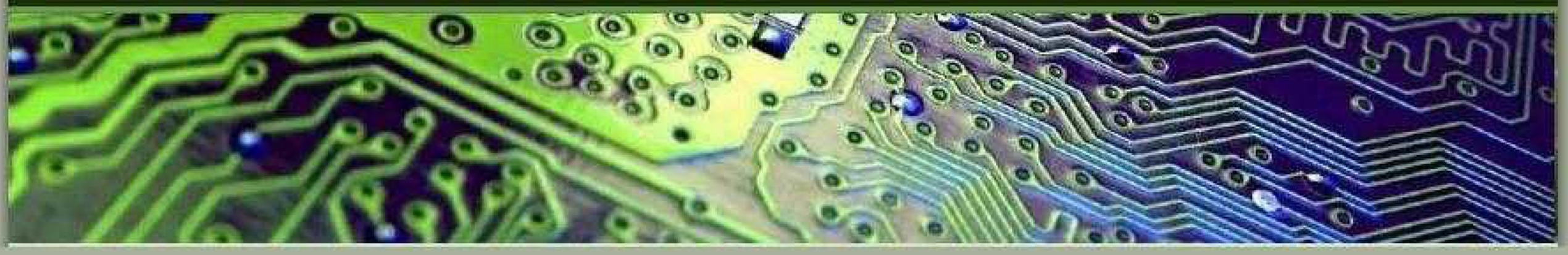
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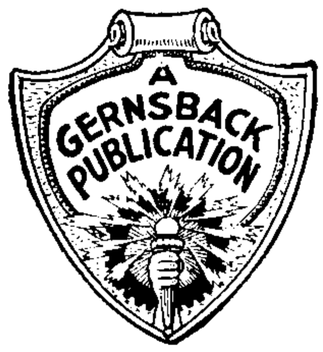
Complete Directory of all 1933-1934 Radio Receivers

FULL RADIO SERVICE GUIDE

Vol. No. 4

HUGO GERNSBACK
Editor

C. W. PALMER
Associate Editor



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..Introduction..

IN preparing the 1934 edition of the OFFICIAL RADIO SERVICE MANUAL, the editors have made every effort to give the Service Man as complete and concise a volume of practical data as could be selected from the available service material, which has been obtained from every conceivable source.

Special care has been taken to prevent duplication of material previously published. All the material in this edition is new and original. In fact, many pages in the book were held open until the last minute so that material which was not available before could be included.

The outstanding problems of the Service Man have been kept in mind in the compilation of this book—methods of servicing, material essential to correct servicing, the new equipment and tools constantly needed to cope with new sets and tubes as well as other fields in radio, including public address systems, short waves, auto radio, centralized installations and others.

It will be found that the illustrations in the 1934 OFFICIAL RADIO SERVICE MANUAL are much more explicit than before; the diagrams are not limited to the schematic circuit but other illustrations such as parts layouts, positions of trimmers, voltage and resistance readings, parts lists, etc., are included. There are hundreds of new circuits in this volume, and not one has been published in a previous issue.

A new section in the back of the book lists the essential data for practically every tube available, including socket connections. In this section, too, will be found a list of the broadcasting stations and police stations in the United States.

We will be pleased to receive suggestions and criticisms from any of the readers of this book. It has been written for Service Men and any suggestions for improving future issues will be useful to us.

To the Manufacturers who have furnished service data and information used in compiling this Manual, and to the thousands of readers who have written in during the course of the year, we wish to extend our most sincere thanks, and the hope that the present volume will find a myriad of uses to the radio Service Man.

—THE EDITORS.

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1931, 1932, 1933 and 1934 Manuals

THIS INDEX includes material printed in the 1931, 1932 and 1933 Manuals, as well as the present volume. To differentiate between the various volumes, a Roman numeral follows the page number of each set listed. Thus the numeral I refers to the 1931 issue, II refers to the 1932 issue, etc. The small "s" following some of the Roman numerals specifies that the particular page is in one of the supplements of the 1931 or 1932 Manuals.

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Record Changer 578-II
Zenette 5 Tube 574-II
Zenette 6 Tube 574-II

TABLE OF INTERMEDIATE FREQUENCIES used in Superheterodynes
632-III 633-III

ATWATER KENT MFG. CO.

MODEL 82-Q

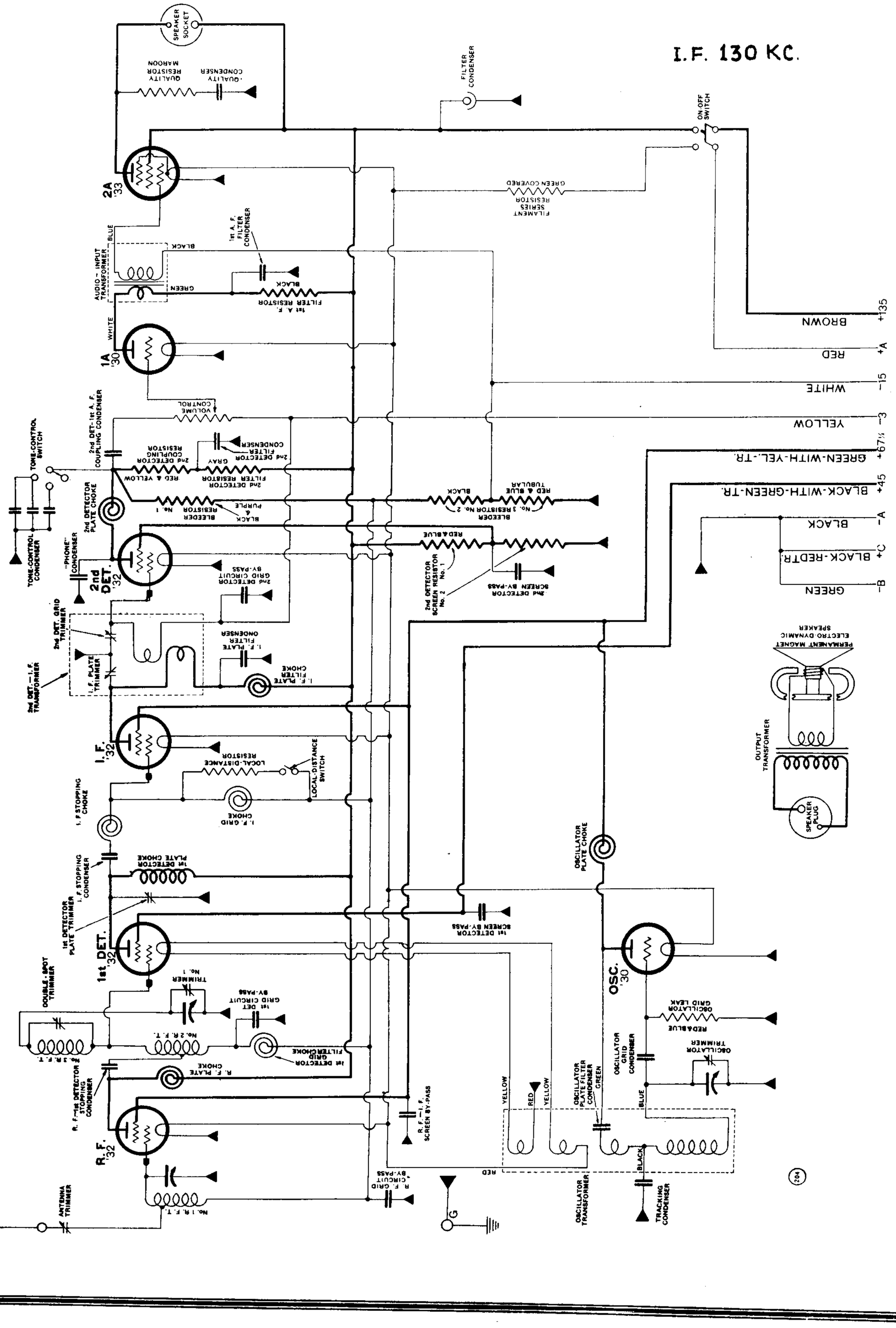


FIG. 285. DIAGRAM OF MODEL 82-Q (BATTERY-OPERATED).

In some 82-Q receivers, the primary of the audio input transformer is connected as follows: Green to the plate, and white to the 1st-A. F. filter resistor.

VOLTAGE TABLE FOR MODELS

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

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

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

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

Line voltage=110 volts.

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

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

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

ATWATER KENT MFG. CO.

MODEL 86, 86-F

I.F. 130 KC.

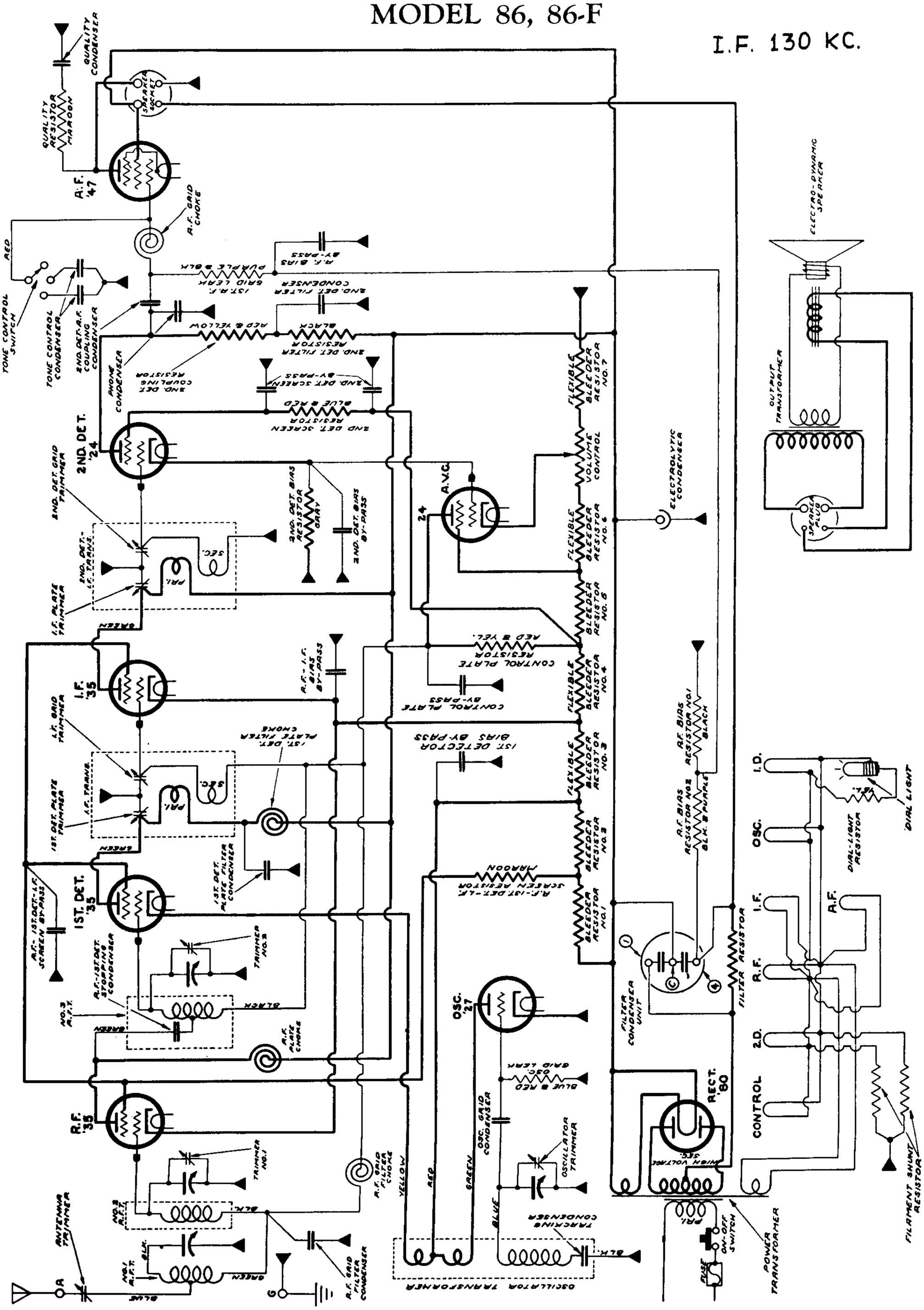


DIAGRAM OF MODEL 86 AND 86-F (A. C.-OPERATED).

The electrolytic condenser is listed in the Parts List as filter condenser No. 3.

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

ATWATER KENT MFG. CO.

MODEL 87-D

I.F. 130 KC.

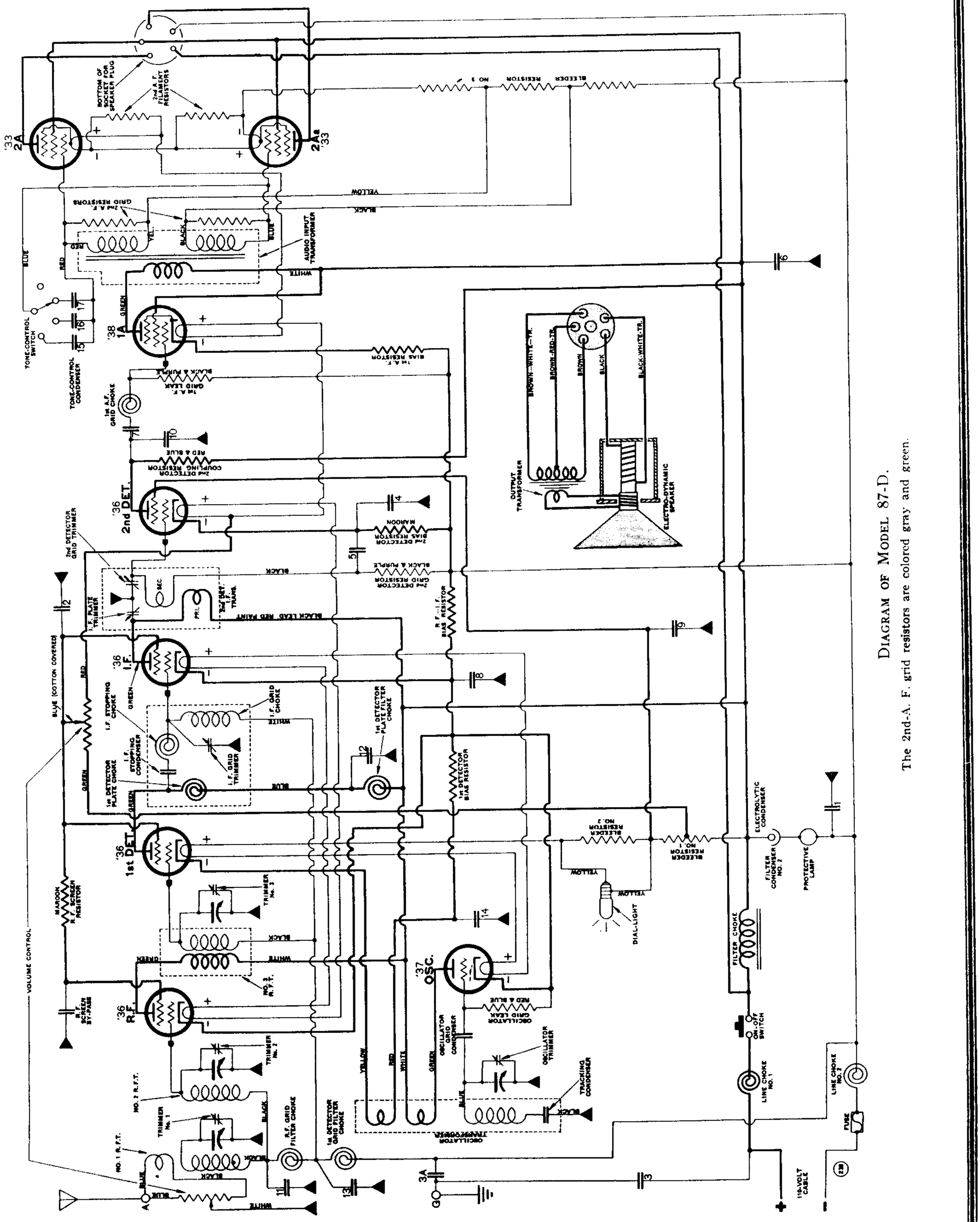


DIAGRAM OF MODEL 87-D.

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

ATWATER KENT MFG. CO.

MODEL 87-D (Direct Current Operated) RECEIVER

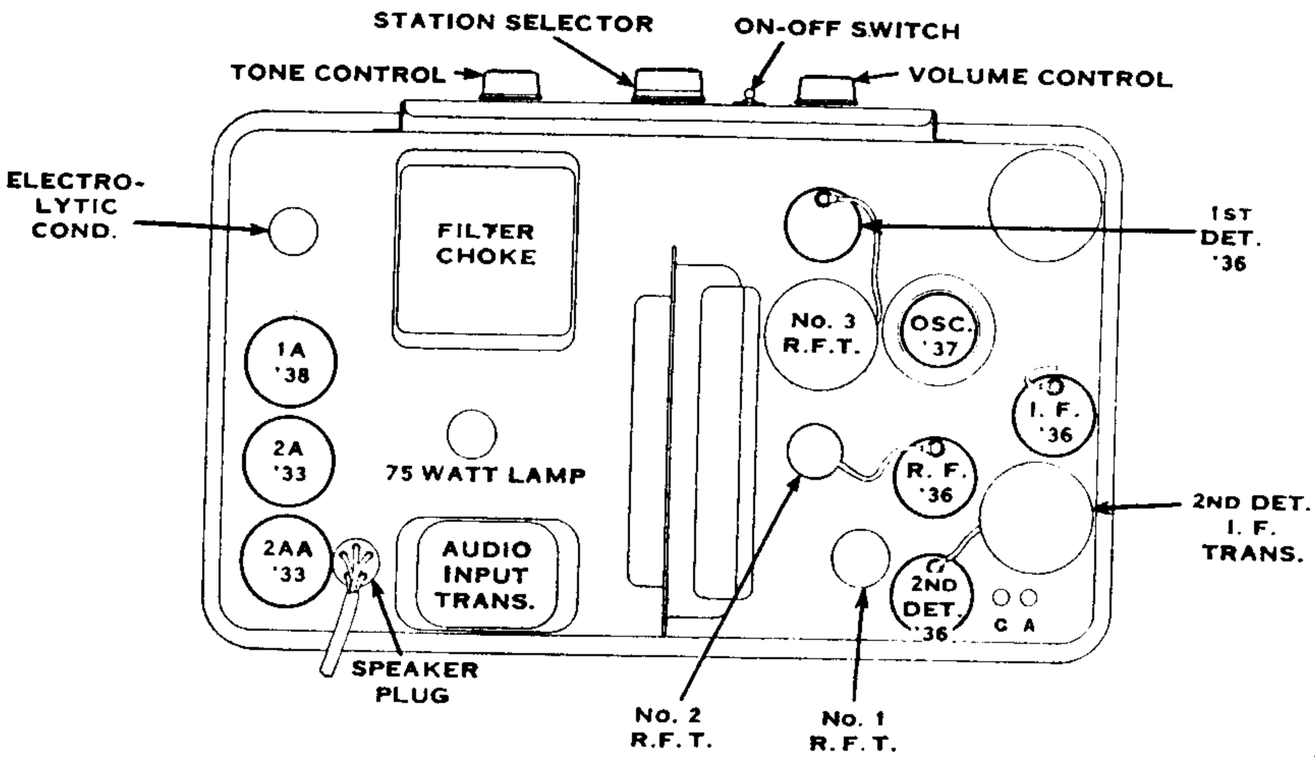
GENERAL DESCRIPTION

Model 87-D is a console-type super-heterodyne receiver designed for 110-volt direct-current supply. It incorporates the following features—

1. Atwater Kent super-heterodyne circuit with single-spot selectivity.
2. Eight tubes, including three pentodes as audio-frequency amplifiers.
3. Quick-vision dial, tone control, electro-dynamic speaker.
4. Atwater Kent expert design and dependable construction.

SERVICE NOTES

1. The intermediate frequency is 130 kilocycles.
2. Instructions regarding adjustment of trimmers have been given previously in the supplement for Type H chassis. Much of this information may be applied in servicing Model 87-D.
3. The readings given in the table below were obtained with the 250-volt scale of a 1000-ohm-per-volt D. C. voltmeter. The values given are only approximate and are the measured values, not the actual operating voltages. All measurements are made from cathode in heater tubes and from —F in plain-filament-type tubes.



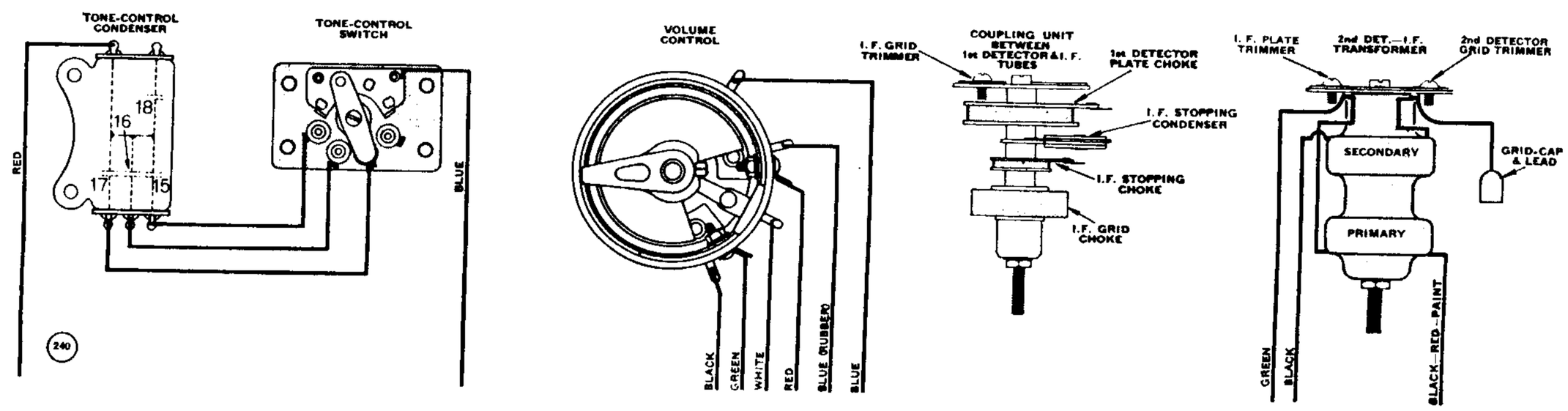
TOP VIEW OF MODEL 87-D.

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

Voltage Table for Model 87-D

Turn Volume Control to Maximum
Line Voltage, 120

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

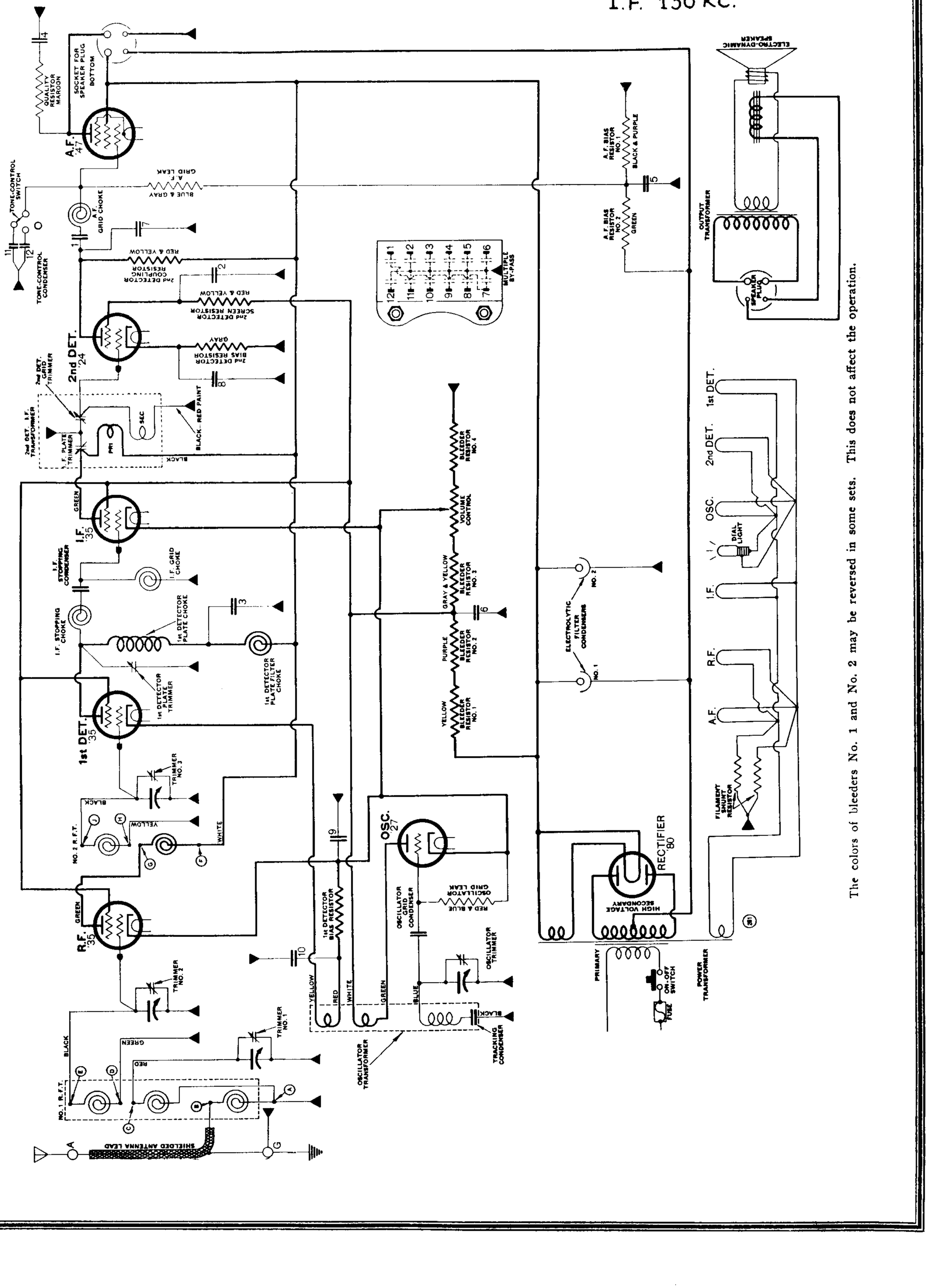


CONNECTION OF PANEL UNITS AND I. F. TRANSFORMERS, MODEL 87-D.

ATWATER KENT MFG. CO.

MODEL 90, 90-F

I.F. 130 KC.

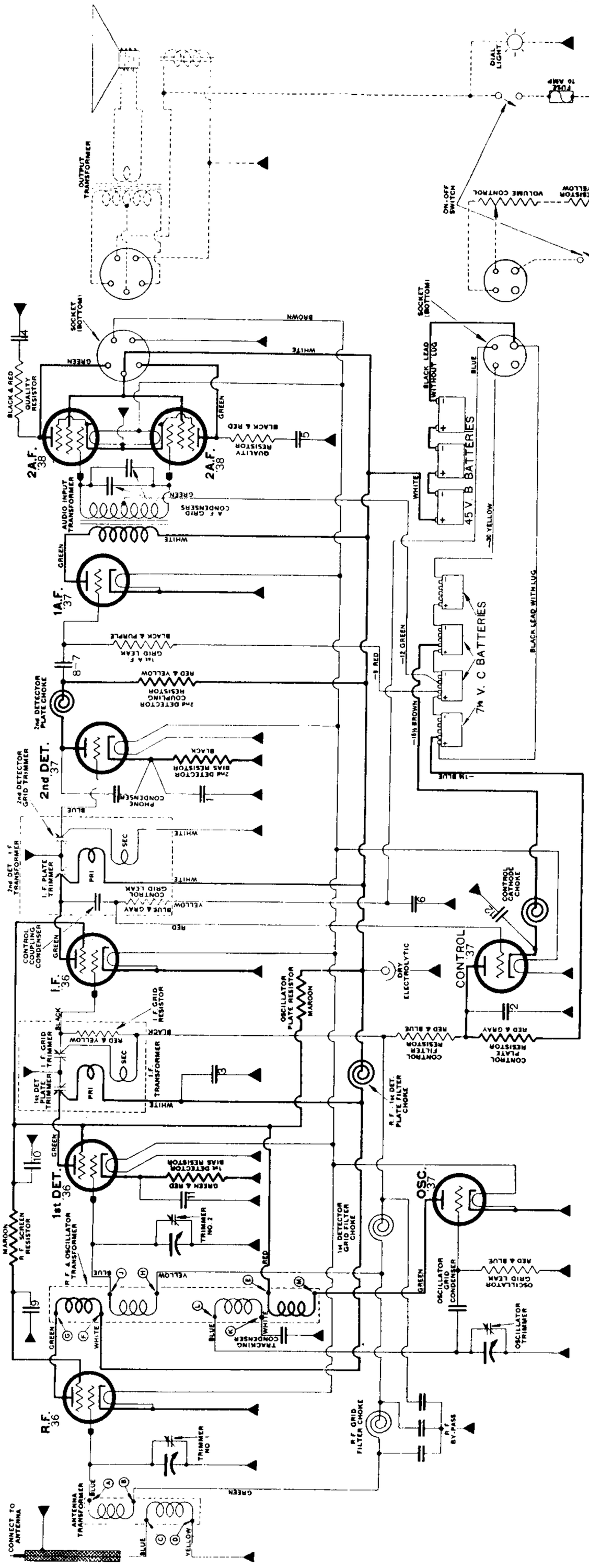


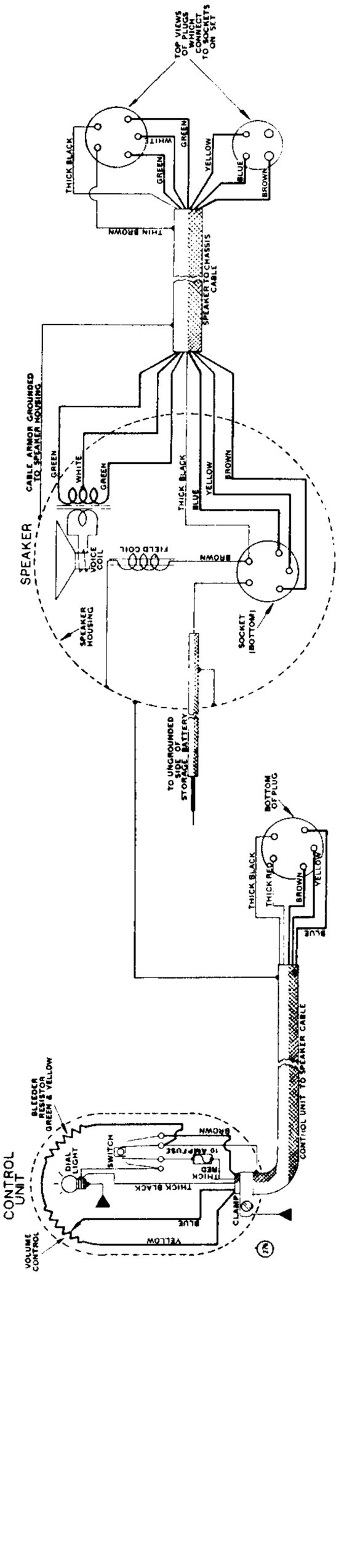
The colors of bleeders No. 1 and No. 2 may be reversed in some sets. This does not affect the operation.

ATWATER KENT MFG. CO.

MODEL 91, 91-B AND 91-C MOTOR CAR RADIO

(Intermediate Frequency, 260 Kilocycles)



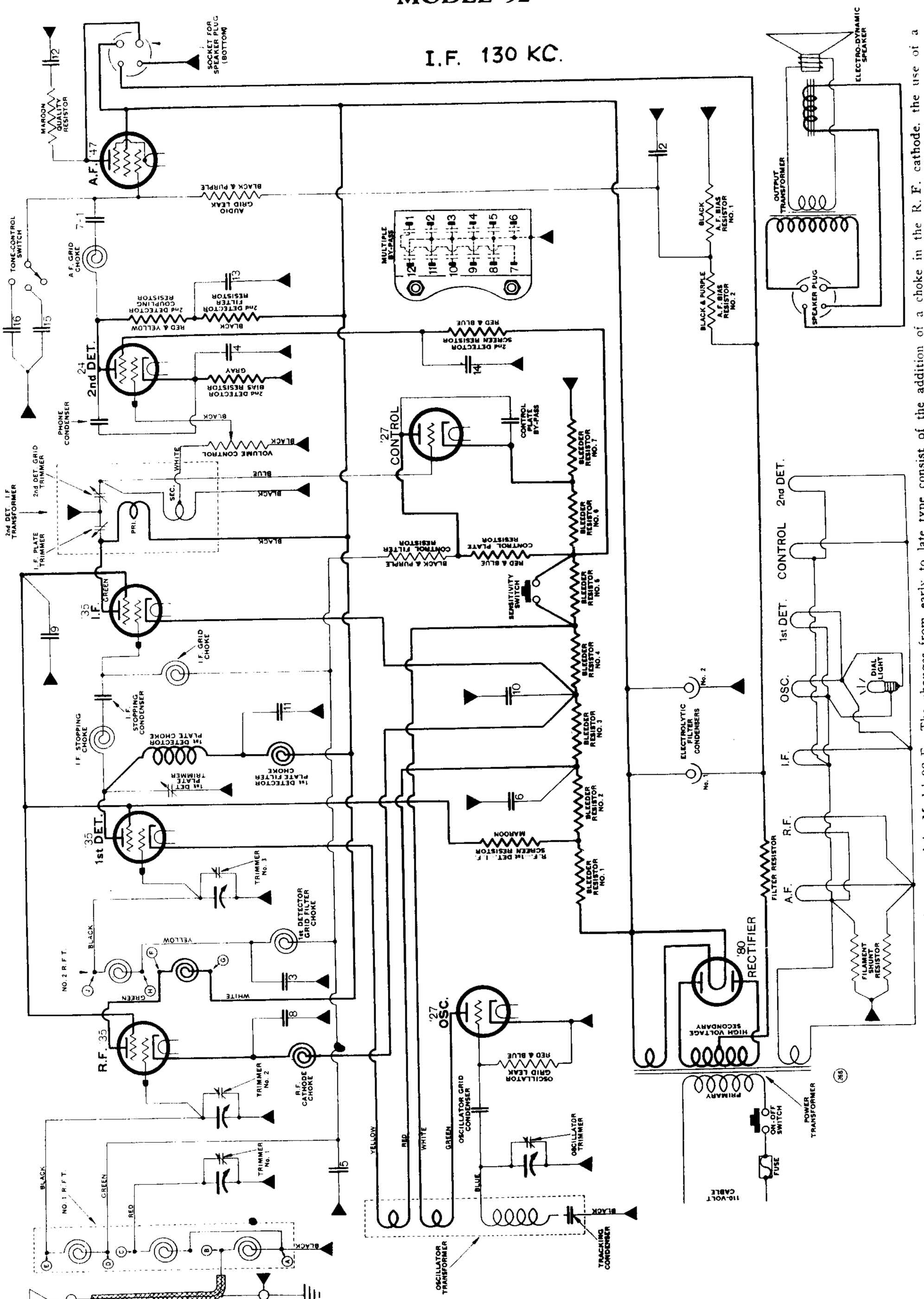


The wiring of the control unit and speaker in Model 91 is the same as in Model 81.

ATWATER KENT MFG. CO.

MODEL 92

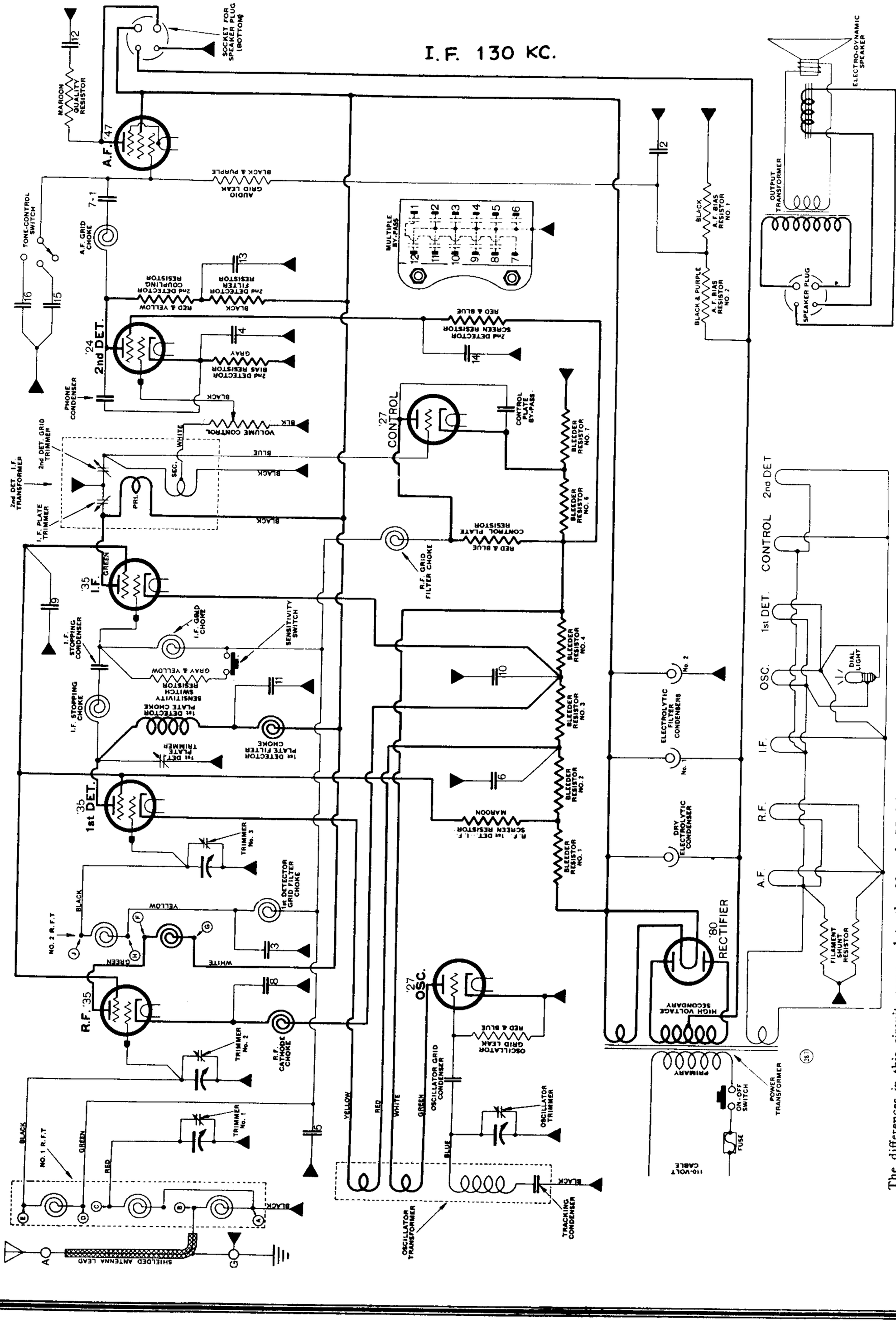
I.F. 130 KC.



The filter resistor (in the high-voltage center-tap lead) is not used in Model 92-F. The changes from early to late type consist of the addition of a choke in the R. F. cathode, the use of a separate control-plate by-pass, and a slight re-arrangement of leads to the multiple by-pass.

ATWATER KENT MFG. CO.

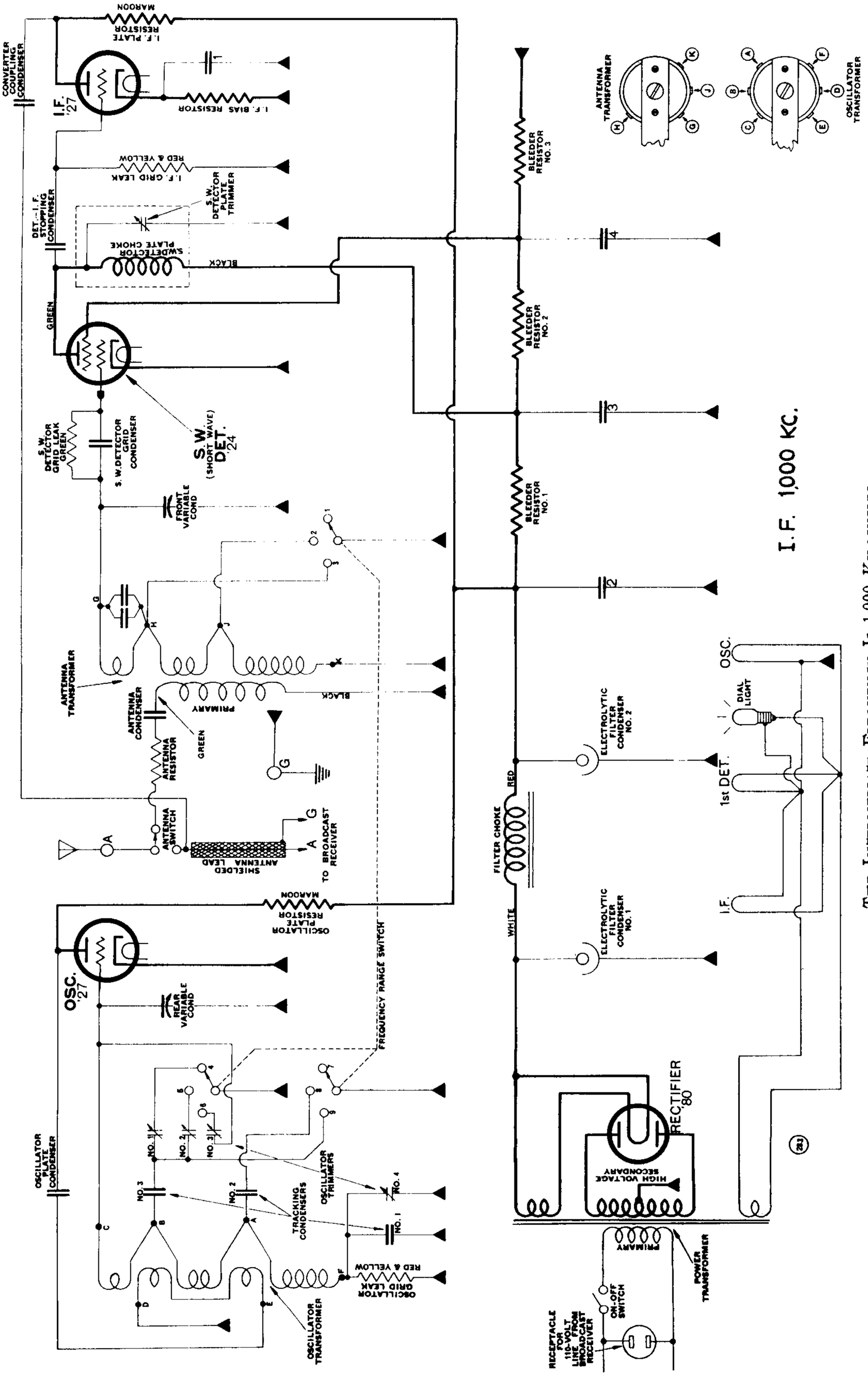
MODEL 92-F



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

ATWATER KENT MFG. CO.

MODEL 93 SHORT WAVE CONVERTER



I.F. 1,000 KC.

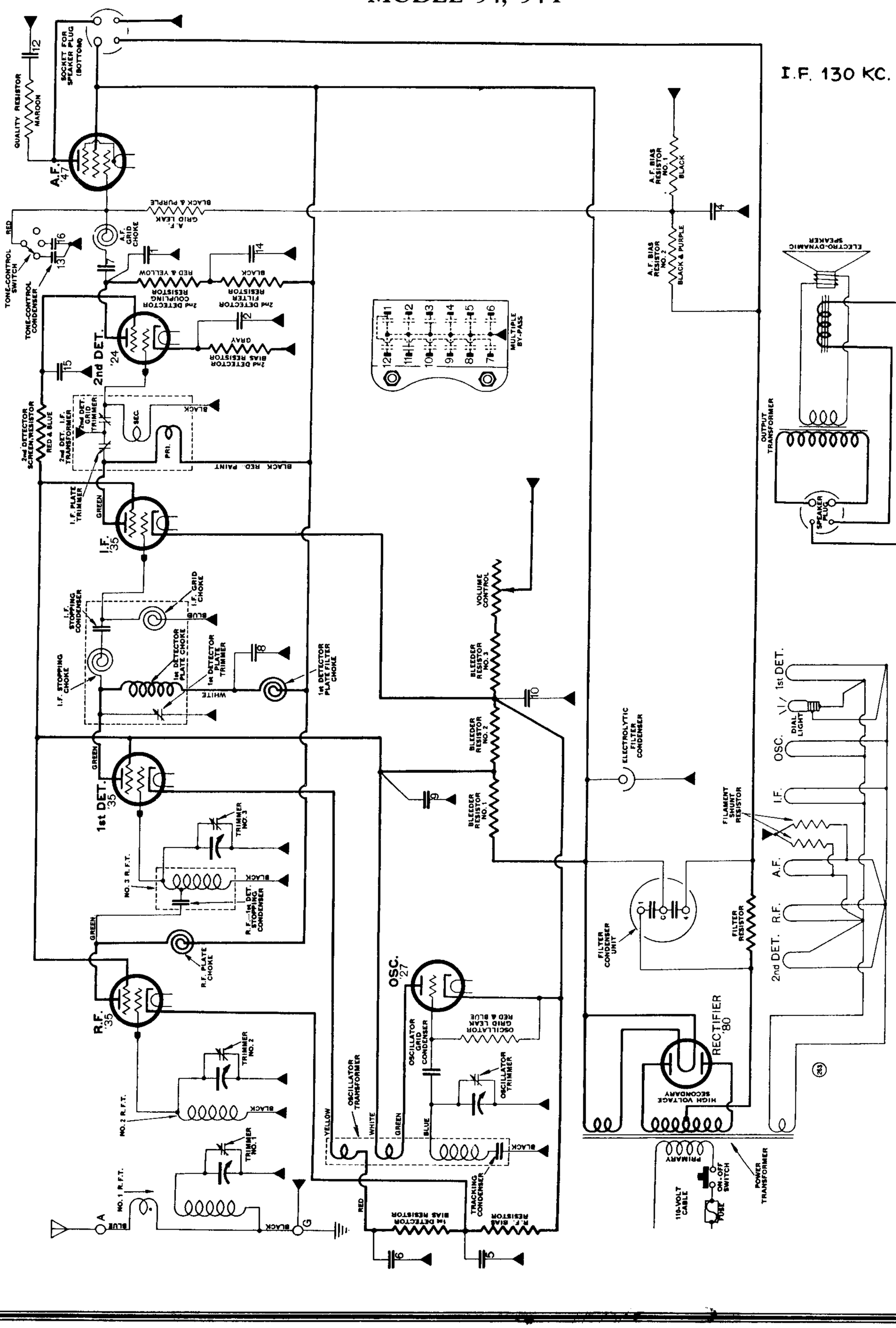
THE INTERMEDIATE FREQUENCY Is 1,000 KILOCYCLES.

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

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

ATWATER KENT MFG. CO.

MODEL 94, 94-F

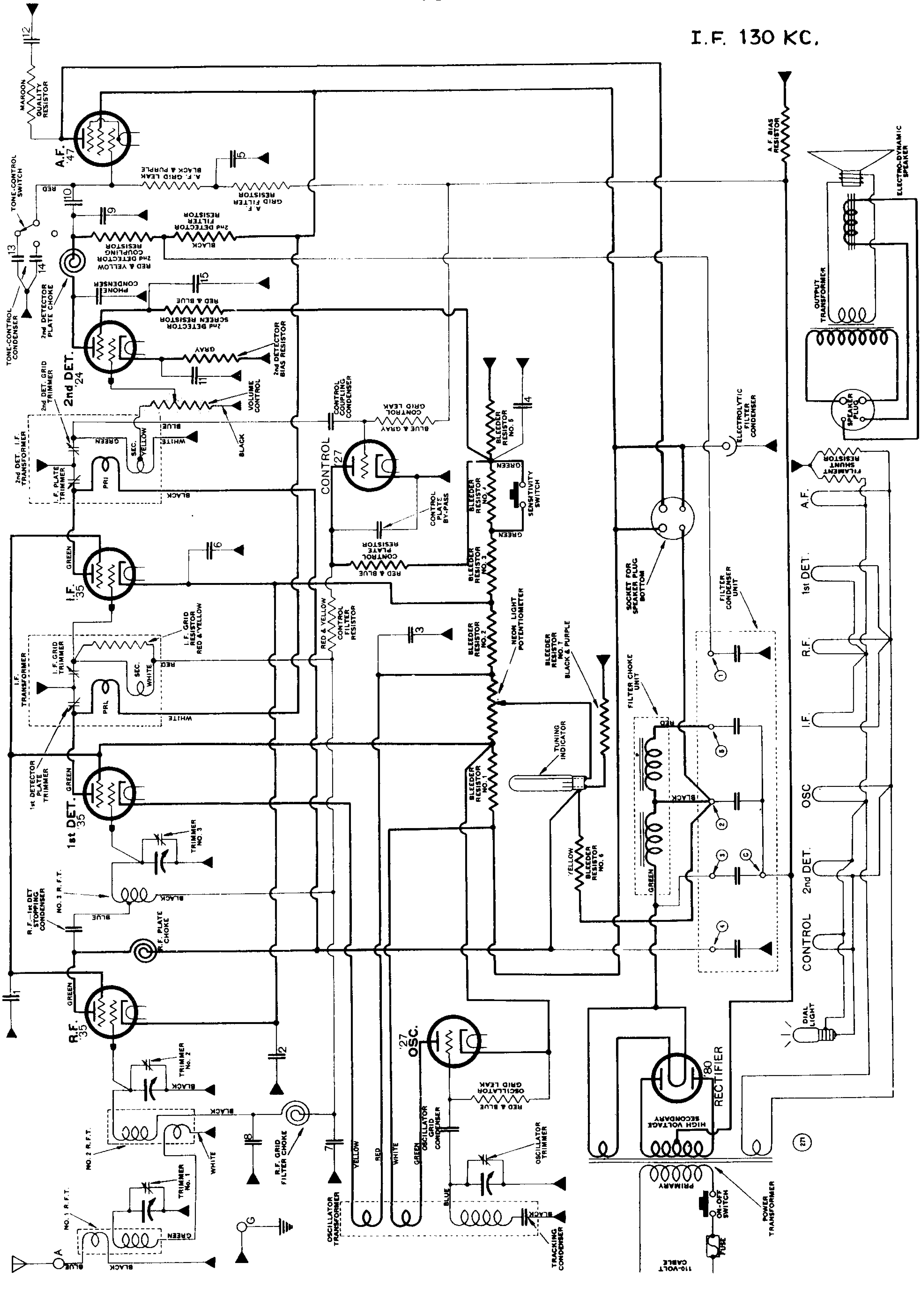


The filter resistor (in the high-voltage center-tap lead) is not used in Model 94-F.

ATWATER KENT MFG. CO.

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

I.F. 130 KC.



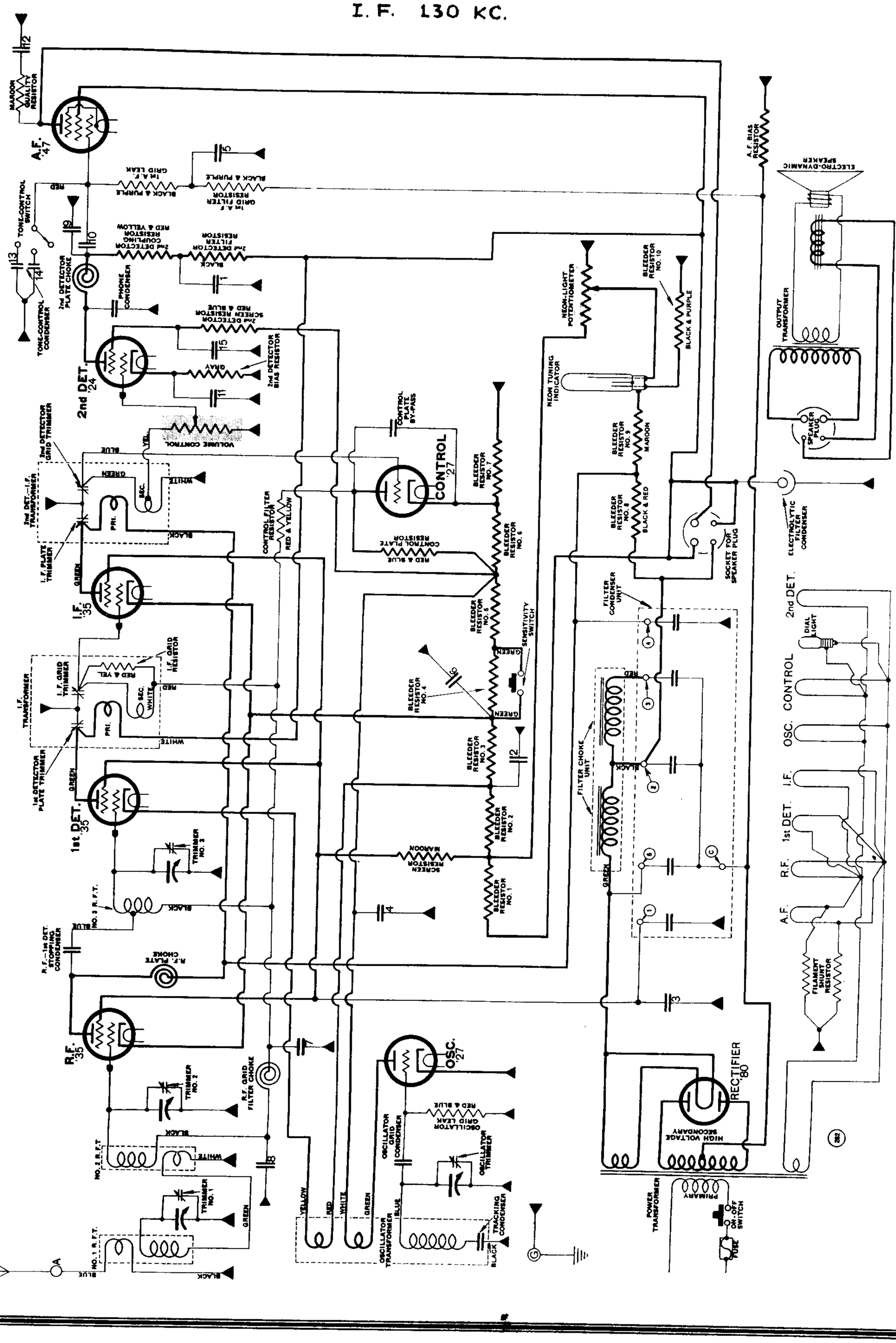
The neon-light potentiometer used in 3rd type Model 96 is marked with red paint as identification.

In some late type Model 96 receivers, a flexible type 1st-detector bias resistor (No. 16320) is connected in series with the red lead from the oscillator transformer, after by-pass 3. Also in some of these sets, a flexible bleeder No. 8 (No. 24450) is connected in series with the lead to the center contact of the potentiometer.

ATWATER KENT MFG. CO.

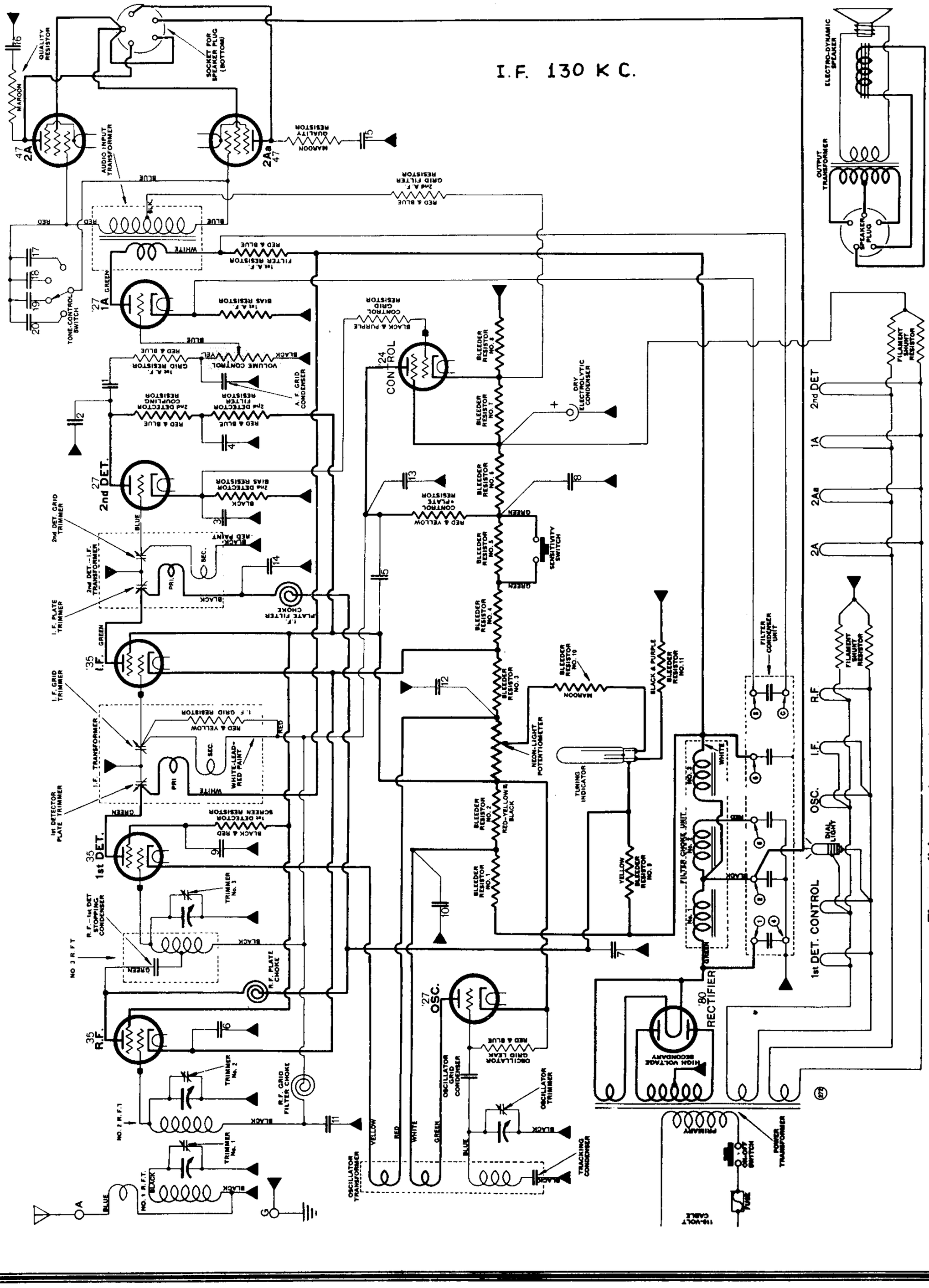
MODEL 96-F

I. F. 130 KC.



ATWATER KENT MFG. CO.

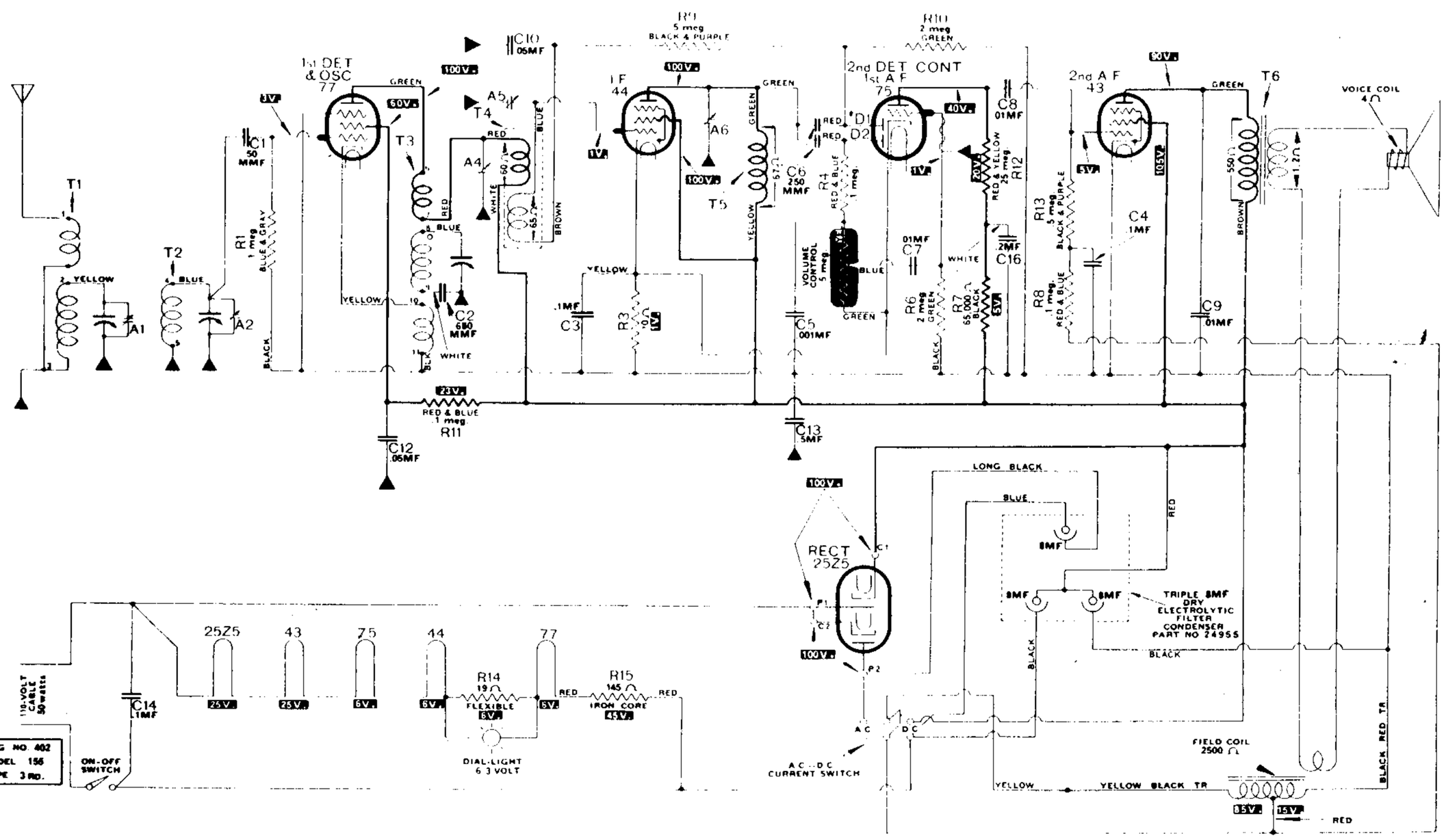
MODEL 99 (3rd Type) Above Serial No. 4884901



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

ATWATER KENT MFG. CO.

MODEL 155, 3rd Type, ABOVE SERIAL No. 7088700



For parts not listed below, please order by description or name of part and model number of set.

Part No.	Name of Part	List Price
24293	Volume control, complete, less leads, .5 meg.	$ .75
24722	Cabinet complete	3.50
24955	Triple dry electrolytic condenser 8, 8, 8MF, 150 volts	1.50
*25317	Variable condenser rotor stator and frame (23 plates)	2.00

* In 1st and 2nd type Model 155, the variable condenser is No. 24561, list price $2.00 (21 plates).

TRANSFORMERS

Dia. Code No.	Part No.	Name of Part	List Price
T-1	32210	No. 1 R. F. transformer	$1.00
T-2	32220	No. 2 R. F. transformer	1.00
T-3	32190	Oscillator transformer	.70
T-4	31790	No. 1 I. F. transformer	.65
T-5	31780	No. 2 I. F. transformer	.35
T-6	24897	Output transformer	.85

RESISTORS

R-1	30360	Blue-gray	1,000,000 ohms, 1/3 watt	$ .10
R-3	18520	Flexible	70 ohms	.18
R-4	30340	Red-blue	100,000 ohms, 1/3 watt	.10
R-6	36370	Green	2,000,000 ohms, 1/3 watt	.10
R-7	31980	Black	65,000 ohms, 1/3 watt	.10
R-8	30340	Red-blue	100,000 ohms, 1/3 watt	.10
R-9	30350	Black-purple	500,000 ohms, 1/3 watt	.10
R-10	30370	Green	2,000,000 ohms, 1/3 watt	.10
R-11	30340	Red-blue	100,000 ohms, 1/3 watt	.10
R-12	31970	Red-yellow	250,000 ohms, 1/3 watt	.10
R-13	30350	Black-purple	500,000 ohms, 1/3 watt	.10
R-14	16610	Flexible	19 ohms	.15
R-15	31690	Iron core	145 ohms	.30

FIXED CONDENSERS

Dia. Code No.	Part No.		List Price
C-1	30260	50MMF, letter E stamped on washer	$ .15
C-2	31180	680MMF, 100 volts	.35
C-3, C-16	32760	.1MF, and .2MF, 100 volts	.30
C-4	31530	.1MF, 100 volts	.22
C-5	33640	.001MF, 450 volts	.22
C-6	33630	250MMF (double) 450 volts	.25
C-7	23250	.01MF, 450 volts	.31
C-8	27630	.01MF, 200 volts	.20
C-9	27630	.01MF, 200 volts	.20
C-10, C-12, C-13	31890	.05MF, .05MF, and .5MF, 100 volts	.45
C-14	26660	.1MF, 200 volts	.25

No. 24942 SPEAKER

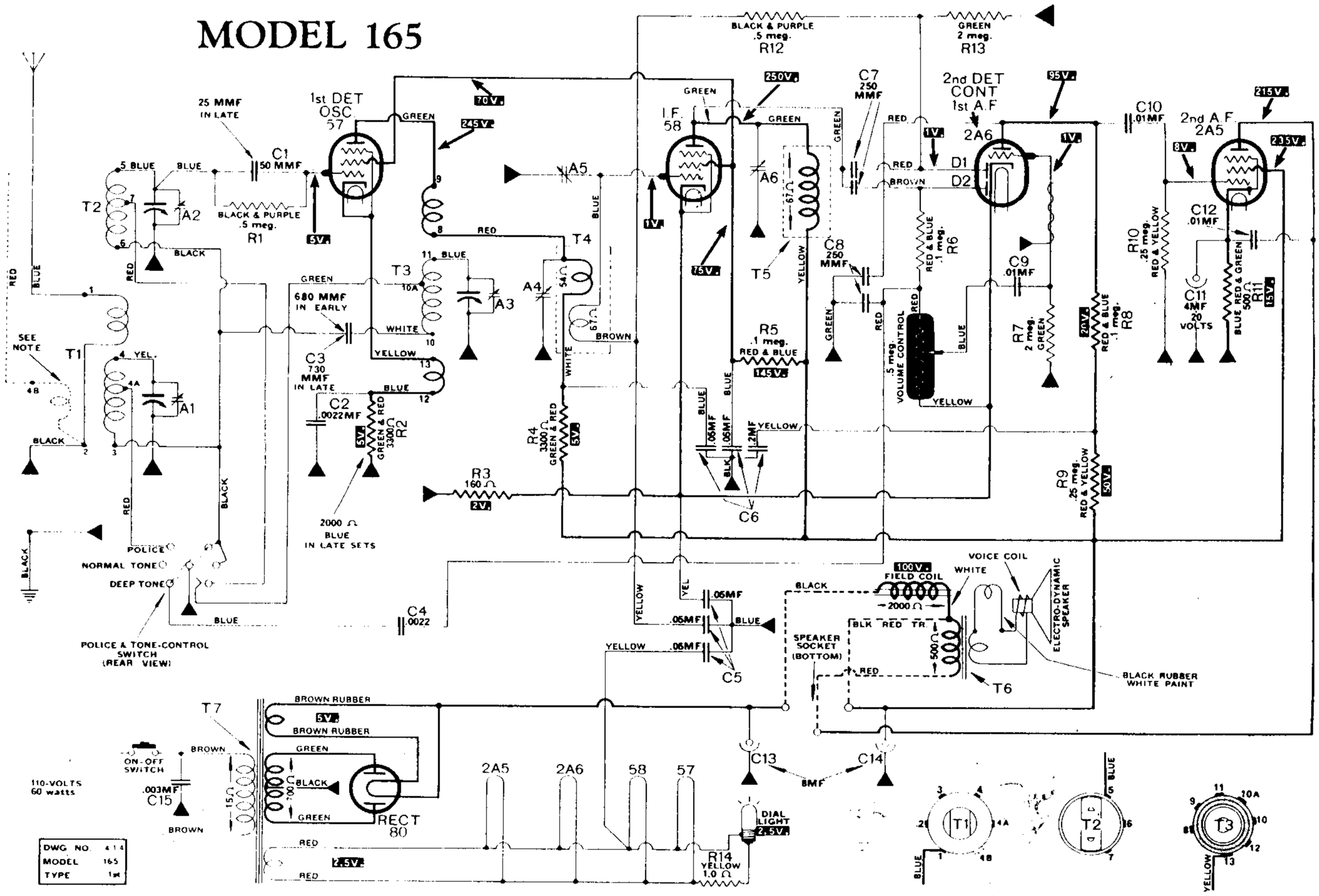
Part No.	Name of Part	List Price
24942	Speaker, complete	$ 3.25
24897	Output transformer (T-6)	.85
25053	Field coil (2500 ohms)	1.25
24895	Cone assembly	1.65

MISCELLANEOUS PARTS

Part No.	Name of Part	List Price
24908	Instruction and log card (F-1056)	net $ .01
24733	110-volt cable and plug	.60
24727	Antenna lead (30 feet)	.75
24278	Knob for volume control or station selector	.10
24892	A. C.—D. C. current switch	.60

ATWATER KENT MFG. CO.

MODEL 165



DWG. NO.	414
MODEL	165
TYPE	1st

Part No.	Name of Part	List Price
25309	Cabinet, complete	$ 4.50
24293	Volume control and on-off switch (.5 meg.)	.75
25022	Variable condenser	2.25
25312	Police and tone control switch, complete	.40
25311	Switch base, complete	.25
25226	Switch shaft and blade	.05

TRANSFORMERS

Dia. Code No.	Part No.	Description	List Price
T-1	32430*	No. 1 R. F. T.	$ 1.00
T-2	32440	No. 2 R. F. T.	1.00
T-3	32450	Oscillator transformer	1.00
T-4	32620	No. I. F. transformer	.75
T-5	32630	No. 2 I. F. transformer	.35
T-6	21672	A. F. output transformer	1.25
T-7	25191	Power transformer	3.15

RESISTORS

R-1	30350	Black and purple, .5 meg., 1/3 watt	.10
R-2	33250	Blue, 2000 ohms, 1/3 watt	.10
R-3	28950	Flexible, 160 ohms	.17
R-4	30380	Red and green, 3300 ohms, 1/3 watt	.10
R-5	20980	Red and blue, .1 meg., ½ watt	.10
R-6	30340	Red and blue, .1 meg., 1/3 watt	.10
R-7	30370	Green, 2 meg., 1/3 watt	.10
R-8	30340	Red and blue, .1 meg., 1/3 watt	.10
R-9	31970	Red and yellow, .25 meg., 1/3 watt	.10
R-10	31970	Red and yellow, .25 meg., 1/3 watt	.10
R-11	32010	Blue, red and green, 500 ohms, 1 watt	.15
R-12	30350	Black and purple, .5 meg., 1/3 watt	.10
R-13	30370	Green, 2 meg., 1/3 watt	.10
R-14	31860	Flexible, 1 ohm, yellow covered	.17

* In early 165, R-2 is No. 30380 red and green, 3300 ohms, ⅓ watt, $.10.

CONDENSERS

C-1	30260	50MMF. Letter E stamped on washer	$ .15
C-2	33660	.0022MF, 400-volts	.22

CONDENSERS

Dia. Code No.	Part No.	Description	List Price
C-3	25638	730MMF, 100-volts	.25
C-4	33660	.0022MF, 450-volts	.22
C-5	32360	.05, .05 and .05MF, 100-volts	.40
C-6	32350	.05, .05 and .2MF, 200-volts	.50
C-7	33630	250MMF (double), 450-volts	.25
C-8	33630	250MMF (double), 450-volts	.25
C-9	23250	.01MF, 450-volts	.31
C-10	27630	.01MF, 200-volts	.20
C-11	25167	4MF, 20-volts dry electrolytic	.40
C-12	27630	.01MF, 200-volts	.20
C-13	25168	8MF, 475-volts, electrolytic	.85
C-14	25168	8MF, 475-volts, electrolytic	.85
C-15	32740	.003MF, 500-volts	.40

** In early 165, C-3 is No. 31180, 680MMF, 100 volts $.35.

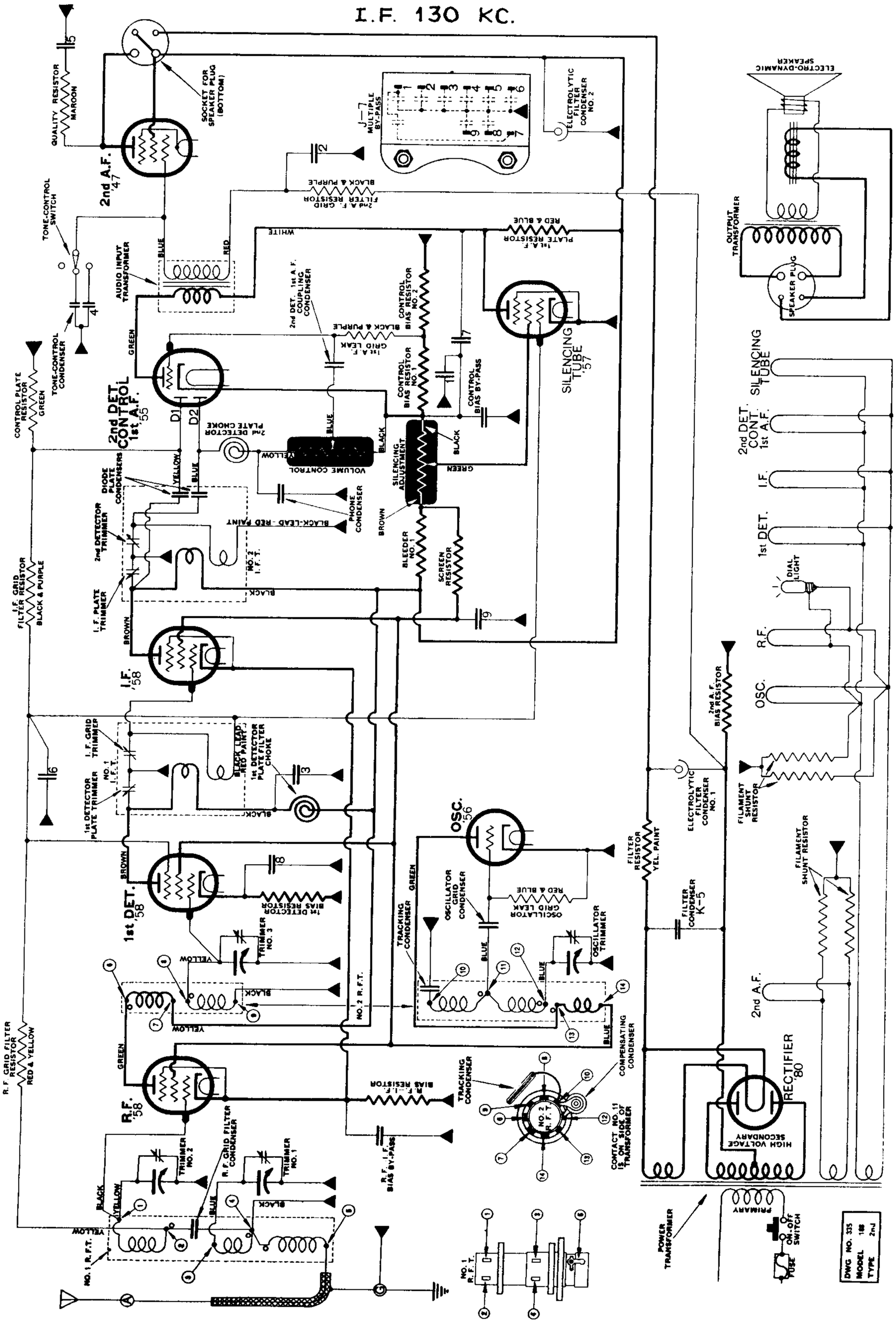
MISCELLANEOUS PARTS

Part No.	Description	List Price
25194	Cloth screen	$ .40
25213	Cabinet foot	.02
24278	Station selector and volume control knob	.10
25145	Police and tone control switch knob	.15
24323	Power transformer cover (2 used)	.15
24554	I.F.T. shield and trimmer (A5)	.55
19566	110-volt cable and plug	.45
24732	110-volt plug	.06
15404	2.5-volt dial lamp	.15
22683	Tube shield	.10
24549	Dial assembly	.25
31870	Trimmer A6	.20
24495	Trimmer A4	.25
25196	Speaker socket	.10
24492	Rectifier socket	.10
24494	Small 6-prong socket (3 used)	.10
22733	Large 6-prong socket (1 used)	.10
25049	Instruction and log card (F-1059)	net .01
25186	Switch instruction tag	net .01
25189	Shipping container	net .25

ATWATER KENT MFG. CO.

MODEL 188 (2nd Type)

I.F. 130 KC.



ATWATER KENT MFG. CO.

ATWATER KENT RADIO

SERVICE DATA

WITH PARTS AND PRICE LISTS FOR

Models 188 (2nd Type), 260 (3rd Type), 469 (2nd Type), 469-D, 469-Q, 480, 558, 558-D, 558-Q, 612, 627 and 812

All Models listed in this supplement employ the Atwater Kent super-heterodyne circuit with an intermediate frequency of 130 kilocycles, except Model 480 which has an intermediate frequency of 472½ kilocycles.

TABULATED DATA FOR MODELS DESCRIBED IN THIS SUPPLEMENT

Model No.	Power Supply	Part No. Complete	Part No. Speaker	Tone-beam	Auto-matic Vol. Control	Auto-matic Silencing	Range Switch	R.F.	1st Det.	1st I.F.	2nd I.F.	2nd Det.	Control	1st A.F.	osc.	Silencing Tube	2nd A.F.	Driver	Push-Push	Rect.
188 Above 8074387	110-V., 60-C.	28400	28700	No	Yes	Yes	No	58	58	58	—		55		56	57	47	—	—	80
188-F Above 5693025	110-V., 25-C.	29300	28700	No	Yes	Yes	No	58	58	58	—		55		56	57	47	—	—	80
260 Above 8423096	110-V., 60-C.	28900	28800	Yes	Yes	Yes	No	58	58	58	58		55		56	57	47(2)	—	—	80
260-F Above 6188242	110-V., 25-C.	29500	28800	Yes	Yes	Yes	No	58	58	58	58		55		56	57	47(2)	—	—	80
469 Above 8498122	110-V., 60-C.	29000	28800	Yes	Yes	Yes	No	58	58	58	—		55		56	57	47(2)	—	—	80
469-F Above 6186242	110-V., 25-C.	29400	28800	Yes	Yes	Yes	No	58	58	58	—		55		56	57	47(2)	—	—	80
469-D	110-V., D. C.	31300	31600	No	Yes	Yes	No	39	39	39	—		85		37	36	48(2)	—	—	—
469-Q	Battery	31100	31500	No	Yes	No	Yes	34	32*	34	34	30		32	*	—	—	30	30(2)	—
480	110-V., 60-C.	29600	28800	Yes	Yes	No	Yes	58	58	58	58	56	56	47(2)	56	—	—	—	—	80
480-F	110-V., 25-C.	29900	28800	Yes	Yes	No	Yes	58	58	58	58	56	56	47(2)	56	—	—	—	—	80
558	110-V., 60-C.	29800	17300	No	Yes	Yes	No	58	58	58	—		55		56	57	47	—	—	80
558-F	110-V., 25-C.	30800	17300	No	Yes	Yes	No	58	58	58	—		55		56	57	47	—	—	80
558-D	110-V., D. C.	31400	31800	No	Yes	Yes	No	39	39	39	—		85		37	36	48(2)	—	—	—
558-Q	Battery	31200	31700	No	Yes	No	Yes	34	32*	34	34	30		32	*	—	—	30	30(2)	—
612	110-V., 60-C.	30000	30200 or 30300	Yes	Yes	Yes	No	58	58	58	58		55		56	57	—	46	46(2)	83(2)
627	110-V., 60-C.	29700	17300	No	Yes	No	Yes	58	58	58	—		55		56	—	47	—	—	80
627-F	110-V., 25-C.	30700	17300	No	Yes	No	Yes	58	58	58	—		55		56	—	47	—	—	80
812	110-V., 60-C.	30500	30400 or 30600	Yes	Yes	Yes	No	58	58	58	58		55		56	57	—	46	46(2)	83(2)

*In Models 469-Q and 558-Q, the 1st-detector and oscillator are combined in one type 32 tube.

In Model 612, the 4-prong speaker, No. 30200, is type 324, and the 5-prong speaker, No. 30300, is type 326.

In Model 812, the 4-prong speaker, No. 30400, is type 336, and the 5-prong speaker, No. 30600, is type 338.

ATWATER KENT MFG. CO.

Parts and Price List for Model 188 (2nd Type), 260 (3rd Type), 469 (2nd Type), 612 and 812

NAME OF PART	188	260	469	612	812
Volume control, complete less leads	23228 1.25	23228 1.25	23228 1.25	23228 1.25	23228 1.25
Tone-control condenser	28040 .20	21530 1.00	21530 1.00	30270 1.00	30270 1.00
Silencing adjustment	28220 1.25	28220 1.25	28220 1.25	28220 1.25	28220 1.25
TRANSFORMERS					
Power transformer No. 1 (Top)	26720 7.50	28680 7.50	28680 7.50	29170 8.25	28660 7.50
Power transformer No. 2 (Bottom)					28650 6.00
Audio transformer unit	28490 3.75	26940 3.75	26940 3.75	28670 5.75	29960 5.75
R.F. Transformer group	23912 2.00	23823 3.00	23949 3.00	23823 3.00	23823 3.00
No. 1 I.F. Transformer, less trimmers	23356 2.00	23535 2.00	23356 2.00	23535 2.00	23535 2.00
No. 2 I.F. Transformer, less trimmers	22059 2.00	22913 2.00	22059 2.00	22913 2.00	22913 2.00
No. 3 I.F. Transformer, less trimmers		22915 2.00		22915 2.00	22915 2.00
Oscillator transformer		27080 1.25	27040 1.25	27080 1.25	27080 1.25
Output transformer				28630 2.25	28630 2.25
CHOKES					
Filter choke unit		26960 5.75	26970 5.75	29410 5.75	28640 5.75
1st. Detector plate filter choke	19210 .25				19210 .25
2nd. Detector plate choke	17390 .60	17390 .60	17390 .60	17390 .60	17390 .60
R.F. Plate choke			17015 .50		
R.F. Screen filter choke		19210 .25			
Cathode filter choke		19210 .25			
1st. I.F. Plate filter choke		19210 .25		19210 .25	19210 .25
2nd. I.F. Plate filter choke		19210 .25		19210 .25	19210 .25
I.F. Plate filter choke			19210 .25		
I.F. Cathode choke			19210 .25		
CONDENSERS					
Electrolytic filter condenser No. 1	22538 2.50	22538 2.50	22538 2.50	23498 2.50	23498 2.50
Electrolytic filter condenser No. 2	22538 2.50	22538 2.50	22538 2.50	22538 2.50	22538 2.50
Electrolytic filter condenser No. 3				22538 2.50	23481 2.50
Electrolytic filter condenser No. 4				22538 2.50	22538 2.50
Filter condenser unit, paper and foil	26620 1.00		26620 1.00		
Quality condenser				30250 .20	30250 .20
Tracking condenser	26690 .25	26690 .25	26690 .25	26690 .25	26690 .25
R.F. Grid filter condenser	26820 .20				
1st. Det. grid filter cond.			26820 .20		
Oscillator grid condenser	26670 .25		26670 .25		
Diode plate condenser	30240 .20	30240 .20	30240 .20	30240 .20	30240 .20

NAME OF PART	188	260	469	612	812
CONDENSERS (Cont'd)					
2nd. Detector-1st. A. F. Coupling condenser	23250 .35	23250 .35	23250 .35	23250 .35	23250 .35
Phone condenser	17440 .50	17440 .50	17440 .50	30260 .35	30260 .35
Compensating or stopping condenser	16360 .10				
Control bias by-pass condenser	26550 .50				
R.F.-I.F. bias by-pass condenser	26660 .25				
1st. Detector screen by-pass condenser		26660 .25			
Multiple-type by-pass condenser	28140 2.00				
Other by-pass condensers are listed on Page 419.					
Dry electrolytic condenser				23479 .90	23479 .90
FLEXIBLE AND WIRE-WOUND RESISTORS For tubular resistors, see Page 419.					
2nd. A.F. Bias resistor	21420 .20	25950 .20	25950 .20		
R.F.-I.F. Bias resistor No. 1 or No. 2		20040 .20			
Oscillator plate resistor			23780 .20		
Screen resistor	24470 .20				
Driver bias resistor				16320 .20	20380 .20
2nd. I.F. Bias resistor				20040 .20	20040 .20
2nd. I.F. screen resistor					28470 .20
R.F. I.F. Bias resistor	28950 .20		20040 .20	21420 .20	25950 .20
1st. Detector bias resistor	16320 .20	25950 .20	16320 .20	25950 .20	25950 .20
Control bias resistor No. 1	21030 .20	20380 .20	16320 .20	16320 .20	16320 .20
Control bias resistor No. 2	25850 .20		24470 .20	24470 .20	
Bleeder resistor No. 1	24450 .20				
Bleeder resistor No. 2			24470 .20		
Bleeder resistor No. 4				20380 .20	
Filter resistor	27930 1.00				
Filament shunt resistor	17077 .15	17077 .15	17077 .15	17077 .15	17077 .15
TONEBEAM	22011 2.00	22011 2.00	22011 2.00	22011 2.00	22011 2.00
Tonebeam adjustment potentiometer	29020 1.25	29020 1.25	29020 1.25	29020 1.25	29020 1.25
Line fuse	18534 .05	18534 .05	18534 .05	23774 .05	23774 .05
Instruction folder	22615* F-1008 .01 Net	22615* F-1008 .01 Net	23497 F-1028 .01 Net	23497 F-1028 .01 Net	
Instruction and log card	23483 F-1024 .01 Net				
Panel card	22769* F-986 .01 Net	22738* F-993 .01 Net	22875* F-994 .01 Net	23793 F-1037 .01 Net	23663 F-1033 .01 Net

*When ordering, specify for silent tuning.

THESE PRICES SUPERSEDE ALL PREVIOUS PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.

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

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

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

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

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

VOLTAGES ACROSS RESISTORS

	2nd TYPE 188	3rd TYPE 260	2nd TYPE 469	480	558	558-D 469-D	627	612	812
BLEEDER RESISTORS									
Bleeder resistor No. 1	93	88	152	43	88	28	—	60	143⅔
Bleeder resistor No. 2	—	153	9	100	—	—	—	123	172
Bleeder resistor No. 3	—	27	87	15	—	—	—	0	27
Bleeder resistor No. 4	—	138	87	0	—	—	—	12	0
Bleeder resistor No. 5	—	0	62	30	—	—	—	—	80
Bleeder resistor No. 6	—	23	22	40	—	—	—	—	81
Bleeder resistor No. 7	—	—	0	—	—	—	—	—	—
BIAS RESISTORS									
R.F.-I.F. bias resistor	2	—	1	—	2	3	—	2	3
R.F.-I.F. bias resistor No. 1	—	1	—	—	—	—	1	—	—
R.F.-I.F. bias resistor No. 2	—	2	—	—	—	—	10	—	—
R.F.-1st-I.F. bias resistor No. 1	—	—	—	1	—	—	—	—	—
R.F.-1st-I.F. bias resistor No. 2	—	—	—	5	—	—	—	—	—
1st-detector bias resistor	5	1	2	2	4	4	6	—	1
2nd-I.F. bias resistor	—	—	—	—	—	—	—	0	1
2nd-I.F. bias resistor No. 1	—	—	—	1	—	—	—	—	—
2nd-I.F. bias resistor No. 2	—	—	—	5	—	—	—	—	—
2nd-detector bias resistor	—	—	—	16	—	—	—	—	—
Control bias resistor No. 1	12	8	6	—	12	4	6	5	9
Control bias resistor No. 2	14	73	23	—	13	4	12	20	55
2nd-A.F. bias resistor	—	—	—	—	—	13	—	—	—
A.F. bias resistor	14	13	12	16	—	—	—	—	—
Driver bias resistor	—	—	—	—	—	—	—	28	27
MISCELLANEOUS									
Screen resistor	37	193	—	—	33	—	100	120	215
2nd-I.F. screen resistor	—	—	—	18	—	—	—	40	17
Tonebeam adjustment	—	87	47	85	—	—	—	63	93
Silencing adjustment	102	130	147	—	100	108	—	132	150⅔
Four-prong speaker field	.....							140	120
Five-prong speaker field	.....							190	240
Front rectifier (83) (P to F)	.....							340	370
Back rectifier (83) (P to F)	.....							290	360

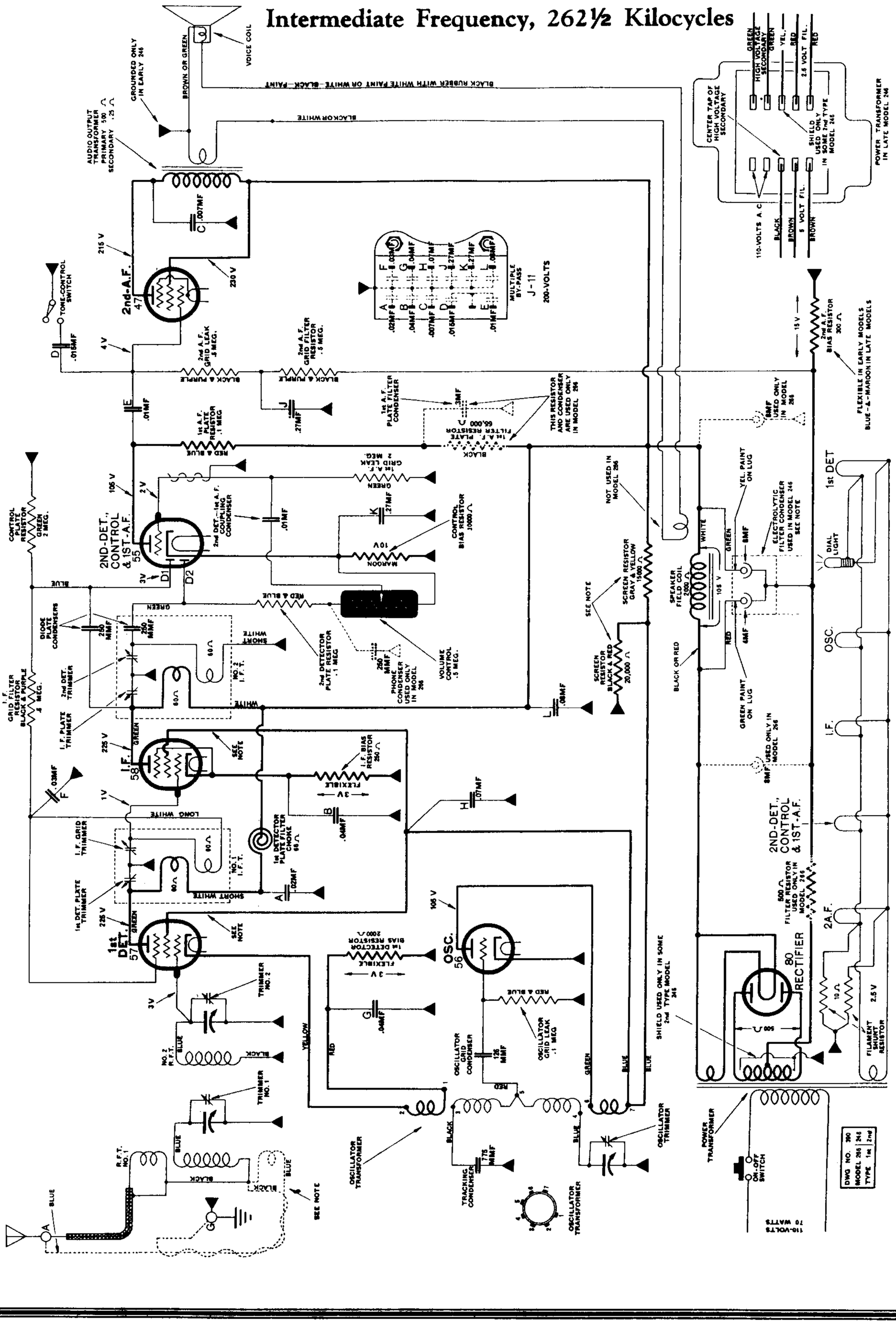
⅔ In sets where bleeder No. 1 is gray, its voltage is 170, and the voltage across the silencing adjustment is 115.

‡ In early 612 and 812, the measured voltage on the driver grid is about 27 volts.

ATWATER KENT MFG. CO.

MODEL 246 (2nd Type) and MODEL 266

Intermediate Frequency, 262½ Kilocycles



The black and red screen resistor is used only in late Model 246. In early 246, which does not use the plate of the 57 and 58 tubes is about 100 volts, and the drop across the gray and yellow screen resistor is about 125 volts. In late 246, the low screen resistor is about 145 volts, and the voltage across the black and red screen resistor is about 80 volts, thus making the screens about 80 volts also.

The additional primary that is shown in dotted lines on No. 1 R.F.T. is used in some Model 246 and 266 receivers. In Model 246, the output transformer is mounted on the speaker housing, and the connections are slightly different than shown above.

The black and red screen resistor, the voltage on the plate of the oscillator and on the screens of the gray and yellow screen resistor is about 125 volts. In late 246, the voltage across the gray and yellow screen resistor is about 145 volts, and the voltage across the black and red screen resistor is about 80 volts, thus making the oscillator plate and the 57 and 58 screens about 80 volts also.

In all Model 266, and in late Model 246, the output transformer is mounted on the speaker housing, and the connections are slightly different than shown above.

ATWATER KENT MFG. CO.

PARTS AND PRICE LIST FOR MODEL 246 No. 32000

For parts not listed below, please order by description or name of part and model number of set.

Part No.	Name of Part	List Price
24079	VOLUME CONTROL, complete, less leads (½ meg.)	$1.25
23430	POWER TRANSFORMER	5.25
24113	R.F. TRANSFORMER GROUP	2.00
30410	NO. 1 I.F. TRANSFORMER, less trimmers	.95
30420	NO. 2 I.F. TRANSFORMER, less trimmers	.95
30440	OSCILLATOR TRANSFORMER	1.00
19697	OUTPUT TRANSFORMER	2.25
19210	1st-DETECTOR PLATE FILTER CHOKE	.25
24099	ELECTROLYTIC FILTER CONDENSER	1.60

SMALL FIXED CONDENSERS

26670	Osc. grid condenser (125 MMF)	.25
30240	Diode plate condenser (250 MMF)	.20
27630	2nd-Det.-1st A.F. Coupling condenser (.01 MF)	.20
26050	Tracking condenser (800 MMF)	.20
30430	BY-PASS CONDENSER, MULTIPLE TYPE	$2.00

FLEXIBLE RESISTORS

21030	1st. Detector bias resistor (2000 ohms)	.20
21420	I.F. Bias resistor (250 ohms)	.20
25840	2nd. A.F. Bias resistor (300 ohms)	.20

TUBULAR RESISTORS

20980	Red and Blue (½ watt)	.25
20930	Black and Purple (½ watt)	.25
20940	Green (½ watt)	.25
20950	Maroon (½ watt)	.25
27220	Gray and Yellow (1½ watt)	.30

SPEAKER PARTS

19465	Diaphragm	1.50
18870	Field coil	3.00
23657	Hum-bucking coil	.20

VOLTAGE TABLE FOR MODEL 246

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

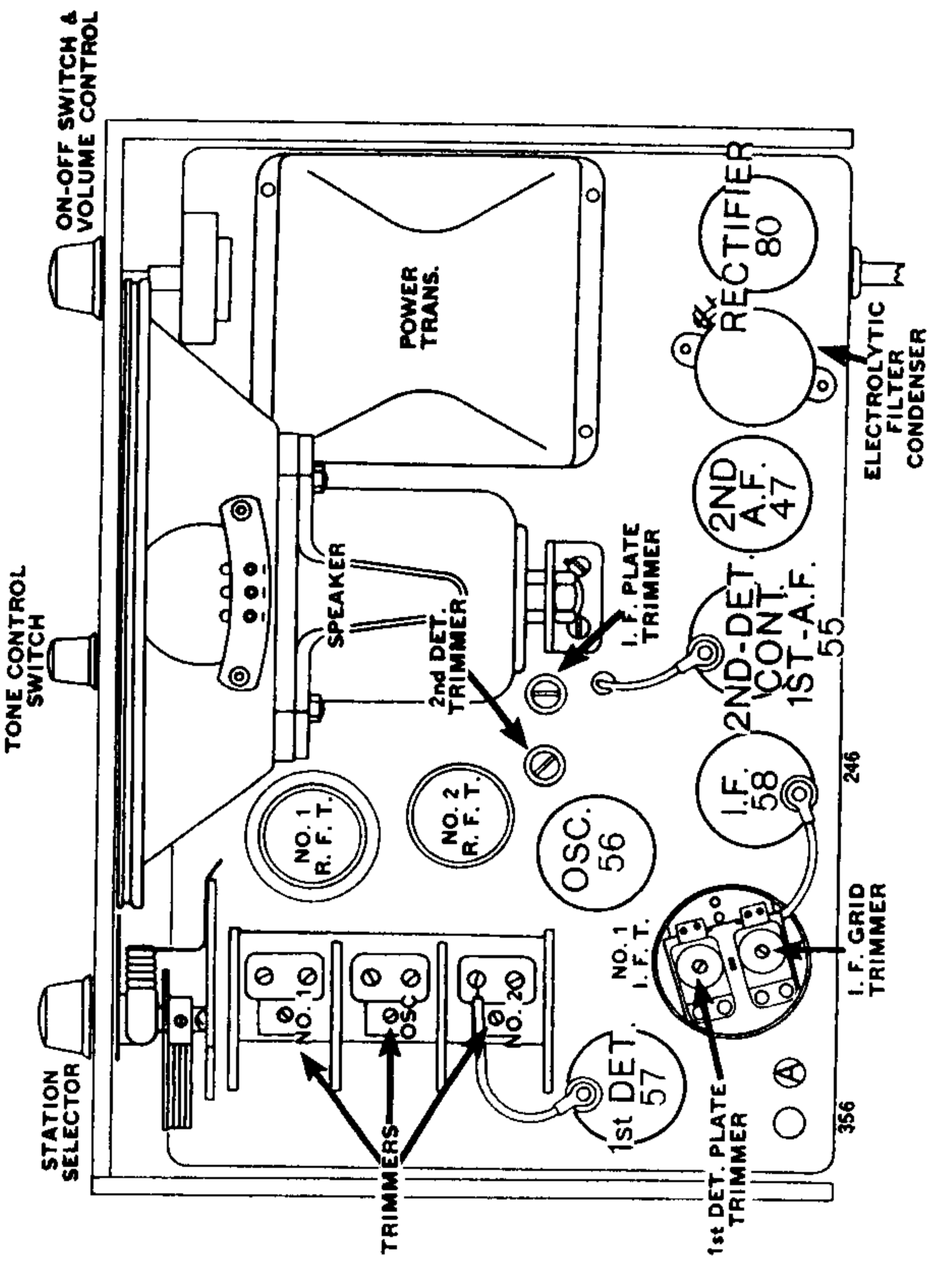
Use 250-volt scale of a 1000-ohm-per-volt. D. C. Voltmeter.

All measurements made from cathode.

Line Voltage, 110 volts				
1st Det. tube	55 tube	Filament	2.4	
		Plate	225	105
		D1	115	3
		D2	3	**
		Grid		2
I.F. tube	2nd A.F. tube	Filament	2.4	
		Plate	225	215
		Screen	100	230
		Grid	1	4
Osc. tube		Filament	2.4	
		Plate	105	
		Grid	8*	

*The oscillator grid voltage varies.

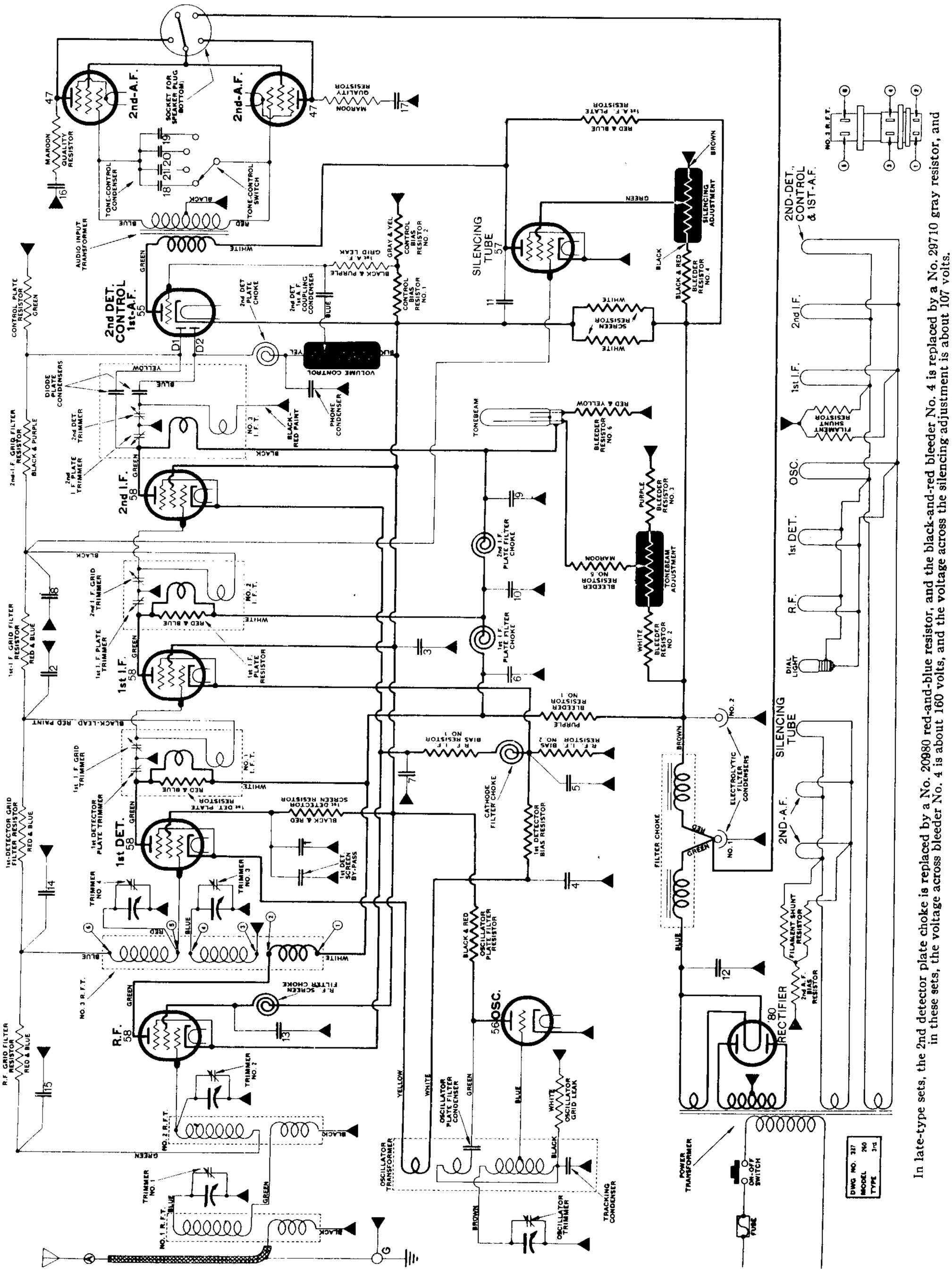
**The voltage from 2D to cathode is zero when no signal or noise is being picked up.



TOP VIEW OF MODEL 246, SHOWING LOCATION OF R. F. AND I. F. TRIMMER CONDENSERS

ATWATER KENT MFG. CO.

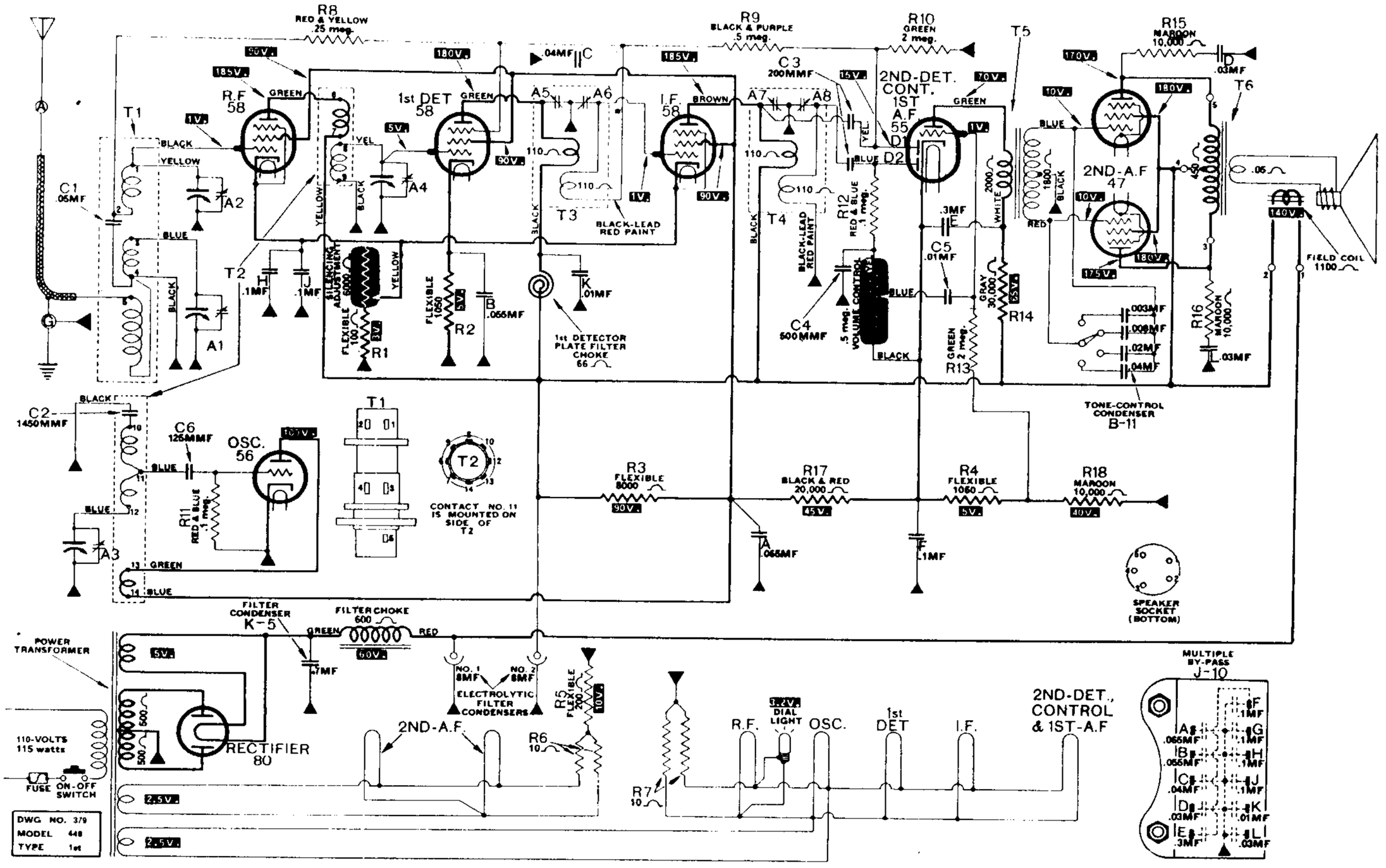
MODEL 260 (3rd Type)



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

ATWATER KENT MFG. CO.

MODEL 448



Part No.	Name of Part	List Price
23228	VOLUME CONTROL, complete less leads	$ .75
21530	TONE CONTROL CONDENSER (B-11)	.65
24711	SILENCING ADJUSTMENT	.85
28680	POWER TRANSFORMER	4.75
30910	FILTER CHOKE UNIT	1.55
19210	1st. DETECTOR PLATE FILTER CHOKE	.15
22538	ELECTROLYTIC FILTER CONDENSER NO. 1	1.00
22538	ELECTROLYTIC FILTER CONDENSER NO. 2	1.00
26620	FILTER CONDENSER (K-5) paper and foil	.75
30720	MULTIPLE BY-PASS CONDENSER (J-10)	1.25
18534	LINE FUSE	.03
24211	INSTRUCTION AND LOG CARD F-1041 Net	.01
24712	PANEL CARD F-1055 Net	.02

TUBULAR RESISTORS (½ Watt)

Dia. Code No.	Part No.	Color	Value	List Price
R- 8	20920	Red-yellow	250,000 Ohms	$ .10
R- 9	20930	Black-purple	500,000 Ohms	.10
R-10	20940	Green	2,000,000 Ohms	.10
R-11	20980	Red-blue	100,000 Ohms	.10
R-12	20980	Red-blue	100,000 Ohms	.10
R-13	20940	Green	2,000,000 Ohms	.10
R-14	20970	Gray	30,000 Ohms	.10
R-15	20950	Maroon	10,000 Ohms	.10
R-16	20950	Maroon	10,000 Ohms	.10
R-17	23120	Red-black	20,000 Ohms	.10
R-18	20950	Maroon	10,000 Ohms	.10

	Dia. Code No.	Part No.	Value	List Price
Small Fixed Condensers	C-1	26820	.05 MF	$ .20
	C-2	26690	1450 MMF	.35
	C-3	30240	250 MMF (2 used)	.15
	C-4	17440	.0005 MF	.15
	C-5	23250	.01 MF	.31
Flexible Resistors	R-1	20040	100 Ohms	.17
	R-2	16320	1050 Ohms	.15
	R-3	24340	8000 Ohms	.21
	R-4	16320	1050 Ohms	.15
	R-5	25950	200 Ohms	.17
	R-6	17077	10 Ohms	.12
	R-7	17077	10 Ohms	.12
		31860	1 Ohm, dial light resistor (late sets)	.17

TRANSFORMERS

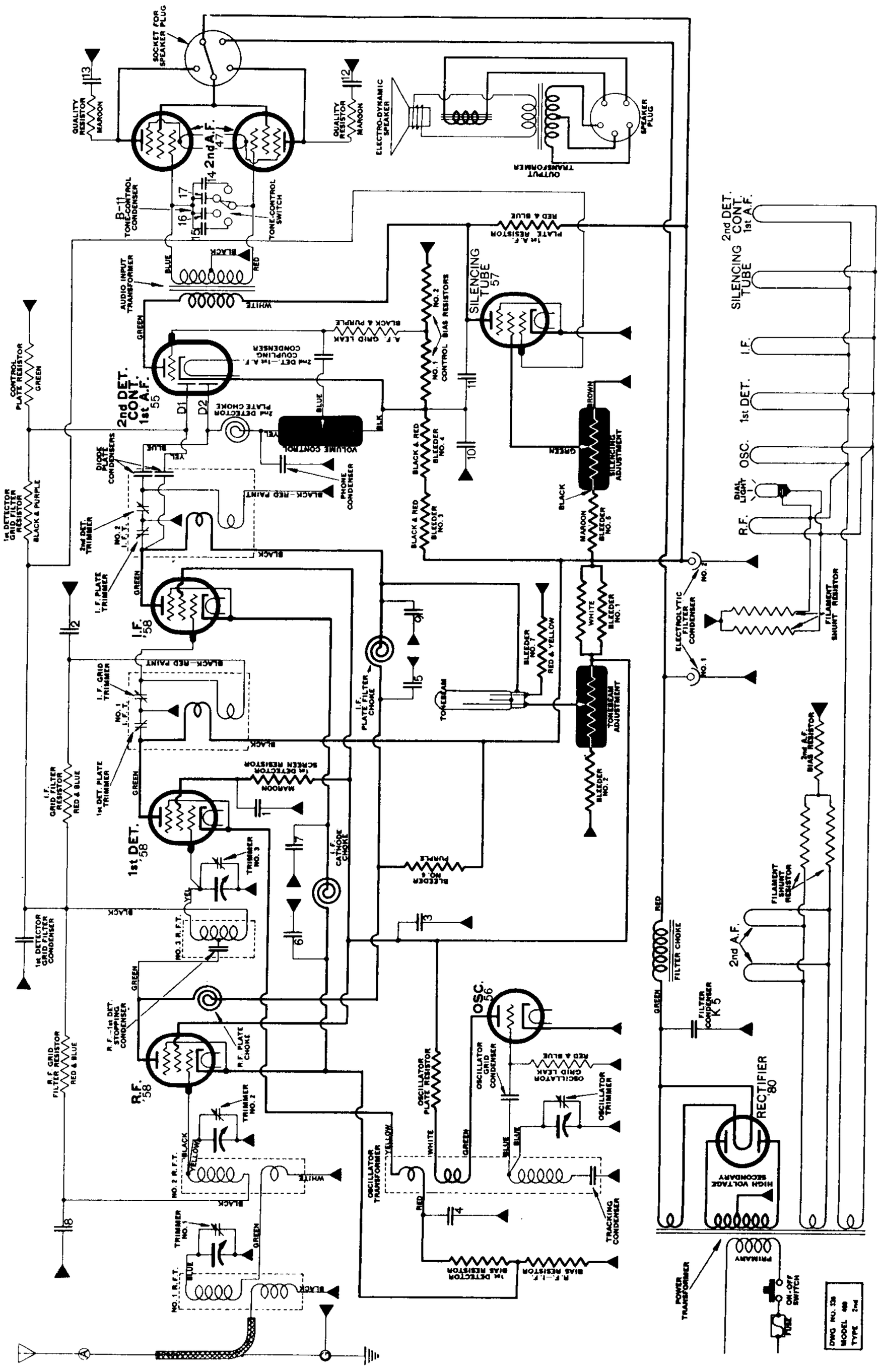
Dia. Code No.	Part No.	Description	List Price
T-1	28480	No. 1 R.F. Transformer	$ 1.00
T-2	30810	No. 2 R.F. Transformer and oscillator	1.00
T-3	23356	No. 1 I.F. Transformer, less trimmers	.75
T-4	22059	No. 2 I.F. Transformer, less trimmers	.75
T-5	30920	Audio transformer unit	1.85
T-6	21693	Output transformer, less case	1.50

No. 28800 TYPE 380 SPEAKER USED IN MODEL 448

Part No.	Name of Part	List Price
20737	Diaphragm	$ 1.25
21260	Field coil	1.25
20657	Cable and plug assembly	$ .65

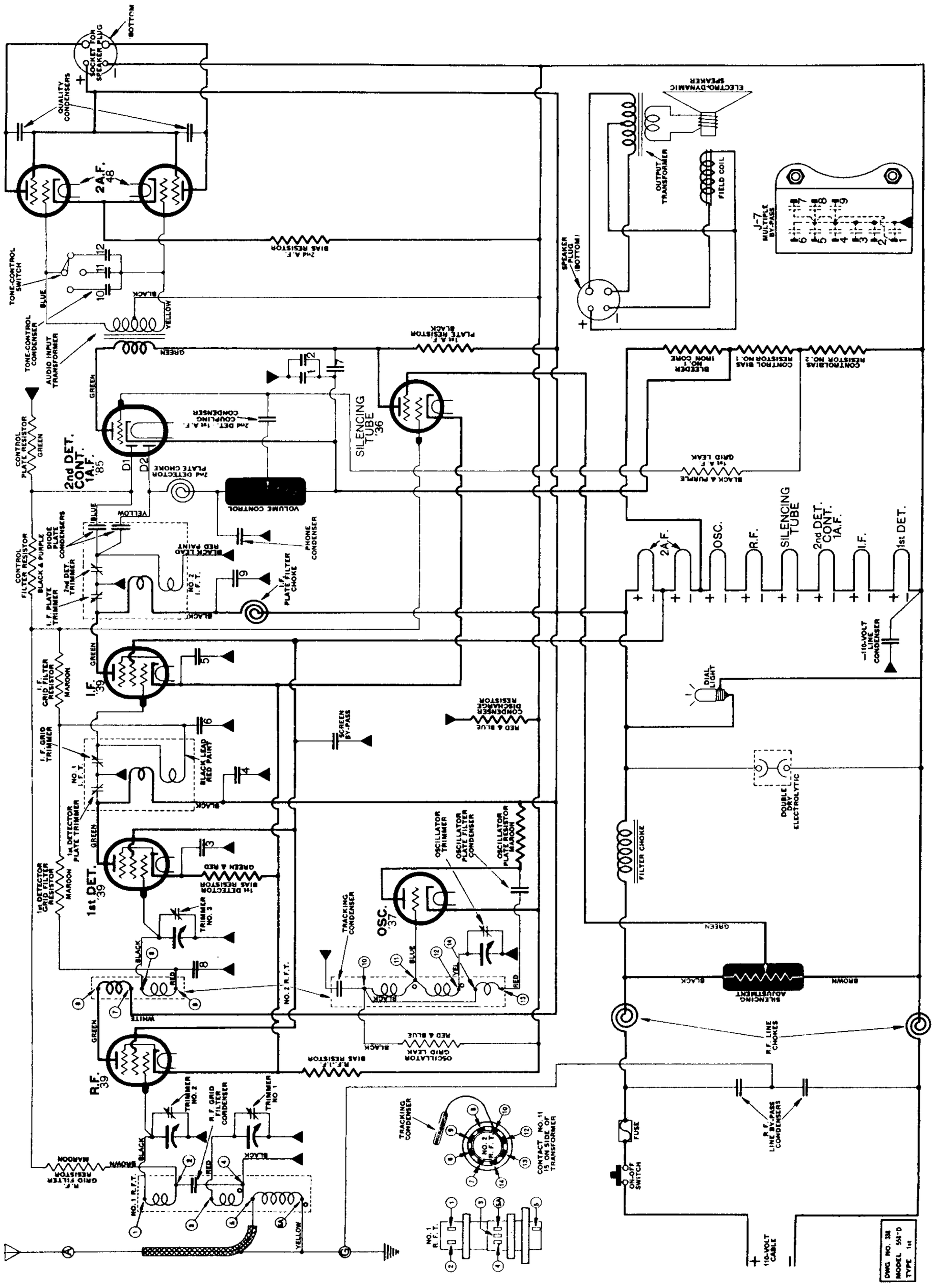
ATWATER KENT MFG. CO.

MODEL 469 (2nd Type)



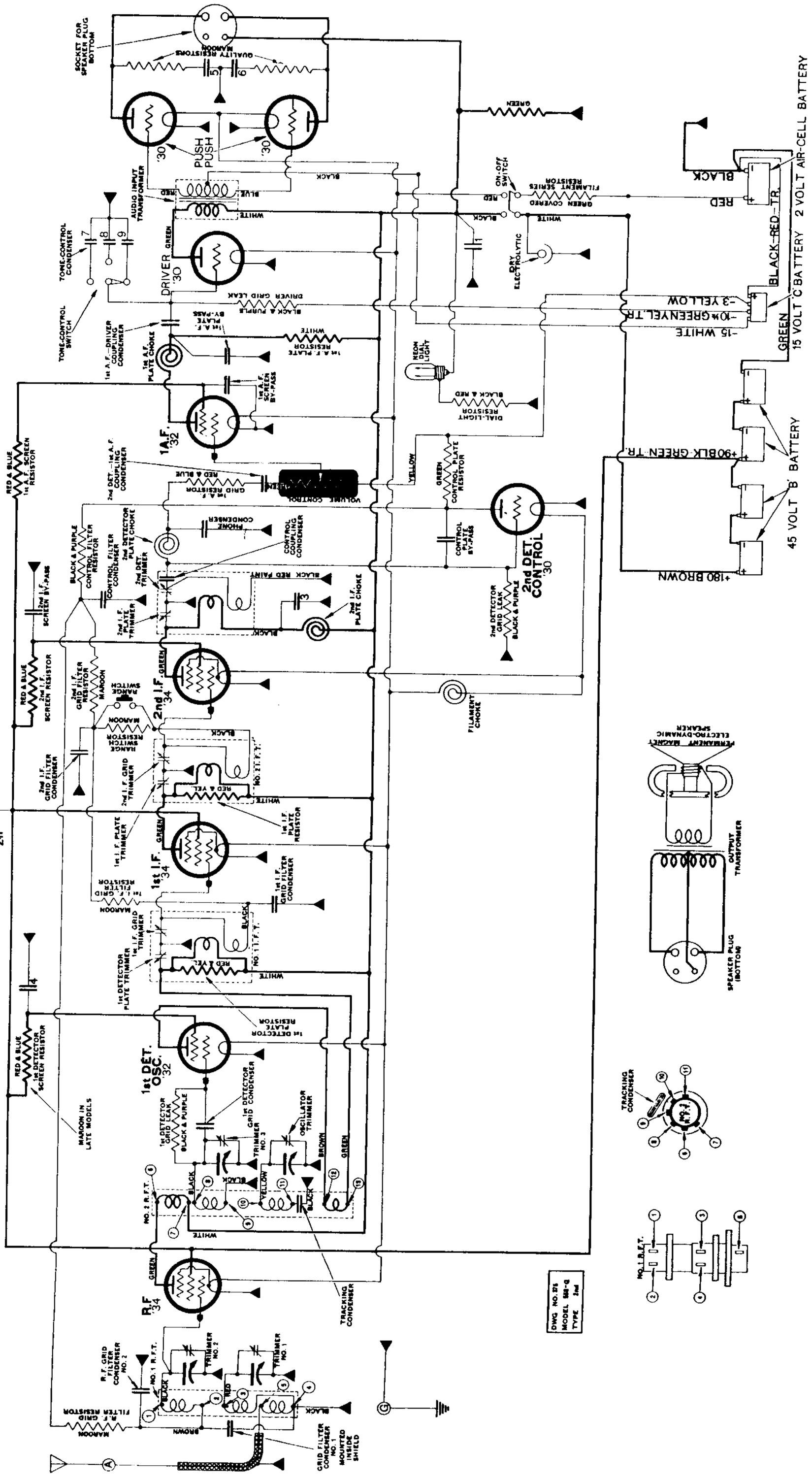
ATWATER KENT MFG. CO.

MODEL 469-D and 558-D



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MODEL 469-Q and 558-Q



ATWATER KENT MFG. CO.

Parts and Price List for Model 469-D, 469-Q, 558-D and 558-Q

NAME OF PART	469-D	469-Q	558-D	558-Q
	23982	23832	23982	23832
Dial lamp	.35 Net	.55 Net	.35 Net	.55 Net
	23228	23482	23228	23482
Volume Control, complete, less leads	1.25	.75	1.25	.75
	27390	21530	27390	21530
Tone-control condenser	1.00	1.00	1.00	1.00
	29380	29390	29380	29390
Audio Input transformer	4.00	4.00	4.00	4.00
	24043	23915	24043	23915
R.F. Transformer group	2.00	2.00	2.00	2.00
	28220		28220	
Silencing adjustment	1.25		1.25	
No. 1 I.F. Transformer,	23356	23535	23356	23535
less trimmers	2.00	2.00	2.00	2.00
No. 2 I.F. Transformer,	22059	23535	22059	23535
less trimmers	2.00	2.00	2.00	2.00
No. 3 I.F. Transformer,		23975		23975
less trimmers		2.00		2.00
	29370		29370	
Filter-choke unit	5.00		5.00	
	17254		17254	
R.F. Line choke	.50		.50	
		19210		19210
1st. A.F. Plate choke		.25		.25
	19210		19210	
I.F. Plate filter choke	.25		.25	
		19210		19210
2nd. I.F. Plate filter choke		.25		.25
	17390	17390	17390	17390
2nd. Detector plate choke	.60	.60	.60	.60
		17254		17254
Filament choke		.50		.50
	26670		26670	
Oscillator plate filter condenser	.25		.25	
	26690	26690	26690	26690
Tracking condenser	.25	.25	.25	.25
	22220	21160	22220	21160
Phone condenser	.35	.35	.35	.35
2nd. Detector—1st. A.F.	23250	23250	23250	23250
Coupling condenser	.35	.35	.35	.35
	29550		29550	
110-V. Line condenser	1.00		1.00	
	26820		26820	
R.F. Grid filter condenser	.20		.20	
		29030		29030
2nd. I.F. Screen by-pass condenser		.20		.20
		22220		22220
1st. A.F. Plate by-pass condenser		.35		.35
1st. A.F.—Driver coupling		27630		27630
condenser		.20		.20
		27630		27630
1st. I.F. Grid filter condenser		.20		.20

NAME OF PART	469-D	469-Q	558-D	558-Q
		27630		27630
2nd. I.F. Grid filter condenser		.20		.20
		27630		27630
Control filter condenser		.20		.20
		26820		26820
R.F. Grid filter condenser No. 1		.20		.20
		27630		27630
R.F. Grid filter condenser No. 2		.20		.20
	26660		26660	
R.F. Line by-pass condenser	.25		.25	
	26820	21450	26820	21450
Quality condenser	.20	.50	.20	.50
		26660		26660
1st. A.F. Screen by-pass condenser		.25		.25
		30240		30240
Control Coupling Condenser		.20		.20
		26660		26660
Control plate by-pass condenser		.25		.25
	26660		26660	
Screen by-pass condenser	.25		.25	
	30240		30240	
Diode plate condenser	.20		.20	
	28140		28140	
Multiple-type by-pass condenser	2.00		2.00	
	23981	22472	23981	22472
Dry Electrolytic condenser	1.25	.80	1.25	.80
		13664		13664
Range switch		1.00		1.00
		21958		21958
On-off switch		1.60		1.60
FLEXIBLE AND WIRE-WOUND RESISTORS				
For tubular resistors see Page 419.				
		30030		30030
Filament series resistor		.15		.15
	29220		29220	
Bleeder resistor No. 1	1.00		1.00	
	19820		19820	
Control bias resistor No. 1	.20		.20	
	19820		19820	
Control bias resistor No. 2	.20		.20	
	20050		20050	
R.F.-I.F. Bias resistor	.20		.20	
	28950		28950	
2nd. A.F. Bias resistor	.20		.20	
		23807		23806
Battery Cable		.75		1.25
	23693 F-1034	23496 F-1027	23693 F-1034	23496 F-1027
Instruction and log-card	.01 Net	.01 Net	.01 Net	.01 Net
	23555 F-1030	23527 F-1029	23556 F-1031	23484 F-1025
Panel card	.01 Net	.01 Net	.01 Net	.01 Net

No. 31600 SPEAKER USED IN MODEL 469-D

Part No.	Name of Part	List Price
20737	Diaphragm	$2.10
19860	Field coil	3.00
30020	Output transformer, less case	$2.25
19789	Cable and plug assembly	1.65

No. 31500 SPEAKER USED IN MODEL 469-Q

Part No.	Name of Part	List Price
19465	Diaphragm	$1.50
19918	Magnet assembly	6.00
23701	Output transformer, less case	$2.25
23863	Cable and plug assembly	1.00

No. 31800 SPEAKER USED IN MODEL 558-D

Part No.	Name of Part	List Price
19465	Diaphragm	$1.50
19860	Field coil	3.00
30020	Output transformer, less case	$2.25
19487	Cable and plug assembly	1.60

No. 31700 SPEAKER USED IN MODEL 558-Q

Part No.	Name of Part	List Price
19465	Diaphragm	$1.50
19918	Magnet assembly	6.00
23701	Output transformer, less case	$2.25
23764	Cable and plug assembly	1.00

THESE PRICES SUPERSEDE ALL PREVIOUS PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ATWATER KENT MFG. CO.

No. 17300 TYPE S SPEAKER USED IN MODEL 558, 627

Part No.	Name of Part	List Price	Part No.	Name of Part	List Price
19465	Diaphragm	$1.50	21672	Output transformer, less case	$3.00
18870	Field coil	3.00	19487	Cable and plug assembly	1.60

No. 28700 TYPE 368 SPEAKER USED IN MODEL 188

Part No.	Name of Part	List Price	Part No.	Name of Part	List Price
20737	Diaphragm	$2.10	21672	Output transformer, less case	$3.00
18870	Field coil	3.00	19789	Cable and plug assembly	1.65

No. 28800 TYPE 380 SPEAKER USED IN MODEL 260, 260-F, 469, 469-F, 480

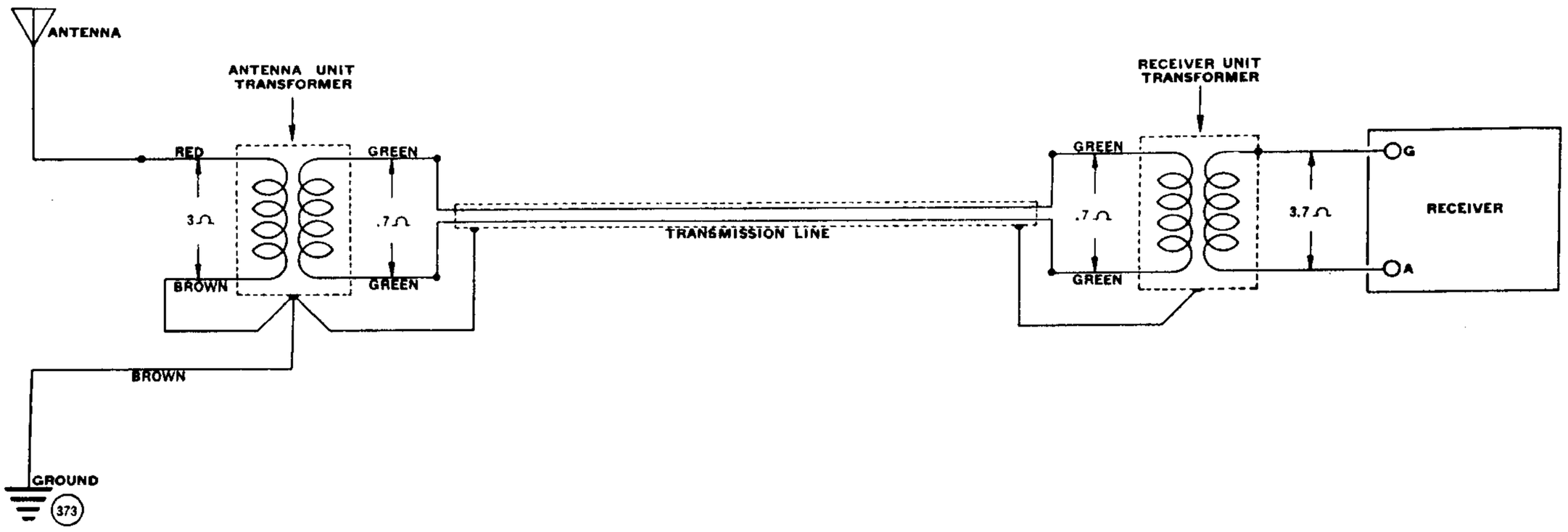
Part No.	Name of Part	List Price	Part No.	Name of Part	List Price
20737	Diaphragm	$2.10	21693	Output transformer, less case	$3.00
21260	Field coil	3.00	20657	Cable and plug assembly	1.65

PARTS AND PRICE LIST FOR SPEAKERS USED IN MODEL 612 and 812

Name of Part	Type 324 No. 30200	Type 326 No. 30300	Type 336 No. 30400	Type 338 No. 30600
DIAPHRAGM	23589 1.50	23589 1.50	23589 1.50	23591 2.10
FIELD COIL	18870 3.00	28550 3.25	18870 3.00	28550 3.25
HUM-BUCKING COIL	23657 .20			
CABLE AND PLUG ASSEMBLY	23761 1.00	23822 1.00	23761 1.00	23822 1.00

PARTS AND PRICE LIST FOR TYPE 2-E INTERFERENCE ELIMINATOR No. 29210

Part No.	Name of Part	List Price	Part No.	Name of Part	List Price
23748	Antenna Unit	$3.65	23743	Auxiliary Tube Shield	$ .15
23749	Receiver Unit	3.55	23744	Instruction Sheet	Net .50/c
13222	Cable Clamp	.03	23745	Packing Box	Net .05



CIRCUIT OF TYPE 2-E INTERFERENCE ELIMINATOR.

THESE PRICES SUPERSEDE ALL PREVIOUS PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ATWATER KENT MFG. CO.

TUBULAR RESISTORS

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

½ WATT

Part No.	Color	Resistance	List Price
20920	Red-yellow	250,000 Ohms	$ .25
20930	Black-purple	500,000 Ohms	.25
20940	Green	2,000,000 Ohms	.25
20950	Maroon	10,000 Ohms	.25
20960	Gray-yellow	15,000 Ohms	.25
20970	Gray	30,000 Ohms	.25
20980	Red-blue	100,000 Ohms	.25
21040	Black	65,000 Ohms	.25
21050	Blue-gray	1,000,000 Ohms	$ .25
23120	Red-black	20,000 Ohms	.25
23130	Red-gray	800,000 Ohms	.25
23170	Green-yellow	900,000 Ohms	.25
26160	White	40,000 Ohms	.25
26410	Green-red	3,300 Ohms	.25
28050	Blue-yellow	5,000 Ohms	.25

1 WATT

Part No.	Color	Resistance	List Price
15285	Gray	30,000 Ohms	$ .25
15544	Yellow	7,500 Ohms	.25
15545	Maroon	10,000 Ohms	.25
15592	Black	65,000 Ohms	.25
15891	Black-red	20,000 Ohms	.25
15892	Green	2,000,000 Ohms	.25
16282	Blue-red	100,000 Ohms	.25
16724	White	40,000 Ohms	.25
19346	Green-red	3,300 Ohms	$ .25
19581	Red-yellow	250,000 Ohms	.25
19649	Black-purple	500,000 Ohms	.25
20151	Purple	6,000 Ohms	.25
20223	Red-gray	800,000 Ohms	.25
21784	Gray-green (superseded by 22211)		
22211	Yellow-gray	15,000 Ohms	.25
22407	Black-yellow-red	50,000 Ohms	.25

1½ WATT

Part No.	Color	Resistance	List Price
27210	Maroon	10,000 Ohms	$ .30
27220	Gray-yellow	15,000 Ohms	.30
28030	Red-black	20,000 Ohms	.30
28750	White	40,000 Ohms	.30
28760	Red-blue	100,000 Ohms	$ .30
28770	Purple	6,000 Ohms	.30
29710	Gray	30,000 Ohms	.30

BY-PASS AND TONE-CONTROL CONDENSERS

Part No.	*Code Markings	List Price
†15262	B-1, H-1, H-9, H-20	$1.00
15263	B-2, H-2	.90
15640	H-16	1.00
15770	H-15	1.00
15780	H-17	1.10
15790	H-18, H-21	1.00
15837	B-3 (Superseded by 16233)	
15870	B-7, L-28	1.00
16060	H-24, L-29 (304) (Superseded by 18350)	***
16233	H-4, H-10	.90
16461	H-6, H-12	.75
16462	H-5, H-11	1.00
16490	B-6, L-12	1.00
16745	H-7, H-8, H-13	1.00
16828	B-5	.50
16880	H-23, L-26 (439)	1.10
16940	H-22, L-10	1.10
17360	H-27, L-32	1.10
17370	H-25, H-26, L-3, L-39	1.10
18350	H-28, L-49	1.10
19150	H-29	1.00
19160	H-30	1.00
19560	H-31	1.00
19690	H-32	1.00
19710	H-33	1.00
19980	H-34	1.00
19990	H-35	1.00
20010	B-8	1.00
20350	H-36	$1.00
20830	L-B-9, J-2, J-1	2.00
21170	H-37	1.00
21180	H-38	1.00
21250	B-9	1.00
21430	H-39, L-37-A	1.00
21440	H-40, L-44-A	1.00
21450	B-10- L-36-A	.50
21530	L-42-A, B-11	1.00
22050	H-41	1.00
22570	J-3	2.00
23140	J-4	2.00
23310	H-42 (Superseded by 21180)	**
23330	H-43	1.00
23590	L-55-A, H-44	1.00
23610	L-57-A, H-45	1.00
24250	LB-30, J-5	2.00
25690	LB-34, J-6	2.00
27120	H-46, L-66-A	1.00
27140	H-47	1.00
27390	B-14	1.00
27580	H-48	1.00
28140	J-7	2.00
29560	H-49	1.00
29690	B-15	1.00
30270	B-16	1.00
30310	H-51	1.00

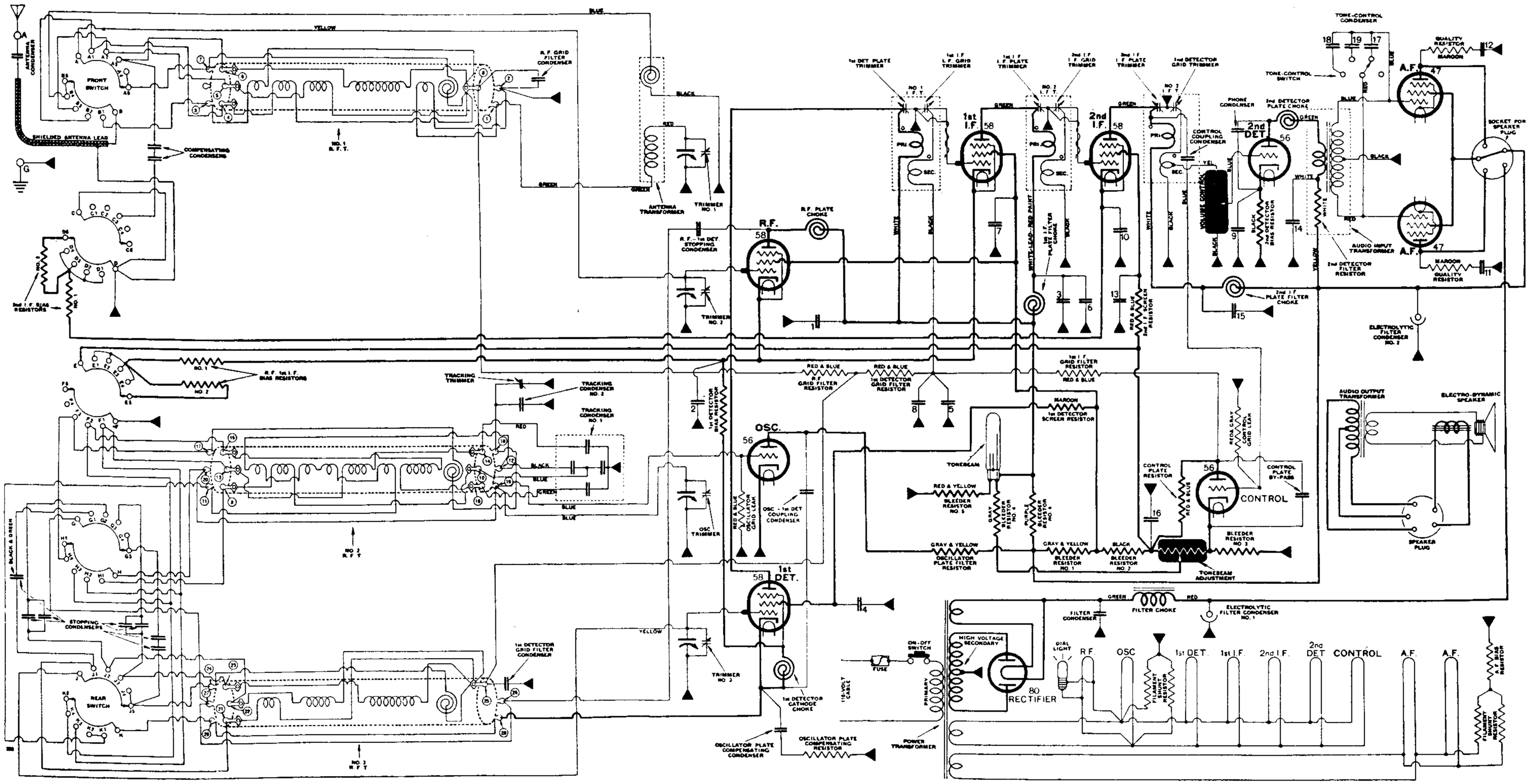
* For information about code markings, see Page 253. ** Do not use 23310 in place of 21180. *** See note on Page 243.
† Do not use B-1, H-1, or H-9 in place of H-20.

THESE PRICES SUPERSEDE ALL PREVIOUS PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ATWATER KENT MFG. CO.

MODEL 480

(Intermediate Frequency, 472½ Kilocycles)

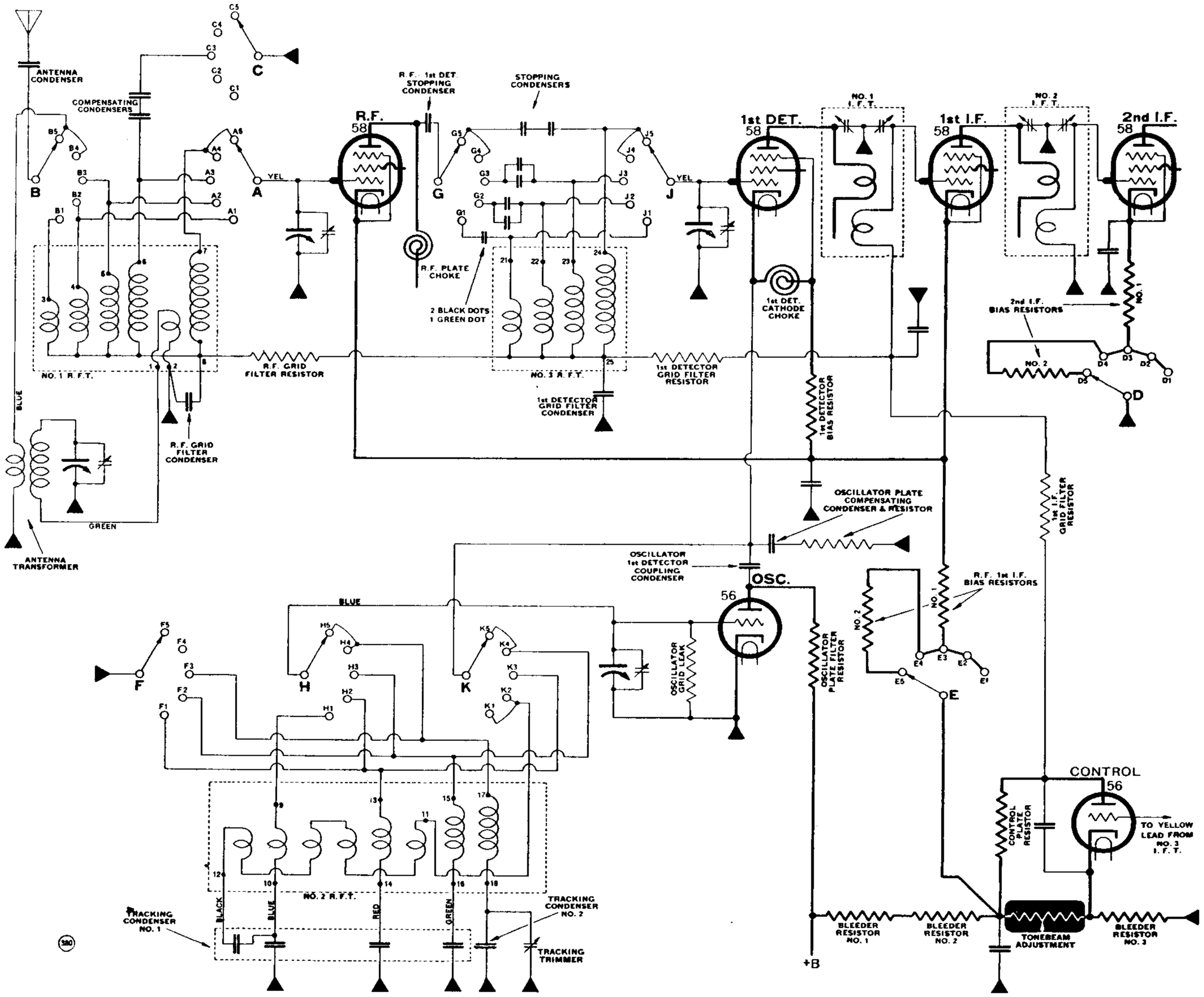


In some early-type Model 480 receivers the circuit arrangement and contacts of the frequency-band switch are different from that shown above. The early circuit arrangement is shown on page 411.

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

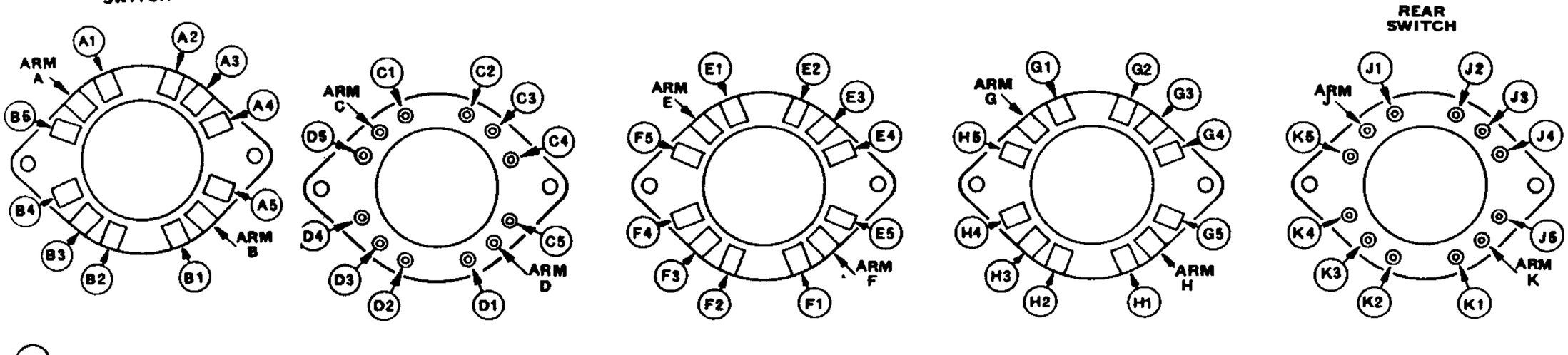
ATWATER KENT MFG. CO.

MODEL 480 SIMPLIFIED SCHEMATIC



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

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



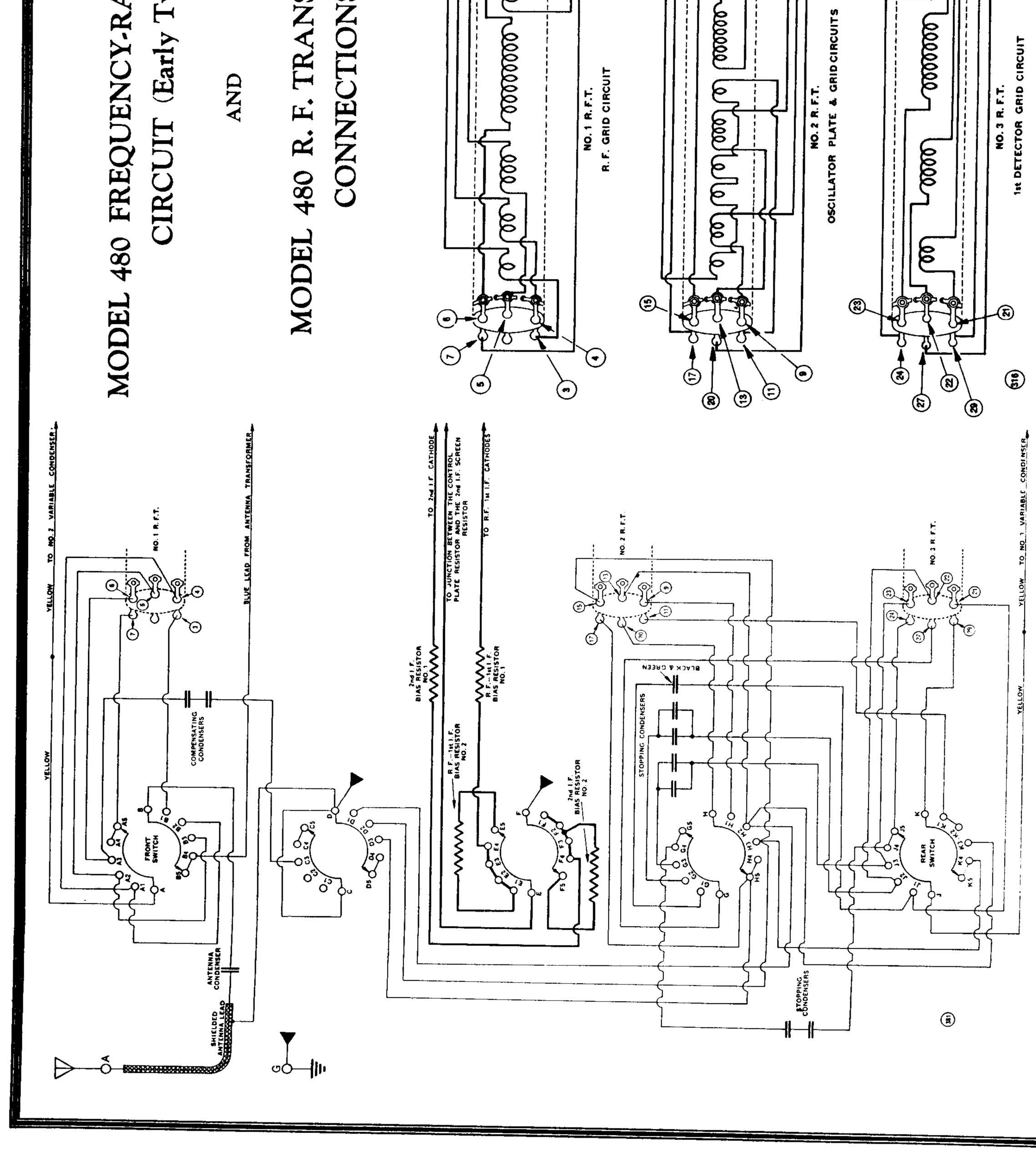
CONTACTS ON FREQUENCY-RANGE SWITCH IN MODEL 480 (LATE TYPE.)

ATWATER KENT MFG. CO.

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

AND

MODEL 480 R. F. TRANSFORMER CONNECTIONS



ATWATER KENT MFG. CO.

PARTS AND PRICE LIST

FOR MODEL 480

Part No.	Name of Part	List Price
23376	VOLUME CONTROL, complete, less leads	$1.25
27390	TONE-CONTROL condenser	1.00
22011	TONEBEAM	2.00
27190	TONEBEAM ADJUSTMENT potentiometer	1.25
27720	POWER TRANSFORMER	8.25
30680	POWER TRANSFORMER, 25 cycle	10.75
27760	AUDIO INPUT TRANSFORMER	3.75
23408	R.F. TRANSFORMER GROUP	3.00
27670	ANTENNA TRANSFORMER	1.00
23271	NO. 1 I.F. TRANSFORMER, less trimmers	2.00
23353	NO. 2 I.F. Transformer, less trimmers	2.00
23272	NO. 3 I.F. Transformer, less trimmers	2.00
26970	FILTER CHOKE UNIT	5.75
17015	1st. Detector cathode choke	.50
19210	2nd. Detector plate choke	.25
17015	R.F. Plate choke	.50
19210	1st. or 2nd. I.F. Plate filter choke	.25
26620	FILTER CONDENSER UNIT, paper and foil type	1.00
22538	Filter condenser No. 1 or No. 2 (electrolytic)	2.50
	SMALL FIXED CONDENSERS	
27130	Antenna condenser	.25
27630	Control-plate by-pass condenser	.20
27640	R.F.-1st. Detector stopping condenser	.25
26670	Oscillator-1st. Detector coupling condenser	.25
27630	1st. Detector grid filter condenser	.20
23411	Tracking condenser No. 1	2.15
25650	Tracking condenser No. 2	$ .35
17440	Phone condenser	.50
27650	Compensating or stopping condenser	.10
23282	Stopping condenser (1 green dot, 2 black dots)	.30
	FLEXIBLE AND WIRE-WOUND RESISTORS (For tubular resistors, see Page 419)	
25950	R.F.-I.F. Bias resistor No. 1	.20
23780	R.F.-I.F. Bias resistor No. 2	.20
16320	1st. Detector bias resistor	.20
16320	2nd. I.F. Bias resistor No. 1	.20
24470	2nd. I.F. Bias resistor No. 2	.20
25840	A.F. Bias resistor	.20
20380	Bleeder resistor No. 3	.20
23780	Oscillator plate compensating resistor	.20
17077	Filament shunt resistor	.15
23107	FREQUENCY BAND SWITCH (less resistors and condensers)	3.75
23184	WAVE GUIDE F-1013 Net	.01
23279	Instruction folder F-1015 Net	.01
23216	Panel card F-1012 Net	.01
	BY-PASS CONDENSERS	
27580	H-48	1.00
	(For other by-pass condensers, see Page 419)	

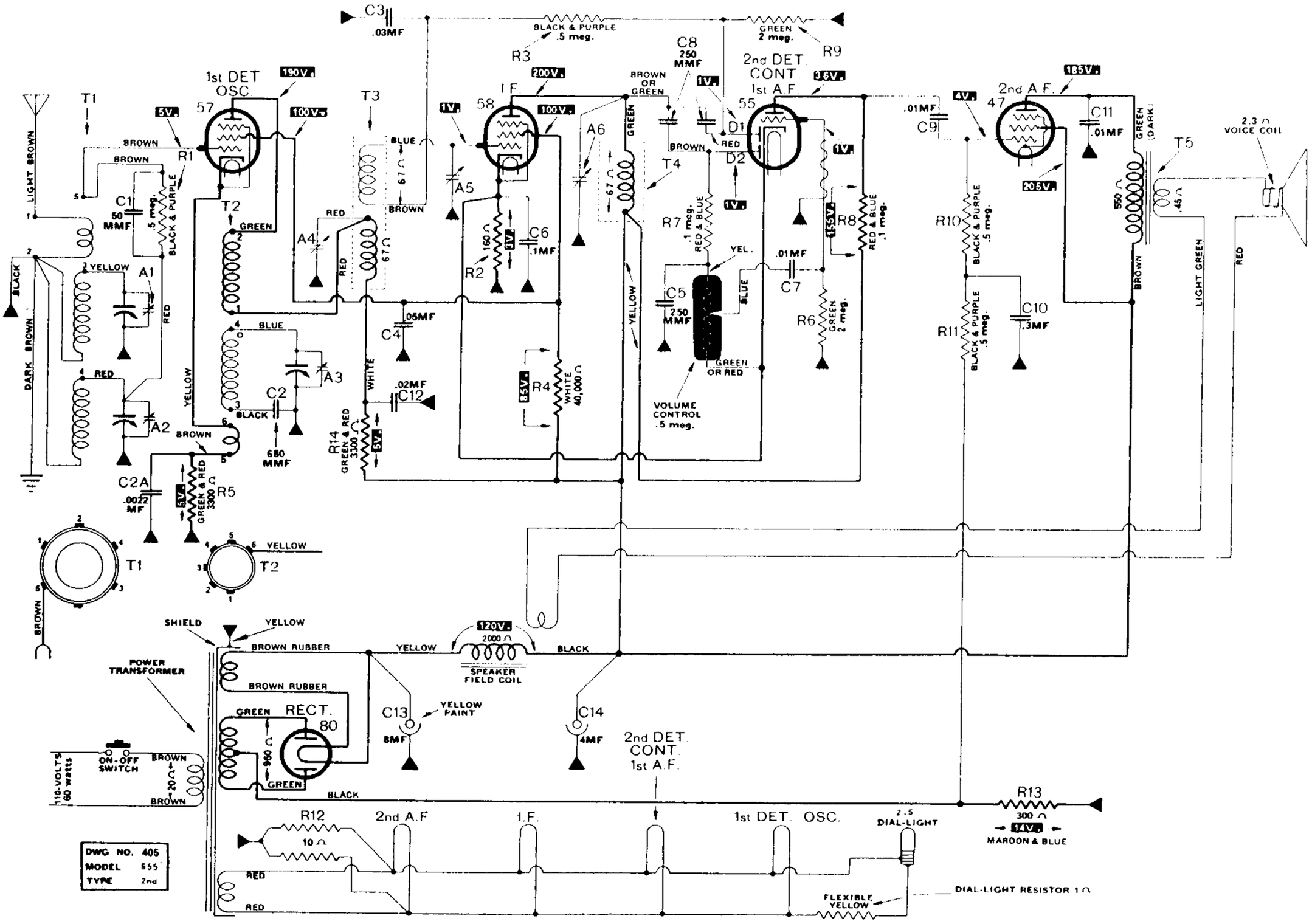
PARTS AND PRICE LIST FOR MODEL 558, 627

Name of Part	558	627
VOLUME CONTROL, complete, less leads	23228 1.25	23228 1.25
TONE-CONTROL Condenser	28040 .20	28040 .20
SILENCING ADJUSTMENT	28220 1.25	
POWER TRANSFORMER, 60 cycles, 110 volts	28150 7.50	28150 7.50
Power transformer, 60 cycles, 220 volts	28430 11.50	28430 11.50
AUDIO INPUT TRANSFORMER	28290 3.75	
R.F. TRANSFORMER GROUP	23643 2.00	23434 2.00
NO. 1. I.F. TRANSFORMER, less trimmers	23356 2.00	23356 2.00
NO. 2 I.F. Transformer, less trimmers	22059 2.00	22059 2.00
1st. DETECTOR PLATE FILTER CHOKE	19210 .25	19210 .25
2nd. Detector plate choke	17390 .60	17390 .60
1st. A.F. Plate choke		19210 .25
R.F. Cathode Coke	19210 .25	19210 .25
ELECTROLYTIC FILTER CONDENSER NO. 1	22538 2.50	22538 2.50
Electrolytic filter condenser No. 2	22538 2.50	22538 2.50
SMALL FIXED CONDENSERS		
Tracking condenser	26690 .25	26690 .25
R.F. Grid filter condenser	26820 .20	26820 .20
Oscillator grid condenser	26670 .25	26670 .25
Diode plate condenser	30240 .20	30240 .20
2nd. Detector—1st. A.F. Coupling condenser	27630 .20	23250 .35
Phone condenser	17440 .50	17440 .50
Compensating or stopping condenser	16360 .10	16360 .10
Control bias by-pass condenser	26550 .50	26550 .50
R.F. Bias by-pass condenser	26660 .25	
R.F.-I.F. Bias by-pass condenser		26660 .25
Screen by-pass condenser	26660 .25	
BY-PASS CONDENSER, MULTIPLE TYPE. Other by-pass condensers are listed on Page 419.	28140 2.00	24250 2.00
FLEXIBLE AND WIRE-WOUND RESISTORS For tubular resistors, see Page 419		
R.F.-I.F. Bias resistor No. 1	20040 .20	
R.F.-I.F. Bias resistor No. 2	20380 .20	
R.F.-I.F. Bias resistor	20040 .20	
1st. Detector bias resistor	16320 .20	16320 .20
Control bias resistor No. 1	21030 .20	
Control bias resistor No. 2	25850 .20	
Screen resistor	24470 .20	
Bleeder resistor No. 1	24450 .20	
Filter resistor	27930 1.00	27930 1.00
Filament Shunt resistor	17077 .15	17077 .15
RANGE SWITCH	20983 1.50	
INSTRUCTION AND LOG CARD	23393 Net. 01	23347 Net. 01
PANEL CARD	23357 Net. 01	23339 Net. 01

THESE PRICES SUPERSEDE ALL PREVIOUS PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ATWATER KENT MFG. CO.

MODEL 555, 2nd TYPE, ABOVE SERIAL No. 5063260



For parts not listed below, please order by description or name of part and model number of set.

Part No.	Name of Part	List Price
24293	Volume control, complete, less leads, .5 meg.	$ .75
*25456	Variable condenser rotor, stator and frame (23 plates)	2.00
24558	Cabinet, complete	6.50

* In 1st type 555, the variable condenser is No. 24559, list price $2.00 (21 plates).

TRANSFORMERS

Dia. Code No.	Part No.	Description	List Price
—	24438	Power transformer	$ 2.95
T-1	33470	R. F. transformer	1.00
T-2	33480	Oscillator transformer	1.00
T-3	31390	No. 1 I. F. transformer	.75
T-4	31380	No. 2 I. F. transformer	.45
T-5	24901	Output transformer	1.00

RESISTORS

R-1	30350	Black and purple, .5 meg., 1/3 watt	$ .10
R-2	28950	Flexible, 160 ohms	.17
R-3	30350	Black and purple, .5 meg., 1/3 watt	.10
R-4	16724	White, 40,000 ohms, 1 watt	.15
R-5	30380	Red and green, 3300 ohms, 1/3 watt	.10
R-6	30370	Green, 2 meg., 1/3 watt	.10
R-7	30340	Red and blue, .1 meg., 1/3 watt	.10
R-8	30340	Red and blue, .1 meg., 1/3 watt	.10
R-9	30370	Green, 2 meg., 1/3 watt	.10
R-10	30350	Black and purple, .5 meg., 1/3 watt	.10
R-11	30350	Black and purple, .5 meg., 1/3 watt	.10
R-12	17077	Flexible, 10 ohms	.12
R-13	31490	Maroon and blue, 300 ohms, 1½ watts	.20
R-14	30380	Red and green, 3300 ohms, 1/3 watt	.10

FIXED CONDENSERS

Dia. Code No.	Part No.	Description	List Price
C-1	30260	50 MMF, 450-volts	$ .15
C-2	31180	680 MMF, 100-volts	.35
C-2A	33660	.0022 MF, 450-volts	.22
C-3	29530	.03 MF, 200-volts	.20
C-4	26820	.05 MF, 200-volts	.20
C-5	30240	250 MMF, 200-volts	.20
C-6	31530	.1 MF, 100-volts	.22
C-7	27630	.01 MF, 200-volts	.20
C-8	31140	250 MMF (double), 200-volts	.20
C-9	27630	.01 MF, 200-volts	.20
C-10	31150	.3 MF, 100-volts	.25
C-11	27630	.01 MF, 200-volts	.20
C-12	29030	.02 MF, 450-volts	.20
C-13	22538	Electrolytic, 8 MF, 475-volts	1.00
C-14	25184	Electrolytic, 4 MF, 475-volts	.70

MISCELLANEOUS PARTS

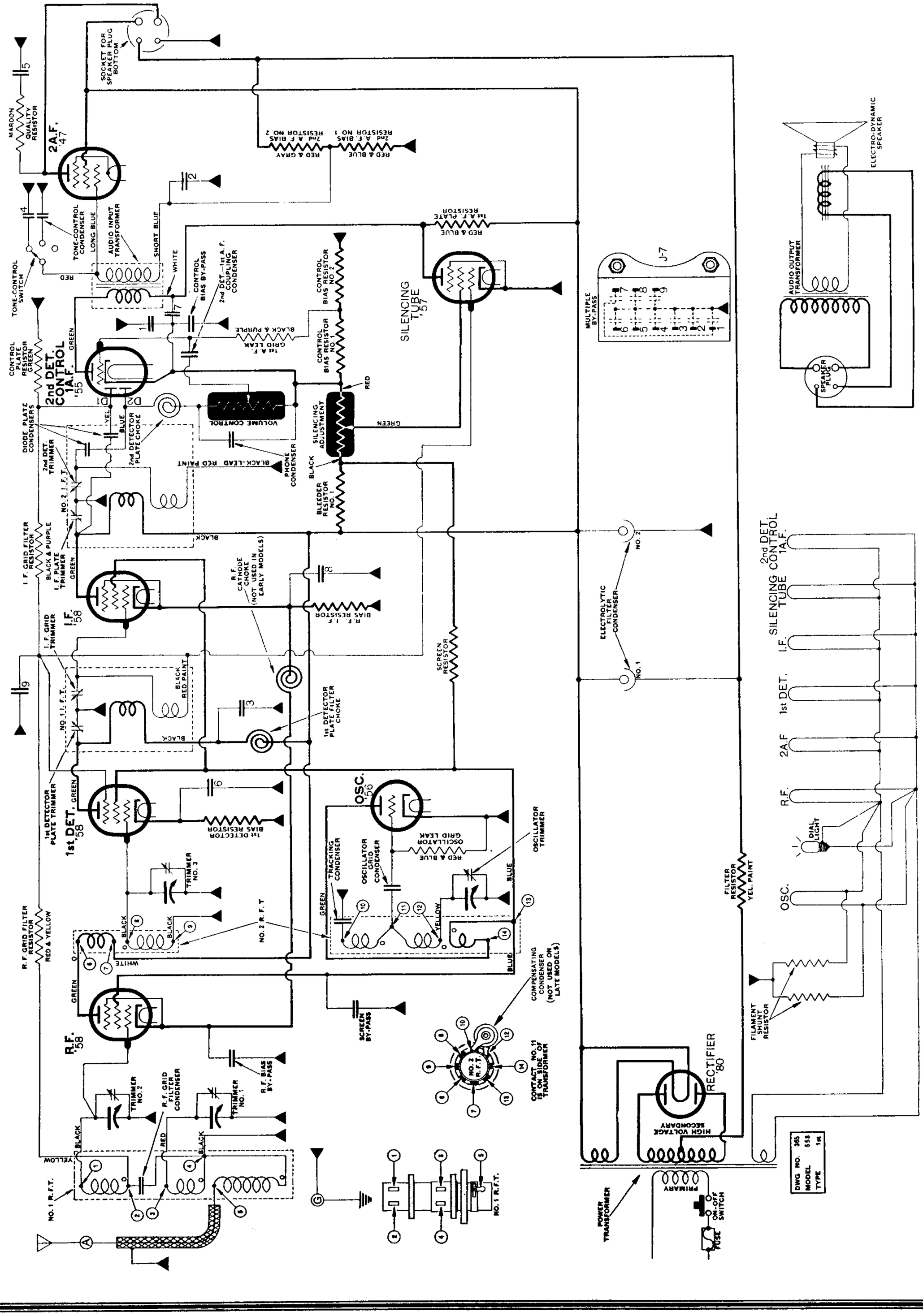
Part No.	Description	List Price
24457	Instruction and log card (F-1045)	net $ .01
24656	Antenna lead (20 feet)	.60
24651	Ground lead (8 feet)	.15
24649	110-volt cable	.60
24278	Knob for volume control or station selector	.10

No. 24408 SPEAKER USED IN MODEL 555

24408	Speaker, complete, less dial light assembly	$ 4.25
24901	Output transformer (T-5)	1.00
24899	Field coil	1.00
24898	Cone assembly	2.35

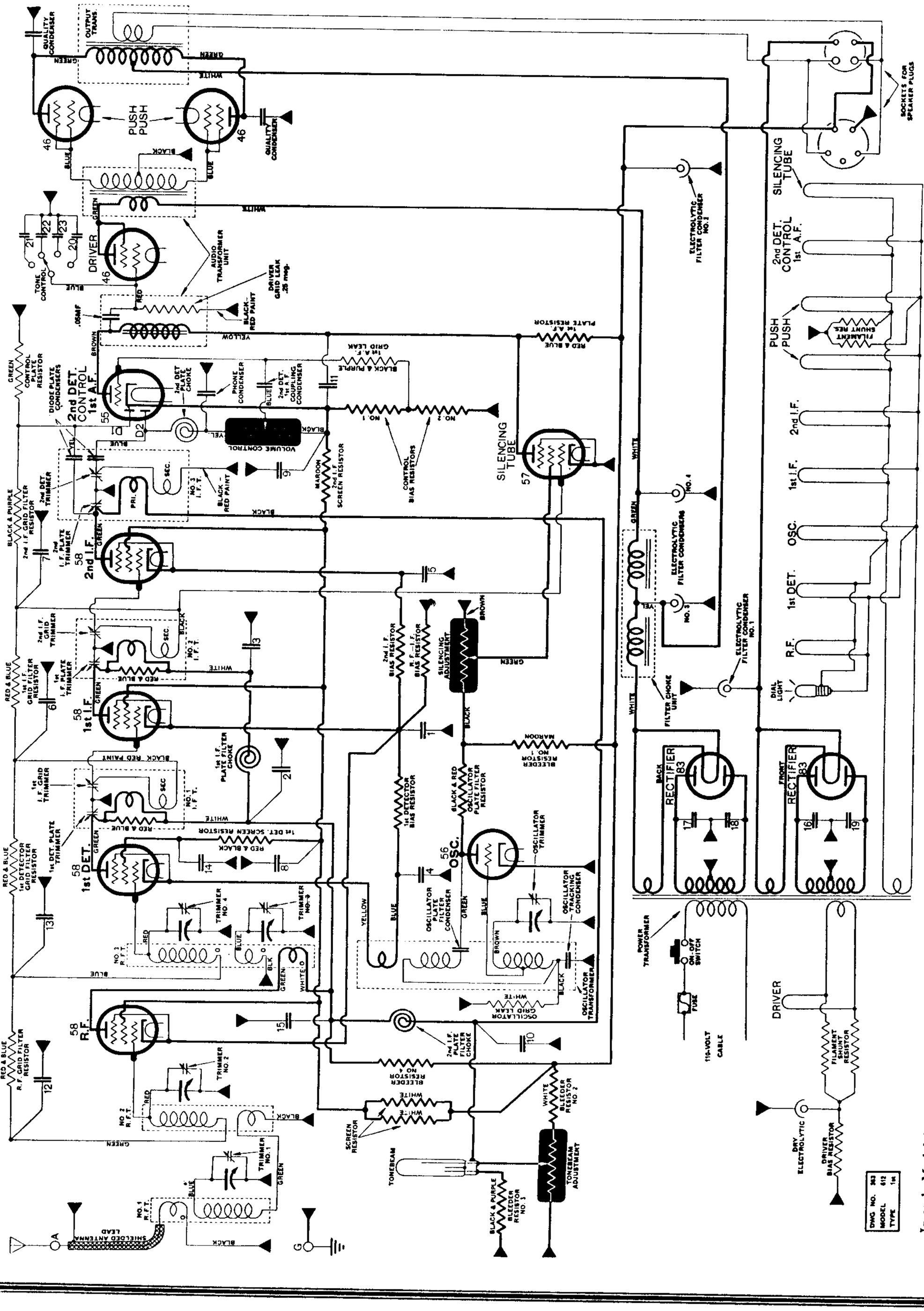
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MODEL 558



ATWATER KENT MFG. CO.

MODEL 612



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

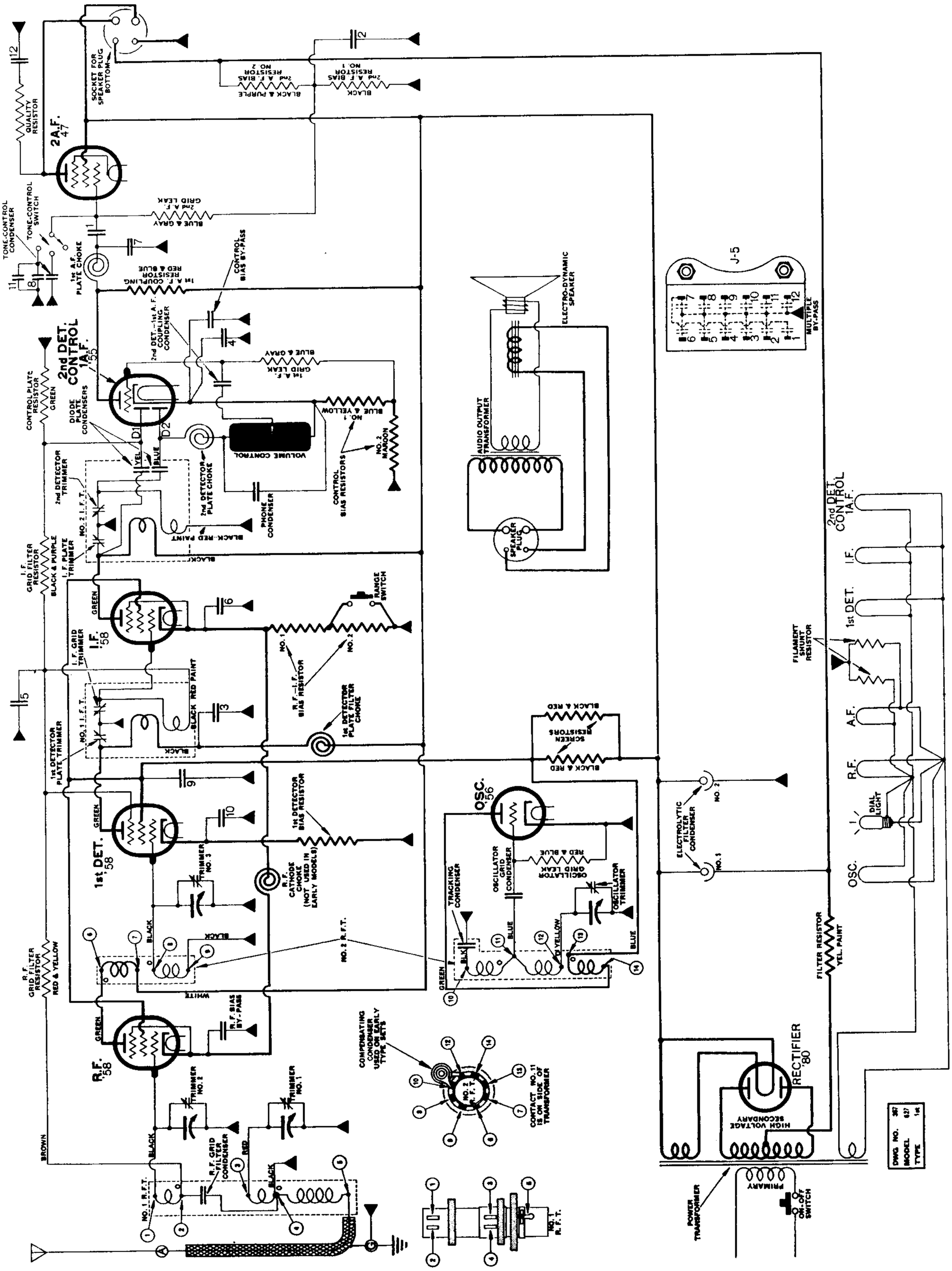
The power transformer has an internal shield which is used to couple the 1st-A. F. and driver tubes.

In late Model 612, the control-grid of the silencing tube connects to the green lead from No. 2 R. F. T. instead of to the black lead from No. 1 I. F. T.

In early Model 612, by-pass No. 5 is an H-20. Use H-49 for replacement.

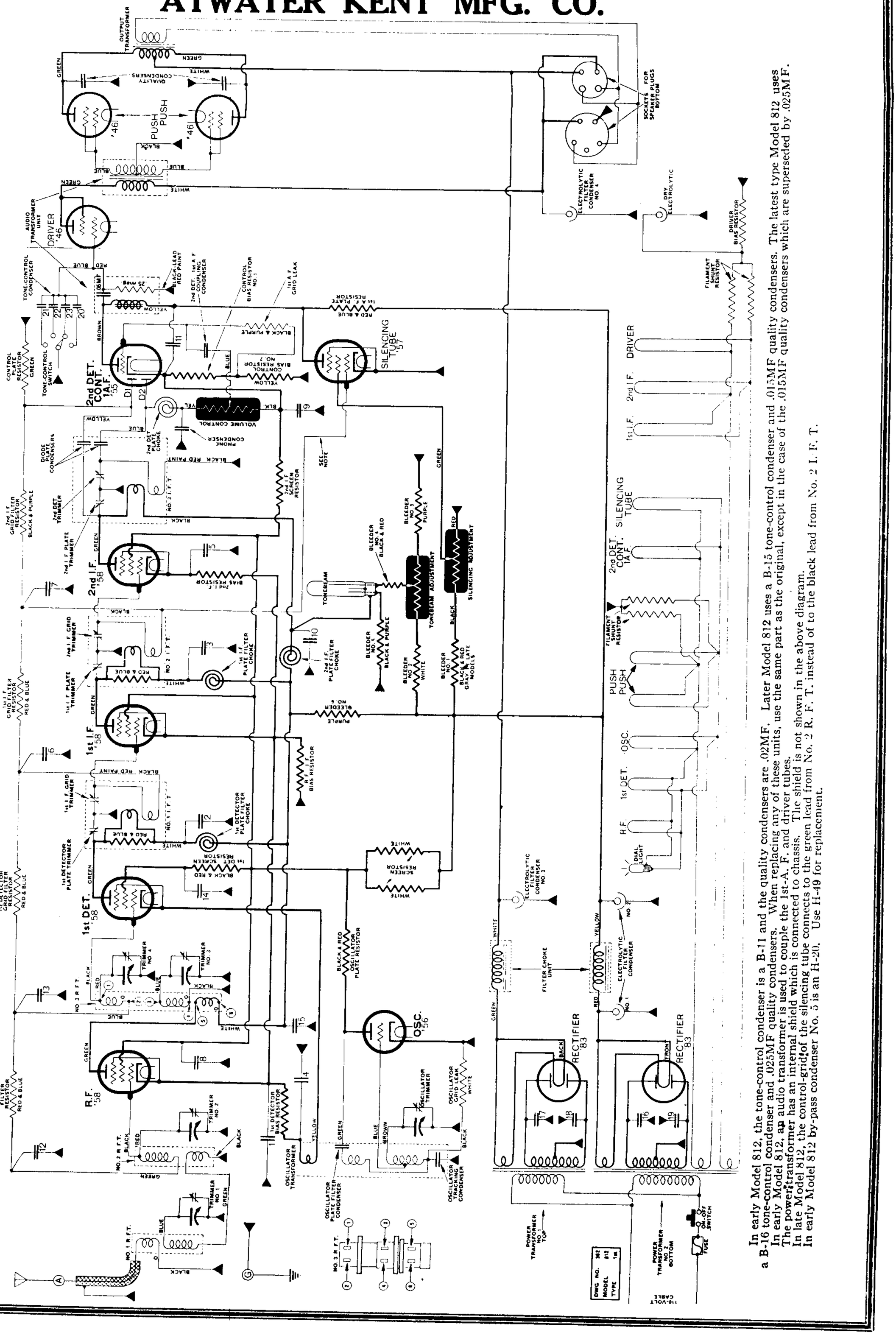
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MODEL 627



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MODEL 812



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

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TYPE L-2 CHASSIS, VOLTAGE TABLE AND DIAGRAM

The Type L Chassis has three stages of screen-grid radio-frequency amplification, plate detection, one stage of resistance-coupled audio, and a "double-audio" output stage It is designed for 110-120-volt, 50-60-cycle alternating-current operation.

Type F Chassis is similar to Type L, but it is designed for operation on 25-cycle alternating current. The filter circuit is different from the L.

Type P Chassis is similar to Type L, but instead of a "local-distance" switch, it has a "radio-phonograph" switch.

VOLTAGE TABLE FOR TYPE L-2 AND P CHASSIS

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

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

APPROX. VOLTAGES, USING 120 V. LINE

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

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

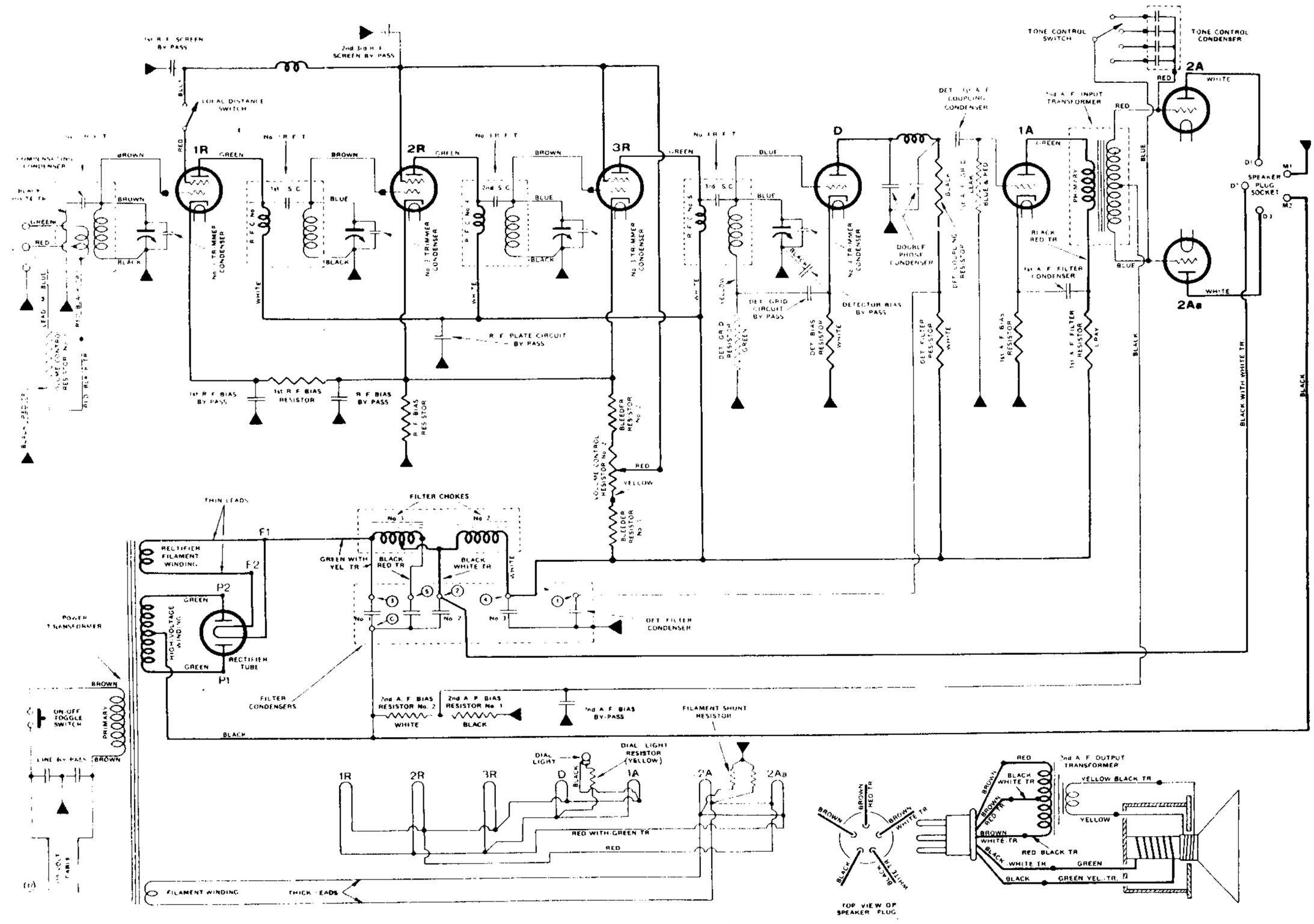


FIG. 220. DIAGRAM OF L-2 CHASSIS.

In the majority of L-2 sets, the filament shunt resistor is connected across the R.F. filaments, as shown in Fig. 219. Also, a 2-ampere fuse is connected in one side of the 110-volt line.

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OUTPUT MEASURING CIRCUIT

DESCRIPTION

An output measuring meter is required to ensure correct adjustment of variable condensers and trimmers. There are several satisfactory methods of connecting an output meter, but the circuit shown on page **59** has proved particularly satisfactory and popular because only one magnetic speaker is required to test any type of Atwater Kent chassis. In other words, on a chassis repair job, you do not have to "pull" the speaker; just bring in the chassis, connect it to the output meter circuit, and you can then check trimmer adjustments, sensitivity, volume and tone quality.

The output circuit includes dummy-field resistors of the correct value for each type of Atwater Kent chassis. A thermo-coupled galvanometer is used to indicate resonance when adjusting variable condensers and trimmers. The magnetic speaker provides a check on volume and tone quality. The cables and plugs provide a quick method of connecting the chassis to the output circuit.

We recommend the use of an Atwater Kent type JB inductor-dynamic speaker with this output circuit. This speaker provides good reproduction and can handle the required volume.

LIST OF PARTS

(The meter "G," fuse "F," and 8-point switch "S-4" are not Atwater Kent parts and can not be supplied from the factory.)

T—No. 18911 special audio output transformer.
S1—No. 13678 toggle switch.
S2, S3—No. 9991 toggle switches.
S4—8-point rotary switch.
R1—No. 16433 680-ohm resistor.
R2—No. 14039 535-ohm resistor (360-ohm section used).
R3—No. 16433 680 ohm resistor.
R4—No. 16434 600-ohm resistor (300-ohm section used).
R5—No. 14039 535-ohm resistor.
R6—Six No. 19180 1100-ohm resistors in series. These take the place of the 6500-ohm field coil in Models 612 and 812.
F—¼ ampere fuse.
G—115 milliampere thermo-coupled galvanometer.
Socket No. 1—No. 21337.
Socket No. 2—No. 21337.
Socket No. 3—No. 21336.
L1—No. 20075 110-volt, 75-watt lamp.
L2—No. 23982 120-volt, 3-watt lamp, miniature base.
L3—No. 16099 6-volt dial lamp.
Cable No. 1—1 No. 18582 5-prong speaker plug, and 1 No. 4259 two-conductor cord.
Cable No. 2—1 No. 19789 4-prong speaker cable and plug, and 1 No. 15079 4-prong plug.
Cable No. 3—1 No. 20657 5-prong speaker cable and plug, and 1 No. 18582 5-prong plug.
Cable No. 4—1 No. 23863 4-prong speaker plug and 3-conductor cable 1 No. 18582 5-prong plug.
Cable No. 5—1 No. 19789 4-prong speaker cable and plug. 1 No. 18582 5-prong plug.
Cable No. 6—1 No. 20889 2-prong speaker cable and plug. 1 No. 18582 5-prong plug.
Cable No. 7—1 No. 19789 4-prong speaker cable and plug. 1 No. 18582 5-prong plug.
Cable No. 8—1 No. 18582 5-prong plug, and resistor R6.

OPERATION OF OUTPUT CIRCUIT

1. Put switch S4 in the correct position, and connect the chassis to the output circuit by means of the correct cable, as specified in the table below.

2. Throw S1 to the right to test for quality or volume on the magnetic speaker.

   Throw S1 to the left to pick up oscillator signals on the headphones.

3. Close S2 and S3 to secure a reading on the galvanometer.

   Open S3 to disconnect the galvanometer when checking volume and quality.

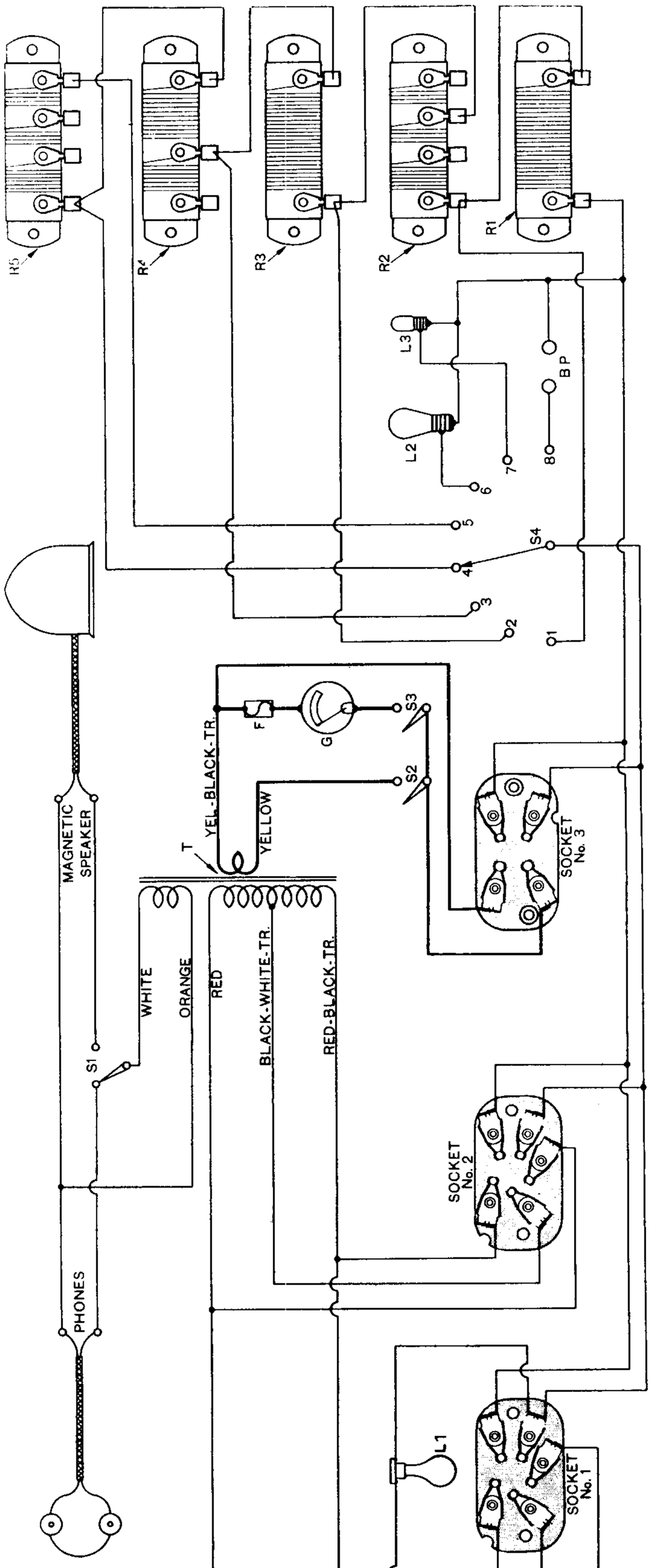
CONNECTION TABLE

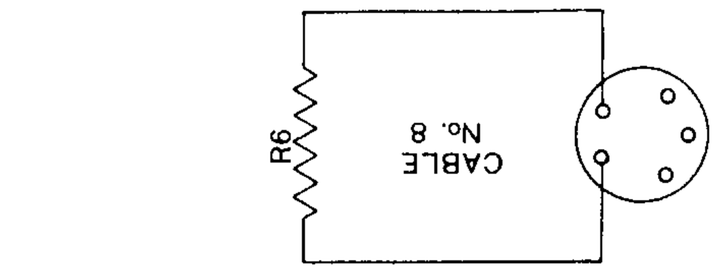
Model Number of Set	Speaker Type No.	Resistance of Field Coil (Ohms)	Put Switch S-4 at Tap No.	Use Cable No.	Use Socket No.
43	F	2500	5	2	3
46, 47	F-2	1700	3	2	3
53 (Early)	F-3	2500	5	2	3
53 (Late)	F-3	1700	3	2	3
55	F-4	1100	2	2	3
55-F	F-2	1700	3	2	3
60	F-4	1100	2	2	3
61	F-6	700	6*	2	3
66	F-6	700	1	2	3
67	F-7	8	7**	2	3
L, F, P or H	N	1100	2	3	2
D	N-3	650	6*	3	2
Q	J	***	***	4	2
80, 82, 83, 84, 85, 86, 90, 92, 94, 96, 188, 228, 558, 567 and 627	—	2000	4	5	2
82D, 84D- 228D	—	1200	6*	3	1
82Q, 84Q, 85Q and 228Q	—	***	***	6	2
87, 89	—	1100	2	3	2
87D	—	1200	6*	3	2
99 below 4884901	—	1100	2	3	2
99 above 4884901	—	2000	4	3	2
99F	—	1100	2	3	2
99P	—	2000	4	3	2
260, 469, 480	380	1100	2	3	2
469D, 558D	—	1200	6*	7	2
469Q, 558Q	—	***	***	4	2
612	324	2000	4	2	3
	326	6500	—	8	—
812	336	2000	4	2	3
	338	6500	—	8	—

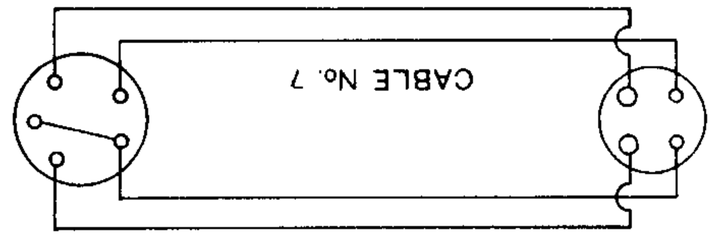
***Lamp L2 should light, indicating continuity of the field supply circuit.**
****Lamp L3 should light, indicating continuity of the field supply circuit.**
*****S4 may be left in any position as there is no field connection in these sets.**

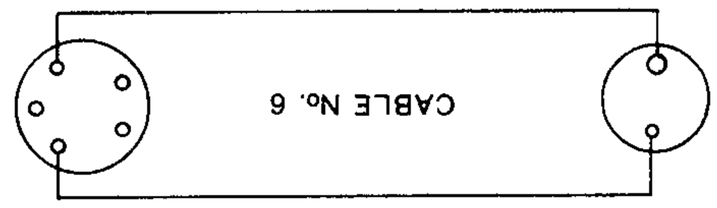
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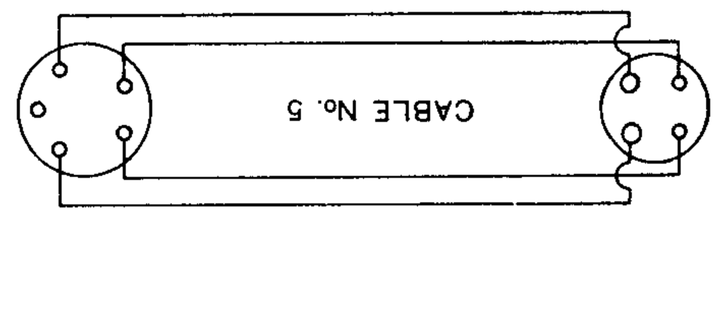
OUTPUT MEASURING CIRCUIT

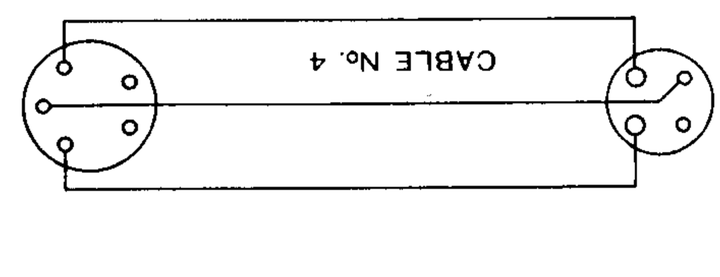


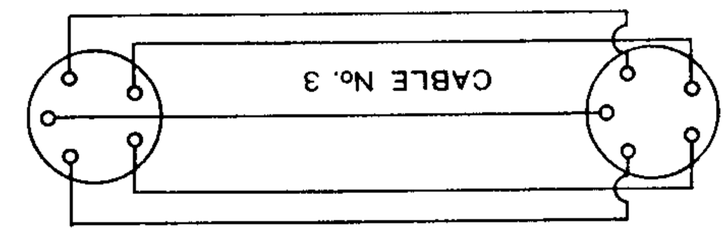


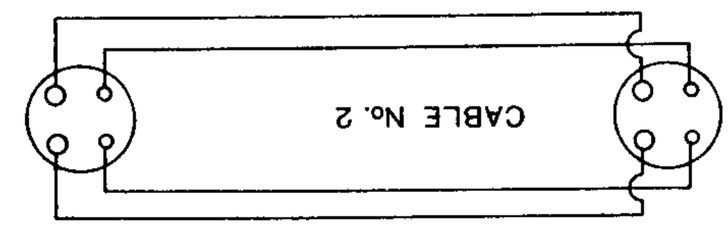


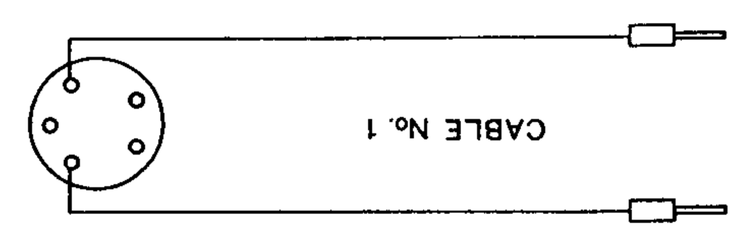












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The top plug on each cable is for insertion in the correct socket on the output measuring circuit. The bottom plug on each cable is for insertion in the speaker socket on the chassis that is being tested. Follow instructions given in the table on the facing page.

In this diagram, all connections are made looking at the bottom of the sockets and plugs.

When switch S4 is set at contact 8, the binding posts BP are connected in the circuit and may be used to connect an external dummy field-resistor of the correct value to take care of future models.

ATWATER KENT MFG. CO.

SERVICE NOTES

SYNCHRONIZING SPEAKERS IN MODELS 612 and 812

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

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

TYPE '55 TUBE

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

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

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

The signal voltage developed across the manual volume control in the 2nd-detector plate circuit is impressed on the grid of the triode, which acts as 1st-A.F. amplifier.

The automatic volume control plate (D-1) is actuated by strong signals in such a way as to produce an increased negative bias on the control grids of the R.F. and I.F. tubes, thus reducing their amplification and tending to keep a uniform signal level. The voltage drop across control bias resistors No. 1 and 2 determines the signal level at which the automatic volume control begins to function.

The drop across control bias resistor No. 1 is the bias voltage for the 1st-A.F. grid.

There is no bias on the 2nd-detector plate.

TYPE '85 TUBE

The 85 tube used in Models 469-D and 558-D corresponds to the 55 tube described above.

ACTION OF SILENCING TUBE

The silencing tube is so connected in the plate circuit of the 1st-A.F. tube that when no signal is being received (that is, when the set is tuned between stations), the plate voltage and consequently the amplification of the 1st-A.F. tube is decreased. When a signal is tuned in, the silencing tube automatically restores the normal plate voltage and amplification of the 1st-A.F. tube.

The automatic action of the silencing tube is secured by having the grid of the silencing tube connected to the automatic volume control circuit.

An adjustment for selecting the desired amount of silencing between stations is provided by having the screen of the silencing tube connected to a potentiometer by means of which the screen voltage may be regulated.

PUSH-PUSH AMPLIFICATION

"Class B" or push-push amplification is used in Atwater Kent Models 612, 812, 469-Q and 558-Q, to provide high power output with comparatively low power consumption.

Class B amplification differs from regular push-pull amplification in this way:—

In **push-pull** amplification, the grids of the two tubes are biased to a point where there is comparatively *high plate current* in each tube. When an A.C. signal voltage is impressed on the grids, the plate current of one tube decreases, and the plate current of the other tube increases in like amount. This action reverses as the impressed A.C. grid voltage reverses. Note that both tubes are functioning at all times, one pushing while the other pulls.

In class B or **push-push** amplification, the grids of the two tubes are biased to a point where there is practically *no plate current* in either tube. (The 46 tube is designed to give low plate current with zero grid bias.) When an A.C. signal voltage is impressed on the grids, one grid swings more negative, and the other grid swings positive. The plate current of the first tube cannot decrease as it is already practically zero, but the plate current of the other tube increases. This action reverses as the impressed A.C. signal voltage reverses. Note that in class B amplification, only one tube functions at a time, the other tube being inoperative for that half-cycle of the impressed A.C. signal voltage. The name push-push is derived from this action.

NECESSITY FOR DRIVER TUBE

In **push-pull** amplification, the grids do not swing positive, so there is practically no grid current, and very little power is required to feed the grid circuit.

However, in **push-push** amplification the grids swing positive, thus drawing grid current, and considerable power is required to feed the grids of these tubes.

This power is furnished by a "driver" tube which provides sufficient power output to swing or "drive" the grids of the push-push-tubes.

NECESSITY FOR 83 TUBE

In **push-pull** amplification, the average plate current of the two tubes is practically constant at all times, regardless of signal strength. The current drain on the power unit is therefore practically constant, so there is no tendency for the output voltage of the power supply to vary. Under this condition the type 80 rectifier tube is satisfactory as it can supply the constant drain.

In **push-push** tubes there is practically no plate current when the volume control is turned down. But when a signal is received and the volume control is turned up, the push-push tubes alternately draw high plate current. This intermittant drain on the power supply necessitates use of a special rectifier and filter circuit to maintain constant voltage under the varying current drain. The 83 tube is designed to meet this condition as it has low internal resistance and good voltage regulation.

ACTION OF TONEBEAM

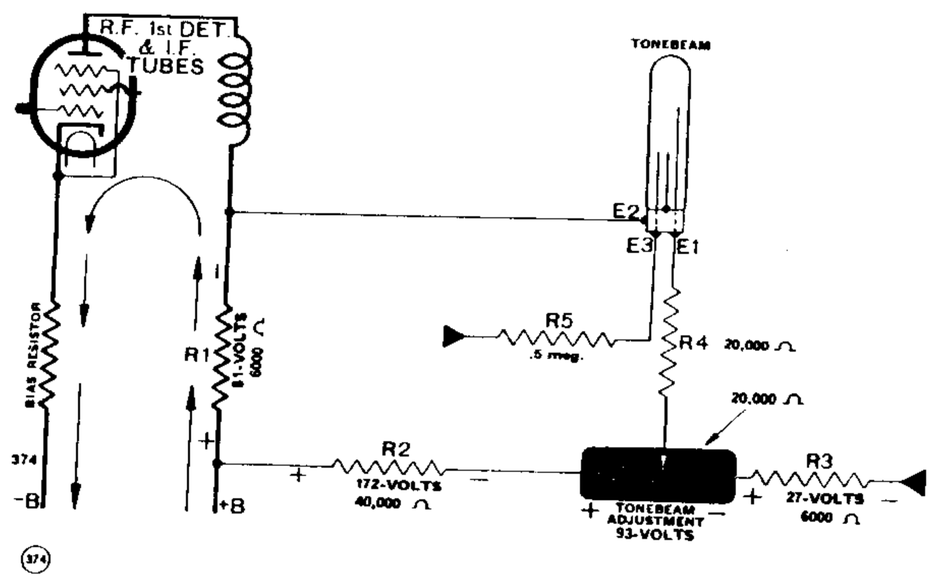
The Atwater Kent tonebeam is a neon light-column that indicates visually when the set is tuned correctly to resonance with the incoming signal.

A typical circuit arrangement for the tonebeam is shown below. This particular circuit is used in Model 812.

The tonebeam requires an initial bias to make the short center electrode (E-2) positive with respect to the long electrode (E-1). The bias is adjustable to take care of different tonebeam tubes, the adjustment being provided by a potentiometer in series with resistors R-2 and R-3 which limit the range of adjustment. In the circuit shown below, the bias voltage across E-1 and E-2 can be adjusted from 91 to 184 volts.

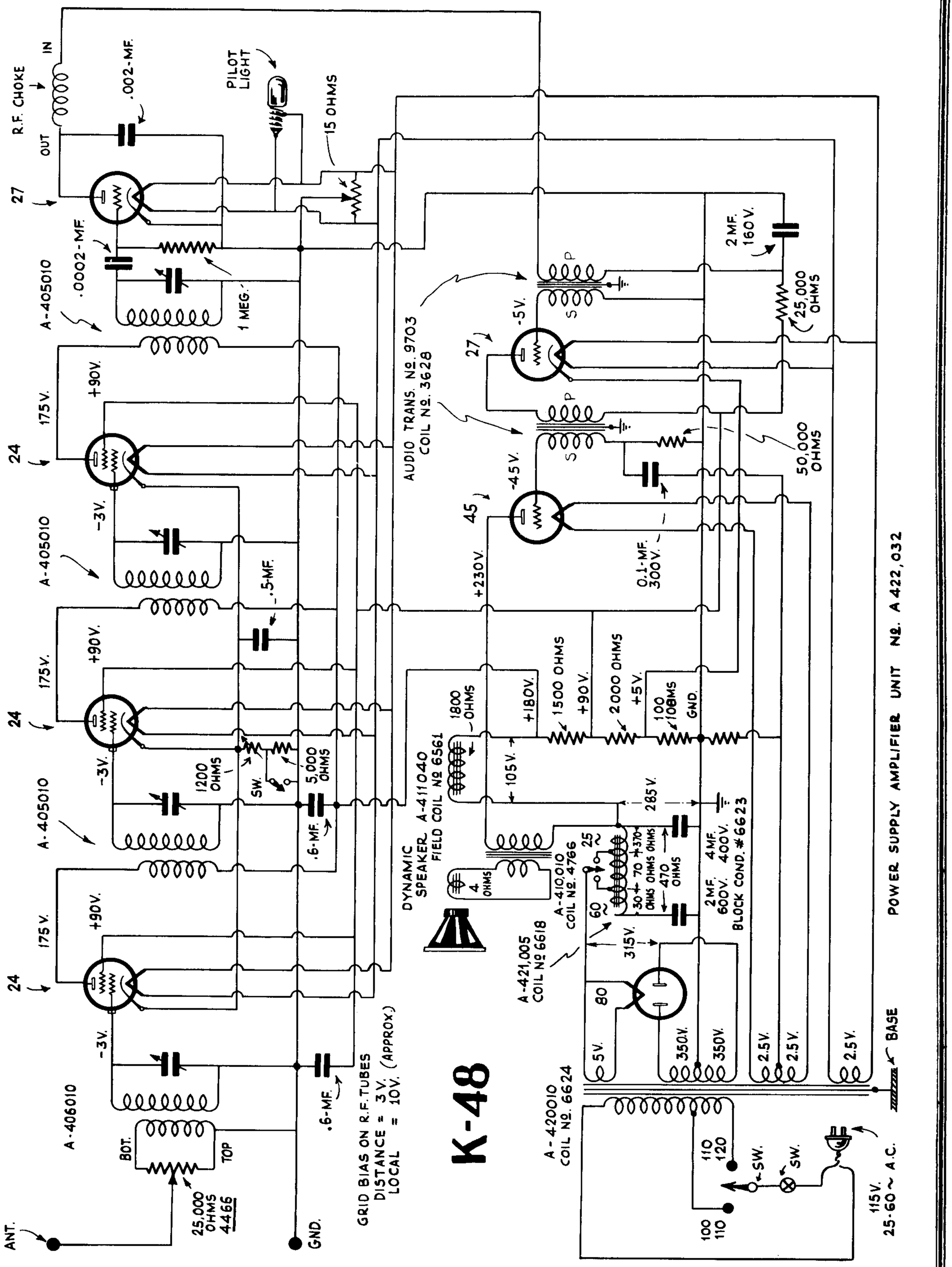
When a signal is tuned in, the automatic volume control increases the negative bias on the control grids of the R.F., 1st-detector, and I.F. tubes, thus decreasing their plate current. This decrease in plate current causes a decrease in voltage across R-1 and a corresponding increase in the voltage difference between electrodes E-1 and E-2. The increase in voltage across E-1 and E-2 causes the neon glow to extend up the long electrode. When the initial bias voltage is adjusted to the correct operating point, an increase of about 20 volts across E-1 and E-2 will cause the neon glow to extend up to the top of the long electrode E-1.

The electrode E-3 and resistor R-5 are used to ensure stable operation of the tonebeam. Resistor R-4 is used to make the tonebeam action more uniform on weak and strong signals.



TONEBEAM CIRCUIT IN MODEL 812.

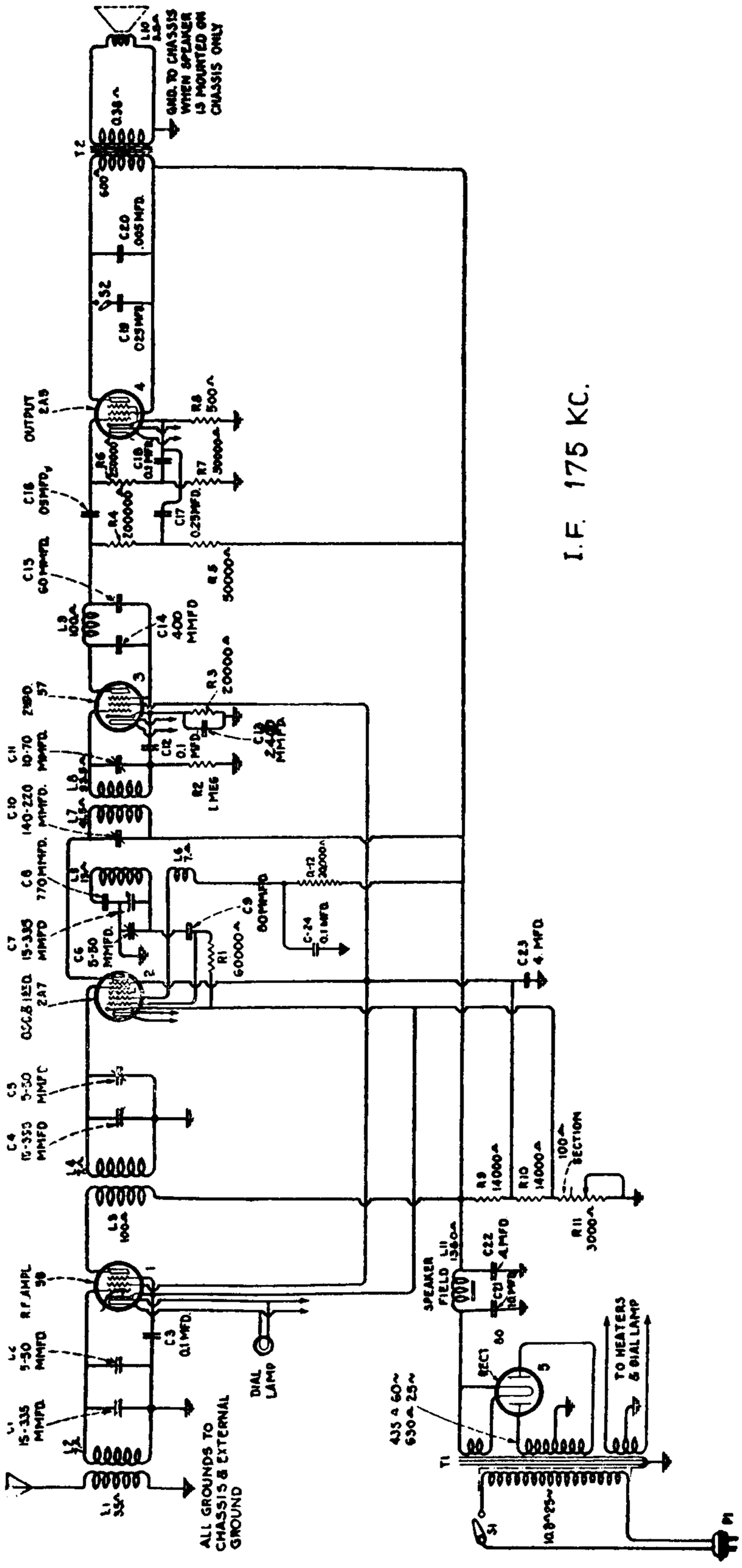
BRANDES PRODUCTS CORP.



K-48

CANADIAN WESTINGHOUSE CO.

Westinghouse Superheterodyne 53



I.F. 175 KC.

Schematic Circuit Diagram

CANADIAN WESTINGHOUSE CO.

MODEL 53

SERVICE DATA

Voltage Rating.....105-125 Volts
Frequency Rating.....25–60 Cycles
Power Consumption.....70 Watts

Number and Types of Radiotrons....1 UX-280, 1 W 2A5, 1 W 58, 1 W 57, 1 W 2A7.....Total 5
Undistorted Output.....1.75 Watts
Frequency Range.....504 K.C. to 1550 K.C.

This receiver is a five-tube Super-Heterodyne incorporating a Dynamic Loud speaker as a part of the chassis; two-point tone control; single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The circuit consists of an R.F. Stage, a combined oscillator and first detector in the Westinghouse 2A7 tube, an intermediate stage consisting of a transformer only using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K.C. The I.F. frequency is 175 K.C. and the two circuits that comprise it are adjusted for maximum output at 175 K.C.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING---NO SIGNAL

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate Volts	Plate Current M.A.	Heater Volts
1. W-58 R.F. Amplifier	3.0	95	250	5.0	2.33
2. W-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. W-57 Second Detector	6.0	89	170	0.3	2.33
4. W-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. W-80 Rectifier	725 Volts Plate to Plate—60 M.A. Total				4.82
TOTAL CATHODE CURRENT—11 M.A.					

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

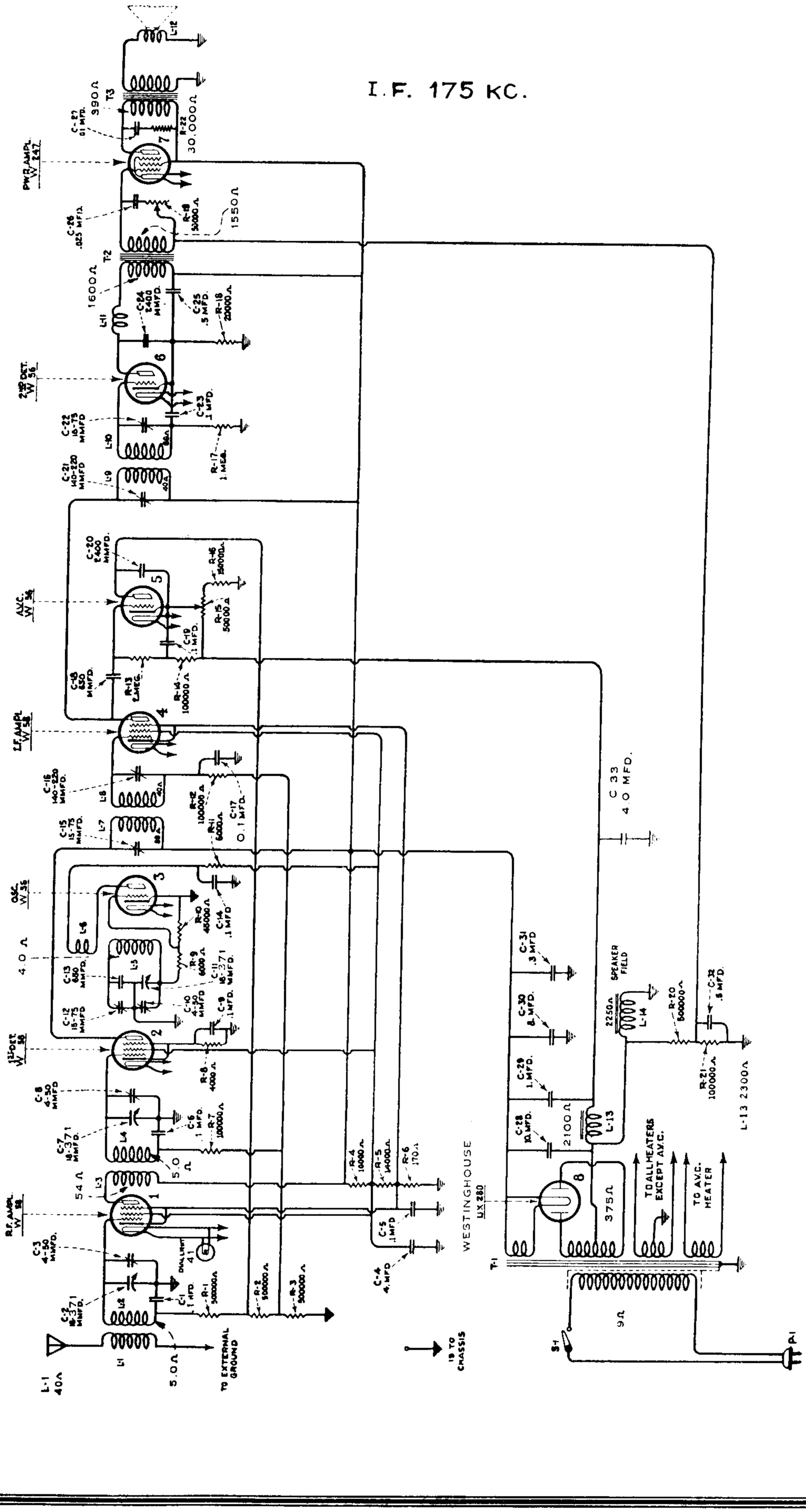
STYLE NO.	DESCRIPTION	LIST PRICE
H-29391	Coil—Antenna coil assembly	$1.60
H-29392	Coil—R.F. coil assembly	1.40
H-29393	Coil—Oscillator coil assembly	1.10
H-29389	Coil—R.F. choke	1.00
H-29390	Transformer—I.F. transformer	2.80
H-29399	Transformer—Line transformer—25-60 cyc.	7.70
H-29367	Resistor—carbon—¼ watt—60,000 ohms	
H-27699	Resistor—carbon—½ watt—20,000 ohms	
H-29372	Resistor—carbon—½ watt—50,000 ohms	
H-29339	Resistor—carbon—½ watt—200,000 ohms	See
H-29366	Resistor—carbon—½ watt—250,000 ohms	
H-25519	Resistor—carbon—½ watt—1.0 meg	RS2141
H-29369	Resistor—carbon—1 watt—500 ohms	
H-27702	Resistor—carbon—1 watt—14,000 ohms	
H-29368	Resistor—carbon—3 watts—14,000 ohms	
H-29364	Volume control and operating switch	1.85
H-29373	Tone control switch	.70
H-29379	Capacitor—toothpick—60 mmfd	.55
H-29378	Capacitor—toothpick—80 mmfd	.55
H-29384	Capacitor—toothpick—400 mmfd	.45
H-29385	Capacitor—toothpick—770 mmfd	.45
H-29382	Capacitor—flat type—0.0024 mfd.—400 volts	.50
H-29386	Capacitor—flat type—0.005 mfd. and 0.025 mfd.—400 volts	.60

NO.	DESCRIPTION	LIST PRICE
H-29383	Capacitor—flat type—0.05 mfd.—300 volts	$0.90
H-29381	Capacitor—flat type—0.1 mfd.—150 volts	.55
H-29387	Capacitor—flat type—0.1 mfd.—300 volts	.55
H-29380	Capacitor—flat type—0.25 mfd.—300 volts	.60
H-29374	Capacitor—two 4.0 mfd. dry electrolytic units in container	2.45
H-29376	Capacitor—10 mfd.—wet electrolytic	2.10
H-29394	Socket—4 contact socket	.50
H-29409	Socket—6 contact socket	.80
H-29410	Socket—7 contact socket	.60
H-23786	Clip—grid connector clip—Pkge. of 5	.60
H-29406	Knob—large control knob with set screw	.25
H-29405	Knob—small control knob with set screw	.25
H-29388	Scale—tuning dial scale assembly	.75
H-29564	Ring—R.F. or oscillator coil retaining ring	.12
H-29362	Reproducer assembly complete	
H-29404	Transformer—output transformer	2.15
H-29363	Cone—reproducer cone	1.50
H-29565	Coil assembly—field coil, magnet and cone support	3.50
H-29401	W-53A cabinet, stripped	
H-29402	W-53B cabinet, stripped	

CANADIAN WESTINGHOUSE CO.

MODEL 82

I.F. 175 KC.



SCHEMATIC CIRCUIT DIAGRAM

On later production an additional hum filter resistor 500,000 ohms is connected in series with the common point of resistors R 20 and R 21

CANADIAN WESTINGHOUSE CO.

Meter Readings at Radiotron Sockets

110 VOLT A. C. LINE -- ANT. AND GROUND LEADS SHORTED

VOLUME CONTROL AT MINIMUM

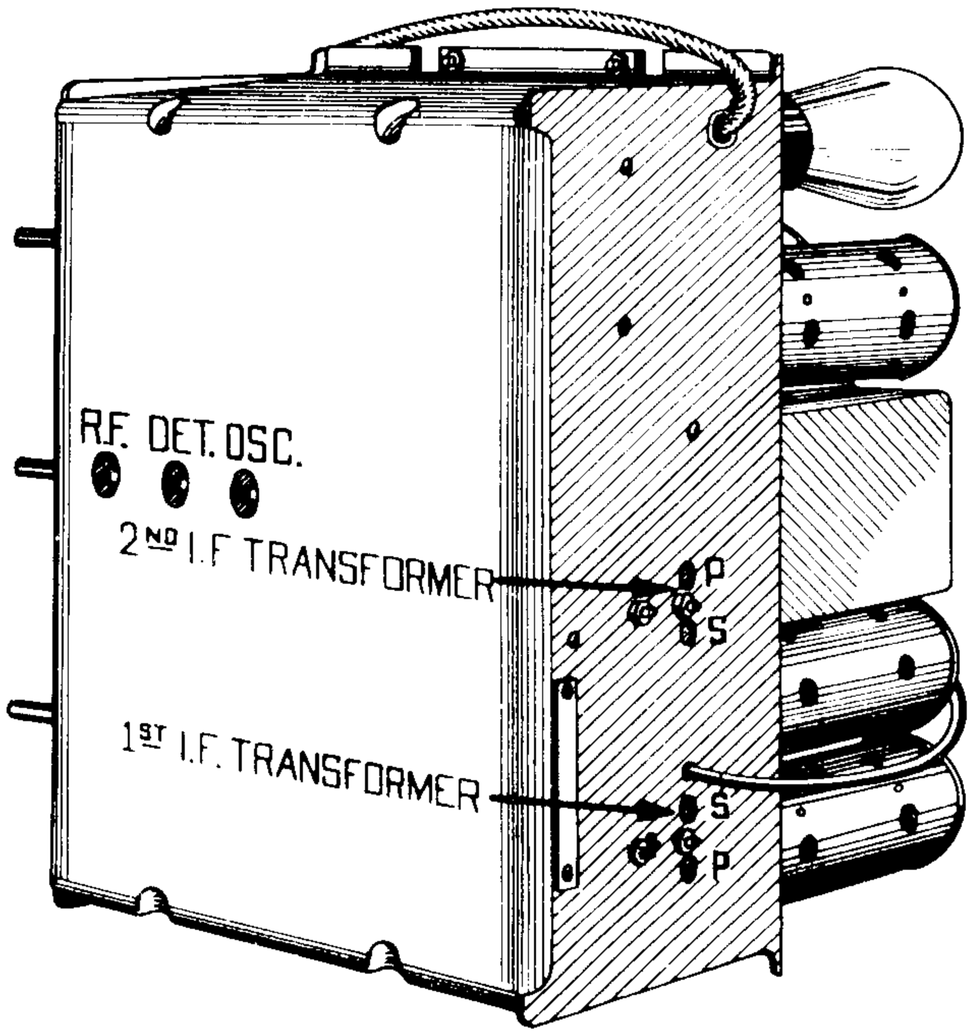
Radiotron No.	Cathode to Heater, Volts D.C.	Cathode or Filament to Control Grid, Volts D.C.	Cathode or Filament to Screen Grid Volts, D.C.	Cathode or Filament to Plate Volts, D.C.	Plate Current, M.A.	Heater or Filaments, Volts, D.C.
1—R. F.	**2.0	*1.2	110	300	0.	2.3
2—1st Det.	0	*1.3	110	290	0	2.4
3—Osc.	—	—	—	70	7.0	2.4
4—I. F.	**2.0	*2.3	110	300	0.3	2.3
5—A. V. C.	—	0.2	—	10	0	2.3
6—2nd Det.	—	5.0	—	275	0.5	2.4
7—Pwr.	—	0.5	280	270	38.0	2.3

VOLUME CONTROL AT MAXIMUM

1—R.F.	** 4.0	*0.2	100	275	5.5	2.3
2—1st Det.	**10.0	*0.6	95	265	2.2	2.4
3—Osc.	—	—	—	60	6.0	2.4
4—I. F.	** 4.0	*2.2	110	270	3.5	2.3
5—A. V. C.	—	0.5	—	15	0	2.3
6—2nd Det.	—	5.0	—	265	0.5	2.4
7—Pwr.	—	***0.5	270	260	30.0	2.3

*On 5 Volt. 1000 Ohm per Volt Meter.
**On 50 Volt, 1000 Ohm per Volt Meter.
***On later sets only. See note under Fig. 2.

MODEL 82



I.F. 175 KC.

VIEW OF CHASSIS SHOWING R. F. AND I. F. LINE-UP ADJUSTMENT POINTS

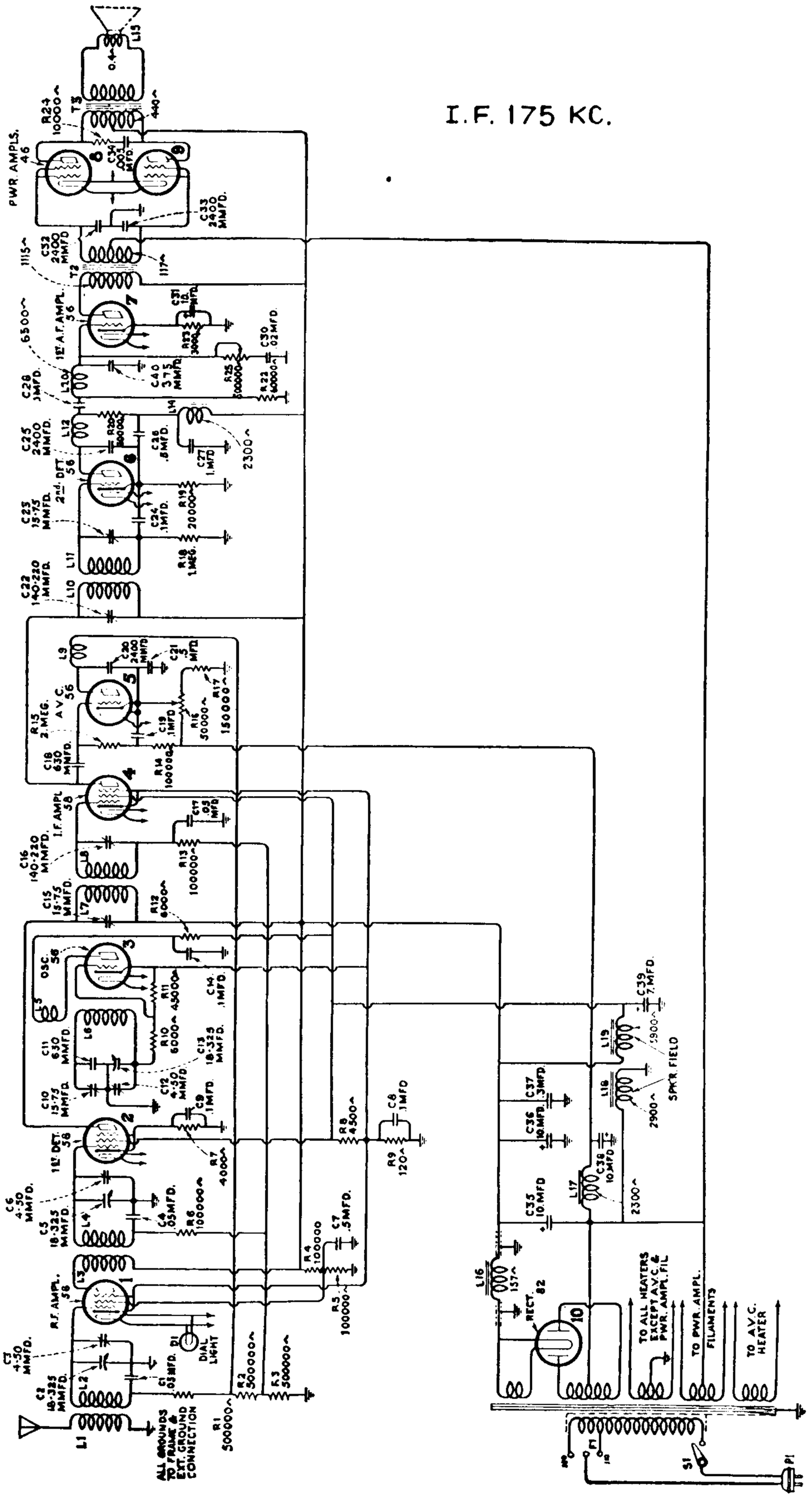
ADJUSTMENT OF R.F LINE-UP AND OSCILLATOR TRIMMING CONDENSERS

Four adjustable condensers are provided for aligning the R.F. circuits, and adjusting the oscillator frequency so that it will be at a 175 K.C. difference from the incoming R.F. signal throughout the tuning range of the set. Poor quality, insensitivity and possible inoperation of the receiver may be caused by these condensers being out of adjustment.

CANADIAN WESTINGHOUSE CO.

MODEL 102

I.F. 175 KC.



Schematic Circuit Diagram

NOTE:—On later production Condenser C-18 is 160 mmfd., Resistor R-17 is 200,000 ohms.

CANADIAN WESTINGHOUSE CO.

