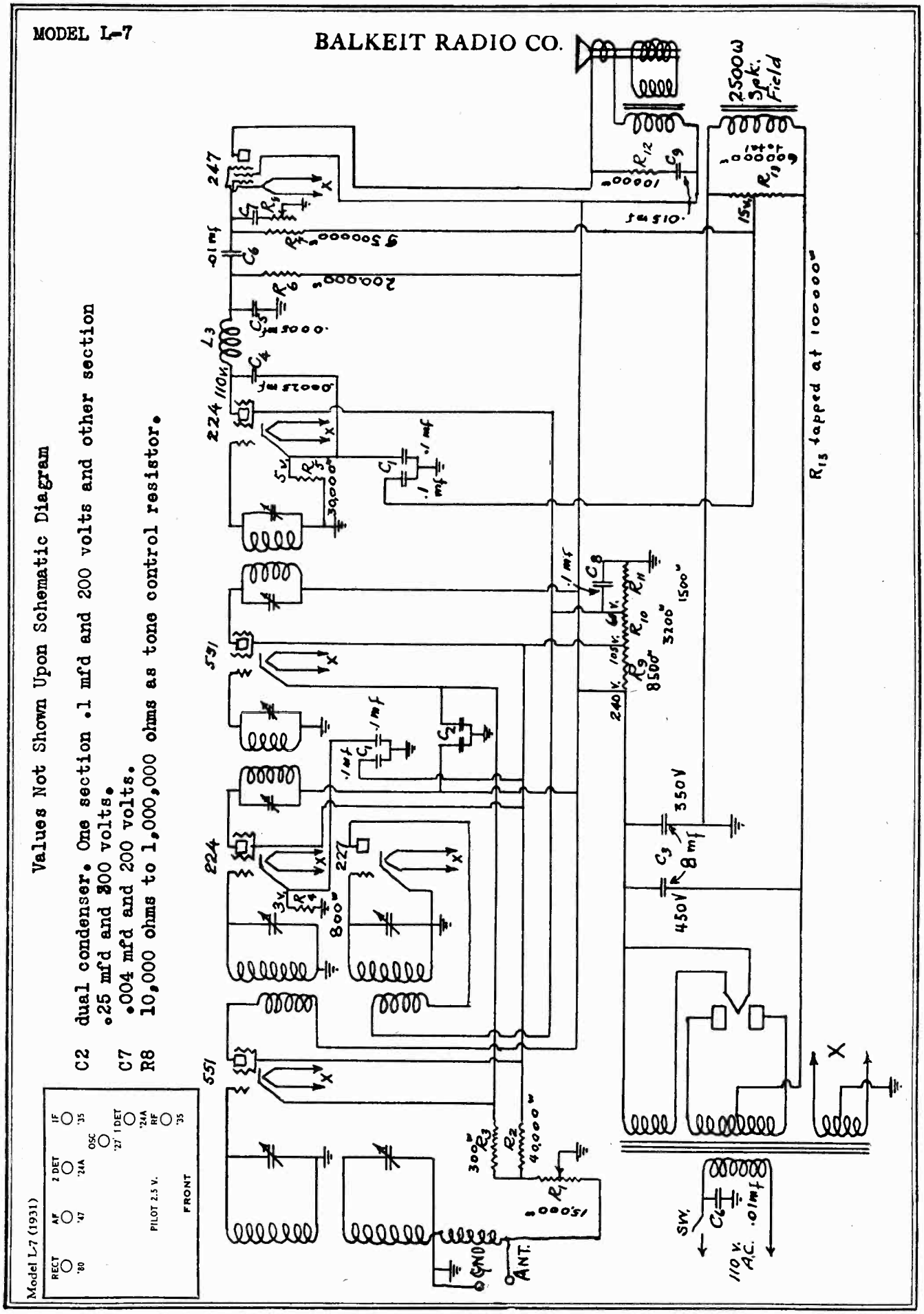
BALKEIT RADIO CO.



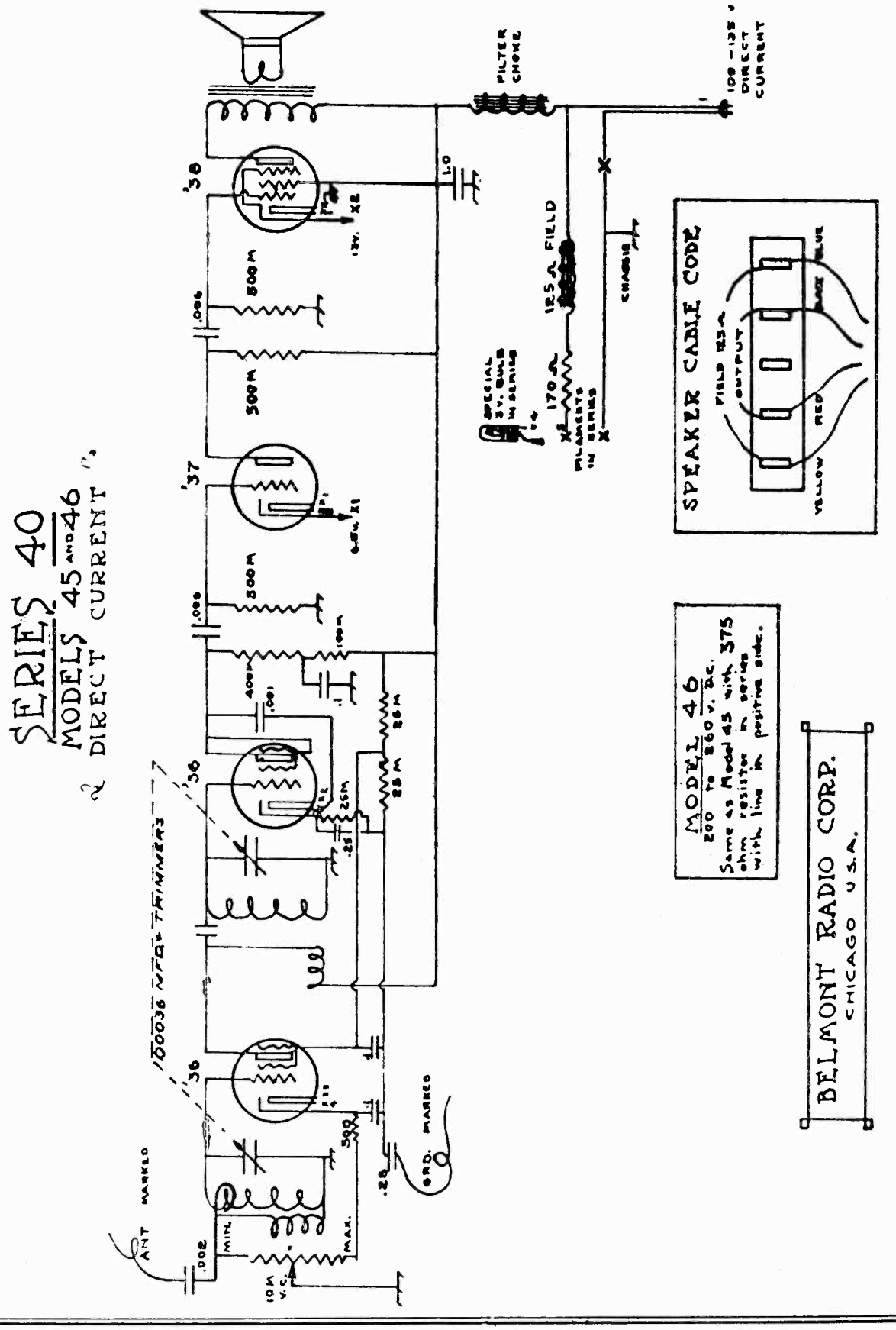
BALKEIT RADIO CO.

MODEL "KP"



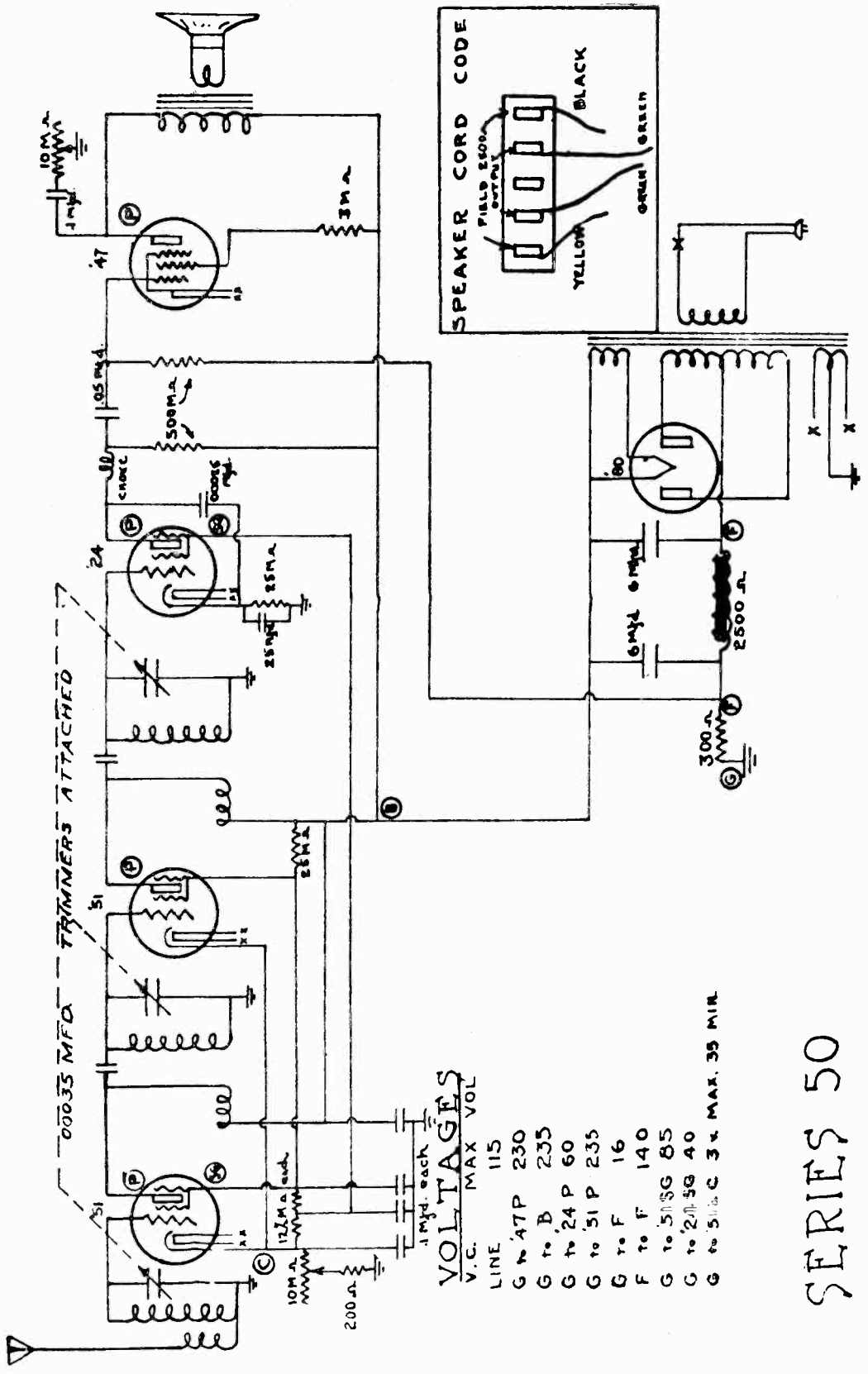


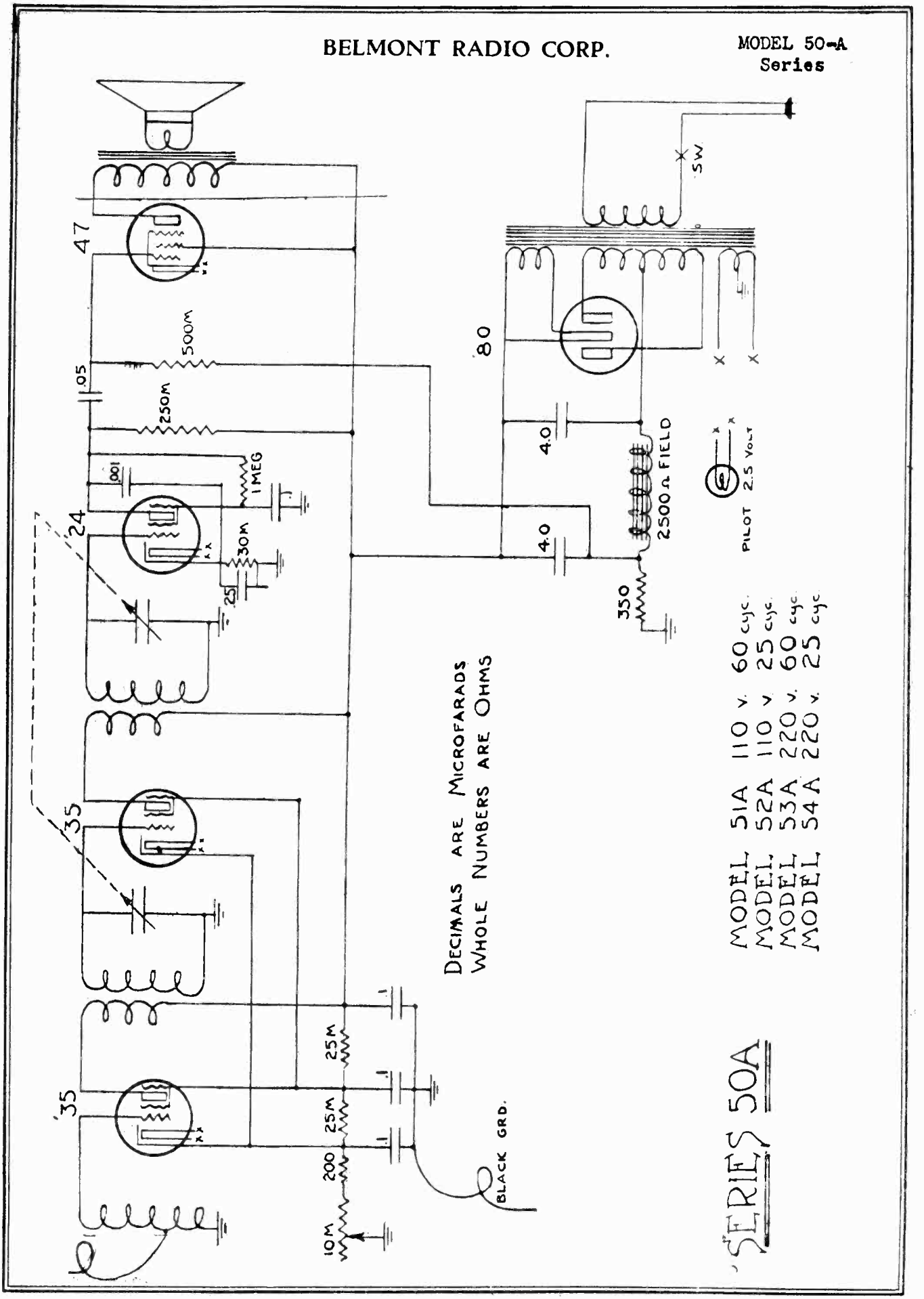
BELMONT RADIO CORP.



MODEL 50
Series

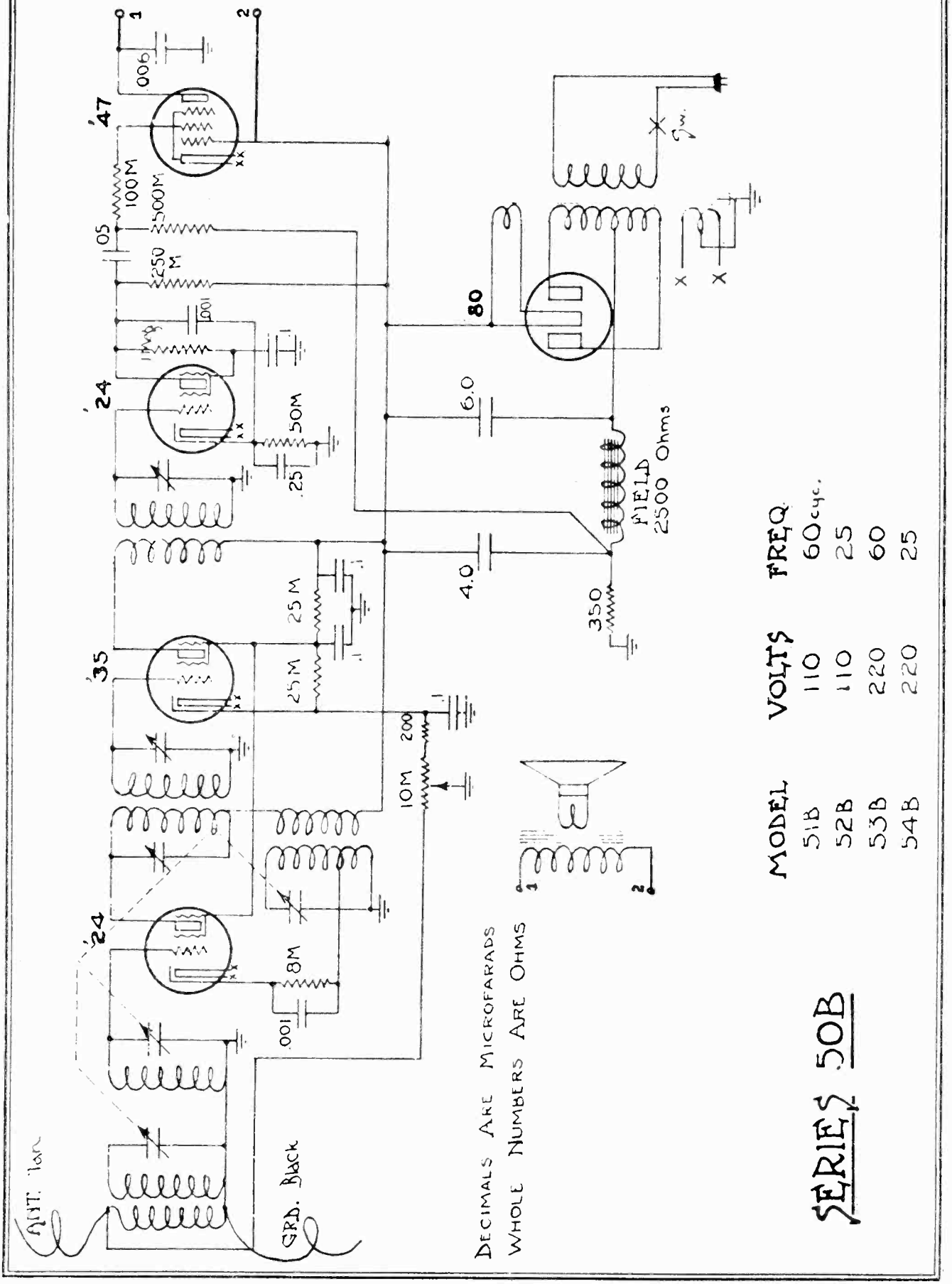
BELMONT RADIO CORP.





MODEL 50-B
Series

BELMONT RADIO CORP.

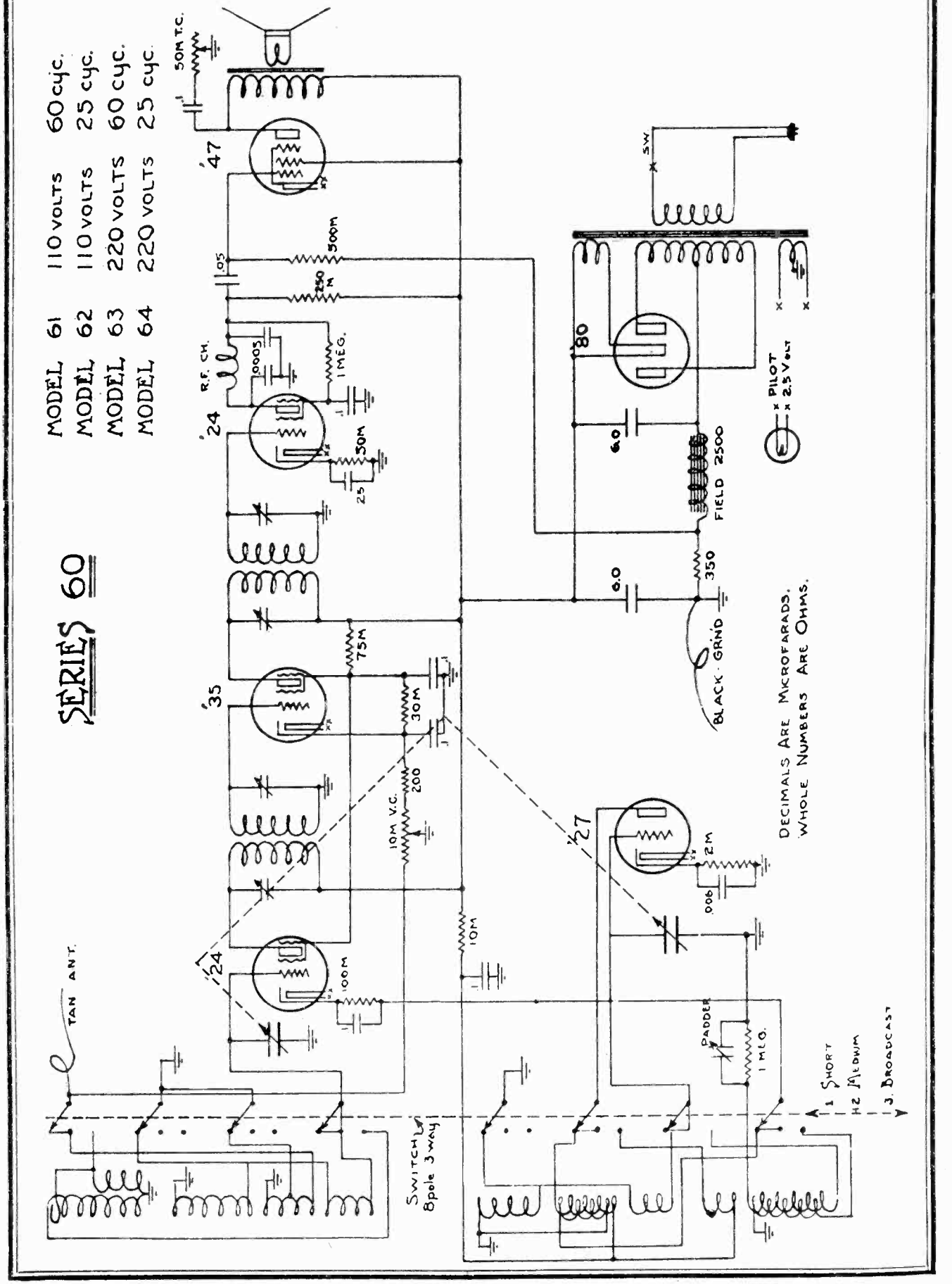


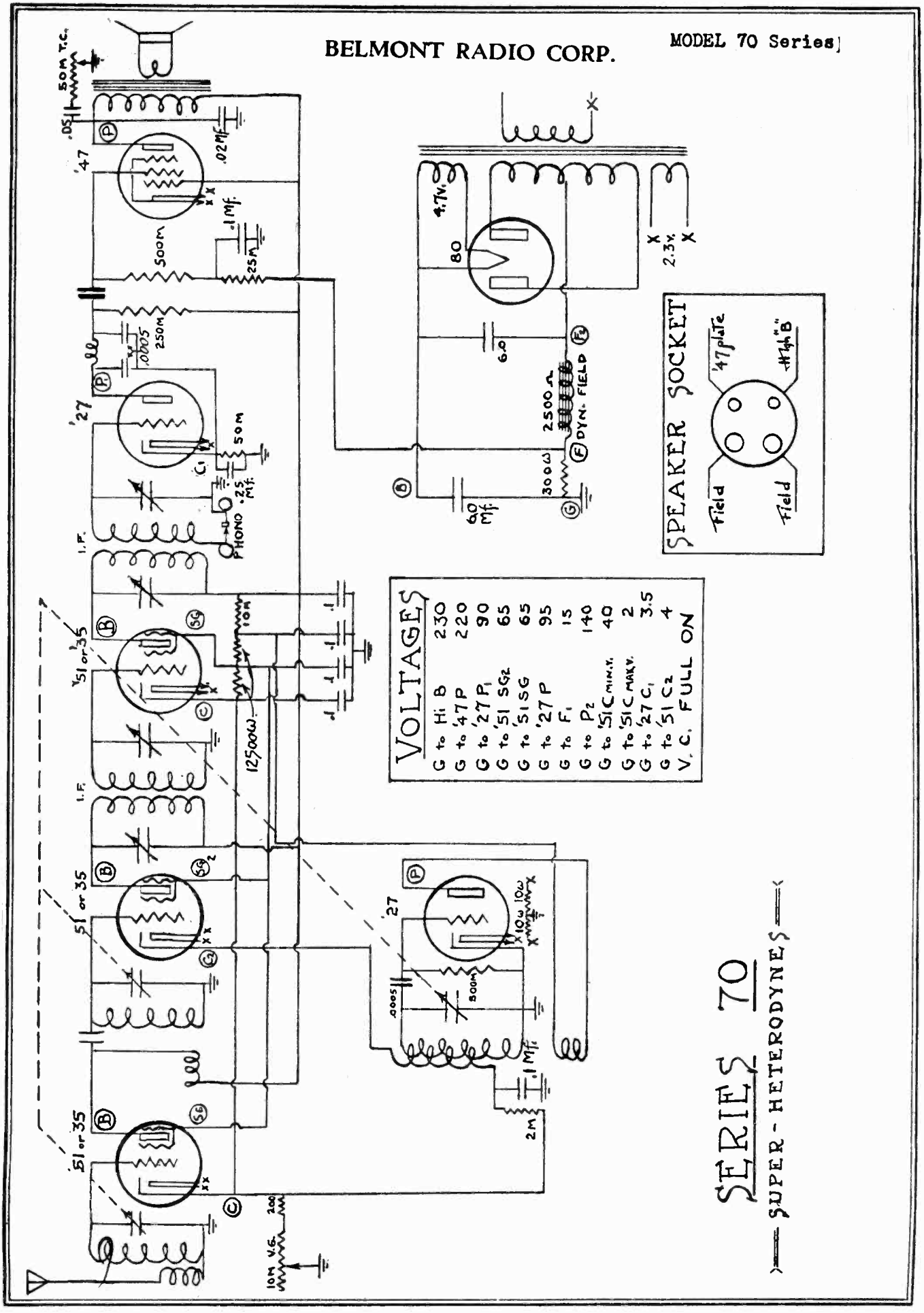
MODEL	VOLTS	FREQ
51B	110	60 cyc.
52B	110	25
53B	220	60
54B	220	25

SERIES 50B

BELMONT RADIO CORP.

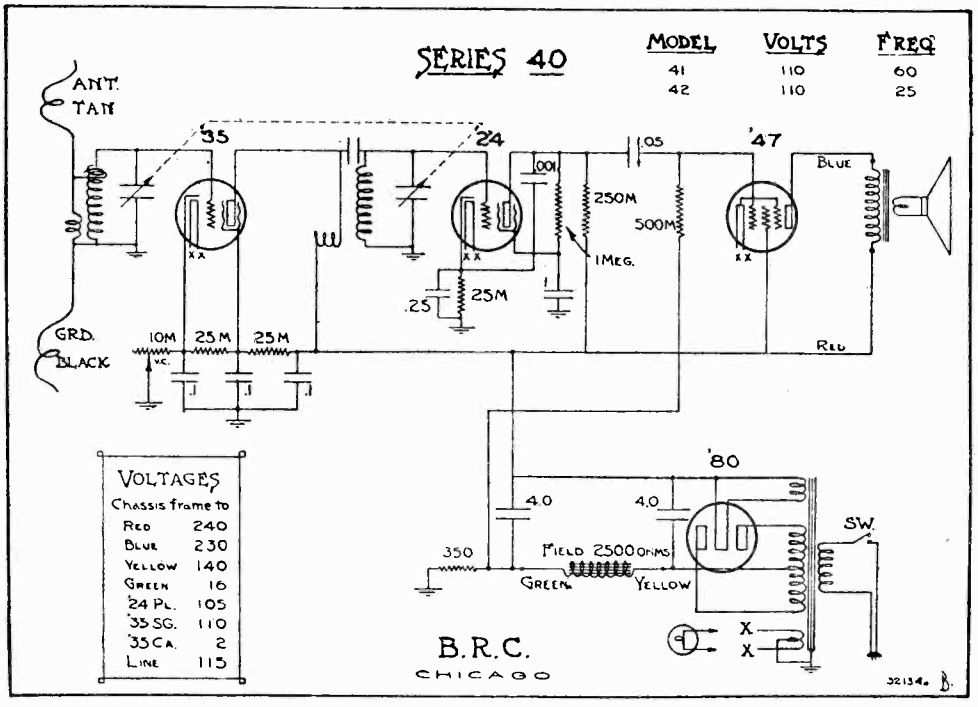
MODEL 60
Series



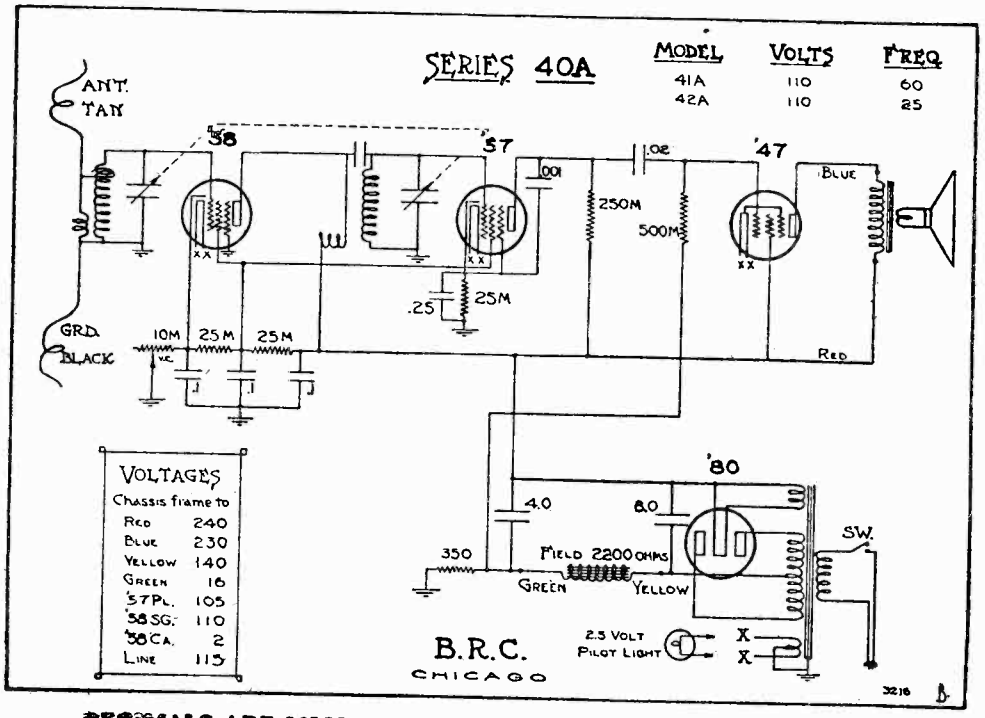


BELMONT RADIO CORP.

MODEL Series 40 AC
MODEL Series 40-A AC



DECIMAL ARE MICROFARADS. WHOLE NUMBERS ARE OHMS.



DECIMALS ARE MICROFARADS. WHOLE NUMBERS ARE OHMS.

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

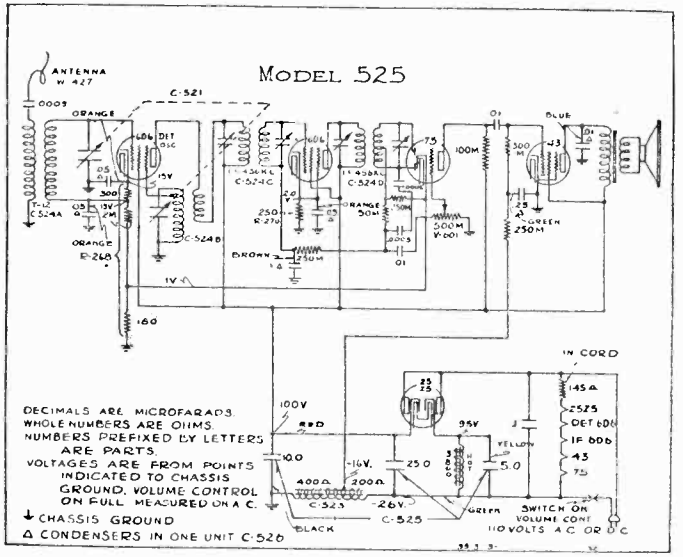
NOTE—CONNECTING CORD OF SET GETS WARM IN NORMAL OPERATION. DO NOT BECOME ALARMED.

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.

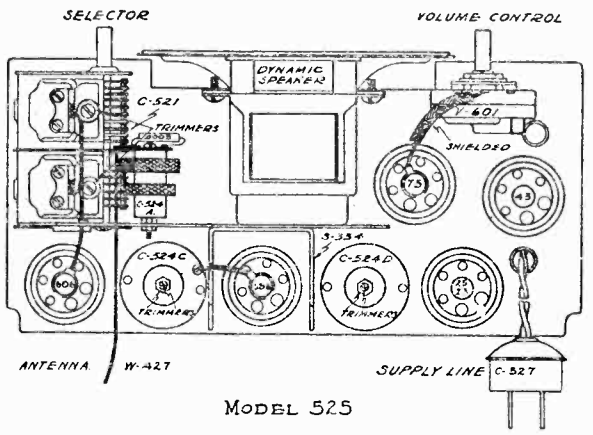
To remove chassis from cabinet, pull off knobs from front, remove back (held with screws to case). Remove four mounting screws, then chassis can be slipped out of case.



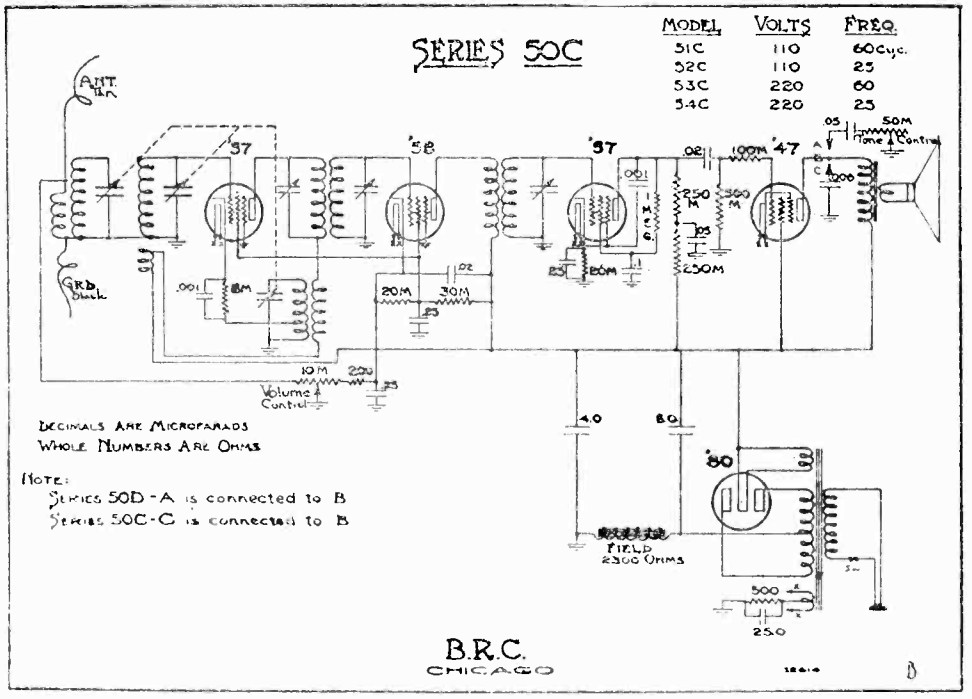
Schematic circuit diagram Model 525 AC-DC Superheterodyne, with automatic volume control

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.

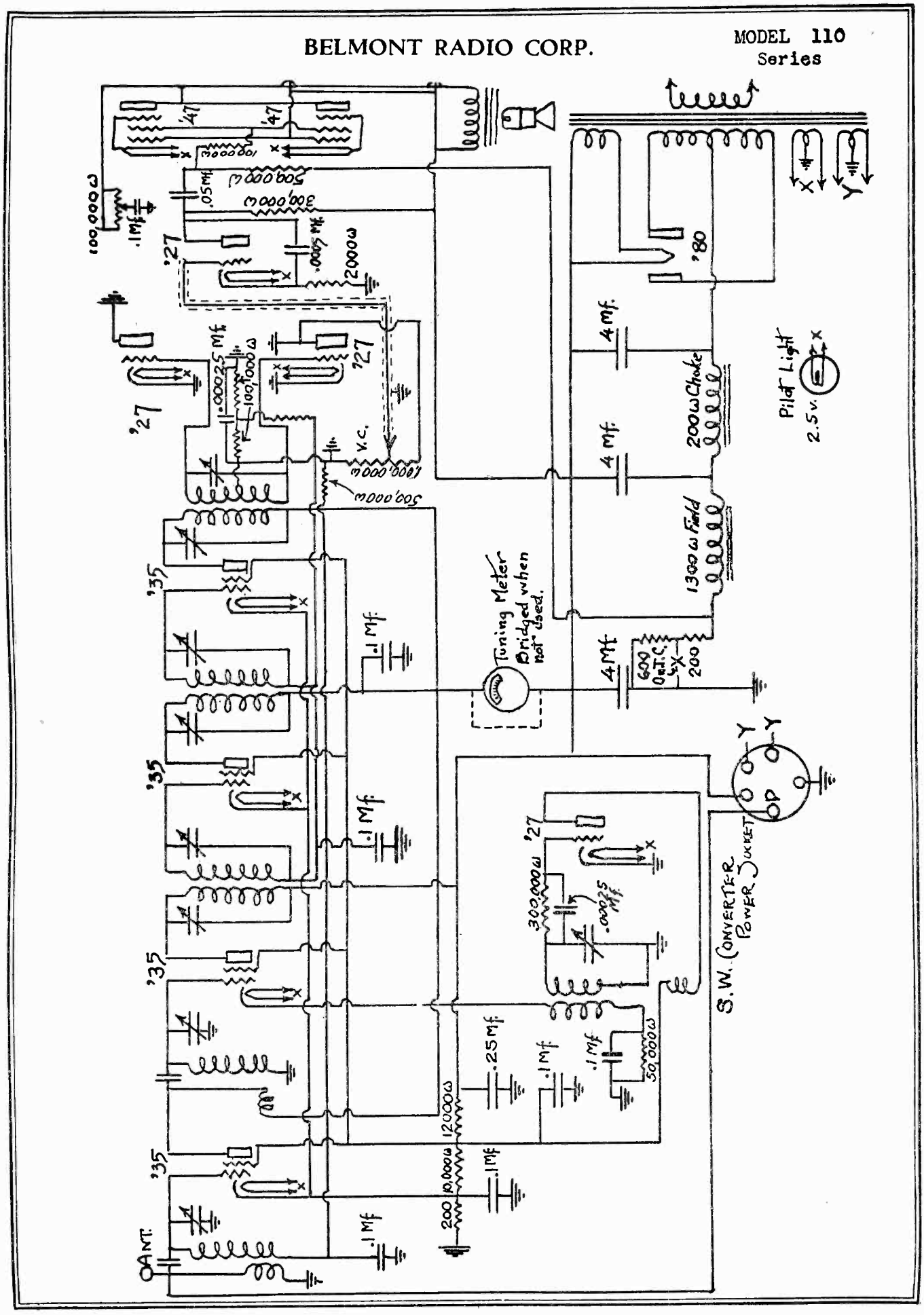


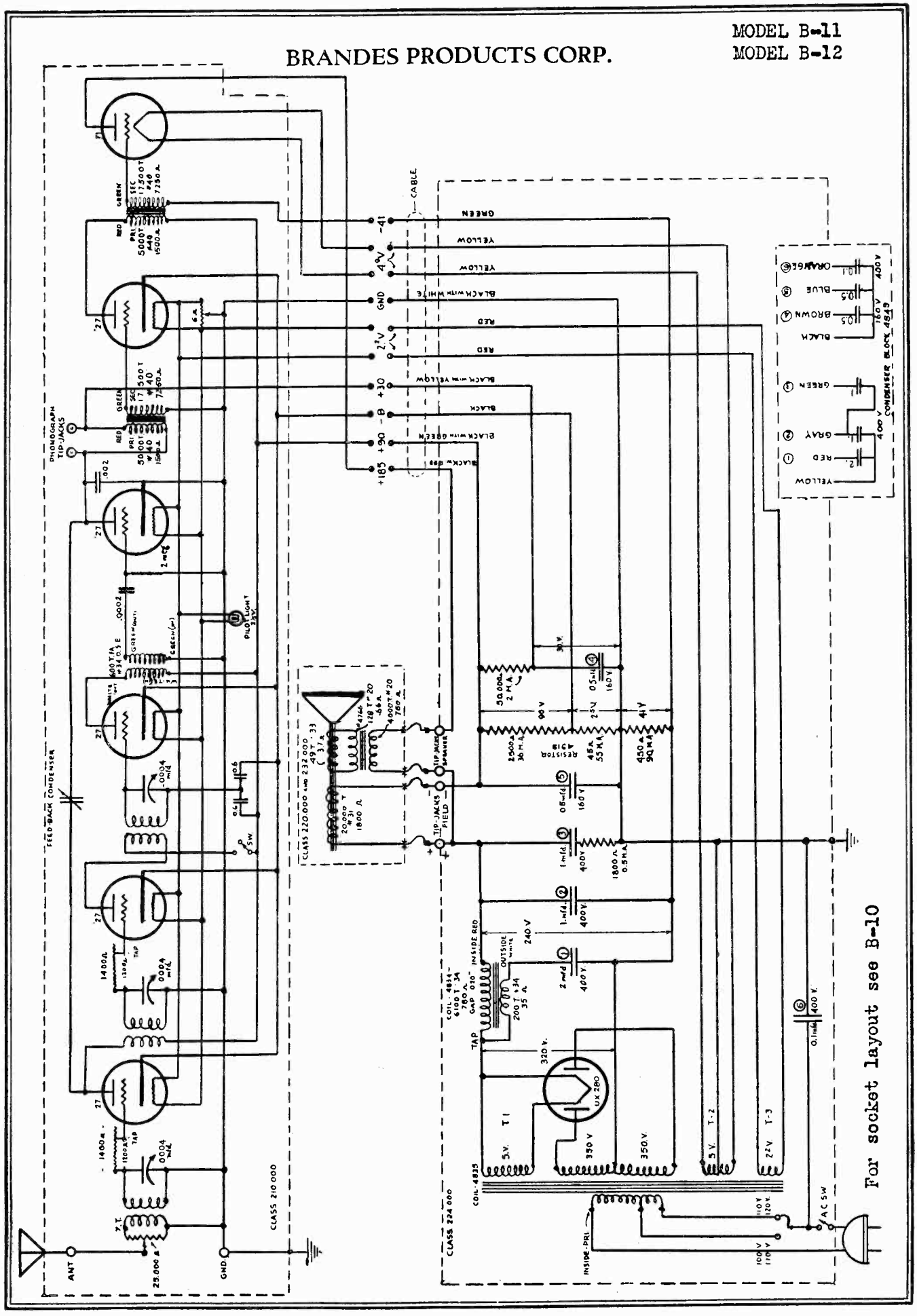
MODEL 525

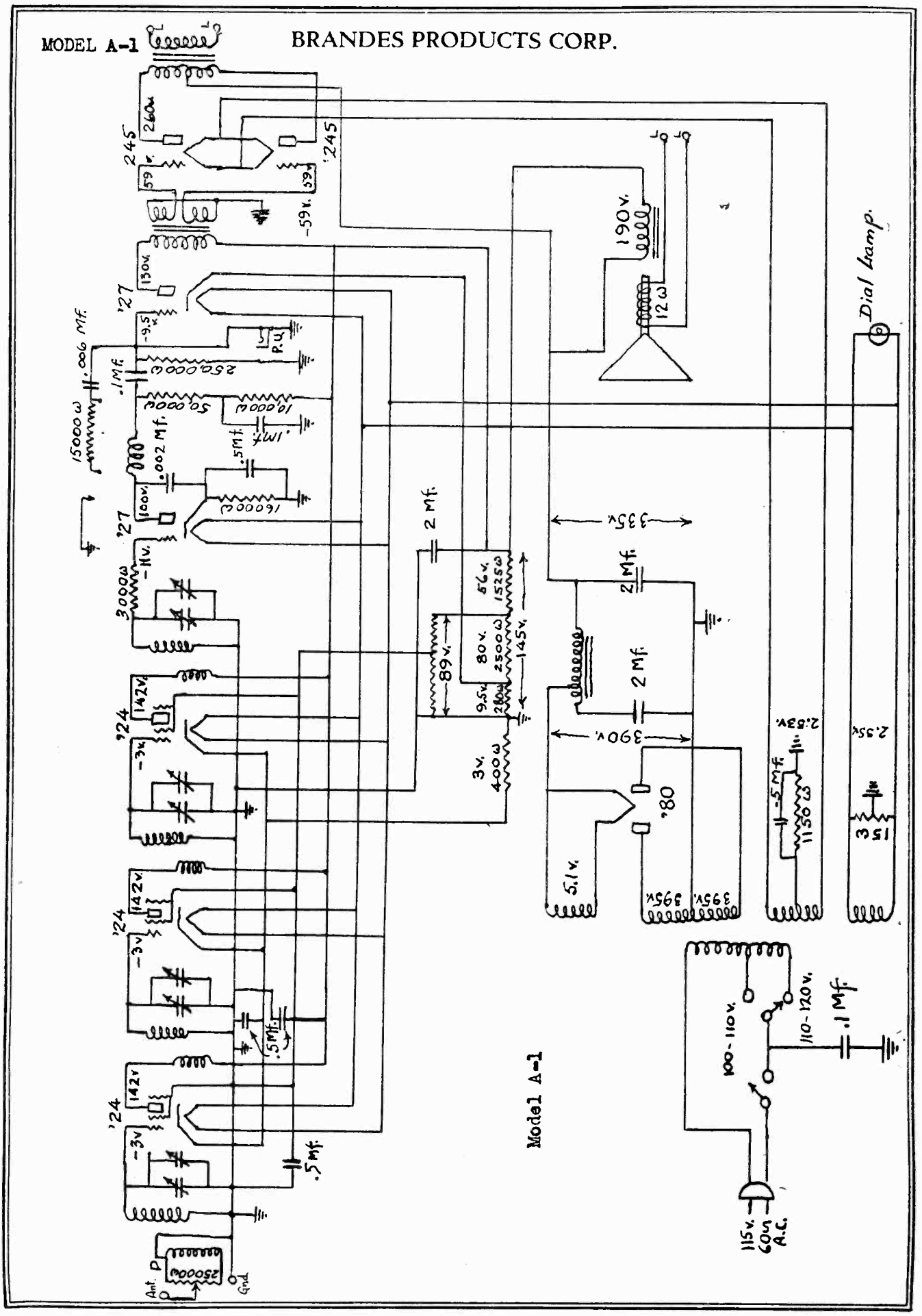


BELMONT RADIO CORP.

MODEL 110
Series





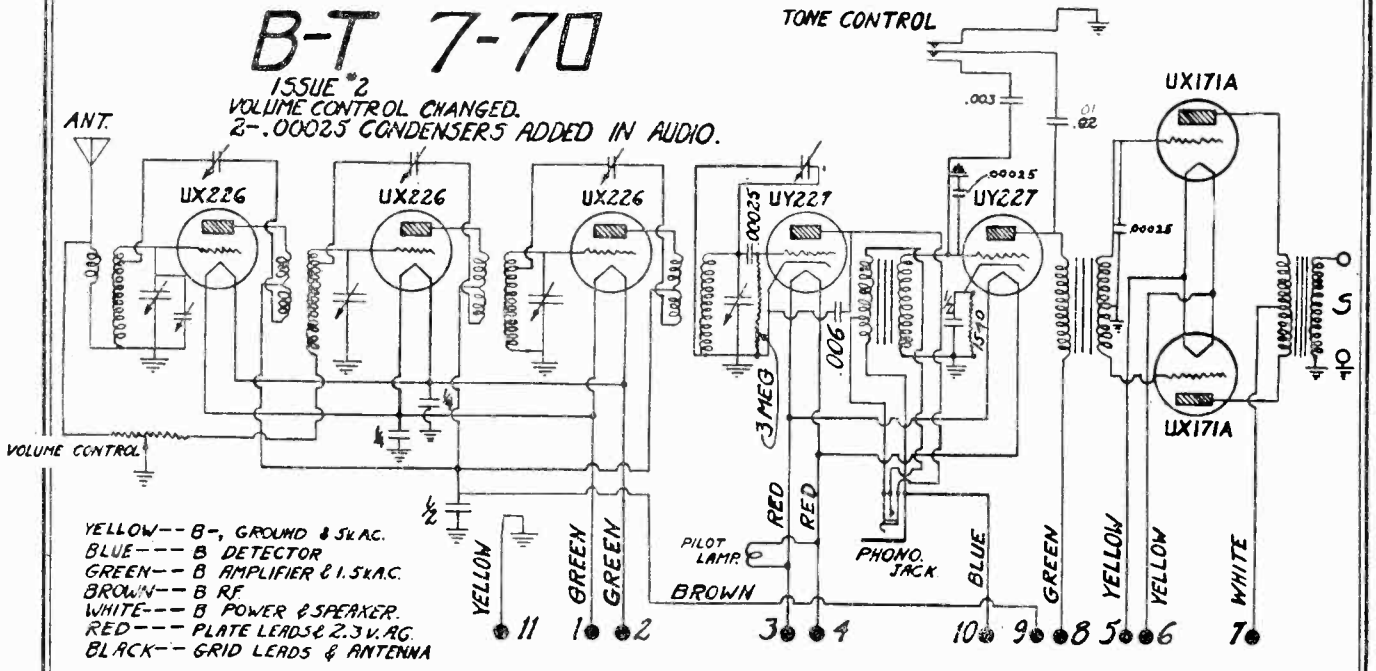


BREMER-TULLY MFG. CO

MODEL 7-70
Receiver

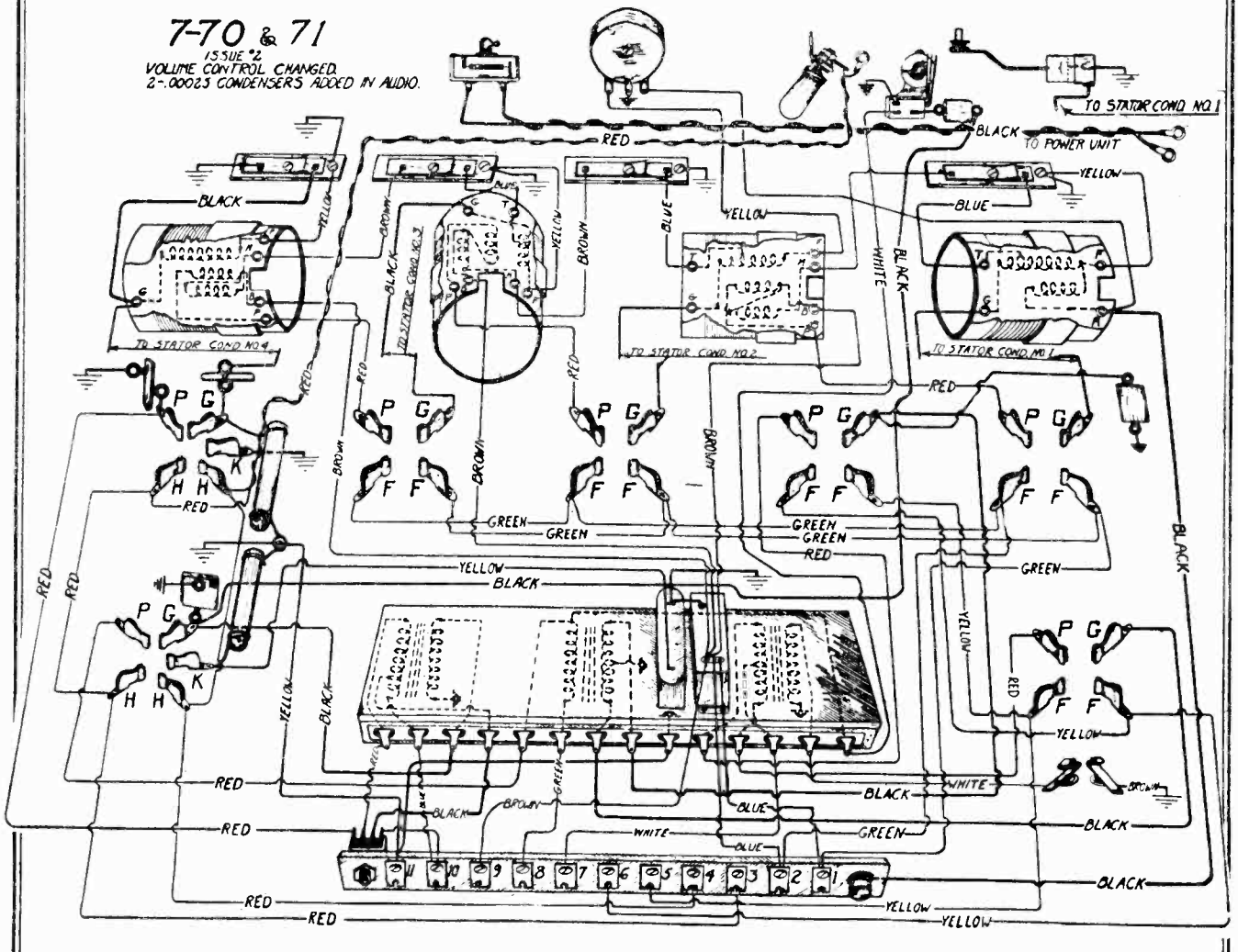
B-T 7-70

ISSUE #2
VOLUME CONTROL CHANGED.
2-.00025 CONDENSERS ADDED IN AUDIO.



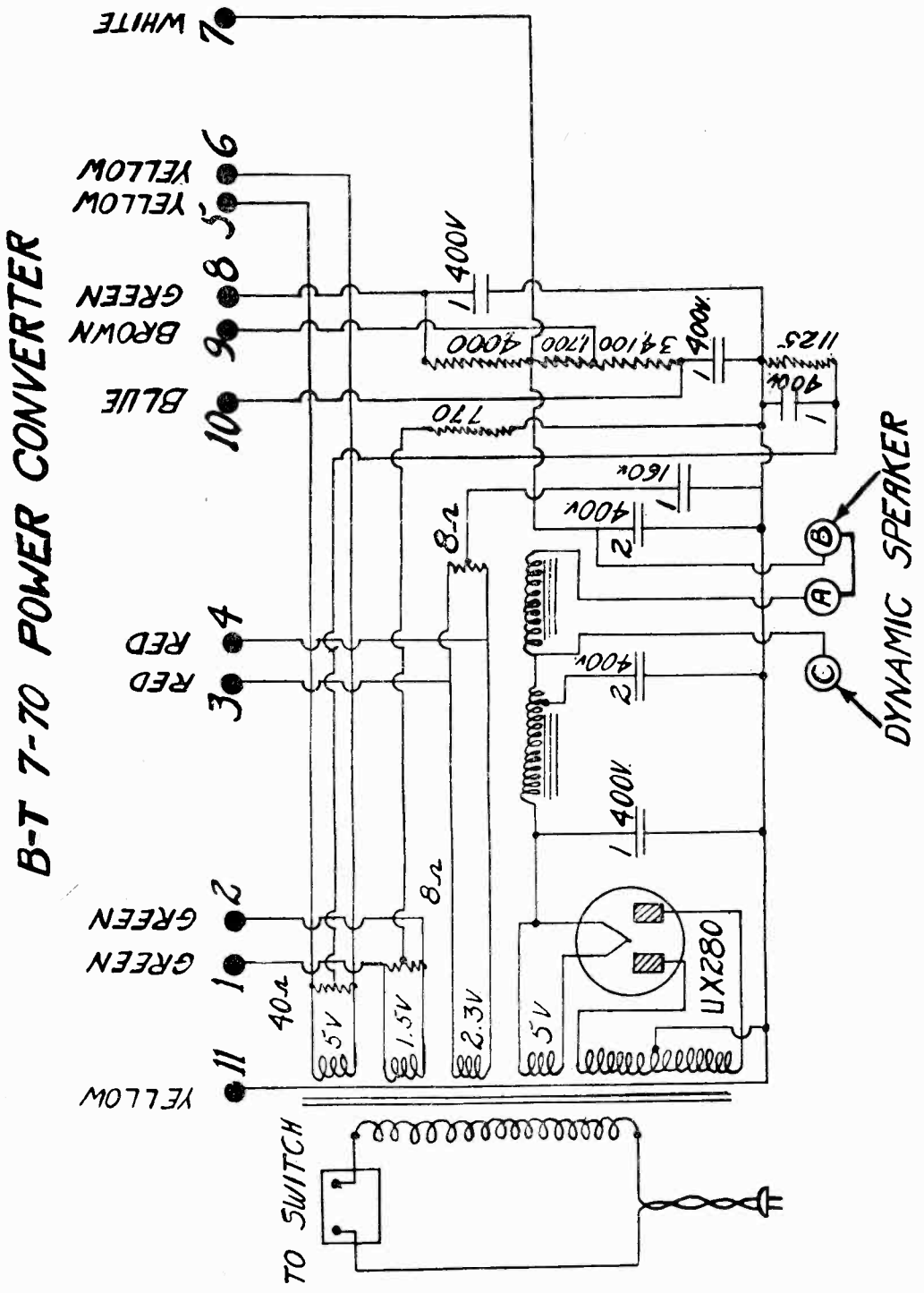
7-70 & 71

ISSUE #2
VOLUME CONTROL CHANGED.
2-.00025 CONDENSERS ADDED IN AUDIO.



MODEL 7-70
Power Converter

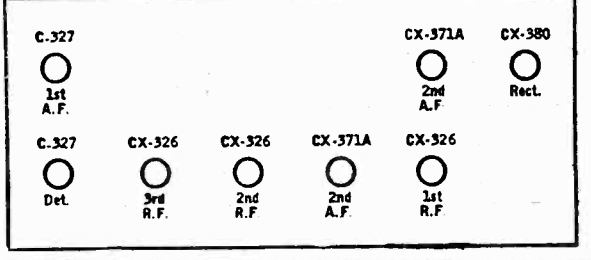
BREMER-TULLY MFG. CO



BREMER-TULLY—Models 7-70 and 7-71
Line Voltage 115

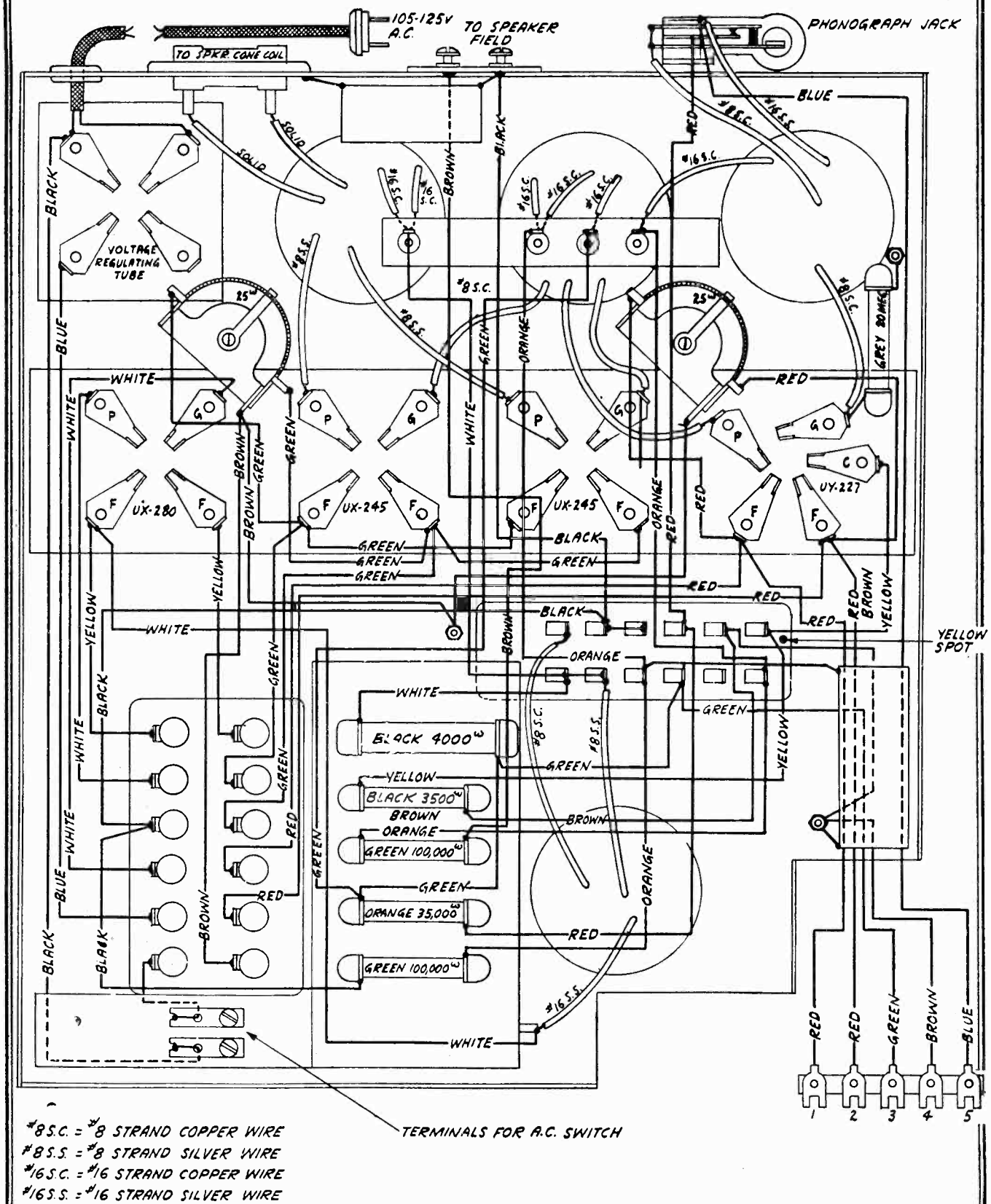
TUBE NO. IN ORDER	TYPE OF TUBE	POSITION OF TUBE 1ST RF DET STG	READINGS-PLUG IN SOCKET OF SET: TUBE OUT A VOLTS	TUBE OUT B VOLTS	TUBE IN TESTER A VOLTS	TUBE IN TESTER B VOLTS	TUBE IN TESTER C VOLTS	TUBE IN TESTER CATHODE VOLTS	TUBE IN TESTER NORMAL PLATE M.A.	TUBE IN TESTER PLATE M.A. GRID TEST	TUBE IN TESTER PLATE M.A. CHANGE
	226	1st.R.F.			1.4	150	9	—	8	12	4
	171A	Push-Pull			4.9	150	30	—	18	31	13
	226	2nd.R.F.			1.4	150	9	—	5	12	7
	226	3rd.R.F.			1.4	150	9	—	5	12	7
	227	Detector			2.1	60	0	—	2	—	—
	227	1st.A.F.			2.1	150	8	—	5	8	3
	171A	Push-Pull			4.9	150	18	—	18	31	13

7-70, 7-71M, 7-71P (A.C.)



