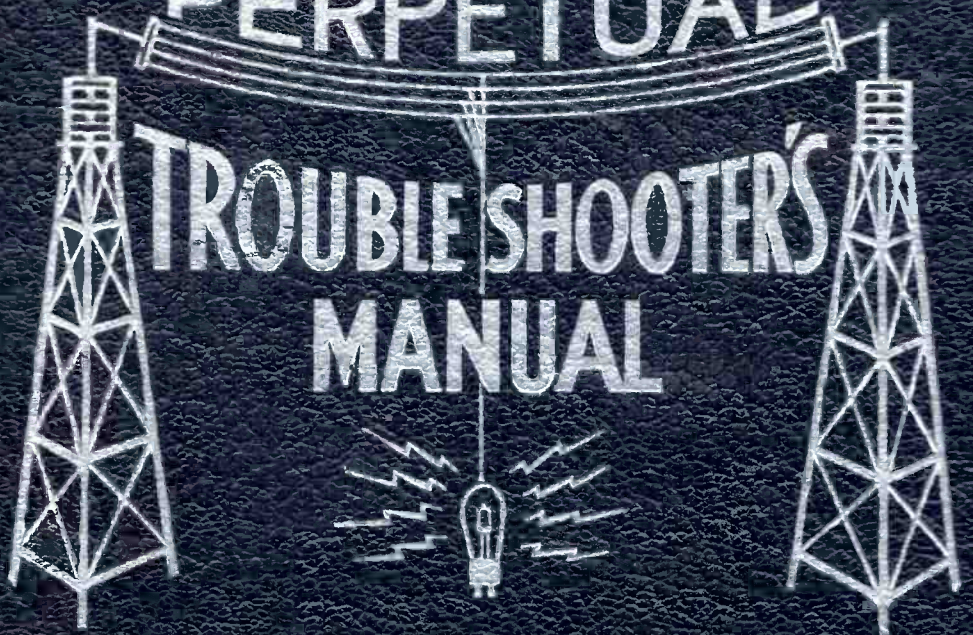
VOLUME III

PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

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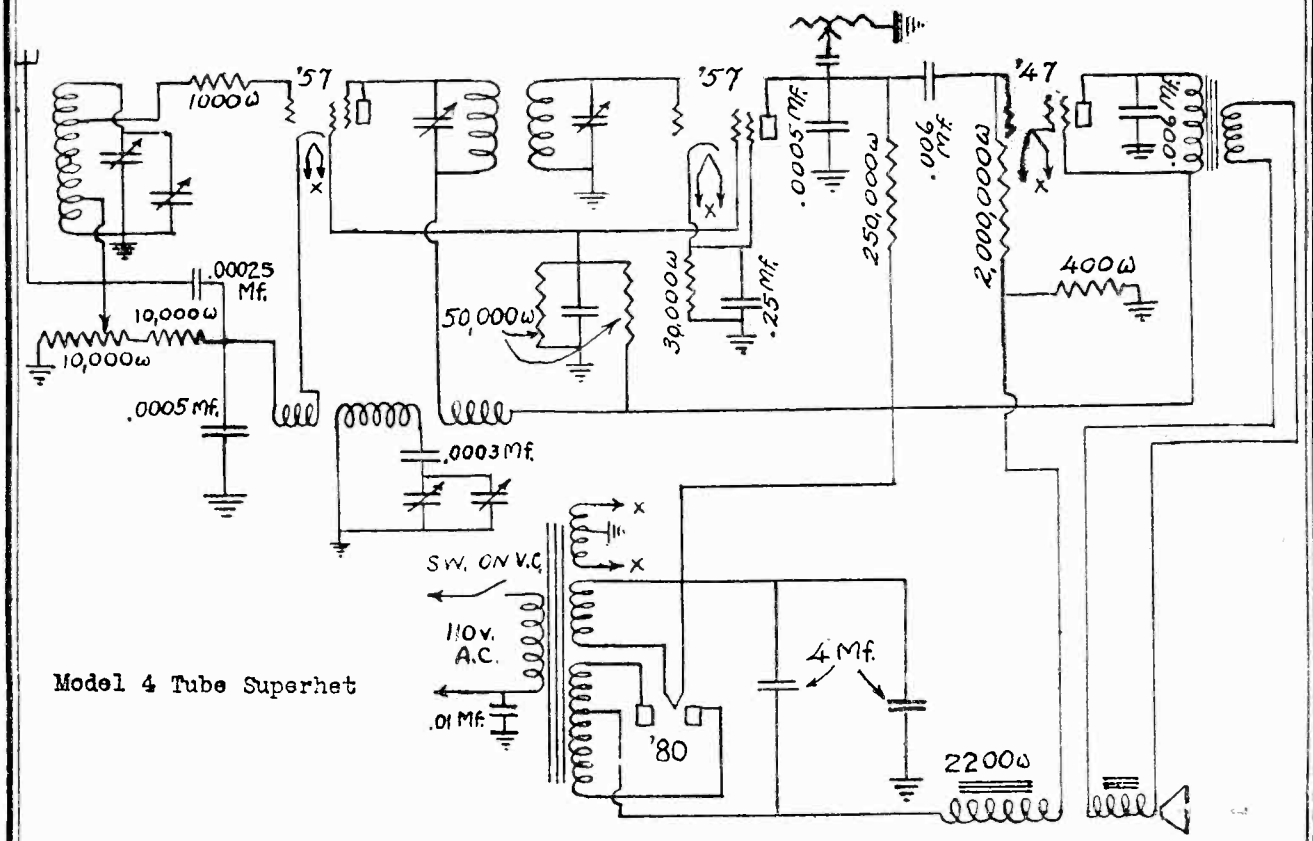
PACKARD

MODEL 4 Tube Super
MODEL 5 Auto



Model 4 Tube Superhet

Model 5 Data

The tuning range of the receiver is 550 to 1,750 kc., and reception of the 2,480-kc. police signals as an image frequency. The intermediate frequency used is 465 kc.

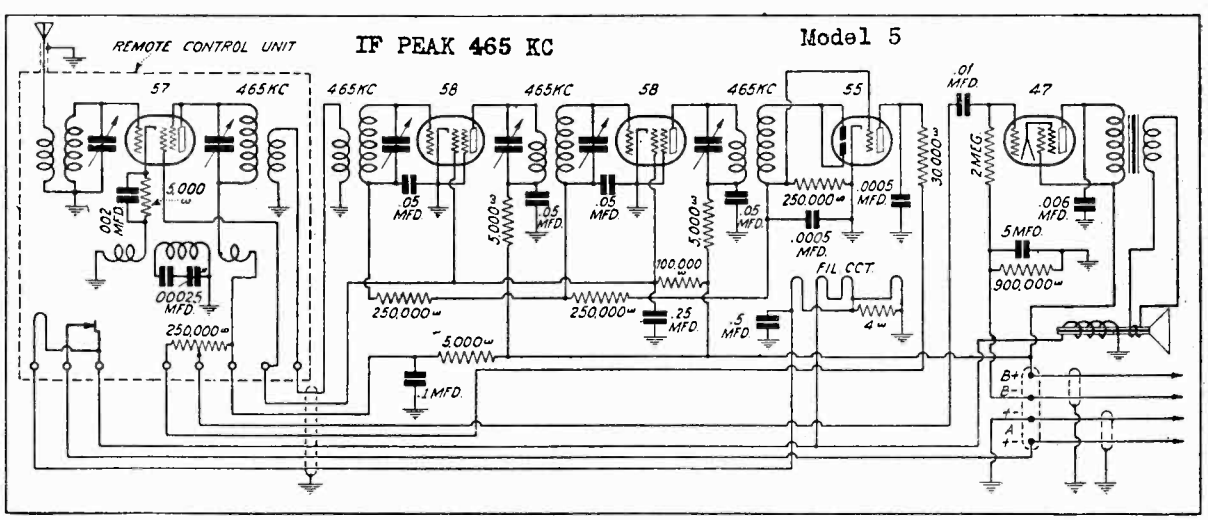
The most interesting feature of this receiver is the control unit which, instead of merely consisting of the usual remote tuning dial and volume control, actually contains the type '57 combination first detector and oscillator tube together with the associated units. This unit is then coupled to the intermediate-frequency amplifier by an i-f. transmission line contained in a shield along with the "A" and "B" feed wires, etc. The intermediate frequency and audio units are in a case with an eight-inch Lansing speaker, making the whole a two-unit job with remote control and no flexible shafts.

The i-f. feed line has at each end a coil composed of three turns of wire around a standard i-f. bobbin, and the line may be 15 feet long without causing appreciable loss . . . the loss with a 15-foot run being about 5 db.

The two type '58 tubes in the intermediate-frequency stages are used as standard r-f. pentodes. AVC is provided by the type '55 second detector tube which feeds the type '47 output pentode. Total plate current is 18 ma. at 180 volts.

Care should be taken with the B + terminal as it is inclined to short to the chassis, in which case the 900-ohm bias resistor for the '47 tube will blow, as well as the electrolytic condenser shunting it.

The plate winding on the oscillator coil in the control unit suffers seriously from electrolysis.



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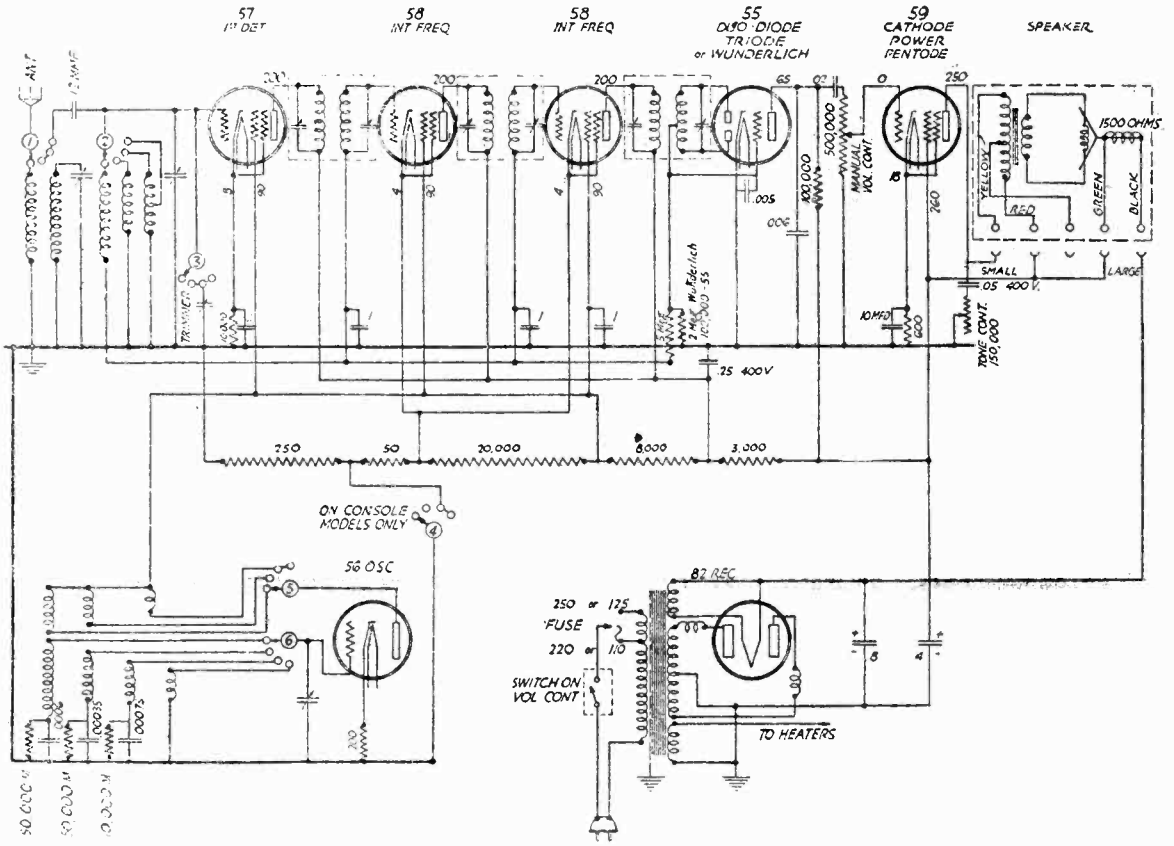
PATTERSON RADIO CO.

MODEL 70-AW, 107-AW, 207-AW, 210-AW



IF PEAK 262 KC

The values of all the parts are given in the diagram and a close study will show that the normal voltages on the elements of the tubes, etc., are also given. Thus, the voltage at the plate of the type 55 tube is 65 volts, and so on.

The set covers the wavebands from 15 to 575 meters. The intermediate frequency employed is 262 kc.

All models have automatic volume control of the diode type, controlling the first detector as well as the i-f. amplifier tubes. This AVC makes it impossible to service and rebalance without the use of a vacuum tube voltmeter.

A defective 82 tube will cause a sharp 60 cycle r-f. pickup. This is most prominent on low frequency. Replace with a good tube.

Overloading or poor quality at low volume is more often due to an aerial of too great a length. A powerful local station will cause the i-f. tubes to block. Check this by disconnecting the antenna on the station causing the trouble. If too close to a powerful station, installing a switch in the aerial circuit helps this. In rare cases the set seems to overload and the AVC works too quickly on all stations. In such cases, check the following:

Disconnect the 5-megohm resistor from the AVC buss at the tie point. Have all tubes cold. Use a high-voltage, high-resistance ohmmeter capable of reading 25 megohms and test from ground to AVC buss for leakage. After the condensers have charged, no leakage should be shown. This must read around 100 megohms to ground.

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MODEL 3
Transitone
Voltage
Electrical Values

This Receiver has been especially designed for installation and operation in automobiles. Filament and heater currents are supplied by the automobile battery. "B" and "C" voltages are supplied by four 45-volt dry "B" batteries.

Only three battery leads are required, one to the live side of the six-volt system, one to the positive terminal of the 180-volt battery, and one to the negative terminal of the 180-volt battery.

The chassis of the Receiver when installed, is grounded or bonded to the metal work and frame of the automobile, completing the circuit to the grounded side of the storage battery.

Table No. 1—Tube Socket Readings

Tube		Voltage					Plate Milli-Amperes
Type	Circuit	Filament	Plate	Screen	Cathode	Grid	
24	1st R. F.	2 V.	150	80	2	.....	1.5
24	2nd R. F.	2 V.	150	80	2	.....	1.5
24	3rd R. F.	2 V.	150	80	2	.....	1.5
71-A	Det. Rect.	5 V.	....	..	..	.....	....
01-A	Det. Amp.	5 V.	45	..	..	—1.0	1.0
01-A	1st A. F.	5 V.	140	..	..	—2.5	3.0
71-A	2nd A. F.	5 V.	142	..	..	—32 V.	16.0

Table 2—Resistor Data

No. on Figs. 1 and 2	Terminal	Resistance in Ohms	Color
①		10,000	Black
④		100,000	Silver Gray (Yel. Tip)
⑭		50,000	Orange
⑮		25,000	Brown (Yel. Tip)
⑯	1–2 3–4 4–5 5–6	250 1 30 30	Flat-Wire Wound
㉑		1,000,000	Green (White Tip)
㉒		250,000	White
㉓		100,000	Silver Gray (Yel. Tip)
㉔		100,000	Silver Gray (Yel. Tip)
㉖		1,000,000	Green (White Tip)
㉘		100,000	Silver Gray (Yel. Tip)
㉛		250,000	White
㉝	1–2 2–3	500 300	Flat-Wire Wound

Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity MFD
⑤ ⑨ ⑫	.05
⑧	1.0
⑦	.25
⑩ ⑱	.05 with 250 Ohm Resistor
⑰	.00025
⑲	.00005
㉕	.00025
㉗	.00025
㉙	.015
㉜	.25
㉟	2.0
㊲	1.0

No. on Figs. 1 and 2	Description	Part No.
①	Resistor (10,000 ohms—½ watt)	4412
②	First R. F. Transformer	4401-A
③	Tuning Condenser	4372-A
④	Resistor (100,000 ohms—1 watt)	3767
⑤	Condenser (.05 mfd)	3615-N
⑥	Condenser (1.0 mfd)	4419
⑦	Condenser (.25 mfd)	4487
⑧	Second R. F. Transformer	4401-B
⑨	Condenser (.05 mfd)	3615-N
⑩	Condenser and Resistor (.05 mfd with 250 ohms)	3615-P
⑪	Third R. F. Transformer	4401-B
⑫	Condenser (.05 mfd)	3615-N

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MODEL 3
Transitone
Schematic
Parts List

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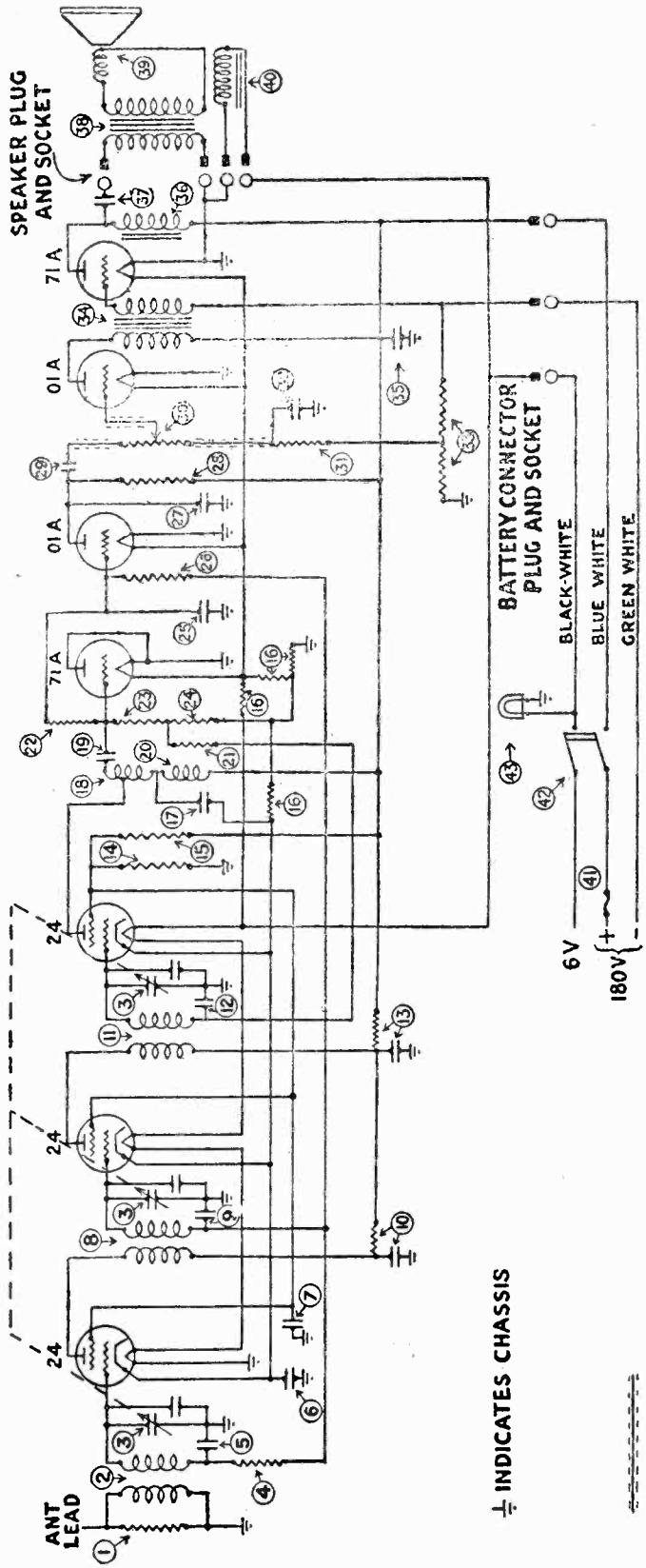

COMPENSATING

Compensating condensers in all Philco Transitone Receivers are carefully adjusted at the factory, and ordinarily need not be readjusted.

If necessary to readjust, a good oscillator should be used. With the Receiver and oscillator set up for operation, and the volume control of the Receiver turned on full—adjust the oscillator signal to a frequency between 1000 and 1200 kilocycles, or 100 and 120 on the Receivers. Tune the Receiver sharply to the signal and then reduce the oscillator signal so that it is barely audible in the Speaker.

Using the special fibre wrench, adjust the third compensating condenser to that point at which the maximum signal is heard in the Speaker, then adjust the second and finally the first condenser in the same manner, always adjusting for that position which gives the maximum signal.

After the adjustments are completed tune the Receiver to several broadcast programs to make sure that the stations are tuned in at the proper place on the tuning scale.

⑬	Condenser and Resistor (.05 mfd with 250 ohms)	3615-C
⑭	Resistor (50,000 ohms—1 watt)	4237
⑮	Resistor (25,000 ohms—1 watt)	3656
⑯	Resistor (4-section)	4407
⑰	Condenser (.00025 mfd)	3082
⑱	Fourth R. F. Transformer	3775-B
⑲	Condenser (.00005 mfd)	3774
⑳	R. F. Choke	3256-A
㉑	Resistor (1,000,000 ohms—½ watt)	4409
㉒	Resistor (250,000 ohms — ½ watt)	4410
㉓	Resistor (100,000 ohms — ½ watt)	4411
㉔	Resistor (100,000 ohms — ½ watt)	4411
㉕	Condenser (.00025 mfd)	3082
㉖	Resistor (1,000,000 ohms — 1 watt)	4414
㉗	Condenser (.00025 mfd)	3082
㉘	Resistor (100,000 ohms — ½ watt)	4411
㉙	Condenser (.015 mfd)	3793-D
㉚	Volume Control	4463
㉛	Resistor (250,000 ohms — ½ watt)	4410
㉜	Condenser (.25 mfd)	4487
㉝	Resistor (2-section)	4408
㉞	Audio Transformer	3241
㉟	Condenser (2.0 mfd)	4418
㊱	Audio Choke	4485
㊲	Output Condenser (1.0 mfd)	4420

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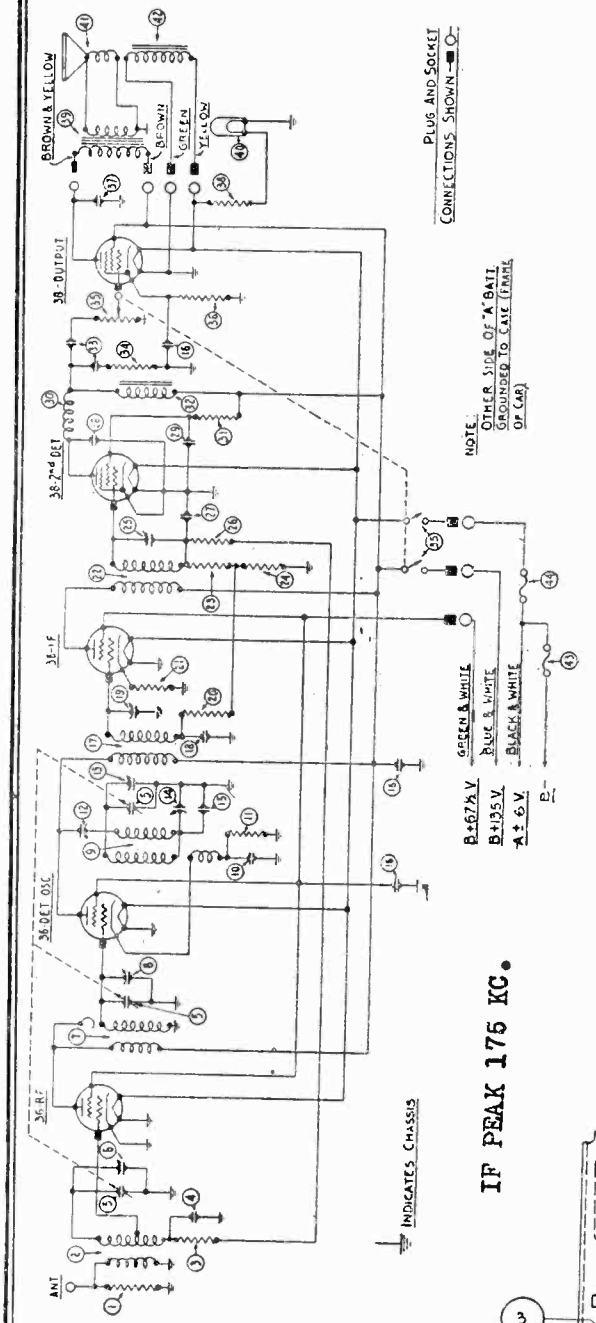
MODEL 7
Transitone



IF PEAK 175 KC.

Condenser Data

Numbers on Figs. 1 and 2	Capacity Mfd.	Color
27	0.00025	Yellow
10, 15	0.0007	White and Golden Yellow
28, 37	0.002	Blue
33	0.015	Black Bakelite
4, 18	0.05	Black Bakelite
29	0.25	Metal
16	0.25; 0.5; 1.0	Metal

Tube Socket Readings

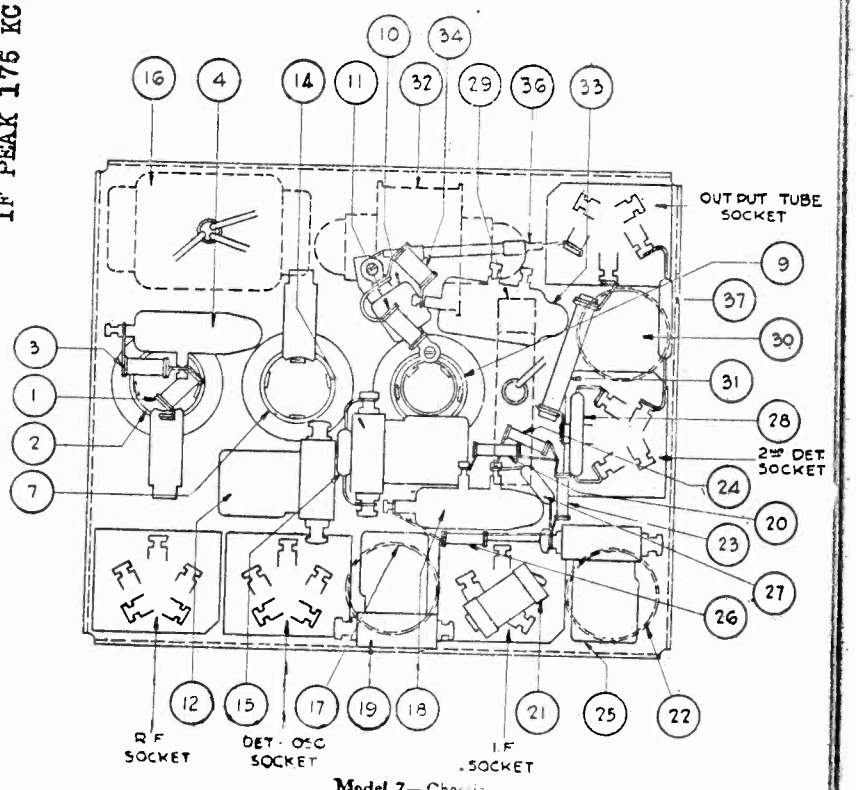
Tube	Filament Volts	Plate Volts	Cathode Volts	Screen Grid Volts	Plate Current
R.F.	6.0	129	0.0	61	2.8 ma.
Det-Osc.	6.0	129	6.0	61	0.8 ma.
I.F.	6.0	129	0.5	61	2.0 ma.
2nd Det.	6.0	115	0.0	50	6.0 ma.
Output	6.0	125	11.0	129	6.0 ma.

All voltages taken to chassis with A plus grounded. Detector-oscillator cathode readings taken with receiver tuned to 550 kc.

Resistor Data

Numbers on Figs. 1 and 2.	Resistance*** Ohms
38	7*
21	225*
36	1,250**
1, 11	5,000
31, 34	50,000
3, 23, 24	99,000
20, 26	490,000

* Flat type.
** Insulated covering.
*** Philco utilizes the RMA color coding



Model 7—Chassis

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There are certain peculiarities to be found in this receiver. Two pentode tubes are used, one as the 2nd detector or demodulator and another as the output tube. The 1st detector and oscillator functions are performed by one tube. Obviously the receiver is a superheterodyne. The oscillator system and the input to the i-f system both emanate from the plate circuit of the autodyne tube. The peak frequency of the i-f system is 175 kc.

Adjusting the R.F. Padding Condensers

In order to obtain the maximum results from the radio installation, the first and second R.F. padders should be adjusted after the installation is completed.

It will be necessary to remove the front cover plate and to set up a good oscillator capable of generating a signal of approximately 1400 K.C. Connect a six foot lead to the oscillator output terminal, simply dropping it over the back of the seat, and turn on the oscillator. Turn on the receiver and tune to approximately 140 on the receiver scale. Adjust the oscillator frequency to 1400 kc. When using an i-f oscillator, set it for the 175 kc. range and use the eighth harmonic. Turn on full volume on the receiver and adjust the output of the oscillator until the signal is barely audible. Tune the receiver sharply to the signal and cars and power lines, lack of signal under bridges and tunnels and in some cities, apparent fading at street crossings due to shielding by overhead cables and wires, are easy to explain to the customer and will not be construed as alibis which is likely to happen if the customer is told only after registering a complaint.

Adjusting Intermediate Frequency Stages

Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the receiver and oscillator turned "on", set the oscillator for 175 kc. Adjust the oscillator attenuator so that the signal is barely audible with the receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained. Using a Philco No. 3164 fibre wrench, adjust the second i-f condenser. This is numbered twenty-five on the schematic and chassis view. The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary i-f condensers, nineteen and twelve respectively. Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator

Connect the output of the oscillator to the antenna lead and the housing of the receiver. With the receiver turned on and the oscillator set for 175 kc., tune the receiver to 1400 kc., the eighth harmonic of 175 kc., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 kc., is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 kc., in order to get a strong enough signal through.

R.F. Compensators

After the detector oscillator has been padded at 1400 kc., adjust the first and second R.F. Condensers on tuning condenser at 1400 kc.

Low Frequency Condenser

Now tune the receiver to 700 kc. and adjust the condenser fourteen. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 kc again.

then adjust the first r-f padder. This is the one mounted to the extreme right on the condenser housing. Adjust this for maximum signal and then proceed with the second padder, the one in the center. Use only the standard fibre padding wrench. Replace the front panel and the adjustment is completed.

Servicing

A great number of the demands for service made by the car owners will be imaginary and can be traced largely to ignorance of what is to be expected from automobile radio.

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MODELS 8,12
Schematic
Resistor Data
MODEL EA
Schematic

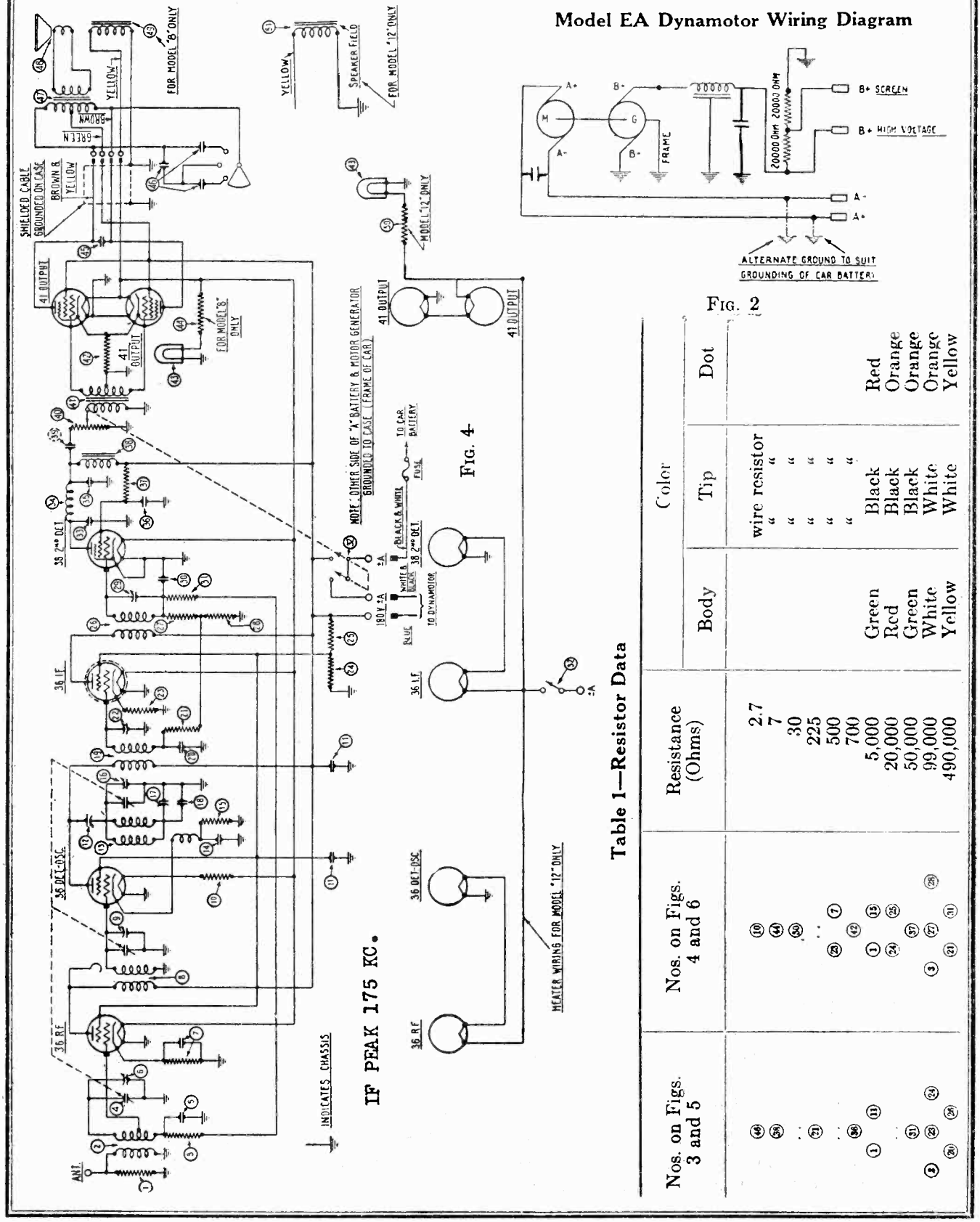

FIG. 4

Model EA Dynamotor Wiring Diagram

FIG. 2

Table 1—Resistor Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Resistance (Ohms)	Color			
			Body	Tip	Dot
44 56	10 44 56	2.7		wire resistor	Red
21	59	7		"	Orange
36	7 28	30		"	Orange
1 11	12 42	225		"	Orange
51 28	15 25 1 24	500		"	Orange
4 26	57 27 3 21 31	700		"	Orange
	26	5,000	Green	Black	Red
		20,000	Red	Black	Orange
		50,000	Green	Black	Orange
		99,000	White	White	Orange
		490,000	Yellow	White	Yellow

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MODELS 8,12
Chassis
Alignment
MODEL EA
Schematic

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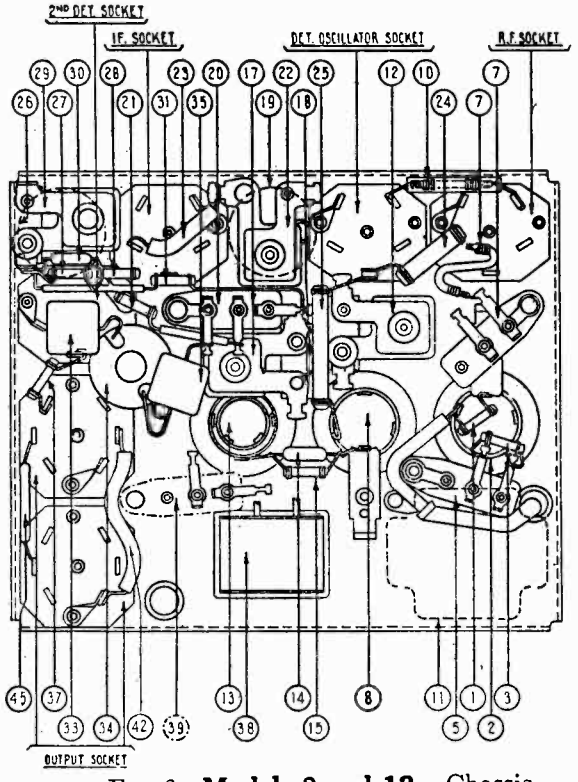
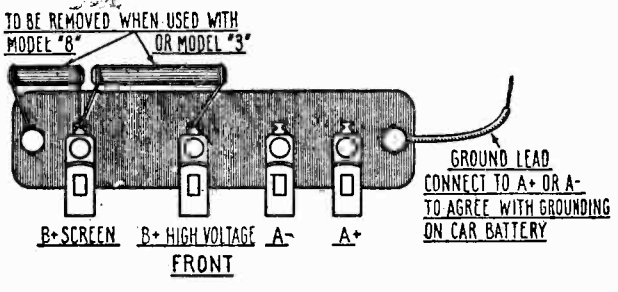


FIG. 6—**Models 8 and 12**—Chassis

Model EA Terminal Arrangement



Special Adjustments—In order to render proficient service, the installation station must be able to make the proper adjustments to the Receivers whenever they are needed. This is impossible without the use of a good service oscillator. The best and most economical oscillator for this work is the Philco Oscillator, Model 095. Complete information and instructions for its use can be had on request from your Philco Transitone distributor or from the service department at the factory.

The adjustments should be made as follows:

Intermediate Frequency or I. F. Stages—Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the Receiver and oscillator turned "on", set the oscillator for 175 K. C. Adjust the oscillator attenuator so that the signal is barely audible with the Receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained.

Using a Philco 3164 fibre wrench, adjust the second I.F. condenser. This is numbered ㉕ on figs. 3 and 5 and ㉙ on figs. 4 and 6.

The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary I.F. condensers. These are ⑲ and ⑫ respectively on figs. 3 and 5 and ㉒ and ⑫ on figs. 4 and 6.

Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator—Connect the output of the oscillator to the antenna lead and the housing of the Receiver. With the Receiver turned on and the oscillator set for 175 K. C., tune the Receiver to 1400 K. C., the eighth harmonic of 175 K. C., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 K. C. is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 K. C., in order to get a strong enough signal through.

R. F. Compensators—After the detector oscillator has been padded at 1400 K. C., adjust the first and second R. F. Condensers on tuning condenser at 1400 K. C.

Low Frequency Condenser—Now tune the Receiver to 700 K. C. and adjust the condenser ⑭ on figs. 3 and 5 and ⑰ on figs. 4 and 6. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 K. C. again.

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MODELS 8,12
Condenser Data
MODEL EA
Data

Table 2—Condenser Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Capacity (Mfd.)	Color
		.00025	Yellow
		.0007	White and Yellow
		.001	Green and White
		.00125	Blue and Orange
		.002	Blue
		.01	Black Bakelite
		.05	Black Bakelite
		.25	Metal Can
		.25, .5	Metal Can
	See Note 1	.25, .25, .5	Metal Can
		.25, .5, 20.0	Metal Can

Dynamotor—The Model EA Dynamotor is supplied as standard equipment with all Model 8 Receivers and the Model EC with the Model 12 Receivers. The Model 7 will be furnished with the Model EA Dynamotor in place of batteries when specified, or the Model EA can be ordered as a replacement unit for the Model 3 and Model 7 Receivers sold previously with batteries. The Model EA is for operation on 6 volt battery systems; the Model EC on 12 volt battery systems.

The dynamotor housing or box can be conveniently located in the floor of the car. Simply cut a hole 6⅛ by 8 7/16 inches in the floor and drop the box in place from the top. Fasten the flange to the floor by means of screws or bolts.

It will be necessary to drill a hole in the end of the box for the battery cable. The tapered rubber bushing must be used over the hole to make it water-proof.

When used with the Model 8 Receiver, remove the two small fixed resistors at the left end of the terminal panel.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal.

Connect the blue lead to the "B+" High Voltage terminal. The dynamotor box must be grounded securely to the frame of the car by means of a heavy copper braid.

When the Model EA is used with the Model 3 Philco Transitone Receiver, remove the two resistors at the left end of the panel. The ground lead from the filter condenser must be removed from the ground terminal and must be spliced out and connected to the B+ Screen terminal.

The "B—" lead, the black lead which is grounded at the rear end of the dynamotor, must be removed from ground and must be spliced out and connected to the B+ Screen terminal also. This terminal now becomes "B—". Connect the blue-white lead to B+ High Voltage terminal and the green-white to B+ Screen terminal.

The relay switch must be used to control the dynamotor. With the relay in the same position as described above, the middle terminal must be connected to the car battery through a 15 amp. fuse. The terminal on the right must be connected to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The remaining terminal on the left must be connected to the black-white lead of the battery cable. The relay should be mounted on the frame of the car near the battery. The ground connection on the dynamotor and the shield on the cable must be connected to the other "A" terminal.

The dynamotor box must be grounded to the frame of the car by means of a heavy copper braid

The Model EC Philco Transitone dynamotor must be used only on a 12 volt battery system.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal

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MODEL 5
Transitone
Schematic

PHILCO RADIO & TELEVISION CORP.

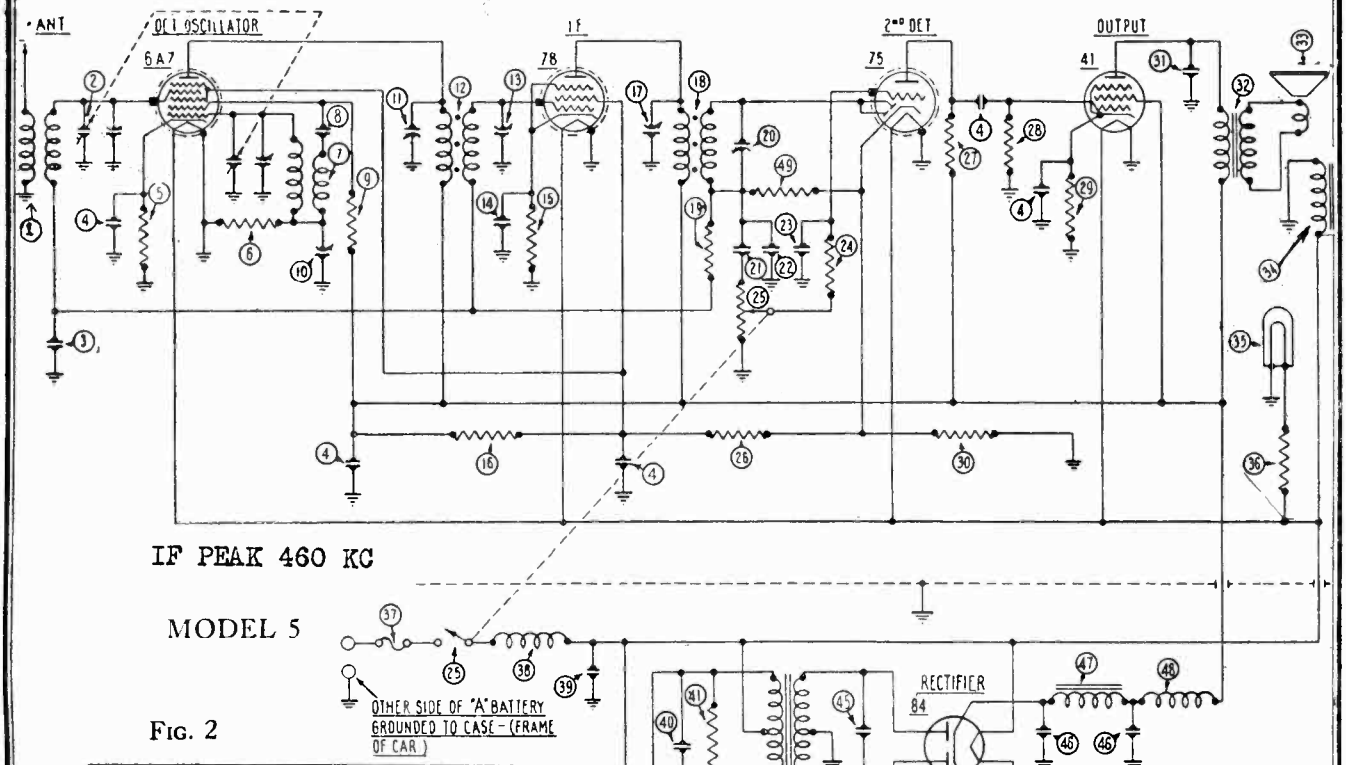
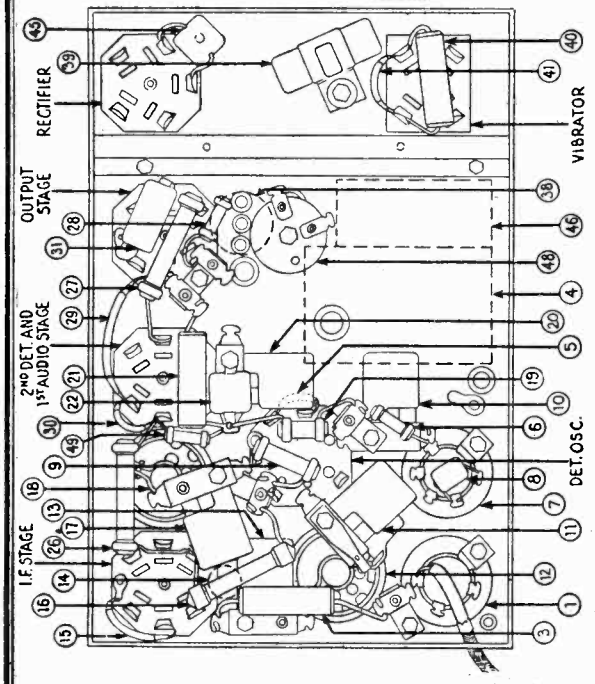


FIG. 2



FILTER CONDENSER 30-4017

④ on Figs. 1 and 2

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

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

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

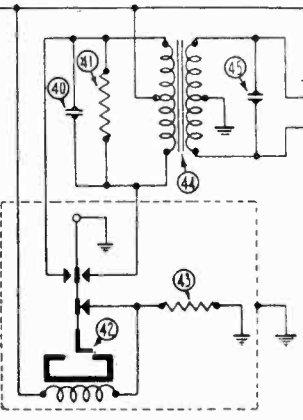


FIG. 1

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

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.

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MODEL 5
Transitone
Parts List
MODEL EA
Eliminator

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
㊳	R. F. Choke (Low voltage)	32-1083
㊴	Condenser (.5 mfd.)	30-4015
㊵	Condenser (.05 mfd.)	30-4020
㊶	Resistor (200 ohms)	7217
㊷	Vibrator	38-5036
㊸	Resistor (200 ohms)	7217
㊹	Transformer	32-7030
㊺	Condenser (.006 mfd.)	30-1002
㊻	Condenser (4 mfd.; 8 mfd.)	30-4010
㊼	Filter Choke	32-7026
㊽	R. F. Choke (High voltage)	32-1078
㊾	Resistor (250,000 ohms)	4410
	Control Shaft (Tuning)	28-8006
	Control Shaft (Volume)	28-8007
	Tube Kit	34-3006
	75 Tube	8002
	78 Tube	8315
	41 Tube	6446
	84 Tube	34-2001
	6A7 Tube	34-2002
	Dial	27-5006
	Antenna Lead	L-1594
	Battery Cable (Bat. end)	38-5124
	Battery Cable (Rec. end)	38-5123
	Fuse Housing	28-1269
	Male Cap (Fuse)	28-1270
	Contact (Fuse)	27-7133
	Washer	27-7132
	Spring	28-8009
	Fuse Insulator	27-7131
	Antenna Male Cap	28-1270
	Contact (Antenna)	28-7133
	Spark Plug Resistors	4531
	Dist. Resistors	4546
	Screw Type	4851
	Interference Condenser (1 mfd.)	4522
	Interference Condenser (½ mfd.)	30-4007

MODEL EF FULL WAVE VIBRATOR

(Used With Model 6F Receiver)

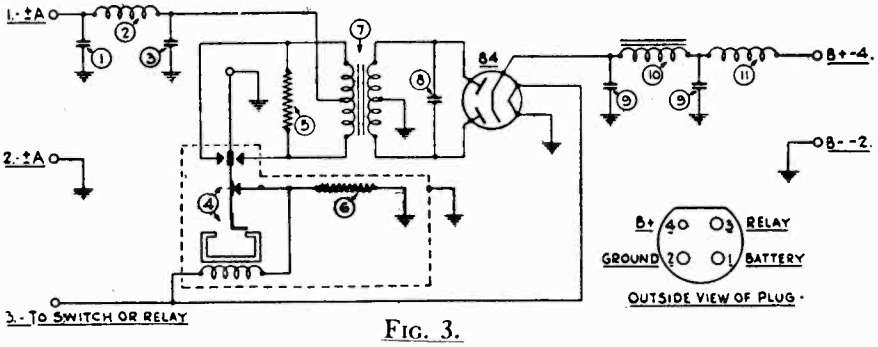

FIG. 3.

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

MODEL EF—PARTS LIST

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

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MODEL 15
Socket
Voltage

PHILCO RADIO & TELEVISION CORP.

The Philco Radio of the 15 series is an eleven-tube superheterodyne, employing the high efficiency 6.3-volt filament tubes, automatic volume control, superpower push-pull pentode output, and twin electro-dynamic speakers. Philco shadow tuning and the combination distance switch and power switch on the control panel are additional features. The intermediate frequency used in adjusting the superheterodyne circuit of the 15 series is 175 kilocycles. The total power consumption is approximately 115 watts.

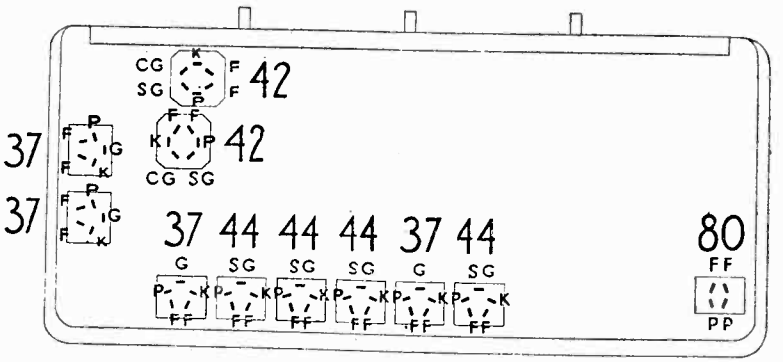


Fig.1—Tube Sockets

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

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

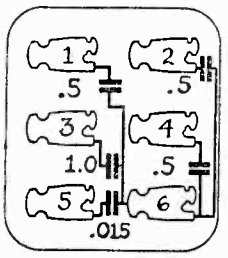
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Tube		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					
44	R. F.	6.3	165	55	15	30
44	1st Det.	6.3	250	90	.85	10
37	Osc.	6.3	60	...	15	10
44	1st I. F.	6.3	250	90	.85	10
44	2nd I. F.	6.3	275	90	3.3	10
37	Det.-Rect.	6.3	0	...	.2	10
37	1st Audio	6.3	75	...	.4	10
37	2nd Audio	6.3	100	...	.2	10
42	P. P. Output	6.3	255	270	15	15
42	P. P. Output	6.3	255	270	15	15
80	Rectifier	5.0	320/Plate			

*All of the above readings were taken from the under side of the chassis using test prods and leads with a suitable A. C. volt meter for filament voltages and a high resistance multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Power switch in middle position.

Table 2—Power Transformer Data

Terminals on Figs. 3 and 4	A. C. Volts	Circuit
1–2	105 to 125	Primary
3–5	6.3	Filament
6–7	5.0	Filament of 80
8–10	720	Plates of 80
4	...	Center Tap of 3–5
9	...	Center Tap of 8–10



Internal Connections Filter Condenser

Table 3—Resistor Data

No. on Figs. 3 & 4	Power (Watts)	Resistance (ohms)	Terminals	COLOR		
				Body	Tip	Dot
(66)	..	50	1–2	Long	Tubular	
		50	2–3			
		205	3–4			
(36)	.5	1000	....	Brown	Black	Red
(45) (55)	.5	5000	....	Green	Black	Red
(1) (52)	.5	10,000	....	Green	Black	Orange
(32)	1.	13,000	....	Brown	Orange	Orange
(50)	.5	25,000	....	Red	Green	Orange
(21)	.5	51,000	....	Green	Brown	Orange
(40)	.5	99,000	....	White	White	Orange
(10)	.5	160,000	....	Brown	Blue	Yellow
(57)	.5	240,000	....	Red	Yellow	Yellow
(9) (17) (54) (28) (47) (51)	.5	490,000	....	Yellow	White	Yellow
	.5	1,000,000	....	Brown	Black	Green

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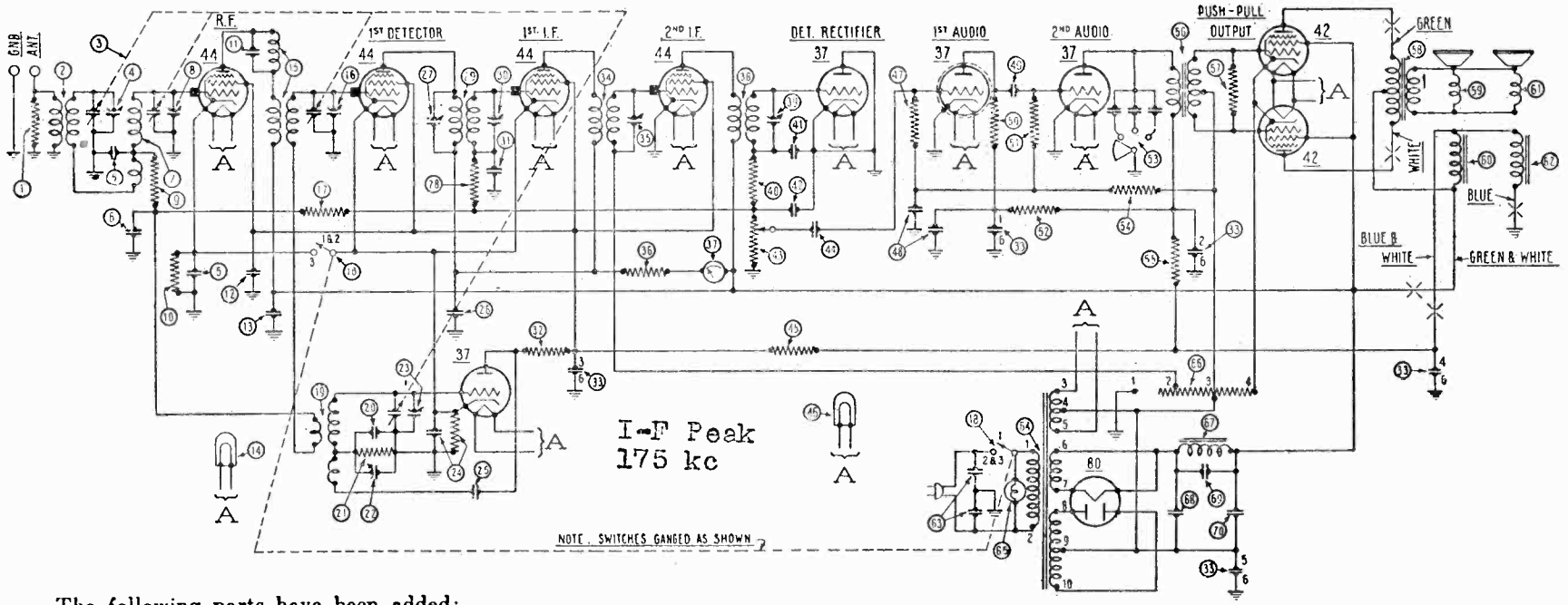

The following parts have been added:

Part number 4412, resistor 10,000 ohms; part number 6287G, condenser; part number 4516, resistor 25,000 ohms; part number 7625B, condenser; part number 03103, terminal block.

Below run No. 26 interchange the two outside wires of the input transformer secondary.

Below run No. 27 change (17) resistor 490,000 ohms to 1,500,000 ohms, part 7009. Change (28) resistor 1,000,000 ohms to 2,000,000 ohms, part 5872.

Below run No. 25, place a 490,000 ohm resistor, part 4517, across two outside terminals of volume control.

Below run No. 22 add .002 Mfd. condenser part 6853 across the plates of the pentodes.

Add tuning condenser drive cord, part 04916 and spring 6508.

(68) Electrolytic condenser (.6 Mfd.) part 6707 changed to 4916.