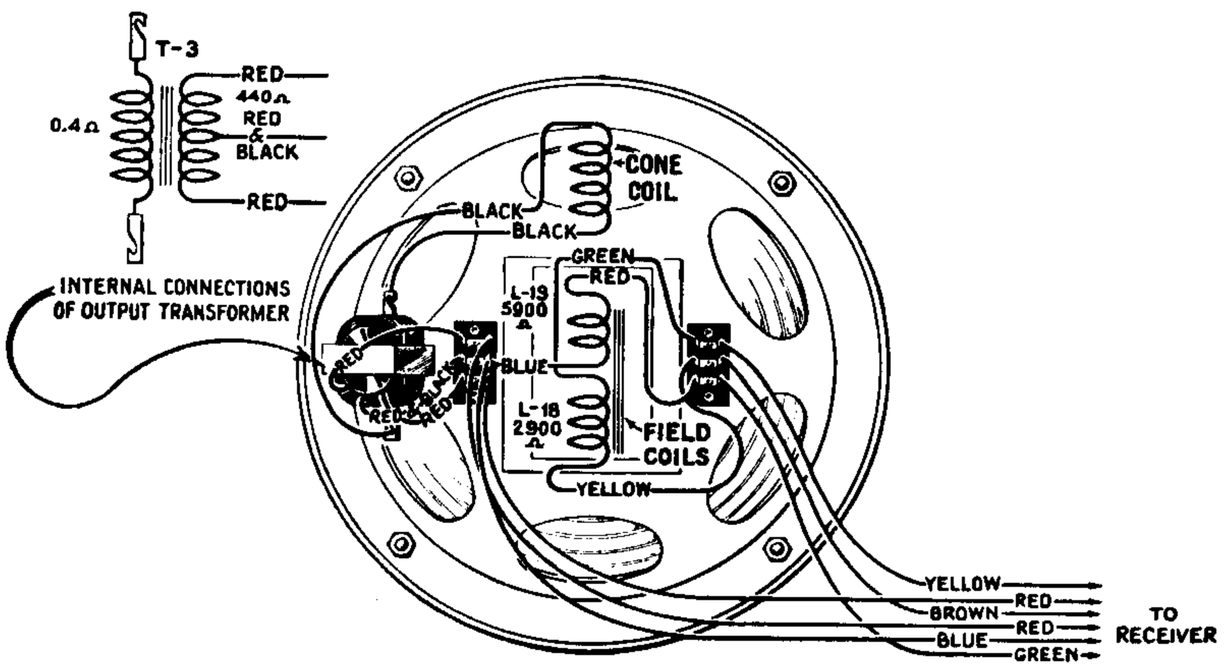
MODEL 102

RADIOTRON SOCKET VOLTAGES

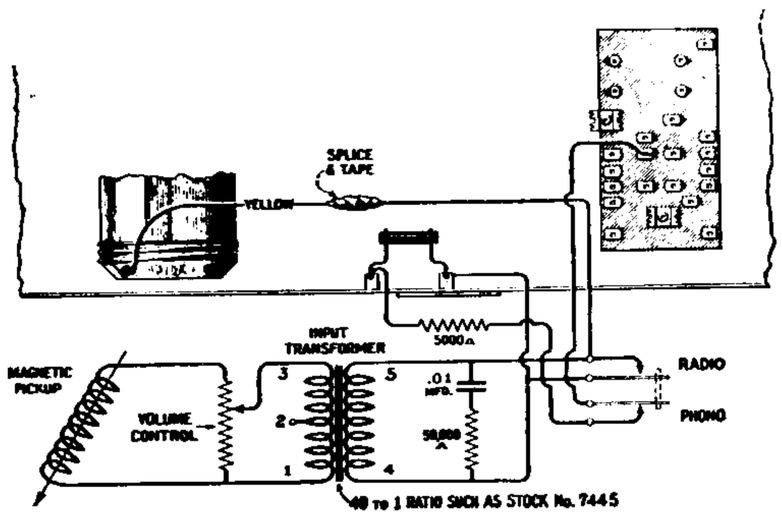
120 Volt A. C. Line

(No Signal Being Received—Antenna Lead Grounded to Chassis)

Radiotron No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid, Volts, D.C.	Cathode or Filament to Screen Grid, Volts, D.C.	Cathode or Filament to Plate, Volts, D. C.	Plate Current, M. A.	Heater or Filament, Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1. R. F.	+4	1.0	90	280	0	2.4
2. 1st Det.	0	1.2	90	275	0	2.4
3. Osc.	+4	0	—	55	5.0	2.4
4. I. F.	+3	1.8	90	280	0	2.4
5. A. V. C.	0	0	—	5	0	2.4
6. 2nd Det.	+15	3.0	—	225	1.0	2.4
7. 1st A. F.	+14	10.0	—	260	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4
VOLUME CONTROL AT MAXIMUM						
1. R. F.	+4	0	70	250	4.5	2.4
2. 1st Det.	+6	0.6	75	235	2.0	2.4
3. Osc.	+4	0	—	50	5.0	2.4
4. I. F.	+4	1.5	84	250	4.5	2.4
5. A. V. C.	0	0	—	15	0	2.4
6. 2nd Det.	+15	3.0	—	210	1.0	2.4
7. 1st A. F.	+14	10.0	—	240	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4



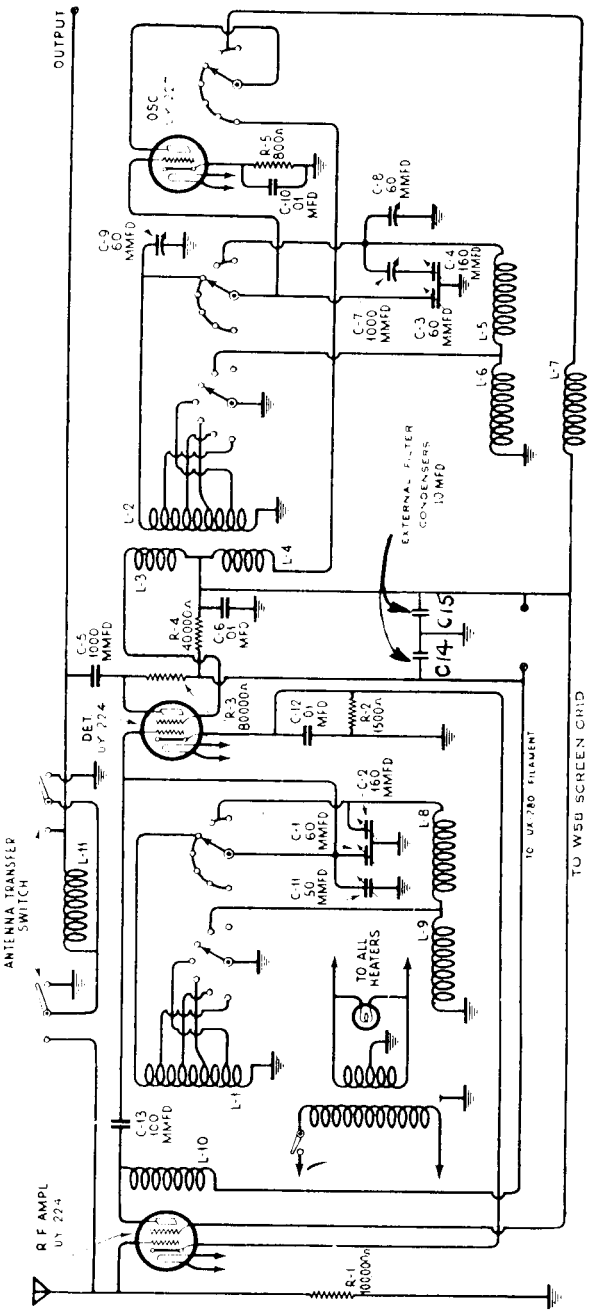
Loudspeaker Wiring



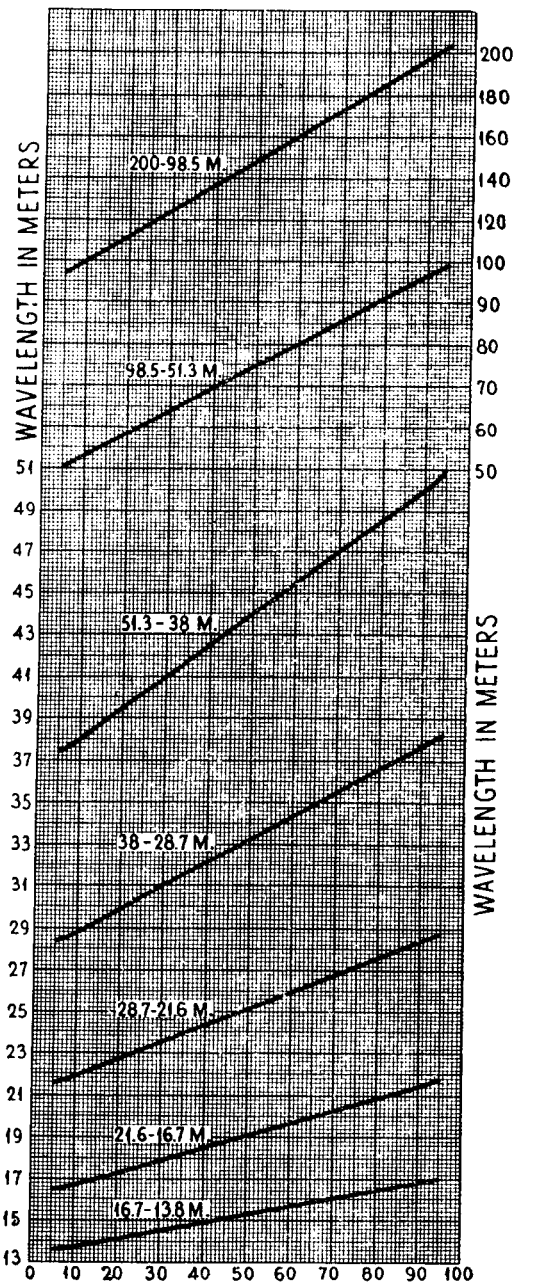
Magnetic Pickup Connections

CANADIAN WESTINGHOUSE CO.

MODEL 112 S.W. CONVERTER



Voltage Rating	105-125 Volts and 200-250 Volts
Frequency Rating	25-60 cycles
Power Consumption	20 Watts
Recommended Antenna Length	25-75 feet



Approximate Calibration of Short Wave Tuning Dial (with 1075 K.C. Intermediate Frequency)

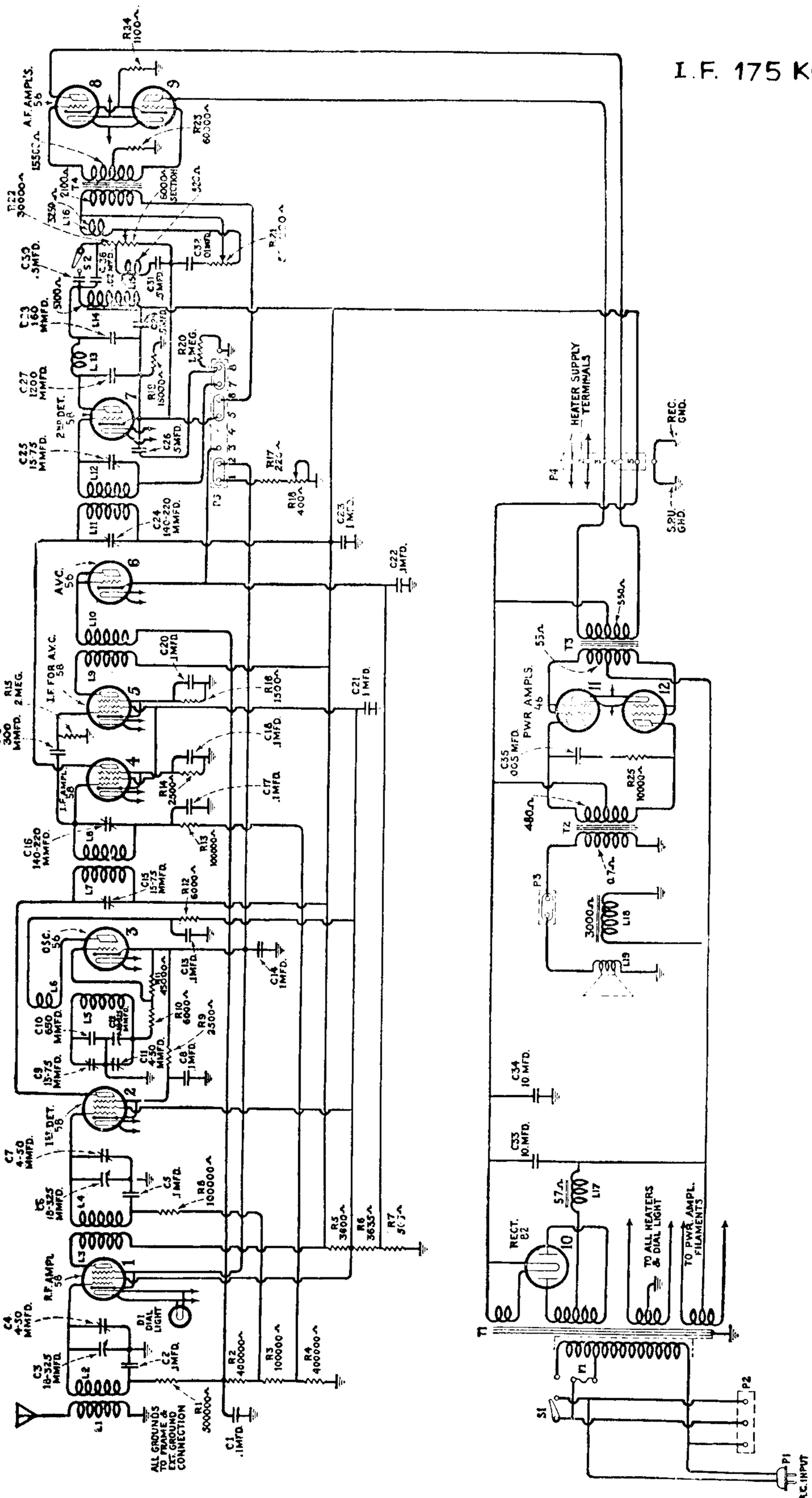
RADIOTRON SOCKET VOLTAGES-120 Volt A.C. Line

Radiotron No.	Control Grid to Cathode Volts D. C.	Screen Grid to Cathode Volts D. C.	Plate to Cathode Volts D.C.	Plate M.A.	Heater Volts A. C.
R. F.	—5	70	270	1.2	2.5
Detector	—5	70	150	1.4	2.5
Oscillator	—4	—	100	5.0	2.4

CANADIAN WESTINGHOUSE CO.

MODEL 122

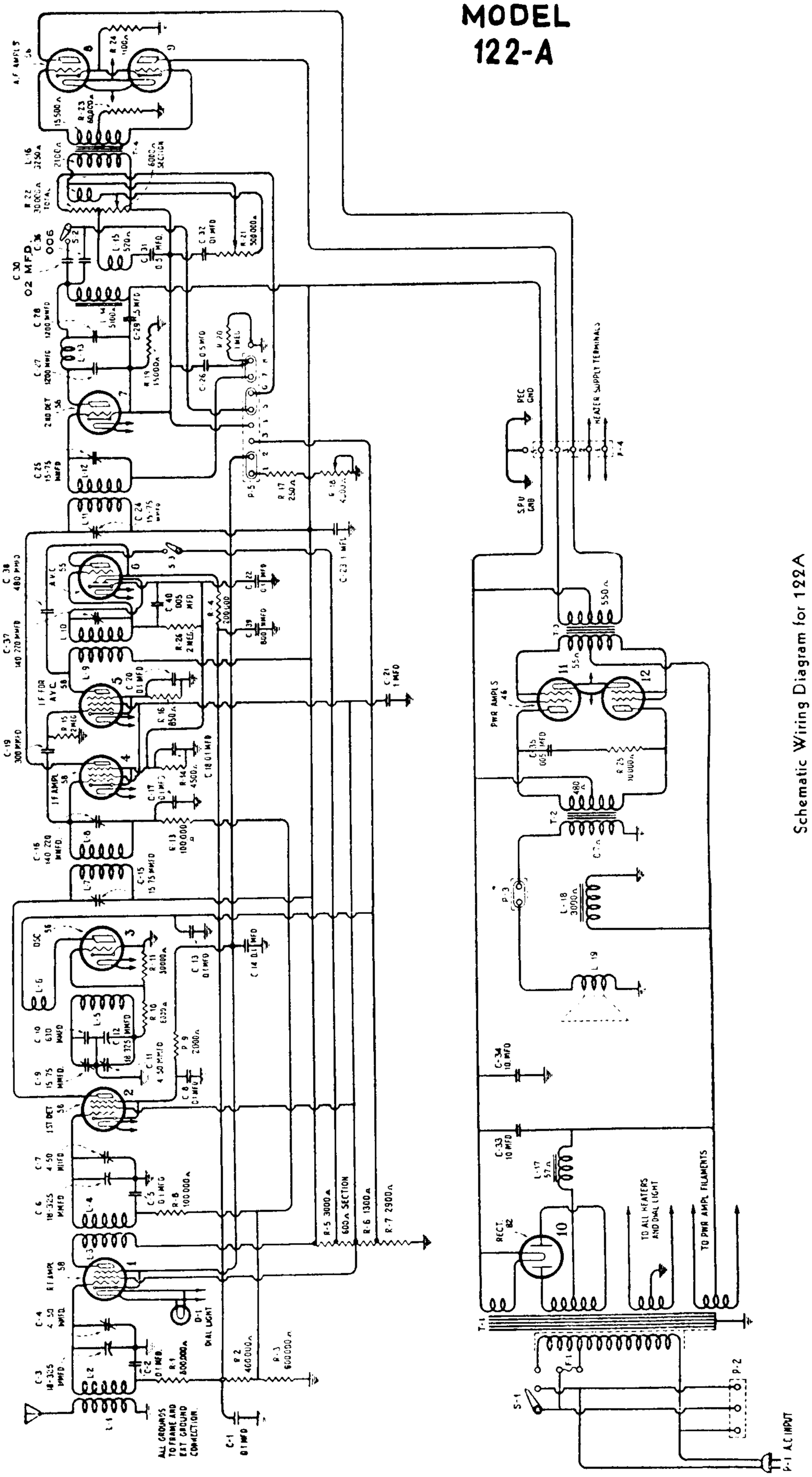
I.F. 175 KC.



Schematic Circuit Diagram

CANADIAN WESTINGHOUSE CO.

MODEL 122-A



Schematic Wiring Diagram for 122A

CANADIAN WESTINGHOUSE CO.

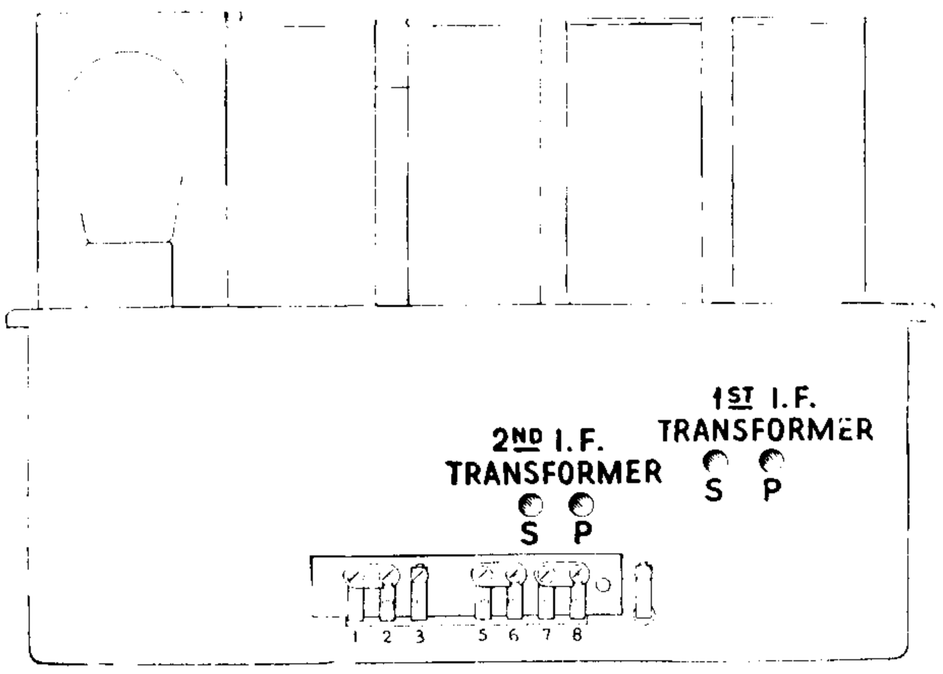
MODEL 122 AND 122 A

RADIOTRONS SOCKET VOLTAGES

120 Volt A.C. Line

No signal being received Volume Control at minimum

Tube No.	Cathode to Heater Volts, D.C.	Cathode or Filament to Control Grid Volts, D.C.	Cathode or Filament to Screen Grid Volts, D.C.	Cathode or Filament to Plate Volts, D.C.	Plate Current M.A.	Heater or Filament Volts, A.C.
1 —R.F.	7.0	0	100	210	3.0	2.5
2 —1st Det.	10.0	0	95	210	1.5	2.5
3 —Osc.	7.0	0		70	5.0	2.5
4 —I.F.	8.0	0	95	210	2.5	2.5
5 —A.V.C. —I.F.	7.0	0	95	210	3.0	2.5
6 —A.V.C.	15.0	0		0	0	2.5
7 —2nd Det.	12.0	12.0		200	1.0	2.5
8 —A.F.	11.0	8.0		210	5.0	2.5
9 —A.F.	11.0	8.0		210	5.0	2.5
10 —Pwr.	—	0		400	6.0	2.5
11 —Pwr.	—	0	—	400	6.0	2.5



Location of I.F. Tuning Capacitors.

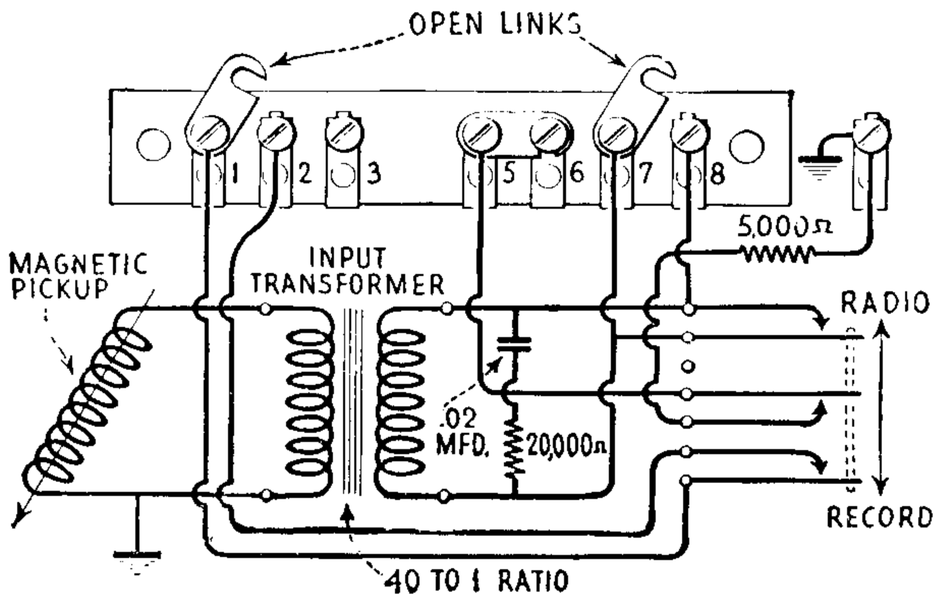
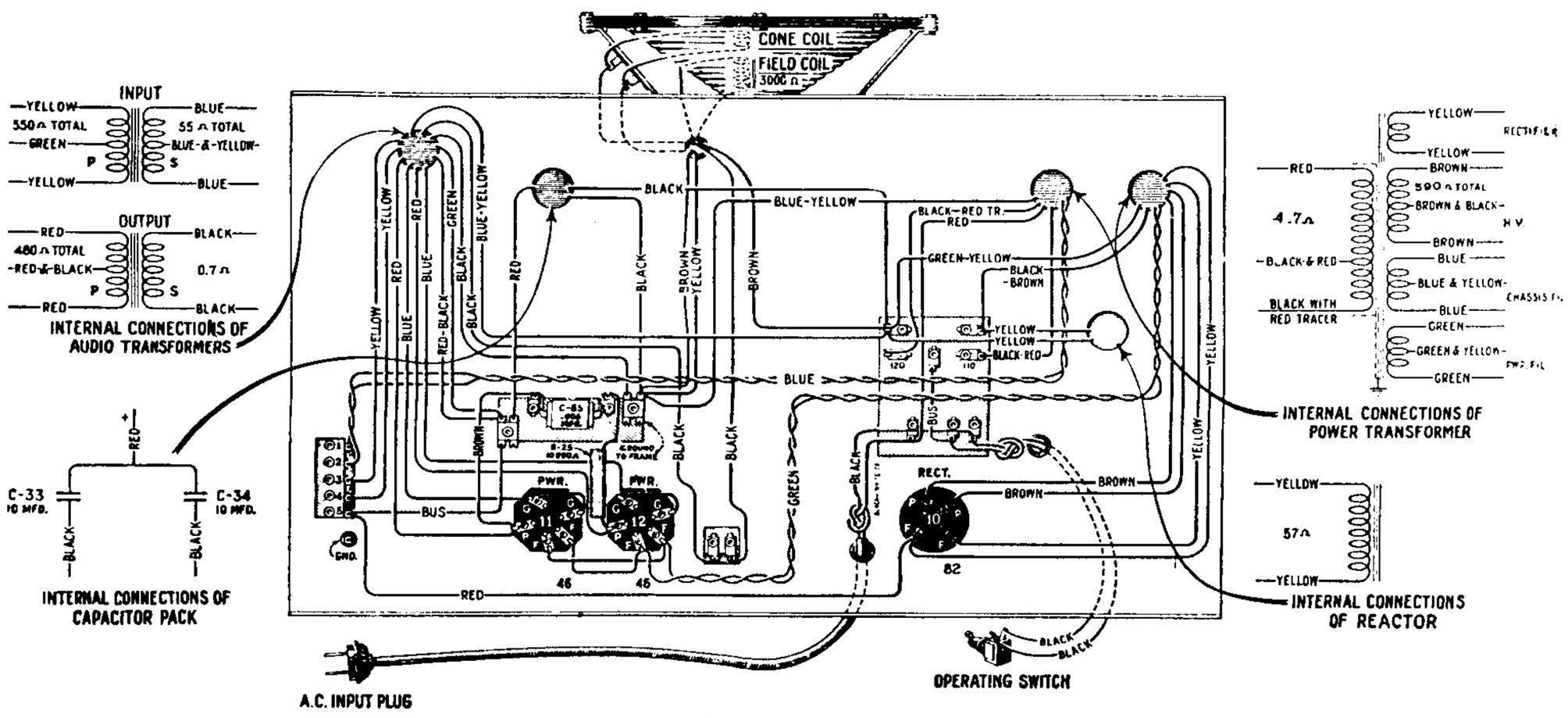


Figure 7 Connections for Attaching Magnetic Pickup.

MAGNETIC PICKUP CONNECTIONS

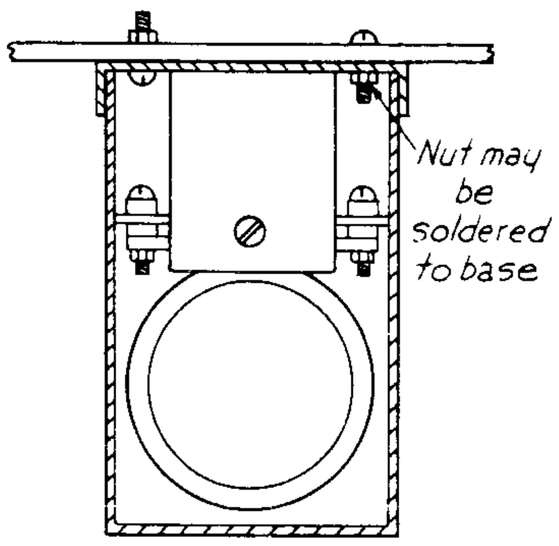
Due to the audio system of the receiver being designed to compensate for the radio end of the receiver, its characteristics must be altered slightly for phonograph operation. It is therefore necessary to use the auxiliary switches, resistors and capacitors shown in Figure 7 when making connections to magnetic pickups. When using these devices, the usual record volume control should be set at maximum and the volume adjusted by means of the "Radio" volume control. In some cases a slight reduction of the high frequencies by means of the tone control may prove desirable. If the degree of compensation is too great —too many highs and lows— this may be remedied by reducing the record volume control setting and advancing the radio volume control.



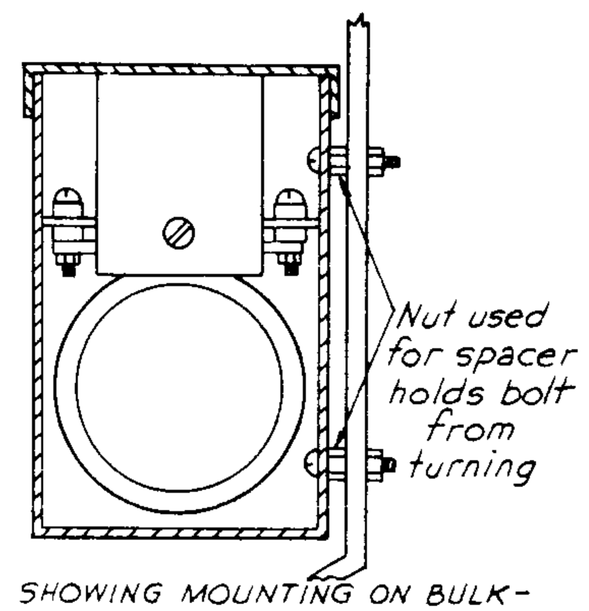
Amplifier Wiring Diagram

DIRECTIONS FOR INSTALLING CARTER GENEMOTOR

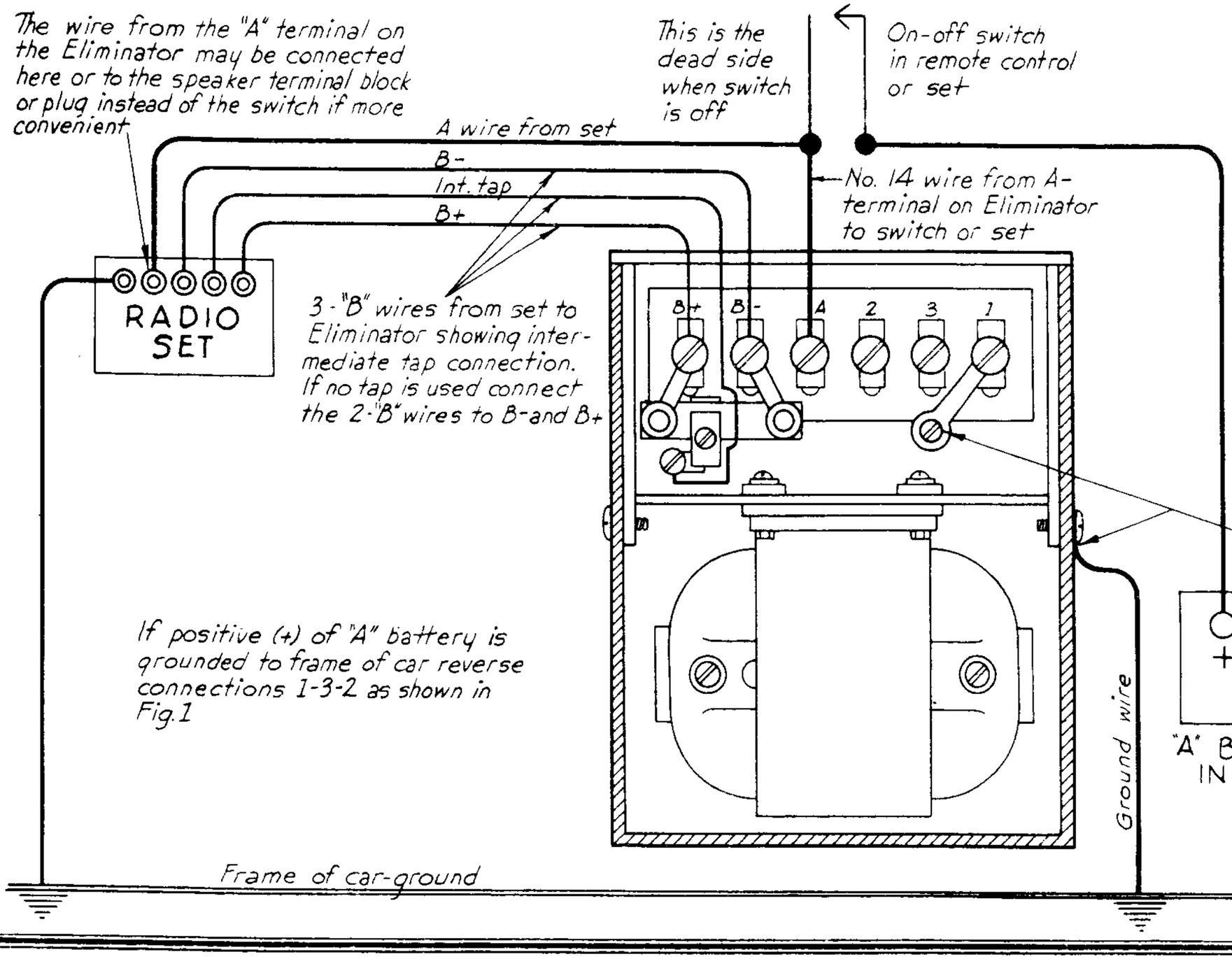
Radio sets having only two B wires do not require an intermediate tap at the Eliminator as the necessary resistors are in the set. Sets having three B wires require an intermediate tap. This tap is set at the factory at 90 Volts on Eliminators of 180 Volt output and at 67½ Volts on 135 Volt output. Usually this is the proper setting for the average set, and should not be varied unless the set fails to operate properly. To change the intermediate tap voltage, loosen the screw that holds the contact on the resistance unit that is connected across the B output terminals. The tap may be then moved to a position where best results are obtained. Then tighten screw. When Eliminators with intermediate tap are used with set having 2 B wires disregard the intermediate tap, connect the 2 B wires from the set to B- and B+ on the Eliminator. The unused intermediate tap resistance unit will not interfere with the operation of the set.



SHOWING UNDER CAR MOUNTING



SHOWING MOUNTING ON BULKHEAD UNDER THE COWL. CAN BE MOUNTED ON MOTOR SIDE OF BULKHEAD IF DESIRED



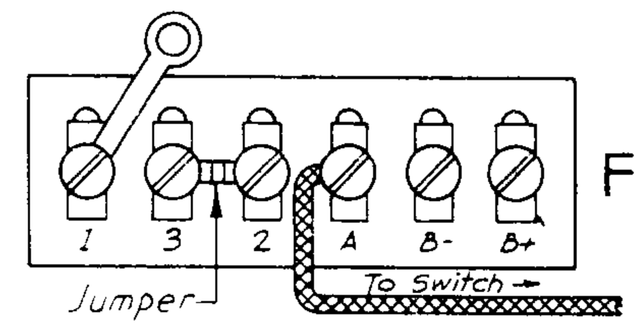


FIG. 2

CONNECT THIS WAY WHEN NEGATIVE OF "A" BATTERY IS GROUNDED

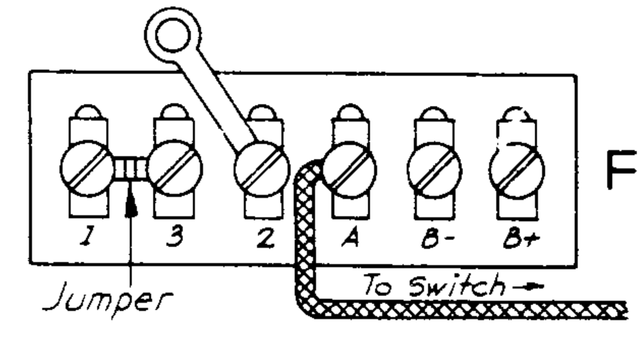
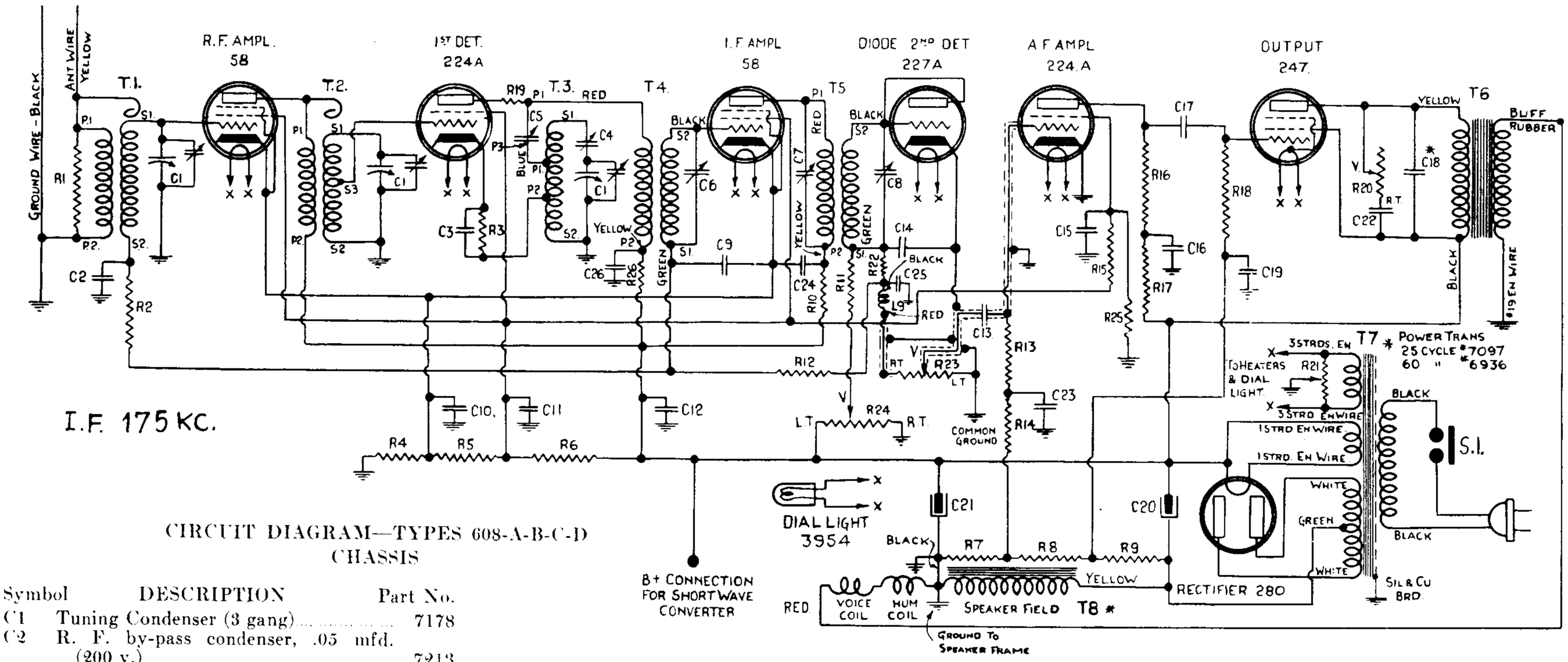


FIG. 1

CONNECT THIS WAY WHEN POSITIVE OF "A" BATTERY IS GROUNDED

Carter Genemotor Corp.
361-365 WEST SUPERIOR STREET
CHICAGO, ILL.



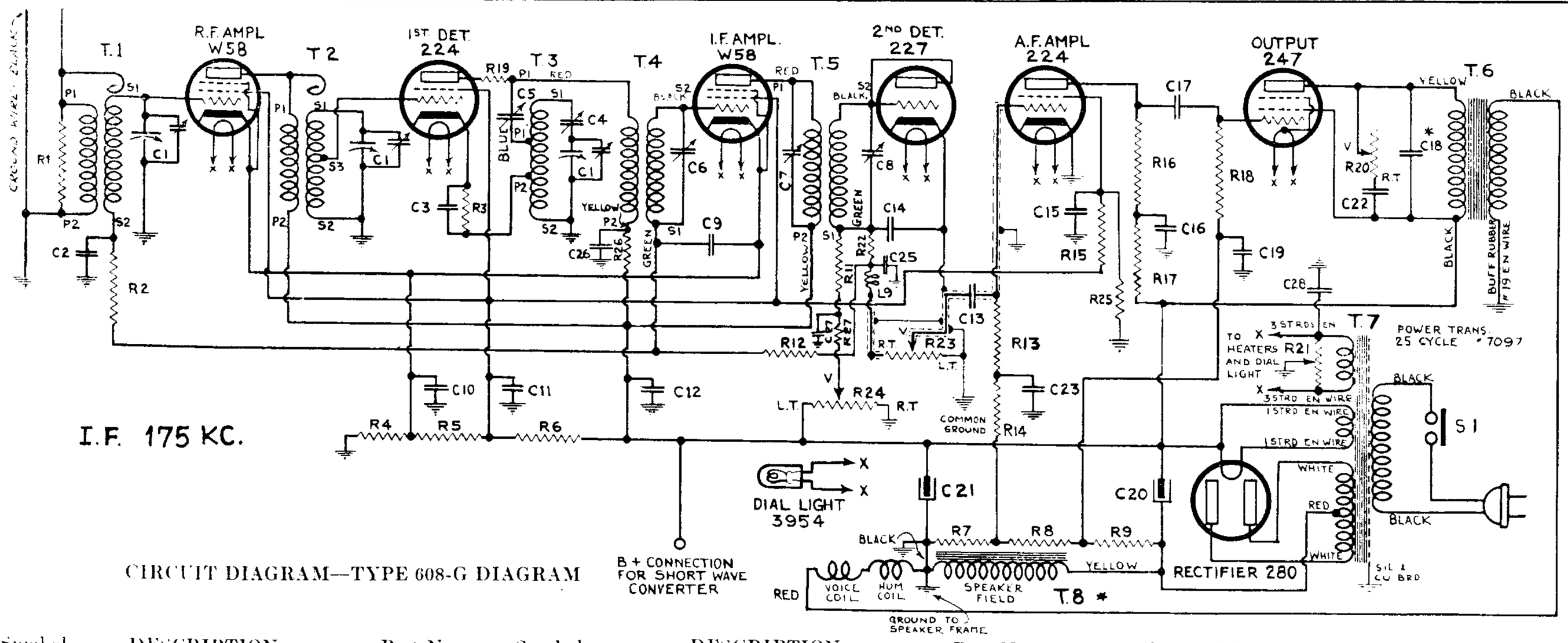
CIRCUIT DIAGRAM—TYPES 608-A-B-C-D CHASSIS

Symbol	DESCRIPTION	Part No.
C1	Tuning Condenser (3 gang)	7178
C2	R. F. by-pass condenser, .05 mfd. (200 v.)	7213
C3	Osc. by-pass condenser, .002 mfd. (M)	6755
C4	Osc. aligning condenser, (600 kcs.)	6790
C5	I. F. aligning condenser, (Part of T4)	7106
C6	I. F. aligning condenser, (Part of T4)	7106
C7	I. F. aligning condenser, (Part of T5)	7105
C8	I. F. aligning condenser, (Part of T5)	7105
C9	I. F. by-pass condenser, .02 mfd. (200 v.)	6766
C10	R. F. by-pass condenser, .1 mfd. (200 v.)	6757
C11	R. F. by-pass condenser, .1 mfd. (400 v.)	6758
C12	R. F. by-pass condenser, .25 mfd. (400 v.)	6763
C13	A. F. coupling condenser, .02 mfd. (200 v.)	6766
C14	Diode by-pass condenser, .00025 mfd. (M)	6555
C15	A. F. filter condenser, .25 mfd (400v.)	7228
C16	A. F. filter condenser, .25 mfd. (600 v.)	6845
C17	Output coupling condenser, .05 mfd. (600 v.)	6860
C18[1]	A. F. resonating condenser, .005 mfd. (M)	7307
C18[2]	A. F. resonating condenser, .007 mfd. (M)	6848
C19	Output filter condenser, .2 mfd. (200 v.)	6849
C20	Power filter condenser, 8. mfd. (Electrolytic)	6305
C21	Power filter condenser, 8. mfd. (Electrolytic)	6305
C22	A. F. tone control, .1 mfd. (400 v.)	6851
C23	A. F. filter condenser, .05 mfd. (200 v.)	7217
C24	I. F. by-pass condenser, .05 mfd. (600 v.)	6860
C25	Diode filter condenser, .0001 mfd. (M)	6556
C26	I. F. filter condenser, .1 mfd. (400 v.)	5218
R1	Antenna resistor, 10,000 ohms (½ w.)	6911
R2	R. F. filter resistor, 10,000 ohms (1 w.)	7154
R3	Osc. grid leak resistor, 8,900 ohms (½ w.)	7316
R4	Min. (fixed) bias resistor, 140 to 185 ohms (W. W.)	6865
R5	Voltage divider resistor, 16,600 ohms (1 w.)	7153
R6	Voltage divider resistor, 14,000 ohms (2 w.)	7144
R7	Voltage divider resistor, 8,100 ohms (½ w.)	7148
R8	Voltage divider resistor, 80,000 ohms (½ w.)	7147
R9	Voltage divider resistor, 335,000 ohms (½ w.)	7146
R10	Voltage divider resistor, 2,500 ohms (½ w.)	7137
R11	Silencer resistor, 2,000,000 ohms (1 w.)	7141
R12	R.F.-I.F. filter resistor, 2,500,000 ohms (1 w.)	7140
R13	A. F. grid leak resistor, 2,000,000 ohms (1 w.)	7081
R14	A. F. filter resistor, 500,000 ohms (½ w.)	7142
R15	A. F. filter resistor, 60,000 ohms (½ w.)	7143
R16	A. F. plate resistor, 50,000 ohms (½ w.)	7145
R17	A. F. filter resistor, 50,000 ohms (½ w.)	7145
R18	Output grid leak resistor, 500,000 ohms (½ w.)	7142
R19	Osc. plate resistor, 800-900 ohms (½ w.)	7274
R20	A. F. tone control resistor, 50,000 ohms (var. c.)	6958
R21	Hum adjusting resistor, 20 ohms (var. w.)	7200
R22	A. V. C. resistor, 100,000 ohms (1 w.)	7190
R23	Level control resistor, 500,000 ohms (var. c.)	6887
R24	Silencer control resistor, 50,000 ohms (var. c.)	7278
R25	A. F. bleeder resistor, 25,000 ohms (1 w.)	2114
R26	I. F. filter resistor, 25,000 ohms (½ w.)	7187
S1	"On-off" switch (Part of R20)	6958
T1	Antenna R. F. transformer	7350
T2	Interstage R. F. transformer	7326
T3	Oscillator coil	6980
T4	First I. F. transformer	7106
T5	Second I. F. transformer	7105
T6	A. F. output transformer	7102
T7[3]	25 cycle power transformer	7097
T7[4]	60 cycle power transformer	6936
T8[1]	Type D152C speaker	6875
T8[2]	Type D154B speaker	6881
L9	Det. R. F. choke	6170

[1]—Consoles only—608-A and B.
[2]—Compacts only—608-C and D.
[3]—25 cycles only—608-A and C.
[4]—60 cycles only—608-B and D.
(M)—Indicates mica condensers.
(½ w.)—Indicates rating in watts of resistor.
(var. c.)—Indicates variable carbon resistor.
(var. w.)—Indicates variable wire resistor.
(400 v.)—Indicates voltage rating of condensers.

CONSOLIDATED INDUSTRIES PRODS. LTD.

MODEL 608-G



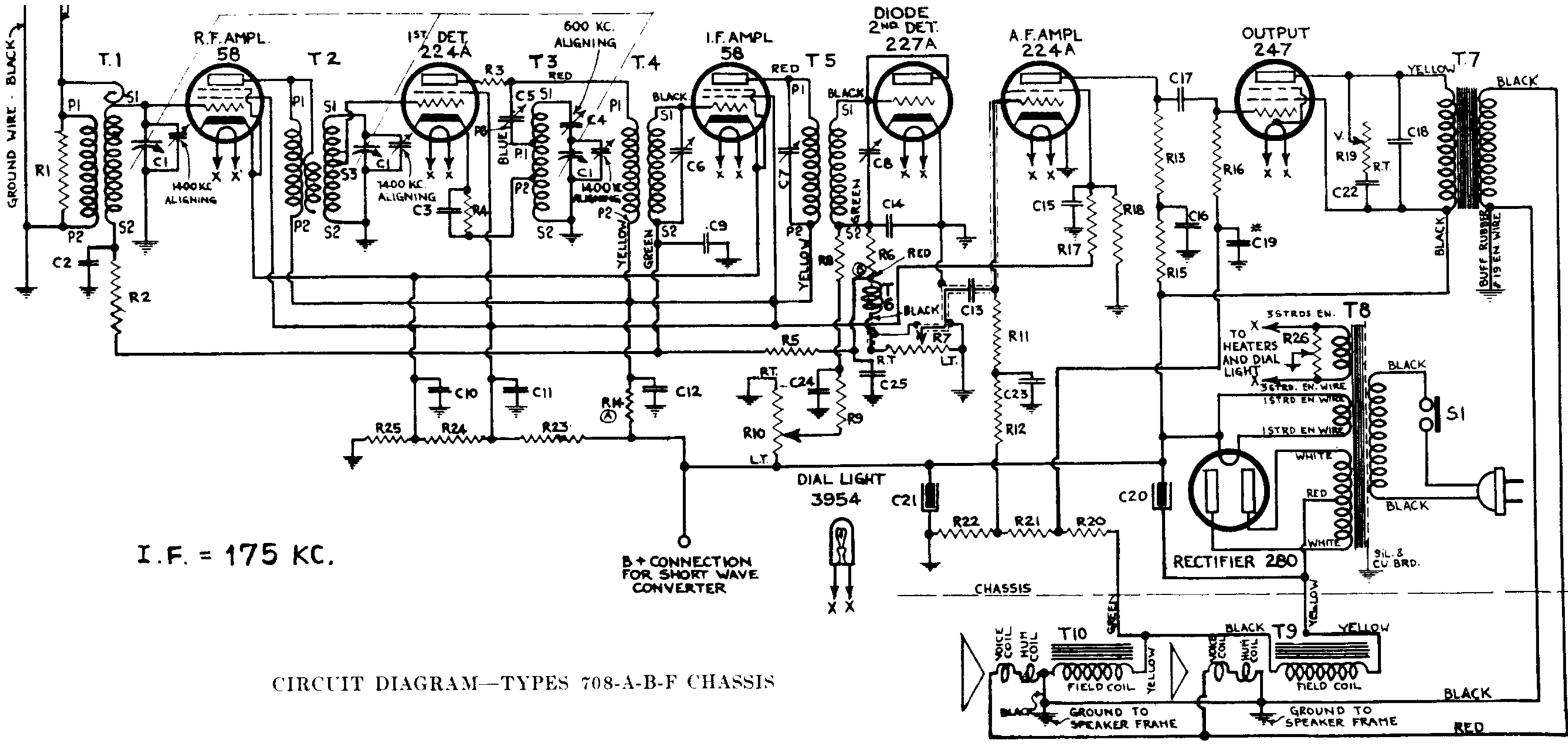
CIRCUIT DIAGRAM—TYPE 608-G DIAGRAM

Symbol	DESCRIPTION	Part No.
C1	Tuning Condenser (3 gang)	7178
C2	R. F. by-pass Condenser, .05 mfd. (400 v.)	7613
C3	Osc. by-pass Condenser, .002 mfd., (M)	6755
C4	Osc. aligning condensser, (600 kcs.)	6790
C5	I. F. aligning Condenser, (Part of T4)	7106
C6	I. F. aligning Condenser, (Part of T4)	7106
C7	I. F. aligning Condenser, (Part of T5)	7105
C8	I. F. aligning Condenser, (Part of T5	7105
C8	I. F. aligning Condenser, (Part of T5)	7105
C9	I. F. by-pass Condenser, .02 mfd., (400 v.)	7614
C10	R. F. by-pass Condenser, .1 mfd., (200 v.)	6757
C11	R. F. by-pass Condenser, .1 mfd., (400 v.)	6758
C12	R. F. by-pass Condenser, .25 mfd., (400 v.)	6763
C13	A. F. coupling Condenser, .02 mfd., (200 v.)	6766
C14	Diode by-pass Condenser, .00025 mfd., (M)	6555
C15	A. F. filter Condenser, .25 mfd. (200 v.)	6038
C16	A. F. filter Condenser, .25 mfd., (400 v.)	6133
C17	Output coupling Condenser, .05 mfd., (400 v.)	7556
C18	(*) A. F. resonating Condenser, .007 mfd., (M)	6848
C19	Output filter Condenser, .2 mfd., (200 v.)	6849
C20	Power filter Condenser, 8. mfd. (Electrolytic)	7336
C21	Power filter Condenser, 8. mfd. (Electrolytic)	7336
C22	A.F. tone control Condenser, .1 mfd. (400 v.)	6851
C23	A. F. filter Condenser, .05 mfd. (200 v.)	7217
C25	Diode filter Condenser, .0001 mfd. (M)	6556
C26	I. F. filter Condenser, .1 mfd. (400 v.)	5218
C27	Diode filter Condenser, .05 mfd. (400 v.)	7556
C28	R. F. by-pass Condenser, .1 mfd., (400 v.)	5218
R1	Antenna resistor, 10,000 ohms (½w.)	6911
R2	R. F. filter resistor, 10,000 ohms (1 w.)	7154
R3	Osc. grid leak resistor, 8,900 ohms (½ w.)	7316
R4	Min. (fixed) bias resistor, 115 ohms (½ w.)	7655
R5	Voltage divider resistor, 16,600 ohms (1 w.)	7153
R6	Voltage divider resistor, 14,000 ohms (2 w.)	7144
R7	Voltage divider resistor, 18,000 ohms (½ w.)	6963
R8	Voltage divider resistor, 82,000 ohms (½ w.)	6964
R9	Voltage divider resistor, 380,000 ohms (½ w.)	7656
R10		
R11	Silencer resistor, 1,250,000 ohms (½ w.)	7609
R12	R. F.-I. F. filter resistor, 1,000,000 ohms (½ w.)	7196
R13	A. F. grid leak resistor, 1,500,000 ohms (½ w.)	6956
R14	A. F. filter resistor, 500,000 ohms (½ w.)	7142
R15	A. F. filter resistor, 42,000 ohms (1 w.)	7657
R16	A. F. plate resistor, 50,000 ohms (½ w.)	7145
R17	A. F. filter resistor, 40,000 ohms (½ w.)	6901
R18	Output grid leak resistor, 500,000 ohms (½ w.)	7142
R19	Osc. plate resistor, 800-900 ohms (½ w.)	7274
R20	A. F. tone control resistor, 50,000 ohms (var. c.)	6958
R21	Hum adjusting condenser, 20 ohms (var. w.)	7200
R22	A. V. C. resistor 100,000 ohms (1 w.)	7190
R23	Level control resistor, 500,000 ohms (var. c.)	6887
R24	Silencer control resistor, 50,000 ohms (var. c.)	7278
R25	A. F. bleeder resistor, 57,000 ohms (½ w.)	7611
R26	I. F. filter resistor, 25,000 ohms (½ w.)	7187
R27	Silencer filter resistor, 250,000 ohms (½ w.)	7198
S1	"On-off" switch (Part of R20)	6958
T1	Antenna R. F. transformer	7350
T2	Interstage R. F. transformer	7326
T3	Oscillator coil	6980
T4	First I. F. transformer	7106
T5	Second I. F. transformer	7105
T6	A. F. output transformer	7102
T7	25 cycle power transformer	7097
T8	Type D154B speaker (field 1,200 ohms)	6881
L9	Det. R. F. choke	6170

*Compacts only—608-G.
(M)—Indicates mica condensers.
(½ w.)—Indicates rating in watts of resistor.
(var. c.) —Indicates variable carbon resistor.
(var. w.)—Indicates variable wire resistor.
(400 v.)—Indicates voltage rating of condensers.

CONSOLIDATED INDUSTRIES PRODS. LTD.

MODEL 708-A-B-F

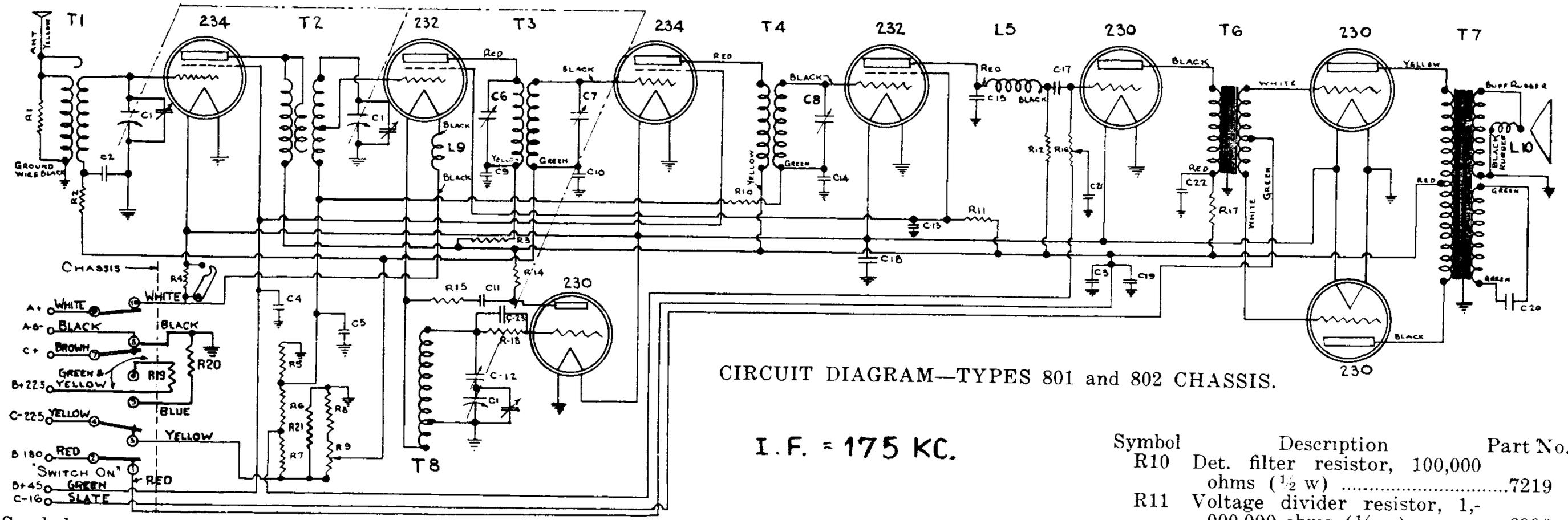


CIRCUIT DIAGRAM—TYPES 708-A-B-F CHASSIS

Symbol	DESCRIPTION	Part No.
C1	Tuning Condenser (3 gang)	7178
C2	R. F. by-pass condenser, .05 mfd. (400 v.)	7613
C3	Osc. by-pass condenser, .002 mfd. (M)	6755
C4	Osc. aligning condenser, (600 kcs.)	6790
C5	I. F. aligning condenser, (Part of T4)	7106
C6	I. F. aligning condenser, (Part of T4)	7106
C7	I. F. aligning condenser, (Part of T5)	7105
C8	I. F. aligning condenser, (Part of T5)	7105
C9	I. F. by-pass condenser, .02 mfd. (400 v.)	7614
C10	R. F. by-pass condenser, .1 mfd. (200 v.)	6757
C11	R. F. by-pass condenser, .1 mfd. (200 v.)	6757
C12	R. F. by-pass condenser, .5 mfd. (400 v.)	7615
C13	A. F. coupling condenser, .02 mfd. (200 v.)	6766
C14	Diode by-pass condenser, .00025 mfd. (M)	6555
C15	A. F. filter condenser, .25 mfd. (200 v.)	6038
C16	A. F. filter condenser, .25 mfd. (400 v.)	6133
C17	Output coupling condenser, .05 mfd. (400 v.)	7556
C18	Output resonating condenser, .005 mfd. (400 v.)	7307
C19[3]	Output filter condenser, .2 mfd. (200 v.)	6849
C19[4]	Output filter condenser, .1 mfd. (200 v.)	7652
C20	Power filter condenser, 10 mfd. (Electrolytic)	7477
C21	Power filter condenser, 8 mfd. (Electrolytic)	7336
C22	A. F. tone control condenser, .1 mfd. (400 v.)	6851
C23	A. F. filter condenser, .05 mfd. (200 v.)	7217
C24	Silencer by-pass condenser, .05 mfd. (400 v.)	7225
C25	Diode filter condenser, .0001 mfd. (M)	6556
R1	Antenna resistor, 10,000 ohms (½ w.)	6911
R2	R. F. filter resistor, 25,000 ohms (½ w.)	7491
R3	Osc. plate resistor, 800-900 ohms (½ w.)	7274
R4	Osc. grid resistor, 8,900 ohms (½ w.)	7316
R5	R.F.-I.F. filter resistor, 1,000,000 ohms (½ w.)	7196
R6	A. V. C. resistor, 100,000 ohms (½ w.)	7219
R7	Level control resistor, 500,000 ohms (Var. C.)	6887
R8	Silencer resistor, 1,250,000 ohms (½ w.)	7609
R9	Silencer resistor, 250,000 ohms (½ w.)	7198
R10	Silencer control resistor, 50,000 ohms (Var. C.)	7278
R11	A. F. grid resistor, 1,500,000 ohms (½ w.)	6956
R12	A. F. filter resistor, 500,000 ohms (½ w.)	7142
R13	A. F. plate resistor, 50,000 ohms (½ w.)	7145
R14	Voltage div. resistor, 1,000 ohms (½ w.)	6130
R15	A. F. filter resistor, 40,000 ohms (½ w.)	6901
R16	Output grid resistor, 500,000 ohms (½ w.)	7142
R17	A. F. filter resistor, 42,000 ohms (1 w.)	7610
R18	A. F. bleeder resistor, 57,000 ohms (½ w.)	7611
R19	Tone control resistor, 50,000 ohms (Var. C.)	6958
R20	Bias volt. div. resistor, 240,000 ohms (½ w.)	7612
R21	Bias volt. div. resistor, 82,000 ohms (½ w.)	6964
R22	Bias volt. div. resistor, 18,000 ohms (½ w.)	6963
R23	Voltage, divider resistor, 5,800 ohms (Vitreous)	7677
R24	Voltage divider resistor, 5,000 ohms (Vitreous)	7677
R25	Min. (fixed) bias resistor, 75 ohms (Vitreous)	7677
R26	Hum adjusting resistor, 20 ohms (Var. W.)	7200
S1	"On-off" switch (Part of R7)	6887
T1	Antenna R. F. transformer	7350
T2	Interstage R. F.	7326
T3	Oscillator coil	6980
T4	First I. F. transformer	7106
T5	Second I. F. transformer	7105
L6	Det. R. F. choke coil	7654
T7	A. F. output transformer	7604
T8	25 cycle power transformer	7605
T8	60 cycle power transformer	7447
T9	Type D154E upper speaker (field 670 ohms)	7620
T10	Type D152H lower speaker (field 670 ohms)	7621

[3]Used in 708-A and F Chassis.
[4]Used in 708-B Chassis only.

CONSOLIDATED INDUSTRIES PRODS. LTD.
MODEL 801 AND 802



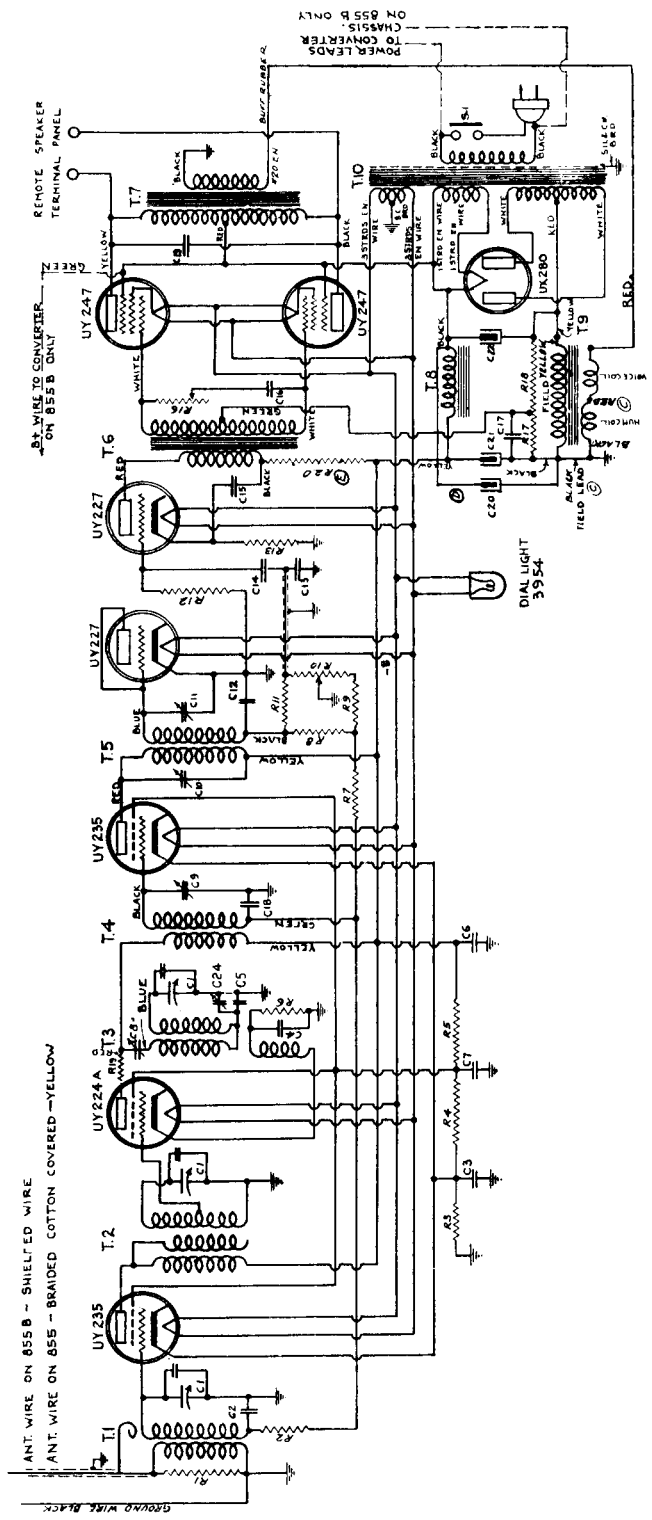
CIRCUIT DIAGRAM—TYPES 801 and 802 CHASSIS.

Symbol	Description	Part No.
C1	Tuning Condenser (3 gang)	6989
C2	R. F. by-pass condenser, .05 Mfd. (200 v.)	5865
C3	R. F. plate by-pass condenser .05 Mfd. (200 v.)	5865
C4	R. F. and I. F. screen by-pass condenser .1 Mfd. (200 v.)	7020
C5	Det. bias by-pass condenser .25 Mfd. (200 v.)	6134
C6	I. F. aligning condenser (part of T3)	6997
C7	I. F. aligning condenser (part of T3)	6997
C8	I. F. aligning condenser (part of T4)	6998
C9	Det. plate by-pass condenser .05 Mfd. (200 v.)	5865
C10	I. F. bias condenser .05 Mfd. (200 v.)	5865
C11	Osc. coupling condenser .01 Mfd. (200 v.)	7021
C12	Osc. series align. condenser	6790
C13	Det. screen by-pass condenser .1 Mfd. (200 v.)	7022
C14	Det. bias by-pass condenser .05 Mfd. (200 v.)	5865
C15	Det. plate by-pass condenser .005 Mfd. (M)	6176
C17	A. F. coupling condenser .05 Mfd. (400 v.)	5302
C18	Fil. by-pass condenser .5 Mfd. (200 v.)	6945
C19	"B" supply by-pass condenser 16 Mfd.	7025
C20	A. F. trap condenser .001 Mfd. (M)	4514
C21	A. F. tone control condenser .005 Mfd. (200 v.)	7026
C22	A. F. filter condenser .2 Mfd. (200 v.)	6991
C23	Osc. grid condenser .001 Mfd. (M)	7023
R1	Antenna resistor, 10,000 ohms (½ w)	6911
R2	R. F. filter resistor, 50,000 ohms (½ w)	6967
R3	I. F. filter resistor, 60,000 ohms (½ w)	6968
R4	Filament series resistor, .69 ohms (w.w.)	6969
R5	Voltage divider resistor, 50,000 ohms (½ w)	6466
R6	Voltage divider resistor, 41,000 ohms (½ w)	6971
R7	Voltage divider resistor, 85,000 ohms (½ w)	6972
R8	Minimum bias resistor, 4,000 ohms (Part of R9)	
R9	Volume control resistor, 86,000 ohms (Var. C.)	6992
R10	Det. filter resistor, 100,000 ohms (½ w)	7219
R11	Voltage divider resistor, 1,000,000 ohms (½ w)	6990
R12	Det. plate resistor, 175,000 ohms (½ w)	6973
R14	Voltage divider resistor, 40,000 ohms (½ w)	6975
R15	Osc. resistor, 1,000 ohms (½ w)	6743
R16	Tone control resistor, 500,000 ohms (Var. C.)	6993
R17	A. F. filter resistor, 11,000 ohms (½ w)	6957
R18	Osc. grid leak resistor, 200,000 ohms (½ w)	7104
R19	Current limiting resistor, 750 ohms (w.w.)	7608
R20	Current limiting resistor, 750 ohms (w.w.)	7608
R21	Bias bleeder resistor, 31,100 ohms (½ w)	7644
T1	Antenna R. F. transformer	6994
T2	Interstage R. F. transformer	6995
T3	First I. F. transformer	6997
T4	Second I. F. transformer	6998
L5	Det. R. F. choke	6170
T6	A. F. input transformer	7004
T7	A. F. output transformer	7005
T8	Oscillator coil	6996
L9	Filament choke	6999
T10	Speaker (P.M. 252 A) Console only	7045
T10	Speaker (P.M. 252 B) Compact only	7540

(200 v.) —Indicates voltage rating of condenser.
(M) —Indicates mica condenser.
(½ w) —Indicates rating in watts of resistor.
(w.w.) —Indicates wire wound resistor.
(Var.C.)—Indicates variable carbon resistor.

CONSOLIDATED INDUSTRIES PRODS. LTD.

MODEL 855 AND 855-B

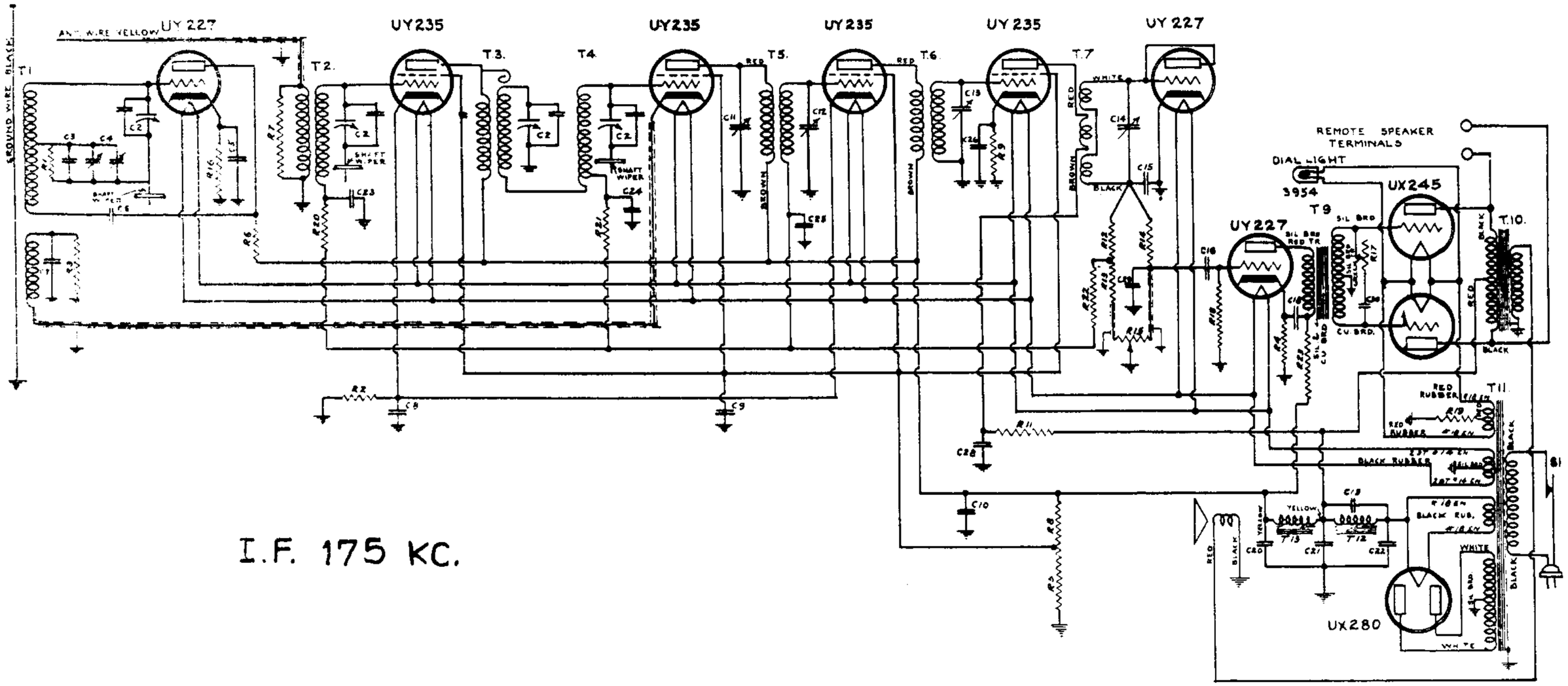


Circuit Diagram. Types 855—855 B chassis.

Symbol	DESCRIPTION	Part No.
C1	Gang condenser (3 section)	5970
C2	R. F. by-pass condenser, .05 mfd.	5240
C3	R. F. cathode by-pass condenser, .05 mfd.	5240
C4	Osc. cathode by-pass condenser, .0005 mfd.	5321
C5	Osc. padding (first) condenser, .00068 mfd.	5368
C6	R. F. plate by-pass condenser, .25 mfd.	5919
C7	R. F. screen by-pass condenser, .05 mfd.	5865
C8	I. F. aligning condenser	6093 (A)
C9	I. F. aligning condenser	6093 (A)
C10	I. F. aligning condenser	6094 (B)
C11	I. F. aligning condenser	6094 (B)
C12	Det. (diode) cathode by-pass condenser, .00025 mfd.	6083
C13	Det. (diode) R. F. by-pass condenser, .00025 mfd.	6083
C14	A. F. coupling condenser, .02 mfd.	6085
C15	A. F. filter condenser, .25 mfd.	6133
C16	A. F. tone control condenser, .003 mfd.	6081
C17	247 bias by-pass condenser, .25 mfd.	6134
C18	I. F. by-pass condenser, .05 mfd.	5240
C19	Output plate by-pass condenser, .003 mfd.	6081
C20	Electrolytic filter condenser, 8.0 mfd.	6305
C21	Electrolytic filter copdenser, 8.0 mfd.	6305
C22	Electrolytic filter condenser, 8.0 mfd.	6305
C24	Osc. padding (var.)	5845
R1	Antenna resistor, 10,000 ohms.	6071
R2	R. F. isolating resistor, 10,000 ohms.	6071
R3	R. F. min. bias resistor, 96 ohms.	6070
R4	Voltage dividing resistor, 3,000 ohms.	6069
R5	Voltage dividing resistor, 5,530 ohms.	6069
R6	Osc. cathode bias resistor, 7,700 ohms.	5854
R7	R. F. isolating resistor, 200,000 ohms.	6072
R8	A. V. C. volt. dividing resistor, 100,000 ohms.	5197
R9	A. V. C. volt. dividing resistor, 200,000 ohms.	5200
R10	A. V. C. volt. dividing resistor, 500,000 ohms.	6067 (C)
R11	A. V. C. volt. dividing resistor, 100,000 ohms.	5197
R12	A. F. grid leak resistor, 2,000,000 ohms.	6074
R13	A. F. cathode bias resistor, 1,250 ohms	5862
R14	A. F. filter resistor, 18,000 ohms	5861
R15	A. F. filter resistor, 9,000 ohms	6078
R16	A. F. tone control resistor, 1,500,000 ohms	5863
R17	247 bias resistor, 204,000 ohms	6079
R18	247 bias resistor, 500,000 ohms	6080
R19	Osc. plate resistor, 1,000 ohms.	6130
R20	A. F. filter resistor, 27,000 ohms.	6358
S1	On-off switch.	6067 (D)
T1	Ant. stage R. F. transformer.	6092
T2	Interstage R. F. transformer.	5416
T3	Oscillator transformer.	5462
T4	I. F. (1st stage) transformer.	6093
T5	I. F. (2nd stage) transformer.	6094
T6	A. F. input transformer.	6086
T7	A. F. output	6087
T8	Filter choke.	6088
T9	Filter choke (speaker field).	6063
T10	Power transformer.	6065
(A)	Part of I. F. transformer assembly Part No. 6093.	
(B)	Part of I. F. transformer assembly Part No. 6094.	
(C)	Level control potentiometer.	
(D)	Part of level control assembly Part No. 6067.	

CONSOLIDATED INDUSTRIES PRODS. LTD.

MODEL 905



TYPE 905 CHASSIS—CIRCUIT DIAGRAM

Symbol	Description	Part No.
C2	Gang condenser (4 section)	5246
C3	Osc. padding condenser, .0005 Mfd.	5074
C4	Osc. aligning condenser, 380 Mmfd.	5074
C5	Osc. cathode by-pass condenser, .05 Mfd.	4513
C6	Osc. plate coupling condenser. .0001 Mfd.	3815
C7	Det. (1st) cathode by-pass condenser, .05 Mfd.	4679
C8	R. F. cathode by-pass condenser, .25 Mfd.	5215(A)
C9	R. F. Screen by-pass condenser, .50 Mfd.	5215(A)
C10	R. F. plate by-pass condenser, .40 Mfd.	5212(B)
C11	I. F. aligning condenser	5097(D)
C12	I. F. aligning condenser	5097(D)
C13	I. F. aligning condenser	5095(E)
C14	I. F. aligning condenser	5228
C15	Det. (Diode) cathode by-pass condenser, .0001 Mfd.	3815
C16	A. F. coupling condenser, .02 Mfd.	5214
C18	A. F. filter condenser, .50 Mfd.	5213(C)
C19	Power filter, condenser, 1.8 Mfd.	5212(B)
C20	Electrolytic filter condenser, 8.0 Mfd.	4560
C21	Electrolytic filter condenser, 8.0 Mfd.	4560
C22	Electrolytic filter condenser, 8.0 Mfd.	4560
C23	R. F. isolating condenser, .05 Mfd.	5215(A)
C24	R. F. isolating condenser, .05 Mfd.	5215(A)
C25	I. F. isolating condenser, .05 Mfd.	5240
C26	I. F. cathode by-pass condenser, .10 Mfd.	5213(C)
C28	I. F. plate by-pass condenser, .10 Mfd.	5218
C29	Det. (Diode) R. F. by-pass condenser, .0001 Mfd.	3861
C30	A. F. tone control condenser, .002 Mfd.	5213(C)
R1	Osc. equalizing resistor, 25,000 ohms	5086
R2	R. F., I. F. minimum bias resistor, 560 ohms	5211(F)
R3	Det. (1st) bias resistor, 5,600 ohms	5202
R4	A. F. bias resistor, 1,000 ohms	5211(F)
R5	Power bleeder resistor, 2,800 ohms	5207(G)
R6	Osc. volt. dividing resistor, 50,000 ohms	5195
R7	Antenna resistor, 5,500 ohms	5201
R8	Power bleeder resistor, 2,300 ohms	5207(G)
R9	I. F. bias resistor, 1,200 ohms	5203
R11	I. F. volt. dividing resistor, 12,000 ohms	5233
R12	A. V. C. volt. dividing resistor, 150,000 ohms	5196
R13	A. V. C. volt. dividing resistor, 150,000 ohms	5196
R14	A. V. C. volt. dividing resistor, 100,000 ohms	5197
R15	A. V. C. volt. dividing resistor, 500,000 ohms	5098(H)
R16	Osc. bias resistor, 5,000 ohms	5058
R17	A. F. tone control resistor, 1,500,000 ohms	4887
R18	A. F. grid leak resistor, 2,000,000 ohms	5198
R19	245 bias resistor, 800 ohms	3572
R20	R. F. isolating resistor, 10,000 ohms	5199
R21	R. F. isolating resistor, 100,000 ohms	5224
R22	R. F. isolating resistor, 200,000 ohms	5200
R23	A. F. filter resistor, 20,000 ohms	5204
S1	On-off Switch	5098(H)
T1	Osc. transformer	4597
T2	R. F. antenna transformer	5050
T3	R. F. interstage transformer	5061
T4	R. F. interstage transformer	5225
T5	I. F. intersage transformer	5097(D)
T6	I. F. interstage transformer	5095(E)
T7	I. F. diode stage transformer	5226
T9	A. F. input transformer	5037
T10	A. F. output transformer	5037
T11	Power (line) transformer (110 v. 25 to 60 cycles)	5036
T12	Power filter choke	5105
T13	Power filter choke (speaker field—2,500 ohms)	5065

(A) Block assembly C8-9-23-24- in some chassis contains only C8-9-23, part number 5078—C24 then separate unit part number 5240.

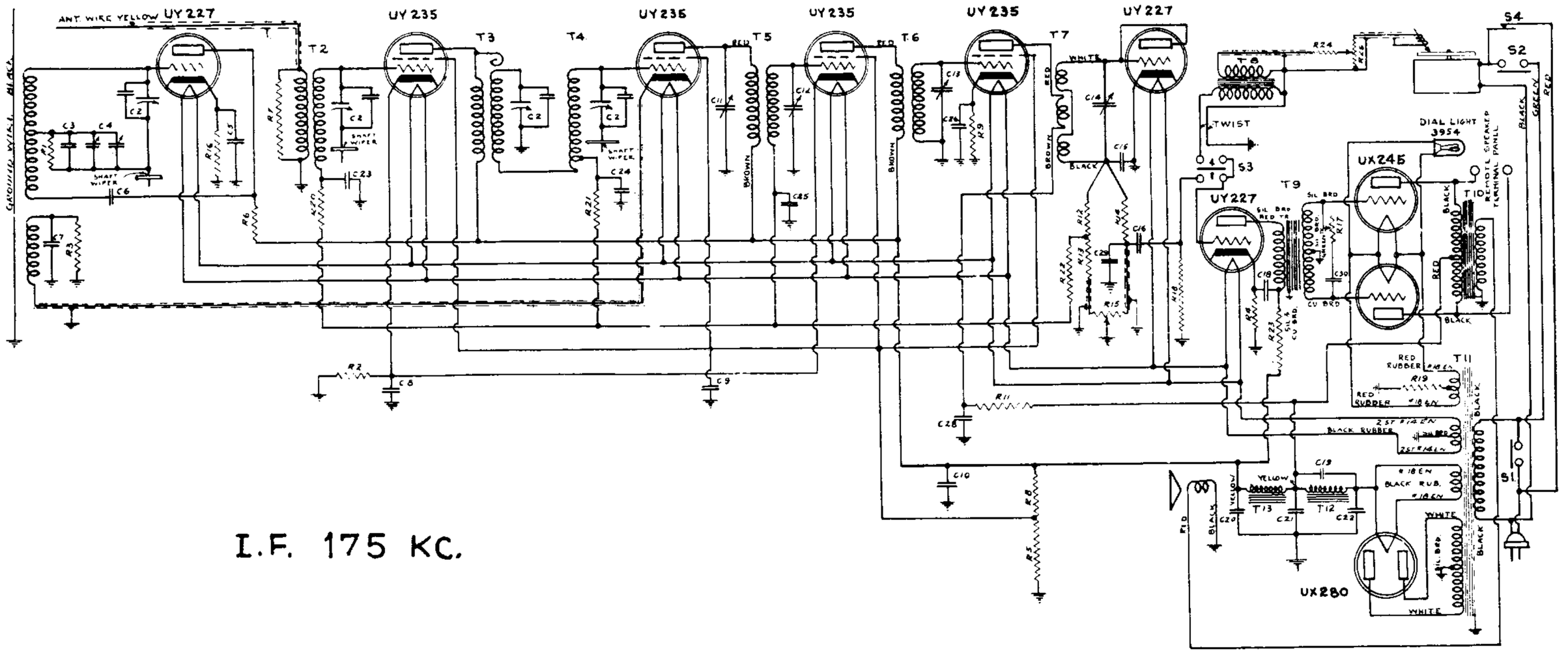
(B) Block assembly. C10-19.

(C) Block assembly. C-18-26-30—in some chassis only C18-26, part number 5072.—C30 then separate unit part number 3992.

(D) Part of I. F. assembly, part number 5097.

CONSOLIDATED INDUSTRIES PRODS. LTD.

MODEL 907



TYPE 907 CHASSIS—CIRCUIT DIAGRAM

Symbol	Description	Part No.
(E)	Part of I. F. assembly, part number 5095.	
(F)	Two section resistor.	
(G)	Two section resistor.	
(H)	Radio level (vol.) control, includes on-off switch.	
C2	Gang condenser (4 section)	5246
C3	Osc. padding condenser, .0005 Mfd.	4554
C4	Osc. aligning condenser, 380 Mmfd.	5074
C5	Osc. cathode by-pass condenser, .05 Mfd.	4513
C6	Osc. plate coupling condenser, .0001 Mfd.	3815
C7	Det. (1st) cathode by-pass condenser, .05 Mfd.	4679
C8	R. F. cathode by-pass condenser, .25 Mfd.	5215(A)
C9	R. F. screen by-pass condenser, .50 Mfd.	5215(A)
C10	R. F. plate by-pass condenser, .40 Mfd.	5212(B)
C11	I. F. aligning condenser	5097(D)
C12	I. F. aligning condenser	5097(D)
C13	I. F. aligning condenser	5095(E)
C14	I. F. aligning condenser	5228
C15	Det. (Diode) cathode by-pass condenser, .0001 Mfd.	3815
C16	A. F. coupling condenser, .02 Mfd.	5214
C18	A. F. filter condenser, .50 Mfd.	5213(C)
C19	Power filter, condenser, 1.8 Mfd.	5212(B)
C20	Electrolytic filter condenser, 8.0 Mfd.	4560
C21	Electrolytic filter condenser, 8.0 Mfd.	4560
C22	Electrolytic filter condenser, 8.0 Mfd.	4560
C23	R. F. isolating condenser, .05 Mfd.	5215(A)
C24	R. F. isolating condenser, .05 Mfd.	5215(A)
C25	I. F. isolating condenser, .05 Mfd.	5240
C26	I. F. cathode by-pass condenser, .10 Mfd.	5213(C)
C28	I. F. plate by-pass condenser, .10 Mfd.	5218
C29	Det. (Diode) R.F. by-pass condenser, .0001 Mfd.	3861
C30	A. F. tone control condenser, .002 Mfd.	5213(C)
R1	Osc. equalizing resistor, 25,000 ohms	5086
R2	R. F., I. F. minimum bias resistor, 560 ohms	5211(F)
R3	Det. (1st) bias resistor, 5,600 ohms	5202
R4	A. F. bias resistor, 1,000 ohms	5211(F)
R5	Power bleeder resistor, 2,800 ohms	5207(G)
R6	Osc. volt. dividing resistor, 50,000 ohms	5195
R7	Antenna resistor, 5,500 ohms	5201
R8	Power bleeder resistor, 2,300 ohms	5207(G)
R9	I. F. bias resistor, 1,200 ohms	5203
R11	I. F. volt. dividing resistor, 12,000 ohms	5253
R12	A. V. C. volt. dividing resistor, 150,000 ohms	5196
R13	A. V. C. volt dividing resistor, 150,000 ohms	5196
R14	A. V. C. volt. dividing resistor, 100,000 ohms	5197
R15	A. V. C. volt. dividing resistor, 500,000 ohms	5253(H)
R16	Osc. bias resistor, 5,000 ohms	5058
R17	A. F. tone control resistor, 1,500,000 ohms	4887
R18	A. F. grid leak resistor, 2,000,000 ohms	5198
R19	245 bias resistor, 800 ohms	3572
R20	R. F. isolating resistor, 10,000 ohms	5199
R21	R. F. isolating resistor, 100,000 ohms	5224
R22	R. F. isolating resistor, 200,000 ohms	5200
R23	A. F. filter resistor, 20,000 ohms	5204
R24	Vol. limiting resistor, 31 ohms	3686
R25	Phono. vol. control resistor, 80 ohms	4985
S1	On-off switch	5255
S2	Motor switch	5254
S3	Phono-radio switch	5253(H)
S4	Motor switch (automatic on record changer)	
T1	Osc. transformer	4597
T2	R. F. antenna transformer	5050
T3	R. F. interstage transformer	5061
T4	R. F. interstage transformer	5225
T5	I. F. interstage transformer	5097(D)
T6	I. F. interstage transformer	5095(E)
T7	I. F. diode stage transformer	5226
T8	Pickup transformer	4894
T9	A. F. input transformer	5087
T10	A. F. output transformer	5087
T11	Power (line) (110 v. 25 to 60 cycles)	5036
T12	Power filter choke	5105
T13	Power filter choke (speaker field—2,500 ohms)	5065
(A)	Block assembly C8-9-23-24- in some chassis contains only C8-9-23, part number 5078—C24 then separate unit part number 5240.	
(B)	Block assembly. C10-19.	
(C)	Block assembly. C18-26-30—in some chassis only C18-26, part number 5072.—C30 then separate unit part number 3992.	
(D)	Part of I. F. assembly, part number 5097.	
(E)	Part of I. F. assembly, part number 5095.	
(F)	Two section resistor.	
(G)	Two section resistor.	
(H)	Radio level (vol.) control, includes phono-radio switch.	

CROSLEY RADIO CORP.

CROSLEY ROAMIO AUTOMOTIVE T.R.F. RECEIVER MODELS 90, 91 AND 92

(The T.R.F. series of Crosley Roamio sets; Radio Service Data Sheet No. 88 describes the superheterodyne series.)

Model 90

Average operating potentials are given below. These values are measured with the reproducer connected and the tubes in place. For plate and grid voltages, use a high-resistance meter; measure from tube element to negative filament.

Tube Type	Fil. Volts	C.-G. Volts	S.-G. Volts	Plate Volts
V1	2.0	2.5	90	135
V2	2.0	2.5	90	135
V3	2.0	3.0	....	22.5
V4	4.7	12	....	135
V5	4.7	12	....	135

The A.V.C. potential is derived as the drop across R2. With increased signal, more current flows through the plate circuit of the combination detector and A.V.C. tube, V3, increasing the drop across R2 and thereby increasing the bias voltage applied to the control-grids of V1 and V2. This results in a reduction of the R.F. amplification, and thus maintains constant the A.F. output determined by the setting of R1.

Battery D supplies plate potential for V3. The negative "B" and positive "C" lead returns to the center-tap of two 25 ohm resistors, to secure the same plate potentials regardless of whether the car-battery positive or negative terminal is grounded.

Model 91

Average operating potentials are given in the tabulation below. Measure, with a high-resistance meter, to the negative filament contact.

Tube Type	Fil. Volts	C.-G. Volts	S.-G. Volts	Plate Volts
V1	2.0	1.5	100	170
V2	2.0	1.5	100	170
V3	2.0	2.5	7.5	45
V4	4.7	10*	.....	170
V5	4.7	10*	.....	170

*With volume control "off."

If a signal of sufficient strength is received to cause current to flow in the grid circuit of V3 (biased by R6), the resultant drop across R2 decreases the amplification of V1, V2. Resistors R3, R4, R5 are R.F. filters.

Manual volume control R1 determines the A.F. input to the control-grid of A.F. amplifier V4.

Model 92

Operating potentials appear in the table.

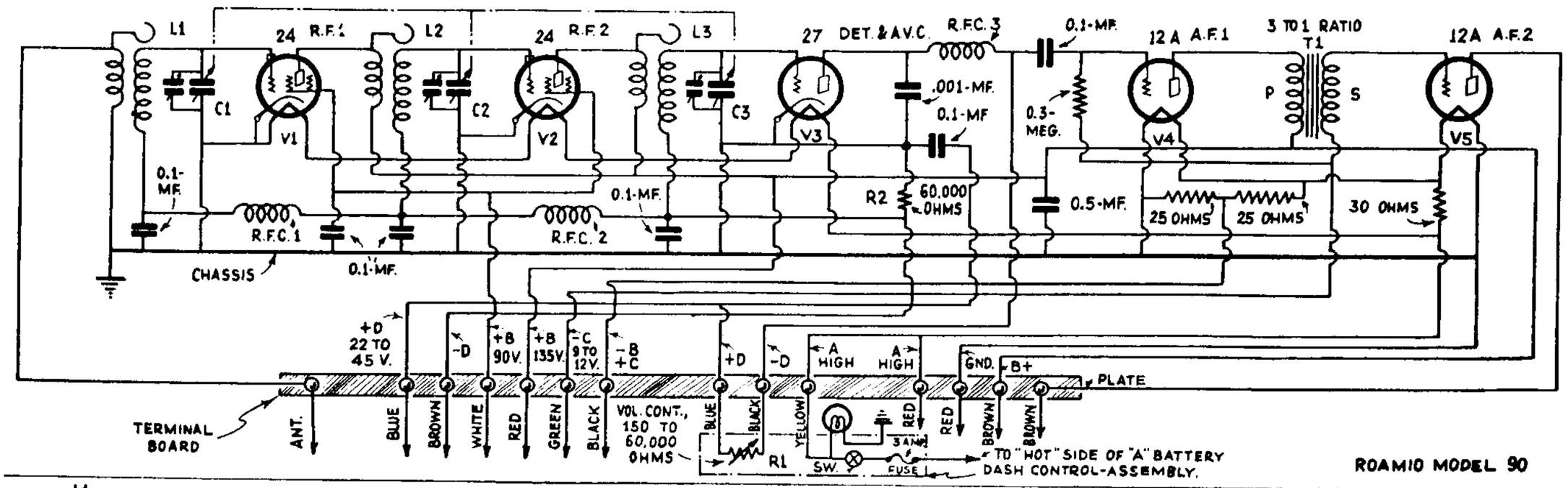
Tube Type	Fil. Volts	C.-G. Volts	S.-G. Volts	Plate Volts
V1	5.9	3	75	170
V2	5.9	3	40	170
V3	5.9	3	40	45
V4	5.9	20	.....	170
V5	4.7	40	.....	170
V6	5.9	.....	.....	3

The circuit is adjusted for zero current flow in the circuit of A.V.C. tube V6, with normal signal input; at the same time resistor R3 establishes the normal bias required by the control-grids of V1, V2. Now, an incoming signal of increased strength causes diode V6, in conjunction with load-resistor R2, to develop across R2 an increased D.C. negative potential which reduces the amplification of V1, V2. Resistors R4, R5 are R.F. filters.

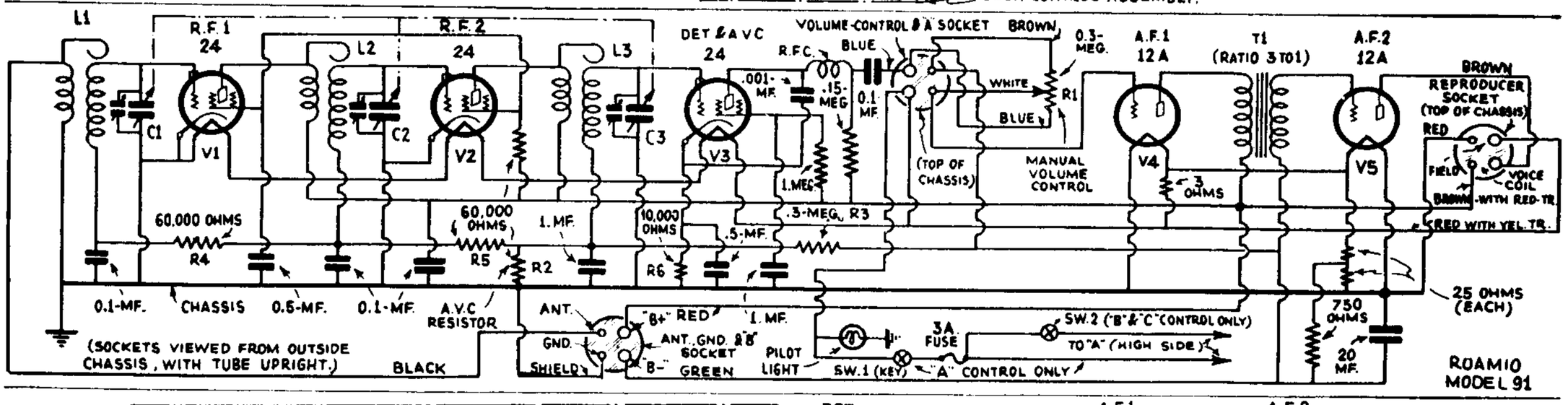
The A.F. input to the first-A.F. tube, V4, is determined by the setting of the manual volume control, R1.

Manual volume control resistor R1 has a value of 0.3-meg. Since Crosley Service Bulletin No. A8 does not include the tube operating voltages for the model 92, estimated values are given.

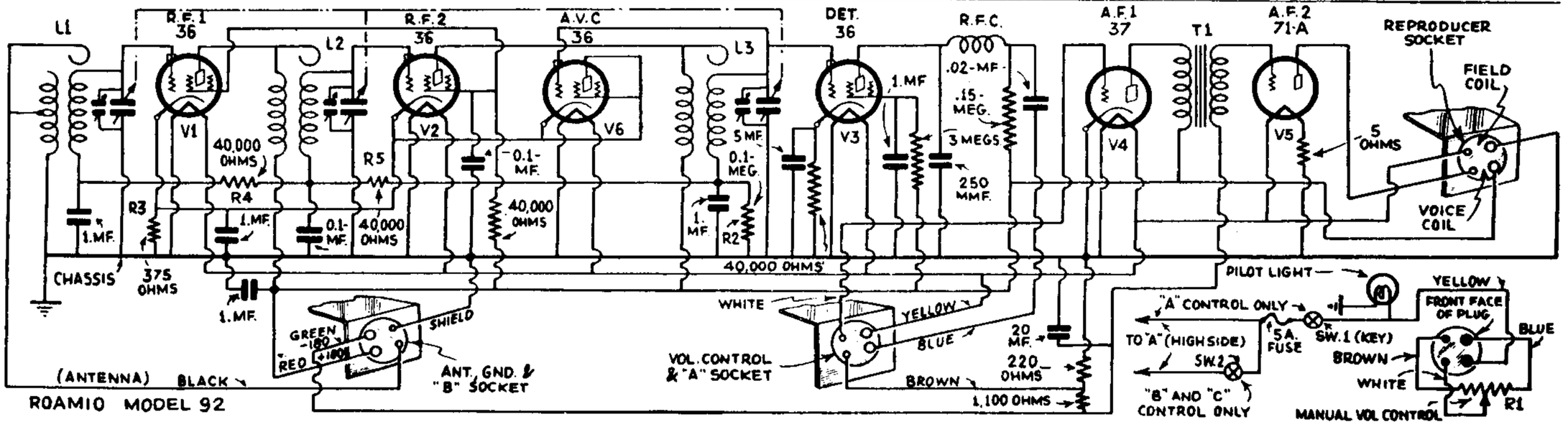
At the present time there are no Roamio models 93 or 94 receivers.



ROAMIO MODEL 90



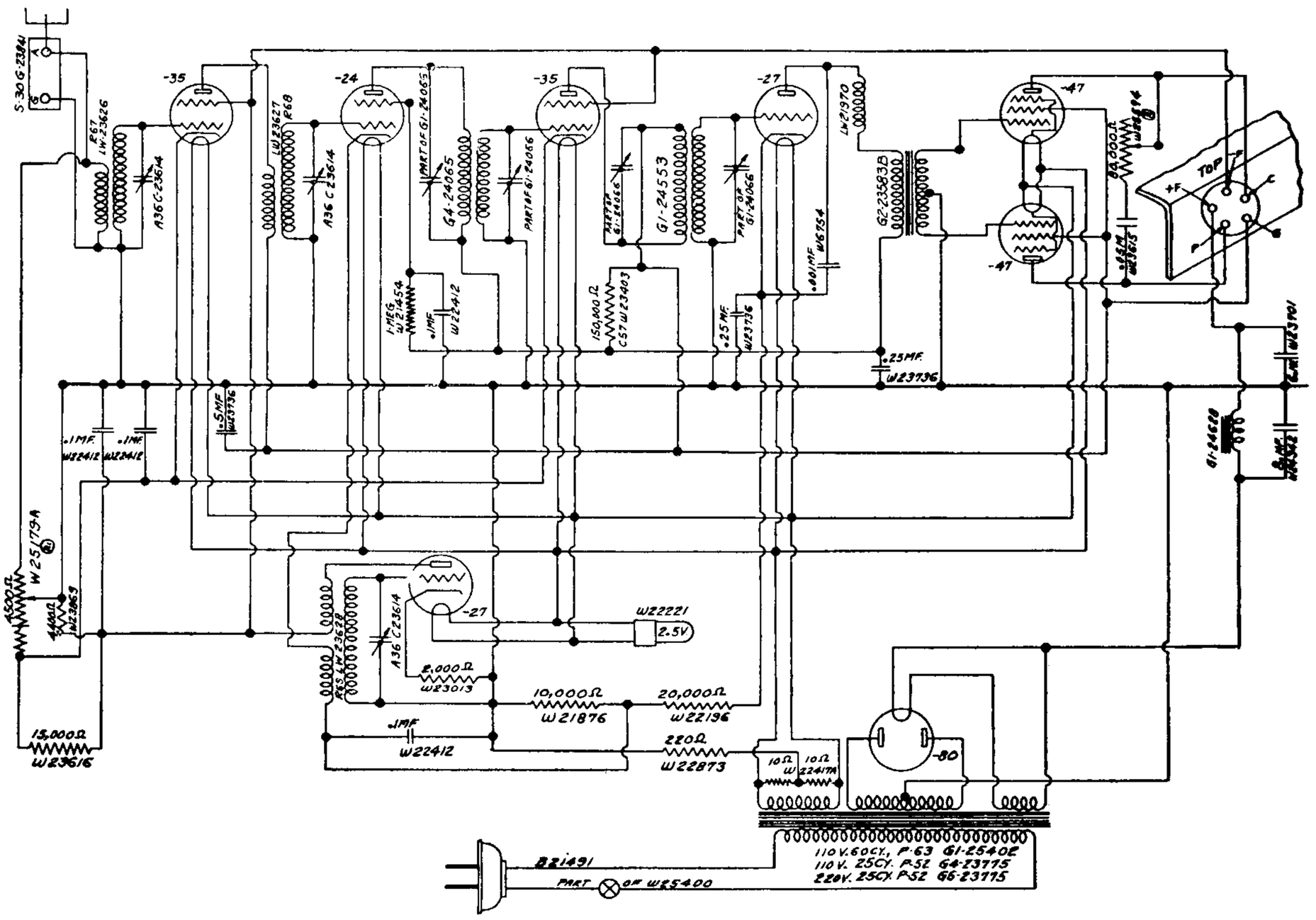
ROAMIO MODEL 91



ROAMIO MODEL 92

CROSLEY RADIO CORP.

Model 124-1



Circuit Diagram, Model 124-1

124-1 CHASSIS ASSEMBLY WIRING DIAGRAM

Model 124-1 is a modified Model 124 chassis adapted to operate dual speakers. The circuit is shown in Figure 1, and the speaker connections in Figure 2. This chassis uses two -35 type tubes as radio frequency and intermediate frequency amplifiers, two -27 type tubes as oscillator, and second detector, one -24 type tube as first detector, two -47 type tubes as output tubes, and one -80 type tube as rectifier.

Alignment

Alignment of I. F. Stages

Model 124-1 is designed to work with an intermediate frequency of 175 kilocycles. There are aligning condensers across the primary and secondary of the coupling transformers between the first detector and the intermediate frequency amplifier, and between the intermediate frequency amplifier and the second detector.

To align the intermediate frequency stages it is necessary to have an oscillator which tunes accurately to 175 kilocycles. Such oscillators are supplied by the Weston Electrical Instrument Co., the Jewel Co., the General Radio Company, the Radio Products Co., etc.

1. Connect the high side of the test oscillator through 0.1 mf condenser to the grid of the first detector tube. **Do not** remove the grid clip from the tube. Connect the low side of the test oscillator to chassis.

2. Turn the dial on the receiver so that the set is tuned to 550 kilocycles.

3. Adjust the condensers on either side of the coupling transformer between the first detector and the intermediate frequency amplifier to give maximum reading on the output meter.

4. Adjust the condenser on either side of the coupling transformer between the inter-

CROSLEY RADIO CORP.

Model 124-1

mediate frequency amplifier and the second detector tube to give maximum reading on the output meter.

After these adjustments have been made the intermediate frequency stages will be properly aligned.

Alignment of Tuning Condensers

To align the oscillator, antenna coupling circuit, and radio frequency stage, it is necessary to have an oscillator which can be tuned to 1400 kilocycles. If no oscillator is available, the receiver may be tuned to a station of known frequency within 50 kilocycles of 1400.

1. Connect the high side of the test oscillator through a 0.00025 mf condenser (or a dummy antenna) to the antenna post on the receiving set, and connect the low side to chassis.

2. Tune the receiver to 1400 kilocycles.

3. Adjust the padding condensers on the side of the units of the ganged condenser to give maximum reading on the output meter.

After this has been done the receiver will be properly aligned.

Voltage Limits

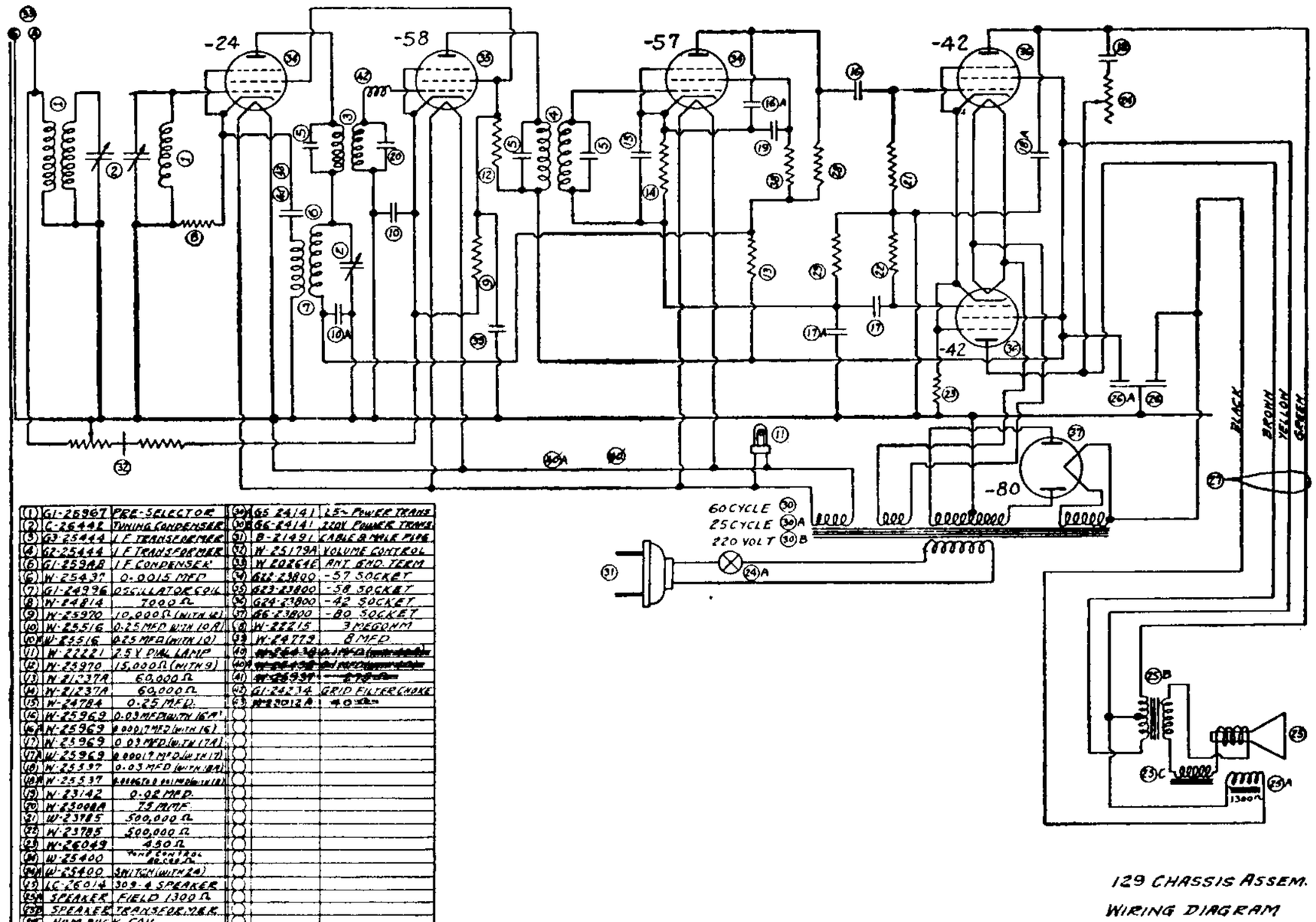
The voltages are to be measured with the speakers connected, the tubes in place, and a line voltage of 117½ volts (235 volts for 220 volt receivers). All voltages should be measured with a high resistance voltmeter (600 ohms or more per volt). The plate, screen grid, and operating grid voltages are measured from the elements named to cathode.

Filament Voltages	
All tubes but Rectifier	2.2 to 2.5
Rectifier tube	4.6 to 5.0
Plate Voltages	
R. F. and I. F. Tubes	245 to 285
First Detector Tube	130 to 150
Oscillator Tube	80 to 100
Second Detector Tube	120 to 140
Output Tube	230 to 270
Rectifier	330 to 390 (A.C.)
Screen Grid Voltages	
R. F. and I. F. Tubes	80 to 100
First Detector Tube	75 to 85
Output Tubes	230 to 280
Grid Voltages	
R. F. and I. F. Tubes	-3.0 to -3.4
First Detector Tube	-7.0 to -9.0
Oscillator Tube	-10.0 to -12.0
Second Detector Tube	-16.0 to -20.0
Output Tubes	-15.0 to -17.0

Fig. 2—Diagram of Speaker Connections

CROSLEY RADIO CORP.

Models 129, 129-1, Circuit Model 131



(1)	GI-26967	PRE-SELECTOR	(34)	GS-24141	25~ POWER TRANS
(2)	C-26442	TUNING CONDENSER	(35)	GG-24141	220V POWER TRANS
(3)	G3-25444	I.F. TRANSFORMER	(36)	B-21491	CABLE & TABLE PLUG
(4)	G2-25444	I.F. TRANSFORMER	(37)	W-25179A	VOLUME CONTROL
(5)	GI-25948	I.F. CONDENSER	(38)	W-20264E	ANT. GND. TERM.
(6)	W-25437	0.0015 MFD	(39)	GS2-23800	-57 SOCKET
(7)	GI-24996	OSCILLATOR COIL	(40)	GS3-23800	-58 SOCKET
(8)	W-24814	7000 Ω	(40A)	GS4-23800	-42 SOCKET
(9)	W-25970	10,000 Ω (WITH 12)	(41)	GG-23800	-80 SOCKET
(10)	W-25516	0.25 MFD WITH 10A	(42)	W-22215	3 MEGOHM
(10A)	W-25516	0.25 MFD (WITH 10)	(43)	W-24773	8 MFD.
(11)	W-22221	2.5 V PIL. LAMP	(44)	[illegible]	
(12)	W-25970	15,000 Ω (WITH 9)	(45)	[illegible]	
(13)	W-21237A	60,000 Ω	(46)	[illegible]	
(14)	W-21237A	60,000 Ω	(47)	GI-24234	GRID FILTER CHOKE
(15)	W-24784	0.25 MFD.	(48)	W-23012A	40 Ω
(16)	W-25969	0.03 MFD WITH 16A			
(16A)	W-25969	0.0001 MFD (WITH 16)			
(17)	W-25969	0.03 MFD (WITH 17A)			
(17A)	W-25969	0.0001 MFD (WITH 17)			
(18)	W-25537	0.03 MFD (WITH 18A)			
(18A)	W-25537	0.0005 TO 0.001 MFD (WITH 18)			
(19)	W-23142	0.02 MFD.			
(20)	W-23008A	75 MMF.			
(21)	W-23785	500,000 Ω			
(22)	W-23785	500,000 Ω			
(23)	W-26049	450 Ω			
(24)	W-25400	VOLT CONTROL 40,000 Ω			
(24A)	W-25400	SWITCH (WITH 24)			
(25)	LC-26014	309-A SPEAKER			
(25A)	SPEAKER	FIELD 1300 Ω			
(25B)	SPEAKER	TRANSFORMER			
(25C)	HUM BUCK COIL				
(26)	W-25542A	8 MFD (WITH 26A)			
(26A)	W-25542A	4 MFD (WITH 26)			
(27)	W-26041	SPEAKER CORD			
(28)	W-21455	300,000 Ω			
(29)	W-21455	300,000 Ω			
(30)	GG-23559	60~ POWER TRANS			

129 CHASSIS ASSEM.
WIRING DIAGRAM

Circuit Diagram, Model 129

Specifications

Models 129 and 129-1 are six-tube superheterodynes for operation from A.C. electrical circuits, differing only in that Model 129 is adapted to the operation of a single speaker, and Model 129-1 to the operation of dual speakers. The tubes used are: a -24 type oscillating first detector, a -58 type I.F. amplifier, a -57 type second detector, two -42 type push-pull output tubes, and a -80 type rectifier.

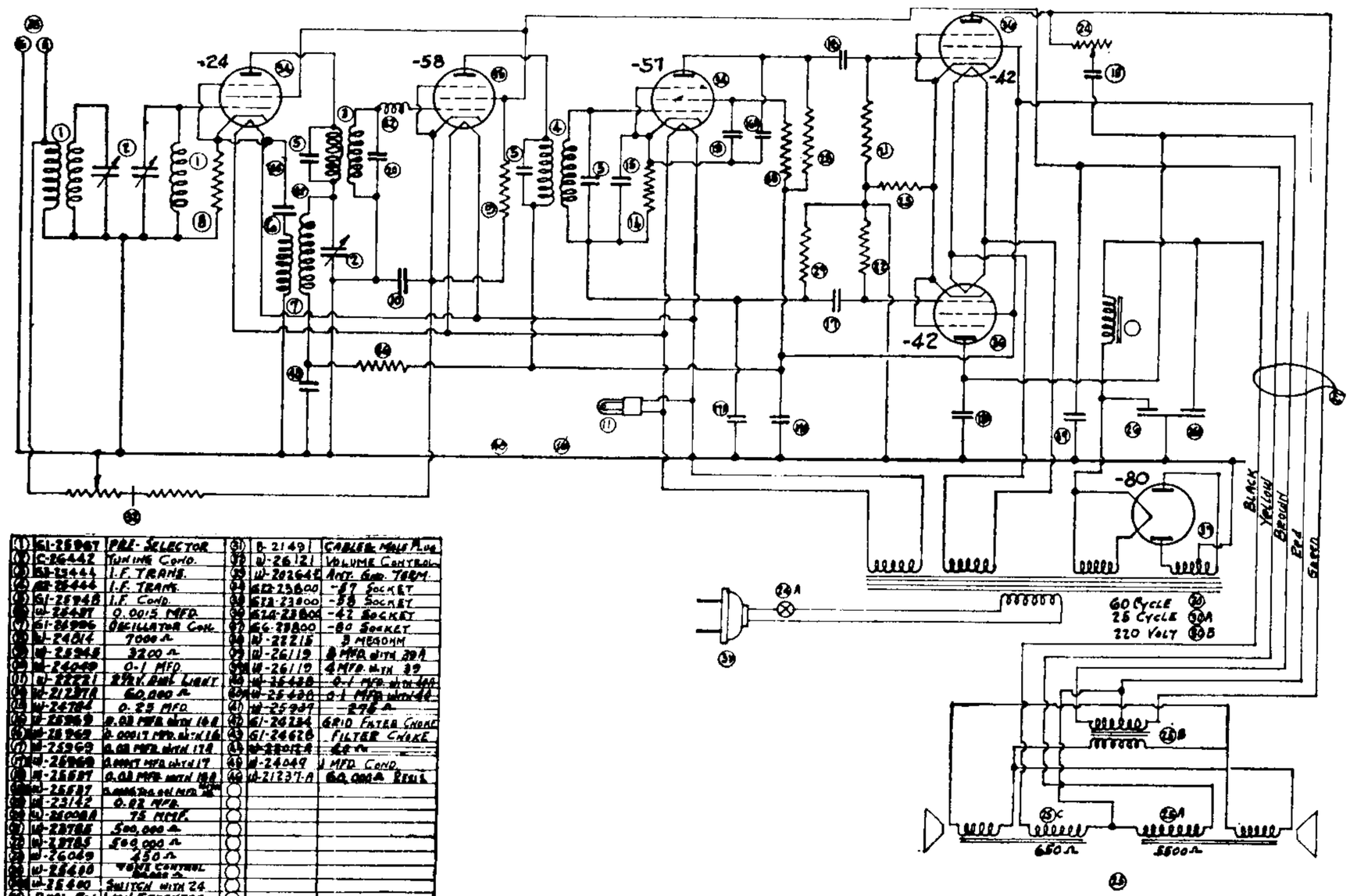
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speakers connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages as shown in table. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
First Detector, I. F. Amplifier, and Second Detector tubes	2.3 to 2.7
Output tubes	6.0 to 7.0
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector tube	175 to 215
I. F. Amplifier tube	260 to 320
Second Detector tube	72 to 88
Output tubes	240 to 300
Rectifier tube	335 to 365
Screen Grid Voltages	
First Detector and I. F. Amplifier tubes	85 to 105
Second Detector tube	27 to 33
Output tubes	240 to 300
Operating Grid Voltages	
First Detector tube (cathode to chassis)	7 to 9
I. F. amplifier tube (cathode to chassis)	2.7 to 3.3
Second Detector tube (across 6,000 ohm bias resistor)	6.3 to 7.7
Output tubes (cathode to chassis)	18 to 22

CROSLEY RADIO CORP.

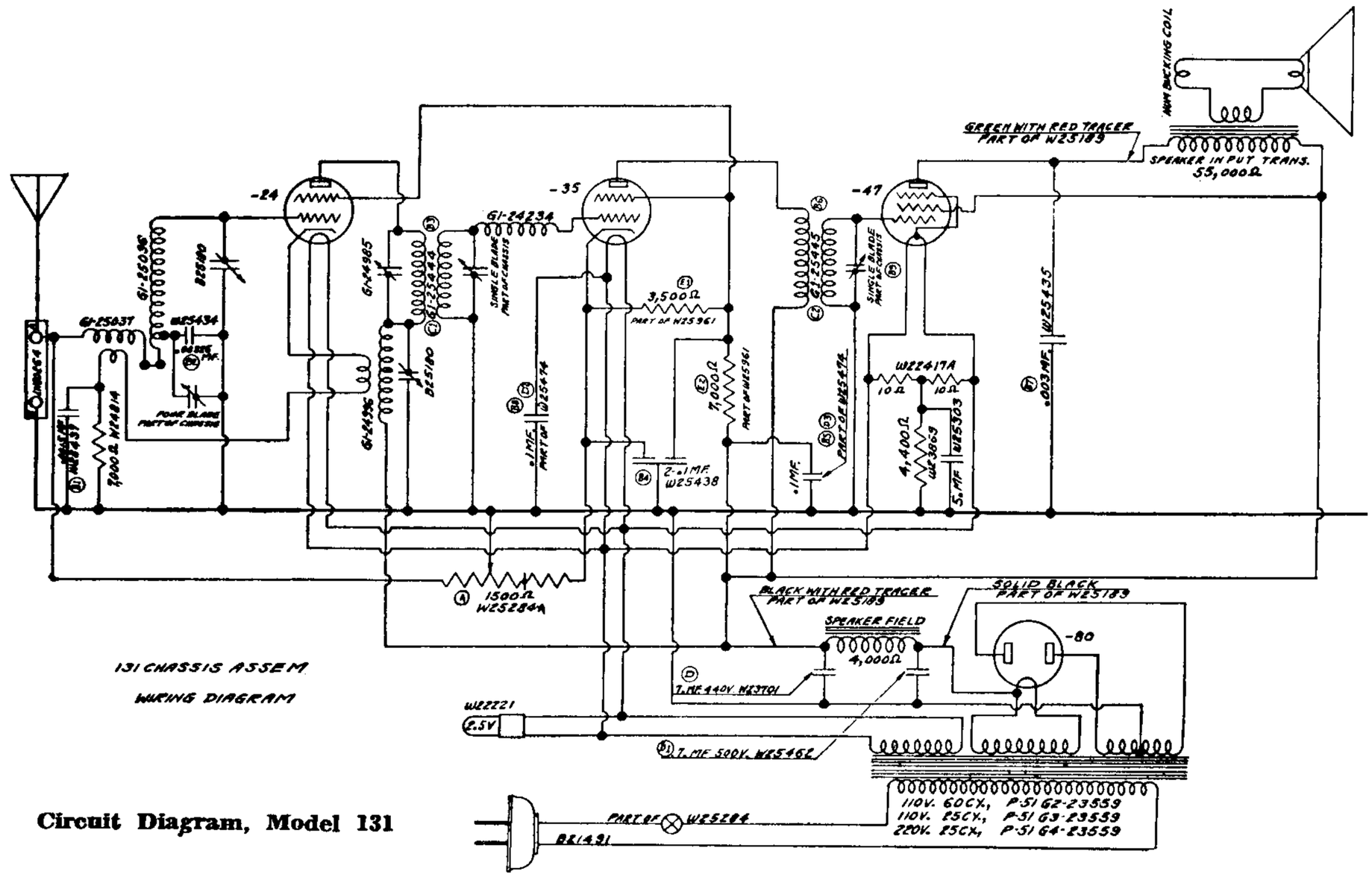
Models 129, 129-1, Circuit Model 131



①	GI-25967	PRE-SELECTOR	㉛	P-2149	CABLE & MALE PLUG
②	C-26442	TUNING COND.	㉜	W-26121	VOLUME CONTROL
③	GI-25444	I.F. TRANS.	㉝	W-26164	ANT. COIL 700M.
④	GI-25444	I.F. TRANS.	㉞	GI2-23600	-57 SOCKET
⑤	GI-25948	I.F. COND.	㉟	GI3-23600	-58 SOCKET
⑥	W-25457	0.0015 MFD.	㊱	GI4-23600	-42 SOCKET
⑦	GI-25996	OSCILLATOR COIL	㊲	GI6-23600	-80 SOCKET
⑧	W-24814	7000Ω	㊳	W-22215	3 MEGOHM
⑨	W-25945	3200Ω	㊴	W-26119	8 MFD WITH 39A
⑩	W-24049	0.1 MFD	㊵	W-26119	4 MFD WITH 39
⑪	W-22221	2 VOLT PANEL LIGHT	㊶	W-25428	0.1 MFD WITH 40A
⑫	W-21237A	60,000Ω	㊷	W-25430	0.1 MFD WITH 40
⑬	W-24784	0.25 MFD	㊸	W-25939	27Ω
⑭	W-25969	0.03 MFD WITH 14A	㊹	GI-24234	GRID FILTER CHOKE
⑮	W-25968	0.0015 MFD WITH 16	㊺	GI-24620	FILTER CHOKE
⑯	W-25969	0.03 MFD WITH 17A	㊻	W-21201-A	40Ω
⑰	W-25968	0.0015 MFD WITH 17	㊼	W-24049	1 MFD COND.
⑱	W-25967	0.03 MFD WITH 18A	㊽	W-21237-A	60,000Ω RESIS.
⑲	W-25827	0.0005 MFD WITH 20			
⑳	W-23142	0.02 MFD.			
㉑	W-20008A	75 MMF.			
㉒	W-23786	500,000Ω			
㉓	W-23785	500,000Ω			
㉔	W-26049	450Ω			
㉕	W-25400	VOLT CONTROL 8,000Ω			
㉖	W-25400	SWITCH WITH 24			
㉗	OVAL 8x5	INCH SPEAKERS			
㉘	L-26107	318-3 SPEAKER			
㉙		SPEAKER TRANSFORMER			
㉚	L-26106	318-3 SPEAKER			
㉛	W-26119	8 MFD. WITH 26A			
㉜	W-26119	8 MFD WITH 26			
㉝	W-26120	SPEAKER CORD			
㉞	W-21485	300,000Ω			
㉟	W-21285	300,000Ω			
㊱	62-25524	60~ POWER TRANS.			
㊲	60-25460	25~ POWER TRANS			
㊳	65-25461	25~ POWER TRANS			

129-1 CHASSIS ASSEM.
WIRING DIAGRAM.

Circuit Diagram, Model 129-1



131 CHASSIS ASSEM.
WIRING DIAGRAM

Circuit Diagram, Model 131

CROSLEY RADIO CORP.

CROSLEY "CHIEF" 12-TUBE MODEL 132-1 12-TUBE SUPERHETERODYNE

(Dual reproducers, class B push-push A.F. power output fed by a class A push-pull driver stage, meter tuning, A.V.C., tone control, static control.)

The Crosley Chief, 12-tube superheterodyne console model radio receiving set, is the most recent addition to the line. This receiver incorporates the model 132-1 chassis. Although incorporating a large number of tubes, the power line current consumption is held to a minimum by use of the new tubes which consume much less current than the older types.

Resistors R1A, R1B, 1.5 megs. (per section); R2, 0.4-meg.; R3, 80,000 ohms; R4, 0.15-meg.; R5, R6, 60,000 ohms; R7, 2,000 ohms; R8, 1. meg.; R9, 7,000 ohms; R10, 40 ohms; R11, 750 ohms; R12, R13, R24, 0.5-meg.; R-14, R23, 0.3-meg.; R15, 450 ohms; R16, 3 megs.; R17, 30,000 ohms; R18, 20 ohms center-tapped; R19, 3,500 ohms; R20, 6,000 ohms; R21, 10,000 ohms; R22, 5 megs.

Condensers C1 to C4, tuning units; C5 to C8, I. F. trimmers; C9, C25, C26, .02-mf.; C10, C11, C13, C14, C16, C30, C31, C32, 0.1-mf.; C17, C15, 4 mf.; C18, 150 mmf.; C19, 100 mmf.; C20, C23, .006-mf.; C21, C22, C28, 8 mf.; C24, .05-mf.; C27, .003-mf.; C29, 12 mf.

Tube Type	Fil. Volts	Bias Volts	S.-G. Volts	Plate Volts
V1	2.4	0.5	60	200
V2	2.4	2.5	60	200
V3	2.4	13.5	—	170
V4	2.4	0.5	60	200
V5	2.4	8	165	220
V6	2.4	—	—	—
V7	5.6	23.5	220	200
V8	5.6	23.5	220	200
V9	5.6	28.5	—	405
V10	5.6	28.5	—	405
V11	2.4	77.5	—	70
V12	2.5	—	—	415

With a line potential of 117.5 V. the above figures may be taken as average readings; for "220 V." sets a line voltage of 235 is taken as standard. Bias (unless otherwise stated), screen-grid, and plate readings are taken between these tube contacts and the emitter; bias for V3, V5, V7 to V11, cathode to chassis.

Late chasses of this model have a 1,400-ohm resistor shunted across the visual tuning meter. Also, these later chasses may have two 1. meg. resistors (total) in the manual volume control circuit, connected from the moving arms to the ground ends of R1A and R1B.

The tuning meter of this receiver has a resistance of approximately 440 ohms and the deflection is approximately 10 ma.

The A. F. output of V6 actuates tube V11 which, in turn, controls the bias on the amplifier tubes for A.V.C. operation. By manual adjustment of R2 the degree of background noise is controlled to suit individual preference of sensitivity.

Note that the transformer secondary supplying tubes V1, V2, V3 is bypassed by a dual-section condenser, C30-C31. Another unusual circuit arrangement is the use of a double choke coil arrangement comprising Ch1-Ch2. and field coils 1 and 2. The first two choke coils are connected in the positive high-voltage lead in the usual manner, while the second two chokes, the field coils of the dynamic reproducers, are connected as an "inductive voltage divider," one terminal of the two coils in series being connected to the positive output of the regular filter system, and the other end being grounded to the chassis; the center-tap of these field coils supplies voltage to the screen-grids of V1, V2, V4, and to the plate of V5.

The tone correction furnished by C25-C26 applies equally to V9 and V10, the center-tap of these two condensers being grounded to the chassis. If any portion of the tone control R3, C24, becomes grounded the A. F. portion of the receiver will become inoperative as the entire tone control operates at the potential of the plates of V7, V8.

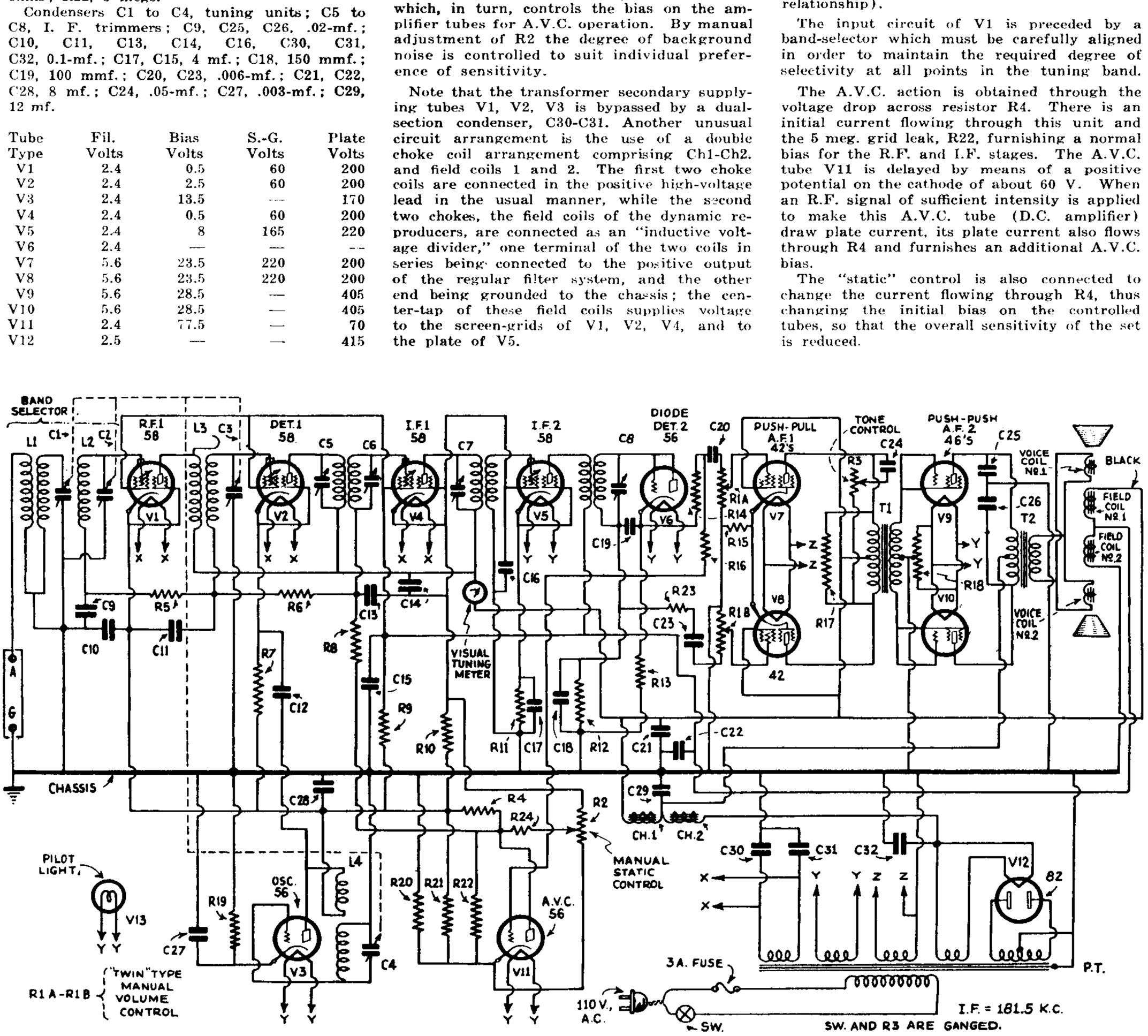
The manual volume control operates in the input circuit of the push-pull driver stage, V7-V8. The two sections of this volume control, R1A, R1B, operate simultaneously as a dual unit.

The first A.F. stage, V7, V8, is driven by a so-called split-diode circuit furnishing A.F. voltage from both the cathode and plate circuits, which are out of phase (in push-pull relationship).

The input circuit of V1 is preceded by a band-selector which must be carefully aligned in order to maintain the required degree of selectivity at all points in the tuning band.

The A.V.C. action is obtained through the voltage drop across resistor R4. There is an initial current flowing through this unit and the 5 meg. grid leak, R22, furnishing a normal bias for the R.F. and I.F. stages. The A.V.C. tube V11 is delayed by means of a positive potential on the cathode of about 60 V. When an R.F. signal of sufficient intensity is applied to make this A.V.C. tube (D.C. amplifier) draw plate current, its plate current also flows through R4 and furnishes an additional A.V.C. bias.

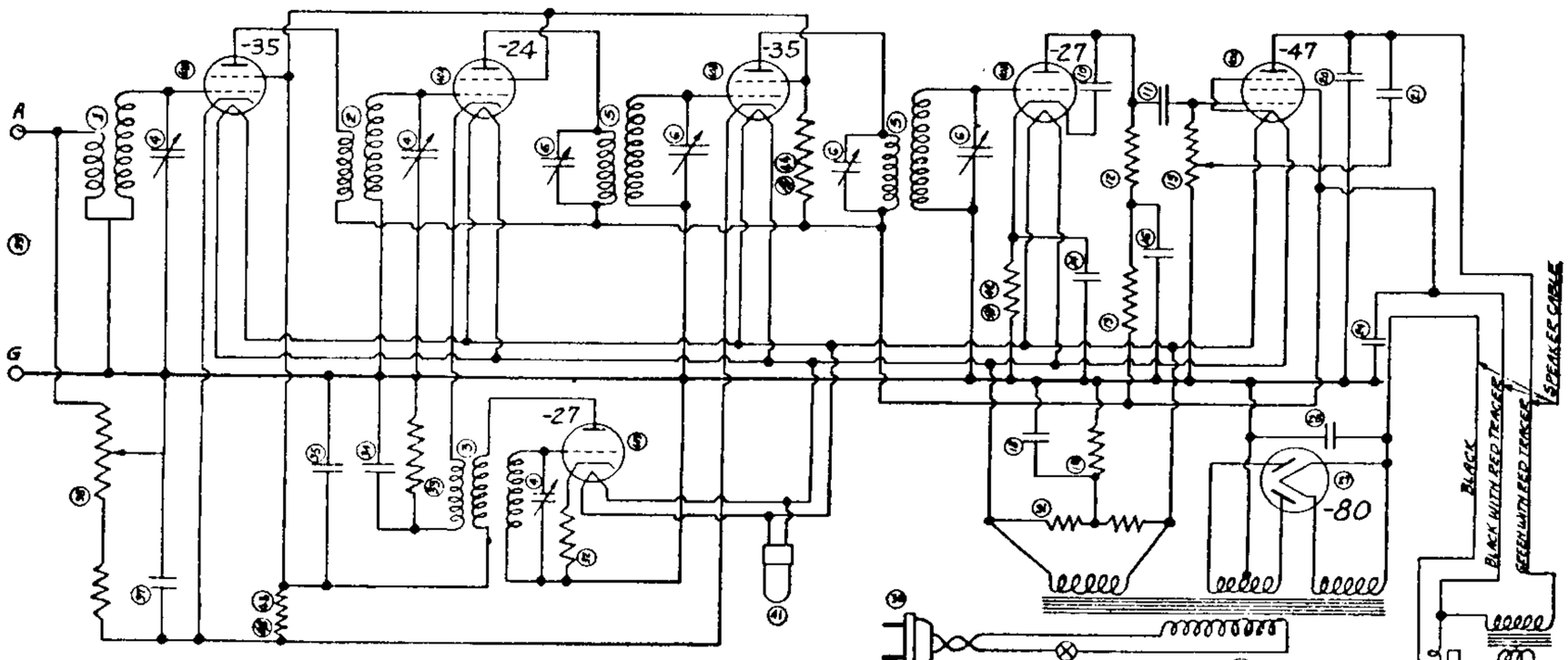
The "static" control is also connected to change the current flowing through R4, thus changing the initial bias on the controlled tubes, so that the overall sensitivity of the set is reduced.



Schematic circuit of the Crosley "Chief" model 132-1, 12-tube superheterodyne. Note the unusual arrangement of the circuits of V7-V8, and also V11.

CROSLEY RADIO CORP.

Model 133



1	LW23626	ANTENNA COIL	34	W25437	.0015 MFD.
2	LW23627	INTERSTAGE COIL	35	W25516	.25 MFD (WITH 14)
3	LW23628	OSCILLATOR COIL	36	~~W25516~~	~~.25 MFD~~
4	C23614	TUNING CONDENSER	37	W25474	1 MFD (WITH 16)
5	GS-24065	I.F. COIL	38	W25179A	4500 Ω
6	GC-24066	I.F. CONDENSER	39	GI-23841	TERMINAL BOARD
			40A	G2-23800	-24 SOCKET
			40B	G4-23800	-35 SOCKET
9	~~W25540~~	~~150,000 Ω~~	40C	G5-23800	-47 SOCKET
10	W25537	.0006 MFD.	40D	G3-23800	-27 SOCKET
11	W25537	.03 MFD (WITH 10)	41	W22221	2.5 V DIAL LAMP
12	W23403	150,000 Ω	42	W21737-A	60,000 Ω
13	W23403	150,000 Ω	43	W25946	15000 Ω WITH 44
14	W25516	.25 MFD.	44	W25946	5000 Ω WITH 43
15	~~W25539A~~	~~250,000 Ω~~			
16	W25474	1 MFD.			
17	W25521	450 Ω			
18	W25303	5 MFD.			
19	W25539	300,000 Ω 500,000 Ω			
20	W25538	.0015 MFD.			
21	W25538	.0015 MFD (WITH 20)			
23	LC25518	SPEAKER			
24	W25542	4 MFD.			
25	W25542	4 MFD (WITH 24)			
27	G6-23800	-80 SOCKET			
28	GI-25534	60 ~ POWER TRANS			
28A	GI-23775	25 ~ POWER TRANS			
28B	G3-23775	220 V POWER TRANS			
29	W25539	SWITCH (WITH 19)			
30	B21491	CABLE			
31	WE24178	10 Ω + 10 Ω			
32	W23013	2,000 Ω			
33	W21876	10,000 Ω			

133 CHASSIS ASSEMBLY
WIRING DIAGRAM

Circuit Diagram, Model 133

Specifications

Model 133 is a seven-tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -35 type R.F. tube, a -24 type first detector, a -27 type oscillator, a -35 type I.F. tube, a -27 type second detector, a -47 type output tube, and a -80 type rectifier.

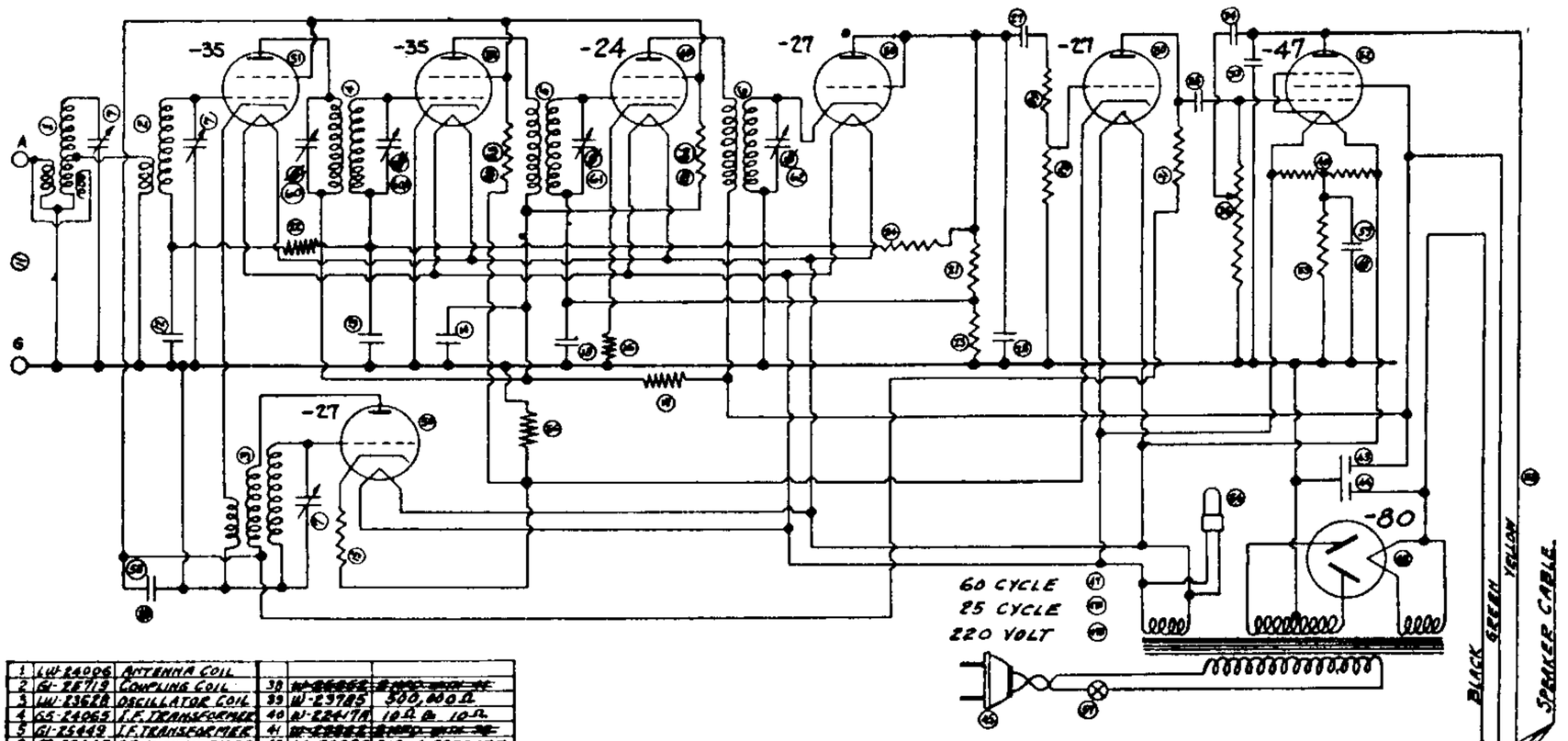
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohm per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.4 to 5.4
Plate Voltages	
R. F., First Detector, and I. F. tubes	265 to 325
Oscillator tube	80 to 100
Second Detector tube	125 to 155
Output tube	230 to 280
Rectifier tube	395 Volts A C
Screen Grid Voltages	
R. F., First Detector, and I. F. tubes	80 to 100
Output tube	250 to 310
Bias Voltages	
R. F. and I. F. tubes	2.7 to 3.3
First Detector tube	6 to 7
Oscillator tube	11 to 13
Second Detector tube	14 to 18
Output tube	16 to 20

CROSLEY RADIO CORP.

Models 134, 134-1



1	LW-24006	ANTENNA COIL			
2	GI-25713	COUPLING COIL	38	[illegible]	
3	LW-23628	OSCILLATOR COIL	39	W-23785	500,000 Ω
4	GS-24065	I.F. TRANSFORMER	40	W-22417A	10 Ω & 10 Ω
5	GI-25449	I.F. TRANSFORMER	41	[illegible]	
6	G3-25445	I.F. TRANSFORMER	42	LG-25586	312-4 SPEAKER
7	C-23614	TUNING CONDENSER	43	W-25542	4 MFD WITH 44
8	[illegible]		44	W-25542	8 MFD WITH 43
8A	[illegible]		45	B-2149M	CABLE
9	[illegible]				
10	[illegible]		47	GI-25534	60~ POWER TRANS.
11	GI-23841	A&B TUNE BOARD	47A	GI-25669	25~ POWER TRANS.
12	W-24049	0.1 MFD.	47B	GE-25669	220V POWER TRANS.
13	W-25438	0.1 MFD WITH 12	48	GE-23800	-80 SOCKET
14	W-22688	0.1 MFD.	49	GR-23800	-24 SOCKET
15	W-22180	1650 Ω.	50	G2-23800	-27 SOCKET
16	W-25357	75 Ω.	51	G4-23800	-35 SOCKET
17	W-23907	760 Ω.	52	G5-23800	-47 SOCKET
18	W-25438	0.1 MFD WITH 13	53	W-25521	450 Ω.
19	[illegible]		54	W-22221	2.5V DIAL LIGHT
20	[illegible]		55	W-25189	SPEAKER CABLE
21	W-23785	500,000 Ω.	56	W-24097	380 Ω.
22	W-21875	100,000 Ω.	57	W-25539	SWITCH WITH 36
23	W-21876	100,000 Ω.	58	W25857	8 MFD. WITH 59
24	W-22215	3 MEGOHMS	59	W25857	8 MFD WITH 58
			60	G7-24066	I.F. CONDENSER WITH 60A
			60A	G7-24066	I.F. CONDENSER WITH 60
27	W-25537	0.03 MFD WITH 28	61	G7-24066	I.F. CONDENSER WITH 62
28	W-25537	0.03 MFD WITH 27	62	G7-24066	I.F. CONDENSER WITH 61
29	W-25666	3 MEGOHMS	63	W-25946	15000 Ω WITH 64
			64	W-25946	15000 Ω WITH 63
31	W-22199A	25,000 Ω.			
33	W-25538	0.006 MFD WITH 34			
34	W-25538	0.006 MFD WITH 33			
35	W-22600	0.1 MFD			
36	W-25539	[illegible]			

#134 CHASSIS ASSEM.
WIRING DIAGRAM

Circuit Diagram, Model 134

Specifications

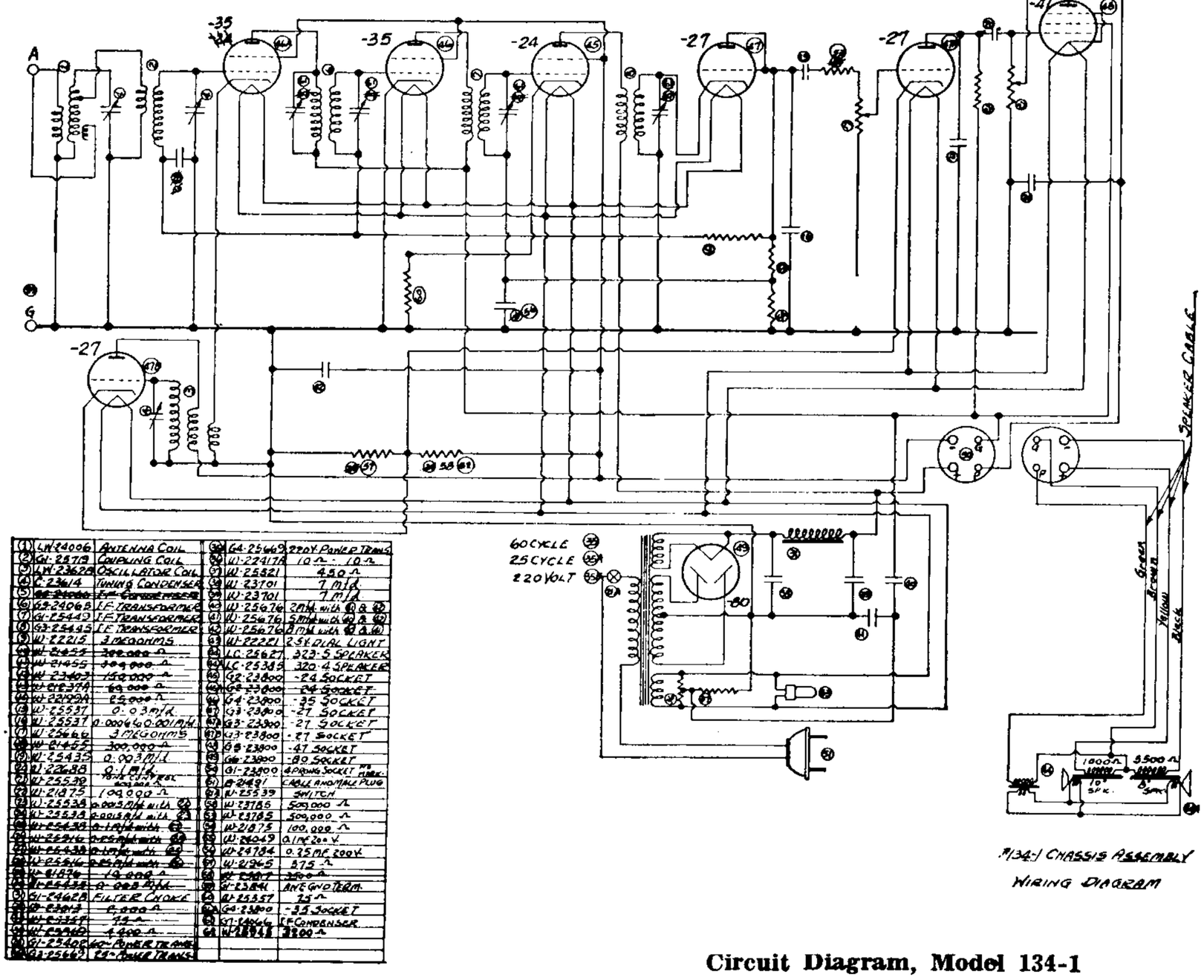
Models 134 and 134-1 are both eight-tube chasses for operation from A.C. electrical circuits. They employ similar superheterodyne circuits, the essential differences being due to the fact that Model 134 is used with a single speaker and Model 134-1 with dual speakers. Both employ a -35 or -51 type first detector tube, a -27 type oscillator tube, a -35 or -51 type first I.F. amplifier tube, a -24 type second I.F. amplifier tube, a -27 type second detector and automatic volume control tube, a -27 type first A.F. amplifier tube, a -47 type output tube, and a -80 type rectifier tube.

Voltage Limits

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

CROSLEY RADIO CORP.

Models 134, 134-1



(1)	LW-24006	ANTENNA COIL	(36)	G4-25469	220V. POWER TRANS.
(2)	GI-25719	COUPLING COIL	(37)	W-22417A	10 Ω - 10 Ω
(3)	LW-23628	OSCILLATOR COIL	(38)	W-25821	450 Ω
(4)	C-23614	TUNING CONDENSER	(39)	W-23701	7 MFD.
(5)	GE-24006	R.F. TRANSFORMER	(40)	W-23701	7 MFD.
(6)	G3-24068	I.F. TRANSFORMER	(41)	W-25676	2MFD. with (42) & (43)
(7)	GI-25443	I.F. TRANSFORMER	(42)	W-25676	5MFD. with (41) & (43)
(8)	G3-25445	I.F. TRANSFORMER	(43)	W-25676	8MFD. with (41) & (42)
(9)	W-22215	3 MEGOHMS	(44)	W-22221	25 W. DIAL LIGHT
(10)	W-21455	300,000 Ω	(45)	LC-25627	323-S SPEAKER
(11)	W-21455	300,000 Ω	(46)	LC-25385	320-4 SPEAKER
(12)	W-23403	150,000 Ω	(47)	G2-23800	-24 SOCKET
(13)	W-CRE379	60,000 Ω	(48)	G8-23800	-24 SOCKET
(14)	W-22900A	25,000 Ω	(49)	G4-23800	-35 SOCKET
(15)	W-25537	0.03 MFD.	(50)	G3-23800	-27 SOCKET
(16)	W-25537	0.0006 & 0.001 MFD.	(51)	G3-23800	-27 SOCKET
(17)	W-25537	0.003 MFD.	(52)	G3-23800	-27 SOCKET
(18)	W-21455	3 MEGOHMS	(53)	G8-23800	-47 SOCKET
(19)	W-21455	300,000 Ω	(54)	G6-23800	-80 SOCKET
(20)	W-25435	0.003 MFD.	(55)	G1-23800	4 PRONG SOCKET MFR. CABLE
(21)	W-22688	0.1 MFD. TONE CONTROL	(56)	P-24891	CABLE AND MALE PLUG
(22)	W-25539	500,000 Ω	(57)	W-25539	SWITCH
(23)	W-21875	100,000 Ω	(58)	W-23786	500,000 Ω
(24)	W-25538	0.005 MFD. with (25)	(59)	W-23785	500,000 Ω
(25)	W-25538	0.001 & 0.01 MFD. with (24)	(60)	W-21875	100,000 Ω
(26)	W-25538	0.1 MFD. with (24)	(61)	W-24049	0.1 MF 200 V.
(27)	W-25538	0.1 MFD. with (24)	(62)	W-24784	0.25 MF 200 V.
(28)	W-25538	0.25 MFD. with (24)	(63)	W-21965	575 Ω
(29)	W-21870	10,000 Ω	(64)	W-23807	2500 Ω
(30)	W-25538	0.002 MFD.	(65)	W-23841	ANT. GND. TERM.
(31)	GI-24628	FILTER CHOKE	(66)	W-25557	25 Ω
(32)	W-23813	6,000 Ω	(67)	G4-23800	-35 SOCKET
(33)	W-23557	75 Ω	(68)	GI-24604	I.F. CONDENSER
(34)	W-24040	4,400 Ω	(69)	W-18911	3100 Ω
(35)	GI-25406	AUDIO TRANS.			
(36)	G3-25662	2ND AUDIO TRANS.			

134-1 CHASSIS ASSEMBLY WIRING DIAGRAM

Circuit Diagram, Model 134-1

Model 134

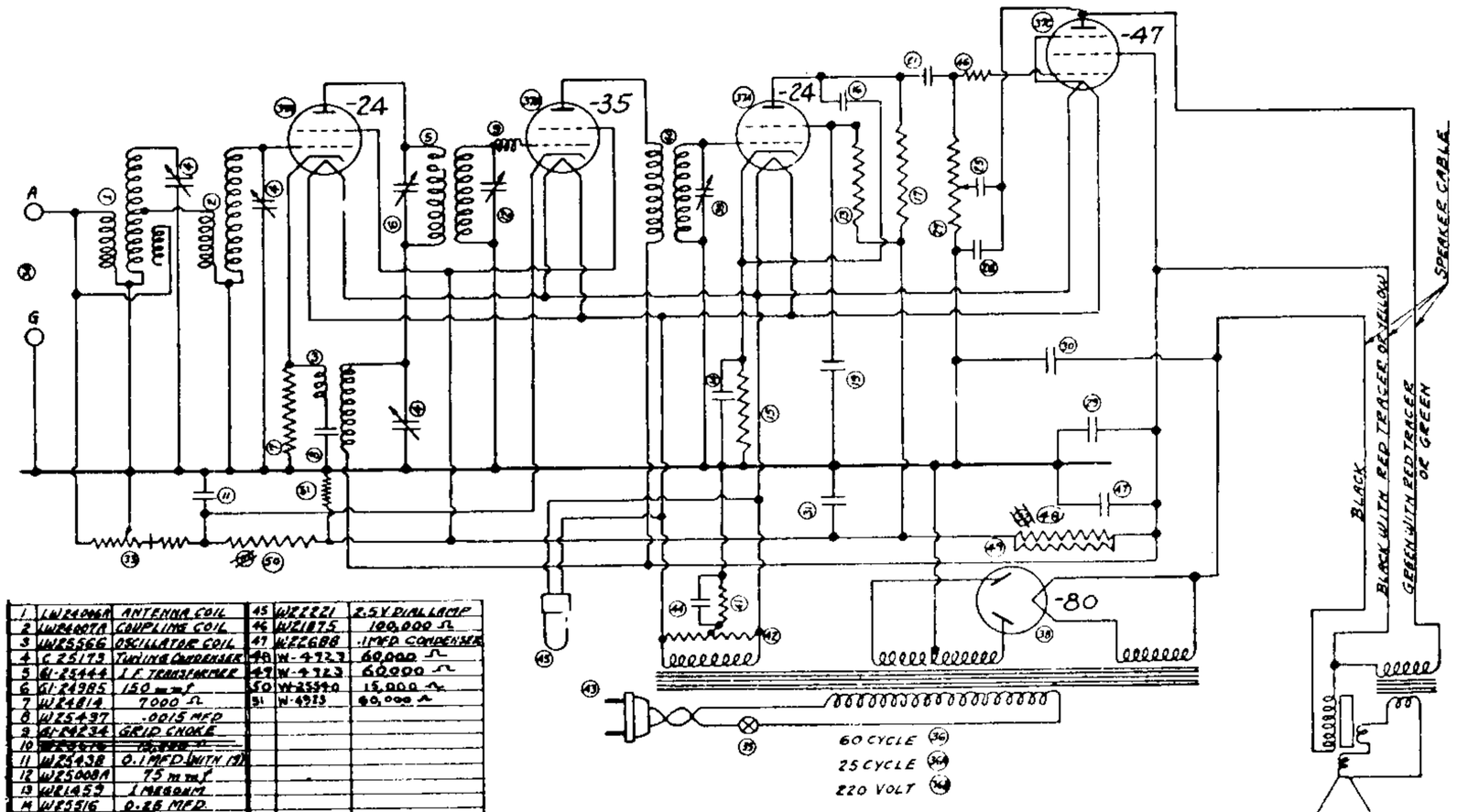
Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector and I. F. Amplifier tubes	260 to 310
Oscillator tube	77 to 93
First A. F. tube	50 to 60
Output tube	240 to 290
Rectifier tube	350 to 410
Screen Grid Voltages	
First Detector and I. F. Amplifier tubes	77 to 93
Output tube	260 to 310
Bias Voltages	
Oscillator tube	11 to 13
First Detector and First I. F. Amplifier tubes	0
Second I. F. tube	0.4 to 0.6
First A. F. Amplifier tube	4 to 6
Output tube	17.5 to 21.5

Model 134-1

Heater Or Filament Voltages	
All tubes but Rectifier	2.3 to 2.7
Rectifier tube	4.5 to 5.5
Plate Voltages	
First Detector and First I. F. tubes	240 to 290
Oscillator tube	77 to 93
Second I. F. Amplifier tube	325 to 375
First A. F. Amplifier tube	125 to 155
Output Tube	230 to 280
Rectifier tube (measured from each plate to chassis)	340 to 400
Screen Grid Voltages	
First Detector and I. F. tubes	77 to 93
Output Tube	245 to 295
Bias Voltages	
Oscillator tube	12 to 14
First Detector and First I. F. Amplifier tubes	0
Second I. F. tube	0.5 to 0.7
First A. F. tube	11 to 13
Output Tube	14 to 18

CROSLEY RADIO CORP.

Model 135



1	LW24066A	ANTENNA COIL	45	WE2221	2.5 V. DIAL LAMP
2	LW24607A	COUPLING COIL	46	WE1875	100,000 Ω
3	LWE5566	OSCILLATOR COIL	47	WE2688	.1 MFD. CONDENSER
4	C 25173	TUNING CONDENSER	48	W-4723	60,000 Ω
5	GI-25444	I.F. TRANSFORMER	49	W-4723	60,000 Ω
6	GI-24985	150 m/m/f	50	W-25590	15,000 Ω
7	WE4814	7000 Ω	51	W-4913	40,000 Ω
8	WE25497	.0015 MFD.			
9	GI-24234	GRID CHOKE			
10	~~WE5516~~	~~.25 MFD.~~			
11	WE25438	0.1 MFD. (WITH 9)			
12	WE25008A	75 m/m/f			
13	WE1459	1 MEGOHM			
14	WE5516	0.25 MFD.			
15	WE1453	40,000 Ω			
16	WE5537	.0006 TO .001 MFD.			
17	WE1455	300,000 Ω			
18	WE25438	0.1 MFD. (WITH 11)			
19	WE25537	0.03 MFD. (WITH 16)			
20	WE5516	.0006 MFD.			
21	WE5572	.0005 MFD. (WITH 26)			
22	WE25539	400,000 Ω			
23	LC 25518	SPEAKER			
24	WE25542	4 MFD.			
25	WE25542	8 MFD. (WITH 29)			
26	WE5516	0.25 MFD. (WITH 14)			
27	~~WE5006~~	~~25,000 Ω~~			
28	WE26573	4800 Ω			
29	LW20264	TERMINAL BOARD			
30	WE5400A	(WITH 37)			
31	GS-23559	60 ~ POWER TRANS.			
31A	GJ-24141	25 ~ POWER TRANS.			
31B	GJ-24141	220 V. POWER TRANS.			
31A	SC-23800	-24 SOCKET			
31B	SC-23800	-35 SOCKET			
31C	SC-23800	-47 SOCKET			
32	SC 23800	-80 SOCKET			
33	WE5008A	75 m/m/f			
34	GI-25443	I.F. TRANSFORMER			
41	WE6521	450 Ω			
42	WE4417A	10 Ω - 10 Ω			
43	R 21481	CABLE			
44	WE5303	5 MFD.			

135 CHASSIS ASSEMBLY
WIRING DIAGRAM

Circuit Diagram, Model 135

Specifications

Model 135 is a five tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -24 type oscillating first detector, a -35 or -51 type I.F. amplifier, a -24 type second detector, a 147 output pentode, and an -80 type rectifier.

Voltage Limits

The following are the approximate voltages which should be measured with tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.8
Rectifier tube	4.4 to 5:4
Plate Voltages	
First Detector and I. F. tubes	250 to 290
Second Detector tube	40 to 60
Output tube	220 to 270
Rectifier tube	350 to 400
Screen Grid Voltages	
First Detector and I. F. tubes	70 to 90
Second Detector tube	20 to 35
Output tube	225 to 275
Bias Voltages	
First Detector tube	6 to 9
I. F. tube	2.7 to 3.5
Second Detector tube	4 to 6
Output tube	16 to 21

CROSLEY RADIO CORP.

Model 136-1

Specifications

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

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

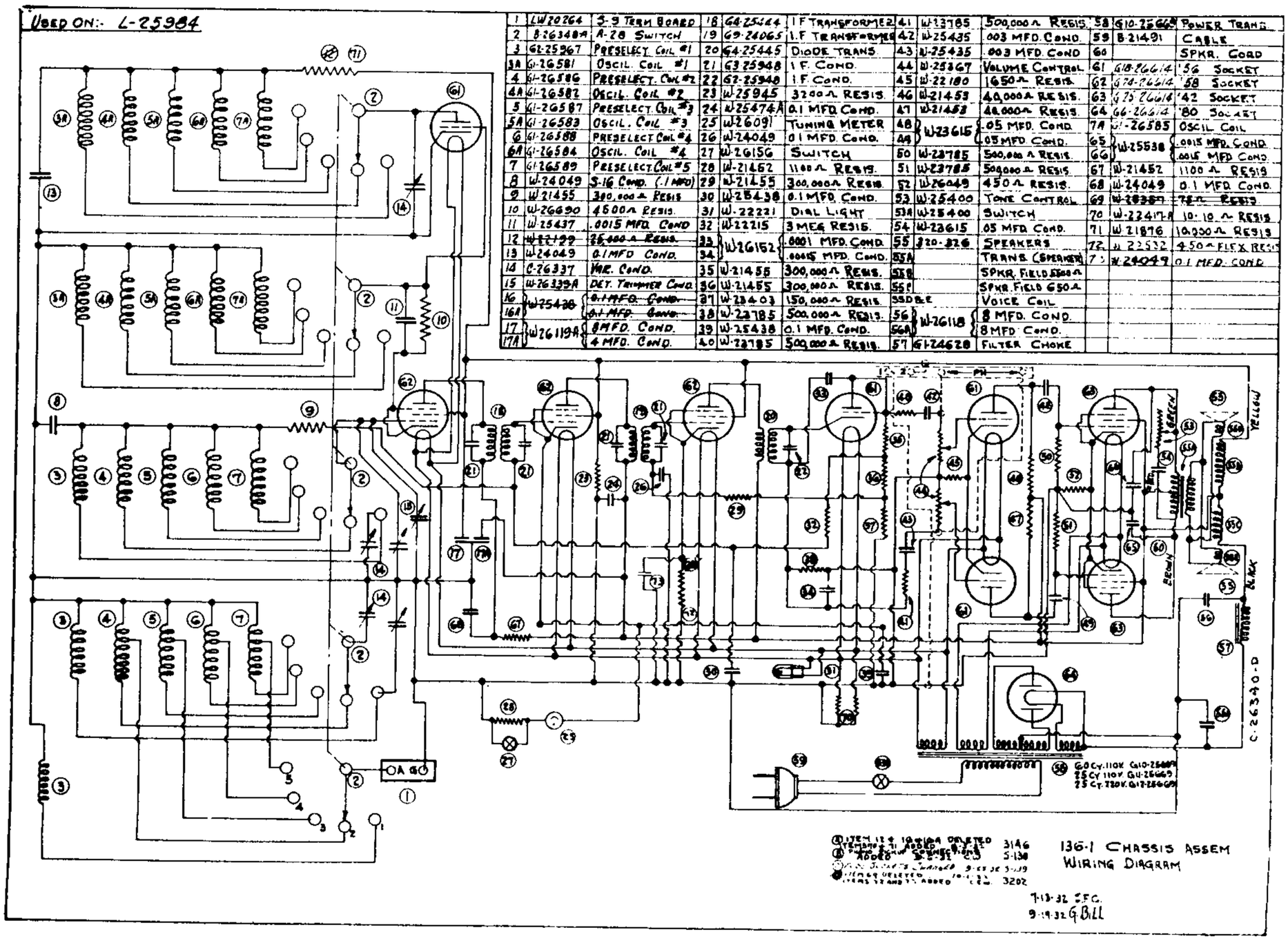
Line voltage—117.5 volts (235 for 220 volt receivers).

Plate voltage measured from plate contact to cathode contact.

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

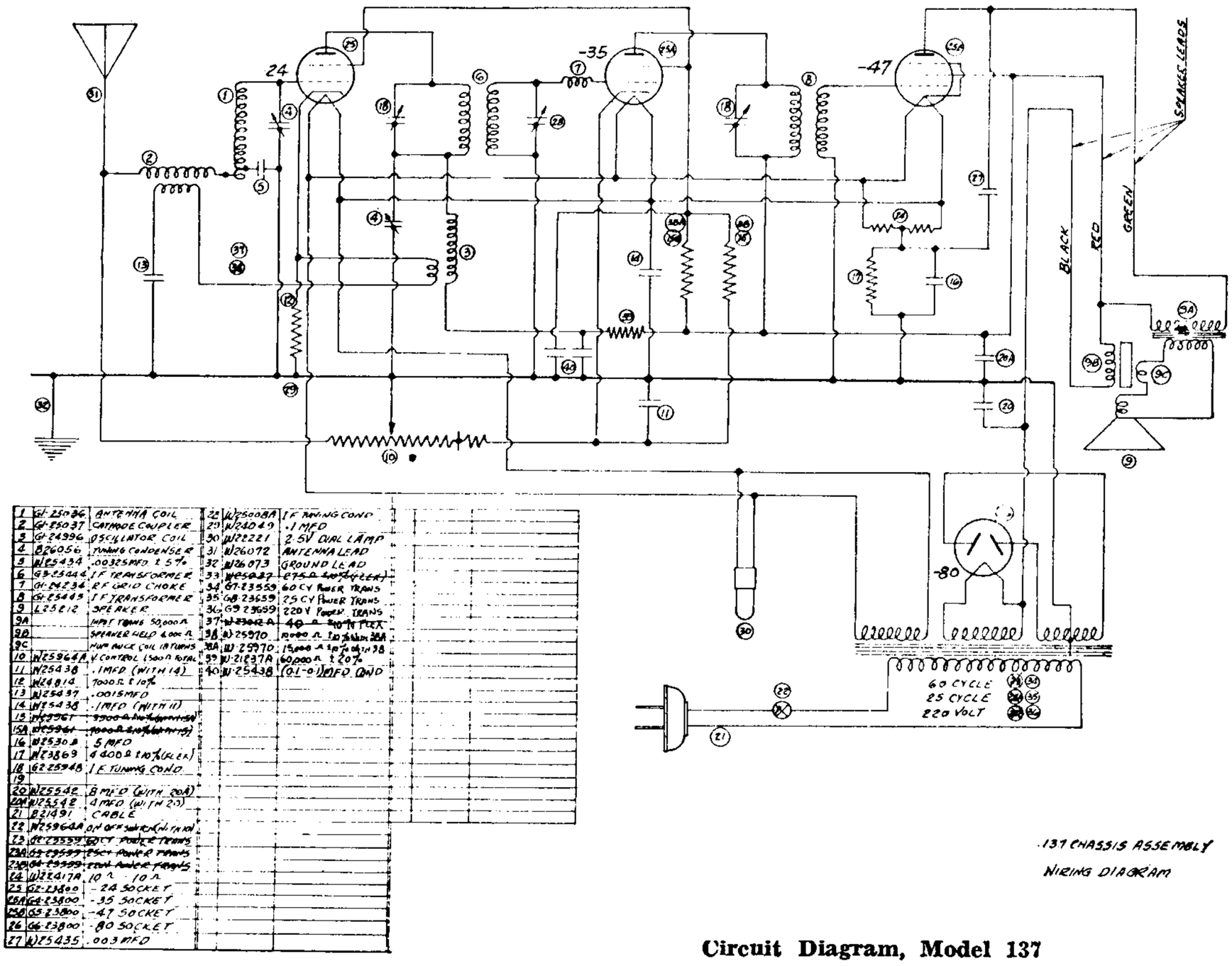
Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-56	Oscillator	45			0	2.5
-58	1st Detector	275	100	0	10.0	2.5
-58	1st I. F. Amplifier	275	100	0	2.5	2.5
-58	2nd I. F. Amplifier	275	100	0	4.0	2.5
-56	Diode Detector	0			0	2.5
-56	Push Pull A. F. Amplifier	135		0	7.0	2.5
-56	Push Pull A. F. Amplifier	135		0	7.0	2.5
-42	Output	270	275		20.0	6.3
-42	Output	270	275		20.0	6.3
-80	Rectifier	370				4.8



CROSLEY RADIO CORP.

Model 137



1	GI-25036	ANTENNA COIL	22	W25008A	IF TUNING COND
2	GI-25037	CATHODE COUPLER	23	W24049	.1 MFD
3	GI-24996	OSCILLATOR COIL	30	W22221	2.5V PIL LAMP
4	B26056	TUNING CONDENSER	31	W26072	ANTENNA LEAD
5	W25434	.00325MFD ± 5%	32	W26073	GROUND LEAD
6	G3-25044	I F TRANSFORMER	33	W25027	675 Ω [illegible] (FLEX)
7	GI-24236	RF GRID CHOKE	34	G7-23559	60 CY POWER TRANS
8	GI-25045	I F TRANSFORMER	35	G8-23659	25 CY POWER TRANS
9	L25012	SPEAKER	36	G9-23659	220 V POWER TRANS
9A		INPT TRANS 50,000 Ω	37	W25012A	40 Ω [illegible] FLEX
9B		SPEAKER FIELD 4,000 Ω	38	W-25970	8000 Ω [illegible]
9C		HUM BUCK COIL 18 TURNS	38A	W-25970	15,000 Ω [illegible]
10	W25964A	V CONTROL 1500 Ω TOTAL	39	W-21837A	60,000 Ω ± 20%
11	W25438	.1 MFD (WITH 14)	40	W-25438	(.01-.01) MFD COND
12	W24812	7000 Ω ± 10%			
13	W25437	.0015 MFD			
14	W25438	.1 MFD (WITH 11)			
15	[illegible]	[illegible]			
15A	[illegible]	[illegible]			
16	W25308	5 MFD			
17	W23869	4,400 Ω ± 10% (FLEX)			
18	G2-25948	I F TUNING COND			
19					
20	W25542	8 MFD (WITH 20A)			
20A	W25542	4 MFD (WITH 20)			
21	B21491	CABLE			
22	W25964A	ON OFF SWITCH (WITH 14)			
23	G1-23559	60 CY POWER TRANS			
23A	G2-23559	25 CY POWER TRANS			
23B	G4-23559	220 V POWER TRANS			
24	W22417A	10 Ω - 10 Ω			
25	G2-23800	-24 SOCKET			
25A	G4-23800	-35 SOCKET			
25B	G5-23800	-47 SOCKET			
26	G6-23800	-80 SOCKET			
27	W25435	.003 MFD			

.137 CHASSIS ASSEMBLY
WIRING DIAGRAM

Circuit Diagram, Model 137

Specifications

Model 137 is a four-tube superheterodyne for operation from A.C. electric circuits. The tubes employed are as follows: a -24 type oscillating first detector, a -35 or -51 type I.F. amplifier, a -47 type second detector and output tube, and an -80 type rectifier.

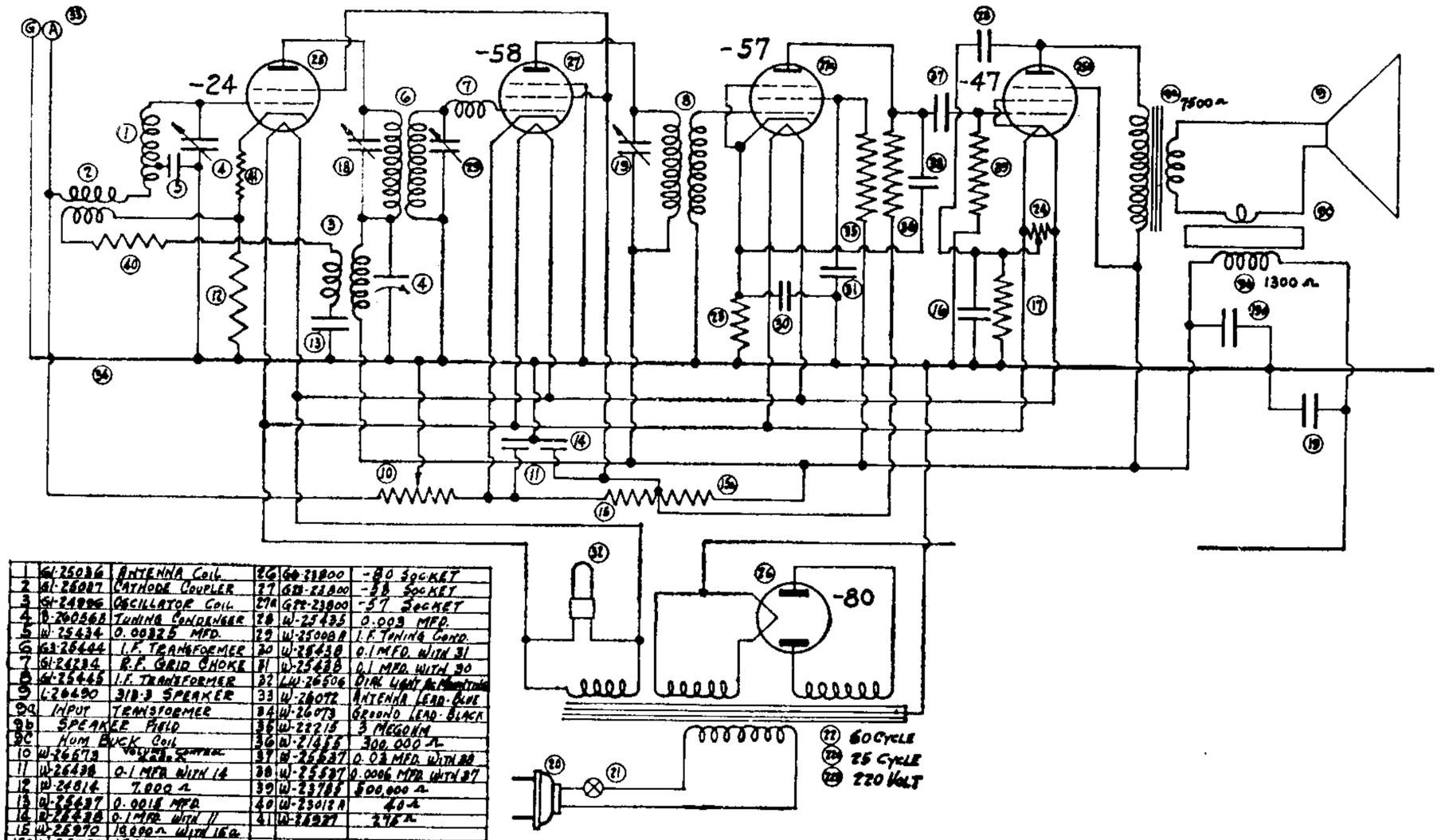
Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers). Measure plate and screen grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.6
Rectifier tube	4.4 to 5.2
Plate Voltages	
First Detector and I. F. tubes	220 to 260
Second Detector tube	210 to 250
Rectifier tube	380 to 430
Screen Grid Voltages	
First Detector and I. F. tubes	90 to 110
Second Detector tube	220 to 260
Bias Voltages	
First Detector tube	8 to 10
I. F. tube	2.7 to 3.3
Second Detector tube (with no signal)	25 to 30

CROSLEY RADIO CORP.

Model 141



1	GI-25036	ANTENNA Coil	26	G0-23800	-80 SOCKET
2	GI-26087	CATHODE COUPLER	27	G57-23800	-57 SOCKET
3	GI-24096	OSCILLATOR Coil	27A	G57-23800	-57 SOCKET
4	B-260568	TUNING CONDENSER	28	W-25435	0.003 MFD.
5	W-25434	0.00325 MFD.	29	W-25008A	I.F. TUNING COND.
6	G3-25444	I.F. TRANSFORMER	30	W-25438	0.1 MFD. WITH 31
7	GI-24234	R.F. GRID CHOKE	31	W-25428	0.1 MFD. WITH 30
8	G4-25445	I.F. TRANSFORMER	32	LW-26506	DIAL LIGHT
9	L-26490	310-3 SPEAKER	33	W-26072	ANTENNA LEAD-BLUE
9a	INPUT	TRANSFORMER	34	W-26073	GROUND LEAD-BLACK
9b	SPEAKER	FIELD	35	W-22215	3 MEGOHM
9c	HUM BUCK	Coil	36	W-27455	300,000 Ω
10	W-26672	VOLUME CONTROL 1 MEG.	37	W-25427	0.02 MFD. WITH 38
11	W-26438	0.1 MFD WITH 14	38	W-25397	0.0006 MFD. WITH 37
12	W-24814	7,000 Ω	39	W-23785	500,000 Ω
13	W-26437	0.0018 MFD.	40	W-25018A	40 Ω
14	W-26438	0.1 MFD. WITH 11	41	W-26927	275 Ω
15	W-26970	10,000 Ω WITH 16A			
16A	W-26970	16,000 Ω WITH 16			
16	W-25303	5 MFD.			
17	W-26521	450 Ω			
18	G2-25040	I.F. TUNING COND.			
19	W-25442	.8 MFD WITH 19A			
19A	W-25442	.4 MFD WITH 19			
20	B-21491	COND. & PLUG			
21	W-23618C	SWITCH WITH 10			
22	G1-23859	POWER TRANS. 60~			
22A	G0-23858	POWER TRANS. 25~			
22B	G0-23869	POWER TRANS. 220V			
23	W-21287A	60,000 Ω			
24	W-22417A	10 Ω - 10 Ω			
25	G2-23800	-24 SOCKET			
25A	G2-23800	-47 SOCKET			

.141 CHASSIS ASSEMBLY
WIRING DIAGRAM

Circuit Diagram, Model 141

Specifications

Model 141 is a five-tube superheterodyne for operation from A.C. electric circuits. It employs the following tubes: a -24 type oscillating first detector, a -58 type I.F. amplifier, a -57 type second detector, a -47 type output tube, and a -80 type rectifier.

Voltage Limits

The following are the approximate voltages which should be measured with the tubes in place, speaker connected, and a line voltage of 117½ (235 for 220 volt receivers), Measure plate and screw grid voltages with a high-resistance D.C. voltmeter (1000 ohms per volt) from plate or screen grid tube contact to emitter contact. Measure bias voltages from cathode to chassis. Use a low-range A.C. voltmeter for filament or heater voltages.

Heater Or Filament Voltages	
All tubes but Rectifier	2.2 to 2.6
Rectifier tube	4.3 to 5.3
Plate Voltages	
First Detector and I. F. tubes	230 to 270
Second Detector tube	30 to 50
Output tube	230 to 260
Rectifier tube	340 to 380
Screen Grid Voltages	
First Detector and I. F. tubes	90 to 110
Second Detector tube	30 to 50
Output tube	235 to 265
Bias Voltages	
First Detector tube	8 to 10
I. F. tube	3.1 to 3.9
Second Detector tube	9 to 12
Output tube	16 to 21

CROSLEY RADIO CORP.

Models 146 and 146-1

1	GI-23841	ANT. GND. POST
2	G5-24996	IMAGE SUPPRESOR COIL
3	C26442B	TUNING CONDENSER
4	GI-25968A	R.F. TRANSFORMER
5	W25438	0.1 MFD
6		0.1 MFD.
7	G8-24065	I.F. TRANSFORMER
8	G2-25449	I.F. TRANSFORMER
9	G3-25948	I.F. TUNING CONDENSER
10	G2-25449	DIODE FEEDING TRANS.
11	W-25435	0.003 MFD.
12	W-23635	0.006 MFD
13	W25666	LEVEL CONTROL 3 MEG
14	W25400	TONE CONTROL
15		POWER SWITCH
16	G20-26614	-46 SOCKET
17	W-23906	0.05 MFD.
18	G2-24729	A.F. TRANSFORMER
19	W22417A	10Ω - 10Ω
20	W-23191	0.01 MFD
21	W26041	SPEAKER CABLE
22	W23907	750Ω
23	W26896	6 MFD.
24		12 MFD.
25	W26577	3 MEGOHM
26	W21454	1 MEGOHM
27	W25438	0.1 MFD
28		0.1 MFD.
29	W21482	1100Ω
30	W22514	750Ω
31	W26816	0.1 MFD.
32	G7-24996	OSCILLATOR COIL
33	W25437	0.0015 MFD.
34	W27121	5,000Ω
35	W25438	0.1 MFD
36		0.1 MFD.
37	W22514	750Ω
38	W21454	1 MEGOHM
39	W-23606	0.1 MFD
40	W23403	150,000Ω
41	W23403	150,000Ω
42	W23785	500,000Ω
43	W21455	300,000Ω
44	L-26963	315 SPEAKER
45		FIELD COIL 2800Ω
46	W25945	3200Ω
47	W26852	1600Ω
48	W26852	1600Ω
49	W26877	SENSITIVITY CONTROL
50	W24536	2600Ω
51	W26091	TUNING METER
52	W25438	0.1 MFD.
53		0.1 MFD.
54	W26184	12 MFD.
55	G2-24628	FILTER CHOKE
56	G13-25669	POWER TRANS. 60 CY.
57	G14-25669	POWER TRANS. 25 CY.
58	G15-25669	POWER TRANS 220V
59	W7083-A	3 AMP. FUSE
60	B21491A	CORD & PLUG
61	G19-26614	-82 SOCKET
62	G24-26614	-58 SOCKET
63	G23-26614	-57 SOCKET
64	G18-26614	-56 SOCKET
65	G20-26614	-89 SOCKET
66	W22221	2.5V DIAL LIGHT
67	W21453	40,000Ω
68	W26152A	.0001 MFD.
69		.00015 MFD.
70	W24049	0.1 MFD.
71	W-5370-A	20,000Ω
72	W23142	0.02 MFD.
73	W24077	EYELET
74	W25474-A	0.1 MFD.
75		0.1 MFD.
76	W-25937	275Ω
77	W-22688	0.1 MFD.
78	W-23635	.006 MFD.
79	W-21454	1 MEGOHM
80	W-25572	.0005 MFD.
81		.0005 MFD
82	W-21454	1 MEGOHM
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56 - 60 CY - 110 VOLT
57 - 25 CY - 110 VOLT
58 - 25 CY - 220 VOLT

RECORD OF CHANGES

(A) REPLACE ITEM 20 WITH 78 - ITEM 17 WITH 77 ADD ITEMS 74-75 AND 76 DELETE ITEM 40 — 3192
(B) ITEM 78 WAS ITEM 40 — 3197
(C) ITEMS 80 AND 81 ADDED - ITEMS 68 AND 69 DELETED 9-27-32 — 3238
(D) ADD ITEM 82 10-13-32 CW — 3238

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO
146 WIRING DIAGRAM.
APPROVED 4-13-32 | DATE | DRAWN BY | CHECKED BY | DRAWING No. B26894

1	G5-24995	ANTENNA COIL
2	G1-25968	R.F. INTERSTAGE COIL
3	G7-24996	OSCILLATOR COIL
4	G8-24065	1ST I.F. TRANSFORMER
5	G2-25449	2ND I.F. TRANSFORMER
6	G2-25449	3RD I.F. TRANSFORMER
7	C-26442B	VARIABLE CONDENSER
8	G3-25948	I.F. TUNING CONDENSER
9	G2-24729	A.F. TRANSFORMER
10	W-22417A	10-10 Ω FIL. POTEN.
11	W-23191	.01 MFD. CONDENSER
12	W-22196	20,000Ω RESISTOR
13	W-23615	.05 MFD. CONDENSER
14	W-25594	80,000Ω TONE CONTROL
15	W-23635	.006 MFD. CONDENSER
16	W-23907	750Ω RESISTOR
17	W-25540	15,000Ω RESISTOR
18	W-25435	.003 MFD. CONDENSER
19	W-23403	150,000Ω RESISTOR
20	W-21454	1-MEGOHM RESISTOR
21	W-25666A	3-MEGOHM LEVEL CONTROL
22	W-21455	300,000Ω RESISTOR
23	W-25538	.0015 MFD. CONDENSER
24		.0015 MFD. CONDENSER
25	W-25438	.1 MFD. CONDENSER
26		.1 MFD. CONDENSER
27	W-23142	.02 MFD. CONDENSER
28	W-21454	1-MEGOHM RESISTOR
29	W-21454	1-MEGOHM RESISTOR
30	W-21454	1-MEGOHM RESISTOR
31	W-25438	.1 MFD. CONDENSER
32		.1 MFD. CONDENSER
33	W-27121	5000Ω RESISTOR
34	W-25437	.0015 MFD. CONDENSER
35	W-22514	750Ω RESISTOR
36	W-23142	.02 MFD. CONDENSER
37	W-26091	TUNING METER
38	W-25857A	8 MFD. CONDENSER
39		8 MFD. CONDENSER
40	W-25573	4500Ω SEN. CONTROL
41	W-27120	25,000Ω RESISTOR
42		8500Ω RESISTOR
43	W-25945	3200Ω RESISTOR
44	G2-24628	1ST. FILTER CHOKE
45	LW-23213	2ND. FILTER CHOKE
46	W-26194	12 MFD. CONDENSER
47	W-25542	8 MFD. CONDENSER
48		4 MFD. CONDENSER
49	G13-25669	60~ POWER TRANS.
50	PART OF W-25594	POWER SWITCH
51	W-7983A	3 AMP. FUSE
52	B-21491A	CORD & PLUG
53	W-22221	2.5V. DIAL LAMP
54	W-26600	SPEAKER CABLE
55	L-26109	329-4 SPEAKER 5500Ω FIELD
56	L-26999	327-4 SPEAKER 650Ω FIELD
57	G1-23841	ANT.-GND. STRIP
58	G24-26614	-58 SOCKET
59	G23-26614	-57 SOCKET
60	G29-26614	-55 SOCKET
61	G28-26614	-89 SOCKET
62	G20-26614	-46 SOCKET
63	G19-26614	-82 SOCKET
64	W-24077	EYELET CONDENSER
65	W-4921	10,000Ω RESISTOR
66	W-26152A	.0001 MFD. CONDENSER
67		.00015 MFD. CONDENSER
68	W-23635	.006 MFD. CONDENSER
69	W-21454	1-MEGOHM RESISTOR
70	G14-25669	25~ POWER TRANS.
71	G15-25669	220V POWER TRANS.
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146-1—Wiring Diagram

CROSLEY RADIO CORP.

Models 146 and 146-1

Specifications

Models 146 and 146-1 are nine tube superheterodynes for operation from A. C. electric circuits. Model 146 uses a single speaker and Model 146-1 uses two speakers. The intermediate frequency used in both models is 181.5 kilocycles.

Tubes and Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

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

Plate voltage measured from plate contact to cathode contact.

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

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

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

Model 146

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	195	62	0	2.5*	2.5
-57	Osc. Detector	195	132	0	9.0	2.5
-58	1st I. F. Amplifier	200	62	0	2.0*	2.5
-58	2nd I. F. Amp. and Diode	0	105	200	5.0	2.5
-56	A. V. C.	60			70.0	2.5
-89	A. F. Amplifier	180	200	0	20.0	6.0
-46	Class B Output	350			0	2.5
-46	Class B Output	350			0	2.5
-82	Rectifier	380				2.5

* Measured across cathode resistors of each tube.

Model 146-1

Tube	Position	Voltages Plate	Grid Screen	Grid Supp.	Bias	Fil.
-58	R. F. Amplifier	310	130	0	4.5	2.5
-57	Osc. Detector	290	130	0	6.0	2.5
-58	1st I. F. Amplifier	310	130	0	4.5	2.5
-58	2nd I. F. Amp.	310	130	0	6.0	2.5
-56	Diode Detector and A. V. C.	80				2.0
-89	A. F. Amplifier	250	255		28.0	6.0
-46	Class B Output	365			0	2.5
-46	Class B Output	365			0	2.5
-82	Rectifier	380				2.5

CROSLEY RADIO CORP.

Model 147

Specifications

Model 147 is a four tube tuned radio frequency receiver designed for operation from 110 volt, 25 or 60 cycle A. C. and 110 volt D. C. electric circuits.

Tubes And Voltage Limits

The following are the voltage limits measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all voltages but filaments on A. C. operation. For heater or filament voltages on A. C. use a low range A. C. meter.

Line voltage—117.5 volts.

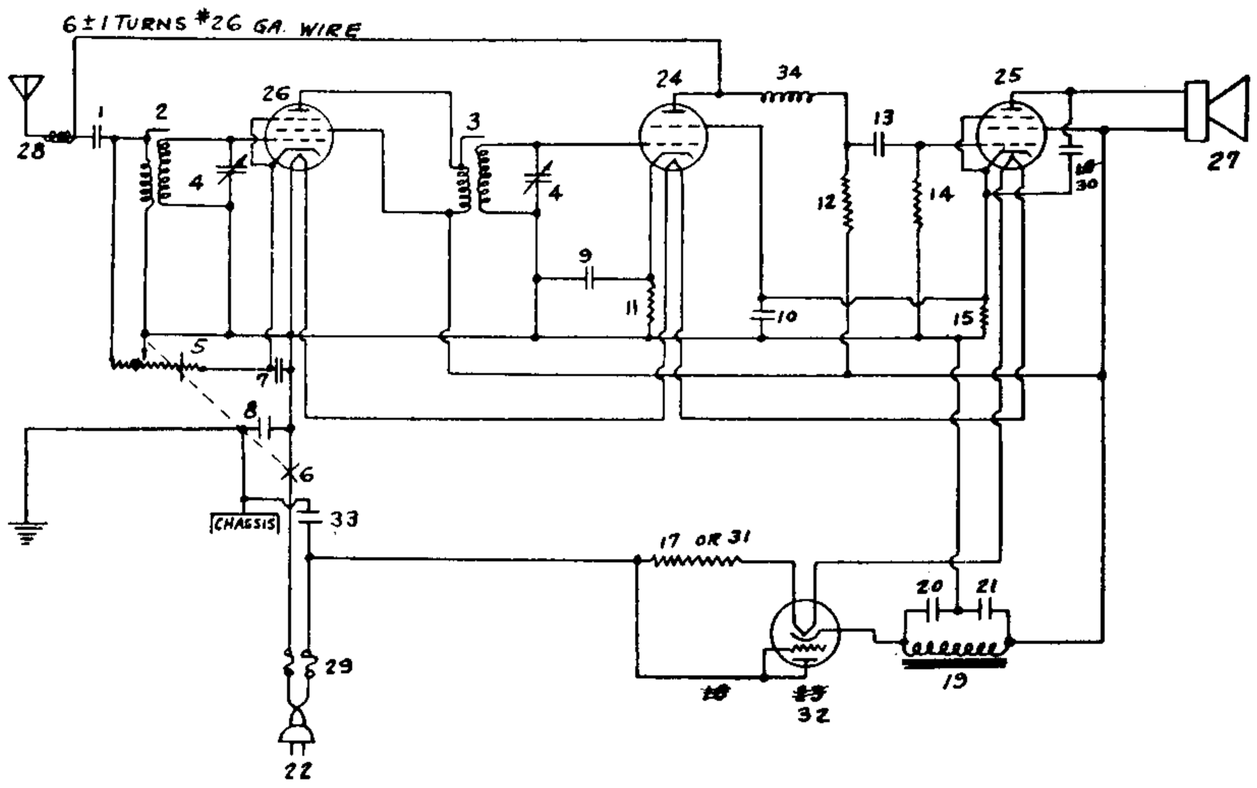
Plate voltage measured from plate contact to cathode contact.

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

Bias voltage measured from cathode to negative of "B" supply.

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
Voltages with A. C. Power Supply						
-39	R. F. Amplifier	104	104		1.3	5.6
-36	Detector	5	7		1.2	5.6
-38	Output	92	95		14	5.6
-37	Rectifier				118	5.6
Voltages with D. C. Power Supply						
-39	R. F. Amplifier	100	100		1.2	5.6
-36	Detector	5	7		1.0	5.6
-38	Output	92	95		12.0	5.6
-37	Rectifier	3			102	5.6

1	W-27652	.003 MFD.
2	LW-27680	ANTENNA COIL
3	LW-27681	INTERSTAGE COIL
4	B-27706	TUNING CONDENSER
5	W-27694	VOLUME CONT. 4500Ω
6		LINE SWITCH
7	W-25438	.1 MFD.
8		.1 MFD.
9	W-27677A	8 MFD.
10		8 MFD.
11	W-21237A	60,000 Ω
12	W-26577	3 MEG.
13	W-27203	.02 MFD.
14	W-26578	5 MEG.
15	W-26690	4500 Ω
16	~~W-25438~~	~~.003 MFD.~~
17	W-27675	300 Ω RED DEVIL
18	~~GI-24234~~	~~10 HY.~~
19	G2-24774	FILTER CHOKE
20	W-27676	4 MFD.
21		4 MFD.
22	LW-27815	CORD & PLUG
23	~~G14-27727~~	~~-24 SOCKET~~
24	G11-27727	-36 SOCKET
25	G15-27727	-38 SOCKET
26	G17-27727	-39 SOCKET
27	27790	340 SPEAKER
28	W-26072	ANTENNA LEAD
29	W-4639C	2 AMP. FUSE
30	W-27652	.003 MFD.
31	W-28100	300Ω CANDOHM
32	G12-27727	-37 SOCKET
33	W-27652	.003 MFD.
34	GI-24234	FILTER CHOKE



RECORD OF CHANGES

		Change No.
A	ITEM 16 REPLACED WITH ITEM 30 11-19-32 CRW JF	3262
B	ITEM 31 ADDED AS SELECT ITEM WITH ITEM 17 JF 11-28-32	3275
B	ITEM 18 DELETED. ITEM 23 REPLACED BY ITEM 32 JF	3262
C	ITEM 33 ADDED 11-29-32 CRW JF	3281
D	ADD ITEM 34 12-7-32 CRW JF	3289

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

147 WIRING DIAGRAM

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

CROSLEY RADIO CORP.

Model 148

Specifications

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

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

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

Plate voltage measured from plate contact to cathode contact.

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

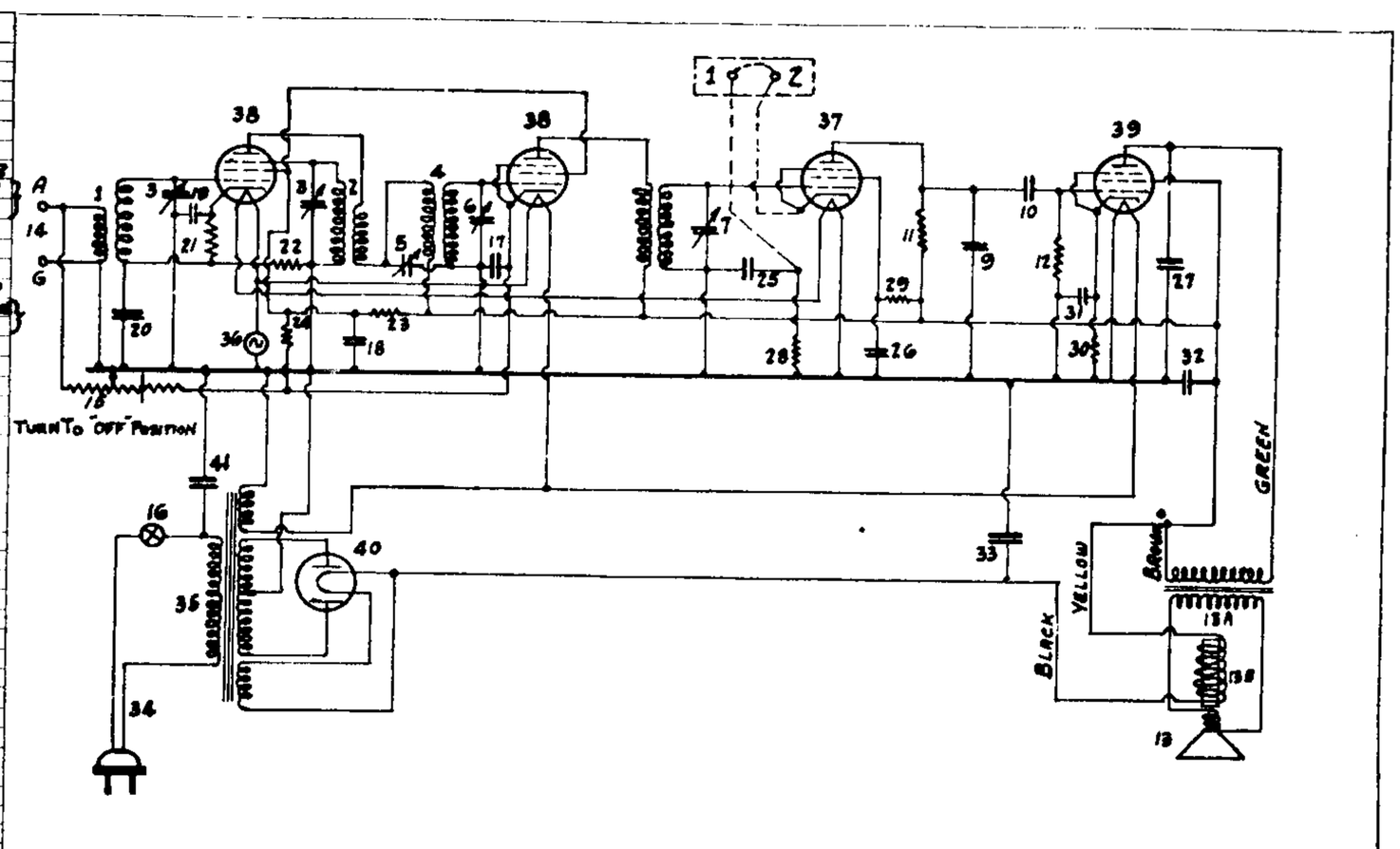
Suppressor grid voltage measured from suppressor grid contact to cathode contact.

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

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	Osc. Detector	230	110	33	2.7*	2.5
-58	I. F. Amplifier	255	140	0	3.0	2.5
-57	Detector	180	40	0	5.8	2.5
-42	Output	240	255	0	17.0	7.0
-80	Rectifier	330				4.8

*Across 275 ohm resistor in cathode circuit.

1	W-27474	ANTENNA COIL
2	W-27475	OSC. COIL
3	W-27425	456 KC. COND.
4	W-24208-0	I.F. TRANS. COIL
5	W-25948	I.F. TRANS. COND.
6	W-25008-A	I.F. TUNING COND.
7	W-25008-A	I.F. TUNING COND.
8	W-25445	I.F. TRANSFORMER
9	W-25837	.0005 MFD. COND
10	W-25837	.03 MFD. COND
11	W-21456	100,000 Ω RESIS.
12	W-23788	300,000Ω RESIS.
13	27610	SPEAKER
14	W-30264-E	5-9 TERM. BOARD
15	W-26873	5-35 VOLUME CONTROL
16	W-26873	SWITCH
17	W-25436	.1 MFD. COND.
18	W-25436	.1 MFD. COND.
19	W-25436	.1 MFD. COND
20	W-25436	.1 MFD. COND.
21	W-25937	275Ω RESIS.
22	W-26690	4800Ω RESIS.
23	W-27120	8500Ω RESIS.
24	W-27120	25000Ω RESIS.
25	W-24704	.25 MFD. COND.
26	W-25517	.05 MFD. COND.
27	W-25517	.008 MFD. COND.
28	W-21463	40000Ω RESIS.
29	W-26577	3 MEG. RESIS.
30	W-23907	750Ω RESIS.
31	W-27488	8 MFD. COND.
32	W-27488	8 MFD. COND.
33	W-23701-A	7 MFD. COND.
34	W-21491	CORD & PLUG
35	W-23559	POWER TRANS.
36	W-40994	DIAL LIGHT 6V.
37	W-27466	'57 SOCKET
38	W-27466	'58 SOCKET
39	W-27466	'42 SOCKET
40	W-27466	'80 SOCKET
41	W-27540	.0005 MFD. COND.
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64			80				
65			81				
66			82				
67			83				
68			84				
69			85				
70			86				
71			87				
72			88				
73			89				
74			90				
75			91				
76			92				
77			93				
78			94				

RECORD OF CHANGES

		Change No
A	WIRING CHGD TO REMOVE HIGH VOLTAGE FROM TRIMMER COND.	B242
B	PHONO CONNECTIONS REVERSED	B246
C	ITEM 41 ADDED	B268

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

148 WIRING DIAGRAM

APPROVED DATE DWG NO B-27437 C

CROSLEY RADIO CORP.

Model 150

Specifications

Model 150 is a six tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 181.5 kilocycles.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all but the filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of the values given in the following table.

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

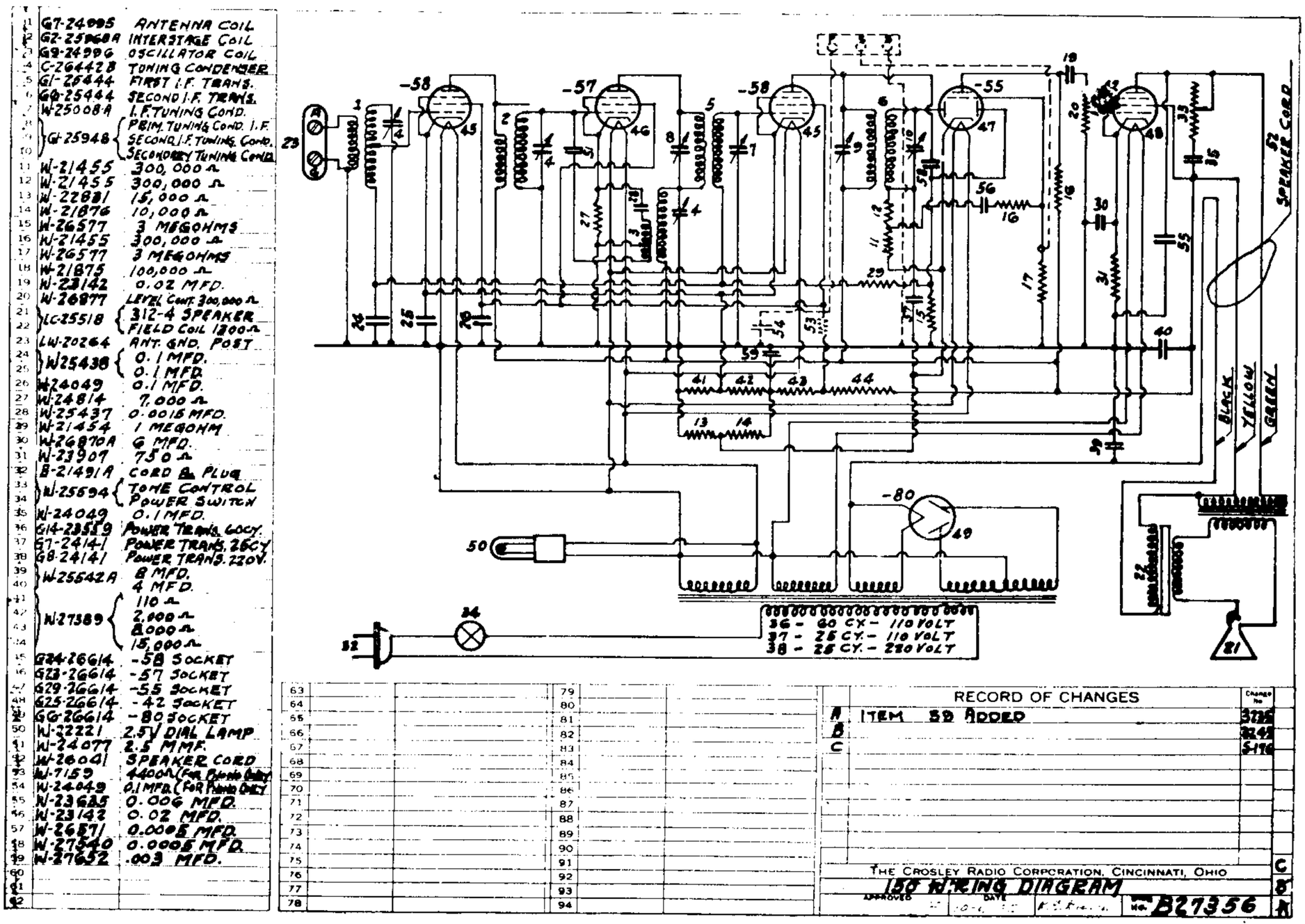
Plate voltage measured from plate contact to cathode contact.

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

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

Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	260	90	0	2.5	2.5
-57	Oscillating detector	240	80	0	5.0	2.5
-58	I. F. Amplifier	275	100	0	2.5	2.5
-55	Detector	95			23.0	2.5
-42	Output	255	260	0	22.0	6.3
-80	Rectifier	360				5.0



1	G7-24095	ANTENNA COIL	63		79
2	G2-25968A	INTERSTAGE COIL	64		80
3	G9-24996	OSCILLATOR COIL	65		81
4	C-26442B	TUNING CONDENSER	66		82
5	G1-26444	FIRST I.F. TRANS.	67		83
6	G6-25444	SECOND I.F. TRANS.	68		84
7	W-25008A	I.F. TUNING COND.	69		85
8	G1-25948	PRIM. TUNING COND. I.F.	70		86
9		SECOND. I.F. TUNING COND.	71		87
10		SECONDARY TUNING COND.	72		88
11	W-21455	300,000 Ω	73		89
12	W-21455	300,000 Ω	74		90
13	W-22881	15,000 Ω	75		91
14	W-21876	10,000 Ω	76		92
15	W-26577	3 MEGOHMS	77		93
16	W-21455	300,000 Ω	78		94
17	W-26577	3 MEGOHMS			
18	W-21875	100,000 Ω			
19	W-23142	0.02 MFD.			
20	W-26877	LEVEL CONT. 300,000 Ω			
21	LC-25518	312-4 SPEAKER			
22		FIELD COIL 1300 Ω			
23	LW-20264	ANT. GND. POST			
24	W-25438	0.1 MFD.			
25		0.1 MFD.			
26	W-24049	0.1 MFD.			
27	W-24814	7,000 Ω			
28	W-25437	0.0015 MFD.			
29	W-21454	1 MEGOHM			
30	W-26870A	6 MFD.			
31	W-23907	750 Ω			
32	B-21491A	CORD & PLUG			
33	W-25594	TONE CONTROL			
34		POWER SWITCH			
35	W-24049	0.1 MFD.			
36	G14-23519	POWER TRANS. 60CY.			
37	G7-24141	POWER TRANS. 25CY.			
38	G8-24141	POWER TRANS. 220V.			
39	W-25542A	8 MFD.			
40		4 MFD.			
41	W-27589	110 Ω			
42		2,000 Ω			
43		8,000 Ω			
44		15,000 Ω			
45	G24-26614	-58 SOCKET			
46	G23-26614	-57 SOCKET			
47	G29-26614	-55 SOCKET			
48	G25-26614	-42 SOCKET			
49	G6-26614	-80 SOCKET			
50	W-22221	2.5V DIAL LAMP			
51	W-24077	2.5 MMF.			
52	W-26041	SPEAKER CORD			
53	W-7159	4400Ω (FOR PHONO ONLY)			
54	W-24049	0.1 MFD. (FOR PHONO ONLY)			
55	W-23685	0.006 MFD.			
56	W-23142	0.02 MFD.			
57	W-26571	0.0005 MFD.			
58	W-27540	0.0005 MFD.			
59	W-27652	.003 MFD.			
60					
61					
62					

RECORD OF CHANGES		Change No.
A	ITEM 52 ADDED	3726
B		3845
C		5-196

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

150 WIRING DIAGRAM

APPROVED — DATE — DWG. NO. B27356

C B A

CROSLEY RADIO CORP.

Model 154

Specifications

Model 154 is a midget four tube superheterodyne designed for operation from A. C. electric circuits. The intermediate frequency used is 456 KC. In addition to the combination volume control-switch and the tuning control, there is a regeneration control, a short fibre rod with a screw driver slot, located at the rear of the chassis. This should be adjusted for the most sensitive operation without oscillation in the receiver.

Tubes and Voltage Limits

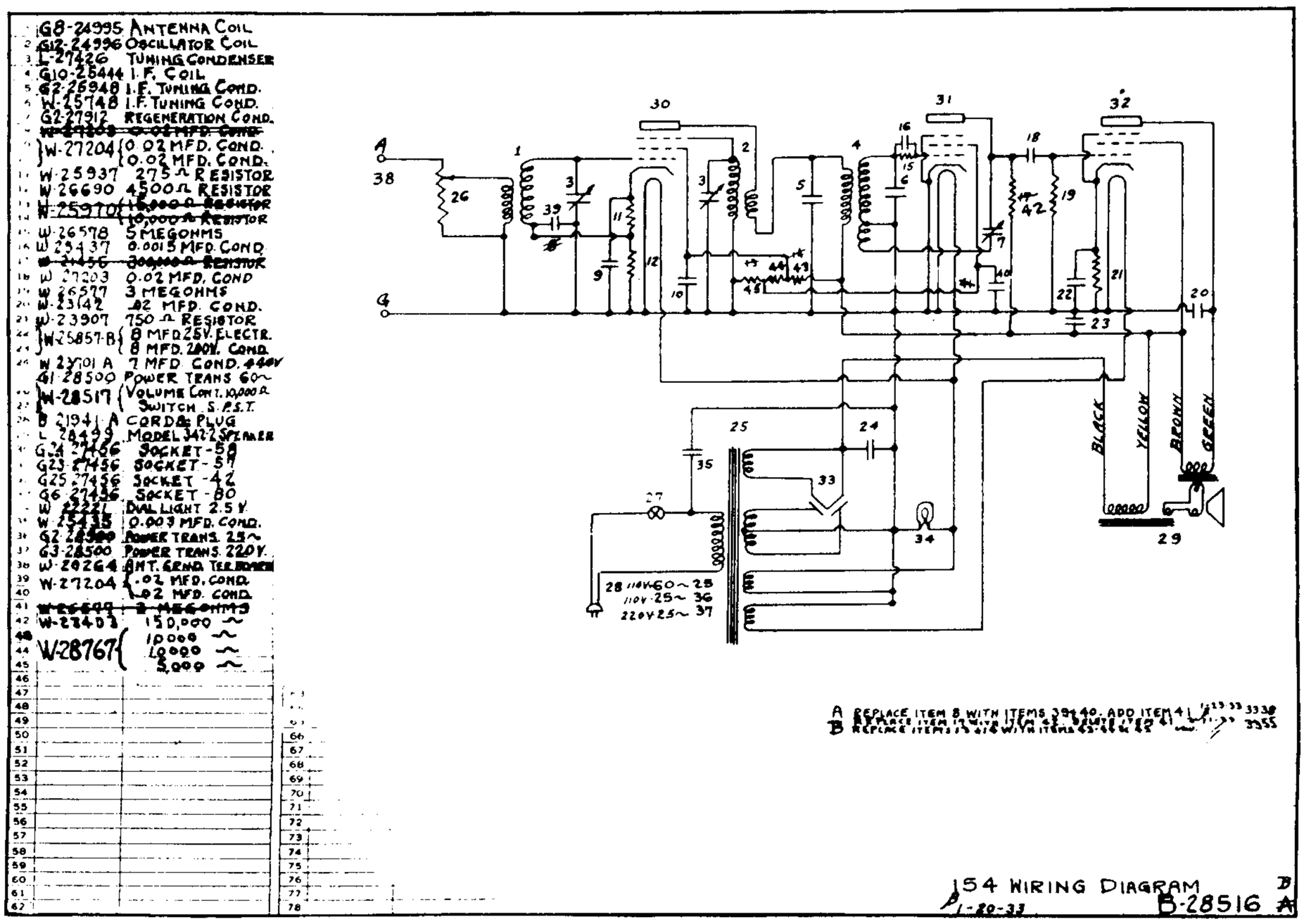
The tubes and their functions and voltages are shown in the following chart. All tube voltages are to be measured with the set in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for measuring all but filament voltages. Measure filament voltages with a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

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

All voltages, except filament, measured from tube contact to chassis.

Filament voltages measured between filament contacts.

Tube	Position	Voltages Plate	Screen Grid	Cathode	Control Grid	Fil.
-58	Oscillator modulator	200	100	16	-14	2.5
-57	2nd Detector	25	20	0	0	2.5
-42	Output	190	200	12	0	6.3
-80	Rectifier	310				5.0



CROSLEY RADIO CORP.

Model 155

Specifications

Model 155 is a four tube superheterodyne designed for operation from D. C. electric circuits. The intermediate frequency used is 456 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all voltages. The voltage limits are + or — 10% of values given in the following table.

Line voltage—117.5 volts.

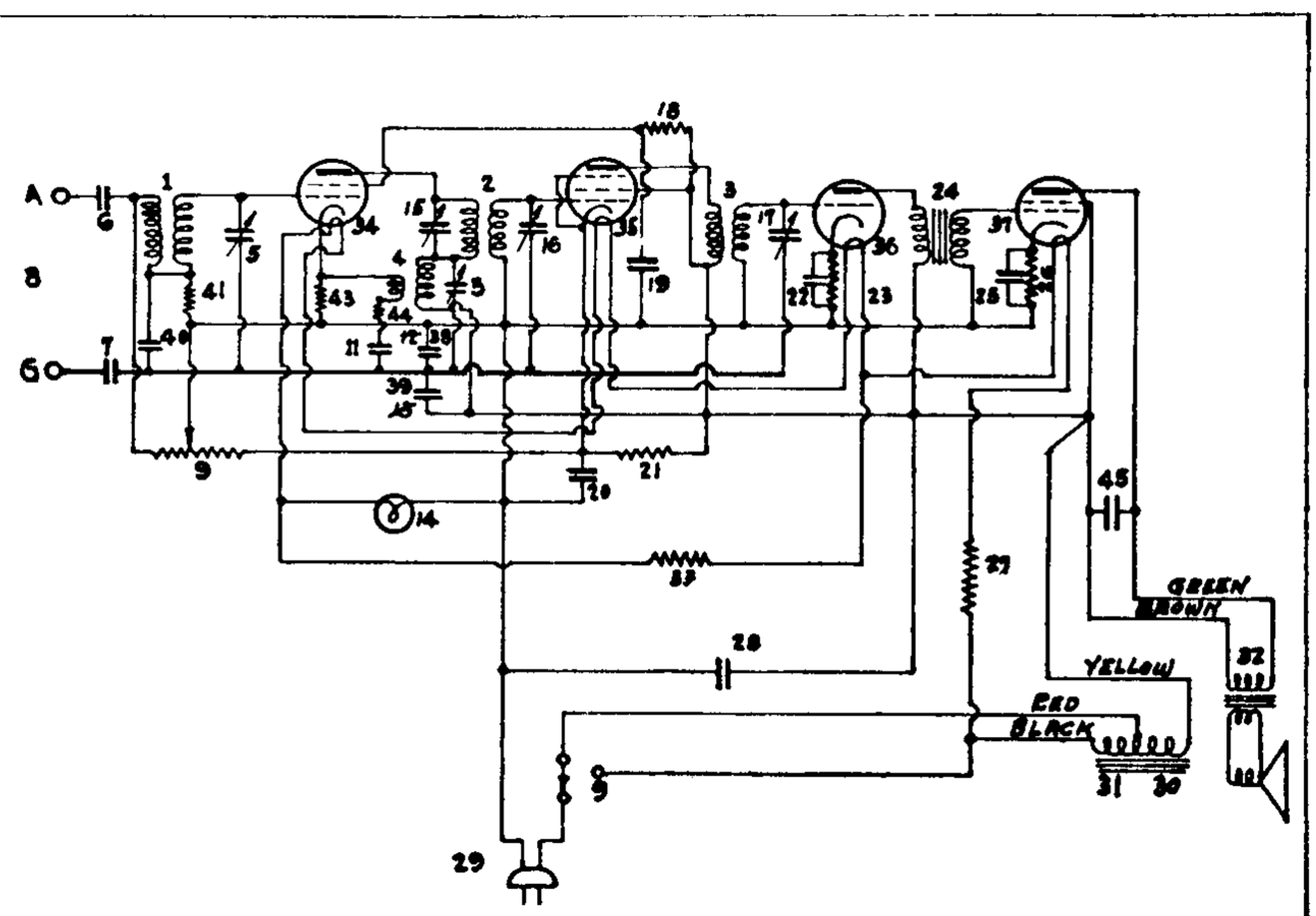
Plate voltage measured from plate contact to cathode contact.

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

Bias voltage measured from grid contact or negative of D. C. supply to cathode contact.

Tube	Position	Voltages			
		Plate	Screen Grid	Bias	Fil.
-36	Oscillating Detector	92	50	5.0	6.3
-39	I. F. Amplifier	96	96	3.6	6.3
-37	2nd Detector	82		9.5	6.3
-48	Output	65	80	15.0	30.0

1	68-24935	ANTENNA COIL
2	67-25444	I.F. TRANSFORMER
3	67-25445	I.F. TRANSFORMER
4	613-24996	OSCILLATOR COIL
5	L-27752	TUNING CONDENSER
6	W-23633	.006 MFD.
7	W-23635	.006 MFD.
8	W-20264	ANT. GRD. TERM.
9	W-27755	VOL. CONT. & SWITCH
10	W-27121	5,000 Ω
11	W-27652	.003 MFD.
12	W-25428	.1 MFD.
13		.1 MFD.
14	W-22221	2.5 V. DIAL LIGHT
15	62-26948	I.F. CONDENSER
16	W-26008-A	I.F. CONDENSER
17	W-26008-A	I.F. CONDENSER
18	W-21465	300,000 Ω
19	W-27204	.02 MFD.
20		.02 MFD.
21	W-23616	15,000 Ω
22	W-24784	.25 MFD.
23	W-21875	100,000 Ω
24	67-27062	A.F. TRANSFORMER
25	W-26870A	6 MFD.
26	W-24097	350 Ω
27	W-27814	135 Ω
28	W-27749	.5 MFD.
29	A-21491A	PLUG & CABLE
30	FILTER CHOKE ON SPKR.	
31	SPKR. FIELD COIL 30 Ω	
32	OUTPUT TRANS. ON SPKR.	
33	W-27813	200 Ω
34	611-27456	-36 TUBE SOCKET
35	611-27456	-39 TUBE SOCKET
36	612-27456	-37 TUBE SOCKET
37	633-27456	-48 TUBE SOCKET
38	W-25316	.25 MFD.
39		.25 MFD.
40	W-27203	.02 MFD.
41	W-21875	100,000 Ω
42	W-23681	15,000 Ω
43	W-24814	7,000 Ω
44	W-25937	275 Ω
45	W-27203	.02 MFD.
46		
47		
48		
49		
50		
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52		
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63			79		
64			80		
65			81		
66			82		
67			83		
68			84		
69			85		
70			86		
71			87		
72			88		
73			89		
74			90		
75			91		
76			92		
77			93		
78			94		

RECORD OF CHANGES

		Change No.
A	REPLACE ITEMS 12 AND 13 WITH 38 ADDED ADD ITEMS 40 AND 41	3265
B	ITEM 10 REPLACED WITH ITEM 42	3269
C	ITEM 42 REPLACED WITH ITEM 43 ADD ITEM 44	3274
D	ITEM 45 ADDED	3294

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

155 CHASSIS WIRING DIAGRAM

APPROVED | DATE 10-25-32 | Johnafer | DWG NO. B-27757

D C B A

CROSLEY RADIO CORP.

Model 156

Specifications

Model 156 is a five tube battery superheterodyne designed for operation from a 2 volt "A" battery, three 45 volt "B" batteries, and a 22½ "C" battery. The intermediate frequency used is 456 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohm per volt, or more) for all voltages. The voltage limits are + **or** − 10% of values given in the following table.

Battery voltage should be that specified above.

Plate voltage measured from plate contact to filament contact, except as specified.

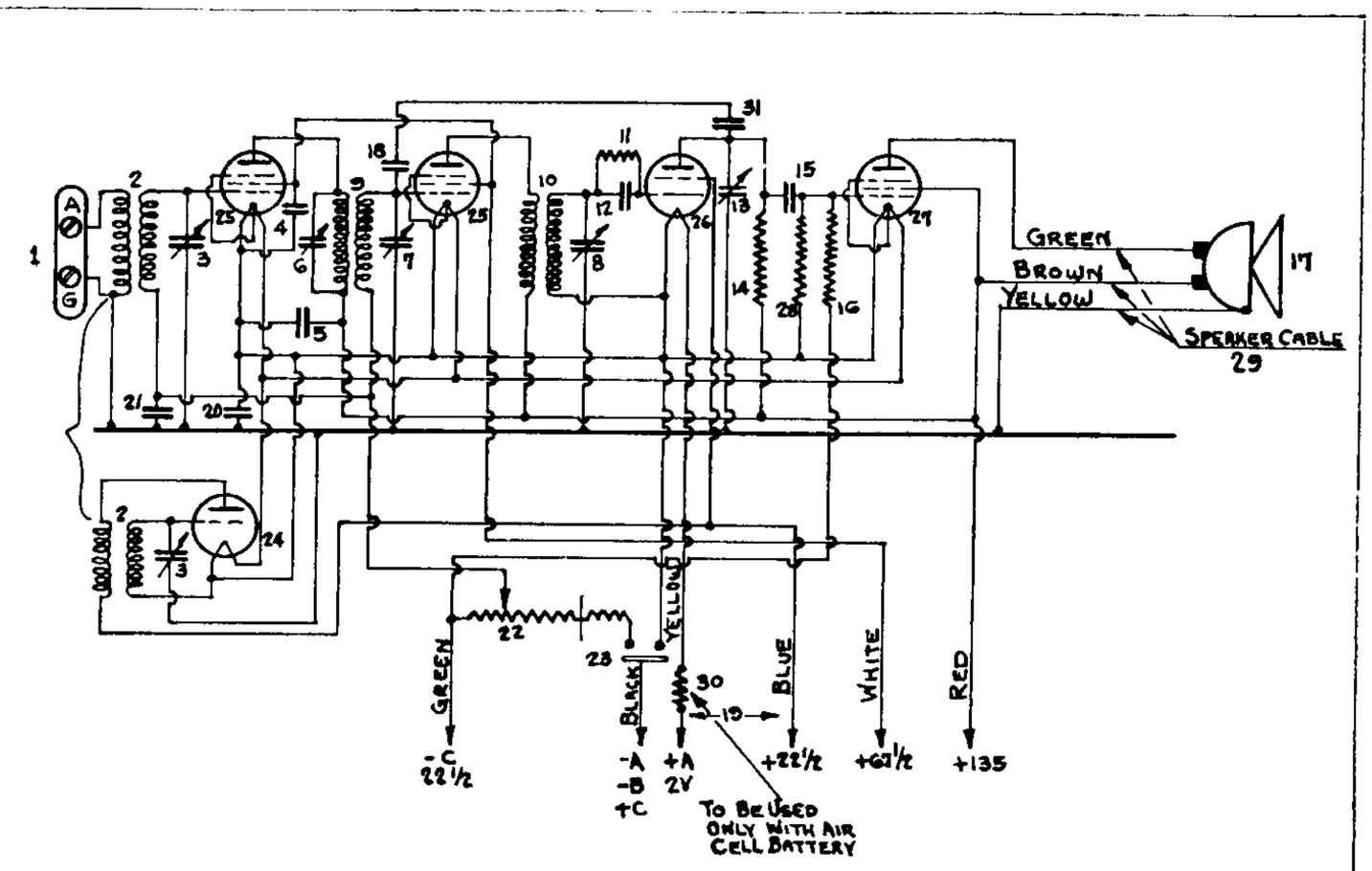
Screen grid voltage measured from screen grid contact to filament contact.

Bias voltage measured from grid contact to negative filament contact.

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

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

1	L-20264	Antenna Ground Post
2	GI-27937	Ant. & Osc. Coils
3	B-27425	Tuning Cond.
4	W-25438	0.1 MFD.
5		0.1 MFD.
6	GI-25948	I.F. Tuning Cond.
7	W-25008-A	I.F. Tuning Cond.
8	W-25008-A	I.F. Tuning Cond.
9	GT-25444	I.F. Trans.
10	GT-25445	I.F. Trans.
11	W-26577	3 Meg Grid Leak
12	W-5382	0.00025 MFD.
13	GI-27912	Regenerat. Cont. Cond.
14	W-21455	300,000 Ω
15	W-27203	0.02 MFD.
16	W-21454	1 Megohm Grid Leak
17	L-27917	336-3 Speaker
18	M-41	Eyelet Condenser
19	B-27930	Battery Cable
20	W-25438	0.1 MFD.
21		0.1 MFD.
22	W-27939	Volume Cont. 10,000 Ω Switch
23		
24	G9-27456	-30 Socket
25	G31-27456	-34 Socket
26	G10-27456	-32 Socket
27	G36-27456	-33 Socket
28	W-26577	3 Meg. Resis.
29	W-27933	Speaker Cable
30	G2-23300	Air Cell Resistor
31	W-24077	Eyelet Cond.



RECORD OF CHANGES — Change No.

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

APPROVED — DRAWN: 156 WIRING DIAGRAM — DATE: 11-10-32 — DWG NO: B-27938

CROSLEY RADIO CORP.

Model 157

Specifications

Model 157 is a ten tube superheterodyne for operation from A. C. electric circuits. The intermediate frequency used is 181.5 kilocycles.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

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

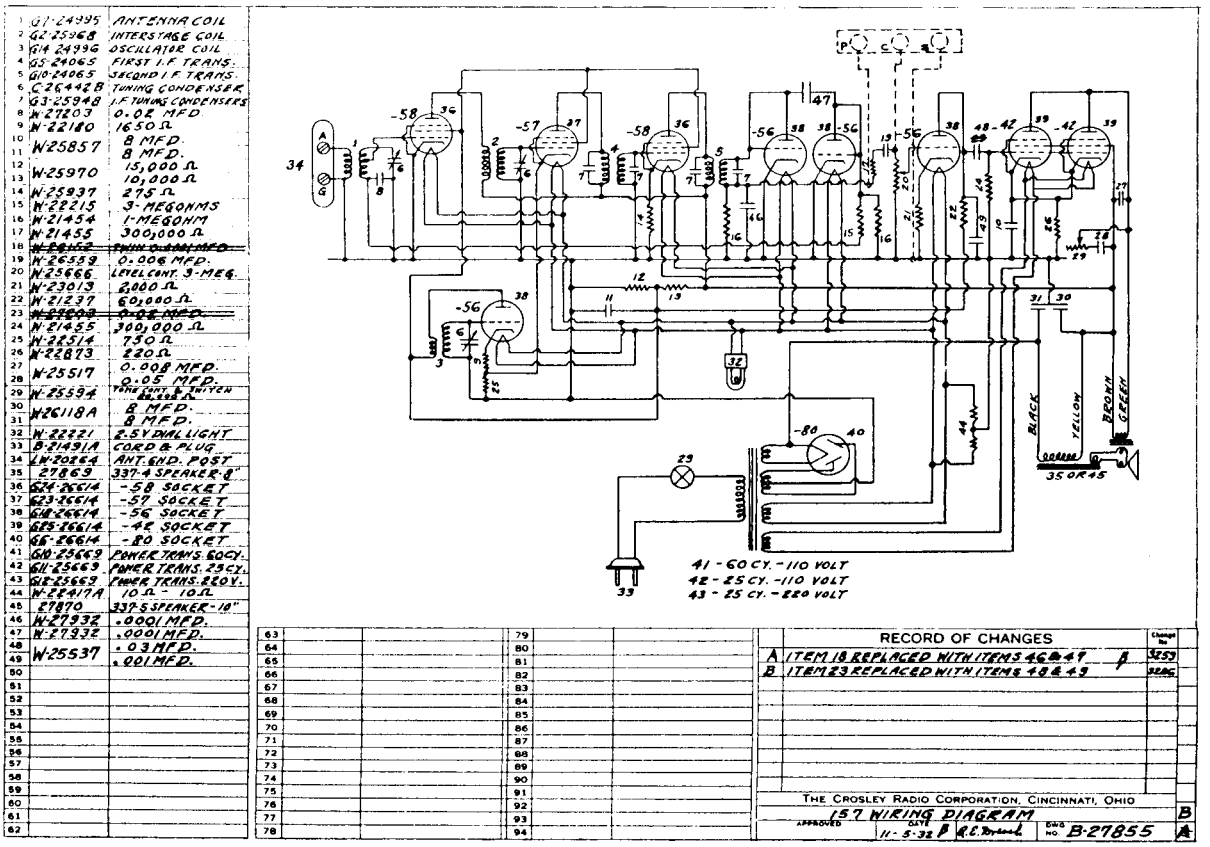
Plate voltage measured from plate contact to cathode contact.

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

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

Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	240	110	0	0	2.5
-57	1st Detector	240	110	0	6.0	2.5
-56	Oscillator	110			20.0	2.5
-58	I. F. Amplifier	240	110	0	2.8	2.5
-56	Detector	0				2.5
-56	AVC Rectifier	0				2.5
-56	A. F. Amplifier	40			2.0	2.5
-42	Parallel Output	250	260		17.5	6.3
-42	Parallel Output	250	260		17.5	6.3
-80	Rectifier	350				4.8



1	G1-24995	ANTENNA COIL
2	G2-25968	INTERSTAGE COIL
3	G4-24996	OSCILLATOR COIL
4	G5-24965	FIRST I.F. TRANS.
5	G6-24965	SECOND I.F. TRANS.
6	C-26442B	TUNING CONDENSER
7	G3-25948	I.F. TUNING CONDENSERS
8	W-27203	0.02 MFD.
9	W-22180	1650 Ω
10		8 MFD.
11	W-25857	8 MFD.
12		15,000 Ω
13	W-25970	10,000 Ω
14	W-25937	275 Ω
15	W-22215	3-MEGOHMS
16	W-21454	1-MEGOHM
17	W-21455	300,000 Ω
18	~~W-25952~~	~~TWIN 0.006 MFD.~~
19	W-26559	0.006 MFD.
20	W-25666	LEVEL CONT. 3-MEG.
21	W-23013	2,000 Ω
22	W-21237	60,000 Ω
23	~~W-25952~~	~~TWIN 0.05 MFD.~~
24	W-21455	300,000 Ω
25	W-22514	750 Ω
26	W-22873	220 Ω
27	W-25517	0.008 MFD.
28		0.05 MFD.
29	W-25594	TONE CONT. & ANTENN BAL. 1.5Ω
30	W-26118A	8 MFD.
31		8 MFD.
32	W-22221	2.5V DIAL LIGHT
33	B-21491A	CORD & PLUG
34	LW-20264	ANT. GND. POST
35	27869	337-4 SPEAKER-8"
36	G24-2661A	-58 SOCKET
37	G23-2661A	-57 SOCKET
38	G14-2661A	-56 SOCKET
39	G15-2661A	-42 SOCKET
40	G6-2661A	-80 SOCKET
41	G10-25663	POWER TRANS. 60CY.
42	G11-25663	POWER TRANS. 25CY.
43	G12-25663	POWER TRANS. 220V.
44	W-22417A	10 Ω - 10 Ω
45	27870	337-5 SPEAKER-10"
46	W-27932	.0002 MFD.
47	W-27932	.0001 MFD.
48	W-25537	.03 MFD.
		.001 MFD.

RECORD OF CHANGES

A ITEM 18 REPLACED WITH ITEMS 46 & 47 — B — 3259

B ITEM 23 REPLACED WITH ITEMS 48 & 49 — 3260

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

157 WIRING DIAGRAM — B

APPROVED — DATE 11-5-32 — DWG NO. B-27855 — A

CROSLEY RADIO CORP.

Model 158

Specifications

Model 158 is a seven tube superheterodyne designed for operation from A. C. electric circuits. The intermediate frequency used is 181.5 KC.

Tubes And Voltage Limits

The following are the voltages measured with the receiver in operating condition, but with no signal to the antenna circuit. Use a high resistance D. C. Voltmeter (1000 ohms per volt, or more) for all but filament voltages. In measuring filament or heater voltages use a low range A. C. meter. The voltage limits are + or — 10% of values given in the following table.

Line voltage—117.5 (235 for 220 volt receivers).

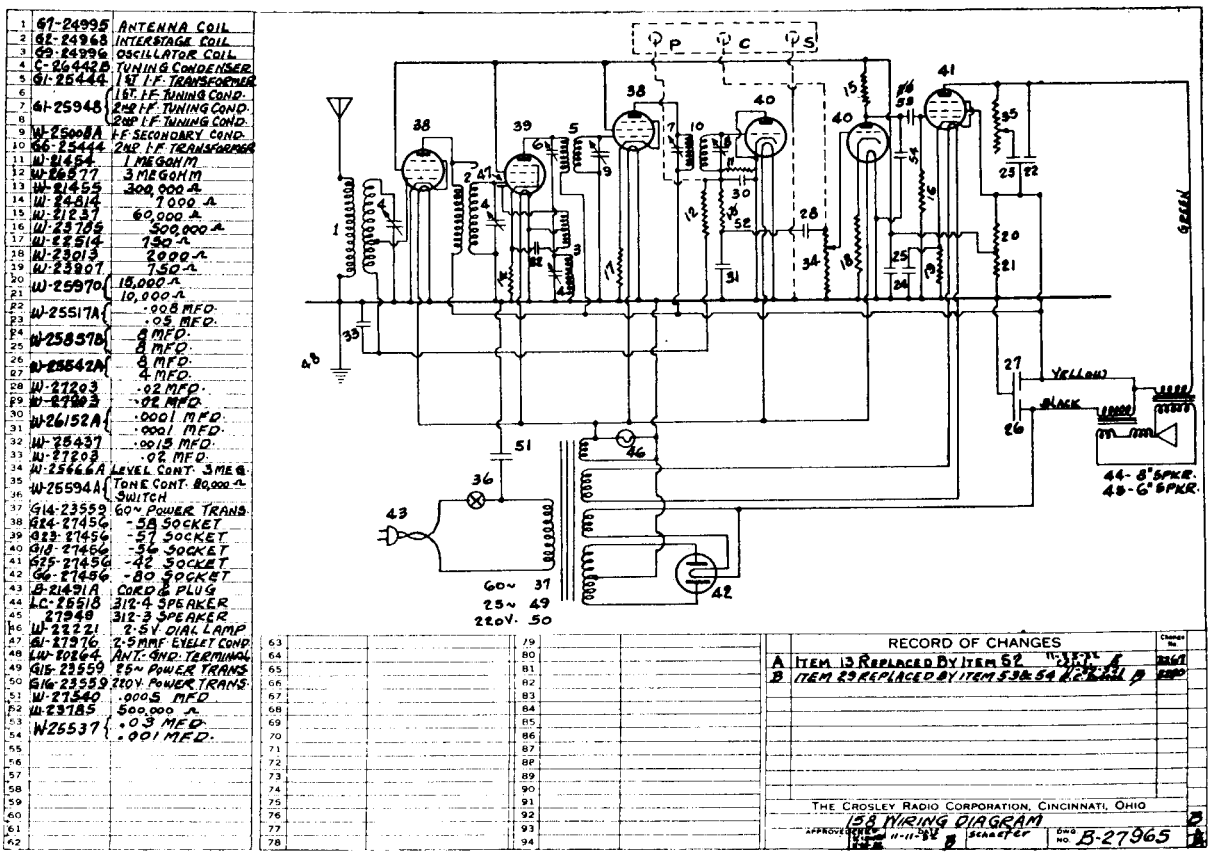
Plate voltage measured from plate contact to cathode contact.