BREMER-TULLY MFG. CO

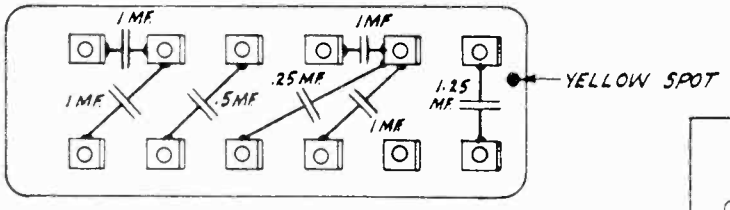
MODEL 81, 82
Power Unit
Chassis



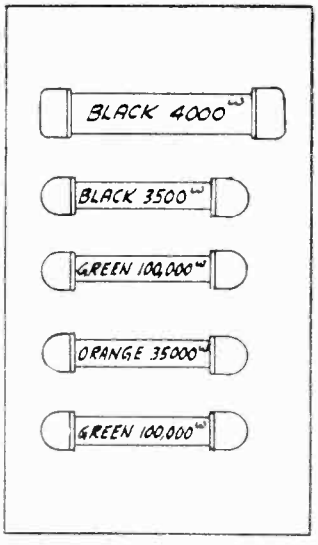
81, 82 AF and Power Unit Chassis

MODEL 81, 82 Data
MODEL "ABC" Power Pack

BREMER-TULLY MFG. CO

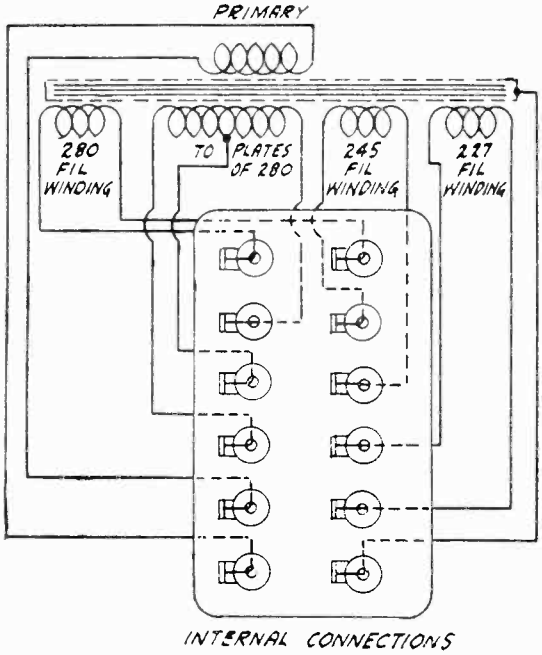


INTERNAL CONNECTIONS OF FILTER AND BY-PASS CONDENSERS

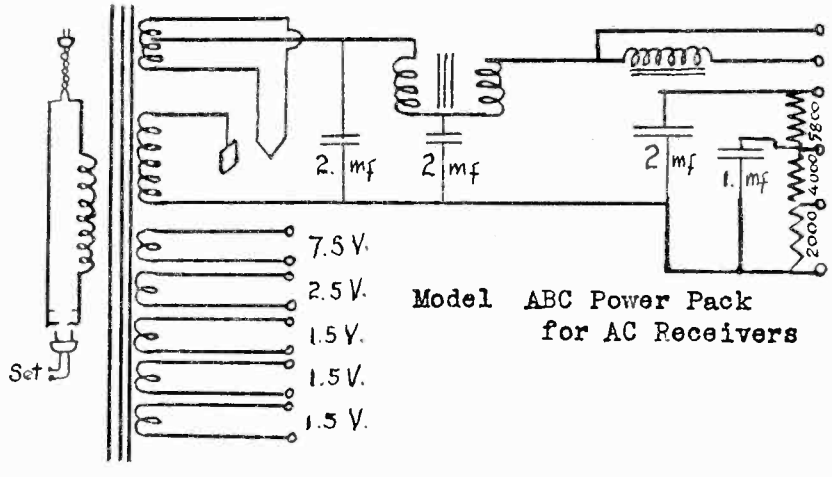


ARRANGEMENT OF RESISTORS ON TERMINAL BOARD

Model 81,82 Data



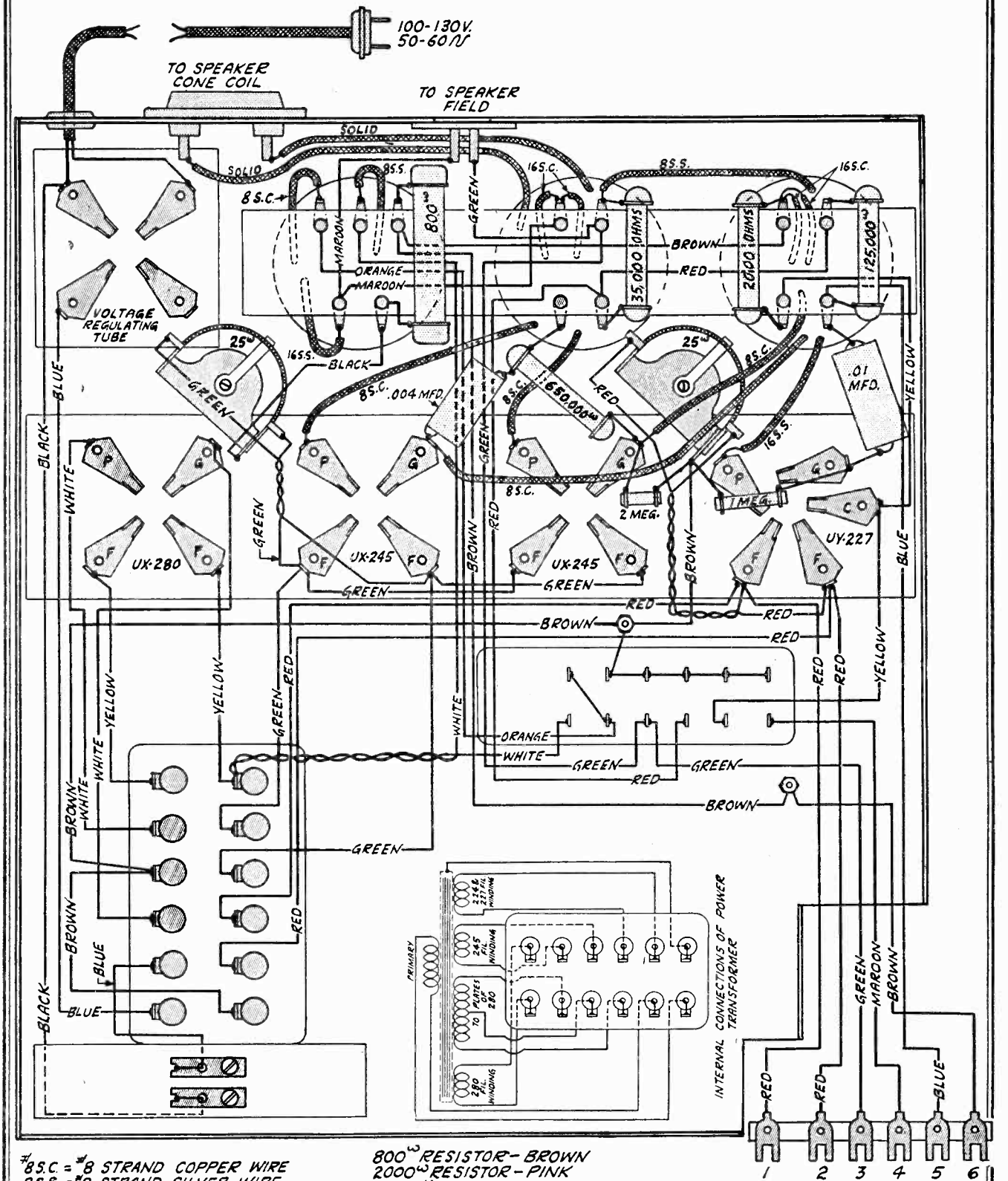
INTERNAL CONNECTIONS OF POWER TRANSFORMER



Model ABC Power Pack for AC Receivers

BREMER-TULLY MFG. CO

MODEL S-81, S-82
60 cy. AF Chassis



#8S.C. = #8 STRAND COPPER WIRE
8S.S. = #8 STRAND SILVER WIRE
16S.C. = #16 STRAND COPPER WIRE
16S.S. = #16 STRAND SILVER WIRE

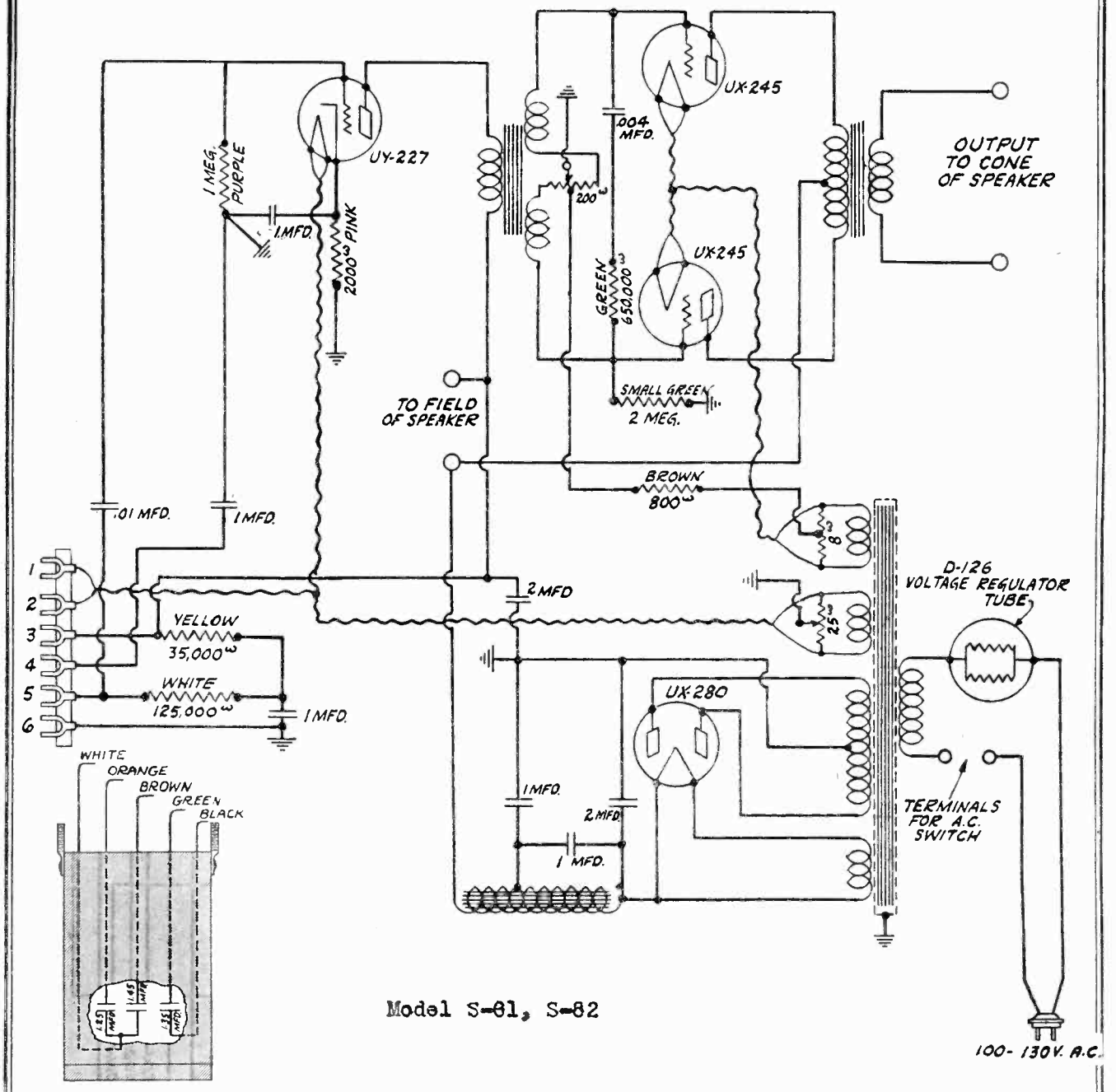
800Ω RESISTOR - BROWN
2000Ω RESISTOR - PINK
35,000Ω RESISTOR - ORANGE
125,000Ω RESISTOR - WHITE
650,000Ω RESISTOR - GREEN
1 MEG. RESISTOR - PURPLE
2 MEG. RESISTOR - LIGHT GREEN

7005

ACTUAL WIRING DIAGRAM OF AUDIO AMPLIFIER POWER SUPPLY CHASSIS

MODEL S-81, S-82
25 Cy. Power pack
and AF schematic

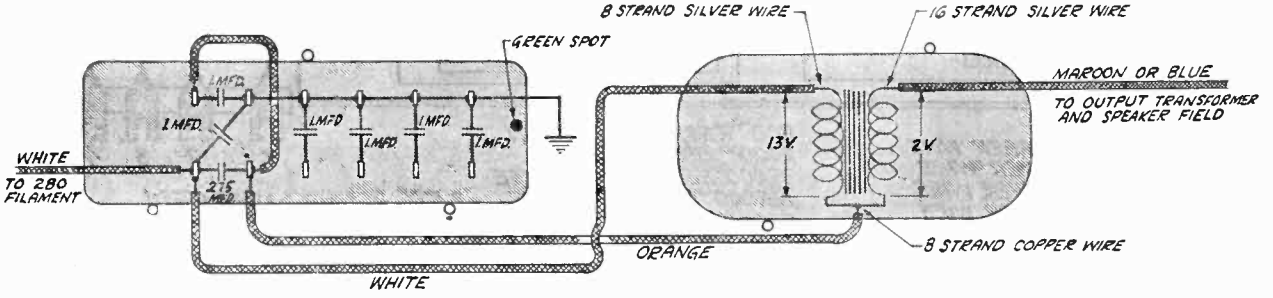
BREMER-TULLY MFG. CO



Model S-81, S-82

CONNECTIONS OF 25 CYCLE
ADDED FILTER CONDENSERS

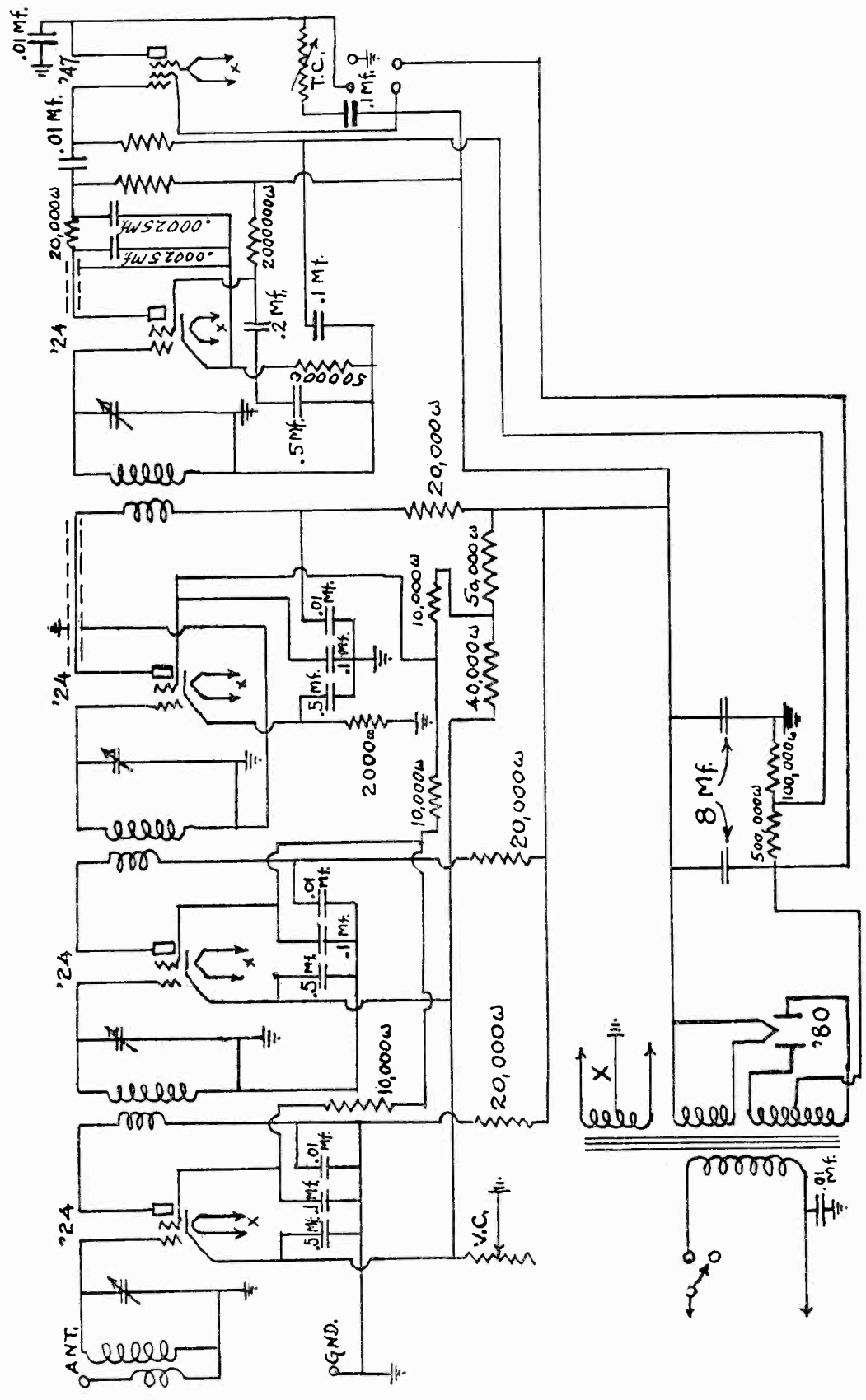
Model S-81, S-82 25 cycle AF and Power Supply schematic



CONNECTIONES OF FILTER CHOKE AND CONDENSERS

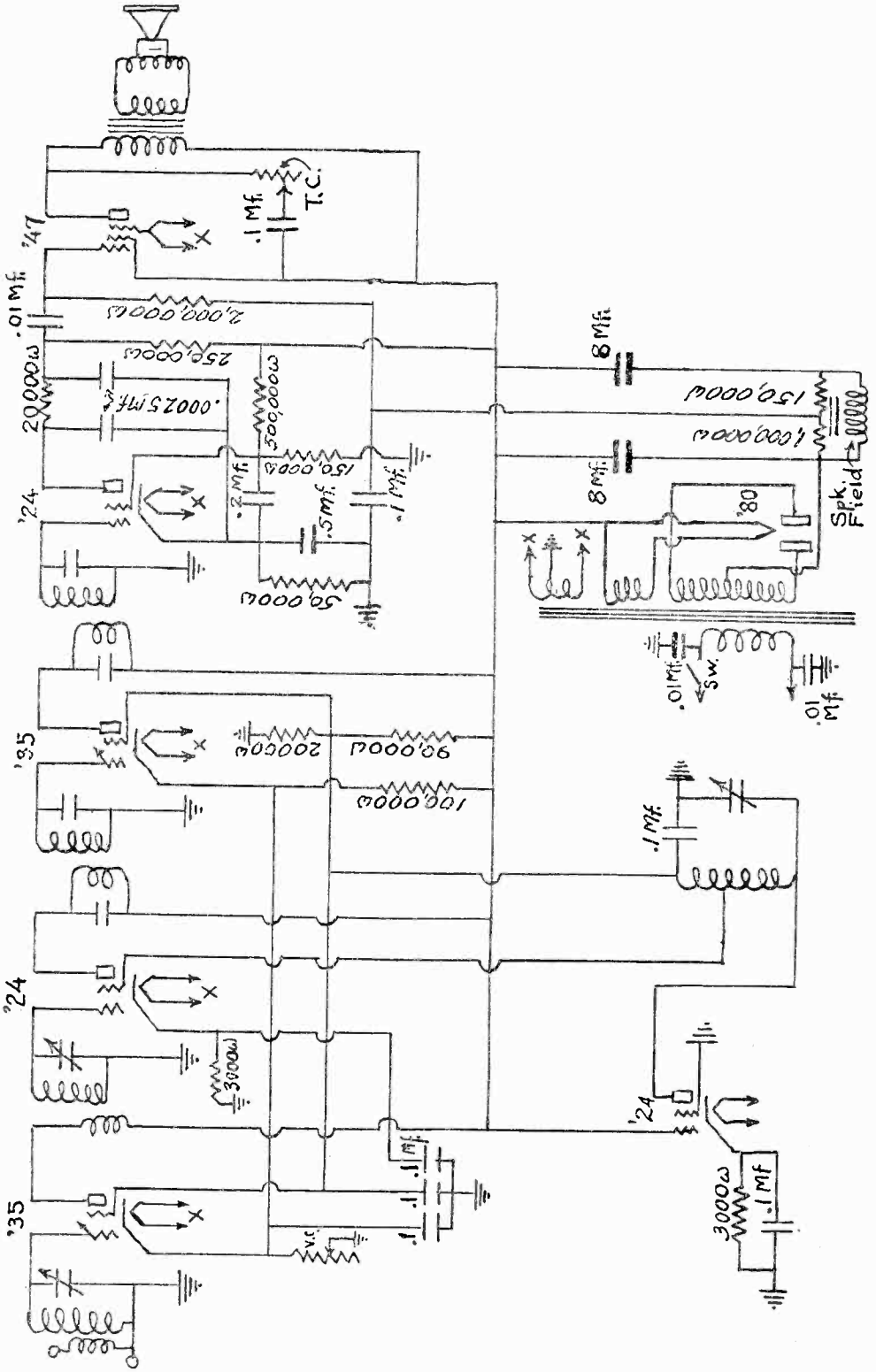
MODEL 20

BROWNING - DRAKE CORP.



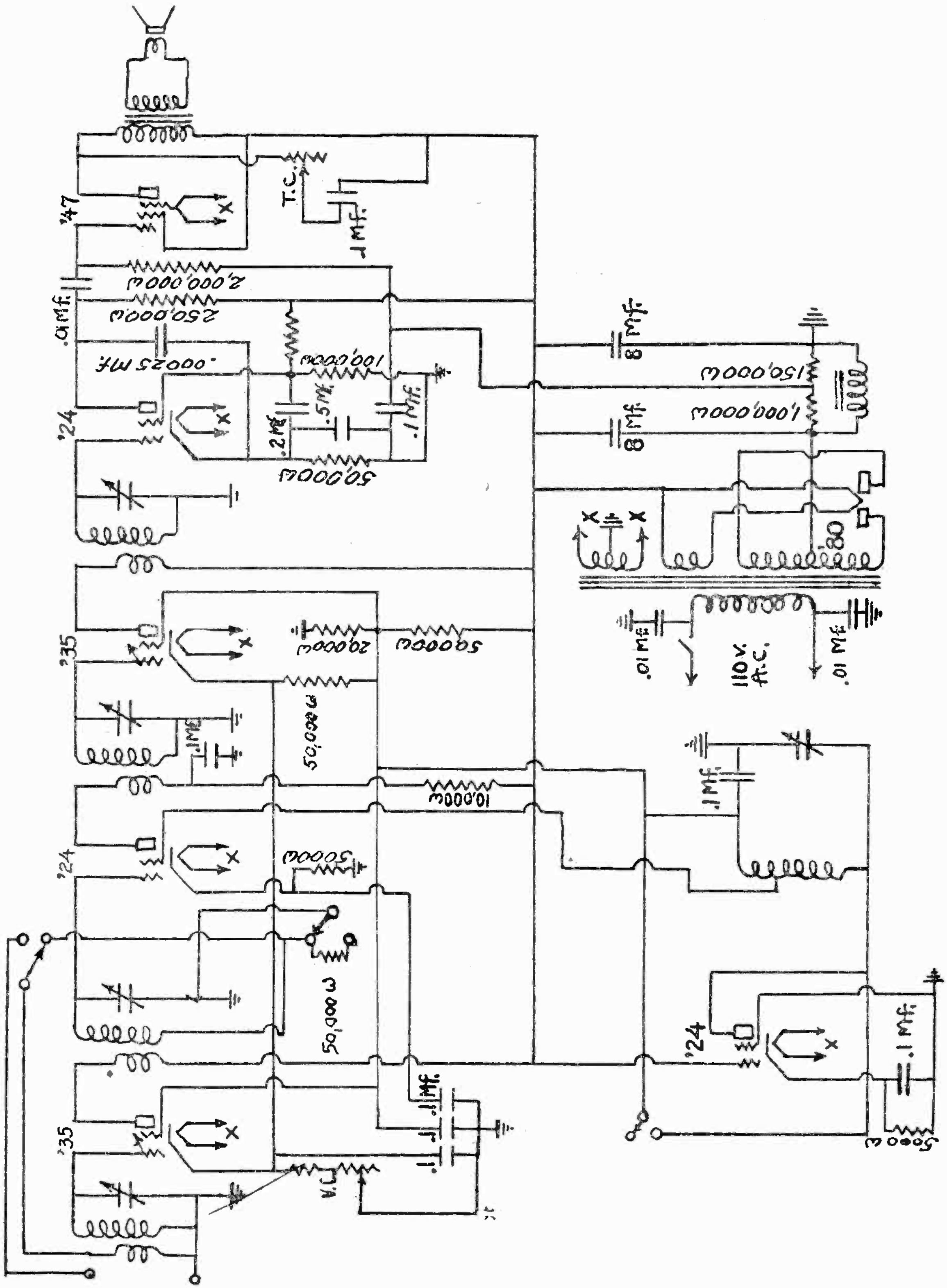
MODEL 40

BROWNING - DRAKE CORP.



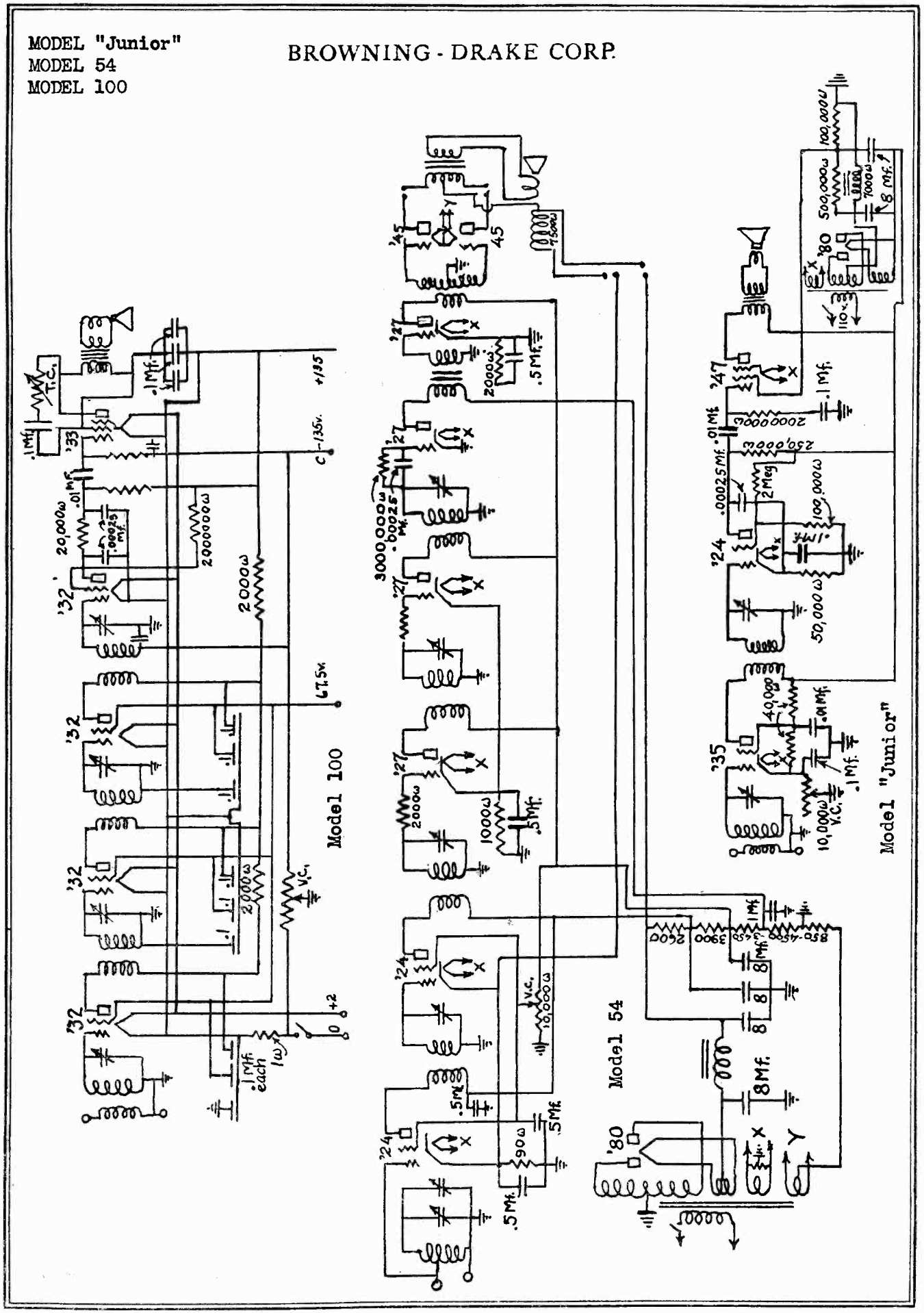
MODEL 80

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.

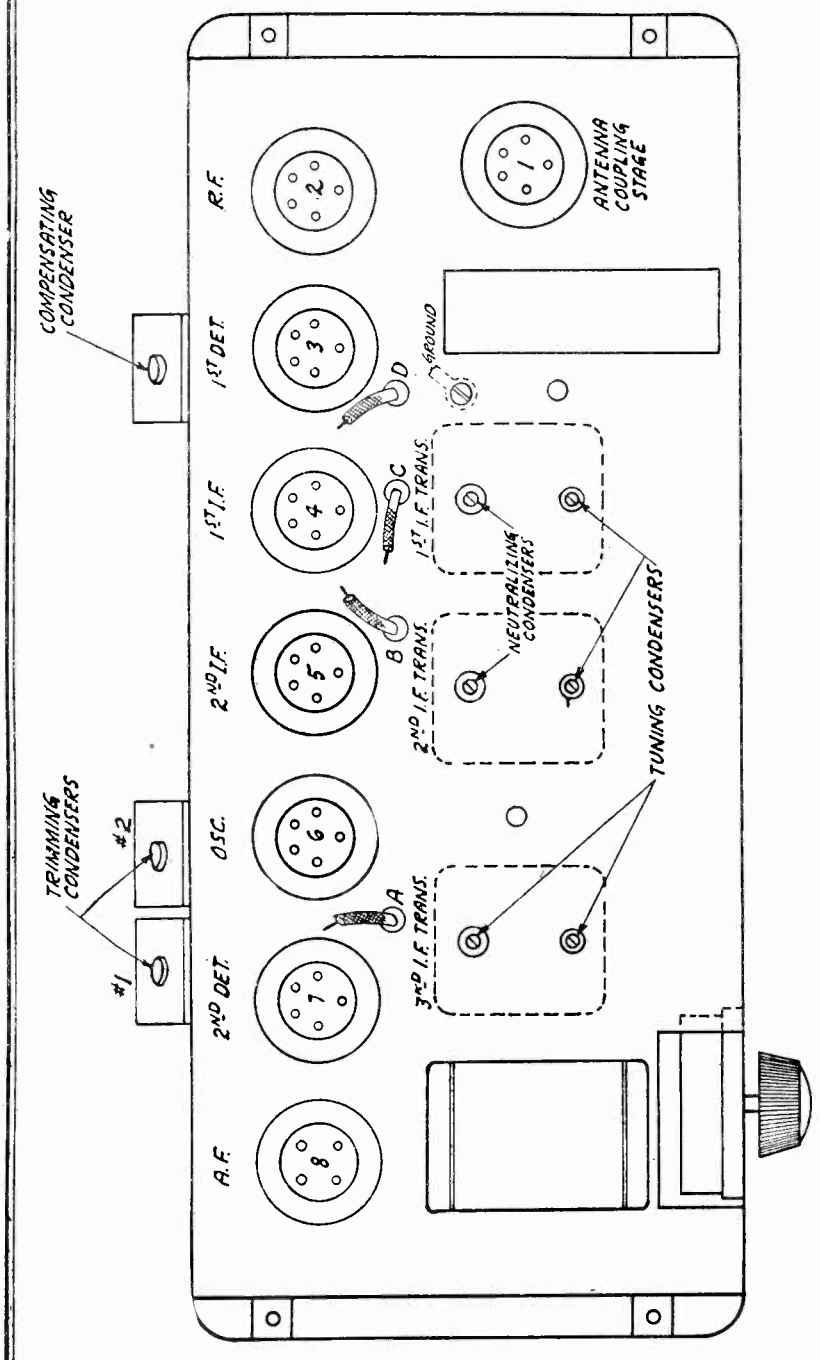
(a) With apparatus set up as before, substitute special UY-227 tube with amputated heater prong in first I. F. socket (fifth tube from left side). Adjust set screw toward the rear of the right hand transformer for minimum meter deflection and minimum sound in speaker.

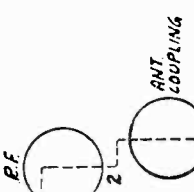
(b) Inter-change special UY-227 tube in first I. F. stage with the regular tube in the second I. F. stage (fourth tube from left side) and adjust set screw toward rear of middle transformer for minimum meter reading and minimum sound in phones. The left transformer is not neutralized, the two condensers in this unit are in parallel and are both used for tuning.

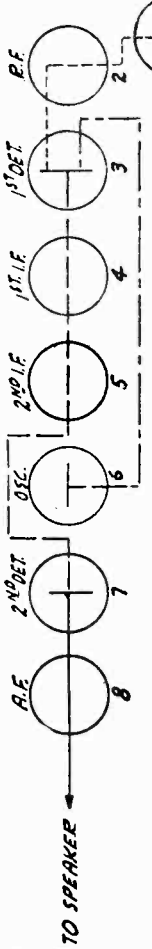
After tuning and neutralizing the I. F. amplifier, it is best to check the adjustment of the oscillator trimming condensers as mentioned before in this Bulletin.

MODEL 5 NO, 5 NC8,
3 NC8
Trimmer Locations

BRUNSWICK RADIO CORP.







RADIO FREQUENCY CURRENT
OSCILLATOR FREQUENCY CURRENT
INTERMEDIATE FREQUENCY CURRENT
AUDIO FREQUENCY CURRENT

THE BRUNSWICK-BALKE-COLLENDER CO.
CHICAGO ILLINOIS.

TECHNICAL DEPARTMENT

LOCATION OF ADJUSTING CONDENSERS ON 5NO, 5NC8 & 3NC8 EQUIPMENTS

DESIGNED	DRAWN	CHECKED	DATE
	H.O.B.	H.C.B.	10-10-28

APPROVED:

SCALE

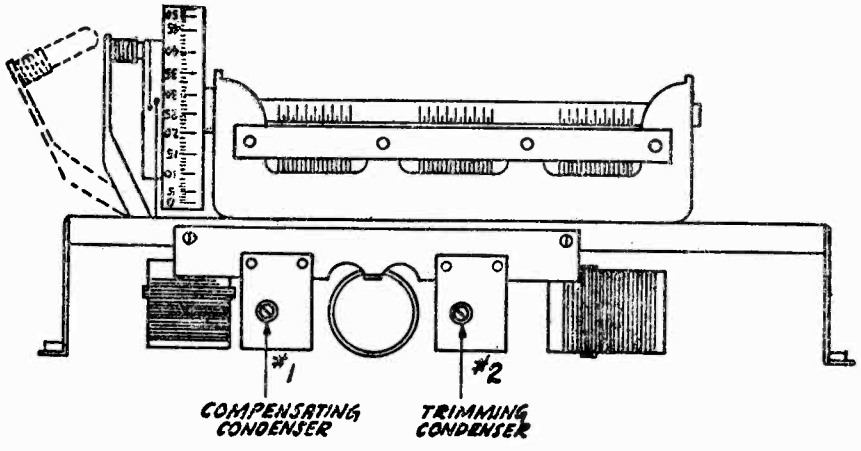
CA-6039

REVISED 11-12-28
REVISED 10-26-28

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

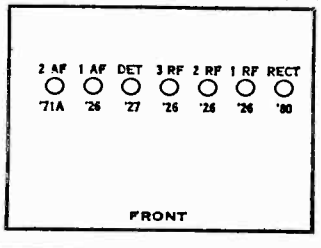


Adjustment for Low Line Voltages. The R-1 is normally adjusted for line voltages between 115 and 120 volts and should not be changed unless it has been definitely ascertained that the line voltage is less than 115 volts and then only when the volume is insufficient to satisfy the customer.

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.

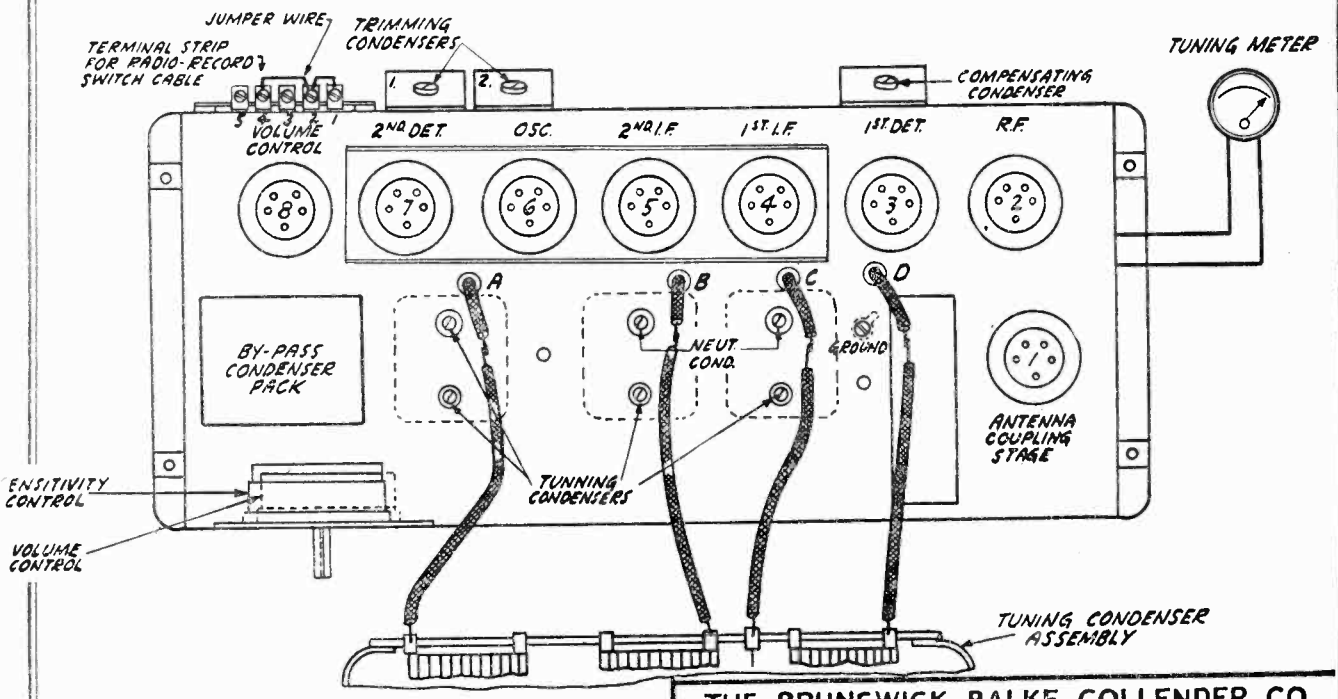
Connect the **red and black** lead to the power cable lead, solder and tape. Tape up the unused **black with red tracer** lead.

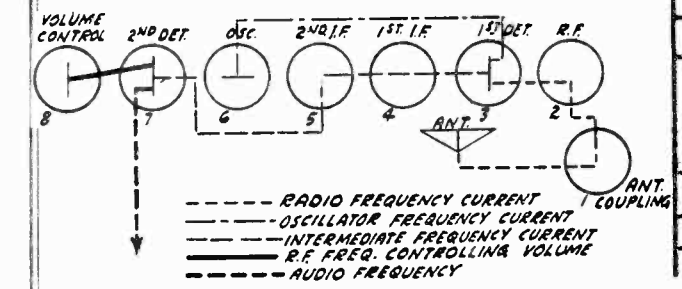
Models Brunswicks PR-17-8, R-1, 3KRO, 5KR (1928)



MODEL 3 NW 8
Trimmers and Notes

BRUNSWICK RADIO CORPORATION

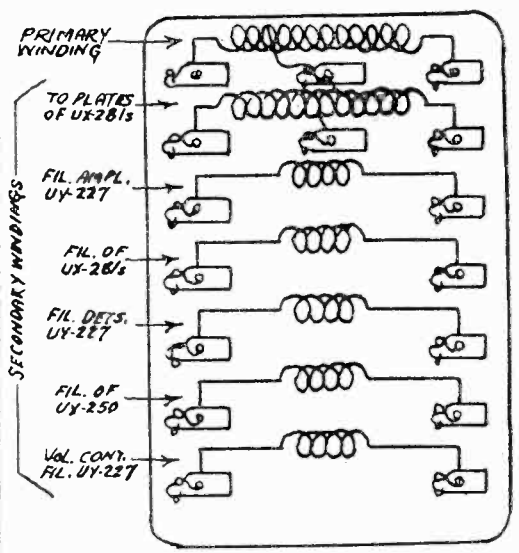




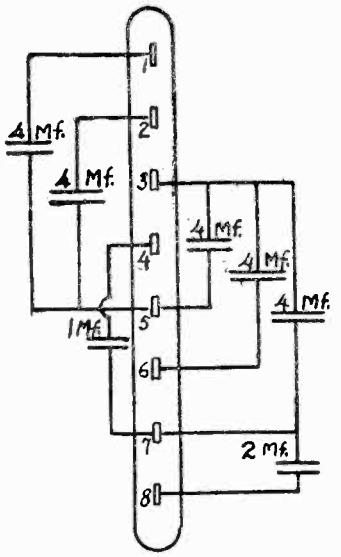
THE BRUNSWICK-BALKE-COLLENDER CO.
CHICAGO, ILLINOIS.
TECHNICAL DIVISION

1. VOLTAGE DIVIDER CIRCUIT
2. LOCATION OF ADJUSTMENT CONDENSERS
3. TUBE SEQUENCE AND FUNCTION

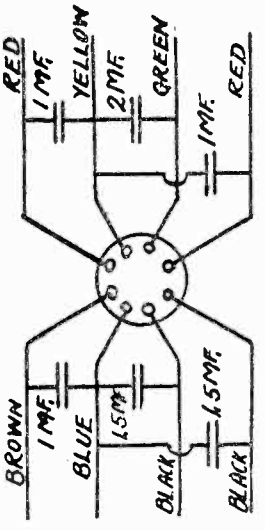
DESIGNED	DRAWN	CHECKED	DATE
	H.O.B.	C.C. pmc	1-18-29
APPROVED	K.R.S.	CA-6057	



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 readjust 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

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.

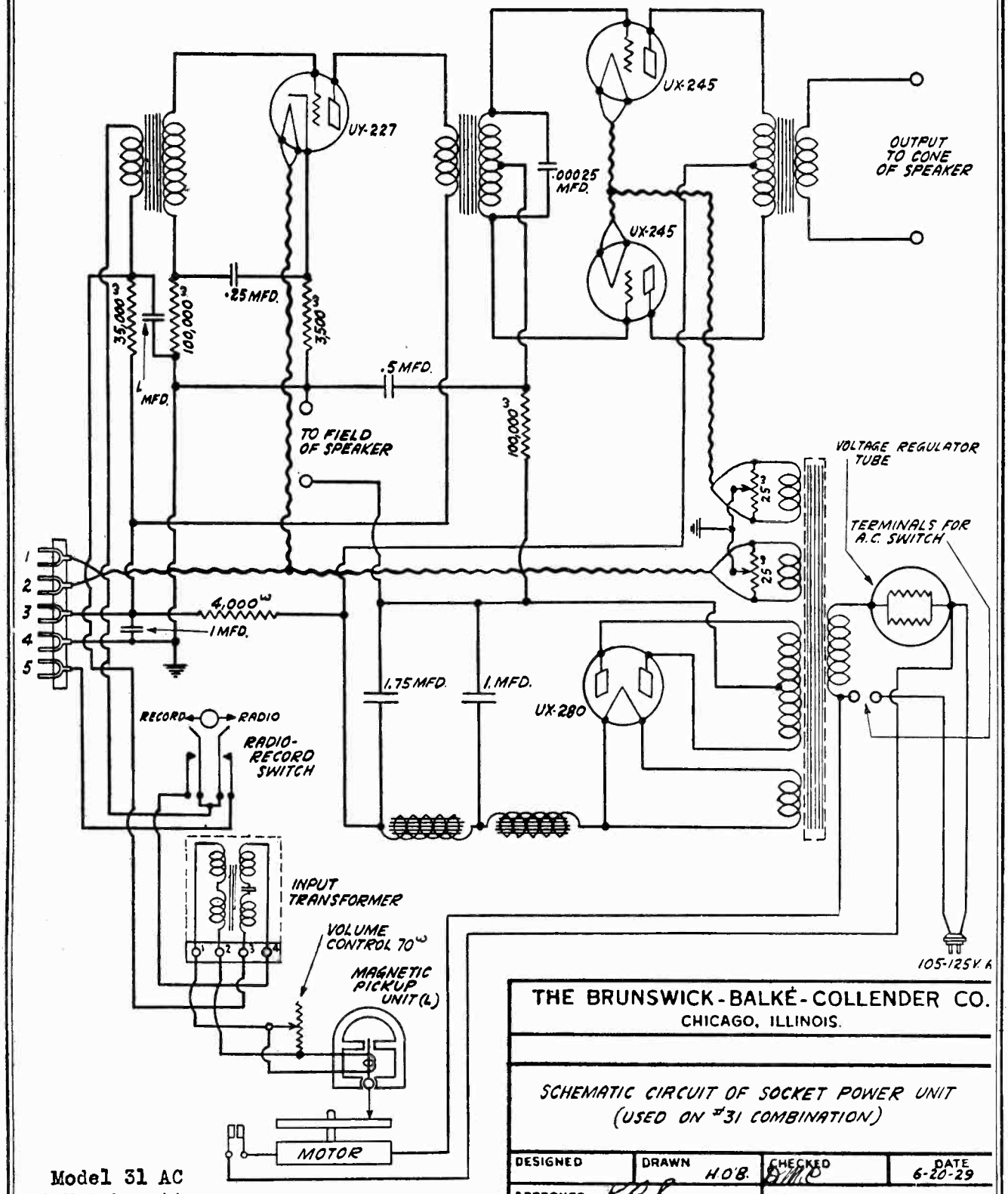
   The oscillator should be placed in operation at 750 kilocycles several feet from the receiver to be adjusted, and the receiver should be tuned accurately to the oscillator frequency. The volume and sensitivity controls should be so adjusted that the tuning meter will register three quarters of full scale 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.

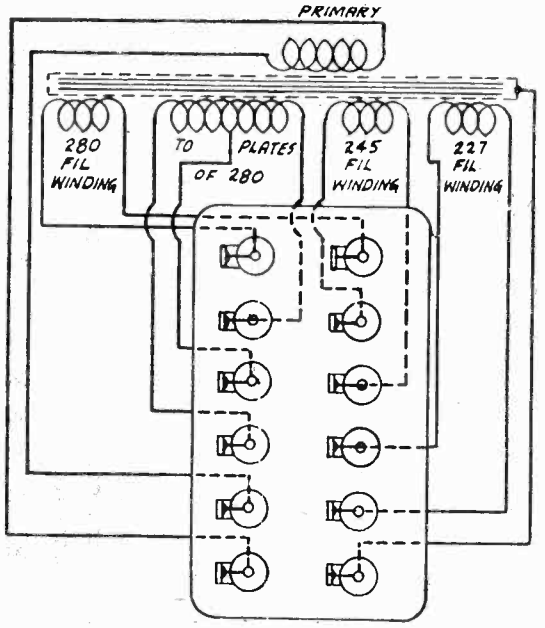
SCHEMATIC CIRCUIT OF SOCKET POWER UNIT
(USED ON #31 COMBINATION)

DESIGNED	DRAWN	CHECKED	DATE
	H.O.B.	D.M.E.	6-20-29
APPROVED	K.R.S.		CA-6074

Model 31 AC
SPU Schematic

Adjustment of Neutralizing Condensers

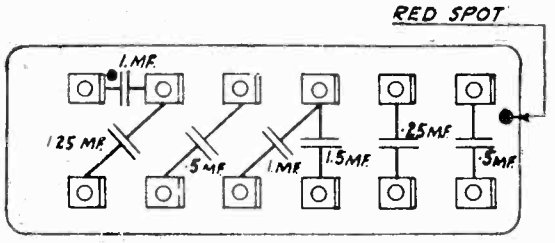
To neutralize the R.F. amplifier proceed as follows:



INTERNAL CONNECTIONS OF POWER TRANSFORMER

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.

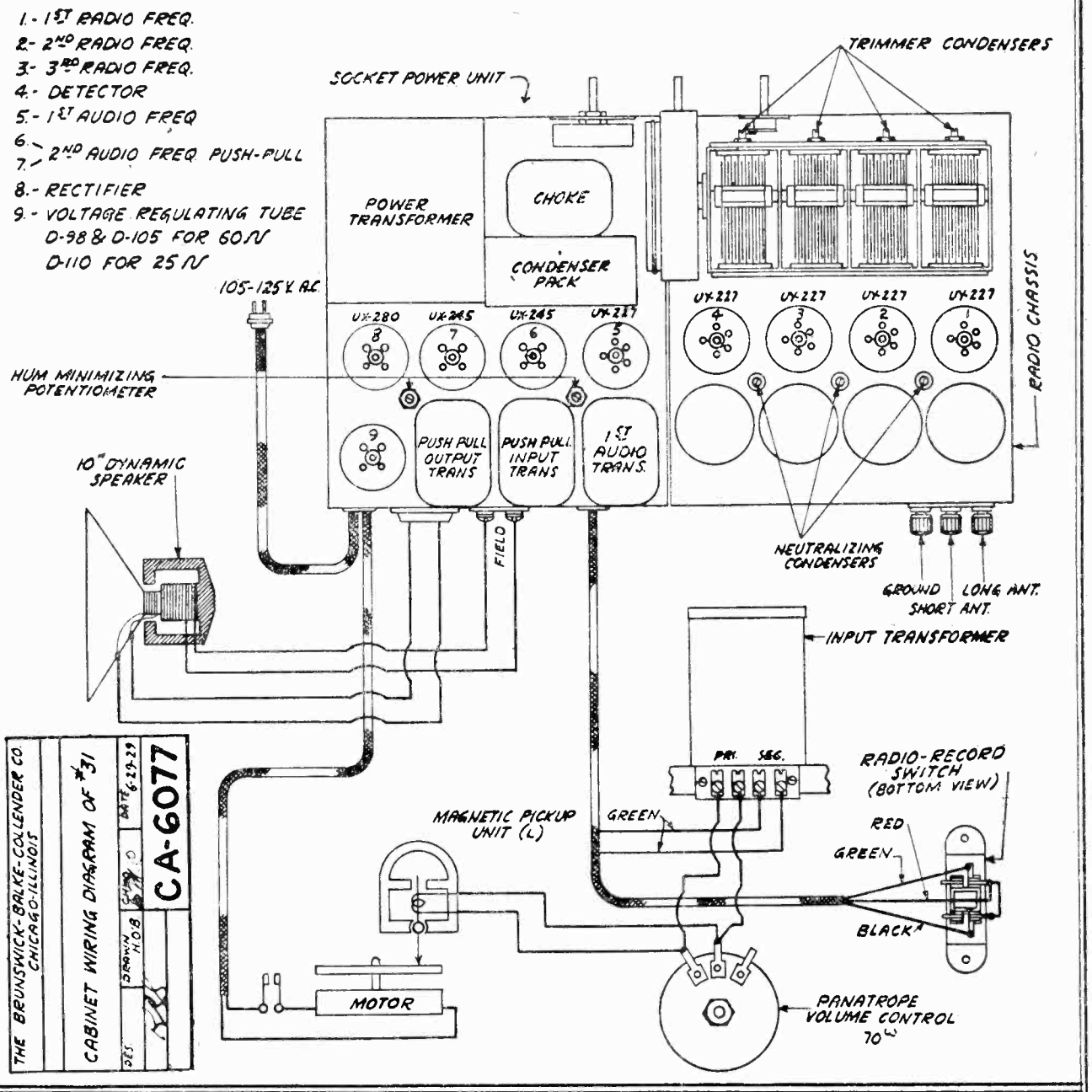
In the event any trouble is experienced in neutralizing this receiver, a thorough check should be made of the receiver voltages and the by-pass condensers. An open by-pass condenser may allow sufficient radio frequency energy to feed back from one stage to another to make neutralizing impossible. If 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 FILTER AND BY-PASS CONDENSERS

MODEL 14, 21, 31, 81 and 82 AC Socket and Notes

BRUNSWICK RADIO CORPORATION



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.

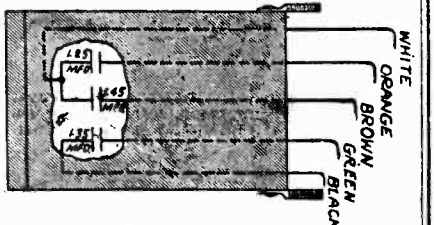
Hum will result in the Model S-31 if the grounding wires on the induction disc motor and suspension arm are removed. Examine these to see that they are in place. It is possible in some cases where hum is experienced in the record side to make a slight reduction by unclamping the pickup input transformer 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 pereentage of the a-c component in the rectified voltage is applied across achoke 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.

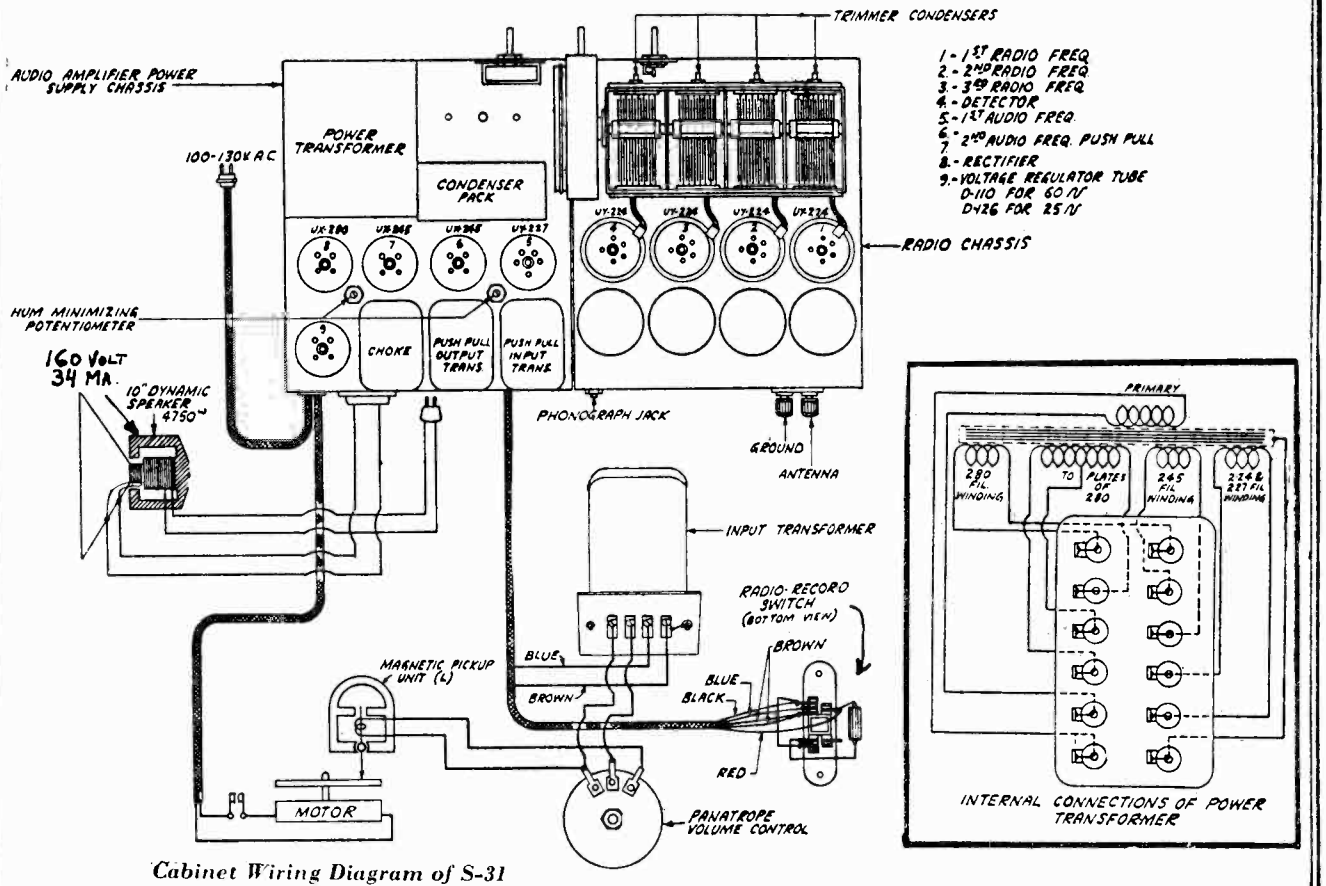
Power Consumption (60 cycle model) 110 Watt
" " (25 " ") 130 "
Speaker Field - 4750 Ohm, 160 Volt,34 Ma .
PANATROPE - Type of motor - Induction disc
" - Power consumption of motor- 35 Watt
" - Type of magnetic pickup- Low imped.
The following Ballast units are specified by
BRUNSWICK - For 60 cyc. -DURESITE BALLAST D-110
" 25 " - " " D-126



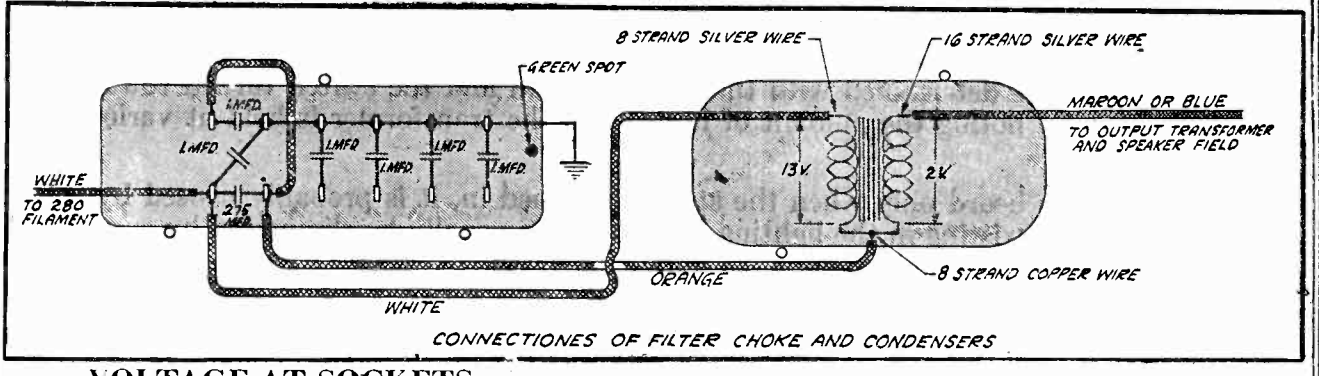
CONNECTIONS OF 25 CYCLE ADDED FILTER CONDENSERS

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

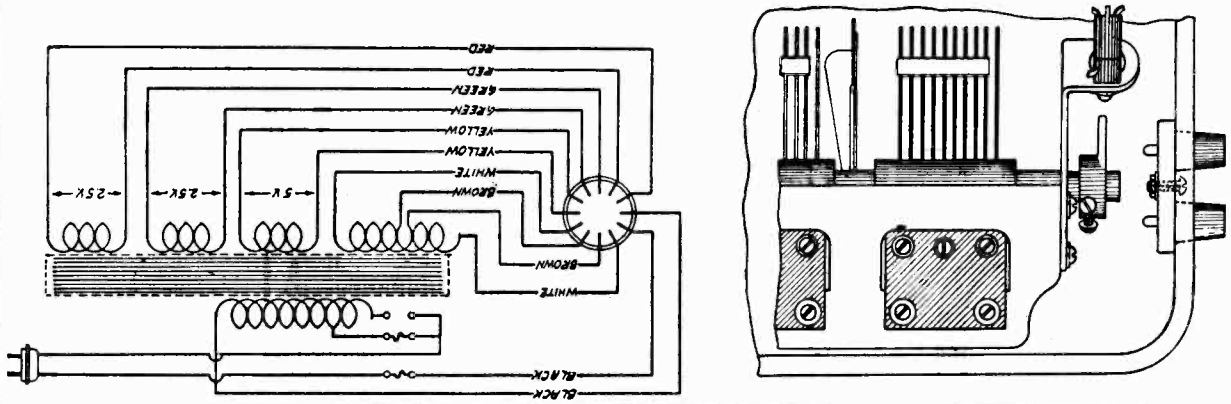
VOLTAGE AT SOCKETS
(Volume control at maximum.)

