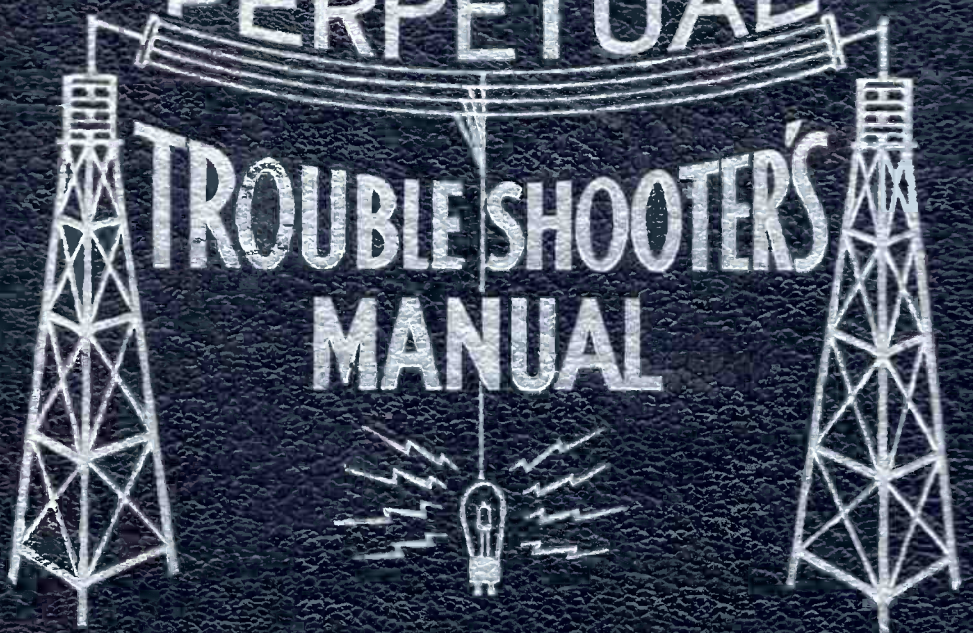
VOLUME III

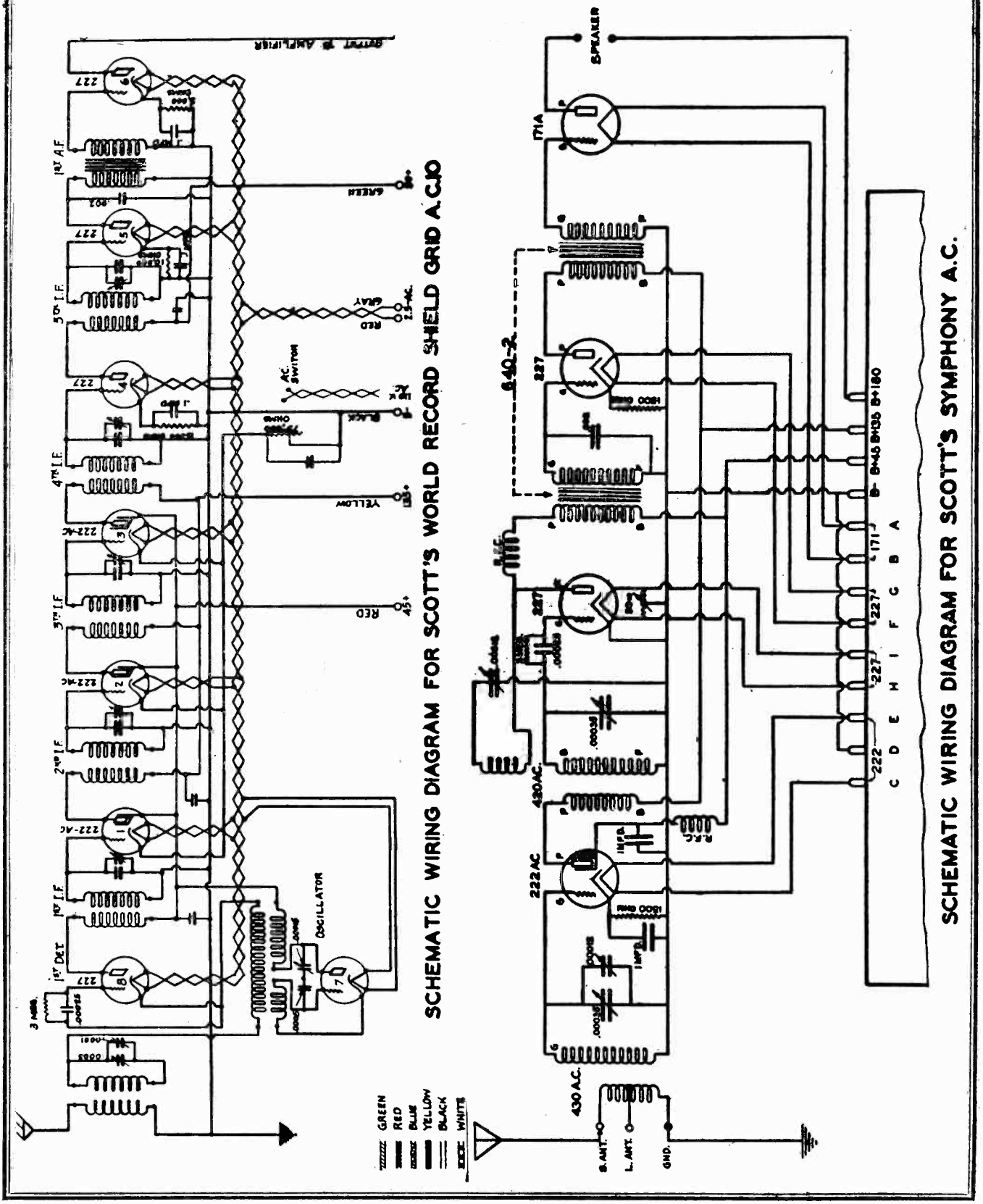
PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

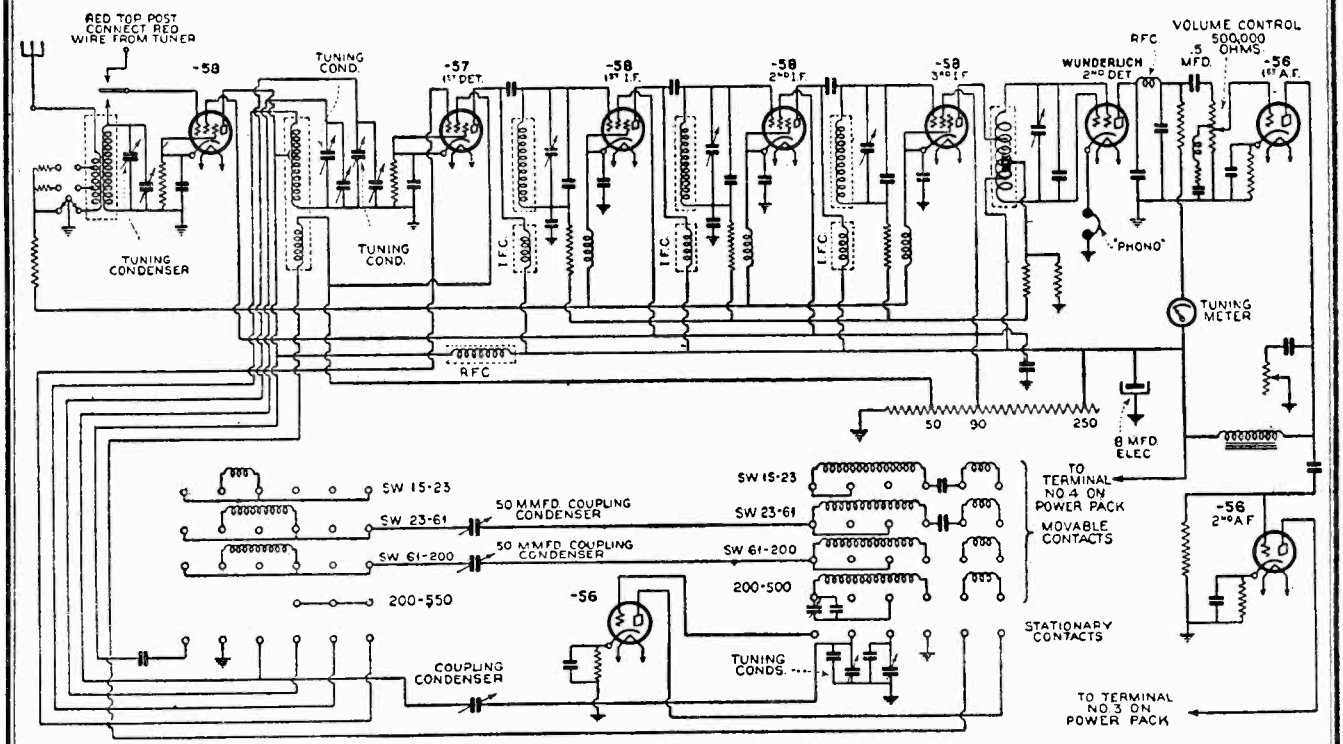
MODEL "World Record"
Shield Grid 10
MODEL Scotts Symphony AC

SCOTT TRANSFORMER CO.

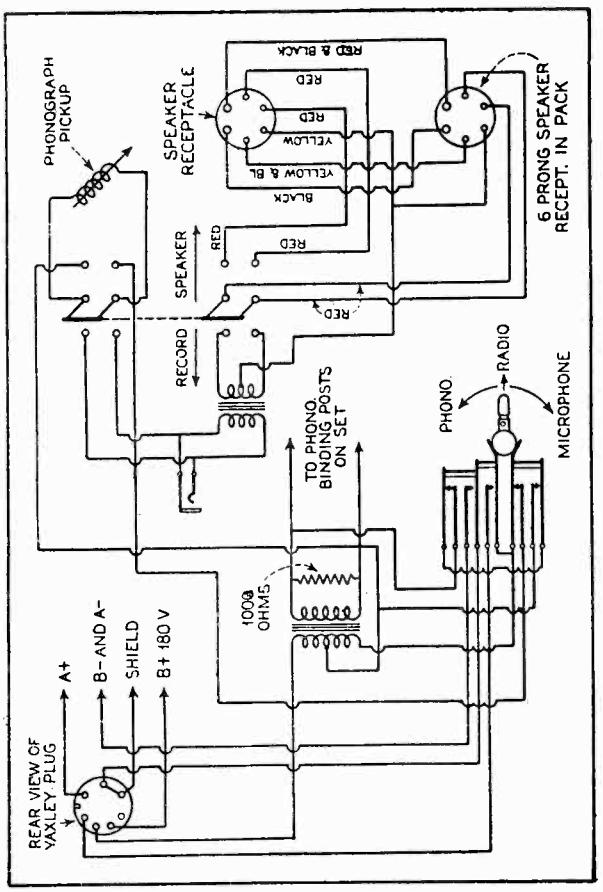


MODEL "1933 De Luxe"
AVC Super
Schematic
Power Supply
Recording

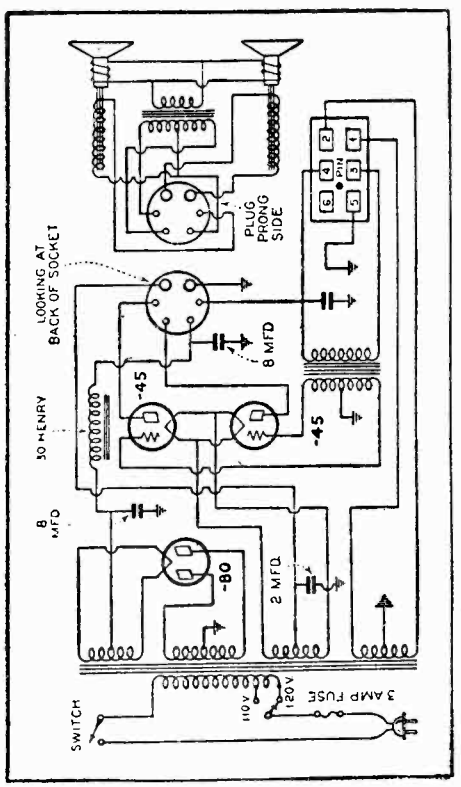
SCOTT TRANSFORMER CO.



Model Scott DeLuxe AVC Super 1933



Recording and Reproducing mechanism for Scott Imperial 1933 Super



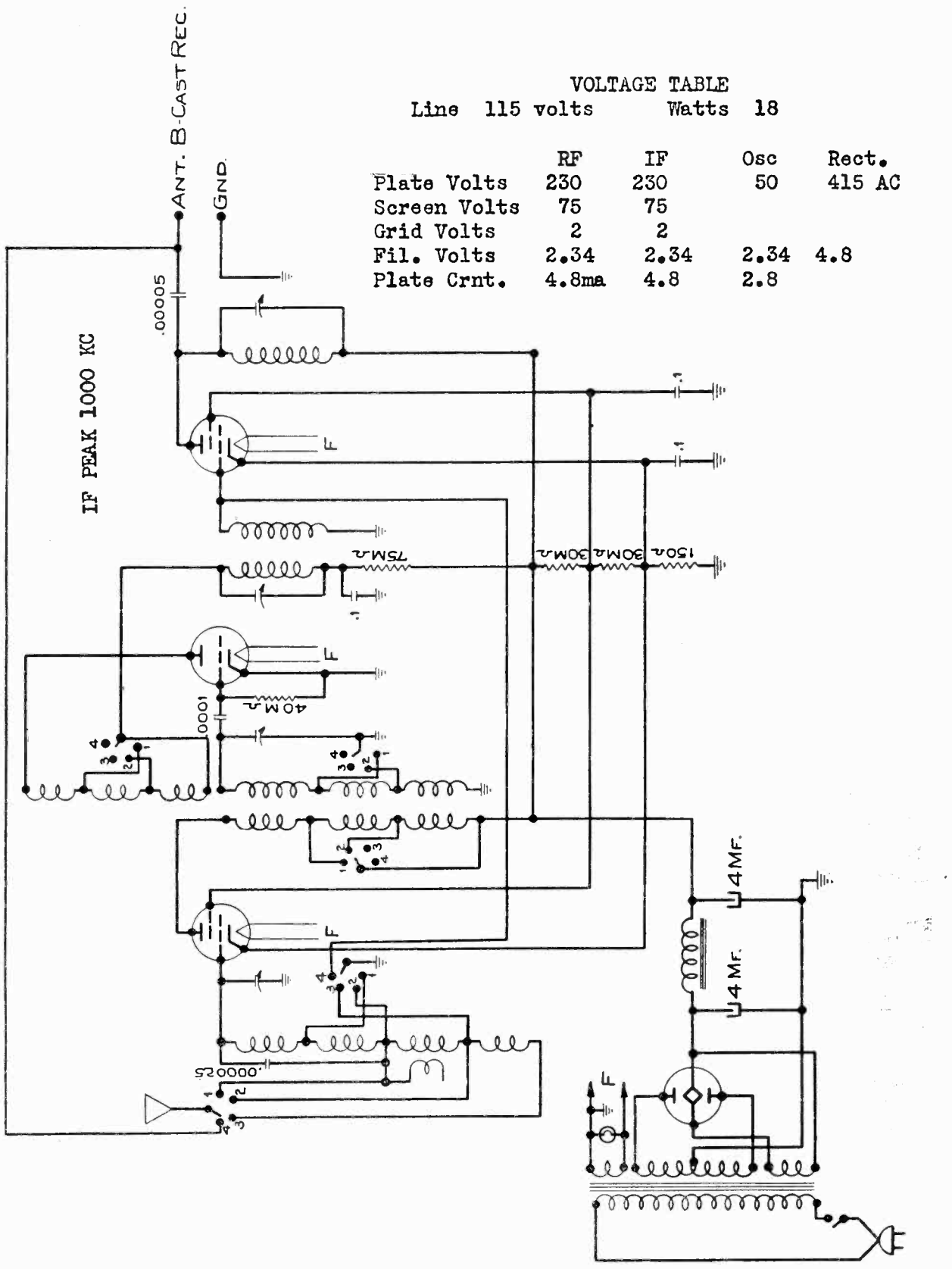
Power Pack for De-Luxe 1933 Super

SEARS-ROEBUCK & CO.

MODEL 1600
Schematic

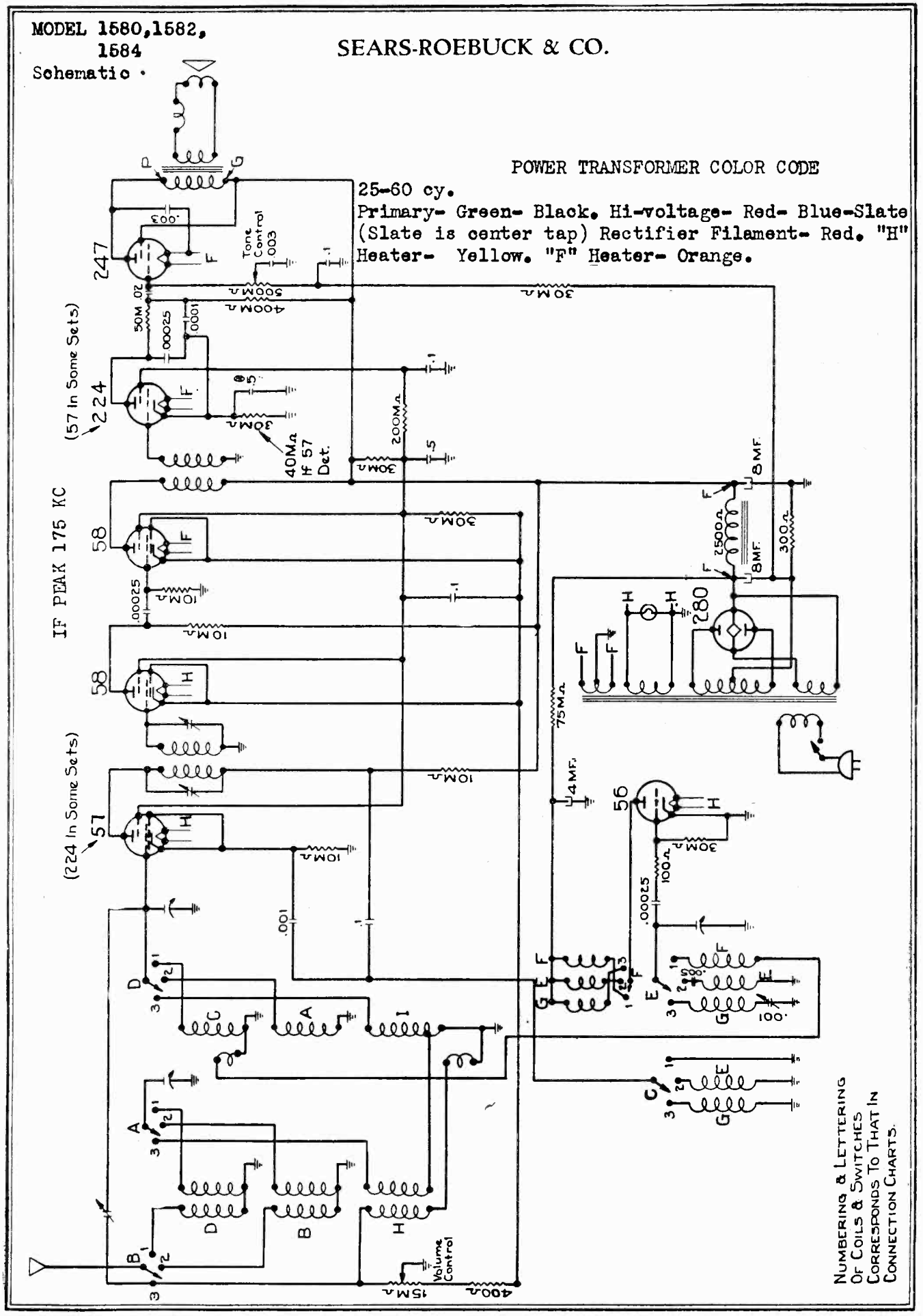
VOLTAGE TABLE
Line 115 volts Watts 18

	RF	IF	Osc	Rect.
Plate Volts	230	230	50	415 AC
Screen Volts	75	75		
Grid Volts	2	2		
Fil. Volts	2.34	2.34	2.34	4.8
Plate Crnt.	4.8ma	4.8	2.8	



MODEL 1580,1582, 1584
Schematic.

SEARS-ROEBUCK & CO.

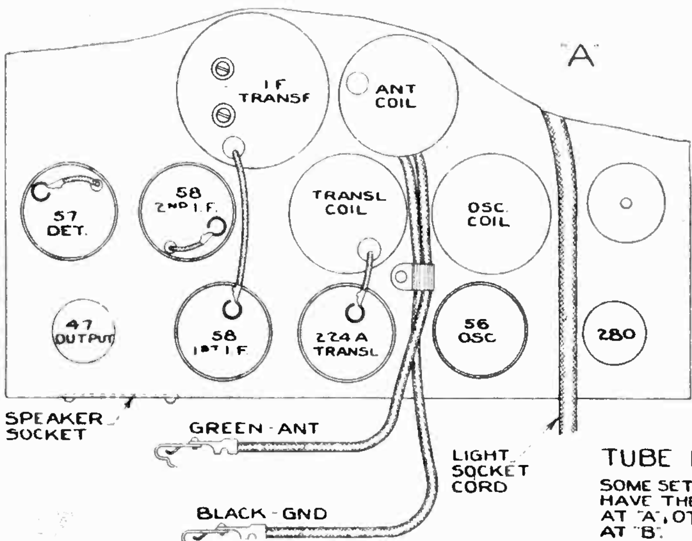


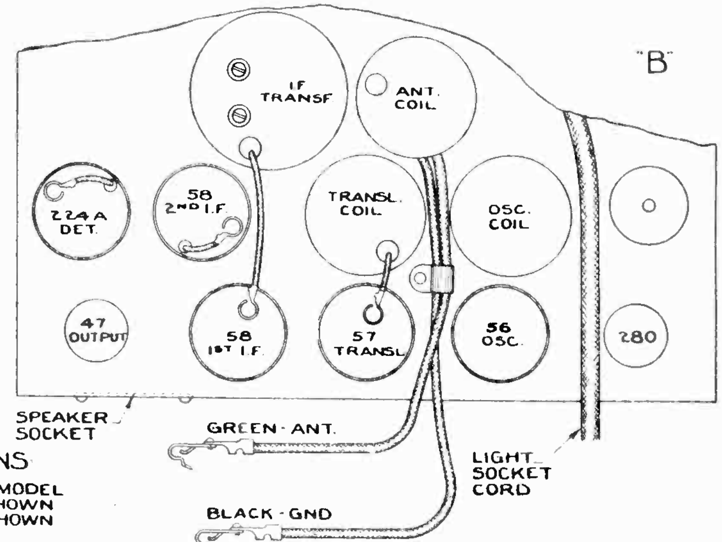
SEARS-ROEBUCK & CO.

MODEL 1580, 1582, 1584
Voltage - Socket

TUBE	Fil. Volt.	Plate Volt. Vol. Max.	Plate Volt. Vol. Min.	Screen Volt. Vol. Max.	Screen Volt. Vol. Min.	Control Grid V. Vol. Max.	Control Grid V. Vol. Min.	Plate Current Vol. Max.	Plate Current Vol. Min.	Screen Current Vol. Max.	Screen Current Vol. Min.
224 - Translator *** 57 - Translator	2.5 2.5	215 215	215 215	75 75	125 125	-6 -5	-10 -7.5	.5 .5	.8 .5	.2 .25	.2 .25
58 - First I.F.	2.5	175	175	75	75	-4	-45	3.5	0	1	0
58 - Second I.F.	2.5	220	180	80	80	-4	-45	4.5	0	1	0
57 - Second Detector*** 224 - Second Detector	2.5 2.5	75 64	75 64	40 40	70 70	-3 -3.6	-5 -4.6	.1 .25	.1 .25	.06 .06	.05 .05
247 - Output	2.5	215	225	250	260	**	**	26.5	32	5.5	6.75
56 - Oscillator	2.5	40 - 60 *						4			
280 - Rectifier	4.8	Max. DC Volts - 350						25 M.A. Each Plate			

* 40 Volts when not oscillating; 60 Volts when oscillating. Stop from oscillating by touching finger to grid. Line - 117 Volts; Watts - 65.





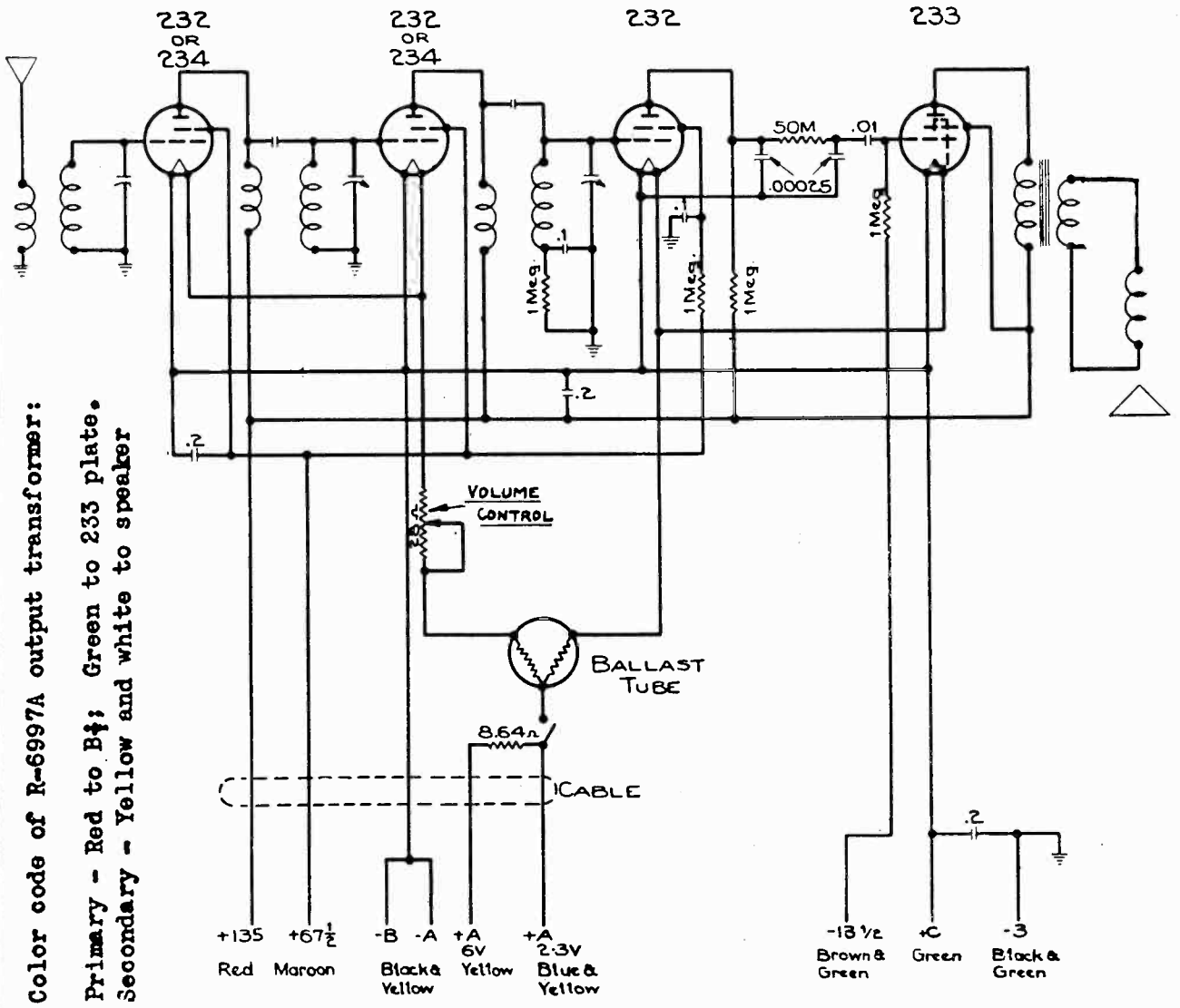
TUBE POSITIONS
SOME SETS OF THIS MODEL HAVE THE LAYOUT SHOWN AT "A", OTHERS AS SHOWN AT "B".

** 530,000 ohms in series.

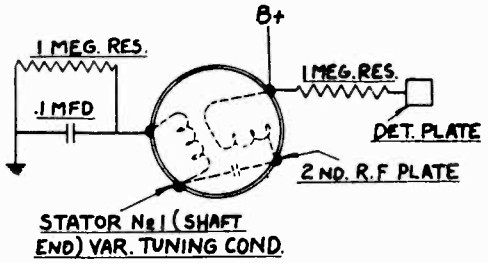
*** Some of these sets have a 224 translator and a 57 detector. Others have a 57 translator and a 224 detector.

MODEL 1620,1622
Schematic

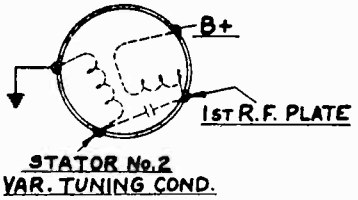
SEARS-ROEBUCK & CO.



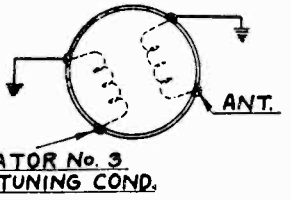
Color code of R-6997A output transformer:
Primary - Red to B+; Green to 233 plate.
Secondary - Yellow and white to speaker



R6687 2ND R.F. COIL



R6687 1ST R.F. COIL

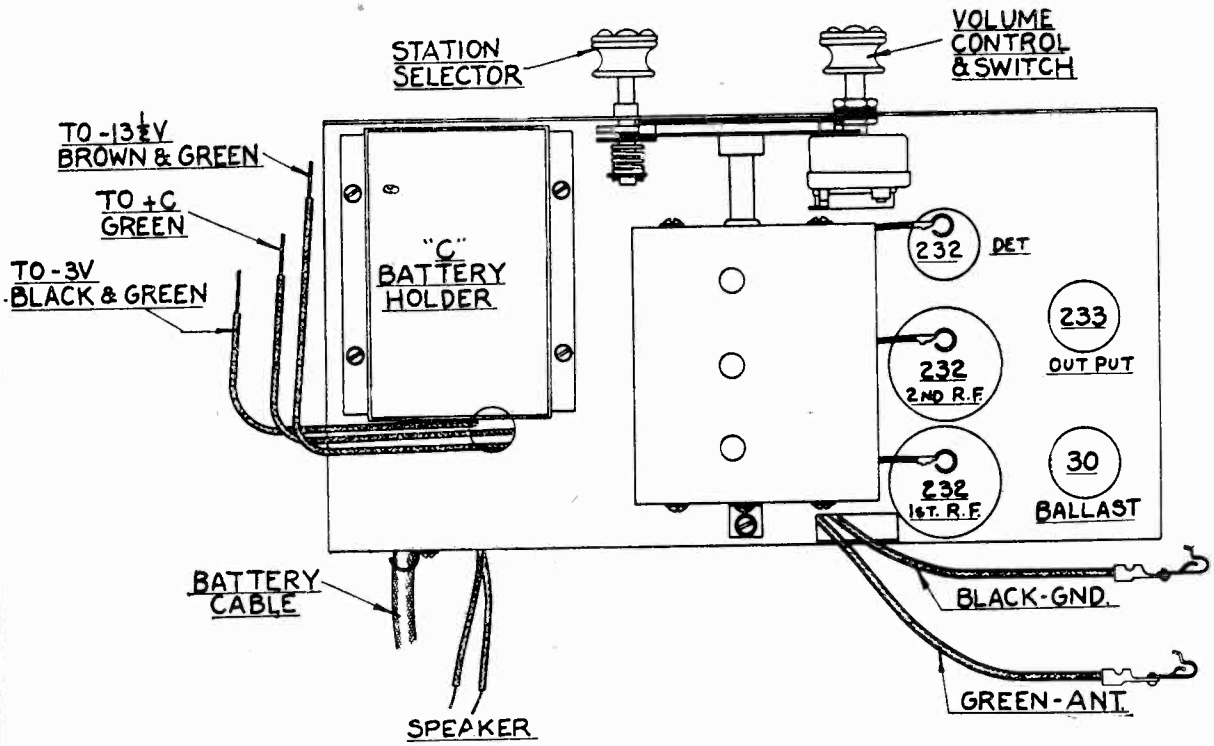


R7300 ANT. COIL

COIL CONNECTIONS
VIEWED FROM BOTTOM OF CHASSIS

SEARS-ROEBUCK & CO.

MODEL 1620,1622
Voltage - Socket



TUBE POSITIONS

TUBE	Filament Voltage	Plate Voltage	Screen Voltage	Control Grid V.	Plate Current	Screen Current
232 - First R.F.	2.1	135	67	-3	1.7	.125
232 - Second R.F.	2.1	135	67	-3	1.7	.125
232 - Detector	2.05	27*	13.5*	*	.05	Too low to read
233 - Output	2.05	135	135	*	14	4

Total "B" current drain - 22.4 M.A.
Total "A" current drain - 440 M.A.

* 1 Meg. resistor in series.

Grid, plate and screen voltages taken between negative side of filament and respective element. Volume Control at maximum.

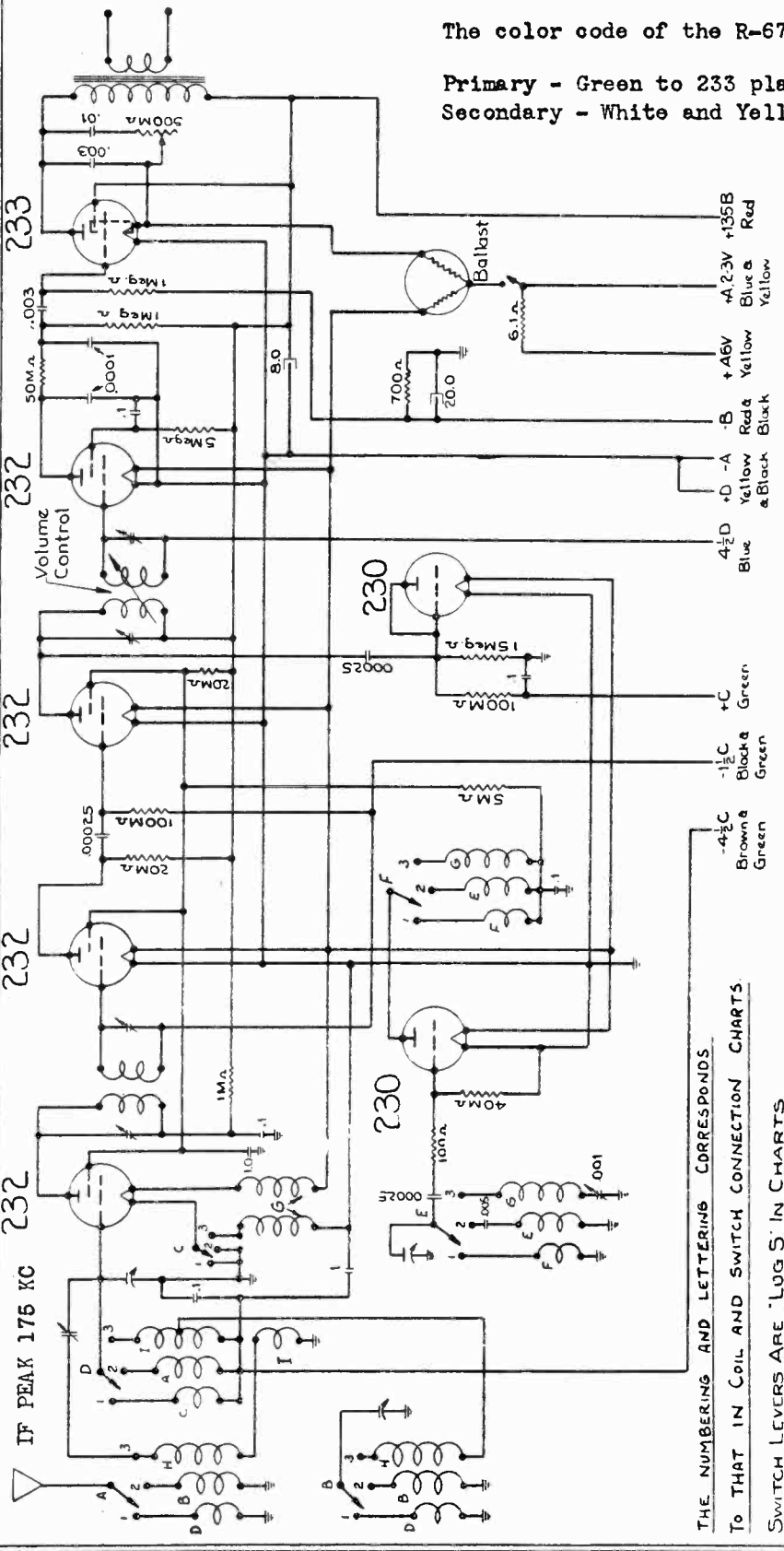
Control grid readings taken on 7.5 volt scale of 1000 ohms per volt meter; others on 250 volt scale. These are average values. Usually, deviations up to 20% are permissable and do not necessarily indicate a fault. Where series grid resistors prevent grid voltage readings, proper plate current at rated plate voltage will serve as an indication of proper Grid bias and normal functioning of the tube. Care must be used when readings are taken with an analyzer since the capacity of the cable may cause the circuit to oscillate and give erratic readings. Usually touching a finger to the grid will stop oscillation.

MODEL 1570,1572,
1574
Schematic

SEARS-ROEBUCK & CO.

The color code of the R-6790A output transformer is:

Primary - Green to 233 plate; Red to B+
Secondary - White and Yellow to speaker jacks.



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.

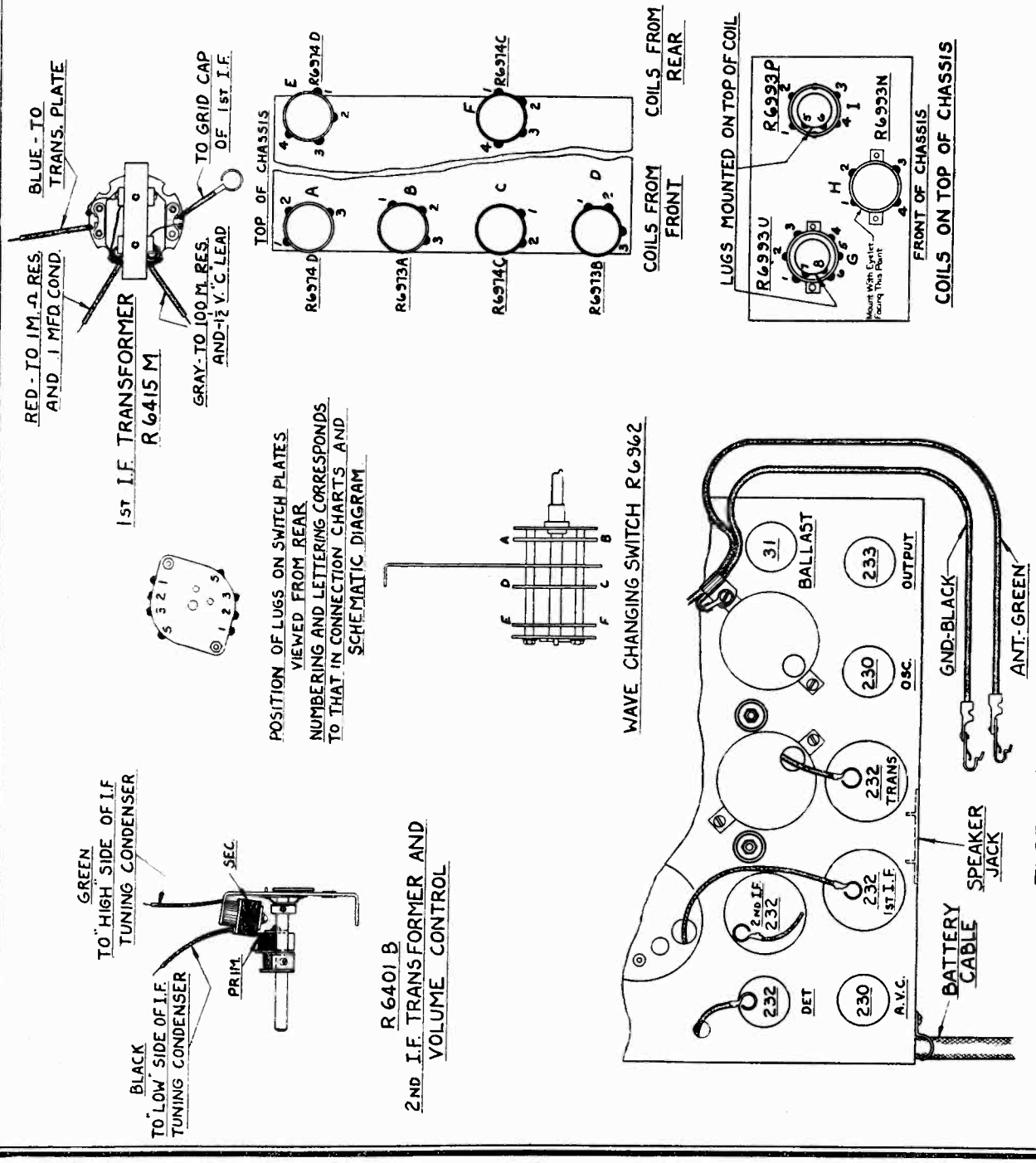
SEARS-ROEBUCK & CO.

MODEL 1570,1572, 1574
Voltage - Socket

	Fil.	Plate	Screen	C.Grid	Plt. Crnt	Scr. Crnt
232 Translator	2.	118	50	1.	.6 ma	.05 ma
232 1st IF	2.	78	50	*	2.	.4
232 2nd IF	2.	118	50	*	1.5	.1
232 Detector	2.	15*	4*	-4.5	Too low to read	
233 Output	2.	112	120	*	11.	3.
230 Oscillator	2.	44-50**	--	--	2.5 - 2**	--
230 AVC	2.	Used as rectifier with plate and grid joined.				

* High resistance in series.

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



MODEL 1590,1592
Schematic-Voltage

SEARS-ROEBUCK & CO.

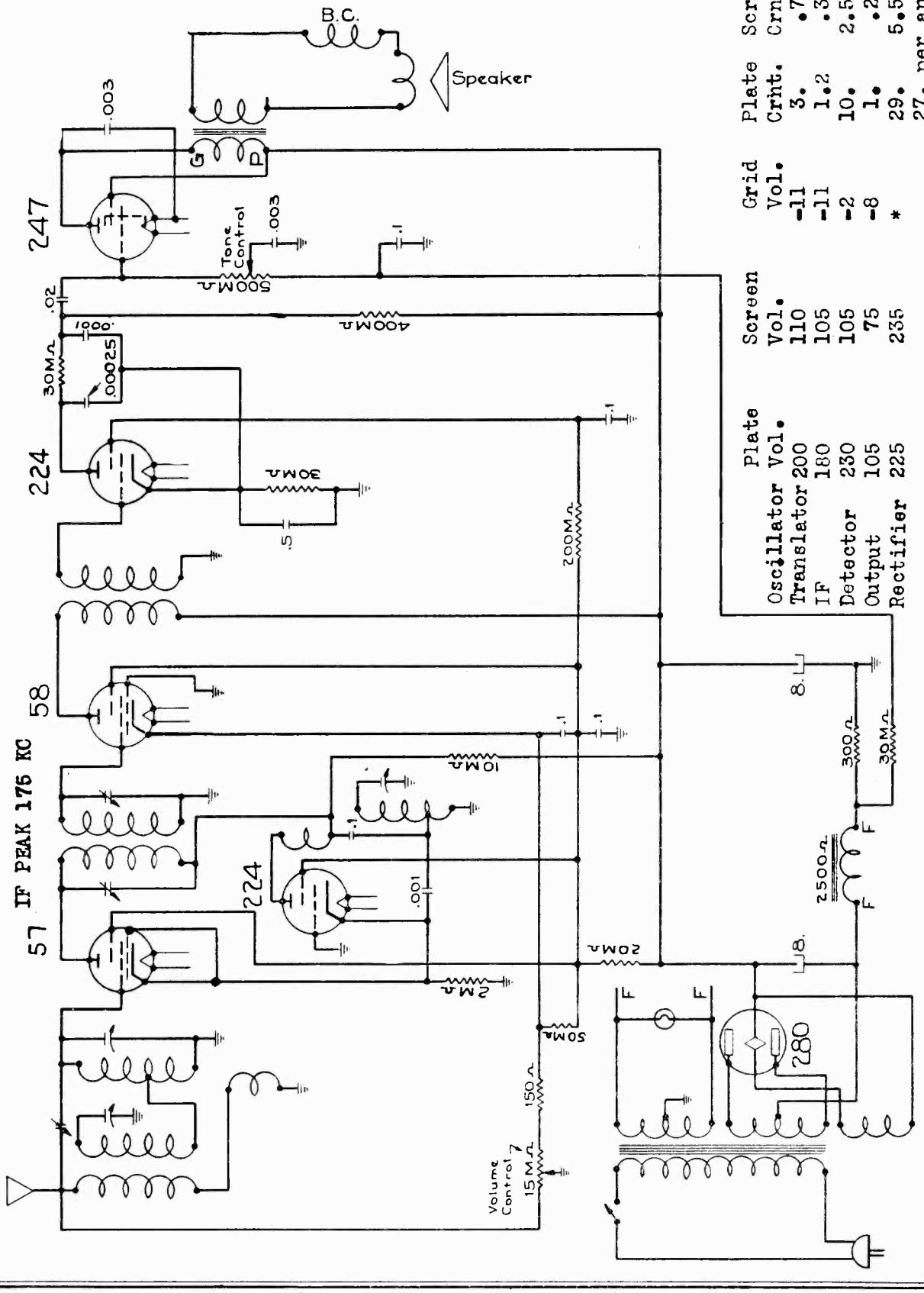


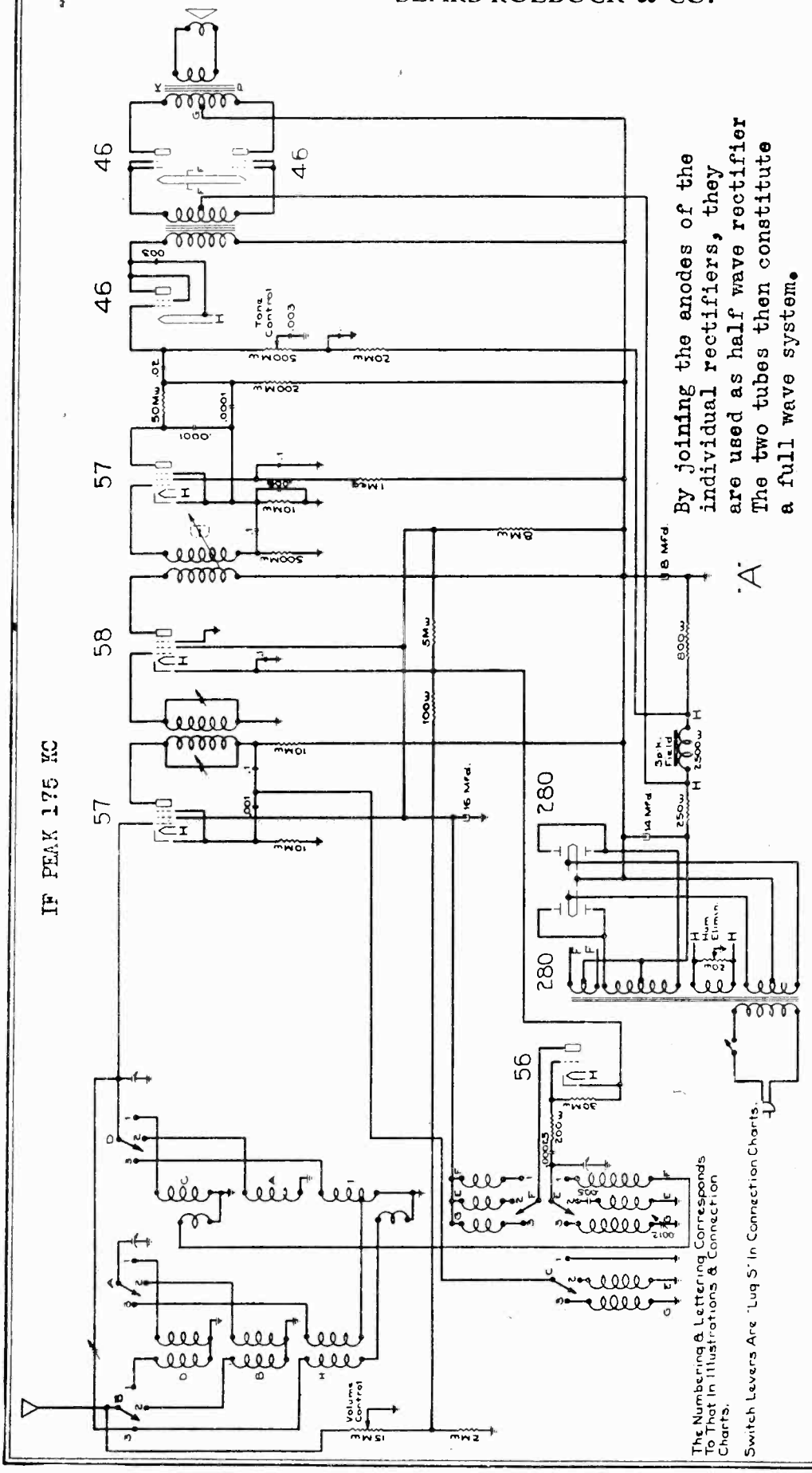
	Plate	Screen	Grid	Plate	Screen
	Screen	Vol.	Vol.	Crnt.	Crnt.
Oscillator	Vol.	110	-11	3.	.7
Translator	200	105	-11	1.2	.35
IF	180	105	-2	10.	2.5
Detector	230	105	-8	1.	.25
Output	105	75	*	29.	5.5
Rectifier	225	235			27. per anode

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

This receiver tunes from 1765 kc to 520 kc.

SEARS-ROEBUCK & CO.

MODEL 1630
Schematic #1



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

AF Transformer (Output)
Green and Blue to 46 plates.
Red is center tap to B plus.
See schematic for connections to speaker plug.
Secondary.-- #16 enamelled wire leads to voice coil.

Speaker Field... Black and Slate.

AF Transformer (Input)
Primary--- Black to driver plate.
Red to B plus.
Secondary --- Green to grid. Slate is center tap. In some sets the green lead has a tracer. Further, one of these leads (green) comes out singly from one side of the coil and connects to the grid of the 46 next to the translator.

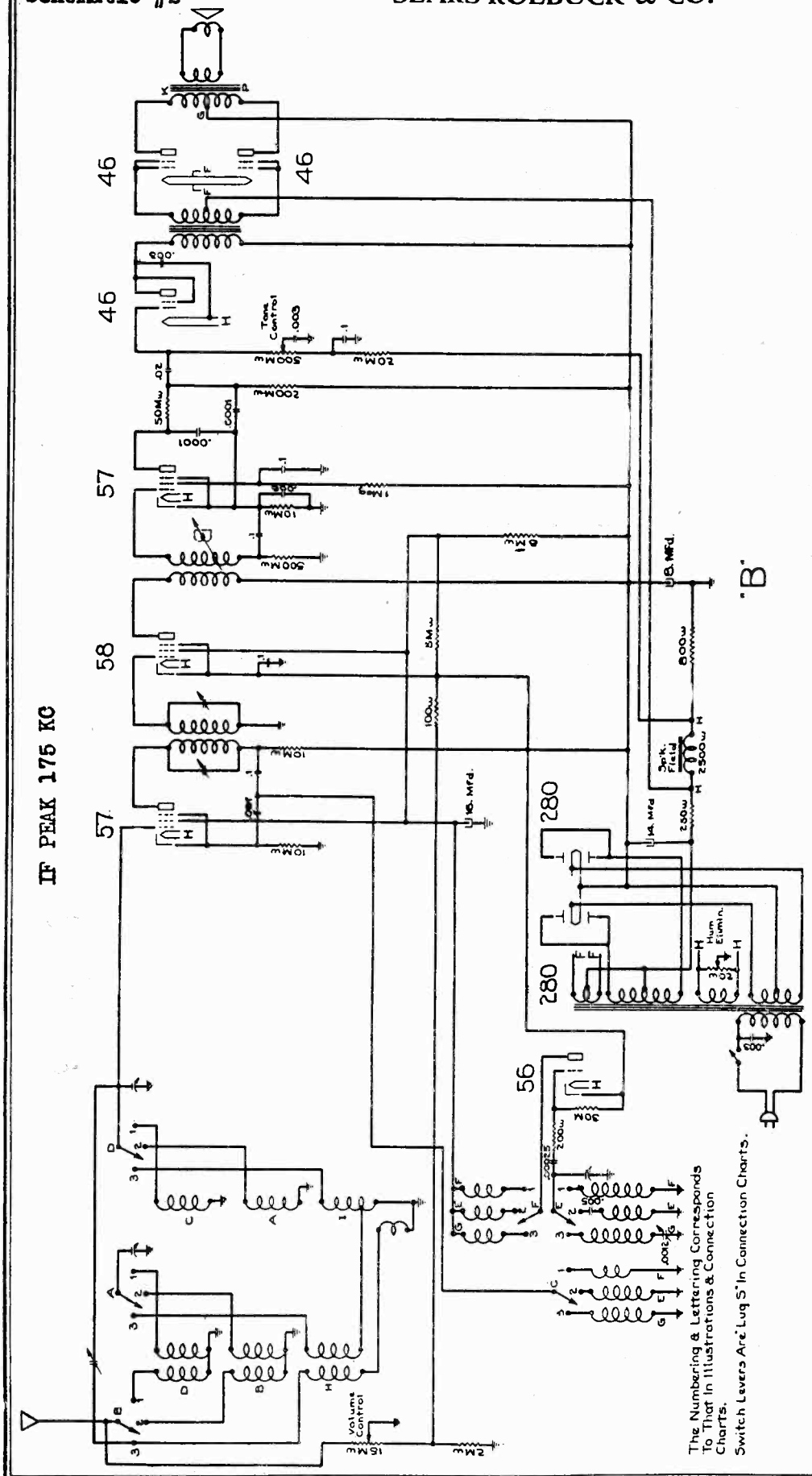
Power Transformer
Primary ---Green and Black
Hi-Voltage---Red and Blue with Slate for center tap.
Rectifier Fil.---Red. Solid wire.
Output Fil.---Orange. Solid wire.
Heater.---Yellow. Solid wire.

The Numbering & Lettering Corresponds To That In Illustrations & Connection Charts.

Switch Levers Are Lug 5 In Connection Charts.

MODEL 1630
Schematic #2

SEARS-ROEBUCK & CO.



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.

SEARS-ROEBUCK & CO.

MODEL 1630
Voltage - Data

INSTRUCTIONS FOR ALIGNING SHORT WAVE COILS

It sometimes happens that all-wave receivers which are in perfect alignment at broadcast frequencies are out of alignment on short waves. Reception of the same station at two points a few divisions apart on the dial, or poor sensitivity, results. This condition will be most liable to occur on the shortest wave-range, for two reasons. First, the required accuracy of alignment is much greater on this range. For instance, assume a receiver tuned to 600 kc. with its oscillator high in its frequency setting by .2%. That means the IF signal generated will be 176.55 kc. instead of 175 kc. Satisfactory reception still is possible. Now suppose the receiver is tuned to 15,000 kc. The IF signal then becomes 205 kc and reception is impossible, although the oscillator is still "out" only the same .2%. The second reason is that the coils for the shortest wave-range have the fewest turns and lowest inductance. Consequently, a change in the position of a single turn means a change in a comparatively large percentage of the total turns on the coil, with resultant effect on frequency. If a coil with ten turns has one shifted, 10% of the total are thereby shifted. But if a coil has a hundred turns and one is shifted, only 1% of the total are shifted. Thus it is apparent why realignment most often is necessary on the shortest wave-range.

When realignment is called for, it can be done as follows: Tune in a station at about 6200 kc. If the station is heard at two points, tune to the one of higher frequency. If none can be picked up, the noise level will serve as an indication of sensitivity. Then shift an end turn of wire toward or away from the other turns on the high-range translator and band-pass coils until maximum signal or noise is heard. These coils are the lower two of the four mounted on the switch plate. (Coils "C" and "D" in Service Manual illustrations). When the best spacing of the turn for maximum volume is found, the wire should be secured in place with amberoid or similar substance.

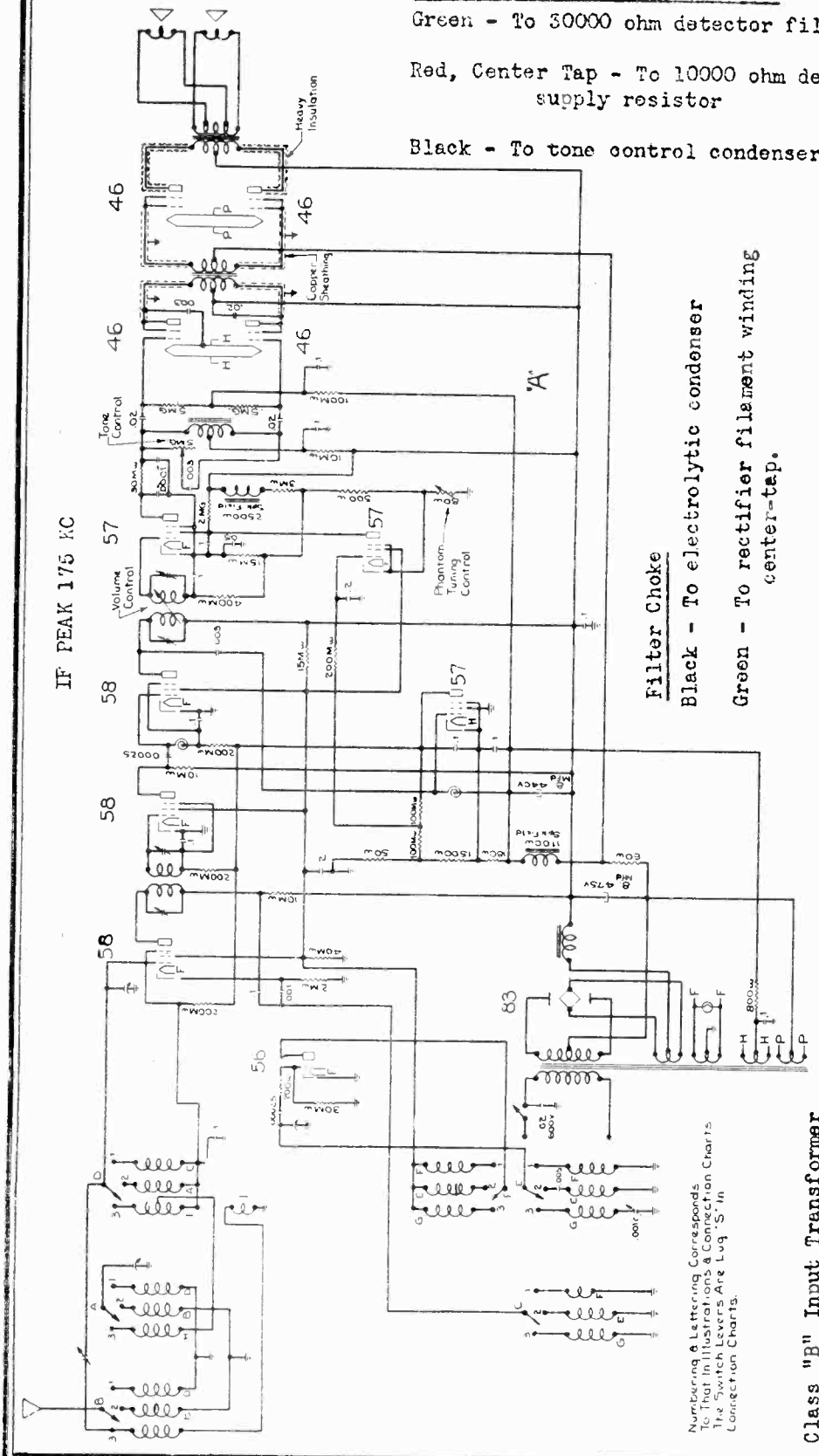
If the receiver is equipped with automatic volume control, this should be rendered inoperative or else a small signal input used. One method is to twist the antenna lead-in around the receiver's antenna lead for a few inches instead of connecting it directly to the antenna lead clip. The input can then be varied by changing the length for which the leads are twisted.

	Plate Vol.	Screen Vol.	Grid Vol.	Plate Crnt.	Screen Crnt.
56 Oscillator	75	-	-8	5	-
57 Translator	240	70	-6	.4	.1
58 IF	240	70	-2	9	2.
57 Detector	115	80	-2	.5	.1
46 Driver	240	240	-10*	12	2.5
46 Class "B"s	385	7	.7	30-65**	1.7-15**
280 Rectifier	Max. d.c.	390 volts		25 ma per plate of each tube	

* 520,000 ohms in series
** Second value applies when a very loud signal is being received. Grid current is for both grids. Values are per tube.
Touching a finger to the grid of a tube will cause it to cease oscillating.

MODEL 1640
Schematic

SEARS-ROEBUCK & CO.



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.

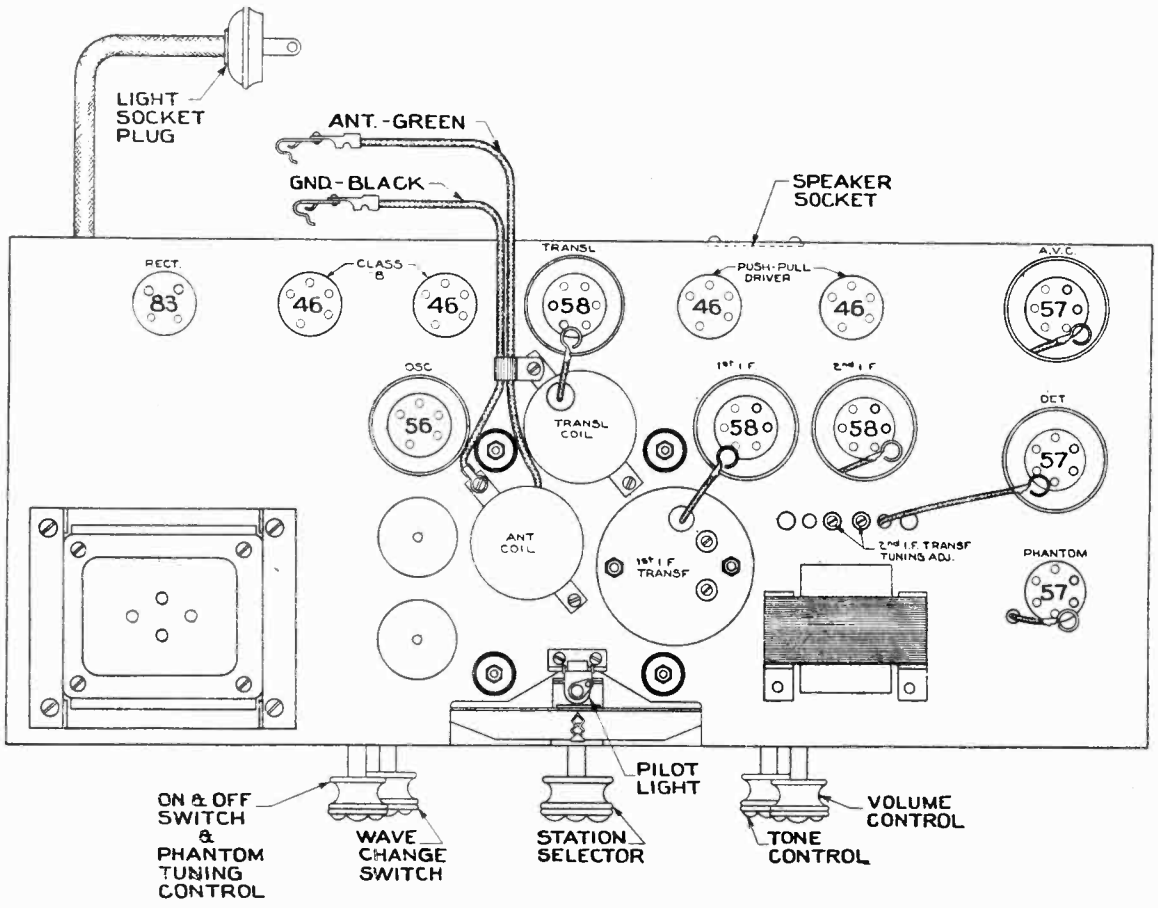
Red, Center Tap - To B +

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

Shield Pigtail - To ground

SEARS-ROEBUCK & CO.

MODEL 1640
Voltage-Socket



TUBE VOLTAGE and CURRENT CHART

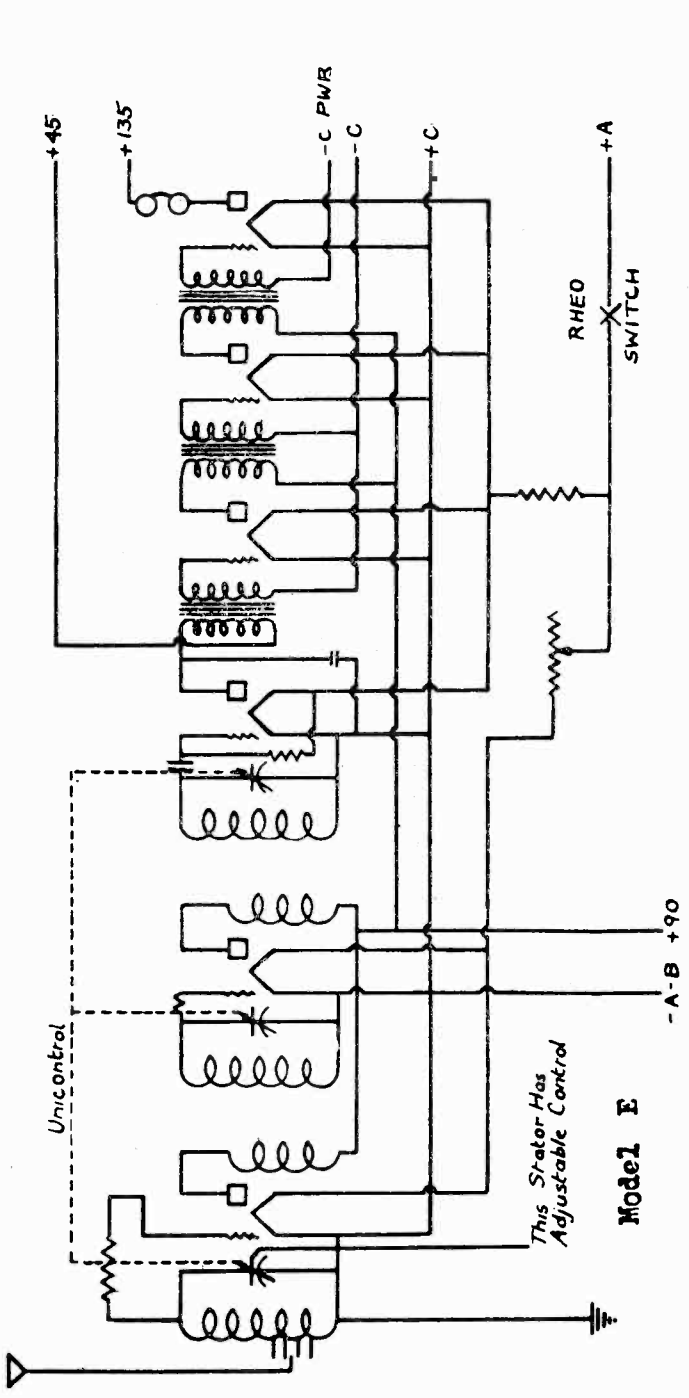
MODEL 71

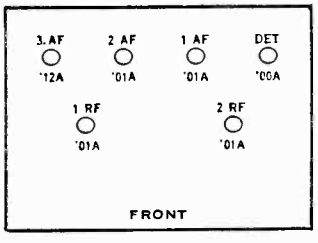
TUBE	PLATE VOLTAGE	SCREEN VOLTAGE	GRID VOLTAGE	PLATE M.A.	SCREEN M.A.	GRID M.A.
58 - Translator	190	60	-5	.4	.2	
56 - Oscillator	65	--	-10	4	--	
58 - 1st IF	170	65	*	3	.8	
58 - 2nd IF	200	65	*	4.5	1	
57 - Detector	170	40a	*	.2a	b	
46 - Drivers	250	250	-10*	18	3.5	
46 - Class "B"	370	5	+5	21-50c	.5-5c	1.8-11c
57 - A.V.C.	50	80	-10	b	b	
57 - Phantom	45a	65a	*	b	1.25d	
83 - Rectifier	Max. d.c. - 390 Volts			70 m.a. each plate		

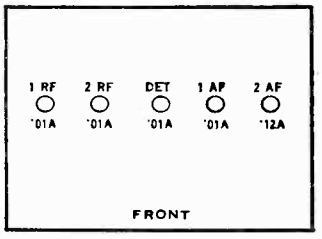
* High resistance in series
a "Phantom Tuning Control" knob turned all the way to the right
b Too low to read.
c The latter value when a loud signal is being received.
d "Phantom Turning Control" knob turned all the way to the left, (but not so far as to switch set off).