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

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

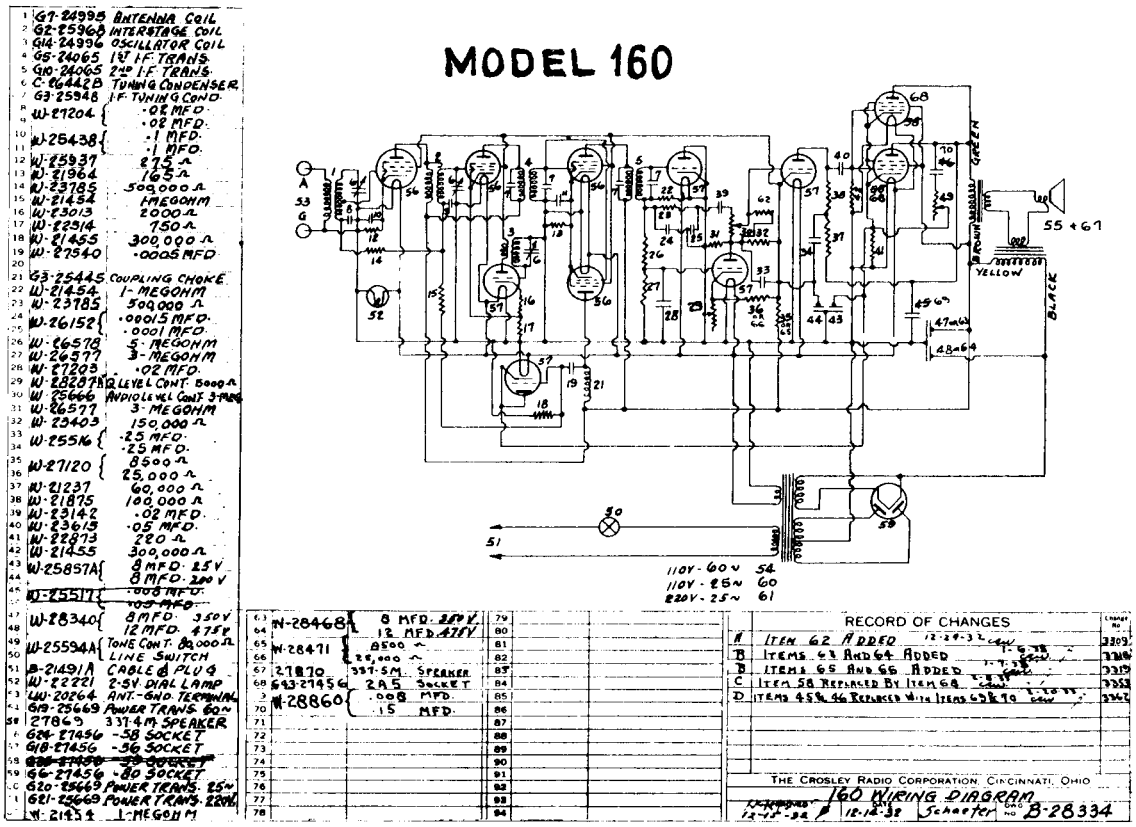
Bias voltage measured from cathode contact to chassis.

Tube	Position	Voltages Plate	Screen Grid	Supp. Grid	Bias	Fil.
-58	R. F. Amplifier	270	85	0	0	2.5
-57	Oscillating Detector	270	80	0	6.0	2.5
-58	I. F. Amplifier	275	80	0	4.0	2.5
-56	Detector	0				2.5
-56	A. F. Amplifier	40			1.6	2.5
-42	Output	245	250		22.0	6.3
-80	Rectifier	350				4.8



CROSLEY RADIO CORP.

MODEL 160



Tube	Position	Plate	Voltages Screen Grid	Cathode	Fil.
-58	R. F. Amplifier	255	120	4	2.5
-58	1st Detector	260	120	9	2.5
-58	I. F. Amplifier	260	115	4	2.5
-58	Aperiodic I. F. Amplifier	260	115	4	2.5
-56	Oscillator	120		22	2.5
-56	AVC diode	17		17	2.5
-56	QAVC Tube	90		0-20*	2.5
-56	2nd Detector	0		0	2.5
-56	A. F. Amplifier	190		120	2.5
-59†	Output (Class A Pentode)	250	260	17	2.5
-59†	Output (Class A Pentode)	250	260	17	2.5
-80	Rectifier	380			4.8

*** Voltage dependent on position of "Q" control.**
† May be 2A5 tubes.

Specifications

Model 160 is a twelve tube superheterodyne for operation from A.C. electric circuits. The intermediate frequency used is 181.5 KC.

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

All voltages, except filament, measured from tube contact to chassis. Filament voltages measured between heater contacts.

CROSLEY RADIO CORP.

Model 163

Specifications

Model 163 is a five tube superheterodyne designed to operate on 100 to 130 volts, D. C. or any frequency A. C., electric circuits. The intermediate frequency is 456 KC.

Tubes and Voltage Limits

The following chart gives the tubes, their functions, and voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all but filament voltages on A. C. operation. For A. C. filament voltages on A. C. operation use a low range A. C. meter. The voltage limits are + or — 10% of the values given.

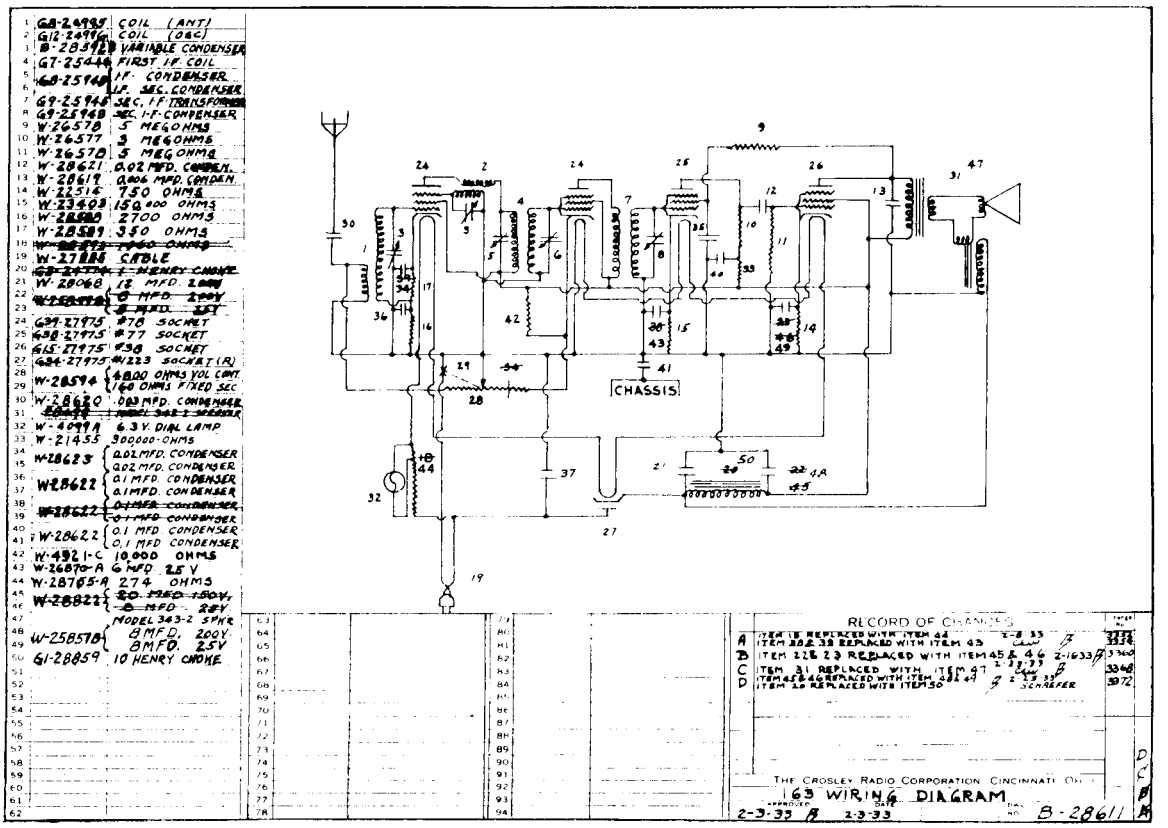
Line voltage—117.5 volts D. C. or A. C.

All voltages measured from tube contact to negative line, except filament.

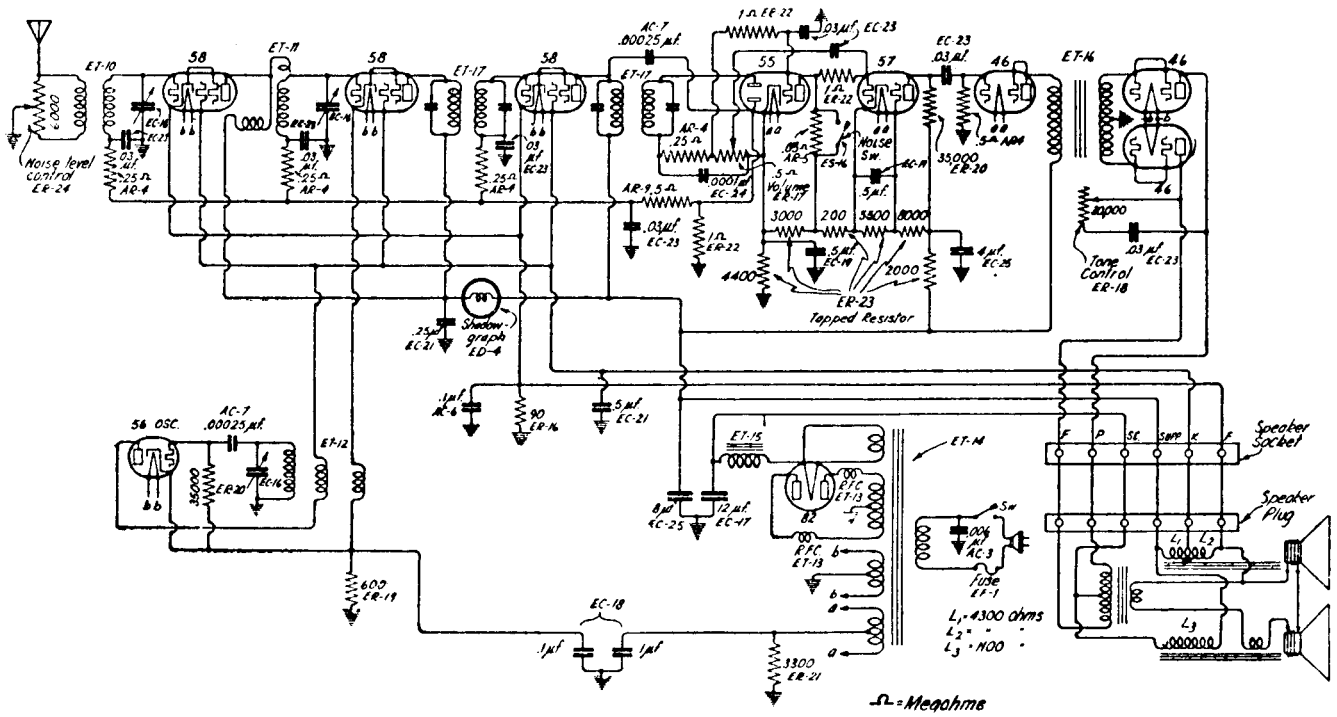
Filament voltages measured between filament contacts.

Tube	Position	Plate	Voltages for A. C. Operation* Screen Grid	Cathode	Supp. Grid	Fil.
-78	Oscillator modulator	105	105	2.5	20	6.3
-78	I. F. Amplifier	105	105	3.0	3.0	6.3
-77	2nd Detector	5	5	4.0	4.0	6.3
-38	Output	102	105	8.0	8.0	6.3
12Z3	Rectifier	117.5AC		120		12.6

* **Voltages with D. C. operation are about 10% lower than those with A. C. operation.**



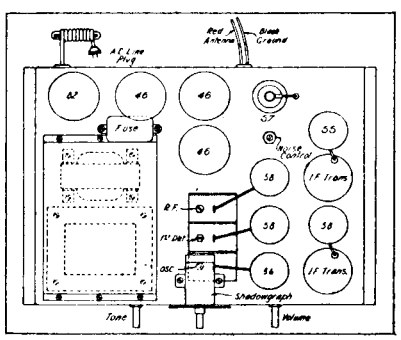
EMERSON RADIO & PHONOGRAPH CORP.



Model B-AC-10

Model B-10 Chassis

Part No.	Description	List Price
ET-10	Antenna Coil	$ .50 each
ET-11	R. F. Coil	.50 "
ET-12	Oscillator Coil	.55 "
ET-13	R. F. Chokes	.20 "
ET-14	Power Transformer	5.25 "
ET-15	Power Choke	1.80 "
ET-16	Audio Transformer	1.85 "
ET-17	I. F. Transformer	1.15 "
ER-17	Volume Control	.85 "
ER-18	Tone Control	.60 "
ER-24	Noise Control	.55 "
	Any Carbon Resistor (specify value) (See diagram for Part No.)	.15 "
ER-23	Tapped Resistor	.55 "
EC-16	Variable Condenser	2.50 "
EC-17	12 mfd. Electrolytic Condenser	.90 "
EC-25	Dual Electrolytic Condenser	1.25 "
EC-18	1 mfd. & 1 mfd. Condensers in can	.70 "
	Any size Tubular Condenser or Mica Condenser (See diagram for Part No.)	.15 "
	Any Socket (specify tube number)	.10 "
ES-15	Dual Speakers	10.80 pair
ED-4	Shadowgraph	1.65 each
ES-16	On-Off Switch	.40 "
ED-3	Frequency Calibrated Tuning Dial	1.05 "



Minor Reasons For Failure Of Receiver To Function

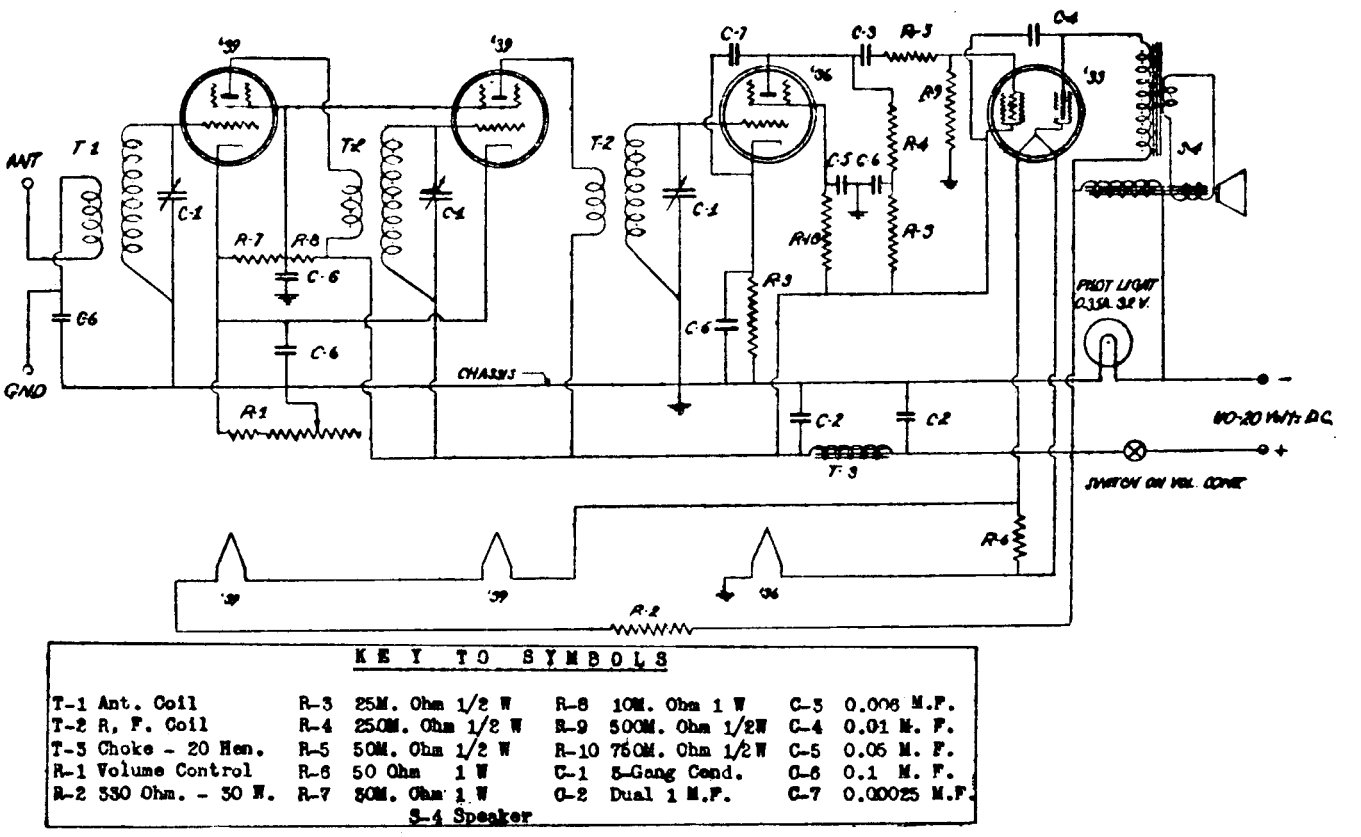
1. **Defective Tubes**
2. **Screen Grid Caps Off Tubes**
3. **Volume Control not fully on**
4. **Speaker Plug not in socket**
5. **Aerial disconnected**
6. **Poor Aerial**
7. **Fuse burnt out**
8. **Noise Control set too far counter-clockwise.**

Voltage Readings

	Plate	Chassis To Cathode
58—R. F.	230-250	3-5
58—Det.	230-250	5-7
56—Osc.	95-115	5-7
58—I. F.	230-250	3-5
55—Duo-diode triode	75-90	40-50
46—Driver	230-250	30-35
46, 46—Amplifiers	310-330	.....

Line Voltage—117

EMERSON RADIO & PHONOGRAPH CORP.



KEY TO SYMBOLS

T-1 Ant. Coil	R-3	25M. Ohm 1/2 W	R-8	10M. Ohm 1 W	C-3	0.006 M.F.
T-2 R. F. Coil	R-4	250M. Ohm 1/2 W	R-9	500M. Ohm 1/2W	C-4	0.01 M. F.
T-3 Choke - 20 Hen.	R-5	50M. Ohm 1/2 W	R-10	750M. Ohm 1/2 W	C-5	0.05 M. F.
R-1 Volume Control	R-6	50 Ohm 1 W	C-1	3-Gang Cond.	C-6	0.1 M. F.
R-2 330 Ohm. - 30 W.	R-7	50M. Ohm 1 W	C-2	Dual 1 M.F.	C-7	0.00025 M.F.
		S-4 Speaker				

Model D. C.-4

SERVICE PRICE LIST

Part No.	Description	List Price
T-1	Antenna Coil	$ .55
T-2	R. F. Coil	1.05
T-3	Choke-20 Hen.	1.00
R-1	Volume Control	.90
R-2	330 Ohm-30 Watt Resistor	.60
	½ Watt and 1 Watt Resistors	.15
C-1	Three-Gang Condenser	2.55
C-2	Dual 1 Mfd. Condenser	1.05
C-7	.00025 Mfd. Molded Mica Cond	.15
	Any Size Tubular Condenser -	.15
S-1	No. 339 Socket	.10
S-2	No. 336 Socket	.10
S-3	No. 333 Socket	.10
S-4	Dynamic Speaker	4.50
D-1	Disc Dial with Set Screws	.25
W-1	D. C. Cord Assembly 6½ ft. long	.20
L-2	Pilot Light Globe .5 Amp. - 3.2 Volt	.15
K-1	Control Knob	.15
	Cabinet (Specify Serial No. of Set)	2.50
	Shipping Carton - Complete	.25

Voltage Readings:

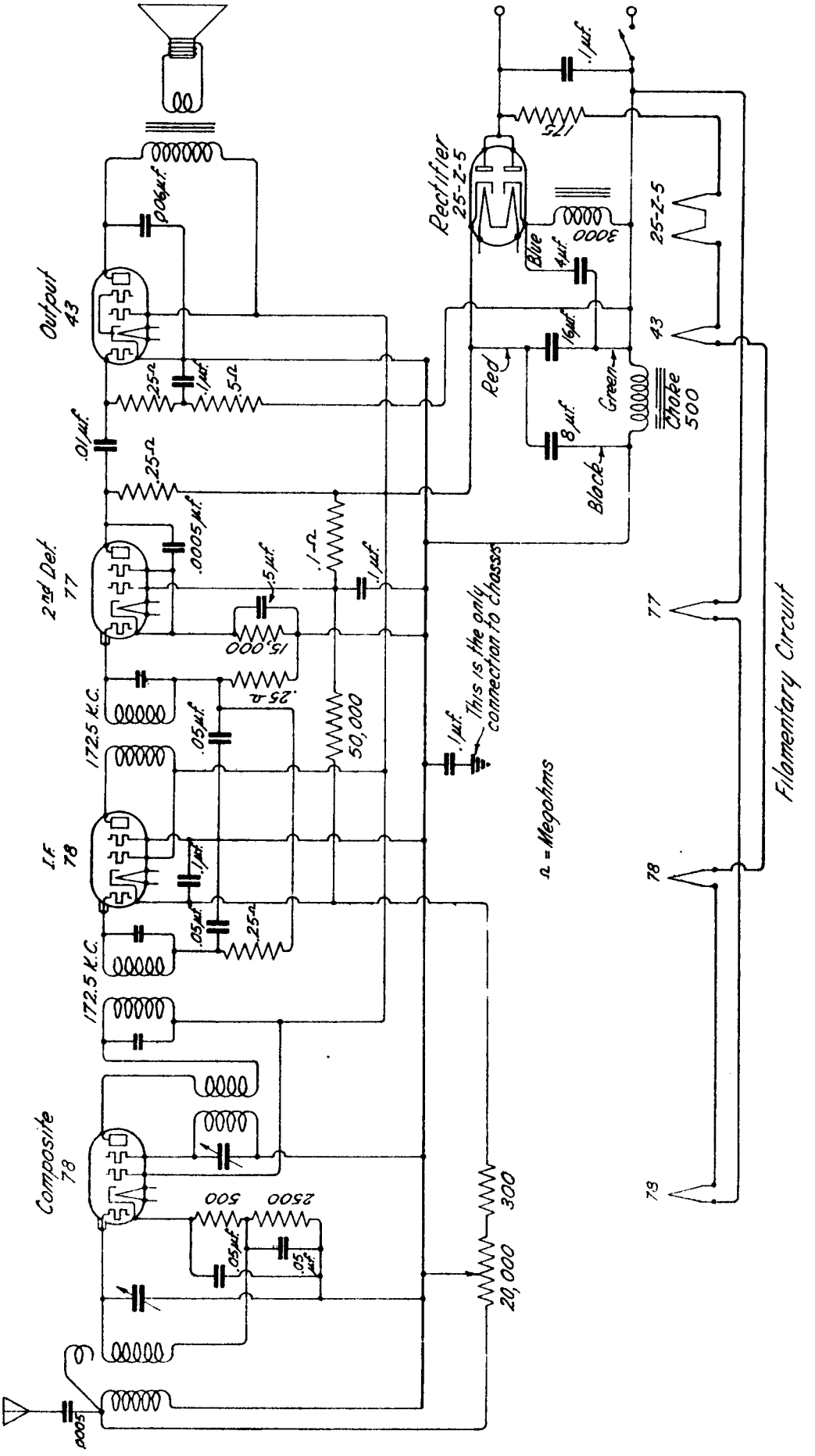
Voltages should be measured with the volume control all the way on, using a 250-volt D. C. voltmeter, with the resistance of 1,000 ohms per volt.

	Approximate Voltages		
	Plate	Screen	Cathode
333 Pentode Tube to Chassis	105	110	none
339 R. F. Tubes to Chassis	110	80	3
336 Detector Tube	50	20	5

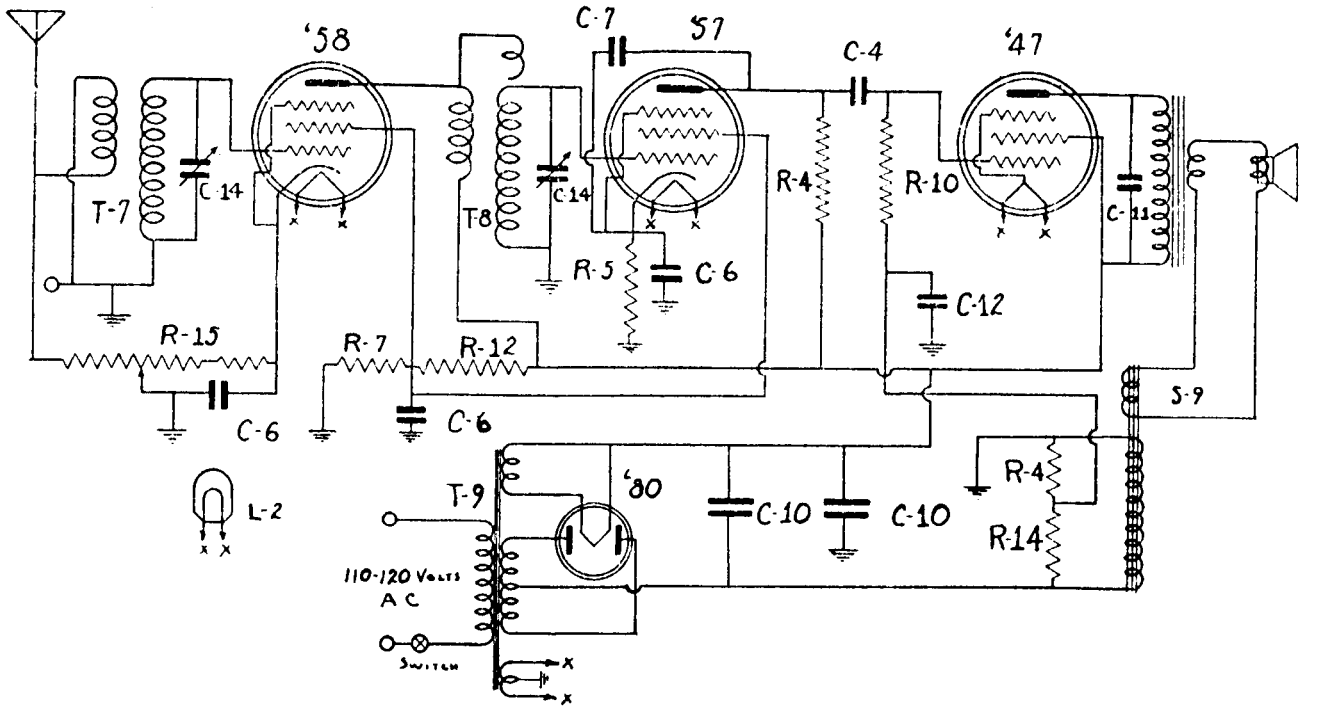
The bias on the pentode is obtained by reading from pentode filament to Chassis and should be about 9 volts.

EMERSON RADIO & PHONOGRAPH CORP.

CHASSIS No. H-5
USED IN MODEL 30 SET
" " 250 "
" " 300 "



EMERSON RADIO & PHONOGRAPH CORP.



L-AC-4

SERVICE PRICE LIST

Part No.	Description	List Price
T-7	Antenna Coil	$ .36
T-8	R. F. Coil	.54
T-9	Power Transformer	2.00
R-15	Volume Control	.75
	Any ½ or 1 Watt Resistor (Refer to Diagram)	.15
C-14	Two-Gang Condenser	1.50
C-10	4 mfd. Dry Electrolytic Cond	.50
	Any Size Tubular Condenser No. (Refer to Diagram)	.10
C-7	.00025 Molded Mica Condenser	.10
S-9	Dynamic Speaker	4.50
	Any Socket - Specify Tube Nu on Socket and Set Serial Nu	.10
D-2	Disc Dial with Set Screws	.20
K-1	Control Knob	.10
B-2	Pilot Light Assembly	.10 "
L-2	Pilot Light	.15 "

Voltage Readings:

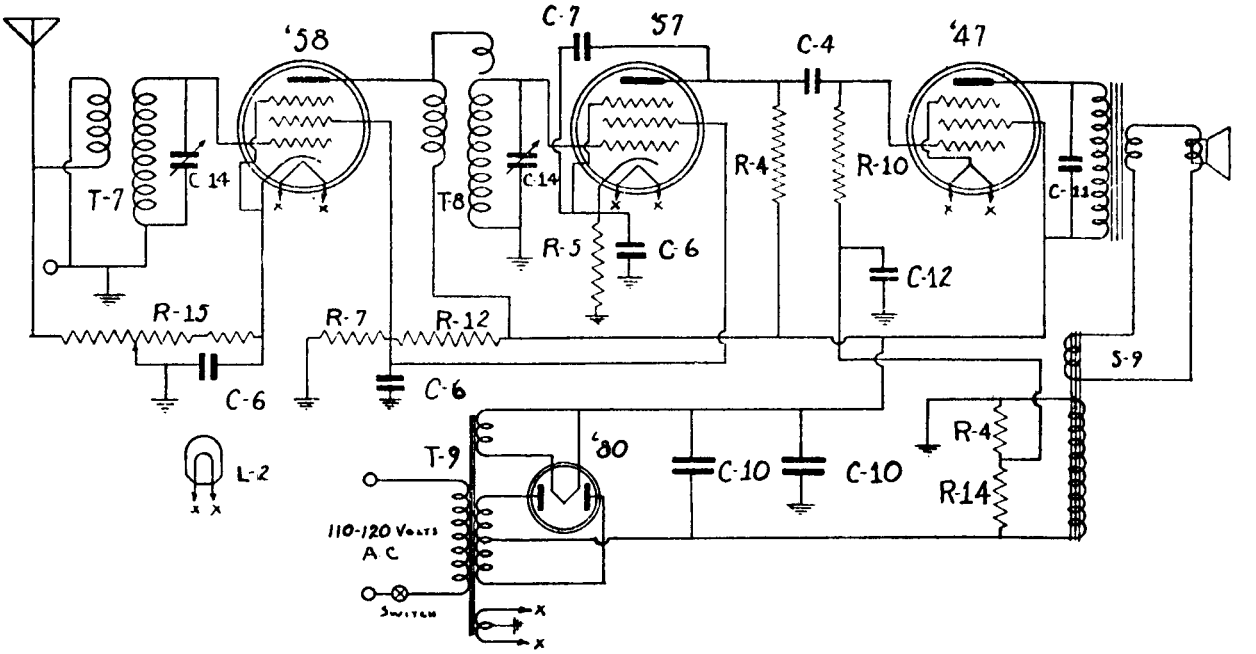
Readings should be taken with volume control all the way on and tuning control set for high wave length stations. Use a 250 volt D. C. meter having a resistance of 1,000 ohms per volt.

	Plate	Screen	Cathode
347 Tube—ground to	215	237	none
58 Tube—ground to	237	92	2
57 Tube—ground to	115	92	4.5
Line Voltage	119		

The bias on the pentode cannot be read on the volt meter.

These readings are approximate and will vary slightly with sets, tubes, etc

EMERSON RADIO & PHONOGRAPH CORP.



L-AC-5

SERVICE PRICE LIST

Part No.	Description	List Price
T-4	Antenna Coil	$ .50
T-5	R. F. Coils	.50
T-6	Power Transformer	2.00
R-11	Volume Control	.75
	Any Carbon Resistor Refer to Diagram)	.15
C-8	3 Gang Variable Condenser	2.25
C-9	8 mfd. Dry Electrolytic Cond	.75
C-10	4 mfd. Dry Electrolytic Cond	.50
	Any size Tubular Condenser No. Refer to Diagram)	.10
C-7	.00025 Molded Mica Condenser	.10
	Any Socket (Specify Tube Nu on Socket)	.10
S-9	Dynamic Speaker	5.50
D-2	Disc Dial with Set Screws	.20
W-8	Flexible Shielding for Grid Lead	.05 "
B-2	Pilot Light Assembly	.10 "
L-2	Pilot Lamp	.15 "
K-1	Control Knob	.10 "

Voltage Readings:

Readings should be taken with volume control all the way on and tuning control set for high wave length stations. Use a 250 volt D. C. meter having a resistance of 1,000 ohms per volt.

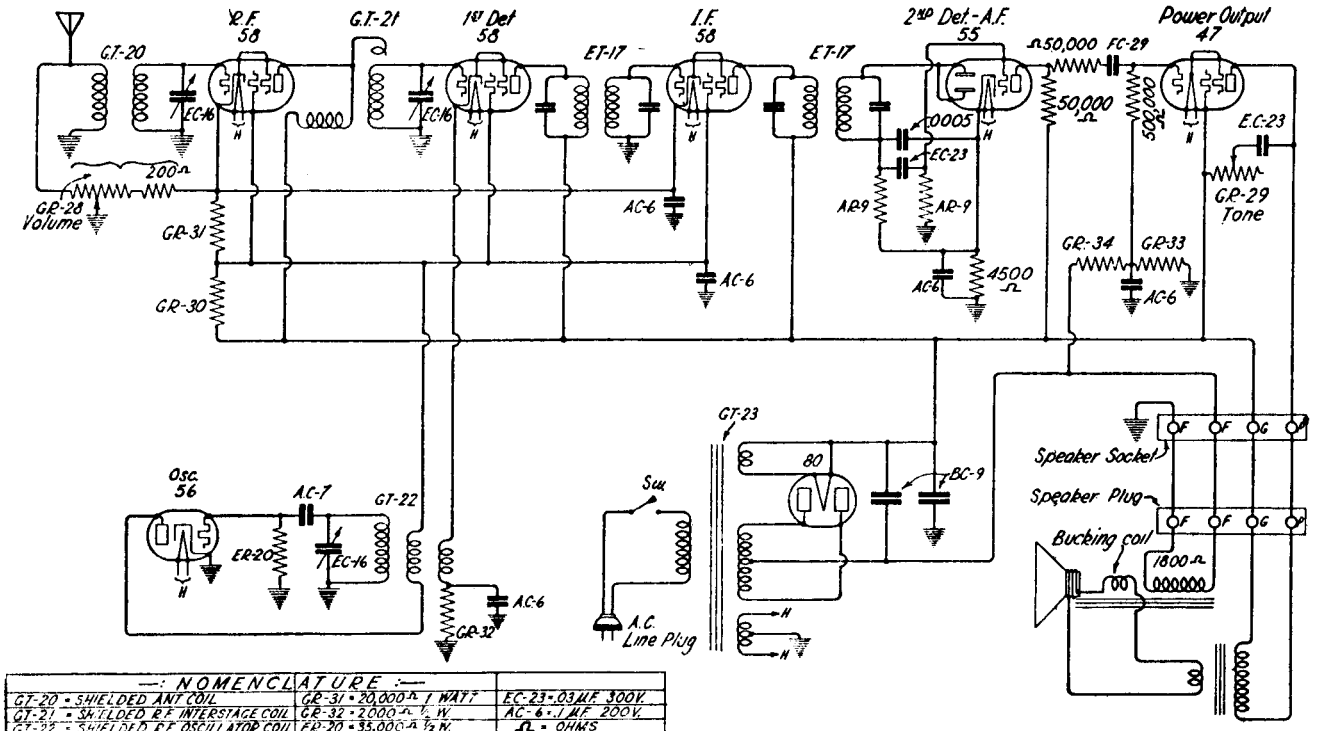
	Plate	Screen	Cathode
347 Pentode Tube ground to	220	240	none
58 First R. F. Tube ground to	240	90	4.5
58 Second R. F. Tube ground to	240	90	4.5
57 Detector Tube ground to	114	90	4.5

Line Voltage 119

The bias on the 347 cannot be read with the volt meter.

These readings are approximate and will vary slightly with tubes, set, etc.

EMERSON RADIO & PHONOGRAPH CORP.



—: NOMENCLATURE :—		
GT-20 = SHIELDED ANT COIL	GR-31 = 20,000Ω 1 WATT	EC-23 = .03 MF 300V.
GT-21 = SHIELDED R.F. INTERSTAGE COIL	GR-32 = 2000Ω ½ W.	AC-6 = .1 MF 200V.
GT-22 = SHIELDED R.F. OSCILLATOR COIL	ER-20 = 35,000Ω ½ W.	Ω = OHMS
ET-17 = 175 K.C. SHIELDED I.F. TRANSF.	GR-33 = 100,000Ω ½ W.	
GT-23 = POWER TRANSFORMER	AR-9 = 500,000Ω ½ W.	
EC-16 = GANGED CONDENSER	GR-34 = 600,000Ω ½ W.	
GR-28 = 5000Ω VOLUME CONTROL	BC-9 = 8-8 MF 300V PEAK	
GR-29 = 30000Ω TONE CONTROL	AC-7 = .00025 MF MICA	
GR-30 = 12,500Ω 2 WATTS	FC-29 = .02 MF 500 V.	

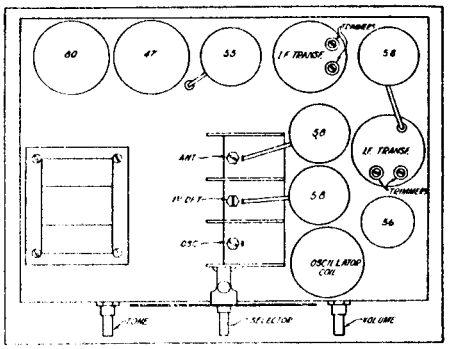
M-AC-7

The receiver is accurately adjusted at the factory and no adjustment should be changed except by an experienced serviceman. The intermediate frequency is 175 *K.C.*

REPLACEMENT PARTS PRICE LIST

Part No.	Description	List Price
GT-20	Antenna Coil	$ .65 each
GT-21	Interstage R.F. Coil	.65 "
GT-22	Oscillator Coil	.65 "
ET-17	I. F. Transformer	1.15 "
GT-23	Power Transformer	1.95 "
GR-28	Volume Control	.80 "
GR-29	Tone Control	.60 "
GR-30	12,500 ohm 2 wt. Resistor	.25 "
EC-16	3-Gang Variable Condenser	2.45 "
BC-9	8 & 8 mfd. Electrolytic Condenser	.65 "
GD-5	Dial Assembly	.90 "
AL-2	Pilot Light	.08 "
AK-1	Knobs	.10 "
GS-19	Dynamic Speaker	5.65 "

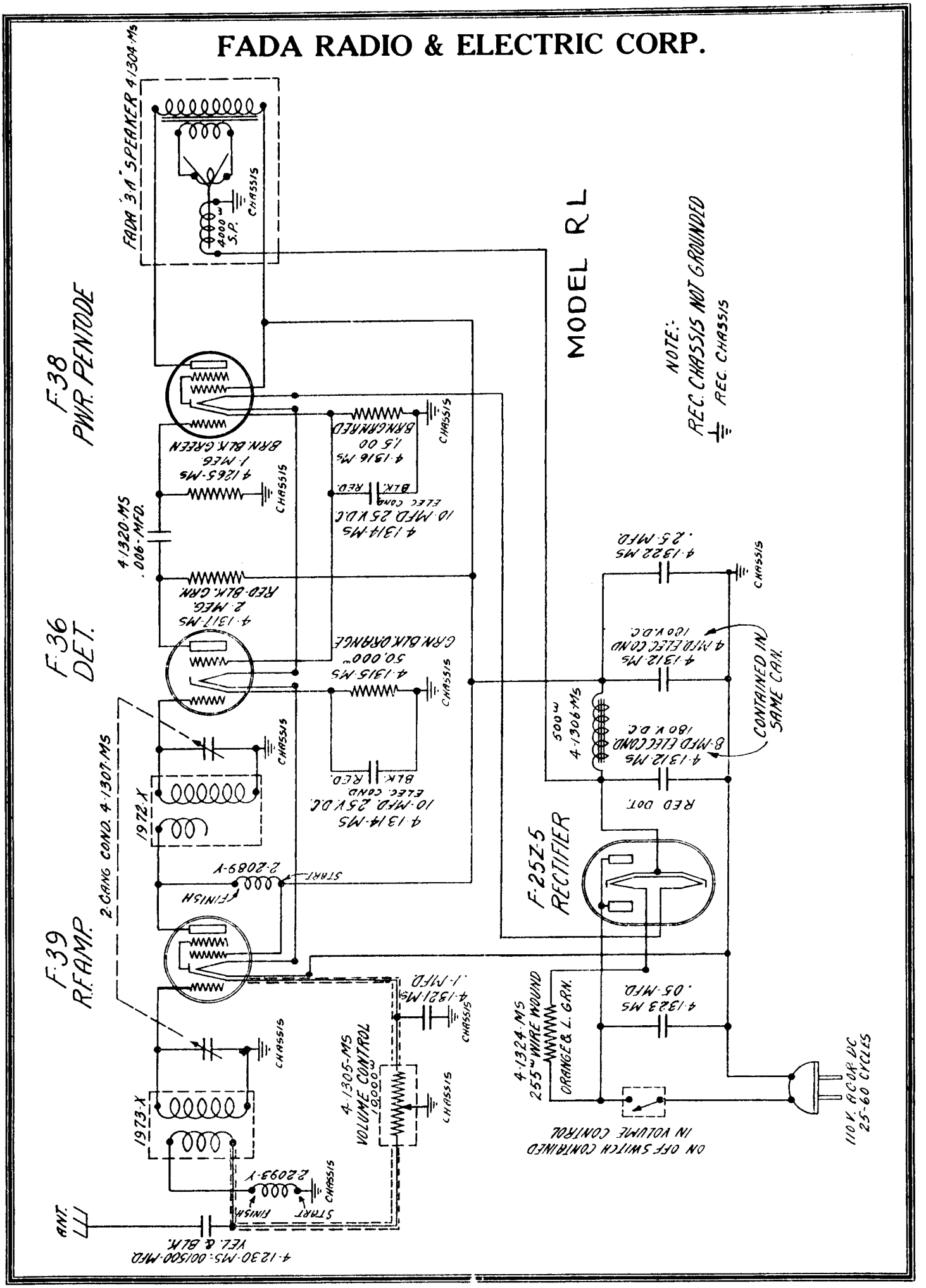
TUBE DIAGRAM



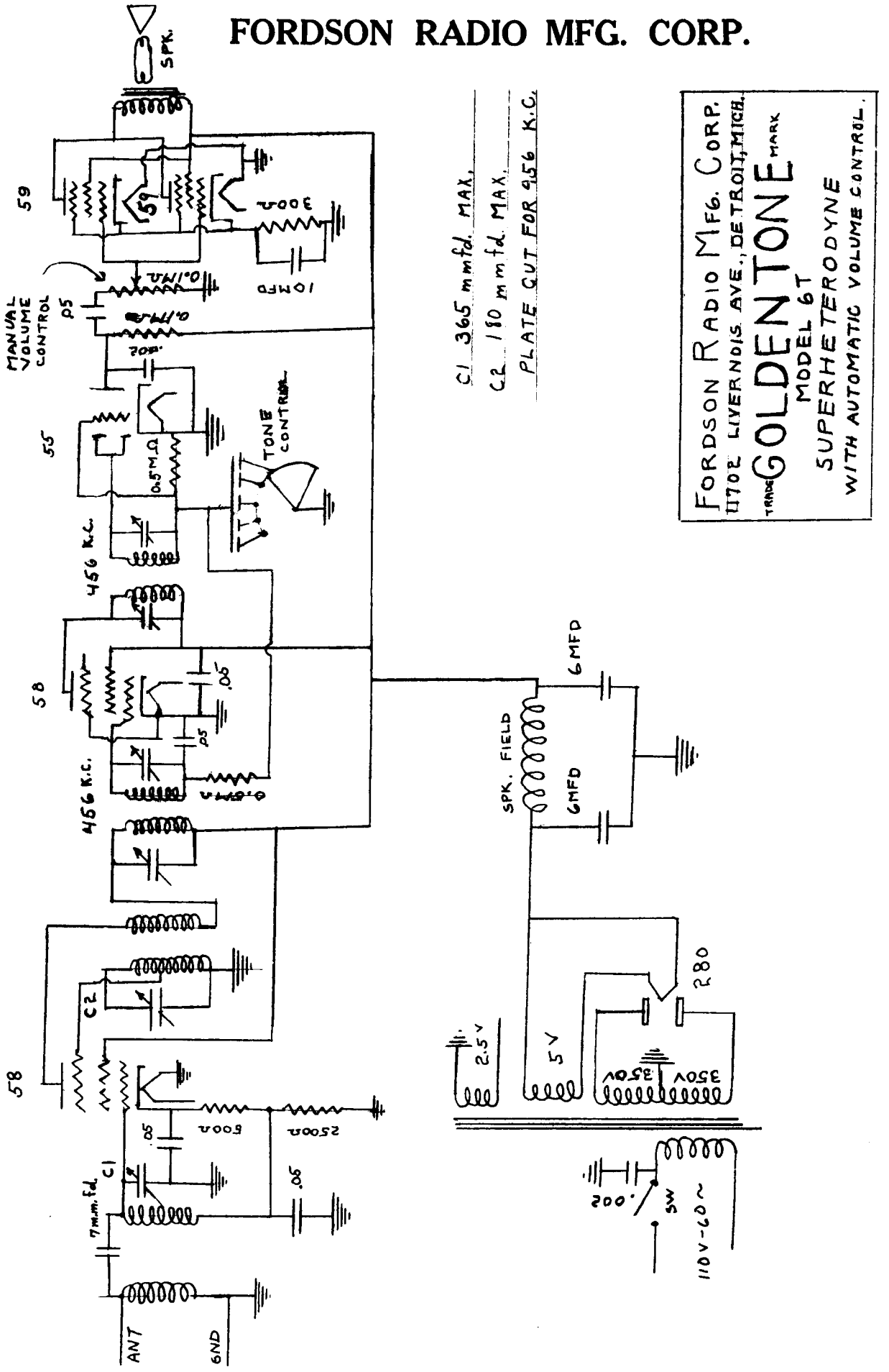
Minor reasons for failure of Set to function

1. Defective Tubes
2. Grid Clips off Tubes
3. Volume Control not fully on
4. Tubes not in sockets securely
5. Aerial disconnected or grounded
6. Defective A.C. plug or poor plug connection

FADA RADIO & ELECTRIC CORP.



FORDSON RADIO MFG. CORP.



FORDSON RADIO MFG. CORP.

PARTS PRICE LIST
MODEL 6 T GOLDENTONE SUPERHETERODYNE

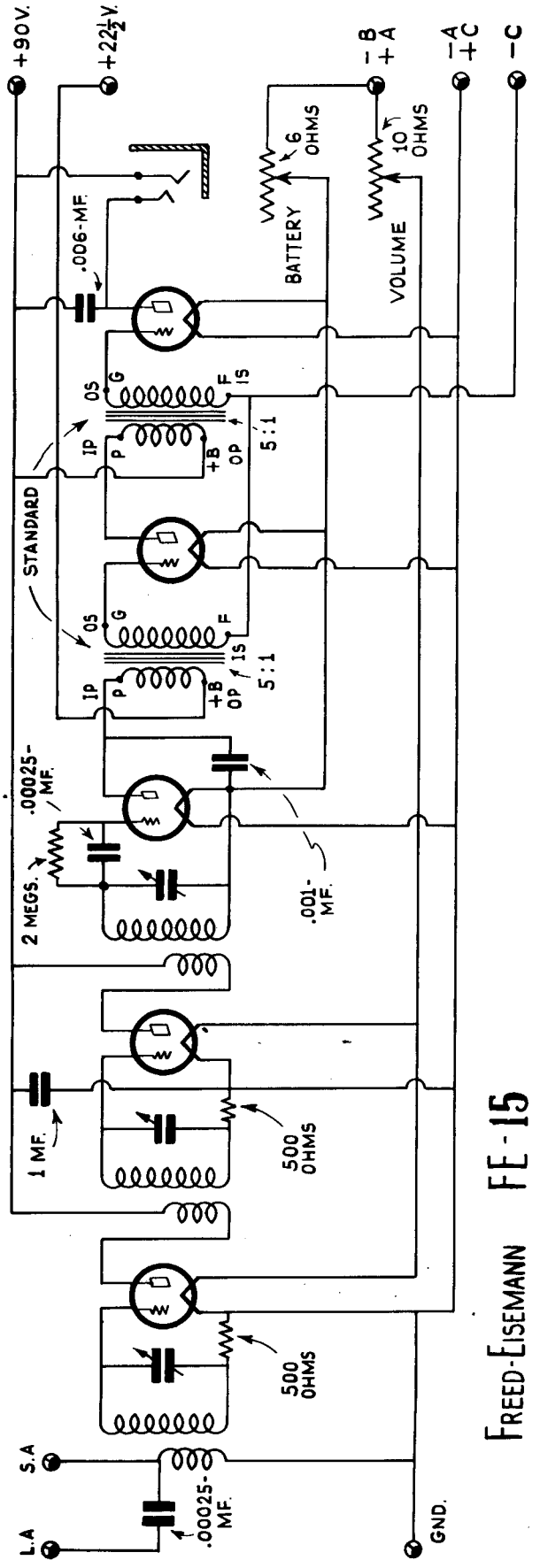
PART NO.	DESCRIPTION	LIST PRICE
6T72	Volume control and switch	$1.50
6T58	Variable Condenser	2.00
6T56	Power Transformer	2.00
6T52	Intermediate Frequency Transformer	1.50
6T48	Antenna Oscillator Dowel Coil	1.50
6T28	Dual 6 Mfd. Filter Condenser	1.60
6T50	Tone Control	1.00
6T60	Six-inch Dynamic Speaker	4.00
6T62	Midget Cabinet	3.00
6T01	Tube Shield	.15
6T44	Chassis Base	.75
6T46	Variable Condenser Cover	.50
6T42	.05 Mfd. Tubular Condenser	.15
6T40	.002 Mfd. Tubular Condenser	.15
6T30	500,000 ohm Resistor	.20
6T32	100,000 ohm Resistor	.20
6T34	2,500 ohm Resistor	.20
6T36	300 ohm Resistor	.20
6T38	500 ohm Resistor	.20
6T26	10 Mfd. - 500 V. Electrolytic Condenser	.60
6T18	Type 58 Socket	.10
6T20	Type 55 Socket	.10
6T22	Type 80 Socket	.10
6T24	Type 2A5 Socket	.15
6T10	Ant. Gnd. Binding Post	.15
6T12	Connecting Cord (6 ft.)	.40
6T08	Insulated Terminal Strip	.10
6T14	Traveling Light Dial	.50
6T16	Escutcheon Plate and Scale	.50
6T06	Large Knob	.15
6T04	Small Knob	.15

The plate voltage on the 55 tube is about 20 to 25 volts when measured with a high resistance voltmeter, as the voltage is reached by the 100,000 ohm plate resistor.

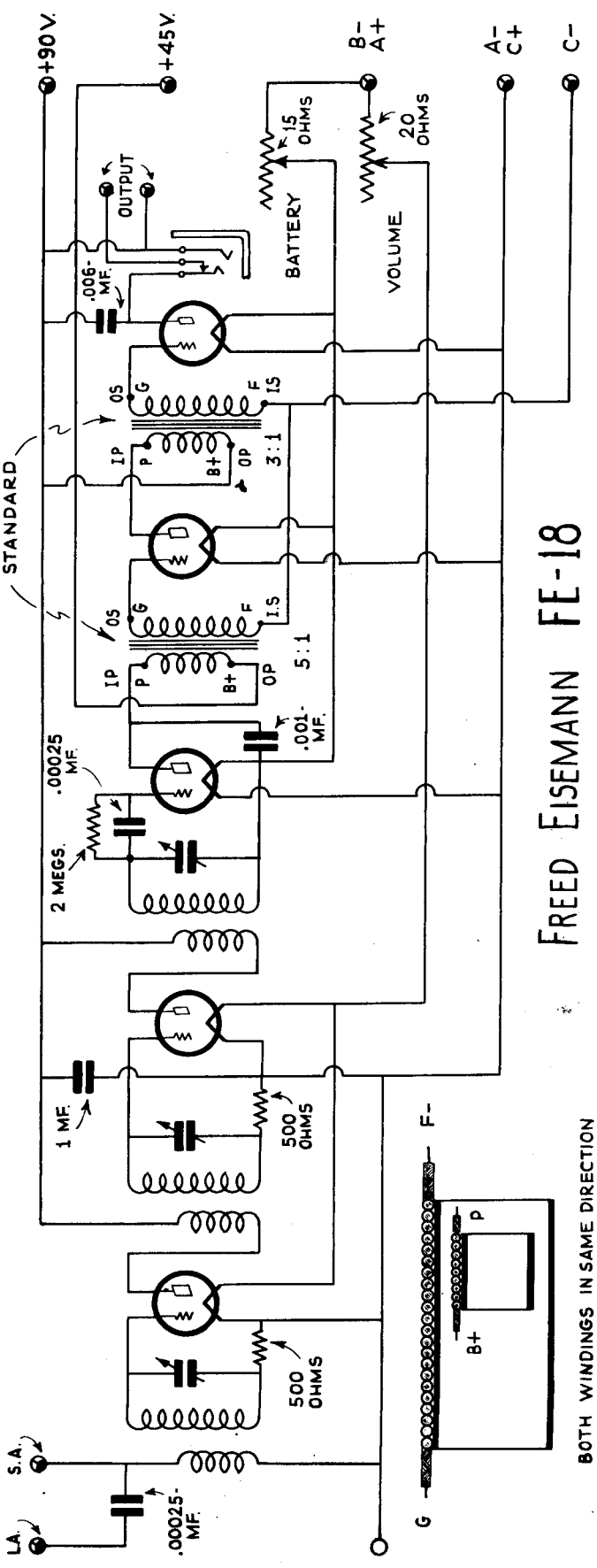
An easy check for the audio stage can be made by removing the clip off of the 55 tube and placing the finger on the cap of the tube. If a very loud hum is received (with the volume on full) the audio circuit is undoubtedly satisfactory.

A continuity test of the intermediate coils can be taken. The red and blue leads are the primary and should show a closed circuit. The green lead of the secondary goes to the screen clip of the 58 tube on the center coil, but comes out underneath and chassis on the coil next to the 55 tube and connects to the two diode terminals on the socket.

FREED-EISEMANN RADIO CORP.



FREED-EISEMANN FE-15

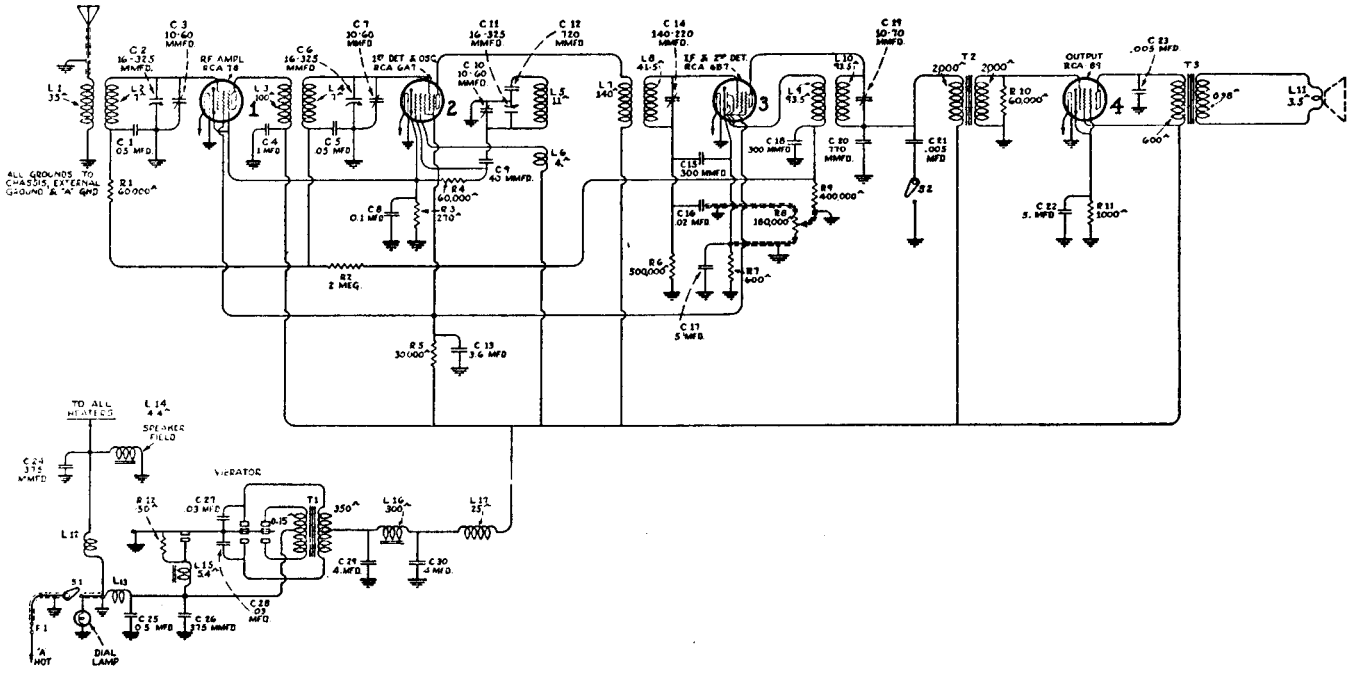


FREED EISEMANN FE-18

GENERAL ELECTRIC COMPANY

Automobile Radio

MODEL B-40



Schematic Diagram

RADIOTRON SOCKET VOLTAGES

6.3 Volt Battery

Radiotron No.		Cathode to Ground	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
RCA-78 R. F.		3.7	92	253	7.0	6.06
RCA-6A7	First Detector	3.7	92	253	12.0	6.06
	Oscillator	0	—	253	Total	
RCA-6B7 Second Detector		3.2	92	236	6.0	6.06
RCA-89 Power		26.5	230	217	27.5	6.06

Suppression of Ignition Interference

1. Disconnect all wires from the spark plugs. Fasten one spark plug suppressor to the top of each plug and re-attach the wires to the free ends of the suppressors. These suppressors may be mounted either in line with or at right angles to the plugs (as shown in Figure 1) in order to avoid interference with metallic parts grounded to the engine or frame.

2. If the distributor is of the plug-in type, disconnect the center wire from the head. Plug the distributor suppressor into the distributor head and insert the wire in the free end of the suppressor.

3. Clamp the generator by-pass capacitor against the generator frame. The screw holding the cut-out ordinarily may be utilized for securing this unit. Connect the capacitor lead to the terminal on the generator side of the cut-out switch. (In some cases, interference will be reduced by connecting the capacitor lead to the opposite side of the cut-out. The most suitable position for this lead must be determined by trial.)

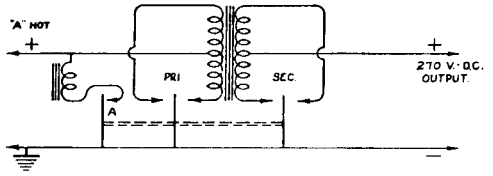
4. The other by-pass capacitor must be connected between the battery terminal of the ammeter and any convenient screw on the instrument panel.

GENERAL ELECTRIC COMPANY

B-40

SERVICE DATA FOR VIBRATOR UNIT

The vibrator unit used in this receiver is of excellent design and sturdy construction. It functions as a combined A. C. generator and mechanical rectifier. Referring to Figure C, it will be noted that the primary and secondary of the transformer are center tapped. By connecting the outside of each winding to the contacts of the vibrator and using the arms and center taps of the windings as sources of input and output voltage, a combined generating and rectifying action is obtained.



Schematic of Vibrator Unit

When the switch is turned "on" the vibrator makes and breaks contact at point "A." This constitutes the driving action of the unit, and is in no way connected with the other circuits. The primary vibrator functions to connect the input low voltage current first across one-half and then across the other half of the primary of the transformer. This results in a pulsating direct current applied to the primary in an alternating direction. The result is an A. C. voltage emanating from the secondary of the transformer; as the transformer has a step-up ratio the A. C. secondary voltage is considerably greater than the primary. The secondary vibrator functions in a similar manner as that on the primary side, so that by reversing the alternations applied to the load, a pulsating D. C. is obtained. After filtering, this is used as plate and grid supply to all Radiotrons.

(1) Spring and Contact Adjustment Limits.

Proper adjustments of the various contacts are made in the following order and manner:

1. With 8 and 10, Figure D, firmly held against their respective stops and with 3 and 5 in contact with 8 and 10 respectively, the air gap between 1, 6 and 2, 7 shall be 0.015" plus or minus 0.005". On no particular unit however, shall the differences between the two air gaps exceed 0.005".

2. Adjust the buzzer screw, 11, Figure D, so that when the position of the armature is such that 1 and 2 are just making contact with 6 and 7 respectively, the contact between 4 and 9 shall just be breaking.

(2) Adjustment for the Reduction of Sparking.

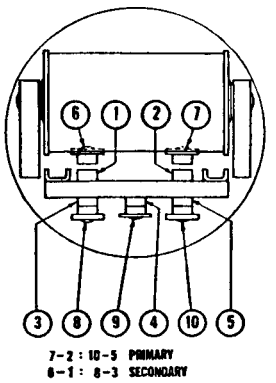
If any pair of contacts show excessive sparking, the following procedure will in general reduce the sparking to a minimum.

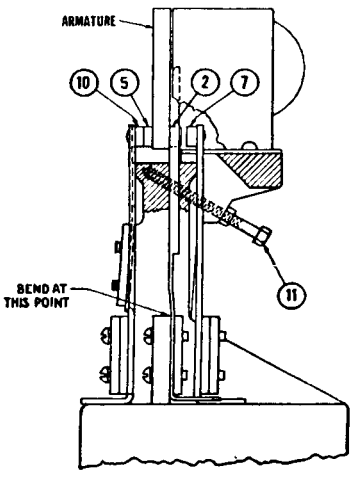
For example, consider the case where excessive sparking is occurring between 6 and 1. Sparking will be reduced to a minimum by bending the armature spring on that side (secondary side) away from 6 and toward 8. (See Figure D.) If the bend is too small, only a small change will be noted. However, if an excessive bend is made, the sparking will be transferred from 6, 1 to 8, 3.

The same method may be applied to any pair of contacts. Usually only a slight bend will be necessary. Although after bending, no change in the position of the armature contacts may be noted, a sufficient change in the initial force requirements will have been made to reduce sparking.

(3) Output Voltage.

When connected to a 6 volt primary source, the output voltage across a 5,000 ohm resistor (connected in place of the receiver load at the output of the filter), must be 240 volts or greater.





Vibrator Contacts

GENERAL ELECTRIC COMPANY

MODEL-BX

Electrical Specifications

Voltage Rating..105–120 Volts, 25–133 Cycles A. C. or D. C.
Power Consumption.....40 Watts
Frequency Range.....540 K. C.–1700 K. C.
Type and Number of Radiotrons—
1 RCA-36, 1 RCA-37, 1 RCA-38, 1 RCA-39—Total 4

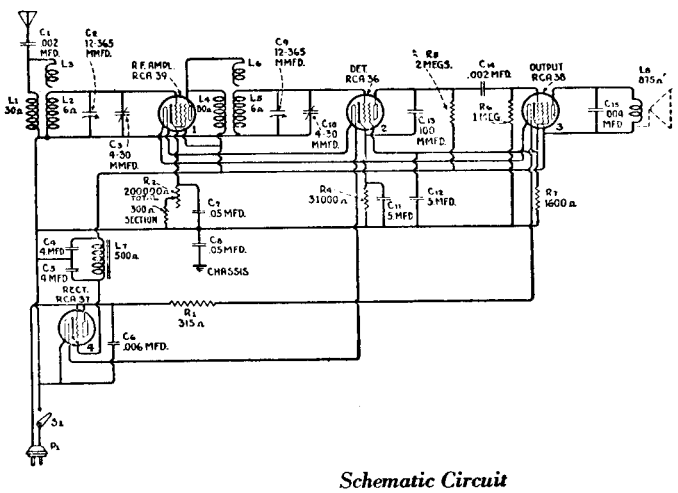
This receiver is an A. C.–D. C. table model tuned R. F. broadcast receiver. Features such as universal operation on both A. C. and D. C., wide tuning range, excellent performance and compact construction characterize this instrument. Figures A and B show the schematic and wiring diagrams respectively. The voltage readings and replacement parts are given below.

RADIOTRON SOCKET VOLTAGES

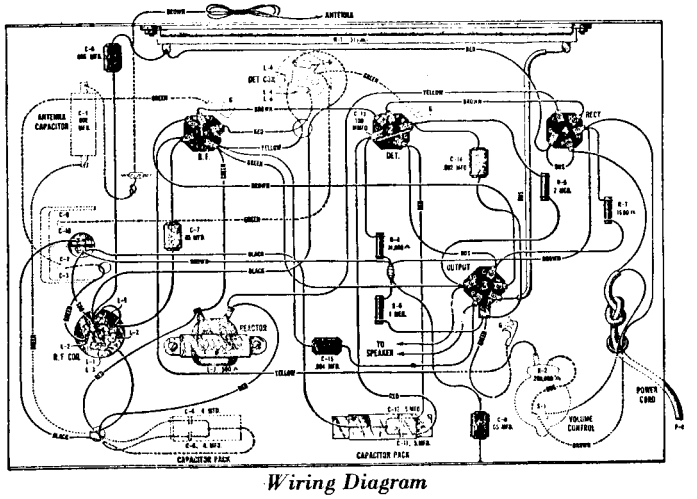
Measured at Maximum Volume—115 Volt A. C. Line
All Voltages on D. C. will be slightly lower

Radiotron No.	Cathode or Filament to Control Grid, Volts	Cathode or Filament to Screen Grid, Volts	Cathode or Filament to Plate, Volts	Plate Current M. A.	Filament or Heater, Volts
1. RCA-39 R. F.	3.0	105.0	105	7.0	6.0
2. RCA-36 Detector	*0.75	11.0	*60	0.025	6.0
3. RCA-38 Output	11.0	100.0	95	5.0	6.0
4. RCA-37 Rectifier	——	——	115	15.0	6.0

*Impossible to measure on ordinary voltmeter.



Schematic Circuit



Wiring Diagram

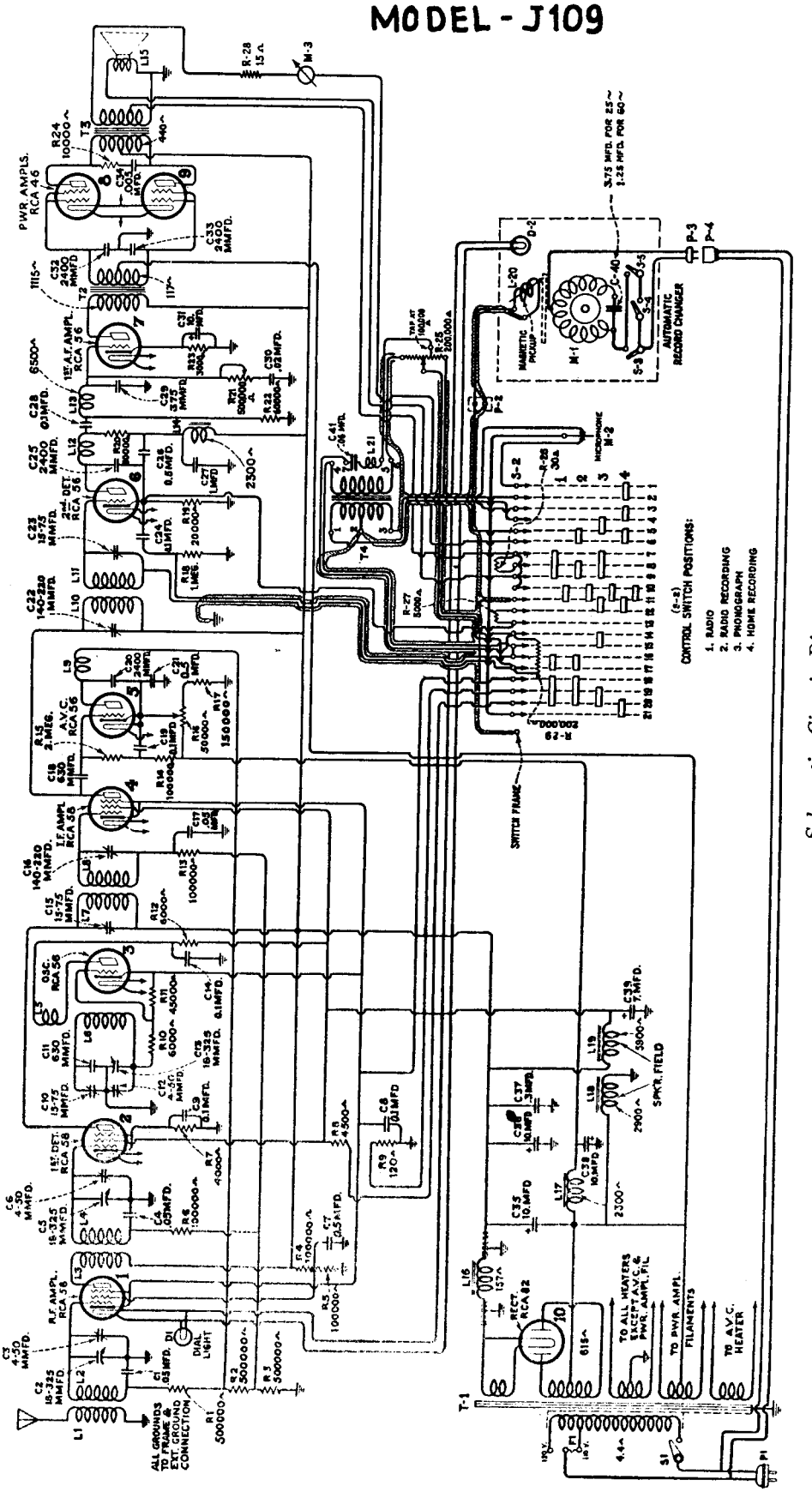
REPLACEMENT PARTS

(Replacement parts may be purchased from authorized Distributors or Dealers only)

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2747	Cap—Contact cap—Package of 5	$0.50
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	1.00
3456	Capacitor—.05 mfd.	.44
3536	Capacitor—Filter capacitor—Two 5.0 mfd. capacitors	1.10
3537	Reactor—Filter reactor	1.10
3538	Capacitor—Filter capacitor—Two 4.0 mfd.	1.18
3542	Volume control—Complete with mounting nut	1.18
3557	Capacitor—0.002 mfd.	.30
3559	Resistor—31,000 ohms—Carbon type—½ watt—Package of 5	1.00
3560	Resistor—1,600 ohms—Carbon type—½ watt—Package of 5	1.00
3561	Capacitor—0.004 mfd.	.42
3562	Capacitor—0.006 mfd.	.42
3635	Resistor—Filament resistor—315 ohms	1.00
3686	Escutcheon—Volume control escutcheon—Package of 2—Brown Cabinet	.25
3714	Coil—Detector coil	.98
3715	Coil—R. F. coil complete	1.08
3709	Knob—Station selector or volume control knob—Package of 5	$0.65
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	1.00
6451	Condenser—Two gang variable tuning condenser	2.04
7484	Socket—Radiotron socket—5 contact	.35
10405	Capacitor—Antenna series capacitor—.002 mfd.	.40
10820	Capacitor—100 mmfd.	.40
G5031	Escutcheon—Station selector escutcheon—Package of 2—Brown Cabinet	.25
G5032	Escutcheon—Volume control escutcheon—Package of 2—Silver cabinet	.25
G5033	Escutcheon—Station selector escutcheon—Package of 2—Silver cabinet	.25
	LOUDSPEAKER ASSEMBLIES—MAGNETIC TYPE	
7594	Cone—Speaker cone—Package of 5	5.00
7595	Support—Cone support	.60
7596	Mechanism—Speaker mechanism complete with magnet	3.00
9426	Loudspeaker complete	4.38

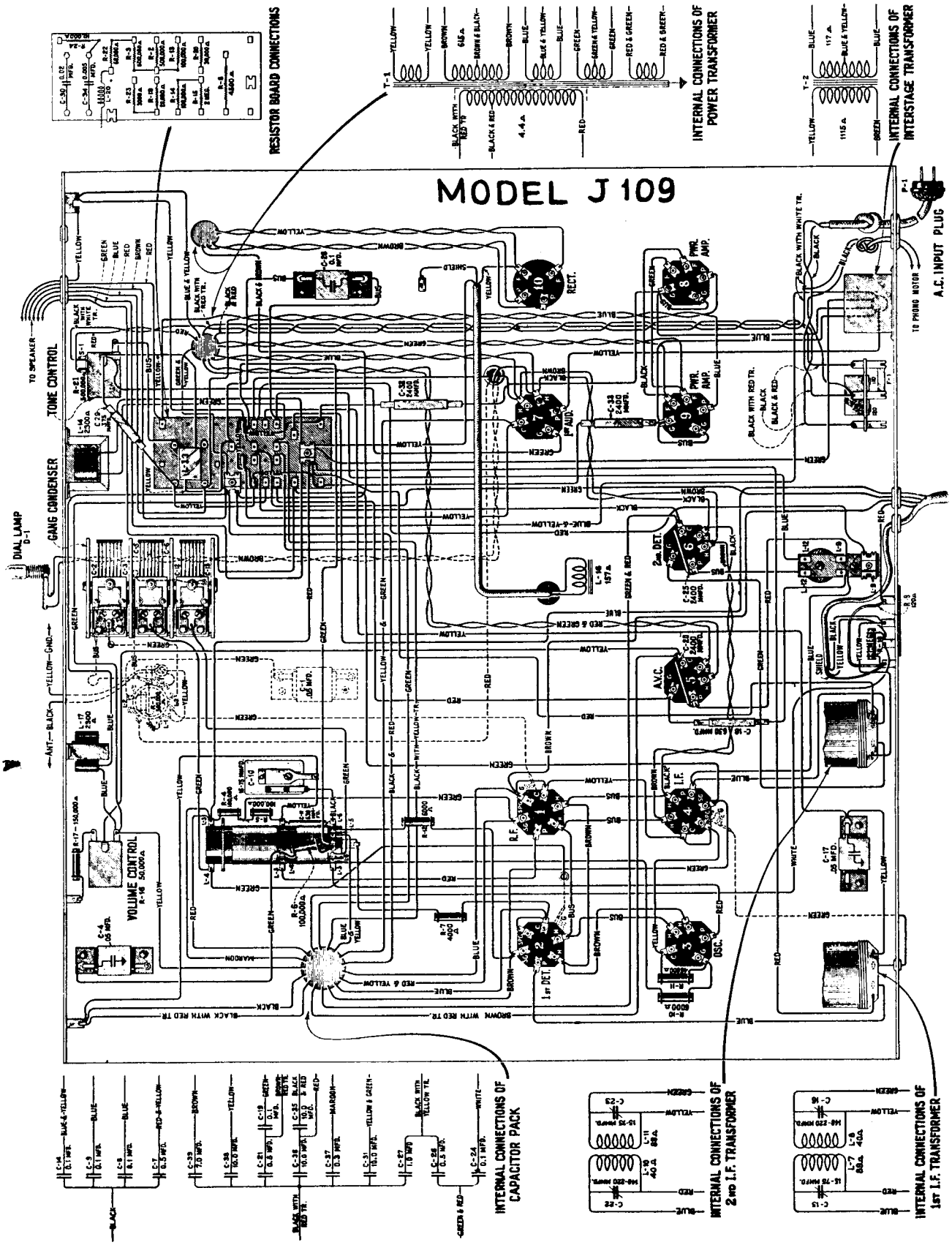
GENERAL ELECTRIC COMPANY

MODEL - J109



Schematic Circuit Diagram

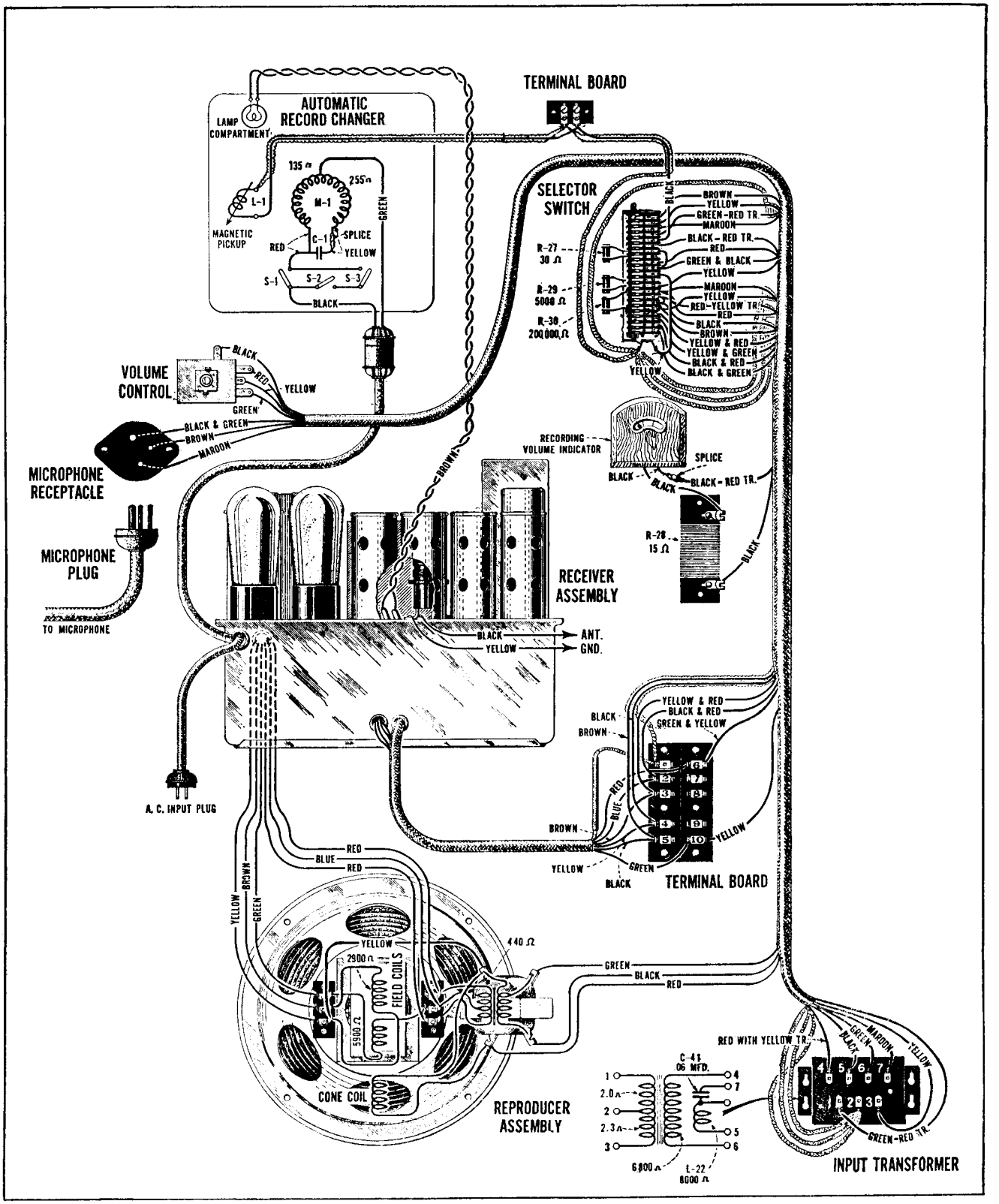
GENERAL ELECTRIC COMPANY



Wiring Diagram

GENERAL ELECTRIC COMPANY

MODEL - J 109



Assembly Wiring Diagram

GENERAL ELECTRIC COMPANY

MODEL K-40-A

Electrical Specifications

Voltage Rating..105–125 Volts, 25–133 Cycles, A. C. or D. C.
Power Consumption.....50 Watts at 115 Volts, 60 Cycles
Frequency Range.....540–1710 K. C.
Type and Number of Radiotrons—
1 RCA-78, 1 RCA-77, 1 RCA-38, 1 RCA-25Z5—Total 4
Undistorted Output.....A. C. 0.55 Watts
D. C. 0.15 Watts

This receiver is a four tube A. C.–D. C. table model R. F. type broadcast receiver. Features such as universal operation on both A. C. and D. C., wide tuning range, dynamic loudspeaker, excellent performance and compact construction characterize this instrument. Due to the use of a voltage doubling circuit in the rectifier, the receiver has considerably greater output when operated on alternating current than when operated on direct current.

Figures A and B show the schematic and wiring diagrams respectively while the voltage readings and replacement parts are given below.

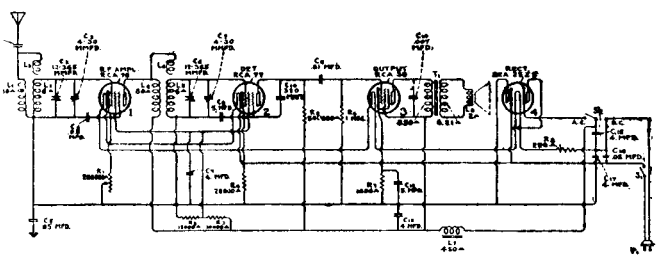
RADIOTRON SOCKET VOLTAGES

Measured at Maximum Volume—115 Volts, 60 Cycles and 115 Volts D. C.

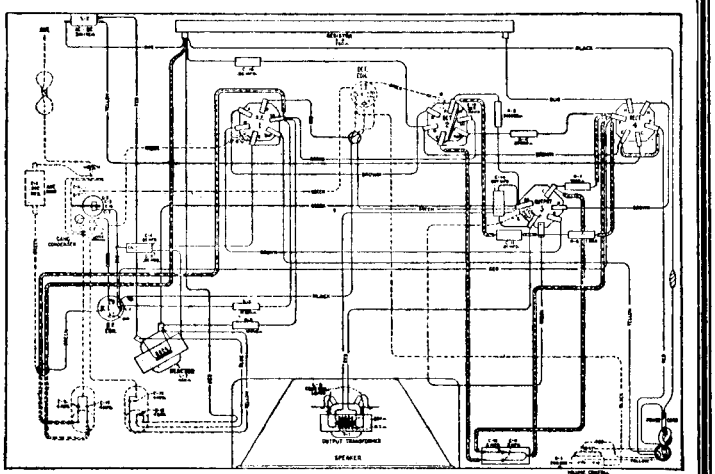
Radiotron No.	Cathode to Control Grid, Volts D. C.		Cathode to Screen Grid, Volts D. C.		Cathode to Plate, Volts D. C.		Plate Current, M. A.		Filament or Heater Volts
	A. C.	D. C.	A. C.	D. C.	A. C.	D. C.	A. C.	D. C.	
RCA-78, R. F.	2.5	1.5	100	50	200	100	8.0	5.0	6.0
RCA-77, Detector	*5.0	*3.0	95	45	*100	*50	0.2	0.1	6.0
RCA-38, Output	18.0	9.0	180	95	170	90	14.0	7.0	6.0
RCA-25Z5, Rectifier	—	—	—	—	115	—	30.0	20.0	25.0

* Impossible to measure on ordinary voltmeter.

NOTE: 25 cycle voltages will be less than those obtained on 60 cycles.



Schematic Circuit



Wiring Diagram

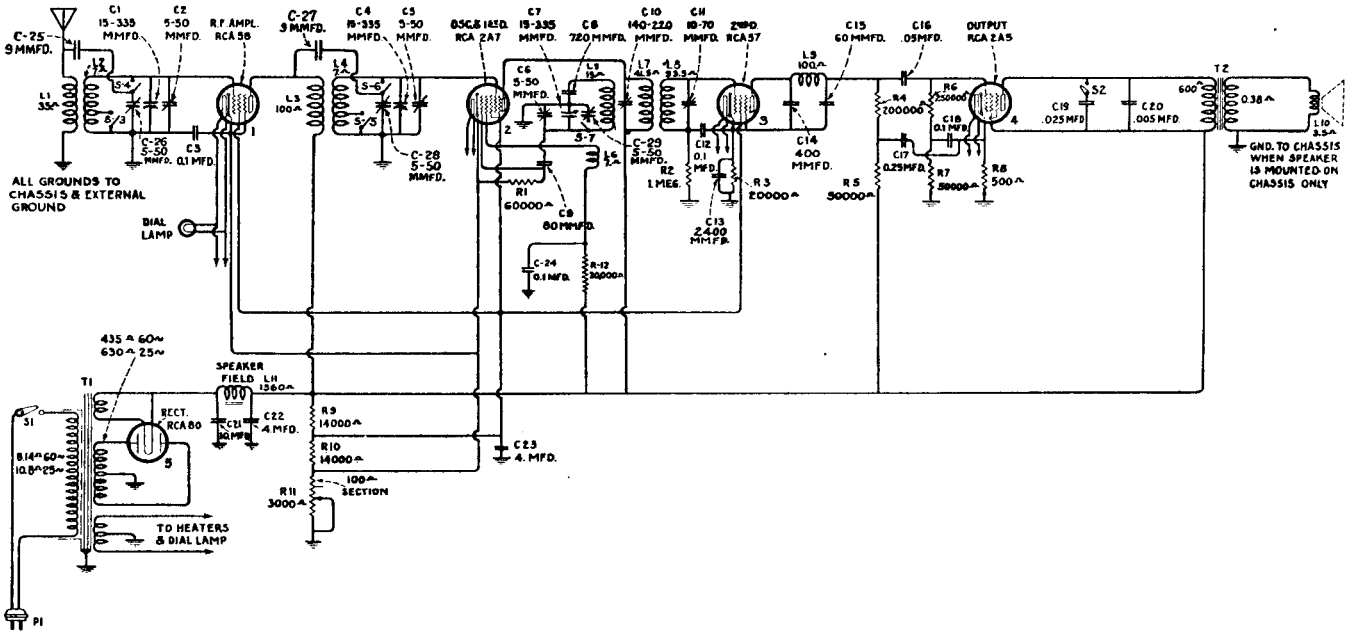
REPLACEMENT PARTS

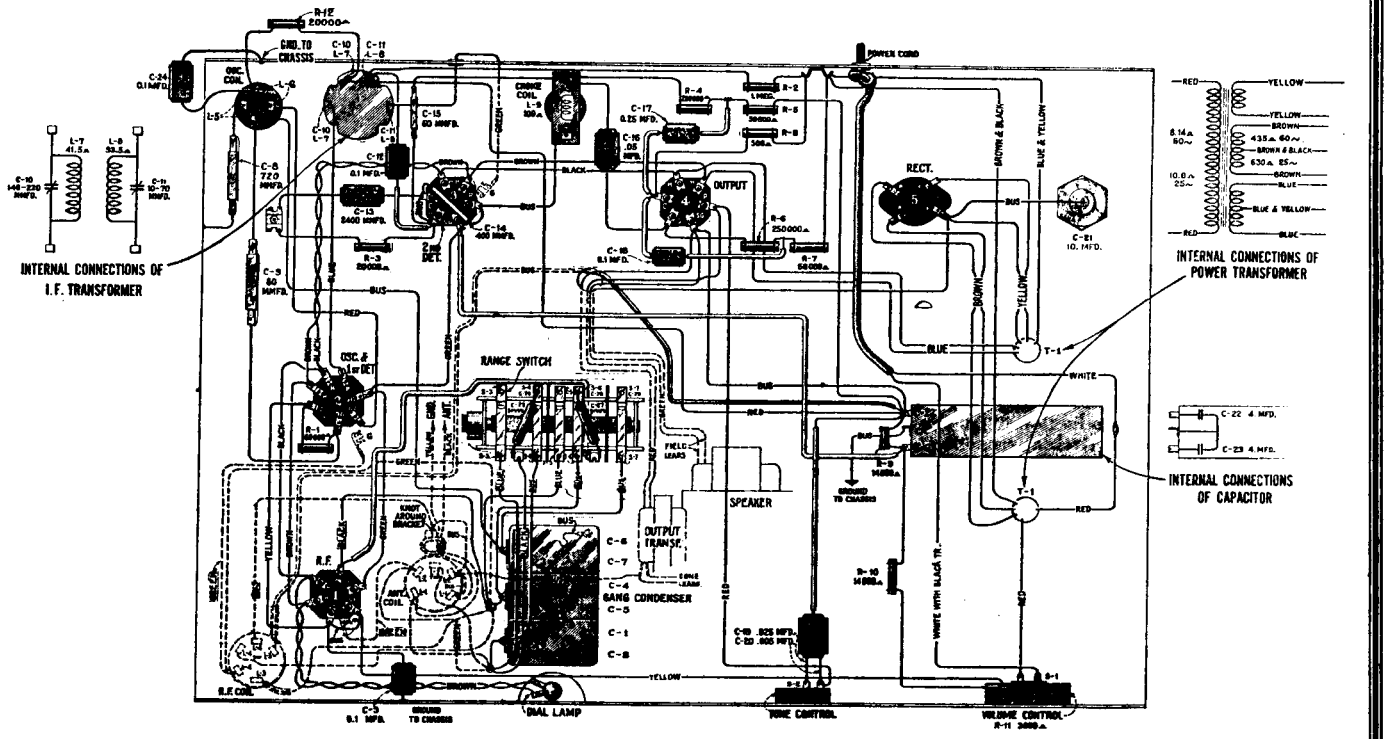
Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2731	Resistor—10,000 ohms—Carbon type—1 watt—Package of 5	$1.10
2981	Capacitor—320 mmfd.	.30
3048	Resistor—500,000 ohms—Carbon type—½ watt—Package of 5	1.00
3066	Resistor—12,000 ohms—Carbon type—1 watt—Package of 5	1.10
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	1.00
3472	Capacitor—0.0024 mfd.	.32
3536	Capacitor—Filter capacitor—Comprising two 5.0 mfd. capacitors	1.10
3538	Capacitor—Filter capacitor—Comprising two 4.0 mfd. capacitors	1.78
3542	Volume control—Complete with mounting nut	1.18
3567	Escutcheon—Station selector escutcheon—Package of 2	.42
3568	Escutcheon—Volume control escutcheon—Package of 2	.42
3569	Knob—Station selector or volume control knob—Package of 5	.65
3684	Switch—Single pole double throw—Toggle switch	.94
3701	Capacitor—0.01 mfd.	.30
3713	Capacitor—0.05 mfd.	.32
3714	Coil—Detector coil	$0.98
3715	Coil—R. F. coil	1.08
3720	Resistor—250 ohms—Filament resistor	1.00
3721	Resistor—1,000 ohms—Carbon type—½ watt—Package of 5	1.00
3722	Capacitor—Comprising two 0.05 mfd. capacitors	.70
3723	Capacitor—0.007 mfd.	.45
3724	Reactor—Filter reactor	1.10
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	1.00
6451	Condenser—Two gang variable tuning condenser	2.04
6535	Capacitor—Comprising two 4.0 mfd. capacitors—High voltage	1.25
7484	Socket—Radiotron socket—5 contact	.35
7485	Socket—Radiotron socket—4 contact	.40
10405	Capacitor—Antenna series capacitor—0.002 mfd.	.40
	REPRODUCER ASSEMBLIES—DYNAMIC TYPE	
3610	Magnet	1.04
6477	Transformer—Output transformer	1.32
7598	Cone—Reproducer cone complete—Package of 5	4.35
7599	Housing—Cone housing and cone assembly	1.16
9429	Reproducer—Complete	4.85

GENERAL ELECTRIC COMPANY

MODELS - K-50-P, K-51-P





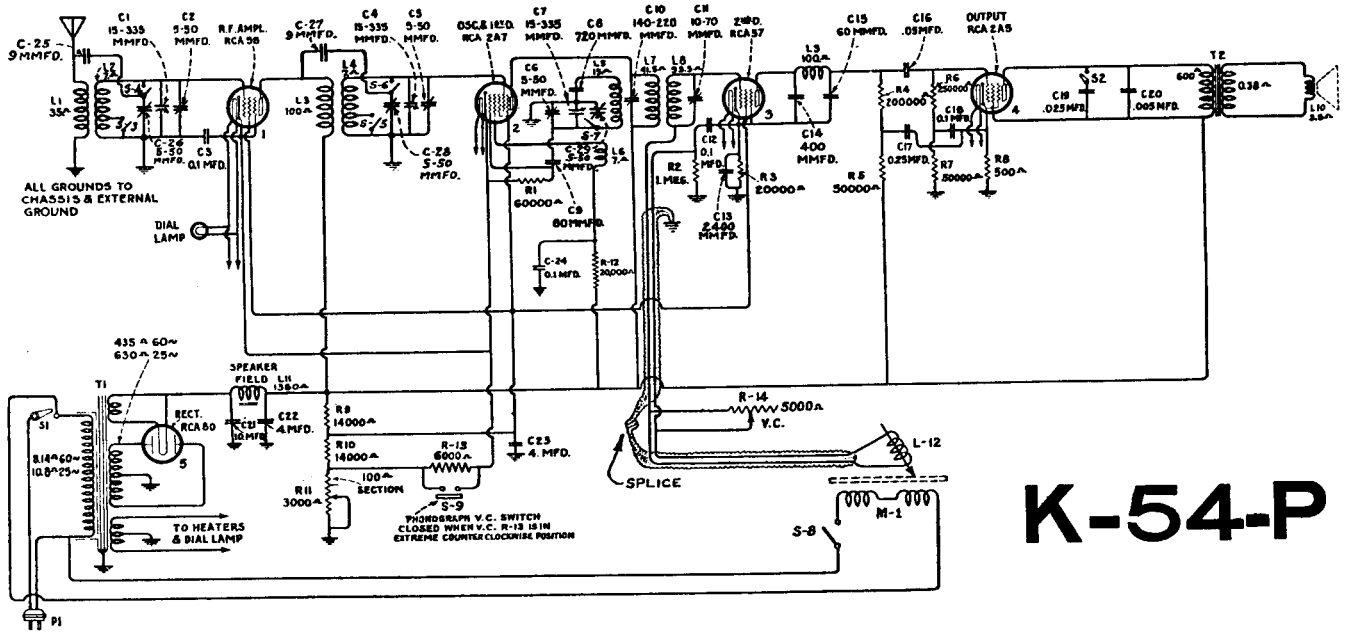
RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

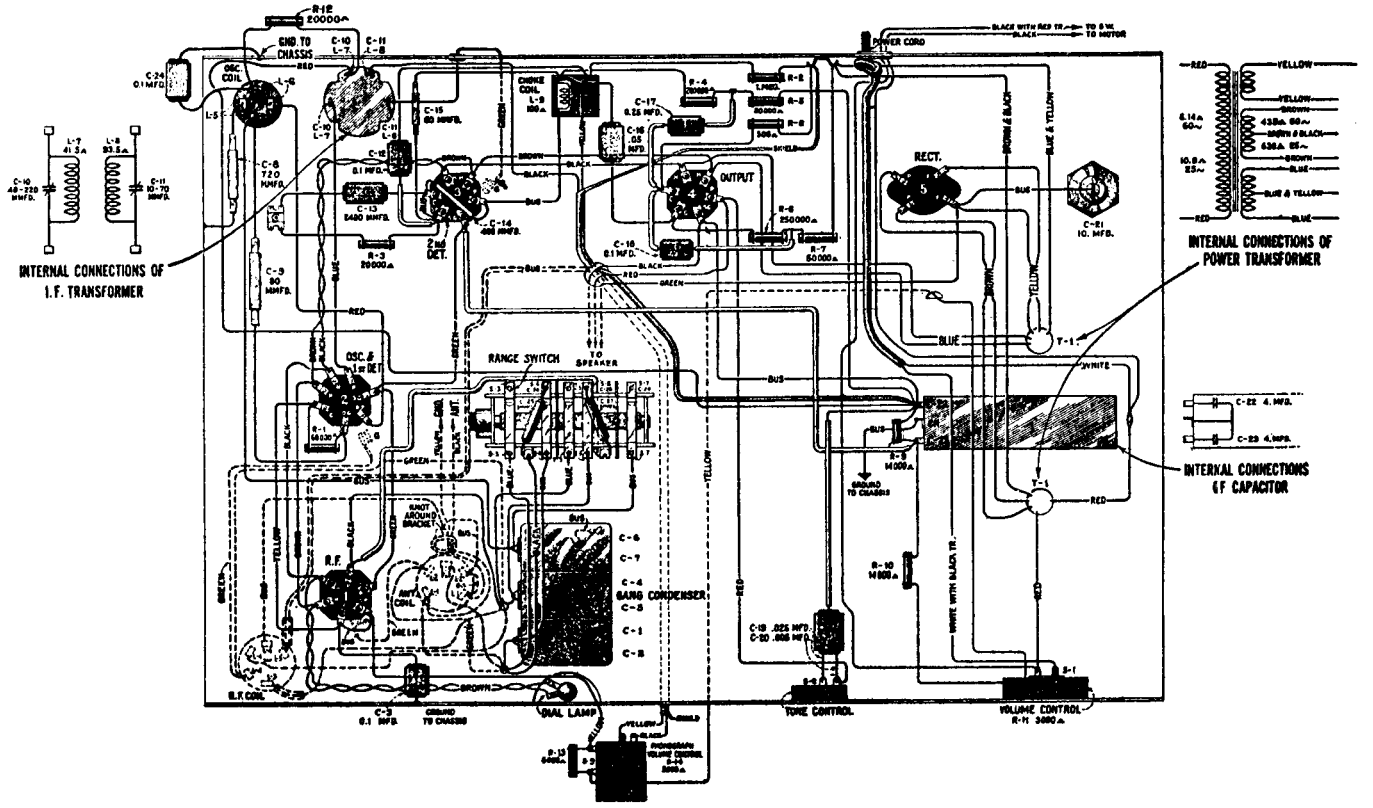
MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

GENERAL ELECTRIC COMPANY



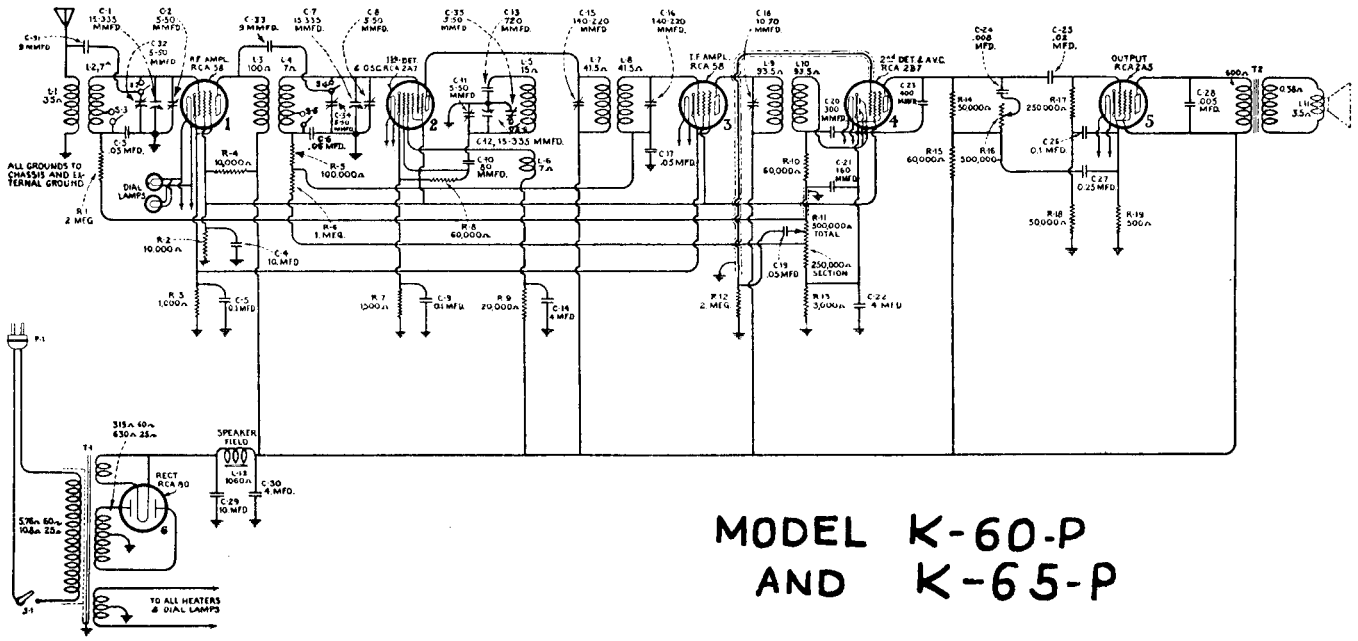
K-54-P



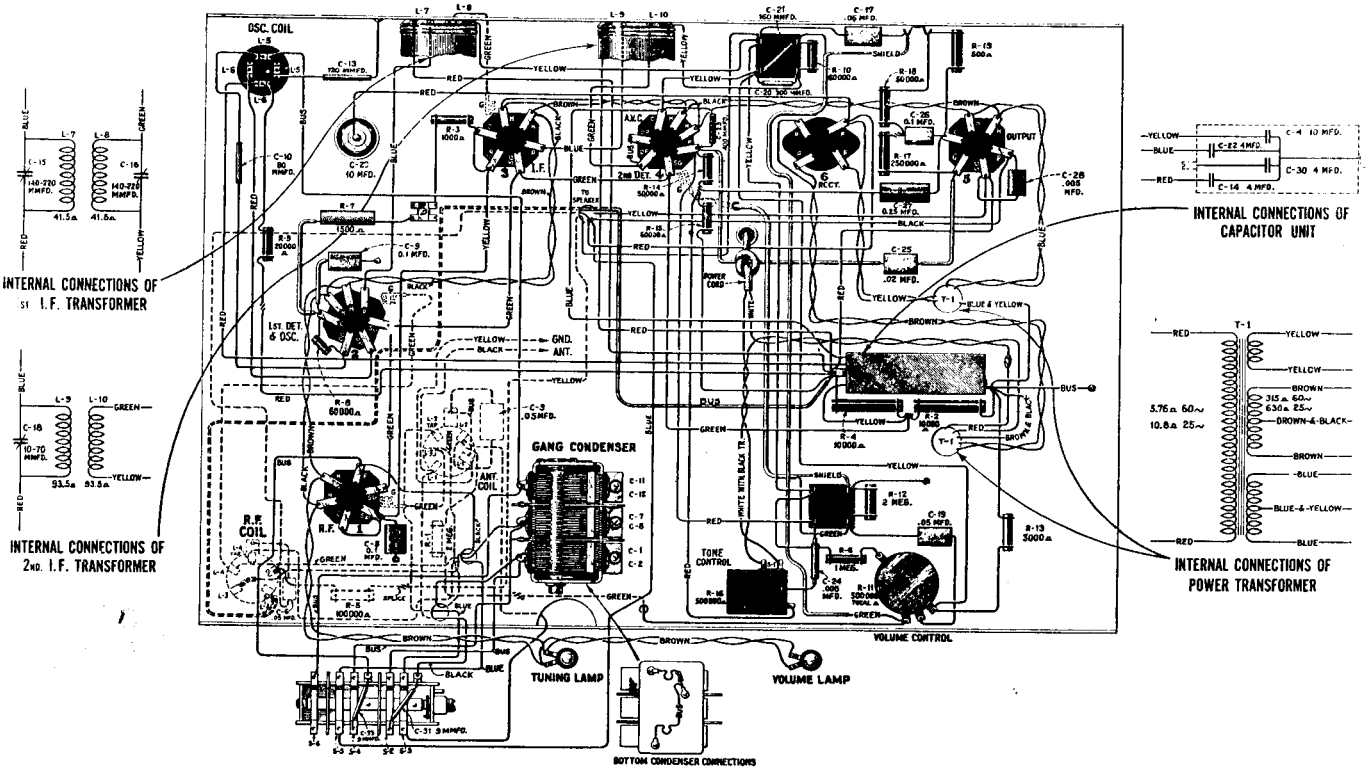
RADIOTRON SOCKET VOLTAGES
115 Volt A. C. Line
MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

GENERAL ELECTRIC COMPANY



MODEL K-60-P AND K-65-P



RADIOTRON SOCKET VOLTAGES

115 Volts, A. C. Line—No Signal

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F.	3.0	95	255	5.0	2.31
2. RCA-2A7 1st Det. Osc.	3.0*	95*	255*	3.0*	2.31
3. RCA-58 I. F.	3.0	95	255	5.0	2.31
4. RCA-2B7 2nd Det. A. V. C.	7.5	92	60	2.0	2.31
5. RCA-2A5 Power	20.0	250	235	33.0	2.31
6. RCA-80 Rectifier	700/350 Volts—75 M. A. Total Current				4.82

*The Voltages and current refer to the detector part of the tube. The total cathode current is 10 M. A.

GENERAL ELECTRIC COMPANY

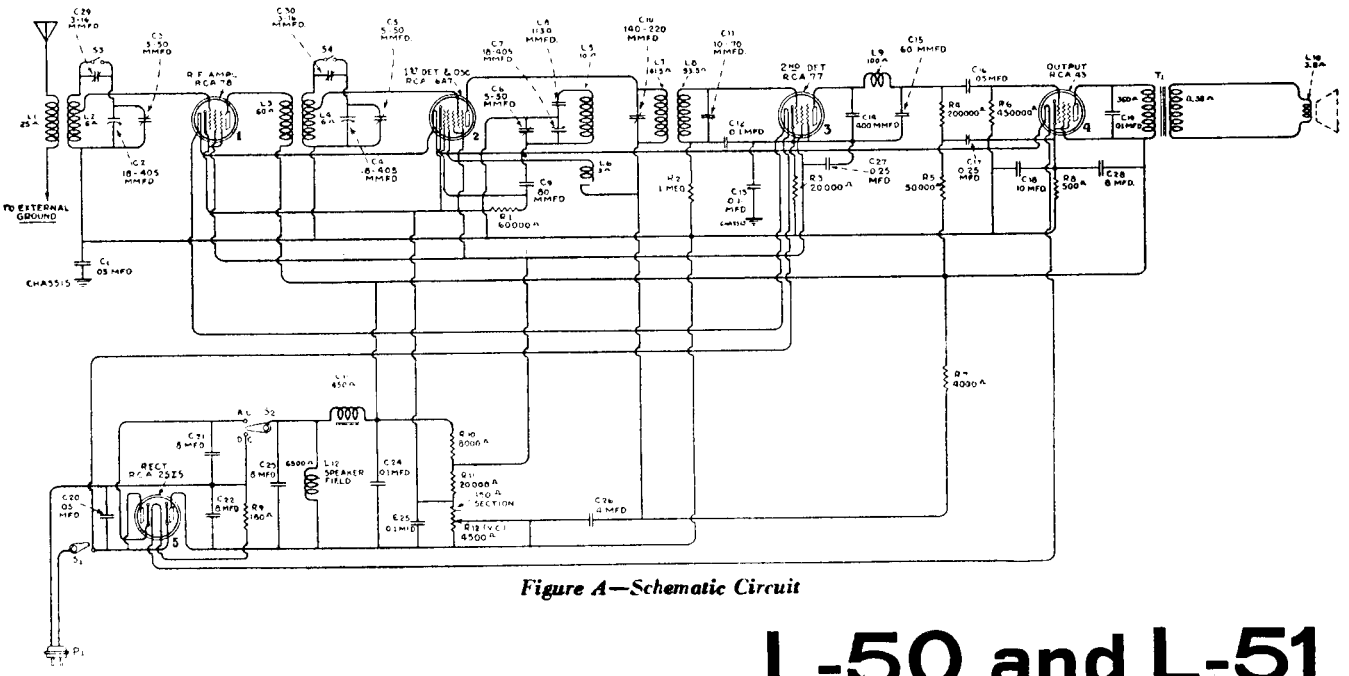
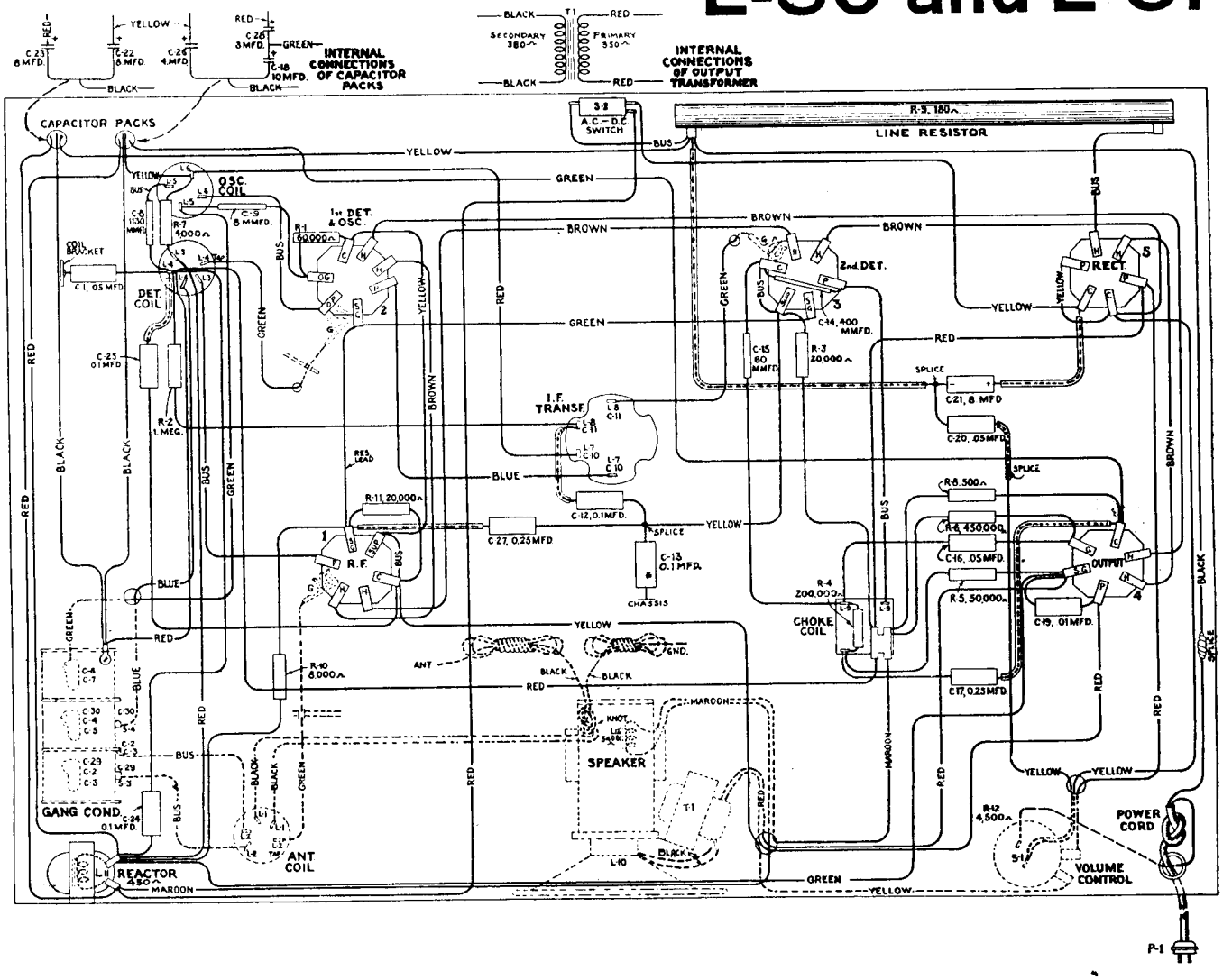
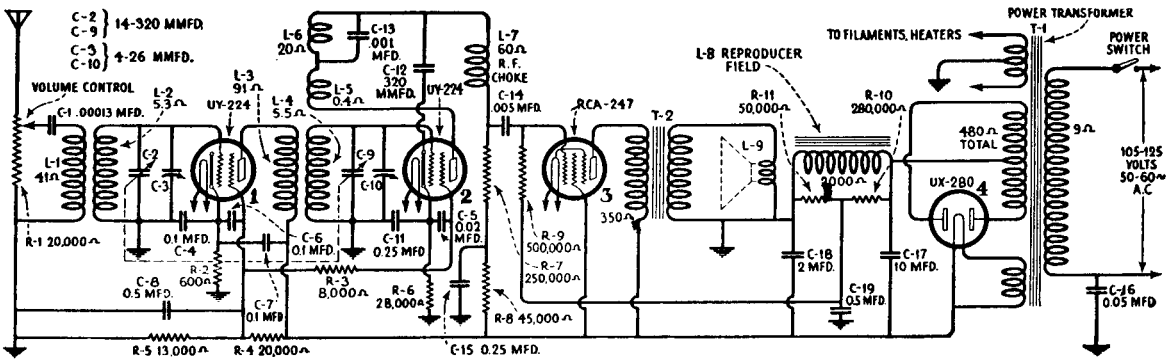


Figure A—Schematic Circuit

L-50 and L-51



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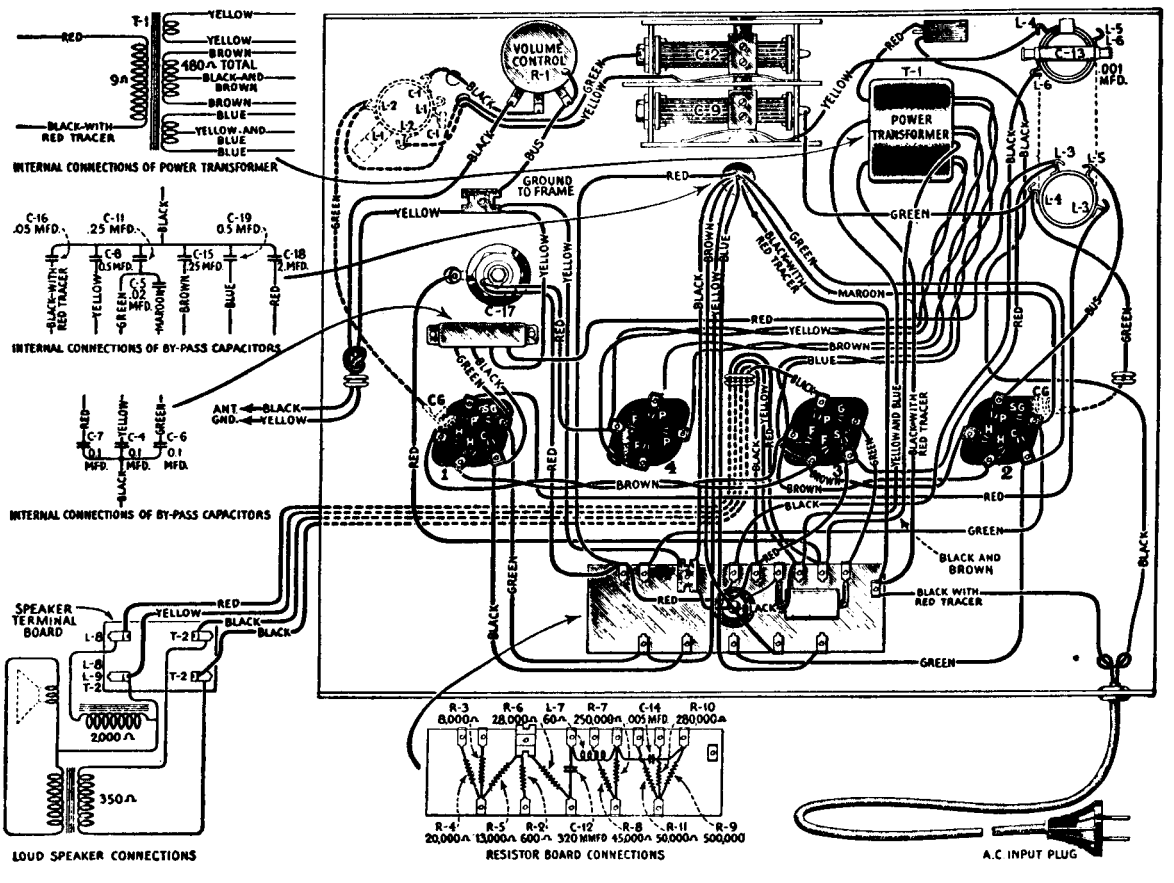
Schematic Circuit Diagram

SOCKET VOLTAGE READINGS GRAYBARETTE 4

110-VOLT LINE

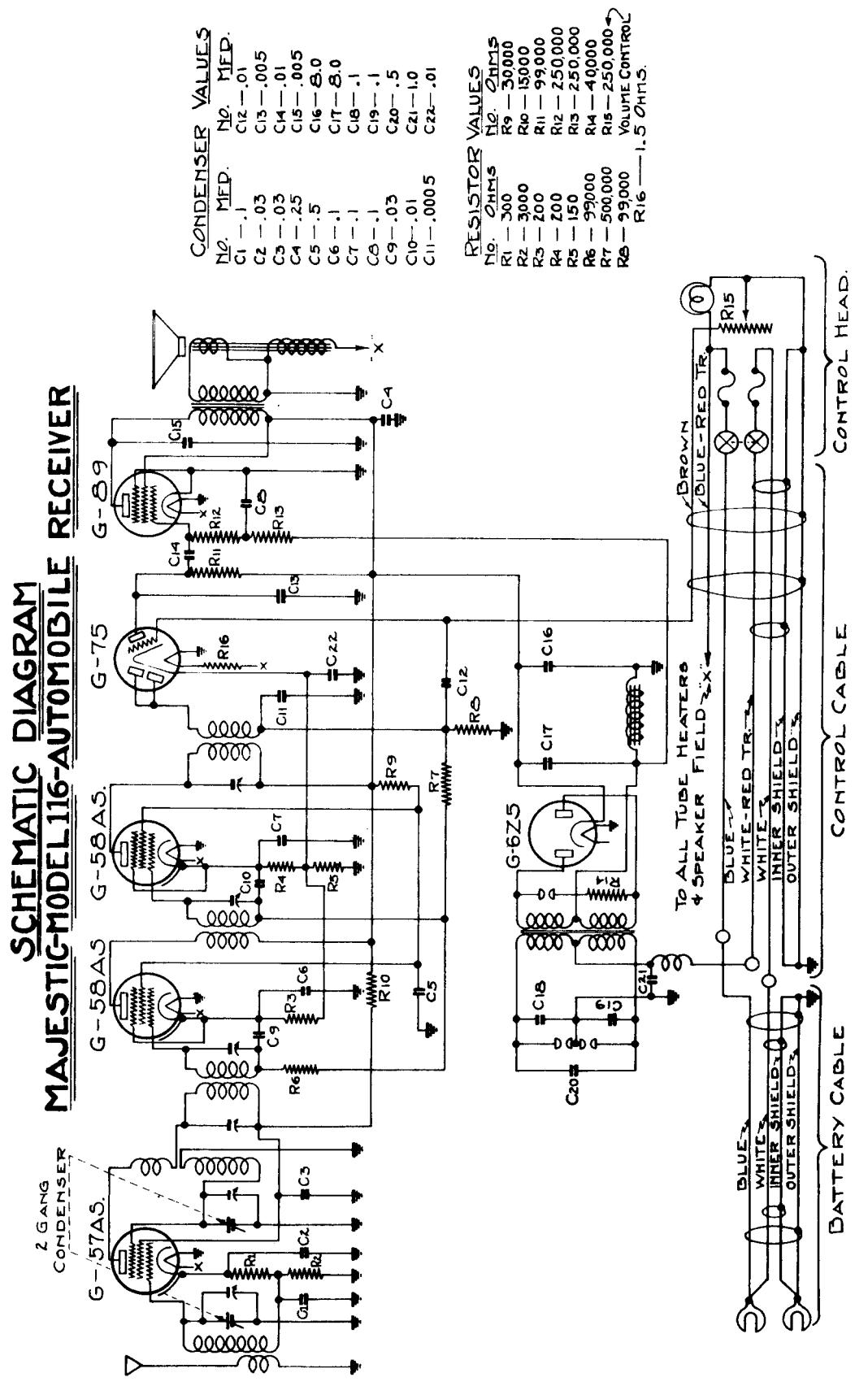
These readings are obtained with the usual Set Analyzers and are not true readings of the voltages at which the Radiotrons operate.

Radiotron No.	Heater to Cathode Volts	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Heater Volts
1	3.0	3.0	85	225	4.0	2.2
2	7.0	7.0	65	100	0.25	2.2
3	——	2.0	225	215	30.0	2.2

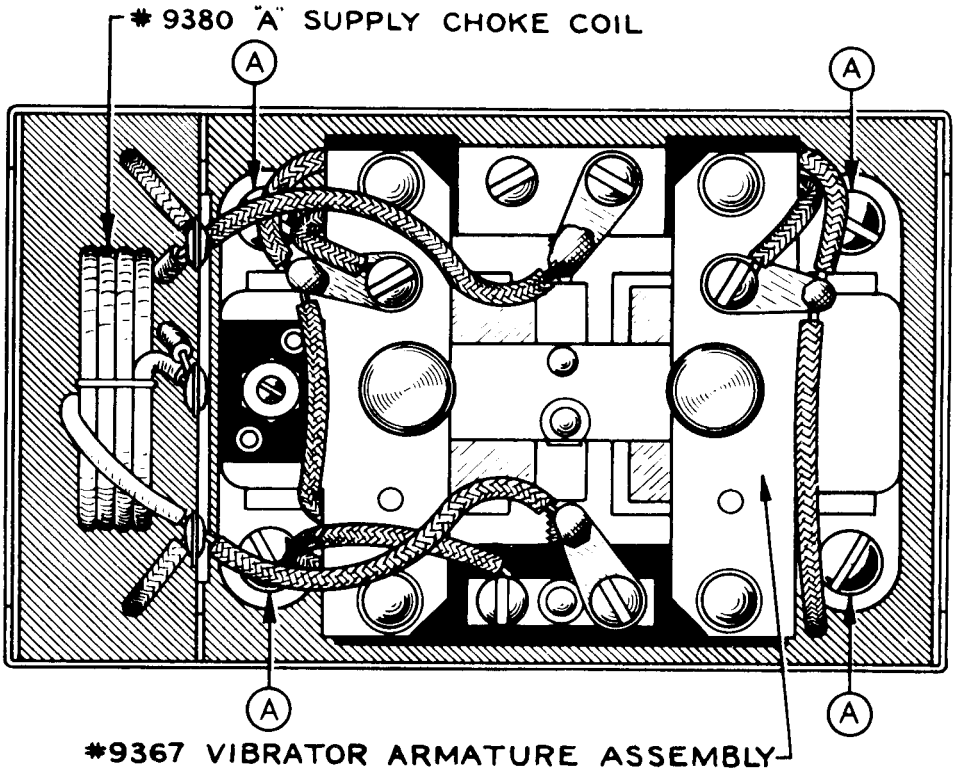


Wiring Diagram

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DURO-MUTE POWER UNIT

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

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

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

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

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

Unsolder the red, yellow, blue and black leads from the speaker output transformer (see Figure 12).

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

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

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

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

WARNING!
Do not file the contacts or tamper with any of the adjustments on the vibrator armature

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assembly. This unit has been carefully adjusted at the factory for utmost efficiency and any changes will seriously affect its operation.

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

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

Replace with a new part #9367 vibrator armature assembly.

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

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

Reassemble the outer container and speaker to the chassis and replace the bottom cover. Solder the speaker leads as indicated in Figure 12.

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

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

Replace cover and assemble receiver to firewall.

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

VOLTAGE CHART FOR MODEL 116 AUTO RECEIVER

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

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

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

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SCHEMATIC DIAGRAM
MAJESTIC-MODEL 116-A AUTOMOBILE RECEIVER

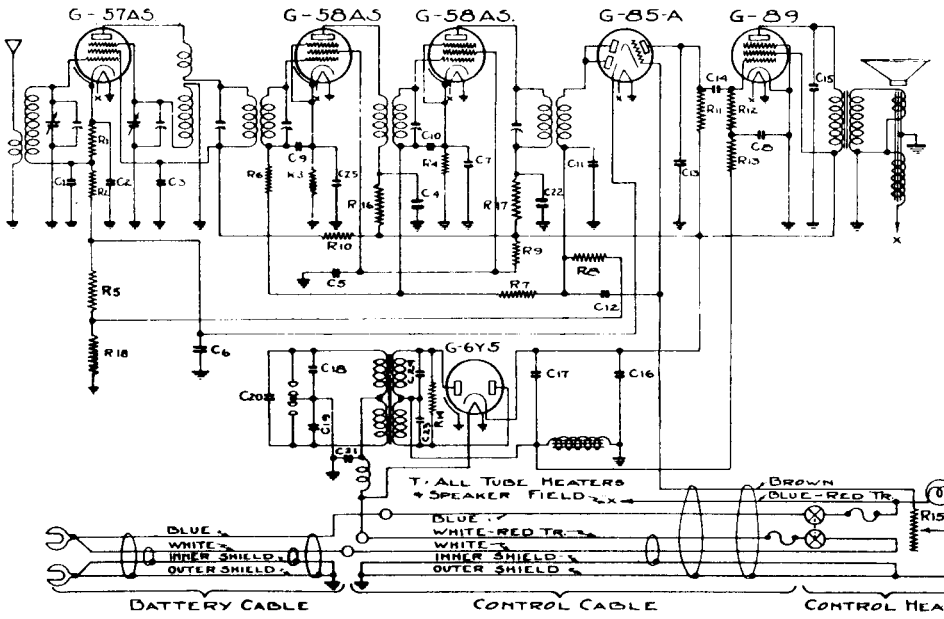


FIG. 175

REVISIONS	ISSUE	MEMO
1-25-33	1	7686
2-10-33	2	7736
4-13-33	3	7842
4-17-33	4	7851
5-4-33	5	7877

CONDENSER VALUES

NO.	MFD	NO.	MFD
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.1	C15	.01
C5	.25	C16	8.0
C6	.25	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	.5
C11	.0005	C22	.1
C23	.008	C24	.008
C25	.1		

RESISTOR VALUES

NO.	OHMS	NO.	OHMS
R1	300	R9	30,000
R2	1800	R10	15000
R3	900	R11	50000
R4	250	R12	250,000
R5	470	R13	250,000
R6	99000	R14	GLOBAR
R7	500,000	R15	250,000 VOLUME CONTROL
R8	250,000	R17	1,000
R16	10,000		
R18	530		

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TABLE OF VOLTAGES

Purpose	Tube Type	Plate Voltage	Screen Voltage	Cathode Voltage	Suppressor Voltage	Grid Volts
1st Det. Oscillator	G-57A-S	110	110	15	0	1.4
1st I. F. Amplifier	G-58A-S	180	90	3.5	3.5	..
2nd I. F. Amplifier	G-58A-S	180	90	3.5	3.5	..
2nd Det. and 1st Audio Amplifier	G-75	135	...	2.25	..	..
Power Amplifier	G-89	170	180	0	0	..
Rectifier	G-6-Z5	...	...	180	..	..

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

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

NOISE SUPPRESSION

Detailed instructions for installation of sparkplug and distributor suppressors and condensers for generator are contained in Service Manual. For checking purposes keep the following points in mind.

1. Go over each spark plug suppressor.
2. Check distributor suppressor. In cars having two coils, a suppressor in each coil or high tension lead is necessary. Always install the suppressor as close to the distributor as possible.
3. Make sure that the two condensers are properly connected to the generator and ammeter respectively.
4. If noise interference still prevails, determine whether picked up by antenna or radio. Ground antenna as it leaves the radio. If interference stops, it is certain that antenna picks it up. Check all ground connections of chassis.
5. To guard against ground interference, make sure that no choke wires, speedometer cables, copper tubes, battery cables, or the like rub on the radio container.

ALIGNMENT

If, for any reason it becomes necessary to align the Model No. 116 Auto Radio, the following procedure should be carefully followed.

It will be necessary to remove the chassis container and cover to align the receiver.

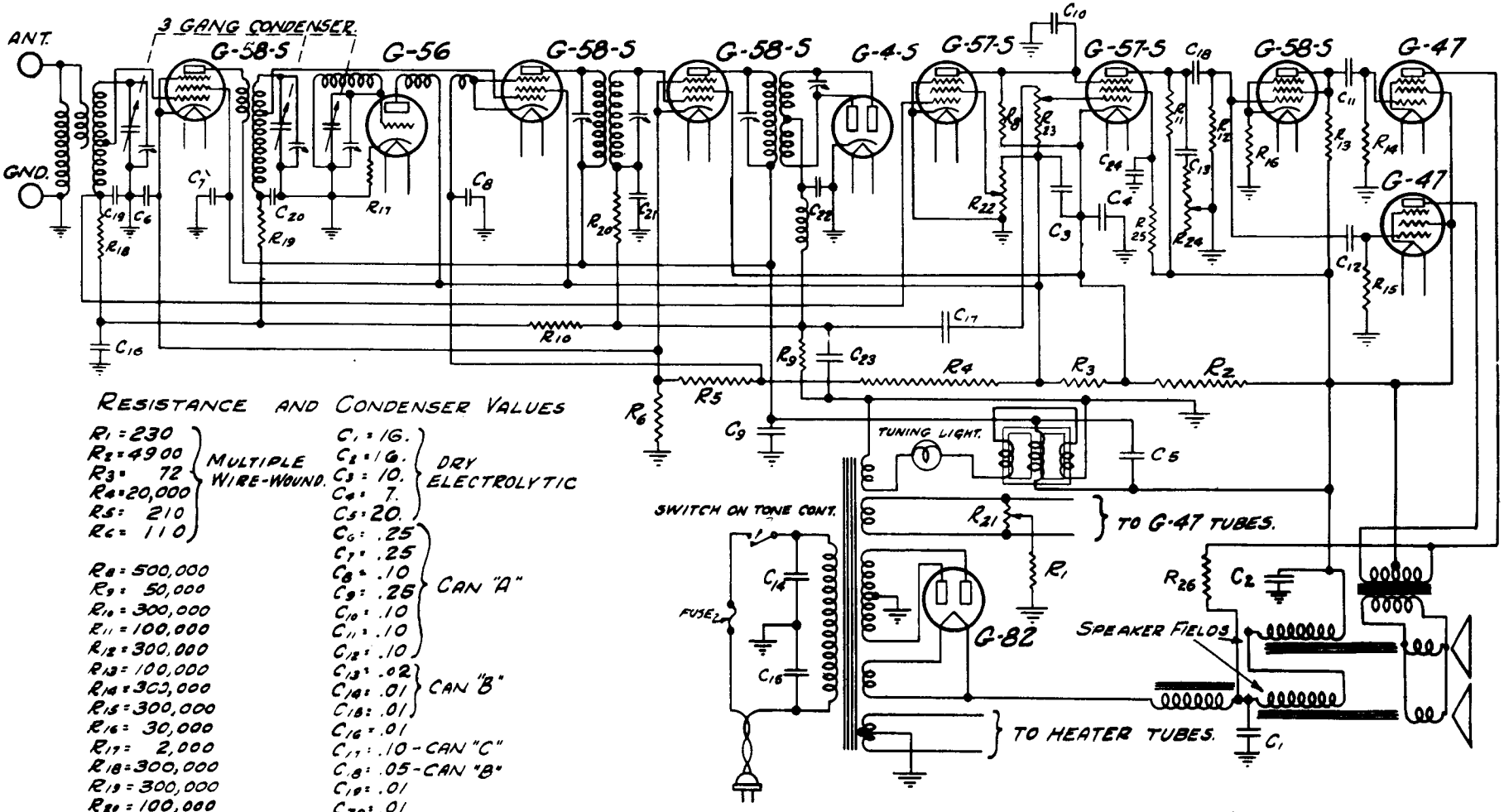
1. Set the volume control at maximum, insert all tubes in their proper sockets and connect the battery cable to a six (6) volt storage battery.
2. Supply a 456 Kilocycle signal to the grid of the first detector tube and align for maximum output the three (3) I.F. aligning condensers that are located on the bottom right hand side of the chassis and the one (1) I.F. aligning condenser located on the upper part of the chassis behind the speaker.

The shielding is to be connected to the grounded side of the battery and the two wires emerging from the shielding are both connected to the hot side. The polarity of the battery need not be considered when making these connections. When making the ground connections, scrape away any corrosion, paint or rust so as to make a good electrical contact.

TO OBTAIN BEST RESULTS FROM THIS RECEIVER, ADVANCE THE CAR GENERATOR TO KEEP THE STORAGE BATTERY FULLY CHARGED.

The cable must be securely clamped and must not come in contact with the battery in order to avoid the possibility of corrosion and shorting the battery.

SCHEMATIC DIAGRAM of MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE MODEL 300 TWIN SPEAKER



RESISTANCE AND CONDENSER VALUES

R_1 = 230	MULTIPLE WIRE-WOUND.	C_1 = 16.	DRY ELECTROLYTIC
R_2 = 4900		C_2 = 16.	
R_3 = 72		C_3 = 10.	
R_4 = 20,000		C_4 = 7.	
R_5 = 210		C_5 = 20.	
R_6 = 110		C_6 = .25	CAN "A"
		C_7 = .25	
R_8 = 500,000		C_8 = .10	
R_9 = 50,000		C_9 = .25	
R_{10} = 300,000		C_{10} = .10	
R_{11} = 100,000		C_{11} = .10	
R_{12} = 300,000		C_{12} = .10	
R_{13} = 100,000		C_{13} = .02	CAN "B"
R_{14} = 300,000		C_{14} = .01	
R_{15} = 300,000		C_{15} = .01	
R_{16} = 30,000		C_{16} = .01	
R_{17} = 2,000		C_{17} = .10 - CAN "C"	
R_{18} = 300,000		C_{18} = .05 - CAN "B"	
R_{19} = 300,000		C_{19} = .01	
R_{20} = 100,000		C_{20} = .01	
R_{21} = 20	HUM CONT.	C_{21} = .01	
R_{22} = 20,000	SUPPRESSOR	C_{22} = .0005	
R_{23} = 200,000	VOL. CONT.	C_{23} = .0005	
R_{24} = 250,000	TONE CONT.	C_{24} = .25	CAN "C"

R_{25} = 500,000 R_{26} = 100,000

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TECHNICAL DATA PERTAINING TO MODEL 300 CHASSIS

THE CIRCUIT

Model 300 Chassis is employed in the 303, 304, and 307 Receivers. Fundamentally the Model 300 circuit is similar to the 200 circuit, except that it employs Synchro-silent tuning and incorporates the new MAJESTIC Reactance Resonance Indicator. Another outstanding feature is the use of true resistance coupled push-pull amplification through a novel phase rotation circuit.

METHOD OF BIASING

Initial bias on the R.F. and I.F. tubes is obtained from Resistor R-6. The initial bias on the First Detector tube comes from Resistor R-5. Automatic volume control bias is applied to these three tubes from Resistor R-9. The oscillator tube obtains its bias from Resistor R-17.

The fixed bias on the screen grid A.F. tube is obtained from Resistor R-3, while the bias necessary for Synchro-Silent Tuning is obtained from R-8.

Bias for the phase rotating tube is obtained from R-16.

Bias for the output tubes comes from R-1.

AUTOMATIC VOLUME CONTROL SYSTEM

This is the now proved MAJESTIC Duodiode circuit, which was so successfully used in the 200 and 210 chassis. The manual level control is a simple audio frequency potentiometer, R-23, in the grid circuit of the screen grid audio state. Automatic Volume Control effect is exerted on the R.F., First Detector, and I. F. tubes, due to the voltage drop across R-9.

INSTRUCTIONS FOR ADJUSTING AUTOMATIC SYNCHRO-SILENT TUNER

1. Complete installation in the same manner as an ordinary broadcast receiver so far as antenna, ground, tubes, etc., are concerned.

2. Set Synchro-Silent Tuning Knob to position of no silencing. (All the way clockwise).

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

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

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

6. The set is now ready for operation, and it will be found that stations come in with just as much volume as they would if the Synchro-Silent Tuning were not used, but when tuning between stations, the set is absolutely quiet. It may be found that in some particular locations the noise is greater at one end of the dial than at the other, so that if the Synchro-Silent Tuning Control is adjusted to take out noise at the low frequency end of the dial, some noise may come in at the high frequency end. In this case, it is perfectly permissible and advisable to readjust the Synchro-Silent Tuning Control at the high frequency end of the dial.

7. If at any time it is desired to get maximum distance without regard to noise between stations, simply turn the Automatic Synchro-Silent Tuning Control knob as far clock-wise as possible.

MAJESTIC PUSH-PULL RESISTANCE COUPLING CIRCUIT

This is a feature which has never before appeared in a broadcast receiver. The advantages of resistance coupling are so well known that it is unnecessary to point out how good tone quality and well designed resistance coupling are synonymous. The advantages of push-pull are also well known, the chief among these being that it is possible to get greater power output with less distortion. Now, as mentioned above, for the first time we have both of these features in one chassis.

In push-pull amplification, it is necessary that the grids of the push-pull tubes be fed with voltages that are equal in magnitude, but exactly opposite in phase or polarity. When a transformer is used, this is accomplished simply by using the two extremes of the secondary winding to feed the push-pull grids, and if a center tap is provided, these voltages are bound to be equal, and opposite in polarity.

In the new MAJESTIC circuit, phase rotation is accomplished by making use of the fact that a signal in passing through a vacuum tube is rotated in phase exactly 180° (complete reversal). Following the audio channel from the duodiode, we find that the audio voltage built up across Resistor R-9 is fed to the G-57-S audio tube through potentiometer R-23. The output of this audio amplifier follows two

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO MODEL 300 CHASSIS (Cont'd)

channels; the direct and conventional channel is through condensers C-18 and C-12 to the lower of the two G-47 push-pull output pentodes and the remaining channel is through condenser C-18, and the G-58-S phase rotating tube. The signal coming out of this tube built up across R-13 is reversed in polarity over that originally built up across R-11. This reversed signal is fed to the upper of the two G-47 output pentodes. By suitable design, the G-58-S phase rotating tube and associated circuit is arranged so that no change in the magnitude of the signal takes place, the only change being a reversal of polarity or phase.

In this way, we have two voltages fed to the two G-47 output tubes which are equal in magnitude, but exactly opposite in polarity and true push-pull resistance coupled operation results.

REACTANCE RESONANCE INDICATOR

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

The operation of the reactor is as follows:

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

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

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

G-14-F, G-19-B AND G-19-C SPEAKERS EMPLOYED IN MAJESTIC MODELS

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

NOTICE

In the first run of Model 300 chassis, condenser C-13 in the #7285 "Can B" condenser assembly had a capacity of .02 mfd. while in the later run it had a capacity of .015 mfd. In cases where there is a .02 mfd. condenser a 5,000 resistor was used in series with the tone control. When replacing the #7285 condenser assembly, this resistor should be entirely removed from the circuit.

POWER TRASFORMER CODE

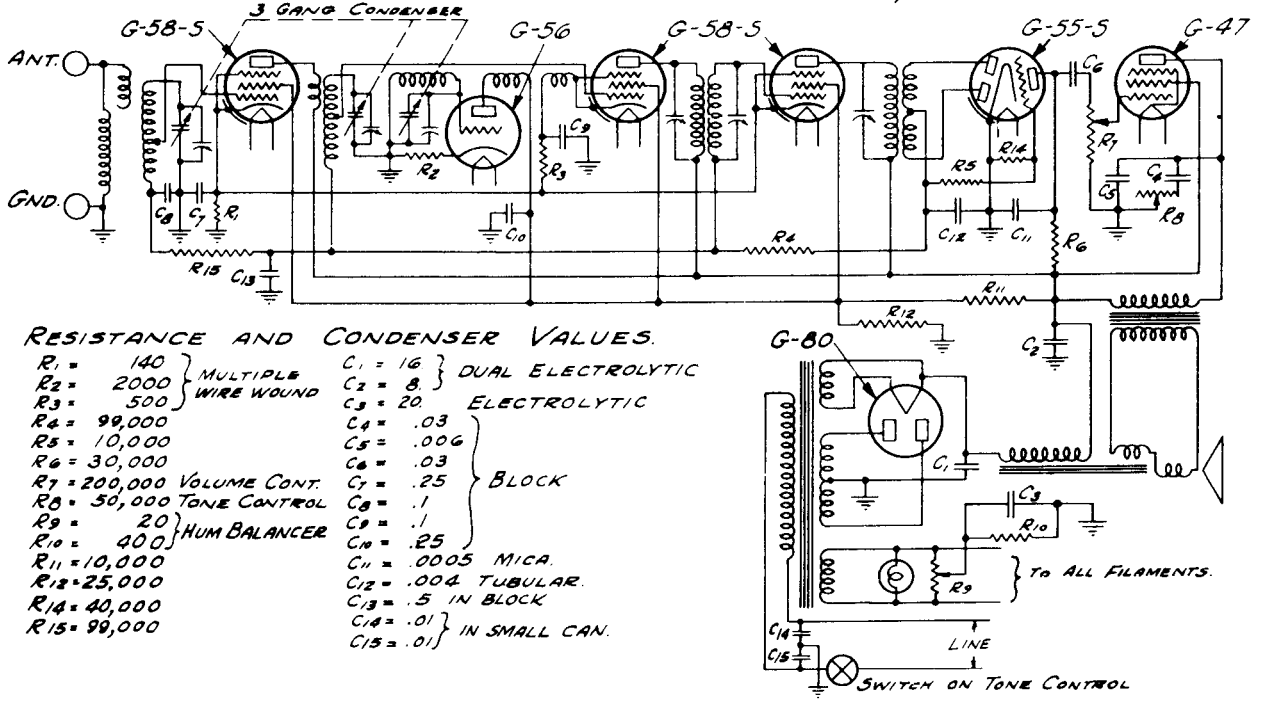
Rectifier Filament	Terminals #1 and 3.	Black
Heater Center Tap.	Terminal #2. . . .	Green
Tuning Light . . .	Terminals #4 and 6.	Black
47 Filament. . . .	Terminals #5 and 8.	Yellow
Start of Anode . .	Terminal #10.	Red
Center Tap of Anode	Terminal #11. . . .	Black
Finish of Anode. .	Terminal #12.	Red
Primary.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

GRIGSBY-GRUNOW CO.

DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE

MODEL 310-A SINGLE SPEAKER

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



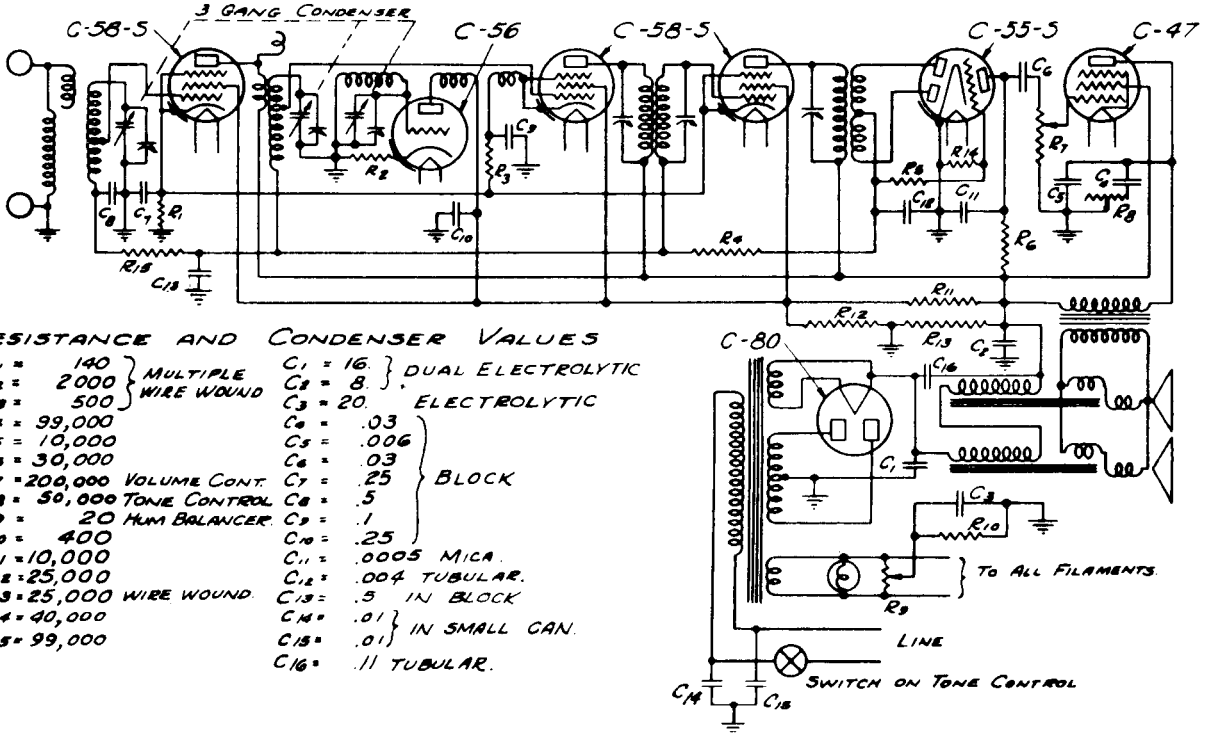
RESISTANCE AND CONDENSER VALUES.

R_1 = 140	MULTIPLE WIRE WOUND	C_1 = 16	DUAL ELECTROLYTIC
R_2 = 2000		C_2 = 8	
R_3 = 500		C_3 = 20	ELECTROLYTIC
R_4 = 99,000		C_4 = .03	BLOCK
R_5 = 10,000		C_5 = .006	
R_6 = 30,000		C_6 = .03	
R_7 = 200,000	VOLUME CONT.	C_7 = .25	
R_8 = 50,000	TONE CONTROL	C_8 = .1	
R_9 = 20	HUM BALANCER	C_9 = .1	
R_{10} = 400		C_{10} = .25	
R_{11} = 10,000		C_{11} = .0005	MICA.
R_{12} = 25,000		C_{12} = .004	TUBULAR.
R_{14} = 40,000		C_{13} = .5	IN BLOCK
R_{15} = 99,000		C_{14} = .01	IN SMALL CAN.
		C_{15} = .01	

DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE

MODEL 310-B TWIN SPEAKER.

FOR SERIAL NUMBER 12,304 AND UNDER.



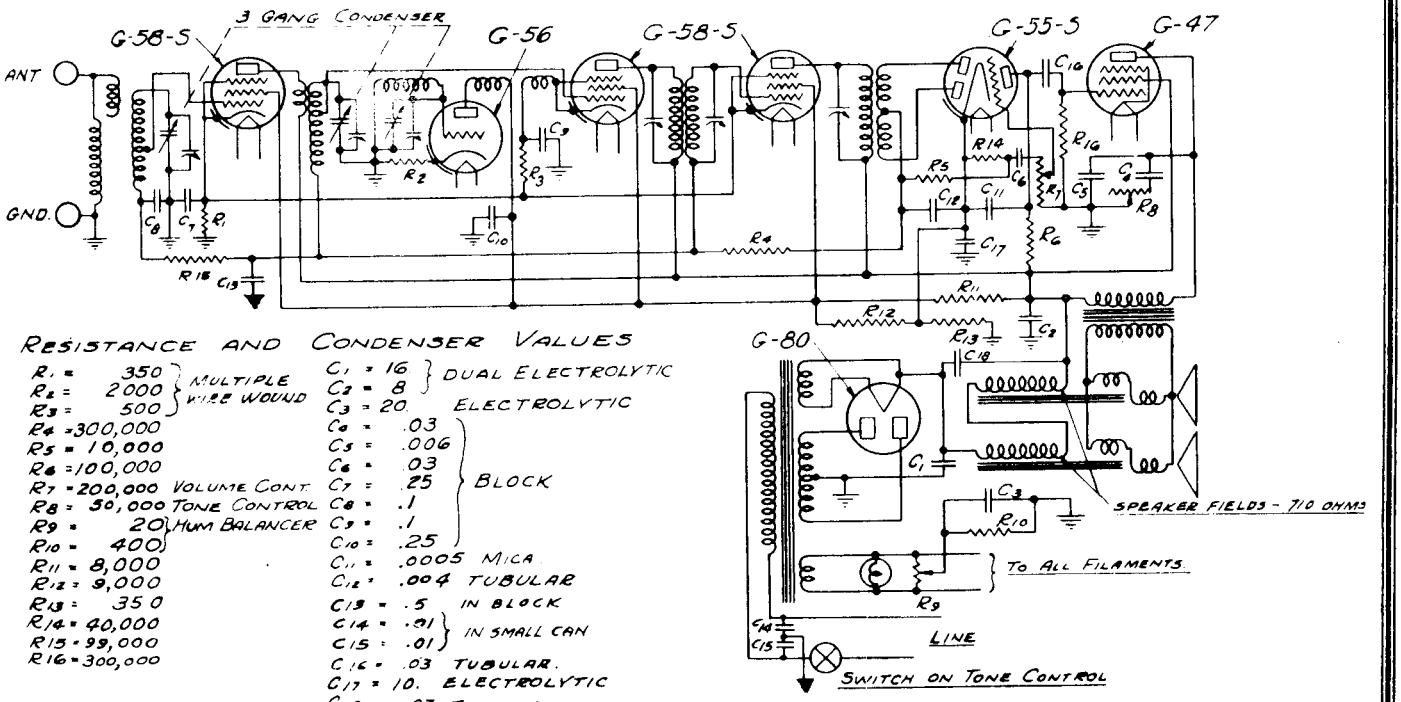
RESISTANCE AND CONDENSER VALUES

R_1 = 140	MULTIPLE WIRE WOUND	C_1 = 16.	DUAL ELECTROLYTIC
R_2 = 2000		C_2 = 8.	
R_3 = 500		C_3 = 20.	ELECTROLYTIC
R_4 = 99,000		C_4 = .03	BLOCK
R_5 = 10,000		C_5 = .006	
R_6 = 30,000		C_6 = .03	
R_7 = 200,000	VOLUME CONT.	C_7 = .25	
R_8 = 50,000	TONE CONTROL	C_8 = .5	
R_9 = 20	HUM BALANCER	C_9 = .1	
R_{10} = 400		C_{10} = .25	
R_{11} = 10,000		C_{11} = .0005	MICA.
R_{12} = 25,000		C_{12} = .004	TUBULAR.
R_{13} = 25,000	WIRE WOUND.	C_{13} = .5	IN BLOCK
R_{14} = 40,000		C_{14} = .01	IN SMALL CAN.
R_{15} = 99,000		C_{15} = .01	
		C_{16} = .11	TUBULAR.

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MODEL 310-B TWIN SPEAKER.

EFFECTIVE ON SERIAL #12,304 AND OVER



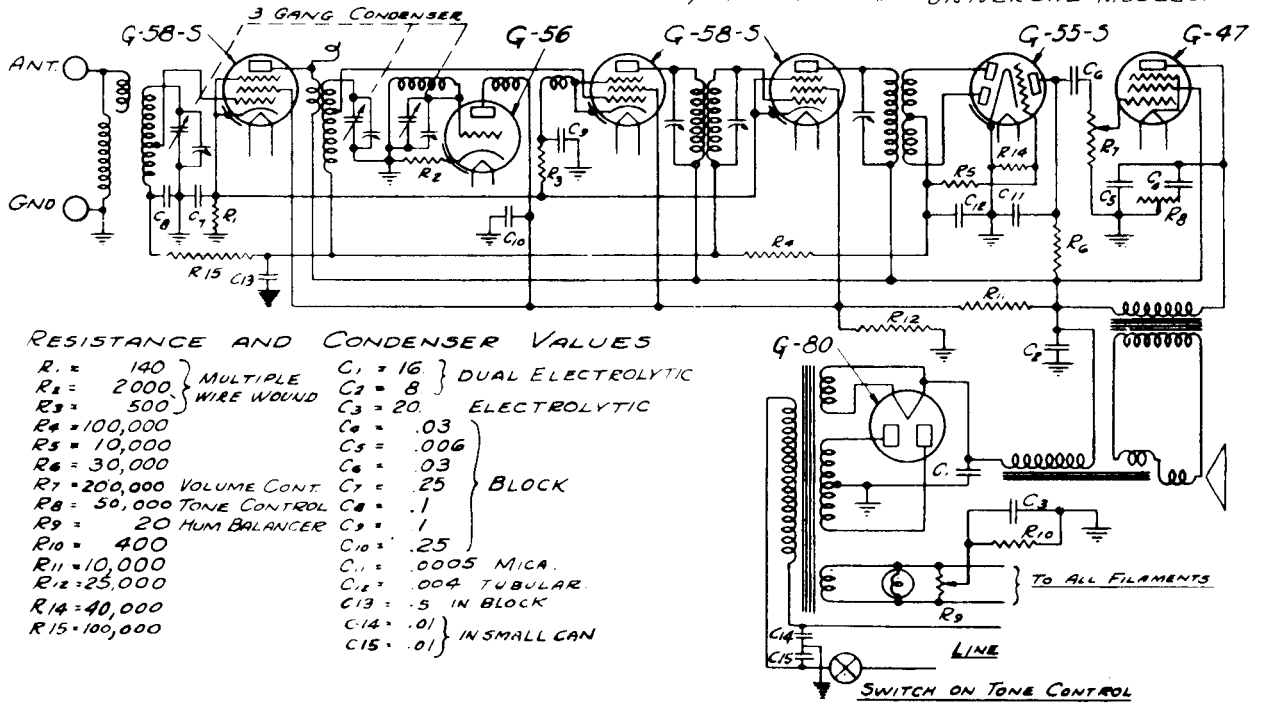
RESISTANCE AND CONDENSER VALUES

R_1 = 350	MULTIPLE WIRE WOUND	C_1 = 16	DUAL ELECTROLYTIC
R_2 = 2000		C_2 = 8	
R_3 = 500		C_3 = 20.	ELECTROLYTIC
R_4 = 300,000		C_4 = .03	BLOCK
R_5 = 10,000		C_5 = .006	
R_6 = 100,000		C_6 = .03	
R_7 = 200,000	VOLUME CONT.	C_7 = .25	
R_8 = 50,000	TONE CONTROL	C_8 = .1	
R_9 = 20	HUM BALANCER	C_9 = .1	
R_{10} = 400		C_{10} = .25	
R_{11} = 8,000		C_{11} = .0005	MICA
R_{12} = 9,000		C_{12} = .004	TUBULAR
R_{13} = 350		C_{13} = .5	IN BLOCK
R_{14} = 40,000		C_{14} = .01	IN SMALL CAN
R_{15} = 99,000		C_{15} = .01	
R_{16} = 300,000		C_{16} = .03	TUBULAR.
		C_{17} = 10.	ELECTROLYTIC
		C_{18} = .07	TUBULAR

DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE

MODEL 310-A SINGLE SPEAKER

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



RESISTANCE AND CONDENSER VALUES

R_1 = 140	MULTIPLE WIRE WOUND	C_1 = 16	DUAL ELECTROLYTIC
R_2 = 2000		C_2 = 8	
R_3 = 500		C_3 = 20.	ELECTROLYTIC
R_4 = 100,000		C_4 = .03	BLOCK
R_5 = 10,000		C_5 = .006	
R_6 = 30,000		C_6 = .03	
R_7 = 200,000	VOLUME CONT.	C_7 = .25	
R_8 = 50,000	TONE CONTROL	C_8 = .1	
R_9 = 20	HUM BALANCER	C_9 = .1	
R_{10} = 400		C_{10} = .25	
R_{11} = 10,000		C_{11} = .0005	MICA.
R_{12} = 25,000		C_{12} = .004	TUBULAR.
R_{14} = 40,000		C_{13} = .5	IN BLOCK
R_{15} = 100,000		C_{14} = .01	IN SMALL CAN
		C_{15} = .01	

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO MODEL 310 CHASSIS

THE CIRCUIT

The Model 310-A is a seven-tube superheterodyne chassis with automatic volume control, designed for single speaker operation and the 310-B is the same type chassis designed for twin speaker operation. The circuit employs the latest 2.5 volt type tubes arranged as follows: pentode radio frequency amplifier stage (G-58-S), oscillator stage (G-56), pentode first detector stage (G-58-S), high gain pentode intermediate frequency amplifier stage (G-58-S), combined duodiode second detector and triode first audio amplifier stage (G-55-S) and pentode audio output stage (G-47). The principal characteristics of the circuit are its excellent automatic volume control, high sensitivity, extreme selectivity, and carefully matched fidelity.

METHOD OF BIASING

In the late Model 310-B chassis, the initial bias for the R. F. and I. F. stages is provided by a 350 ohm resistor in the common cathode circuit. In the early 310-B and all 310-A chassis, this resistor has a value of 140 ohms. Initial bias for the first detector is provided by a 500 ohm resistor in its cathode circuit. Automatic bias for all three of these tubes is provided by a 10,000 ohm resistor and 40,000 ohm resistor in series in the detector circuit. This automatic bias is also applied to the triode part of the G-55-S detector tube except in the late Model 310-B chassis. This provides substantially flat automatic volume control for any input between fifty micro-volts and one volt. Bias for the output pentode is provided by plate current drop across a 400 ohm resistor in the filament circuit.

SPEAKERS

The Model 310-A chassis employs a single six-inch dynamic speaker having a field resistance of 1300 ohms and designated as GJ-16-B. The late Model 310-B chassis employs two ten-inch dynamic speakers each having a field resistance of 710 ohms and designated as G-19-F and G-19-G, while the early 310-B had a field resistance of 520 ohms per speaker. These speakers operating simultaneously produce an almost flat audio frequency response curve which gives these receivers a truly faithful reproduction.

NEW MAJESTIC TUBES

The new type G-55 tube is a combination of duodiode and triode tube concentric to one cathode. It functions as two tubes in that the duodiode part operates as a second detector and A.V.C. tube, and the triode operates as a first audio amplifier tube. It is designed for use in the detector stage of small receivers where more power is necessary to swing the grid of the output tube than is available from the ordinary duodiode detector.

NOTICE

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

MODEL 310-A:

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

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

MODEL 310-B:

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

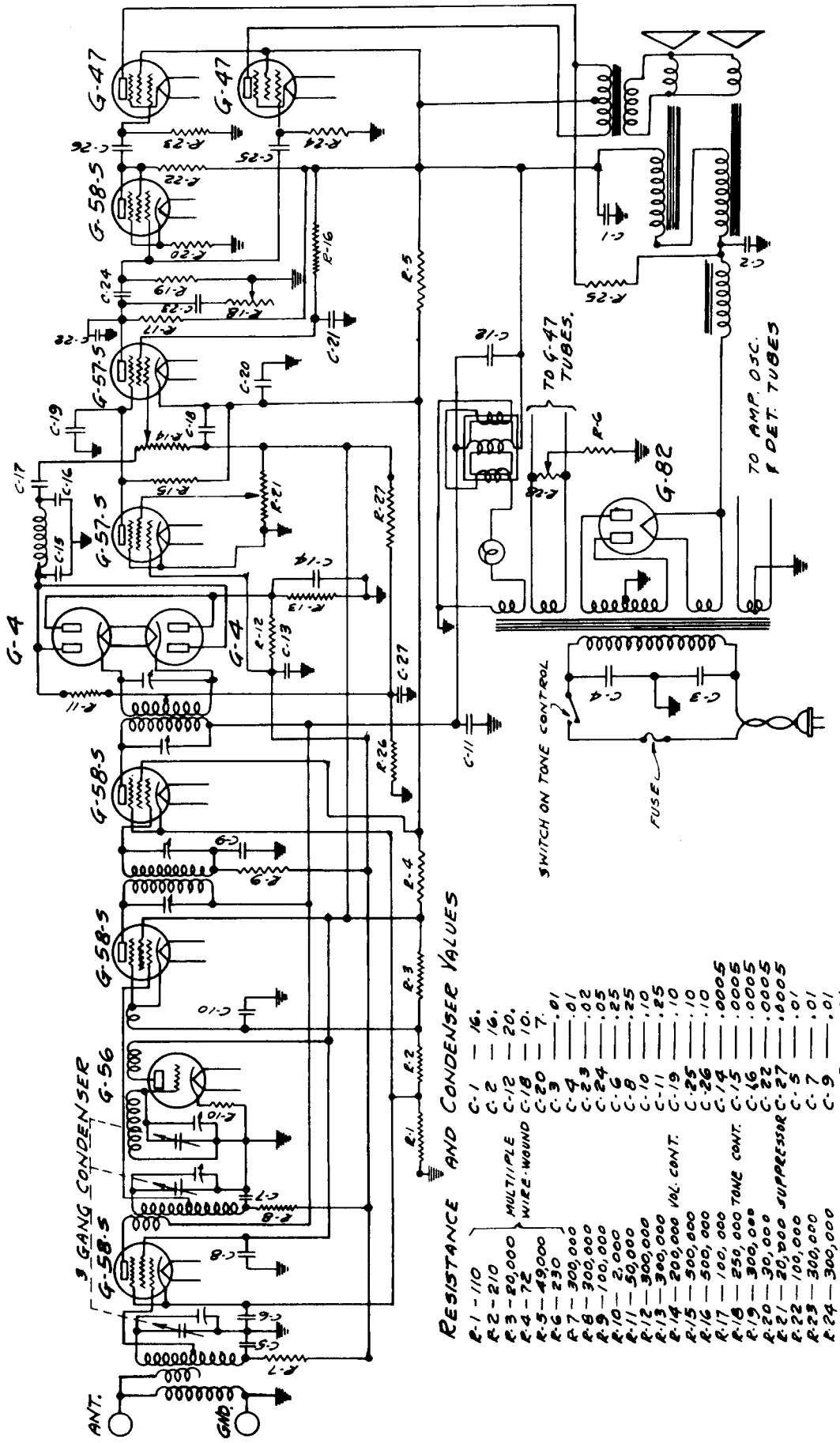
In replacing any coils or gang condensers in these chassis it will be necessary to carefully observe the serial number and the wattage rating on the name plate so as to be able to make the correct replacements.

POWER TRANSFORMER COLOR CODE

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

GRIGSBY-GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE MODEL-320 TWIN SPEAKER



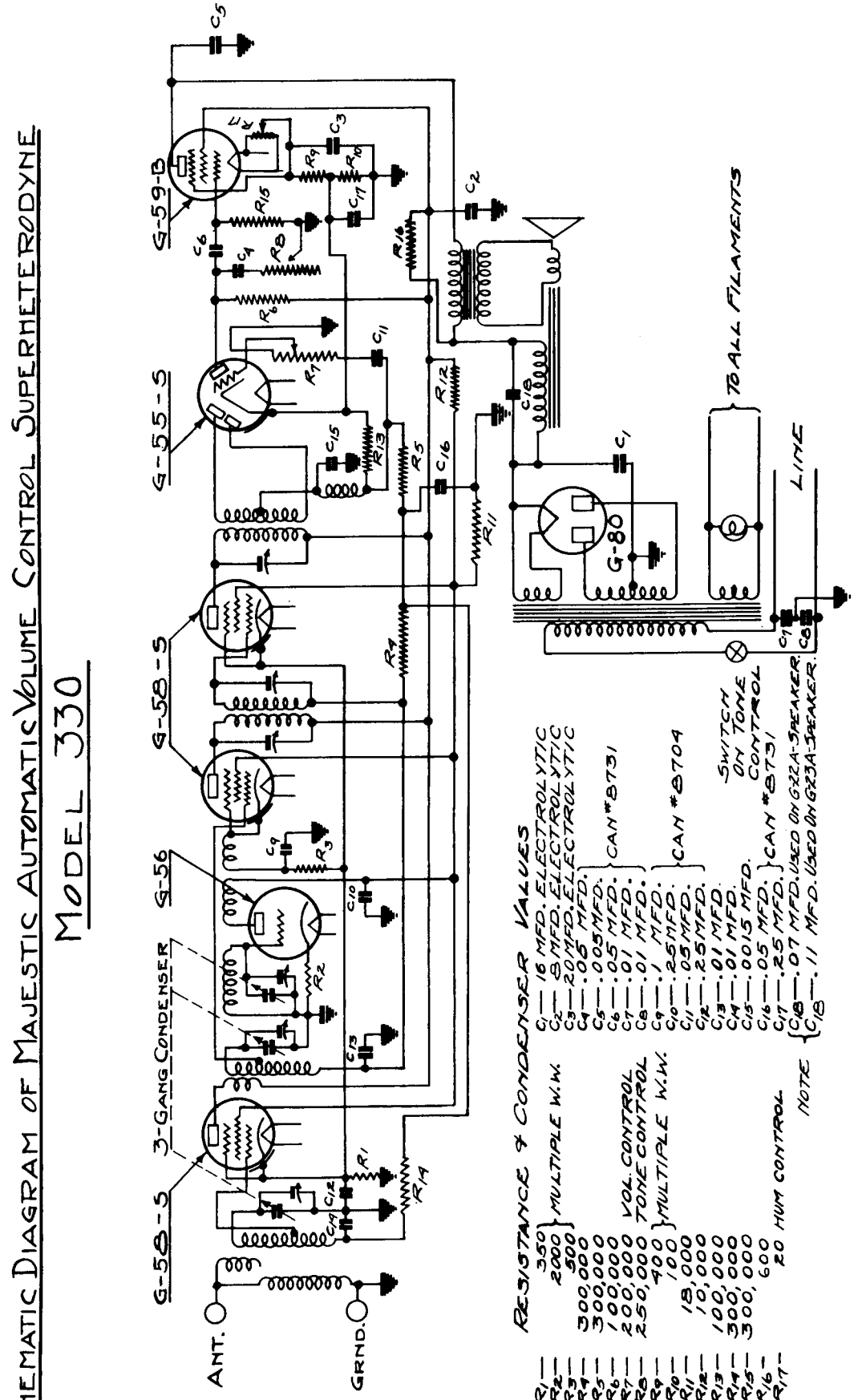
RESISTANCE AND CONDENSER VALUES

R-1 - 110		C-1 — 16.	
R-2 - 210		C-2 — 16.	
R-3 - 20,000	MULTIPLE	C-12 — 20.	
R-4 - 72	WIRE-WOUND	C-18 — 10.	
R-5 - 49,000		C-20 — 7.	
R-6 — 230		C-3 — .01	
R-7 — 300,000		C-4 — .01	
R-8 — 300,000		C-23 — .02	
R-9 — 100,000		C-24 — .05	
R-10 — 2,000		C-6 — .25	
R-11 — 50,000		C-8 — .25	
R-12 — 300,000		C-10 — .10	
R-13 — 300,000	VOL. CONT.	C-11 — .25	
R-14 — 200,000		C-19 — .10	
R-15 — 500,000		C-25 — .10	
R-16 — 500,000		C-26 — .10	
R-17 — 100,000		C-14 — .0005	
R-18 — 250,000	TONE CONT.	C-15 — .0005	
R-19 — 300,000		C-16 — .0005	
R-20 — 30,000		C-22 — .0005	
R-21 — 20,000	SUPPRESSOR	C-27 — .0005	
R-22 — 100,000		C-5 — .01	
R-23 — 300,000		C-7 — .01	
R-24 — 300,000		C-9 — .01	
R-25 — 75,000		C-13 — .01	
R-26 — 5,000		C-17 — .10	
R-27 — 100,000		C-21 — .25	
R-28 — 20- HUM CONT.			

GRIGSBY-GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE

MODEL 330



GRIGSBY - GRUNOW CO.

ALIGNMENT PROCEDURE

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

2 - Supply a 175 K.C. signal to the first detector grid and align all I.F. tuning condensers to give maximum sensitivity.

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

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

TABLE OF VOLTAGE TO GROUND

MODEL 330 CHASSIS

TUBE PURPOSE	TYPE	FILAMENT A. C.	PLATE D. C.	SCREEN D. C.	CATHODE D. C.
R. F. Amp.	G-58-S	2.3	250	88	7.2
Modulator	G-58-S	2.3	250	88	9.3
Oscillator	G-56	2.3	90	----	18
I. F. Amp.	G-58-S	2.31	250	88	7.2
2nd Detector & 1st Audio	G-55-S	2.32	Triode 65	----	4.3
Power Output	G-59-B	2.34	254	250	19
Rectifier	G-80	4.8	352 A.C.	----	----

First Filter Condenser . . . 326 volts D.C.
Second Filter Condenser. . . 250 volts D.C.

Line Voltage . . . 115 volts
Volume Control . . . Maximum

Measurements made with a 1,000 ohm per volt D.C. voltmeter, all tubes in their sockets no signal supplied to the receiver.

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO MODEL 330 CHASSIS

THE CIRCUIT

The Model 330 is a seven tube chassis designed for single speaker operation in the Models 331 and 336 receivers. The tubes used and their respective stages are as follows: G-58-S, R.F. amplifier; G-56, Oscillator; G-58-S, first detector; G-58-S, I.F. amplifier; G-55-S, second detector and first audio; G-59-B pentode output; and G-80, rectifier.

This chassis is similar to the Model 310 series, except that it employs wet electrolytic condensers and a G-59-B tube connected as a pentode in the output stage.

As on the 310 series, a hum balancing potentiometer is connected in the filament circuit and should be adjusted to right or left as required, to reduce hum to a minimum after the receiver has been installed.

AUTOMATIC VOLUME CONTROL

Automatic volume control bias voltage is developed across resistors R-13 and R-10 and is applied to the grid of the radio frequency, first detector and intermediate frequency tubes to control their amplification.

The manual volume control is a 200,000 ohm potentiometer which is connected in the grid circuit of the G-55-S tube and works entirely independent of the automatic volume control.

SPEAKER

The "Best" D-65, a six and one-half inch dynamic speaker, is used in conjunction with the Model 330 chassis when used in the Model 331 receiver while the Model G-22-A, a twelve inch dynamic speaker, is used in the Model 336 receiver. The former has a field resistance of 1070 ohms hot, while the latter has a field resistance of 970 ohms at 70°F. A .07 mfd. condenser is connected across the field of each speaker in order to reduce hum.

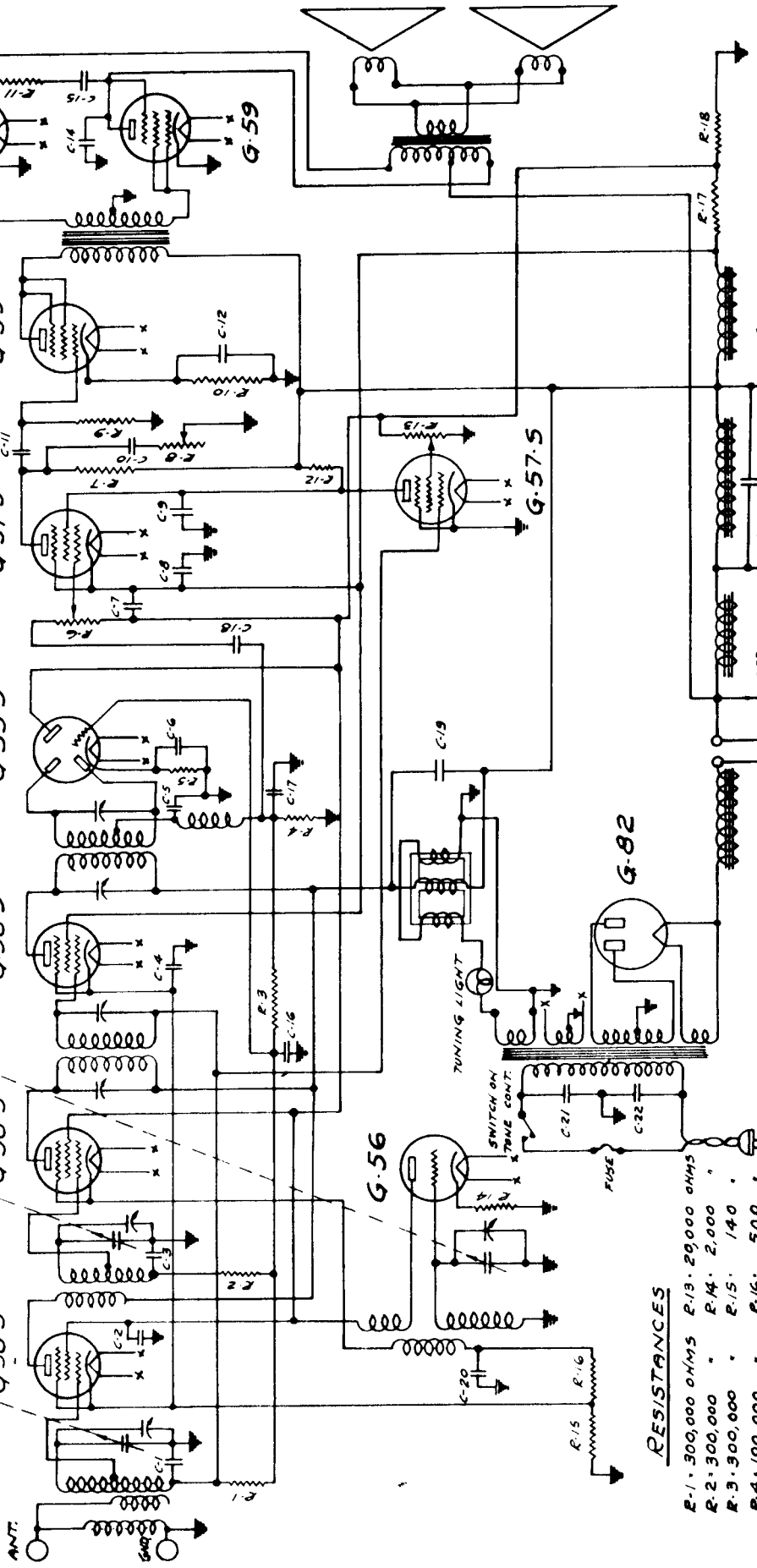
POWER TRANSFORMER COLOR CODE

Primary	Stranded Yellow
Primary	Stranded Yellow
High Voltage	Stranded Red
High Voltage C.T.	Stranded Black
High Voltage	Stranded Red
Heater	Solid Black
Heater	Solid Black
Rectifier Filament	Solid Yellow
Rectifier Filament	Solid Yellow

GRIGSBY - GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL

SUPERHETERODYNE MODEL-340-B DOUBLE SPEAKER



CAPACITIES

C-1 =	0.01	MFD.	C-9 =	0.10	MFD.
C-2 =	0.25	"	C-10 =	0.02	"
C-3 =	0.01	"	C-11 =	0.15	"
C-4 =	0.25	"	C-12 =	20.	"
C-5 =	0.0005	"	C-13 =	0.001	"
C-6 =	0.10	"	C-14 =	0.001	"
C-7 =	10.	"	C-15 =	0.005	"
C-8 =	7.	"	C-16 =	0.05	"

JUMPER ON SPKR. PLUG.

C-17 =	0.0005	MFD.	C-25 =	16.	MFD.
C-18 =	0.05	"	C-26 =	1.	"
C-19 =	20.	"			
C-20 =	0.10	"			
C-21 =	0.01	"			
C-22 =	0.01	"			
C-23 =	8.	"			
C-24 =	8.	"			

RESISTANCES

R-1 =	300,000	OHMS	R-13 =	20,000	OHMS
R-2 =	300,000	"	R-14 =	2,000	"
R-3 =	300,000	"	R-15 =	140	"
R-4 =	100,000	"	R-16 =	500	"
R-5 =	500	"	R-17 =	36	"
R-6 =	200,000	"	R-18 =	1,730	"
R-7 =	150,000	"			
R-8 =	250,000	"			
R-9 =	100,000	"			
R-10 =	1,000	"			
R-11 =	4,500	"			
R-12 =	500,000	"			

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO MODEL 340 CHASSIS

THE CIRCUIT

The Model 340 is an eleven tube chassis designed for dual speaker operation in the Model 344 receiver. It provides reactance dimmer action, delayed automatic volume control, synchro-silent tuning and class "B" amplification.

The tubes employed and their respective stages are as follows: G-58-S, R.F. amplifier; G-56, oscillator; G-58-S, first detector; G-58-S, I.F. amplifier; G-55-S, second detector and delayed automatic volume control; G-57-S, first audio; G-57-S, suppressor; G-59, driver; two G-59's output and G-82 rectifier.

SYNCHRO-SILENT TUNING CONTROL

The operation of this control in the Model 340 chassis is similar to that in the 360 chassis. See page 15 for description of its operation.

INSTRUCTIONS FOR OPERATING AUTOMATIC SYNCHRO-SILENT TUNING CONTROL

1 - Complete installation of this radio in the same manner as an ordinary broadcast receiver as far as antenna, ground, tubes, etc. are concerned.

2 - Turn Automatic Synchro-Silent Tuning Control knob located on the side of the cabinet clockwise as far as possible - to position marked "distance".

3 - Turn the dial to a position between 650 and 800 kilocycles at a point on the dial where no station is heard and then turn the volume control to maximum volume position.

4 - FOR LOCAL STATIONS: Adjust the Automatic Synchro-Silent Tuning Control by turning the knob toward "local" position (counter-clockwise) until the noise and static is no longer heard. This noise and static will diminish suddenly and care must be taken to see that the control knob is turned toward "local" position only far enough to eliminate the noise and static and no further.

5 - The set is now ready for operation, and local stations will come in with just as much volume as they would if the Automatic Synchro-Silent Tuning Control was not used, but when tuning between stations the set is quiet. In practically all cases, the adjustment stated above is all that is necessary to cut out objectionable static and noises between stations.

6 - FOR DISTANT STATIONS: Turn the Automatic Synchro-Silent Tuning Control knob as far as possible toward "distance" position.

REACTANCE DIMMER OPERATION

Similar to Model 360 chassis - see page 17 for description of its operation.

DELAYED AUTOMATIC VOLUME CONTROL

With the ordinary type of automatic volume control circuit, the total output from the second detector is somewhat reduced by the circuit. This effect is eliminated when using the delayed automatic volume control system which allows the full output of the receiver regardless of signal strength.

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Delayed automatic volume control is accomplished by connecting the triode part of the G-55-S second detector so that, when a weak signal is tuned in, the bias on the grid of the G-55-S causes current to flow from the triode plate to the cathode. The flow of current causes the cathode bias to increase, which is in effect a bias on the diode plate. Hence, the rectification action and current drain properties of the diode are delayed until a point is reached in the intensity of the input signal where the peak volts are equal to the D.C. bias on the diode plates. Up to this point there is no automatic volume control.

However, beyond this point, full automatic volume control action is had because the plate current of the triode approaches zero as the intensity of the signal increases due to the fact that the grid bias on the G-55-S is obtained from the automatic volume control bias voltage that is developed across resistor R-4.

CLASS "B" AMPLIFICATION

The Model 340 chassis provides class "B" amplification for which a type G-59 tube is employed as a driver and two tubes of the same type are used in the output stages. The screen and control grids of the output tubes are connected together to serve as a single control-grid, and the third grid is connected to the plate of the tube. No grid bias is necessary with this connection. The control-grids of the output tubes are operated sufficiently positive to cause grid current to flow in their input circuit.

SPEAKERS

The Models G-22-B and G-22-C dynamic speakers are used in conjunction with the Model 340 chassis. They have a field resistance of 970 ohms and 2200 ohms respectively.

A seven prong plug is used to connect the speaker to the chassis. A jumper is connected across two of the prongs in such a way that no D.C. voltage is applied to any of the condensers in the chassis if the A.C. line is turned "on" when the speaker plug is removed from its socket.

POWER TRANSFORMER CONNECTIONS

Primary	Yellow lead
Primary	Yellow lead
Heater	Lugs #4 and #7
Heater C.T.	Lug #1
Heater	Lugs #5 and #8
High Voltage	Red lead
High Voltage C.T.	Black lead
High Voltage	Red lead
Rectifier Filament	Blue lead
Rectifier Filament	Blue lead
Tuning Light	Lug #10
Tuning Light	Lug #11

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ALIGNMENT PROCEDURE

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

2 - Supply a 175 K.C. signal to the first detector grid and align the four I.F. tuning condensers to give maximum sensitivity.

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

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

TABLE OF VOLTAGE TO GROUND

MODEL 340 CHASSIS

TUBE PURPOSE	TYPE	FILAMENT A. C.	PLATE D. C.	SCREEN D. C.	CATHODE D. C.	SUPPRESSOR D. C.
R.F. Amplifier	G-58-S	2.5	210	80	2.5	2.5
Modulator	G-58-S	2.5	210	80	4.5	4.5
Oscillator	G-56	2.5	80	---	18	---
I.F. Amplifier	G-58-S	2.5	210	85	2.5	2.5
2nd Detector	G-55-S	2.5	Triode 80	---	1.1	---
1st Audio	G-57-S	2.5	105	100	82.2	82.2
Suppressor	G-57-S	2.5	100	*0	0	0
Driver	G-59	2.5	225	225	22.	225.
Power Output	G-59	2.5	360	0	0	360.
Power Output	G-59	2.5	360	0	0	360.
Rectifier	G-82	2.5	---	---	---	---

First Filter Condenser . . . 400 volts D.C.
Second Filter Condenser. . . 340 volts D.C.
Third Filter Condenser . . . 235 volts D.C.

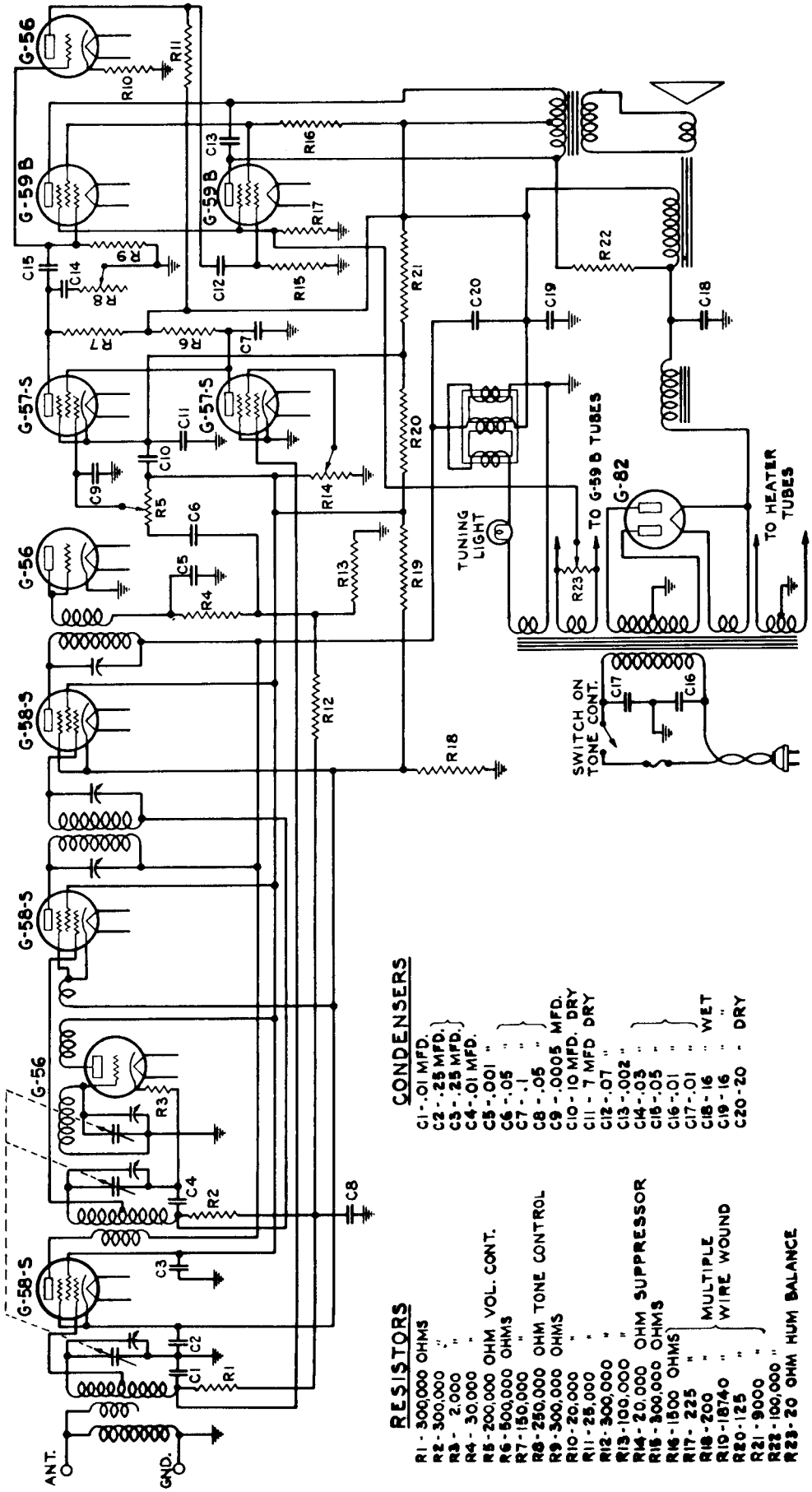
Line Voltage . . . . . .115 volts
Volume Control . . . . . .Maximum
Synchro Silent Tuner-Completely Clockwise

*Will vary from 0 to 80 volts according to setting of Syncro Silent Tuning Control.

Measurements made with a 1,000 ohm per volt, D.C. voltmeter, all tubes in their sockets and no signal supplied to the receiver.

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SCHEMATIC DIAGRAM OF MAJESTIC MODEL 360 RECEIVER



RESISTORS

R1 - 300,000 OHMS
R2 - 300,000 " }
R3 - 2,000 " } MULTIPLE WIRE WOUND
R4 - 30,000 " }
R5 - 200,000 OHM VOL. CONT.
R6 - 500,000 OHMS
R7 - 150,000 "
R8 - 250,000 OHM TONE CONTROL
R9 - 300,000 OHMS
R10 - 20,000 "
R11 - 25,000 "
R12 - 300,000 "
R13 - 100,000 "
R14 - 20,000 OHM SUPPRESSOR
R15 - 300,000 OHMS
R16 - 1500 OHMS
R17 - 225 "
R18 - 200 "
R19 - 18740 "
R20 - 125 "
R21 - 9000 "
R22 - 100,000 "
R23 - 20 OHM HUM BALANCE

CONDENSERS

C1 - .01 MFD.
C2 - .25 MFD. } WET
C3 - .25 MFD. }
C4 - .01 MFD. DRY
C5 - .001 "
C6 - .05 " " } WET
C7 - .1 " " }
C8 - .05 " " } DRY
C9 - .0005 MFD.
C10 - 10 MFD. DRY
C11 - 7 MFD DRY
C12 - .07 "
C13 - .002 " }
C14 - .03 " } WET
C15 - .05 " " }
C16 - .01 " " } DRY
C17 - .01 " " }
C18 - 16 " WET
C19 - 16 " "
C20 - 20 " DRY

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POWER TRANSFORMER CONNECTION

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

ALIGNMENT PROCEDURE

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

2 - Supply a 175 K.C. signal to the first detector grid and align the three I.F. tuning condensers to give maximum sensitivity.

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

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

TABLE OF VOLTAGE TO GROUND

MODEL #360 CHASSIS

TUBE PURPOSE	TYPE	FILAMENT A. C.	PLATE D. C.	SCREEN D. C.	CATHODE D. C.	SUPPRESSOR D. C.	GRID D. C.
R.F.Amplifier	G-58-S	2.35	275	105	5	5	---
Modulator	G-58-S	2.35	275	105	5	5	---
Oscillator	G-56	2.35	105	---	15	---	---
I.F.Amplifier	G-58-S	2.3	275	105	5	5	---
2nd Detector	G-56	2.3	0	---	0	---	---
First Audio	G-57-S	2.3	140	135	115	115	90
Suppressor	G-57-S	2.32	135	0	0	0	---
Phase Rotator	G-56	2.35	260	---	17	---	---
Power Output	G-59-B	2.35	280	270	---	18	---
Power Output	G-59-B	2.35	280	270	---	18	---
Rectifier	G-82	2.5	---	---	---	---	---

First Filter Condenser . . . 350 volts D.C.
Second Filter Condenser. . . 300 volts D.C.

Line Voltage . . . . . 115 volts
Volume Control . . . . . Maximum
Synchro Silent Tuner - Clockwise

Measurements made with a 1,000 ohm per volt D.C. voltmeter, all tubes in their sockets and no signal supplied to the receiver.

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INSTRUCTIONS FOR ADJUSTING SYNCHRO-SILENT TUNING CONTROL

1 - Complete installation of the radio in the same manner as an ordinary broadcast receiver as far as antenna, ground, tubes, etc. are concerned.

2 - Turn the Synchro-Silent Tuning Control knob, which is located on the side of the cabinet, clockwise as far as possible - to position marked "distance".

3 - Turn the dial to a point on the dial between 650 and 800 kilocycles where no station is heard and then turn the volume control to maximum position.

4 - FOR LOCAL STATIONS: Adjust the Synchro-Silent Tuning Control, by turning the knob toward "local" position (counter-clockwise) until the noise and static is appreciably reduced. This noise and static will diminish suddenly and care must be taken to see that the control knob is turned toward "local" position only far enough to reduce the noise and static and no further.

5 - The set is now ready for operation, and local stations will come in with just as much volume as they would if the Synchro-silent Tuning Control was not used, but when tuning between stations the set is quiet. In practically all cases, the adjustment stated above is all that is necessary to cut out objectionable static and noises between stations.

6 - FOR DISTANT STATIONS: Turn the Synchro-Silent Tuning Control knob as far as possible toward "distance" position.

MAJESTIC PUSH-PULL RESISTANCE COUPLING CIRCUIT

The advantages of resistance coupling are so well known that it is unnecessary to point out how good tone quality and well designed resistance coupling are synonymous. The advantages of push-pull are also well known, the chief among these being that it is possible to get greater power output with less distortion. Now, as mentioned above, we have both of these features in one chassis.

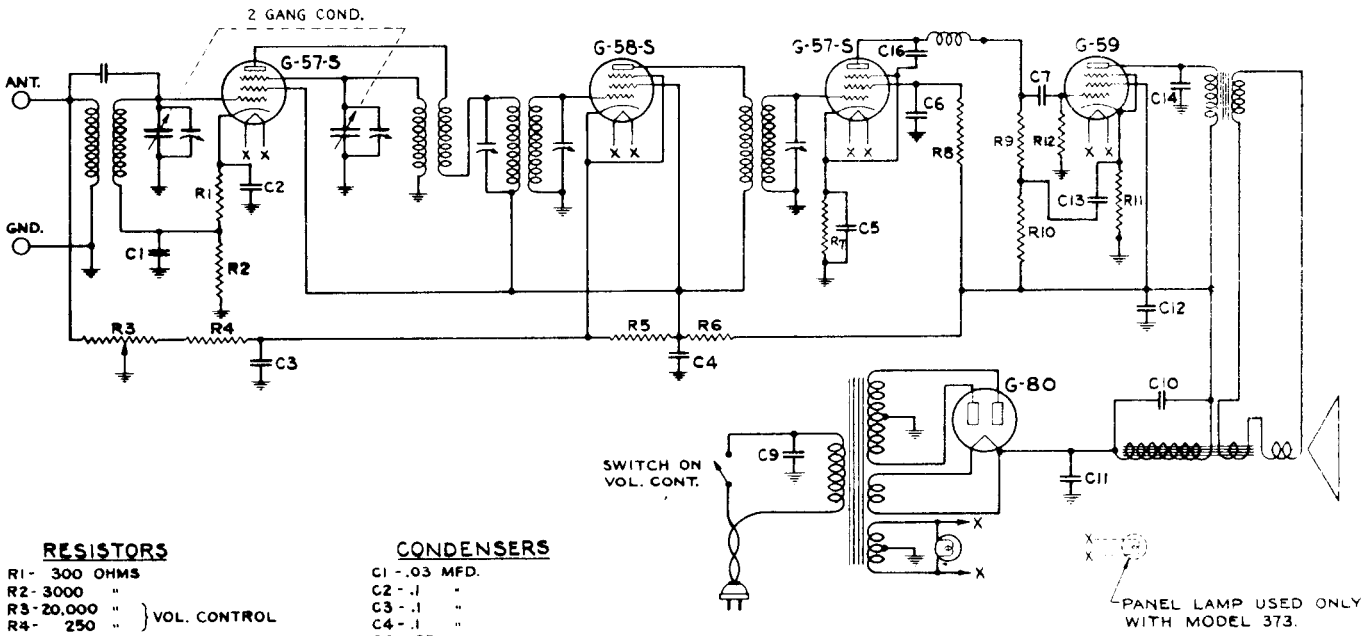
In push-pull amplification, it is necessary that the grids of the push-pull tubes be fed with voltages that are equal in magnitude, but exactly opposite in phase or polarity. When a transformer is used, this is accomplished simply by using the two extremes of the secondary winding to feed the push-pull grids, and if a center tap is provided, these voltages are bound to be equal, and opposite in phase.

In the new Majestic circuit, phase rotation is accomplished by making use of the fact that a signal in passing through a vacuum tube is rotated in phase exactly 180° (complete reversal). Following the audio channel from the detector, we find that the audio voltage built up across Resistor R-13 is fed to the G-57-S audio tube through potentiometer R-5. The output of the audio amplifier follows two channels. The direct and conventional channel is through condenser C-15 to the upper of the two G-59-B push-pull output pentodes. The remaining channel is through condenser C-15 and the G-56 phase rotating tube. The signal coming out of this tube built up across R-11 is reversed in polarity over that originally built up across R-9. This reversed signal is fed to the lower of the two G-59-B output pentodes. By suitable design, the G-56 phase rotating tube and associated circuit is arranged so that no change in the magnitude of the signal takes place, the only change being a reversal of polarity or phase.

In this way, we have two voltages fed to the two G-59-B output tubes which are equal in magnitude, but opposite in polarity and true push-pull resistance coupled operation results.

GRIGSBY-GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC MODEL 370 RECEIVER



RESISTORS

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

CONDENSERS

C1 - .03 MFD.
C2 - .1 "
C3 - .1 "
C4 - .1 "
C5 - .25 "
C6 - .03 "
C7 - .03 "
C9 - .01 "
C10 - .1 "
C11 - 8. " } DRY ELECTROLYTIC
C12 - 8. "
C13 - .1 "
C14 - .01 "
C16 - .0015 "

ALIGNMENT PROCEDURE

1 - The receiver must be aligned with the volume control in maximum position.
2 - Supply a 456 K.C. signal to the first detector grid and align the three I.F. tuning condensers to give maximum sensitivity.
3 - Turn the gang condenser completely in mesh; set the dial at the line below 550 K.C. and lock in place.
4 - Set the dial at 1500 K.C. and after supplying a 1500 K.C. signal to the input of the receiver, align the two radio frequency circuits for maximum output.

TABLE OF VOLTAGE TO GROUND

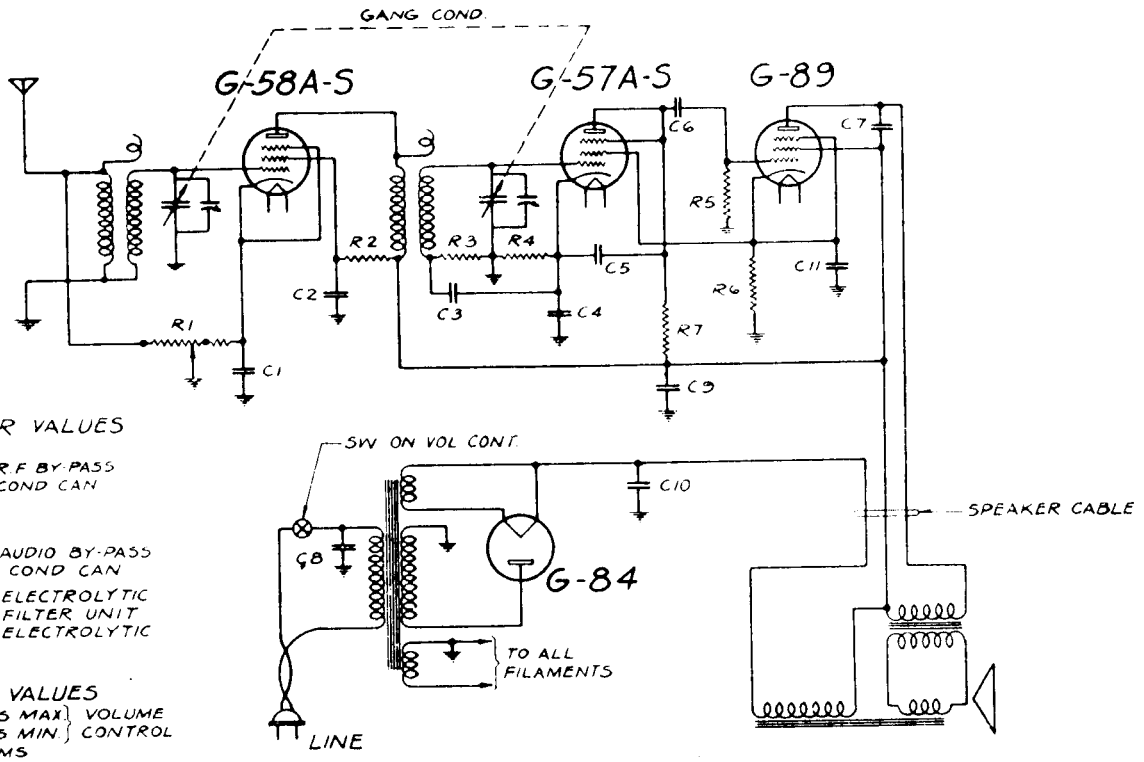
MODEL 370 CHASSIS

TUBE PURPOSE	TYPE	FILAMENT A. C.	PLATE D. C.	SCREEN D. C.	CATHODE D. C.
Modulator	G-57-S	2.4	105	105	13.5
I. F. Amp.	G-58-S	2.4	105	105	3.3
2nd Detector	G-57-S	2.4	95	53	5.4
Power Output	G-59	2.43	218	235	16.5
Rectifier	G-80	4.85	Plate to Plate A.C.620	---	---

First Filter Condenser . . . 325 volts D.C. Line voltage . . . . 115 volts
Second Filter Condenser. . . 235 volts D.C. Volume Control . . . . Maximum
Measurements made with a 1,000 ohm per volt, D.C. voltmeter, all tubes in their sockets and no signal supplied to the receiver.

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SCHEMATIC DIAGRAM OF MAJESTIC MODEL - 380



CONDENSER VALUES

C1 - .05 MFD
C2 - .05 MFD } R.F. BY-PASS
C3 - 0.1 MFD } COND CAN
C4 - 0.1 MFD
C5 - .0005 MFD
C6 - .03 MFD
C7 - .005 MFD } AUDIO BY-PASS COND CAN
C8 - .01 MFD
C9 - 4 MFD } ELECTROLYTIC
C10 - 8 MFD } FILTER UNIT
C11 - 10 MFD — ELECTROLYTIC

RESISTOR VALUES

R1 - 50,000 OHMS MAX } VOLUME
250 OHMS MIN } CONTROL
R2 - 50,000 OHMS
R3 - 500,000 OHMS
R4 - 25,000 OHMS
R5 - 300,000 OHMS
R6 - 900 OHMS
R7 300,000 OHMS

CHASSIS PARTS

PART No.	DESCRIPTION
8881	Antenna Coil Assembly
8753	By-Pass Condenser Assembly Consisting of 1-.1, 1-.03, 1-.005 MFD
8776	By-Pass Condenser Assembly Consisting of 2-.1, 2-.05 MFD
6242	Condenser, .0005 MFD.
	Condenser, Electrolytic
8755	4-8 MFD.
8774	10 MFD.
8758	Condenser, TWO-GANG
8894	Dial Strip and Hub, Complete
8892	Power Transformer, Complete
	Resistors
8756	900 Ohm
7298	25,000 Ohm
7498	50,000 Ohm
7253	300,000 Ohm
7482	500,000 Ohm
8875	R. F. Coil Assembly.
	Tube Socket
8754	Four Prong for G-84
8757	Six Prong for G-57, G-58, G-89.
8759	Volume Control and Line Switch

TABLE OF VOLTAGES

Purpose	Tube Type	Heater D.C.	Cathode Ground D.C.	Plate to Ground	Screen Ground D.C.	Heater Ground D.C.
R. F. Amp.	G-58A-S	5.9	2.5	178 D.C.	...	...
Detector	G-57A-S	5.9	1.4	80 D.C.	18.4	...
Pentode Output	G-89	5.9	18.4	171 D.C.	183	...
Rectifier	G-84	2.4	...	350 A.C.	...	285

Line Volts—115 A. C.

COLOR CODE OF POWER TRANSFORMER

PRIMARY—Stranded Yellow.
HIGH VOLTAGE—Red.
RECTIFIER FILAMENT—Black.
HEATERS—Solid Yellow.

ALIGNMENT PROCEDURE

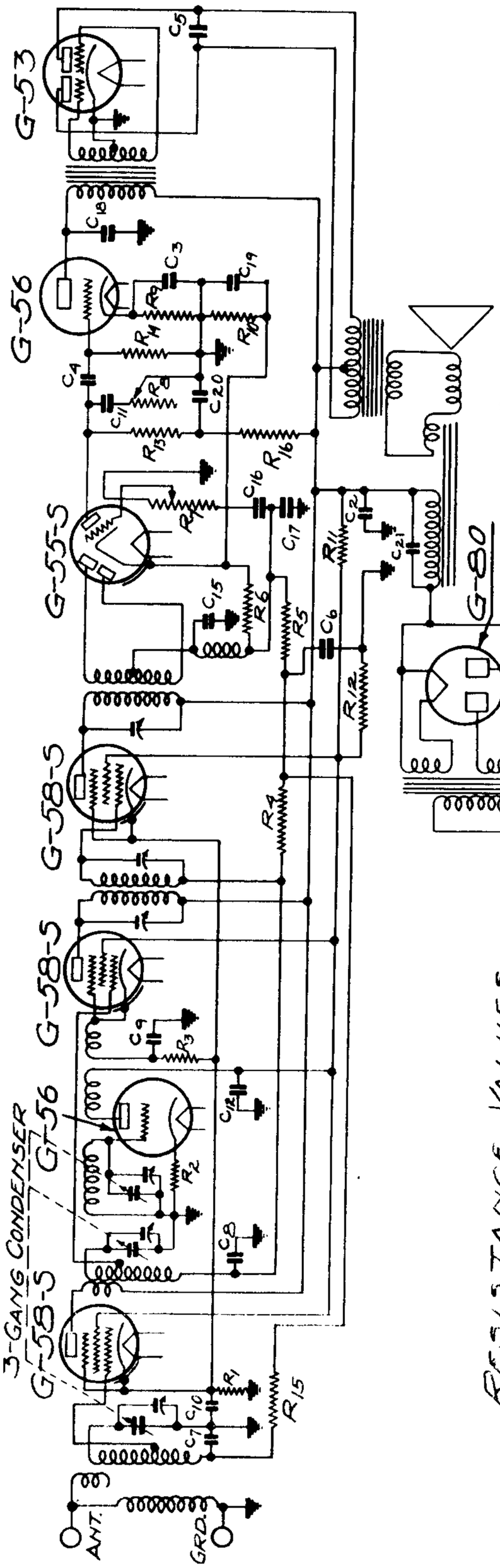
Set the dial in a position so the gang mark below 1500 K. C. is in line with the pointer when the gang condenser is completely unmeshed.

Supply a 1500 K. C. signal to the input of the receiver and after turning the dial to 1500 K. C., adjust both gang condenser trimmers for maximum output.

GRIGSBY-GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC AUTOMATIC VOLUME CONTROL SUPERHETERODYNE

MODEL-390



CONDENSER VALUES

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

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

RESISTANCE VALUES

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

R7 = VOLUME CONTROL
R8 = TONE CONTROL

GRIGSBY-GRUNOW CO.

ALIGNMENT PROCEDURE

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

2 - Supply a 175 K.C. signal to the first detector grid and align all I.F. tuning condensers to give maximum sensitivity.

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

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

TABLE OF VOLTAGE TO GROUND

MODEL 390 CHASSIS

TUBE PURPOSE	TYPE	FILAMENT A. C.	PLATE D. C.	SCREEN D. C.	CATHODE D. C.	SUPPRESSOR D. C.
R.F. Amplifier	G-58-S	2.3	265	95	6.5	6.5
Modulator	G-58-S	2.35	265	95	9.5	9.5
Oscillator	G-56	2.38	98	---	13.5	---
I. F. Amplifier	G-58-S	2.28	265	95	6.5	6.5
Second Detector	G-55-S	2.4	Triode 50	---	3	---
Driver	G-56	2.41	262	---	12.5	---
Power Output	G-53	2.42	Plate #1 262	Plate #2 262	0	---
Rectifier	G-80	4.9	320 A.C.	---	---	---

First Filter Condenser . . . 305 volts D.C.
Second Filter Condenser. . . 265 volts D.C.

Line Voltage . . . 115
Volume Control-Maximum

Measurements made with a 1,000 ohm per volt D.C. voltmeter, all tubes in their sockets and no signal supplied to the receiver.

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO MODEL 390 CHASSIS

THE CIRCUIT

The Model 390 is an eight tube superheterodyne chassis designed for single speaker operation in the Model 393 receiver. The tubes employed and their respective stages are as follows: G-58-S, R.F. amplifier; G-56, Oscillator; G-58-S, first detector; G-58-S, I.F. amplifier; G-55-S, second detector and first audio amplifier; G-56, driver; G-53, class "B" amplifier; and G-80, rectifier. The main feature of this chassis is class "B" amplification in one output tube.

AUTOMATIC VOLUME CONTROL

Automatic volume control bias voltage is developed across resistors R-6 and R-10 in the second detector circuit and is applied to the grids of the radio frequency, first detector and intermediate frequency amplifier tubes to control their amplification.

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

SPEAKER

The Model G-22-E speaker employed in conjunction with the Model 390 chassis is a large 12" dynamic speaker and has a field resistance of 970 ohms at 70° F. This speaker is designed to carry a tremendous amount of power without distortion.

CLASS "B" AMPLIFICATION

The Model 390 chassis has as a part of its circuit Class "B" Amplification for which a type G-56 tube is used as the driver and a type G-53 tube is used as the output.

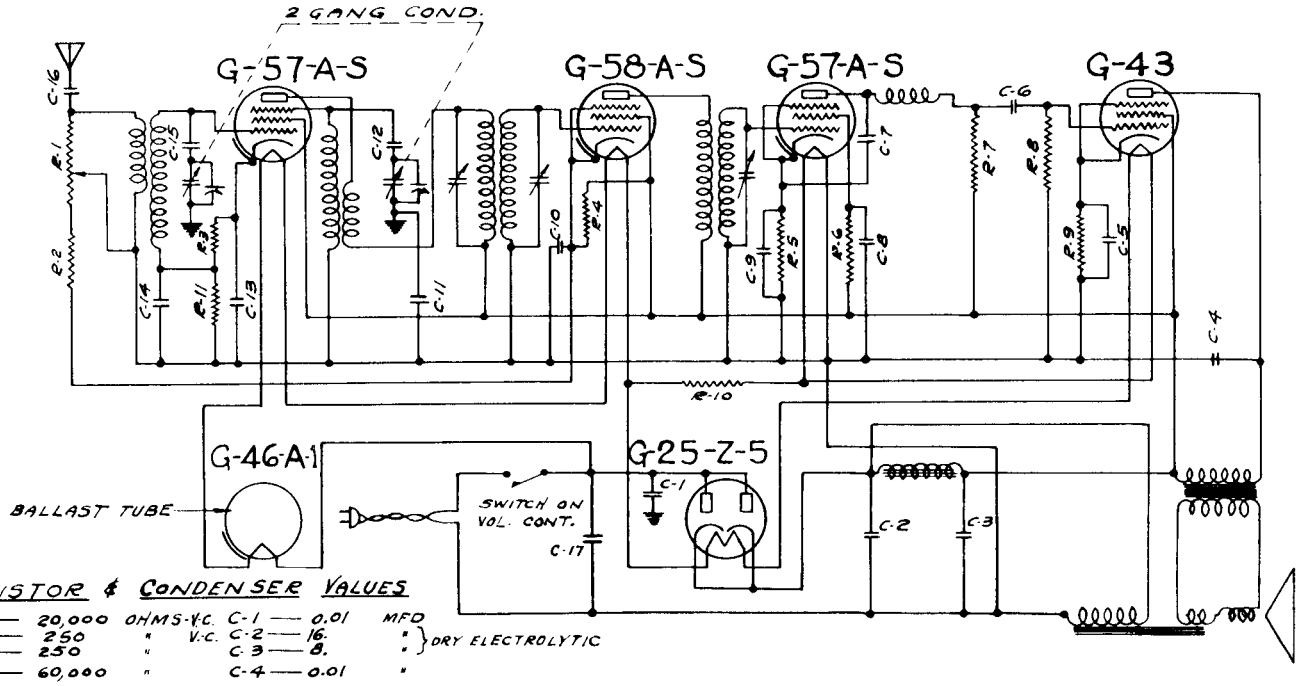
This output tube is of the 2.5 volt heater type and has two plates and two grids. It does the work of two triode tubes and makes possible tremendous output.

POWER TRANSFORMER CODE

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

GRIGSBY-GRUNOW CO.

SCHEMATIC DIAGRAM OF MAJESTIC SCREEN GRID A.C.-D.C. SUPERHETERODYNE RECEIVER MODEL - 400 USED IN 411 - 413 RECEIVERS.



RESISTOR & CONDENSER VALUES

R-1	20,000	OHMS	V.C.	C-1 — 0.01	MFD
R-2	250	"	V.C.	C-2 — 16.	" } DRY ELECTROLYTIC
R-3	250	"		C-3 — 8.	"
R-4	60,000	"		C-4 — 0.01	"
R-5	50,000	"		C-5 — 10.	" DRY ELECTROLYTIC
R-6	1,000,000	"		C-6 — 0.10	"
R-7	500,000	"		C-7 — 0.0005	"
R-8	500,000	"		C-8 — 0.10	"
R-9	700	"		C-9 — 0.25	"
R-10	500	"		C-10 — 0.25	"
R-11	2,000	"		C-11 — 0.25	"
				C-12 — 0.01	"
				C-13 — 0.25	"
				C-14 — 0.10	"
				C-15 — 0.01	"
				C-16 — 0.001	"
				C-17 — 0.10	"

TUBE PURPOSE	TYPE	FILAMENT A.C.-D.C.	PLATE D.C.	SCREEN D.C.	CATHODE D.C.
Modulator and Oscillator	G-57A-S	6.3	105	105	13
I.F. Amp.	G-58A-S	6.3	105	105	*3 to 30
2nd Det.	G-57A-S	6.3	18	18	2
Power Output	G-43	25.0	96	105	16
Rectifier	G-25Z5	25.0	...	...	118
Ballast	G-46A1	46.1	...	...	...

LINE VOLTAGE - 115 A.C.

* Varies according to setting of volume control.

GRIGSBY-GRUNOW CO.

TECHNICAL DATA PERTAINING TO THE MODEL No. 400 CHASSIS EMPLOYED IN MODELS Nos. 411 AND 413 RECEIVERS

CIRCUIT

The Model #400 chassis employs the superheterodyne circuit augmented by the latest tubes designed especially for A.C. - D.C. operation. The tubes used and their respective stages are as follows:

G-57A-S	Composite oscillator and modulator
G-58A-S	Intermediate frequency amplifier
G-57A-S	Second detector
G-43	Output amplifier
G-25Z5	Rectifier
G-46A1	Ballast

The filaments of all the tubes including the ballast tube are connected in series. The sum of their required filament voltages is equal to 115 V. and they therefore, are connected directly to the line. This eliminates the necessity of dropping the voltage further through a resistor to provide proper filament supply for the tubes.

The filaments of the G-43 and G-25Z5 tubes are shunted by a 500 ohm, 5 watt resistor, due to the fact, that the current required by these filaments is only 300 milliamperes while the current required by the other four tubes is 400 milliamperes.

POWER SUPPLY

The Model 400 chassis will work on either an A.C. or D.C. supply and on any voltage between 100 and 125 volts.

For A.C. operation the G-25Z5 tube acts as a half-wave rectifier, thus providing the necessary D.C. voltage for operation of the tubes. On D.C. the G-25Z5 allows the current to flow from its plates to the cathodes in the same manner as an ordinary vacuum tube.

On D.C. the set will operate with the plug in one position only. It may be necessary to reverse the polarity of the line cord plug, that is, turn it half way around so that the prongs go into the opposite holes before the receiver will operate. The plug should also be tried in both positions for A.C. operation, in order to determine the position in which the least amount of noise is heard. This is especially important if no ground connection is being used.

ANTENNA

An antenna is provided with each Model #411 and #413 receiver. This should be stretched out to its full length by placing it around the moulding or dropping it out of a window. For best reception an antenna other than the one furnished with the receiver, should not be used.

SPEAKER

The Model G-26-C speaker is used in conjunction with the Model #400 chassis. The field coil of this speaker has a resistance of 2,600 ohms and is connected directly across the output of the rectifier tube. In order to minimize hum, a hum-buck coil is connected in series with the voice coil.

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TUBES

The type G-43 output tube is of the Pentode type having three grids. The filament of this tube requires 25 volts at 300 mills. The maximum recommended plate voltage is 135 volts. This type of tube is especially designed for transformerless receivers.

The G-25Z5 rectifier tube is one of the latest developments in the tube industry and may be connected as a half-wave rectifier, full-wave rectifier or a voltage doubler. However, in this particular receiver it is connected as a half-wave rectifier, the positive "B" supply coming from the cathodes of the tube. The filaments of this tube require 25 volts at 300 mills.

The type G-46A1 tube employed in the Model #400 receiver as a ballast dissipates 46.1 volts. This tube is spray shielded in order to reduce the glow, however, no connection is made to the spray shield.

In some cases where noisy reception is encountered an improvement may be made by connecting a ground wire to the receiver. A screw is provided for a ground connection on the left hand side of the chassis in the rear.

The intermediate frequency is 456 kilocycles.

WARNING - If the receiver is of the leather carrying case type (Model #413), do not operate it without first opening the back of the carrying case to allow the heat, created by the receiver, to be dissipated.

ALIGNMENT PROCEDURE

The Model #400 chassis is aligned for maximum sensitivity before leaving the factory and the aligning adjustments should not be altered unless it is known that they are incorrect. Whenever the radio frequency or intermediate frequency coil or tuning condenser is changed the receiver should be realigned.

1 - With the volume control in maximum volume position and the gang condenser completely out of mesh, supply a 456 K.C. signal to the grid of the modulator tube and adjust the 4 I.F. tuning condensers for maximum sensitivity.

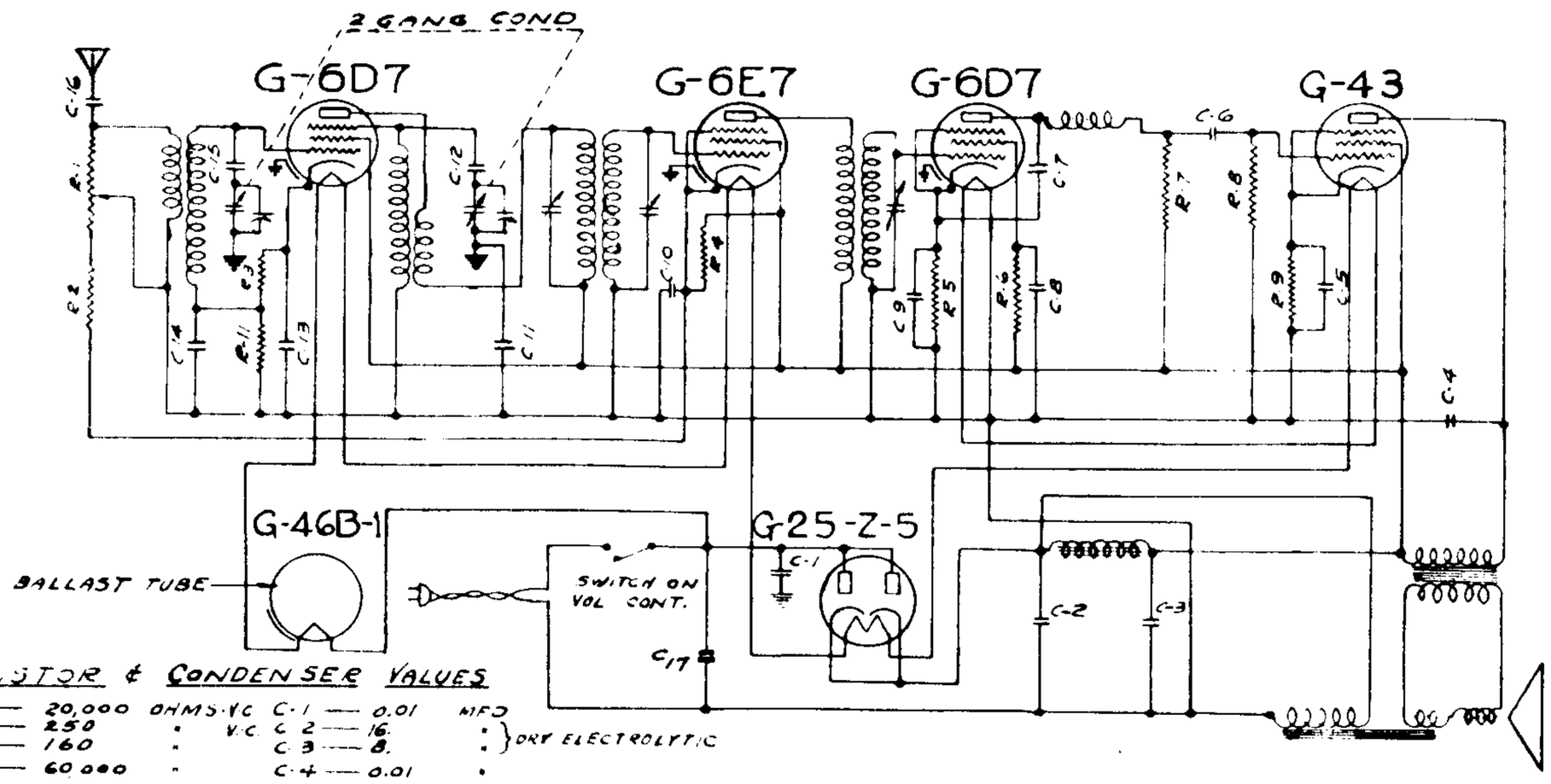
2 - With the gang condenser and volume control in the same position, supply a 1730 K.C. signal to the input of the receiver and align the 2 R.F. trimmer condensers for maximum sensitivity.

SPECIAL CHANGES

In some receivers the 250 ohm resistor, R-3, and the 2000 ohm resistor, R-11 have been replaced by a 160 ohm and a 2500 ohm resistor respectively. The purpose of this was to make the G-57A-S modulator tube oscillate more readily. If a 250 and 2000 ohm resistor are used in the set it may be necessary to try two or three different tubes in this stage when replacement is being made, before a tube is found that will oscillate over the entire band. If trouble is experienced along this line the changing of the value of either one or both of these resistors should eliminate the difficulty.

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SCHEMATIC DIAGRAM OF MAJESTIC SCREEN GRID A.C.-D.C. SUPERHETERODYNE RECEIVER MODEL-400-A



RESISTOR & CONDENSER VALUES

R-1	20,000 OHMS-½ W.	C-1	0.01	MFD	
R-2	250 "	C-2	16.	"	} DRY ELECTROLYTIC
R-3	160 "	C-3	8.	"	
R-4	60,000 "	C-4	0.01	"	
R-5	50,000 "	C-5	10.	"	DRY ELECTROLYTIC
R-6	1,000,000 "	C-6	0.10	"	
R-7	500,000 "	C-7	0.0005	"	
R-8	500,000 "	C-8	0.10	"	
R-9	700 "	C-9	0.25	"	
R-10	—	C-10	0.25	"	
R-11	2500 "	C-11	0.25	"	
		C-12	0.01	"	
		C-13	0.25	"	
		C-14	0.10	"	
		C-15	0.01	"	
		C-16	0.001	"	
		C-17	0.10	"	

CHASSIS 400-A

Models 411-A and 413-A

TABLE OF VOLTAGES TO "B—"

Purpose	Tube Type	Filament A.C.-D.C.	Plate D.C.	Screen D.C.	Cathode D.C.
Modulator and Oscillator	G-6D7	6.3	105	105	13
I. F. Amp.	G-6E7	6.3	105	105	*3 to 30
2nd Det.	G-6D7	6.3	18	18	2
Power Output	G-43	25.0	96	105	16
Rectifier	G-25-Z5	25.0	...	...	118
Ballast	G-46B-1	46.1	...	...	...

Line Voltage—115 A. C.

*Varies according to setting of volume control.

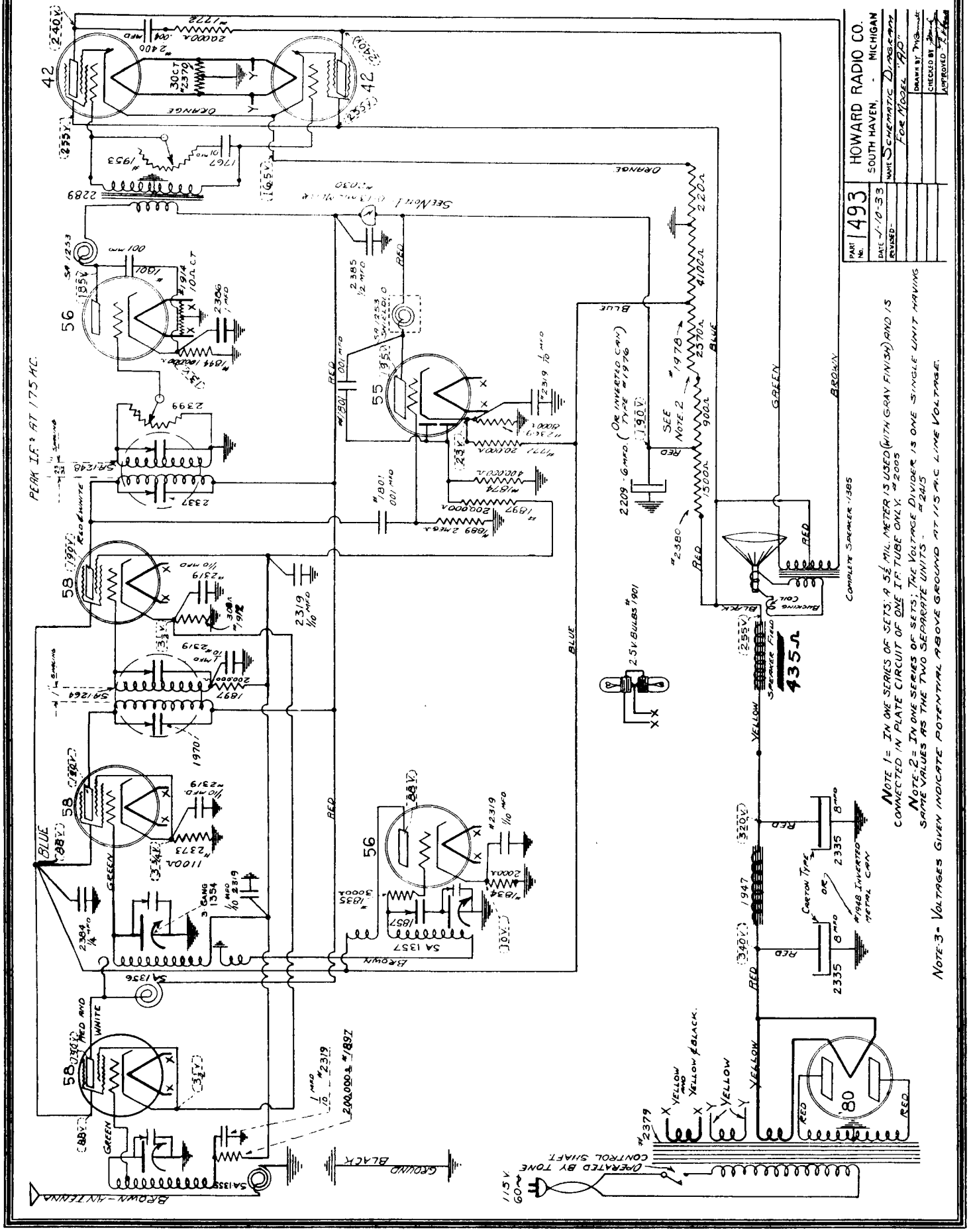
THE CIRCUIT

The circuit of the Model 400-A chassis is practically the same as that of the Model 400. The main difference is that three types of tubes have been replaced.

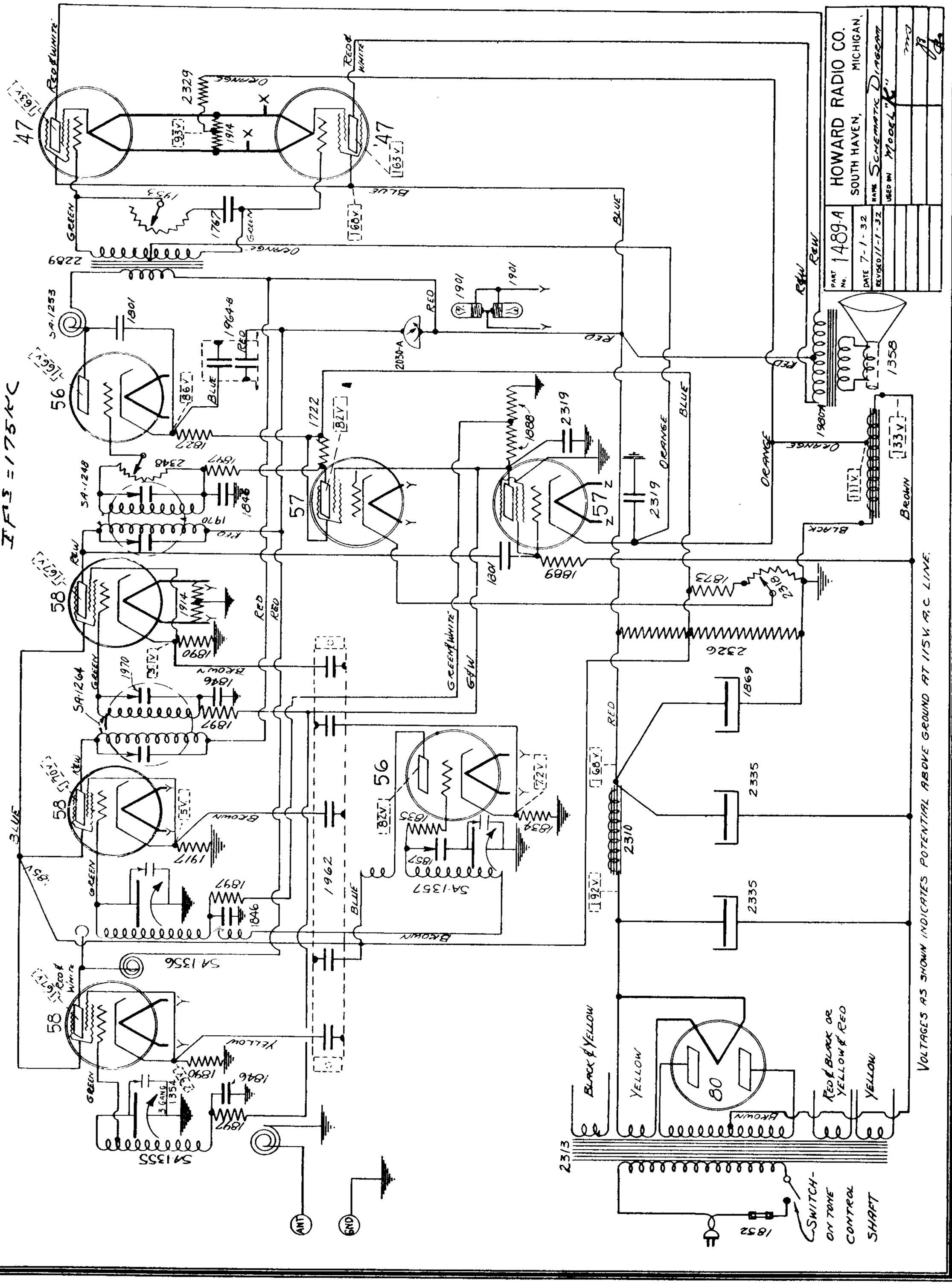
G-6D7	Replaces G-57A-S
G-6E7	Replaces G-58A-S
G-46B-1 (Ballast)	Replaces G-46A-1

Resistors R-3 and R-11 have a value of 160 and 2,500 ohms respectively in the Model 400-A chassis while they have a value of 250 and 2,000 ohms in the Model 400 chassis. Resistor R-10 is omitted entirely from the circuit.

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PARTS LIST

MODEL K RECEIVER

Part No.		Retail List Price
2313	Power Transformer	$8.00
1832	2 Amp. Fuse	.06
1869	8 mf. Filter Condenser, single gauze	1.90
2335	8 " " " double "	2.15
2348	Volume Control .01	1.50
1962	By-pass Condenser	2.20
1964	" "	1.55
1767	.01 mf. TC Condenser	.36
1953	Tone Control	2.50
1901	Pilot Light	.33
1897	200 M ohm Resistor	.35
1890	500 ohm Resistor	.35
1827	30 M ohm "	.35
1917	2500 ohm "	.35
SA1355	Antenna Coil	2.76
SA1356	R.F. Coil	2.20
SA1264	I.F. Coil	.80
SA1248	I.F. Coil	.80
2289	Audio Transformer	4.00
1358	Speaker	16.25
1835	3 M ohm Resistor	.35

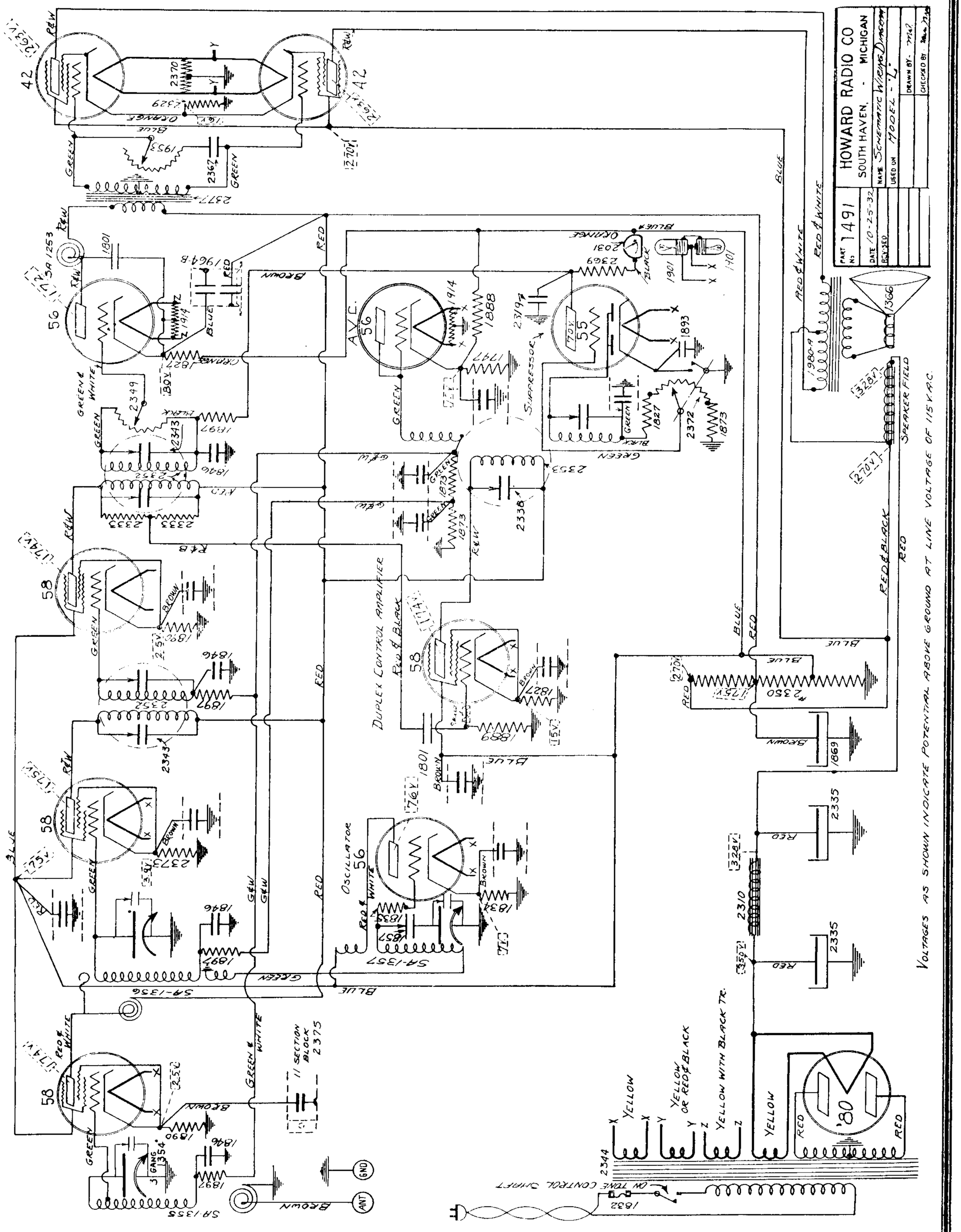
ALIGNING

This receiver uses 175 kcs. for the intermediate frequency, and the method of gaining these intermediate frequency stages is the same as employed in standard type receivers. There are no over-coupled stages in this intermediate frequency amplifier system and the following method is recommended for gaining this stage:

Disconnect grid cap on the 58 ist detector tube and connect between grid and ground of this tube the 175 kcs. oscillator, and by means of either the ear or a meter connected across the voice coil or plate circuit of output stage, adjust the trimming condensers associated with the two I.F. transformer systems for maximum output. We suggest that you make this adjustment with as small an input signal as can be obtained from your oscillator, in order to get away from the apparent detuning condition met with due to operation of automatic volume control system.