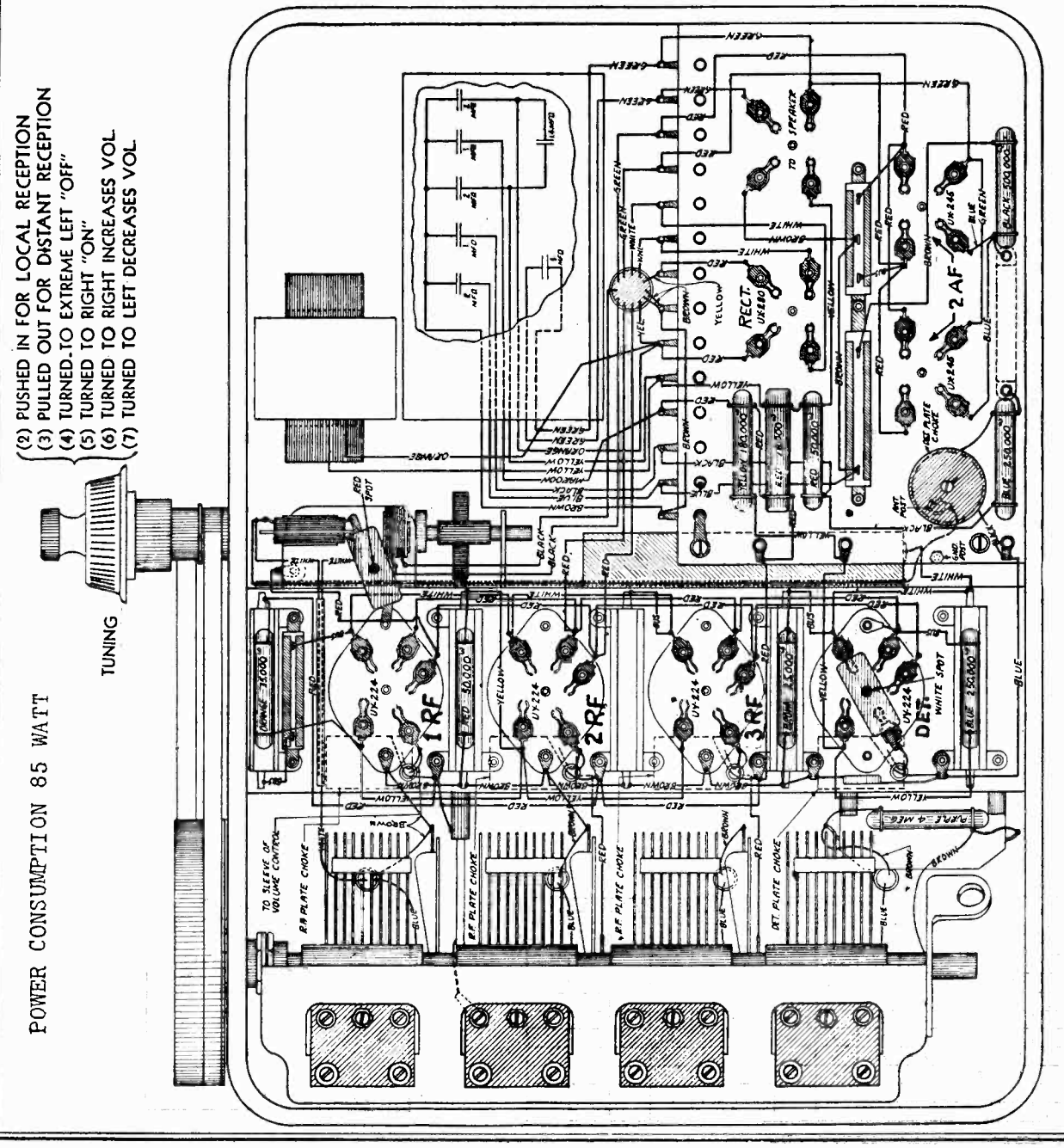
Position of Tube	Heater to Cathode Volts	Control Grid to Cathode Volts	Screen-Grid to Cathode Volts	Plate to Cathode Volts	Plate Current Milamps	Filament or Heater Volts
1st, 2nd, 3rd R. F	—2.5	—2.5	60	135	1.7	2.5
Detector	*—5	*—5	*13	*84	.2	2.5
1st A. F.	—8	*—.27		130	4.5	2.5
Power Stage		—45		245	28	2.5
Rectifier					45 per Plate	5

*Readings may vary considerably depending on resistance of voltmeter used.

BRUNSWICK RADIO CORP.

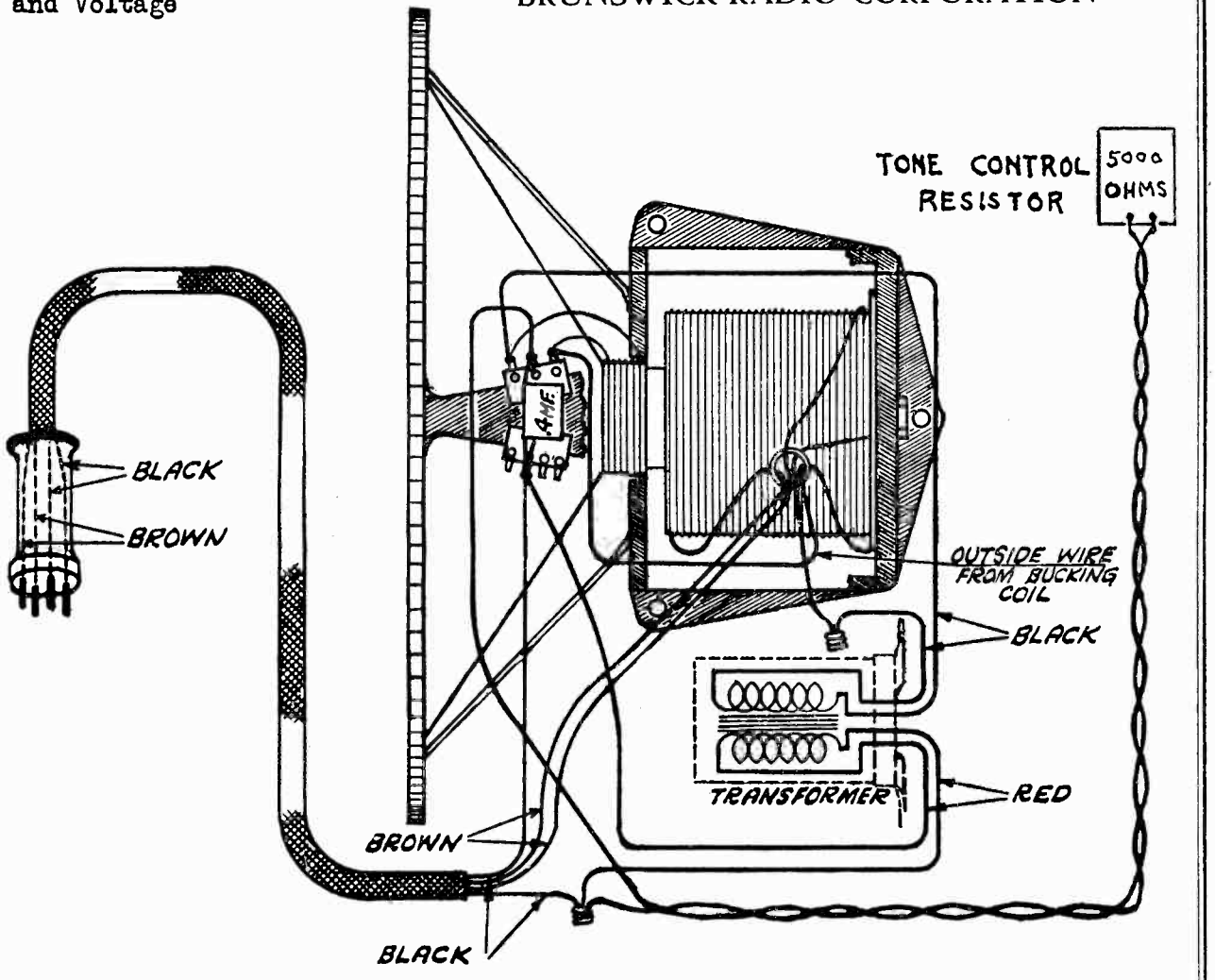
MODEL 15, 22 AC
Chassis
Also 32 and 42 AC

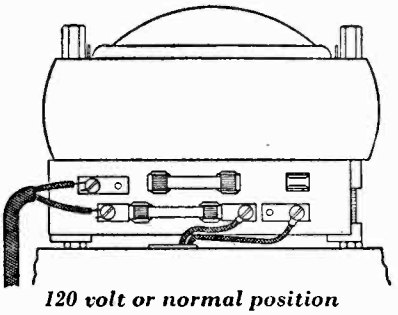




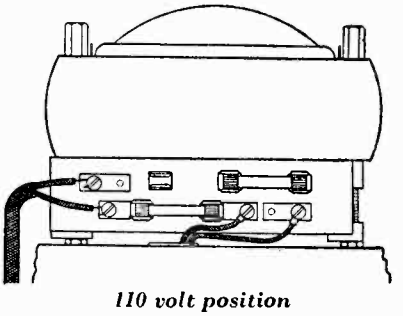
MODEL 15, 22, 32, 42 AC
AC Speaker
and Voltage

BRUNSWICK RADIO CORPORATION





120 volt or normal position

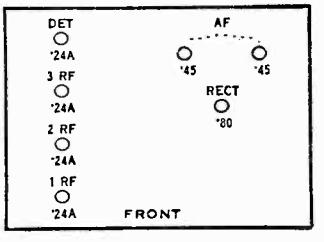


110 volt position

BRUNSWICK—Models 15-22-32-42
Line Voltage 110—Voltage Tap 120
Volume Control Full On

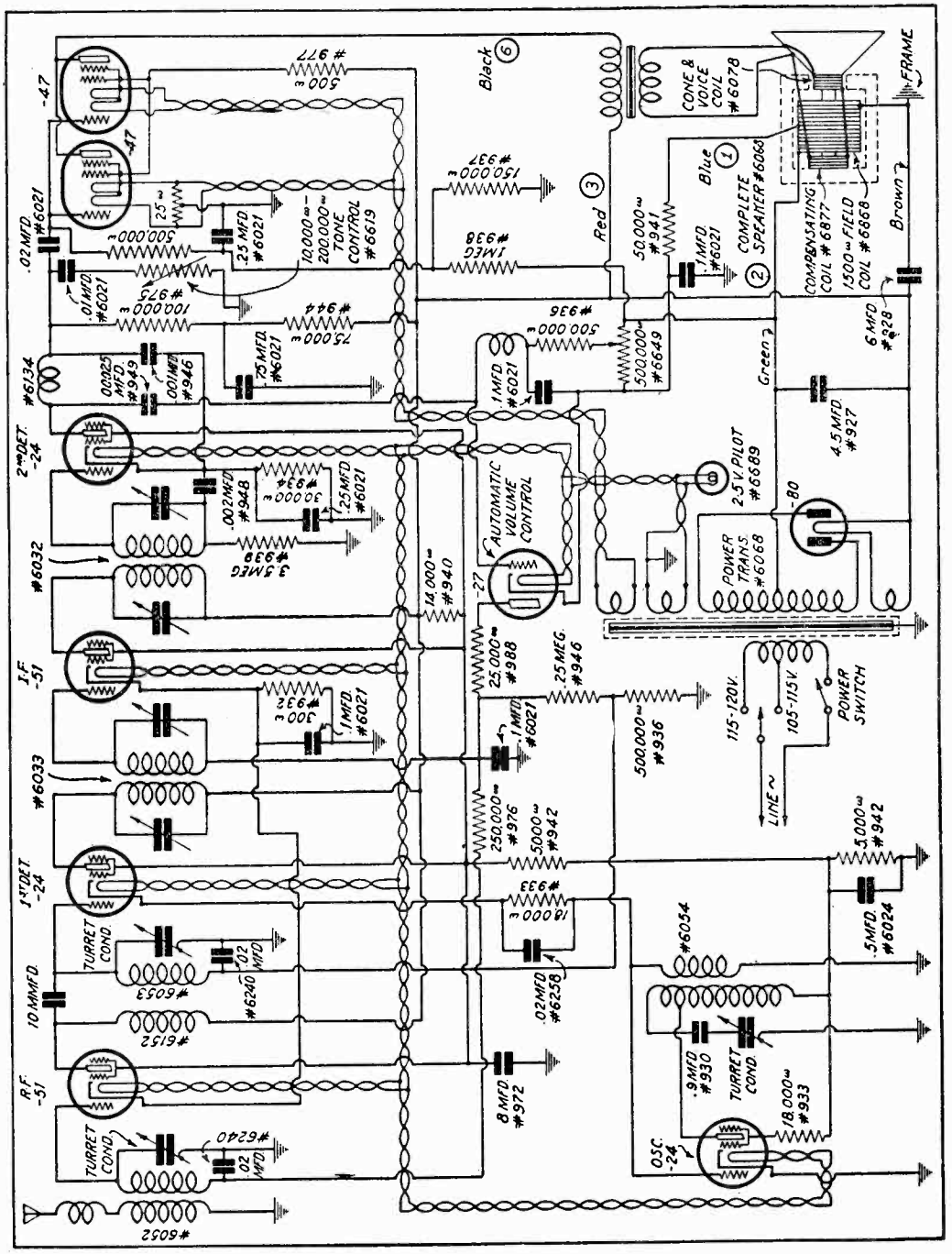
TUBE SO. IN ORDER TESTED	TYPE OF TUBE	POSITION OF TUBE IN SET	METER READINGS WITH JEWELL TEST PLUG IN SOCKET OF SET									
			OPERATING VOLTAGES					MILLIAMPERES				
			FILAMENT OR HEATER	PLATE OR ANODE	CONTROL GRID — SPACE	NORMAL GRID — SCREEN	CATHODE TO HEATER	SCREEN G. M. TO PLATE	PLATE R. M. TO PLATE	TUBE TEST	PLATE CURRENT CHANGE	
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	365	-	-	-	40	40			
8												
9												

Models Brunswicks 15, 22, 32, 42 (1930)

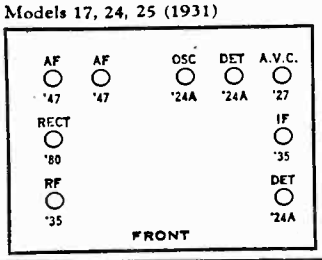


MODEL 17,24,25 AC
Schematic

BRUNSWICK RADIO CORPORATION



Models 17, 24, 25 (1931)



IF PEAK 175 KC

BUSH & LANE PIANO COMPANY

MODEL 10
Voltage and
Service Notes

Line Voltage 112—Set on 120 Volt Tap

TUBE NO. IN ORDER	TYPE OF TUBE	POSITION OF TUBE 1 ST. 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 (CONTROL GRID)	CATHODE - HEATER VOLTS	NORMAL PLATE M.A.	PLATE M.A. GRID TEST	PLATE CHANGE M.A.	SCREEN GRID VOLTS
1	227	1st RF	2.45	130	2.37	118	8	8	5.8	6.8	3	
2	227	2nd RF	2.45	130	2.37	118	8	8	5.8	6.8	3	
3	227	3rd RF	2.45	130	2.37	118	8	8	5.8	6.8	3	
4	227	Det.	2.45	136	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)

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.

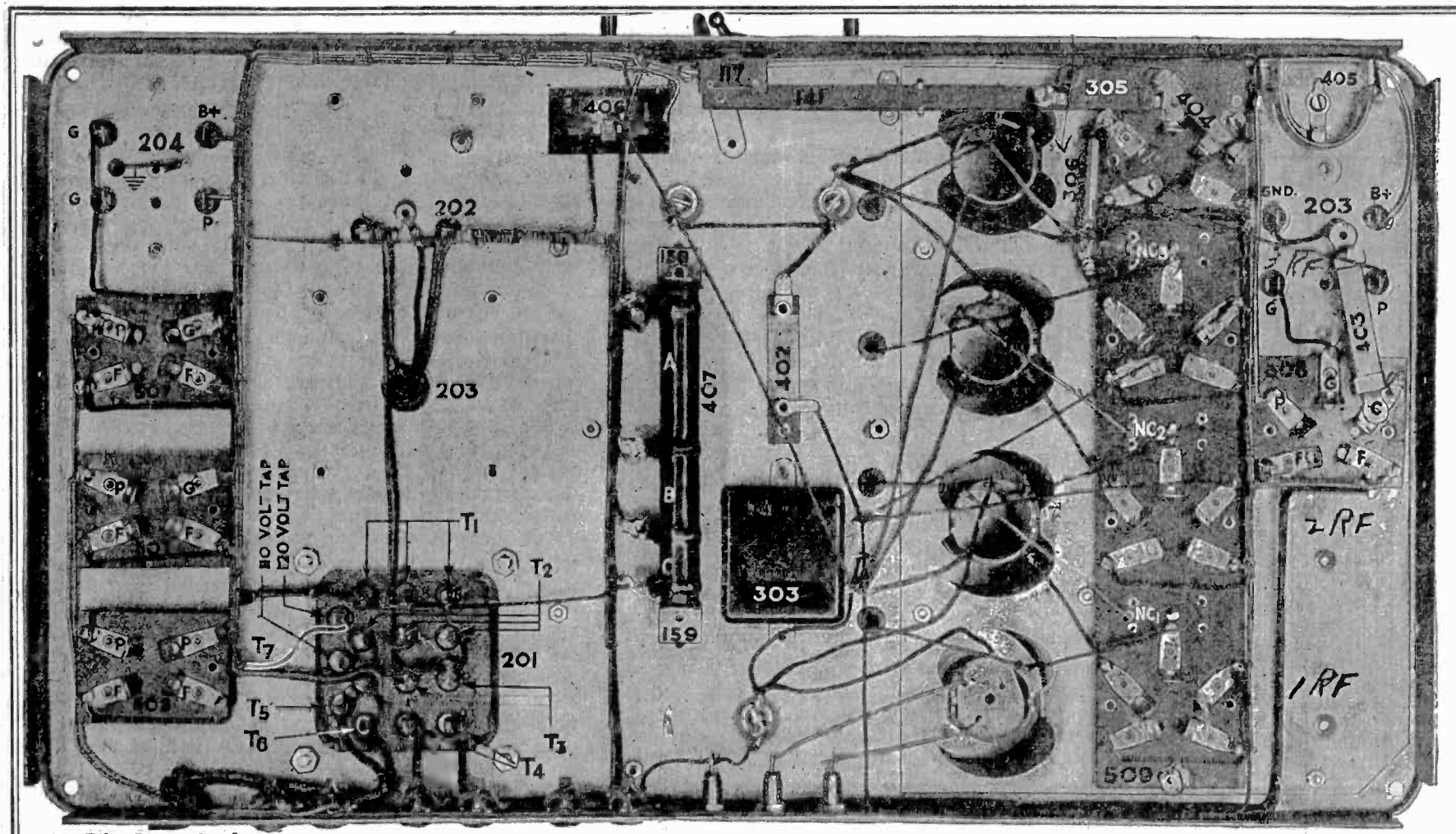
A check for resonance with receiver tuning condenser plates nearly full "in" and nearly full "out" is sufficient.

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.

MODEL 10
Chassis

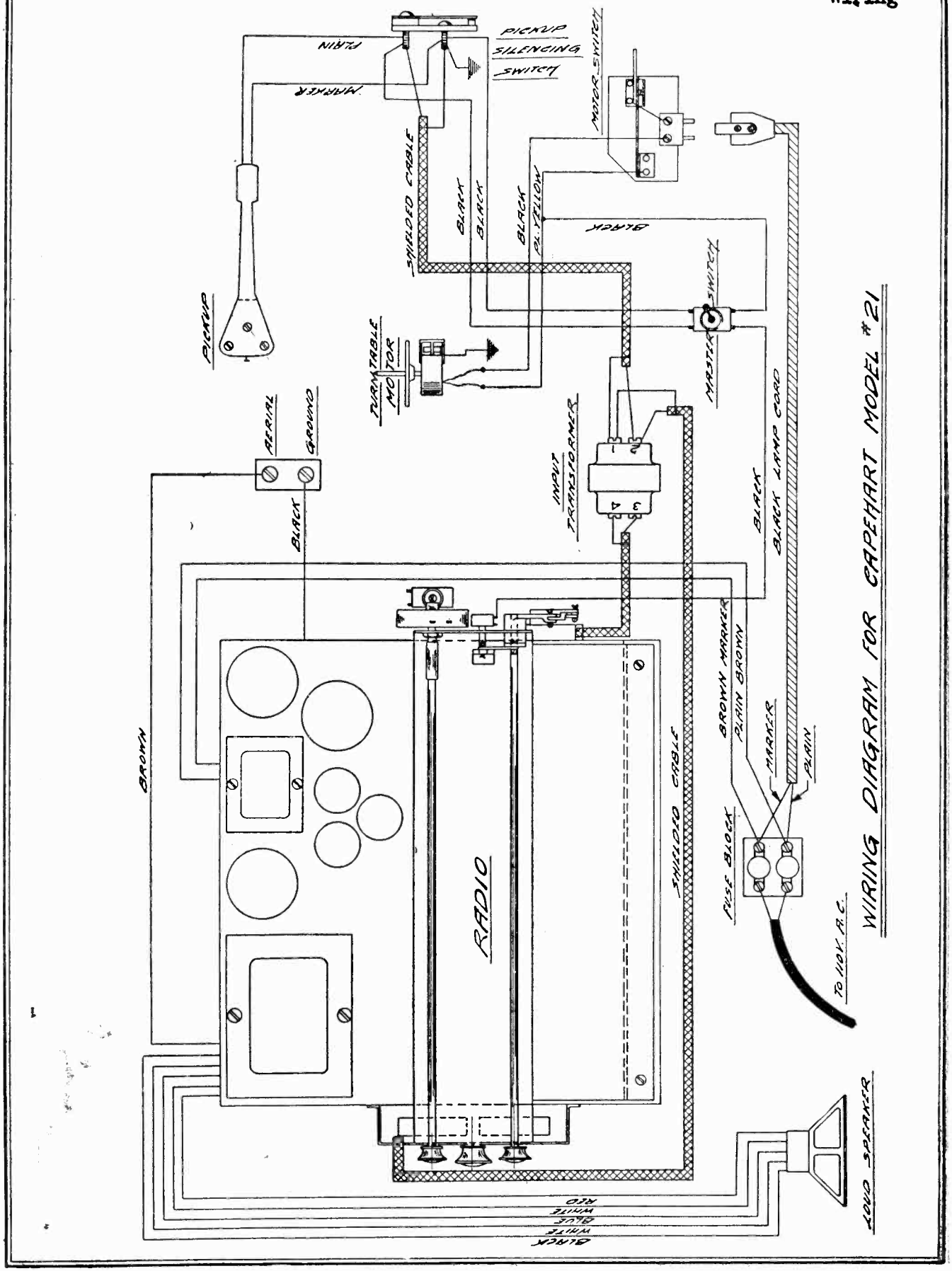
BUSH & LANE PIANO COMPANY



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 audid 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

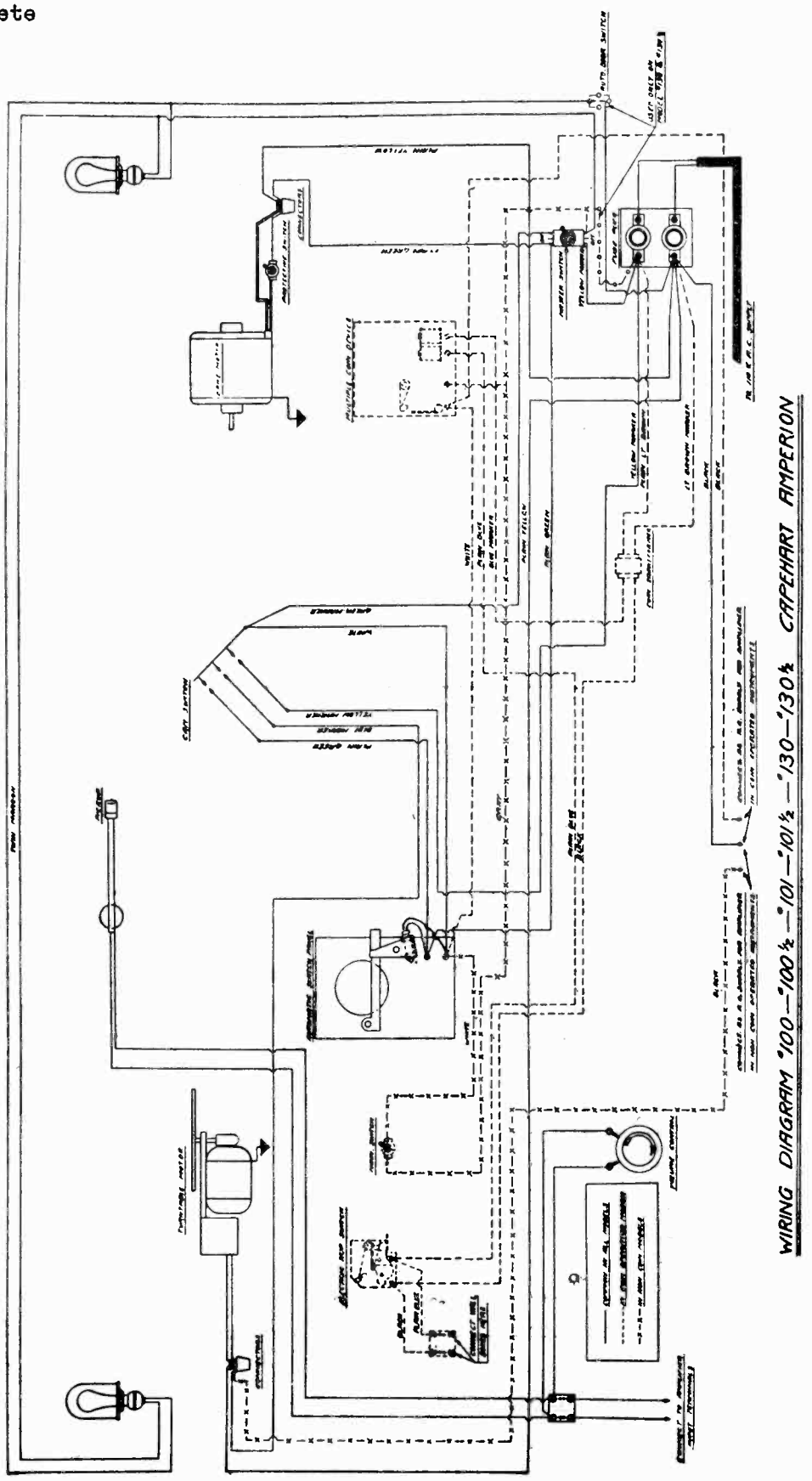
MODEL 21
Cabinet
Wiring



WIRING DIAGRAM FOR CAPEHART MODEL #21

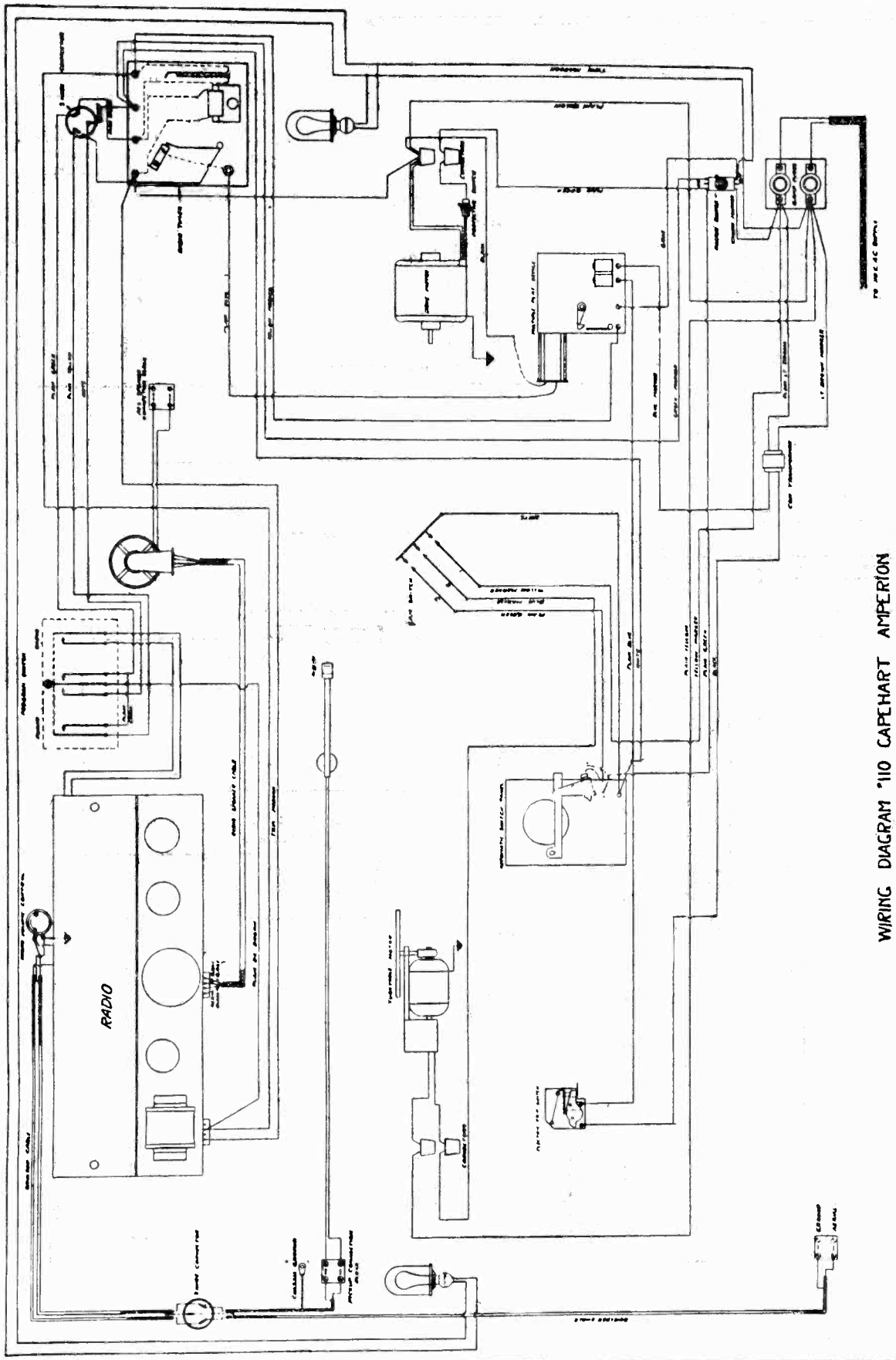
MODEL 100, 100½, 101, 101½, 130, 130½ Complete Wiring

CAPEHART CORPORATION



CAPEHART CORPORATION

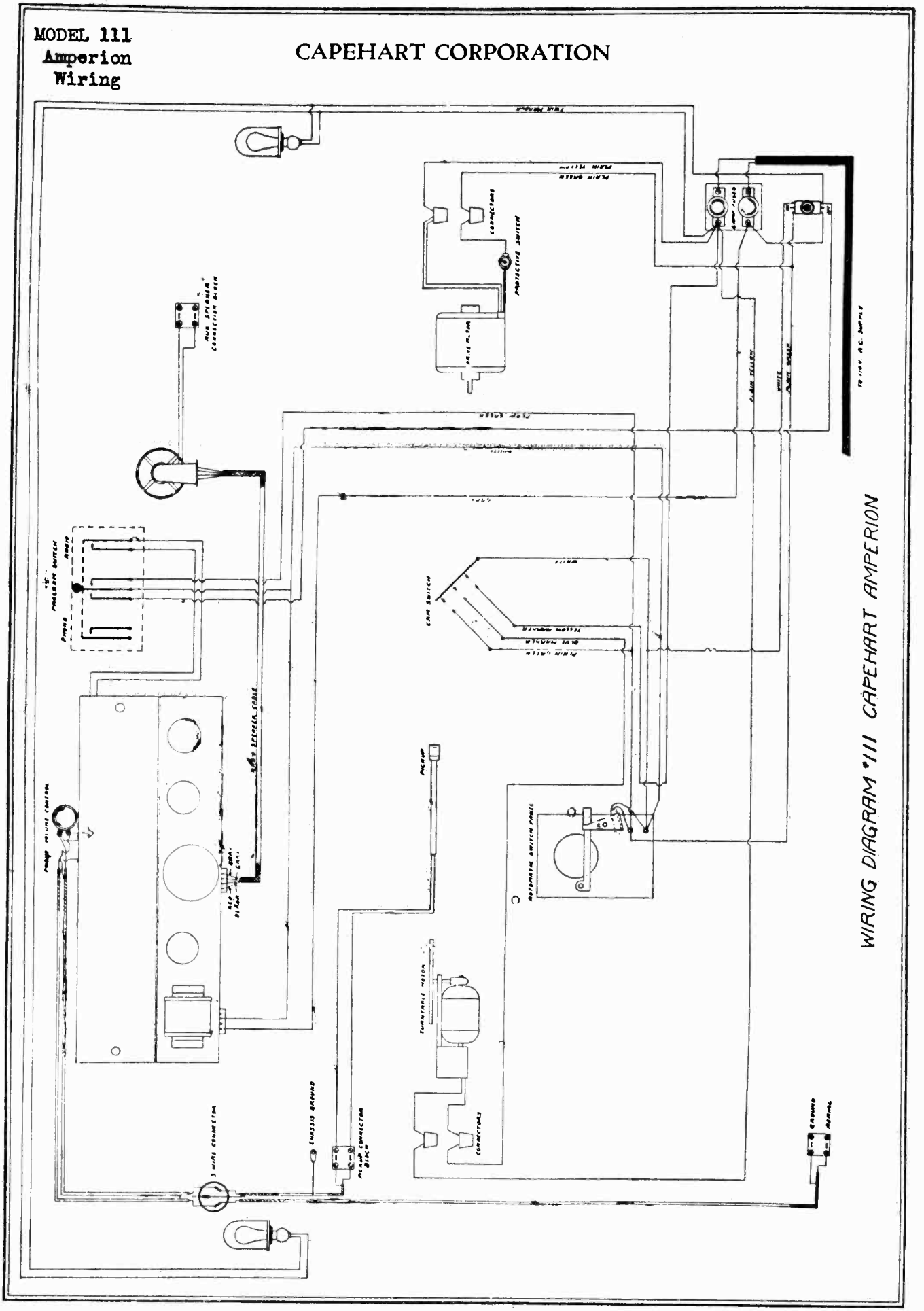
MODEL 110
Amperion
Wiring



WIRING DIAGRAM '110 CAPEHART AMPERION

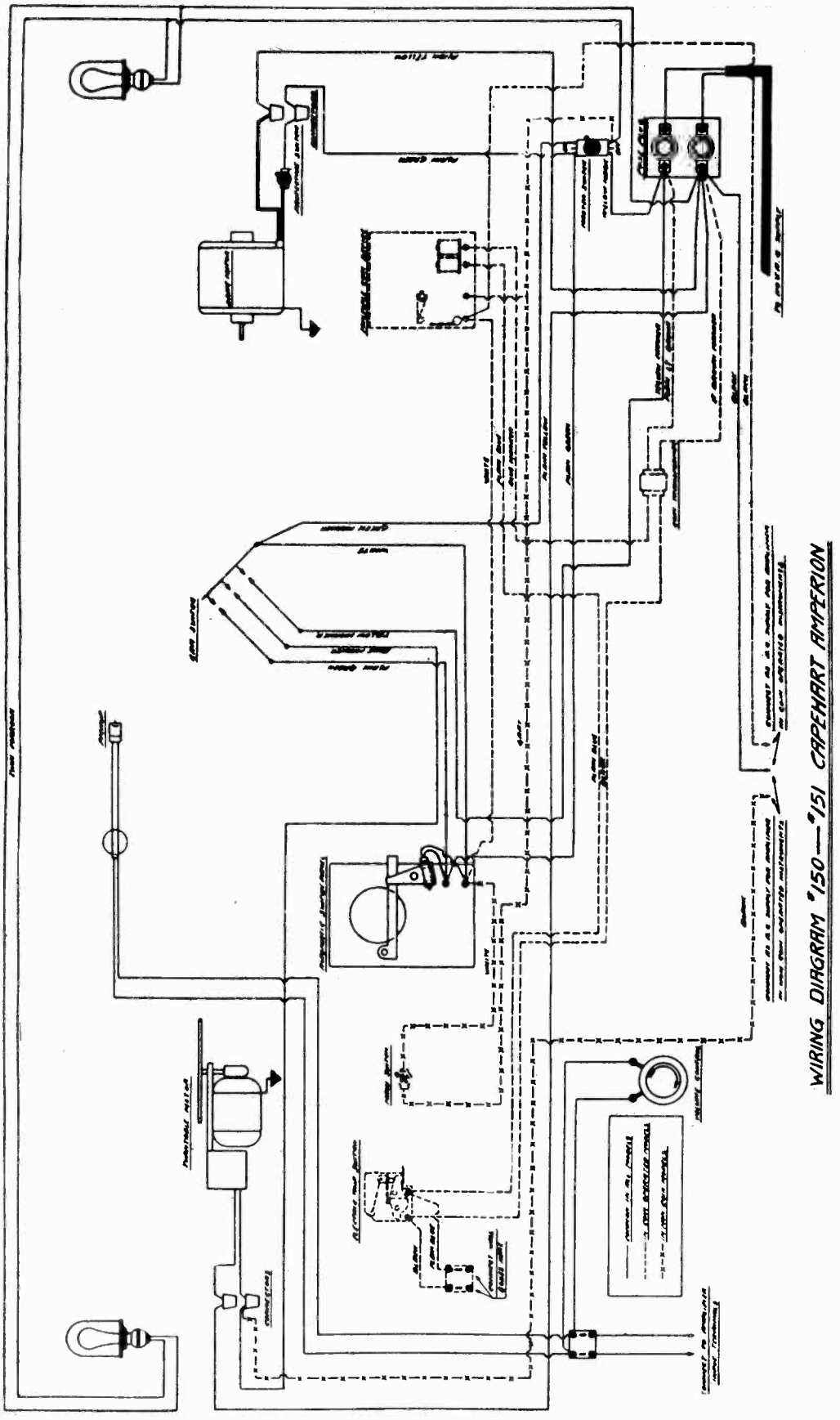
MODEL 111
Amperion
Wiring

CAPEHART CORPORATION



CAPEHART CORPORATION

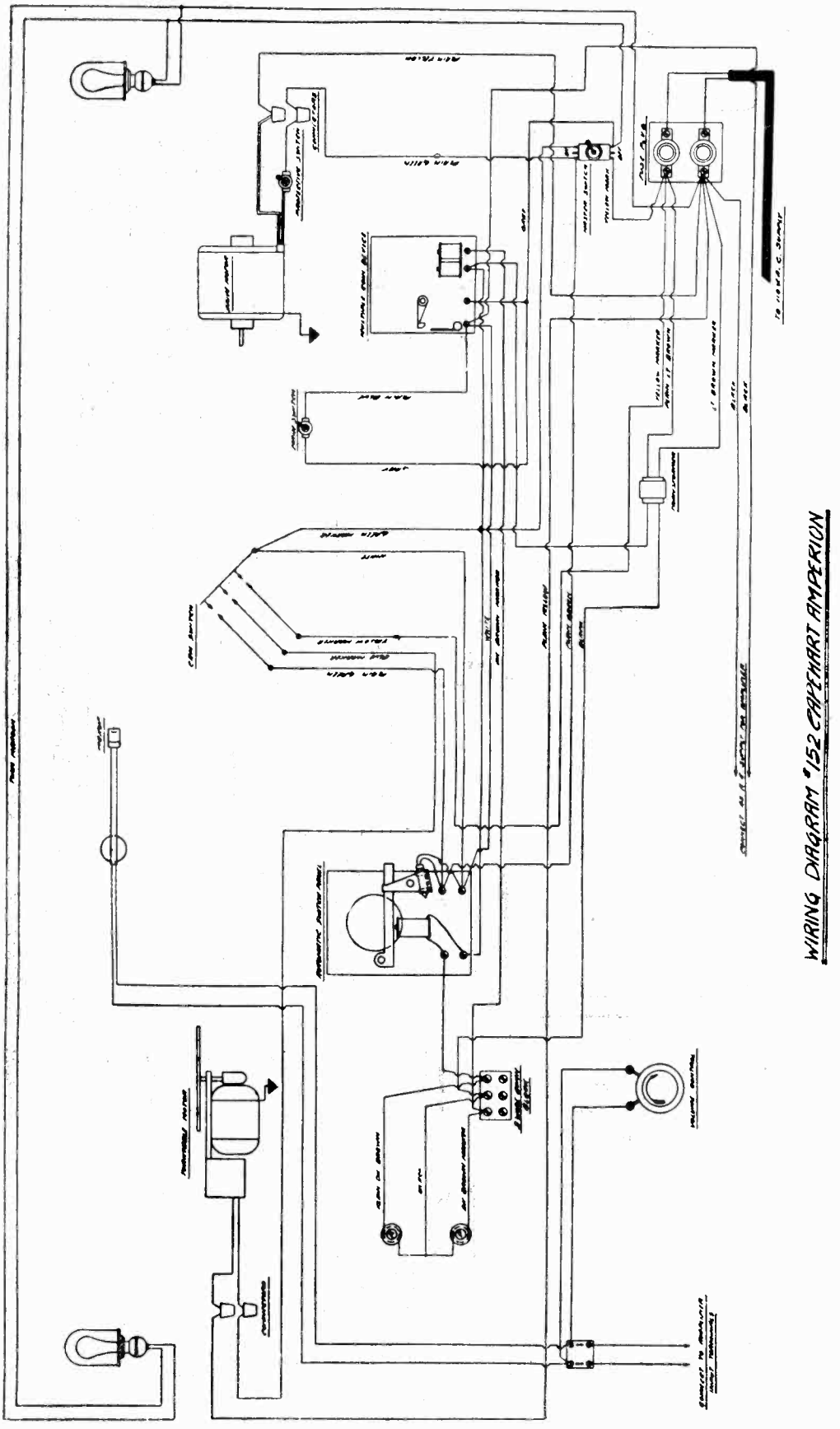
MODEL 150,151
Amperion
Wiring



WIRING DIAGRAM '150—'151 CAPEHART AMPERION

MODEL 152
Amperion
Wiring

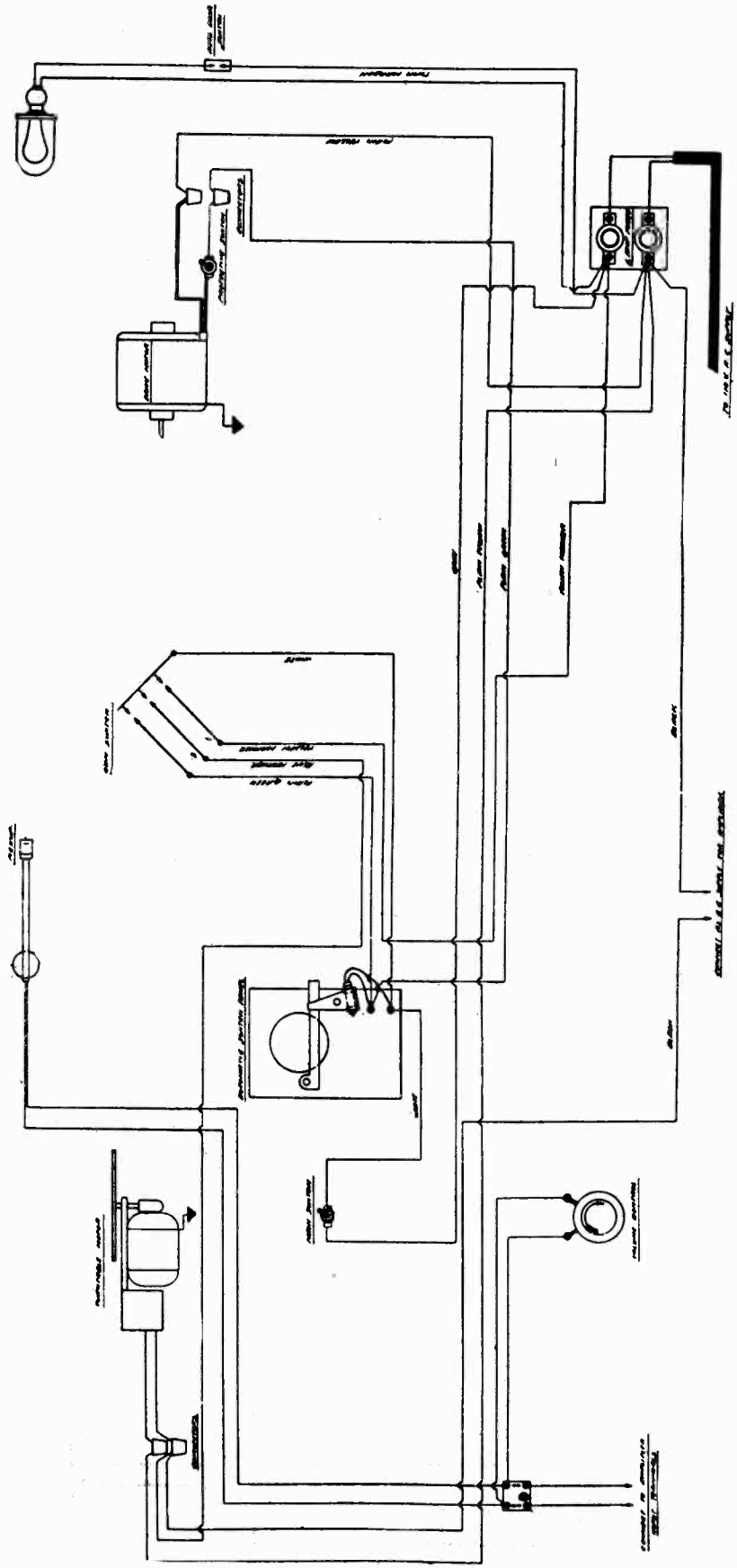
CAPEHART CORPORATION



WIRING DIAGRAM #152 CAPEHART AMPERION

CAPEHART CORPORATION

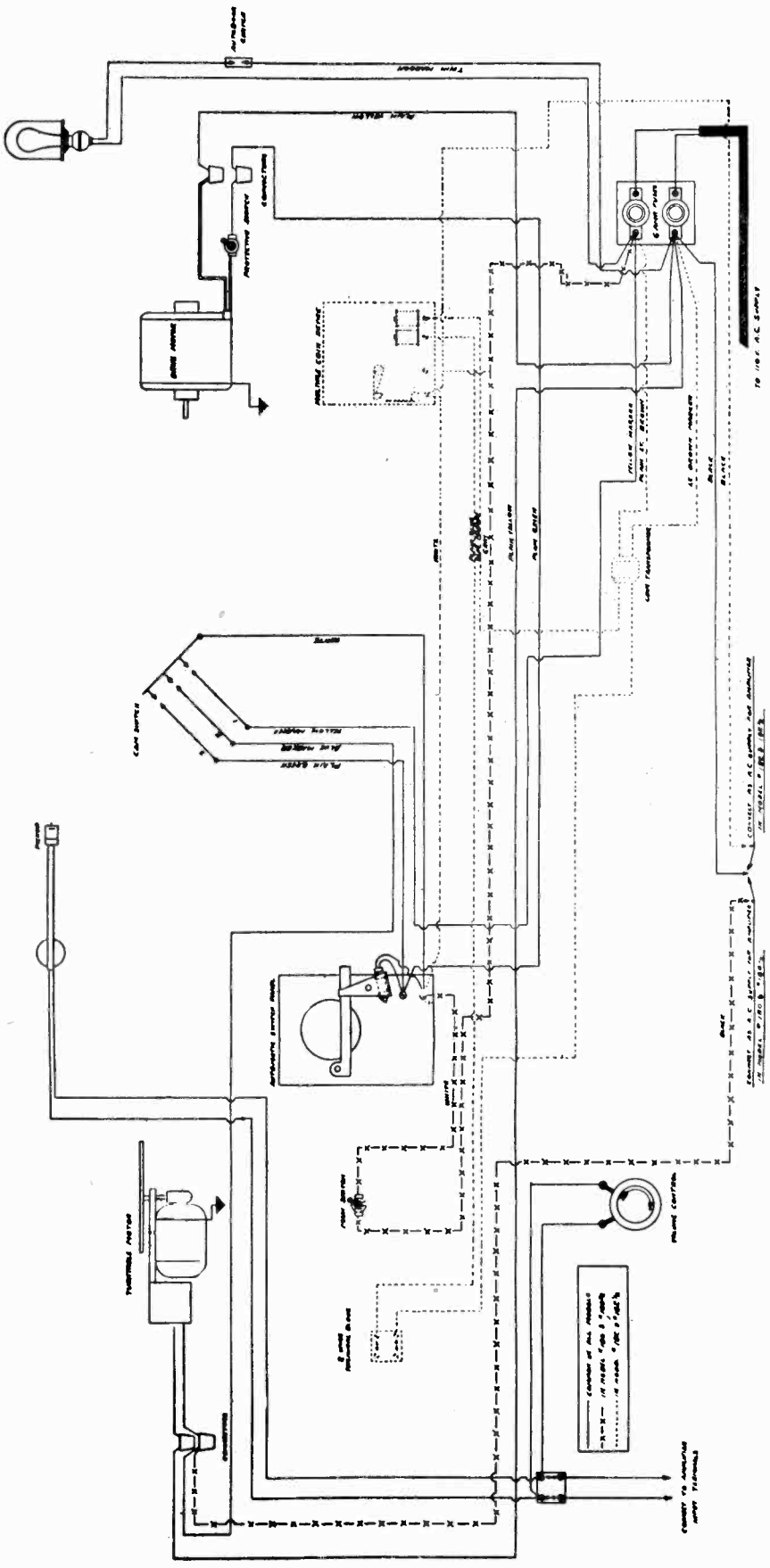
MODEL 170
Amperion
Wiring



WIRING DIAGRAM "170 CAPEHART AMPERION

MODEL 180, 180½, 182, 182½ Amperion Wiring

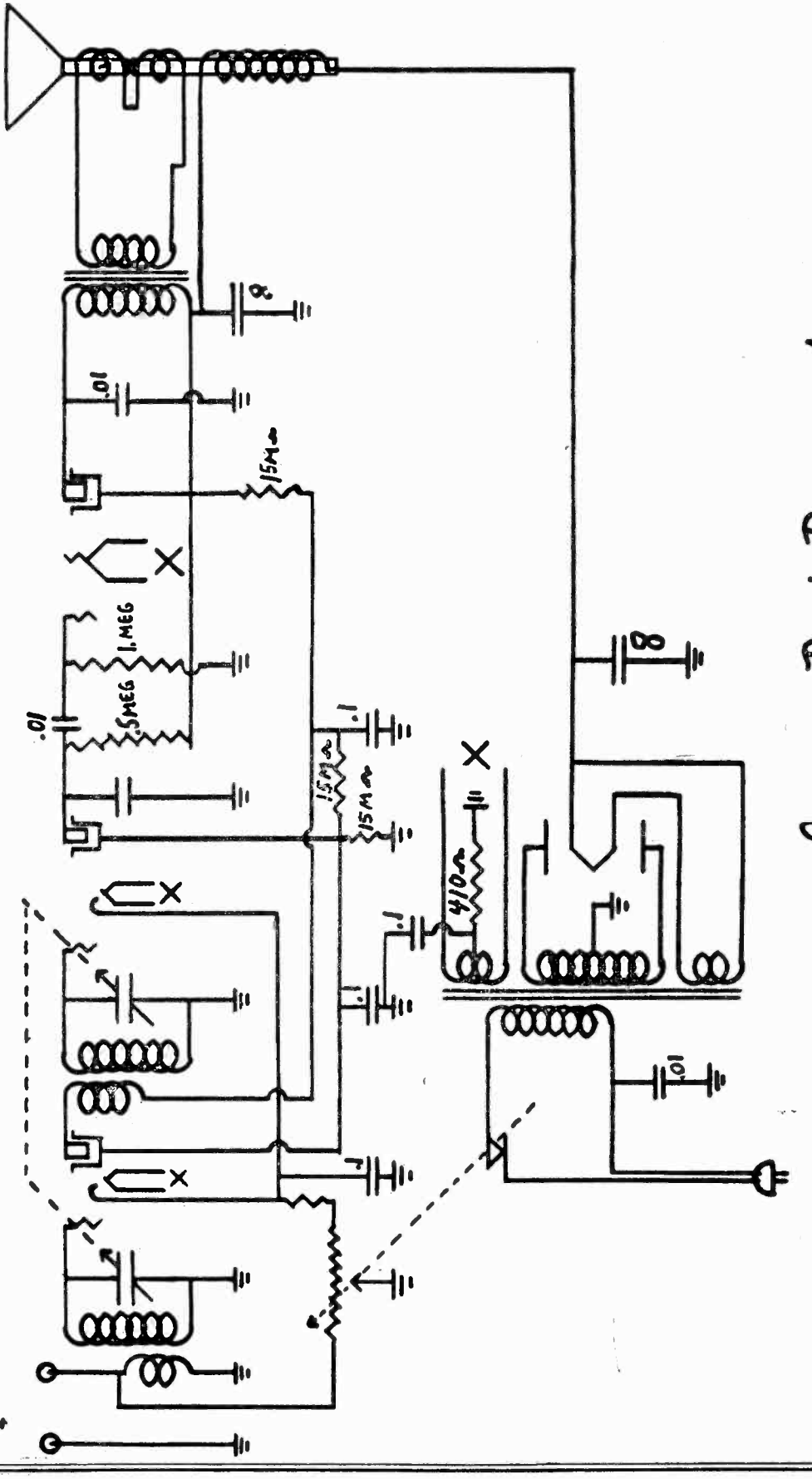
CAPEHART CORPORATION



WIRING DIAGRAM "180 — "180½ — "182 — "182½ CAPEHART AMPERION

MODEL 4-47
Schematic

CENTURY RADIO PRODUCTS CO.



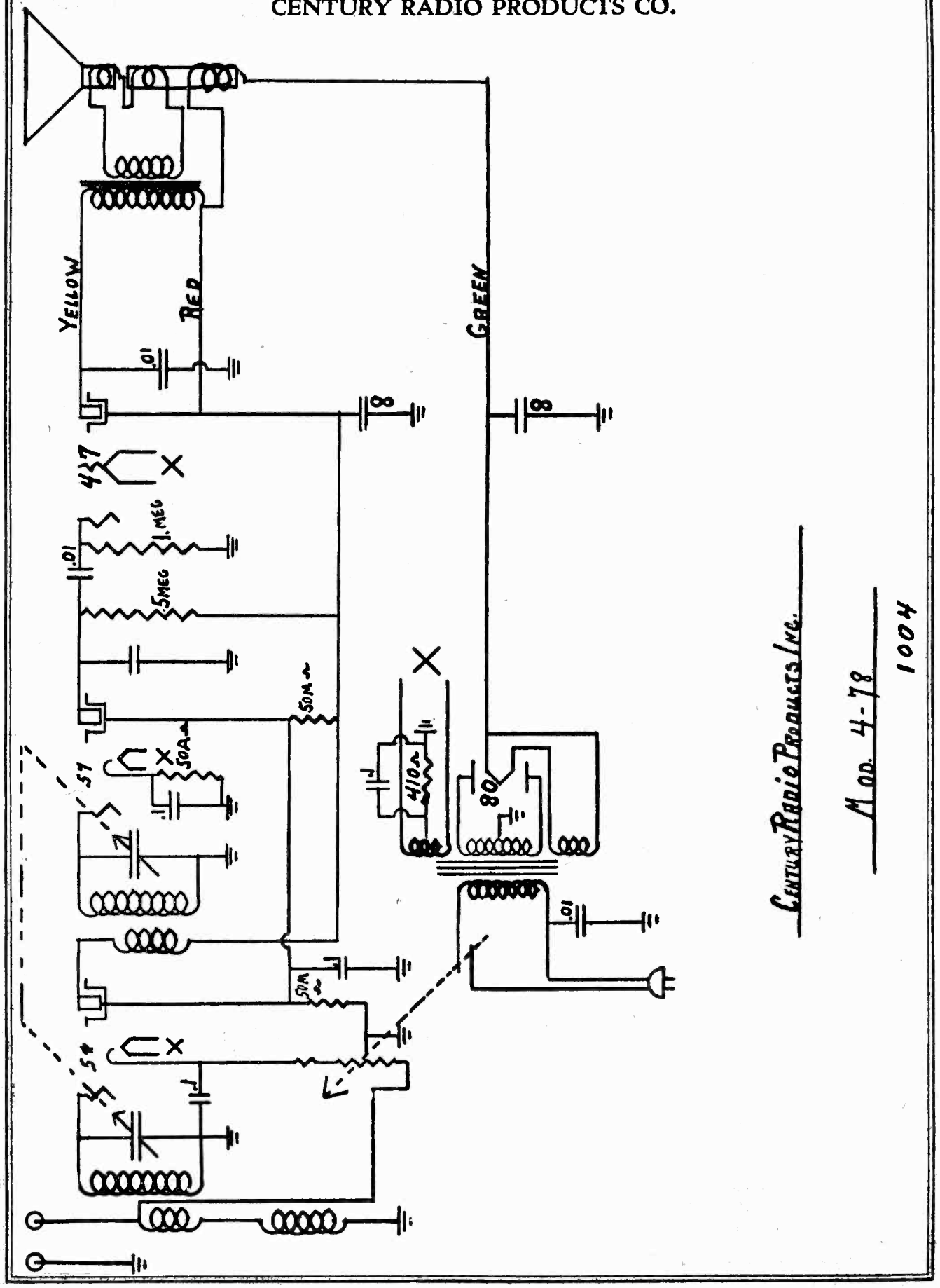
CENTURY RADIO PRODUCTS INC.

MODEL 4-47

1003

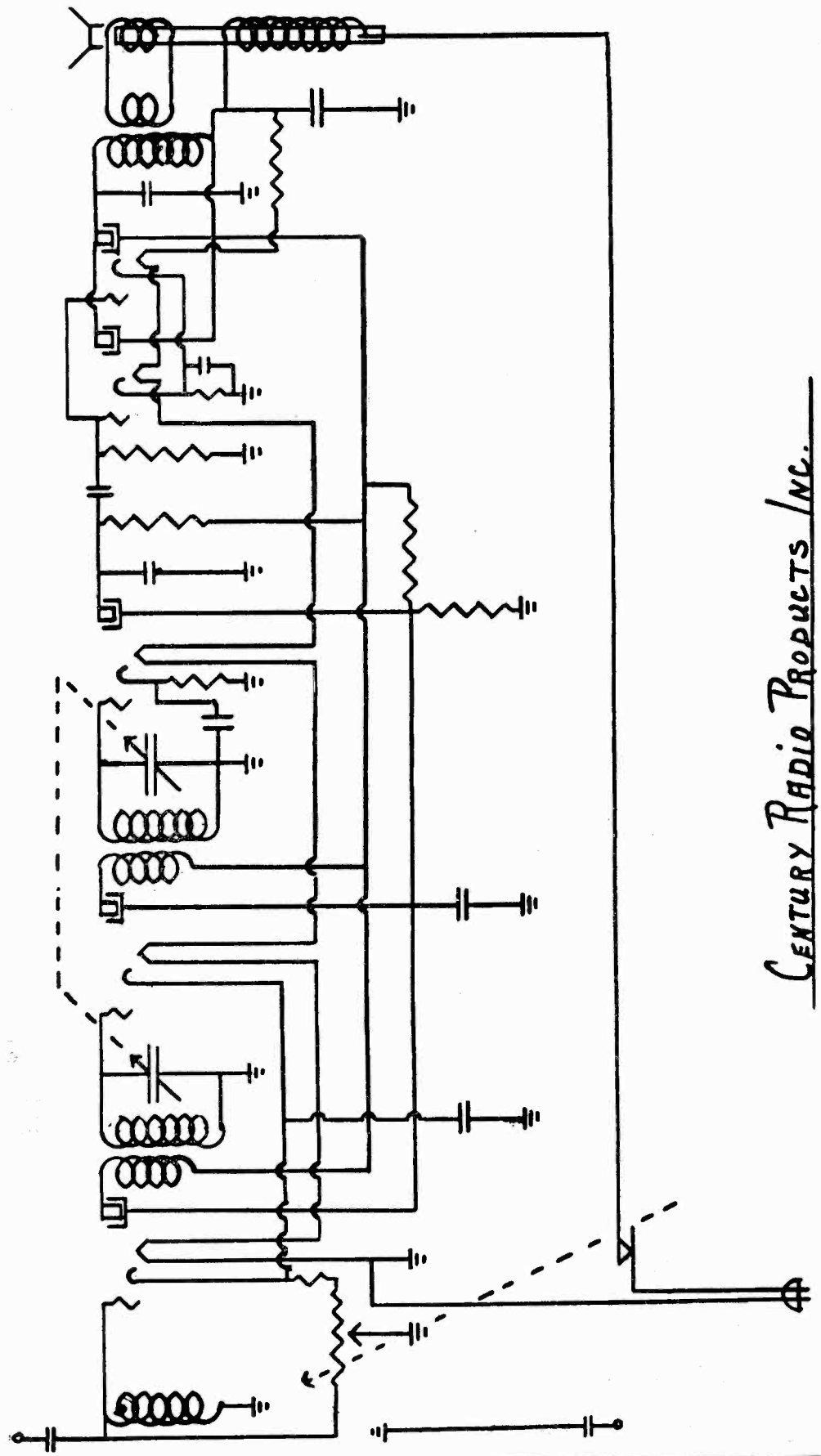
MODEL 4-78

CENTURY RADIO PRODUCTS CO.



MODEL 5-38

CENTURY RADIO PRODUCTS CO.



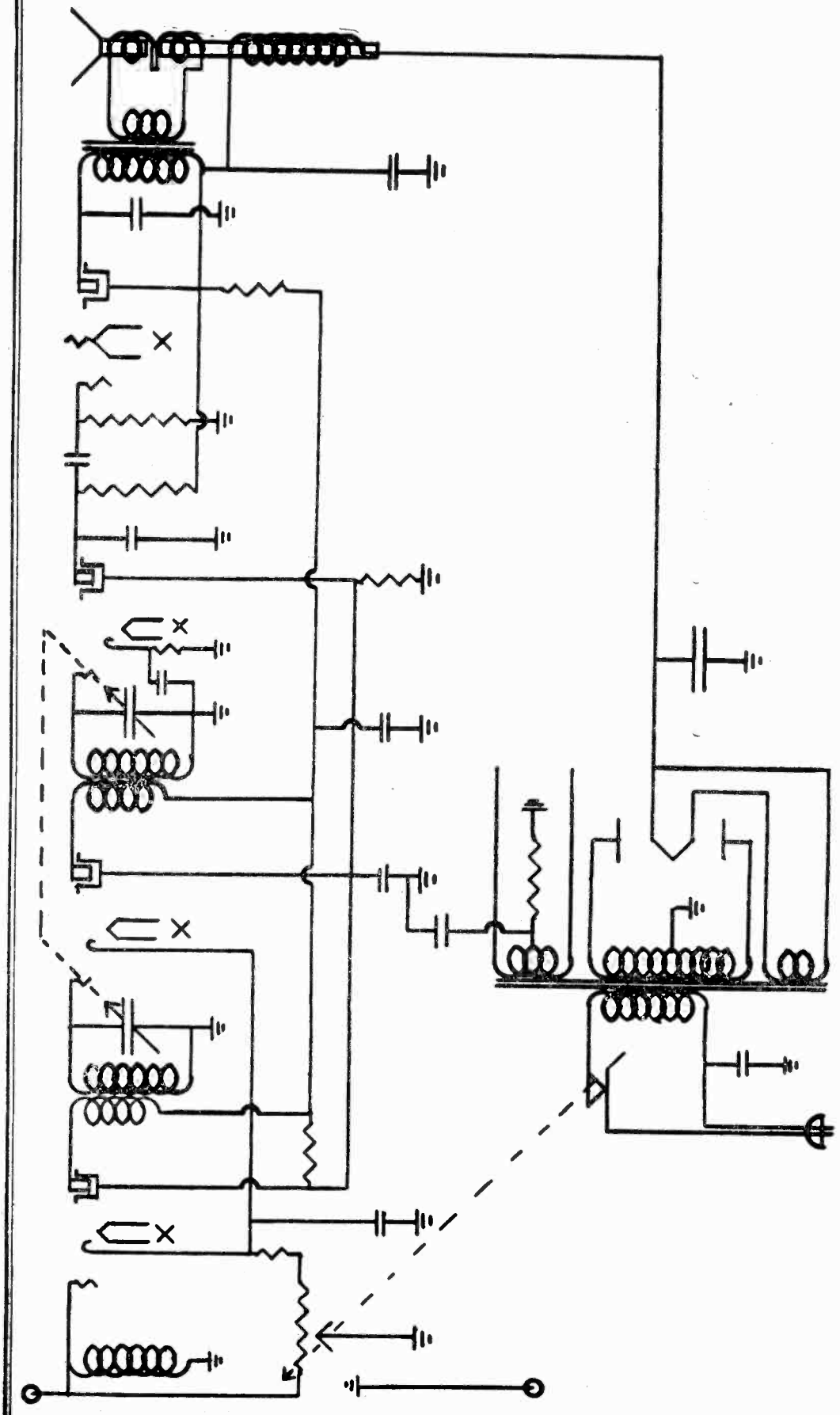
CENTURY RADIO PRODUCTS INC.