MODEL Silvertone E
MODEL Silvertone F

SEARS-ROEBUCK & CO.

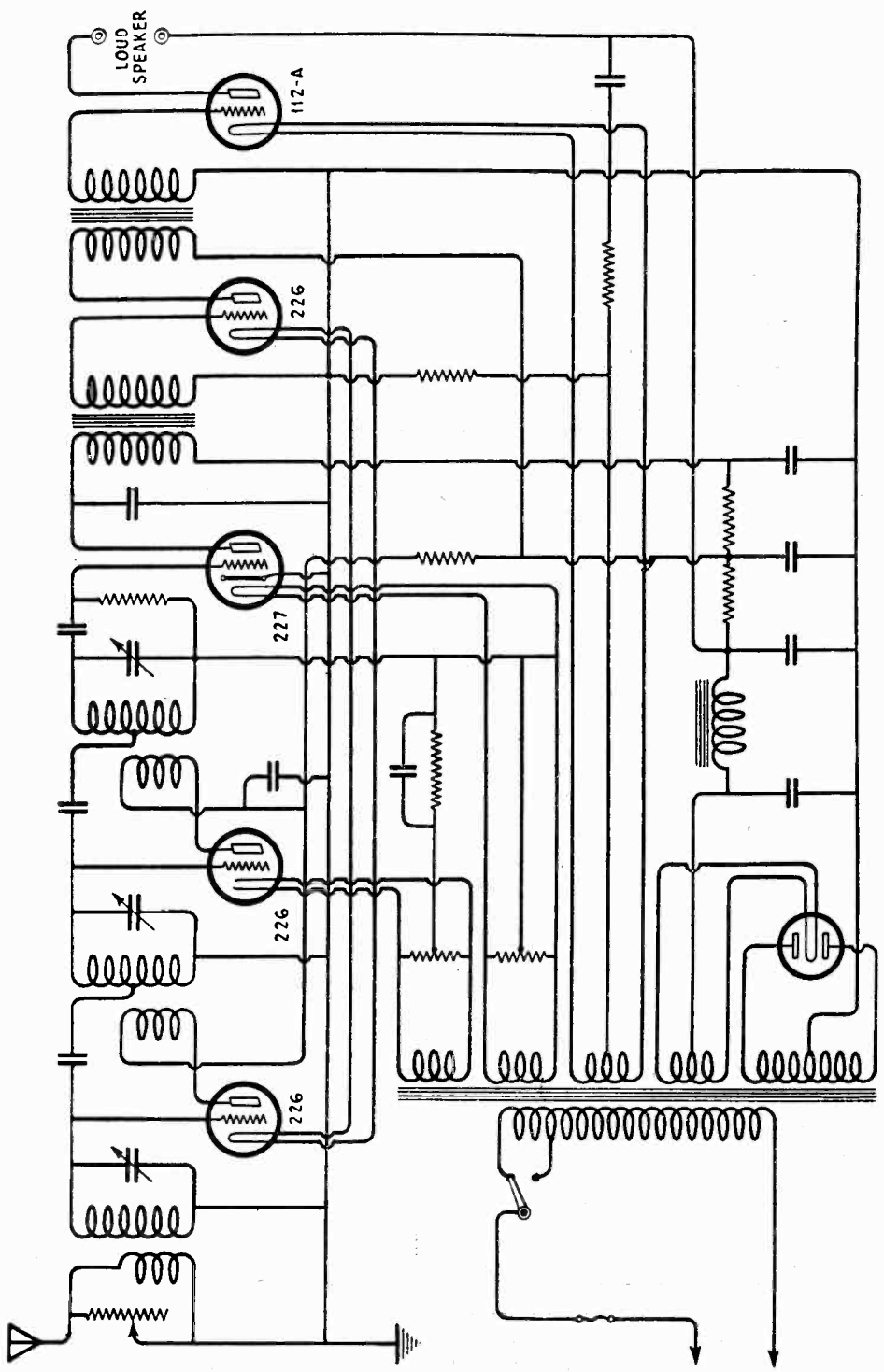




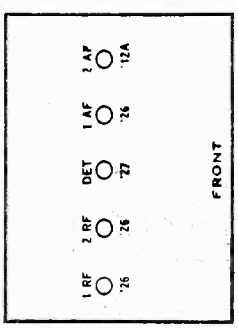


MODEL Silvertone FF

SEARS-ROEBUCK & CO.

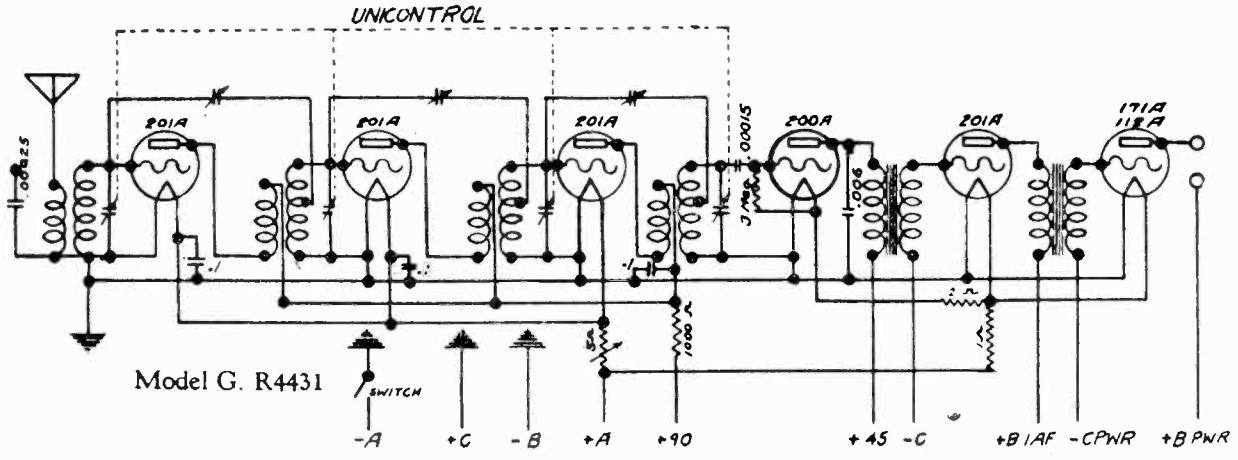


MODEL FF

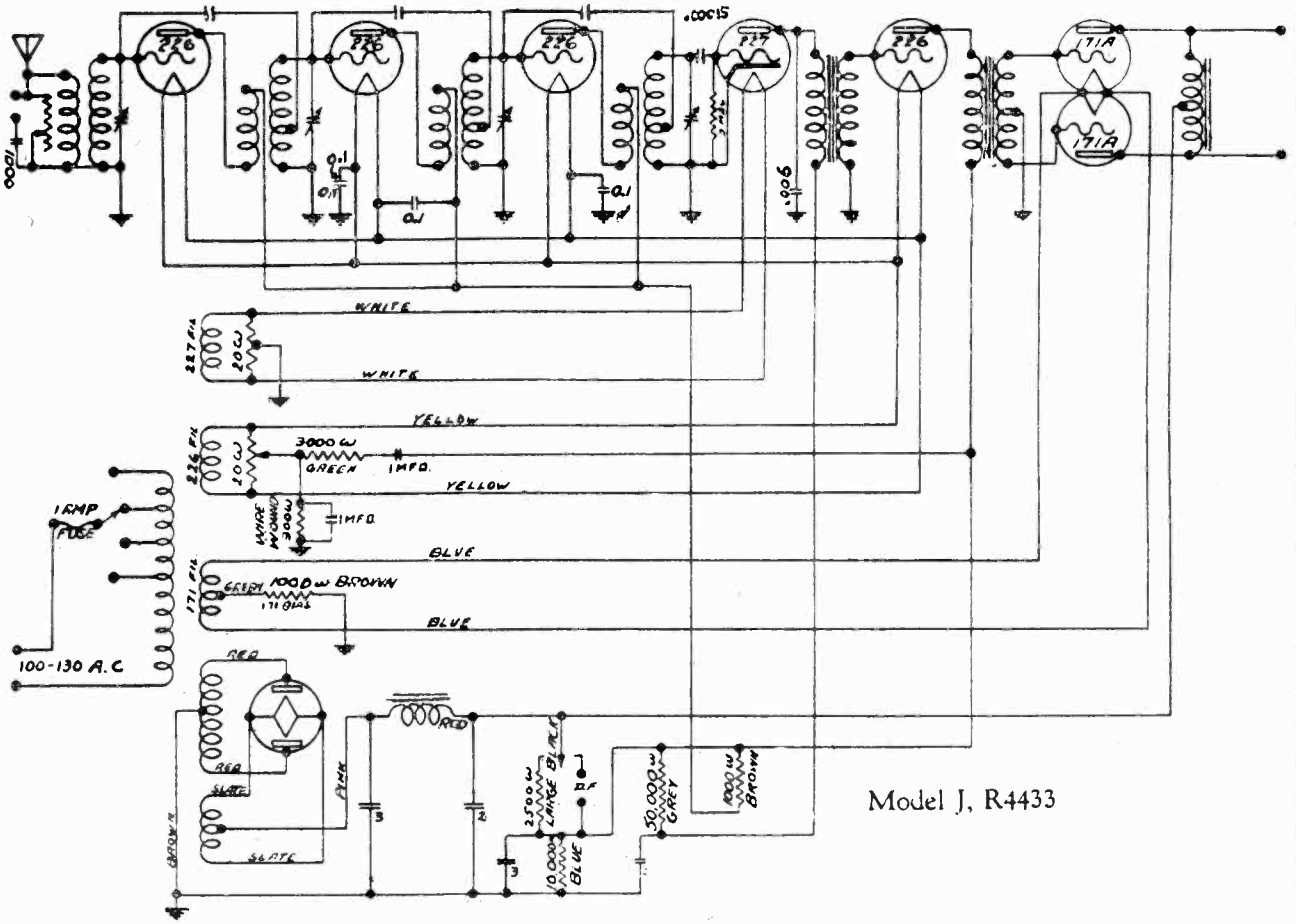


MODEL Silvertone G
MODEL Silvertone J

SEARS-ROEBUCK & CO



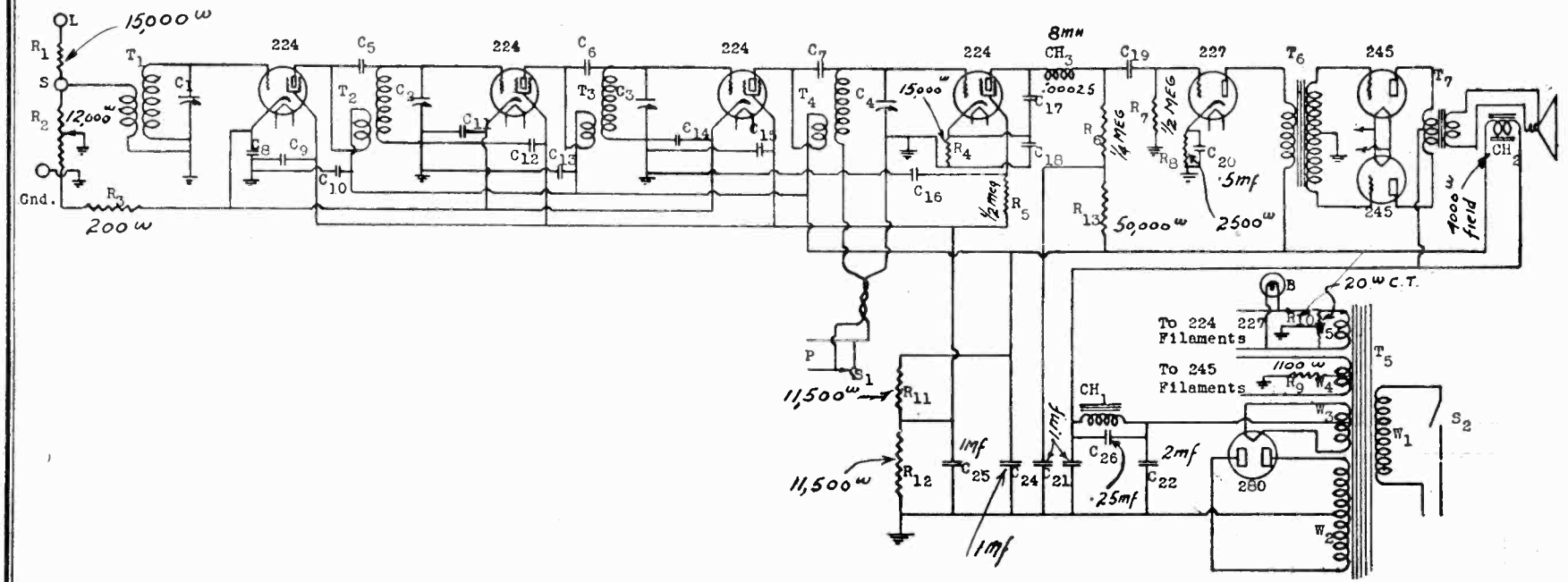
Model G. R4431



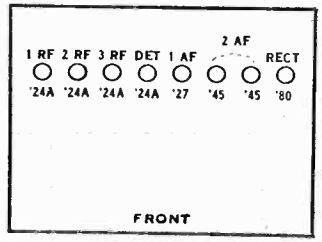
Model J, R4433

SENTINEL RADIO CORP.

MODEL 8, 9
Schematic
Voltage



Models 8, 9



—Tube Voltages—

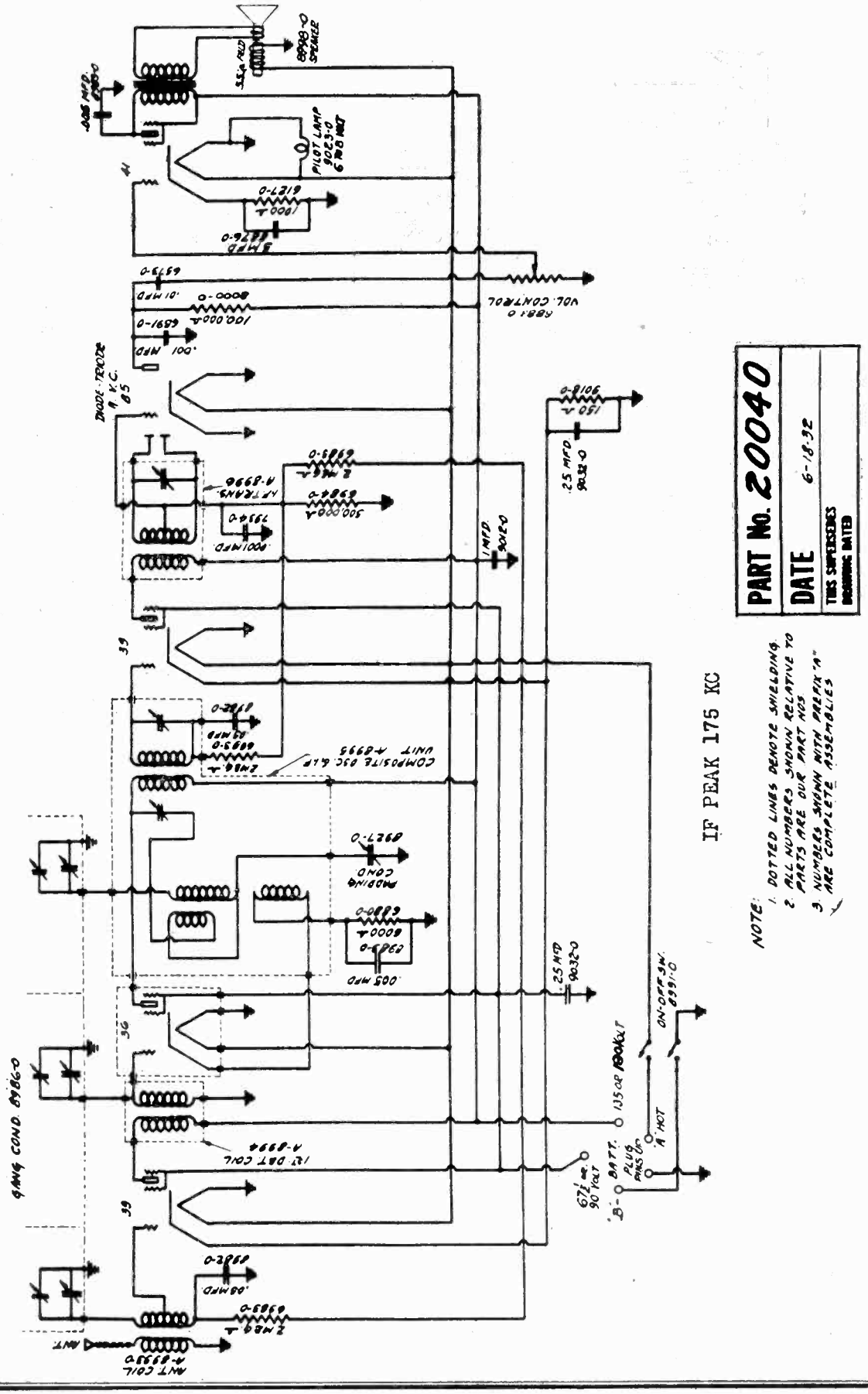
Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	Normal Plate M. A.	Screen Volts
224	1st R. F.	2.25	190	2.5	4.0	89
224	2nd R. F.	2.25	190	2.5	4.0	89
224	3rd R. F.	2.25	190	2.5	4.0	89
224	Detector	2.25	80*	4.2	.2	10*
227	1st Audio	2.25	170	12	4.5	
245	Output	2.35	250	50	30	
245	Output	2.35	250	50	30	
280	Rectifier	4.75			55*x	

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

*x 55 M. A. drain each plate.

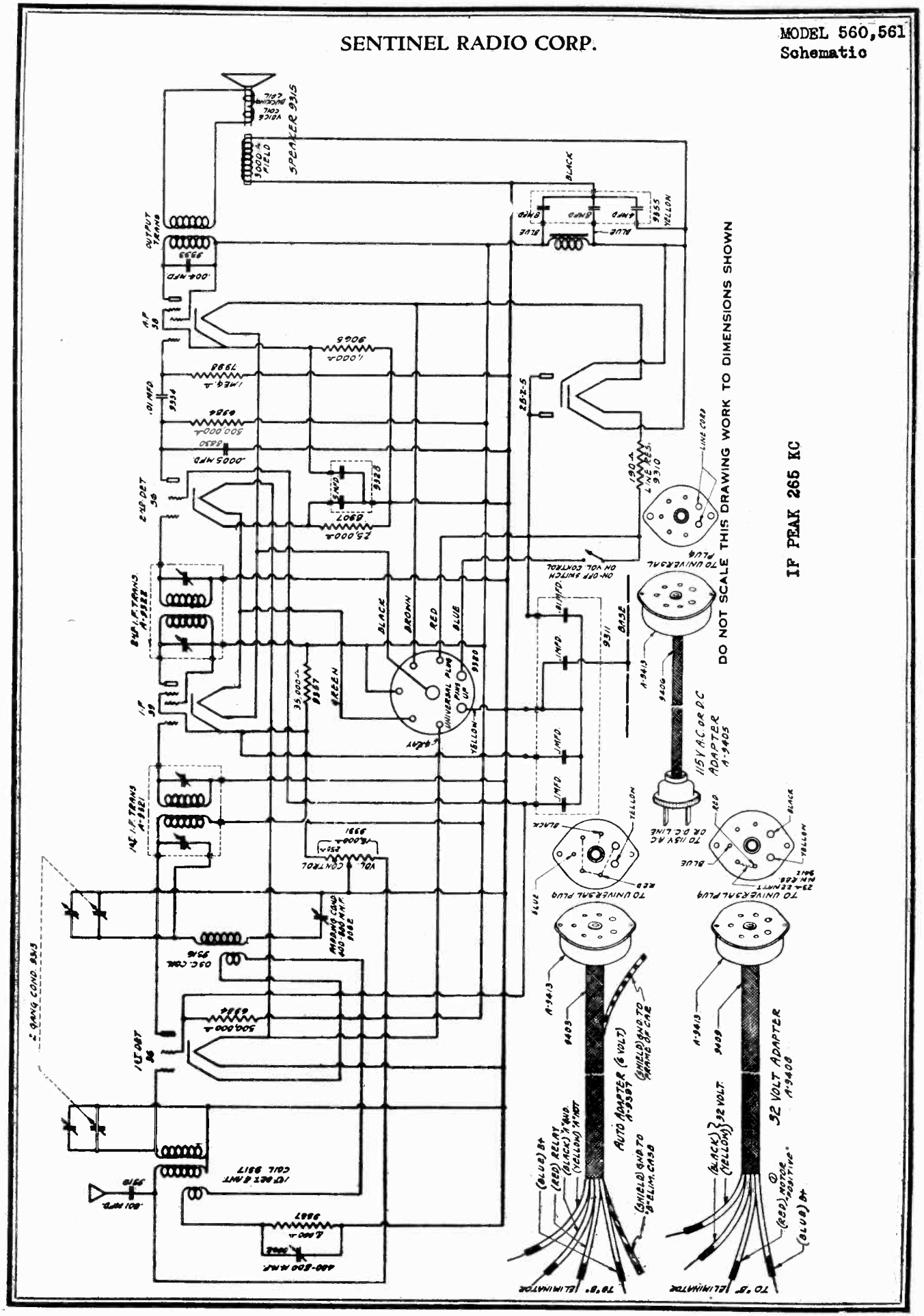
MODEL 261

SENTINEL RADIO CORP.



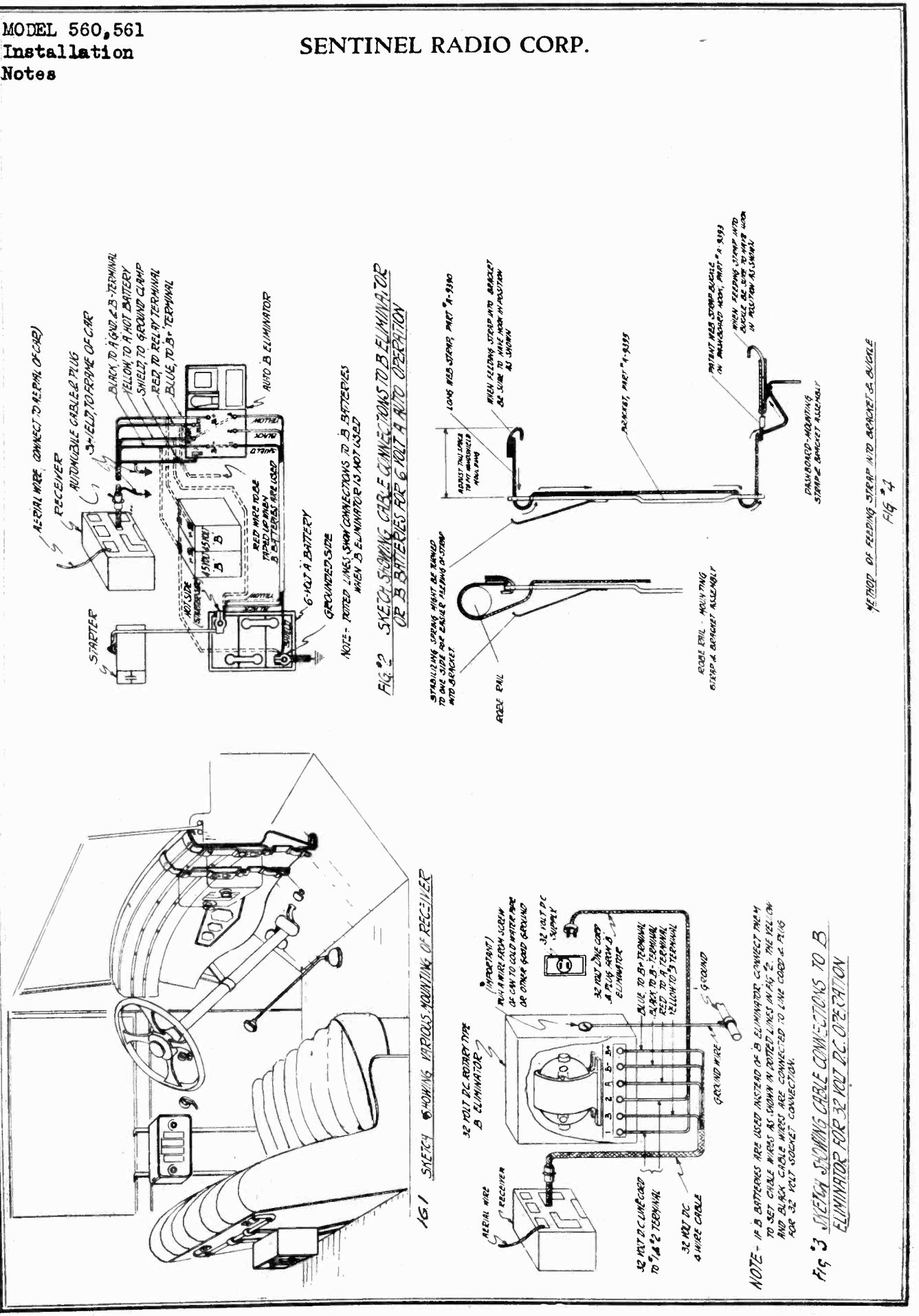
SENTINEL RADIO CORP.

MODEL 560,561
Schematic



MODEL 560,561
Installation Notes

SENTINEL RADIO CORP.



SENTINEL RADIO CORP.

MODEL 560,561
Voltage Data
Part 1

SERVICE NOTES
for the
FIVE TUBE AC-DC SUPERHETERODYNE
(110 V. AC-DC, 6 V. Storage Batteries & 32 V. DC)

VOLUME CONTROL: The volume control is located on the left hand side of the chassis. It is a fifteen thousand ohm potentiometer and attenuates by controlling the bias on the intermediate frequency tube and also attenuates in the anntena circuit, by shunting the input. The off and on switch is controlled by the volume control knob. When the volume control is turned to the maximum counter-clockwise position the receiver is turned off and is placed in operation by the reversed action. The quality of the reproduced signal is not affected by the setting of the volume control, except if it is too far advanced to the right on strong local signals the detector tube will naturally overload. This condition will be indicated by the volume decreasing and the tone quality being impaired. Retarding volume control in the counter-clockwise direction will increase volume and eliminate distortion. This is natural and does not indicate a defect in the receiver or a defective volume control. A double peak will be noticed when the detector is overloaded, that is the station will be heard on either side of the correct tuning point with more volume than at the correctly tuned position. If an extremely long aerial is used the overloading position of the volume control will be further towards the minimum volume position than if a short antenna is used likewise local signals will overload the detector more readily than distant reception.

INTERMEDIATE TRANSFORMERS: The intermediate transformers are tuned to 265 kilocycles. The intermediate frequency transformer trimmers are rigidly mounted and the transformers are so constructed that the transformer rarely becomes detuned. FOR THIS REASON IT SHOULD NEVER BE NECESSARY TO RETRACK THE INTERMEDIATE TRANSFORMERS UNLESS ONE OF THE TRANSFORMERS HAS BECOME DEFECTIVE AND REQUIRES REPLACEMENT. The first and second intermediate transformers have two trimmers each which are accessible through the small holes in the side of the shield can.

ELECTRO DYNAMIC SPEAKER: The speaker has a DC field resistance of 3000 ohms.

OSCILLATOR: The 36 tube is used as a modulator (1st detector) and oscillator by a method which sacrifices none of the qualities of either function. The combined circuit is such that it is not super-critical and special selection of 36 tube is not required. Any good 36 tube with correct characteristics will work satisfactorily in this stage. If the receiver only operates over a portion of the broadcast band, (long wave length) the trouble may be due to a tube which does not have proper characteristics. The remedy is, of course, to replace the 36 tube.

ANTENNA: Approximately 25 feet of aerial wire wound on a fibre spool is provided with the receiver. The winding spool or the contact lug on spool should not be destroyed and the aerial wire should be rewound on the spool when transporting the receiver. This will prevent kinks and knots in the wire and in this way prevent the insulation from breaking down. In most locations running the aerial wire provided around the moulding of the room will provide satisfactory reception. Where distant daylight reception is desired especially in isolated communities it may be necessary to attach an additional aerial to the antenna spool contact lug. In some locations where it is inconvenient to install an additional aerial improved reception may be obtained by attaching the contact lug to a steam radiator, water pipe, electrical conduit, curtain rod, etc. Always be sure that the lug makes firm contact otherwise noisy reception will result. This will not work satisfactorily in all locations. The results can only be determined by actual experimentation.

Where the set is to be used in buildings constructed with a large amount of steel, running the aerial around the room will generally prove unsatisfactory. Dropping the aerial out of the window may improve reception considerably. If this does not improve results it will be necessary to install an additional outside antenna. Another condition which may require an outside aerial is in DC installations because when operating the receiver on DC it will be found that in most instances the noise interference is greater than when the receiver is used on AC current. DC appliances such as motors, fans, etc. as a general rule, cause more interference than similar AC equipment. Unfortunately this interference can only be eliminated at the source of the interference. By connecting the antenna to an outside aerial the interference can generally be minimized as the increased volume obtained with the longer aerial permits a lower minimum volume control setting and a consequent apparent reduction in noise interference.

TUBES: The receiver utilizes the following tubes:

One (1) Type 36 as a composite oscillator and modulator tube.
One (1) Type 39 intermediate frequency amplifier tube.
One (1) Type 36 (second) detector.
One (1) Type 38 output tube.
One (1) Type 25z5 rectifier tube.

The receiver is shipped with tubes in their respective sockets. While it is possible to remove or install some of the tubes by removing the back of the cabinet it is suggested that the set be removed from the cabinet whenever the tubes are to be checked. To do this remove the back of the cabinet, volume control and tuning control knobs, and the four screws which hold the set to the cabinet. This will permit removal of the chassis from the cabinet by sliding the chassis outward through the back of the cabinet. Excessive hum when tuning in stations may be caused by a defective 36, 39 or 25z5 tube. Installing new tubes will indicate the defective tube or tubes. Be sure when replacing tubes that the new AC type (humless type heaters) be used. Otherwise the hum level may be high. In a great many cases considerable difference in hum will be noticed even between tubes made by the same manufacturer.

VOLTAGE TABLE: Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table #1 is taken at 115 volts (AC) line with the volume control in the full on position. It must be remembered that the voltage readings vary directly as the line voltage and also with the accuracy of the meters used. A variation of 10% plus or minus is permissible. THE VOLTAGES WILL BE APPROXIMATELY AS GIVEN FOR EITHER DC OR AC OPERATION.

TUBE VOLTAGES — Table #1

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.5	108	21*	2.5
39	Intermediate Frequency	5.6	108	108	2.5
36	Detector	5.7	27*	21*	2.5
38	Output	5.8	103	108	1.5*
25z5	Rectifier	29.0	52.5 MA		

MODEL 560,561
Voltage Data
Part 2

SENTINEL RADIO CORP.

The voltage table #2 is for 6 volt battery operation with a B eliminator which is especially designed for the model #561 receiver. The voltages as given will be correct for 32 volt DC operation in conjunction with a B eliminator of the recommended factory type. It will be found that on certain types of eliminators which do not have sufficient output or a low 6 volt battery, the readings will be lower than that given in the voltage table.

TUBE VOLTAGES

Table #2

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.8	112	25*	2.5
39	Intermediate Frequency	5.8	112	112	2.9
36	Detector	5.8	28*	25*	2.0
38	Output	5.8	108	112	1.5*
25z5	Rectifier	52.5 MA			

* These readings for both Table #1 and #2 are only comparative and are not true voltages applied. The voltmeter, when readings are taken at these points, is in series with a very high resistance.

IMAGE SUPPRESSION: Occasionally in some locations interference in the form of whistles or stations which are tuned in on dial settings other than the station's frequency may be encountered. This is a rare occurrence and is called image interference caused by two signals whose frequencies differ by twice the intermediate frequency. This should not be confused with heterodyne whistles which are caused by two stations being received whose frequencies are the same nor by local stations whose frequencies are close to some out-of-town stations frequency which might result in reception from both stations. To overcome this possibility of image interference an image suppression circuit is incorporated in the receiver. The image adjusting condenser is mounted on the back of the chassis below the first IF transformer shield and is accessible through the hole in the chassis. If a whistle or interfering station is received on a frequency other than its fundamental, tune the receiver to this interference and adjust the image suppression condenser until the interference disappears or until the interference is at the minimum point. UNLESS THERE IS AN ACTUAL IMAGE INTERFERENCE DO NOT ATTEMPT TO ADJUST THE IMAGE SUPPRESSION CIRCUIT.

INTERMEDIATE FREQUENCY ALIGNMENT: Only when an intermediate transformer has become defective, due to an open or burned out winding, should it be necessary to readjust the intermediate stages. Should this occur it is necessary that an oscillator be used with some type of output measuring device so as to correctly tune the transformers. To align the intermediate transformers connect the high side of the oscillator output to the control grid of the 36 oscillator modulator tube leaving the grid cap disconnected from the tube. The ground side of the test oscillator should be connected to the gang condenser frame and MUST NOT OTHERWISE BE GROUNDED. Set the oscillator at 265 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Align the first intermediate transformer by turning the intermediate frequency trimmer screw up and down until maximum reading is obtained on the output motor. Both the primary and secondary trimmer screws should be adjusted in this manner. It is always best to recheck the grid side of the intermediate frequency transformer adjustment to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate transformer. After both intermediate transformers are adjusted the alignment of the intermediate stage is complete and the trimmer should not be further disturbed, and the grid cap should be connected to the grid of the 36 tube.

VARIABLE CONDENSER ALIGNMENT: If the intermediate frequency stage has been realigned or if an antenna or oscillator coil requires replacement it will be necessary to realign the variable condenser. The front section of the variable condenser (looking at the front of the receiver) is the oscillator section, the other section tunes the antenna stage. Tune the receiver to 1720 kilocycles on the dial and set the oscillator at this frequency. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Next adjust the trimmer screws of the oscillator and antenna sections which are mounted on top of the variable condensers so as to obtain maximum output reading. It will be found that the oscillator section trimmer condenser will in most cases have to be adjusted to minimum capacity and in some instances it may be necessary to remove the trimmer screw entirely. After the trimmers have been correctly adjusted, at this frequency, tune the receiver to 600 kilocycles and adjust the oscillator to 600 K.C. Next, adjust the oscillator padding condenser (which is located directly below the variable condenser and accessible through the hole in the front of the chassis) to obtain maximum reading on the output meter. If the above is correctly followed the receiver will now track correctly over the entire band from 1720 KC to 550 KC. It is always advisable to align the receiver, whenever possible, with the tubes that are to be used in the set.

AUTO INSTALLATION: The receiver may be mounted in any convenient place in the automobile such as the robe rail in back of the front seat, between the dashboard and windshield frame or on the under side of the dashboard head. It is well to remember that the further away from the motor the less the ignition noise is likely to be. The receiver should be so mounted that it does not strike the body through bouncing or road jars as the cabinet may be damaged if the set is permitted to swing freely. The mounting brackets have lugs on both ends which should be hooked between the windshield frame or robe rail or wherever the set is to be mounted and the bottom lug hooked to some part of the body or body bolts and the slack in the straps taken up by adjusting the adjusting buckle so that the set is held rigidly in position. The four studs provided should be screwed into the four threaded holes in the back of the chassis. Each of the strap mounting brackets has two holes into which the stud should be inserted and by pulling upward on the straps the stud will be locked into position. Pushing the strap downward will unlock the studs and permit removal of the brackets.

CAR ANTENNA: It is very important that a good aerial be used as an insufficient or ineffective aerial will result in poor reception. A simple aerial installation that will give good results can be had by using about 50 feet of stranded insulated wire, running the wire under the car back and forth between the two running boards, using care not to stretch the wire too tightly as the bouncing of the car will break the wire. An aerial in the top of the car insulated from the body will in most instances be an excellent one. Many of the latest model automobiles are factory equipped with this type aerial. A strap type or plate type antenna mounted beneath the automobile will generally be an effective antenna. The closer to the ground this type of aerial is permitted to extend the greater its efficiency.

MODEL 728 SW

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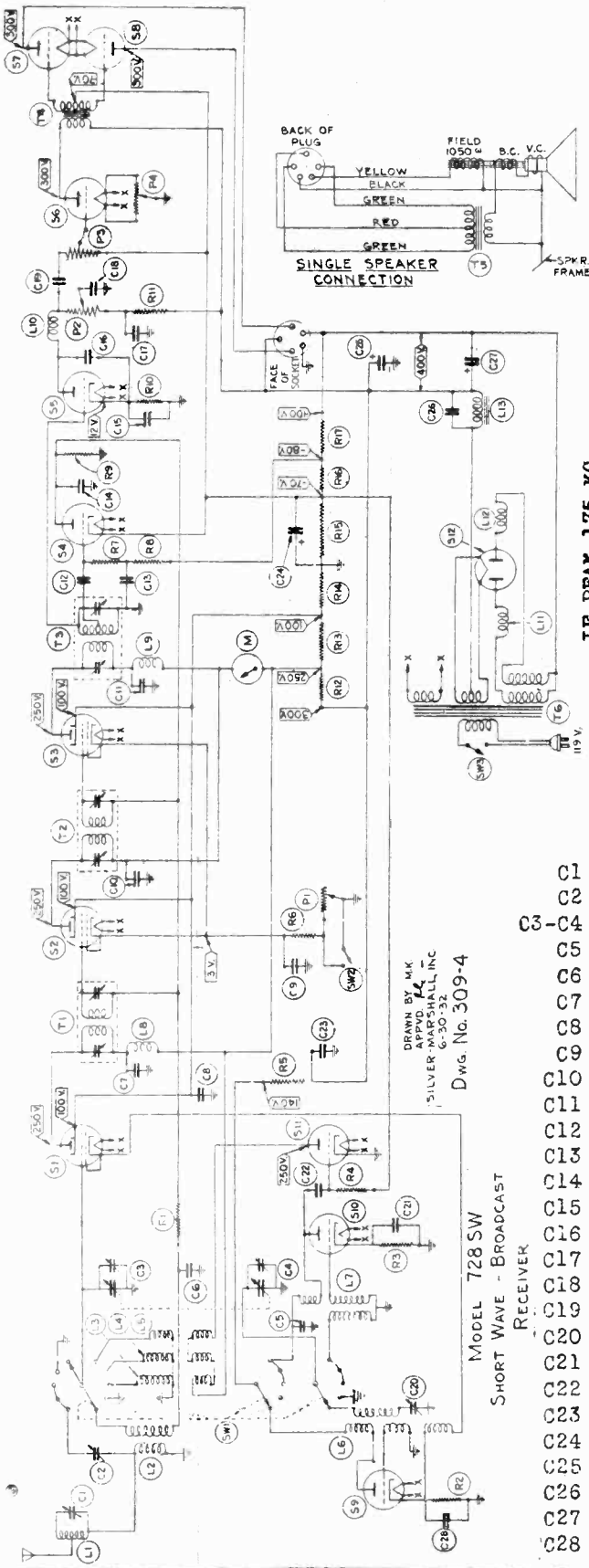
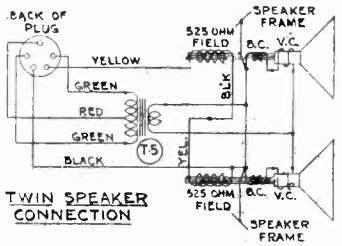


SINGLE SPEAKER CONNECTION



TWIN SPEAKER CONNECTION

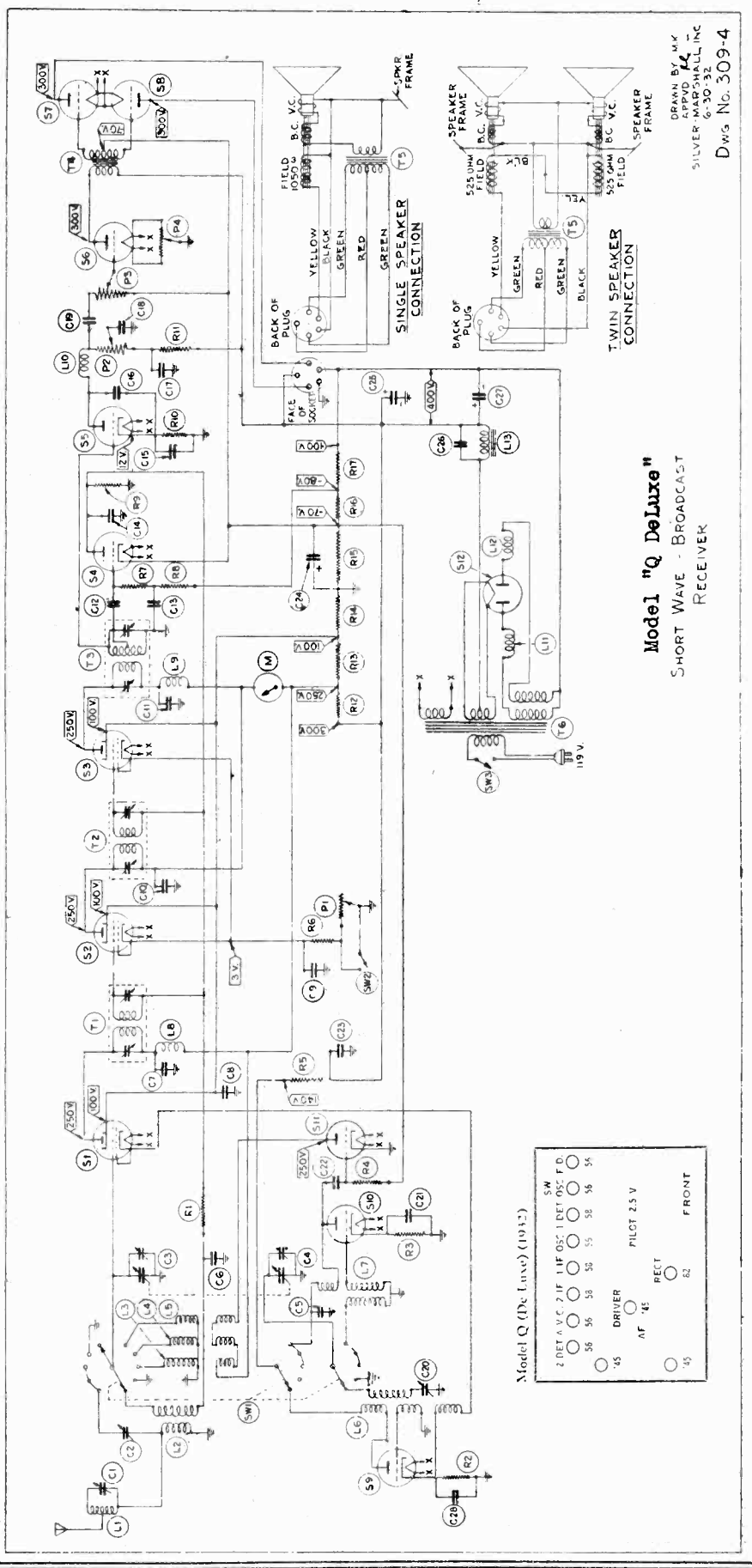
P1 - 3000 ohm variable resis
P2 - 100,000 ohm tone control
P3 - 375,000 ohm pot.
P4 - 40 ohm hum balance

R1 - 25,000 ohm Resistor
R2-R3 - 1,000 ohm Resistor
R4 - 1 megohm Resistor
R5 - 6,500 ohm Resistor
R6 - 200 ohm Resistor
R7-R8 - 1 megohm Resistor
R9 - .5 megohm Resistor
R10 - 30,000 ohm Resistor
R11 - 25,000 ohm Resistor
R12 - 1,405 ohms)
R13 - 8,720 ohms)
R14 - 7,315 ohms)
R15 - 14,000 ohms)
R16 - 2,000 ohms)
R17 - 4,000 ohms)

C1 - 60-120 mmfd. antenna trimmer condenser
C2 - 200 mmfd. variable trimmer condenser
C3-C4 - 2 gang variable condenser - 365 mmfd.
C5 - .002 mfd. mica condenser
C6 - .1 mfd. condenser - Sprague 200 v.
C7 - .1 mfd. condenser - Sprague 400 v.
C8 - .25 mfd. condenser - Sprague 200 v.
C9 - .5 mfd. condenser - Sprague 200 v.
C10 - .1 mfd. condenser - Sprague 400 v.
C11 - .1 mfd. condenser - Sprague 400 v.
C12 - .0005 mfd. condenser - Sprague
C13 - .1 mfd. condenser - Sprague 200 v.
C14 - .5 mfd. condenser - Sprague 200 v.
C15 - .5 mfd. condenser - Sprague 200 v.
C16 - .0005 mfd. condenser - Sprague
C17 - .5 mfd. condenser - Sprague 400 v.
C18 - .025 mfd. condenser - Sprague 400 v.
C19 - .05 mfd. condenser - Sprague 400 v.
C20 - 275-550 mmfd. osc. trimmer condenser
C21 - .05 mfd. condenser - Sprague 400 v.
C22 - .00025 mfd. condenser - Sprague
C23 - .25 mfd. condenser - Sprague 400 v.
C24 - 8 mfd. dry electrolytic cond. 75 v.
C25 - 4 mfd. dry electrolytic cond. 450 v.
C26 - .15 mfd. condenser - Sprague 400 v.
C27 - 12 mfd. dry electrolytic cond. 450 v.
C28 - .1 mfd. condenser - Sprague 200 v.

MODEL Q DeLuxe

SILVER - MARSHALL, INC.



C1	60-120 mmfd. antenna trimmer condenser	6182
C2	200 mmfd. variable trimmer condenser	3283
C3-C4	2 gang variable condenser - 365 mmfd.	3189
C5	.002 mfd. mica condenser	3311
C6	.1 mfd. condenser - Sprague 200 v.	3277
C7	.1 mfd. condenser - Sprague 400 v.	3278
C8	.25 mfd. condenser - Sprague 200 v.	3269
C9	.5 mfd. condenser - Sprague 200 v.	3266
C10	.1 mfd. condenser - Sprague 400 v.	3278
C11	.1 mfd. condenser - Sprague 400 v.	3278
C12	.0005 mfd. condenser - Sprague	7052
C13	.1 mfd. condenser - Sprague 200 v.	3277
C14	.5 mfd. condenser - Sprague 200 v.	3266
C15	.5 mfd. condenser - Sprague 200 v.	3266
C16	.0005 mfd. condenser - Sprague	7052
C17	.5 mfd. condenser - Sprague 400 v.	3273
C18	.025 mfd. condenser - Sprague 400 v.	3333
C19	.05 mfd. condenser - Sprague 400 v.	13127
C20	275-550 mmfd. osc. trimmer condenser	16179
C21	.05 mfd. condenser - Sprague 400 v.	13127
C22	.00025 mfd. condenser - Sprague	3330
C23	.25 mfd. condenser - Sprague 400 v.	3230
C24	8 mfd. dry electrolytic cond. - 75 v.	13326
C25	4 mfd. dry electrolytic cond. - 450 v.	13177
C26	.15 mfd. condenser - Sprague 400 v.	13145
C27	12 mfd. dry electrolytic cond. 450 v.	3162
C28	.1 mfd. condenser - Sprague 200 v.	3277

L1	209 Antenna choke coil	
L2	208 Antenna coil	
L3	517 short wave coil (4800- 1550 kilocycles)	
L4	518 short wave coil(10,000- 3600 kilocycles)	
L5	519 short wave coil(25,350- 9600 kilocycles)	
L6	207 Broadcast oscillator coil	
L7	516 Short wave oscillator coil	
L8-L9-L10	283 choke coils	
L11-L12	281 choke coils	
L13	10238 Filter choke coil	

M	Tuning meter - 20 ma.	
P1	3000 ohm variable resistance	4430
P2	100,000 ohm tone control	14438
P3	375,000 ohm pot.	4360
P4	40 ohm hum balance	4445
R1	25,000 ohm Resistor - 1 watt carbon	4697
R2-R3	1,000 ohm Resistor - wire wound	4688
R4	1 megohm Resistor - 1 watt carbon	4759
R5	6,500 ohm Resistor - Ohmite Red Devil	14777
R6	200 ohm Resistor - wire wound	4722
R7-R8	1 megohm Resistor - 1 watt carbon	4759
R9	.5 megohm Resistor - 1 watt carbon	4772
R10	30,000 ohm Resistor - 1 watt carbon	14693
R11	25,000 ohm Resistor - 1 watt carbon	4697
R12	1405 ohms)	
R13	8720 ohms)	
R14	7315 ohms)	
R15	14,000 ohms) Ohmite Red Devil Resistor	4752
R16	2,000 ohms)	
R17	4,000 ohms)	

S1-S2-S3 - '58 tubes
S4-S5-S9-S10-S11 - '56 tubes
S6-S7-S8 - '45 tubes
S12 - '82 tubes.

SW1	Tandem Band Selector Switch	15348
SW2	Noise Control Switch	5121
SW3	A.C.Switch (combined with volume control)	

T1	V1 I.F.Transformer
T2	V2 I.F.Transformer
T3	V3 I.F.Transformer
T4	10268 Driver transformer
T5	Output transformer (10244 for Single speaker (10245 for Two speakers
T6	10231 Power transformer

MODEL V
S.W.-Broadcast

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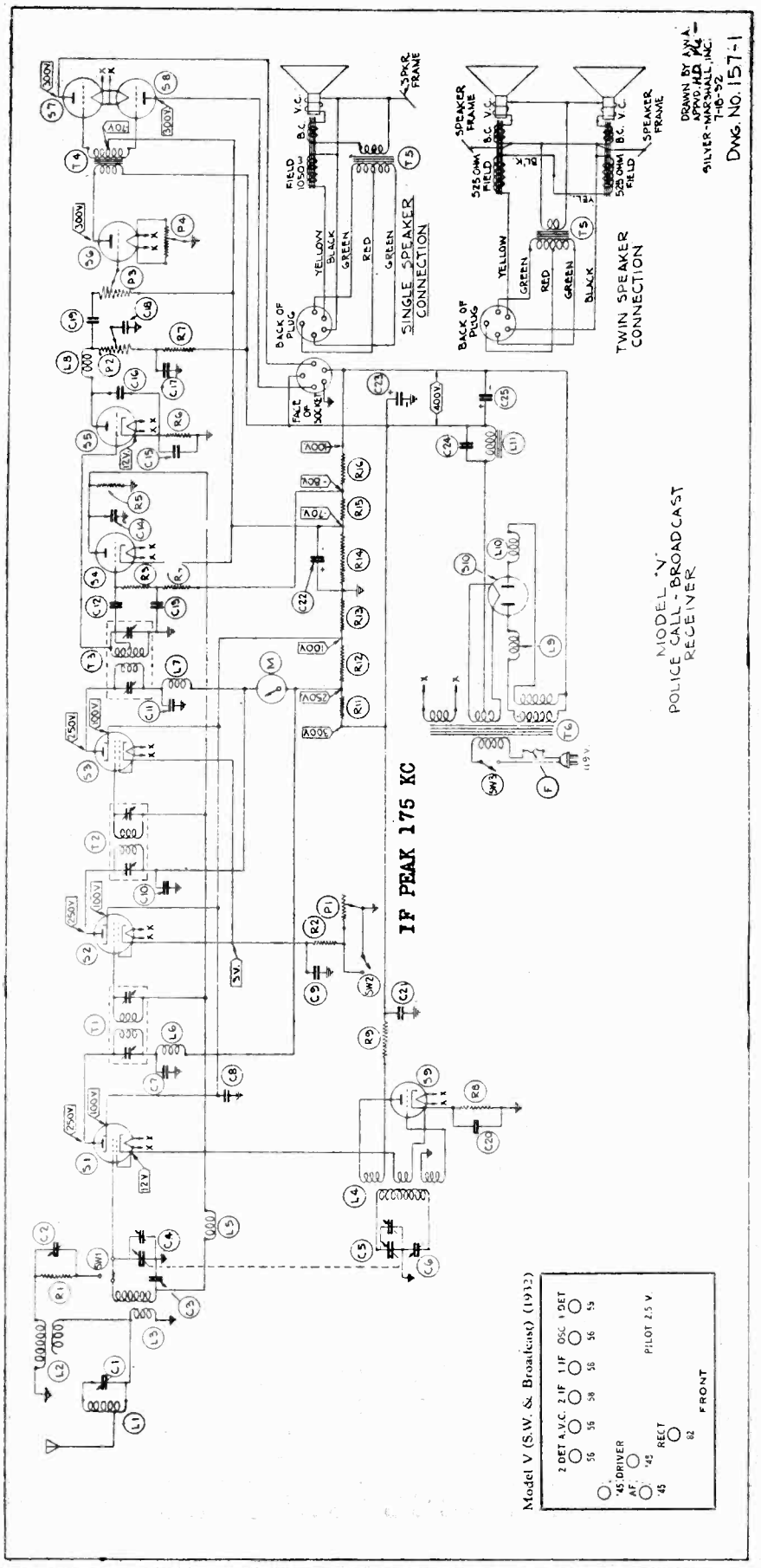
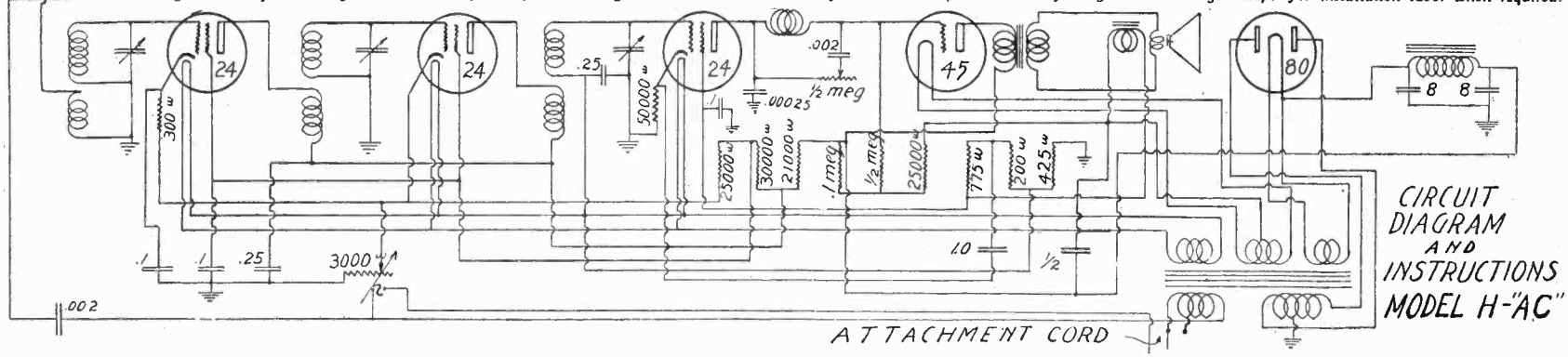


SILVER - MARSHALL, INC.

MODEL V
Parts List

C1	50-125 mmfd. antenna trimmer condenser (1 Plate)	6182
C2	120-325 mmfd. police coil trimmer condenser (2 Plate)	16041
C3	.1 mfd. condenser - Sprague 200V.	3277
C4-C5	2 Gang variable condenser - 365 mmfd.	3189
C6	250-525 mmfd. osc. trimmer condenser (3 Plate)	16179
C7	.1 mfd. condenser - Sprague 400V.	3278
C8	.25 mfd. condenser - Sprague 200 V.	3269
C9	.5 mfd. condenser - Sprague 200V.	3266
C10	.1 mfd. condenser - Sprague 400V.	3278
C11	.1 mfd. condenser - Sprague 400V	3278
C12	.0005 mfd. Mica condenser	7052
C13	.1 mfd. condenser - Sprague 200V	3277
C14	.5 mfd. condenser - Sprague 200V	3266
C15	.5 mfd. condenser - Sprague 200V	3266
C16	.0005 mfd. Mica condenser	7052
C17	.5 mfd. condenser - Sprague 400V	3273
C18	.025 mfd. Condenser - Sprague 400V	3333
C19	.05 mfd. condenser - Sprague 400V	13127
C20	.1 mfd. condenser - Sprague 200V	3277
C21	.25 mfd. condenser - Sprague 400V	3230
C22	8 mfd. dry electrolytic cond. 75V	13326
C23	4 mfd. dry electrolytic cond. 450V	18177
C24	.15 mfd. condenser - Sprague 400V	13145
C25	12 mfd. dry electrolytic cond. 450V	3162
F	3 ampere fuse	3501
L1	209 Antenna choke coil	
L2	520 Police coil	
L3	208A-S Antenna coil	
L4	207A-S Oscillator coil	
L5-L6-L7-L8	283 Choke coils	
L9-L10	281 Choke coils	
L11	10238 Filter choke coil	
M	Tuning meter - 20 M.A.	13928
P1	3000 ohm variable resistance	4430
P2	100,000 ohm tone control	14438
P3	375,000 ohm pot. (volume control combined with A.C. switch)	4360
P4	40 ohm hum balance	
R1	1 megohm resistor - 1 watt carbon	4759
R2	200 ohm resistor - wire wound	4723
R3-R4	1 megohm resistor - 1 watt carbon	4759
R5	.5 megohm resistor - 1 watt carbon	4772
R6	30,000 ohm resistor - 1 watt carbon	14693
R7	25,000 ohm resistor - 1 watt carbon	4697
R8	1,000 ohm resistor - Wire wound	4688
R9	6,500 ohm resistor - Ohmite Red devil	14777
S1-S2-S3-	'58 Tubes	
S4-S5-S9	'56 Tubes	
S6-S7-S8	'45 Tubes	
S10	'82 Tube	
SW1	Change-over switch	15363
SW2	Noise control switch	5121
SW3	A.C. Switch (combined with volume control)	
T1	V2 I.F. Transformer	
T2	V2 I.F. Transformer	
T3	V3 I.F. Transformer	
T4	10268 Driver Transformer	
T5	Output Transformer (10244 for Single speaker (10245 for Two speakers	
T6	10231 Power Transformer.	

CAUTION! Do not attempt to operate on current other than that noted on instrument. Fifty feet of aerial is usually enough for efficient operation. More may be used if desired. If no aerial available, connect "ANT" to "BL'T-in-ANT" and operate with or without ground. The right hand knob is a combination switch and volume control. The left hand knob is a tone control. This instrument is provided for Television apparatus which may be readily connected by (1st), disconnecting wire from plate terminal of 245 power tube, (2nd) connecting an A. F. choke between plate terminal of power tube and that terminal of filter choke farthest from front of panel, and (3rd) connecting a 1 mfd. 400 D. C. W. V. condenser in series with the plate terminal of the 245 power tube, two binding posts, or other terminals, and the center tap of the filament winding of the 245 tube. The binding posts will then be the point to connect the input of the television amplifier. Phonograph may be connected by installing a small single pole toggle switch in the center of the rear flange of chassis and connecting in series with number three R. F. coil by breaking the lead to the lower end of secondary and soldering to switch terminal along with pickup leads. *This instrument is guaranteed for 90 days, within which period parts showing electrical or mechanical defects will be replaced at the factory without charge except for installation labor when required.*



CIRCUIT DIAGRAM AND INSTRUCTIONS MODEL H-"AC"

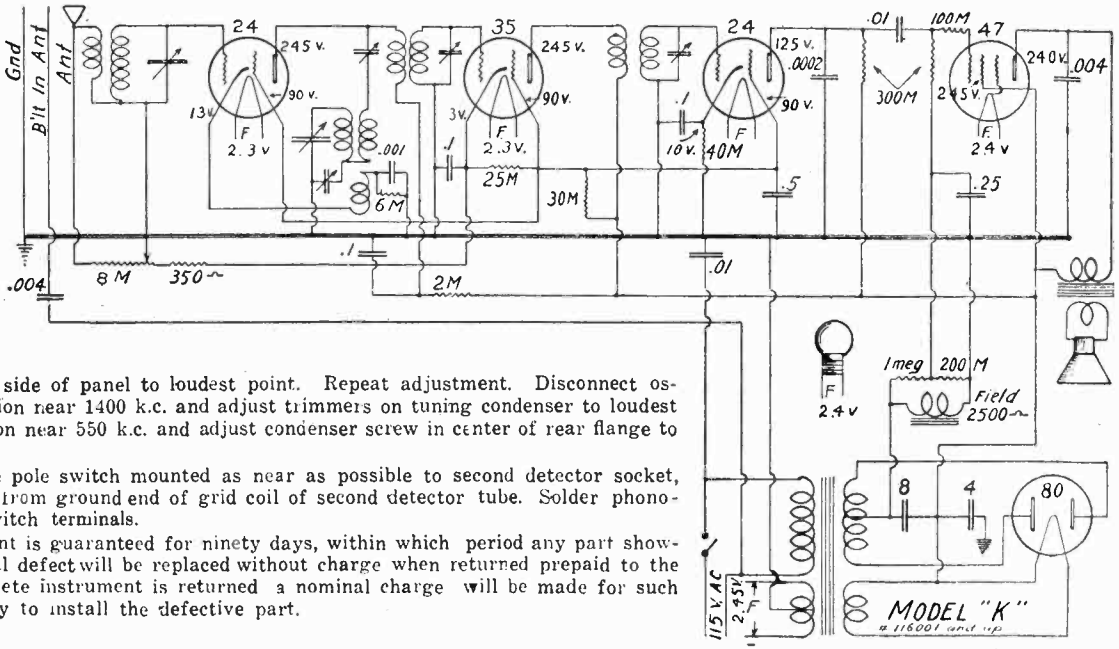
CAUTION : *DO NOT ATTEMPT TO OPERATE ON CURRENT OTHER THAN THAT NOTED ON INSTRUMENT.*

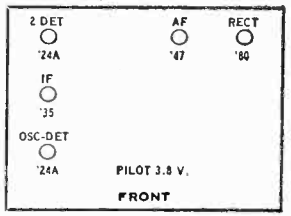
INSTALLATION : "Ant" lead may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs or any large metal object, if desired.

BALANCING: Attach output of 175 k.c. oscillator to grid of 224 tube at front of chassis. Adjust the condenser screws in top of tall can and one in under side of panel to loudest point. Repeat adjustment. Disconnect oscillator. Turn dial to station near 1400 k.c. and adjust trimmers on tuning condenser to loudest signal. Turn dial to station near 550 k.c. and adjust condenser screw in center of rear flange to loudest point.

PHONOGRAPH: Use a single pole switch mounted as near as possible to second detector socket, connect in series with lead from ground end of grid coil of second detector tube. Solder phonograph pickup leads to switch terminals.

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory, but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part.



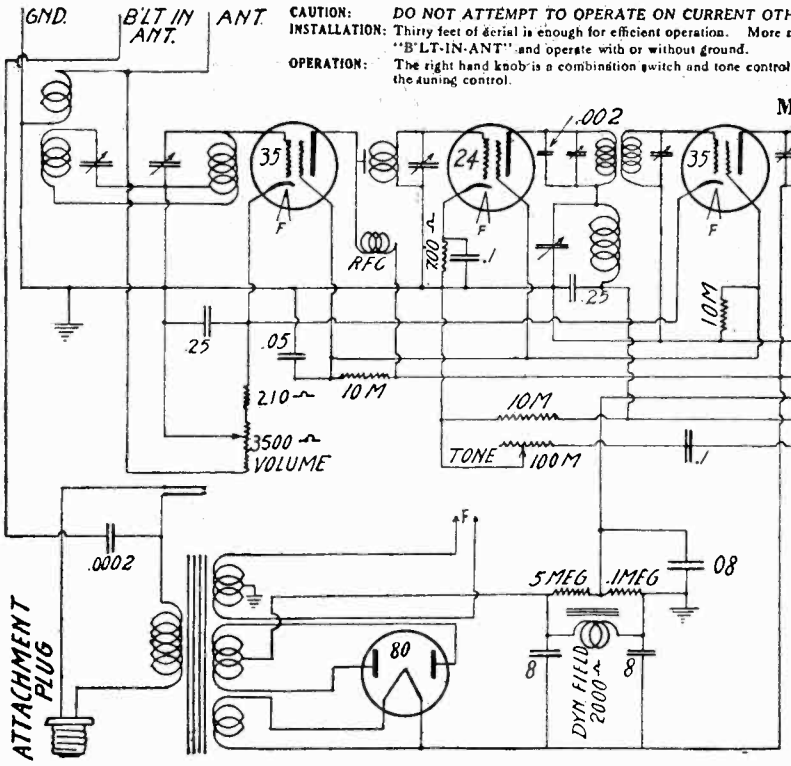


SIMPLEX RADIO CO.

MODEL H (AC) Schematic
MODEL K Schematic

MODEL J Schematic
MODEL L Schematic

SIMPLEX RADIO CO.



CAUTION: *DO NOT ATTEMPT TO OPERATE ON CURRENT OTHER THAN THAT NOTED ON INSTRUMENT.*

INSTALLATION: Thirty feet of aerial is enough for efficient operation. More may be used if desired. If no aerial available connect "ANT" to "B'LT-IN-ANT" and operate with or without ground.

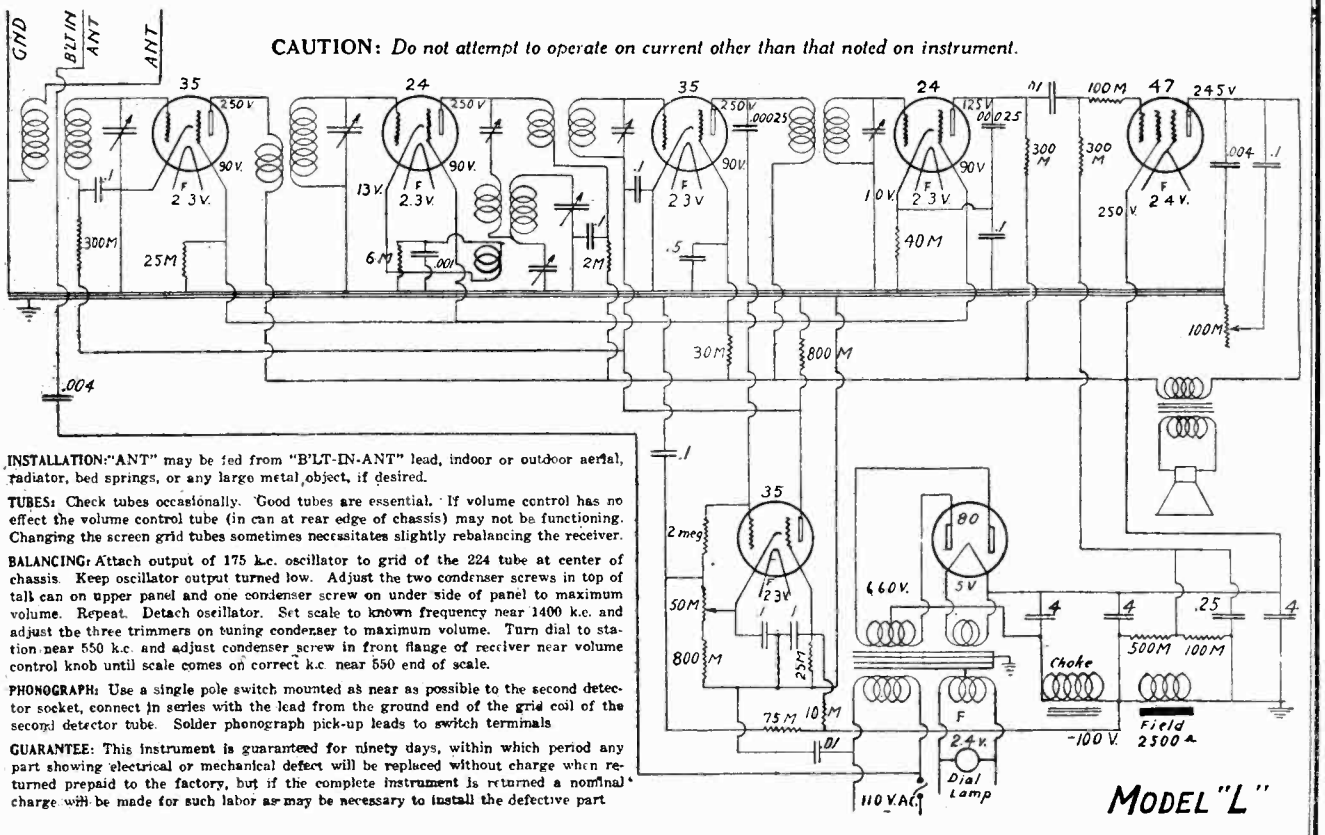
OPERATION: The right hand knob is a combination switch and tone control. The left hand knob is the volume control. The center knob is the tuning control.