To align the R.F. tuning circuits, it is necessary to use an oscillator set at 1400 kcs. and connected to antenna and ground posts for this adjustment. Set receiver at 1400 kcs. on the dial and then adjust trimmer condensers of the variable condenser, adjusting first the oscillator condenser and then the antenna and R.F. tuning condensers. In cases where the receiver has seen considerable service and there is a doubt in the mind of the Service Man with respect to the condition of the receiver, it is permissible, after the 1400 kcs. adjustment has been made, to set the receiver at 600 kcs. and adjust padding condenser associated with the oscillator system. After the 600kcs. adjustment has been made, it is advisable to readjust again the oscillator at 1400 kcs.

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PARTS LIST

MODEL L RECEIVER

Part No.		Retail List Price
2352	I.F. Transformer	$1.50
1354	Variable Tuning Condenser	5.00
1351	Dial Drive Mechanism and Scale	2.00
1562	A.C. Line cord and plug	.55
1702	Socket No. 80	.30
2358	" " 58	.30
2356	" " 56	.30
2355	" " 55	.30
2342	" " 42	.30
1890	Resistor 500 ohms 1/2 watt	.35
1897	" 200,000 ohms 1/3 watt	.35
2373	" 1,100 ohms 1/2 watt	.35
1827	" 30,000 ohms 1/2 watt	.35
1834	" 2,000 ohms 1/2 watt	.35
1835	" 3,000 ohms 1/3 watt	.35
1889	" 2 meg. 1/2 watt	.35
1873	" 100.000 ohms 1/2 watt	.35
2350	" Voltage Divider, 9830 ohms	2.00
2329	" 210 ohms Candohm	.26
1747	" 50,000 ohms 1/2 watt	.35
1888	" 150,000 ohms 1/2 watt	.35
1914	" 10 ohm center tap	.19
2369	" 8,000 ohm 1/2 watt	.35
1832	Fuse 2 amp.	.06
1857	Oscillator padding Condenser	1.25
2375	By-pass Condenser Block	3.80
2319	" " .1 mf.	.25
1893	" " .05 mf.	.35
2335	Filter Cond. Double Gauze, 8 mf. 450 V.1	2.15
1869	" " Single " " " " "	1.90
1964	By-pass Condenser Block	1.55
2367	Tone Control Condenser .002-	.25
1901	Pilot Light 2.5 volt	.33
2344	Power Transformer	9.00
1953	Tone Control and Power Switch, 1½ meg.	2.50
2343	I.F. Transformer tuning condenser	.90
2310	Choke Coil Power Pack	4.70
2349	Volume Control 250,000 ohms	1.50
2377	Audio Transformer, 2 to 1 ratio	4.00
SA1355	Antenna Radio Frequency Transformer	2.76
SA1357	Oscillator Tuning Coil	2.20
SA1356	Radio Frequency Transformer	2.50
SA1253	Detector R.F. Choke	.35
SA2031	Tuning Meter	3.25
SA2353	Tri Coil	1.50
2353	Variator	.90
1980A	Speaker Transformer	3.60
2370	30 ohm Center Tap	.30
1366	Speaker 435 ohm	16.25
1801	.001 Type W	.41
2328	Large Knob	.30
2327	Small Knob	.25
1722	Resistor 200,000 ohms 1/2 watt	.35

HOWARD RADIO CO.

HOWARD MODEL M "TRIPLEX CONTROL" 14-TUBE SUPERHETERODYNE

(Parallel push-pull A. F. amplification; visual tuning meter; A.V.C.; silent-tuning control; twin 80 rectifiers; duo-diode silent-tuning tube; tone control.)

In the Howard Model M 14-tube superheterodyne, manufactured by Howard Radio Co., are incorporated several new circuit details with which the progressive Service Man must acquaint himself. Use of a "triplex control" circuit in this set results in improved performance in the reduction of station background noise, and sensitivity and inter-station noise suppression, over the "duplex control" Model K chassis.

The following tube voltages are used in this set:

Tube No.	Fil. Volts	Cath. Volts	S.G. Volts	Sup. G. Volts	Plate Volts
1	2.5	2.7	80	2.7	190
2	2.5	4.4	80	—	190
3	2.5	7.5	—	—	190
4	2.5	2.8	80	—	80
5	2.5	87.0	—	—	188
6	6.3	16.5	280	—	267
7	6.3	16.5	280	—	267
8	6.3	16.5	280	—	267
9	6.3	16.5	280	—	267
10	2.5	15.0	80	—	188
11	2.5	12.0	—	—	70
12	2.5	——*	—	—	—
13	5.0	——	—	—	374**
14	5.0	——	—	—	374**

(Voltages indicated at a line potential of 115 V. *Switch Sw. 2 closed. **Read between V13, V14 filaments and chassis.)

The values of the components used in the Howard model M receiver chassis are given below.

Resistor **R1,** tone control, 1½ megs.; R2, manual silent tuning control, .25 meg. (liner taper); R3, manual volume control, .25-meg.; R4, R6, R8, R10, R11, R13, 0.2-meg.; R5, 2,000 ohms; R7, 1,100 ohms; R9, R12, 500 ohms; R14, R17, R28, 30,000 ohms; R15, 105 ohms; R16, 2 megs.; R18, R19, R27, 0.1-meg.; R20, 50,000 ohms; R21, R25, 10 ohms, center-tapped; R22, .15-meg.; R23, 8,000 ohms; R24, 3,000 ohms; R26, 30 ohms, center-tapped; R29, R30, R31, 2,200, 3,730 and 3,900 ohms, respectively, and on one resistor unit. The field coil has a resistance of 300 ohms.

Condensers C1 to C3, tuning units; C1A to C3A, trimmers; C4 to C7, C16, C18, I.F. trimmers; C8, C11, .001-mf.; C9, 1. mf.; C10, .002-mf.; C12, C13, C17, C24, C25, C27, C28, C29, C31, C32, C33, C35, 0.1-mf.; C14, C15, C19, C20, .05-mf.; C21, C22, C23, 8 mf.; C26, .000153-mf., padding condenser; C30, 0.5-mf.

Pilot lights V15, V16 connect to winding X, X on the power transformer, PT.

A red-lead 0.5-mf. condenser, in the same can with the blue-lead unit, C9, but not shown in the schematic circuit, bypasses the plate current supply to V5. An 11-section condenser block includes the following condensers: C12, C13, C14, C15, C17, C19, C24, C28, C30, C31, C32. The color code is as follows: brown leads, 0.1-mf.; green, .05-mf.; red, 0.5-mf.; all are rated at 200 V., as are condensers C25, C27, C29, C33.

To gang the I.F. circuits, disconnect the control-grid cap on V2 and connect the 175 kc. oscillator between the control-grid and ground (chassis); then, by means of either the ear or a meter connected across the voice coil or plate circuit output stage, adjust trimming condensers C4 to C7 for greatest output. Make the input signal as small as possible in order to eliminate the apparent detuning condition met with due to the operation of the A.V.C. system.

Due to the fact that the silent-tuning circuit (S.T.C.) and the automatic volume control (A.V.C.) system constitute a tuned unit, it will be necessary to tune the plate circuit of the type 58 "triplex control amplifier," V10, and also the tuned circuit which is associated with the type 55 tube, V12. This circuit can be readily tuned to correct resonance by use of the 175 kc. oscillator operated at the low input to the first-detector V2. All that is necessary is to first tune the plate circuit of the "triplex control amplifier," V10, until the tuning meter needle swings the greatest distance to the right. Next, tune the suppressor or type 55 tube, V12, circuit until the meter swings to the greatest distance toward the right. It may be possible that both circuits are exactly in tune so that any additional adjustment of these two tuned circuits will not effect the meter swing.

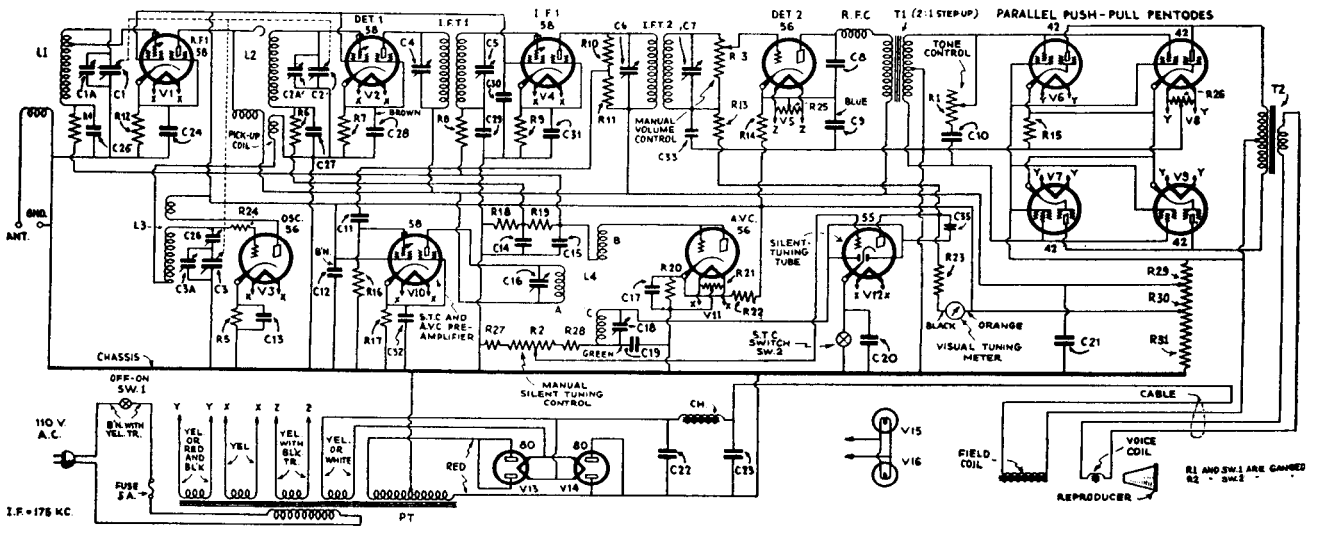
Be sure, when making this adjustment, that you snap on switch Sw.2, associated with resistor R2. If this switch is not thrown to the "on" position, the meter will not operate because switch Sw.2 opens the cathode circuit of V12 and no plate current will flow (unless V12 is gassy).

If it is not possible to obtain a sufficiently low voltage in the oscillator to "gain" this "triplex control" system, you can rotate the knob of R2 further to the right, when you will note that the meter needle swings away from the zero or maximum right position, and when this condition is obtained, you can again check the tuning of the two circuits in order to obtain the maximum right swing of the needle on this meter. If your input signal from the oscillator is excessive, as previously stated, with the minimum right rotation of R2, you will note that when tuning to a station or to your service oscillator, the tuning meter swings to the full right position, and in such a position you cannot tune the noise-control circuits. Be sure, when tuning these circuits, that either your input signal from the oscillator is as small as possible, or if this is not obtainable, rotate R2 to the right until the meter swings away from the zero or maximum right position. The tuning of these two circuits is simple if you take precautions referred to above, and if these two circuits are properly tuned, you will note that by snapping Sw.2 the inter-station noise will disappear and you will have quiet operation between stations. This tuning operation, when correctly done, increases the apparent selectivity of the receiver and provides a beautifully operating receiver which embodies the latest development of the "duplex control" feature of previous Howard set models.

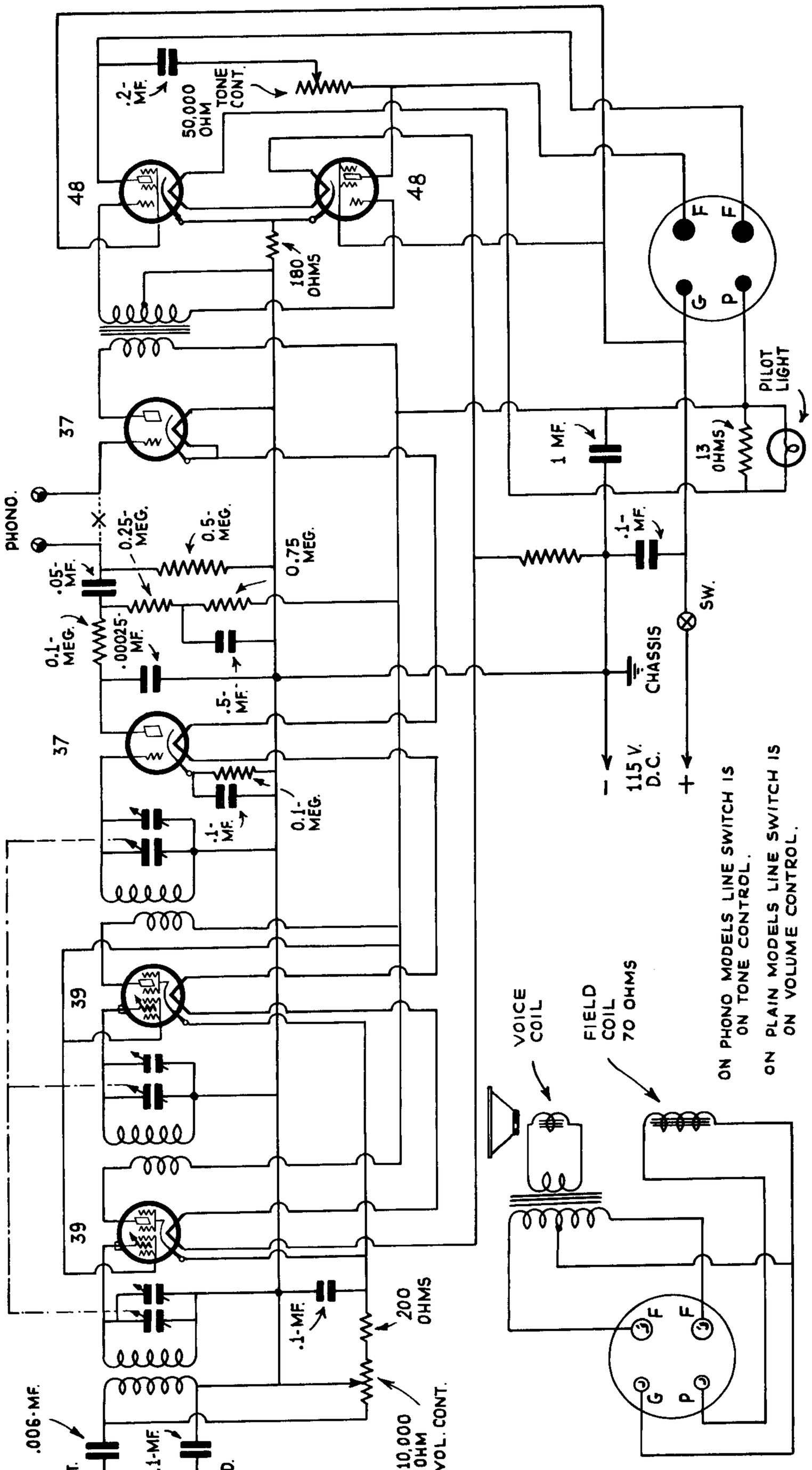
The output of V5 is fed to the parallel push-pull circuit through a step-up transformer T1 with a ratio of 2-to-1.

Associated with the plate circuit of the "triplex control," or S.T.C. and A.V.C. pre-amplifier tube V10, are three coils, L4, inductively coupled to each other. The first coil, A, is merely a coupling primary in the plate circuit of the pre-amplifier, V10; the second, B, provides voltage for the rectifier system of V11 in the A.V.C. circuit; the third coil, C, provides the noise-suppressor voltage on the control-grid of second-detector V5, through the medium of the voltage drop across resistor R23 in the plate circuit of the S.T.C. tube V12.

In the event that is necessary to realign the R.F. circuits, connect the service oscillator to the antenna and ground post of the set and tune the oscillator to 1,400 kc. Adjust the set dial to this setting and align the trimmers, starting with C3A, then C1A and then C2A. If it is necessary to align the padding condenser C26 at 600 kc., it will be necessary to go over the adjustments of the high-frequency trimmers again. Condenser C26 is accessible through a hole in the upper part of the container which shields the variable condensers



LANG RADIO CO.



LANG MODEL DC6

MOTOMETER GAUGE & EQUIP. CORP.

MOTOVOX MODELS 10A ALL-ELECTRIC AND 10E BATTERY-OPERATED "MOTO-TETRADYNES"

(The model 10A car-radio set is a superheterodyne; the model 10E receiver is a T.R.F. set incorporating a manual sensitivity control; both instruments include A.V.C.)

Latest in the car-radio line of receivers developed by Motormeter Gauge & Equipment Corp. are the Motovox All-Electric model 10A, and the Battery-Operated model 10E.

The model 10A 5-tube set installation includes the following items: chassis, remote tuning control, reproducer and harness, antenna lead-in, filter bypass condensers, suppressors "B" unit and harness; a superheterodyne circuit is utilized.

The model 10E 5-tube receiver includes the following equipment: chassis, remote tuning control, reproducer and harness, antenna lead-in, filter bypass condensers, suppressors; a T.R.F. circuit is used.

Model 10A

Tube Type	Cath.* Volts	S-G.** Volts	Plate** Volts
V1	2.0	85	180
V2	2.7	85	180
V3	2.7	85	180
V4	4.5	....	50
V5	13.5	166.5	158.5

*Measured to ground; **to cathode. Readings taken with a 1,000-ohms-per-volt meter; "no signal" setting of set. Total drain, 31 ma.

Model 10E

Tube Type	Cath.* Volts	S.-G.** Volts	Plate** Volts	+45** Volts
V1	.....	60	135	1.9
V2	.....	59	134	3.0
V3	.....	59	134	3.0
V4	3.5	40	65	....
V5	16.0	165	155	....

*Measured to ground; **measured to cathode. Use a high-resistance meter. Drain, 19 ma.

Sensitivity of models 10A and 10E, ¾-microvolt-per-meter; power output, 2.25 w.

Since the intensity of signal strength delivered by the antenna to the receiver is directly proportional to the height and effective length and inversely proportional to the resistance of the antenna, it is necessary to use every precaution to obtain an effective auto-radio antenna installation. Thus, *only a low-capacity shielded lead-in should be used;* also, the antenna should not come closer than 3 ins. to any metal-work. A counterpoise antenna is used in an automobile since no actual ground is available. The height of the antenna is, therefore, equal to the distance between the flat plane of the antenna and the body of the car. Consequently, the most efficient aerial is one in which the capacity of lead-in and aerial matches the antenna stage of the receiver, covers the largest possible area and is as far removed as possible from the body of the car.

The following instructions pertain to the installation of the model 10A set. After mounting the power supply, run the separately shielded red lead, in the reproducer, to terminal No. 3. Next, connect the red lead in the radio cable to the "B+" terminal in the supply and the yellow lead to the "B—" terminal, making certain that the shield of the cable is anchored by the mounting clamp provided in the power supply. Now connect the black, yellow-tracer lead of the tuning control along with the yellow lead from the power supply terminal No. 2 to the *ungrounded* or "hot" post of the battery. Connect the black lead from terminal No. 1 of the power supply to the grounded battery post. *Make certain that the connections to the battery are correct.* Do *not* pull forward the switch underneath the tuning control until the receiver has been plugged into the harness, otherwise, the power unit will be operating without a load.

Installation instructions which apply to the model 10E receiver are as follows. Connect the yellow lead in the "B" harness to the negative tap of the 180 V. battery (four Burgess type 2308 batteries). Next, connect the maroon lead to the "+45" tap, and the red lead to the "+180" tap. In this line is a ¼-A. fuse.

The sensitivity control on the model 10E set is located in the bottom of the receiver. After tuning the set to a no-signal position near 1,400 kc., turn the sensitivity control right, or clockwise, to "stop," then back it, counter-clockwise, until the static level becomes very high. This is the point of maximum sensitivity, to exceed this will result in lack of sensitivity and A.V.C. It is recommended that this control be set just below maximum sensitivity to reduce engine interference.

Due to the current interest in automotive radio installations the following information concerning car antennas is furnished through courtesy of Motometer Gauge & Equipment Co. Although most of the late car models are equipped at the factory with an aerial of some type, earlier cars will usually require the services of a technician acquainted both with the technique of handling car upholstery and the demands of good antenna design.

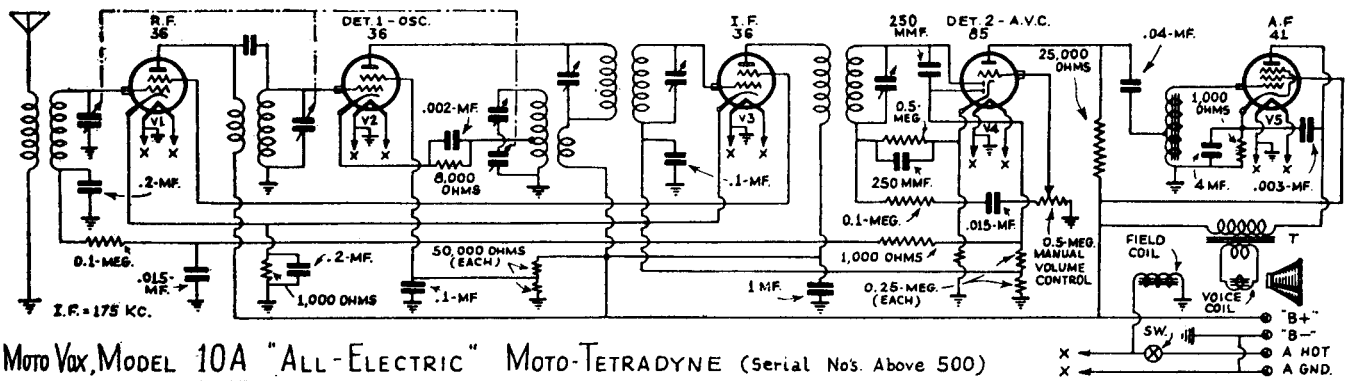
It is recommended that No. 14 or No. 16 mesh copper or galvanized screen be used. Do not forget to clear the dome-light by 3 ins. In fastening the lead-in to the screen, a No. 18 insulated wire should be used and if the aerial is *copper* screen it should be soldered around two adjacent sides so that a good electrical connection is assured. The screen should then be securely tacked at all points possible, *making certain* that it is not grounded to any metal part of the top. Conceal the lead-in and replace the top, soldering the end of the No. 18 wire to the short shielded lead-in which is provided with most sets, making sure to insulate the soldered joint well; ground the shield to some part of the metal body. Keep the unshielded portion of the lead-in, that is, the No. 18 rubber covered wire, as short as possible so that the shielded lead-in actually enters, if possible, the metal corner post, eliminating the possibility of spark pick-up by the unshielded lead.

Top construction may be divided into the following general classifications:

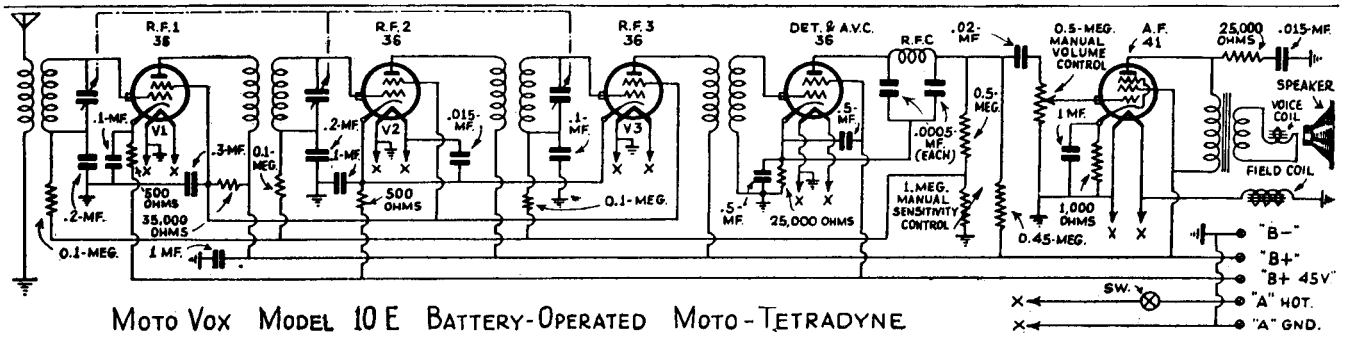
Open and Convertible. Loosen the top slightly preliminary to putting it back and weave a No. 18 insulated wire around the border between the top and the flap, giving in all a total length of about 60 ft. of wire. Then bring down the lead-in in the manner described above, and re-tighten the top.

Screen Wire Tops. Clip a 3 in. border around the top. Lace the center screen to the edges, using raw-hide.

Standard Fabric Tops. This type of top will be found most frequently. Use a wire screen, as described, removing it 3 ins. from all metals.

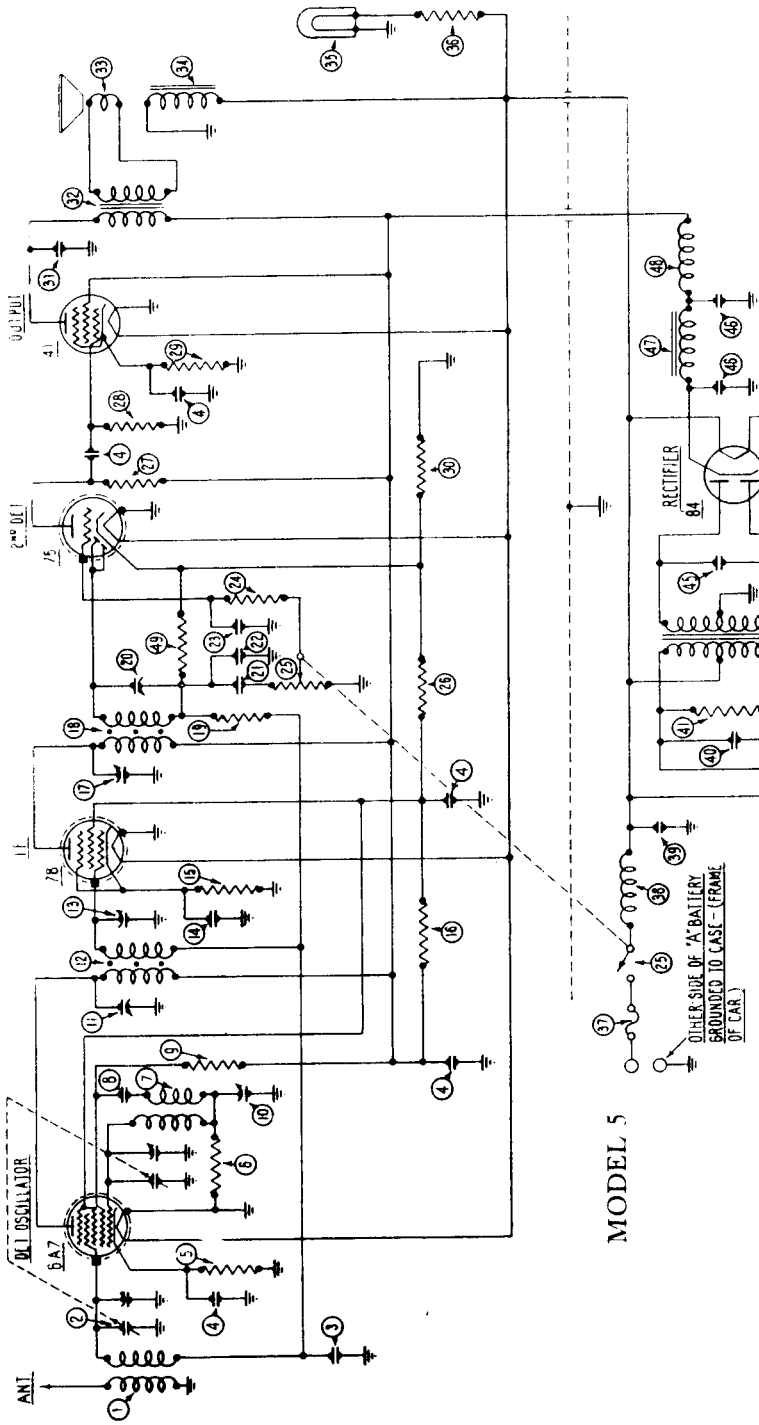


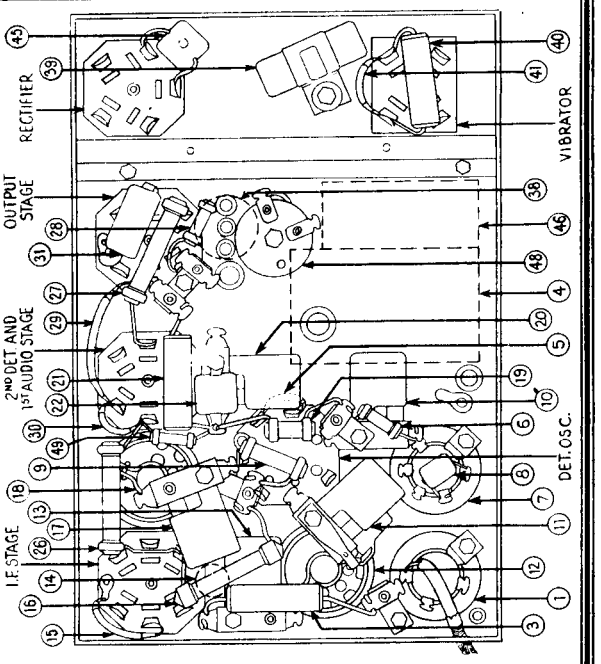
MOTO VOX, MODEL 10A "ALL-ELECTRIC" MOTO-TETRADYNE (Serial No's. Above 500)



MOTO VOX MODEL 10E BATTERY-OPERATED MOTO-TETRADYNE

PHILCO RADIO
MODEL -5





FILTER CONDENSER 30-4017

④ on Figs. 1 and 2

There are five sections in this filter condenser, all terminated with wire leads. The two green leads connect to the .1 mfd. section, which is used for coupling the plate output of the 75 tube to the grid of the 41 tube.

The remaining four sections are all grounded to the can on one side. The white leads connect to two .25 mfd. sections. The first section is connected to the cathode of the 6A7 tube. The second section is connected to the screen of the 78 tube.

The red lead from the .5 mfd. section is connected to the B+ side of all the plate circuits. A 20 mfd. section terminates in a black lead, which in turn is connected to the cathode of the 41 tube.

FILTER CONDENSER 30-4010

㊻ on Figs. 1 and 2

This condenser consists of two sections, a 4 mfd. section and an 8 mfd. section, both of them grounded on one side.

The 4 mfd. section terminates in a red lead, which is connected to the cathode of the 84 tube. The 8 mfd. section terminates in a green lead, which is connected between the two chokes in the rectifier filter circuit.

NOTE.—The first condensers (30-4017) were made up having five sections. The .1 mfd. section has now been removed from the can and this section replaced with a .006 mfd. condenser (Part No. 30-1001). This condenser is located in the chassis adjacent to the grid terminal of the 41 tube socket.

PHILCO RADIO & TELEVISION CORP.

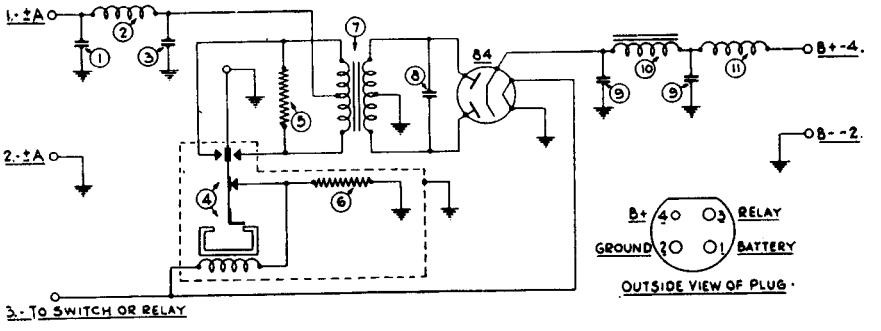
MODEL 5 PARTS LIST

No. on Fig. 1 and 2	Description	Part No.
①	Antenna Transformer	32-1084
②	Tuning Condenser	31-1019
③	Condenser (.05 mfd.)	30-4020
④	Filter Condenser (.25; .25; .5; 20 mfd.)	30-4017
⑤	Resistor (200 ohms)	7217
⑥	Resistor (1300 ohms)	8267
⑦	Oscillator Coil	32-1085
⑧	Condenser (.00025 mfd.)	3082
⑨	Resistor (15,000 ohms)	6208
⑩	Padder	04000-S
⑪	Padder	04000-J
⑫	First I. F. Transformer	32-1086
⑬	Padder	04000-Y
⑭	Condenser (.5 mfd.)	30-4018
⑮	Resistor (1,000 ohms)	33-3017
⑯	Resistor (10,000 ohms)	4412
⑰	Padder	04000-D
⑱	Second I. F. Transformer	32-1087
⑲	Resistor (1,000,000 ohms)	4409
⑳	Padder	04000-M
㉑	Condenser (.05 mfd.)	30-4020
㉒	Condenser (.00025 mfd.)	3082
㉓	Condenser (.0005 mfd.)	3910
㉔	Resistor (100,000 ohms)	6099
㉕	Volume Control and Switch	33-5009
㉖	Resistor (32,000 ohms)	3525
㉗	Resistor (250,000 ohms)	3768
㉘	Resistor (500,000 ohms)	6097
㉙	Resistor (700 ohms)	6443
㉚	Resistor (400 ohms)	33-3016
㉛	Condenser (.006 mfd.)	30-1002
㉜	Output Transformer	32-7005
㉝	Cone	36-3027
㉞	Field Coil	9013
㉟	Pilot Lamp	6608
㊱	Resistor (7 ohms)	7155
㊲	Fuse, 15 A.	7227

No. on Fig. 1 and 2	Description	Part No.
㊳	R. F. Choke (Low voltage)	32-1083
㊴	Condenser (.5 mfd.)	30-4015
㊵	Condenser (.05 mfd.)	30-4020
㊶	Resistor (200 ohms)	7217
㊷	Vibrator	38-5036
㊸	Resistor (200 ohms)	7217
㊹	Transformer	32-7030
㊺	Condenser (.006 mfd.)	30-1002
㊻	Condenser (4 mfd.; 8 mfd.)	30-4010
㊼	Filter Choke	32-7026
㊽	R. F. Choke (High voltage)	32-1078
㊾	Resistor (250,000 ohms)	4410
	Control Shaft (Tuning)	28-8006
	Control Shaft (Volume)	28-8007
	Tube Kit	34-3006
	75 Tube	8002
	78 Tube	8315
	41 Tube	6446
	84 Tube	34-2001
	6A7 Tube	34-2002
	Dial	27-5006
	Antenna Lead	L-1594
	Battery Cable (Bat. end)	38-5124
	Battery Cable (Rec. end)	38-5123
	Fuse Housing	28-1269
	Male Cap (Fuse)	28-1270
	Contact (Fuse)	27-7133
	Washer	27-7132
	Spring	28-8009
	Fuse Insulator	27-7131
	Antenna Male Cap	28-1270
	Contact (Antenna)	28-7133
	Spark Plug Resistors	4531
	Dist. Resistors	4546
	Screw Type	4851
	Interference Condenser (1 mfd.)	4522
	Interference Condenser (½ mfd.)	30-4007

MODEL EF FULL WAVE VIBRATOR

(Used With Model 6F Receiver)



The Model EF takes the place of the EB dynamotor. The cable connection between the Vibrator and the Model 6F completes the installation of the Vibrator. Terminal 1 is connected directly to the main battery lead. Terminal 2 is the cable shield. Terminal 3 is connected to the Radio switch. Terminal 4 is the B+ high voltage lead and is connected directly to the plate circuits.

MODEL EF—PARTS LIST

No. on Fig. 3	Description	Part No.
①	Condenser (.5 mfd.)	30-4015
②	R. F. Choke (Low voltage)	32-1083
③	Condenser (.5 mfd.)	30-4015
④	Vibrator	38-5036
⑤	Resistor (200 ohms)	7217
⑥	Resistor (200 ohms)	7217
⑦	Transformer	32-7030

No. on Fig. 3	Description	Part No.
⑧	Condenser (.006 mfd.)	30-1002
⑨	Condenser (4 mfd.; 8 mfd.)	30-4010
⑩	Filter Choke	32-7026
⑪	R. F. Choke (High voltage)	32-1078
	84 Tube	32-2001
	Battery Cable (Model 6F)	41-3017

PHILCO TRANSITONE MODEL 5

The Philco Transitone Model 5 is the latest Philco development in automobile radio. It is a powerful and extremely compact superheterodyne having many of the features of the larger auto radio Receivers.

The Receiver, Speaker and the new Full Wave Philco Vibrator are all housed in a single shielded container designed for quick installation on the dash of the automobile. The arrangement is particularly adaptable for small cars and for cars already equipped with a heater. The full powered, electro-dynamic speaker is mounted in the bottom of the housing so as to afford excellent tone quality and volume without the necessity of using a speaker as a separate unit.

All the tubes used are the latest Philco high-efficiency tubes, designed especially for automobile radio. Several of these tubes each perform the functions which formerly required two and three tubes, thereby effecting a great tube economy, reducing the number of tubes necessary for satisfactory operation, and reducing the amount of current taken from the car battery to the very minimum.

Philco's system of automatic volume control is used to give that smooth, elastic control which counteracts fading while driving along, and prevents blasting of local stations.

The new Receiver is All Electric, operating entirely from the car storage battery. The new Full Wave Philco Vibrator is built in as an integral part of the Receiver.

This Receiver is destined to be one of the most popular models we have ever offered to the public and will meet with instant approval from everyone as soon as it can be seen and heard. Ease of installation will enable service stations to cut their costs and speed up installations. Customers will wait for their cars while the installation is being made, since the average installation will be made in only a fraction of the time formerly required.

THE NEW MODEL 6F

The Model 6 with the latest improvements becomes the Model 6F. The new features are entirely for your benefit.

Greater ease of installation and service is accomplished, cutting the installation time practically in half.

The Model 6F is now a two-piece unit instead of having the customary three pieces. The new improved full wave EF Vibrator is securely attached to the side of the Receiver housing. Drilling three holes for the Receiver and installing it, automatically takes care of the Vibrator installation.

Connections, too, are much more simple. The battery cable plugs into the Receiver receptacle, while a leg of the cable connects by a plug to the Vibrator unit. Just one lead to connect to the battery and the antenna lead. Install the Receiver and connect the cable.

If the Vibrator requires servicing, remove four screws from the lid and the Vibrator lifts right out of the housing. The only service it should ever require will be either a replacement tube or a replacement Vibrator unit. Don't ever attempt to adjust the Vibrator.

MODEL EG VIBRATOR

The Model EF Vibrator is a part of the Model 6F Receiver. Its counterpart for "B" battery replacement service is the Model EG Vibrator. Instead of being connected with a cable and plug, it is equipped with a terminal panel for easy installation.

When used as a replacement unit for "B" batteries, simply install in the old "B" battery box or in any place that is convenient and where the Vibrator will not be exposed to water and dirt. The installation is easy, but at the same time permanent.

Simplicity in construction insures freedom from trouble and efficient operation. Cut disc tungsten points eliminate any possibility of troubles from contacts. Full wave rectification with the 84 rectifier tube developed especially for this type of service is used to give a smooth flow of power. Complete filtering eliminates all hum.

The terminal panel provides for the following connections:

A ± terminal for control, connecting to the control relay.

+B terminal, 180 volts to 200 volts for the "B" lead to the Receiver.

INT+B terminal, an intermediate voltage for Receivers requiring a tap voltage.

—B terminal, for Receivers requiring this lead. Normally it is not grounded. This, however, can be accomplished by strapping to the GND terminal.

GND terminal for grounding the chassis.

MODEL 5 ADJUSTMENTS

Become thoroughly familiar with the adjustment procedure and the location of the padding condensers before starting to adjust a Model 5 Receiver.

Furthermore, don't attempt to make the adjustments using a make-shift oscillator. The modern radio depends on critically tuned circuits for its exceptional performance. It is nothing short of gross carelessness to try to adjust these delicately tuned circuits using unstable oscillators which are incapable of being calibrated accurately.

Use a Philco 095 oscillator, or if your service department is fortunate enough to have one, the new Philco Signal Generator 048.

NOTE.—United Motors Service Stations, see U. M. S. Service Manual.

The intermediate frequency used is 460 K. C. Set up the oscillator or signal generator for this frequency.

Disconnect the grid lead from the 6A7 tube. Then connect the test lead to the grid of this tube and ground the shield on the Receiver housing. Use the fibre adjusting wrench 3164 for all adjustments.

Padder 10. Turn the adjusting nut in until tight. Then back off one full turn. Leave this condenser in this position until the last step.

Padder 11. This is the first I. F. primary condenser. With the Receiver and oscillator turned on and the oscillator set for 460 K. C., turn the Receiver volume control on full and adjust the oscillator attenuator. Then adjust the padder for maximum signal in the loud speaker.

Padder 13. This is the first I. F. secondary condenser. Adjust the attenuator so that the signal is barely audible. This should be repeated with each adjustment if necessary. Adjust the padder for maximum signal in the loud speaker. Repeat this procedure in the next two adjustments.

Padder 17. This is the second I. F. primary condenser.

Padder 20. This is the second I. F. secondary condenser.

Remove the oscillator connections from the 6A7 tube and reconnect the Receiver grid lead to this tube. The oscillator setting must now be changed to 1500 K. C.

The Receiver volume control must be turned on full, the oscillator lead connected to the antenna lead-in and the shield to the Receiver housing. To obtain the correct setting of the tuning condenser, open the plates as wide as possible. Place a piece of paper on the stator plates and then turn the rotor in until it strikes the paper.

Oscillator padder. This is the padder on the second section of the tuning condenser (section nearest drive mechanism). Adjust for maximum signal.

Antenna Padder. This is the remaining padder on the tuning condenser. Remove the paper from the tuning condenser and set the condenser and oscillator for 1400 K. C. Adjust the padder for maximum signal.

Low Frequency Padder 10. Set the oscillator for 600 K. C. and tune the Receiver to this frequency. Adjust the padder for maximum signal. After completing these operations, repad the antenna padder at 1400 K. C.

PHILCO RADIO & TELEVISION CORP.

PHILCO TRANSITONE MODEL 6

THE Philco Transitone Model 6 auto radio is a five-tube receiver of the superheterodyne type. Either a roof or capacity-plate aerial may be used, although the manufacturer advises the roof type.

The accessories in this receiver include the type EB dynamotor and kit of suppressors and condensers as standard equipment. No specific mounting locations have been furnished by the manufacturer, although it is recommended that the receiver be installed on the driver's side of the engine compartment on the bulkhead; as far to the right as possible; it may also be mounted on the dash. In the model A Ford, due to the location of the gas tank, the receiver must be mounted on the left side of the bulkhead in the engine compartment. The speaker should be mounted on the inside of the dash over the steering column or toward the center. In the model A Ford, the speaker should be mounted on brackets against the right kick pad.

The circuit of the Model 6 is of the superheterodyne type and uses the following tubes: One 36 as R.F. amplifier; one 36 as combination first-detector and oscillator; one 36 as I.F. amplifier (I.F. is 260 kc.); one 85 as second detector, A.V.C. and audio amplifier; and one 41 as an output tube.

The Philco Transitone Model B6, made expressly for the Chrysler Corporation for installation in the 1933 Plymouth cars, is essentially the same in circuit design and base layout as the Model 6.

The difference between these models is in the assembly and the manner in which they are installed. In the B6, the receiver and dynamotor are located in a metal box (similar to a battery box) and the complete unit is installed in the floor of the car. The control unit is mounted in its usual place and the speaker is on the dash.

PHILCO TRANSITONE MODEL 6F

THIS set, which incorporates the fundamental circuit of the model 6 chassis described below, is distinguished by its power supply; a vibrator-type "B" unit supplants the dynamotor and is incorporated in the receiver chassis. The model NF set is optional equipment, through United Motors Service, on the following makes of cars: Auburn, Chrysler, Cord, DeSoto, Dodge, Essex, Franklin, Hudson, Hupmobile, Nash, Rockne and Studebaker. (A special set is available for Packards.) The installation time for a model 6F job is only about 1 hour.

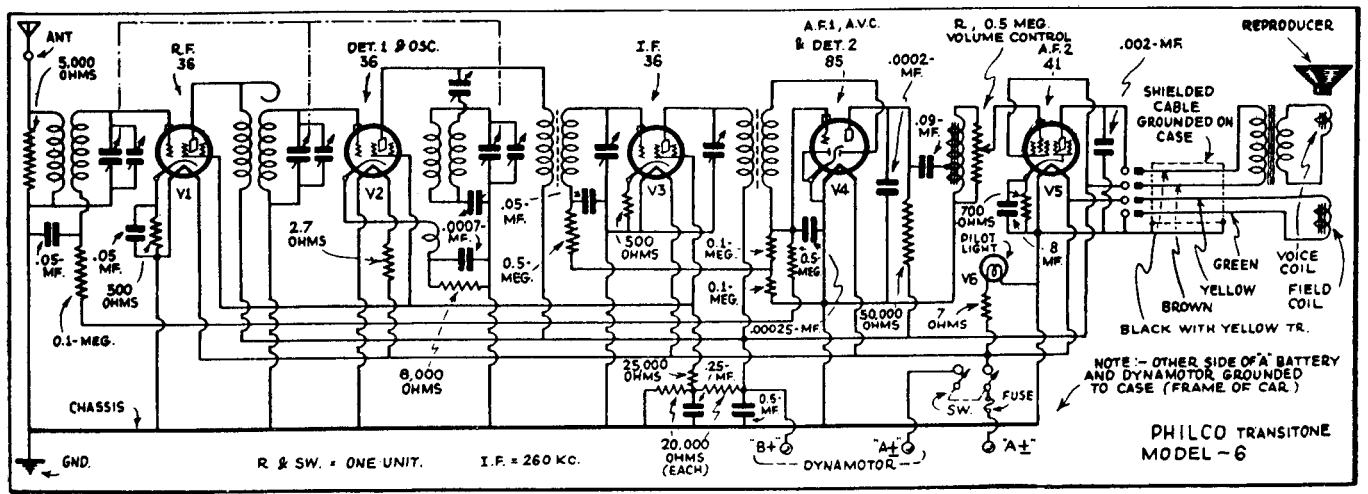
PHILCO TRANSITONE MODEL 7

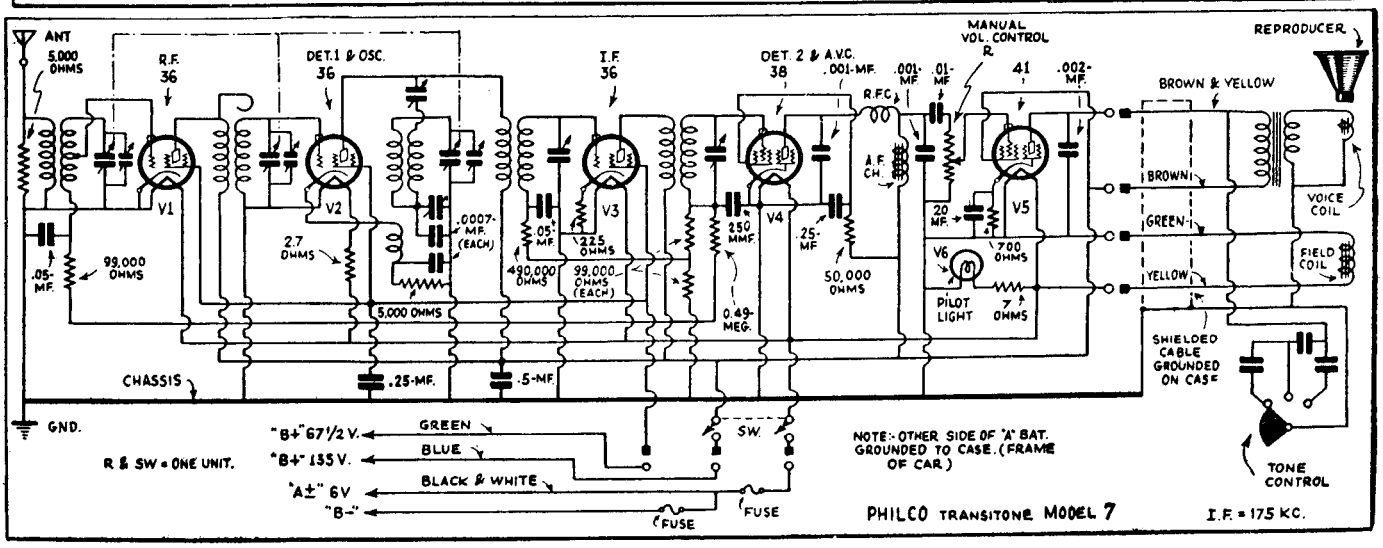
THE Transitone Model 7 receiver is a five-tube auto-radio receiver. The accessories in this set include ignition noise suppression equipment and the type EA dynamotor.

Installation of this receiver is made on the inside of the dash, as high and far to the right as possible. Clinch-on nuts are provided so that the receiver may be mounted on the dash in either position. In the model A Ford, the set should be placed on the left side of the dash on the engine side of the bulkhead because of the location of the gas tank. The speaker should be mounted on the inside of the dash either over the steering column or near the center. In the model A Ford, the speaker should be mounted on brackets against the right kick pad. The control unit is mounted on the steering column.

The circuit of the Model 7 is of the superheterodyne type and uses the following tubes: One 36 as an R.F. amplifier; one 36 as a combination first detector and oscillator; one 36 as an I.F. amplifier (I.F. is 175 kc.); one 38 as a second detector and A.V.C.; and one 41 in the output stage.

The model EA dynamotor, or batteries, (180 volts) may be used with this receiver. Terminal connections and a diagram of the EA dynamotor are shown here.





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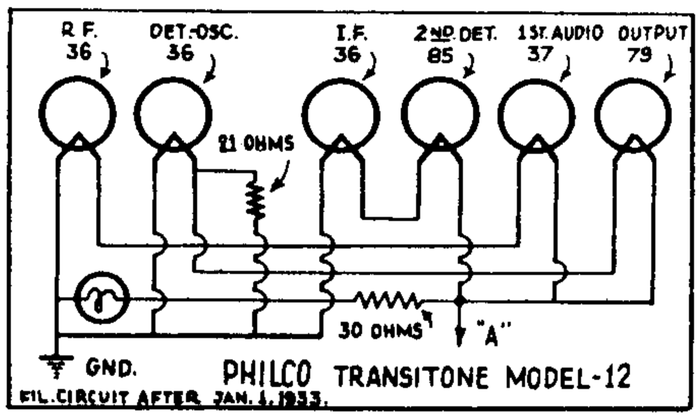
PHILCO TRANSITONE MODELS 8 AND 12

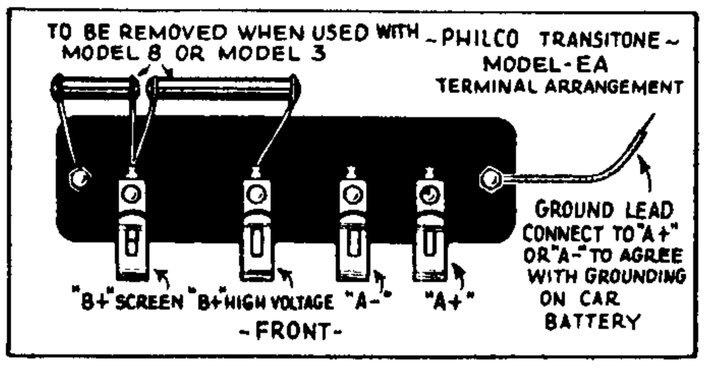
THESE two receivers are identical except for the fact that the Model 12 is designed for operation from a 12-volt storage battery. The filament connections of the Model 12 are shown here.

The installation data for these receivers are the same as for the Model 7 receiver except for the cable connections: in the Models 8 and 12, the speaker and battery cables and the antenna lead are all formed in a one-piece cable which is totally shielded. The Model EA dynamotor is supplied as standard equipment on the Model 8 set, and the Model EC dynamotor is supplied as standard equipment with the model 12 receiver. The size of these dynamotors is approximately 6½ x 8-7/16 inches.

These receivers are six-tube superheterodynes using the following tubes: one 36 as an R.F. amplifier; one 36 as a combination detector-oscillator; one 36 as an I.F. amplifier (I.F. is 175 kc.); one 38 as a second detector and A. V. C.; two type 41 tubes in the push-pull output stage. The "B" supply is 180 volts. A dynamic speaker is employed. As in other Philco Transitone auto receivers, ignition-noise suppression equipment is supplied as an accessory.

All Philco Transitone Model 12's manufactured after January 1, 1933, are similar to the Model 9, except that they are designed for operation on 12-volt bus and boat batteries.

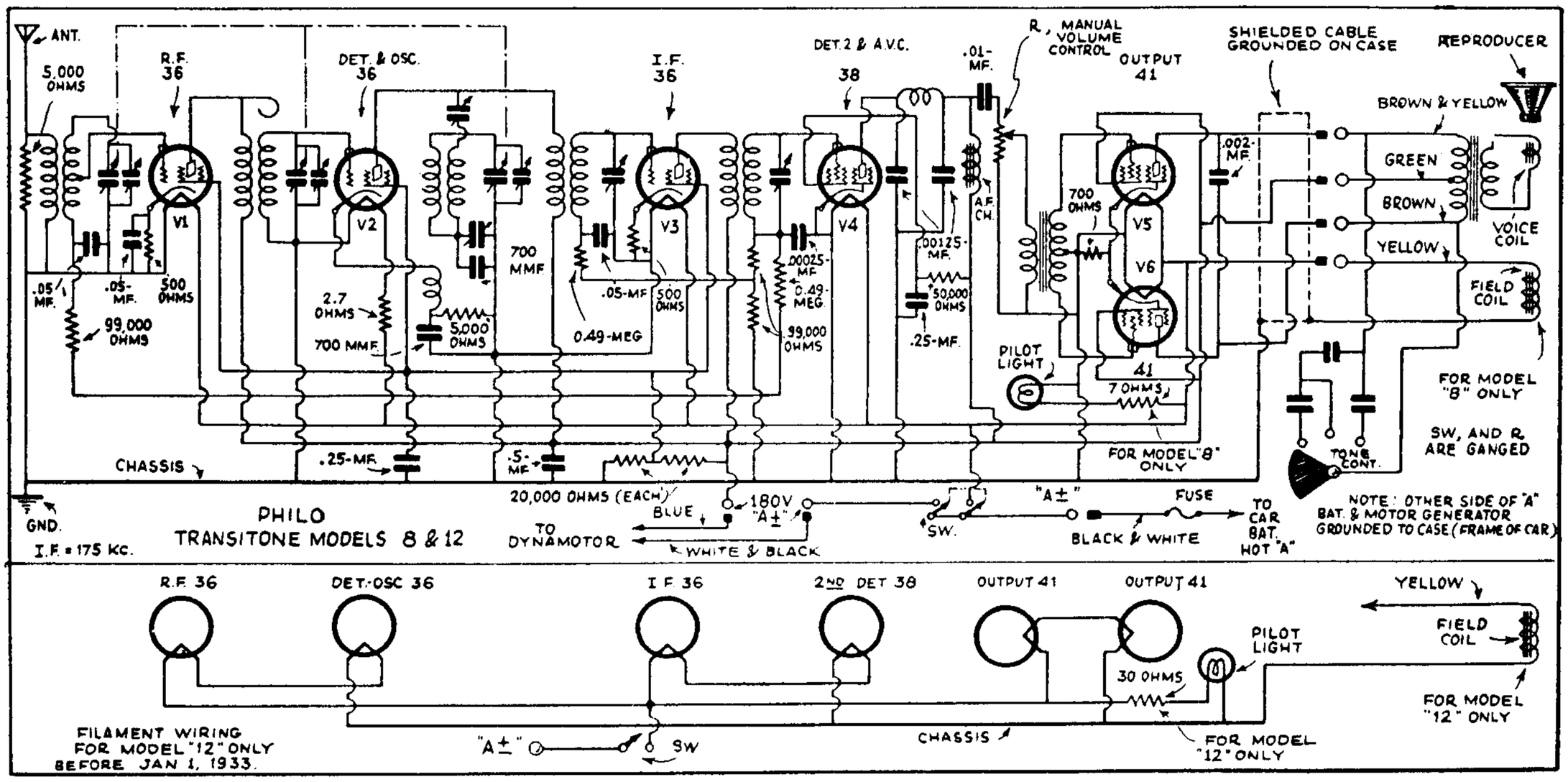


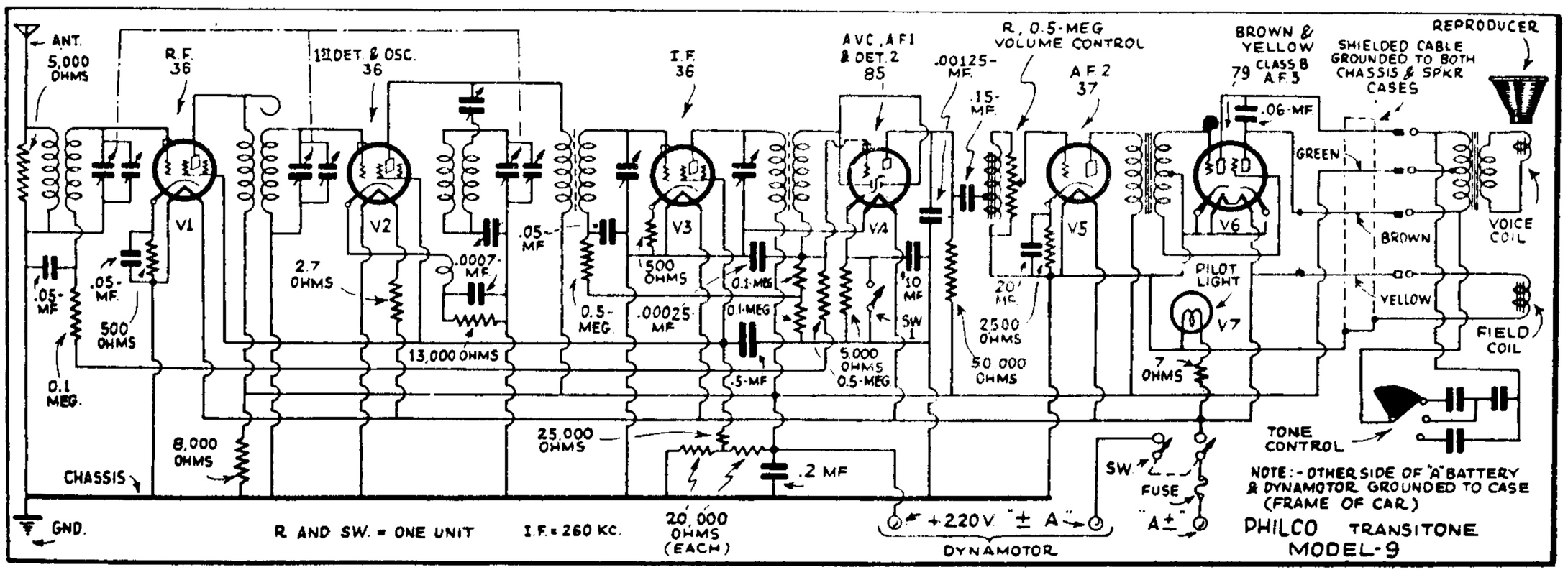


PHILCO TRANSITONE MODEL 9

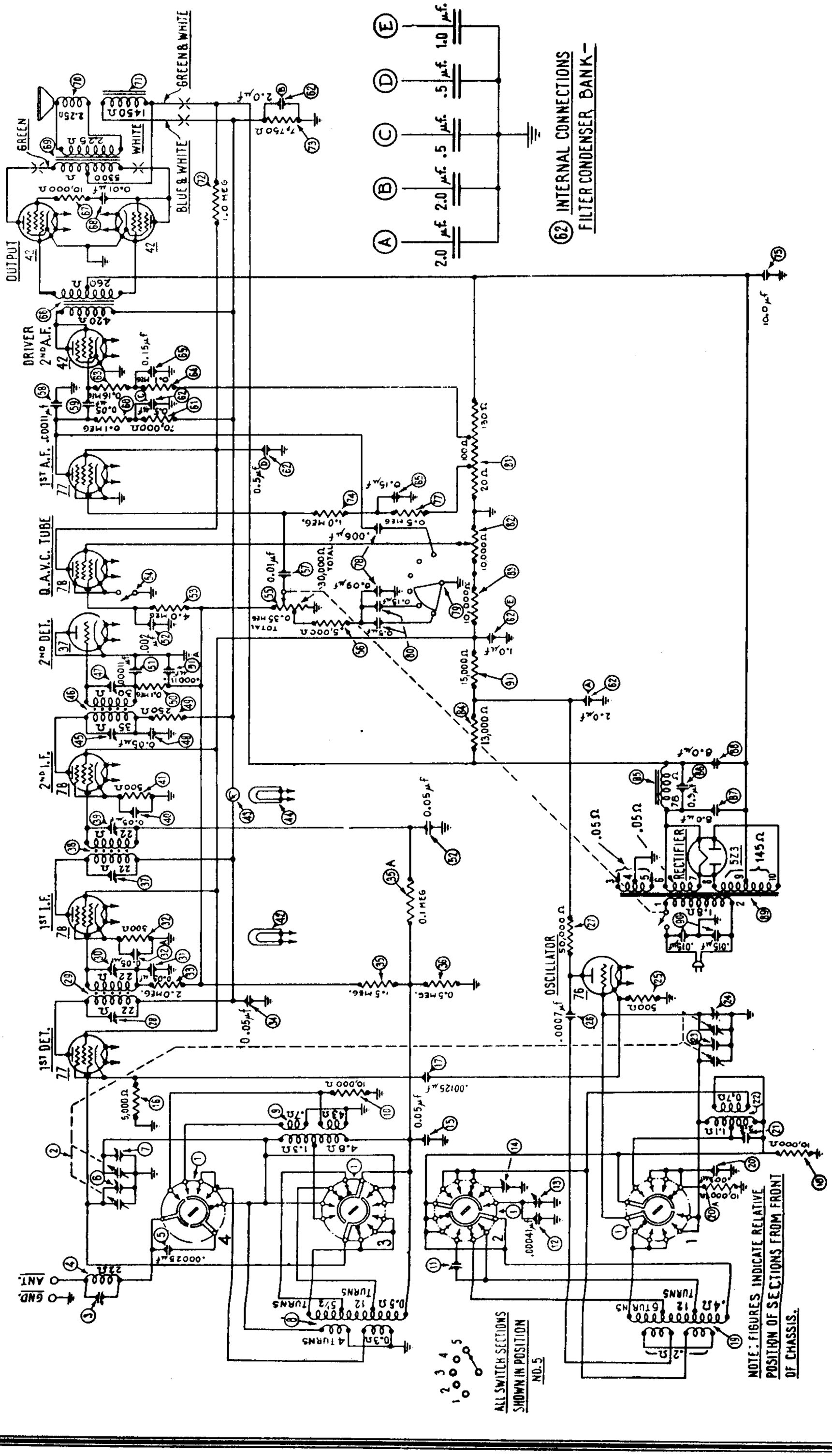
THE Model 9 receiver is a six-tube superheterodyne receiver. The mechanical details are essentially the same as for the Models 7, 8, and 12. The electrical characteristics of this receiver are the same for the Model 6 discussed previously, and, therefore, reference should be made to that description. The tubes used are as follows: One 36 as an R.F. amplifier; one 36 as a combination first-detector and oscillator; one 36 as I.F. amplifier (I.F. is 260 kc.); one 85 as second-detector, A.V.C., and audio amplifier; one 37 in an audio stage; and one 79 in the output stage.

The "B" supply is furnished by a type ED dynamotor which supplies 220 volts.





PHILCO RADIO & TELEVISION CORP.



Schematic Wiring Diagram

PHILCO RADIO & TELEVISION CORP.

Model 16

THE PHILCO RADIO MODEL 16 is an eleven-tube superheterodyne broadcast and short-wave receiver, operating upon alternating current and employing the high-efficiency 6.3 volt tubes, automatic interstation noise suppression, and a frequency (wave-band) coverage that permits reception of the short-wave (high-frequency) broadcast programs. The same superheterodyne circuit is used for all reception. The Receiver is equipped with a five-point wave-band switch. The ranges are—

(1) 520 K. C. to 1500 K. C.
(2) 1.5 M. C. to 4.0 M. C.
(3) 3.2 M. C. to 6.0 M. C.
(4) 5.8 M. C. to 12.0 M. C.
(5) 11.0 M. C. to 23.0 M. C.

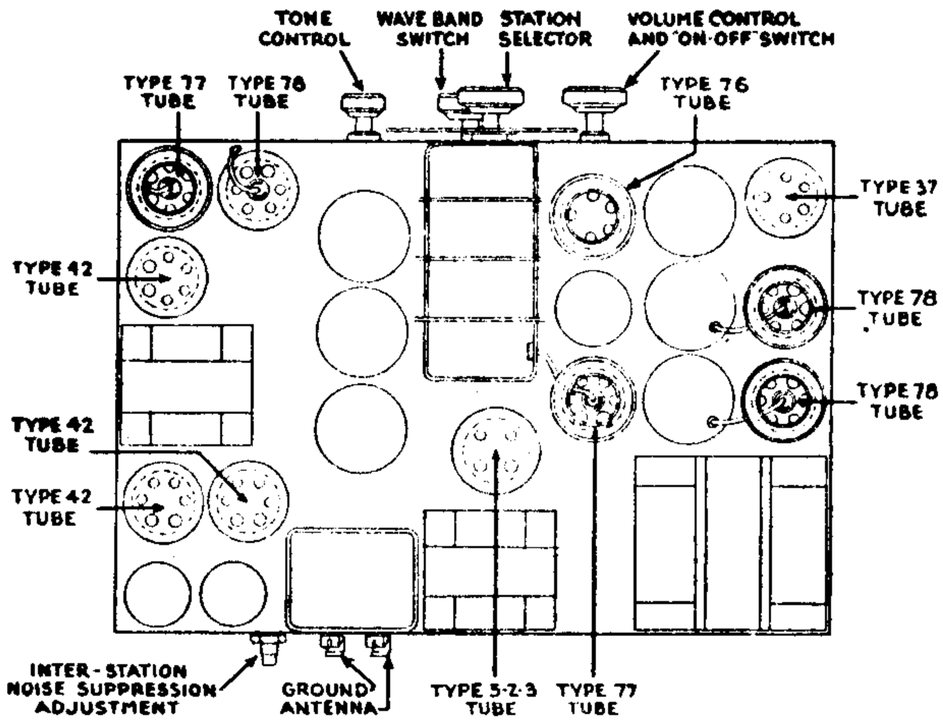
The Receiver employs a Philco Type 77 tube for first detector, a Type 76 for oscillator, a Type 78 for first I. F., a Type 78 for second I. F., and a Type 37 for second detector. The automatic interstation noise suppression circuit uses a Type 78, the first A. F., a Type 77. The driver (second A. F.) is a Type 42; the class "A" amplification is accomplished with two Type 42 tubes as triodes; the rectifier is a Type 5-Z-3. The intermediate frequency is 460 kilocycles. The power consumption of Model 16-122 is 130 watts; of Model 16-121, 120 watts.

Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Circuit	1st Det.	Osc.	1st. I. F.	2nd I. F.	2nd Det.	Inter-Station Noise Supr. Circuit	1st A. F.	2nd A. F. (Driver)	Output		Rectifier
Type Tube	77	76	78	78	37	78	77	42	42	42	5-Z-3
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	4.7
Plate Volts—P to K	220	53	225	230	0	1.8	130	220	340	340	400
Screen Grid Volts—SG to K	80	—	80	80	—	1.8	1.8	220	340	340	—
Control Grid Volts—CG to K	1.6	6.4	0	0	.2	1.6	.4	.6	34	34	—
Cathode Volts—K to F	4.2	1.9	2.2	2.5	0	0	0	0	0	0	—

* All of the above readings were taken from the underside of the chassis, using test prods and leads, with a suitable A. C. voltmeter for filament voltages, and a high-resistance multi-range D. C. voltmeter for other readings. The *Philco Model 048 All-Purpose Set Tester* is highly recommended for this use. Volume control set at maximum and station selector turned to low frequency end; interstation noise suppression circuit potentiometer turned all the way to the right; and toggle switch (interstation noise suppression circuit) in "ON" ("S") position. Readings taken with a plug-in adapter will NOT be satisfactory.

NOTE—These values are for Model 16-122. Model 16-121 uses a Type 80 Rectifier Tube. See Note, page 4, at end of Replacement Parts List.



Top View of Chassis, Showing Tube Locations and Major Parts

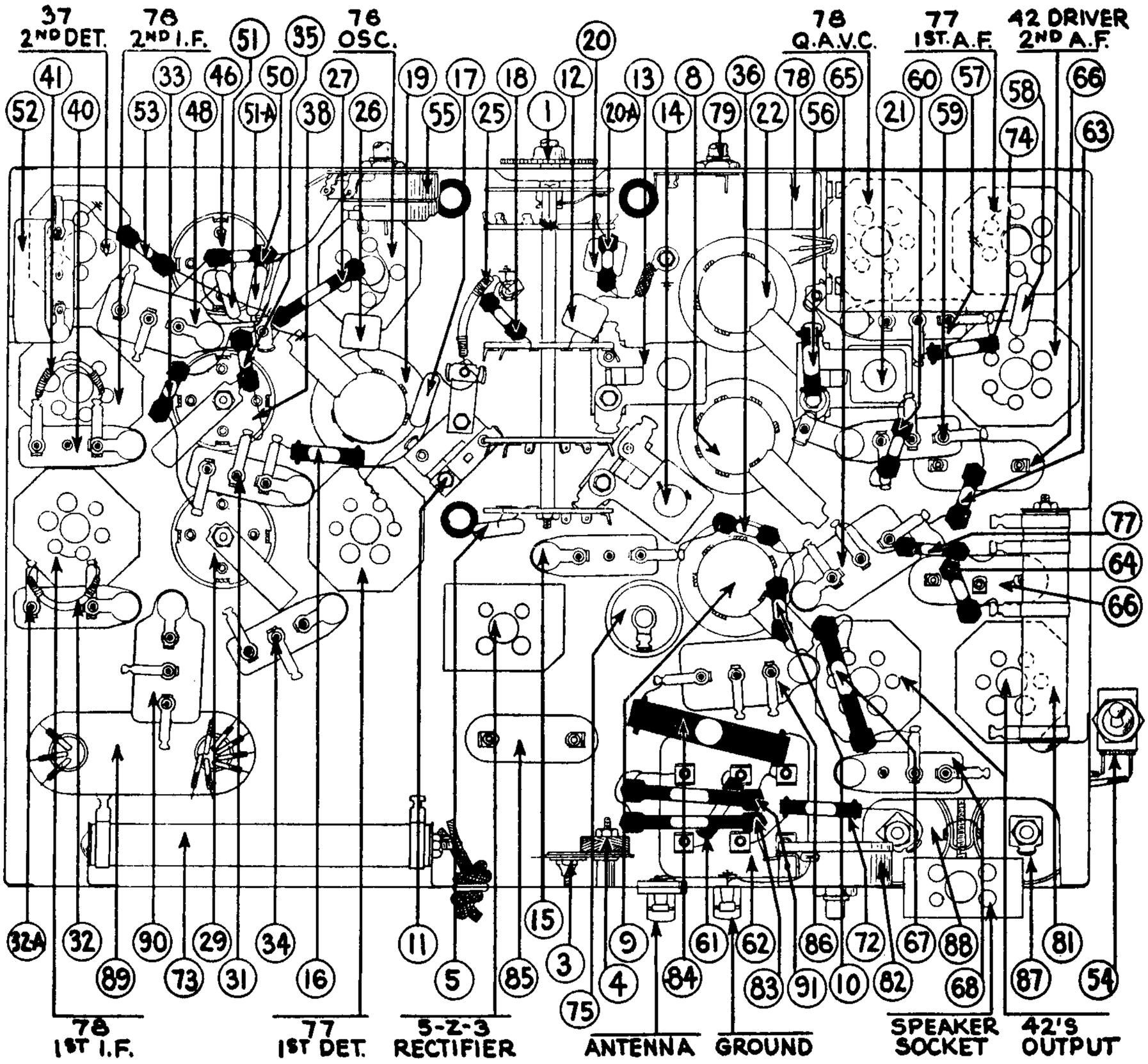
Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1—2	105—125	Primary	White
3—5	6.3	Filament	Black
6—7	5.0	Filament of 5-Z-3	Blue
8—10	800	Plates of 5-Z-3	Yellow
4	---	Center Tap of 3—5	Black—Yellow Tracer
9	---	Center Tap of 8—10	Yellow—Green Tracer



Terminal Arrangement of Tube Sockets Viewed from Underside of Chassis

PHILCO RADIO & TELEVISION CORP.



Bottom View of Chassis, Showing Parts

Inability of a suitable radio receiver to pick up signals upon the shorter waves (higher frequencies) frequently can be traced to the aerial itself. A relatively short, but efficiently designed, aerial will give better results on the short waves than one which has a long and involved lead-in. Extreme care should be exercised in the installation of the Model 16, that it may have every opportunity to bring in *all* the frequencies. Instruction should be given the customer in tuning in the shorter waves, which are characteristically difficult for a novice. Attention should be called to the time-difference existing, that the listener may not listen at such hours as a desired station is *not* transmitting. Much good will be acomplished by a thorough instruction of the customer. Philco distributors are prepared to supply special aerial equipment, especially designed for reception of the short waves.

ADJUSTMENT OF MODEL 16 SERIES

These receivers are adjusted accurately at the factory prior to shipment. Under normal conditions it is not necessary to readjust the compensating condensers. If such adjustment becomes necessary, it should not be attempted without first making sure that proper instructions and suitable equipment are at hand. Philco distributors are in a position to supply both. The Philco Model 048 All-Purpose Set Tester contains a variable-frequency signal generator covering all frequencies between 105 K. C., and 2000 K. C., and is highly recommended for all required adjustments.

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REPLACEMENT PARTS FOR MODEL 16

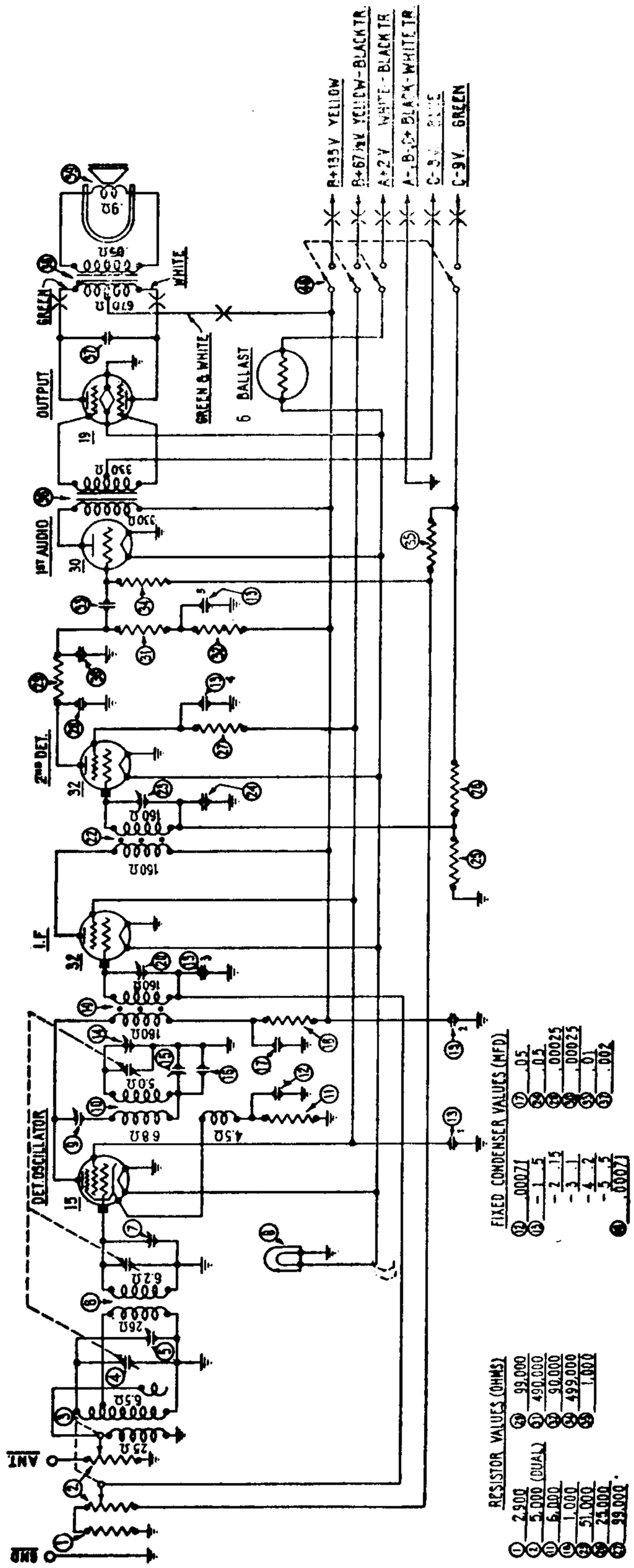
No. on Figs.	Description	Part No.	List Price
①	Wave Band Switch	42-1037	....
②	Tuning Condenser Assembly	31-1039	....
③	Compensating Condenser (Wave-trap)	38-5199	....
④	Inductance (Wave-trap)	5858	.16
⑤	Condenser		....
⑥	Compensating Condenser (Ant.; H. F.; Part of ②)		....
⑦	Compensating Condenser (Ant.; Broadcast and Police; Part of ②)		....
⑧	Antenna Transformer (H. F. Bands)	32-1183	....
⑨	Antenna Transformer (B'dc't & Police B'ds)	32-1182	....
⑩	Resistor (Brown-Black-Orange)	4412	.20
⑪	Compensating Condenser (Range 3)	04000-V	.16
⑫	Condenser	30-1000	.20
⑬	Compensating Condenser (Range 2; series)	04000-R	.35
⑭	Compensating Condenser (Range 1; series)	04000-R	.35
⑮	Condenser	3615-L	.16
⑯	Resistor (Green-Black-Red)	5310	.20
⑰	Condenser	5886	.25
⑱	Resistor (Brown-Black-Orange)	4412	.20
⑲	Oscillator Coil (H. F.)	32-1185	....
⑳	Condenser	7301	.35
⑳a	Resistor (Brown-Black-Orange)	4412	.20
㉑	Compensating Condenser (Range 1; Shunt)	0-4000-A	.12
㉒	Oscillator Coil (Broadcast and Police)	32-1184	....
㉓	Compensating Condenser (Osc.; H. F.; Part of ②)		....
㉔	Compensating Condenser (Osc.; Police; Part of ②)		....
㉕	Resistor (Flexible Wire-wound; Green-Black-Brown)	6977	.20
㉖	Condenser	5863	.18
㉗	Resistor (Green-Brown-Orange)	4237	.25
㉘	Compensating Cond'ser (1st, I. F. Primary)	31-6002	....
㉙	1st, I. F. Transformer	32-1186	....
㉚	Compensating Cond'r (1st, I. F. Secondary)	Common with ㉘	....
㉛	Condenser	3615-AB	.20
㉜	Resistor (Flexible Wire-wound; Orange-Black-Brown)	33-3010	.15
㉜a	Condenser	3615-AT	.20
㉝	Resistor (Red-Black-Green)	5872	.20
㉞	Condenser	3615-D	.18
㉟	Resistor (Brown-Green-Green)	7009	.20
㉟a	Resistor (White-White-Orange)	4411	.20
㊱	Resistor (Yellow-White-Yellow)	4517	.20
㊲	Compensating Cond'ser (2d, I. F. Primary)	31-6002	....
㊳	2d, I. F. Transformer	32-1186	....
㊴	Compensating Cond'r (2d, I. F. Secondary)	Common with ㊲	....
㊵	Condenser	3615-AT	.20
㊶	Resistor (Flexible Wire-wound; Green-Black-Brown)	6977	.20
㊷	Pilot Lamp (Station Selector)	6608	.12
㊸	Shadow Tuning Meter	6497	2.25
㊹	Pilot Lamp (Shadow Tuning Meter; Part of ㊸)		....
㊺	Compensating Cond'ser (3d, I. F. Primary)	31-6003	....
㊻	3d, I. F. Transformer	32-1188	....
㊼	Compensating Cond'r (3d, I. F. Secondary)	Common with ㊺	....
㊽	Condenser	3615-AS	.25
㊾	Resistor (Part of ㊽)		....
㊿	Resistor (White-White-Orange)	4411	.20
(51)	Condenser	4519	.18
(51)a	Condenser	4519	.18
(52)	Condenser (Double)	7296-G	....
(53)	Resistor (Yellow-Black-Green)	6010	.20
(54)	Switch (Toggle); Interstation Noise Suppression Circuit	42-1036	.40
(55)	Volume Control and "On-Off" Switch	33-5013	1.00
(56)	Resistor (Green-Black-Red)	5310	.20
(57)	Condenser	3903-J	.20
(58)	Condenser	4519	.18
(59)	Condenser	3615-AD	.20
(60)	Resistor (White-White-Orange)	4411	.20
(61)	Resistor (Violet-Black-Orange)	5385	.20
(62)	Filter Condenser Bank	30-4026	3.00
(63)	Resistor (Brown-Blue-Yellow)	5331	.20
(64)	Resistor (White-White-Orange)	4411	.20
(65)	Condenser (Double)	6287-J	....
(66)	Input Transformer	32-7057	2.25
(67)	Resistor (Brown-Black-Orange)	3524	.20
(68)	Condenser	3903-F	.15
(69)	Output Transformer	32-7052	....
(70)	Voice Coil and Cone Assembly	36-3061	.75
(71)	Speaker Field, Assembled with Pot (U-2)	36-3088	....
(72)	Resistor (Brown-Black-Green)	4409	.20
(73)	Resistor (Wire-wound)	33-3020	.30
(74)	Resistor (Brown-Black-Green)	4409	.20
(75)	Condenser (Electrolytic)	30-2003	.70
(77)	Resistor (Yellow-White-Yellow)	4517	.20
(78)	Condenser (Internal to (79))		....
(79)	Tone Control	30-4033	....
(80)	Condensers (External to (79))	06713	.45
(81)	Voltage Divider Resistor (Wire-wound)	33-3021	.16
(82)	Potentiometer (Interstation Noise Suppression Circuit)	33-5015	.80
(83)	Resistor (Brown-Black-Orange)	3524	.20
(84)	Resistor (Brown-Orange-Orange)	6450	.35
(85)	Filter Choke	32-7056	1.85
(86)	Condenser	6287-F	.12
(87)	Condenser (Electrolytic)	30-2011	1.25
(88)	Condenser (Electrolytic)	30-2011	1.25
(89)	Power Transformer (50–60 ~)	32-7058	5.00
(90)	Condenser (Double)	3793-E	.20
(91)	Resistor (Brown-Green-Orange)	5718	.40
	Tube Shield	28-1107	.10
	Four-prong Socket	7545	.08
	Five-prong Socket	7546	.10
	Six-prong Socket	7547	.10
	Knob (Large)	03063	.08
	Knob (Small)	03064	.06

NOTE.—Model 16-121 uses a Type 80 tube in lieu of 5-Z-3. Parts used in the 16-121 chassis that differ from the 16-122 parts above listed are:

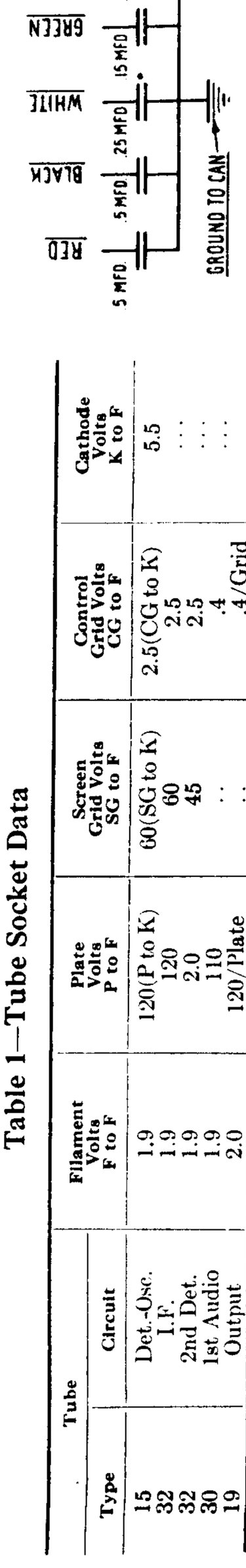
(89)	Power Transformer (50–60 ~)	32-7080	....
(87)	Condenser (Electrolytic) (8.0 Mfd.)	6706	1.50
(88)	Condenser (Electrolytic) (8.0 Mfd.)	7464	1.25
	Speaker	K-17	....
	Speaker Socket	7084	....
	Speaker Cable	L1632	....

PHILCO RADIO & TELEVISION CORP.

Model 37



Schematic Wiring Diagram



Internal Connections Filter Condenser

Table 1—Tube Socket Data

Tube Type	Circuit	Filament Volts F to F	Plate Volts P to F	Screen Grid Volts SG to F	Control Grid Volts CG to F	Cathode Volts K to F
15	Det.-Osc.	1.9	120(P to K)	60(SG to K)	2.5(CG to K)	5.5
32	I.F.	1.9	120	60	2.5	...
32	2nd Det.	1.9	2.0	45	2.5	...
30	1st Audio	1.9	110	..	.4	...
19	Output	2.0	120/Plate	..	.4/Grid	...

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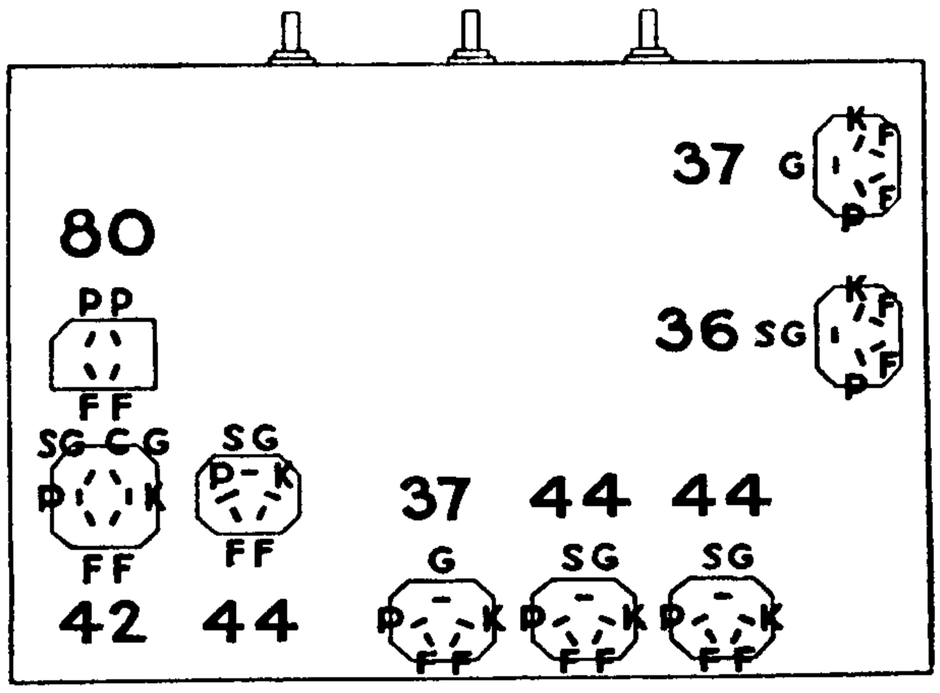
Model 43

The Philco Radio of the 43 Series is an eight tube superheterodyne short wave and broadcast wave combination, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The same superheterodyne circuit is employed for both short wave and broadcast wave ranges, with an intermediate frequency of 450 kilocycles. Four tuning ranges on the dial are provided, these being controlled by the wave change switch. The ranges are as follows:

Position 1.....550 KC to 1400 KC
Position 2.....1.4 MC to 3.4 MC
Position 3.....3.3 MC to 9.0 MC
Position 4.....8.5 MC to 20.0 MC

The chassis is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code, employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chasses of one code are not interchangeable with those of another. The power consumption of the various models is as follows:

Chassis	Volts	Cycles	Watts
43-121	115	50-60	65
43-221	115	50-60	88
43-121	115	25-40	67
43-121	230	50-60	65
43-221	230	50-60	88



F—Filament P—Plate SG—Screen Grid CG—Control Grid K—Cathode

Tube Sockets, Under Side of Chassis

Caution:—Never connect the chassis to the power supply unless the speakers are connected and all tubes are in place.

Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Tube		Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
Type	Circuit					
37	Osc.	6.3	175	—	6.	—
36	1st Det.	6.3	235	80	3.0	12.0
44	1st I. F.	6.3	235	80	.2	3.0
44	2nd I. F.	6.3	235	80	3.5	3.5
37	2n l Det.	6.3	0	—	0	0
44	1st Audio	6.3	45	45	.2	2.0
42	Output	6.3	215	240	.4	15.0
80	Rectifier	5.0	350/Plate			

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adaptor will not be satisfactory.

Table 2—Power Transformer Data

Terminals	A. C. Volts	Circuit	Color
1–2	105 to 125	Primary	White
3–5	6.3	Filaments	Black
6–7	5.0	Filament of 80	Blue
8–10	685	Plates of 80	Yellow
4	....	Center Tap of 3–5	Black Yellow Tracer
9	....	Center Tap of 8–10	Yellow Green Tracer

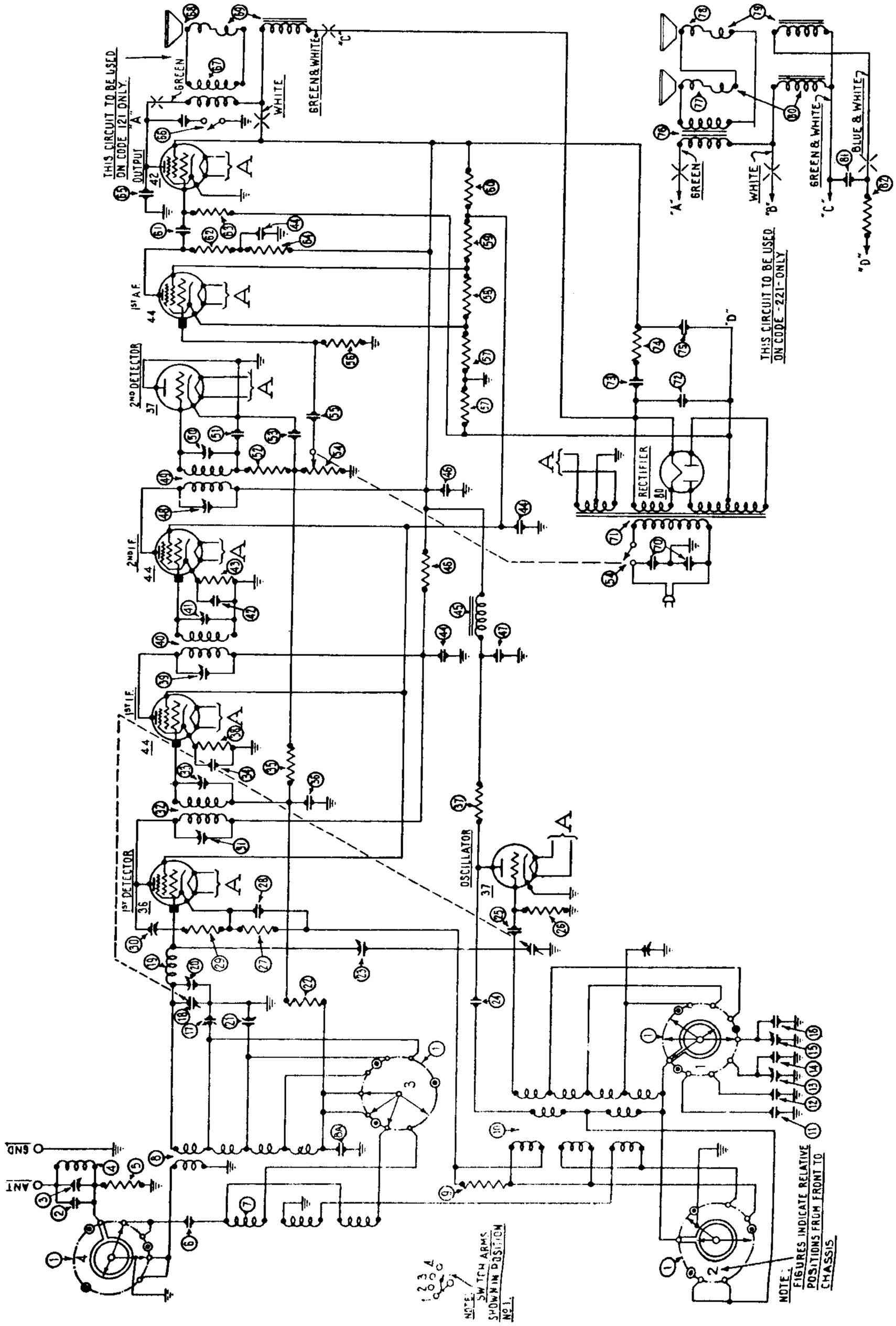
Table 3—Resistor Data

No. on Figs.	Power (Watts)	Resistance (ohms)	COLOR		
			Body	Tip	Dot
(29) (38) (43)	...	500	Flexible Wire		
(9)	.5	1,000	Brown	Black	Red
(5)	.5	2,000	Red	Black	Red
(58) (59)	1.0	5,000	Green	Black	Red
(82)	...	5,620	Long Tubular		
(37)	1.0	10,000	Brown	Black	Orange
(74)	.5	10,000	Brown	Black	Orange
(60)	.5	13,000	Brown	Orange	Orange
(27) (64)	.5	25,000	Red	Green	Orange
(62)	.5	70,000	Violet	Black	Orange
(22) (52)	.5	99,000	White	White	Orange
(26) (63)	.5	490,000	Yellow	White	Yellow
(56)	.5	1,000,000	Brown	Black	Green
(35)	.5	2,000,000	Red	Black	Green

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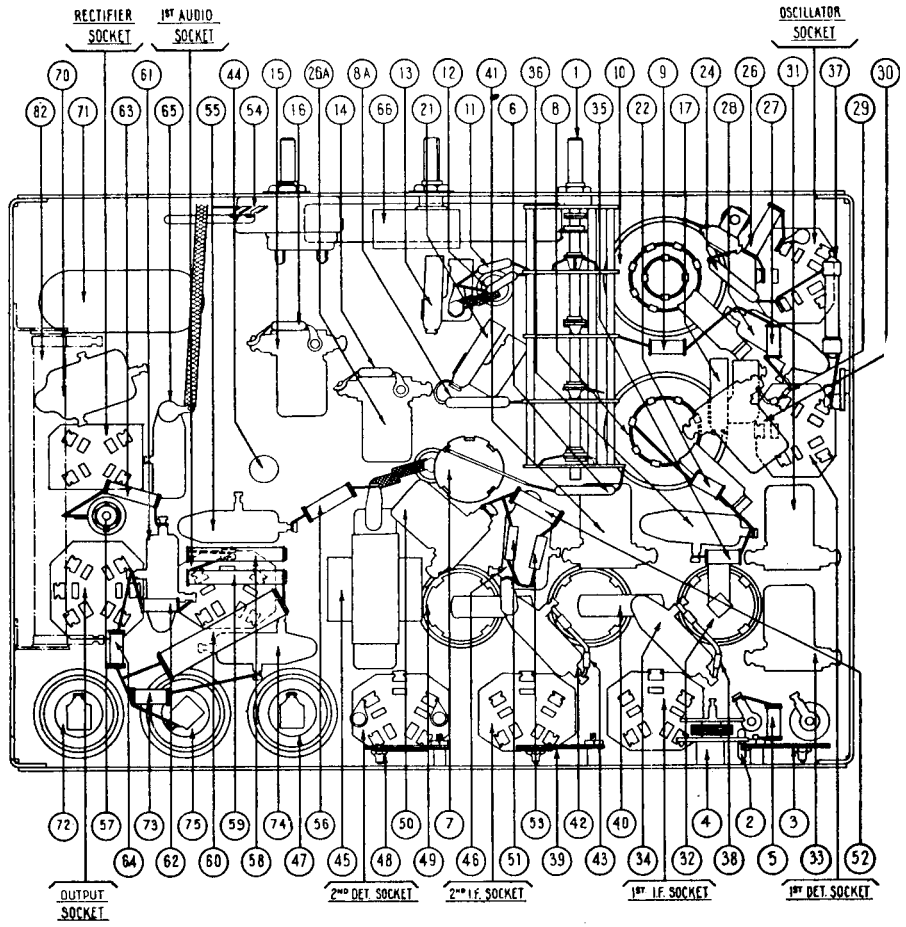
Model 43



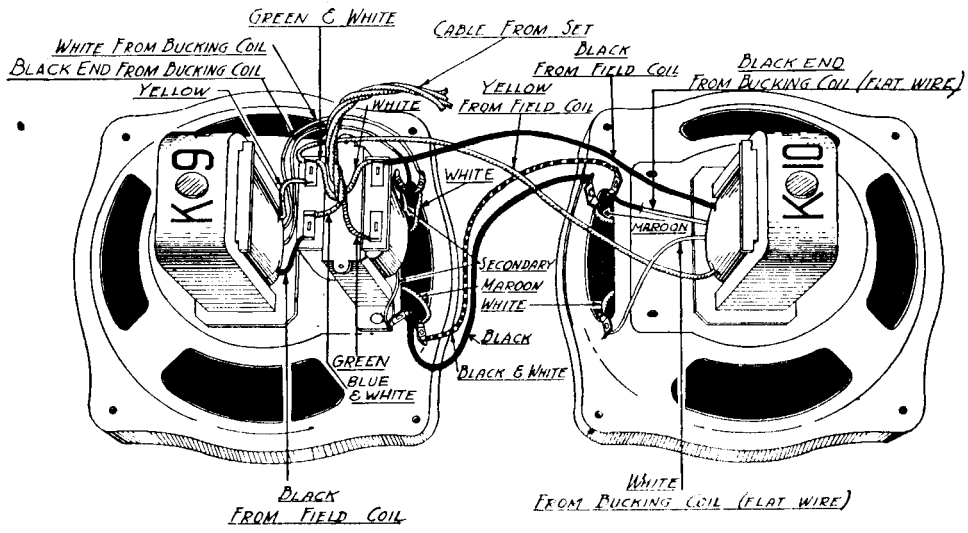
Schematic Wiring Diagram

PHILCO RADIO & TELEVISION CORP.

Model 43



Parts Diagram



Twin Speaker Connections—221 Code

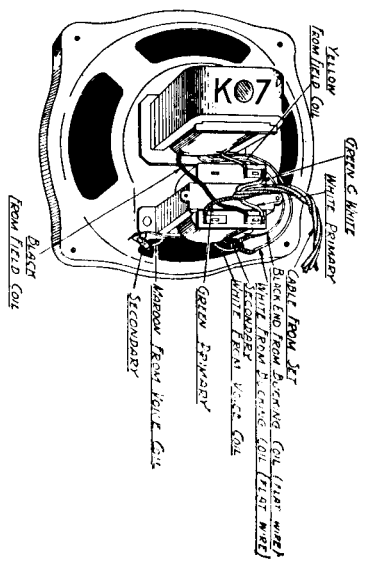


Fig. 5—Speaker Connections—121 Code

Adjustment of Model 43 Series

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to re-adjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your distributor. The Philco Oscillator equipment has been especially designed for use in this work and will be found the most inexpensive and most reliable for the purpose.

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Replacement Parts Model 43

No. on Figs. 2 and 3	Description	Part No.	List Price
①	Wave Change Switch	05617	
②	Condenser (410 mmf.)	5120	.18
③	Compensating Condenser—450 K. C. Wave Trap	04000B	.18
④	R. F. Choke	05191	.15
⑤	Resistor (2,000 ohms)	6984	.25
⑥	Condenser (1000 mmf.)	5215	.20
⑦	Antenna Coupling Coil	05189	.50
⑧	Antenna Transformer*	06404	
⑧a	Condenser (3,000 mmf.)	6009	.30
⑨	Resistor (1,000 ohms)	5837	.25
⑩	Oscillator Coil*	05624	
⑪	Condenser (1,650 mmf.)	5877	.30
⑫	Condenser (1,250 mmf.)	5886	.25
⑬	Compensating Condenser—1400 K. C. End of Second Band	04000F	.16
⑭	Condenser (250 mmf.)	3082	.20
⑮	Compensating Condenser—600 K. C. End of First Band	04000F	.16
⑯	Condenser (250 mmf.)	3082	.20
⑰	Compensating Condenser—8 Megacycle End Third Band	04000V	
⑱	Tuning Condenser Assembly	05154	
⑲	Grid Coil (Top of Chassis)	05190	.25
⑳	Compensating Condenser (Part of Tuning Cond. Assembly)		
㉑	Compensating Condenser (3.5 Megacycle End of Second Band)	04000V	
㉒	Resistor (99,000 ohms)	4411	.25
㉓	Neutralizing Condenser (Top of Chassis)	04000V	
㉔	Condenser (1000 mmf.)	5837	.25
㉕	Condenser (50 mmf.) (Top of Chassis)	3774	.25
㉖	Resistor (490,000 ohms)	4517	.25
㉖a	Compensating Condenser (1400 K. C. End of First Band)	04000F	.16
㉗	Resistor (25,000 ohms)	4516	.25
㉘	Condenser (.05 mfd.)	3615E	.20
㉙	Resistor (500 ohms)	6977	.20
㉚	Compensating Condenser	04000C	.08
㉛	Compensating Condenser—1st I. F. Primary	04000M	.16
㉜	First I. F. Transformer	05185	.55
㉝	Compensating Condenser—1st I. F. Secondary	04000M	.16
㉞	Condenser (.05 mfd.)	3615W	.16
㉟	Resistor (2,000,000 ohms)	5872	.25
㊱	Condenser (.05 mfd.)	3615J	.18
㊲	Resistor (10,000 ohms)	3524	.25
㊳	Resistor (500 ohms)	6977	.20
㊴	Compensating Condenser—2nd I. F. Primary	04000M	.16
㊵	Second I. F. Transformer	05185	.55
㊶	Compensating Condenser—2nd I. F. Secondary	04000X	.16
㊷	Condenser (.05 mfd.)	3615W	.16
㊸	Resistor (500 ohms)	6977	.20
㊹	Filter Condenser Bank (.25, 2-.5 mfd.)	05239	1.00
㊺	Filter Choke	5930	1.40
㊻	Condenser (.05 mfd. and Resistor 250 ohms)	3615AS	.25
㊼	Electrolytic Condenser	7556	1.25
㊽	Compensating Condenser—3rd I. F. Primary	04000M	.16
㊾	Third I. F. Transformer	05185	.55
㊿	Compensating Condenser—3rd I. F. Secondary	04000M	.16

*Supplied in matched pair—Antenna and oscillator coils.

No. on Figs. 2 and 3	Description	Part No.	List Price
㊿①	Condenser (110 mmf.)	4519	.18
㊿②	Resistor (99,000 ohms)	4411	.25
㊿③	Condenser (110 mmf.)	4519	.18
㊿④	Volume Control and On-Off Switch	6892	1.25
㊿⑤	Condenser (.01 mfd.)	3903F	.15
㊿⑥	Resistor (1,000,000 ohms)	4409	.25
㊿⑦	Wire Wound Resistor (185 and 245 ohms)	6452	.16
㊿⑧	Resistor (5,000 ohms)	3526	.25
㊿⑨	Resistor (5,000 ohms)	3526	.25
㊿⑩	Resistor (13,000 ohms)	6450	.35
㊿⑪	Condenser (.01 mfd.)	3903N	.16
㊿⑫	Resistor (70,000 ohms)	5385	.25
㊿⑬	Resistor (490,000 ohms)	4517	.25
㊿⑭	Resistor (25,000 ohms)	4516	.25
㊿⑮	Condenser (.01 mfd.)	3903AA	.14
㊿⑯	Tone Control	05174	.16
㊿⑰	Output Transformer	2580	1.25
㊿⑱	Voice Coil and Cone Assembly	02823	.45
㊿⑲	Speaker Field and Bucking Coil Assembled with Pot (K-7)	02761	2.25
㊿⑳	Condenser (.015 mfd. Double)	3793K	.20
㊿㉑	Power Transformer—50-60 Cycles, 115 Volts, Single Speaker Models	7074	3.50
	25-40 Cycles, 115 Volts, Single Speaker Models	7075	6.75
	50-60 Cycles, 230 Volts, " " "	7076	4.00
	50-60 Cycles, 115 Volts, Twin Speaker Models	6985	4.50
	50-60 Cycles, 230 Volts, " " "	6986	5.25
㊿㉒	Electrolytic Condenser (6 mfd.) 50-60 Cycles	4916	1.75
	Electrolytic Condenser (8 mfd.) 25-40 Cycles	6707	1.50
㊿㉓	Resistor (10,000 ohms)	4412	.25
㊿㉔	Condenser (.05 mfd.)	3615AD	.20
㊿㉕	Electrolytic Condenser (6 mfd.) 50-60 Cycles	4916	1.75
	Electrolytic Condenser (8 mfd.) 25-40 Cycles	6706	1.50
㊿㉖	Output Transformer—Twin Speaker	2564	1.35
㊿㉗	Voice Coil and Cone Assembly	02823	.45
㊿㉘	Voice Coil and Cone Assembly	02823	.45
㊿㉙	Speaker Field and Bucking Coil Assembled with Pot (K-9)	02762	2.75
㊿㉚	Speaker Field and Bucking Coil Assembled with Pot (K-10)	02767	2.25
㊿㉛	Condenser (.5 mfd.)	05150	.50
㊿㉜	Wire Wound Resistor (5,620 ohms) Twin Speaker	6451	.30
	Tube Shield	5387	.05
	Knob (Large)	03063	.08
	Knob (Medium)	03064	.06
	Knob (Small)	03437	.02
	Knob Spring (Large)	5262	.35 per C
	Knob Spring (Small)	4147	.01
	Grid Clip	4897	.30 per C
	Four Prong Socket Assembly	5026	.08
	Five Prong Socket Assembly	4956	.10
	Six Prong Socket Assembly	6417	.10
	Dial Complete	05418	.55
	Bezel	6826	.20
	Tuning Condenser Drive Cord	04834	.12
	Spring	6508	1.60 per C
	Chassis Mounting Screw	W-468	3.50 per C
	Mounting Washer	W-315	.40 per C
	Rubber Washer	5189	.03

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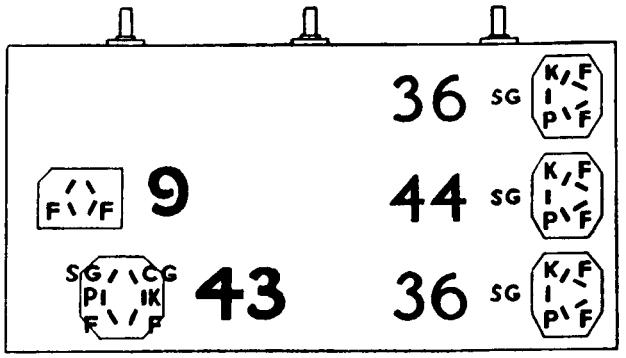
PHILCO RADIO & TELEVISION CORP.

Model 48

The Model 48 is a four tube, 115 volt direct current operated superheterodyne receiver, designed for operation on 540 to 1500 kilocycles.

This model contains a type 36 screen grid tube for combination first detector and oscillator, a type 44 r. f. pentode tube as intermediate frequency amplifier, a type 36 screen grid tube as second detector, and a type 43 pentode tube as output. A type 9 ballast tube is used for automatic voltage regulation. All of these tubes are the new Philco high efficiency type which consume a minimum of current.

The intermediate frequency of this model is 175 kilocycles. The power consumption is 40 watts.



F—Filament SG—Screen Grid K—Cathode
P—Plate CG—Control Grid

Tube Sockets, Under Side of Chassis

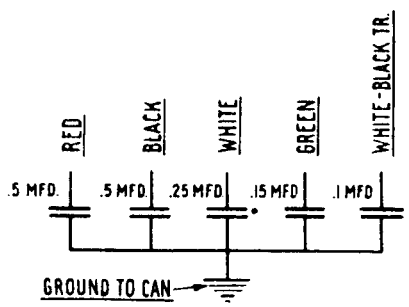
Caution.—Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

Table 1—Tube Socket Data—D.C. Line Voltage 125 Volts

Valve		Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
Type	Circuit					
36	Det.-Osc.	6.3	100	55	3.0	.5
44	I.F.	6.3	70	70	4 5	10.
36	2nd Det.	6.3	37	35	3.0	.5
43	Output	25.0	100	105	.4	.4
9	Ballast	50	...	..	...	...

Table 2—Resistor Data

Nos. on Figs. 3 and 4	Resistance (Ohms)	Power (Watts)	Color		
			Body	Tip	Dot
(26)	30 & 140	. .	Wire	Wound	
(21)	250	...	Combined with .05 Mfd. Condenser		
(20)	1000	.5	Brown	Black	Red
(14)	8000	.5	Gray	Black	Red
(34)	25,000	1.	Red	Green	Orange
(35)	32,000	1.	Orange	Red	Orange
(29) (31)	51,000	.5	Green	Brown	Orange
(25)	10,000	2.	Brown	Black	Orange
(32) (33) (41)	99,000	.5	White	White	Orange
(39)	240,000	.5	Red	Yellow	Yellow
(40)	490,000	.5	Yellow	White	Yellow
(9)	1,000,000	.5	Brown	Black	Green

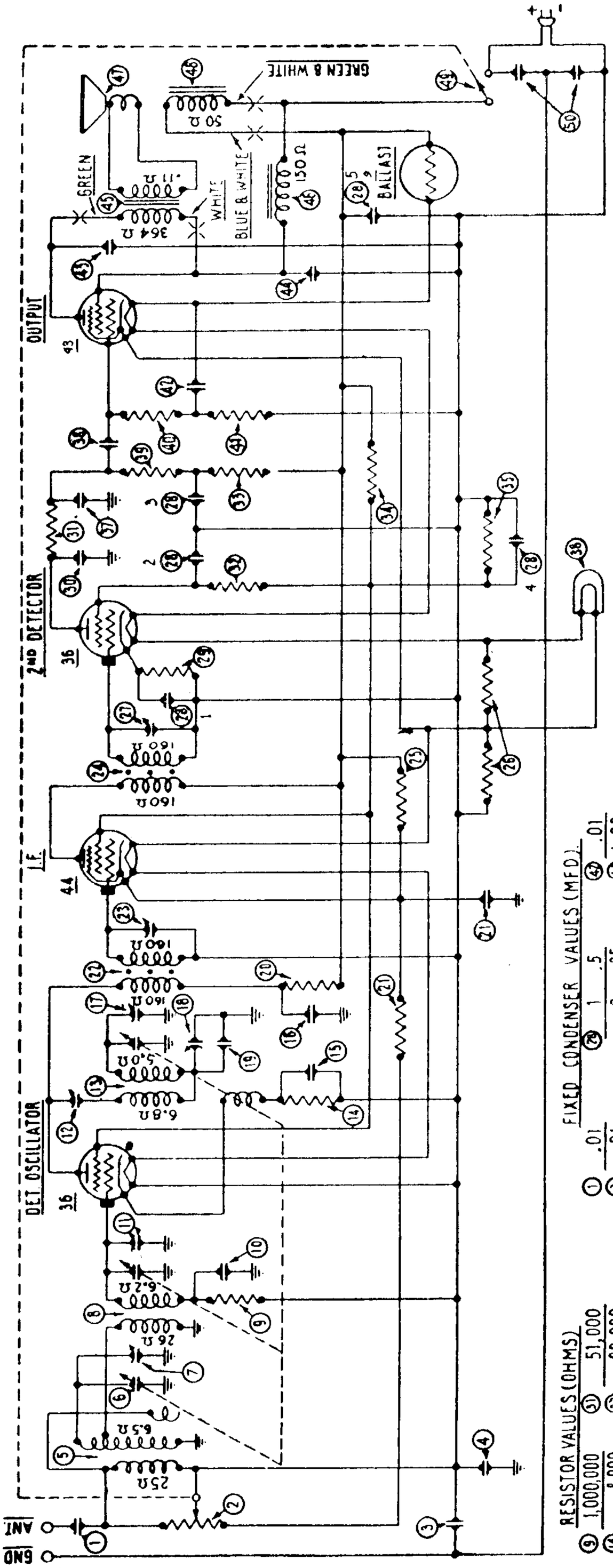


Internal Connections Filter Condenser

PHILCO RADIO & TELEVISION CORP.

Model 48

Schematic Wiring Diagram



FIXED CONDENSER VALUES (MFD.)

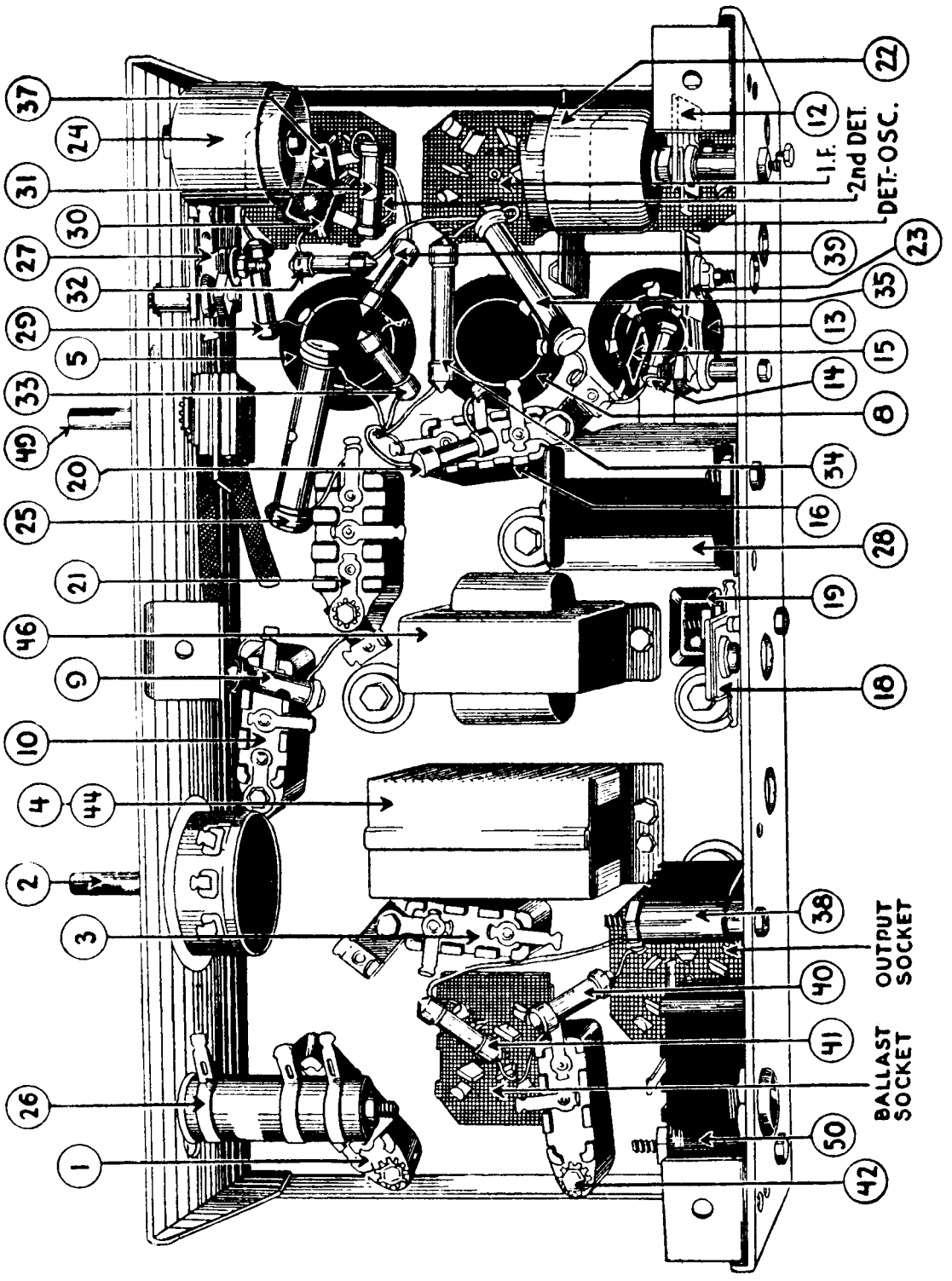
①	.01	③	.01	④	2.00	⑩	.05	⑮	.00071
⑯	.05	⑲	.00071	㉑	.05	㉗	.01	㉘	.5
㉙	1	㉚	.25	㉛	.15	㉜	.5	㉝	.1
㉞	.00025	㉟	.00025	㊳	.01	㊴	.01	㊹	1.00
㊺	.015	㊻	.01						

RESISTOR VALUES (OHMS)

⑨	1,000,000	⑫	8,000	⑭	1,000	⑰	250	⑬	10,000
㉔	140 & 30	㉑	51,000	㉒	99,000	㉓	99,000	㉔	25,000
㉕	92,000	㉖	240,000	㊷	490,000	㊶	99,000		

PHILCO RADIO & TELEVISION CORP.

Model 48



Under Side of Chassis Showing Parts

PHILCO RADIO & TELEVISION CORP.

ADJUSTMENT OF MODEL 48

These receivers are accurately adjusted at the factory prior to shipment. Under no circumstances are the compensating condensers to be changed in the field unless the proper instructions and equipment are available. This adjustment requires special oscillator equipment which can be obtained from all Philco distributors.

Replacement Parts for Model 48

No. on Figs. 3 and 4	Description	Part No.
①	Condenser (.01 Mfd.)	3903-T
②	Volume Control (5,000 Ohms)	5839
③	Condenser (.01 Mfd.)	3903-AK
④	Condenser (2 Mfd.)	05518
⑤	Antenna Transformer	05848
⑥	Tuning Condenser Assembly	05885
⑦	Compensating Cond.—Antenna—Part of Tuning Condenser Assembly	
⑧	Detector Transformer	05849
⑨	Resistor (1,000,000 Ohms)	4409
⑩	Condenser (.05 Mfd.)	3615-J
⑪	Compensating Cond.—Detector, Part of Tuning Condenser Assembly	
⑫	Comp. Cond. First I.F. Primary	04000-A
⑬	Oscillator Coil	
⑭	Resistor (6,000 Ohms)	
⑮	Condenser (710 Mmf.)	5863
⑯	Condenser (.05 Mfd.)	3615-AC
⑰	Compensating Cond.—High Frequency —Part of Tuning Condenser Assembly	
⑱	Comp. Condenser Low Frequency	04000-F
⑲	Condenser (710 Mmf.)	5863
⑳	Resistor (1000 Ohms)	5837
㉑	Condenser (.05 Mfd. and Resistor 250 Ohms)	3615-C
㉒	First I.F. Transformer	04887
㉓	Comp. Cond. First I.F. Secondary	04000-A
㉔	Second I.F. Transformer	03887
㉕	Resistor (10,000 Ohms)	4237
㉖	Resistor—Wire Wound –(140 Ohms and 30 Ohms)	06200
㉗	Compensating Condenser, Second I.F. Secondary	04000-A
㉘	Filter Condenser Bank (.1, .15, .25, 2-.5 Mfd)	05569
㉙	Resistor (51,000 Ohms)	4518
㉚	Condenser (250 Mmf.)	3082
㉛	Resistor (51,000 Ohms)	4518
㉜	Resistor (99,000 Ohms)	4411
㉝	Resistor (99,000 Ohms)	4411
㉞	Resistor (25,000 Ohms)	3656
㉟	Resistor (32,000 Ohms)	3525
㊱	Pilot Light	6608
㊲	Condenser (250 Mmf.)	3082
㊳	Condenser (.01 Mfd.)	3903-F
㊴	Resistor (240,000 Ohms)	4410
㊵	Resistor (490,000 Ohms)	4517
㊶	Resistor (99,000 Ohms)	4411
㊷	Condenser (.01 Mfd.)	3903-F
㊸	Condenser .01 Mmf. (assembled with ③)	3903AK
㊹	Condenser (1 Mfd.)	05518
㊺	Output Transformer	2660
㊻	Choke	4951
㊼	Voice Coil and Cone Assembly	02861
㊽	Speaker Field Assembly with Pot	02671
㊾	On-Off Switch Assembly with Volume Control	5839
㊿	Condenser (.015 Mfd. Twin)	3793-P
	Tube Shield	03169
	Knob	03064
	Knob Spring	5262
	Grid Clip	4897
	Four Prong Socket	5026
	Five Prong Socket	4956
	Six Prong Socket	6417
	Pilot Light Bracket Complete	05603
	Dial Complete	05811
	Bezel	6413

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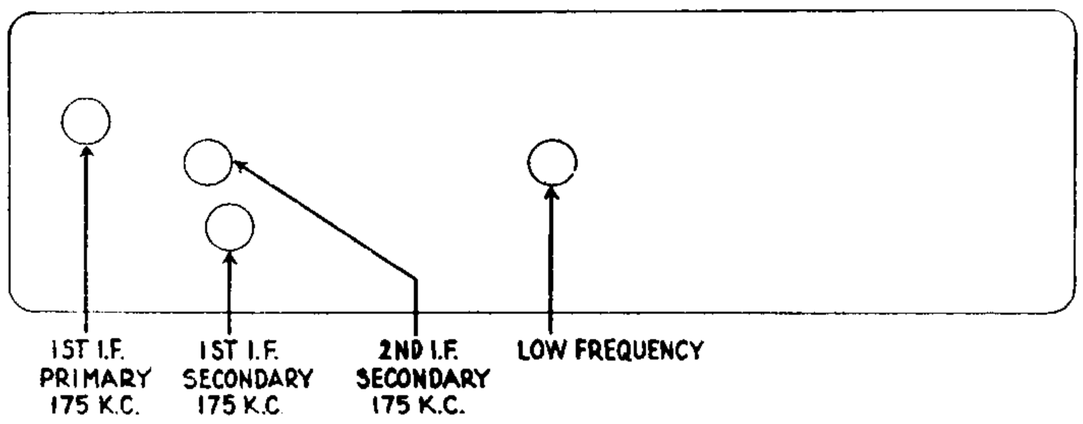
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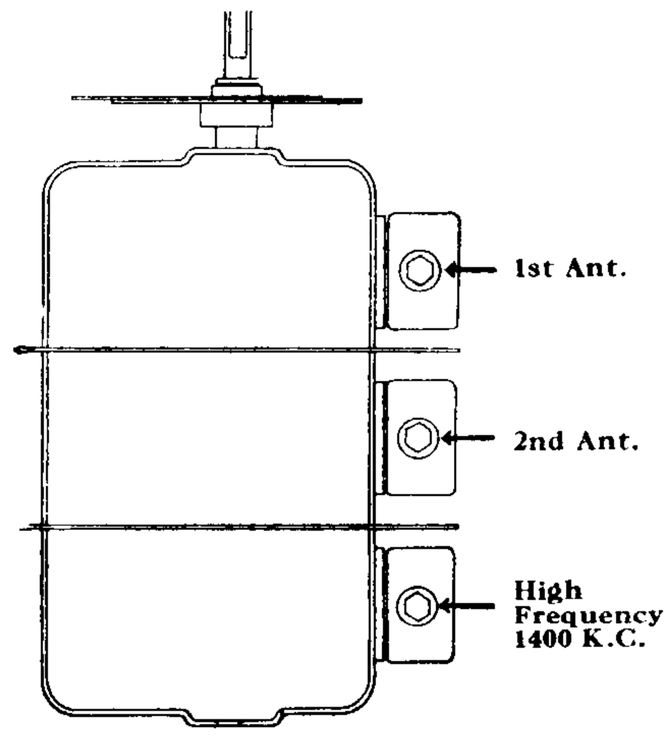
Service Bulletin — No. 147

Adjusting Models 48, 89 and 19

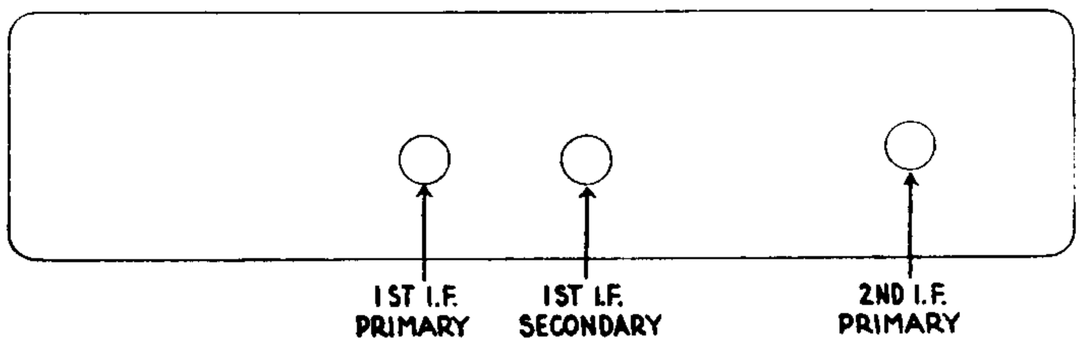


Back of Model 48 Chassis, showing location of Compensating Condensers

NOTE:— The 2nd I.F. Secondary Condenser is mounted on the front of the Chassis, but accessible through the opening in the back as shown

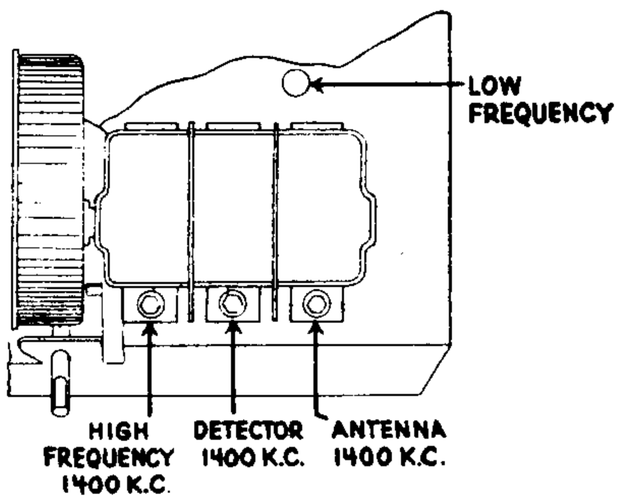


Tuning Condenser, Model 48 Chassis, showing location of additional Compensating Condensers



Back of Model 89 and 19 Chassis, showing location of Compensating Condensers

NOTE:—I.F. Frequency in 89 and 19 is 260 K.C.



Top View of Chassis showing Tuning Condensers, Models 89 and 19, also additional Compensating Condensers

The general method of adjusting the Philco Models 48, 89 and 19 is the same as that for other models as outlined in Service Bulletin No. 120-C. The adjustment of the I.F. Compensating Condensers is completed first. This adjustment is then followed by the adjustment of the high frequency and Antenna Condensers, and finally the low frequency condenser.

It is necessary to have an accurately calibrated oscillator signal at 175 K.C. and 260 K.C. for adjusting the I.F. Compensating Condensers on the above Models 48, 89 and 19. The Philco Oscillators Models 095 or 095B are accurately calibrated for these frequencies.

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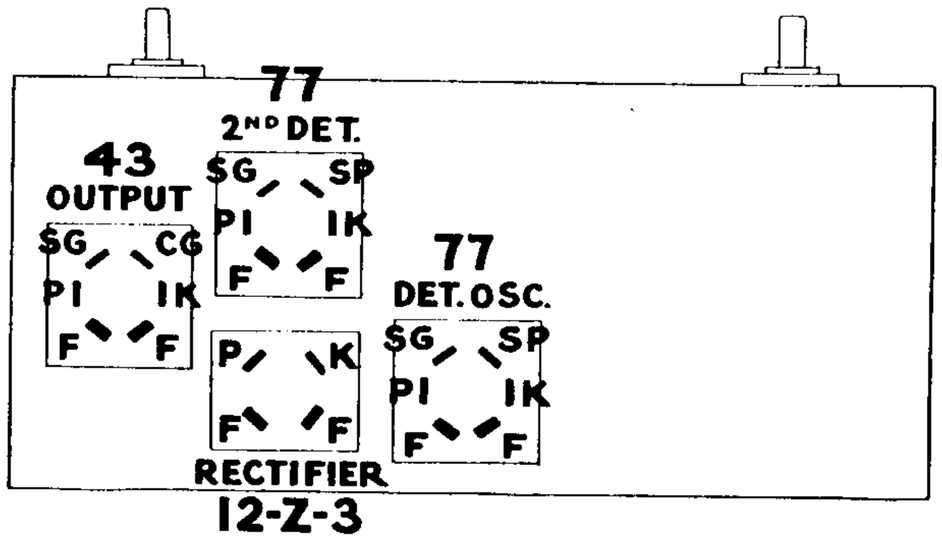
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Service Bulletin—No. 149

Model 53

The Philco Radio Model 53 is a four tube superheterodyne, employing the new Philco high efficiency tubes with pentode output and a permanent Field Dynamic Speaker. The set uses a Philco Type 77 tube as a first detector and oscillator, a Type 77 tube as second detector, a Type 43 tube as output, and a Type 12-*Z*-3 as a rectifier. The set will operate universally on either alternating or direct current, 105-125 Volts. The intermediate frequency for tuning the I.F. transformer is 450 kilocycles. The power consumption on both A. C. and D. C. is approximately 45 watts.



F Filament SG Screen Grid K Cathode
P Plate CG Control Grid SP Suppressor Grid

Tube Sockets, Under Side of Chassis

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Circuit	Det. Osc.	2nd Det.	Out-put	Recti-fier
Type Tube	77	77	43	12-Z-3
Filament—Total 49.9 Volts A.	C. Refer	to Note.		
Plate Volts—P to K.....	95	15	94	112
Screen Grid Volts—SG to K...	94	34	102	....
Control Grid Volts—CG to K..	7	4	4	....
Cathode Volts—K to F.....	18	12	10	112

NOTE:—Refer to Fig. 3. Due to filaments in series, test with suitable A. C. voltmeter across the two points indicated.

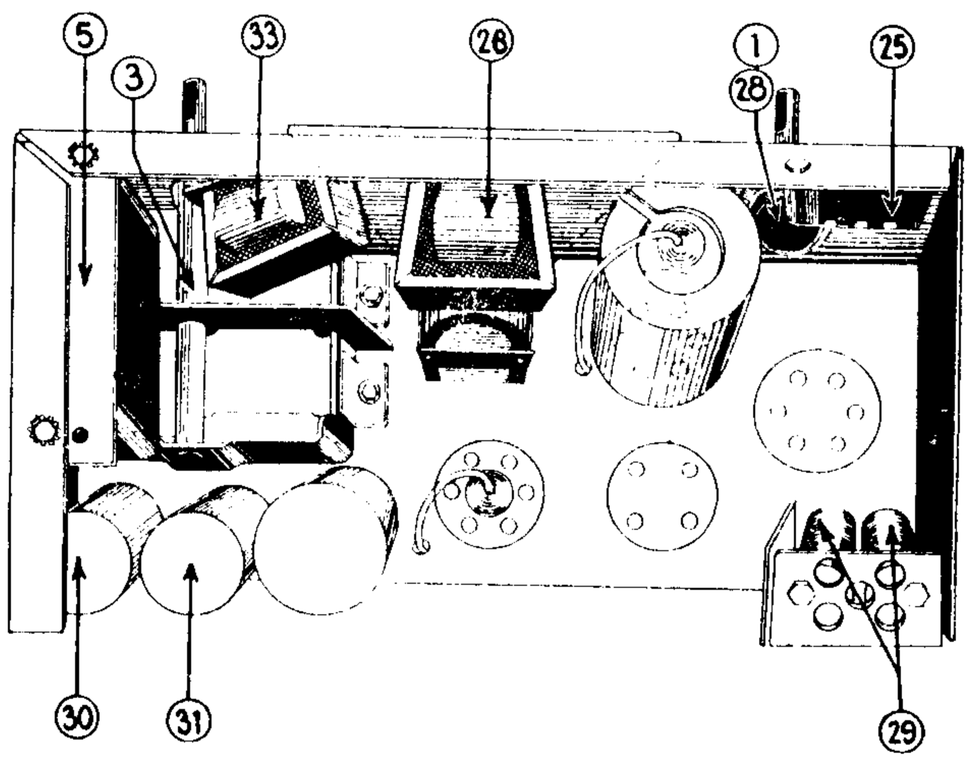
*All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltage and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Tube Socket Data*—D.C. Line Voltage 120 Volts

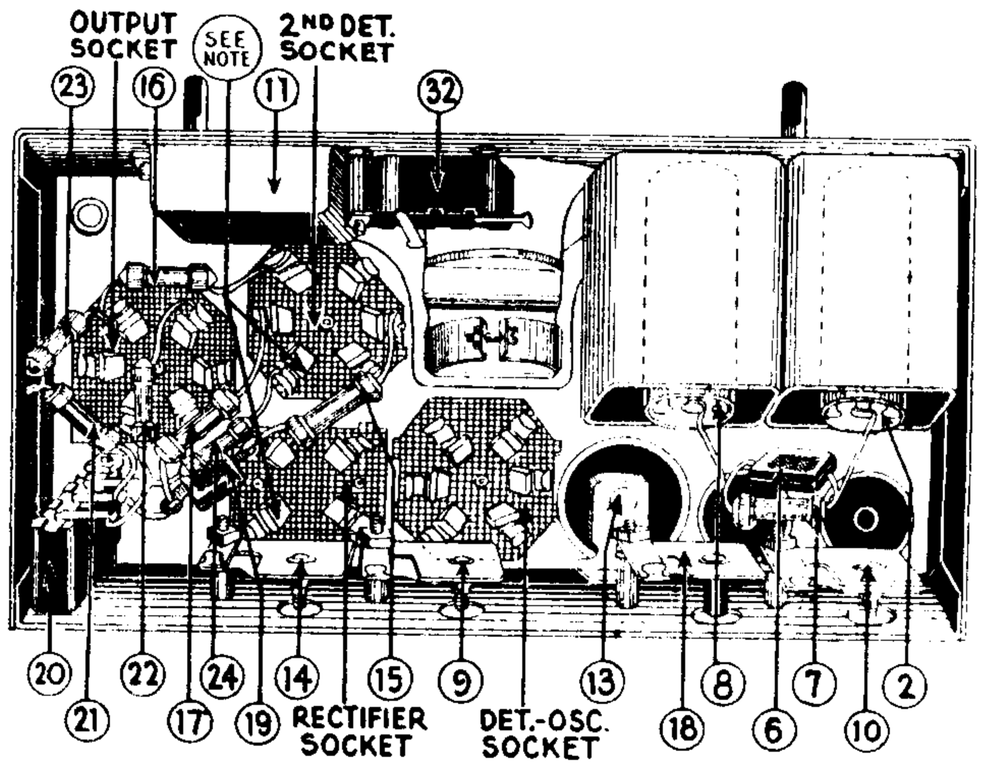
Circuit	Det. Osc.	2nd Det.	Out-put	Recti-fier
Type Tube	77	77	43	12-Z-3
Filament—Total 51 Volts D.C.	—Refer	to Note.		
Plate Volts—P to K.....	95	14	94	10
Screen Grid Volts—SG to K...	93	34	100	....
Control Grid Volts—CG to K..	8	3	4	....
Cathode Volts—K to F.....	7–14	6–12	3–26	58–73

NOTE:—Refer to Fig. 3. Due to filaments in series, test with suitable D.C. Voltmeter across the two points indicated.

*All of the readings above in Table 2 were taken from the under side of chassis, using test prods and leads with a suitable high resistance, multi-range D. C. voltmeter for all readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.



Top View of Chassis, Showing Parts



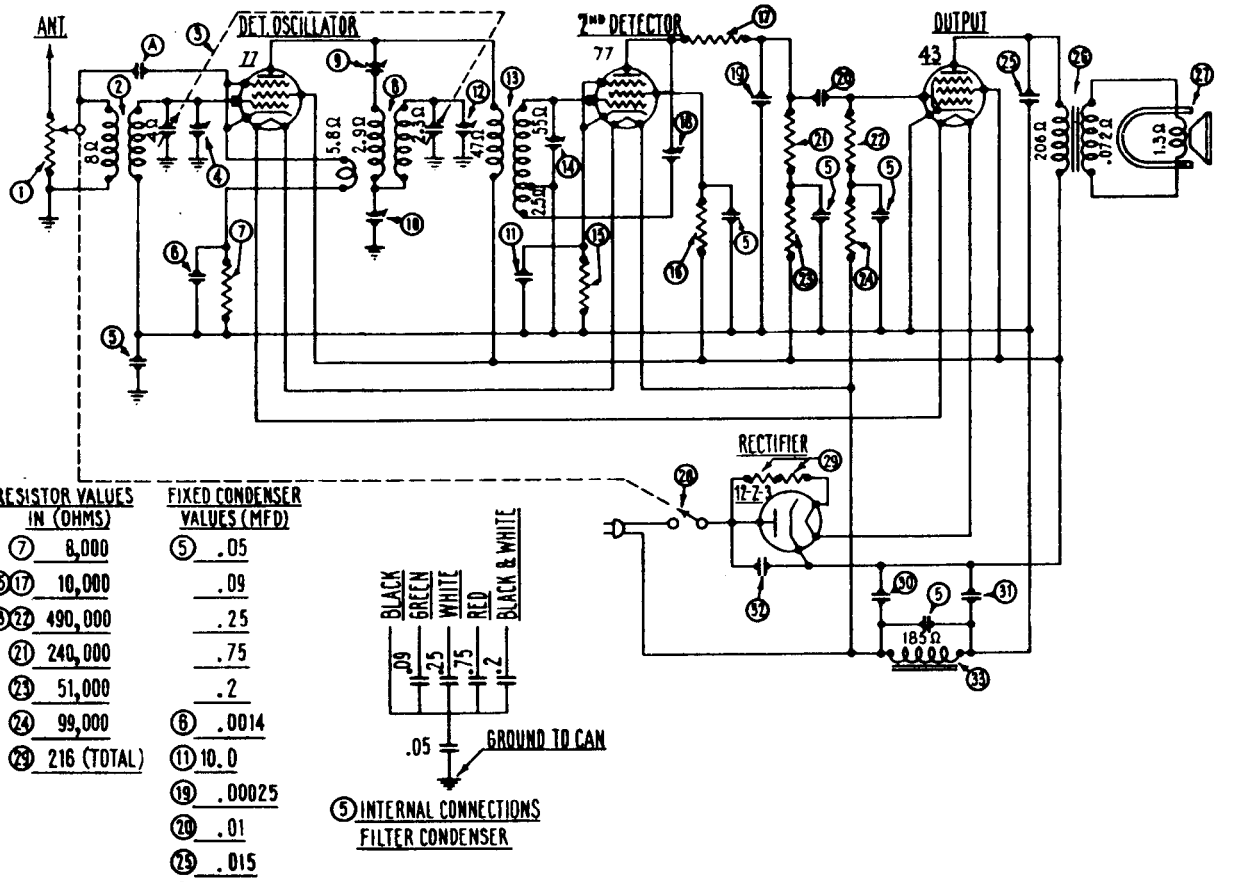
Bottom View of Chassis, Showing Parts

NOTE:—Place test prods across the two points indicated to test filament voltage.

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PHILCO
Service Bulletin

Model 53



–Schematic Wiring Diagram

NOTE Ⓐ—This capacity obtained by pair twisted wires

Replacement Parts for Model 53

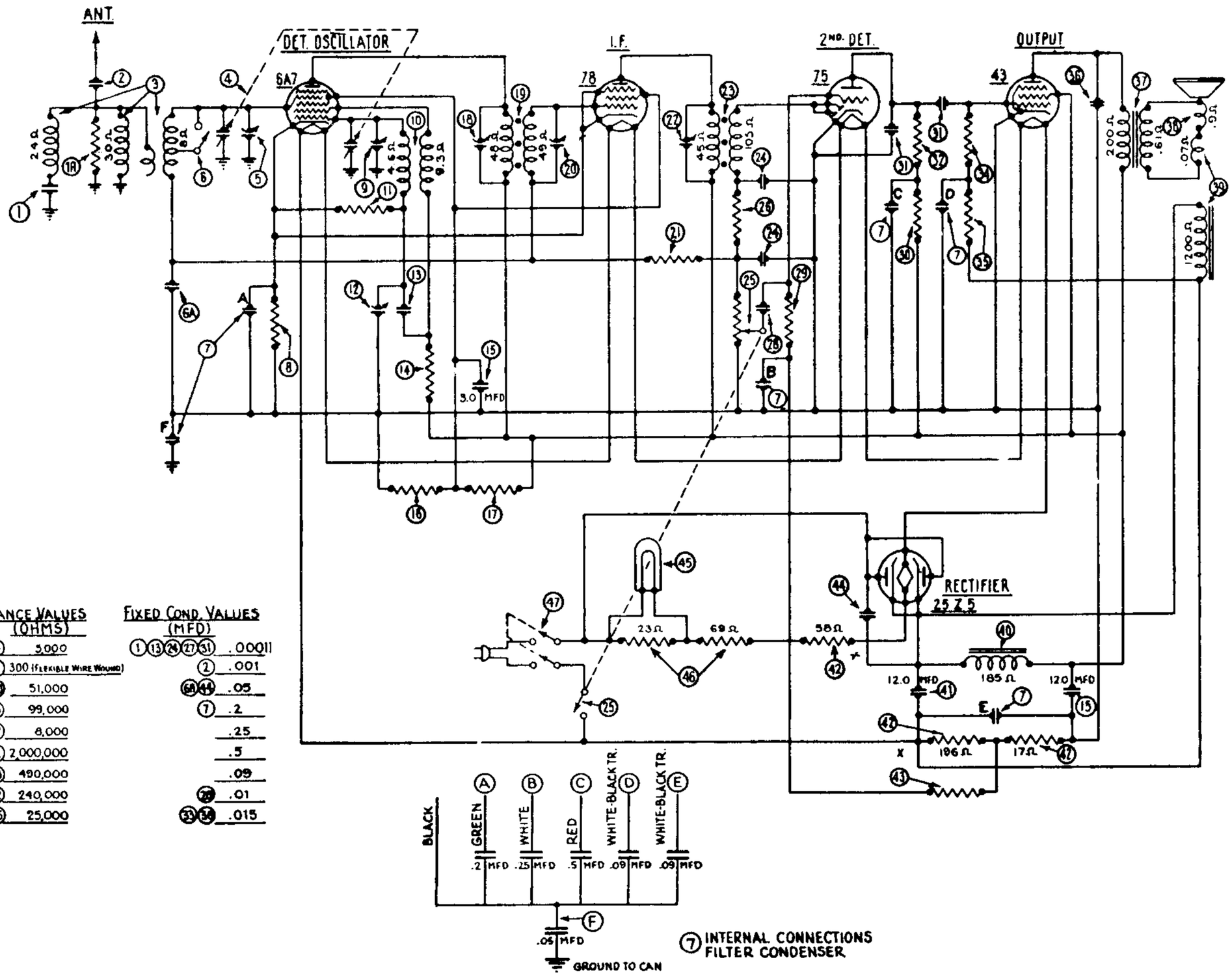
No. on Figs. 2, 3 and 4	Description	Part No.
①	Volume Control	33-5001
②	Antenna Transformer	32-1000
③	Tuning Condenser Assembly	31-1000
④	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑤	Filter Condenser Block (.05-.09-.25-.75-.2 Mfd.)	30-4000
⑥	Condenser (.0014 Mfd.)	7007
⑦	Resistor (8,000 ohms) Gray–Black–Red	5838
⑧	Oscillator Transformer	32-1001
⑨	Compensating Condenser (I.F. Primary)	04000-A
⑩	Compensating Cond. (Low Frequency)	04000-S
⑪	Condenser (10.0 Mfd.)	7440
⑫	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑬	I.F. Transformer	32-1002
⑭	Compensating Cond. (I.F. Secondary)	04000-A
⑮	Resistor (10,000 ohms) Brown–Black–Orange	4412
⑯	Resistor (490,000 ohms) Yellow–White–Yellow	4517
⑰	Resistor (10,000 ohms) Brown–Black–Orange	4412
⑱	Compensating Condenser (Regeneration)	04000
⑲	Condenser (.00025 Mfd.)	3082
⑳	Condenser (.01 Mfd.)	3903-AM
㉑	Resistor (240,000 ohms) Red–Yellow–Yellow	4410
㉒	Resistor (490,000 ohms) Yellow–White–Yellow	4517
㉓	Resistor (51,000 ohms) Green–Brown–Orange	4518
㉔	Resistor (99,000 ohms) White–White–Orange	4411
㉕	Condenser (.015 Mfd.)	3793-S
㉖	Output Transformer	32-7000
㉗	Voice Coil and Cone Assembly	36-3000
㉘	A. C. Switch (Part of Volume Control Assembly)	33-5001
㉙	Resistors (2 Wire Wound–108 ohms each)	33-3000 / 33-3001
㉚	Electrolytic Condenser (8 Mfd.)	30-2000
㉛	Electrolytic Condenser (8 Mfd.)	30-2000
㉜	Condenser (.05 Mfd.)	3615-E
㉝	Filter Choke	32-7000
	Tube Shield	7172
	Knobs (Both Controls)	03064
	Four Prong Socket	7544
	Six Prong Socket	7547
	Pointer for Station Selector	28-1019
	Dial	28-1021

USE PHILCO REPLACEMENT PARTS AND TUBES FOR EVERY MAKE RADIO
GET COMPLETE CATALOGUE FROM YOUR DISTRIBUTOR

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Model 54



Schematic Wiring Diagram

Resistance Values (Ohms)	
18 14	5,000
8	300 (Flexible Wire Wound)
11 26 30	51,000
16	99,000
17	8,000
21	2,000,000
29 34 43	490,000
32	240,000
35	25,000

Fixed Cond. Values (MFD)	
1 13 24 27 31	.00011
2	.001
6A 44	.05
7	.2
	.25
	.5
	.09
28	.01
33 36	.015

THE PHILCO RADIO MODEL 54 is a five-tube superheterodyne, designed for operation on 110 volts, alternating current, 25, 60 cycles, and 110 volts direct current, employing the new Philco high efficiency tubes with pentode output and an Electro Dynamic Speaker. The set uses a Philco Type 6A7 tube as a first detector and oscillator; a Type 78 tube as intermediate frequency; a Type 75 tube as a second detector; a Type 43 tube as pentode output and a Type 25-Z-5 tube as a rectifier and voltage doubler. The intermediate frequency for tuning the I. F. transformers is 460 kilocycles. The power consumption on both A. C. and D. C. is approximately 50 watts.

Table 1—Tube Socket Data*—A.C. Line Voltage 115 Volts

Circuit	Det. Osc.	I. F.	2nd Det.	Output	Rectifier
Type Tube	6A7	78	75	43	25-Z-5
Filament—Total 68—Refer to	Note.				
Plate Volts—P to K	84	84	38	84	146
Screen Grid Volts—SG to K	K to G 3/5 65	52	..	90	....
Control Grid Volts—CG to K	.15	.15	.25	.5	....
Cathode Volts—K to F	12	12	10	10	....

NOTE—Due to filaments in series, test with suitable A. C. voltmeter across the two points on Resistor (42) marked with an X in Fig. 3.

* All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltage and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Tube Socket Data*—D.C. Line Voltage 120 Volts

Circuit	Det. Osc.	I. F.	2nd Det.	Output	Rectifier
Type Tube	6A7	78	75	43	25-Z-5
Filament—Total 70—Refer to	Note.				
Plate Volts—P to K	90	90	40	90	....
Screen Grid Volts—SG to K	70	70	..	92	....
Control Grid Volts—CG to K	.15	.15	.25	.5	....
Cathode Volts—K to F	7.5	7.5	10	10	....

NOTE—Due to filaments in series, test with suitable D. C. voltmeter across the two points on Resistor (42) marked with an X in Fig. 3.

* All of the readings above in Table 2 were taken from the under side of chassis, using test prods and leads with a suitable high resistance, multi-range D. C. voltmeter for all readings. Volume control at maximum and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

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Changes in Models

It is unnecessary to alter receivers in your stock to comply with these changes.

In order to facilitate supplying correct replacement parts to dealers, it is our intention to supply you with production change information, such as that outlined below, at regular intervals. These minor changes are made in the factory in accordance with our policy of constant research and improvement in Philco products. To make it possible for you to furnish dealers with correct parts, it will be necessary for you to have the model number, code number, and run number. The main purpose of these change bulletins is to enable you to order and sell the correct parts. This information is intended for your service department only. Your orders for parts from Philco will be filled as specified on your order. It is suggested that you mark up your copies of Service Bulletins so as to agree with the latest production. The changes noted can be easily understood if a bulletin is marked up in this manner.

Speakers

H-9 and H-10, speaker cones changed from old part number 02807 to a new part number 02625.

Models 71 and 22L

Refer to Service Bulletins 128-128A

Below run No. 3 on 71-125B, run No. 2 on both 71-125 and 71-225; tone control ㊴ part number 05153 was changed to part number 04787. A part number 3903AH condenser was connected from plate of output tube type ㊷ to ground on chassis.

The tube shield used on detector amplifier tube was changed to new shield part number 8005.

Condenser ㊾ part number 3793-H was changed to part number 3793-R.

Models 91, 91A and 14

Refer to Service Bulletins 129-129A

On model 14LZX; the grille silk part number 8140 was changed to new grille silk part number 8139.

On models 19–121–122; a felt pad to eliminate the possibility of buzzing of the shadow tuning meter was placed on the back of the bezel.

On model 14–221; only 6497G shadow meters can be used.

On models 91–14; tone control ㊹ part number 04787 was changed to new tone control part number 06698.

Volume control ㊸ part number 7049 was changed to new volume control part number 8054.

The following parts have been added:

Part number 7625B, plate condenser; part number 6984, resistor 2,000 ohms; part number 4516, resistor 25,000 ohms; two part number 4411, resistor 99,000 ohms; part number 06713, by-pass condenser—this change effective on run No. 1 for models 91–125 and 91–225; run No. 2 for models 14–221.

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Model 80

Refer to Service Bulletin 140

The following changes made on sets above run No. 12.

All tube shields were changed to new shield part number 8005.

Coil shield (square type) part number 7406 was changed to (round type) part number 7830. The following additional changes were made at the same time. Antenna coil ② part number 05831 changed to new coil part number 06888, and the oscillator coil ⑧ part number 05832 changed to new coil part number 06887; resistor ⑥ (10,000 ohms) part number 4412 and condenser ⑤ (710 Mmfd.) part number 4520 becomes part of coil assembly—(part number 06887).

Resistor ⑳ part number 4412 should be as far away from the I. F. coils as possible. The black and white lead from ⑭ I. F. coil should be placed as near the chassis as possible over the oscillator coil.

Model 48 and 48E

Refer to Service Bulletins 143 and 143-S

Volume control ② part number 5839 was changed to new volume control part number 6415.

Model 43

Refer to Service Bulletins 138 and 138A

Grid inductance coil ⑲ part number 05190 changed to new type, bearing same part number, identified by black paint.

Resistors (700 ohms) ㊳ and ㊸ part number 6443 changed to new resistors (500 ohms) part number 6977.

Resistor (10,000 ohms) ㉘ part number 4412 changed to new resistor (25,000 ohms) part number 4516.

A half plate compensating condenser part number 04000-C added; this is mounted on top of ⑰ compensating condenser part number 04000-V. An extra collar part number 3098 and a longer screw part number W443 are used for mounting. The solid plate of this new compensating condenser is connected to the plate of the first detector tube and the movable plate to a new (500 ohm) resistor part number 6977; the other end of this resistor is connected to the cathode of the first detector tube.

The first detector tube changed from type 44 to type 36.

The I. F. compensating condensers are re-adjusted in the usual manner, but with the new one half plate compensating condenser (04000-C) open. After the set has been re-adjusted and placed in operation, oscillation in the broadcast band is corrected by increasing the capacity of the new one-half plate compensating condenser with the dial set slightly off the frequency of a strong signal at the low frequency end of the band until the oscillation disappears. The primary compensating condenser ㉑ of the first I. F. is then readjusted by decreasing capacity.

If oscillation still persists the above adjusting procedure is repeated until the sensitivity is strong and no oscillation is present.

Be sure to order your requirements of the above parts at once.

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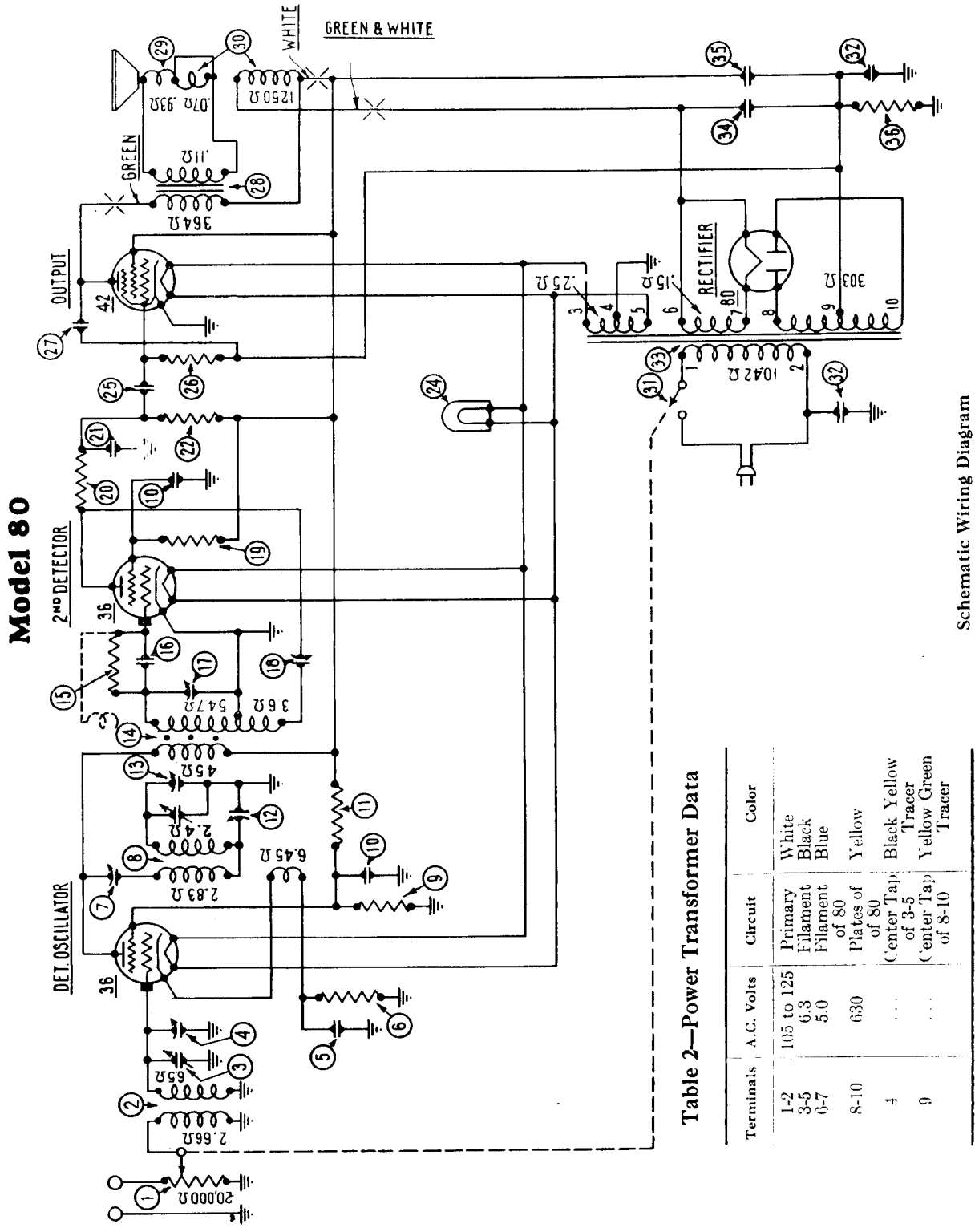


Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament of 80	Blue
8-10	630	Plates of of 80	Yellow
4	...	Center Tap of 3-5	Black Yellow Tracer
9	...	Center Tap of 8-10	Yellow Green Tracer

Table 1—Tube Socket Data*—Power Line Voltage 115 Volts

Tube		Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
Type	Circuit					
36	Det.—Osc.	6.3	245	165	6.4	8.4
36	2nd Det.	6.3	40	15	.4	0
42	Output	6.3	240	255	4	0
80	Rectifier	5.0	340/Plate	...	...	..

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Model 81

The Philco Radio Model 81 is a four tube superheterodyne receiver combining Standard broadcast and police reception and employs the new Philco high efficiency tubes with pentode output and electro dynamic speaker. The same superheterodyne circuit is used for Standard broadcast and police reception. The intermediate frequency for tuning the I. F. transformer is 460 kilocycles. The power consumption of the Model 81 is 46 watts.

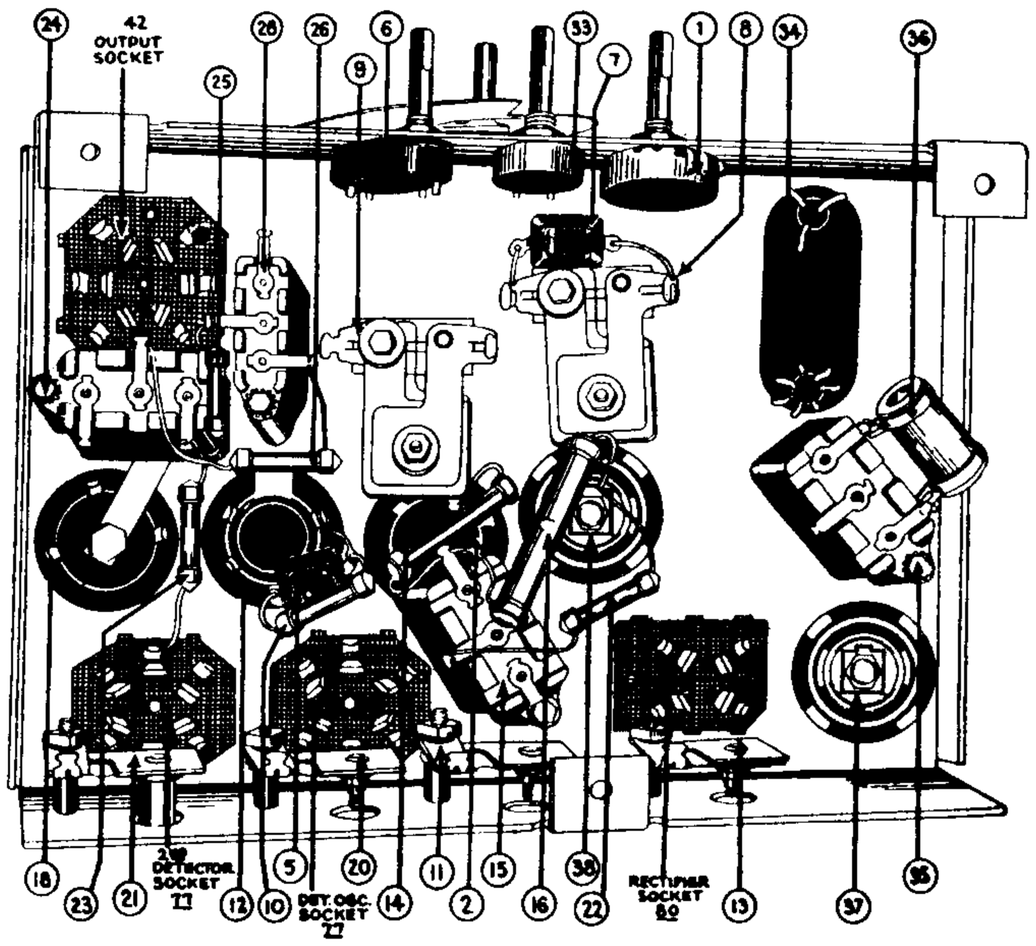
Table 1—Tube Socket Data*
Power Line Voltage 115 Volts

Circuit	Det. Osc.	2nd Det.	Output	Rectifier
Type Tube	77	77	42	80
Filament Volts–F to K	6.3	6.3	6.3	5.0
Plate Volts–P to K	240	75	240	425
Screen Grid Volts–SG to K	85	40	250	..
Control Grid Volts–CG to K	5.6	.6	2.3	..
Cathode Volts–K to F	24.5	16	16.2	..

Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1–2	105–125	Primary	White
3–5	6.3	Filament	Black
6–7	5.0	Filament of 80	Blue
8–10	630	Plates of 80	Yellow
4	..	Center Tap of 3-5	Black-Yellow Tracer
9	..	Center Tap of 8-10	Yellow-Green Tracer

*All of the above readings were taken from the underside of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance multirange D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug in adapter will not be satisfactory.



Parts Diagram



77 Sockets



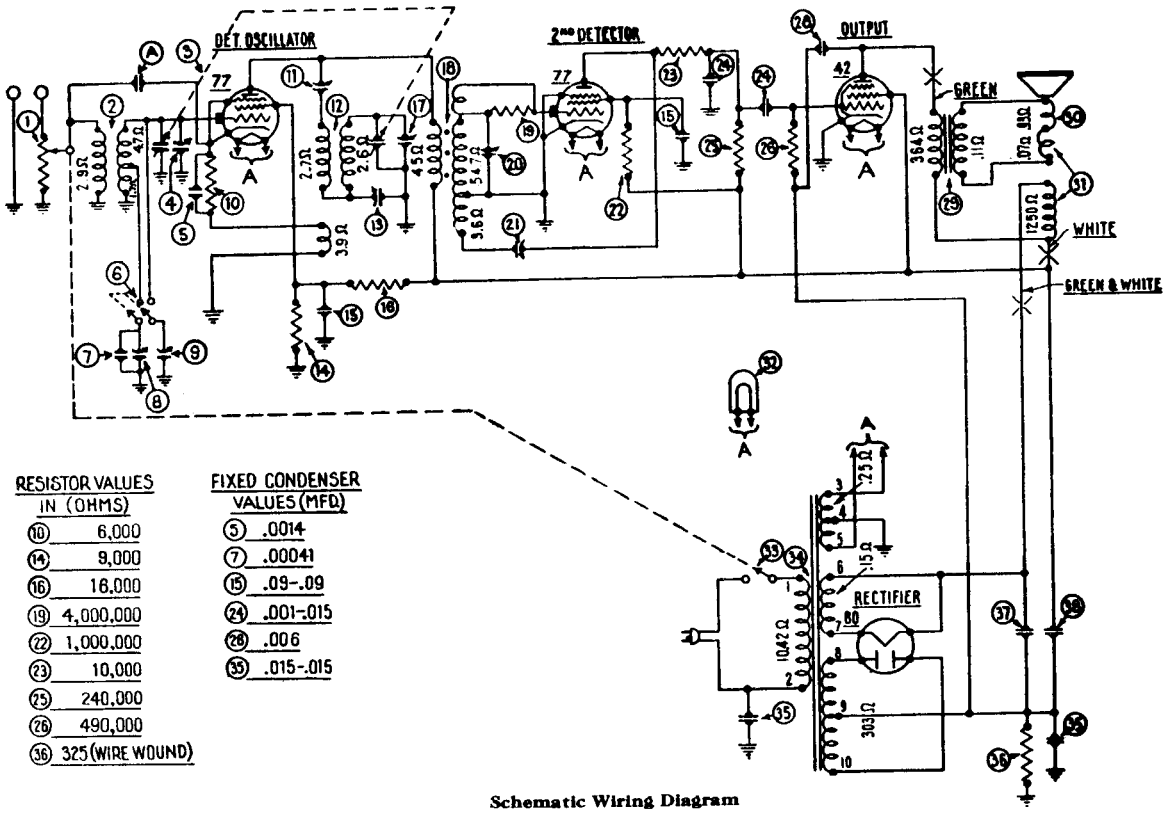
42 Socket



80 Socket

Terminal Arrangement of Tube Sockets Viewed from Under Side of Chassis.

PHILCO RADIO & TELEVISION CORP.



RESISTOR VALUES IN (OHMS)	
⑩	6,000
⑭	9,000
⑯	16,000
⑲	4,000,000
㉒	1,000,000
㉓	10,000
㉕	240,000
㉖	490,000
㊱	325 (WIRE WOUND)

FIXED CONDENSER VALUES (MFD)	
⑤	.0014
⑦	.00041
⑮	.09-.09
㉔	.001-.015
㉘	.006
㉟	.015-.015

Schematic Wiring Diagram

Note Ⓐ—This capacity obtained by pair twisted wires.

REPLACEMENT PARTS MODEL 81

No. on Figs.	Description	Part No.	List Price
①	Volume Control*	33-5002	.75
②	Antenna Transformer	32-1030	.50
③	Tuning Cond. Assembly	31-1006	
④	Compensating Condenser (Part of ③)		
⑤	Cond. (Red and Black)	7007	.25
⑥	Frequency Switch	42-1000	
⑦	Cond. (Orange and Yellow)	30-1000	.20
⑧	Compensating Condenser	04000-S	.25
⑨	Compensating Condenser	04000-X	.16
⑩	Resistor (Blue-Black-Red)	7352	.25
⑪	Compensating Condenser (I.F. Primary)	04000-A	.12
⑫	Oscillator Coil	32-1031	.75
⑬	Compensating Condenser (Low Frequency)	04000-S	.25
⑭	Resistor (White-Black-Red)	7501	.25
⑮	Condenser	4989-B	.22
⑯	Resistor (Brown-Blue-Orange)	7500	.40
⑰	Compensating Condenser (Part of ③)		
⑱	I.F. Transformer	06100	1.25
⑲	Resistor (Mounted on I.F. Transformer)	6010	.25
⑳	Compensating Condenser (I.F. Secondary)	04000-D	.10
㉑	Compensating Condenser	04000	.16
㉒	Resistor (Brown-Black-Green)	4409	.25
㉓	Resistor (Brown-Black-Orange)	4412	.25
㉔	Condenser (Double)	7762-B	.20
㉕	Resistor (Red-Yellow-Yellow)	4410	.25
㉖	Resistor (Yellow-White-Yellow)	4517	.25
㉘	Condenser	7625-B	.12
㉙	Output Transformer	2660	1.25
㉚	Voice Coil and Cone Assembly	02861	.60
㉛	Speaker Field and Bucking Coil (with Pot)	02667	2.00
㉜	Pilot Light	6608	.14
㉝	"On-Off" Switch*	6416-W	.40
㉞	Power Transformer—50-60 Cycles	7421	2.75
	Power Transformer—25-40 Cycles	7422	4.00
	Power Transformer—50-60 Cycles, 250 Volts	7423	2.75
㊱	Condenser (Double)	3793-R	.25
㊱	Resistor (Wire Wound)	7465	.12
㊲	Electrolytic Condenser (8 Mfd.)	7558	1.25
㊳	Electrolytic Condenser (4 Mfd.)	7467	1.25
	Bezel	7417	
	Tube Shield	7172	.12
	Knob (Large)	03063	.08
	Knob (Small)	03064	.06
	Knob Spring	5262	.35 per C
	Grid Clip	4897	.30 per C
	Four Prong Socket Assembly	5026	.08
	Six Prong Socket Assembly	6417	.10
	Chassis Mounting Screw	W-567	2.40 per C
	Chassis Mounting Washer	W-315	.40 per C
	Pilot Lamp Shield	5760	

*On later production (run No. 3 and above, rubber stamped in a star on back of chassis) volume control ① and on-off switch ㉝ was combined. This new volume control and on-off switch is Part Number 7439.

PHILCO RADIO & TELEVISION CORPORATION
Service Department

PHILCO RADIO & TELEVISION CORP.

Models 89 and 19

The Philco Radio of the 89 and 19 Series is a 6 tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The intermediate frequency used in adjusting the superheterodyne circuit is 260 kilocycles. The power consumption of the models 89 and 19 is 60 watts.

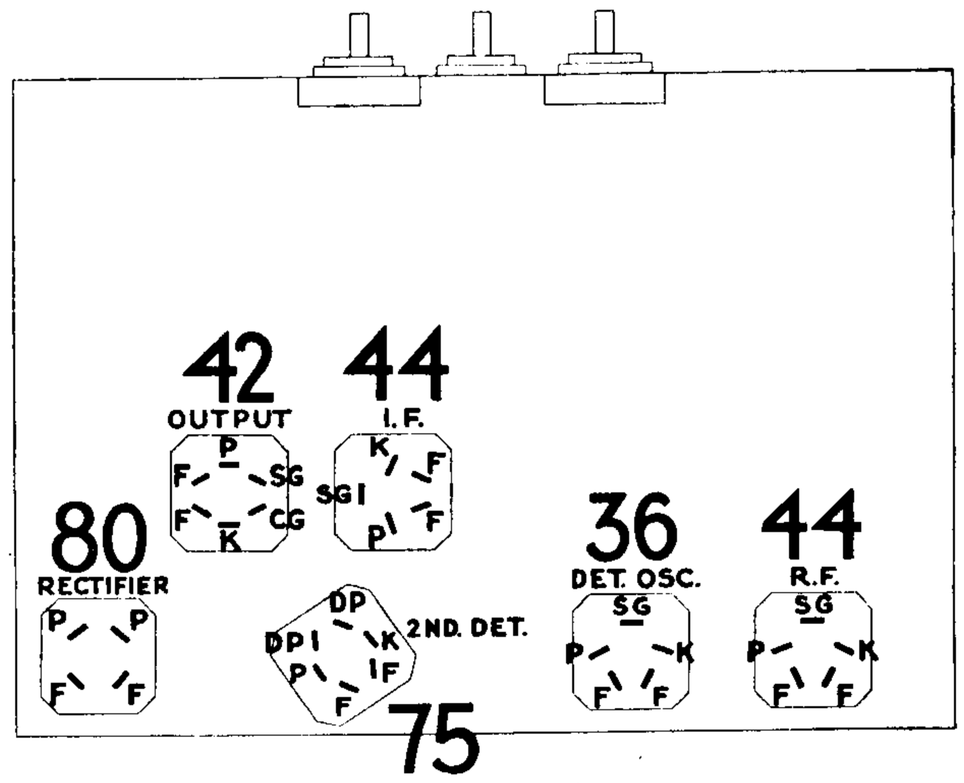
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Circuit	RF	Det. Osc.	IF	2nd Det.	Output	Rectifier
Type Tube	**44**	**36**	**44**	**75**	**42**	**80**
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts—P to K	235	230	240	175	235	350/Plate
Screen Grid Volts—SG to K	90	90	90	.....	245	.....
Control Grid Volts—CG to K	.3	7.5	.3	.3	.15	.....
Cathode Volts—K to F	3.5	7.8	3.5	.....	14	.....
Diode Plate Volts—K to DP	.....	.....	.....	.2	.....	.....

*All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1–2	105–125	Primary	White
3–4	6.3	Filaments	Black
6–7	5.0	Filament of 80	Blue
9–10	670	Plates of 80	Yellow
5	....	Center Tap of 3–4	Black-Yellow Tracer
8	....	Center Tap of 9–10	Yellow-Green Tracer

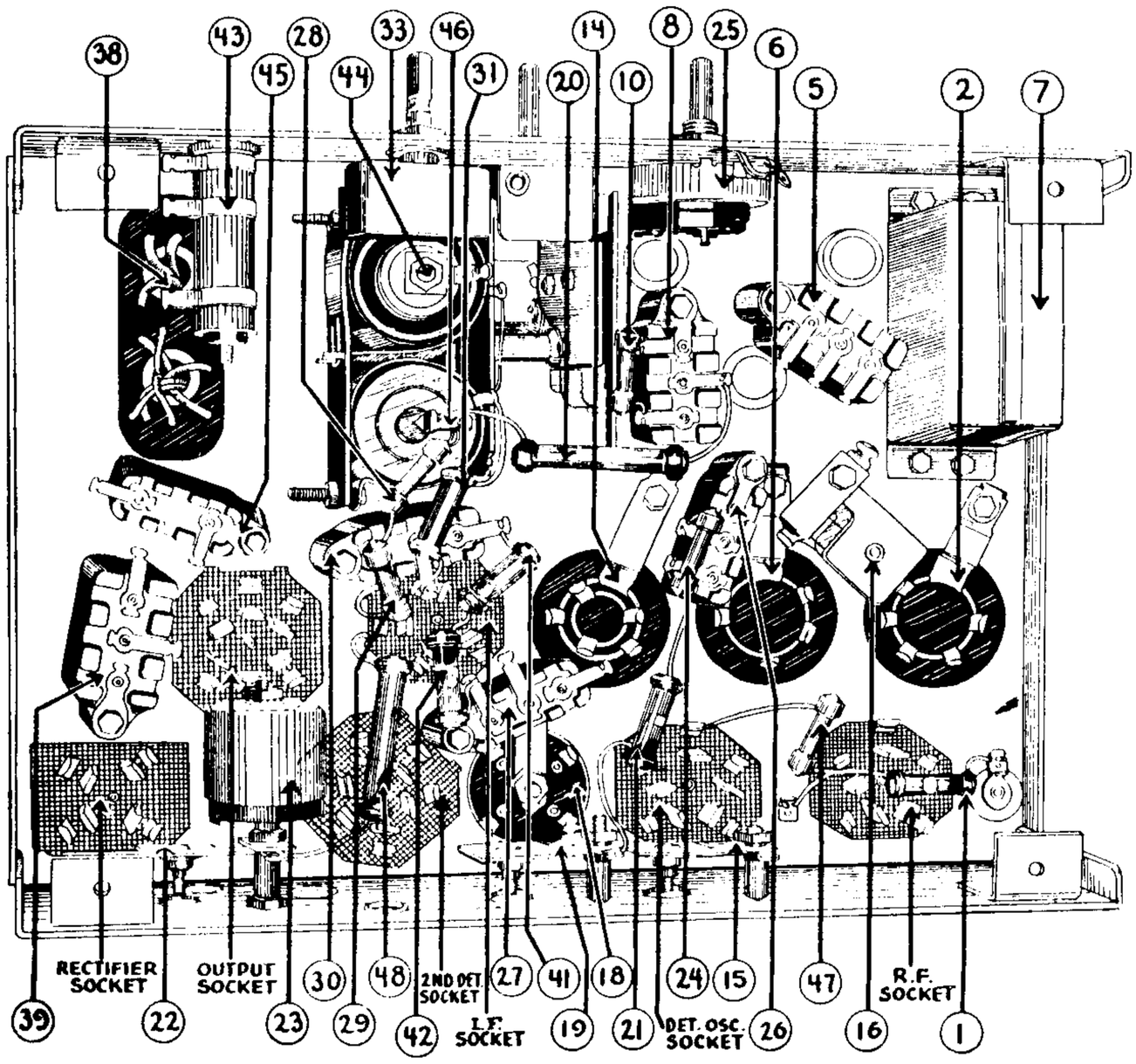


F Filament SG Screen Grid K Cathode

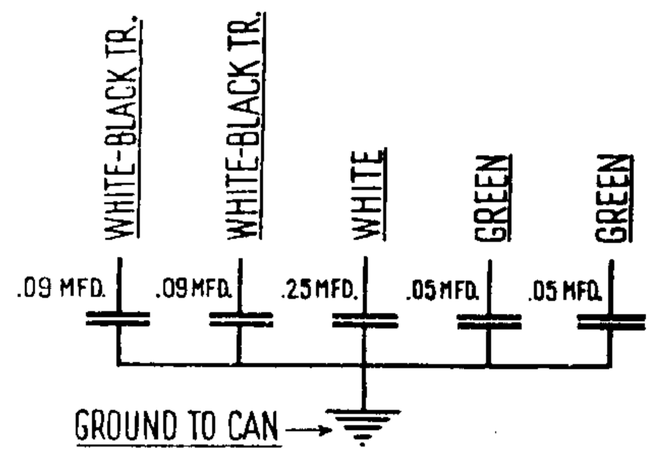
P Plate CG Control Grid DP Diode Plate

Tube Socket, Under Side of Chassis

Caution: Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.



Bottom View of Chassis, Showing Parts



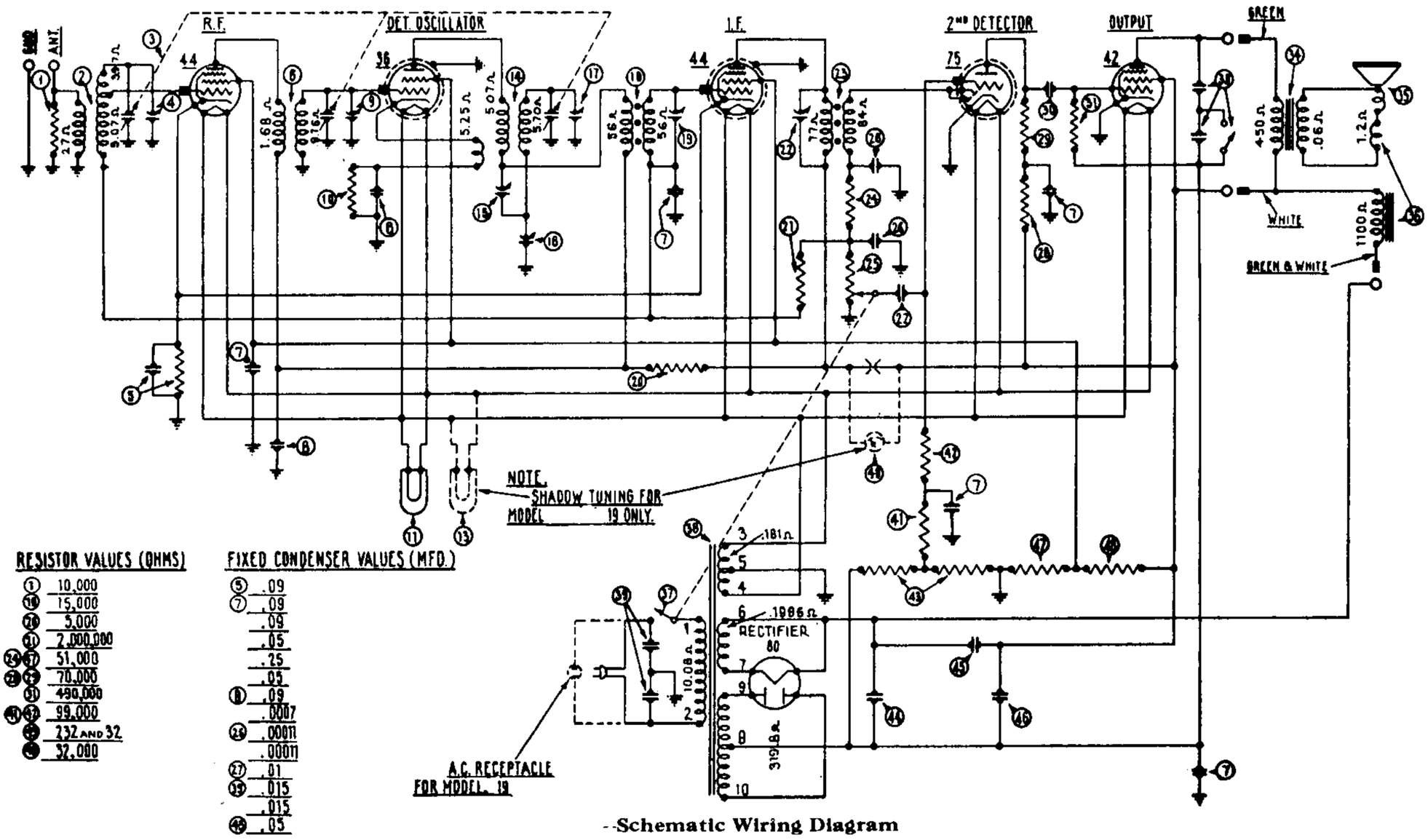
Internal Connections Filter Condenser.

PHILCO RADIO & TELEVISION CORP.

Adjustment of Models 89 and 19

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to readjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your Distributor. The Philco Oscillator equipment has been designed for use in this work and will be found the most inexpensive and most reliable for the purpose.

Models 89 and 19



RESISTOR VALUES (OHMS)

①	10,000
⑩	15,000
㉔	5,000
㉛	2,000,000
㉔ ㉗	51,000
㉙ ㊷	70,000
㉛	490,000
㊶ ㊼	99,000
㊸	232 AND 32
㊽	32,000

FIXED CONDENSER VALUES (MFD.)

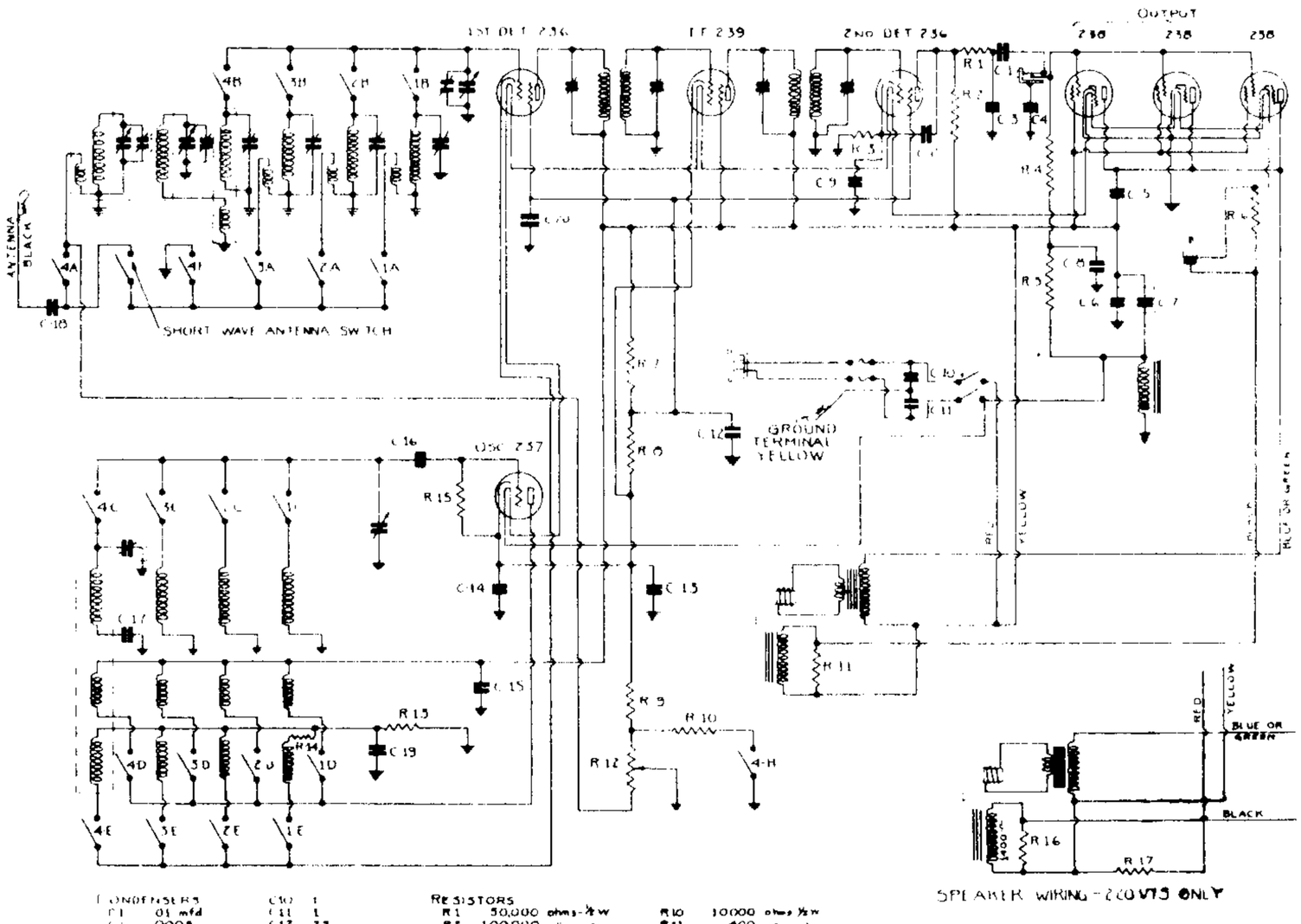
⑤	.09
⑦	.09
	.09
	.05
	.25
	.05
⑧	.09
	.0007
㉖	.00011
	.00011
㉗	.01
㊴	.015
	.015
㊻	.05

--Schematic Wiring Diagram

Replacement Parts for Models 89 and 19

①	Resistor (10,000 Ohms) Brown—Black—Orange	4412
②	Antenna Transformer	06619
③	Tuning Condenser Assembly	06577
④	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑤	Condenser and Resistor—(.09 Mfd. and 200Ω)	4989-W
⑥	Interstage Transformer	06662
⑦	Filter Cond. Bank (.09—.09—.05—.05—.25)	06624
⑧	Condenser (Double—.09 and .0007 Mfd.)	8174-B
⑨	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑩	Resistor (15,000 Ohms) Brown—Green—Orange	6208
⑪	Pilot Lamp	6608
⑫	Dial Scale	7882
⑬	Pilot Lamp—(Shadow Tuning)	6608
⑭	Oscillator Transformer	06620
⑮	Compensating Condenser — (1st I.F. Primary)	04000-M
⑯	Compensating Condenser — (Low Frequency	04000-S
⑰	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑱	First I.F. Transformer	06621
⑲	Compensating Condenser (1st I.F. Secondary)	04000-M
⑳	Resistor (5,000 Ohms) Green—Black—Red	3526
㉑	Resistor (2,000,000 Ohms) Red—Black—Green	5872
㉒	Compensating Cond. (2nd I.F. Primary)	04000-A
㉓	Second I.F. Transformer	06622
㉔	Resistor (51,000 Ohms) Green—Brown—Orange	6098
㉕	Volume Control and A.C. Switch	8003
㉖	Condenser (Double—.00011 & .00011 Mfd.)	8035-C
㉗	Condenser (.01 Mfd.)	3903-AB
㉘	Resistor (70,000 Ohms) Violet—Black—Orange	5385
㉙	Resistor (70,000 Ohms) Violet—Black—Orange	5385
㉚	Condenser (.01 Mfd.)	3903-T
㉛	Resistor (490,000 Ohms). Yellow—White—Yellow	4517
㉜	Bezel	8055
㉝	Tone Control	06764
㉞	Output Transformer	2580
㉟	Voice Coil and Cone Assembly	02823
㊱	Speaker Field and Bucking Coil Assembled with Pot (K-7)	02761
㊲	Switch (A.C.) Part of Vol. Control Assembly	
㊳	Power Transformer (50-60 Cycles, 115 Volts)	8046
	Power Transformer (25-40 Cycles—115 Volts)	8047
	Power Transformer (50-60 Cycles—230 Volts)	8048
㊴	Condenser (Double—.015 and .015 Mfd.)	3793-E
㊵	Shadow Tuning	6497-G
㊶	Resistor (99,000 Ohms) White—White—Orange	4411
㊷	Resistor (1,000,000 Ohms) Brown—Black—Green	4409
㊸	B.C. Resistor (235 Ohms and 32 Ohms—Wire Wound)	7998
㊹	Electrolytic Condenser—6 Mfd.	8165
㊺	Condenser (.05 Mfd.)	3615-E
㊻	Electrolytic Condenser—6 Mfd.	8166
㊼	Resistor (51,000 Ohms) Green—Brown—Orange	4518
㊽	Resistor (32,000 Ohms) Orange—Red—Orange	3525
	Tube Shield	8005
	Knob (Large)	03063
	Knob (Small)	03064
	Knob Spring	5262
	Grid Clip	4897
	Four Prong Socket	7544
	Five Prong Socket	7546
	Six Prong Socket	7547
	Pilot Lamp Shield	5760

PILOT RADIO & TUBE CORP.



CONDENSERS

C1	.01 mfd	C10	1
C2	.0005	C11	1
C3	.0005	C12	.25
C4	1	C13	.25
C5	.005	C14	1
C6	.25	C15	1
C7	.5	C16	.0001
C8	.25	C17	.001400
C9	.25	C18	.001500
		C19	1
		C20	1

RESISTORS

R1	50,000	ohms-½w	R10	10000	ohms ½w
R2	100,000	" -	R11	400	" -
R3	18,000	" -	R12	10,000	" VC
R4	500,000	" -	R13	10,000	" ½w
R5	500,000	" -	R14	300	" -
R6	30	" -	R15	400,000	" -
R7	6,000	" ½w	R16	300	" -
R8	10,000	" -	R17	200	" -
R9	150	" -			

SCHEMATIC DIAGRAM
DRAGON MODEL 11 SUPER HET

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

		Line Voltage -- 220 D. C. -- .34 Amperes								Line Voltage -- 110 D. C.						
Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	-	15.0	3.8
236	1st Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	1st Det.A	6.2	93	-3.8	52	1.2	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	1.2	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	1.33	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	62	-37	60	.0	+33	*
236	2nd A Det.B	6.7	94.	-5.	75.	.05	1.7	.3	2nd A Det.B	6.2	26	-9.8	65	1.0	-4.5	0.18
		6.8	100.	-6.	92.	.15	2.8	.26		6.3	26	-10.7	51	1.3	-4.8	0.2
238	Out-A put B	7.2	118.	-	140.	1.5	-9.4	7.5	Out-A put B	6.2	85	-	100	2.0	-15.1	5.0
		7.3	115.	-	143.	2.8	-11.8	10.0		6.3	85	-	103	1.55	-15.7	6.5

A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

RE-ALIGNMENT

The sensitivity and selectivity of the Pilot DRAGON largely depend upon the proper adjustment of the various trimmer condensers. Before sets leave the factory, these trimmers are carefully tuned and every precaution is taken to insure the permanence of the adjustments.

The best method of adjusting the I.F. trimmers is by means of a signal generator (or modulated oscillator) tuned to 115 KC. The output of the oscillator is connected across the grid circuit of the first detector and the two I.F. transformers are lined up to resonance with the 115 KC. signal. Many service stations, however, may not be equipped with a 115 KC. oscillator, in which case the I.F. transformers can be adjusted at the same time as the broadcast band trimmers, using an oscillator tuned to broadcast frequencies. This method can be used successfully when the I.F. transformers are slightly out of adjustment. However, if the factory adjustments have been changed with a screw driver and the I.F. amplifier thrown completely out of line, a 115 KC. generator must be used to re-adjust the trimmers.

D. C. Dragon Receiver

For Table and Console Sets Bearing the Following Chassis Model Numbers

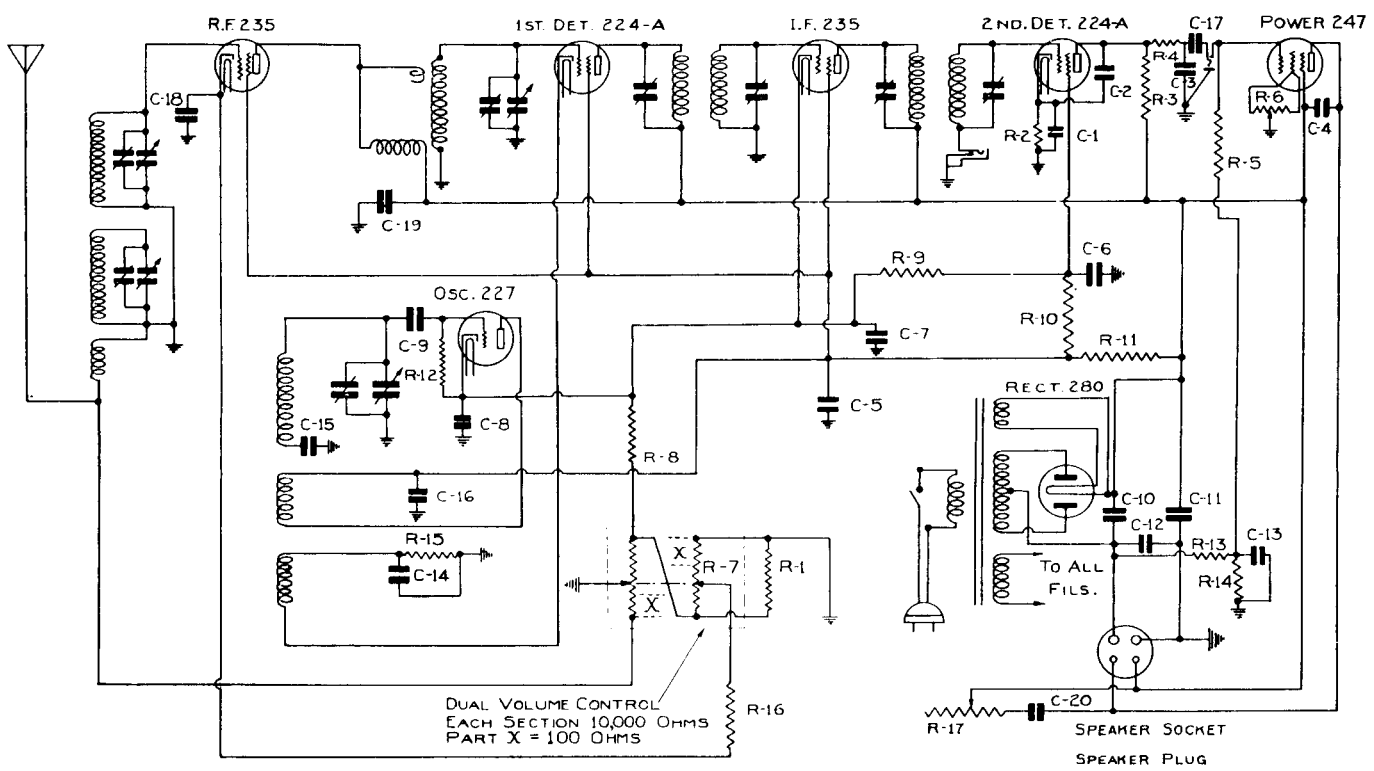
Chassis No. 11-R	**110-125 volts D.C.**
Chassis No. 11-A	**220 volts D.C.**

PILOT RADIO & TUBE CORP.

SCHEMATIC DIAGRAM MODEL 35
PILOT HIGH BAND SUPER HET

VOLTAGE TABLE FOR CHASSIS MODEL NO. 35 (A-B-F & FJ).

Type Tube	Tube Position	Fil. A.C.	Plate + to Cath.	Cath. + to Screen Control Grid —	Grid + to Screen Cath. —	Screen Current	Cath. Plate Va.	Plate Current
227	Osc. (a)	2.3	73	3.4*			3.2	5.8
	(b)	2.3	68	2.4*			36	5.4
224-A	1st Det. (a)	2.3	225	8.4	58	.1	9.6	1.25
	(b)	2.3	234	8.7	86	.18	9.8	1.85
235	R.F. (a)	2.3	237	1.7	77	.76	1.5	5.3
	(b)	2.3	214	34	75	.5	34.	.6
235	I.F. (a)	2.3	234	3.3	75	.53	3.5	4.0
	(b)	2.3	216	36.	73	.11	36.	.5
224-A	2nd Det. (a)	2.3	200+	4.1	30	.05	5.0	.12
	(b)	2.3	200+	4.9	50	.04	4.5	.1
247	Power (a)	2.3	214	7.5‡	240	8.2		28
	(b)	2.3	218	7.5‡	255	8.8		33
280	Rect. (a)	4.9	590	* Too small				32.0 per anode
	(b)	4.9	590	to read.				29 per anode



CONDENSERS

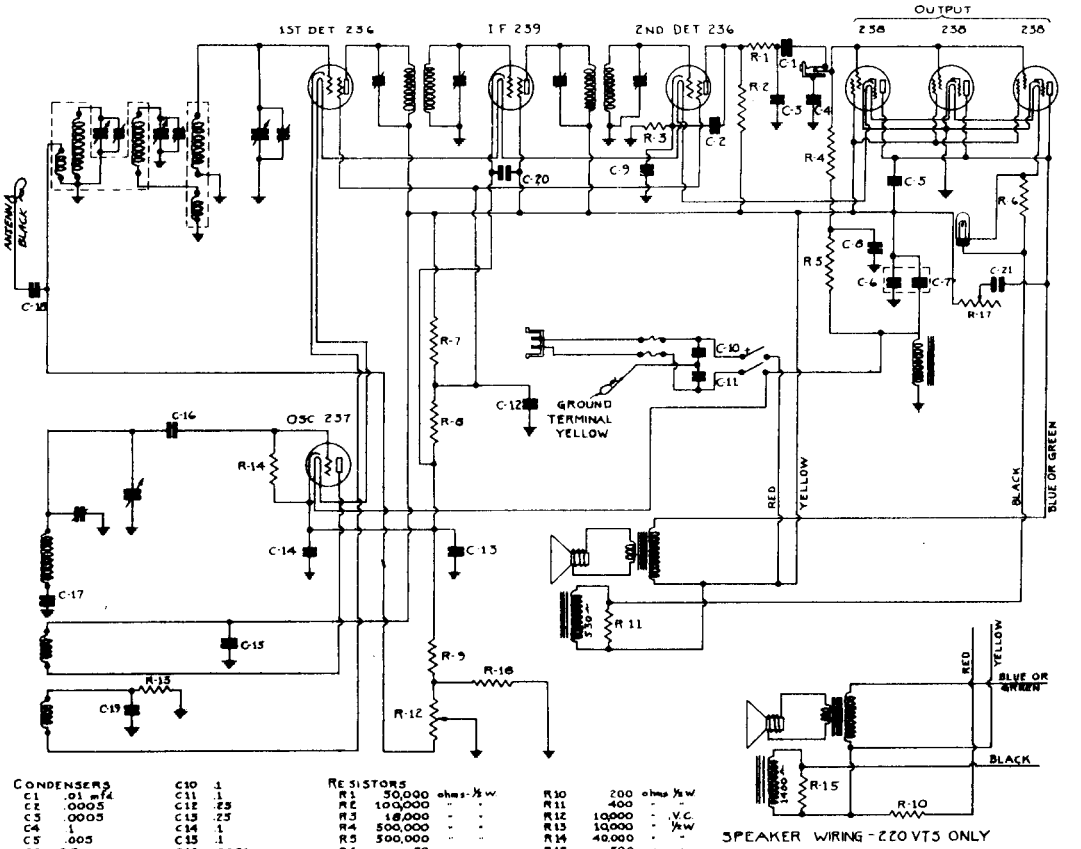
C1 — .25 mfd.
C2 — .0005
C3 — .0005
C4 — .01
C5 — .25
C6 — .25
C7 — .25
C8 — .1
C9 — .0001
C10 — 8
C11 — 8
C12 — .035
C13 — .25
C14 — .1
C15 — .001480
C16 — .1
C17 — .01
C18 — .1
C19 — .25
C20 — .05

RESISTORS

R1 — 10,000 ohms-½ w
R2 — 40,000 " "
R3 — 250,000 " "
R4 — 50,000 " "
R5 — 500,000 " "
R6 — Center Tap Resistor
R7 — 10,000 ohms-VC
R8 — 250 " ½w
R9 — 10,000 ohms ½W
R10 — 10,000 " "
R11 — 14,000 " 3W
R12 — 40,000 " ½W
R13 — 500,000 " "
R14 — 120,000 " "
R15 — 10,000 " "
R16 — 300 " "
R17 — 0-50,000 " TC

PILOT MODEL 39 SUPER HET

PILOT RADIO & TUBE CORP.



SCHEMATIC DIAGRAM
PILOT MODEL 41 SUPER HET

Chassis No. 41-R 110-125 volts D.C.

Chassis No. 41-A 220 volts D.C.

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

		Line Voltage -- 220 D. C. -- .34 Amperes								Line Voltage -- 110 D. C.						
Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	-	55.0	3.8
236	1st Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	1st Det.A	6.2	93	-3.8	52	1.2	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	1.2	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	1.33	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	82	-37	60	.0	+33	*
236	2nd A Det.B	6.7	94.	-5.	75.	.05	1.7	.3	2nd A	6.2	26	-9.8	65	1.0	-4.5	0.18
		6.8	100.	-6.	92.	.15	2.8	.26	Det.B	6.3	26	-10.7	51	1.3	-4.8	0.2
238	Out-A	7.2	118.	-	140.	1.5	-9.4	7.5	Out-A	6.2	85	-	100	2.0	-15.1	5.0
	put B	7.3	115.	-	143.	2.8	-11.8	10.0	put B	6.3	85	-	103	1.55	-15.7	6.5

A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

RE-ALIGNMENT

The sensitivity and selectivity of the PILOT DX Super-Heterodyne largely depend upon the proper adjustment of the various trimmer condensers. Before sets leave the factory, these trimmers are carefully tuned and every precaution is taken to insure the permanence of the adjustments.

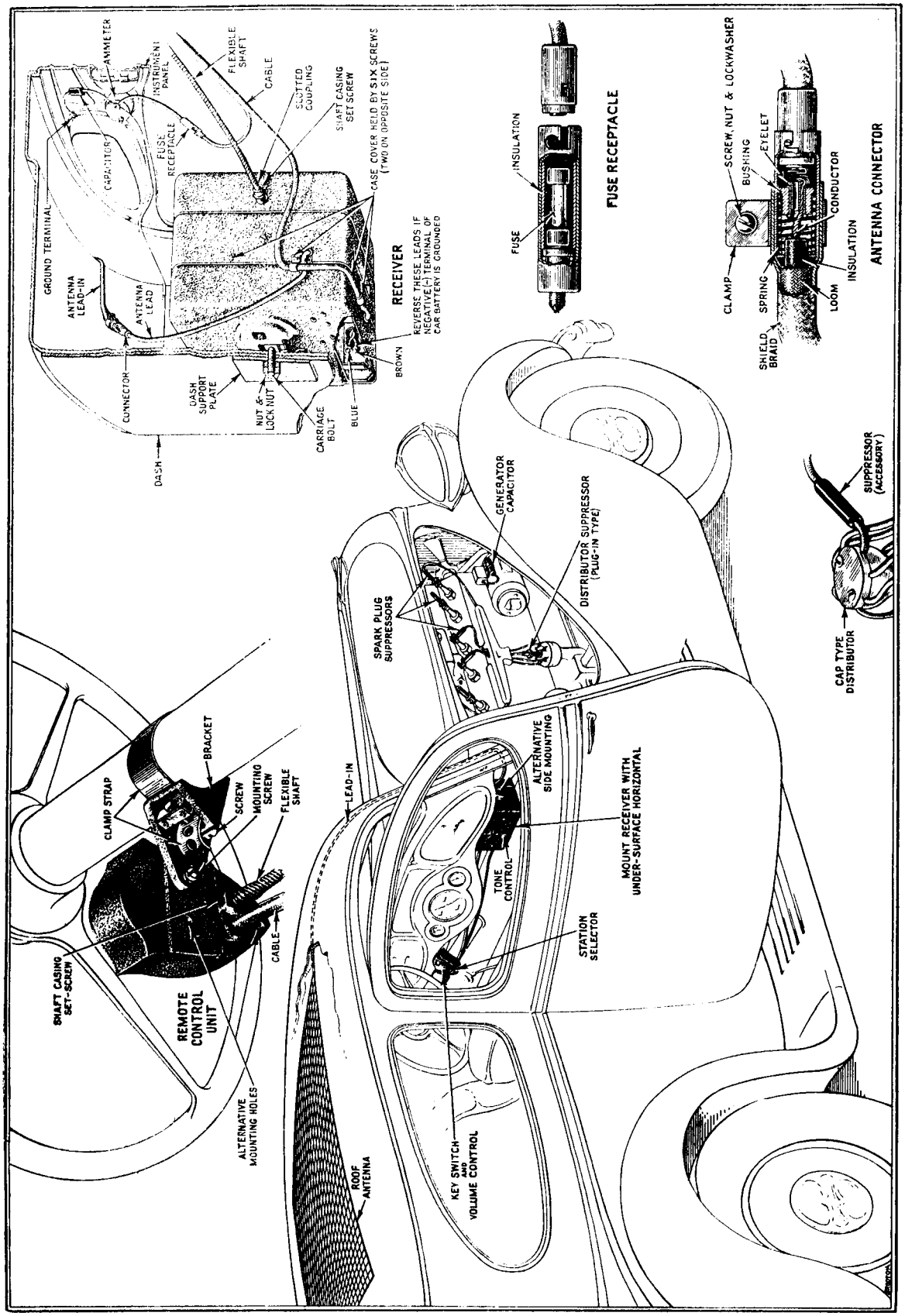
If a set appears to be insensitive, it is possible that rough handling in transit has changed the positions of some of the trimmers. In this case, the sensitivity can be restored by re-aligning the set. It is understood, of course, that the tubes have been checked and other tests made as suggested in the foregoing sections, to make sure that the insensitivity is not due to other causes.

The best method of adjusting the I.F. trimmers is by means of a signal generator (or modulated oscillator) tuned to 115 KC. The output of the oscillator is connected across the grid circuit of the first detector and the two I.F. transformers are lined up to resonance with the 115 KC signal. Many service stations, however, may not be equipped with a 115 KC oscillator in which case the I.F. transformers can be adjusted at the same time as the broadcast band trimmers, using an oscillator tuned to broadcast frequencies. This method can be used successfully when the I.F. transformers are slightly out of adjustment. However, if the factory adjustments have been changed with a screw driver and the I.F. amplifier thrown completely out of line, a 115 KC generator must be used to re-adjust the trimmers.

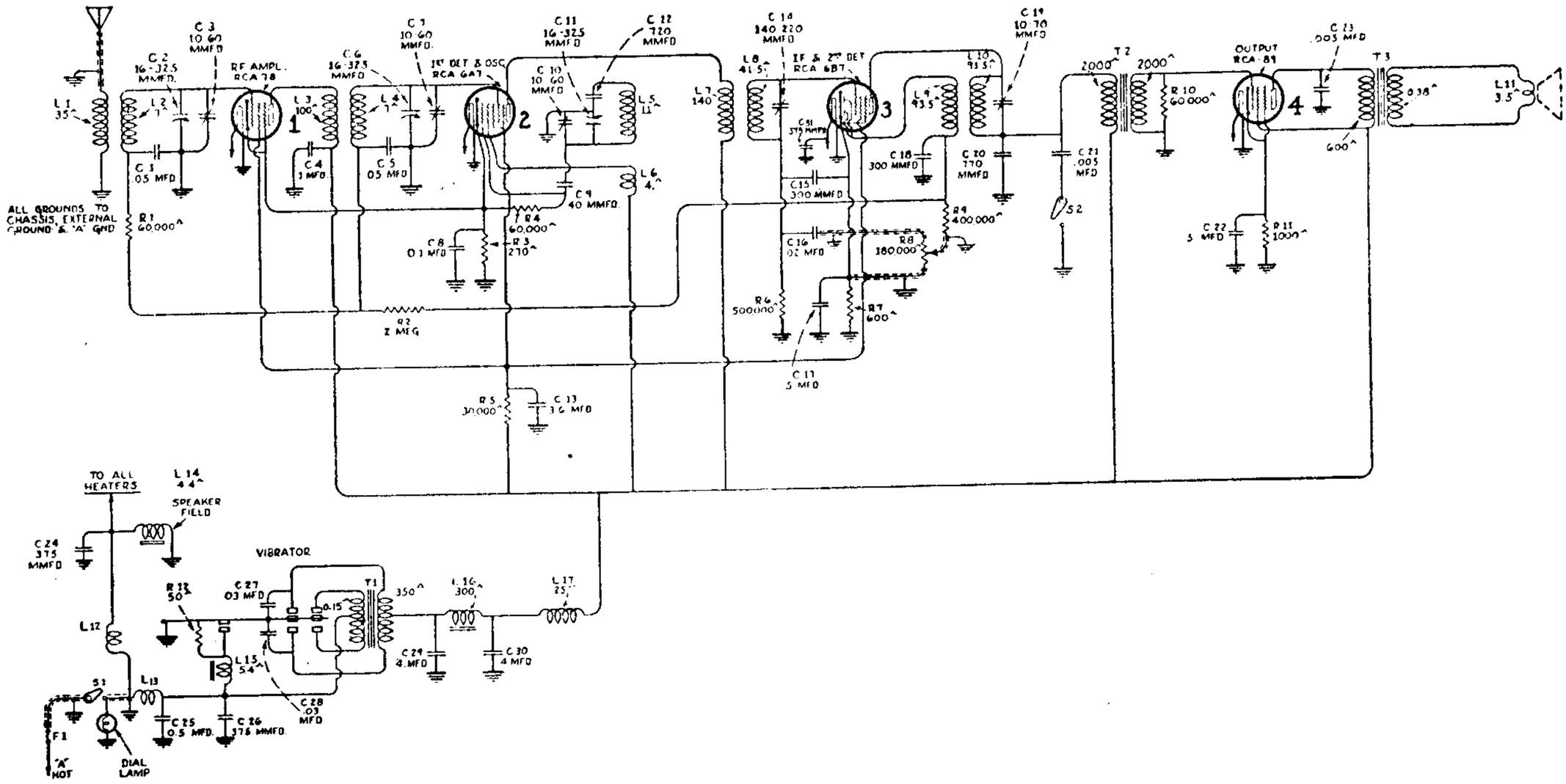
RCA-VICTOR, INC.

M-34

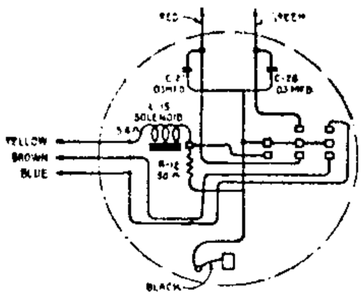
Automobile Receiver



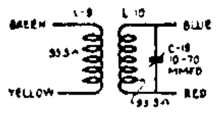
RCA-VICTOR, INC.



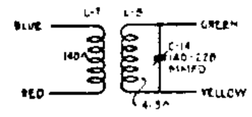
Radiotron No.		Cathode to Ground	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
RCA-78 R. F.		3.7	92	253	7.0	6.06
RCA-6A7	First Detector	3.7	92	253	12.0 Total	6.06
	Oscillator	0	—	253		
RCA-6B7 Second Detector		3.2	92	236	6.0	6.06
RCA-89 Power		26.5	230	217	27.5	6.06



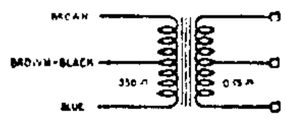
INTERNAL CONNECTIONS OF VIBRATOR



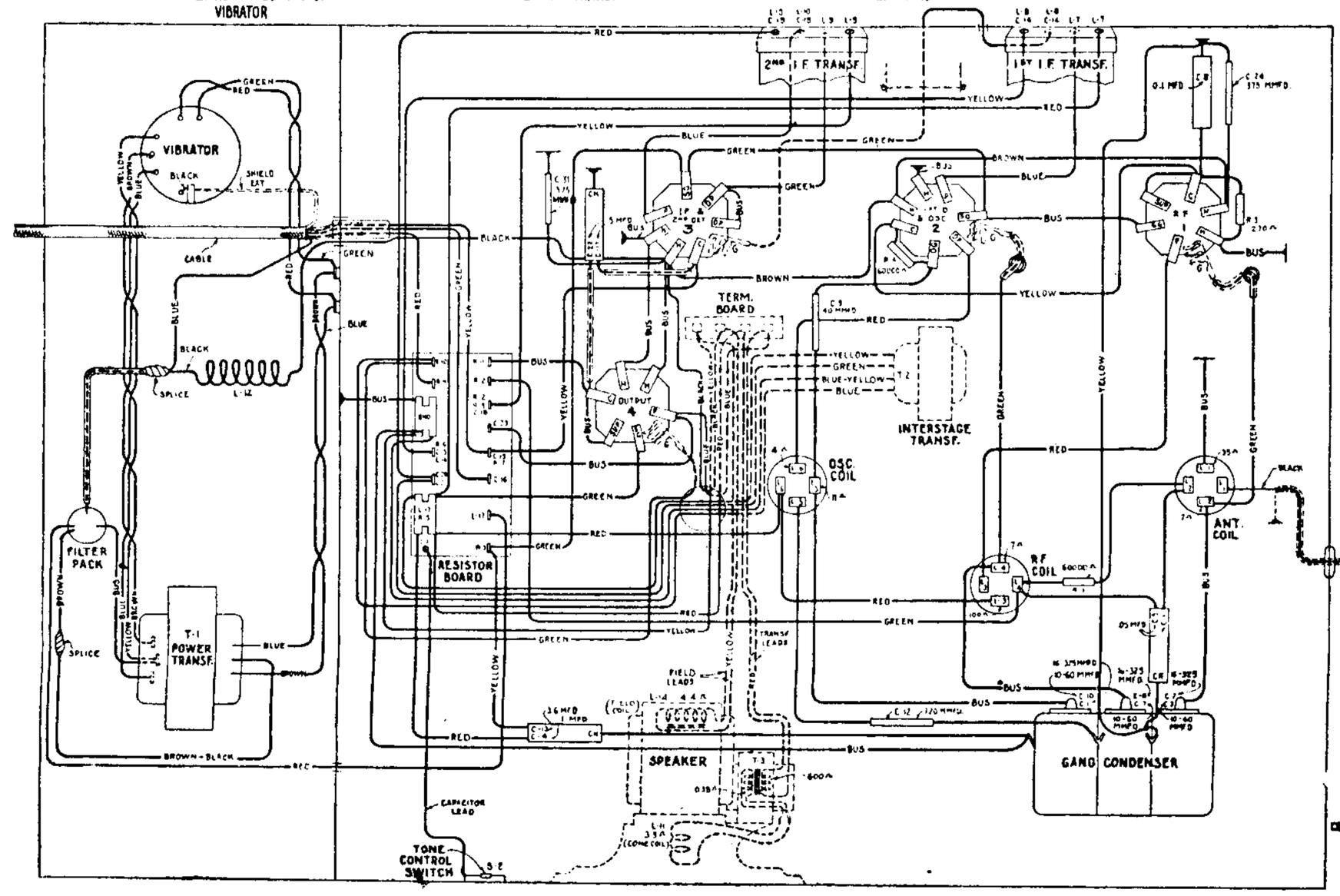
INTERNAL CONNECTIONS OF 2ND I.F. TRANSF.

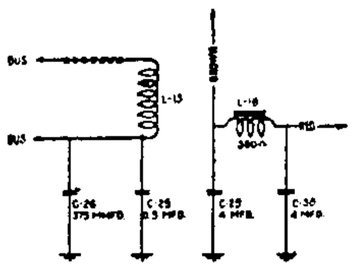


INTERNAL CONNECTIONS OF 1ST I.F. TRANSF.

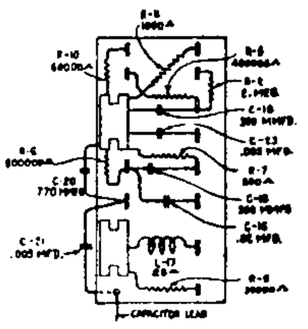


INTERNAL CONNECTIONS OF POWER TRANSF.

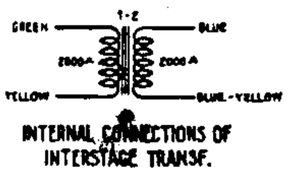




INTERNAL CONNECTIONS OF FILTER PACK



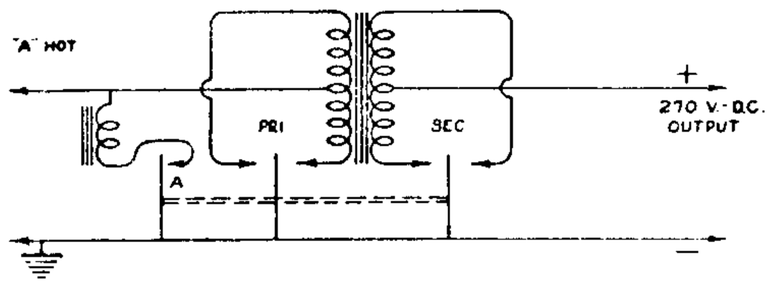
INTERNAL CONNECTIONS OF RESISTOR BOARD



INTERNAL CONNECTIONS OF INTERSTAGE TRANSF.

RCA-VICTOR,. INC.
SERVICE DATA FOR VIBRATOR UNIT

The vibrator unit used in this receiver is of excellent design and sturdy construction. It functions as a combined A. C. generator and mechanical rectifier. Referring to Figure C, it will be noted that the primary and secondary of the transformer are center tapped. By connecting the outside of each winding to the contacts of the vibrator and using the arms and center taps of the windings as sources of input and output voltage, a combined generating and rectifying action is obtained.



Schematic of Vibrator Unit

When the switch is turned "on" the vibrator makes and breaks contact at point "A." This constitutes the driving action of the unit, and is in no way connected with the other circuits. The primary vibrator functions to connect the input low voltage current first across one-half and then across the other half of the primary of the transformer. This results in a pulsating direct current applied to the primary in an alternating direction. The result is an A. C. voltage emanating from the secondary of the transformer; as the transformer has a step-up ratio the A. C. secondary voltage is considerably greater than the primary. The secondary vibrator functions in a similar manner as that on the primary side, so that by reversing the alternations applied to the load, a pulsating D. C. is obtained. After filtering, this is used as plate and grid supply to all Radiotrons.

(1) Spring and Contact Adjustment Limits.

Proper adjustments of the various contacts are made in the following order and manner:

1. With 8 and 10, Figure D, firmly held against their respective stops and with 3 and 5 in contact with 8 and 10 respectively, the air gap between 1, 6 and 2, 7 shall be 0.015" plus or minus 0.005". On no particular unit however, shall the differences between the two air gaps exceed 0.005".

2. Adjust the buzzer screw, 11, Figure D, so that when the position of the armature is such that 1 and 2 are just making contact with 6 and 7 respectively, the contact between 4 and 9 shall just be breaking.

(2) Adjustment for the Reduction of Sparking.

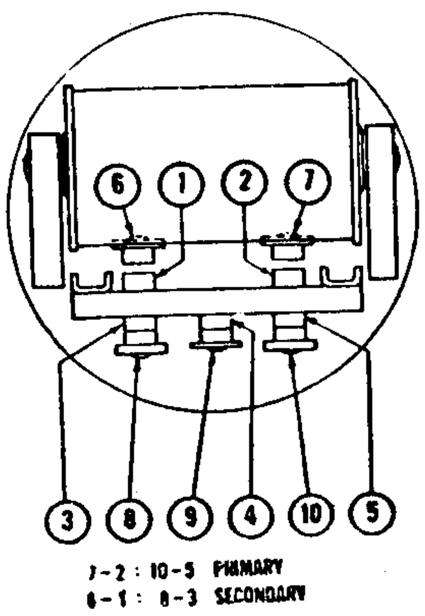
If any pair of contacts show excessive sparking, the following procedure will in general reduce the sparking to a minimum.

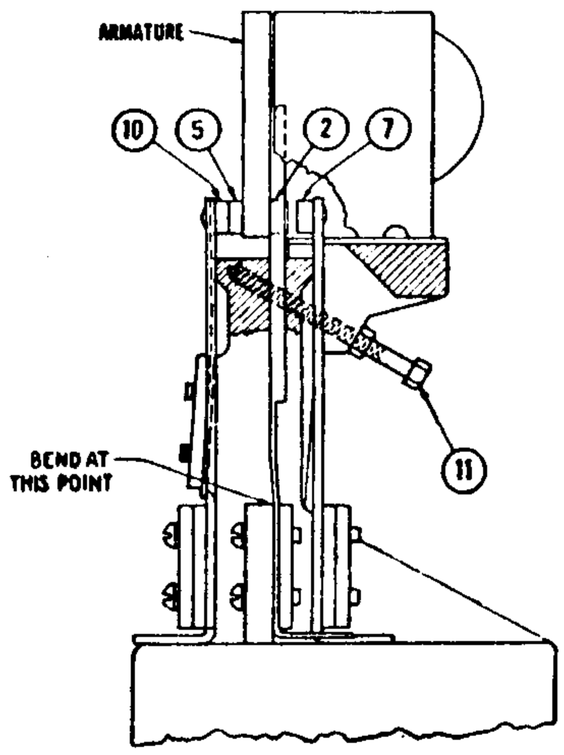
For example, consider the case where excessive sparking is occurring between 6 and 1. Sparking will be reduced to a minimum by bending the armature spring on that side (secondary side) away from 6 and toward 8. (See Figure D.) If the bend is too small, only a small change will be noted. However, if an excessive bend is made, the sparking will be transferred from 6, 1 to 8, 3.

The same method may be applied to any pair of contacts. Usually only a slight bend will be necessary. Although after bending, no change in the position of the armature contacts may be noted, a sufficient change in the initial force requirements will have been made to reduce sparking.

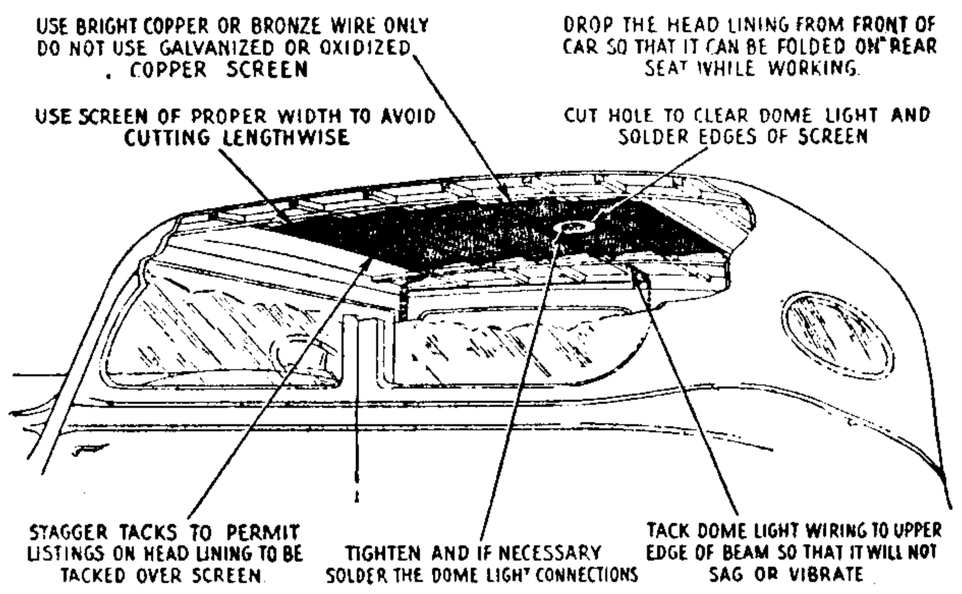
(3) Output Voltage.

When connected to a 6 volt primary source, the output voltage across a 5,000 ohm resistor (connected in place of the receiver load at the output of the filter), must be 240 volts or greater.





Vibrator Contacts



Fuses—This installation is protected by one fuse (rated 20 amperes) which is mounted in the fuse receptacle contained in the power input lead. If the set fails to operate and the dial lamp does not light, this fuse should be removed for examination. If found to be burned out, the wiring should be inspected for short-circuits or grounds and all tubes tested prior to insertion of a new fuse. **The replacement fuse must be of the same ampere rating.**

Ignition System—The ignition system of the car must be kept in good condition. Fouled plugs or plugs with improperly adjusted gaps will affect the operation of the receiver as well as of the automobile. Burned or improperly adjusted breaker points will also impair the performance. It will be advisable to advance the generator charging rate in order to compensate for the additional drain on the car storage battery imposed by this instrument.

RCA-VICTOR, INC.

Portable Public Address System Type PG-62

Instructions for Operation and Service

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts
Frequency Rating	50–60 Cycles
Power Consumption	110 Watts
Number and Type of Radiotrons	1 RCA-57, 2 RCA-56, 3 RCA-59, 1 RCA-83
Number of Voltage Amplifier Stages	Three
Number of Power Amplifier Stages	Two
Overall Gain	95 db.
Type of Loudspeaker	Electro-Dynamic
Wattage Dissipation in Loudspeaker Fields	9 Watts
Number of Loudspeakers	Two
Maximum Undistorted Audio Output	20 Watts

RADIOTRON SOCKET VOLTAGES

The Radiotron socket voltages given in the following tabulation are the actual values at which each Radiotron should operate. In circuits containing high resistance, voltages read on a set analyzer will not agree with the values in the table, due to the relatively low resistance of the meter employed. Therefore, a correction must be applied to the meter reading to obtain the correct voltage at each socket. Usually, an application of Ohms Law will give an approximate value of the voltages at which each Radiotron is operating, assuming that the resistance of the meter is known.

RADIOTRON SOCKET VOLTAGES

115 VOLT A. C. LINE — NO INPUT SIGNAL VOLTAGE

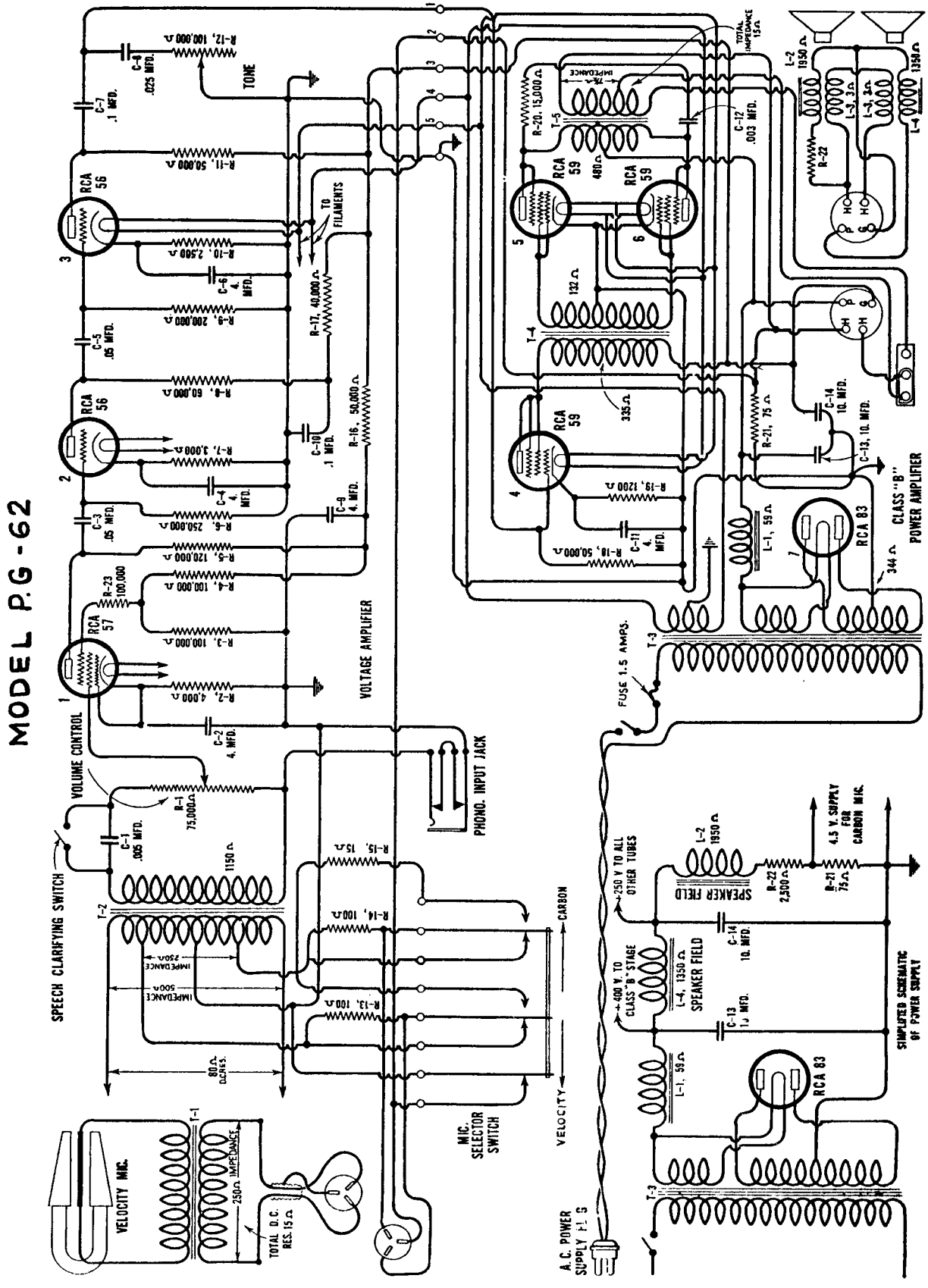
Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-57	1.0	80	145	.25	2.5
2. RCA-56	3.5	—	120	1.2	2.5
3. RCA-56	4.0	—	165	1.6	2.5
4. RCA-59	2.8	—	242	23.0	2.5
5. RCA-59	0	—	390	13.0	2.5
6. RCA-59	0	—	390	13.0	2.5

CAUTION: Whenever the Radiotron RCA-83 rectifier is removed from or installed in its socket, the A. C. power control switch should be in the "off" position.

The amplifier consists of two units; the voltage amplifier and the power amplifier, both mounted in a carrying case. The loudspeakers, two of which are supplied with the equipment, are mounted in the cover of the carrying case. A velocity type microphone, the latest type developed by the RCA Victor engineers, is also supplied as a standard part of the equipment. Provision is made for placing the microphone and stand together with the interconnecting cables in the carrying case when the equipment is to be transported. The weight of the complete equipment packed in the carrying case is 75 pounds.

RCA-VICTOR, INC.

MODEL P.G-62

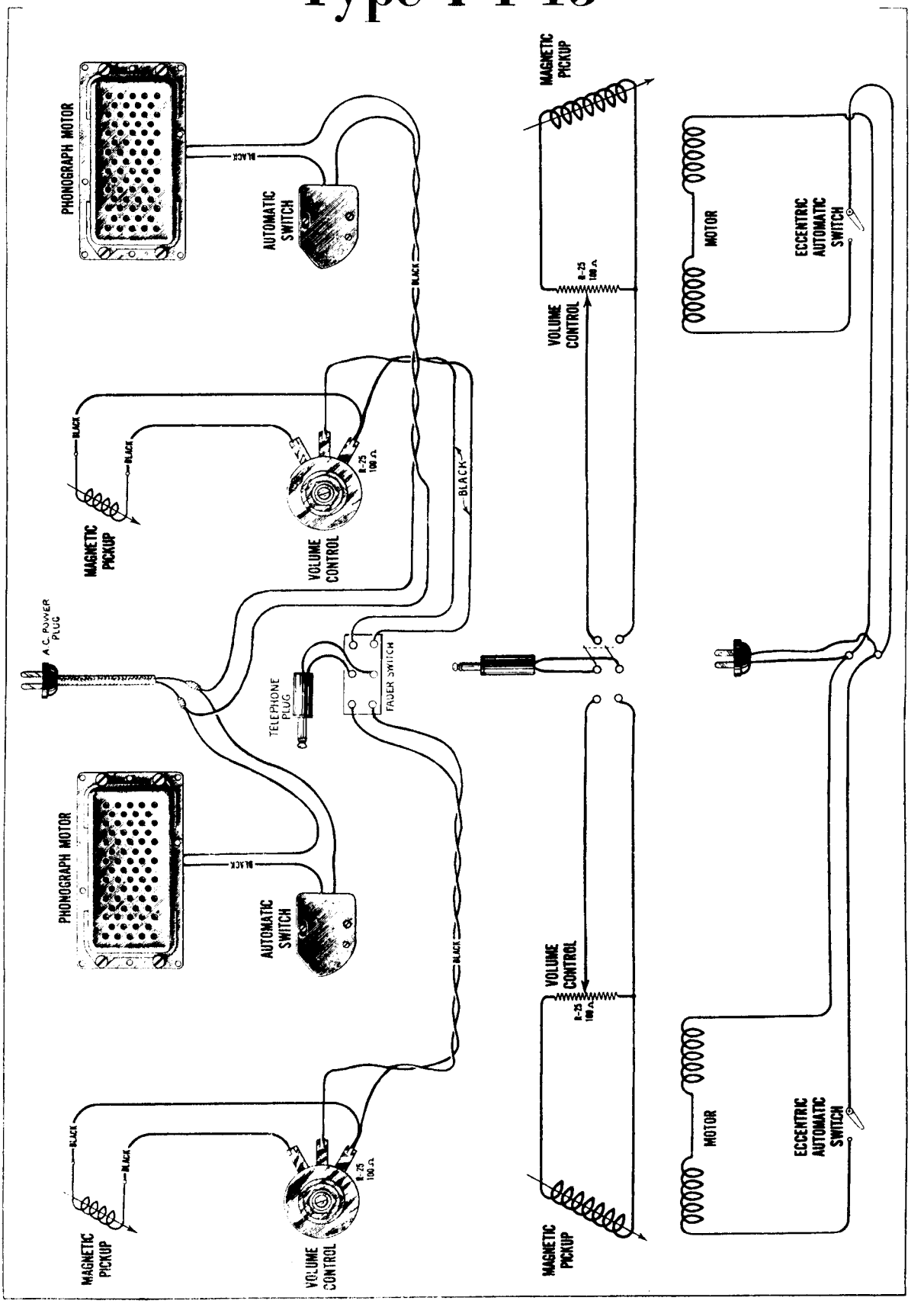


Schematic Circuit Diagram

RCA-VICTOR, INC.