MODEL 5-38 - D.C. 110V.

1006

MODEL 5-47

CENTURY RADIO PRODUCTS CO.



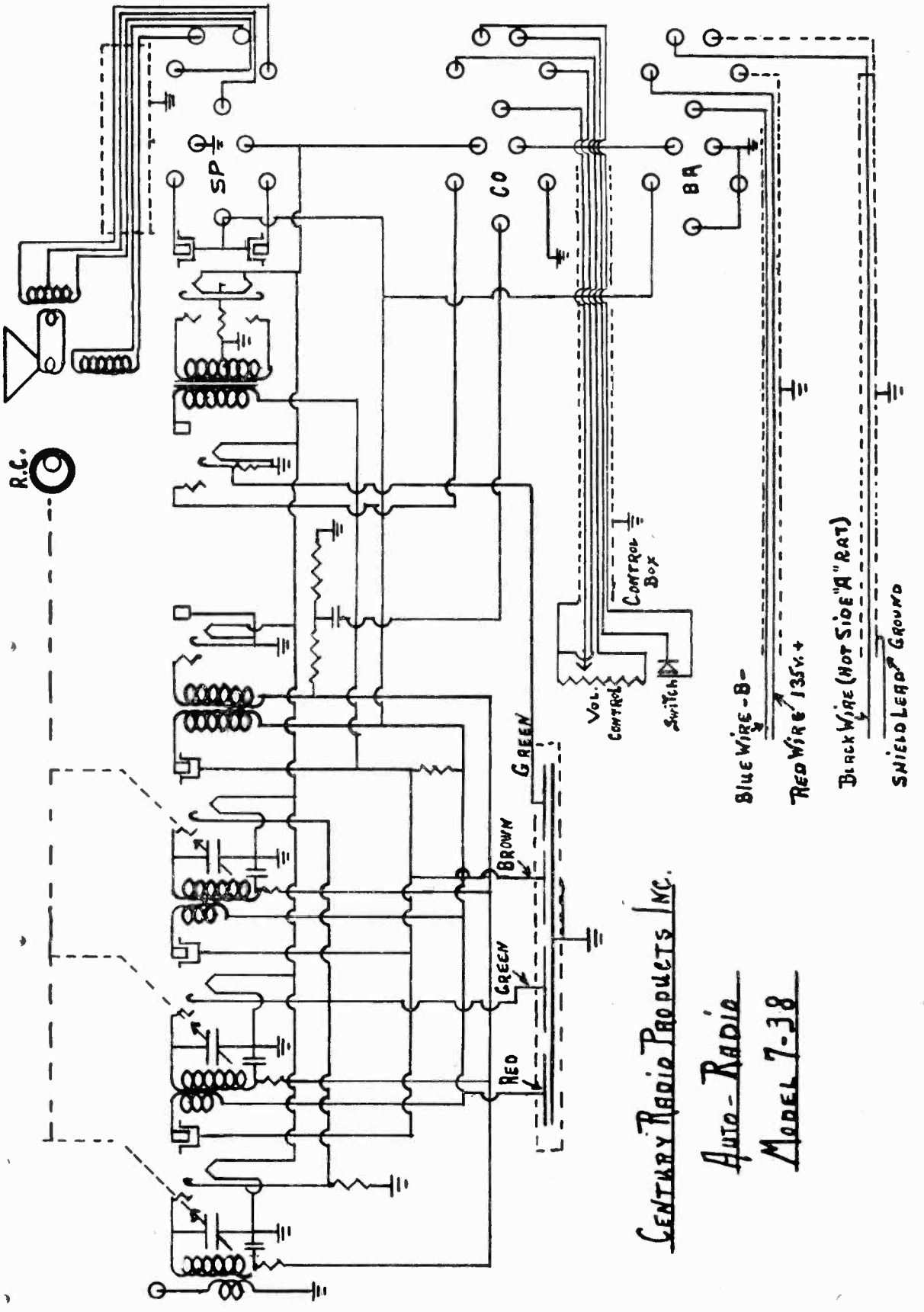
CENTURY RADIO PRODUCTS INC.

MODEL 5-47

100S

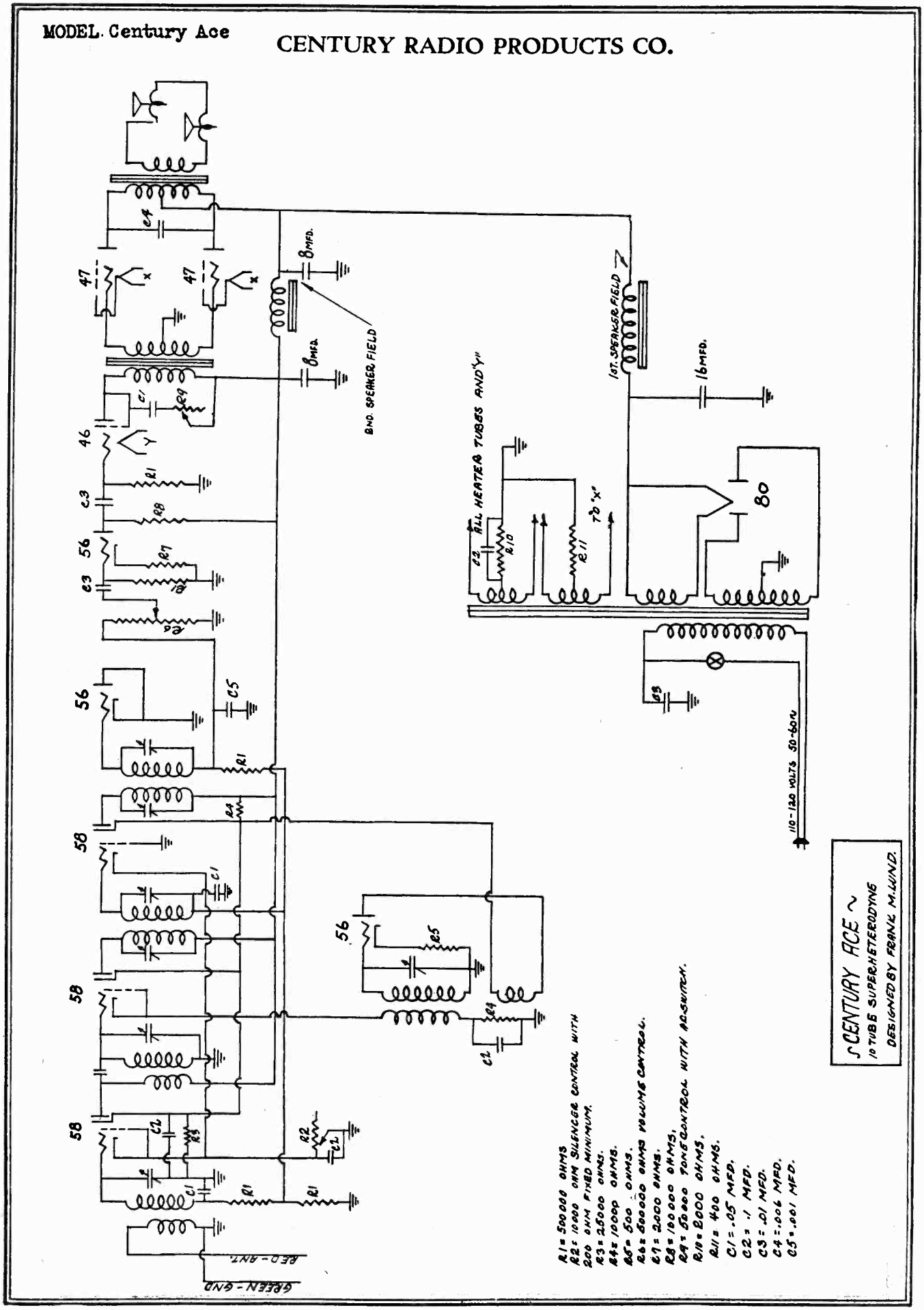
CENTURY RADIO PRODUCTS CO.

MODEL 7-38
Auto Radio



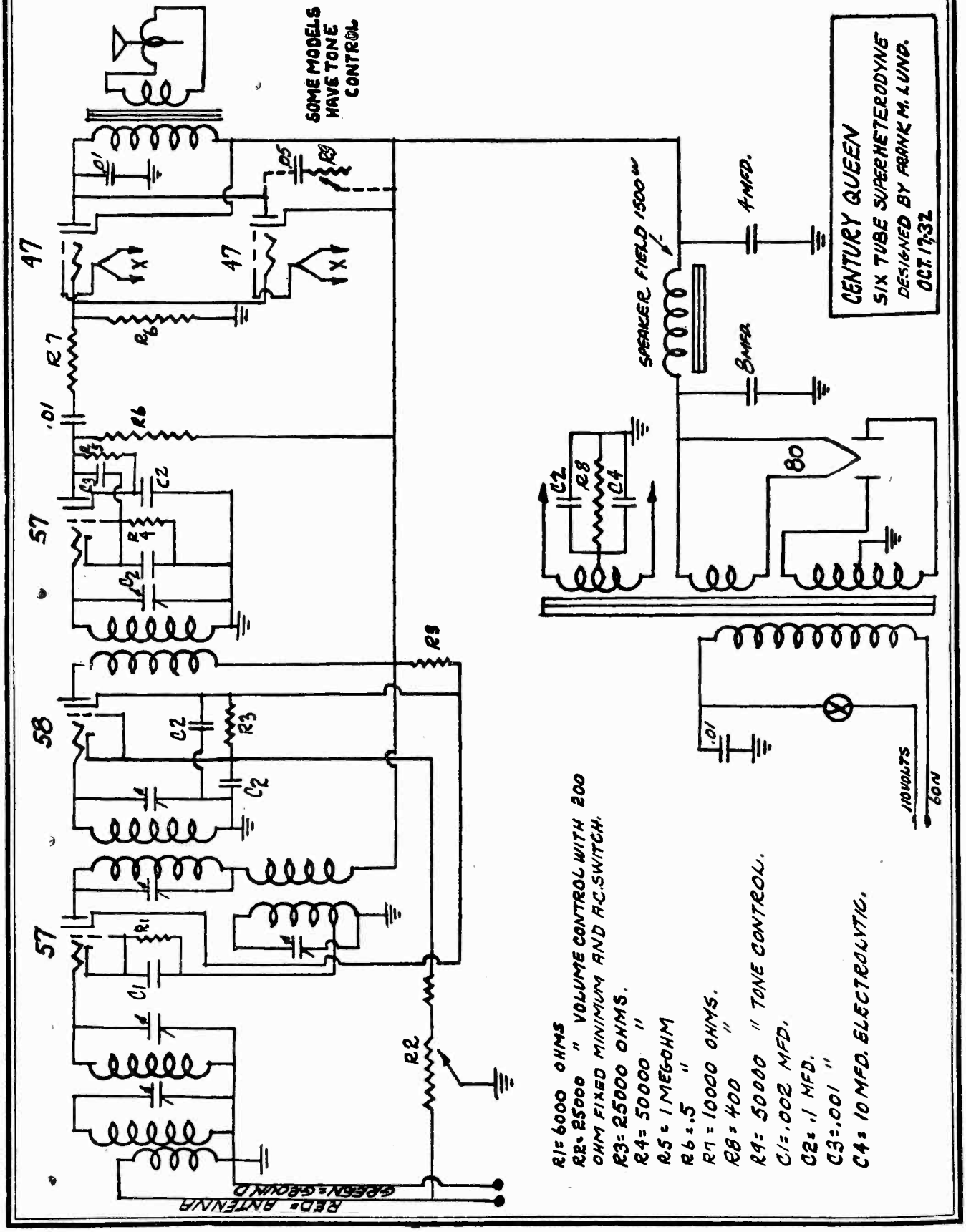
MODEL. Century Ace

CENTURY RADIO PRODUCTS CO.



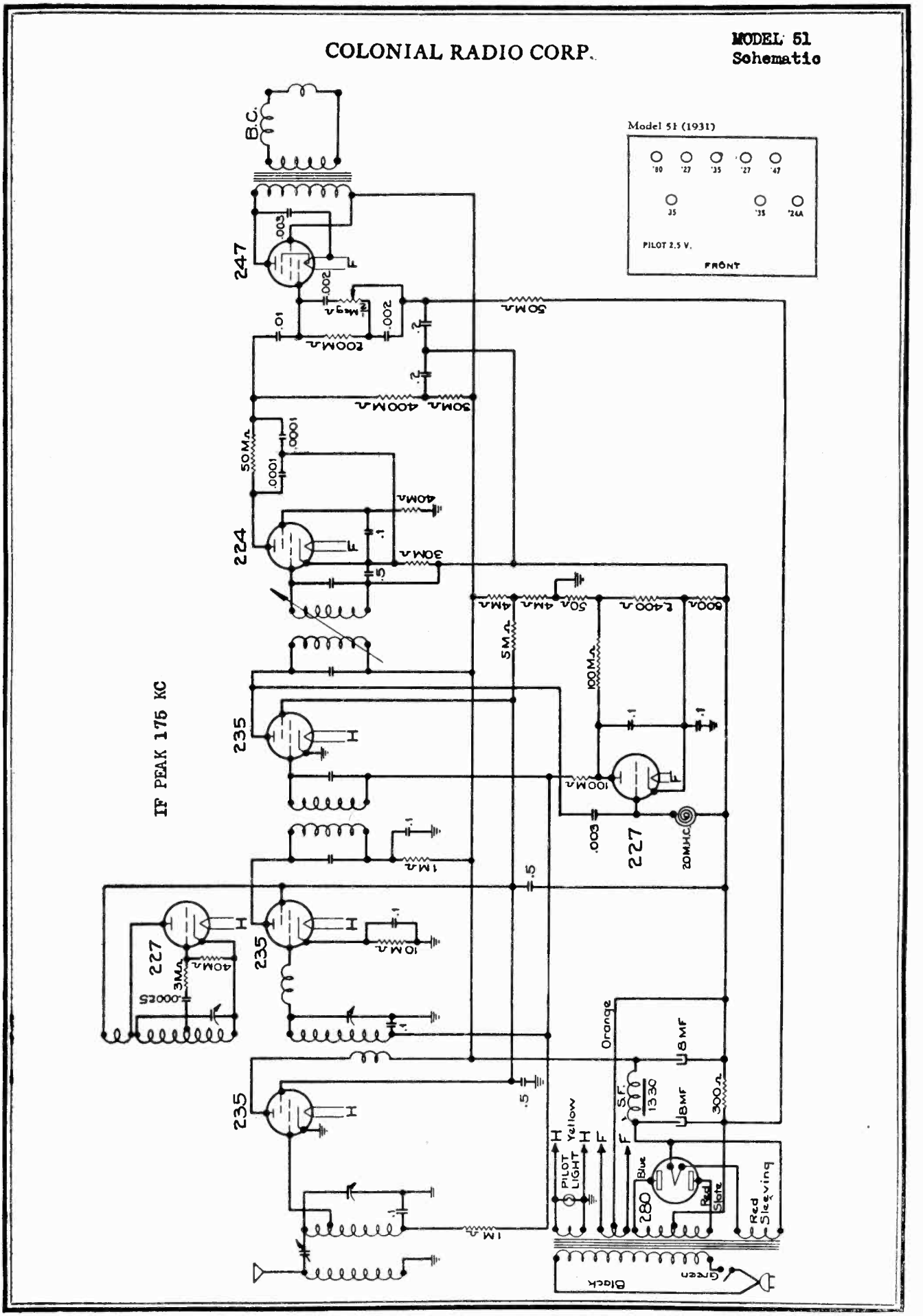
MODEL Century Queen

CENTURY RADIO PRODUCTS CO.



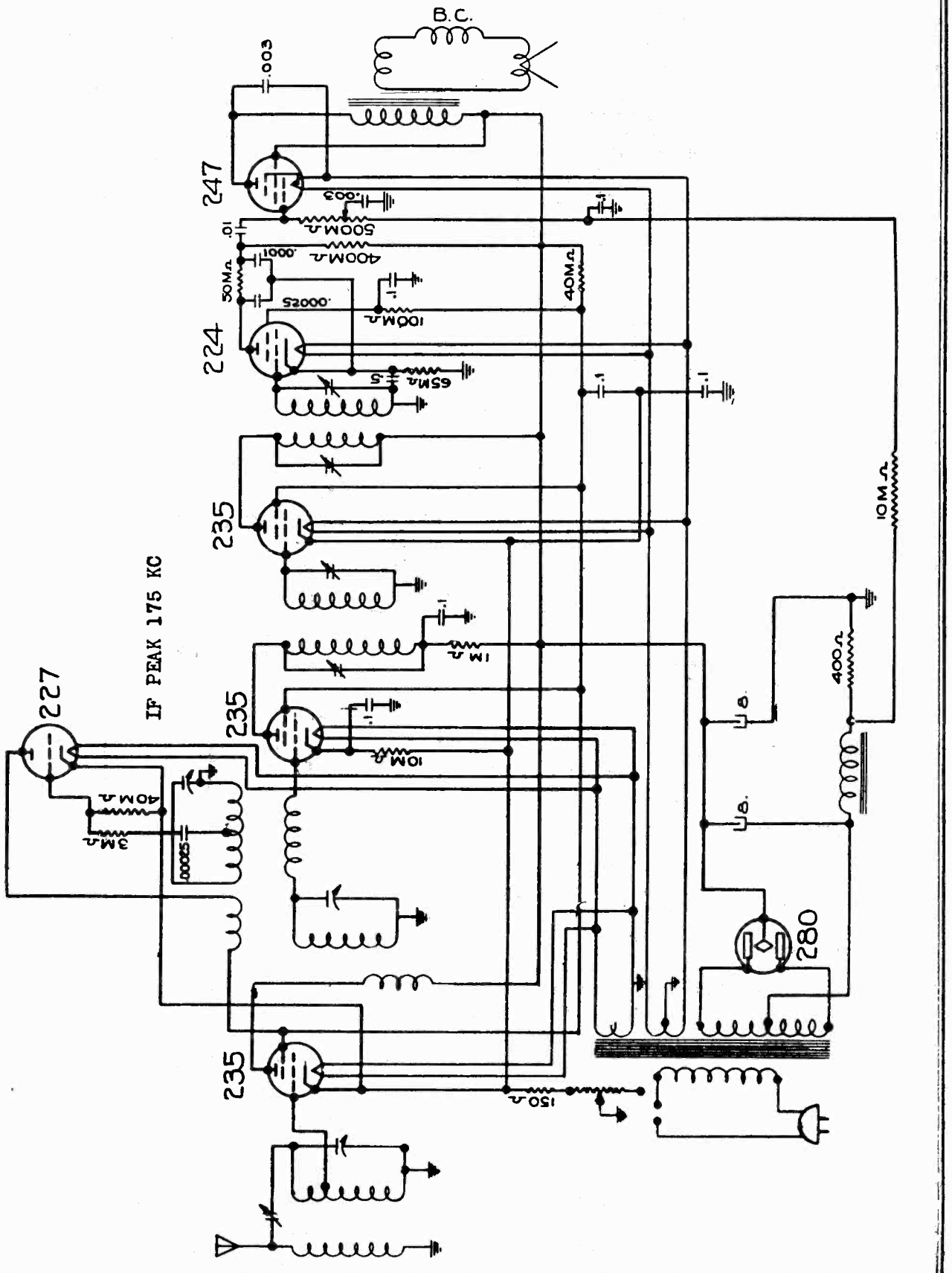
COLONIAL RADIO CORP.

MODEL 51
Schematic



MODEL 52
Schematic

COLONIAL RADIO CORP.



MODEL 51
MODEL 52
Voltage

COLONIAL RADIO CORP.

MODEL 51 - 60 CYCLE

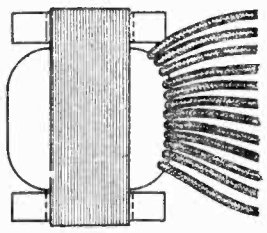
	Trans. 235	Osc. 227	IF 235	RF 235	247 Output	AVC 227	280 DC	Det 224
PLATE VOLTAGE	160	55	160	160	242	48	370	80
AVERAGE PLATE CURRENT MA	1.	-	5.	5.	26.	-	-	.2
SCREEN VOLTAGE	58	-	58	58	250	-	-	40
AVERAGE SCREEN CURRENT MA	.2	-	1.	1.	7.	-	-	.15
GRID VOLTAGE	10	-	1.5	1.5	18	-	-	6
FILAMENT VOLTAGE	2.4	2.4	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

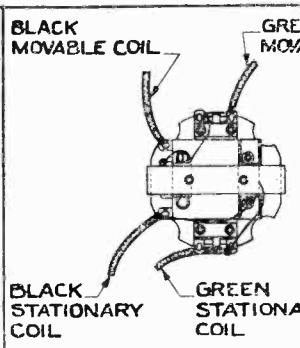
	Trans. 235	Osc. 227	IF 235	RF 235	Det 224	Pentode 247	280
PLATE VOLTAGE	230	55	230	230	75	220	360
AVERAGE PLATE CURRENT MA	1.	3.	5.	5.	.2	26.	
SCREEN VOLTAGE	55		55	55	38	230	
AVERAGE SCREEN CURRENT MA	.2		1.	1.	.15	7.	
GRID VOLTAGE	10		1.5	1.5	5	17	
FILAMENT VOLTAGE	2.47	2.52	2.54	2.56	2.5	2.49	5

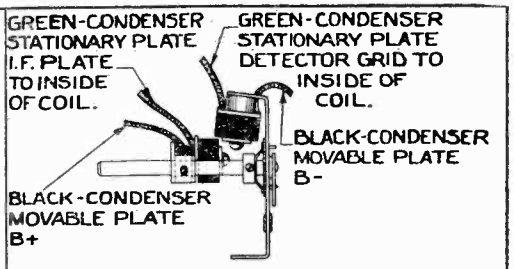
SPEAKER FIELD 115 volts LINE VOLTAGE 115
TOTAL PLATE CURRENT 40 ma. TOTAL WATTS 70



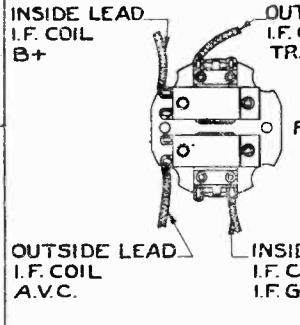
RED-FIL.RECT. TUBE-5V
RED-FIL.RECT. TUBE-5V, +B
GREEN-START PRIM.-115 V
BLACK-FINISH PRIM.-115 V
YELLOW-FIL.R.F. TUBES-2.5V
YELLOW-FIL.R.F. TUBES-2.5V
RED-PLATE-RECT. TUBE
SLATE-CENTER TAP PLATE
BLUE-PLATE-RECT. TUBE
ORANGE-FIL.AUDIO TUBES-2.5V
ORANGE-CENTER TAP-VOLT. DIV.
ORANGE-FIL.AUDIO TUBES-2.5V

POWER TRANSFORMER
R 6422A - 60 CYCLE
R 6424A - 25 CYCLE

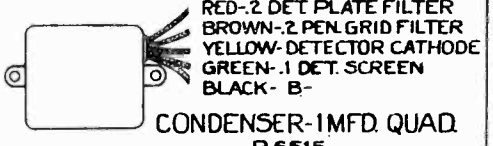




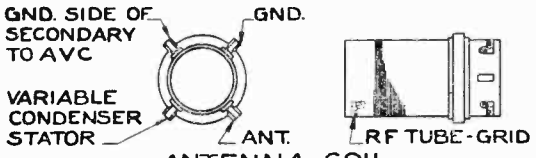
VOLUME CONTROL
R 6401A



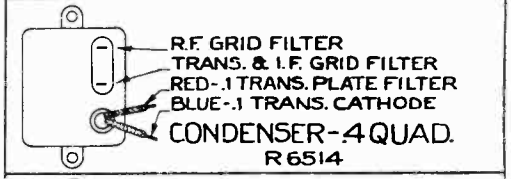
ASSEM. I.F. TRANS. & I.F. TUNING CONDENSERS



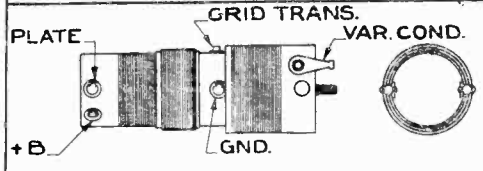
CONDENSER-1 MFD. QUAD.
R 6515



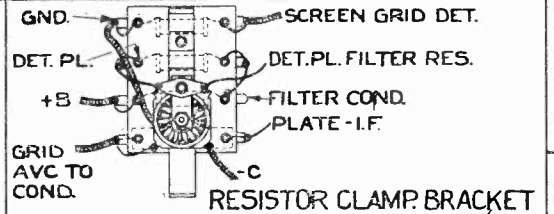
ANTENNA COIL
R 6478A



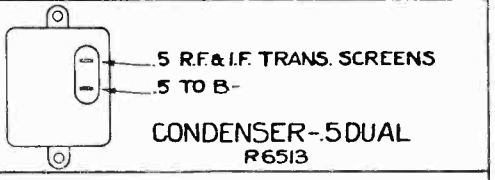
CONDENSER-.4 QUAD.
R 6514



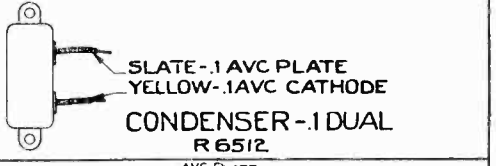
TRANSLATOR COIL
R 6470 B



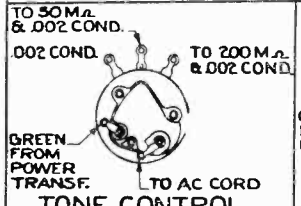
RESISTOR CLAMP BRACKET
R 6443 C



CONDENSER-.5 DUAL
R 6513



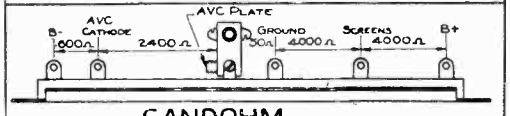
CONDENSER-.1 DUAL
R 6512



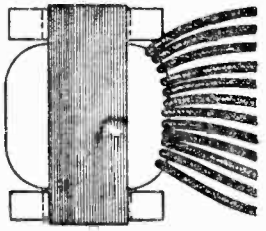
TONE CONTROL
R 6571

ELECT. COND.
(2) 4758 P
BOTH INSULATED

LEAD DETAILS
REPLACEMENT PARTS

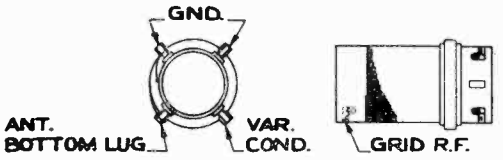


CANDOHM
R 6438A

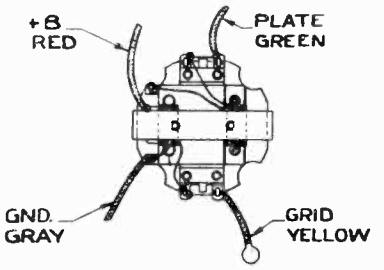


RED-FILAMENT RECT. TUBE 5V, +B
RED-FILAMENT RECT. TUBE 5V
GREEN-START PRIMARY 115V A.C.
BLACK-FINISH PRIMARY 115V A.C.
YELLOW-FILAMENT RF TUBES 2.5V
YELLOW-FILAMENT RF TUBES 2.5V
RED-PLATE, RECTIFIER TUBE
SLATE-CENTER TAP TO NEG. B
BLUE-PLATE, RECTIFIER TUBE
ORANGE-FIL. AUDIO TUBES 2.5V
ORANGE-CENTER TAP TO 300Ω
ORANGE-FIL. AUDIO TUBES 2.5V

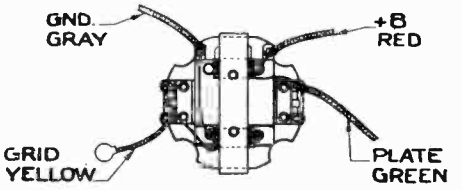
POWER TRANSFORMER
R 6440 A - 60 CYCLE
R 6453 A - 25 CYCLE



ANTENNA COIL
R 6478

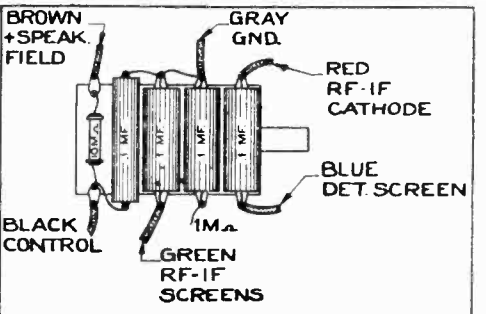


R 6415 A

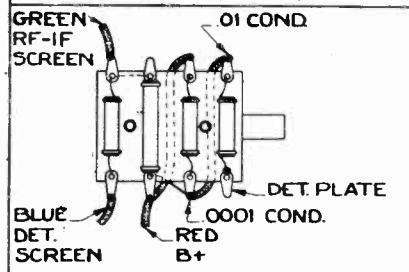


R 6415 B

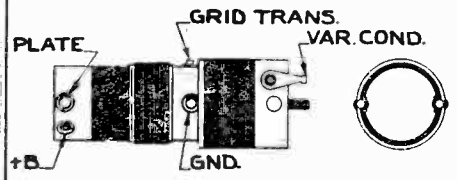
ASSEM. I.F. TRANS. & I.F. TUNING COND.



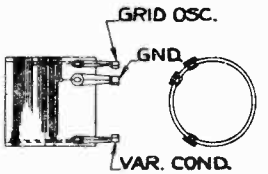
CONDENSERS & RESIST. ASSEM.
R 6443 A



RESISTOR ASSEM.
R 6443 B



TRANSLATOR COIL
R 6470 B



OUTER SECT. TRANS. COIL
R 6471 A

4758 P INSULATED FROM CHASSIS
4758 P GROUNDED TO CHASSIS

ELECTROLYTIC CONDENSERS

LEAD DETAILS
REPLACEMENT PARTS

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.

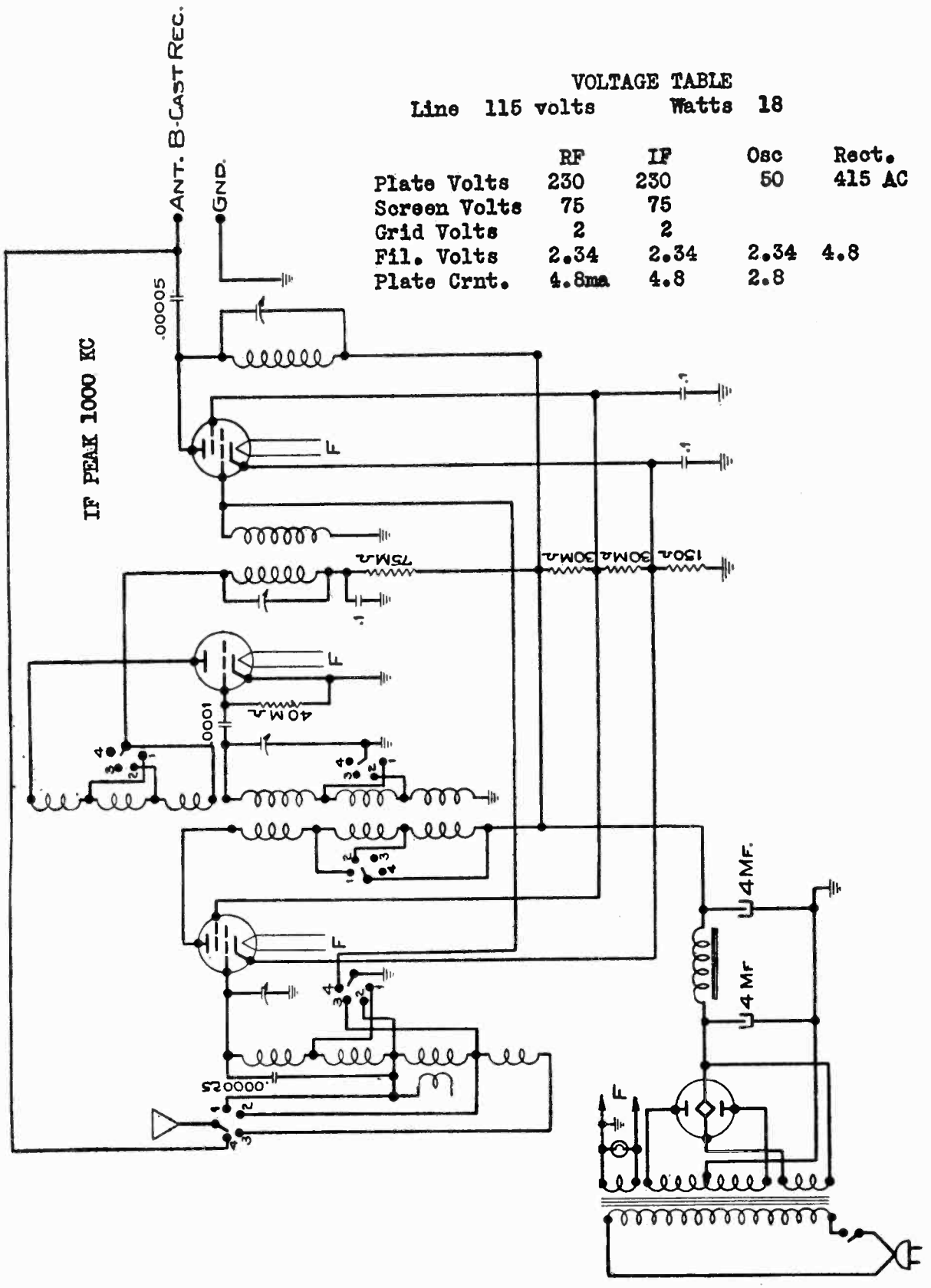
COLONIAL RADIO CORP.
MODEL 52
Parts Coding

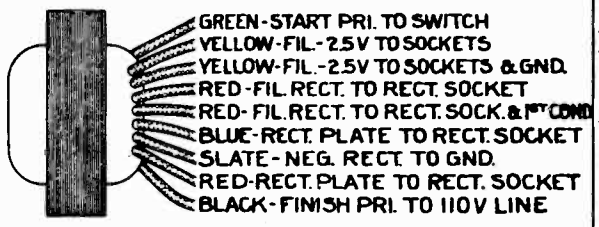
MODEL 55
Schematic
Voltage

COLONIAL RADIO CORP.

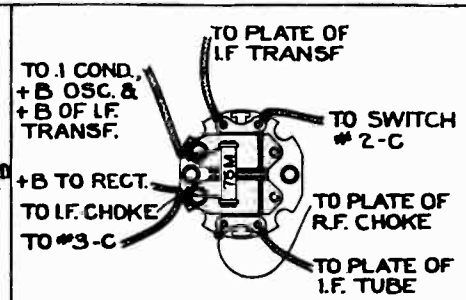
VOLTAGE TABLE
Line 115 volts Watts 18

	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	

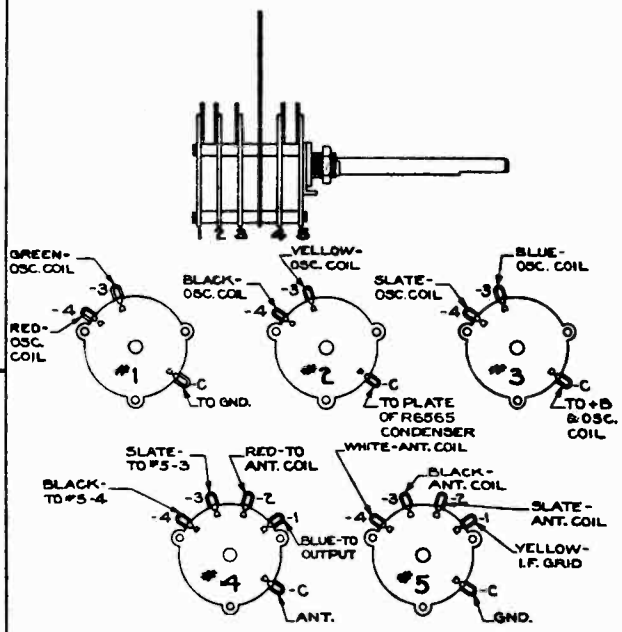




POWER TRANSFORMER
R 6643-60 CYCLE
R 6726-25 CYCLE

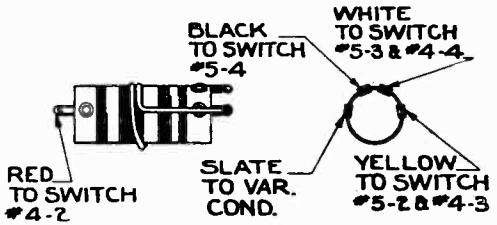


I.F. TUNING CONDENSER
R 6565

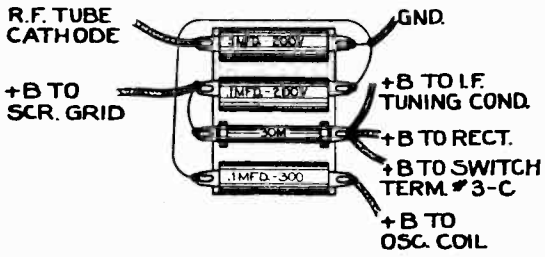


WAVE CHANGE SWITCH
R6644

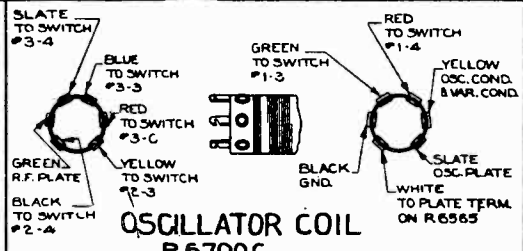
FILTER CHOKE
R6715A



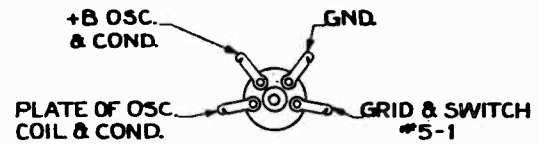
R. F. COIL
R6700A



RESISTOR & CONDENSER BOARD
R6600A

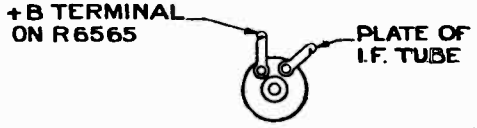


OSCILLATOR COIL
R6700C



I.F. TRANSFORMER
R6646

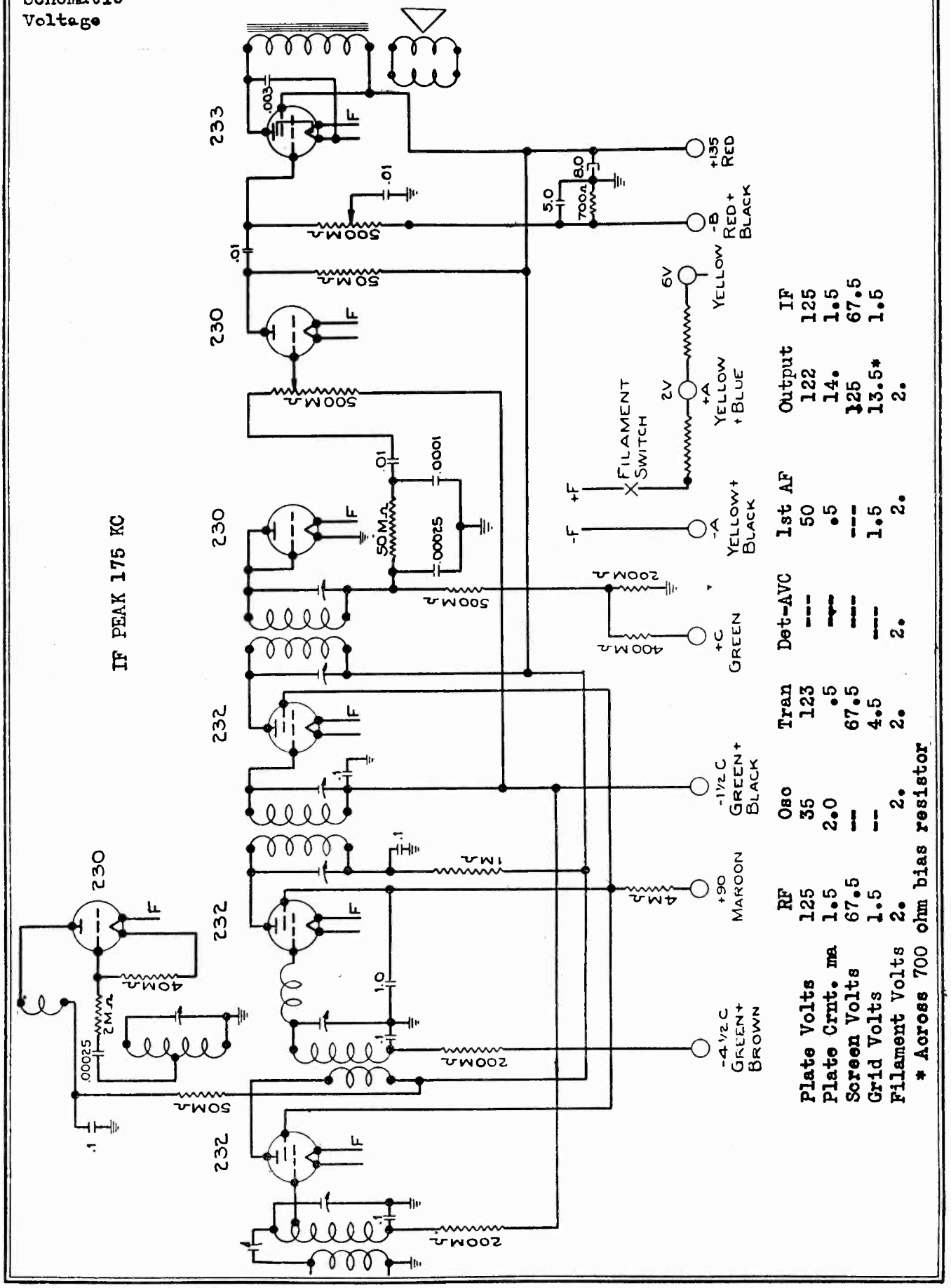
2 ELECTROLYTIC COND: 4 MFD.
R6645



R.F. CHOKE
R6647

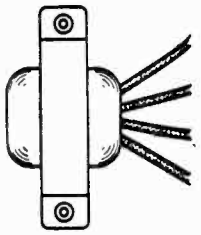
MODEL 56
Schematic
Voltage

COLONIAL RADIO CORP.

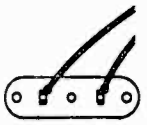


	RF	Osc	Tran	Det-AVC	1st AF	Output	IF
Plate Volts	125	35	123	---	50	122	125
Plate Crnt. ma	1.5	2.0	.5	---	.5	14.	1.5
Screen Volts	67.5	---	67.5	---	---	125	67.5
Grid Volts	1.5	--	4.5	---	1.5	13.5*	1.5
Filament Volts	2.	2.	2.	2.	2.	2.	

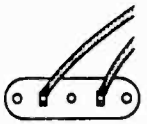
* Across 700 ohm bias resistor



OUTPUT TRANSFORMER
R6790A

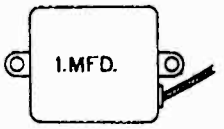


PHONO JACK
R5408
USED ON PHONO MODELS ONLY

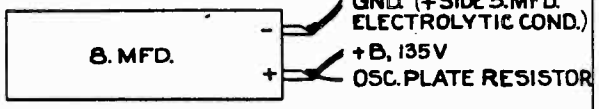


SPEAKER JACK
R5408

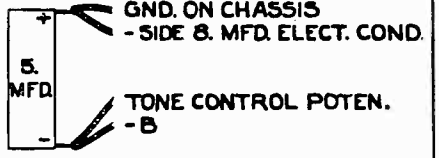
7.17Ω RESISTOR
R6979



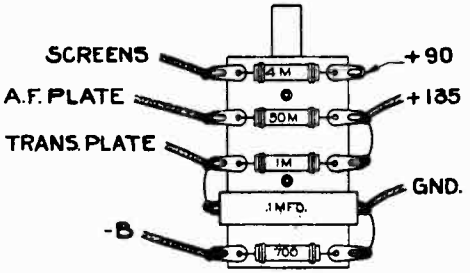
CONDENSER
R6789



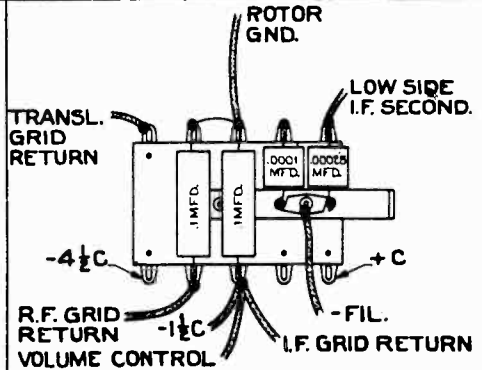
DRY ELECTROLYTIC COND.
R6911



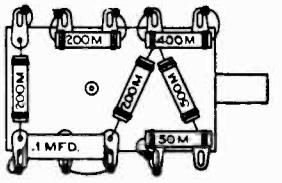
DRY ELECTROLYTIC COND.
R6719



RESISTOR & CONDENSER BOARD
R6443K



CONDENSER SIDE

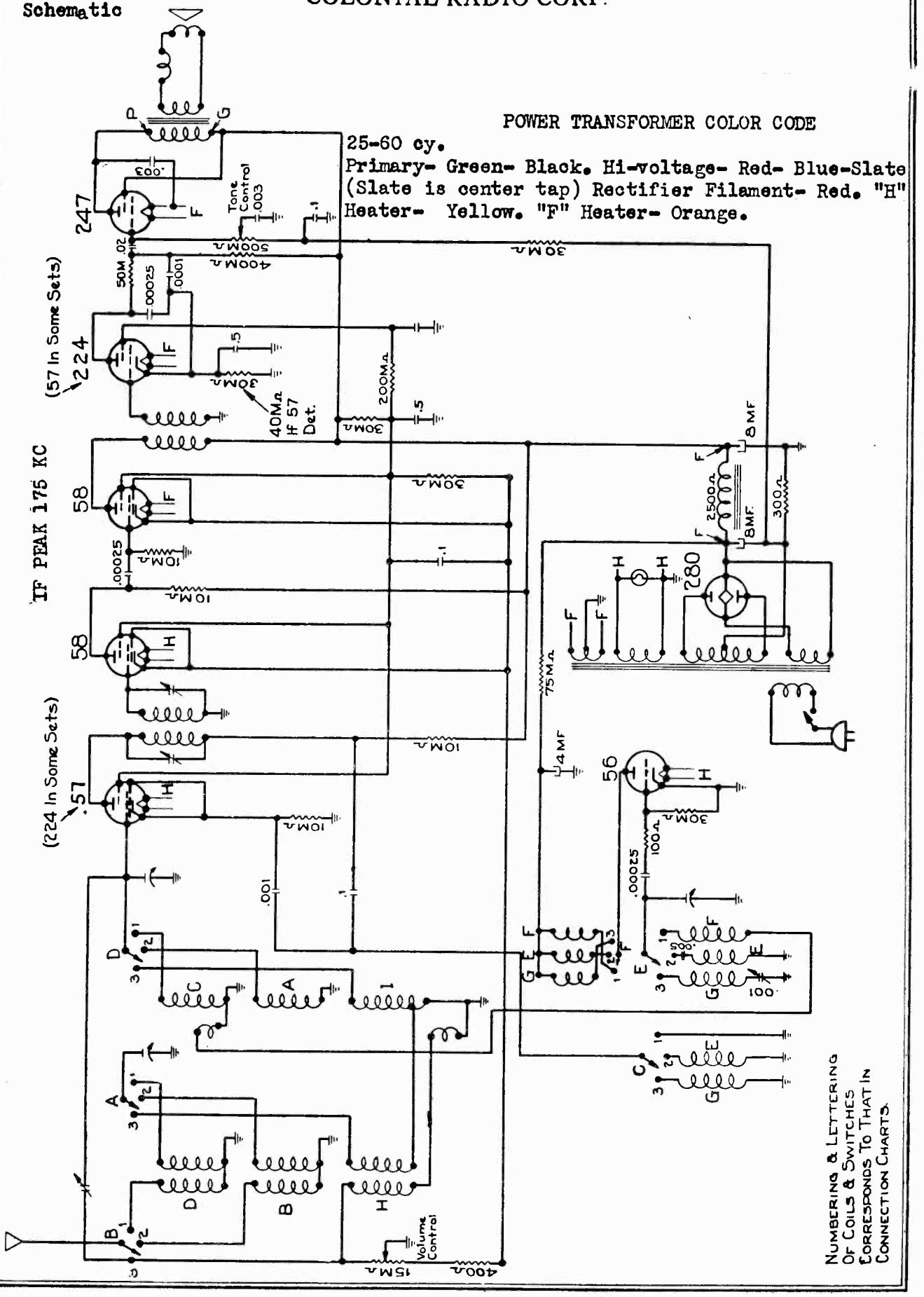


RESISTOR SIDE

RESISTOR & CONDENSER BOARD
R6443J

MODEL 62
Schematic

COLONIAL RADIO CORP.



COLONIAL RADIO CORP.

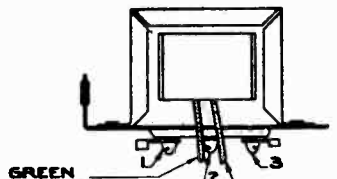
MODEL 62
Voltage
Socket

TUBE	Fil. Volt.	Plate Volt. Vol. Max.	Plate Volt. Vol. Min.	Screen 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 ***	2.5	215	215	75	125	-6	-10	.5	.8	.2	.2
57 - Translator	2.5	215	215	75	125	-5	-7.5	.5	.5	.25	.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***	2.5	75	75	40	70	-3	-5	.1	.1	.05	.05
224 - Second Detector	2.5	64	64	40	70	3.6	-4.6	.25	.25	.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 - 66.

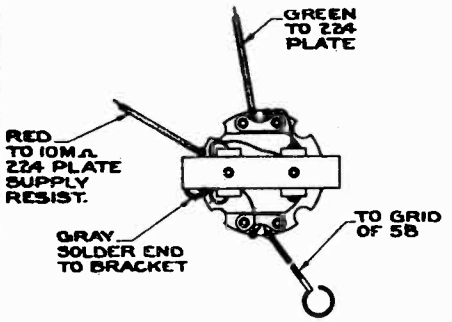
** 530,000 ohms in series.

*** Some of these sets have a 224 translator and a 57 detector. Others have a 57 translator and a 224 detector.

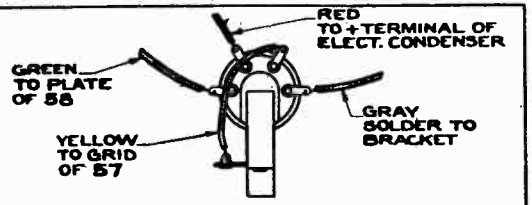


1-TO VOICE COIL & HUM BUCKING COIL.
2-TO HUM BUCKING COIL & SECONDARY.
3-TO SECONDARY & VOICE COIL.

OUTPUT TRANSFORMER
S 6317A

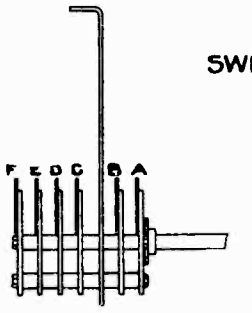


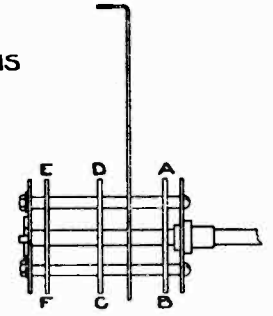
1ST I.F. TRANSFORMER
R 6415 L

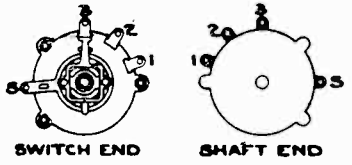


2ND I.F. TRANSFORMER
R 7056 B

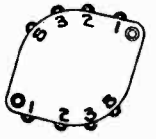
SWITCH CONNECTIONS







WAVE CHANGING SWITCH
R 7238

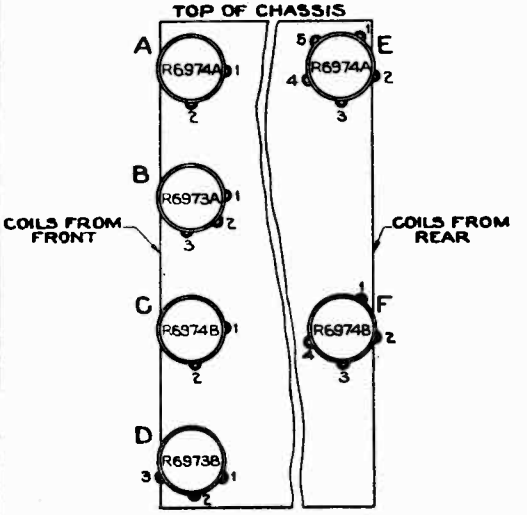


POSITION OF LUGS AS VIEWED FROM REAR.

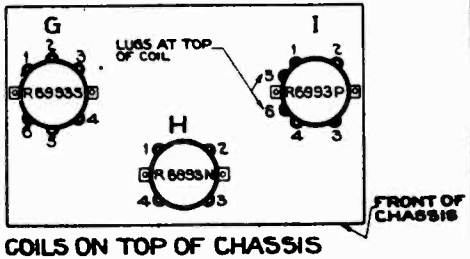
WAVE CHANGING SWITCH
R 6962

SOME SETS OF THIS MODEL HAVE THE R 6962 SWITCH & OTHERS THE R 7238.

LETTERING & NUMBERING CORRESPONDS TO THAT IN SCHEMATIC DIAGRAM & CONNECTION CHART.



POSITIONS OF COILS & LUGS
LETTERING & NUMBERING CORRESPONDS TO THAT IN SCHEMATIC DIAGRAM & CONNECTION CHART.



COILS ON TOP OF CHASSIS

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

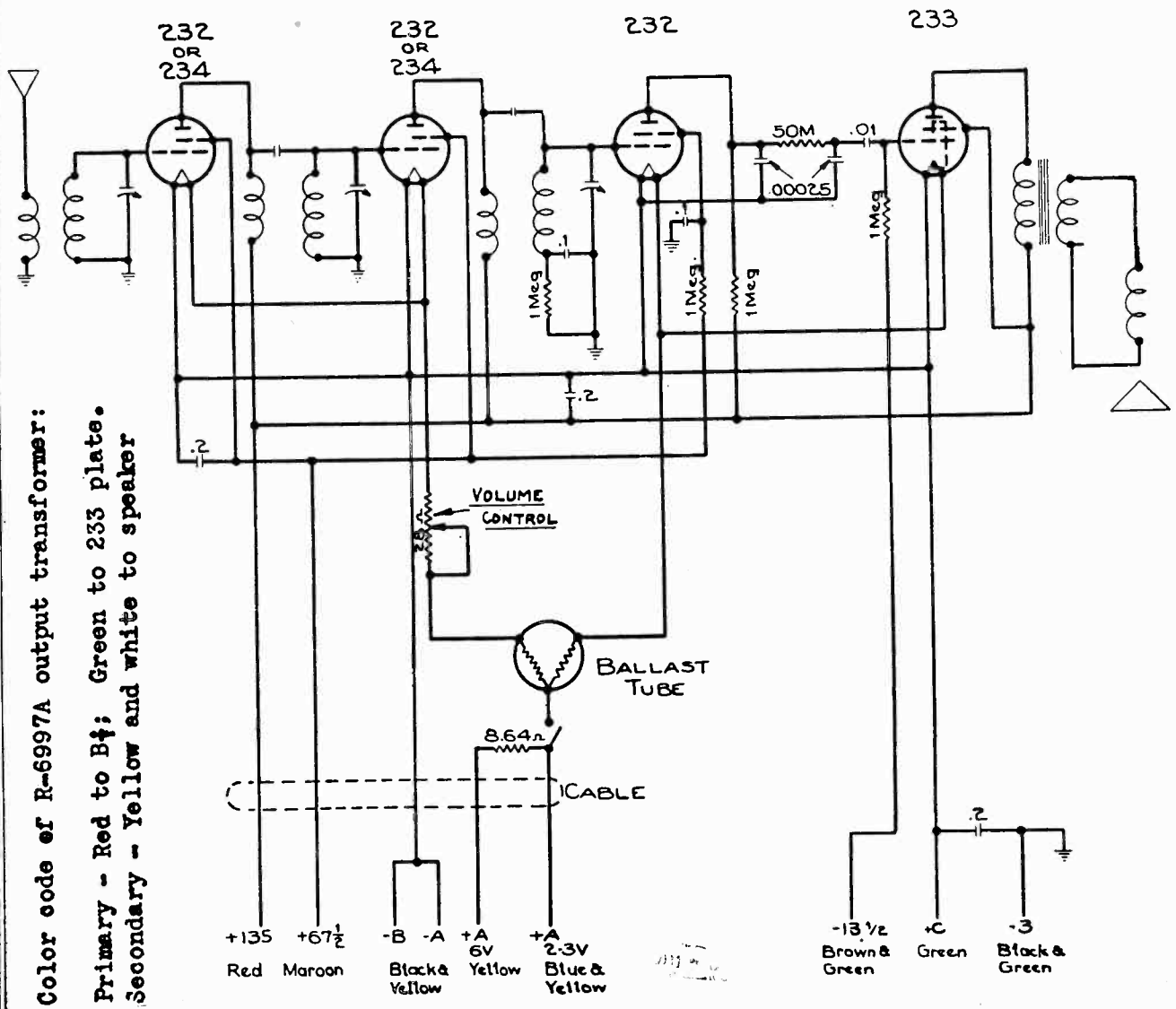
Lug #1 - To coil "F", lug 3
Lug #2 - To .005 condenser other side of which goes to coil "E", lug 4.
Lug #3 - To coil "G", lug 4
Lug S - To .00025 oscillator grid condenser and stator of number three variable tuning condenser unit.

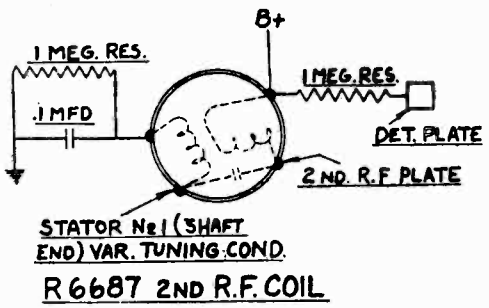
Plate F

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

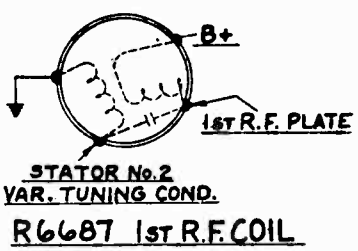
COLONIAL RADIO CORP.

MODEL 65
Schematic

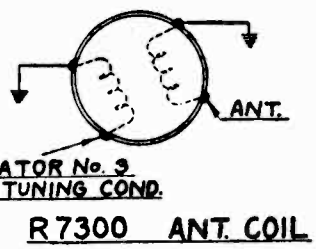




R6687 2ND R.F. COIL



R6687 1ST R.F. COIL



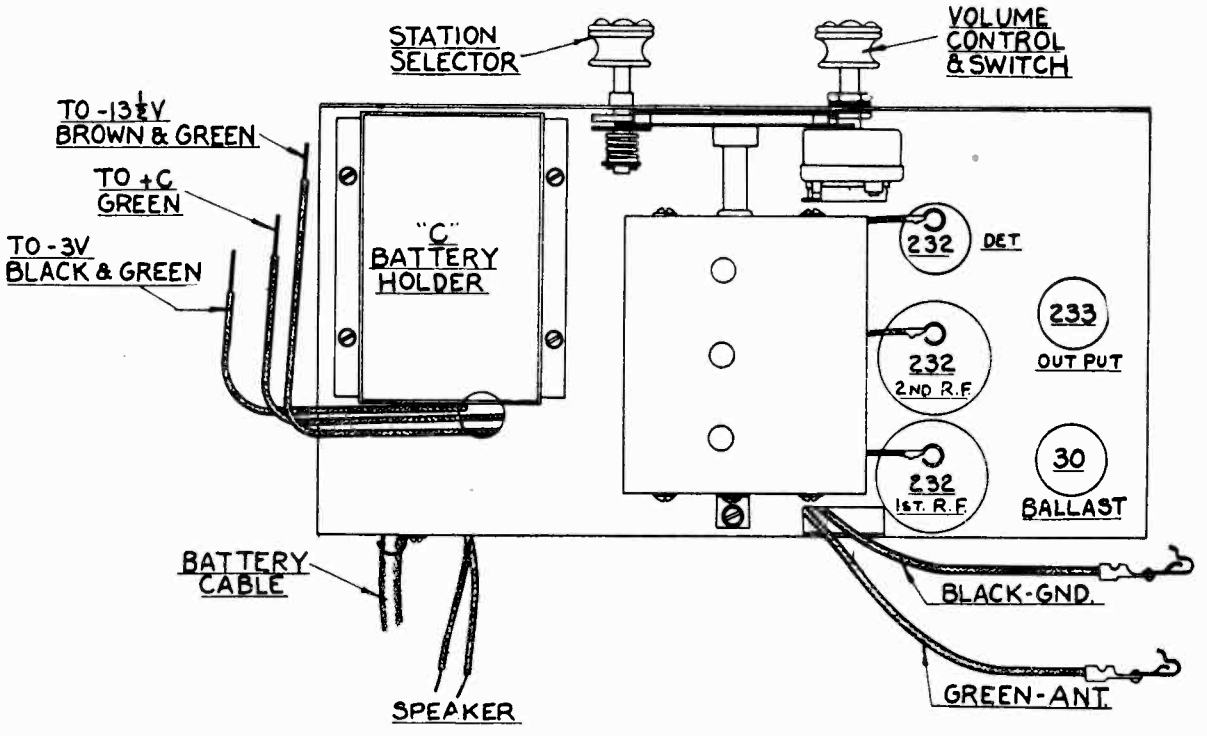
R7300 ANT. COIL

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.