PHONOGRAPH: Use a single pole switch mounted as near as possible to the second detector socket, connect in series with the lead from the ground end of the grid coil of the second detector tube. Solder phonograph pick-up leads to switch terminals.

TUBES: The dial is accurately calibrated in kilocycles and due to extreme selectivity it is possible to throw the circuit out of resonance when a tube change is made. To avoid this care should be taken that the screen grid leads which go to the top of the tubes lay as closely as possible against the tubes before the shield is placed over them.

BALANCING: In case a tube change necessitates rebalancing the set the dial should be set to a station of known frequency between 1200 and 1500 kilocycles and the balancing plates carefully adjusted to a point of maximum volume.

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part.



INSTALLATION: "ANT" may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs, or any large metal object, if desired.

TUBES: Check tubes occasionally. Good tubes are essential. If volume control has no effect the volume control tube (in can at rear edge of chassis) may not be functioning. Changing the screen grid tubes sometimes necessitates slightly rebalancing the receiver.

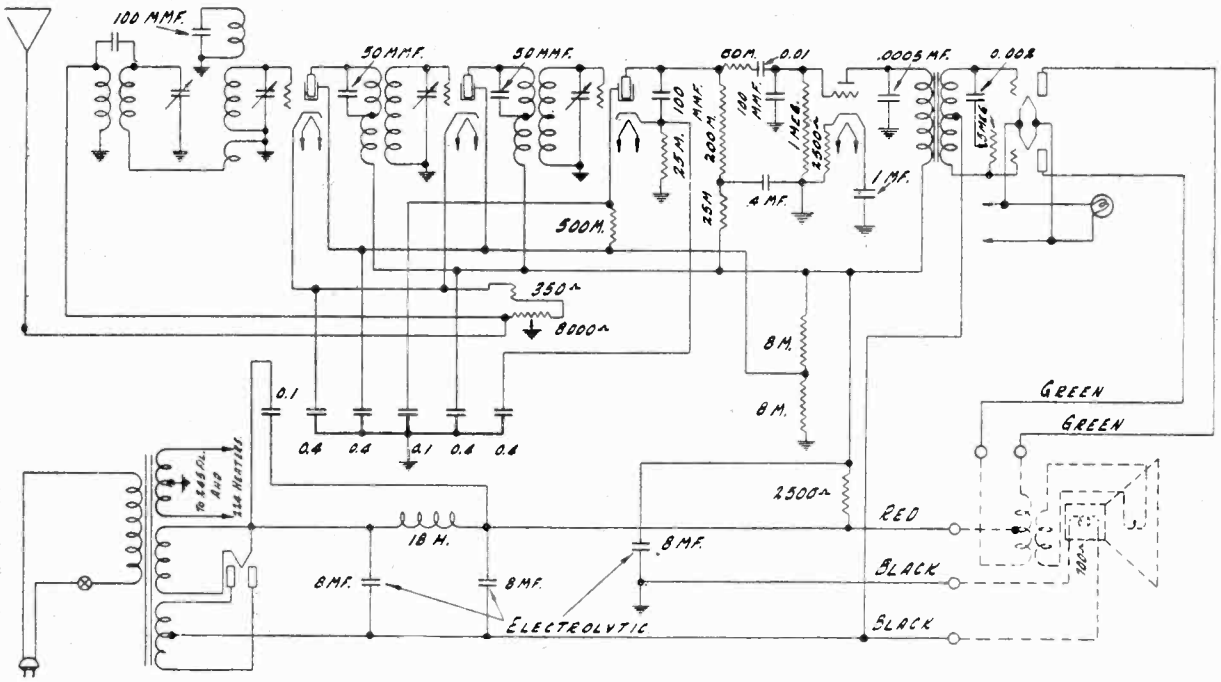
BALANCING: Attach output of 175 k.c. oscillator to grid of the 224 tube at center of chassis. Keep oscillator output turned low. Adjust the two condenser screws in top of tall can on upper panel and one condenser screw on under side of panel to maximum volume. Repeat. Detach oscillator. Set scale to known frequency near 1400 k.c. and adjust the three trimmers on tuning condenser to maximum volume. Turn dial to station near 550 k.c. and adjust condenser screw in front flange of receiver near volume control knob until scale comes on correct k.c. near 550 end of scale.

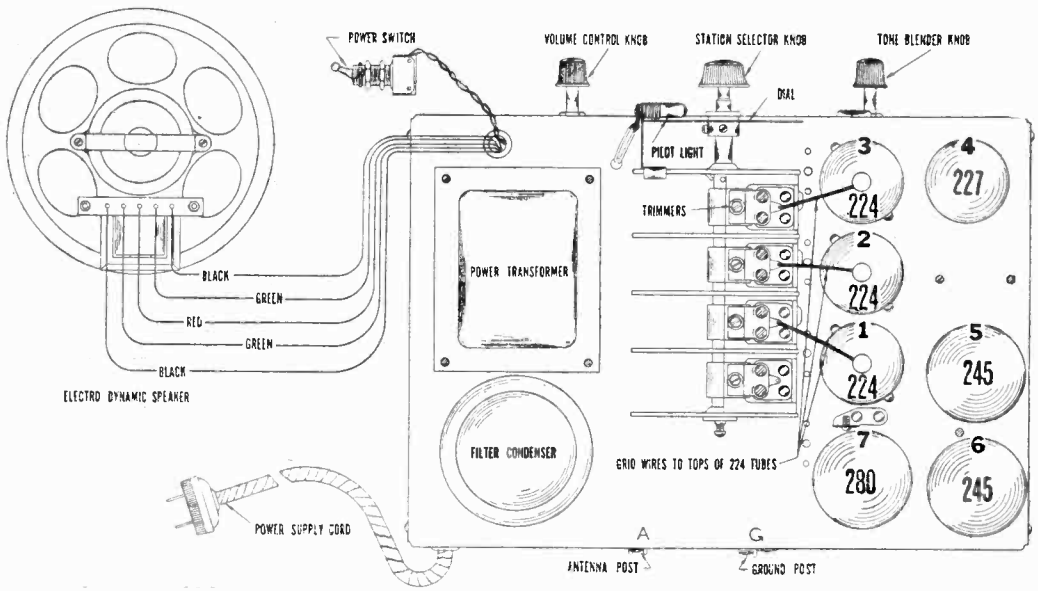
PHONOGRAPH: Use a single pole switch mounted as near as possible to the second detector socket, connect in series with the lead from the ground end of the grid coil of the second detector tube. Solder phonograph pick-up leads to switch terminals

GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory, but if the complete instrument is returned a nominal charge will be made for such labor as may be necessary to install the defective part

SONORA

MODEL 64





Chassis showing Tube Sequence and Speaker Connections

I—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM LINE VOLTAGE, 115—PLUG IN SOCKET OF RECEIVER—TUBE IN TEXT SET

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Volts*	*Screen Current MA*	*Cathode Volts*	*Plate MA*	*Grid Test MA*
224	1	1st Radio	2.3	198	3.	88	.9	3	3.5	6.
224	2	2nd Radio	2.3	198	3.	88	.9	3.	3.5	6.
224	3	Detector	2.3	150	6.	45	.1	6.	.25	.4
227	4	1st Audio	2.3	180	12.5			12.5	5	6.1
245	5	2nd Audio	2.4	255	55				26.	31.
245	6	2nd Audio	2.4	255	55.				26.	31
280	7	Rectifier	5.						36. Per Plate	

MODEL 74

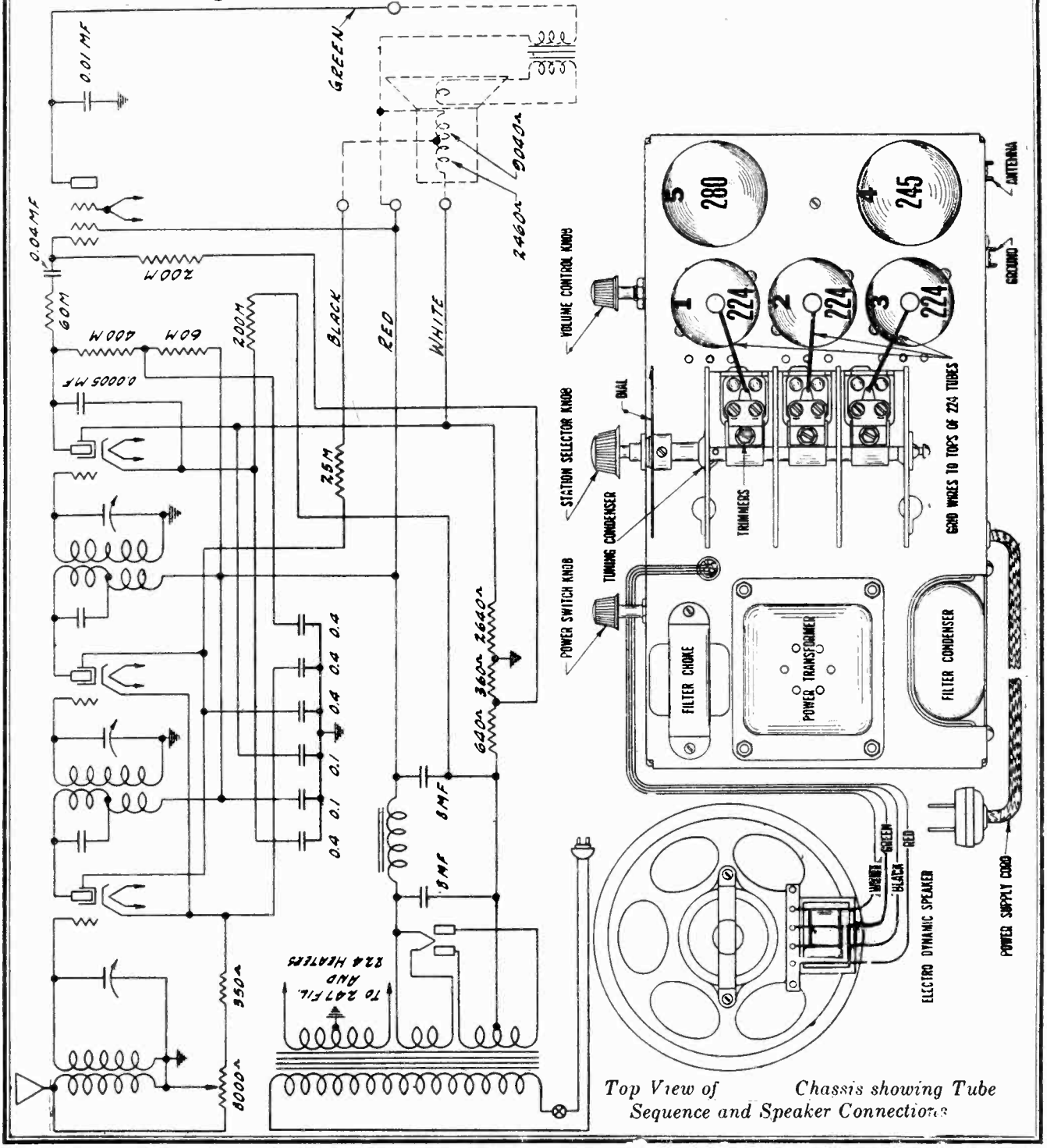
SONORA

Volume Control at maximum. Line Voltage 115

Tube	"A"	"B"	"C"	Screen	Cathode	Plt. Crnt
1st RF	2.2	250	2.	55.*	2.	2.1 ma
2nd RF	2.2	250	2.	55.*	2.	2.1
Det	2.2	130	2.8	40.*	2.8	.25
AF	2.3	238	18.**	250.		27.
Rect	4.65					28 per anode

* Reading with 250000 ohm meter. Reading will be less with lower meters

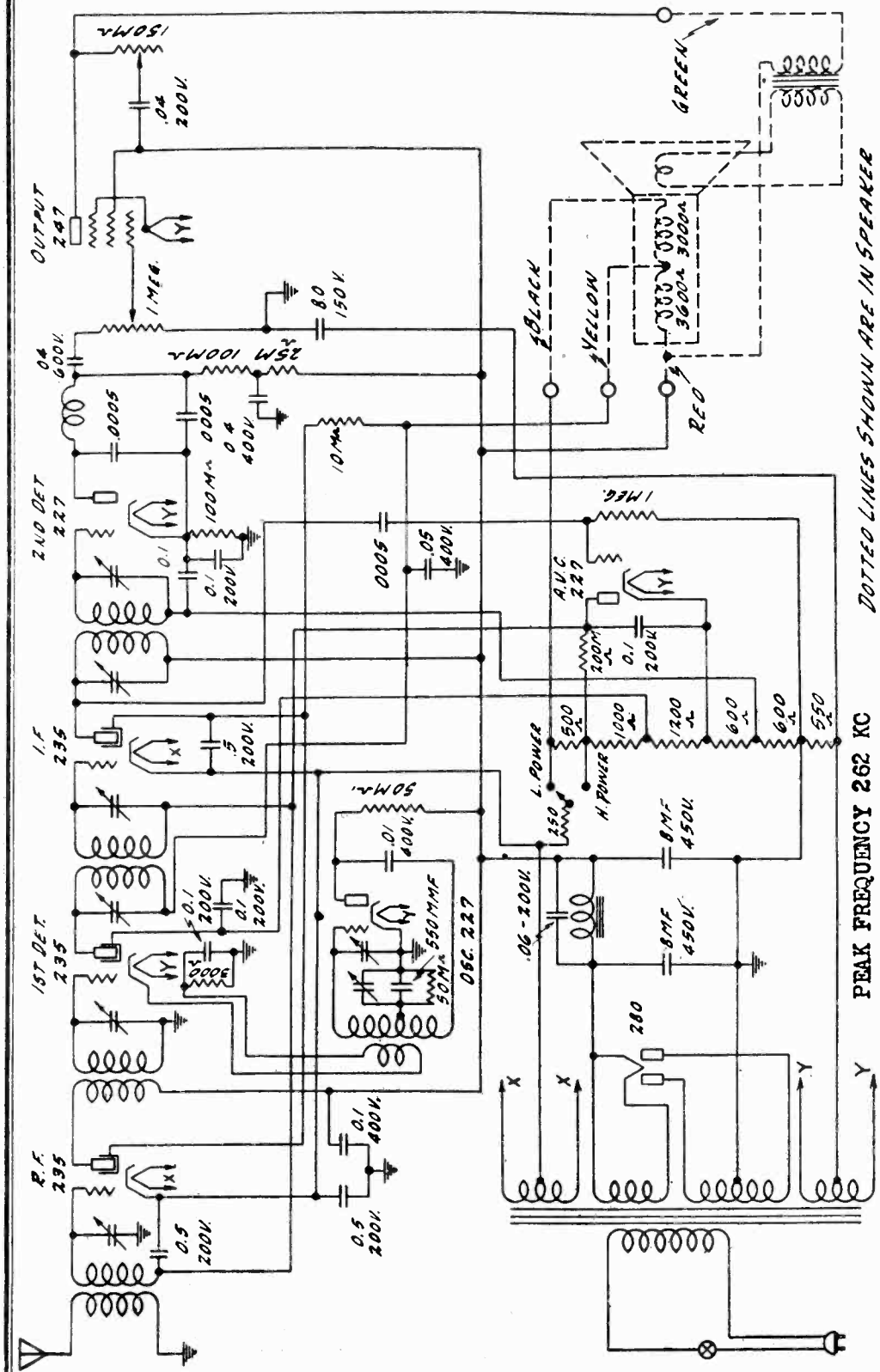
**This voltage read across 360 ohm section of shunt resistance.



Top View of Chassis showing Tube Sequence and Speaker Connections

SONORA

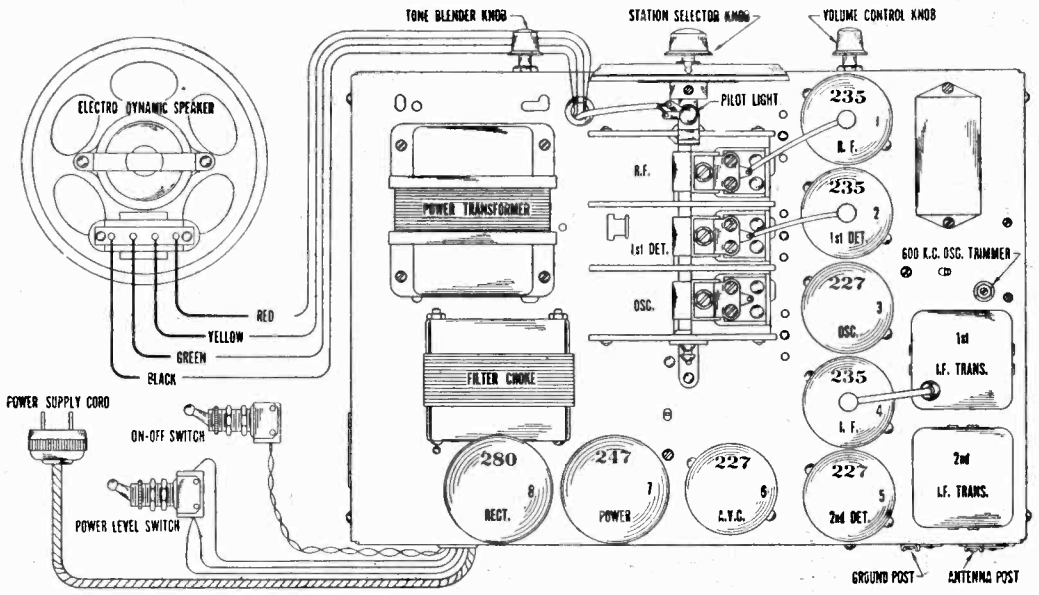
MODEL 70
Schematic
Notes

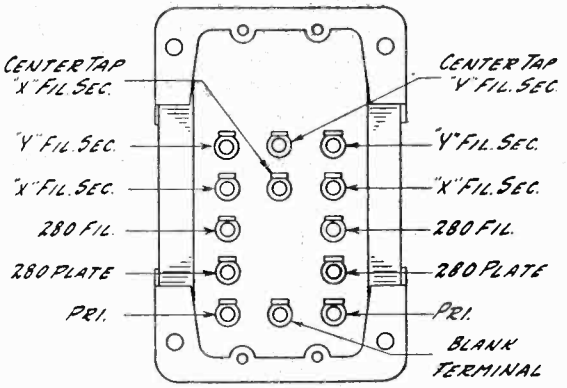


The Super-heterodyne is a receiver of exceptional selectivity and sensitivity and accurate alignment of the I.F., R.F. and oscillator condensers is of the greatest importance. A local and accurately calibrated signal generator as well as an output indicating meter is absolutely essential for correct alignment. This signal generator must provide a signal at the broadcast frequencies of from 550 to 1500 K.C. and in addition a signal of 262 K.C. for the intermediate frequency. The broadcast band signals of the signal generator must be accurately known as the dial scale of the receiver is calibrated in kilocycles and alignment of the gang tuning condenser must be made at definite frequencies in order to have the pointer at the correct location on the scale for the various frequencies. The intermediate frequency signal of the signal generator must likewise be accurate in order to align the I.F. stages at 262 K.C.

MODEL 70
Socket
Voltage
Notes

SONORA



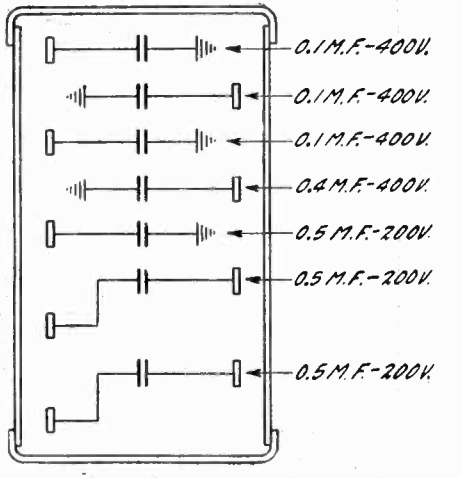


Power Transformer Terminals

VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM—POWER LEVEL SWITCH HIGH POWER

Type of Tube	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Volts*	*Screen Current MA*	*Cathode Volts*	*Plate MA*	*Grid Test MA*
235	R.F.	2.3	190	2.3(1)	68	1.0	0.	3.8	6.5
235	1st Det.	2.3	190	6.5	70	.35	14.	2.0	4.9
227	Osc.	2.3	80	15–50(2)			20.	4.7	4.8
235	I.F.	2.3	190	2.3(1)	68	.6	0.	3.6	6.0
227	2nd Det.	2.3	150	20.			20.	.4	.4
227	A.V.C.	2.3	65(3)	40. (4)			20.	0.	0.
247	Power	2.35	260	20. (5)	280	7.		32.	36.
280	Rectifier	5.						41. Per Plate	

(1) Measured across 250 ohm series resistor.
(2) Bias voltage varies from 15 to 50 between 1500 and 550 K.C. settings of tuning condenser.
(3) Measured across 1000 and 1200 ohm sections of shunt resistor.
(4) Measured across two 600 ohm sections of shunt resistor.
(5) Measured across 550 ohm series resistor.



Section Condenser Internal Wiring

SPARKS WITHINGTON CO.

MODEL 27
Chassis
Voltage

Sparton Model 27 Super-Heterodyne Schematic Diagram and Voltage Analysis

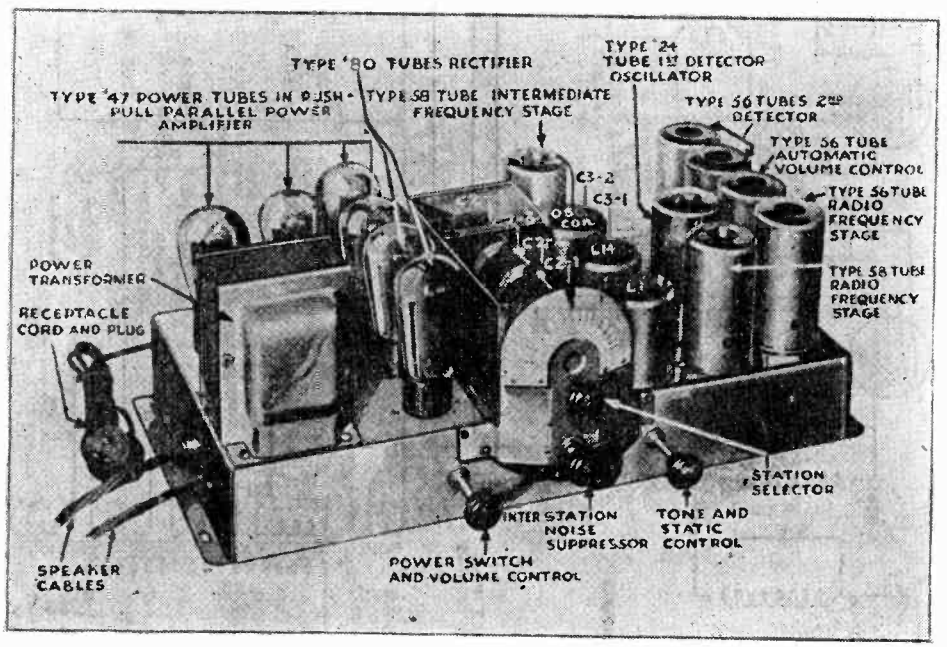
VOLTAGE ANALYSIS

Line Voltage 115—Position of Voltage Compensator 100-115—Position of Volume Control Full

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
58	R. F. Stage	2.2—2.5	155-190	2.2—2.6	85—108	4.5—8.0
'24	1st Det.-Osc.	2.2—2.5	155-190	5.0—9.0	85—108	0.8—1.4
58	I. F. Stage	2.2—2.5	155-190	2.2—2.6	85—108	4.5—8
56	2nd Det.	2.2—2.5	*	*	——	*
56	2nd Det.	2.2—2.5	*	*	——	*
56	A. F. Stage	2.2—2.5	145—180	7—11	——	4—7
56	AVC	2.2—2.5	30— 50	50—80	——	Zero
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'47	Power Stage	2.2—2.5	260—310	22—28	270—320	20—32
'80	Rectifier	4.2—5.0	320—375	——	——	33-45 per Plate
'80	Rectifier	4.2—5.0	320—375	——	——	33-45 per Plate

* Present only when signal is applied.

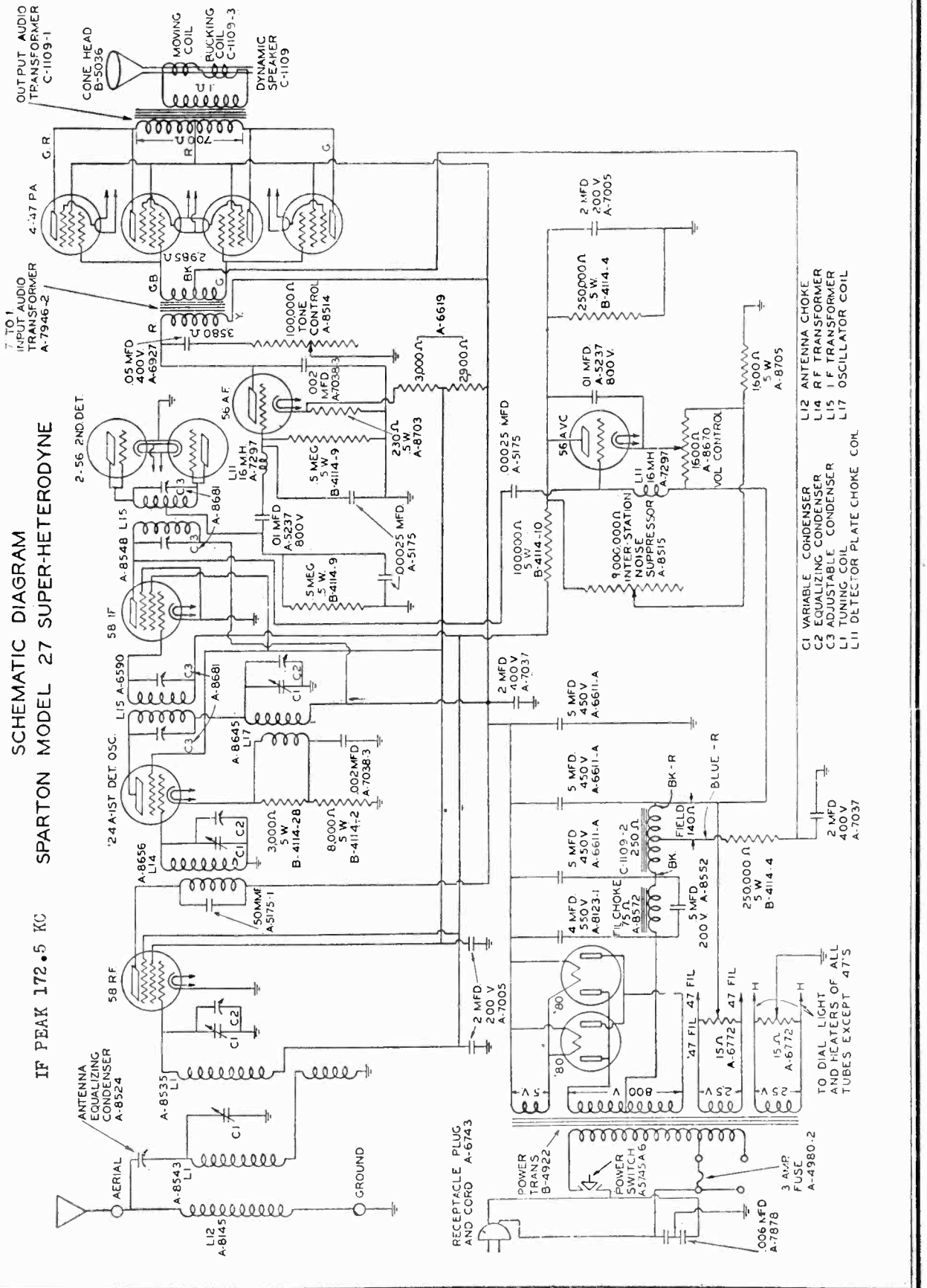
MODEL 27 CHASSIS

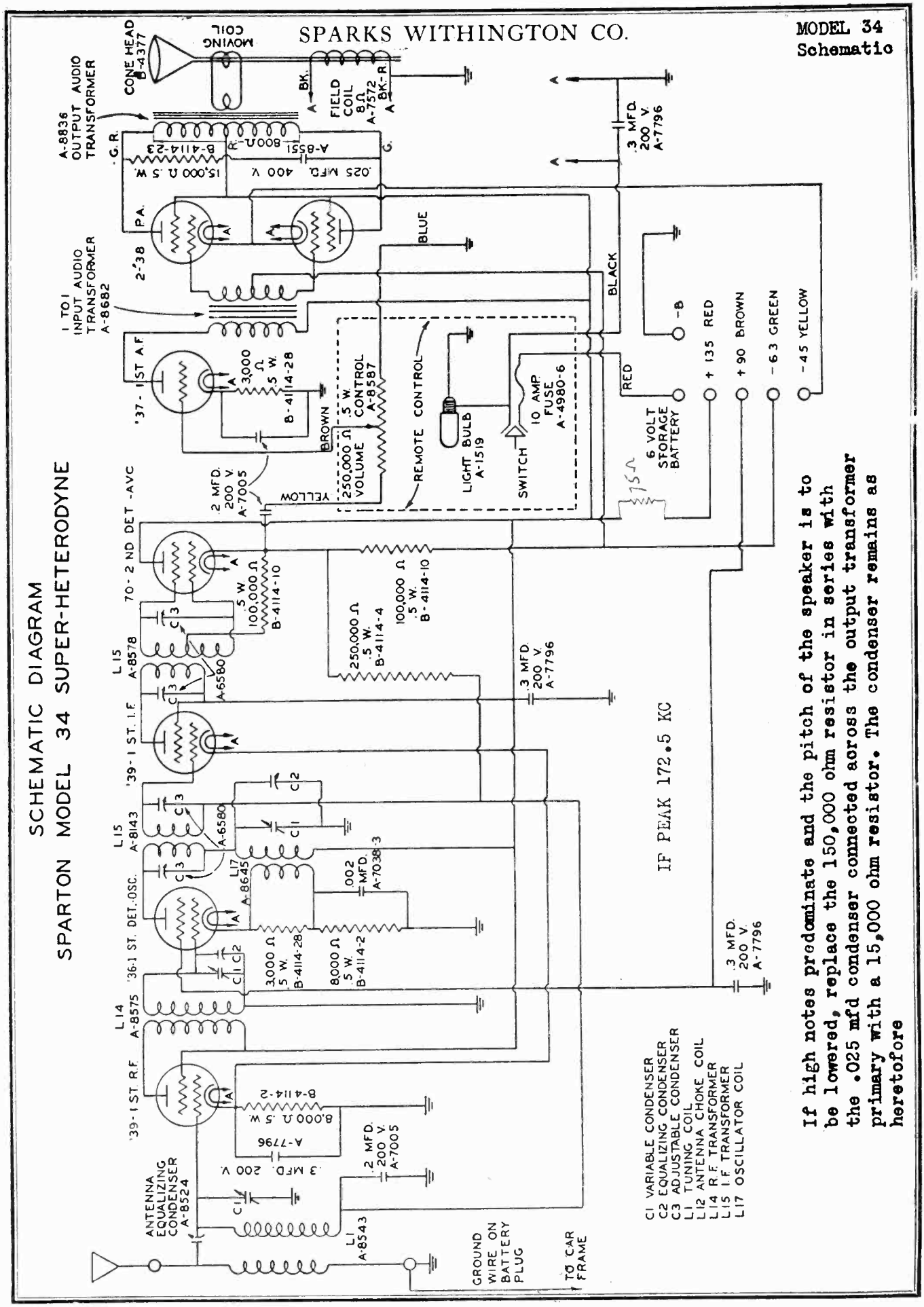


C2-1 Antenna Equalizing Condenser
C2-2 R. F. Stage Equalizing Condenser
C2-3 1st Detector Equalizing Condenser
C2-4 Oscillator Equalizing Condenser
C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L1 1st Tuning Coil
L14 R. F. Transformer

MODEL 27
Schematic

SPARKS WITHINGTON CO.





MODEL 34
Chassis
Voltage

SPARKS WITHINGTON CO.

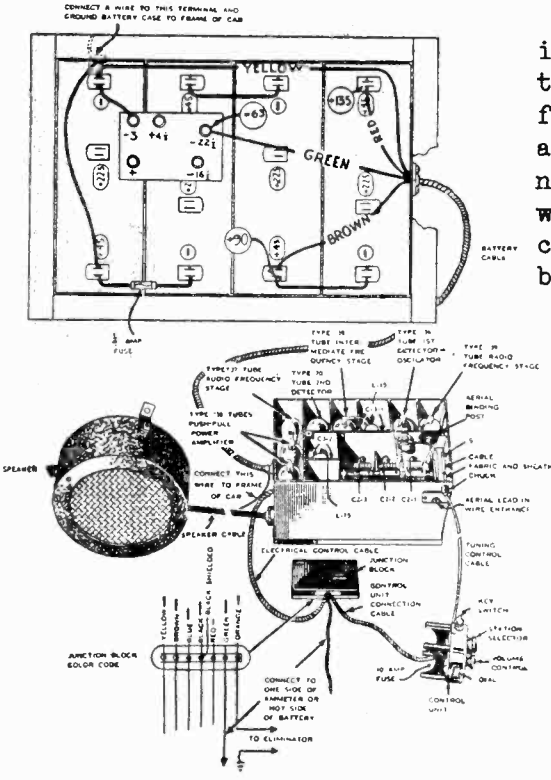
Sparton Model 34 Super-Heterodyne Schematic Diagram and Voltage Analysis

VOLTAGE ANALYSIS

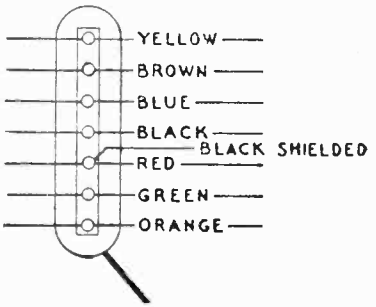
Condition of "A" Battery—Good
Condition of "B" Battery—Good
Condition of "C" Battery—Good
Position of Volume Control—Full with No Signal

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
'39	R. F. Stage	6.3	90	3.0	90	4.0
'36	1st Det.-Osc.	6.3	120	15	90	2.0
'39	I. F. Stage	6.3	90	3.0	90	4.0
70	2nd Det.-AVC	6.3	180	——	——	1.0
'37	A. F. Stage	6.3	125	10	——	4.0
'38	Power Stage	6.3	180	19.5	180	8.0—10
'38	Power Stage	6.3	180	19.5	180	8.0—10

MODEL 34 CHASSIS
and associated equipment

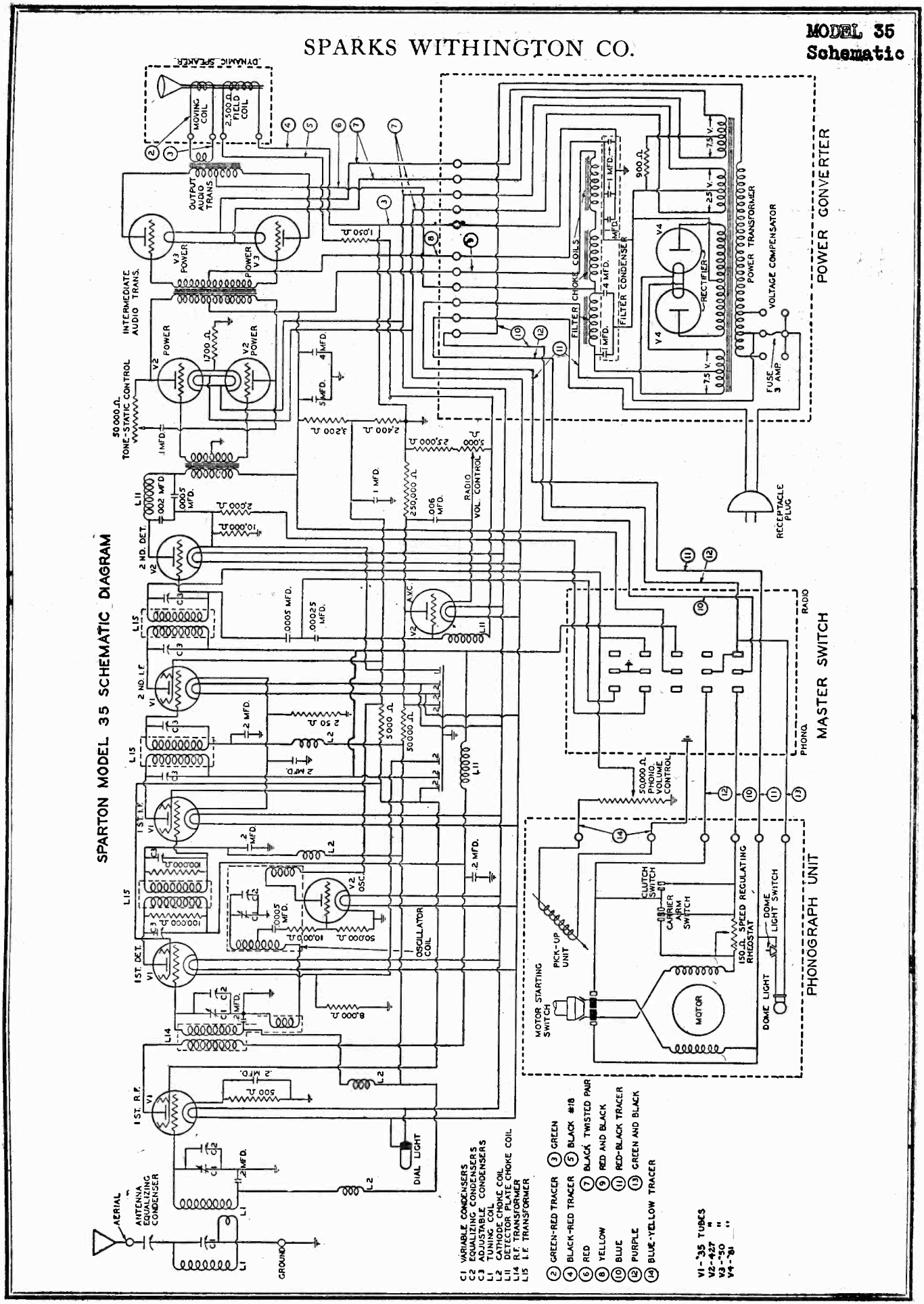


The black shielded "A" battery wire is shown connected to the center terminal on the Junction Block to which the black wire from the control unit also connects. This is an error. The black shielded wire should connect to the terminal on the Junction Block to which the red wire from the control unit is connected. The following diagram shows the black shielded wire properly connected.



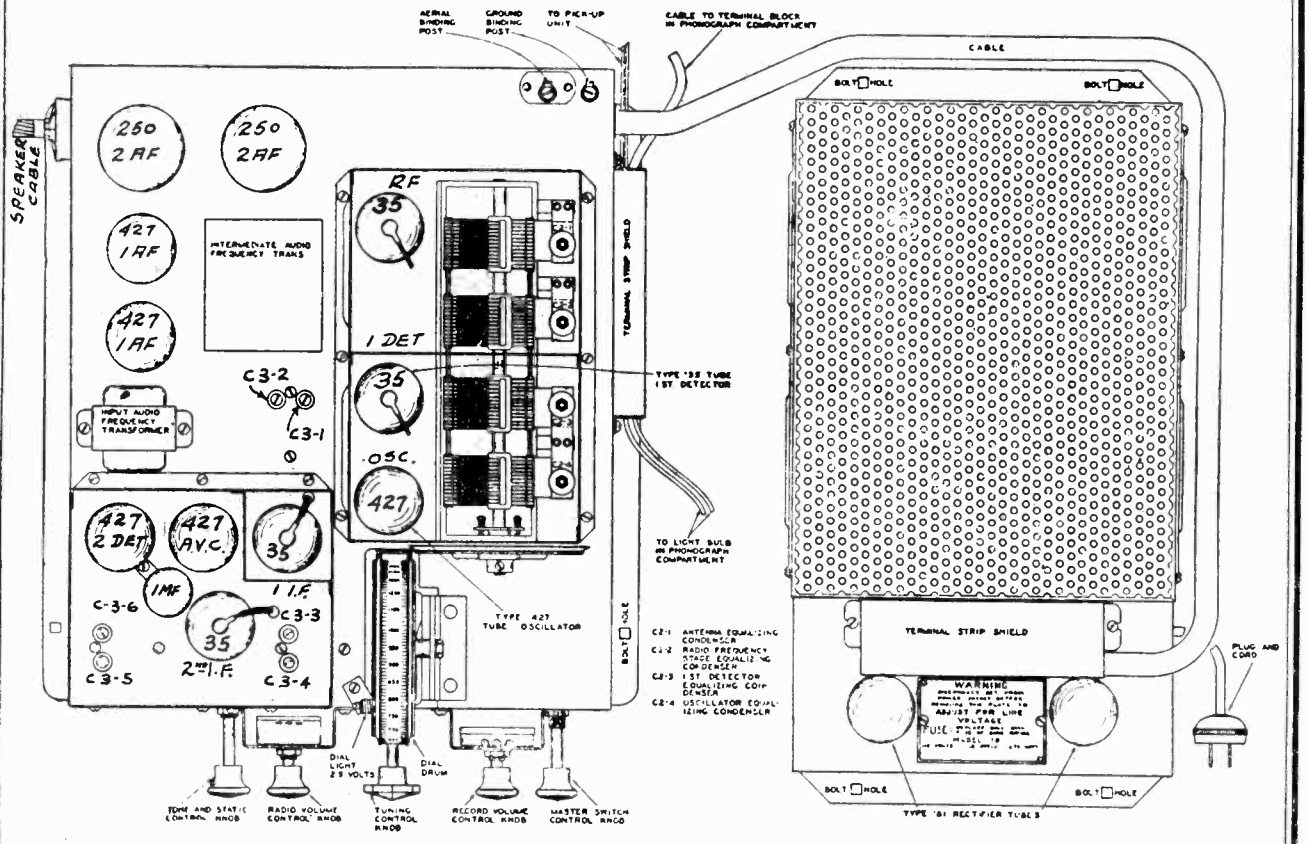
C2-1 Antenna Equalizing Condenser
C2-2 1st Detector Equalizing Condenser
C2-3 Oscillator Equalizing Condenser

C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L15 I. F. Transformer



MODEL 35
Chassis
Voltage

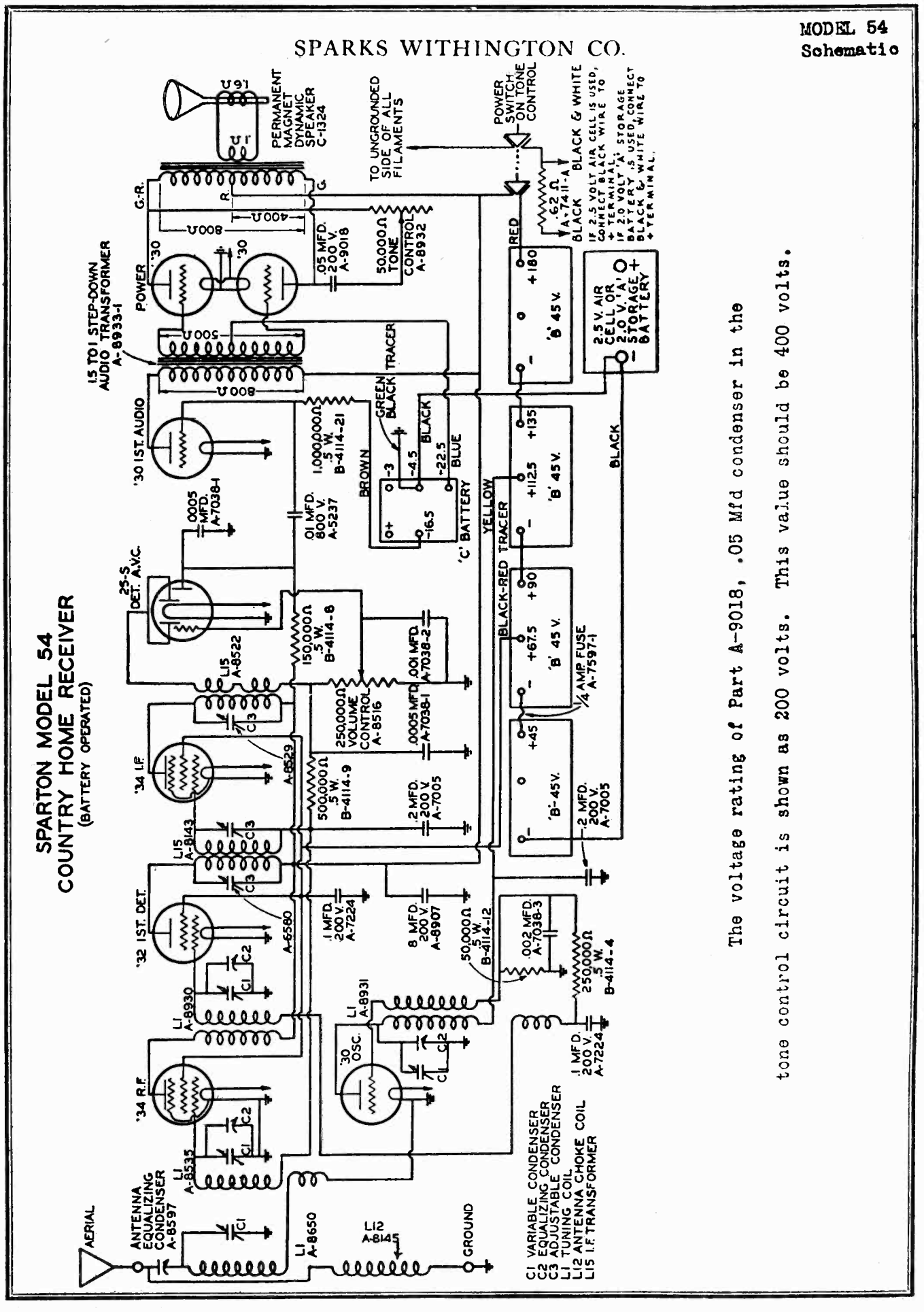
SPARKS WITHINGTON CO.



C3-1 I. F. Stage First Adjustable Condenser
C3-2 I. F. Stage Second Adjustable Condenser
C3-3 I. F. Stage Third Adjustable Condenser
C3-4 I. F. Stage Fourth Adjustable Condenser
C3-5 I. F. Stage Fifth Adjustable Condenser
C3-6 I. F. Stage Sixth Adjustable Condenser

Tube	Location	Grid	Plate	Fil.	Screen	Plate Current
35	1st RF	190-230	2-4	2.2	70-95	1-7 ma
35	1st Det	190-230	'6-14	2.2	70-95	'.8-1.8
35	1st IF	190-230	2-4	2.2	70-95	4-8
35	2nd IF	190-230	2-4	2.2	70-95	4-8
427	2nd Det	185-225	14-22	2.2		.7 -1.1
427	Osc.	70-95	**	2.2		⸗
427	AVC	*	30-50	2.2		Zero
427	1st Pwr	190-230	14-22	2.2		5-8
427	1st Pwr	190-230	14-22	2.2		5-8
50	2nd Pwr	350-420	60-90	7.0		36-48
50	2nd Pwr	350-420	60-90	7.0		36-48
81	Rect.	440-560	---	7.0		65-85
81	Rect.	440-560	---	7.0		65-85

*Test from grid prong to ground approx. 125 volts
'Remove oscillator tube.
**Tube generates own bias when oscillating
⸗ Test with plug in second detector socket and tube in analyzer



The voltage rating of Part A-9018, .05 Mfd condenser in the tone control circuit is shown as 200 volts. This value should be 400 volts.

MODEL 54
Voltage
Socket

SPARKS WITHINGTON CO.

Sparton Model 54 Super-Heterodyne
Schematic Diagram and Voltage Analysis

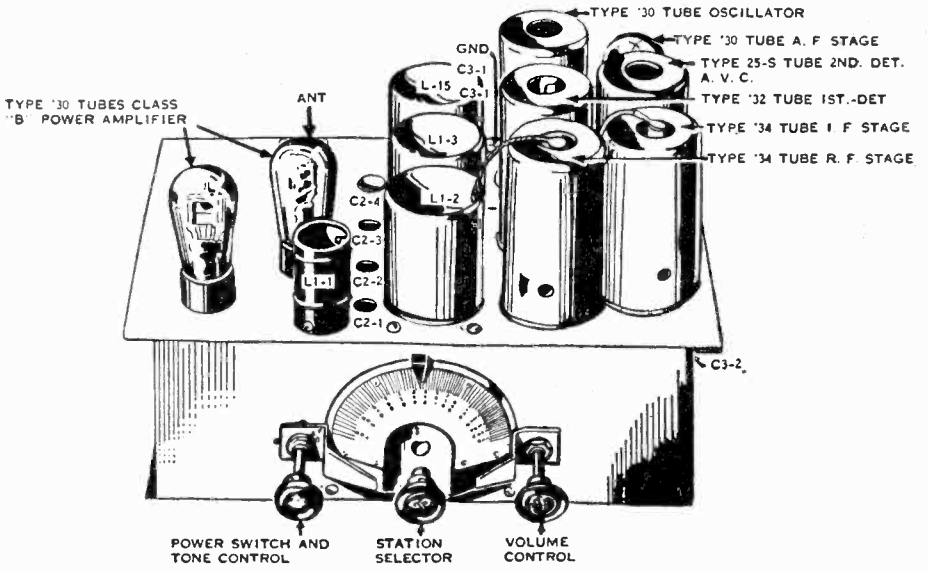
VOLTAGE ANALYSIS

Condition of "A" Battery—Good
Condition of "B" Battery—Good
Condition of "C" Battery—Good
Position of Volume Control—Full with No Signal

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
'34	R. F. Stage	2.0	180	†—	67½	3.0
'32	1st Det.	2.0	180	†—	67½	0.5
'30	Oscillator	2.0	112½	†—	—	‡1.0—2.0
'34	I. F. Stage	2.0	180	†—	67½	3.0
25-S	2nd Det.-AVC	2.0	*—	†—	—	0.5
'30	A. F. Stage	2.0	180	12	—	0.2
'30	Power Stage	2.0	180	18	—	1.0
'30	Power Stage	2.0	180	18	—	1.0

* 180 Volts through 150,000 ohm plate resistor.
† These biases supplied either by oscillator or by AVC tube—through very high resistances. Cannot be measured with a test kit.
‡ This current varies with frequency of oscillation. Cannot be measured in a test kit.

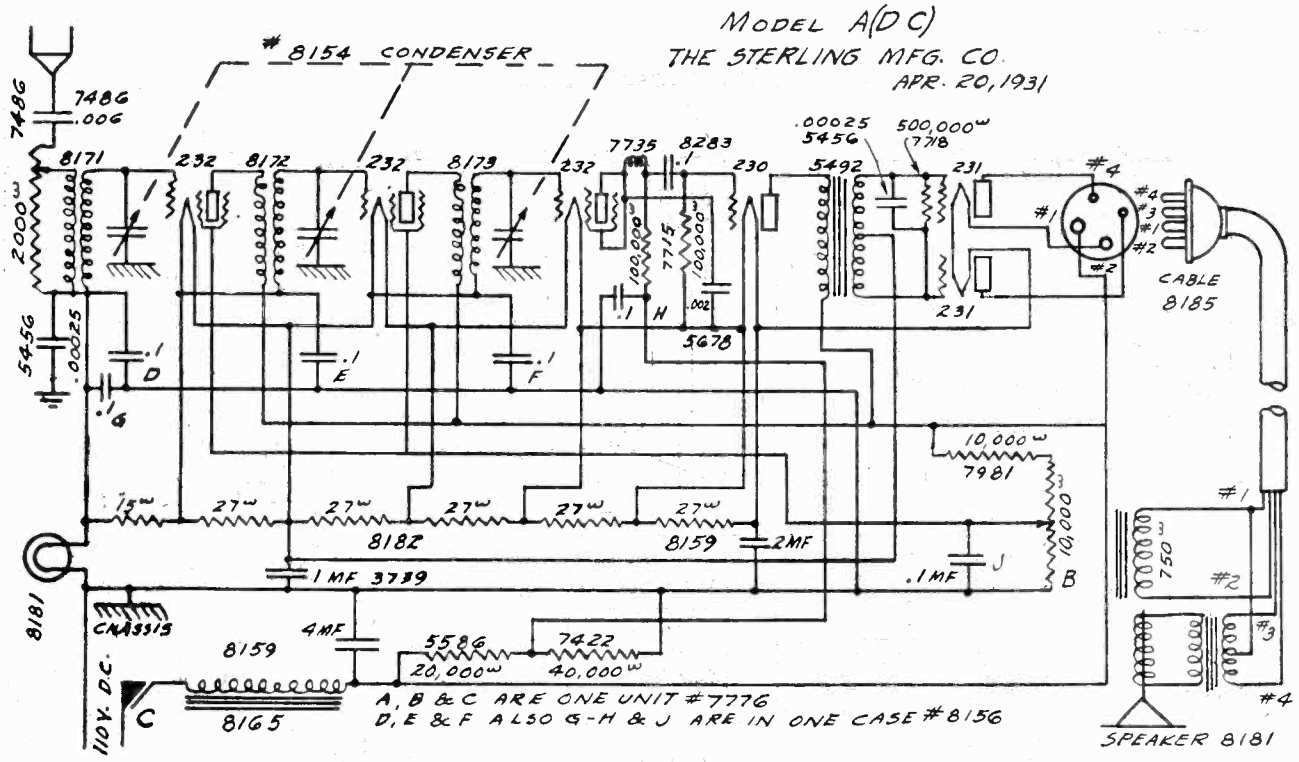
MODEL 54 CHASSIS

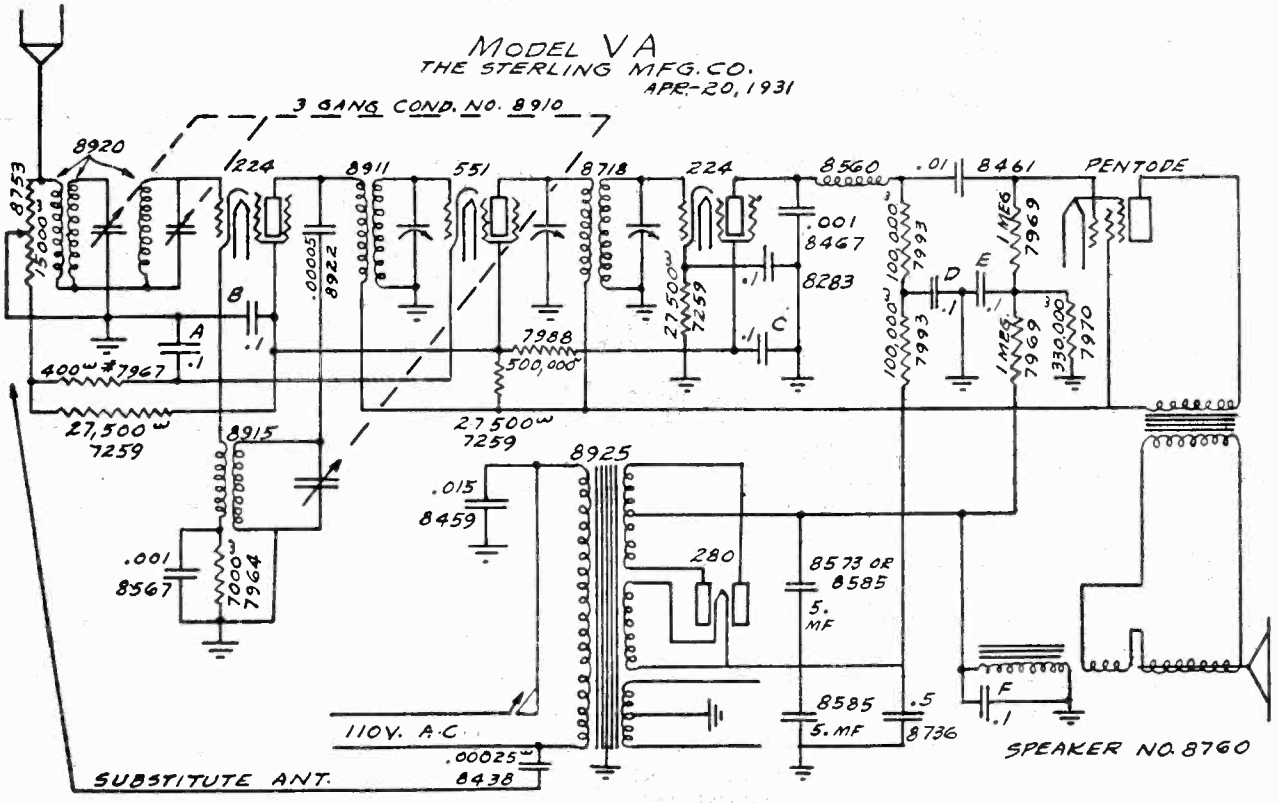


C2-1 Antenna Equalizing Condenser
C2-2 R. F. Stage Equalizing Condenser
C2-3 1st Detector Equalizing Condenser
C2-4 Oscillator Equalizing Condenser
C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L1 1st Tuning Coil
L2 Second Tuning Coil
L14 R. F. Transformer
L15 I. F. Transformer

MODEL A (DC)
MODEL VA

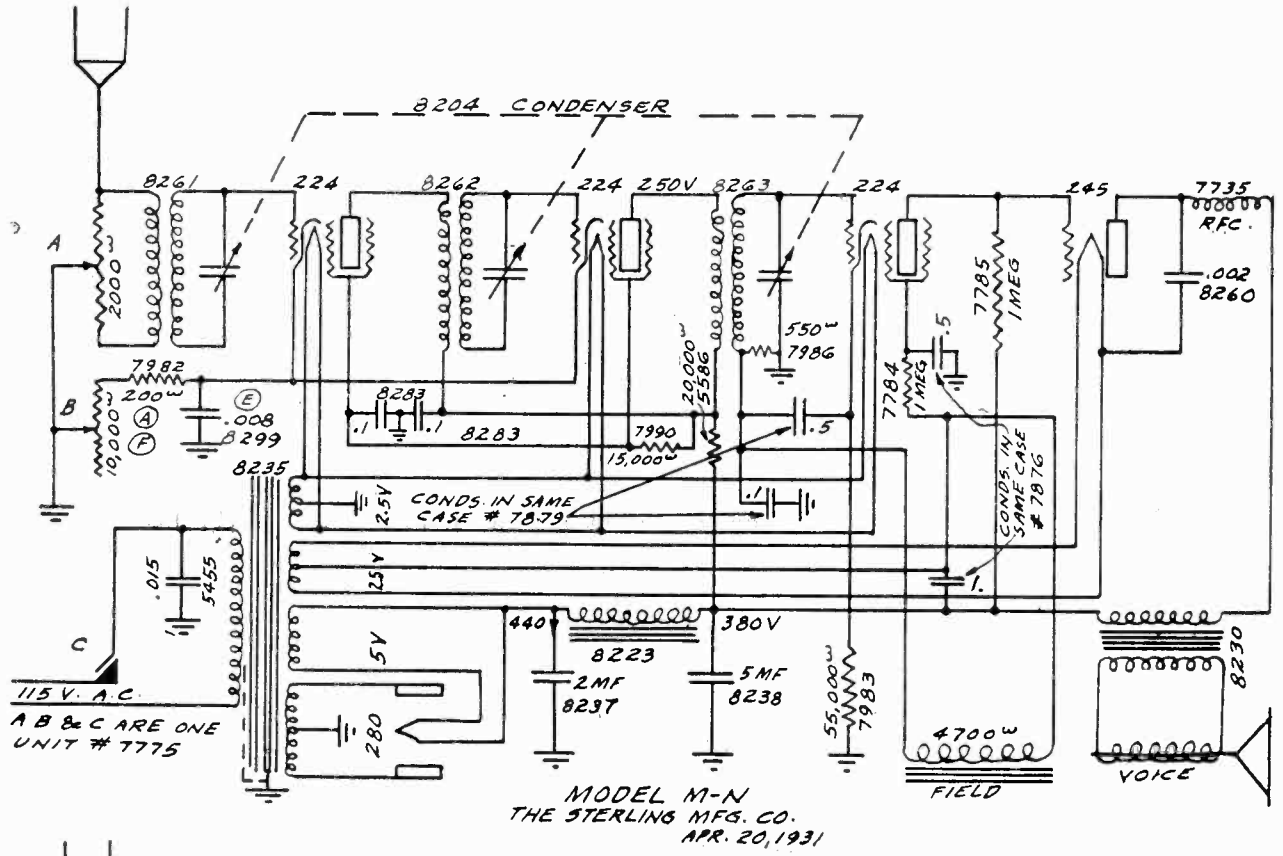
STERLING MFG. CO.



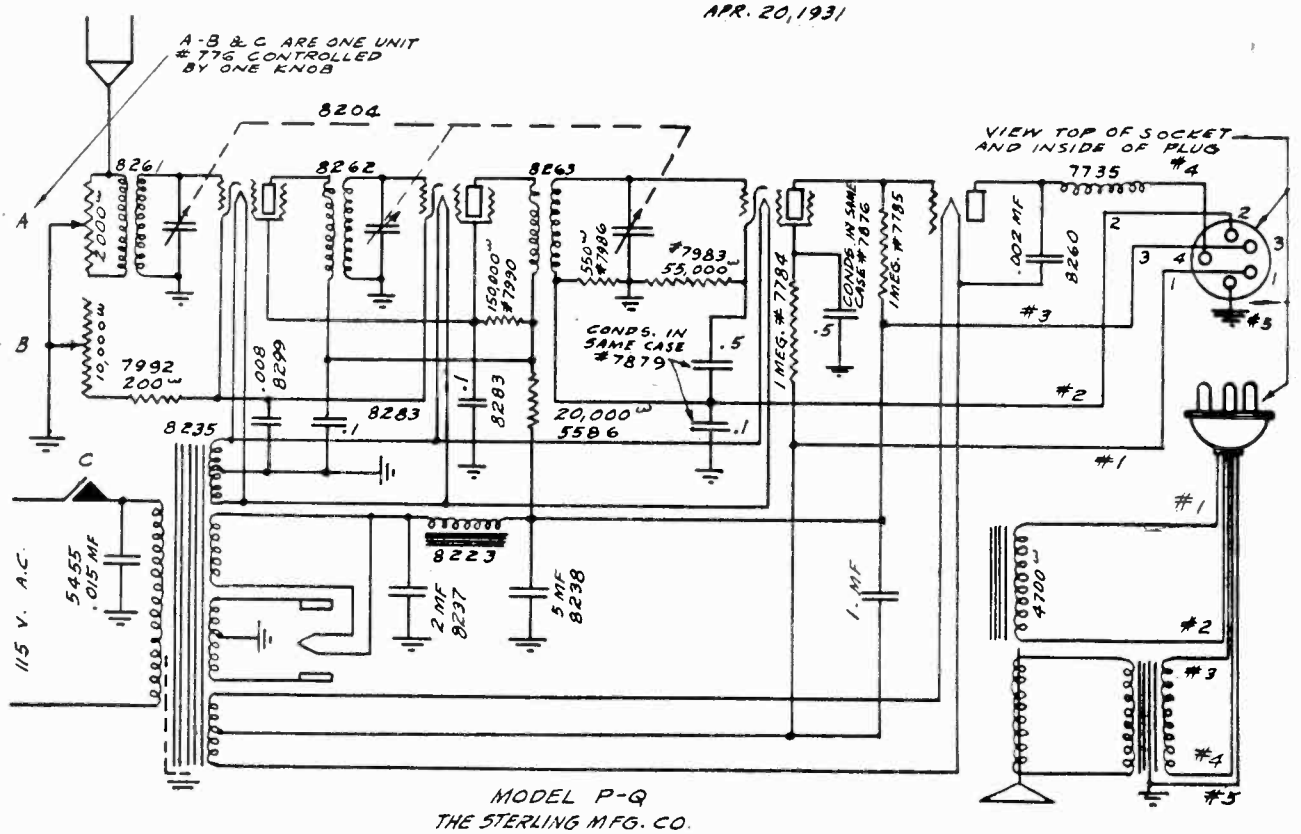


STERLING MFG. CO.