(70) Electrolytic condenser (.6 Mfd.) part 6706 changed to 4916.

For 25 Cycle Models

use power transformer, part 6673. Change (68) electrolytic condenser 6 Mfd. 6707 to read 8 Mfd. 6707. Change (70) electrolytic condenser 6 Mfd. 6706 to 8 Mfd. 6707. (69) condenser .18 Mfd. not used. Change (33) filter condenser 03489 to part 05302. This new condenser contains the following capacities: .015, .5, .75, 1., 2-1.5 Mfd. The sections between terminals 2-6 and 4-6 are both raised from .5 Mfd. to 1.5 Mfd. The .75 section is brought out with two rubber covered leads, and connects across the filter choke (67) in place of the .18 Mfd. condenser (69) which was removed.

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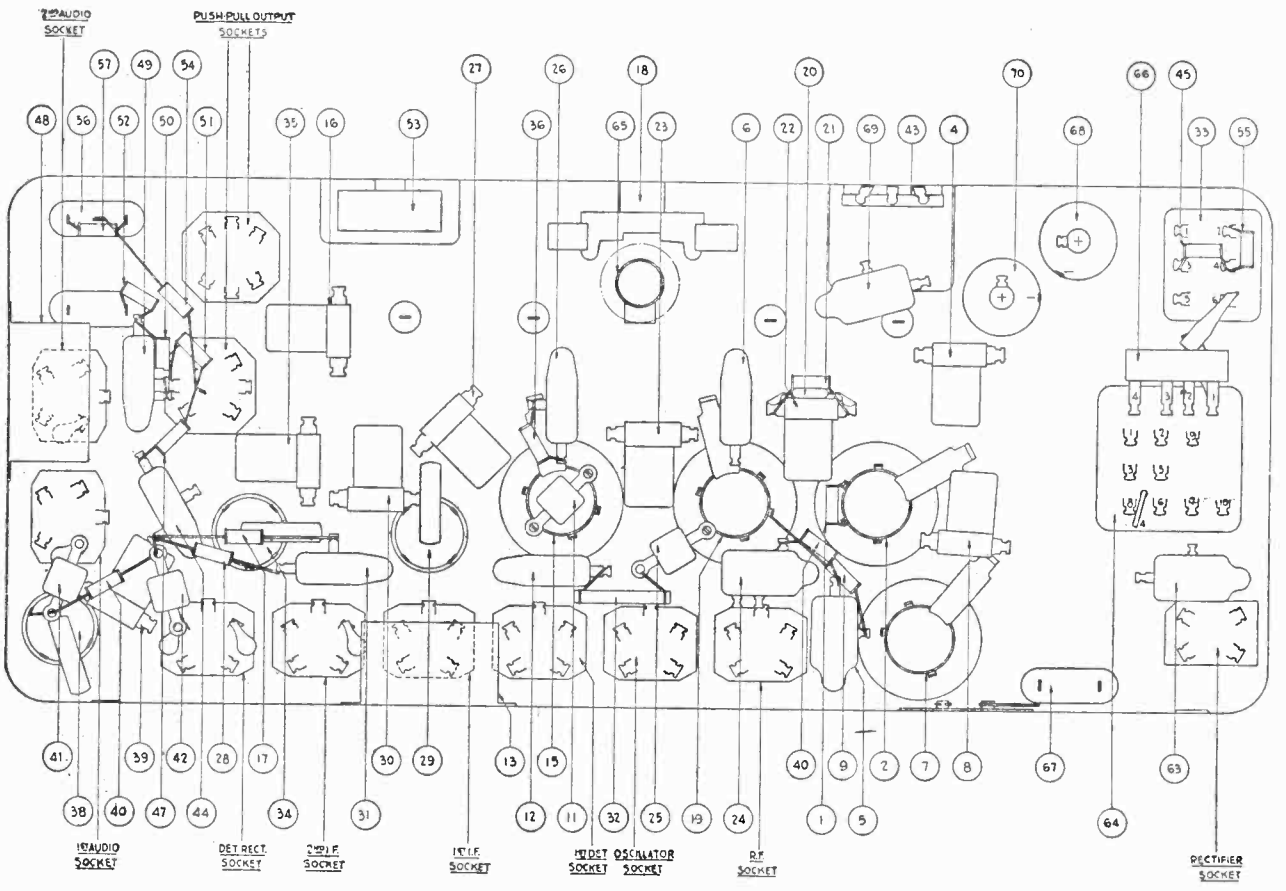
MODEL 15
Chassis
Speaker

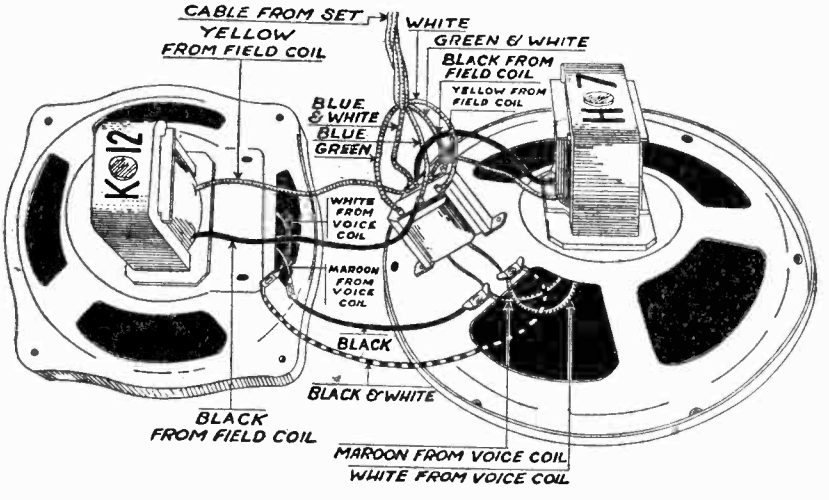
PHILCO RADIO & TELEVISION CORP.



Parts Diagram

Adjustment of Model 15 Series

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to re-adjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your distributor. The Philco Model 095 Oscillator has been especially designed for use in this work and will be found the most in expensive and most reliable for the purpose.



Speaker Connections

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PHILCO RADIO & TELEVISION CORP.

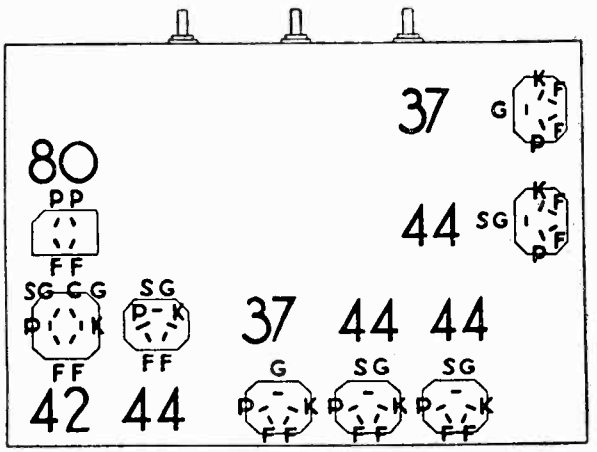
MODEL 43 AC
Socket
Voltage
Values

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

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

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

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



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

Fig. 1—Tube Sockets, Under Side of Chassis

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

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

Tube		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.	—
44	1st Det.	6.3	235	80	3.0	12.0
44	1st I. F.	6.3	235	80	.2	3.0
44	2nd I. F.	6.3	235	80	3.5	3.5
37	2nd Det.	6.3	0	—	0	0
44	1st Audio	6.3	45	45	.2	2.0
42	Output	6.3	215	240	.4	15.0
80	Rectifier	5.0	350/Plate			

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adaptor will not be satisfactory.

Table 2—Power Transformer Data

Terminals	A. C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filaments	Black
6-7	5.0	Filament of 80	Blue
8-10	685	Plates of 80	Yellow
4	....	Center Tap of 3-5	Black Yellow Tracer
9	....	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

No. on Figs.	Power (Watts)	Resistance (ohms)	COLOR		
			Body	Tip	Dot
(38) (43)	...	500	Flexible Wire		
(9)	.5	1,000	Brown	Black	Red
(5)	.5	2,000	Red	Black	Red
(8)	.5	3,000	Orange	Black	Red
(58) (59)	1.	5,000	Green	Black	Red
(62)	...	5,620	Long	Tubular	
(28)	.5	8,000	Gray	Black	Red
(37)	1.	10,000	Brown	Black	Orange
(73)	.5	10,000	Brown	Black	Orange
(60)	3.	13,000	Brown	Orange	Orange
(64)	.5	25,000	Red	Green	Orange
(62)	.5	70,000	Violet	Black	Orange
(22) (52)	.5	99,000	White	White	Orange
(30) (63)	.5	490,000	Yellow	White	Yellow
(56)	.5	1,000,000	Brown	Black	Green
(35)	.5	2,000,000	Red	Black	Green

Model 43

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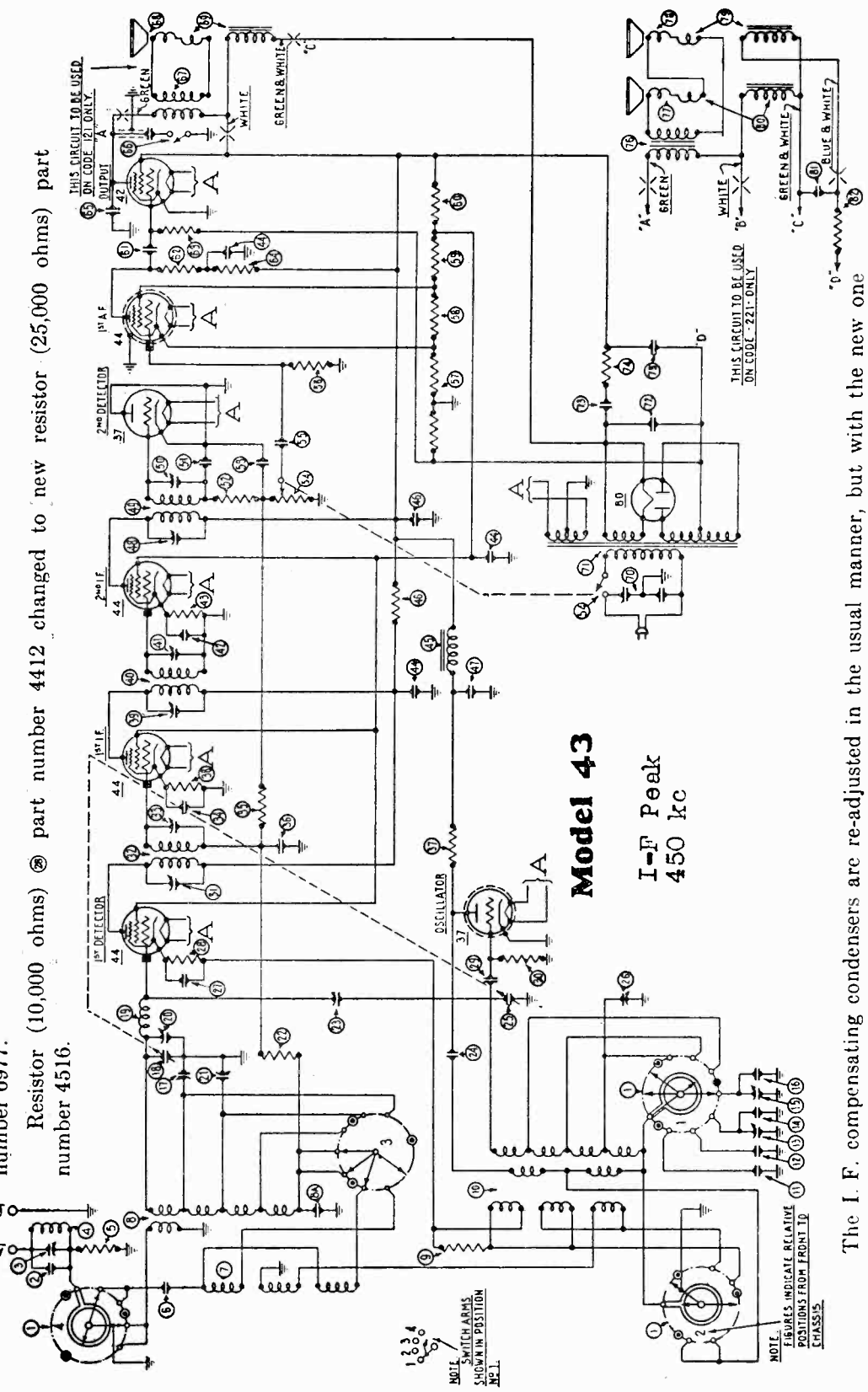
MODEL 43
Schematic Changes

PHILCO RADIO & TELEVISION CORP.

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.



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 ⑱ of the first I. F. is then readjusted by decreasing capacity.

If oscillation still persists the above adjusting procedure is repeated until the sensitivity is strong and no oscillation is present.

Grid inductance coil ⑲ part number 05190 changed to new type, bearing same part number, identified by black paint.

The first detector tube changed from type 44 to type 36.

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MODEL 43
Chassis
Speaker

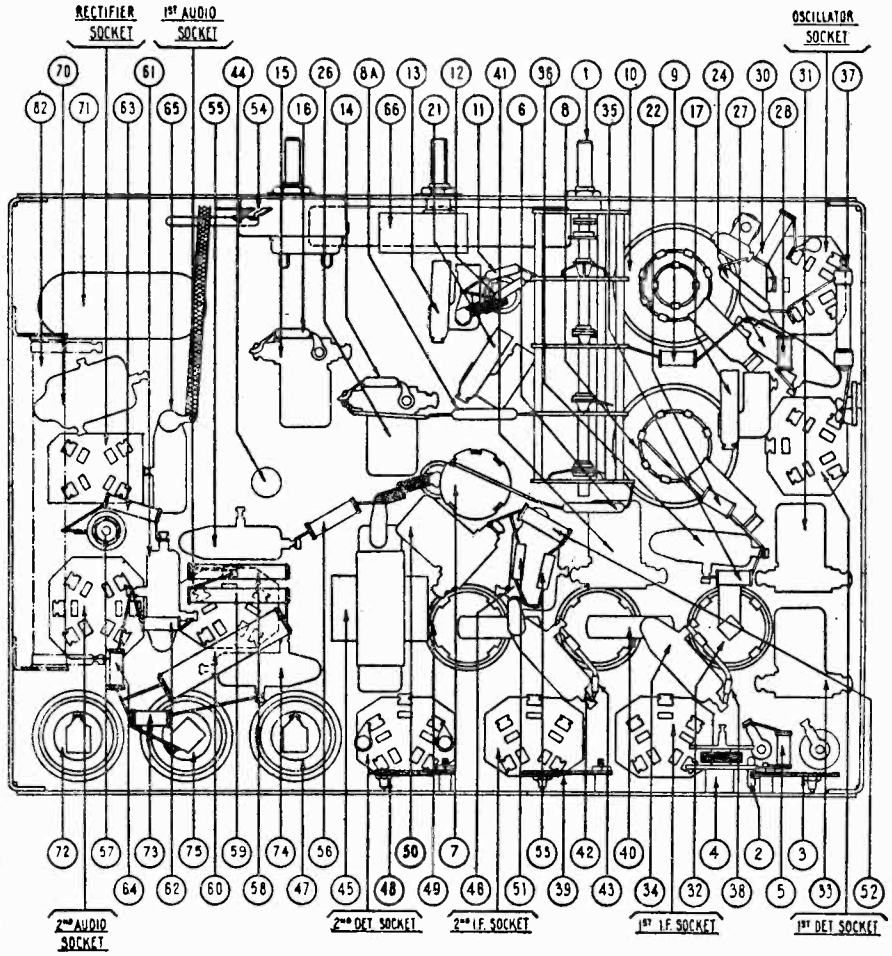

Fig. 3—Parts Diagram

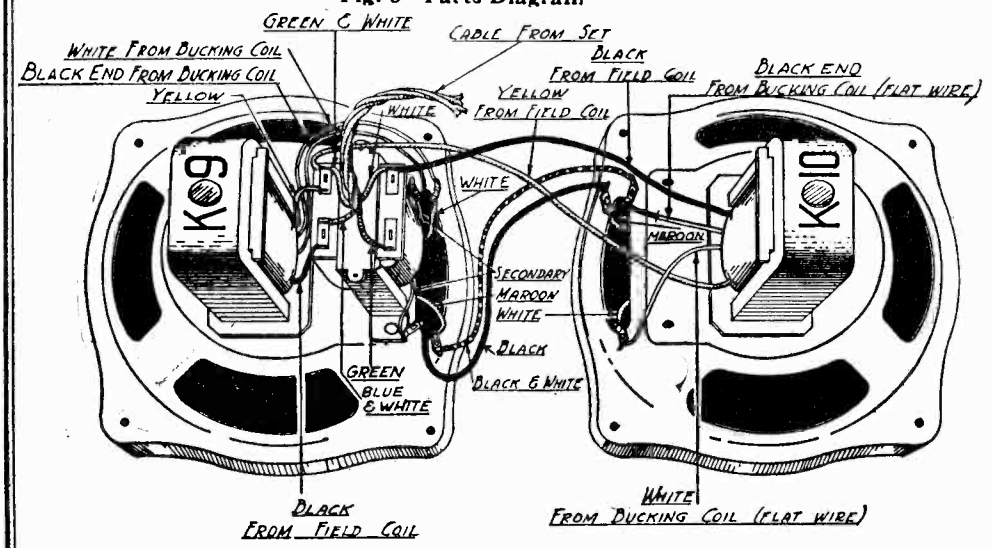

Fig. 4—Twin Speaker Connections—221 Code

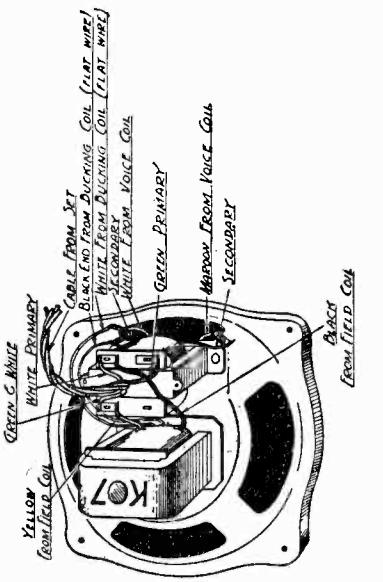

Fig. 5—Speaker Connections—121 Code

Model 43-1

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(32)	45	45
(40)	45	45
(45)	2100	.....
(49)	45	45
(67)	465	.....
(69)	1125	.....
(76)	465	.....
(79)	3275	.....
(80)	1125	.....
(71) Single Speaker Models	6.22	.11 Fila. .14 80 Plate
(71) Twin Speaker Models	2.06	.505 80 Plate .10 Fila. .07 80 Fila. .143 80 Plate

Model 43-25

The condenser ② part number 5120 was changed to new condenser part number 30-1000.

To convert the Model 43-221 chassis (two speakers) into Model 43-121. (single speaker) the following changes are necessary:—

1. Change ⑦① power transformer part number 6985 to new power transformer part number 7074.
2. Remove ⑧② BC Resistor part number 6451.

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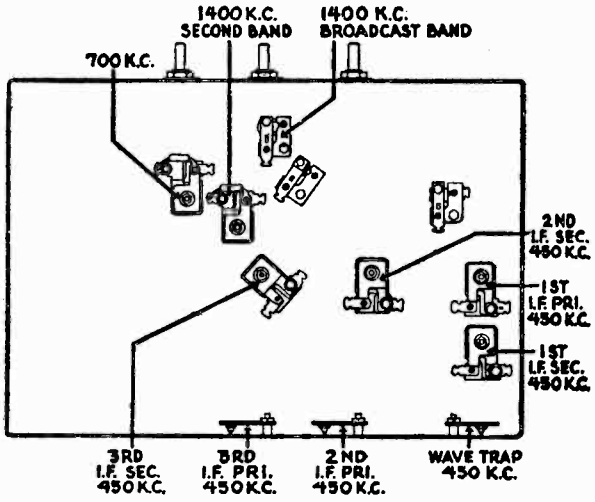
MODEL 43
Alignment
Changes

PHILCO RADIO & TELEVISION CORP.

Adjusting the Model 43



The Philco Model 43 Short Wave Combination Receiver can be adjusted by means of the Philco Model 095 B Oscillator. This oscillator provides a 450 K.C. signal which is used for adjusting the intermediate frequency amplifier stages, and it also provides 700 K.C. and 1400 K.C. signals for adjustments in the broadcast range. The other compensating condensers in the short wave range are of special construction and will not require re-adjustment. The procedure and equipment for making these adjustments are elaborate and are not practicable for use in the field. Since all gain in the receiver is obtained in the I.F. stages, it is only necessary to make the adjustments of the I.F. compensating condensers should the set ever become weak. The following procedure should be used:

(1) Remove the control grid connection from the first detector tube, and substitute the antenna connection from the Philco 095 B oscillator. Connect the output meter across the primary of the output transformer.

(2) Set the oscillator in operation at 450 K.C.

(3) Adjust all the I.F. compensating condensers for maximum output meter reading.

(4) Replace the control grid connection of the first detector tube, and connect the 450 K.C. signal to the antenna terminal of the radio set; adjust the wave trap for minimum reading in the output meter.

(5) Change the oscillator setting to 175 K.C.

(6) Tune in the fourth harmonic of this signal at 700 K.C., and adjust the 700 K.C. condenser for maximum output meter reading.

(7) Re-set the dial to 1400 K.C., and tune in the eighth harmonic of 175 K.C. at 1400 on the bottom scale; adjust the 1400 K.C. condenser for maximum output meter reading.

(8) Tune the radio set to 1400 K.C. on the second scale from the bottom, and adjust this compensating condenser for maximum output *meter reading.*

NOTE: When adjusting the 1400 and 700 compensating condensers, it may be found that the oscillator signal will be heard 10 K.C. or more off the desired dial reading. This can be corrected by alternate adjustments and re-tuning of the tuning condenser, bringing the signal nearer 700 or 1400 each time until maximum output meter reading is obtained with the correct dial scale reading.

Never attempt to make adjustments to any of the other compensating condensers in the receiver. It is important that the wires which connect between the r.f. coils and the wave change switch be so arranged that they will have maximum separation between them for minimum capacity losses.

A half plate compensating condenser part number 04000-C added; this is mounted on top of (17) compensating condenser part number 04000-V. An extra collar part number 3098 and a longer screw part number W443 are used for mounting. The solid plate of this new compensating condenser is connected to the plate of the first detector tube and the movable plate to a new (500 ohm) resistor part number 6977; the other end of this resistor is connected to the cathode of the first detector tube.

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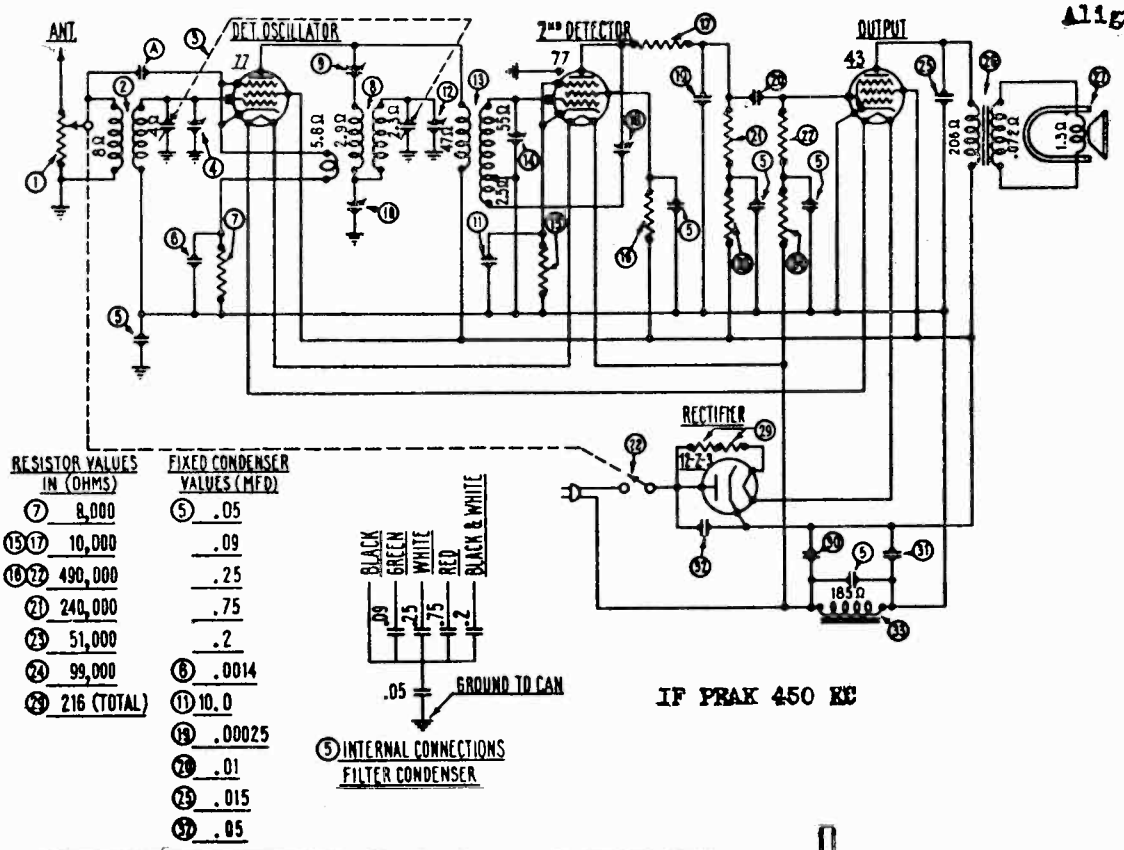
PHILCO RADIO & TELEVISION CORP.

MODEL 53
AC-DC
Schematic
Alignment



RESISTOR VALUES IN (OHMS)		FIXED CONDENSER VALUES (MFD)	
⑦	8,000	⑤	.05
⑮⑰	10,000		.09
⑱㉒	490,000		.25
㉑	240,000		.75
㉓	51,000		.2
㉔	99,000	⑥	.0014
㉙	216 (TOTAL)	⑪	10.0
		⑱	.00025
		⑳	.01
		㉕	.015
		㉜	.05

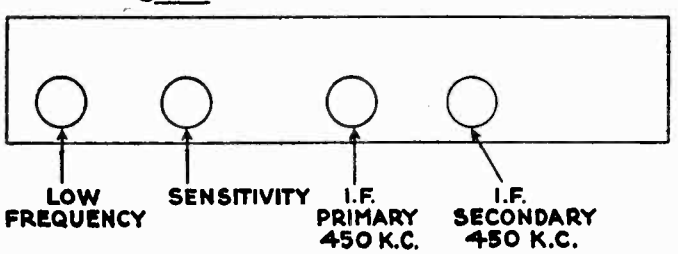


Fig. 1 Back of Model 53 Chassis showing location of Compensating Condensers

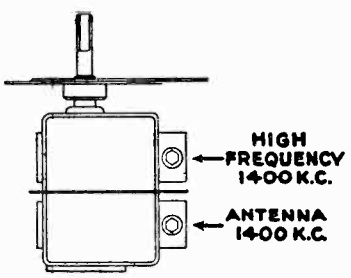


Fig. 2 Tuning Condenser, Model 53 Chassis, showing location of additional Compensating Condensers

The general method of adjusting the High Frequency and the I.F. Compensating Condensers is the same as that for other models outlined in Service Bulletin No. 120-C. The adjustment of the I.F. Compensating Condensers is completed first. This adjustment is then followed by the adjustment of the high frequency compensating condensers.

To obtain maximum sensitivity through the use of the 30′ antenna wire it will be necessary to to adjust the antenna compensating condenser, the low frequeney compensating condenser and the sensitivity condenser in the following manner:—unroll the 30′ antenna wire to its full length (do not connect it to another aerial or ground while the following adjustments are being made). Tune to a station near the high frequency end of the dial (between 1400 and 1500 K.C.). With a fibre adjusting wrench cut off, adjust the antenna condenser (Fig. 2) for maximum volume. After this is completed tune to a station near the low frequency end of the dial (as near 600 as possible) and then adjust the low frequency condenser (Fig. 1) for maximum volume; retune to the high frequency station and do any necessary fine re-adjusting so as to bring in the station with maximum volume. Now check the adjustment of the sensitivity condenser (Fig. 1) with the receiver tuned to a station near the high frequency end of the dial, turn this condenser to the right as far as possible without causing an oscillation or squeal. Repeat this adjustment on a station near the low frequency end of the dial; if an oscillation or squeal appears turn the condenser to the left until this disappears.

It is necessary to have an accurately calibrated oscillater signal at 450 K.C. for adjusting the I.F. compensating condenser on the Model 53. The Philco Oscillater Model 095B is accurately calibrated for this frequency.

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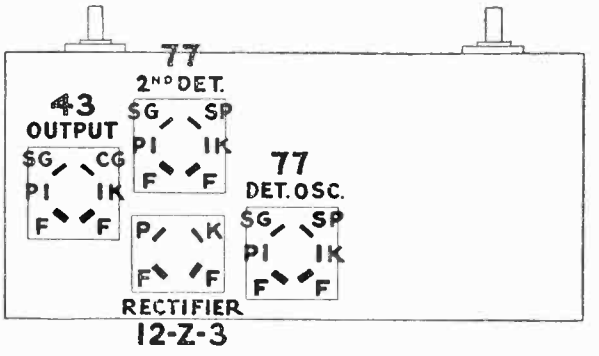
MODEL 53
AC-DC
Chassis
Socket

PHILCO RADIO & TELEVISION CORP.

The Philco Radio Model 53 is a four tube superheterodyne, employing the new Philco high efficiency tubes with pentode output and a permanent Field Dynamic Speaker. The set uses a Philco Type 77 tube as a first detector and oscillator, a Type 77 tube as second detector, a Type 43 tube as output, and a Type 12-Z-3 as a rectifier. The set will operate universally on either alternating or direct current, 105-125 Volts. The intermediate frequency for tuning the I.F. transformer is 450 kilocycles. The power consumption on both A. C. and D. C. is approximately 45 watts.



F Filament SG Screen Grid K Cathode
P Plate CG Control Grid SP Suppressor Grid

Fig. 1—Tube Sockets, Under Side of Chassis

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

Circuit	Det. Osc.	2nd Det.	Output	Rectifier
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.	Output	Rectifier
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.

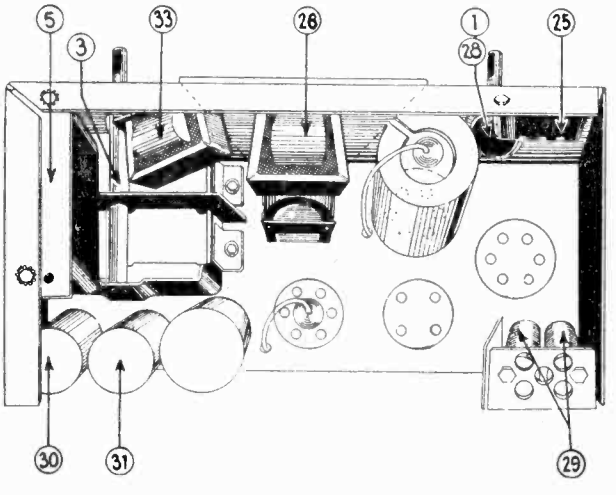


Fig. 2—Top View of Chassis, Showing Parts

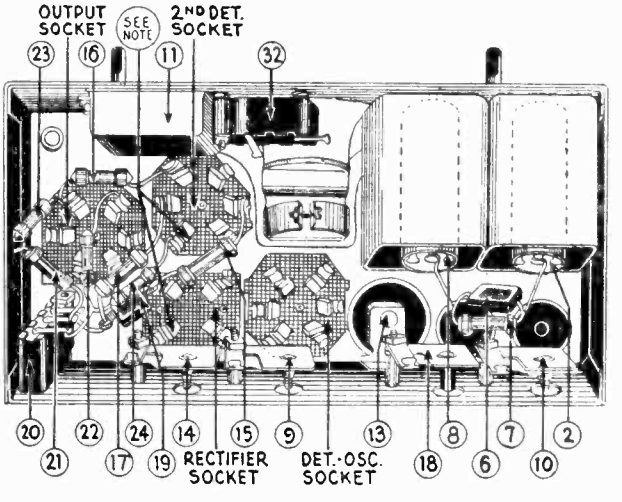


Fig. 3—Bottom View of Chassis, Showing Parts
NOTE:—Place test prods across the two points indicated to test filament voltage.

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MODEL 37
Chassis, Data

Under view of the Philco Model 37 chassis, with all units numbered, the numbers corresponding to those given in the circuit diagram and in the tables

Model 37

The (99,000 ohm) resistor ㉗ part number 4411 was changed to new resistor (490,000 ohms) part number 4517.

The (490,000 ohm) resistor ㉛ part number 4517 was changed to new resistor (240,000 ohms) part number 4410.

The (99,000 ohm) resistor ㉜ part number 4411 was changed to new resistor (1,000,000 ohms) part number 4414.

The (51,000 ohm) resistor ㉖ and the (25,000 ohm) resistor ㉘ were removed.

The secondary lead of the second I. F. transformer connected to condenser ㉔ was removed and connected to the secondary lead of the first I. F. transformer on condenser ⑬. A (490,000 ohm) resistor part number 4517 was added between the center top of the volume control (in cathode circuit) and the secondary leads of first and second I. F. transformer connected on condenser ⑬.

A (15,000 ohm) resistor part number 6208 was added, connected between end of the volume control (in cathode circuit) and end of resistors ㉞ and ㊱.

Model 37—

Key No. in Wiring Dia.	Resistance in Ohms	
	Primary	Secondary
(3)	25	6.5
(6)	26	6.2
(10)	6.8	
	4.5	5.0
(19)	160	160
(22)	160	160
(36)	330	330
(38)	670	.05
(39)	.9 Voice Coil	

—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.

Internal Connections Filter Condenser Bank

(Above) Back of Philco Model 37 chassis, showing locations of compensating condensers. The 2nd i-f. secondary condenser is mounted on the front of the chassis, but is accessible through the opening in the back, as shown. Fig. 4. (Right) Indicating the locations of the additional compensating condensers on the gang condenser

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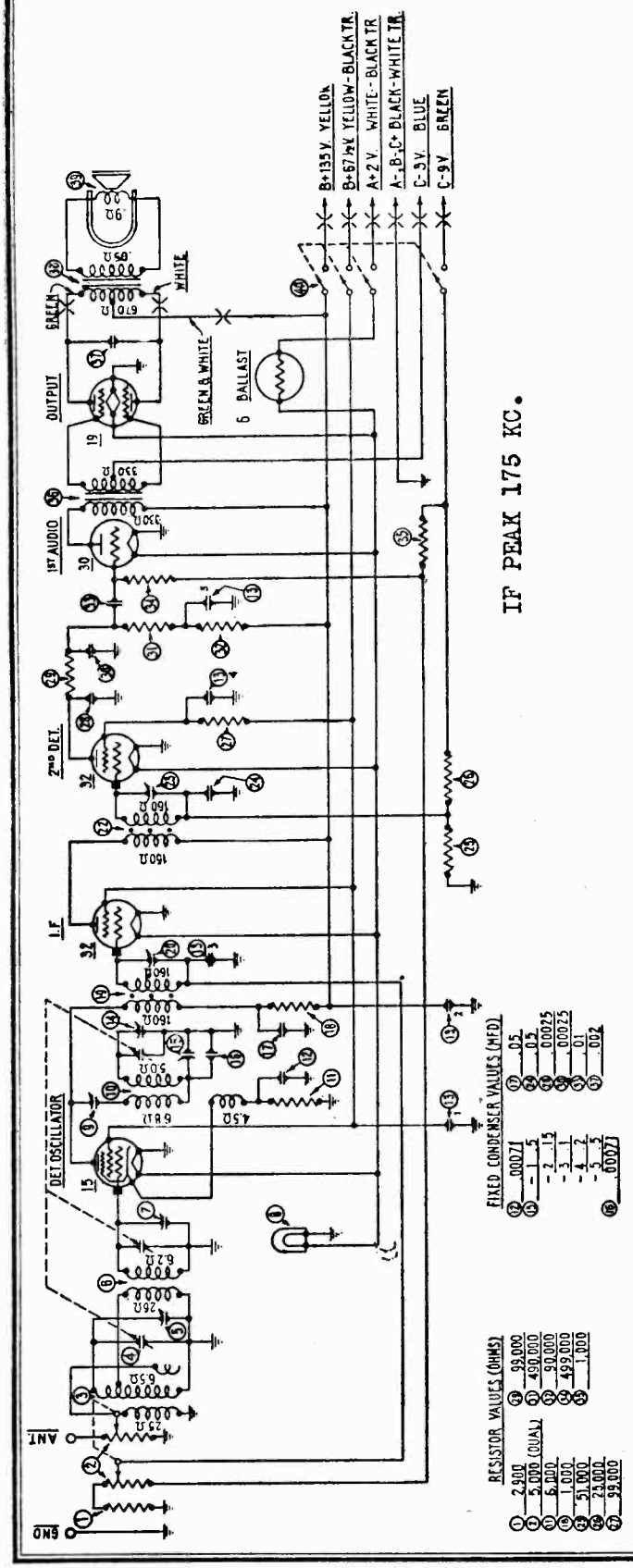
MODEL 37
Schematic
Data

PHILCO RADIO & TELEVISION CORP.



IF PEAK 175 KC.

The Philco Model 37 is a five tube battery operated superheterodyne receiver.

This model contains the new Philco type 15 r.f. pentode tube as detector oscillator, a type 32 screen grid intermediate frequency amplifier, a type 32 screen grid second detector, a type 30 first audio, and the new type 19 push pull (class B amplifier) output tube.

The filaments are supplied from the Philco Dry A battery. The chassis is equipped with an automatic voltage regulator tube which affords constant A voltage to the set throughout the life of the battery. The filament current drain from the A battery is 720 milliamperes.

The plates are supplied from standard Philco 45 B batteries. At 135 volts, the B battery current drain varies between 8 and 12 milliamperes.

The intermediate frequency of the superheterodyne circuit in this model is 175 kilocycles.

Table 1—Tube Socket Data

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

Table 2—Resistor Data

No. in Figs. 3 and 4	Resistance (Ohms)	Color		
		Body	Tip	Dot
(18) (35)	1,000	Brown	Black	Red
(1)	2,900	Red	White	Red
(11)	6,000	Blue	Black	Red
(26) (45)	25,000	Red	Green	Orange
(29)	51,000	Green	Brown	Orange
(27)	99,000	White	White	Orange
(31) (34)	490,000	Yellow	White	Yellow

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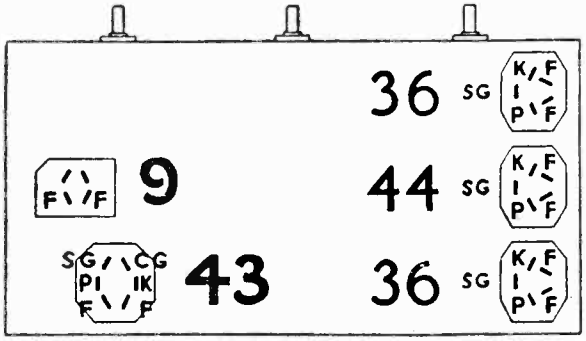
MODEL 48
Socket
Resistor Data

The Model 48 is a four tube, 115 volt direct current operated superheterodyne receiver, designed for operation on 540 to 1500 kilocycles.

This model contains a type 36 screen grid tube for combination first detector and oscillator, a type 44 r. f. pentode tube as intermediate frequency amplifier, a type 36 screen grid tube as second detector, and a type 43 pentode tube as output. A type 9 ballast tube is used for automatic voltage regulation. All of these tubes are the new Philco high efficiency type which consume a minimum of current.

The intermediate frequency of this model is 175 kilocycles. The power consumption is 40 watts.



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

Fig. 1—Tube Sockets, Under Side of Chassis

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

Table 1—Tube Socket Data—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 ㊶ ㊴ ㊵ ⑨ 33	99,000	.5	White	White	Orange
	240,000	.5	Red	Yellow	Yellow
	490,000	.5	Yellow	White	Yellow
	1,000,000	.5	Brown	Black	Green

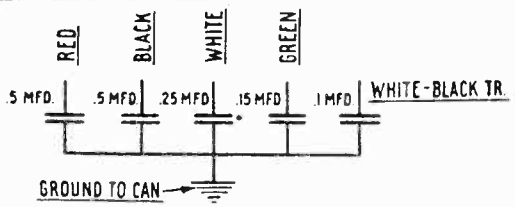


Fig. 2—Internal Connections Filter Condenser

Compensating condenser ⑱ part number 04000F was changed to new condenser part number 04000S.

Condenser ⑲ part number 4520 was changed to new condenser part number 30-1000.

Condenser ④ listed as part number 05518 in replacement parts list, Service Bulletin 143, should read part number 4418. This condenser mounted under resistor ㉖ instead of being combined with condenser ㊹.

The wire from the compensating condenser ㉘ leading to the terminal block mounted on the compensating condenser ⑬ was unsoldered at the terminal block and then resoldered to the lug number 3 on the detector transformer ⑧ The wire leading from the compensating condenser ㉗ to the terminal block mounted on the condenser ㉑ was removed and a new resistor, part number 4517 (490,000 ohms) was added in its place.

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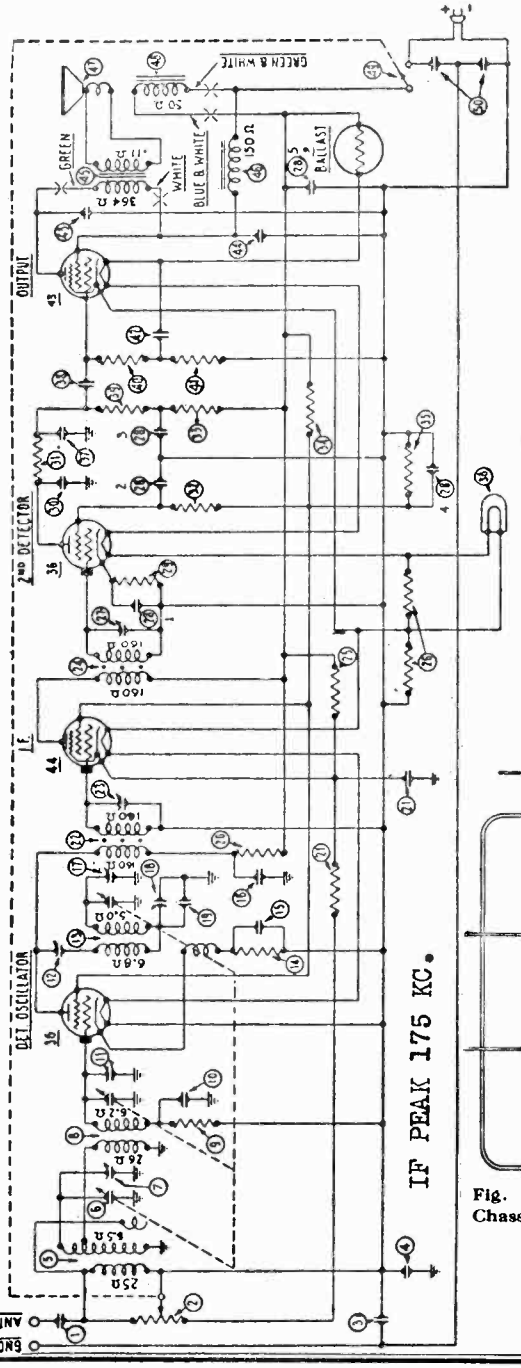
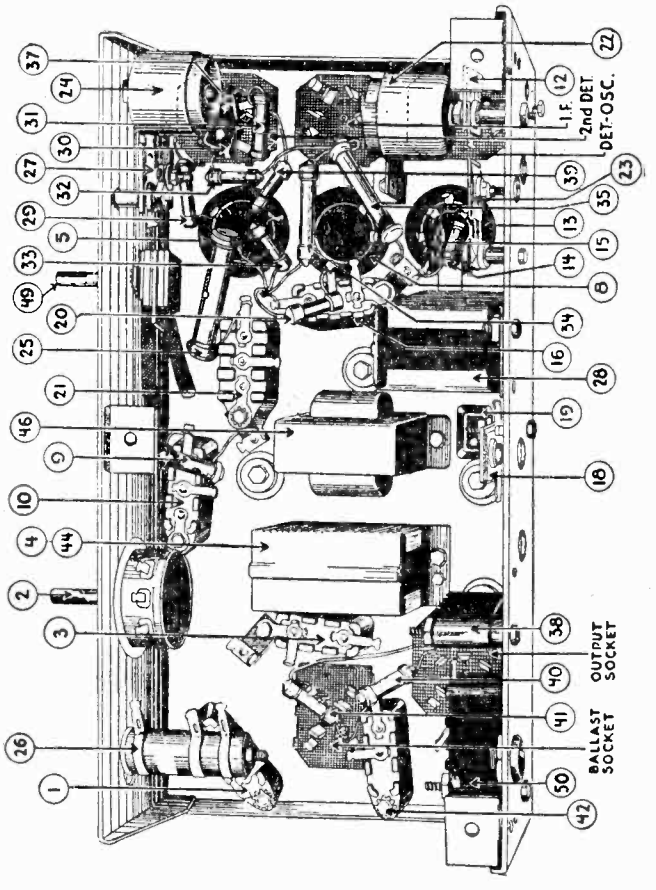
MODEL 48
Schematic
Chassis, Data

PHILCO RADIO & TELEVISION CORP.





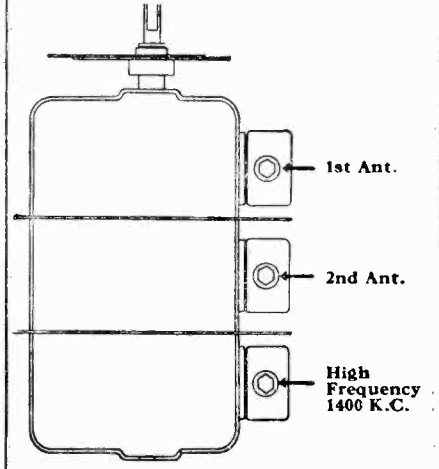


Fig. 2—Tuning Condenser, Model 48 Chassis, showing location of additional Compensating Condensers

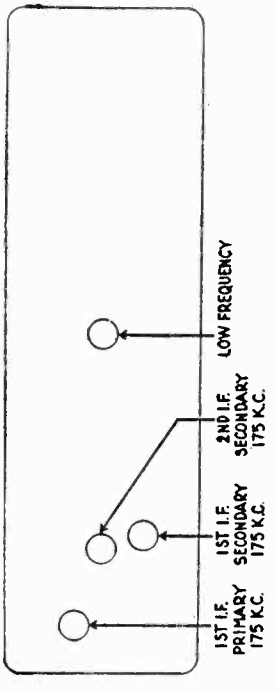


Fig. 1—Back of Model 48 Chassis, showing location of Compensating Condensers

NOTE:—The 2nd I.F. Secondary Condenser is mounted on the front of the Chassis, but accessible through the opening in the back as shown

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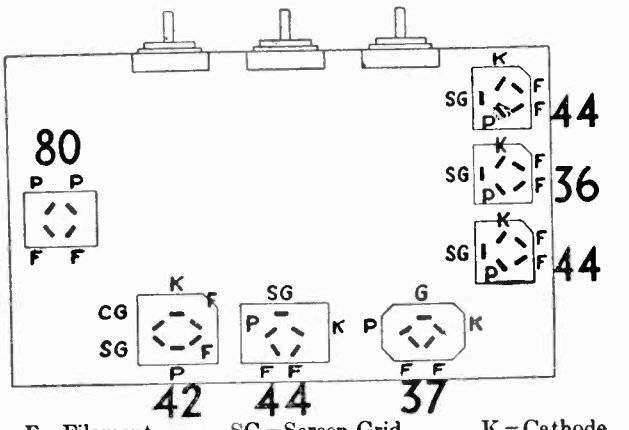
PHILCO RADIO & TELEVISION CORP.

MODEL 71 Series
Voltage, Data

The Philco Radio of the 71 series is a seven tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The chassis is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code, employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chassis of one code are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 71 series is 260 kilocycles. The power consumption of the various models is as follows:

Chassis	Volts	Cycles	Watts
71 -121	115	50-60	63
71 -221	115	50-60	80
71A-121	115	25-40	65
71A-221	115	25-40	85
71E-121	230	50-60	63
71E-221	230	50-60	80



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

Fig. 1—Tube Sockets

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

Tube Type	Tube Circuit	Filament Volts—F to F	Plate Volts—P to K	Screen Grid Volts—SG to K	Control Grid Volts—CG to K	Cathode Volts—K to F
44	R. F.	6.3	245	90	4.	20
36	Det. Osc.	6.3	235	90	2.3	20
44	I. F.	6.3	255	90	.2	20
37	Det. Rect.	6.3	0	..	..	15
44	Audio	6.3	50	50	.3	20
42	Output	6.3	250	260	.2	15
80	Rectifier	5.0	365/plate	..	..	..

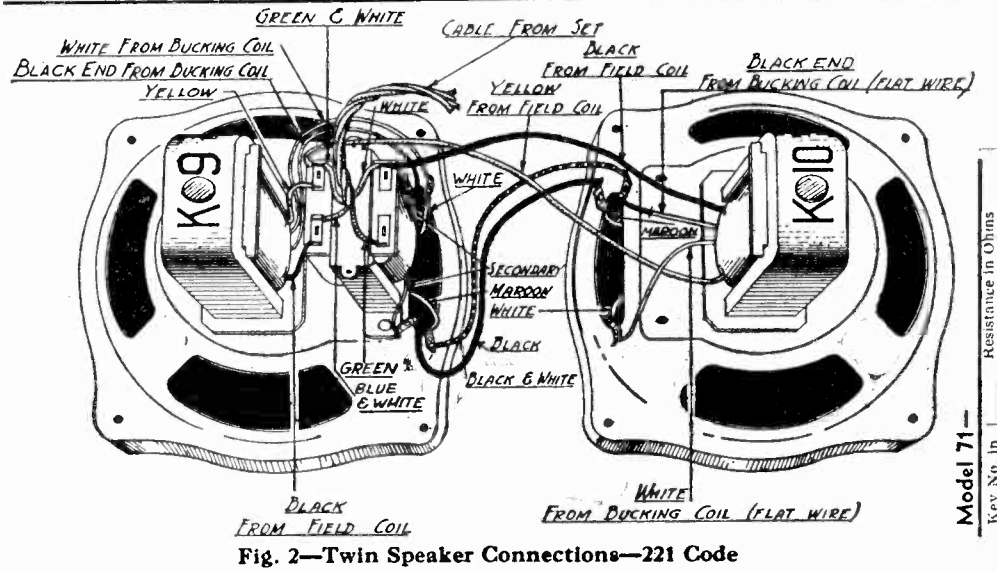
*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a high resistance multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament of 80	Light Blue
8-10	685	Plates of 80	Yellow
4	.....	Center Tap of 3-5	Black Yellow Tracer
9	.....	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

No. on Figs. 4 & 5	Power (Watts)	Resistance (Ohms)	Color Body	Color Tip	Color Dot
(52)	..	185 & 245	Round	Tubular	
(24)	.5	1,000	Brown	Black	Red
(57)(58)	.5	5,000	Green	Black	Red
(48)	(Twin	Speaker) 5,620	Round	Tubular	
(1)(54)	.5	10,000	Brown	Black	Orange
(59)	3.	13,000	Brown	Orange	Orange
(18)	.5	15,000	Brown	Green	Orange
(35)	.5	25,000	Red	Green	Orange
(25)	.5	(Twin Speaker) 51,000	Green	Brown	Orange
(34)	.5	70,000	Violet	Black	Orange
(27)	.5	99,000	White	White	Orange
(37)	.5	490,000	Yellow	White	Yellow
(17)(28)(33)	.5	1,000,000	Brown	Black	Green



Model 71—

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(2)	Inner 10.9 Outer 2.2	4.0
(8)	.....	3.8
(9)	Inner 5.2 Outer 5.2	15.7 55 67
(13)	.....	.....
(20)	55	.....
(26)	67	.....
(40)	465	.....
(42)	1125	.....
(43)	465	.....
(45)	1125	.....
(47)	3275	.....
(51) Single Speaker Models	7.36	14 Fila. 13 80 Fila. 465 80 Plate
(51) Twin Speaker Models	3.6	13 Fila. 16 80 Fila. 185 80 Plate

Fig. 2—Twin Speaker Connections—221 Code

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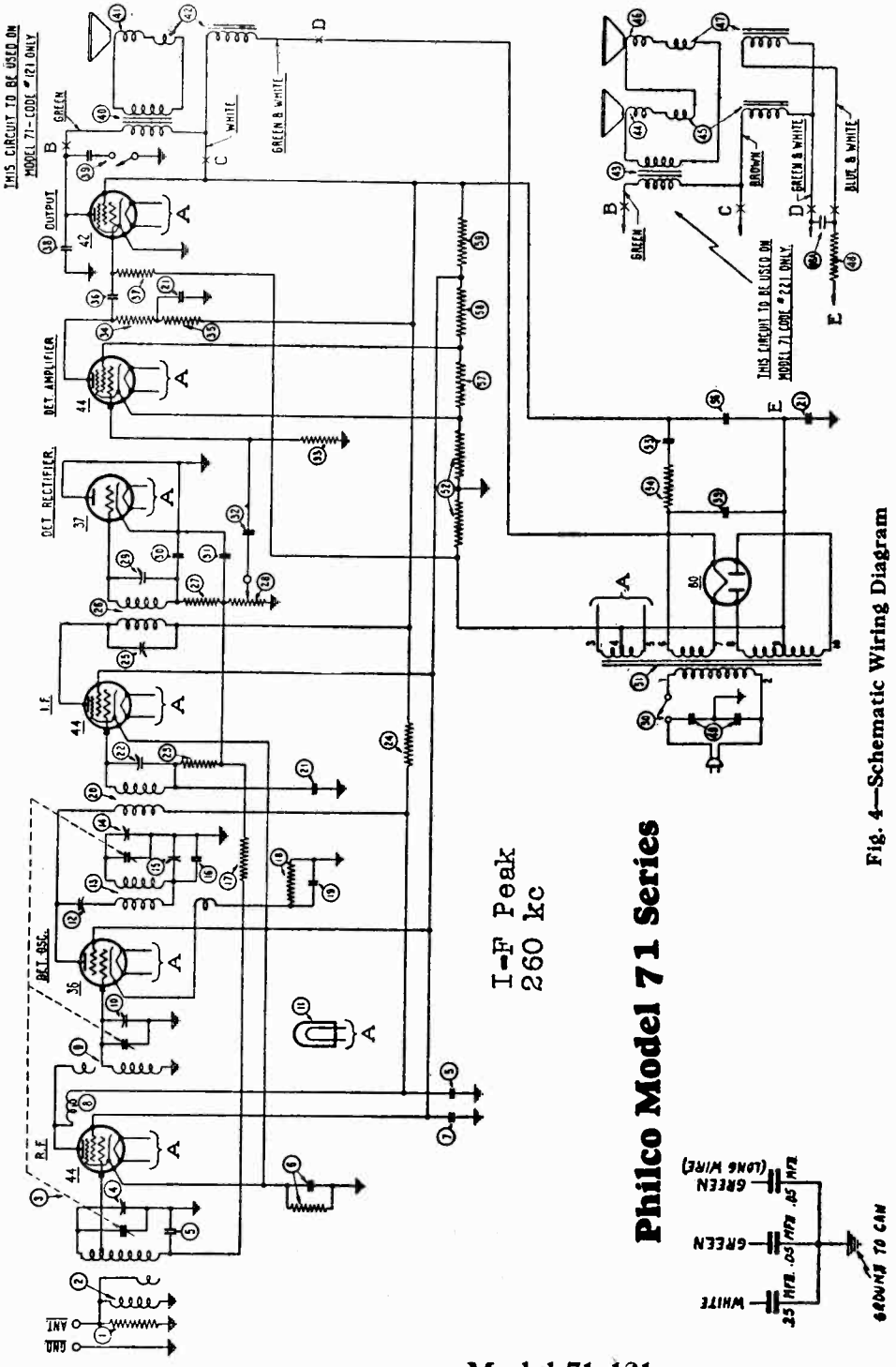
MODEL 71 Series
Schematic

PHILCO RADIO & TELEVISION CORP.