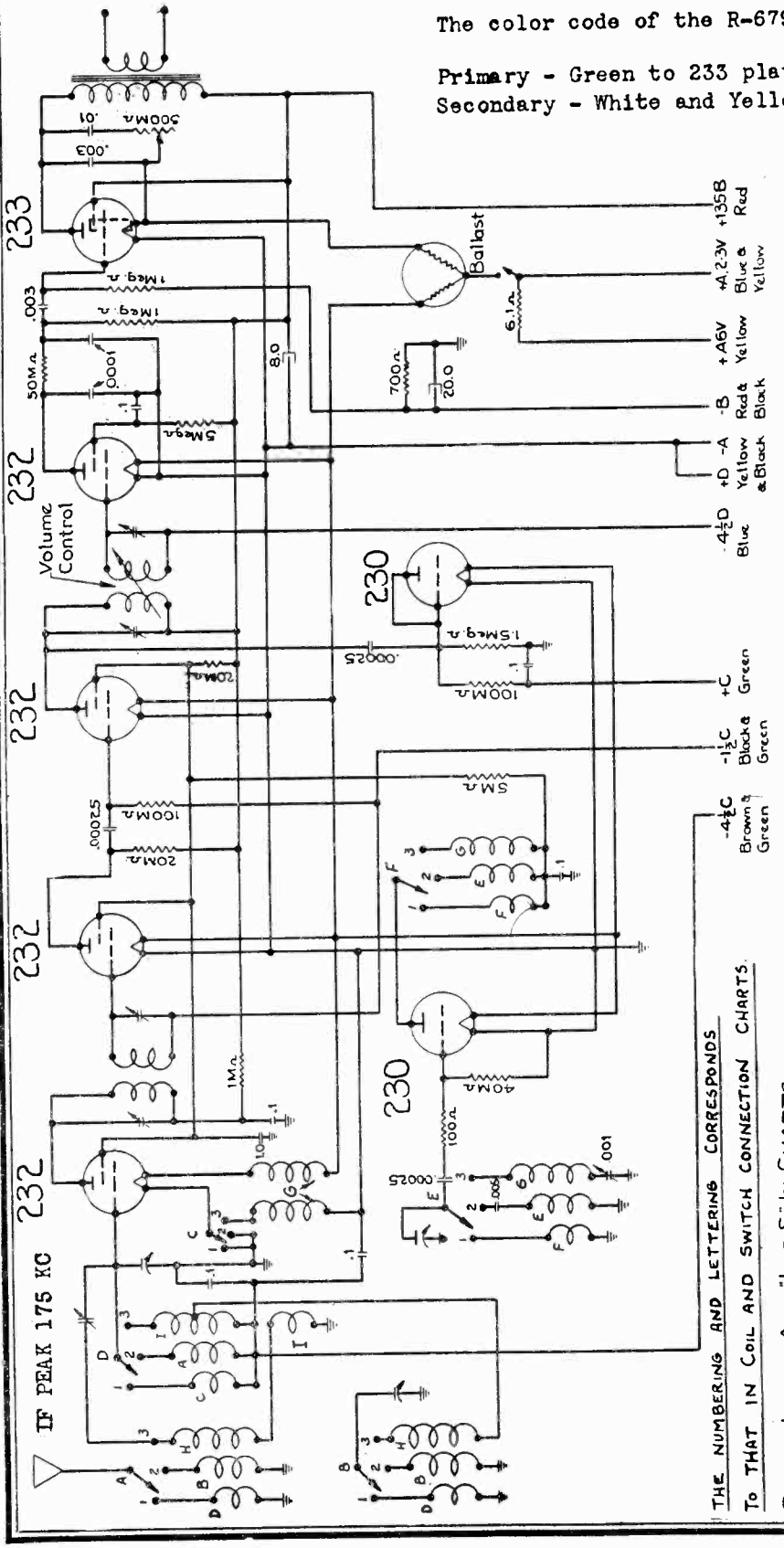
Control grid readings taken on 7.5 volt scale of 1000 ohms per volt meter; others on 250 volt scale. These are average values. Usually, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at rated 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.



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 C4 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.

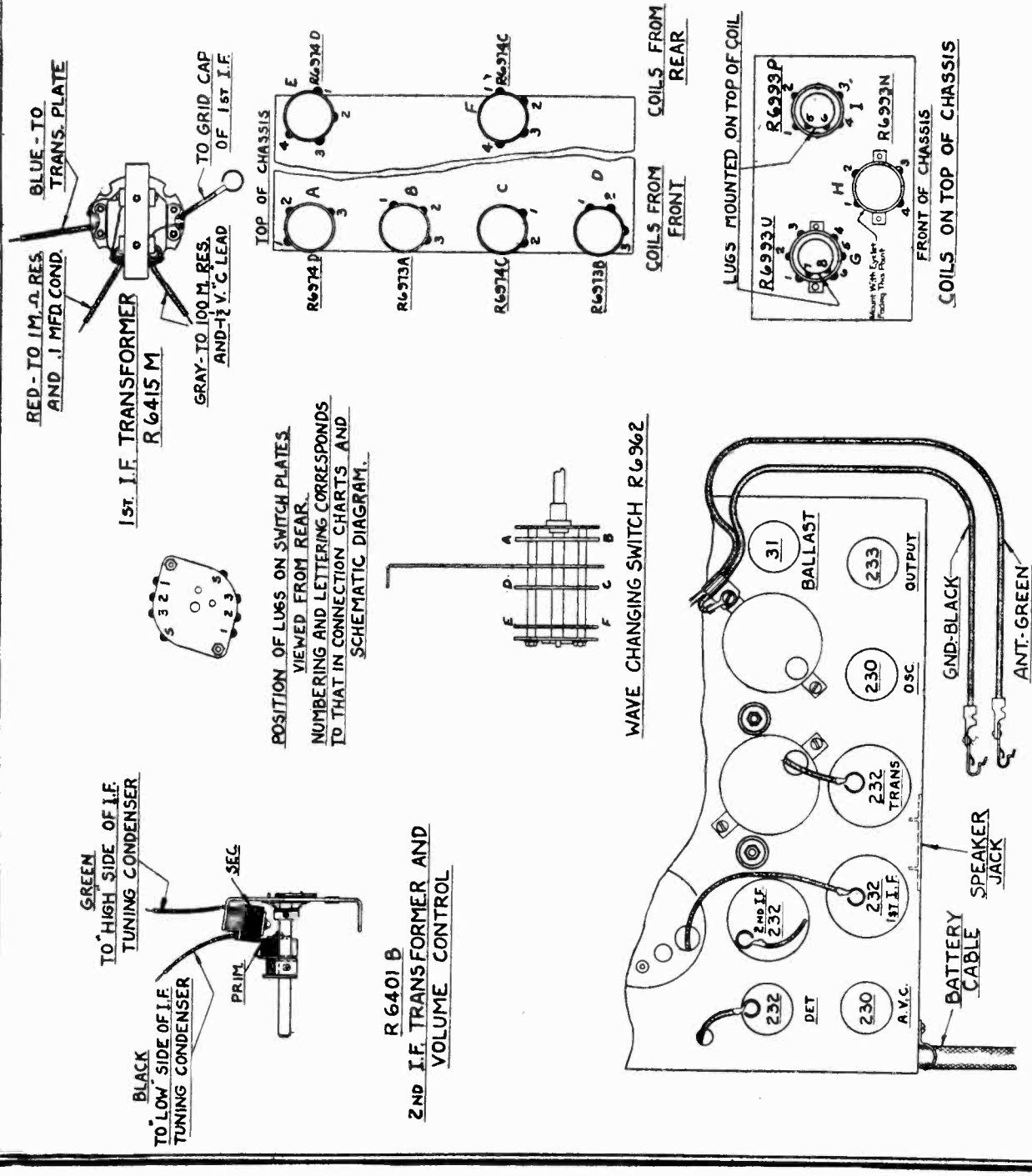
MODEL 69
Voltage
Socket
Parts Coding

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.

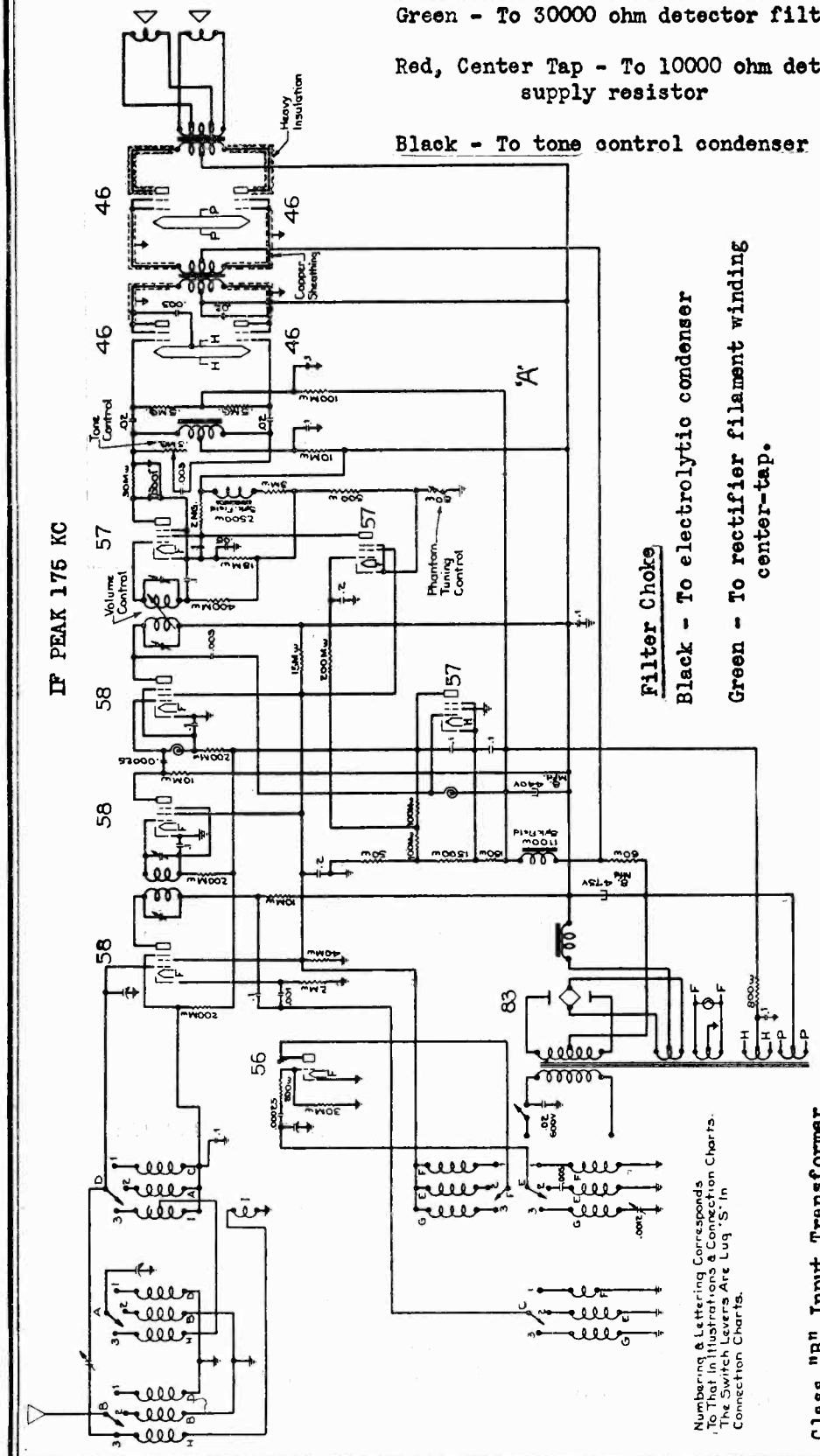
**Second value applies when tube is not oscillating. Stop oscillation by touching finger to grid.



COLONIAL RADIO CORP.

MODEL 71
Schematic
Transformer
Notes

IF PEAK 175 KC



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.

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.

Class "B" Input Transformer

Primary:

Black, in Shielded Lead - To plate of the Driver tube next to A.V.C. tube.

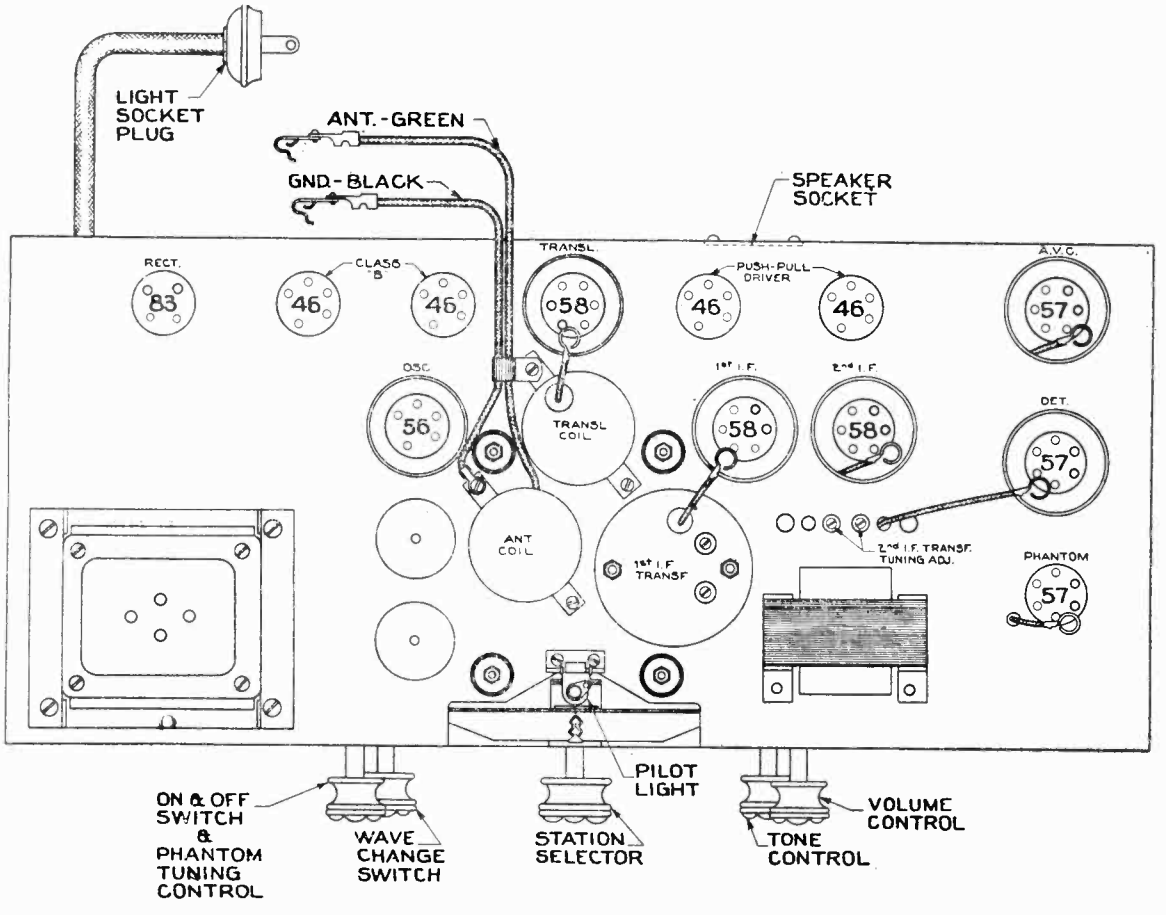
Red, Center Tap - To B +

Black with Tracer, in Shielded Lead - To plate of the Driver tube next to Translator tube.

Shield Pigtail - To ground

MODEL 71
Socket
Voltage

COLONIAL RADIO CORP.

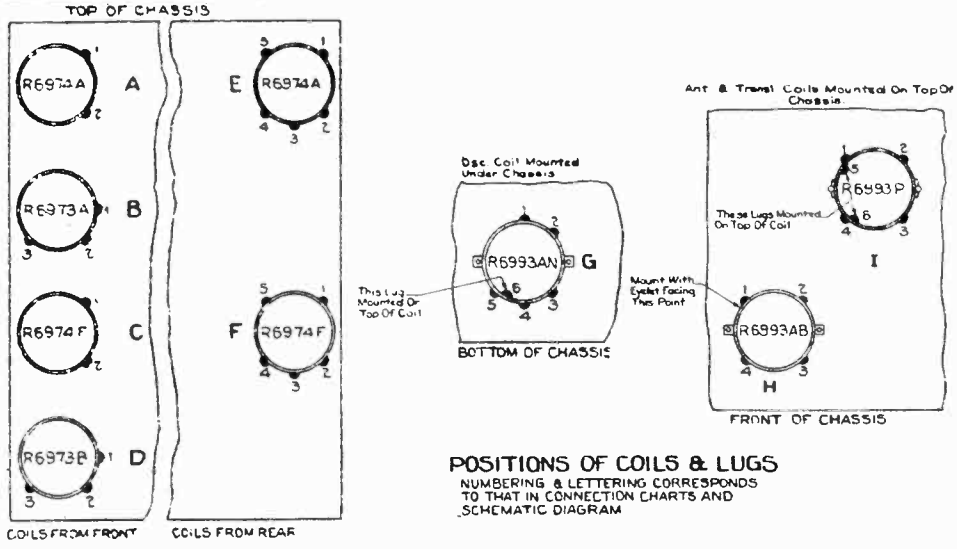


TUBE VOLTAGE and CURRENT CHART

MODEL 71

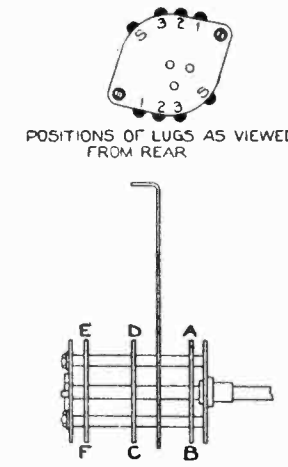
TUBE	PLATE VOLTAGE	SCREEN VOLTAGE	GRID VOLTAGE	PLATE M.A.	SCREEN M.A.	GRID M.A.
58 - Translator	190	60	-5	.4	.2	
56 - Oscillator	65	--	-10	4	--	
58 - 1st IF	170	65	*	3	.8	
58 - 2nd IF	200	65	*	4.5	1	
57 - Detector	170	40a	*	.2a	b	
46 - Drivers	250	250	-10*	18	3.5	
46 - Class "B"	370	5	+5	21-50c	.5-5c	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).



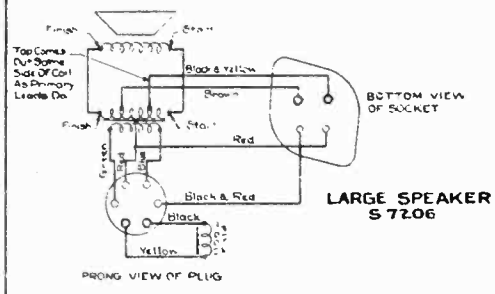
POSITIONS OF COILS & LUGS

NUMBERING & LETTERING CORRESPONDS TO THAT IN CONNECTION CHARTS AND SCHEMATIC DIAGRAM

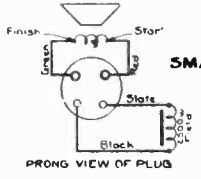


FREQUENCY SELECTING SWITCH R6962

NUMBERING & LETTERING CORRESPONDS TO THAT IN CONNECTION CHARTS AND SCHEMATIC DIAGRAM.

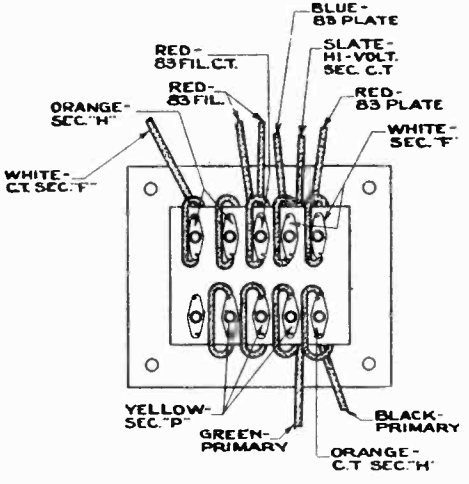


LARGE SPEAKER S 7206

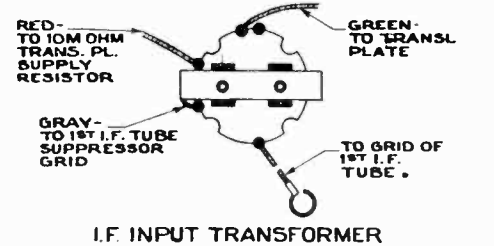


SMALL SPEAKER S 7207

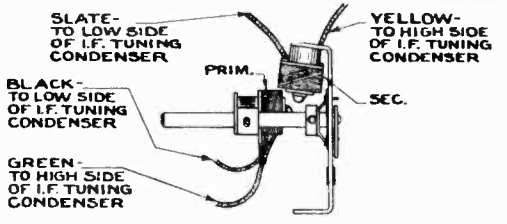
POLARITY & CONNECTIONS OF SPEAKERS



CONNECTIONS TO POWER TRANSFORMER R 7268



I.F. INPUT TRANSFORMER R6415P



2ND I.F. TRANSFORMER (VOLUME CONTROL) R6401B

THE AUTOMATIC VOLUME CONTROL ACTION

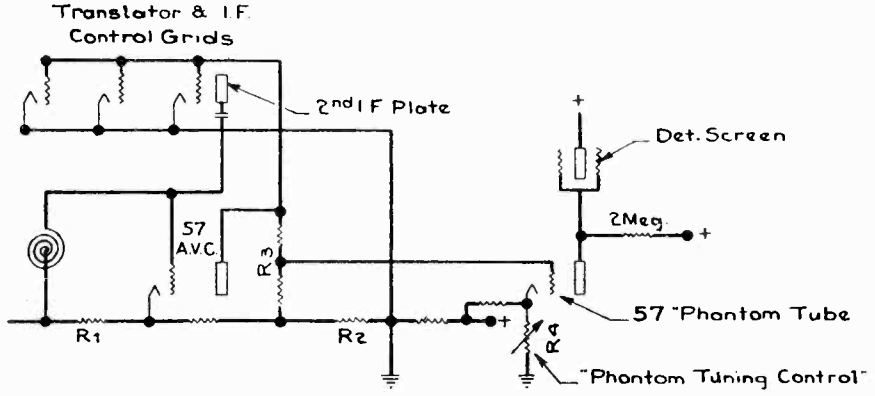
A portion of the signal existing at the plate of the second IF tube is impressed on the grid of the 57 A.V.C. tube. Normally, the A.V.C. grid is biased negatively by the voltage drop across R 1, and therefore no plate current flows through R 3. When the IF signal is impressed on the A.V.C. grid, the 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

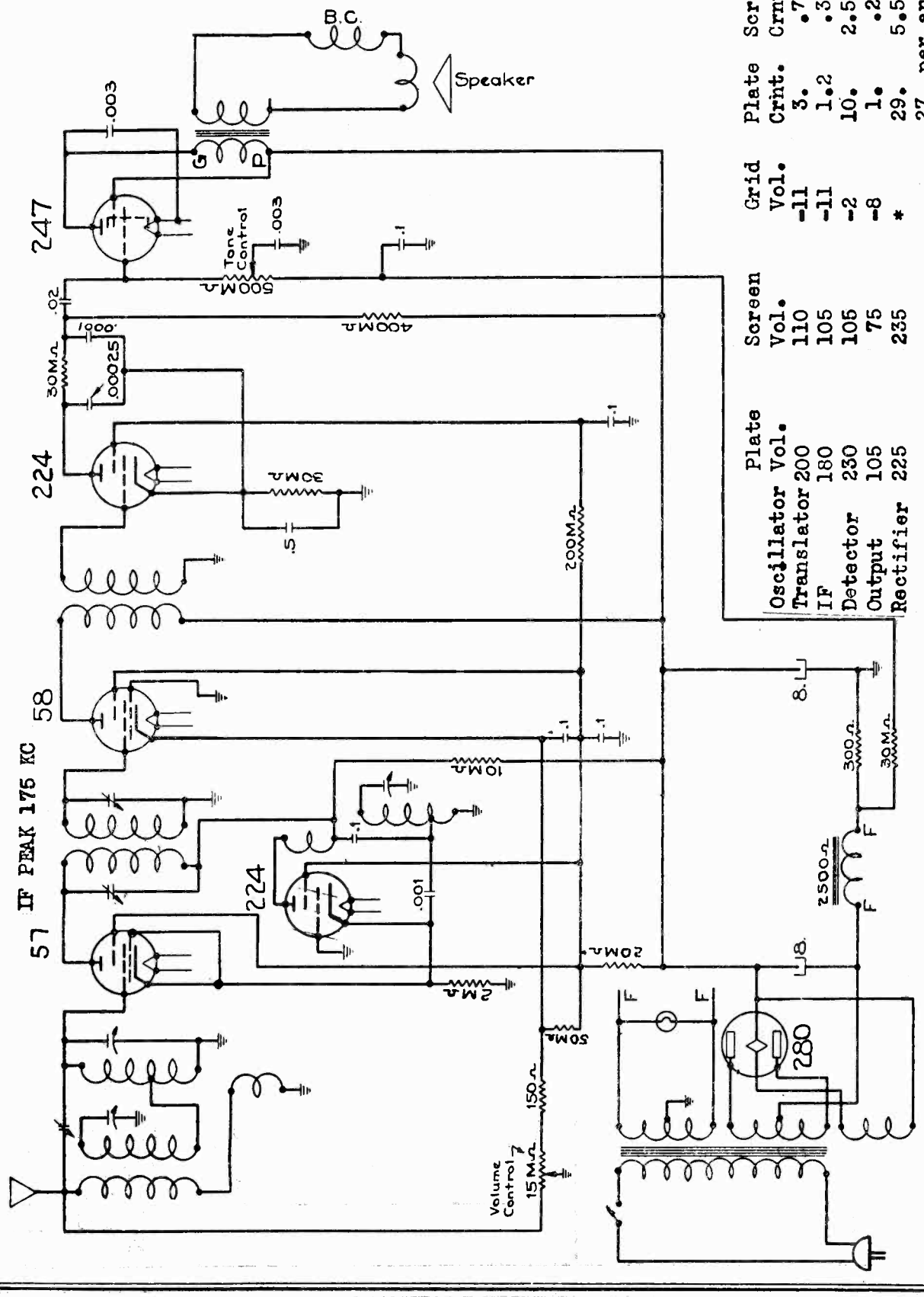


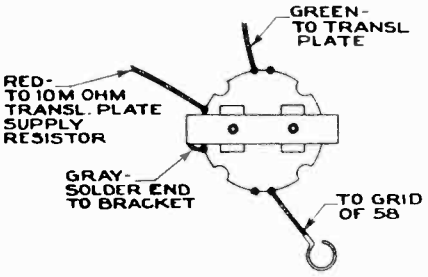
	Plate	Screen	Grid	Plate	Screen
	Screen	Vol.	Vol.	Crnt.	Crnt.
Oscillator	Vol.	110	-11	3.	.7
Translator	200	105	-11	1.2	.35
IF	180	105	-2	10.	2.5
Detector	230	105	-8	1.	.25
Output	105	75	*	29.	5.5
Rectifier	225	235			27. per anode

* 530,000 ohms in series. Volume control at maximum.

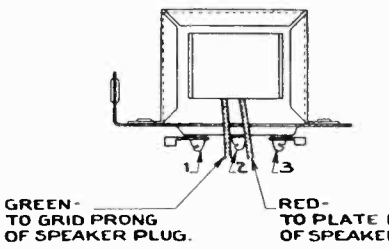
This receiver tunes from 1765 kc to 520 kc.

MODEL 73
Parts Coding

COLONIAL RADIO CORP.

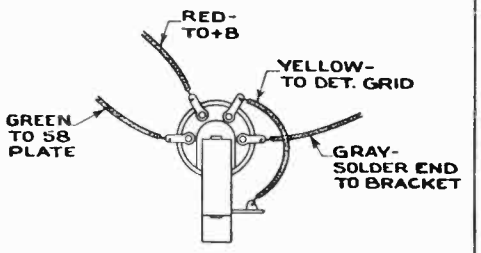


I.F. INPUT TRANSFORMER
R 6415 H

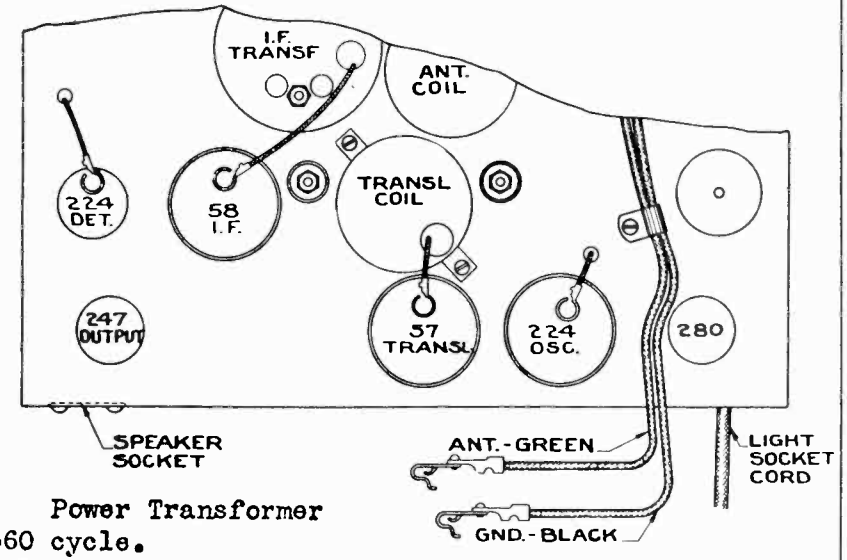


1 TO VOICE COIL & HUM BUCKING COIL.
2 TO HUM BUCKING COIL & SECONDARY.
3 TO SECONDARY & VOICE COIL

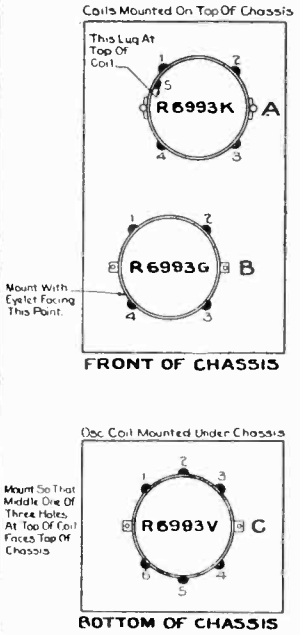
OUTPUT TRANSFORMER
S 6317A



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.

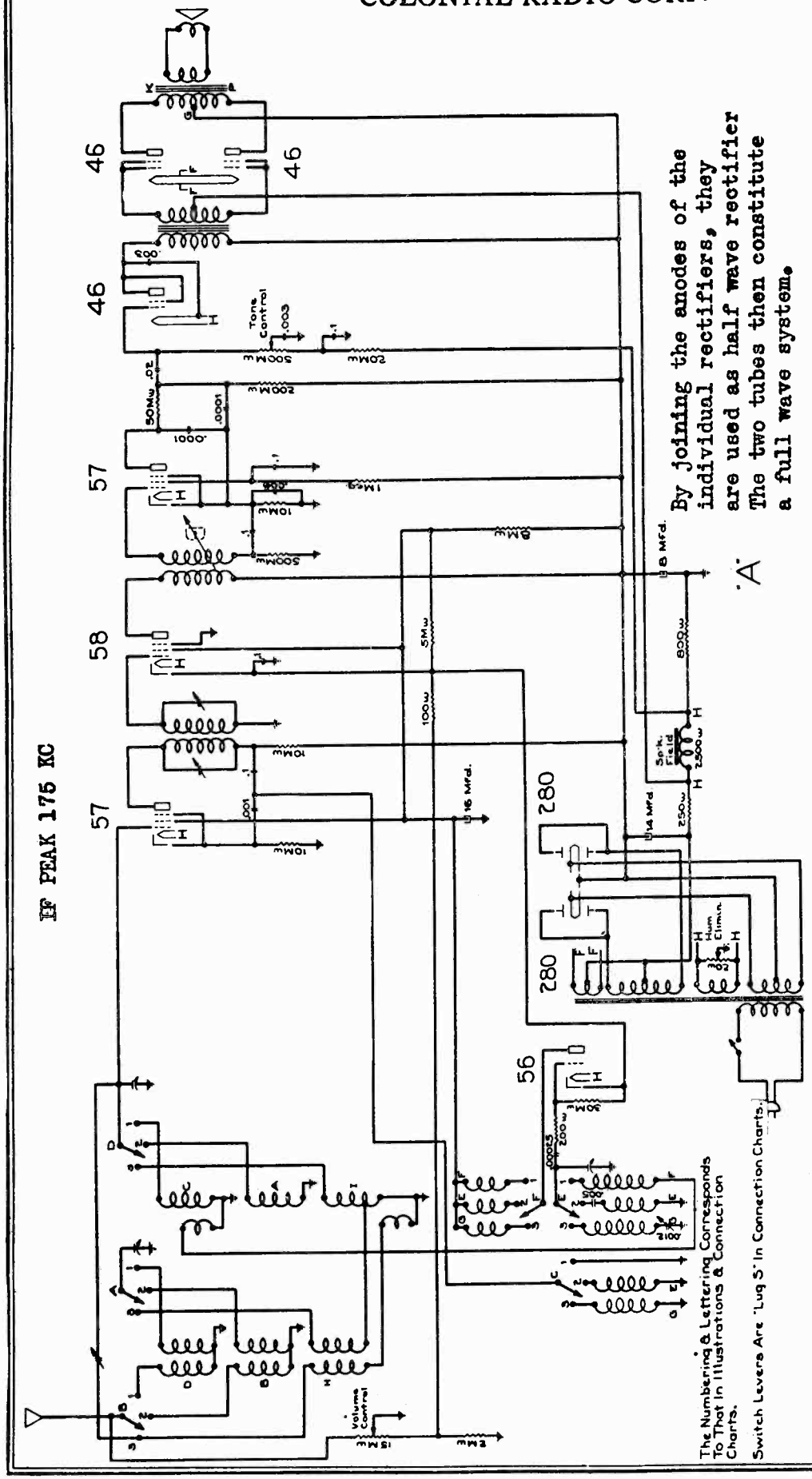
COIL "B"
LUG #1: TO COIL "A", LUG 3.
LUG #2: TO COIL "A", LUG 1.
LUG #3: TO STATOR, #1 (SHAFT END) VAR TUNING CONDENSER UNIT.
LUG #4: TO ANT., VOL. CONTROL & IMAGE SUPPRESSOR CONDENSER.

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.

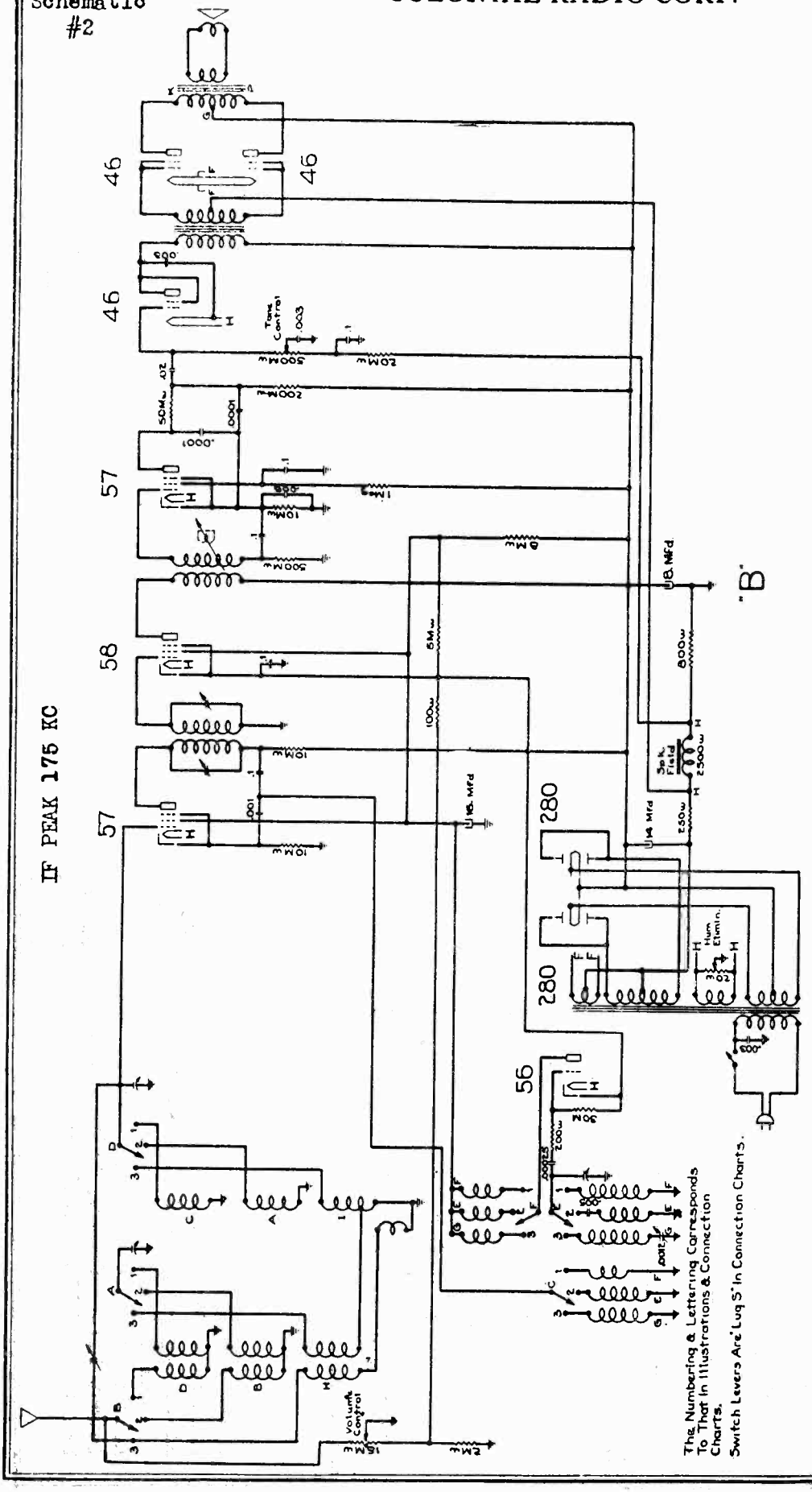
COLONIAL RADIO CORP.

MODEL 76
Schematic
#1



MODEL 76
Schematic
#2

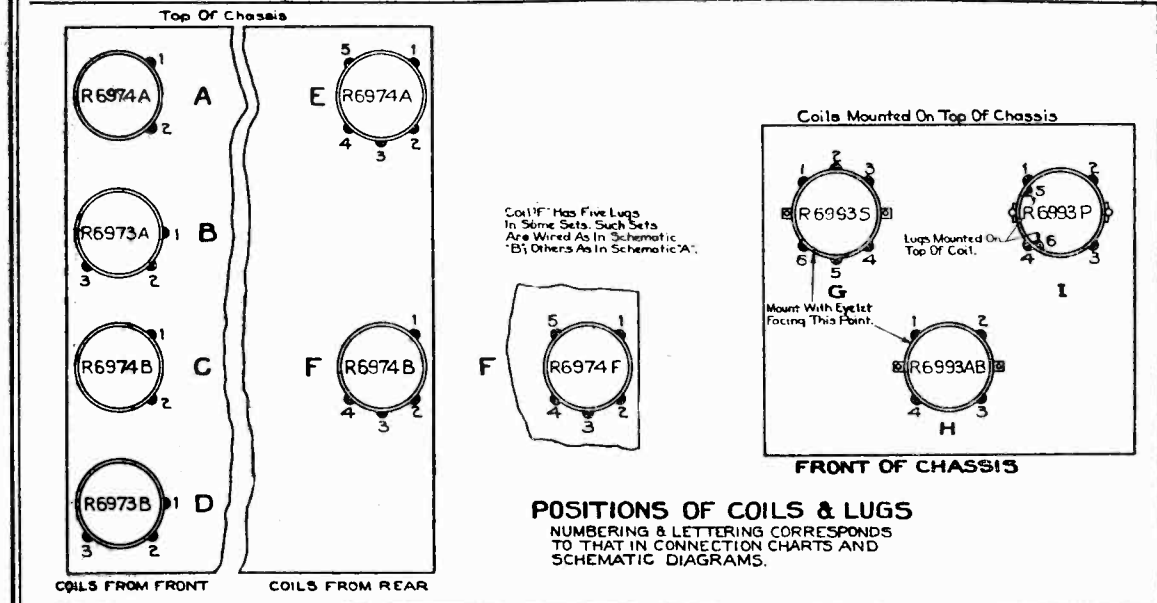
COLONIAL RADIO CORP.



By joining the anodes of the individual rectifiers, they are used as half wave rectifiers. The two tubes then constitute a full wave system.

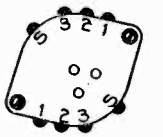
Some sets of this model are wired as in Schematic "A"; others as in "B". Those wired as in "A" have four lugs on coil "F"; those wired as in "B" have five lugs.

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.



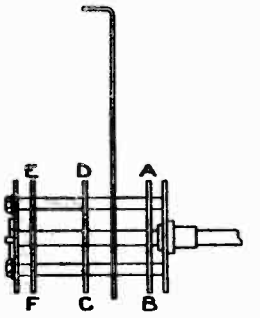
POSITIONS OF COILS & LUGS

NUMBERING & LETTERING CORRESPONDS TO THAT IN CONNECTION CHARTS AND SCHEMATIC DIAGRAMS.

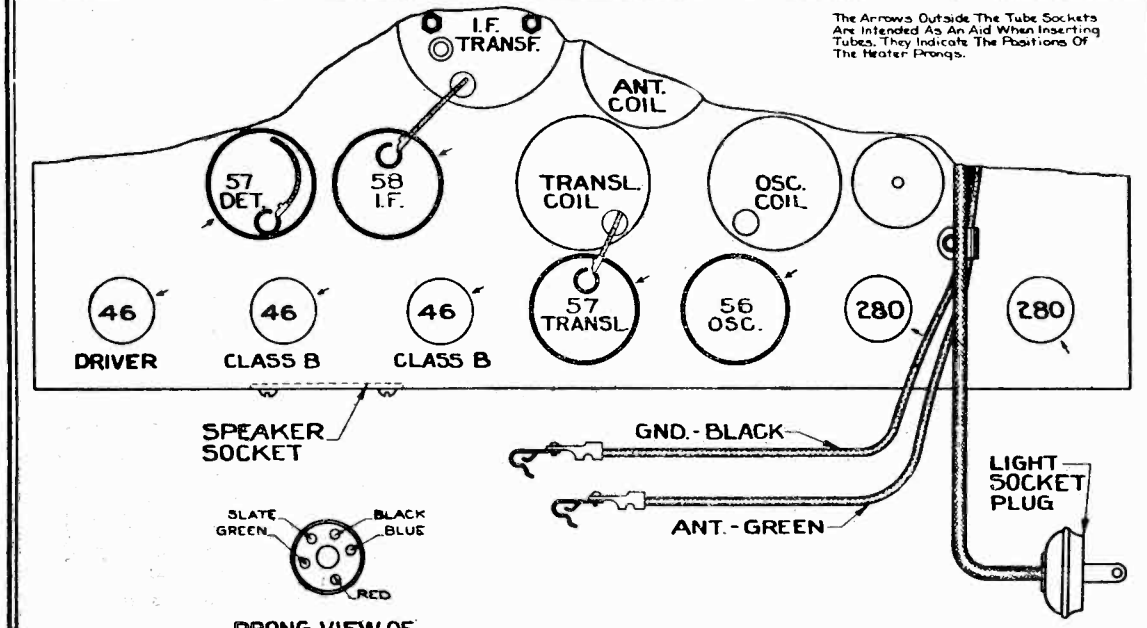


POSITIONS OF LUGS AS VIEWED FROM REAR.

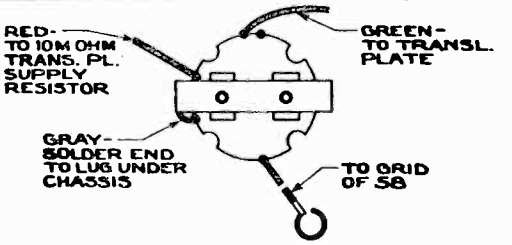
NUMBERING & LETTERING CORRESPONDS TO THAT IN CONNECTION CHARTS AND SCHEMATIC DIAGRAMS.



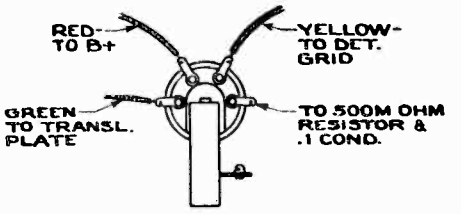
FREQUENCY SELECTING SWITCH
R6962



PRONG VIEW OF SPEAKER PLUG



I.F. INPUT TRANSFORMER
R 6415 N



I.F. OUTPUT TRANSFORMER
R 7056 C

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	

* 520,000 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.

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).

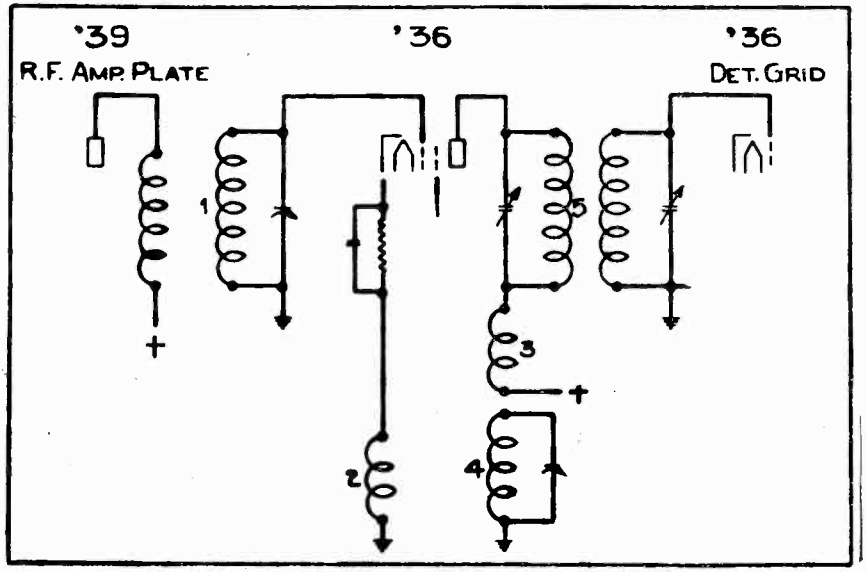
Coils (1) and (2) comprise the grid circuit; coils (3), (4) and (5) the plate circuit. The amplified broadcast signal is applied to the grid of the 236 tube by coil (1) which is tuned to the broadcast signal's frequency. Because coils (2) and (3) are coupled together through coil (4), feedback occurs 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.	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.
'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.

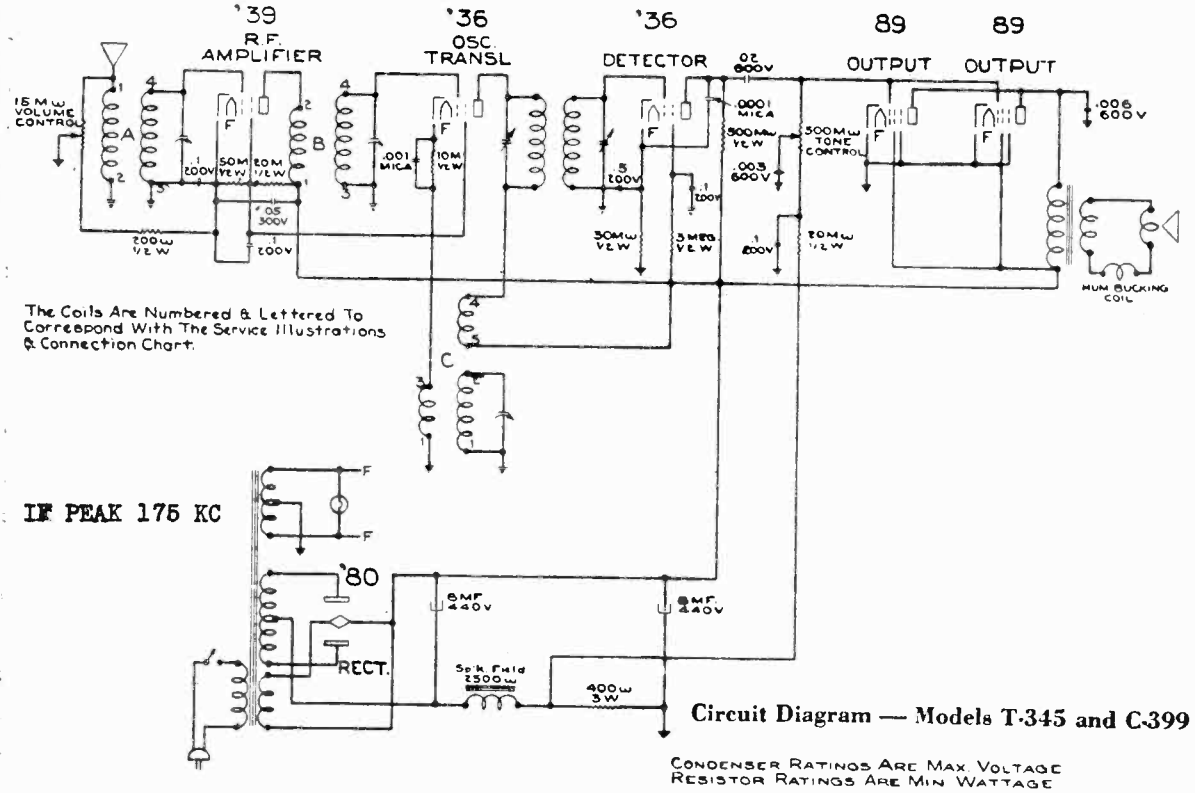
Control grid readings taken on 150 volt scale of 1000 ohms per volt meter; others on 750 volt scale. Readings taken with antenna and ground shorted together and no signal received. These are average values. Ordinarily, deviations up to 20% are permissable and do not necessarily indicate a fault. Where 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 15¼" 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.

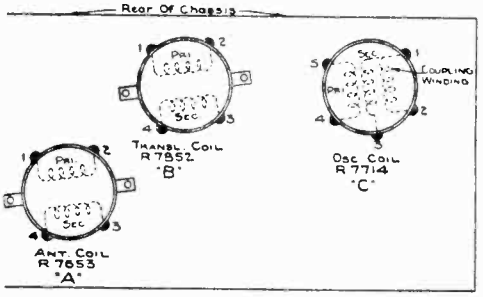


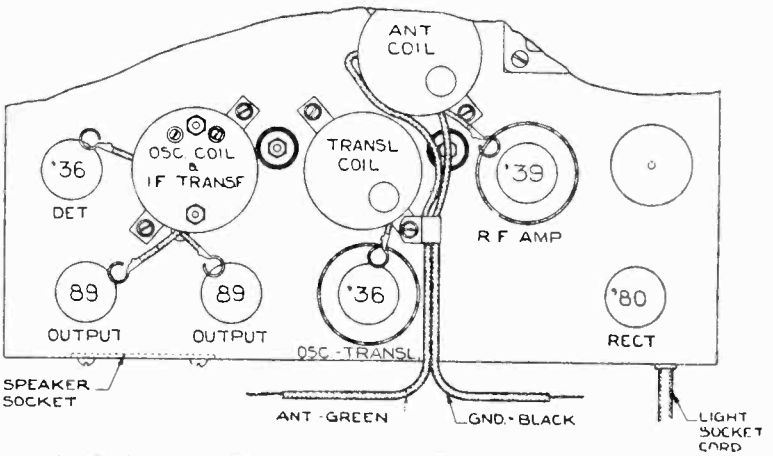
Circuit Diagram — Models T-345 and C-399

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

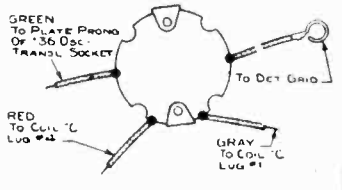
COIL "C"

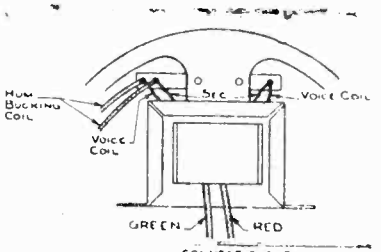
Lug #1 To Gnd. & To Gray Lead Of R 7713A I.F. Transformer
Lug #2 To Stator #3 Of Variable Tuning Condenser
Lug #3 To .001 By-pass Condenser & 10 M Ohm Osc.-Transl Cathode Resistor
Lug #4 To Red Lead Of R 7713A I.F. Transformer
Lug #5 To B+

THE COILS ARE NUMBERED & LETTERED IN THE SCHEMATIC TO CORRESPOND WITH THIS CHART

I.F. TRANSFORMER R 7713A

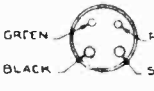
MOUNTED ON TOP OF R 7714 Oscillator Coil





CONNECTIONS OF S7806 A OUTPUT TRANSFORMER MOUNTED ON REAR OF SPEAKER

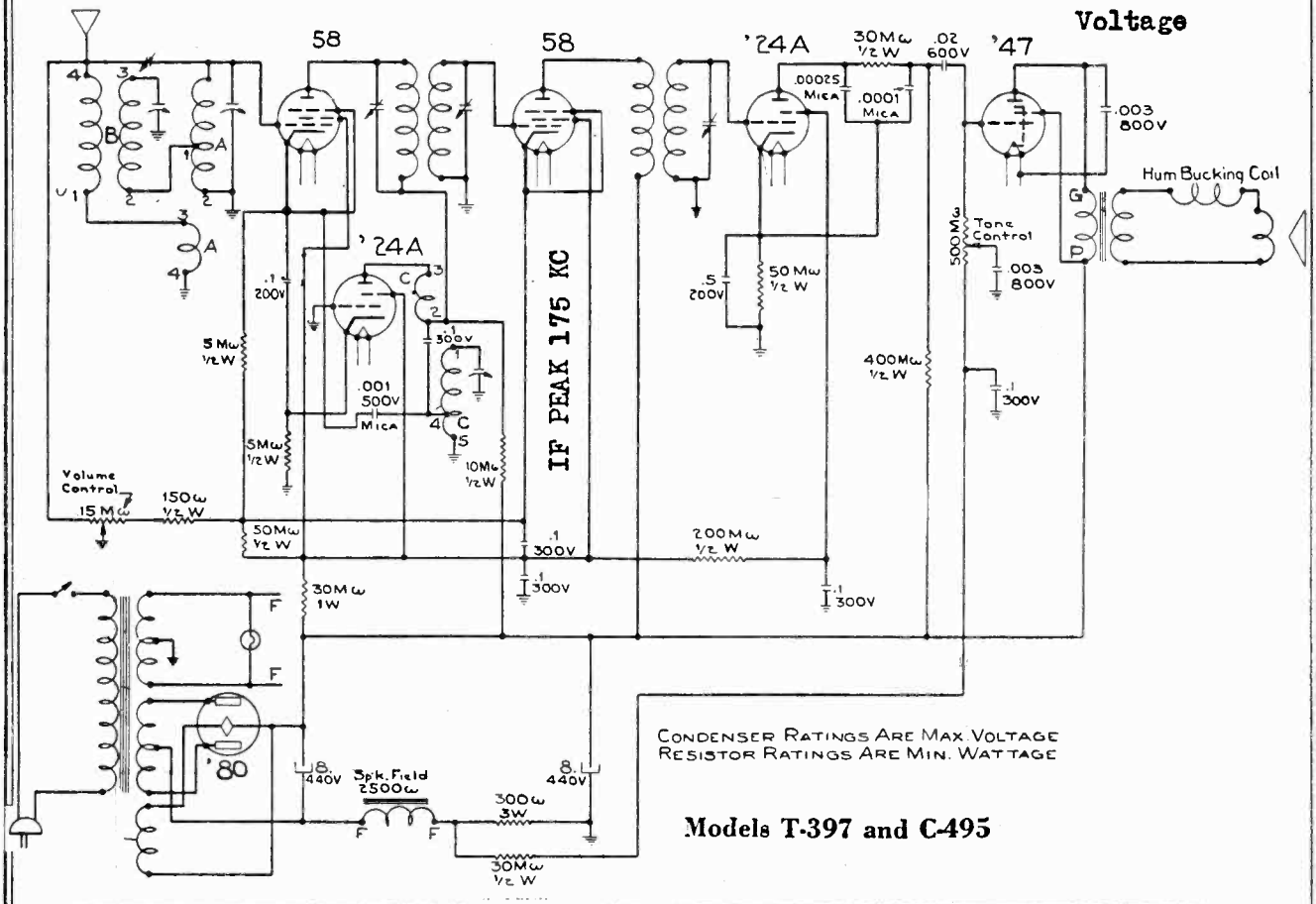
PRONG VIEW OF SPEAKER PLUG



(13). Service Illustration — Models T-345 and C-399

COLONIAL RADIO CORP.

MODEL T-397
C-495
Schematic
Voltage



CONDENSER RATINGS ARE MAX. VOLTAGE
RESISTOR RATINGS ARE MIN. WATTAGE

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.

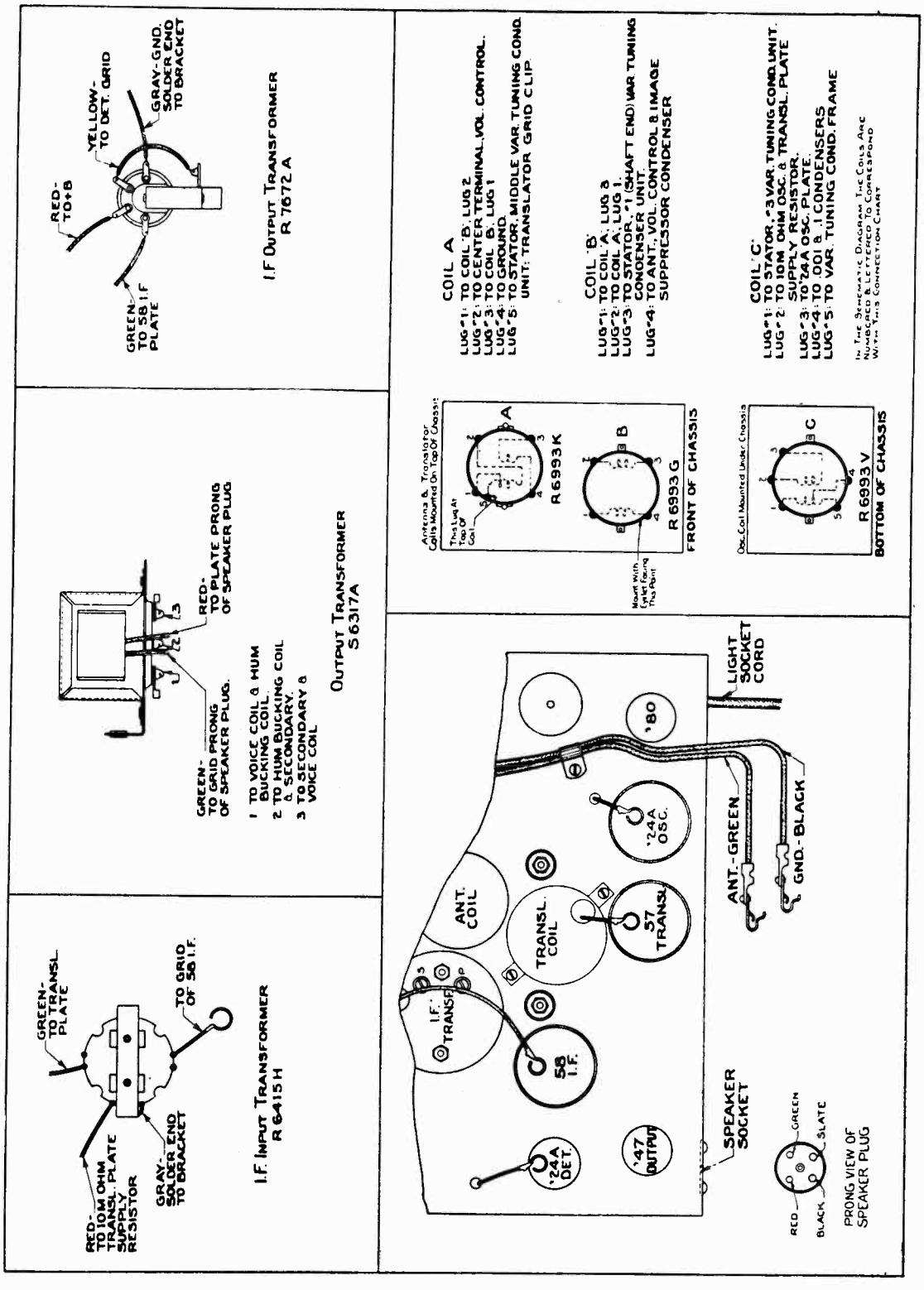
(a)—Too low to read.

(*)—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-6761	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.

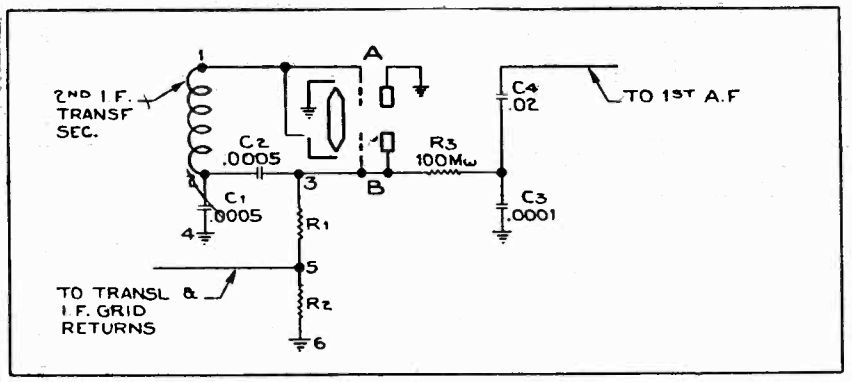
Material may not be returned to the factory for credit or replacement without written factory authorization.

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).