MODEL M-N
MODEL P-Q



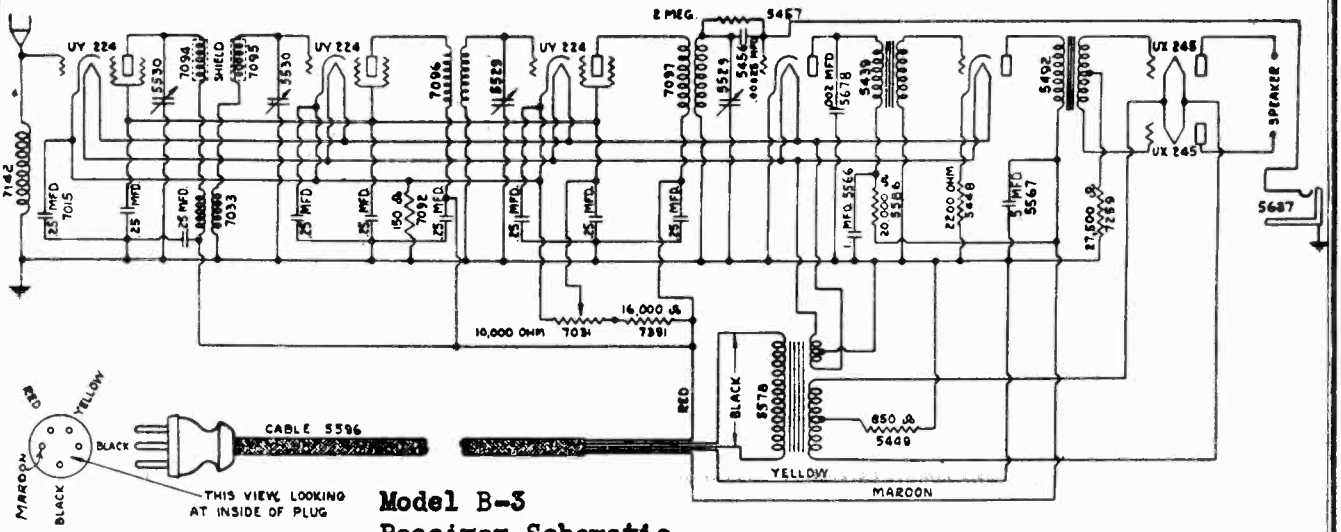
MODEL M-N
THE STERLING MFG. CO.
APR. 20, 1931



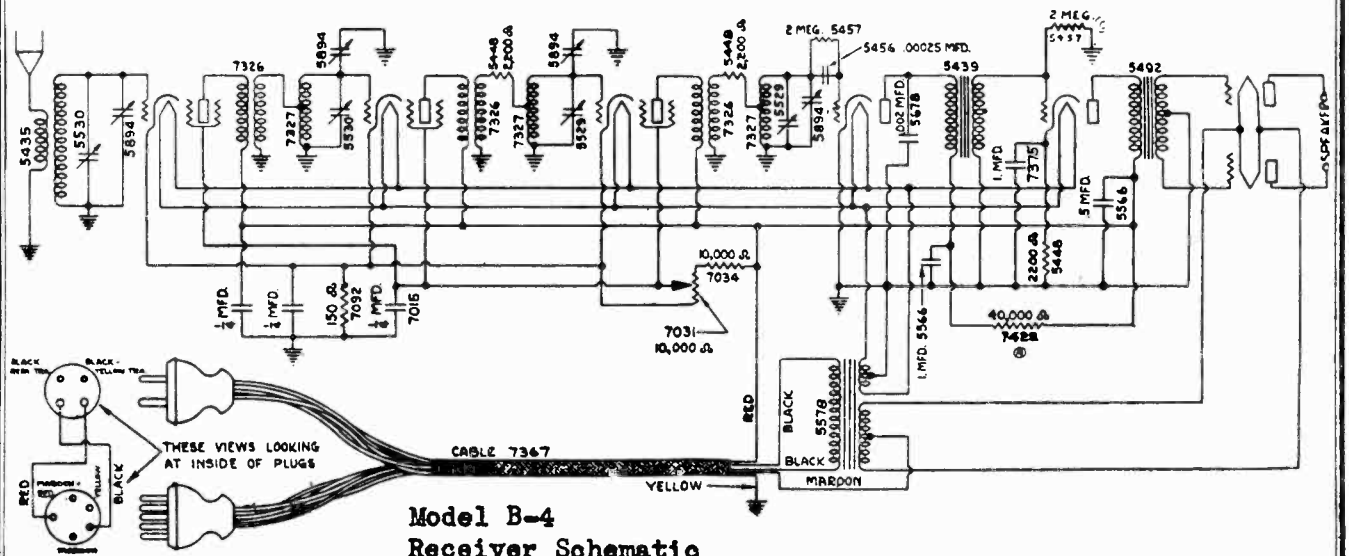
MODEL P-Q
THE STERLING MFG. CO.
APR. 20, 1931

STERLING MFG. CO.

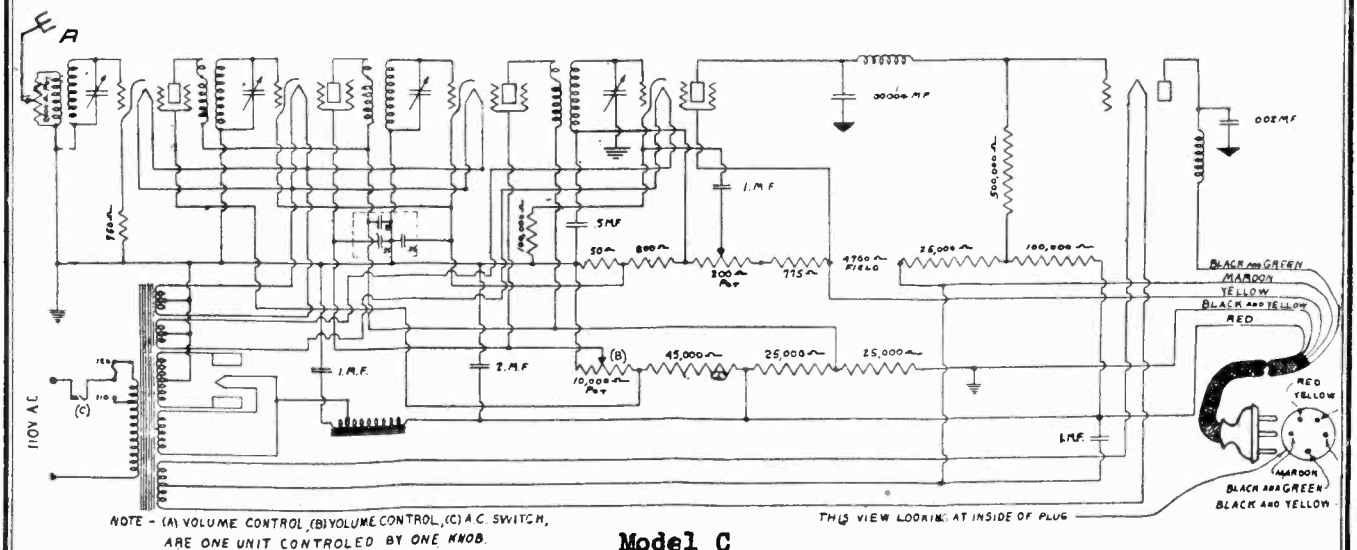
MODEL B-3
Receiver Sch.
MODEL B-4
Receiver Sch.
Model C



Model B-3
Receiver Schematic



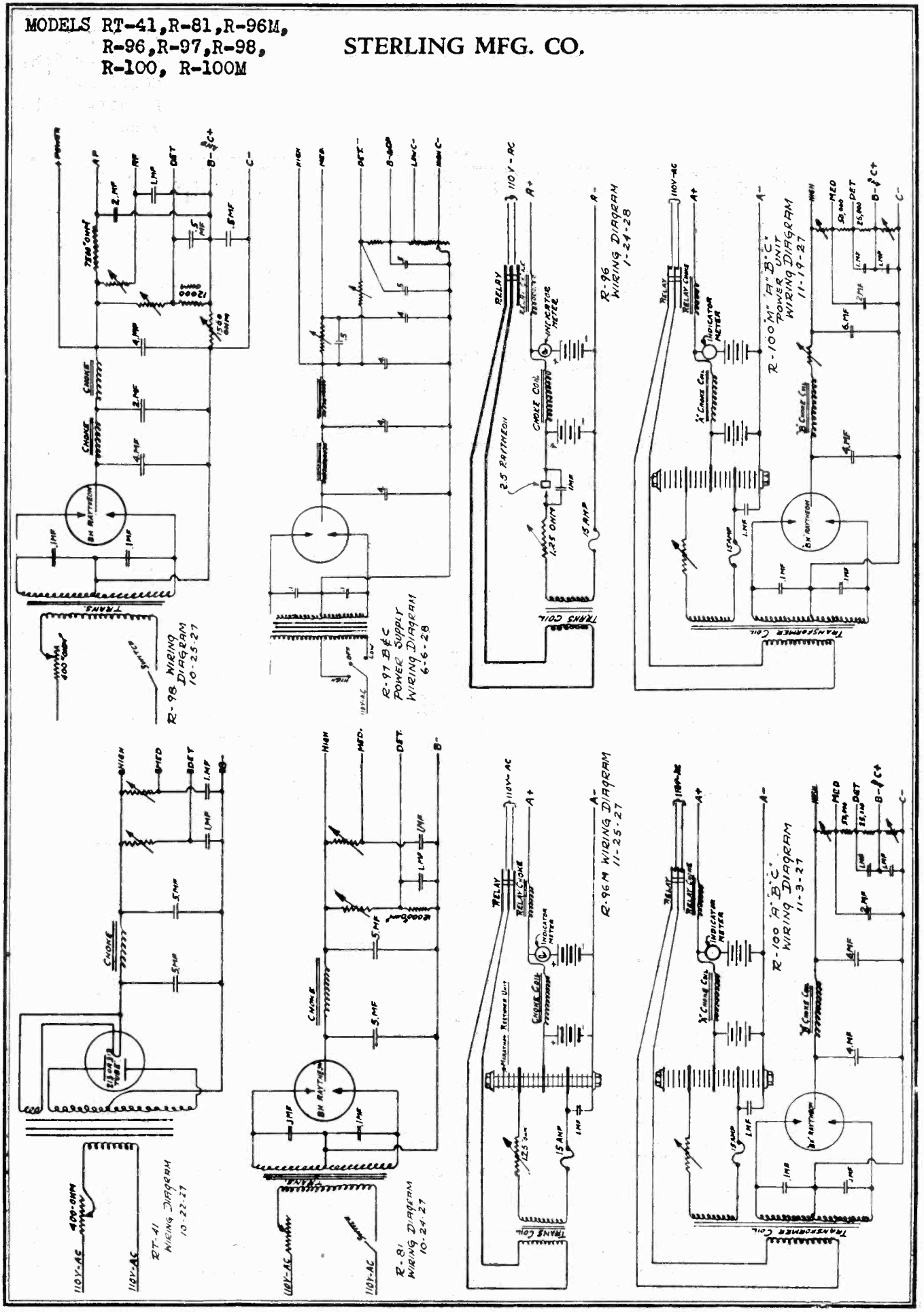
Model B-4
Receiver Schematic



Model C

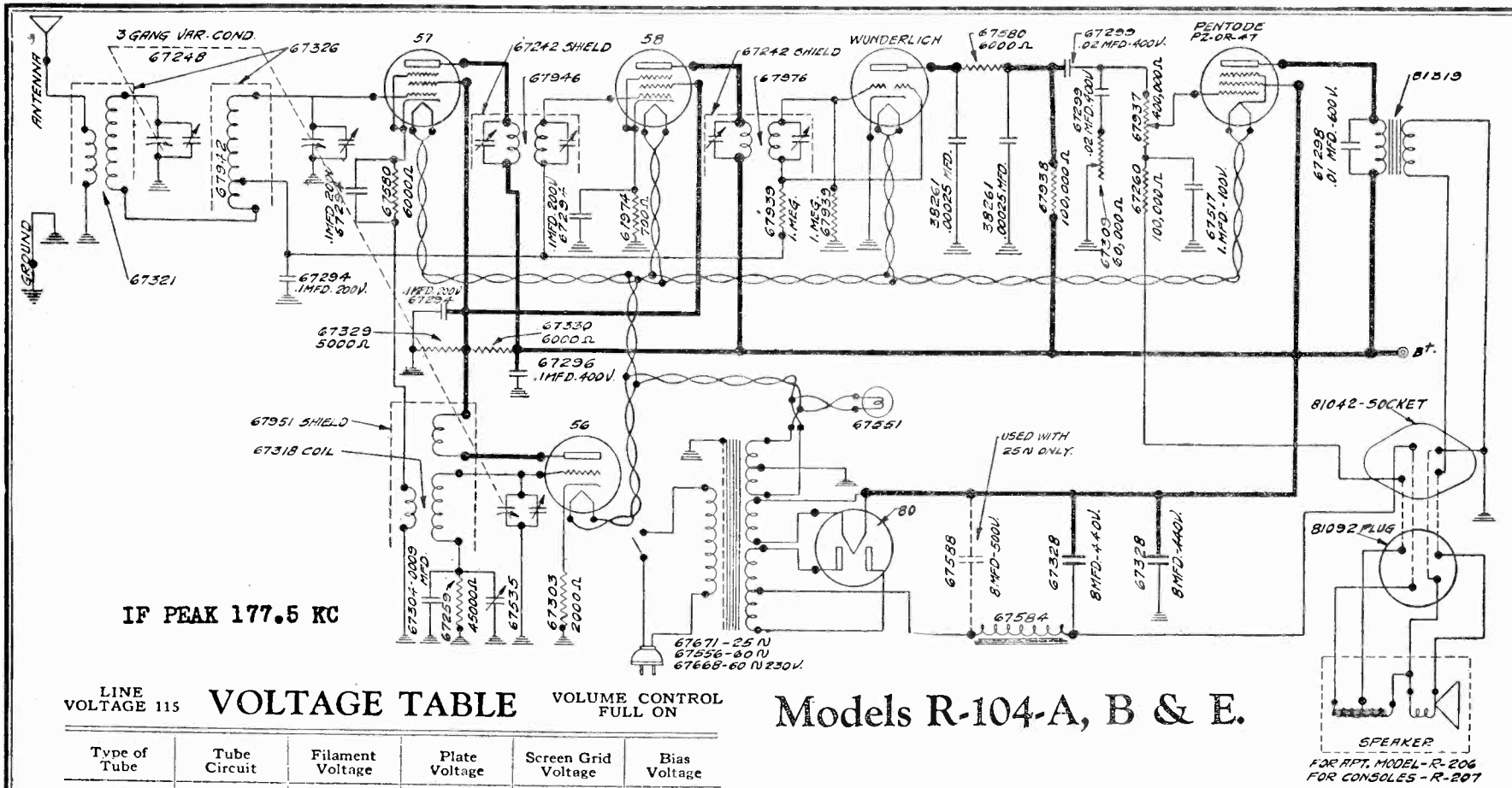
MODELS RT-41, R-81, R-96M, R-96, R-97, R-98, R-100, R-100M

STERLING MFG. CO.



STEWART - WARNER CORP.

MODEL R-104-A, B & E
Schematic, Voltage



IF PEAK 177.5 KC

LINE VOLTAGE 115

VOLTAGE TABLE

VOLUME CONTROL FULL ON

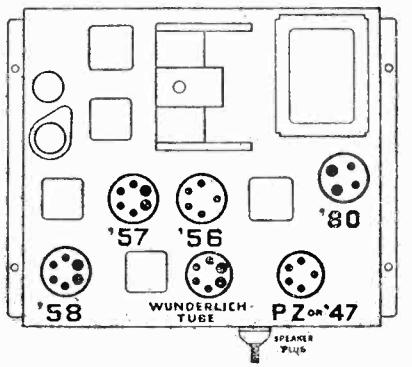
Type of Tube	Tube Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
'57	1st Det.	2.57	256	100	4.5
'56	Osc.	2.57	100		7.8
'58	I. F.	2.56	256	100	3.9
Wunderlich	2nd Det.	2.56	37		
P. Z. or '47	Output	2.56	239	256	15.75 ‡
'80	Rect.	4.9			

All D. C. voltages measured with respect to ground, using high resistance voltmeter of 1000 ohms per volt. Readings will vary, depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltages.

‡This reading obtained between ground and that prong of speaker socket situated furthest from other three. Direct reading from grid to ground or reading taken with a set tester will show about 3 volts because of high resist ance in grid circuit.

Models R-104-A, B & E.

FRONT OF SET



MODEL 104 Chassis
Service Data

STEWART-WARNER CORP.

SERVICE DATA ON MODEL 104 CHASSIS

CIRCUIT DESCRIPTION OF 104 CHASSIS

The Model 104 Stewart-Warner Radio Chassis makes use of a six-tube superheterodyne circuit embodying automatic volume control (A.V.C.) thru the action of its Wunderlich-type detector tube. An incoming signal is tuned first by a pre-selector circuit to increase selectivity and reduce image frequency interference and then fed into a tuned first detector stage, where it beats with the output of a local oscillator to produce a 177.5 K. C. intermediate frequency signal. This odd frequency is chosen to reduce further any image frequency interference. The I.F. signal is amplified in an exceptionally high gain stage and then fed into the Wunderlich tube which performs the triple functions of detection, amplification, and automatic volume control. As a result of the A.V.C. action of this tube a voltage varying in value in direct relationship to the strength of the incoming signal, appears across the 1 megohm resistor connected between one of its grids and ground. This resistor is also in the grid return circuit of both the first detector and I.F. tubes, so that their biases increase in direct relationship to the strength of the incoming signal. This action results in an automatic control of sensitivity.

The plate circuit audio output of the detector tube is impressed across the 400,000 ohm variable resistor in the grid circuit of the pentode tube. Volume is controlled by using this variable resistor as a voltage divider to feed any desired audio voltage from zero to the maximum available across the pentode grid circuit.

ALIGNING THE 104 CHASSIS

Alignment can be carried out intelligently only if the service man knows the general layout of the set, and how each circuit is affected during the process of alignment. The simplified top view of the chassis appearing on the other side of this sheet gives the layout of the receiver and indicates the names and locations of the various aligning adjustments. The following brief discussion of what actually happens during alignment should be carefully read, using the sketch as a basis before commencing the actual work.

LOCATION AND FUNCTION OF ALIGNING ADJUSTMENTS

The incoming signal is tuned first by the pre-selector "A" stage and then fed into the first detector "B" circuit, where it is tuned again to improve selectivity. These circuits are brought into exact alignment by the two trimmer condensers "A" and "B," pointed out in the attached sketch. The tuned oscillator circuit is so designed that it tunes to a frequency exactly 177.5 K.C. higher than the incoming signal. This circuit is kept in exact step by means of two adjustments, the oscillator condenser trimmer "O," and the padding condenser "P," which can be reached thru a small hole in the chassis base just in front of the "O" condenser.

THE "O" TRIMMER IS MAINLY EFFECTIVE AT THE HIGH FREQUENCY END OF THE DIAL, AND THE PADDING CONDENSER "P" AT THE LOW FREQUENCY END. The alignment routine which will be outlined takes this into consideration.

The two intermediate frequency (I. F.) transformers are of the tuned input,—tuned output type and each winding is tuned by a separate trimmer condenser, making a total of four additional adjustments. The first I. F. transformer is in the steel shield at the right side of the set, while the second I. F. transformer is at the rear of the chassis. The I. F. trimmer adjusting screws can easily be reached thru two small holes at the base of each shield, the primary circuit adjustment in each case being at the left and the secondary adjustment at the right.

PRELIMINARY STEPS IN ALIGNING

In aligning the Model 104 it is essential to use a high grade oscillator and sensitive output meter. The R. F. signal fed into the receiver must be very weak or it will cause the A. V. C. circuit to function, making correct alignment impossible. The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment procedure see that the volume control is full on, and the output meter connected either between the pentode plate and ground thru a .25 mfd condenser or across the voice coil, depending upon its sensitivity.

ALIGNING PROCEDURE

With this preliminary discussion clearly in mind, the actual alignment can be started. The following step-by-step routine should be followed for satisfactory results.

1. Remove the grid clip leading from the variable condenser to the cap of the first detector tube.
2. Set up the oscillator, and tune it to exactly 177.5 K.C. (This frequency can be accurately determined by tuning in a station at either 710 or 1420 K.C. and beating the 4th or 8th harmonic of the oscillator 177.5 K.C. signal against it. To be sure that you have the harmonic of the 177.5 K.C. signal, instead of some other frequency, tune in the other 177.5 harmonics on the broadcast dial. These should come in 177.5 K.C. on either side of the original setting. **Do not use the oscillator calibration curve to determine this intermediate frequency.**) Connect the oscillator output between the grid cap and grid clip of the first detector tube.
3. Adjust the oscillator output to give about one-half full scale deflection of the output meter.

Adjusting the I. F. Circuits

1. Adjust all four I. F. trimmer condensers, in each case tuning carefully to make sure that maximum deflection is obtained on the output meter.

IT IS VERY IMPORTANT THAT ABSOLUTELY NO INWARD PRESSURE BE APPLIED TO THE ALIGNMENT TOOL, OR THE CONDENSER MAY SPRING BACK TO A DIFFERENT SETTING AS SOON AS THE TOOL IS REMOVED.

2. Go back and repeat all four adjustments since the adjustment of each I. F. trimmer affects the others to a certain extent, thus necessitating readjustment.

Adjusting R. F. and Oscillator Circuits

1. Replace the grid cap on the first detector tube.
2. Twist the aerial and ground wires of the set together to reduce noise pick-up. Connect the aerial wire to the output of the oscillator and ground both set and oscillator. Adjust the oscillator frequency to 1400 K.C. and carefully tune the receiver to give maximum output. Adjust the oscillator output to produce about one-half full scale deflection of the output meter.
3. Carefully tune the "A" trimmer till the output meter reading reaches a maximum.
4. Note the wire leading from the grid cap of the 57 first detector tube (see tube layout diagram on the reverse side of this sheet), to the tuning condenser. The section of the condenser gang to which this lead is soldered is the "B" section. **Altho this "B" section is shown as the center condenser section on the diagram, some sets were manufactured with the "B" section in the rear.**

Retune the set and adjust the "B" trimmer for maximum output. The third, or "O" trimmer should not be touched unless the set is badly out of calibration at the high frequency end of the dial.

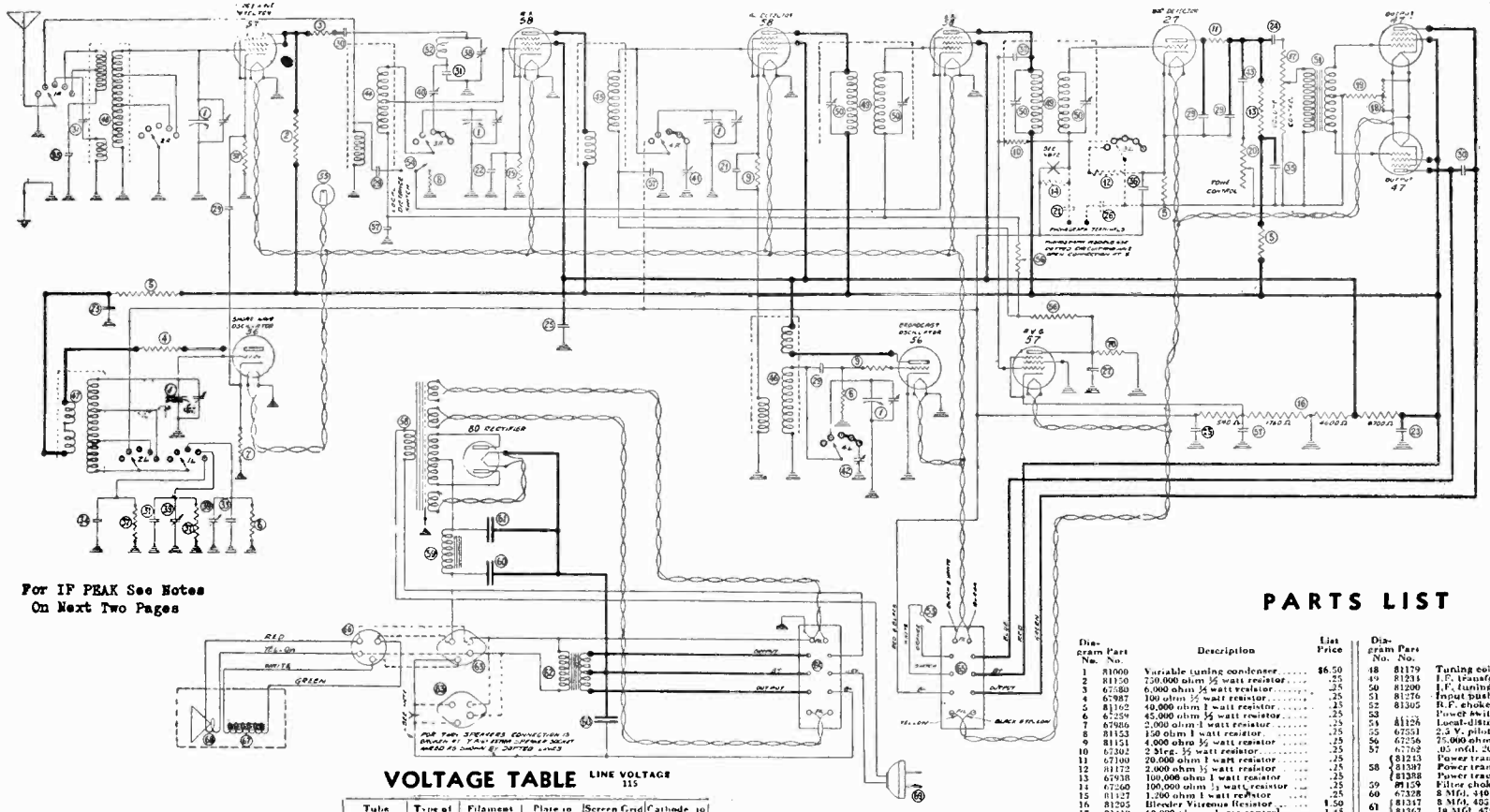
5. Set the oscillator at 600 K.C. and tune the set carefully to this frequency.
6. Adjust the oscillator padding condenser "P" for maximum output, RETUNING THE SET AFTER EACH CHANGE IN ADJUSTMENT. This is important.
7. Turn back the oscillator to 1400 K.C., tune the set to the same frequency, and very carefully readjust the "A" and "B" trimmer condensers to produce maximum output.

The receiver should now be perfectly aligned.

104 PARTS LIST

Part No.	Description	List Price
38261	.00025 mfd. condenser	$0.35
67240	Speaker diaphragm and voice coil assembly	1.85
67242	I.F. coil shield	.25
67248	Main tuning condenser	5.50
67259	45000 ohm, ½ watt resistor	.25
67260	100,000 ohm, ½ watt resistor	.25
67294	.1 mfd. 200 volt condenser	.30
67296	.1 mfd. 400 volt condenser	.40
67298	.01 mfd. 600 volt condenser	.30
67299	.02 mfd. 400 volt condenser	.30
67303	2000 ohm, ½ watt resistor	.25
67304	.0009 mfd. padding condenser	.30
67309	60,000 ohm tone control	1.50
67318	Oscillator tuning coil	1.25
67321	"A" tuning coil	1.00
67326	R.F. coil shield	.50
67328	8 mfd. 440 volt electrolytic condenser	1.75
67329	5000 ohm vitreous resistor	.50
67330	6000 ohm vitreous resistor	.50
67517	1. mfd. 100 volt condenser	.75
67535	Oscillator pad trimmer condenser	.45
67551	2.5 volt pilot light	.25
67556	115 volt 60 cycle power transformer	5.50
67580	6000 ohm, ½ watt resistor	.25
67581	Speaker field coil	3.50
67584	Filter choke coil	2.00
67588	8 mfd. 500 volt electrolytic condenser	1.80
67671	115 volt 25 cycle power transformer	8.00
67937	400,000 ohm volume control	.95
67938	100,000 ohm, 1 watt resistor	.25
67939	1 megohm, ½ watt resistor	.25
67942	"B" tuning coil	.75
67946	1st I.F. transformer	2.00
67946	67481 coil only	.75
67946	67536 trimmer only	.65
67951	Oscillator coil shield	.75
67971	700 ohm, 1 watt resistor	.25
67976	2nd I.F. transformer	2.00
67976	67481 coil only	.75
67976	67536 trimmer only	.65
81042	Speaker socket	.20
81092	81092 Speaker plug only	.20
81092	67972 Cable and plug	.60
81092	67971 Cable only	.40
81459	230 volt 60 cycle power transformer	10.00
	PARTS NOT SHOWN ON DIAGRAM	
67532	Rubber dial drive bushing	.02
67953	Escutcheon plate	.50
81412	Volume or tone control knob	.25
81413	Tuning knob	.25

CIRCUIT DIAGRAM OF SERIES 105 CHASSIS



For IF PEAK See Notes On Next Two Pages

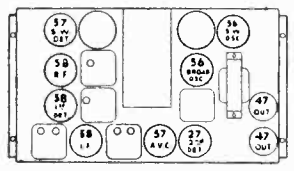
VOLTAGE TABLE

LINE VOLTAGE 115

Tube Circuit	Type of Tube	Filament Voltage	Plate to Chassis	Screen Grid Chassis	Cathode to Chassis
Short Wave Oscillator	56	2.4	83		5.2
Short Wave Detector	57	2.4	23	3	1.9
R F	58	2.4	188	102	2.4
Broadcast Oscillator	56	2.4	102		0
First Detector	58	2.4	188	102	9
1 F	58	2.42	188	102	2.2
A V C	57	2.44	0	0	—85
Second Detector	27	2.42	70		—92
Output	47	2.4	177	188	Fil to chassis —97 Fil to grid 16.5
Rectifier	80	4.9			

TUBE LOCATIONS

FRONT OF SET



NOTE: Use an 80 tube in the Power Unit.

CAUTION

Reading must be taken with the set tuned to one of the short wave ranges, and the local-distance switch pulled out.

All D.C. voltages are measured between the tube socket terminal and chassis, using a high resistance voltmeter of 1000 ohms per volt. Readings will vary depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for all detector and oscillator D.C. voltages.

Readings taken with set testers plugged into tube sockets may deviate considerably from the values given in this table, due to their internal circuit arrangements.

PARTS LIST

Diagram No.	Part No.	Description	List Price
1	81000	Variable tuning condenser	$6.50
2	81150	750,000 ohm ½ watt resistor	.25
3	67080	6,000 ohm ½ watt resistor	.25
4	67987	100 ohm ½ watt resistor	.25
5	81162	40,000 ohm 1 watt resistor	.25
6	67259	45,000 ohm ½ watt resistor	.25
7	67986	2,000 ohm 1 watt resistor	.25
8	81153	150 ohm 1 watt resistor	.25
9	81151	4,000 ohm ½ watt resistor	.25
10	67302	2.5 meg. ½ watt resistor	.25
11	67100	20,000 ohm 1 watt resistor	.25
12	81172	2,000 ohm ½ watt resistor	.25
13	67938	100,000 ohm 1 watt resistor	.25
14	67260	100,000 ohm ½ watt resistor	.25
15	81127	1,200 ohm 1 watt resistor	.25
16	81295	Bleeder Vitreous Resistor	1.50
17	81419	60,000 ohm volume control	1.15
18	81131	20 ohm resistor on one form	.50
19		220 ohm resistor	
20	81437	100,000 ohm tone control	1.50
21	81190	.1 Mfd. 200 V. fixed condenser	.35
22	67291	.1 Mfd. 200 V. fixed condenser	.30
23	67296	.1 Mfd. 400 V. fixed condenser	.40
24	81191	.1 Mfd. 400 V. fixed condenser	.45
25	67297	.25 Mfd. 200 V. fixed condenser	.40
26	81345	.25 Mfd. 200 V. fixed condenser	.45
27	67299	.02 Mfd. 400 V. fixed condenser	.30
28	81352	.02 Mfd. 400 V. fixed condenser	.35
29	81156	.001 Mfd. fixed condenser	.30
30	81115	.002 Mfd. fixed condenser	.35
31	81155	.0005 Mfd. fixed condenser	.25
32	81157	.00025 Mfd. fixed condenser	.30
33	81138	.0001 Mfd. fixed condenser	.25
34	81202	.003 Mfd. fixed condenser	.50
35	81081	.5 Mfd. 400 V. fixed condenser	.50
36	81083	.1 Mfd. 100 V. fixed condenser	.75
37	81132	10,000 ohm ½ watt resistor	.25
38	81306	Trimmer Condenser	.50
39	81231	Trimmer Condenser	.50
40	81202	Trimmer Assembly	.40
41	81201	Double trimmer condenser one	.60
42		Double trimmer condenser unit	
43	81415	.02 Mfd. 400 V. fixed condenser	.40
44	81189	"A" Tuning coil	1.00
45	81188	"B" Tuning coil	1.00
46	81406	"C" Tuning coil	1.00
47	81178	Tuning coil	1.50
48	81179	Tuning coil	1.70
49	81231	I.F. transformer coils	1.00
50	81200	I.F. tuning condensers	.90
51	81276	Input push-pull transformer	5.00
52	81305	R.F. choke coil	.90
53		Power switch part of 81237	
54	81126	Local-distant switch	.60
55	67551	2.5 V. pilot lamp	.15
56	67256	25,000 ohm, ½ watt resistor	.25
57	67762	.05 mfd. 200v. condenser	.30
58	81243	Power transformer, 115 V. 60 cyc.	10.75
	81397	Power transformer, 115 V. 25 cyc.	12.75
	81388	Power transformer, 230 V. 60 cyc.	14.00
59	81159	Filter choke	2.50
60	67328	8 Mfd. 340 V. Electrolytic cond.	1.75
61	81347	8 Mfd. 405 V. (for 60 cycles)	1.75
	81367	16 Mfd. 475 V. (for 25 cycles)	2.00
62	81160	Output transformer, single speaker	2.75
	81291	Output transformer, twin speaker	2.75
63	81042	Speaker socket	.15
64	81095	Power supply terminal socket	.50
65	81094	Receiver power terminal plug	.45
66	81100	Speaker cord and plug	.60
	81098	Speaker cord only	.35
	81092	Speaker plug only	.20
67	81265	Field coil Model R-208-A (460 ohm)	3.50
	81266	Field coil Models RL-209-A or RH-209-A (250 ohm)	3.50
68	81274	Diaphragm Assembly (Model R-208-A)	2.75
	81271	Diaphragm Assembly (Model RL-209-A)	2.75
	81279	Diaphragm Assembly (Model RH-209-A)	2.75
69	81246	Cord and plug	.60
70	81509	½ Meg. ½ watt resistor	.25

Miscellaneous Parts

81232	Range switch	$4.00
81084	Tuning knob	.30
81085	Tone or Volume Control knob	.30
81086	Range switch lever	.30
81011	Escutcheon plate	.45
81408	Celluloid dial	.60
81109	Small rubber drive bushing	.03
81113	Large rubber drive bushing	.04

STEWART-WARNER CORP.

MODEL 105 Series
Schematic, Voltage
Parts List

MODEL 105 Series
Service Data
Part 1

STEWART-WARNER CORP.

SERVICE DATA

for

STEWART-WARNER 105 SERIES CHASSIS

CIRCUIT DESCRIPTION OF 105 RECEIVER

GENERAL:

The Model 105 Stewart-Warner Radio Receiver is an 11-tube all wave receiver, using a double superheterodyne circuit, which thru the use of a multi-section range switch permits the use of any one of four tuning ranges or phonograph hook-up as desired.

CIRCUIT LAYOUT:

Thru the use of the range switch radio signals are made to follow one of two general circuit paths, depending on their wave lengths. If the signal is in the broadcast band, it is fed directly to the tuned input circuit of the R.F. tube, and from there on amplified in the usual way. During broadcast reception interference from short wave stations is prevented by applying a very high negative bias on the short wave oscillator tube, preventing it from functioning.

When the set is switched over to any one of the three short wave ranges, the following circuit changes are made:

1. The antenna is switched to the tuned input circuit of the short wave detector.
2. The bias on the short wave oscillator tube is reduced so that it can function.
3. The tuning condenser sections in the R.F., first detector, and broadcast oscillator stages are cut out of the circuit and replaced by fixed trimmer condensers which are adjusted to tune these circuits to pass a 1525 K.C. signal. This frequency is used to prevent pickup of broadcast band stations during short wave reception.

The received short wave signal passes thru the short wave detector, where it is converted to 1525 K.C. by the action of the short wave oscillator and it is then amplified at this frequency in the broadcast section of the receiver.

Input to the second detector tube is kept constant regardless of variation in signal strength by means of an A.V.C. circuit using a separate 57 tube. Volume is regulated by means of a variable resistor acting as a voltage divider to feed the primary of the input push-pull transformer.

EXPLANATION OF RANGE SWITCH:

The range switch consists of eight independent switch sections, each section being provided with five contacts. Ordinarily only seven sections of the eight, and only four contacts of the five per switch are used, the remainder being wired in on phonograph models only.

In the circuit diagram these different switch sections are labelled 1R, 1L, 2R, etc., and for the sake of simplicity are shown in different locations in the diagram, altho they are all parts of the master range switch assembly located in the center of the chassis. With the chassis bottom-side up and controls pointing away from you 1R is the front right hand section, 1L is the front left hand section, 2R is the second right-hand section counting from the front of the chassis, and so on.

Switch contact positions are arranged in the following order reading in a clockwise direction.

1. PHONOGRAPH. { This contact is used on phonograph models only. On all other sets, the switch lever cannot be moved to this position.
2. BROADCAST RANGE. { In non-phonograph models a stop has been placed to prevent the switch from turning on to Point No. 1 so that No. 2 is really the first switch position.
3. 180-80 METER SHORT WAVE RANGE.
4. 80-33 METER SHORT WAVE RANGE.
5. 33-14 METER SHORT WAVE RANGE.

As the range switch is rotated in a clockwise direction the following circuit changes are effected.

POSITION 1. Phonograph. (This position is available on phonograph models only.) Switch 1R grounds the aerial, while switch 4R biases the first detector to cut off, thus rendering it inoperative. These circuit changes prevent radio interference while the phonograph is being used. Switch 3L which is wired in on phonograph models only, makes the necessary connections to bias the second detector as an amplifier instead of a detector.

POSITION 2. Broadcast Band. (This is the first position in use on non-phonograph models.) In this position switch 2L biases the short wave oscillator to stop it from oscillating so that the short wave section cannot cause interference when receiving stations on the broadcast band. Switch 1R connects the aerial to the primary of the R.F. coil. Switch 3R connects the third section of the variable condenser gang across the secondary of the R.F. coil. Switch 4R connects the fifth section of the variable condenser gang across the secondary of the first detector coil. Switch 4L connects the fourth section of the variable condenser gang across the secondary of the broadcast oscillator circuit. In phonograph models only, switch 3L connects the secondary of the second I.F. transformer direct to B minus.

POSITION 3. 180 to 80 Meter Short Wave Band. In this position switch 1R connects the aerial to one of the two tuned primaries of the short wave detector. Switch 3R connects the output of the short wave detector to the secondary of the R.F. coil, and also connects an adjustable trimmer condenser across the secondary of this coil to tune it to 1525 K.C. Switch 4R connects an adjustable trimmer across the secondary of the first detector coil to tune it to 1525 K.C. Switch 4L connects a variable trimmer across the secondary of the broadcast oscillator to tune it to 1702.5 K. C., thus giving an I.F. of 177.5 K.C. Switch 1L connects an adjustable padding circuit in series with the secondary of the short wave oscillator coil, thus permitting proper tracking of this circuit in this short wave band. In phonograph models only, switch 3L connects the secondary of the second I.F. transformer directly to B minus.

POSITION 4. 80 to 33 Meter Short Wave Band. In this position switch 1R connects the aerial to the second of the two primaries of the short wave detector coil. Switch 2R shorts out a portion of the secondary of the short wave detector coil, thus enabling it to tune to the 33 to 80 meter band. Connections to switches 3R, 4R and 4L remain the same as in position 3, tuning the R.F. section to 1525 K.C. Switch 1L connects a different adjustable padding circuit in series with the secondary of the short wave oscillator coil, thus permitting proper tracking of this circuit in this short wave band. Switch 2L shorts out part of the secondary of the short wave oscillator coil so that it will tune to wave lengths between 33 and 80 meters. In phonograph models only, switch 3L connects the secondary of the second I.F. coil directly to B minus.

POSITION 5. 33 to 14 Meter Short Wave Band. In this position switch 1R connects the aerial thru a tap to the second primary of the short wave detector coil. Switch 2R shorts out a larger section of the secondary of the short wave detector coil so that this circuit can be tuned from 14 to 33 meters. Connections thru switches 3R, 4R, 3L and 4L remain as in positions 3 and 4. Switch 1L connects a non-adjustable padding circuit in series with the secondary of the short wave oscillator coil. Switch 2L shorts out a larger portion of the secondary of the short wave oscillator coil, thus permitting this tuned circuit to cover the 14 to 33 meter band.

LOCAL-DISTANCE SWITCH:

The local-distance or "quiet" switch, which is operated by an in-and-out motion of the tone control knob, functions in the following manner. In the "in" or local position, the primary of the R.F. coil is shunted by a fixed condenser, thus by-passing part of the signal to ground and reducing the signal input into this circuit. The R.F. and I.F. tubes are operated at a high negative bias to reduce their amplification. In the "out" or distance position, the by-passing condenser is cut out of the circuit and a fixed resistor is connected in parallel with the bias resistor of the R.F. and I.F. tubes, thus reducing the bias on these tubes to its normal value, permitting them to operate at maximum sensitivity.

STEWART - WARNER CORP.

MODEL 105 Series
Service Data, Part 2

SPEAKER:

Three different types of speakers are used with the 105 set.

(1) R-208-A. This is the standard model for single speaker receivers.

(2) RL-209-A. This is the LOW unit of a twin speaker set. Its field coil resistance is less than that of the R-208-A.

(3) RH-209-A. This is the HIGH unit of a twin speaker set. Its field coil resistance is the same as that of the RL-209-A.

Replacement diaphragms for RL-209-A and RH-209-A are marked 67208 and 81268 respectively.

POWER UNIT

Altho the chassis are the same, different power units are used for the single and twin speaker sets. The twin speaker power unit has two speaker sockets instead of one, and a different output transformer, designed to handle two speakers.

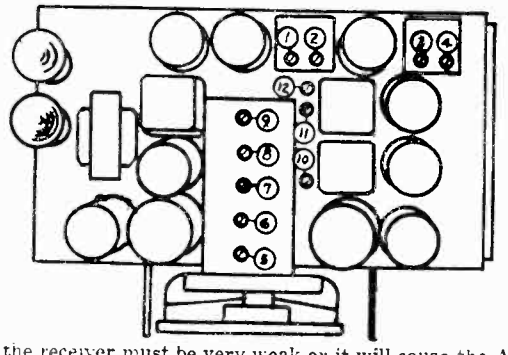
ALIGNING THE MODEL 105 RECEIVER

There are five distinct circuits to be aligned in the 105 receiver. **The order in which they are given below is the order in which they must be aligned.**

(1) Intermediate Frequency Amplifier (177.5 K.C.)
(2) Broadcast Tuning Circuit (540-1550 K.C.)
(3) Short Wave Intermediate Frequency Amplifier (1525 K.C.)
(4) First Short Wave Circuit (180 to 80 meters)
(5) Second Short Wave Circuit (80 to 33 meters)

NOTE: The third short wave circuit requires no aligning since both condensers will be in step if short wave circuits (4) and (5) are properly aligned.

In aligning the Model 105 it is essential to use a high grade oscillator and a sensitive output meter. The R.F. signal fed



into the receiver must be very weak or it will cause the A.V.C. circuit to function, making correct alignment impossible. The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment of the set, see that **the volume control is full on, the local-distance switch pulled out,** and the output meter connected to the pentode plates thru .25mfd. condensers, or to the voice coil of the speaker. The tone control should be turned all the way to the right. This last step is helpful in reducing the tube "shish" and makes aligning easier.

(1) ALIGNING THE I. F. CIRCUITS AT 177.5 K. C.

Remove the grid clip from the first detector tube and connect the two output terminals of the oscillator in series with the grid clip and grid cap of the tube. Set the oscillator to exactly 177.5 K.C. and adjust its output to give about one-half scale deflection of the output meter.

Carefully adjust the four I.F. trimmers Nos. 1, 2, 3 and 4 (see diagram) until output is at a maximum. After all four trimmers have once been adjusted, go back and readjust them again in the same order, since any change made in one affects the others to some extent so that readjustment is necessary. If any static is coming thru the receiver so that the output meter fluctuates, pull out the broadcast oscillator tube to prevent this interference from coming thru.

(2) ALIGNING BROADCAST R. F. CIRCUITS

Before starting this alignment procedure, it is necessary to check the calibration of the set on the broadcast band, since this band must subsequently be used as a reference point in aligning the three short wave bands. **This calibration check is very important.** It can easily be done by disconnecting the test oscillator and tuning in some broadcast station between 1000 and 1400 K.C. whose frequency is definitely known.

If the dial reading of the set corresponds to the broadcast frequency of the station, the set is in calibration. If the dial reading is incorrect, set the dial pointer to the proper frequency and carefully adjust trimmer No. 8 until the station is tuned in with maximum volume.

After the receiver is calibrated it must be aligned. To do this connect the test oscillator to the set aerial and ground terminals and set it to approximately 1400 K.C. Tune the set to this signal. Carefully adjust trimmers No. 7 and No. 9 for maximum output. Retune the set, which is thrown out of resonance when trimmers No. 7 and No. 9 are adjusted, and once more adjust these trimmers. Repeat this procedure until you are certain the output cannot be increased by further adjustment.

(3) ALIGNING SHORT WAVE I. F. AT 1525 K. C.

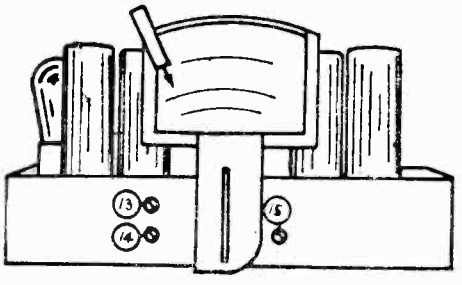
Adjust the test oscillator to exactly 1525 K.C. by setting the broadcast receiver to this frequency and tuning the oscillator until the signal comes thru with maximum volume. Now shift the tuning range of the set to the second short wave band (80 to 33 meters). Adjust the oscillator output to give about one-half full scale deflection. If static is bad, causing the output meter needle to jump about, remove the short wave oscillator tube.

Using a Bakelite screwdriver, adjust trimmers Nos. 10, 11 and 12 to give maximum output.

NOTE: It should never be necessary to adjust the following short wave circuits unless the short wave trimmers or coils have been changed or tampered with. Alignment procedure as a rule should not go beyond this point.

(4) ALIGNING 180-80 METERS SHORT WAVE BAND

The following alignment procedure is extremely critical. Tune the receiver to exactly 800 K.C. and adjust the output frequency of the test oscillator until its signal is a maximum at this frequency. Shift to the first short wave band of the set, and turn the pointer as far as it will go to the left. This tunes the set to 1600 K.C., which is the second harmonic of



the test oscillator signal. Adjust trimmer No. 14 until this signal comes thru with maximum output. If static noises of sufficient intensity to affect the A.V.C. action of the set are being picked up, substitute for the A.V.C. tube a 57 with an open filament or with one of its filament prongs cut off.

Again using the calibrated broadcast band, set the test oscillator output to exactly 975 K.C., shift back to the first short wave band, and turn the pointer as far as it will go to the right. Adjust trimmer No. 5 until the oscillator signal (4th harmonic of 975 K.C.) is picked up with maximum output. If it has been necessary to change the adjustment of trimmer No. 5 appreciably, go back to trimmer No. 14 and adjust it again as outlined at the beginning of this section. This second readjustment is important.

(5) ALIGNING 80-33 METERS SHORT WAVE BAND

Set the test oscillator to exactly 925, K.C. using the method previously outlined for 800 K.C. and 975 K.C. Shift the tuning range of the set to the second short wave band (80-33 meters) and turn the pointer as far as it will go to the left. Adjust trimmer No. 13 until the fourth harmonic of the 925 K.C. signal comes thru with maximum output.

Set the test oscillator at 1500 K.C., using the method previously outlined. Tune in the signal at approximately 50 meters, which is the 4th harmonic of 1500 K.C. and adjust trimmers Nos. 6 and 15 until the oscillator signal comes thru with maximum output. Retune set and readjust trimmers 6 and 15. Trimmer No. 15 is not at all critical in its action.

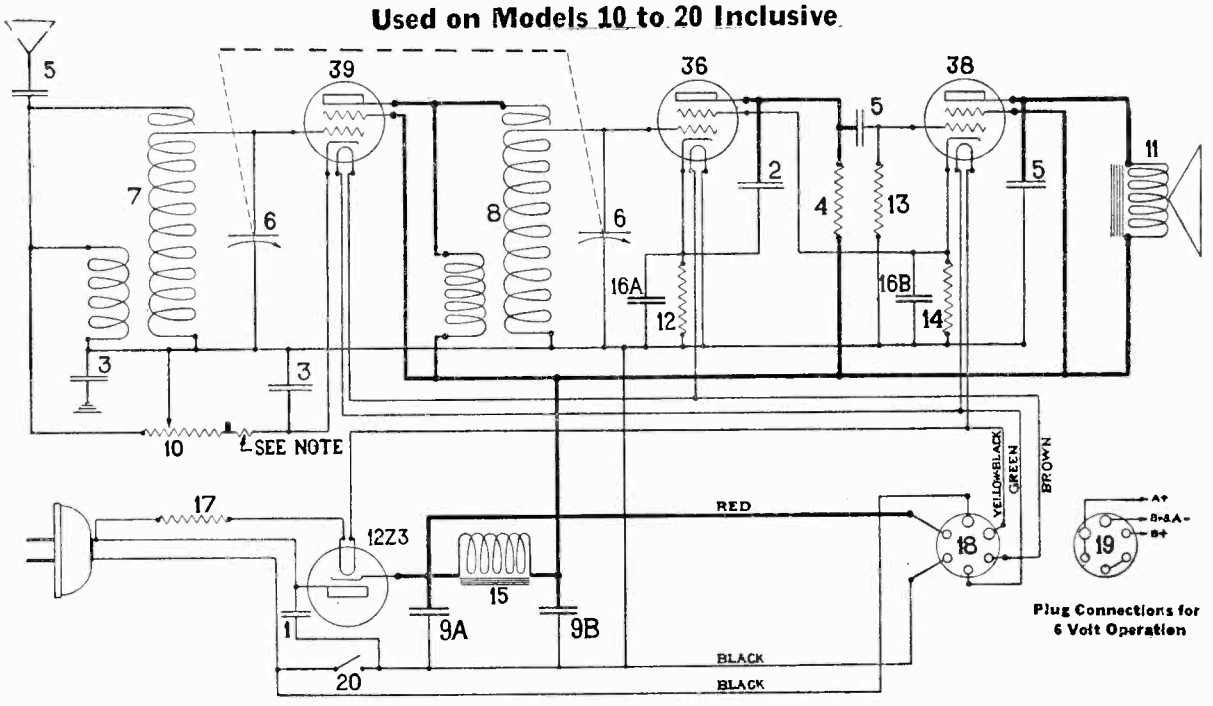
NOTE: It is very important that the aligning frequencies given in sections 3, 4 and 5 be exact, otherwise both the calibration and sensitivity, particularly at the third short wave band, will be badly off.

MODEL 108, 108-X
(Models 10 to 20 inc.)

STEWART-WARNER CORP.

Circuit Data for Stewart-Warner Chassis Series 108 and 108-X

Used on Models 10 to 20 Inclusive



Plug Connections for 6 Volt Operation

NOTE: In some receivers, a 140 ohm, ¼ watt carbon resistor, part 81646 is connected in series with the volume control; in other sets this resistor is built into the volume control.

LINE VOLTAGE ★ Voltage Table ★ VOLUME CONTROL FULL ON
115 VOLTS A. C.

Type of Tube	Tube Circuit	Filament to Condenser	Plate to Condenser	Screen Grid to Condenser	Cathode to Condenser
39	R. F.	** (See Note)	107	107	1.5
36	Det.	** (See Note)	1.3‡	9	1.3
38	Output	** (See Note)	103	107	9
12Z3	Rect.	** (See Note)	....	....	122

IMPORTANT NOTE

★These voltages will be obtained when the set is operated at 115 volts, 60 cycles A. C. For D. C. operation, voltages will be somewhat lower. All voltage readings have been taken between tube prongs and the variable condenser frame, *not the chassis*. The chassis cannot be used in this receiver as a reference point for voltage readings.

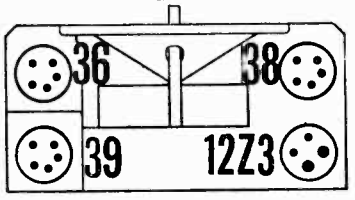
**Filament voltage readings will vary widely, depending upon the resistance of the A. C. voltmeter. With high resistance rectifier type meters, voltage readings will be approximately 6.3 for the detector and amplifier tubes, and 12.6 for the 12Z3 rectifier. With ordinary A. C. Voltmeters, readings will be very much less.

‡This reading is obtained with a 30-volt scale, one thousand ohms per volt instrument. Higher resistance meters or higher scale readings will give greater voltage readings.

PARTS LIST

Diag. No.	Part No.	Description
1	67298	.01 mfd. 600 V cartridge condenser
2	81158	.0001 mfd. mica condenser
3	81630	.1 mfd. 100 V cartridge condenser
4	81644	2.1 meg. ¼ W. carbon resistor
	81646	140 ohm ¼ W. carbon resistor
5	81657	.003 mfd. mica condenser
6	81662	Variable condenser
7	81664	Antenna Coil
8	81666	Detector Coil
9A, 9B	81678	4 mfd. 150 V dry electrolytic condensers (in one unit)
10	81679	250,000 ohm volume control and switch
11	81680	Speaker
12	81681	29,000 ohm ¼ W. carbon resistor
13	81682	1.1 meg. ¼ W. carbon resistor
14	81683	1600 ohm ½ W. carbon resistor
15	81694	Filter choke
16A, 16B	81698	5 mfd. 20 V dry electrolytic condensers (in one unit)
17	81785	Power cord assembly
18	81834	Battery cable socket
19	81861	6 volt battery cable
	81863	12 volt battery cable
	81865	32 volt battery cable
20	....	Switch on back of 81679

FRONT OF CHASSIS

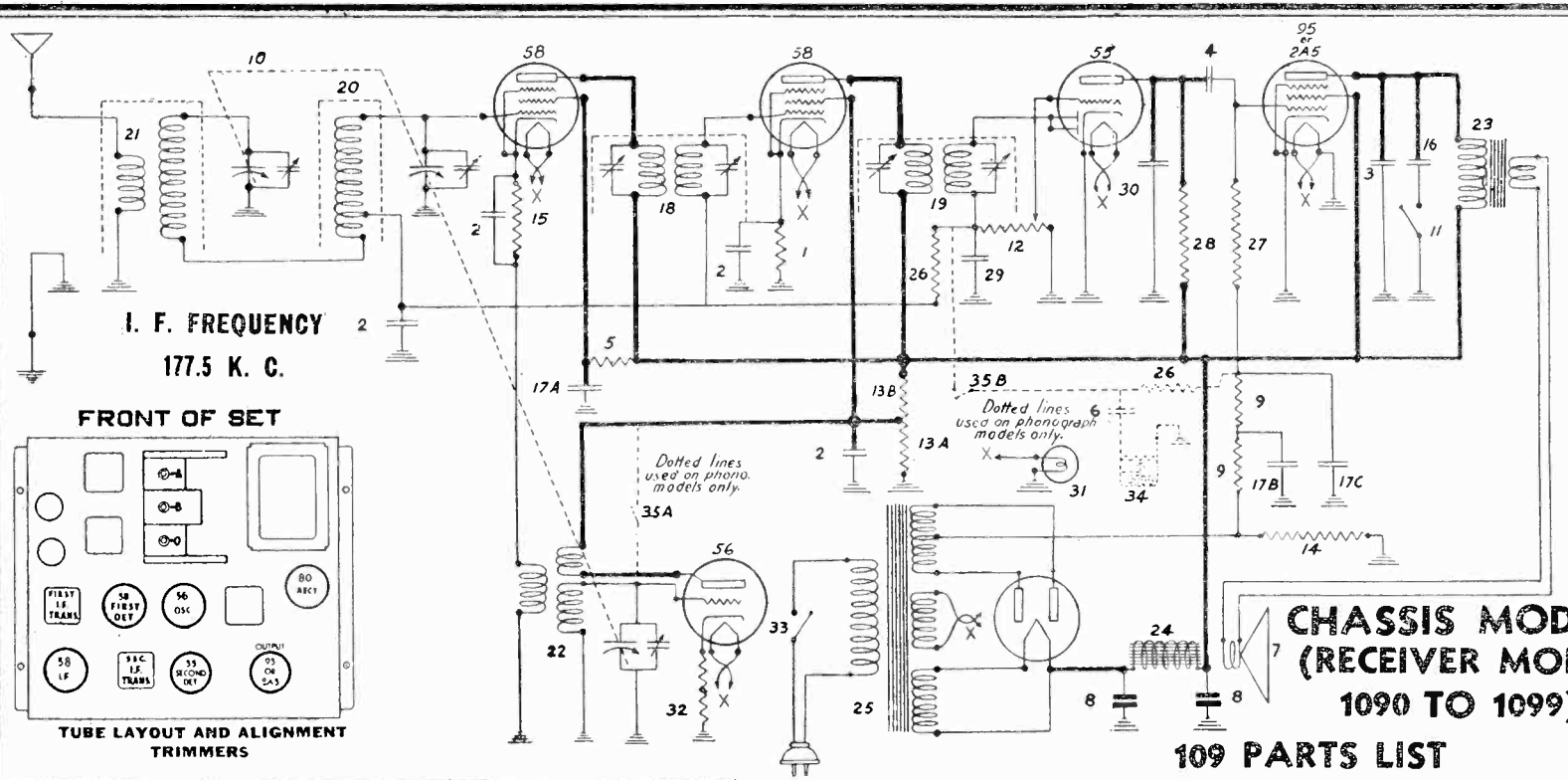


USING MODEL 108-X IN AUTOMOBILE

Two #81884 brackets and a #81861 6-volt adaptor cable are needed. The plug at the cable's end fits the socket at the rear of set. Clip the yellow A lead to the positive terminal of storage battery and the yellow-black wire labeled -A to the negative terminal of battery. Connect these leads to battery terminals instead of ammeter or other convenient connection points.

STEWART - WARNER CORP.

MODELS 1090 to 1099
(Chassis 109)
Schematic, Voltage



CHASSIS MODEL 109 (RECEIVER MODELS 1090 TO 1099)

VOLTAGE TABLE

LINE VOLTAGE 115 — VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
56	Osc.	2 40	88		9 6
58	1st Det.	2 40	208	92	5
58	I. F.	2 40	208	92	3 4
55	2nd Det.	2 42	18		
95 or 2A5	Output	2 38	200	208	16 5*
80	Rect.	5 00			

All D. C. voltages measured with respect to ground, using high resistance voltmeter of 1000 ohms per volt. Readings will vary, depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltages.

*This reading taken across metal clad bias resistor

109 PARTS LIST

Diag. No.	Part No.	Description	List Price
1	67257	500 ohm, ¼ watt resistor	$0.25
2	67294	.1 mfd., 200 volt condenser	.30
3	67298	.01 mfd., 600 volt condenser	.30
4	67299	.02 mfd., 400 volt condenser	.30
5	67938	100,000 ohm, ½ watt resistor	.25
6	81190	.1 mfd., 200 v. cond. Phono model only	.35
7	81274	Speaker diaphragm assembly	2.75
8	81347	8 mfd., 485 volt electrolytic cond.	1.75
9	81381	150,000 ohm, ½ watt resistor	.25
10	81700	Variable condenser	5.00
11	81721	Tone control switch	.45
12	81722	500,000 ohm, vol. control & A. C. switch	1.25
	81870	Vol. control & phonograph switch unit	2.10
13A	81724	10,000 ohm, resistor (Wound in one unit)	.60
13B		7,500 ohm, resistor (Wound in one unit)	
14	81725	315 ohm, wire wound resistor	.30
15	81727	1000 ohm, ¼ watt resistor	.20
16	81739	.04 mfd, 600 volt condenser with bracket	.35
17A	81756	.5 mfd., 200 volt	1.50
17B		.25 mfd., 100 volt in one cell	
17C		.25 mfd., 100 volt	
18	81757	First I. F. Transformer	2.00
19	81758	Second I. F. Transformer	2.00
20	81764	First detector tuning coil	3.00
21	81768	Antenna coil	1.25
22	81770	Oscillator coil	1.35
23	81774	Output transformer	3.00
24	81779	Speaker field coil	4.00
25	81800	110 volt 60 cy., power transformer	6.00
	81850	230 volt 60 cy., power transformer	6.25
26	81698	980,000 ohm ½ watt resistor	.20
27	81809	160,000 ohm ½ watt resistor	.20

Diag. No.	Part No.	Description	List Price
28	81810	110,000 ohm 1 watt resistor	.20
29	81811	.00026 mfd., condenser	.25
30	81812	.00051 mfd., condenser	.25
31	81822	2.5 volt pilot light	.25
32	81829	1500 ohm ¼ watt resistor	.20
	81850	230 volt 60 cy. powertransf. (see 81800)	6.25
33	81869	Line Switch. (Separate unit used in phonograph chassis only. Part of volume control on standard chassis)	.40
	81870	Phono chassis type volume control (See 81722)	2.00
34	.....	Phonograph pickup.	
35	.....	Phonograph switch; mounted on back volume control in phonograph models.	

MISCELLANEOUS PARTS NOT SHOWN IN DIAGRAM

67236	Rubber tuning drive bushing	.02
81039	4-prong socket	.12
81040	5-prong socket	.12
81013	6-prong socket	.20
81608	R. F. coil shield	.50
81625	Tube shield	.20
81723	Ground clip	.10
81805	Tuning dial and gear assembly (see 81879)	.60
81817	First I. F. coil shield	.50
81819	Second I. F. coil shield	.50
81879	Celluloid tuning dial	.30
35459	Steel washer	.10 dz.
39393	Lock washer (Used for rubber mounting variable condenser.)	.50 per C
67711	Rubber washer	.05
67712	Rubber bushing	.05
67713	Steel bushing	.05

MODELS 1090 to 1099
(Chassis 109)
Service Data

STEWART-WARNER CORP.

SERVICE DATA FOR MODEL 109 CHASSIS

CIRCUIT DESCRIPTION OF 109 CHASSIS

The Model 109 Stewart-Warner Radio Chassis makes use of a six-tube superheterodyne circuit embodying automatic volume control (A.V.C.) through the action of its type 55 detector tube. An incoming signal is tuned first by a pre-selector circuit to increase selectivity and reduce image frequency interference and then fed into a tuned first detector stage, where it beats with the output of a local oscillator to produce a 177.5 K.C. intermediate frequency signal. This odd frequency is chosen to reduce further any image frequency interference.

The I.F. signal is amplified in an exceptionally high gain stage, and then fed to the diode section of the 55 tube where it is rectified. This rectified signal appears across the 500,000 ohm potentiometer (No. 12 in the diagram) not only at radio frequencies but also as an audio voltage. Any desired portion of this audio voltage is picked up by the sliding arm of the potentiometer and fed to the triode section of the 55 tube, which functions purely as a standard A.F. amplifier. Thus this potentiometer is made to act as the volume control.

The necessary A.V.C. operating potential is developed by virtue of the radio frequency drop across the potentiometer resistance. This potential is smoothed out by an appropriate resistance-capacity filter and applied as a bias to the grids of the first detector and I.F. tubes. Thus as the incoming signal increases or decreases in strength the bias is raised or lowered proportionately and the audio output of the set maintained constant.

Excellent tone quality is realized in this set because of the superior design of the resistance network coupling the triode section of the 55 to the output pentode.

ALIGNING THE 109 CHASSIS

Alignment can be carried out intelligently only if the service man knows the general layout of the set, and how each circuit is affected during the process of alignment. The simplified top view of the chassis appearing on the other side of this sheet gives the layout of the receiver and indicates the names and locations of the various aligning adjustments. The following brief discussion of what actually happens during alignment should be carefully read, using the sketch as a basis before commencing the actual work.

LOCATION AND FUNCTION OF ALIGNING ADJUSTMENTS

The incoming signal is tuned first by the pre-selector "A" stage and then fed into the first detector "B" circuit, where it is tuned again to improve selectivity. These circuits are brought into exact alignment by the two trimmer condensers "A" and "B," pointed out in the attached sketch. The tuned oscillator circuit is so designed that it tunes to a frequency exactly 177.5 K.C. higher than the incoming signal. This circuit is kept in exact step with the other two by means of the oscillator condenser trimmer "O."

The two intermediate frequency (I.F.) transformers are of the tuned input-tuned output type and each winding is tuned by a separate trimmer condenser, making a total of four additional adjustments. The first I.F. transformer is in the steel shield at the right side of the set, while the second I.F. transformer is at the rear of the chassis. The I.F. trimmer adjusting screws can easily be reached through two small holes at the base of each shield, the primary circuit adjustment in each case being at the left and the secondary adjustment at the right.

PRELIMINARY STEPS IN ALIGNING

In aligning the Model 109 it is essential to use a high grade oscillator and sensitive output meter The R.F. signal fed into the receiver must be very weak or it will cause the A.V.C. circuit to function, making correct alignment impossible The output meter must be sufficiently sensitive to give a satisfactory reading with this low signal.

Before starting the alignment procedure see that the volume control is full on, and the output meter connected either between the pentode plate and ground **through a .25 mfd condenser** or across the voice coil, depending upon its sensitivity.

ALIGNING PROCEDURE

With this preliminary discussion clearly in mind, the actual alignment can be started. The following step-by-step routine should be followed for satisfactory results.

1. Set up the oscillator, and tune it to exactly 177.5 K.C. (This frequency can be accurately determined by tuning in a station at either 710 or 1420 K.C. and beating the 4th or 8th harmonic of the oscillator 177.5 K.C. signal against it. To be sure that you have the harmonic of the 177.5 K.C. signal, instead of some other frequency, tune in the other 177.5 harmonics on the broadcast dial. These should come in 177.5 K.C. on either side of the original setting. **Do not use the oscillator calibration curve to determine this intermediate frequency.)**

2. Connect the oscillator output between the grid cap of first detector tube and chassis.

Adjusting R. F. and Oscillator Circuits

1 Twist the aerial and ground wires of the set together to reduce noise pick-up. Connect the aerial wire to the output of the oscillator and **ground both set and oscillator.** Adjust the oscillator frequency to 1400 K.C. and carefully tune the receiver to give maximum output. Adjust the oscillator output to produce about one-half full scale deflection of the output meter.

2. Carefully tune the "A" trimmer till the output meter reading reaches a maximum.

Due to the fact that the variable condenser is mounted on rubber cushion supports, pressure of the aligning tool will usually cause it to shift slightly and throw it out of tune. **It is therefore necessary to retune the set repeatedly while adjusting any variable condenser trimmer.**

3. Retune the set and adjust the "B" trimmer for maximum output.

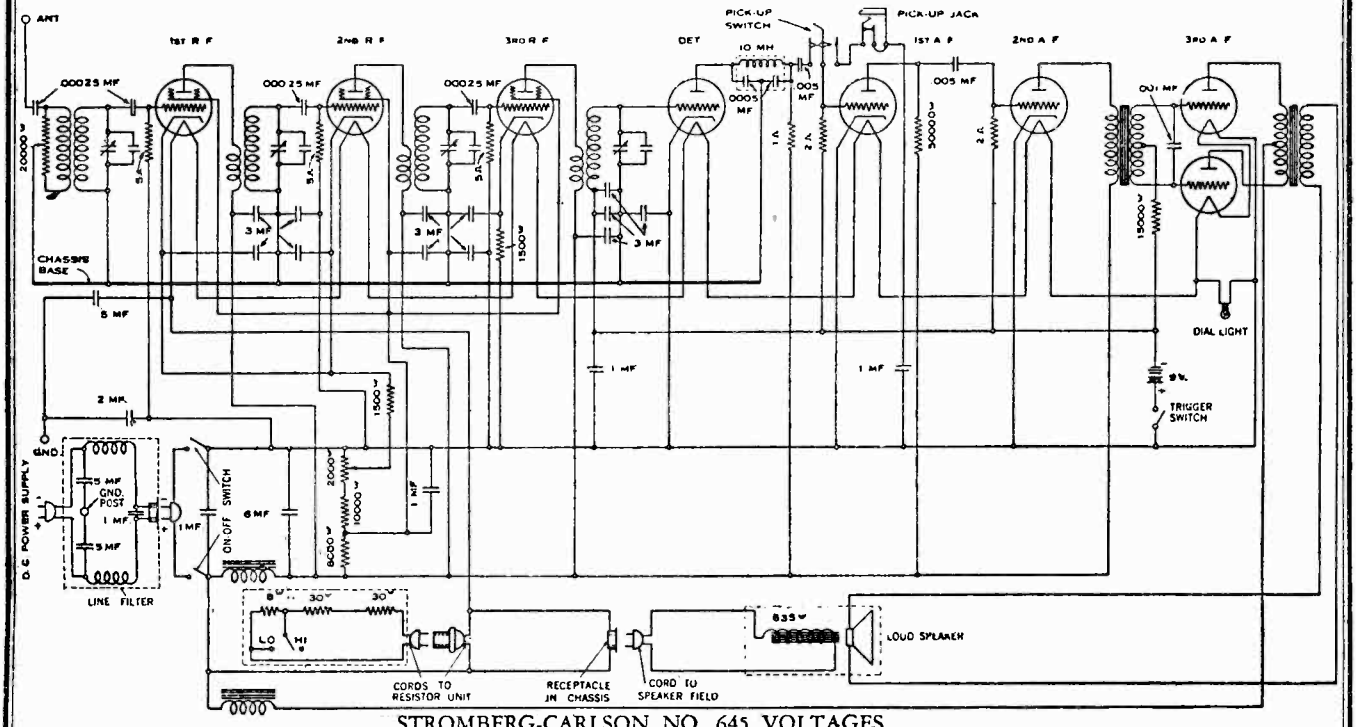
The third, or "O" trimmer should not be touched unless the set is badly out of calibration at the high frequency end of the dial.