Philco Model 71 Series

I-F Peak
260 kc

Fig. 4—Schematic Wiring Diagram

Fig. 3—Internal Connections Filter Condenser

Below run No. 4, unsolder top (ungrounded) connection of volume control ㉘ and substitute in the circuit a 240,000 ohm resistor, part 4410, one end grounded. Disconnect the condenser ㉜ .01 Mfd., part 3903-J, from the center tap of the volume control and from its common connection with the control grid of the detector amplifier tube and the ungrounded end of ㉝ resistor 1,000,000 ohms 4409. This resistor is no longer used, and can be removed. Solder one side of the condenser ㉜ to top of volume control and other side of condenser to ungrounded end 240,000 ohm resistor. Solder the control grid lead of the detector amplifier tube to the variable arm connection of the volume control tube.

㊽ A Condenser .25 Mfd. part 04997, change to .5 Mfd. part 05150.
㊾ Resistor 25,000 ohms 4516 used on both 121 an ! 221 models.
Dial complete, part 03031, change to part 04832.
Add tuning condenser drive cord, part 04834 and spring 6508.

Model 71-121

For 25 Cycle

Use ㊶ power transformer 6455. Change ㊸ electrolytic condenser (6 Mfd.) to 8 Mfd. 6707. Change ㊻ electrolytic condenser (6 Mfd.) to 8 Mfd. 6706.

Model 71-221

For 25 Cycle

Use ㊶ power transformer 6458. Change ㊸ electrolytic condenser (8 Mfd.) 6707 to 10 Mfd., 6893. Change ㊻ electrolytic condenser (8 Mfd.) 6706 to 10 Mfd., 5142.

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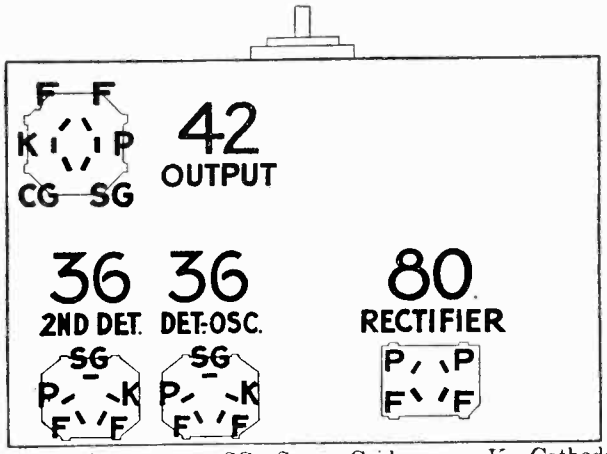
MODEL 80
Voltage, Data

Model 80-

Key No. in Wiring Dia	Resistance in Ohms Primary	Secondary
(2)	2.68	6.5
(8)	2.38	...
	6.45	2.4
(14)	45	54.7
	...	3.6
(28)	364	11
(29)	93 Voice Coil	... ...
(30)	07 Bucking Coil	.....
(33)	1250 Field 10 42	Fila .25 80 Fila. .15 80 Plate 303

The intermediate frequency for tuning the I.F. transformer is 450 kilocycles. The power consumption of the Model 80 is 46 watts.



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

Fig. 1—Tube Sockets, Under Side of Chassis

CAUTION: Never connect the chassis to the power supply unless the speaker is connected and all tubes are in place.

Table 1—Tube Socket Data*—Power Line Voltage 115 Volts

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
36	Det.—Osc.	6.3	245	165	6.4	8.4
36	2nd Det.	6.3	40	15	.4	0
42	Output	6.3	240	255	4	0
80	Rectifier	5.0	340/Plate	...	...	...

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a high resistance multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament of 80	Blue
8-10	630	Plates of of 80	Yellow
4	...	Center Tap of 3-5	Black Yellow Tracer
9	...	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

Nos. on Figs. 2 and 3	Resistance (Ohms)	Power (Watts)	Color Body	Color Tip	Color Dot
㊱	325	...	Wire	Wound	
⑨	9,000	1.	White	Black	Red
⑧ ⑳	10,000	.5	Brown	Black	Orange
⑪	16,000	5.	Brown	Blue	Orange
㉒	240,000	.5	Red	Yellow	Yellow
㉘	490,000	.5	Yellow	White	Yellow
⑲	1,000,000	.5	Brown	Black	Green
⑮	4,000,000	.5	Yellow	Black	Green

The following changes made on sets above run No. 12

All tube shields were changed to new shield part number 8005.

Coil shield (square type) part number 7406 was changed to (round type) part number 7830. The following additional changes were made at the same time. Antenna coil ② part number 05831 changed to new coil part number 06888, and the oscillator coil ⑧ part number 05832 changed to new coil part number 06887; resistor ⑥ (10,000 ohms) part number 4412 and condenser ⑤ (710 Mmfd.) part number 4520 becomes part of coil assembly—(part number 06887)

Resistor ⑳ part number 4412 should be as far away from the I. F. coils as possible. The black and white lead from ⑭ I. F. coil should be placed as near the chassis as possible over the oscillator coil.

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MODEL 80
Schematic
hıssis

PHILCO RADIO & TELEVISION CORP.

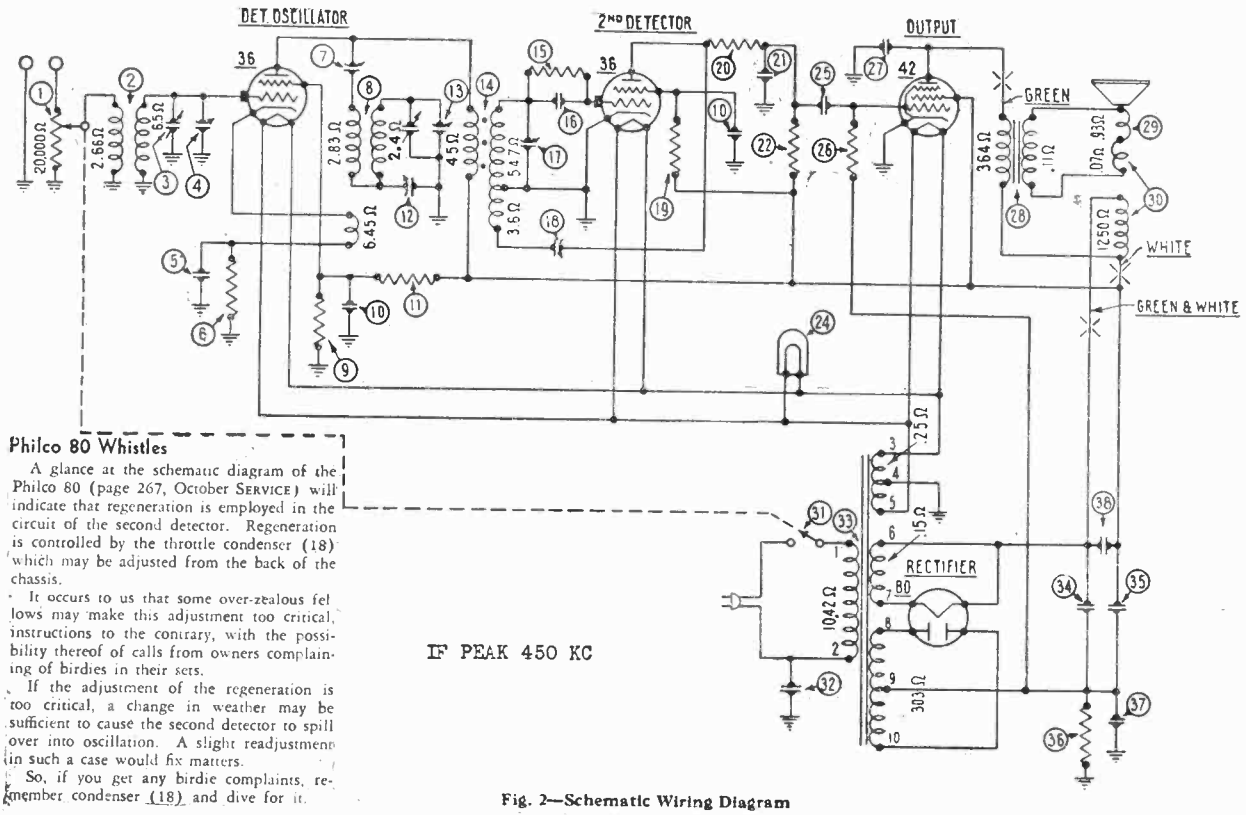

Fig. 2—Schematic Wiring Diagram

Philco 80 Whistles

A glance at the schematic diagram of the Philco 80 (page 267, October SERVICE) will indicate that regeneration is employed in the circuit of the second detector. Regeneration is controlled by the throttle condenser (18) which may be adjusted from the back of the chassis.

It occurs to us that some over-zealous fellows may make this adjustment too critical, instructions to the contrary, with the possibility thereof of calls from owners complaining of birdies in their sets.

If the adjustment of the regeneration is too critical, a change in weather may be sufficient to cause the second detector to spill over into oscillation. A slight readjustment in such a case would fix matters.

So, if you get any birdie complaints, remember condenser (18) and dive for it.

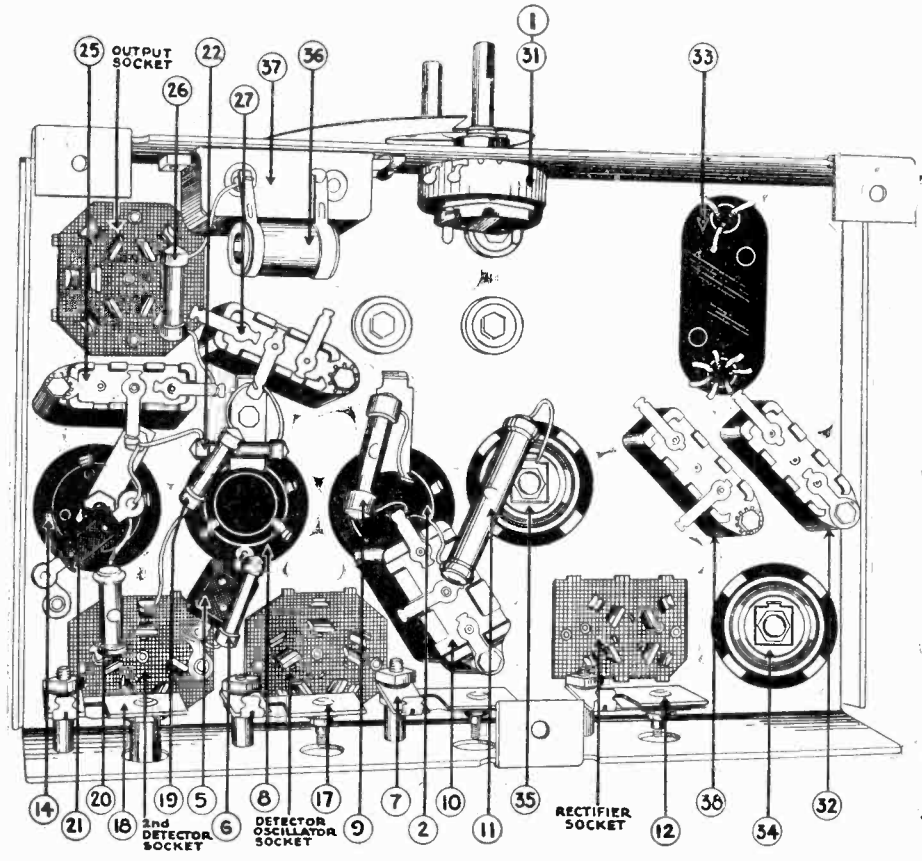

Fig. 3—Bottom View of Chassis, Showing Parts

A condenser part number 4989K was added. This condenser was connected between the electrolytic condenser ㉙ and the screen grid prong of the output socket.

The following changes were made to extend the frequency range of the Model 80—Tuning condenser assembly ⑤ part number 05794 was changed to new tuning condenser assembly part number 31-1030. The tuning scale part number 7989 was changed to new tuning scale part number 27-5009. The antenna coil ② part number 06888 was changed to new coil part number 32-1125. The oscillator coil ⑧ part number 06887 was changed to new coil part number 32-1120.

The black wire with yellow tracer (filament center tap) of ㉘ power transformer was disconnected from ground and connected to the yellow wire with green tracer (80 plate center tap). This was connected to lug number 6 of ㉜ condenser.

The above effective on run number 14.

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PHILCO RADIO & TELEVISION CORP.

MODEL 81
Chassis
Voltage, Data

The Philco Radio Model 81 is a four tube superheterodyne receiver combining Standard broadcast and police reception and employs the new Philco high efficiency tubes with pentode output and electro dynamic speaker. The same superheterodyne circuit is used for Standard broadcast and police reception. The intermediate frequency for tuning the I. F. transformer is 460 kilocycles. The power consumption of the Model 81 is 46 watts.

Table 1—Tube Socket Data*
Power Line Voltage 115 Volts

Circuit	Det. Osc.	2nd Det.	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.

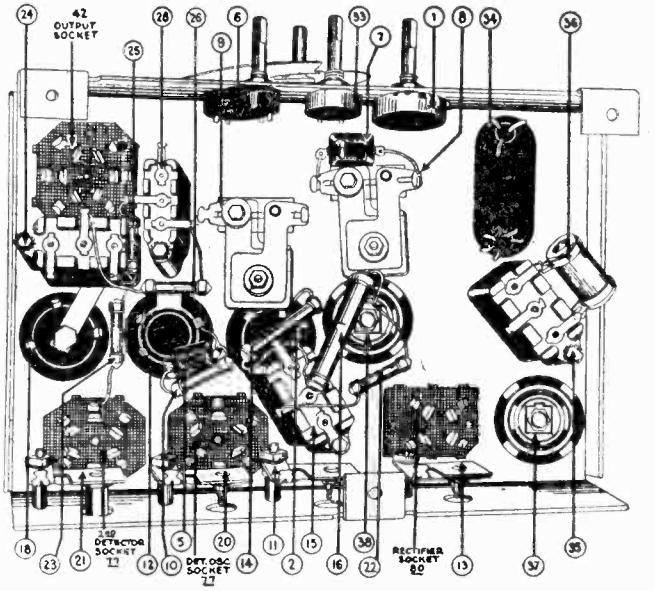

Fig. 1—Parts Diagram

77 Sockets

42 Socket

80 Socket

Terminal Arrangement of Tube Sockets Viewed from Under Side of Chassis.

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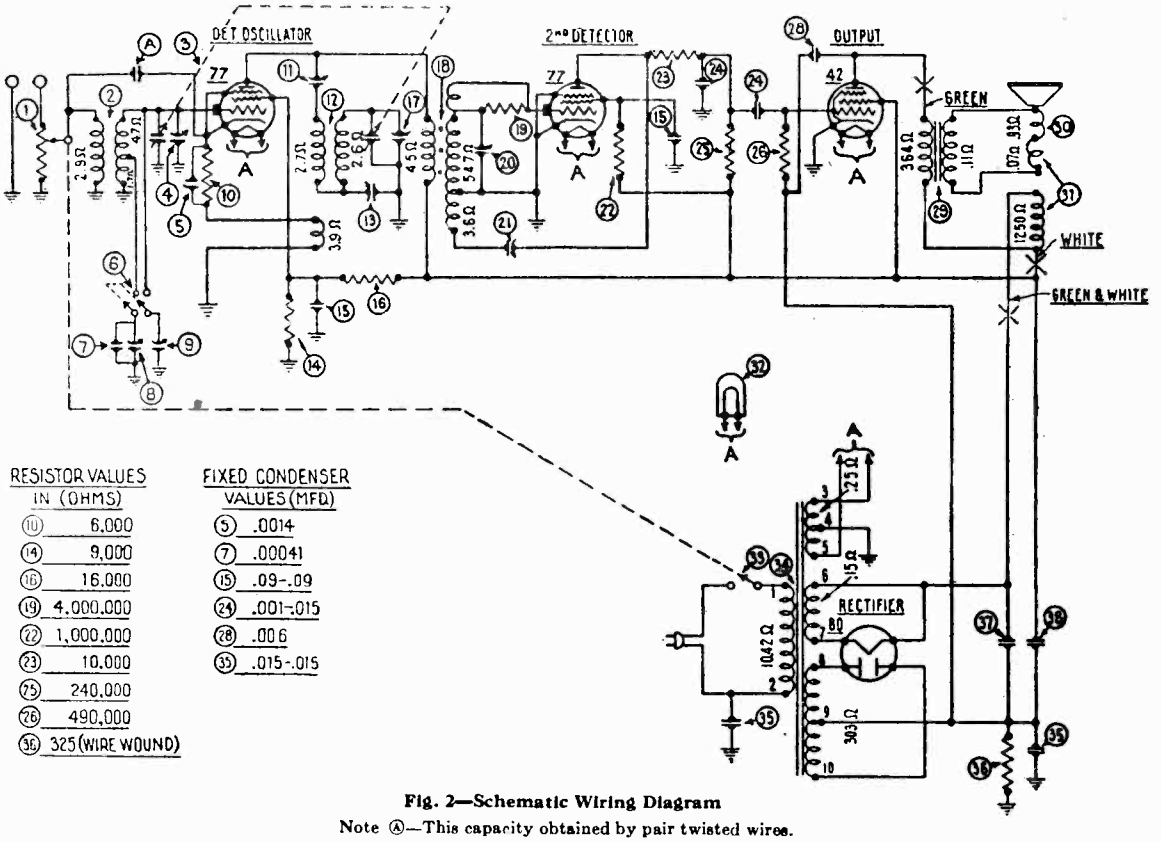
MODEL 81
Schematic
Replacement List

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

Fig. 2—Schematic Wiring Diagram

Note Ⓐ—This capacity obtained by pair twisted wires.

REPLACEMENT PARTS MODEL 81

No. on Figs.	Description	Part No.	List Price
①	Volume Control*	33-5002	.75
②	Antenna Transformer	32-1030	.50
③	Tuning Cond. Assembly	31-1006	
④	Compensating Condenser (Part of ③)		
⑤	Cond. (Red and Black)	7007	.25
⑥	Frequency Switch	42-1000	
⑦	Cond. (Orange and Yellow)	30-1000	.20
⑧	Compensating Condenser	04000-S	.25
⑨	Compensating Condenser	04000-X	.16
⑩	Resistor (Blue-Black-Red)	7352	.25
⑪	Compensating Condenser (I.F. Primary)	04000-A	.12
⑫	Oscillator Coil	32-1031	.75
⑬	Compensating Condenser (Low Frequency)	04000-S	.25
⑭	Resistor (White-Black-Red)	7501	.25
⑮	Condenser	4989-B	.22
⑯	Resistor (Brown-Blue-Orange)	7500	.40
⑰	Compensating Condenser (Part of ③)		
⑱	I.F. Transformer	06100	1.25
⑲	Resistor (Mounted on I.F. Transformer)	6010	.25
⑳	Compensating Condenser (I.F. Secondary)	04000-D	.10
㉑	Compensating Condenser	04000	.16
㉒	Resistor (Brown-Black-Green)	4409	.25
㉓	Resistor (Brown-Black-Orange)	4412	.25
㉔	Condenser (Double)	7762-B	.20
㉕	Resistor (Red-Yellow-Yellow)	4410	.25
㉖	Resistor (Yellow-White-Yellow)	4517	.25
㉘	Condenser	7625-B	.12
㉙	Output Transformer	2660	1.25
㉚	Voice Coil and Cone Assembly	02861	.60
㉛	Speaker Field and Bucking Coil (with Pot)	02667	2.00
㉜	Pilot Light	6608	.14
㉝	"On-Off" Switch*	6416-W	.40
㉞	Power Transformer—50-60 Cycles	7421	2.75
	Power Transformer—25-40 Cycles	7422	4.00
	Power Transformer—50-60 Cycles, 250 Volts	7423	2.75
㊱	Condenser (Double)	3793-R	.25
㊲	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.

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PHILCO RADIO & TELEVISION CORP.

MODEL 14,91
(126-226)
Chassis
Speaker
Voltage

The Philco Radio of the 91 and 14 series is a nine-tube superheterodyne receiver combining standard broadcast, police and airplane reception and employs the high efficiency 6.3 volt filament tubes, automatic volume control, bass compensating tone control, shadow tuning, and push-pull pentode output. The chassis is made in two different types, one known as the 126 type, employing a single dynamic speaker, and the other known as the 226 type, employing twin dynamic speakers. These type numbers appear on the radio chassis as a part of the model number. Chassis of one type are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 91 and 14 series is 260 kilocycles. The power consumption of the various models is as follows: Single Speaker models, 90 watts; Twin Speaker models, 95 watts.

Table 1—Tube Socket Data*
Power Line Voltage 115 Volts

Circuit	R. F.	Det. Osc.	I. F.	Det. Rect.	Det. Amp.	Audio	Output	Output	Rect.
Type Tube	**44**	**36**	**44**	**37**	**37**	**37**	**42**	**42**	**80**
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts—F to K	200	250	250	0	60	100	240	240	310
Screen Grid Volts—SG to K	50	80	85	.	.	.	250	250	. . .
Control Grid Volts—CG to K	6	10	2	2	2	0	15	15	. . .
Cathode Volts—K to F	25	10	5	2	2	2	15	15	. .

* All of the above readings were taken from the underside of the chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance multi-range D. C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end. Readings taken with a radio set tester and plug in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminal	A.C. Volts	Circuit	Color
1- 2	105 to 125	Primary	White
3- 5	6.3	Filament	Black
6- 7	5.0	Filament 80	Blue
8-10	670	Plates of 80	Yellow
4	.	Center Tap of 3-5	Black—Yellow Tracer
9	.	Center tap of 8-10	Yellow—Green Tracer

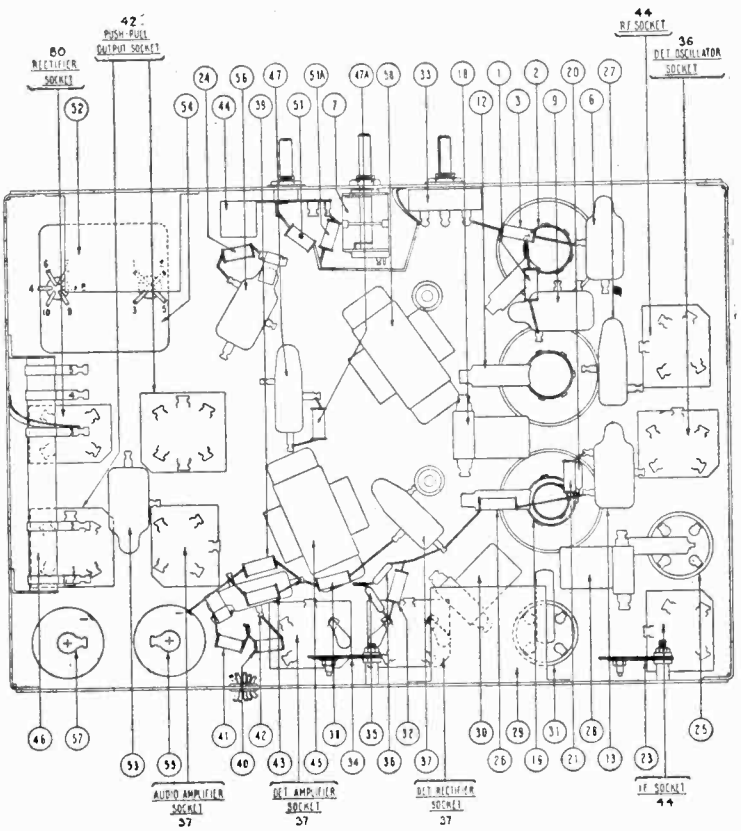

Fig. 1—Parts Diagram

Terminal Arrangement of Tube Sockets Viewed from Under Side of Chassis

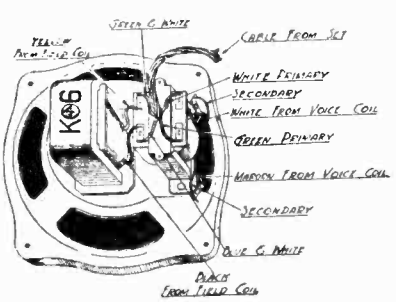

Fig. 2—Speaker Connections—126 Code

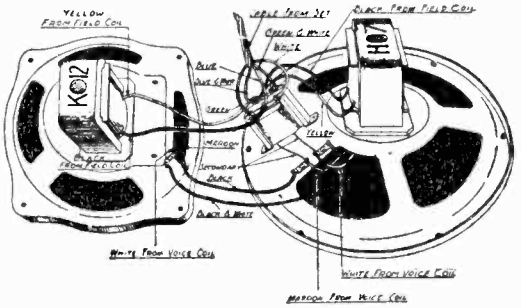

Fig. 3—Speaker Connections—226 Code

Model 91—

Key No. In Wiring Dia.	Resistance in Ohms Primary	Secondary
(2)	Inner 24 Outer 3.3	6.6
(12)	92.	5.8
(19)	Inner 4. Outer 5.2	3.7
(25)	67	67
(31)	55	55
(45)	2000	2400
(48)	700	
(50)	3275	. . .
(52)	3275	
(54) Single Speaker Models	3.1	.09 Fila. .11 80 Plate 176. 80 Plate
(54) Twin Speaker Models	2.77	.09 Fila. .11 80 Plate 128. 80 Plate
(58)	285	

In run number 1, the (15,000 ohm) resistor ㉑ part number 6208 was changed to new resistor (10,000 ohms) part number 4412. Condenser ⑥ part number 3615AM was changed to new condenser part number 3615AF. A terminal block part number 03103 was added. This terminal block was mounted on the condenser ㊻ part number 4989K or 4989T.

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MODEL 14,91
(126-226)
Schematic
Parts List

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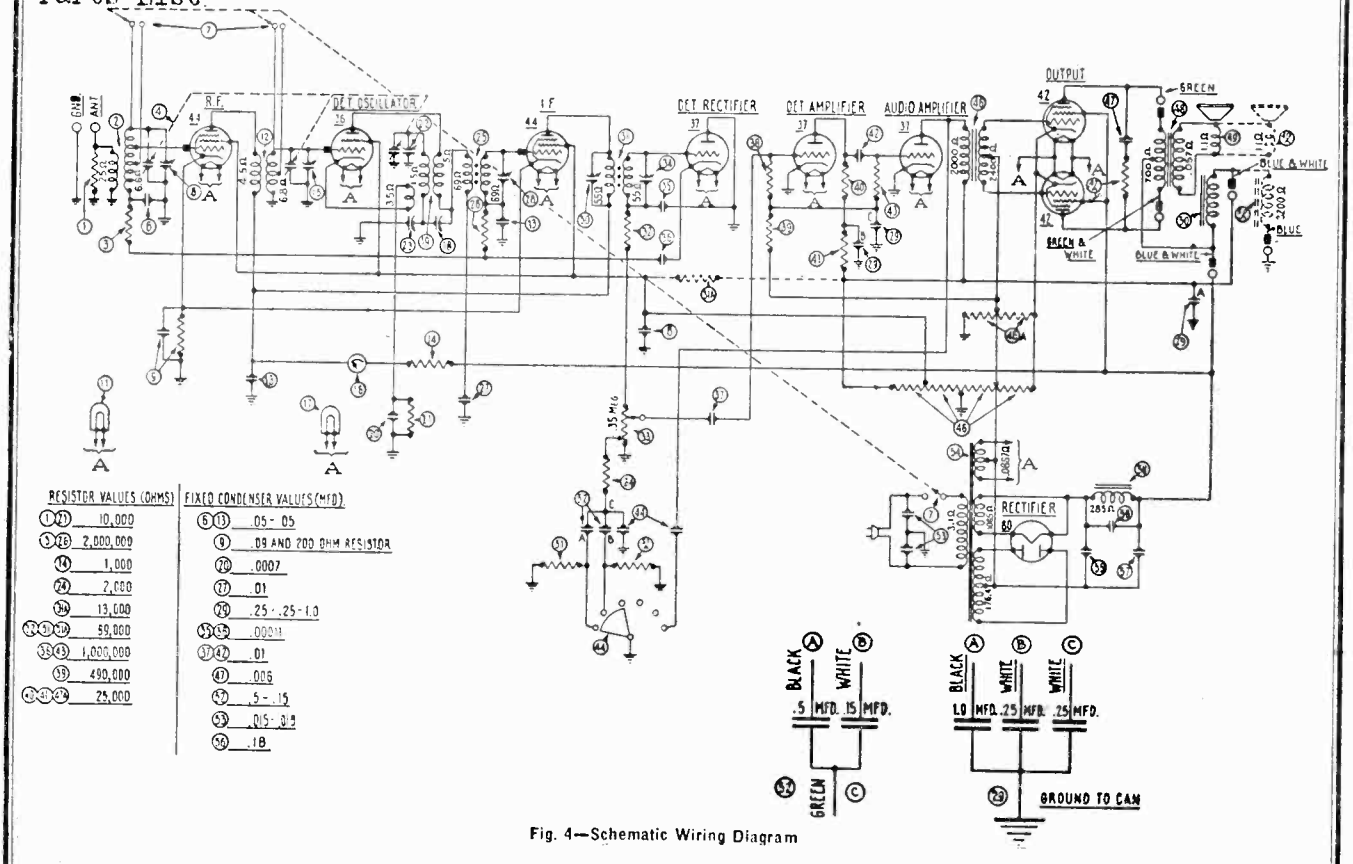

Fig. 4—Schematic Wiring Diagram

No. on Figs.	Description	Part No.	List Price
1	Resistor (Brown-Black-Orange)	4412	.20
2	R.F. Transformer	32-1069	.60
3	Resistor (Red-Black-Green)	5872	.20
4	Tuning Condenser Assembly	04790	4.25
5	Compensating Cond. (R.F.) Part of 4		
6	Condenser	3615-AM	.20
7	"On-Off" and Frequency Switch	42-1002	1.00
9	Condenser (and Resistor)	6287-C	.20
11	Pilot Lamp (Philco Scale)	6608	.14
12	Detector Transformer	32-1070	.40
13	Condenser	3615-AJ	.25
14	Resistor (Brown-Black-Red)	5837	.20
15	Compensating Cond. (Detector) Part of 4		
16	Tuning Meter	6497	2.25
17	Pilot Lamp (Tuning Meter)	6608	.14
18	Compensating Cond. (1st I.F. Primary)	04000-M	.16
19	Oscillator Coil	05985	.40
20	Condenser (White and Yellow)	4520	.20
21	Resistor (Brown-Black-Orange)	4412	.20
22	Comp. Cond. (High Freq.) Part of 4		
23	Compensating Condenser (Low Freq.)	04000-B	.18
24	Resistor (Red-Black-Red)	6984	.20
25	First I.F. Transformer	04319	.75
26	Resistor (Red-Black-Green)	5872	.20
27	Condenser	3903-AE	.14
28	Comp. Cond. (1st I.F. Secondary)	04000-M	.16
29	Filter Condenser Bank	04830	.75
30	Comp. Cond. (2d I.F. Primary)	04000-M	.16
31	Second I.F. Transformer	04320	.75
32	Resistor (White-White-Orange)	4411	.20
33	Volume Control	8054	1.25
34	Comp. Cond. (2nd I.F. Secondary)	04000-M	.16
35	Condenser (Blue and Golden Yellow)	4519	.18
36	Condenser (Blue and Golden Yellow)	4519	.18
37	Condenser	3903-P	.20
38	Resistor (Brown-Black-Green)	4409	.20
39	Resistor (Yellow-White-Yellow)	4517	.20
40	Resistor (Red-Green-Orange)	4516	.20
41	Resistor (Red-Green-Orange)	4516	.20
42	Condenser	3903-P	.20

No. on Figs.	Description	Part No.	List Price
43	Resistor (Brown-Black-Green)	4409	.20
44	Tone Control	0669S	.55
45	Push-Pull Input Transformer	6064	2.25
46	B.C. Resistor (Wire Wound)	6702	.40
46a	B.C. Resist. (Wire Wound) Twin Speaker	6808	.18
47	Condenser	7625-B	.12
47a	Resistor (Red-Green-Orange)	4516	.20
48	Push-Pull Output Trans. (Sing. Speaker)	2585	1.35
	Push-Pull Output Trans. (Twin Speaker)	2565	1.40
49	Voice Coil and Cone Assembly (K-6 and K-12)	02823	.45
49a	Voice Coil and Cone Assembly (H-7) Twin Speaker Model	02807	.65
50	Speaker Field Assembled with Pot (K-6 and K-12)	02803	2.25
50a	Speaker Field Assembled with Pot (H-7) Twin Speaker Model	02803	2.25
51	Resistor (White-White-Orange)	4411	.20
51a	Resistor (White-White-Orange)	4411	.20
52	Condenser Bank	06713	.45
53	Condenser (Double)	3793-E	.20
54	Power Trans. (50-60 cycles) Sing. Speak'r	6554	4.75
	Power Trans. (25-40 cycles) Sing. Speak'r	6555	7.25
	Power Trans. (50-60 cycles) Twin Speak'r	6804	5.50
	Power Trans. (25-40 cycles) Twin Speak'r	6805	7.50
55	Electrolytic Cond. (6 MFD) Sing. Sp'ker	4916	1.75
	Electrolytic Cond. (8 MFD) Twin Sp'ker	7464	1.25
56	Condenser	4989-T	.20
57	Electrolytic Cond. (6 MFD) Sing. Sp'ker	4916	1.75
	Electrolytic Cond. (8 MFD) Twin Sp'ker	7464	1.25
58	Filter Choke	4819	1.40
	Tube Shields	8005	.05
	Knob (Large)	03063	.08
	Knob (Medium)	03064	.06
	Knob (Small)	03437	.02
	Four Prong Socket	5026	.08
	Five Prong Socket	4956	.10
	Six Prong Socket	6417	.10
	Dial, Complete	04832	.40
	Bezel	6418	.20

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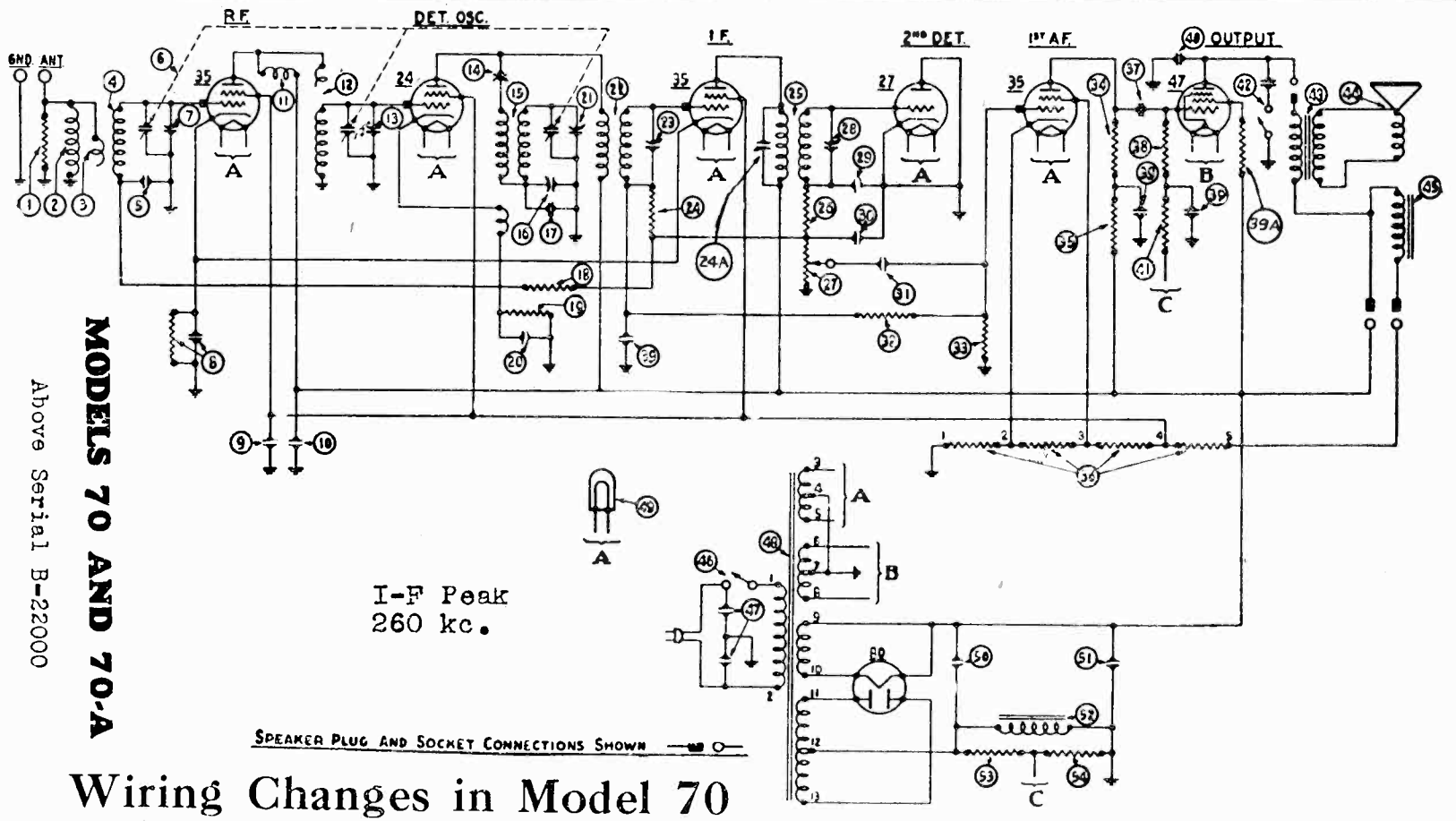

Wiring Changes in Model 70

(Above Serial No. B-22,000)

The filter condenser ㊴ Fig. 1 and 2, Service Bulletin No. 57B, part No. 04194 has been changed to part No. 04559. The 1.5 Mfd. section of 04194, connected in the plate filter circuit of the first A.F. tube, is changed to .75 Mfd.; the .05 Mfd. section, connected between resistor ㉜ and ground, is removed from the 04194 block, and is connected externally as an .05 Mfd. condenser, part 3615L. The new condenser part 04559 still contains the .25 Mfd. section which is wired in the same manner as in 04194. The 25,000 ohm resistor ㉟, part 4516, is changed to 51,000 ohms, part 4518.

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MODEL 70,70-A
Above B-22,000
Voltage- Values

PHILCO RADIO & TELEVISION CORP.

Model 70 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 70A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with A.C. Set Tester—AC Line—115 volts

Tube		Filament Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
35	R. F.	2.25	250	5	70	6	4.3
24	OSC & 1st Det.	2.25	250	8	12	8	.5
35	I. F.	2.25	250	20	70	0	1.7
27	Rectifier Detector	2.25	...	0	0	0	0
35	Audio Amplifier	2.25	50	0	. 60	0	1.0
47	Output	2.25	240*	4*	255*	.	28*
80	Rectifier	4.70	260/plate	..	....	.	...

*These readings must be taken from the underside of the chassis, using test prods and leads unless the set checker is specially equipped for testing pentode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	Circuit	Color
1–2	105 to 125	Primary	White
3–5	2.5	Filament of 24 and 35's	Black
6–8	2.5	Filament of 47	Dark Green
9–10	5.	Filament of 80	Blue
11–13	700	Plates of 80	Yellow
4		Center Tap of 3–5	Black, Yellow Tracer
7		Center Tap of 6–8	Black, Green Tracer
12		Center Tap of 11–13	Yellow, Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity (mfd.)	Container
(29) (30)	.00011	Blue and Yellow
(17)	.00041	Yellow and Orange
(20)	.0007	White and Yellow
(5)	.003	Orange and White
(31) (37) (40)	.01	Black Bakelite
(47)	.015 (Double)	Black Bakelite
(5) (10)	.05	Black Bakelite
(39)	.05, .25, 1.5	Metal
(8)	.09 & 200 Ohms	Black Bakelite
(9)	.5	Metal
(80) (81) (50-60 cycles)	6	Electrolytic
(51) (25-40 cycles)	10	Electrolytic
(50) (25-40 cycles)	14	Electrolytic

Table 4—Resistor Data

Nos. on Figs. 1 and 2	Power (watts)	Resistance (ohms)	Color		
			Body	Tip	Dot
(36)	Terminals 1–2	26	Long Tubular		
	Terminals 2–3	850			
	Terminals 3–4	1650			
	Terminals 4–5	1060			
(2)	.5	1,000	Brown	Black	Red
(39)A	.5	2,900	Red	White	Red
(1) (19)	.5	10,000	Brown	Black	Orange
(38)	.5	25,000	Red	Green	Orange
(33)	.5	51,000	Green	Brown	Orange
(34)	.5	70,000	Violet	Black	Orange
(28)	.5	99,000	White	White	Orange
(41)	.5	330,000	Red	Yellow	Yellow
(38) (84)	.5	490,000	Yellow	White	Yellow
(23)	.5	1,000,000	Brown	Black	Green
(18) (24)	.5	2,000,000	Red	Black	Green
(32)	.5	4,000,000	Yellow	Black	Green

Models 70 and 70-A Receivers

(Above Serial No. B-22,000)

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PHILCO RADIO & TELEVISION CORP.

MODEL 89,19
Schematic
Alignment
Changes

Models 89 and 19

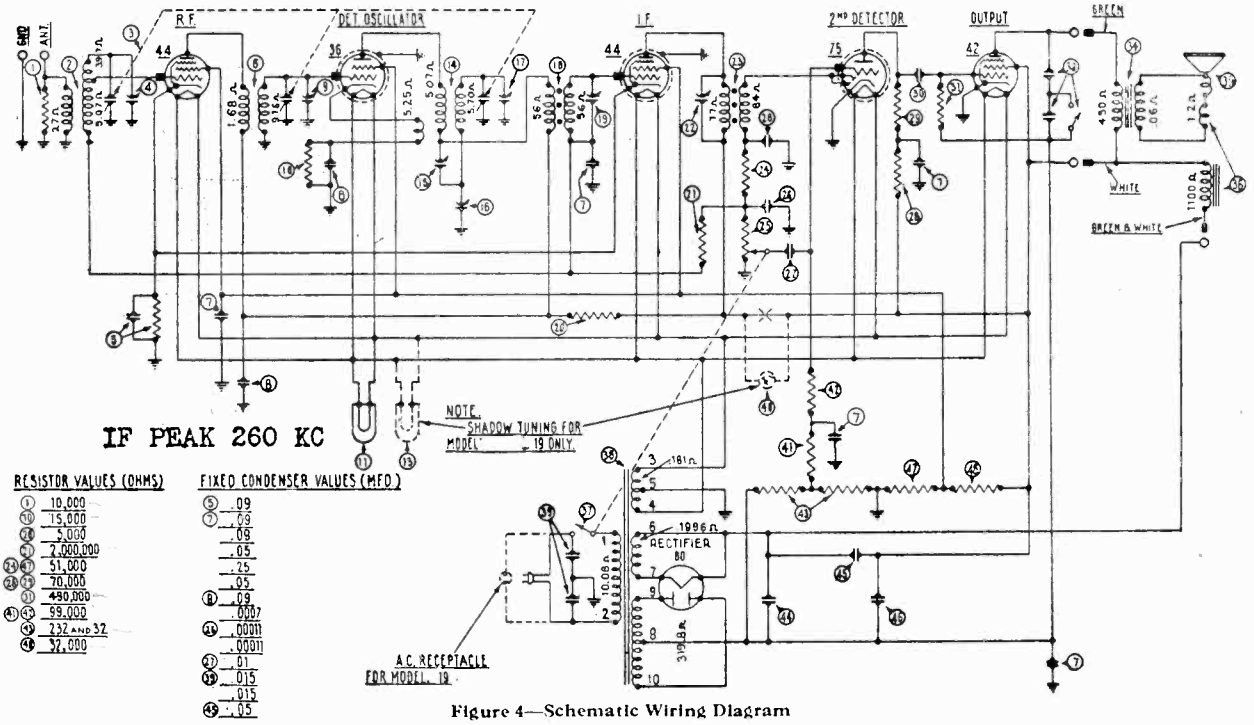

Figure 4—Schematic Wiring Diagram

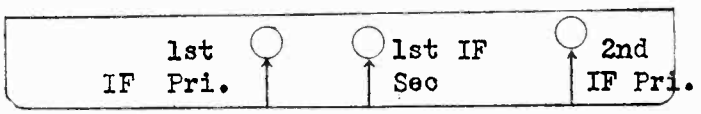

Fig. 3—Back of Model 89 and 19 Chassis, showing location of Compensating Condensers

In run number 5; the antenna coil ② part number 06619 was changed to new coil part number 32-1062. The interstage coil ⑥ part number 06662 was changed to new coil part number 32-1063. The volume control and A. C. switch ㉖ part number 33-5004 was changed to new Volume Control (only) part number 33-5007. A combined "On-Off" and frequency change switch was added, part number 42-1002. The above changes permits the police and airplane broadcast reception.

In run number 2, Model 19-121; run number 3, Model 19-122; a (2900 ohms) resistor, part number 5309 was added. This resistor was connected between ⑧ condenser, lug No. 3 to lug No. 5 on the condenser mounted between ② antenna transformer and the R. F. socket.

The following changes were made in 19-122 to make 19-123 under run No. 1:

The sub base part number 8136 was changed to new sub base part number 29-1051. The tuning condenser assembly part number 06702 was changed to new condenser assembly part number 31-1004. The dial scale 8111 was changed to new dial scale 7882. The A. C. Socket part number 5962 was removed. The bottom shield part number 8057 was removed. The two side brackets part numbers 8133 and 8134 were removed. Four new mounting feet part number 4222 were added. The two electrolytic condensers part number 8095 were changed to part numbers 8165 and 8166.

Below run number 4 on 89-121; run number 1 on 19-121; run number 2 on 19-122, the wiring on the compensating condenser ⑮ was reversed and the fibre nut, part number 7505 was changed to part number 3151 (brass nut); part number W-775 hole cover was added.

Notes for 25 cycle Model 89-A

Use ㊳ power transformer part number 8047. Change ㊹ electrolytic condenser (6 mfd.) part number 8165 to new condenser (8 mfd.) part number 7558. Change ㊻ electrolytic condenser (6 mfd.) part number 8166 to new condenser (8 mfd.) part number 7558.

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PHILCO RADIO & TELEVISION CORP.

MODEL 89,19
Chassis
Socket
Voltage

Models 89 and 19

The Philco Radio of the 89 and 19 Series is a 6 tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control and pentode output. The intermediate frequency used in adjusting the superheterodyne circuit is 260 kilocycles. The power consumption of the models 89 and 19 is 60 watts.

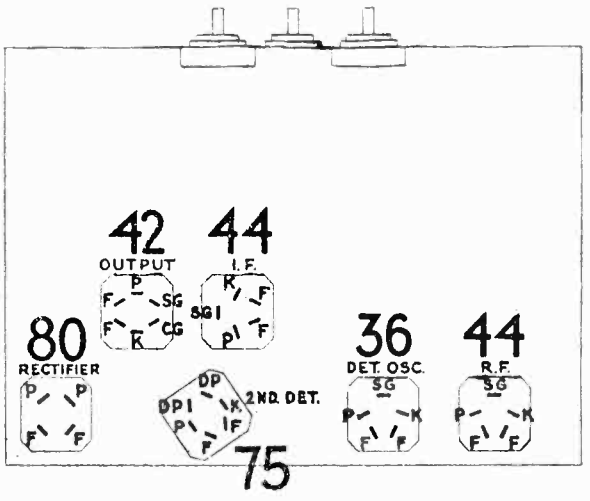
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Circuit	RF	Det. Osc.	IF	2nd Det.	Output	Rectifier
Type Tube	44	36	44	75	42	80
Filament Volts—F to F.	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts—P to K	235	230	240	175	235	350/Plate
Screen Grid Volts—SG to K	90	90	90	.....	245	.....
Control Grid Volts—CG to K	.3	7.5	.3	.3	.15	.....
Cathode Volts—K to F	3.5	7.8	3.5	.....	14	.....
Diode Plate Volts—K to DP	.....	.....	.....	2	.....	.....

*All of the readings above in Table 1 were taken from the under side of chassis, using test prods and leads with a suitable A. C. voltmeter for filament voltages and a high resistance, multi-range D. C. voltmeter for all other readings. Volume control at maximum and switch and station selector set for 550 KC. Readings taken with a radio set tester and plug-in adapter will not be satisfactory.

Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1–2	105–125	Primary	White
3–4	6.3	Filaments	Black
6–7	5.0	Filament of 80	Blue
9–10	670	Plates of 80	Yellow
5	....	Center Tap of 3–4	Black-Yellow Tracer
8	....	Center Tap of 9–10	Yellow-Green Tracer



F Filament SG Screen Grid K Cathode
P Plate CG Control Grid DP Diode Plate

Figure 1—Tube Socket, Under Side of Chassis

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

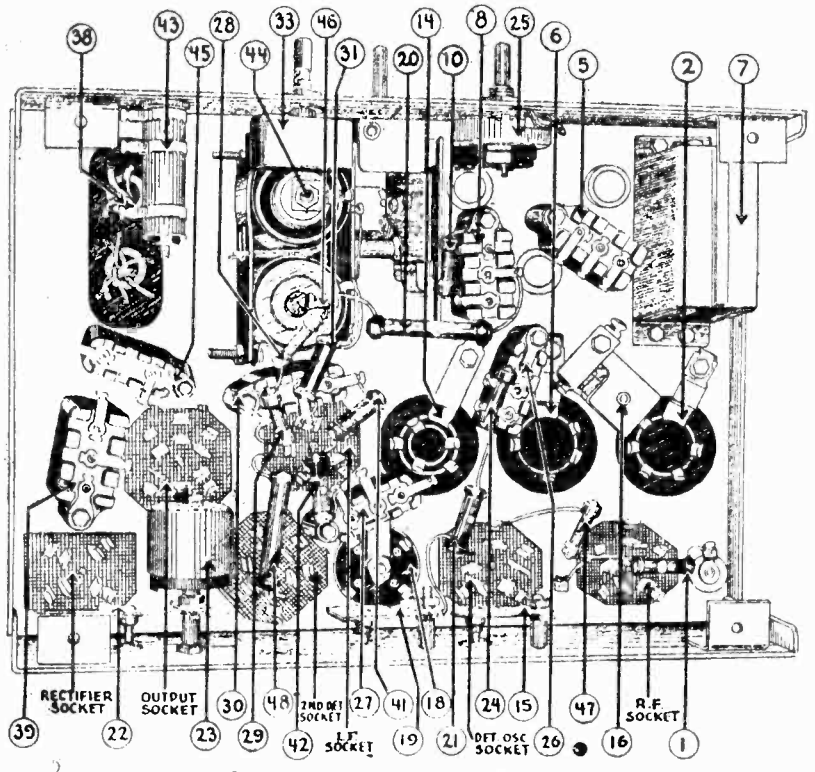


Figure 2—Bottom View of Chassis, Showing Parts

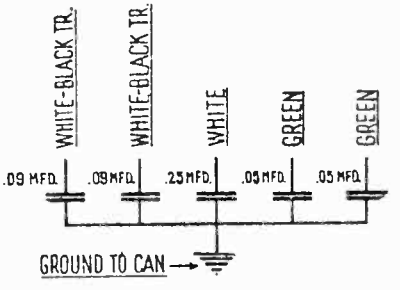


Figure 3—Internal Connections Filter Condenser.

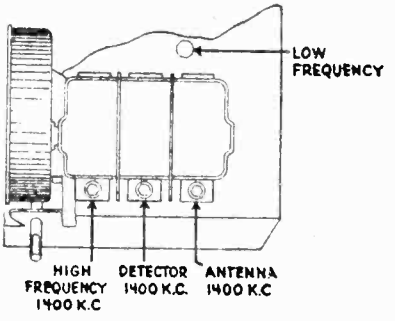


Fig. 4—Top View of Chassis showing Tuning Condensers, Models 89 and 19, also additional Compensating Condensers

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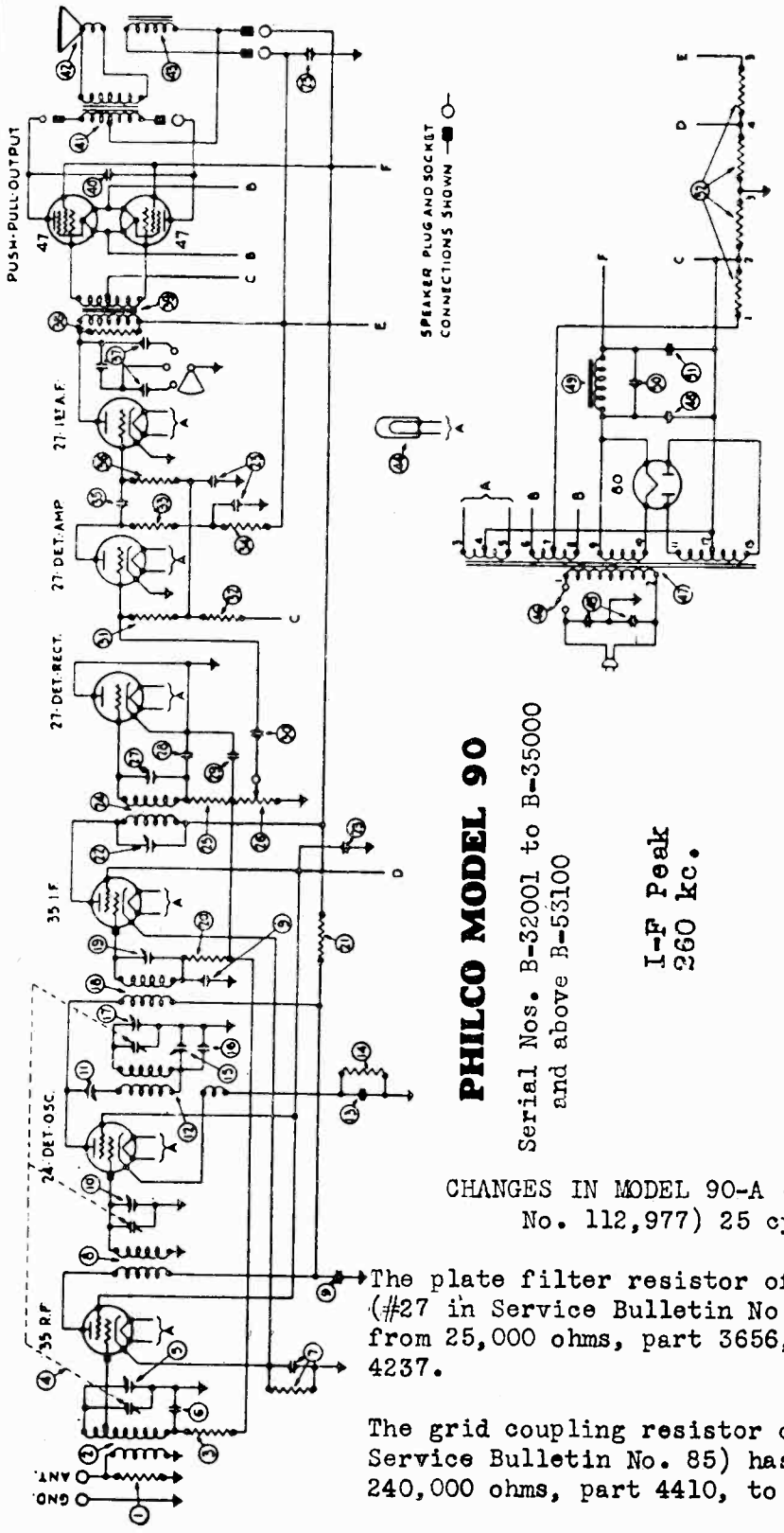
PHILCO RADIO & TELEVISION CORP.

MODEL 90,90-A
(With 2-'47s)
Schematic
Changes



New Speaker in Model 90

Attention is called to the fact that the speakers for the new Model 90 (serial nos. B-32001 to B-35,000 and above B-53,100) are not interchangeable with the speakers for the earlier Model 90 with the single pentode output tube. This is due to the fact that the output transformers are different. Part 2635 output transformer is required for the models with push pull pentode output tubes and part 2673 is required for the models with the single pentode output.

PHILCO MODEL 90

Serial Nos. B-32001 to B-35000
and above B-53100

I-F Peak
260 kc.