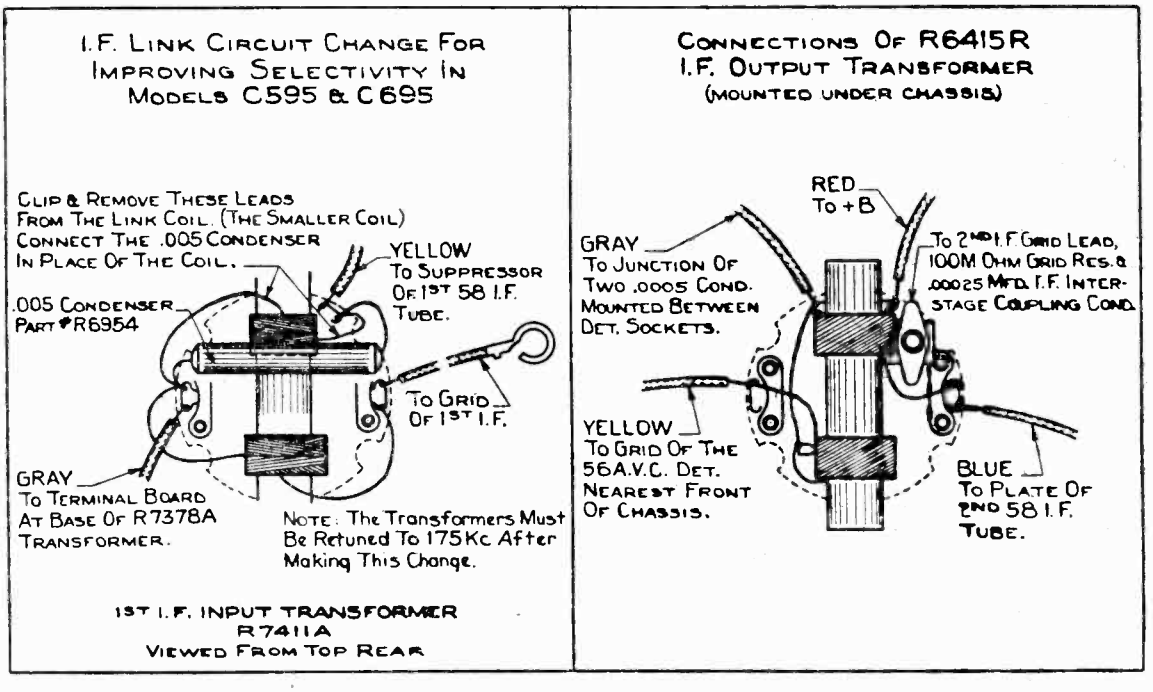
The 58 oscillator tube has been replaced by a 224A necessitating the circuit modifications shown in the revised schematic. The connection of lug 2. coil A is changed to the terminal board to which are also connected the 10 M ohm oscillator and translator plate supply resistor, and a .1 condenser. The 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.

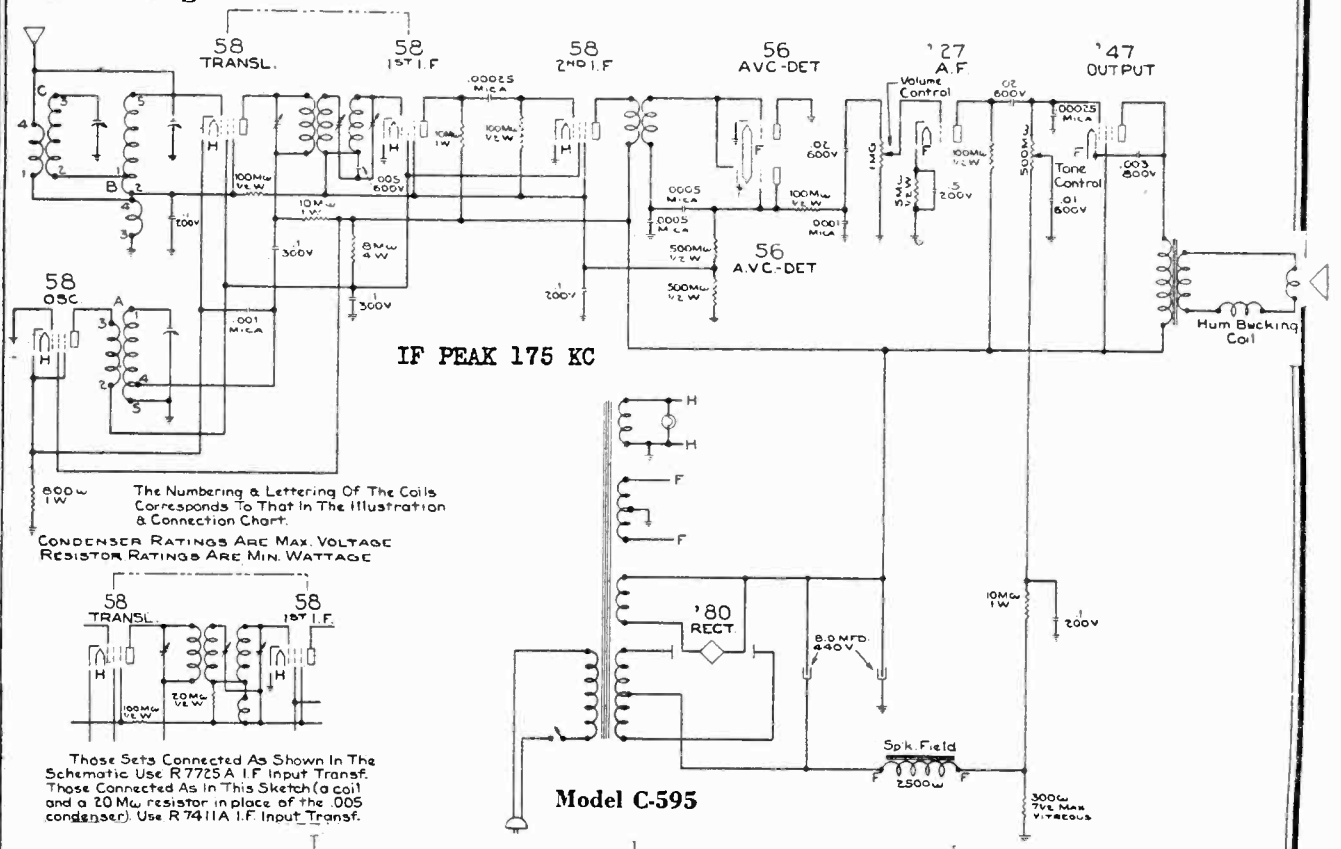
A slight amount of hum, which disappears when a carrier is tuned in, is normal to Models C-595 and C-695. Severe hum, which becomes increased when a carrier is tuned in, is definite indication of faulty type 56 detector tubes. Sometimes interchanging their positions will eliminate the hum. Otherwise the type 56 tubes must be replaced.

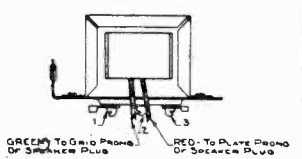


— Models C-595 and C-695

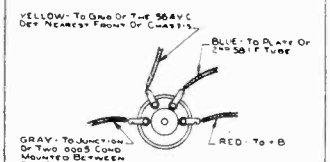
MODEL C-595
Schematic
Parts Coding

COLONIAL RADIO CORP.

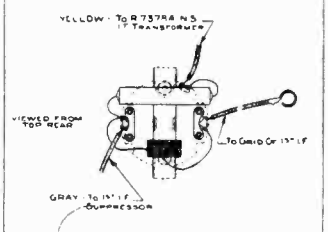




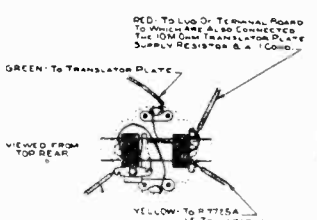
OUTPUT TRANSFORMER
S 6317 A



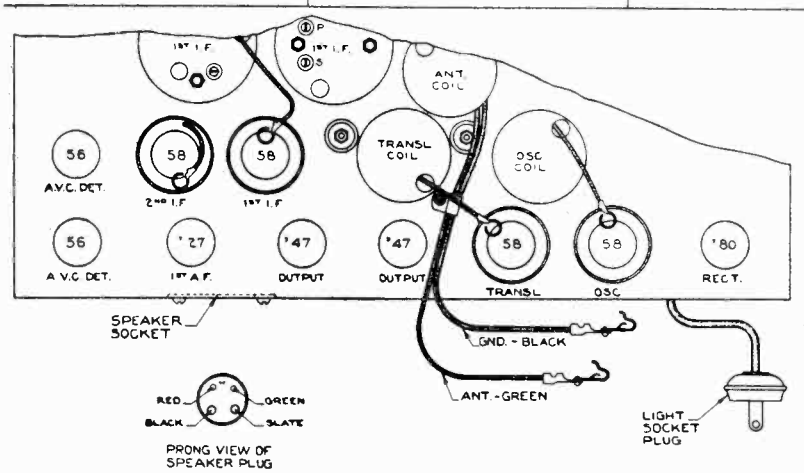
I.F OUTPUT TRANSFORMER
R 7056 D



1ST I.F INPUT TRANSFORMER
R 7725 A

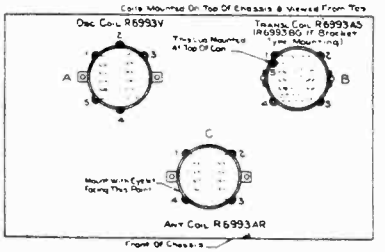


1ST I.F INPUT TRANSFORMER
R 7378 A NS



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 820Ω 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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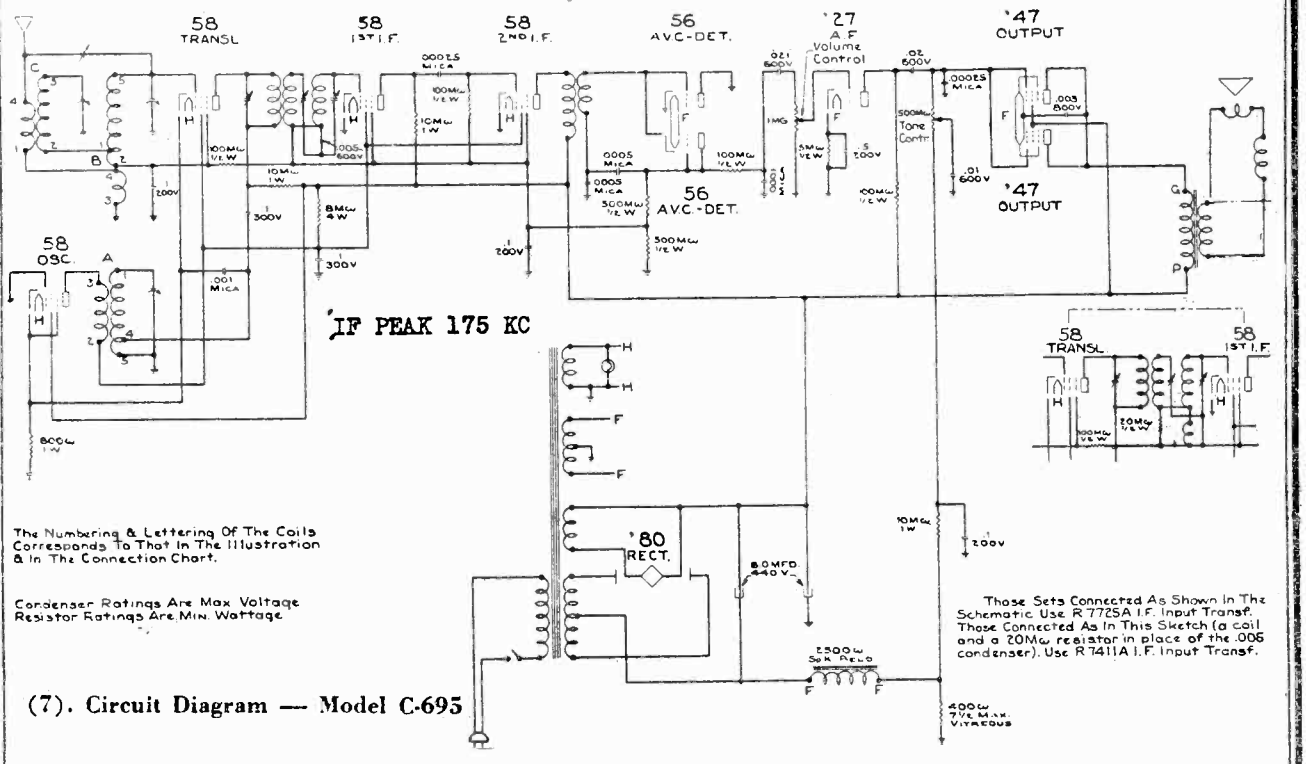
MODEL C-695
Schematics
#1 and #2



(7). Circuit Diagram — Model C-695

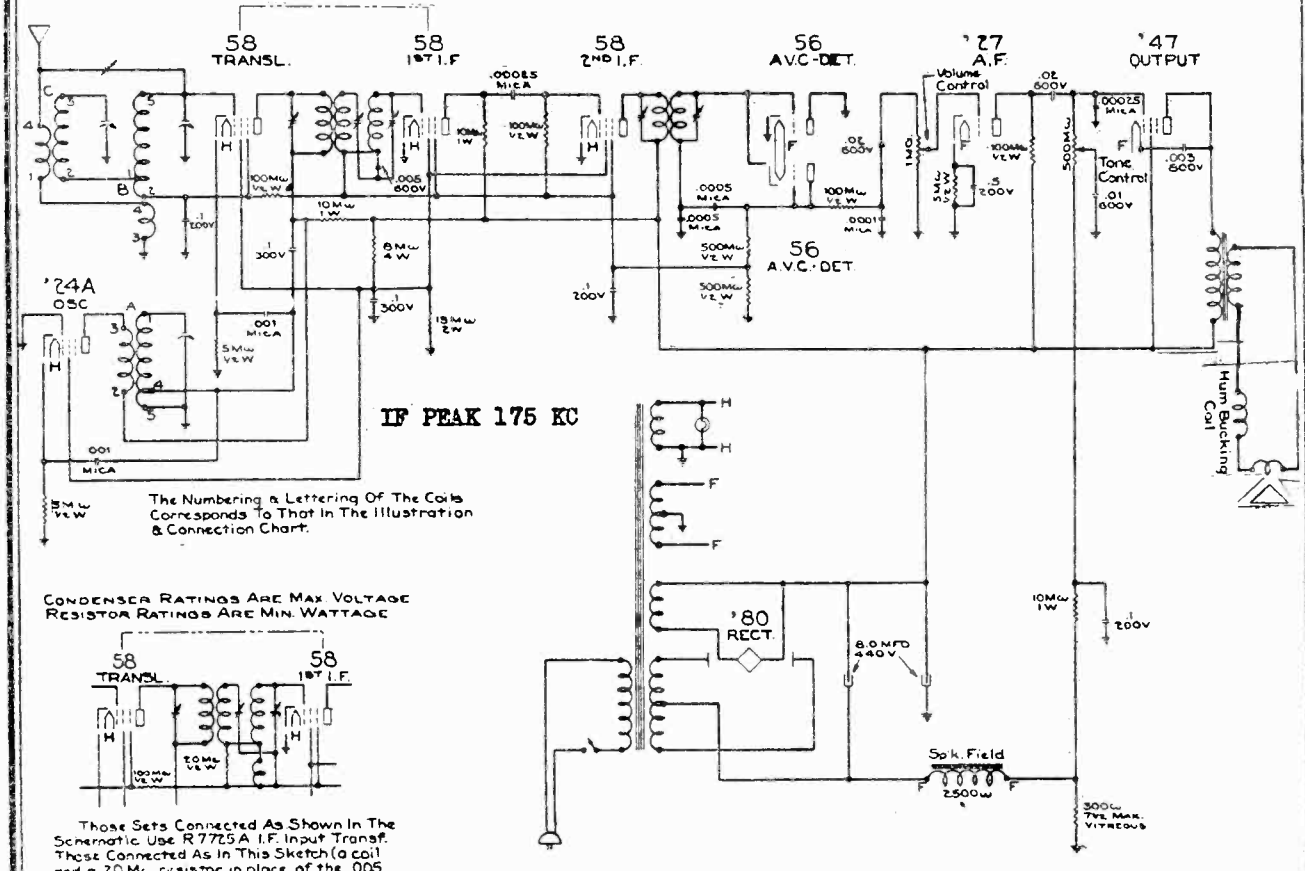


Figure 6A revised drawing

Circuit Diagram — Model C-595

SERVICE NOTES

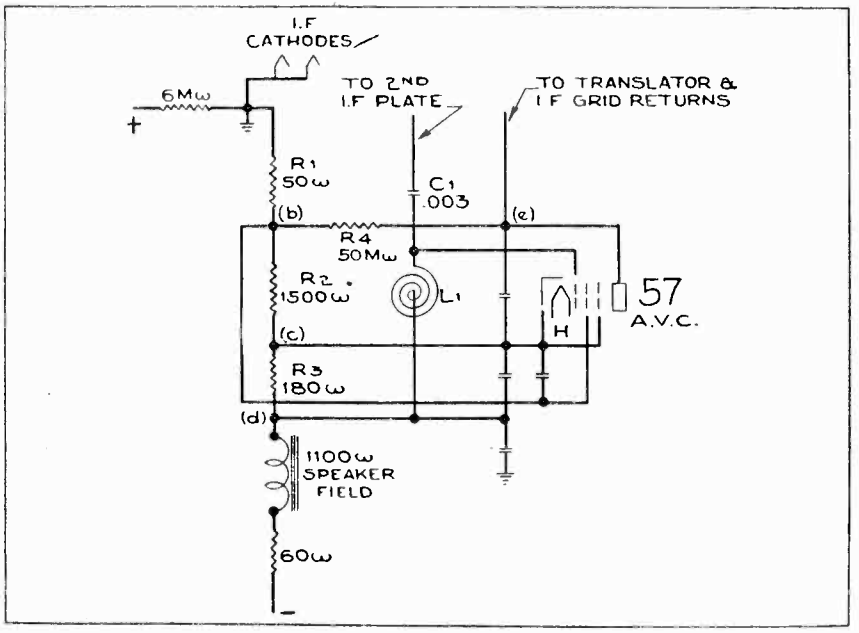
MODEL C-995

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.



(8). A.V.C. Circuit — Model C-995

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.

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.

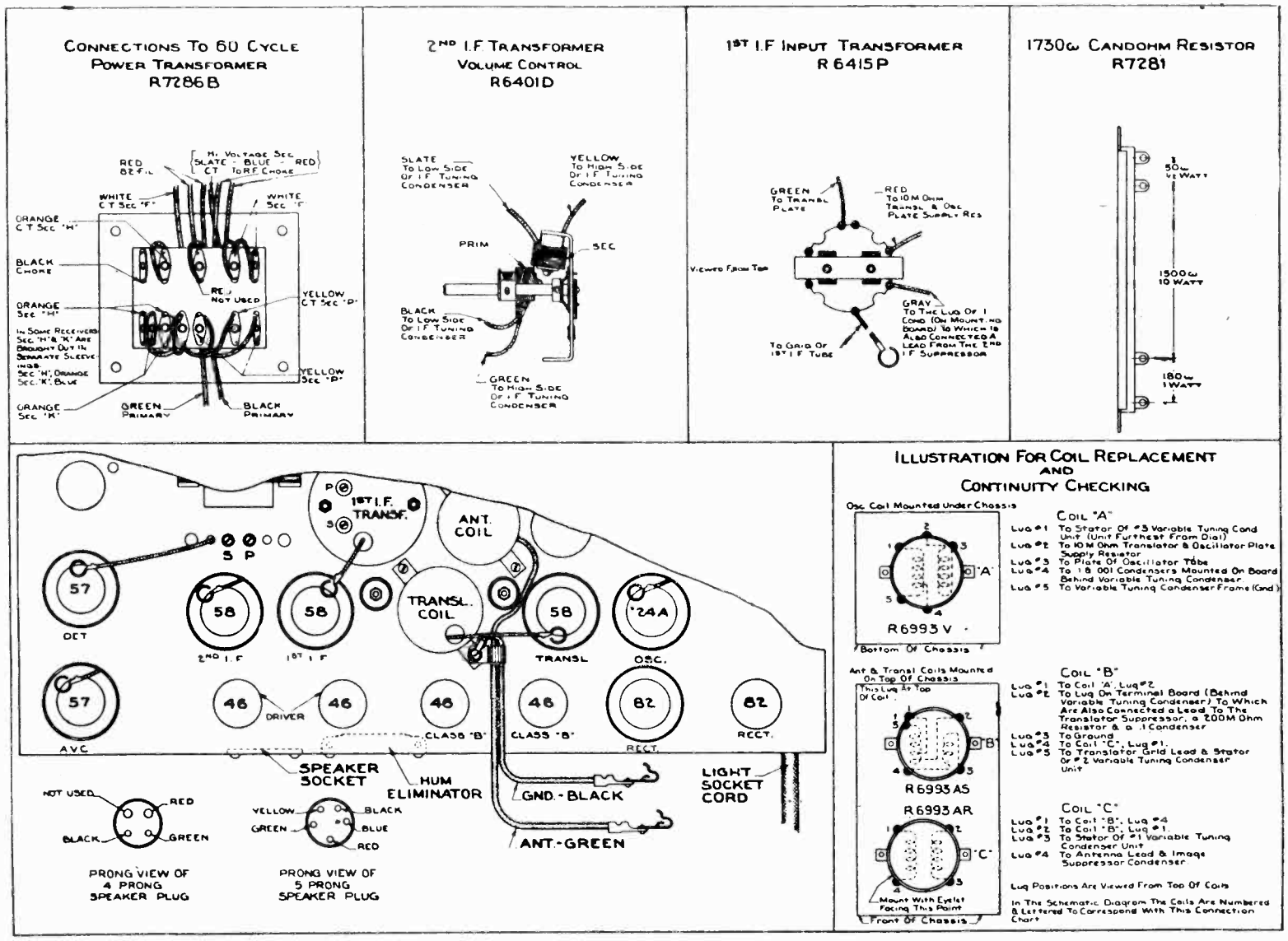
Speaker field voltage=90 v.

(*) 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.



(9). Service Illustrations — Model C-995

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.

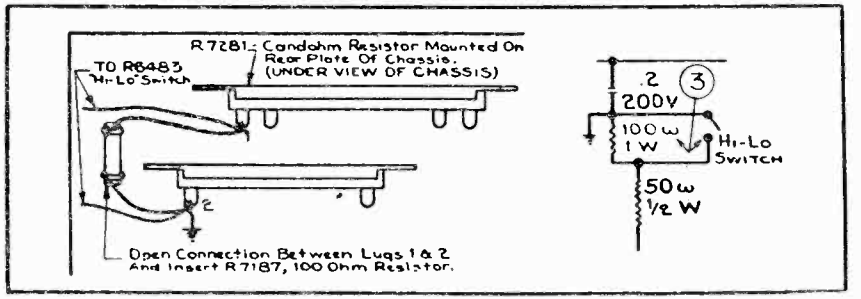
As revealed by the schematic, this switch, in its closed position, shorts out a 100 ohm resistor. The residual bias on the I.F. tubes is thereby reduced from a value of −8 volts to approximately −3 volts, increasing sensitivity.

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



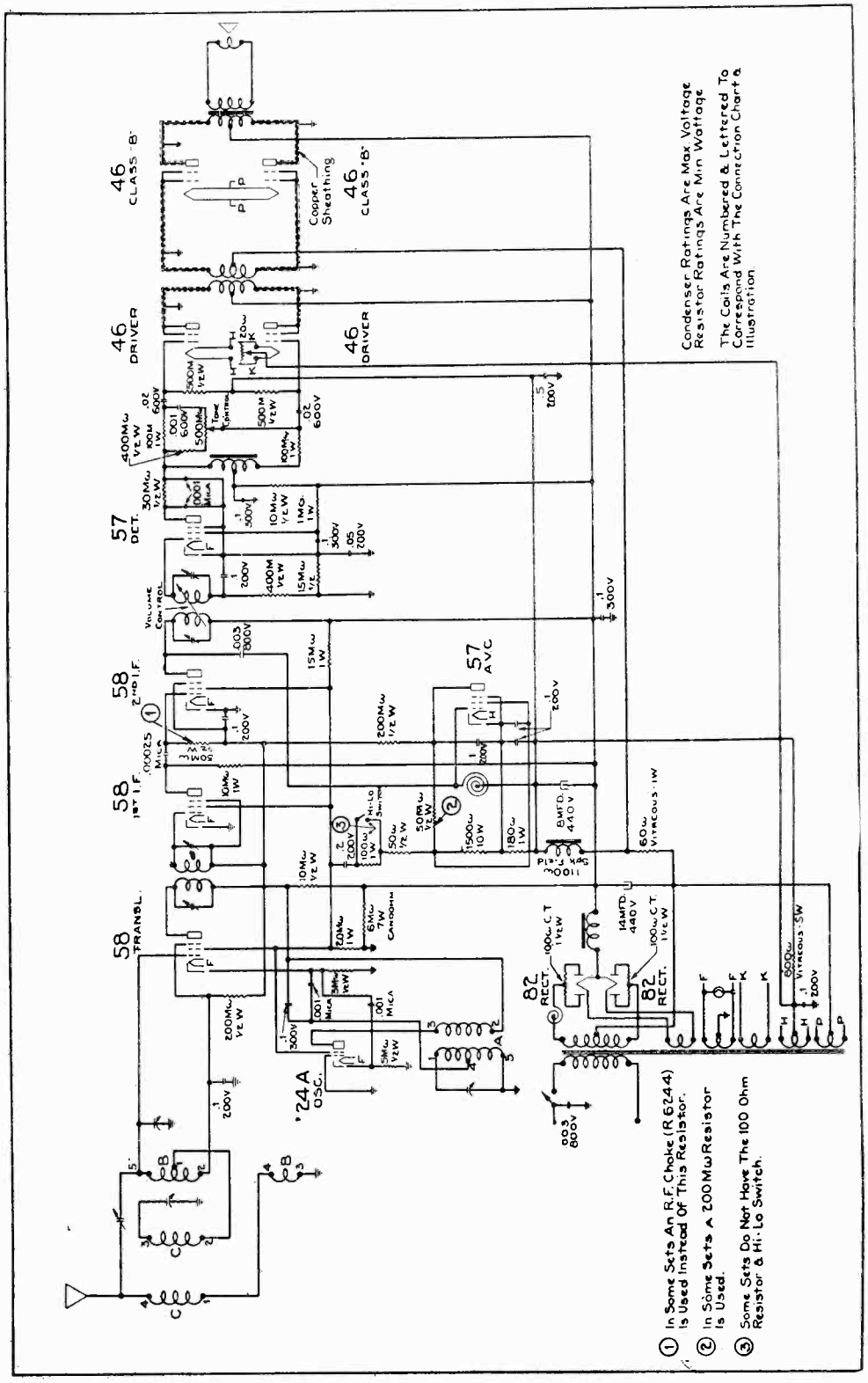
(9A). Sensitivity Control Switch Connection

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.

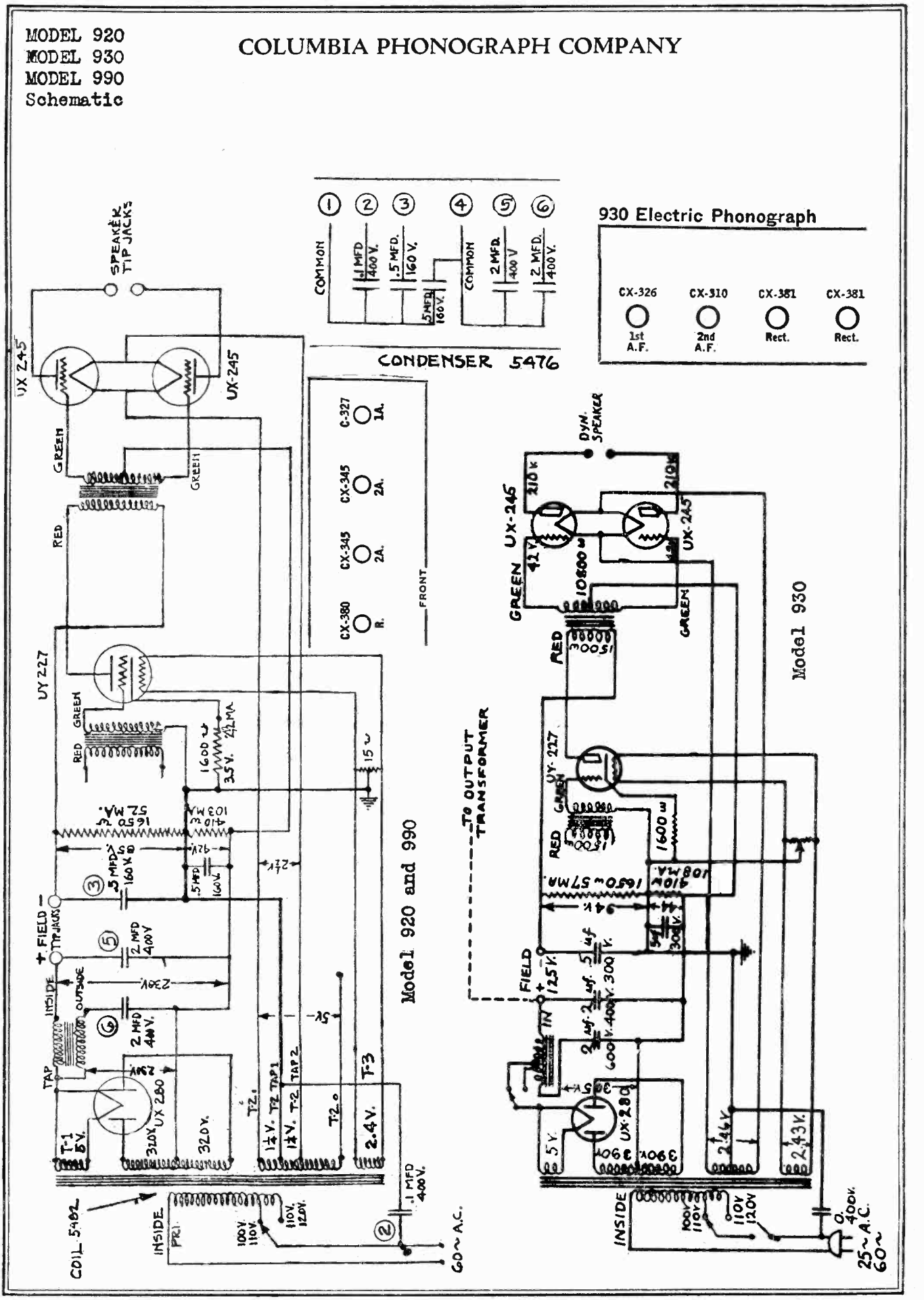
MODEL C-995
Schematic



(10). Circuit Diagram — Model C-995

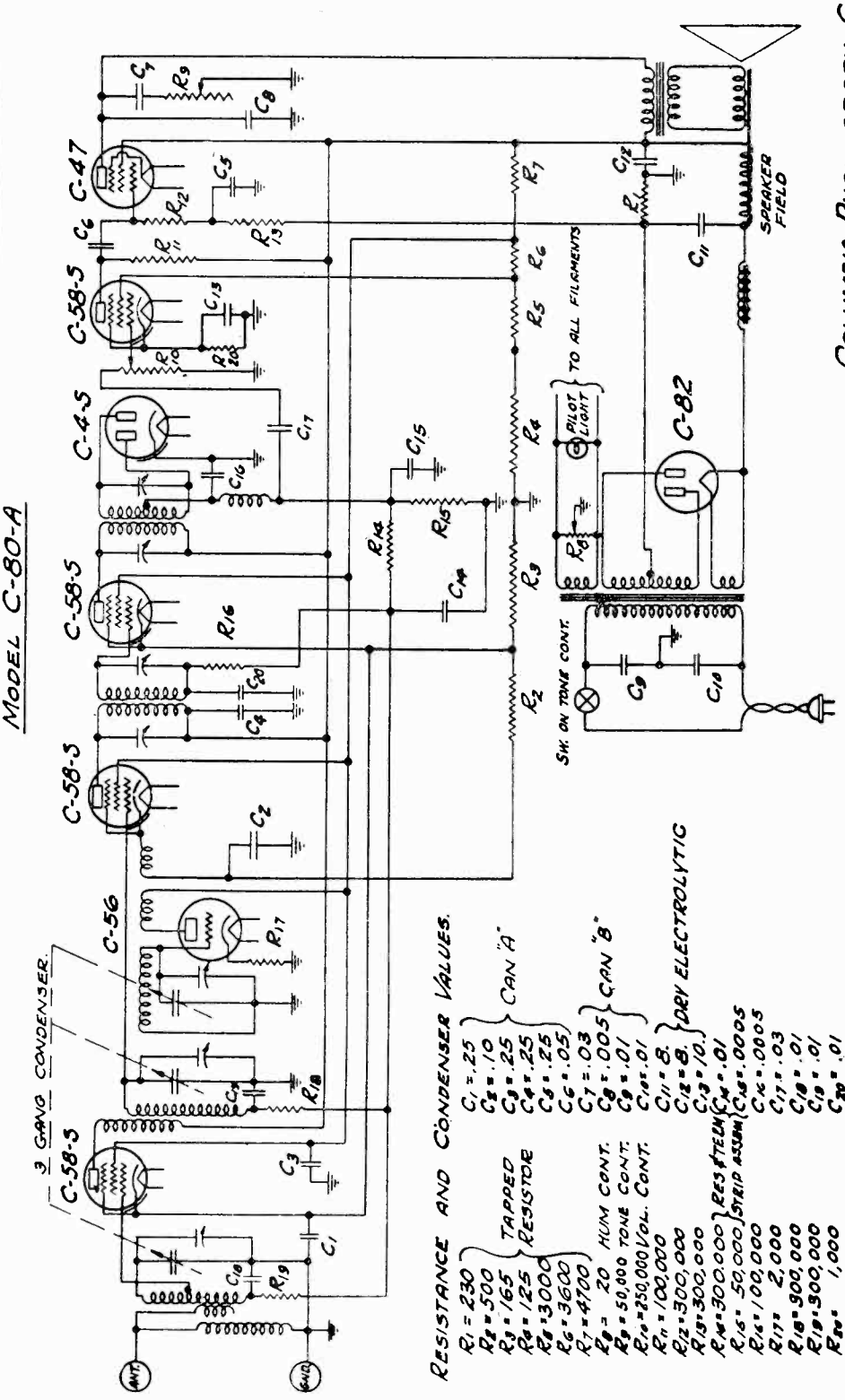
MODEL 920
MODEL 930
MODEL 990
Schematic

COLUMBIA PHONOGRAPH COMPANY



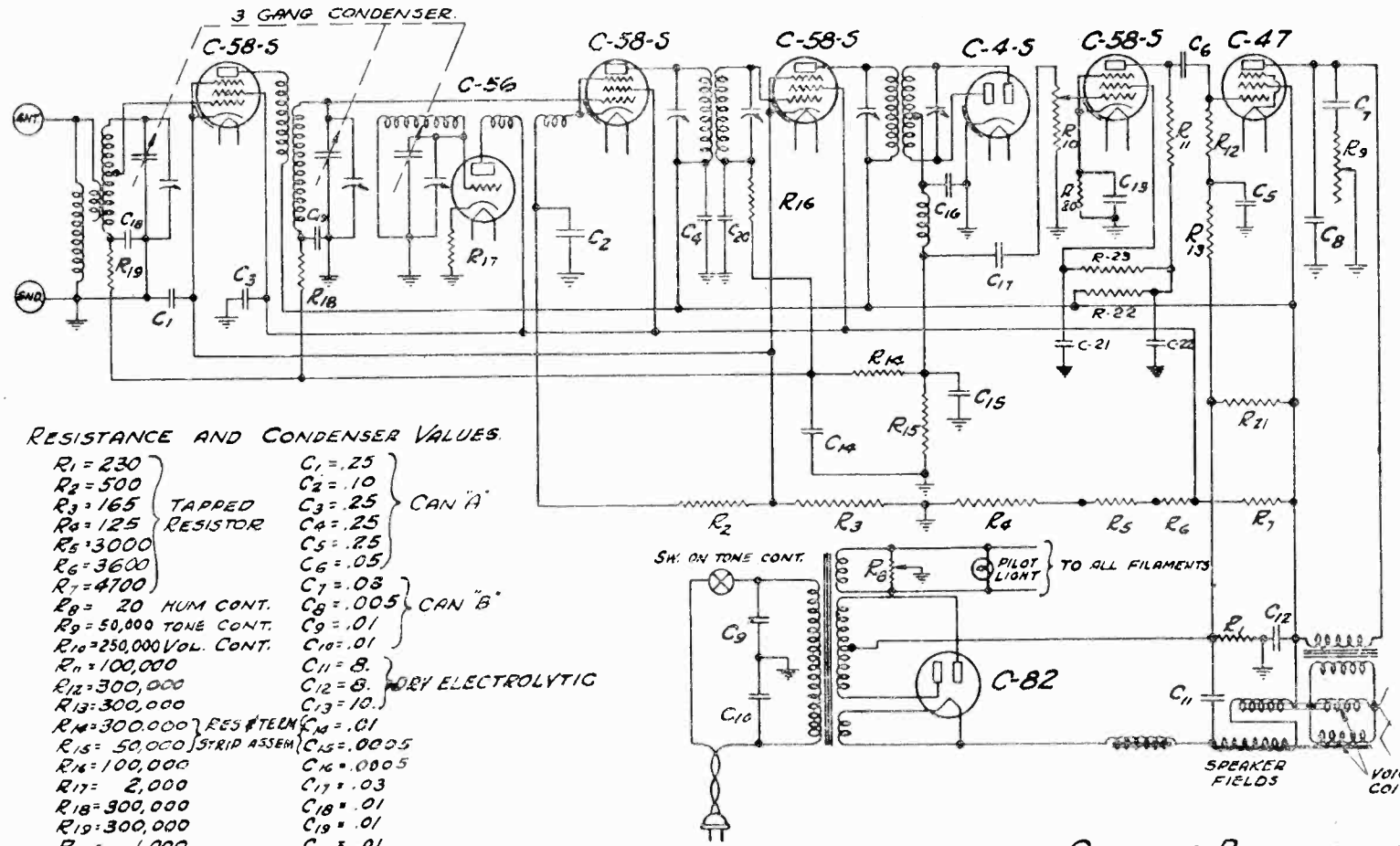
MODEL C-80-A
Schematic

COLUMBIA PHONOGRAPH COMPANY



IF PEAK 175 KC

SCHEMATIC DIAGRAM OF COLUMBIA AUTOMATIC VOLUME CONTROL SUPERHETERODYNE
MODEL C-80-B



RESISTANCE AND CONDENSER VALUES.

R_1 = 230	TAPPED RESISTOR	C_1 = .25	CAN "A"
R_2 = 500		C_2 = .10	
R_3 = 165		C_3 = .25	
R_4 = 125		C_4 = .25	
R_5 = 3000		C_5 = .25	
R_6 = 3600		C_6 = .05	
R_7 = 4700		C_7 = .08	
R_8 = 20 HUM CONT.		C_8 = .005	CAN "B"
R_9 = 50,000 TONE CONT.		C_9 = .01	
R_{10} = 250,000 VOL. CONT.		C_{10} = .01	
R_{11} = 100,000		C_{11} = 8.	DRY ELECTROLYTIC
R_{12} = 300,000		C_{12} = 8.	
R_{13} = 300,000		C_{13} = 10.	
R_{14} = 300,000	RESISTEUM STRIP ASSEM	C_{14} = .01	
R_{15} = 50,000		C_{15} = .0005	
R_{16} = 100,000		C_{16} = .0005	
R_{17} = 2,000		C_{17} = .03	
R_{18} = 300,000		C_{18} = .01	
R_{19} = 300,000		C_{19} = .01	
R_{20} = 1,000		C_{20} = .01	
R_{21} = 9,800		C-21 = .25	
R-22 = 100,000		C-22 = .25	
R-23 = 500,000			

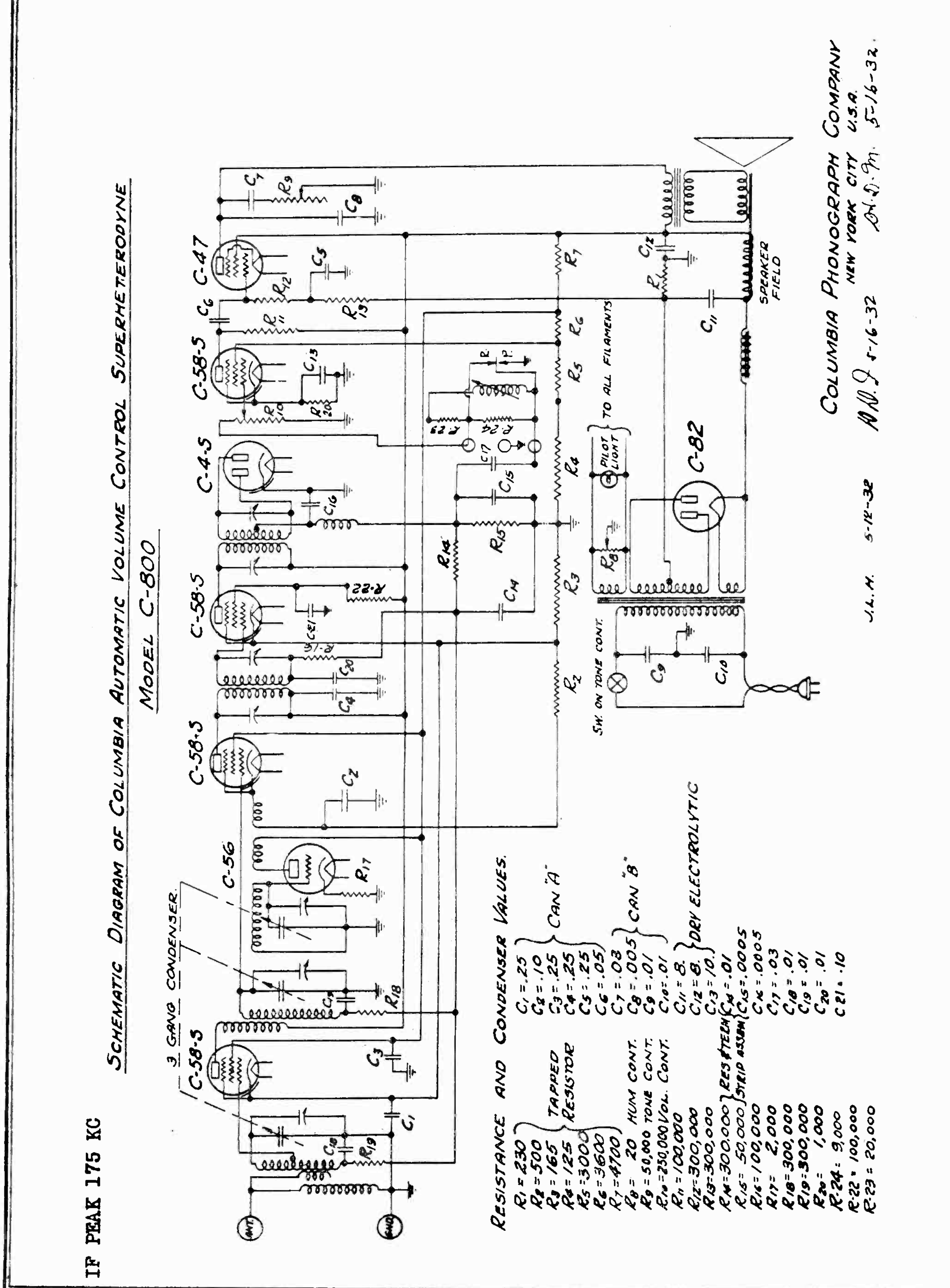
COLUMBIA PHONOGRAPH COMPANY
NEW YORK CITY U.S.A.

J.L.M. 5-12-32 A.D.M. 5-16-32 A.D.M. 5-16-32

COLUMBIA PHONOGRAPH COMPANY MODEL C-80-B Schematic 150

MODEL C-800
Schematic

COLUMBIA PHONOGRAPH COMPANY


SCHEMATIC DIAGRAM OF COLUMBIA AUTOMATIC VOLUME CONTROL SUPERHETERODYNE
MODEL C-800
IF PEAK 175 KC
C-58-5
C-56
C-58-5
C-58-5
C-4-5
C-58-5
C-47
C-82
3 GANG CONDENSER.
SPEAKER FIELD
PILOT LIGHT
TO ALL FILAMENTS
SW. ON TONE CONT.
RESISTANCE AND CONDENSER VALUES.
R1 = 230
R2 = 500
R3 = 165
R4 = 125
R5 = 3000
R6 = 3600
R7 = 4700
TAPPED RESISTOR
R8 = 20 HUM CONT.
R9 = 50,000 TONE CONT.
R10 = 250,000 VOL. CONT.
R11 = 100,000
R12 = 300,000
R13 = 300,000
R14 = 300,000 RES & TECH STRIP ASSEM
R15 = 50,000
R16 = 100,000
R17 = 2,000
R18 = 300,000
R19 = 300,000
R20 = 1,000
R24 = 9,000
R22 = 100,000
R23 = 20,000
C1 = .25
C2 = .10
C3 = .25
C4 = .25
C5 = .25
C6 = .05
CAN "A"
C7 = .03
C8 = .005
C9 = .01
C10 = .01
CAN "B"
C11 = 8.
C12 = 8.
C13 = 10.
DRY ELECTROLYTIC
C14 = .01
C15 = .0005
C16 = .0005
C17 = .03
C18 = .01
C19 = .01
C20 = .01
C21 = .10
J.L.H. 5-12-32
COLUMBIA PHONOGRAPH COMPANY
NEW YORK CITY U.S.A.
5-16-32

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 3 - - 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.

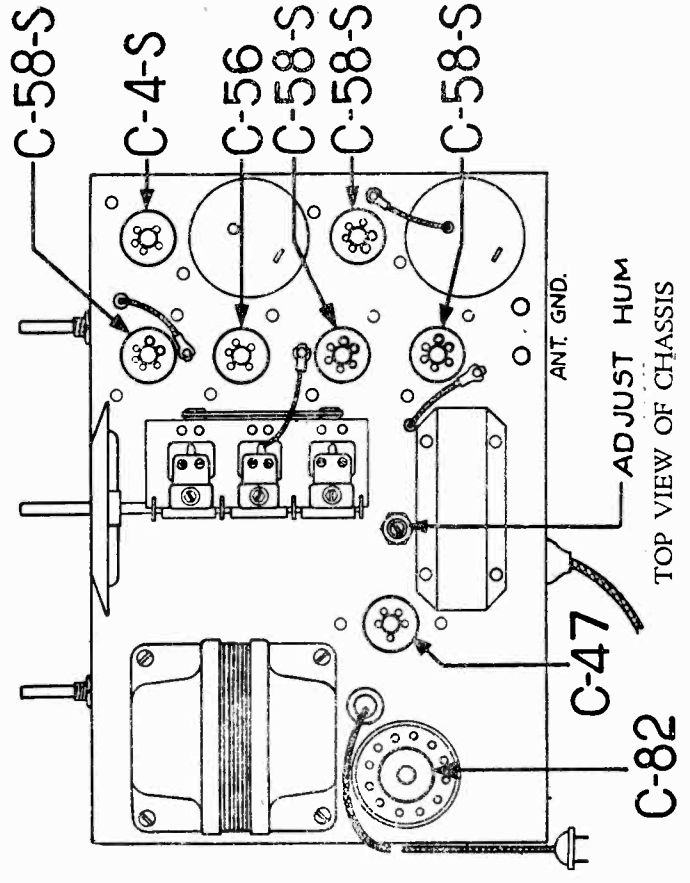
TECHNICAL DATA PERTAINING TO MODEL C-80-B CHASSIS

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



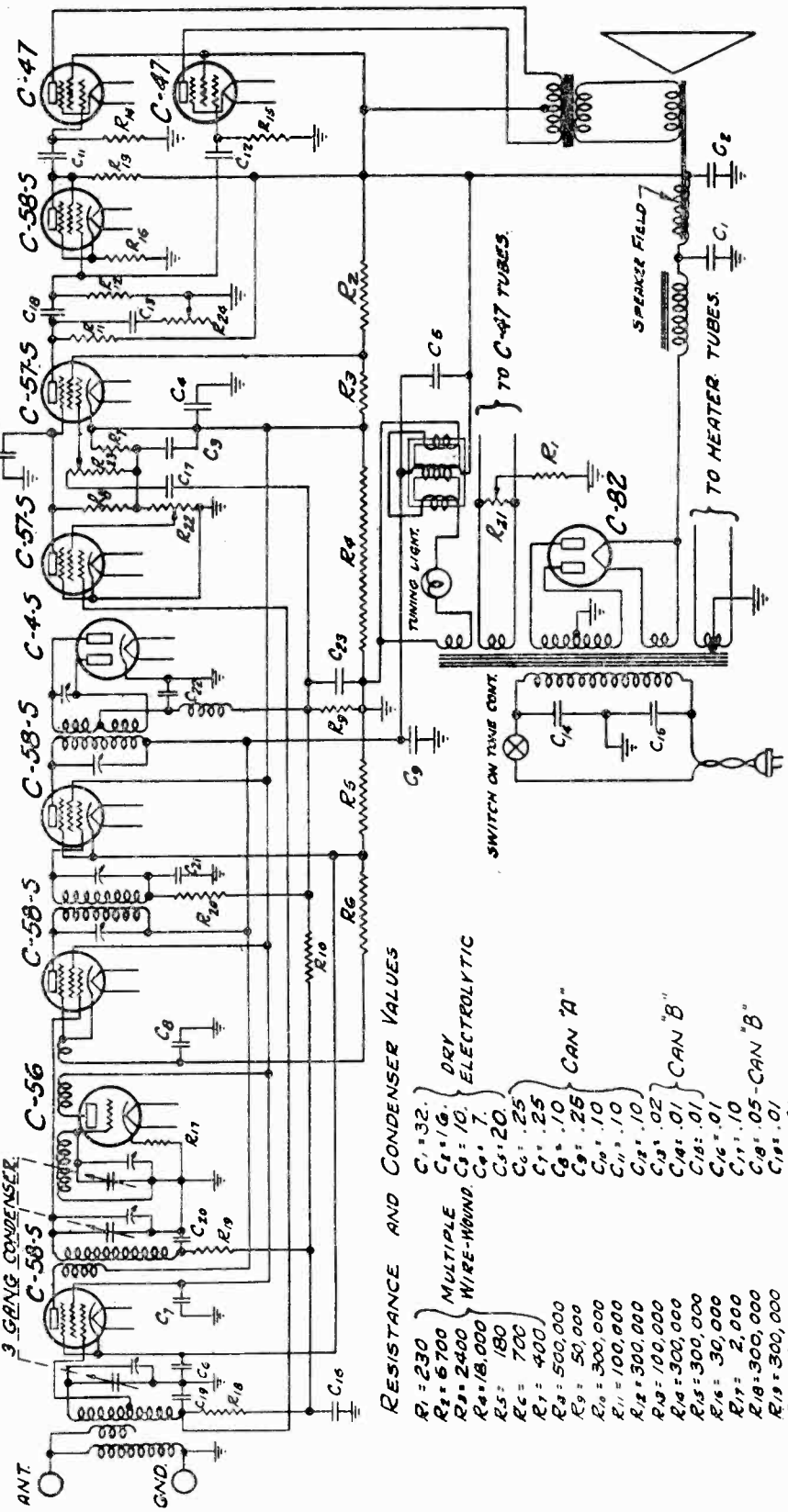
TOP VIEW OF CHASSIS

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

R1 = 230
R2 = 6700
R3 = 2400
R4 = 18,000
R5 = 180
R6 = 700
R7 = 400
R8 = 500,000
R9 = 50,000
R10 = 300,000
R11 = 100,000
R12 = 300,000
R13 = 100,000
R14 = 300,000
R15 = 300,000
R16 = 30,000
R17 = 2,000
R18 = 300,000
R19 = 300,000
R20 = 100,000
R21 = 20
R22 = 20,000
R23 = 200,000
R24 = 250,000

MULTIPLE WIRE-WOUND

HUM CONT.
SUPPRESSOR
VOL. CONT.
TONE CONT.

C1 = 32. DRY
C2 = 16. ELECTROLYTIC
C3 = 10.
C4 = 7.
C5 = 20.
C6 = .25
C7 = .25
C8 = .10 CAN "A"
C9 = .25
C10 = .10
C11 = .10
C12 = .10
C13 = .02
C14 = .01 CAN "B"
C15 = .01
C16 = .01
C17 = .10
C18 = .05-CAN "B"
C19 = .01
C20 = .01
C21 = .01
C22 = .0005
C23 = .0005
C24 = .0005

COLUMBIA PHONOGRAPH CO.
NEW YORK CITY.

V.L.H. 7-5-32.

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 85). 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.

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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 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 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. 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 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

MODEL C-100
Schematic
Voltage
Notes

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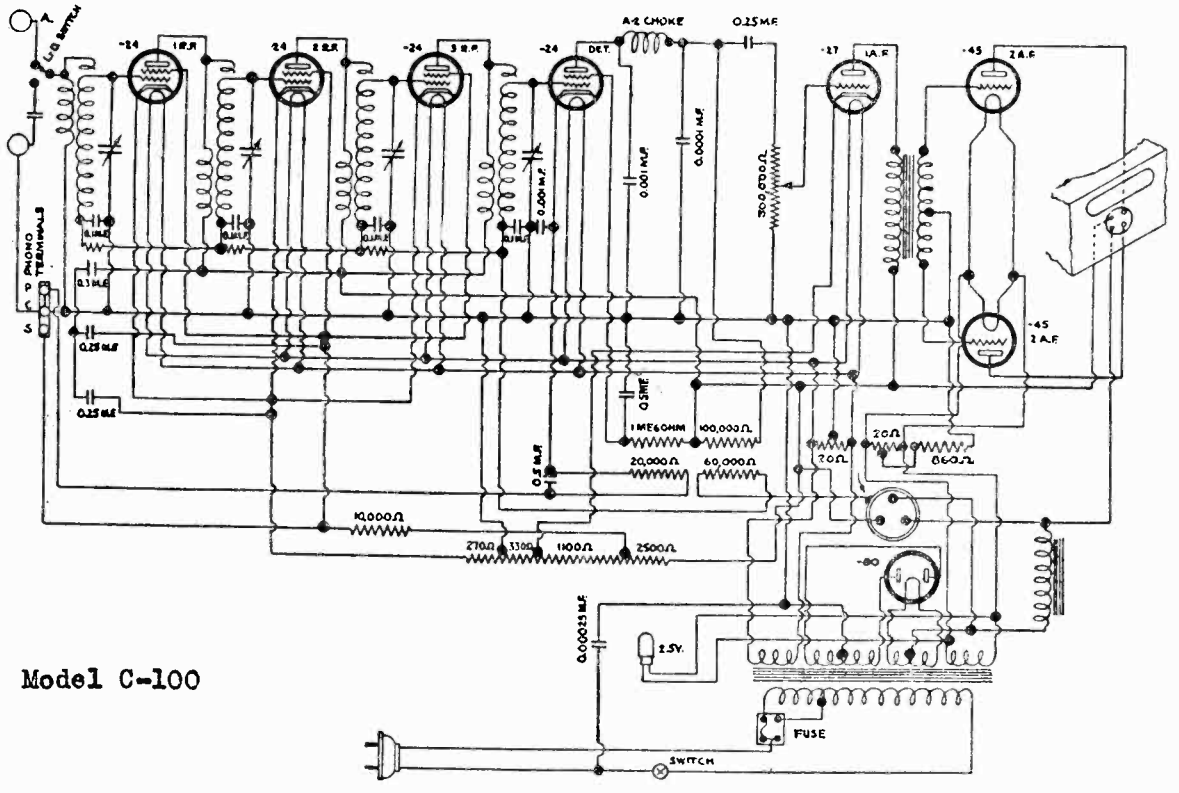
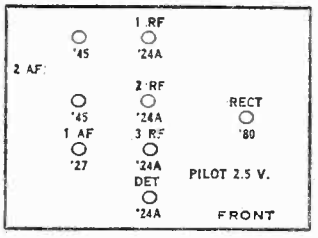


Model C-100



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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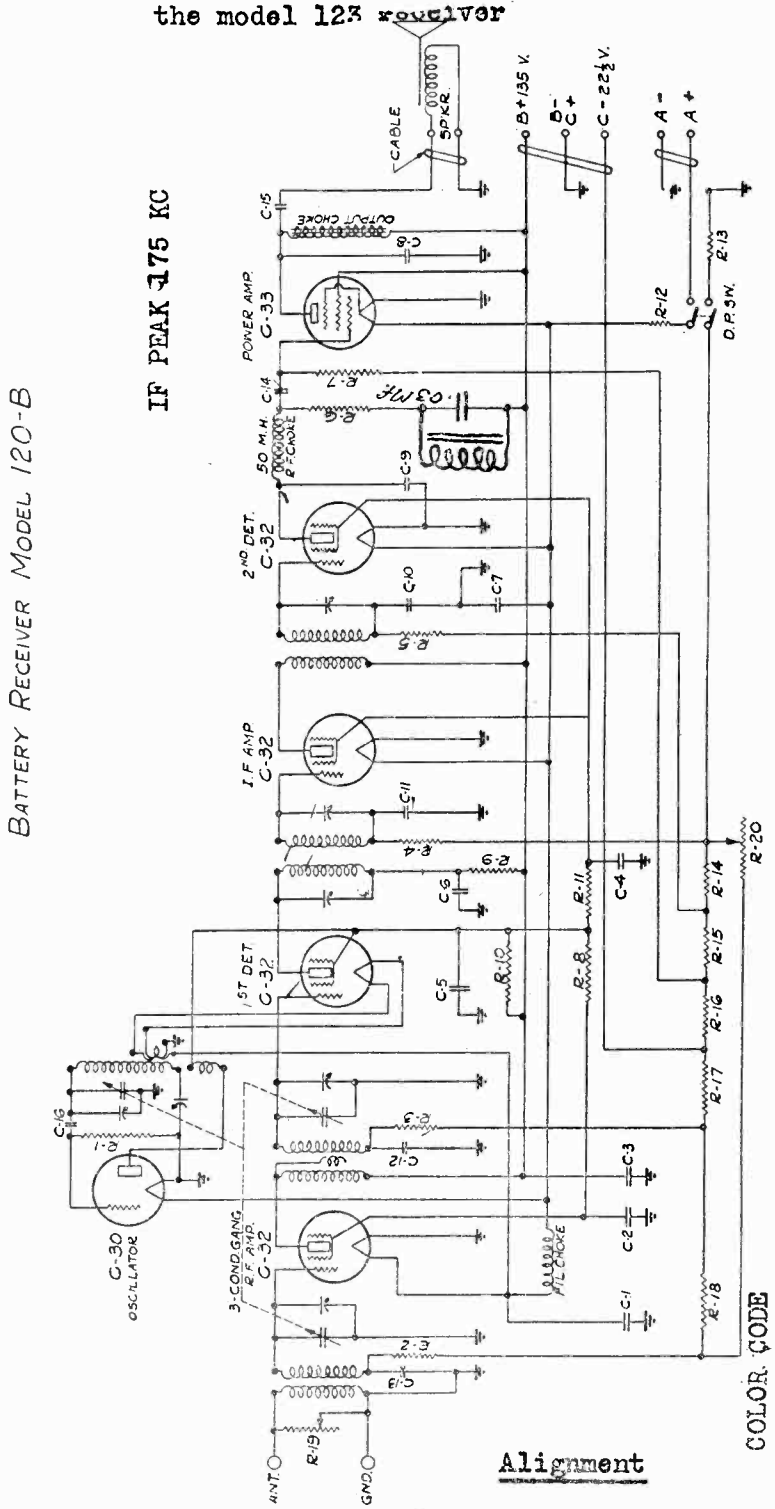
MODEL 120-B
Schematic
Notes

NOTE.. This chassis is used in the model 123 receiver

BATTERY RECEIVER MODEL 120-B

IF PEAK 175 KC



CAPACITIES M.F

C1 = .1		CAN
C2 = .1		
C3 = .27		
C4 = .1		
C5 = .1		
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		

RESISTANCES-Ω

R1 = 330,000		
R2 = 100,000		
R3 = 100,000		
R4 = 100,000		
R5 = 100,000		
R6 =		
R7 = 600,000	TERM. STRIP 'A'	
R8 = 50,000		
R9 = 250		
R10 = 20,000		
R11 = 50,000		
R12 = 0.45		
R13 = 375	TERM. STRIP 'B'	
R14 = 830		
R15 = 920		
R16 = 1,500		
R17 = 7,250		
R18 = 2,530	VOLUME CONTROL	
R19 = 10,000		
R20 = 10,000		
R21 = 25,000		

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".