If the set is out of calibration, it can be re-calibrated as follows: Set the tuning dial at the frequency reading of some station **between 1200 and 1500 kilocycles only,** whose exact frequency is known and which can be picked up without any difficulty. Adjust the oscillator trimmer "O" until this station is brought in with maximum volume. **Re-adjust the "A" and "B" trimmers again,** since these are always affected by any change in the oscillator tuned circuit.

The receiver should now be perfectly aligned.

STROMBERG - CARLSON TEL. MFG. CO.

MODEL 645 DC
Schematic

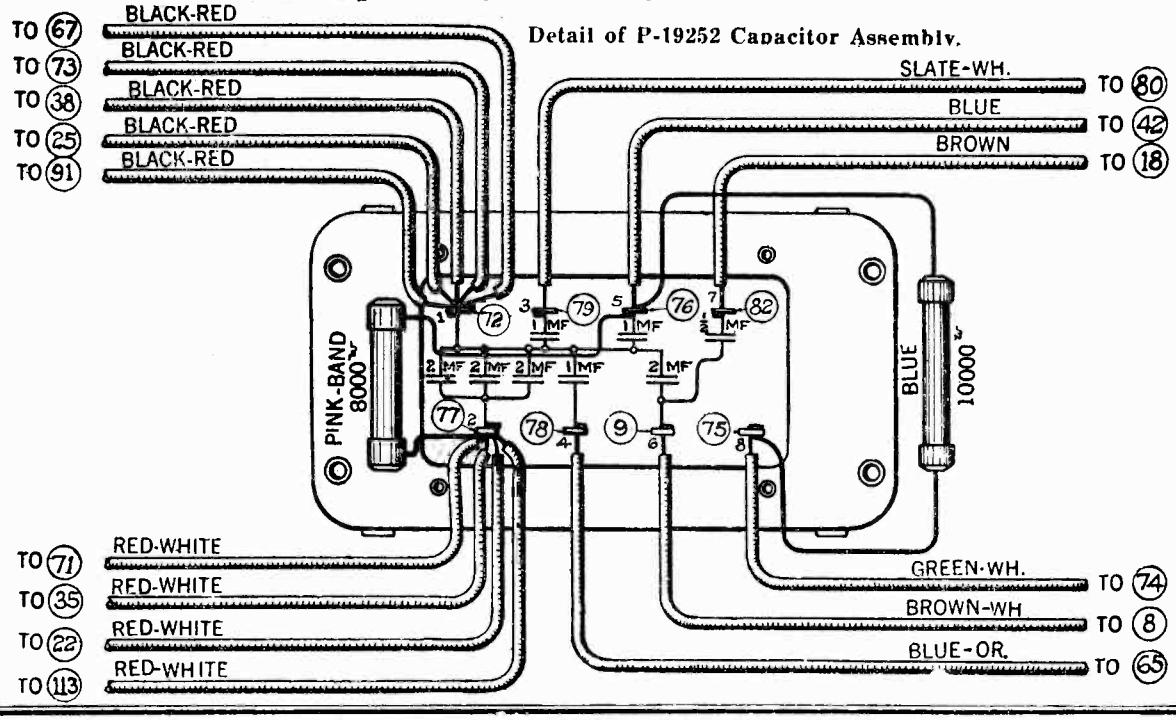


STROMBERG-CARLSON NO. 645 VOLTAGES

Tube	*Fil.*	*Plate*	*Grid*	*Screen*	*"B"*	*"C"*
1st R-F.	2.4	105	(Variable)	60		
2nd R-F.	2.4	105	(Variable)	60		
3rd R-F.	2.4	105	1.5	60		
Det.	2.4	22	9.0		110	9.0
1st A-F.	2.4	80	1.0		110	9.0
2nd A-F.	2.4	80	1.0		110	9.0
Each '45	5.5	100	7.0		110	9.0

Note: Total "B" voltage is 110. Speaker field voltage is 90.

Detail of P-19252 Capacitor Assembly.



MODEL 37
Schematic

STROMBERG - CARLSON TEL. MFG. CO.

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Type and Number of Tubes	4 No. 58, 2 No. 56, 2 No. 45, 1 No. 80
Voltage Rating	115 volts
Frequency Rating	60 cycles and 25-60 cycles
Power Consumption	110 watts
Undistorted Electrical Power Output of Chassis	3.2 watts

CIRCUIT DESCRIPTION

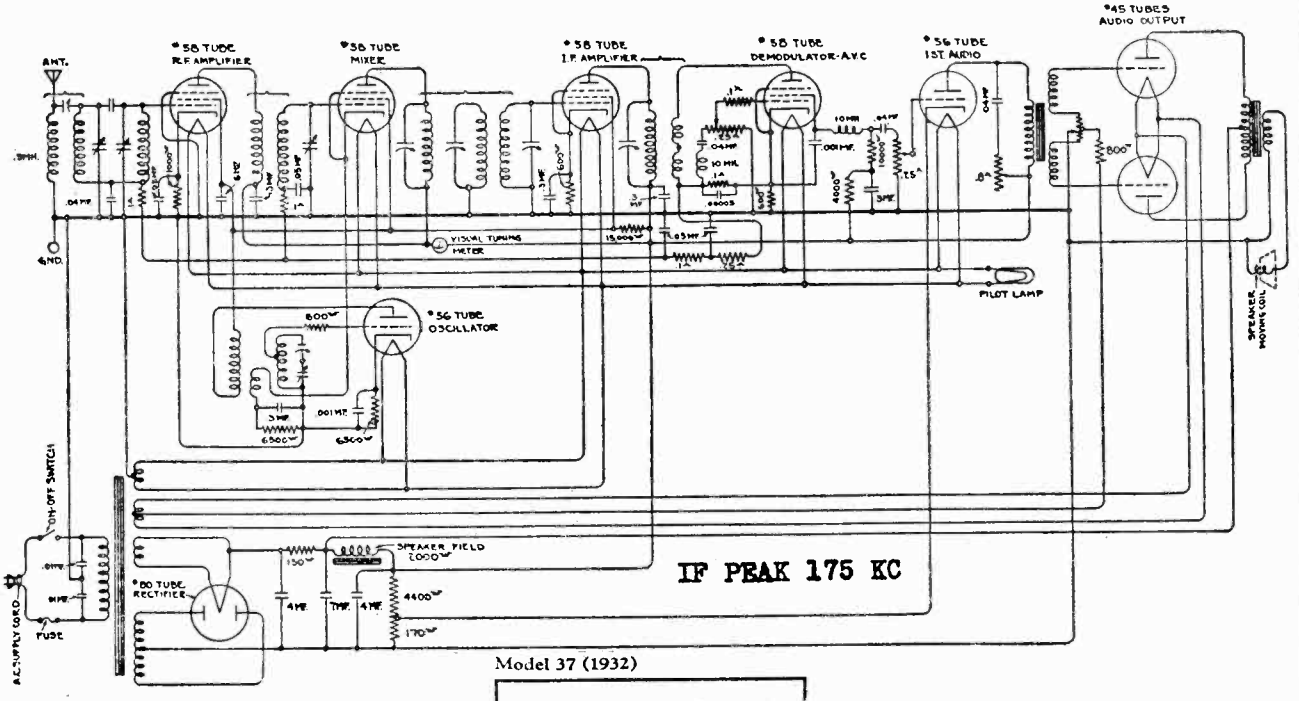
The four No. 58 triple-grid tubes are used as R. F. Amplifier, Mixer, I. F. Amplifier, and Demodulator-AVC. The two No. 56 tubes are used as Oscillator and First Audio Amplifier. The two No. 45 tubes are used in the push-pull output stage. The No. 80 is used as the rectifier in the power supply.

A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent any cross modulation. The R. F. amplifier is coupled to the mixer by an ordinary tuned R. F. transformer. This gives three tuning circuits (four gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is exceedingly high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into a Tri-resonator (three tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the diode-triode demodulator-AVC tube by a single tuned circuit transformer.

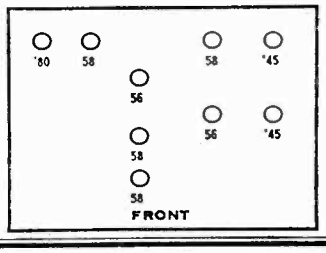
The AVC voltage and the rectified audio voltage are built up across the diode load resistor. The AVC voltage is fed back to the grids of the first two tubes through a suitable filter. The audio voltage is fed to the first potentiometer of the dual volume control and from there applied through the movable contact to the grid of the triode portion of the diode-triode. The screen of the tube acts as the plate of the triode portion of the system, thus forming a triode audio amplifier in conjunction with the diode rectifier.

The output of this "plate" circuit is coupled to the second unit of the dual volume control which feeds the grid of the first audio tube. The output of this first audio stage is coupled to the push-pull output triodes. The Adjustable Automatic Clarifier system is connected across the primary of the push-pull input transformer. The output transformer feeds the signal from the power triodes to the high quality electro-dynamic speaker.

The power supply system employs two stages of filter; the first being of the resistance type, and the second using the field of the speaker as a choke. The plate supply for the output tubes is tapped off between these filter sections, while the remainder of the voltages are supplied from the voltage divider resistor.



Model 37 (1932)



STROMBERG - CARLSON TEL. MFG. CO.

MODEL 37
Parts List
Voltage

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts. The dial should be set at about 1,000 kc. D. C. voltages are measured with a 1,000 ohms per volt meter.

Voltage	Meter	Scale	Where Measured	Approx. Value in Volts
Heater Voltages No. 56 and No. 58 Tubes	A. C.	0–4	Across Heater Terminals of Sockets	2.5
Filament Voltages No. 245 Tubes	A. C.	0–4	Across Filament Terminals of Audio Output Sockets	2.5
Filament Voltage No. 80 Tube	A. C.	0–8	Across Filament Terminals of No. 80 Rectifier Socket	5.06
Plate Voltage Radio Amplifier Tube	D. C.	0–250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	160
Plate Voltage Mixer Tube	D. C.	0–250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (—)	160
Plate Voltage Oscillator Tube	D. C.	0–250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (—)	85
Plate Voltage I. F. Tube	D. C.	0–250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (—)	165
Plate Voltage Demodulator Tube	D. C.	0–250	Between Plate Terminal of Demodulator Socket (+) and Chassis Base (—)	2.5
Plate Voltage First Audio Tube	D. C.	0–250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (—)	150
Plate Voltages Audio Output Tubes	D. C.	0–750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (—)	295
"C" Voltage R. F. Amplifier Tube	D. C.	0–10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	5
"C" Voltage Mixer Tube	D. C.	0–10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (—)	10
"C" Voltage Oscillator Tube	D. C.	0–250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (—)	20
"C" Voltage I. F. Tube	D. C.	0–10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (—)	3
"C" Voltage Demodulator Tube	D. C.	0–10	Between Cathode Terminal of Demodulator Socket (+) and Chassis Base (—)	3
"C" Voltage First Audio Tube	D. C.	0–10	Between Cathode Terminal of First Audio Socket (+) and Chassis Base (—)	6.5
"C" Voltage Audio Output Tube	D. C.	0–250	Across 800 ohm Biasing Resistor	50
Screen Voltages R. F., Mixer, and I. F. Tubes	D. C.	0–250	Between Screen Terminals on Sockets (+) and Chassis Base (—)	80
"Screen" Voltage Demodulator Tubes	D. C.	0–250	Between Screen Terminal on Demodulator Socket (+) and Chassis Base (—)	90
"B" Voltage R. F., Mixer, I. F. First Audio, and Demodulator Tube	D. C.	0–250	Between High Side of Voltage Divider (+) and Chassis Base (—)	160
"B" Voltage Audio Output Tubes	D. C.	0–750	Between Mid-Tap of Output Transformer (+) and Chassis Base (—)	300
Speaker Field Volts -	D. C.	0–250	Across Small Pins on Speaker Connector Socket	140
Plate Voltage A. C., per Anode No. 80 Rectifier-Tube	A. C.		Between Plate Terminals of No. 80 Rectifier Socket and Chassis Base	340

REPLACEMENT PARTS

Piece Number	Part	Description of Part	Required per Receiver
22692	Audio Transformer Assembly	Output Transformer Assembly	1
22693	Audio Transformer Assembly	Input Transformer Assembly	1
22679	Binding Post	Antenna and Ground	1
21663	Bracket Assembly	Voltage Divider Mounting	2
22353	Capacitor	Oscillator Series Aligner	1
22701	Capacitor	Filter Capacitor Assembly	1
21334	Capacitor	.001 Mfd.	2
19597	Capacitor	.042 Mfd.	1
22706	Capacitor Assembly	.042 Mfd.	1
21535	Capacitor	2– .01 Mfd.	1
22411	Capacitor	.042 Mfd.	2
22535	Capacitor	.01 Mfd.	1
22556	Capacitor	Aligner in Tri-Resonator	1
22702	Capacitor	By-Pass Capacitor Assembly	1
22549	Coil	Volume Control Circuit and Demodulator Plate Circuit	2
22687	Coil Assembly	1st Preselector	1
22359	Coil Assembly	2nd Preselector	1
22688	Coil Assembly	Interstage	1
22361	Coil Assembly	Oscillator Coil	1
22716	Coil Assembly	Tri-Resonator (I. F.)	1
21566	Fuse	1.5 Amperes	1
19630	Grid Clip		4
22699	I. F. Transformer		1
22390	Knob	Selector Knob	1
22391	Knob	Volume Control and Clarifier Switch Knob	2
22351	Meter	Visual Tuning Meter (Weston No. 654)	1
19617	Potentiometer	Hum Adjuster	1
22593	Potentiometer	Clarifier and Off-On Switch	1
22696	Potentiometer	Dual Volume Control	1
22550	Resistor, 150 ohms	Filter Resistor	1
22596	Resistor, 5,370 ohms	Voltage Divider	1
21621	Resistor, 1,000 ohms, Type C	Carbon Resistor, Brown, Black, and Red	1
22329	Resistor, 6,500 ohms, Type C	Carbon Resistor, Blue, Green, and Red	2
22327	Resistor, 600 ohms, Type C	Carbon Resistor, Blue, Black and Brown	3
22328	Resistor, 4,000 ohms, Type C	Carbon Resistor, Yellow, Black, and Red	1
22330	Resistor, 10,000 ohms, Type C	Carbon Resistor, Brown, Black, and Orange	1
22331	Resistor, 15,000 ohms, Type C	Carbon Resistor, Brown, Green, and Orange	1
22333	Resistor, 100,000 ohms, Type D	Carbon Resistor, Brown, Black, and Yellow	3
21280	4 Contact Socket		4
22570	5 Contact Socket		2
22571	6 Contact Socket		4
22671	Transformer	Power, 60 cycle, 110 volts	1
22672	Transformer	Power, 25-60 cycle, 110 volts	1

MODEL 38,39,40,41

STROMBERG - CARLSON TEL. MFG. CO.

2nd Type Schematic

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Type and Number of Tubes	3 No. 58, 1 No. 57, 1 No. 56, 2 No. 55, 2 No. 45, 1 No. 80
Voltage Rating	105-125 volts
Frequency Rating	60 cycles and 25-60 cycles
Power Consumption	110 watts
Undistorted Electrical Power Output of Chassis	3.2 watts

CIRCUIT DESCRIPTION

The three No. 58 tubes are used as R. F. amplifier, Mixer, and I. F. amplifier. The No. 57 tube is used as the "relay" tube in the "Q" circuit. The No. 56 tube is used as the oscillator. The two No. 55 tubes are used as Demodulator-AVC and audio amplifier. The two No. 45 tubes are used in the push-pull output stage. The No. 80 rectifier is used in the power supply.

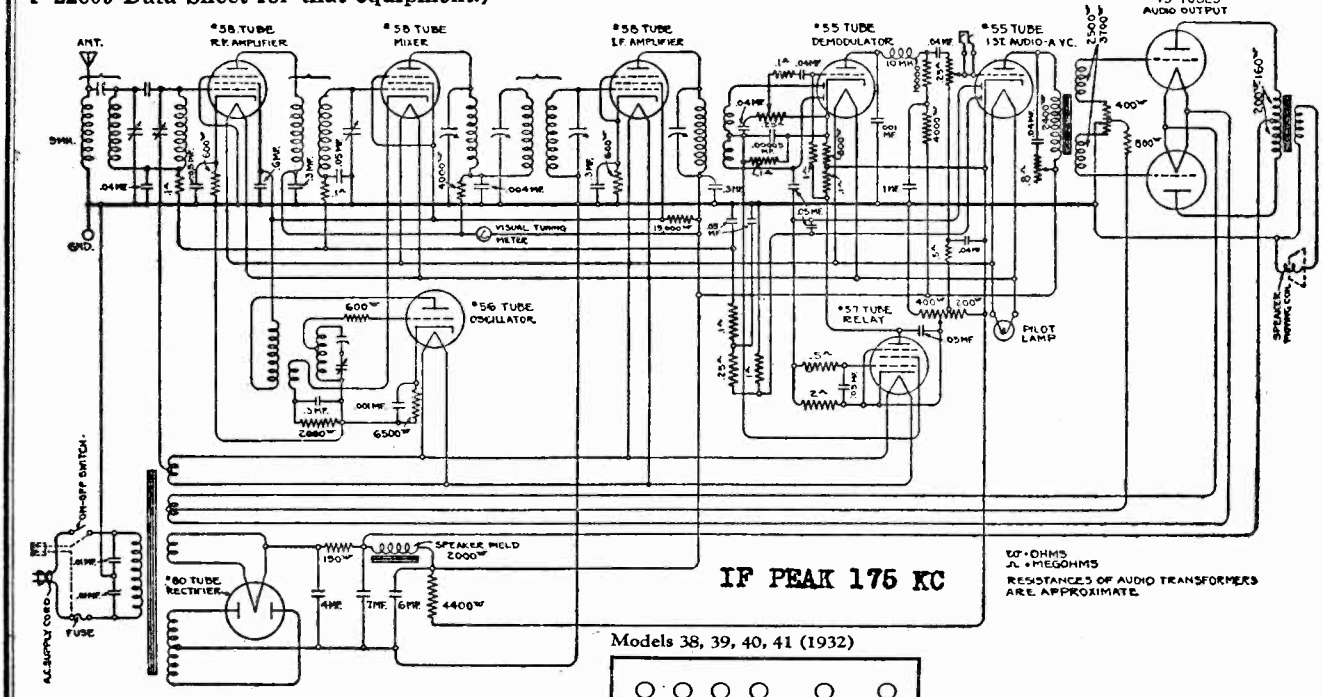
A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent any cross modulation. The R. F. amplifier is coupled to the mixer by an ordinary tuned R. F. transformer. This gives three tuning circuits (four gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is exceedingly high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into a Tri-resonator (three tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the No. 55 demodulator tube by a single tuned circuit transformer. The resistor unit of the first potentiometer of the dual volume control forms part of the load of the diode of this No. 55 tube. The audio voltage is applied to the control grid of the triode portion of this tube through the movable contact of the potentiometer. The output of this triode is connected to the grid of the triode of the First Audio-AVC tube through a resistance coupling which includes the second potentiometer of the volume control. The AVC voltage is obtained from one of the diodes in this No. 55 First Audio-AVC tube which is connected to the last I. F. transformer. This voltage is fed back to the first two tubes through a suitable filter.

The "Q" circuit for providing quiet operation for tuning between stations consists of the other diode of this First Audio-AVC tube in conjunction with the No. 57 Relay tube. When there is no carrier coming in, the action of this circuit is to put high negative potentials on the diode system and the control grid of the triode of the Demodulator tube, thus preventing reception of inter-station noise when tuning. When a carrier of suitable strength comes in these negative potentials are removed and the signal is received. An adjustment is provided so that this "Q" circuit can be set for the noise level of the location in which the receiver is used. This adjustment is controlled by the small knurled metal knob in the back of the chassis.

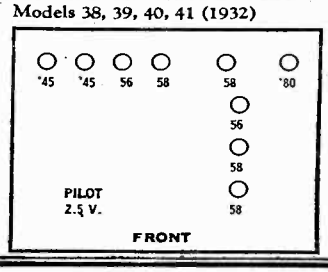
From the triode portion of the First Audio-AVC tube the audio signal is coupled to the push-pull output triodes by a transformer. The Adjustable Automatic Clarifier system is connected across the primary of this push-pull input transformer. The output transformer feeds the signal from the power triodes to the high quality electro-dynamic speaker.

The power supply system employs two stages of filter; the first being of the resistance type, and the second using the field of the speaker as a choke. The plate supply for the output tubes is tapped off between these filter sections, while the remainder of the voltages are supplied from the voltage divider resistor.

(The servicing instructions for the Multi-Record Phonograph in the No. 41 Radio-Phonograph are in P-22809 Data Sheet for that equipment.)

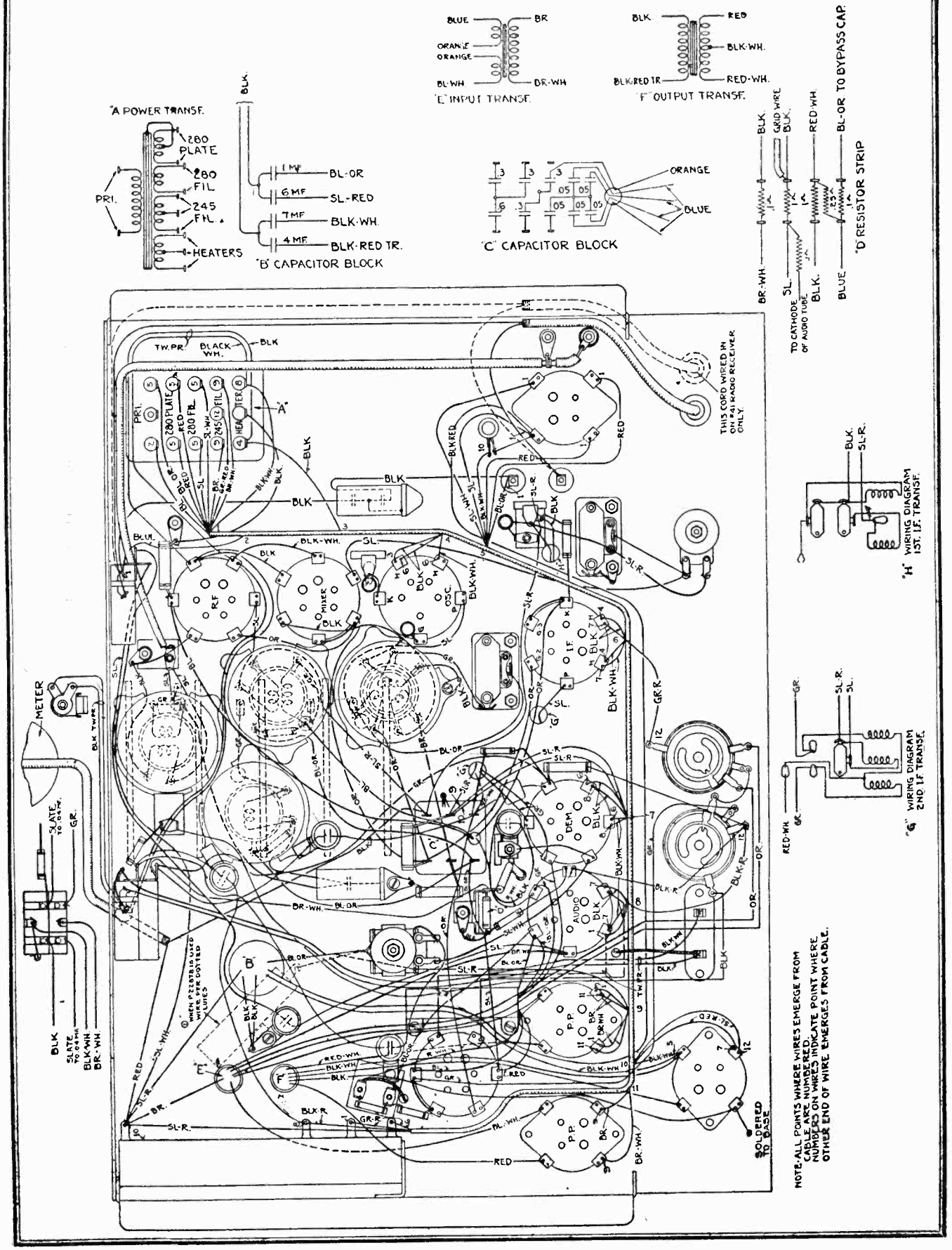


Models 38, 39, 40, 41 (1932)



MODEL 38,39,40,41
2nd Type
Chassis Wiring

STROMBERG - CARLSON TEL. MFG. CO.



STROMBERG - CARLSON TEL. MFG. CO.

MODEL 38,39,49,41
2nd Type
Parts List,
Voltage

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts.

Voltage	Meter	Scale	Where Measured	Appro. Value in Volts
Heater Voltages No. 55, 56, 57, and No. 58 Tubes	A. C.	0-4	Across Heater Terminals of Sockets	2.5
Filament Voltages No. 245 Tubes	A. C.	0-4	Across Filament Terminals of Audio Output Sockets	2.5
Filament Voltage No. 280 Tube	A. C.	0-8	Across Filament Terminals of No. 280 Rectifier Socket	5.
Plate Voltage Radio Amplifier Tube	D. C.	0-250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	165
Plate Voltage Mixer Tube	D. C.	0-250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (−)	155
Plate Voltage Oscillator Tube	D. C.	0-250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (−)	80
Plate Voltage I. F. Tube	D. C.	0-250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (−)	170
Plate Voltage Demodulator Tube	D. C.	0-250	Between Plate Terminal and Demodulator Socket (+) and Chassis Base (−)	104
Plate Voltage First Audio Tube	D. C.	0-250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (−)	160
Plate Voltages Audio Output Tubes	D. C.	0-750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (−)	295
"C" Voltage R.F. Amplifier Tube	D. C.	0-10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	3
"C" Voltage Mixer Tube	D. C.	0-10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (−)	7
"C" Voltage Oscillator Tube	D. C.	0-250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (−)	25
"C" Voltage I. F. Tube	D. C.	0-10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (−)	3
"C" Voltage Demodulator Tube	D. C.	0-10	Between Cathode Terminal of Demodulator (+) and Chassis Base (−)	26
"C" Voltage First Audio Tube	D. C.	0-10	Between Cathode Terminal of First Audio Socket (+) and Chassis Base (−)	27
"C" Voltage Audio Output Tube	D. C.	0-250	Across 800 ohm Biasing Resistor	49
Grid Voltage Triode of Demodulator Tube	D. C.	0-10	Between Cathode Terminals of Demodulator Socket (+) and 1st Audio Socket (−)	2.5
Grid Voltage First Audio Tube	D. C.	0-10	Between Cathode of 1st Audio Socket (+) and Tap on Q Potentiometer (−)	8.5
Screen Voltages R. F. Mixer and I. F. Tubes	D. C.	0-250	Between Screen Terminals on Sockets (+) and Chassis Base (−)	90
"B" Voltage R. F. Mixer, I. F. First Audio and Demodulator Tube	D. C.	0-250	Between High Side of Voltage Divider (+) and Chassis Base (−)	170
"B" Voltage Audio Output Tubes	D. C.	0-750	Between Mid-Tap of Output Transformer (+) and Chassis Base (−)	300
Speaker Field Volts	D. C.	0-250	Across Small Pins on Speaker Connector Socket	125
Plate Voltage A. C. per Anode No. 280 Rectifier Tube	A. C.		Between Plate Terminals of No. 280 Rectifier Socket and Chassis Base	340

REPLACEMENT PARTS

Piece Number	Part	Description of Part	Required per Receiver
P-22540	Audio Transformer Assembly	Input and Output Push-Pull Transformer	1
P-21663	Bracket Assembly	Voltage Divider Mounting	1
P-22353	Capacitor	Oscillator "Series Aligner"	1
P-21334	Capacitor	.001 Mfd.	2
P-22557	Capacitor	.004 Mfd.	1
P-19597	Capacitor	.04 Mfd.	1
P-21535	Capacitor	2—.01 Mfd.	1
P-22411	Capacitor	.04 Mfd.	2
P-22556	Capacitor	Aligner in Tri-Resonator	1
P-22565	Capacitor Assembly	R. F. and I. F. By-Pass Capacitors	1
P-22849	Capacitor Assembly	Filter Capacitor Assembly	1
P-22706	Capacitor Assembly	.042 Mfd.	3
P-22855	Capacitor Assembly	4—.05 Mfd.	1
P-22549	Coil	Tri-Resonator Circuit and Demodulator Plate Circuit	2
P-22358	Coil Assembly	First Coil of Bi-Resonator	1
P-22359	Coil Assembly	Second Coil of Bi-Resonator	1
P-22360	Coil Assembly	R. F. Transformer	1
P-22361	Coil Assembly	Oscillator Coil	1
P-21628	Coil Assembly	Antenna Inductor	1
P-21566	Fuse	1.5 Amperes	1
P-19630	Grid Clip		1
P-21704	Grid Clip Assembly		2
P-22872	Grid Clip Assembly		2
P-22532	I. F. Transformer	First I. F. Transformer	1
P-22533	I. F. Transformer	Second I. F. Transformer	1
P-21277	Knob	Antenna Aligner	1
P-22390	Knob	Selector Knob	1
P-22391	Knob	Volume Control and Clarifier Switch	2
P-22351	Meter	Visual Tuning Meter (Weston No. 654)	1
P-19617	Potentiometer	Hum Adjuster	1
P-22862	Potentiometer	"Q" Adjuster	1
P-22593	Potentiometer	Clarifier and On-Off Switch	1
P-22546	Potentiometer	Dual Volume Control and Phonograph Switch	1
P-22550	Resistor, 150 Ohms	Filter Resistor	1
P-22596	Resistor, 5370 Ohms	Voltage Divider	1
P-21621	Resistor, 1,000 Ohms, "C" Type	Carbon Resistor, Brown, Black, and Red	1
P-21521	Resistor, 2,000 Ohms, "C" Type	Carbon Resistor, Red and Black	1
P-22329	Resistor, 6,500 Ohms, "C" Type	Carbon Resistor, Blue, Green, and Red	1
P-22327	Resistor, 600 Ohms, "C" Type	Carbon Resistor, Blue, Black, and Brown	4
P-22328	Resistor, 4,000 Ohms, "C" Type	Carbon Resistor, Yellow, Black, and Red	2
P-22330	Resistor, 10,000 Ohms, "C" Type	Carbon Resistor, Brown, Black, and Orange	1
P-22331	Resistor, 15,000 Ohms, "C" Type	Carbon Resistor, Brown, Green, and Orange	1
P-22333	Resistor, 100,000 Ohms, "D" Type	Carbon Resistor, Brown, Black and Yellow	6
P-22334	Resistor, 250,000 Ohms, "D" Type	Carbon Resistor, Red, Green, and Yellow	1
P-22335	Resistor, 500,000 Ohms, "D" Type	Carbon Resistor, Green, Black, and Yellow	2
P-22561	Resistor, 1 Megohm, "D" Type	Carbon Resistor, Brown, Black, and Green	1
P-21280	4 Pin Socket		4
P-22570	5 Pin Socket		1
P-22571	6 Pin Socket		6
P-22529	Transformer	Power, 60 Cycle, 110 Volts	1
P-22530	Transformer	Power, 25-60 Cycles, 110 Volts	1

MODEL 48,49,50,51

STROMBERG - CARLSON TEL. MFG. CO. Data

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Type and Number of Tubes	3 No. 58, 1 No. 57, 3 No. 56, 1 No. 55, 2 No. 2A3, 1 No. 5Z3
Voltage Rating	105-125 Volts
Frequency Rating	60 Cycles and 25-60 Cycles
Power Consumption (Maximum at 125 Volts)	160 watts

CIRCUIT DESCRIPTION

The three No. 58 tubes are used as R. F. amplifier, mixer, and I. F. amplifier. The No. 57 is used as the "relay" tube in the "Q" circuit. One No. 56 tube is used as the oscillator and the other two as the push-pull first audio amplifier. The No. 55 tube is used as the demodulator. The two No. 2A3 super-triode tubes are used in the push-pull power output stage. The No. 5Z3 rectifier is used in the power supply.

A Bi-resonator is used to couple the antenna to the R. F. amplifier to prevent cross modulation. The R. F. amplifier is coupled to the mixer by a regular tuned R. F. transformer. This gives three tuning circuits (four-gang tuning capacitor) for R. F. selectivity ahead of the mixer, thus the image response ratio is extremely high. The oscillator is coupled to the cathode circuit of the mixer tube in the regular manner. The I. F. output of the mixer tube is fed into Tetro-resonator (four-tuned circuit transformer) and thence to the I. F. amplifier tube. This tube is coupled to the No. 55 demodulator tube by a single-tuned circuit transformer.

The resistor unit of the volume control potentiometer forms part of the load of the "audio" diode of the No. 55 tube, and the audio voltage is applied to the triode portion of this tube through the movable contact of this potentiometer. The potentiometer is double, the rear unit being used in the low level tone compensation circuit, which increases the response to bass frequencies and high frequencies in proper amount as the volume level is reduced. The output of the triode portion of the No. 55 tube is fed through a transformer to the push-pull first audio stage. The "Bass Control" circuit apparatus is connected across the primary of this transformer. The "Bass Control" switch is provided to remove the bass compensation by opening this circuit when it is desired to secure extremely high levels of sound output for dancing, etc. The AVC voltage is obtained from the other diode of the No. 55 tube, and is fed back to the first two tubes through a suitable filter.

The "Q" circuit for providing quiet operation for tuning between stations consists of the No. 57 relay tube connected to the "AVC" diode of the No. 55 tube. When there is no carrier coming in, the action of this circuit is to put high negative potentials on the "audio" diode and the control grid of the triode of the No. 55 tube, thus preventing reception of inter-carrier noise when tuning. When a carrier of suitable strength comes in, these negative potentials are removed and the signal is received. A switch in the rear of the chassis is provided, so that this "Q" circuit can be rendered inoperative if it is desired to use the maximum sensitivity of the receiver.

From the push-pull first audio stage the signal is coupled by a transformer to the super-triode push-pull power output stage. The "Adjustable Treble Control" circuit apparatus is connected across the primary of this coupling transformer to enable the user to adjust the proportion of high frequencies in the reproduction as he desires. Used in conjunction with the "Bass Control" a wide range of variation in the response characteristics can be obtained.

A large output transformer, large on account of the high audio power available in the system, is used to couple the super-triode tubes to the high quality electro-dynamic speaker.

The power supply employs three stages of filter; the first being of the resistance type, and the other two of the choke type. The speaker field is used as the choke in the third stage. The plate supply for the output tube is tapped off between the second and third stages of filter, while the remainder of the voltages are supplied from the voltage divider resistor.

(The servicing instructions for the Multi-Record Phonograph in the No. 51 Radio-Phonograph are in P-23221 Data Sheet.)

ALIGNMENT OF RECEIVERS

Realignment of the R. F. and Oscillator Tuning circuits when necessary may be accomplished in the following manner:

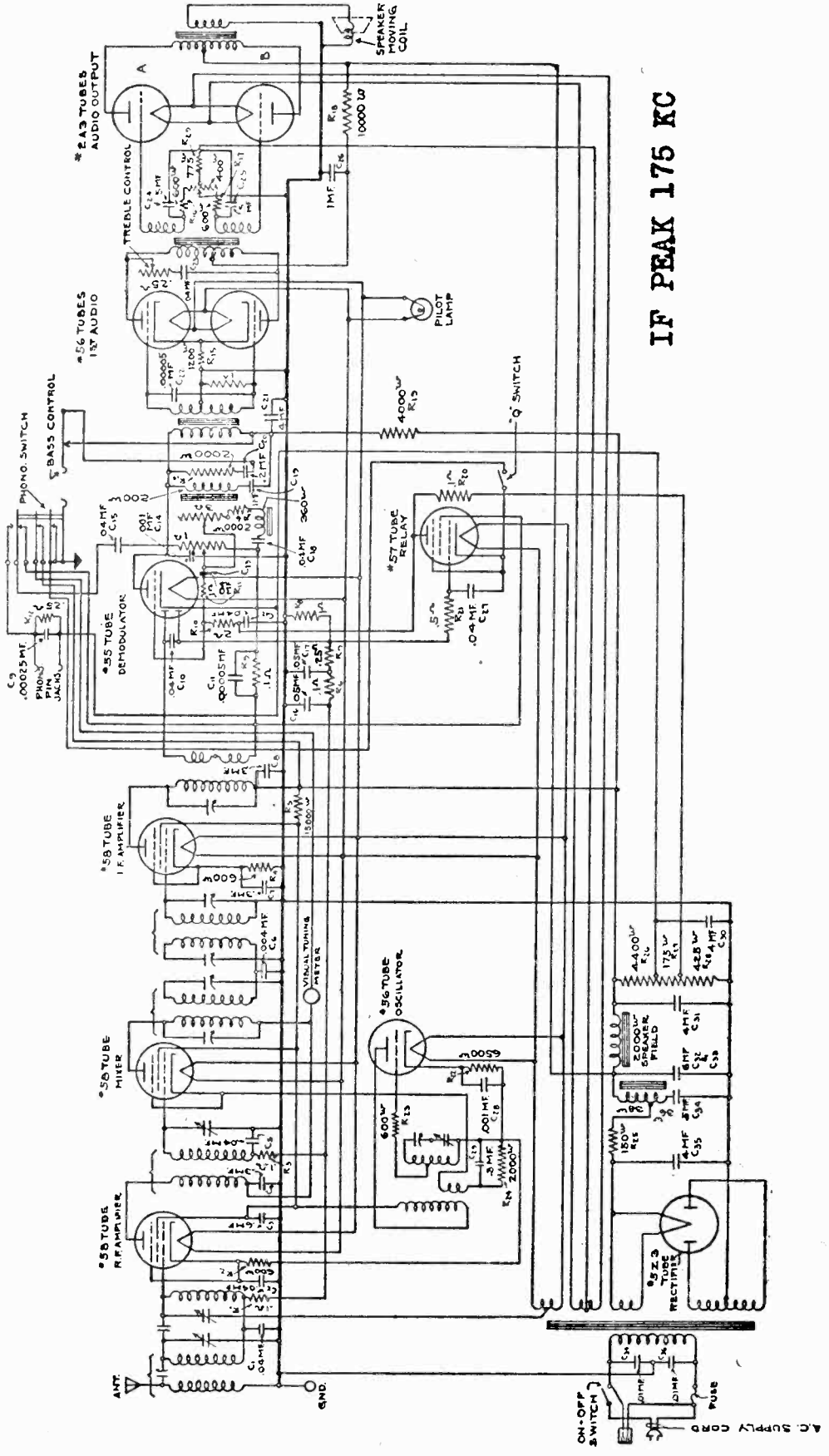
If a test oscillator and output meter are used, the signal strength applied to the receiver should be low enough so that the automatic volume control is not operated in order to avoid apparent broad adjustment. If broadcast signals are used, moderately strong signals which swing the meter pointer about half the distance back toward the "Off" position should be used.

With whichever method is used, the receiver should be tuned to a 1400 kc. signal first, and the Antenna, R. F. and Oscillator Shunt Aligners adjusted for best setting. Next the receiver should be set at 600 kc. on the dial, and the Oscillator Series Aligner ONLY adjusted for best position for maximum background noise. After this is done re-check the Oscillator Shunt Aligner at 1400 kc., using same dial setting as previously. The receiver should be left turned "On" for about fifteen minutes before aligning.

The Intermediate Amplifier circuits are aligned on oscillographs to obtain the proper shape of resonance curves having "steep" sides to get proper selectivity and fidelity. "Peak" methods of alignment (with oscillator and meter) do not give the desired curve, as it may be broad and unsymmetrical although a high peak is indicated. The adjustment of these circuits is very stable as shown by field experience and Proving Division tests. Therefore, as these adjustments cannot be duplicated exactly without the oscillograph equipment, it is recommended that the I. F. circuits never be adjusted by a service man.

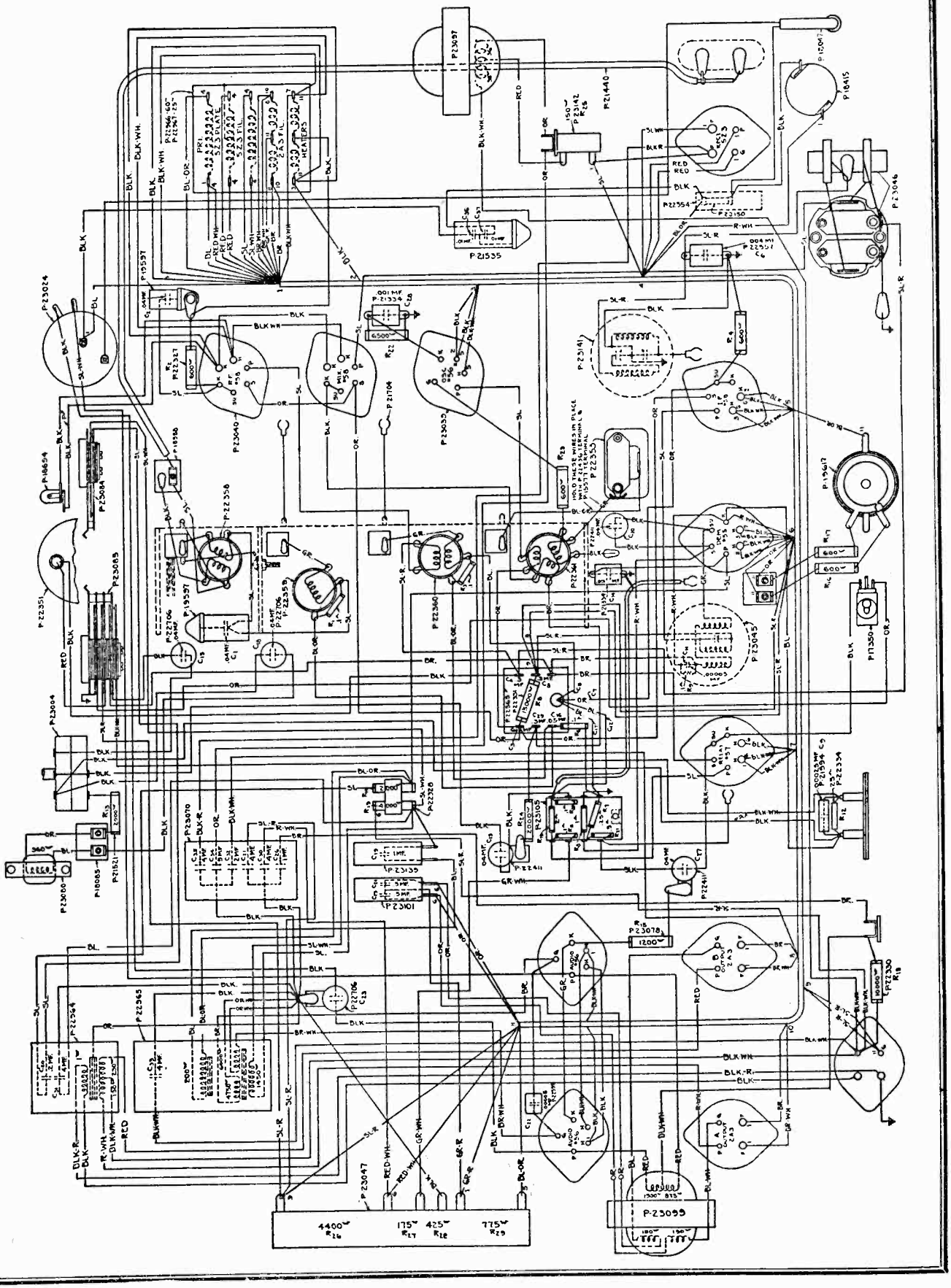
MODEL 48,49,50,51

STROMBERG - CARLSON TEL. MFG. CO. Data



MODEL 48,49,50,51
Chassis Wiring

STROMBERG - CARLSON TEL. MFG. CO.



STROMBERG - CARLSON TEL. MFG. CO.

MODEL 48,49,50,51
Voltage
Resistance Data

NORMAL VOLTAGE READINGS

These voltage readings correspond to a line voltage at 120 volts. When voltages are measured, proper allowances should be made for a difference in line voltage above or below 120 volts. Be sure to make these readings with the Meter and Scale indicated, otherwise the results will not agree with those tabulated. Alternating voltages are indicated in italics. The dial should be set at about 1000 kc. The "Q" switch should be set in the "Up" position so that the "Q" circuit is not operating.

Voltage	Meter	Scale	Where Measured	Approx. Value in Volts
Heater Voltages Nos. 55, 56, 57, and 58 Tubes	A. C.	0–4	Across Heater Terminals of Sockets	*2.5*
Filament Voltages Nos. 2A3 Tubes	A. C.	0–4	Across Filament Terminals of Audio Output Sockets	*2.5*
Filament Voltage No. 5Z3 Tube	A. C.	0–8	Across Filament Terminals of No. 280 Rectifier Socket	*5.*
Plate Voltage Radio Amplifier Tube	D. C.	0–250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	200
Plate Voltage Mixer Tube	D. C.	0–250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (−)	200
Plate Voltage Oscillator Tube	D. C.	0–250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (−)	95
Plate Voltage I. F. Tube	D. C.	0–250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (−)	200
Plate Voltage Demodulator Tube	D. C.	0–250	Between Plate Terminal and Demodulator Socket (+) and Chassis Base (−)	170
Plate Voltage First Audio Tubes	D. C.	0–250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (−)	220
Plate Voltages Audio Output Tubes	D. C.	0–750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (−)	345
"C" Voltage R. F. Amplifier Tube	D. C.	0–10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (−)	4
"C" Voltage Mixer Tube	D. C.	0–10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (−)	8
"C" Voltage Oscillator Tube	D. C.	0–250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (−)	25
"C" Voltage I. F. Tube	D. C.	0–10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (−)	4
"C" Voltage First Audio Tubes	D. C.	0–250	Between Cathode Terminal of First Audio Sockets (+) and Chassis Base (−)	12
"C" Voltage Audio Output Tube	D. C.	0–250	Across 775-ohm Biasing Resistor	60
Grid Voltage Triode of Demodulator Tube	D. C.	0–250	Between Cathode Terminals of Demodulator Socket (+) and Tap No. on "B" Stick (−)	8
Screen Voltages R. F. Mixer and I. F. Tubes	D. C.	0–250	Between Screen Terminals on Sockets (+) and Chassis Base (−)	95
"B" Voltage R. F. Mixer, I. F. First Audio and Demodulator Tube	D. C.	0–250	Between High Side of Voltage Divider (+) and Chassis Base (−)	200
"B" Voltage Audio Output Tubes	D. C.	0–750	Between Mid-Tap of Output Transformer (+) and Chassis Base (−)	350
Speaker Field Volts	D. C.	0–250	Across Small Pins on Speaker Connector Socket	145
Plate Voltage A. C. per Anode No. 5Z3 Rectifier Tube	A. C.		Between Plate Terminals of No. 5Z3 Rectifier Socket and Chassis Base	380

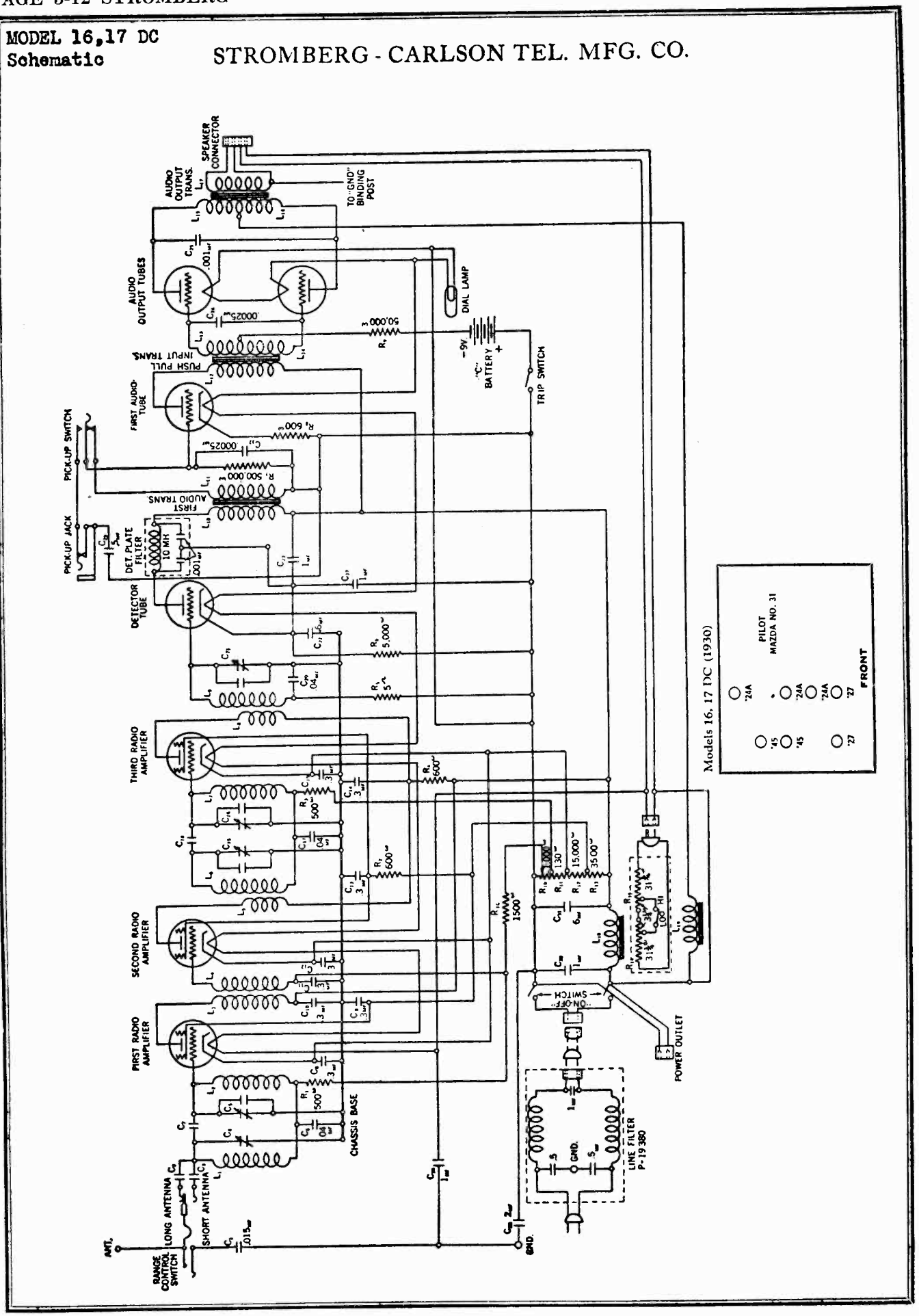
CONTINUITY READINGS OF CHASSIS

All readings taken from designated terminal to chassis base unless otherwise specified and are indicated in ohms
The G terminals of the Nos. 55, 57, and 58 tubes are connected to the top caps.

Tube	H	H	K	SU	S	P	G	Remarks
R. F. (58)	0	0	600	600	20,000	5,000	1,450,000	
Mix (58)	0	0	2000	2000	20,000	5,000	1,450,000	SU and S terminals of Demodulator Socket are diode plates.
OSC (56)	0	0	6500			20,000	600	
I. F. (58)	0	0	600	600	20,000	5,000	70	NOTE A With phono switch on, Res. is from 1 megohm to 400,000 ohms, varying with volume control.
Demod. (55)	0	0	600	100,000	1,000,000	10,450	2,100,000	
Relay (57)	0	0	See Note B Open—0		100,600	100,425	See Note A 1,500,000	NOTE B Open when switch is in up position, 600 ohms when switch is in down position and relay tube is operating.
1st (1st Aud.) (56)	0	0	1200			See Note C 11,065	5,000	
2nd (1st Aud.) (56)	0	0	1200			See Note C 11,690	6,500	NOTE C Readings taken from designated terminal to either "H" terminal of rectifier (5Z3) socket.
	F	F						
1st (2nd Aud.) (2A3)	975	975				See Note C 340	1,100	
2nd (2nd Aud.) (2A3)	975	975				See Note C 420	1,100	NOTE D Taken from H-H terminals to either P terminal of 2nd audio (output) sockets.
Rect. (2Z3)	See Note D 340 — 420					27	27	

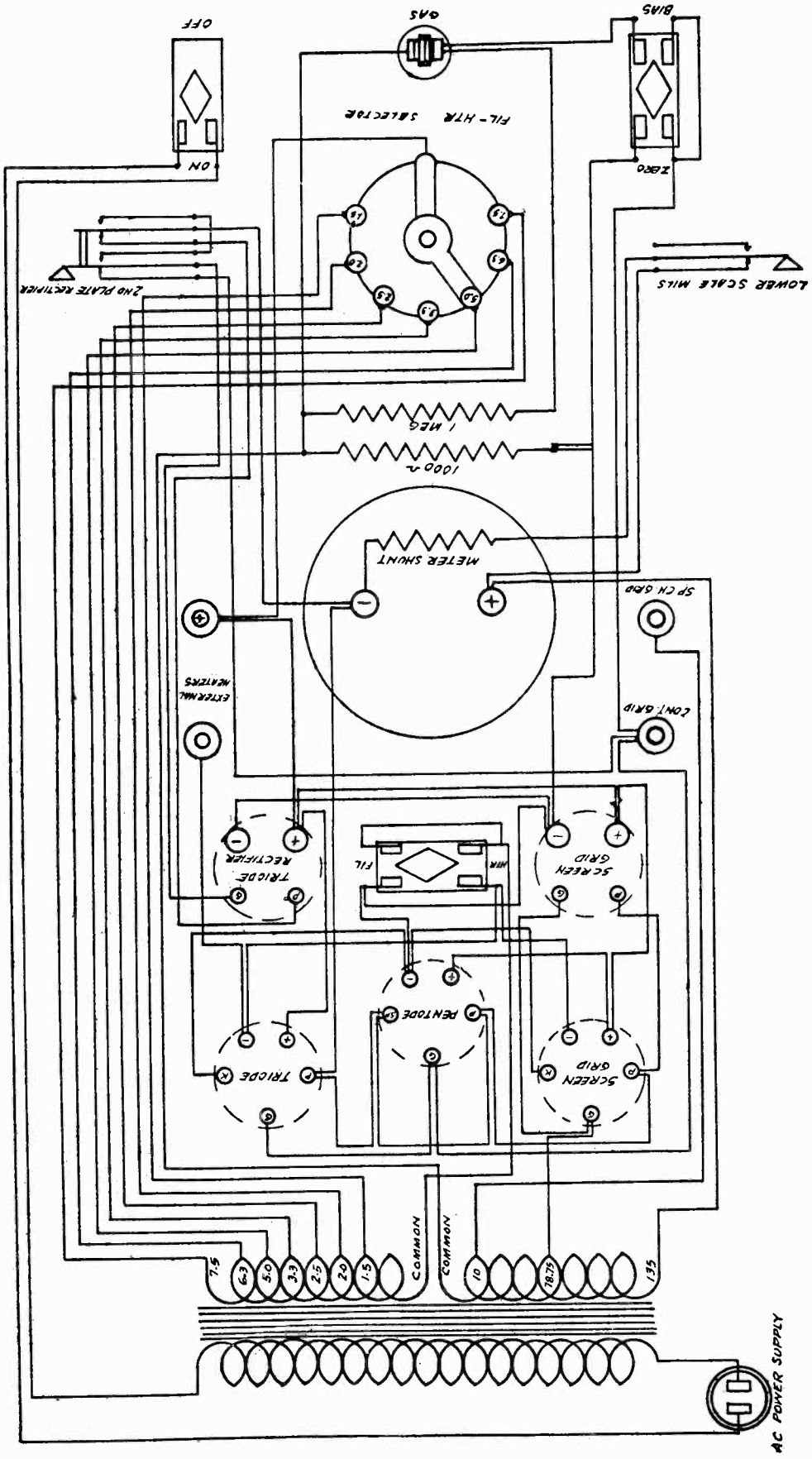
MODEL 16,17 DC
Schematic

STROMBERG - CARLSON TEL. MFG. CO.



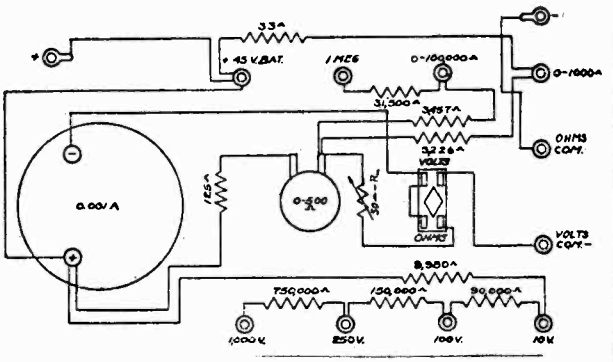
MODEL 40 Tube Checker

SUPREME INSTRUMENTS CORP.

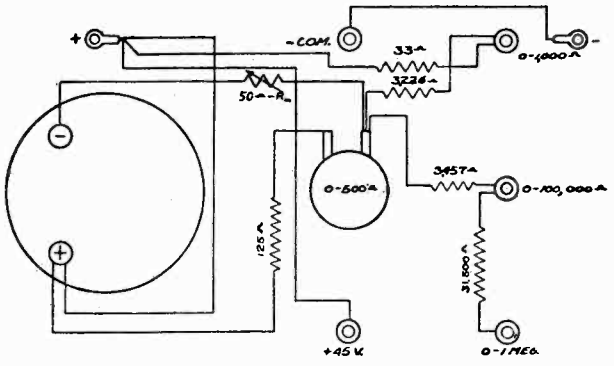


MODEL 33 Ohmmeter
MODEL 44 Volt-Ohmmeter
MODEL 60 Oscillator
MODEL 62 Tube Testing Unit
MODEL 75 AC-DC Volt-Ohm Milliammeter

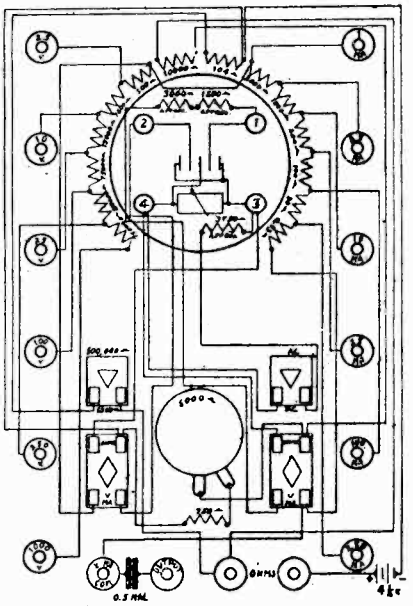
SUPREME INSTRUMENTS CORP.



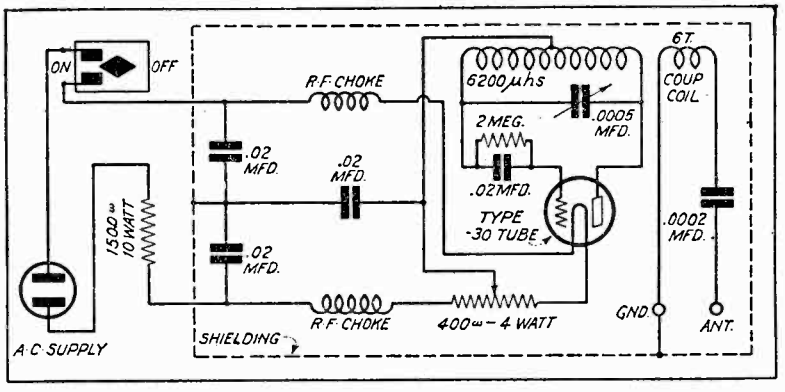
Model 44 Volt-Ohmmeter



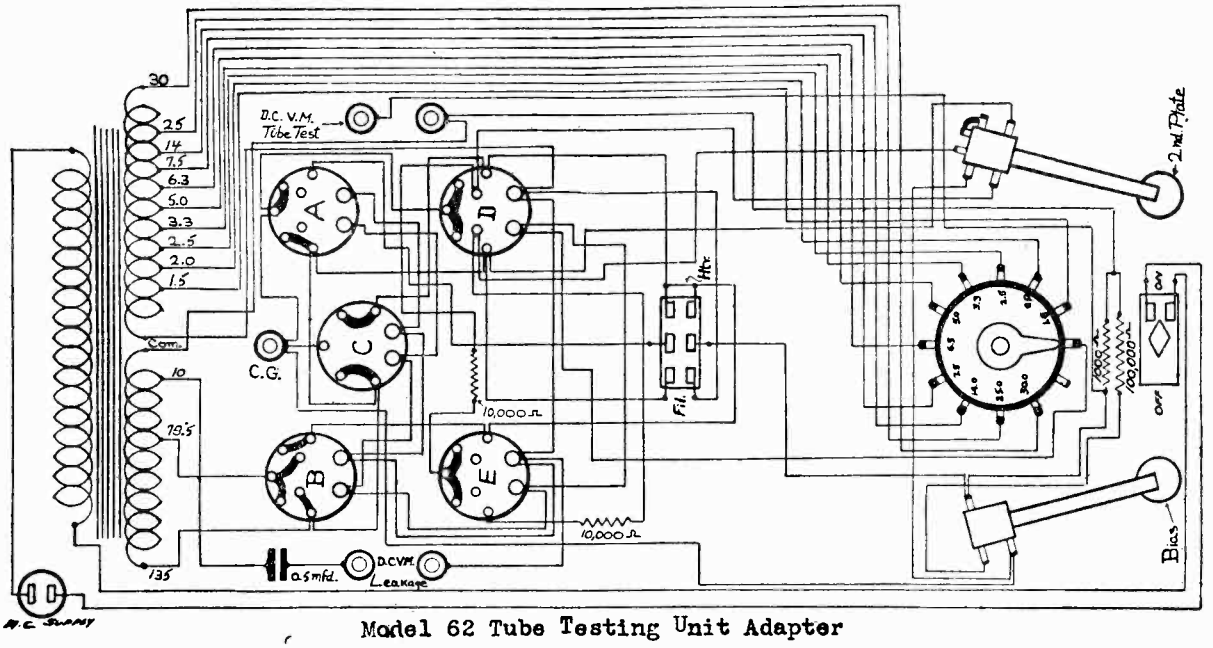
Model 33 Ohmmeter



Model 75 AC-DC Volt-Ohm Milliammeter



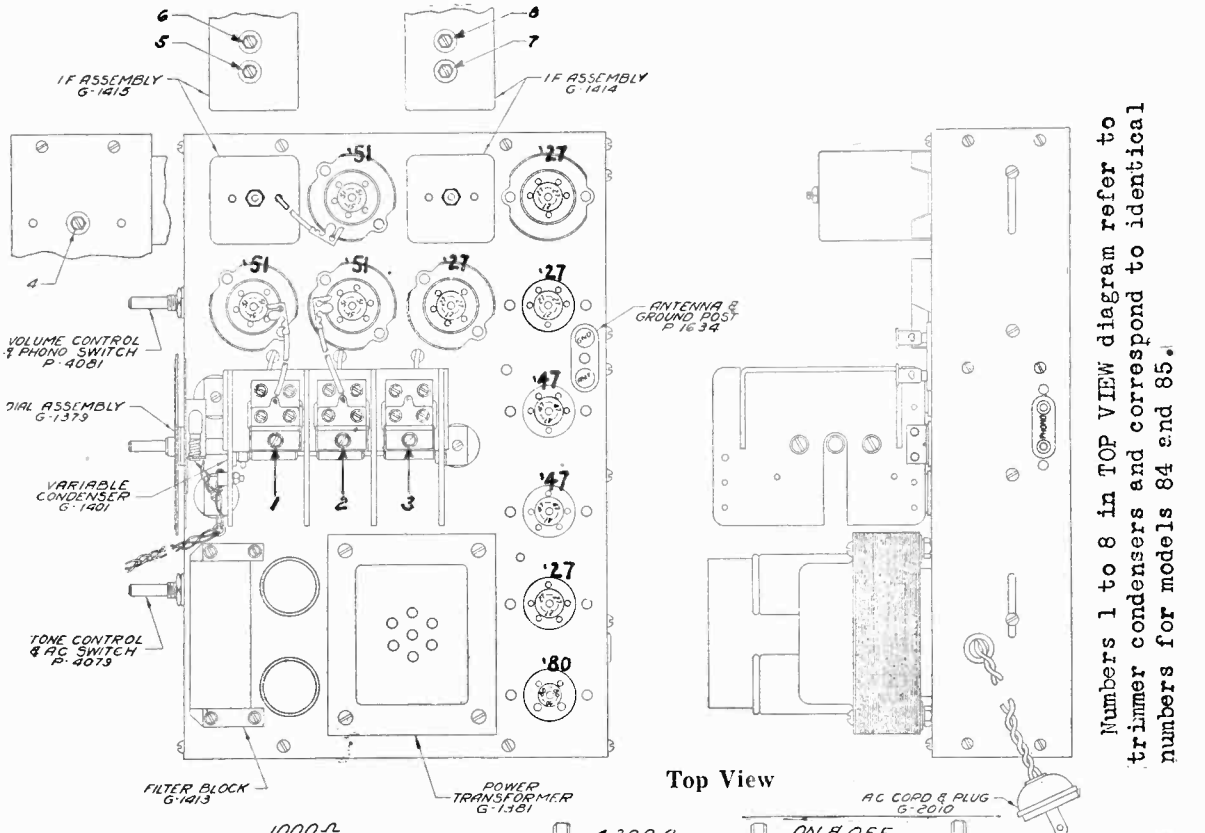
Model 60 Oscillator



Model 62 Tube Testing Unit Adapter

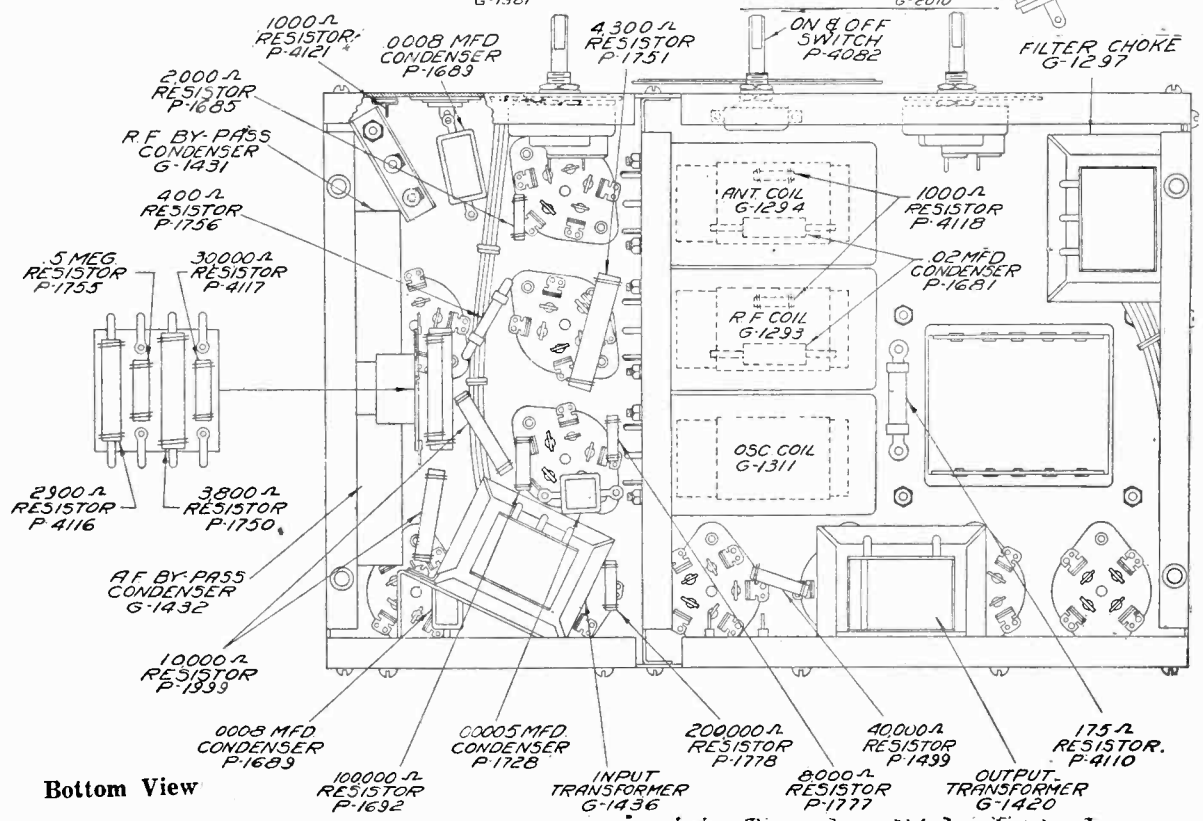
TRANSFORMER CORP. OF AMERICA

MODEL AC-160,25-160
Chassis Views



Top View

Numbers 1 to 8 in TOP VIEW diagram refer to trimmer condensers and correspond to identical numbers for models 84 and 85.