CHANGES IN MODEL 90-A (above serial No. 112,977) 25 cycle

The plate filter resistor of the last 27 tube (#27 in Service Bulletin No. 85) has been changed from 25,000 ohms, part 3656, to 51,000 ohms, part 4237.

The grid coupling resistor of the 47 tube (#29, in Service Bulletin No. 85) has been changed from 240,000 ohms, part 4410, to 99,000 ohms, part 4411.

The grid filter resistor for the last 27 and the 47 tubes (#51, in Service Bulletin No. 85) has been changed from 240,000 ohms, part 3768, to 490,000 ohms, part 3769.

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MODEL 90,90-A
(With 2-'47s)
Voltage - Data

PHILCO RADIO & TELEVISION CORP.

Model 90 receivers are for operation on 100 to 130 volt, 50-60 cycle AC lines. This receiver is a nine tube superheterodyne with push-pull pentode output. Automatic volume control, 4 point tone control, super control screen grid tubes and combination first detector and oscillator tube are some of the additional features. The maximum power consumption is 100 watts.

Table 1—Tube Socket Readings Taken with A.C. Set Tester—A.C. Line 115 Volts

Tube		Filament Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Plate Milli-Amperes
Type	Circuit						
35	R.F.	2.5	225	0	38	6	4.2
24	Det.-Osc.	2.5	215	12	40	22	.5
35	I.F.	2.5	235	10	38	10	1.0
27	Det. Rectifier	2.5	...	...	...	10	...
27	Det. Amplifier	2.5	50	0	...	1.	1.0
27	1st Audio	2.5	90	0	...	1	5.0
47	Output	2.5	210	10	225	...	31.
47	Output	2.5	210	10	225	...	31.
80	Rectifier	5.0	225/plate	...	...	...	...

Above readings taken with volume control at maximum and dial turned to low frequnecy end.

Table 2—Power Transformer Voltages

Terminals Figs. 1 and 2	A.C. Volts	Circuit	Color
1-2	115	Primary	White
4	...	Center Tap Heater	Black, Yellow Tracer
3-5	2.5	Heater	Black
6-8	2.5	Filament 47's	Dark Green
7	...	Center Tap Filament 47's	Black, Green Tracer
9-10	5.0	Filament 80	Light Blue
11-13	665	Plates 80	Yellow
12	...	Center Tap Plates 80	Yellow, Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity (Mfd.)	Container
(28) (29)	.00011	Blue and Golden Yellow
(16)	.00041	Yellow and Orange
(13)	.0007	White and Golden Yellow
(40)	.001	Green and White
(30) (35)	.01	Black Bakelite
(45)	.015	Black Bakelite
(6)	.05	Black Bakelite
(9)	.09	Black Bakelite
(7)	.09 & 200 Ohms	Black Bakelite
(50)	.15	Black Bakelite
(28)	2-.25, 2-.5	Metal
(46)	6.	Electrolytic
(51)	6.	Electrolytic

Table 4—Resistor Data

Nos. on Figs. 1 and 2	Power (Watts)	Resistance (Ohms)	Color		
			Body	Tip	Dot
	(Terminals)				
	1-2	205			
	2-3	95			
(52)	3-4	2,400	Long	Tubular	
	4-5	1,200			
(21)	1.	1,000	Brown	Black	Red
(1)	.5	10,000	Brown	Black	Orange
(14)	.5	15,000	Brown	Green	Orange
(33) (34)	.5	25,000	Red	Green	Orange
(38)	.5	51,000	Green	Brown	Orange
(25)	.5	99,000	White	White	Orange
(32)	.5	490,000	Yellow	White	Yellow
(3) (20) (31) (36)	.5	1,000,000	Brown	Black	Green

Model 90

(Serial Nos. B-32,001 to B-35,000 and Above B-53,100)

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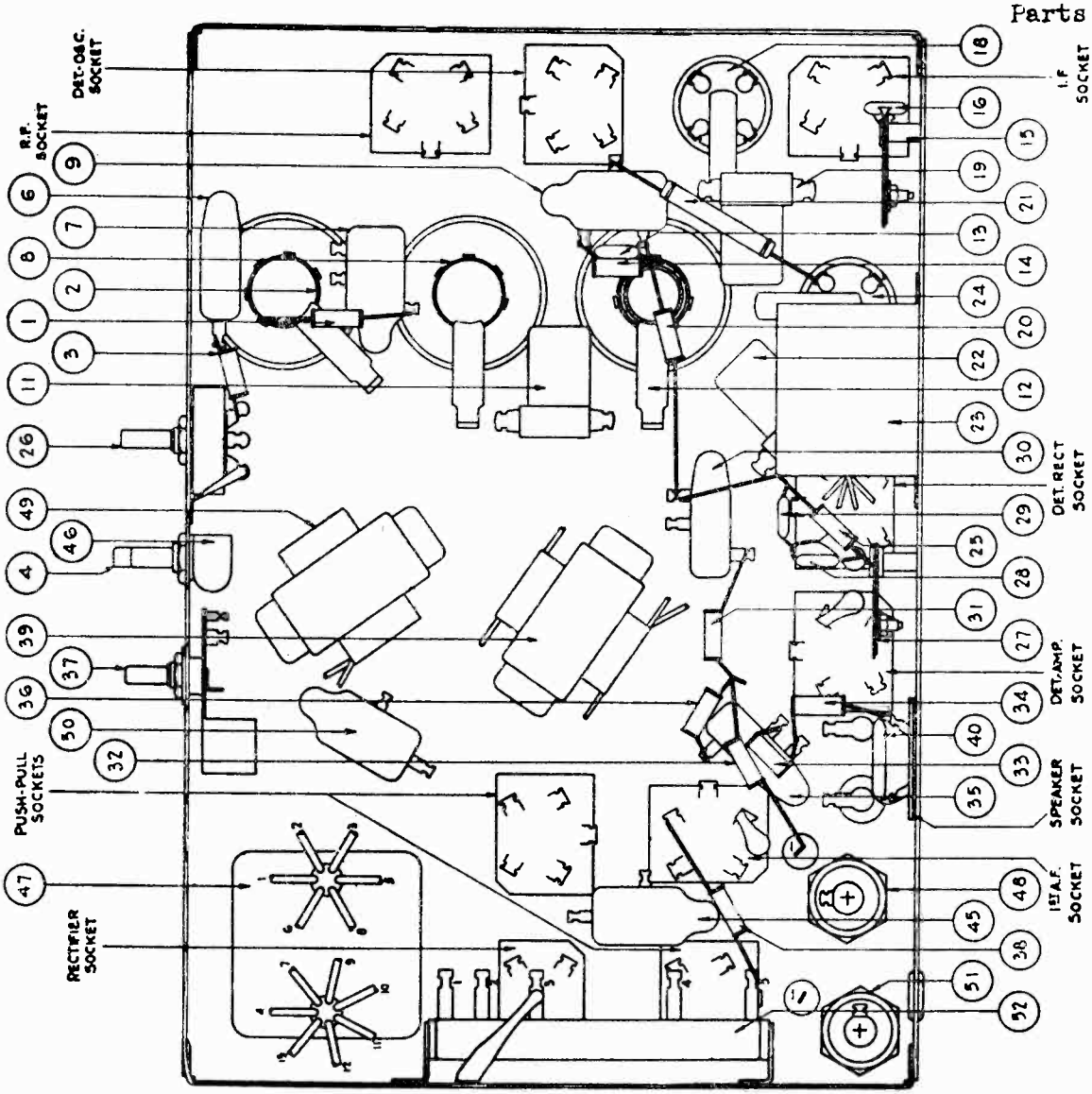
PHILCO RADIO & TELEVISION CORP.

MODEL 90,90-A
(With 2-'47s)
Chassis
Parts List



PHILCO MODEL 90

Serial Nos. B-32001 to B-35000
and above B-53100

No. on Figs. 1 and 2	Description	Part No.
1	Resistor (10,000 Ohms)	4412
2	Antenna Transformer	04317
3	Resistor (1,000,000 Ohms)	4409
4	Tuning Condenser (50-60 cycles)	04309
	Tuning Condenser (25-40 cycles)	04310
5	Compensating Condenser — Antenna — Part of Tuning Condenser Assembly	
6	Condenser (.05 Mfd.)	3615-L
7	Condenser (.09 Mfd. and 200 Ohm Resistor)	4989-L
8	Detector Transformer	04408
9	Condenser (.09 Mfd.)	3615-AJ
10	Compensating Condenser — Detector — Part of Tuning Condenser Assembly	
11	Compensating Condenser—Coupling	04000-M
12	Oscillator Coil	04409
13	Condenser (700 Mmf.)	4520
14	Resistor (15,000 Ohms)	6208
15	Compensating Condenser—Low Frequency	04000-B
16	Condenser (410 Mfd.)	5120
17	Compensating Condenser — High Frequency—Part of Tuning Condenser Assembly	
18	First I.F. Transformer	04319
19	Compensating Condenser—First I.F.	04000-M
20	Resistor (1,000,000 Ohms)	4409
21	Resistor (1,000 Ohms)	4590
22	Compensating Condenser—Second I.F. Primary	04000-M
23	Condenser (2-.25, 2-.5 Mfd.)	04407
24	Second I.F. Transformer	04320
25	Resistor (99,000 Ohms)	4411
26	Volume Control	6015
27	Compensating Condenser (Second I.F. Secondary)	04000-M
28	Condenser (110 Mmf.)	4519
29	Condenser (110 Mmf.)	4519
30	Condenser (.01 Mfd.)	3903-N
31	Resistor (1,000,000 Ohms)	4517
32	Resistor (490,000 Ohms)	4516
33	Resistor (25,000 Ohms)	4409
34	Resistor (25,000 Ohms)	4409
35	Condenser (.01 Mfd.)	3903-X
36	Resistor (1,000,000 Ohms)	4409
37	Tone Control	03137
38	Resistor (51,000 Ohms)	4518
39	Push-Pull Input Transformer	6064

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Shadow Tuning Adjustment

PHILCO RADIO & TELEVISION CORP.

Adjustment of Shadow Tuning

Philco shadow tuning is one of the greatest aides to correct tuning ever developed so it is important that this device be properly adjusted on each set before being placed in operation. There are no adjustments inside the shadow box, but there are a few simple adjustments of the position of the box and the position of the pilot lamp.

INSTALLATION

The shadow tuning box is purposely moved back away from the bezel during shipment so as to avoid breakage. When the set is placed in operation, and after the chassis mounting bolts have been loosened, the two mounting screws at each side of the shadow box should be loosened by means of a short screwdriver, and the box moved forward to the bezel. The position of the box can be adjusted so that the shadow is centered with respect to the bezel opening.

POSITION ADJUSTMENTS

In some cases, it may be found that the position or the intensity of the shadow on the screen is not entirely satisfactory because of slight changes during shipment. The necessary re-adjustments can be made in the manner outlined below, first turning on the radio and removing the type 80 tube.

1. **Shadow too faint.** Move and focus lamp by bending the bracket slightly to obtain a sharp shadow of the smallest possible width exactly in the center of the screen.

2. **Shadow not centered on screen.** Move and focus lamp as described above.

3. **Shadow not sharp on one side.** Pry off the lamp reflector and adjust the lamp position by turning lamp and socket in a clockwise direction until the filament supports are parallel to the back of the shadow tuning box. Ordinary pilot lamps with inverted U shaped filament will not be satisfactory since they do not produce a concentrated light and a sharply defined shadow. The new Philco pilot lamps have a relatively straight filament which gives better light concentration. It may be necessary to make a further adjustment by bending the bracket as described in 1. above.

4. **No light on screen.** Adjust reflector on pilot lamp.

5. **White light between screen and bezel opening.** Loosen shadow tuning box mounting screws, and move box forward against back of bezel. Center shadow properly with respect to bezel opening.

Replace the 80 tube after completing the above adjustments.

RADIO ADJUSTMENTS

After the above adjustments have been made, the shadow tuning box may be checked for operation by tuning in a number of stations. The following suggestions are offered in case of difficulties:

1. **No change in shadow width when tuning in weak signal.** Change first detector and first I. F. tubes in Model 15 and R. F. and I. F. tubes in Models 91 and 23.

2. **Insufficient change in shadow width on all stations.** Look for faulty aerial connection or too small aerial.

3. **Shadow remains at minimum width while dial is turned several divisions.** Compensating condensers out of adjustment, causing set to be broad in tuning; station signal extremely broad

DO NOT ATTEMPT TO MAKE ANY ADJUSTMENTS INSIDE THE SHADOW BOX.

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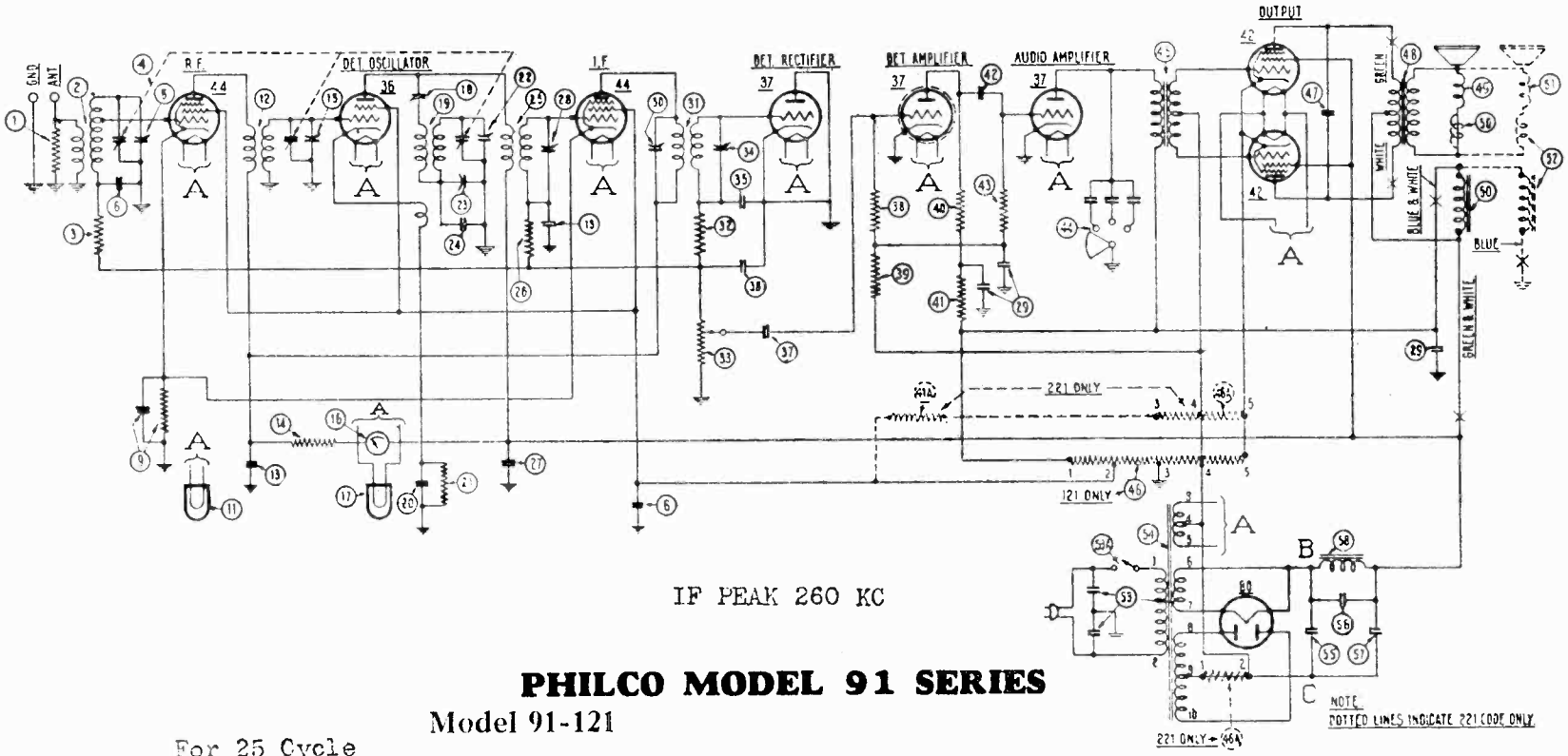

IF PEAK 260 KC

PHILCO MODEL 91 SERIES

Model 91-121

For 25 Cycle

use (51) power transformer 6555. Change (55) electrolytic condenser (6 Mfd.) 4916 to 10 Mfd., 5142. Change (57) electrolytic condenser 4916 to 14 Mfd. 5725. Change (56) condenser (.18 Mfd.) 4989K to .5 Mfd., 05150. Change (40) resistor (25,000 ohms) 4516 to 51,000 Ohms, 4518. The physical positions of (55) and (57) are interchanged, although their electrical connections remain the same.

Model 91-221

For 25 Cycle

use (54) power transformer 6805. Change (47)A B. C. Resistor 6807 to 6808. Change (55) electrolytic condenser (8 Mfd.) 6707 to 10 Mfd. 5142. Change (57) electrolytic condenser (8 Mfd.) 6706 to 14 Mfd. 5725. Change (40) resistor (25,000 ohms) 4516 to 51,000 ohms, part 4518. Change (56) condenser (.18 Mfd.) 4989K to .5 Mfd. and .75 Mfd. 05213. The .5 Mfd. section takes the place of 4989K and the .75 section (white wire) is connected to the blue and white lead of the speaker cord. The physical positions of (55) and (57) are interchanged, although their electrical connections remain the same.

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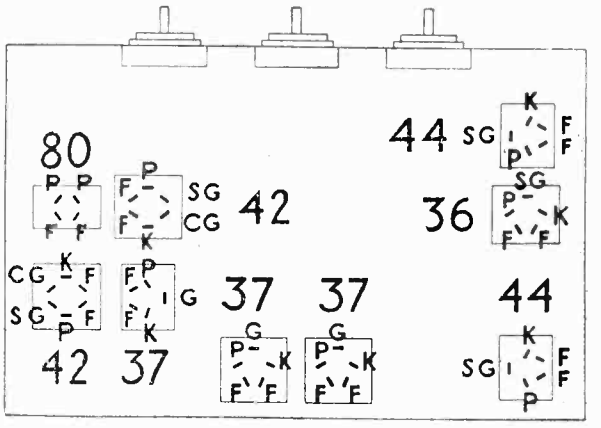
MODEL 91
(121-221)
Socket-Data

PHILCO RADIO & TELEVISION CORP.

The Philco Radio of the 91 series is a nine tube superheterodyne, employing the high efficiency 6.3 volt filament tubes, automatic volume control, shadow tuning, and push-pull pentode output. The chassis is made in two different types, one known as the 121 type, employing a single dynamic speaker and the other known as the 221 type, employing twin dynamic speakers. These type numbers appear on the radio chassis as a part of the model number. Chassis of one type are not interchangeable with those of another. The intermediate frequency used in adjusting the superheterodyne circuit of the 91 series is 260 kilocycles. The power consumption of the various models is as follows:

Model	Volts	Cycles	Watts
91-121	115	50-60	90
91-221	115	50-60	95
91A-121	115	25-40	92
91A-221	115	25-40	97
91E-121	230	50-60	90
91E-221	230	50-60	95



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

Fig. 1—Tube Sockets

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

Tube Type	Tube Circuit	Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts
44	R.F.	6.3	200	50	.6	25
36	Det.—Osc.	6.3	250	80	10	10
44	I.F.	6.3	250	85	.2	5
37	Det.—Rect.	6.3	0	...	.2	2
37	Det.—Ampl.	6.3	60	...	.2	2
37	Audio	6.3	100	...	0	2
42	Output	6.3	240	250	15	15
42	Output	6.3	240	250	15	15
80	Rectifier	5.0	310/Plate	...	...	..

*All of the above readings were taken from the under side of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages and a multi-range D.C. voltmeter for all other readings. Volume control at maximum and station selector turned to low frequency end.

Table 2—Power Transformer Data

Terminals	A.C. Volts	Circuit	Color
1-2	105 to 125	Primary	White
3-5	6.3	Filament	Black
6-7	5.0	Filament 80	Blue
8-10	670	Plates of 80	Yellow
4	...	Center Tap of 3-5	Black Yellow Tracer
9	...	Center Tap of 8-10	Yellow Green Tracer

Table 3—Resistor Data

Nos. on Figs. 4 & 5	Resistance (ohms)	Power (Watts)	Terminals	Color Body	Color Tip	Color Dot
(46) Single Speaker	900	..	1-2	LONG	TUBULAR	
	2700	..	2-3			
	95	..	3-4			
	205	..	4-5			
(46)a Twin Speaker	136	..	1-2	LONG	TUBULAR	
	Blank	..	2-3			
	85	..	3-4			
	205	..	4-5			
(14)	1,000	.5	....	Brown	Black	Red
(1)	10,000	.5	....	Brown	Black	Orange
(21)	15,000	.5	....	Brown	Green	Orange
(40) (41)	25,000	.5	....	Red	Green	Orange
(41)a	13,000	1.	....	Brown	Orange	Orange
(22)	99,000	.5	....	White	White	Orange
(39)	490,000	.5	....	Yellow	White	Yellow
(43) (3) (38)	1,000,000	.5	....	Brown	Black	Green
(26)	1,000,000	1.	....	Brown	Black	Green*

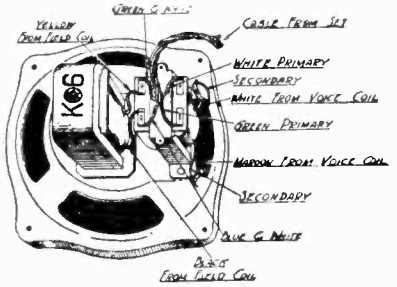


Fig. 2—Speaker Connections—121 Code

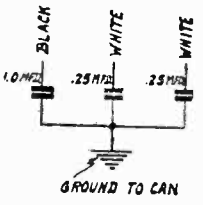


Fig. 3—Internal Connections Filter Condenser

Model 91 Series

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PHILCO RADIO & TELEVISION CORP.

MODEL 91
(121-221)
Chassis
Speaker

PHILCO MODEL 91 SERIES

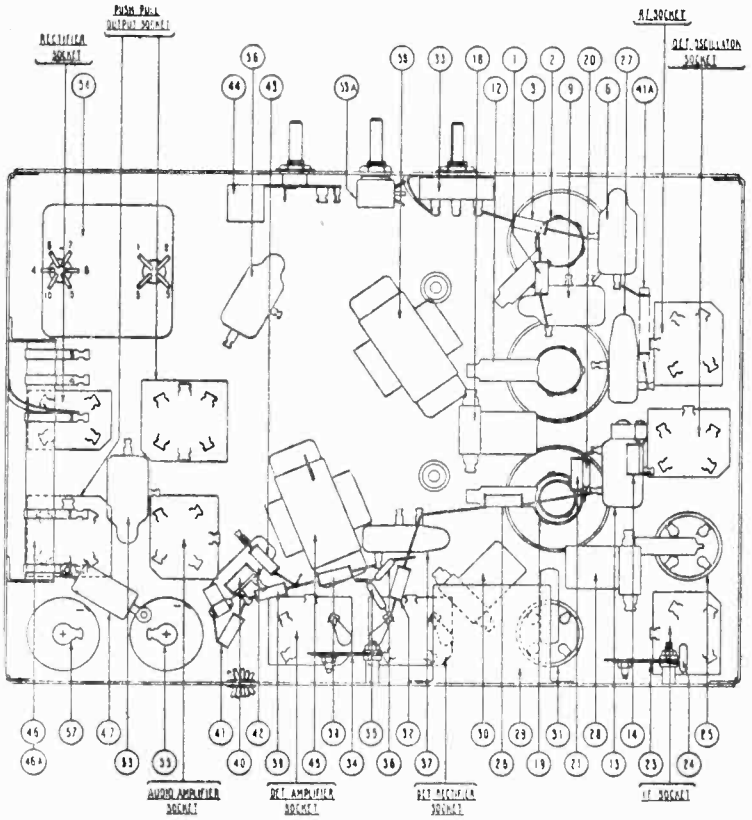

Fig. 5—Parts Diagram

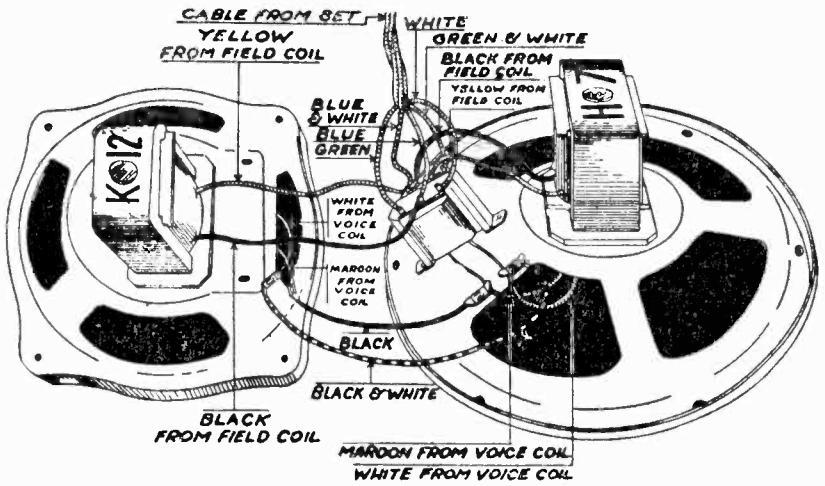

Fig. 6—Speaker Connections—221 Code

Model 91 chassis with pickup and turntable is chassis 23-X shown on page 466-2-8

ADJUSTMENT OF MODEL 91 SERIES

These receivers are accurately adjusted at the factory prior to shipment. Under normal conditions it will never be necessary to re-adjust the compensating condensers. If for any reason such adjustment should be required, it should not be attempted without first receiving the proper instruction and equipment from your distributor. The Philco Model 095 Oscillator has been especially designed for this work, and will be found the most inexpensive and most reliable for the purpose.

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MODEL 91
(121-221)
Parts List

PHILCO RADIO & TELEVISION CORP.

REPLACEMENT PARTS FOR MODEL 91 SERIES

①	Resistor (10,000 ohms)	4412
②	R. F. Transformer	04317
③	Resistor (1,000,000 ohms)	4409
④	Tuning Condenser (50-60 cycles)	04790
	Tuning Condenser (25-40 cycles)	04791
⑤	Compensating Condenser—R. F.—part of tuning condenser assembly	
⑥	Condenser (.05 Mfd. Double)	3615-AM
⑨	Condenser (.15 Mfd. and 200 ohm resistor)	6287-C
⑪	Pilot Lamp—Dial	6608
⑫	Detector Transformer	04409
⑬	Condenser (.05 Mfd. Double)	3615-AJ
⑭	Resistor (1,000 ohms)	5837
⑮	Compensating Condenser—Detector—Part of tuning condenser assembly	
⑯	Tuning meter	6477
⑰	Pilot Lamp—Tuning meter	6608
⑱	Compensating condenser—First I. F. Primary	04000-M
⑲	Oscillator Coil	04408
⑳	Condenser (700 Mmf.) (White and Yellow)	4520
㉑	Resistor (15,000 ohms)	6208
㉒	Compensating Condenser—High — Frequency — part of tuning Condenser Assembly	
㉓	Compensating Condenser—Low Frequency	04496
㉔	Condenser (410 Mmf.) (Yellow and Orange) Assembled with L. F. Condenser	04496
㉕	First I. F. Transformer	04319
㉖	Resistor (1,000,000 ohms)	4414
㉗	Condenser (.01 Mfd.) Single Speaker	3903-AF
	Condenser (.01 Mfd.) Twin Speaker	3903-AE
㉘	Compensating condenser—First I. F. secondary	04000-M
㉙	Filter condenser (2-.25, 1.0 Mfd.)	04830
㉚	Compensating Condenser—Second I. F. Primary	04000-M
㉛	Second I. F. Transformer	04320
㉜	Resistor (99,000 ohms)	4411
㉝	Volume Control	6499
㉞	Compensating Condenser—Second I. F. Secondary	04000-M
㉟	Condenser (110 Mmf.) (Blue and Golden Yellow)	4519
㊱	Condenser (110 Mmf.) (Blue and Golden Yellow)	4519
㊲	Condenser (.01 Mfd.)	3903-R
㊳	Resistor (1,000,000 ohms)	4409
㊴	Resistor (490,000 ohms)	4517
㊵	Resistor (25,000 ohms)	4516
㊶	Resistor (25,000 ohms)	4516
㊶a	Resistor (13,000 ohms)	3766
㊷	Condenser (.01 Mfd.)	3903-R
㊸	Resistor (1,000,000 ohms)	4409
㊹	Tone Control	04787
㊺	Push-pull Input Transformer	6064
㊻	B. C. Resistor—Single Speaker	6071
㊻a	B. C. Resistor—Twin Speaker	6807
㊼	Condenser (.001 Mfd.)	6773
㊽	Push-pull output transformer—single speaker Models	2585
	Push-pull output transformer—Twin speaker Models	2565
㊾	Voice coil and cone assembly (K-6 and K-12)	02823
㊿	Speaker Field Assembled with pot (K-6) single speaker Models	02803
	Speaker Field Assembled with pot (H-7) Twin speaker Models	02770
(61)	Voice Coil and Cone Assembly —(H-7) Twin speaker Models	02807
(62)	Speaker Field assembled with pot (K-12) Twin speaker Models	02803
(63)	Condenser (.015 Mfd. Double)	3793-E
(63)a	On-off Switch	6498
(64)	Power Transformer (50 - 60 cycles) single speaker	6554
	Power Transformer (25 - 40 cycles) single speaker	6555
	Power Transformer (50 - 60 cycles — 230 volts) single speaker	6556
	Power Transformer (50 - 60 cycles) Twin speaker	6557
	Power Transformer (25 - 40 cycles) Twin speaker	6558
	Power Transformer (50 - 60 cycles — 230 volts) Twin speaker	6559
(65)	Electrolytic Condenser (6 Mfd.) single speaker	4916
	Electrolytic Condenser (8 Mfd.) Twin speaker	6707
(66)	Condenser (.18 Mfd.)	4989-K
(67)	Electrolytic Condenser (6 Mfd.) Single Speaker	4916
	Electrolytic Condenser (8 Mfd.) Twin Speaker	6706
(68)	Filter Choke	4819
	Tube Shield (Large)	04792
	Tube Shield (Small)	5387
	Shield Plate	03646
	Knob (Large)	03063
	Knob (Medium)	03064
	Knob (Small)	03437
	Knob Spring (Large)	5262
	Knob Spring (Small)	4147

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MODEL 22-L
Schematic
Changes

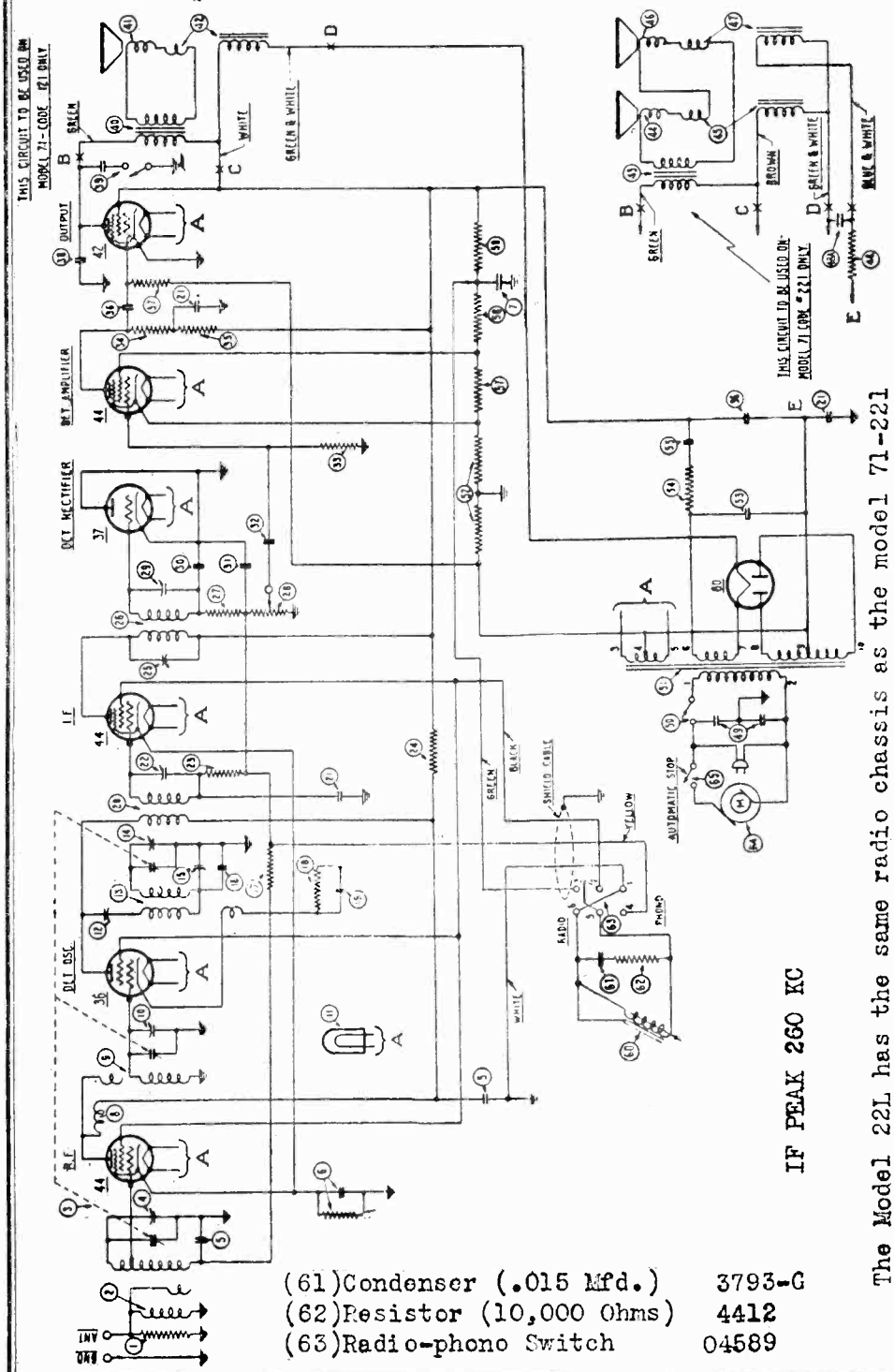
Below run No. 4, unsolder top (ungrounded) connection of volume control (28) and substitute in the circuit a 240,000 ohm resistor, part 4410, one end grounded. Disconnect the condenser (32) .01 Mfd., part 3903-J, from the center tap of the volume control and from its common connection with the control grid of the detector amplifier tube and the ungrounded end of (33) resistor 1,000,000 ohms 4409. This resistor is no longer used, and can be removed.

Solder one side of the condenser (32) to top of volume control and other side of condenser to ungrounded end 240,000 ohm resistor. Solder the control grid lead of the detector amplifier tube to the variable arm connection of the volume control tube.

(48) A Condenser .25 Mfd. part 04997, change to .5 Mfd. part 05150.

(35) Resistor 25,000 ohms 4516 used on both 121 an l 221 models.

Dial complete, part 03031, change to part 04832.



IF PEAK 260 KC

(61)Condenser (.015 Mfd.) 3793-G
(62)Resistor (10,000 Ohms) 4412
(63)Radio-phono Switch 04589

The Model 22L has the same radio chassis as the model 71-221 except for the additional wiring of the phonograph equipment.

All information applying to the 71-221, likewise applies to the Model 22L.

The motor is the self starting synchronous type, depending upon correct power line frequency (cycles) for correct speed. A motor for one frequency will not operate at correct speed on any other frequency. Do not attempt to do repair work on the motor. Should this part become defective, replace it with a new one, and return, to the factory.

The motor should be lubricated at least once every six months. It is only necessary to remove the turntable, and place light machine oil in the oil hole on the motor top plate.

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PHILCO RADIO CHASSIS DATA

MODEL		TUBES														SPEAKER				VOLUME CONTROL		TONE CONTROL			
		27	24	35	47	45	80	14	17	32	33	30	2	3	71A	Type	Cone Assembly	Field Assembly	Output Transformer	Part No.	Resistance (Ohms)	Part No.	2 Point	4 Point	Capacity (Mfd.)
Early Models	70 B.G.	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	√		2-.01
	70 H.B.	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	√		2-.01
	270	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	√		2-.01
	370	1	4		1		1									K-3	02996	02987	2673	5056	5000 & 210	03168	√		2-.01
	470	2	5		1		1									K-4	02996	02987	2673	5039	5000 & 210	03140	√		2-.01
	570	1	4		1		1									K-3	02996	02987	2673	5039	5000 & 210	03140	√		2-.01
Automatic Volume Control	70 B.G.	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	√		.01
	70 H.B.	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	√		.01
	270	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	√		.01
	370	1	1	3	1		1									K-3	02996	02987	2673	6307	1,000,000	04652	√		.01
	470	2	2	3	1		1									K-4	02996	02987	2673	6015	1,000,000	03637	√		.01
	570	1	1	3	1		1									K-3	02996	02987	2673	6015	1,000,000	03637	√		.01
Push Pull 45's	90 B.G.	2	4			2	1									K-2	02996	02987	2766	5039	5000 & 210	03137		√	.015, 2-.01
	90 L.B.	2	4			2	1									H-2	02874	02988	2766	5039	5000 & 210	03137		√	.015, 2-.01
	90 H.B.	2	4			2	1									H-2	02874	02988	2766	5039	5000 & 210	03137		√	.015, 2-.01
Single Pentode	90 B.G.	4	3		1		1									K-3	02996	02987	2673	5724	500,000	03137		√	.015, 2-.01
	90 L.B.	4	3		1		1									H-3	02874	02988	2673	5724	500,000	03137		√	.015, 2-.01
	90 H.B.	4	3		1		1									H-3	02874	02988	2673	5724	500,000	03137		√	.015, 2-.01
	490	5	4		1		1									K-4	02996	02987	2673	5724	500,000	03137		√	.015, 2-.01
Push Pull Pentode	90 B.G.	3	1	2	2		1									K-5	02996	02987	2635	6015	1,000,000	03137		√	.015, 2-.01
	90X	3	1	2	2		1									H-6	02874	02988	2635	6015	1,000,000	03137		√	.015, 2-.01
	490	4	2	2	2		1									K-8	02996	02987	2635	6015	1,000,000	03137		√	.015, 2-.01
Push Pull 45's	112	4	4			2	1									H-2	02874	02988	2766	4093	500,000	03137		√	.015, 2-.01
	212	4	4			2	1									H-2	02874	02988	2766	4093	500,000	03137		√	.015, 2-.01
Push Pull Pentodes	112	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		√	.015, 2-.01
	112X	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		√	.015, 2-.01
	212	4	4		2		1									H-6	02874	02988	2635	4093	500,000	03137		√	.015, 2-.01
	50 B.G.		3		1		1									P-2	02861*	02942	2660	5232	1750				
	50 L.B.		3		1		1									S-2	02887**	02942	2660	5232	1750				
	51 B.G.		2	1	1		1									P-2	02861	02942	2660	5839	5000				
	51 L.B.		2	1	1		1									S-2	02887	02942	2660	5839	5000				
	551		2	1	1		1									P-2	02861*	02942	2660	5839	5000				
	4	1	1				1																		
	46 B.G.							3	1				1	1 (E)	2	N-2	02996	02924	2766	4141	1750				
	46 H.B.							3	1				1	1 (E)	2	N-2	02996	02924	2766	4141	1750				
	35 B.G.									3	1	3				R-2	02887**		2646	5317	5000 (Dual)	03637	√		.01
	35 H.B.									3	1	3				R-2	02387**		2646	5317	5000 (Dual)	03637	√		.01

*Used with spacer washer 3316 and mounting screw W-161 when replacing cone assembly 02970.
**Used with spacer washer 2616 and mounting screw W-161 when replacing cone assembly 02949.

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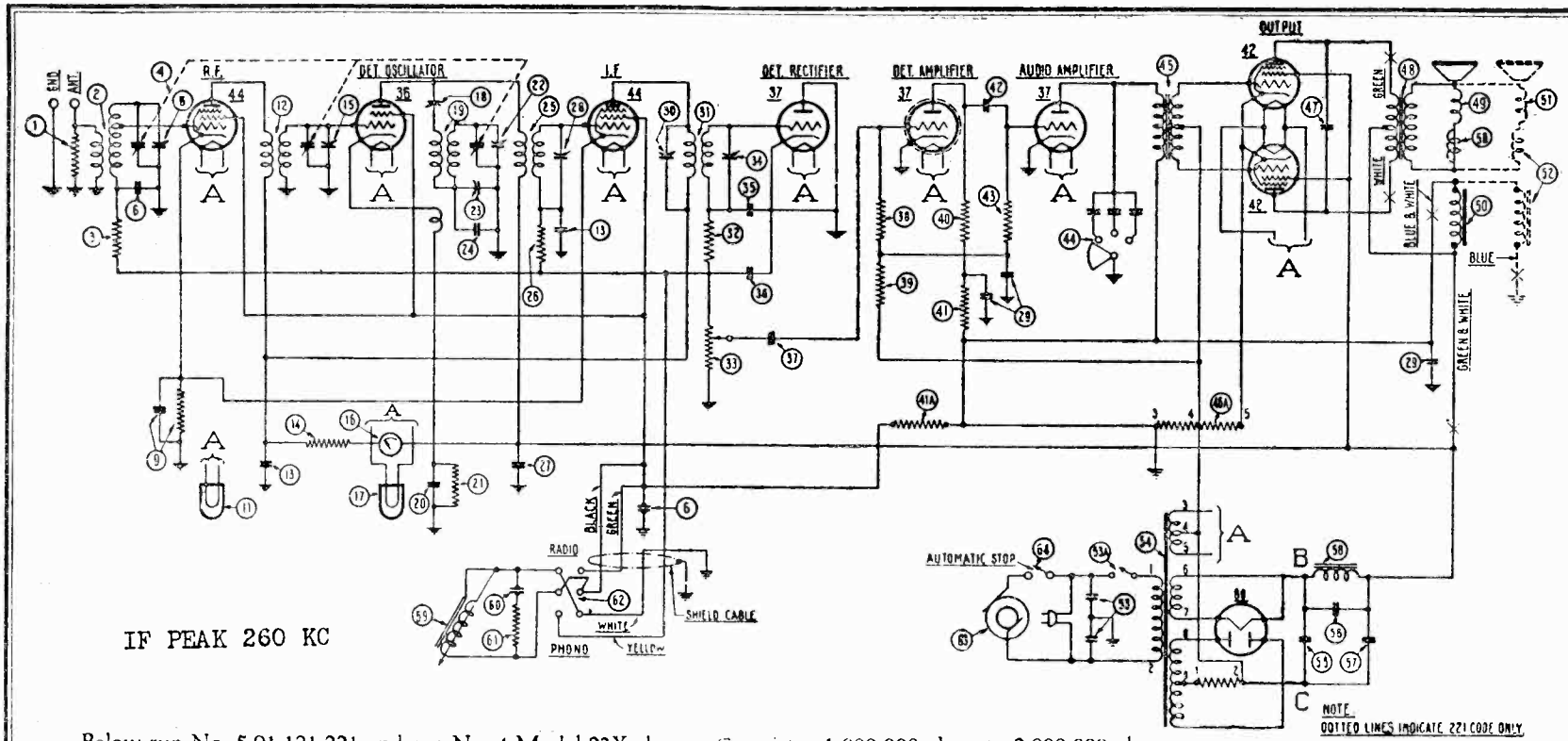

IF PEAK 260 KC

Below run No. 5-91-121-221 and run No. 4 Model 23X change (5) resistor 1,000,000 ohms to 2,000,000 ohms, part 5872. Change (56) resistor 1,000,000 ohms to 2,000,000 ohms, part 5872.

Below run No. 4-91-121-221, run No. 3 Model 23-X, add a 490,000 ohm resistor, part 4517, across the two outside terminals of the volume control.

Below run No. 3-91-121-221, run No. 2 Model 23 X change (47) condenser .001 Mfd. part 6773 to .002 Mfd., part 6853.

Model 23X and 91-221 have the same chassis, except for the additional wiring required for the phono pickup. Service data for Model 91-221 applies to 23X

(60)	Electric Pickup	6823
(61)	Condenser (.015 Mfd.)	3793-C
(62)	Resistor 10,000 ohms	4412
(63)	Radio-phonograph switch	04589
(64)	Motor (115 volts 60 cycles)	6336
(65)	Motor Switch	6345

The motor is the self starting synchronous type, depending upon correct power line frequency (cycles) for correct speed. A motor for one frequency will not operate at correct speed on any other frequency. Do not attempt to do repair work on the motor. Should this part become defective, replace it with a new one, and return to the factory.

The motor should be lubricated at least once every six months. It is only necessary to remove the turntable, and place light machine oil in the oil hole on the motor top plate.

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INCREASING Tuning

PHILCO RADIO & TELEVISION CORP.

Increasing Tuning Range and Interference Notes

CHANGES IN PHILCO MODELS FOR INCREASING LOW FREQUENCY RECEIVING RANGE

A number of changes have been made in the Models 52, 71, 91, and 47 to extend the low frequency receiving range, making these models capable of receiving the new 540 K.C. frequency assignment of the Canadian station in Windsor. The Model 52 receives down to 540 K.C. and the Models 71, 91, and 47 go down to 520 K.C., although at the present time there are no assignments lower than 540 K.C. All Models 37 and 80's shipped from the factory have been designed for reception down to 540 K.C.

The circuit changes involve new r.f. coils, new tuning condenser assembly, and new dial assembly. The following table lists all of the part number changes.

Part Changed	MODELS							
	52	540 K.C.	71	520 K.C.	91	520 K.C.	47	520 K.C.
	Old Part No.	New Part No.	Old Part No.	New Part No.	Old Part No.	New Part No.	Old Part No.	New Part No.
Antenna Coil....	03880	05726	04339	05988	04317	04984	04339	05988
Tuning Cond....	03809	05829	04733	05986	04790	05982	05098	06144
Det. Trans.....	03881	05727	04185	05989	04409	05985	05093	06146
Oscill. Coil.....	03882	05728	04186	05987	04408	05983	04186	05987
Dial Assembly...	04031	05811	04832	05992	04832	05992	04832	05992

On all models which are designed for the lower frequency reception the code number has been changed from 121 or 221 to 123 or 223. These numbers appear on the inspection and serial number tag attached to the packing cases.

SLIPPING OF MODEL 15 TUNING CONDENSER

CORRECTING RADIO BEACON STATION INTERFERENCE

TIGHTENING PILOT LAMP AND SHADOW TUNING LAMP SOCKETS

The spring which is used to hold the drive cable under tension has been changed from Part 6508 to Part 7776. The new spring is heavier and can be used on the earlier models if any are found in which the cable slips or the condenser rotor drops from its own weight.

The sockets used for both pilot lamps and shadow tuning lamps on all Philco models now have indentations in the threads which lock the lamps in place so that they will not be loosened by vibration. Lamps in earlier models will be held tight in their sockets if the lamp is removed and the socket flattened slightly with a pair of pliers. This will place enough pressure on the lamp base so as to prevent it from working loose.

On some of the earlier Model 70 and 90 sets, difficulty has been experienced with interference from airport radio beacon stations, transmitting at or near 260 K.C. Last year when these models were being sold, the interference was not present, but during the past year, several new beacon stations have been installed.

The interference can be readily eliminated by re-adjusting the I. F. compensating condensers at 250 or 270 K.C. instead of 260 K.C. The Philco 095 oscillator can be re-calibrated at 250 by tuning in a reliable broadcast station signal at 750 K.C. (third harmonic of 250 K.C.) or 1000 K.C. (fourth harmonic); substituting the oscillator for the aerial, and re-adjusting the 260 K.C. compensating condenser of the oscillator until the signal is heard and the output meter reads maximum.

All models of the present line have been specially designed to eliminate any interference from airport radio beacon stations.

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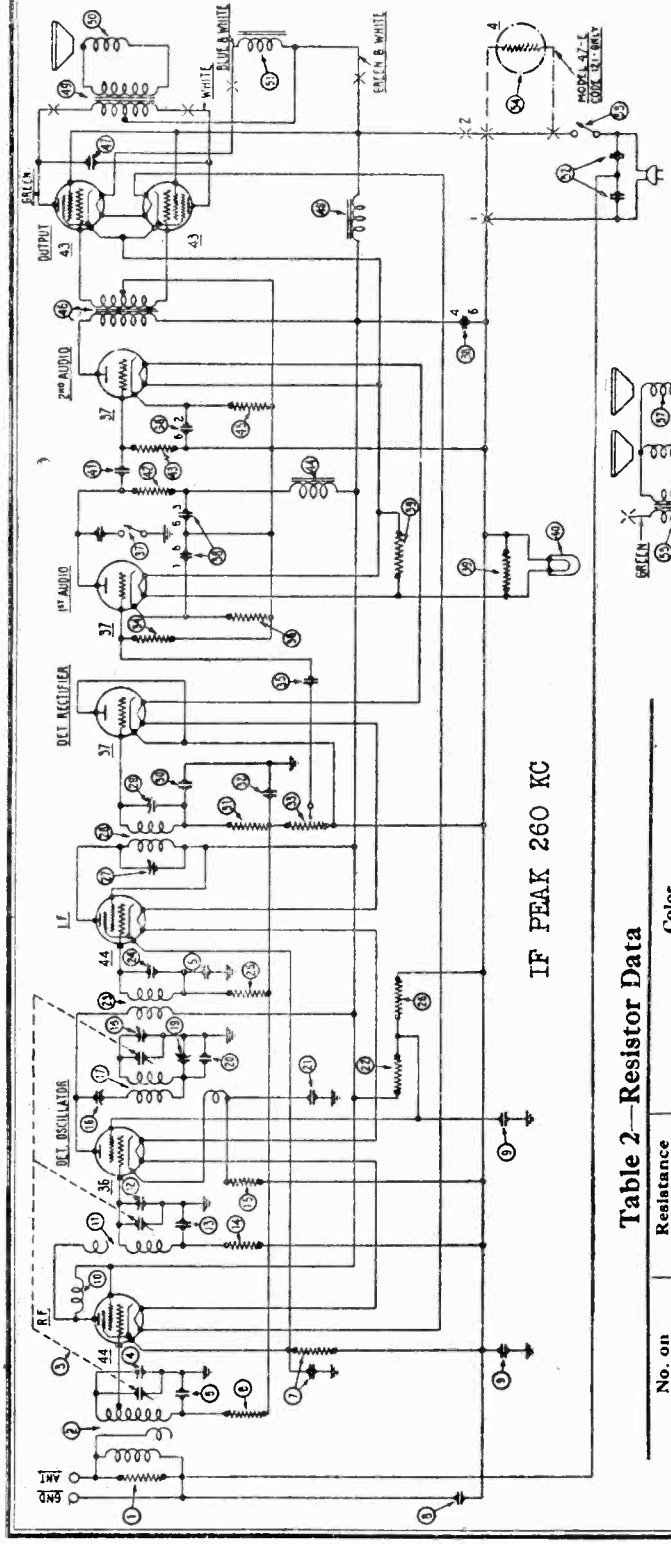
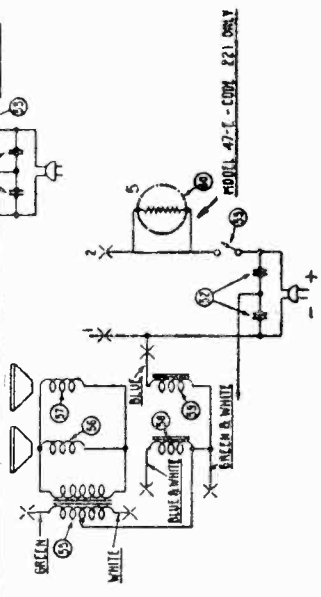
PHILCO RADIO & TELEVISION CORP.

MODEL 47 DC
(121-221)
Schematic
Voltage

The Philco Radio of the 47 series is an eight tube direct current (D.C.) superheterodyne, employing the high-efficiency 6.3 volt filament tubes, automatic volume control, and superpower push-pull pentode output. The chassis is made for operation on 115 volts D.C. and 230 volts D.C. The complete instrument is made in two different types, one known as the 121 code, employing a single dynamic speaker, and the other known as the 221 code employing twin dynamic speakers. These code numbers appear on the radio chassis as a part of the model number. Chassis of one code are not interchangeable with those of another. On the 230 volt models, a ballast lamp type 4 in series with one side of the power line is used on the single speaker models and a type 5 on the twin speaker models. The intermediate frequency used in adjusting the superheterodyne circuit of the 47 series is 260 kilocycles. The power consumption of the 115 volt models is 45 watts; that of the 230 volt models is 90 watts.





Model 47-

Key No. in Wiring Dia.	Resistance in Ohms Primary	Secondary
(2)	Inner 10.9 Outer 2.2	4.0
(10)	15	
(11)	4.7	
(17)	Inner 5.3 Outer 5.3	15.2
(23)	52	80
(28)	80	75
(44)	4600	
(46)	2000	2400
(48)	750	
(49)	165	
(51)	70	
(58)	70	
(59)	3200	

Table 2—Resistor Data

No. on Figs. 3 and 4	Resistance (Ohms)	Color Body	Color Tip	Color Dot
(29) (15) (16) (1) (22) (36) (32) (26) (31) (14) (25) (34) (43) (6)	70 & 16	Green	Round Tubular Black	Red
	5,000	Gray	Black	Red
	8,000	Brown	Black	Orange
	10,000	Red	Green	Orange
	25,000	Violet	Black	Orange
	70,000	White	White	Orange
	99,000	Brown	Black	Green
	1,000,000			

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

Tube Type	Tube Circuit	Filament Volts F to F	Plate Volts P to K	Screen Grid Volts SG to K	Control Grid Volts CG to K	Cathode Volts K to F
44	R. F.	6.3	100	100	-4	40
36	Det.-Osc.	6.3	100	65	5.0	30
44	I. F.	6.3	100	100	-4	25
37	Det.-Rect.	6.3	0	.....	-2	22
37	1st Audio	6.3	75	.....	-4	2
37	2nd Audio	6.3	90	.....	-4	10
43	{Push-Pull	25.	110	112	10.	80
43	{Output	25.	110	112	10.	80
4	Ballast (121) 230 Volts	110	.....	.....	.....	.....
5	Ballast (221) 230 Volts	110	.....	.....	.....	.....

*All readings were taken from the under side of the chassis, using test prods and leads with a suitable high resistance multi-range D.C. voltmeter for all readings. Volume control at maximum and station selector turned to low frequency end.

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MODEL 47 DC
(121-221)
Chassis
Speaker

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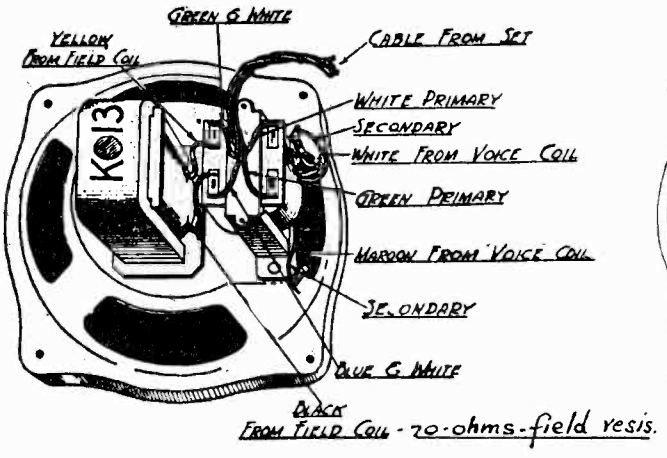


Fig. 1—Single Speaker Connections—121 Code.