Portable Phonograph Turntable

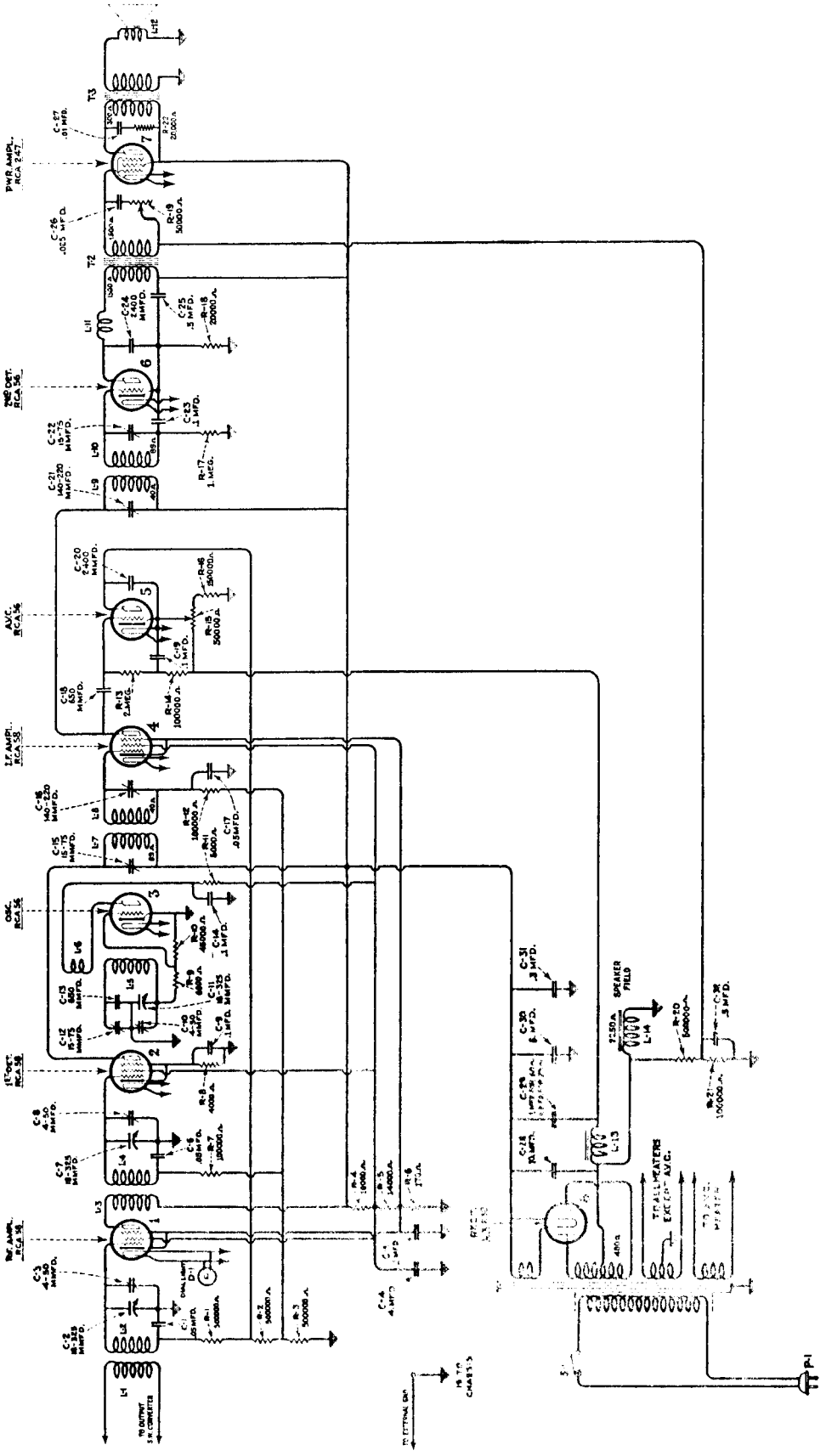
Type PT-15



Wiring and Schematic Diagrams

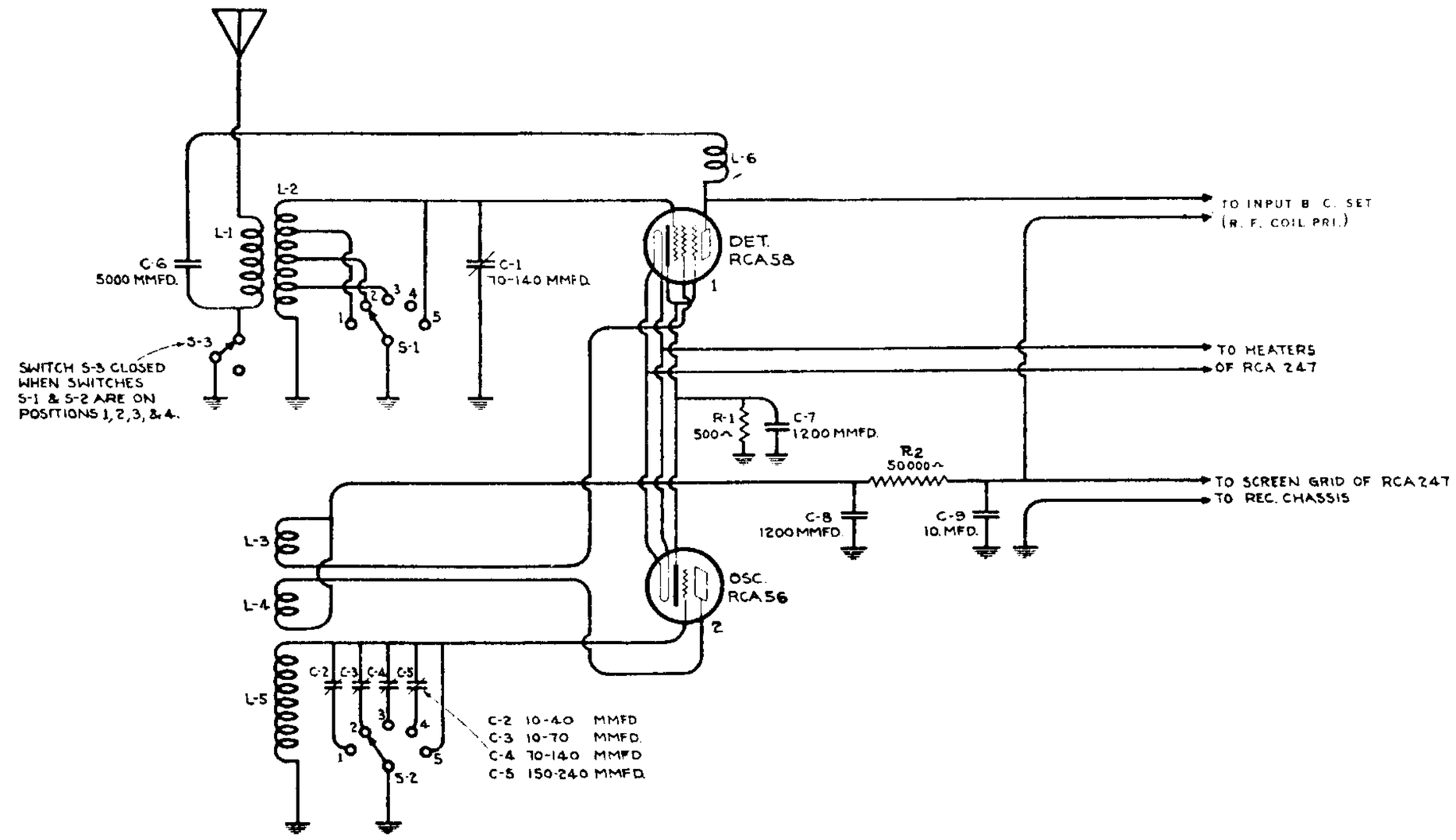
RCA-VICTOR, INC.

Intravario Model R-24 and SW-3



Schematic Diagram of Receiver Assembly

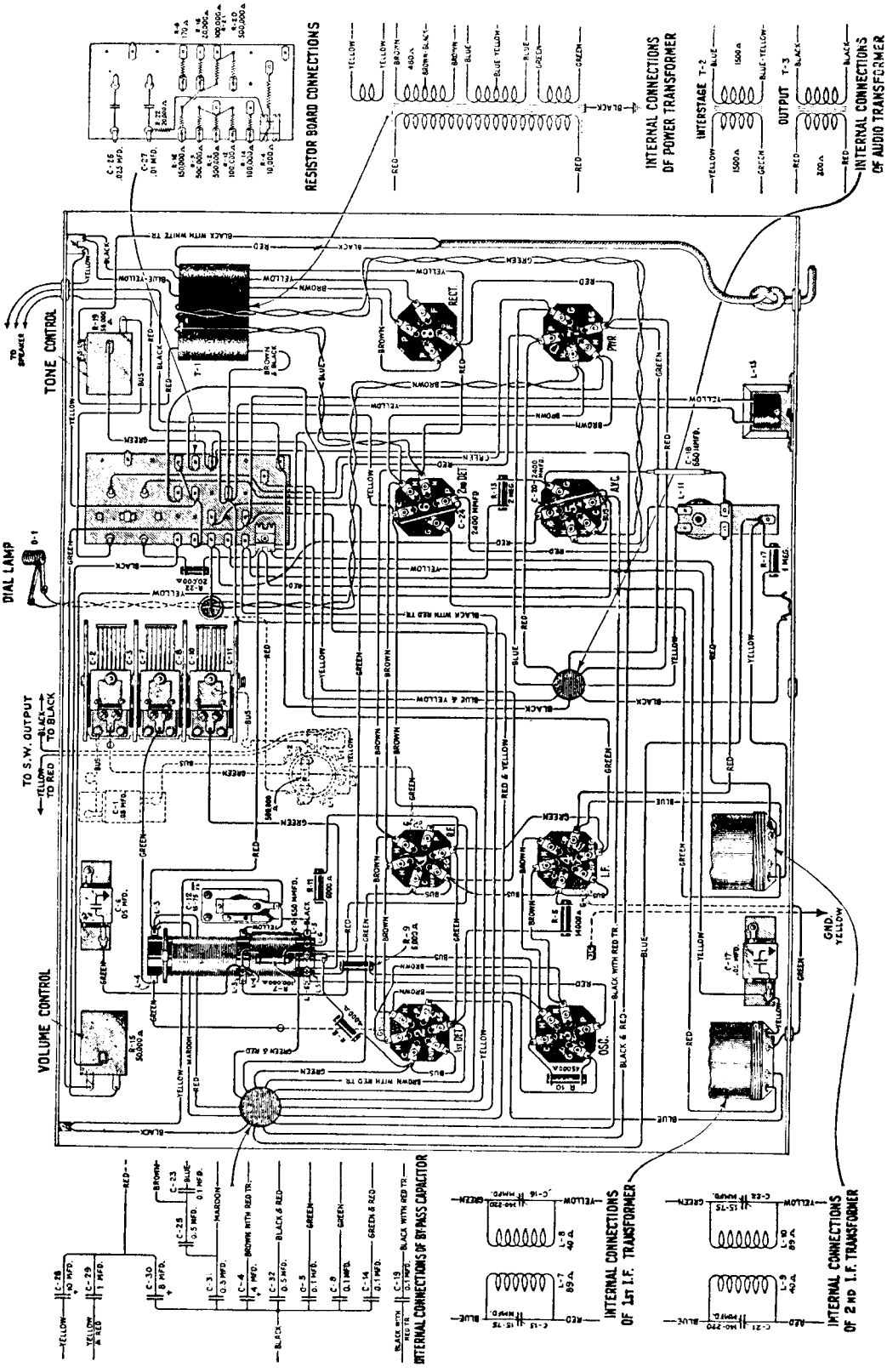
RCA-VICTOR, Inc.



Schematic Circuit Diagram of Short Wave Converter

Wiring Diagram of Short Wave Converter

RCA-VICTOR, INC.



Wiring Diagram of Receiver Assembly

RCA-VICTOR, INC.

LINE-UP CAPACITOR ADJUSTMENTS

The detector and oscillator trimming capacitors may be correctly aligned in the following manner:

The oscillator frequencies should be the following values for the taps indicated:

Band	*Oscillator Frequency*	*Trimming Capacitor*
19 Meter	14100 K. C.	C-2
25 Meter	12900 K. C.	C-3
31 Meter	8450 K. C.	C-4
49 Meter	7250 K. C.	C-5

If a frequency meter or a calibrated receiver is available, either will be suitable for checking or adjusting these capacitors. If such equipment is not available then the following method may be used:

The frequency of the oscillator may be checked by adding or subtracting the dial reading in kilocycles from the operating frequency of the station being received. The instruction book lists a number of stations with their correct operating frequency. The dial reading should be added or subtracted as follows:

19 Meter Tap.....Subtract dial reading.
25 Meter Tap.....Add dial reading.
31 Meter Tap.....Subtract dial reading.
49 Meter Tap.....Add dial reading.

The adjustment of the detector trimming capacitor may be checked as follows:

Unless the set is operating poorly in comparison with similar receivers do not attempt to make these adjustments.

(a) Remove the Short Wave Convertor chassis from the cabinet without disturbing its wiring, and remove mounting plates so that access to C-1 is obtained. See Figure 1.
(b) Set the switch at the 49 meter position and tune in W8XK (6140 K. C.). Then detune the receiver to a higher frequency, 50–70 K. C., *at which no station is being received.*
(c) Turn the tone control clockwise for maximum highs and advance the volume control toward maximum so that background noise is readily discernible.
(d) Then with a non-metallic screw driver, rotate C-1 back and forth until the noise is at its loudest value. This is the correct adjustment and detector will be accurately tuned to the center of the 49 meter band.
(e) Carefully note the position of the screw head of the trimming capacitor. It is suggested that a pencil mark be made opposite one end of the slot on the chassis and a corresponding mark at the end of the slot on the trimmer.
(f) Then turn the switch to the 31 meter position and tune in W2XAF at 9530 K. C. Detune the receiver to a slightly higher frequency, 10–30 K. C., *at which no station is being received.*
(g) Repeat adjustments given in (c), (d) and (e), and again note very carefully the position of the screw head. It should not be necessary to turn the screw more than one half turn.

Note this down in terms of ½ or ¼ turns in or out from previous setting. Then return the trimming capacitor to the position marked for the 49 meter position.

(h) Turn the switch to the 25 meter position and tune in W8XK at 11870 K. C. Tune out the station by turning the dial to a higher frequency (60–80 K. C.) *at which no station is heard.*

RCA-VICTOR, INC.

(i) Again check the trimming capacitor for maximum noise as in (c), (d), and (e), and note the amount of change in the screw from the 49 meter position marking.

(j) Turn to the 19 meter position. Tune in W2XAD at 15330 K. C. and then set the dial at a lower frequency (90-110 K. C.) *at which no station is heard.* Find the position of the detector trimmer for maximum noise and note it in terms of relation to the 49 meter position.

(k) Tabulate the results as per the following example:

Band	*Aligning Frequency*	*Trimmer Change*
49 Meter	6080 K. C.	0—Adjustment marked
31 Meter	9550 K. C.	Out—½ turn
25 Meter	11800 K. C.	In+¼ turn
19 Meter	15220 K. C.	Out—¼ turn
		4)—½ turn
		—⅛ turn out

By taking the average of the four adjustments, it is found that the best adjustment for all four bands is—⅛ turn out from the 49 meter position for this particular example.

In general, it will be found that if the proper adjustment is made for the 49 meter band, the corrections for the other three bands will be negligible and the single adjustment is sufficient.

If it is found that any of the bands require readjustment of more than one full turn of the detector trimmer, the circuit wiring should be investigated for a poor contact or misplaced tap on the switch or inductance coil. The wiring of the detector coil must be with the shortest possible leads.

GENERAL NOTES

1. Keep the antenna lead from the converter as far as possible from the broadcast chassis.
2. Do not connect the SW-3 to a receiver having the antenna coil grounded.
3. Keep leads from the SW-3 to the receiver as short as possible but do not shield.
4. If modulation hum is encountered connect a 5,000 MMFD. Capacitor from either heater lead to ground.

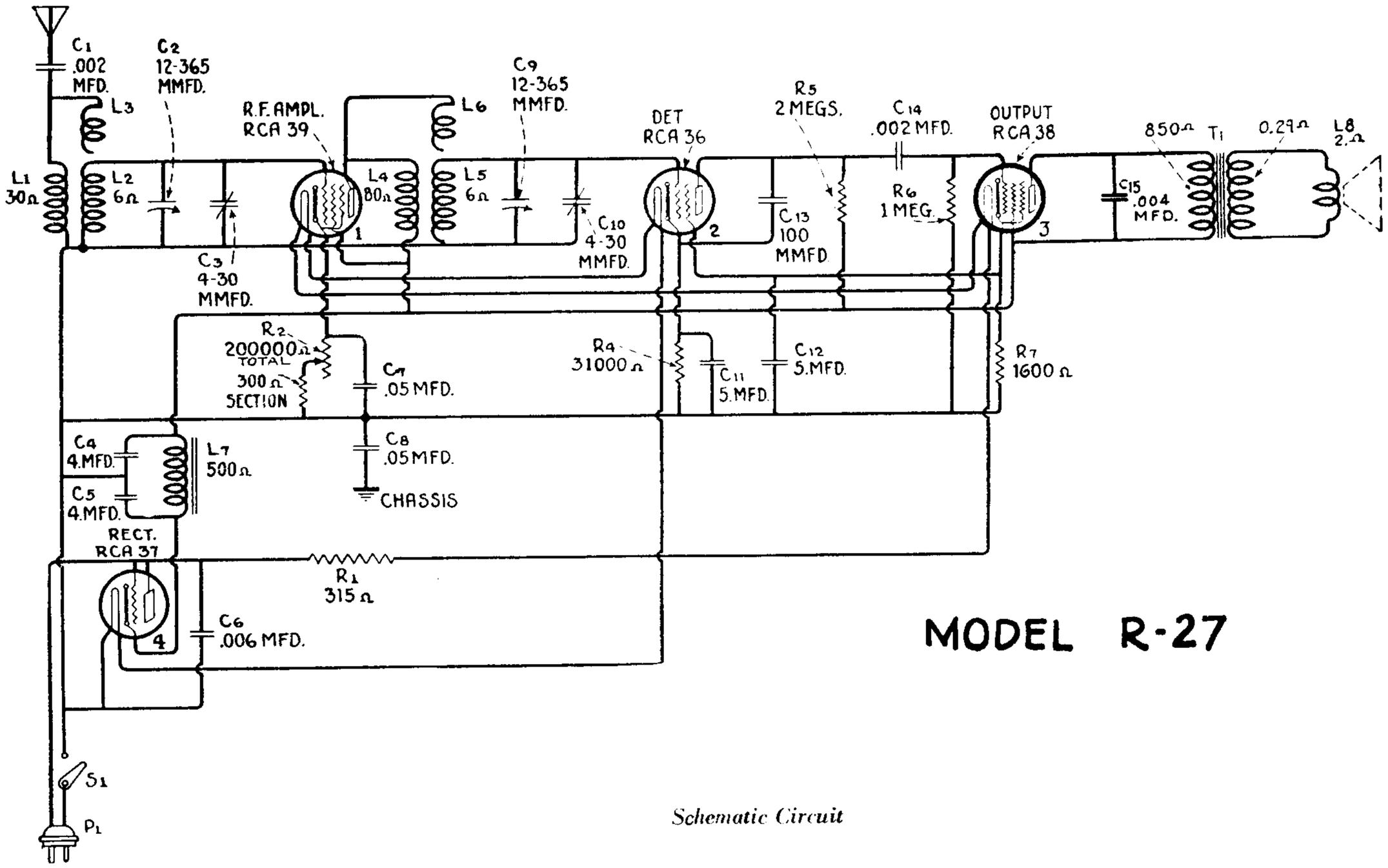
RADIOTRON SOCKET VOLTAGES

120 VOLT A. C. LINE

Radiotron No.	Cathode to Heater, Volts, D. C.	Cathode or Filament to Control Grid, Volts, D. C.	Cathode or Filament to Screen Grid, Volts, D. C.	Cathode or Filament to Plate, Volts, D. C.	Plate Current M. A.	Heater or Filament, Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1—R. F.	**2.0	*1.2	110	280	0	2.5
2—1st Det.	0	*1.5	110	280	0	2.5
3—Osc.	—	—	—	90	5.5	2.5
4—I. F.	**2.0	*2.0	110	280	0	2.5
5—A. V. C.	—	1.0	—	10	0	2.5
6—2nd Det.	—	6.0	—	260	1.0	2.5
7—Power	—	20.0	275	265	35.0	2.5
Conv. Det.	—	—	—	—	—	2.5
Conv. Osc.	—	—	—	—	—	2.5
VOLUME CONTROL AT MAXIMUM						
1—R. F.	**4.0	*0.1	100	260	5.0	2.5
2—1st Det.	**10.0	*1.0	95	250	2.0	2.5
3—Osc.	—	—	—	75	4.5	2.5
4—I. F.	**4.0	*1.8	100	260	3.0	2.5
5—A. V. C.	—	2.0	—	20	0	2.5
6—2nd Det.	—	7.0	—	240	1.0	2.5
7—Power	—	20.0	275	265	30.0	2.5
Conv. Det.	—	2.1	60.0	255	0.15	2.5
Conv. Osc.	—	2.1	—	60	4.0	2.5

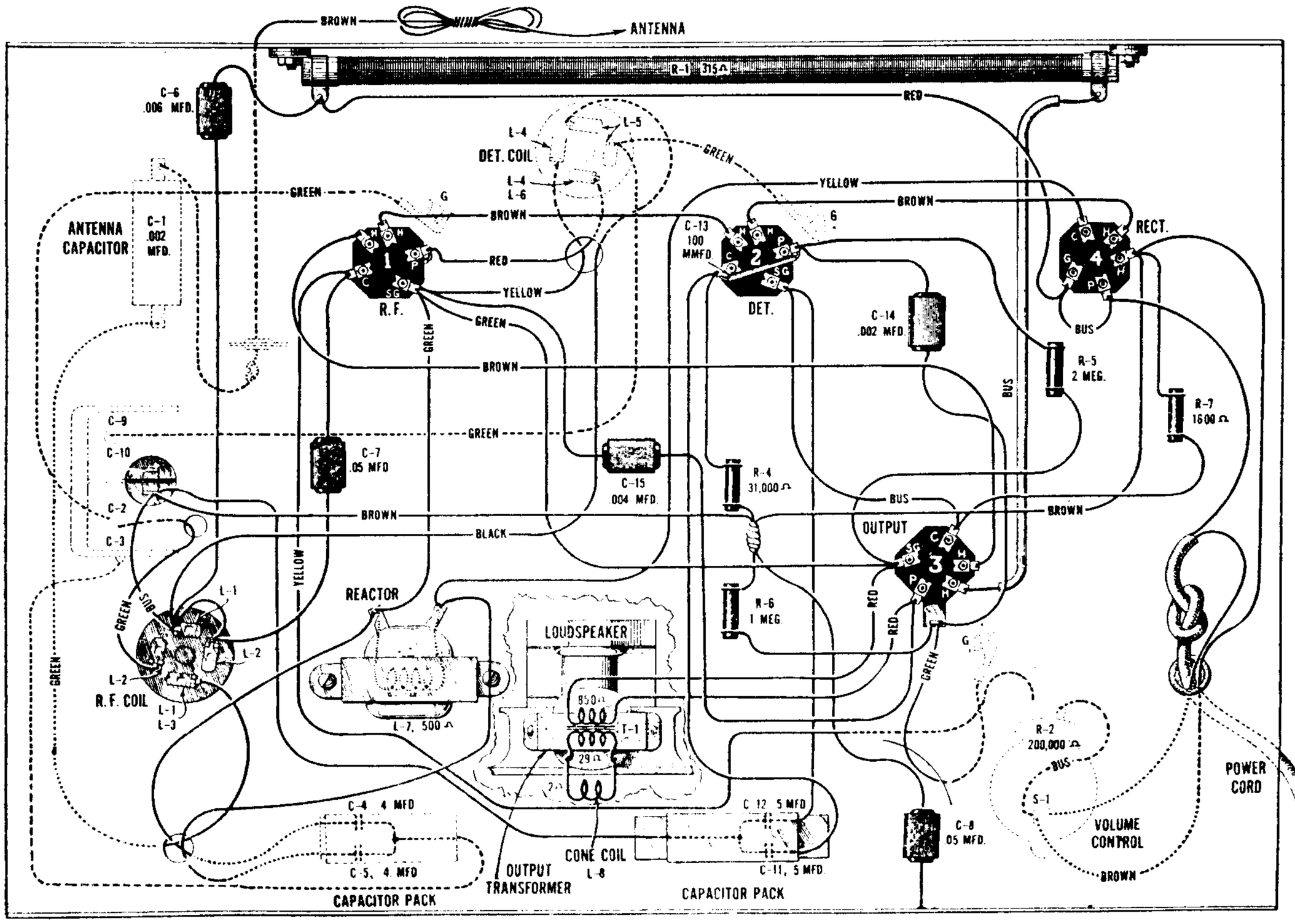
*On 5 Volt, 1000 Ohm per Volt Meter.
**On 50 Volt, 1000 Ohms per Volt Meter.

RCA-VICTOR, INC.



MODEL R-27

Schematic Circuit



Wiring Diagram

RCA-VICTOR, INC.

MODEL R-27

SERVICE DATA

Electrical Specifications

Voltage Rating . . 105–120 Volts, 25–133 Cycles A. C. or D. C.
Power Consumption . . . . . 40 Watts
Frequency Range . . . . . 540 K. C.–1710 K. C.
Type and Number of Radiotrons—
1 RCA-36, 1 RCA-37, 1 RCA-38, 1 RCA-39—Total 4

This receiver is an A. C.–D. C. table model tuned R. F. broadcast receiver. Features such as universal operation on both A. C. and D. C., wide tuning range, excellent performance and compact construction characterize this instrument. Figures A and B show the schematic and wiring diagrams respectively. The voltage readings and replacement parts are given below.

RADIOTRON SOCKET VOLTAGES

Measured at Meximum Volume—115 Volt A. C. Line
All Voltages on D. C. will be slightly lower

Radiotron No.	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid, Volts	Cathode or Filament to Plate, Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-39 R. F.	3.0	105	105	7.0	6.0
2. RCA-36 Det.	*0.75	11.0	*60	.025	6.0
3. RCA-38 Output	11.0	100	95	5	6.0
4. RCA-37 Rect.	——	——	115	15	6.0

*Impossible to measure on ordinary voltmeter

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
3076	Resistor—1 megohm—Carbon type—Package of 5	$2.50
3456	Capacitor—.05 mfd.	.44
3536	Capacitor—Filter capacitor—Two 5.0 mfd. capacitors	1.10
3537	Reactor—Filter reactor	1.10
3538	Capacitor—Filter capacitor—Two 4.0 mfd.	1.18
3539	Coil—R. F. coil complete	1.08
3540	Coil—Detector coil	.98
3512	Volume control—Complete with mounting nut	1.18
3557	Capacitor—0.002 mfd.	.30
3559	Resistor—31,000 ohms—Carbon type—½ watt—Package of 5	1.00
3560	Resistor—1,600 ohms—Carbon type—½ watt—Package of 5	1.00
3561	Capacitor—0.004 mfd.	.42
3562	Capacitor—0.006 mfd.	.42
3567	Escutcheon—Station selector escutcheon Package of 2	.42
3568	Escutcheon—Volume control escutcheon Package of 2	$0.42
3569	Knob—Station selector or volume control knob—Package of 5	.65
3635	Resistor—Filament resistor—315 ohms	1.00
6188	Resistor—2 megohm—Carbon type—½ watt Package of 5	2.00
6451	Condenser—Two gang variable tuning condenser	2.04
7484	Socket—Radiotron socket—5 contact	.65
10405	Capacitor—Antenna series capacitor—.002 mfd.	.50
10820	Capacitor—100 mmfd.	.50
	REPRODUCER ASSEMBLIES DYNAMIC TYPE	
3610	Magnet	1.04
6177	Transformer—Output transformer	1.32
7598	Cone—Reproducer cone complete—Package of 5	4.35
7599	Housing—Cone housing and core assembly	1.16
9429	Reproducer—Complete	4.85

RCA-VICTOR, Inc.

R-28

SERVICE DATA

Voltage Rating.....105–125 Volts
Frequency Rating.....25–40 Cycles and 50–60 Cycles
Power Consumption.....70 Watts
Number and Types of Radiotrons.....1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

This receiver is a five-tube Super-Heterodyne incorporating a Dynamic Loudspeaker as a part of the chassis; two-point tone control; single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer only using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K. C. The I. F. frequency is 175 K. C. and the two circuits that comprise it are adjusted for maximum output at 175 K. C.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

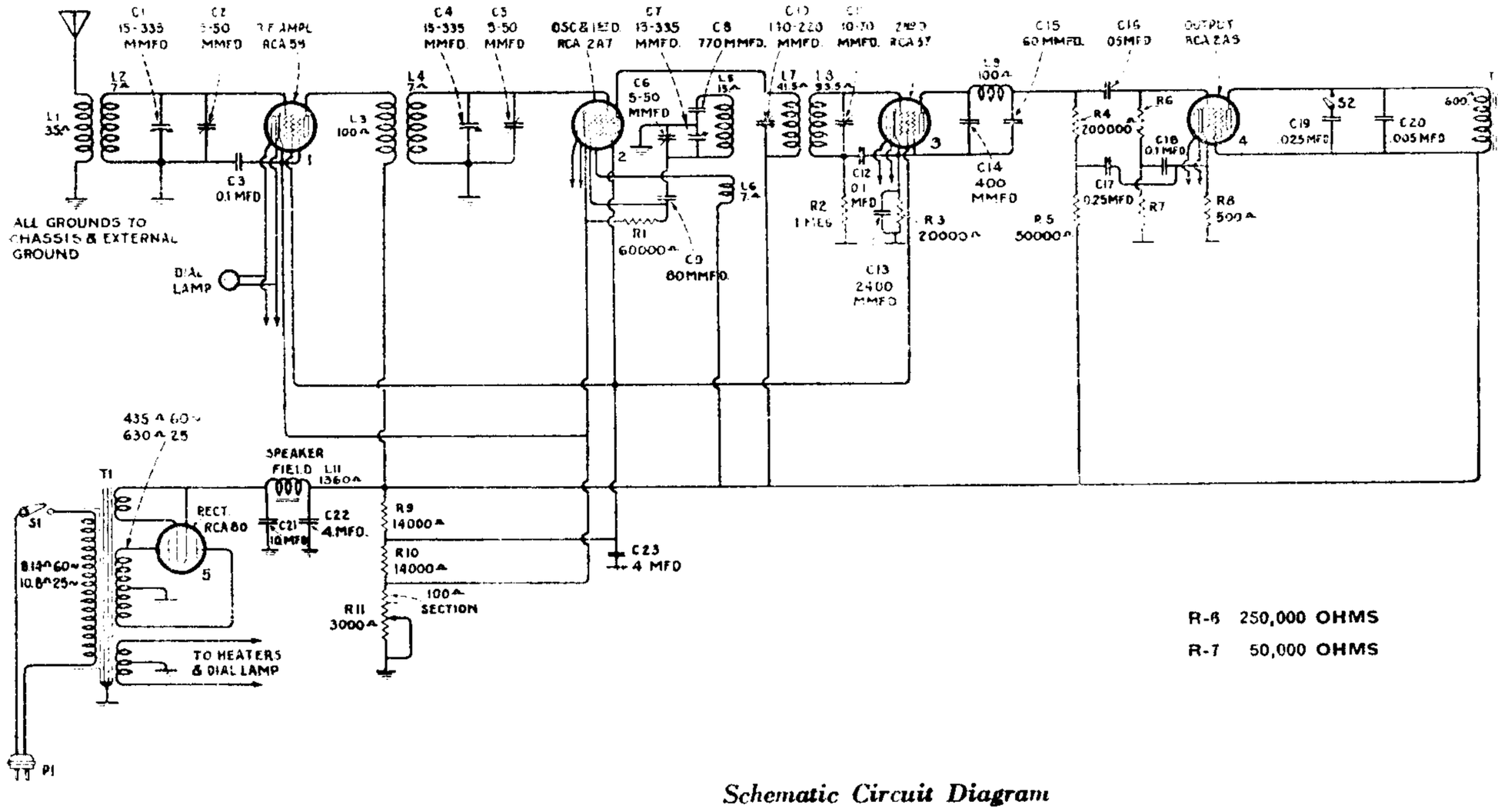
Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2747	Contact cap—Package of 5	$0.50
2749	Capacitor—2,400 mmfd.	1.60
3050	Resistor—14,000 ohms—Carbon type—3 watts	.60
3456	Capacitor—0.05 mfd.	.44
3459	Capacitor—80 mmfd.	.44
3472	Capacitor—0.0024 mfd.	.32
3514	Resistor—250,000 ohms—Carbon type—½ watt—Package of 5	1.00
3572	Socket—Radiotron 7 contact socket	.38
3573	Socket—Radiotron 4 contact socket	.32
3574	Coil—Choke coil	.68
3575	Socket—Dial lamp socket and bracket	.34
3584	Ring—R. F. or oscillator coil retaining ring—Package of 5	.40
3590	Escutcheon—Station selector escutcheon—Package of 5	1.10
3591	Escutcheon—Name plate escutcheon—Package of 5	1.40
3592	Knob—Station selector, operating switch or volume control knob—Package of 5	.80
3593	Screw—Chassis mounting screw—Package of 10	.30
3594	Resistor—50,000 ohms—Carbon type—½ watt—Package of 5	1.00
3596	Capacitor—60 mmfd.	.36
3597	Capacitor—0.25 mfd.	.40
3598	Capacitor—0.1 mfd.	.36
3601	Coil—Choke coil	.68
3602	Resistor—60,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3603	Resistor—500 ohms—Carbon type—1 watt—Package of 5	1.10
3604	Capacitor—400 mmfd.	.30
3605	Capacitor—770 mmfd.	.30
3606	Capacitor—Comprising one 0.005 mfd. and one 0.25 mfd. capacitors	.40
6113	Resistor—40,000 ohms—Carbon type—¼ watt—Package of 5	$2.00
6228	Resistor—200,000 ohms—Carbon type—½ watt—Package of 5	2.50
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6464	Transformer—I. F. transformer	1.88
6465	Volume control—Complete with mounting nut	1.22
6466	Switch—Tone control switch	.45
6470	Coil—Antenna coil	1.08
6471	Coil—Oscillator coil assembly	.74
6472	Coil—R. F. coil assembly	.94
6473	Scale—Dial scale assembly	.50
7485	Socket—Radiotron 6 contact socket	.70
7487	Shield—Radiotron tube shield	.50
7588	Condenser—3 gang variable tuning condenser	2.85
7589	Capacitor—Filter capacitor—Two 4.0 mfd. in container	1.64
7590	Capacitor—10 mfd.	1.40
8985	Transformer—Power transformer—105–120 volts—50–60 cycles	4.26
8986	Transformer—Power transformer—200–250 volts—60 cycles	4.38
9002	Transformer—Power transformer—105–125 volts—25–50 cycles	6.00
	REPRODUCER ASSEMBLIES	
6467	Transformer—Output transformer	1.14
8987	Cone—Reproducer cone—Package of 5	5.00
8988	Coil assembly—Comprising field coil, magnet and cone support	2.35

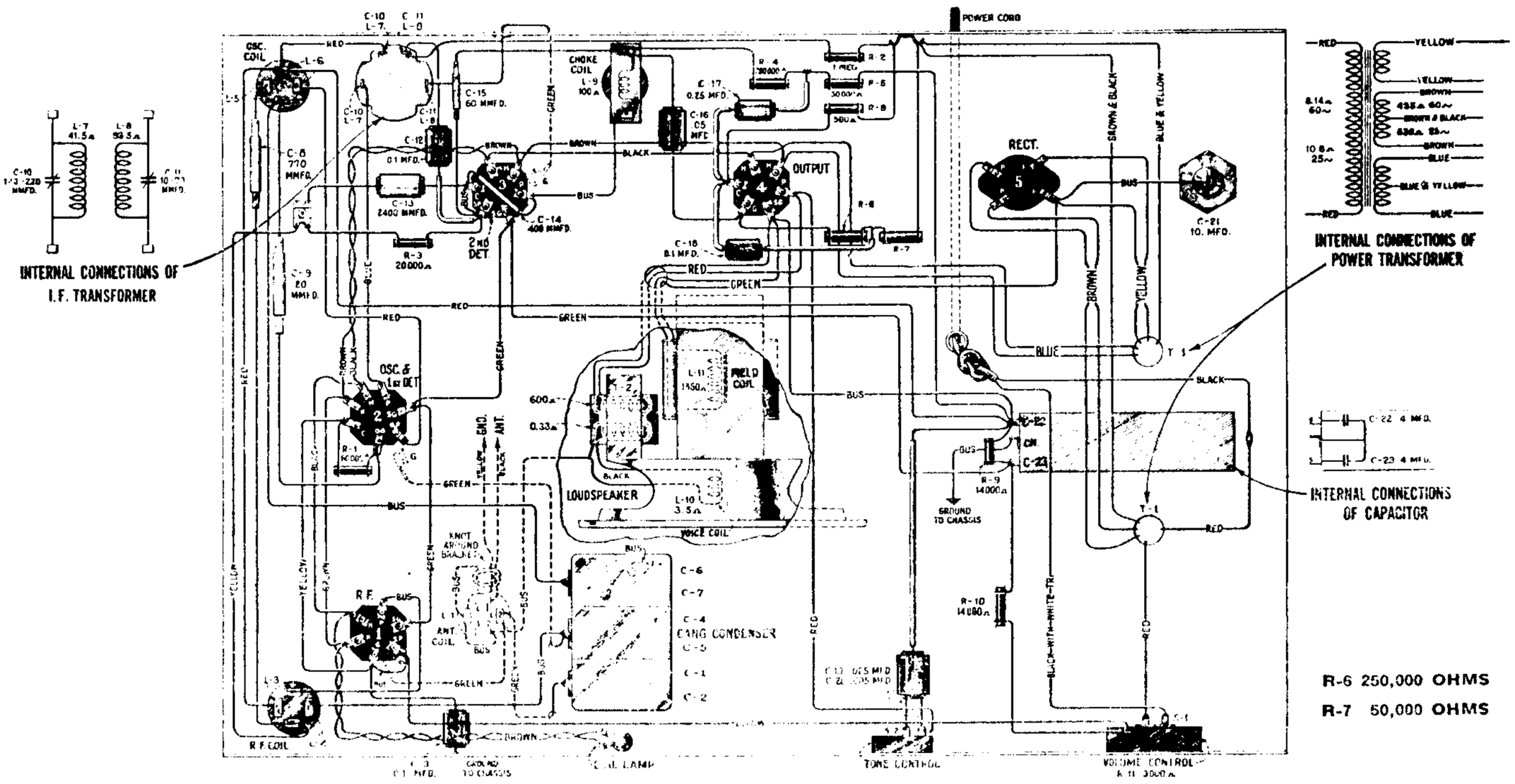
RCA-VICTOR, Inc.

R-28



R-6 250,000 OHMS
R-7 50,000 OHMS

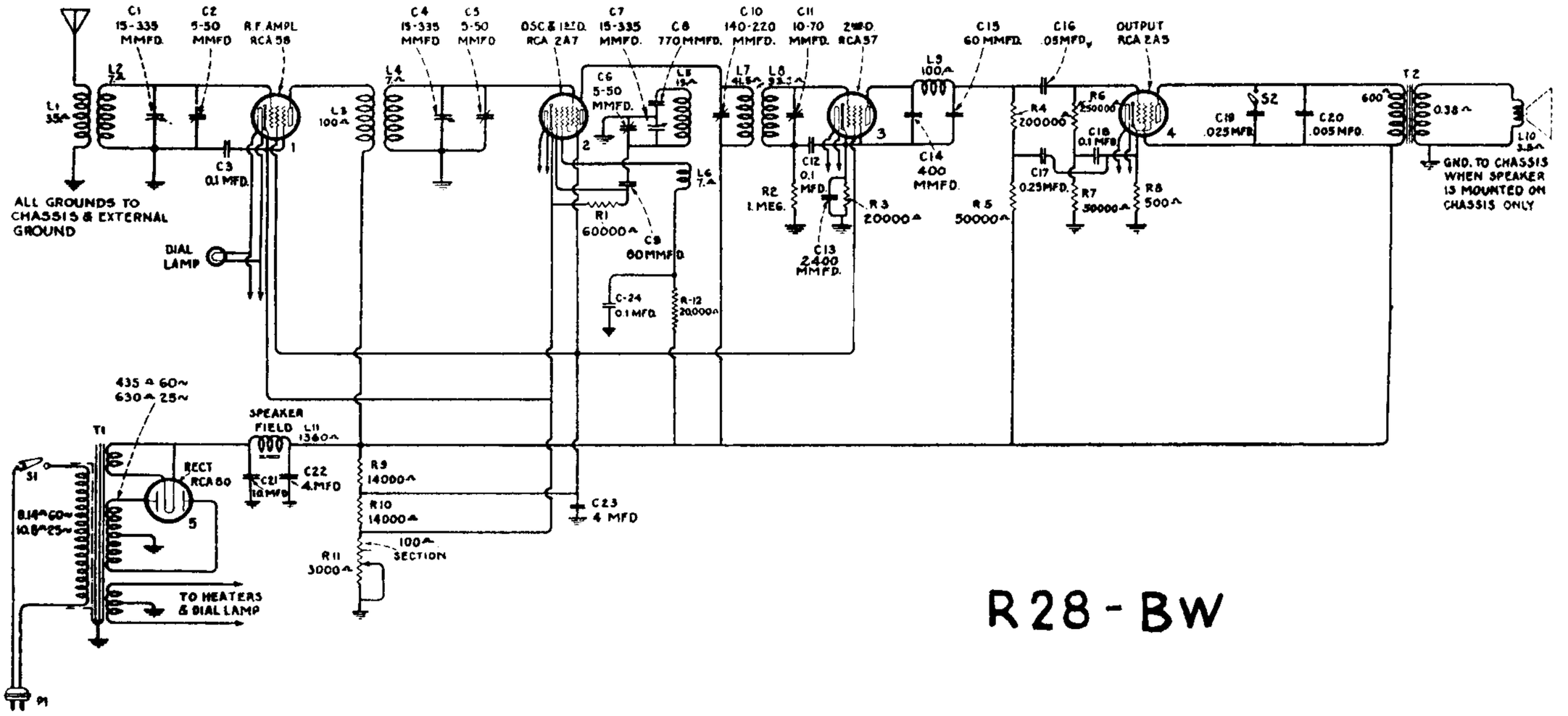
Schematic Circuit Diagram



R-6 250,000 OHMS
R-7 50,000 OHMS

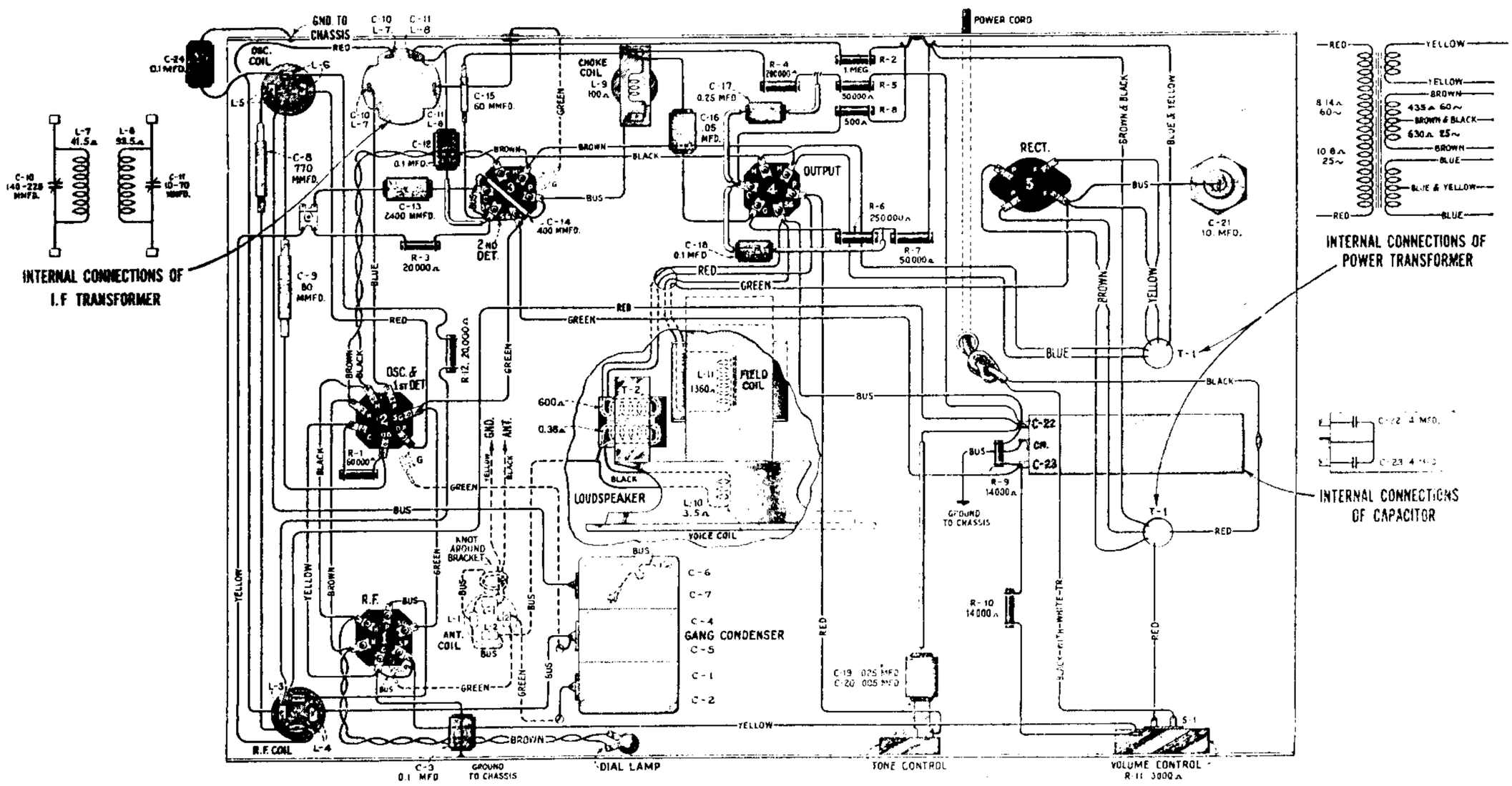
Wiring Diagram

RCA-VICTOR, Inc.



R28-BW

Schematic Circuit Diagram



Wiring Diagram

RCA-VICTOR, Inc.

R-28 BW

SERVICE DATA

Voltage Rating.....105–125 Volts
Frequency Rating.....25–40 Cycles and 50–60 Cycles
Power Consumption.....70 Watts
Number and Types of Radiotrons.....1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total, 5
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

This receiver is a five-tube Super-Heterodyne incorporating a Dynamic Loudspeaker as a part of the chassis; two-point tone control; single heater type Pentode Output and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer only using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K. C. The I. F. frequency is 175 K. C. and the two circuits that comprise it are adjusted for maximum output at 175 K. C.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

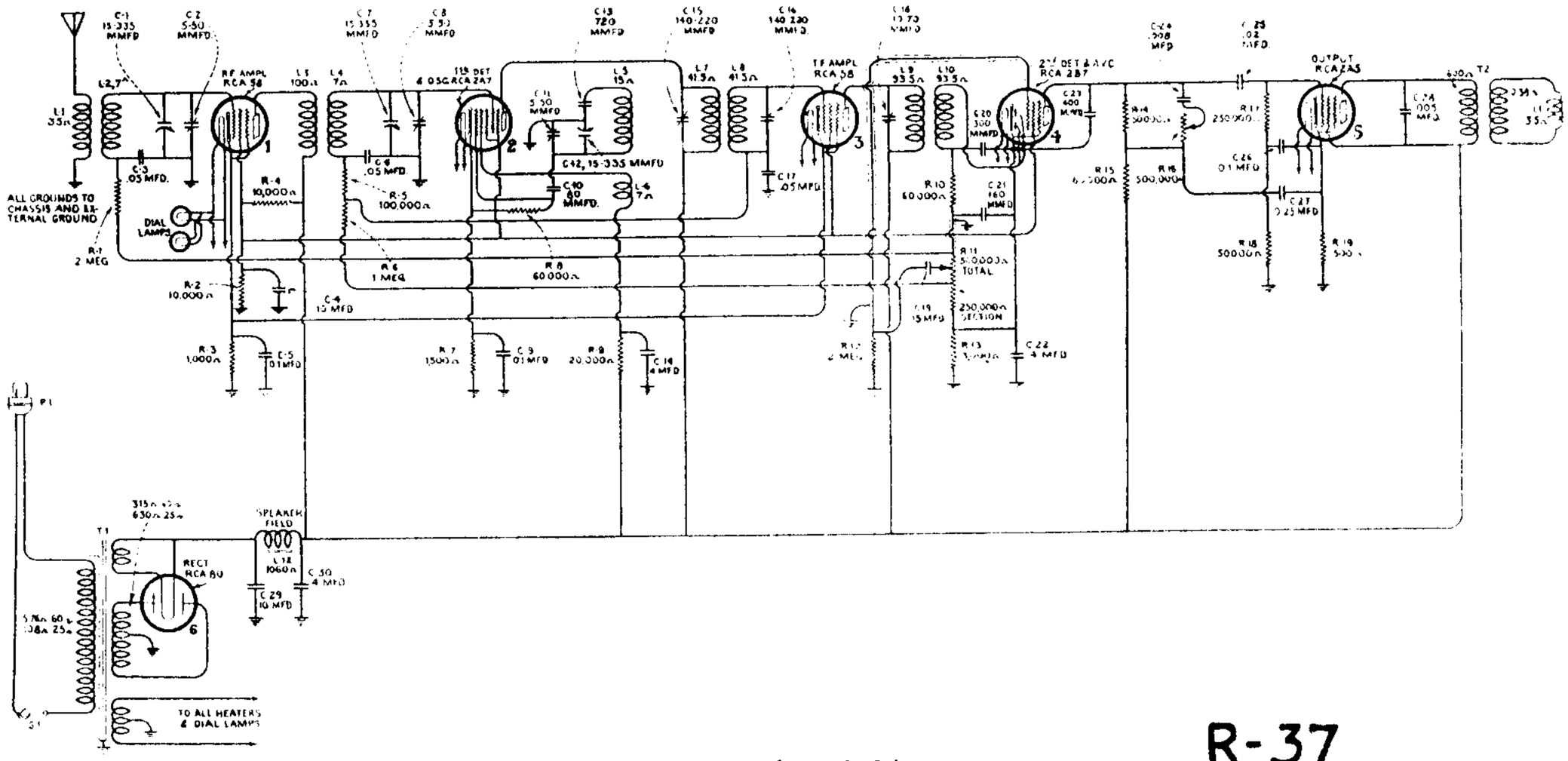
Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	725 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2747	Contact cap—Package of 5	$0.50
2749	Capacitor—2,400 mmfd.	1.50
3050	Resistor—14,000 ohms—Carbon type—3 watts	.60
3456	Capacitor—0.05 mfd.	.44
3459	Capacitor—80 mmfd.	.44
3472	Capacitor—0.0024 mfd.	.32
3514	Resistor—250,000 ohms—Carbon type—½ watt—Package of 5	1.00
3555	Capacitor—0.1 mfd.	.36
3572	Socket—Radiotron 7 contact socket	.38
3573	Socket—Radiotron 4 contact socket	.32
3574	Coil—Choke coil	.68
3584	Ring—R. F. or oscillator coil retaining ring—Package of 5	.10
3586	Scale—Dial scale	.50
3587	Socket—Dial lamp socket and bracket	.32
3588	Volume control—Complete with mounting nut	1.40
3589	Switch—Tone control switch	.54
3592	Knob—Station selector, operating switch or volume control knob—Package of 5	.80
3593	Screw—Chassis mounting screw—Package of 10	.30
3594	Resistor—50,000 ohms—Carbon type—½ watt—Package of 5	1.00
3596	Capacitor—60 mmfd.	.36
3597	Capacitor—0.25 mfd.	.40
3598	Capacitor—0.1 mfd.	.36
3601	Coil—Choke coil	.68
3602	Resistor—60,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3603	Resistor—500 ohms—Carbon type—1 watt—Package of 5	1.10
3604	Capacitor—400 mmfd.	.30
3605	Capacitor—770 mmfd.	$0.30
3606	Capacitor—Comprising one 0.005 mfd. and one .025 mfd. capacitors	.40
6143	Resistor—40,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6228	Resistor—200,000 ohms—Carbon type—½ watt—Package of 5	2.50
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6443	Capacitor—10 mfd.	1.50
6464	Transformer—I. F. transformer	1.88
6470	Coil—Antenna coil	1.08
6471	Coil—Oscillator coil assembly	.74
6472	Coil—R. F. coil assembly	.94
7485	Socket—Radiotron 6 contact socket	.70
7487	Shield—Radiotron tube shield	.50
7589	Capacitor—Filter capacitor—Two 4.0 mfd. in container	1.64
7592	Condenser—3 gang variable tuning condenser	3.35
8985	Transformer—Power transformer—105–125 volts—50–60 cycles	4.26
8986	Transformer — Power transformer — 200–250 volts — 60 cycles	4.38
9002	Transformer—Power transformer—105–125 volts—25–50 cycles	6.00
	REPRODUCER ASSEMBLIES	
6467	Transformer—Output transformer	1.44
8987	Cone—Reproducer cone—Package of 5	5.00
9004	Coil assembly—Comprising field coil, magnet and cone support	2.35

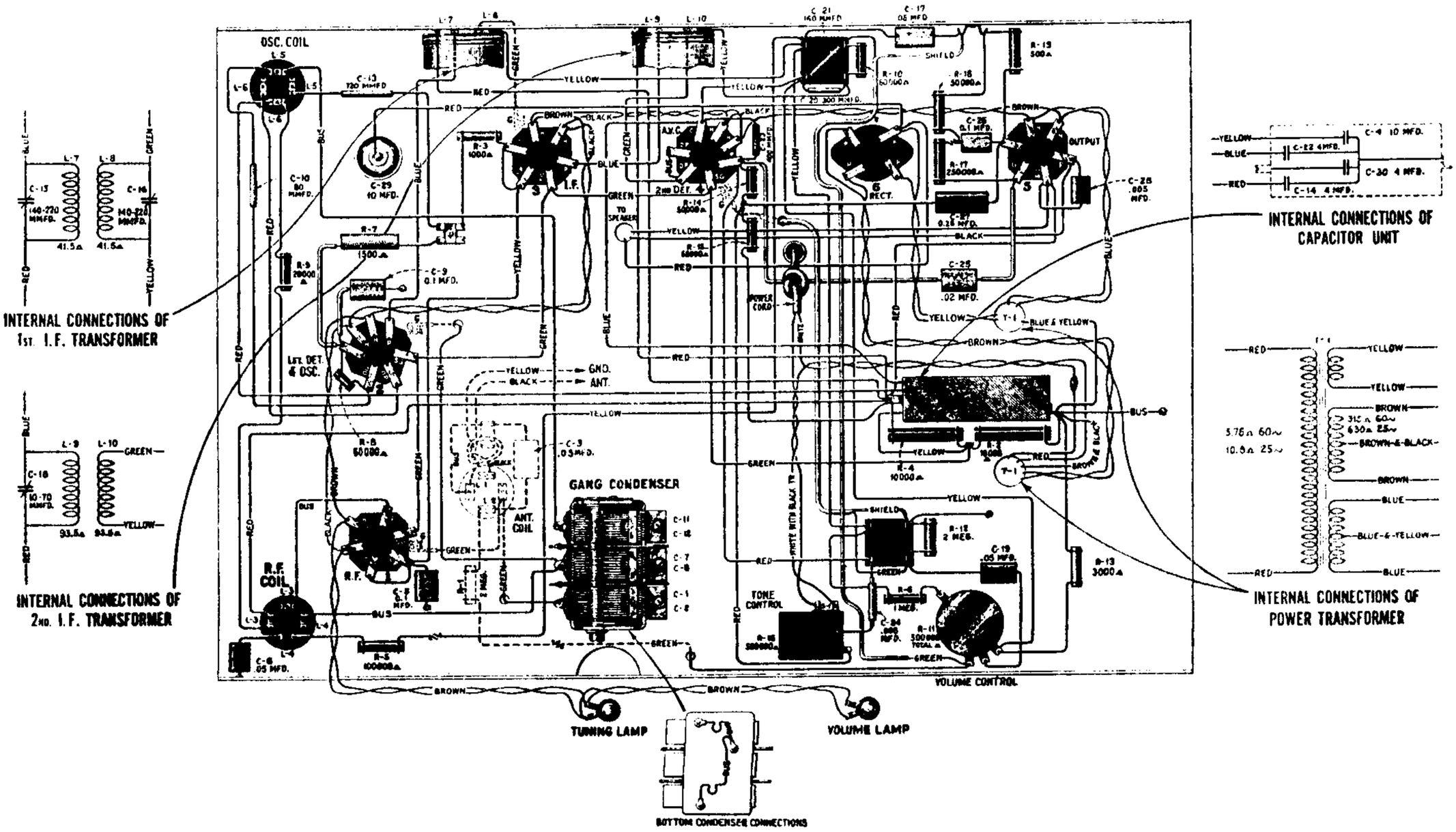
RCA-VICTOR, Inc.



Schematic Diagram

R-37

R-38



Wiring Diagram

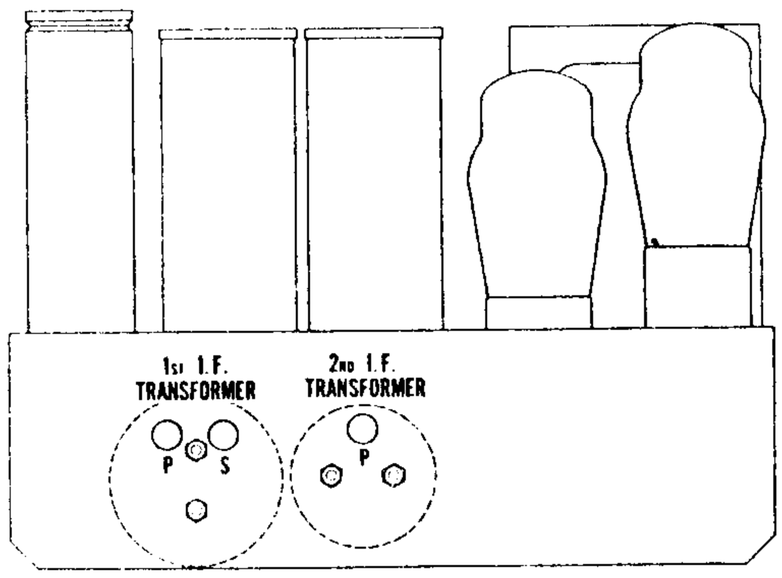
RCA-VICTOR, INC.
R-37 R-38
SERVICE DATA

Electrical Specifications

Voltage Rating.....115 Volts
Frequency Rating.....25–60 and 50–60 Cycles
Power Consumption...60 Cycle 75 Watts, 25 Cycle 80 Watts
Number and Types of Radiotrons..2 RCA-58, 1 RCA-2A7, 1 RCA-2B7, 1 RCA-2A5, 1 RCA-80—Total 6
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

This receiver is a six tube Superheterodyne incorporating a Dynamic Loudspeaker as a part of the chassis, automatic volume control, single heater type Pentode output tube, continuosly variable type tone control and the inherent sensitivity, selectivity and tone quality of the Superheterodyne.

The circuit consists of an R. F. stage using Radiotron RCA-58, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage using Radiotron RCA-58, an RCA-2B7 functioning a combined second detector and automatic volume control, an output stage using the new heater Pentode RCA-2A5 and the RCA-80 functioning as a rectifier.



Location of I. F. Line-up Adjustment Screws

Service work in conjunction with this receiver will be similar to that of other Superheterodyne receivers incorporating a similar type automatic volume control.

Line-up Adjustments

I. F. Tuning Adjustments—Two transformers comprising three tuned circuits (the secondary of the second transformer is untuned) are used in the intermediate amplifier. These are tuned to 175 K. C. and the adjustment screws are accessible as shown in Figure C. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.

(b) Short-circuit the antenna and ground leads and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the chassis.

(c) Connect the oscillator output between the 1st detector control grid and chassis ground. Connect the output meter across the voice coil of the loudspeaker and adjust the oscillator output so that with the receiver volume control at maximum, a slight deflection is obtained in the output meter.

(d) Adjust the primary of the second, and the secondary and primary of the first I. F. transformers until a maximum deflection is obtained. Keep the oscillator output at a low value so that only a slight deflection is obtained on the output meter at all times. Go over these adjustments a second time as there is a slight interlocking of adjustments. This completes the I. F. Adjustments.

R. F. and Oscillator Adjustments—The three gang capacitor screws are accessible at the top of the chassis. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 1400 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.

(b) Connect the output of the oscillator to the antenna and ground lead of the receiver. Check the dial at the extreme maximum position of the tuning capacitor. The indicator should be at the last division. Then set the dial at 140, the oscillator at 1400 K. C. and connect the output meter across the cone coil. Adjust the oscillator output so that a slight deflection is obtained when the receiver volume control is at maximum.

(c) Adjust the three tuning condenser line-up capacitors until maximum deflection is obtained in the output meter.

When making both the I. F. and R. F. adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

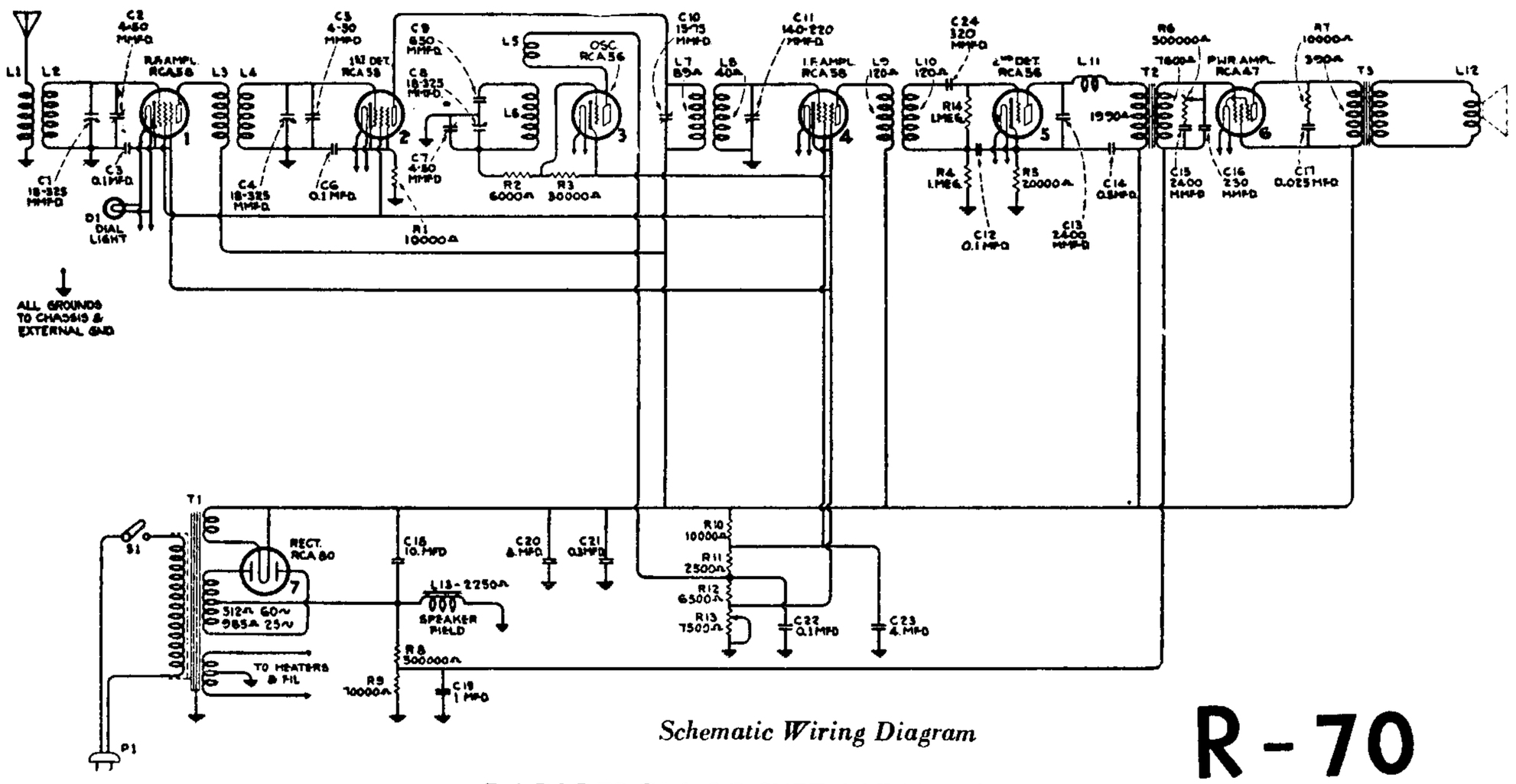
RADIOTRON SOCKET VOLTAGES

115 Volts. A. C. Line—No Signal

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current M. A.	Heater Volts
1. RCA-58 R. F.	3.0	95	255	5.0	2.31
2. RCA-2A7 1st Det. Osc.	3.0*	95*	255*	3.0*	2.31
3. RCA-58 I. F.	3.0	95	255	5.0	2.31
4. RCA-2B7 2nd Det. A. V. C.	7.5	92	60	2.0	2.31
5. RCA-2A5 Power	20.0	250	235	33.0	2.31
6. RCA-80 Rect.	700/350 Volts - 75 M.A. Total Current				4.82

*The Voltages and current refer to the detector part of the tube. The total cathode current is 10 M. A.

RCA-VICTOR, INC.



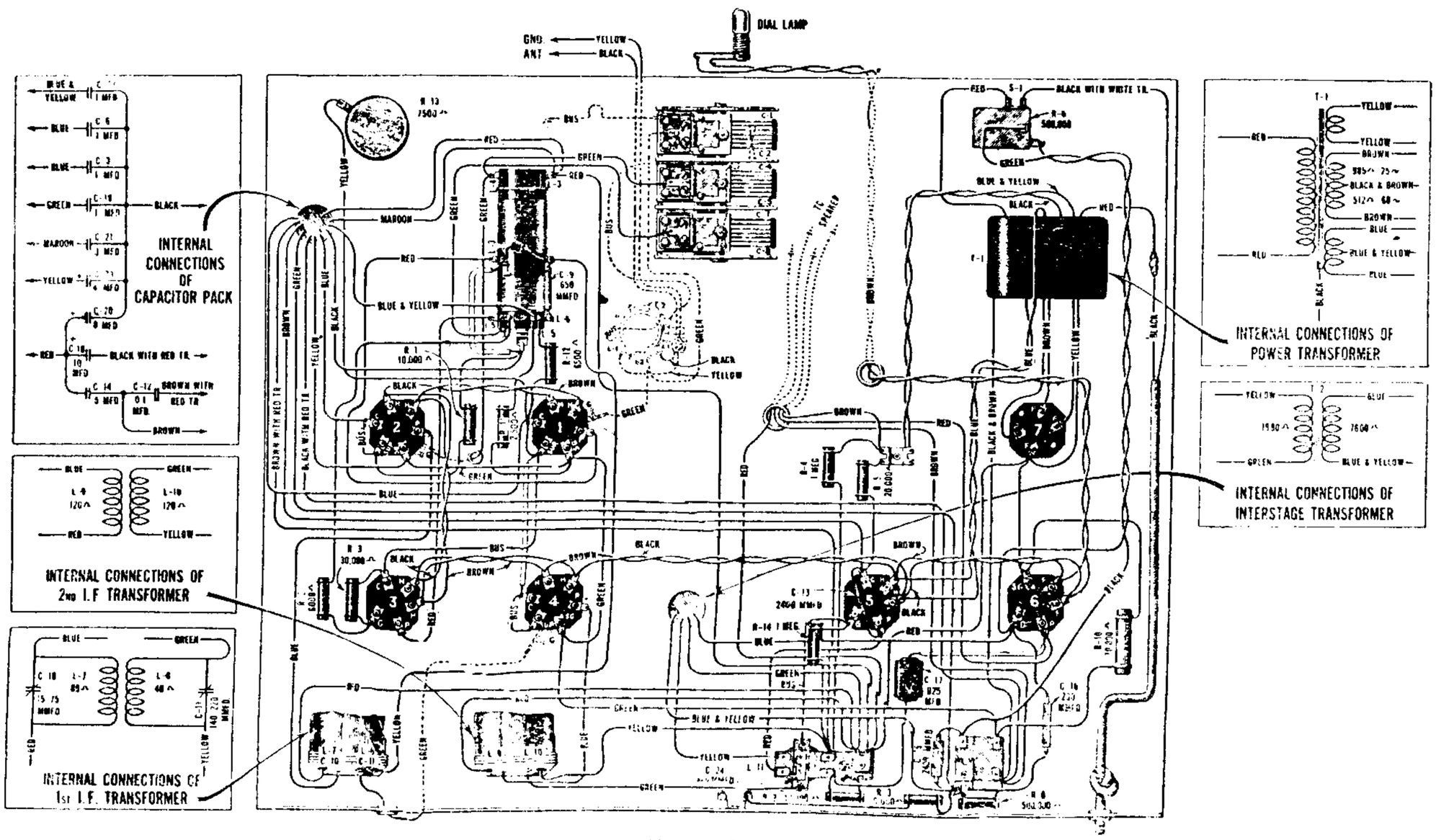
Schematic Wiring Diagram

R-70

RADIOTRON SOCKET VOLTAGES

All Voltages Measured at Maximum Volume with no Signal Impressed on Input. 120 Volt 60 Cycle A. C. Source Used

Radiotron No.	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Heater or Filament Volts
1. R. F. RCA-58	4.5	100	245	6.0	2.37
2. Oscillator RCA-56	—	—	60	4.5	2.37
3. First Detector RCA-58	13.0	90	235	1.3	2.37
4. I. F. RCA-58	4.5	100	245	6.0	2.37
5. Second Detector RCA-56	18.0	—	230	1.0	2.37
6. Power RCA-247	16.5	250	240	30.0	2.37
7. Rectifier UX-280	370 Volts R. M. S. each plate			70.0	5.0



Chassis Wiring Diagram

RCA-VICTOR, INC.

SERVICE NOTES
for
RCA Victor Model R-71-B

ELECTRICAL SPECIFICATIONS

"A" Batteries Required ..... Eveready Aircell "A" Battery
"B" Batteries Required ..... Four 45 Volt Blocks, Preferably of Heavy Duty Type
"A" Battery Current ..... 0.48 Amperes
Average "B" Battery Current ..... 18 M. A.
Type of Circuit ..... Super-Heterodyne with A. V. C., Class "B" Output Stage and Compensated Volume Control
Type and Number of Radiotrons ..... 3 RCA-234, 1 RCA-232, 4 RCA-230—Total 8
Number of R. F. Stages ..... One
Number of I. F. Stages ..... One
Type of Second Detector ..... Pentode, Combining Detector, A. V. C. and Audio Amplification
Number of Audio Stages ..... Two
Undistorted Output ..... 1.00 Watt

PHYSICAL SPECIFICATIONS

Height ..... 18 11/16 Inches
Depth ..... 10 21/32 Inches
Width ..... 14 Inches
Weight Alone ..... 34 Pounds
Weight Packed for Shipment ..... 40 Pounds

RCA Victor Model R-71-B is an eight tube battery operated Super-Heterodyne radio receiver incorporating such features as Super-Control R. F. Amplifier Pentode Radiotrons in the R. F. and I. F. stages, automatic volume control, combination Pentode second detector, compensated Class "B" audio amplifier and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-Heterodyne. The chassis and permanent magnet dynamic loudspeaker are enclosed in a standard R-71 cabinet. The performance of this receiver is comparable in all respects to the A. C. model of the same designation, except in output volume.

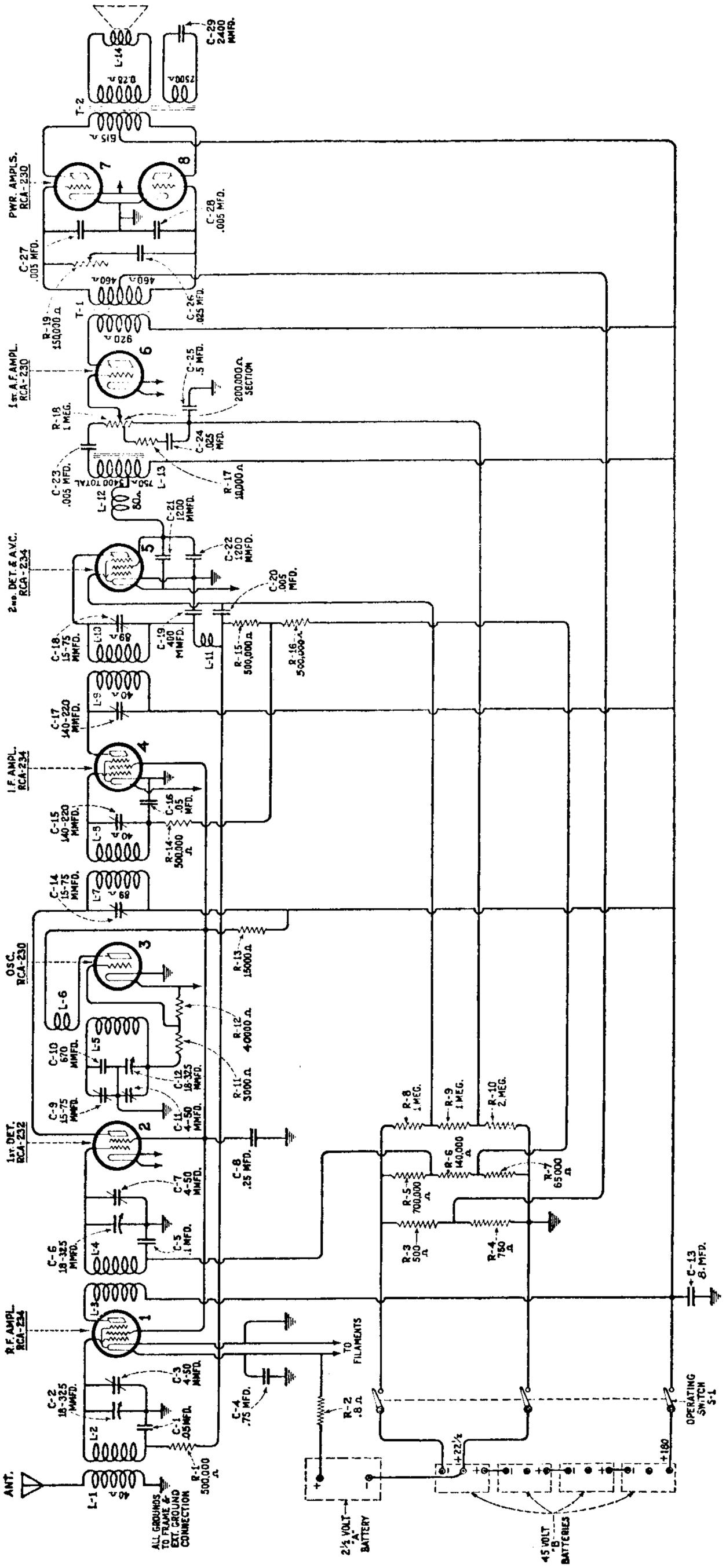
SERVICE DATA

Except for different chassis design the circuit used in the R-71-B is very similar to that of the P-31 Portable Radiola. A reference to this Service Note should therefore be made for a description of the circuit and manner of making adjustments. The voltage readings are given below and the replacement parts on page 3. Figure 1 shows the schematic circuit diagram and Figure 2 the chassis wiring diagram.

RADIOTRON SOCKET VOLTAGES
(No signal being received)

Radiotron No.	Control Grid to Filament Volts	Screen Grid to Filament Volts	Plate to Filament Volts	Screen Current M. A.	Plate Current M. A.	Filament Volts
1. R. F.	0.2	65	157	1.0	3.0	2.0
2. 1st Detector	0.5	65	157	0.1	0.2	2.0
3. Oscillator	1.0	—	65	—	4.0	2.0
4. I. F.	0.5	65	157	1.0	3.0	2.0
5. 2d Detector	2.0	155	0	4.0	0	2.0
6. 1st A. F.	1.0	—	155	—	2.5	2.0
7. Power	14.0	—	155	—	1.2	2.0
8. Power	14.0	—	155	—	1.2	2.0

RCA-VICTOR, INC.



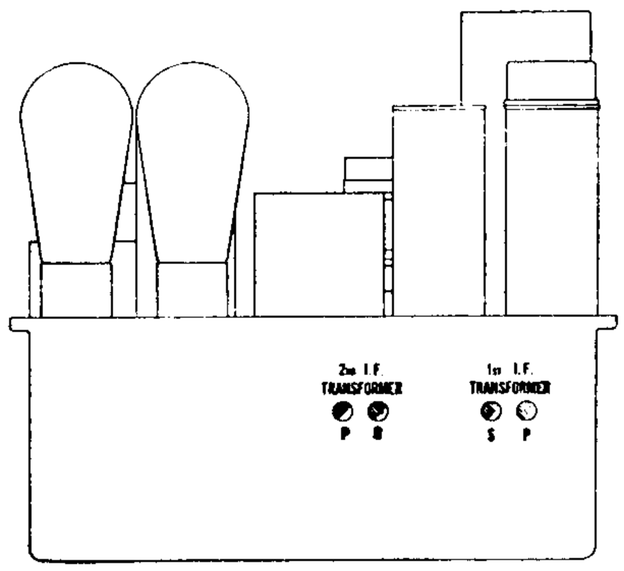
Schematic Wiring Diagram of R-71-B

RCA-VICTOR, INC.
R-73
SERVICE DATA

Electrical Specifications

Voltage Rating.....105–125 Volts
Power Consumption.....100 Watts
Type and Number of Radiotrons.....3 RCA-58, 1 RCA-56, 1 RCA-55, 2 RCA-247, 1 UX-280—Total, 8
Type of Circuit.....Super-Heterodyne with A. V. C., tone control and push-pull Pentode Output
Undistorted Output.....3 Watts
R. F. and Oscillator Alignment Frequency 600 K. C. and 1400 K. C.
Intermediate Frequency.....175 K. C.

This receiver is an eight tube Super-Heterodyne incorporating Automatic volume control, tone control and Push-Pull Pentode Output. Service Data will be found to be similar to that of other Super-Heterodyne receivers incorporating similar features.



I. F. Alignment Location

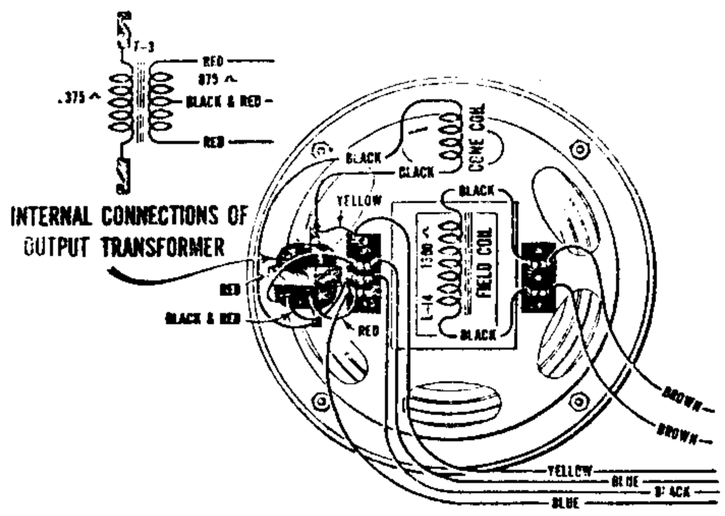
Line-up Adjustments

I. F. Tuning Adjustments—Two transformers comprising four tuned circuits are used in the intermediate amplifier. These are tuned to 175 K. C. and the adjustment screws are accessible from the rear of the chassis. See Figure 5 for location of the adjustment screws and proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.
(b) Remove the oscillator tube and connect a ground to the chassis.
(c) Connect the oscillator output between the 1st detector control grid and chassis ground. Connect the output meter across the voice coil of the loudspeaker and adjust the oscillator output so that with the receiver volume control at maximum, a *slight deflection* is obtained in the output meter.
(d) Adjust the secondary and then the primary of the second and then the first I. F. transformers until a maximum deflection is obtained. Keep the oscillator output at a low value so that only a slight deflection is obtained on the output meter at all times. Go over these adjustments a second time as there is a slight interlocking of adjustments. This completes the I. F. Adjustments.

R. F. and Oscillator Adjustments—The three gang capacitor screws are accessible through the bottom cover and the 600 K. C. oscillator trimmer through the top of the chassis adjacent to the R. F. coil. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 1400 K. C. and 600 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.



Loudspeaker Wiring

(b) Connect the output of the oscillator to the antenna and ground lead of the receiver. Check the dial at the extreme maximum position of the tuning capacitor. The indicator should be at the short line on the dial. Then set the dial at 1400 K. C., the oscillator at 1400 K. C. and connect the output meter across the cone coil. Adjust the oscillator output so that a slight deflection is obtained when the receiver volume control is at maximum.
(c) Adjust the three line-up capacitors accessible at the bottom of the receiver until maximum deflection is obtained in the output meter.
(d) Shift the oscillator frequency to 600 K. C. and tune the signal. Then adjust the 600 K. C. capacitor, accessible through the top, until maximum deflection is obtained. The main tuning capacitor must be rocked back and forth while making this adjustment.
(e) Then realign at 1400 K. C. This completes the adjustments.

When making both the I. F. and R. F. adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

RADIOTRON SOCKET VOLTAGES

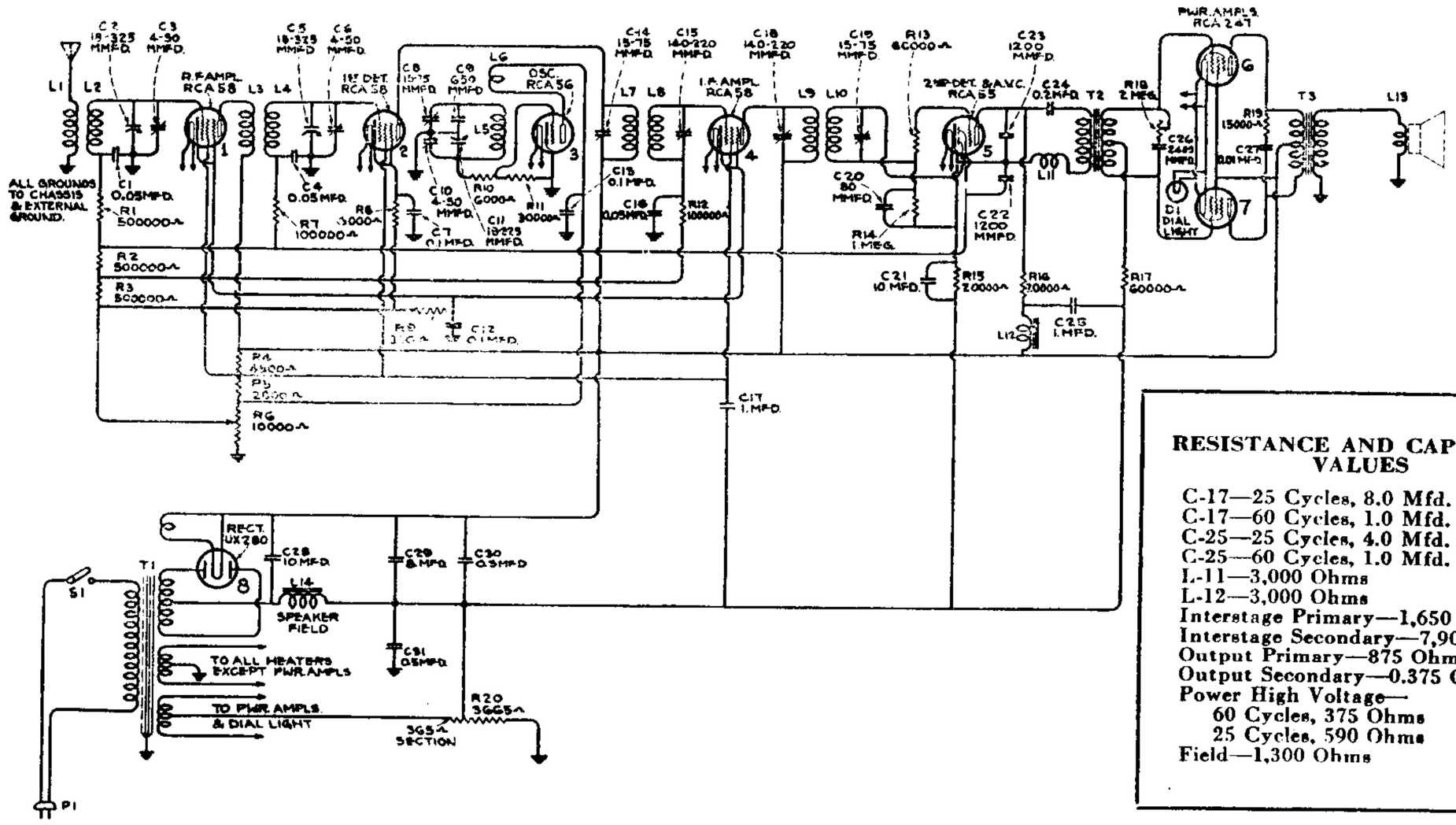
120 Volts, 60 Cycles A. C. Line—V. C. At Maximum and no Signal

Radiotron No.	Control Grid to Filament or Cathode Volts	Screen Grid to Filament or Cathode Volts	Plate to Filament or Cathode Volts	Plate Current M. A.	Heater or Filament Volts
1. R. F. RCA-58	4.5	100	165	6.0	2.37
2. 1st Det. RCA-58	11.0	95	155	1.5	2.37
3. Oscillator RCA-56	—	—	70	4.5	2.37
4. I. F. RCA-58	4.5	100	165	6.0	2.37
5. 2nd Det. RCA-55 and A.V.C.	—	—	55	4.7	2.37
6. Power RCA-247	19.0	235	225	20.0	2.37
7. Power RCA-247	19.0	235	225	20.0	2.37

OTHER IMPORTANT VOLTAGES

2nd Detector and A.V.C. Cathode to Low Side of Field. 105 Volts
Chassis to Low Side of Field.....90 Volts
Voltage Across Field.....120 Volts
Rectifier..370 Volts R.M.S. Each Plate—80 M.A. Each Plate

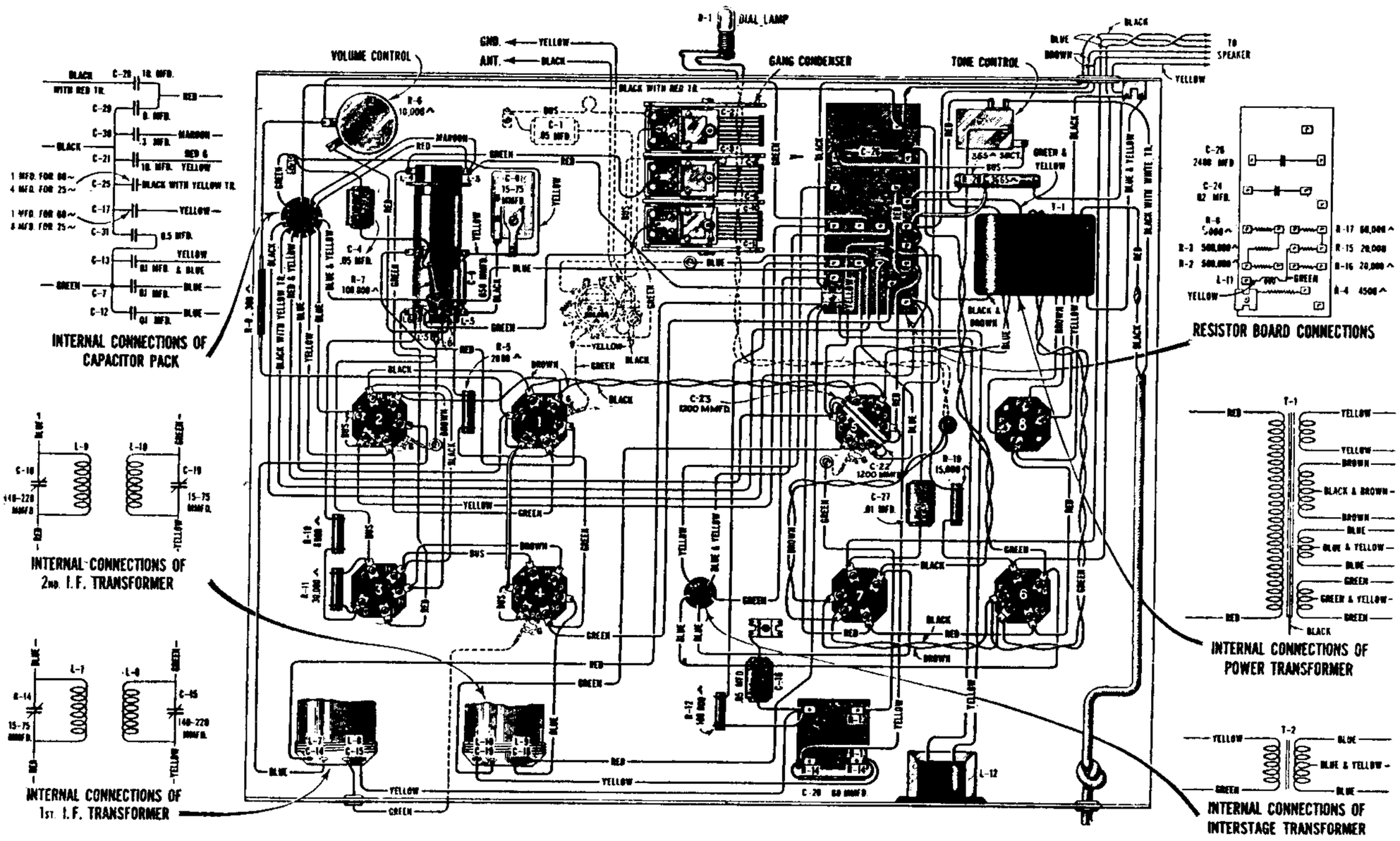
RCA-VICTOR, INC.
R-73



RESISTANCE AND CAPACITOR VALUES

C-17—25 Cycles, 8.0 Mfd.
C-17—60 Cycles, 1.0 Mfd.
C-25—25 Cycles, 4.0 Mfd.
C-25—60 Cycles, 1.0 Mfd.
L-11—3,000 Ohms
L-12—3,000 Ohms
Interstage Primary—1,650 Ohms
Interstage Secondary—7,900 Ohms
Output Primary—875 Ohms
Output Secondary—0.375 Ohm
Power High Voltage—
60 Cycles, 375 Ohms
25 Cycles, 590 Ohms
Field—1,300 Ohms

Schematic Circuit



Chassis Wiring Diagram

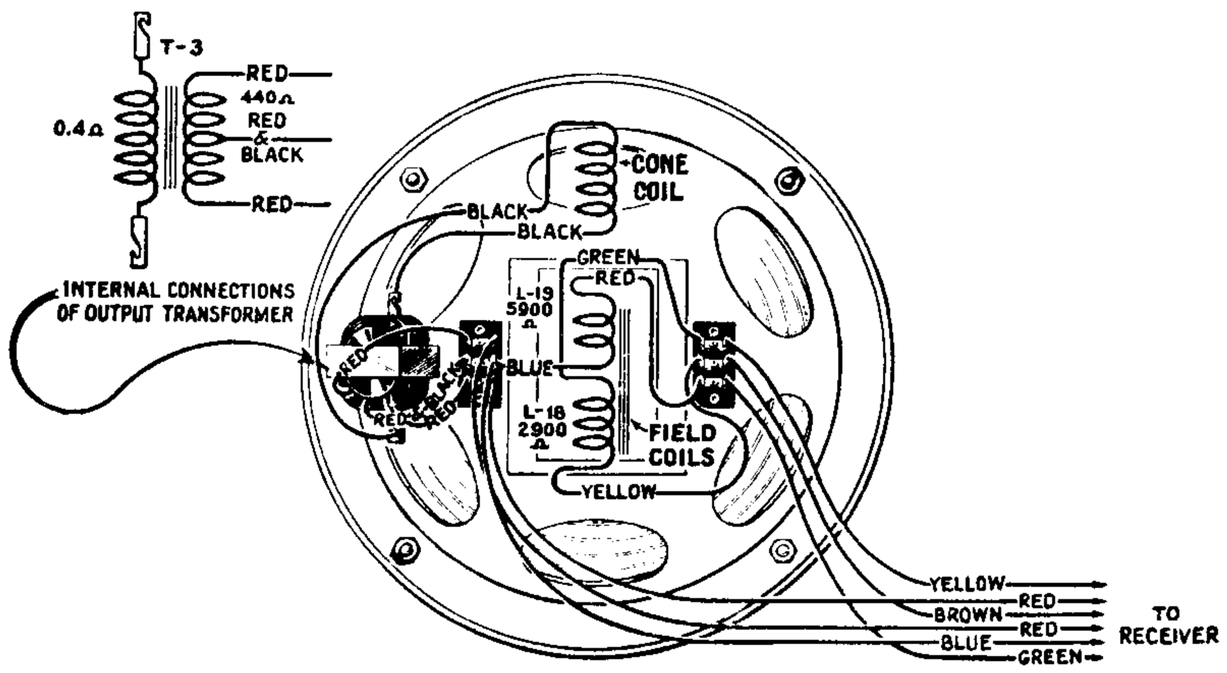
RCA-VICTOR, INC.

R-74, R-76, R-77.

SERVICE DATA

Service data in conjunction with these receivers will be found to be similar to that of other RCA Victor Super-Heterodyne receivers employing automatic volume control. A dummy Radiotron RCA-56 should replace the tube normally in the A. V. C. socket when making R. F., oscillator and I. F. adjustments. The Radiotron socket voltages are given below and the Replacement Parts on Pages 7 and 8.

Figure 1 shows the schematic diagram for all models. Figures 2 and 4 show the wiring diagrams while Figure 3 shows the loudspeaker wiring. Figures 5, 6, and 7 show various magnetic pickup connections and Figure 8 gives the correct manner of attaching the RCA Victor Short Wave Adaptor.



Loudspeaker Wiring

RADIOTRON SOCKET VOLTAGES

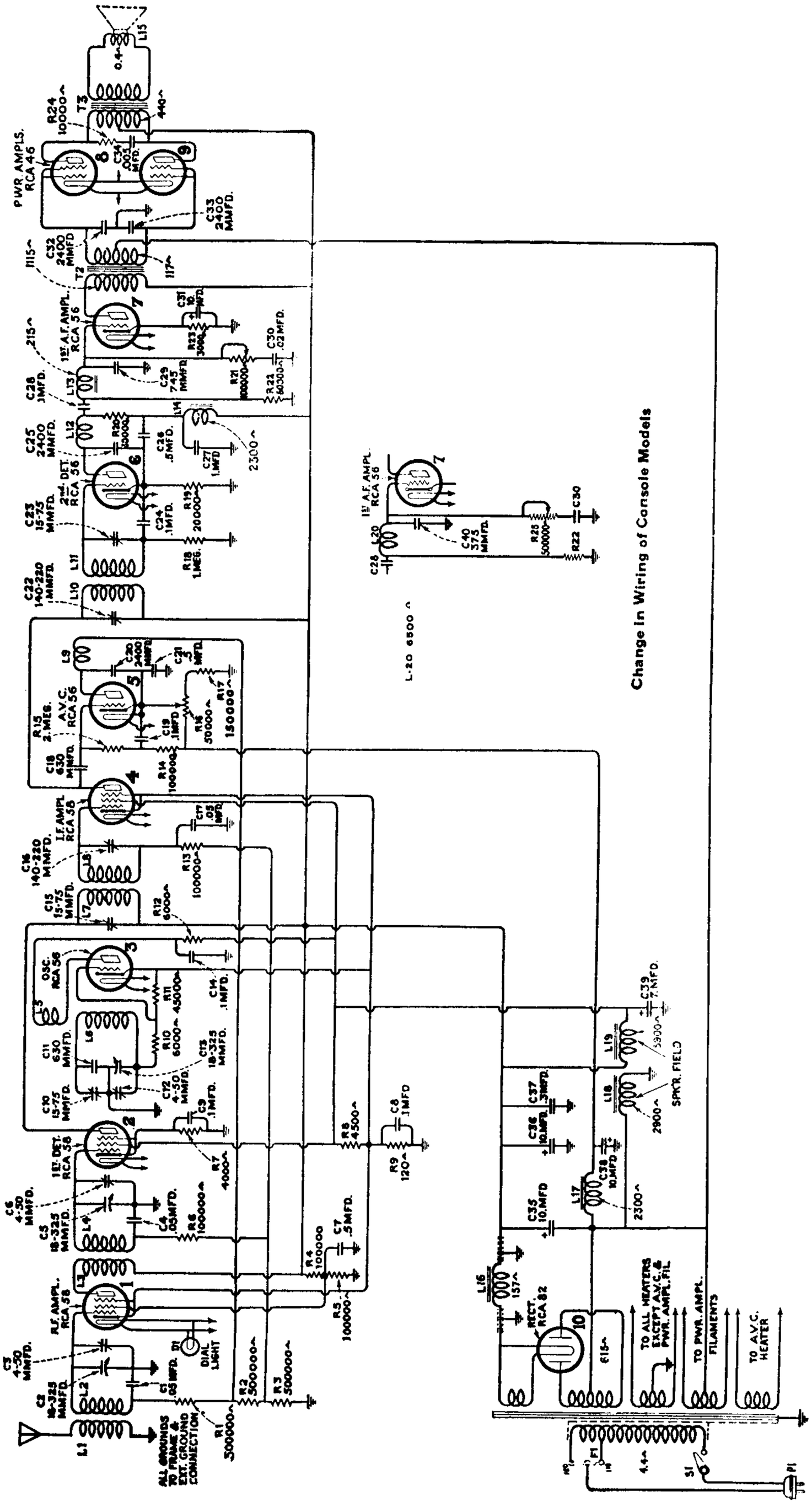
120 Volt A. C. Line

(No Signal Being Received—Antenna Lead Grounded to Chassis)

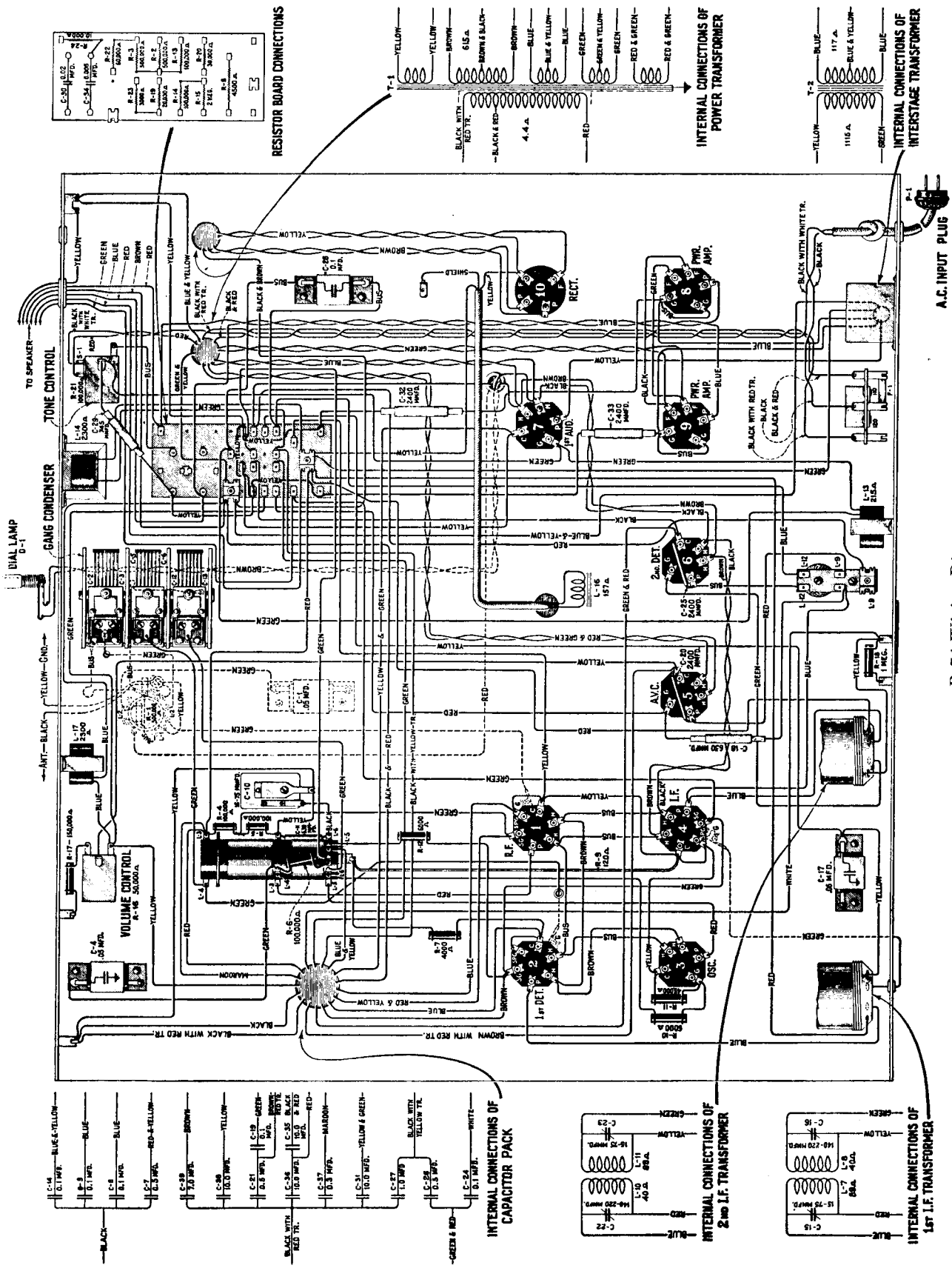
Radiotron No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current, M. A.	Heater or Filament Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1. R. F.	+4	1.0	90	280	0	2.4
2. 1st Det.	0	1.2	90	275	0	2.4
3. Osc.	+4	0	—	55	5.0	2.4
4. I. F.	+3	1.8	90	280	0	2.4
5. A. V. C.	0	0	—	5	0	2.4
6. 2nd Det.	+15	3.0	—	225	1.0	2.4
7. 1st A. F.	+14	10.0	—	260	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4
VOLUME CONTROL AT MAXIMUM						
1. R. F.	+4	0	70	250	4.5	2.4
2. 1st Det.	+6	0.6	75	235	2.0	2.4
3. Osc.	+4	0	—	50	5.0	2.4
4. I. F.	+4	1.5	84	250	4.5	2.4
5. A. V. C.	0	0	—	15	0	2.4
6. 2nd Det.	+15	3.0	—	210	1.0	2.4
7. 1st A. F.	+14	10.0	—	240	5.0	2.4
8. Power	—	0	—	400	6.0	2.4
9. Power	—	0	—	400	6.0	2.4

RCA-VICTOR, INC.

Schematic Circuit Diagram

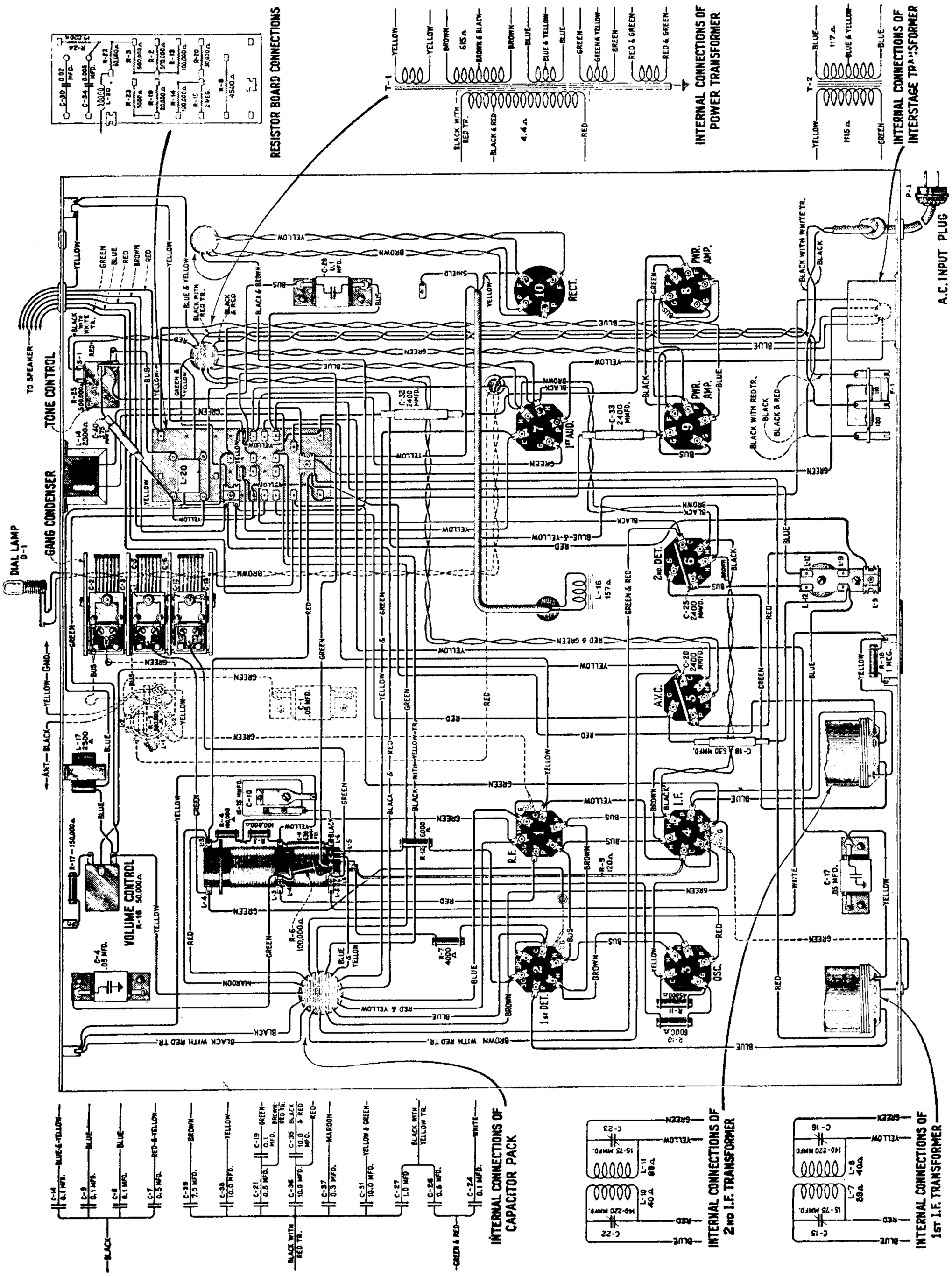


RCA-VICTOR, INC.



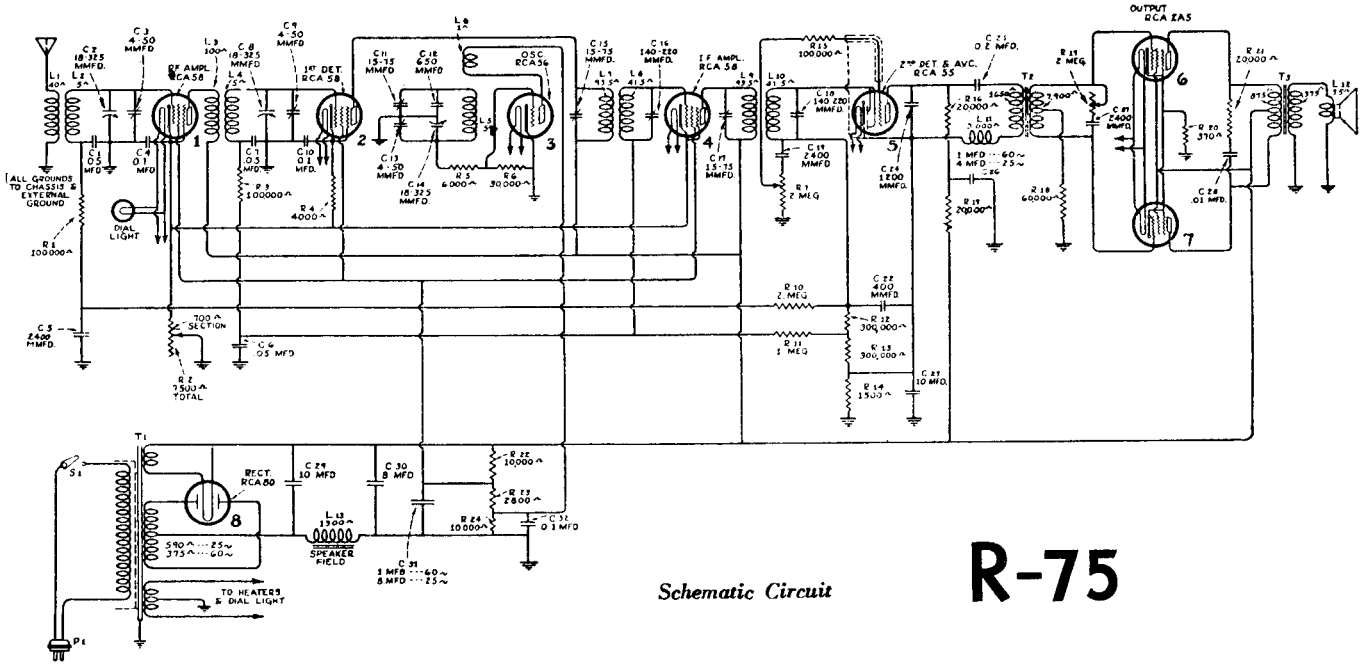
R-74 Wiring Diagram

RCA-VICTOR, INC.



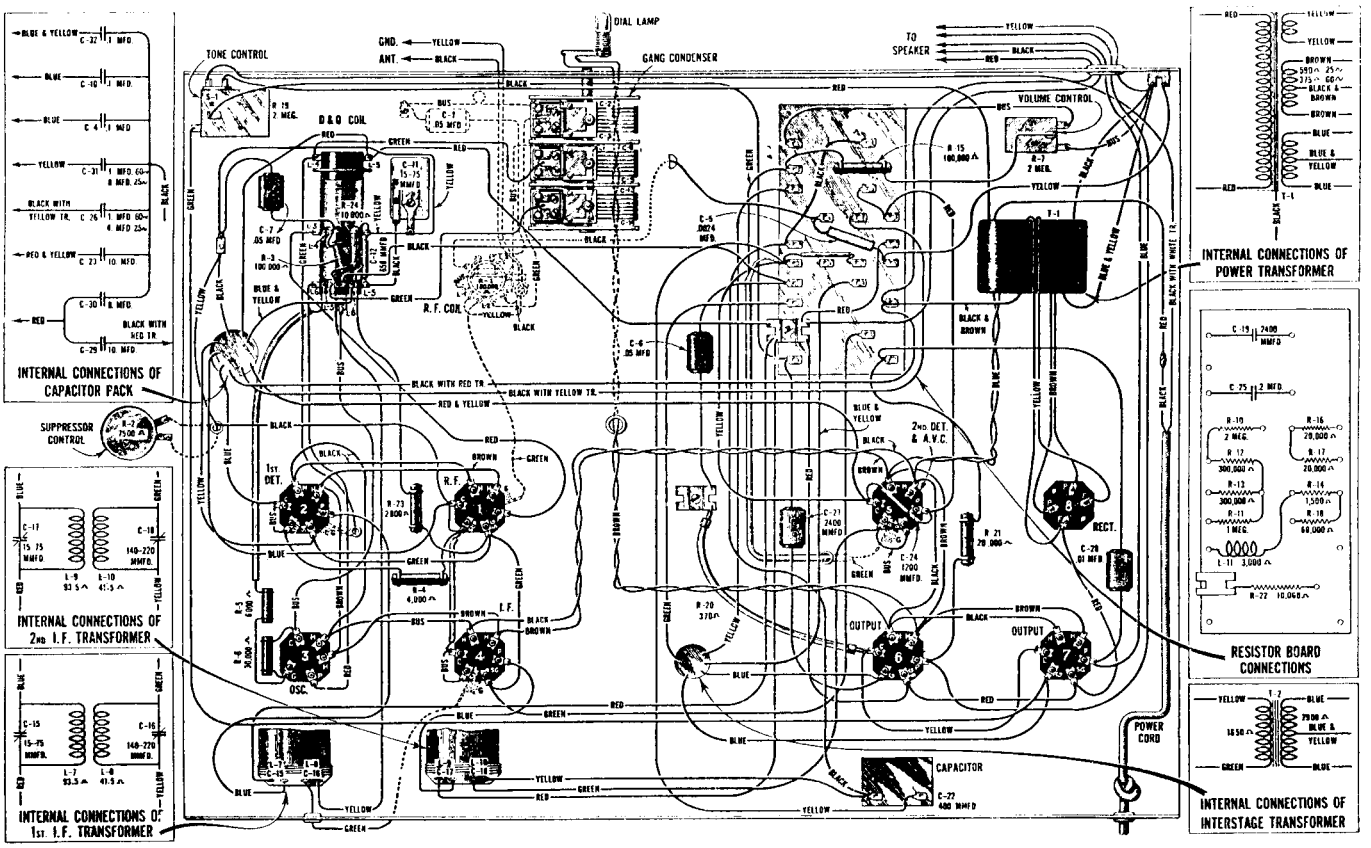
R-76 and R-77 Wiring Diagram

RCA-VICTOR, INC.



Schematic Circuit

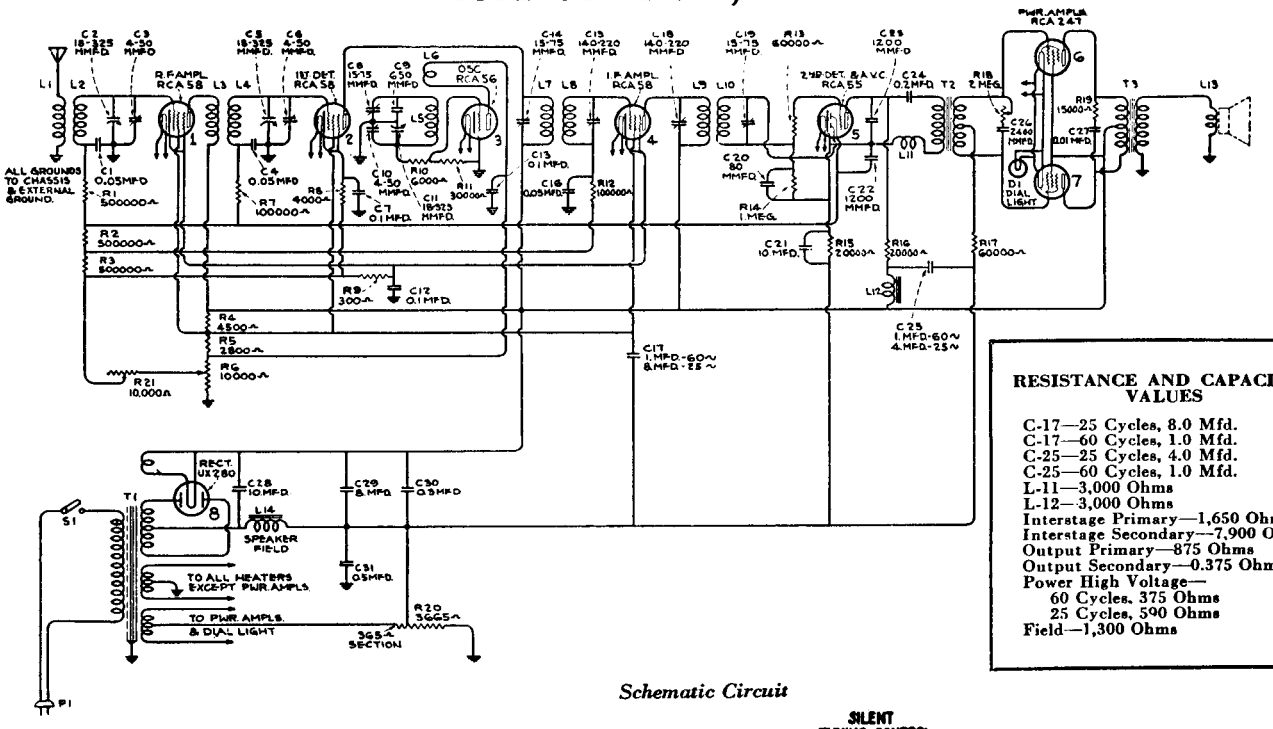
R-75



Chassis Wiring Diagram

Radiotron No.	Control Grid to Cathode, Volts	Screen Grid to Filament or Cathode, Volts	Plate to Filament or Cathode, Volts	Plate Current, M. A.	Heater or Filament, Volts
1. R. F. RCA-58	4.0	100	240	6.0	2.4
2. 1st Det. RCA-58	10.0	90	230	2.0	2.4
3. Osc. RCA-56	—	—	75	4.5	2.4
4. I. F. RCA-58	4.0	100	240	6.0	2.4
5. 2nd Det. RCA-55 and A.V.C.	5.8	—	100	4.0	2.4
6. PWR. RCA-2A5	19.0	230	220	20.0	2.4
7. PWR. RCA-2A5	19.0	230	220	20.0	2.4
Rectifier—370 Volts R.M.S. Each Plate					

RCA-VICTOR, INC.

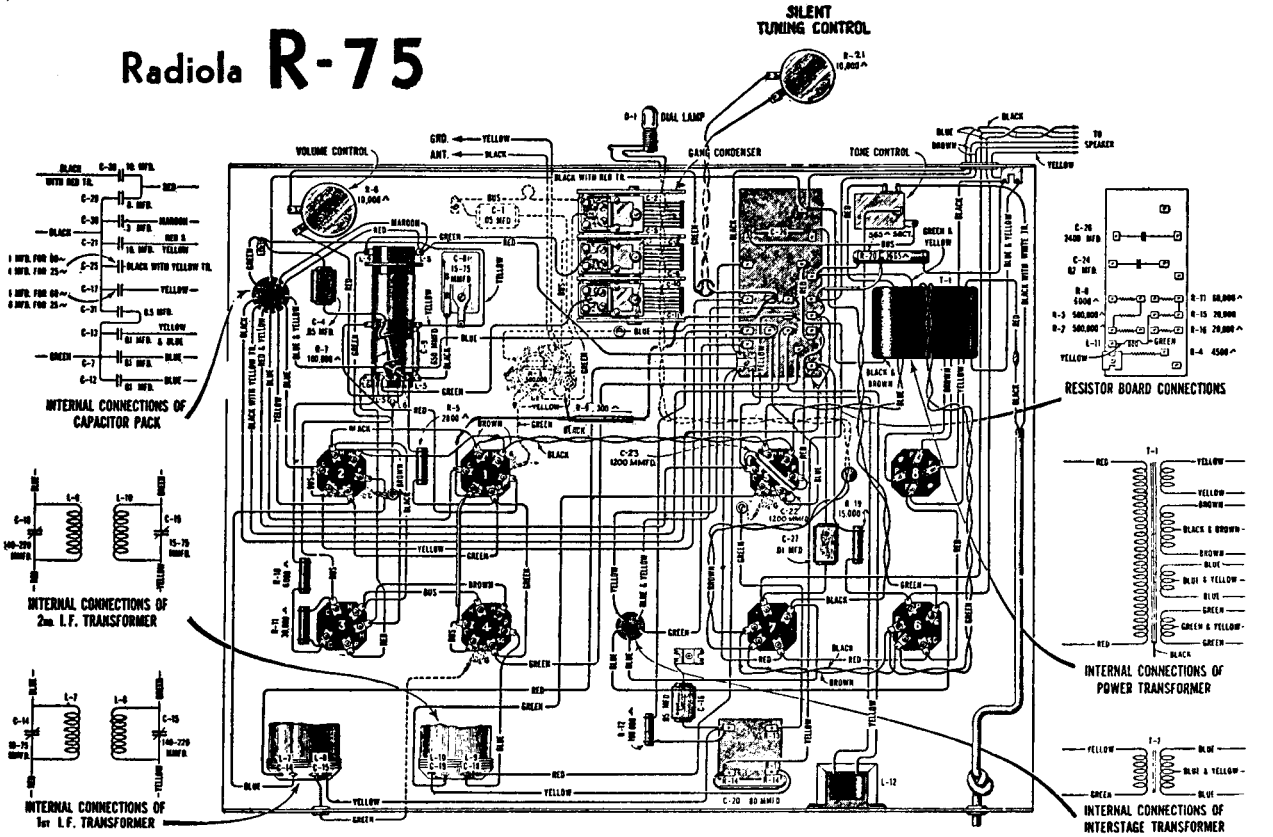


Schematic Circuit

RESISTANCE AND CAPACITOR VALUES

C-17—25 Cycles, 8.0 Mfd.
C-17—60 Cycles, 1.0 Mfd.
C-25—25 Cycles, 4.0 Mfd.
C-25—60 Cycles, 1.0 Mfd.
L-11—3,000 Ohms
L-12—3,000 Ohms
Interstage Primary—1,650 Ohms
Interstage Secondary—7,900 Ohms
Output Primary—875 Ohms
Output Secondary—0.375 Ohm
Power High Voltage—
60 Cycles, 375 Ohms
25 Cycles, 590 Ohms
Field—1,300 Ohms

Radiola R-75



Radiotron No.	Control Grid to Filament or Cathode Volts	Screen Grid to Filament or Cathode Volts	Plate to Filament or Cathode Volts	Plate Current M. A.	Heater or Filament Volts
1. R. F. RCA-58	4.5	100	165	6.0	2.37
2. 1st Det. RCA-58	11.0	95	155	1.5	2.37
3. Oscillator RCA-56	—	—	70	4.5	2.37
4. I. F. RCA-58	4.5	100	165	6.0	2.37
5. 2nd Det. RCA-55 and A.V.C.	—	—	55	4.7	2.37
6. Power RCA-247	19.0	235	225	20.0	2.37
7. Power RCA-247	19.0	235	225	20.0	2.37

OTHER IMPORTANT VOLTAGES

2nd Detector and A.V.C. Cathode to Low Side of Field . 105 Volts
Chassis to Low Side of Field . . . . . 90 Volts
Voltage Across Field . . . . . 120 Volts
Rectifier . . 370 Volts R.M.S. Each Plate—80 M.A. Each Plate

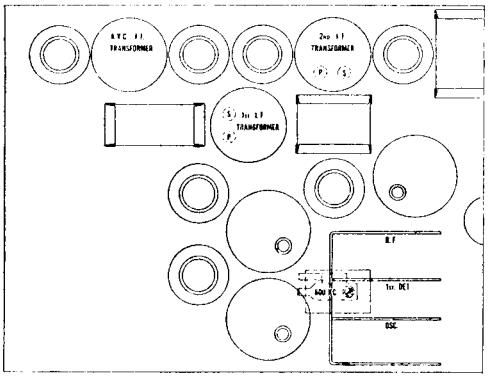
RCA-VICTOR, INC.
R-90
SERVICE DATA

Electrical Specifications

Voltage Rating ..... 105-125 Volts
Power Consumption ..... 120 Watts
Type and Number of Radiotrons ..... 3 RCA-56, 4 RCA-58, 1 UX-280, 2 RCA-2A5—Total, 10
Frequency Range ..... 540 K. C.–1500 K. C.
Undistorted Output ..... 4.0 Watts

This receiver is a ten tube Super-Heterodyne radio receiver. Features such as illuminated control, improved automatic volume control, noise suppressor, compensated volume control, heater pentode output tubes operated as a push-pull stage, acoustically correct cabinets and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne are included in this instrument.

Figure A shows the schematic circuit, Figure B the wiring diagram, Figure C the location of the adjustable capacitors and Figure D, the loudspeaker wiring. The Radiotron socket voltages, the line-up procedure and the replacement parts are given on the following pages.



Location of Adjustable Capacitors

R. F. And Oscillator Line - Up Capacitor Adjustments

Four adjustable capacitors are provided for aligning the R. F. circuits and adjusting the oscillator frequency so that the oscillator will maintain a constant frequency—175 K. C.—difference from that of the incoming signal. Poor quality, insensitivity, poor A. V. C. action and possible inoperation of the receiver may be caused by these capacitors being out o adjustment.

If the other adjustments have not been tampered with—the intermediate transformer tuning capacitors—the following procedure may be used for aligning these capacitors.

(a) Procure an R. F. Oscillator giving a modulated signal at 600 K. C. and 1400 K. C. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

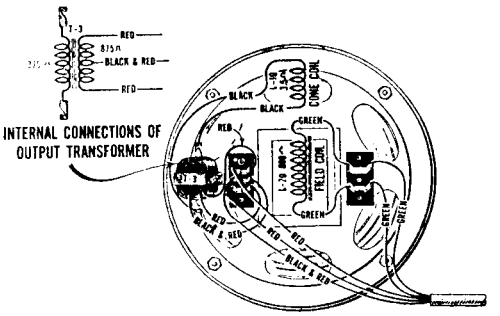
(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket. This should be a tube that is otherwise normal in all respects but having one heater prong removed. Insert this tube in the A. V. C. socket.

(d) First check the chassis and carefully ascertain that the dial pointer reads exactly at the first line on the scale when the tuning capacitor rotor plates are fully meshed with the stator plates.

(e) Place the oscillator in operation at exactly 1400 K. C. and couple its output to the antenna. Set the dial scale at exactly 1400. Connect the output meter to the set and place the volume control and suppressor control, if noise level will permit, at its maximum position. Adjust the oscillator input so that an excessive reading on the output meter is not obtained.

(f) With a suitable socket wrench—the nuts are at ground potential—adjust the oscillator, first detector and R. F. line-up capacitors, until a maximum deflection is obtained in the output meter.

(g) Set the oscillator at 600 K. C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K. C. series capacitor, Figure C, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.



Loudspeaker Wiring

(h) Change the frequency of the oscillator to 1400 K. C. and set the dial at 1400. Again make the adjustments given under (f) and (g).

So adjusted, the R. F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R. F. signal.

I. F. Tuning Capacitor Adjustments

Although this receiver has two I. F. stages, one for the second detector and one for the A. V. C., only two of the three I. F. transformers are tuned by adjustable capacitors and require adjustment. The stage used for the A. V. C. is broadly tuned and does not require any adjustment.

The transformers are all tuned to 175 K. C. and the circuits broadly peaked.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R. F. Oscillator that gives a modulated 175 K. C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket.

(d) Remove the oscillator tube and make a good ground connection to the chassis. Place the oscillator in operation and couple its output from the control grid of the first detector to ground. Adjust the oscillator output, with the receiver volume control at maximum, until a deflection is obtained in the output meter.

(e) Refer to Figure C. Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

When the adjustments are made the set should perform at its maximum efficiency. However, due to the interlocking of adjustments, it is good practice to follow the I. F. adjustments with the R. F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the preceding section.

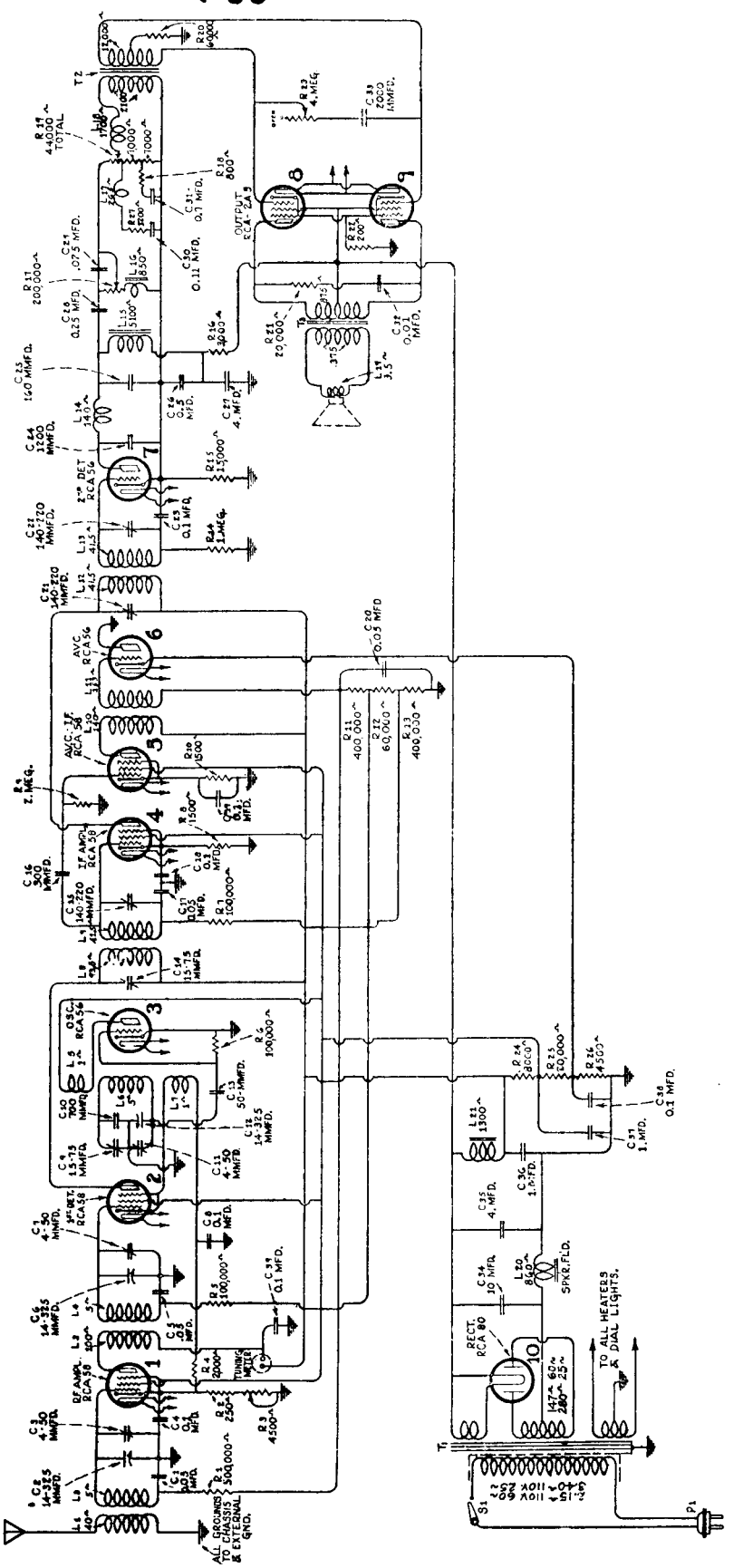
RADIOTRON SOCKET VOLTAGES

120 Volt, A. C. Line—No signal being received—Volume Control at minimum

Radiotron No.	Cathode to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current, M. A.	Heater or Filament Volts, A. C.
1. R. F.	3.0	100	230	7.0	2.4
2. 1st Detector	8.0	95	220	2.5	2.4
3. Oscillator	—	—	105	6.0	2.4
4. I. F.	7.5	100	225	2.5	2.4
5. A. V. C.—I. F.	7.5	100	225	2.5	2.4
6. A. V. C.	20.0	—	0	—	2.4
7. 2nd Detector	17.0	—	250	1.2	2.4
8. Power	18.0	255	245	33.0	2.4
9. Power	18.0	255	245	33.0	2.4

RCA-VICTOR, INC.

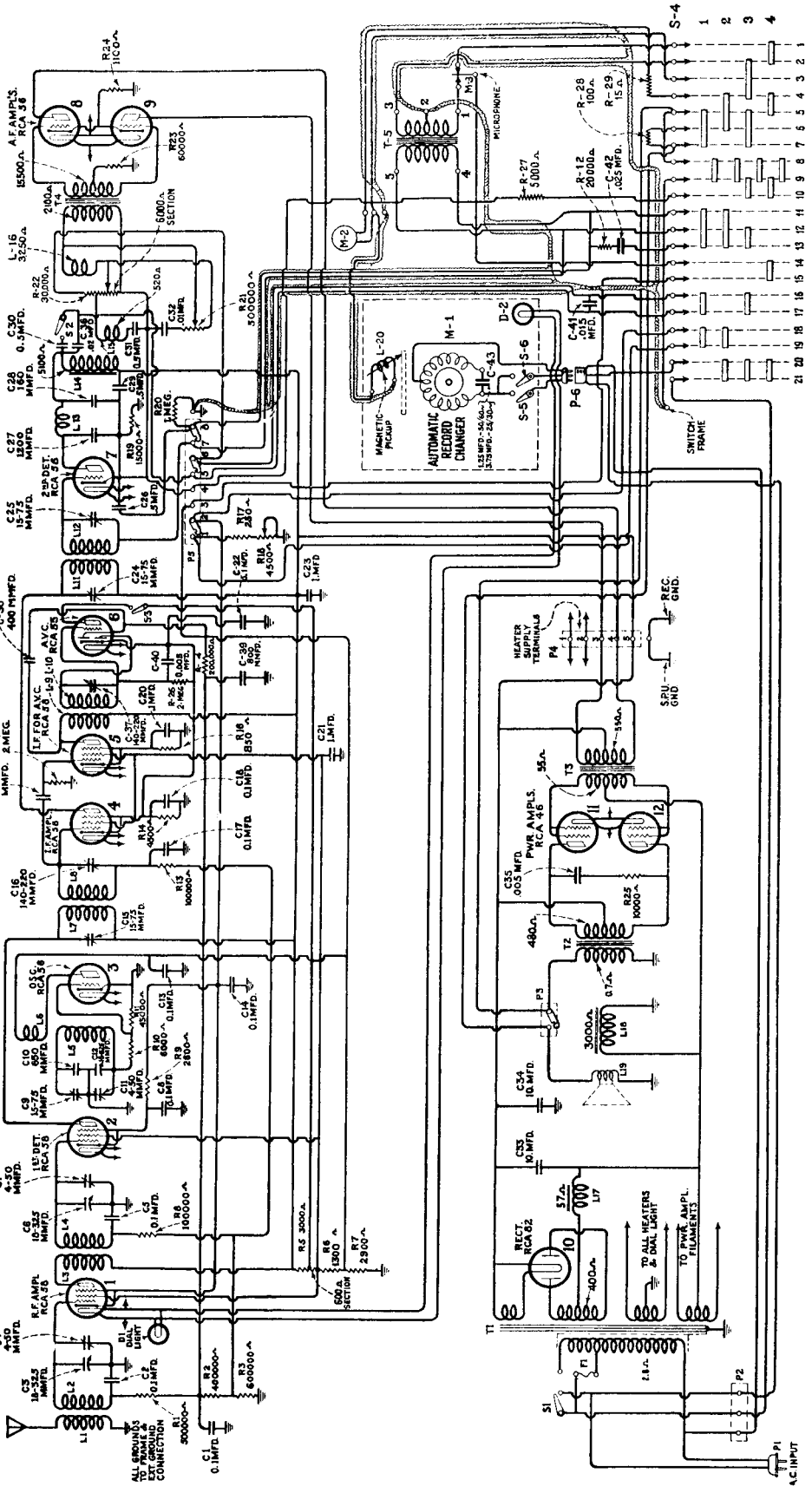
R-90



RCA-VICTOR, INC.

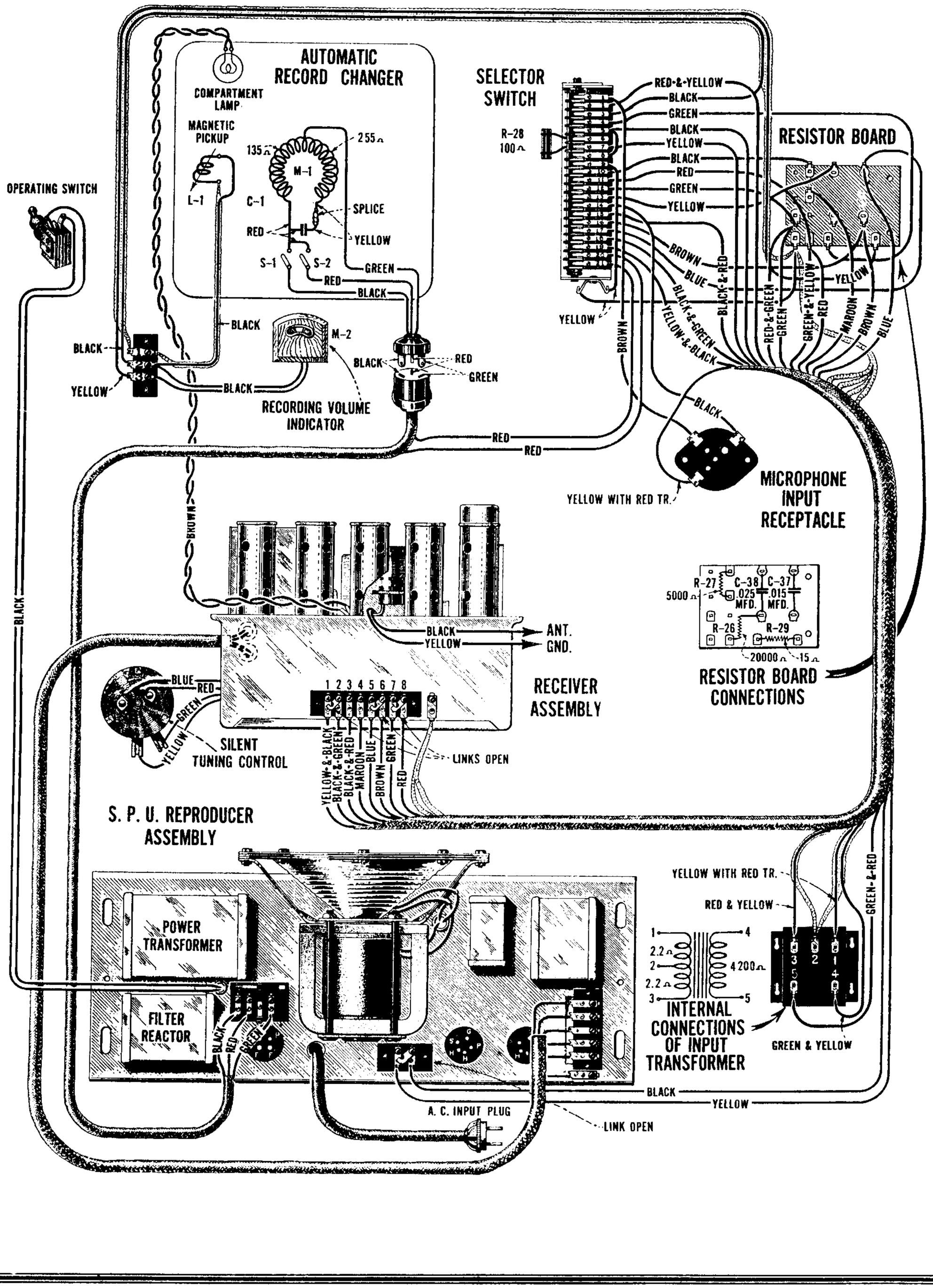
Radiola Automatic Electrola

Model RAE-84



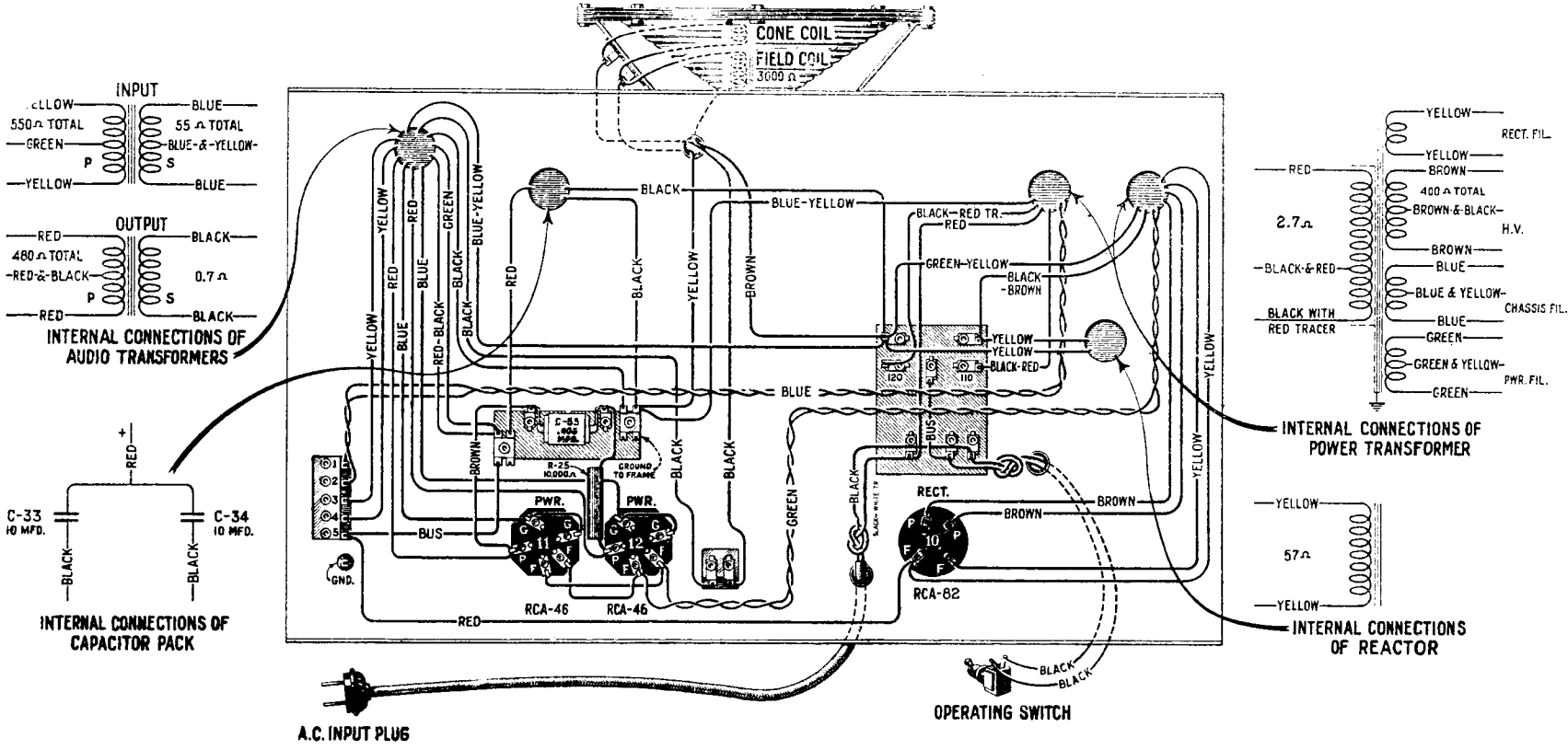
Schematic Wiring Diagram of RAE-84

RCA-VICTOR, INC.



RAE-84

RCA-VICTOR, INC.

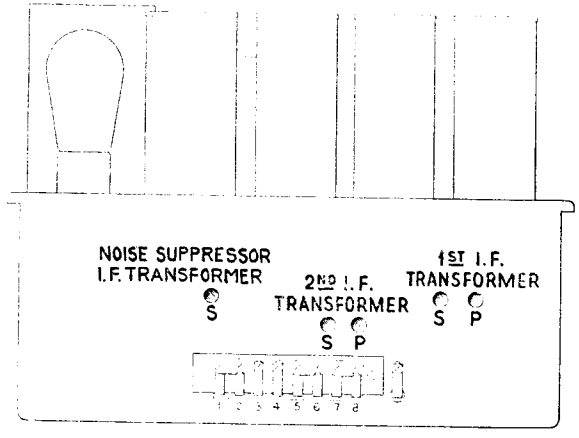


Amplifier Wiring Diagram of RAE-84

RADIOTRON SOCKET VOLTAGES

120 Volt Line—Fuse at 120 Volt Tap—Antenna Shorted to Ground—No Signal

Radiotron No.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts D. C.	Cathode or Filament to Plate Volts D. C.	Diode Plate No. 1 to Cathode Volts D. C.	Diode Plate No. 2 to Cathode Volts D. C.	Plate Current M. A.	Heater or Filament Volts D. C.
1. RCA-58—R. F.	— 3.5	106	212	—	—	6.5	2.5
2. RCA-56—Osc.	—	—	65	—	—	4.5	2.5
3. RCA-58—1st Det.	— 9	101	206	—	—	1.8	2.5
4. RCA-58—I. F.	—12	98	203	—	—	2.0	2.5
5. RCA-58—A. V. C. I. F.	— 5	106	210	—	—	4.0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Minimum)	0	—	0	0	—12	0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Maximum)	0	—	69	0	36	8.0	2.5
7. RCA-56—2nd Det.	—15	—	200	—	—	1.0	2.5
8. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
9. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
10. RCA-46—Power	0	0	400	—	—	6.0	2.5
11. RCA-46—Power	0	0	400	—	—	6.0	2.5
12. RCA-82—Rectifier	462.5 Volts R. M. S. Each Plate—72 M. A. Total Plate Current.						



Location of I. F. Capacitors

RCA-VICTOR, INC.
RE-40
SERVICE DATA

Voltage Rating ..... 105–125 Volts
Frequency Rating ..... 25, 30, 40, 50 and 60 Cycles
Power Consumption ..... 60 Cycles, 95 Watts
Number and Types of Radiotrons ..... 1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output ..... 1.75 Watts
Frequency Range ..... 540 K. C. to 1500 K. C.

This combination radio-phonograph instrument uses a five-tube Super-Heterodyne receiver incorporating a dynamic loudspeaker, two-point tone control, single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The standard RCA Victor two speed motor board equipment is used and the entire assembly enclosed in a table type cabinet.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer only, using two tuned circuits, a second detector, an output tube and a rectifier.

Service work in conjunction with this receiver will be similar to that of other Super-Heterodyne receivers of the small compact type construction. The line-up adjustments are made in conjunction with an external oscillator and an output meter. The line-up capacitors on the gang capacitor are adjusted for maximum output when the oscillator is coupled to the antenna and the set and oscillator are both set at 1400 K. C. The I. F. frequency is 175 K. C. and the two circuits that comprise it are adjusted for maximum output at 175 K. C.

Service data for the magnetic pickup is included below.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current, M. A.	Heater Volts
1. RCA-58 R. F. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier	275 Volts PLATE TO PLATE—60 M. A. TOTAL				4.82
TOTAL CATHODE CURRENT—11 M. A.					

SERVICE DATA ON MAGNETIC PICKUP

This magnetic pickup is of a new design that results in excellent reproduction. While in physical appearance, it is similar to that of the older type, details of construction are considerably different. It consists of essentially a chromium steel magnet, two thin pole pieces, a mechanism support and bracket, a coil, and an armature.

REPLACING MAGNET COIL, PIVOT RUBBERS, OR ARMATURE

In order to replace a defective magnet coil or hardened pivot rubbers, it is necessary to proceed as follows:

(a) Remove the pickup cover by removing the center holding screw and needle screw.

(b) Remove the pickup magnet and the magnet clamp by pulling them forward.

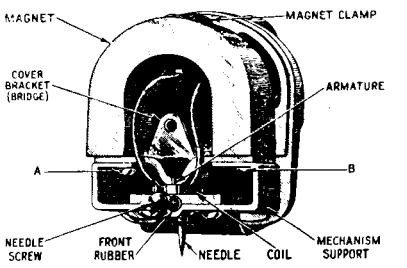
(c) Unsolder the coil leads and remove the mechanism assembly from the back plate by releasing the two mounting screws.

(d) Remove screws A and B, Figure A, and then remove the mechanism assembly from the pole pieces.

(e) The coil or the front pivot rubber may now be removed and replaced. If it is desired to replace the rear pivot rubber, then the end of the armature soldered to the mechanism support must be unsoldered.

(f) The mechanism should now be reassembled except for the magnet which must be magnetized. After being magnetized the mechanism—with the pole pieces upward, should be placed so that the magnet may be slid from the magnetizer onto the pole pieces without breaking physical contact. After placing the pole pieces on the magnet, the entire assembly should be remagnetized thoroughly, being careful not to change polarity.

(g) After reassembling to the mechanism, the entire assembly should be fastened to the back plate by means of the two screws provided, making sure support is down against pads on back. At the same time, the metal dust cover must be placed in position.



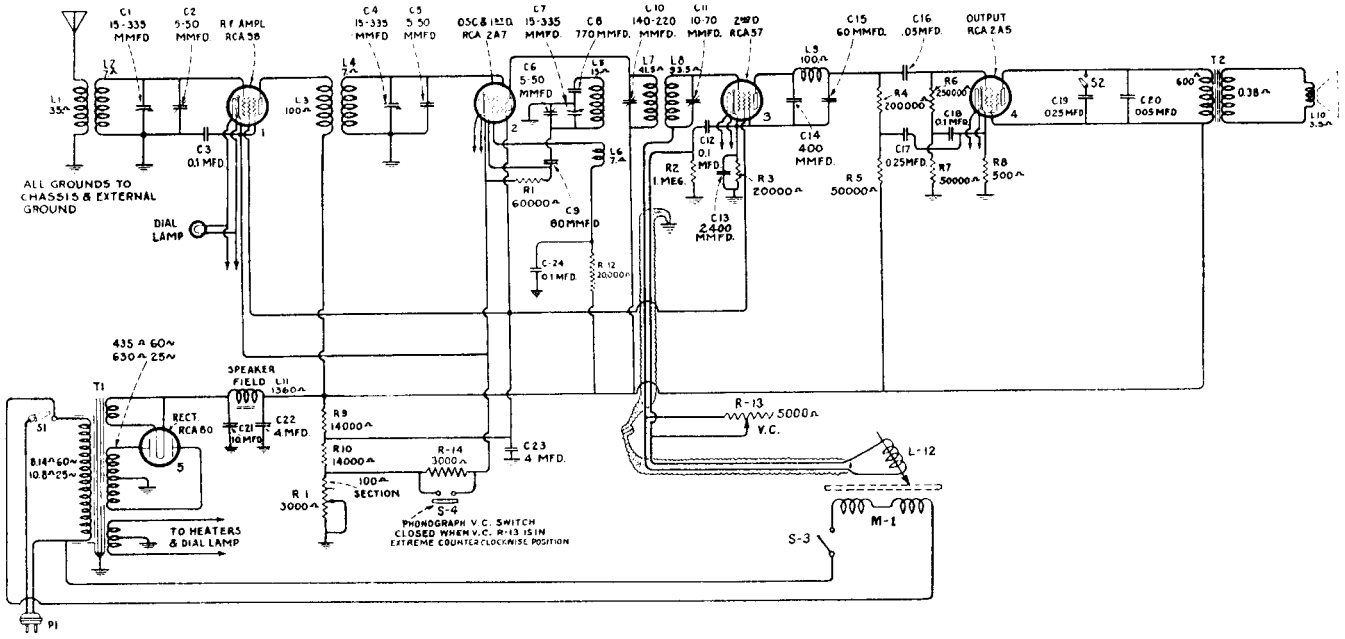
View of Pickup showing parts

(h) After remagnetizing, it is necessary to correctly center the armature. This may be done quite accurately by feeling its play after the needle is inserted. A little practice will quickly show which way an adjustment is necessary to have the armature centered properly. The adjustment is made by loosening screws A and B (Figure A), and sliding the mechanism slightly in relation to the pole pieces.

(i) The cover may be now replaced over the entire assembly, and the pickup returned to the tone arm.

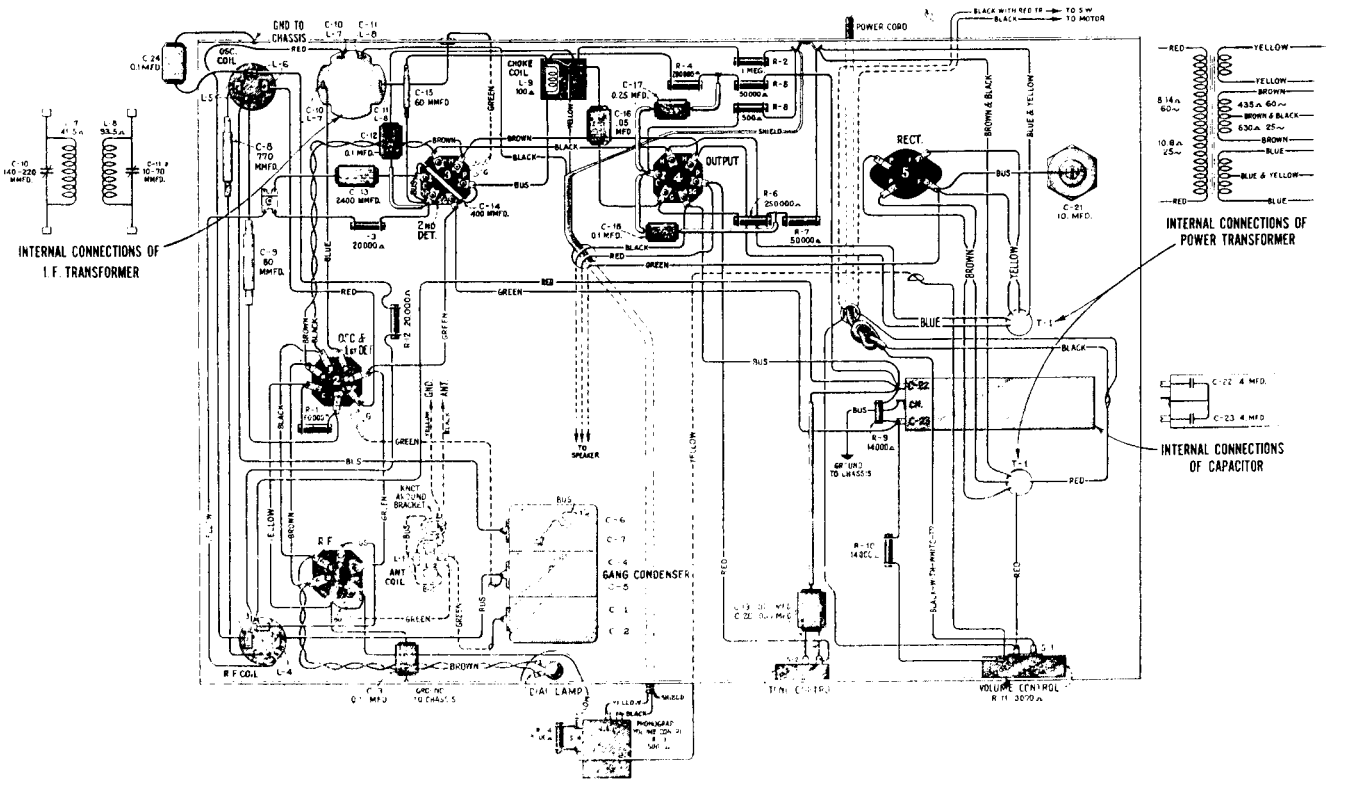
Only rosin core solder should be used for any soldering in conjunction with the pickup. However, if great care to wipe clean and use as small amount as possible is exercised, paste or liquid flux may be used for soldering the end of the spring.

RCA-VICTOR, INC.



Schematic Circuit

RE-40



Wiring Diagram

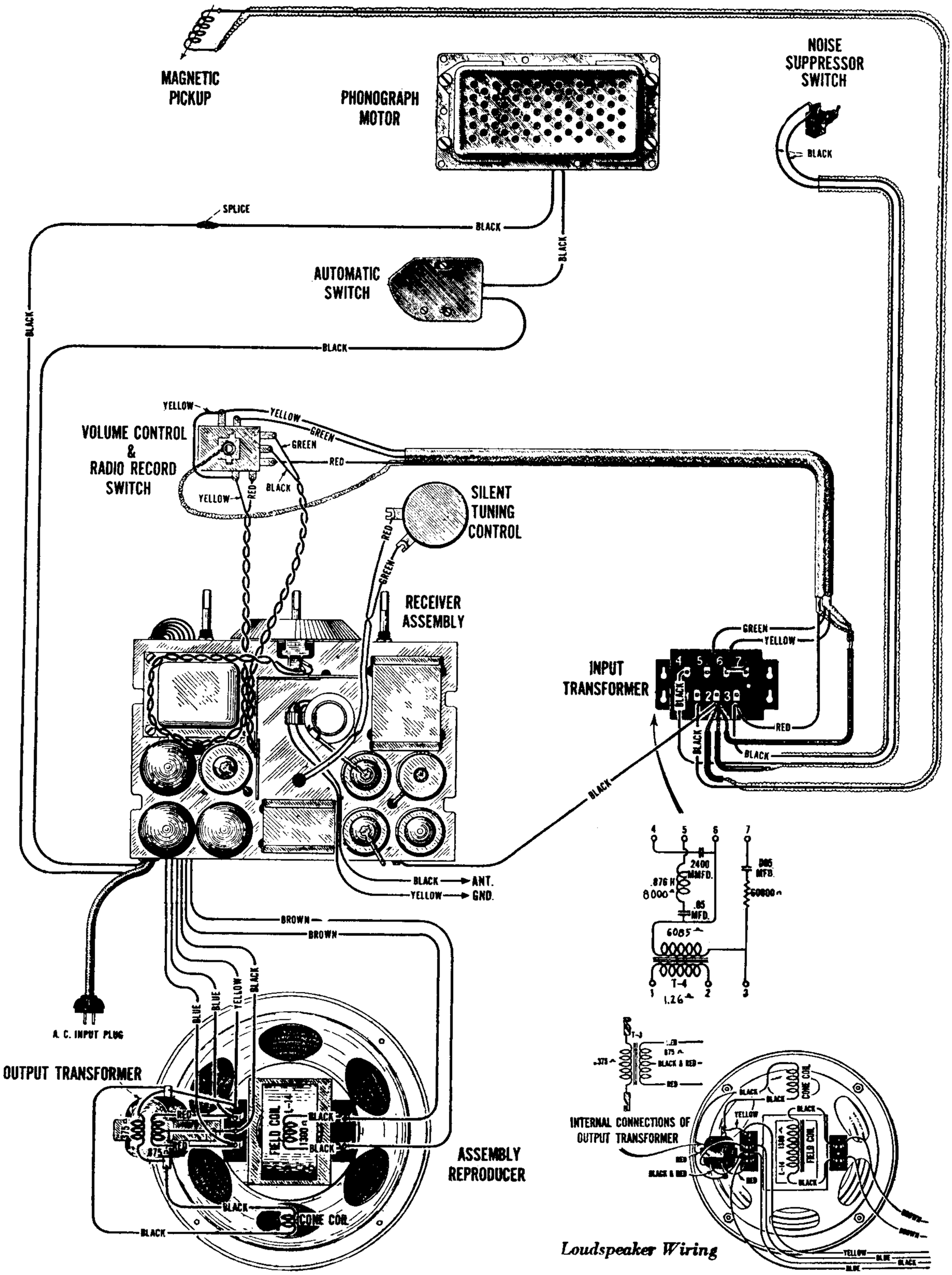
RCA-VICTOR, INC.

RE-80

Schematic Wiring Diagram

Chassis Wiring Diagram

RCA-VICTOR, INC.



Loudspeaker Wiring

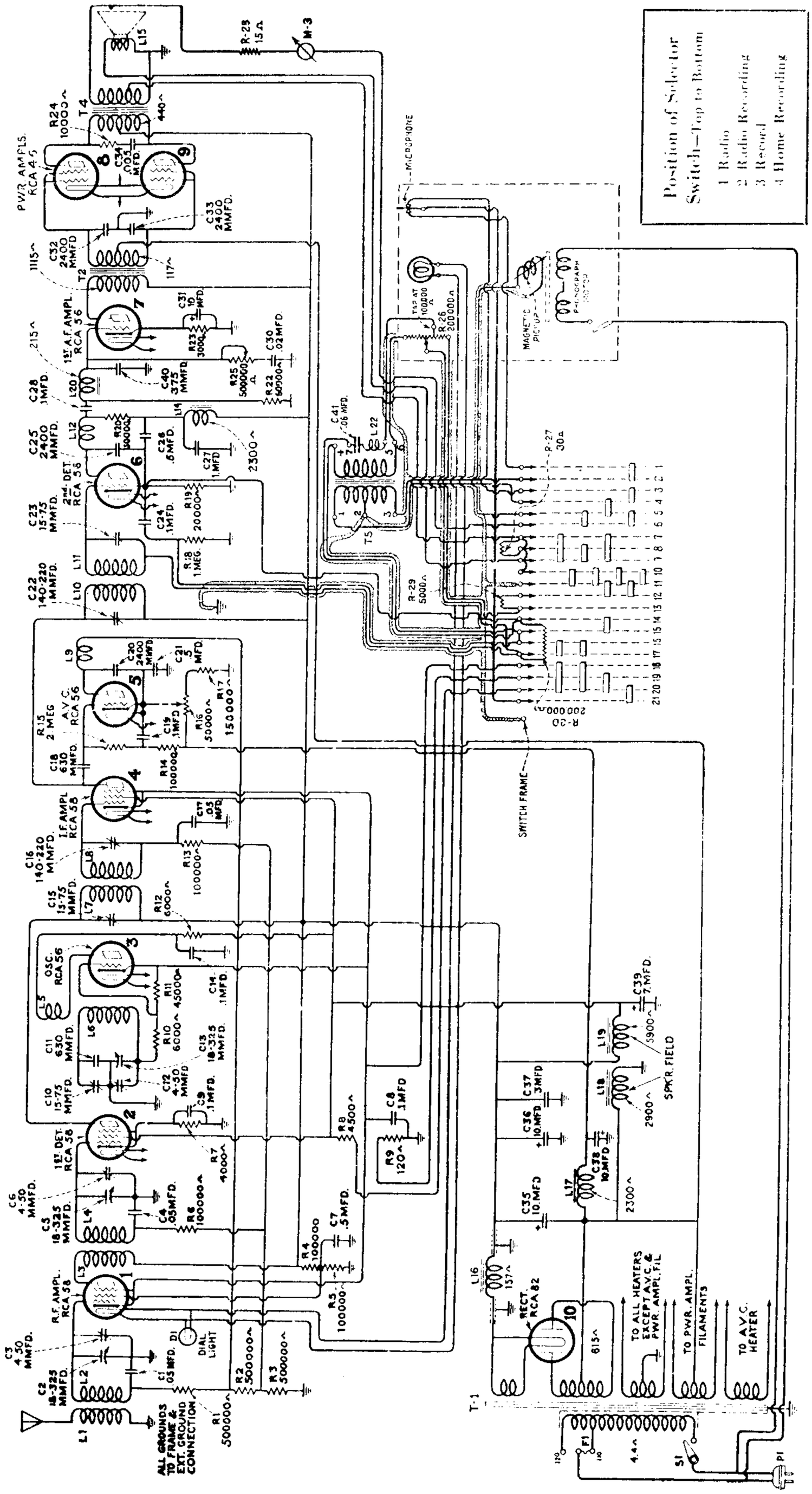
Radiotron No.	Control Grid to Filament or Cathode Volts	Screen Grid to Filament or Cathode Volts	Plate to Filament or Cathode Volts	Plate Current M. A.	Heater or Filament Volts
1. R. F. RCA-58	4.5	100	165	6.0	2.37
2. 1st Det. RCA-58	11.0	95	155	1.5	2.37
3. Oscillator RCA-56	—	—	70	4.5	2.37
4. I. F. RCA-58	4.5	100	165	6.0	2.37
5. 2nd Det. RCA-55 and A.V.C.	—	—	55	4.7	2.37
6. Power RCA-247	19.0	235	225	20.0	2.37
7. Power RCA-247	19.0	235	225	20.0	2.37

OTHER IMPORTANT VOLTAGES

2nd Detector and A.V.C. Cathode to Low Side of Field . 105 Volts
Chassis to Low Side of Field . . . . . 90 Volts
Voltage Across Field . . . . . 120 Volts
Rectifier . . 370 Volts R.M.S. Each Plate—80 M.A. Each Plate

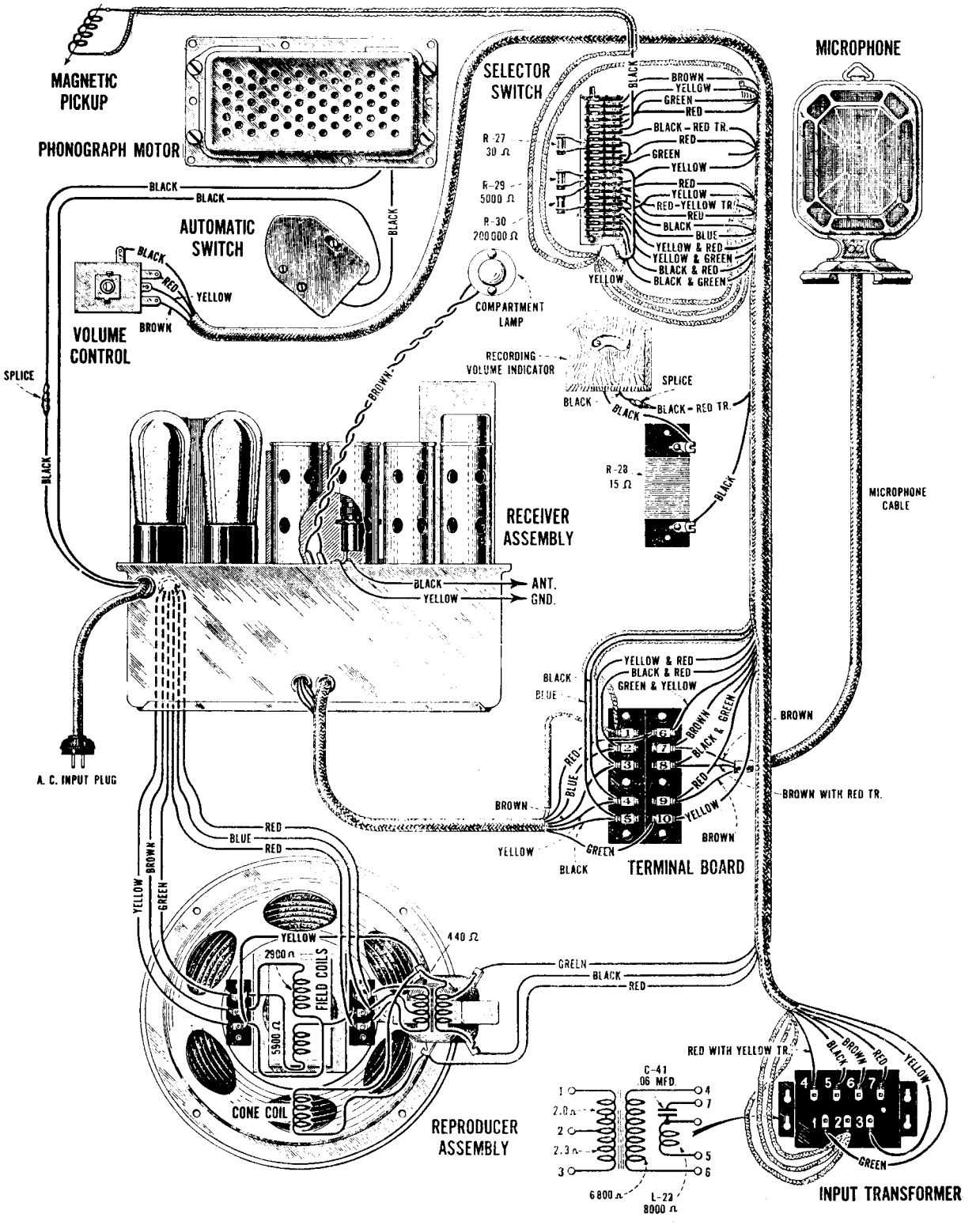
RCA-VICTOR, INC.
RE-81

Radiola Electrola, Model RE-81



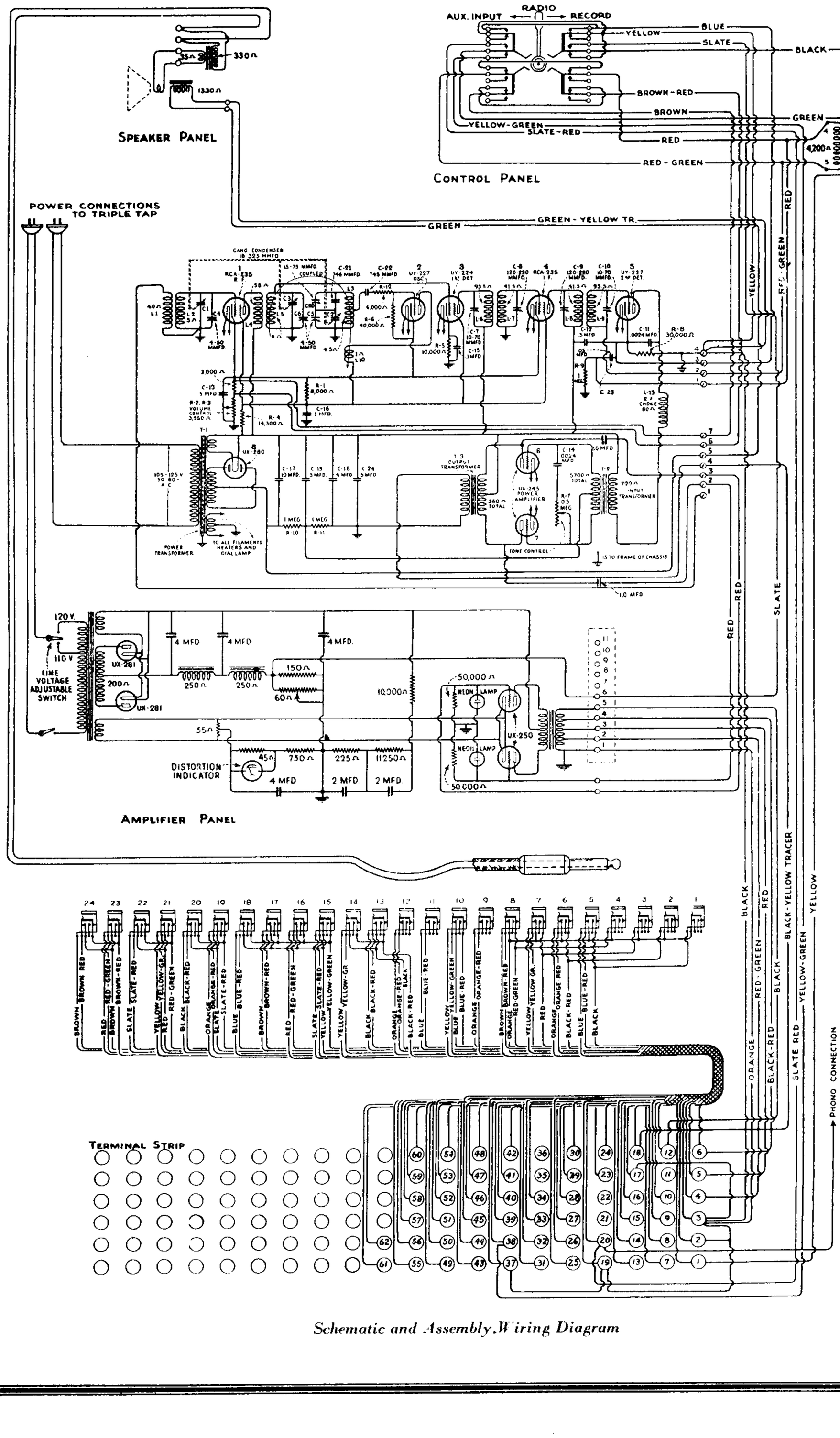
Schematic Diagram of RE-81

RCA-VICTOR, INC.
RE - 81



RCA-VICTOR, INC.

Centralized Radio Rack
Model ER-1240-A2



Schematic and Assembly Wiring Diagram

RCA-VICTOR, INC.

ER 1240-A2

Wiring Diagram of Receiver Assembly

RCA-VICTOR, INC.

MODEL ER-1240-A2

VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron socket with the receiver in operating condition should prove of value when checking with test sets such as the Weston Model 547, Type 3, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the cable in the test set will cause some circuits to oscillate, due to its added capacity. Small variations of voltages will be caused by different tubes and line voltages. Therefore, the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the tube socket numbers shown in Figure 3.

RADIOTRON SOCKET VOLTAGES—RECEIVER ASSEMBLY
120 VOLT LINE

Tube No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts, A. C.
VOLUME CONTROL AT MINIMUM							
1	40	40	55	200	0	0	2.4
2	40	0		50	4.0	—	2.4
3	8.0	7.0	90	240	0.5	0.25	2.4
4	40	40	55	200	0	0	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30.0		245	30.0	—	2.4
7	—	*30.0	—	245	30.0	—	2.4
VOLUME CONTROL AT MAXIMUM							
1	3.5	3.5	70	240	5.0	**0.7	2.4
2	2.5	0		65	5.5	—	2.4
3	5.0	5.0	70	235	0.5	0.25	2.4
4	3.5	3.5	70	240	5.0	**0.7	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30		245	25.0	—	2.4
7	—	*30		245	25.0	—	2.4

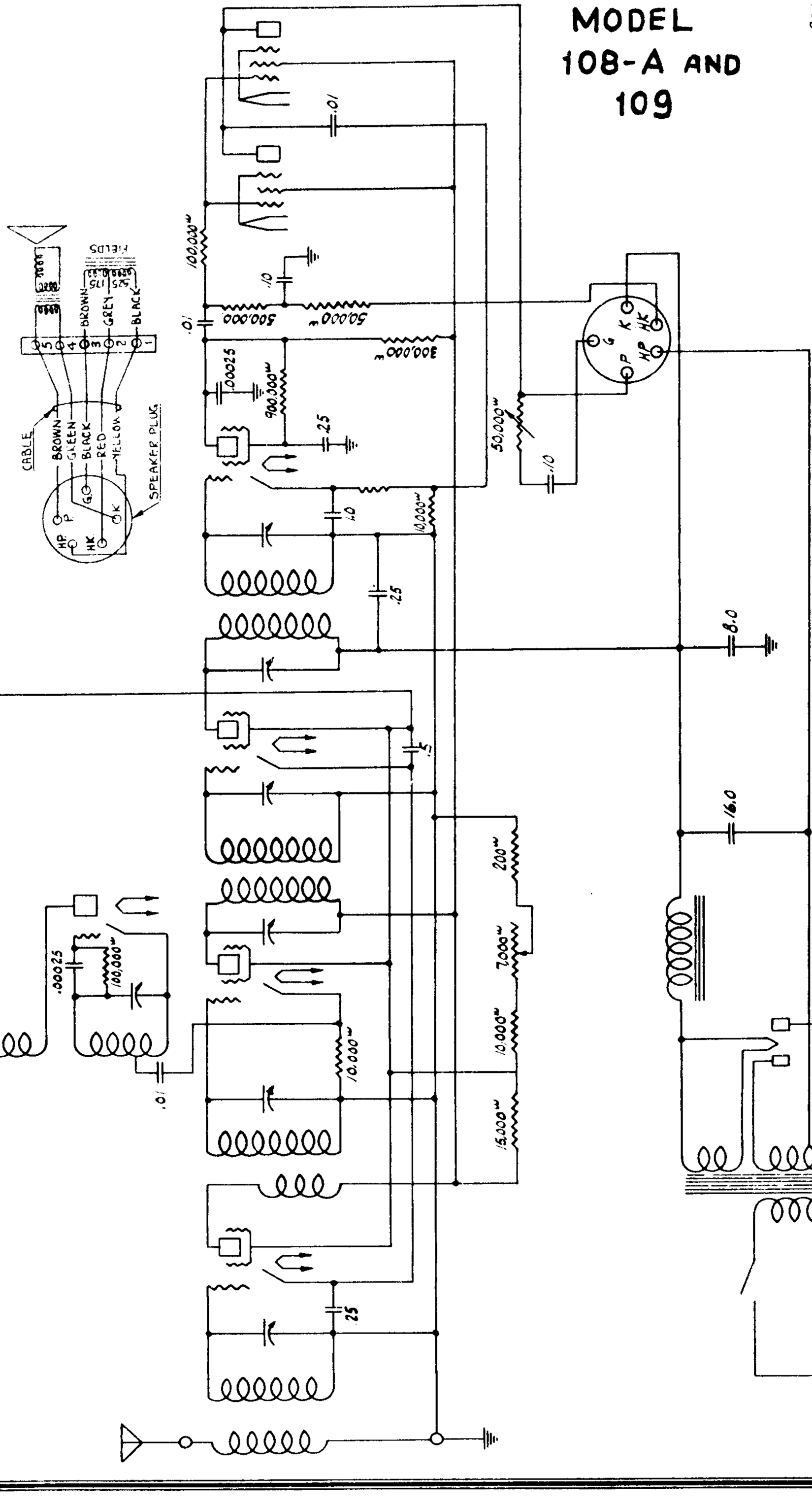
*Not true reading due to resistance in circuit.
**This reading may be + or − depending on age of tube.

RADIOTRON SOCKET VOLTAGES—POWER AMPLIFIER
120 VOLT LINE

Tube	Cathode or Filament to Grid—Volts	Cathode or Filament to Plate—Volts	Plate Current Milliamperes	Filament or Heater—Volts
VOLUME CONTROL AT ZERO—NO STATION TUNED IN				
Either UX-250	86.5	460	55.0	7.5
Either UX-281	—	630	75.0	7.5

SENTINEL RADIO CORP.

MODEL 108-A AND 109



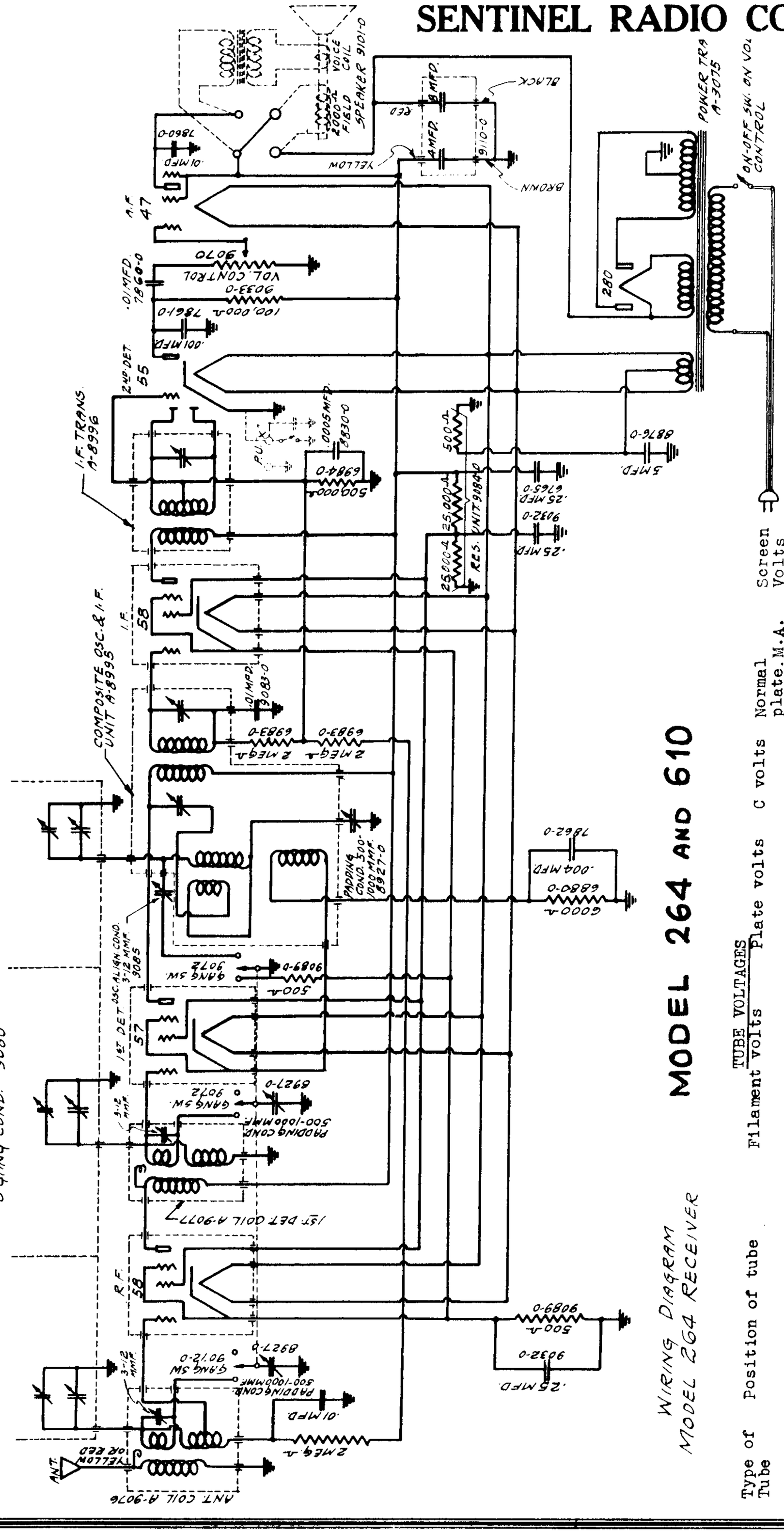
Type of Tube	Position	Filament Volts	B Volts	C Volts	Normal Plate M.A.	Screen Volts
227	Oscillator	2.4	62.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4.35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
224	2nd Detector	2.4	100*	2.1*	2.5	35*
247	Pentode	2.4	220	16.5**	32.5	250
247	Pentode	2.4	220	16.5**	32.5	250
280	Rectifier	4.95			47.5 ea.plate	

115 V. Line Volume Control Full On

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

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

SENTINEL RADIO CORP.



NOTE:
1. DOTTED LINES DENOTE SHIELDING
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NOS.
3. NUMBERS SHOWN WITH PREFIX "9" ARE COMPLETE ASSEMBLIES
4. WHEN PHONO JKS ARE USED CATHODE OF 55 TUBE IS CONNECTED TO POINT MARKED "X"

WIRING DIAGRAM MODEL 264 AND 610
MODEL 264 RECEIVER

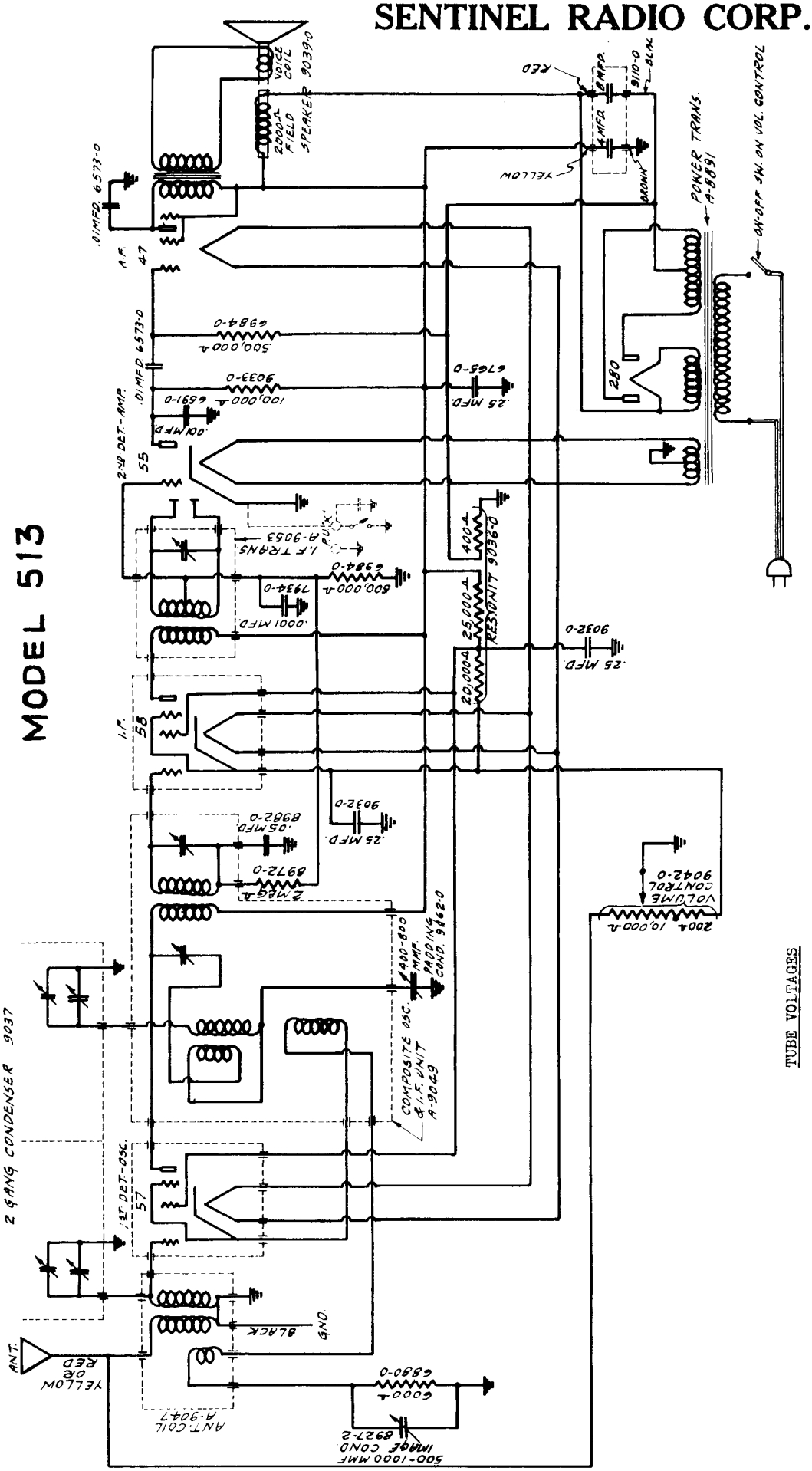
TUBE VOLTAGES

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

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

SENTINEL RADIO CORP.

MODEL 513



NOTE:
1. DOTTED LINES DENOTE SHIELDING
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NOS.
3. NUMBERS SHOWN WITH PREFIX "A" ARE COMPLETE ASSEMBLIES.
4. WHEN PHONO JKS ARE USED CATHODE OF 55 TUBE IS CONNECTED TO POINT MARKED "X"

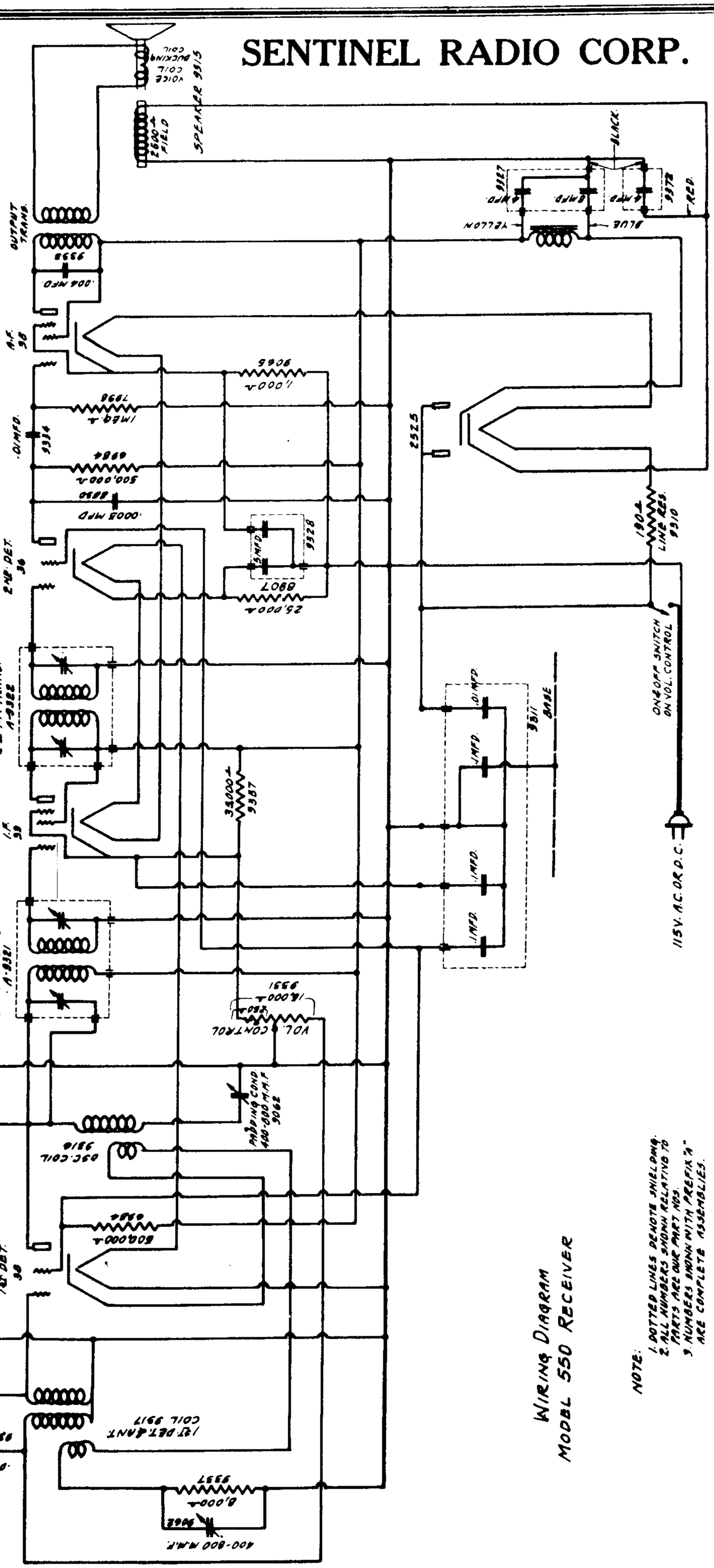
TUBE VOLTAGES

Type of Tube	Position of tube	Filament volts	Plate volts	C volts	Normal Plate-M.A.	Screen volts
257	Composite oscillator and modulator	2.4	240	6	3.5	85
258	Intermediate frequency	2.4	240	3	7	85
255	Detector and audio	2.4	30*			
247	Output	2.4	220	5**	32.5	240
280	Rectifier	4.9	30 M.A. each plate			

* These readings are only comparative and are not true voltages applied. The voltmeter, when readings are taken at these points, is in series with a very high resistance.
** To read 247 bias, read between 247 control grid and ground.

SENTINEL RADIO CORP.

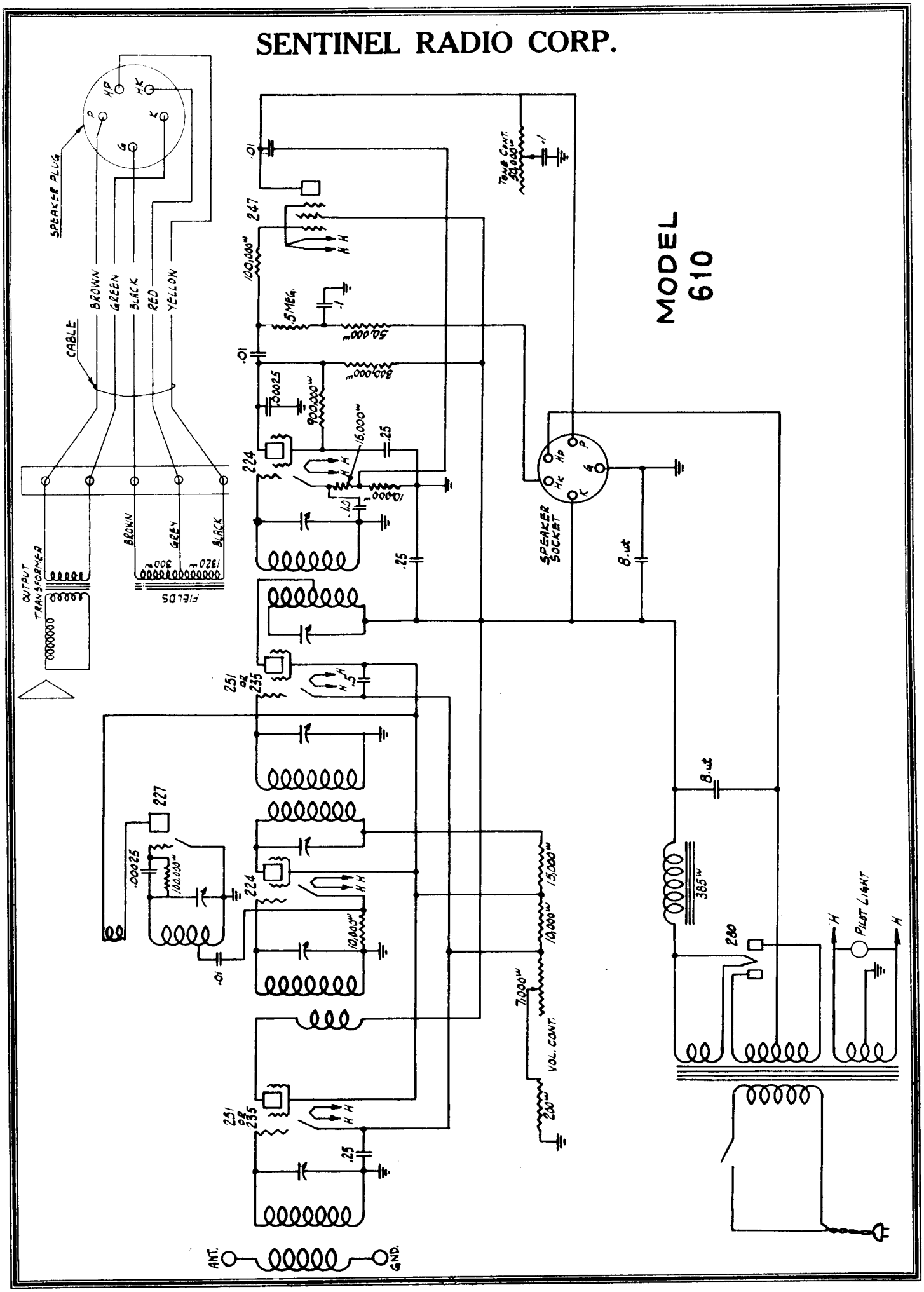
MODEL 550



WIRING DIAGRAM
MODEL 550 RECEIVER

NOTE:
1. DOTTED LINES DENOTE SHIELDING.
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NOS.
3. NUMBERS SHOWN WITH PREFIX "A" ARE COMPLETE ASSEMBLIES.

SENTINEL RADIO CORP.



SILVER-MARSHALL MFG. CO.

SILVER-MARSHALL MODEL Z-13 ALL-WAVE 13-TUBE SUPERHETERODYNE

(The Z-13 Round-the-World receiver incorporates automatic volume control, silent tuning control, beat-tuning oscillator, parallel type 56 driver tubes, push-pull type 59 A. F. output, tone control, and a diode second-detector. The wavelength range is 15 to 545 meters, in four steps.)

Technicians and, particularly, Mr. Consumer, are acquainted with the tedious technique of short-wave tuning, as compared with the operation at the "broadcast" wavelength range of 200 to 545 meters. It is to overcome this objection that the model Z-13 receiver was designed, in an effort to popularize short-wave reception. A full-vision tuning dial, with color bands to correspond with the setting of the frequency-band selector switch, Sw.1 to Sw.4, a ganged unit, gives accurate indication of the frequency to which the receiver is tuned. On each color band the position of police, television, aviation, amateur, and broadcast channels are marked.

Instant location of even the weakest stations is accomplished by means of an electron-coupled heterodyne oscillator; this beat-tuning oscillator is designated in the diagram as V10. The action of this tube is controlled by a pendant push-button, Sw.7.

The use of a silent-tuning control circuit results in quite operation during the period of tuning from one station to another, but at the expense of sensitivity; therefore, switch Sw.5, a panel-operated unit, is provided to control the operation of the silent-tuning tube, V12.

Resistor R1, a tapered manual volume control, 5,000 ohms; R2, tone control, log taper, 0.5-meg.; R3, 2 W., 3,000 ohms; R4, 0.23-meg.; R5, 60,000 ohms; R6, 11,000 ohms; R7, R21, 0.1-meg.; R8, R9, 0.5-meg.; R10, 0.25-meg.; R11, R14, 1 meg.; R12, 2 meg.; R13, 0.3-meg.; R15, 6,000 ohms; R16, 8,000 ohms; R17, R18, R19, R20, 2,600, 340, 1,840 and 5,750 ohms, respectively, wire wound; R22, 150 ohms.

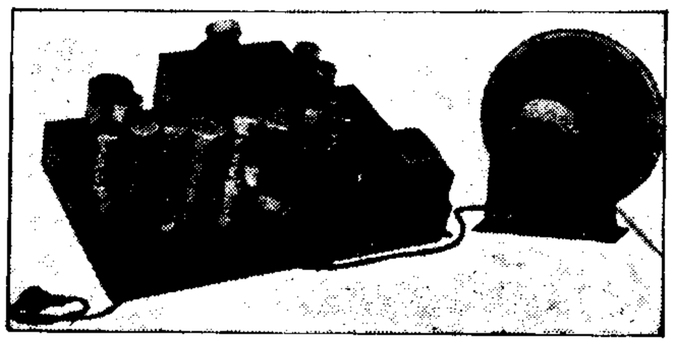
Condensers C1, C4, C5, C15, .01-mf.; C2, .25-mf.; C3, C7, C8, C9, .5-mf.; C6, C14, 0.1-mf.; C10, mica dielectric, .01-mf.; C11, .15-mf.; C12, C19, mica dielectric, 100 mmf.; C13, .0-25-mf.; C16, C32, mica dielectric, 250 mmf.; C17, mica dielectric, 50 mmf.; C18, C33, mica dielectric, .002-mf.; C20, dry electrolytic, 450 V., 8 mf.; C21, dry electrolytic, 450 V., 12 mf.; C22, .002-mf.; C23, mica-dielectric trimmers, 20 to 65 mmf.; C24, mica-dielectric trimmer, 6 to 30 mmf.; C25, mica-dielectric trimmer, 25 to 65 mmf.; C26; C29, tuning condensers, 410 mmf.; C27, C30, trimmers; C28, mica dielectric, 350 to 500 mmf.; C31, mica dielectric, 70 to 125 mmf.

Instead of operating voltage and current figures for the tubes in this receiver the following voltage figures, measured on a high-resistance meter, connected from chassis to the points indicated, are given. Point A, 250 V.; B, 100 V.; C, 5 V.; D, 150 to 180 V.; E, 3 V.; F, 3 V.; G, 60 V.; H, 18 V.; I, 3 V.; J, 40 V.; K, 47 V.; L, 100 V.; M, 250 V.; N, 250 V.; O, 250 V.

In the center, directly below the tuning knob, is the switch controlling the silent tuning or quiet A.V.C. circuit. When this knob is turned to the left, or counter-clockwise, the S.T.C. circuit is in operation. Only the louder broadcast stations are now heard. When the tuning dial is rotated off the local station, the inter-carrier noise usually heard on A.V.C.-equipped receivers is muffled or entirely silent. Thus, the listener is not bothered with static and other spurious noises when only reception from the louder stations is desired.

When distant broadcast or short-wave reception is desired, this switch should be turned to the right and the S.T.C. circuit will be inoperative. *It is imperative that the switch be turned to this position for short-wave reception*, otherwise it is very possible to miss stations in tuning, due to the sharpness of tuning.

The electron-coupled beat-oscillator is weak-coupled to the I.F. amplifier section of the receiver in such a way that when the pushbutton on the pendant cord is depressed the oscillator is connected in circuit. If any station carrier is crossed during the turning of the tuning dial while the oscillator is in operation, there will be heard, from the reproducer, a musical note, or whistle, of varying pitch. When this note is tuned to the lowest possible pitch, "zero beat," the receiver will be very closely adjusted to the distant station signal and the pendant switch should be released. If the signal is that of a radiophone station, the voice or music will now be heard and only the slightest readjustment will be necessary to bring it in at its maximum volume. For code reception, continue to press button.



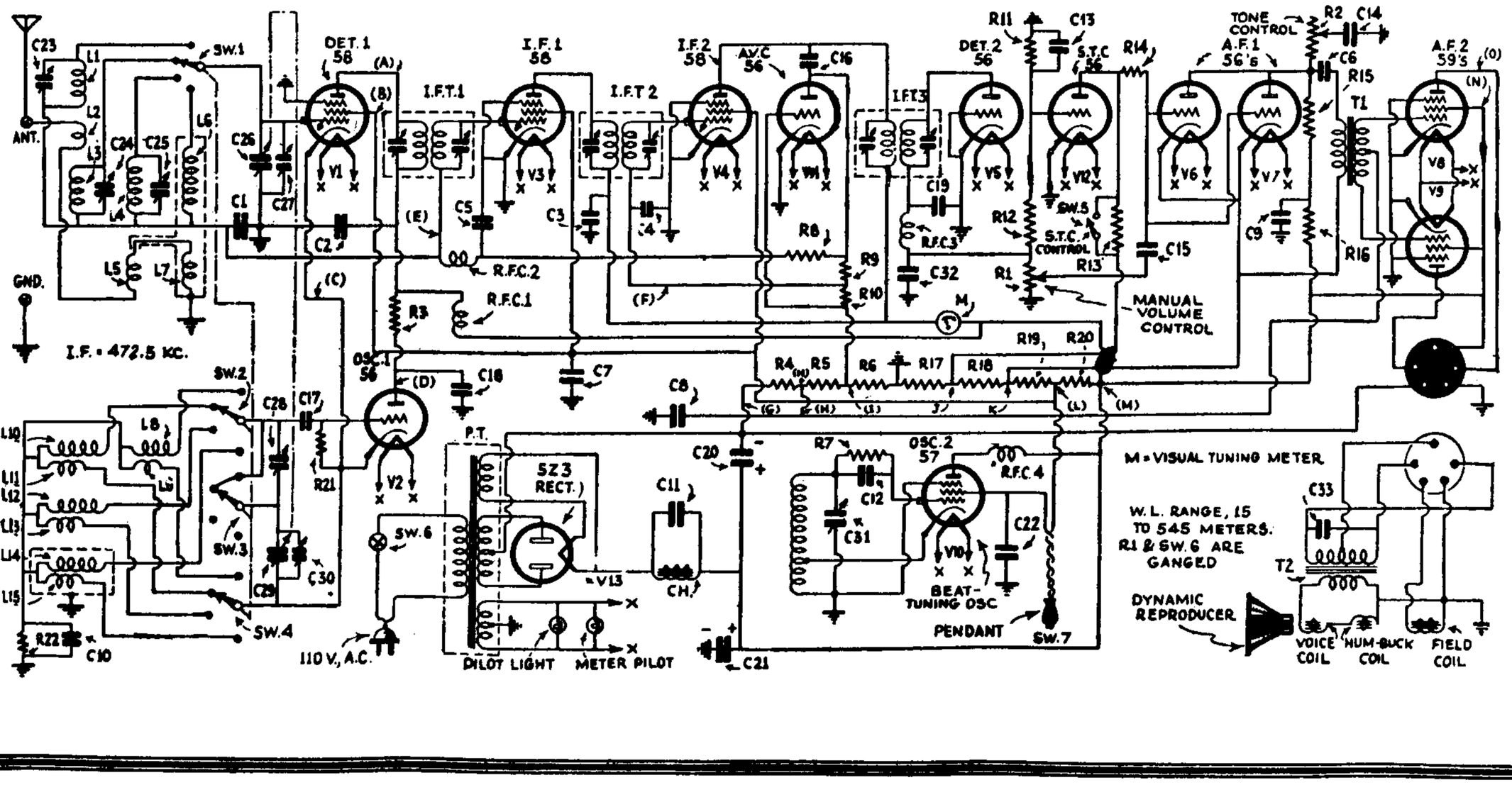
The tuning dial should be operated *very slowly* when tuning for short-wave stations, particularly when in the green and purple bands, for the receiver is extremely selective and faint signals may be passed.

This receiver is designed to be used on an antenna with a length of about 40 to 100 ft. It is imperative that a good ground connection be used with this receiver in order to obtain stable operation.

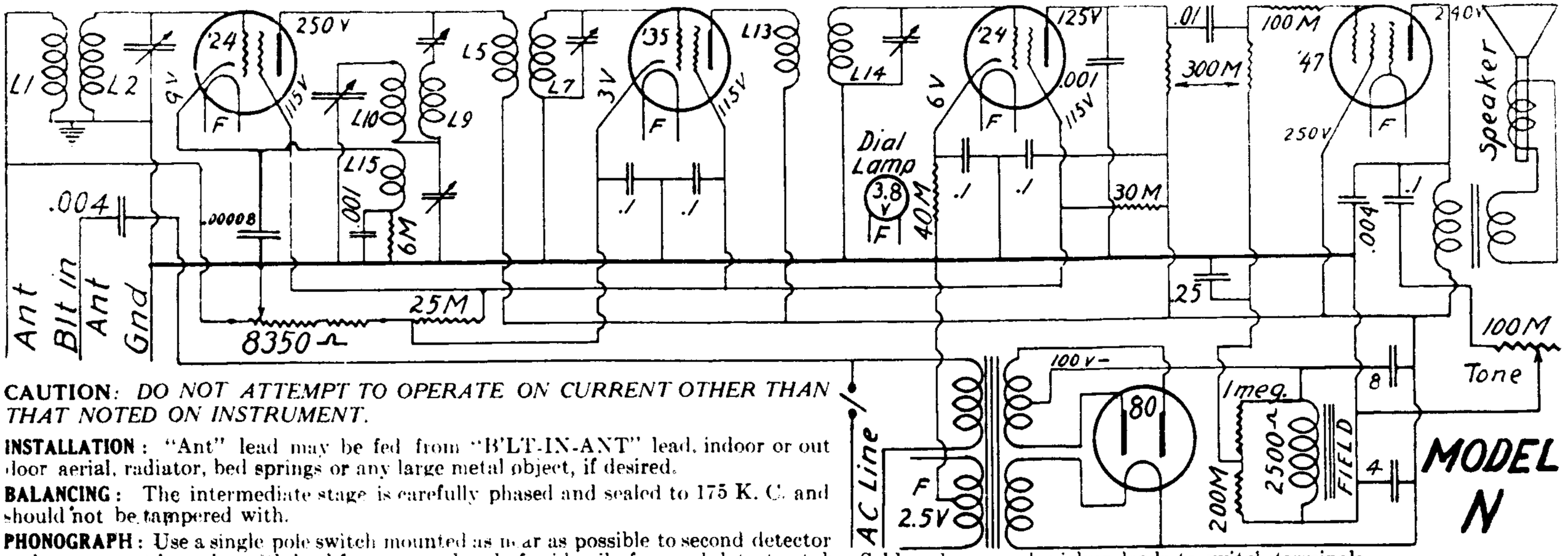
The receiver is shipped with a kit of selected tubes. If it becomes necessary to replace tubes, carefully select the oscillator. Test two or three tubes until a type 56 for V2 is found which will operate satisfactorily in the purple band.

The model Z-13 receiver has a sensitivity of .45-microvolt-per-meter, a power output of 6.9 W., and power consumption of 120 W.

The first R.F. and oscillator input circuits of this receiver are unusual. The antenna circuit includes three primaries in series: L2, L5, and L7; L2 feeds two secondaries, L1 and L3, while primaries L5 and L7 feed only one apiece, L4 and L6, respectively. The latter primary and secondary are used for tuning in the 200 to 550 meter band, and it is only in this range hat trimming condenser C27 is to be aligned; trimmers for each of the other ranges are provided in shunt to the individual secondaries. Since the two gang tuning condenser has sections of equal capacity, a padding circuit is required; condenser C28 is the padding condenser for this circuit and is to be aligned at the highest wavelength to which the receiver will tune, or about 545 meters. Since, at the shortest wavelength to which the receiver will tune the frequency tracking of the oscillator tuning condenser is close to that of the signal-frequency tuning condenser, padding condenser C28 is not required on the first two short-wave bands and, therefore, is shorted out of the circuit by one of the sections, Sw.3, of the band-selector switch.



SIMPLEX RADIO CO.



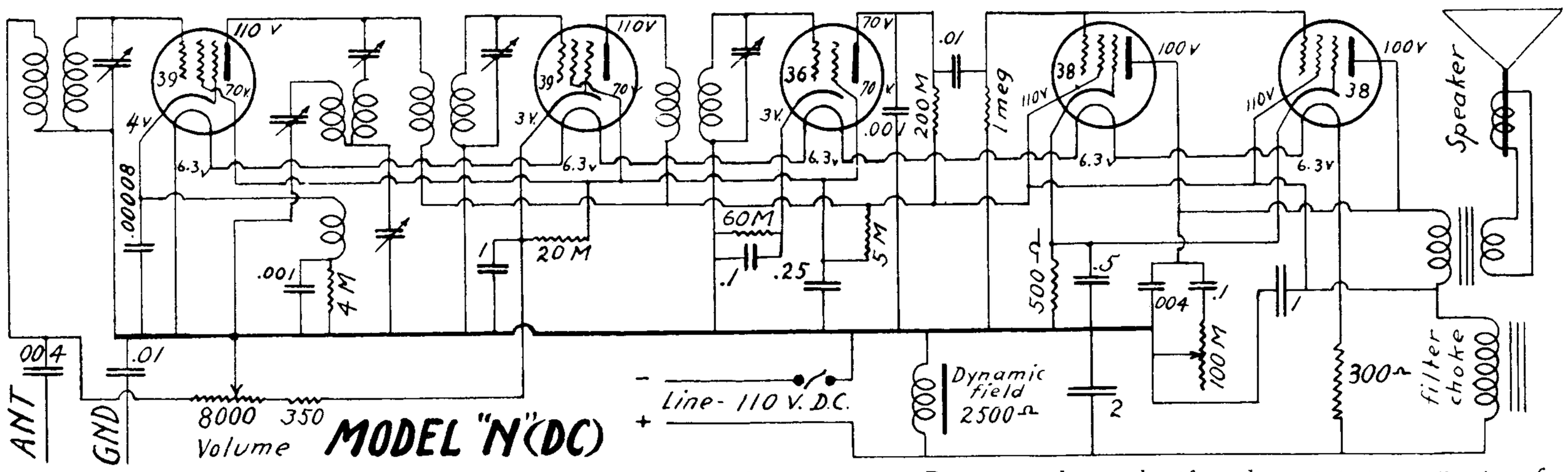
CAUTION: *DO NOT ATTEMPT TO OPERATE ON CURRENT OTHER THAN THAT NOTED ON INSTRUMENT.*

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

BALANCING: The intermediate stage is carefully phased and sealed to 175 K. C. and should not be tampered with.

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 defects will be replaced without charge whan 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 parts.



CAUTION: *Do not attempt to operate on current other than that noted on instrument. Reverse attachment plug if set does not start operating in a few seconds after being turned on.*

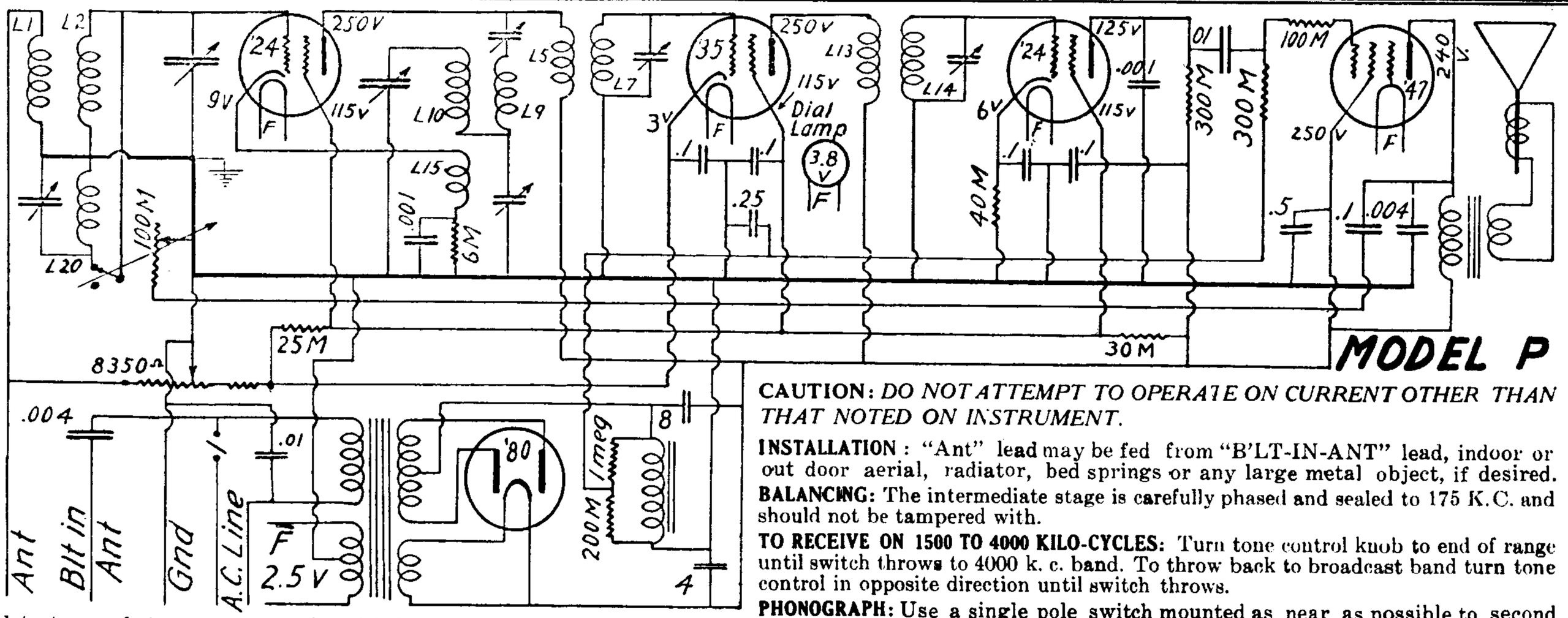
INSTALLATION: "ANT" may be fed from "B'LT-IN-ANT" lead, indoor or ourdoor aerial, radiator, bed springs or any large metal object, if desired.

BALANCING: The intermediate stage is carefully phased and sealed to 175 K. G. and should not be tampered with.

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

SIMPLEX RADIO CO.



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

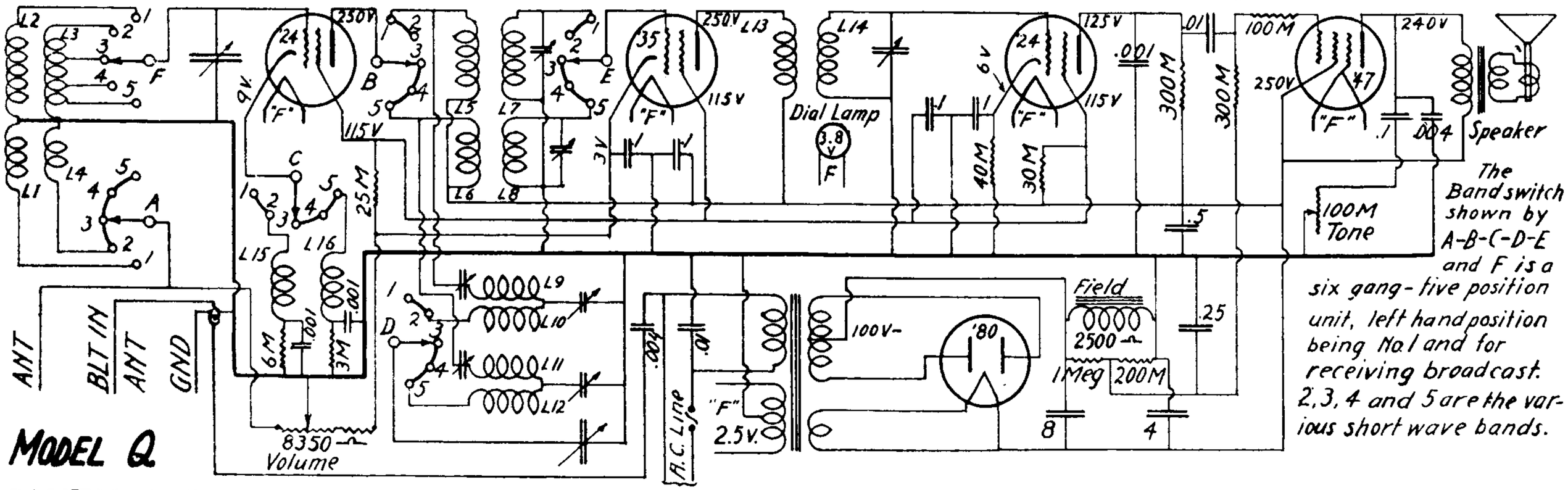
INSTALLATION: "Ant" lead may be fed from "B'LT-IN-ANT" lead, indoor or out door aerial, radiator, bed springs or any large metal object, if desired.

BALANCING: The intermediate stage is carefully phased and sealed to 175 K.C. and should not be tampered with.

TO RECEIVE ON 1500 TO 4000 KILO-CYCLES: Turn tone control knob to end of range until switch throws to 4000 k. c. band. To throw back to broadcast band turn tone control in opposite direction until switch throws.

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



MODEL Q

CAUTION: *Do not attempt to operate on current other than that noted on instrument.*

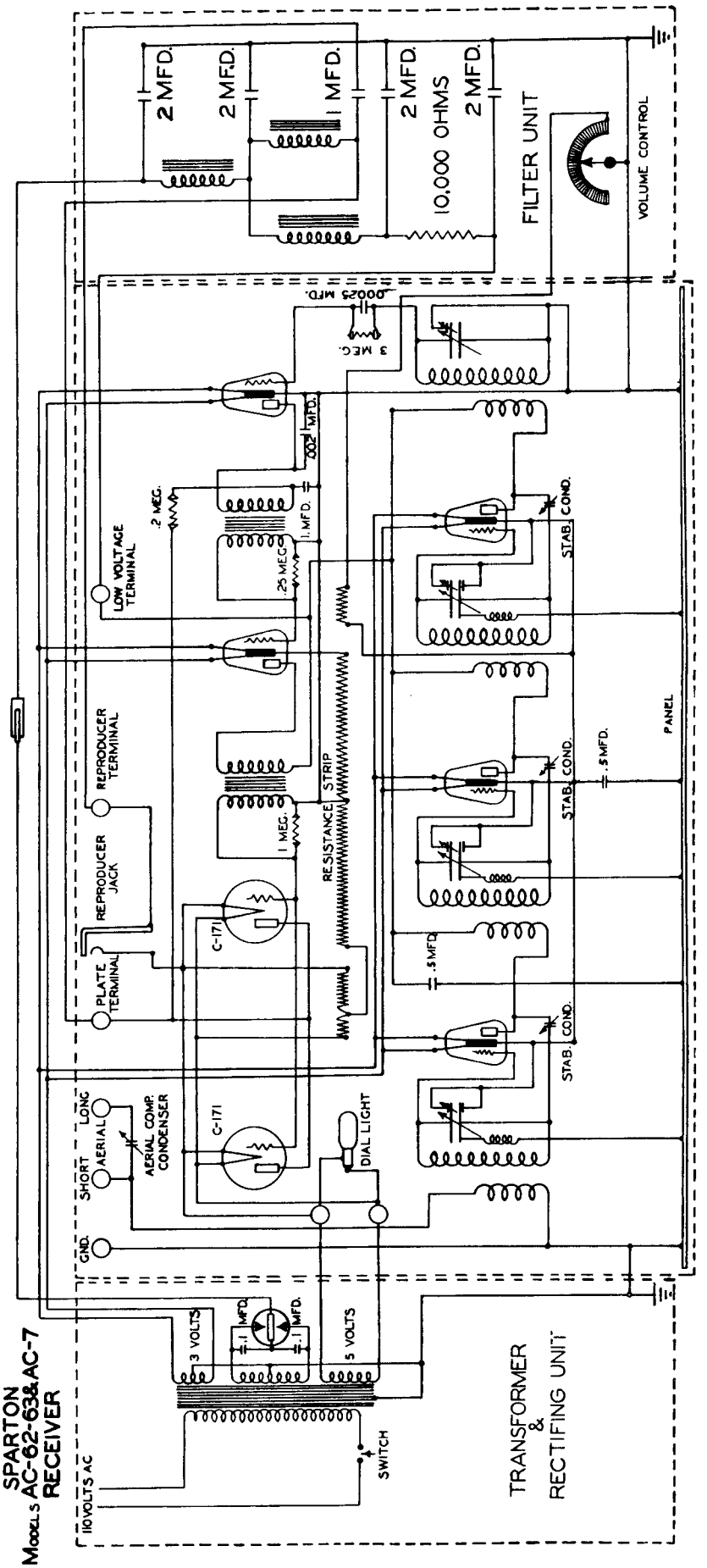
INSTALLATION: "ANT" may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs, or any large metal object, if desired

BALANCING: The intermediate stage is carefully phased and sealed to 175 K. C. and should not be tampered with.

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

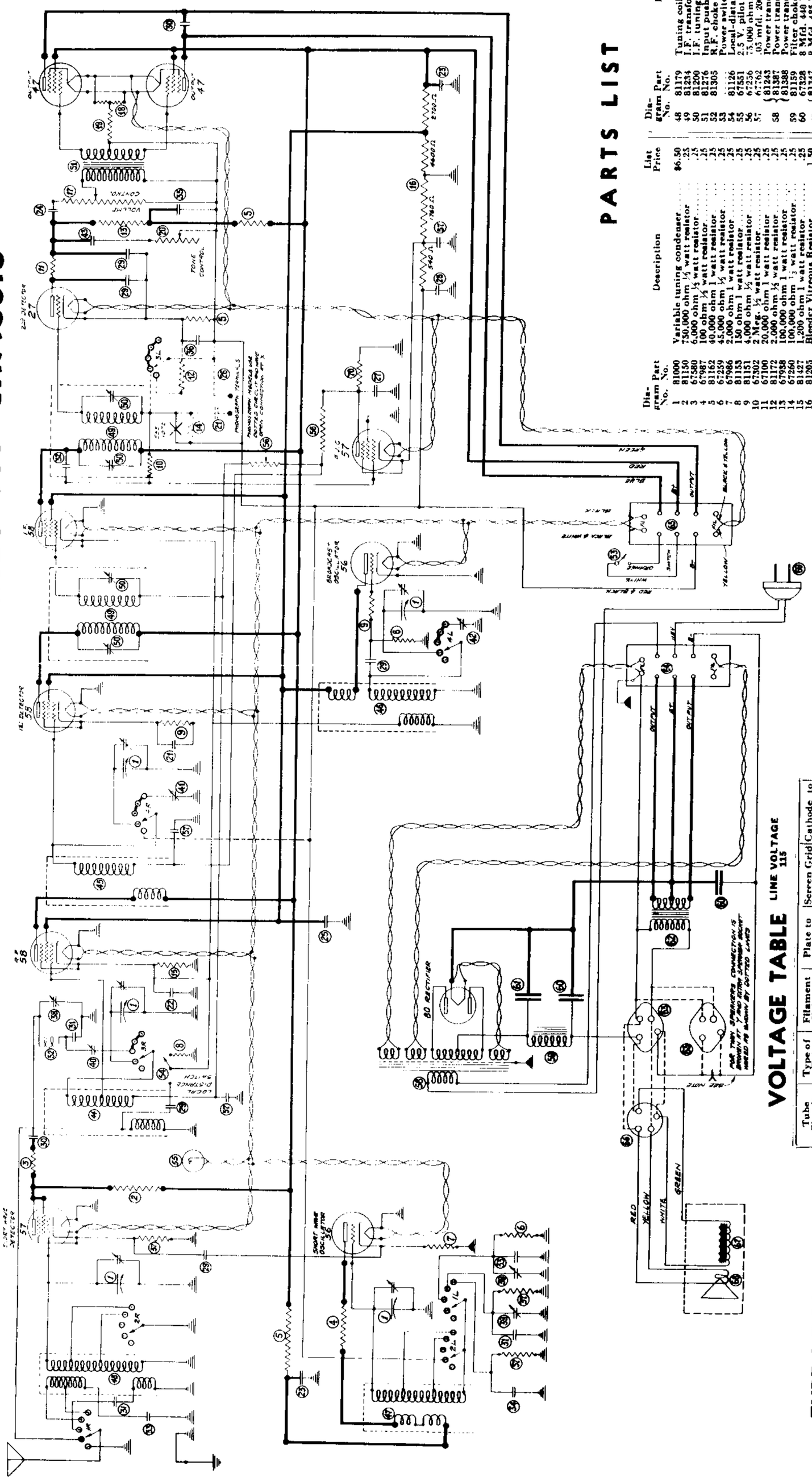
GUARANTEE: This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory, but if the complete instrument is returned a nominal charge will be made for such labor

SPARKS - WITHINGTON, INC.



STEWART-WARNER SPEEDOMETER CORP.

CIRCUIT DIAGRAM OF SERIES 105 CHASSIS



PARTS LIST

Diagram No.	Description	List Price
1	81000 Variable tuning condenser	$6.50
2	81150 750,000 ohm ½ watt resistor	.25
3	67580 6,000 ohm 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
7-8	67986 2,000 ohm 1 watt resistor	.25
9	81153 150 ohm 1 watt resistor	.25
10	67302 4,000 ohm ½ watt resistor	.25
11	67100 2 Meg. ½ watt resistor	.25
12	81172 20,000 ohm 1 watt resistor	.25
13	67938 2,000 ohm 1 watt resistor	.25
14	67260 100,000 ohm ½ watt resistor	.25
15	81427 1,200 ohm 1 watt resistor	.25
16	81205 Bleeder Vitreous Resistor	1.50
17	81419 60,000 ohm volume control	1.45
18-19	81131 20 ohm resistor } on one form	.50
20	81437 100,000 ohm tone control	1.50
21	81190 .1 Mfd. 200 V. fixed condenser	.35
22	67294 .1 Mfd. 200 V. fixed condenser	.30
23	67296 .1 Mfd. 400 V. fixed condenser	.40
24	81191 .1 Mfd. 400 V. fixed condenser	.45
25	67297 .25 Mfd. 200 V. fixed condenser	.40
26	81345 .25 Mfd. 200 V. fixed condenser	.45
27	67299 .02 Mfd. 400 V. fixed condenser	.30
28	81333 .02 Mfd. 400 V. fixed condenser	.35
29	81156 .001 Mfd. fixed condenser	.30
30	81415 .002 Mfd. fixed condenser	.35
31	81155 .0005 Mfd. fixed condenser	.25
32	81157 .00025 Mfd. fixed condenser	.30
33	81158 .0001 Mfd. fixed condenser	.25
34	81282 .003 Mfd. fixed condenser	.50
35	81081 .5 Mfd. 400 V. fixed condenser	.50
36	81083 .1 Mfd. 100 V. fixed condenser	.75
37	81152 10,000 ohm ½ watt resistor	.25
38	81306 Trimmer Condenser	.50
39	81231 Trimmer Condenser	.50
40	81202 Trimmer Assembly	.40
41-42	81201 Double trimmer condenser } one Double trimmer condenser } unit	.60
43	81445 .02 Mfd. 400 V. fixed condenser	.40
44	81189 "A" Tuning coil	1.00
45	81188 "B" Tuning coil	1.00
46	81406 "C" Tuning coil	1.00
47	81178 Tuning coil	1.50

Diagram No.	Miscellaneous Parts	List Price
48	81179 Range switch	$4.00
49	81234 Tuning knob	.30
50	81200 Tone or Volume Control knob	.30
51	81276 Range switch lever	.30
52	81305 Escutcheon plate	.45
53	Cellutoid dial	.60
54	81126 Small rubber drive bushing	.03
55	67551 Larger rubber drive bushing	.04
56	67256	.05
57	67762	.05
58	81243	.25
	81387	.25
	81388	.25
59	81159	.25
60	67328	.25
61	81347	1.50
	81367	1.45
62	81160	.50
	81291	.50
63	81042	1.50
64	81095	.35
65	81094	.30
66	81100	.40
	81098	.45
	81092	.40
67	81265	.45
	81266	.30
	81274	.35
68	81274	.25
	81279	.30
		.25
69	81246	.50
70	81509	.75
		.25
		.50
	81232	.50
	81084	.40
	81085	.60
	81086	.40
	81011	.45
	81468	.60
	81199	.03
	81111	.04

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.

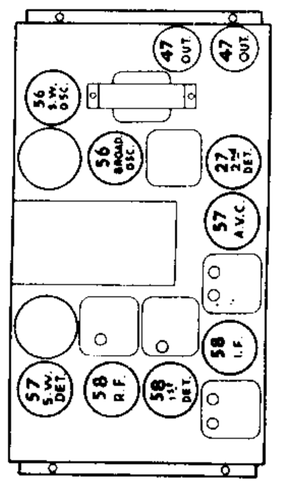
VOLTAGE TABLE

LINE VOLTAGE 115

Tube Circuit	Type of Tube	Filament Voltage	Plate to Chassis	Screen Grid to Chassis	Cathode to Chassis
Short Wave Oscillator	56	2.4	81		5.2
Short Wave Detector	57	2.4	21	2	1.9
R. F.	58	2.4	188	102	2.4
Broadcast Oscillator	56	2.4	102		0
First Detector	58	2.4	188	102	9
I. F.	58	2.42	188	102	2.2
A. V. C.	57	2.44	0	0	—89
Second Detector	27	2.42	70		—92
Output	47	2.4	177	188	Fil. to chassis —97 Fil. to grid 16.5
Rectifier	80	4.9			

TUBE LOCATIONS

FRONT OF SET

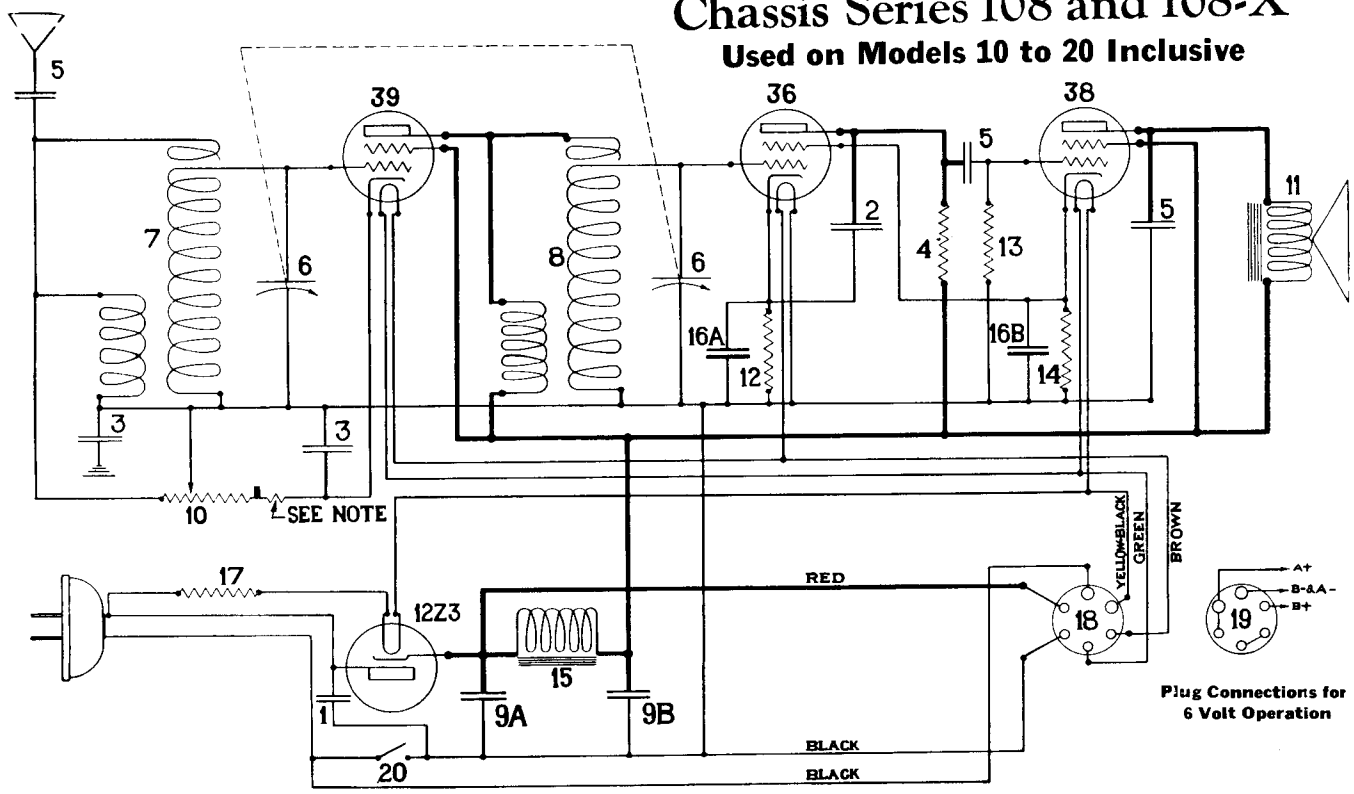


NOTE: Use an 80 tube in the Power Unit.

STEWART-WARNER SPEEDOMETER CORP.