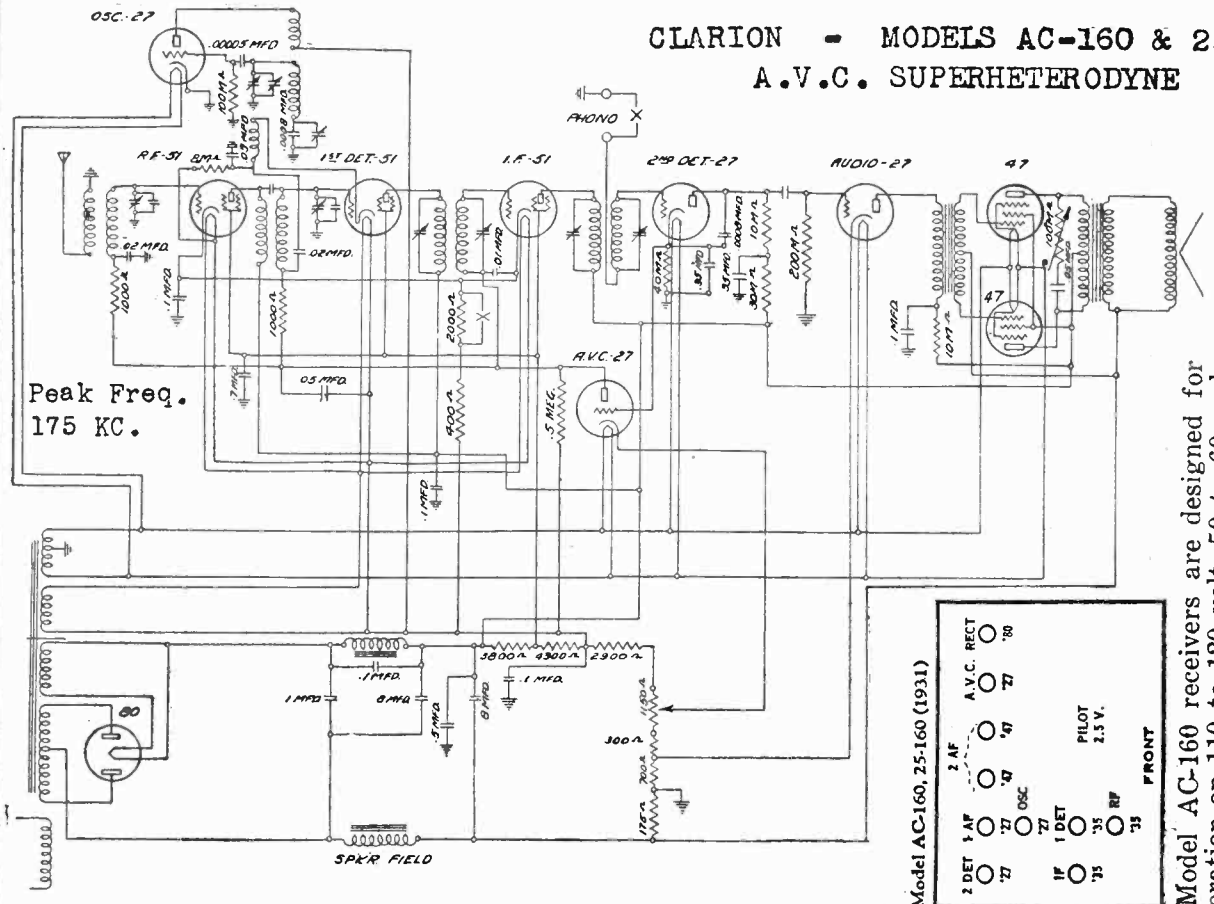
Bottom View

Due to the high audio gain of this receiver, special precautions had to be taken in design to eliminate hum. You will see by examination of the under side of the chassis that the input audio transformer is supported on a bracket. The angle on this bracket has been carefully calculated to minimize hum, and if for any reason, this transformer is replaced, be sure to retain the bracket and see that it is not accidently distorted or twisted out of its original angle.

MODEL AC160, 25-160
Schematic - Voltage

TRANSFORMER CORP. OF AMERICA

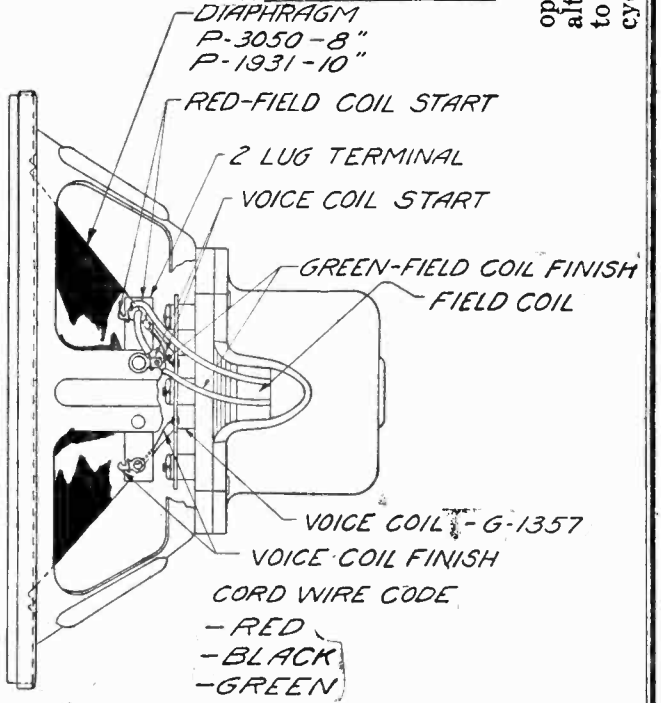
CLARION - MODELS AC-160 & 25-160
A.V.C. SUPERHETERODYNE



Model AC-160 receivers are designed for operation on 110 to 120 volt, 50 to 60 cycle alternating current. The Models 25-160 are to be operated on 110 to 120 volts, 25 to 40 cycle alternating current only.

READINGS TAKEN WITH WESTON 565 ANALYSER
Vol. control position "full on" Super-sensitive switch "to right"

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid Volt	Cath. Volts	S.G. Volts	Ip. Norm
1	R. F.	51	2.2	151	2	3	75	3.
2	1st Det.	51	2.2	140	5.7	9	70	1.2
3	I. F.	51	2.2	151	2	3	75	2.5
4	Osc.	27	2.1	115	0	0	0	9.5
5	2nd Det.	27	2.1	192	0	0	0	5
6	1st Aud.	27	2.1	230	8	15	0	5.5
7 & 8	P.P. Pentodes	47	2.3	250	16.5	0	255	27
9	A. V. C.	27	2.2	15	20	45	0	0
10	Rect.	80	4.9	0	0	0	0	47



(DYNAMIC SPEAKER)
G-1360-8"
G-1370-10

TRANSFORMER CORP. OF AMERICA

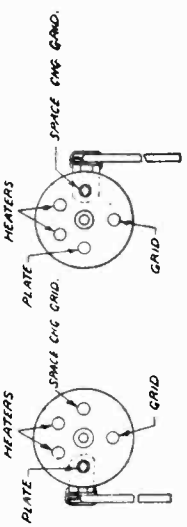
MODEL 200
Chassis Views

CLARION SERIES 200 SHORT WAVE CONVERTER

CONNECTING THE SET

On the right hand rear of the chassis, there are two binding posts marked GND and OUT respectively. A short length of braided, shielded wire is supplied with the unit, and this wire should be connected to the "OUT" or output binding post. The outer metal shield has a small piece of wire soldered to it, and this wire should be connected to the "GND" binding post. The other ends of these wires should connect to the antenna and ground binding posts respectively of the broadcast receiver.

The adapter plug at the left hand side of the unit should be inserted into the pentode tube socket of the broadcast receiver, and the pentode tube plugged into the adapter. This supplies "B" power for the unit. The filaments of the tubes in the unit are fed separately through the small transformer located at the front right of the chassis. It should be noted that in the wafer type adapter, *the lug connection can easily become reversed by mis-handling*, and an improper connection here, would mean that *the "B" power for the short wave unit, would be taken from the plate prong of the pentode tube* rather than from the space charge grid prong *and the result would be weakness of signals, and oscillation.*

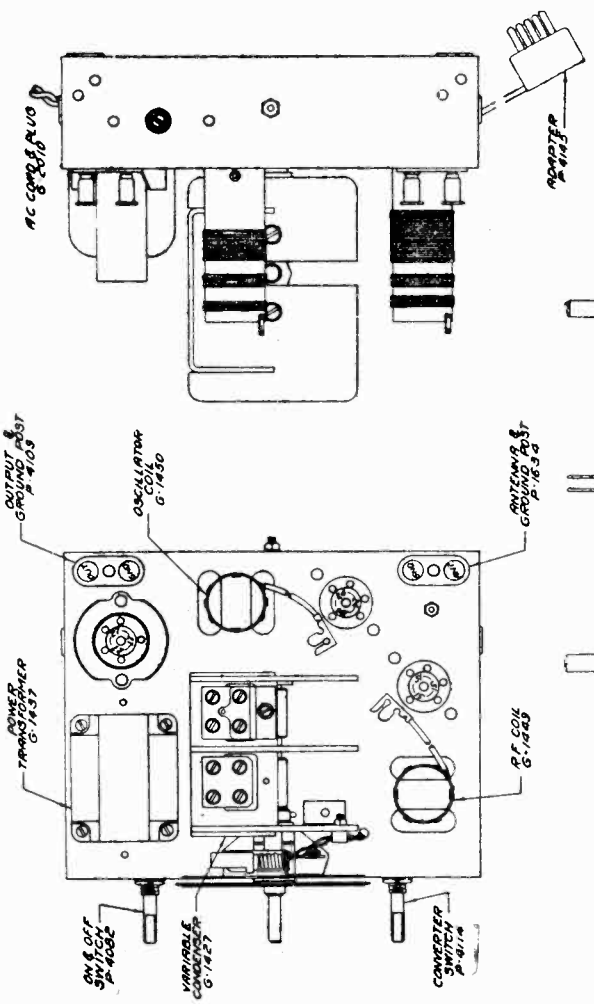


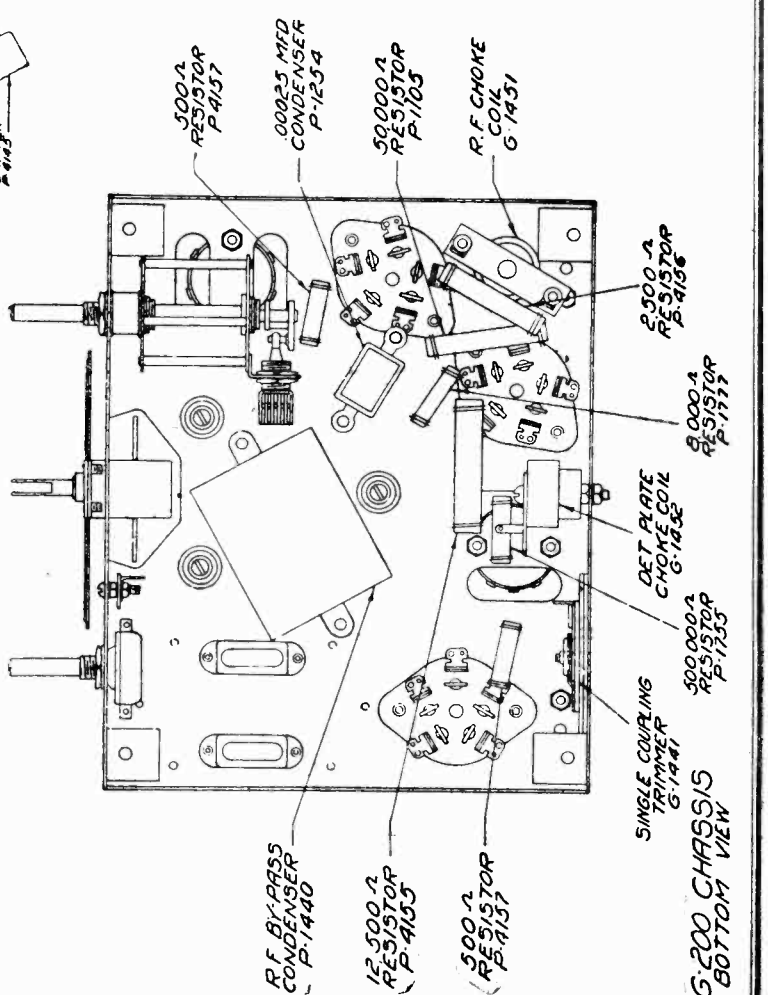
WRONG
WEAK SIGNALS
AND OSCILLATION

CORRECT
STRONGER SIGNALS

THE RIGHT AND WRONG WAY THE LUG CAN BE INSERTED IN THE ADAPTER WAFER

The trimmer adjustment screw on the right rear of the chassis is intended to adjust the output impedance of the unit to the antenna coil of the broadcast receiver into which it operates. This adjusting screw need not be moved if the unit is connected to a model 100 receiver.

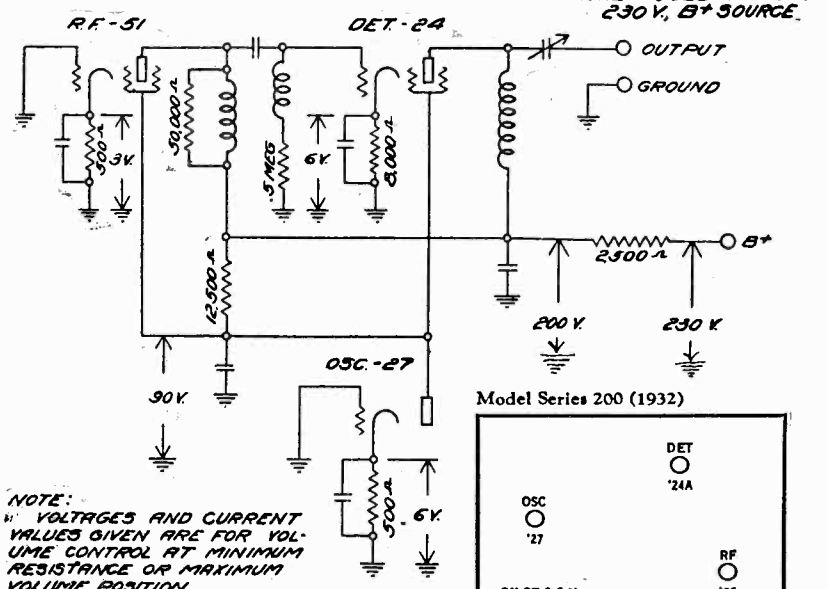




MODEL 200
Schematic
Voltage - Data
Breakdown

TRANSFORMER CORP. OF AMERICA

BREAKDOWN ANALYSIS FOR MODEL - 200 WHEN USED WITH A 230 V. B+ SOURCE



NOTE: VOLTAGES AND CURRENT VALUES GIVEN ARE FOR VOLUME CONTROL AT MINIMUM RESISTANCE OR MAXIMUM VOLUME POSITION.

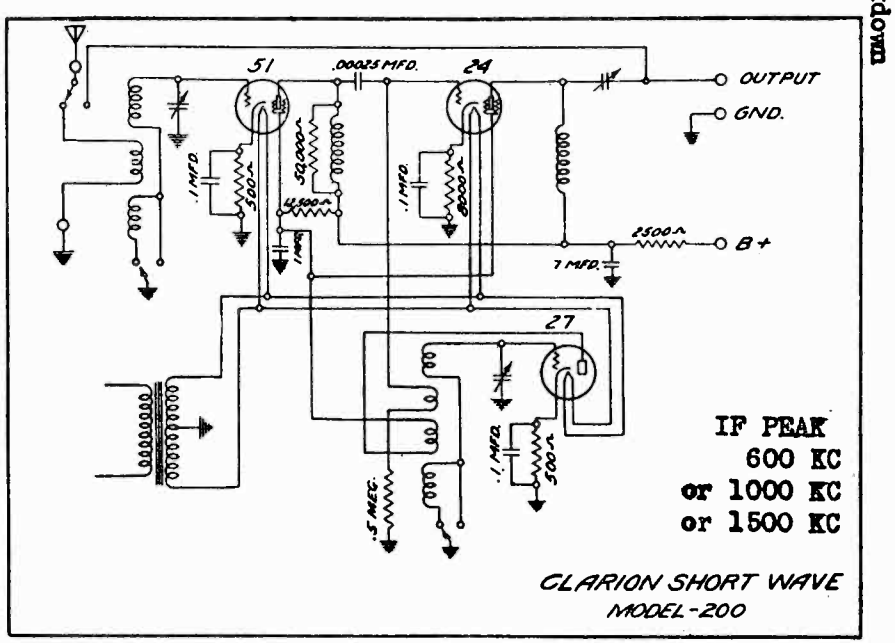
Model Series 200 (1932)

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grind Volt	Cath. Volts	S.G. Volts	Ip. Norm.
1	R. F.	51	2.3	190	1.	1.	50	3.
2	Osc.	27	2.3	155	0	0	0	6.
3	Det.	24	2.3	180	.4	3	50	.4

Readings Taken With Western 565 Analyser
Line Voltage 115. Switch Position 55,000 K. C. Band.
(Broadcast Volume Control Full On)

Since resistance tolerances in the sets are plus or minus ten per cent and tubes may vary over twenty per cent, your readings may disagree with the above by plus or minus, thirty per cent.

In making an analyzer test of this unit, it should be remembered that the "B" power for the short wave set is drawn through the adapter plug under the pentode tube from the broadcast receiver, and any erroneous current or voltage reading shown by an analyzer test of the short wave unit should always be traced back to determine if the cause is not in the broadcast set itself or the adapter plug.



The series 200 Short Wave unit was designed and is intended for use with the series 100 superheterodyne, six tube receiver, and as such comprises the model 140 series broadcast-short wave superheterodyne.

Filament power for the unit is turned on by turning the right hand switch or knob over to the right. The broadcast receiver operating in conjunction with this short wave unit should be adjusted to 600 K. C. to maintain accurate calibration on the short wave unit. Since the sensitivity of various broadcast receivers will differ over the broadcast range, *it is advisable to try adjusting the broadcast receiver to 600 K. C., then to 1000 K. C., then to 1500 K. C.*, and select that setting which gives loudest signals from any short wave station. This will have no effect on the short wave set's operation that will be detrimental, but will merely shift the calibration of your short wave receiver between five and seven points over to the right, or higher frequency.

This unit covers a frequency range of from 1500 K. C. to 15000 K. C. For normal broadcast reception, when the unit is working into a standard broadcast receiver, it is only necessary to turn the "Band Switch" [which is controlled by the lower right hand knob and is marked broadcast 550 to 1500 (left) 1500 to 5500 (center), and 5500 to 15,000 (right)], to the extreme left position and then tune the broadcast receiver. When it is desired to pick up short wave stations between 1500 and 5500 K. C., such as police, aeroplane, television and amateur phones, the band switch should be turned to the center or "up" position. To receive signals between 5500 and 15,000 K. C., such as foreign stations, the band switch should be thrown all the way over to the right.

TRANSFORMER CORP. OF AMERICA

MODEL AC 220
Voltage - Adapter
Resistance Data
Trimmer Locations

CIRCUIT RESISTANCE ANALYSIS

Model 220 Socket to ground

Stage	Grid	Cathode	Heater	Plate	Screen G	Suppr. G	Space G
R.F. .	4.5	220	.1	19,500	8,400	.....	.....
Autodyne.	1,000	5,000	.1	19,500	8,400	.....	.....
I.F. .	60	220	.12	19,500	8,400	.....	.....
2nd. det .	70	40,000	.1	270,000	260,000	40,000	.....
Output	500,000	.....	.1	19,600	.....	.....	19,400
Rectifier.	.....	.....	19,500	..1,870	.....	.....	.....

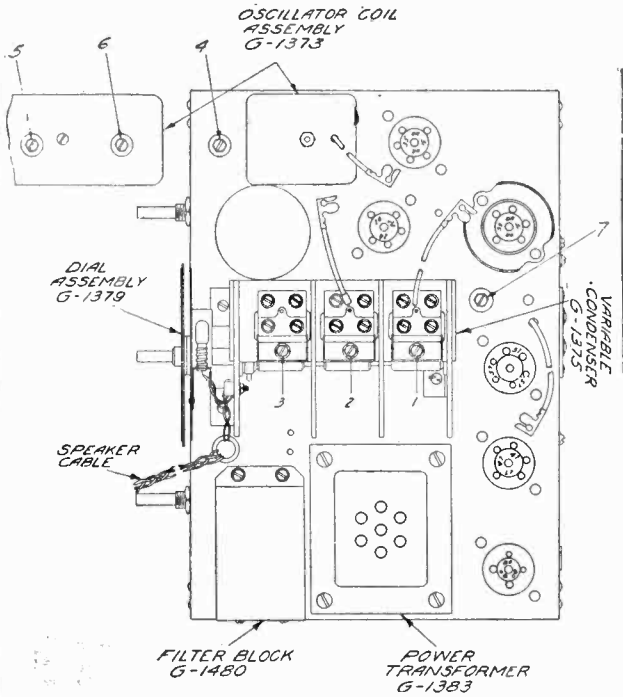
Note: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohm meter in each reading; the individual resistance in the circuit can be readily checked upon removal of chassis.

VOLTAGE ANALYSIS

Model 220

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid	Cath. Volts	Screen Volts	Ip. Norm.	Misc.
1	R.F .	51	2.15	245	3.4	3.1	81	5.	
2	Autodyne 1st. Det.	24	2.15	240	4.4	5.0	85	1.6	
3	I.F .	51	2.15	245	4.4	3.5	84	7.	
4	2nd. Det.	57	2.25	106	1.8	3.	43	.1	Suppressor Grid 3
5	Output.	47	2.25	245	15.	0.	0	31.	Pentspace Charge-Grid 250
6	Rect.	80	4.8	300	0.	0.	0	68.	

Vol. control "full on".
Tested with Weston model 565 analyzer.
Line: 115 Volts.



Number 1 is the antenna trimmer.

Number 2 is the gang condenser trimmer tuning the grid of the Super-autodyne.

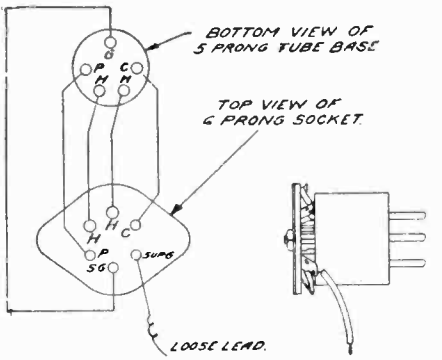
Number 3 is the gang condenser trimmer tuning the plate (or oscillator of the super-autodyne).

Number 4 is the oscillator padding trimmer.

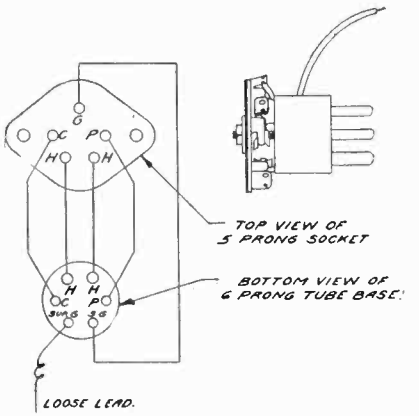
Number 5 is the Super-autodyne plate trimmer.

Number 6 is the I. F. grid trimmer.

Number 7 is the second detector grid trimmer.

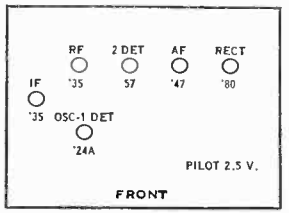


SKETCH OF CONNECTIONS FOR ADAPTER TO PLUG INTO ANALYZER.



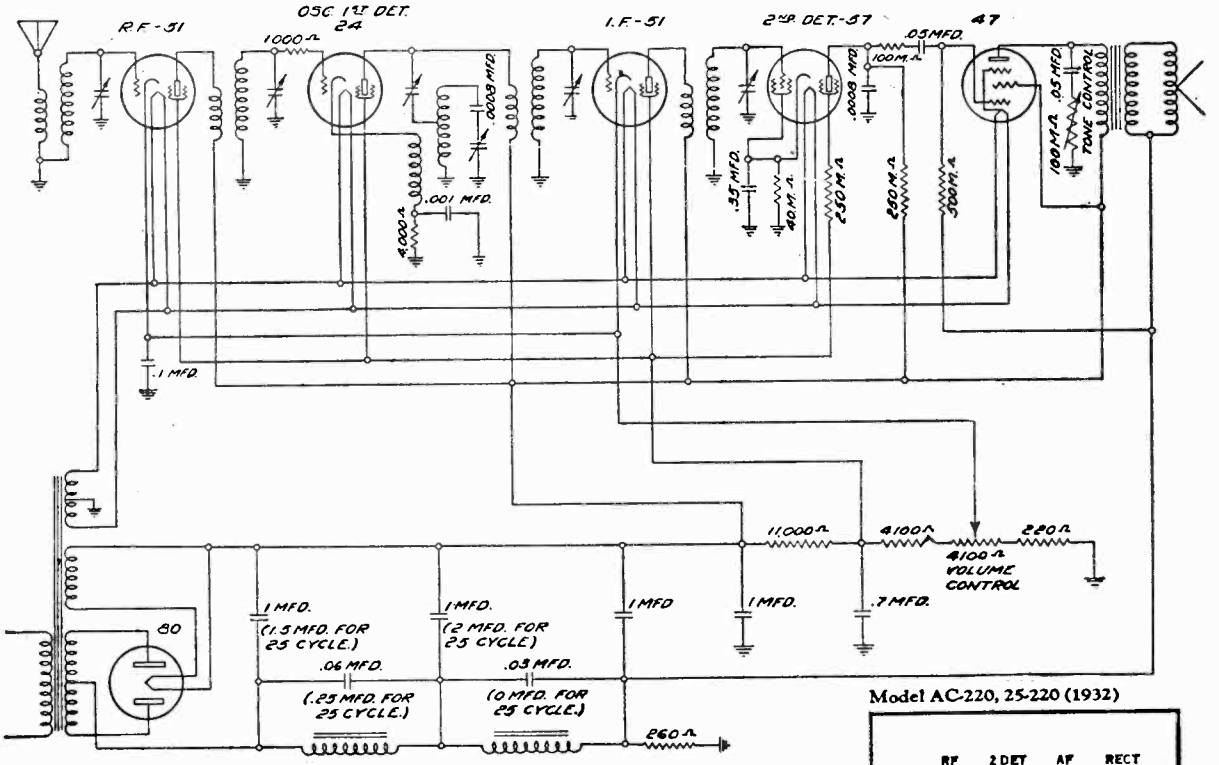
SKETCH OF CONNECTIONS FOR ADAPTER TO PLUG INTO SET

Model AC-220, 25-220 (1932)

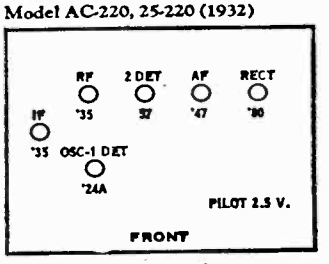


MODEL AC 220
Schematic
Chassis View

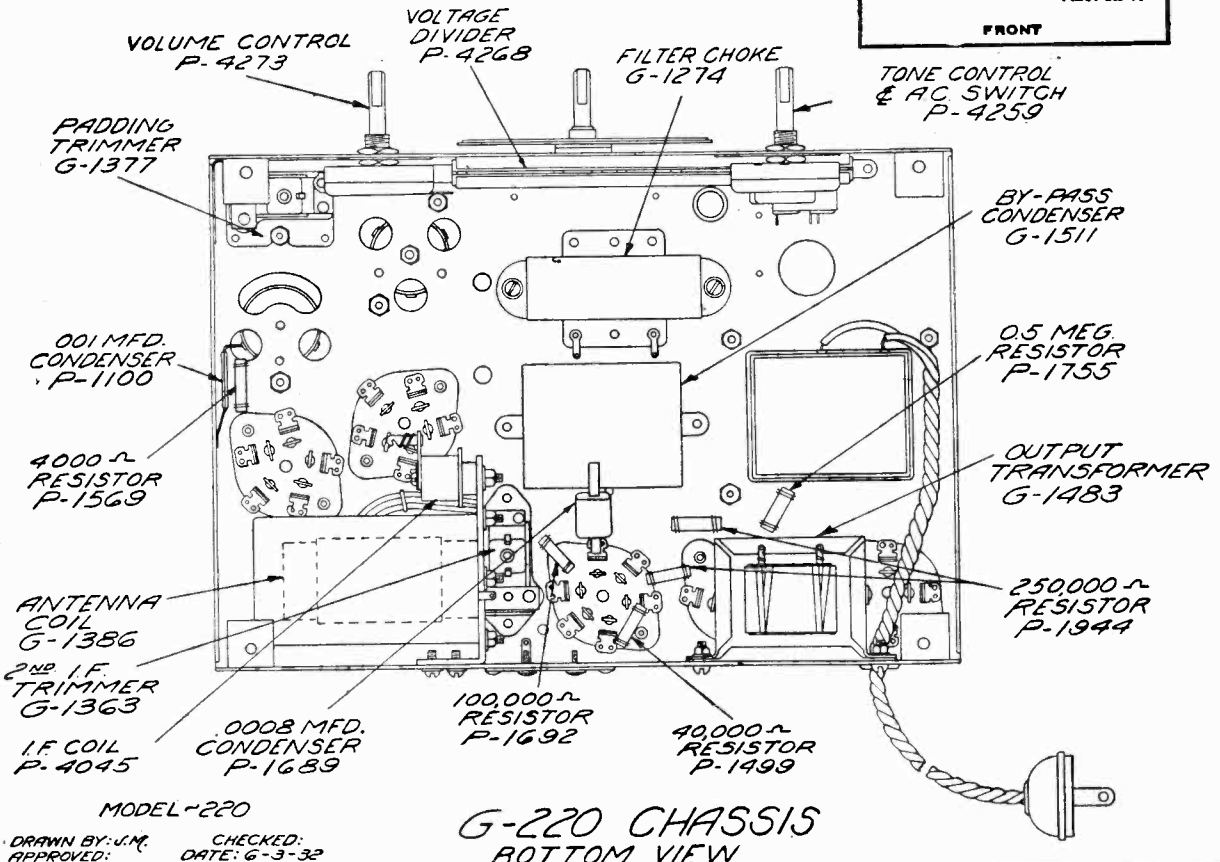
TRANSFORMER CORP. OF AMERICA



Model AC-220, 25-220 (1932)



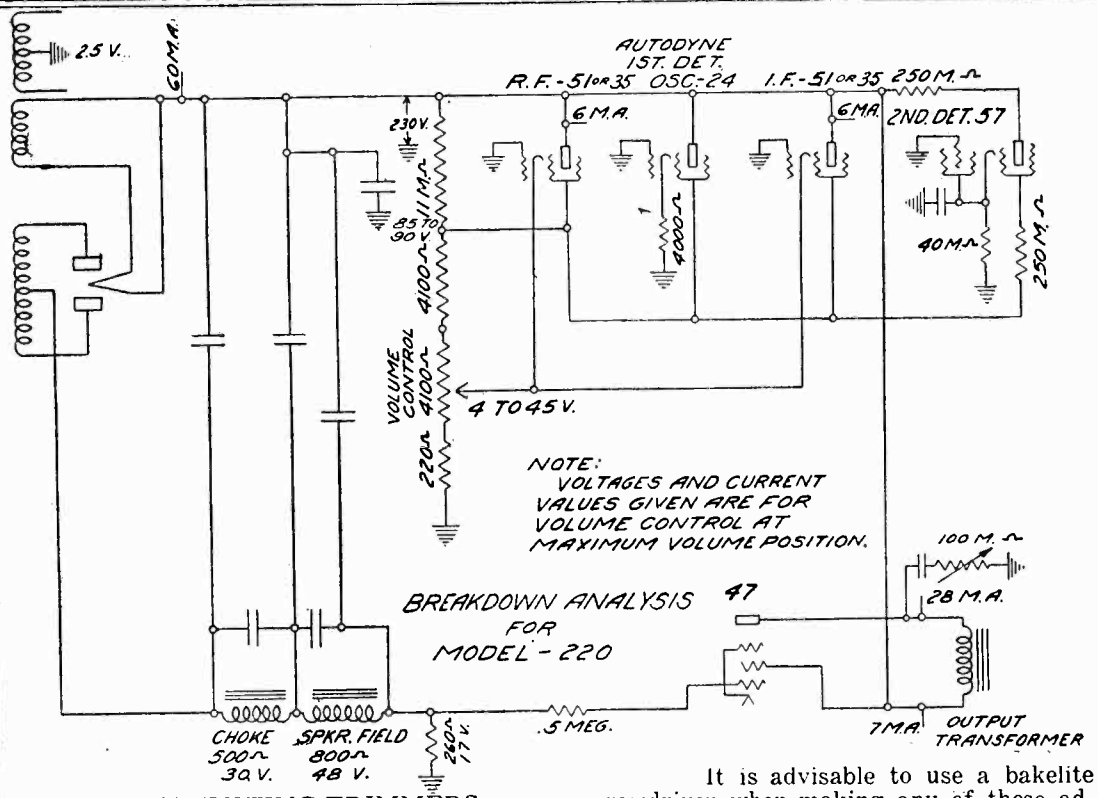
IF PEAK 175 KC



MODEL-220

DRAWN BY: V.M. CHECKED:
APPROVED: DATE: 6-3-32

G-220 CHASSIS
BOTTOM VIEW



READJUSTING TRIMMERS

The most important advice we can give you in regard to the adjustment of trimmers would be "don't make 'em." It has been proven conclusively to us that the Factory adjustment of these trimmers will not vary even when the set is severely jarred or dropped. However, if a customer were to tamper with their settings, a readjustment may have to be made. First, let us explain the location of the various trimmers. Diagram No. 3, top view of the series 220 chassis, shows each trimmer numbered. You should be acquainted intimately with each adjustment. A customer would not have to change the settings very much to ruin the sensitivity of the receiver. Further, if a readjustment appears to be necessary, it is imperative to know which circuit is being adjusted when a trimmer is being turned.

It is advisable to use a bakelite screwdriver when making any of these adjustments.

First, connect the 175 k. c. oscillator output leads from the control grid cap of the super-autodyne tube to ground. Do not remove any of the tubes from the sockets, and it is not necessary to disconnect the grid cap clip from the tube. Reset trimmers numbers 5, 6 and 7 for maximum output. While this test oscillator is working into the intermediate frequency stages, no adjustment of the tuning condenser on the receiver will have any effect, inasmuch as the intermediate frequency stage is fixed tuned.

If your test oscillator is properly designed, it will supply exactly 175 k. c., and when trimmers number 5, 6 and 7 are set for maximum output, they will be correctly adjusted and should be sealed.

Next, disconnect the 175 k. c. test oscillator and connect to the antenna binding post of the receiver, the output lead from your broadcast test oscillator, or tune in a broadcast signal around 1400 k. c., then reset trimmers numbers 2 and 1 respectively for maximum output. This adjustment will track the super-autodyne grid circuit of the R. F. stage.

To check the calibration of the receiver, whether it be high or low, trimmer number 3 should be reset until a station of known high frequency is brought in on the correct dial marking with peak volume. If your broadcast test oscillator is accurately calibrated, it might be used in place of the broadcasting station signal. In this adjustment, a broadcast station or test oscillator signal at about 1400 k. c. should be chosen. The setting of the trimmer at 1400 k. c. is more critical than it would be at 600 k. c.; calibration, therefore more accurate.

The next adjustment is important and not easily explained in writing, so pay close attention to the following instruction. We will now balance the oscillator to the r. f. and first detector stages.

Tune the external broadcast test oscillator and the receiver both to 600 k.c., then slowly increase or decrease the capacity of No. 4 (oscillator padding trimmer), at the same time and continuously tuning back and forth across the signal with the receiver tuning condenser gang. The output meter needle will now be swinging up and down in step with the variation in tuning. Watch the peak of this swinging closely and readjust No. 4 trimmer until the swinging needle reaches its highest peak.

Retune the receiver and broadcast test oscillator to 1400 k.c. and re-check trimmer No. 3 to make sure that the adjustment of No. 4 has not thrown the receiver out of calibration. If it has, then readjust No. 3 until the calibration is correct, (as previously explained), and check on trimmers No. 2 and No. 1, to make sure that the adjustment of No. 4 has not reduced the sensitivity.

MODEL AC 280
Resistance Data
Voltage
Breakdown Chart
Chassis View

TRANSFORMER CORP. OF AMERICA

CIRCUIT RESISTANCE ANALYSIS

Model 280 Socket to ground

Stage	Grid	Cathode	Heater	Plate	Screen G	Suppr. G	Space G
R.F. . . .	Infinity	500	.1	19,200	9,100	.....	.....
1st.det. .	4.	10,000	.1	19,200	9,000	.1	.....
Oscillator	100,000	.1	.1	9,100	.....	.....	.....
I.F. . . .	Infinity	500	.1	19,200	9,100	.....	.....
A.V.C.det.	250,000	500	.1	500	.....	.....	.....
A.V.C.det.	250,000	500	.1	500	.....	.....	.....
Audio. . .	Infinity	1,000	.1	20,300	.....	.....	.....
Output . .	1,940	.....	.1	19,200	.....	.....	19,100
Output . .	1,940	.....	.1	19,200	.....	.....	19,100
Output . .	1,740	.....	.1	19,200	.....	.....	19,100
Output . .	1,740	.....	.1	19,200	.....	.....	19,100
Rectifier.	.....	.....	19,100	1,640	.....	.....	.....

Note: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohm meter in each reading; the individual resistance in the circuit can be readily checked upon removal of chassis.

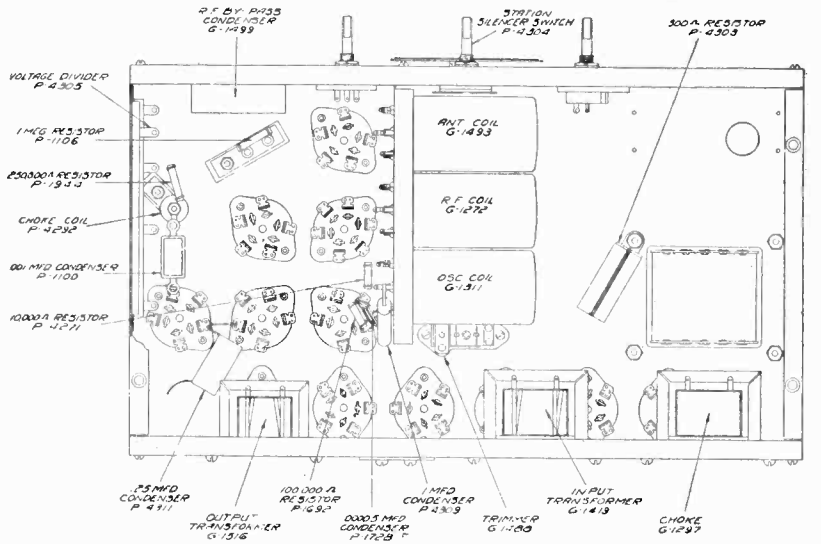
VOLTAGE ANALYSIS

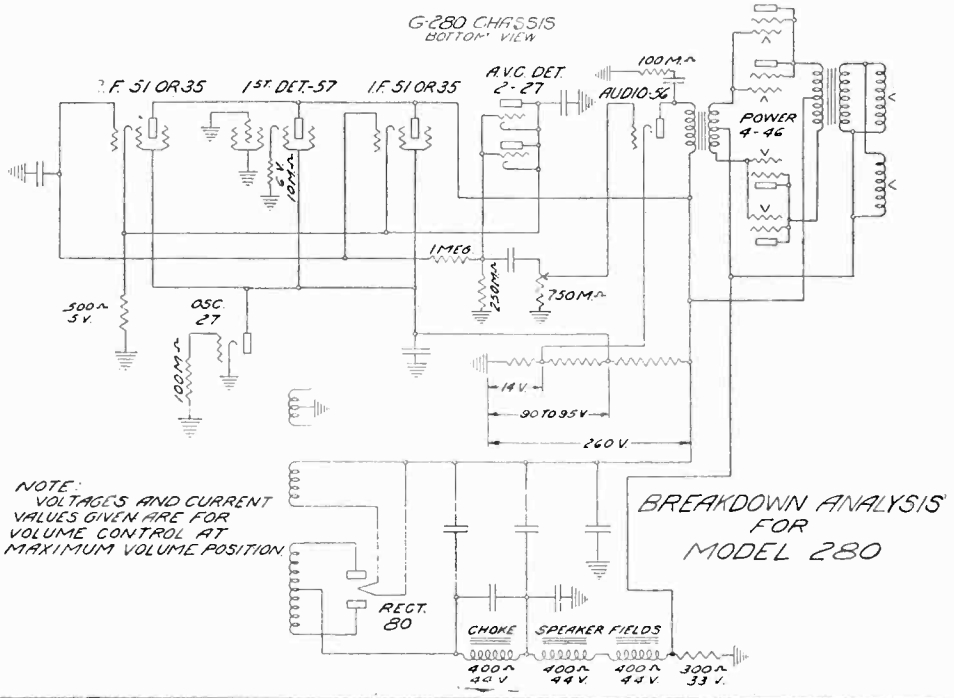
Model 280

No.	Stage	Type Tube	"A" Volts	"B" Volts	Cont. Grid Volts	Cath. Volts	Screen Volts	Ip. Norm.	Misc.
1	R.F. . . .	51	2.2	250	.2	4.	77	4.	.....
2	1st.Det. .	57	2.3	242	4.	5.	85	.25	Suppressor Grid 0
3	I.F. . . .	51	2.2	249	.2	4.	77	2.	.....
4	Osc. . . .	27	2.2	110	.05	0	0	8.	.....
5	Duo.Det. .	27	2.2	0	2.	5.	0	0	.....
6	Duo.Det. .	27	2.2	0	2.	5.	0	0	.....
7	1st.Aud. .	56	2.3	237	3.	9.5	0	3.	.....
8	Output P.P.	46	2.4	245	32.	...	...	3.	Outer Grid Volts 245
9	Output P.P.	46	2.4	245	32.	...	...	3.	245
10	Output P.P.	46	2.4	245	32.	...	...	3.	245
11	Output P.P.	46	2.4	245	32.	...	...	3.	245
12	Rect . . .	80	4.9	340	.....	...	...	108.	.....

Line Voltage 115. Volume Control "Full On". Muting Switch "Out". Tested with Weston Model 565 Analyser.

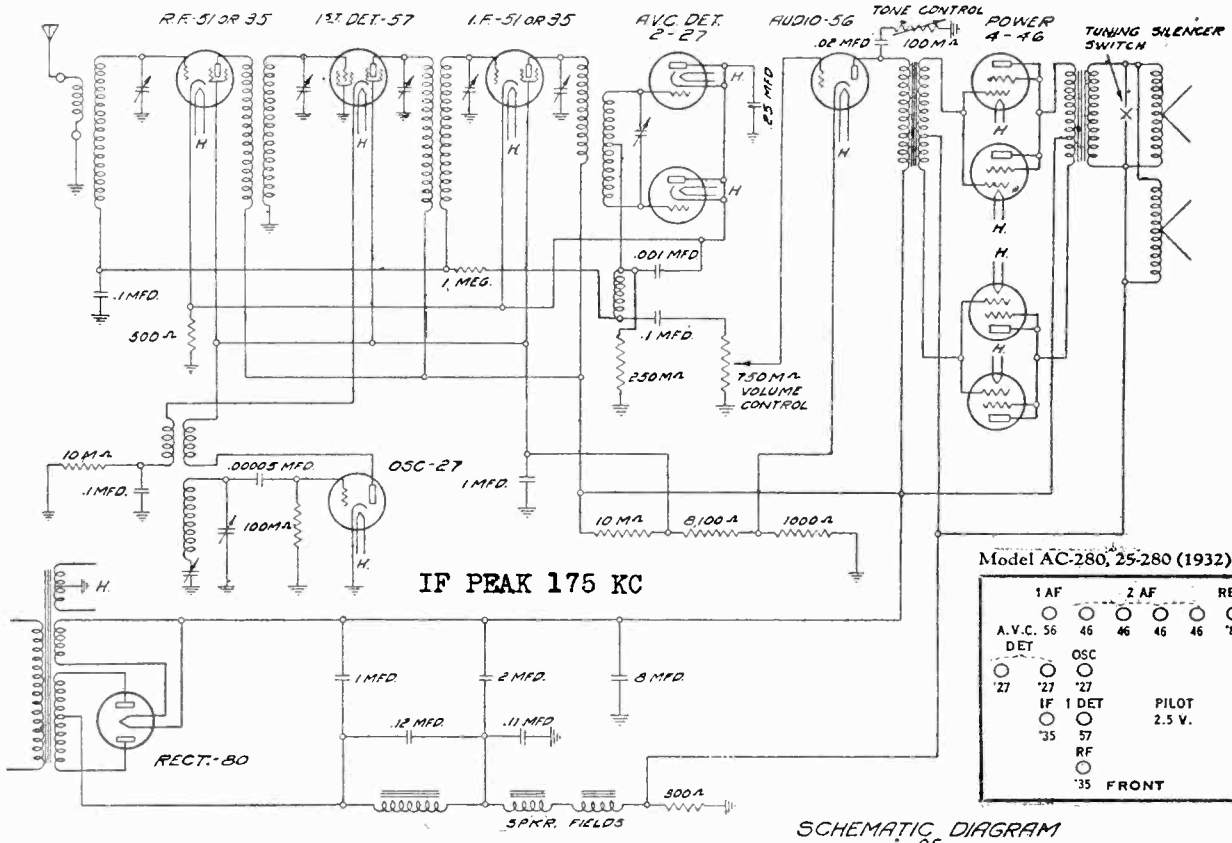
A whistle similar to oscillation is introduced on the side bands of strong stations by too long an aerial. Reducing the physical length of the aerial or connecting a .00025 to .002 microfarads condenser in series with the lead-in, will eliminate this trouble.





TRANSFORMER CORP. OF AMERICA

MODEL AC 280
Schematic
Trimmers

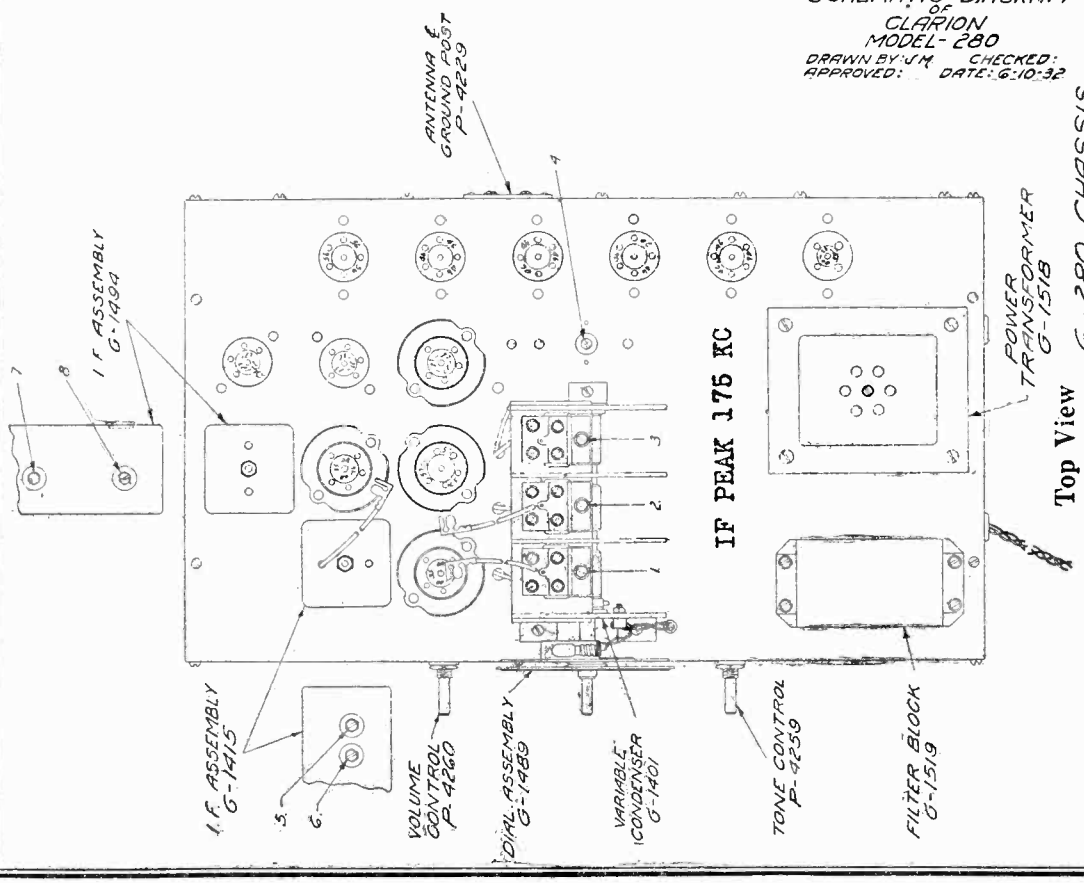


Model AC-280, 25-280 (1932)

1 AF		2 AF			RECT
A.V.C. 56	46	46	46	46	'80
DET	OSC				
'27	'27 '27				
	IF 1 DET		PILOT		
	'35 57		2.5 V.		
	RF				
	'35 FRONT				

SCHEMATIC DIAGRAM
OF
CLARION
MODEL-280

DRAWN BY: JM CHECKED:
APPROVED: DATE: 6-10-32

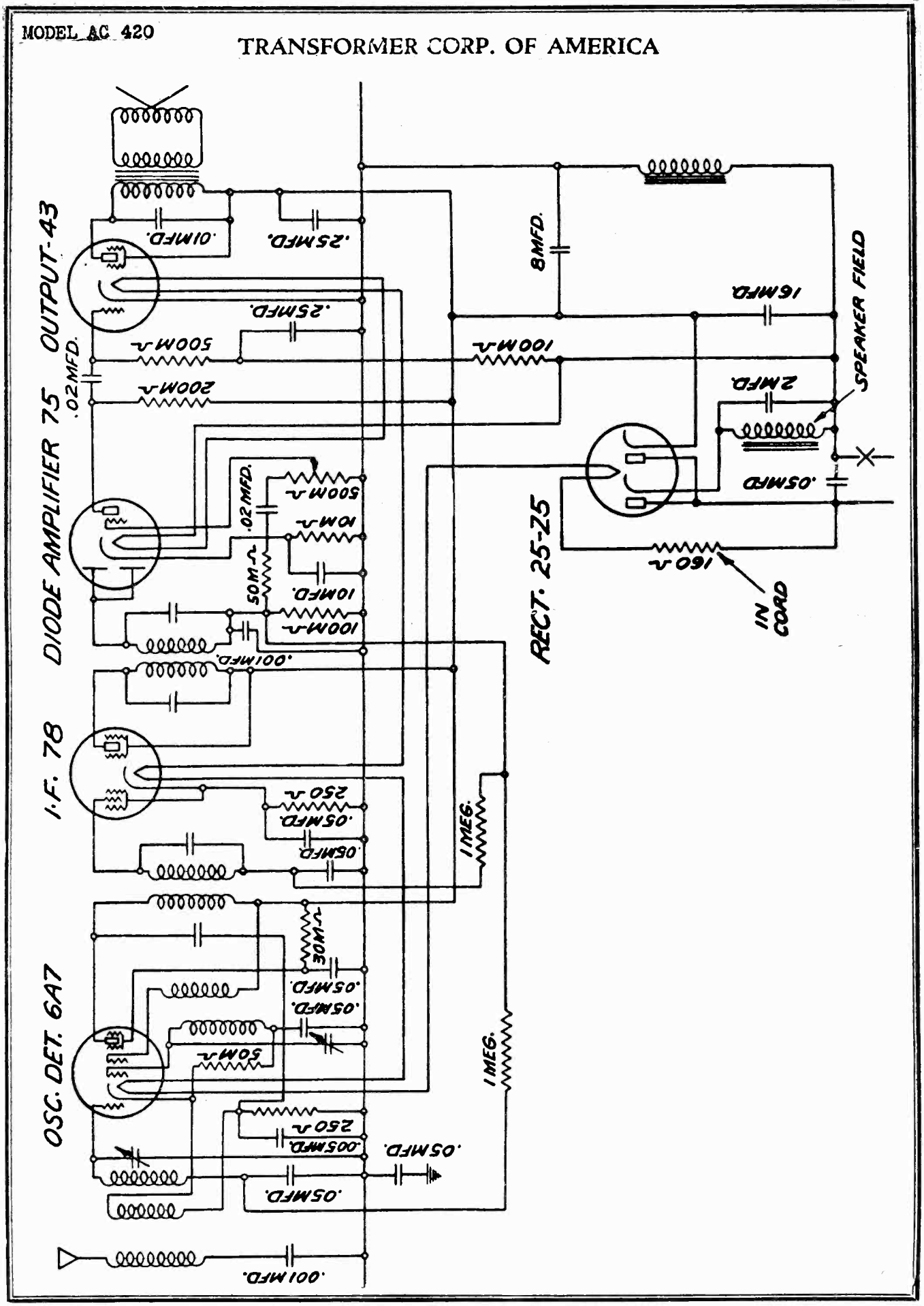


Top View G-280 CHASSIS

No. 1 is the antenna trimmer, No. 2 first detector trimmer, No. 3 oscillator gang trimmer, No. 4 oscillator padding trimmer, No. 5 second detector grid trimmer, No. 6 second detector plate trimmer, No. 7 intermediate frequency grid trimmer, No. 8 intermediate frequency plate trimmer.

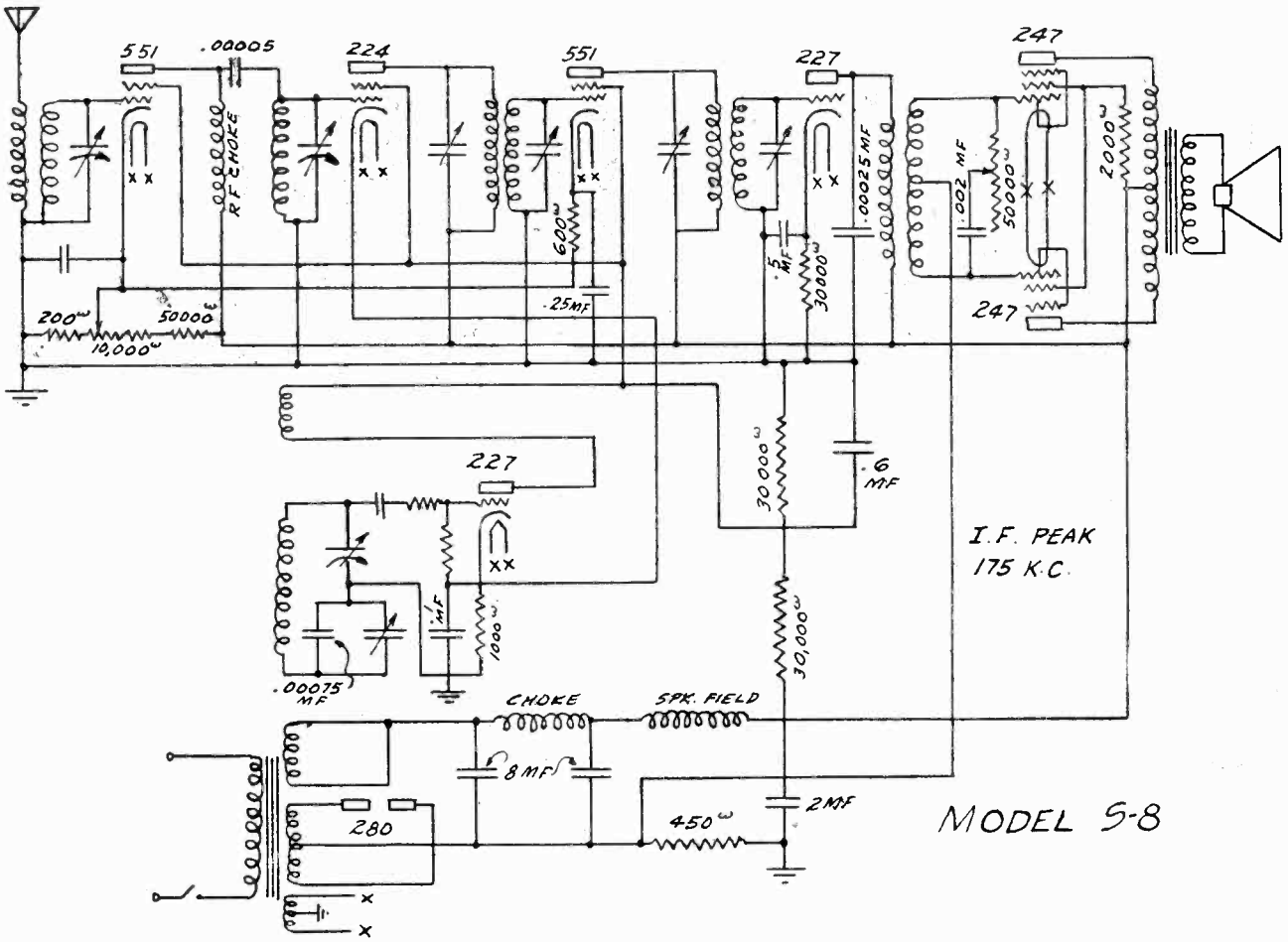
MODEL AC 420

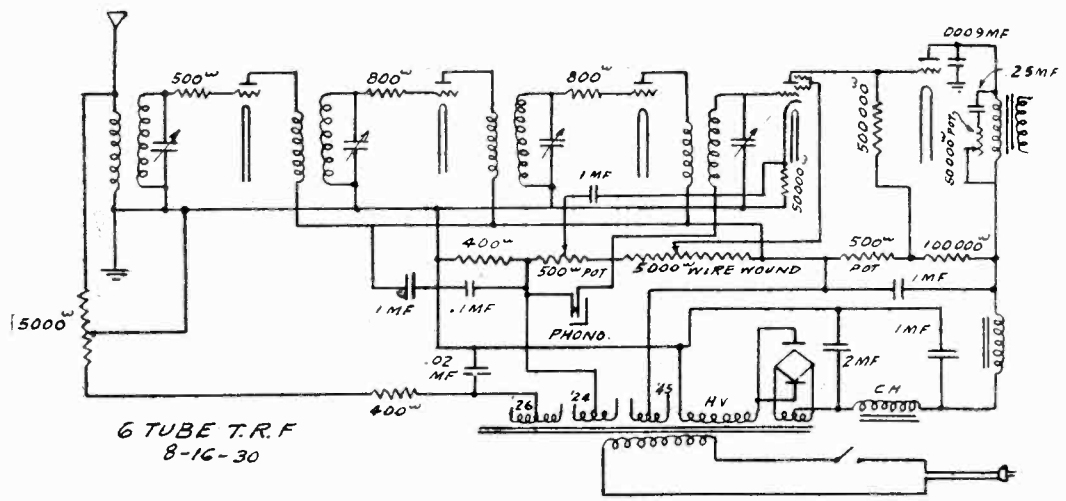
TRANSFORMER CORP. OF AMERICA



TRAV-LER RADIO & TELEVISION CORP.

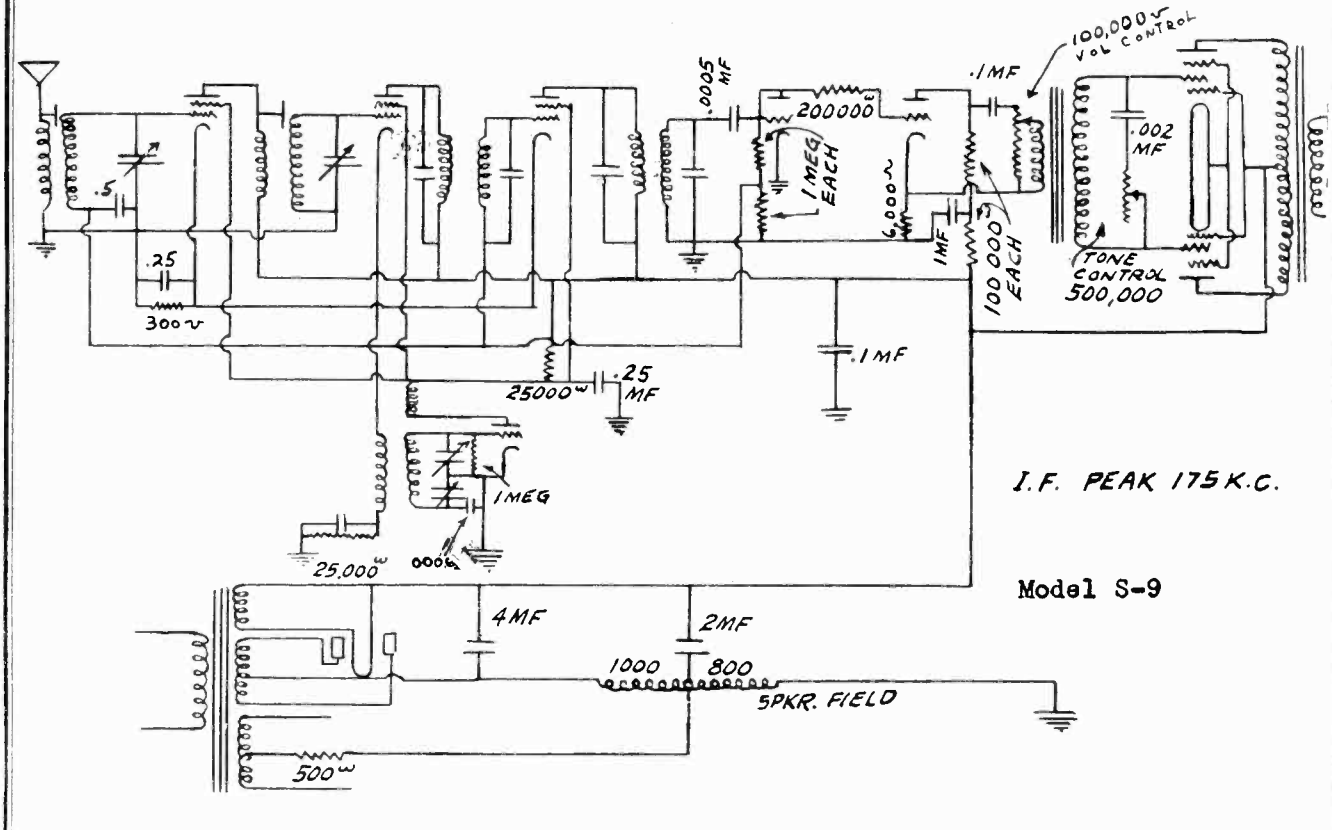
MODEL S-8
MODEL 6 Tube TRF





MODEL S-9
MODEL SG DC

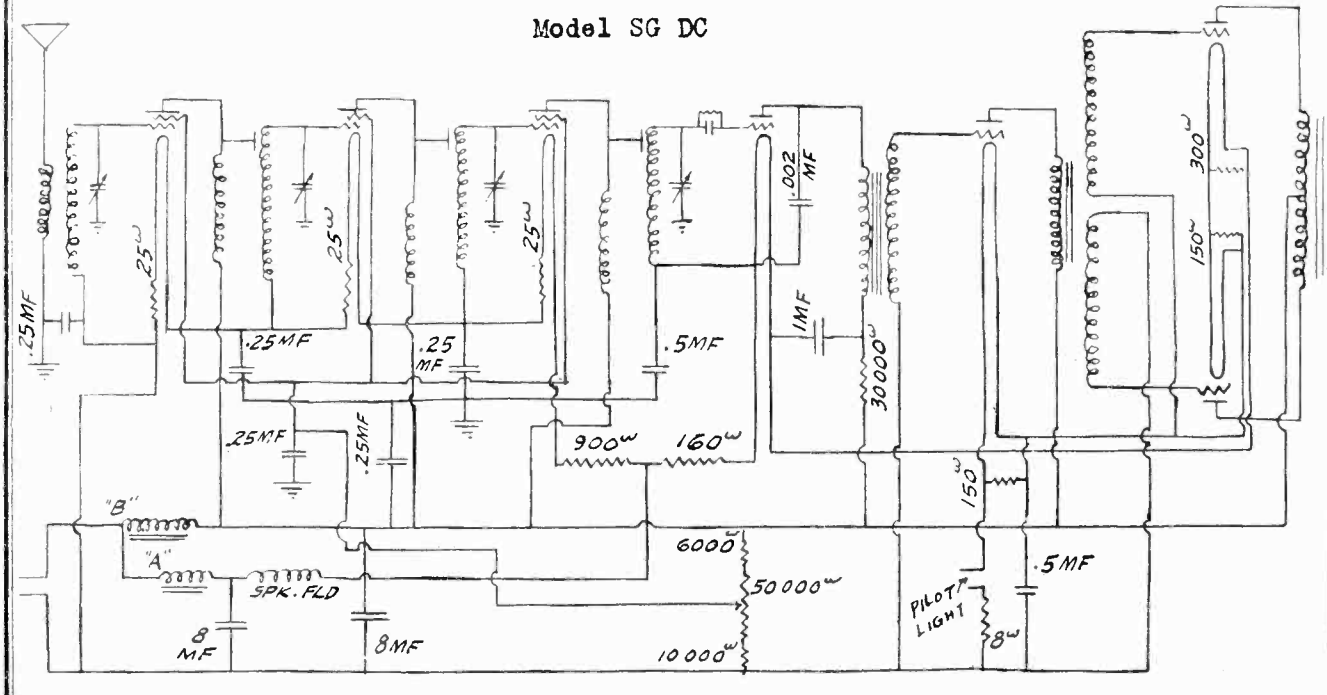
TRAV-LER RADIO & TELEVISION CORP.



I.F. PEAK 175 K.C.