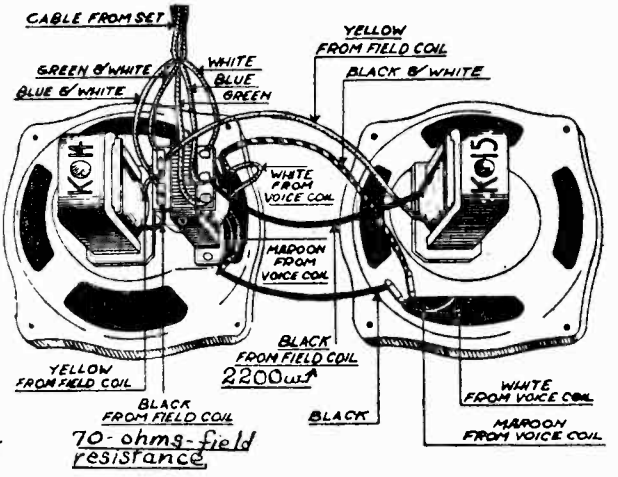
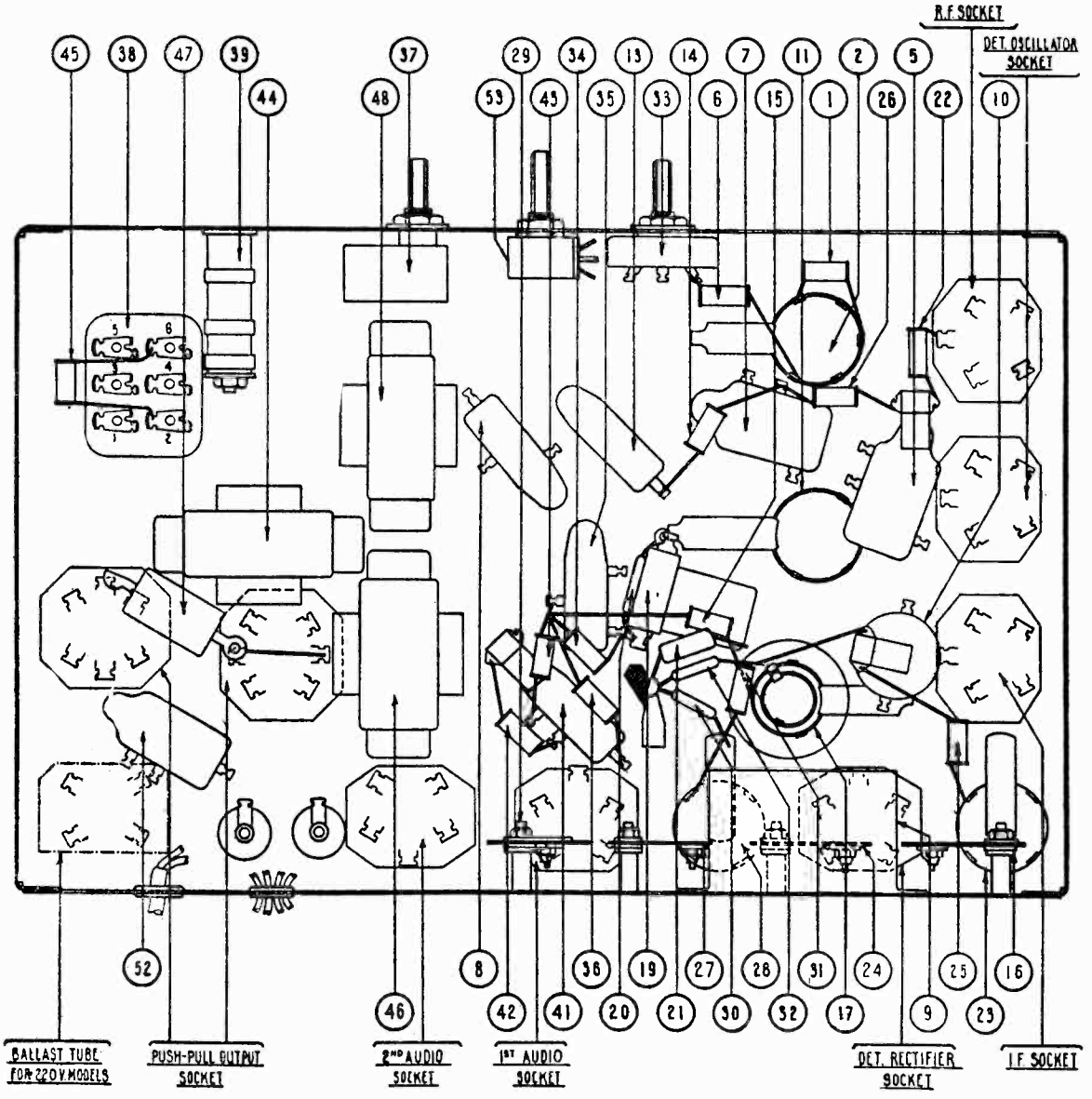


Fig. 2—Twin Speaker Connections—221 Code



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Adding 450 KC To
095 Philco Osc.

PHILCO RADIO & TELEVISION CORP.

Adding 450 KC Adjusting Frequency to Philco Model 095 Oscillator

The Model 095 Oscillator can be altered to provide a suitable 450 KC signal for adjusting the intermediate frequency amplifier stages of the Philco Model 43, or other radios using an I F of 450, without interfering with the present frequencies at 175 KC and 260 KC. The following instructions should be used in making this addition.

1. *Drilling and Mounting.* A Philco compensating condenser, part 04000C and a snap switch part 3253, must be mounted on the side of the oscillator case.

A. Drill a 3/16" hole in the side of the oscillator case for mounting the additional compensating condenser.

B. Drill a second hole 9/16" in diameter 1 1/32" to the left and 7/8" above the first to provide an opening for the adjustment of this condenser.

C. Drill a third hole 1/2" in diameter for mounting the toggle switch.

D. Mount the compensating condenser and the switch in position.

2. *Wiring.* The wiring consists of connecting the new compensating condenser and switch in series, and connecting these two across the 260 KC compensating condenser.

A. Connect a wire between the adjustable plate terminal of the 260 KC compensating condenser (this condenser is designated on the oscillator case) and the adjustable plate terminal of the condenser just added.

B. Connect a wire from the fixed plate terminal of the 260 KC compensating condenser to one side of the toggle switch just added.

C. Connect a wire from the other side of the toggle switch to the fixed plate terminal of the new compensating condenser.

D. Mark the ON position of the new switch on the side of the oscillator case.

3. *Adjustments.* The adjustments consist of checking the 260 KC compensating condenser setting and adjusting the new compensating condenser in the manner outlined below.

A. Place a radio set in operation, tuning it exactly to a reliable station at 780, 1040, or 1300 KC. If no station signal is available at any one of these frequencies, tune the station selector of an accurately calibrated radio set to one of these points on the dial.

B. Without disturbing the radio dial setting, disconnect the antenna, and substitute the "Antenna" connection from the oscillator. Connect the ground terminal of the oscillator to the ground terminal of the set, with the ground wire still connected. Connect the output meter of the oscillator to the radio speaker connections in the usual manner.

C. Place the oscillator in operation at 260 KC, with the new switch in the "OFF" position and adjust the 260 KC compensating condenser by means of the Philco fibre wrench, part 3164, for maximum reading in the output meter.

D. Now reconnect the antenna in place of the oscillator and tune the radio set to a station at 900 KC or 1350 KC.

E. Again substitute the oscillator for the antenna, placing the 175-260 switch in the "260" KC position, and the new switch in the "ON" position.

F. Adjust the new compensating condenser for maximum reading in the output meter.

This completes the adjustments and the oscillator is now ready for use. The fundamental frequency which has been added is 225 KC. The second harmonic of this frequency at 450 KC is actually employed for making the adjustments to the new Philco radio models. The 900 KC and 1350 KC points used in adjusting the 225 KC compensating condenser are the fourth and sixth harmonics, respectively, of the 225 KC signal. When making adjustments to a Philco radio having an intermediate frequency of 450 KC, place the oscillator in operation for 260 KC and the new switch in the "ON" position.

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MODEL 14-LZX,91
23,14,19-
LZ,19-LZX,
37
Changes.

PHILCO RADIO & TELEVISION CORP.

Changes in Models

It is unnecessary to alter receivers in your stock to comply with these changes.

The main purpose of these change bulletins is to enable you in ordering and supplying correct replacement parts to dealers. Mark up your copies of Service Bulletins to agree with the latest production. Your orders for parts from Philco will be filled as specified on your order.

This information is intended for your service department only.

Model 14LZX

In run number 3, the following changes were made to permit police and airplane broadcast reception; the antenna coil ② part number 05984 was changed to new coil part number 32-1069. The interstage coil ⑫ part number 05984 was changed to new coil part number 32-1070. The "on-off" switch (53A) part number 6498 was removed. A combined "on-off" and frequency change switch part number 42-1002 was added.

In run number 3, the Philco Three Purpose Antenna system was added. The set transformer part number 32-1003 was mounted in the radio chassis. The antenna transformer part number 32-1005 was mounted in the speaker cabinet. In the speaker cabinet the control box part number 06617 was changed to new control box part number 38-5056.

Models 91, 23 and 14

In run number 1, the (15,000 ohm) resistor ㉑ part number 6208 was changed to new resistor (10,000 ohms) part number 4412. Condenser ⑥ part number 3615AM was changed to new condenser part number 3615AF. A terminal block part number 03103 was added. This terminal block was mounted on the condenser ㊾ part number 4989K or 4989T.

Models 19LZ—19LZX

In run number 4, model 19LZ; run number 3, model 19LZX; the following changes were made to permit police and airplane broadcast reception: The antenna coil ② part number 06619 was changed to new coil part number 32-1062. The interstage coil ⑥ part number 06662 was changed to new coil part number 32-1063. The "on-off" switch part number 6498 was removed. A combined "on-off" and frequency change switch part number 42-1017 was added.

In run number 4, model 19LZ; run number 3, model 19LZX; rubber insulators part number 4054 were added to both ends of the 10,000 ohm resistor connected between the tone control and the tap on the volume control.

In run number 3, model 19LZX, the Philco Three Purpose Antenna system was added. The set transformer part number 32-1003 was mounted in the chassis. The antenna transformer part number 32-1005 was mounted in the speaker cabinet. In the speaker cabinet the control box part number 06798 was changed to new control box part number 38-5057.

Model 37

The (99,000 ohm) resistor ㉗ part number 4411 was changed to new resistor (490,000 ohms) part number 4517.

The (490,000 ohm) resistor ㉛ part number 4517 was changed to new resistor (240,000 ohms) part number 4410.

The (99,000 ohm) resistor ㉜ part number 4411 was changed to new resistor (1,000,000 ohms) part number 4414.

The (51,000 ohm) resistor ㉘ and the (25,000 ohm) resistor ㉖ were removed.

The secondary lead of the second I. F. transformer connected to condenser ㉔ was removed and connected to the secondary lead of the first I. F. transformer on condenser ⑬. A (490,000 ohm) resistor part number 4517 was added between the center top of the volume control (in cathode circuit) and the secondary leads of first and second I. F. transformer connected on condenser ⑬.

A (15,000 ohm) resistor part number 6208 was added, connected between end of the volume control (in cathode circuit) and end of resistors ㉞ and ㉟.

A (30 ohm) resistor part number 7155 was added across the filament of the Ballast tube. Two pieces of 1″ braid was used to protect the ends of the resistor.

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PHILCO RADIO & TELEVISION CORP.

MODEL 220, 220-A
Schematic

DIFFERENT CIRCUIT ARRANGEMENT FOR MODEL 220-A

Model 220-A for use on 25-60 cycle lines is wired differently than the Model 220. The plate supply lead for the two 24 R. F. Tubes is taken from the low side of the Speaker field Coil. The lead "D" to the 24 tubes should be changed to "J" for the Model 220-A only. This will change the plate voltage from 250 volts to 115-125 volts. The plate current readings will also be lower than those given in the table.

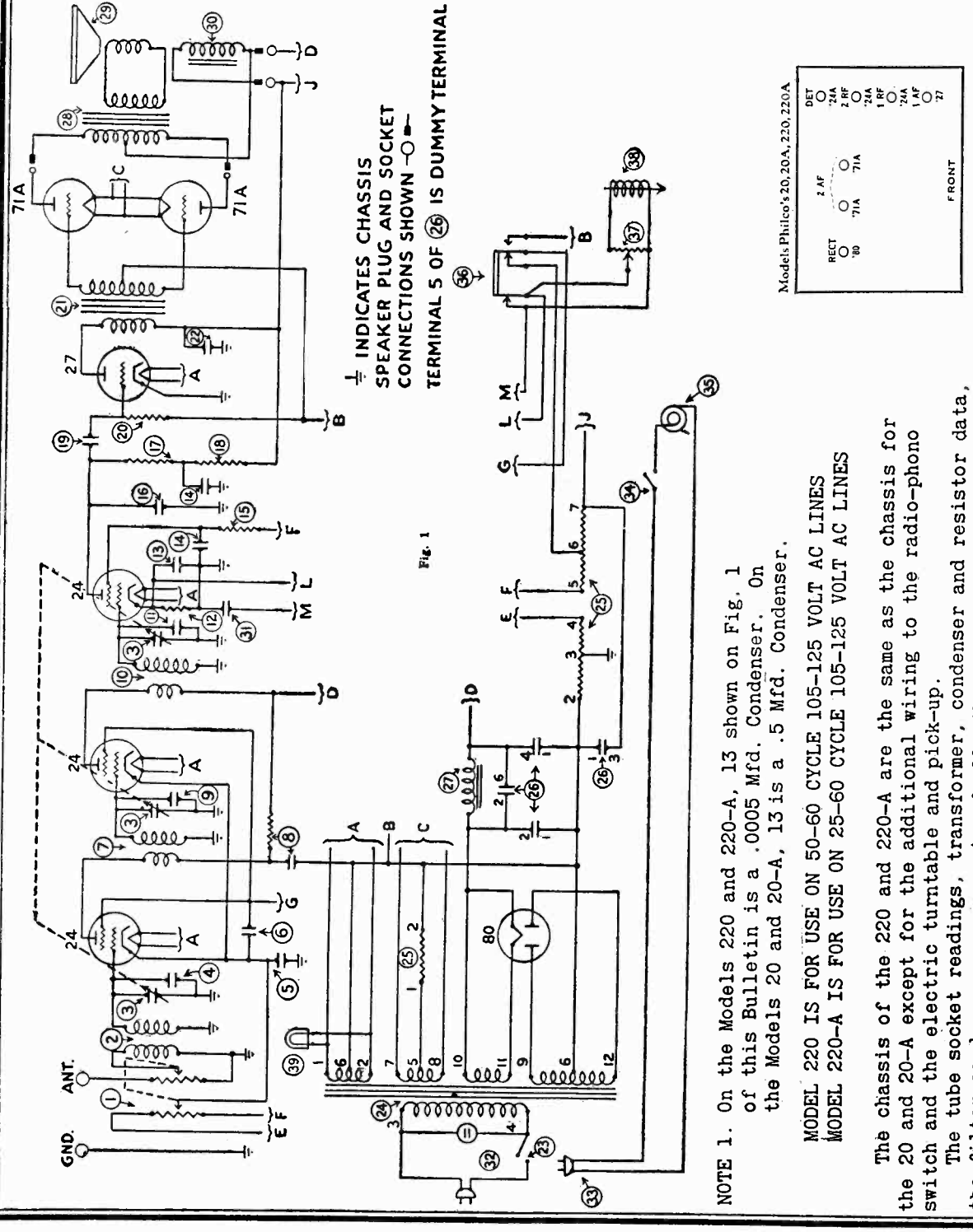

Fig. 1

NOTE 1. On the Models 220 and 220-A, 13 shown on Fig. 1 of this Bulletin is a .0005 Mfd. Condenser. On the Models 20 and 20-A, 13 is a .5 Mfd. Condenser.

MODEL 220 IS FOR USE ON 50-60 CYCLE 105-125 VOLT AC LINES
MODEL 220-A IS FOR USE ON 25-60 CYCLE 105-125 VOLT AC LINES

The chassis of the 220 and 220-A are the same as the chassis for the 20 and 20-A except for the additional wiring to the radio-phono switch and the electric turntable and pick-up.

The tube socket readings, transformer, condenser and resistor data, the filter condenser arrangement and all other information given in Bulletin No. 36 should be used for the 220 and 220-A respectively.

The parts list in Bulletin No. 36 is supplemented with the following which are the additional parts used in the Radio Phonograph.

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MODEL Lazy X
Installation

PHILCO RADIO & TELEVISION CORP.

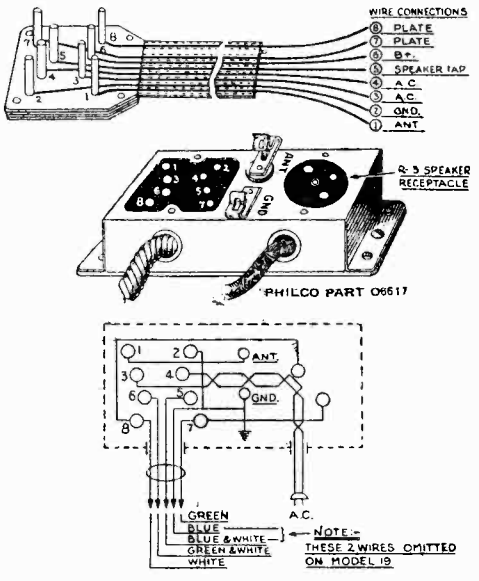
Installing the Philco Lazy X

THE Philco Lazy X Model offer many possibilities for custom-built installation, and as a result we have received many requests for further details concerning the installation. We are outlining below for the benefit of all dealers and servicemen information on the problems most frequently encountered.

Flat Cable Extension

It is often desirable to extend the length of the flat cable which connects the control cabinet with the speaker cabinet. An extension cable is available for this purpose in lengths of 25 feet. The extension cable can be obtained assembled with the plug on one end. This assembly is known as Philco Part No. 06993, and sells at a list price of $6.50.

When using this assembly, the wires should be unsoldered from the plug at the end of the LZX cable and spliced to the ends of the corresponding wires at the end of the extension cable. The flat cable only without the plug is known as Philco Part No. L-1528, and lists at $6.00 for a 25-foot length.



LZX CABLE AND PLUG CONNECTIONS

Extension Losses Eliminated

It is recommended that the total length of flat cable for any installation should be under 50 feet. There are certain losses introduced because of the close proximity of the aerial and ground wires in the cable. Up to 25 feet, the standard length supplied with the LZX Models—this loss is not noticeable, but beyond this length the loss increases, and should be compensated for by increasing the length and height of the outside antenna or by the installation of the Philco Three Purpose Antenna System. Complete instructions for the Lazy X connections are included with each Three Purpose Kit, and are also given below.

Another consideration when using more than the standard 25-foot length of cable is the excessive pickup of man-made static originating in various electric appliances and wiring within the house. Here again the use of the Philco Three Purpose Antenna System is recommended for cables in excess of 25 feet in length.

Connecting the Philco Three-Purpose Antenna System to the Lazy X Models

There are two methods of connecting the Philco Three Purpose Antenna System to the LZX Models, both of which will give equally satisfactory performance. In the first method the transmission line from the Antenna Transformer is run direct to the radio cabinet on which the set transformer is mounted. Referring to the cable and plug illustration below, it will be noted that the ground and aerial wires through the flat cable are separated by a cord about the size of a wire. Lay the LZX cabinet on its side so that chassis is in upright position on the floor. Looking from rear of chassis, first two wires from left of flat cable are antenna and ground connections, respectively Slit the cable with a sharp knife so that enough of the "ANT" and "GND" lead is exposed to reach Set Transformer. Cut first wire from left in cable and connect end coming from chassis to "ANT" terminal of "Set" Transformer. Second wire from left must not be cut, but should be bared and short lead spliced from bared section to "GND" terminal of set Transformer This connection should be soldered and taped. Connect red wire in transmission line to "RED" terminal on "ANT" transformer and black wire to "BLK" terminal. The set Transformer should then be mounted in position in receiver cabinet.

In the second method, the transmission line from the antenna transformer runs to the speaker cabinet, and two of the wires through the flat cable are employed as a continuation of transmission line up to the radio cabinet, at which point the set transformer is mounted. In order to get a properly matched line through the flat cable and not lose all the advantage of the system up to this point, it is necessary to employ a different wire through the cable as the antenna At present the antenna wire is separated from the ground wire by a tracer cord. When making the change the antenna wire should be adjacent to the ground wire through the cable. It is simply a case of interchanging the wires on the two sides of the cable to agree with the cable and plug drawings shown above, where wires 1 and 2 become antenna and ground and wires 7 and 8 become plate connections. The antenna wire is cut a few inches from the chassis for insertion of the set transformer just the same as in the first case described above.

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6.3 VOLT SERIES

Type	Use	Base	Bulb	Type of Cathode	RATING Fil. Amps.	RATING Max. Plate Volts	RATING Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
36	R.F.	5B	ST12C	Heater	0.3	275	90	90	− 1.5	55	1.8	Not over	850	250,000	215	.....	.....
								135	− 1.5	67	2.8	½ Ip	1050	300,000	315	.....	.....
								180	− 3.0	90	3.5	....	1050	350,000	370	.....	.....
								250	− 3	90	3.4	....	1100	400,000	440	.....	.....
36	Det.	5B	ST12C	Heater	0.3	275	90	250	− 6	20/45	Plate current to be adjusted to 0.1 Ma. with no input signal						
37	Det. Amp.	5A	ST12	Heater	0.3	275	...	90	− 6	....	2.5	....	800	11,500	9.2	17,500	30
								135	− 9	....	4.1	....	925	10,000	9.2	14,000	80
								180	−13.5	....	4.3	....	900	10,000	9.2	20,000	175
38	Power Amp.	5C	ST12C	Heater	0.3	180	180	135	−13.5	135	9.0	2.5	975	102,000	100	13,500	525
39	R.F.	5C	ST12C	Heater	0.3	275	90	90	− 3	90	4.4	1.3	960	375,000	360	.....	.....
								135	− 3	90	4.4	1.2	980	540,000	530	.....	.....
								180	− 3	90	4.5	1.2	1000	750,000	750	.....	.....
								250	− 3	90	4.5	1.2	1000	1,000,000	1000	.....	.....
41	Power Amp.	6C	ST12	Heater	0.4	200	200	125	−10	135	11.0	1.5	1400	150,000	210	13,000	650
								167.5	−12.5	167.5	16.5	2.5	1700	120,000	205	10,000	1,250
								180	−14	180	19.0	3.5	1800	120,000	215	10,000	1,500
42	Power Amp.	6C	ST16	Heater	0.65	250	250	250	−16.5	250	34	7.5	2200	100,000	220	9,000	3,000
44	R.F. Super Control	5C	ST12C	Heater	0.3	275	90	90	− 3	90	6.0	....	1010	150,000	152	.....	.....
								135	− 3	90	6.25	....	1030	250,000	257	.....	.....
								180	− 3	90	6.4	....	1040	410,000	426	.....	.....
								250	− 3	90	6.5	....	1050	600,000	630	.....	.....
69	Det.	6B	S12	Heater	0.3	275	...	180	− 3	.....	4.5	....	1450	20,700	30	.....	.....
75	Det. Amp.	6D	ST12C	Heater	0.3	250	...	250	− 2	.....	0.8	....	1100	91,000	100	.....	.....
77	R.F.	6A	ST12C	Heater	0.3	250	100	250	− 3	100	2.3	.6	1250	1,500,000	1500	.....	.....
77	Det.	6A	ST12C	Heater	0.3	250	100	250	− 6	100	Plate current to Plate load 250,000 ohms be adjusted to 0.1 Ma. with no input signal						
78	R.F. Super Control	6A	ST12C	Heater	0.3	250	100	180	− 3	75	4	....	1100	1,000,000	1100	.....	.....
								250	− 3	100	7	....	1450	800,000	1160	.....	.....
								250	− 3	125	10.5	....	1650	600,000	990	.....	.....
79	Power Amp.	6F	ST12C	Heater	0.6	180	...	180	0	.....	7.5	....	No applied signal		....	.....	.....
								180	0	.....	44.0	....	Class B Operation		.....	10,000	5,500
85	Det.	6D	ST12C	Heater	0.3	250	...	250	−20	.....	8.0	....	1100	7,500	8.3	20,000	200
89	Power Amp.	6A	ST12C	Heater	0.4	180	180	160	20	160	17	....	1570	3,000	4.7	7,000	300*
								163	17	163	17	....	1575	99,000	125	9,000	1,250**
								180	18	180	20	....	1635	82,500	135	8,000	1,500**
								180	0	.....	52.5	....	Class B Operation		....	2,350	3,500†
6A7	Det. Osc.	Small 7B	ST12C	Heater	0.3	250	100	250	G4 − 3 ‡	G3&5 ‡‡	100	.....	.....	.....	....	.....	.....
6B7	Duplex Diode Pentode	7C	ST12C	Heater	0.3	250	125	100	− 3	100	5.8	.3	950	300,000	285	.....	.....
								180	− 3	75	3.4	1.0	840	1,000,000	840	.....	.....
								250	− 3	100	6.0	.8	1000	800,000	800	.....	.....
								250	− 3	125	9.0	.65	1125	650,000	730	.....	.....

*Triode connection. **Pentode connection. †Two tubes with 40 volts applied signal. ‡Voltage on plate and anode grid. ‡‡Cathode resistor for bias on G1 = 250 ohms.

2.5 VOLT SERIES

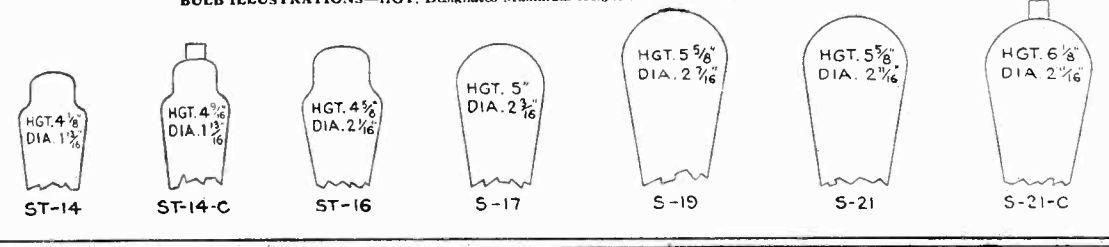
Type	Use	Base	Bulb	Type of Cathode	RATING Fil. Amps.	RATING Max. Plate Volts	RATING Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
24	R.F.	5B	S14C	Heater	1.75	275	90	180	− 1.5	75	4.0	Not over	1050	400,000	420	.....	.....
								180	− 3	90	4.0	½ Ip	1000	400,000	400	.....	.....
								250	− 3	90	4.0		1025	600,000	615	.....	.....
24	Det.	5B	S14C	Heater	1.75	275	90	275	− 5	20-45	Plate current to be adjusted to 0.1 Ma. with no input signal						
27	Amp.	5A	S14	Heater	1.75	275	...	90	− 6	.....	2.7	....	820	11,000	9.0	14,000	30
								135	− 9	.....	4.5	....	1000	9,000	9.0	13,000	80
								180	−13.5	.....	5.0	....	1000	9,000	9.0	18,700	165
								250	−21	.....	5.2	....	975	9,250	9.0	34,000	300
35	R.F. Super Control	5B	S14C	Heater	1.75	275	90	180	− 1.5	75	5.8	Not over	1100	350,000	385	.....	.....
								250	− 3.0	90	6.5	½ Ip	1050	350,000	370	.....	.....
45	Power Amp.	4A	S17	Filament	1.5	275	...	180	−34.5	.....	27.0	....	1850	1,900	3.5	3,500	780
								250	−50.0	.....	34.0	....	2000	1,750	3.5	3,900	1,600
46	Power Amp.	5F	S17	Filament	1.5	250 Class A	...	250	−33	.....	22.0	....	2350	2,380	5.6	6,400	1,250
						400 Class B	...	300	0	.....	4.0	Class B	Operation	.....	....	1,300	16,000
								400	0	.....	6.0	Class B	Operation	.....	....	1,450	20,000
47	Power Amp.	5D	S17	Filament	1.5	250	250	250	−16.5	250	31	7.0	2500	60,000	150	7,000	2,500
55	Det.	6D	ST12C	Heater	1.0	250	...	250	−20.0	.....	8.0	....	1100	7,500	8.3	20,000	200
56	Amp.	5A	S12	Heater	1.0	275	...	250	−13.5	.....	5.0	....	1450	9,500	13.8	.....	.....
57	R.F. Super Control	6A	ST12C	Heater	1.0	275	100	250	− 3	100	2.0	0.6	1225	1,500,000	1500	.....	.....
57	Det.	6A	ST12C	Heater	1.0	275	100	250	− 6	100	Plate current to Plate load 250,000 ohms be adjusted to 0.1 Ma. with no input signal						
58	R.F.	6A	ST12C	Heater	1.0	275	100	250	− 3	100	8.2	2.0	1600	800,000	1280	.....	.....
59	Power Amp.	7A	ST16	Heater	2.0	250	250	250	−28	250*	26	....	2600	2,500	6	5,000	1,250
								250	−18	250**	35	....	2500	4,000	100	6,000	3,000
								400	0	.....	60	....	Class B Operation		....	6,000P	20,000
2A3	Power Amp.	4A	ST16	Filament	2.5	250	...	250	−42	.....	60	....	5500	765	4.2	2,500	3,500
								300	−62	.....	40 per tube	....	Push Pull	.....	....	300P	15,000
2A5	Power Amp.	6C	ST14	Heater	1.75	250	250	250	−16.5	250	34	7.5	2200	100,000	165	9,000	3,000
2A7	Det. Osc.	Small 7B	ST12C	Heater	1.0	250	100	250	G4 − 3 ‡	G3&5 100 ‡‡	.....	....	....	.....	....	.....	.....
2B7	Duplex Diode Pentode	7C	ST12C	Heater	1.0	250	125	100	− 3	100	5.8	....	950	300,000	285	.....	.....
								180	− 3	75	3.4	....	840	1,000,000	840	.....	.....
								250	− 3	100	6.0	....	1000	800,000	800	.....	.....
								250	− 3	125	9.0	....	1125	650,000	730	.....	.....

*Triode connection. **Pentode connection. ‡Voltage on plate and anode grid. ‡‡Cathode resistor for bias on G1 = 250 ohms. P Plate to plate load.

MISCELLANEOUS PILOT LAMPS

Voltage	Current Amps.	Color of Filament Support Bead	Dimensions Overall Hight	Dimensions Overall Diam.	Philco Part Number
Special low current lamps for battery sets					
2.0	.06	Pink	1¼"	13/32"	5316
2.5	.45	White	1¼"	13/32"	3463
6.3	.15	Brown	1¼"	13/32"	4567
6.3	.25	Blue	1 3/32"	13/32"	6608
120 Grille Lamp	.09		2 5/32"	1 5/16"	6600

BULB ILLUSTRATIONS—HGT. Designates Maximum Height of Tube when SEATED IN SOCKET.



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Philco Tubes

PHILCO RADIO & TELEVISION CORP.

2.0 VOLT SERIES

Type	Use	Base	Bulb	Type of Cathode	RATING Fil. Amps.	RATING Max. Plate Volts	RATING Max. Screen Volts	Plate Volts	Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance (Ohms)	Amp. Factor	Ohms Load for Output	Undistorted Power Output (Milliwatts)
15	Det. Osc.	5B	S12C	Heater	0.22	135	67.5	135	− 1.5	67.5	1.85	Not over ⅓ Ip	625	800,000	500	.....	.....
19	Power Amp.	6E	ST12	Filament	0.26	135	.....	135	0.0	.....	*† 27.0	Class B	Operation	.....	.....	P 10,000	2,100
30	Det. Amp.	4A	S12	Filament	0.06	180	.....	90	− 4.5	.....	2.5	.....	850	11,000	9.3	.....	.....
								135	− 9.0	.....	3.0	.....	900	10,300	9.0	.....	.....
								180	−13.5	.....	3.1	.....	900	10,300	9.3	.....	.....
31	Power Amp.	4A	S12	Filament	0.13	180	.....	135	−22.5	.....	8.0	.....	925	4,100	3.8	7,000	185
								180	−30.0	.....	12.3	.....	1050	3,600	3.8	5,700	375
32	R.F.	4B	S14C	Filament	0.06	180	67.5	135	− 3	67.5	1.7	Not over	640	950,000	610	.....	.....
								180	− 3	67.5	1.7	⅓ Ip	650	1,200,000	780	.....	.....
32	Det.	4B	S14C	Filament	0.06	180	67.5	174	− 6	67.5	Plate c	urrent to	be adjust	ed to 0.2 M	a. with	no input s	ignal
33	Power Amp.	5D	S14	Filament	0.26	135	135	135	−13.5	135	14.5		1450	50,000	70.0	7,000	700
34	R.F.	4B	S14C	Filament	0.06	180	67.5	67.5	− 3	67.5	2.7	Not over	560	400,000	224	.....	.....
								135	− 3	67.5	2.8	⅓ Ip	600	600,000	360	.....	.....
								180	− 3	67.5	2.8		620	1,000,000	620	.....	.....

*†50 volts R.M.S. applied to two grids P Plate to plate load

MISCELLANEOUS TUBES

					Volts	Amps.	Supply										
00A	Det.	4A	S14	Filament	5	0.25	DC	45	Grid Return To—Fil.	.....	1.5	.....	666	30,000	20.0	.....	.....
01A	Det. Amp.	4A	S14	Filament	5	0.25	DC	90	− 4.5	.....	2.5	.....	725	11,000	8.0	11,000	15
								135	− 9.0	.....	3.0	.....	800	10,000	8.0	20,000	55
10	Power Amp.	4A	S19	Filament	7.5	1.25	AC	250	−22.0	.....	10.0	.....	1330	6,000	8.0	13,000	40
								350	−31.0	.....	16.0	.....	1550	5,150	8.0	11,000	900
								425	−39.0	.....	18.0	.....	1600	5,000	8.0	10,200	1,600
12A	Det. Amp.	4A	S14	Filament	5.0	0.25	DC	90	− 4.5	.....	5.2	.....	1500	5,600	8.5	5,600	30
								135	− 9.0	.....	6.2	.....	1600	5,300	8.5	8,700	115
								180	−13.5	.....	7.6	.....	1700	5,000	8.5	10,800	260
12A	Power Amp.	4A	S14	Filament	5.0	0.25	DC	135	− 9	.....	6.2	.....	1600	5,300	8.5	8,700	115
								180	−13.5	.....	7.6	.....	1700	5,000	8.5	10,800	260
14	Amp.	5B	S14C	Heater	14.0	0.3	DC	180	− 1.5	90	4.0	Not over	1050	400,000	420	.....	.....
								180	− 3.0	90	4.0	⅓ Ip	1000	400,000	400	.....	.....
								250	− 3	90	4.0		1050	500,000	525	.....	.....
17	Amp.	5A	S14	Heater	14.0	0.3	DC	90	− 6.0	.....	2.7	.....	820	11,000	9	.....	.....
								135	− 9.0	.....	4.5	.....	1000	9,000	9	.....	.....
								180	−13.5	.....	5.0	.....	1000	9,000	9	.....	.....
18	Power Amp.	6C	S17	Heater	14.0	0.7	AC	250	−16.5	250	34.0	7.5	2250	100,000	220	9,000	3,000
20	Power Amp.	4A	T8	Filament	3.3	0.132	DC	90	−16.5	.....	3.0	.....	415	8,000	3.3	9,600	45
								135	−22.0	.....	6.5	.....	525	6,300	3.3	6,500	110
26	Amp.	4A	S14	Filament	1.5	1.05	AC	90	− 6	.....	3.8	.....	955	3,600	8.2	9,800	30
							or	135	− 9	.....	6.3	.....	1135	7,200	8.2	8,800	80
							DC	180	−13.5	.....	7.4	.....	1170	7,000	8.2	10,500	130
43	Power Amp.	6C	ST14	Heater	25.0	0.3	DC	95	−15.0	95	20.0	5.0	2000	45,000	90.0	4,500	900
48	Power Amp.	6C	ST16	Heater	30.0	0.4	DC	95	−20.0	95	47.0	9.0	2800	10,000	28.0	2,000	1,600
50	Power Amp.	4A	S21	Filament	7.5	1.25	AC	250	−54.0	.....	35.0	.....	1900	2,000	3.8	4,600	1,600
								350	−63.0	.....	45.0	.....	2000	1,900	3.8	4,100	2,400
								400	−70.0	.....	55.0	.....	2100	1,800	3.8	3,670	3,400
								450	−84.0	.....	55.0	.....	2100	1,800	3.8	4,350	4,600
71A	Power Amp.	4A	S14	Filament	5.0	.25	AC	90	−16.5	.....	12.0	.....	1330	2,250	3.0	3,200	125
							or	135	−27.0	.....	17.5	.....	1520	1,960	3.0	3,500	370
							DC	180	−40.5	.....	20.0	.....	1620	1,850	3.0	5,350	700
V99	Det.	4G	T8	Filament	3.3	0.063	DC	90	− 4.5	.....	2.5	.....	425	15,500	6.6	15,500	.....
X99	Amp.	4A	T8	Filament	3.3	0.063	DC	90	− 4.5	.....	2.5	.....	425	15,500	6.6	15,500	.....
182B	Det. Amp.	4A	S17	Filament	5.0	1.25	AC	200	−29.0	.....	18.0	.....	1500	3,330	5.0	.....	.....
183	Power Amp.	4A	S17	Filament	5.0	1.25	AC	200	−45.0	.....	20.0	.....	1500	2,000	3.0	.....	.....
								250	−65.0	.....	26.0	.....	2000	1,500	3.0	.....	.....
485	Det. Amp.	5A	S14	Heater	3.0	1.25	AC	90	− 3.0	.....	5.0	.....	1150	10,800	12.5	.....	.....
								120	− 4.0	.....	6.0	.....	1350	9,300	12.5	.....	.....

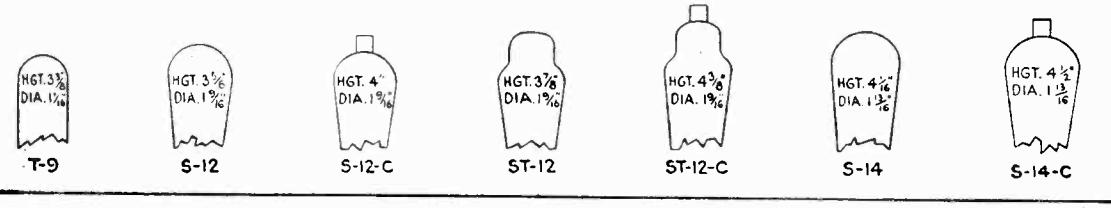
RECTIFIER SERIES

Type	Use	Base	Bulb	Type Cathode	FILAMENT RATING Volts	FILAMENT RATING Amps.	FILAMENT RATING Supply	Max. Plate Volts Per Plate	Plate Current Milliamps.	Remarks
80	Full Wave	4D	S17	Filament	5.0	2.0	AC	350 AC	125	
								400 AC	110	
81	Half Wave	4E	S19	Filament	7.5	1.25	AC	550 AC	135	With choke input only
82	Full Wave	4D	S14	Filament	2.5	3.0	AC	700 AC	85	
83	Full Wave	4D	ST16	Filament	5.0	3.0	AC	500 AC	125	
84	Full Wave	5E	ST12	Heater	6.3	0.5	AC or DC	500 AC	250	
12Z3	Half Wave	4H	ST12	Heater	12.6	0.3	AC or DC	225 AC	50	
25Z5	Full Wave and Voltage Doubler	6G	ST12	Heater	25.0	0.3	AC or DC	230 AC	60	
								230 AC	100	AC Plate voltage per plate for voltage doubling 110 volts
5Z3	Full Wave	4D	ST16	Heater	5.0	3.0	AC or DC	500 AC	250	
866	Half Wave	4F	S21C	Filament	2.5	5.0	AC	7500 AC	600	

MISCELLANEOUS BALLAST TUBES

Type	Base	Bulb	For use in Philco Models	Voltage Drop Across Lamp	Filament Current
2	4C	S17	46	9.0	0.3
3	4C	S17	46E	128.0	0.3
4	4C	S17	47E single speaker	117.0	0.4
5	4C	S17	47E double speaker	117.0	0.46
6	4C	S12	36 & 37	0.6/1.4	0.7
7	4C	S17	248E	176.0	0.3
8	4C	S17	247E	132.0	0.3
9	4C	S17	48	50	0.3

BULB ILLUSTRATIONS—HGT. Designates Maximum Height of Tube when SEATED IN SOCKET.



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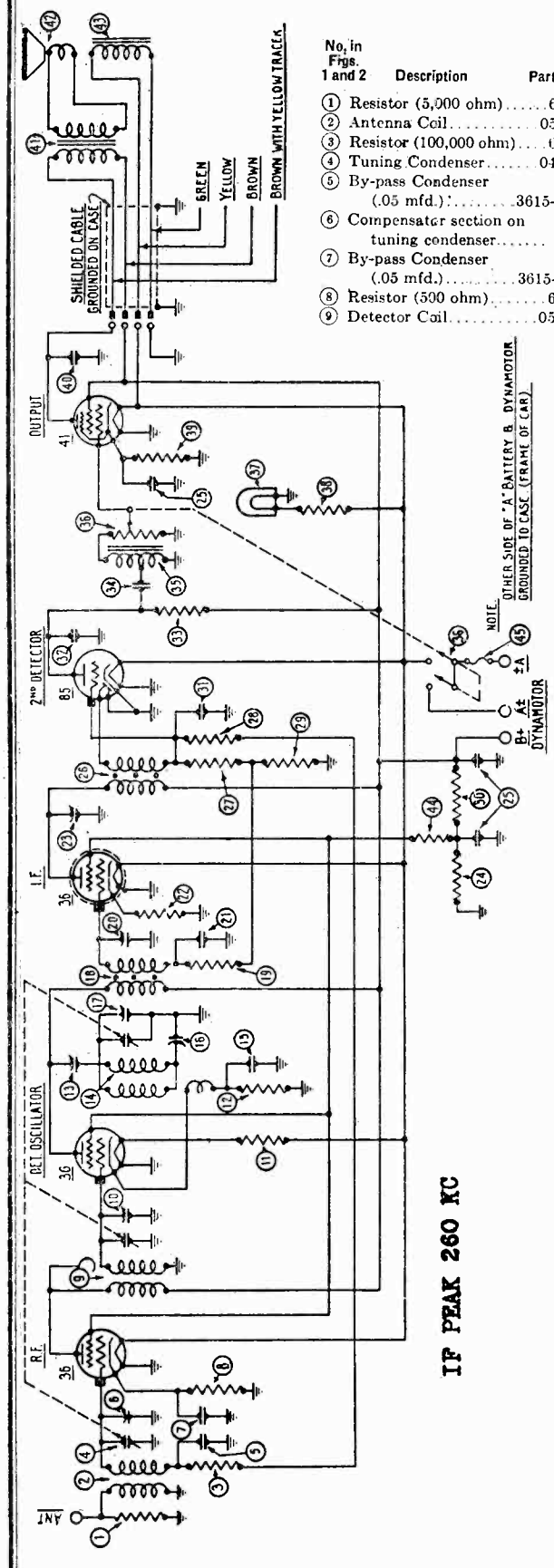
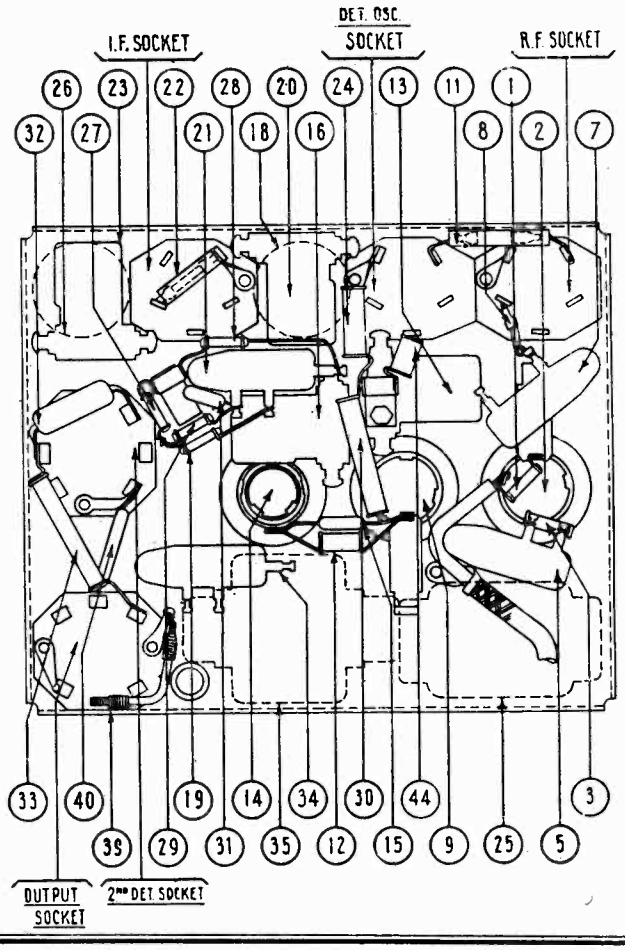
MODEL 6
Transitone



PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
1	Resistor (5,000 ohm)	6096
2	Antenna Coil	05903
3	Resistor (100,000 ohm)	6099
4	Tuning Condenser	04308
5	By-pass Condenser (.05 mfd.)	3615-AN
6	Compensator section on tuning condenser	
7	By-pass Condenser (.05 mfd.)	3615-AT
8	Resistor (500 ohm)	6977
9	Detector Coil	05902
10	Compensator section on tuning condenser	
11	Resistor (2.7 ohm)	6511
12	Resistor (8,000 ohm)	5838
13	Compensating Cond.	04000-A
14	Oscillator Coil	05975
15	Condenser (.007 mfd.)	4520
16	Compensating Cond.	04000-S
17	Compensator section on tuning condenser	
18	First I. F. Transformer	05970
19	Resistor (500,000 ohm)	6097
20	Compensating Cond.	04000-D
21	Condenser (.05 mfd.)	3615-AK
22	Resistor (500 ohm)	6977
23	Compensating Cond.	04000-D
24	Resistor (20,000 ohm)	6650
25	Condenser (.25 mfd., .5 mfd., 8 mfd.)	04354
26	Second I. F. Transformer	05901
27	Resistor (100,000 ohm)	6099
28	Resistor (500,000 ohm)	6097
29	Resistor (100,000 ohm)	6099
30	Resistor (20,000 ohm)	6649
31	Condenser (.00025 mfd.)	3082
32	Condenser (.0002 mfd.)	4059
33	Resistor (50,000 ohm)	4237
34	Condenser (.09 mfd.)	4989-Y
35	Audio Transformer	7535
36	Volume Control (500,000 ohm) and switch	7525
37	Pilot Lamp	4567
38	Resistor (7 ohm)	5110
39	Resistor (700 ohm)	6443
40	Condenser (.002 mfd.)	6853
41	Output Transformer	2598
42	Cone and Coil	02823
43	Field Coil	02794
44	Resistor (25,000 ohm)	4516
	Interstage Shield	05910
	Dynamotor EB	05389
	Dynamotor EA (for battery replacements)	05388
	Receiver Studs	6122
	Shielded Loom (18" high tension shield)	L1387
	Shielded Loom (30" high tension shield)	L1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistors	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cable	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	0538
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke (small unit only)	05746
	18" Volume Control Shaft	6351
	18" Tuning Control Shaft	6352
	32" Volume Control Shaft	6128
	32" Tuning Control Shaft	6129
	48" Volume Control Shaft	6298
	48" Tuning Control Shaft	6299
	120" Volume Control Shaft	6355
	120" Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 7, 8, 6)	Model 095
	Fibre Wrench	3164



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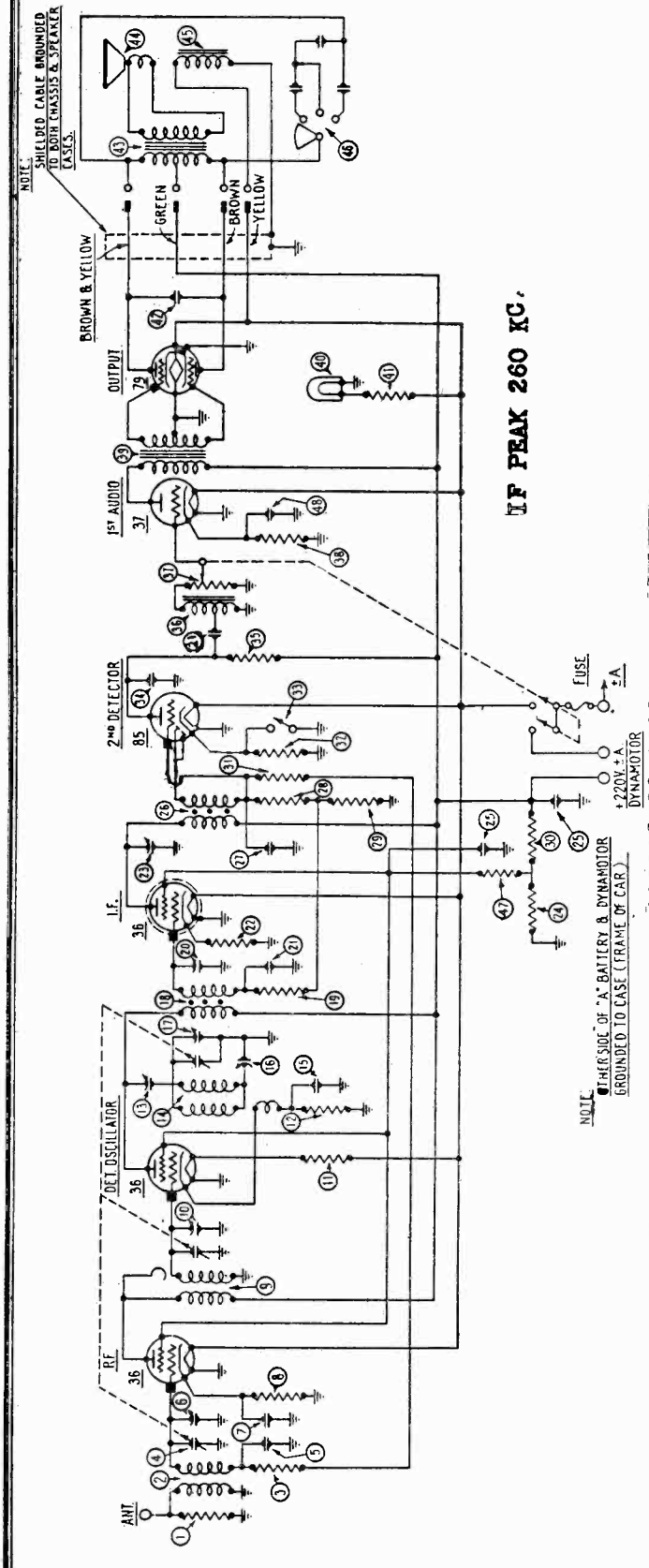
MODEL 9
Transitone

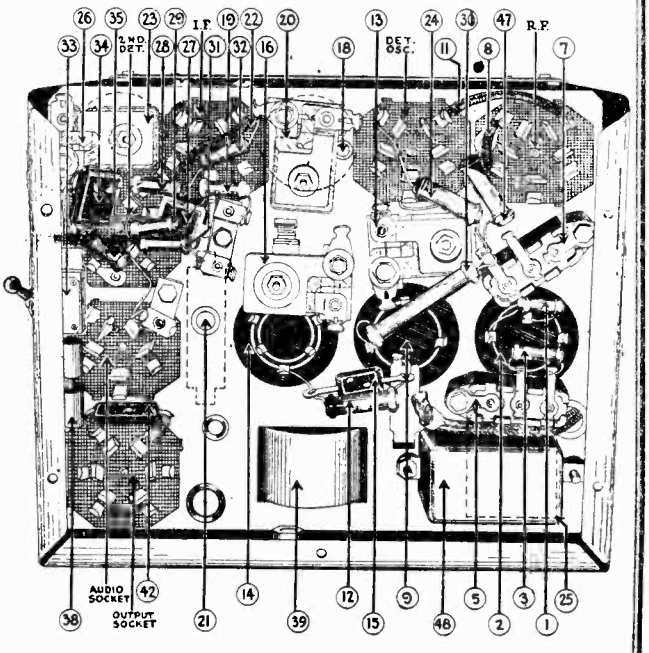
PHILCO RADIO & TELEVISION CORP.



PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
①	Resistor (5,000 ohm)	6096
②	Antenna Coil	06574
③	Resistor (100,000 ohm)	6099
④	Tuning Condenser	04308
⑤	By-pass Condenser (.05 mfd.)	3615-AN
⑥	Compensator section on tuning condenser	
⑦	By-pass Condenser	3615-AY
⑧	Resistor (500 ohm)	6977
⑨	R. F. Transformer	05902
⑩	Compensator section on tuning condenser	
⑪	Resistor (2.7 ohm)	6511
⑫	Resistor (6,000 ohm)	7352
⑬	Compensator	04000-A
⑭	Oscillator Coil	05975
⑮	Condenser (.0007 mfd.)	4520
⑯	Compensating Cond.	04000-S
⑰	Compensator section on tuning condenser	
⑱	First I. F. Transformer	05970
⑲	Resistor (500,000 ohm)	6097
⑳	Compensating Cond.	04000-D
㉑	Condenser (.05 mfd., .15 mfd.)	06091
㉒	Resistor (500 ohm)	6977
㉓	Compensating Cond.	04000-D
㉔	Resistor (20,000 ohm)	6650
㉕	Condenser (.5 mfd., .25 mfd.)	06088
㉖	Second I. F. Transformer	05901
㉗	Condenser (.00025 mfd.)	3082
㉘	Resistor (100,000 ohm)	6099
㉙	Resistor (100,000 ohm)	6099
㉚	Resistor (20,000 ohm)	6649
㉛	Resistor (500,000 ohm)	6097
㉜	Resistor (5,000 ohm)	6096
㉝	Switch	5462
㉞	Condenser (.00125 mfd.)	5886
㉟	Resistor (50,000 ohm)	4518
㊱	Audio Transformer	7552
㊲	Volume Control	7525
㊳	Resistor (2,500 ohm)	7775
㊴	Input Transformer	7652
㊵	Pilot Lamp	4567
㊶	Resistor (7 ohm)	5110
㊷	Condenser (.06 mfd.)	6359
㊸	Output Transformer	2515

No. in Figs. 1 and 2	Description	Part No.
㊹	Speaker Coil and Cone	02823
㊺	Speaker Field Pot.	02795
㊻	Tone Control	05366
㊼	Resistor (25,000 ohm)	4516
㊽	Condenser	7774
	Complete Speaker Assembly (Model 6)	A-4
	Complete Speaker Assembly (Model 7)	A-4
	Complete Speaker Assembly (Model 8)	A-5
	Complete Speaker Assembly (Model 9)	A-7
	Complete Speaker Assembly (Model 12)	A-6
	Complete Speaker Assembly (Model B-6)	A-8
	Interstage Shield	05910
	Dynamotor ED	06084
	Dynamotor EA (for battery replacements)	05388
	Receiver Studs	6122
	Shielded Loom (18" high tension shield)	L-1387
	Shielded Loom (30" high tension shield)	L-1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistor	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cables	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	05386
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke	05723
	Battery Cable	05419-D
	18" Volume Control Shaft	6351
	18" Tuning Control Shaft	6352
	32" Volume Control Shaft	6128
	32" Tuning Control Shaft	6129
	48" Volume Control Shaft	6298
	48" Tuning Control Shaft	6299
	120" Volume Control Shaft	6355
	120" Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 6, 7, 8, 9)	0095
	Fibre Wrench	3164



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PHILCO RADIO & TELEVISION CORP.

MODEL 54
Voltage Data

THE PHILCO RADIO MODEL 54 is a five-tube superheterodyne, designed for operation on 110 volts, alternating current, 25, 60 cycles, and 110 volts direct current, employing the new Philco high efficiency tubes with pentode output and an Electro Dynamic Speaker. The set uses a Philco Type 6A7 tube as a first detector and oscillator; a Type 78 tube as intermediate frequency; a Type 75 tube as a second detector; a Type 43 tube as pentode output and a Type 25-Z-5 tube as a rectifier and voltage doubler. The intermediate frequency for tuning the I. F. transformers is 460 kilocycles. The power consumption on both A. C. and D. C. is approximately 50 watts.

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

Circuit	Det. Osc.	I. F.	2nd Det.	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.