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

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

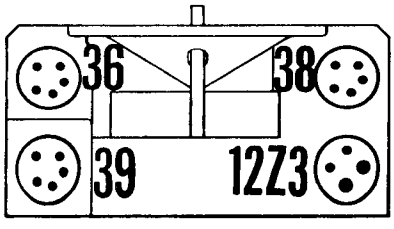
IMPORTANT NOTE

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

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

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

FRONT OF CHASSIS



TUBE LOCATIONS

PARTS LIST

Diag. No.	Part No.	Description	List Price
1	67298	.01 mfd. 600 V cartridge condenser	$0.30
2	81158	.0001 mfd. mica condenser	.22
3	81630	.1 mfd. 100 V cartridge condenser	.30
4	81644	2.1 meg. ¼ W. carbon resistor	.20
	81646	140 ohm ¼ W. carbon resistor	.20
5	81657	.003 mfd. mica condenser	.35
6	81662	Variable condenser	3.00
7	81664	Antenna Coil	.90
8	81666	Detector Coil	1.20
9A 9B	81678	4 mfd. 150 V dry electrolytic condensers (in one unit)	1.35
10	81679	250,000 ohm volume control and switch	1.50
11	81680	Speaker	5.00
12	81681	29,000 ohm ¼ W. carbon resistor	.20
13	81682	1.1 meg. ¼ W. carbon resistor	.20
14	81683	1600 ohm ½ W. carbon resistor	.20
15	81694	Filter choke	2.00
16A 16B	81698	5 mfd. 20 V dry electrolytic condensers (in one unit)	1.20
17	81785	Power cord assembly	1.30
18	81834	Battery cable socket	.10
19	81861	6 volt battery cable	.90
	81863	12 volt battery cable	....
	81865	32 volt battery cable	1.15
20	.....	Switch on back of 81679	

PARTS NOT LISTED ON DIAGRAM

81885	Bronze tuning knob	.35
81886	Bronze volume control knob	.35
81887	Gold tuning knob	.35
81888	Gold volume control knob	.35
81889	Silver tuning knob	.35
81890	Silver volume control knob	.35
81891	Book model knob	.35
81824	Antenna reel	.25
81841	Antenna reel clip	.02
81712	Bronze receiver housing	4.00
81713	Bronze housing back	.60
81731	Gold receiver housing	4.00
81728	Gold housing back	.60
81735	Silver cabinet housing	4.00
81732	Silver housing back	.60
81884	Automobile mounting bracket	.30

STEWART-WARNER SPEEDOMETER 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 osciliator 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.**

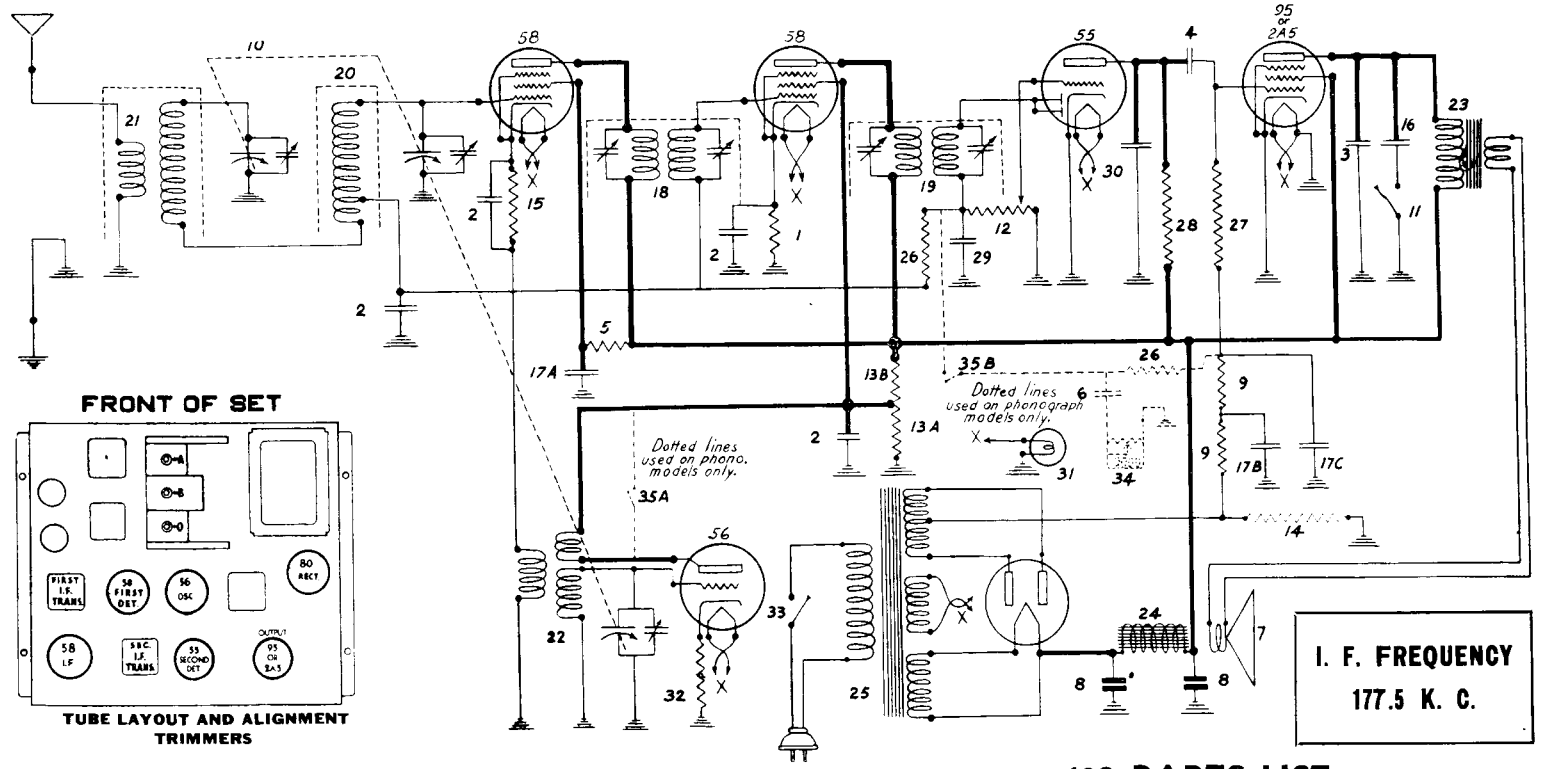
3. Retune the set and adjust the "B" trimmer for maximum output.

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.

CHASSIS MODEL 109 (RECEIVER MODELS 1090 TO 1099)



FRONT OF SET

TUBE LAYOUT AND ALIGNMENT TRIMMERS

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

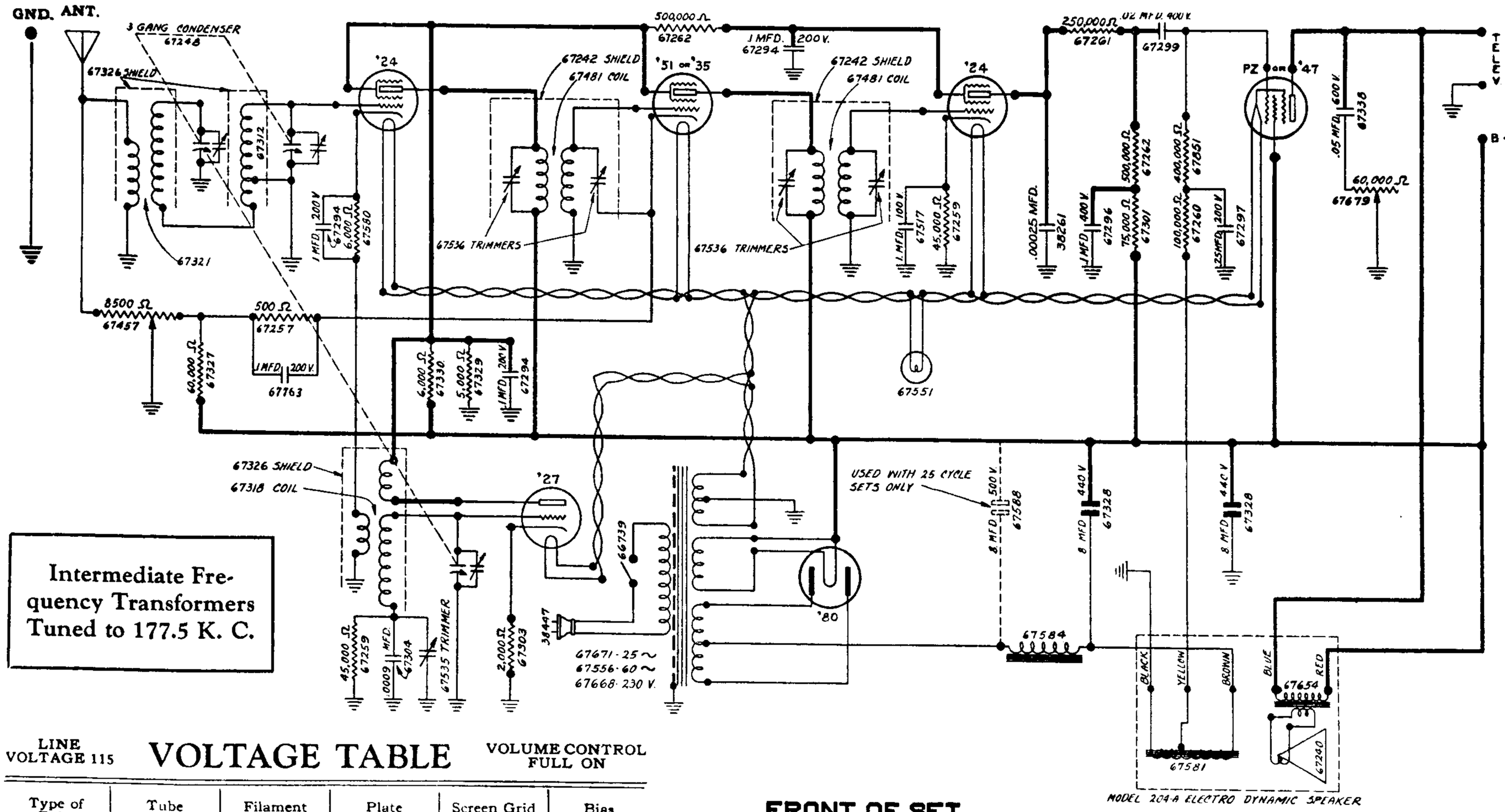
Diag. No.	Part No.	Description	List Price
1	67257	500 ohm, ½ watt resistor	$0.25
2	67294	.1 mfd., 200 volt condenser	.30
3	67298	.01 mfd., 600 volt condenser	.30
4	67299	.02 mfd., 400 volt condenser	.30
5	67938	100,000 ohm, ½ watt resistor	.25
6	81190	.1 mfd., 200 v. cond. Phono model only	.35
7	81274	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	1.00
21	81768	Antenna coil	1.25
22	81770	Oscillator coil	1.35
23	81774	Output transformer	3.00
24	81779	Speaker field coil	4.00
25	81800	110 volt 60 cy., power transformer	6.00
	81850	230 volt 60 cy., power transformer	6.25
26	81808	980,000 ohm ½ watt resistor	.20
27	81809	160,000 ohm ½ watt resistor	.20

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 ½ 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

		List Price
67236	Rubber tuning drive bushing	.02
81039	4-prong socket	.12
81040	5-prong socket	.12
81043	6-prong socket	.20
81608	R. F. coil shield	.50
81625	Tube shield	.20
81723	Ground clip	.10
81805	Tuning dial and gear assembly (see 81879)	.60
81817	First I. F. coil shield	.50
81819	Second I. F. coil shield	.50
81879	Celluloid tuning dial	.30
35459	Steel washer	.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

STEWART-WARNER SPEEDOMETER CORP.



Intermediate Frequency Transformers Tuned to 177.5 K. C.

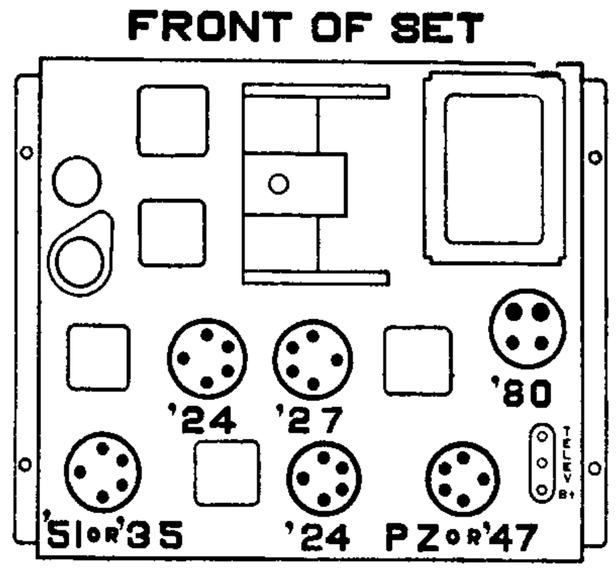
VOLTAGE TABLE

LINE VOLTAGE 115 — VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
'24	1st Det.	2.45	250	95	6.5
'27	Osc.	2.45	95		9
'51	I. F.	2.40	250	95	3
'24	2nd Det.	2.45	70	30	7
P. Z. or '47	Output	2.45	230	250	15 ‡
'80	Rect.	4.8	170		

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 screen grid and plate voltages.

‡ This reading obtained between ground and yellow speaker lead. Direct reading from grid to ground or reading taken with a set tester will show about 3 volts because of high resistance in grid circuit.



TUBE LOCATIONS

*This data sheet applies to the following serial numbers only:

Model 102-A, 34,000 upwards
Model 102-B, 10,500 upwards
Model 102-E, 10,200 upwards

See Form 5535 for lower serial numbers

Models R-102-A, B & E.*

STEWART-WARNER SPEEDOMETER 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.

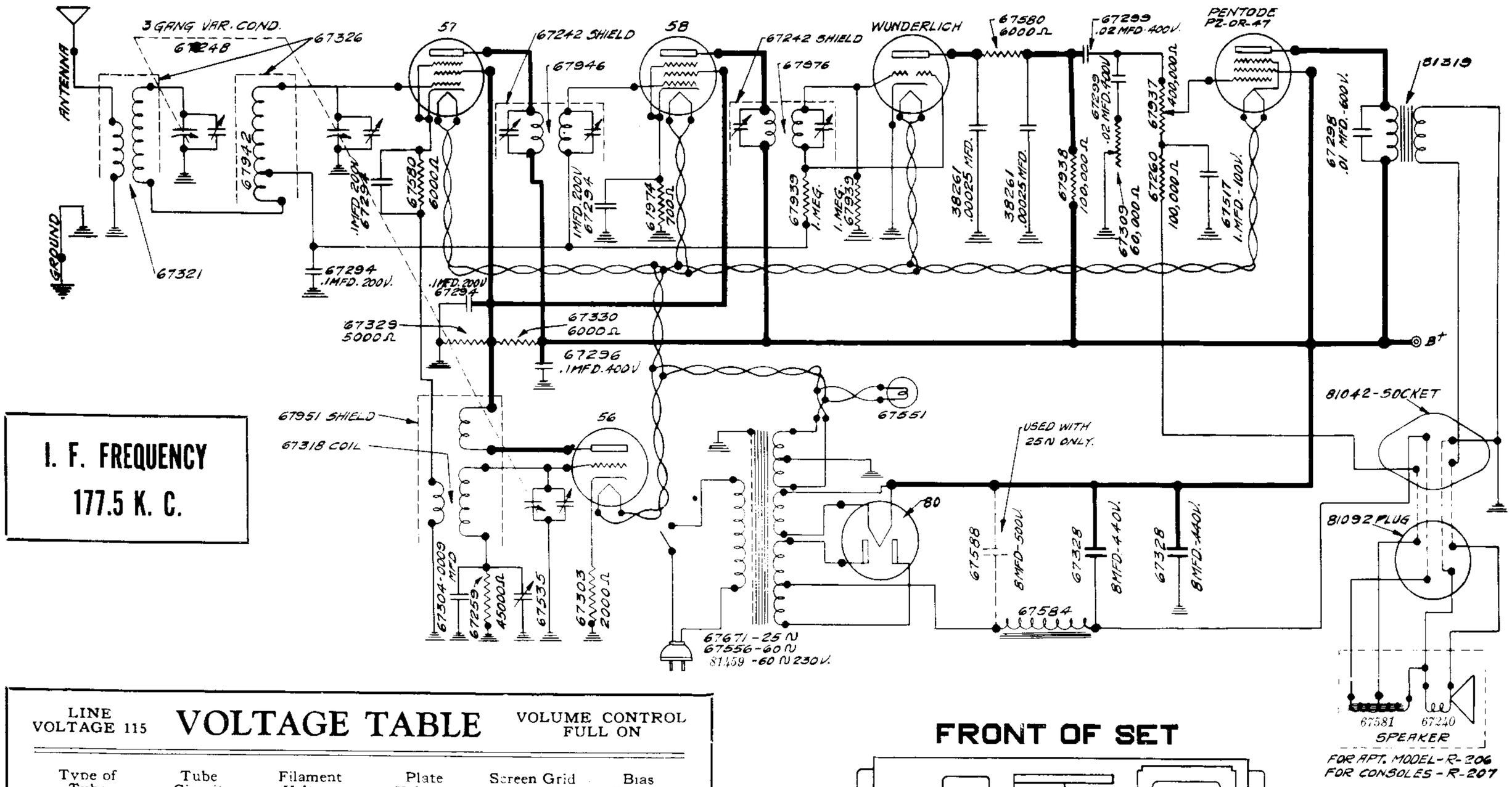
The receiver should now be perfectly aligned.

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, ⅓ watt resistor	.25
67260	100,000 ohm, ⅓ 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, ⅛ watt resistor	.25
67304	.0009 mfd. padding condenser	.30
67309	60,000 ohm tone control	1.59
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, ⅓ 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	67946 1st I.F. transformer	2.00
	67481 coil only	.75
	67536 trimmer only	.65
67951	Oscillator coil shield	.75
67974	700 ohm, 1 watt resistor	.25
67976	67976 2nd I. F. transformer	2.00
	67481 coil only	.75
	67536 trimmer only	.65
81042	Speaker socket	.20
81092	81092 Speaker plug only	.20
	67972 Cable and plug	.60
	67971 Cable only	.40
81459	230 volt 60 cycle power transformer	10.00
	PARTS NOT SHOWN ON DIAGRAM	
67532	Rubber dial drive bushing	.02
67953	Escutcheon plate	.50
81412	Volume or tone control knob	.25
81413	Tuning knob	.25

STEWART-WARNER SPEEDOMETER CORP.

Circuit Data for Stewart-Warner A. C. Series R-104



I. F. FREQUENCY
177.5 K. C.

VOLTAGE TABLE

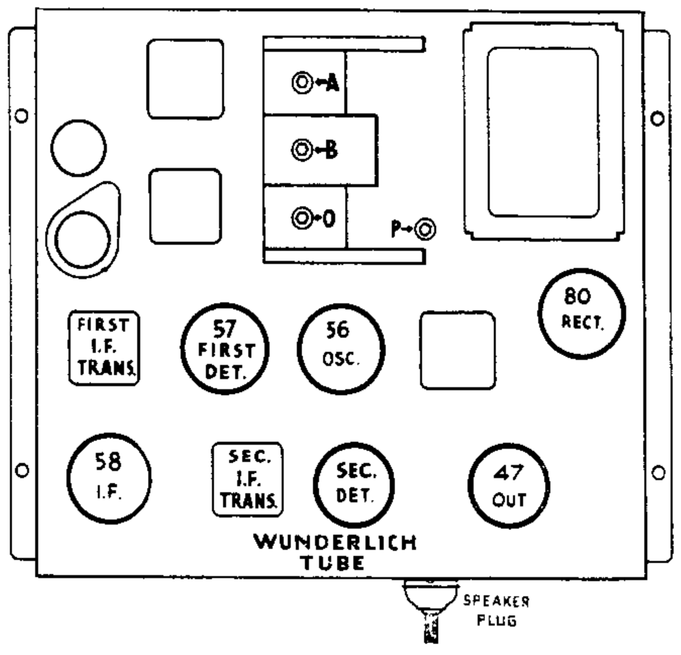
LINE VOLTAGE 115 — VOLUME CONTROL FULL ON

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

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

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

FRONT OF SET



TUBE LOCATIONS

STEWART-WARNER SPEEDOMETER CORP.

SERVICE DATA FOR MODEL 106 CHASSIS

CIRCUIT DESCRIPTION

The Model 106 Stewart-Warner Radio Chassis is a seven tube superheterodyne receiver embodying three important features: (1) Interstation Noise Suppression; (2) "Q" or "Squelch" Circuit; (3) Delayed Automatic Volume Control Action. These desirable features are obtained thru the use of a 55 detector tube which functions as three tubes in one—two diode rectifiers and a triode amplifier. One diode is used for detection, the detected signal obtained in this way being then passed on to the grid of the triode part of the same tube where it is amplified at audio frequencies and fed into the pentode output tube. A constant negative bias is provided on this diode by means of a cathode resistor which prevents detection of signal or noise unless the incoming signal is above a certain minimum value, thus providing the "squelcher" or "Q" circuit. This circuit, in combination with a manually operated sensitivity control (No. 32 on the diagram) makes it possible to eliminate objectionable noise when tuning between stations, resulting in interstation noise suppression.

Delayed A. V. C. is obtained thru the second diode section of the 55 tube, which is coupled to the first by a .001 mfd. condenser. However, this diode plate is about 15 volts negative with respect to the cathode, so that no rectification and consequently no A. V. C. action can take place in this circuit unless the incoming signal builds up to this value, which represents the minimum signal capable of giving full audio output. Consequently no fading will be noticed throughout the range where the A. V. C. has hold. Furthermore, any station not capable of producing full output in the speaker, is not further reduced in volume by the action of the A.V.C. circuit, as is the case in normal A.V.C., so that with delayed A.V.C. weak stations come in with much better volume and the effects of severe fading are greatly minimized.

ALIGNING THE 106 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 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 radio-frequency stage and then fed into the first detector 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 back 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 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 top of each shield.

PRELIMINARY STEPS IN ALIGNING

In aligning the Model 106 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 and inter-station noise suppressor are 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. 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 across the grid clip of the first detector tube and ground.

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. Twist the aerial and ground wires of the set together for their entire length 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 radio frequency stage "A" trimmer till the output meter reading reaches a maximum.

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

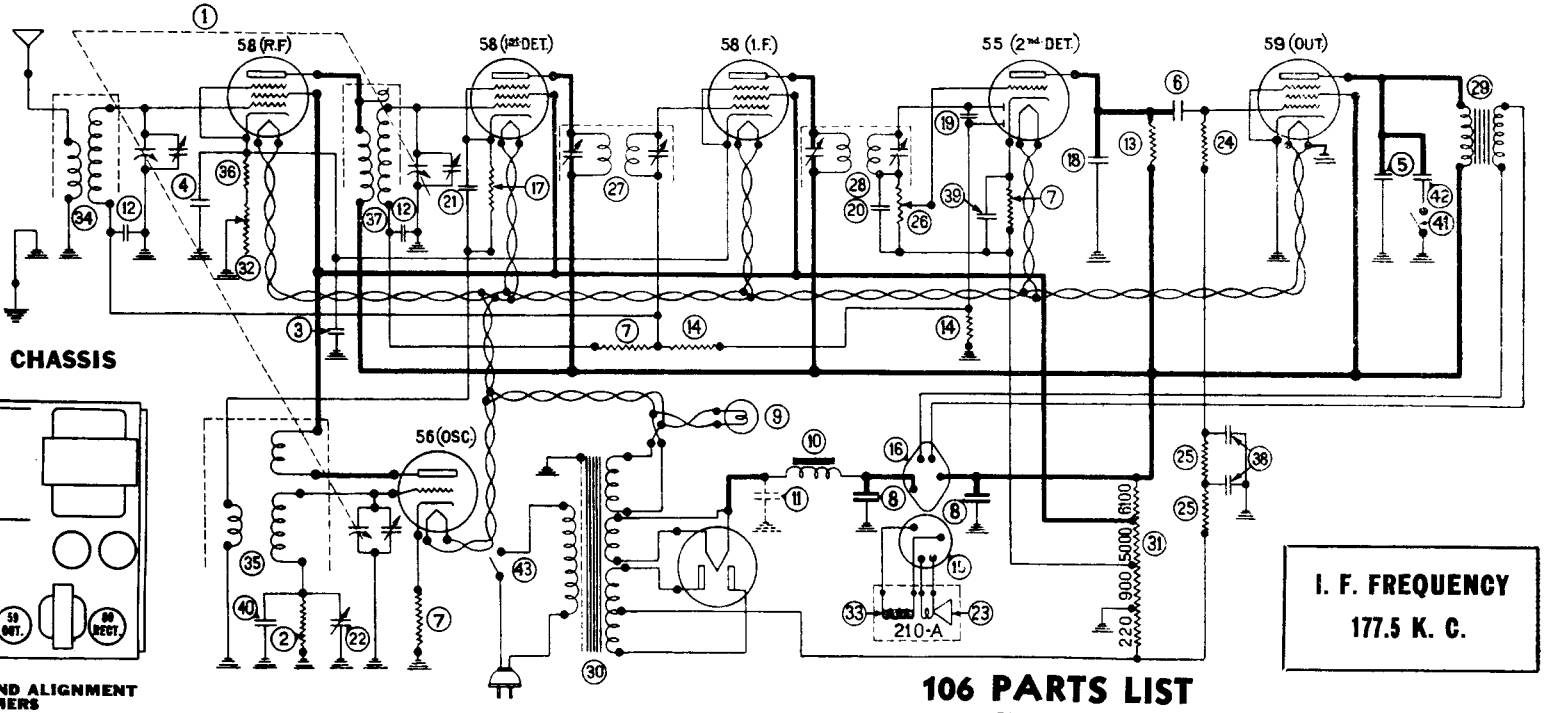
4. Set the oscillator at 600 K.C. and tune the set carefully to this frequency.

5. Adjust the oscillator padding condenser "P" for maximum output, **RETUNING THE SET AFTER EACH CHANGE IN ADJUSTMENT. This is important.**

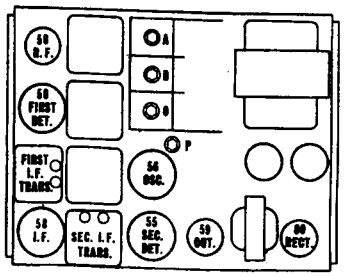
6. Turn back the oscillator to 1400 K.C., tune the set to the same frequency, and very carefully readjust the "A" and "B" trimmer condensers to produce maximum output.

The receiver should now be perfectly aligned.

Circuit Data for Stewart-Warner A. C. Series R-106



FRONT OF CHASSIS



TUBE LAYOUT AND ALIGNMENT TRIMMERS

VOLTAGE TABLE

LINE VOLTAGE 115 — VOLUME AND SENSITIVITY CONTROLS FULL ON

Tube Circuit	Type of Tube	Filament Voltage	Plate Voltage	Screen Grid Voltage	Bias Voltage
58	R. F.	2.29	245	97	3.1
56	Osc.	2.28	97	..	9.3
58	1st Det.	2.28	245	97	...
58	I. F.	2.26	245	97	3.1
55	2nd Det.	2.24	66	..	7.9
59	Output	2.24	229	245	17.4*
80	Rect.	4.78	...	...	....

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 between negative end of voltage divider and chassis.

106 PARTS LIST

Diag. No.	Part No.	Description	List Price
1	67248	3 gang tuning condenser	$5.50
2	67259	45,000 ohm, ¼ w. carbon res.	.25
3	67294,	.1 mf., 200 v. tubular cond.	.30
4	67297	.25 mf., 200 v. tubular cond.	.40
5	67298	.01 mf., 600 v. tubular cond.	.30
6	67299	.02 mf., 400 v. tubular cond.	.30
7	67303	2,000 ohm, ¼ w. carbon res.	.25
8	67328	8 mf., 440 v. electrolytic cond.	1.75
9	67551	2.5 volt pilot lamp	.25
10	67584	Filter choke coil	2.00
11	67588	8 mf., 500 v. electrolytic cond. (For 25 cycle sets only)	1.80
12	67762	.05 mf., 200 v. tubular cond.	.25
13	67938	100,000 ohm, 1 w. carbon res.	.25
14	67939	1 megohm, ½ w. carbon res.	.25
15	67971	Speaker cable only	.40
	67972	Speaker cable and plug	.60
	81092	Speaker plug only	.20
16	81042	Speaker socket	.20
17	81151	4,000 ohm, ½ w. carbon res.	.25
18	81155	.0005 mf. pigtail mica cond.	.25
19	81156	.001 mf. pigtail mica cond.	.30
20	81157	.00025 mf. pigtail mica cond.	.30
21	81190	.1 mf., 200 v. tubular cond. & bracket	.35
22	81231	Oscill. pad trimming cond.	.50
23	81274	Diaphragm (R210A and RL211A)	2.75
	81279	Diaphragm & shell (RH211A)	2.75
24	81381	150,000 ohm, ½ w. carbon res.	.25
25	81382	60,000 ohm, ½ w. carbon res.	.25
26	81484	500,000 ohm volume control	.95
27	81510	1st I. F. trans. assembly	2.00
	81200	Double I. F. trim. cond. only	.60
	81234	I. F. transformer coils only	1.00
28	81511	2nd I. F. trans. assembly	2.00
	81200	Double I. F. trim. cond. only	.60
	81234	I. F. transformer coils only	1.00
29	81513	Single speaker output trans.	2.75
	81596	Twin speaker output trans.	2.75

Diag. No.	Part No.	Description	List Price
	81525	115 v., 60 cy. power trans.	8.00
30	81571	115 v., 25 cy. power trans.	10.00
	81574	110-250 v., 50-60 cy. power trans.	10.00
31	81530	Voltage divider vitreous res.	1.25
32	81534	8,000 ohm sensitivity control & switch	1.50
33	81532	R210A speaker field coil (1000 ohms)	3.50
	81265	211A speaker field coil (460 ohms)	3.50
34	81538	R. F. tuning coil	1.00
35	81539	Oscillator tuning coil	1.00
36	81548	200 ohm, ¼ w. resistor	.25
37	81550	First detector tuning coil	1.00
38	81580	.25 mf., 100 v. shlded. cond. in one can	1.50
39		.25 mf., 100 v. shlded. cond. in one can	
		1 mf., 100 v. shlded. cond. in one can	
40	81593	.0075 mf. oscill. pad. cond.	.25
41	81616	Tone control switch only	.40
42	81618	.04 mf., 600 v. tubular cond.	.30
43	.....	Power switch (mtd. on 81534)	..

PARTS NOT SHOWN IN DIAGRAM

Part No.	Description	List Price
81568	R. F. tube shield shell	.20
81569	R. F. tube shield cover	.05
67964	1st det. & I. F. tube shield	.30
81213	R. F. coil shield (with hole)	.50
67326	R. F. coil shield (plain)	.50
81212	I. F. coil shield	.50
67712	Gang cond. rubber pad	.05
67711	Gang cond. rubber washer	.05
67236	Dial drive rubber bushing	.05
81592	Celluloid dial and frame	.35
67269	No. 14 x 1" chassis screw	.05
67667	1⅛ diam. ¼ hole washer	.01
81091	No. 8—32 x 1⅛ speaker mtg. screw	.01
66735	No. 8—32 thin hex. nut	.01
67953	Escutcheon plate	.50
81326	Escutcheon wood screws per C	.50
81413	Large knob	.25
81412	Small knob	.25
66961	Felt washer for knobs	.01

STROMBERG-CARLSON TELEPHONE MFG. CO.

Engineering Data
Stromberg-Carlson Nos. 48, 49, 50, and 51 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Rochester, New York

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.)

CONTROLS

The accompanying cut shows the location and purpose of the controls on the front panel of the receiver, and the following paragraphs explain their use.

Station Selector

No description of this control is necessary as its operation is usual and normal.

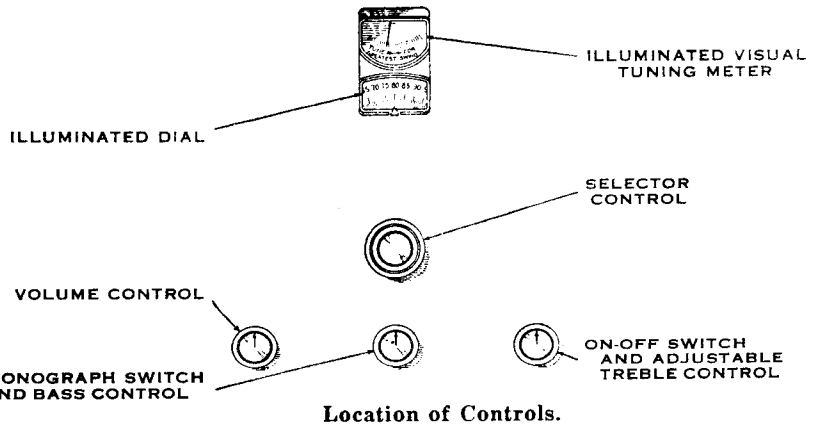
On-Off Switch and Adjustable Treble Control

The On-Off switch is turned to "On" by clockwise rotation. Further rotation in a clockwise direction gradually reduces the response to the high audio or treble frequencies. When in a full clockwise position the minimum response to the highs is obtained. The full audio range is again obtained by turning the knob counter-clockwise until just before the On-Off switch turns "Off".

Volume Control

This control is operated in the usual manner, turning clockwise for higher volume levels. Operated simultaneously with this Volume Control is the low level tone compensation circuit, which increases the relative response to low and high audio frequencies as the volume level is reduced. This gives the effect of "constant fidelity" to the ear.

STROMBERG-CARLSON TELEPHONE MFG. CO.



Location of Controls.

Phonograph Switch and Bass Control

When this knob is turned counter-clockwise from the normal position, the input of the audio system is switched to the phonograph circuits in such a manner that the Volume Control knob is used for controlling the level of reproduction of phonograph recordings. When turned clockwise from the normal position, this control reduces the response at the low audio or bass frequencies. This position is used when it is desired to obtain extremely high sound levels from the receiver without over-loading.

"Q" Switch

This control is a toggle switch located on the rear of the chassis. When the lever is in the "Down" position the "Q" circuit is operating.

Hum Balancer

This is a potentiometer located on the rear of the chassis with means for adjusting by a screwdriver. It should be adjusted only when the Volume Control is at minimum and the "Q" Switch is in the "Up" position.

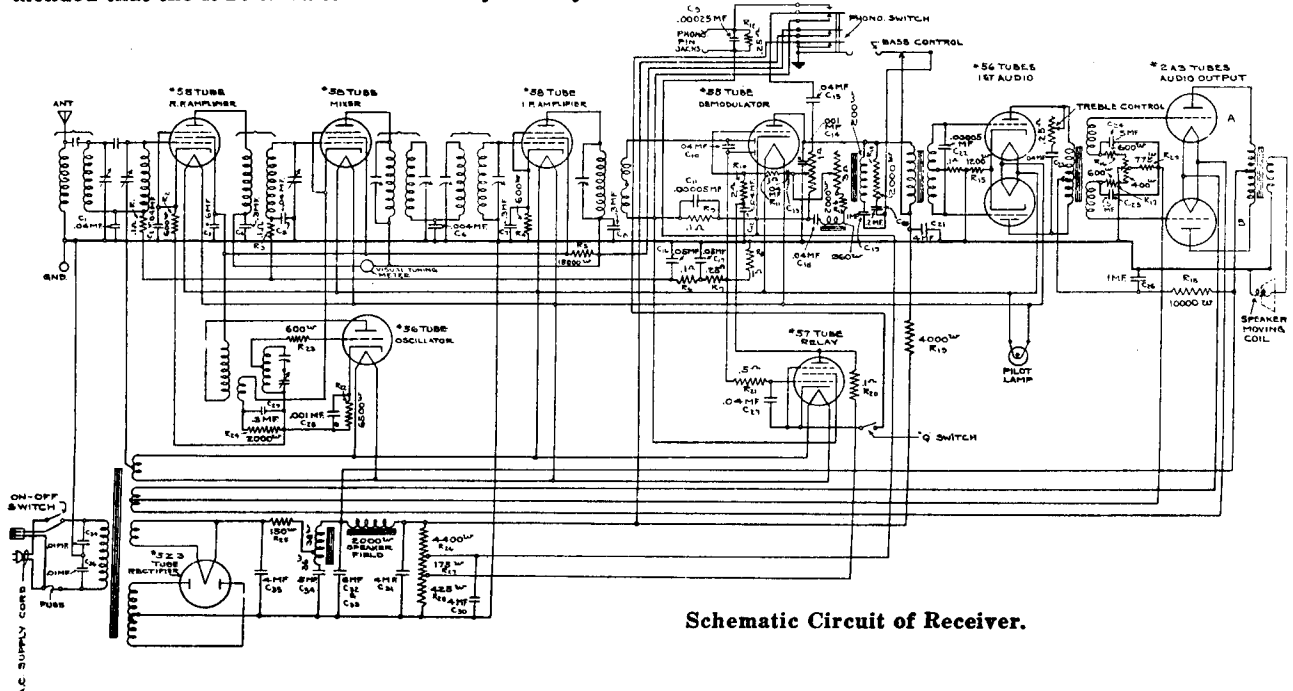
ALIGNMENT OF RECEIVERS

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.



Schematic Circuit of Receiver.

STROMBERG-CARLSON TELEPHONE MFG. CO.

NORMAL VOLTAGE READINGS

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

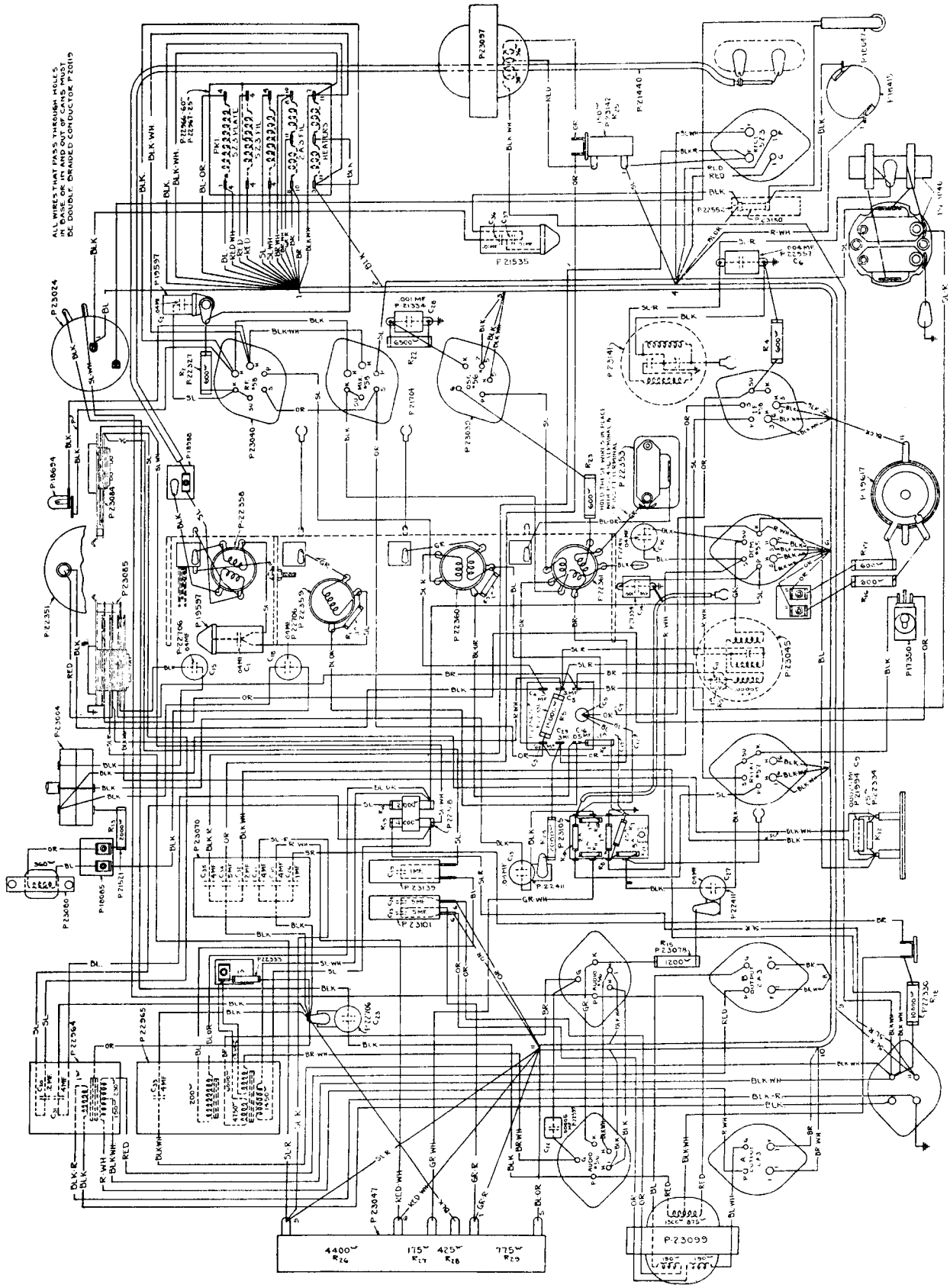
Voltage	Meter	Scale	Where Measured	Approx. Value in Volts
Heater Voltages Nos. 55, 56, 57, and 58 Tubes	A. C.	0–4	Across Heater Terminals of Sockets	*2.5*
Filament Voltages Nos. 2A3 Tubes	A. C.	0–4	Across Filament Terminals of Audio Output Sockets	*2.5*
Filament Voltage No. 5Z3 Tube	A. C.	0–8	Across Filament Terminals of No. 280 Rectifier Socket	*5.*
Plate Voltage Radio Amplifier Tube	D. C.	0–250	Between Plate Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	200
Plate Voltage Mixer Tube	D. C.	0–250	Between Plate Terminal of Mixer Socket (+) and Chassis Base (—)	200
Plate Voltage Oscillator Tube	D. C.	0–250	Between Plate Terminal of Oscillator Socket (+) and Chassis Base (—)	95
Plate Voltage I. F. Tube	D. C.	0–250	Between Plate Terminal of I. F. Socket (+) and Chassis Base (—)	200
Plate Voltage Demodulator Tube	D. C.	0–250	Between Plate Terminal and Demodulator Socket (+) and Chassis Base (—)	170
Plate Voltage First Audio Tubes	D. C.	0–250	Between Plate Terminal of First Audio Socket (+) and Chassis Base (—)	220
Plate Voltages Audio Output Tubes	D. C.	0–750	Between Plate Terminals of Audio Output Sockets (+) and Chassis Base (—)	345
"C" Voltage R. F. Amplifier Tube	D. C.	0–10	Between Cathode Terminal of R. F. Amplifier Socket (+) and Chassis Base (—)	4
"C" Voltage Mixer Tube	D. C.	0–10	Between Cathode Terminal of Mixer Socket (+) and Chassis Base (—)	8
"C" Voltage Oscillator Tube	D. C.	0–250	Between Cathode Terminal of Oscillator Socket (+) and Chassis Base (—)	25
"C" Voltage I. F. Tube	D. C.	0–10	Between Cathode Terminal of I. F. Socket (+) and Chassis Base (—)	4
"C" Voltage First Audio Tubes	D. C.	0–250	Between Cathode Terminal of First Audio Sockets (+) and Chassis Base (—)	12
"C" Voltage Audio Output Tube	D. C.	0–250	Across 775-ohm Biasing Resistor	60
Grid Voltage Triode of Demodulator Tube	D. C.	0–250	Between Cathode Terminals of Demodulator Socket (+) and Green-White Wire 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 as read on a Weston Model 663 Ohmmeter. The G terminals of the Nos. 55, 57, and 58 tubes are connected to the top caps.

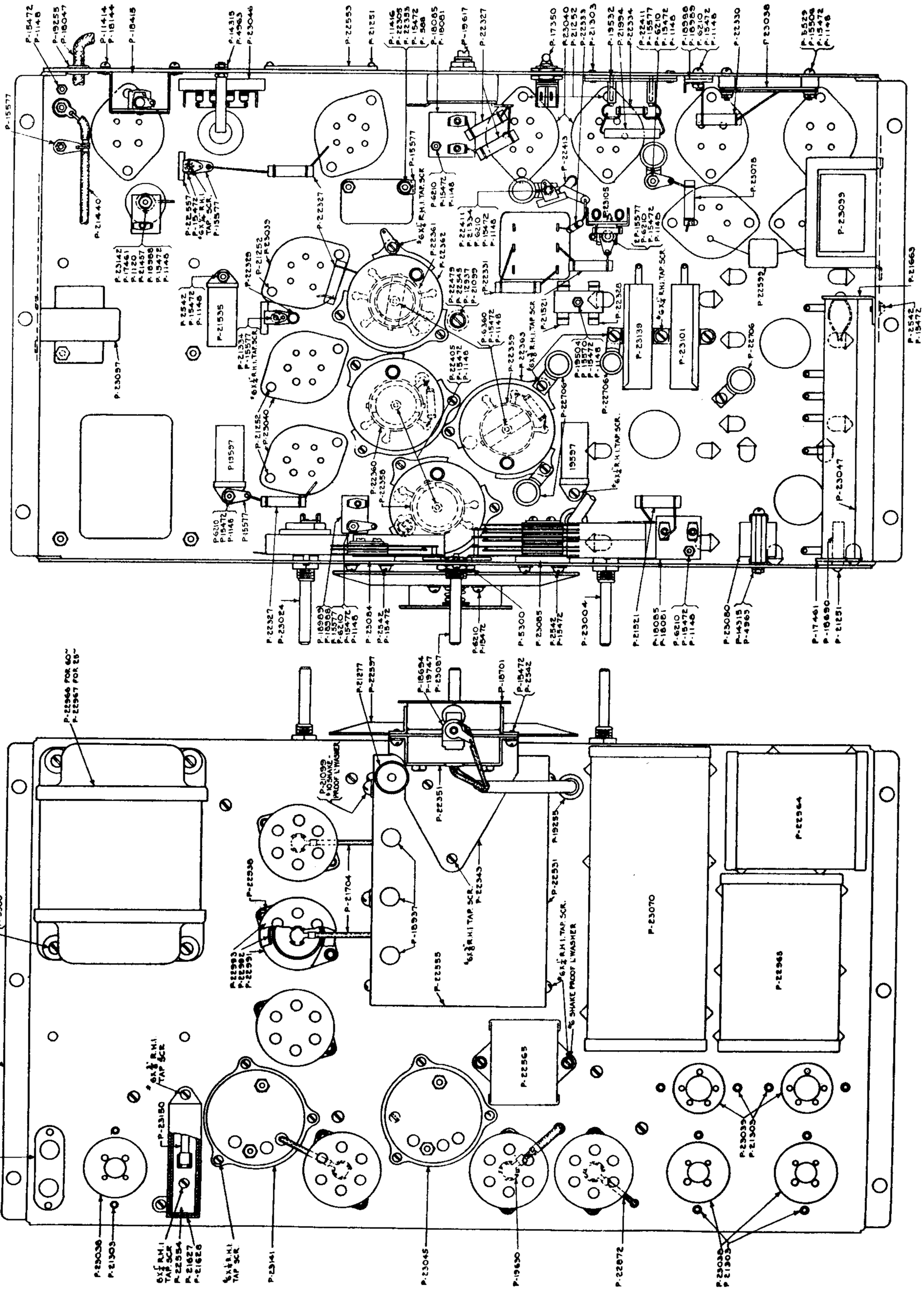
Tube	H	H	K	SU	S	P	G	Remarks
R. F. (58)	0	0	600	600	20,000	5,000	1,450,000	
Mix (58)	0	0	2000	2000	20,000	5,000	1,450,000	SU and S terminals of Demodulator Socket are diode plates.
Osc (56)	0	0	6500			20,000	600	NOTE A
I. F. (58)	0	0	600	600	20,000	5,000	70	With phono switch on, Res. is from 1 megohm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

STROMBERG-CARLSON TELEPHONE MFG. CO.



Wiring Diagram of Chassis.

STROMBERG-CARLSON TELEPHONE MFG. CO.



Chassis Assembly.

THORDARSON ELECTRIC MFG. CO.

A CLASS "B" AMPLIFIER USING TYPE 46 TUBES

The release of the type 46 double grid tube and the type 82 mercury vapor rectifier makes possible the construction of an amplifier that will deliver 20 watts of audio power at a very reasonable cost. In order that full power may be obtained with negligible distortion, it is important that carefully designed coupling transformers be used and that the power supply unit have extremely good regulation.

We recommend that the filaments be lighted from a separate transformer as shown in the circuit diagram. This, with the unusually heavy plate supply transformer, assists greatly in improving the regulation over that obtained with the ordinary power supply. In addition, a swinging filter choke, T-2353-A, so designed that the inductance decreases with an increase in current, has the effect of raising the output voltage of the rectifier system at the heavier current drains and tends to make the voltage output of the power supply constant over the required range. This is extremely important for a class "B" amplifier since the plate current of the power tubes varies over a wide range with each signal impulse.

The grids of the power output tubes of class "B" amplifiers draw considerable current. The coupling transformer used to feed the grids must be designed with care in order that maximum power transfer may be accomplished with a minimum of signal distortion. A driver stage of sufficient capacity to properly excite the class "B" stage is, of course, necessary.

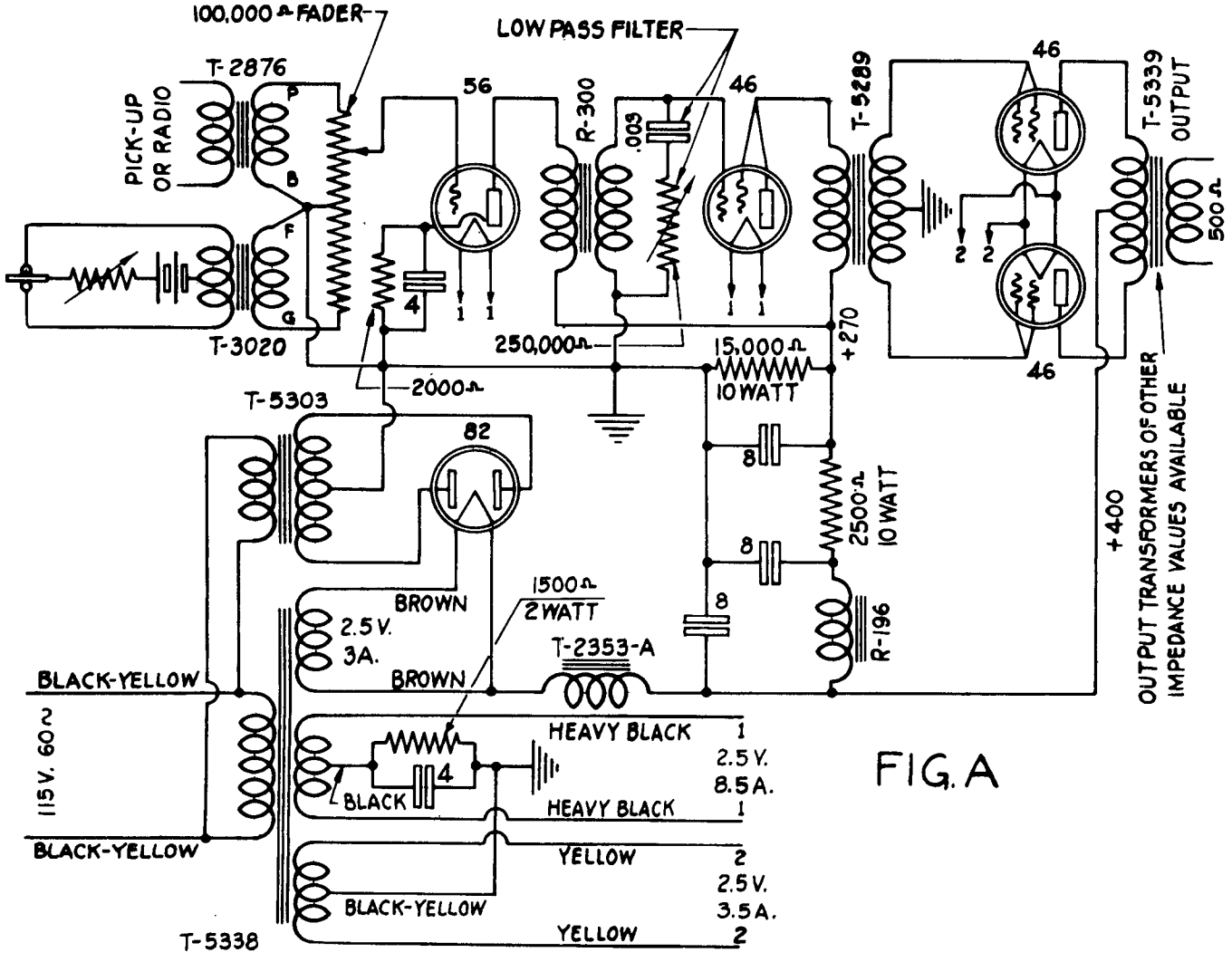


FIG. A

THORDARSON ELECTRIC MFG. CO.

A schematic diagram of the complete amplifier is shown in Figure "A". The input is designed so that it is possible to fade from an electric pick-up or a radio set to the microphone. A type T-2876 transformer was used to couple the pick-up to the fader. It is important that this coupling transformer have a low resistance primary in order that the full voltage developed by the pick-up be available. It should be noted that the pick-up is connected to the secondary of the transformer, the terminals of which are marked "speaker", and the primary is connected to the fader. This gives a step-up ratio of 1.7. The circuit shows the use of the T-3020 transformer to couple the double button microphone to the fader. In case a single button microphone is used, the type T-2357 transformer may be substituted. The fader also serves as a volume control for the amplifier.

A type 56 tube is used in the first audio or voltage amplifier stage. This has practically the same characteristics as the type 27 tube with the exception that the amplification factor is 13.8 compared with 8.2 for the type 27. The type 27 tube can be substituted for the type 56 tube without any change in the circuit constants if the voltage input from the pick-up and microphone is sufficiently high.

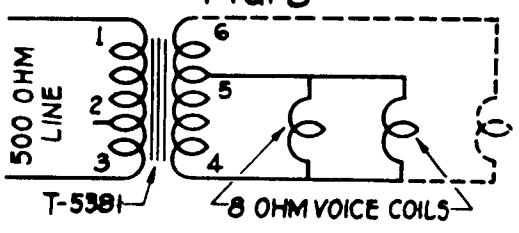
The type 56 tube is coupled to a type 46 tube in the driver stage operating as a class "A" amplifier. The 46 has two grids, one close to the plate and the other next to the filament. In class "A" operation, the grid closest to the plate is tied to the plate. An R-300 transformer is used to couple the voltage amplifier stage to the driver stage and a low pass filter is placed across the secondary of the R-300. The low pass filter is adjustable so that the response of the amplifier to the higher frequencies can be reduced. Adjusting the low pass filter will eliminate objectionable high notes. If a greater cut off of the high frequencies is desired, this can be obtained by using a condenser larger than the .003 mfd. recommended. The filter also cuts down needle scratch and microphone hiss.

The driver stage is coupled through a type T-5289 transformer into the grids of the 46 tubes in the class "B" power output stage. This is a transformer of generous design with the secondary center tapped and designed to carry the heavy grid currents. For class "B" operation, the two grids of the 46 tube are tied together.

A cheap and fairly good volume indicator consists of a 0-25 milliampere D.C. meter placed in the circuit between the center tap of the T-5289 transformer secondary and ground. This measures the grid current drawn by the class "B" power output tubes which varies with the strength of signal. For full power the meter will swing to about 20 milliamperes on signal peaks.

The output transformer shown in Figure "A" couples the power stage to a 500 ohm line. If the speakers are placed at any distance from the amplifier, it is recommended that this method of coupling to the speakers be used, since considerable loss of power will result if long leads are connected direct to the voice coils.

FIG. B



THORDARSON ELECTRIC MFG. CO.

At the speaker end of the line, the type T-5381 transformer should be used. The primary of this transformer is designed to match the 500 ohm line and has a tap for 250 ohms. The secondary is designed for an 8 ohm voice coil (which is almost standard for dynamic speakers) and has a tap at 4 ohms if two are to be used in parallel. Figure "B" shows the circuit for two speakers with the connections for one speaker dotted in. The 4 and the 8 ohm taps should not both be used at the same time.

Figure "C" shows the method of coupling recommended where it is desired to operate two groups of speakers which may be some distance apart. Two of the T-5381 transformers are used and should be placed as close as possible to the speakers. Using the 250 ohm taps, the primaries of the two transformers are connected in series to match the 500 ohm line. Either one or two voice coils may be connected to the secondaries as explained above.

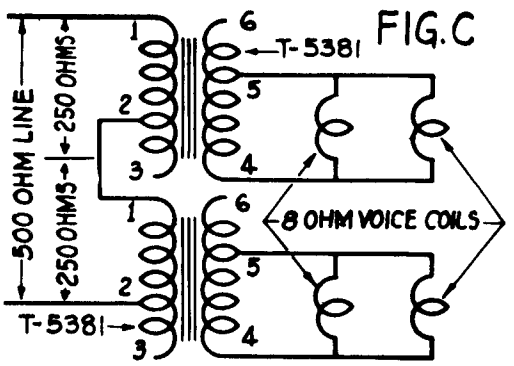


FIG. C

If the speakers are close to the amplifier, the type T-5356 transformer can be used as the output transformer in the amplifier and the secondary coupled directly to the voice coils of the speakers. Figure "D" shows this method of connection. If one speaker is used it should be connected to terminals 1 and 3 which is the 8 ohm output. If four speakers are to be used, they should be connected in series-parallel to the 8 ohm terminals. If two speakers are to be used, the four ohm secondary should be used with the speakers in parallel.

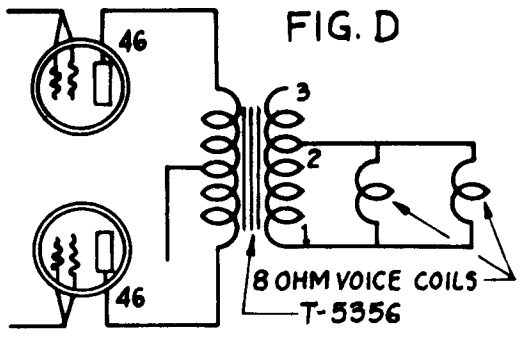


FIG. D

Figure "E" shows the overall response curve of the amplifier from the grid of the 56 tube to the secondary of the output transformer.

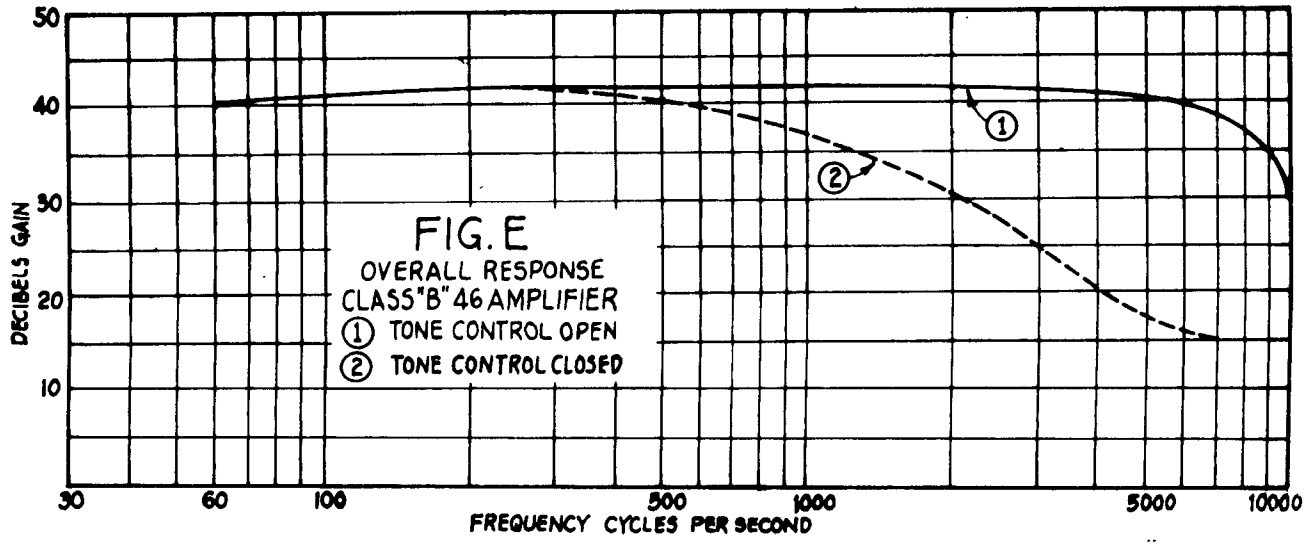


FIG. E
OVERALL RESPONSE
CLASS "B" 46 AMPLIFIER
① TONE CONTROL OPEN
② TONE CONTROL CLOSED

THORDARSON ELECTRIC MFG. CO.

The average gain of the amplifier is approximately 42 decibels, which does not include the amplification of the input transformer. The dotted curve shows the effect of the low pass filter in attenuating the high frequencies.

There are no tricks to the circuit and it is only necessary to observe ordinary precautions in the construction and operation of the amplifier. The cases of all the coupling transformers should be connected to the ground (B-) of the amplifier. The pick-up, the frame of the turntable motor, and the center tap of the microphone transformer should be grounded as well. If it is not convenient to connect the ground post of the amplifier to a good ground, a 1.0 mfd. condenser connected to the ground side of the incoming power line may be used to ground the amplifier. All grid leads should be kept as short as possible. The leads carrying A.C. should be twisted together and kept as far as possible from the other wiring. The coupling transformers should be placed outside the magnetic field of the power supply to keep the hum at a low level. It is often times possible to reduce hum by rotating the input transformers until a most advantageous position is found.

The amplifier should never be operated without a load connected to the secondary of the output transformer as it might cause the destruction of either the tubes or the output transformer, or both. If the amplifier is operated with only one or two speakers the volume should be kept low or the speakers may be permanently injured by the tremendous power available.

For amateur phone transmitters the same circuit may be used, the type T-5291 output transformer being used to modulate one or two 210 tubes. A choke and condenser should be used to isolate the plate current of the modulated tubes from the secondary of the transformer.

List of Transformers to be Used

T-5303	Plate Transformer - 400 volts D.C. - 200 m.a.	$8.00 list
T-5338	Filament Transformer	6.00 list
T-2353-A	Swinging Filter Choke	5.00 list
T-5289	Input Transformer - 46 to 46's Class "B"	5.00 list
T-5339	Output 46's Class "B" to 500 ohms	5.00 list
T-5356	Output 46's Class "B" to 8 or 4 ohms	5.00 list
T-5381	Line transformer 500 to 8 or 4 ohms	4.50 list
T-5291	Output 46's Class "B" to 10,000 or 5,000 ohms	5.00 list
T-3020	Double Button Microphone to Grid	5.00 list
T-2876	Coupling Transformer	3.00 list
R-300	Audio Transformer	4.00 list
R-196	Filter Choke	3.00 list

TRANSFORMER CORPORATION OF AMERICA

MODEL 300

SUPERHETERODYNE

ADJUSTING TRIMMERS: The model 300 receiver has nine trimmer condensers. The setting must be accurate, although with tolerence enough to permit exchange of tubes without ruining sensitivity. Rough handling in shipment will not ordinarily jar these condensers and cause the set to lose sensitivity.

To adjust the trimmers connect your 175 K. C. oscillator to the first detector type 58 grid cap, and in the following order, readjust trimmers numbers five, six, seven, eight and nine for maximum output; next, disconnect your 175 K. C. 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 from a known frequency, crystal controlled, station at 1400 K. C., then reset trimmers two and one respectively for maximum output. This adjustment will track the first detector and r. f. stage.

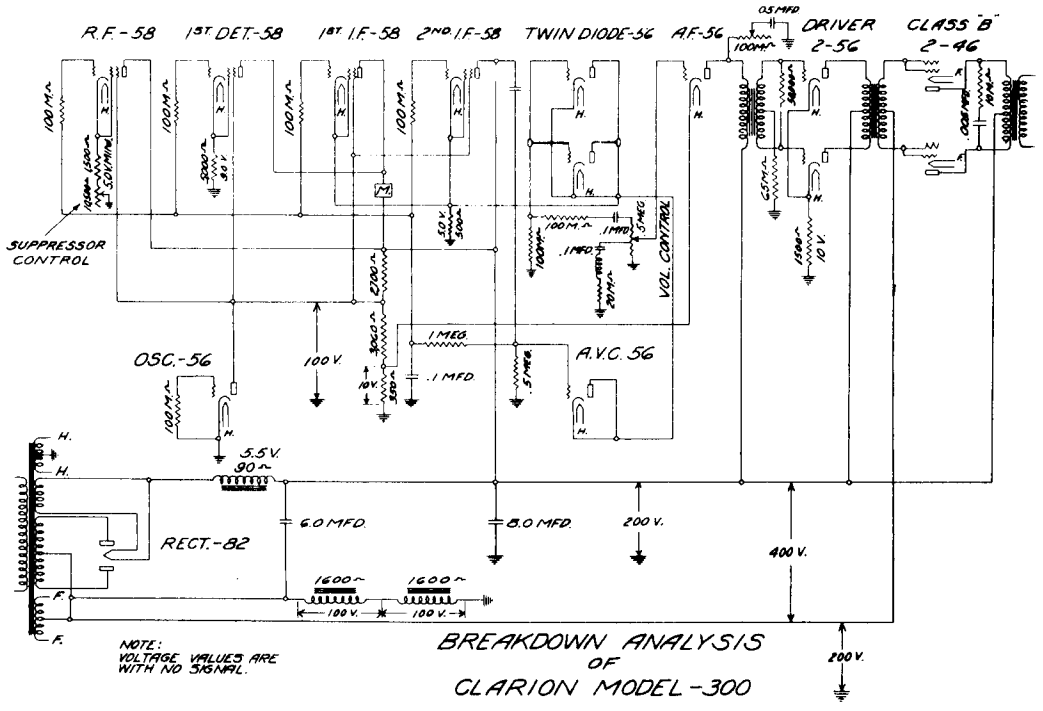
To check the calibration of the receiver, whether it be high or low, trimmer, number three (oscillator) should be reset until a station of known high frequency is brought in at the correct dial marking with peak volume. If your broadcast test oscillator is accurately calibrated, it might be used in place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

The next adjustment is important and not easily explained in writing, so pay close attention to the following instructions. 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 needle and readjust No. 4 trimmer until the swinging needle reaches its highest peak. Your output meter mentioned in this test is not to be confused with the tuning meter incorporated in the set.

Retune the receiver and broadcast test oscillator to 1400 K. C., and recheck 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.

TRANSFORMER CORPORATION OF AMERICA

MODEL 300



CIRCUIT RESISTANCE ANALYSIS
Model 300 Socket to ground

Stage	Grid	Cathode	Heater	Plate	Screen G	Suppr. G
R. F.	Infinity	1,450	.1	6,100	3,350	1,480
1st. Det.	Infinity	5,000	.1	6,600	3,350	5,000
1st. I. F.	Infinity	500	.1	6,600	3,350	500
2nd. I. F.	Infinity	500	.1	6,100	3,350	500
Oscillator	100,000	.07	.1	3,400	.....	.....
A.V.C.	500,000	500	.1	500	.....	.....
1st. diode	100,000	500	.1	500	.....	.....
2nd. diode	100,000	500	.1	500	.....	.....
A. F.	500,000	350	.1	8,600	.....	.....
Driver 1.	68,000	1,500	.1	6,400	.....	.....
Driver 2.	68,000	1,500	.1	6,400	.....	.....
1 Class "B"	3,250	.....	3,250	6,300	.....	.....
2 Class "B"	3,250	.....	3,250	6,300	.....	.....
Rectifier	.....	.....	6,100	3,400	.....	.....

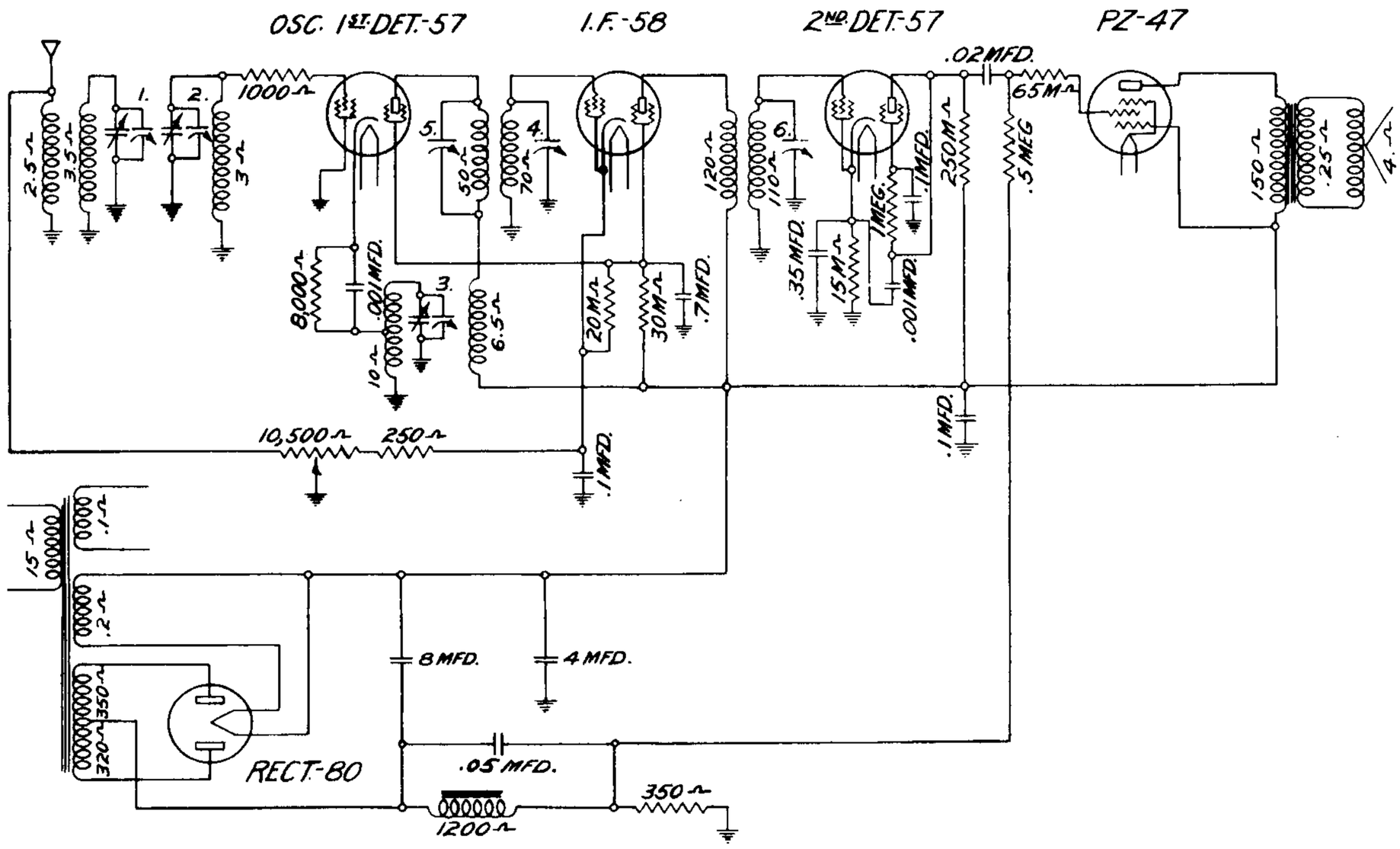
Note: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohm meter in each reading; the individual resistance in the circuit can be readily checked upon removal of chassis.

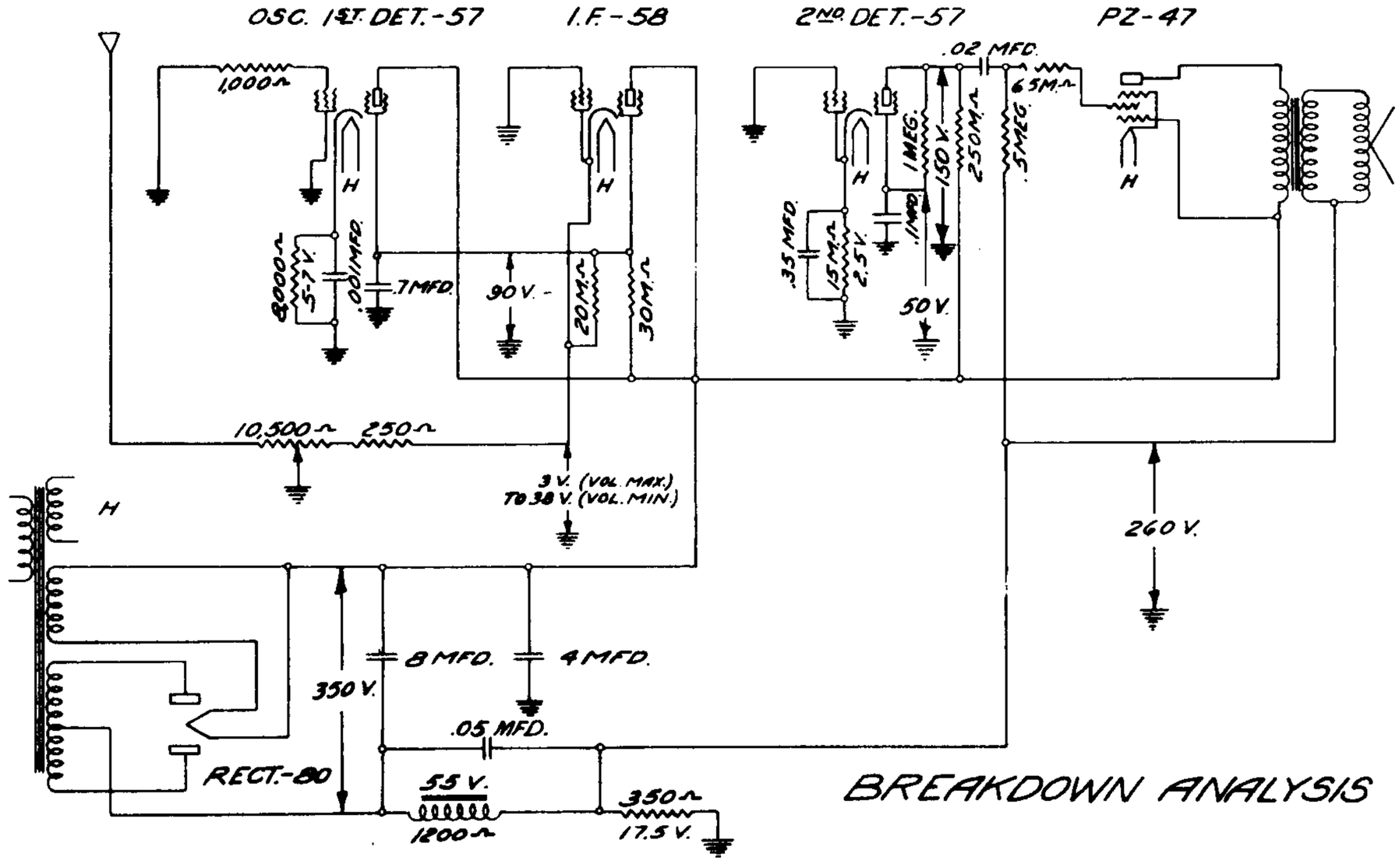
VOLTAGE OF ANALYSIS
Model 300

No.	Stage	Tube	A	B	C	K	Sc.G	Ip.	Su.G.
1	R.F.	58	2.2	180	.5	7.	85	.7	7.
2	1st. Det.	58	2.2	180	1.	7.	85	1.2	7.
3	Oscillator	56	2.2	100	0	0	0	10.	..
4	1st. I.F.	58	2.1	190	.4	4.	90	3.	4.
5	2nd. I.F.	58	2.0	190	.2	4.	90	2.	4.
6	A.V.C.	56	2.0	0	0	4.	..	0	..
7	Diode	56	2.1	0	0	4.	..	0	..
8	Diode	56	2.1	0	0	4.	..	0	..
9	A.F.	56	2.2	180	0	10.	..	2.	..
10	Driver 1	56	2.3	185	0	8.	..	3.	..
11	Driver 2	56	2.3	185	0	8.	..	3.5	..
12	Class "B" 1	46	2.2	400	0	0	..	5.	..
13	Class "B" 2	46	2.2	400	0	0	..	5.	..
14	Rectifier	82	2.3	300	..	..	..	..	..

Vol. control "full on".
Noise Suppresser "full open".
Tested with Weston model 565 analyzer.
Line: 115 volts.

TRANSFORMER CORPORATION OF AMERICA





BREAKDOWN ANALYSIS

VOLTAGE ANALYSIS

Model 320

No.	Stage	Tube	A	B	C	K	ScG	Ip	Su.G
1	Autodyne.	57	2.0	230	3.0	3.0	75	3.5	....
2	I.F	58	2.0	245	1.5	1.5	65	4.5	1.5
3	2nd. det.	57	2.0	125	1.0	2.0	45	.2	2.0
4	Output.	47	2.0	260	14	...	270	27.	....
5	Rectifier	80	4.4	280	...	...	...	....	....

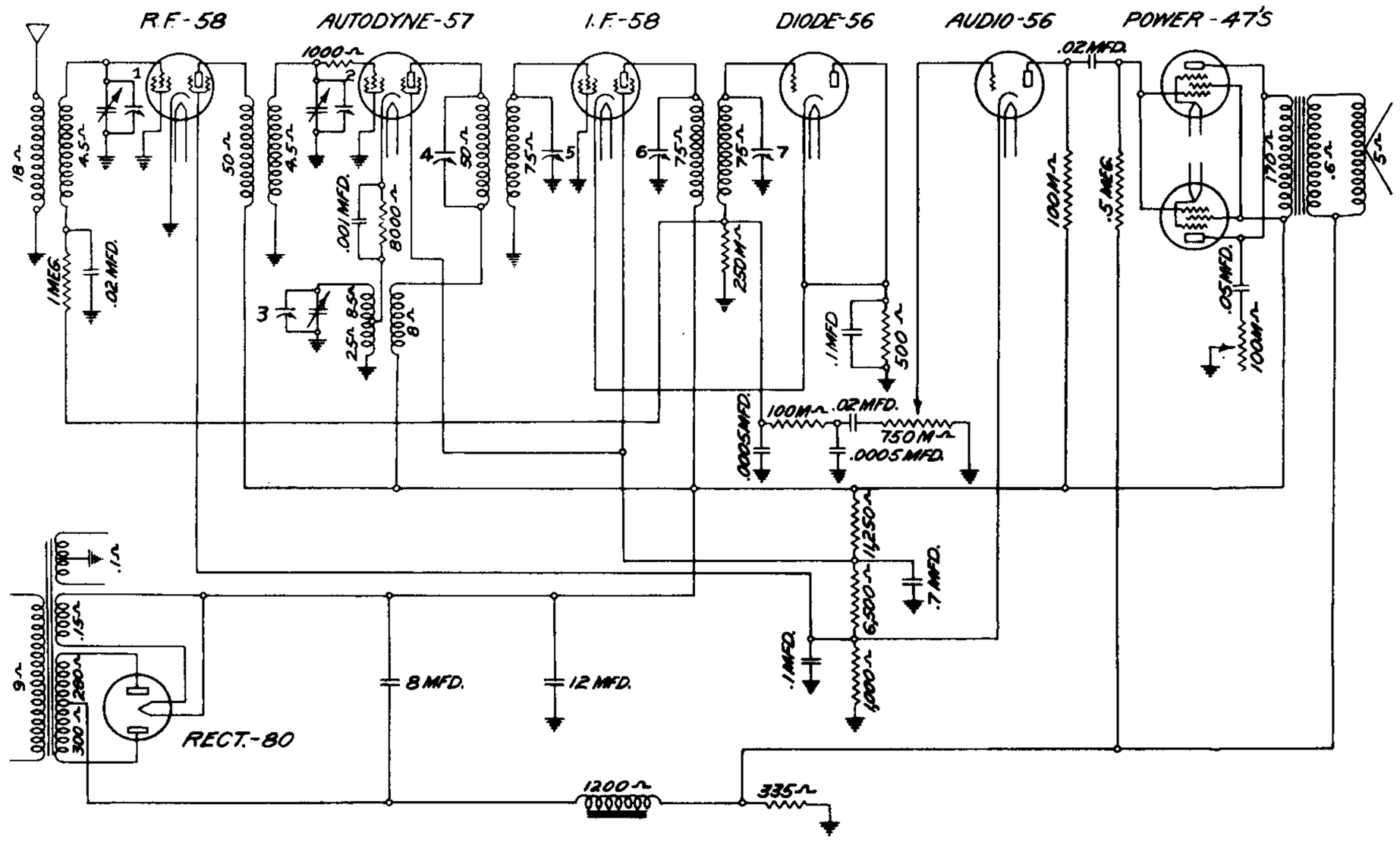
Vol. control "full on".
Line: 115 volts.

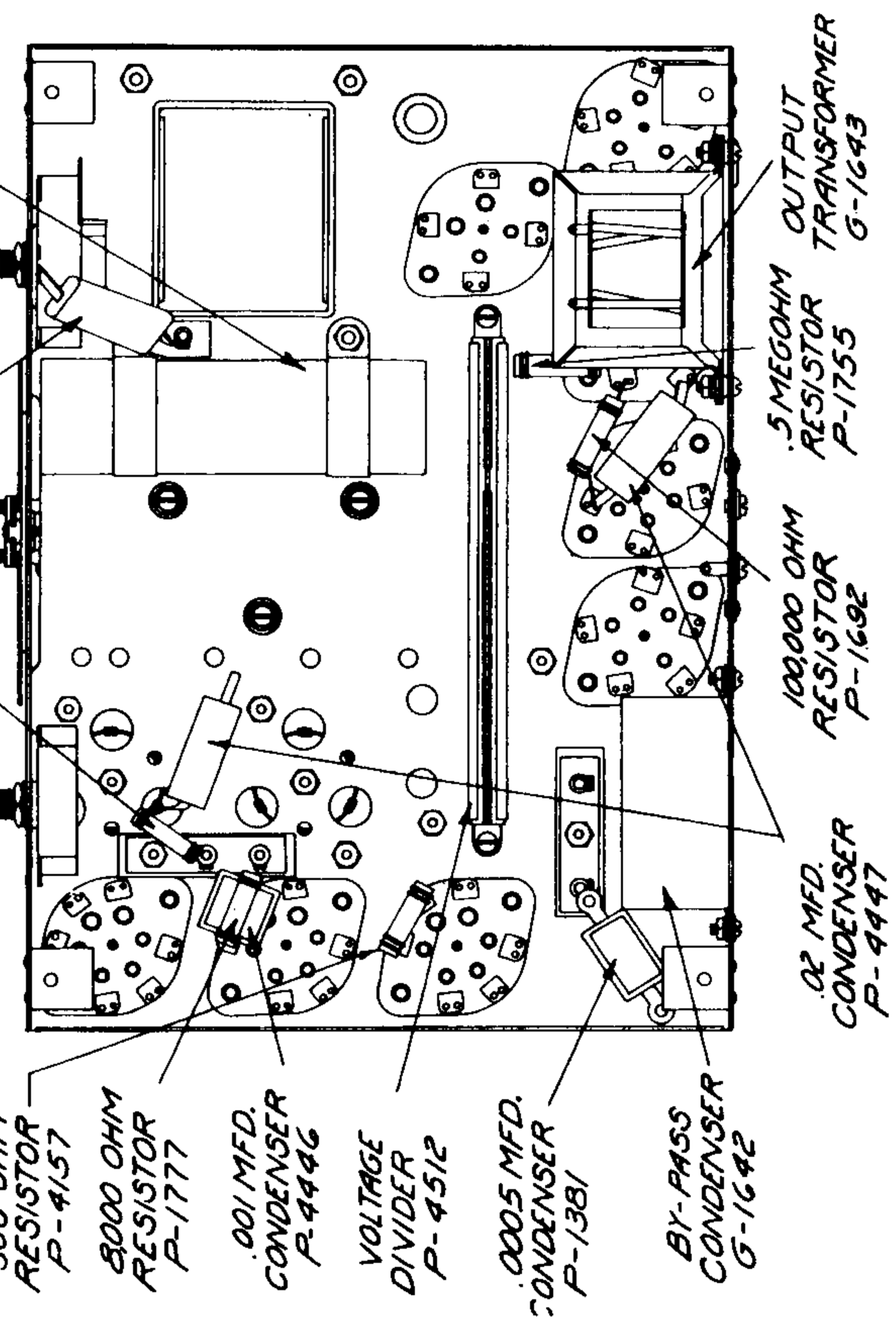
MODEL 320
SUPERHETERODYNE

Clarion Radio

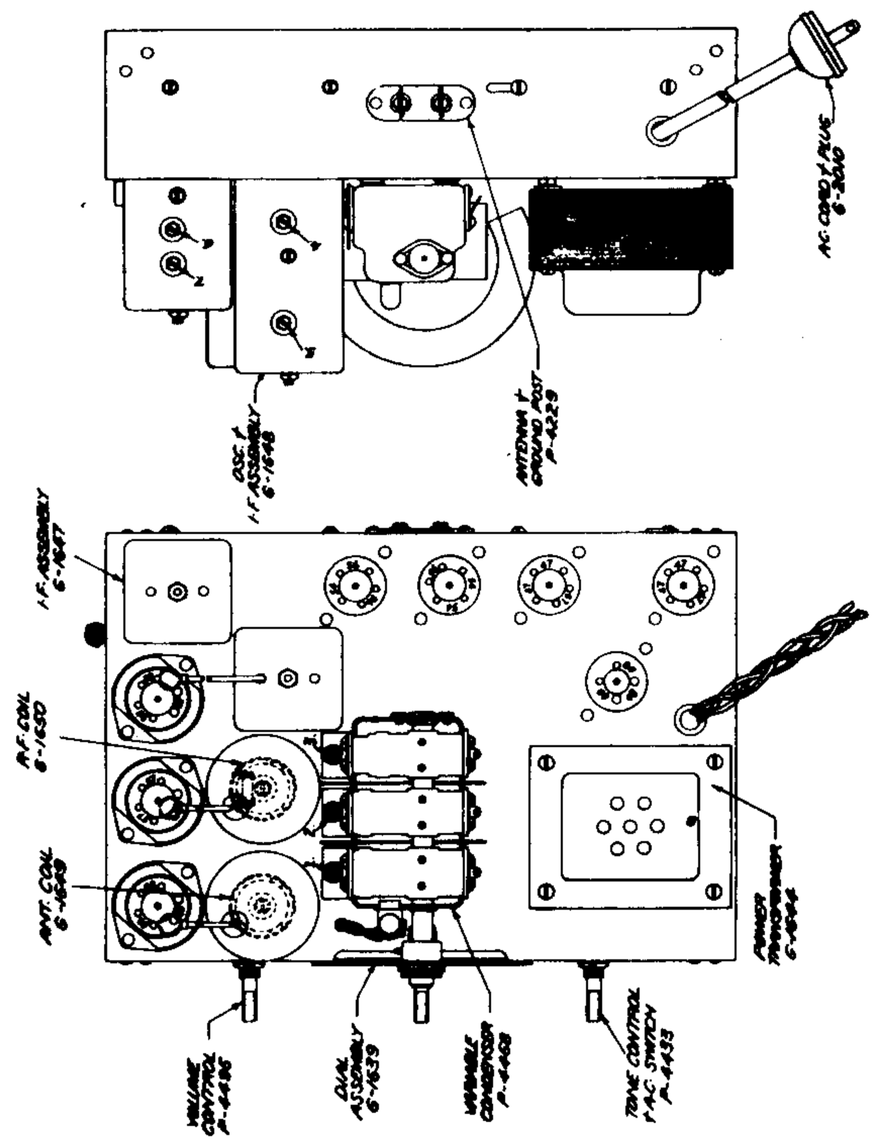
TRANSFORMER CORPORATION OF AMERICA

TYPE 340





G-340 CHASSIS
BOTTOM VIEW



G-340 CHASSIS

TRANSFORMER CORPORATION OF AMERICA

CIRCUIT RESISTANCE ANALYSIS

MODEL 340 SOCKET TO GROUND

Stage	Grid	Cathode	Heater	Plate	Screen G	Suppr. G	Space G
R.F. . .	Infinity	0	.1	18,750	1,000	0	.....
Autodyne. .	1,000	8,000	.1	18,750	7,500	0	.....
I.F. . .	75	500	.1	18,750	7,500	0	.....
Diode det . .	250,000	500	.1	500	.....	.....	.....
Audio. .	*750,000	1,000	.1	118,750	.....	.....	.....
Output .	500,000	.....	.1	18,750	.....	.....	18,750
Output .	500,000	.....	.1	18,750	.....	.....	18,750
Rectifier. .	.....	.....	18,700	1,800	.....	.....	.....

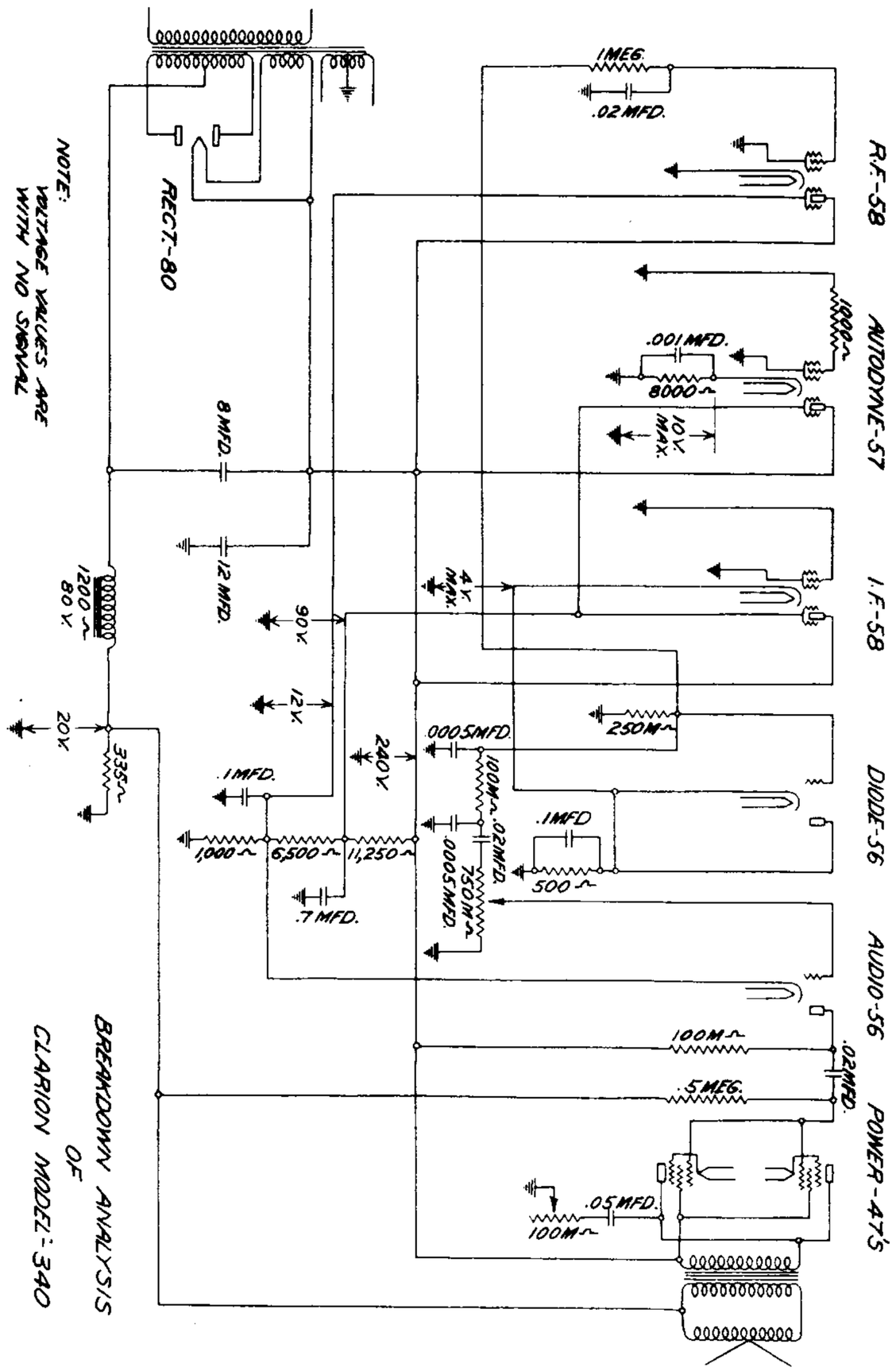
* Volume control "full on".
NOTE: Readings of one megohm and over are given as "infinity". The first three significant figures, only are interpreted from the ohmmeter in each reading: The individual resistance in the circuit can be readily checked upon removal of chassis.

VOLTAGE ANALYSIS *ACTUAL

MODEL 340

No.	Stage	Tube	A	B	C	K	Sc.G	Ip	Su.G
1	r.f	58	2.4	260	.4	0	12	.6	0
2	Autodyne.	57	2.4	260	0	7	90	.5	0
3	i.f	58	2.4	260	0	3	90	5.	0
4	Diode det	56	2.4	3	0	3	....	0	....
5	Audio	56	2.4	180	0	12	....	5	....
6	Output.	47	2.4	250	1	..	260	20	....
7	Output.	47	2.4	250	1	..	260	20	....
8	Rectifier	80	4.8	...	..	..	....	....	....

Volume control full on.
*Tested from socket to chassis with 1000 ohm per volt meter. Line 115 volts.



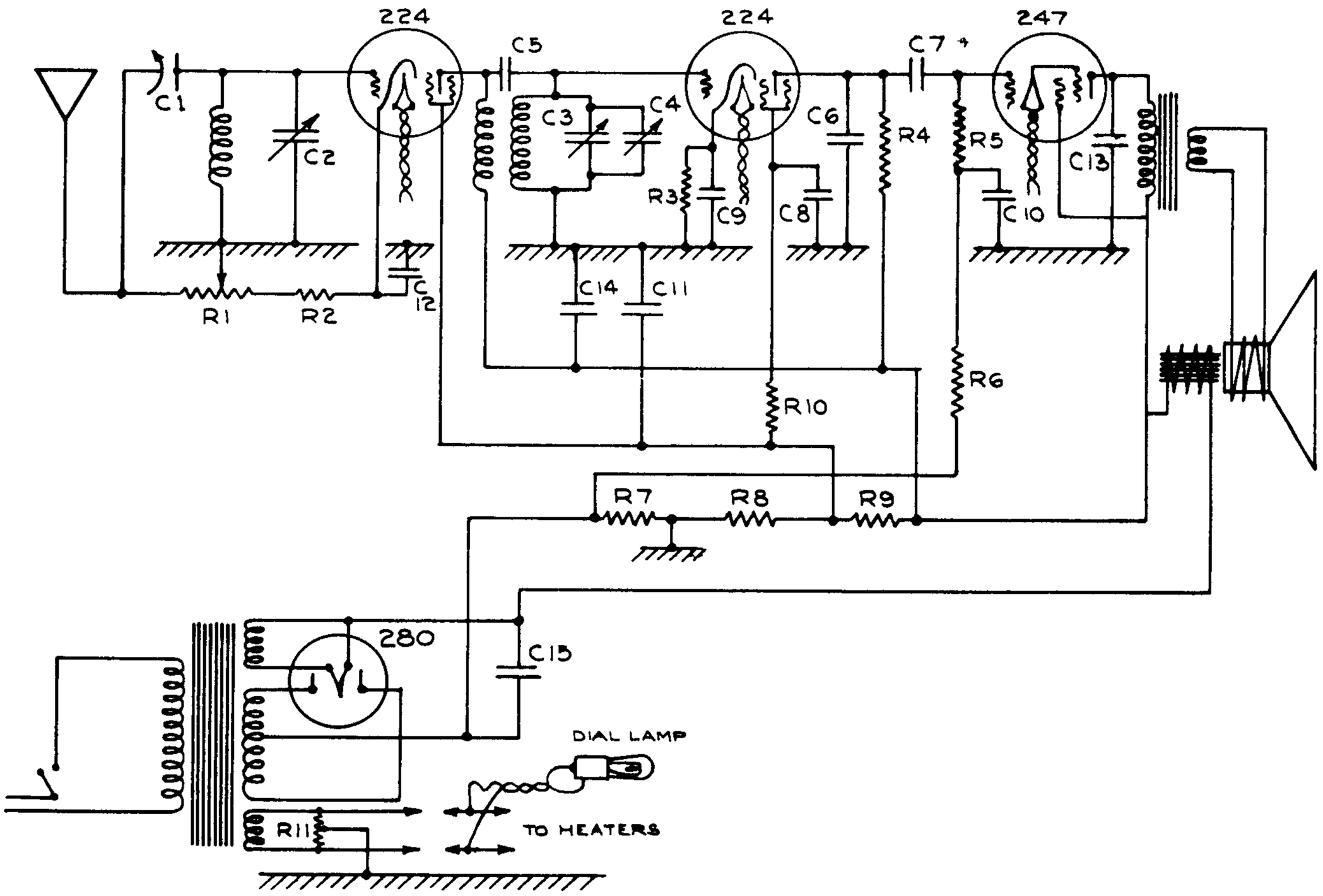
TRANSFORMER CORPORATION OF AMERICA

SCHEMATIC DIAGRAM
OF
CLARION
MODEL-360

UNITED AMERICAN BOSCH CORP.

ESSEX RADIO

Service Instructions for the Models 4 and 10 Receivers

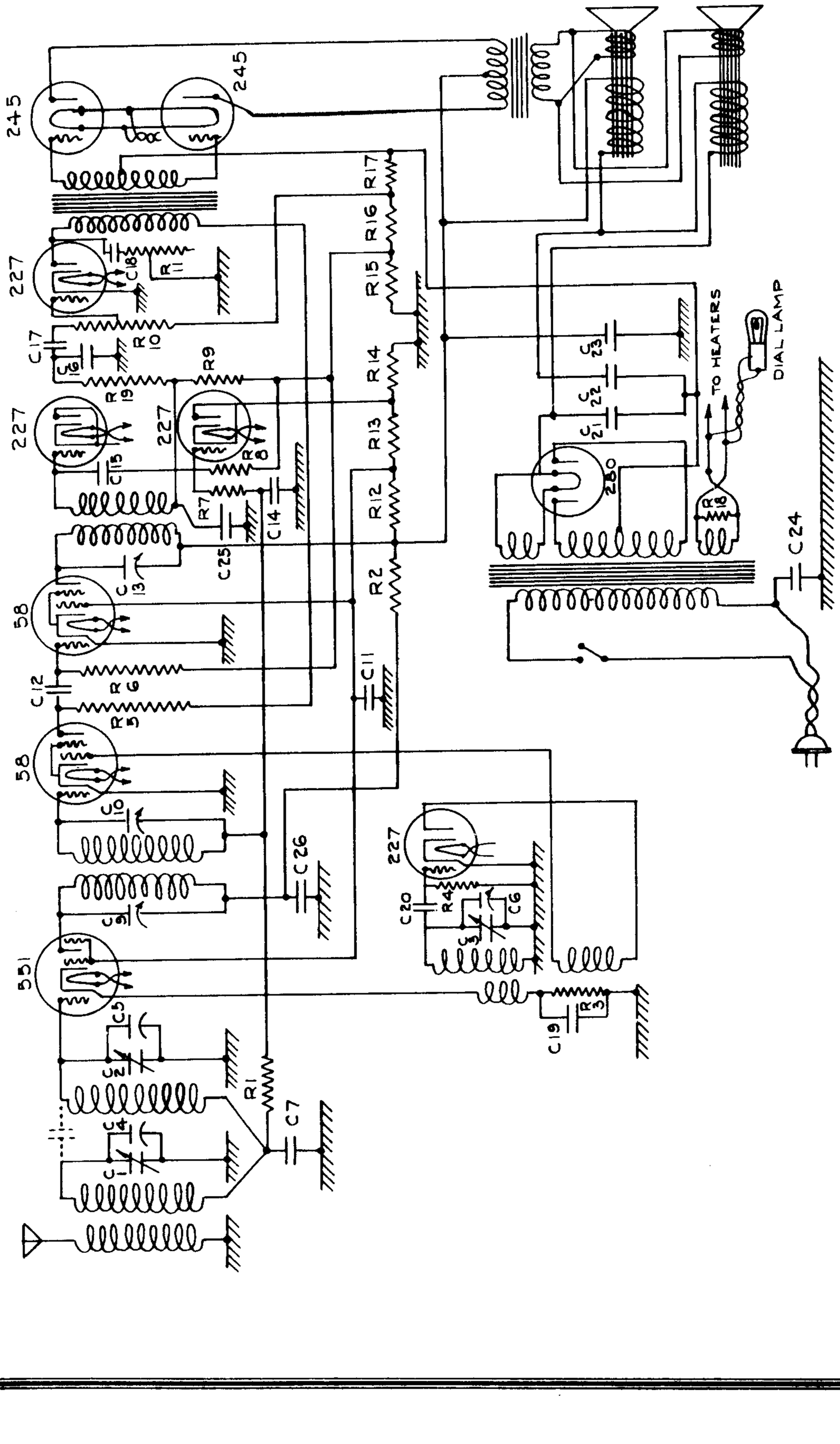


Schematic Wiring Diagram - Model 4 Receiver

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.)

UNITED AMERICAN BOSCH CORP.

MODEL 10



Schematic Wiring Diagram - Model 10 Receiver

R1 - 100,000 ohms
R2 - 1000 ohms
R3 - 2000 ohms
R4 - 100,000 ohms
R5 - 20,000 ohms
R6 - 100,000 ohms
R7 - 500,000 ohms
R8 - 1 megohm
R9 - 500,000 ohms
R10- 500,000 ohms
R11- 500,000 ohms
R12- 12,000)
R13- 8000) ohms
R14- 6000)
R15- 30)
R16- 200) ohms
R17- 300)
R18- Center Tap
R19- 20,000 ohms

C1 - Condenser Gang
C2 - Condenser Gang
C3 - Condenser Gang
C4 - Condenser Gang
C5 - Condenser Gang
C6 - Condenser Gang
C7 - .04 mfd. 3 ply
C8 - .05 mfd. 3 ply
C9 - 7 to 70 mmf.
C10 - 7 to 70 mmf.
C11 - .5 mfd.
C12 - .0005 mfd.
C13 - 7 to 70 mmf.
C14 - .05 mfd. 2 ply
C15 - .0001 mfd mica
C16 - .0001 mfd mica
C17 - .05 mfd 2 ply
C18 - .05 mfd 3 ply
C19 - .05 mfd 2 ply
C20 - .0001 mfd. mica
C21 - 8 mfd.
C22 - 8 mfd.
C23 - 4 mfd.
C24 - .01 mfd 4 ply
C25 - .0001 mica
C26 - .1 mfd 3 ply

UNITED AMERICAN BOSCH CORP.

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	-

Socket Voltage Readings - Model 10 Receiver

	227 Osc.	1st Det. 551	1st I.F. 58	2nd IF 58	AVC 227	2ND DET 227	AF 227	AF 245	Rect. 280
Filament	2.5	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	-

ALIGNMENT INSTRUCTIONS FOR MODEL 10

I. F. ADJUSTMENT

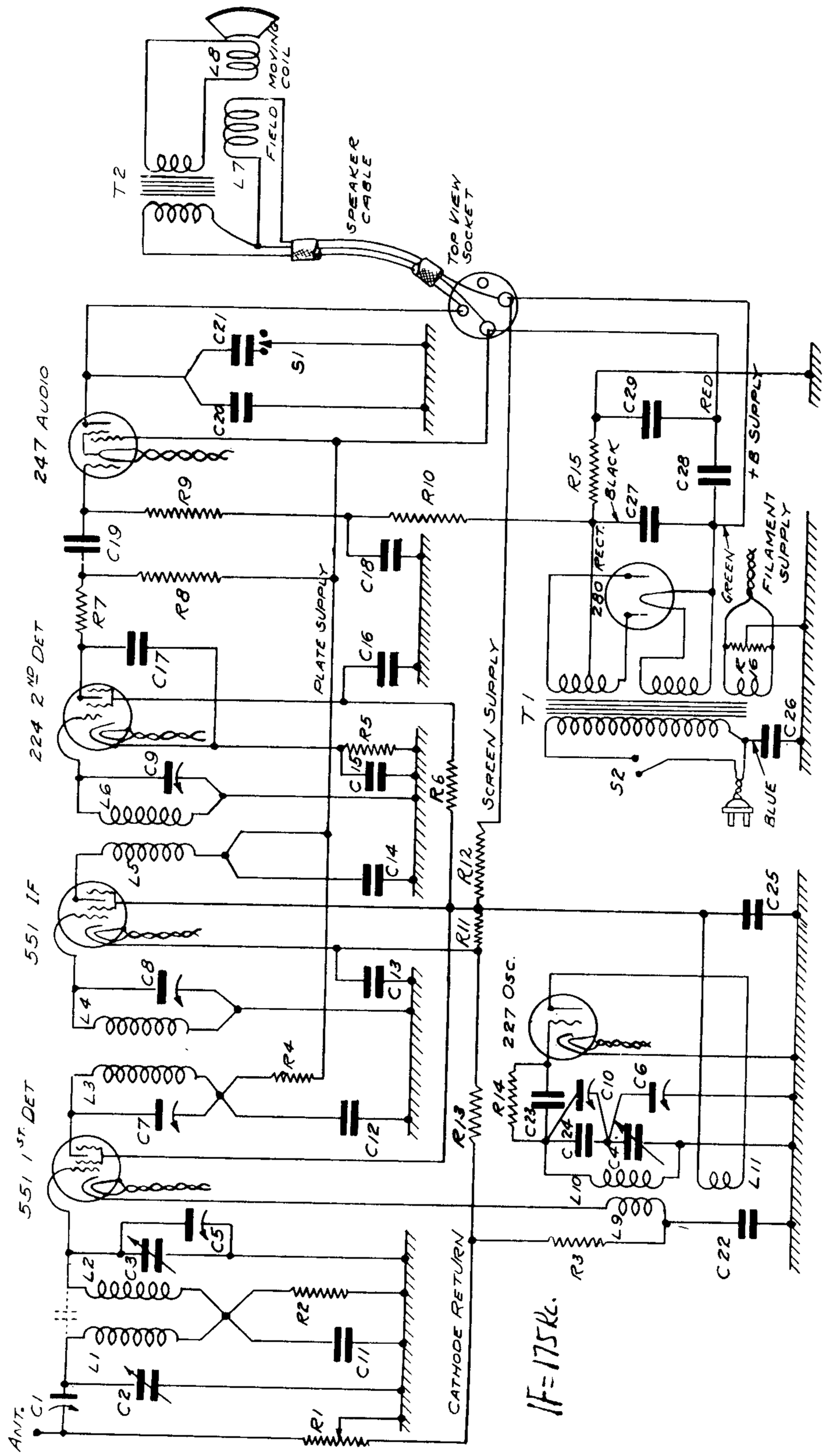
1. Connect the five leads to the loud speaker.
2. Set volume control at maximum, tone control on base, and ground antenna lead.
3. Connect the 175 KC oscillator to the grid of the 2nd I. F.tube.
   a) Align the second I. F. transformer, for max. sensitivity. 20,000 u.v.
4. Connect the 175 KC oscillator to the grid of the 1st I.F. tube.
   a) Align the first and second I.F. coils for max. sens. Limit: 500 u.v.
5. Check the I. F. stability.

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.

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MODEL 31



—Wiring Diagram of Model 31 Receiver

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MODEL - 31

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—50,000 ohms
R6—2nd Det. Screen Resistor—2 megohms
R7—2nd Det. Plate Resistor—10,000 ohms
R8—2nd Det. Plate Desistor—1 megohm
R9—Audio Grid Resistor—½ megohm
R10—Audio Grid Resistor—100,000 ohms
R11—Divider Resistor—20,000 ohms
R12—Screen Supply Resistor—30,000 ohms
R13—Cathode Resistor—300 ohms
R14—Oscillator Grid Resistor—100,000 ohms
R15—Audio Bias Resistor—350 ohms
R16—Mid Tap Resistor

C1—Antenna Trimmer
C2—Tuning Condenser
C3—Tuning Condenser
C4—Oscillator Tuning Condenser
C5—Alignment Condenser
C6—Oscillator Tuning Alignment
C7—I. F. Alignment Condenser
C8—I. F. Alignment Condenser
C9—Alignment Condenser
C10—Oscillator Alignment
C11—RF Coupling Condenser .05 mfd.
C12—1st Det. Plate By-pass .05 mfd.
C13—I. F. Cathode By-pass .05 mfd.
C14—I. F. Plate By-pass .05 mfd.
C15—2nd Det. Cathode By-pass 1. mfd.
C16—2nd Det. Screen By-pass .25 mfd.
C17—2nd Det. Plate By-pass 0001 mfd.
C18—Audio De-coupling Condenser .02 mfd.
C19—Audio Coupling Condenser .006 mfd.
C20—Audio Plate Condenser .05 mfd.
C21—Tone Selector Condenser .05 mfd.
C22—Cathode By-pass Condenser .05 mfd.
C23—Oscillator Grid Condenser .0001 mfd.
C24—Oscillator Tuning Condenser .0011 mfd.
C25—Screen By-pass Condenser 8. mfd.
C26—Buffer Condenser .08 mfd.
C27—Filter Condenser 3.5 mfd.
C28—Field Coil Tuning Condenser .08 mfd.
C29—Filter Condenser 3.5 mfd.

S1—Tone Selector Switch
S2—Main Switch

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—Speaker Field
L8—Speaker Voice Coil
L9—Oscillator Coupling Coil
L10—Oscillator Grid Coil
L11—Oscillator Plate Coil

SOCKET VOLTAGES

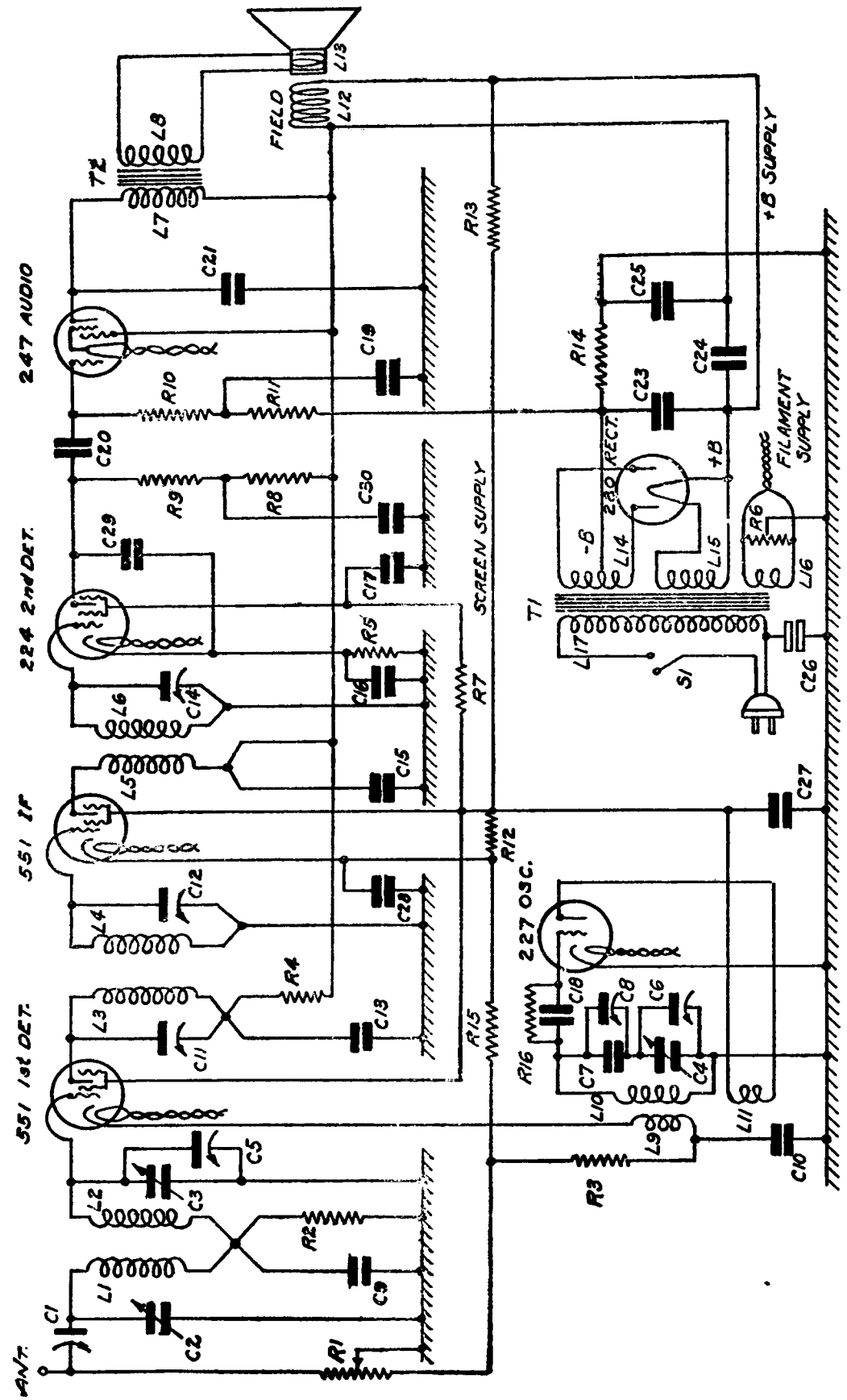
Stage	Tube	Plate	Screen	Cathode	Grid	Fil.	Plate MA
1st Det.	551	260	80	10	7	2.2	2
Oscillator	227	75	..	*0	*0	2.2	5
I.F.	551	260	80	3	3	2.2	4
2nd Det.	224	50	*5	3	1	2.2	*.1
Audio	247	250	250	..	*3	2.2	32
Rectifier	280					4.8	22-22

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 - 36



Schematic Wiring Diagram of Model 36 Receiver

UNITED AMERICAN BOSCH CORP.
MODEL-36

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.

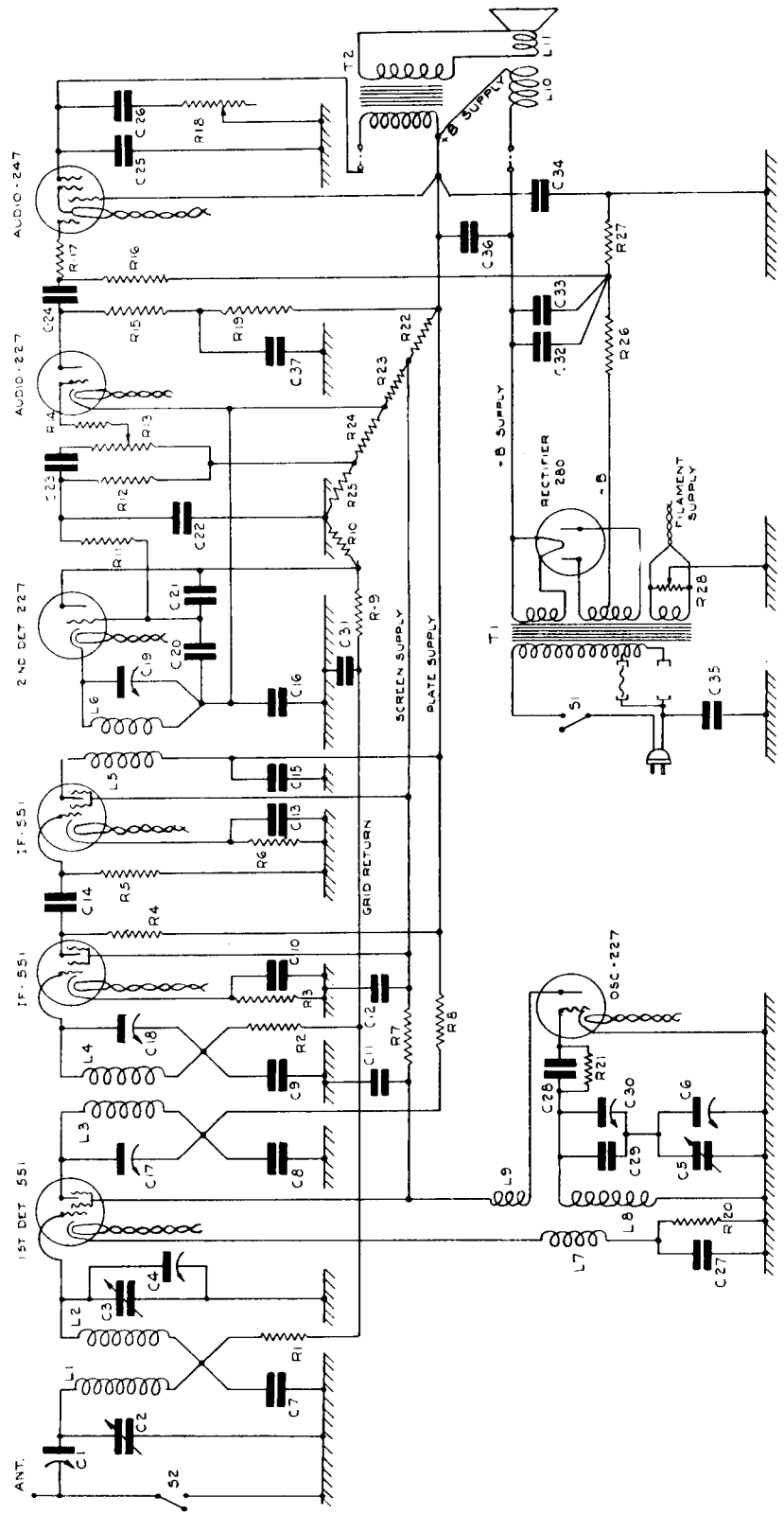
4—With input on grid of 1st detector set dial at 140 and align oscillator shunt condenser C6. Align on the second peak out from maximum capacity of condenser.

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.

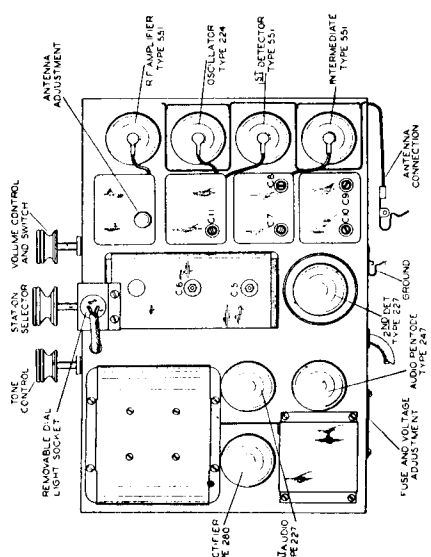
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Schematic Diagram — Model 40

DUO DIODE DETECTOR

The type 227 detector utilizes the elements (cathode, grid, and plate) for two very distinct functions, namely detection and automatic volume control. The grid to cathode circuit (L 6 and C 19 is the tuned IF circuit. C 20 imposes the signal on the grid, and R 11 and R 12 provide a voltage drop for the rectified audio voltage) acts as the detector and the AVC action is furnished by the plate to cathode circuit (R 10 controls the bias of the 1st detector and 1st IF tubes, and R 24 and R 25 furnish the delay action.) This type of control provides high output on weak signals and controls over a wide range of signal strengths.



UNITED AMERICAN BOSCH CORP.

NOMENCLATURE — MODEL 40

R 1—Grid Resistor—10,000 ohms
R 2—Grid Resistor—10,000 ohms
R 3—Cathode Resistor—750 ohms
R 4—IF Plate Resistor—25,000 ohms
R 5—IF Grid Resistor—.1 megohm
R 6—Cathode Resistor—750 ohms
R 7—Screen Resistor—1,000 ohms
R 8—Plate Resistor—1,000 ohms
R 9—Divider Resistor—.5 megohm
R 10—Divider Resistor—.1 megohm
R 11—2nd Det. Screen Resistor—10,000 ohms
R 12—2nd Det. Screen Resistor—.5 megohm
R 13—Volume Control—.5 megohm
R 14—Audio Grid Resistor—.1 megohm
R 15—Audio Plate Resistor—25,000 ohms
R 16—Audio Grid Resistor—.5 megohm
R 17—Audio Grid Resistor—.1 megohm
R 18—Tone Control—.5 megohm
R 19—Audio Plate Resistor—5,000 ohms
R 20—1st Det. Cathode Resistor—5,000 ohms
R 21—Osc. Grid Resistor—.1 megohm
R 22—Screen Supply Resistor—5,000 ohms
R 23—Divider Resistor—1,830 ohms
R 24—Divider Resistor—235 ohms
R 25—Divider Resistor—850 ohms
R 26—Bias Resistor—300 ohms
R 27—Bias Resistor—200 ohms
R 28—Mid Tap Resistor

C 1—Antenna Trimmer
C 2—Tuning
C 3—Tuning
C 4—Alignment
C 5—Tuning
C 6—Alignment
} Condenser Gang
C 7—RF Coupling—.05 mfd.
C 8—Plate By-pass—.05 mfd.
C 9—IF Grid—.05 mfd.
C 10—IF Cathode By-pass—.05 mfd.
C 11—Screen By-pass—.05 mfd.
C 12—Screen By-pass—.05 mfd.
C 13—IF Cathode By-pass—.05 mfd.
C 14—IF Coupling—1100 mmf.
C 15—IF Plate By-pass—.05 mfd.
C 16—2nd Det. Cathode—.05 mfd.
C 17—1st Det. Alignment
C 18—1st IF Alignment
C 19—2nd Det. Alignment
C 20—Blocking Condenser—100 mmf.
C 21—By-pass Condenser—.05 mfd.
C 22—2nd Det. Screen By-pass—100 mmf.
C 23—Audio Coupling—.05 mfd.
C 24—Audio Coupling—.05 mfd.
C 25—Audio Plate By-pass—.01 mfd.
C 26—Tone Control Condenser—.05 mfd.
C 27—1st Det. Cathode—.05 mfd.
C 28—Osc. Grid Condenser—100 mmf.
C 29—Oscillator Condenser—1100 mmf.
C 30—Oscillator Series Alignment
C 31—By-pass Condenser—.05 mfd.
C 32—Filter Condenser—8 mfd.
C 33—Filter Condenser—8 mfd.
C 34—Filter Condenser—4 mfd.
C 35—Buffer Condenser—.05 mfd.
C 36—Field Tuning Condenser—.05 mfd.
C 37—1st Audio Plate By-pass—.25 mfd.

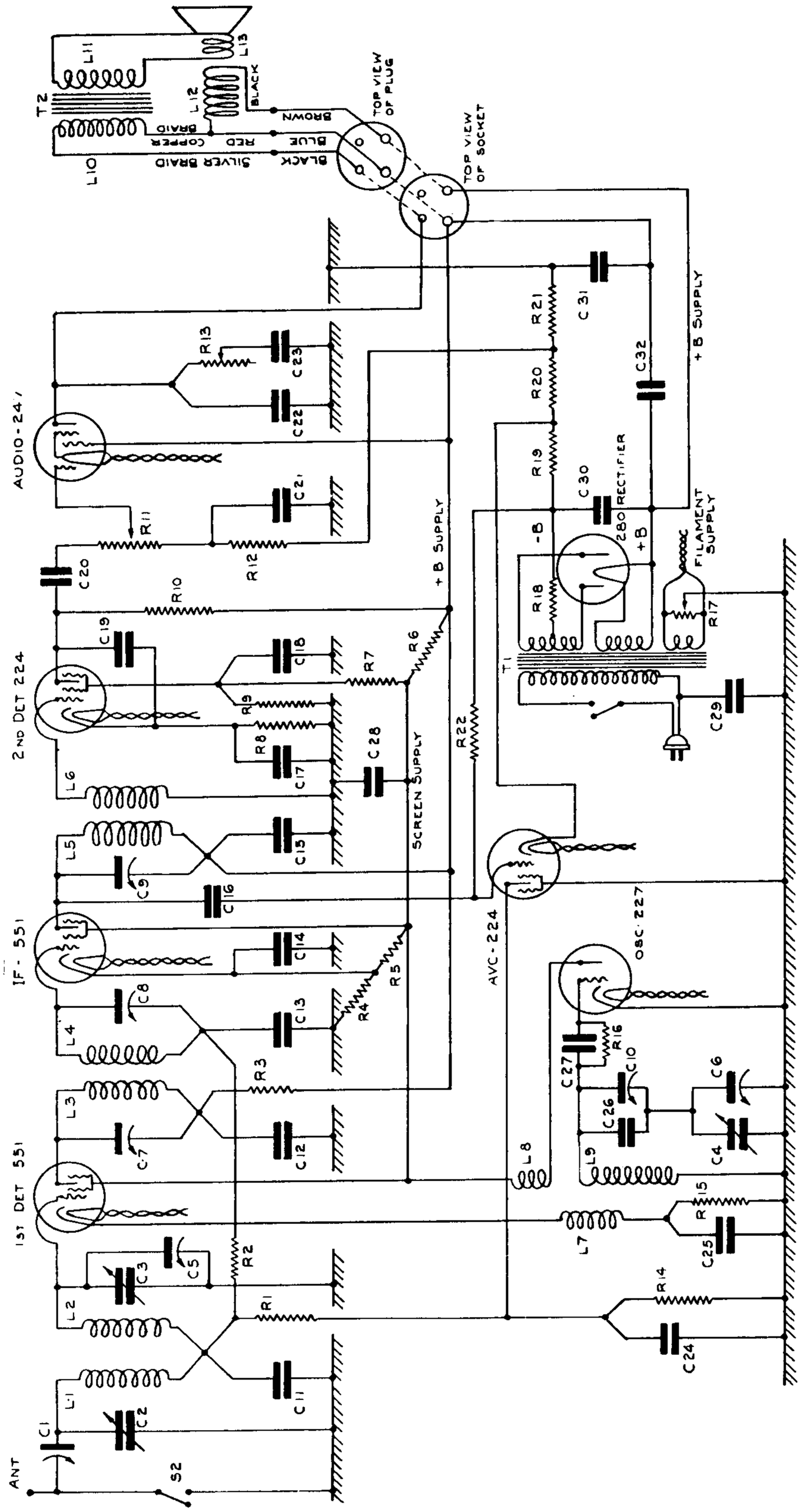
L 1—RF Coil
L 2—RF Coil
L 3—Primary
L 4—Secondary
} 1st IF coil
L 5—Primary
L 6—Secondary
} 2nd IF coil
L 7—Cathode Winding
L 8—Grid Winding
L 9—Plate Winding
} Osc. coil
L 10—Speaker Field
L 11—Voice Coil

SOCKET VOLTAGES

Stage	Tube	Plate	Screen	Cathode	Grid	Fil.	Plate MA
1st Det.	551	250	75	10	2	2.2	2
Osc.	227	75	....	0	0	2.2	7
1st IF	551	140	85	4	.2	2.2	4
2nd IF	551	260	85	5	.4	2.2	5
2nd Det.	227	—5	....	35	1	2.2	.1
1st Audio	227	110	....	35	1	2.2	4
2nd Audio	247	250	250	....	16	2.2	30
Rect.	280	.....	.....	....	....	5.0	30

NOTE: These are average readings obtained by an ordinary set analyzer.

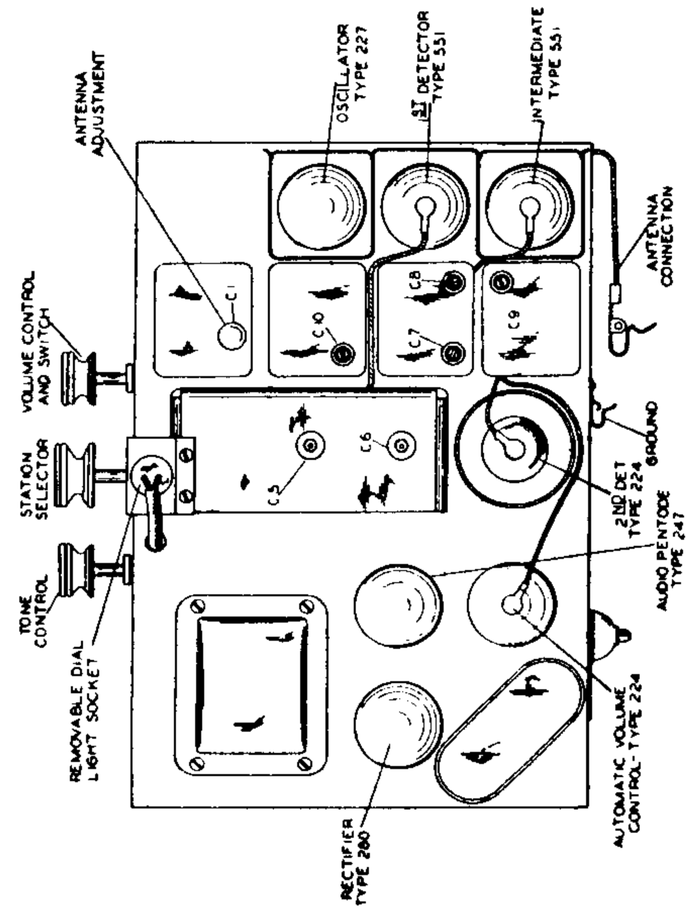
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Schematic Diagram — Model 91

LOCATION OF PARTS

R 9, R 11, R 13, R 17, C 1, C 19, C 22, C 23, C 28, C 32 on Chassis Base.
R 3, R 4, R 5, R 6, R 15, R 16, C 14, C 25, C 27 on Resistor Strip.
R 7, R 8, R 10, R 12, C 17, C 18, C 20, C 21 on Resistor Strip.
R 1, R 14, R 19, R 20, R 21, C 24, C 29 on Resistor Strip.
C 10, C 26, L 7, L 8, L 9 on Oscillator Coil Assembly.
R 2, C 7, C 8, C 12, C 13, L 3, L 4 on 1st IF Coil Assembly.
R 22, C 9, C 15, C 16, L 5, L 6 on 2nd IF Coil Assembly.
C 30, C 31 in Housed Filter Assembly.
C 1, C 2, C 3, C 4, C 5, C 6 on Main Tuning Condenser Gang.



UNITED AMERICAN BOSCH CORP.

NOMENCLATURE — MODEL 91

R 1—500,000 ohms—Grid Resistor
R 2—10,000 ohms—Grid Resistor
R 3—1,000 ohms—Plate Resistor
R 4—300 ohms—Cathode Divider Resistor
R 5—20,000 ohms—Cathode Divider Resistor
R 6—15,000 ohms—Screen Supply Resistor
R 7—20,000 ohms—Screen Resistor
R 8—25,000 ohms—Cathode Resistor
R 9—50,000 ohms—Screen Resistor
R 10—500,000 ohms—Plate Resistor
R 11—500,000 ohms—Volume Control
R 12—100,000 ohms—Grid Resistor
R 13—500,000 ohms—Tone Control
R 14—2 megohms—AVC Resistor
R 15—5,000 ohms—Cathode Resistor
R 16—100,000 ohms—Grid Resistor
R 17—Mid Tap Resistor
R 18—750 ohms—25 cycle only
R 19—200 ohms—Bias Resistor
R 20—750 ohms—Bias Resistor
R 21—350 ohms—Bias Resistor
R 22—2 megohms—Bias Resistor

L 1—Antenna Coil
L 2—1st R.F. Coil
L 3—Primary, L 4—Secondary } 1st IF Coil
L 5—Primary, L 6—Secondary } 2nd IF Coil
L 7—Cathode Winding, L 8—Plate Winding, L 9—Grid Winding } Oscillator Coil
L 10—Primary, L 11—Secondary } Output Transformer T 2
L 12—Field Coil, L 13—Voice Coil } Loud Speaker

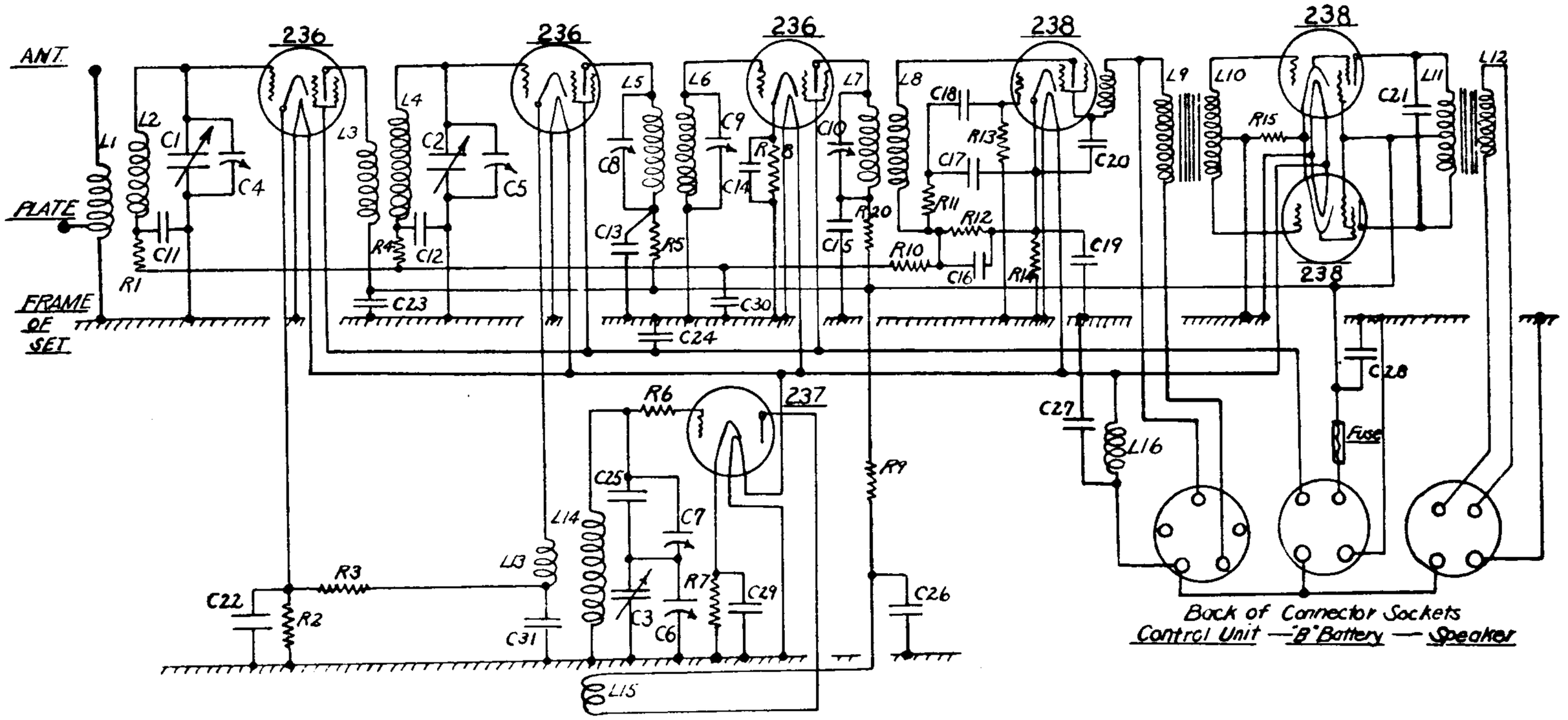
C 1—Variable—Antenna Trimmer
C 2—Variable, C 3—Variable, C 4—Variable } Condenser Gang
C 5—Alignment, C 6—Alignment
C 7—Variable, C 8—Variable } 1st IF alignment condenser
C 9—Variable—2nd IF alignment condenser
C 10—Variable—Oscillator Series Condenser
C 11—.05 mfd.—RF coupling condenser
C 12—.05 mfd.—Plate by-pass condenser
C 13—.05 mfd.—Grid Condenser
C 14—.05 mfd.—Cathode by-pass condenser
C 15—.05 mfd.—Plate by pass condenser
C 16—.0001 mfd.—AVC condenser
C 17—.5 mfd.—Cathode by-pass
C 18—.25 mfd.—Screen by-pass
C 19—.00025 mfd.—Plate by-pass
C 20—.006 mfd.—Audio coupling condenser
C 21—.25 mfd.—Grid by-pass
C 22—.01 mfd.—Plate by-pass
C 23—.05 mfd.—Tone Control Condenser
C 24—.05 mfd.—Grid condenser
C 25—.05 mfd.—Cathode by-pass
C 26—.0011 mfd.—Oscillator series condenser
C 27—.0001 mfd.—Oscillator grid condenser
C 28—8 mfd.—Screen by-pass
C 29—.01 mfd.—Buffer condenser
C 30—16 mfd.—Filter condenser
C 31—4 mfd.—Filter condenser
C 32—.01 mfd.—Field shunt condenser

SOCKET VOLTAGES

Stage	Tube	Plate	Screen	Cathode	Grid	Fil.	Plate MA
Osc.	227	100	....	0	5	2.2	4
1st Det.	551	240	85	0	3.5	2.2	.1
IF	551	240	90	3	.5	2.2	2
2nd Det.	224	90	45	5	4	2.2	.1
AVC	224	10	50	60	.5	2.2	.1
Audio	247	240	240	....	16	2.2	30
Rect.	280	.....	.....	....	....	4.8	25

NOTE: These are average readings obtained with an ordinary set analyzer.

Schematic Diagram of Model 100 Motor Car Radio Receiver



Symbols and Electrical Values

R1 —10,000 ohms
R2 — 3,000 ohms
R3 — 5,000 ohms
R4 —10,000 ohms
R5 — 1,000 ohms
R6 — 1,000 ohms
R7 — 3,000 ohms
R8 — 1,500 ohms
R9 — 5,000 ohms
R10— .5 megohm
R11—100,000 ohms
R12— .5 megohm
R13— .1 megohm
R14— 2,000 ohms
R15— 1,500 ohms
R16— 1,000 ohms

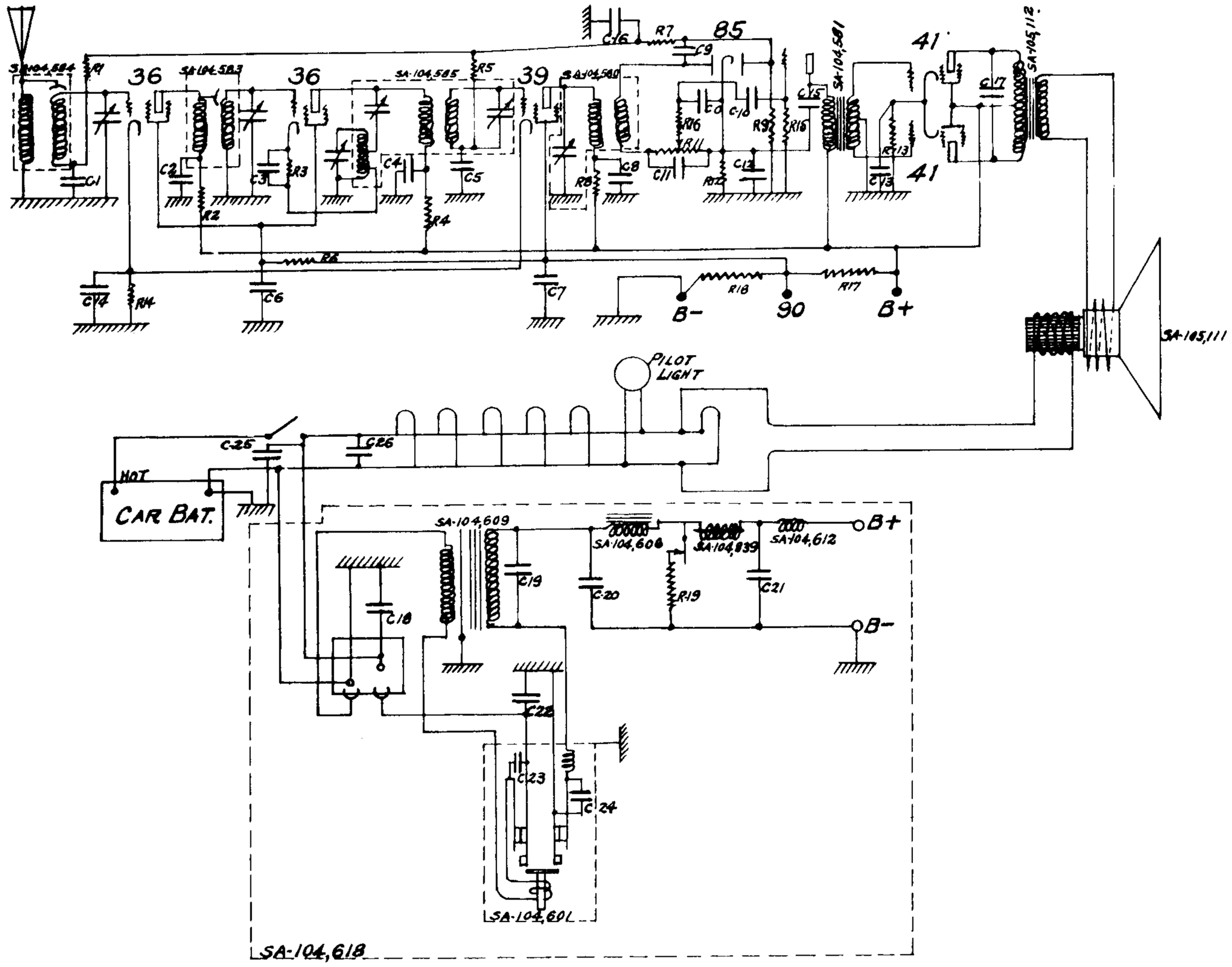
C1, C2, C3, C4, C5, C6 — Condenser Gang with Alignment Condensers
C7 —100 to 200 mmf.
C8 — 75 to 140 mmf.
C9 — 75 to 140 mmf.
C10— 75 to 140 mmf.
C11— .05 mfd.
C12— .05 mfd.
C13— .05 mfd.
C14— .05 mfd.
C15— .05 mfd.
C16— .00025 mfd.
C17— .0001 mfd.
C18— .01 mfd.
C19— .5 mfd.
C20— .0011 mfd.
C21— .004 mfd.
C22— .05 mfd.
C23— .05 mfd.
C24— .25 mfd.
C25—1100 mmf.
C26— .05 mfd.
C27— .25 mfd.
C28— .25 mfd.
C29— .05 mfd.
C30— .25 mfd.
C31— .05 mfd.

L1, L2 — Antenna Coil
L3, L4 — Radio Frequency Coil
L5, L6 — Intermediate Coil
L7, L8 — Intermediate Coil
L9, L10 — Audio Input Transformer
L11, L12 — Audio Output Transformer
L13, L14, L15 — Oscillator Coil
L16—Filter

UNITED AMERICAN BOSCH CORP.

VIBRO-POWER CAR RADIO

MODEL 150



1 - CHASSIS ASSEMBLY - SA-104,564
2 - RESISTOR STRIP ASS'Y. - SA-105,068
3 - RESISTOR STRIP ASS'Y. - SA-105,070
4 - RESISTOR STRIP ASS'Y. - SA-105,078
5 - POWER PACK ASS'Y. - SA-104,618
6 - VAR. COND. & SHIELD ASS'Y. - SA-105,091

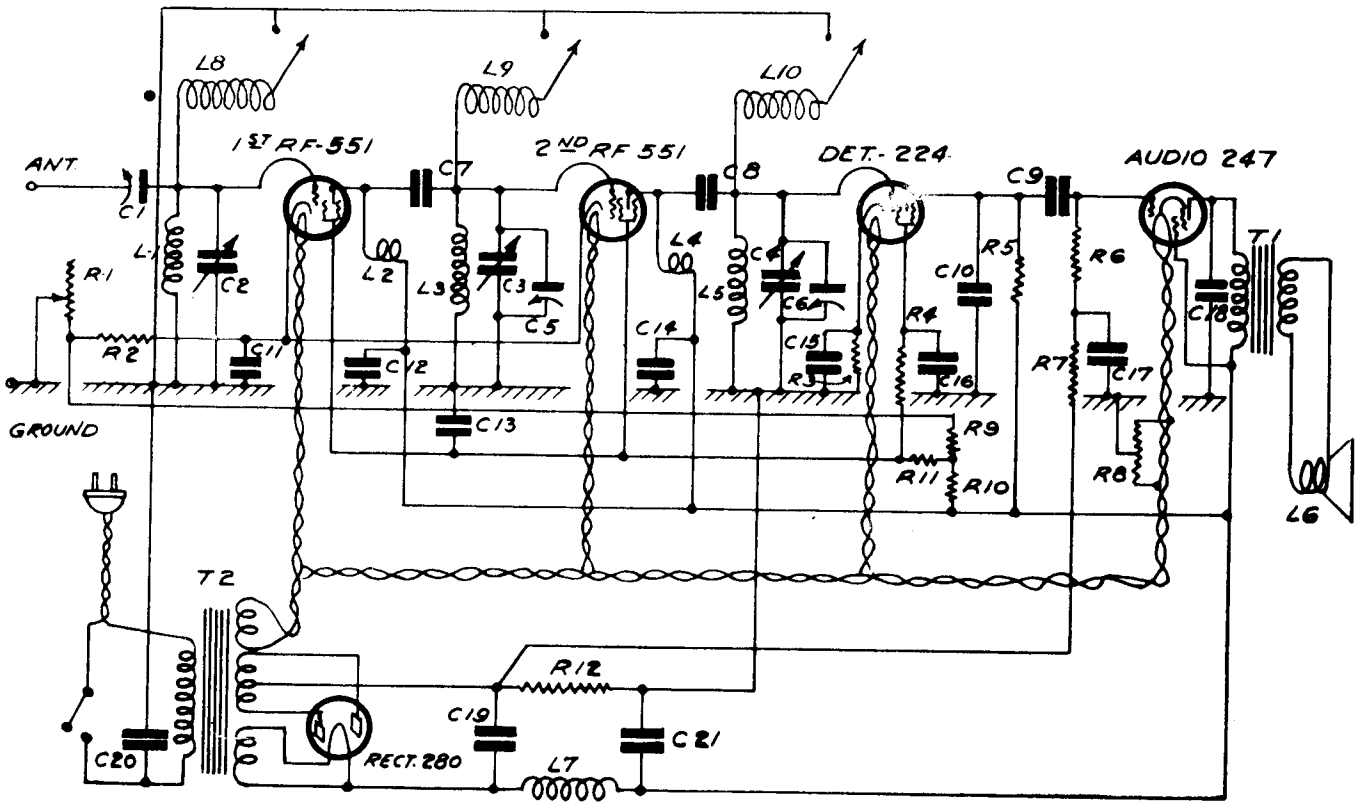
INTERMEDIATE FREQUENCY 175 K.C.

3	R1	100 000 ~ 1/2 WATT	SA-100,727
3	R2	1,000 ~ "	SA-100,729
1	R3	7500 ~ "	SA-104,824
3	R4	1,000 ~ "	SA-100,729
3	R5	100,000 ~ "	SA-100,727
4	R6	5,000 ~ "	SA-100,824
4	R7	0.5 MEG. "	SA-100,194
2	R8	1,000 ~ "	SA-100,729
4	R9	0.5 MEG "	SA-100,194
6	R11	0.5 MEG VOL. CONT.	SA-104,605
4	R12	1,800 ~ 1/2 WATT	SA-102,961
1	R13	600 ~ 1-WATT	SA-105,004
4	R14	500 ~ 1/2 WATT	SA-99,583
2	R15	1 MEG. "	SA-100,815
2	R16	50,000 ~ "	SA-100,512
2	R17	40,000 ~ "	SA-103,410
2	R18	75,000 ~ "	SA-101,163
5	R19	5,000 ~ 10-WATT	SA-104,704

1	C-0	.0001 MFD.	SA-101,143
3	C-1	.05 - 2-PLY	SA-102,493
3	C2	.05 - 3-PLY	SA-102,492
1	C3	.002 - 4-PLY	SA-103,852
3	C4	.05 - 3-PLY	SA-102,492
3	C5	.05 - 2-PLY	SA-102,493
4	C6	.1 - 2-PLY	SA-102,495
4	C7	.05 - 2-PLY	SA-102,493
2	C8	.05 - 3-PLY	SA-102,492
2	C9	.0001 MFD.	SA-101,143
2	C10	.01 - 3-PLY	SA-102,500
2	C11	.0001 MFD.	SA-101,143
1	C12	.5 - 2-PLY	SA-102,499
1	C13	.5 - 2-PLY	SA-102,499
4	C14	.25 - 2-PLY	SA-102,497
1	C15	.002 - 4-PLY	SA-103,852
4	C16	.05 - 2-PLY	SA-102,493
1	C17	.002 - 4-PLY	SA-103,852
5	C18	.002 - 4-PLY	SA-103,852
5	C19	.01 MF-1600 V	SA-104,837
5	C20	8 MFD	SA-104,614
5	C21	8 MFD	SA-104,614
5	C22	.002 - 4-PLY	SA-103,852
5	C23	.5 - } —	SA-104,601
5	C24	.01 - }	
5	C25	.5 - 2-PLY	SA-102,499
1	C26	.002 - 4-PLY	SA-103,852

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 200-201



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 - .06 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.

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.

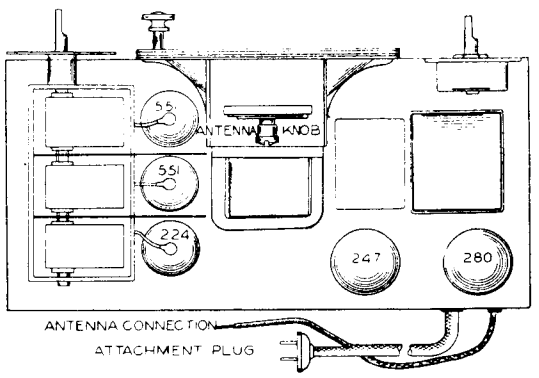
*These voltages are the correct values altho the average test kit will probably give much lower readings (as low as 1/10 of these values) due to the high resistance included in the detector plate and screen circuits, and the audio grid circuit.

RESISTOR COLOR CODE

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

TEMPORARY CONDENSED SERVICE PARTS LIST

FOR THE MODEL 200 RECEIVER



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)

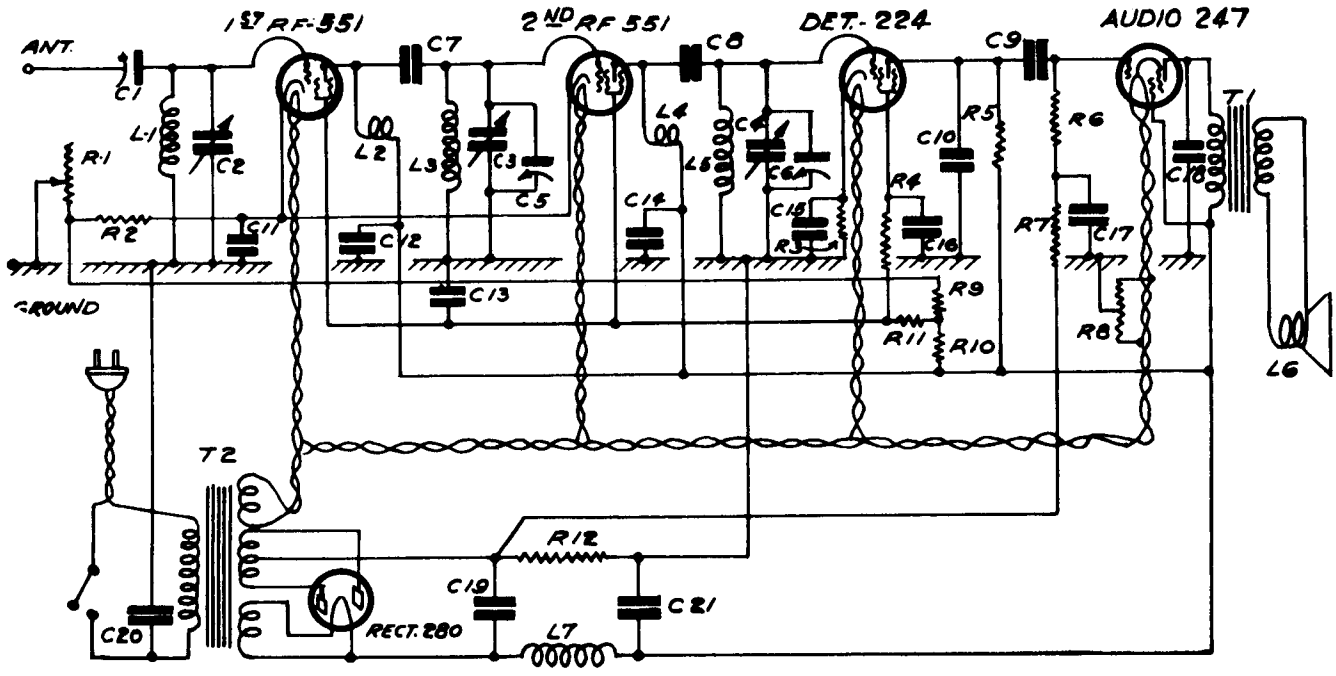
SOCKETS
101890 Socket for dial light
103686 Tube socket (4 prong)
103514 Tube socket (5 prong)

SWITCHES
103703 Switch with nuts
103725 Switch (police)

TRANSFORMERS
102551 Out-put transformer
101939 Power transformer

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 205 and 206



Schematic Diagram of Model 205 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.

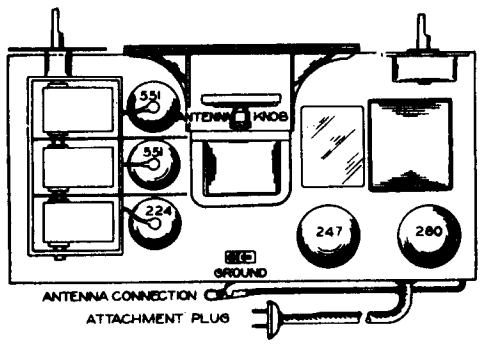
UNITED AMERICAN BOSCH CORP.

SOCKET VOLTAGES

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. The average test kit will give much lower readings, (as low as 1/10 of these values) due to the low resistance of the meters compared to the high resistance included in the detector plate and screen circuits and the audio grid circuit.



IMPORTANT

Antenna Adjustment: The small knob located on the loud speaker must be adjusted at the time of installation to obtain the best reception. Make this adjustment on a weak station which is received at some point near 30 on the dial and then re-check the adjustment at several other points to make sure that it has been accurately done.

Chassis: The chassis may be removed by pulling off the knobs and unscrewing the felt feet.

RESISTOR COLOR CODE

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

TEMPORARY CONDENSED SERVICE PARTS LIST FOR TYPE R.S. 205 RADIO RECEIVER

MAIN ASSEMBLIES
105655 Chassis (with tubes)
102280 Speaker
103878 Cabinet with plates

COILS
101858 Field coil (speaker)
102438 R. F. coil complete
102245 R. F. primary coil
102439 Antenna coil

CONDENSERS
102178 By-pass assembly
102022 Antenna trimmer
.01143 Fixed (.0001 mfd.)
101881 Large filter cond.
103695 Cond. (.01 mfd-4ply)
100705 Cond. (.006 mfd.)

KNOBS
102445 Volume and tuning knobs
100929 Trimmer cond. knob

MISCELLANEOUS PARTS
101895 Dial with scale
102282 Diaphragn for speaker
98713 Lamp for dial

RESISTORS
102542 Volume control & switch
102437 Volume control only
102514 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)
100815 Resistor (1 megohm)
100196 Resistor (2 megohms)
99412 Mid tap resistance

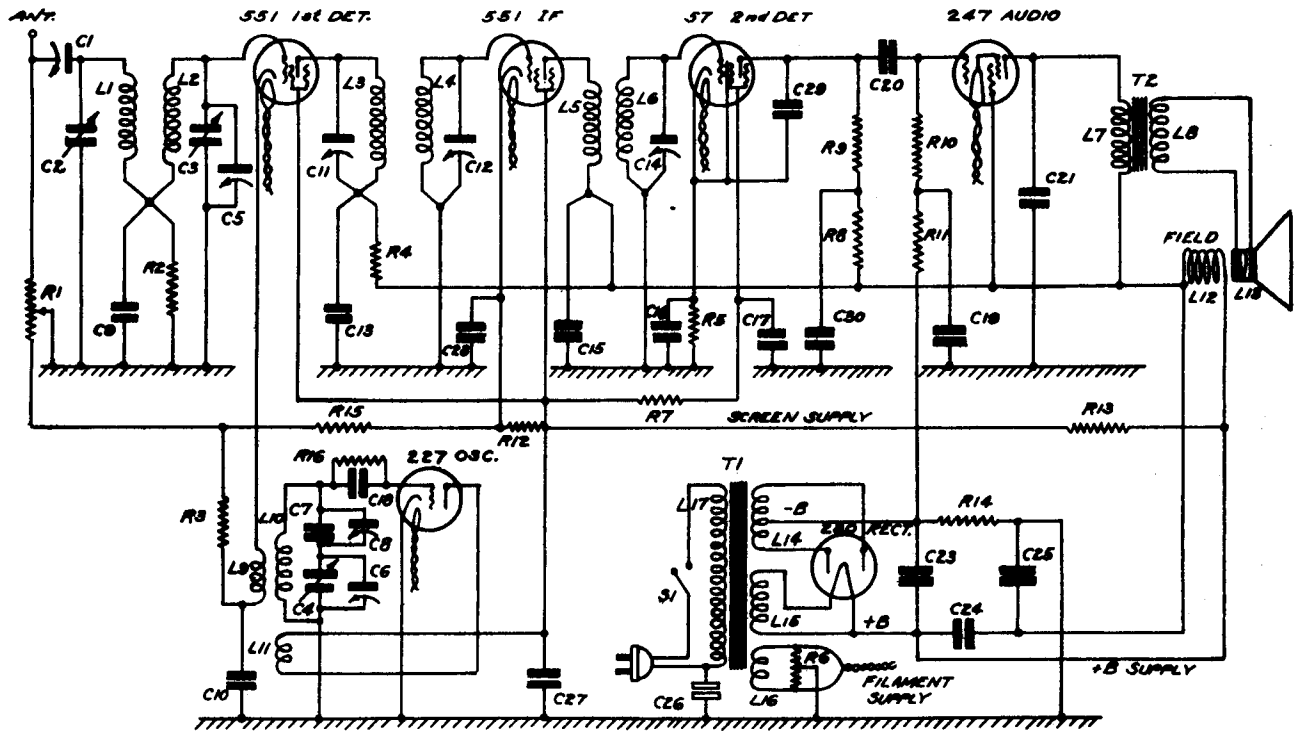
SOCKETS
101890 Dial light socket
102447 Tube socket for '24 tube
102449 Tube socket for '80 tube
102446 Tube socket for '47 tube
102448 Tube socket for '51 tube

SWITCH
101930 Switch with (2) nuts

TRANSFORMER
102551 Output transformer
101939 Power transformer

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 236 AND 237



Schematic Diagram of Model 236 Receiver

ELECTRICAL VALUES

R1 - 10000 ohms
R2 - 1000 ohms
R3 - 5000 ohms
R4 - 1000 ohms
R5 - 25000 ohms
R6 - Mid Tap
R7 - .5 megohm
R8 - .1 megohm
R9 - .5 megohm
R10- .5 megohm
R11- .1 megohm
R12- 20000 ohms
R13- 30000 ohms
R14- 350 ohms
R15- 300 ohms
R16- .1 megohm

C1 - Trimmer
C2 - Tuning
C3 - Tuning
C4 - Tuning
C5 - Alignment
C6 - Alignment
C7 - Alignment
C8 - Alignment
C9 - .05 mfd.
C10- .05 mfd.
C11- Alignment
C12- Alignment
C13- .05 mfd.
C14- Alignment
C15- .05 mfd.
C16- .5 mfd

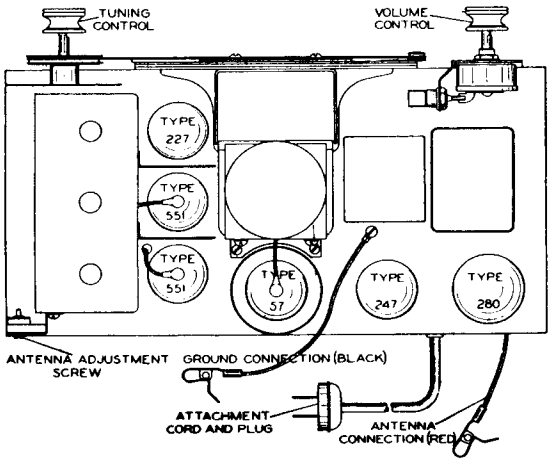
C17 - .25 mfd.
C18 - .0001 mfd.
C19 - .05 mfd.
C20 - .01 mfd.
C21 - .006 mfd.
C23 - 8. mfd.
C24 - .05 mfd.
C25 - 4. mfd.
C26 - .01 mfd.
C27 - 8. mfd
C28 - .02 mfd.
C29 - .0001 mfd.
C30 - .01 mfd.

T1 - Power Trans.
T2 - Audio Trans.

UNITED AMERICAN BOSCH CORP.

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.	224	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.



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

TEMPORARY CONDENSED PARTS LIST

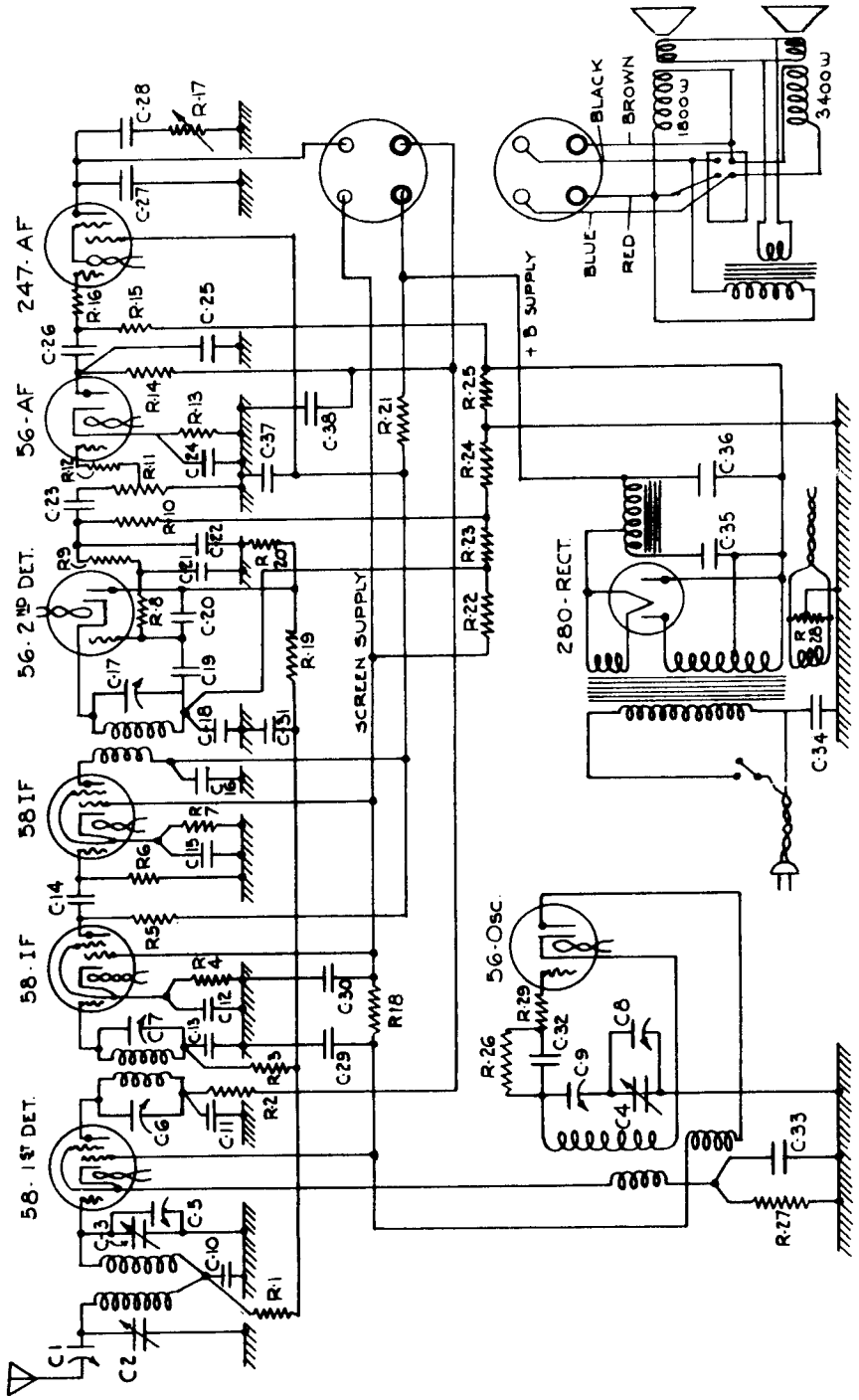
FOR MODEL 236 RECEIVER

MISCELLANEOUS PARTS
103110 Dial assembly with scale
103238 Diaphragm (speaker)
98713 Lamp for dial
RESISTORS
102552 Volume control and switch
102684 Volume control only
101181 Resistor (300 ohms)
102564 Resistor (350 ohms)
100729 Resistor (1,000 ohms)
100824 Resistor (5,000 ohms)
100813 Resistor (20,000 ohms)
100197 Resistor (25,000 ohms)
103293 Resistor (30,000 ohms)
100727 Resistor (100,000 ohms)
100194 Resistor (1/2 megohm)
99412 Mid tap resistance
SOCKETS
101890 Dial Light socket
101641 Tube socket for '27 tube
102162 Tube socket for '47 tube
101643 Tube socket for '80 tube
102161 Tube socket for '51 tube
103513 Tube socket for '57 tube
TRANSFORMERS
103171 Power transformer
102551 Output transformer

MAIN ASSEMBLIES
103792 Chassis with tubes
103173 Speaker
103211 Cabinet (Model A)
COILS
101858 Field Coil (speaker)
103119 1st intermediate coil
103106 2nd intermediate coil
103118 Oscillator coil
103121 R. F. coil
CONDENSERS
102768 Housed filter condenser
101143 Fixed (.0001 mfd.)
100705 Cond. (.006 mfd.)
102500 Cond. (.01 mfd. - 3 ply)
103695 Cond. (.01 mfd. - 4 ply)
102504 Cond. (.02 mfd.)
102493 Cond. (.05 mfd. - 2 ply)
102492 Cond. (.05 mfd. - 3 ply)
102497 Cond. (.25 mfd. - 2 ply)
102499 Cond. (.5 mfd. - 2 ply)
103037 Cond. (8 mfd.)
102253 Double alignment
103148 Antenna trimming
103310 Condenser and resistor
KNOBS
102445 Knob for both shafts

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 242 and 243



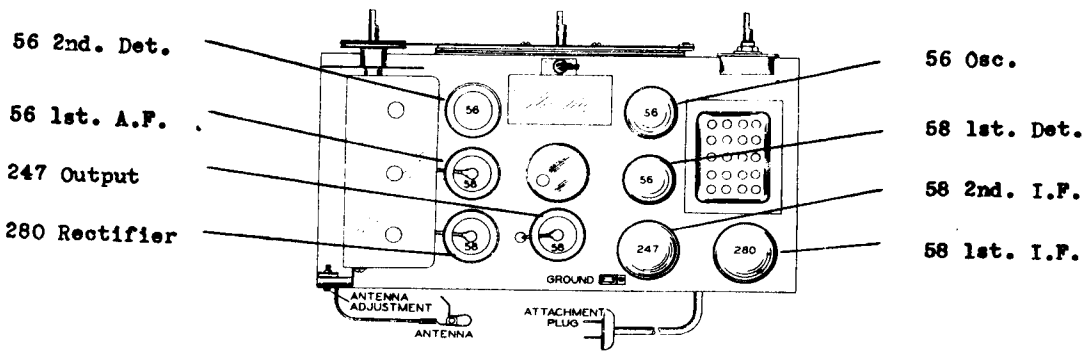
SCHEMATIC DIAGRAM OF MODEL 242 RECEIVER

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

UNITED AMERICAN BOSCH CORP.

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.



TEMPORARY CONDENSED SERVICE PARTS LIST FOR MODEL 242 and 243 RADIO RECEIVERS

MAIN ASSEMBLIES
103573 Chassis with tubes (RS 242)
104089 Chassis with tubes (RS 243)
103838 Speakers (2) on baffle
103839 Speaker with transformer
103840 Speaker (has no transformer)
103881 Cabinet (Model E).

COILS
103527 1st intermediate coil
103593 2nd intermediate coil
103568 Oscillator coil
103121 R.F. coil
103554 Filter choke
101858 Field coil (speaker 103839)
103818 Field coil (speaker 103840)

CONDENSERS
103595 Housed filter (Model 242)
103950 Housed filter (Model 243)
101143 .0001 mfd. straight term.
101301 .0001 mfd. offset terminals
102349 .0011 mfd.
103852 .002 mfd. - 4 ply
102500 .01 mfd. - 3 ply
103695 .01 mfd. - 4 ply
102493 .05 mfd. - 2 ply
102492 .05 mfd. - 3 ply
103668 25 mfd.
102463 Alignment cond. on 103593
102253 Alignment cond. on 103527
103521 Alignment cond. on 103568
104060 Antenna trimming cond.

KNOBS
102445 Knobs for all controls
102272 Antenna knob and screw

MISC. PARTS
103198 Dial scale with bracket
102282 Diaphragm (speaker)
98713 Lamp for dial

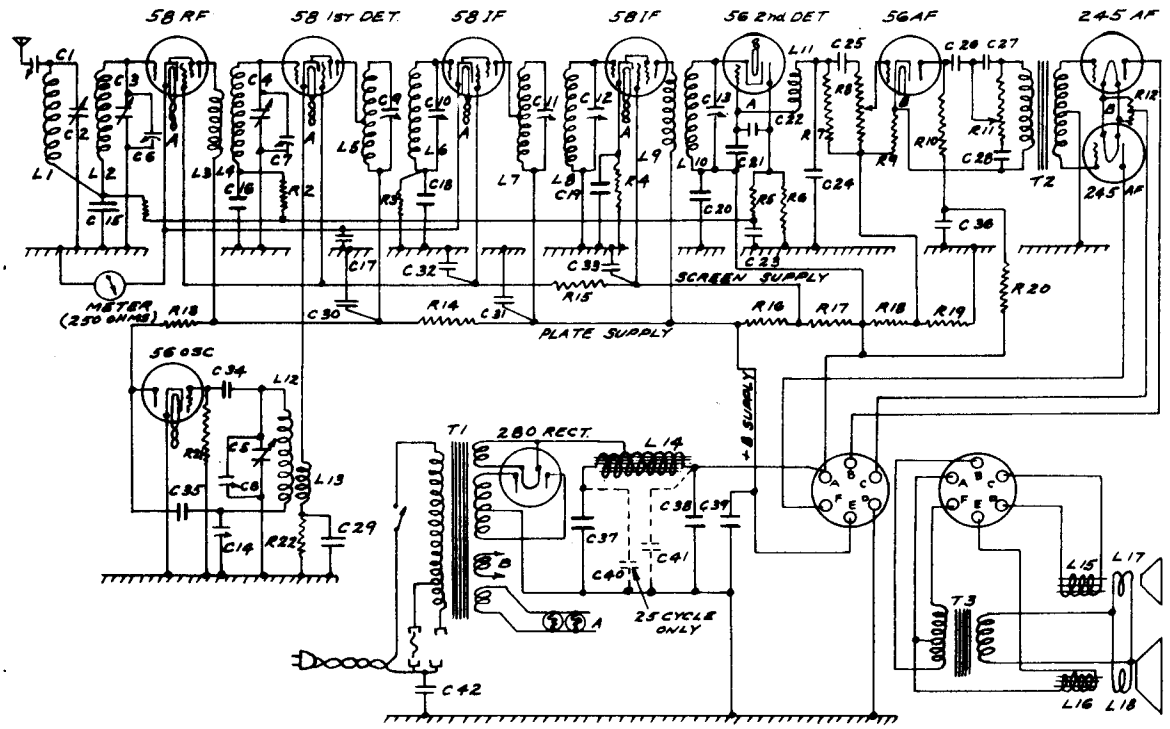
RESISTORS
103017 Volume control with switch
102959 Tone control
103616 Resistor (250 ohms)
101211 Resistor (600 ohms)
100729 " (1000 ohms)
102095 " (1500 ohms)
100824 " (5000 ohms)
100825 " (10000 ohms)
102875 " (15000 ohms)
100197 " (25000 ohms)
101163 " (75000 ohms)
100727 " (100000 ohms)
100194 Resistor (1/2 megohm)
100815 " (1 megohm)
103609 " (tapped)
99412 Mid tapped resistor

SOCKETS
103686 Socket (4 prong)
103514 Socket (5 prong)
103513 Socket (6 prong)
103196 Speaker socket

TRANSFORMERS
103565 Power transformer (242)
104174 Power transformer (243)
103849 Output transformer

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 250 and 251



SCHEMATIC DIAGRAM OF MODEL 250 RECEIVER

R1 - 100,000 ohms
R2 - 100,000 ohms
R3 - 100,000 ohms
R4 - 500 ohms
R5 - 500,000 ohms
R6 - 100,000 ohms
R7 - 100,000 ohms
R8 - 500,000 ohms
R9 - 1500 ohms
R10 - 25,000 ohms
R11 - 100,000 ohms
R12 - Center Tap
R13 - 30,000 ohms
R14 - 1000 ohms
R15 - 1000 ohms
R16 - 3700 }
R17 - 2270 } ohms
R18 - 230 }
R19 - 1280 }
R20 - 10,000 ohms
R21 - 100,000 ohms
R22 - 5000 ohms

C1 - Trimmer
C2 - Tuning
C3 - Tuning
C4 - Tuning
C5 - Tuning
C6 - Alignment
C7 - Alignment
C8 - Alignment
C9 - IF
C10 - IF
C11 - IF
C12 - IF
C13 - 2nd Det.
C14 - Alignment
C15 - .05 mfd.
C16 - .05 mfd.
C17 - .05 mfd.
C18 - .05 mfd.
C19 - .05 mfd.
C20 - .05 mfd.
C21 - 100 mmf.
C22 - .05 mfd.

C23 - .05 mfd.
C24 - 100 mmf.
C25 - .05 mmf.
C26 - .5 mfd.
C27 - .05 mfd.
C28 - .05 mfd.
C29 - .05 mfd.
C30 - .05 mfd.
C31 - .05 mfd.
C32 - .05 mfd.
C33 - .05 mfd.
C34 - 100 mmf.
C35 - .05 mfd.
C36 - 4 }
C37 - 8 } mfd.
C38 - 8 }
C39 - 4 }
C40 - 8 } mfd.
C41 - 8 }
C42 - .01 mfd.

L1 - RF coil

L2 - RF coil
L3 - RF coil
L4 - RF coil
L5 - IF coil
L6 - IF coil
L7 - IF coil
L8 - IF coil
L9 - IF coil
L10 - IF coil
L11 - Choke
L12 - Osc.
L13 - Osc.
L14 - Choke
L15 - Field
L16 - Field
L17 - Voice
L18 - Voice

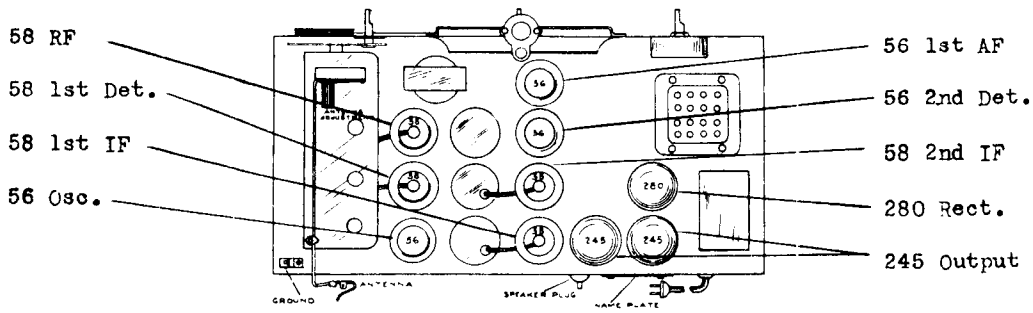
T1 - Power
T2 - Input
T3 - Output

UNITED AMERICAN BOSCH CORP.

SOCKET VOLTAGES

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
RF	58	2.4	200	100	4.5	0
1st Det.	58	2.4	200	100	8.5	0
Osc.	56	2.4	85	-	0	7.8
1st IF	58	2.4	200	100	4.5	0
2nd IF	58	2.4	200	100	4.5	0
2nd Det.	56	2.4	0	-	47	0
1st AF	56	2.4	175	1	47	0
2nd AF	245	2.4	350	-	-	55
2nd AF	245	2.4	350	-	-	55
Rect.	280	4.8				

Note: These values are readings of a high resistance voltmeter to ground with the exception of the filament voltages. Cathode voltages are given for those tubes having the grid at ground.



TEMPORARY CONDENSED SERVICE PARTS LIST FOR MODEL 250 and 251 RECEIVERS

MAIN ASSEMBLIES
103562 Chassis with tubes (250)
104064 Chassis with tubes (251)
103796 Two speakers on baffle
103731 Speaker only (small)
103669 Speaker only (large)
103882 Cabinet with plates (Model M)

COILS
103712 Field coil (small speaker)
103675 Field coil (large speaker)
103586 1st & 3rd I. F. transformer
103587 2nd I. F. transformer
103519 Oscillator coil
103525 R. F. transformer (single)
103526 R. F. transformer (double)
103588 Coil for 1st I. F. trans.
102463 Coil for 2nd I. F. trans.
103584 Choke coil (small)
103554 Choke coil (filter)

CONDENSERS
103950 Housed filter (250-251) 6 wire
103740 Housed filter (251) 5 wire
101301 Cond. .0001 mfd.
101143 Cond. .0001 mfd.
103695 Cond. .01 mfd. - 4 ply.
102493 Cond. .05 mfd. - 2 ply.
102492 Cond. .05 mfd. - 3 ply.
102498 Cond. .5 mfd. - 3 ply.
104060 Antenna trimmer cond.

FUSE
101723 Fuse (2 amp.)

KNOBS
103625 Dial knob
101445 Mute switch knob
102272 Antenna trimmer knob

METER
103296 Tuning meter

MISC. PARTS
103560 Dial scale only
102282 Diaphragm (small)
102283 Diaphragm (large)
98713 Lamp for dial

RESISTORS
103539 Volume control (Round)
103858 Volume control (Square)
103548 Tone control
99583 500 ohms
100729 1000 ohms
102095 1500 ohms
100824 5000 ohms
100825 10000 ohms
100197 25000 ohms
101722 30000 ohms
100727 100000 ohms
100194 500000 ohms
100815 1 megohm
99412 Mid tap resistor
103614 Tapped resistor

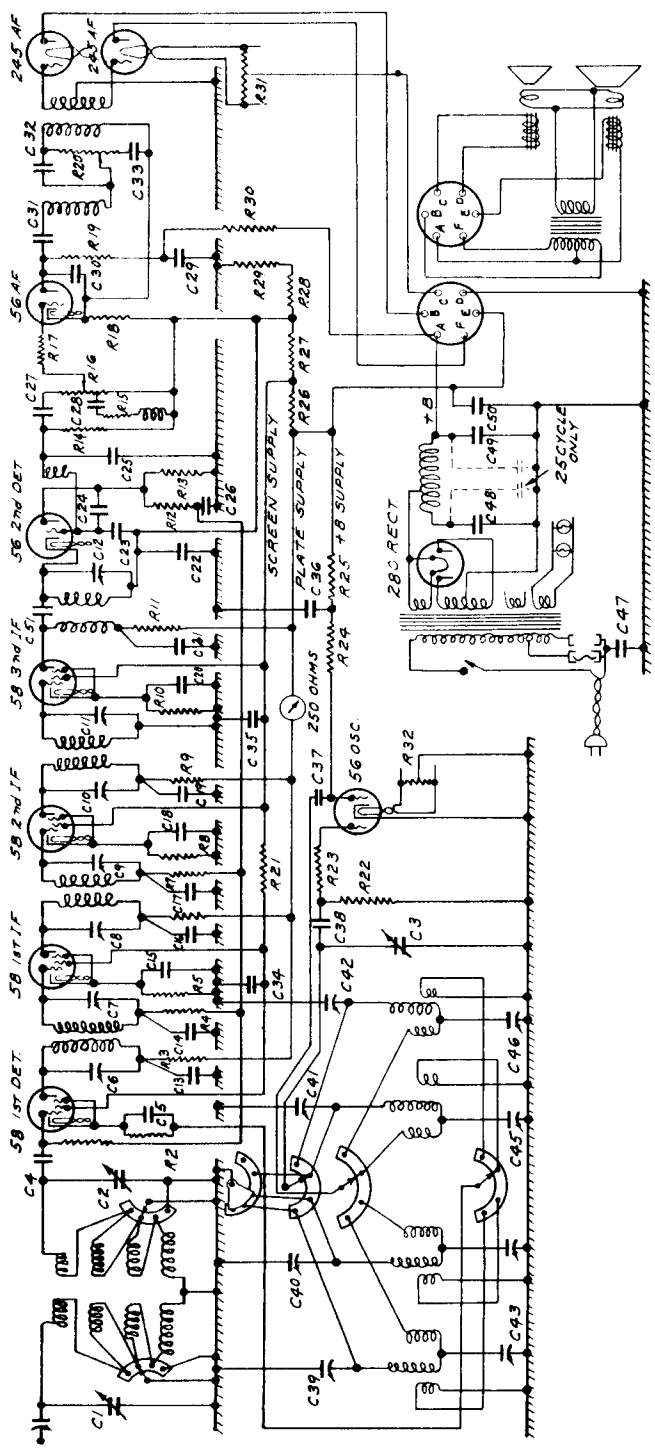
SOCKETS
103686 Socket (4 prong)
103514 Socket (5 prong)
103513 Socket (6 prong)

SWITCH
103901 Mute switch

TRANSFORMERS
103236 Power for RS 250
104144 Power with laminations for RS 251
103232 Output transformer
103578 Input transformer

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 260 and 261



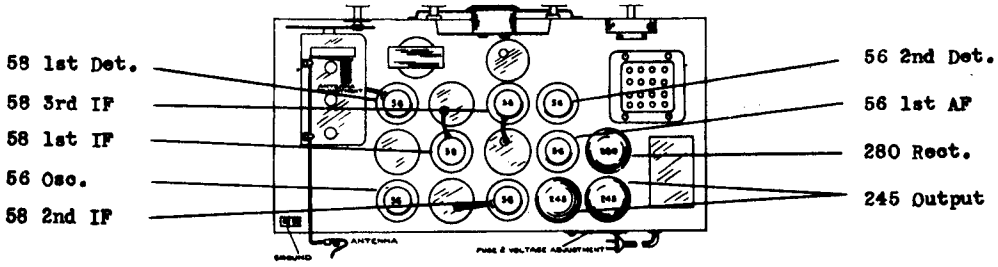
SCHEMATIC WIRING DIAGRAM OF THE MODEL 260 RECEIVER

R 1 - 500,000 ohms	R20 - 100,000 ohms	C 6 - alignment	C25 - 100 mmf.	C40 - alignment
R 2 - 5,000 ohms	R21 - 10,000 ohms	C 7 - alignment	C26 - .25 mfd.	C41 - alignment
R 3 - 1,000 ohms	R22 - 50,000 ohms	C 8 - alignment	C27 - .05 mfd.	C42 - alignment
R 4 - 100,000 ohms	R23 - 150 ohms	C 9 - alignment	C28 - .025 mfd.	C43 - alignment
R 5 - 1,500 ohms	R24 - 10,000 ohms	C10 - alignment	C29 - 4. mfd.	C44 - alignment
R 6 - 1,000 ohms	R25 - 10,000 ohms	C11 - alignment	C30 - .001 mfd.	C45 - alignment
R 7 - 100,000 ohms	R26 - 3700)	C12 - alignment	C31 - .5 mfd.	C46 - alignment
R 8 - 1,500 ohms	R27 - 2270) ohms	C13 - .005 mfd.	C32 - .05 mfd.	C47 - .01 mfd.
R 9 - 1,000 ohms	R28 - 230)	C14 - .005 mfd.	C33 - .05 mfd.	C48 - 8 mfd.
R10 - 350 ohms	R29 - 1280)	C15 - .05 mfd.	C34 - .05 mfd.	C49 - 8 mfd.
R11 - 1,000 ohms	R30 - 10,000 ohms	C16 - .005 mfd.	C35 - .05 mfd.	C50 - 4 mfd.
R12 - 500,000 ohms	R31 - Mid tap	C17 - .005 mfd.	C36 - .25 mfd.	C51 - 1,000 mmf.
R13 - 1 megohm	R32 - Mid tap	C18 - .05 mfd.	C37 - .05 mfd.	C52 - 8 mfd.
R14 - 100,000 ohms		C19 - .005 mfd.	C38 - 100 mmf.	C53 - 4 mfd.
R15 - 10,000 ohms	C 1 - Tuning	C20 - .05 mfd.	C39 - alignment	
R16 - 500,000 ohms	C 2 - Tuning	C21 - .005 mfd.	(R26, R27, R28, R29 - tapped unit	
R17 - 100,000 ohms	C 3 - Tuning	C22 - .05 mfd.	(C13, C14, C16, C17, C19, C21 - single unit	
R18 - 1,500 ohms	C 4 - 100 mmf.	C23 - 100 mmf. Note	(C29, C48, C49, C50 - single unit	
R19 - 25,000 ohms	C 5 - .05 mfd.	C24 - .05 mfd.		

UNITED AMERICAN BOSCH CORP.

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
1st Det.	58	2.4	215	90	7.5	0
1st IF	58	2.4	215	90	5.0	0
2nd IF	58	2.4	215	105	48	0
3rd IF	58	2.4	215	105	32	0
Osc.	56	2.4	70	-	0	0
2nd Det.	56	2.4	0	-	45	-
1st AF	56	2.4	180	-	50	12
Output	245	2.4	350	-	60	0
Output	245	2.4	350	-	60	0
Rect.	280	4.8	-	-	-	-

Note: These values are readings of a high resistance voltmeter from each socket terminal to ground, with the exception of the filament voltages. 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.



TEMPORARY CONDENSED PARTS LIST FOR MODEL 260 AND 261 RECEIVERS

MAIN ASSEMBLIES
103564 Chassis with tubes (260)
104119 Chassis with tubes (261)
103796 Speakers on baffle (260B)
103904 Speakers on baffle (260C)
103669 Speaker only - large
103731 Speaker only - small
103883 Cabinet (Model C)
103884 Cabinet (Model B)

COILS
103675 Field coil - large
103712 Field coil - small
103658 1st and 2nd. I. F. trans
103897 3rd I. F. transformer assy.
103778 4th I. F. transformer assy.
103661 Coil for 1st and 3rd I. F.
103776 Coil for 2nd I. F. trans
103727 Pre-selector coil #1
103728 Pre-selector coil #2
103729 Pre-selector coil #3
103730 Pre-selector coil #4
103822 Oscillator coil #1
103821 Oscillator coil #2
103822 Oscillator coil #3
103797 Oscillator coil #4
103554 Choke filter
103584 Choke coil - small

CONDENSERS
103950 Housed filter (260)(261)
103740 Housed filter - (261)
101301 .0001 mfd.
103775 .001 mfd.
103659 .005 mfd. - 3 ply
104080 .006 mfd.
103695 .01 mfd. - 4 ply
102493 .05 mfd. - 2 ply
102492 .05 mfd. - 3 ply
102497 .25 mfd. - 2 ply
102499 .15 mfd. - 2 ply
104060 Antenna trimmer
103148 Alignment (square) 7 to 70
103801 Alignment (square) 600 to 1600
103800 Alignment (square) 1000 to 2000
103798 Alignment (on oscillator coil)
102253 Alignment (on I. F. coils 103897 & 103658)

FUSE
101723 Fuse (2 amp)

KNOBS
100798 Dial knob
101445 Mute switch knob
102272 Antenna trimmer knob

MISC. PARTS
103813 Dial scale
102282 Diaphragm (small)
102283 Diaphragm (large)
98713 Lamp for dial

METER
103296 Tuning meter

RESISTORS
103539 Volume control
103548 Tone Control
103810 (150 ohms)
102564 (350 ohms)
100729 (1000 ohms)
102095 (1500 ohms)
100824 (5000 ohms)
100825 (10000 ohms)
100197 (25000 ohms)
103811 (50000 ohms)
100727 (100000 ohms)
103812 ($\frac{1}{8}$ megohm (7/8" long)
100194 $\frac{1}{8}$ megohm (1" long)
100815 1 megohm
99412 Mid tap resistor
103614 Tapped resistor

SOCKETS
103686 Socket (4 prong)
103514 Socket (5 prong)
103513 Socket (6 prong)

SWITCH
103901 Mute switch
103570 Wave change switch

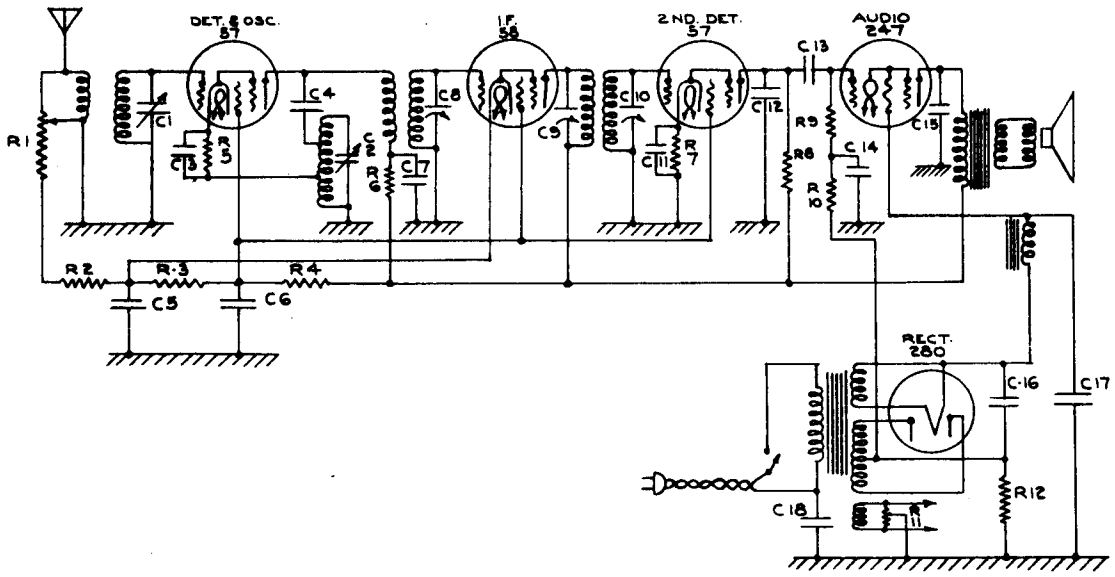
TRANSFORMERS
104049 Power for 260
104156 Power for 261
103232 Output transformer
103945 Input transformer

UNITED AMERICAN BOSCH CORP.

AMERICAN BOSCH RADIO

(SUPER-FIVE)

Service Instructions --- Model 305-A



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

UNITED AMERICAN BOSCH CORP.

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid
Detc. & Osc.	57	2.47	245	95	7	0
2nd Det.	57	2.48	48	95	5	0
I. F.	58	2.47	248	95	3.3	0
Output	47	2.5	235	248	0	17
Rect.	80	5	360	-	-	-

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

ALIGNING INSTRUCTIONS --- MODEL 305-A

I. F. ADJUSTMENT: 456 K. C.

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

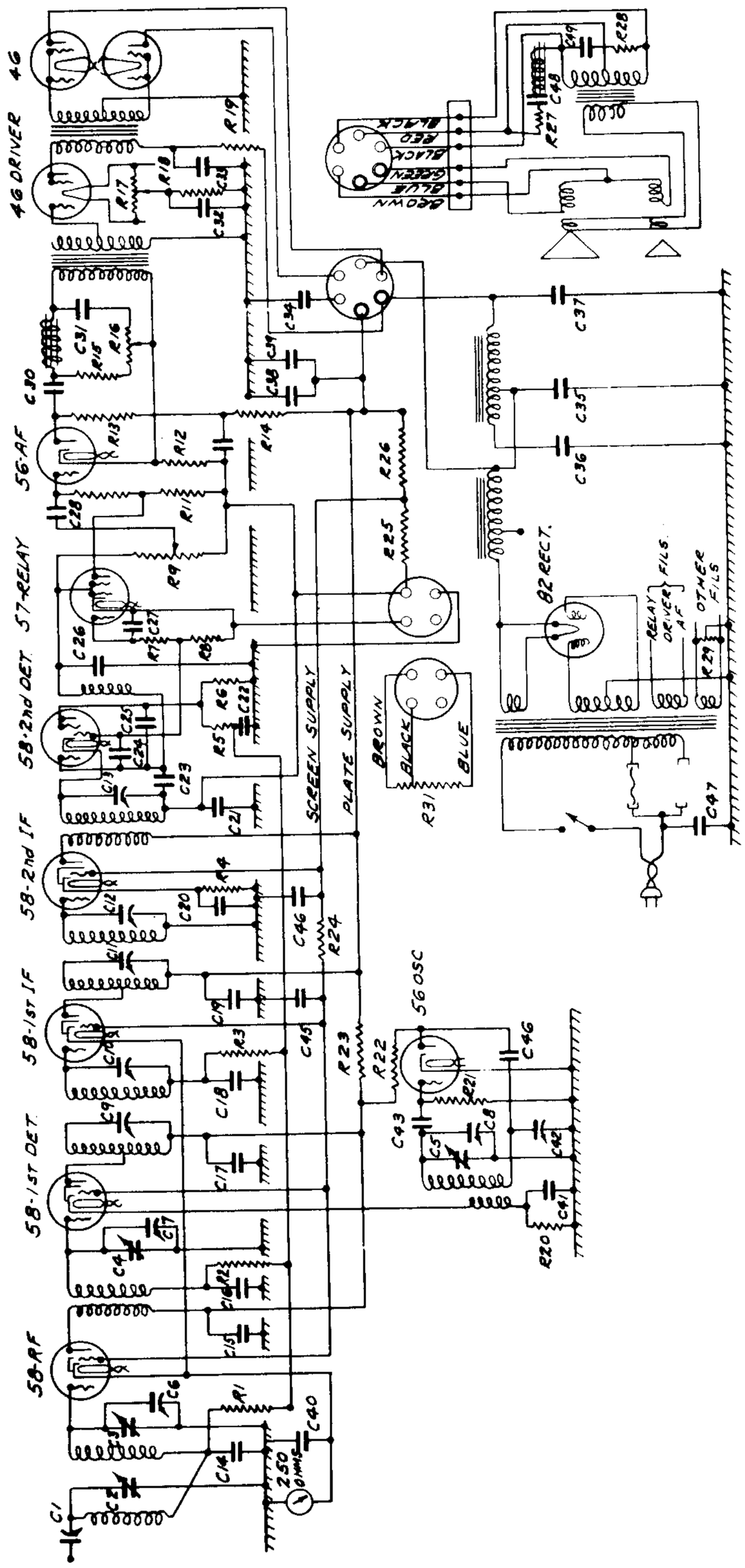
OSCILLATOR ADJUSTMENT

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

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

UNITED AMERICAN BOSCH CORP.

SERVICE INSTRUCTIONS - MODELS 312 and 313



SCHEMATIC WIRING DIAGRAM OF MODEL 312 RECEIVER

R21 - 100,000 ohms
R22 - 30,000 ohms
R23 - 1000 ohms
R24 - 1000 onms
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

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

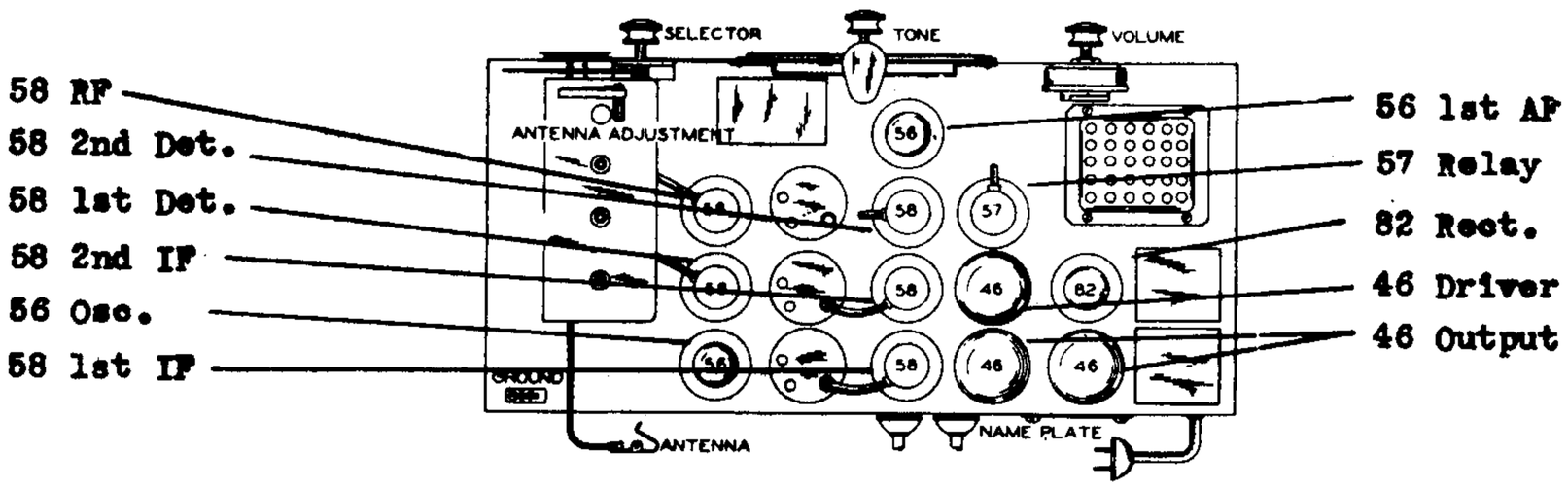
C30 - .1 mfd.
C31 - .05 mfd.
C32 - 8. mfd.
C33 - 4.)
C34 - 4.) mfd.
C35 - 8.)
C36 - 4.)
C37 - 8.) mfd.
C38 - 4.)
C39 - 4.)
C40 - .05 mfd.
C41 - .05 mfd.
C42 - Alignment
C43 - 100 mmf.
C44 - .05 mfd.
C45 - .05 mfd.
C46 - .05 mfd.
C47 - .01 mfd.
C48 - 2. mfd.
C49 - .01 mfd.

UNITED AMERICAN BOSCH CORP.

MODELS 312 AND 313

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.



TEMPORARY CONDENSED PARTS LIST FOR MODEL 312 RADIO RECEIVERS

MAIN ASSEMBLIES

103563 Chassis with tubes
103854 Speakers (2) with baffle (C)
103802 Speakers (2) with baffle (G)
103805 Speaker only (small)
103806 Speaker only (large)
103885 Cabinet (Model C)
103886 Cabinet (Model G)

COILS

103675 Field coil (either speaker)
103525 R.F. transformer (single)
103526 R.F. transformer (double)
103519 Oscillator coil
103586 1st and 3rd I. F. transformer
103587 2nd. I. F. transformer
103588 Coil only for 1st. I. F.
102841 Coil only for 2nd. I. F.
103736 Inductance coil
104116 Choke filter (2 leads)
103554 Choke filter (3 leads)
103746 Rectifier R. F. choke
103584 Choke coil (small)

CONDENSERS

103740 Housed filter (5 leads)
103595 Housed filter (6 leads)
101301 .0001 mfd. (offset terminals)
101143 .0001 mfd.
103696 .01 mfd. - 4 ply
102500 .01 mfd. - 3 ply
102493 .05 mfd. - 2 ply
102492 .05 mfd. - 3 ply
102494 .1 mfd. - 3 ply
102498 .5 mfd. - 3 ply
103828 2. mfd. - 2 ply
103037 8. mfd.
104060 Antenna trimmer

FUSE

101725 Fuse (2 amp.)

KNOBS

100798 Dial knob
102272 Antenna trimmer knob
101445 Potentiometer knob

MISC. PARTS

103560 Dial scale only
102282 Diaphragm (small)
102283 Diaphragm (large)
98713 Lamp for dial

METER

103296 Tuning meter

RESISTORS

103549 Volume control
103548 Tone control
99583 (500 ohms)
100729 (1000 ohms)
99581 (1500 ohms)
103836 (3000 ohms)
100824 (5000 ohms)
98366 (5000 ohms)
100825 (10000 ohms)
101722 (30000 ohms)
100727 (100000 ohms)
100194 (1/2 megohm)
100815 (1 megohm)
100196 (2 megohm)
103741 Mid tap variable
99412 Mid tap resistor
103742 Tapped resistor
103701 Potentiometer

SOCKETS

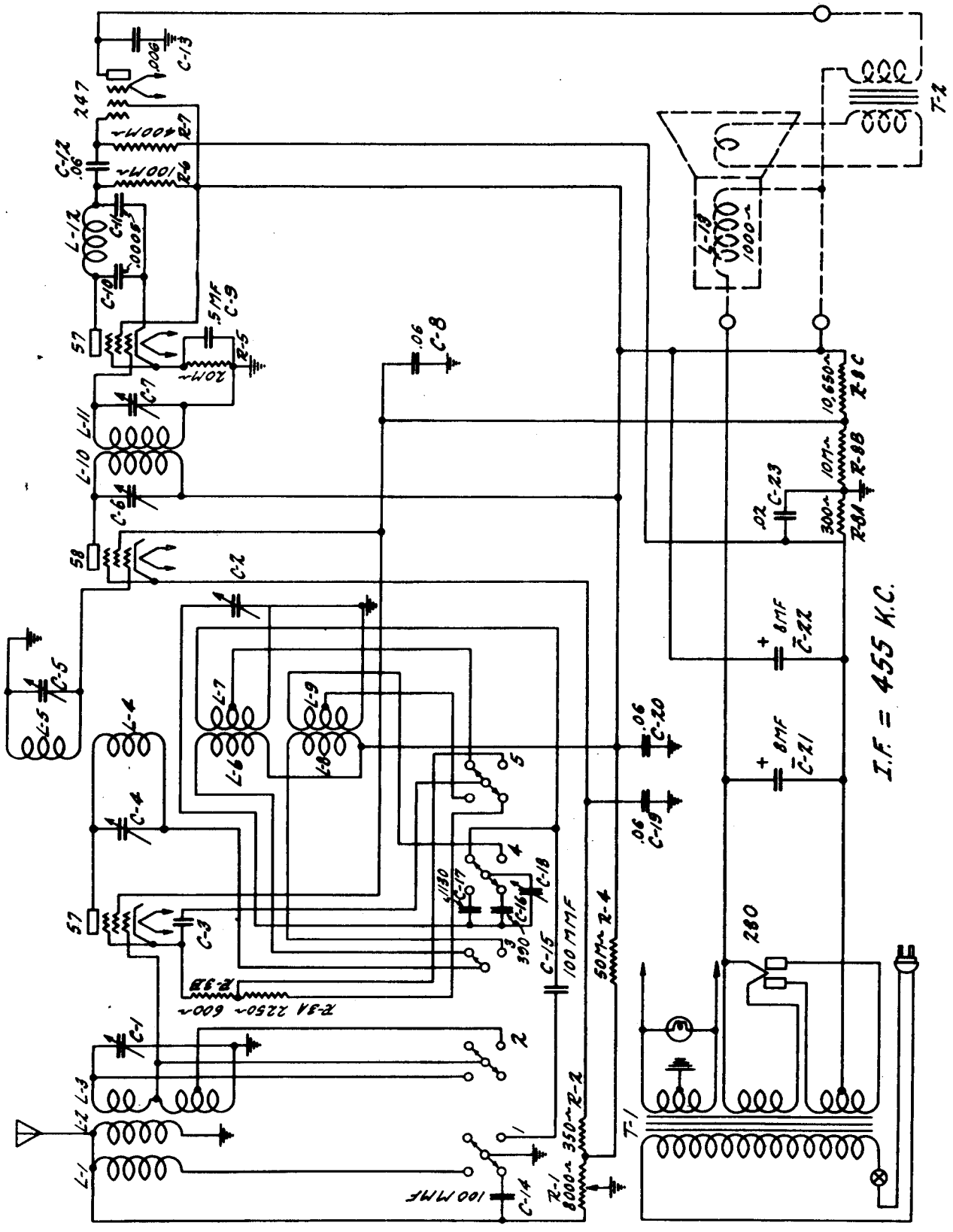
103686 Socket (4 prong)
103514 Socket (5 prong)
103513 Socket (6 prong)

TRANSFORMERS

103738 Power transformer
103815 Output transformer
103765 Input transformer
103737 Driver output trans

U. S. RADIO & TELEVISION CORP.

MODEL 5A (502 CHASSIS)



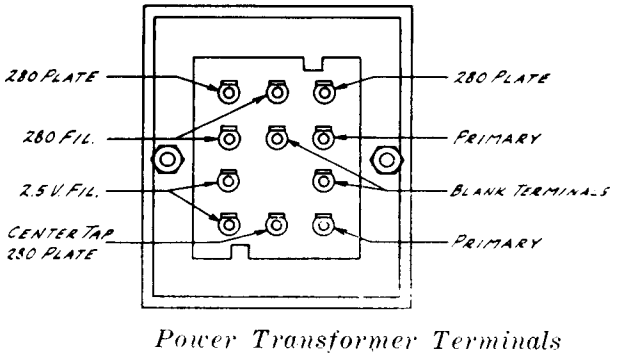
U. S. RADIO & TELEVISION CORP.

MODEL 5A (502 CHASSIS)

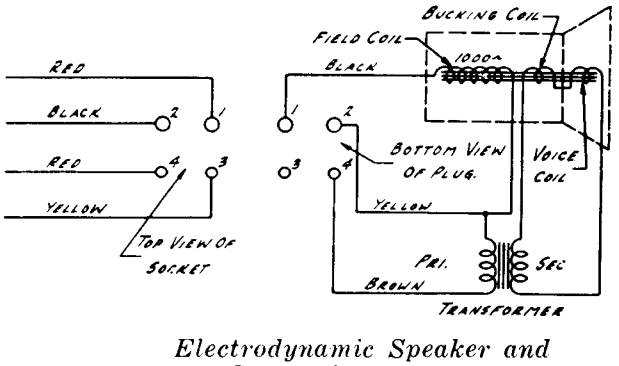
NO. 502 CHASSIS—VOLTAGES AT SOCKETS
LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM

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	

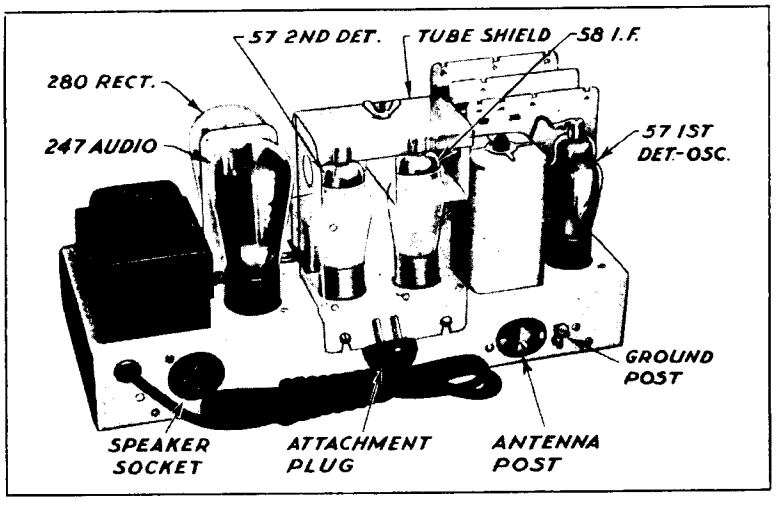
(1) Varies with frequency setting of dial approximately as shown.
(2) Measured across 300 ohm section of voltage divider resistor.



Power Transformer Terminals



Electrodynamic Speaker and Connections.



Top View of Chassis Showing Location and Function of Tubes

U. S. RADIO & TELEVISION CORP.

MODEL 5A - (502 CHASSIS)

CONTINUITY CHART

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

U. S. RADIO & TELEVISION CORP.

CONTINUITY CHART

NO. 502 CHASSIS

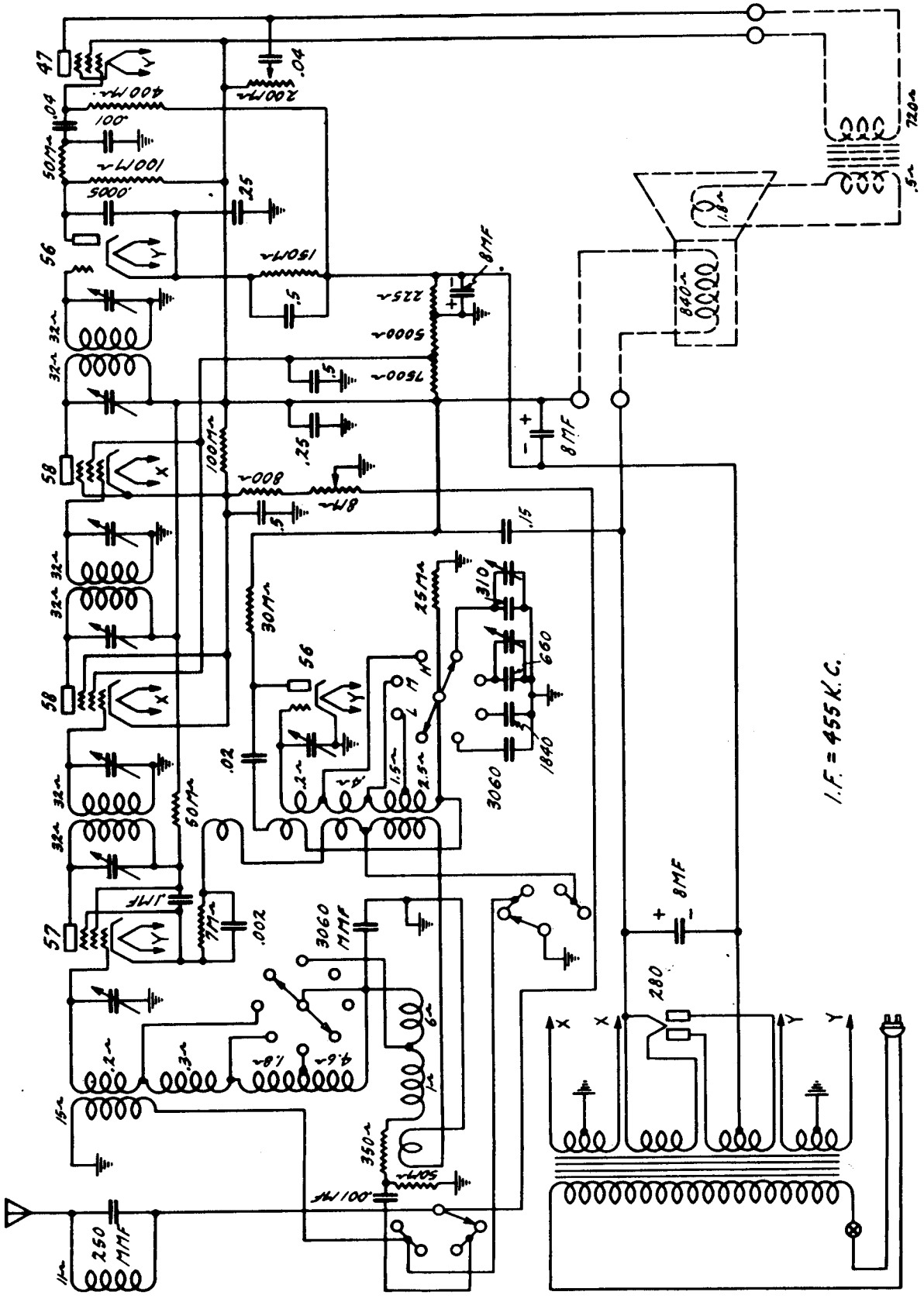
Volume Control at Maximum—Switch in Broadcast Position

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

U. S. RADIO & TELEVISION CORP.

MODEL 7D (No. 700 CHASSIS)



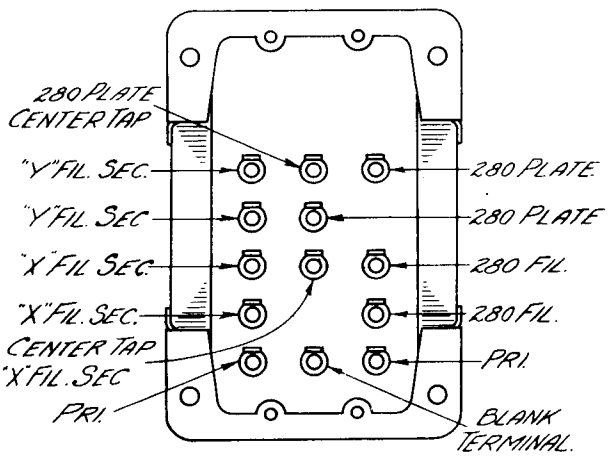
U. S. RADIO & TELEVISION CORP.

MODEL - 7D

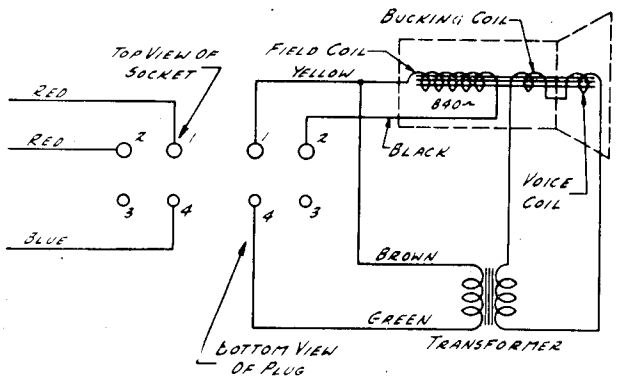
No. 700 CHASSIS—VOLTAGES AT SOCKETS
VOLUME CONTROL AT MAXIMUM—LINE VOLTAGE 115

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	Grid Test MA
56	1	Osc.	2.4	70	18(1)			0	6.2	6.2
57	2	1st Det.	2.4	170	8.0	170	.3	8.0	1.2	1.6
58	3	1st I.F.	2.4	260	7.0	90(2)	.6	7.0	2.5	4.0
58	4	2nd I.F.	2.4	260	7.0	90(2)	.6	7.0	2.5	4.0
56	5	2nd Det.	2.4	200(3)	17.0(2)			17.0	.2	.3
247	6	Audio	2.4	240	1.6(4)	265	6.8		33.0	38.0
280	7	Rect.	5.0						39 Per Plate	

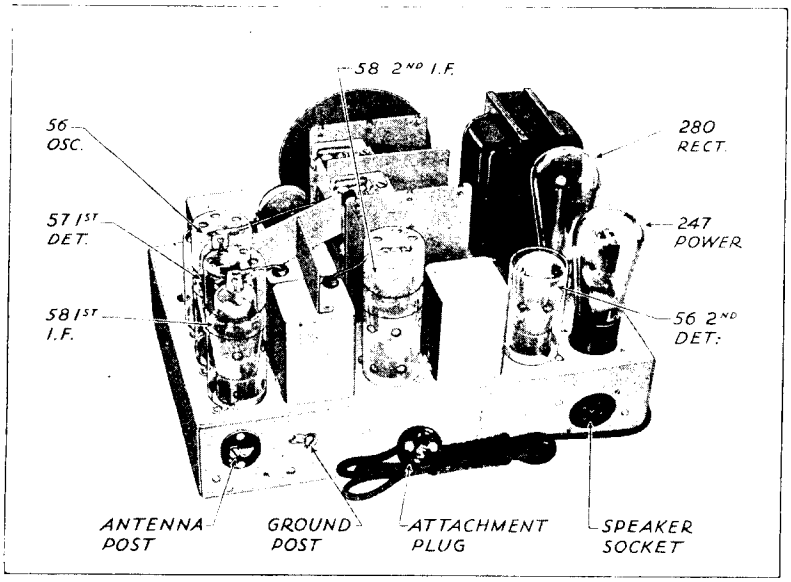
(1) Varies with frequency. Actual voltage measured across 25,000 ohm bias resistor—39 Volts.
(2) Voltage measured with 120,000 ohm meter.
(3) Voltage measured with 600,000 ohm meter.
(4) Actual voltage measured across 225 ohm section of voltage divider resistor—17 Volts.



Power Transformer Terminals



Electrodynamic Speaker and Connections

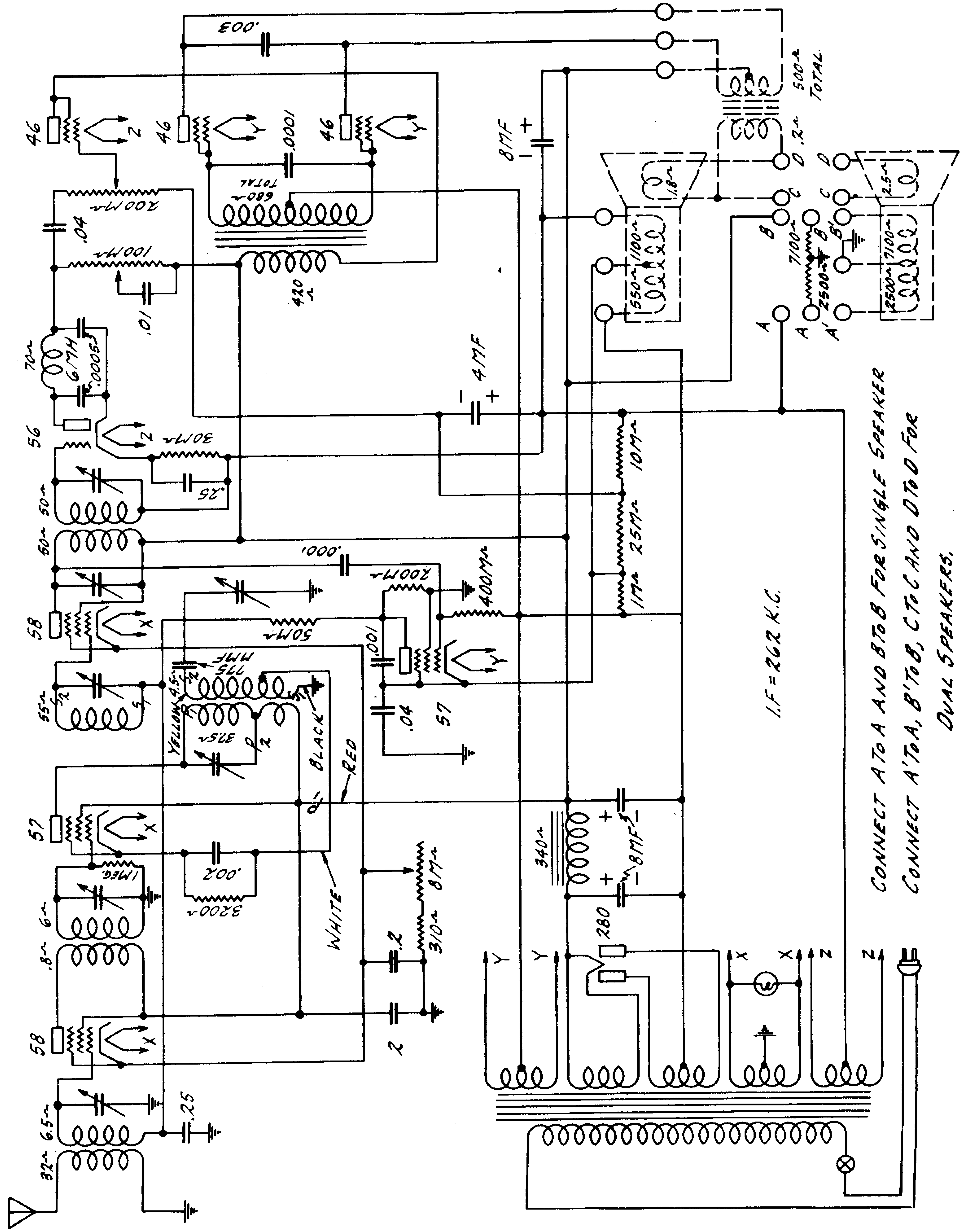


Top View of Chassis Showing Tube Location

U. S. RADIO & TELEVISION CORP.

MODELS 9 & 19 (No 900 CHASSIS)

CLASS "B"

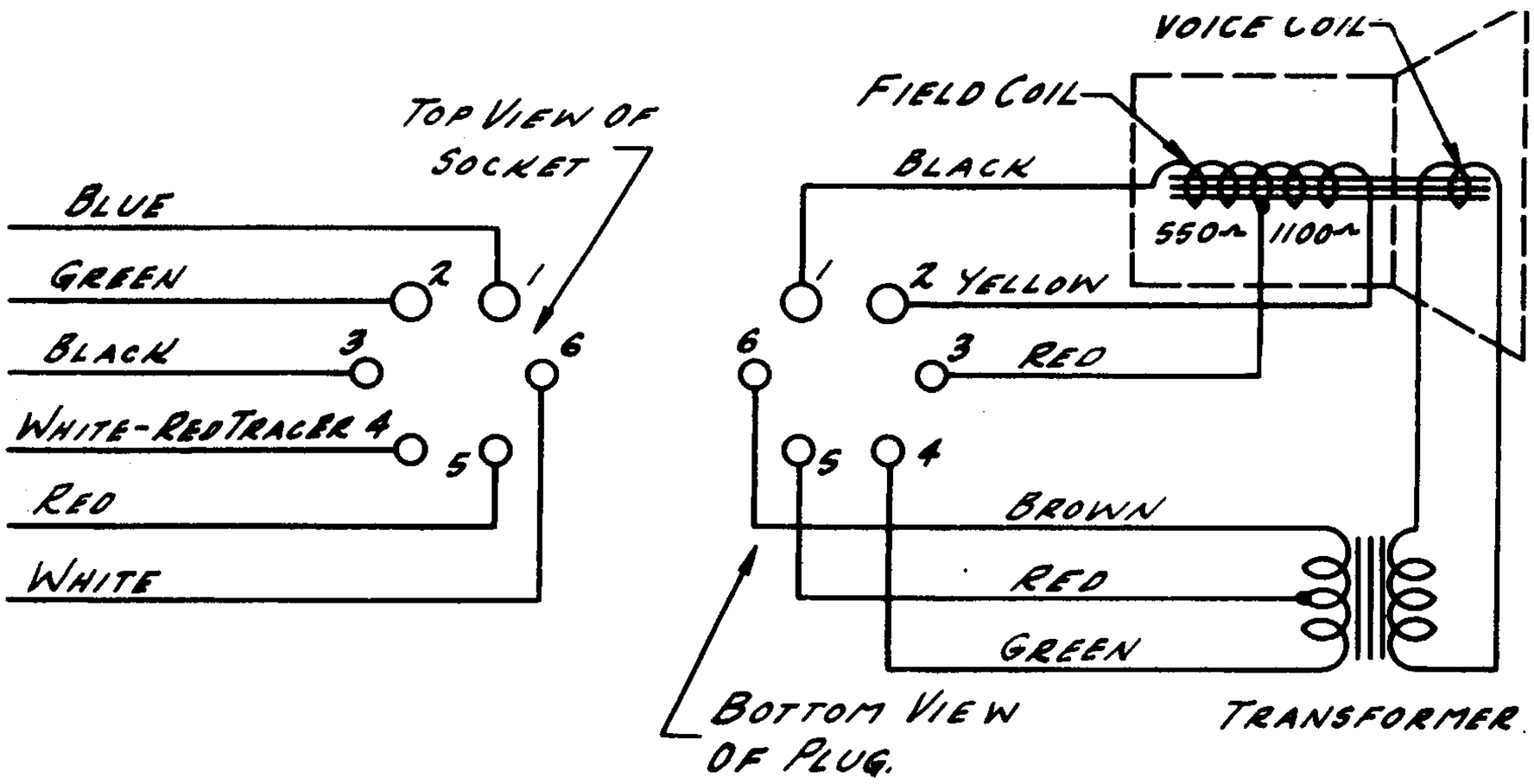


U. S. RADIO & TELEVISION CORP.

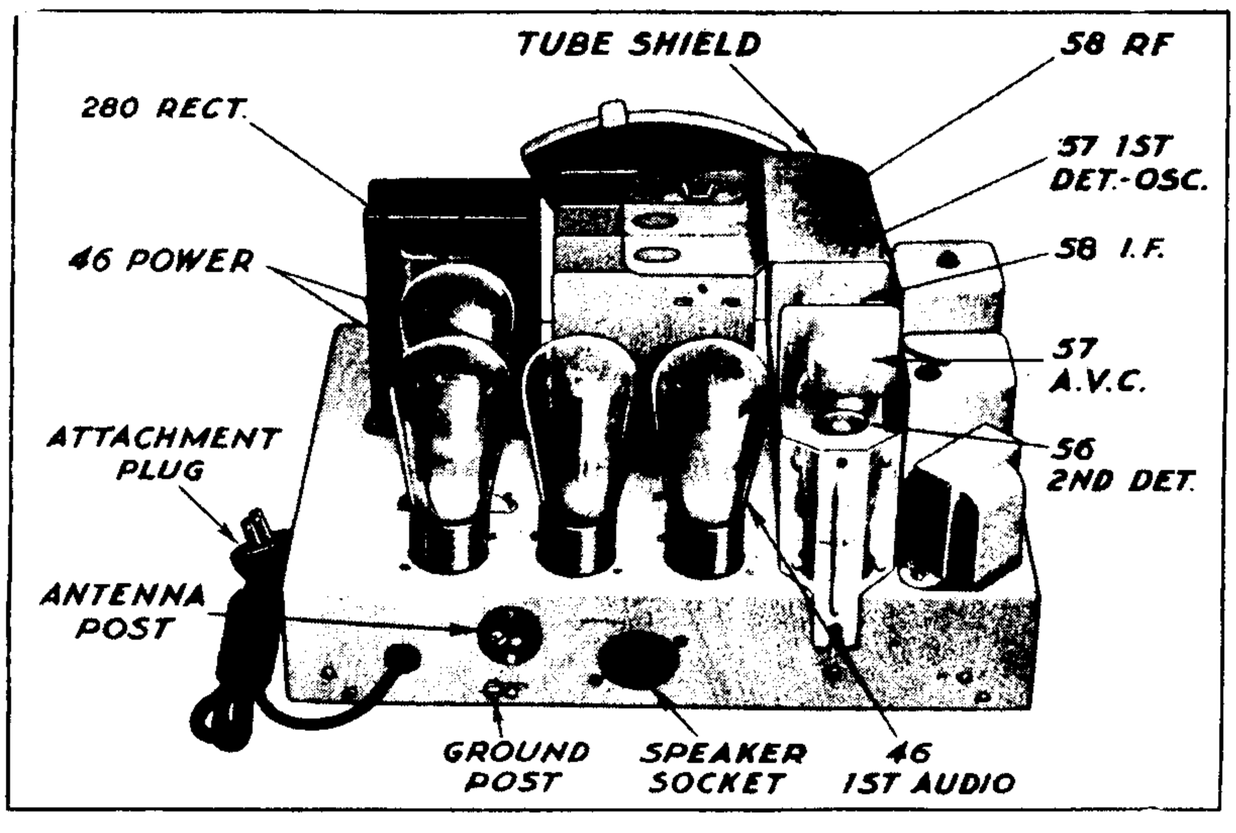
No. 900 and No. 902 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM—"Q" CONTROL AT MAXIMUM

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.

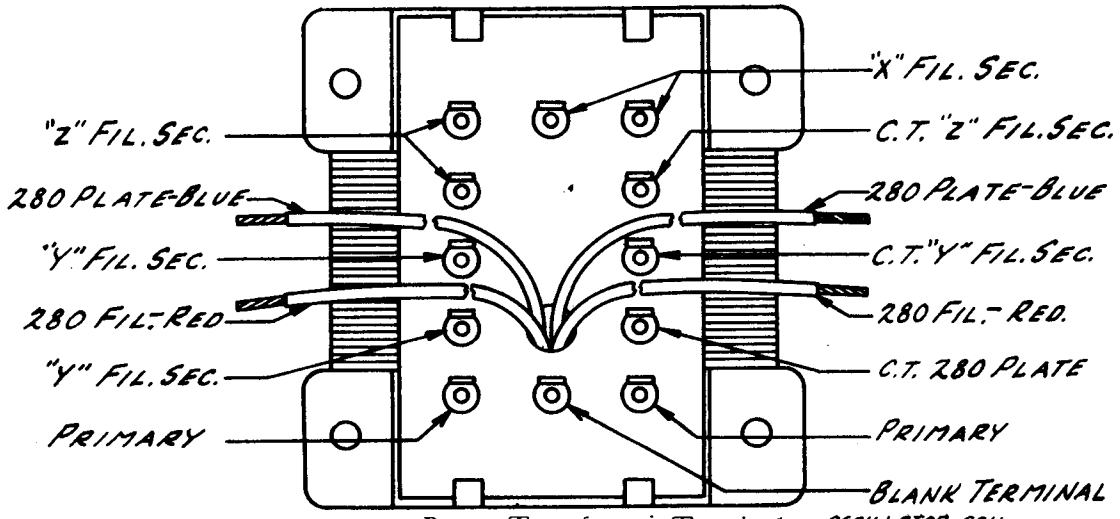


No. 4245 Electrodynamic Speaker and Connections

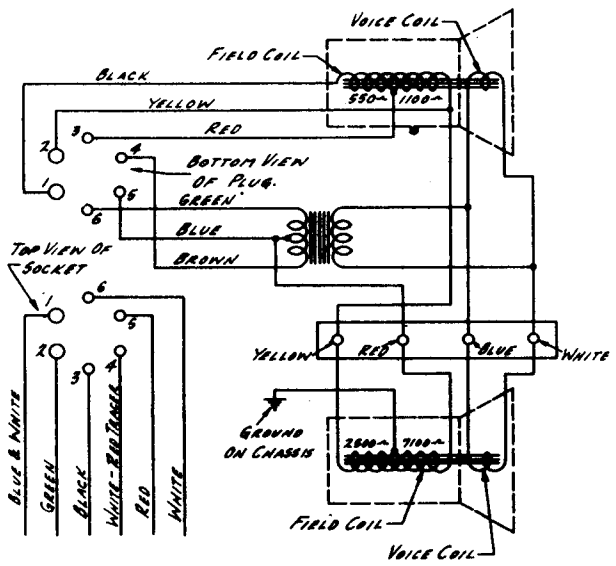


Top View of Chassis Showing Tube Location

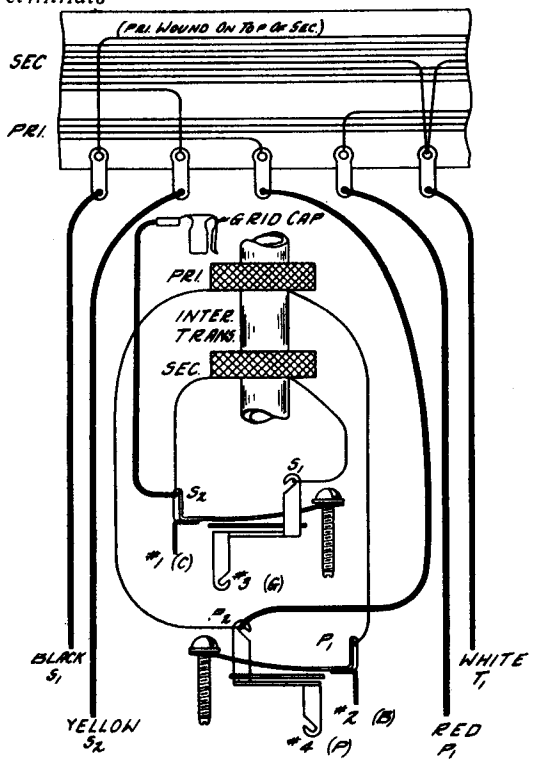
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Power Transformer Terminals



No. 4246 and 4247 Electrodynamic Speakers and Connections



Wiring Diagram, Osc. and I.F. Assembly

SUPPLEMENTARY NOTES FOR No. 902 CHASSIS

Chassis No. 902 is very similar to Chassis No. 900, except that it is designed for dual-speaker operation. Two speakers, Part No. 4246 and 4247 are supplied with this chassis, the No. 4246 speaker being identical with the No. 4245 speaker used with the No. 900 chassis as regards electrical constants with the exception that the speaker input transformer is designed with a secondary impedance to match two voice coils in parallel. The No. 4247 speaker is supplied with a field having a resistance of 9600 ohms which is connected in the power supply system of the No. 902 chassis in place of the 2500 and 7100 ohm sections of the Candohm resistor which is used in the No. 900 chassis. The speaker field is tapped at 2500 ohms and there is a voltage drop of 115 and 130 volts across the 2500 and 7100 sections respectively.