Model S-9

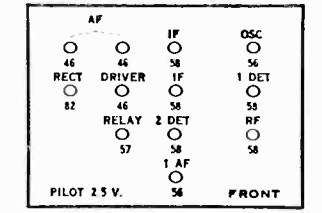
Model SG DC

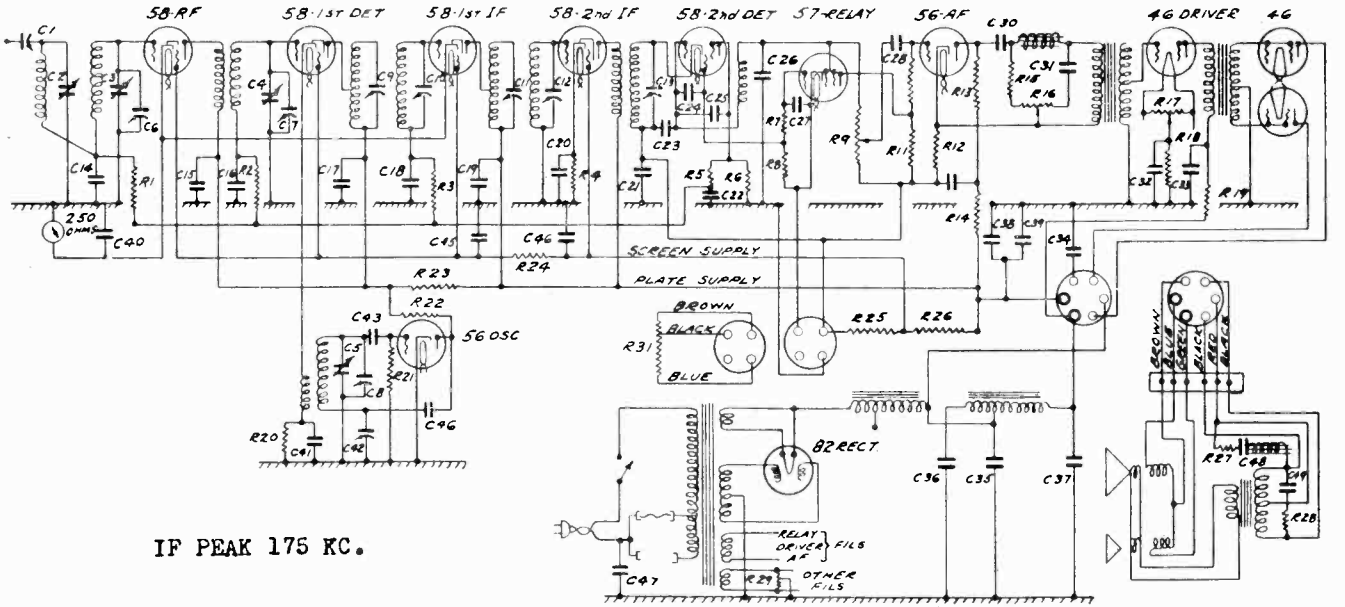


UNITED AMERICAN BOSCH CORP.

MODEL 312,313
Schematic, Voltage

Models 312, 313 (1932)





IF PEAK 175 KC.

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
1st R.F.	58	2.4	180	85	3-6	0
1st Det.	58	2.4	180	90	4.5-10	0
1st I.F.	58	2.4	195	90	3.5-6	0
2nd I.F.	58	2.4	195	90	3.5-6	0
2nd Det.	58	2.4	0	2	40	0
Relay	57	2.4	2	25	0-45	0
1st A.F.	56	2.4	120	1	45	0
Driver	46	2.4	290	290	-	30
Output	46	2.4	430	0	-	0
Output	46	2.4	430	0	-	0
Osc.	56	2.4	75	-	-	-
Rect.	82	2.4	-	-	-	-

Note: These values are readings of a high resistance voltmeter from each socket terminal to ground. The filament voltages are, of course, an exception. Cathode readings are given for those tubes having the grid at ground. The values are only approximate and will vary with the line voltage and the type of meter employed.

R1 - 100,000 ohms
R2 - 100,000 ohms
R3 - 100,000 ohms
R4 - 500 ohms
R5 - 500,000 ohms
R6 - 1 megohm
R7 - 1 megohm
R8 - 2 megohm
R9 - 500,000 ohms
R10 - 1 megohm
R11 - 1 megohm
R12 - 1000 ohms
R13 - 10,000 ohms
R14 - 10,000 ohms
R15 - 10,000 ohms
R16 - 100,000 ohms
R17 - Center Tap
R18 - 1500 ohms
R19 - 5000 ohms
R20 - 5000 ohms
R21 - 100,000 ohms
R22 - 30,000 ohms
R23 - 1000 ohms
R24 - 1000 ohms
R25 - 2800) ohms
R26 - 2400)
R27 - 3000 ohms
R28 - 10,000 ohms
R29 - Mid Tap
R30 - 2100 ohms

C1 - Trimmer
C2 - Tuning
C3 - Tuning
C4 - Tuning
C5 - Tuning
C6 - Alignment
C7 - Alignment
C8 - Alignment
C9 - Alignment
C10 - Alignment
C11 - Alignment
C12 - Alignment
C13 - Alignment
C14 - .05 mfd.
C15 - .05 mfd.
C16 - .06 mfd.
C17 - .05 mfd.
C18 - .05 mfd.
C19 - .05 mfd.
C20 - .05 mfd.
C21 - .05 mfd.
C22 - .05 mfd.
C23 - 100 mmf.
C24 - .05 mfd.
C25 - .06 mfd.
C26 - 100 mmf.
C27 - .1 mfd.
C28 - .05 mfd.
C29 - .5 mfd.
C30 - .1 mfd.
C31 - .05 mfd.
C32 - 8. mfd.
C33 - 4.)
C34 - 4.) mfd.
C35 - 8.)
C36 - 4.)
C37 - 8.) mfd.
C38 - 4.)
C39 - 4.)
C40 - .05 mfd.
C41 - .05 mfd.
C42 - Alignment
C43 - 100 mmf.
C44 - .05 mfd.
C45 - .05 mfd.
C46 - .05 mfd.
C47 - .01 mfd.
C48 - 2. mfd.
C49 - .01 mfd.

MODEL MU-6 Ed 1
Magmotor
Schematic -Data

UNITED AMERICAN BOSCH CORP.

To use MU6 180 Ed. 1 with Model 7 Philco Receivers:

(a) Use Philco "B" shielded cable which comes with that set. Cut away the black and white lead at the fuse and discard the two fuse blocks and attached wires.

(b) Remove cover of chassis and unsolder the wire in the large prong (diagonally opposite the smaller prong) and solder on an insulated wire of large gauge sufficiently long to reach the 6-volt battery. Ground the prong from which the above wire was removed.

(c) Attach a large gauge wire insulated to the socket prong which is first in the "High A" circuit.

(d) Connect the blue-white wire of the Philco "B" cable to the +180 terminal of the Magmotor, the green-white wire to the +90 terminal and the black-yellow wire to the -B terminal.

(e) Connect wire under "c" to +A terminal of Magmotor.

(f) Connect wire added under "b" to ungrounded terminal of "A" battery.

(g) Plug all cables into receiver, switch should operate receiver and Magmotor simultaneously.

(h) Connect 2 mfd. of Magmotor between "180" and "-B".

To use MU6 180 Ed. 1 with Model 3 Philco Transitone Receiver:

(a) Connect to that terminal in the receiver which carries high A from the control head, a large gauge copper wire of sufficient length to reach the Magmotor. Drape this wire through a corner of the chassis housing.

(b) Attach to side of chassis housing a dry electrolytic condenser 4 mfd. in this container ¾" x 1⅜" x 4¼". Connect plus side of this condenser to +B terminal in receiver and minus side to high A terminal which is the same terminal as noted under "c" for Super Deluxe Motorola.

(c) Arrange 2 mfd. condenser of Magmotor between +B brush and -B terminal of Magmotor structure.

To use MU6 180 Ed. 1 with Model 7T47A Super Deluxe Motorola:

(a) Remove cable terminal cover from back of receiver chassis and find "AH" (A high) terminal which is designated on connection diagram in the cover of the chassis housing. Bare the larger of the two wires connected to "AH" and attach additional wire of large gauge and of sufficient length to reach Magmotor. Tape up joint.

(b) Drill a hole in end of cable terminal cover and pass wire which was attached as above. The loose end of this wire should be connected to the "A" terminal of the Magmotor.

(c) Connect a 4 mfd. dry electrolytic condenser (approximately ¾" x 1⅜" x 4¼") metal case between +B and -B terminals as they are designated in diagram in chassis housing cover. Polarity of this condenser must be correctly arranged when making connections. This condenser must be supported on the back of the housing and wires run through holes to put into side of cable terminal cover.

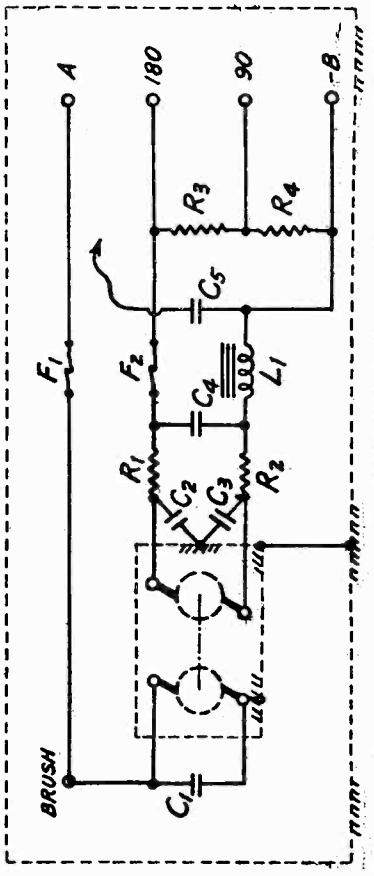
(d) Connect the "B" cable wires to proper terminals of Magmotor red to +180, green to +90, white to -B.

(e) Connect 2 mfd. of Magmotor between "180" and "-B".

To use MU6 180 Ed. 1 with American Bosch Model 100

(a) Apply American Bosch standard shielded Magmotor cable which has been equipped with spade tips at Magmotor end. Ground shield through band clamp to housing base.

(b) Connect 2 mfd. of Magmotor filter between +B terminal and -B terminal.



R1	50 ohms	
R2	50 ohms	
R3	15000 ohms	
R4	20000 ohms	
L1	60 ohms	
F1	10 amp.	
F2	⅛ amp.	
C1	.5 mfd.	
C2	.05 mfd.	
C3	.05 mfd.	
C4	.5 mfd.	
C5	2. mfd.	

INSTRUCTIONS for INSTALLING and OPERATING

THE AMERICAN BOSCH MAGMOTOR

Type MU 6 180 Ed. 1

A. GENERAL DESCRIPTION

The American Bosch Magmotor is a rotating device for converting 6 volts direct current, as supplied from a storage battery, to 180 volts direct current for use as a plate supply for motor car radio sets.

The Magmotor is essentially a dynamotor having a double commutator armature which has two separate independent windings, one wound for 6 volts as a motor winding, and the other wound for 180 volts as the generator winding. Both of these windings occupy the same armature slots and thus form a very compact and efficient unit since only two sets of bearings are required. The 6 volt winding is connected to a 7 bar commutator which is supplied with current from two copper graphite brushes. The high voltage winding is connected to a 14 bar commutator which delivers current to two high resistance carbon brushes. The two pole field structure is magnetically excited by means of an ordinary horse shoe magnet, very similar to that used on magnetos. This has the advantage of compactness and higher efficiency since the field current is eliminated.

The complete magmotor assembly is mounted on a steel base with four brackets which support the cover and provide the means for mounting the unit on the car. The power unit is insulated from its mounting by means of rubber cushions which permits the motor to run freely and quietly, completely eliminating vibration and noise

B. INSTALLATION

1. Before mounting the magmotor on the car it must first be determined whether the car battery is grounded from the positive (+) or negative (—) terminal. The connections on the magmotor are made for operation with the plus terminal of the battery grounded as the battery connections on most cars are arranged in this manner, but if the minus terminal of the battery is grounded the connections to the plus and minus terminals on the magmotor must be reversed. This is important.

When the minus terminal of the battery is grounded proceed as follows: Remove the cover from the magmotor. Disconnect the black (grounded) wire from the terminal clip on top of the magmotor at the magnet end. Disconnect the red (positive) wire from the terminal clip at the bottom of the magmotor at the magnet end and reverse the position of these two wires. The supporting clip crimped to the red wire and fastened by the brush mounting screw should also be transferred. The use of this clip is important as it will prevent vibration and possible breakage of the red wire.

2. Position and Mounting:

The magmotor must be mounted in a horizontal position and absolutely level to avoid bearing thrust in any direction. Whenever possible the unit should be placed in a position where it will be readily accessible and will permit removal of the cover. It can be mounted on the bulkhead, in the engine compartment or under the front seat, wherever most convenient and the length of the connecting cable to the receiver will permit. The magmotor is secured by means of four studs passed through holes drilled in the support. The four holes are spaced 2-1/16" by 6-3/4". After the holes have been drilled use the nuts and lock washers provided to fasten the unit in place.

C. SERVICE INFORMATION

1. Lubrication:

It is very important that the efficiency of the magmotor should be as high as possible and for this reason, friction losses such as bearing friction and brush friction, should be at a minimum. The ball bearings must run very freely and must not, under any circumstances, be lubricated with vaseline or ball bearing grease, such as is ordinarily used in magnetos, as these lubricants will materially increase the friction load. The ball bearings should be free from all traces of grease and dirt and should spin freely.

Two or three drops of Bosch US506 oil on the bearings about once a year is sufficient lubrication.

2. Brushes:

The Magmotor has four brushes, two in the input (magnet) end and two in the output (filter) end. The brushes in the input end are made of copper graphite and carbon brushes are used in the output end. The brushes in the input end can be distinguished by their copper color, and under no circumstances must these brushes be interchanged with the carbon brushes. When new brushes are required the complete brush holder assembly should be replaced. It is very important that the proper grade of brushes are used and no brushes should be used except those furnished by the United American Bosch Corporation.

3. Ball Bearings:

The ball bearings are held in place by means of set screws (7 Fig. 1) located in the top of each end plate. Extreme care must be exercised when these set screws are tightened because if they are screwed down too tightly it is possible to distort the ball bearing sufficiently to increase the friction in the bearing. The set screws should be carefully tightened while the armature is rotating and with an ammeter in circuit so that the current drain may be observed. There are two set screws in each end cap, the top one locking the lower one in place. Both of the set screws must be removed when disassembling the unit.

4. Magnetizing:

The magnet should retain its original magnetic strength for an indefinite period but there are factors that may cause dissipation of the magnetism as, for example, the removal of the armature. It is advisable, therefore, to remagnetize the magnet after any work has been done on the power unit especially if the armature has been taken out.

The unit should be completely assembled when magnetizing in order to obtain the proper field excitation. This can be done on a standard Bosch or American Bosch Magnetizing Stand.

5. Testing:

Current Input and Output:

The current input on the 6 volt side, without any load on the high voltage side, should be between 0.8 and 1.1 ampere maximum. When the power unit only without the filter system is tested the unit should give an output of 200 volts D.C. 40 milliamperes, with an input of 2.6 to 2.8 amperes at 6 volts. With the filter system in circuit the terminal voltage should not be less than 160 volts with a load of 40 milliamperes and a maximum input of 2.8 amperes at 6 volts.

6. Resistors and Condensers:

The position in which the resistors and condensers are placed has a direct bearing on the efficiency of the magmotor and if it is necessary to replace any of these parts it is of the utmost importance that they be placed in exactly the same position as the part removed. The leads must also be of the same length and gauge, or larger and must be placed in the same position as the ones removed.

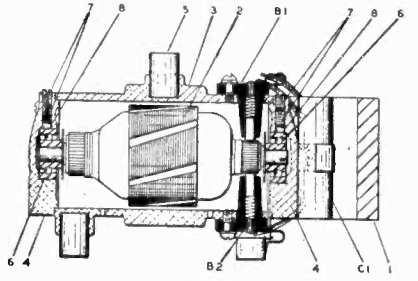


Fig. 1
Cross Sectional View of Magmotor Power Unit

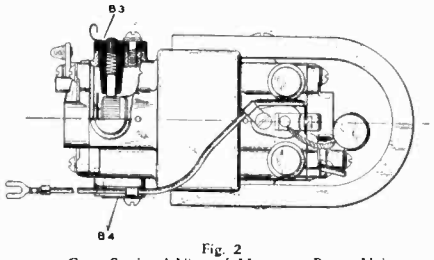


Fig. 2
Cross Sectional View of Magmotor Power Unit viewed from bottom

4. Nomenclature:

1. Magnet
2. Armature
3. Magmotor frame
4. End plates
5. Rubber cushions
6. Ball bearings
7. Ball bearing set screws
8. Felt plug
C1. Condenser
B1. Brush holder
B2. Brush holder
B3. Brush holder
B4. Brush holder

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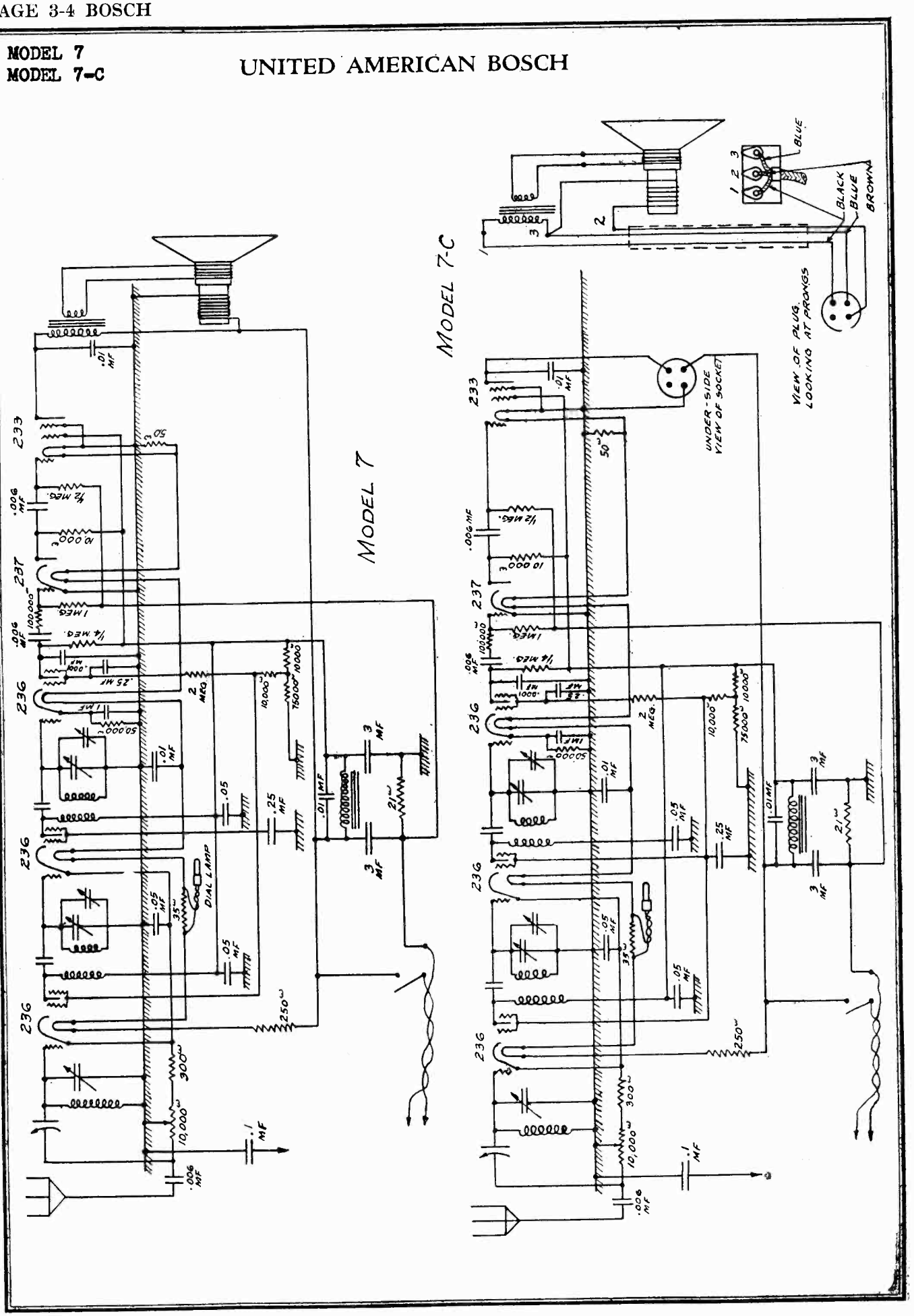
MODEL MU-6 ED 1
Magmotor
Applications

MODEL 7
MODEL 7-C

UNITED AMERICAN BOSCH



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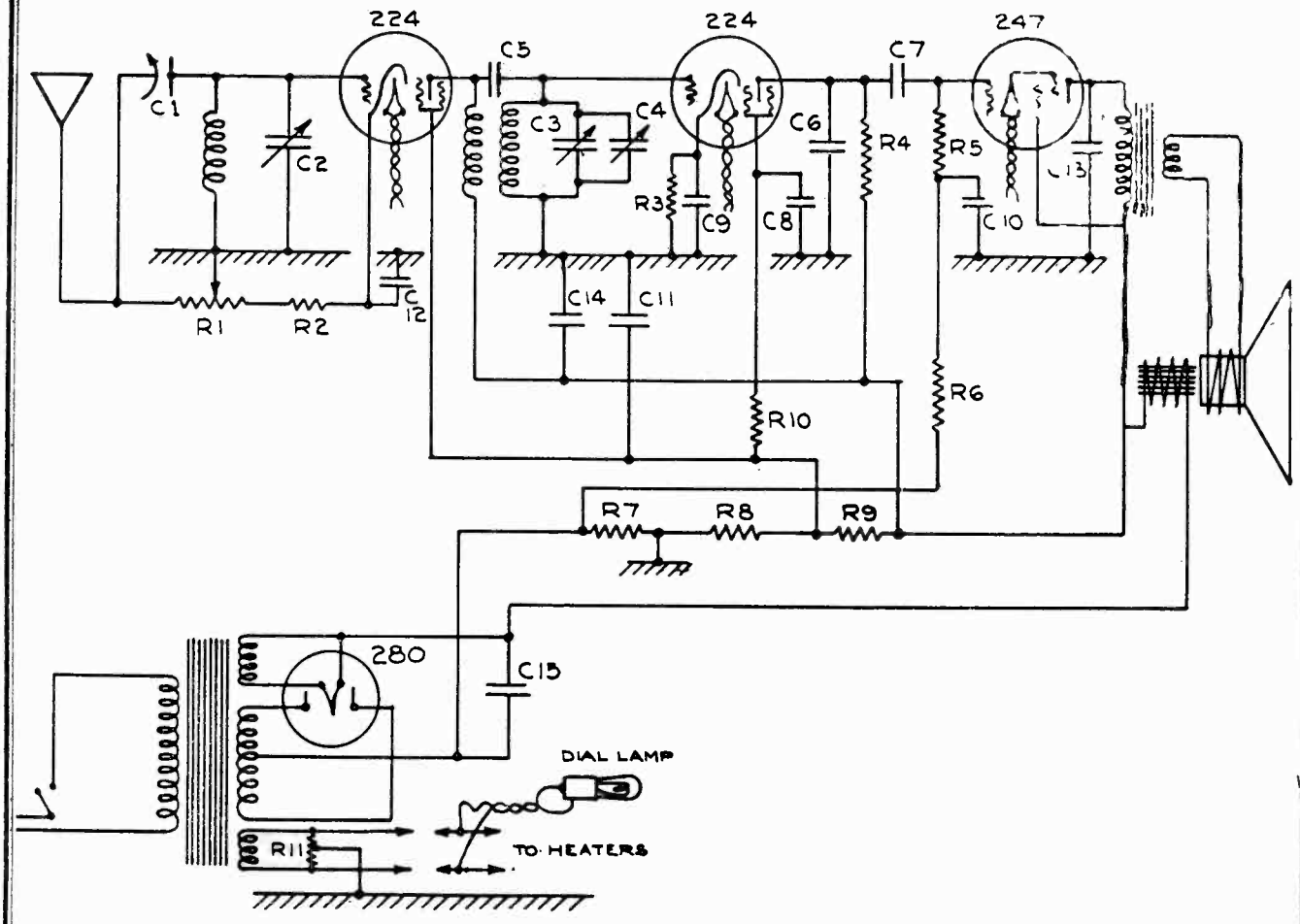
MODEL 4 (Essex)
Schematic
Voltage



Schematic Wiring Diagram - Model 4 Receiver

R1 - Volume Control
R2 - 600 ohms
R3 - 50,000 ohms
R4 - 1 megohm
R5 - 1/2 megohm
R6 - 100,000 ohms
R7 - 400)
R8 - 11,500)ohms
R9 - 19,000)
R10 - 2 megohms
R11 - Center Tap
C1 - Antenna Trimmer
C2 - Condenser Gang

C3 - Condenser Gang
C4 - Condenser Gang
C5 - Coupling Capacity
C6 - .0001 mfd. mica
C7 - .005 3 ply
C8 - .25 2 ply
C9 - .25 2 ply
C10 - .05 2 ply } By-pass unit
C11 - .05 2 ply
C12 - .05 2 ply
C13 - .01 3 ply
C14 - 8 mfd.) Filter unit
C15 - 4 mfd.)

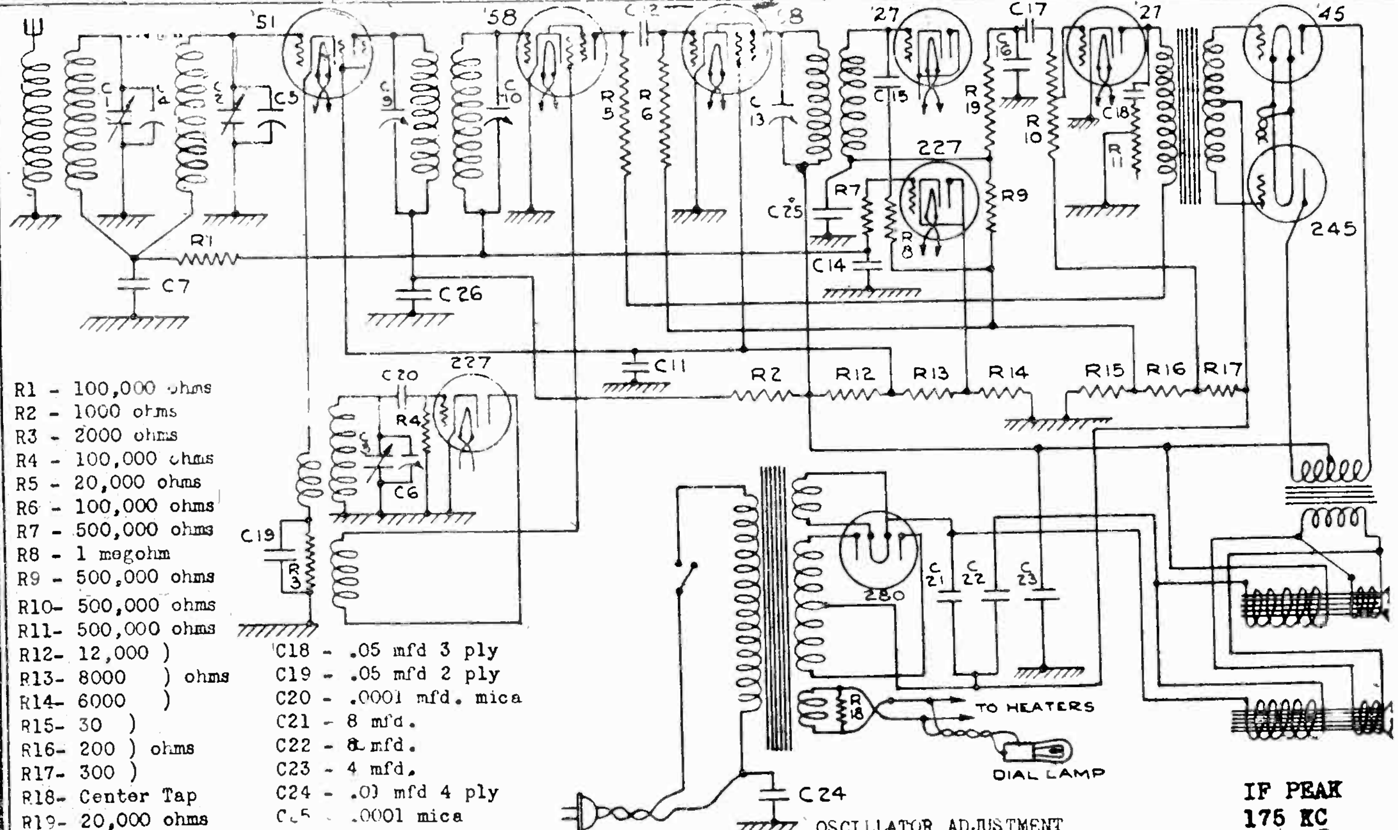
Socket Voltage Readings - Model 4 Receiver

	224 1st RF	224 Det.	247 Audio	280 Rect.
Filament	2.2	2.2	2.2	4.5
Plate	250	250	250	-
Screen	90	90	250	-
Bias	2.5	-	45	-

MODEL 10 (Essex)
Schematic
Voltage

UNITED AMERICAN BOSCH CORP.

	Osc. '27	1st Det. 551	1st IF 58	2nd IF 58	AVC 227	2nd Det. 227	AF 227	AF '45	Rect. 280
Fil	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	4.5
Plate	85	228	105	232	36	-	225	225	-
Screen	-	85	85	85	-	-	-	-	-
Bias	7	2.6	2.6	-	-	-	19	45	-



IF PEAK
175 KC

R1 - 100,000 ohms
R2 - 1000 ohms
R3 - 2000 ohms
R4 - 100,000 ohms
R5 - 20,000 ohms
R6 - 100,000 ohms
R7 - 500,000 ohms
R8 - 1 megohm
R9 - 500,000 ohms
R10- 500,000 ohms
R11- 500,000 ohms
R12- 12,000)
R13- 8000) ohms
R14- 6000)
R15- 30)
R16- 200) ohms
R17- 300)
R18- Center Tap
R19- 20,000 ohms
C1 - Condenser Gang
C2 - Condenser Gang
C3 - Condenser Gang
C4 - Condenser Gang
C5 - Condenser Gang
C6 - Condenser Gang
C7 - .04 mfd. 3 ply
C8 - .05 mfd. 3 ply
C9 - 7 to 70 mmf.
C10 - 7 to 70 mmf.
C11 - .5 mfd.
C12 - .0005 mfd.
C13 - 7 to 70 mmf.
C14 - .05 mfd. 2 ply
C15 - .0001 mfd mica
C16 - .0001 mfd mica
C17 - .05 mfd 2 ply
C18 - .05 mfd 3 ply
C19 - .05 mfd 2 ply
C20 - .0001 mfd. mica
C21 - 8 mfd.
C22 - 8 mfd.
C23 - 4 mfd.
C24 - .0) mfd 4 ply
C̦5 - .0001 mica
C26 - .1 mfd 3 ply

OSCILLATOR ADJUSTMENT

1. Adjust scale so that the indicator will be on the second line from the left, when the gang is entirely closed.
2. Connect ant. lead of the R. F. Oscillator to the grid of the 1st Detector.
3. Set the oscillator and set scale at 1400 Kilocycles.
   a) Peak the oscillator condenser on the second signal heard, when turning the condenser out. The osc. condenser is the front align. cond. on the variable condenser gang.
4. Connect ant. lead of the R. F. oscillator to the antennae lead of the set.
   a) Without touching the oscillator condenser, align the R. F. and ant. alignment condensers to the 1400 Kilocycle signal, until maximum sensitivity is obtained.
5. Check sensitivity at 1400 Kilocycles. Limit is 20 microvolts.
   Check sensitivity at 1000 Kilocycles. Limit is 20 microvolts.
   Check sensitivity at 550 Kilocycles. Limit is 20 microvolts.
6. If set lacks sensitivity at 600 or 550, the plates of the condenser gang should be adjusted until the set will reach the sensitivity limits.
7. If set does not track at 600, readjust plates of osc. section of gang condenser.

I. F. ADJUSTMENT

Connect five leads to speaker. Set Volume Control at max., Tone Control on base, and ground antenna lead. Connect the 175KC osc. to the grid of the 2nd IF tube.
(a) Align the 2nd IF trans. for max. sensitivity. 20,000 u.v.
(a) Align the 1st and 2nd IF coils for max. sens. Limit: 500 u.v.

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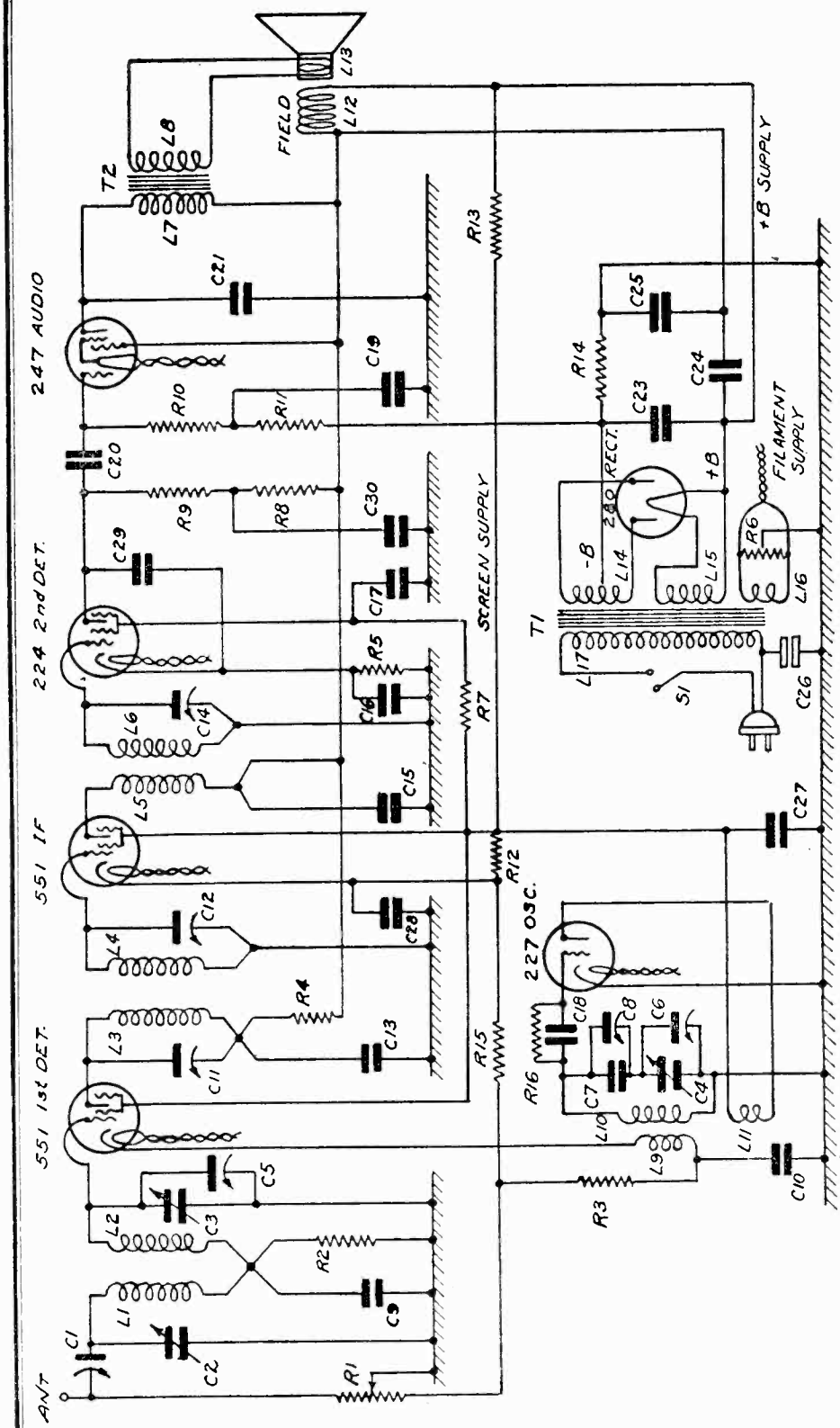
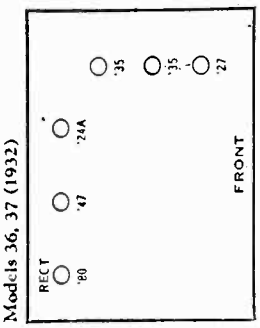
MODEL 36,37 AC
Schematic
Transformer Data



Schematic Wiring Diagram of Model 36 Receiver

IF PEAK 175 KC



Resistors are RMC Coded.

Power Transformer Leads

Primary- Stranded wires. Terminal strip side.

'24 and '27 Filaments:- Heavy wires. Terminal strip side.

'80 Filament:- Small wires. Opposite side.

'80 Plates:- Stranded wires. Opposite sides.

'80 Center tap:-Stranded wire nearest rear of set. Opposite side.

Line Voltage

The model 36 receiver is designed for use on 50 to 60 cycle alternating current, 105 to 120 volts. The model 37 is designed for 25 to 50 cycle, 105 to 120 volt alternating current.

Loud Speaker

The electro-dynamic speaker consists of four principal assemblies, diaphragm with moving coil and centering spring—frame—field magnet and pole—field coil.

The construction of the speaker is so simple that the method of replacing any part is self evident. The pole of the field magnet is centered exactly in the opening of the frame by four small steel dowel pins which accurately relocate these two parts after the speaker has been disassembled. It is essential that the air gap around the pole piece is exactly uniform. The moving coil must also be centered exactly in the air gap. If the diaphragm is replaced this adjustment is best made by placing four strips of thick paper or card in the space between the outside of the moving coil and the frame before tightening the screw holding the bronze diaphragm centering spring against the end of the pole piece.

A rattle in the speaker may be the result of a wire touching against the diaphragm, a loose part in the receiver, or the diaphragm incorrectly centered. In the latter case it must be centralized as described in the preceding paragraph.

Alignment Instructions:

The following instructions for the alignment of the condensers in the models 36 and 37 describe the operation as done with any type of special oscillator designed for the adjustment of superheterodyne receivers. Such an oscillator is essential for anyone who handles more than a small amount of service work. Such oscillators are designed to provide ordinary broadcast frequencies, and in addition, a 175 kilocycle for the alignment of the intermediate frequency (I. F.) stages.

There are seven alignment adjustments on the receiver. The location, together with the schematic diagram reference numbers, are given below.

Antenna Alignment (C1)—on rear of condenser gang.

Oscillator Shunt Condenser (C6)—on front stator of condenser gang.

Oscillator Series Condenser (C8)—on side of base, near front.

Preselector Alignment (C5)—on middle stator of condenser gang.

1st IF Alignment (Plate) (C11)—on side of base, lower rear.

1st IF Alignment (Grid) (C12)—on side of base, upper rear.

2nd IF Alignment (C14)—on coil can over speaker.

1—Connect 175 KC output of oscillator to grid terminal of 1st detector (unshielded type 551 tube) and set dial at 55. Align 2nd IF condenser C14.

2—With input and dial setting as above, align 1st IF condensers C11 and C12.

3—With input and dial setting as above, recheck step No. 1.

4—With input on grid of 1st detector set dial at 140 and align oscillator shunt condenser C6. Align on the second peak out from maximum capacity of condenser.

5—Connect input of oscillator to antenna. Align antenna trimmer C1 and preselector condenser alignment C5.

6—Set receiver at 60 and tune in oscillator input. Adjust oscillator series condenser C8 by "max-max" method. (Move condenser gang slowly back and forth and at the same time adjust oscillator series condenser C8 for maximum response).

7—Set dial at 1400 and tune oscillator to set. Align oscillator shunt condenser C6, preselector condenser C5, and antenna trimmer.

IMPORTANT

The trimmer condenser mounted on the condenser gang must be adjusted for maximum volume.

No tubes should be removed from the set while it is in operation. To do so will damage the 247 tube.

Filter Condenser

Black-To centre tap of '80 winding.
Green-To filament terminal of '80 tube.
Red-To plus B connection of terminal strip.

NOMENCLATURE

R1—Volume Control—10,000 ohms
R2—Coupling Resistor—1000 ohms
R3—1st Det. Cathode Resistor 5000 ohms
R4—1st. Det. Plate Resistor 1000 ohms
R5—2nd Det. Cathode Resistor—25,000 ohms
R6—Mid Tap Resistor
R7—2nd Det. Screen Resistor— 5 megohms
R8—2nd Det Plate Resistor— .1 megohm
R9—2nd Det. Plate Resistor— .5 megohms
R10—Audio Grid Resistor—½ megohm
R11—Audio Grid Resistor—100,000 ohms
R12—Divider Resistor—20,000 ohms
R13—Screen Supply Resistor—30,000 ohms
R14—Audio Bias Resistor—350 ohms
R15—Cathode Resistor—300 ohms
R16—Oscillator Grid Resistor—100,000 ohms

C1—Antenna Trimmer
C2—Tuning Condenser
C3—Tuning Condenser
C4—Oscillator Tuning Condenser
C5—Alignment Condenser
C6—Oscillator Tuning Alignment
C7—Oscillator Tuning Condenser 1350 mmf
C8—Oscillator Alignment
C9—RF Coupling Condenser .05 mfd.
C10—Cathode By-pass Condenser .05 mfd.
C11—I. F. Alignment Condenser
C12—I. F. Alignment Condenser
C13—1st Det. Plate By-pass .05 mfd.
C14—Alignment Condenser
C15—I. F. Plate By-pass .05 mfd
C16—2nd Det. Cathode By-pass .5 mfd.
C17—2nd Det. Screen By-pass .25 mfd.
C18—Oscillator Grid Condenser .0001 mfd
C19—Audio De-coupling Condenser .05 mfd.
C20—Audio Coupling Condenser .01 mfd.
C21—Audio Plate Condenser .006 mfd
C23—Filter Condenser 8 mfd.
C24—Field Tuning Condenser .05 mfd
C25—Filter Condenser 4 mfd.
C26—Buffer Condenser .01 mfd.
C27—Screen By-pass Condenser 8 mfd.
C28—I. F. Cathode By-pass .02 mfd.
C29—2nd Det. Plate By-pass .0001 mfd.
C30—2nd Det. Plate By-pass .01 mfd.

T1—Power Transformer
T2—Output Transformer

L1—RF Coil
L2—RF Coil
L3—I.F. Coil (Primary)
L4—I.F. Coil (Secondary)
L5—I.F. Coil (Primary)
L6—I.F. Coil (Secondary)
L7—Audio Transformer (Primary)
L8—Audio Transformer (Secondary)
L9—Oscillator Coupling Coil
L10—Oscillator Grid Coil
L11—Oscillator Plate Coil
L12—Speaker Field
L13—Speaker Voice Coil
L14—Filament Winding
L15—Filament Winding
L16—Plate Winding
} Power Transformer

SOCKET VOLTAGES

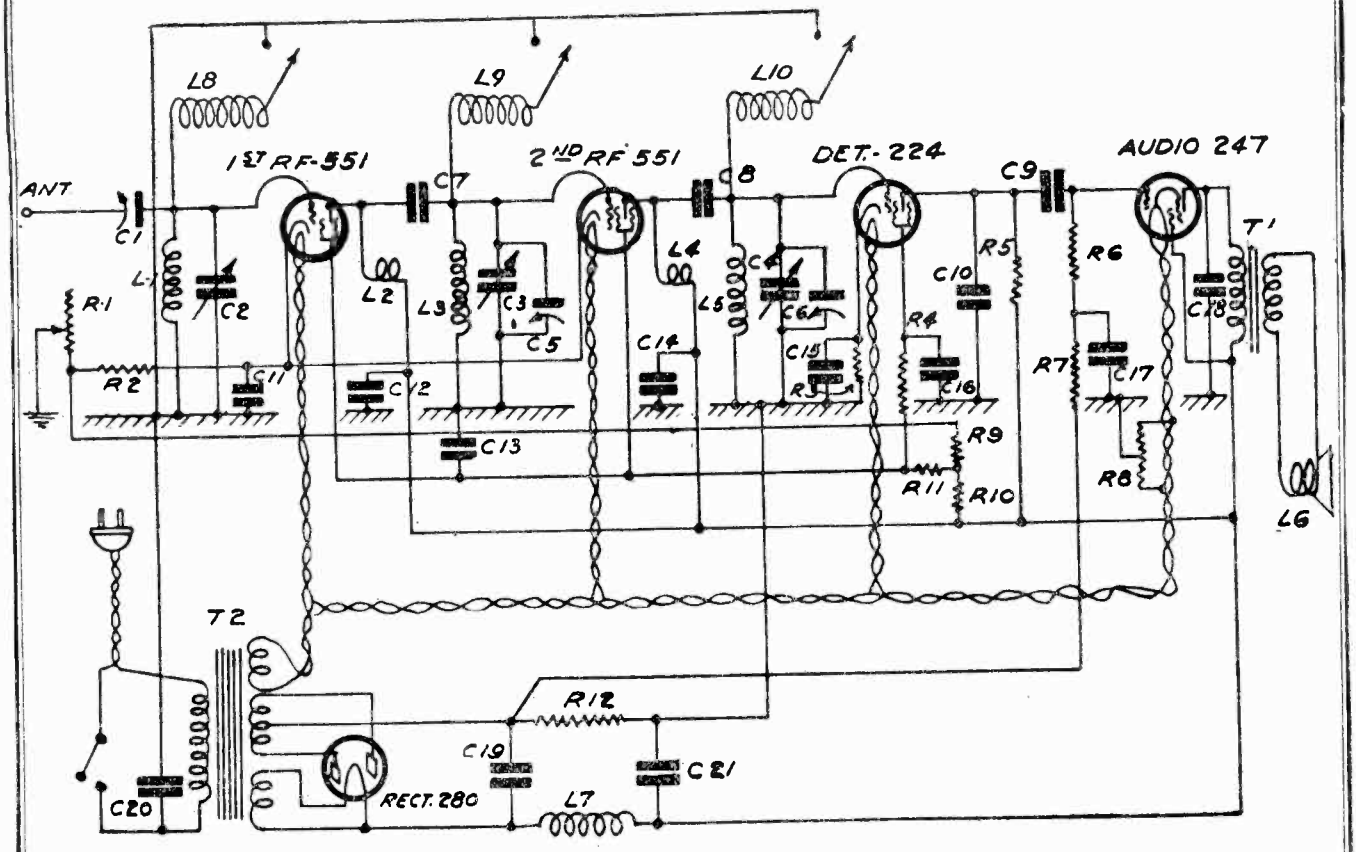
Stage	Tube	Plate	Screen	Cathode	Grid	Fil.	Plate MA
1st Det.	551	250	80	35	8	2.2	2
Oscillator	227	75	..	*0	*0	2.2	8
I.F.	551	250	80	3	3	2.2	4
2nd Det.	224	60	*5	2	2	2.2	*.1
Audio	247	250	250	..	*3	2.2	32
Rectifier	280					4.8	29-29

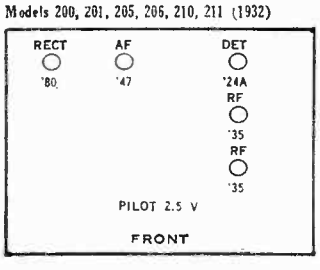
Line voltage--115 volts — Volume control fully "on"

* These values will vary considerably with the type of test kit employed, due to the high resistance in the circuit.

UNITED AMERICAN BOSCH CORP.

MODEL 200,201
Schematic
Parts List





Schematic Diagram of Model 200 Receiver

ELECTRICAL VALUES

R1	- 10,000 ohms	R11	- 10,000 ohms	C9	- .006 mfd.	C19	- 8. mfd.
R2	- 200 ohms	R12	- 400 ohms	C10	- .0001 mfd.	C20	- .01 mfd.
R3	- 50,000 ohms	C1	- Trimmer	C11	- .05 mfd.	C21	- 4 mfd.
R4	- 2 megohms	C2	- Tuning	C12	- .05 mfd.	L1	- Ant. Coil
R5	- 1 megohm	C3	- Tuning	C13	- .25 mfd.	L2	- Primary
R6	- 500,000 ohms	C4	- Tuning	C14	- .01 mfd.	L3	- Secondary
R7	- 100,000 ohms	C5	- Alignment	C15	- 1. mfd.	L4	- Primary
R8	- Center Tap	C6	- Alignment	C16	- .25 mfd.	L5	- Secondary
R9	- 20,000 ohms	C7	- Coupling	C17	- .05 mfd.	L6	- Voice Coil
R10	- 15,000 ohms	C8	- Coupling	C18	- .01 mfd.	L7	- Field Coil

Note: Electrolytic filter condensers C19 and C21 are a single assembly. Condensers C11 to C18 inclusive are also a single assembly contained in the square can underneath the base plate.

MODEL 200,201
Voltage
Data

UNITED AMERICAN BOSCH CORP.

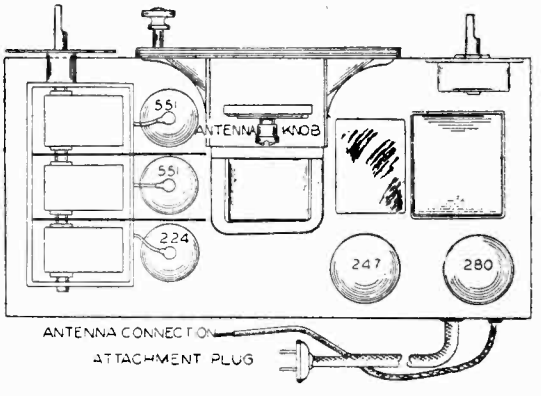
STAGE	TUBE	FIL.	PLATE	SCREEN	CATHODE	GRID	PLATE MA
1st RF	551	2.3	250	90	2.5	3.0	4.5
2nd RF	551	2.3	250	90	2.5	3.0	4.5
Det.	224	2.3	*150	*20	3.0	1.5	.5
Audio	247	2.3	250	250	-	*16	32
Rect.	280	4.8		Plate current of each plate			20

The readings were made with the volume control in the full "on" position.

*These voltages are the correct values altho the average test kit will probably give much lower readings (as low as 1/10 of these values) due to the high resistance included in the detector plate and screen circuits, and the audio grid circuit.

RESISTOR COLOR CODE

200 ohms ------- Red -----Black -- Brown
400 ohms ------- Yellow --Black -- Brown
10,000 ohms ---- Brown ---Black -- Orange
15,000 ohms ---- Brown ---Green -- Orange
20,000 ohms ---- Red -----Black -- Orange
50,000 ohms ---- Green ---Black -- Orange
100,000 ohms --- Brown ---Black -- Yellow
500,000 ohms --- Green ---Black -- Yellow
1 megohm ------- Brown -- Black -- Green
2 megohms ------ Red ---- Black -- Green



MAIN ASSEMBLIES
103491 Chassis(with tubes)
102280 Speaker
103876 Cabinet (Model "A")
103877 Cabinet (Model "B")

COILS
101858 Field Coil (speaker)
103494 R. F. Coil
103497 R. F. primary coil
103495 Antenna coil

CONDENSERS
102178 By-pass condenser
102022 Antenna trimmer
101143 Fixed (.0001 mfd.)
100705 Fixed (.006 mfd.)
101881 Large filter
103695 Condenser (.01 mfd.)

KNOBS
102445 Volume and tuning
103751 Knob for switch
100929 Trimmer knob

MISCELLANEOUS PARTS
101895 Dial and scale
102282 Diaphragm (speaker)
98713 Lamp for dial

RESISTORS
103706 Volume control
102314 Resistor (200 ohms)
102177 Resistor (400 ohms)
100825 Resistor (10,000 ohms)
101404 Resistor (15,000 ohms)
100813 Resistor (20,000 ohms)
100512 Resistor (50,000 ohms)
100727 Resistor (100,000 ohms)
100194 Resistor (1/2 megohm)

RESISTORS
100815 Resistor (1 megohm)
100196 Resistor (2 megohm)
99412 Resistor (mid tap)

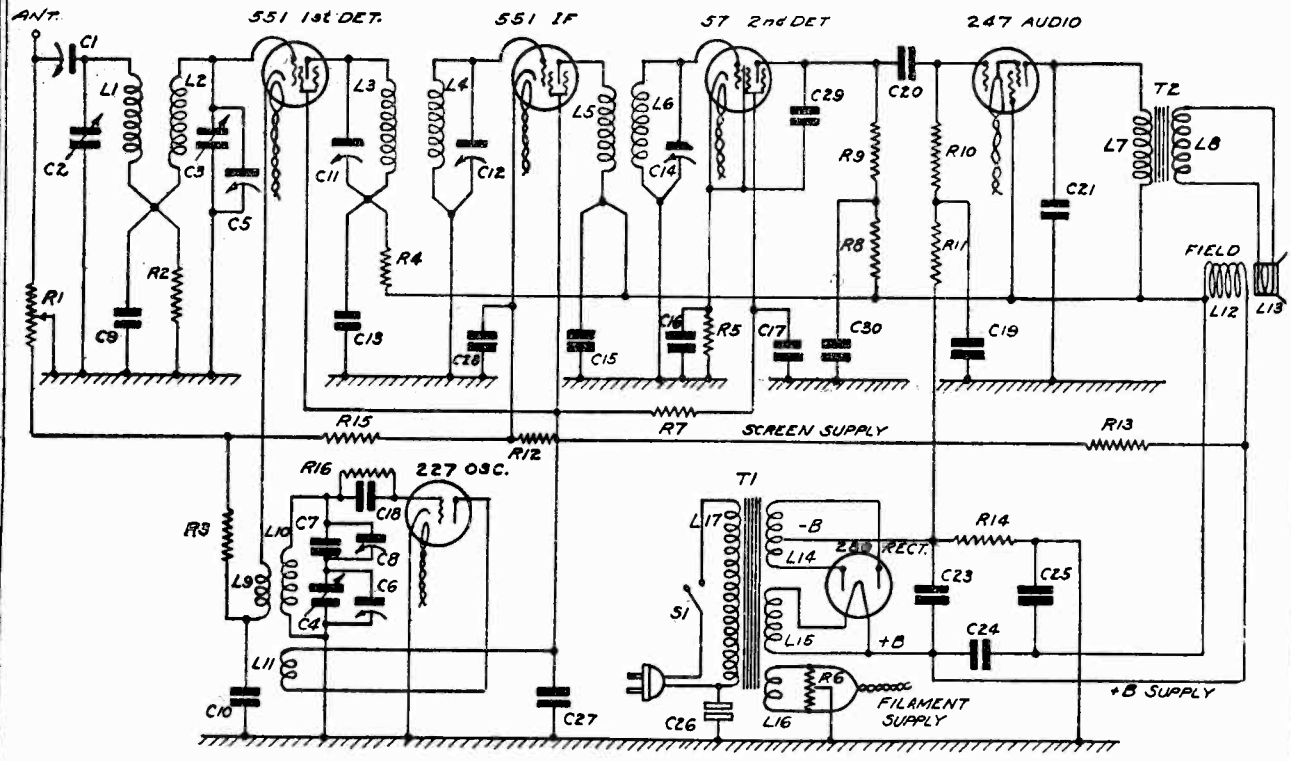
SOCKETS
101890 Socket for dial light
103686 Tube socket (4 prong)
103514 Tube socket (5 prong)

SWITCHES
103703 Switch with nuts
103725 Switch (police)

TRANSFORMERS
102561 Out-put transformer
101939 Power transformer

UNITED AMERICAN BOSCH CORP.

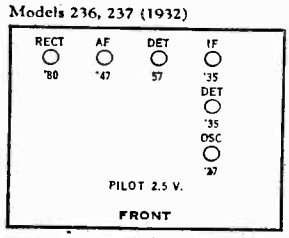
MODEL 236,237
Schematic,Voltage



Schematic Diagram of Model 236 Receiver

IF PEAK 175 KC.

Models 236, 237 (1932)



RESISTORS

300 ohms	-	Orange, Black, Brown
350 ohms	-	Orange, Green, Brown
1,000 ohms	-	Brown, Black Red
5,000 ohms	-	Green, Black, Red
20,000 ohms	-	Red, Black, Orange
25,000 ohms	-	Red, Green, Orange
30,000 ohms	-	Orange, Black, Orange
.1 megohm	-	Brown, Black Yellow
.5 megohms	-	Green, Black, Yellow

ELECTRICAL VALUES

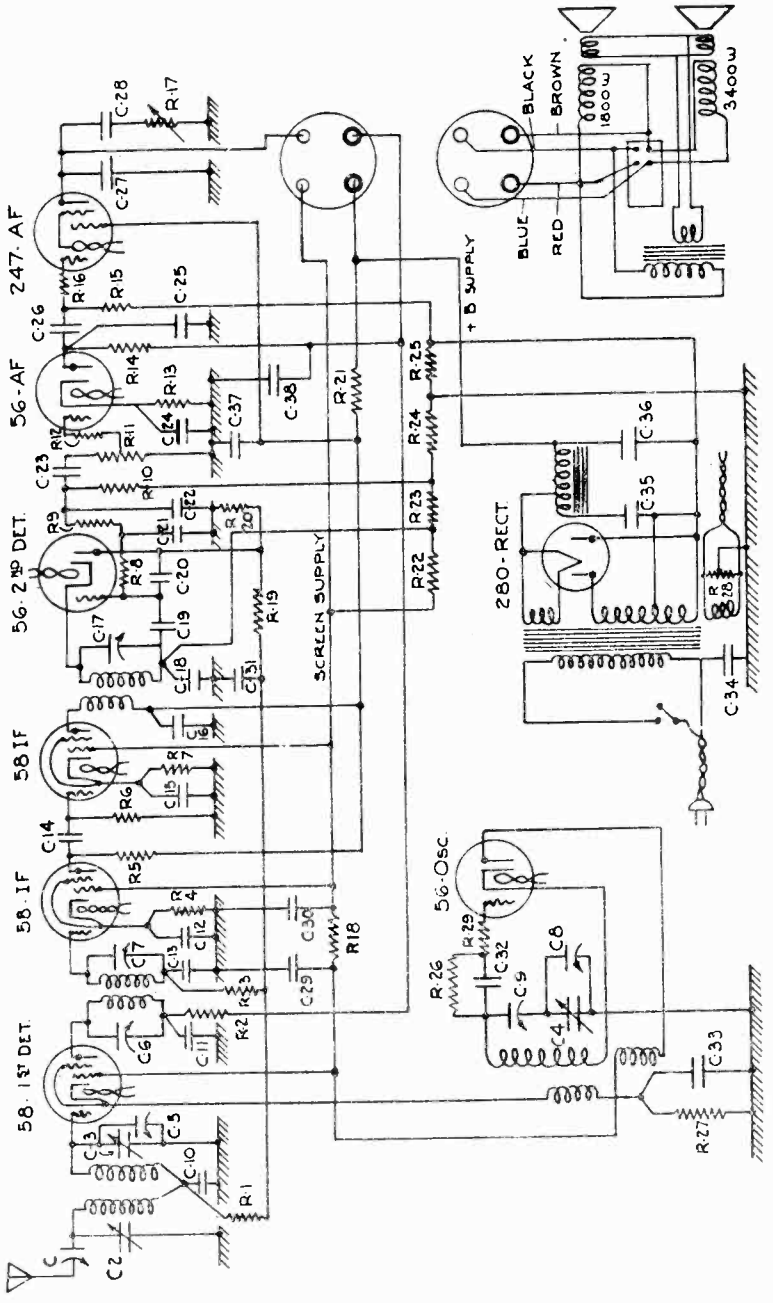
R1 - 10000 ohms	C1 - Trimmer	C17 - .25 mfd.
R2 - 1000 ohms	C2 - Tuning	C18 - .0001 mfd.
R3 - 5000 ohms	C3 - Tuning	C19 - .05 mfd.
R4 - 1000 ohms	C4 - Tuning	C20 - .01 mfd.
R5 - 25000 ohms	C5 - Alignment	C21 - .006 mfd.
R6 - Mid Tap	C6 - Alignment	C23 - 8. mfd.
R7 - .5 megohm	C7 - Alignment	C24 - .05 mfd.
R8 - .1 megohm	C8 - Alignment	C25 - 4. mfd.
R9 - .5 megohm	C9 - .05 mfd.	C26 - .01 mfd.
R10- .5 megohm	C10- .05 mfd.	C27 - 8. mfd
R11- .1 megohm	C11- Alignment	C28 - .02 mfd.
R12- 20000 ohms	C12- Alignment	C29 - .0001 mfd.
R13- 30000 ohms	C13- .05 mfd.	C30 - .01 mfd.
R14- 350 ohms	C14- Alignment	
R15- 300 ohms	C15- .05 mfd.	T1 - Power Trans.
R16- .1 megohm	C16- .5 mfd	T2 - Audio Trans.

STAGE	TUBE	PLATE	SCREEN	CATHODE	GRID	FIL.	PLATE MA
1st Det.	551	250	80	35	8	2.2	2
Osc.	227	75	--	* .1	* .1	2.2	8
I.F.	551	250	80	3	3	2.2	4
2nd Det.	57	60	*5	2	2	2.2	*.1
Audio	247	250	250	-	*3	2.2	32
Rect.	280					4.8	29

* These values will vary considerably with the type of test kit employed, due to the high resistance in the circuit.

MODEL 242,243
Schematic, Voltage

UNITED AMERICAN BOSCH CORP.

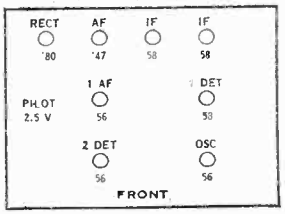


SCHEMATIC DIAGRAM OF MODEL 242 RECEIVER

IF PEAK 175 KC

C1 - Antenna Trimmer
C2 - Tuning
C3 - Tuning
C4 - Osc. Tuning
C5 - Alignment
C6 - IF Alignment
C7 - IF Alignment
C8 - Osc. Alignment
C9 - Osc. End Cond.
C10 - .05 mfd. 2 ply
C11 - .05 mfd. 2 ply
C12 - .05 mfd. 2 ply
C13 - .05 mfd. 2 ply
C14 - 1100 mmf.
C15 - .05 mfd. 2 ply
C16 - .05 mfd. 3 ply
C17 - IF Alignment
C18 - .05 mfd. 2 ply
C19 - .0001 mfd.
C20 - .05 mfd. 2 ply
C21 - .0001 mfd.
C22 - .0001 mfd.
C23 - .05 mfd. 2 ply
C24 - 25 mfd.
C25 - .01 mfd. 3 ply
C26 - 1100 mmf.
C27 - .002 mfd. 4 ply
C28 - .05 mfd. 3 ply
C29 - .05 mfd. 2 ply
C30 - .05 mfd. 2 ply
C31 - .05 mfd. 2 ply
C32 - .0001 mfd.
C33 - .05 mfd. 2 ply
C34 - .01 mfd. 4 ply
C35 - 4 mfd. (60
C35 - 8 mfd. (25
C36 - 8 mfd.
C37 - 4 mfd.
R1 - 10,000 ohms
R2 - 1000 ohms
R3 - 10,000 ohms
R4 - 600 ohms
R5 - 25,000 ohms
R6 - 100,000 ohms
R7 - 600 ohms
R8 - 15,000 ohms
R9 - 15,000 ohms
R10 - 500,000 ohms
R11 - 500,000 ohms
R12 - 100,000 ohms
R13 - 5000 ohms
R14 - 75,000 ohms
R15 - 500,000 ohms
R16 - 100,000 ohms
R17 - 500,000 ohms
R18 - 1000 ohms
R19 - 500,000 ohms
R20 - 1 megohm
R21 - 1500 ohms
R22 - 2500
R23 - 150
R24 - 1400
R25 - 250
R26 - 100,000 ohms
R27 - 5000 ohms

Models 242, 243 (1932)

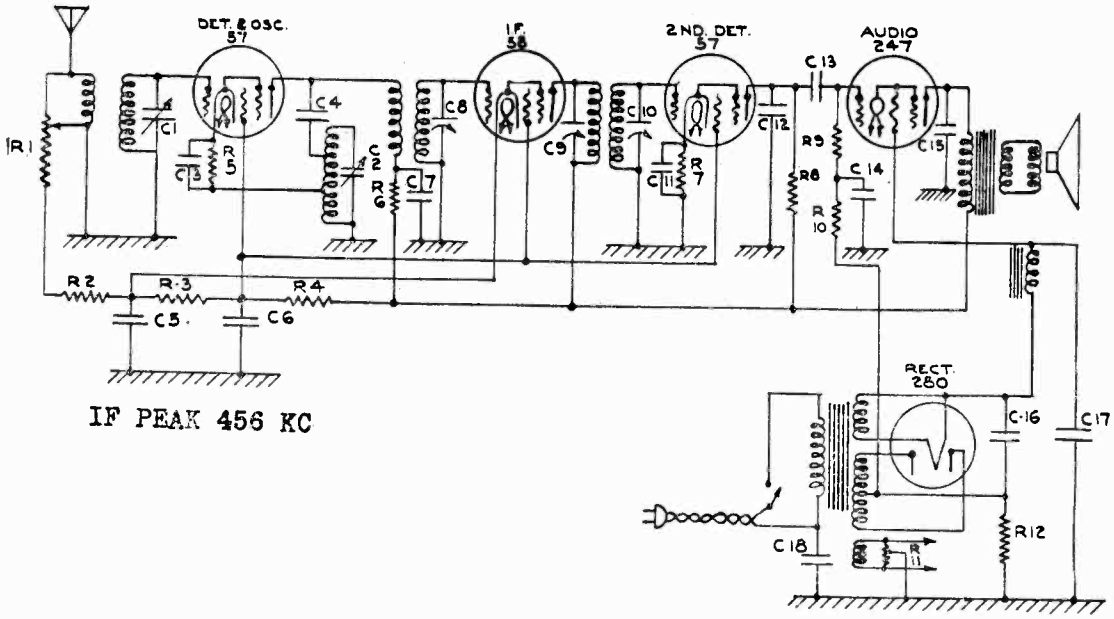


Stage	Tube	Fil.	Plate	Screen	Cathode
1st Det.	58	2.4	200	90	7 - 10
1st IF	58	2.4	115	95	4
2nd IF	58	2.4	115	95	3.4
2nd Det.	56	2.4	0	-	38
Osc.	56	2.4	95	-	2 - 4
Output	247	2.4	260	265	20
Rect.	280	4.8	-	-	-

Note: These values are readings of a high resistance voltmeter to ground, with the exception of filament voltages. Cathode voltages are given instead of grid voltages, inasmuch as the grid is at ground potential.

UNITED AMERICAN BOSCH CORP.

MODEL 305-A
Schematic
Resistor Color Code



IF PEAK 456 KC

SCHEMATIC WIRING DIAGRAM - MODEL 305A

Electrical Values

C-1)	Vari.cond.	C-11	.5 - 2 ply	R3 -	25,000 ohms
C-2)		C-12	.0004 mica	R4 -	30,000 ohms
C-3	.002 mica	C-13	.005 - 3 ply	R5 -	7,500 ohms
C-4	70 to 140 mmf.	C-14	.05 - 2 ply	R6 -	2,000 ohms
C-5	.05 - 2 ply	C-15	.005 - 3 ply	R7 -	25,000 ohms
C-6	.25- 2 ply	C-16	8 mfd.	R8 -	500,000 ohms
C-7	.01 - 3 ply	C-17	4 mfd.	R9 -	500,000 ohms
C-8	70 to 140 mmf.	C-18	.01 4 ply	R10 -	100,000 ohms
C-9	7 - 80 mmf.	R1 - volume control		R11 -	5 ohms (mid tap)
C-10	7-80 mmf.	R2 - 300 ohms		R12 -	400 ohms

RESISTOR COLOR CODE

300 ohms	orange	-	black	-	brown
400 ohms	yellow	-	black	-	brown
2000 ohms	red	-	black	-	red
7500 ohms	violet	-	green	-	red
25,000ohms	red	-	green	-	orange
30,000 ohms	orange	-	black	-	orange
100,000 ohms	brown	-	black	-	yellow
500,000 ohms	green	-	black	-	yellow

MODEL 305-A
Voltage
Adjustments

UNITED AMERICAN BOSCH CORP.