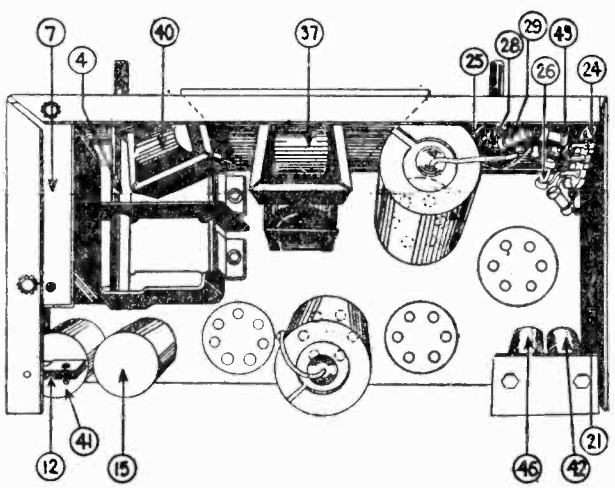

Fig. 1—Top View of Chassis Showing Parts

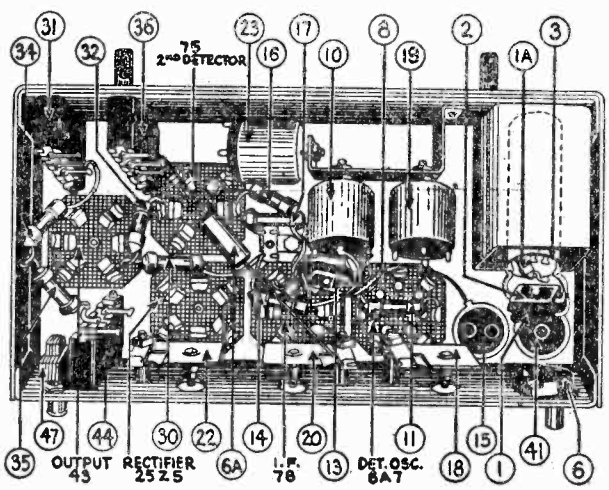

Fig. 2—Bottom View of Chassis Showing Parts

6A7 Socket

78 Socket

75 Socket

43 Socket

25-Z-5 Socket

Terminal Arrangement of Tube Sockets Viewed From Under Side of Chassis.

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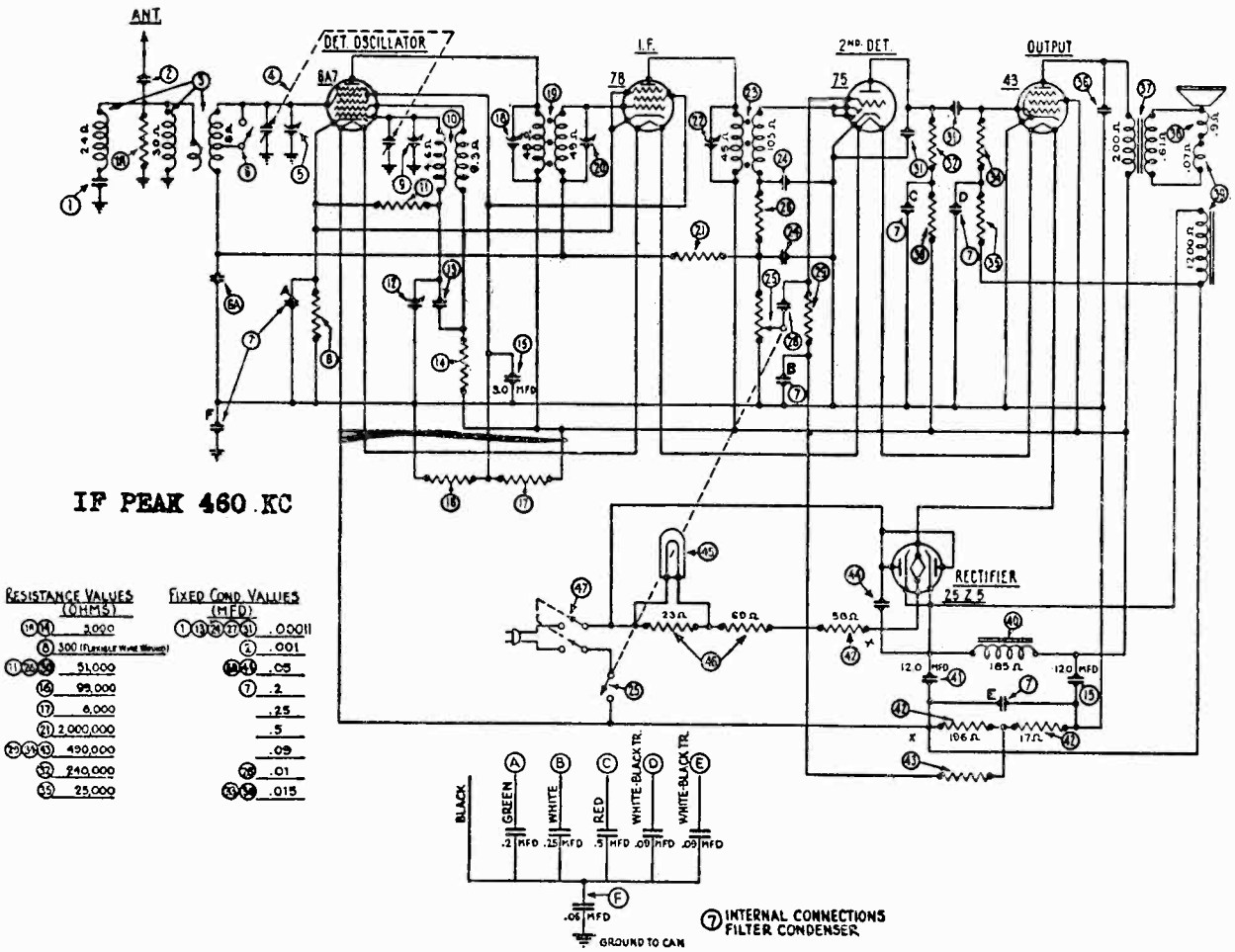
MODEL 54
Schematic
Parts List

PHILCO RADIO & TELEVISION CORP.



RESISTANCE VALUES (OHMS)	
1 14	2,000
6	300 (Flexible Wire Wound)
11 28 30	51,000
16	99,000
17	6,000
21	2,000,000
23 34 43	490,000
32	240,000
35	25,000

FIXED COND. VALUES (MFD)	
1 13 20 27 31	.0001
2	.001
4 40	.05
7	.2
	.25
	.5
	.09
28	.01
33 38	.015

Fig. 3—Schematic Wiring Diagram

REPLACEMENT PARTS FOR MODEL 54

No. on Figs.	Description	Part No.	List Price
1	Condenser	30-1005	.16
1a	Resistor (Green-Black-Red)	6096	.20
2	Condenser	5215	.20
3	Antenna Transformer Assembly	32-1117	1.25
4	Tuning Condenser Assembly	31-1027	1.75
5	Compensating Condenser (Part of 4)	....	....
6	Wave Band Switch	42-1027	.50
6a	Condenser	30-4020	.12
7	Filter Condenser (Block)	30-4023	1.00
8	Resistor (Flexible)	33-3010	.15
9	Compensating Condenser (High Frequency 1400) Part of 4	....	....
10	Oscillator Coil	32-1118	1.00
11	Resistor (Green-Brown-Orange)	4518	.20
12	Compensating Condenser (Low Freq.)	04000-B	.19
13	Condenser	4519	.18
14	Resistor (Green-Black-Red)	5310	.20
15	Electrolytic Condenser (Double)	30-2002	1.00
16	Resistor (White-White-Orange)	4411	.20
17	Resistor (Gray-Black-Red)	5838	.20
18	Compensating Cond. (1st I. F. Primary)	04000-A	.14
19	1st I. F. Transformer	32-1115	.65
20	Compensating Condenser (1st I. F. Secondary)	04000-A	.14
21	Resistor (Red-Black-Green)	5872	.20
22	Compensating Cond. (2nd I. F. Primary)	04000-A	.14
23	2nd I. F. Transformer	32-1116	.75
24	Condenser (Double)	8035-G	.20
25	Volume Control and "On-Off" Switch	33-5010	1.00
26	Resistor (Green-Brown-Orange)	4518	.20
28	Condenser	3903AM	.20
29	Resistor (Yellow-White-Yellow)	6097	.20
30	Resistor (Green-Brown-Orange)	4518	.20
31	Condenser (Double)	8035-F	.18
32	Resistor (Red-Yellow-Yellow)	4410	.20
34	Resistor (Yellow-White-Yellow)	4517	.20
35	Resistor (Red-Green-Orange)	4516	.20
36	Condenser	3793-Y	.16
37	Output Transformer	32-7020	.80
38	Voice Coil and Cone Assembly	36-3029	....
39	Field Coil and Pot Assembly	36-3040	1.60
40	Filter Choke	32-7036	.75
41	Electrolytic Condenser	30-2001	1.25
42	Resistor (Wire Wound)	33-3012	.25
43	Resistor (Yellow-White-Yellow)	6097	.20
44	Condenser	3615-B	.30
45	Pilot Lamp	4567	.11
46	Resistor (Wire Wound)	33-3011	.25
47	Safety Switch	42-1026	1.00
	Tube Shield	28-1130	.10
	Six Prong Socket	7547	.10
	Seven Prong Socket	27-6005	.10
	Tuning Scale	27-5008	.12
	Volume Control Scale	27-5010	.12

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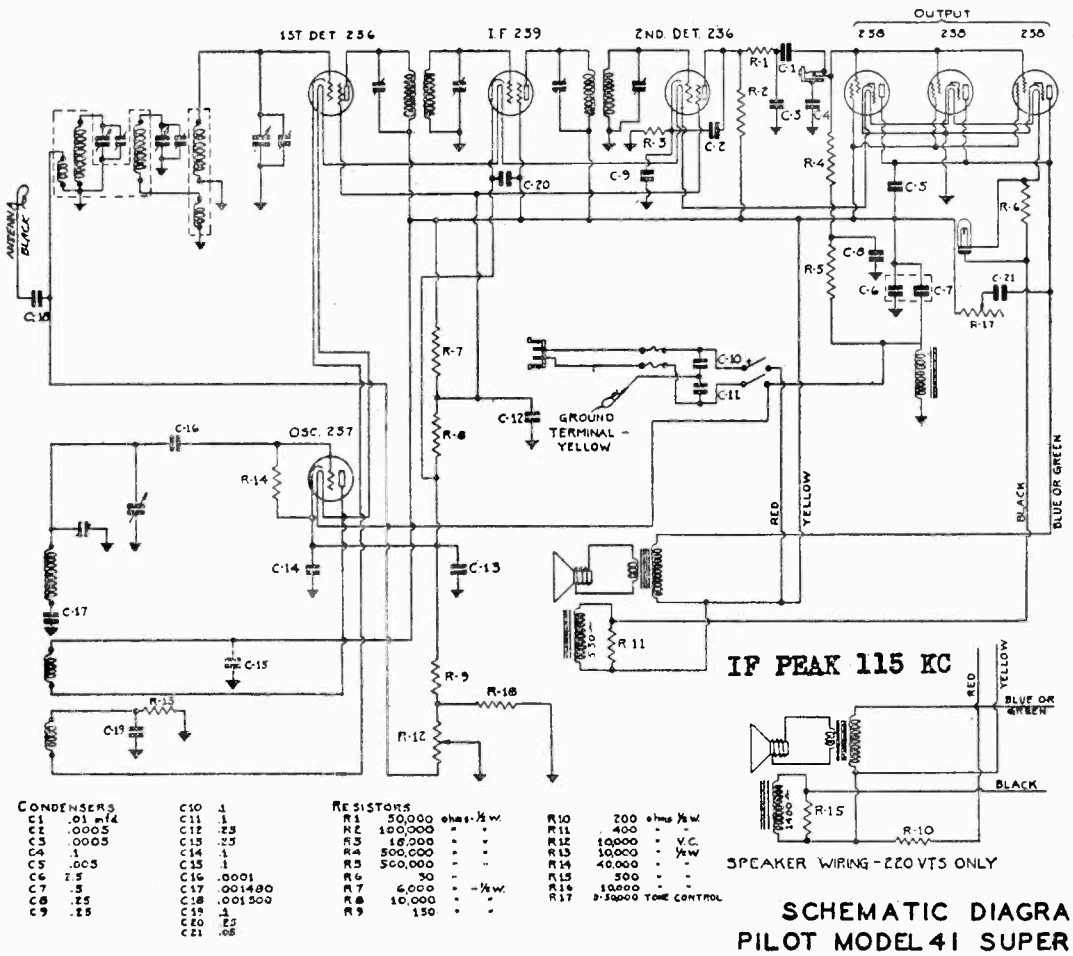
PILOT RADIO & TUBE CORP.

MODEL 41 Series
DC Dragon



CONDENSERS

C1	.01 mfd	C10	.1
C2	.0005	C11	.1
C3	.0005	C12	.25
C4	.1	C13	.25
C5	.1	C14	.1
C6	.005	C15	.1
C7	.5	C16	.0001
C8	.25	C17	.001480
C9	.25	C18	.001500
		C19	.1
		C20	.25
		C21	.05

RESISTORS

R1	50,000 ohms - ½ w.	R10	200 ohms ½ w.
R2	100,000 " "	R11	400 " "
R3	16,000 " "	R12	10,000 " V.C.
R4	500,000 " "	R13	10,000 " ½ w
R5	500,000 " "	R14	40,000 " "
R6	30 " "	R15	500 " "
R7	6,000 " - ½ w.	R16	10,000 " "
R8	10,000 " "	R17	5-50,000 TONE CONTROL
R9	150 " "		

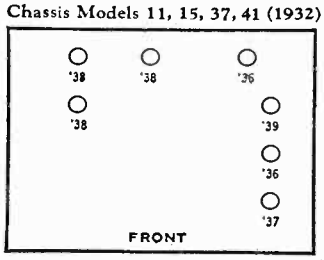
SCHEMATIC DIAGRAM
PILOT MODEL 41 SUPER HET

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

		Line Voltage — 220 D. C. — .34 Amperes								Line Voltage -- 110 D. C.					
Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	55.0	3.8
236	1st Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	1st Det.A	6.2	93	-3.8	52	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	62	-37	60	+33	*
236	2nd A Det.B	6.7	94.	-5.	75.	.05	1.7	.3	2nd A Det.B	6.2	26	-9.8	65	-4.5	0.18
		6.8	100.	-6.	92.	.15	2.8	.26		6.3	26	-10.7	51	-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	-15.1	5.0
		7.3	115.	-	143.	2.8	-11.8	10.0		6.3	85	-	103	-15.7	6.5

A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

Chassis Models 11, 15, 37, 41 (1932)



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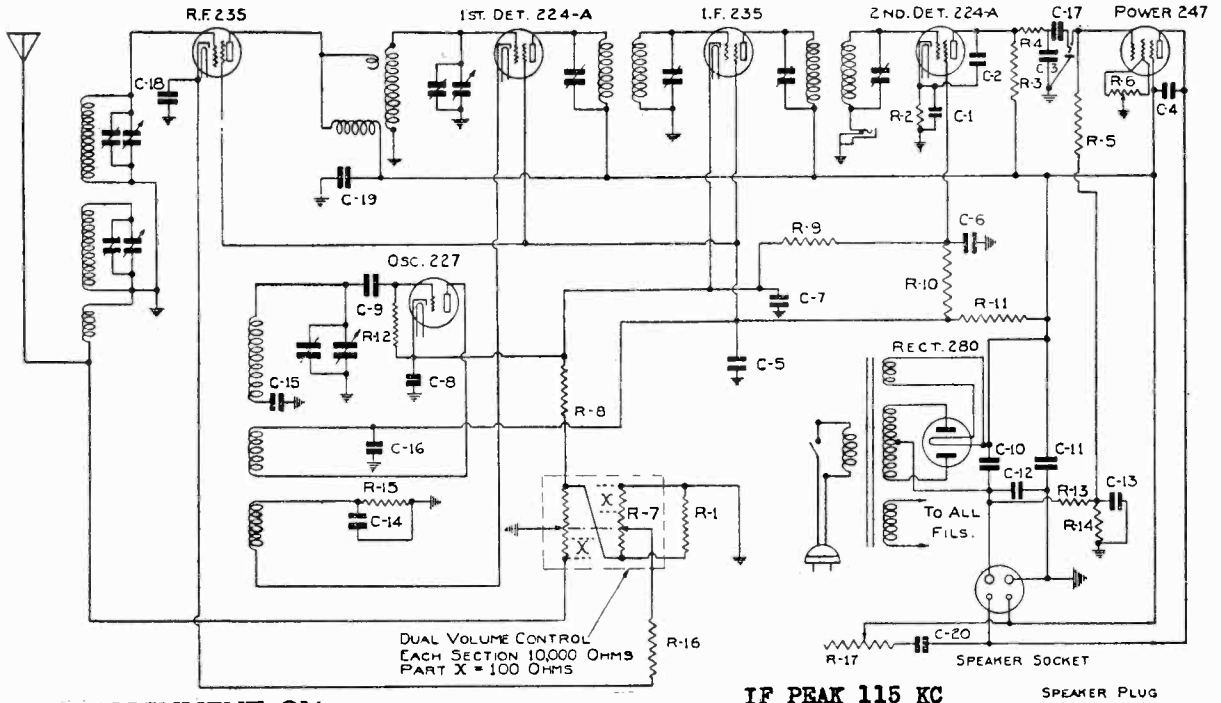
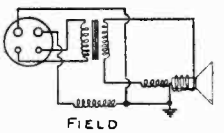
MODEL 39 Series

PILOT RADIO & TUBE CORP.



IF PEAK 115 KC

SPEAKER PLUG



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 " - ¼ W
R9 — 10,000 ohms ½ W
R10 — 10,000 " "
R11 — 14,000 " 3 W
R12 — 40,000 " ½ W
R13 — 500,000 " "
R14 — 120,000 " "
R15 — 10,000 " "
R16 — 300 " "
R17 — 050,000 " TC

RE-ALIGNMENT ON BROADCAST BAND

To re-align the I.F. and broadcast band trimmers, the service station must be equipped with a modulated oscillator and output meter. The oscillator must be able to supply a modulated output at 1,400 K.C. and 600 K.C.

To adjust the set with this equipment, the procedure is as follows:

1. Remove the chassis from the cabinet.

2. Connect the output meter across the primary of the loudspeaker input transformer. If the meter is not equipped with a multiplier, connect it across the secondary of the speaker transformer.

3. Plug the loudspeaker into the chassis.

4. Connect the output of the oscillator across the grid circuit of the first detector. In other words, clip one output lead to the control grid of the first detector and the other output lead to the chassis.

5. Adjust the oscillator to 600 K.C., tune in the 600 K.C. signal, turning down the volume control of the set, or the attentuator of the oscillator, until a normal output is registered on the output meter. Tune the set carefully to the position which gives the maximum deflection of the output meter. Then adjust the four trimmers of the I.F. transformers for maximum output.

6. Connect the output of the oscillator to the antenna and ground connection of the set. Tune the oscillator to 1,400 K.C. and turn the dial of the receiver until the signal is accurately tuned in. Then adjust the broadcast trimmer R.F. and the pre-selector trimmers until maximum output is recorded on the meter. Go over the adjustments of these trimmers several times to make sure that the circuits are properly lined up with the oscillator.

VOLTAGE TABLE FOR CHASSIS MODEL NO. 10 (A-B-F & FJ)

Type Tube	Tube Position	Fil. A.C.	Plate + to Cath. —	Cath. + to Screen Control Grid —	Grid + to Cath. —	Screen Current	Cath. Vts.	Plate Current
227	Osc. (a)	2.3	73	3.4*			3.2	5.8
	(b)	2.3	68	2.4*			36	5.4
224-A	1st (a)	2.3	225	8.4	58	.1	9.6	1.25
	Det. (b)	2.3	234	8.7	86	.18	9.8	1.85
235	R.F. (a)	2.3	237	1.7	77	.76	1.5	5.3
	(b)	2.3	214	34	75	.5	34.	.6
235	I.F (a)	2.3	234	3.3	75	.53	3.5	4.0
	(b)	2.3	216	36.	73	.11	36.	.5
224-A	2nd (a)	2.3	200+	4.1	30	.05	5.0	.12
	Det. (b)	2.3	200+	4.9	50	.04	4.5	.1
247	Power (a)	2.3	214	7.5‡	240	8.2		28
	(b)	2.3	218	7.5‡	255	8.8		33
280	Rect. (a)	4.9	590	* Too small				32.0 per anode
	(b)	4.9	590	to read.				29 per anode

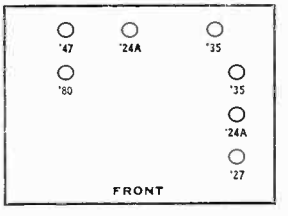
RE-ALIGNMENT

The sensitivity and selectivity of the Pilot DX Super largely depend upon the proper adjustment of the various trimmer condensers. Before sets leave the factory, these trimmers are carefully tuned and every precaution is taken to insure the permanence of the adjustments.

If a set appears to be insensitive, it is possible that rough handling in transit has changed the positions of some of the trimmers. In this case, the sensitivity can be restored by re-aligning the set. It is understood, of course, that the tubes have been checked and other tests made, as suggested in the foregoing sections, to make sure that the insensitivity is not due to other causes.

The best method of adjusting the I.F. trimmers is by means of a signal generator, or modulated oscillator, tuned to 115 K.C. The output of the oscillator is connected across the grid circuit of the first detector and the two I.F. Transformers are lined up to resonance with the 115 K.C. signal.

Chassis Models 10, 13, 35, 39 (1932)



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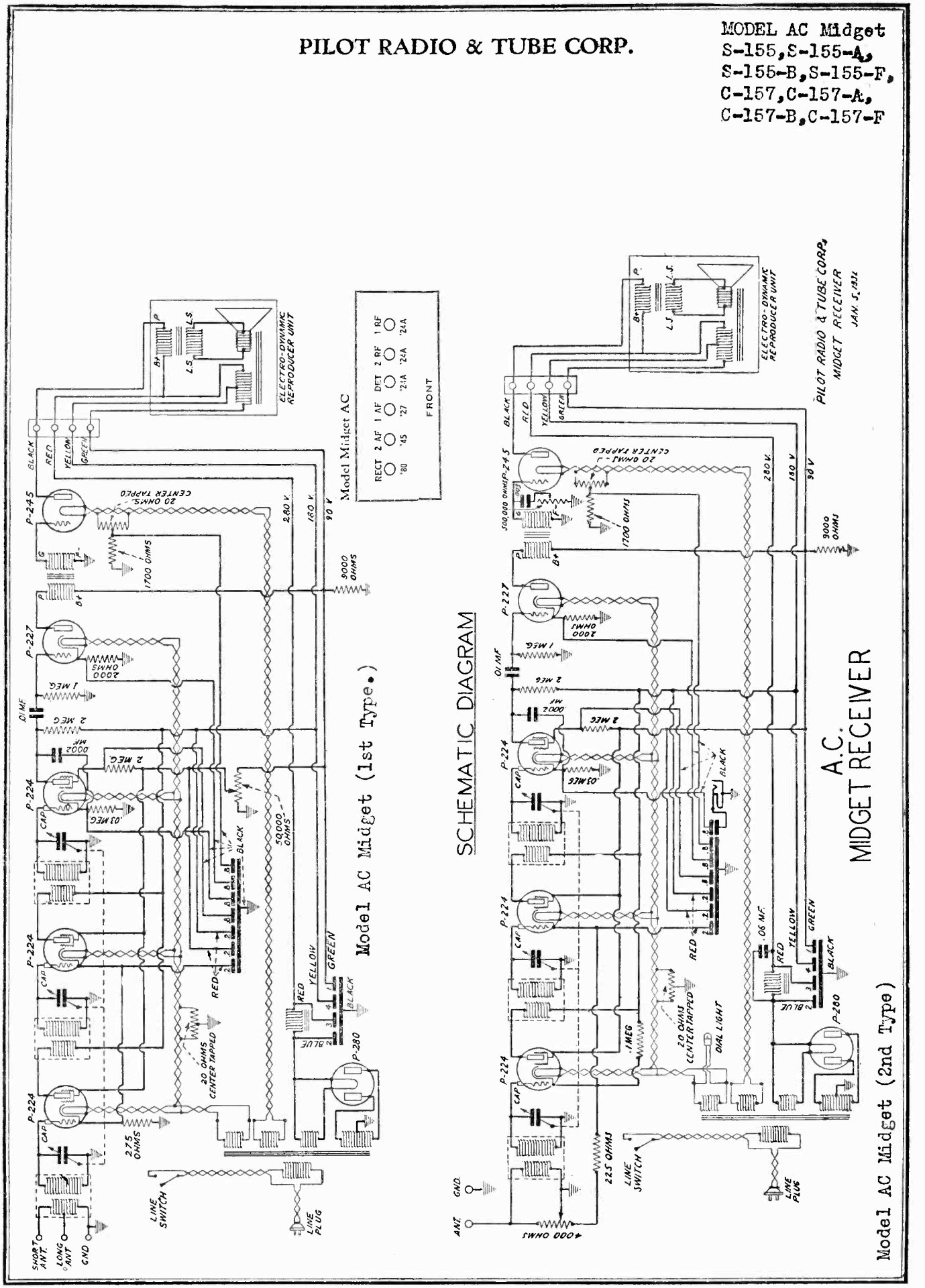
PILOT RADIO & TUBE CORP.

MODEL AC Midget
S-155, S-155-A,
S-155-B, S-155-F,
C-157, C-157-A,
C-157-B, C-157-F



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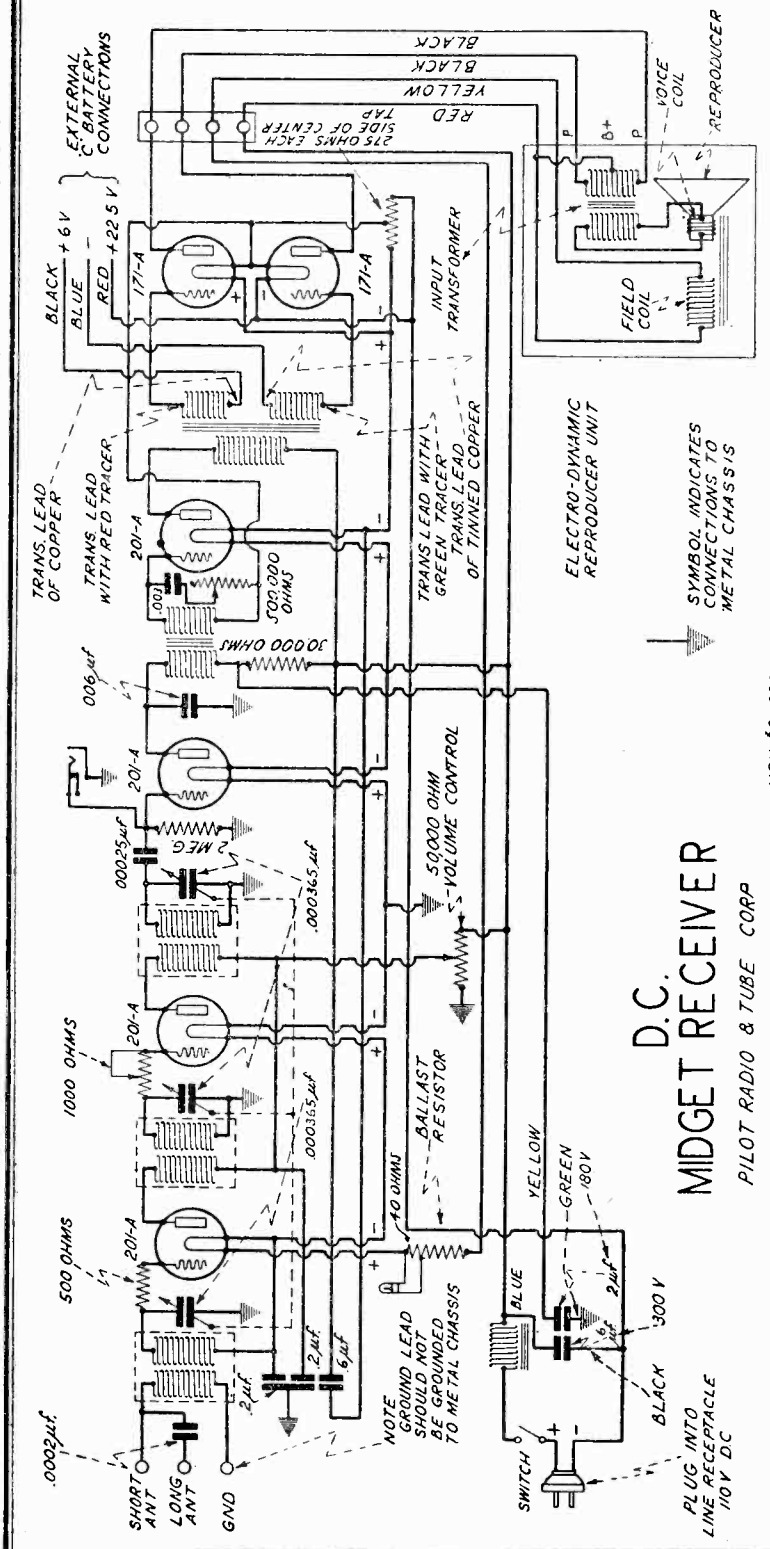
MODEL DC Midget
S-156, S-158

PILOT RADIO & TUBE CORP.



D.C. MIDGET RECEIVER

PILOT RADIO & TUBE CORP

NOV 20, 1930

OSCILLATION CONTROL

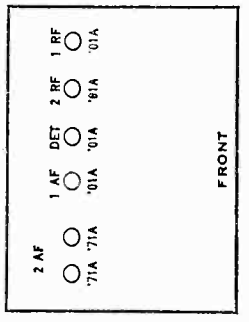
Oscillation adjustment is provided by means of the variable grid suppresser mounted in back of the main tuning condenser. The set will tend to oscillate more easily as the adjustment screw is turned in. It should be adjusted for best results with the tuning dial set at about 1000 kilocycles. In some cases greater sensitivity can be obtained by the use of 112-A tubes instead of 201-A tubes in the R.F. and detector circuits. If these are used, the grid suppressor must again be adjusted.

The dial light is a six volt flashlight bulb. It is connected across part of the ballast resistor, which is the long unit mounted on the under side of the chassis in front of the tone control.

The phonograph pick-up is connected directly across the grid leak of the detector tube.

Every direct current receiver shipped from the factory is supplied with a heavy lead cap which should be placed over the detector tube to prevent microphonic howling. Some tubes are more susceptible to howling than others, so it is a good idea to switch the 201-A's around until the quietest one is found.

Model Midget DC



SPECIAL NOTE

A slight change was made in the D.C. set. The ground binding post has been replaced by a red flexible wire 3½ feet long, to which the ground wire should be spliced. This arrangement will prevent accidental contact of the ground wire with the chassis, which always results in one or more blown out tubes. The receiver otherwise is exactly the same as before.

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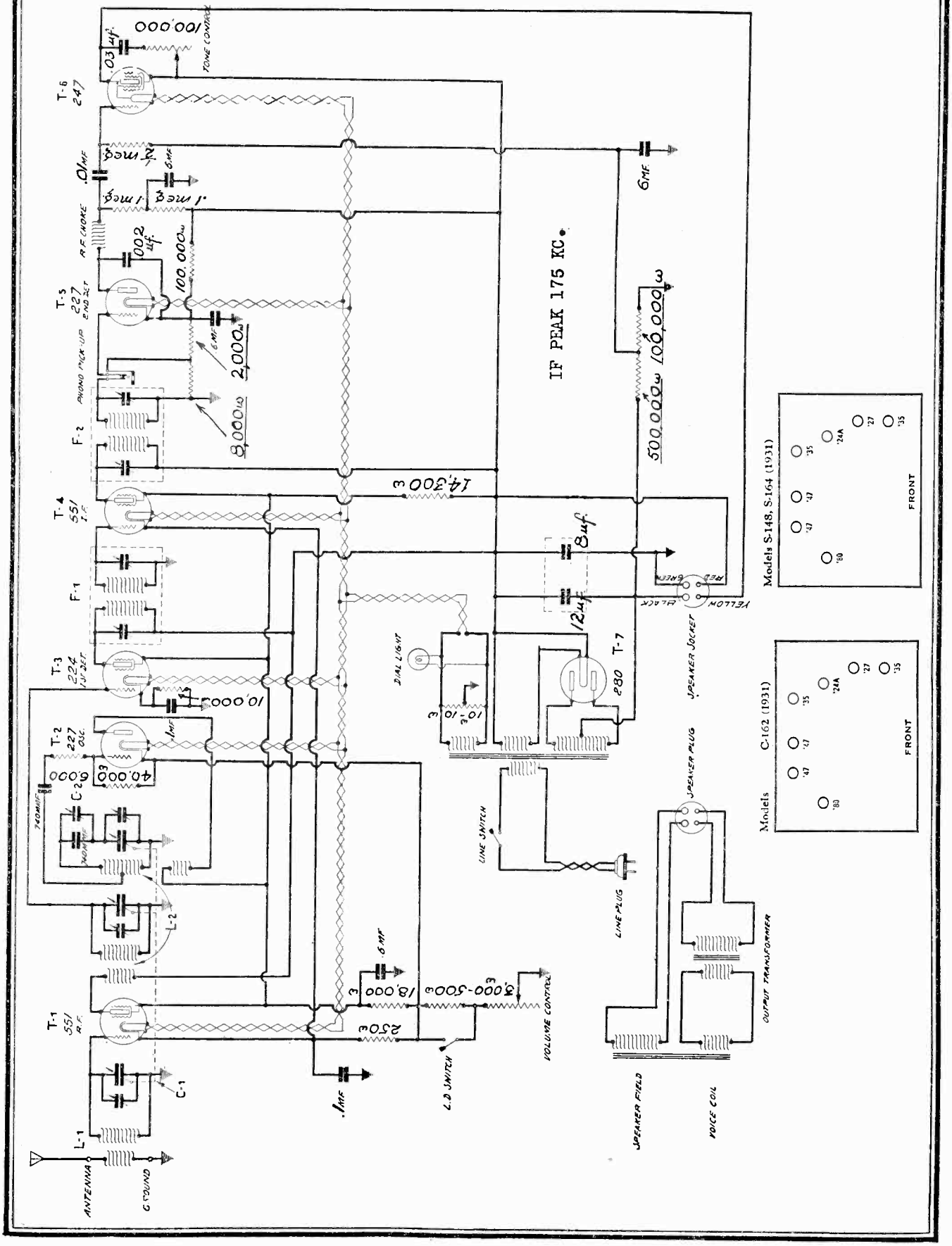
MODEL S-148,S-164
C-162,C-165

PILOT RADIO & TUBE CORP.



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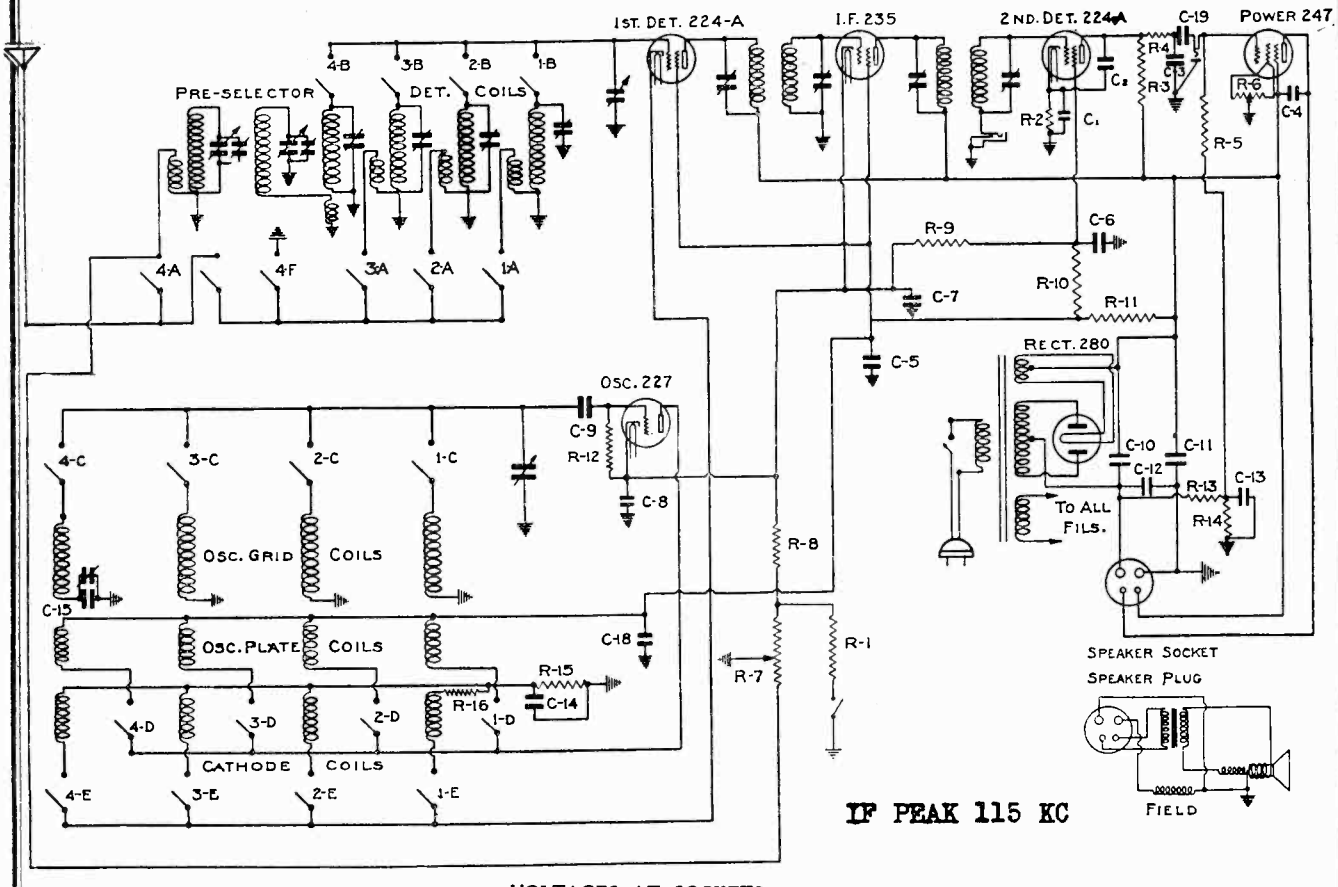
MODEL 1010
All Wave Dragon

PILOT RADIO & TUBE CORP.



VOLTAGES AT SOCKETS

As measured with a standard Weston Model 566 Tester—Line Voltage 115 Volts A.C.

Type Tube	Tube Position		A Vts.	B Vts.	C Vts.	Screen Vts.	Screen Current	Cath. Vts.	Plate Current
227	OSC	(a)	2.35	75	3.5*	.....	.....	4.	6.
		(b)	2.35	65	2.2*	.....	.....	36.	6.
224	1st DET	(a)	2.35	230	10	75	0.13	10	0.9
		(b)	2.35	236	11.5	100	0.15	11.5	1.0
235	I.F.	(a)	2.35	237	4.	80	1.95	4.	5.5
		(b)	2.35	212	36.	80	0	36	0.2
224	2nd DET	(a)	2.35	200†	5.	40	0.05	5.	0.1
		(b)	2.35	200†	7.5	65	0.07	7.5	0.13
247	Power	(a)	2.35	210	7.5‡	245	6.5	0	31.
		(b)	2.35	215	7.5‡	250	7.2	0	34.
280	Rect.	(a)	4.8	600					31.0 per anode
		(b)	4.8	600					29.0 per anode

(a)—Volume Control at Maximum.
(b)—Volume Control at Minimum.
*—Only when set is tuned to higher than 700 KC on B.C. band. No voltage reading on short wave bands.
†—On 1000 Volt Scale.
‡—On 250 Volt Scale. Not true bias but reading due to series resistance.

CONDENSERS

C1—.25 mfd.	C10—8.0
C2—.0005	C11—8.0
C3—.0005	C12—.035
C4—.01	C13—.25
C5—.25	C14—.10
C6—.25	C15—.00148
C7—.25	C18—.1
C8—.10	C19—.01
C9 —.0001 mfd.	

RESISTORS

R1— 6,000 ohms ½ W.	R9 — 10,000 ohms ½ W.
R2— 40,000 " ½ W.	R10— 10,000 " ½ W.
R3—250,000 " ½ W.	R11— 14,000 " 3 W.
R4— 50,000 " ½ W.	R12— 40,000 " ½ W.
R5—500,000 " ½ W.	R13—500,000 " ½ W.
R6—Center tap resistor	R14—120,000 " ½ W.
R7—10,000 ohms	R15— 10,000 " ½ W.
R8 — 250 ohms ½ W.	R16— 500 " ½ W.

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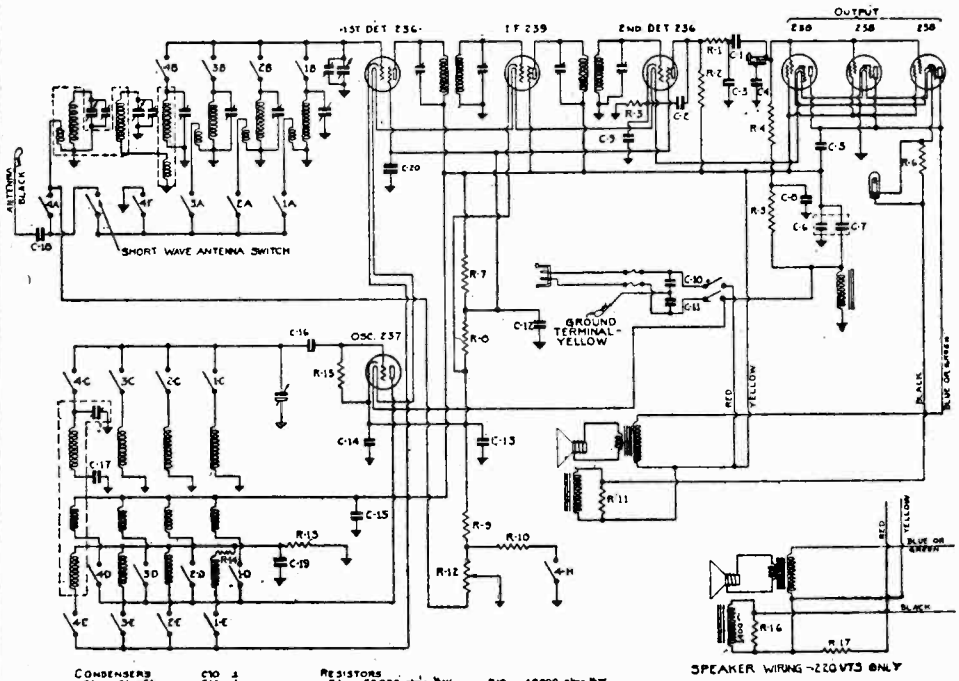
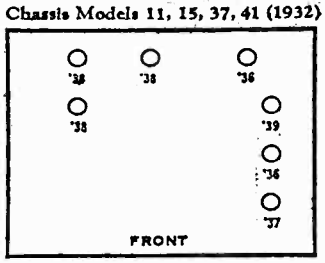
MODEL 11 Dragon DC.

PILOT RADIO & TUBE CORP.



SCHEMATIC DIAGRAM
DRAGON MODEL 11 SUPER HET

Chassis Models 11, 15, 37, 41 (1932)



IF PEAK 115 KC

VOLTAGES AT SOCKETS AS MEASURED WITH MODEL 566 WESTON TESTER

			Line Voltage -- 220 D. C. -- .34 Amperes								Line Voltage -- 110 D. C.					
Type of Tube	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Screen Current	Cath.+ to Fil.-	Plate Current	Tube Position	Fil.	Plate+ to Cath.-	Cath.+ to Grid-	Screen+ to Cath.-	Cath.+ to Fil.-	Plate Current
237	Osc.A	6.2	128.	-5.	-	-	19.3	9.2	Osc.A	6.2	93	-1.3	-	12.0	7.3
	B	6.3	78.	0	-	-	64.0	7.0	B	6.3	55	-0.1	-	55.0	3.8
236	1st Det.A	5.2	120.	-9.6	70.	.05	18.8	5.0	1st Det.A	6.2	93	-3.8	52	7.0	3.6
	B	5.3	130.	-7.3	93.	.03	14.0	3.7	B	6.3	96	-3.9	67	5.7	3.4
239	I.F.A	6.2	130.	-4.8	130.	4.8	.8	10.0	IF A	6.2	95	-2.4	95	-0.3	5.5
	B	6.3	90.	-50.	90.	.01	52.0	.01	B	6.3	62	-37	60	+33	*
236	2nd A	6.7	94.	-5.	75.	.05	1.7	.3	2nd A	6.2	26	-9.8	65	-4.5	0.18
	Det.B	6.8	100.	-6.	92.	.15	2.8	.26	Det.B	6.3	26	-10.7	51	-4.8	0.2
238	Out-A	7.2	118.	-	140.	1.5	-9.4	7.5	Out-A	6.2	85	-	100	-15.1	5.0
	put B	7.3	115.	-	143.	2.8	-11.8	10.0	put B	6.3	85	-	103	-15.7	6.5

A - Vol. control maximum. B.- Vol. control minimum. Vm return on K.
Readings all taken at approximately 1400 kilocycles.

RE-ALIGNING THE SHORT WAVE BANDS

To re-align the short-wave bands, the service station should be equipped with a short-wave signal generator or oscillator, supplying a modulated output at 12,000 KC., 9,000 KC. and 3,500 KC. The first band is lined up at 12,000 KC., the second band at 9,000 KC. and the third band at 3,500 KC. In each case, the detector trimmer is adjusted to give best sensitivity. The method is the same on each band and may be described as follows:- MICROPHONIC HOWL - may be due to:

1. Microphonic tubes. Replace all tubes with tested tubes.
2. Oscillation. Locate and remove cause.
3. Vibration of gang condenser. Check the rubber mountings and see that the gang condenser is properly cushioned. Make sure that the dial or dial shaft is not touching the cabinet or escutcheon.

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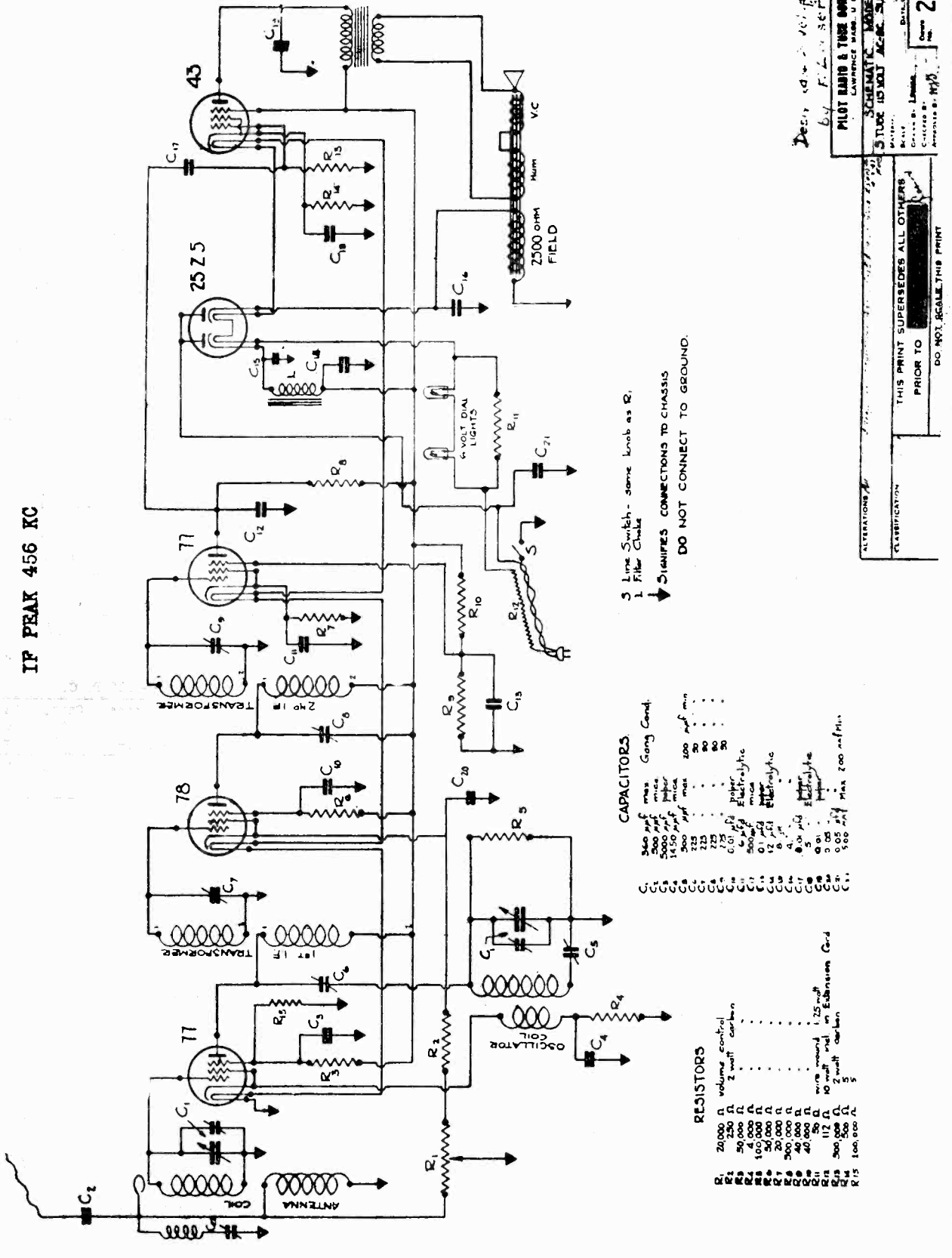
MODEL B-2
Standard.

PILOT RADIO & TUBE CORP.



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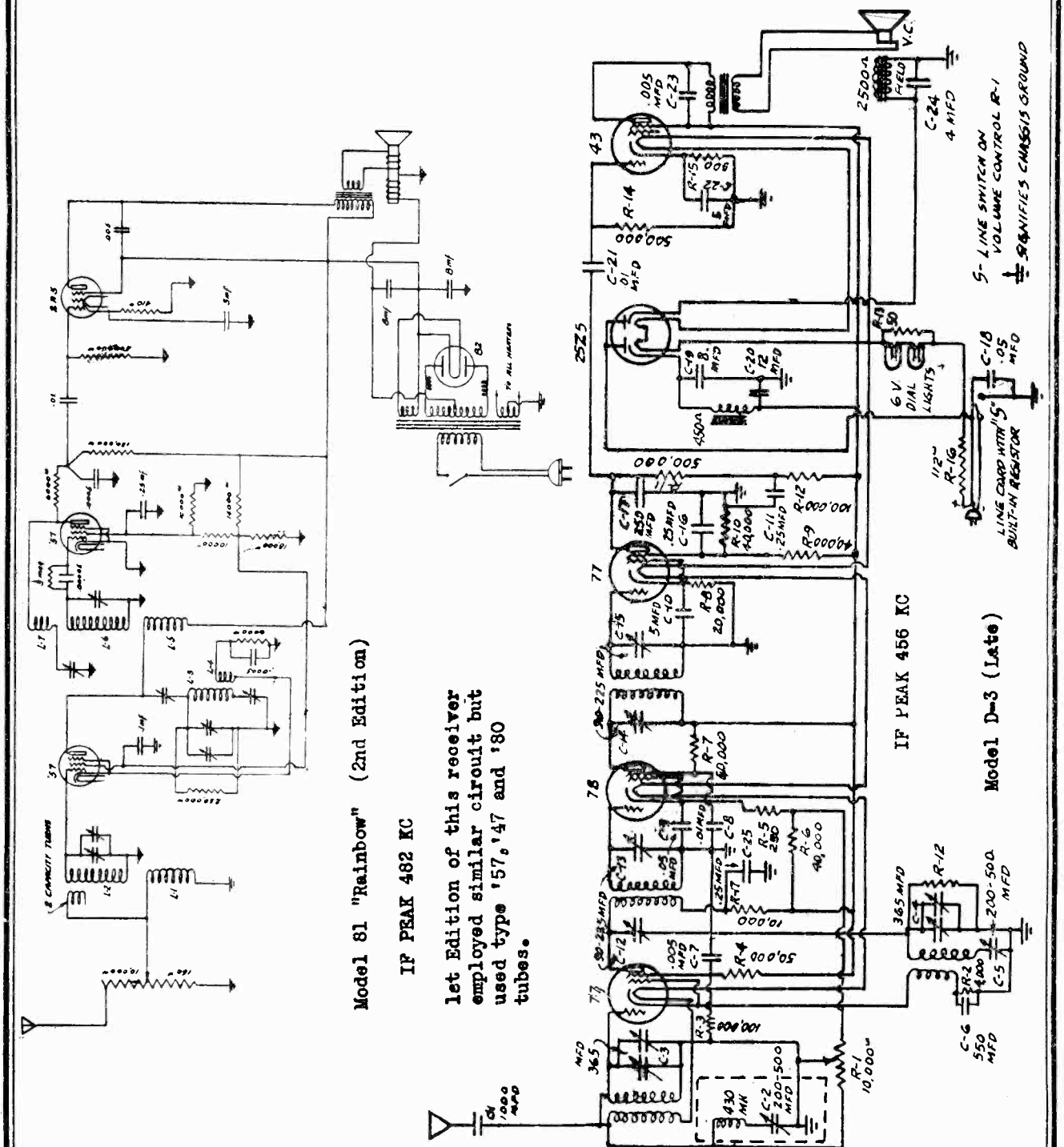
PILOT RADIO & TUBE CORP.

MODEL 81 Rainbow
2nd Edition
MODEL D-3 AC-DC
Late



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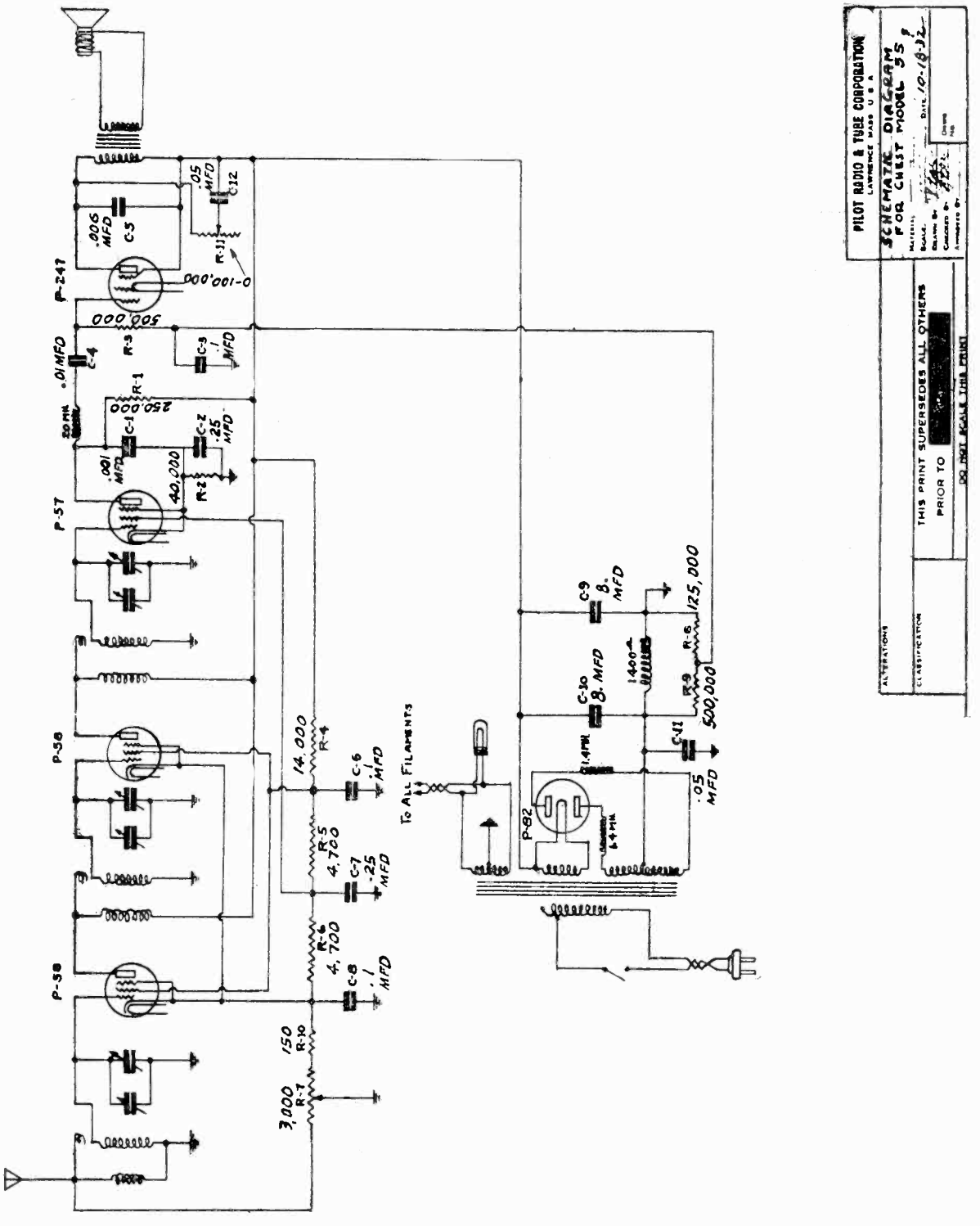
MODEL 55
Capt. Kidd
Chest

PILOT RADIO & TUBE CORP.