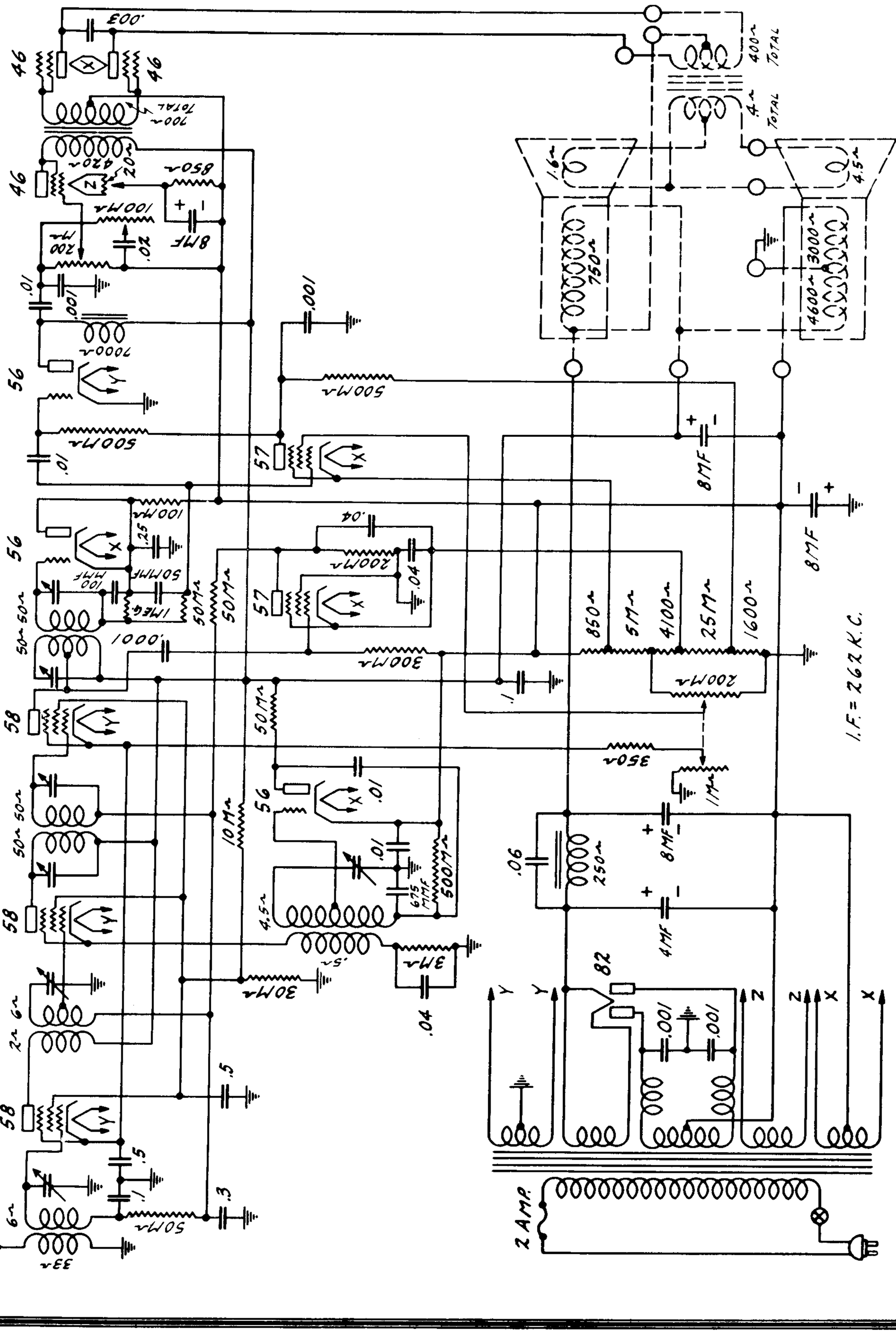
It is essential that the polarity of the leads which connect the voice coils of the two speakers in parallel be correct. If the blue and white leads are reversed, very poor audio quality will result because one cone will be moving out while the other is moving in and vice versa.

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.

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MODELS 12 & 120 (No 1200 CHASSIS CLASS "B"

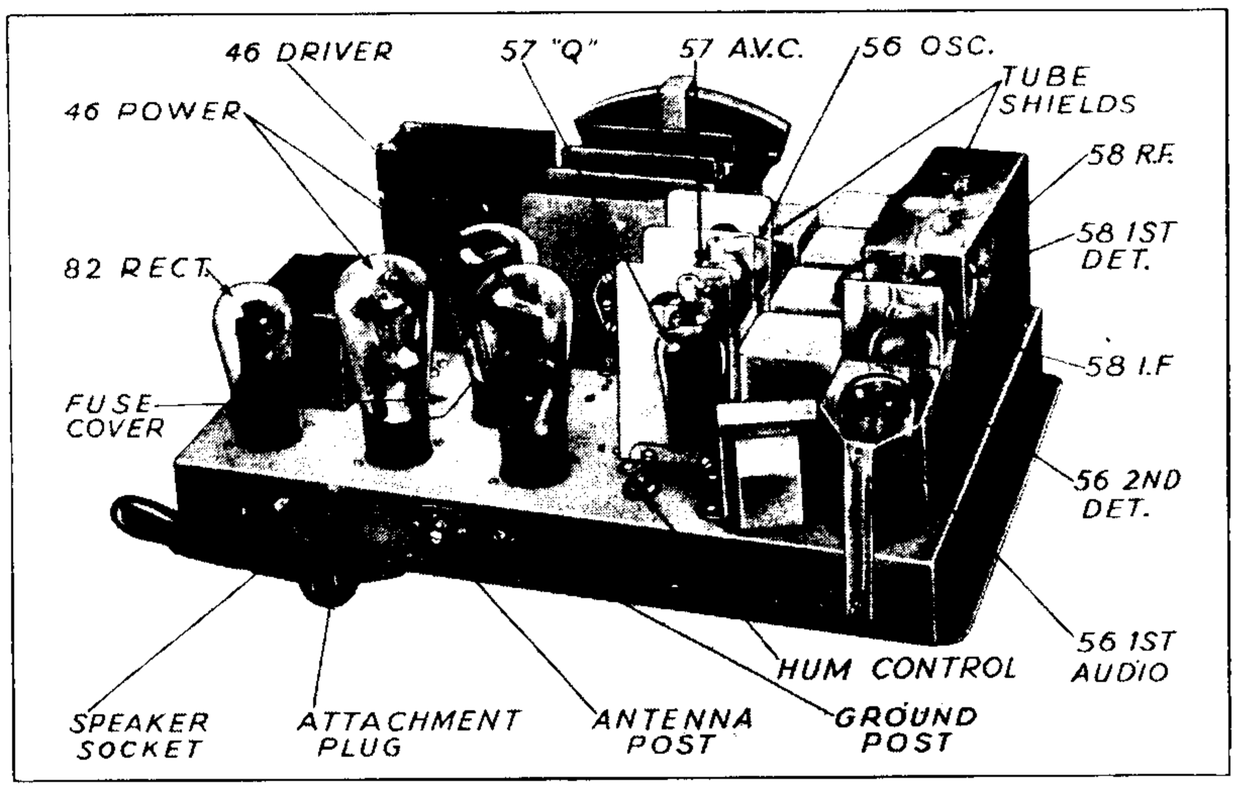


U. S. RADIO & TELEVISION CORP.

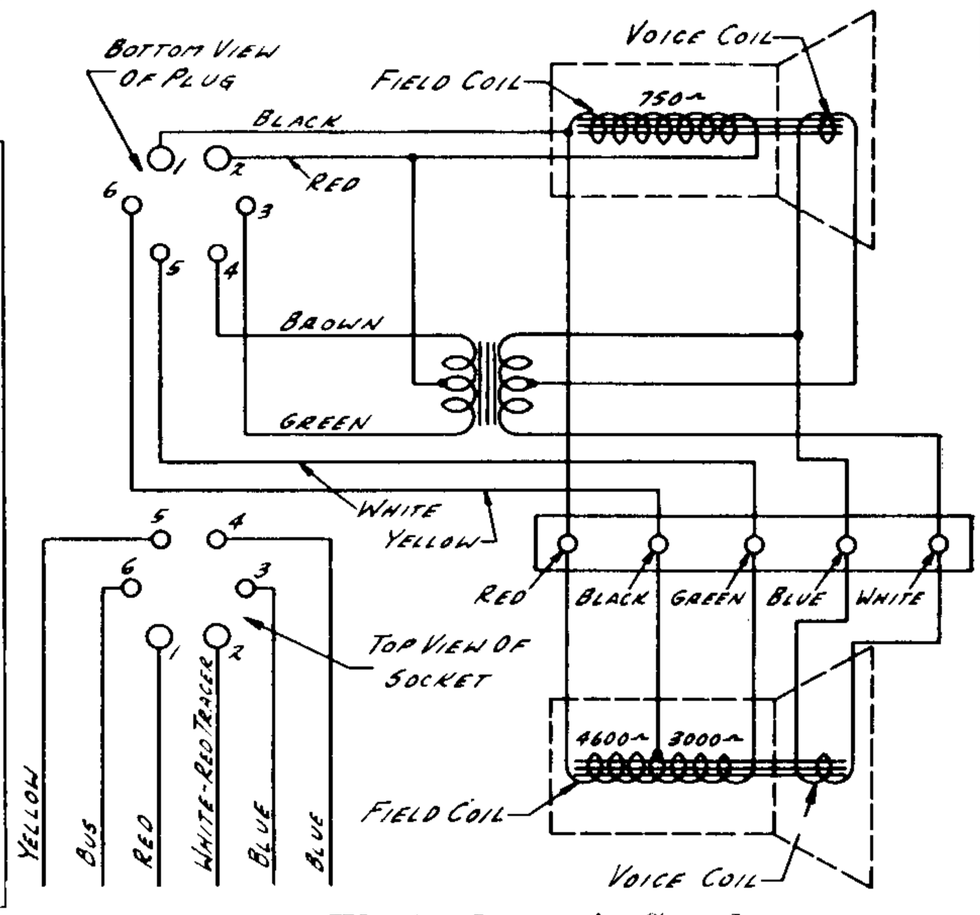
No. 1200 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM —"Q" CONTROL AT MAXIMUM

Tube No.	*Type of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid MA*	*Cathode Volts*	*Plate Current MA*	*Grid Test MA*
1	58	R.F.	2.25	140	3.2(1)	80	.9	3.2	3.6	7.6
2	58	1st Det.	2.25	130	7.5	74	.5	7.5	2.0	2.3
3	58	I. F.	2.25	140	3.2(1)	80	.9	3.2	3.6	7.6
4	56	2nd Det.	2.25							
5	56	1st Audio	2.25	110	5.5(2)			0	4.2	8.6
6	56	Osc.	2.25	110	10-23(3)			0	3.4	
7	57	AVC	2.25	65(4)	35(5)	85	0	35(5)	0	0
8	57	"Q"	2.25	120(6)	3.5(7)	20	0	3.5(7)	0	0
9	46	Driver	2.25	235	28(8)				26.0	28
10	46	Power	2.25	335	0				5.5(9)	13
11	46	Power	2.25	335	0				5.5(9)	13
12	82	Rect.	2.2						51 Per Plate	

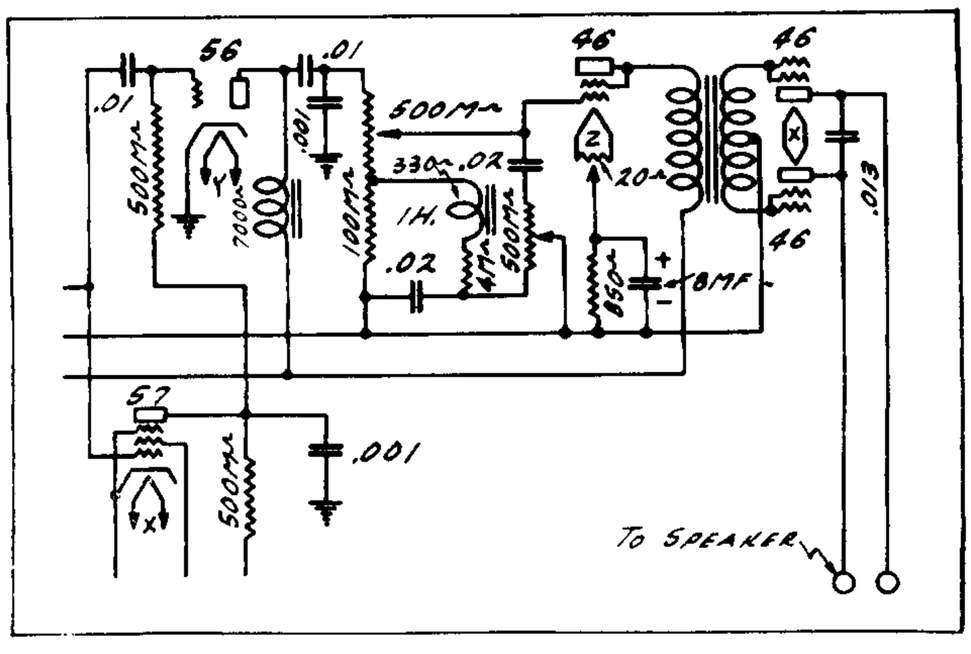
(1) Measured across 350 Ohm Resistor.
(2) Measured across 1600 Ohm section of Voltage Divider Resistors.
(3) Varies as shown with frequency—measured across 500,000 Ohm Resistor.
(4) Measured with 600,000 Ohm Meter.
(5) Measured across 850—5,000—4100 Ohm sections of Voltage Divider Resistors.
(6) Measured across 5,000—4100—25,000 Ohm sections of Voltage Divider Resistors.
(7) Measured across 850 Ohm "Q" Tube Bias Resistor.
(8) Measured across 850 Ohm Driver Tube Bias Resistor.
(9) Plate Current at No Signal.



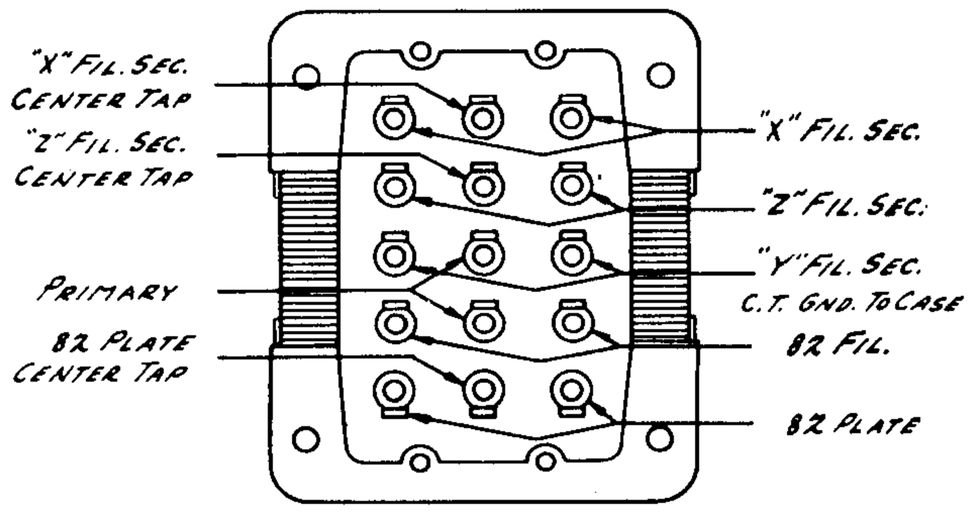
Top View of No. 1200 Chassis Showing Tube Location



Electrodynamic Speakers and Connections



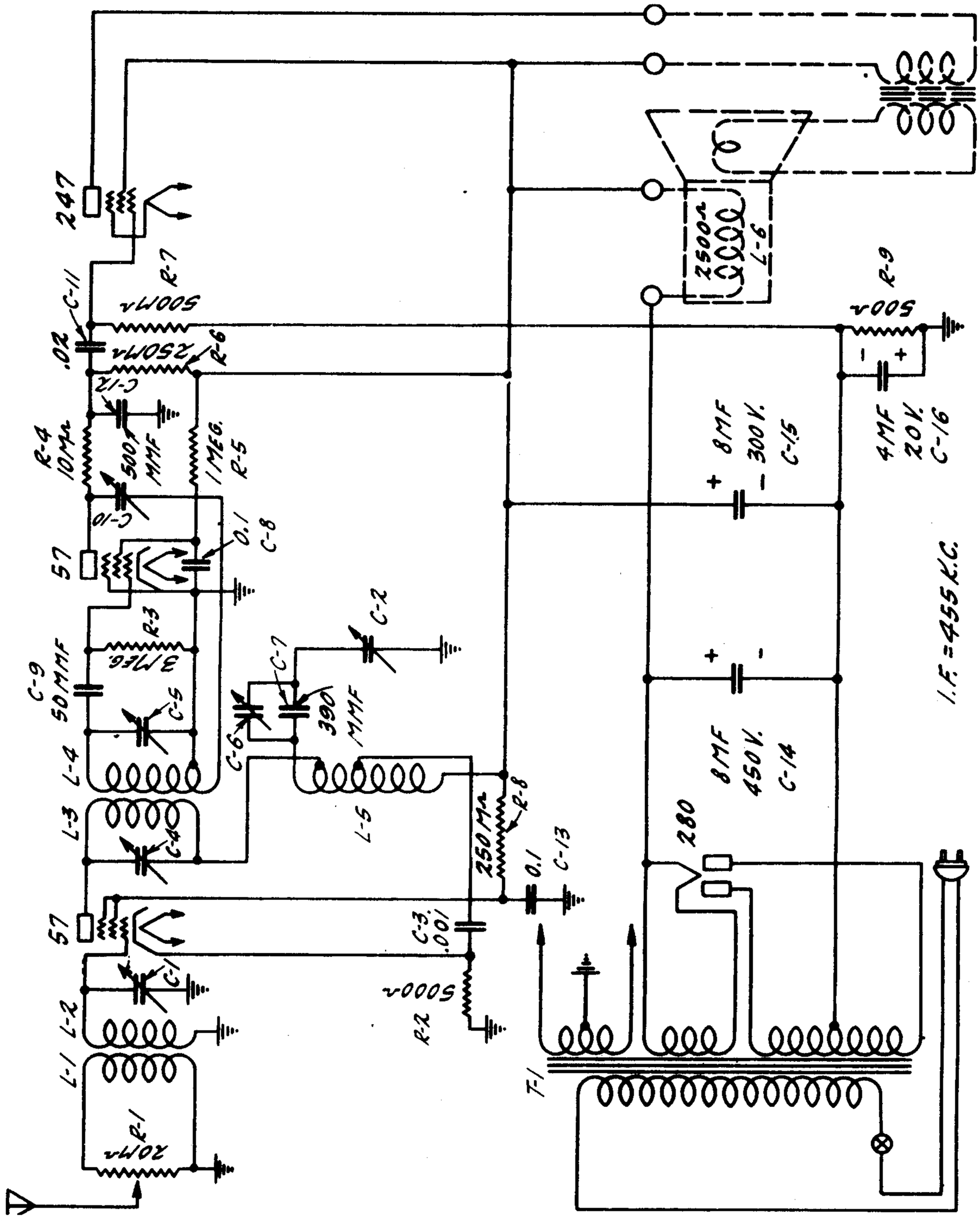
Revised Audio Circuit in No. 1200 Chassis above Serial No. 1189197



Power Transformer Terminals

U. S. RADIO & TELEVISION CORP.

MODEL 24 (No 400 CHASSIS)

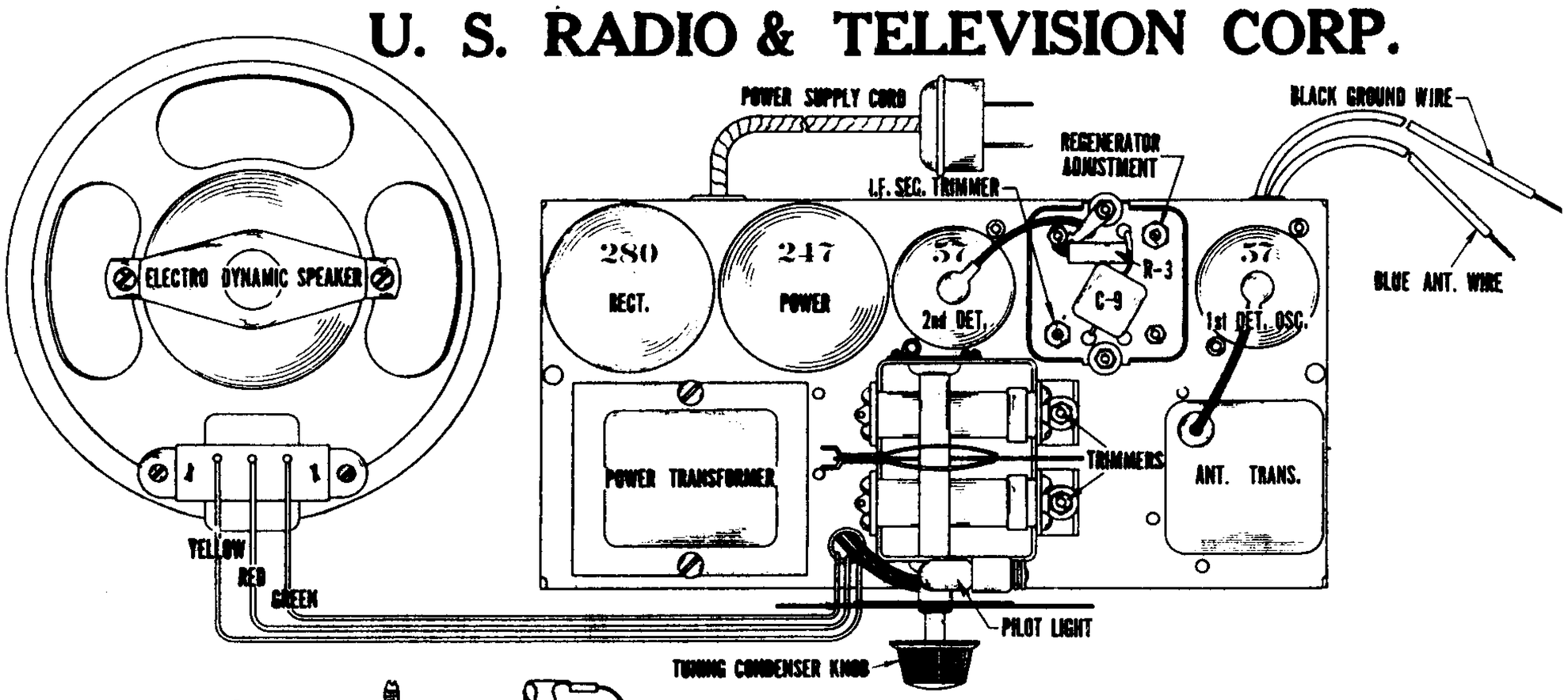


No. 400 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115 VOLUME CONTROL AT MAXIMUM

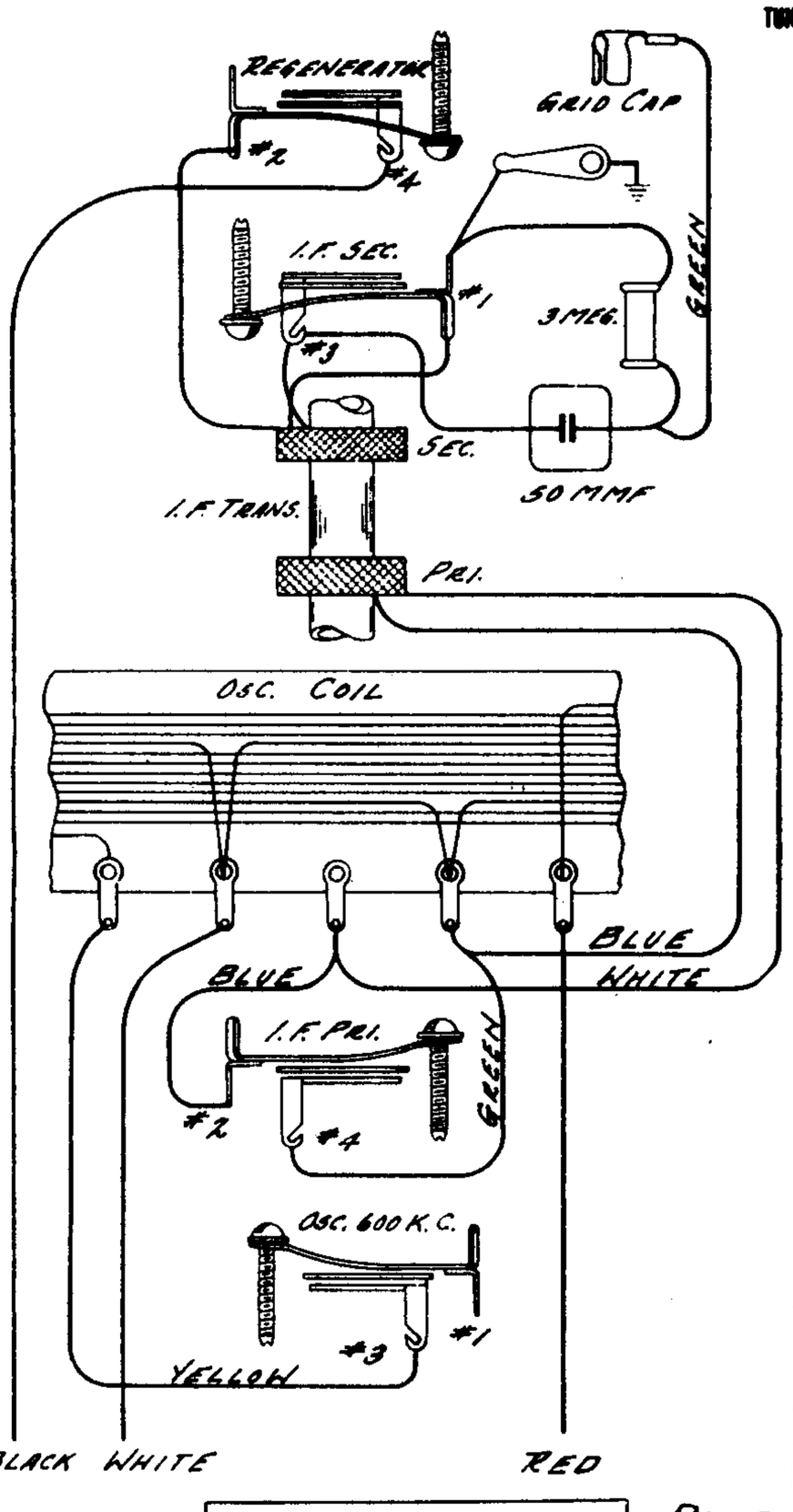
Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current MA*	*Cathode Volts*	*Plate Current MA*
57	1	1st Det. & Osc.	2.4	235	8	120	—(1)	8	—(1)
57	2	2nd Det.	2.3	45(2)	0	20(2)	.2	0	.7
247	3	Audio	2.3	235	1.0(3)	245	5.2		26
280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

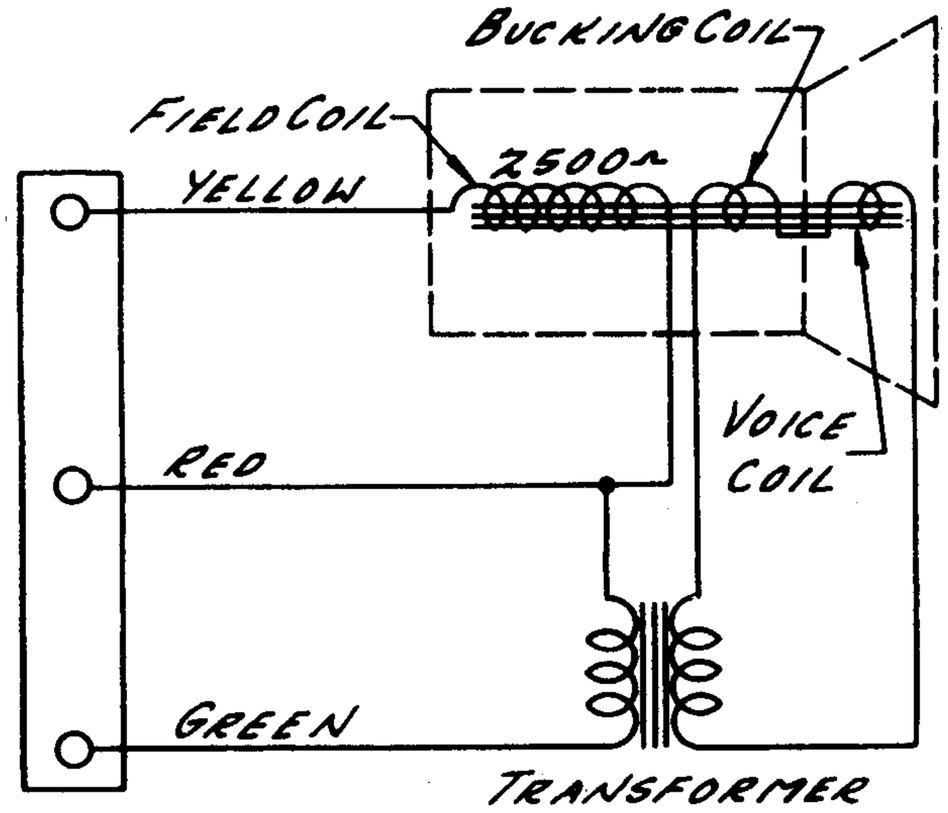
U. S. RADIO & TELEVISION CORP.

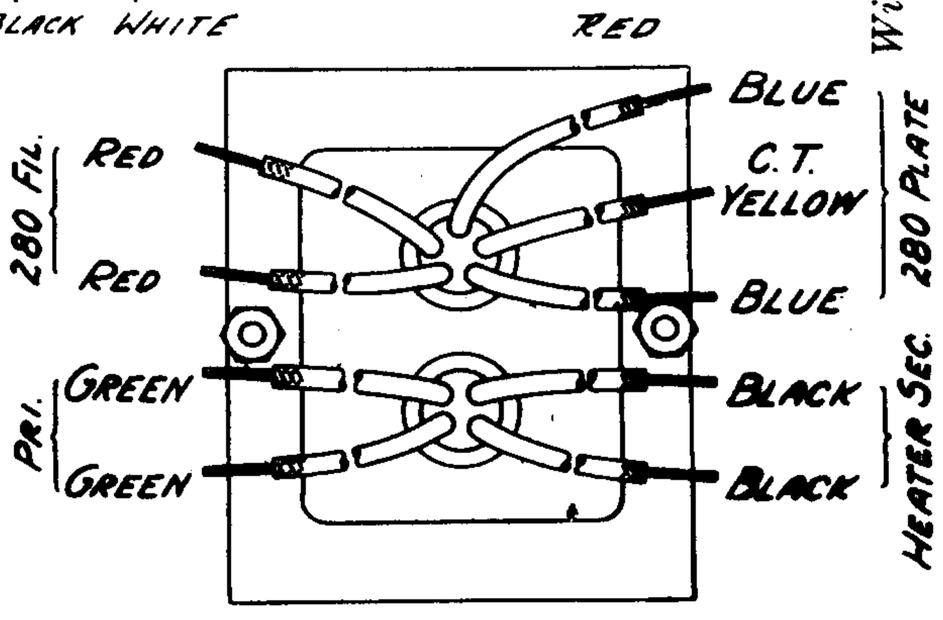


Electrodynamic Speaker and Connections

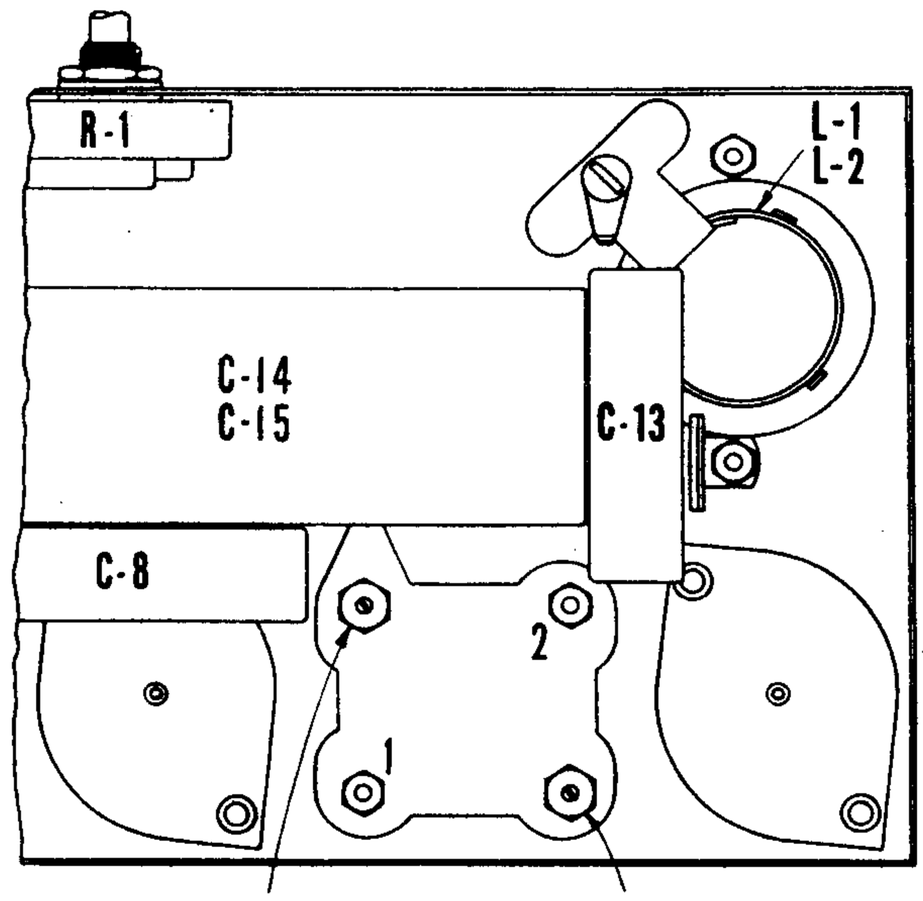


Wiring Diagram, Oscillator-I. F. Assembly





Power Transformer Lead Identification



Location of Trimmers beneath Chassis

U. S. RADIO & TELEVISION CORP.

CONTINUITY TEST CHART

NO. 400 CHASSIS

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

REFERENCE POINT—CHASSIS

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

U. S. RADIO & TELEVISION CORP.

CONTINUITY TEST CHART

REFERENCE POINT—CHASSIS
MODEL 400 CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Stator C-2	Open		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

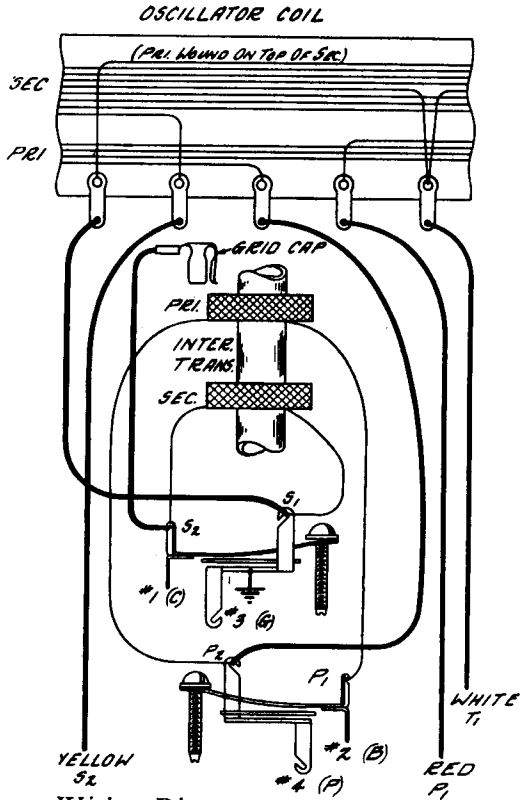
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NO. 500 CHASSIS—VOLTAGES AT SOCKETS
LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM
ANALYZER PLUG IN SOCKET—TUBE IN ANALYZER SOCKET

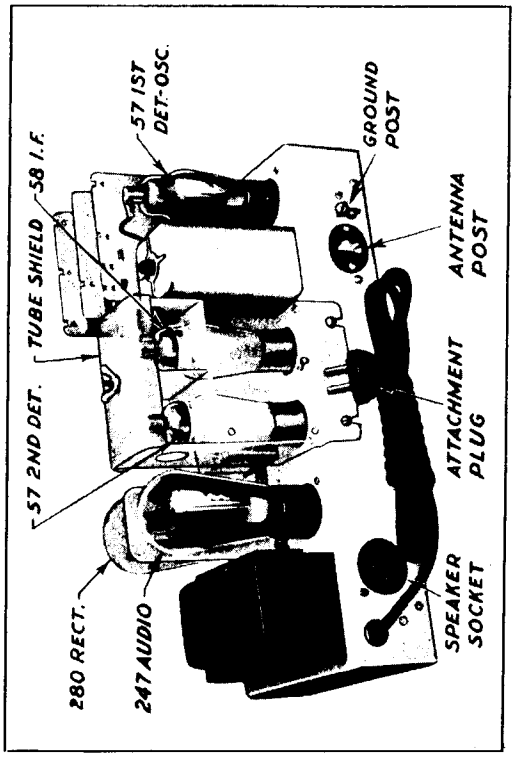
Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Grid Volts	Screen Grid Current MA	Cathode Volts	Plate MA	Grid Test MA
57	1	1st Det. & Osc.	2.15	245	4.3-5.9(1)	100	.6	4.3-5.9(1)	.95	2.0
58	2	I.F.	2.15	240	3.0	100	1.5	3.0	6.6	10.4
57	3	2nd Det.	2.15	166	9.0	115(2)	.1	9.0	.35	.45
247	4	Audio	2.15	215	17.0(3)	240	8.0		30.	48.
280	5	Rect.	4.6						30 Per Plate	

(1) Varies with frequency setting of dial approximately as shown.
(2) Voltage as measured with 120,000 ohm meter.
(3) Measured across 300 ohm section of voltage divider resistor.

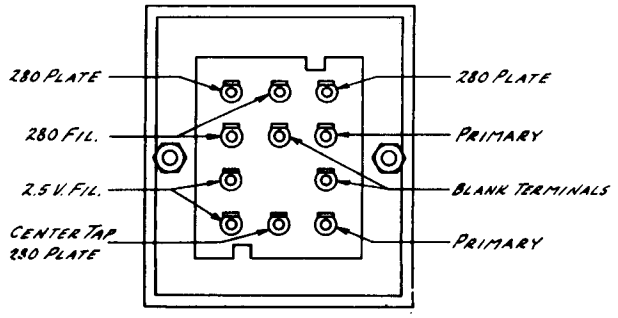
25 SERIES (No 500 CHASSIS)



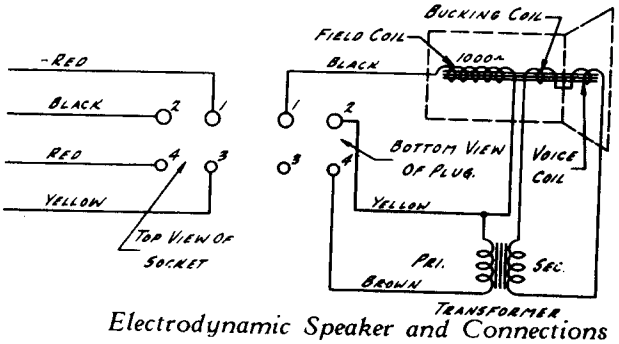
Wiring Diagram, Osc. and I.F. Assembly



Top View of Chassis Showing Tube Location



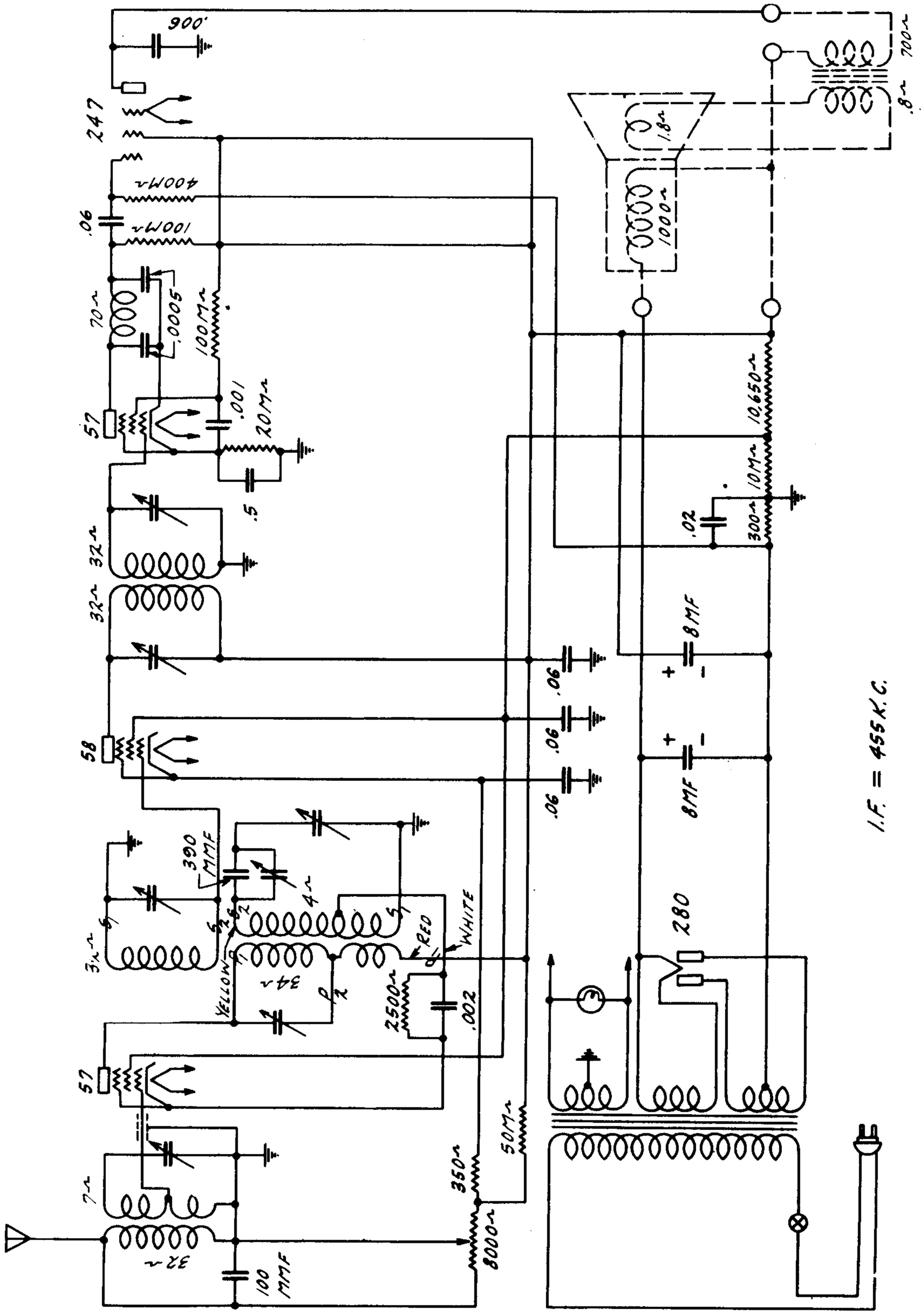
Power Transformer Terminals



Electrodynamic Speaker and Connections

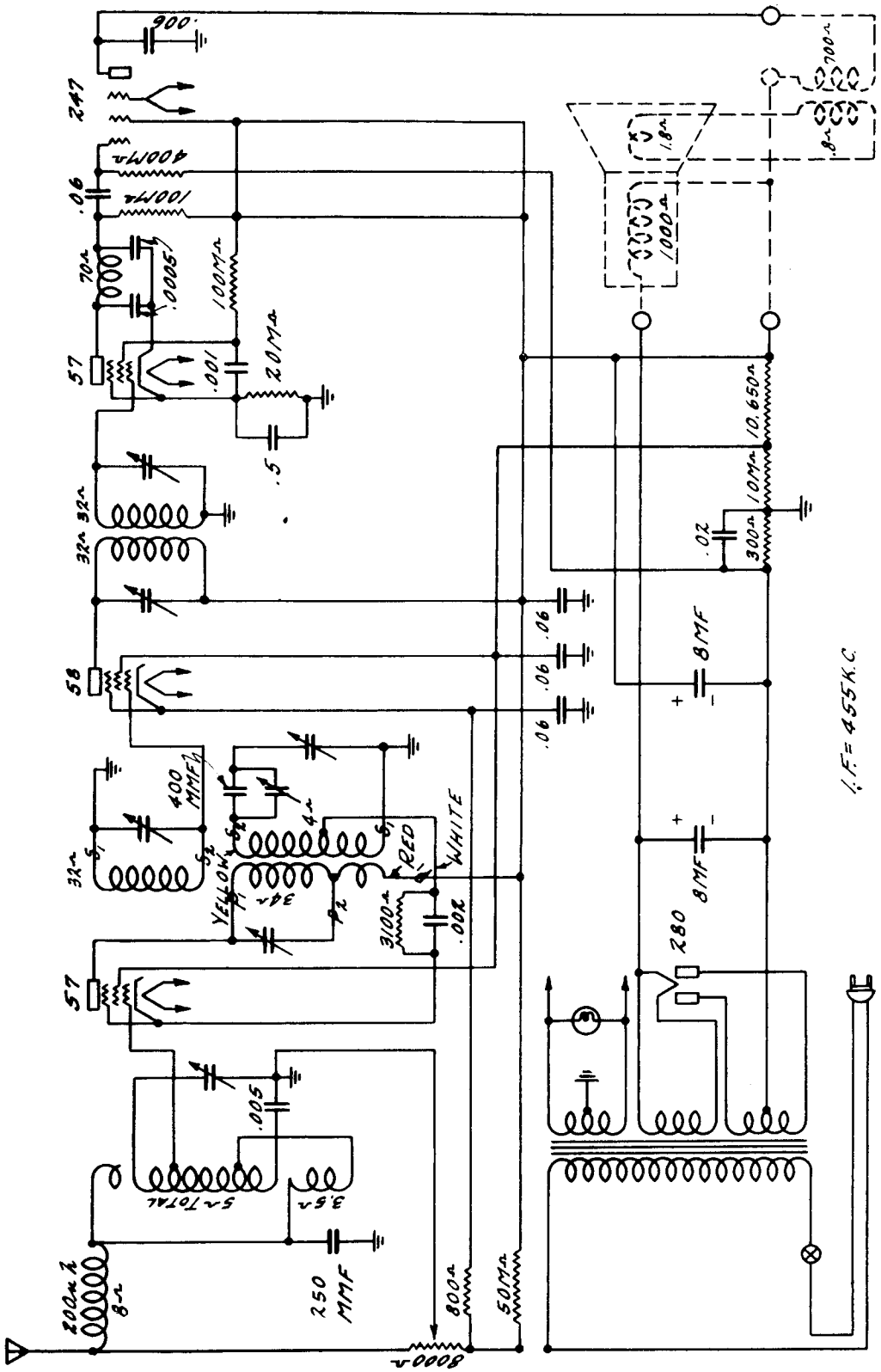
U. S. RADIO & TELEVISION CORP.

25 SERIES (No. 500 CHASSIS)



I.F. = 455 K.C.

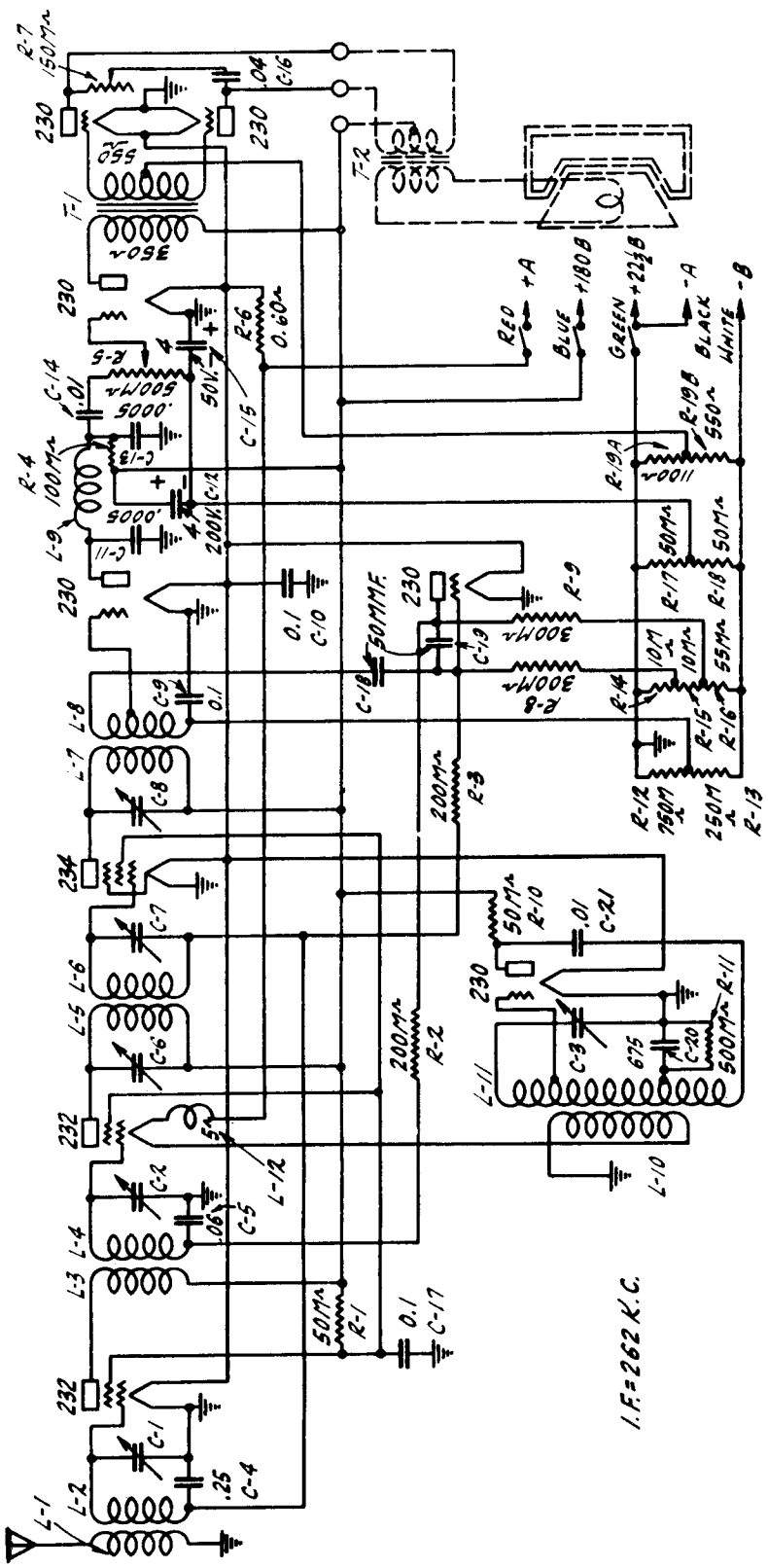
U. S. RADIO & TELEVISION CORP.



Schematic Circuit Diagram of No. 500 Chassis above Serial No. 1188825

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MODEL 69 (906 CHASSIS)



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

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

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

U. S. RADIO & TELEVISION CORP.
MODEL 69
CONTINUITY TEST CHART

REFERENCE POINT—+180 B (RED LEAD)

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
R. F. Screen Grid	50,000	Open	Open R-1
R. F. Plate	2.5	Open	Open L-3
1st Detector Plate	48	Open 0	Open L-5 Shorted C-6
Oscillator Plate	50,000	Open	Open R-10
I. F. Plate	48	Open 0	Open L-7 Shorted C-8
2nd Detector Plate	100,070	Open	Open R-4 or L-10
1st Audio Plate	350	Open	Open Pri. T-1
Power Stage Fither Plate	400	Open	Open Pri. T-2

MISCELLANEOUS

+A Lead to +Fil. Contact of R. F., I. F., Osc., AVC, 2nd Det., or Audio	.6	Open	Open R-6
+A Lead to +Fil. Contact 1st Det.	5	Open	Open L-7
+A Lead to -A Lead	Open	0	Shorted C-10
-A Lead to -Fil. Contact 1st Det.	.6	Open	Open L-11
-A Lead to -B Lead	1,600	45,000 1,650 1,625	Open R-19 A or R-19 B Open R-14, R-15, R-16, R-17 or R-18 Open R-12 or R-13
Plate to Plate Power Tubes	800	Open 0	Open Pri. T-2 Shorted C-16
Oscillator Plate to Grid (Tone Control at Min.)	Open	3	Shorted C-21
AVC Plate to Grid	610,000	0 Open	Shorted C-19 Open R-8 or R-9
Across Voice Coil (Unsolder Lead)	1.3	Open	Open Voice Coil
Across Sec. T-2 (Unsolder Lead)	.14	Open	Open Sec. T-2

U. S. RADIO & TELEVISION CORP.
MODEL 69

CONTINUITY CHART

All tubes removed from sockets—Batteries disconnected — Volume Control at Maximum—Switch in "On" position—Tone Control at Maximum.

REFERENCE POINT—CHASSIS OR -A LEAD

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna Post	30	Open	Open L-1
R. F. Control Grid	510,000	0 6 Open	Shorted C-1 or Trimmer Shorted C-4 Open R-3, R-8 or L-2
R. F. Screen Grid	Open	100,000 0	Shorted C-12 Shorted C-17
R. F. Plate	Open	25,000 50,000	Shorted C-12 Shorted C-17
1st Detector Control Grid	520,000	0 6 Open	Shorted C-2 or Trimmer Shorted C-5 Open L-4, R-2, R-9
Oscillator Control Grid	500,000	2.5 2 Open	Shorted C-20 Shorted C-3 or Trimmer Open L-12 or R-11
Oscillator Plate	Open	100,000	Shorted C-17
I. F. Control Grid	510,000	360,000 Open	Shorted C-19 Open L-6, R-3 or R-8
2nd Detector Control Grid	200,000	23	Shorted C-9
2nd Detector Plate	Open	0 70 150,000 550,000	Shorted C-11 Shorted C-13 Shorted C-12 Shorted C-14
1st Audio Control Grid (Vol. Control at Min.)	25,000	0	Shorted C-15
1st Audio Plate	Open	50,350	Shorted C-17
Power Stage Control Grids	1,375	Open 45,000	Open Sec. T-1 Open R-19
A V C Control Grid	310,000	Open 150,000 365,000	Open R-8 Shorted C-19 Open R-14
AVC Plate	320,000	Open	Open R-9

U. S. RADIO & TELEVISION CORP.

S.W. CONVERTER Nº 300 SERIES CHASSIS

DESCRIPTION

The No. 300 Chassis is an A. C. operated Short Wave Converter utilizing the Super-Heterodyne principle and when used in conjunction with any standard broadcast band receiver permits the reception of stations transmitting on frequencies ranging from 550 K.C. to 20,000 K.C. This chassis is used in U. S. Radio Table Models 12A and 12AX Short Wave Converters and Console Models 712A and 712AX Combination Short Wave and Broadcast Band Receivers.

The chassis is self-powered and is designed to operate satisfactorily on a power supply of from 105 to 125 volts and from 50 to 60 cycles alternating current. The No. 300X Chassis is designed for 25 cycle, 115 volt operation. The tube sequence (top view) is shown in Fig. 2.

The broadcast receiver used in connection with the converter is tuned for the best performance to a frequency of 1000 K.C. Unless proper precaution were taken in the design of the converter troublesome interference would be introduced if it so happened a station broadcasting on 1000 K.C. was within the receiving range of the receiver. In the No. 300 Chassis this possibility is very effectively overcome by incorporating in the antenna circuit of the antenna transformer a parallel combination of inductance and capacity. The values of these parts are, as can be seen by referring to Fig. 1, 84.5 microhenries and 300 Mmf. respectively. This parallel impedance constitutes the frequency filter and offers maximum opposition to the undesirable 1000 K.C. frequency without. however, preventing the passage of currents of other frequencies and for which the tuning range of the converter is designed.

The capacity of coils frequently causes peculiar and undesirable effects in radio circuits caused by the capacities of those parts of a coil which are not connected in the circuit. Referring to the schematic wiring diagram it will be noted the unused sections of the secondary of the antenna transformer are short circuited by the band selector switch as the frequency tuning range is increased. The effect of "dead ends" in a coil, especially at the higher frequencies, is to produce undesirable effects and to produce energy loss and considerably effect the frequency of resonance of the circuit, because the unused turns are in the magnetic field of the used portion of the coil and are closed by the inherent distributed capacity. Due to the close coupling, if the resonant frequency of this circuit is near that of the first it will greatly affect the resonant frequency of the first circuit. This undesirable effect is counteracted by short circuiting the unused portions of the coil, increasing the impedance of this circuit and causing very little current to flow, thus preventing the possibility of the circuit from responding to two frequencies.

The output from the plate of the 1st detector of the converter is fed through a .0005 coupling condenser to the antenna post of the broadcast receiver by means of a shielded cable with the shield grounded. The capacity reactance between the antenna lead and the grounded shield is of the order of a few hundred ohms and would, were not proper provisions taken in the design, seriously affect the sensitivity. This effect is satisfactorily overcome by choosing an inductance coil of suitable value and connecting it in parallel to the inherent capacity reactance of the shielded cable. This coil is the 250 microhenry choke shown in the schematic wiring diagram and it greatly increases the impedance between the antenna lead and the ground, thus preventing any loss in sensitivity.

The Band Selector Switch permits the selection of any of the three bands. The tuning knob has letters upon its face designating the three bands. The frequency band covered by the tuning condenser with the switch in the "L" position is 1.5 M.C. to 3.75 M.C; in the "M" position, 3.58 M.C. to 9.10 M.C; and from 8.40 M.C. to 20 M.C. with the switch at the "H" position. This switch is of excellent design and under normal conditions of service no inherent trouble should develop in its function.

The Antenna and A. C. Rotor Switch serves a dual purpose. It turns the power on to the converter and connects the antenna to the converter when turned clockwise. When turned counterclockwise the power supply to the converter is disconnected and the antenna connected to the broadcast receiver.

The broadcast receiver is turned on and off by its own On-Off switch in the normal manner.

The volume and tone of the short wave signals are controlled by the volume and tone controls on the broadcast receiver.

NOTE: In No. 300 Chassis below Serial No. 1155363 there is incorporated in the circuit of the oscillator and the "M" range of the band selector switch a variable padding condenser in addition to a fixed condenser of 1100 Mmf. The fixed condenser was subsequently changed to one having a capacity of 1130 Mmf. as shown in the schematic wiring diagram, thus making the use of a variable padding condenser unnecessary. The location of this condenser is shown at the point "M" of Fig. 2, and aligning instructions are given in the alignment paragraph in this manual.

DETECTOR

The 1st detector stage consists of a 224 type tube functioning as a grid-condenser-and-leak detector. The 224 type tube, due to its inherently low input capacity, is used in this stage in preference to other tubes which would, due to their high input resistance, as one component of the impedance of the input circuit, seriously affect the selectivity.

OSCILLATOR

The oscillator is of the tuned grid type and has combined inductive and capacity coupling. The oscillator pick-up coil which is inductively coupled to the oscillator coil is connected in the cathode circuit of the 1st detector. The signal generated by the oscillator is 1000 K.C. in frequency above the frequency to which the 1st detector is tuned. The drop across the 250,000 ohm resistor in the oscillator brought about by the D.C. component of the oscillatory current establishes the bias voltage.

POWER UNIT

The power system consists of the conventional, power transformer, full wave rectifier, filter choke and filter condensers. The filter condensers are of the dry electrolytic type having a capacity of 2 Mfd. each and rated at 450 volts. The high potential side of the system is connected to the 13,000 ohm and 100,000 ohm carbon resistors supplying plate voltage to the oscillator and 1st detector tubes respectively.

ALIGNMENT

The excellent performance of which the No. 300 Chassis is capable depends to a large degree on the correct alignment of the antenna and oscillator trimmer located on their respective sections of the two-gang tuning condenser and the oscillator padding condenser. The actual mechanics of the alignment procedure is, with the exception of the frequency range involved, identically the same as in those Super-Heterodyne chassis designed for the regular broadcast band.

The signal generator or test oscillator must be one designed to cover a frequency range of from 1500 K.C. to 20,000 K.C. or 1.5 megacycles to 20 megacycles, and accurately calibrated to obviate any possibility of misalignment that might otherwise arise. It is quite likely a few of the well-known and reputable manufacturers of service test equipment will in the near future, due to the exceptional popularity and general trend of the public towards short wave receivers, have oscillators for this purpose available to the radio trade as the demand becomes more acute.

The adjustable trimmers are accurately aligned at the factory with accurately calibrated signal generators and output meters and the receivers should not as a general rule require alignment unless mishandled or tampered with. If realignment is found necessary the chassis should be removed from the cabinet. The complete aligning procedure and location of the different condensers is as follows:

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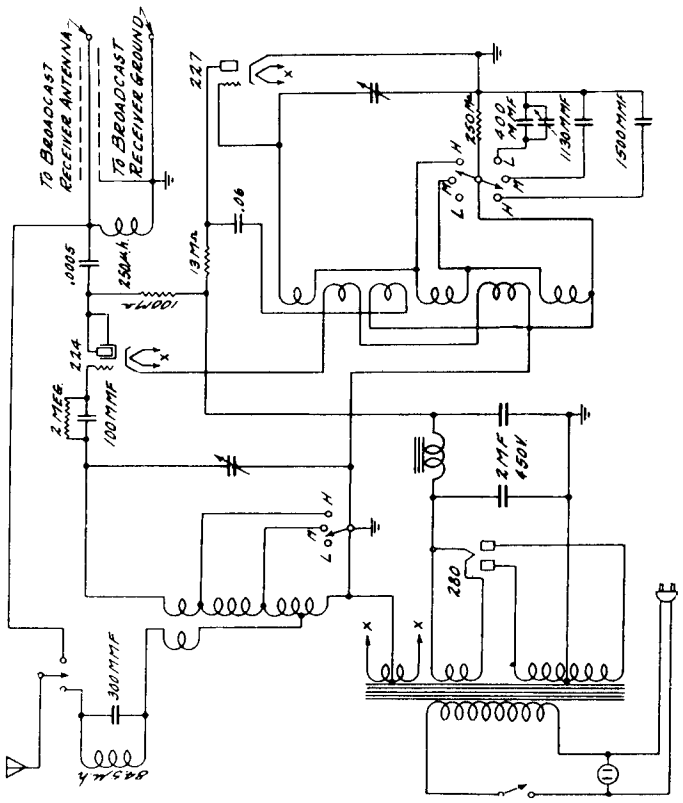
ALIGNING OSCILLATOR TRIMMER — The chassis must be connected to a broadcast receiver in the usual manner with the ground wire connected but the antenna lead disconnected. The signal generator placed in operation and coupled with a wire to the antenna post on the converter. The signal generator must be grounded and adjusted to 20,000 K.C.

Then turn the tuning condenser rotor until the dial pointer is at exactly 100 with the rotor plates completely out of mesh, indicating minimum capacity. If the dial does not correspond to a reading of 100 with the plates out of mesh the set screws that secure the drive to the tuning condenser shaft should be loosened and the dial shifted until the pointer is at exactly 100 on the dial scale.

The band selector switch should be turned to the "H" position and the oscillator trimmer screw turned up or down until maximum deflection on the output indicating meter is obtained. It will be noted two peaks can be obtained and the correct one is with the trimmer screw farthest out.

ALIGNING ANTENNA TRIMMER—The position of the band selector switch should be retained as in the case above with the signal generator adjusted to 20,000 K.C. and the tuning condenser rotor turned until the pointer is at 10 on the dial scale. The adjusting screw of this trimmer is then turned up or down until maximum deflection on the output meter is obtained.

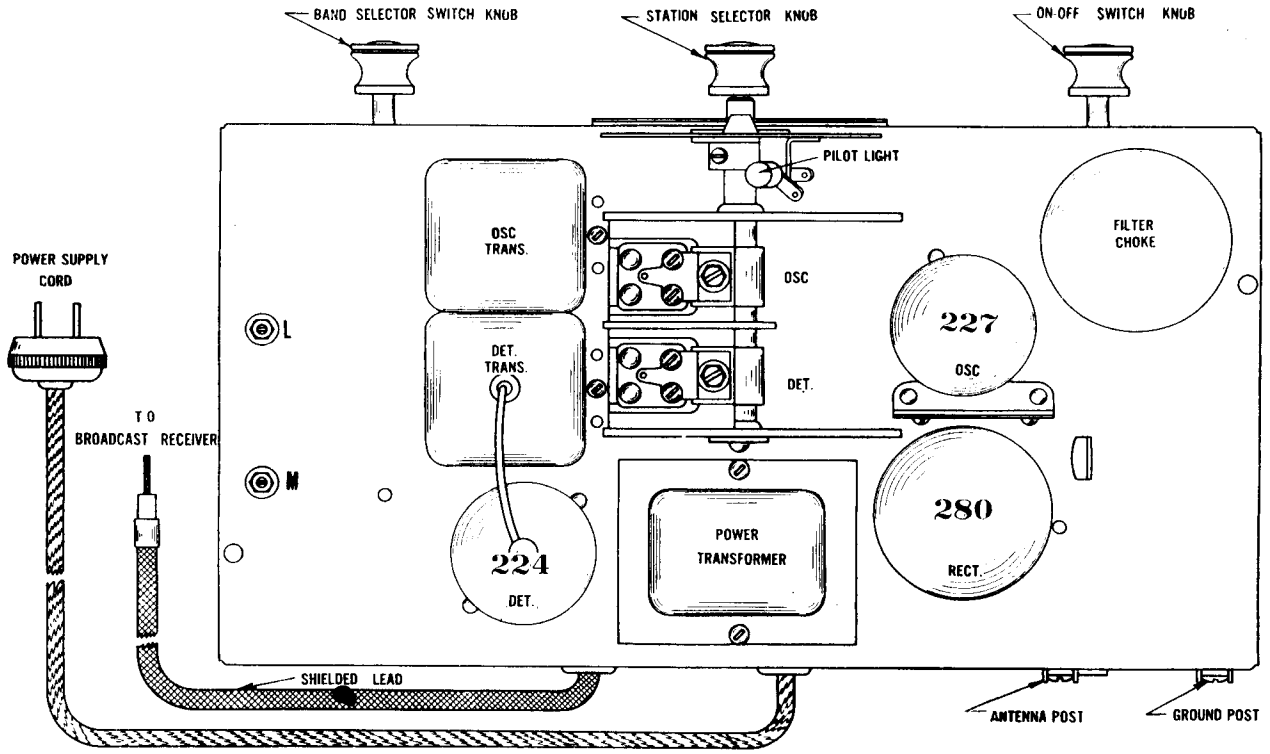
ALIGNING OSCILLATOR PADDING CONDENSER—The band selector switch must be turned to the "L" position and the signal generator adjusted to 1500 K.C. The adjusting screw for this condenser is located to the right outer edge of the subpanel as indicated by "L" in Fig. 2, and it should be turned up or down until maximum output is obtained.



NO. 300 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
BAND SELECTOR SWITCH ON "L"—TUNING DIAL AT "0"

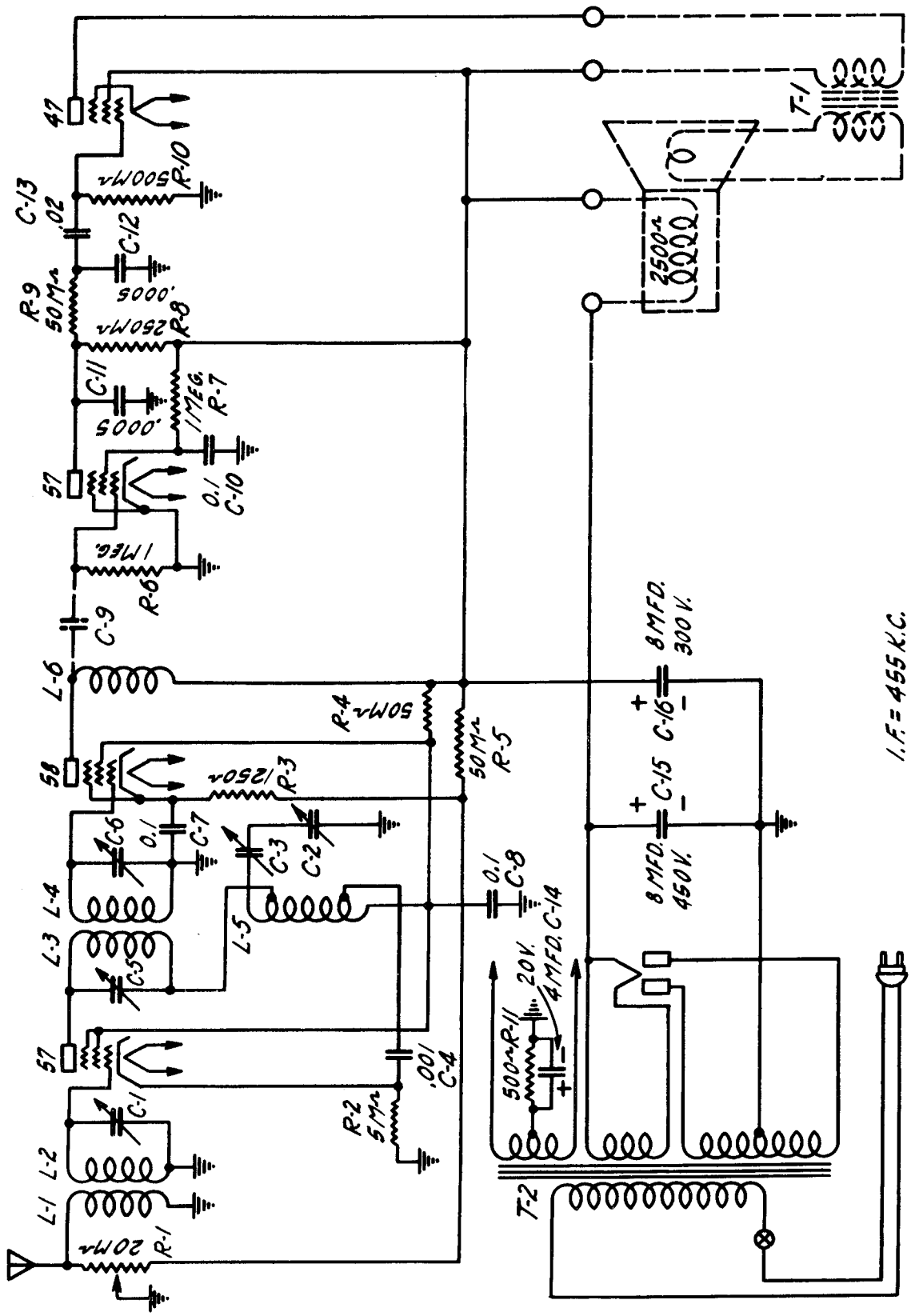
Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Plate MA	Grid Test MA
224	1	1st Det.	2.45	50.	4.	1.	—
227	2	Osc.	2.45	135.	28. (*)	5.5	5.9
280	3	Rect.	5.			2.8 Per Plate	

*Measured across 250,000 ohm oscillator bias resistor.



U. S. RADIO & TELEVISION CORP.

MODELS 3040, 3056 (507 CHASSIS)

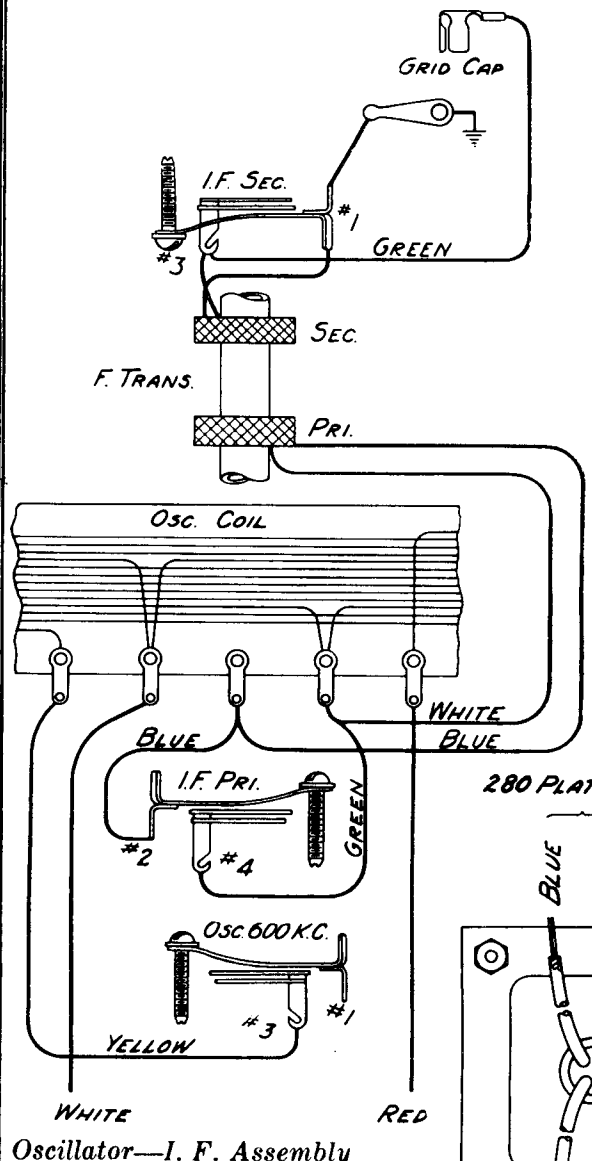


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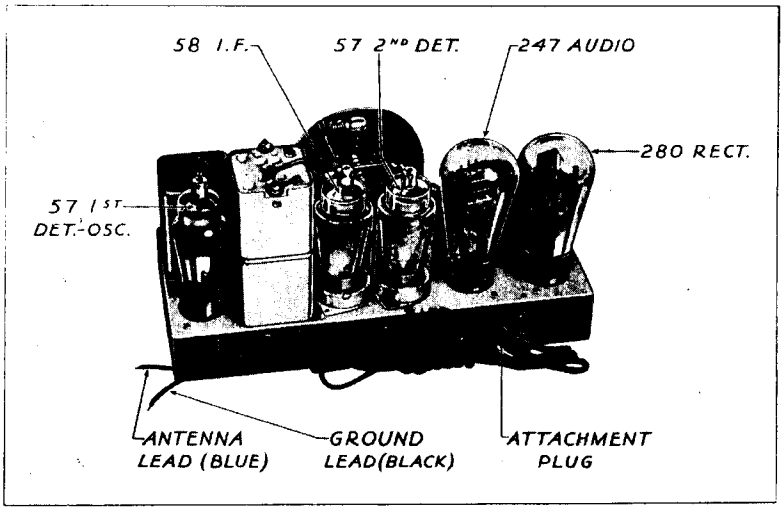
No. 507 CHASSIS—VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM

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.	2.3	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

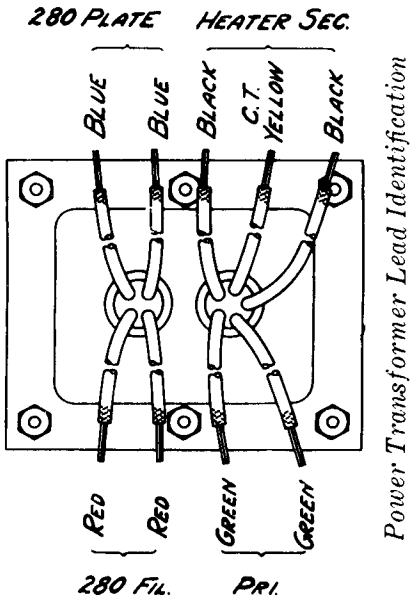
(1) Can only be read with special adapter.
(2) Voltage as read with 600,000 ohm meter.
(3) Not true reading. Actual voltage across 500 ohm resistor 17 volts.



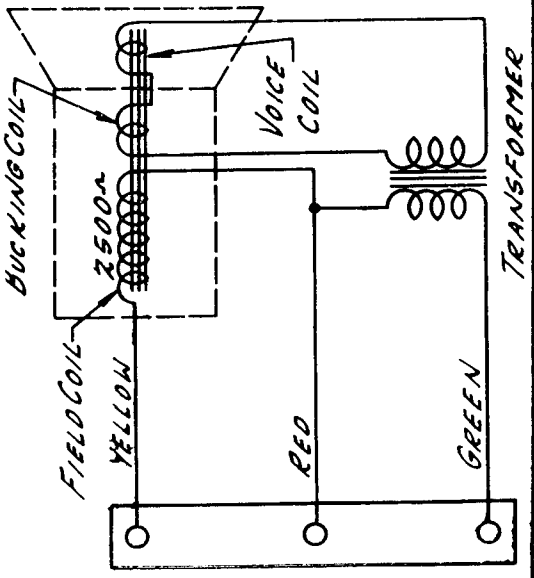
Oscillator—I. F. Assembly



Top View of Chassis Showing Tube Location



Power Transformer Lead Identification



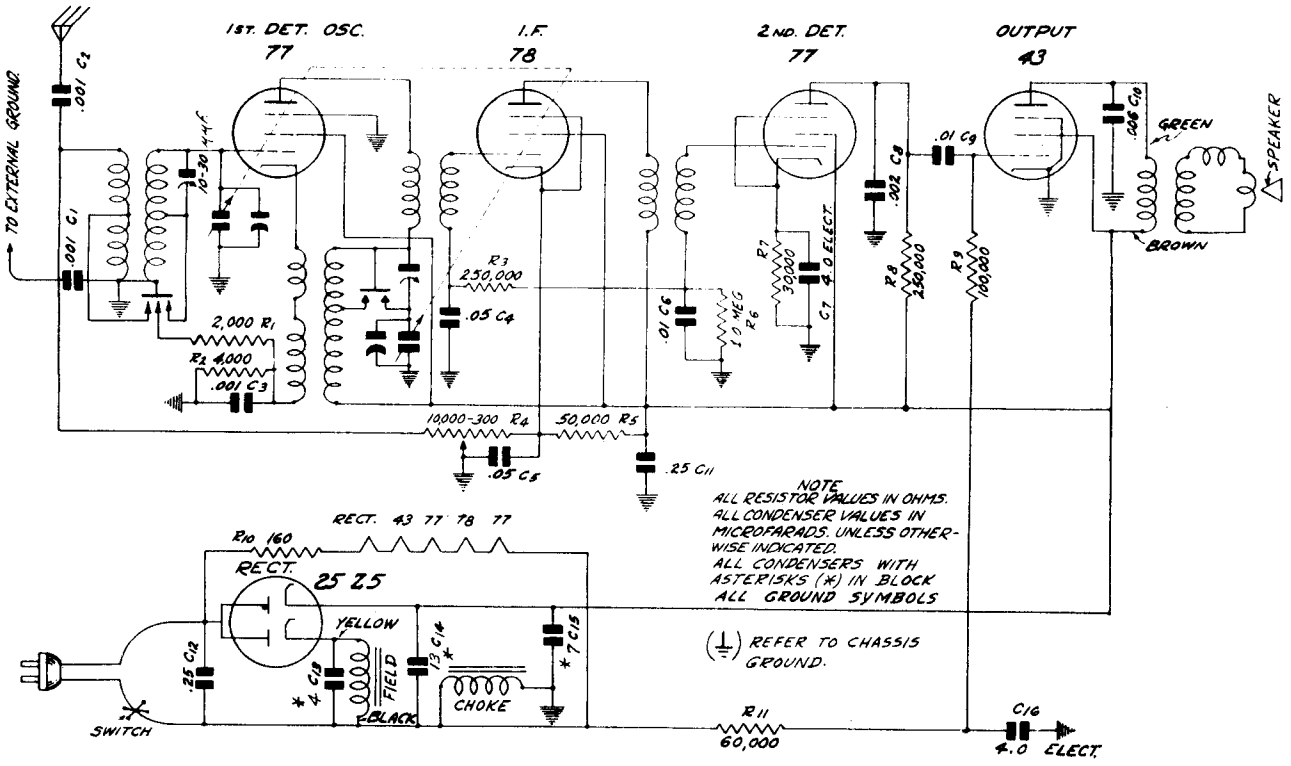
Electrodynamic Speaker and Connections

WELLS-GARDNER & CO.

No. 05A Series

5 Tube A.C. - D.C.

Superheterodyne Receiver



Schematic Circuit Diagram

Voltages at Sockets

Antenna lead connected to ground lead (not external ground).—Volume Control at Maximum.
CAUTION—Do not put chassis on any grounded surface or let chassis touch any ground.

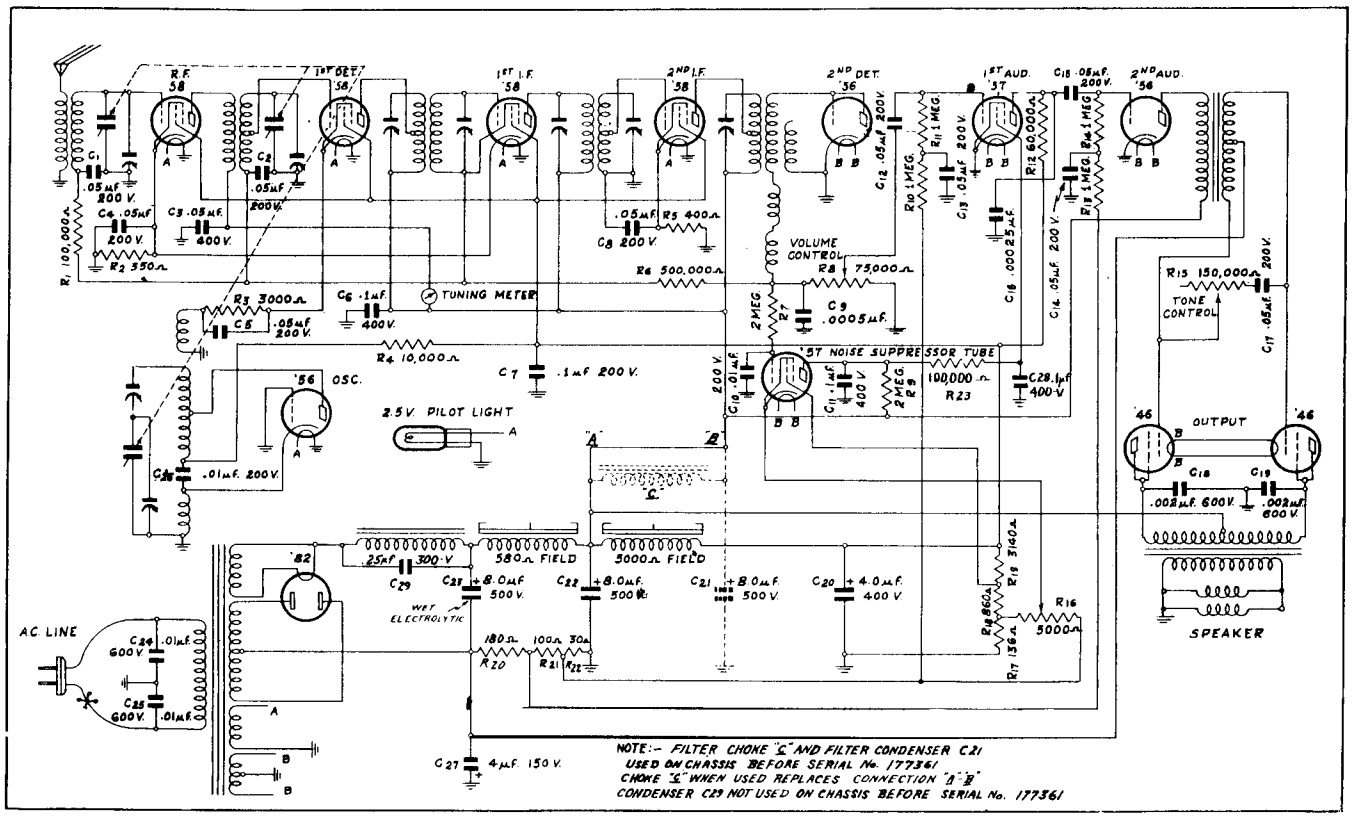
Type of Tube	Function	A.C. Line Voltage—115 Use High Resistance A.C. Meter, Rectifier Type, for Heater Voltage Measurements					D.C. Line Voltage—110 Use High Resistance D.C. Meter for Heater Voltage Measurements				
		Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
77	1st Det. Osc.	5.8	106	106	5.2	.8	5.6	87	87	4.3	.6
78	I.F.	5.8	108	108	3.0(1)	7.4	5.6	88	88	2.4(1)	6.0
77	2nd Det.	5.8	65(2)	104	6.0(3)	.14	5.6	58(2)	82	5.0(3)	.11
43	Output	24.	95	110	18.0(4)	22.0	23.0	80	90	15.0(4)	17.0
25Z5	Rect.	24.	110 / 155 (5)			84.0 Total	23.0	5.0 / 6.0 (5)			74.0 Total

(1) Cathode to Ground.
(2) With 1,000,000 ohm meter—reading will be lower with lower resistance meter.
(3) Cathode to ground—read with 100,000 ohm meter.
(4) Read across filter choke.
(5) Readings from plate to two cathodes with 250,000 ohm meter

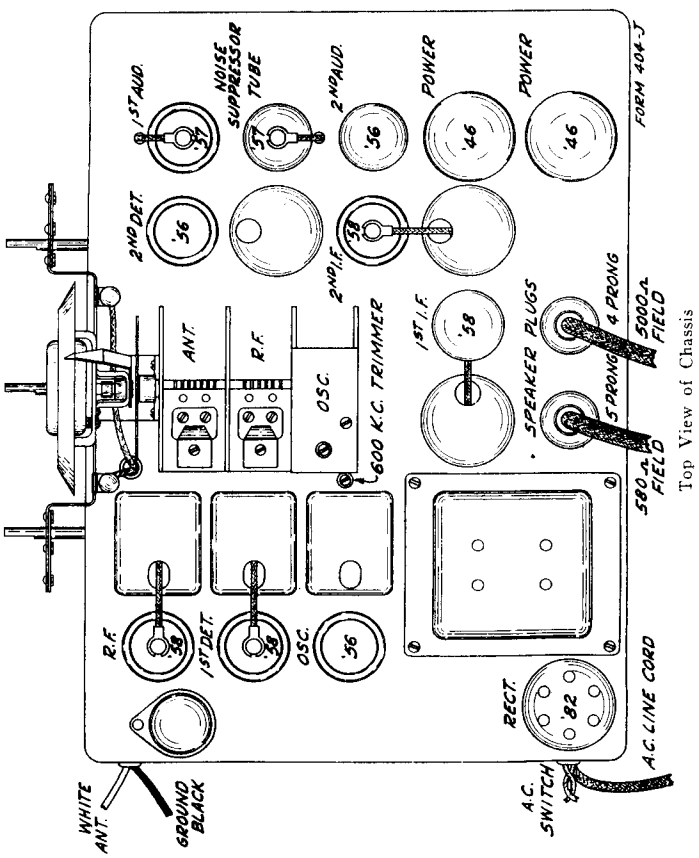
WELLS-GARDNER & CO.

No. 022 Series

12 Tube Superheterodyne



Schematic Circuit Diagram



Top View of Chassis

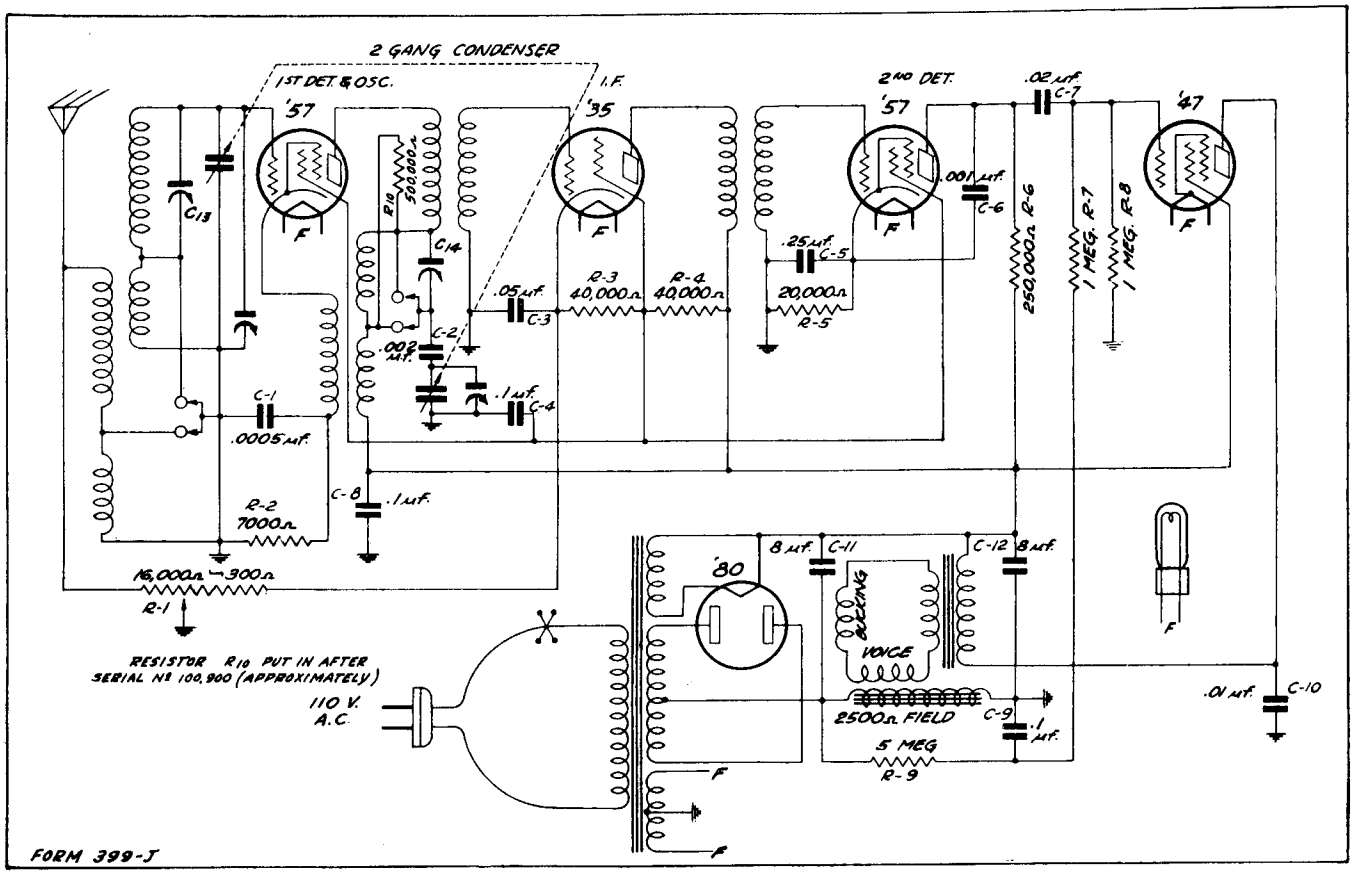
Voltages at Sockets

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

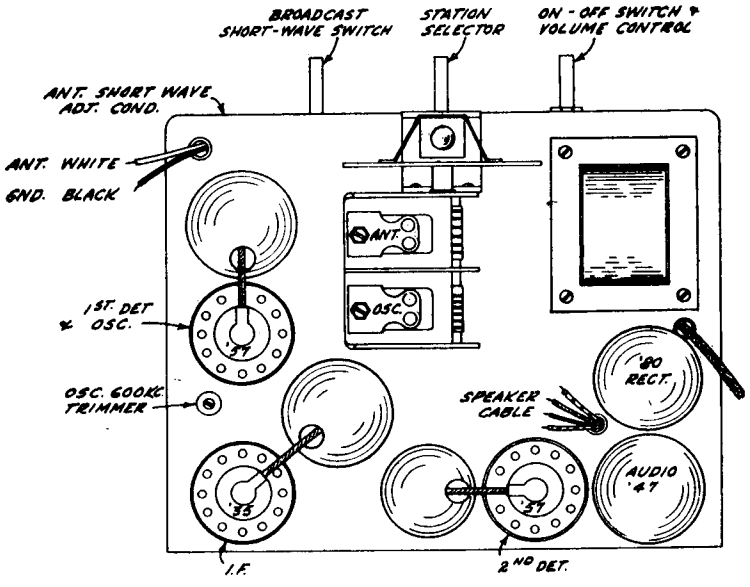
Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
58	R.F.	2.4	242	90	4(1)	4
58	1st Det.	2.4	250	86	7(1)	2
56	Osc.	2.4	24		0	8
58	1st I.F.(2)	2.4	252	90	4(1)	4
58	2nd I.F.(2)	2.4	254	91	3	5.7
56	2nd Det.	2.4	0		0	0
57	1st Audio	2.4	65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

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

WELLS-GARDNER & CO.
No. 052 Series



Schematic Circuit Diagram



Top View of Chassis

Voltages at Sockets

LINE VOLTAGE 115 — VOLUME CONTROL AT MAXIMUM — ANT. SHORTED TO GND.

Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
'57	1st Det.	2.15	225	90	4	.5
'35	I.F.	2.15	230	90	3.2(1)	6.2
'57	2nd Det.	2.15	170	90	4.3	.2
'47	Audio	2.15	225	240	14(2)	23.
'80	Rect.	4.75	620 volts plate to plate			20. per plate

(1) If read with cord and plug, ground the control grid.
(2) Computed figure—cannot be accurately read with ordinary voltmeter. Voltage consists of drop across 1 megohm resistor, R 8.

Twenty-Five Cycle Receivers

The twenty-five cycle receiver differs from the sixty-cycle receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle chassis can be operated satisfactorily from a sixty-cycle power supply. However, the reverse is not true, the sixty-cycle receiver cannot be operated from a twenty-five cycle power supply.

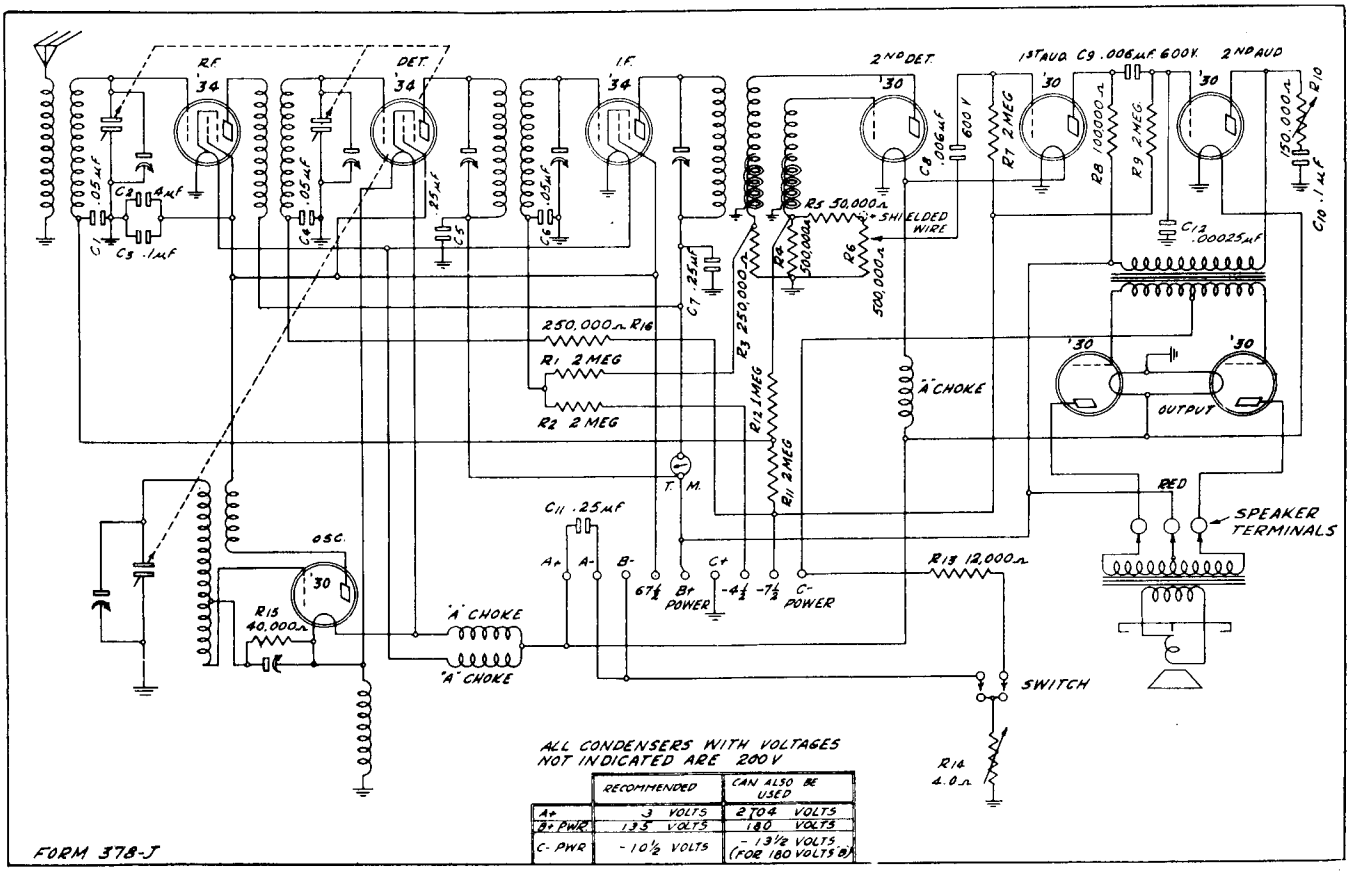
Oscillation and Whistle

Should the set oscillate on being connected up, it may be due to tubes whose characteristics vary considerably from the standard. In case of oscillation, therefore, change the two 57's around and try out some new tubes.

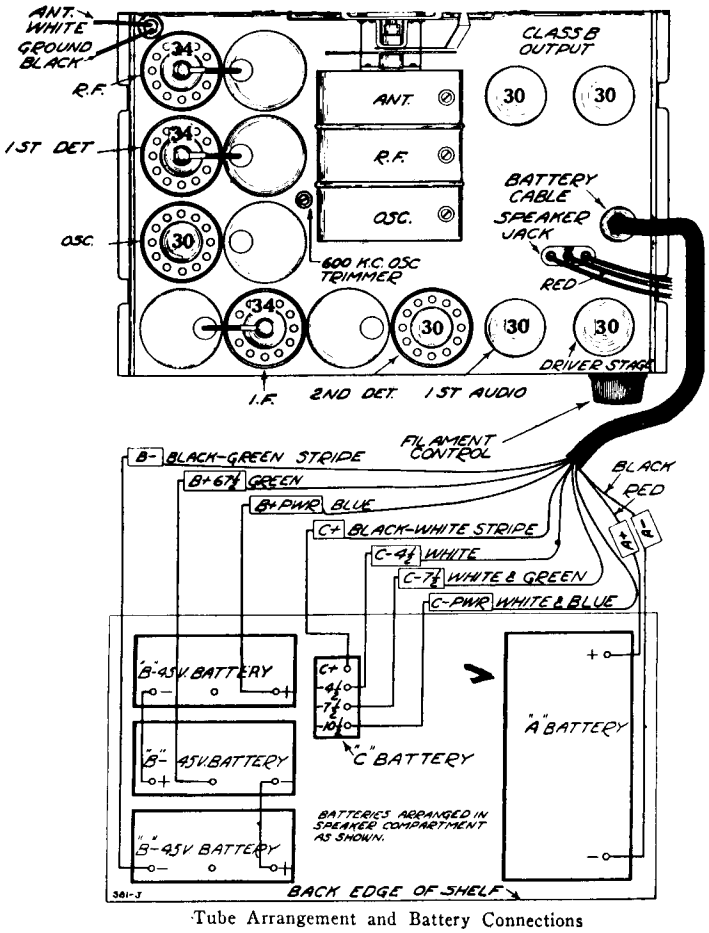
See if the receiver is properly grounded and if it is, try out a new ground. Investigate the line voltage to see if it is excessively high.

The tube shields must all be on and the control grid leads to the top grid connection tubes firmly in place. Otherwise oscillation may result.

WELLS-GARDNER & CO.
No. 092 Series



	RECOMMENDED	CAN ALSO BE USED
A+	3 VOLTS	2 TO 4 VOLTS
B+ PWR	135 VOLTS	180 VOLTS
C- PWR	-10½ VOLTS	-13½ VOLTS (FOR 180 VOLTS B)



Tube Arrangement and Battery Connections

Voltages at Sockets

"B" AND "C" BATTERIES UP TO RATED VOLTAGE—FILAMENT CONTROL KNOB SET SO THAT FILAMENT VOLTAGE IS 2—ANTENNA LEAD SHORTENED TO GROUND—VOLTAGES READ FROM NEGATIVE FILAMENT LEG

Type of Tube	Function	Across Filament	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
'34	R.F.	2.0	125	65	2.88(1)	2.3
'34	1st Det.	2.0	130	65	7.5(1)	1.4
'30	Osc.	2.0	67		4-15(2)	1.6-4(2)
'34	I.F.	2.0	120	65	2.38(1)	2.4
'30	2nd Det.	2.0	0		0	0
'30	1st Audio	2.0	85		7.5(1)	.5
'30	Driver	2.0	125		7.5(1)	4.0
'30	Output	2.0	130		10.	1.1

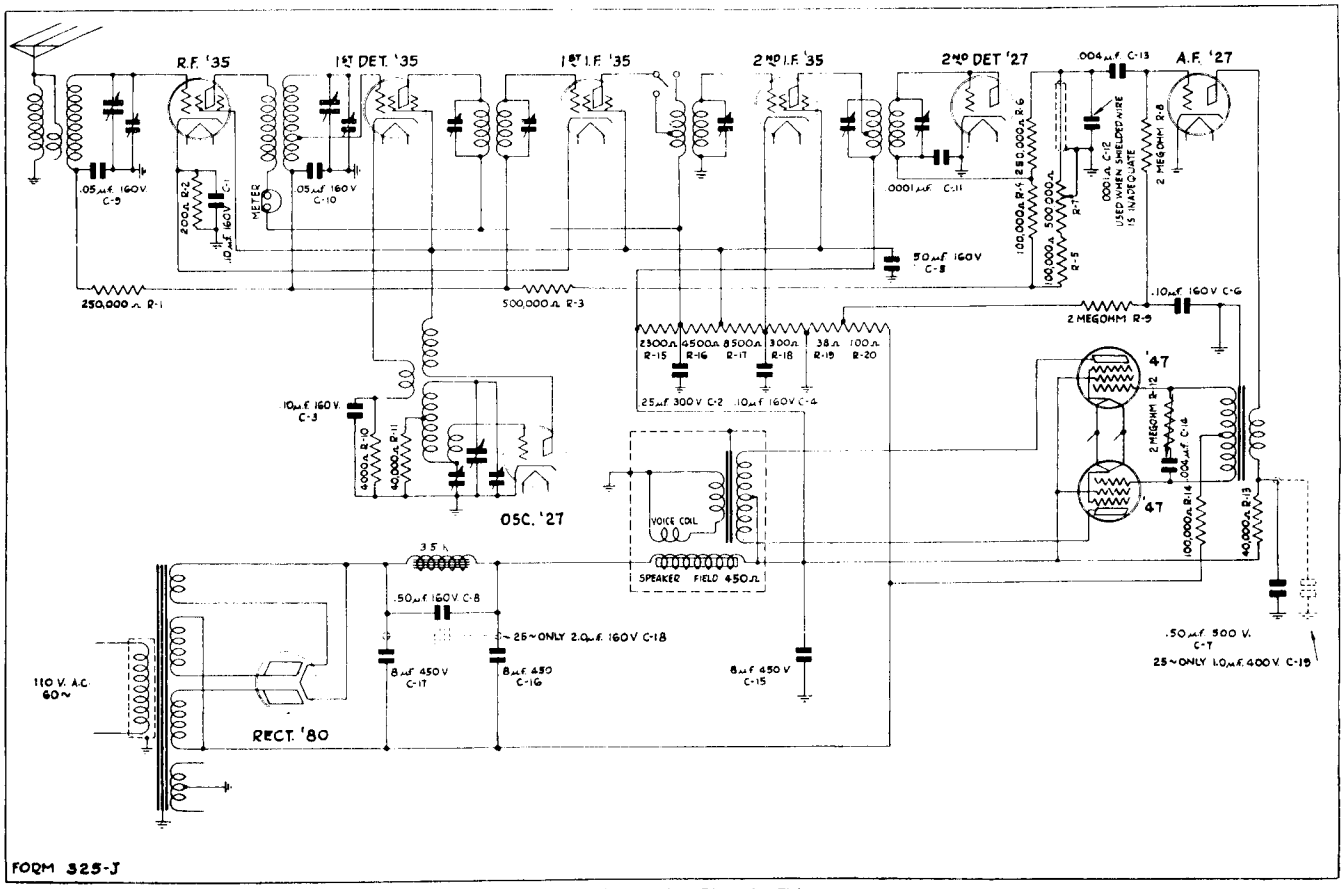
(1) Computed figure—cannot be read with ordinary voltmeter because of high resistance in this circuit. See article "Voltages" for further information.

(2) Subject to variation with dial setting.

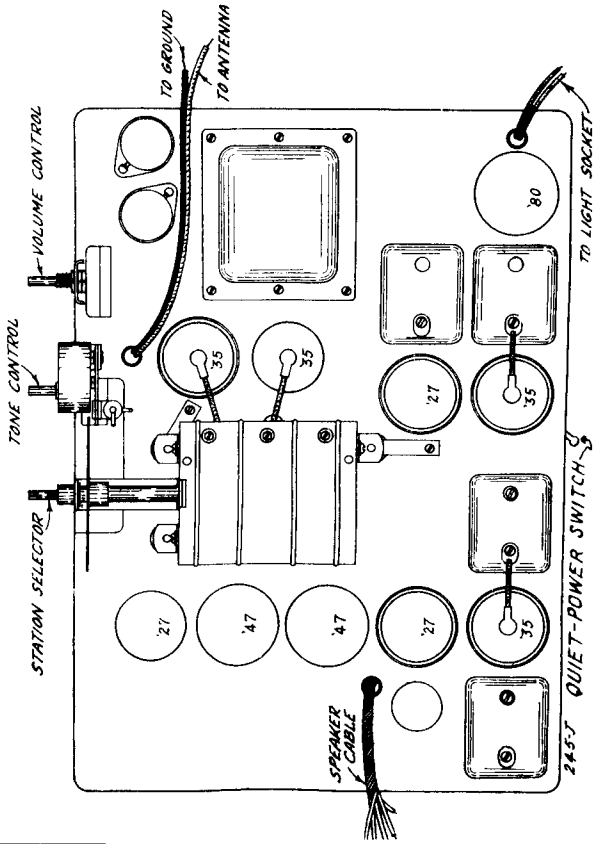
WELLS-GARDNER & CO.

No. 20 Series

10 Tube Super-Heterodyne Receivers



Schematic Circuit Diagram



Top View of Chassis.

Voltages at Sockets

LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM—SECOND DETECTOR TUBE REMOVED FROM SOCKET

Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
'35	R.F.	2.2	180	92	3(1)	6.2
'35	1st. Det.	2.2	178	85	10(1)	2.2
'27	Oscil.	2.2	94		6(2)	4.0(2)
'35	1st. I.F.	2.2	180	92	3(1)	6.0
'35	2nd. I.F.	2.2	260(5)	90	6	5.5
'27	1st. Audio	2.2	105		5(3)	4.2
'47	2nd. Audio	2.2	245	260	17(4)	31.
'80	Rect.	4.8	725 volts plate to plate			66 per plate

(1) Read from cathode to ground.
(2) Subject to variation with dial setting.
(3) Read across 38 ohm section of voltage divider resistor.
(4) Read across 38 and 100 ohm sections of voltage divider.
(5) Changes to 178 volts in latest models.
NOTE: All readings, except heater, for second detector tube are zero.

WELLS-GARDNER & CO.
MODEL 20
Data on Earlier Models in This Series

The foregoing service manual describes the chassis of this series as it is manufactured at the present time. However, when the model was first brought out it was slightly different mechanically and electrically than the present model.

In this supplement, the changes of importance from a servicing standpoint from the first models to the present are discussed. This section should be gone over carefully by the service technician, as it is of importance both in servicing the set and when ordering replacement parts. The changes described were not all made at the same time. Investigation of the chassis will show which of the changes are incorporated. One way of eliminating error in replacing parts is to return the old part when ordering a new one.

Key Numbers

In Fig. 3 is shown the schematic circuit diagram of the original model. In the changes as described below, reference will be made both to this diagram and to the schematic circuit diagram of the present model Fig. 1. Note that the key numbers of the resistors and condensers in Figs. 1 and 3 do not coincide.

Interstage Transformer

The interstage R.F. transformer of the original sets contained a 250,000 ohm isolating resistor shown in Fig. 3 as R3. This is replaced by the present type of interstage R.F. transformer with no resistor.

Isolating Resistors

Isolating resistor R3, as shown in Fig. 3 is omitted and isolating resistor R4, 250,000 ohms, is changed in the later models to 500,000 ohms.

Tone Control and On-Off Switch

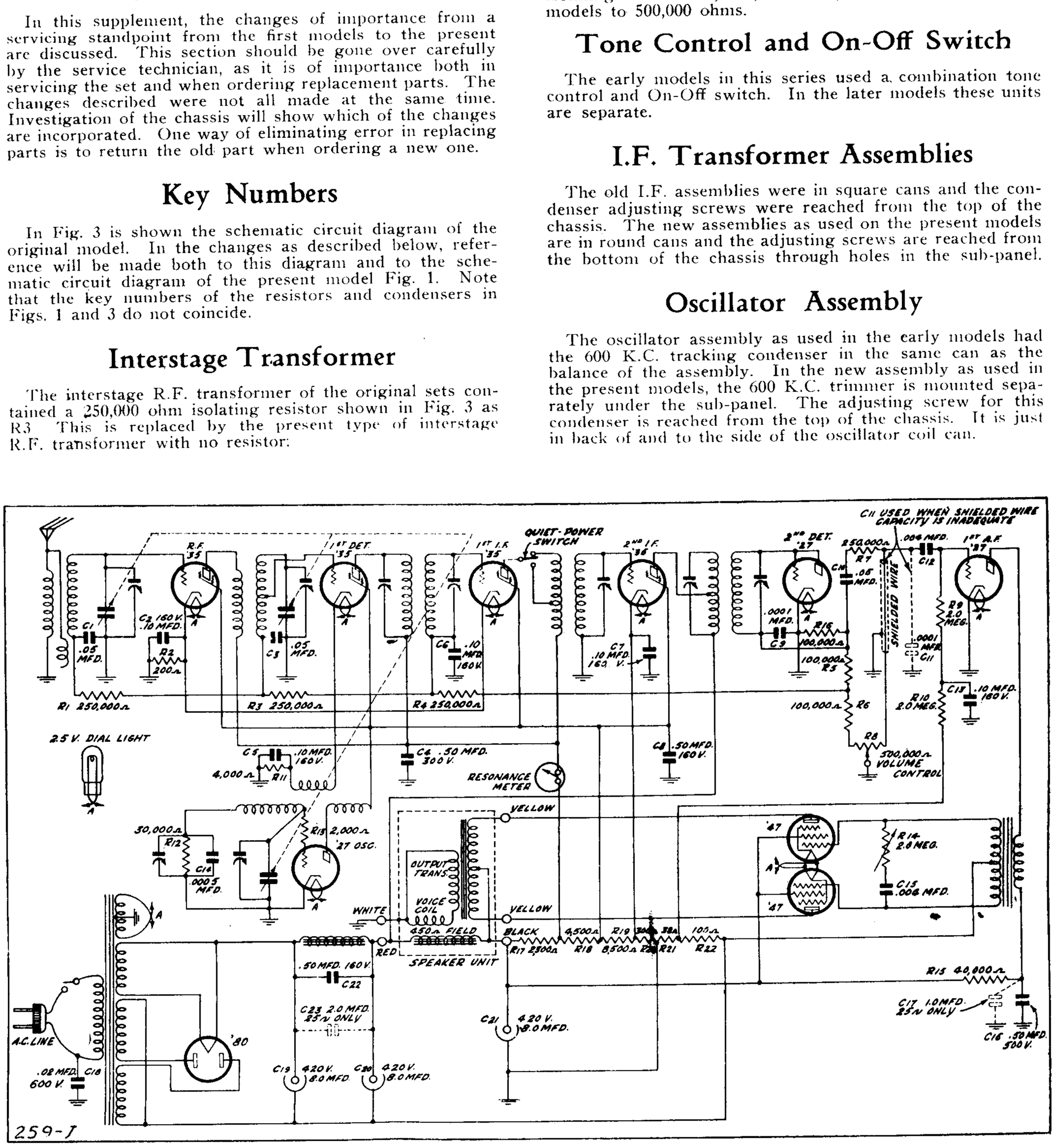
The early models in this series used a combination tone control and On-Off switch. In the later models these units are separate.

I.F. Transformer Assemblies

The old I.F. assemblies were in square cans and the condenser adjusting screws were reached from the top of the chassis. The new assemblies as used on the present models are in round cans and the adjusting screws are reached from the bottom of the chassis through holes in the sub-panel.

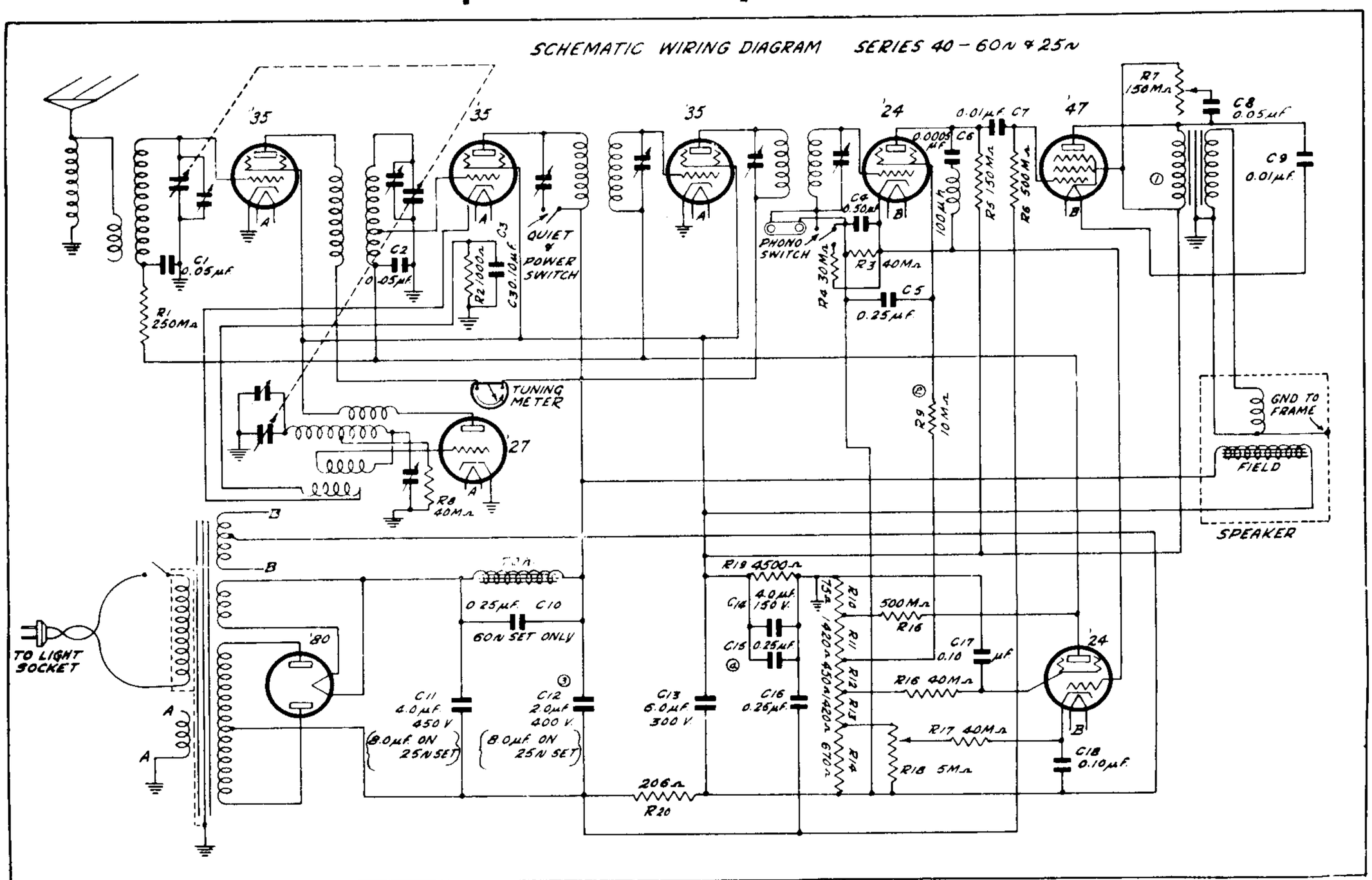
Oscillator Assembly

The oscillator assembly as used in the early models had the 600 K.C. tracking condenser in the same can as the balance of the assembly. In the new assembly as used in the present models, the 600 K.C. trimmer is mounted separately under the sub-panel. The adjusting screw for this condenser is reached from the top of the chassis. It is just in back of and to the side of the oscillator coil can.

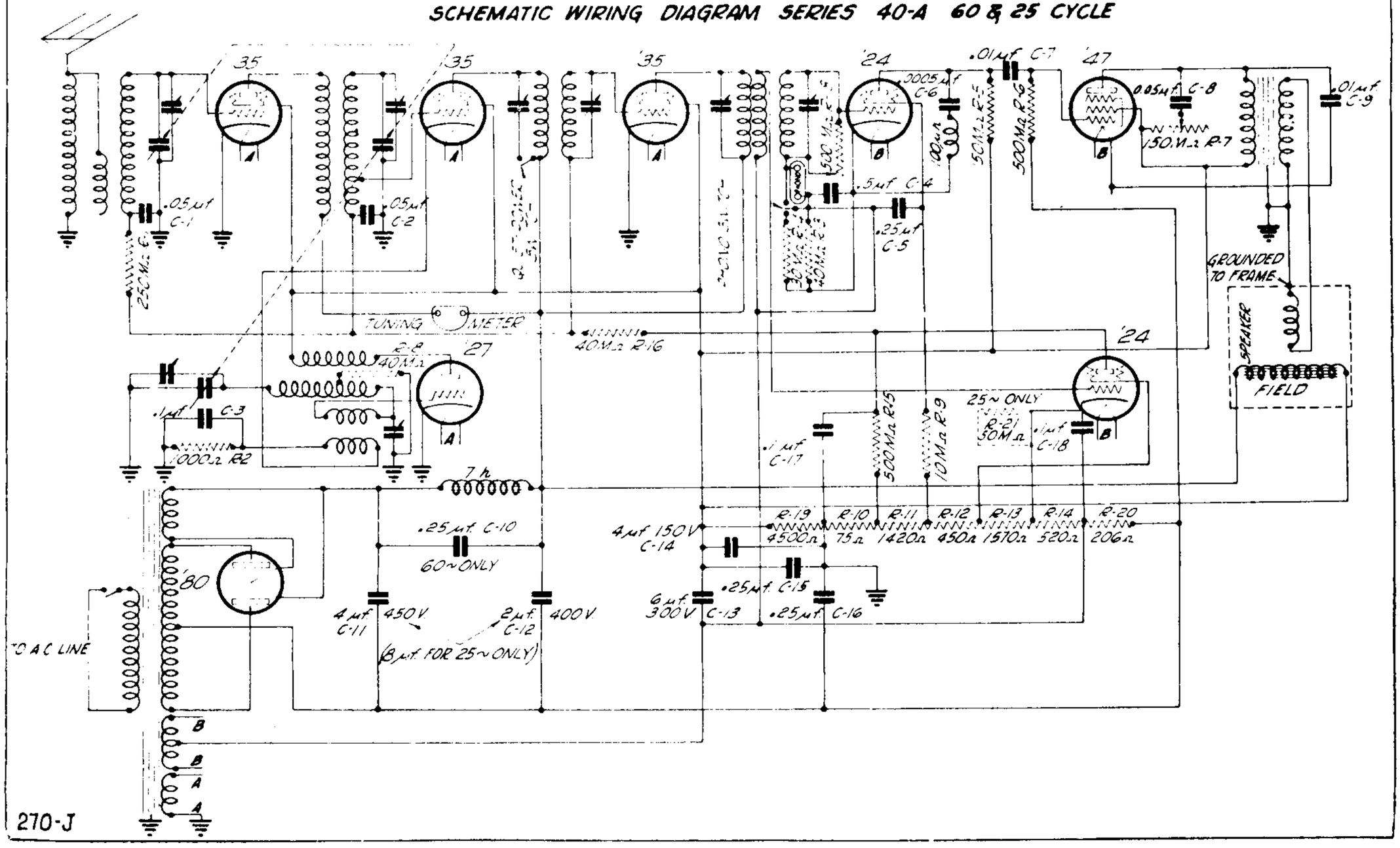


Schematic Circuit Diagram of Early Model

WELLS-GARDNER & CO.
Series 40 and Series 40-A
8 Tube Super-Heterodyne AC Receivers



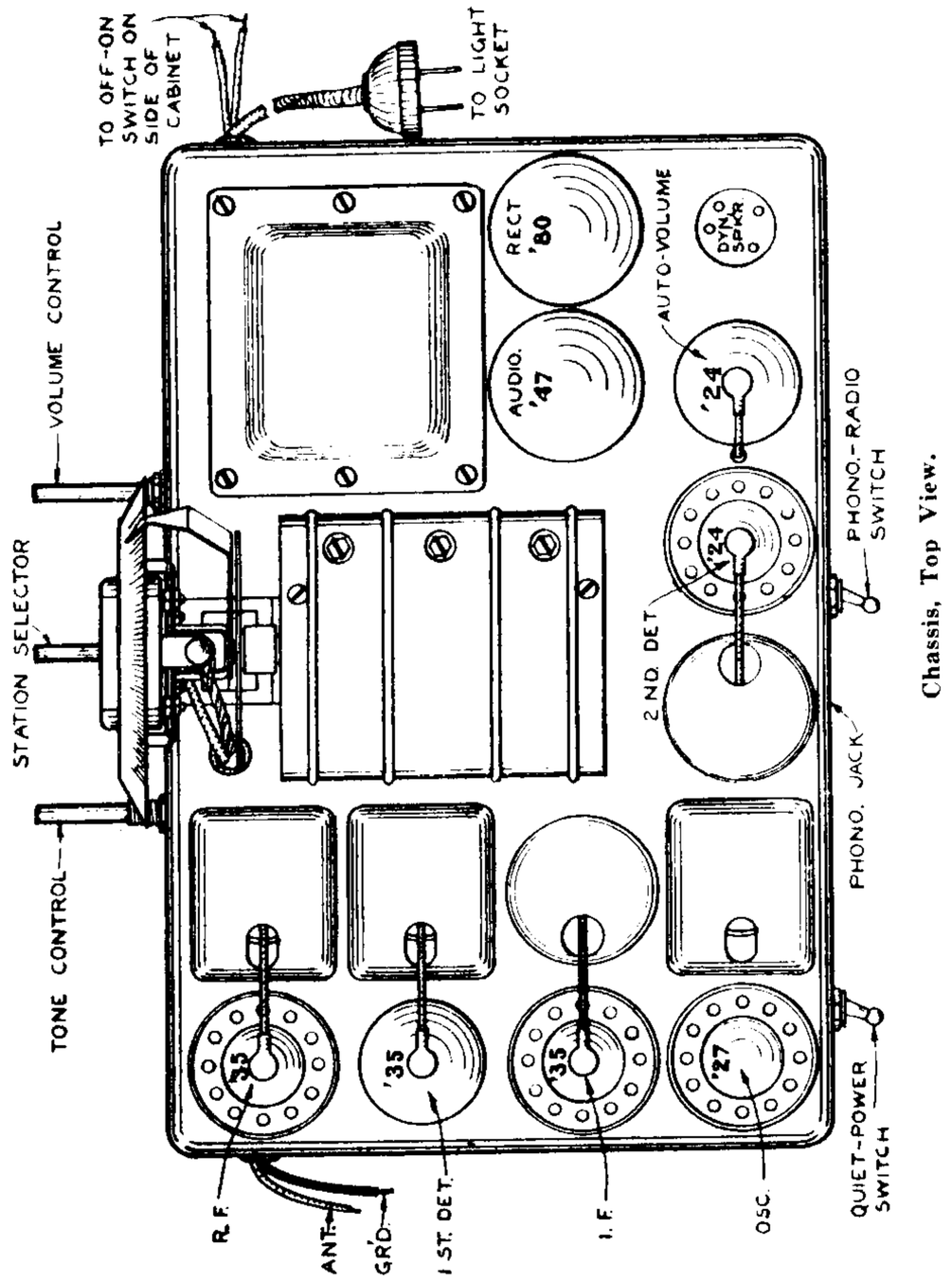
Schematic Wiring Diagram. Series 40.



Schematic Wiring Diagram. Series 40-A

WELLS-GARDNER & CO.

SERIES 40-40A



Chassis, Top View.

Voltages at Sockets

The voltages shown in the chart were taken with a 1,000 ohm per volt voltmeter; voltage measurements taken with a voltmeter having a different resistance will, of course, differ from those shown.

Turn the volume control all the way on, connect the antenna and ground leads together and turn the gang condenser plates all the way out. Check the line voltage.

Tube	Circuit	LINE VOLTAGE 90 V.	100 V.	110 V.	120 V.	130 V.
R. F. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
1st Det. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
I. F. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
Oscillator '27	Plate	70	78	85	92	100
2nd Det. '24	Screen-Grid	66	73	80	87	94
	Plate	127	134	141	148	155
A. V. C. '24	Grid	14	15.5	17	18.5	20
	Screen-Grid	24	26	28	30	32
Audio '47	Accelerating-Grid	199	221	244	267	289
	Plate	171	190	210	230	250
Rectifier '80	Current (both plates)	67 MA	75 MA	82 MA	89 MA	96 MA
	Plate to Plate Volt.	512	569	625	682	739

Condenser Alignment

A thorough check of the receiver should be made before any attem t is made to re-align any circuits. Examine the antenna and ground connections. Test all the tubes and check all voltages to determine if the failure of the receiver to operate properly is not due to some fault other than misalignment. A superheterodyne receiver must be accurately aligned to be selective and sensitive. This receiver has been accurately aligned at the factory, and due to the mechanical design of the gang and adjustable condensers, will not lose its alignment unless damaged by abuse or accident.

A modulated test oscillator and an output meter MUST be used when aligning this receiver to insure accurate alignment. It is important that the oscillator deliver a signal at exactly 175 K.C. in addition to frequencies in the broadcast band.

The adjustable condensers which tune the primaries and secondaries of the I.F. transformers are adjusted by inserting a screw driver through the holes in the chassis base directly below the I.F. transformer assemblies.

A trimmer condenser is mounted over each section in the gang and is adjusted by turning the screw located under the hole in the top of the gang shield.

The oscillator 600 K.C. tracking condenser is on the back of the chassis near the "QUIET-POWER" switch.

Make each adjustment in the order given below or the receiver may be thrown further out of alignment and it will then be a difficult task to align it properly.

The receiver and test oscillator must be well grounded and the output kept within the range of the output meter at all times.

All shields must be in place when making the adjustments.

INTERMEDIATE CIRCUITS.—Tune the test oscillator to exactly 175 K.C., and connect its output to the grid of the first detector tube after removing the clip on the tip of the tube. Connect the output meter across the secondary of the speaker coupling transformer and then adjust all four condensers which tune the intermediate transformers, for the greatest deflection on the output meter. Check the settings of all four condensers to make certain the maximum output has been obtained.

When the above instructions have been followed remove the test oscillator coupling and replace the grid clip on the tip of the first detector tube.

GANG CONDENSERS.—Turn the gang condenser plates all the way in and see that the dial pointer is on the first dial division point below 550 K.C.

Tune the test oscillator to 1,400 K.C., turn the dial to read 1,400 K.C., and then adjust each gang condenser trimmer for maximum output.

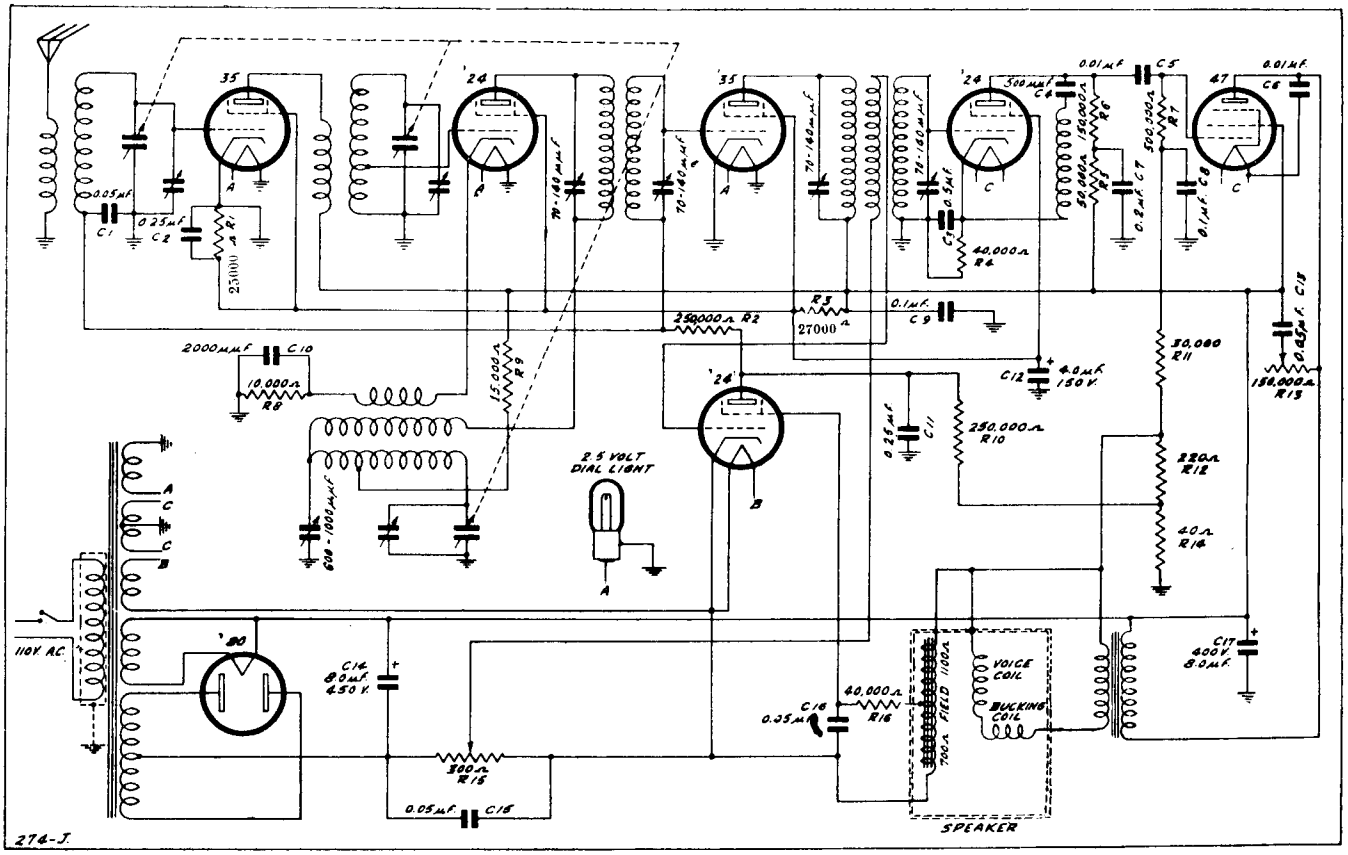
OSCILLATOR.—Tune the test oscillator to 600 K.C., and tune the receiver to the signal. Disconnect the output meter and then rotate the adjusting screw on the oscillator 600 K.C. tracking condenser. Rock the gang condenser back and forth across the signal at the same time, and listen closely until the maximum volume is obtained. The tracking condenser is then properly adjusted and remains fixed thereafter.

The gang condenser trimmers only must then be adjusted again at 1,400 K.C. for maximum output.

The receiver should be accurately aligned if the above instructions have been followed and no further adjustments need be made.

WELLS-GARDNER & CO.

SERIES 50



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

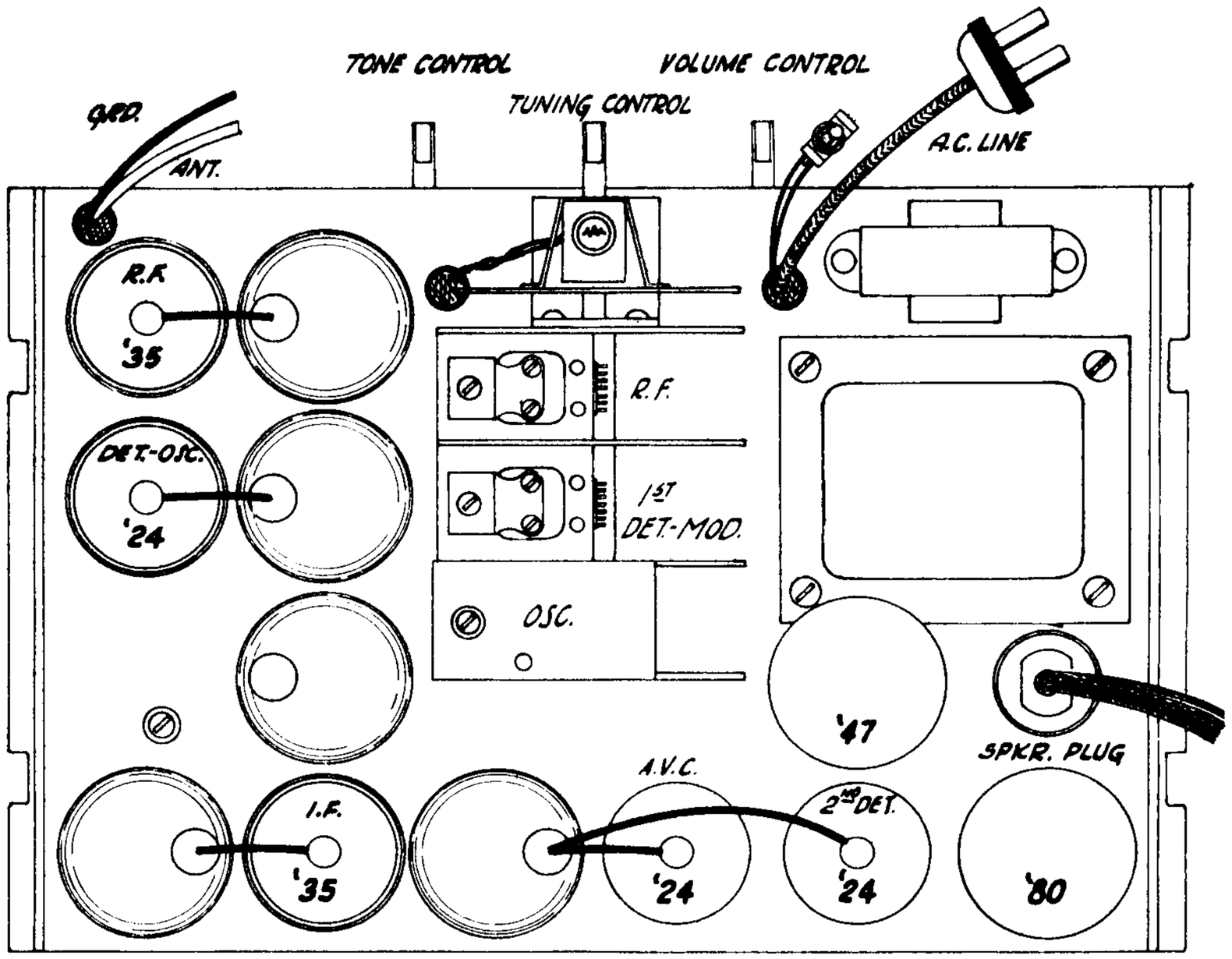
TUBE	CIRCUIT	LINE VOLTAGE				
		90 V.	100 V.	110 V.	120 V.	130 V.
R.F. '35	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
Det.-Modulator '24	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
I. F '35	Screen-Grid	70	78	85	92	100
	Plate	192	213	234	256	277
2nd Detector '24	Screen-Grid	70	78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

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

WELLS-GARDNER & CO.

SERIES 50

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



Voltages at Sockets

LINE VOLTAGE 115—ANTENNA LEAD SHORTED TO GROUND—VOLUME CONTROL AT MAXIMUM

Type of Tube	Function	Across Filament or Heater	For early Models with 2-section vitreous enamel resistor. Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.	For later Models with 4-section armoured wire-wound resistor. Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
'58	R.F.	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	1st Det.	2.4	270	100	5	.4	250	103	5	.4
'58	I.F.(2)	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	A.V.C.	2.4	90	40	9.5	0	103	45	10	0
'57	2nd Det.	2.4	207	98	6	.15	190	101	6	.15
'47	Audio	2.4	262	280	24(3)	31	242	260	17(3)	30
'80	Rect.	4.8				30 per plate				34 per plate

(1) Read Across R-14.
(2) If I.F. readings are made with a cord and plug, ground the control grid through a condenser to prevent oscillation.
(3) Read Across R12 and R14.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer and an additional filter condenser are used. Also, a slight change is made in the power unit wiring In the twenty-five cycle set, condenser C-17, the dry electrolytic unit is put in parallel with condenser C-14. An 8.0 mfd. wet electrolytic condenser is put in place of condenser C-17.

The twenty-five cycle chassis can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, that is the sixty cycle chassis cannot be operated from a twenty-five cycle power supply.

A 110-220 volt 40-60 cycle power transformer is also available for this model.

Excessive Hum

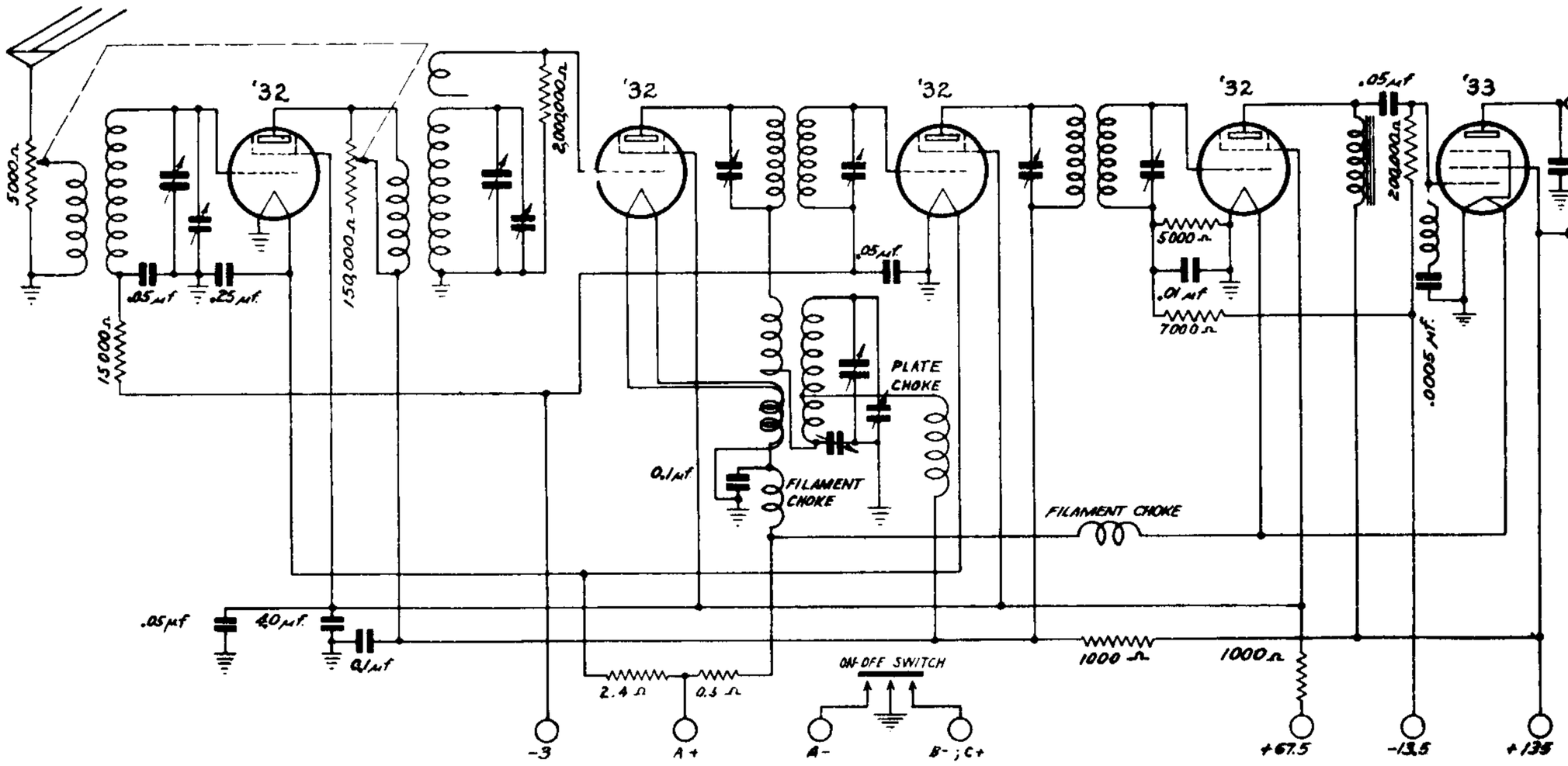
Defective tubes are very often the cause of excessive hum. Try out a complete new set of tubes and note any difference. The hum may be due to external pick-up. Disconnect the antenna and ground and see if the hum disappears.

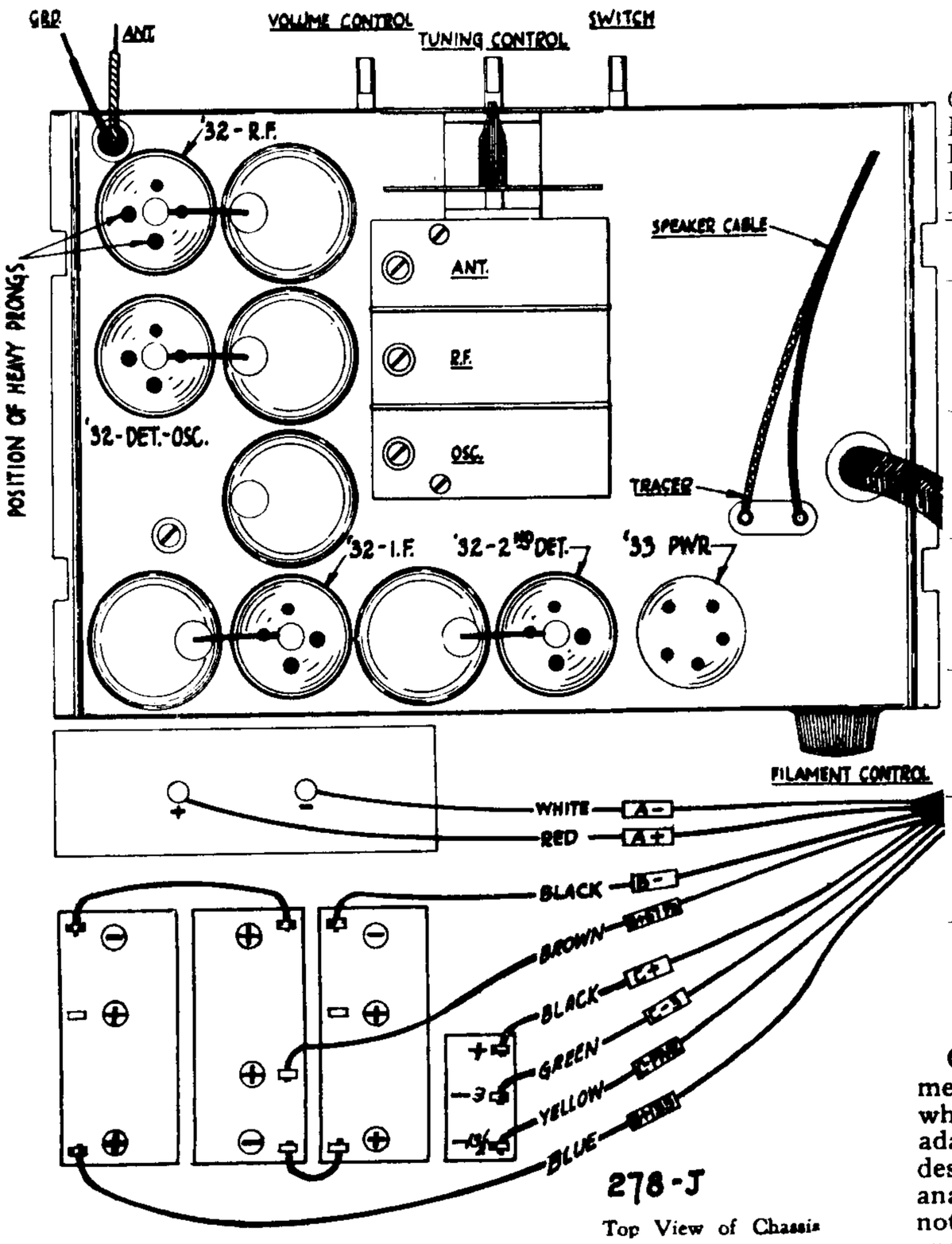
Open filter condensers can cause excessive hum. Inspect these condensers and the leads to them. Other causes of excessive hum are, unequal rectifier plate currents, defects in grid circuits and defective power transformer.

If Microphonic hum or howl is encountered, switch the tubes of the same type around in the sockets and try out some new ones.

WELLS-GARDNER & CO.

Models No 92-93





Top View of Chassis

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

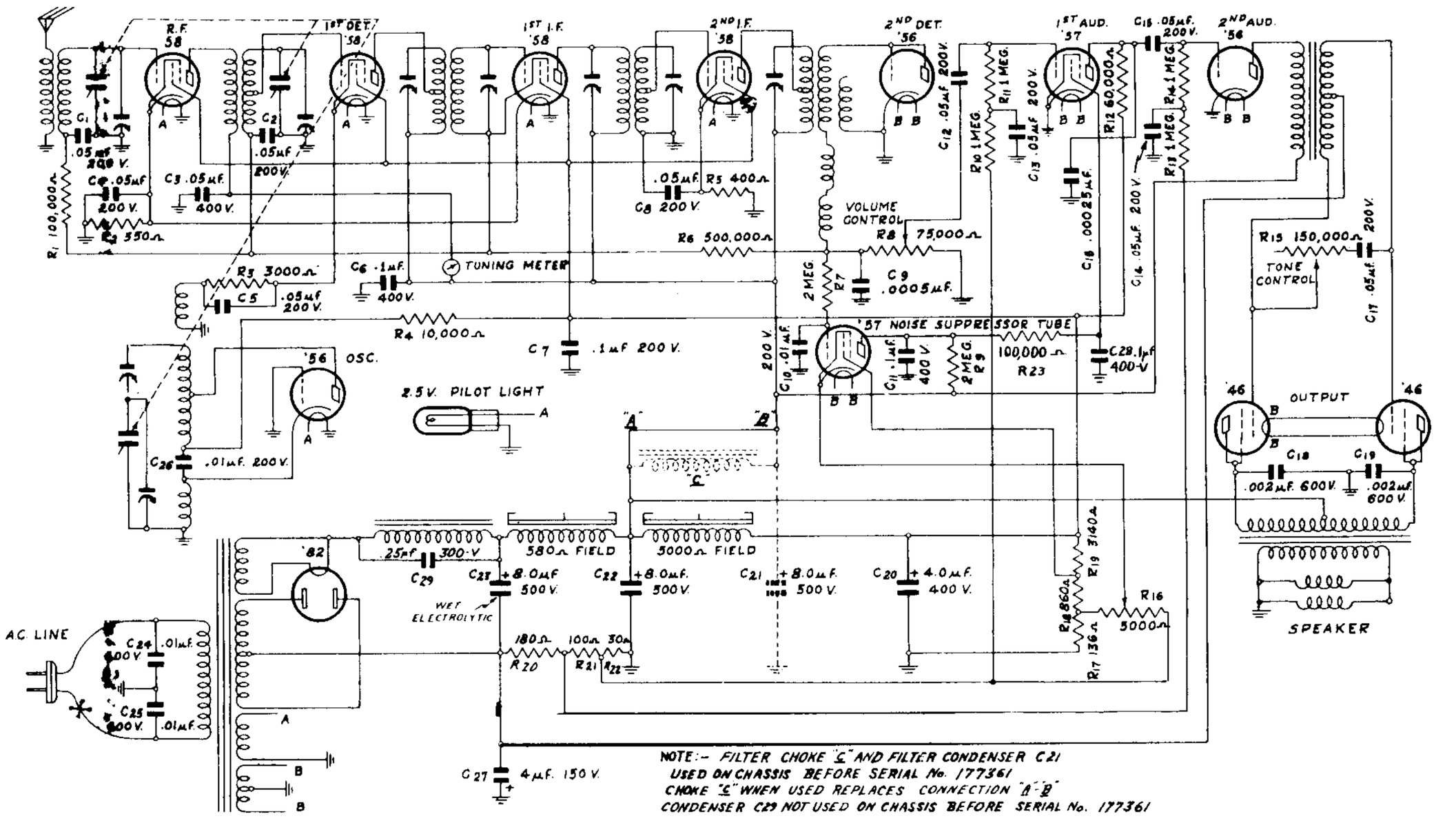
TUBE	CIRCUIT	VOLTAGE
R.F. '32	Filament	2.
	Screen Grid	65.
	Plate	127.
	Control Grid	1.4
1st Det. & Oscillator '32	Filament	2.
	Screen Grid	65
	Plate	85.
	Control Grid	No Reading
I.F. '32	Filament	2.
	Screen Grid	65.
	Plate	125.
	Control Grid	5. *
2nd Det '32	Filament	2.
	Screen Grid	67.
	Plate	127.5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

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

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

WELLS-GARDNER & CO.

No. 322 Series



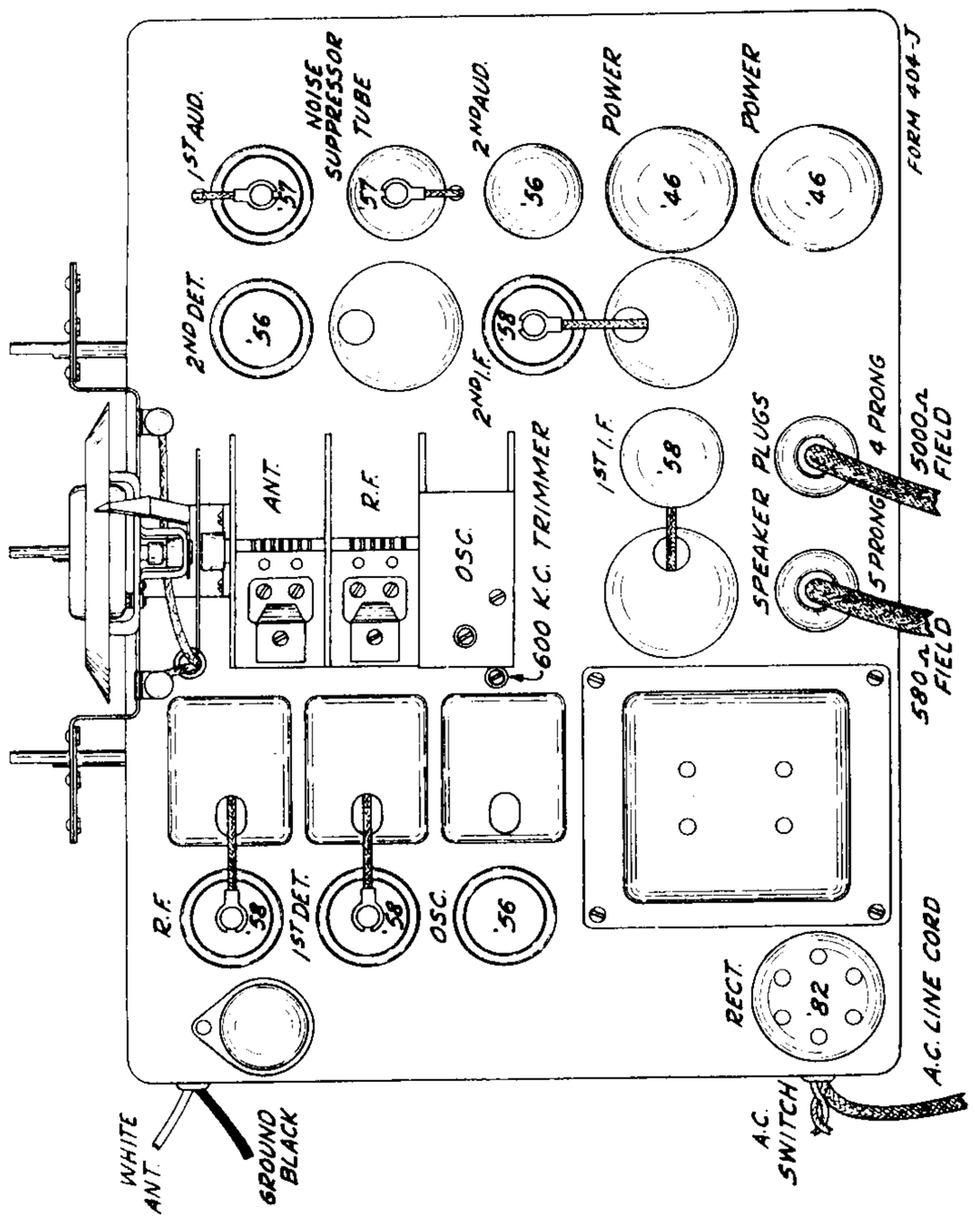
NOTE:- FILTER CHOKE "C" AND FILTER CONDENSER C21 USED ON CHASSIS BEFORE SERIAL No. 177361
CHOKE "C" WHEN USED REPLACES CONNECTION "A"-"B"
CONDENSER C29 NOT USED ON CHASSIS BEFORE SERIAL No. 177361

Voltages at Sockets

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

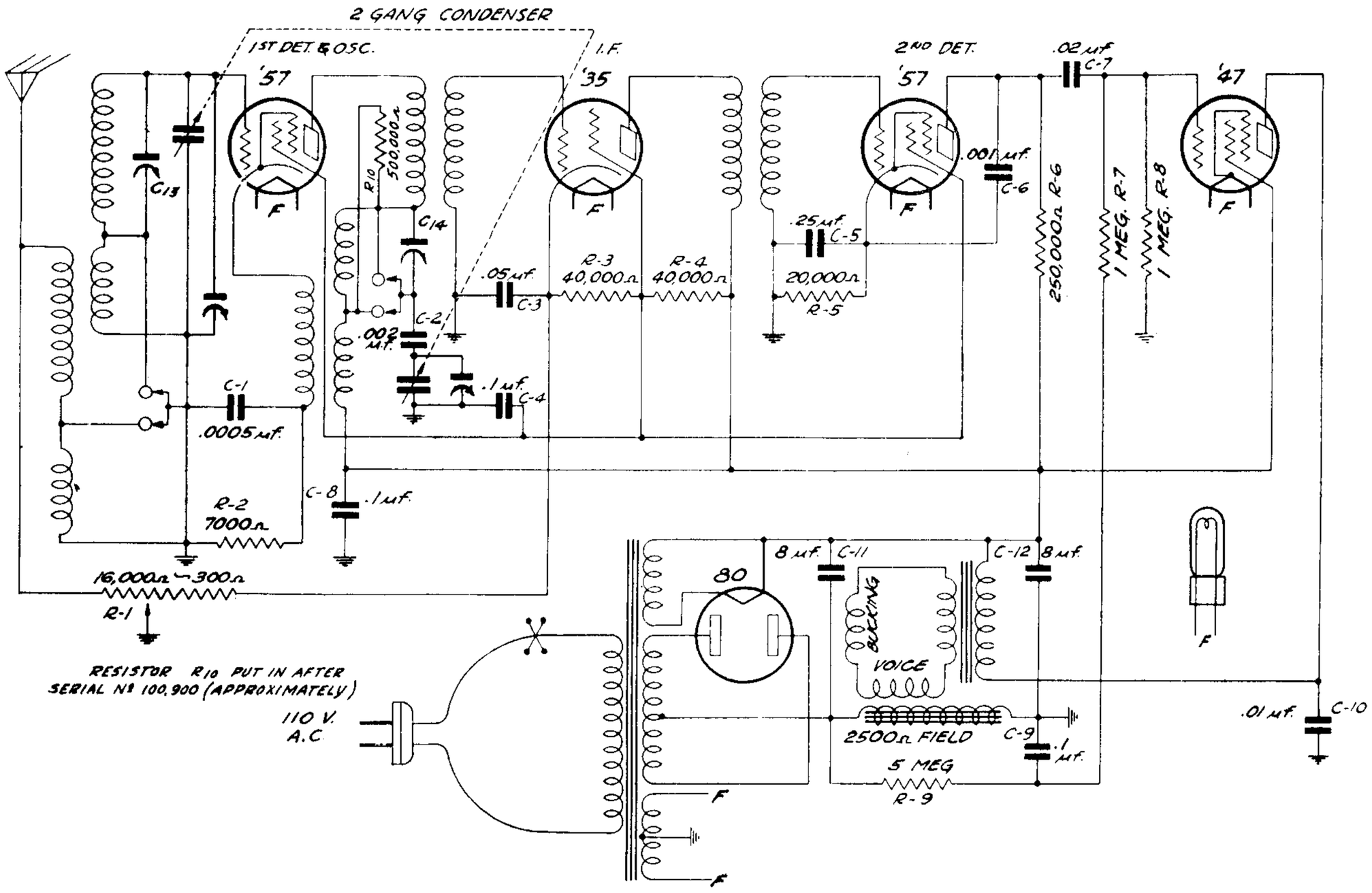
Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
58	R.F.	2.4	242	90	4(1)	4
58	1st Det.	2.4	250	86	7(1)	2
56	Osc.	2.4	24		0	8
58	1st I.F.(2)	2.4	252	90	4(1)	4
58	2nd I.F.(2)	2.4	254	91	3	5.7
56	2nd Det.	2.4	0		0	0
57	1st Audio	2.4	65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

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



WELLS-GARDNER & CO.

No. 352 Series

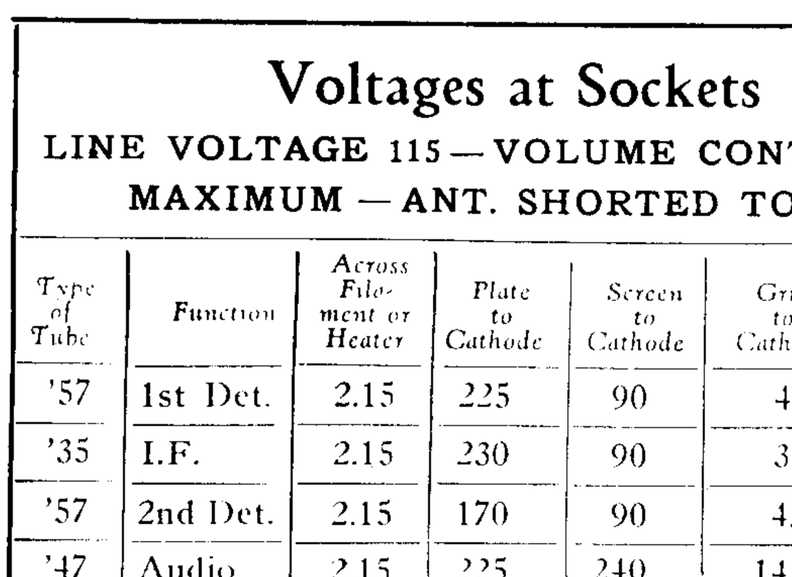


Voltages at Sockets

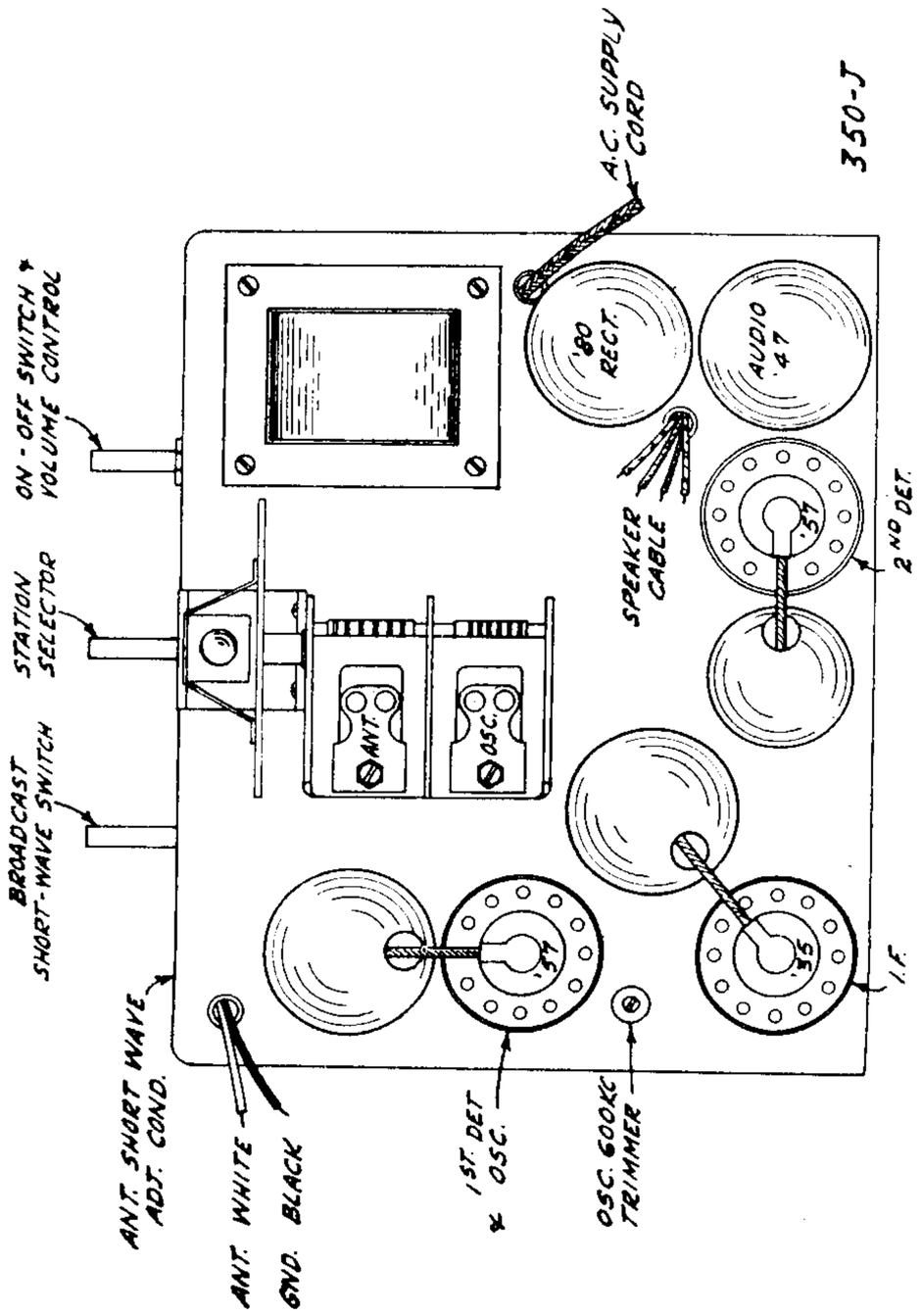
LINE VOLTAGE 115 — VOLUME CONTROL AT MAXIMUM — ANT. SHORTED TO GND.

Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
'57	1st Det.	2.15	225	90	4	.5
'35	I.F.	2.15	230	90	3.2(1)	6.2
'57	2nd Det.	2.15	170	90	4.3	.2
'47	Audio	2.15	225	240	14(2)	23.
'80	Rect.	4.75	620 volts plate to plate			20. per plate

(1) If read with cord and plug, ground the control grid.
(2) Computed figure- cannot be accurately read with ordinary voltmeter. Voltage consists of drop across 1 megohm resistor, R 8.

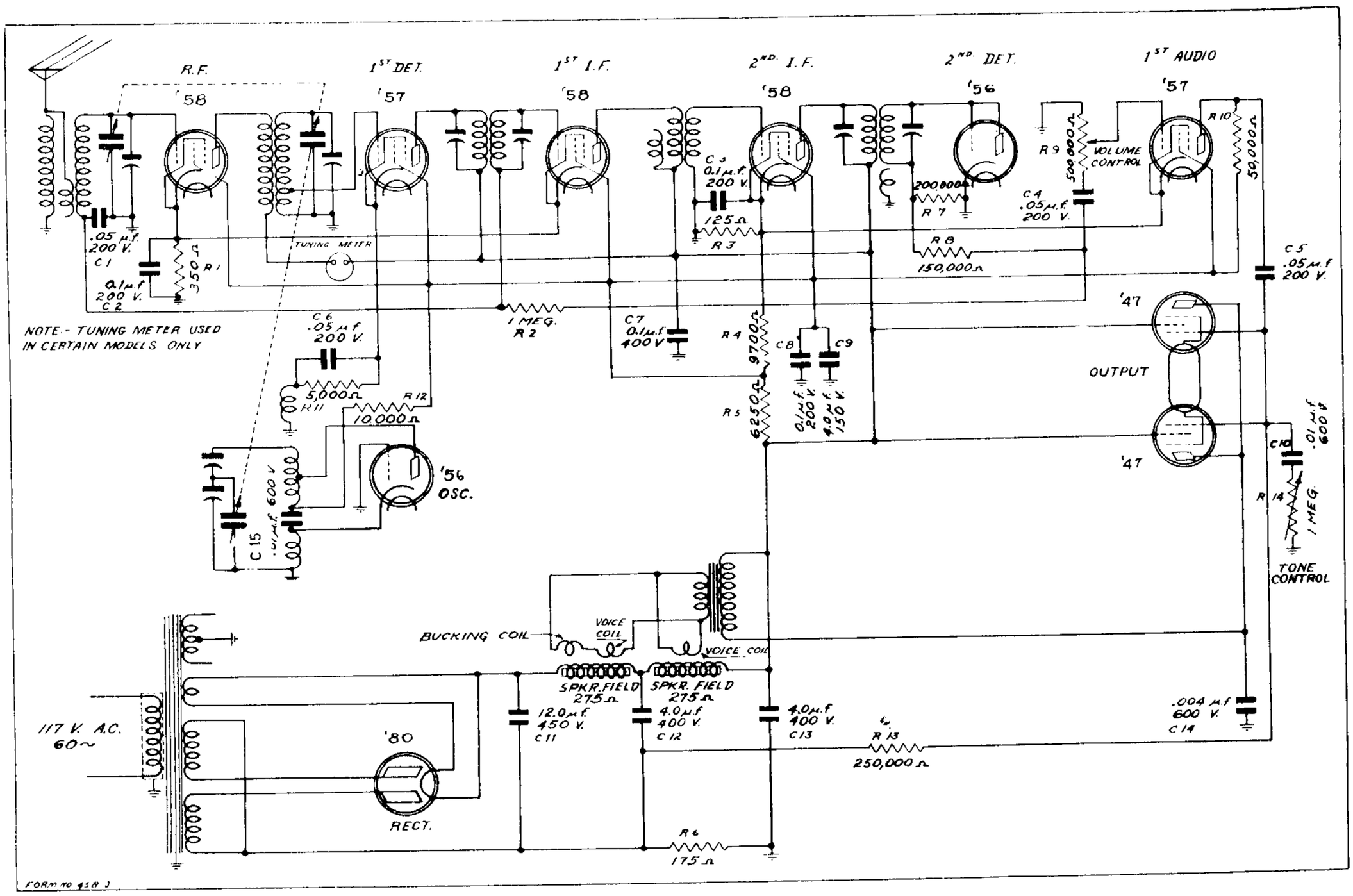


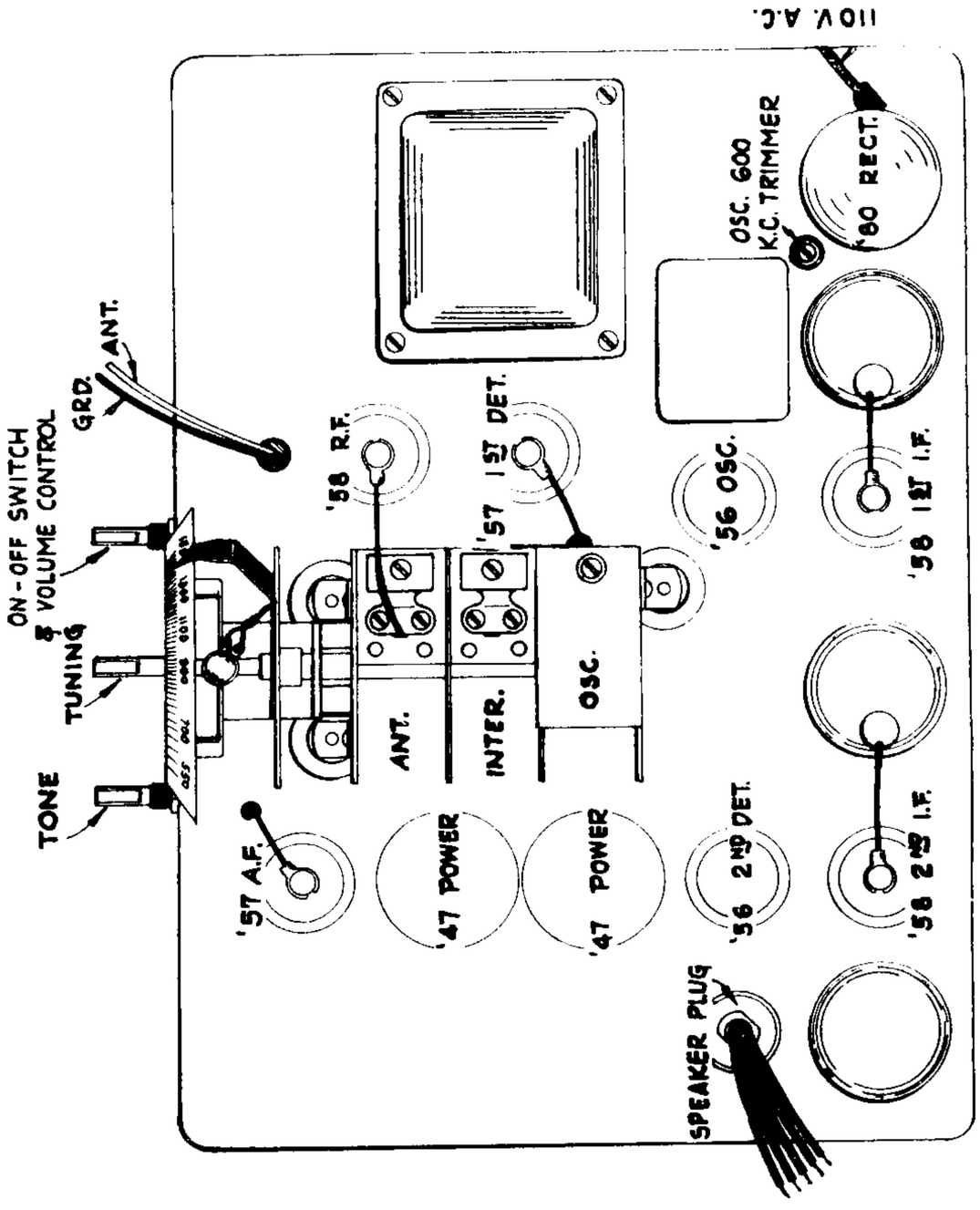
Terminal Arrangement of 57 and 58 Tubes



WELLS-GARDNER & CO.

No. 502 Series





Voltages at Sockets

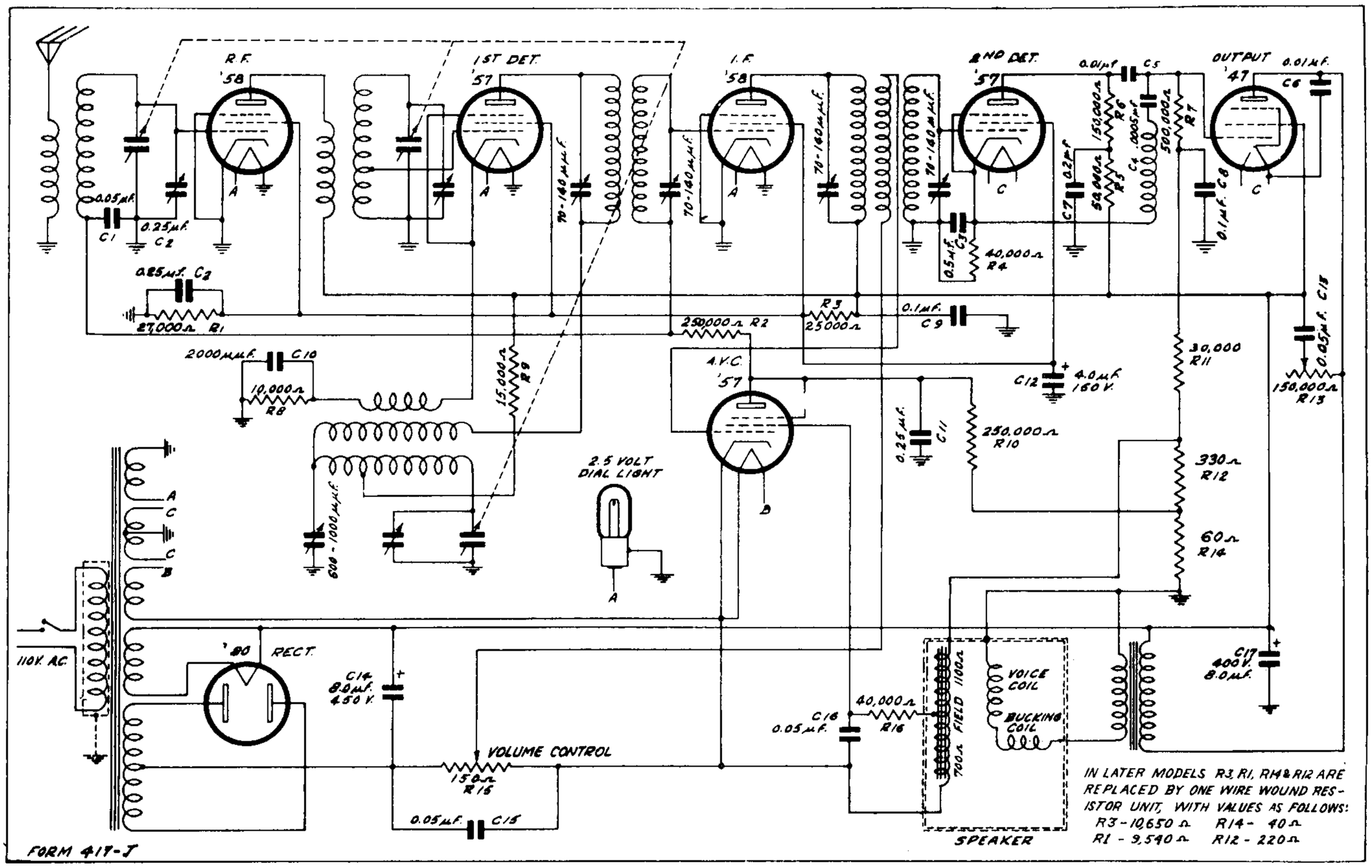
LINE VOLTAGE, 115 — ANTENNA LEAD SHORTED TO GROUND

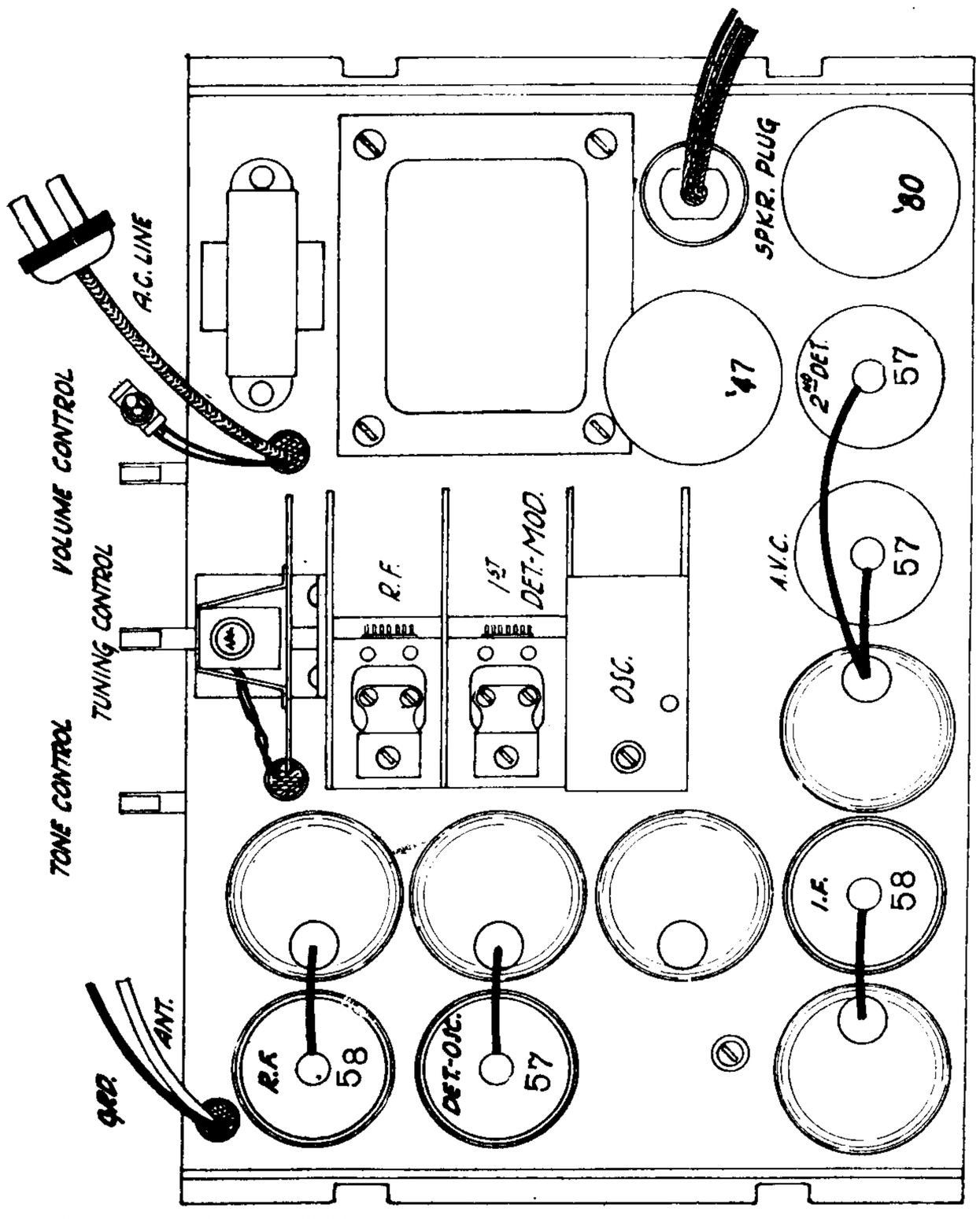
Type of Tube	Function	Across Filament or Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M.A.
58	R.F.	2.4	275	100	4.2(1)	5.2
57	1st Det.	2.4	265	99	5.4	.9
56	Osc.	2.4	28		0	8.6
58	1st I.F.	2.4	275	100	4.2(1)	5.2
58	2nd I.F.	2.4	275	102	3.0	8.5
56	2nd Det.	2.4	0		0	0
57	1st Audio	2.4	12	102	3.0(1)	1.8
47	Output	2.4	265	280	18.5(2)	30.0
80	Rect.	4.9				55.0 per plate

(1) Measured from cathode to ground.

(2) Measured across Resistor R6.

WELLS-GARDNER & CO. No. 572 Series





Change in Later Models

In the first models of this chassis, resistors R-1 and R-3 were carbon resistors of the values as shown in Fig. 1. Resistors R-12 and R-14, were in one vitreous enamel unit. The voltages for the sets with these resistors are shown in the voltage chart on Page 4 at the left.

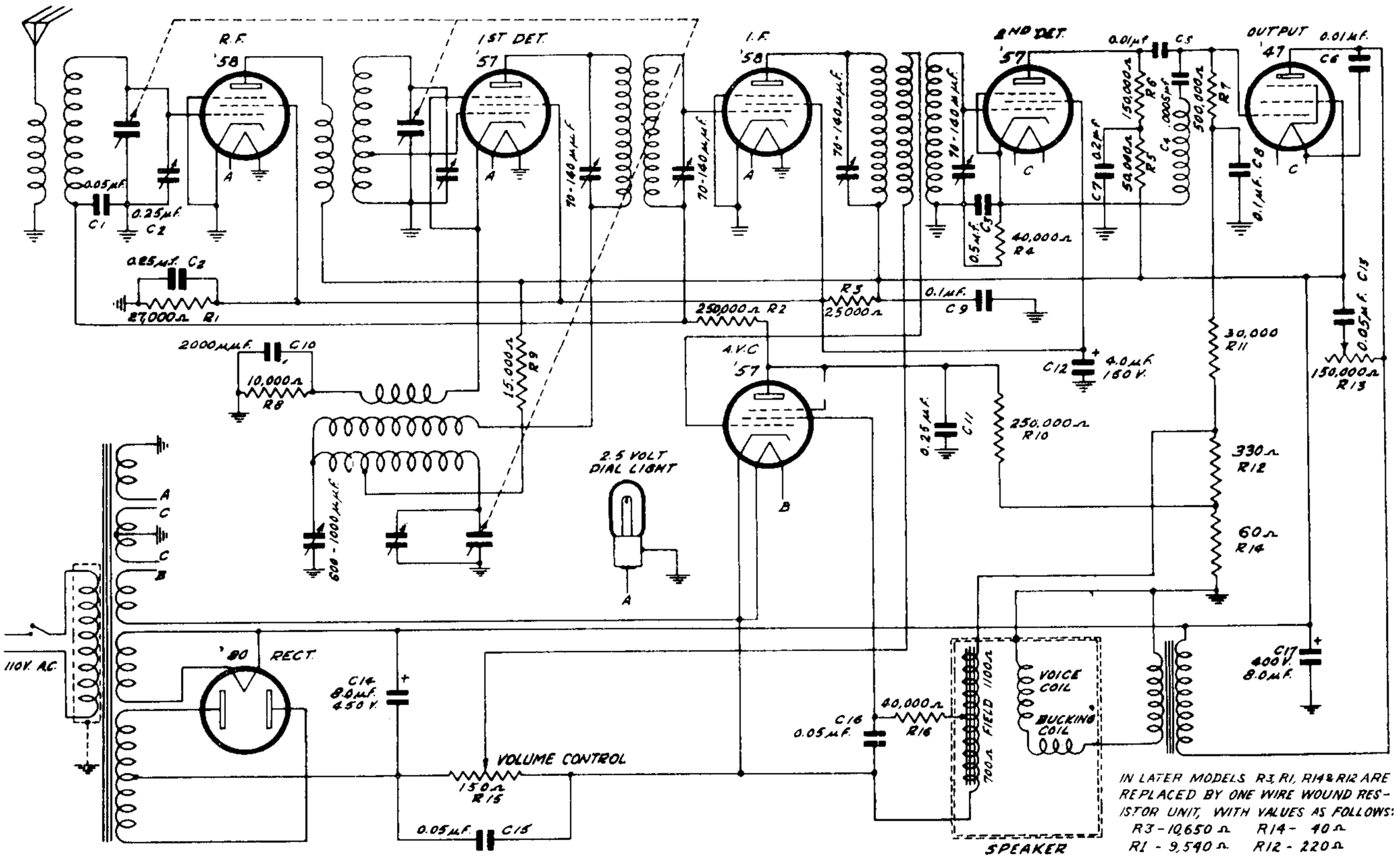
In later models the four above mentioned resistors were replaced by one armored wire wound resistor unit. New values are used as follows:

Code	Resistance
R-12	220 ohms
R-14	40 ohms
R-1	9,540 ohms
R-3	10,650 ohms

The voltages for the sets with the four-section wire wound resistor are shown in the second voltage chart

WELLS-GARDNER & CO.

No. 872 Series



IN LATER MODELS R3, R1, R14 & R12 ARE REPLACED BY ONE WIRE WOUND RESISTOR UNIT, WITH VALUES AS FOLLOWS:
R3 - 10,650Ω R14 - 40Ω
R1 - 9,540Ω R12 - 220Ω

Voltages at Sockets

LINE VOLTAGE 115—ANTENNA LEAD SHORTED TO GROUND—VOLUME CONTROL AT MAXIMUM

Type of Tube	Function	Across Filament or Heater	For early Models with 2-section vitreous enamel resistor. Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.	For later Models with 4-section armoured wire-wound resistor. Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M. A.
'58	R.F.	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	1st Det.	2.4	270	100	5	.4	250	103	5	.4
'58	I.F.(2)	2.4	282	107	4(1)	8.	258	106	2.8(1)	8.0
'57	A.V.C.	2.4	90	40	9.5	0	103	45	10	0
'57	2nd Det.	2.4	207	98	6	.15	190	101	6	.15
'47	Audio	2.4	262	280	24(3)	31	242	260	17(3)	30
'80	Rect.	4.8				30 per plate				34 per plate

(1) Read Across R-14.
(2) If I.F. readings are made with a cord and plug, ground the control grid through a condenser to prevent oscillation.
(3) Read Across R12 and R14.

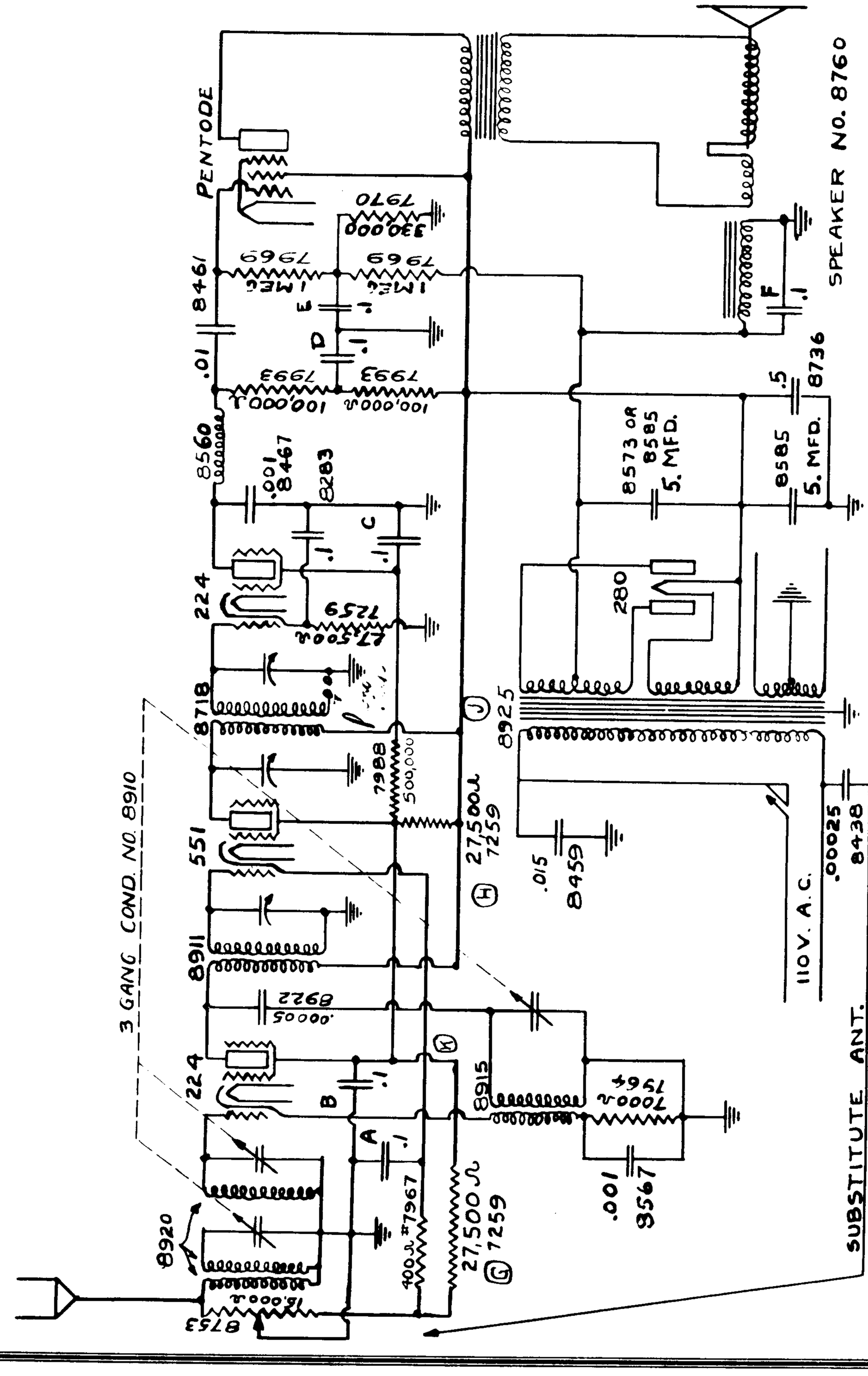
Condenser Alignment

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

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

WHOLESALE RADIO SERVICE CO., INC.

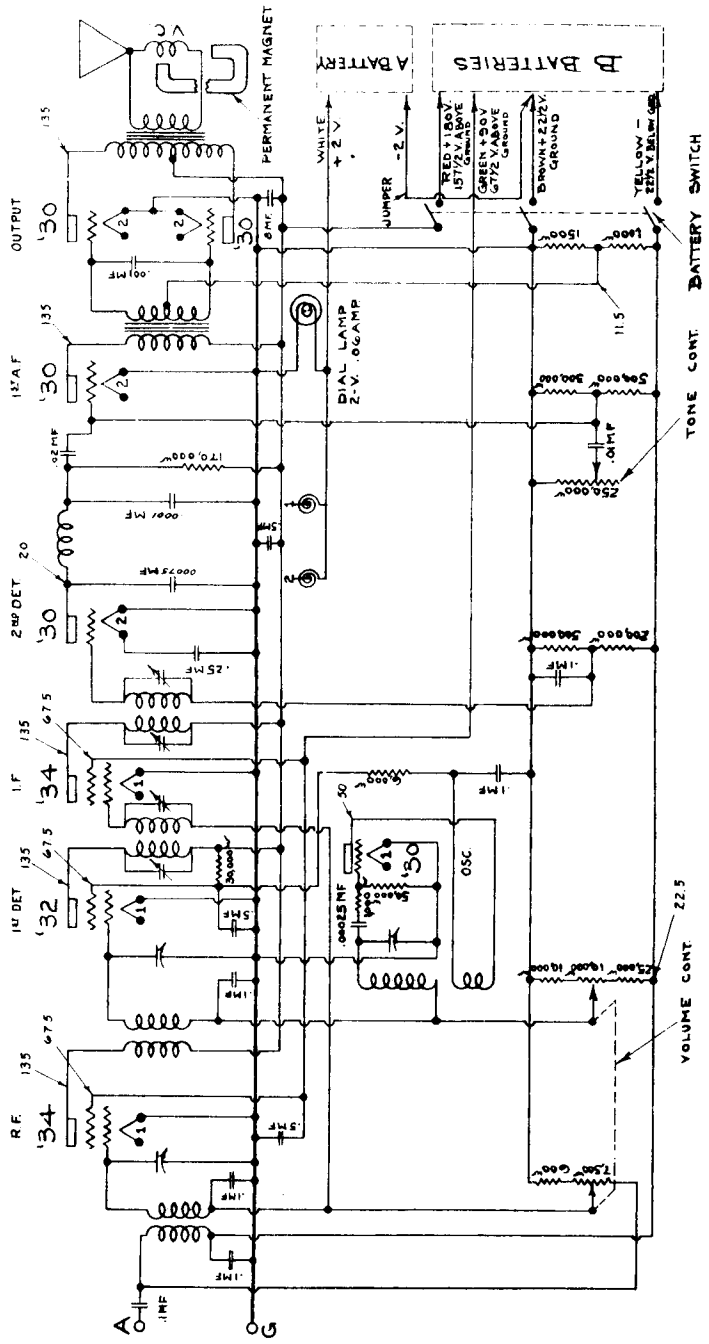
MODEL V-A

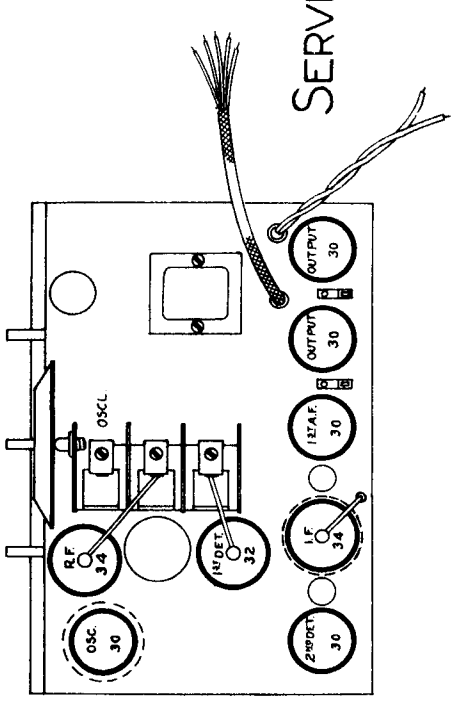


THE RUDOLPH WURLITZER MFG. CO.

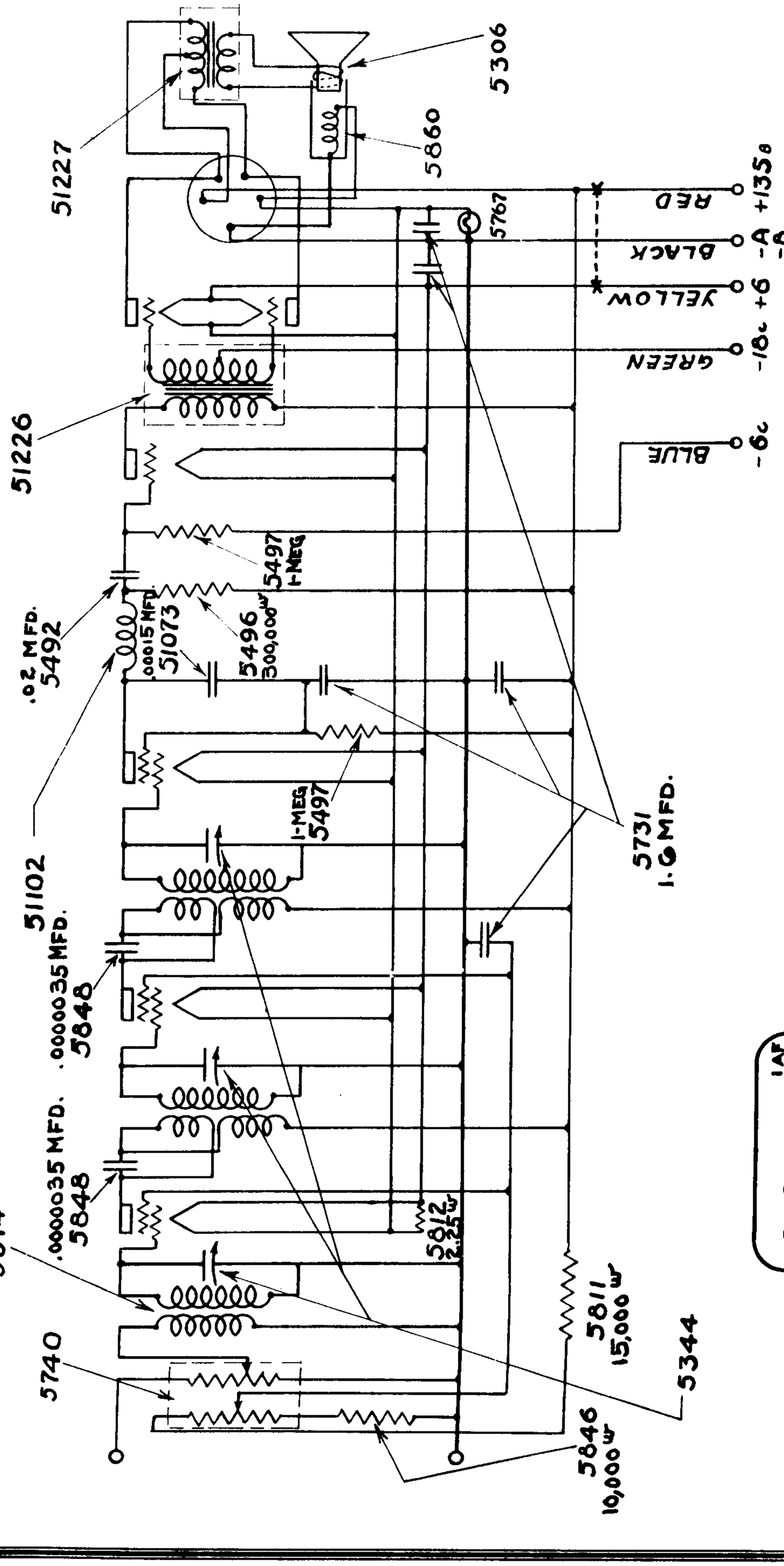
SERVICE SCHEMATIC LYRIC MODEL B-80

NOTE: ALL VOLTAGE READINGS LISTED ARE TAKEN WITH ALL CONTROLS TURNED ON FULL AND NO SIGNAL - USE 1000$^{\omega}$ PER VOLT - VOLTMETER

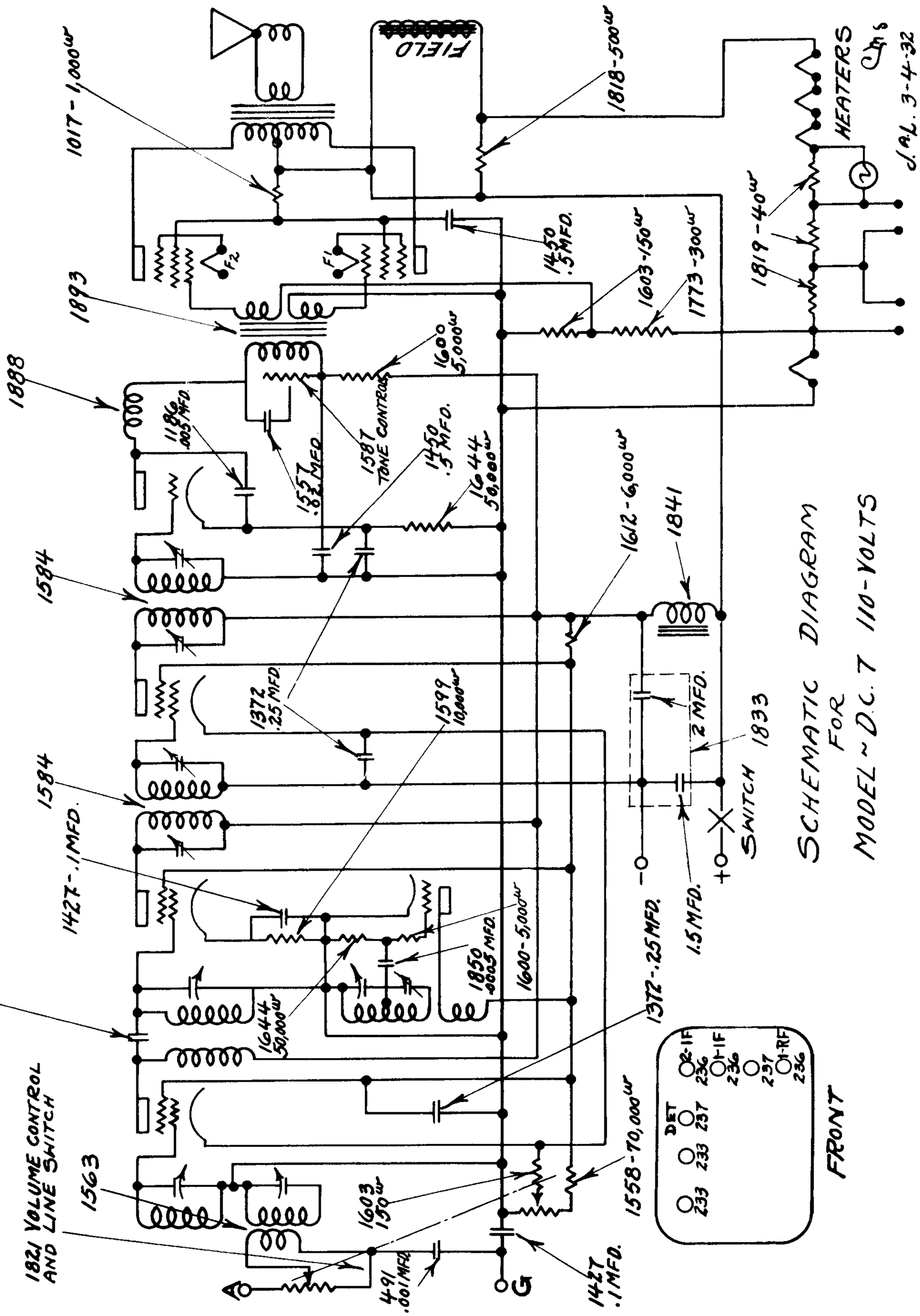




THE RUDOLPH WURLITZER MFG. CO.

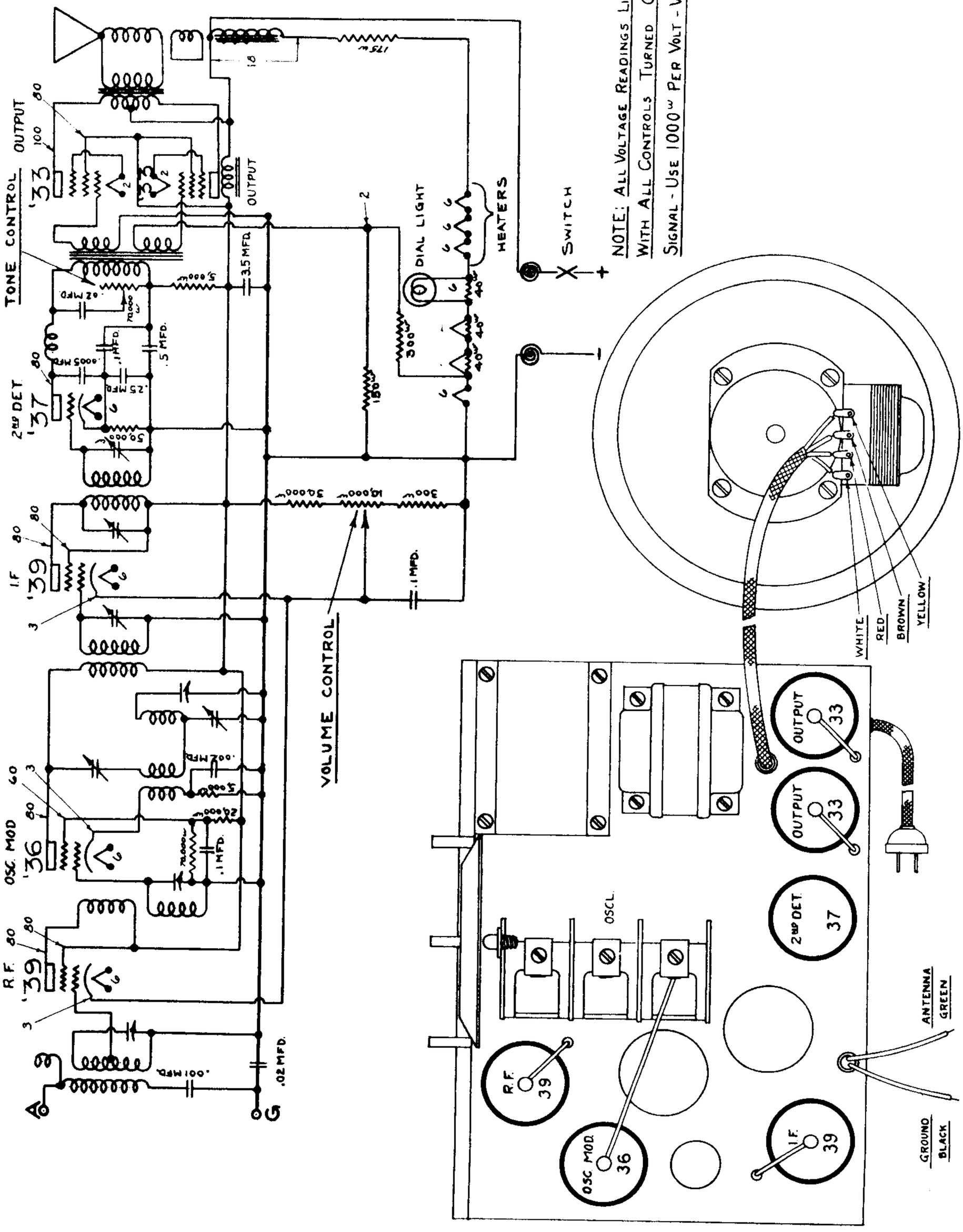


THE RUDOLPH WURLITZER MFG. CO.



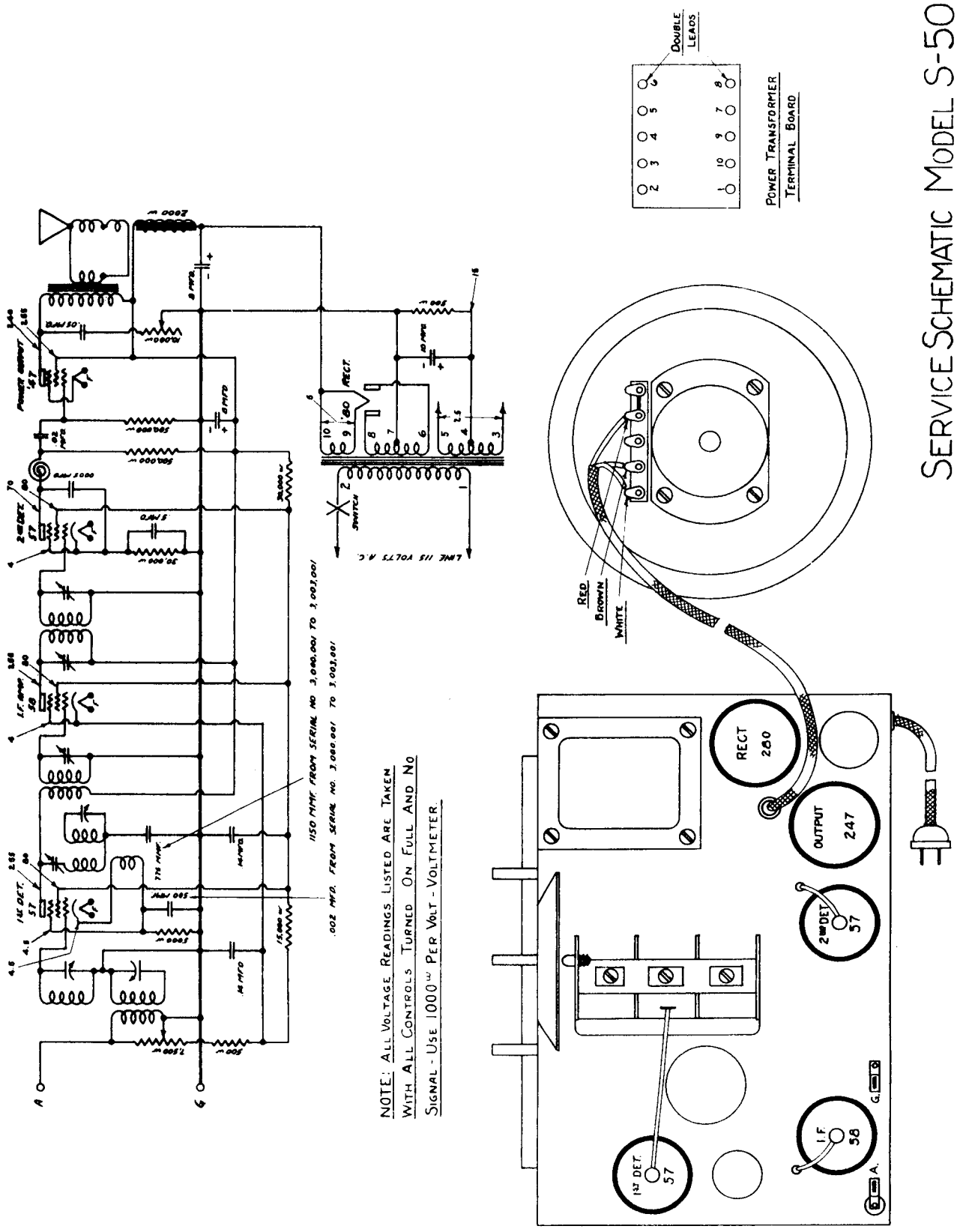
THE RUDOLPH WURLITZER MFG. CO.

SERVICE SCHEMATIC LYRIC MODEL DC-65 - 110 VOLTS



THE RUDOLPH WURLITZER MFG. CO.

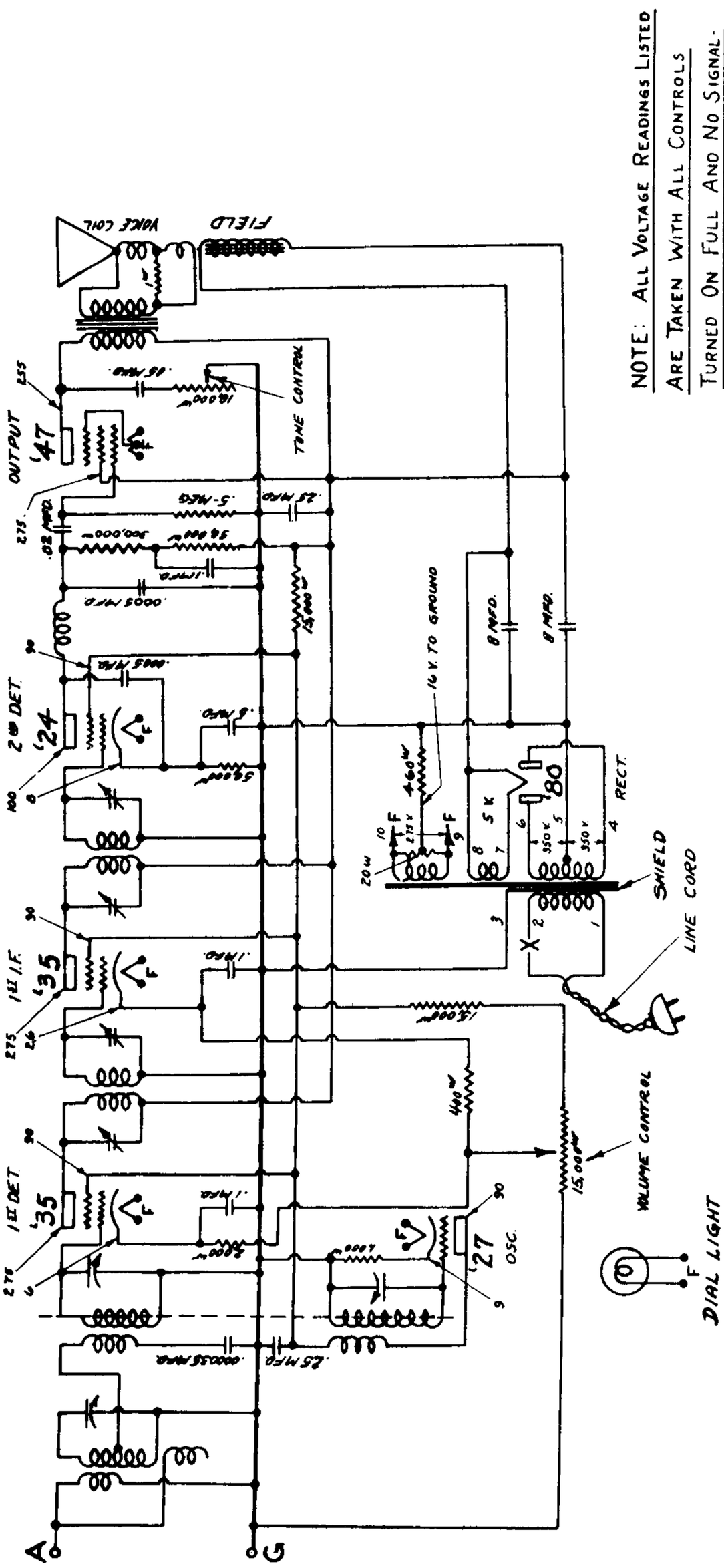
SERVICE SCHEMATIC MODEL S-50



NOTE: ALL VOLTAGE READINGS LISTED ARE TAKEN WITH ALL CONTROLS TURNED ON FULL AND NO SIGNAL - USE 1000$^{\omega}$ PER VOLT - VOLTMETER.

THE RUDOLPH WURLITZER MFG. CO.

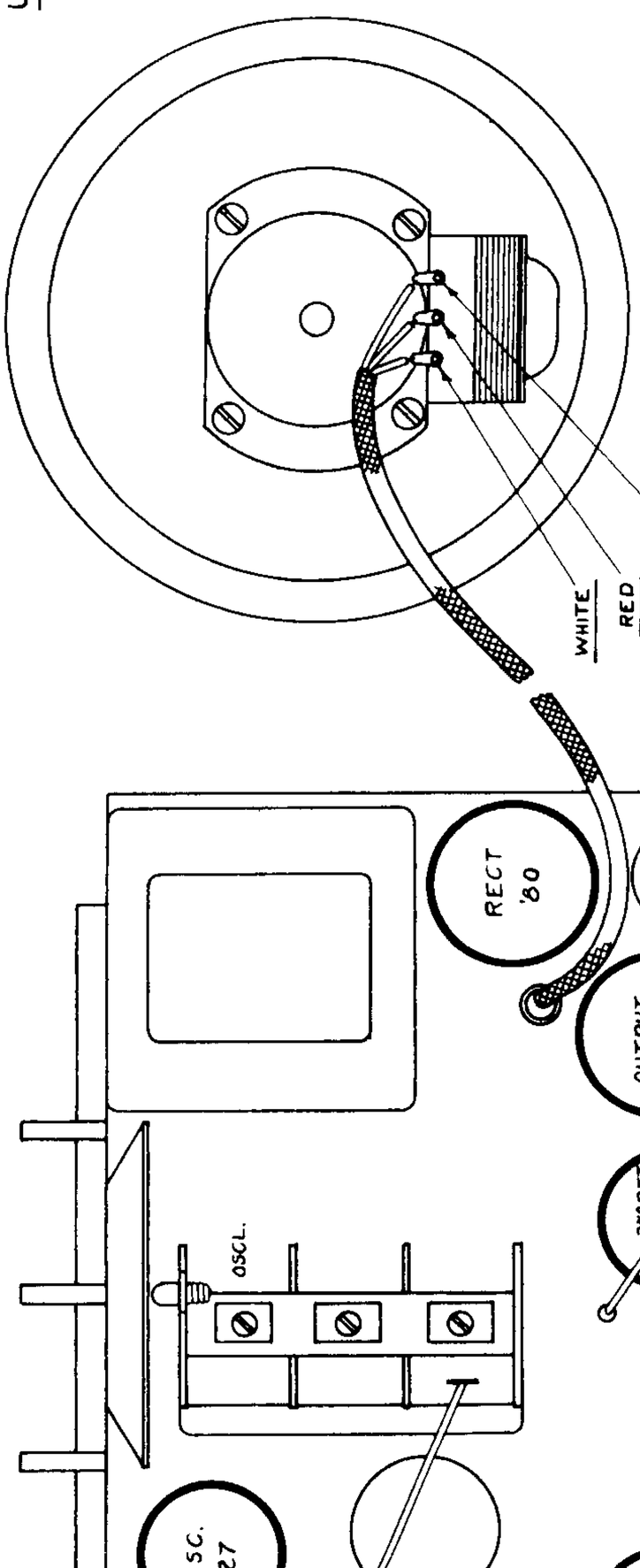
SERVICE SCHEMATIC LYRIC MODEL S-63



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

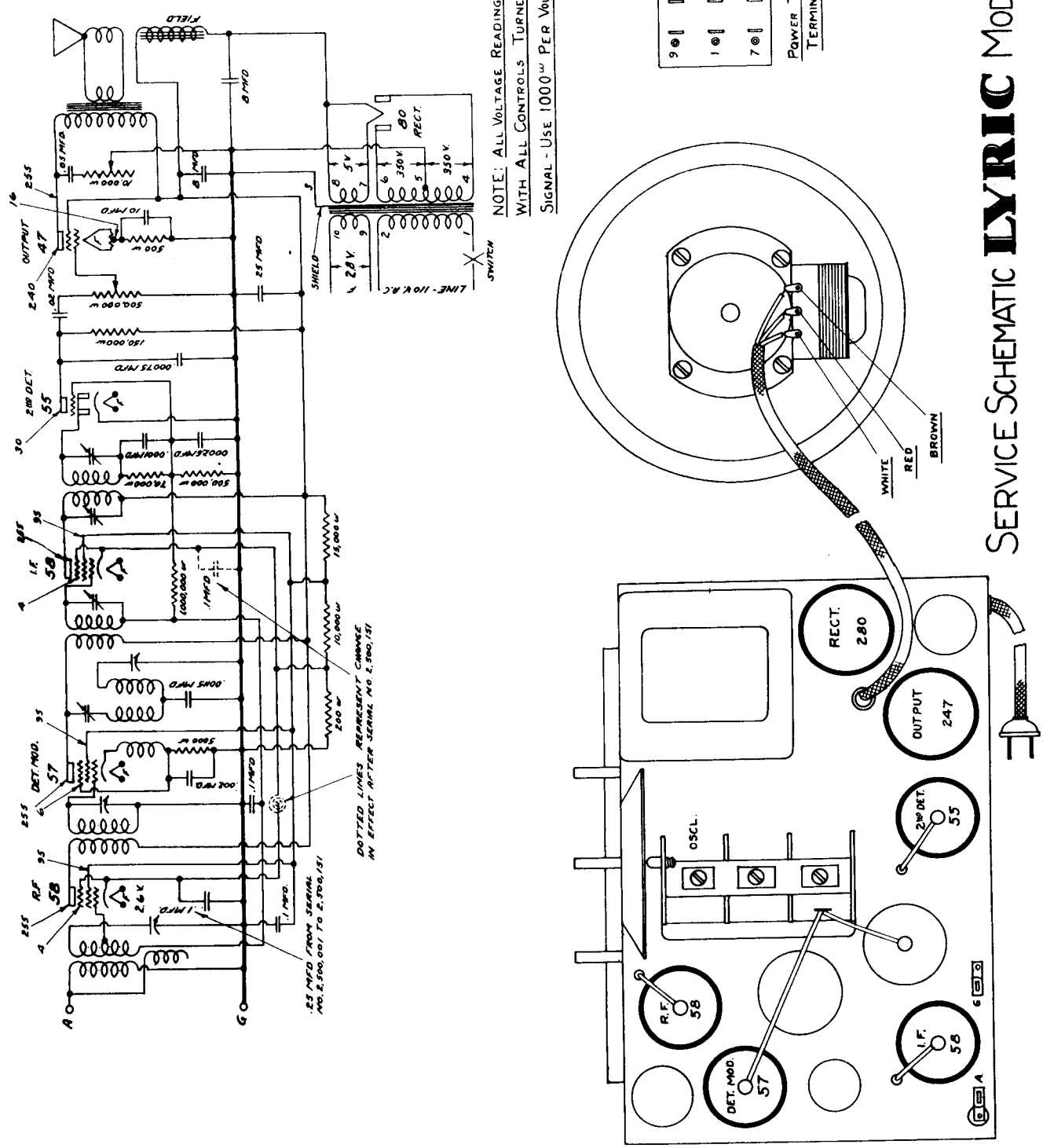


POWER TRANSFORMER
TERMINAL BOARD.



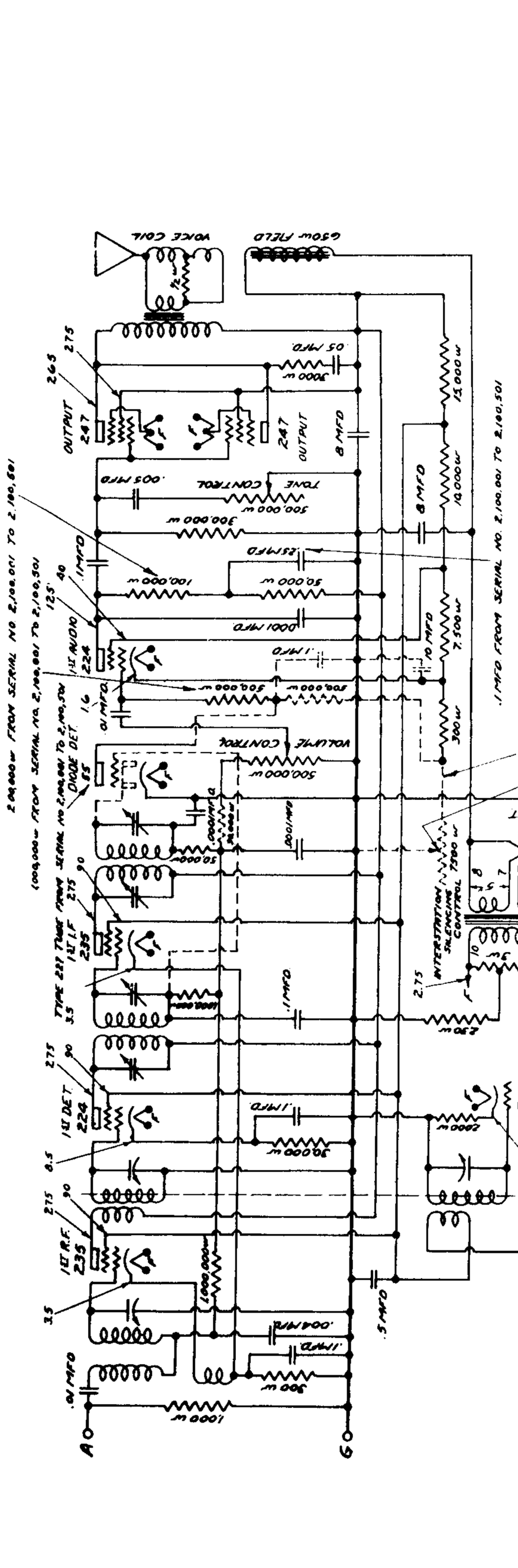
THE RUDOLPH WURLITZER MFG. CO.

SERVICE SCHEMATIC LYRIC MODEL SA-65

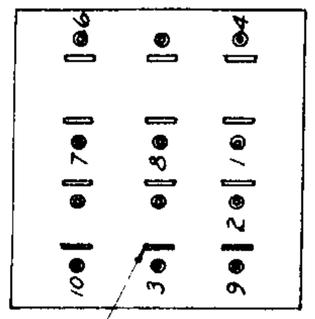


THE RUDOLPH WURLITZER MFG. CO.

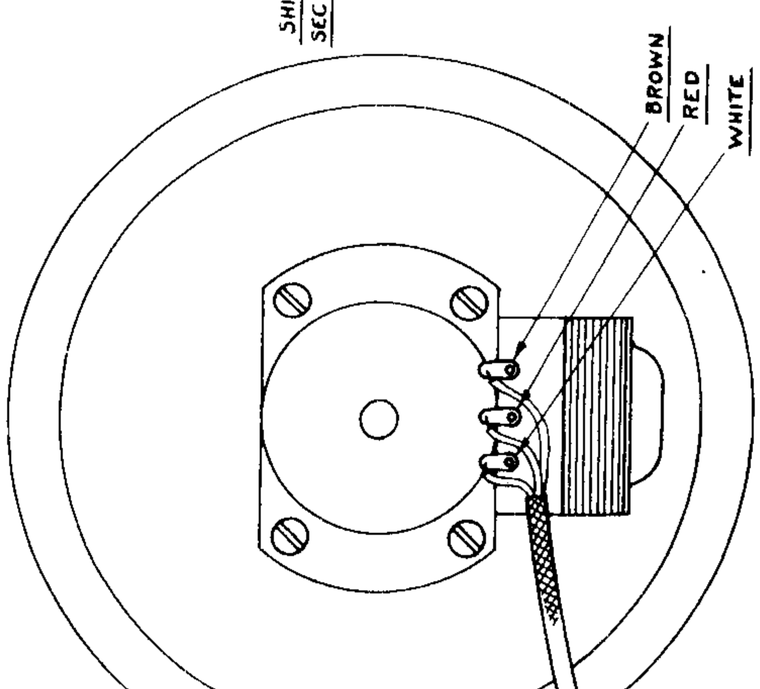
SERVICE SCHEMATIC **LYRIC** MODEL SA-90

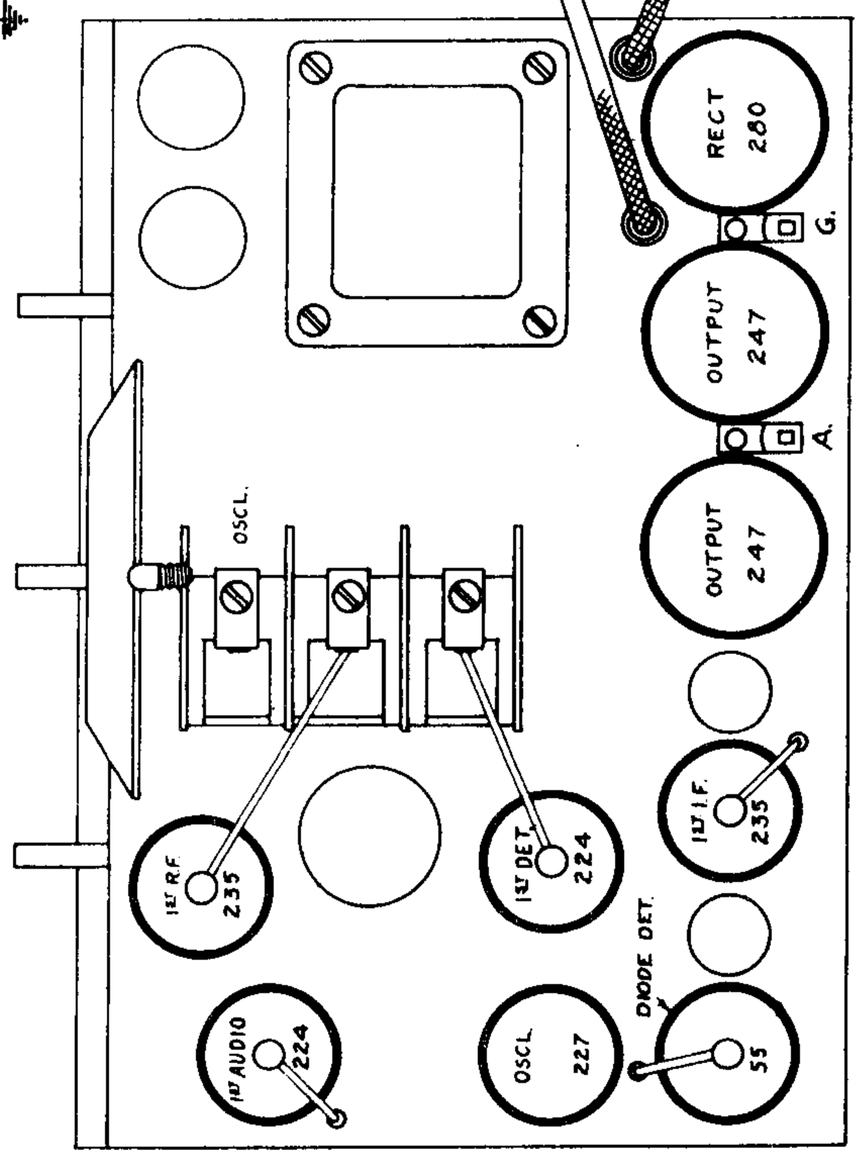


NOTE: All Voltage Readings Listed Are Taken With All Controls Turned On Full And No Signal - Use 1000ᵂ Per Volt - Voltmeter.



Power Transformer Terminal Board

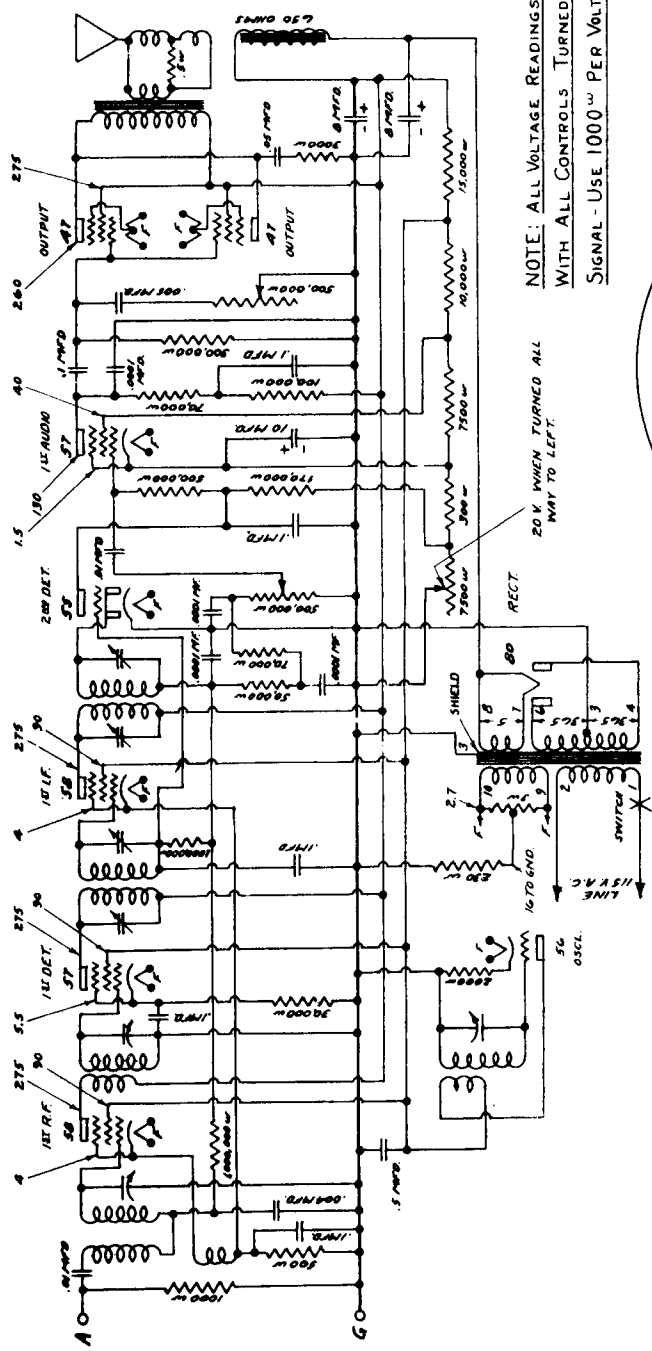


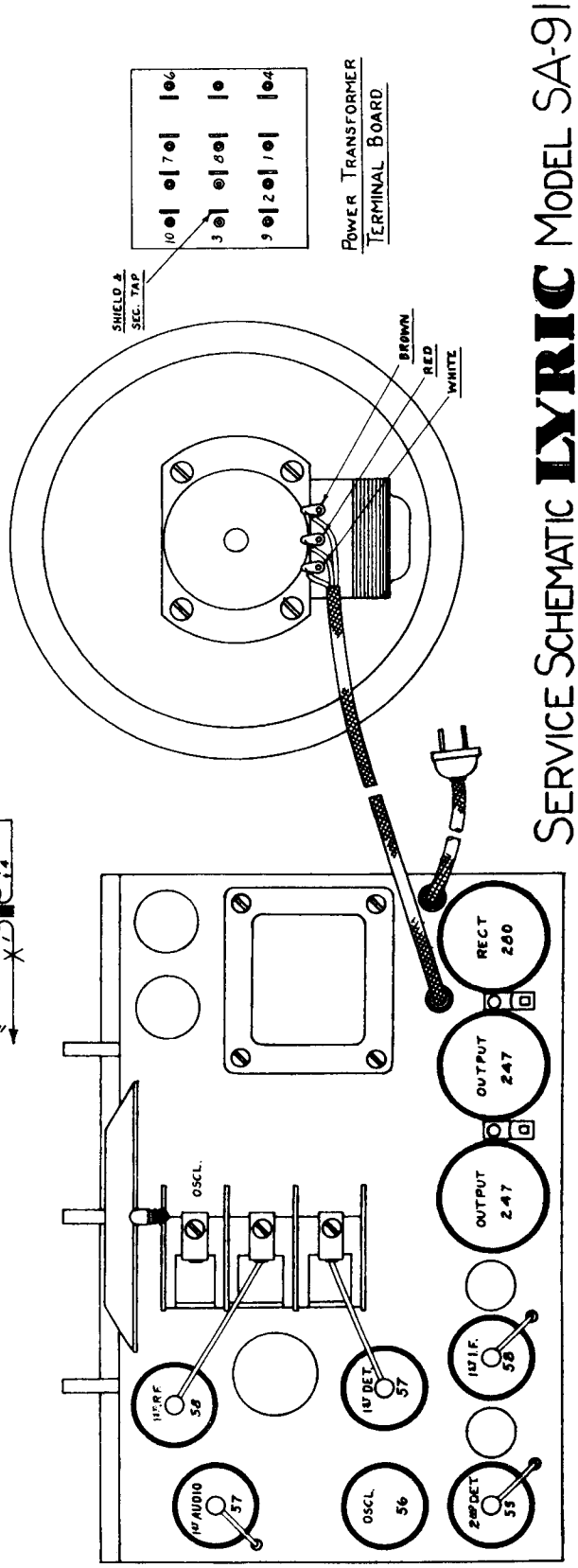


THE RUDOLPH WURLITZER MFG. CO.