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
Detc. & Osc.	57	2.47	245	95	7	0
2nd Det.	57	2.48	48	95	5	0
I. F.	58	2.47	248	95	5.3	0
Output	47	2.5	235	248	0	17
Rect.	80	5	360	-	-	-

Note: These values are readings of a high resistance voltmeter from each socket terminal to ground. The filament voltages are, of course, an exception. Cathode readings are given for those tubes having the grid at ground. The values are only approximate and will vary with the line voltage and the type of meter employed.

ALIGNING INSTRUCTIONS --- MODEL 305-A

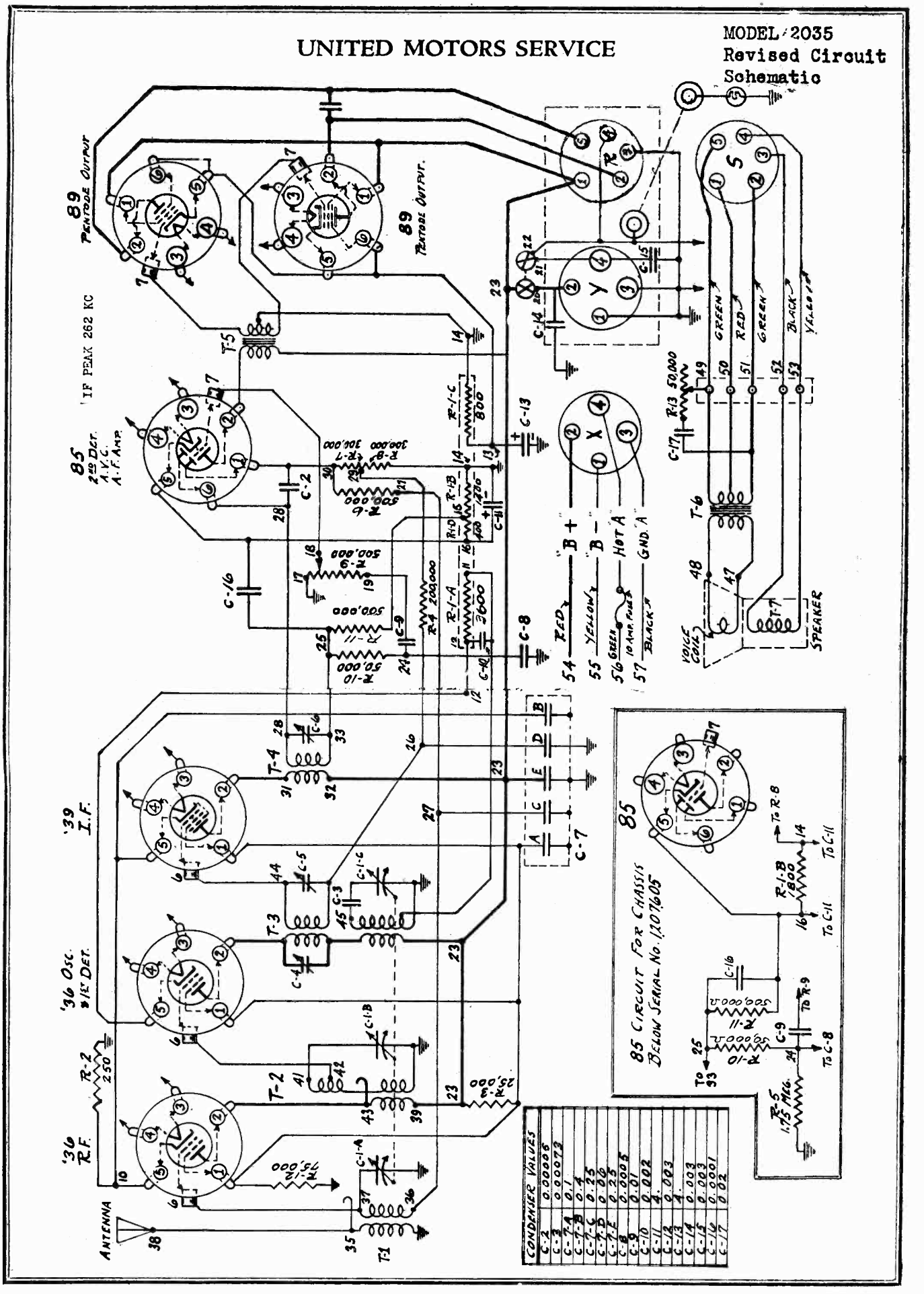
I. F. ADJUSTMENT: 456 K. C.

1. Connect volume indicator to speaker.
2. Set volume control on max.
3. Connect generator to grid of 1st I. F. tube, and adjust both condensers on coil nearest the back of set to max. output.
4. Sensitivity should be 3200 m. v.
5. Connect signal generator to grid of 1st det.; adjust both condensers on forward coil to max. output.
   Sensitivity should be 30 m. v. with gang closed.
6. Check I. F. stability.

OSCILLATOR ADJUSTMENT

1. Connect R. F. signal generator to antenna lead.
2. Set scale to 100 with gang closed tight.
3. With generator set at 1400 K. C. and dial scale at 21, peak the oscillator trim condenser. This condenser is the back alignment condenser on gang.
4. Check sensitivity at 1400 K. C. Limits 5 m. v.
   Set dial 50 1000 K. C. Limits 10 m. v.
   Set dial 89 600 K. C. Limits 30 m. v.
   Set dial 800 K. C. Limits 20 m. v.

If it is necessary to improve sensitivity at 600 or 1000 K. C., adjust plates until the set reaches the sensitivity limits. If bending plates does not help, change tubes.



LOCATING TROUBLES ISOLATED BY VOLTAGE TESTS

(By Means of Resistance Measurements)

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
A. No. Filament (A) Voltage at any Socket	1. Hot "A" Lead	X4	Zero	Fuse, or Green Lead of "A" Cable Switch or Wiring
	2. Ground	Y4	*Zero	
B. No. Plate (B) Voltage at any Socket	1. 54	X2	*Zero	"B" Cable
	2. 23	Y2	*Zero	Switch ("B" Sec.)
	3. Ground	Y2	100,000	C-14 Condenser
	4. Ground	23	100,000	C-7-E Condenser
C. "89" Sockets				
a. Plate Voltage	1. R2	R5	Open	C-12 Condenser
	2. S2	S5	900	T6 Transformer
	3. S2	S1	450	T6 Transformer
b. Screen Voltage	1. R1	A1	Zero	Wiring
	2. R1	B1	Zero	Wiring
c. Cathode Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
d. Supressor Grid Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
D. 85 Socket				
a. Plate Voltage	85 Det. #2	23	2600	T5 Transformer
b. A.V.C. Plate or Det. Plate Voltage	1. 85 Det. #6	25	5	T4 Transformer
	2. 24	25	50,000	R10 Resistor
	3. 85 Det. #5	25	500,000	R11 Resistor or C-16 Condenser
	4. 85 Det. #1	29	300,000	R-7 (Encl. in T4)
	5. 29	14	300,000	R-8 Resistor
	6. 15	16	400	R-1-D Resistor
	7. 15	14	1,400	R-1-B Resistor
	**8. 14	16	1,800	R-1-B Resistor
	9. 85 Det. #1	28	1,100,000	C-2 Condenser
	10. Ground	26	500,000	C-7-D Condenser
	11. 24	19	Open	C-9 Condenser
	12. 24	GND	551,000	C-8 Condenser

* Switch--on
** Disconnect C-11 Electrolytic Condenser and Test separately

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
F. 39 I. F. Socket				
a. Plate Volts	I.F. #2	23	5	T-4 Transformer
b. Screen Volts	1. I.F. #1	23	25,000	R-3 or C-7-A
	2. I.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	I.F. #5	GRD	250	R-2 or C-7-B
F. Osc. & 1st. Det.				
a. Plate Volts	Osc. #2	23	5	T-3 Coil
b. Screen Volts	1. Osc. #1	23	25,000	R-3 or C-7-A
	2. Osc. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	Osc. #5	11	*3,600	R-1-A or C-10
G. 236 R. F. Socket				
a. Plate Volts	R.F. #2	23	5	T-2 Coil
b. Screen Volts	1. R.F. #1	23	25,000	R-3 or C-7-A
	2. R.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	R.F. #5	GRD	250	R-2 or C-7-B
H. Speaker				
a. Weak	S3	S4	6	T-7 Speaker Field
b. Distorted	1. S1	S5	900	T-6, C-17 or R-13
	2. 46	49	50,000	R-13 Resistor

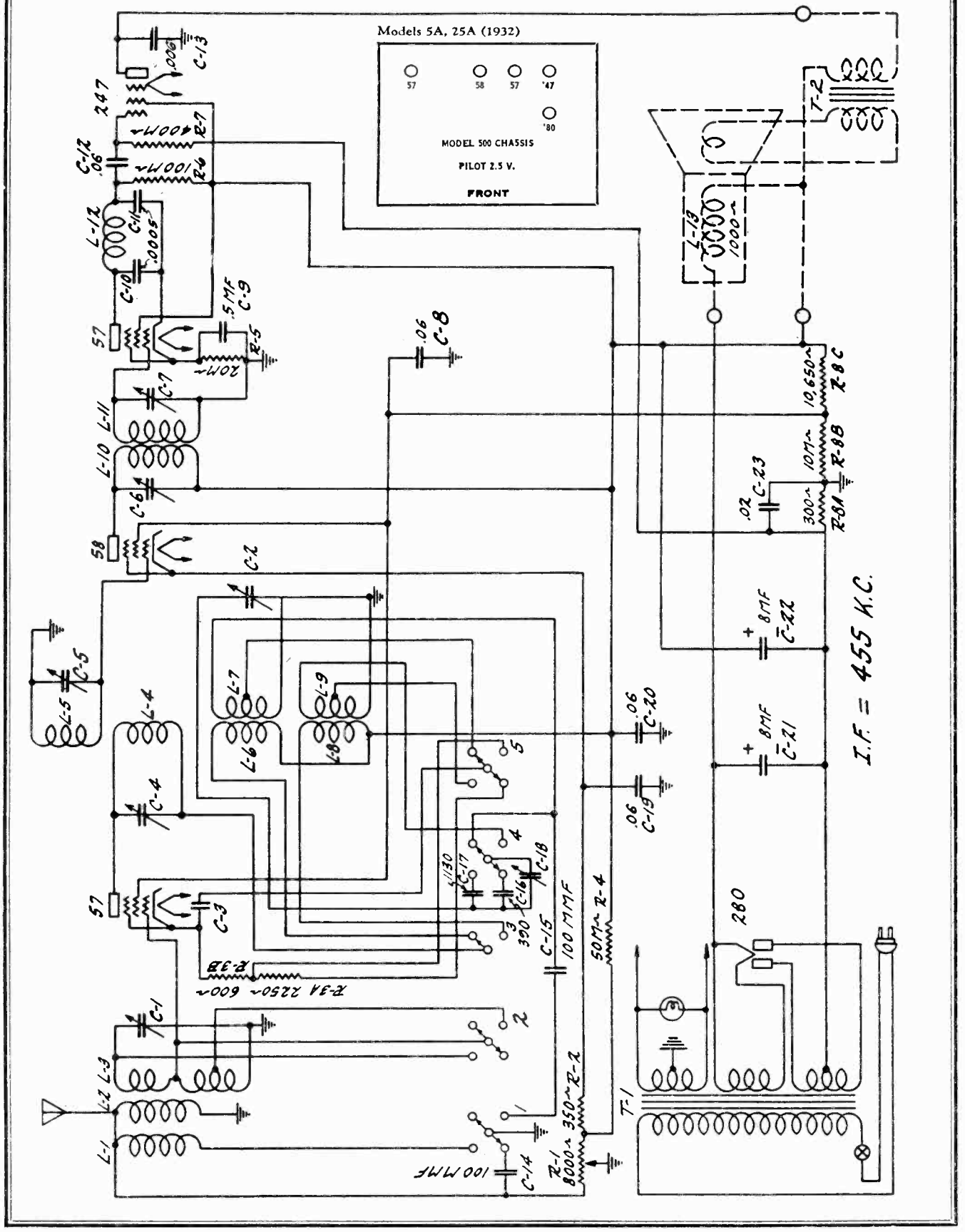
NOTE: It will be necessary to disconnect one lead of C-2, C-7 (All Sections), C-10, C-11, C-14, C-16, C-17 Condensers in order to test them accurately.

Refer to "Testing Electrolytic Filter Condensers" for details on testing C-11 and C-13 condensers.

* R-1-A Resistor originally measured 4200 ohms. This was changed to 3150 ohms at Serial No. 1207605, to 4000 ohms at Serial No. 1207761 and finally to 3600 ohms at Serial No. 1222409.

MODEL 5-A
Schematic

U. S. RADIO & TELEVISION CORP.



MODEL 5-A
Resistance Data
Voltage

U. S. RADIO & TELEVISION CORP.

Volume Control at Maximum—Switch in Broadcast Position

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna Post	21	8000 0	Open L-2 Shorted C-14
1st Detector Control Grid	5	1.2 Open	Shorted C-1 or Trimmer Open L-3
1st Detector Cathode	2,850	Open .4	Open R-3 Shorted C-3
1st Detector Screen Grid	8,600	0 10,000	Shorted C-8 Open R-8C
1st Detector Plate	14,400	18.5 50,000	Shorted C-20 Open R-8B or R-8C
I. F. Control Grid	28	Open 0	Open L-4 Shorted C-5
I. F. Cathode	350	Open 0	Open R-2 Shorted C-19
I. F. Plate	14,000	20 50,000 Open	Shorted C-20 Open R-8B or R-8C Open R-4 or L-10
2nd Detector Control Grid	20	0 Open	Shorted C-7 Open L-11
2nd Detector Cathode	20,000	0 Open	Shorted C-9 Open R-5
2nd Detector Screen Grid	14,000	Open 0 300 1,300	Open R-4 or R-8 Shorted C-20 Shorted C-22 Shorted C-21
2nd Detector Plate	114,000	Open 150,000 120,650 20,000	Open R-6 Open R-8 Open R-4 Shorted C-10 or C-11
Audio Control Grid	400,300	Open	Open R-7 or R-8A
Audio Screen Grid	14,200	20,650 0 50,000	Open R-4 Shorted C-20 Open R-8B or R-8C
Audio Plate	14,900	0 50,000 Open	Shorted C-13 Open R-8B or R-8C Open Pri. T-2
Rectifier Either Plate	600	300 Open	Shorted C-23 Open Secondary T-2 or Open R-8A
Rectifier Either Filament	15,000	Open 300 1,300	Open L-13 or R-8 Shorted C-21 Shorted C-22

NO. 502 CHASSIS—VOLTAGES AT SOCKETS

LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current M A*	*Cathode Volts*	*Plate M A*	*Grid Test M A*
57	1	1st Det. & Osc.	2.15	245	4.3-5.9(1)	100	.6	4.3-5.9(1)	.95	2.0
58	2	I. F.	2.15	240	3.0	100	1.5	3.0	6.6	10.4
57	3	2nd Det.	2.15	166	9.0	235	.1	9.0	.35	.45
247	4	Audio	2.15	215	17.0(2)	240	8.0		30.	48.
280	5	Rect.	4.6						30. Per Plate	

(1) Varies with frequency setting of dial approximately as shown.
(2) Measured across 300 ohm section of voltage divider resistor.

REFERENCE POINT—B (AUDIO SCREEN CONTACT)

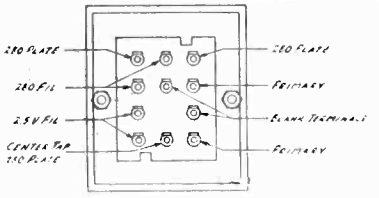
Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector Screen Grid	10,650	Open	Open R-8C
1st Detector Plate	18.5	2 Open	Shorted C-4 Open L-4 or L-6
I. F. Plate	20	Open 0	Open L-10 Shorted C-6
2nd Detector Screen Grid	0	Open	Open Connection
2nd Detector Plate	100,070	Open	Open R-6 or L-12
Audio Plate	700	Open	Open Pri. T-2
Rectifier Plate	14,800	Open	Open R-8 or Sec. T-1
Rectifier Filament	1,000	Open	Open L-13

MISCELLANEOUS

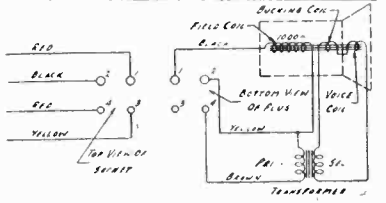
2nd Detector Plate to Audio Grid	Open	70	Shorted C-12
2nd Detector Plate to 2nd Detector Cathode	170,000	0 70	Shorted C-10 Shorted C-11
Rectifier Plate to Plate	600	Open	Open Secondary T-1
Rectifier Filament to Filament	Very Low	Open	Open Fil. Winding T-1
Between Filament Contacts of Other Sockets	Very Low	Open	Open Heater Winding
Across A. C. Plug	9	Open	Open Pri. T-1
Across Secondary T-2 (Unsolder Voice Coil Lead)	.8	Open	Open Sec. T-2
Across Voice Coil	1.8	Open	Open Voice Coil
Across C-15	Open	0	Shorted C-15
Chassis to Common Connection C-16 and C-17	Open	0	Shorted C-2 or Trimmer
Stator C-2 to Cathode 1st Detector	Open	2,854	Shorted C-16 or C-18

BAND SELECTOR SWITCH IN SHORT WAVE POSITION

Chassis to Antenna Binding Post	3.5	4 21	Open L-2 Open L-1
Chassis to Control Grid 1st Detector	1.6	0	Shorted C-1 or Trimmer
Chassis to Cathode 1st Detector	600	Open 3	Open R-3B or L-9 Shorted C-3
Audio Screen to 1st Detector Plate	18	Very Low Open	Shorted C-4 Open L-4 or L-8



Power Transformer Terminals

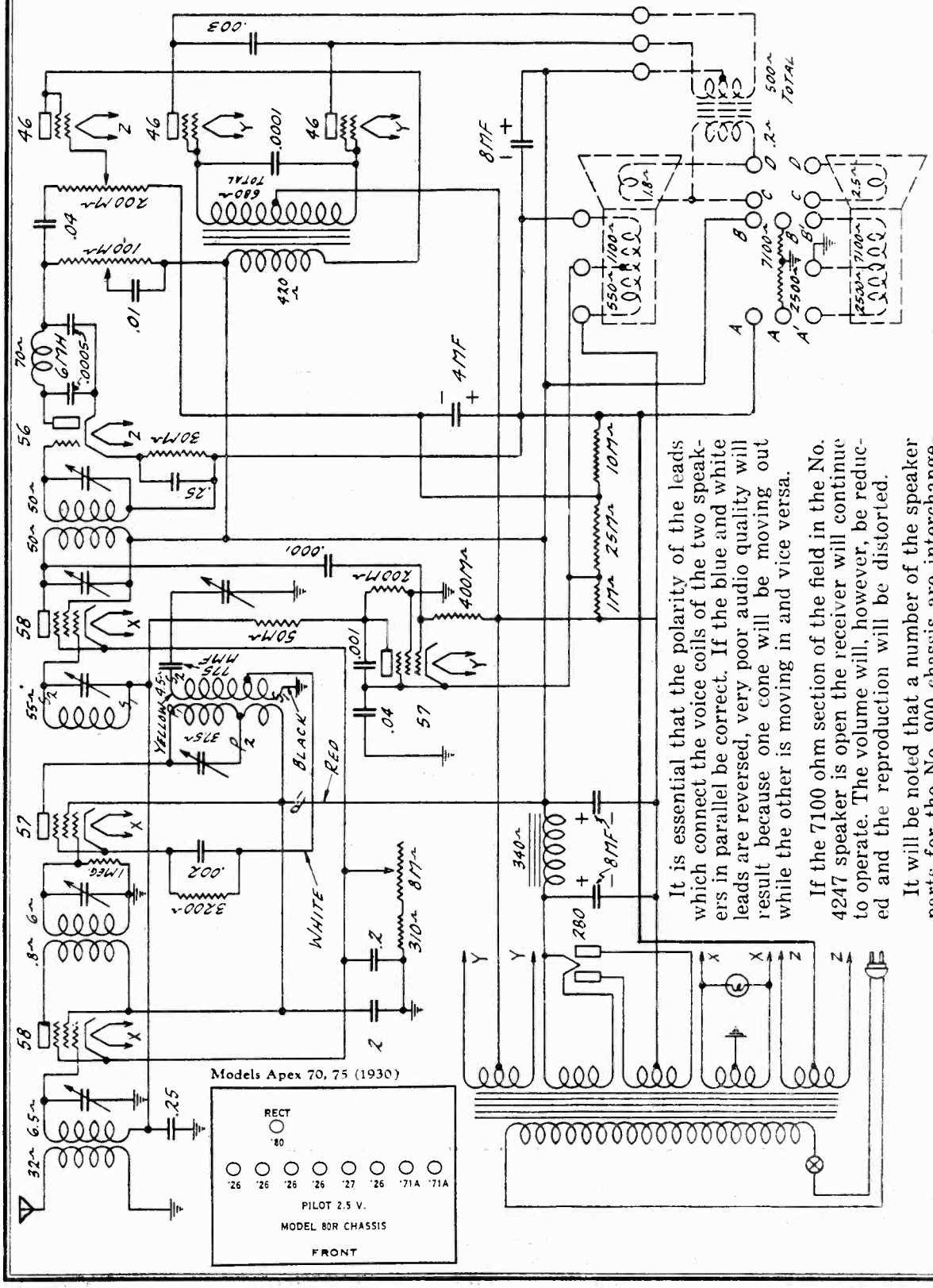


Electrodynamic Speaker and Connections.

U. S. RADIO & TELEVISION CORP.

MODEL 9 and 19
Class "B"
Chassis 900, 902
Schematic

CONNECT A TO A AND B TO B FOR SINGLE SPEAKER.
CONNECT A' TO A, B' TO B, C TO C AND D TO D FOR
DUAL SPEAKERS.



It is essential that the polarity of the leads which connect the voice coils of the two speakers in parallel be correct. If the blue and white leads are reversed, very poor audio quality will result because one cone will be moving out while the other is moving in and vice versa.

If the 7100 ohm section of the field in the No. 4247 speaker is open the receiver will continue to operate. The volume will, however, be reduced and the reproduction will be distorted.

It will be noted that a number of the speaker parts for the No. 900 chassis are interchangeable with parts used in the No. 4246 speaker with the No. 902 chassis. Therefore, it has not been thought necessary to make a repetition of these part numbers in the accompanying list of the changes in parts for the No. 902 chassis.

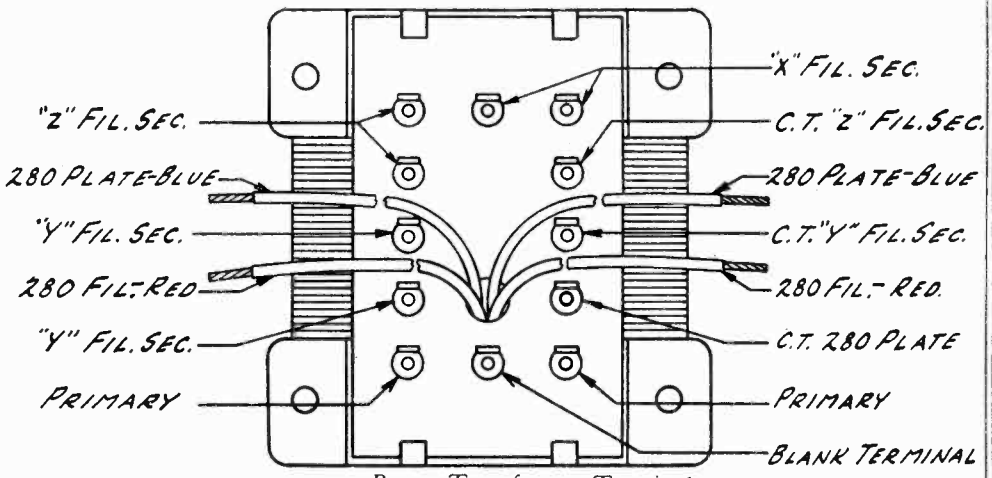
IF PEAK 262 KC

MODEL 9 and 19
Class "B"
Chassis 900,902
Voltage - Data

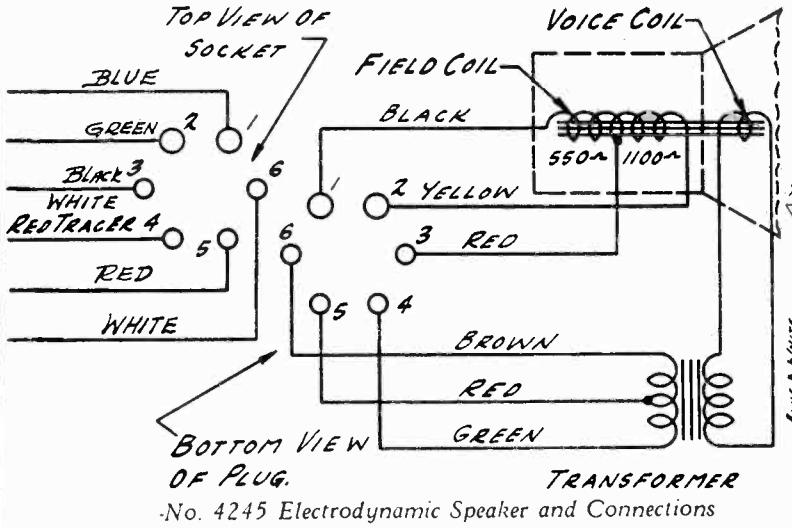
U. S. RADIO & TELEVISION CORP.

FLUTTERING OR MOTORBOATING

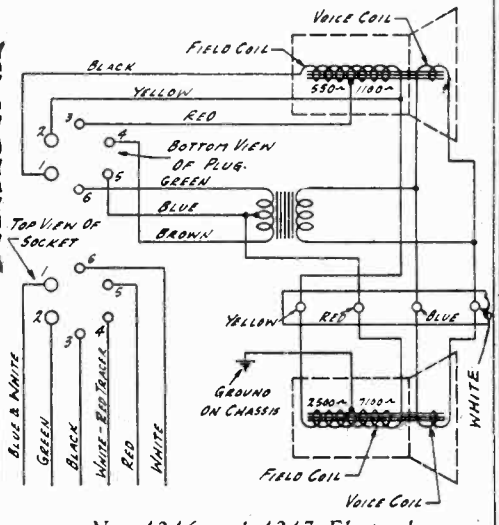
The tube shield and cover must be on, otherwise motorboating may result. Still other causes are open or defective grid circuits or open bypass condensers. Fluttering is very often due to I.F. oscillation and the causes for such a condition should be investigated in line with the information given in the section on "Oscillation."



Power Transformer Terminals



No. 4245 Electrodynamic Speaker and Connections



No. 4246 and 4247 Electrodynamic Speakers and Connections

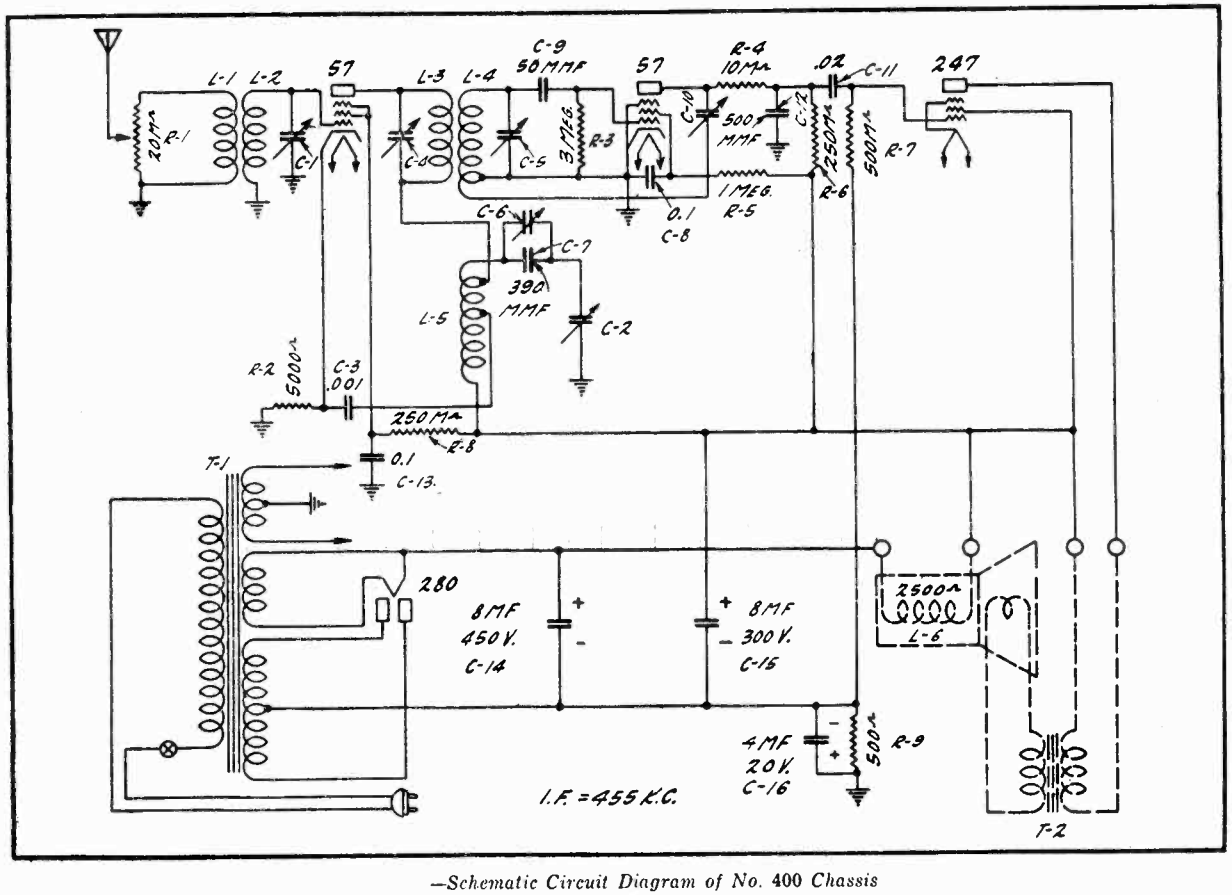
No. 900 and No. 902 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM—"Q" CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
58	1	R.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	2	1st Det	2.25	125	5.0(2)	125	.3(2)	5.0(2)	1.2(2)	2.0
58	3	I.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	4	AVC	2.25	100(3)	24.0(4)	145	0	24.0	0	0
56	5	2nd Det.	2.25	150	12.0			12.0	.4	.5
46	6	Driver	2.25	215	19.0(5)				25.0	30.0
46	7	Power	2.25	320					5.0(6)	13.0
46	8	Power	2.25	320					5.0(6)	13.0
280	9	Rect.	4.8						41 Per Plate	

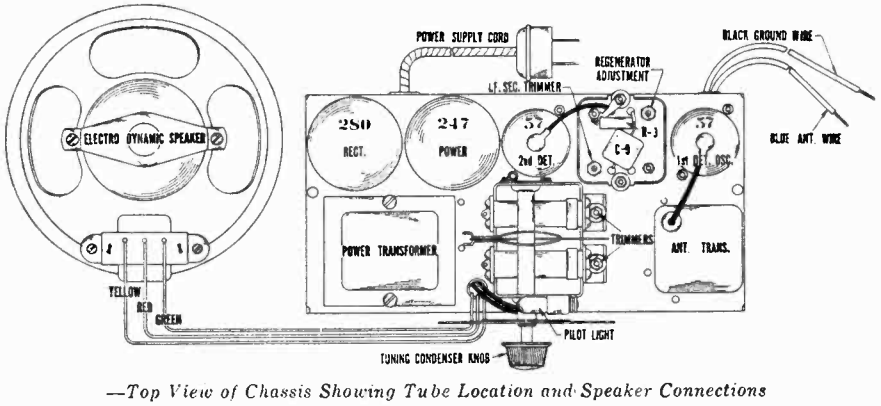
(1) Measured from movable arm of "Q" control to ground. Reads 26 volts with "Q" control at minimum.
(2) Values read with analyzer plug in socket. Actual values different as analyzer prevents oscillator from oscillating.
(3) Measured with 600,000 Ohm Meter.
(4) Measured across 1000 Ohm Resistor.
(5) Measured across 10,000 Ohm Carbon Voltage Divider Resistor.
(6) Plate current at no signal. At full output plate current is 60 to 70 MA.

U. S. RADIO & TELEVISION CORP.

MODEL 24
Chassis 400
Schematic
Voltage - Data



—Schematic Circuit Diagram of No. 400 Chassis



—Top View of Chassis Showing Tube Location and Speaker Connections

No. 400 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Cathode Volts*	*Plate Current MA*
57	1	1st Det. & Osc.	2.4	235	8	120	—(1)	8	—(1)
57	2	2nd Det.	2.3	45(2)	0	20(2)	.2	0	.7
247	3	Audio	2.3	235	1.0(3)	245	5.2		26
280	4	Rect.	4.8						16 Per Plate

(1) Can only be read with special adapter.
(2) Voltage as read with 600,000 ohm meter.
(3) Not true reading. Actual voltage across 500 ohm resistor—17 volts.

CONTINUITY TEST CHART

NO. 400 CHASSIS

Remove all tubes and disconnect power cord. Disconnect antenna and ground and turn Volume Control to maximum. Read from Reference Points to each Measurement Point until defect is isolated.

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna (Vol. Control Maximum)	3	20,000	Open L-1
1st Detector Control Grid	4	0 Open	Shorted C-1 or Trimmer Open L-2
1st Detector Cathode	5000	Open	Open R-2
1st Detector Screen Grid	Open	255,000 0 253,000 250,500	Shorted C-3 Shorted C-13 Shorted C-14 Shorted C-15
1st Detector Plate	Open	5031 3034 534	Shorted C-3 Shorted C-14 Shorted C-15
2nd Detector Control Grid	3,000,000	31 Open	Shorted C-9 Open R-3
2nd Detector Cathode	0	Open	Open Connection
2nd Detector Screen Grid	Open	0	Shorted C-8
2nd Detector Plate	Open	Very Low 10,000	Shorted C-10 Shorted C-12
Audio Grid	500,500	500,000 Open	Shorted C-16 Open R-7 or R-9
Audio Screen Grid	Open	3000 500	Shorted C-14 Shorted C-15
Audio Plate	Open	3520 1020	Shorted C-14 Shorted C-15
Rectifier Filament	Open	500 3000	Shorted C-14 Shorted C-15
Rectifier Plate	875	375 Open	Shorted C-16 Open Secondary or Power Trans.
Coil Side of C-9	31	0 Open	Shorted C-5 Open L-4
Negative Terminal of Filter Condenser	500	Open 0	Open R-9 Shorted C-16

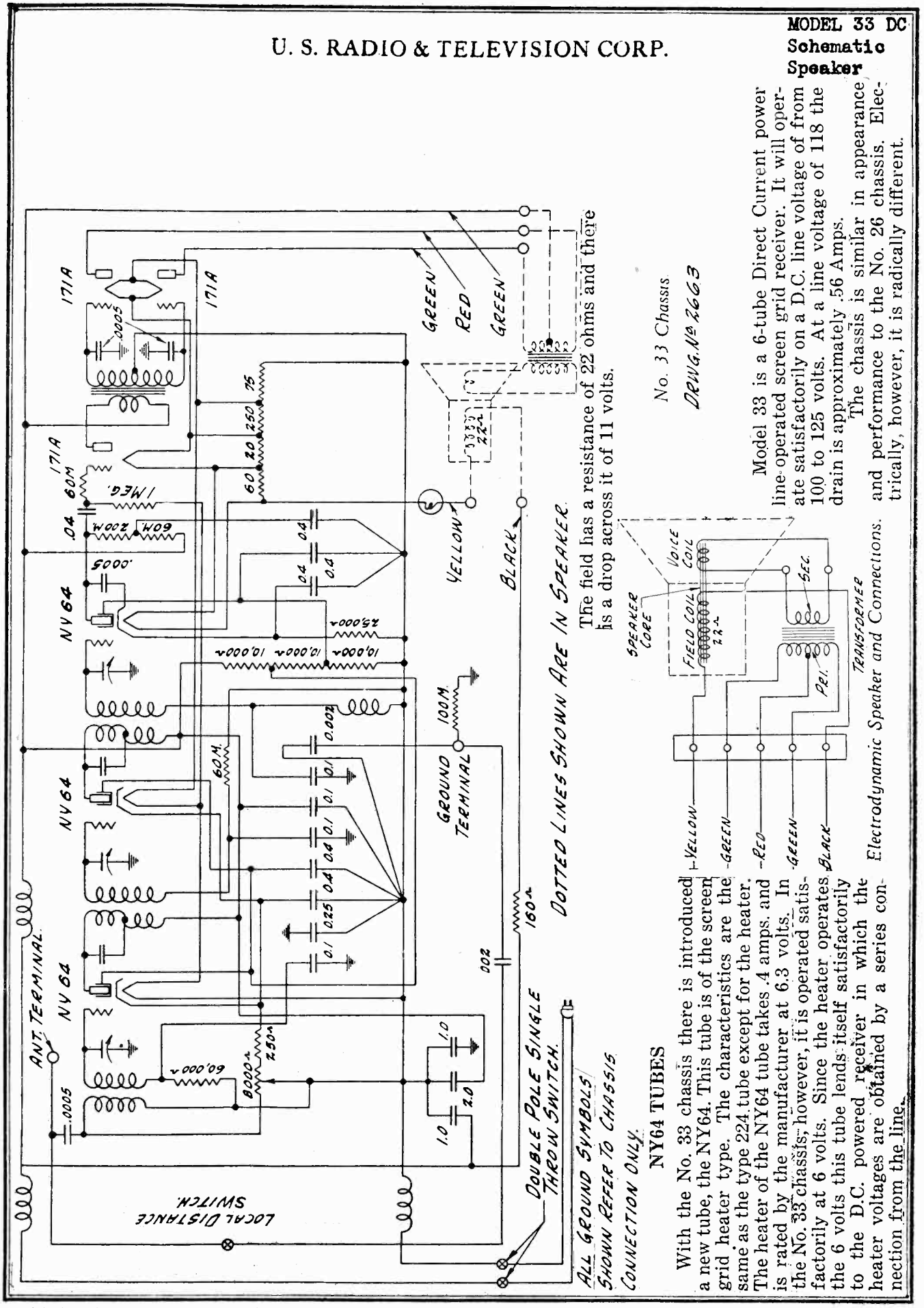
CONTINUITY TEST CHART

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Stator C-2	Open	0	Shorted C-2 or Trimmer
REFERENCE POINT—+B (RED SPEAKER LEAD)			
1st Detector Plate	34	Open 3	Open L-3 or L-5 Shorted C-4
1st Detector Screen Grid	250,000	Open	Open R-8
1st Detector Cathode	Open	1.5	Shorted C-3
2nd Detector Plate	260,000	Open	Open R-4 or R-6
2nd Detector Screen Grid	1,000,000	Open	Open R-5
Audio Plate	530	Open	Open Primary T-2
Rectifier Filament	2500	Open	Open Speaker Field
MISCELLANEOUS			
Plate to Plate Rectifier	750	Open	Open High Voltage Secondary
Filament to Filament Rectifier	Very Low	Open	Open 280 Fil. Winding
Between Filament Contacts of Other Sockets	Very Low	Open	Open Heater Winding
Across AC Plug	17	Open	Open Primary Power Transformer
2nd Det. Plate to Audio Grid	Open	10,000	Shorted C-11
1st Det. Plate to Stator C-2	Open	31	Shorted C-6 or C-7
2nd Det. Plate to Insulated Terminal On Back Panel	10,000	Open	Open R-4
Across Secondary T-2 (Unsolder Voice Coil Lead)	.6	Open	Open Sec. T-2
Across Voice Coil (Unsolder Voice Coil Lead)	2.2	Open	Open Voice Coil
Across Volume Control (Unsolder Black Ground Lead)	20,000	Open	Open R-1

U. S. RADIO & TELEVISION CORP.

MODEL 33 DC
Schematic
Speaker



The field has a resistance of 22 ohms and there is a drop across it of 11 volts.

No. 33 Chassis

DRWG. No. 2663

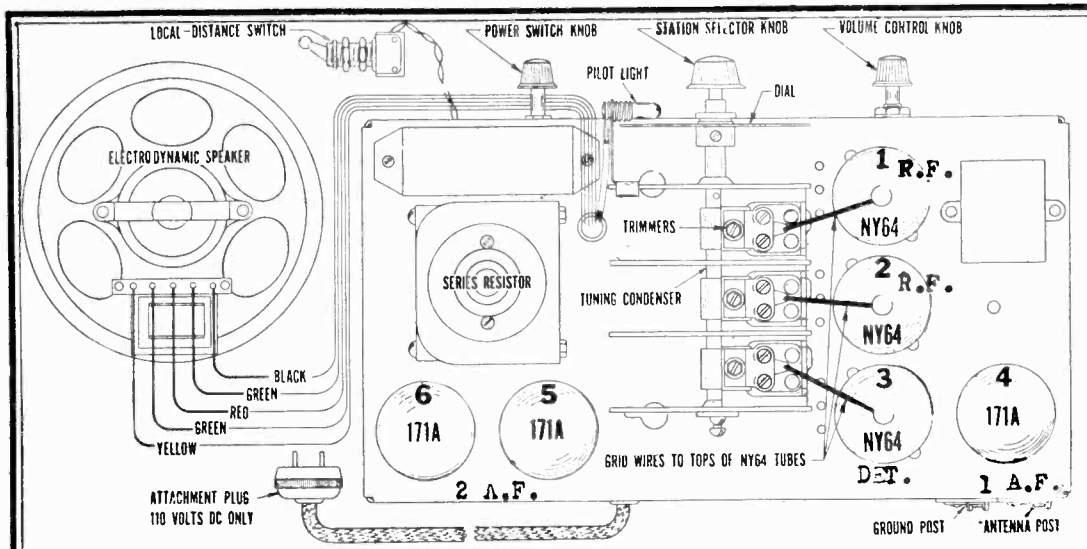
Model 33 is a 6-tube Direct Current power line-operated screen grid receiver. It will operate satisfactorily on a D.C. line voltage of from 100 to 125 volts. At a line voltage of 118 the drain is approximately .56 Amps.

The chassis is similar in appearance and performance to the No. 26 chassis. Electrically, however, it is radically different.

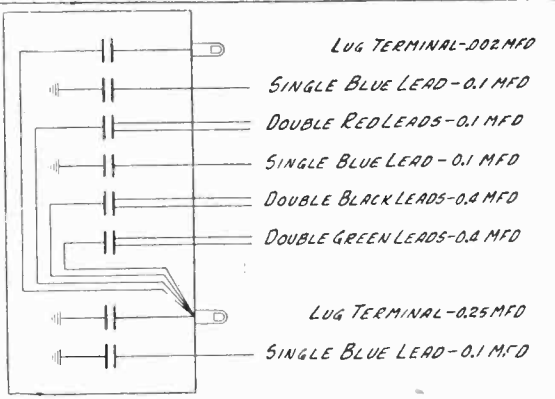
NY64 TUBES

With the No. 33 chassis there is introduced a new tube, the NY64. This tube is of the screen grid heater type. The characteristics are the same as the type 224 tube except for the heater. The heater of the NY64 tube takes .4 amps. and is rated by the manufacturer at 6.3 volts. In the No. 33 chassis, however, it is operated satisfactorily at 6 volts. Since the heater operates the 6 volts this tube lends itself satisfactorily to the D.C. powered receiver in which the heater voltages are obtained by a series connection from the line.

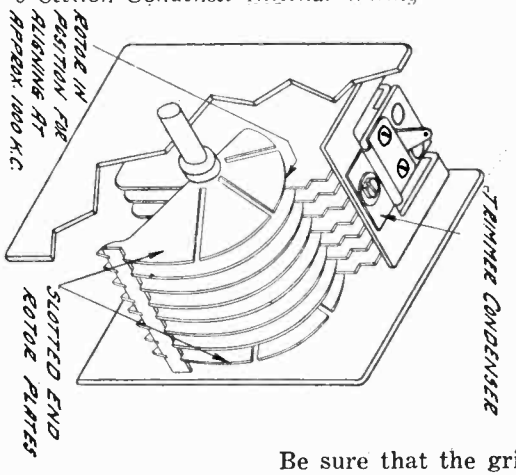
Electrodynamic Speaker and Connections.



Top View of No 33 Chassis Showing Tube Sequence and Speaker Connections.



8 Section Condenser Internal Wiring



Condenser Section with Shield Plate Cut Away

No. 33 CHASSIS—VOLTAGES AT SOCKETS—VOLUME CONTROL AT MAXIMUM LINE VOLTAGE, 118—PLUG IN SOCKET OF RECEIVER—TUBE IN TEST SET

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Volts*	*Screen Current MA*	*Plate MA*	*Grid Test MA*
NY64	1	1st Radio	5.9	114	2.5(1)	65	.6	3.2	4.5
NY64	2	2nd Radio	5.9	114	2.5(1)	65	.6	3.2	4.5
NY64	3	Detector	5.9	60	5. (2)	30	.05	.2	.4
171A	4	1st Audio	5.0	90	11. (3)			20.	27.
171A	5	2nd Audio	5.0	96	12.			22.	29.
171A	6	2nd Audio	5.0	96	12.			22.	29.

(1) This voltage read from – line to R. F. Cathode.
(2) This voltage read from – line to detector cathode.
(3) This voltage read from center point of R.F. heaters to negative 1st audio filament leg.

CAUTION—Certain precautions should be observed when installing and servicing receivers using the No. 33 chassis. Never connect or disconnect the antenna or ground with the power on. Do not turn on the power switch unless all tubes are in the sockets. Do not use any other type of tubes than the ones specified with the receiver.

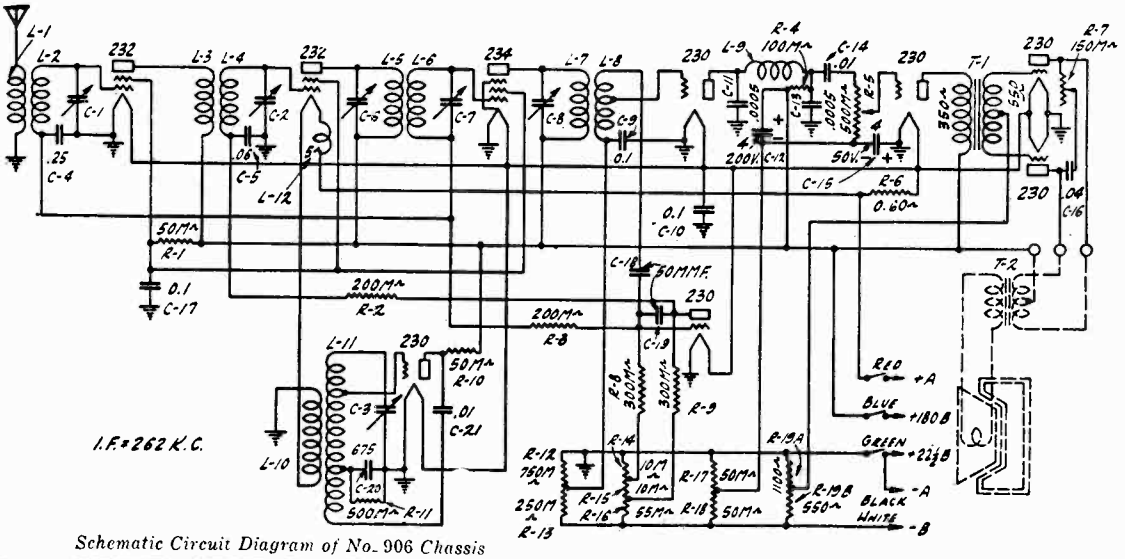
Before reading voltages disconnect the antenna and ground. It is advisable to have the tube shield on while the voltages are being read as there will be oscillation if the shield is off. To read the NY64 voltages pass the tester plug cable through the slot in the shield. The grid wire from the condenser stator is bent up and the clip on the wire from the set tester is attached to the grid cap.

Be sure that the grid cap or clip does not touch the tube shield or the condenser shield plate. Turn off switch when transferring tubes between chassis and analyzer.

The following table gives the tube voltages with all the tubes in, the speaker connected and the set in operating condition. These voltages are typical of the sets but will vary slightly with variations in individual receivers and variations in tube characteristics. The voltages as shown are figured for a line voltage of 118. Differences in line voltage will also cause variation in voltages at socket. All voltage readings as shown are taken with a 1,000-ohm per volt meter of suitable range.

U. S. RADIO & TELEVISION CORP.

MODEL 69
Chassis 906
Voltage
Schematic
Alignment

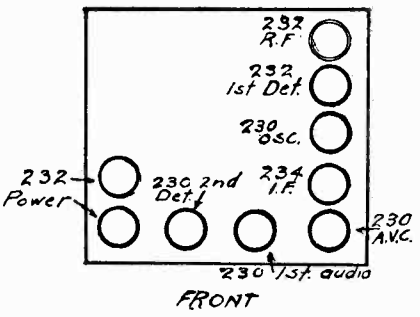


Schematic Circuit Diagram of No. 906 Chassis

No. 906 CHASSIS—VOLTAGES AT SOCKETS
AIR CELL "A" BATTERY—180 VOLTS "B" BATTERY

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Plate Current MA*
232	1	R. F.	2.0	152	.2(1)	54(2)	.5	1.4
232	2	1st Det.	2.0	150	3.0(3)	54(2)	.3	1.1
230	3	Osc.	2.0	63	4.0-5.0(3)			1.8
234	4	I. F.	2.0	150	.2(1)	54(2)	1.2	2.1
230	5	AVC	2.0	3.5(4)	1.8(2)			0
230	6	1st Audio	2.0	150	2.0(2)			4.1
230	7	2nd Det.	2.0	125(5)	6.0(2)			.1
230	8	Power	2.0	152	14.5			.9(6)
230	9	Power	2.0	152	14.5			.9(6)

(1) Voltage as read with 60,000 Ohm meter.
(2) Voltage as read with 120,000 Ohm meter.
(3) Varies with frequency approximately as indicated.
(4) Reversed reading—plate negative with respect to filament.
(5) Voltage as read with 600,000 Ohm meter.
(6) Plate current with no signal applied to receiver.



ALIGNMENT

In order to properly align the R. F. and I. F. circuits of the No. 906 chassis a signal generator is necessary. The generator must be capable of producing an I. F. signal at 262 K. C., as well as R. F. signals throughout the broadcast band of 540 to 1500 K. C. An output meter is also necessary to determine accurately the maximum output of the receiver.

The need for realignment will be evidenced by low sensitivity accompanied by poor selectivity, but realignment should never be undertaken until all other causes for this same condition, such as defective tubes, improper antenna installation or weak batteries have been checked and eliminated as the cause of the trouble.

During the following alignment procedure the 230 A. V. C. tube should be replaced with a dummy tube (Tube with one filament prong removed) in order that there will no possibility of A. V. C. action which would make determination of the output peak difficult.

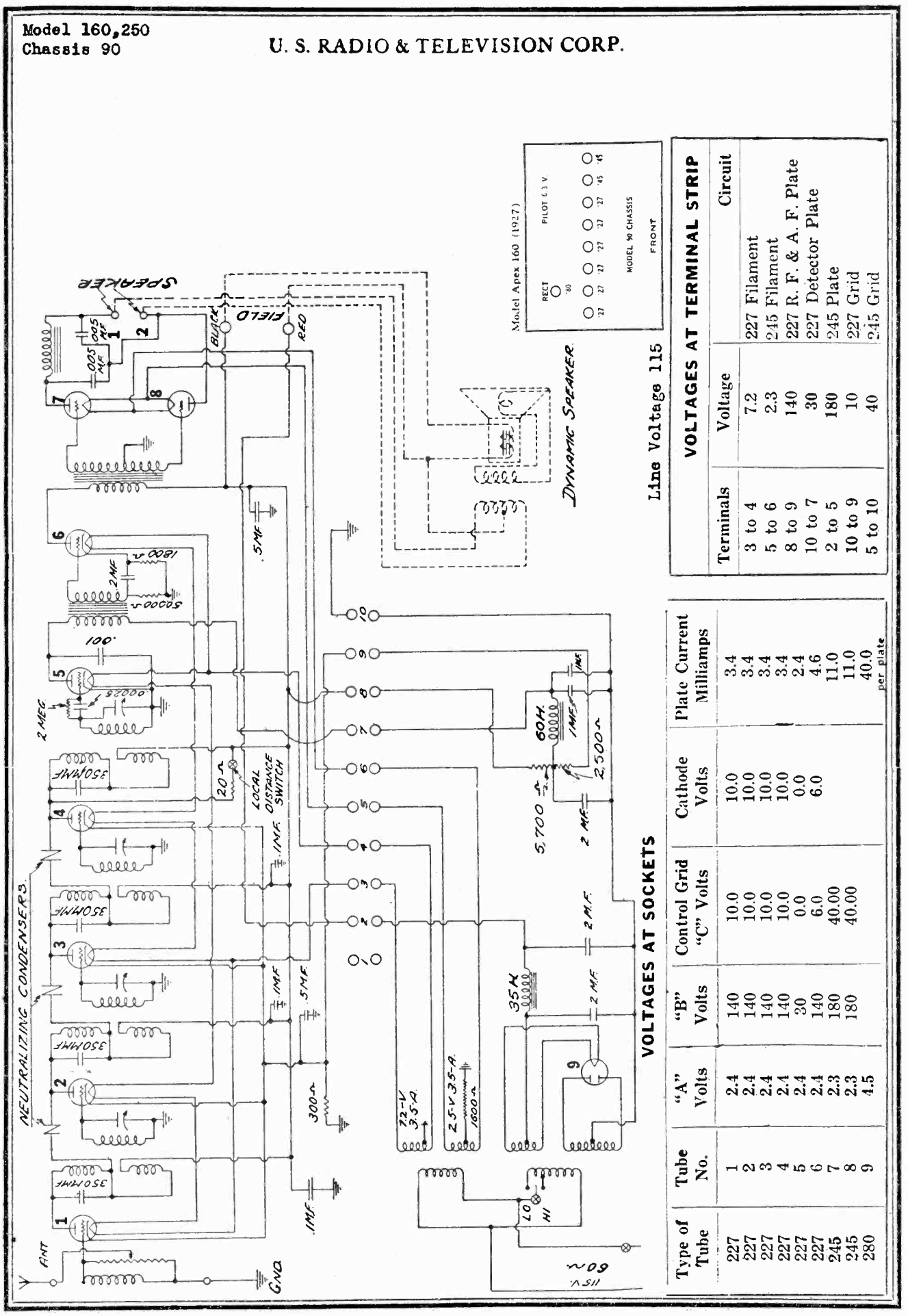
Aligning Intermediate Condensers—The oscillator tube should be removed from its socket during I. F. alignment. Place the signal generator in operation at 262 K. C. and connect its output to the grid contact of the 230 first detector tube. The tube shield should be in position to prevent oscillation of the receiver.

Then adjust the three intermediate condenser screws until maximum output is indicated on the output meter. After all three have been adjusted the first time go over them again and check the setting for maximum output. The intermediate condenser screws are accessible from beneath the chassis and protrude through the porcelain bases of the I. F. Transformers.

Aligning R. F. and Oscillator Condensers—Replace the oscillator tube in its socket and place the signal generator in operation at exactly 1400 K. C. The output of the signal generator should be connected to the antenna binding post at the back of the chassis. Tune the receiver to exactly 1400 K. C. upon the dial chart and adjust the three trimmer condensers which are located on the tuning condenser. Adjust the oscillator 1400 K. C. trimmer condenser (One located nearest back of chassis) first. Then set the signal generator for signals of 1,000, 750 and 600 K. C., and check the R. F. and Oscillator Condensers for resonance. Bend the slotted rotor plate sections of each of these three condensers which are less in mesh, in or out until maximum output is obtained.

Model 160,250
Chassis 90

U. S. RADIO & TELEVISION CORP.



VOLTAGES AT TERMINAL STRIP

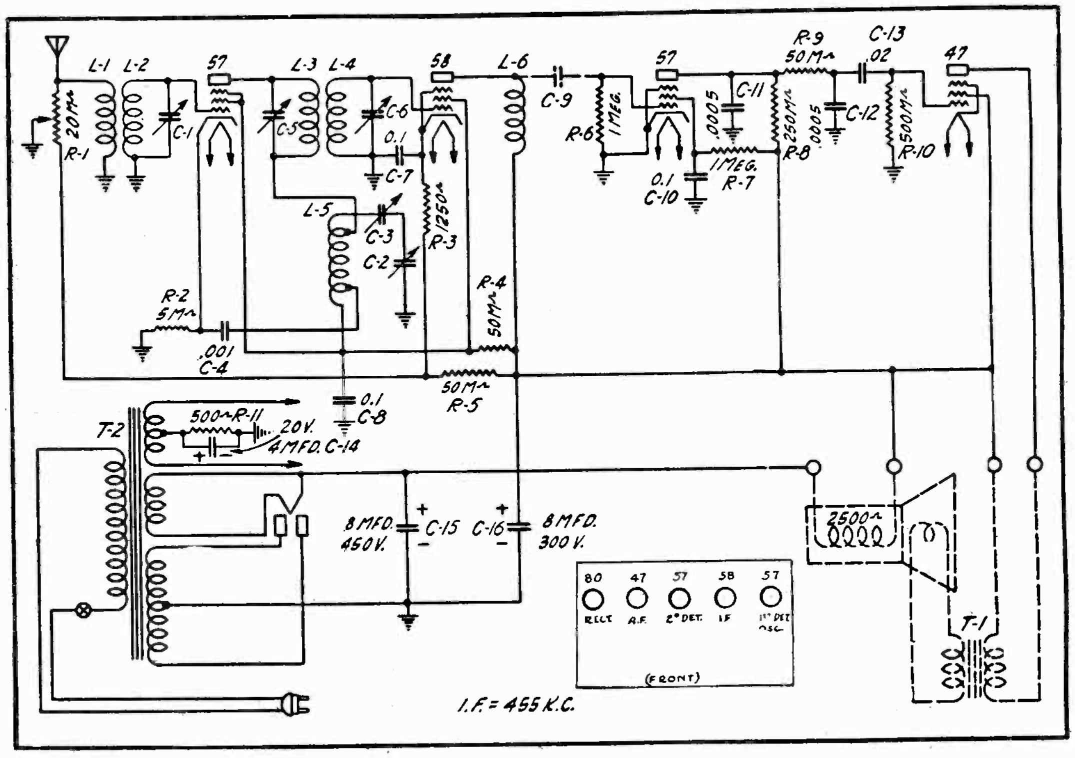
Terminals	Voltage	Circuit
3 to 4	7.2	227 Filament
5 to 6	2.3	245 Filament
8 to 9	140	227 R. F. & A. F. Plate
10 to 7	30	227 Detector Plate
2 to 5	180	245 Plate
10 to 9	10	227 Grid
5 to 10	40	245 Grid

VOLTAGES AT SOCKETS

Type of Tube	Tube No.	"A" Volts	"B" Volts	Control Grid "C" Volts	Cathode Volts	Plate Current Milliamps
227	1	2.4	140	10.0	10.0	3.4
227	2	2.4	140	10.0	10.0	3.4
227	3	2.4	140	10.0	10.0	3.4
227	4	2.4	140	10.0	10.0	3.4
227	5	2.4	30	0.0	0.0	2.4
227	6	2.4	140	6.0	6.0	4.6
245	7	2.3	180	40.00		11.0
245	8	2.3	180	40.00		11.0
280	9	4.5				40.0 per plate

U. S. RADIO & TELEVISION CORP.

MODEL 3040, 3056
Chassis 506
Schematic
Resistance Data



Schematic Wiring Diagram of No. 507 Chassis

CONTINUITY CHART

NO. 507 CHASSIS

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna	31	20,000	Open L-1
1st Detector Control Grid	3.6	0 Open	Shorted C-1 or Trimmer Open L-2
1st Detector Cathode	5,000	Open	Open R-2
1st Detector Screen Grid or I. F. Screen Grid	100,000	0 5,000 50,000 52,500 Open	Shorted C-8 Shorted C-4 Shorted C-16 Shorted C-15 Open R-4 or R-5
1st Detector Plate	100,034	34 5,034	Shorted C-8 Shorted C-4
I. F. Control Grid	30	0 Open	Shorted C-6 Open L-4
I. F. Cathode	1,250	0 Open	Shorted C-7 Open R-3
I. F. Plate	50,048	48 2,548 Open	Shorted C-16 Shorted C-15 Open L-6
2nd Detector Control Grid	1,000,000	0 Open	I. F. Coil Screen Grounded Open R-6
2nd Detector Cathode	0	Open	Open Connection
2nd Detector Screen Grid	1,050,000	0 Open	Shorted C-10 Open R-5 or R-7
2nd Detector Plate	300,000	0 43,000 Open	Shorted C-11 Shorted C-12 Open R-5 or R-8
Audio Control Grid	500,000	206,000 Open	Shorted C-13 Open R-10
Audio Screen Grid	50,000	0 2,500 Open	Shorted C-16 Shorted C-15 Open R-5
Audio Plate	50,520	520 3,020 Open	Shorted C-16 Shorted C-15 Open R-5 or Pri. T-1
Rectifier Either Plate	400	Open	Open Sec. T-2
Rectifier Either Filament	52,500	0 2,500 Open	Shorted C-15 Shorted C-16 Open R-5 or Speaker Field
Filament of 247, 57, or 58	500	0 Open	Shorted R-11 or C-14 or Grounded Pilot Light Socket Open R-11
Antenna (L-1 disconnected)	20,000	Open	Open R-1

REFERENCE POINT—+B (RED SPEAKER LEAD)

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector or I. F. Screen Grid	50,000	30,000 Open	Shorted C-8 Open R-4
1st Detector Plate	50,034	Open	Open L-3, L-5 or R-4
I. F. Plate	48	Open	Open L-6
2nd Detector Screen Grid	1,000,000	50,000 Open	Shorted C-10 Open R-7
2nd Detector Plate	250,000	Open	Open R-8
Audio Plate	520	Open	Open Pri. T-1

MISCELLANEOUS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Det. Screen Grid to Stator C-2	Open	3	Shorted C-3
1st Det. Screen Grid to 1st Det. Plate	34	3 Open	Shorted C-5 Open L-3 or L-5
2nd Det. Plate to Audio Control Grid	Open	50,000	Shorted C-13
Across A. C. Plug	17	Open	Open Pri. T-2
Rectifier Plate to Plate	800	Open	Open Sec. T-2
Rectifier Filament to Filament	Very Low	Open	Open 280 Fil. Sec. T-2
Filament to Filament Other Sockets	Very Low	Open	Open Heater Sec. T-2

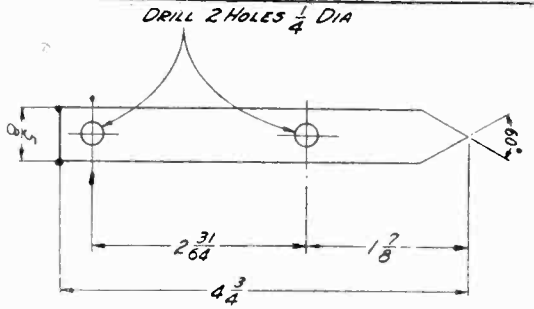


FIG. 5—*Dial Indicator for R. F. Alignment*

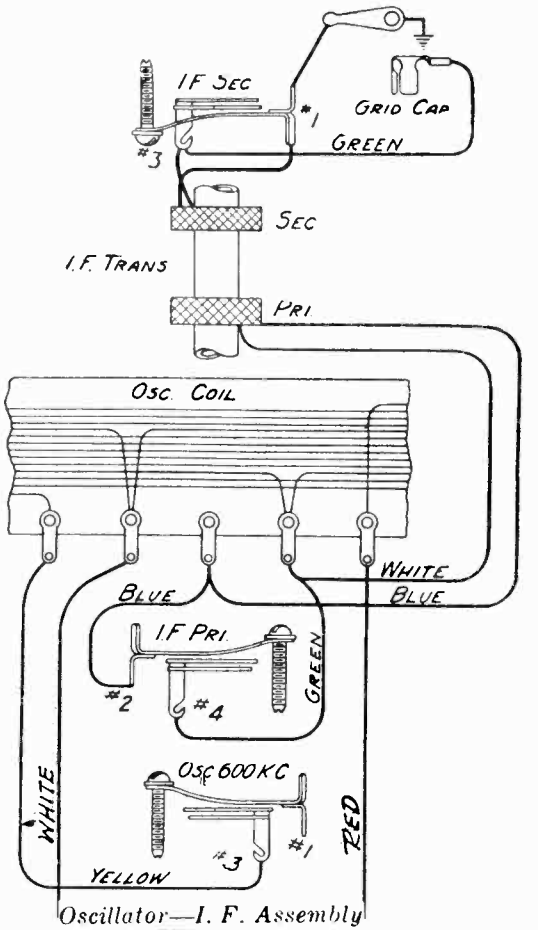
Aligning R. F. and Oscillator Condensers—During alignment of these condensers it will be necessary to provide an indicator for the dial in order that the tuning condenser can be set for the proper frequencies. A simple indicator for this purpose can be made from sheet brass as shown in Fig. 4. The indicator is mounted by slipping it over the volume control and tuning condenser shafts so that the point is over the dial scale.

Turn the tuning condenser until the rotor plates are fully meshed with the stator plates. If the lowest frequency mark is not directly beneath the indicator loosen the set screw which holds the dial in place on the shaft and turn the dial to its correct position taking care not to move the condenser rotor. Tighten the set screw.

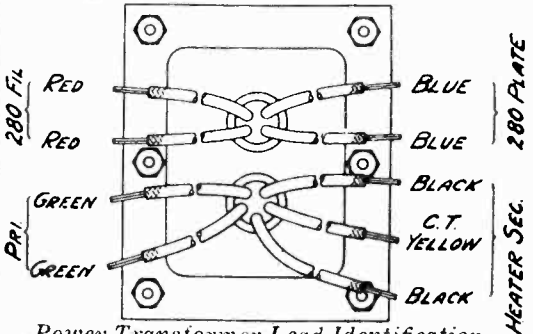
Then turn the tuning condenser until the dial is set at 1400 K. C. and connect the signal generator output to the antenna circuit. Place the signal generator in operation at 1400 K. C. and adjust the oscillator and R. F. trimmers to give maximum output. The oscillator trimmer (nearest back of chassis) should be adjusted first.

Then set the signal generator for a signal of 600 K. C. and tune in this signal on the receiver. Next adjust the oscillator 600 K. C. trimmer which is located on the base of the Oscillator-I. F. assembly nearest the back of the chassis. The tuning condenser should be turned slowly back and forth through the resonant point while the 600 K. C. trimmer is being adjusted and the deflection of the output meter noted for each change of the 600 K. C. trimmer. The setting of this trimmer which gives greatest deflection when the tuning condenser passes through resonance is correct.

Set the signal generator again for a frequency of 1400 K. C. and check the setting of the tuning condenser trimmers for maximum output. Then set the signal generator for a signal of 1000 K. C. and turn the tuning condenser rotor until the output meter shows maximum deflection. Then bend the slotted rotor plate sections of each tuning condenser which are last in mesh with the stator, in or out until maximum output is obtained. Follow the same procedure with signals of 750 and 600 K. C. Do not change the setting of the oscillator 600 K. C. trimmer after it has been once set as explained above.



Oscillator—I. F. Assembly



Power Transformer Lead Identification

VOLUME CONTROL AT MAXIMUM
No. 507 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Cathode Volts*	*Plate Current MA*
57	1	1st Det. & Osc.	2.3	125	5.0	120	—(1)	12.0	—(1)
58	2	I. F.	2.3	230	7.0	120	1.0	10.0	4.2
57	3	2nd Det.	2.3	40(2)	0	24(2)	.2	17.0	.7
247	4	Audio	2.3	210	1.5(3)	225	5.2		25.0
280	5	Rect.	4.7						22 Per Plate

(1) Can only be read with special adapter.
(2) Voltage as read with 600,000 ohm meter.
(3) Not true reading. Actual voltage across 500 ohm resistor—17 volts.