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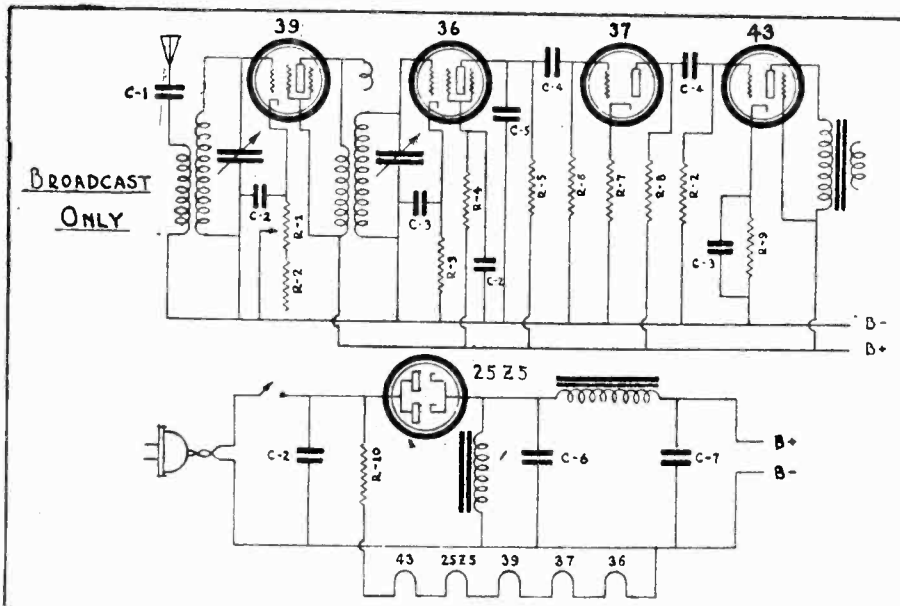
MODEL 49-A
MODEL 549

PLAZA MUSIC CO.



-: LEGEND :-

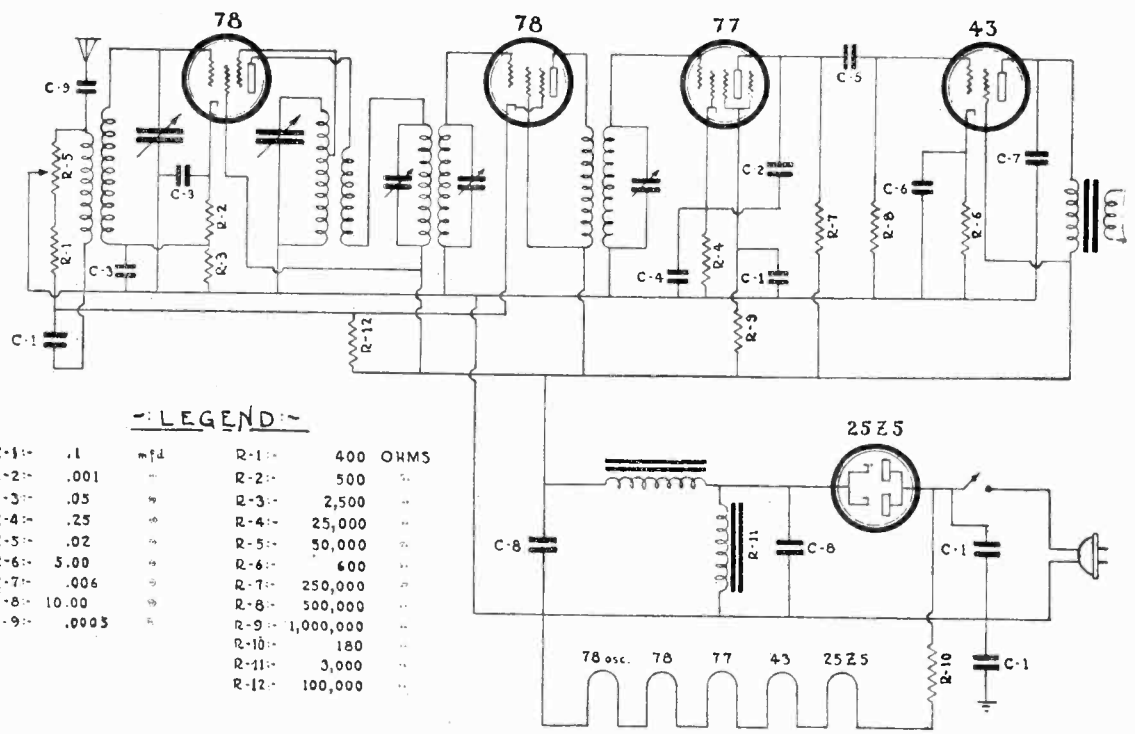
C-1 :-	.002	mfd
C-2 :-	.1	"
C-3 :-	5.	"
C-4 :-	.01	"
C-5 :-	.0005	"
C-6 :-	8.	"
C-7 :-	4.	"

5 TUBE T.R.F.

MODEL 49-A

DATE:-4-22-33

R-1 :-	400	OHMS
R-2 :-	100,000	"
R-3 :-	30,000	"
R-4 :-	5,000,000	"
R-5 :-	350,000	"
R-6 :-	250,000	"
R-7 :-	3,000	"
R-8 :-	50,000	"
R-9 :-	600	"
R-10 :-	180	"



-: LEGEND :-

C-1 :-	.1	mfd	R-1 :-	400	OHMS
C-2 :-	.001	"	R-2 :-	500	"
C-3 :-	.05	"	R-3 :-	2,500	"
C-4 :-	.25	"	R-4 :-	25,000	"
C-5 :-	.02	"	R-5 :-	50,000	"
C-6 :-	5.00	"	R-6 :-	600	"
C-7 :-	.006	"	R-7 :-	250,000	"
C-8 :-	10.00	"	R-8 :-	500,000	"
C-9 :-	.0005	"	R-9 :-	1,000,000	"
			R-10 :-	180	"
			R-11 :-	3,000	"
			R-12 :-	100,000	"

IF PEAK 456 KC

5 TUBE SUPER

456 K.C.

DRAWING:-439 DATE:-3-29-33

MODEL 549

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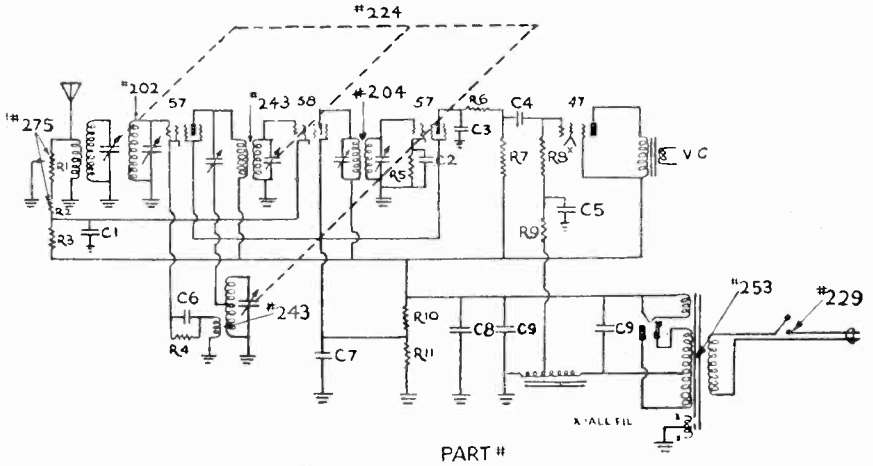
MODEL 711 Super
MODEL 711 Junior
MODEL 6 Tube Long Wave

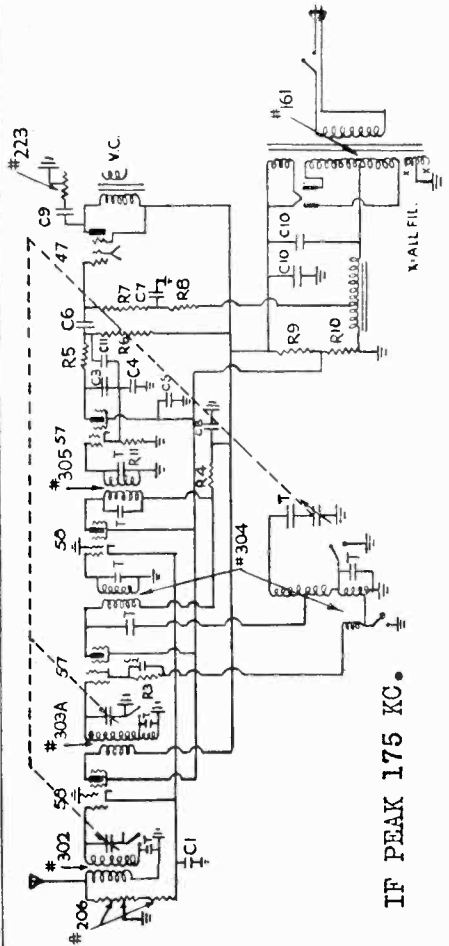
PLAZA MUSIC CO.



R1	15 000Ω	C1 .1 MFD.	PART #
R2	250Ω	C2 .1 MFD	145 BS - Speaker
R3	100 000Ω	C3 .001 MFD.	227 - Dial
R4	3500Ω	C4 .015 MFD	278 - Tube shield only
R5	35 000Ω	C5 .1 MFD.	276 " " Base
R6	11 000Ω	C6 .002 MFD	
R7	250 000Ω	C7 .1 MFD.	
R8	500 000Ω	C8 .1 MFD.	
R9	500 000Ω	C9 8. MFD.	
R10	25 000Ω		
R11	21 000Ω		

IF PEAK 175 KC.

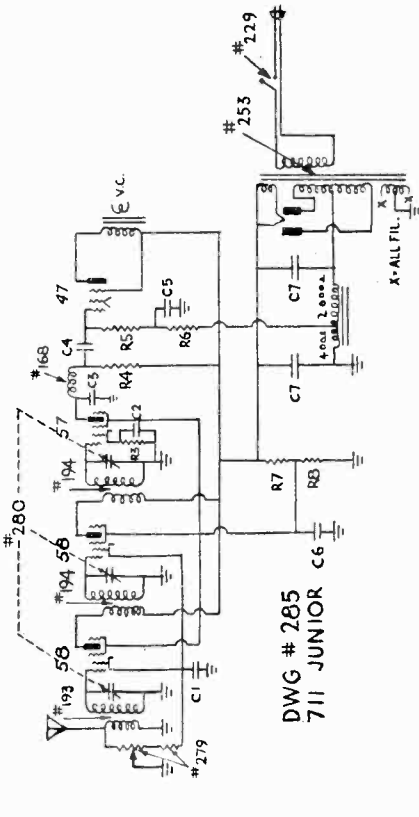
711 5 TUBE SUPER
DWG. # 286



IF PEAK 175 KC.

R3	7000Ω ¼w.	C1 .25 MFD.	PART #
R4	10000Ω ½w.	C2 .001 MFD.	212 - Dial and Pilot Light Assembly
R5	25000Ω ½w.	C3 .0005 MFD.	126F - Speaker
R6	150000Ω 1w.	C4 .5 MFD.	227 - Tube Shields Only
R7	500000Ω ½w	C5 .5 MFD.	226 " " Base
R8	100000Ω ½w.	C6 .015 MFD	334 Taden Trimmer (T)
R9	21000Ω 3w.	C7 .25 MFD.	
R10	15000Ω 1w.	C8 .1 MFD.	
R11	25000Ω ½w.	C9 .05 MFD.	
		C10 8. MFD	
		C11 .00025 MFD.	

6 TUBE LONG WAVE
DWG. # 335



DWG # 285
711 JUNIOR

R3 - 35000Ω	C1 .1 MFD.	PART #
R4 - 250000Ω	C2 .1 "	145-BS - Speaker
R5 - 500000Ω	C3 .001"	227 - Dial
R6 - 500000Ω	C4 .015 "	277 - Tube Shield Only
R7 - 25000Ω	C5 .1 "	276 - " " Base
R8 - 32000Ω	C6 .1 "	239 - Tone Control
	C7 8. "	284 - Switch & Vol. Control

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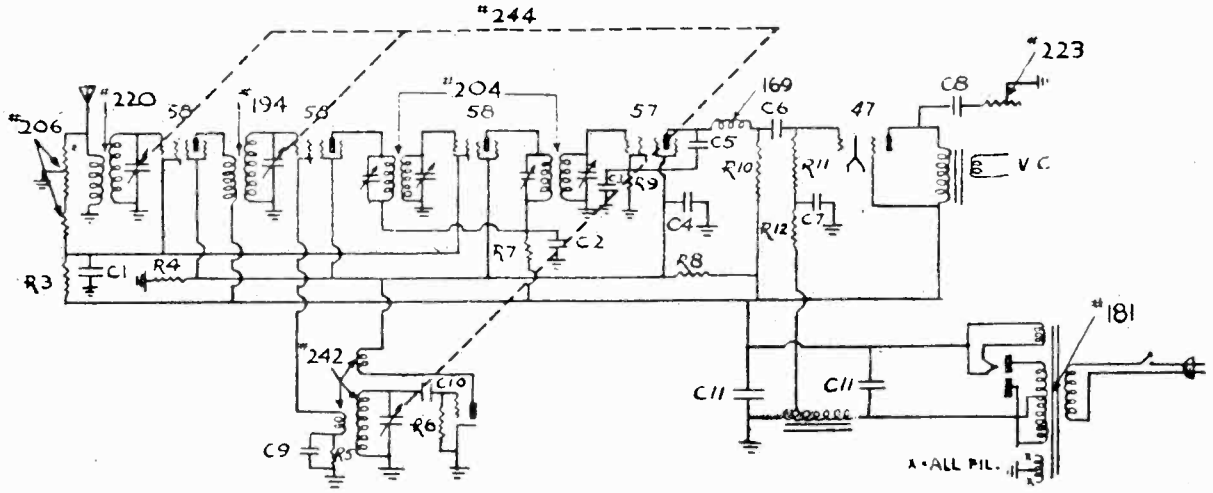
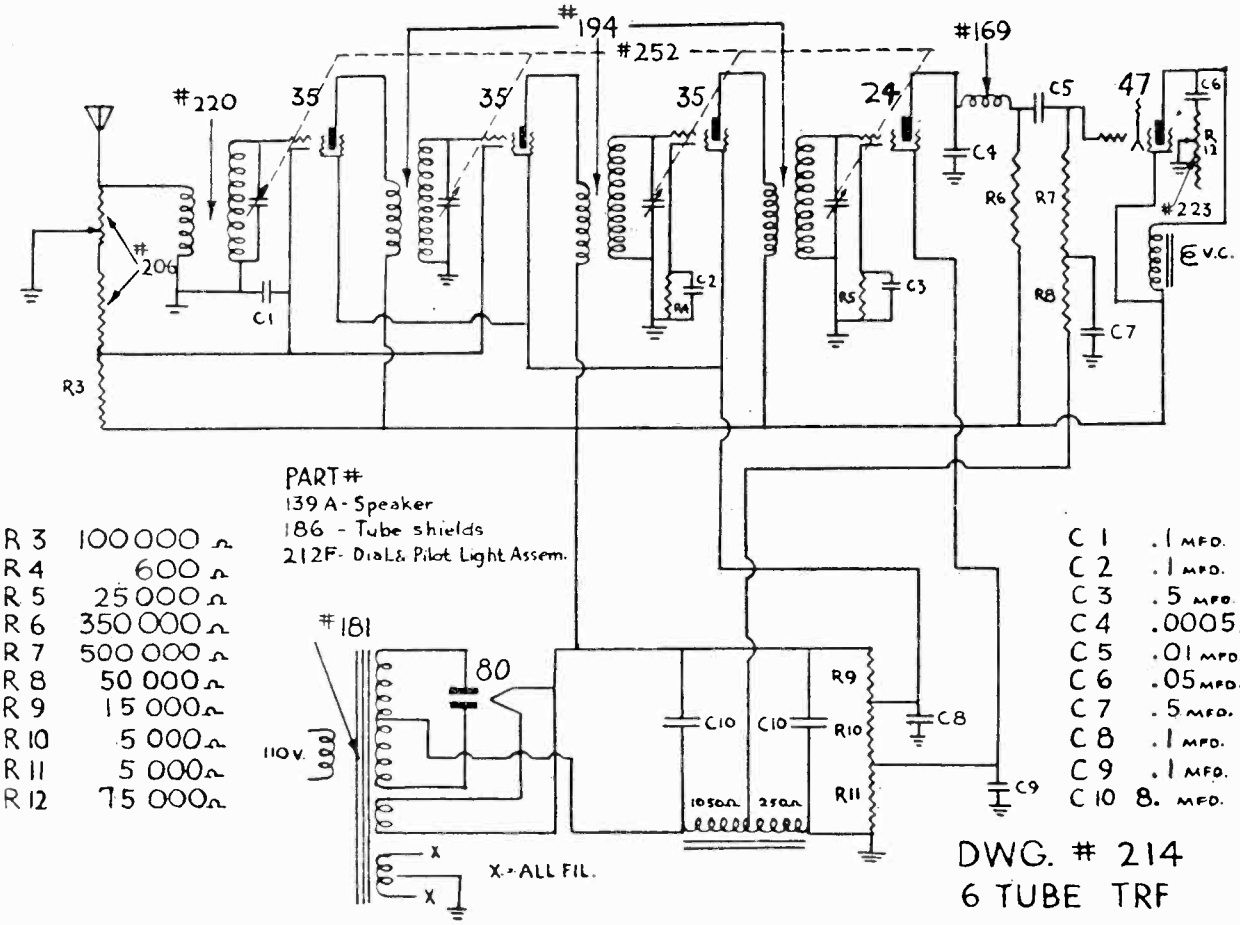
PLAZA MUSIC CO.

MODEL 6 Tube TRF
MODEL 7 Tube Super



R3	100 000 Ω 1w.	C1 .1 MFD.	PART #
R4	17 000 Ω 1w.	C2 .1 MFD.	126 S - Speaker
R5	3 500 Ω ½w.	C3 .5 MFD.	278 - Tube Shields Only
R6	100 000 Ω ½w.	C4 .5 MFD	276 - " " Bases
R7	1 000 Ω ½w.	C5 .0005 MFD.	212 F - Dial and Pilot Lamp Assembly
R8	11 000 Ω 3w.	C6 .015 MFD.	
R9	35 000 Ω ½w.	C7 .5 MFD.	
R10	250 000 Ω ½w.	C8 .05 MFD.	DWG. # 330
R11	500 000 Ω ½w.	C9 .1 MFD.	
R12	100 000 Ω ½w	C10 .00009 MFD.	
		C11 8. MFD.	I.F. PEAK 175 KC.



PART #
139 A - Speaker
186 - Tube shields
212F - Dial & Pilot Light Assem.

R 3	100 000 Ω
R 4	600 Ω
R 5	25 000 Ω
R 6	350 000 Ω
R 7	500 000 Ω
R 8	50 000 Ω
R 9	15 000 Ω
R 10	5 000 Ω
R 11	5 000 Ω
R 12	75 000 Ω

C 1	.1 MFD.
C 2	.1 MFD.
C 3	.5 MFD.
C 4	.0005 MFD.
C 5	.01 MFD.
C 6	.05 MFD.
C 7	.5 MFD.
C 8	.1 MFD.
C 9	.1 MFD.
C 10	8. MFD.

DWG. # 214
6 TUBE TRF

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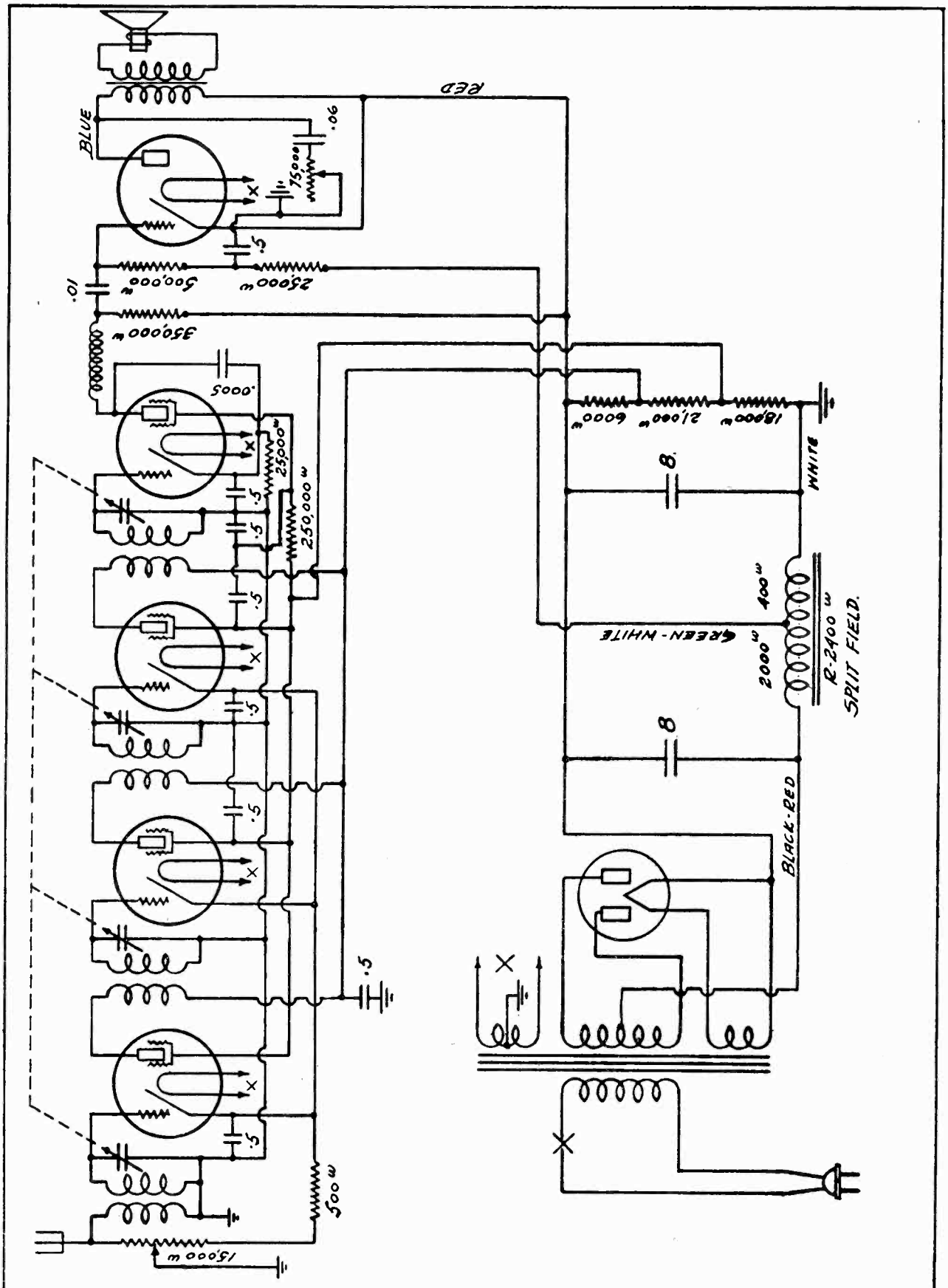
MODEL 24 Standard

PLAZA MUSIC CO.



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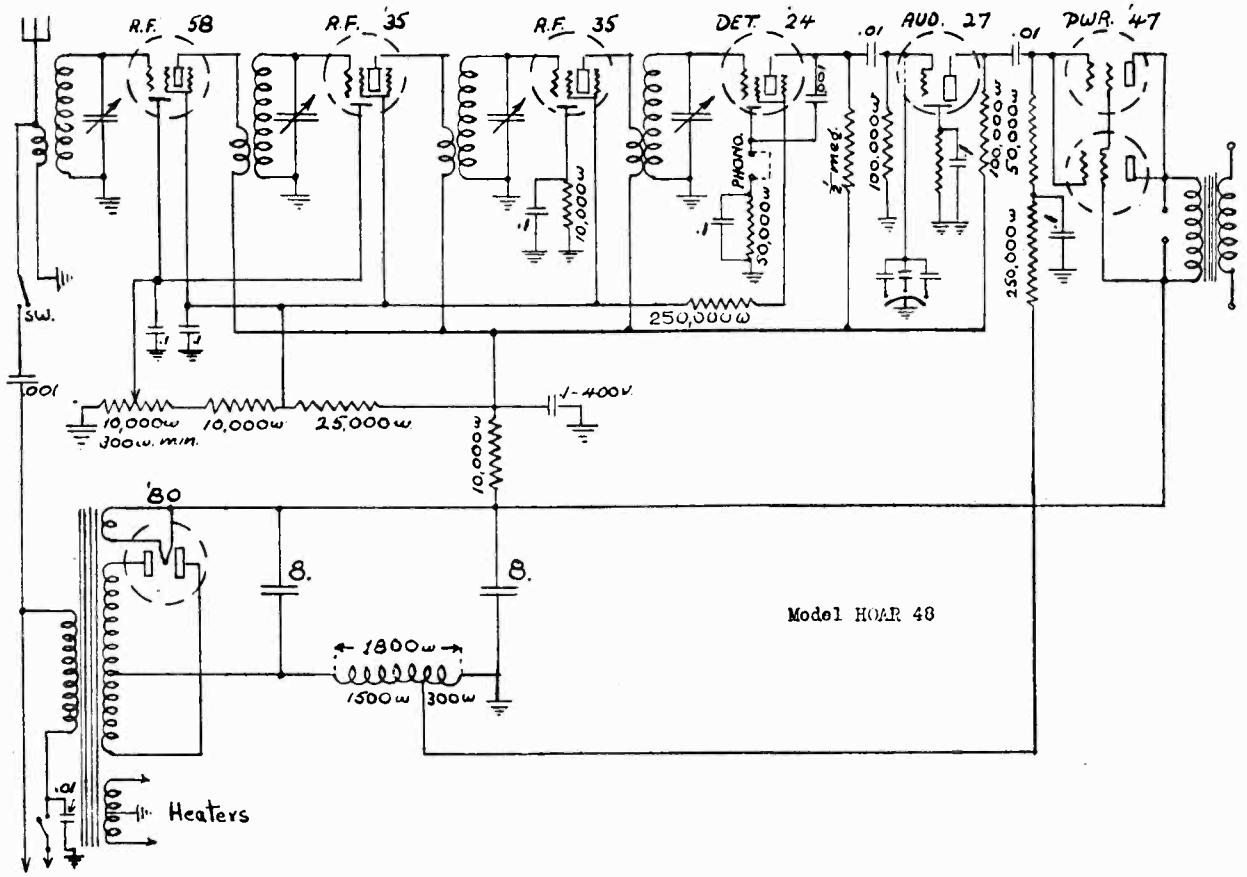
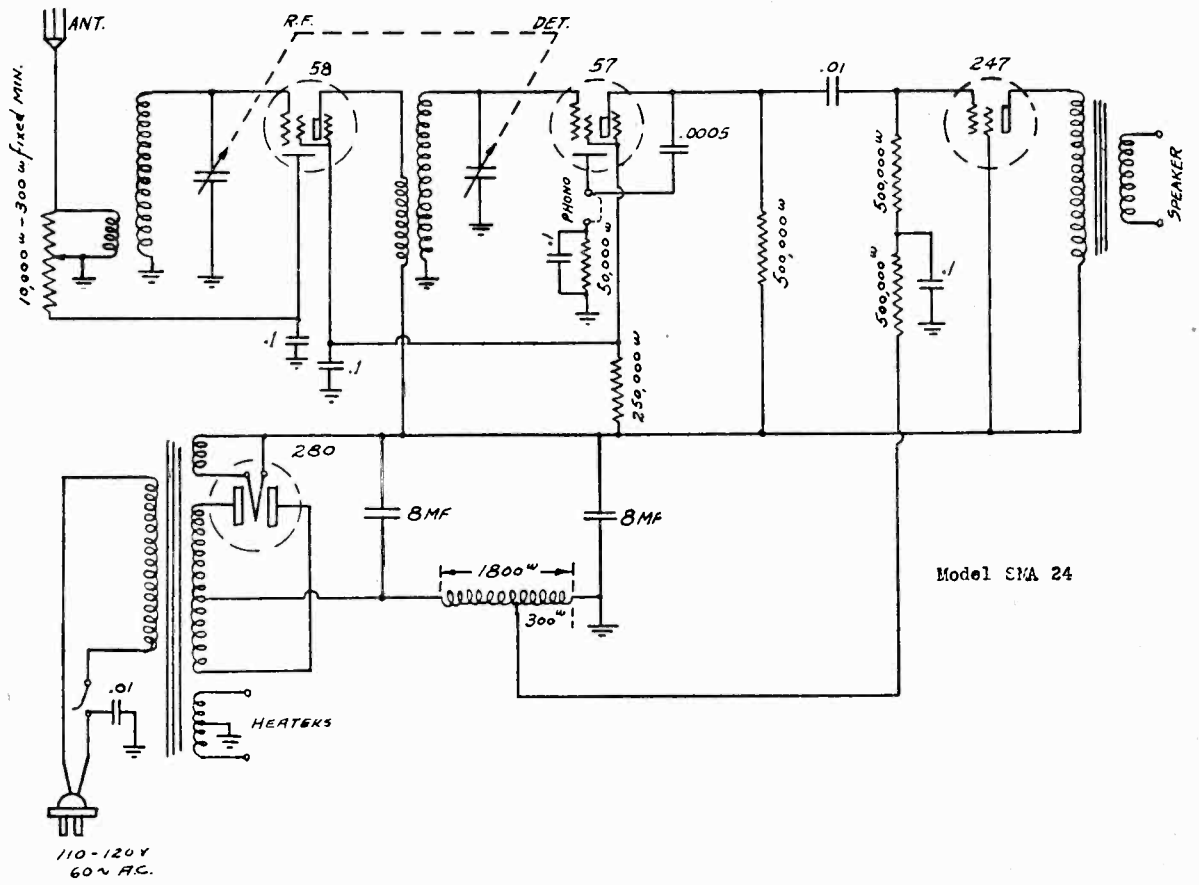
RADIO CHASSIS, INC.

MODEL HOAR 48
MODEL SMA 24





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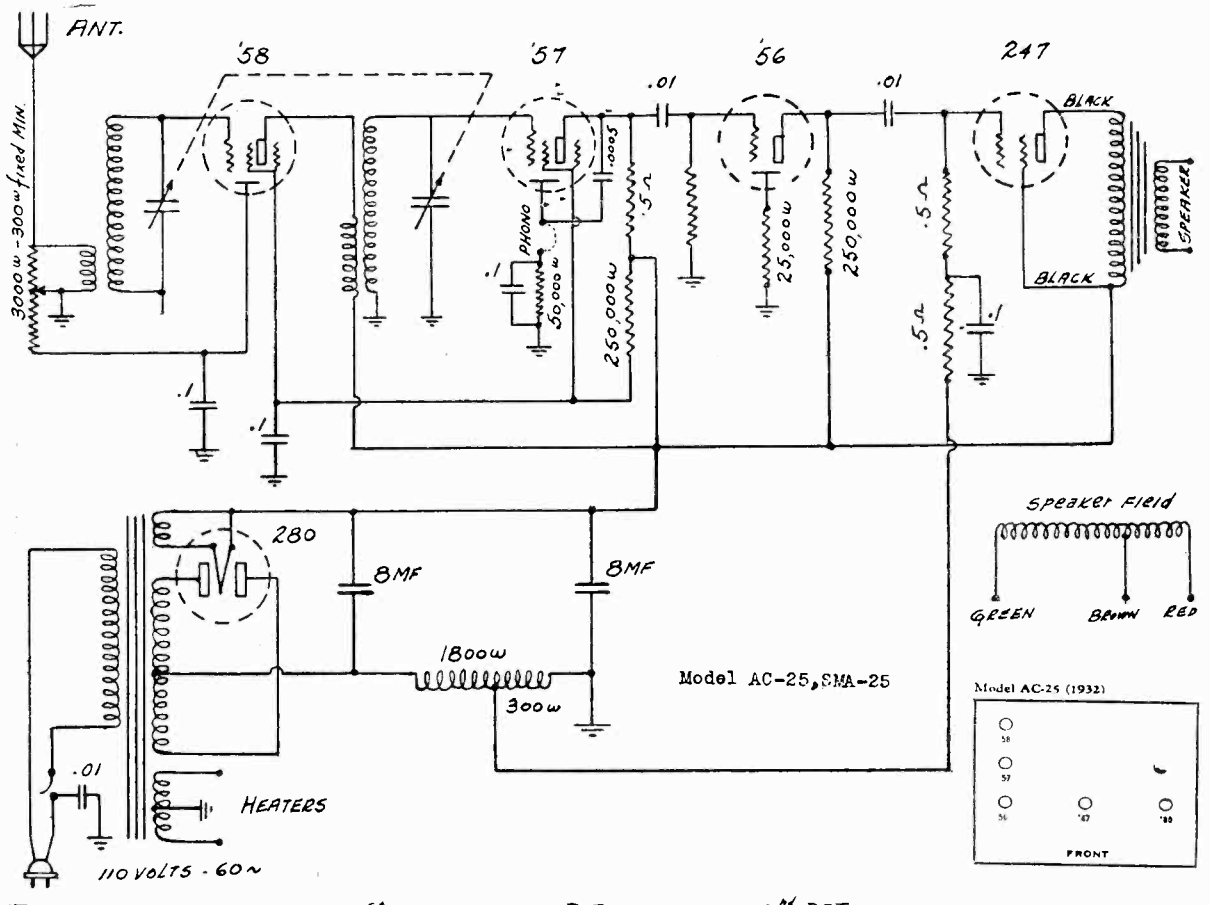
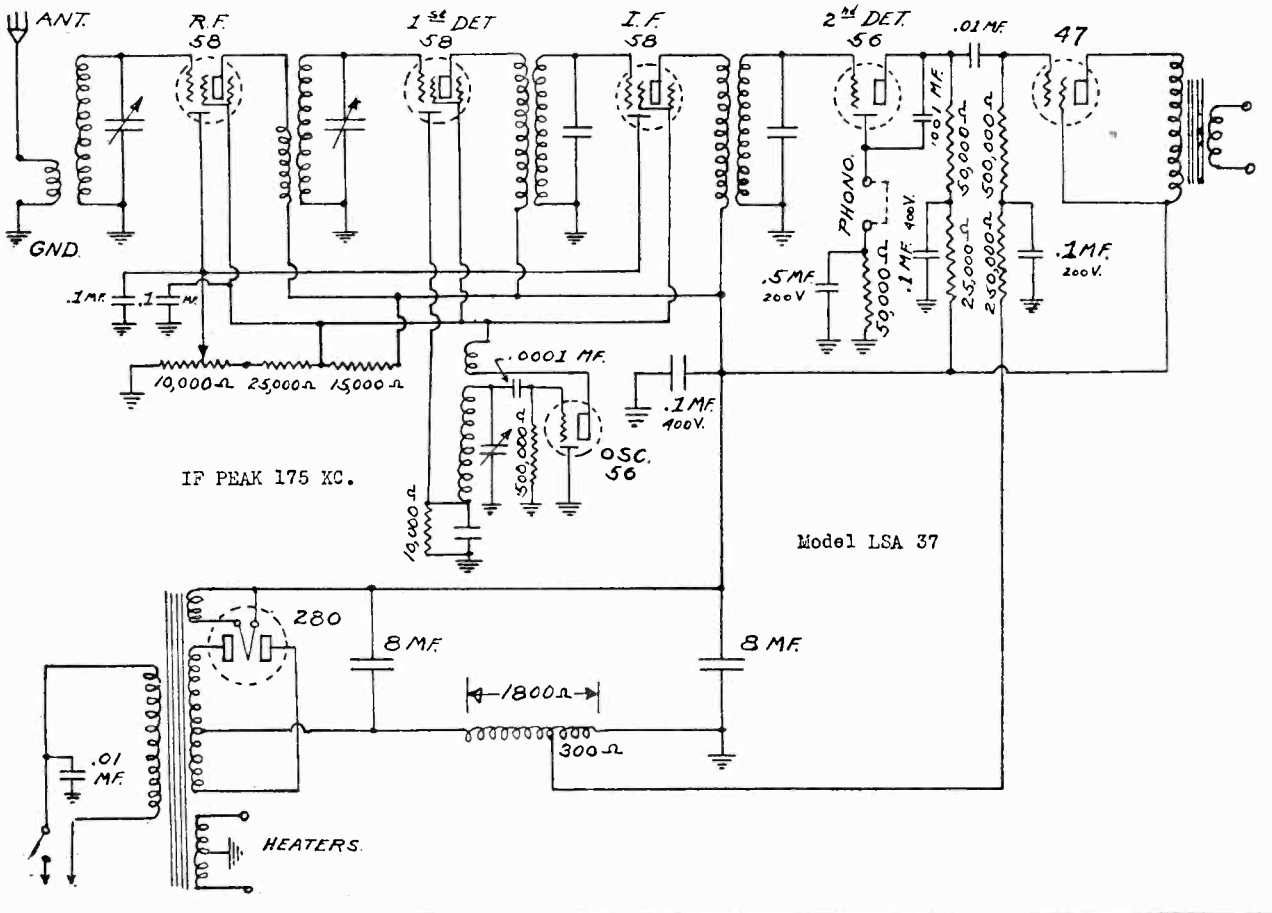
MODEL LSA 37
MODEL AC-25, SMA-25

RADIO CHASSIS, INC.





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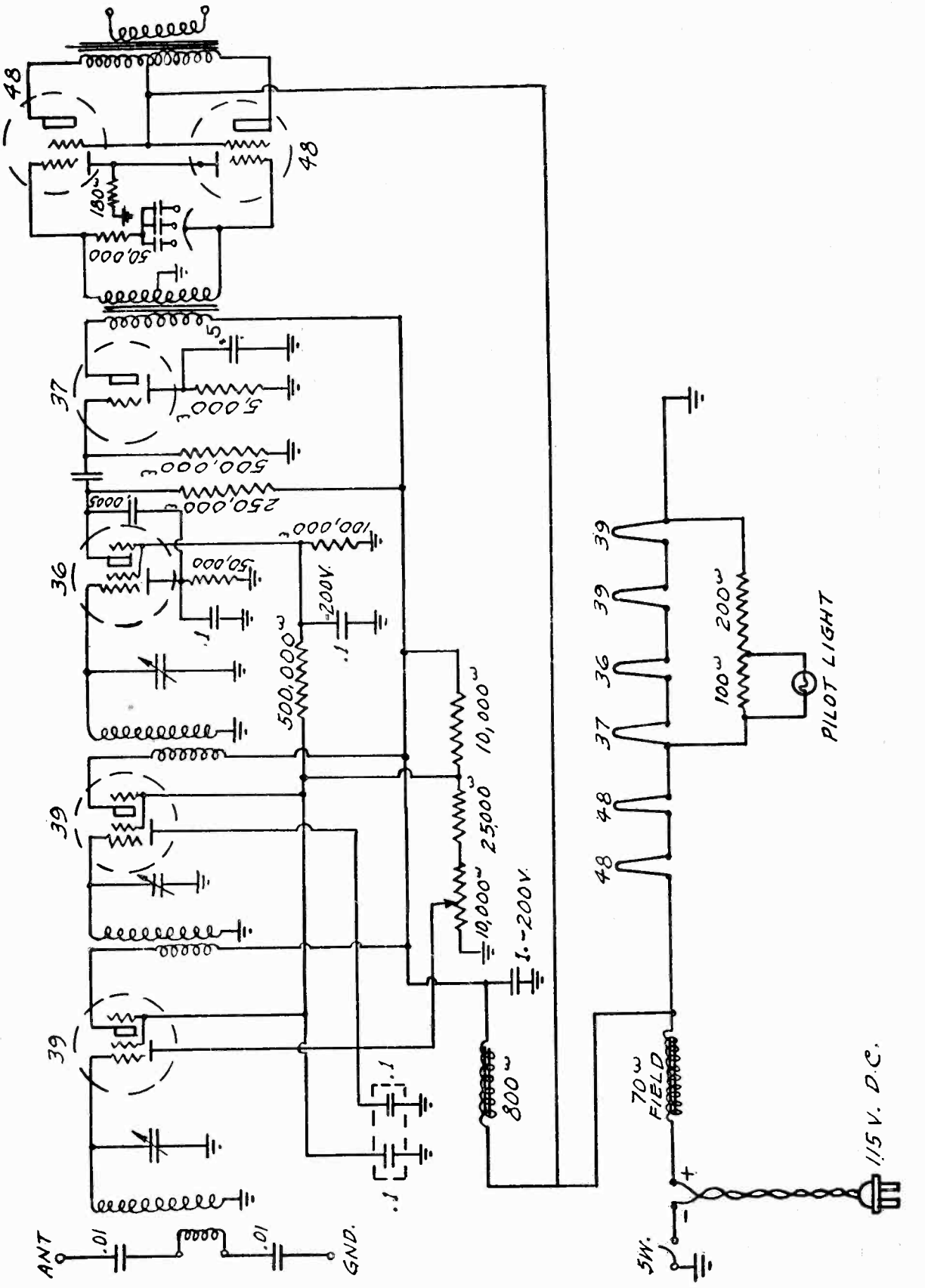
RADIO CHASSIS, INC.

MODEL SDC-36



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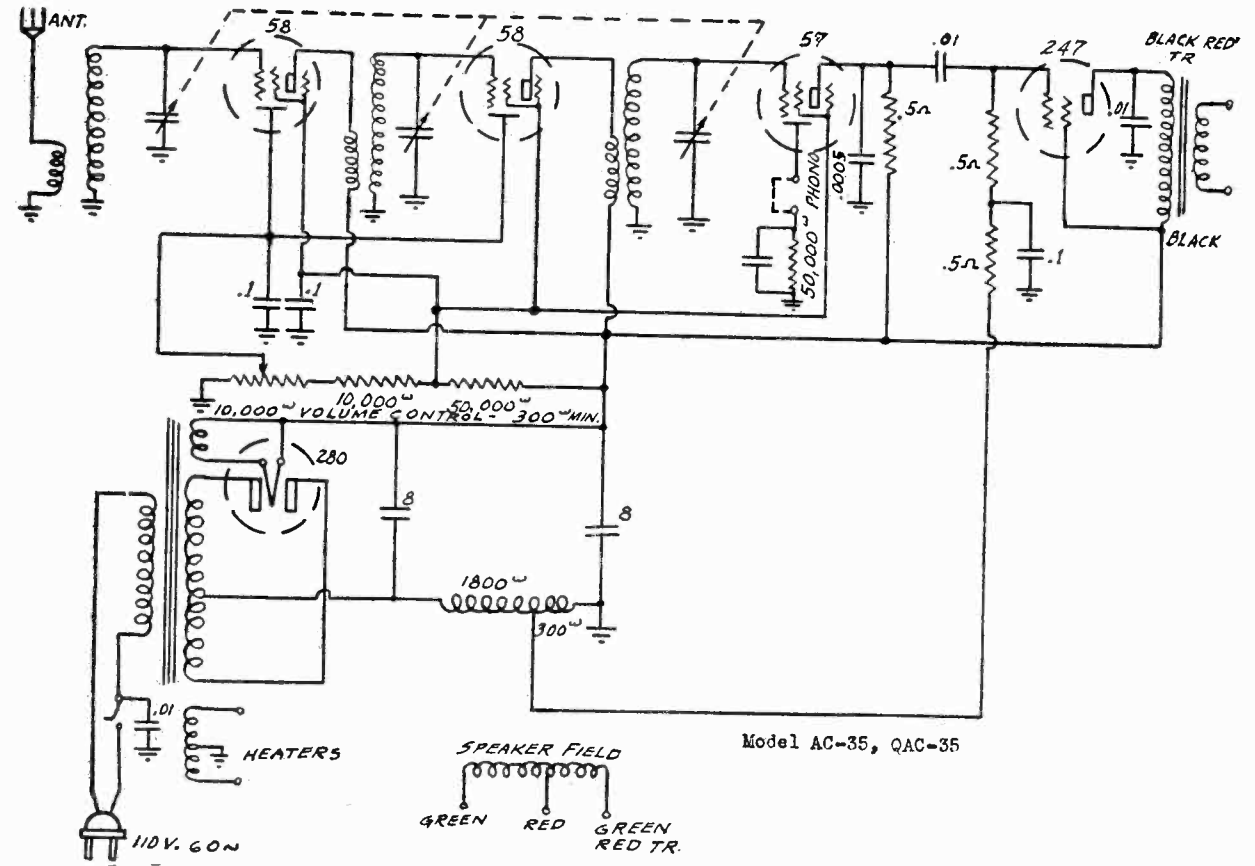
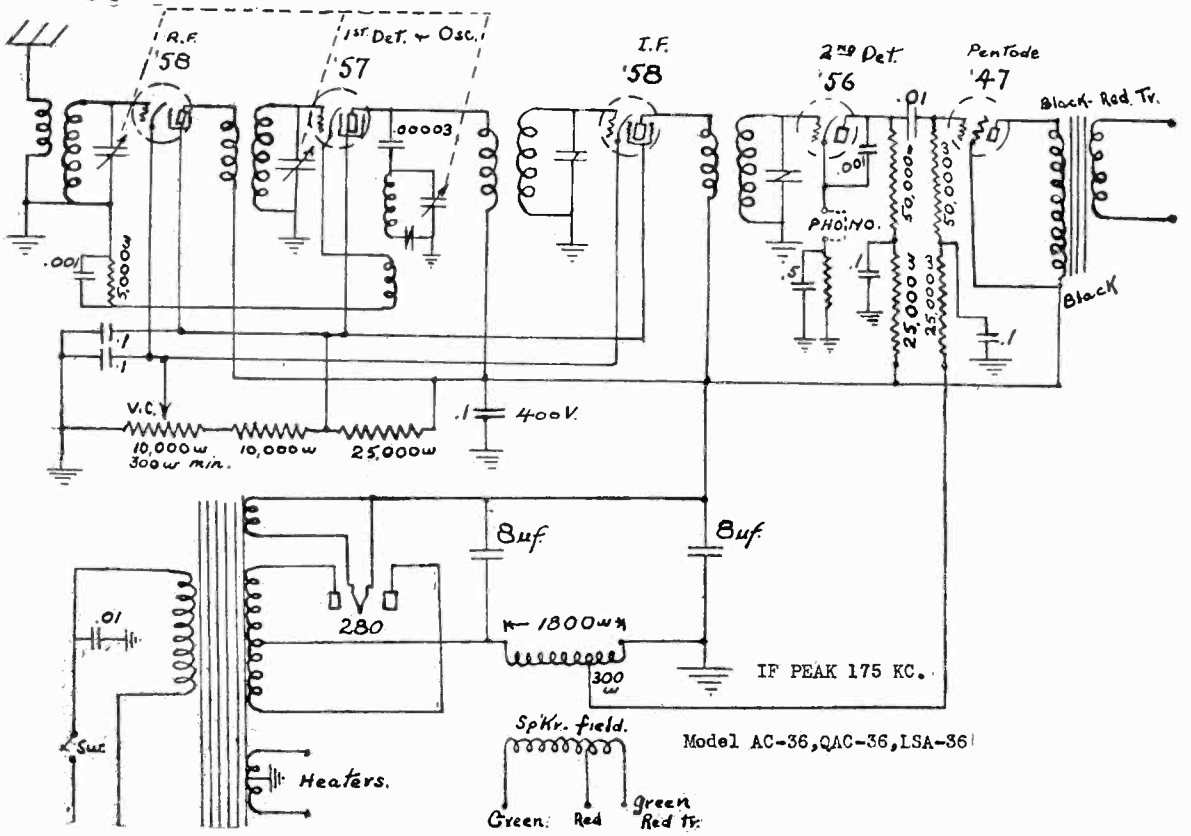
MODEL AC-36, QAC-36, LSA-36
MODEL AC-35, QAC-35

RADIO CHASSIS, INC.



Model AC-35, QAC-35



Model AC-36, QAC-36, LSA-36

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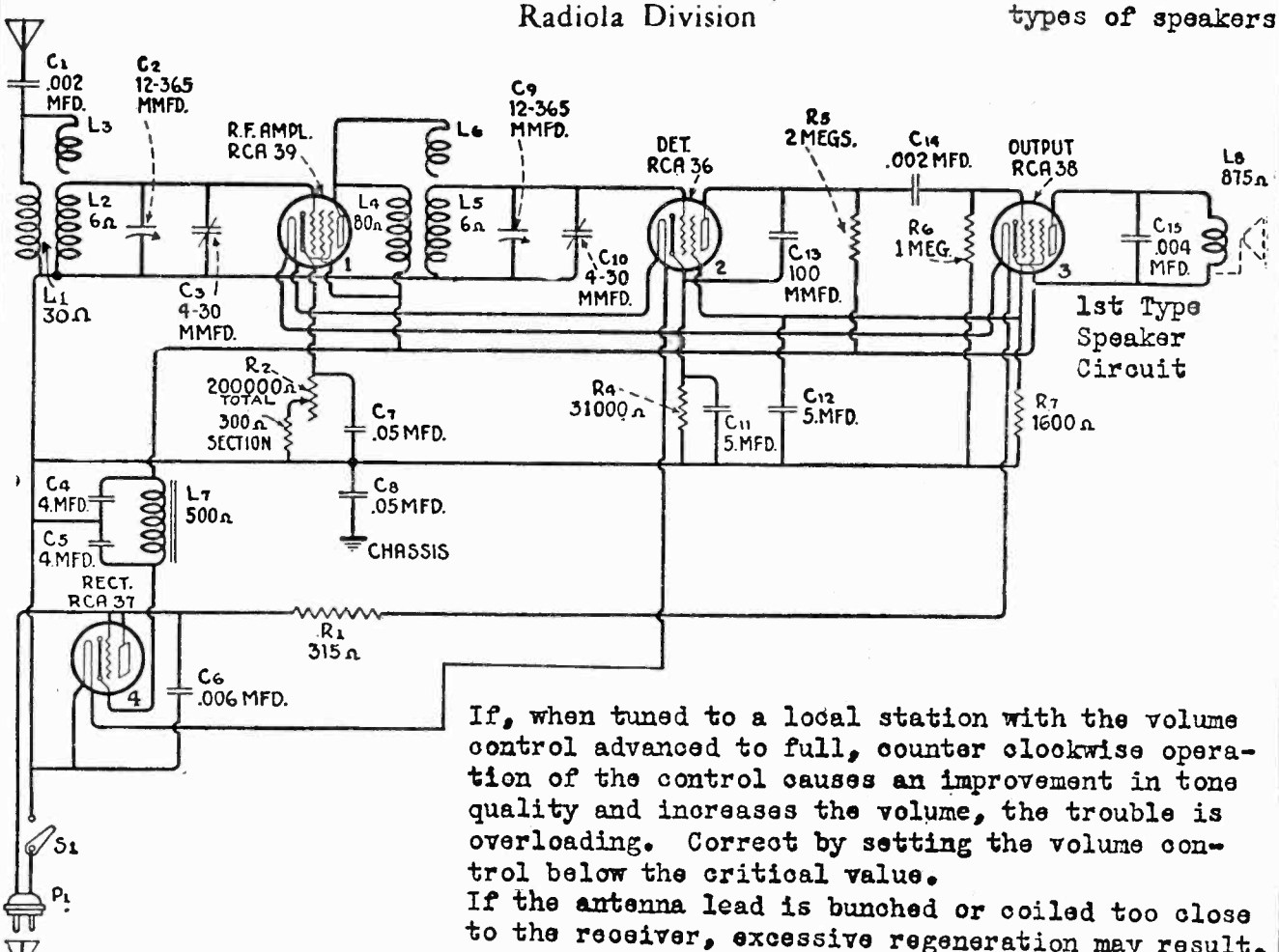
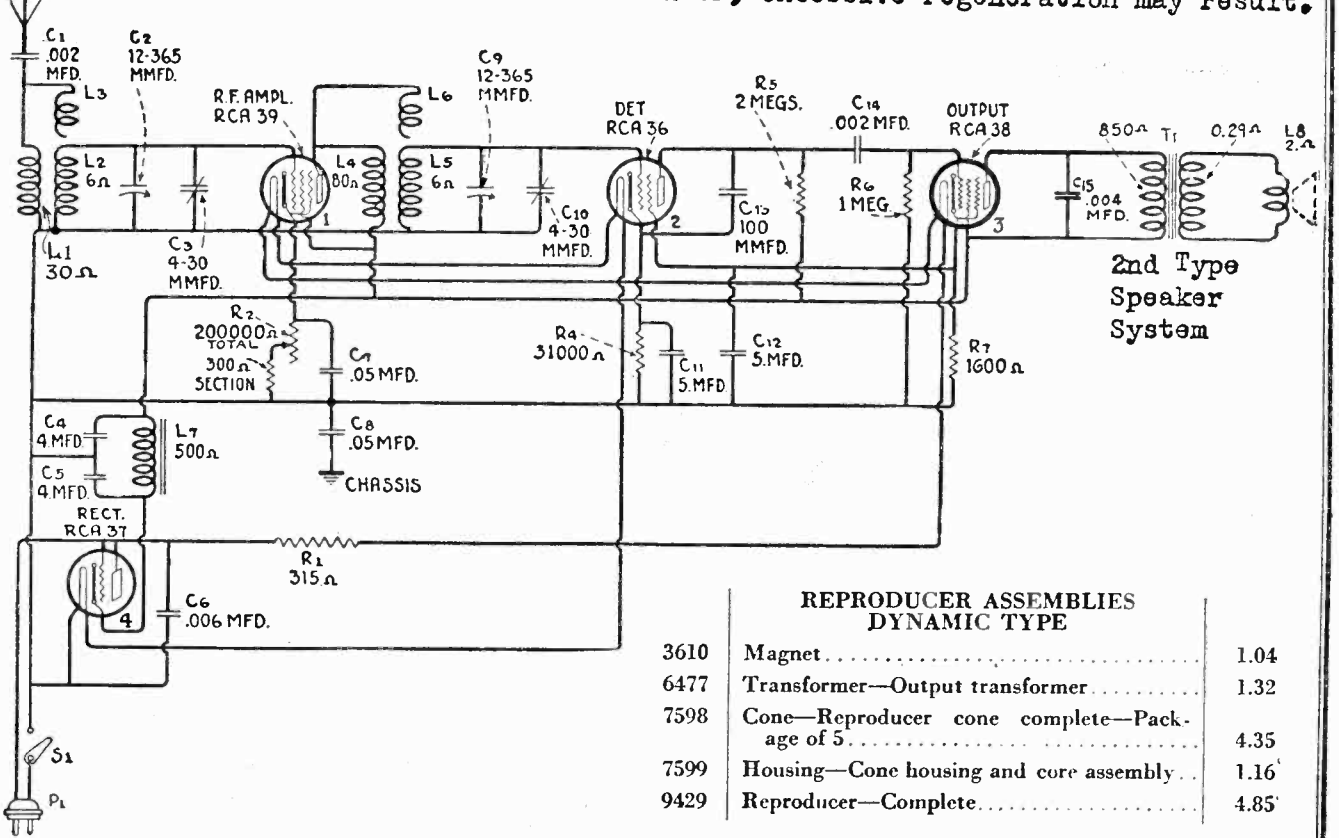
R. C. A. VICTOR CO., INC.
Radiola Division

MODEL R-27 AC-DC
Schematic with 2 types of speakers



If, when tuned to a local station with the volume control advanced to full, counter clockwise operation of the control causes an improvement in tone quality and increases the volume, the trouble is overloading. Correct by setting the volume control below the critical value.

If the antenna lead is bunched or coiled too close to the receiver, excessive regeneration may result.