SERVICE SCHEMATIC LYRIC MODEL SA-91

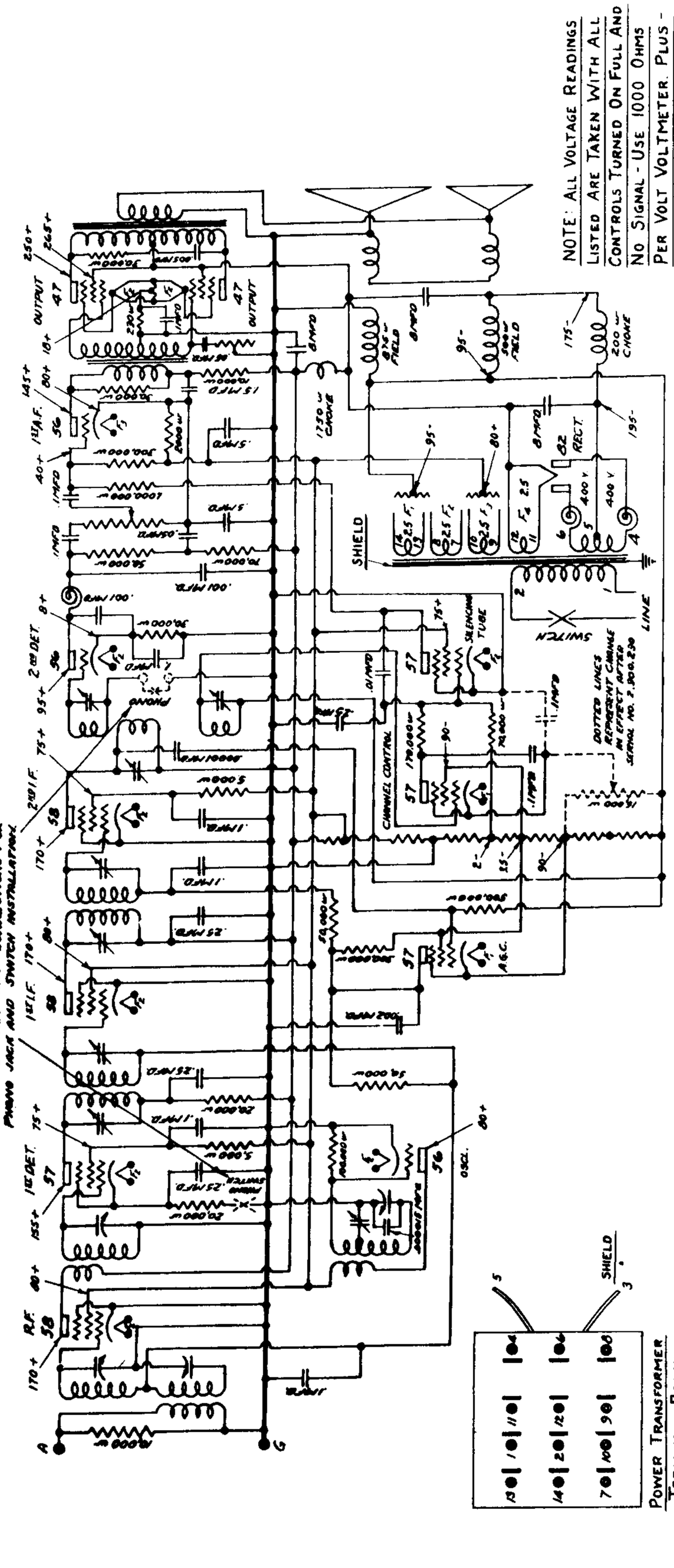
NOTE: ALL VOLTAGE READINGS LISTED ARE TAKEN WITH ALL CONTROLS TURNED ON FULL AND NO SIGNAL - USE 1000 Ω PER VOLT - VOLTMETER.

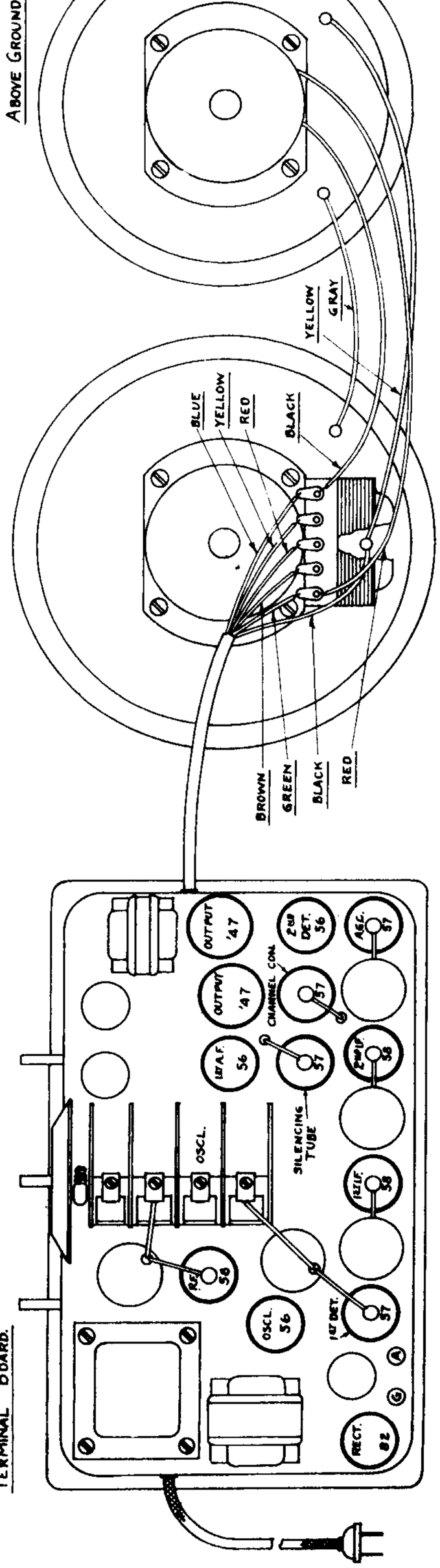




THE RUDOLPH WURLITZER MFG. CO.

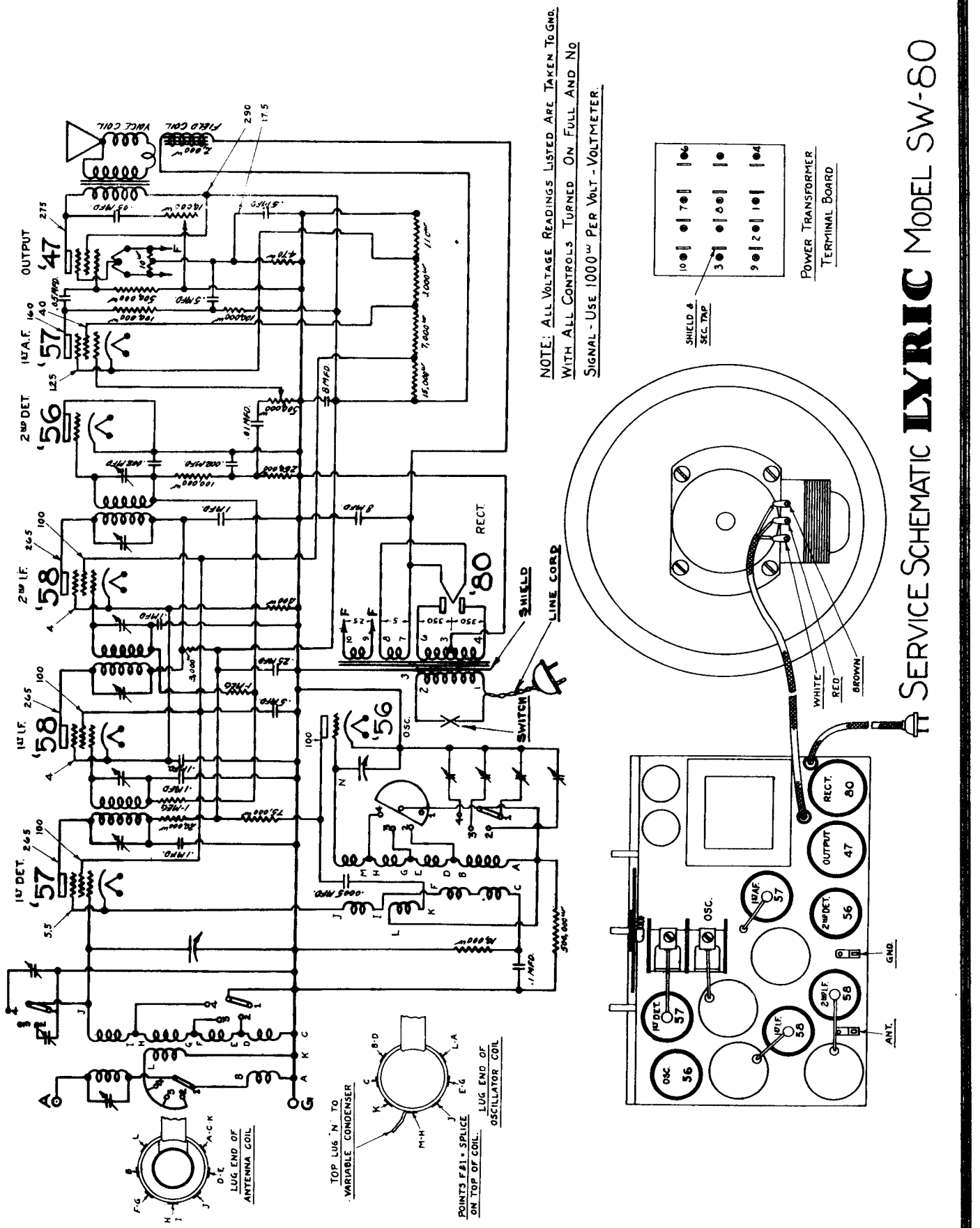
SERVICE SCHEMATIC LYRIC MODEL SA-130





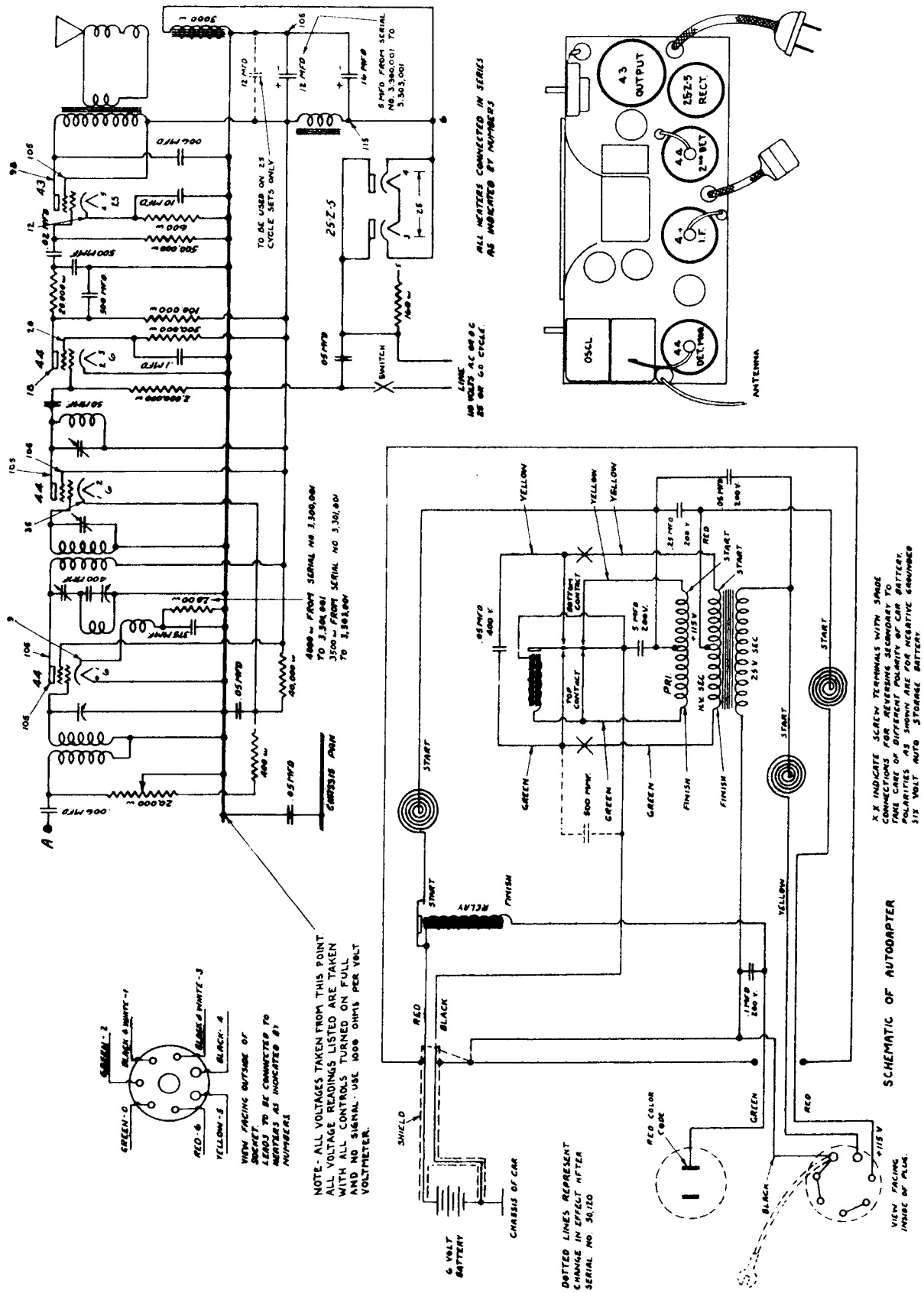
POWER TRANSFORMER TERMINAL BOARD.

THE RUDOLPH WURLITZER MFG. CO.



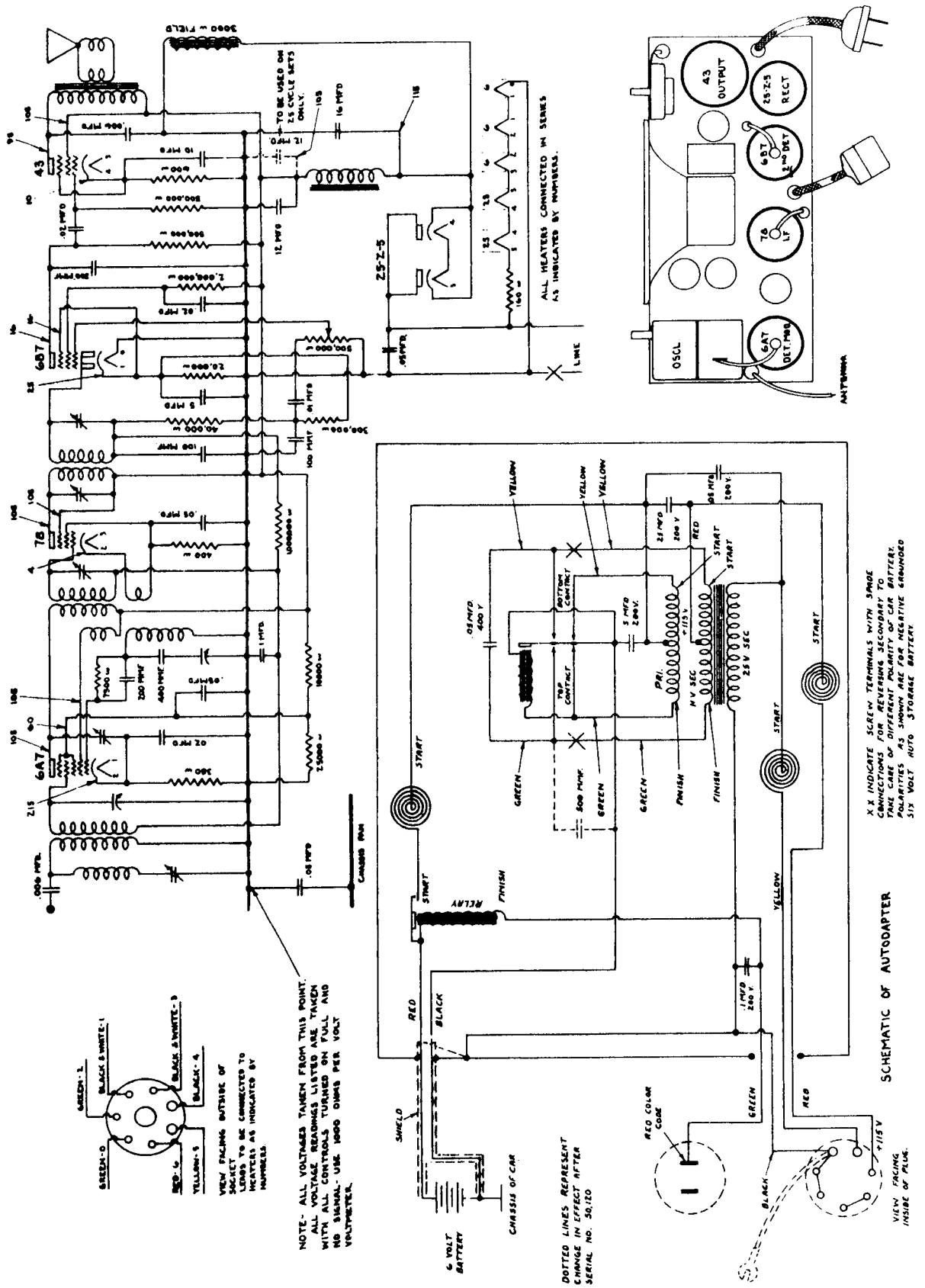
THE RUDOLPH WURLITZER MFG. CO.

SERVICE SCHEMATIC MODEL U-50

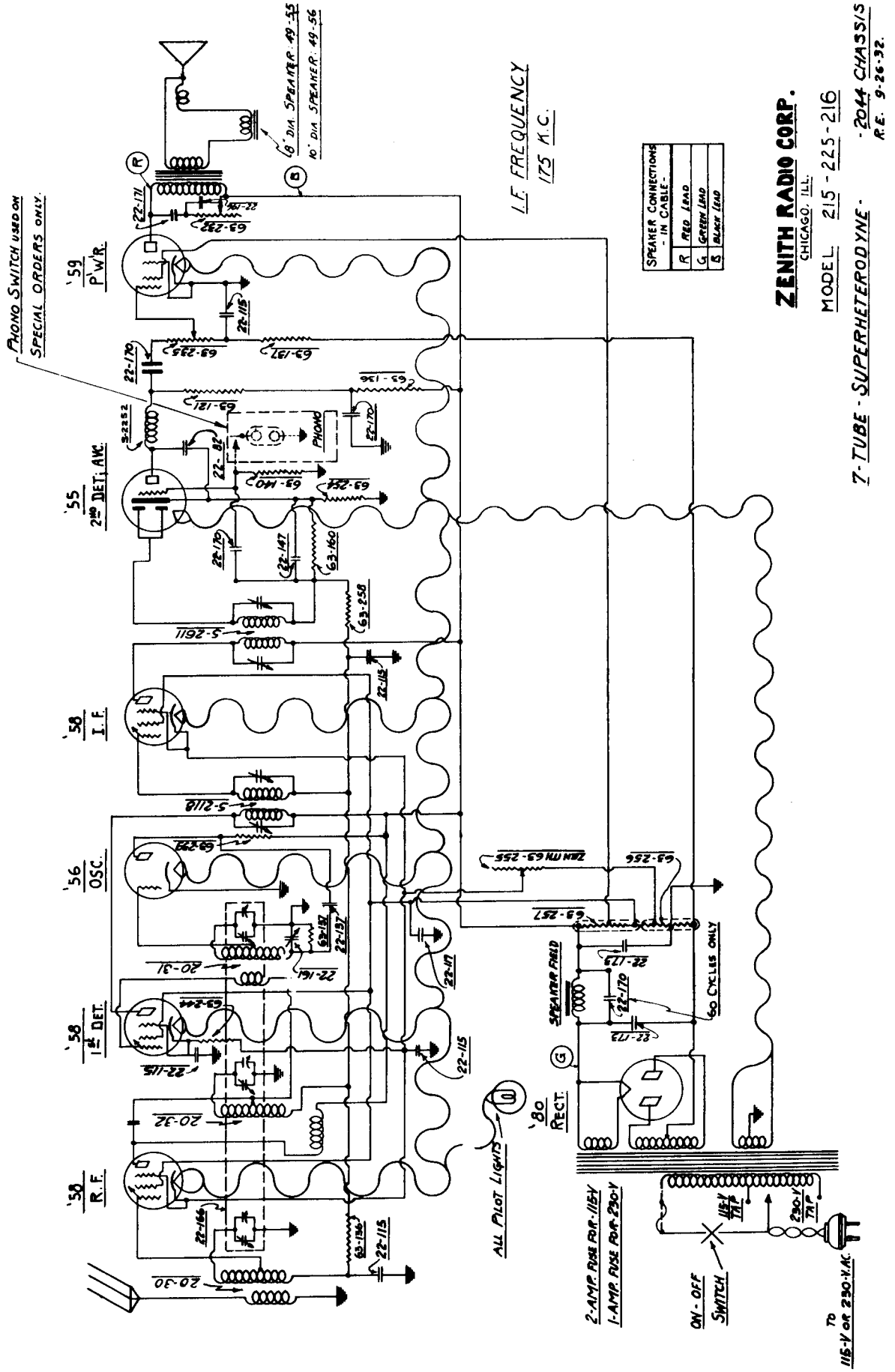


THE RUDOLPH WURLITZER MFG. CO.

SERVICE SCHEMATIC MODEL U-500



ZENITH RADIO CORP.



ZENITH RADIO CORP.

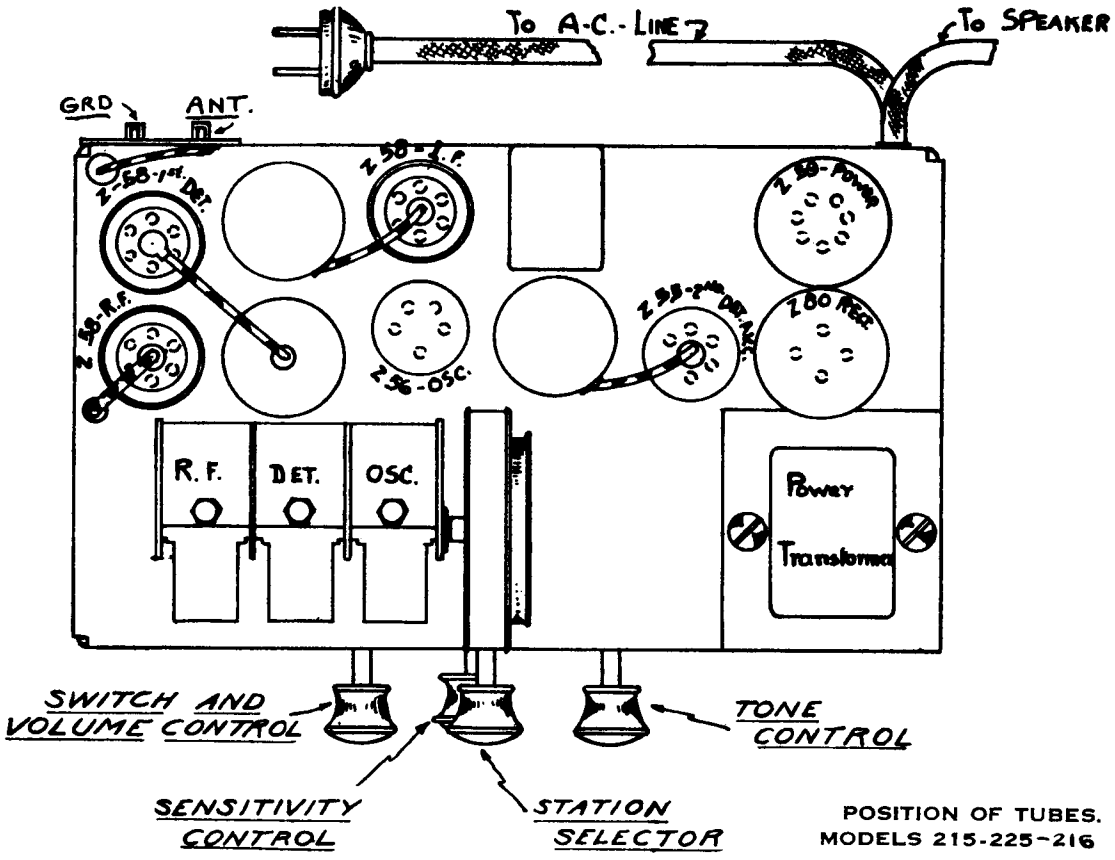
Socket Voltages — Models 215-216-225

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.5	270	8	107	8	5.8
Z-58	1st Det.	2.5	270	10	107	10	4.7
Z-56	Osc.	2.5	140	0	-	-	4.8
Z-58	I.F.	2.5	170	8	107	8	5.5
Z-55	2nd Det. AVC	2.5	70	7	-	-	1.4
Z-59	Power	2.5	250	0	250	0	26.
Z-80	Rect.	5.	360ea	-	-	-	34.ea.

Line 115 Volts — All Controls Maximum

(All readings, with exception of heaters and rectifier plates taken from socket connections to ground. Use 1,000 ohm per volt D.C. meter. Antenna disconnected).

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



POSITION OF TUBES. MODELS 215-225-216

ZENITH RADIO CORP.

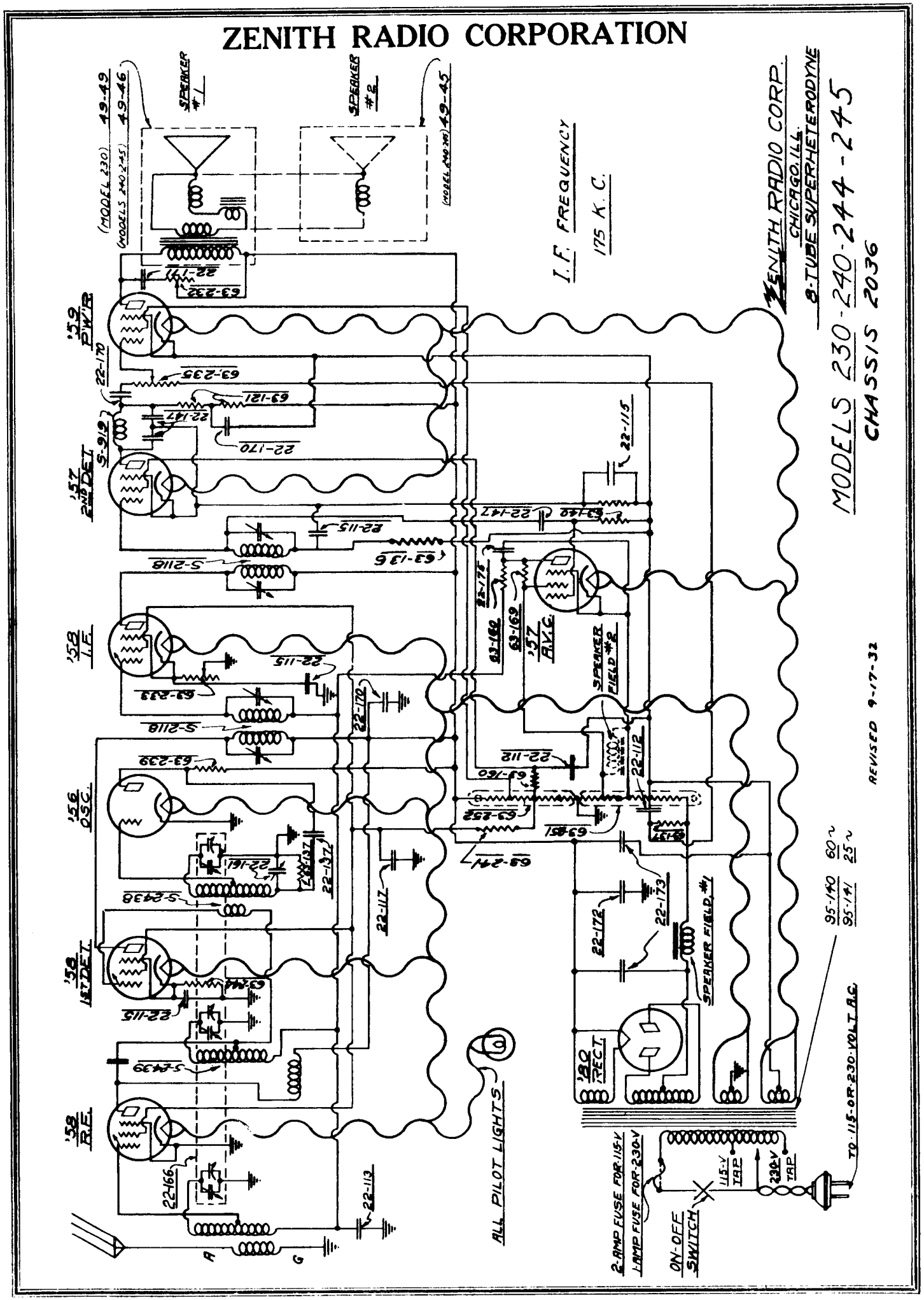
MODELS 215 216 225
CHASSIS 2044

11-3	Dial Cord.....per ft.	$ .10
22-166	Three Gang Variable Condenser.....	3.50
26-38	Celluloid Dial Strip.....	.10
80-69	Dial Cord Tension Spring.....	.01
80-89	Dial Cord Guide Spring.....	.01
100-18	2½ Volt Dial Lamp.....	.12
S-2238	Dial Drum Assembly.....	.80
22-82	.001 mfd. 500 volt.....(2nd Det. Plate).....	.20
* 22-115	.1 " 200 " .....(5 Used. See Footnote).....	.35
22-117	.5 " 300 " .....(Screen Bypass).....	.50
22-137	.05 " 400 " .....(Oscillator Plate).....	.25
22-147	.0005 " 600 " .....(2nd Det. Cathode).....	.20
22-161	Padder.....	.45
* 22-170	.1 mfd. 400 volt.....(Four Used. See Footnote).....	.25
22-171	.05 " 600 " .....(Tone Control).....	.25
22-173	8. " 500 " .....(Filter).....	1.25
22-196	.01 " 600 " .....(Tone Control).....	.12
63-121	100M ohm.....(2nd Det. Plate).....	.25
63-136	50M " .....(RF Grid, 2nd Det. Plate).....	.25
63-137	250M " .....(Osc. Bias, Power Grid).....	.25
63-140	1Meg " .....(Grid).....	.25
63-160	100M " .....(2nd Det.).....	.25
63-232	Tone Control.....	.75
63-235	Volume Control.....	1.25
63-239	24M ohm.....(Oscillator Plate).....	.25
63-244	500 " .....(1st Det. Cathode).....	.25
63-254	5M " .....(2nd Det. Grid).....	.25
63-255	Sensitivity Control.....	.75
63-256	6950 ohm.....(Voltage Divider).....	.45
63-257	8350 " .....(Voltage Divider).....	.40
63-258	490 " .....(1st Det. & I.F. Grid Return).....	.25
20-30	Antenna Coil.....	.75
20-31	Oscillator Coil.....	.85
20-32	Detector Coil.....	1.00
S-2118	1st I.F. Coil Assembly..(Without Grid Lead).....	1.75
S-2611	2nd I.F. Coil Assembly..(With Grid Lead).....	1.75
S-2252	Detector Plate Choke.....	.60

* 22-115 RF Grid; RF 1st Det. and IF Cathode; 1st Det. Suppressor; 1st Det. IF Grid Return and Power Choke.

* 22-170 2nd Det. Plate; 2nd Det. Grid Filter & Audio Coupling.

46-61	Large Tuning Knob.....	$ .10
46-62	Small Control Knob.....	.10
49-55	Dynamic Speaker for Model 215 and 216.....	7.00
49-56	Dynamic Speaker for Model 225.....	8.00
52-37	Speaker Multicable.....	.25
57-370	Escutcheon Plate.....	.30
78-56	Type 59 Tube Socket.....	.15
78-57	Type 56 Tube Socket.....	.15
78-58	Type 58 Tube Socket.....	.15
78-60	Type 80 Tube Socket.....	.15
78-61	Type 55 Tube Socket.....	.15
93-167	Upper Cushion Washer for Chassis Mounting.....	.01
95-153	Regular 117 volt 60 cycle Power Transformer.....	5.25
95-154	Combination 240 volt 117 volt 60 cycle Power Transformer.....	5.25
95-155	Regular 117 volt 25 cycle Power Transformer.....	7.50
126-109	Tube Shields.....	.10
15-16	Tube Shield Cap in AVC Tube.....	.05


ZENITH RADIO CORPORATION
MODELS 230-240-244-245
CHASSIS 2036
8-TUBE SUPERHETERODYNE
ZENITH RADIO CORP.
CHICAGO, ILL.
I.F. FREQUENCY
175 K.C.
REVISED 9-17-32
SPEAKER #1
SPEAKER #2
(MODEL 230) 49-49
(MODELS 240-245) 49-46
(MODEL 244 ONLY) 49-45
'59 PWR
'57 2ND DET
'58 I.F.
'56 OSC
'58 1ST DET
'58 R.F.
'57 A.V.C.
'30 RECT
SPEAKER FIELD #2
SPEAKER FIELD #1
ALL PILOT LIGHTS
2-AMP FUSE FOR 115-V
1-AMP FUSE FOR 230-V
ON-OFF SWITCH
115-V TAP
230-V TAP
TO 115-OR-230 VOLT A.C.
95-140 60~
95-141 25~

ZENITH RADIO CORPORATION

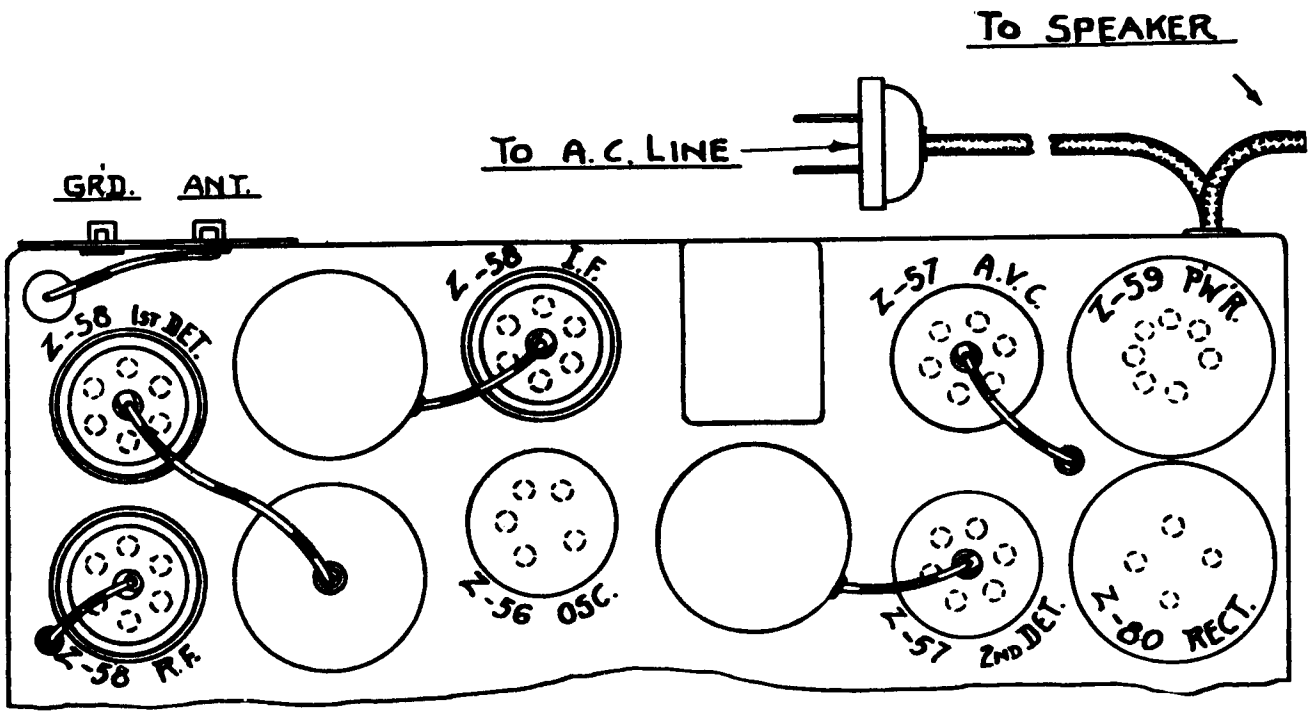
Socket Voltages — Models 230-240-245

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	190	0	95	0	7.
Z-58	1st Det.	2.4	190	2.3	95	2.3	4.
Z-56	Osc.	2.4	100	0	-	-	4.
Z-58	I.F.	2.4	190	0	90	0	2.
Z-57	2nd Det.	2.4	90	-60	70	-60	.2
Z-57	A.V.C.	2.4	-10	-65	-2	-65	0
Z-59	Power	2.4	175	-70	165	-70	25
Z-80	Rect.	5.	*350	-	-	-	*36

Line 115 Volts — All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



TUBE LAYOUT MODELS 230-240-245

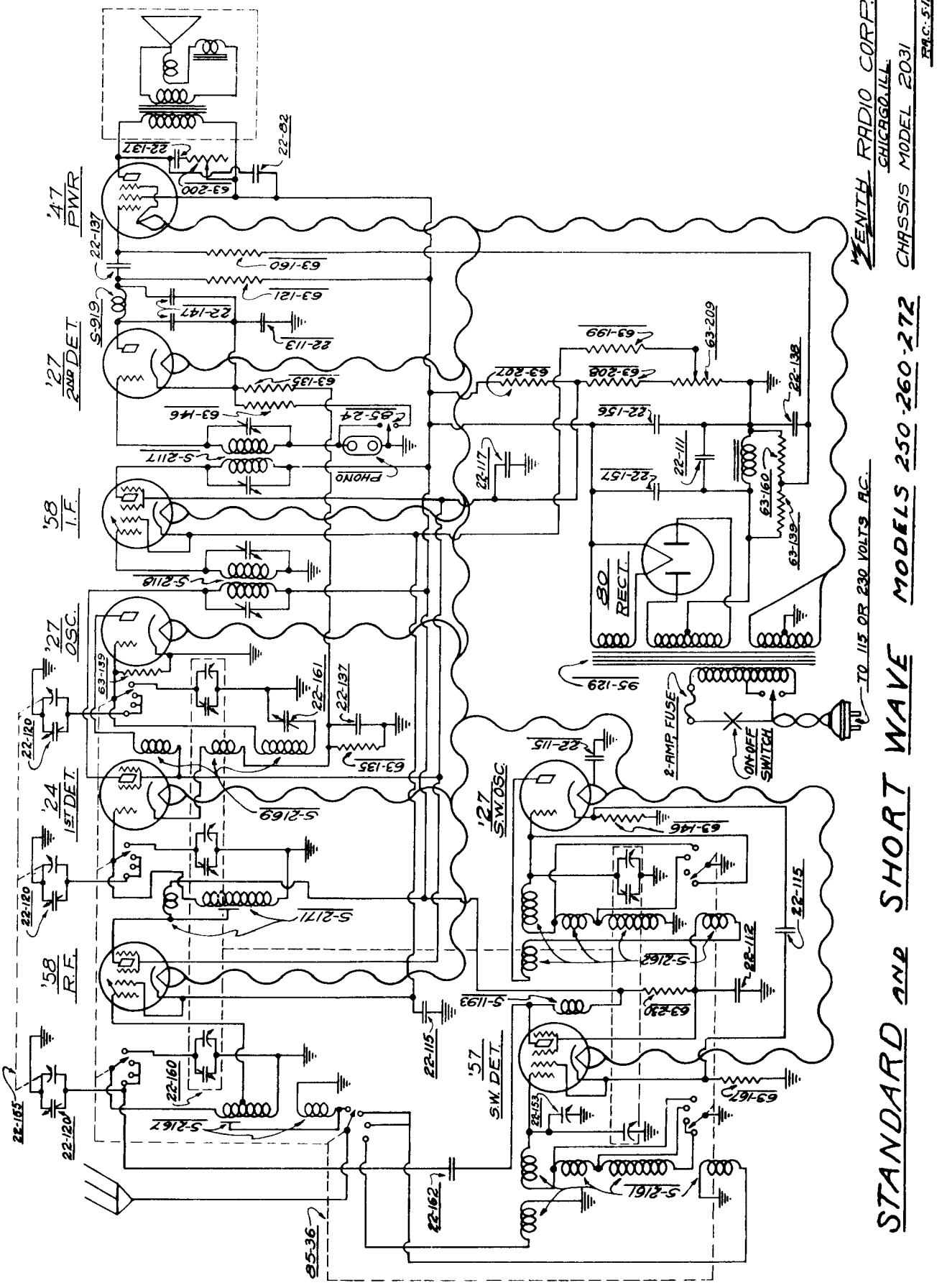
ZENITH RADIO CORPORATION

PARTS AND PRICES — MODELS 230 240 245

	Dial Assembly	
S-769	Dial Lamp Socket and Bracket (less lamp)	$ .15
S-2238	Dial Drum Assembly	.80
S-2248	Small Hypoid Gear Complete with Drive Shaft	1.25
11-3	Pulley String	per ft. .10
26-38	Celluloid Dial Strip	.10
34-23	Hypoid Drum Gear (large)	1.00
34-24	Hypoid Drum Gear (small)	1.00
80-69	Dial String Tension Spring	.01
	Condensers	
22-112	.1 mfd 300 V.(2nd Detector Screen & Power Grid)	.25
22-113	.5 " .....(R.F.1st Detector & I.F.Grid Return)	.35
*22-115	.1 " 200 V.(Four used, see below)	.35
22-117	.5 " .....(R.F.1st Detector, & I.F. Screen)	.50
22-137	.05 " 400V..(Oscillator Plate)	.25
22-147	.0005" 600 V.(2nd Detector Plate & AVC Screen)	.25
22-161	Padder	.45
22-166	Three Gang Variable	3.50
22-170	.1 mfd 400 V.(R.F. & 1st Detector Plate, 2nd Det. Plate)	.35
22-171	.05 " 600 V.(Tone Control)	.25
22-172	2. " 450 V.(Filter)	.60
22-173	8. " 500 V.(Filter)	1.25
22-175	.002 " 600 V.(A.V.C. Plate)	.25
	Resistors	
63-121	100M ohm 1 Watt.....(2nd Detector Plate)	.25
63-135	25M " 1/2 " .....(2nd Detector Cathode)	.25
63-136	50M " 1/2 " .....(2nd Detector Grid Return)	.25
63-137	250M " 1/2 " .....(Oscillator & Power Grid)	.25
63-140	1 meg " 1/2 " .....(A.V.C. Screen)	.25
63-160	100M " 1/2 " .....(A.V.C. Plate, 2nd Detector Screen)	.25
63-169	400M " 1/2 " .....(A.V.C. Grid)	.25
63-232	Manual Tone Control	.75
63-233	Manual Sensitivity Control	.75
63-235	Manual Volume Control	1.25
63-239	24M ohm 1 Watt.....(Oscillator Plate)	.25
63-241	5M " 1 " .....(R.F., 1st Detector., I.F. Screen)	.25
63-244	500 " 1/4 " .....(1st Detector Cathode)	.25
63-251	Voltage Divider.....(six tap)	.65
63-252	Voltage Divider.....(five tap)	.60
	Chokes and Coils	
S-2118	I.F. Coil Assembly	1.75
S-2437	Antenna Coil Assembly	.75
S-2438	Oscillator Coil Assembly	.85
S-2439	Detector Coil Assembly	.30
S-2252	Plate Choke and Bracket Assembly	.50
S-919	2nd Detector Choke Assembly	.60

*22-115 I.F. Cathode, 2nd Detector Grid Return, 1st and 2nd Detector Cathodes.

ZENITH RADIO CORPORATION



ZENITH RADIO CORP.

Socket Voltages — Models 250-260-272

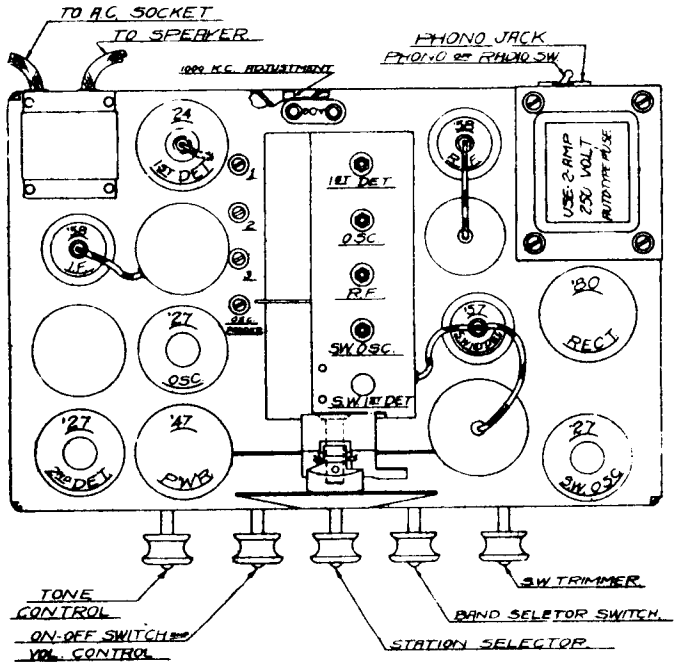
Tube Type	Position	Fil. Volts	Plate Volts	Cath. Volts	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	240	4	110	4	6.2
Z-24	1st Det.	2.4	235	8	110	-	.5
Z-57	S.W.1st Det.	2.4	235	6	150	6	.5
Z-27	S.W.Osc.	2.4	150	10	-	-	5.
Z-27	Osc.	2.4	110	0	-	-	9.
Z-58	I.F.	2.4	235	3	110	3	8.
Z-27	2nd Det.	2.4	35	4	-	-	1.8
Z-47	PWR.	2.4	215	-	230	-	28.
Z-80	Rect.	5.	110ea. to grd.				34. ea

Line 115 Volts — All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D.C. meter.)

BALANCE - Standard Wave. I.F. 175 K.C. Tuning condenser (three rear sections) 1500 K.C. Oscillator padder 600 K.C.

Short Wave. Set 1,000 K.C. adjustment shaft to the center of its tuning range and balance Short Wave I.F. trimmers (1, 2, and 3) to 1,000 K.C. with S.W. oscillator tube removed. Insert tube and place S.W. tuning on scale by adjusting S.W. oscillator trimmer on condenser gang until a station on the 1.5 to 3.75 megacycle band is resonated at its corresponding frequency on the dial.



Tube Position.

ZENITH RADIO CORPORATION

Dial Assembly

11-3	Dial Cord.....per ft.	$ .10
12-251	Dial Slide Support Bracket.....	1.25
61-23	Dial Cord Pulley.....	.15
73-8	Dial Collar Set Screw.....	.01
80-77	Dial Cord Tension Spring.....	.01
84-41	Dial Lamp Support Slide.....	.60
S-2137	Dial Pointer Mask Assembly.....	1.70
S-2164	Dial Vernier Tuning Shaft and Bracket.....	1.50
S-2165	Dial Gear and Bushing Assembly.....	1.50
S-2166	Dial Strip Support and Strip Assembly.....	2.00

Condensers

22-82	.001 Mfd 500 volt.....(Power Plate).....	.20
22-111	.03 " 600 " .....(Filter).....	.20
22-112	.1 " 300 " .....(S.W. Det. Screen).....	.25
22-113	.5 " 200 " .....(2nd Det. Plate).....	.35
22-115	.1 " 200 " .....(3 Used, See Below).....	.35
22-117	.5 " 300 " .....(R.F.Det. & I.F.Screen).....	.50
22-137	.05 " 400 " .....(3 Used, See Below).....	.25
22-138	.2 " 200 " .....(Power Grid).....	.25
22-147	.0005 " 600 " .....(2 Used, See Below).....	.25
22-153	Short Wave Variable Trimmer.....	1.00
22-155	Three Gang Variable Trimmer.....	2.40
22-156	6. Mfd Electrolytic.....(Filter).....	1.25
22-157	8. " Electrolytic.....(Filter).....	1.50
22-158	Three Section Padder.....	.75
22-160	Five Gang Variable Tuning Condenser.....	7.00
22-161	Single Padder.....	.45
22-162	.0001Mfd 600 volt.....	.20

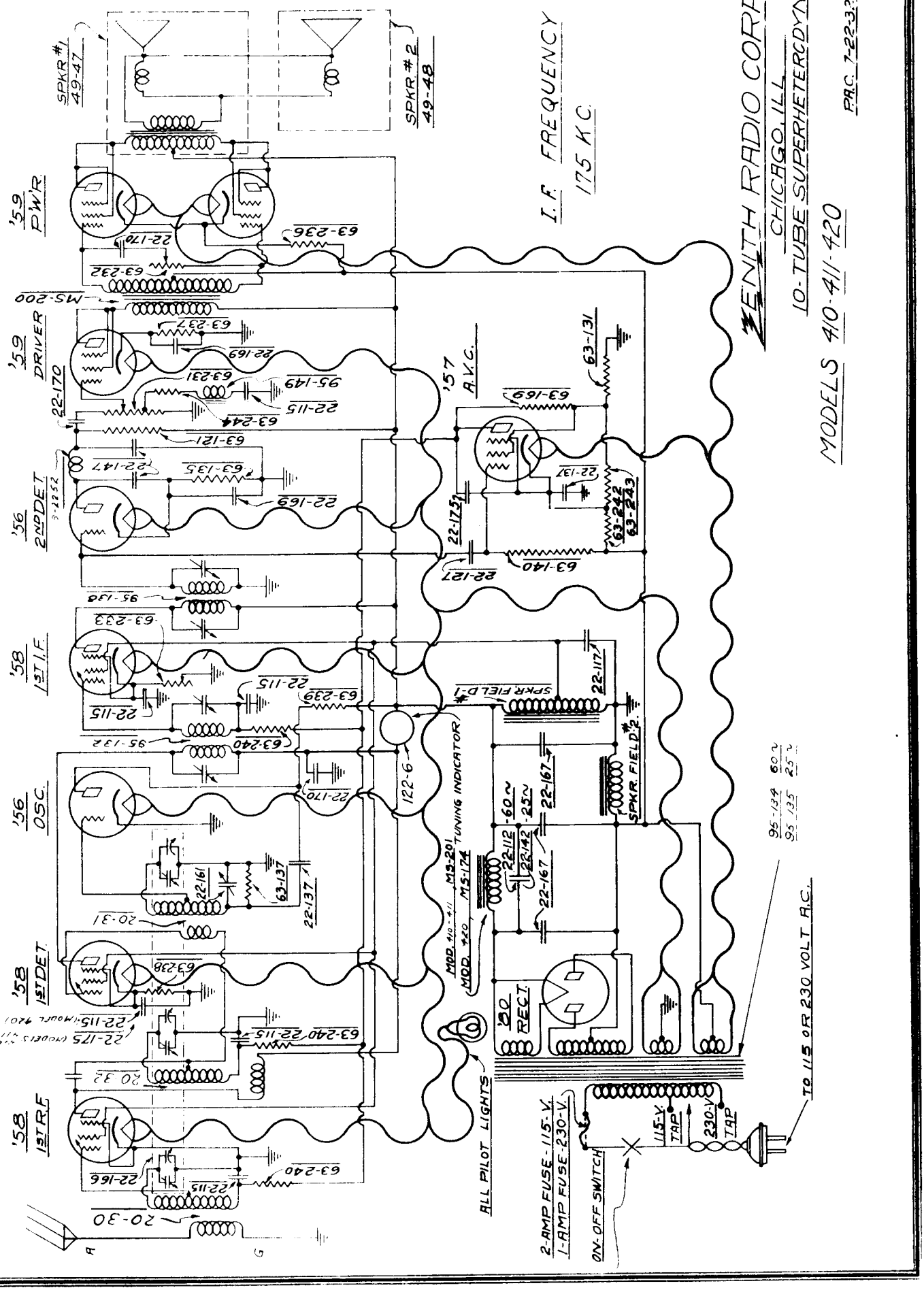
Resistors

63-121	100M ohm 1 watt.....(Det. Plate).....	.25
63-135	25M " ½ " .....(2 Used, 1st & 2nd Det. Cathode).....	.25
63-139	500M " ½ " .....(2 Used, Power Grid, Osc. Grid).....	.25
63-146	2M " ½ " .....(S.W.OSc. Grid, 2nd Det. Cathode)....	.25
63-160	100M " ½ " .....(Power Grid).....	.25
63-167	8M " 1 " .....(S. W. Det. Cathode).....	.25
63-199	150 " .....(R.F., I.F. Cathode).....	.25
63-200	Tone Control.....	.80
63-207	10M ohm ½ watt.....(Voltage Divider).....	.30
63-208	12M " .....(Voltage Divider).....	.25
63-209	Volume Control and Switch Assembly.....	1.25
63-230	15M ohm .....(S. W. Det. Screen).....	.35

22-115	S.W.Coupling,S.W.Oscillating Filter, and R.F.Cathode
22-137	1st Detector Cathode, Audio Coupling, and Tone Control
22-147	2nd Detector Plate

S-919	2nd Detector Plate Choke.....	$ .60
S-1193	S.W.Detector Plate Choke.....	.50
S-2117	2nd I.F. Coil Assembly.....(No Grid Lead).....	1.75
S-2118	1st I.F. Coil Assembly.....(With Grid Lead).....	1.75
S-2161	Detector S. W. Coil.....(Mounted above Chassis).....	1.25
S-2162	Oscillator S. W. Coil.....(Mounted under Chassis).....	1.25
S-2167	1st R.F. Coil Assembly.....	1.25
S-2169	Oscillator Coil L.W.....	.80
S-2171	1st Detector Coil L.W.....	1.25

ZENITH RADIO CORPORATION



ZENITH RADIO CORPORATION

Socket Voltages

Models 410-411-420

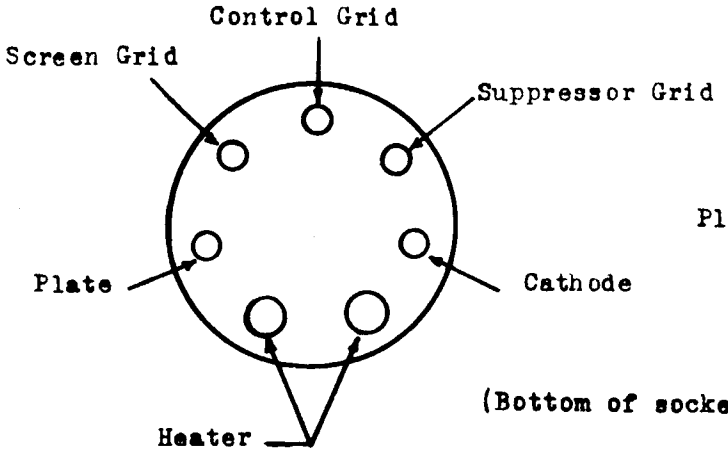
Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.5	220	0	100	0	5.2
Z-58	1st Det.	2.5	220	+2	100	+2	3.
Z-56	Osc.	2.5	120	0	0	*	4.
Z-58	I.F.	2.5	220	0	100	0	6.
Z-56	2nd Det.	2.5	120	20	0	*	.75
Z-57	A.V.C.	2.5	-40	-75	-2	-75	0
Z-59	Driver	2.5	220	+25	220	+220	8.2
Z-59	Power	2.5	230	-65	230	+230	25.
Z-59	Power	2.5	230	-65	230	+230	25.
Z-80	Rect.	5.0	400*				62.5*

Line 115 Volts

All Controls Maximum

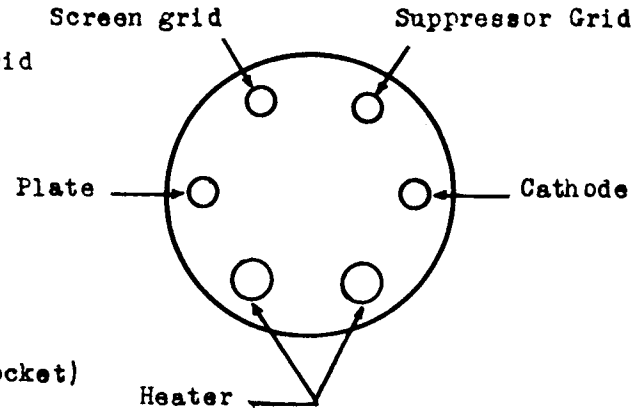
(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter).

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



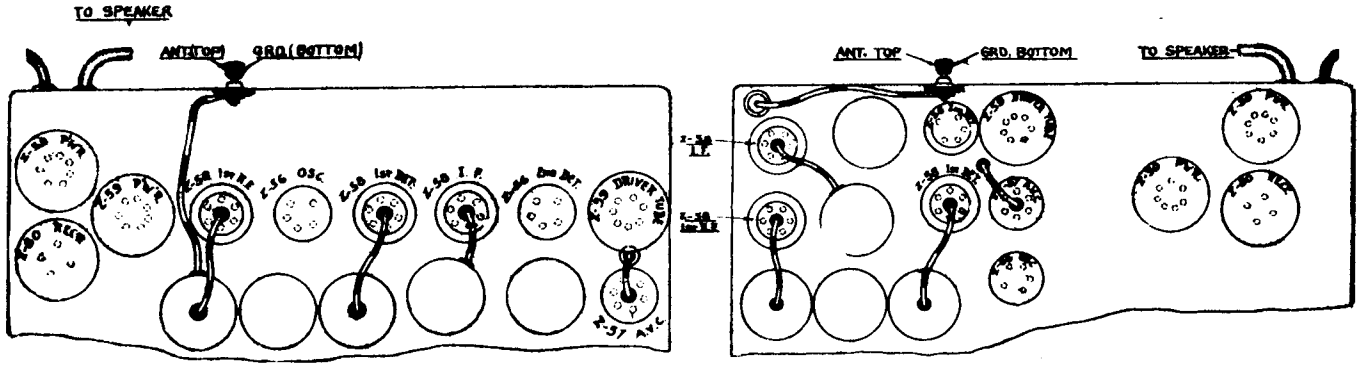
7 Prong Type '59

(Bottom of socket)



6 Prong Type '57-'58

SOCKET CONNECTIONS



Model 420 SOCKET LAYOUT Models 410-411

ZENITH RADIO CORPORATION

PARTS AND PRICES
MODELS 410 411 420
CHASSIS #2030 - 2043

	Dial and Meter Assembly	
11-3	Dial Pulley String.....per ft.	$ .10
26-37	Dial Strip.....	.15
34-23	Large Hypoid Gear (Model 420 Only).....	.30
34-24	Small Hypoid Gear (Model 420 Only).....	.15
59-16	Volume Control Pointer.....	1.00
59-17	Tone Control Pointer.....	1.00
80-69	Dial String Tension Spring.....	.01
80-84	Volume and Tone Control Pointer Spring.....	.01
80-86	Volume and Tone Control Friction Spring.....	.01
83-272	Volume Control Dial Strip.....	.10
83-273	Tone Control Dial Strip.....	.10
83-277	Pointer Guide Strip.....	.01
100-18	Pilot Lamp.....	.12
122-6	Shadowgraph Meter.....	2.00
S-2255	Tone Control Pointer Cam.....	.25
S-2256	Volume Control Pointer Cam.....	.25
S-2265	Dial Drum Assembly.....	1.00
	Condensers	
22-112	.1 mfd 300 volt (Filter).....	.25
22-115	.1 " 200 " (Six used, see footnote).....	.35
22-117	.5 " 200 " (Filter).....	.50
22-127	.000025 600 " (A. V. C. Grid).....	.35
22-137	.05mfd 400 " (Oscillator Plate).....	.25
22-142	.4 " 300 " (Filter 25 Cycle Only).....	.40
22-147	.0005 600 " (2nd Detector Plate).....	.20
22-161	Padder.....	.45
22-166	Three Gang Variable.....	3.50
22-167	8. mfd 500 volt (Filter).....	1.50
22-169	8. " 50 " (2nd Det. and Driver Cathodes).....	.55
22-170	.1 " 400 " (1st Det. plate, Audio Coup., Tone Control)..	.25
22-175	.002" 600 " (1st Det. cathode - Models 410-411 only).....	.20
	Resistors	
63-121	100M ohm 1 watt (2nd Detector Plate).....	.25
63-135	50M " 1 " (2nd Detector Cathode).....	.25
63-137	250M " ½ " (Oscillator Grid).....	.25
63-140	1 meg" ½ " (A. V. C. Grid).....	.25
63-169	400 " ½ " (A. V. C. Plate).....	.25
63-231	Volume Control Assembly.....	1.25
63-232	Tone Control Assembly.....	.75
63-233	Sensitivity Control.....	.75
63-236	500 ohm.....(Power Bias) (Wide Metal).....	.25
63-237	1500 " .....(Driver Bias) (Narrow Metal).....	.25
63-238	1M " ¼ watt (1st Detector Cathode).....	.25
63-239	24M " 1 " (Oscillator Plate).....	.25
63-240	1900 " ¼ " (R.F., 1st Detector and I.F. Grids).....	.25
63-242	2500 " ½ " (A. V. C. Cathode).....	.25
63-243	18M " 1 " (A. V. C. Cathode).....	.25
63-244	500 " ¼ " (Acoustic Filter).....	.25

*22-115 R. F., 1st Detector, I. F. Grid Return, I. F. Cathode, Acoustic Filter, (1st Detector Cathode Model 420 Only).

ZENITH RADIO CORPORATION

PARTS AND PRICES
MODELS 410 411 420

CHASSIS #2030 2043
PAGE - 2 -

Coils

20-30	Antenna Coil	$ .75
20-31	Oscillator Coil	.85
20-32	Detector Coil	1.00
S-2252	Plate Choke and Bracket	.50
95-132	1st I. F. Transformer (With Grid Lead)	1.25
95-138	2nd I. F. Transformer (Without Grid Lead)	1.25

Miscellaneous

46-49	Large Control Knob	.20
46-55	Small Control Knob	.15
49-47	Dynamic Speaker with Transformer	7.00
49-48	Dynamic Speaker without Transformer	8.25
52-35	Speaker Multicord	.35
57-341	Escutcheon Plate	.35
78-56	Type 59 Socket	.15
78-57	Type 56 Socket	.15
78-58	Type 58 Socket	.15
78-59	Type 57 Socket	.15
78-60	Type 80 Socket	.15
93-167	Upper Cushion Washer for Chassis Mounting	.01
93-168	Lower Cushion Washer for Chassis Mounting	.01
95-134	115 Volt 50-60 Cycle Power Transformer	5.50
95-136	115 Volt 25-30 Cycle Power Transformer	7.75
95-149	Accoustic Filter Choke	.30
126-109	Small Tube Shield	.10
136-2	2 amp Fuse	.06
MS-174	Power Choke (Model 420 Only)	3.25
MS-200	Push Pull Input Transformer	3.50
MS-201	Power Choke (Models 410-411 Only)	3.25

PARTS AND PRICES
(Page - 2)

MODELS 230 240 244 245

Miscellaneous

46-49	Large Knob for Model 240 - 245	$.15
46-55	Small Knob for Model 240 - 245	.15
46-61	Large Knob for Model 230	.10
46-62	Small Knob for Model 230	.10
49-45	Dynamic Speaker for Model 240 - 245 (without transformer)	6.00
49-46	Dynamic Speaker for Model 240 - 245 (with transformer)	8.00
49-49	Dynamic Speaker for Model 230	7.00
52-32	Speaker Multicord	.35
57-326	Escutcheon Plate for Model 230	.30
57-353	Escutcheon Plate for Model 240 - 245	.30
78-56	59, 7 Prong Tube Socket	.15
78-57	56, 5 Prong Tube Socket	.15
78-58	58, 6 Prong Tube Socket	.15
78-59	57, 6 Prong Tube Socket	.15
78-60	80, 4 Prong Tube Socket	.15
95-140	110 Volt 50 - 60 cycle Power Transformer	5.00
95-141	110 Volt 25 - 30 cycle Power Transformer	6.75
95-150	110 Volt - 220 Volt 50 - 60 Cycle Power Transformer	5.00
136-2	2 amp Fuse.....(For 110 Volt Transformer)	.06
136-4	1 amp Fuse.....(For 220 Volt Transformer)	.06
126-109	Tube Shield.....(Small)	.10
MS-196	Tube Shield.....(Large for Model 240 - 245 only)	1.25
S-1183	Antenna and Ground Mounting Plate Assembly	.25

ZENITH RADIO CORPORATION

ZENITH MODELS 430 AND 440 12-TUBE SUPERHETERODYNE

(Dual reproducers, Zenith class AAA A.F. power amplifier; illuminated auto type full-vision control escutcheons; 540 to 1750 kc.—121 channels, including police band; silent tuning; A.V.C.; low-volume tone compensator; "shadowgraph" tuning; tone control; 110 V. or 220 V. line.)

The newest product of Zenith Radio Corp. is the model 430 receiver; equipped with the Zenith automatic tuning device, it is the model 440. The outstanding feature of this set is the "class AAA" system of A.F. amplification used.

Tube Type	Fil. Volts	C.-G Volts	S.-G Volts	Sup.-G Volts	Plate Volts	Plate Ma.
V1	2.5	2.2	75	2.2	175	5.7
V2	2.5	4.5	75	4.5	190	2.3
V3	2.5	0	....	....	100	3.5
V4	2.5	2.2	75	2.2	200	5.5
V5	2.5	10	....	....	110	.3
V6	2.5	80	....	....	170	.8
V7	2.5	20	190	190	190	....
V8	2.5	-70	195	195	195	....
V9	2.5	-70	195	195	195	13
V10	2.5	-85	....	-85	....	22
V11	2.5	13	75	13	30	22
V12	5.0	....	....	....	360	65

Line potential, 115 V.; all controls maximum. All tube readings, except heaters, are socket to ground, using 1,000-ohms-per-volt D. C. meter.

Resistor R1, manual volume control, 0.5-meg., total, tapped at 0.4-meg. from ground end; R2, tone control, 0.5-meg.; R3, quiet-tuning control, 400 ohms; R4, R6, R10, 1,900 ohms; R5, 150 ohms; R7, R25, 1,500 ohms; R8, R17, 0.25-meg.; R9, R16, 24,000 ohms; R11, R12, 50,000 ohms; R13, 0.1-meg.; R14, R18, 500 ohms; R15, 8,000 ohms; R19, R20, 1.meg.; R21, 2,500 ohms; R22, 18,000 ohms; R23, R24, 400 ohms.

Condensers C1, C2, C3, tuning gang; C1A, C2A, C3A, tuning trimmers; C4 to C7, I. F. trimmers; C8, L. F. padder; C9, H. F. coupling condenser; C10, C11, C12, .2-mf.; C13, 0.1-mf.; C14, C15, C16, C17, C19, C20, C24 (25 cycles, 0.4-mf.), C30, C31, C35, .1-mf.; C18, .05-mf.; C21, C22, C23, C25, C26, C27, 8 mf.; C28, 0.5-mf.; C29, 25 mmf.; C32, C33, 500 mmf.; C34, .002-mf.

The condenser gang in this receiver is aligned at 1,500 kc.; the oscillator padder is aligned at 600 kc.

Field coil No. 1 has a resistance of 1,600 ohms; field coil No. 2 has a resistance of 2,000 ohms for section A and 3,500 ohms for section B. Choke Ch.2 has a resistance of 400 ohms.

There are no circuit changes or switches in this receiver for the reception of police calls. The tuning dial, itself, actually takes in the police frequencies since it covers a total range of 540 to 1,750 kc.

"Shadowgraph" tuning is effected by means of a vane fastened to a meter movement connected in the plate supply circuit to tubes V1, V2, V3. The incoming signal causes this "meter" to move in the usual manner, thus twisting the vane so that it either obstructs the light and casts a wide shadow (off resonance), or permits the light to pass, casting a shadow no wider than the thickness of the vane (exact resonance of the tuned circuits).

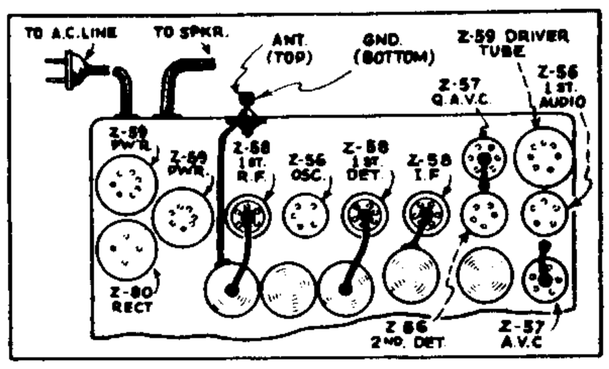
Class AAA A.F. amplifier is the Zenith designation for a system employing three power tubes, each of which are biased as class A amplifiers, one of which is used to drive the other two in push-pull. If the grids were overdriven with the usual type of coupling transformer, having a high secondary impedance, between the driver and the output tubes and the push-pull grids overdriven, extreme distortion would take place. This difficulty is overcome by employing a special transformer of step-down ratio having larger wire and much less resistance in its secondary. This transformer is a very important part of the system. With such an arrangement it is possible to drive the grids of the power tubes positive without introducing distortion, because of the driver being a power tube and capable of supplying the necessary current on such peaks. The primary of this transformer has a higher impedance than is normally used, which value is somewhat reduced as the impedance changes in the secondary, when the power grids are driven positive. Its impedance, however, at the lowest value, still matches the driver plate circuit. It should be remembered that in an ordinary class A amplifier distortion enters when the grids are driven positive by virtue of the previous tube not supplying sufficient power for grid excitation of the output tubes. In other words, in class A, voltage on the power grids is available as long as they do not go positive. As soon as they are driven past zero in that direction the previous amplifier can no longer supply the necessary power.

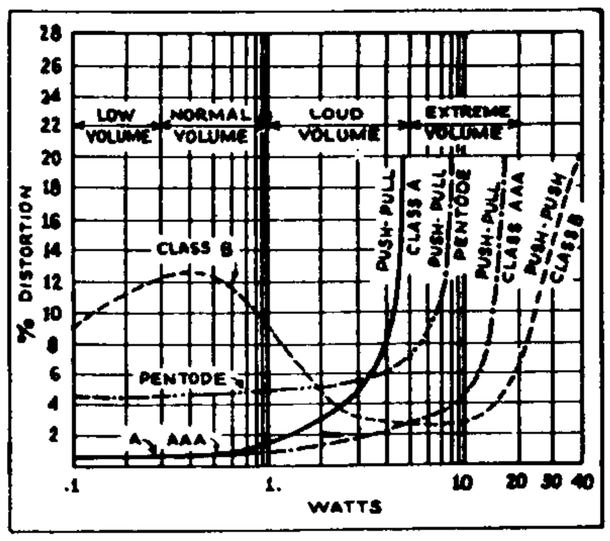
Summing up the above, the triple A amplifier is a combination of both class A and class B. The exception being that the tubes are biased as class A, but by virtue of the power delivered by the driver and the special coupling transformer, sufficient power is supplied for the power tube to draw grid current and still prevent distortion as in the class B amplifier.

Many set analyzers will not accommodate the new tubes, consequently, all voltage readings are to ground. Thus, for instance, the actual voltage on the plates of the power tubes is 295 V.

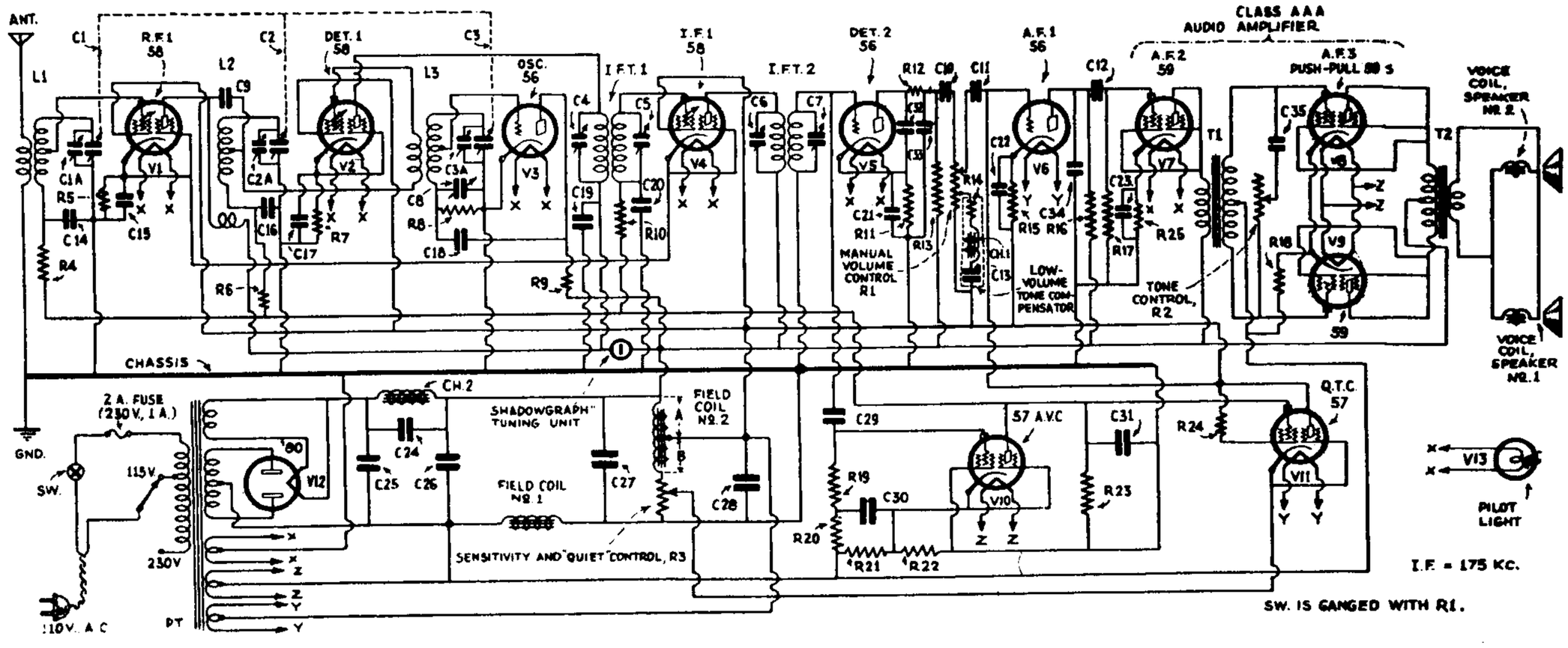
The two reproducers are similar in construction but one is peaked at 90 cycles and the other at 70 cycles. (This is done to cancel the natural period of each reproducer.) The paralleled voice coils result in four times the power obtainable from a single reproducer, states the manufacturer.

An overall sensitivity of less than one-half microvolt-per-meter is obtained with an undistorted power output of 15 watts. The total line consumption at 115 V. is 125 W.

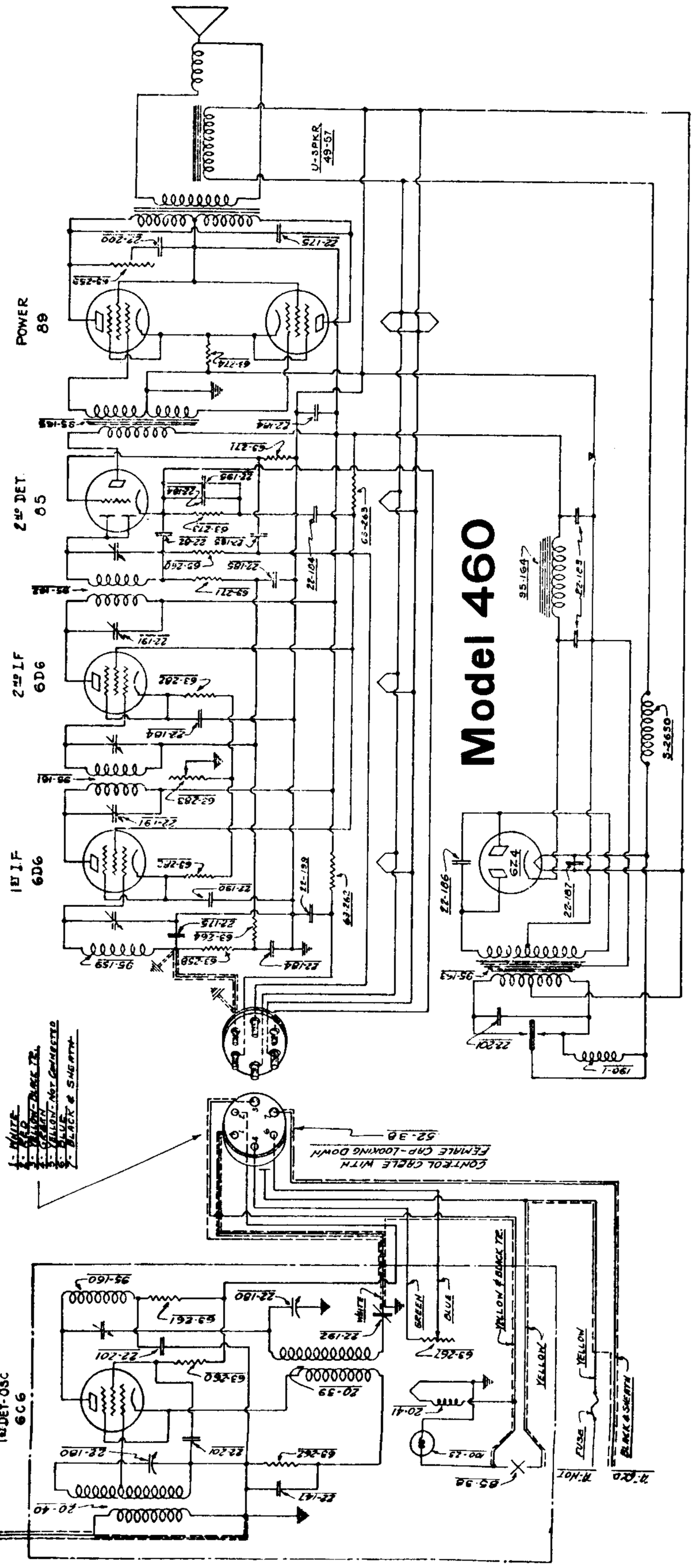




Above, Arrangement of the tubes in the "430." Right, Comparative figures indicating the effectiveness of A.F. amplifiers classes A, push-pull; B, push-push; pentodes in push-pull, and AAA, push-pull. Watts rating, respectively, 4.3 W., 0.8- to 24 W., 6.3 W., 14.2 W.



ZENITH RADIO CORP.



TUBE OPERATING VOLTAGES

Position	Tube	Ef	Ek	E_{g^1}	E_{g^2}	E_{g^3}	Ep
1st Detector	6C6	4.8	6.5	0	6.5	120	150
1st I.F. Amp.	6D6	5.3	10.5	*	10.5	103.5	165
2nd I.F. Amp.	6D6	5.3	10.5	*	10.5	103.5	165
2nd Detector	85	5.3	8.	0	—	—	156
P. P. Audio	89	5.3	17.	0	17.	165	165
	89	5.3	17.	0	17.	165	165

f—Filament. k—Cathode. g^1—Control grid. g^2—Suppressor grid. g^3—Screen grid. p—Plate.
*Depends on applied signal strength. All voltages measured from indicated points to ground.

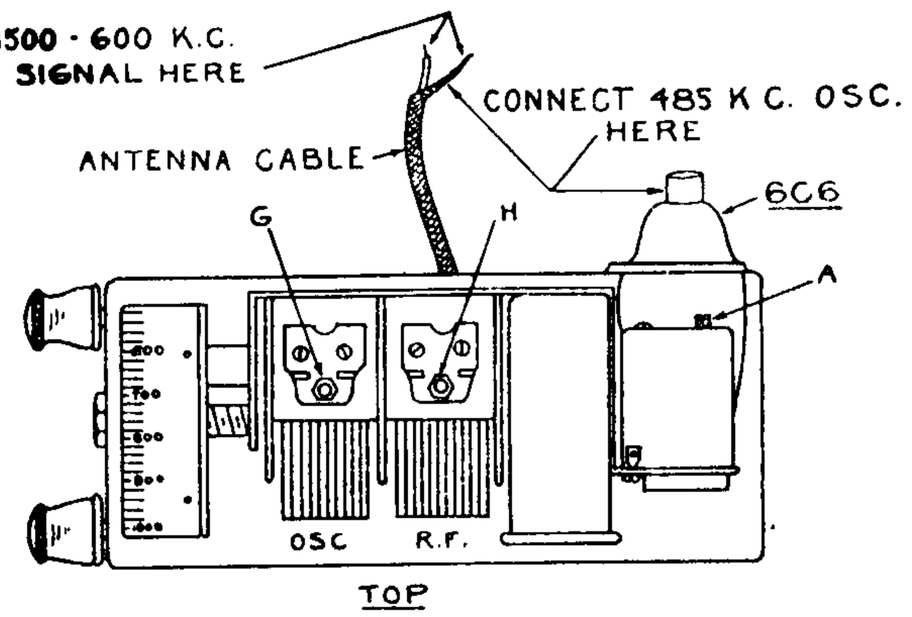
ZENITH RADIO CORP.

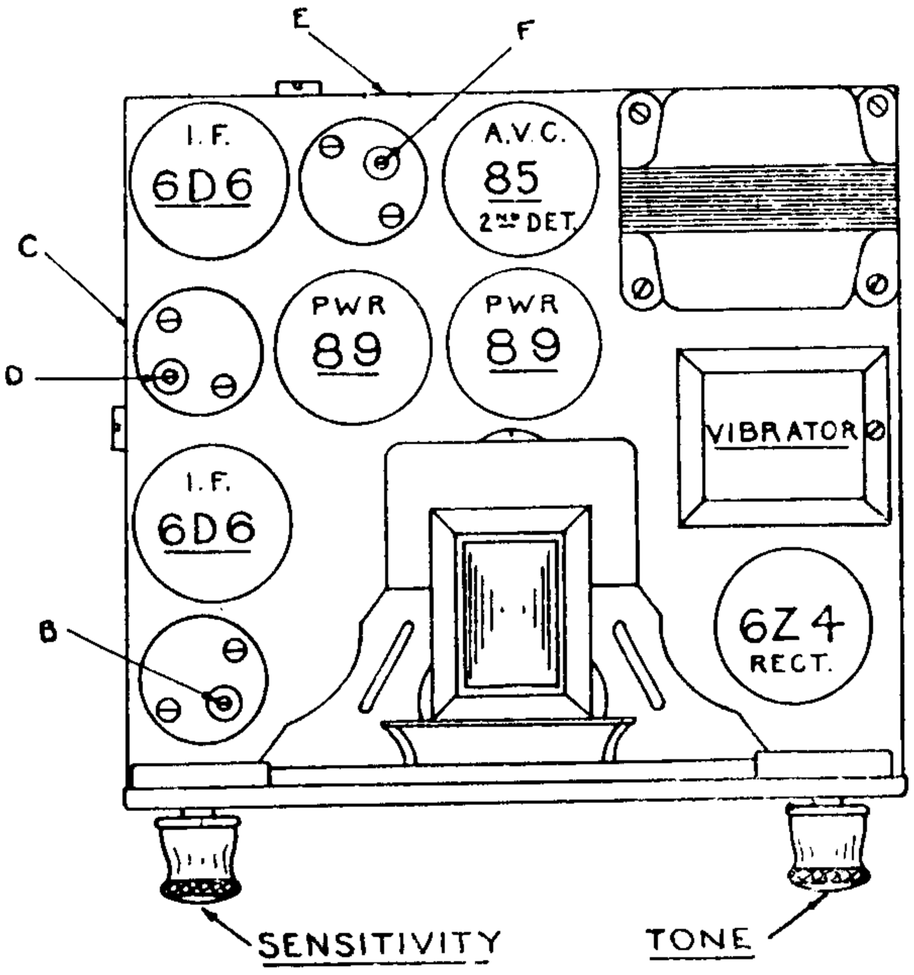
Alignment

Every Zenith Automobile receiver is balanced on an accurate, temperature controlled crystal oscillator before leaving the factory and unless a part is changed or the calibration has shifted, the adjustments should not be tampered with. Where it is absolutely necessary, however, a good test oscillator capable of delivering a modulated signal at 1500, 600 and 485 K.C. will be required.

To balance the I.F. circuit remove the cap and lead from the grid of the 6C6 tube in the control head and attach the test oscillator to the grid and to ground. Set to 485 K.C. and first adjust the primary I.F. trimmer shown (A) in Figure 1. Next trim the secondary (B). Now turn the plate trimmer (C) on the side of the chassis base to resonance, with a No. 4 Spintite wrench. Its (2nd I.F.) transformer is directly above the adjustment. Set the screw (D) in the top of the transformer shield to resonance also. The third I.F. transformer is adjusted through a hole in the rear of the chassis and also on top of the transformer indicated at E and F. This completes the I.F. circuit. Replace the grid lead on the 6C6 and screw the metal cap back in position.

Next attach the test oscillator to the antenna and ground lead of the control head and set it to 1500 K.C. Remove the control head cover and set the variable condenser trimmers (G and H) to a point where the 1500 K.C. signal is loudest at that frequency on the dial. Then set the test oscillator to 600 K.C. and rock the dial slowly at that frequency; at the same time turn the padder condenser adjusting screw. This trimmer is reached by removing the button plug on the bottom of the control head. The adjustments should be gone over twice to insure greater precision. Provided the test equipment is dependable, the entire receiver will now be in proper alignment and the calibration very accurate.





The following is a list of performance factors which information may be of assistance where accurate measurements are essential.

Intermediate Frequency	485 K.C.
Sensitivity in Microvolts	1.5
Power in Milliwatts	2200
Power Consumption in Watts	36

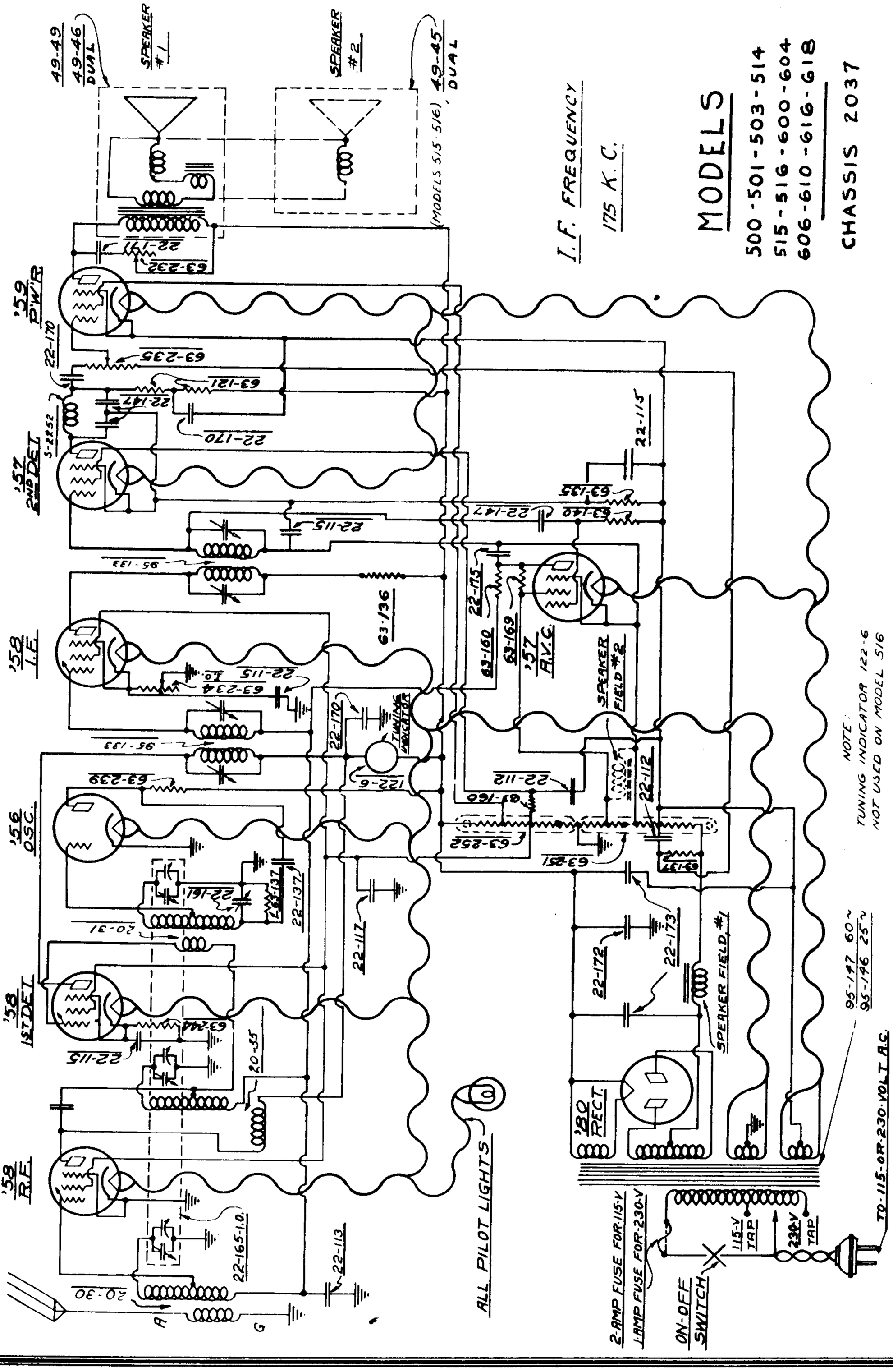
ZENITH RADIO CORPORATION

I.F. FREQUENCY
175 K.C.

MODELS
500-501-503-514
515-516-600-604
606-610-616-618

CHASSIS 2037

Z.R.C.



ZENITH RADIO CORPORATION

SOCKET VOLTAGES

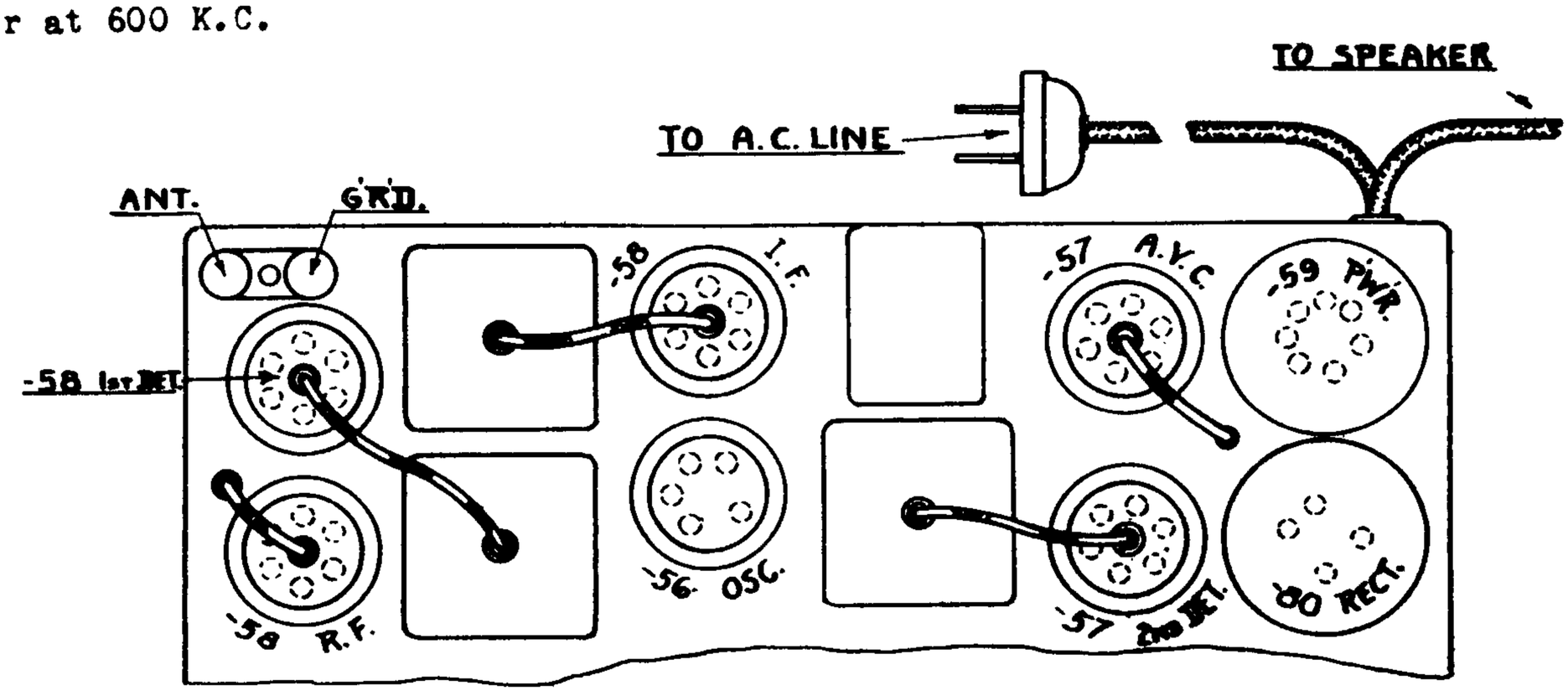
Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	190	0	95	0	7.
Z-58	1st Det.	2.4	190	2.3	95	2.3	4.
Z-56	Osc.	2.4	100	0	-	-	4.
Z-58	I.F.	2.4	190	0	90	0	2.
Z-57	2nd Det.	2.4	90	-60	70	-60	.2
Z-57	A.V.C.	2.4	-10	-65	-2	-65	0
Z-59	Power	2.4	175	-70	165	-70	25
Z-80	Rect.	5.	*350	-	-	-	*36

Line 115 Volts

All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



TUBE POSITION

57-345	Escutcheon Plate	$ .50
78-56	59 Seven Prong Socket	.15
78-57	56 Five Prong Socket	.15
78-58	58 Six Prong Socket	.15
78-59	57 Six Prong Socket	.15
78-60	80 Four Prong Socket	.15
95-146	115 volt 25 cycle Power Transformer	5.50
95-147	115 volt 60 cycle Power Transformer	3.75
136-109	Tube Shield	.10
136-2	2 amp Fuse	.06

ZENITH RADIO CORPORATION

PARTS AND PRICES

CHASSIS 2037

Dial and Meter Assembly

11-3	Pulley String.....per ft....	$ .10
26-38	Dial Drum Strip.....	.10
61-19	Tuning Shaft Pulley (small idler).....	.05
61-22	Tuning Shaft Pulley (large idler).....	.10
80-65	Dial Drum Pulley Tension Spring.....	.01
80-69	Volume and Tone Control Tension Spring.....	.01
100-18	2½ volt Pilot Lamp.....	.12
122-6	Shadow Meter .....(Not used on Model 516).....	2.00
S-2242	Volume Control Dial Assembly....)" " " " ").....	.35
S-2243	Tone Control Dial Assembly.....(" " " " ").....	.35

Condensers

22-112	.1 mfd 300 volt(2nd Detector Screen & Power Grid).....	.25
22-113	.5 " .....(R.F.1st Detector & I.F.Grid Return).....	.35
*22-115	.1 " 200 volt(Four used, see below).....	.35
22-117	.5 " .....(R.F.1st Detector, & I.F. Screen).....	.50
22-137	.05 " 400 volt(Oscillator Plate).....	.25
22-147	.0005 600 volt(2nd Detector Plate & A.V.C.Screen).....	.25
22-161	Padder.....	.45
22-165	Three Gang Variable.....	3.50
22-170	.1 mfd 400 volt(R.F.& 1st Detector Plate,2nd Detector Plate)..	.35
22-171	.05 " 600 volt(Tone Control).....	.25
22-172	2. " 450 volt(Filter).....	.60
22-173	8. " 500 volt(Filter).....	1.25

Resistors

63-121	100M ohm,1 Watt (2nd Detector Plate).....	.25
63-135	25M " ½ " (2nd Detector Cathode).....	.25
63-137	250M " ½ " (Oscillator & Power Grid).....	.25
63-140	1 meg" ½ " (A.V.C. Screen).....	.25
63-160	100M " ½ " (A.V.C.Plate).....	.25
63-169	400M " ½ " (A.V.C. Grid).....	.25
63-232	Manual Tone Control.....	.75
63-234	Manual Sensitivity Control.....	.75
63-235	Manual Volume Control.....	1.25
63-239	24M ohm 1 Watt (Oscillator Plate).....	.25
63-244	500 " ¼ " (1st Detector Cathode).....	.25
63-251	Voltage Divider (six tap).....	.65
63-252	Voltage Divider (five tap).....	.60

Coils and Chokes

20-30	Antenna Coil.....	.75
20-31	Oscillator Coil.....	.85
20-35	Detector Coil.....	1.00
95-133	1st & 2nd I. F. Transformer.....	1.25
S-2252	Plate Choke and Bracket.....	.50

Miscellaneous

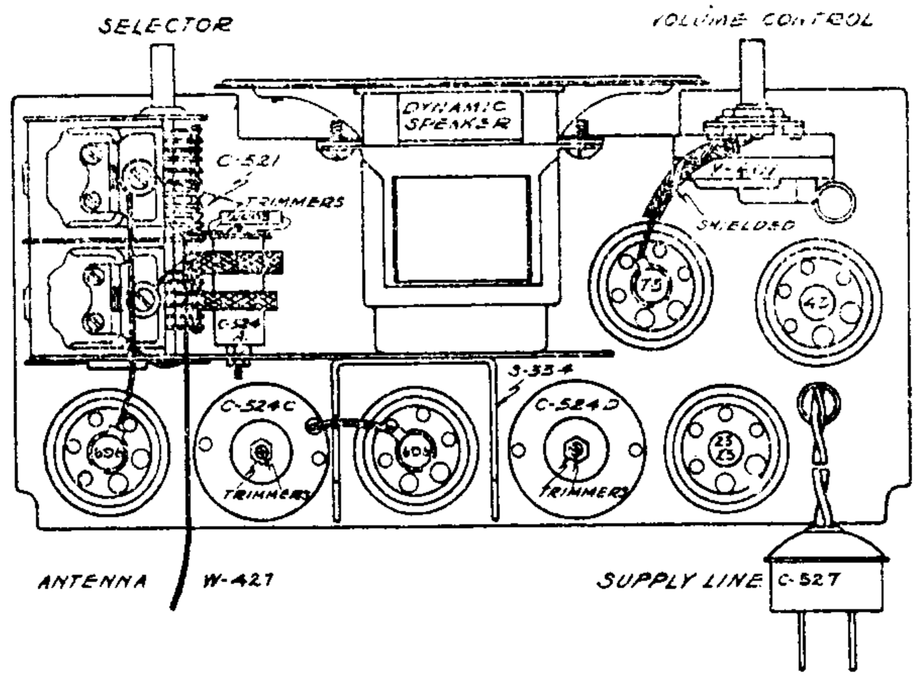
46-46	Large Knob.....	.20
46-62	Small Knob.....	.10
49-45	Dynamic Speaker for Models 500, 516 without transformer.....	6.00
49-46	Dynamic Speaker for Models 500, 516 with transformer.....	8.00
49-49	Dynamic Speaker for Model 517.....	7.00
52-32	Speaker Multicord.....	.35

ZENITH RADIO CORPORATION

MODEL 701

PARTS LIST

Part No.	Description	List Price
A 103	Same	
C 145	.1—300 Volt Condenser	$0.25 ea.
C 155	.0005 Mica Condenser	.20 ea.
C 521	Two Gang Condenser	2.50 ea.
C 522	.01—400 Volt Condenser	.25 ea.
C 523	600 Ohm Choke Coil	1.25 ea.
C 524A	Antenna Coil	.80 ea.
C 524B	Oscillator Coil	.70 ea.
C 524C	I. F. Transformer	1.25 ea.
C 524D	I. F. Transformer	1.25 ea.
C 525	5-25-10 Electrolytic Condenser	2.00 ea.
C 526	By-Pass Condenser Block	1.50 ea.
C 527	Special Cord and Plug	1.25 ea.
K 214	Knobs	.40 ea.
R 268	2480 Ohm Resistor	.50 ea.
R 270	250 Ohm—Wire Wound Resistor	.25 ea.
V 601	Volume Control	1.35 ea.
W427	Antenna Wire	.30 ea.



SERVICE SUGGESTIONS

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

Make sure that all tubes are pushed firmly in their proper sockets and that the clips are securely fasteneed to the caps on the tops of the tubes.

That the aerial is stretched out and that the connections to an outdoor antenna (if used) are good.

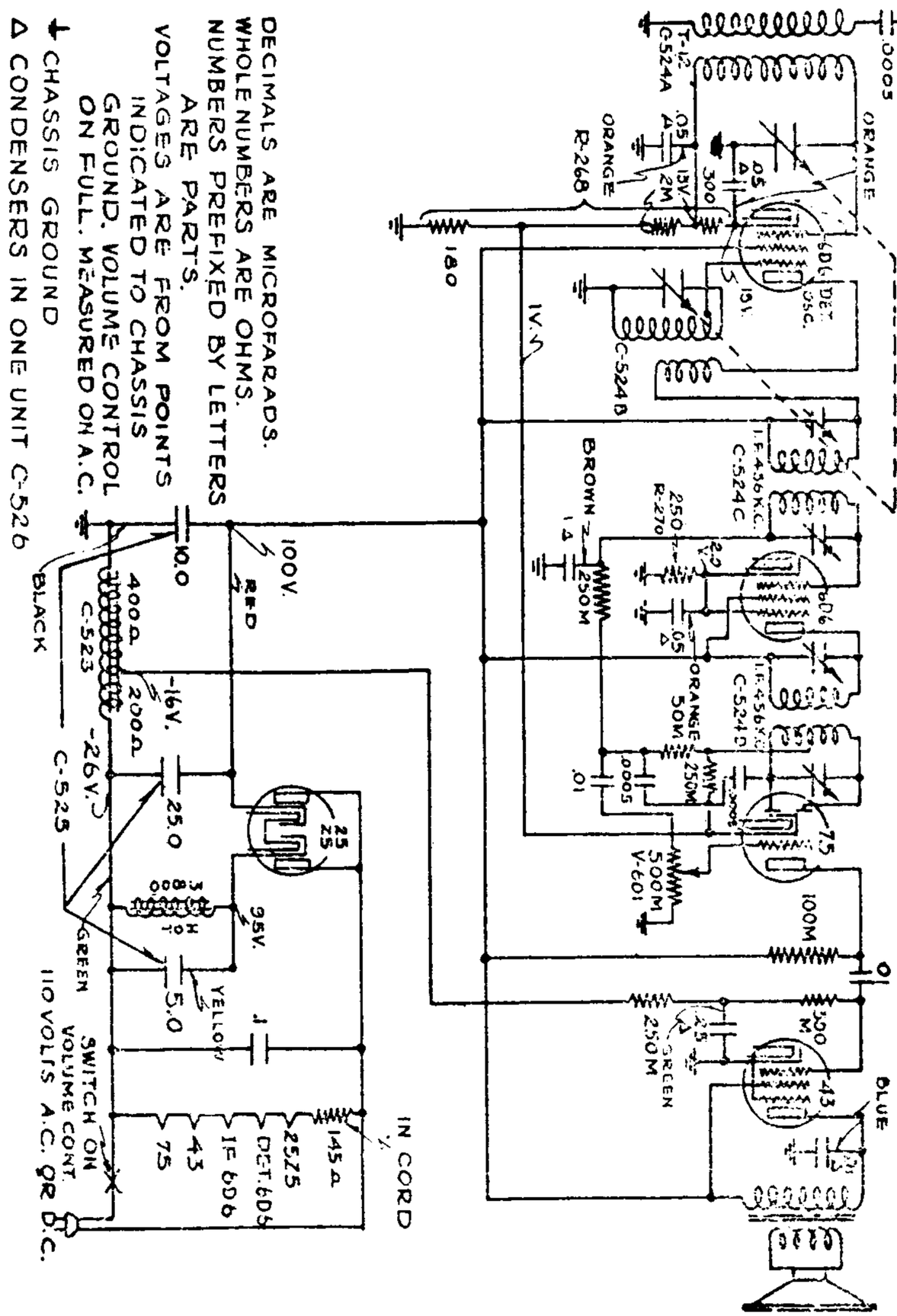
If necessary to change tubes or service chassis, UNDER NO CIRCUMSTANCES REMOVE BACK OR CHASSIS WITHOUT FIRST REMOVING PLUG FROM LIGHT SOCKET.

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

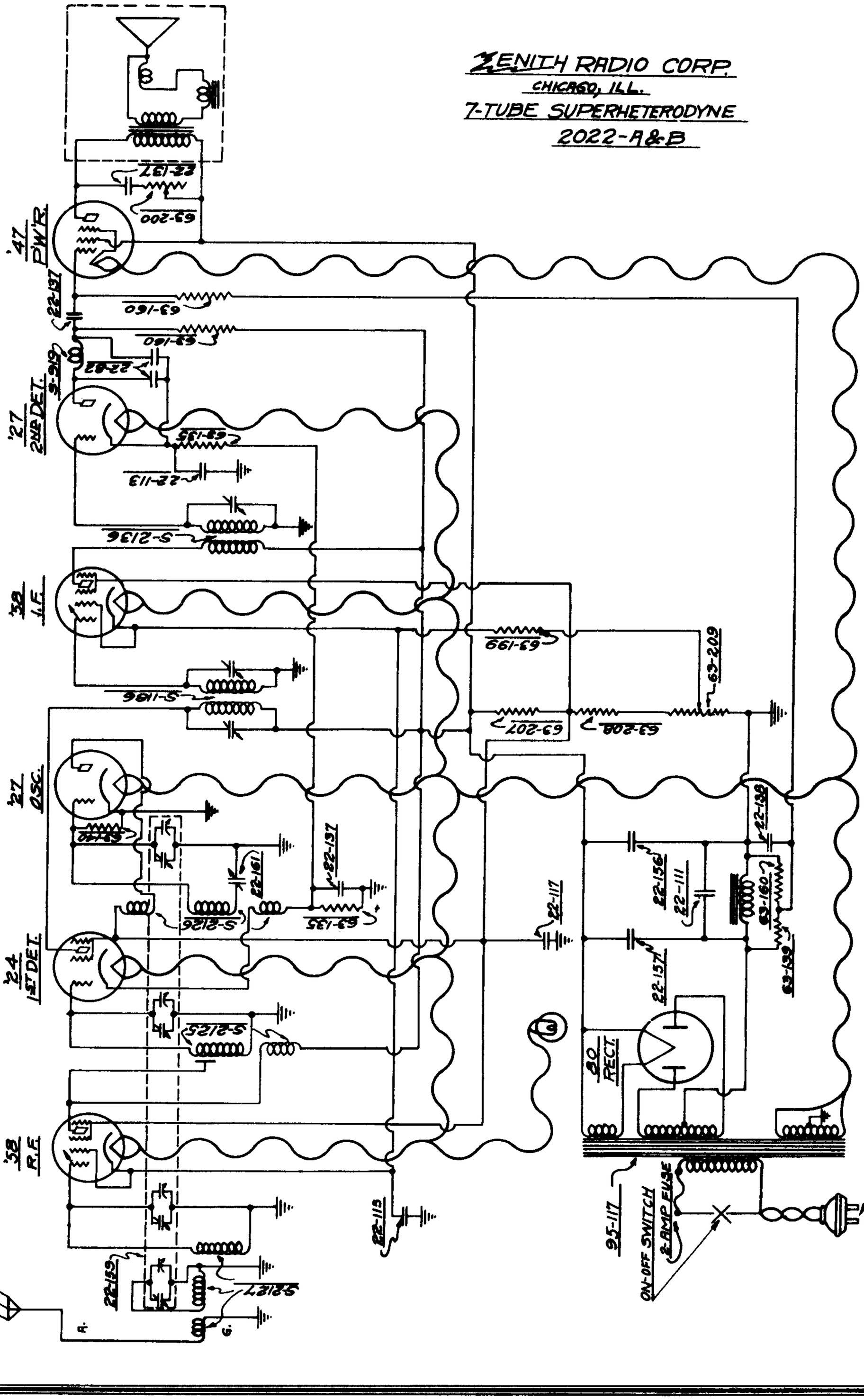
Schematic circuit diagram Model 701 AC-DC Superheterodyne, with automatic volume control

Should it be necessary, at any time, to rebalance this set the procedure is as follows: Attach a 456 kilocycle oscillator to the grid of the 6D6 tube in back of the variable condenser and adjust the trimming condensers of the I. F. transformers to maximum deflection on an output meter connected across the primary of the speaker input transformer. While adjusting these trimmers, the variable condenser should be at the maximum capacity position—at the extreme right of its rotation.

Next disconnect the antenna wire and connect an oscillator in series with a 75 mmf. condenser to the antenna coil. Rotate the condenser plates to the minimum capacity position—extreme left turn, and adjust the trimmer condenser of the rear section of the variable condenser to resonance with an oscillator set at 1725 kilocycles, then adjust the condenser of the front section of the variable condenser to resonance. Align at 1400—1200—1000—800—600—530 kilocycles, bend slotted plates of variable condenser if necessary.



ZENITH RADIO CORP.



ZENITH RADIO CORP.

MODEL 2022 A & B

Variable Condenser Assembly

22-159	Four Gang Condenser	$6.00
S-2121	Dial Drum Assembly	.80
11-3	Pulley String.....per ft.	.10
26-34	Dial Strip	.10
100-18	2½ volt Pilot Lamp	.12
S-769	Dial Lamp Socket Assembly (Less Lamp)	.15

Fixed Condensers

22-82	.001 mfd.....(2nd Detector Plate)	.30
22-111	.03 " .....(Filter Choke Bypass)	.30
22-113	.5 " .....(2nd Detector Cathode)	.50
22-115	.1 " .....(R.F. & I.F. Cathode)	.35
22-117	.5 " .....(R.F. & I.F. Detector Screen)	.50
22-161	Padder	.75
22-156	6. mfd.....(Power Filter)	1.25
22-137	.5 " .....(3 used, see footnote)	.25
22-138	.2 " .....(Power Grid)	.25
22-157	8. " .....(Power Filter)	1.50

Resistors

63-135	25M ohm.....(1st, 2nd Detector Cathode)	.30
63-139	500M " .....(Power Grid)	.30
63-140	1Meg " .....(Oscillator Grid)	.30
63-160	100M " .....(2nd Det. Plate & Power Grid)	.30
63-199	150 " .....(R.F. & I.F. Cathode, Flexible)	.30
63-200	Tone Control	1.00
63-207	10M ohm.....(Voltage Divider, Wire Wound)	.35
63-208	12M " .....(Voltage Divider)	.30
63-209	Volume control and switch assembly	1.25

Coils

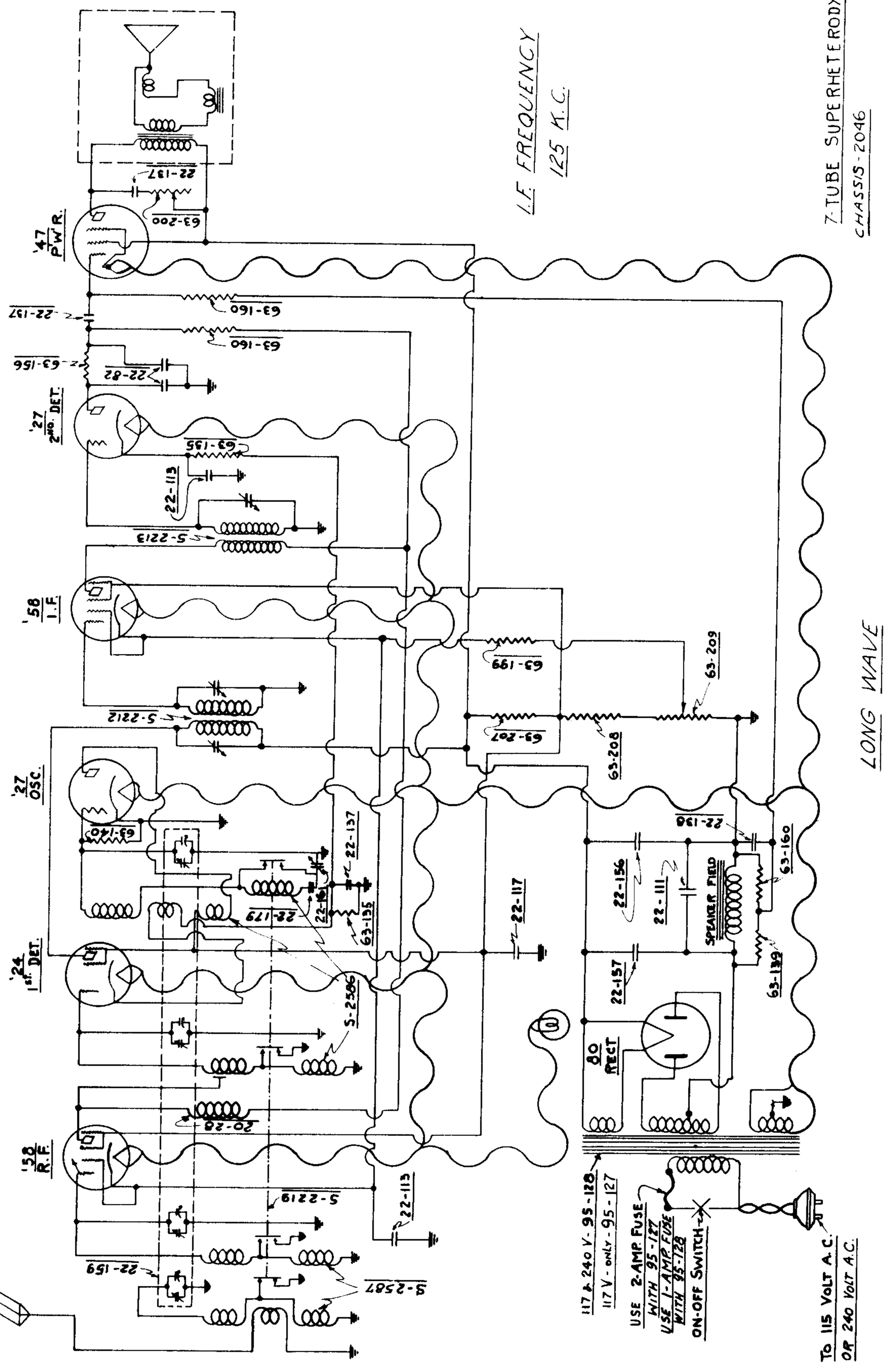
S-919	2nd Detector Choke	.60
S-2125	Detector Coil	.90
S-2126	Oscillator Coil	.90
S-2127	R.F. Pre-selector	1.50
S-1186	1st I.F. Transformer.....(175 K.C.)	1.50
S-2136	2nd I.F. Transformer.....(175 K.C.)	1.40

Miscellaneous

49-44	Dynamic Speaker	8.00
46-58	Control Knobs, all sets, three used	.10
52-27	Speaker Cable	.25

*A.F.COUPLING, TONE CONTROL, AND FIRST DETECTOR CATHODE.

ZENITH RADIO CORP.



Now... the wise serviceman BEATS COMPETITION

NEW "SURE-FIRE" PLAN SHOWS HOW TO GET MORE JOBS—DO THEM QUICKER, BETTER—AND MAKE MORE MONEY

Your biggest Radio service problem is competition. Competition makes it much harder for the average service man to make a living. It cuts his profits to the bone.

There are just two things you can do about it. You either "take it" or find a way to beat the competition.

Most fellows will "take it"—they'll work harder and harder trying to make both ends meet until finally seeing they are "getting nowhere fast" they'll quit. The wise Radio service man uses another method. He gets above competition by a new Sure-Fire Plan—the special N.R.I. Professional Servicemen's Course.

FOR ADVANCED RADIO MEN

This Course is NOT for beginners. They wouldn't know what it was all about. It is for the men with experience, previous Radio training, or both. It is the "ace in the hole" of the service man already in Radio.

BIGGER EARNINGS RESULT

The Professional Servicemen's Course is a real Money Maker for you. It covers methods and plans unknown to men who form your biggest competition. It trains you to do a more thorough service job — to make satisfied customers who come back to you time and time again; the type of customer who wants good work and is willing to pay for it.

It teaches you to do the average job much more quickly — by special methods — by service "short-cuts"; eliminates the "trial and error" method of servicing — enabling you to handle more jobs in the same time with a greater dollars and cents profit.

You can handle "failure" jobs, where the other fellows fell down. Result, money in your pocket.

YOU LEARN TESTED MONEY-MAKING METHODS

You learn the scientific methods—of finding Radio work and doing the jobs. The easiest—simplest—and more productive methods are pointed out to you—methods tested and found best—plans that beat out the "hit and miss methods" used by the majority of your competitors.

Only those things are included which the professional service man must know to beat competition and make good money. Every paragraph is chock full of meaty material—just what you need to be more successful in Radio servicing. There are fifty-two printed and illustrated books averaging thirty-two pages each, containing text diagrams, illustrations and questions.

In addition there are also ten reference books and eight service manuals containing valuable tips, servicing data and diagrams. Additional diagrams appear regularly in National Radio News, a subscription to which is included with the Course.

Get out of the rut—don't battle day by day for existence. You can go far as a Radio service man—with the National Radio Institute's Professional Servicemen's Course. The material can be put into practice immediately. It means added profit to you right from the start.

RECOMMENDED BY PHILCO

Why did the Philco Radio and Television Corp. recommend this course to its thousands of dealers and servicemen? Because they realized its value to professional Radio servicemen; they realized it makes successful servicemen.

N.R.I. training has made many men successful in Radio servicing. Hundreds of success letters are on file here at N.R.I.—letters from men like you who wanted to go further than the ordinary Radio man—who wanted to make big money. Just a few are reproduced on this page to show how N.R.I. fits men to do the jobs where others fail. You, too, can get in on the big money end of Radio — you can override your competition — you can have the better things of life which you have always wanted. It's your "New Deal"—a "Sure-Fire" plan to success in Radio.

There is absolutely no obligation—it costs you nothing to find out more about this Professional Servicemen's Course. Clip out the coupon below and mail it today for a free outline of N.R.I.'s Professional Servicemen's Course.

I SHOWED THESE MEN AND MANY OTHERS HOW TO GET AHEAD

$40 to $100 a Month In Spare Time



Radios are rapidly getting more complicated. My advice to any man in Radio is to "TRAIN." The day of the "magazine" service man is over. My Radio earnings run from $40 to $100 a month in my spare time.
J. J. Reider,
536 Dayton Ave.,
St. Paul, Minn.

Succeeds Where Others Fail



Every service man has competition. The way to beat it is to train to do your work better than the other fellow. I have made a number of sets work after others fell down. I cannot praise N.R.I. training enough.
D. O. Mount,
Box 847,
Libby, Montana

Not Bothered by Competition



There are sixty Radio repair men in this town, but I get a large percentage of the business. I attribute my ability to hold business against competition to what I learned from N.R.I.
Geo. A. Turner,
211 Polk St.,
Pueblo, Colo.

NOW I'LL SHOW YOU — JUST MAIL COUPON

NATIONAL RADIO INSTITUTE, Washington, D. C.
1536 You St.,

I'd like to see a copy of the outline of your special course of training for Professional Service Men. Please rush my copy without cost or obligation to me.

(Name) _____

(Address) _____

(City) _____ (State) _____ 3HP8

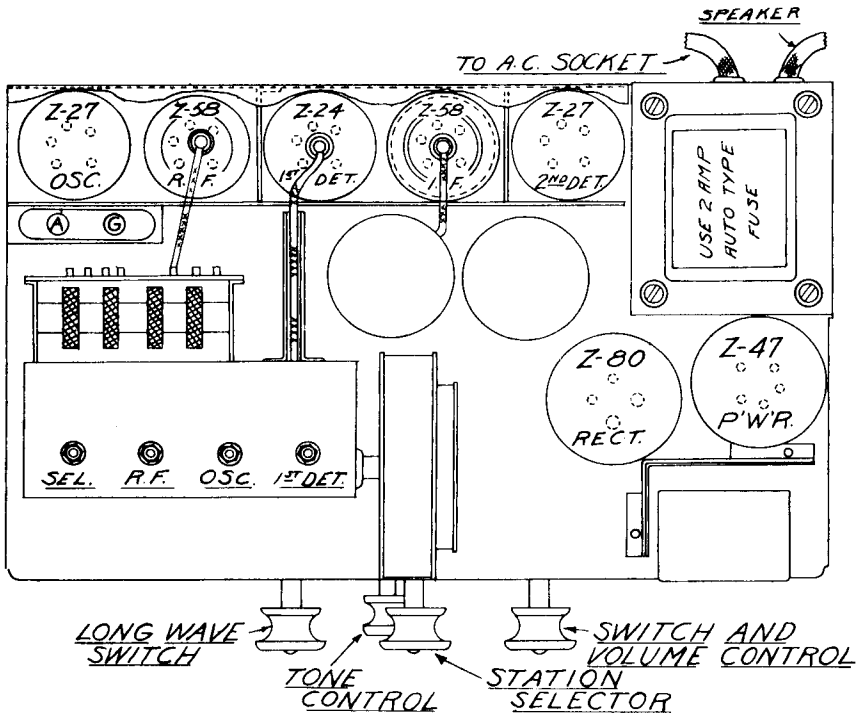
ZENITH RADIO CORP.

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	260	3.5	120	3.5	9.0
Z-24A	1st Det.	2.4	260	5.5	120	120	.2
Z-27	Osc.	2.4	120	0	-	-	4.2
Z-58	I.F.	2.4	260	3.5	120	3.5	8.4
Z-27	2nd Det.	2.4	180	10.	-	-	.3
Z-47	Power	2.4	240	-	260	-	30.
Z-80	Rect.	5.0	120 120	-	-	-	30. 30.

Line 117 Volts — All Controls Maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 125 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



PARTS AND PRICES
STANDARD AND LONG WAVE RECEIVER

CHASSIS 2046

Dial Assembly

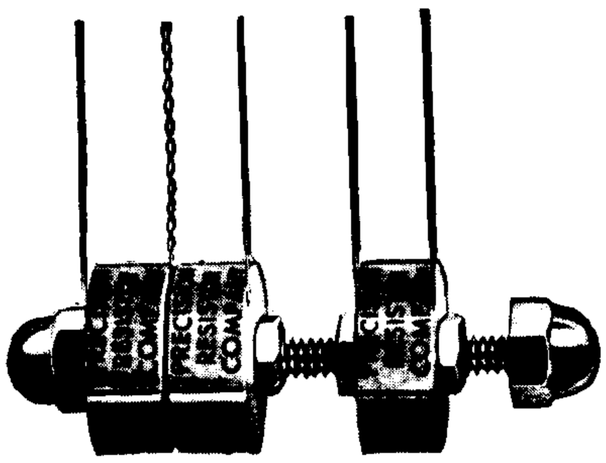
11-3	Pulley String.....per ft.	$ .10
26-40	Calibrated Dial Strip.....	.25
80-69	Pulley String Tension Spring.....	.01
100-18	2½ volt Pilot Lamp.....	.12
S-769	Dial Lamp Socket Assembly (less lamp).....	.15
S-2578	Dial Drum Assembly.....	.80

When formulas mean results—

Many well designed pieces of apparatus have failed due to improper selection of component parts. Don't YOU make this mistake when designing or building that new Set Analyzer, Decade Box or High Resistance Voltmeter. Use this FORMULA, as all the leading Analyzer manufacturers are, and be sure your efforts are not being wasted.

$$\frac{Q + A + Md}{LC} = PwwR$$

Where Q equals QUALITY and A equals ACCURACY, Md equals MODERN DESIGN and LC LOW COST and LAST COST, then PwwR is always PRECISION WIRE-WOUND RESISTORS.

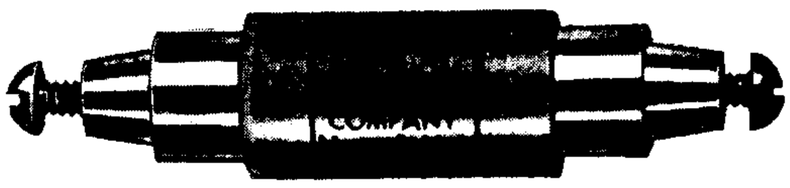


RESISTANCE RANGE

.25 Ohms to 200,000 Ohms

TYPE L—A New Precision Resistor

Maximum Wattage	¼
Diameter	⅝"
Length	¼"
Terminals	2" Flexible Leads



RESISTANCE RANGE — .25 Ohms to 5 Megohms

TYPE A	TYPE B	TYPE C
Normal Rating 1 Watt	Normal Rating 2 Watt	Normal Rating 5 Watt
Maximum Length 2¼"	Maximum Length 2¼"	Maximum Length 4¼"
Maximum Diameter ⅝"	Maximum Diameter ⅝"	Maximum Diameter ⅝"
Furnished with Standard Caps	Furnished with Standard Caps	Furnished with Standard Caps

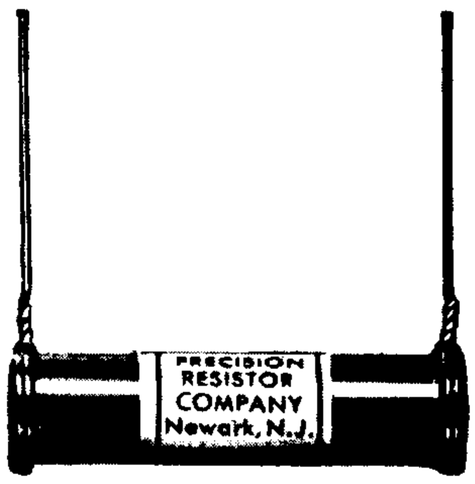
TYPE BP

Maximum Wattage	5
Maximum Resistance	60,000
Diameter	⅜"
Length	1½"

TYPE VP

Maximum Wattage	10
Maximum Resistance	100,000
Diameter	½"
Length	2"

TOLERANCE 2% PLUS OR MINUS RATED RESISTANCE



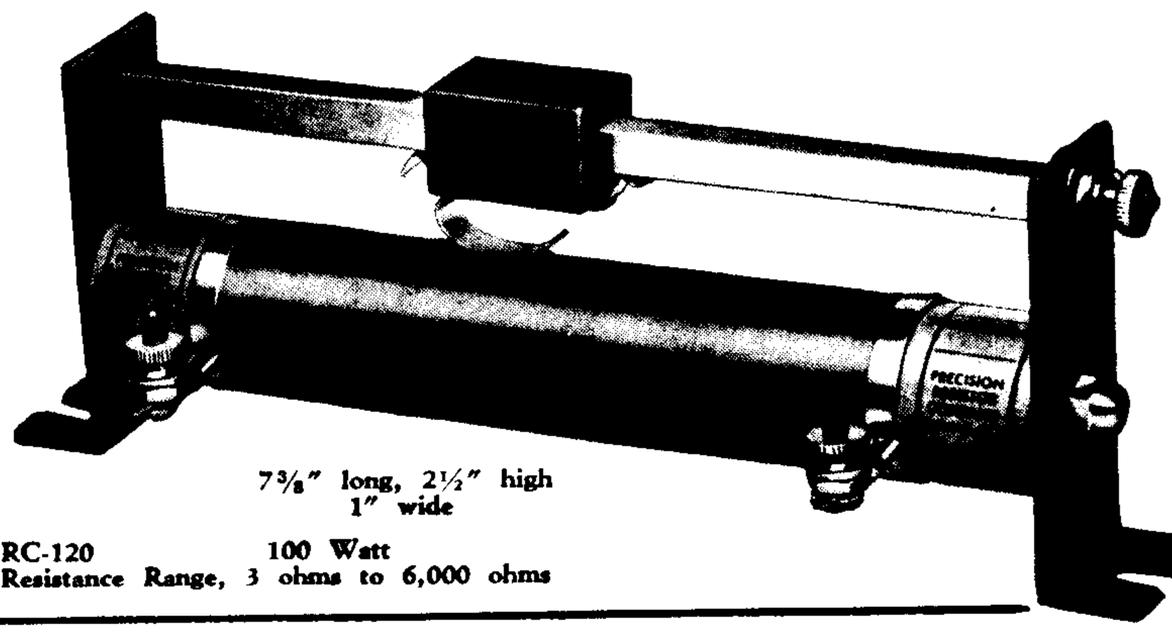


TYPE D

Normal Rating ½ Watt
Maximum Length ¾"
Maximum Diameter ⅝"
Length of Leads 1¼"
Furnished with No. 18 Tinned Copper Leads

TYPE F

Normal Rating 1 Watt
Maximum Length 1"
Maximum Diameter ⅝"
Length of Leads 1¼"
Furnished with No. 18 Tinned Copper Leads



7⅜" long, 2½" high
1" wide

RC-120 100 Watt
Resistance Range, 3 ohms to 6,000 ohms

FREE BOOKLET AND PRICE LIST

Precision Custom-Built Wire-Wound High Resistance Units

Manufactured by

PRECISION RESISTOR COMPANY 334 BADGER AVENUE, NEWARK, N. J.

ZENITH RADIO CORP.

Condensers

22-82	.001 mfd 500 volt.....(two used, 2nd det. plate).....	.20
22-111	.03 " 600 " .....(speaker field).....	.20
*22-113	.5 " 200 " .....(two used, see below).....	.35
22-117	.5 " 300 " .....(1st Det. Screen & R.F.).....	.50
*22-137	.05 " 400 " .....(three used, see below).....	.25
22-138	.2 " 200 " .....(power grid).....	.25
22-156	6. " 450 " .....(filter).....	1.25
22-157	8. " 450 " .....(filter).....	1.50
22-159	Four Gang Variable.....	6.00
22-161	Variable Padder.....	.45
22-179	Series Padder.....	.40

Resistors

63-135	25M ohm.....(1st & 2nd det. cathodes).....	.25
63-139	500M " .....(power grid).....	.25
63-140	1Meg " .....(oscillator grid).....	.25
63-156	10M " .....(2nd det. plate).....	.25
63-160	100M " .....(2nd det. plate power grid).....	.25
63-199	150 " .....(R.F. & I.F. Cathode).....	.25
63-200	Tone Control.....	.80
63-207	10M ohm.....(voltage divider).....	.30
63-208	12M " .....(voltage divider).....	.25
63-209	Volume Control and Switch Assembly.....	1.25

Coils and Chokes

20-28	R. F. Plate Choke.....	.75
S-2212	1st I. F. Transformer.....	1.75
S-2213	2nd I. F. Transformer.....	1.75
S-2586	Oscillator Coil and Detector Coil..(below chassis).....	1.75
S-2587	Preselector Coil.....(above chassis).....	1.50
46-59	Large Knob.....	.15
46-60	Small Knob.....	.15
49-44	Dynamic Speaker.....	8.00

*22-113 R.F. and I.F. Cathode - 2nd Detector Cathode.
*22-137 Tone Control, 1st Detector Cathode, Audio Coupling.

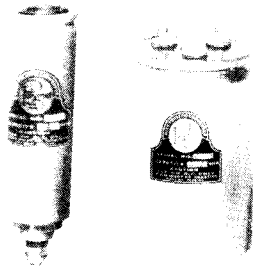
52-27	Speaker Cable.....	$ .25
57-326	Escutcheon Plate.....(Except Model 510-5).....	.30
78-37	Z-27 Tube Socket.....	.15
78-38	Z-24 Tube Socket.....	.15
78-39	Z-47 Tube Socket.....	.15
78-40	Z-80 Tube Socket.....	.15
78-54	Z-58 Tube Socket.....	.15
83-218	Single Terminal Soldering Brackets.....	.05
83-228	Speaker Cable Terminal Strip.....	.15
83-260	Double Terminal Soldering Brackets.....	.07
93-167	Rubber Cushion for Chassis Mounting (upper).....	.01
93-168	Rubber Cushion for Chassis Mounting (lower).....	.01
93-170	Metal Washer used with the above.....	.02
95-128	Combination 220-110 volt, 60 cycle Power Transformer.....	5.25
95-130	25-30 cycle 110 volt, 60 cycle Power Transformer.....	6.25
126-109	Tube Shields - Small.....	.06
136-2	2 amp Fuse.....	.06
136-4	1 amp Fuse.....	.06
S-2124	Heat Insulating Shield.....	.30
S-2218	Long Wave Switch, Shaft & Pin Assembly.....	.50
S-2219	Long Wave Switch Plate, Shaft and Bracket Assembly.....	2.00

Discriminating Service Men Follow the Choice of Well-known Engineers and Specify

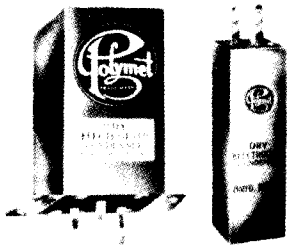
POLYMET PRODUCTS

These finely built parts are used by many leading radio receiver manufacturers, following thorough and successful laboratory tests. ENGINEERS DO NOT GUESS—THEY KNOW!

ELECTROLYTIC CONDENSERS



Polymet Electrolytic Condensers are performing service in all parts of the world, in varied climates with freedom from trouble. Extreme care has been taken to assure a high quality product. Low leakage, low power factor and true capacity are a few of their outstanding features. In addition to the self-healing wet electrolytic condenser, the Polymet dry Electrolytic Condenser has become equally popular. Polymet Electrolytic Condensers are standard for years in many receivers—these condensers are leaders among such capacitors.



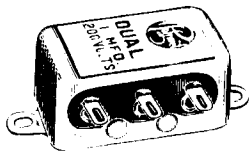
WAXTITE & PETITE BY-PASS CONDENSERS



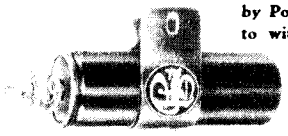
Polymet Waxtite and Pe-tite Condensers are the original type of paper-wrapped "cartridge" form of condensers. Due to special construction, they are thoroughly sealed. These Waxtite and Pe-tite Condensers are made in numerous capacities from .001 Mfd. to .5 Mfd. in many voltages.

BY-PASS CONDENSERS

These Polymet By-pass Condensers are only too well known and are recognized in service work as most reliable for by-pass replacements. They are manufactured in strict accordance with RMA standards.



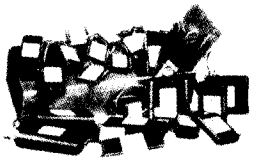
AUTO-ELIMINATOR CONDENSERS



Auto-Eliminator Condensers were originated by Polymet and have been especially designed to withstand high temperature and excessive vibration. They are standard in many well-known auto-radio sets they effectively eliminate spark interference.

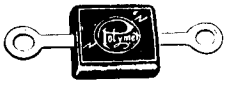
UNCASED PAPER CONDENSERS

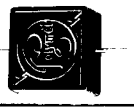
Polymet has assembled a splendid variety of uncased condensers of the highest variety — strictly built to RMA standards—thoroughly wax-sealed, and marked with capacity and accurate voltage rating. They are furnished with flexible leads permitting easy assembly. There are none finer for economical service work.



MICA CONDENSERS

In the construction of Polymet Mica Condensers only selected grades of mica and foil are used. They are entirely sealed in molded bakelite, and protected from atmospheric conditions. They are mechanically strong and electrically accurate. We fabricate many sizes. Our midget sizes are very popular in the small sets. Our large molded types are standard for many industrial concerns.





FIXED RESISTORS

Polymet wire-wound tubular resistors are accurately made of the highest grade of resistance alloy wire, wound on refractory tubes. They are completely covered with heat-resisting, insulating enamel which protects the wire against oxidation, moisture or mechanical injury. Each resistor is accurately valued.



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POLYMET MANUFACTURING CORP.

833-S East 134th Street — New York City

VACUUM TUBE CHART

TYPE	NAME	BASE	SOCKET CONNECTIONS	DIMENSIONS MAXIMUM OVERALL LENGTH X DIAMETER	CATHODE TYPE ■	RATING: FILAMENT OR HEATER VOLTS	RATING: FILAMENT OR HEATER AMPERES	RATING: PLATE MAX. VOLTS	RATING: SCREEN MAX. VOLTS	USE (Values to right give operating conditions and characteristics for indicated typical use)	PLATE SUPPLY VOLTS	GRID VOLTS ■	SCREEN VOLTS	SCREEN MILLI-AMP.	PLATE MILLI-AMP.	A-C PLATE RESISTANCE OHMS	MUTUAL CONDUCTANCE MICROMHOS	VOLTAGE AMPLIFICATION FACTOR	LOAD FOR STATED POWER OUTPUT OHMS	POWER OUTPUT WATTS	TYPE
RCA-1A6	PENTAGRID CONVERTER ■	SMALL 6-PIN	FIG. 26	4 17/32" x 1 9/16"	D-C FILAMENT	2.0	0.06	180	67.5	CONVERTER	180	−3.0 min.	67.5	2.4	1.3	500000	Anode-Grid (# 2) 135 Max. Volts, 2.3 Ma. Oscillator Grid (# 1) Resistor, 50000 Ohms. Conversion Conductance, 300 Micromhos.				C-1A6
RCA-2A3	POWER AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	5 3/8" x 2 1/16"	FILAMENT	2.5	2.5	250	—	CLASS A AMPLIFIER	250	−45	—	—	60.0	300	5250	4.2	2500	3.5	C-2A3
										PUSH-PULL AMPLIFIER	300	−62	Self-bias		40.0	Power Output is for 2 tubes at			5000	10.0	
											300	−62	Fixed-bias		40.0	stated load, plate-to-plate			3000	15.0	
RCA-2A5	POWER AMPLIFIER PENTODE	MEDIUM 6-PIN	FIG. 15A	4 11/16" x 1 13/16"	HEATER	2.5	1.75	250	250	CLASS A AMPLIFIER	250	−16.5	250	6.5	34.0	100000	2200	220	7000	3.0	C-2A5
RCA-2A6	DUPLEX-DIODE HIGH-MU TRIODE	SMALL 6-PIN	FIG. 13	4 17/32" x 1 9/16"	HEATER	2.5	0.8	250	—	TRIODE UNIT AS CLASS A AMPLIFIER	250 ✖	− 1.35	—	—	0.4	—	—	Gain per stage = 50-60			C-2A6
RCA-2A7	PENTAGRID CONVERTER ■	SMALL 7-PIN	FIG. 20	4 17/32" x 1 9/16"	HEATER	2.5	0.8	250	100	CONVERTER	250	− 3.0	100	2.2	3.5	360000	Anode Grid (# 2) 200 Max. Volts, 4.0 Ma. Oscillator Grid (# 1) Resistor, 50000 Ohms. Conversion Conductance, 520 Micromhos.				C-2A7
RCA-2B7	DUPLEX-DIODE PENTODE	SMALL 7-PIN	FIG. 21	4 17/32" x 1 9/16"	HEATER	2.5	0.8	250	125	PENTODE UNIT AS R-F AMPLIFIER	100	− 3.0	100	1.7	5.8	300000	950	285	—	—	C-2B7
											250	− 3.0	125	2.3	9.0	650000	1125	730			
										PENTODE UNIT AS A-F AMPLIFIER	250 ✠	− 4.5	50	—	0.65	—	—	—	—	—	
RCA-6A4 *also LA*	POWER AMPLIFIER PENTODE	MEDIUM 5-PIN	FIG. 6	4 11/16" x 1 13/16"	FILAMENT	6.3	0.3	180	180	CLASS A AMPLIFIER	100	− 6.5	100	1.6	9.0	83250	1200	100	11000	0.31	C-6A4 *also LA*
											180	−12.0	180	3.9	22.0	45500	2200	100	8000	1.40	
RCA-6A7	PENTAGRID CONVERTER ■	SMALL 7-PIN	FIG. 20	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	100	CONVERTER	250	− 3.0	100	2.2	3.5	360000	Anode Grid (# 2) 200 Max. Volts, 4.0 Ma. Oscillator Grid (# 1) Resistor, 50000 Ohms. Conversion Conductance, 520 Micromhos.				C-6A7
RCA-6B7	DUPLEX-DIODE PENTODE	SMALL 7-PIN	FIG. 21	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	125	PENTODE UNIT AS R-F AMPLIFIER	100	− 3.0	100	1.7	5.8	300000	950	285	—	—	C-6B7
											250	− 3.0	125	2.3	9.0	650000	1125	730			
										PENTODE UNIT AS A-F AMPLIFIER	250 ✠	− 4.5	50	—	0.65	—	—	—	—	—	

■ Grids # 3 and # 5 are screen. Grid # 4 is signal-input control-grid.

✠ Applied through plate coupling resistor of 200000 ohms.

✖ Applied through plate coupling resistor of 250000 ohms.

RCA-6F7	TRIODE-PENTODE	SMALL 7-PIN	FIG. 27	4 17/32" x 1 9/16"	HEATER	6.3	0.3	100	—	TRIODE UNIT AS AMPLIFIER	100	− 3.0	—	—	3.5	17800	450	8	—	—	C -6F7
								250	100	PENTODE UNIT AS AMPLIFIER	250	− 3.0	100	1.5	6.5	850000	1100	800	—	—	
										PENTODE UNIT AS MIXER	250	−10.0	100	0.6	2.8	Oscillator peak volts = 7.0. Conversion conductance = 300 micromhos.				
UX-200-A	DETECTOR TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	D-C FILAMENT	5.0	0.25	45	—	GRID LEAK DETECTOR	45	Grid Return to (−) Filament			1.5	30000	666	20	—	—	CX-300-A
RCA-01-A	DETECTOR★ AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	D-C FILAMENT	5.0	0.25	135	—	CLASS A AMPLIFIER	90	− 4.5	—	—	2.5	11000	725	8.0	—	—	C - 01-A
											135	− 9.0			3.0	10000	800	8.0			
RCA-10	POWER AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	5 3/8" x 2 3/16"	FILAMENT	7.5	1.25	425	—	CLASS A AMPLIFIER	350	−31.0	—	—	16.0	5150	1550	8.0	11000	0.9	C - 10
											425	−39.0			18.0	5000	1600	8.0	10200	1.6	
WD-11 WX-12	DETECTOR★ AMPLIFIER TRIODE	WD 4-PIN MEDIUM 4-PIN	FIG. 12 FIG. 1	4 1/4" x 1 3/16" 4 11/16" x 1 7/16"	D-C FILAMENT	1.1	0.25	135	—	CLASS A AMPLIFIER	90	− 4.5	—	—	2.5	15500	425	6.6	—	—	C - 11 CX- 12
											135	−10.5			3.0	15000	440	6.6			
UX-112-A	DETECTOR★ AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	D-C FILAMENT	5.0	0.25	180	—	CLASS A AMPLIFIER	90	− 4.5	—	—	5.0	5400	1575	8.5	—	—	CX-112-A
											180	−13.5			7.7	4700	1800	8.5			
RCA-19	TWIN AMPLIFIER	SMALL 6-PIN	FIG. 25	4 1/4" x 1 9/16"	D-C FILAMENT	2.0	0.26	135	—	CLASS B AMPLIFIER	135	0	—	—	Power output value is for one tube at stated load, plate-to-plate.				10000	2.1	C - 19
											135	− 3.0							10000	1.9	
UX-120	POWER AMPLIFIER TRIODE	SMALL 4-PIN	FIG. 1	4 1/8" x 1 1/16"	D-C FILAMENT	3.3	0.132	135	—	CLASS A AMPLIFIER	90	−16.5	—	—	3.0	8000	415	3.3	9600	0.045	CX-220
											135	−22.5			6.5	6300	525	3.3	6500	0.110	
RCA-22	R-F AMPLIFIER TETRODE	MEDIUM 4-PIN	FIG. 4	5 1/32" x 1 13/16"	D-C FILAMENT	3.3	0.132	135	67.5	SCREEN GRID R-F AMPLIFIER	135	− 1.5	45	0.6*	1.7	725000	375	270	—	—	C - 22
											135	− 1.5	67.5	1.3*	3.7	325000	500	160			
RCA-24-A	R-F AMPLIFIER TETRODE	MEDIUM 5-PIN	FIG. 9	5 1/32" x 1 13/16"	HEATER	2.5	1.75	275	90	SCREEN GRID R-F AMPLIFIER	180	− 3.0	90	1.7*	4.0	400000	1000	400	—	—	C - 24-A
											250	− 3.0	90	1.7*	4.0	600000	1050	630			
										BIAS DETECTOR	275●	− 5.0 approx.	20 to 45	—	Plate current to be adjusted to 0.1 milliampere with no signal.					
RCA-26	AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	FILAMENT	1.5	1.05	180	—	CLASS A AMPLIFIER	90	− 7.0	—	—	2.9	8200	935	8.3	—	—	C - 26
											180	−14.5			6.2	7300	1150	8.3			
RCA-27	DETECTOR★ AMPLIFIER TRIODE	MEDIUM 5-PIN	FIG. 8	4 11/16" x 1 13/16"	HEATER	2.5	1.75	275	—	CLASS A AMPLIFIER	135	− 9.0	—	—	4.5	9000	1000	9.0	—	—	C - 27
											250	−21.0			5.2	9250	975	9.0			
										BIAS DETECTOR	250	−30.0	—	—	Plate current to be adjusted to 0.2 milliampere with no signal.					
RCA-30	DETECTOR★ AMPLIFIER TRIODE	SMALL 4-PIN	FIG. 1	4 1/4" x 1 9/16"	D-C FILAMENT	2.0	0.06	180	—	CLASS A AMPLIFIER	90	− 4.5	—	—	2.5	11000	850	9.3	—	—	C - 30
											135	− 9.0			3.0	10300	900	9.3			
											180	−13.5			3.1	10300	900	9.3			

★ For Grid-leak Detection—plate volts 45, grid return to + filament or to cathode.

● Applied through plate coupling resistor of 250000 ohms or 500-henry choke shunted by 0.25 megohm resistor. *Maximum.

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VACUUM TUBE CHART

TYPE	NAME	BASE	SOCKET CONNECTIONS	DIMENSIONS MAXIMUM OVERALL LENGTH x DIAMETER	CATHODE TYPE ■	RATING: FILAMENT OR HEATER VOLTS	RATING: FILAMENT OR HEATER AMPERES	RATING: PLATE MAX. VOLTS	RATING: SCREEN MAX. VOLTS	USE (Values to right give operating conditions and characteristics for indicated typical use)	PLATE SUPPLY VOLTS	GRID VOLTS ■	SCREEN VOLTS	SCREEN MILLIAMP.	PLATE MILLIAMP.	A-C PLATE RESISTANCE OHMS	MUTUAL CONDUCTANCE MICROMHOS	VOLTAGE AMPLIFICATION FACTOR	LOAD FOR STATED POWER OUTPUT OHMS	POWER OUTPUT WATTS	TYPE
RCA- 31	POWER AMPLIFIER TRIODE	SMALL 4-PIN	FIG. 1	4¼" x 1 9/16"	D-C FILAMENT	2.0	0.13	180	—	CLASS A AMPLIFIER	135 180	−22.5 −30.0	—	—	8.0 12.3	4100 3600	925 1050	3.8 3.8	7000 5700	0.185 0.375	C - 31
RCA- 32	R-F AMPLIFIER TETRODE	MEDIUM 4-PIN	FIG. 4	5 1/32" x 1 13/16"	D-C FILAMENT	2.0	0.06	180	67.5	SCREEN GRID R-F AMPLIFIER	135 180	− 3.0 − 3.0	67.5 67.5	0.4* 0.4*	1.7 1.7	950000 1200000	640 650	610 780	—	—	C - 32
										BIAS DETECTOR	180♥	− 6.0 approx.	67.5	—	Plate current to be adjusted to 0.2 milliampere with no signal.					
RCA- 33	POWER AMPLIFIER PENTODE	MEDIUM 5-PIN	FIG. 6	4 11/16" x 1 13/16"	D-C FILAMENT	2.0	0.26	135	135	CLASS A AMPLIFIER	135	−13.5	135	3.0	14.5	50000	1450	70	7000	0.7	C - 33
RCA- 34	SUPER-CONTROL R-F AMPLIFIER PENTODE	MEDIUM 4-PIN	FIG. 4A	5 1/32" x 1 13/16"	D-C FILAMENT	2.0	0.06	180	67.5	SCREEN GRID R-F AMPLIFIER	135 180	{ − 3.0 min. }	67.5 67.5	1.0 1.0	2.8 2.8	600000 1000000	600 620	360 620	—	—	C - 34
RCA- 35	SUPER-CONTROL R-F AMPLIFIER TETRODE	MEDIUM 5-PIN	FIG. 9	5 1/32" x 1 13/16"	HEATER	2.5	1.75	275	90	SCREEN GRID R-F AMPLIFIER	180 250	{ − 3.0 min. }	90 90	2.5* 2.5*	6.3 6.5	300000 400000	1020 1050	305 420	—	—	C - 35
RCA- 36	R-F AMPLIFIER TETRODE	SMALL 5-PIN	FIG. 9	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	90	SCREEN GRID R-F AMPLIFIER	100 180 250	− 1.5 − 3.0 − 3.0	55 90 90	— — 1.7*	1.8 3.1 3.2	350000 500000 550000	850 1050 1080	470 525 595	—	—	C - 36
										BIAS DETECTOR	100● 250●	− 5.0 − 8.0	55 90	—	Plate current to be adjusted to 0.1 milliampere with no signal.					
RCA- 37	DETECTOR★ AMPLIFIER TRIODE	SMALL 5-PIN	FIG. 8	4¼" x 1 9/16"	HEATER	6.3	0.3	250	—	CLASS A AMPLIFIER	90 180 250	− 6.0 −13.5 −18.0	—	—	2.5 4.3 7.5	11500 10200 8400	800 900 1100	9.2 9.2 9.2	—	—	C - 37
										BIAS DETECTOR	90 250	−10.0 −28.0	—	—	Plate current to be adjusted to 0.2 milliampere with no signal.					
RCA- 38	POWER AMPLIFIER PENTODE	SMALL 5-PIN	FIG. 9A	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	250	CLASS A AMPLIFIER	100 180 250	− 9.0 −18.0 −25.0	100 180 250	1.2 2.4 3.8	7.0 14.0 22.0	140000 110000 100000	875 1050 1200	120 120 120	15000 11600 10000	0.27 1.00 2.50	C - 38
RCA-39-44	SUPER-CONTROL R-F AMPLIFIER PENTODE	SMALL 5-PIN	FIG. 9A	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	90	SCREEN GRID R-F AMPLIFIER	90 180 250	{ − 3.0 min. }	90 90 90	1.6 1.4 1.4	5.6 5.8 5.8	375000 750000 1000000	960 1000 1050	360 750 1050	—	—	C -39-44
UX -240	VOLTAGE AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	D-C FILAMENT	5.0	0.25	180	—	CLASS A AMPLIFIER	135✖ 180✖	− 1.5 − 3.0	—	—	0.2 0.2	150000 150000	200 200	30 30	—	—	CX-340
RCA- 41	POWER AMPLIFIER PENTODE	SMALL 6-PIN	FIG. 15A	4¼" x 1 9/16"	HEATER	6.3	0.4	250	250	CLASS A AMPLIFIER	100 180 250	− 7.0 −13.5 −18.0	100 180 250	1.6 3.0 5.5	9.0 18.5 32.0	103500 81000 68000	1450 1850 2200	150 150 150	12000 9000 7600	0.33 1.50 3.40	C - 41
RCA- 42	POWER AMPLIFIER PENTODE	MEDIUM 6-PIN	FIG. 15A	4 11/16" x 1 13/16"	HEATER	6.3	0.7	250	250	CLASS A AMPLIFIER	250	−16.5	250	6.5	34.0	100000	2200	220	7000	3.00	C - 42

★For Grid-leak Detection—plate volts 45, grid return to + filament or to cathode.
■Either A. C. or D. C. may be used on filament or heater, except as specifically noted. For use of D. C. on A-C filament types, decrease stated grid volts by ½ (approx.) of filament voltage.

●Applied through plate coupling resistor of 250000 ohms or 500-henry choke shunted by 0.25 megohm resistor.
♥Applied through plate coupling resistor of 100000 ohms.
✖Applied through plate coupling resistor of 250000 ohms.
*Maximum.

RCA- 43	POWER AMPLIFIER PENTODE	MEDIUM 6-PIN	FIG. 15A	4 11/16" x 1 13/16"	HEATER	25.0	0.3	135	135	CLASS A AMPLIFIER	100 135	−15.0 −20.0	100 135	4.0 7.0	20.0 34.0	45000 35000	2000 2300	90 80	4500 4000	0.90 2.00	C - 43
RCA- 45	POWER AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	FILAMENT	2.5	1.5	275	—	CLASS A AMPLIFIER	180 250 275	−31.5 −50.0 −56.0	180 250 275	—	31.0 34.0 36.0	1650 1610 1700	2125 2175 2050	3.5 3.5 3.5	2700 3900 4600	0.82 1.60 2.00	C - 45
RCA- 46	DUAL-GRID POWER AMPLIFIER	MEDIUM 8-PIN	FIG. 7	5⅝" x 2 3/16"	FILAMENT	2.5	1.75	250 400	— —	CLASS A AMPLIFIER □ CLASS B AMPLIFIER ♦	250 300 400	−33.0 0 0	— —	— —	22.0 Power output values are for 2 tubes at indicated plate-to-plate load.	2380	2350	5.6	6400 5200 5800	1.25 16.0 20.0	C - 46
RCA- 47	POWER AMPLIFIER PENTODE	MEDIUM 5-PIN	FIG. 6	5⅝" x 2 3/16"	FILAMENT	2.5	1.75	250	250	CLASS A AMPLIFIER	250	−16.5	250	6.0	31.0	60000	2500	150	7000	2.7	C - 47
RCA- 48	POWER AMPLIFIER TETRODE	MEDIUM 6-PIN	FIG. 15	5⅜" x 2 1/16"	D-C HEATER	30.0	0.4	125	100	CLASS A AMPLIFIER	95 125	−20.0 −22.5	95 100	9.0 9.0	47.0 50.0	10000 10000	2800 2800	28 28	2000 2000	1.6 2.5	C - 48
RCA- 49	DUAL-GRID POWER AMPLIFIER	MEDIUM 5-PIN	FIG. 7	4 11/16" x 1 13/16"	D-C FILAMENT	2.0	0.120	135 180	— —	CLASS A AMPLIFIER □ CLASS B AMPLIFIER ♦	135 180	−20.0 0	— —	— —	5.7 Power output values are for 2 tubes at indicated plate-to-plate load.	4000	1125	4.5	11000 12000	0.17 3.5	C - 49
UX -250	POWER AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	6¼" x 2 11/16"	FILAMENT	7.5	1.25	450	—	CLASS A AMPLIFIER	300 400 450	−54.0 −70.0 −84.0	— —	— —	35.0 55.0 55.0	2000 1800 1800	1900 2100 2100	3.8 3.8 3.8	4600 3670 4350	1.6 3.4 4.6	CX-350
RCA- 53	TWIN-TRIODE AMPLIFIER	MEDIUM 7-PIN#	FIG. 24	4 11/16" x 1 13/16"	HEATER	2.5	2.0	300	—	CLASS B AMPLIFIER	250 300	0 0	— —	— —	Power output value is for one tube at stated load, plate-to-plate.				8000 10000	8.0 10.0	C - 53
RCA- 55	DUPLEX-DIODE TRIODE	SMALL 6-PIN	FIG. 13	4 17/32" x 1 9/16"	HEATER	2.5	1.0	250	—	TRIODE UNIT AS CLASS A AMPLIFIER	135 180 250	−10.5 −13.5 −20.0	— —	— —	3.7 6.0 8.0	11000 8500 7500	750 975 1100	8.3 8.3 8.3	25000 20000 20000	0.075 0.160 0.350	C - 55
RCA- 56	SUPER-TRIODE AMPLIFIER DETECTOR★	SMALL 5-PIN	FIG. 8	4¼" x 1 9/16"	HEATER	2.5	1.0	250	—	CLASS A AMPLIFIER	250	−13.5	—	—	5.0	9500	1450	13.8	—	—	C - 56
										BIAS DETECTOR	250	−20.0	—	—	Plate current to be adjusted to 0.2 milliampere with no signal.					

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VACUUM TUBE CHART

RCA- 57	TRIPLE-GRID AMPLIFIER DETECTOR	SMALL 6-PIN	FIG. 11	4 11/16" x 1 9/16"	HEATER	2.5	1.0	250	100	SCREEN GRID R-F AMPLIFIER	250	− 3.0	100	0.5	2.0	exceeds 1.5 meg.	1225	exceeds 1500	——	——	C - 57
										BIAS DETECTOR	250	− 3.9	100	Cathode current 0.97 ma.		——	Plate coupling resistor 250000 ohms. Grid coupling resistor 250000 ohms**.				
RCA- 58	TRIPLE-GRID SUPER-CONTROL AMPLIFIER	SMALL 6-PIN	FIG. 11	4 11/16" x 1 9/16"	HEATER	2.5	1.0	250	100	SCREEN GRID R-F AMPLIFIER	250	− 3.0 min.	100	2.0	8.2	800000	1600	1280	——	——	C - 58
										MIXER IN SUPERHETERODYNE	250	−10.0	100	——	——	Oscillator peak volts = 7.0.				
RCA- 59	TRIPLE-GRID POWER AMPLIFIER	MEDIUM 7-PIN#	FIG. 18	5 3/8" x 2 1/16"	HEATER	2.5	2.0	250	——	AS TRIODE ¶ CLASS A AMPLIFIER	250	−28.0	——	——	26.0	2400	2600	6.0	5000	1.25	C - 59
								250	250	AS PENTODE ■■ CLASS A AMPLIFIER	250	−18.0	250	9.0	35.0	40000	2500	100	6000	3.00	
								400	——	AS TRIODE ● CLASS B AMPLIFIER	300	0	——	——	Power output values are for 2 tubes at indicated plate-to-plate load.				4600	15.0	
											400	0							6000	20.0	
RCA- 71-A	POWER AMPLIFIER TRIODE	MEDIUM 4-PIN	FIG. 1	4 11/16" x 1 13/16"	FILAMENT	5.0	0.25	180	——	CLASS A AMPLIFIER	90	−19.0	——	——	10.0	2170	1400	3.0	3000	0.125	C - 71-A
											180	−43.0			20.0	1750	1700	3.0	4800	0.790	
RCA- 75	DUPLEX-DIODE HIGH-MU TRIODE	SMALL 6-PIN	FIG. 13	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	——	TRIODE UNIT AS CLASS A AMPLIFIER	250 ✖	−1.35	——	——	0.4	——	——	Gain per stage = 50-60			C - 75
RCA- 77	TRIPLE-GRID AMPLIFIER DETECTOR	SMALL 6-PIN	FIG. 11	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	100	SCREEN GRID R-F AMPLIFIER	100	− 1.5	60	0.4	1.7	650000	1100	715	——	——	C - 77
											250	− 3.0	100	0.6	2.3	1500000	1250	1500			
										BIAS DETECTOR	250	− 1.95	50	Cathode current 0.65 ma.		——	Plate coupling resistor 250000 ohms. Grid coupling resistor 250000 ohms**				
RCA- 78	TRIPLE-GRID SUPER-CONTROL AMPLIFIER	SMALL 6-PIN	FIG. 11	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	125	SCREEN GRID R-F AMPLIFIER	90	− 3.0 min.	90	1.5	5.4	315000	1275	400	——	——	C - 78
											180		75	1.0	4.0	1000000	1100	1100			
											250		100	2.0	7.0	800000	1450	1160			
											250		125	3.0	10.5	600000	1650	990			
RCA- 79	TWIN-TRIODE AMPLIFIER	SMALL 6-PIN	FIG. 19	4 17/32" x 1 9/16"	HEATER	6.3	0.6	250	——	CLASS B AMPLIFIER	180	0	——	——	Power output value is for one tube at stated load, plate-to-plate.				7000	5.5	C - 79
											250	0							14000	8.0	
RCA- 85	DUPLEX-DIODE TRIODE	SMALL 6-PIN	FIG. 13	4 17/32" x 1 9/16"	HEATER	6.3	0.3	250	——	TRIODE UNIT AS CLASS A AMPLIFIER	135	−10.5	——	——	3.7	11000	750	8.3	25000	0.075	C - 85
											180	−13.5			6.0	8500	975	8.3	20000	0.160	
											250	−20.0			8.0	7500	1100	8.3	20000	0.350	
RCA- 89	TRIPLE-GRID POWER AMPLIFIER	SMALL 6-PIN	FIG. 14	4 17/32" x 1 9/16"	HEATER	6.3	0.4	250	250	AS TRIODE ¶ CLASS A AMPLIFIER	160	−20.0	——	——	17.0	3300	1425	4.7	7000	0.300	C - 89
											180	−22.5			20.0	3000	1550	4.7	6500	0.400	
											250	−31.0			32.0	2600	1800	4.7	5500	0.900	
										AS PENTODE ■■ CLASS A AMPLIFIER	100	−10.0	100	1.6	9.5	104000	1200	125	10700	0.33	
											180	−18.0	180	3.0	20.0	80000	1550	125	8000	1.50	
											250	−25.0	250	5.5	32.0	70000	1800	125	6750	3.40	
										AS TRIODE ● CLASS B AMPLIFIER	180	0	——	——	Power output values are for 2 tubes at indicated plate-to-plate load.				13600	2.50	
																				9400	3.50	
UV -199 UX -199	DETECTOR★ AMPLIFIER TRIODE	SMALL 4-NUB SMALL 4-PIN	FIG. 10 FIG. 1	3 1/2" x 1 1/16" 4 1/8" x 1 9/16"	D-C FILAMENT	3.3	0.063	90	——	CLASS A AMPLIFIER	90	− 4.5	——	——	2.5	15500	425	6.6	——	——	C -299 CX-299
RCA-864	AMPLIFIER TRIODE	SMALL 4-PIN	FIG. 1	4" x 1 9/16"	D-C FILAMENT	1.1	0.25	135	——	CLASS A AMPLIFIER	90	− 4.5	——	——	2.9	13500	610	8.2	——	——	C -864
											135	− 9.0			3.5	12700	645	8.2			

★For Grid-leak Detection—plate volts 45, grid return to + filament or to cathode.
■ Either A. C. or D. C. may be used on filament or heater, except as specifically noted. For use of D. C. on A-C filament types, decrease stated grid volts by ½ (approx.) of filament voltage.
Requires different socket from small 7-pin.
□ Grid next to plate tied to plate. ◆ Two grids tied together. **For grid of following tube.
■■ Grid #1 is control grid. Grid #2 is screen. Grid #3 tied to cathode.
¶ Grid #1 is control grid. Grids #2 and #3 tied to plate. ✖ Applied through plate coupling resistor of 250000 ohms.
● Grids #1 and #2 connected together. Grid #3 tied to plate. **For grid of following tube.

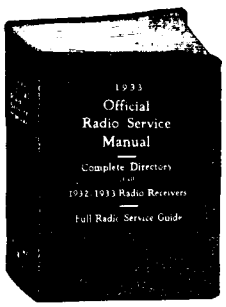
RECTIFIERS

RCA-5Z3	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8" x 2 1/16"	FILAMENT	5.0	3.0	——	——	Maximum A-C Voltage per Plate.....500 Volts, RMS Maximum D-C Output Current.....250 Milliamperes	C -5Z3
RCA-12Z3	HALF-WAVE RECTIFIER	SMALL 4-PIN	FIG. 22	4 1/4" x 1 9/16"	HEATER	12.6	0.3	——	——	Maximum A-C Voltage per Plate.....250 Volts, RMS Maximum D-C Output Current..... 60 Milliamperes	C-12Z3
RCA-25Z5	RECTIFIER-DOUBLER	SMALL 6-PIN	FIG. 5	4 1/4" x 1 9/16"	HEATER	25.0	0.3	——	——	Maximum A-C Voltage per Plate.....125 Volts, RMS Maximum D-C Output Current.....100 Milliamperes	C-25Z5
RCA-1-v°	HALF-WAVE RECTIFIER	SMALL 4-PIN	FIG. 22	4 1/4" x 1 9/16"	HEATER	6.3	0.3	——	——	Maximum A-C Voltage per Plate.....350 Volts, RMS Maximum D-C Output Current..... 50 Milliamperes	C-1v°
RCA- 80	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	4 11/16" x 1 13/16"	FILAMENT	5.0	2.0	——	——	A-C Voltage per Plate (Volts RMS).. 350 400 550 D-C Output Current (Maximum MA.) 125 110 135 The 550 volt rating applies to filter circuits having an input choke of at least 20 henries.	C - 80
UX -281	HALF-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 3	6 1/4" x 2 7/16"	FILAMENT	7.5	1.25	——	——	Maximum A-C Plate Voltage.....700 Volts, RMS Maximum D-C Output Current..... 85 Milliamperes	CX-381
RCA- 82	FULL-WAVE ➤ RECTIFIER	MEDIUM 4-PIN	FIG. 2	4 11/16" x 1 13/16"	FILAMENT	2.5	3.0	——	——	Maximum A-C Voltage per Plate.....500 Volts, RMS Maximum D-C Output Current.....125 Milliamperes Maximum Peak Inverse Voltage.....1400 Volts Maximum Peak Plate Current..... 400 Milliamperes	C - 82
RCA- 83	FULL-WAVE ➤ RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8" x 2 1/16"	FILAMENT	5.0	3.0	——	——	Maximum A-C Voltage per Plate.....500 Volts, RMS Maximum D-C Output Current.....250 Milliamperes Maximum Peak Inverse Voltage.....1400 Volts Maximum Peak Plate Current..... 800 Milliamperes	C - 83
RCA- 84 *also 6Z4*	FULL-WAVE RECTIFIER	SMALL 5-PIN	FIG. 23	4 1/4" x 1 9/16"	HEATER	6.3	0.5	——	——	Maximum A-C Voltage per Plate.....225 Volts, RMS Maximum D-C Output Current..... 50 Milliamperes	C - 84 *also 6Z4*
RCA-866	HALF-WAVE ➤ RECTIFIER	MEDIUM 4-PIN	FIG. 16	6 5/8" x 2 7/16"	FILAMENT	2.5	5.0	——	——	Maximum Peak Inverse Voltage.....7500 Volts Maximum Peak Plate Current.....0.6 Ampere	C -866 (CX-366)

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VACUUM TUBE CHART

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

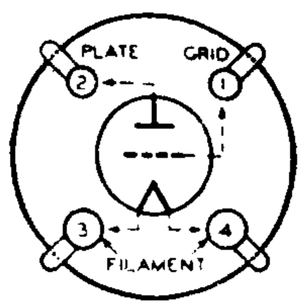


FIG.1

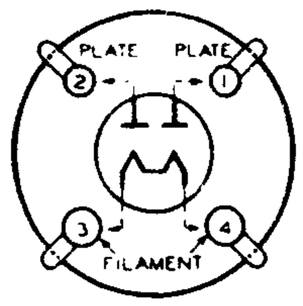


FIG.2

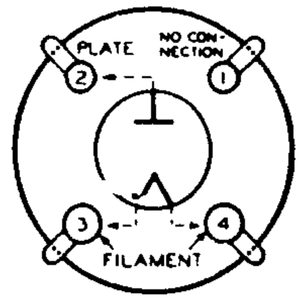


FIG.3

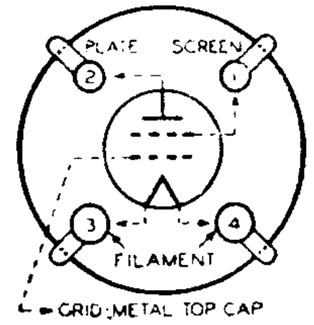


FIG.4

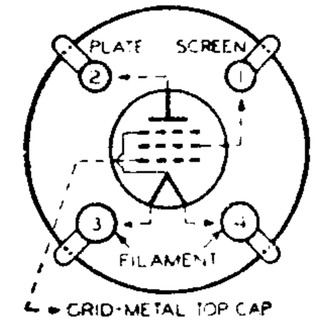


FIG.4A

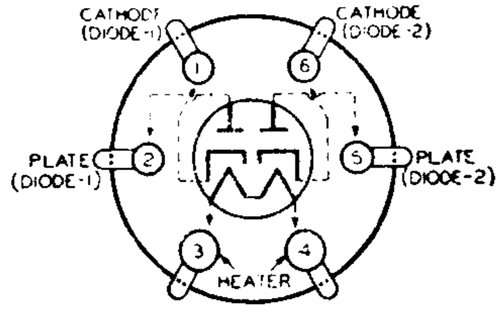


FIG.5

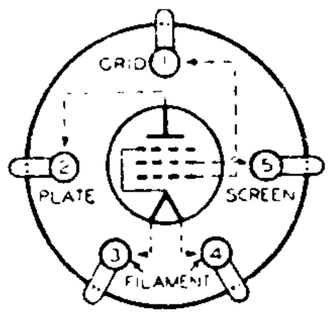


FIG.6

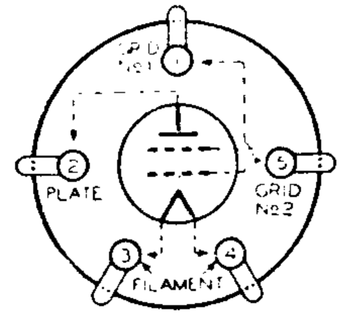


FIG.7

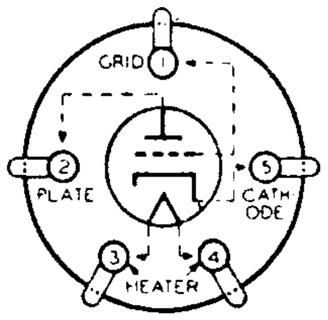


FIG.8

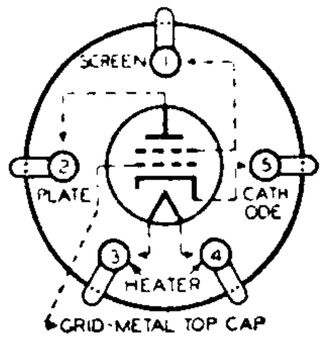


FIG.9

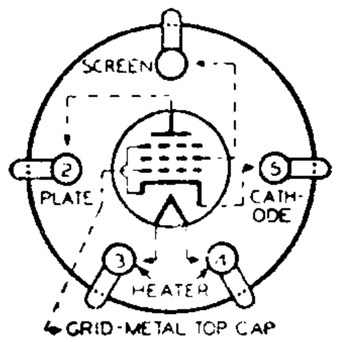


FIG.9A

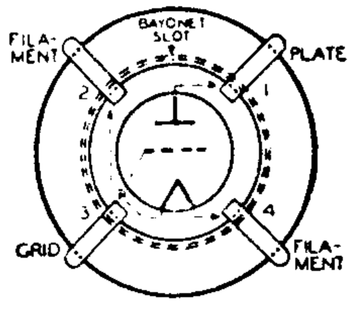


FIG.10

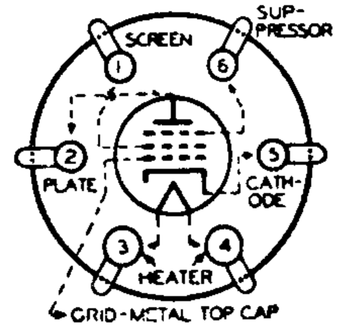


FIG.11

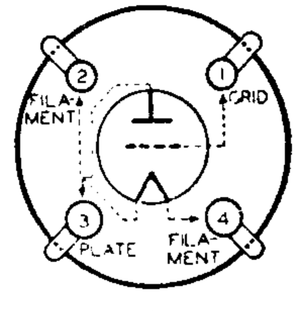


FIG.12

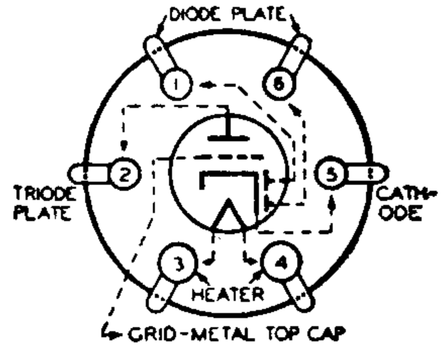


FIG.13

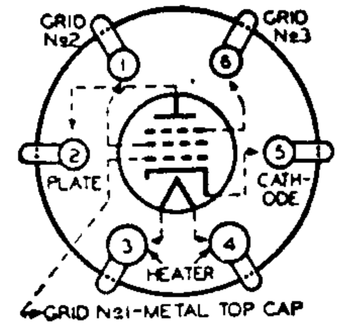


FIG.14

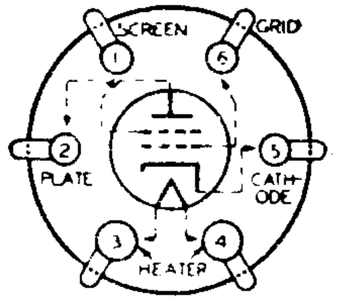


FIG.15

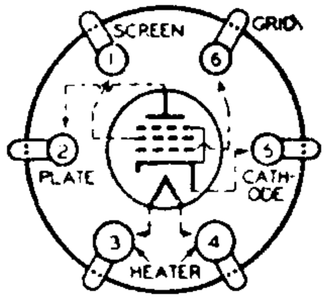


FIG.15A

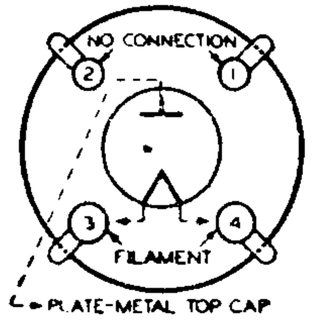


FIG.16

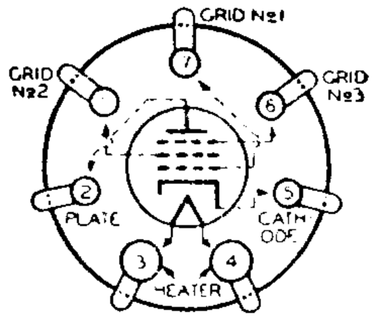


FIG.18

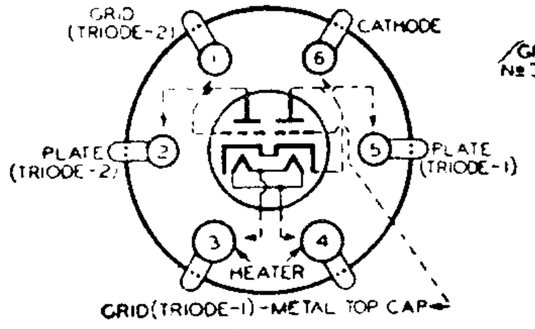


FIG.19

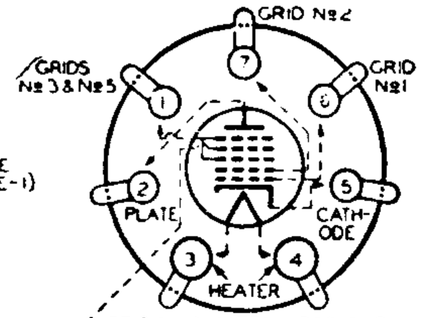


FIG.20

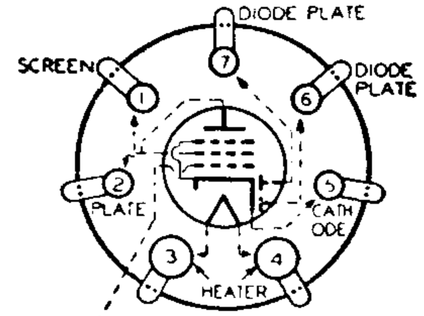


FIG.21

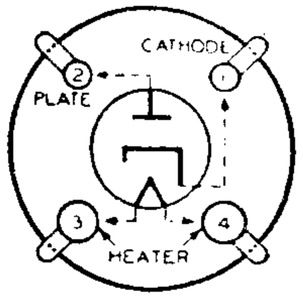


FIG.22

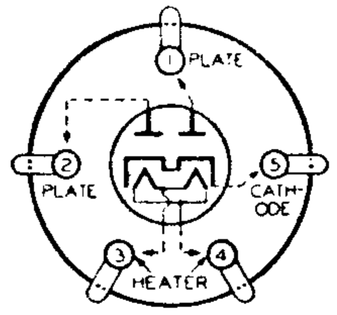


FIG.23

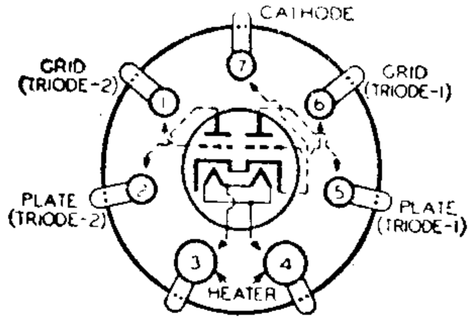


FIG.24

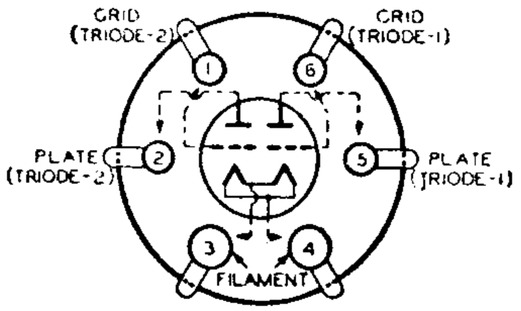


FIG.25

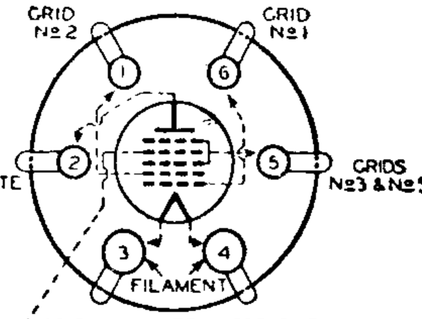


FIG.26

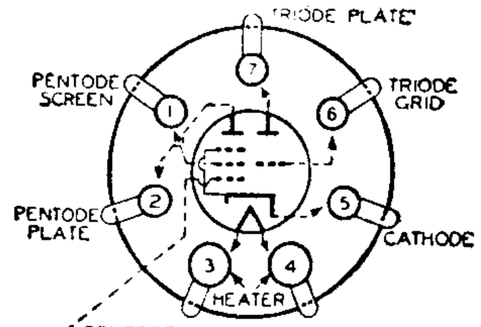


FIG.27

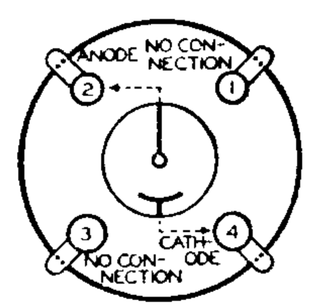


FIG.28

INDEX OF TYPES BY USE AND BY CATHODE VOLTAGE

CATHODE VOLTS	POWER AMPLIFIERS	VOLTAGE AMPLIFIERS *Including Duplex-Diode Types*	CONVERTERS IN SUPERHETERODYNES	DETECTORS	MIXER TUBES IN SUPERHETERODYNES	RECTIFIERS	CATHODE VOLTS
5.0	112-A, 71-A	01-A, '40, 112-A	—	00-A, 01-A, '40, 112-A	—	5Z3, 80, 83	5.0
6.3	6A4, 38, 41, 42, 79, 89	6B7, 6F7, 36, 37, 39-44, 75, 77, 78, 85	6A7, 6F7	6B7, 6F7, 36, 37, 75, 77, 85	6A7, 6F7, 39-44, 78	1-v, 84	6.3
7.5	10, '50	—	—	—	—	'81	7.5
12.6	—	—	—	—	—	12Z3	12.6
25.0	43	—	—	—	—	25Z5	25.0
30.0	48	—	—	—	—	—	30.0
1.5	—	26	—	—	—	—	1.5
2.0	19, 31, 33, 49	30, 32, 34	1A6	30, 32	1A6, 34	—	2.0
2.5	2A3, 2A5, 45, 46, 47, 53, 59	2A6, 2B7, 24-A, 27, 35, 55, 56, 57, 58	2A7	2A6, 2B7, 24-A, 27, 55, 56, 57	2A7, 35, 58	82, 866 (C-366)	2.5
3.3	'20	22, '99	—	'99	—	—	3.3

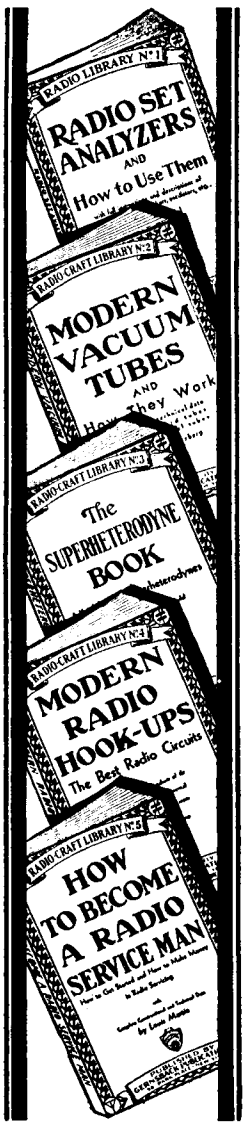
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By C. W. PALMER

It often becomes necessary for experimenters and Service Men to call upon their memory for some short cut or radio wrinkle that will solve a problem quickly. In business, "short cuts" mean time and money saved, and to the Service Man "time saved" means money earned.

Book No. 8

Radio Questions and Answers

A Selection of the Most Important of 5,000 Questions Submitted by Radio Men During the Course of One Year

By R. D. WASHBURNE

There have been collected a wide variety of questions which have come into our editorial offices during the past two years, and only those whose answers would benefit the majority of men engaged in radio have been incorporated in this amazing question and answer book. A tremendously long list of topics is treated.

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Automobile Radio and Servicing

A Complete Treatise on the Subject Covering All Phases from Installing to Servicing and Maintenance

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A few of the really interesting chapters: Introduction; Automotive Radio Installations; Complete Descriptions of Commercial Automotive Receivers; Servicing Automotive Receivers; The Ignition System; General Service Considerations; Effects of Temperature on Power Supply; Conclusion.

Book No. 10

Home Recording and All About It

A Complete Treatise on Instantaneous Recordings, Microphones, Recorders, Amplifiers, Commercial Machines, Servicing, etc.

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The art of recording and reproducing broadcast selections is becoming more important every day to radio men, experimenters and Service Men. Equipping dance halls, auditoriums, churches, restaurants and homes with public address systems and amplifiers brings many extra dollars and often an excellent income.

Book No. 11

Point-to-Point Resistance Measurements

The Modern Method of Servicing Radio Receivers

By CLIFFORD E. DENTON

Of the difficult problems which Service Men face today when repairing receivers, the greatest is that of replacing proper resistance values in sets. This task becomes even more difficult when the values of resistors are unknown; and manufacturers of many standard sets do not pass this information on to Service Men. In this new book radio men will find the information needed to quickly place a receiver in normal operating condition. This book cuts in half the time usually required to adjust the average set. Sufficient space has been devoted to the elementary problems and the theory of electricity as it is applied to resistance measurements so that the Service Man will have a comprehensive idea as to how to overcome this problem.

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INTRODUCTION. Advantages of Resistance Measurement Method of Servicing for Radio Work; Basic Principles; Methods of Resistance Measurement; Resistors in Radio Receivers and Amplifiers; Point-to-Point Resistance-Measurements in Typical Radio Set using Ohmmeter; Resistance Measurements using Modern Tester; Routine Testing where Circuit Diagram is Available and where Resistances are Known; Routine Testing where Circuit Diagram is Not Available and where Resistances are Unknown; the Relation of Voltage Testing Methods to Resistance Measurement; APPENDIX. Resistance Charts, etc.

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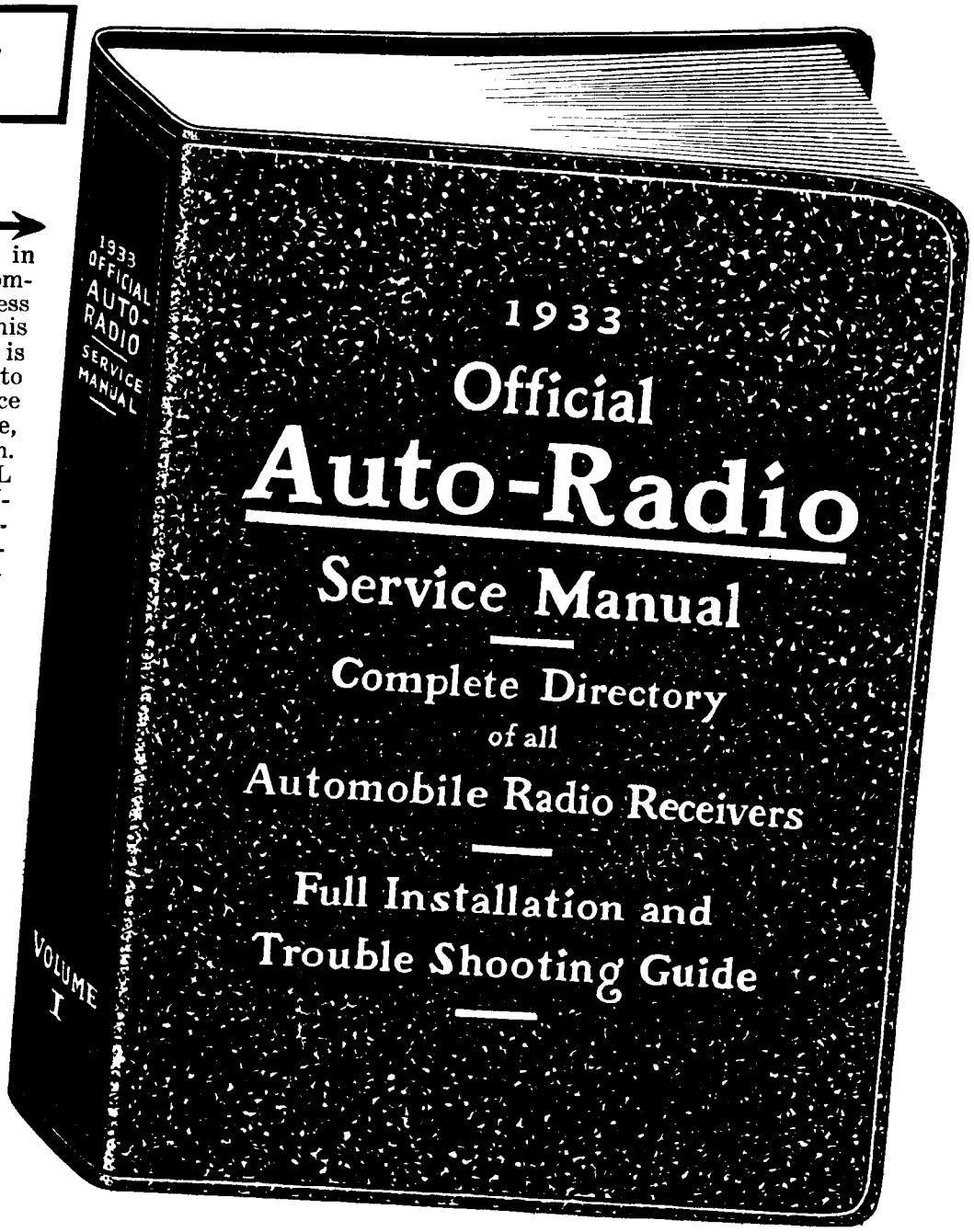
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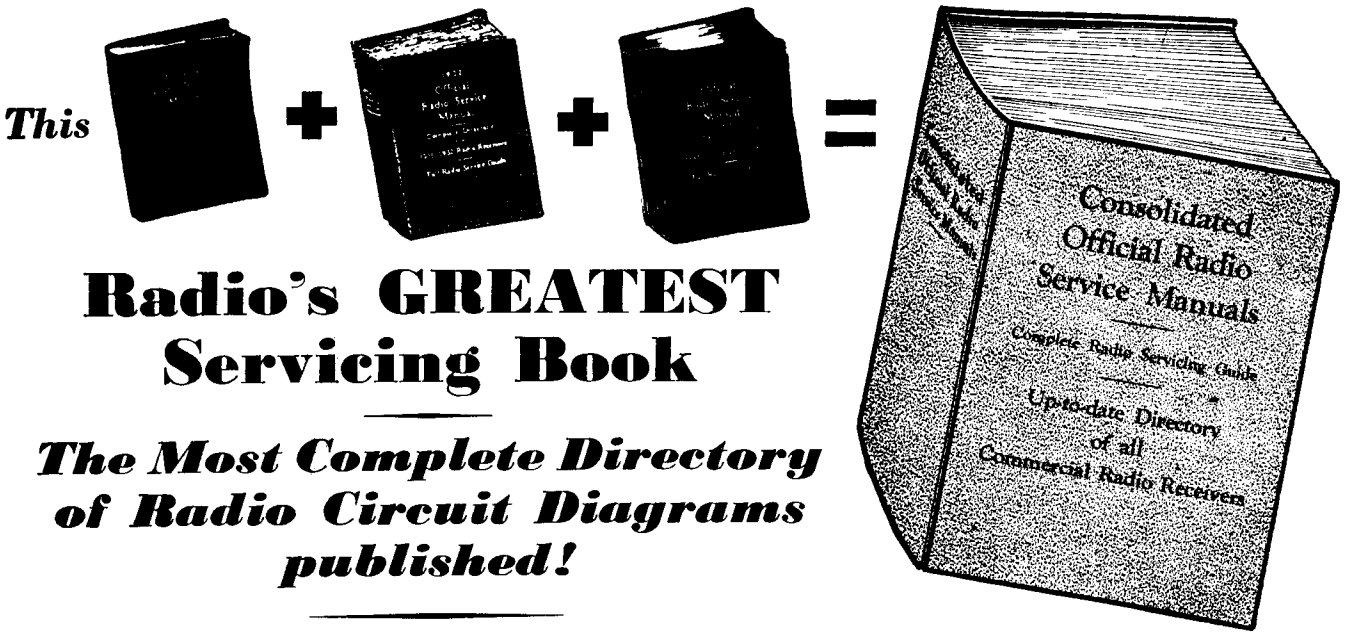
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BROADCAST STATIONS OF THE U. S.

A list of all the broadcast stations in the U. S. as licensed by the Federal Radio Commission and brought up to date to May 1, 1933.

Abbreviations: T, location of transmitter; C. P., construction permit authorized; LS, power until local sunset.

Call Letters	Location	Power (watts)	Freq. kc.	Wave-length (meters)
KABC	San Antonio, Tex.	100	1420	211.3
KALE	Portland, Ore.	500	1300	230.8
KARK	Little Rock, Ark.	250	890	337.1
KASA	Elk City, Okla.	100	1210	247.9
KBPS	Portland, Ore.	100	1420	211.3
KBTM	Paragould, Ark.	100	1200	250
KCMC	Texarkana, Ark.	100	1420	211.3
KCRC	Enid, Okla.	100	1370	219
KCRJ	Jerome, Ariz.	100	1310	229
KDB	Santa Barbara, Calif.	100	1500	200
KDFN	Casper, Wyo.	500	1440	208.3
KDKA	Pittsburgh, Pa. T-Saxonburg.	50kw	980	306
KDLR	Devils Lake, N. D.	100	1210	247.9
KDYL	Salt Lake City, Utah.	1kw	1290	232.6
KECA	Los Angeles, Calif.	1kw	1430	209.8
KELW	Burbank, Calif.	500	780	385
KERN	Bakersfield, Calif.	100	1200	250
KEX	Portland, Ore.	5kw	1180	254.2
KFAB	Lincoln, Nebr.	5kw	770	390
KFAC	Los Angeles, Calif.	1kw	1300	230.8
KFBB	Great Falls, Mont.	1kw	1280	234.4
KFBI	Abilene, Kans. T-Milford	5kw	1050	285.7
KFBK	Sacramento, Calif.	100	1310	229
KFBL	Everett, Wash.	50	1370	219
KFDM	Beaumont, Texas.	500	560	536
KFDY	Brookings, S. D.	1kw	550	545
KFEL	Denver, Colo. T-Edgewater	500	920	326
KFEQ	St. Joseph, Mo.	2½kw	680	441
KFGQ	Boone, Iowa.	100	1310	229
KFH	Wichita, Kans.	1kw	1300	230.8
KFI	Los Angeles, Calif. T-Buena Park	50kw	640	469
KFIO	Spokane, Wash.	100	1120	267.9
KFIZ	Fond du Lac, Wis.	100	1420	211.3
KFJB	Marshalltown, Iowa.	100	1200	250
KFJI	Klamath Falls, Ore.	100	1210	247.9
KFJM	Grand Forks, N. D.	100	1370	219
KFJR	Portland, Ore.	500	1300	230.8
KFJZ	Fort Worth, Tex.	100	1370	219
KFKA	Greeley, Colo.	500	880	341
KFKU	Lawrence, Kan. T-Tonganoxie	500	1220	245.9
KFKX-KYW	(See KYW-KFKX)			
KFLV	Rockford, Ill.	500	1410	212.8
KFLX	Galveston, Tex.	100	1370	219
KFNF	Shenandoah, Iowa.	500	890	337
KFOR	Lincoln, Nebr.	100	1210	247.9
KFOX	Long Beach, Calif.	1kw	1250	240
KFPL	Dublin, Tex.	100	1310	229
KFPM	Greenville, Tex.	15	1310	229
KFPW	Ft. Smith, Ark.	100	1210	247.9
KFPY	Spokane, Wash.	1kw	1340	223.9
KFQD	Anchorage, Alaska.	250	1230	243.9
KFRC	San Francisco, Calif.	1kw	610	492
KFRU	Columbia, Mo.	500	630	476
KFSD	San Diego, Calif.	1kw	600	500
KFSG	Los Angeles, Calif.	500	1120	267.9
KFUO	Clayton, Mo.	500	550	545
KFVD	Los Angeles, Calif.	250	1000	300
KFVS	Cape Girardeau, Mo.	100	1210	247.9
KFWB	Hollywood, Calif.	1kw	950	316
KFWF	St. Louis, Mo.	100	1200	250
KFWI	San Francisco, Calif.	500	930	323
KFXD	Nampa, Idaho.	100	1200	250
KFXF	Denver, Colo.	500	920	326
KFXJ	Grand Junction, Colo.	100	1200	250
KFXM	San Bernardino, Calif.	100	1210	247.9
KFXR	Oklahoma City, Okla.	100	1310	229
KFYO	Lubbock, Texas.	100	1310	229
KFYR	Bismarck, N. D.	1kw	550	545
KGA	Spokane, Wash.	5kw	1470	204.1
KGAR	Tucson, Ariz.	100	1370	219
KGB	San Diego, Calif.	1kw	1330	225.6
KGBU	Ketchikan, Alaska.	500	900	333
KGBX	Springfield, Mo.	100	1310	229
KGBZ	York, Nebr.	500	930	323
KGCA	Decorah, Iowa.	100	1270	236.2
KGCR	Watertown, S. D.	100	1210	247.9
KGCU	Mandan, N. D.	250	1240	241.9
KGCX	Wolf Point, Mont.	100	1310	229
KGDA	Mitchell, S. D.	100	1370	219
KGDE	Fergus Falls, Minn.	100	1200	250
KGDM	Stockton, Calif.	250	1100	272.7
KGDY	Huron, S. D.	250	1340	223.9
KDEK	Yuma, Colo.	100	1200	250
KGER	Long Beach, Calif.	1kw	1360	220.6
KGEZ	Kalispell, Mont.	100	1310	229
KGFF	Shawnee, Okla.	100	1420	211.3
KGFG	Oklahoma City, Okla.	100	1370	219
KGFI	Corpus Christi, Tex.	100	1500	200
KGFJ	Los Angeles, Calif.	100	1200	250
KGFK	Moorhead, Minn.	100	1500	200
KGFL	Raton, N. Mex. C. P. Roswell	50	1370	219
KGFW	Kearney, Nebr.	100	1310	229
KGFX	Pierre, S. D.	200	630	476
KGGC	San Francisco, Calif.	100	1420	211.3
KGGF	Coffeyville, Kans. T. South Coffeyville, Okla.	500	1010	297
KGGM	Albuquerque, N. M.	250	1230	243.9
KGHF	Pueblo, Colo.	250	1320	227.3
KGHI	Little Rock, Ark.	100	1200	250
KGHL	Billings, Mont.	1kw	950	316
KGIR	Butte, Mont.	500	1360	220.6
KGIW	Trinidad, Colo.	100	1420	211.3
KGIX	Las Vegas, Nev.	100	1420	211.3
KGIZ	Grant City, Mo.	100	1500	200
KGKB	Tyler, Tex.	100	1500	200
KGKL	San Angelo, Tex.	100	1370	219
KGKO	Wichita Falls, Tex.	250	570	526
KGKX	Sandpoint, Idaho. C. P. Lewiston	100	1420	211.3
KGKY	Scottsbluff, Nebr.	100	1500	200
KGMB	Honolulu, Hawaii.	250	1320	227.3
KGNF	North Platte, Nebr.	500	1430	209.8
KGNO	Dodge City, Kans.	250	1340	223.9
KGO	San Francisco, Calif. T-Oakland	7½kw	790	380
KGRS	Amarillo, Tex.	1kw	1410	212.8
KGU	Honolulu, Hawaii.	2½kw	750	400
KGVO	Missoula, Mont.	100	1200	250
KGW	Portland, Me. T-Faloma	1kw	620	484
KGY	Olympia, Wash.	100	1210	247.9
KHJ	Los Angeles, Calif.	1kw	900	333
KHQ	Spokane, Wash.	1kw	590	509
KICA	Clovis, N. M.	100	1370	219
KICK	Red Oak, Iowa.	100	1420	211.3
KID	Idaho Falls, Idaho.	250	1320	227.3
KIDO	Boise, Idaho.	1kw	1350	222.2
KIDW	Lamar, Colo.	100	1420	211.3
KIEM	Eureka, Calif.	100	1210	247.9
KIEV	Glendale, Calif.	100	850	353
KIFH	Juneau, Alaska.	100	1310	229
KIT	Yakima, Wash.	100	1310	229
KJBS	San Francisco, Calif.	100	1070	280.4
KJR	Seattle, Wash.	5kw	970	309
KLCN	Blytheville, Ark.	100	1290	232.6
KLO	Ogden, Utah.	500	1400	214.3
KLPM	Minot, N. D.	250	1240	241.9
KLRA	Little Rock, Ark.	1kw	1390	215.8
KLS	Oakland, Calif.	250	1440	208.3
KLX	Oakland, Calif.	1kw	880	341
KLZ	Denver, Colo.	1kw	560	536
KMA	Shenandoah, Iowa.	500	930	323
KMAC	San Antonio, Texas.	100	1370	219
KMBC	Kansas City, Mo. T-Independence	1kw	950	316
KMED	Medford, Ore.	100	1310	.....
KMJ	Fresno, Calif.	500	580	517
KMLB	Monroe, La.	100	1200	250
KMMJ	Clay Center, Neb.	1kw	740	405
KMO	Tacoma, Wash.	250	1330	225.6
KMOX	St. Louis, Mo.	50kw	1090	275.2
KMPC	Beverly Hills, Calif.	500	710	423
KMTR	Los Angeles, Calif.	500	570	526
KNOW	Austin, Tex.	100	1500	200
KNX	Los Angeles, Calif.	25kw	1050	285.7
KOA	Denver, Colo.	12½kw	830	361
KOAC	Corvallis, Ore.	1kw	550	545
KOB	Albuquerque, N. M.	10kw	1180	254.2
KOCW	Chickasha, Okla.	250	1400	214.3
KOH	Reno, Nev.	500	1380	217.4
KOIL	Councils Bluffs, Iowa.	1kw	1260	238.1
KOIN	Portland, Ore.	1kw	940	319
KOL	Seattle, Wash.	1kw	1270	236.2
KOMA	Oklahoma City, Okla.	5kw	1480	202.7
KOMO	Seattle, Wash.	1kw	920	326
KONO	San Antonio, Tex.	100	1370	219
KOOS	Marshfield, Ore.	100	1370	219
KORE	Eugene, Ore.	100	1420	211.3
KOY	Phoenix, Ariz.	1kw-LS	1390	215.8
KPCB	Seattle, Wash.	100	650	462
KPJM	Prescott, Ariz.	100	1500	200
KPO	San Francisco, Calif. T-Near Belmont	5kw C.P.50kw	680	441
KPOF	Denver, Colo.	500	880	341
KPPC	Pasadena, Calif.	50	1210	247.9
KPQ	Wenatchee, Wash.	100kw	1500	200
KPRC	Houston, Tex. T-Sugarland	1kw 2½kw-LS	920	326
KQV	Pittsburgh, Pa.	500	1380	217.4
KQW	San Jose, Calif.	500	1010	297
KRE	Berkeley, Calif.	100	1370	219
KREG	Santa Ana, Calif.	100	1500	200
KRGV	Harlingen, Tex.	500	1260	238.1
KRKD	Los Angeles, Calif.	500	1120	267.9
KRLD	Dallas, Tex.	10kw	1040	288.5
KRMD	Shreveport, La.	100	1310	229
KROW	Oakland, Calif. T-Richmond	500 1kw-LS	930	323
KRSC	Seattle, Wash.	100	1120	267.9
KSAC	Manhattan, Kans.	500	580	517
KSCJ	Sioux City, Iowa.	1kw	1330	225.6
KSD	St. Louis, Mo.	500	550	545
KSEI	Pocatello, Idaho.	250	900	333
KSL	Salt Lake City, Utah. T-Saltair	50kw	1130	265.5
KSO	Des Moines, Iowa.	100	1370	219
KSOO	Sioux Falls, S. D.	2½kw	1110	270.3
KSTP	St. Paul, Minn. T-Radio Center	25kw-LS	1460	205.5
KTAB	San Francisco, Calif. T-Oakland	1kw	560	536
KTAR	Phoenix, Ariz.	500	620	484
KTAT	Fort Worth, Tex. T-Birdville	1kw	1240	241.9
KTBS	Shreveport, La.	1kw	1450	206.9
KTFI	Twin Falls, Idaho.	1kw-LS	1240	241.9
KTHS	Hot Springs National Park, Ark.	10kw	1040	288.5
KTM	Los Angeles, Calif. T-Santa Monica	500 1kw-LS	780	385
KTRH	Houston, Tex.	500	1120	267.9
KTSA	San Antonio, Tex.	1kw	1290	232.6
KTSM	El Paso, Tex.	100	1310	229
KTW	Seattle, Wash.	1kw	1220	245.9
KUJ	Walla Walla, Wash.	100	1370	219
KUMA	Yuma, Ariz.	100	1420	211.3
KUOA	Fayetteville, Ark.	1kw	1260	238.1
KUSD	Vermillion, S. D.	500	890	337
KVI	Tacoma, Wash. T-Des Moines	500	570	526
KVL	Seattle, Wash.	100	1370	219
KVOA	Tucson, Ariz.	500	1260	238.1
KVOO	Tulsa, Okla.	5kw	1140	263.2
KVOR	Colorado Spgs., Colo.	1kw	1270	236.2
KVOS	Bellingham, Wash.	100	1200	250
KWCR	Cedar Rapids, Iowa.	100	1420	211.3
KWEA	Shreveport, La.	100	1210	247.9
KWG	Stockton, Cal.	100	1200	250
KWJJ	Portland, Ore.	500	1060	283
KWK	St. Louis, Mo. T-Kirkwood	1kw	1350	222.2
KWKC	Kansas City, Mo.	100	1370	219
KWKH	Shreveport, La. T-Kennonwood	10kw	850	353
KWLC	Decorah, Iowa.	100	1270	236.2
KWSC	Pullman, Wash.	1kw	1220	245.9
KWWG	Brownsville, Tex.	500	1260	238.1
KXA	Seattle, Wash.	250	760	395
KXL	Portland, Ore.	100	1420	211.3
KXO	El Centro, Calif.	100	1500	200
KXRO	Aberdeen, Wash.	100	1310	229
KXYZ	Houston, Tex.	250	1440	208.3
KYA	San Francisco, Calif.	1kw	1230	243.9
KYW	Chicago, Ill. T-Bloomingdale Twsp.	10kw	1020	294.1
WAAB	Boston, Mass. T-Quincy	500	1410	212.8
WAAF	Chicago, Ill.	500	920	326
WAAM	Newark, N. J.	1kw	1250	240
WAAT	Jersey City, N. J.	500	940	319
WAAW	Omaha, Neb.	500	660	455
WABC-	New York, N. Y.	50kw	860	349



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WAIU	Columbus, Ohio	500	640	469
WALR	Zanesville, Ohio	100	1210	247.9
WAMC	Anniston, Ala	100	1420	211.3
WAML	Laurel, Miss	100	1310	229
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WARD	Brooklyn, N. Y	500	1400	214.3
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WBAK	Harrisburg, Pa	1kw	1430	209.8
WBAL	Baltimore, Md T-Pikeville, Md.	10kw	1060	283
WBAP	Fort Worth, Tex T-Grapevine	50kw	800	375
WBAX	Wilkes-Barre, Pa T-Plains Twp.	100	1210	247.9
WBBL	Richmond, Va	100	1210	247.9
WBBM-WJBT	Chicago, Ill T-Glenview	25kw	770	390
WBBR	Brooklyn, N. Y T-Rossville	1kw	1300	230.8
WBBX	New Orleans, La	100	1200	250
WBBZ	Ponca City, Okla	100	1200	250
WBCM	Bay City, Mich T-Hampton Twp.	500	1410	212.8
WBCN-WENR	(See WENR-WBCN).			
WBEN	Buffalo, N. Y T-Martinsville	1kw	900	333
WBEO	Marquette, Mich	100	1310	229
WBHS	Huntsville, Ala	100	1200	250
WBIG	Greensboro, N. C	500	1440	208.3
WBIS-WNAC	(See WNAC-WBIS)			
WBMS	Hackensack, N. J	250	1450	206.9
WBNX	New York, N. Y	250	1350	222.2
WBOQ-WABC	(See WABC-WBOQ)			
WBOW	Terre Haute, Ind	100	1310	229
WBRC	Birmingham, Ala	500	930	323
WBRE	Wilkes-Barre, Pa	100	1310	229
WBSO	Needham, Mass	500	920	326
WBT	Charlotte, N. C	25kw	1080	277.8
WBTM	Danville, Va	100	1370	219
WBZ	Boston, Mass T-Millis Twp.	25kw	990	303
WBZA	Boston, Mass T-East Springfield	1kw	990	303
WCAC	Storrs, Conn	250	600	500
WCAD	Canton, N. Y	500	1220	245.9
WCAE	Pittsburgh, Pa	1kw	1220	245.9
WCAH	Columbus, Ohio	500	1430	209.8
WCAJ	Lincoln, Neb	500	590	509
WCAL	Northfield, Minn	1kw	1250	240
WCAM	Camden, N. J	500	1280	234.4
WCAO	Baltimore, Md	250	600	500
WCAP	Asbury Park, N. J T-Whitesville	500	1280	234.4
WCAT	Rapid City, S. D	100	1200	250
WCAU	Philadelphia, Pa T-Newton, Square Co.	50kw	1170	256.4
WCAX	Burlington, Vt	100	1200	250
WCAZ	Carthage, Ill	50	1070	280.4
WCBA	Allentown, Pa	250	1440	208.3
WCBD	Zion, Ill	5kw	1080	277.8
WCBM	Baltimore, Md	100	1370	219
WCBS	Springfield, Ill	100	1210	247.9
WCCO	Minneapolis, Minn T-Anoka	50kw	810	370
WCDA	New York, N. Y T-Cliffside, N. J.	250	1350	222.2
WCFL	Chicago, Ill	1½kw	970	309
WCKY	Covington, Ky T-Crescent Springs	5kw	1490	201.3
WCLO	Janesville, Wis	100	1200	250
WCLS	Joliet, Ill	100	1310	229
WCOA	Pensacola, Fla	500	1340	223.9
WCOC	Meridian, Miss	500	880	341
WCOD	Harrisburg, Pa	100	1200	250
WCRW	Chicago, Ill	100	1210	247.9
WCSC	Charleston, S. C	500	1360	220.6
WCSH	Portland, Me T-Scarboro	1kw 2½kw-LS	940	319
WDAE	Tampa, Fla	1kw	1220	245.9
WDAF	Kansas City, Mo	1kw	610	492
WDAG	Amarillo, Tex	1kw	1410	212.8
WDAH	El Paso, Tex	100	1310	229
WDAS	Philadelphia, Pa	100	1370	219
WDAY	Fargo, N. D T-West Fargo	1kw	940	319
WDBJ	Roanoke, Va	250	930	323
WDBO	Orlando, Fla	250	580	517
WDEL	Wilmington, Del	250	1120	267.9
WDEV	Waterbury, Vt	500	550	545
WDGY	Minneapolis, Minn	1kw	1180	254.2
WDOD	Chattanooga, Tenn T-Brainerd	1kw 2½kw-LS	1280	234.4
WDRC	Hartford, Conn T-Bloomfield	500	1330	225.6
WDSU	New Orleans, La T-Gretna	1kw	1250	240
WDZ	Tuscola, Ill	100	1070	280.4
WEAF	New York, N. Y T-Bellmore	50kw	660	455
WEAN	Providence, R. I	250	780	385
WEAO	Columbus, Ohio	750	570	526
WEBC	Superior, Wis	1kw	1290	232.6
WEBQ	Harrisburg, Ill	100	1210	247.9
WEBR	Buffalo, N. Y	100	1310	229
WEDC	Chicago, Ill	100	1210	247.9
WEEI	Boston, Mass T-Weymouth	1kw	590	509
WEEU	Reading, Pa	1kw	830	361
WEHC	Charlottesville, Va	500	1350	222.2
WEHS	Cicero, Ill	100	1420	211.3
WELL	Battle Creek, Mich	50	1420	211.3
WENC	Americus, Ga	100	1420	211.3
WENR-WBCN	Chicago, Ill T-Downers Grove	50kw	870	345
WEPS-WORC	(See WORC-WEPS)			
WERE	Erie, Pa	100	1420	211.3
WESG	Elmira, N. Y T-Ithaca	1kw	1040	288.5
WEVD	New York, N. Y T-Brooklyn	500	1300	230.8
WEW	St. Louis, Mo	1kw	760	395
WEXL	Royal Oak, Mich	50	1310	229
WFAA	Dallas, Tex T-Grapevine	50kw	800	375
WFAB	New York, N. Y T-Carlstadt, N. J.	1kw	1300	230.8
WFAM	South Bend, Ind	100	1200	250
WFAS	White Plains, N. Y	100	1210	247.9
WFBC	Greenville, S. C	250-LS	1200	250
WFBE	Cincinnati, Ohio	100	1200	250
WFBG	Altoona, Pa	100	1310	229
WFBL	Syracuse, N. Y T-Collamer	1kw 2½kw-LS	1360	220.6
WFBM	Indianapolis, Ind	1kw	1230	243.9
WFBR	Baltimore, Md	500	1270	236.2
WFDF	Flint, Mich	100	1310	229
WFDV	Rome, Ga	100	1500	200
WFEA	Manchester, N. H	500	1430	209.8
WFI	Philadelphia, Pa	500	560	536
WFIW	Hopkinsville, Ky	1kw	940	319
WFLA-WSUN	Clearwater, Fla	250	620	484
WGAL	Lancaster, Pa	100	1310	229
WGAR	Cleveland, Ohio T-Cuyahoga Heights	500 1kw-LS	1450	206.9
WGBB	Freeport, N. Y	100	1210	247.9
WGBC-WNBR	(See WNBR-WGBC)			
WGBF	Evansville, Ind	500	630	476
WGBI	Scranton, Pa	250	880	341
WGCM	Mississippi City, Miss	100	1210	247.9
WGCP	Newark, N. J	250	1250	240
WGES	Chicago, Ill	500	1360	220.6
WGH	Newport News, Va	100	1310	229
WGL	Ft. Wayne, Ind	100	1370	219
WGLC	Glens Falls, N. Y C.P. Hudson Falls	50 C.P.100-LS	1370	219
WGMS-WLB	(See WLB-WGMS)			
WGN-WLIB	Chicago, Ill T-Elgin	25kw	720	417
WGNY	Chester Twnsp., N. Y.	50	1210	247.9
WGR	Buffalo, N. Y T-Amherst Twp.	1kw	550	545
WGST	Atlanta, Ga	250	890	337
WGY	Schenectady, N. Y T-South Schenectady	50kw	790	380
WHA	Madison, Wis	1kw	940	319
WHAD	Milwaukee, Wis	250	1120	267.9
WHAM	Rochester, N. Y T-Victor Twp.	5kw C.P. 25kw	1150	260.9
WHAS	Louisville, Ky T-Jeffersontown	25kw	820	366
WHAT	Philadelphia, Pa	100	1310	229
WHAZ	Troy, N. Y	500	1300	230.8
WHB	Kansas City, Mo T-North Kansas City	500	860	349
WHBC	Canton, Ohio	10	1200	250
WHBD	Mt. Orab, Ohio	100	1370	219
WHBF	Rock Island, Ill	100	1210	247.9
WHBL	Sheboygan, Wis	500	1410	212.8
WHBQ	Memphis, Tenn	100	1370	219
WHBU	Anderson, Ind	100	1210	247.9
WHBY	Green Bay, Wis T-West De Pere	100	1200	250
WHDF	Calumet, Mich	100	1370	219
WHDH	Boston, Mass T-Saugus	1kw	830	361
WHDL	Tupper Lake, N. Y	100	1420	211.3
WHEB	Portsmouth, N. H T-Newington	250	740	405
WHEC-WABO	Rochester, N. Y	500	1440	208.3
WHEF	Kosciusko, Miss	100	1500	200
WHET	Troy, Ala	100	1210	247.9
WHFC	Cicero, Ill	100	1420	211.3
WHIS	Bluefield, W. Va	250	1410	212.8
WHK	Cleveland, Ohio T-Seven Hills	1kw 2½kw-LS	1390	215.8
WHN	New York, N. Y	250	1010	297
WHO	Des Moines, Iowa	5kw	1000	300
WHOM	Jersey City, N. J	250	1450	206.9
WHP	Harrisburg, Pa T-Lemoyne	500 1kw-LS	1430	209.8
WIAS	Ottumwa, Iowa	100	1310	229
WIBA	Madison, Wis	500	1280	234.4
WIBG	Glenside, Pa T-Elkins Park	25	930	323
WIBM	Jackson, Mich	100	1370	219
WIBO	Chicago, Ill T-Des Plaines	1kw 1½kw-LS	560	536
WIBU	Poynette, Wis	100	1210	247.9
WIBW	Topeka, Kans	1kw	580	517
WIBX	Utica, N. Y	100	1200	250
WICC	Bridgeport, Conn T-Bridgeport	250 500-LS	600	500
WIL	St. Louis, Mo	100	1200	250
WILL	Urbana, Ill	250	890	337
WILM	Wilmington, Del T-Edge Moor	100	1420	211.3
WINS	New York, N. Y T-Carlstadt, N. J.	500	1180	254.2
WIOD-WMBF	Miami, Fla T-Miami Beach	1kw	1300	230.8
WIP	Philadelphia, Pa	500	610	492
WIS	Columbia, S. C	500	1010	297
WISN	Milwaukee, Wis	250	1120	267.9
WJAC	Johnstown, Pa	100	1310	229
WJAG	Norfolk, Nebr	1kw	1060	283
WJAR	Providence, R. I	250	890	337
WJAS	Pittsburgh, Pa T-No. Fayette, Twp.	1kw 2½kw-LS	1290	232.6
WJAX	Jacksonville, Fla	1kw	900	333
WJAY	Cleveland, Ohio	500	610	492
WJBC	La Salle, Ill	100	1200	250
WJBI	Red Bank, N. J	100	1210	247.9
WJBK	Detroit, Mich T-Highland Park	50	1370	219
WJBL	Decatur, Ill	100	1200	250
WJBO	New Orleans, La C.P. Baton Rouge	100	1420	211.3
WJBT-WBBM	(See WBBM-WJBT)			
WJBU	Lewisburg, Pa	100	1210	247.9
WJBW	New Orleans, La	100	1200	250
WJBY	Gadsden, Ala	100	1210	247.9
WJDX	Jackson, Miss	1kw	1270	236.2
WJEJ	Hagerstown, Md	100	1210	247.9
WJEM	Tupelo, Miss	500	990	303
WJEQ	Williamsport, Pa	100	1370	219
WJJD	Mooseheart, Ill	20kw	1130	265.5
WJKS	Gary, Ind	1kw	1360	220.6
WJMS	Ironwood, Mich	100	1420	211.3
WJR	Detroit, Mich T-Sylvan Lake Village	10kw	750	400
WJSV	Alexandria, Va T-Mt. Vernon Hills C.P. Near Alxnda., Va.	10kw	1460	205.5
WJTL	Oglethorpe Univ., Ga. T-Atlanta	100	1370	219
WJW	Akron, Ohio	100	1210	247.9
WJZ	New York, N. Y T-Bound Brook, N. J.	30kw	760	395
WKAQ	San Juan, P. R	1kw	1240	241.9
WKAR	E. Lansing, Mich	1kw	1040	288.5
WKAV	Laconia, N. H	100	1310	229
WKBB	Joliet, Ill C.P. E. Dubuque	100 C.P. 1500	1310	229
WKBC	Birmingham, Ala	100	1310	229
WKBF	Indianapolis, Ind T-Clermont C.P. T-Nr. Indianapolis	500	1400	214.3
WKBH	La Crosse, Wis	1kw	1380	217.4
WKBI	Cicero, Ill	100	1420	211.3
WKBN	Youngstown, Ohio	500	570	526
WKBV	Connersville, Ind	100	1500	200
WKBW	Buffalo, N. Y T-Amherst Twp.	5kw	1480	202.7
WKBZ	Ludington, Mich	100	1500	200
WKEU	La Grange, Ga	100	1500	200

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Call Letters	Location	Power (watts)	Freq. kc.	Wave length (meters)
WKFI	Greenville, Miss.	100	1210	247.9
WKJC	Lancaster, Pa.	100	1200	200
WKRC	Cincinnati, Ohio	500	550	545
WKY	Oklahoma City, Okla.	1kw	900	333
WKZO	Kalamazoo, Mich.	1kw	590	509
WLAC	Nashville, Tenn.	5kw	1470	204.1
WLAP	Louisville, Ky.	100	1200	250
WLB-WQMS	Minneapolis, Minn. T-St. Paul	1kw	1250	240
WLBC	Muncie, Ind.	50	1310	229
WLBF	Kansas City, Kans.	100	1420	211.3
WLBL	Stevens Point, Wis. T-Nr. Ellis	2½kw	900	333
WLBW	Erie, Pa. T-Summit Township	500 1kw-LS	1260	238.1
WLBZ	Bangor, Me.	500	620	484
WLCI	Ithaca, N. Y.	50	1210	247.9
WLEY	Lexington, Mass.	100	1370	219
WLIB-WGN	(See WGN-WLIB)			
WLIT	Philadelphia, Pa.	500	560	536
WLOE	Boston, Mass. T-Chelsea	100 250-LS	1500	200
WLS	Chicago, Ill. T-Downers Grove	50kw	870	345
WLVA	Lynchburg, Va.	100	1370	219
WLW	Cincinnati, Ohio. T-Mason	50kw	700	429
WLWL	New York, N. Y. T-Kearny, N. J.	5kw	1100	272.7
WMAC-WSYR	(See WSYR-WMAC)			
WMAL	Washington, D. C.	250	630	476
WMAQ	Chicago, Ill. T-Addison	5kw	670	448
WMAS	Springfield, Mass.	100	1420	211.3
WMAZ	Macon, Ga.	500	1180	254.2
WMBC	Detroit, Mich.	100	1420	211.3
WMBD	Peoria, Ill. T-Peoria Heights	500 1kw-LS	1440	208.3
WMBF-WIOD	(See WIOD-WMBF)			
WMBG	Richmond, Va.	100	1210	247.9
WMBH	Joplin, Mo.	100	1420	211.3
WMBI	Chicago, Ill. T-Addison	5kw	1080	277.8
WMBO	Auburn, N. Y.	100	1310	229
WMBQ	Brooklyn, N. Y.	100	1500	200
WMBR	Tampa, Fla.	100	1370	219
WMC	Memphis, Tenn. T-Bartlett	500 1kw-LS	780	385
WMCA	New York, N. Y. T-Flushing	500	570	526
WMIL	Brooklyn, N. Y.	100	1500	200
WMMN	Fairmont, W. Va.	250	890	337
WMPC	Lapeer, Mich.	100	1500	200
WMSG	New York, N. Y.	250	1350	222.2
WMT	Waterloo, Iowa	500	600	500
WNAC-WBIS	Boston, Mass. T-Quincy	1kw	1230	243.9
WNAD	Norman, Okla.	500	1010	297
WNAX	Yankton, S. D.	2½kw-L.S.	570	526
WNBF	Binghamton, N. Y.	100	1500	200
WNBH	New Bedford, Mass. T-Fairhaven	100 250-LS	1310	229
WNBO	Silverhaven, Pa.	100	1200	250
WNBR-WGBC	Memphis, Tenn.	500	1430	209.8
WNB	Carbondale, Pa.	10	1200	250
WNBX	Springfield, Vt.	250	1260	238.1
WNBZ	Saranac Lake, N. Y.	50	1290	232.6
WNOX	Knoxville, Tenn.	2kw-L.S.	560	536
WNYC	New York, N. Y.	500	570	526
WOAI	San Antonio, Tex. T-Selma	50kw	1190	252.1
WOAN-WREC	(See WREC-WOAN)			
WOBU	Charleston, W. Va.	250	580	517
WOC	Davenport, Iowa	5kw	1000	300
WOCL	Jamestown, N. Y.	50	1210	247.9
WODA	Paterson, N. J.	1kw	1250	240
WODX	Mobile, Ala. T-Springhill	500	1410	212.8
WOI	Ames, Iowa	5kw	640	469
WOKO	Albany, N. Y.	500	1440	208.3
WOL	Washington, D. C.	100	1310	229
WOMT	Manitowoc, Wis.	100	1210	247.9
WOOD	Grand Rapids, Mich.	500	1270	236.2
WOPI	Bristol, Tenn.	100	1500	200
WOQ	Kansas City, Mo.	1kw	1300	230.8
WOR	Newark, N. J. T-Kearny	5kw C.P. 50kw	710	423
WORC-WEPS	Worcester, Mass. T-Auburn	100	1200	250
WORK	York, Pa. T-W. Manchester	1kw	1000	300
WOS	Jefferson City, Mo.	500	630	476
WOV	New York, N. Y. T-Secaucus, N. J.	1kw	1130	265.5
WOW	Omaha, Nebr.	1kw	590	509
WOWO	Ft. Wayne, Ind.	10kw	1160	258.6
WPAD	Paducah, Ky.	100	1420	211.3
WPAP-WQAC	(See WQAO-WPAP)			
WPAW-WPRO	(See WPRO-WPAW)			
WPCC	Chicago, Ill.	500	560	536
WPCH	New York, N. Y. T-Flushing	500	810	370
WPEN	Philadelphia, Pa.	100	1500	200
WPFB	Hattiesburg, Miss.	100	1370	219
WPG	Atlantic City, N. J.	5kw	1100	272.7
WPHR	Petersburg, Va. T-Ettrick	100	1200	250
WPOR-WTAR	(See WTAR-WPOR)			
WPRO-WPAW	Providence, R. I. T-Providence	100	1210	247.9
WPTF	Raleigh, N. C.	1kw	680	441
WQAM	Miami, Fla.	1kw	560	536
WQAN	Scranton, Pa.	250	880	341
WQAO-WPAP	New York, N. Y. T-Cliffside, N. J.	250	1010	297
WQBC	Vicksburg, Miss.	500	1360	220.6
WQDM	St. Albans, Vt.	100	1370	219
WQDX	Thomasville, Ga.	100	1210	247.9
WRAK	Williamsport, Pa.	100	1370	219
WRAM	Wilmington, N. C.	100	1370	219
WRAW	Reading, Pa.	100	1310	229
WRAX	Philadelphia, Pa.	250	1020	294.1
WRBL	Columbus, Ga.	100	1200	250
WRBX	Roanoke, Va.	250	1410	212.8
WRC	Washington, D. C.	500	950	316
WRDO	Augusta, Me.	100	1370	219
WRDW	Augusta, Ga.	100	1500	200
WREC-WOAN	Memphis, Tenn. T-Whitehaven	500 1kw-LS	600	500
WREN	Lawrence, Kans.	1kw	1220	245.9
WRHM	Minneapolis, Minn. T-Fridley	1kw	1250	240
WRJN	Racine, Wis.	100	1370	219
WRNY	New York, N. Y. T-Coytesville, N. J.	250	1010	297
WROL	Knoxville, Tenn.	100	1310	229
WRR	Dallas, Tex.	500	1280	234.4
WRUF	Gainesville, Fla.	5kw	830	361
WRVA	Richmond, Va. T-Mechanicsville	5kw	1110	270.3
WSAI	Cincinnati, Ohio. T-Mason	500 1kw-LS	1330	225.6
WSAJ	Grove City, Pa.	100	1310	229
WSAN	Allentown, Pa.	250	1440	208.3
WSAR	Fall River, Mass.	250	1450	206.9
WSAZ	Huntington, W. Va.	250	580	517
WSB	Atlanta, Ga.	5kw	740	405
WSBC	Chicago, Ill.	100	1210	247.9
WSBT	South Bend, Ind.	500	1230	243.9
WSEN	Columbus, Ohio.	100	1210	247.9
WSFA	Montgomery, Ala.	500	1410	212.8
WSIX	Springfield, Tenn.	100	1210	247.9
WSJS	Winston-Salem, N. C.	100	1310	229
WSM	Nashville, Tenn. T-Franklin	50kw	650	462
WSMB	New Orleans, La.	500	1320	227.3
WSMK	Dayton, Ohio.	200	1380	217.4
WSOC	Gastonia, N. C.	100	1210	247.9
WSPA	Spartanburg, S. C.	100	1420	211.3
WSPD	Toledo, Ohio.	1kw	1340	223.9
WSUI	Iowa City, Iowa.	500	880	341
WSUN-WFLA	(See WFLA-WSUN)			
WSVS	Buffalo, N. Y.	50	1370	219
WSYB	Rutland, Vt.	100	1500	200
WSYR-WMAC	Syracuse, N. Y.	250	570	526
WTAD	Quincy, Ill.	500	1440	208.3
WTAG	Worcester, Mass.	500-L.S.	580	517
WTAM	Cleveland, Ohio. T-Brecksville Village	50kw	1070	280.4
WTAQ	Eau Claire, Wis. T-Twp. of Washington	1kw	1330	225.6
WTAR-WPOR	Norfolk, Va.	500	780	385
WTAW	College Station, Tex.	500	1120	267.9
WTAX	Springfield, Ill.	100	1210	247.9
WTBO	Cumberland, Md.	100	1420	211.3
WTEL	Philadelphia, Pa.	100	1310	229
WTFI	Athens, Ga.	500	1450	206.9
WTIC	Hartford, Conn. T-Avon	50kw	1060	283
WTJS	Jackson, Tenn.	100	1310	229
WTMJ	Milwaukee, Wis. T-Waukesha	1kw 2½kw-LS	620	484
WTNJ	Trenton, N.J.	500	1280	234.4
WTOC	Savannah, Ga.	500	1260	238.1
WTRC	Elkhart, Ind.	100-L.S.	1310	229
WWAE	Hammond, Ind.	100	1200	250
WWJ	Detroit, Mich.	1kw	920	326
WWL	New Orleans, La. T-Kenner	10kw	850	353
WWNC	Asheville, N. C.	1kw	570	526
WWRL	Woodside, N. Y.	100	1500	200
WWSW	Pittsburgh, Pa. T-Wilkinsburg	100 250-LS	1500	200
WWVA	Wheeling, W. Va.	5kw	1160	258.6
WXYZ	Detroit, Mich.	1kw	1240	241.9

POLICE STATIONS ALPHABETICALLY BY CALL LETTERS

Call Letters	Location	Freq. kc.	Call Letters	Location	Freq. kc.	Call Letters	Location	Freq. kc.	Call Letters	Location	Freq. kc.
KGHO	Des Moines, Iowa	1534	KGZE	San Antonio, Tex	2506	WPDK	Milwaukee, Wis	2450	WPEL	W. Bridgewater, Mass	1574
KGJX	Pasadena, Calif	1712	KGZF	Chanute, Kans	2450	WPDL	Lansing, Mich	2442	WPEP	Arlington, Mass	1712
KGOZ	Cedar Rapids, Iowa	2470	KGZH	Klamath Falls, Ore	2442	WPDM	Dayton, Ohio	2430	WPET	Lexington, Mass	1712
KGPA	Seattle, Wash	2414	KGZI	Wichita Falls, Tex	1712	WPDN	Auburn, N. Y	2458	WPEV	Portable, Mass	1574
KGPB	Minneapolis, Minn	2416	KGZL	Shreveport, La	1712	WPDO	Akron, Ohio	2458	WPFA	Newton, Mass	1712
KGPC	St. Louis, Mo	1712	KGZM	El Paso, Tex	2414	WPDP	Philadelphia, Pa	2470	WPFC	Muskegon, Mich	2442
KGPD	San Francisco, Calif	2470	KGZN	Tacoma, Wash	2414	WPDR	Rochester, N. Y	2458	WPFD	Highland Park, Ill	2430
KGPE	Kansas City, Mo	2422	KGZP	Coffeyville, Kans	2450	WPDS	St. Paul, Minn	2416	WPFE	Reading, Pa	2442
KGPG	Vallejo, Calif	2422	KGZR	Salem, Ore	2442	WPDT	Kokomo, Ind	2470	WPFF	Toms River, N. J	2430
KGPH	Oklahoma City, Okla	2450	KSW	Berkeley, Calif	2422	WPDU	Pittsburgh, Pa	1712	WPFG	Jacksonville, Fla	2442
KGPI	Omaha, Neb	2470	KVP	Dallas, Tex	1712	WPDV	Charlotte, N. C	2458	WPFH	Baltimore, Md	2414
KGPJ	Beaumont, Tex	1712	WCK	Belle Island, Mich	2414	WPDW	Washington, D. C	2422	WPFI	Columbus, Ga	2414
KGPL	Los Angeles, Calif	1712	WKDU	Cincinnati, Ohio	1712	WPDX	Detroit, Mich	2414	WPFJ	Hammond, Ind	1712
KGPM	San Jose, Calif	2470	WMDZ	Indianapolis, Ind	2442	WPDY	Atlanta, Ga	2414	WPFK	Hackensack, N. J	2430
KGPN	Davenport, Iowa	2470	WMJ	Buffalo, N. Y	2422	WPDZ	Fort Wayne, Ind	2470	WPFL	Gary, Ind	2470
KGPO	Tulsa, Okla	2450	WMO	Highland Park, Mich	2414	WPEA	Syracuse, N. Y	2458	WPFM	Birmingham, Ala	2414
KGPP	Portland, Ore	2442	WMP	Framingham, Mass	1574	WPEB	Grand Rapids, Mich	2442	WPFN	Fairhaven, Mass	1712
KGPQ	Honolulu, T. H	2450	WPDA	Tulare, Calif	2414	WPEC	Memphis, Tenn	2470	WPFO	Knoxville, Tenn	2470
KGPS	Bakersfield, Calif	2414	WPDB	Chicago, Ill	1712	WPEE	New York, N. Y	2450	WPFP	Clarksburg, W. Va	2414
KGPW	Salt Lake City, Utah	2470	WPDC	Chicago, Ill	1712	WPEF	New York, N. Y	2450	WPFQ	Swathmore, Pa	2470
KGPX	Denver, Colo	2442	WPDD	Chicago, Ill	1712	WPEG	New York, N. Y	2450	WPFR	Johnson City, Tenn	2470
KGPY	Shreveport, La	1574	WPDE	Louisville, Ky	2442	WPEH	Somerville, Mass	1712	WRDH	Cleveland, Ohio	2458
KGPZ	Wichita, Kans	2450	WPDF	Flint, Mich	2442	WPEI	E. Providence, R. I	1712	WRDR	Grosse Point Village, Mich	2414
KGZB	Houston, Tex	1712	WPDH	Richmond, Ind	2442	WPEK	New Orleans, La	2422	WRDQ	Toledo, Ohio	2470
KGZD	San Diego, Calif	2430	WPDI	Columbus, Ohio	2430						