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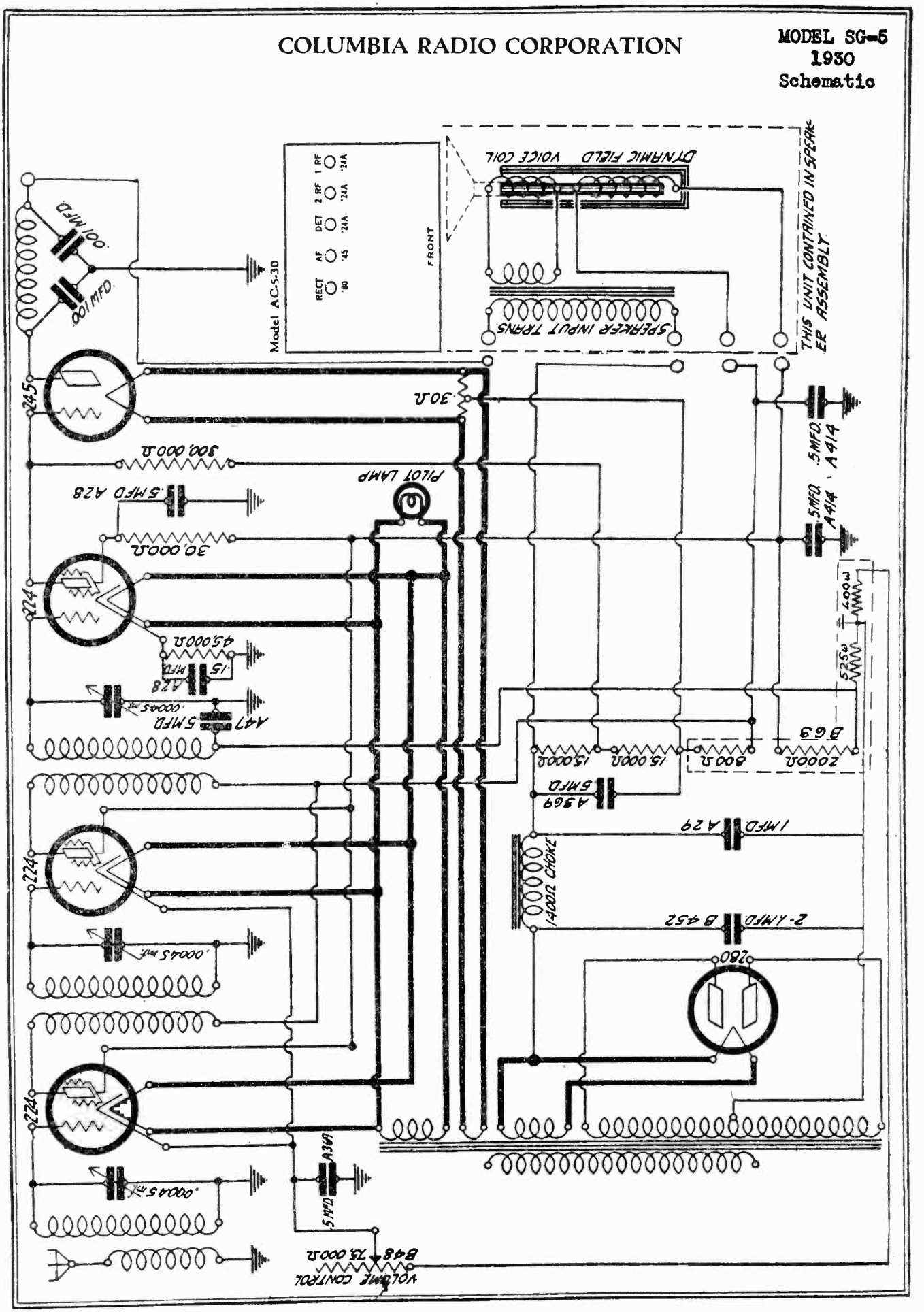
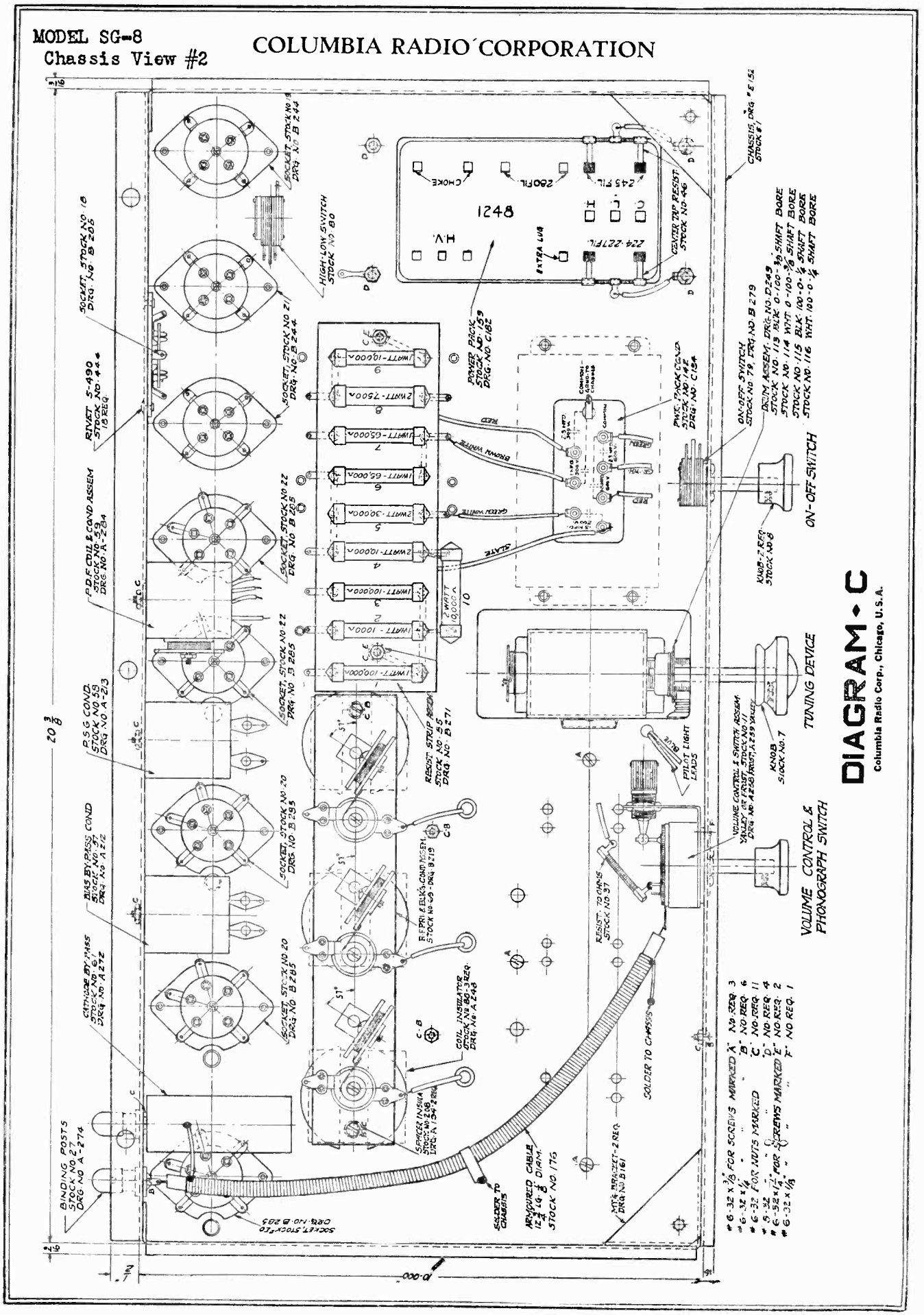
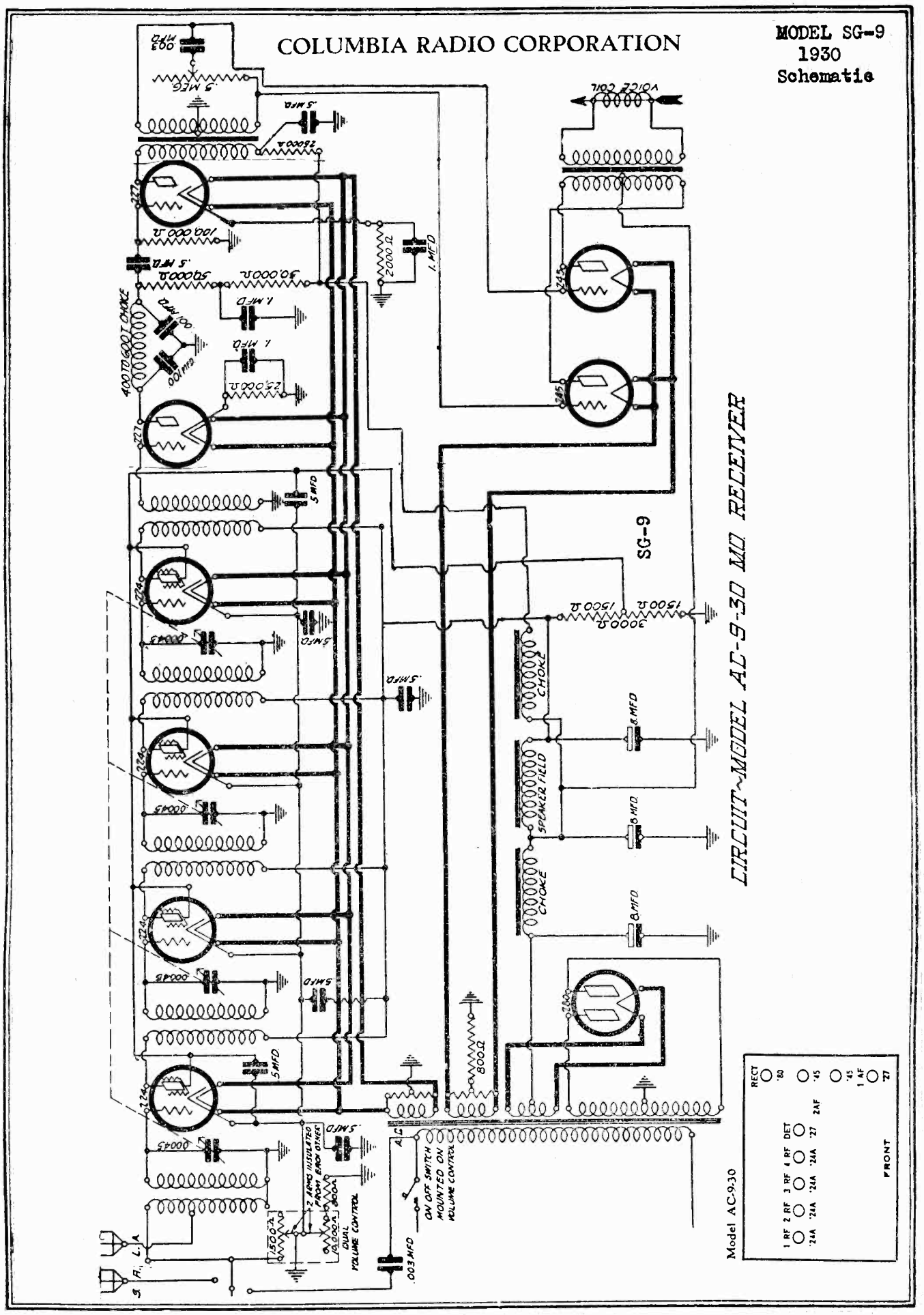
MODEL SG-5
1930
Schematic



MODEL SG-8
Chassis View #2

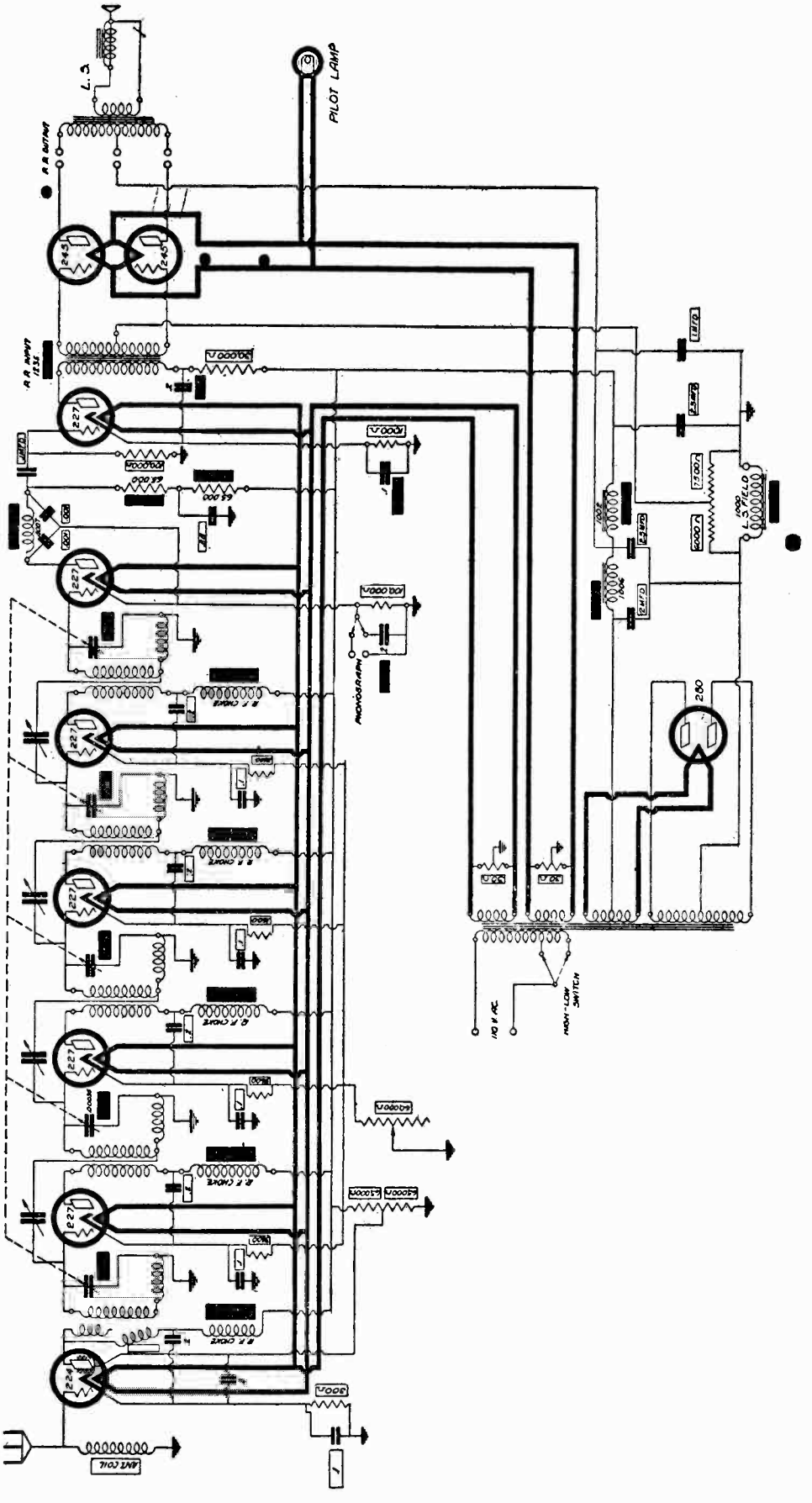
COLUMBIA RADIO CORPORATION





MODEL SG-10
Schematic

COLUMBIA RADIO CORPORATION



RECEIVER SG-10 (1930)

Tuning Condenser Alignment Notes

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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.

Tuning Condenser Alignment Notes

CROSLEY RADIO CORP

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 1260 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.

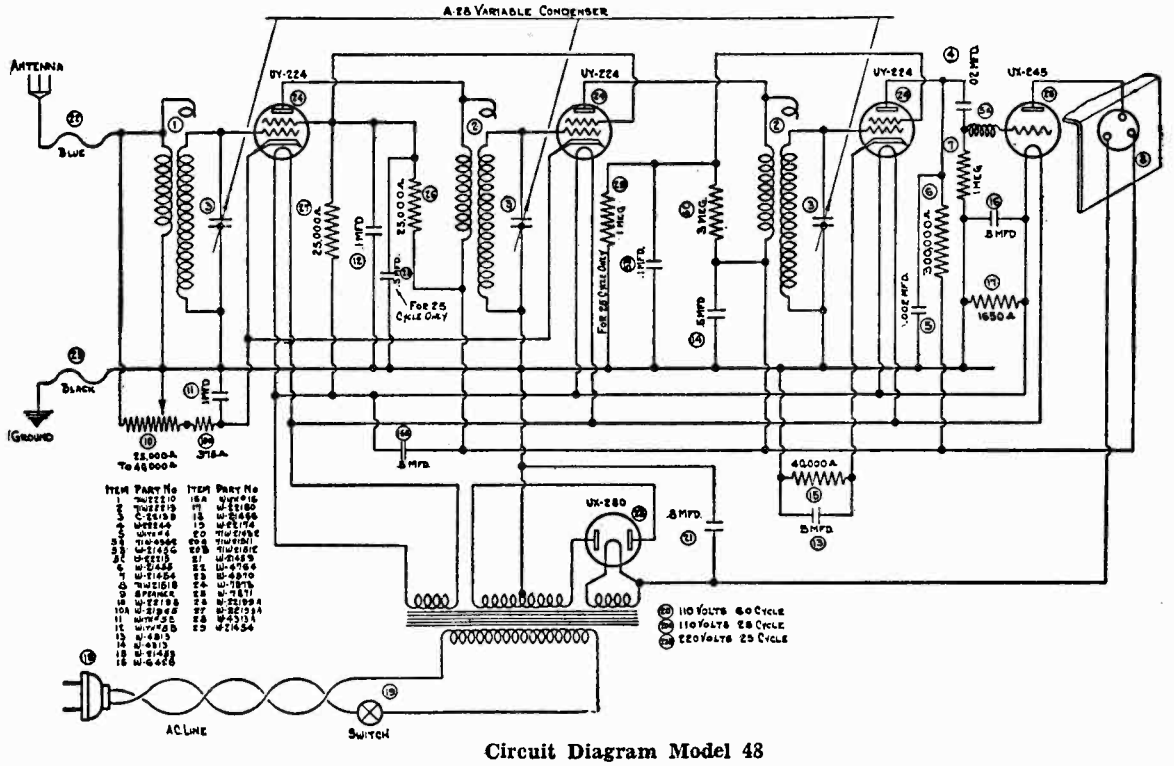
TABLE OF DYNACOIL SPEAKERS

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.

CROSLEY RADIO CORP.

MODEL 48
Schematic, Voltage



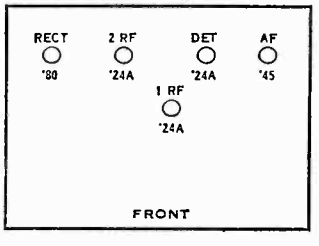
Circuit Diagram Model 48

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.

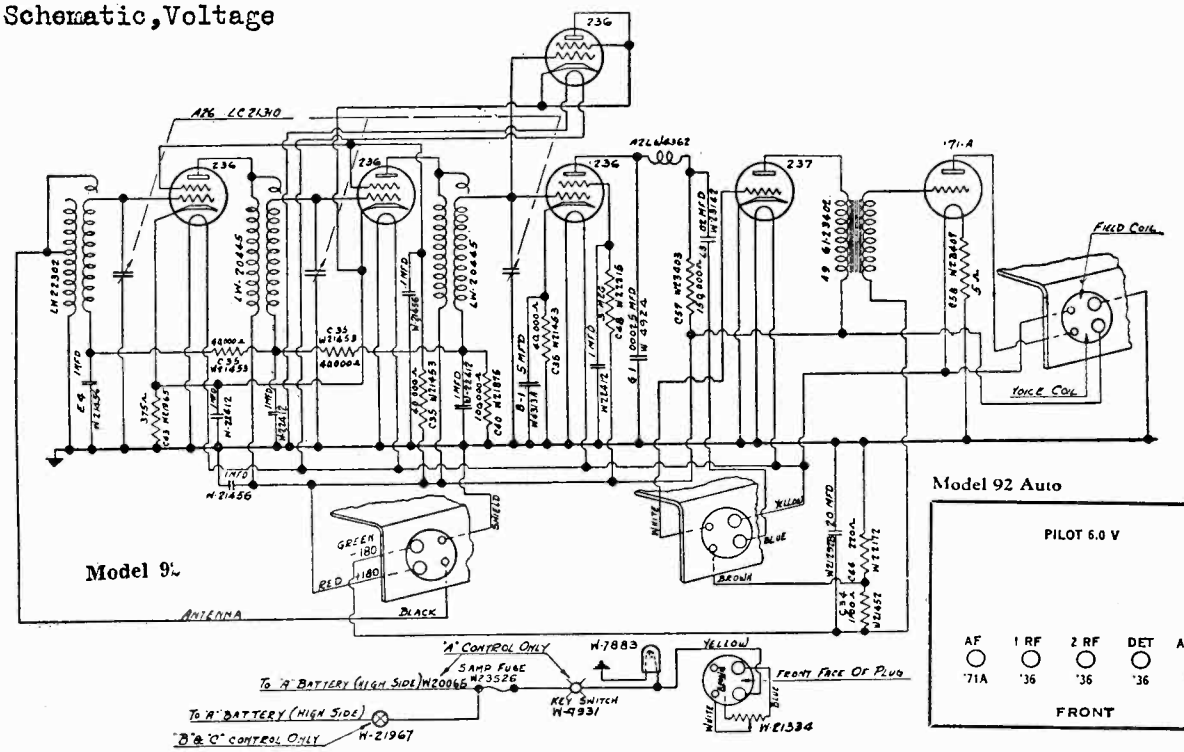
Qty.	Part No.	Description	List Price Each
		CABINET	
1	W-21888A	Housing	2.00
1	W-21887	Front Cover	.50
1	W-21553A	Drive Bracket Hole Cover	.10
1	W-21554A	Drive Bracket Cover	.15
1	B-21555A	Chassis Bottom	.25
1	W-21714	Battery Plug Bracket	.10
		CHASSIS	
1	C-21528	Chassis	.75
5	W-7871	Socket (4 Prong)	.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 (¼ 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

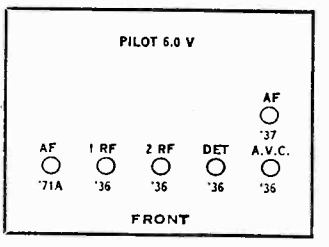
Qty.	Part No.	Description	List Price Each
	W-21315	**TYPE "A" DASH CONTROL COMPLETE**	7.00
2	W-7919	Knob	.20
2	W-7947	Spring	.05
1	W-7946	Fuse Panel	.35
1	W-7959C	Mounting Plate & Dial Light Clip Assembly	.80
1	W-21316	Dial & Gear	.50
1	W-7928A	Escutcheon	.80
1	W-7931A	Key Switch	1.25
1	W-7907A	Pinion	.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-1620G	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.

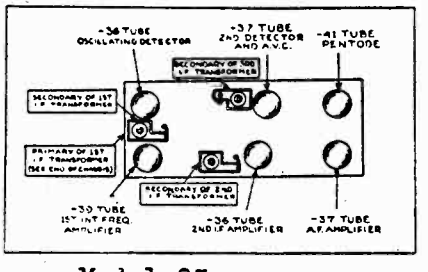




CROSLEY MODEL 95 (ROAMIO) VOLTAGE DATA

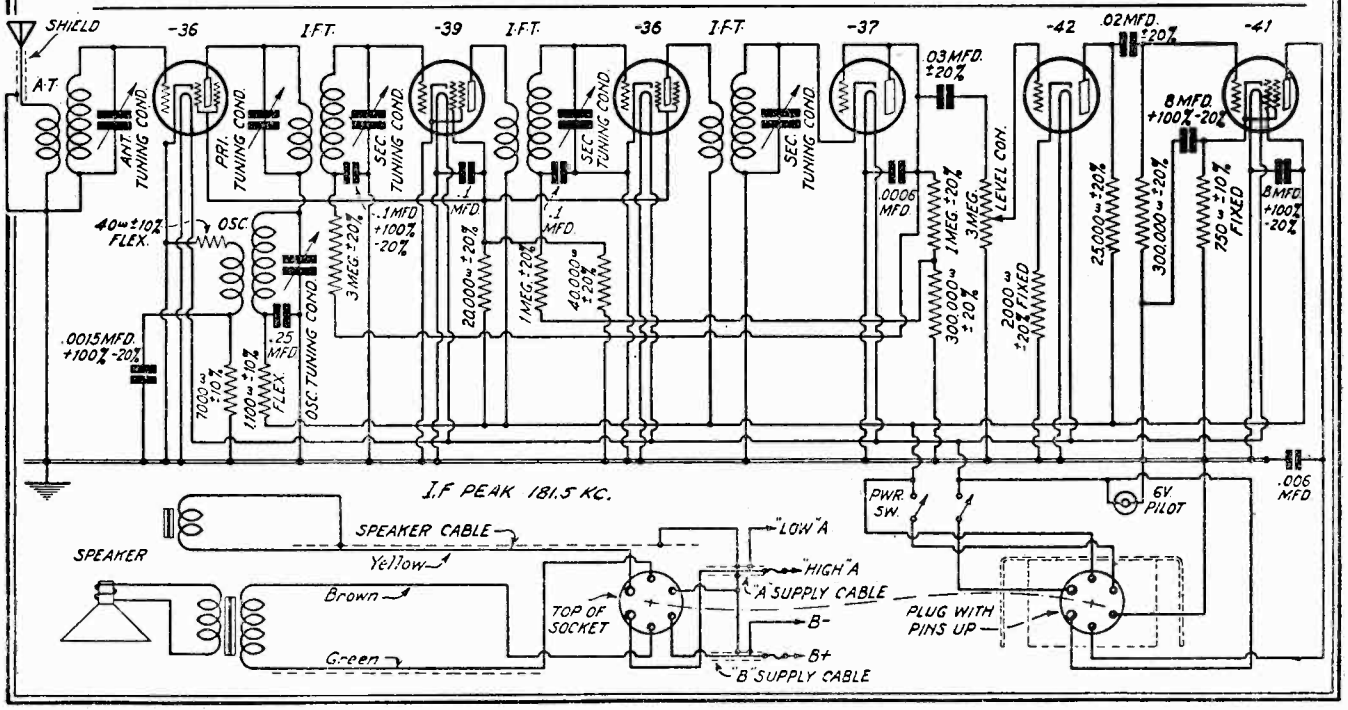
Tube	Plate	Screen	Grid
1st Det.	160—180	70—80	—7 to —9
I-F.	160—180	70—80	AVC only
2nd Det.	0	.....	0
1st A-F.	80—90	.....	—5 to —6
Output	150—170	160—180	—16 to —18

Plate and screen voltages measured from element to chassis.



Model 95

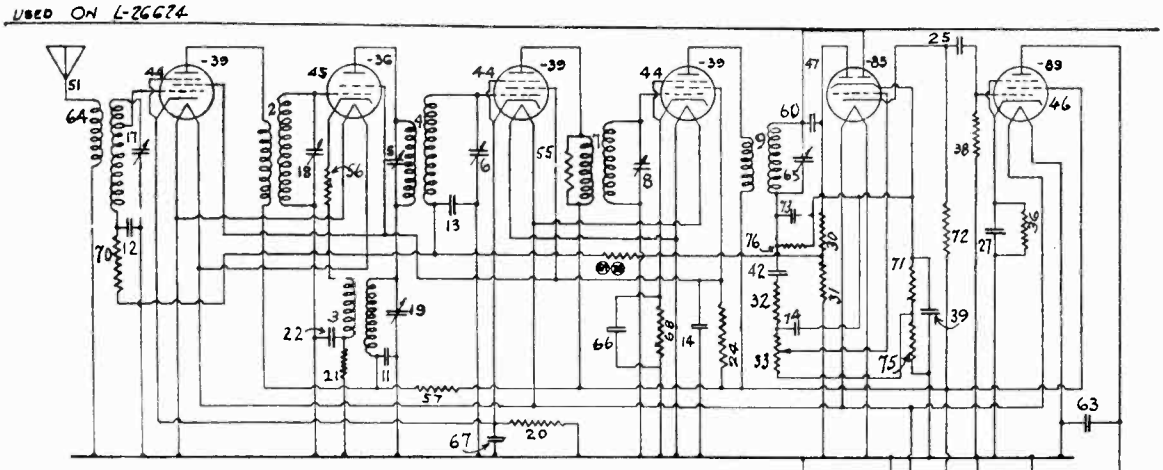
Schematic diagram of the Crosley Model 95 (Roamio), with combination oscillator-detector



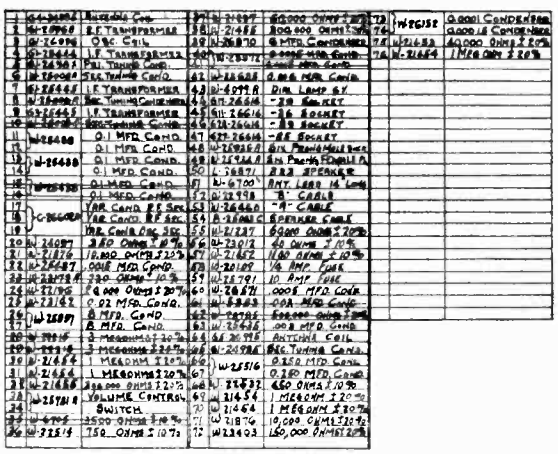
CROSLEY RADIO CORP

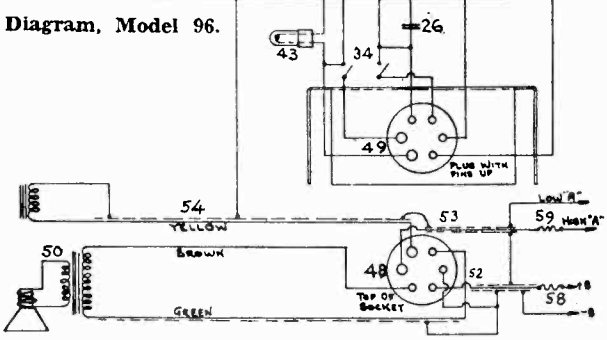
MODEL 96
Schematic
Voltage

USED ON L-26674



Circuit Diagram, Model 96.





I-F.PEAK 181.5 KC.

96 CHASSIS ASSEMBLY
WIRING DIAGRAM

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.

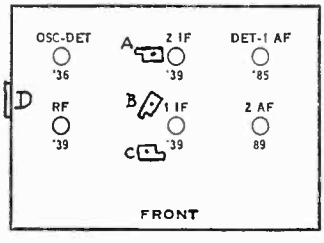
3. Connect the high side of the test oscillator output through a condenser of approximately 0.1 mf. capacity to the grid of the first detector tube, and the low side of the test oscillator to chassis. Do not remove the clip wire from the grid of the first detector tube.

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.

CROSLEY RADIO CORP.

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 aligning 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.

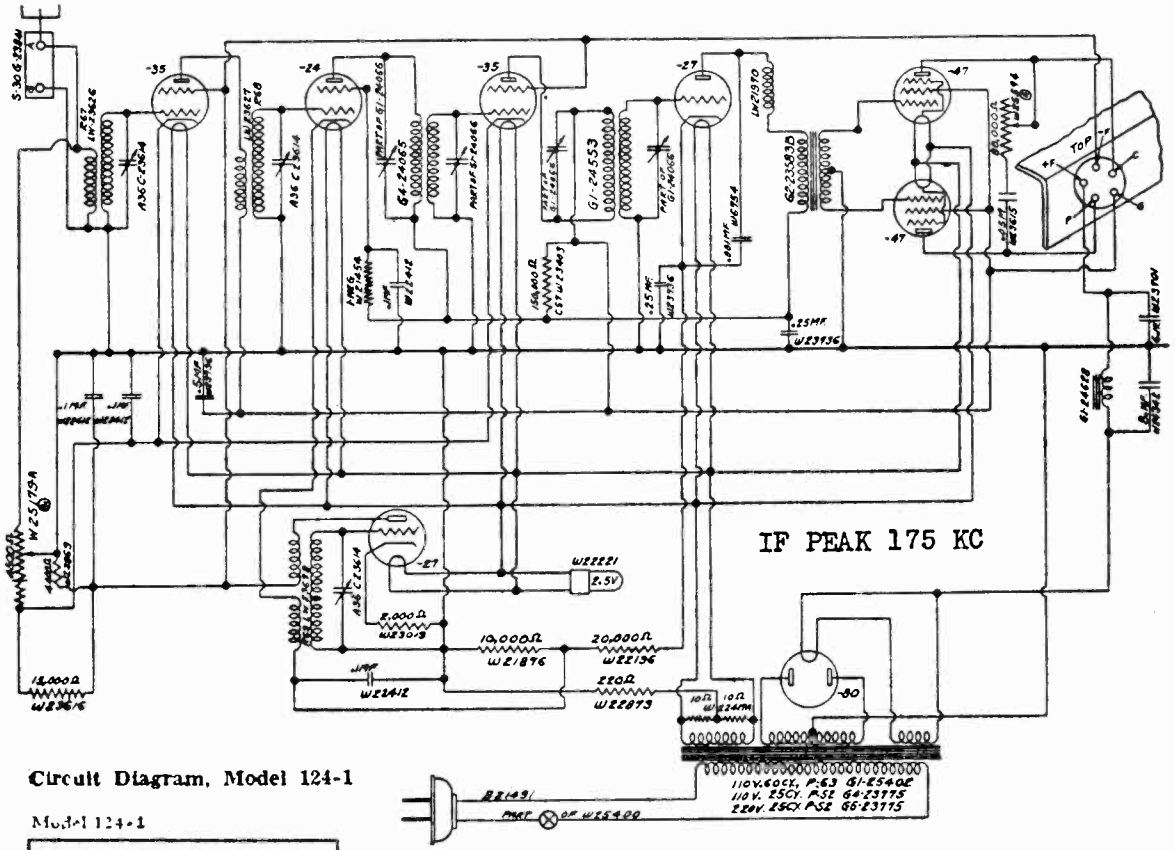
2. Remove the oscillator tube from the chassis. Remove the clip wire from the top of the intermediate frequency amplifier tube. Connect the test oscillator output from the control grid of the intermediate amplifier to ground. Adjust the two screws on either side of the rear r. f. coil (the coil between 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.

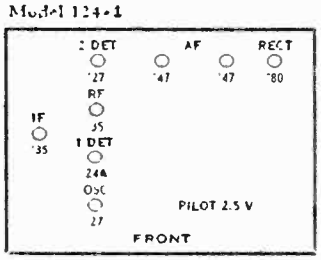
MODEL 124-1
Schematic
Voltage

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

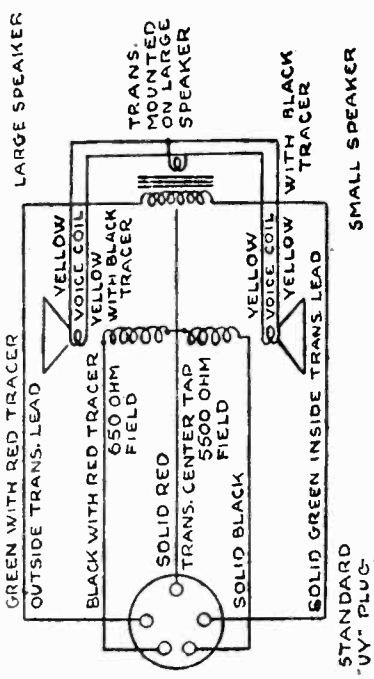
R.F. and I.F. Tubes	245 to 285
First Detector Tube	130 to 150
Oscillator Tube	80 to 100
Second Detector Tube	120 to 140
Output Tube	230 to 270
Rectifier	330 to 390

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



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 (such 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.

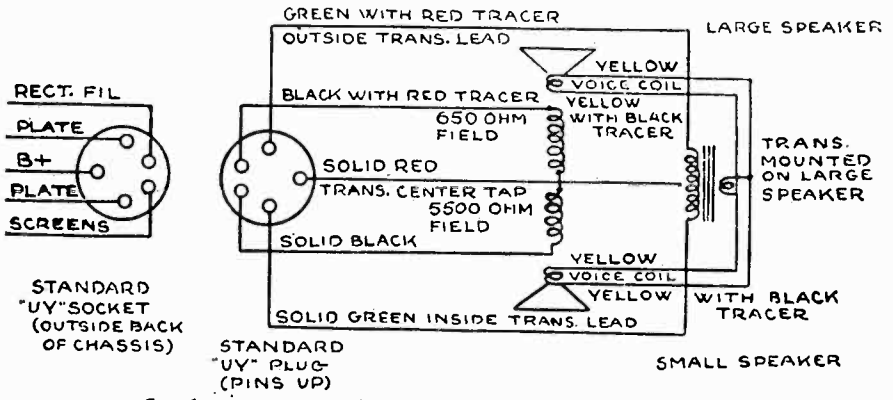
5. Adjustment should be made with a screwdriver of insulating material. If such a screwdriver is not available, adjust with an ordinary screwdriver so that the output is best, or the frequency setting best, **with the screwdriver removed from the chassis.**

CROSLEY RADIO CORP.

MODEL 127-1
Schematic
Voltage
Notes

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.

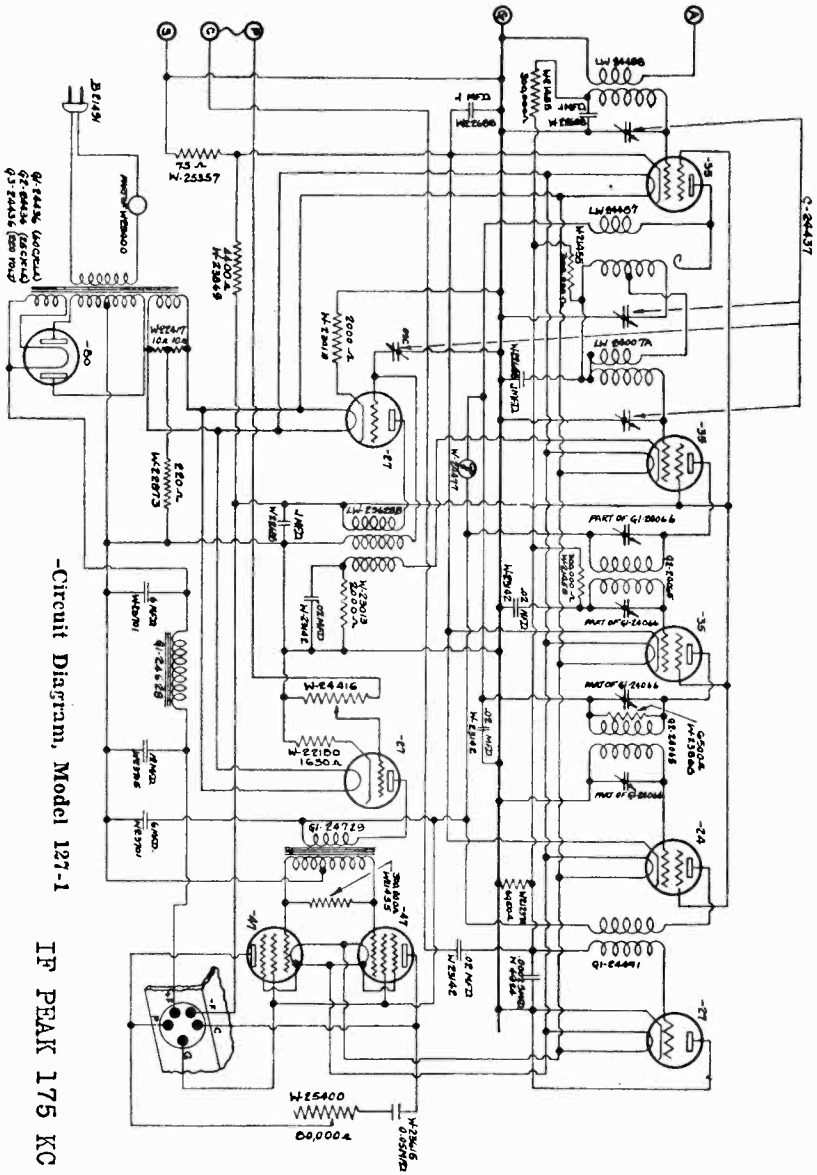
To align the oscillator, antenna coupler and r-f. amplifier stage, the following procedure should be followed:

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

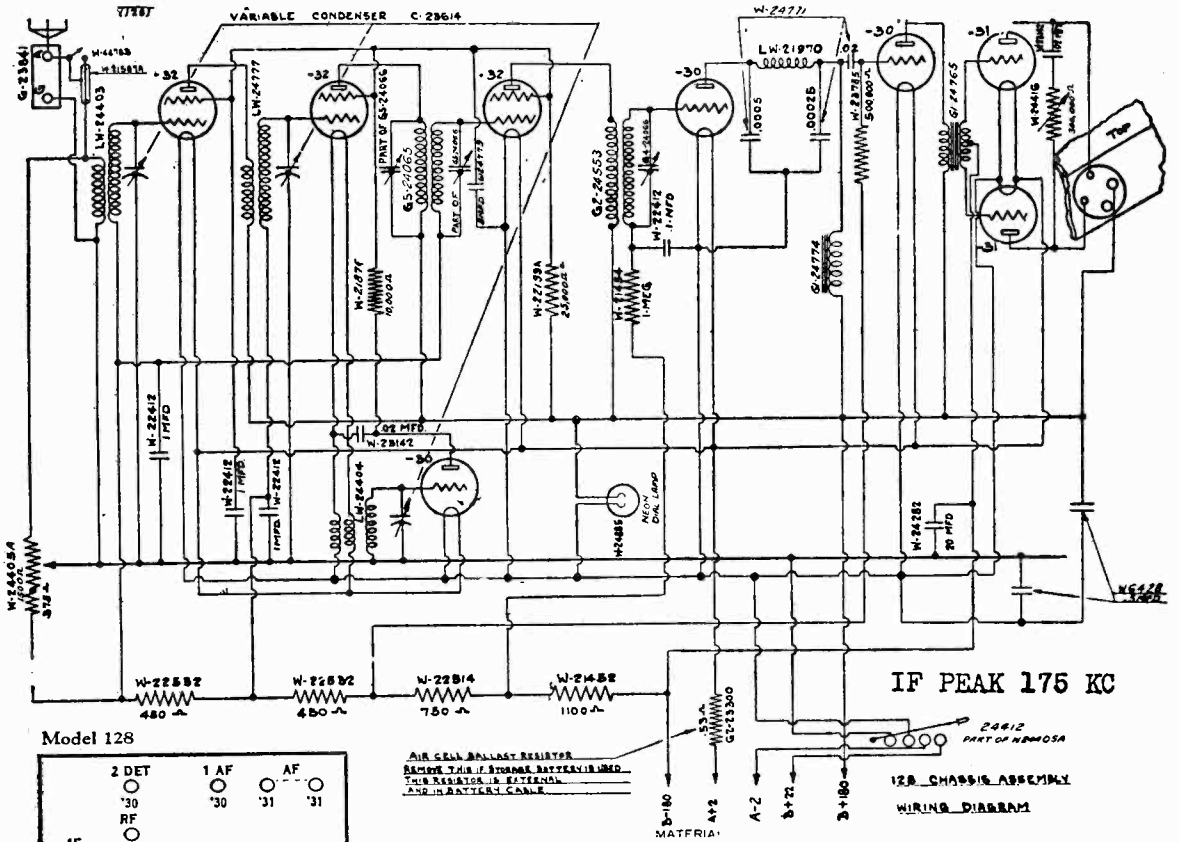
The voltages should be measured with the dual speakers connected, the tubes in position, and a line voltage of 117-1/2 volts. (235 for 220-volt receivers). All voltages should be measured with a high-resistance voltmeter. The plate, screen, and control grid voltages are measured from the elements named, to the emitter.



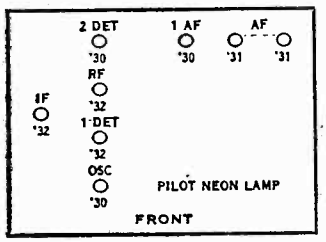
Circuit Diagram, Model 127-1 IF PEAK 175 KC

MODEL 128
MODEL 131
Schematic

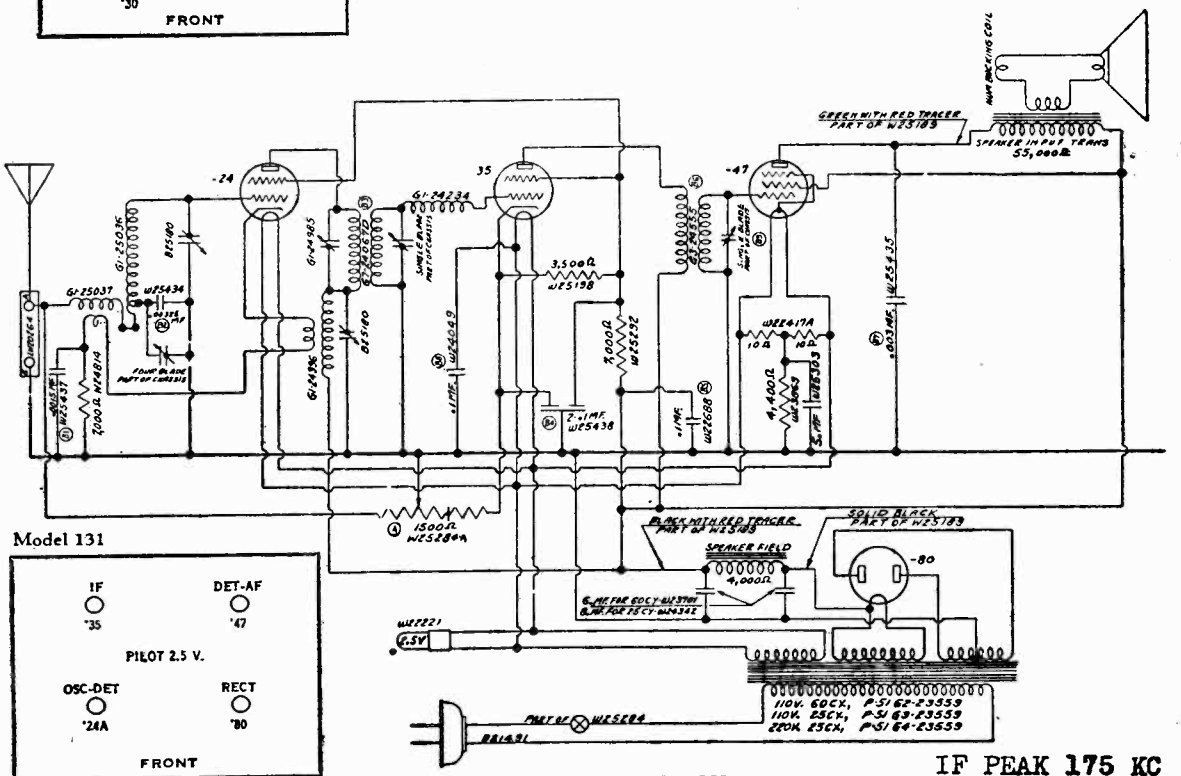
CROSLEY RADIO CORP.



Model 128



Circuit Diagram, Model 128

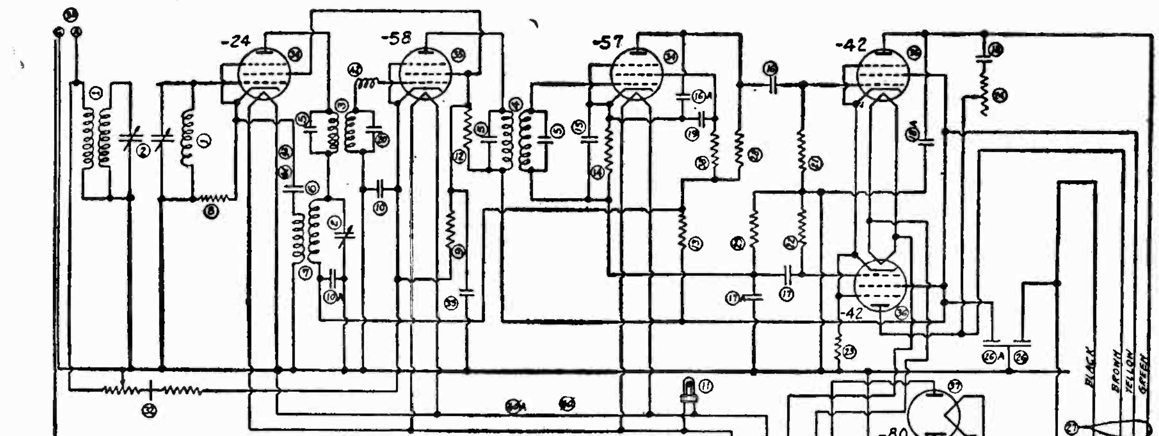


Model 131

Circuit Diagram, Model 131

CROSLEY RADIO CORP.

MODEL 129
Schematic
Voltage
Notes



1	GI-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	GI-25988	I.F. CONDENSER	33	[illegible]	ANT. GND. TERM.
6	W-25437	0.0015 MFD	34	G22-23800	-57 SOCKET
7	GI-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-22815	3 MEGOHM
10A	W-25516	0.25 MFD (WITH 10)	39	W-24999	8 MFD.
11	W-22221	2.5 V PNL LAMP	40	[illegible]	[illegible]
12	W-25970	15,000 Ω (WITH 9)	[illegible]	[illegible]	[illegible]
13	W-21237A	60,000 Ω	41	[illegible]	[illegible]
14	W-21237A	60,000 Ω	42	GI-24234	GRID FILTER CHOKE
15	W-24784	0.25 MFD.	43	[illegible]	[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	0.00017 MFD (WITH 17)			
18	W-25537	0.03 MFD (WITH 18A)			
18A	W-25537	[illegible]			
19	W-23142	0.02 MFD.			
20	W-23008A	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	303-A 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			

IF PEAK 181.5 KC

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.

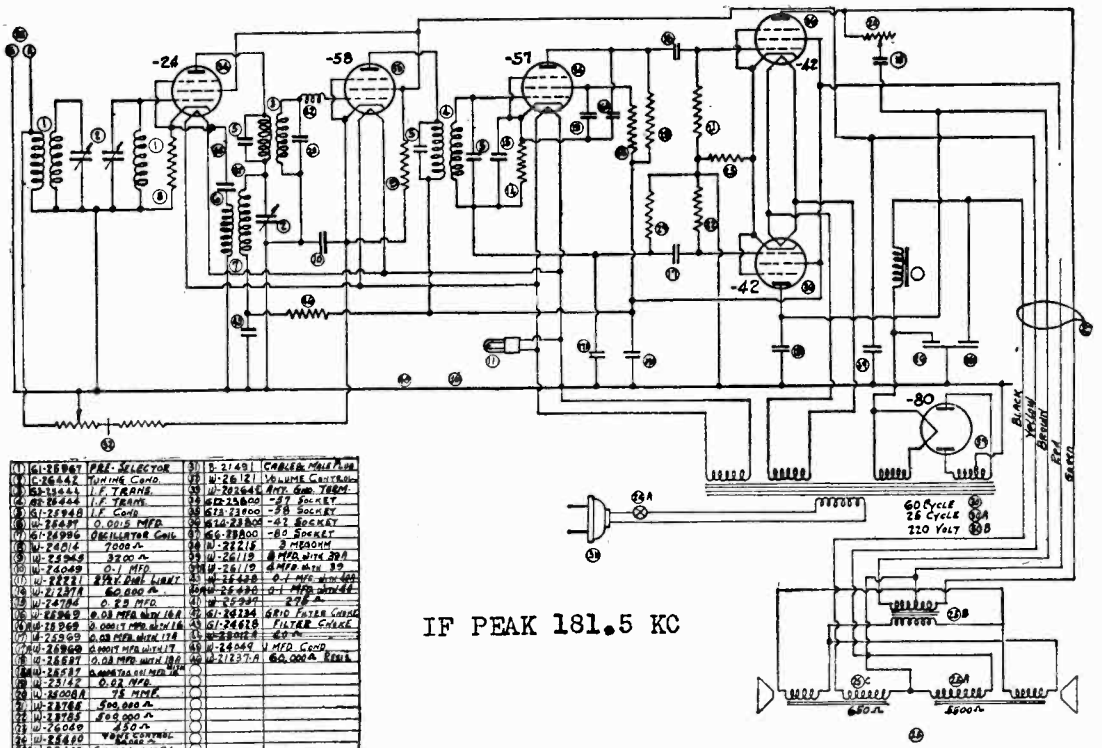
Voltage Limits

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.



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.

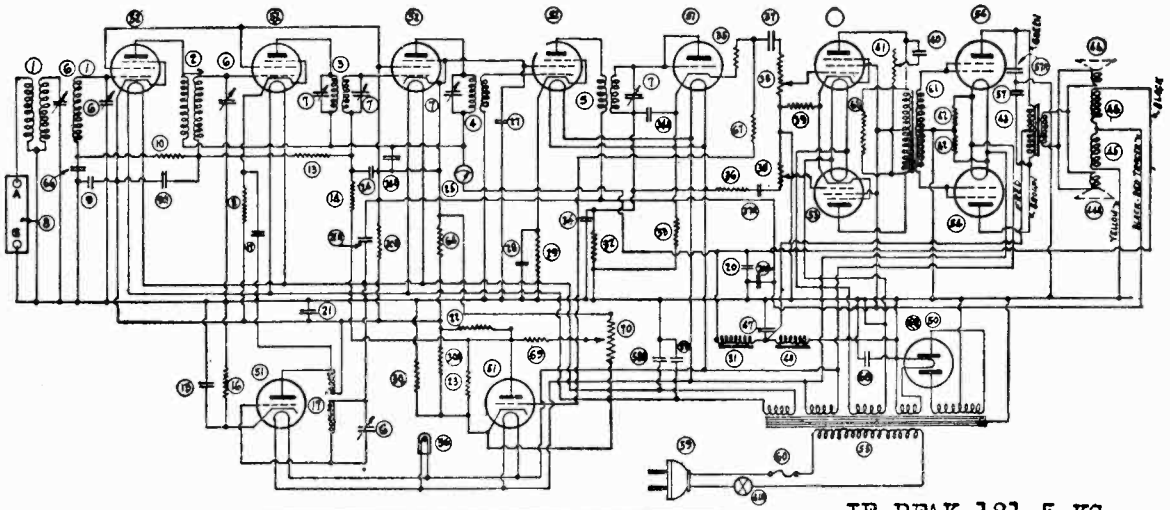
Voltage Limits

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	61-2896T	PRESELECT. COIL	24A	W-25438	.1 MFD COND.	44	MODEL	SPEAKER	67	W-26597	3 MEG. RESIS.	
2	W-25926	R.F. TRANS.	25	W-26091	TUNING MOTOR	46	324	SPKR. FIELD (1100Ω	68	W-26816	0.1 MFD. COND.	
3	W-25446	I.F. TRANS.	26			43	MODEL	SPKR. FIELD (650Ω	69	W-23796	500,000Ω RESIS.	
4	W-25445	I.F. TRANS.	27	W-25438	.1 MFD. COND.	44A	325	SPEAKER	70	W-26877	M.S. CONTROL	
5	62-2844S	DIODE TRANS.	28		.1 MFD. COND.	47	W-25194-A	12 MFD. COND.				
6	C-26112	VAR. COND.	29	W-22816	750Ω RESIS.	48	62-24628	CHOKE				
7	61-2826B	I.F. COND.	30	W-6703	6000Ω RESIS.	49	W-25476	.006 COND.				
8	W-20144-E	TERM. STRIP	30A	W-4921	10,000Ω RESIS.	50		'82 SOCKET				
9	W-25438	.1 MFD. COND.	30B	W-25892	7000Ω RESIS.	51	62-23800	'56 SOCKET				
9A		.1 MFD. COND.	30C			52	62-23800	'58 SOCKET				
10	W-4923	60,000Ω RESIS.	31	W-23213-C	FILTER CHOKE	53	62-23800	'42 SOCKET				
11	W-23013	2000Ω RESIS.	32	W-23785	500,000Ω RESIS.	54	62-23800	'46 SOCKET				
12	W-25435	.002 MFD. COND.	33	W-23185	500,000Ω RESIS.	55	62-25669	POR. TRANS. 60Ω				
13	W-4923	60,000Ω RESIS.	34	W-26182A	.0005 MFD. COND.	56	W-25721	DIAL LIGHT				
14	W-21454	1 MEG RESIS.	34A		.0001 MFD. COND.	57	W-26876	.02 MFD. COND.				
15	W-25435	.002 MFD. COND.	35	W-21455	200,000Ω RESIS.	57A		.02 MFD. COND.				
16	W-6705	350Ω RESIS.	36	W-21435	300,000Ω RESIS.	58	W-25438	.1 MFD. COND.				
17	61-2499-B	OSCIL. COIL	37	W-25635	.006 MFD. COND.	58A		.1 MFD. COND.				
18	W-26118	SWITCH	37A	W-25635	.006 MFD. COND.	59	W-26621	CORD & PLUG				
19	W-25877	3 MEG. RESIS.	38	W-25367	VOLUME CONTROL	60	W-7983-A	FUSE 3 AMP				
20	W-26118	.1 MFD. COND.	39	W-26069	650Ω RESIS.	61	61-2476T	RADIO TRANS.				
20A		.01 MFD. COND.	40	W-23016	.05 MFD. COND.	62	W-26613	30,000Ω RESIS.				
21	W-26117	1.75 RESIS.	41		TONE CONTROL	63						
21A		.1 MFD. COND.		W-25600								
22	W-23403	150,000Ω RESIS.	41A		SWITCH	64	W-13012-A	40Ω RESIS.				
23	W-26818	5 MEG. RESIS.	42	W-22417-A	POTENTIOMETER	65						
24	W-25439	.1 MFD. COND.	43		TRANS.	66	W-3163	.02 MFD. COND.				

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.

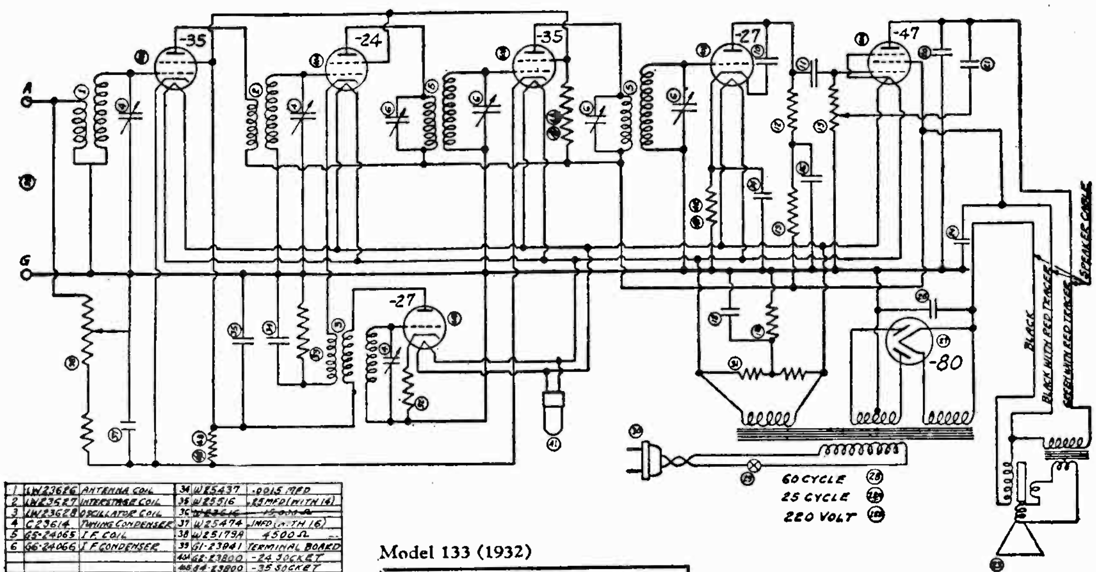
Voltage Limits

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)	26 to 32
A. F. Amplifier tubes (cathode to chassis)	20 to 27

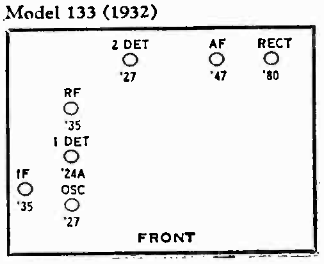
MODEL 133
Schematic
Voltage
Notes

CROSLEY RADIO CORP.



1	W23626	ANTENNA COIL	34	W25437	.0015 MFD
2	W23627	INTERSTAGE COIL	35	W25516	.25 MFD (WITH 14)
3	W23628	OSCILLATOR COIL	36	~~[illegible]~~	~~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	G1-23041	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	W25946	15000 Ω WITH 44
14	W25516	.25 MFD	44	W25946	15000 Ω WITH 43
15	~~[illegible]~~	~~[illegible] 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	W23019	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.

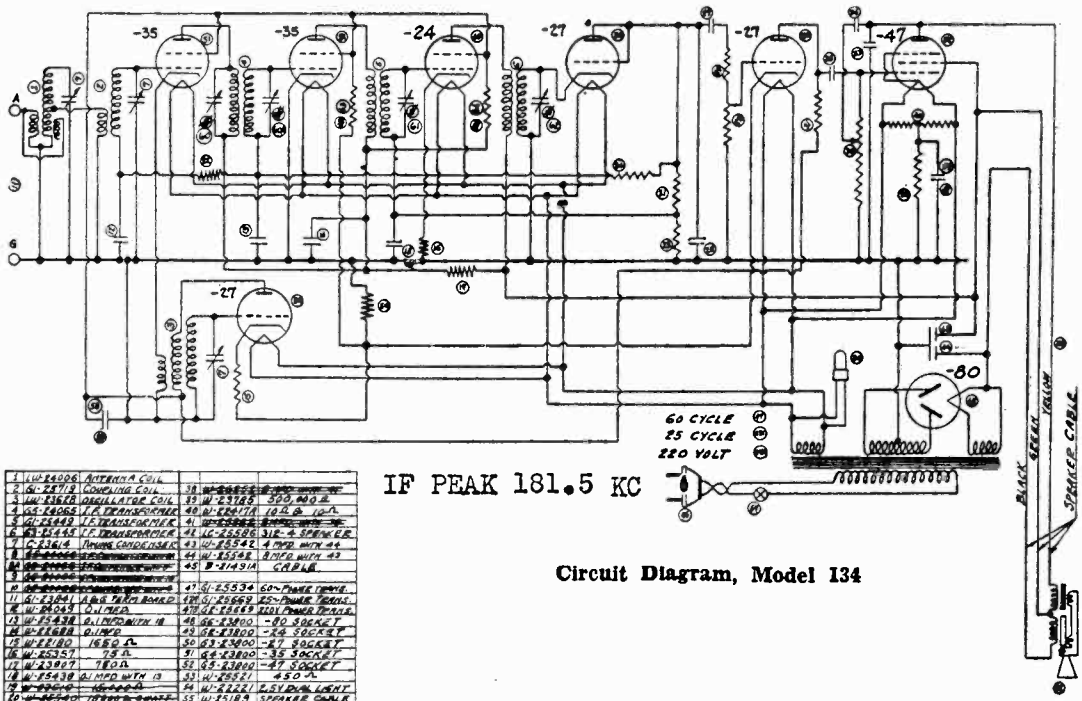
Voltage Limits

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

CROSLEY RADIO CORP.

MODEL 134
Schematic
Voltage
Notes



IF PEAK 181.5 KC

Circuit Diagram, Model 134

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

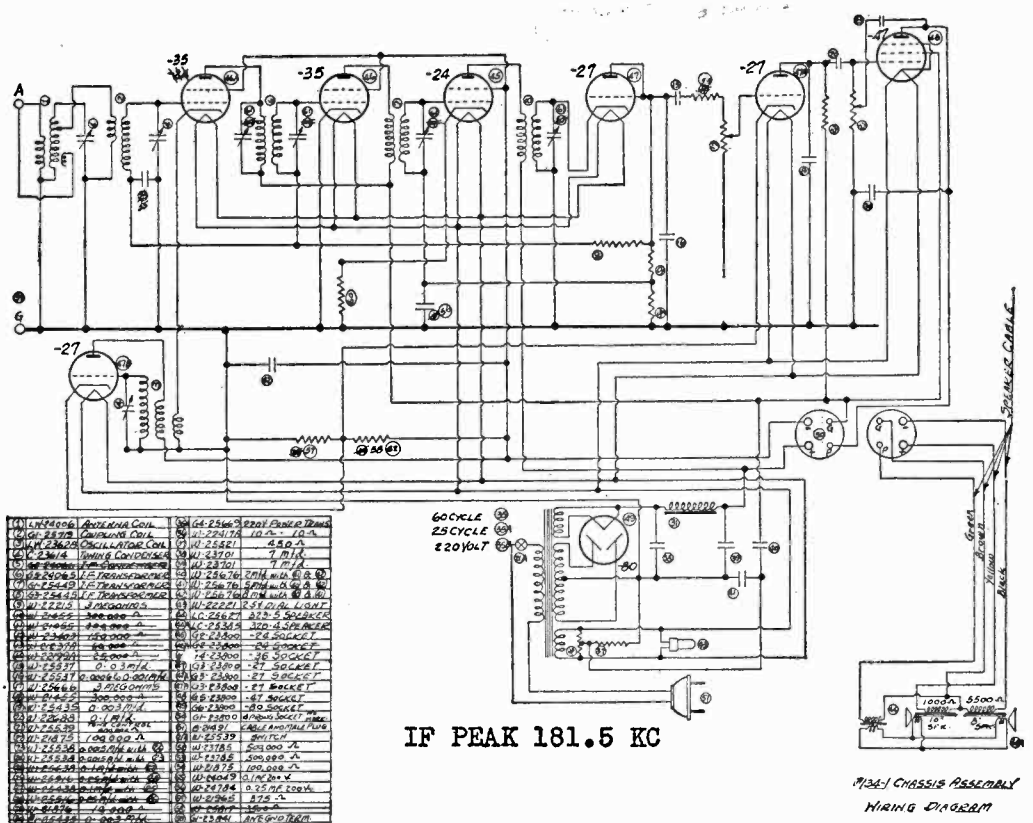
The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (225 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact 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

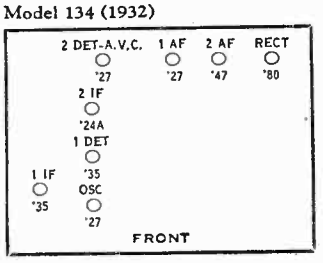
MODEL 134-1
Schematic
Voltage

CROSLEY RADIO CORP.



–Circuit Diagram, Model 134-1

Model 134 (1932)

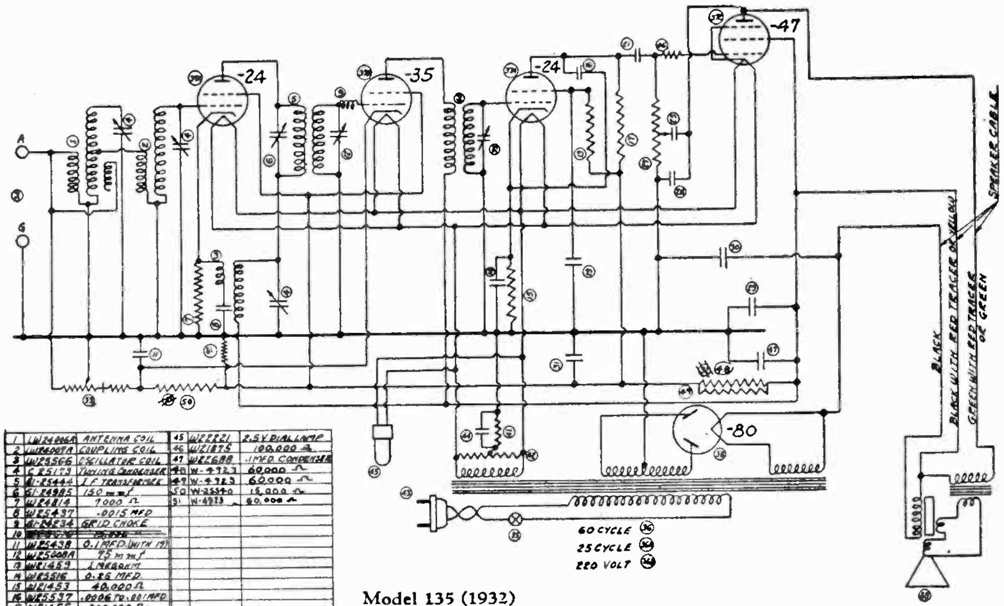


Model 134-1

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

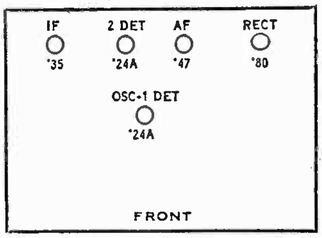
CROSLEY RADIO CORP.

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-4723	60,000 Ω
5	61-25444	I.F. TRANSFORMER	49	W-4723	60,000 Ω
6	61-24985	150 mmf	50	W-25540	15,000 Ω
7	W24814	7000 Ω	51	W-4973	60,000 Ω
8	W25437	.0015 MFD			
9	61-24234	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	0.03 MFD (WITH 16)			
25	W25572	.0002 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]			
33	W26573	4800 Ω			
34	LW20264	TERMINAL BOARD			
35	W25400A	(WITH 27)			
36	65-23553	60 ~ POWER TRANS.			
36A	63-24141	25 ~ POWER TRANS.			
36B	64-24141	220 V. POWER TRANS.			
37A	62-23800	-24 SOCKET			
37B	64-23800	-35 SOCKET			
37C	65-23800	-47 SOCKET			
38	66-23800	-80 SOCKET			
39	W25008A	75 mmf			
40	61-25445	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.

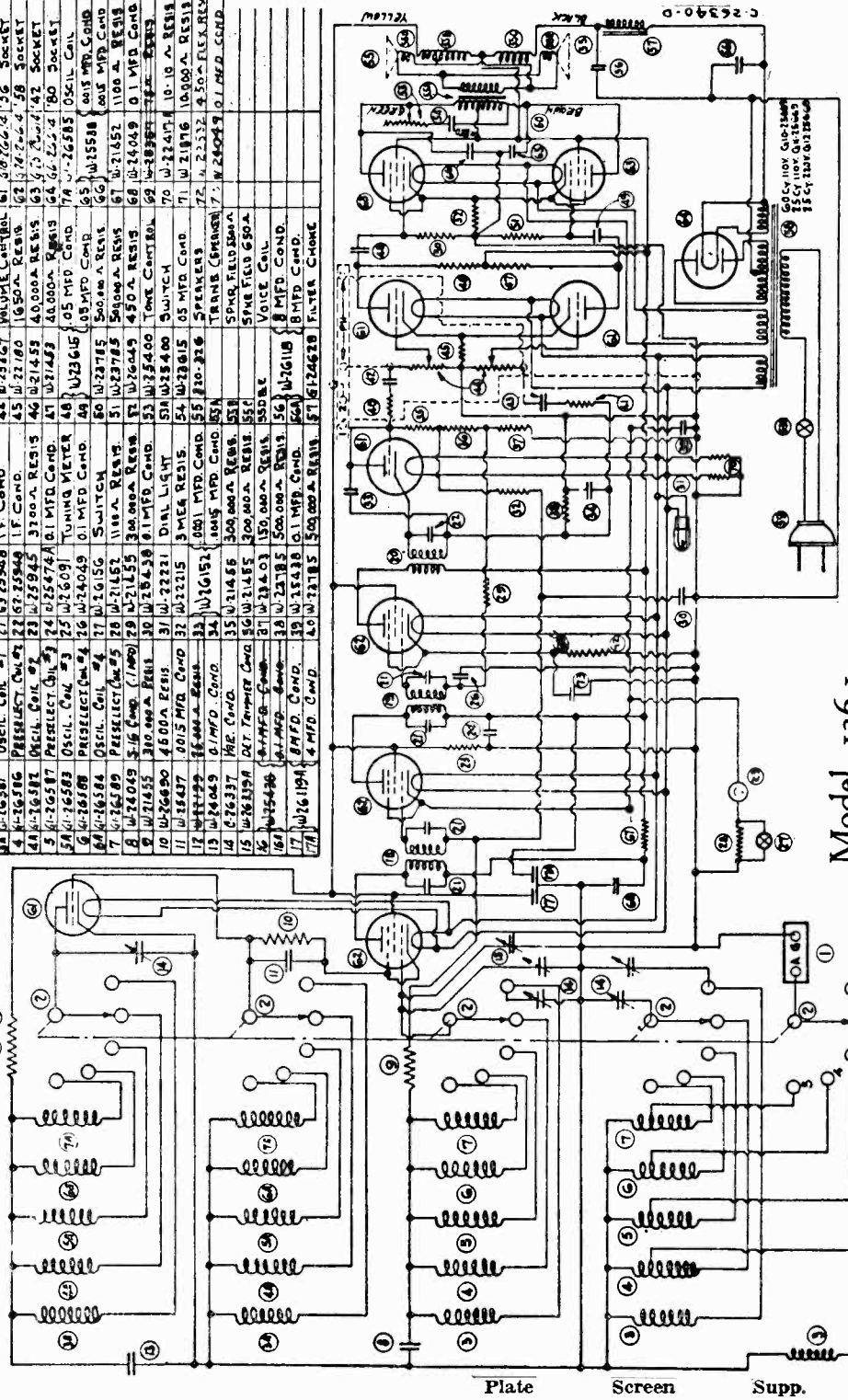
Voltage Limits

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

CROSLEY RADIO CORP.



Model 136-1

IF PEAK 181.5 KC

136-1 CHASSIS ASSEM
WIRING DIAGRAM

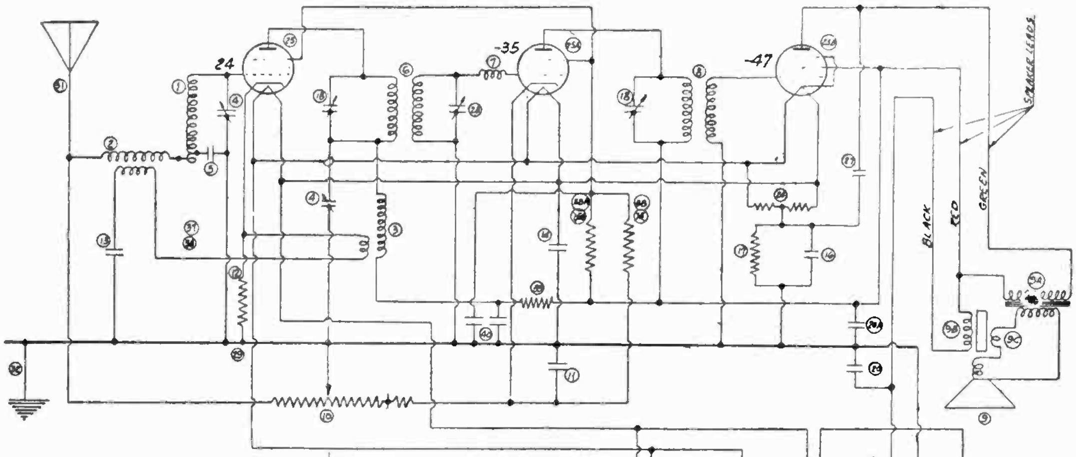
Specifications

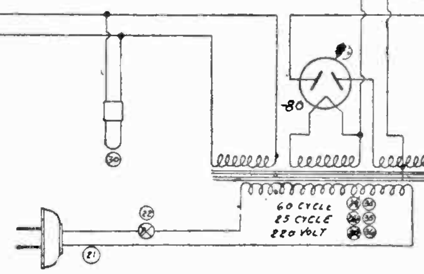
Model 136-1 is a ten tube superheterodyne for operation from A. C. electric circuits. Five sets of coils give the following frequency ranges: 550 to 1500 KC, 1500 to 3500 KC, 3500 to 6500 KC, 6500 to 12000 KC, and 12000 to 20000 KC. The intermediate frequency used is 456 KC.

		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

CROSLEY RADIO CORP.

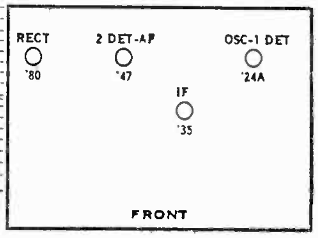
MODEL 137
Schematic
Voltage
Notes





1	G-25086	ANTENNA COIL	28	W25008A	I.F. TUNING COND
2	G-25087	CATHODE COUPLER	29	W24049	.1 MFD
3	G-24996	OSCILLATOR COIL	30	W22221	2.5V DIAL LAMP
4	B26056	TUNING CONDENSER	31	W26078	ANTENNA LEAD
5	W25434	.00375 MFD ± 5%	32	W26079	GROUND LEAD
6	G-25446	I.F. TRANSFORMER	33	[illegible]	[illegible]
7	G-24236	R.F. GRID CHOKE	34	G7-23559	60 CY POWER TRANS
8	G-25449	I.F. TRANSFORMER	35	G8-23659	25 CY POWER TRANS
9	L25818	SPEAKER	36	G9-23659	220 V POWER TRANS
9A		INPUT TRANS 50,000 Ω	37	[illegible]	[illegible]
9B		SPEAKER FIELD 6000 Ω	38	W-25970	10000 Ω ± 10% [illegible]
9C		HUM BUCK COIL 18 TURNS	38A	W-25970	15,000 Ω ± 10% with 38
10	W25964A	V. CONTROL (1500 Ω TOTAL)	39	W-21237A	60,000 Ω ± 20%
11	W25438	.1 MFD (WITH 14)	40	W-25438	(0.1-0.1) MFD COND
12	W24818	7000 Ω ± 10%			
13	W25487	.0015 MFD			
14	W25438	.1 MFD (WITH 11)			
15	[illegible]	[illegible]			
15A	[illegible]	[illegible]			
16	W25808	.5 MFD			
17	W25869	4400 Ω ± 10% ([illegible])			
18	G-25948	I.F. TUNING COND			
19					
20	W25548	8 MFD (WITH 20A)			
20A	W25548	4 MFD (WITH 20)			
21	B21491	CABLE			
22	W25964A	ON OFF SWITCH (WITH 10)			
23	[illegible]	[illegible]			
23A	[illegible]	[illegible]			
23B	[illegible]	[illegible]			
24	W22417A	10 Ω - 10 Ω			
25	G-23800	-24 SOCKET			
25A	G-23800	-35 SOCKET			
25B	G-23800	-47 SOCKET			
26	G-23800	-80 SOCKET			
27	W25035	.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.

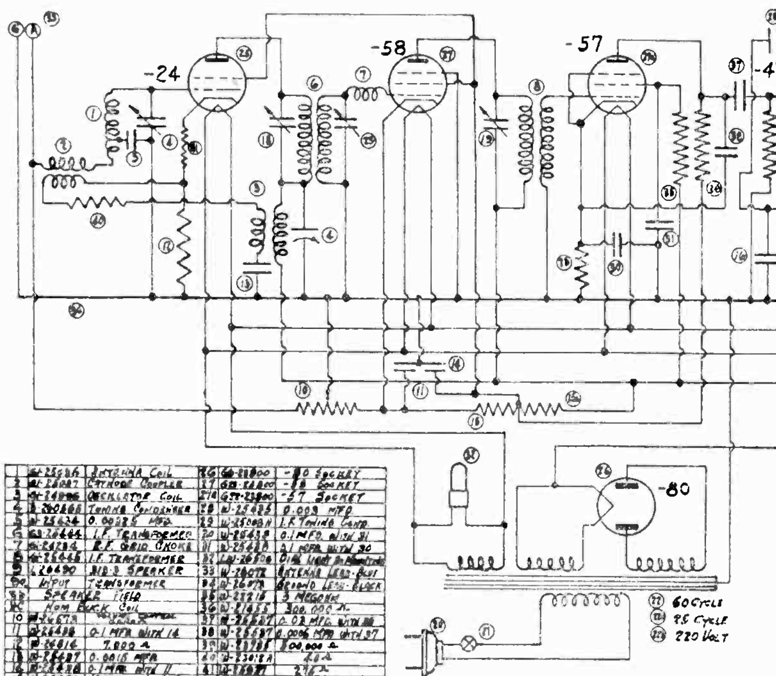
Voltage Limits

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

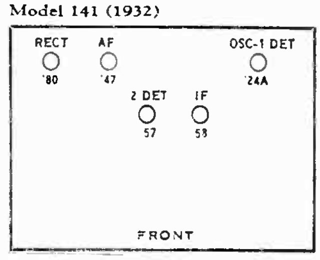
MODEL 141
Schematic
Voltage
Notes

CROSLEY RADIO CORP.



1	W-25686	Antenna Coil	26	W-21800	-80 Socket
2	W-24087	Cathode Coupler	27	W-22800	-58 Socket
3	W-24096	Oscillator Coil	27a	W-23800	-57 Socket
4	W-26066	Tuning Condenser	28	W-25435	0.003 MFD.
5	W-25434	0.00025 MFD.	29	W-25008 N	I.F. Tuning Cond.
6	W-26444	I.F. Transformer	30	W-25438	0.1 MFD. with 31
7	W-24284	R.F. Grid Choke	31	W-25438	0.1 MFD. with 30
8	W-26446	I.F. Transformer	32	W-26700	Dial Light & Bracket
9	W-26490	M.D.3 Speaker	33	W-26072	Antenna Lead-Blue
9a	Input	Transformer	34	W-26073	Ground Lead-Black
9b	Speaker	Field	35	W-23216	3 Megohm
9c	Hum Buck	Coil	36	W-21655	300,000 Ω
10	W-24678	[illegible]	37	W-25687	0.02 MFD. with 38
11	W-25488	0.1 MFD with 14	38	W-25687	0.006 MFD with 37
12	W-26616	7,000 Ω	39	W-23785	500,000 Ω
13	W-25427	0.0015 MFD	40	W-23018 A	20 Ω
14	W-25488	0.1 MFD with 11	41	W-23087	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	W-25868	I.F. Tuning Cond.			
19	W-26642	8 MFD with 19a			
19a	W-26642	4 MFD with 19			
20	W-21681	Cord & Plug			
21	W-26110	Switch with 19			
22	W-25669	Power Trans. 60~			
22a	W-25669	Power Trans. 25~			
22b	W-25669	Power Trans. 220V			
23	W-212979	20,000 Ω			
24	W-26128	10 Ω - 10 Ω			
25	W-22400	-24 Socket			
25a	W-22400	-47 Socket			

Model 141 (1932)



IF PEAK 181.5 KC

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.

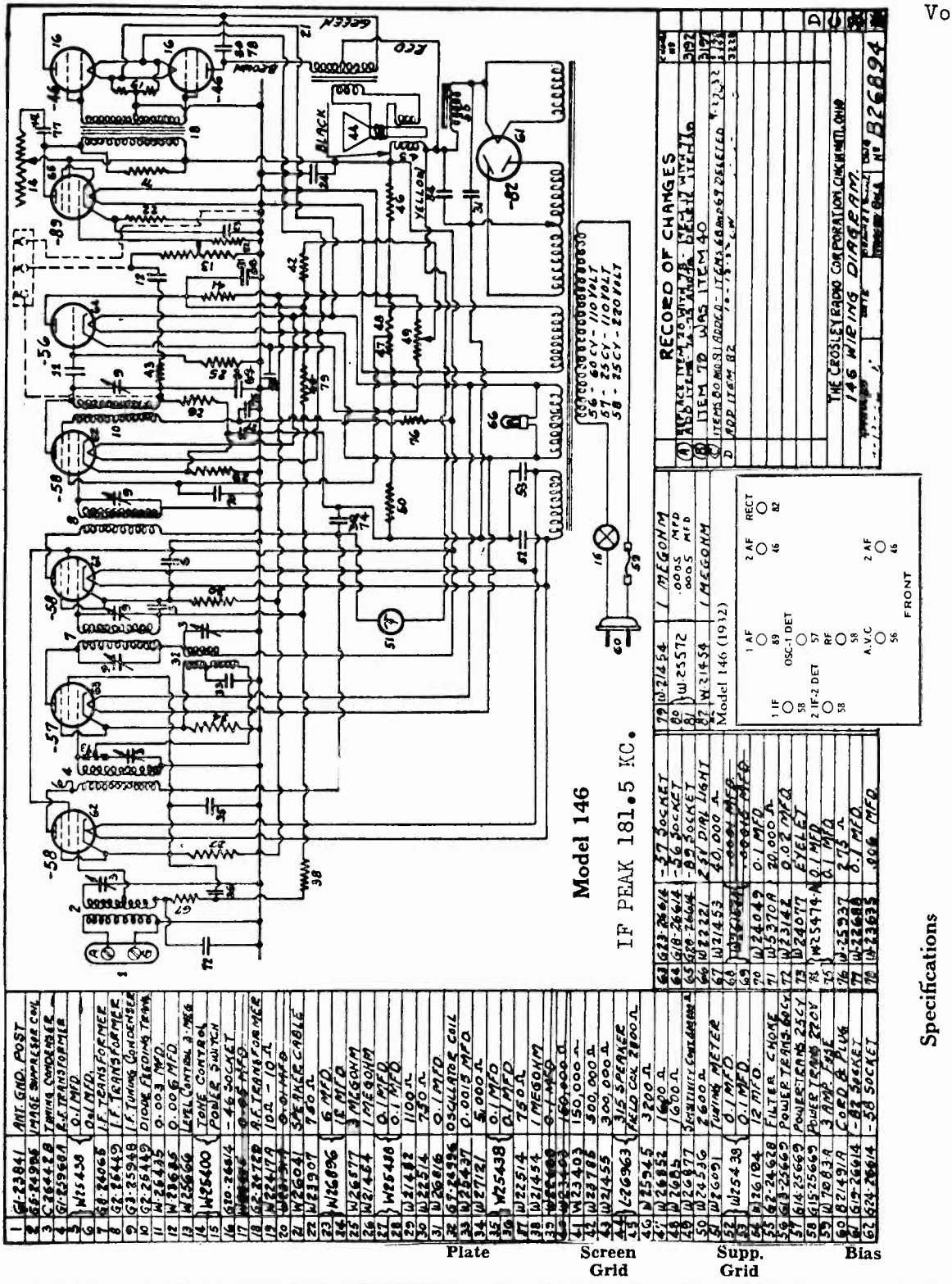
Voltage Limits

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

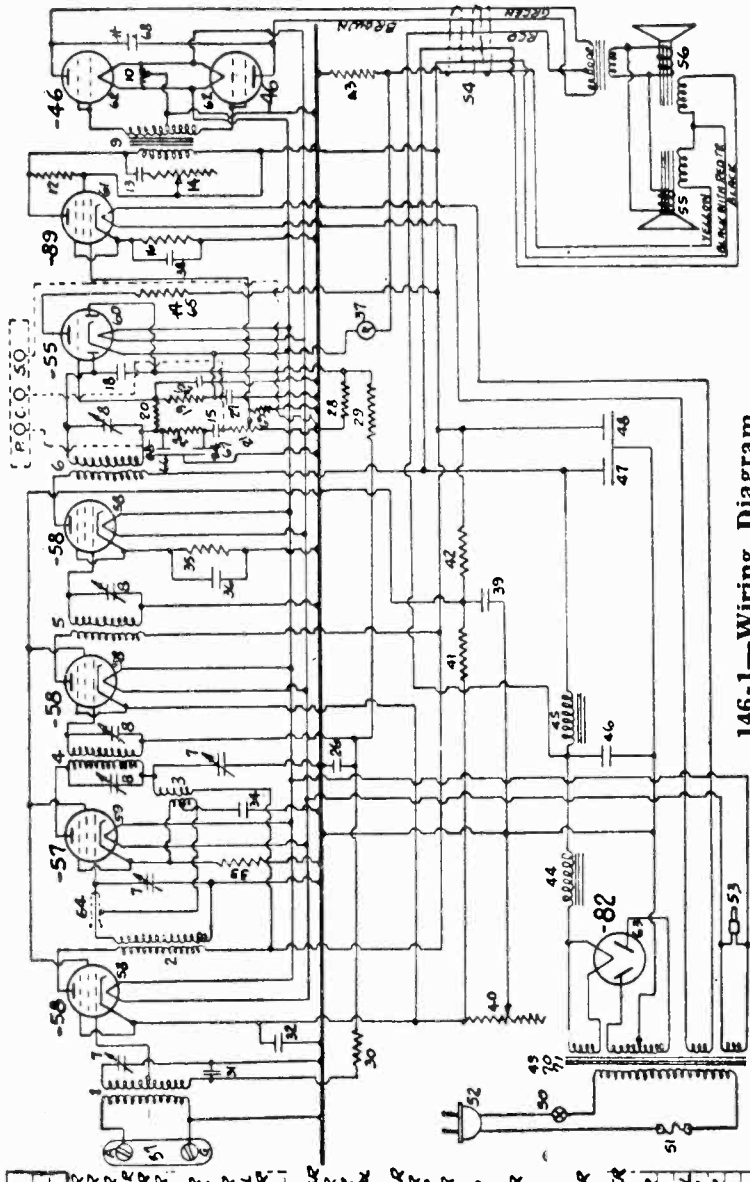
Models 146 and 146-1 are nine tube super-heterodynes for operation from A. C electric circuits. Model 146 uses a single speaker

		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.

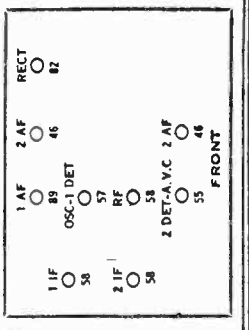


146-1—Wiring Diagram

		Plate	Screen	Grid Supp.	Grid 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

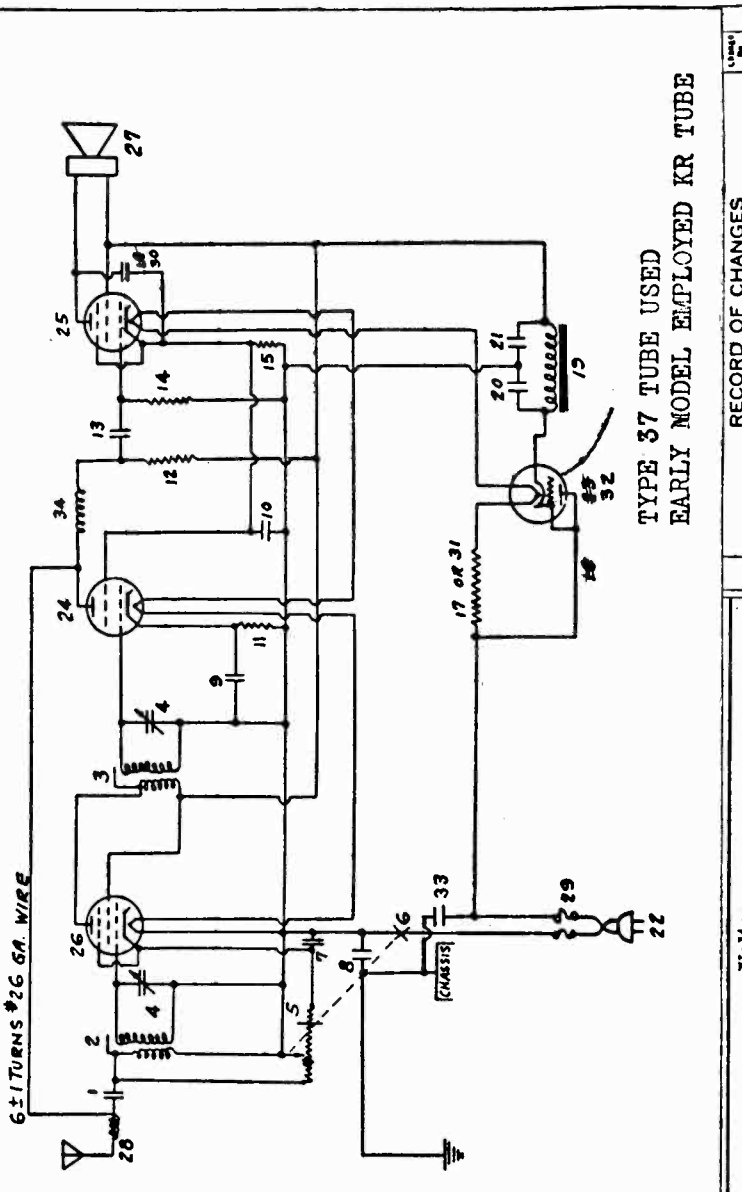
Model 146-1 (1932)



Model 146-1 uses two speakers. The intermediate frequency used in both models is 181.5 kilocycles

CROSLEY RADIO CORP.

MODEL 147
Schematic
Voltage



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. 450Ω A. LINE SWITCH
6		
7	W-25438	.1 MFD.
8		.1 MFD.
9	W-27677A	8 MFD.
10		8 MFD.
11	W-21837A	60,000Ω
12	W-26572	3 MEG.
13	W-27203	.02 MFD.
14	W-26578	3 MEG.
15	W-26690	4500Ω
16	W-[illegible]	.003 MFD.
17	W-27675	300Ω RED PEN
18	G2-24774	FILTER CHOKE
19		4 MFD.
20	W-27676	4 MFD.
21	LW-27815	CORD & PLUG
22	[illegible]	[illegible] SOCKET
23	[illegible]	[illegible]
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-46396	2 AMP. FUSE
30	W-27652	.003 MFD.
31	W-28100	200Ω CARDOHM
32	G12-27727	-37 SOCKET
33	W-27652	.003 MFD.
34	G1-24234	PLATE CHOKE
35		
36		
37		
38		
39		
40		
41		
42		
43		
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45		
46		

RECORD OF CHANGES

A	ITEM 16 REPLACED WITH ITEM 30	11-[illegible]-32	3262
B	ITEM 31 ADDED AS SELECT ITEM WITH ITEM 17	[illegible]	[illegible]
B	ITEM 18 DELETED. ITEM 13 REPLACED BY ITEM 32	[illegible]	3262
C	ITEM 33 ADDED	11-29-32	3281
D	ADD ITEM 34	12-7-32	3402

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

147 WIRING DIAGRAM

APPROVED 11-5-32 Schaefer DWG. NO. B-27788

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

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.

Line voltage 117½ volts (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

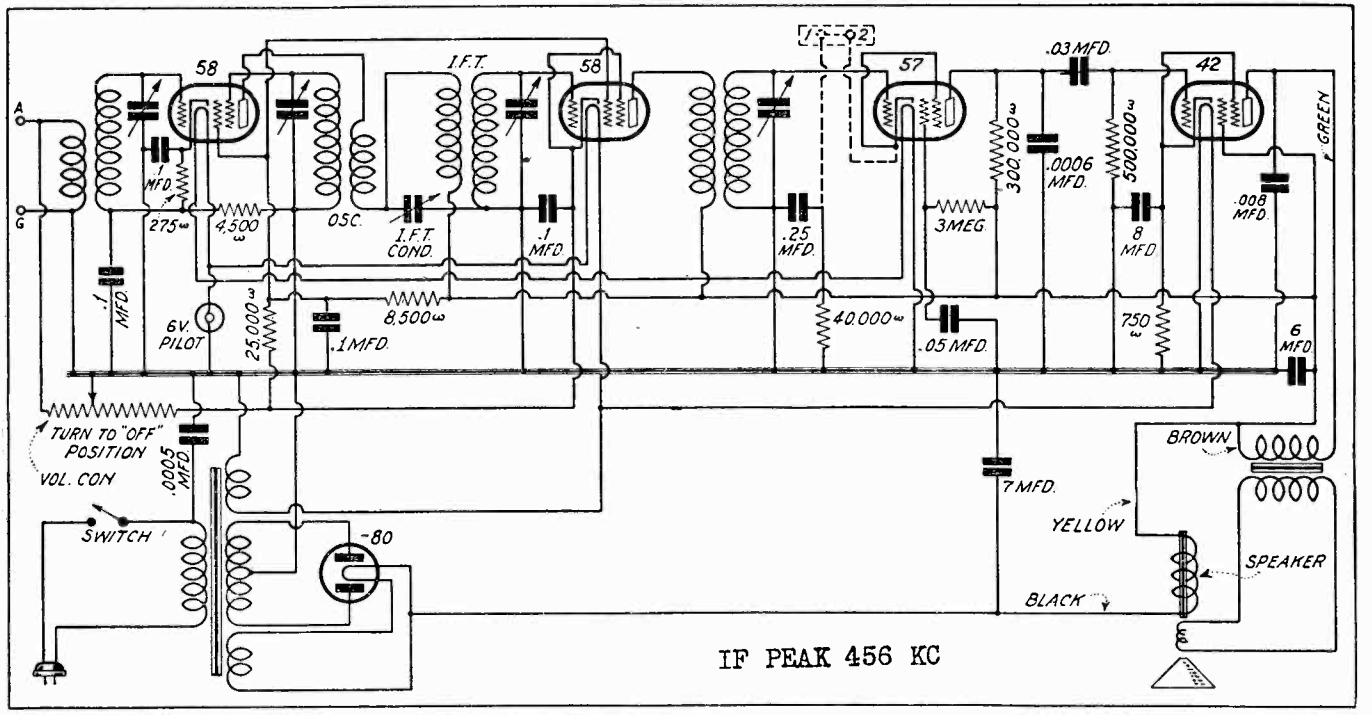
Screen grid voltage measured from screen grid contact to cathode contact.

Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis, except as noted.

Specifications

Model 148 is a five tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 456 kilocycles.



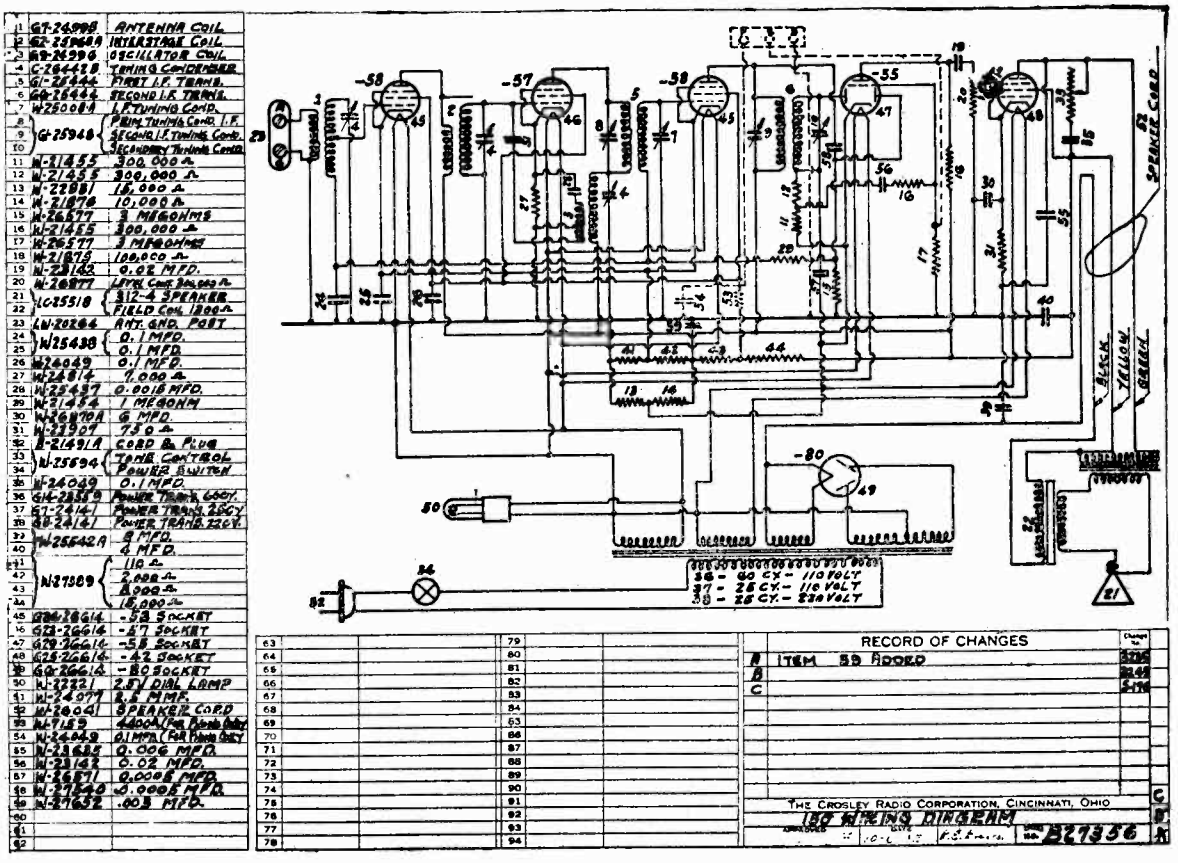
Schematic diagram of the Crosley Model 148 Superheterodyne

Tube	Position	Plate	Screen Grid	Voltages 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	5.8	2.5
-42	Output	240	255	0	17.0	7.0
-80	Rectifier	330				4.8

*Across 275 ohm resistor in cathode circuit.

CROSLEY RADIO CORP.

MODEL 150
Schematic
Voltage
Notes



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	Voltages Plate	Screen Grid	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.

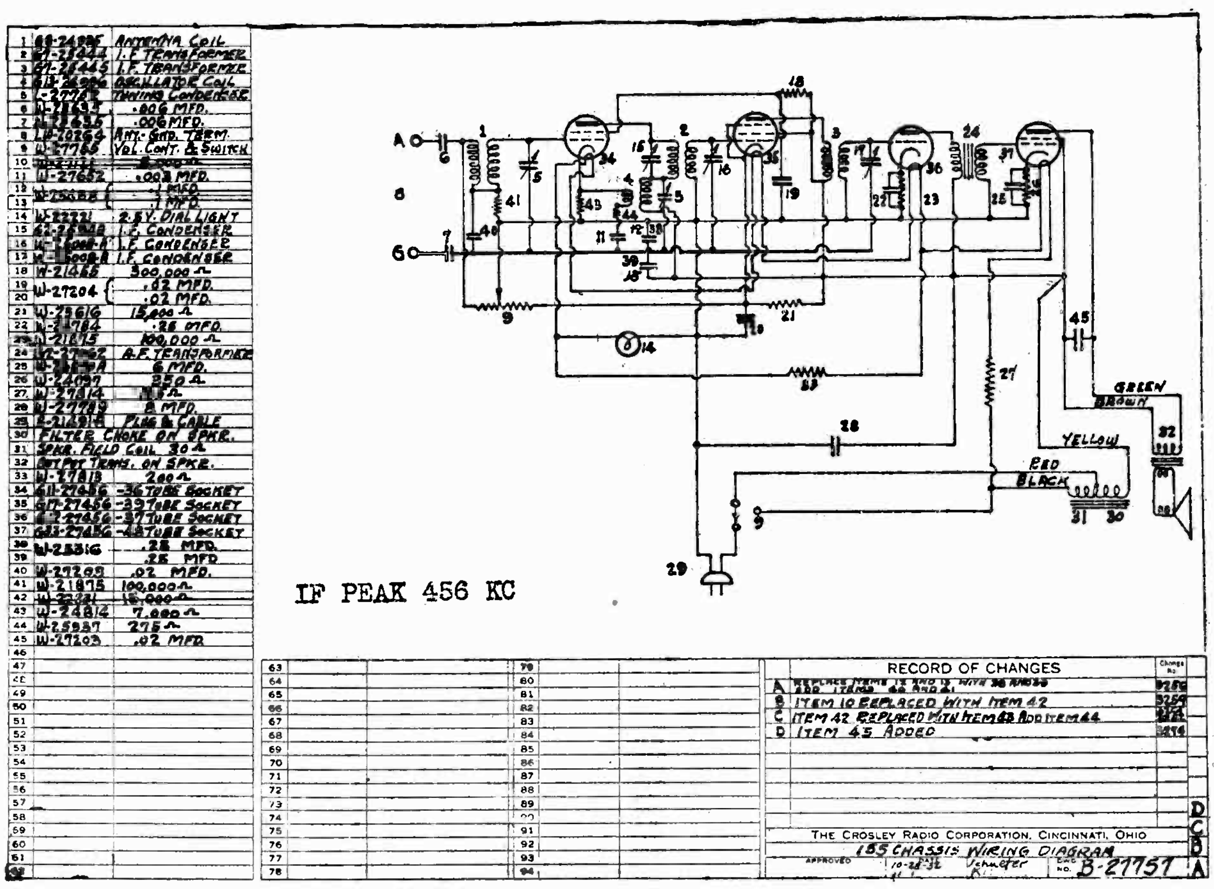
Line voltage—117.5 volts.

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	50	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


1 ANTENNA COIL
2 I.F. TRANSFORMER
3 I.F. TRANSFORMER
4 OSCILLATOR COIL
5 TUNING CONDENSER
6 .006 MFD.
7 .006 MFD.
8 ANT.-GND. TERM.
9 VOL. CONT. & SWITCH
11 W-27652 .002 MFD.
12 .1 MFD.
13 .1 MFD.
14 2.5V. DIAL LIGHT
15 I.F. CONDENSER
16 I.F. CONDENSER
17 I.F. CONDENSER
18 W-21465 300,000 Ω
19 W-27204 .02 MFD.
20 .02 MFD.
21 15,000 Ω
22 .25 MFD.
23 100,000 Ω
24 A.F. TRANSFORMER
25 6 MFD.
26 250 Ω
28 8 MFD.
29 PLUG & CABLE
30 FILTER CHOKE ON SPKR.
31 SPKR. FIELD COIL 30 Ω
32 OUTPUT TRANS. ON SPKR.
33 200 Ω
34 -36 TUBE SOCKET
35 -39 TUBE SOCKET
36 -37 TUBE SOCKET
37 -48 TUBE SOCKET
38 .25 MFD.
39 .25 MFD.
40 .02 MFD.
41 W-21875 100,000 Ω
43 7,000 Ω
44 W-25987 275 Ω
45 W-27203 .02 MFD.
A
G
GREEN
BROWN
YELLOW
RED
BLACK
IF PEAK 456 KC
RECORD OF CHANGES
B ITEM 10 REPLACED WITH ITEM 42
C ITEM 42 REPLACED WITH ITEM 43 ADD ITEM 44
D ITEM 45 ADDED
THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
155 CHASSIS WIRING DIAGRAM
APPROVED
10-28-32
DWG. NO. B-27757

CROSLEY RADIO CORP.

MODEL 156
Schematic
Voltage
Notes

1	L-W-20264	Antenna Ground Post
2	GI-27937	Ant. & Osc. Coils
3	B-27425	Tuning Cond.
4	W-25438	0.1 Mfd.
5		0.1 Mfd.
6	GL-25948	I.F. Tuning Cond.
7	W-25008-A	I.F. Tuning Cond.
8	W-25008-A	I.F. Tuning Cond.
9	GI-25444	I.F. Trans.
10	GL-25445	I.F. Trans.
11	W-26577	3 Meg. Grid Leak
12	W-5362	0.00025 Mfd.
13	GL-27912	Regenerat. Cont. Cond.
14	W-21455	300,000 Ω
15	W-27265	0.02 Mfd.
16	W-21454	1 Megohm Grid Leak
17	L-27917	336-3 Speaker
18	M-41	Eyelet Condenser
19	D-27930	Battery Cable
20	W-25438	0.1 Mfd.
21		0.1 Mfd.
22	W-27939	Volume Cont. 10,000 Ω Switch
23		
24	G9-27456	-30 Socket
25	G8I-27456	-34 Socket
26	G10-27456	-32 Socket
27	G36-27456	-33 Socket
28	W-26577	3 Meg. Resis.
29	W-27933	Speaker Cable
30	GL-23300	Air Cell Resistor
31	W-24077	Eyelet Cond.
32		
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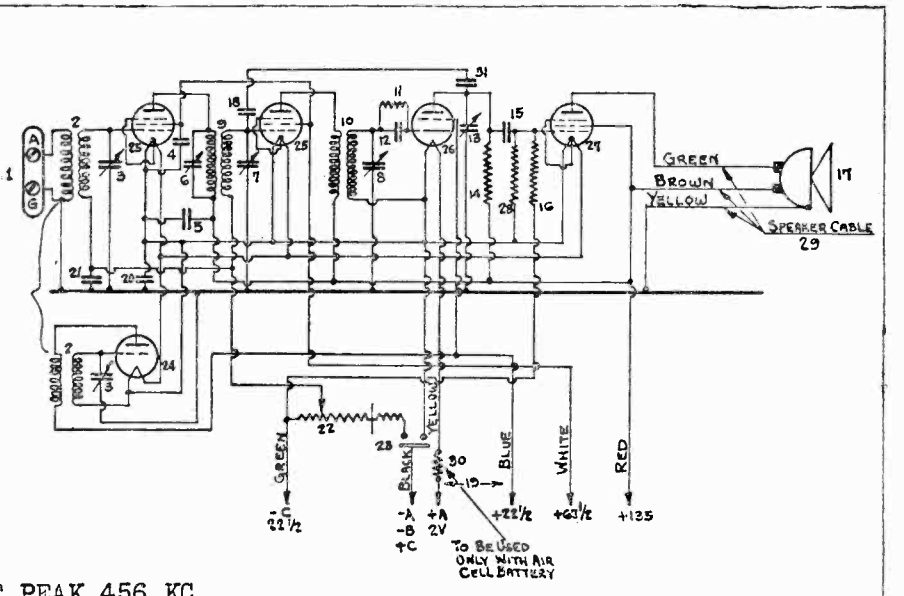


IF PEAK 456 KC

63				79			RECORD OF CHANGES		Change No.
64				80					
65				81					
66				82					
67				83					
68				84					
69				85					
70				86					
71				87					
72				88					
73				89					
74				90					
75				91					
76				92					
77				93			THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO		
78				94			156 WIRING DIAGRAM		
							APPROVED	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.

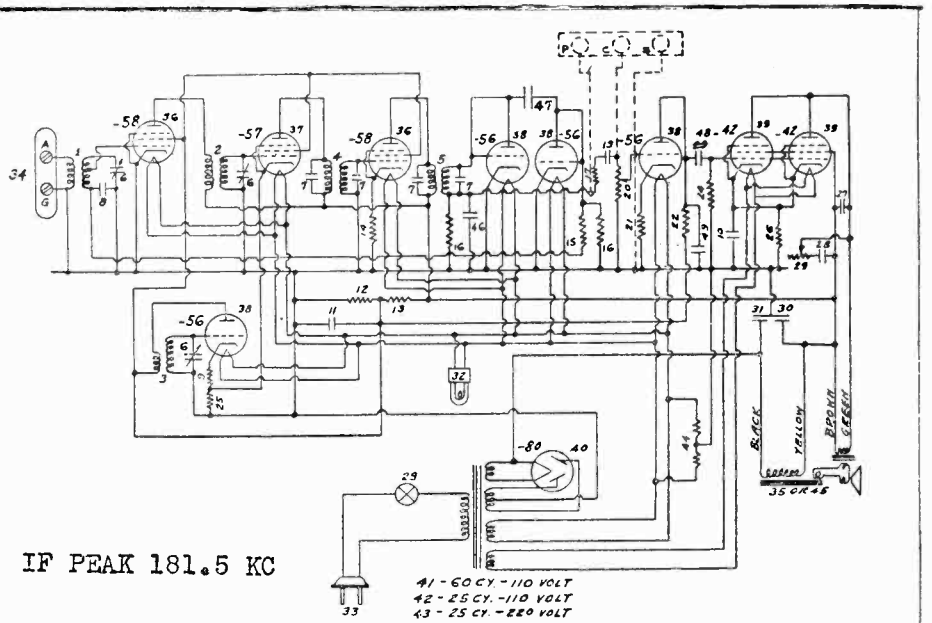
Tube	Position	Voltages			
		Plate	Screen Grid	Bias	Fil.
-34	1st Detector	135	67.5	4.0	2.0
-30	Oscillator	22.5		0	2.0
-34	I. F. Amplifier	135	67.5	4.0	2.0
-32	2nd Detector	135*	22.5	0	2.0
-33	Output	135	135		2.0

* Measured to battery side of 300,000 ohm Plate Resistor.

MODEL 157
Schematic
Voltage
Notes

CROSLEY RADIO CORP.

1	G7-24995	ANTENNA COIL
2	G2-24968	INTERSTAGE COIL
3	G14-24996	OSCILLATOR COIL
4	G5-24965	FIRST I.F. TRANS.
5	G10-24965	SECOND I.F. TRANS.
6	C25492B	TUNING CONDENSER
7	G3-25948	I.F. TUNING CONDENSERS
8	W-27203	0.02 MFD.
9	W-22180	1650 Ω
10	W25857	8 MFD.
11		8 MFD.
12	W-25970	15,000 Ω
13		10,000 Ω
14	W-25937	875 Ω
15	W-22215	3-MEGOHMS
16	W-21454	1-MEGOHM
17	W-21455	300,000 Ω
18	~~W-25668~~	~~TWIN 0.006 MFD.~~
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	~~W-25603~~	~~0.02 MFD.~~
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
30		
31	W26118A	8 MFD.
		8 MFD.
32	W-22221	2.5V DIAL LIGHT
33	B-21491A	CORD & PLUG
34	W-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	G11-25665	POWER TRANS. 25 CY.
43	G12-25669	POWER TRANS. 220 V.
44	W-22417A	10 Ω - 10 Ω
45	27870	337-S SPEAKER-10"
46	W-27932	.0001 MFD.
47	W-27932	.0001 MFD.
48	W-25537	.03 MFD.
49		.001 MFD.



RECORD OF CHANGES		Change By
A	ITEM 18 REPLACED WITH ITEMS 46 & 49	3259
B	ITEM 23 REPLACED WITH ITEMS 48 & 43	32 DEC

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
157 WIRING DIAGRAM
APPROVED DATE 11-5-32 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.

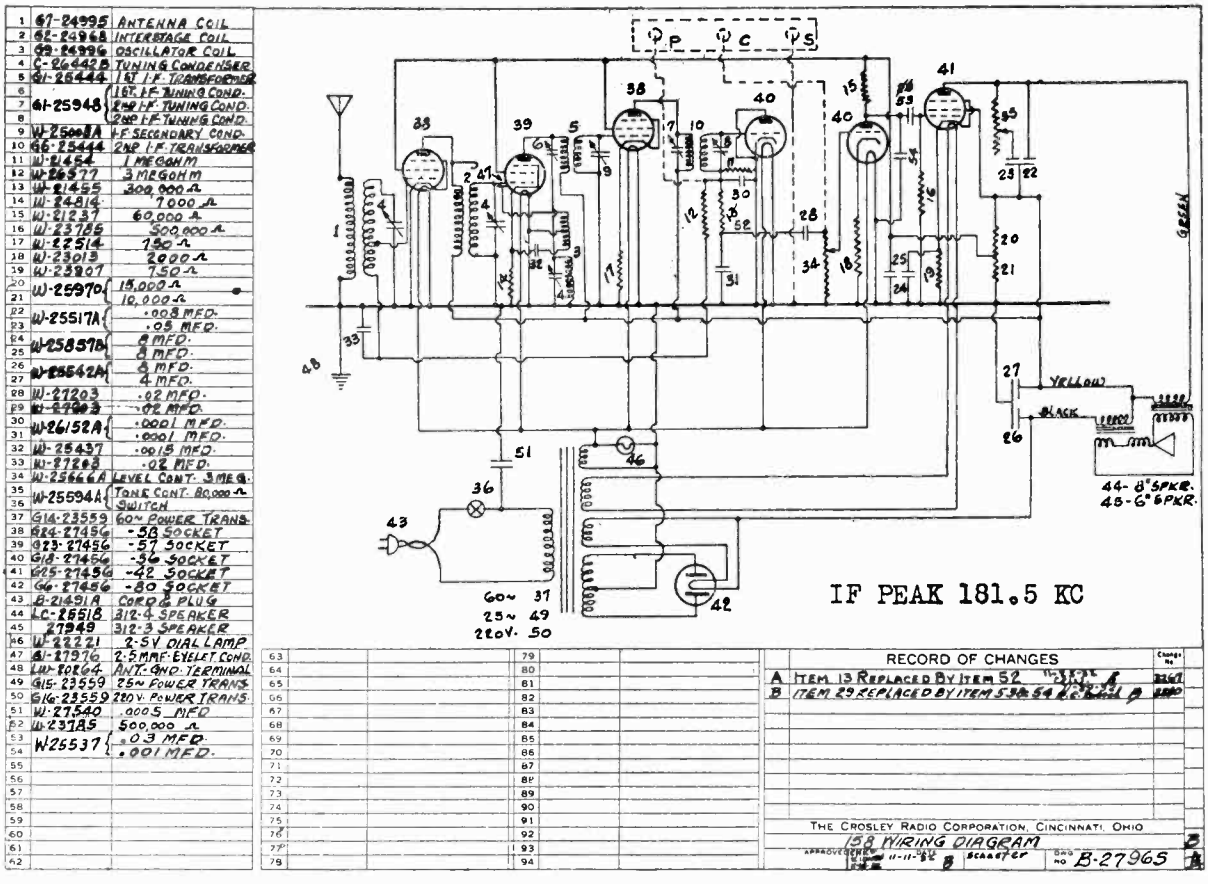
Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages Plate	Screen Grid	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



1	67-24995	ANTENNA COIL
2	68-24968	INTERSTAGE COIL
3	69-24996	OSCILLATOR COIL
4	C-26442B	TUNING CONDENSER
5	61-26444	1ST I.F. TRANSFORMER
6		1ST I.F. TUNING COND.
7	61-25948	2ND I.F. TUNING COND.
8		2ND I.F. TUNING COND.
9	W-25008A	I.F. SECONDARY COND.
10	66-25444	2ND I.F. TRANSFORMER
11	W-21454	1 MEGOHM
12	W-26577	3 MEGOHM
13	W-21455	300,000 Ω
14	W-24814	7000 Ω
15	W-21237	60,000 Ω
16	W-23785	500,000 Ω
17	W-22514	750 Ω
18	W-23013	2000 Ω
19	W-23207	750 Ω
20	W-25970	15,000 Ω
21		10,000 Ω
22	W-25517A	.008 MFD.
23		.05 MFD.
24	W-25857A	8 MFD.
25		8 MFD.
26	W-25542A	4 MFD.
27		4 MFD.
28	W-27203	.02 MFD.
29	W-27203	.02 MFD.
30	W-26152A	.0001 MFD.
31		.0001 MFD.
32	W-25437	.0015 MFD.
33	W-27203	.02 MFD.
34	W-25666A	LEVEL CONT. 3 MEG.
35	W-25594A	TONE CONT. 80,000 Ω
36		SWITCH
37	G14-23559	60~ POWER TRANS.
38	G24-27456	-58 SOCKET
39	G23-27456	-57 SOCKET
40	G18-27456	-56 SOCKET
41	G25-27456	-42 SOCKET
42	G6-27456	-80 SOCKET
43	B-24918A	CORD & PLUG
44	LC-25518	812-4 SPEAKER
45	27949	812-3 SPEAKER
46	W-22221	2.5V DIAL LAMP
47	B-27976	2.5 MMF. EYELET COND.
48	LW-20264	ANT.-GND. TERMINAL
49	G15-23559	25~ POWER TRANS.
50	G16-23559	220V. POWER TRANS.
51	W-27540	.0005 MFD.
52	W-23185	500,000 Ω
53	W25537	.03 MFD.
54		.001 MFD.

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.

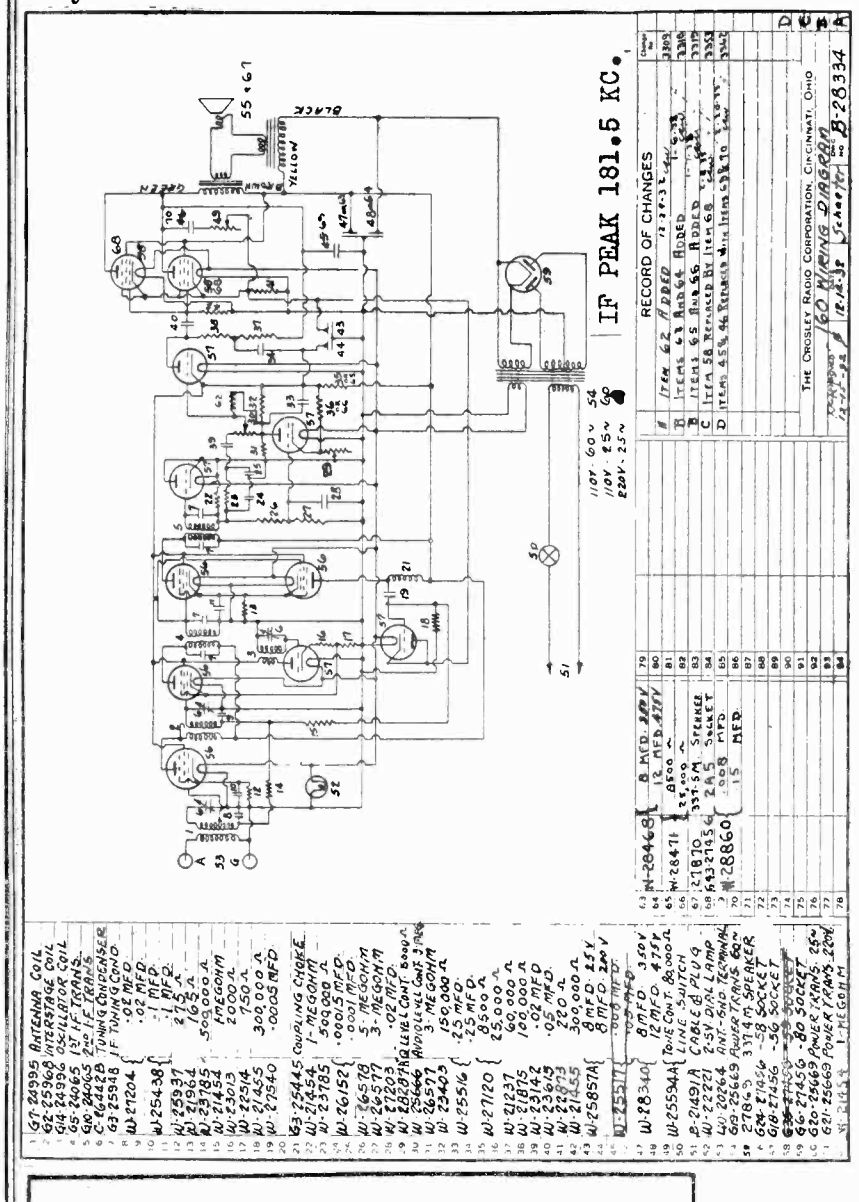
Suppressor grid voltage measured from suppressor grid contact to cathode contact.

Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages 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

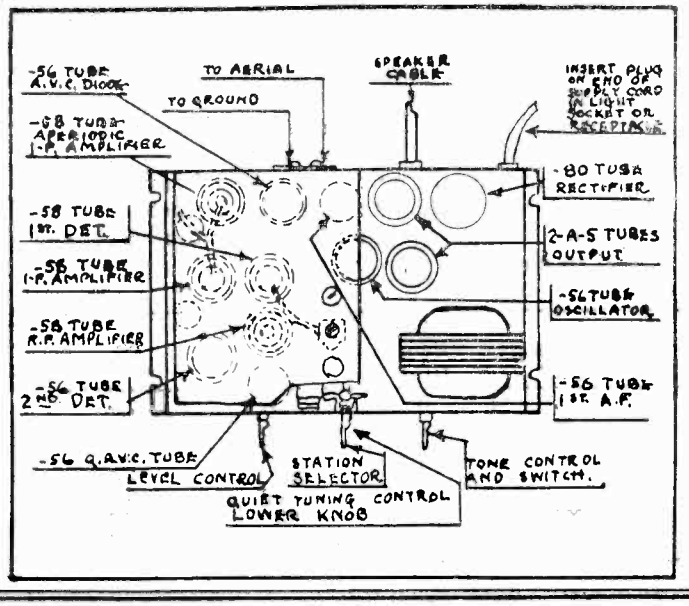
CROSLEY RADIO CORP.



Line voltage -- 117.5 volts (235 for 220|volt receivers).

Tube	Position	Plate	Screen Grid	Cathode	Fil.
-58	R. F. Amplifier	255	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
-58	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.

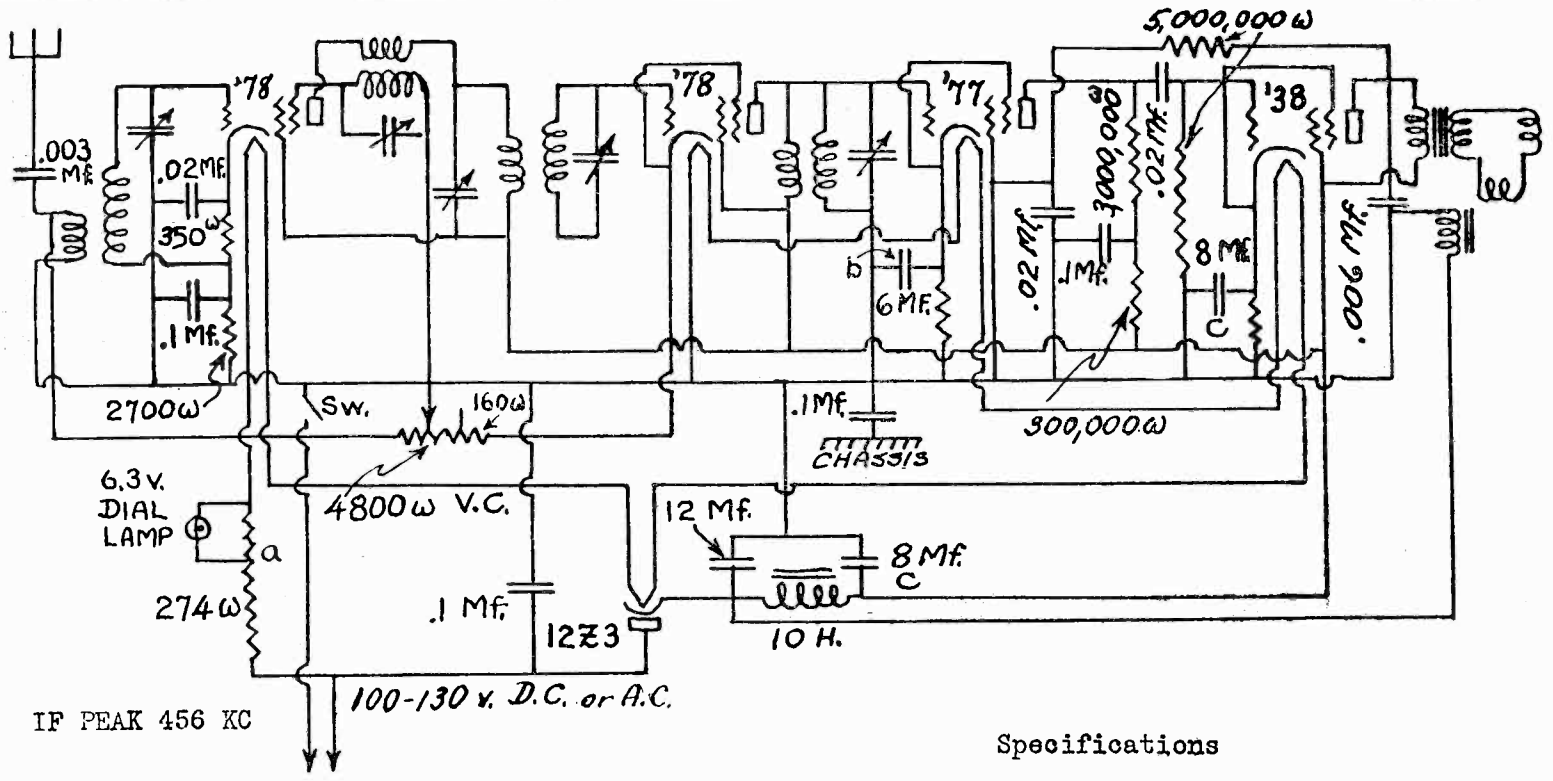


SPECIFICATIONS

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.



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.

Tube	Position	Plate	Screen Grid	Voltages for A.C. * 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