REPRODUCER ASSEMBLIES DYNAMIC TYPE		
3610	Magnet	1.04
6477	Transformer—Output transformer	1.32
7598	Cone—Reproducer cone complete—Package of 5	4.35
7599	Housing—Cone housing and core assembly	1.16
9429	Reproducer—Complete	4.85

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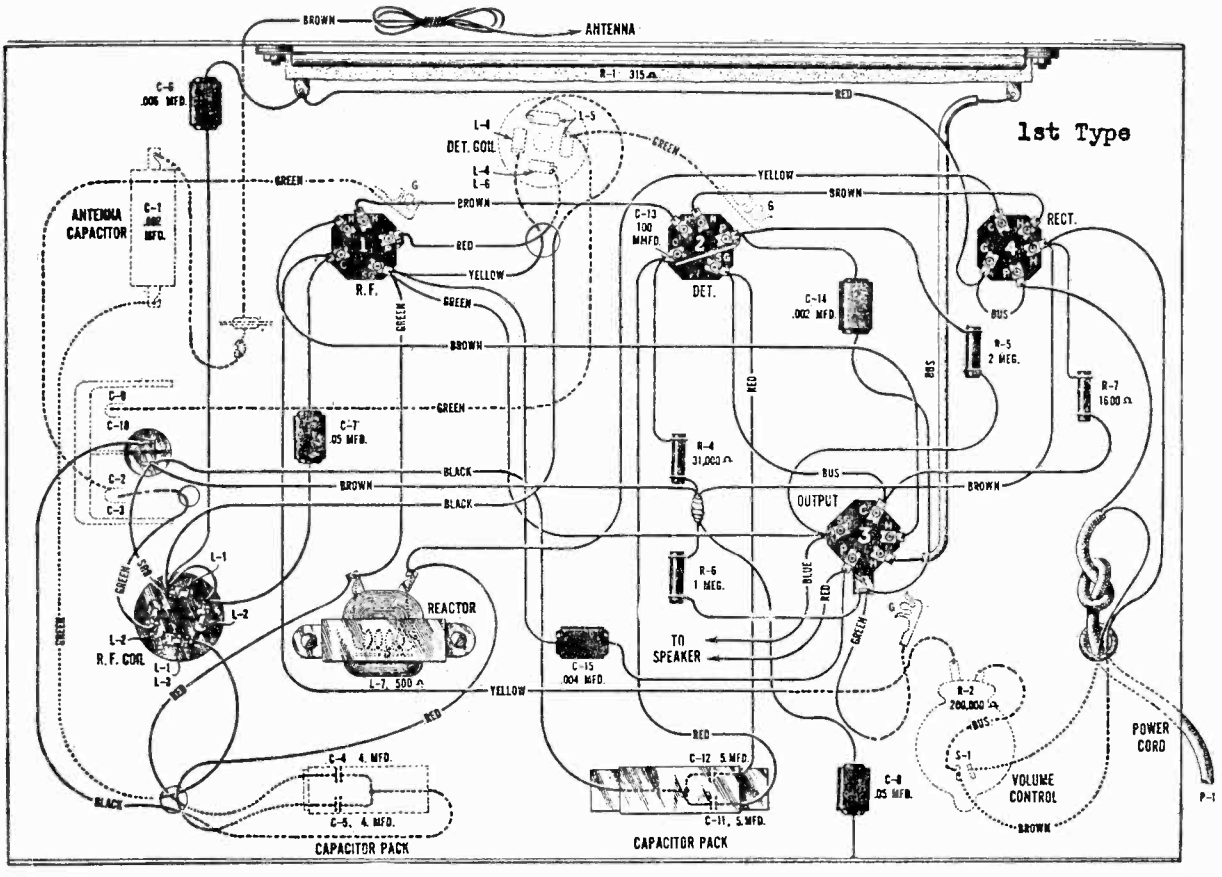
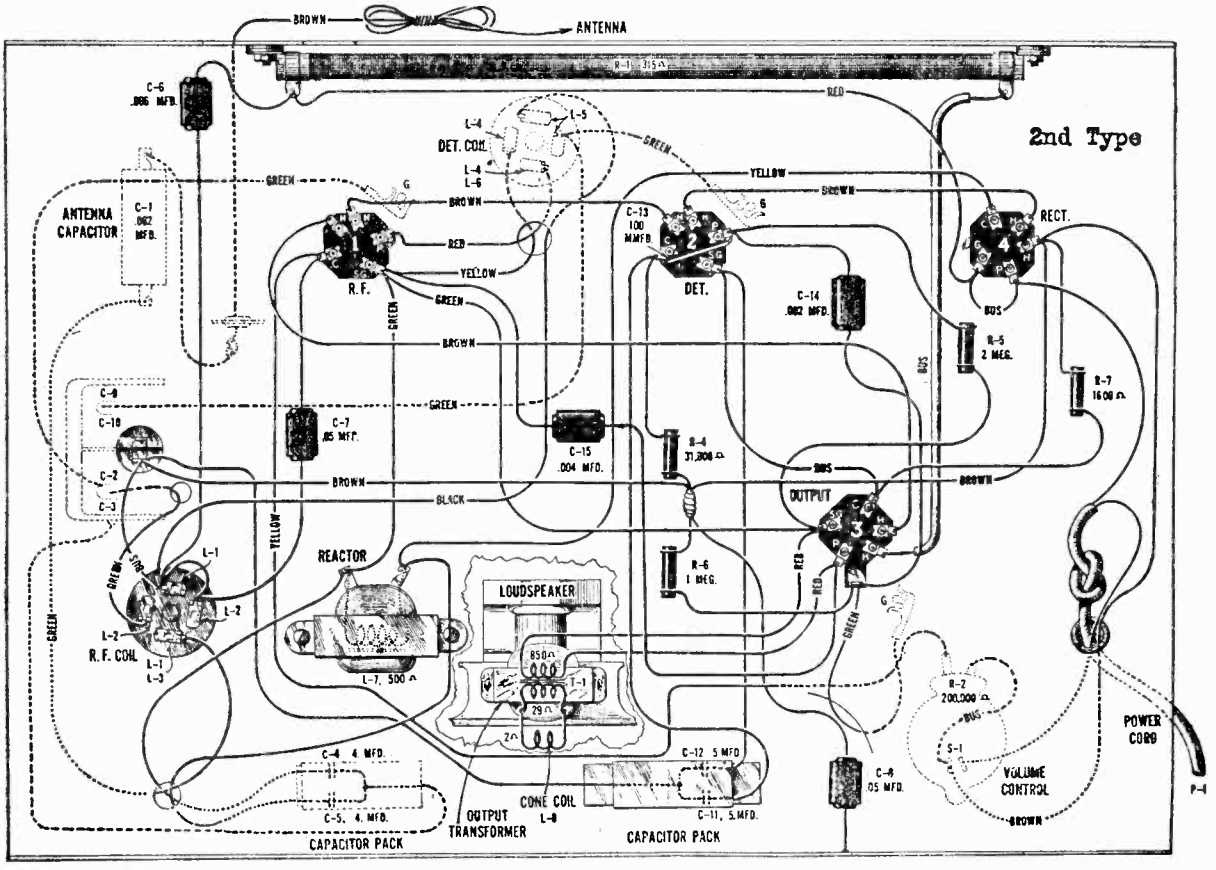
MODEL R-27 AC-DC
Chasses. Two Types

R. C. A. VICTOR CO., INC.





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R. C. A. VICTOR CO., INC.

MODEL R-27 AC-DC
Voltage- Parts List

SERVICE DATA

Electrical Specifications

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

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

RADIOTRON SOCKET VOLTAGES

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

Radiotron No.	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid, Volts	Cathode or Filament to Plate, Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-39 R. F.	3.0	105	105	7.0	6.0
2. RCA-36 Det.	*0.75	11.0	*60	.025	6.0
3. RCA-38 Output	11.0	100	95	5	6.0
4. RCA-37 Rect.	—	—	115	15	6.0

*Impossible to measure on ordinary voltmeter

REPLACEMENT PARTS

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

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
3076	Resistor—1 megohm—Carbon type—Package of 5	$2.50
3456	Capacitor—.05 mfd.	.44
3536	Capacitor—Filter capacitor—Two 5.0 mfd. capacitors	1.10
3537	Reactor—Filter reactor	1.10
3538	Capacitor—Filter capacitor—Two 4.0 mfd.	1.18
3539	Coil—R. F. coil complete	1.08
3540	Coil—Detector coil	.98
3541	Resistor—Filament resistor—315 ohms	1.00
3542	Volume control—Complete with mounting nut	1.18
3557	Capacitor—0.002 mfd.	.30
3559	Resistor—31,000 ohms—Carbon type—½ watt—Package of 5	1.00
3560	Resistor — 1,600 ohms — Carbon type— ½ watt—Package of 5	1.00
3561	Capacitor—0.004 mfd.	$0.42
3562	Capacitor—0.006 mfd.	.42
3567	Escutcheon—Station selector escutcheon	.42
3568	Escutcheon—Volume control escutcheon	.42
3569	Knob—Station selector or volume control knob—Package of 5	.65
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	2.00
6451	Condenser—Two gang variable tuning condenser	2.04
7484	Socket—Radiotron socket—5 contact	.65
10405	Capacitor—Antenna series capacitor—.002 mfd.	.50
10820	Capacitor—100 mmfd.	.50
	REPRODUCER ASSEMBLIES	
9426	Reproducer—Complete	4.38

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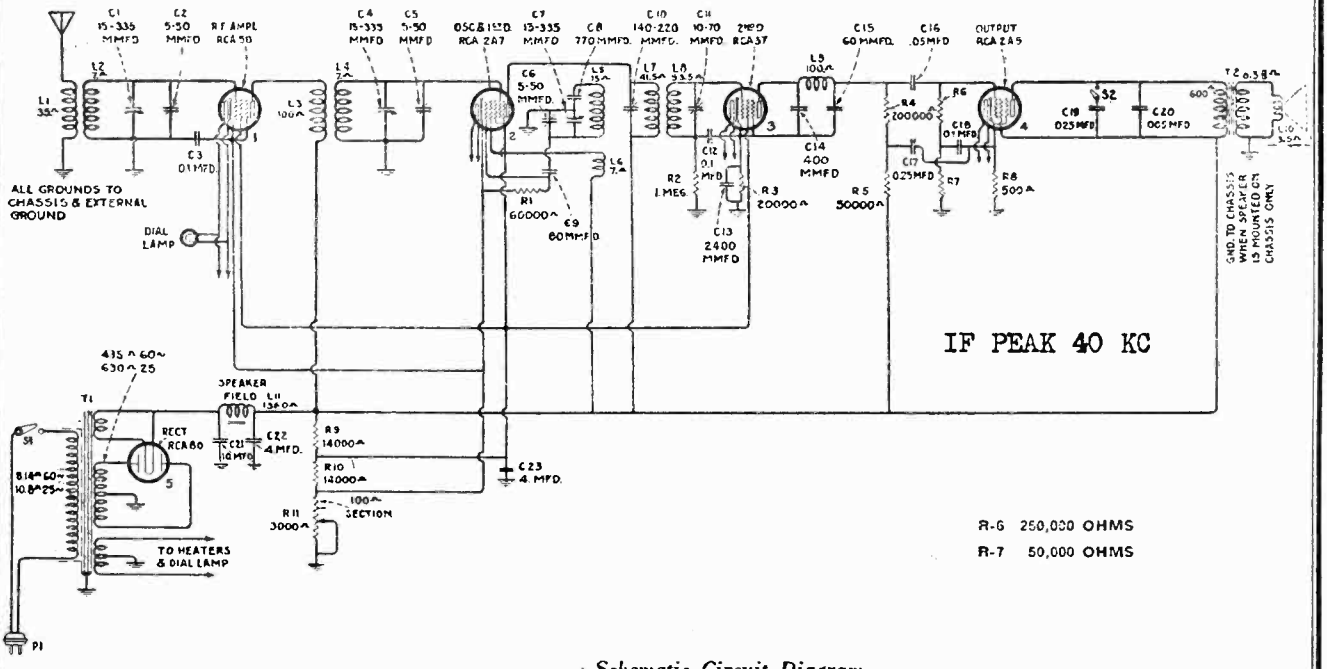
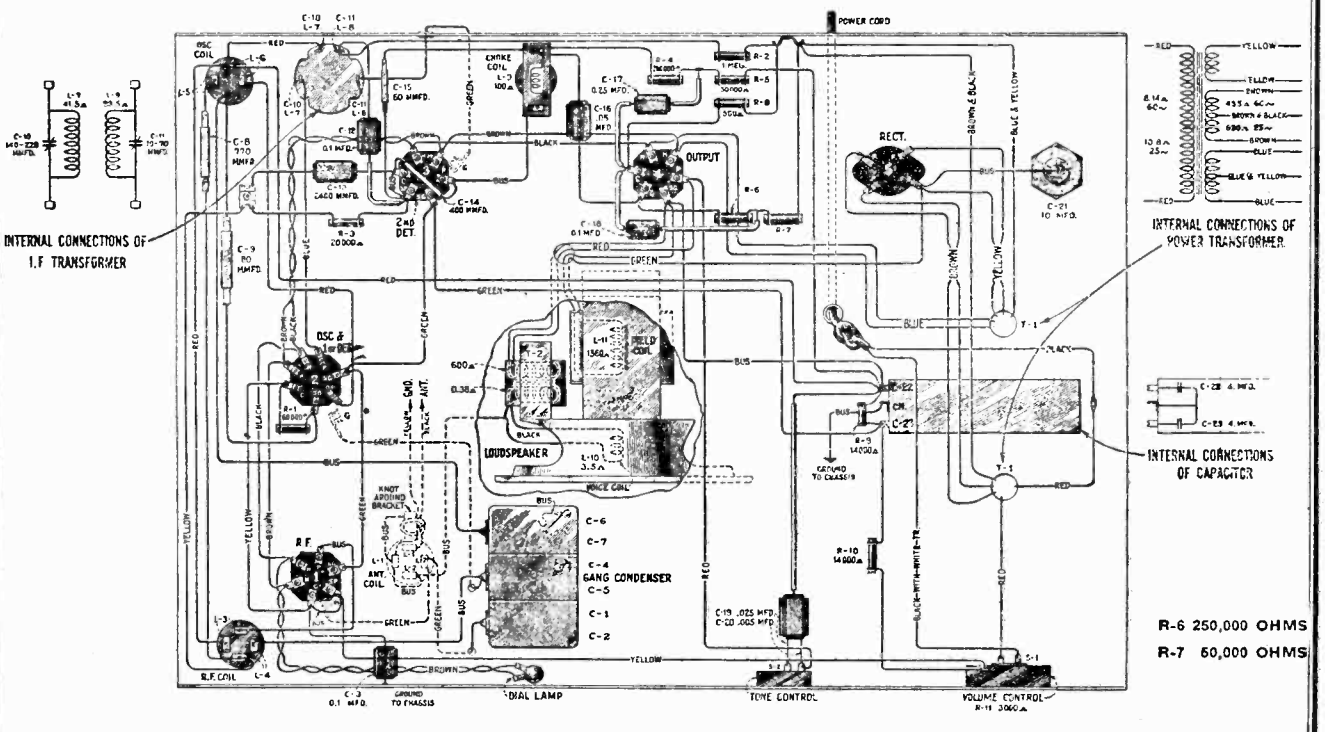
MODEL R-28
Schematic
Chassis

R. C. A. VICTOR CO., INC.



Schematic Circuit Diagram



Wiring Diagram

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R. C. A. VICTOR CO., INC.

MODEL R-23
Voltage
Parts List

SERVICE DATA

Voltage Rating.....105-125 Volts
Frequency Rating.....25-40 Cycles and 50-60 Cycles
Power Consumption.....70 Watts
Number and Types of Radiotrons.....1 UX-280,
1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

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

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

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

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

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

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2747	Contact cap—Package of 5	$0.50
2749	Capacitor—2,400 mmfd.	1.60
3050	Resistor—14,000 ohms—Carbon type—3 watts	.60
3456	Capacitor—0.05 mfd.	.44
3459	Capacitor—80 mmfd.	.44
3472	Capacitor—0.0024 mfd.	.32
3514	Resistor—250,000 ohms—Carbon type—½ watt—Package of 5	1.00
3572	Socket—Radiotron 7 contact socket	.38
3573	Socket—Radiotron 4 contact socket	.32
3574	Coil—Choke coil	.68
3575	Socket—Dial lamp socket and bracket	.34
3584	Ring—R. F. or oscillator coil retaining ring—Package of 5	.40
3590	Escutcheon—Station selector escutcheon—Package of 5	1.40
3591	Escutcheon—Name plate escutcheon—Package of 5	1.40
3592	Knob—Station selector, operating switch or volume control knob—Package of 5	.80
3593	Screw—Chassis mounting screw—Package of 10	.30
3594	Resistor—50,000 ohms—Carbon type—½ watt—Package of 5	1.00
3596	Capacitor—60 mmfd.	.36
3597	Capacitor—0.25 mfd.	.40
3598	Capacitor—0.1 mfd.	.36
3601	Coil—Choke coil	.68
3602	Resistor—60,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3603	Resistor—500 ohms—Carbon type—1 watt—Package of 5.	1.10
3604	Capacitor—400 mmfd.	.30
3605	Capacitor—770 mmfd.	.30
3606	Capacitor—Comprising one 0.005 mfd. and one 0.25 mfd. capacitors	.40
6143	Resistor—40,000 ohms—Carbon type—¼ watt—Package of 5	$2.00
6228	Resistor—200,000 ohms—Carbon type—½ watt—Package of 5	2.50
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6464	Transformer—I. F. transformer	1.88
6465	Volume control—Complete with mounting nut	1.22
6466	Switch—Tone control switch	.45
6470	Coil—Antenna coil	1.08
6471	Coil—Oscillator coil assembly	.74
6472	Coil—R. F. coil assembly	.94
6473	Scale—Dial scale assembly	.50
7485	Socket—Radiotron 6 contact socket	.70
7487	Shield—Radiotron tube shield	.50
7588	Condenser—3 gang variable tuning condenser	2.85
7589	Capacitor—Filter capacitor—Two 4.0 mfd. in container	1.64
7590	Capacitor—10 mfd.	1.40
8985	Transformer—Power transformer—105-120 volts—50-60 cycles	4.26
8986	Transformer — Power transformer — 200-250 volts — 60 cycles	4.38
9002	Transformer—Power transformer—105-125 volts—25-50 cycles	6.00
	REPRODUCER ASSEMBLIES	
6467	Transformer—Output transformer	1.44
8987	Cone—Reproducer cone—Package of 5	5.00
8988	Coil assembly—Comprising field coil, magnet and cone support	2.35

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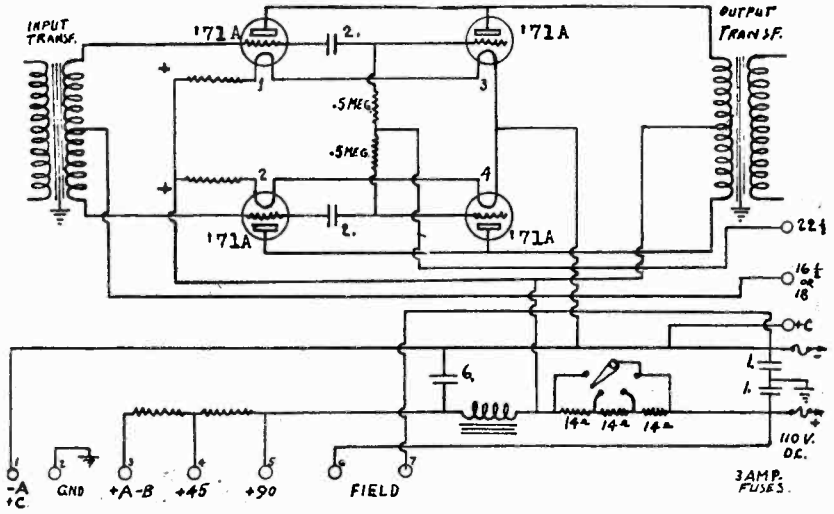
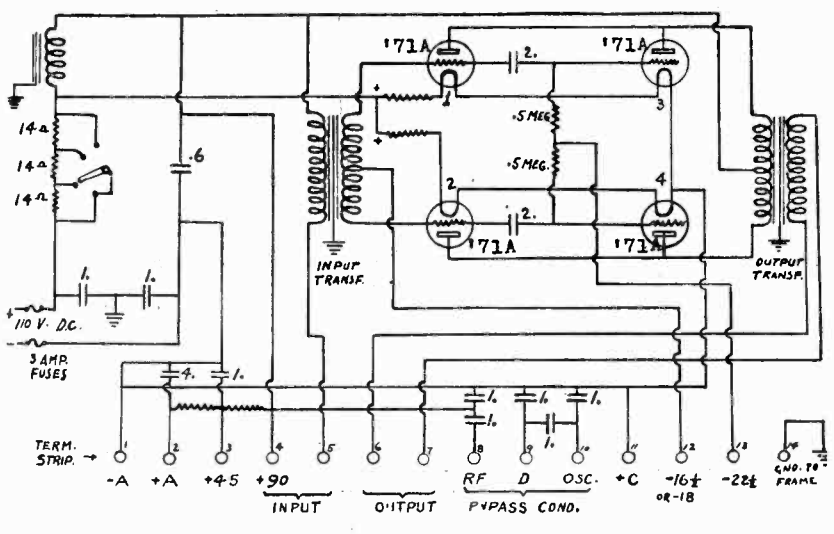
MODEL Radiola 30-A DC
Socket Power Unit
MODEL Radiola 32 DC
Socket Power Unit
MODEL 104 DC Speaker

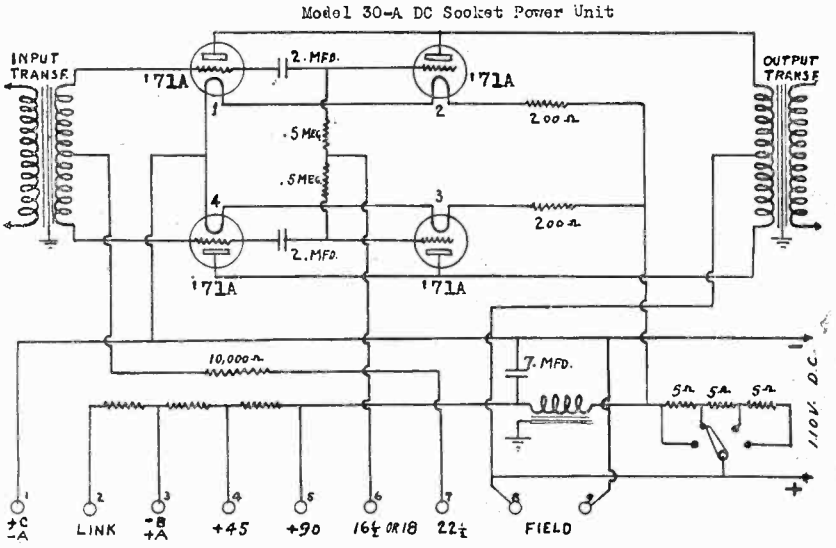
R. C. A. VICTOR CO., INC.



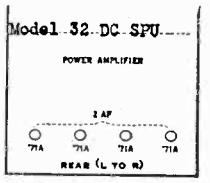
Model 32 DC Socket Power Unit

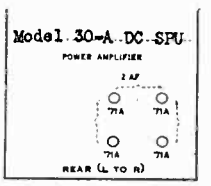


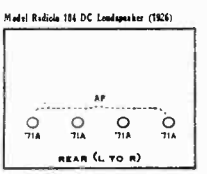
Model 30-A DC Socket Power Unit

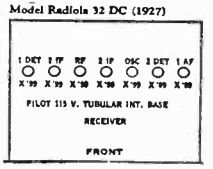


Model 104 DC Speaker









D.C. SOCKET POWERED LOUDSPEAKER 104 may be used with RADIOLAS 25 and 28 by using the regular A.C.Package supplied for this purpose. However when making an installation of this kind the following deviations from the procedure outlined in A.C.Package Instruction Book should be observed.

1) Resistor Unit UP-591 is not used.
2) Instead of opening the link as on an A.C. machine, the position of the link is changed to terminals #2 and 3.

RADIOLAS 30-A D.C., 32 D.C. and LOUDSPEAKER 104 D.C.
(Socket Power Operated)

RADIOLAS 30-A and 32, together with R.C.A.LOUDSPEAKER model 104, are supplied in models designed for direct current socket operation.

These D.C.models differ from the A.C.models only in the construction of the power unit.

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PART I - GENERAL SERVICE DATA

The power stage in all D. C. models consist of four Radiotrons UX-171A connected in a push-pull amplifying circuit using the 110-volt D.C line as plate and filament supply and an external battery for grid voltage supply. Due to the greater filament current consumption, the old Radiotrons UX-171 are not interchangeable with the Radiotrons UX-171A used in the D. C. Radiolas. The output of this push-pull amplifier is equal to that of similar A.C. models.

A series parallel filament connection is used, one tube on each side of the amplifier being connected in series and the two series circuits paralleled together. In this circuit arrangement if a filament of one tube burns out the other tube connected in series with it will also go out, thus throwing the load on the other two tubes of the parallel circuit. In some Radiolas 30A and 32 the result will be a louder signal caused by the increased filament voltage of the two remaining tubes. However, their useful life will be rapidly destroyed under such conditions. In the R.C.A. 104 Loudspeaker and later models of Radiola 30A and 32, due to a different arrangement of the resistance units, the remaining tubes will not receive excessive filament voltage. Filament burn-out in one 171A Radiotron will affect the loudspeaker reproduction only slightly, though the tone quality is not so good. While damage to the two tubes will not be apparent at once, the set should not be operated until the defective Radiotrone is replaced. When any D.C. installation is made the customer should be made fully aware of these conditions so as to prevent unnecessary damage to the Radiotrons.

All socket power D.C. model Radiolas and Loudspeakers are provided with a switch for compensating various line voltages. The range over which satisfactory operation is secured is from 105 to 125 volts. There are four positions of the switch, 100, 105-110, 110-115, 115-120 and 120-125. On making an installation, the voltage of the line should be measured with an accurate voltmeter and the switch set at the correct position for that particular line. On connecting a D. C. Radiola or Loudspeaker to the D. C. lines it will be noticed that at one position of the input plug the set operates correctly and at the other position complete silence results. The correct position must be found be experiment.

An external "C" battery is used to supply the correct negative grid potential to the Radiotrons UX-171A. This is--16½ or --18 volts on the tubes already receiving a five-volt bias through the adjacent tube filaments and--22½ volts for the other two tubes. The correct connections are noted in the schematic circuits on the following pages. It is very important when installing a socket power D.C. Radiola or Loudspeaker to connect these two biasing voltages correctly. Incorrectly connected they will operate apparently O.K. until two of the tubes lose their emission and then the reproduction becomes very poor. As this does not occur immediately the man installing the Radiola should give attention to these connections and make certain they are correct.

On Radiolas 30A and 32 there is provided a link by which the lines may be grounded through two condensers. Experimenting with the two positions of this link will determine which position gives the better results with least pick-up noise.

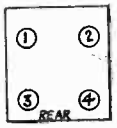
PART II -- D.C. SOCKET POWERED RADIOLA 30A

D. C. socket powered Radiola 30A is identical to the A.C.Model in all respects with the exception of the Socket Power Unit consisting of four Radiotrons UX-171A connected in a push-pull amplifying circuit. The output transformer is designed for use with RCA Loudspeaker 100A.

VOLTAGE READINGS

The following voltage readings should be obtained at the terminal strip located at the rear of the Socket Power Unit. The terminal numbered consecutively from left to right, facing the rear of the Radiola.

Terminals	Correct Effect
1 to 2	31 volts with all Radiotrons lit and battery setting near "Soft"
2 to 3	21.5 volts normally
3 to 4	41 volts normally
11 to 12	16½ or 18 volts with new "C" battery
11 to 13	22½ volts with new "C" battery. If this voltage is below 20, the "C" battery should be replaced.



PART III -- D. C. SOCKET POWERED RADIOLA 32

D.C. Socket powered Radiola 32 is identical to the regular A.C. model with the exception of the socket power unit. In the D.C. Model the power amplifier consists of four Radiotrons UX-171A connected in a parallel push-pull circuit, giving an output equal to the Radiotron UX-210 used in the A.C. Models. Parts other than S.P.U. are identical in both models and any service information needed will be found in the regular "Radiola 32 Service Notes".

VOLTAGE READINGS

The following voltages should be obtained at the terminal strip of the Socket Power Unit. The terminals noted in the first column of the tabulated text refer to the terminal viewed from the rear of the S.P.U. counting from left to right and omitting the first four terminals which are for the input and output of the S.P.U.

Terminals	Correct Voltage
1 to 3	31.0 volts, normally with all Radiotrons lit and battery setting near "Soft"
3 to 4	21.5 volts normally
4 to 5	41 volts normally

The "C" battery terminals are located on the fuse block. A check of the voltages should be made as indicated at the terminals. If the 22½ volt terminal reads less than 20 volts the battery should be replaced.

R. C. A. D.C. SOCKET POWERED LOUDSPEAKER 104

RCA D.C. Socket Powered Loudspeaker 104 is identical to the regular A.C. model with the exception that the Socket Power Unit is designed to operate from the regular 110-volt D.C. lines. This loudspeaker contains a power amplifier consisting of four Radiotrons UX-171A connected in a push-pull circuit and furnished a "B" voltage supply to any receiver and complete plate grid and filament voltages for Radiolas 25 or 28 when used in conjunction with the proper A.C. Package.

VOLTAGE READINGS

The following voltages should be obtained at the terminal strip located at the rear of the Socket Power Unit. The terminal strip numbers are located consecutively from left to right when facing the Loudspeaker from the rear, omitting the first four terminals which are for the input and output of the loudspeaker. With the loudspeaker and receiver in normal operation the following readings should be obtained on a D.C. voltmeter.

VOLTAGES FOR LOUDSPEAKERS SUPPLYING "B" CURRENT ONLY. LINK BETWEEN TERMINALS 1 AND 2

Terminals	Correct Voltage
1 to 4	45
1 to 5	90
1 to 6	16½ or 18
1 to 7	22½

VOLTAGES FOR LOUDSPEAKER SUPPLYING "A", "B" AND "C" POWER TO RADIOLAS 25 or 28. LINK BETWEEN TERMINALS 2 AND 3

Terminals	Correct Voltage
1 to 3	31
3 to 4	21.5
4 to 5	41
1 to 6	16½ or 18
1 to 7	22½

Should the readings on the "C" battery terminals 1 to 7, show less that 20 volts replace the "C" battery.

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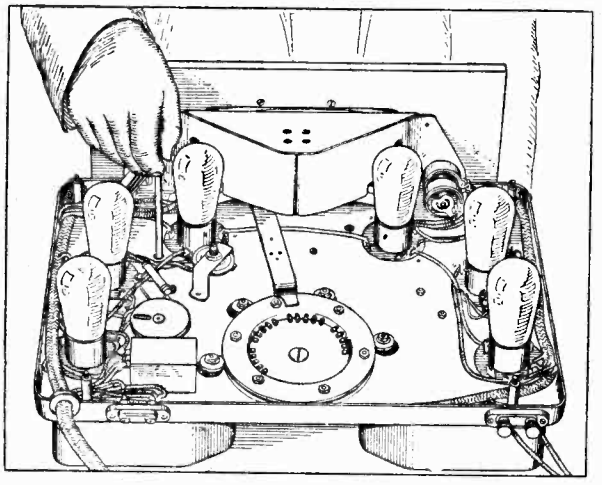
R. C. A. VICTOR CO., INC.

MODEL R-32, RE-45
R,52
Alignment

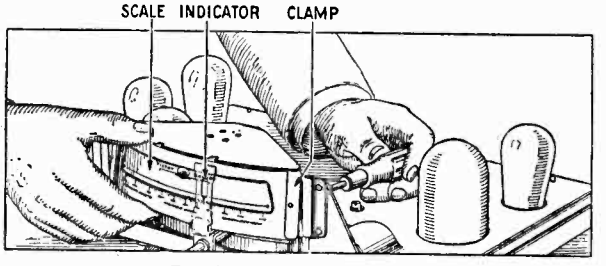
SPECIAL ADJUSTMENTS

1. NEUTRALIZING—Improper neutralization is characterized by oscillation and lack of sensitivity. First be sure that the instrument has a good ground connection, since a poor ground will also cause oscillation. If oscillation still persists, the set should be neutralized in the following manner, using a dummy tube, made by cutting off one of the filament prongs of a UX-226, and a neutralizing screw driver such as Part 18460.

a. Remove the four hex nuts which hold the plate.
b. Tune in a powerful local station, preferably near the high frequency end of the scale. If such a signal is not available, a modulated oscillator, can be used to supply the signal. If the oscillator is used, it should be placed near the radio set and approximately three feet of wire used as an antenna on the set.
c. Remove the UX-226 from the first tuned R. F. stage (socket No. 2, Fig. 5), replace with the dummy UX-226, and adjust the corresponding neutralizing condenser to give minimum signal in the loudspeaker. The volume control may be set to obtain a signal loud enough for accurate neutralization, but not so loud as to cause the minimum to be blurred.
d. Replace the UX-226 in socket No. 2, and repeat the procedure for sockets 3, 4 and 5, adjusting the corresponding neutralizing condenser in each case. After completing the neutralization in this manner, turn back the neutralizing condenser for socket No. 5 approximately ¼ turn counter-clockwise.
Note:—The first UX-226, antenna coupling stage, is not neutralized.
If the instrument continues to oscillate, the condensers are out of alignment. This adjustment requires special attention, and *it is recommended that you consult your distributor before making any changes in the setting.*



—Method of Neutralizing Victor Radio



—Replacing Station Selector Dial

There are five r-f tubes and four tuned circuits which must be neutralized. The antenna coupling stage is untuned and does not require neutralization. A dummy tube or adaptor must be provided. A good 226 tube with one filament cit off at the base or insulated or a UX adaptor with one open filament prong may be used. The latter method is preferred as the receiver can be neutralized with the individual tubes to the used. By doing this the actual grid-plate capacity is balanced out instead of the average capacity. In no case use a dummy plug.

A strong local signal such as that obtained from a local modulated r-f test oscillator tuned to about 1200 KC should be tuned in on the receiver. With the signal tuned in and the dummy tube in the first r-f socket (not the antenna coupling tube) adjust the trimmer condenser for the minimum signal. Increase the signal input to the receiver until a satisfactory minimum point can be determined. Unless this is done a "no signal" position may be reached due to low signal input, but the stage will not be neutralized. Proceed with second, third and fourth stages in like manner. No 4 trimmer, when minimum signal position is reached, should be turned back (to the left) about 1/4 turn. This 1/4 turn will increase the output by a great amount but the tube will not spill over.

The receiver should be neutralized first and then aligned; after which repeat both processes for greater accuracy.

Schematic on page 522, Vol. I.

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R. C. A. VICTOR CO., INC.

MODEL M-34
Auto Radio
Assembly Wiring
Notes

Instructions for

RCA Victor M-34

Automobile Receiver

INTRODUCTION

Mechanical simplicity and high-quality performance are keynotes of this automobile radio receiver. The instrument consists of a superheterodyne chassis, a loudspeaker, and a vibrator-type "B" battery eliminator mounted in a single case. It is operated entirely from the car storage battery.

A remote control unit, mounted on the steering column and connected to the receiver through a flexible shaft and cable, places all controls convenient to the driver. This unit contains the station selector control, a glare-proof illuminated dial (calibrated in station channels) and a combined volume control and "key-lock" power switch.

Equipment for the suppression of ignition interference is provided. The use of a roof (built-in or interior type) antenna is recommended.

PART I—INSTALLATION

Procedure

1. Unpack the set from carton and check equipment. (See "Equipment Furnished"—page 4.)
2. Remove tube packing inside receiver case and examine tubes. (See details under "Mounting of Units"—page 5.) *Do not replace case cover.*
3. **CHECK POLARITY OF AUTOMOBILE STORAGE BATTERY SUPPLY.** If the negative (—) side is grounded to car frame, make changes to chassis connections shown in Figure 1. *Do not disturb these connections if positive (+) side is grounded.* (See details under "Mounting of Units"—page 5.) Replace case cover.
4. Determine most satisfactory mounting position (see details under "Location of Units"—page 4). Spot mounting-bolt location and drill ½" diameter hole. Insert bolt through dash and assemble support plate and nuts on engine side. Hang receiver over bolt head and tighten nuts. (See Figure 1 and details under "Mounting of Units"—page 5.)
5. Attach remote control unit to steering column by means of mounting bracket and strap. (See Figure 1 and details under "Mounting of Units"—page 5.)
6. Assemble flexible shaft to receiver and remote control unit. (See Figure 1 and details under "Mounting of Units"—page 6.)
7. Connect metal-shielded lead from receiver to antenna by means of coupling connector. (See notes on antennas under "Location of Units"—pages 4 and 5—and details of lead-in under "Connections"—pages 6 and 7.)
8. Connect terminal at end of *black* lead from cable to binding-post of automobile ammeter (see Figure 1 and details under "Connections"—page 7). The ignition by-pass capacitor (equipped with two leads) should be installed at this time. (See Figure 1 and paragraph 4 under "Suppression of Ignition Interference"—page 7.)
9. Install spark-plug and distributor suppressors; also generator by-pass capacitor (see Figure 1 and paragraphs 1, 2 and 3 under "Suppression of Ignition Interference"—page 7).
10. Push knob over shaft protruding through front of remote control unit. Observing the dial scale, rotate knob slowly—first to stop position slightly beyond "150" and then reverse to other stop position slightly beyond "55."
11. Insert key in lock on remote control unit and turn to extreme clockwise position. Dial should become illuminated immediately but the tubes will not reach proper operating temperature until after approximately 45 seconds. (See details under "PART II—OPERATION" and "PART III—MAINTENANCE.")

Figure 1

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Equipment

A. Equipment Furnished:

1. *Receiver Package*—Includes the receiver and remote control units joined by the wiring cable.

(a) The receiver contains one each of the following Radiotrons installed in sockets: RCA-78, RCA-6A7, RCA-6B7, RCA-89.

(b) The remote control unit contains one dial lamp (6-8 volts).

(c) The wiring cable includes one fuse (20 amperes) installed in attached fuse receptacle

2. *Outfit Package*—Containing:

(a) Flexible shaft (33¾ inches long).

(b) Receiver unit mounting bolt (⅛ inch diameter), dash support plate, and nuts (2)

(c) Steering column bracket for remote control unit with strap, screws (2) and lockwasher (1).

(d) Shield clamp for antenna lead-in wire with screw (1), lockwasher (1) and nut (1).

(e) Key (1) and knob (1) for remote control unit and eyelets (2) for antenna connector packed in small envelope.

(f) Ignition Interference Suppression Equipment.

6 Spark plug type suppressors (additional obtainable from your dealer).

1 Distributor type suppressor.

2 Capacitors.

(g) Instruction Book.

B. Additional Equipment Required:

1. *Antenna*—One of the following types:

(a) Roof (built-in) type—recommended.

(b) Roof (interior) type for attachment to head-lining inside car—also recommended. A special antenna of this type complete with pin-hooks and lead-in wire may be purchased from your dealer

(c) Plate (sub-mounted) type for attachment to channel members of car chassis—alternative. An efficient plate antenna completely equipped for mounting and a specially-designed shielded lead-in wire also are obtainable from the dealer.

Location of Units

Receiver and Remote Control Units—The arrangement of units shown in Figure 1 is recommended and will be found applicable to the majority of automobiles. Consideration should be given to the possibility of interference of the receiver with other equipment beneath the instrument panel or of the mounting bolt with apparatus on the engine side of the dash. By placing the receiver unit toward the right-hand side of the dash, the flexible shaft will be of correct length as furnished in practically all cases. This position, however, may be considered impractical because of its universal preference for heating devices, necessitating installation of the receiver unit either near the center or at the extreme left-hand side of the dash and the use of a shorter flexible shaft. In such cases, the shaft may be either shortened (as described under "Mounting of Units") or exchanged for one of proper length by the dealer.

NOTE—Two support brackets are attached to the receiver case, one on the rear surface and the other on the right-hand side viewing the loud-speaker opening. The side bracket must be used when the unit is mounted at the extreme left-hand end of the dash in order to avoid sharp bends in the flexible shaft and resultant unsatisfactory operation.

As furnished, the remote control unit is equipped for attachment to the steering column of the car. Its clamp bracket is so designed that the driver may select from a wide variety of possible mounting positions for maximum accessibility. The associated bracket strap will be found to accommodate practically any diameter steering column. If considered desirable, however, the remote control unit may be supported upon the instrument panel by means of an accessory bracket procurable from the dealer

Antenna:

(a) *Roof (Built-in) Type*—Best results will be obtained by use of a built-in roof antenna. The majority of modern automobiles (closed body types only) are already equipped with such an antenna installed at the factory, the lead-in wire from which will usually be found coiled up beneath the instrument panel. Many other earlier cars employ a piece of metallic screen—for top material support—which, if ungrounded (not in electrical contact with the metallic frame), may be readily utilized as an antenna.

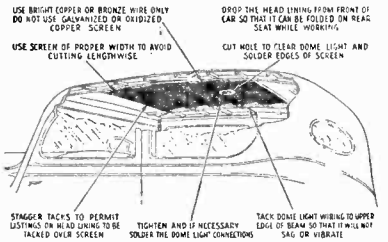

Figure 2

NOTE—The presence of a top support screen and of grounds in that screen may be determined without removing any portion of the inside fabric (head-lining). First procure any sharp-pointed metallic tool, push the point through the fabric (at several points if necessary) and feel around in an attempt to scrape the screen surface—being careful not to puncture the weather-proof top. If a screen is found, connect an ordinary dash or head-lamp between either terminal of the automobile ammeter and the tool, re-insert the tool through the head-lining and make contact with the screen. If the lamp lights, however dimly, it shall be assumed that the screen is grounded.

In order to use an ungrounded support screen, first release the head-lining at the front corner nearest the receiver. Then connect a flexible rubber-insulated lead to the corner of the screen and solder the joint. Feed the free end of the lead down the adjacent pillar-post of the car into the driving compartment and replace the head-lining.

If the top support screen is grounded, or if no screen is present, it will be necessary to drop the entire head-lining (see Figure 2). In the former case, the screen may be insulated by removal of a strip several inches from all edges and from the dome light fixture. The possibility of subsequent shifting may be eliminated by tacking the screen to one or more of the ribs and by lacing the sides with cord. Where no support screen is used, a copper screen having a total area of at least ten square feet should be inserted. It should be located as far to the rear as possible and insulated from all metallic parts grounded to the frame of the car. The antenna finally should be tested for grounds (see the foregoing "NOTE" for test procedure). If satisfactory, attach the lead-in wire and replace the head-lining of the car.

NOTE—Since a degree of skill—only acquired by experience—is necessary in removing and replacing the top fabric material, such work should be allotted to a competent "trim" man.

(b) *Roof (Interior) Type*—The accessory interior-type roof antenna also will provide very satisfactory performance and, in addition, is extremely simple to install. It may be quickly attached to the head-lining inside the car (preferably as far to the rear as possible) by means of pin-hooks, thereby precluding removal of the fabric. An antenna of this type, however, should not be used in any automobile having *a grounded* top material support screen since the proximity of that screen would seriously reduce its efficiency. Before purchase, therefore, it will be advisable to check this possibility, following the test procedure described under *"Roof (Built-in) Type."*

As furnished, the interior-type antenna is equipped with a sufficient length of lead-in wire ready-attached. The effective antenna wire is enclosed by long-wearing paper procurable either in "gray" or "tan" finish as desired to harmonize with the car upholstery.

(c) *Plate Type*—For those cases where the installation of a built-in roof antenna is considered too costly and the interior roof antenna impractical, good reception from local or semi-distant powerful stations may be procured with the special plate-type antenna also obtainable as an accessory. This unit should be clamped to the frame of the chassis as far to the rear as possible. It is adjustable in length and may be mounted either lengthwise or crosswise of the chassis, which position should be selected with due regard to the prevention of overcrowding. The plate must be placed as close to the ground as possible, but not below the lowest portion of the chassis at the desired location, as sufficient road clearance must be retained. It is also important to avoid any position in which the plate will impede free motion of chassis parts such as springs, drive shaft, or axles in order to prevent damage to the antenna.

Mounting of Units

Details of mounting the various units are shown in Figure 1 The following procedures are recommended:

Receiver Unit—The rear cover of the receiver unit case (held in place by six screws) must be removed and all packing material (inserted for protection of the Radiotrons during shipment) withdrawn. Make certain that all Radiotrons are in the proper sockets and that the control grid clips are pressed down firmly over the respective dome terminals as shown by the diagram printed on the label affixed to the inside of the cover.

NOTE—At this point, it will be advisable to determine the electrical polarity of the storage battery supply. This may be done most conveniently by making an examination of the battery connections and ascertaining which terminal is grounded (that is, connected to the frame of the car). The positive terminal is usually marked (+) and tends to form corrosion far more rapidly than the negative (—). If the positive terminal is grounded, no change in the electrical connections of the receiver unit will be required. However, if the opposite is true, the two leads (equipped with spade terminals) located beneath the radio chassis as shown in Figure 1 must be reversed.

Now replace the rear cover and support the assembled unit against the dash in the chosen location. Allowing a clearance of at least two inches above the top surface, where possible, to permit subsequent removal of the case from the mounting bolt head, mark with a pencil or crayon on the dash four points corresponding to the corners of the adjacent case surface. Then determine the exact center of the area bounded by those four points (by drawing diagonal lines between opposite corners) and mark that position with a center-punch. Next drill a ½ inch hole at the center-punch mark and insert the mounting bolt. The support plate and the two nuts then should be assembled upon the bolt from the engine side of the dash as shown but should not be tightened. Finally hang the receiver over the bolt head, align sides vertically and tighten the nuts in place.

Remote Control Unit—In attaching the remote control unit to the steering column of the car, it will be advisable first to examine the detailed view (in Figure 1) showing the assembly of its mounting bracket. Four small holes are contained in the associated flexible strap at distances proper for use with steering columns of the most common diameters (1½, 1⅝, 1¾, 1⅞ inches) but the strap length will be found sufficient to permit the insertion of an additional hole if necessary to accommodate a 2 inch column. The proper hole may be determined by wrapping the clamp strap tightly around the column, inserting the machine screw furnished through that hole found to be nearest in alignment with the tapped hole in the clamp bracket. Three tapped holes are provided in the back of the remote control unit, permitting support of that unit either at the right- or left-hand side or above the steering column

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Flexible Shaft—Insert that end of the flexible shaft to which is attached the slotted coupling through the bushed opening in the left side of the receiver unit. Then rotate the shaft from the free end until the coupling slot is felt to engage over the pin contained in the tuning mechanism and slide the shaft forward to the full depth of the slot. With the shaft held in this position, insert the opposite end of the shaft through the bushing at the rear of the remote control unit and push forward until the flatted portion of the shaft protrudes through the front cover. Then proceed to tighten the external set-screw (located at the bottom of the case—see Figure 3) adjusting the shaft position as necessary until the screw is felt to engage in the groove. Tighten the screw fully to the bottom of the slot and then loosen it approximately one-quarter of a turn. Finally, secure the flexible casing in place by tightening the set-screws at each end.

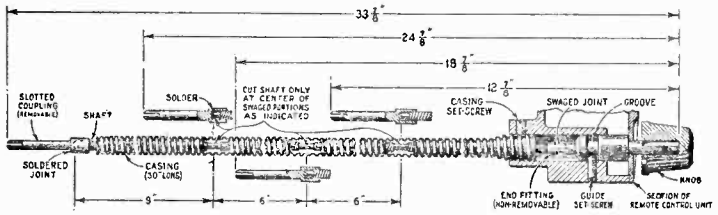

Figure 3

NOTE—In many installations it will be found necessary or desirable to use a flexible shaft of shorter length than 33⅜ inches. While it is simplest to procure a shaft of proper length from the dealer as mentioned heretofore, very little difficulty should be experienced in shortening the original part if deemed expedient. To shorten the shaft, refer to Figure 3 and proceed as follows:

1. Determine the minimum shaft length permissible for the installation.
2. Remove the slotted coupling (using a soldering iron) and withdraw the shaft from its casing.
3. Cut the shaft only at the center of a swaged joint, selecting that joint which allows at least the required length.
4. Cut from the shaft casing a length equal to the amount of shaft removed. (This operation may be simplified by placing the casing between wooden blocks in a vice so that the block ends will serve to guide the hack saw blade.)
5. Replace the shaft in its casing and solder the slotted coupling to the end of the shaft.

Connections

Refer to Figure 1 and make connections as follows:

Antenna to Receiver—For least ignition interference, any portion of the antenna lead-in wire which extends behind the instrument panel or into the engine compartment of the car should be fully shielded and cut to eliminate excessive slack when attached to the receiver antenna connector. Before connecting the antenna to the receiver, the following comments applying to the particular type of antenna adopted should be observed:

(a) *Roof Antenna* (Built-in Type)—The lead-in wire from a factory-installed built-in roof antenna usually is unshielded and often is of insufficient length to reach the receiver. If necessary, an extra length of insulated wire may be spliced to the existing lead-in, in which case the joint must be soldered and wrapped with tape. In general, it will be advisable to shield the exposed length of lead-in wire, procuring for this purpose from your dealer a length of shield braid and an equivalent length of insulating loom (or rubber tubing) sufficient to extend between the end of the lead-in wire and its point of entrance from the body pillar post. Slip the loom over the lead-in wire and the shield braid over the loom.

(b) *Roof Antenna* (*Interior Type*)—If an interior type antenna is used, the lead-in wire should be brought down the outside of that front pillar post nearest the receiver.

(c) *Plate Type Antenna*—With the plate type antenna, the fully-shielded end of the special cable should be brought into the automobile driving compartment through a ½ inch hole drilled in the toe-board (if no other opening is available). This end is to be connected to the receiver unit antenna lead (as explained in following paragraphs) and the opposite (unshielded) end then cut off as required to eliminate excessive slack upon connection to the plate. The pigtail extension from the end of the shield must be soldered or bonded to the frame of the car.

Refer to the detailed view of the antenna connector shown in Figure 1 and proceed to attach the lead-in wire (if shielded) as follows: First, cut the end of the lead-in so that the internal insulated wire and loom (if present) are flush with the end of the shield covering and push back the shield approximately 1½ inches. Cut the loom to the end of the shield and then remove sufficient insulation to expose one inch of clean bare-conductor. Now disconnect the female portion of the connector attached to the receiver antenna lead and remove the small internal bushing and spring.

To assemble, slip the bared conductor through the female portion of the connector and then through the spring and bushing, making certain that the insulation enters the end of the connector. Bend over and spread the strands of the conductor against the forward end of the bushing and then force one of the eyelets (packed in small envelope in outfit package) into the bushing to hold the conductor in position. Cut off the ends of the conductor strands approximately ¼ inch beyond the edge of the eyelet and bend the strands over toward the center of the eyelet. The assembly may be now attached to the receiver portion of the connector and the shield covering on the lead-in wire pushed forward to cover the adjacent end of the female portion. Finally, bond the shield to the connector by means of the small clamp furnished. **No soldering operations are required.**

NOTE—An unshielded lead-in wire (as in the case of the interior-type antenna) may be attached to the antenna connector as described above except that all references to the shield braid and loom may be neglected.

Power Supply to Receiver—The power input lead (*black* wire with fuse receptacle and terminal, extending from the receiver cable) must be connected electrically to the ungrounded side of the car storage battery. This connection preferably may be made at the battery terminal of the ammeter (usually the terminal with only one lead attached—consult wiring diagram in instruction book for automobile) and any slack length remaining should be taped securely behind the instrument panel.

Suppression of Ignition Interference

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

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

NOTE—For cap-type distributors, exchange the distributor suppressor at your dealer's for one of a special type. Cut the wire leading from the distributor to the coil and screw the suppressor into the end attached to the distributor. Screw the other end of the wire (leading to the coil) into the opposite end of the suppressor.

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

4. The other by-pass capacitor must be connected between the battery terminal of the ammeter and any convenient screw on the instrument panel In certain cases, interference will be reduced still further by connecting an additional capacitor (obtainable from your dealer) between the battery side of the ignition coil and the car frame

PART II—OPERATION

The instrument should be operated as follows:

1. Insert the key in the lock on the remote control unit and turn it clockwise to the extremity of its rotation.

NOTE—This key serves to operate both the power switch and the volume control. A slight rotation clockwise will turn the power "on" and the remainder of the range permits adjustment of volume. The dial scale should become illuminated when the power is "on."

2. Rotate the Station Selector knob in either direction until a desirable station program is heard.

NOTE—The dial scale is calibrated in channels to aid in station identification. Add one cipher to the scale marking to obtain the actual frequency in kilocycles.

3. After receiving a signal, turn the Volume Control counter-clockwise until the volume is reduced to a low level. Now, readjust the Station Selector to the position midway between the points where the quality becomes poor or the signal disappears. **This operation insures the best quality of reproduction.**

4. Finally, advance the Volume Control (clockwise) until the desired level is obtained. Except on weak signals, the automatic volume control will maintain the volume substantially at the latter level, thereby precluding further manual adjustments. (Fading of the signal may be experienced in extreme cases, as when passing under bridges or other metallic structures, since such structures almost completely shield the antenna.)

5. Set the Tone Range Switch (located on the front of the receiver unit) for the preferred tone quality. This switch has two positions. In the counter-clockwise position, high-frequency (treble) response and static interference (when present) are decreased.

6. When through operating, turn the key to the "off" position, counter-clockwise. The instrument is then locked by removing the key.

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PART III—MAINTENANCE

Noisy or weak reception may be due to one of the following causes:

Radiotrons—The Radiotrons should be tested periodically and replaced if necessary in order to maintain best performance. The efficiency of each Radiotron may be checked by comparison with a new one of the same type in its place. Spare Radiotrons of each type should be kept on hand.

Fuses—This installation is protected by one fuse (rated 20 amperes) which is mounted in the fuse receptacle contained in the power input lead. If the set fails to operate and the dial lamp does not light, this fuse should be removed for examination. If found to be burned out, the wiring should be inspected for short-circuits or grounds and all tubes tested prior to insertion of a new fuse. **The replacement fuse must be of the same ampere rating.**

"B" Battery Eliminator—This unit should operate satisfactorily with little or no attention. With the power turned "on," a slight buzz should should be noticed to emanate from the receiver This buzz should be taken as indicative of proper operation of the "B" Battery Eliminator vibrator. Failure to observe this buzz, accompanied by repeated necessary replacement of the fuse, will denote a faulty condition, and, in such cases, the complete receiver should be taken to the dealer for inspection. **Do not attempt to adjust the vibrator yourself!**

Antenna—A properly installed roof antenna of the built-in or interior-type should require no attention. When the plate antenna is employed, the insulator bushings should be cleaned occasionally to prevent grounding.

Ignition System—The ignition system of the car must be kept in good condition. Fouled plugs or plugs with improperly adjusted gaps will affect the operation of the receiver as well as of the automobile. Burned or improperly adjusted breaker points will also impair the performance. It will be advisable to advance the generator charging rate in order to compensate for the additional drain on the car storage battery imposed by this instrument.

PART IV—SERVICE DATA

Type and Number of Radiotrons Used.....1 RCA-89, 1 RCA-78, 1 RCA-6A7, 1 RCA-6B7—Total, 4
Total Battery Current.....5.5 Amperes
Undistorted Output.....2.0 Watts
Loudspeaker Field Current.....1.35 Amperes
Maximum Output D. C. Voltage from Rectifier.....250 Volts
Total Plate Current.....53 M. A.

This four tube Superheterodyne Automobile Receiver is of compact construction and gives excellent performance. Features such as unit construction (one unit contains the receiver, plate supply unit and loudspeaker), ease of installation, freedom from ignition noise and excellent sensitivity, selectivity and tone quality characterize this instrument.

Plate Supply Unit

This receiver uses a vibrator type Inverter and rectifier that provides a source of direct current voltage for use as plate and grid supply for all Radiotrons. *This unit is accurately adjusted at the factory and service adjustments should not be attempted.* Any difficulties with this unit should be referred to the nearest Distributor handling these instruments who has instructions for servicing this item.

Line-up Capacitor Adjustments

The three R. F. line-up capacitors and two I. F. tuning capacitors are accessible and may require adjustments. The R. F. adjustments are made at 1400 K. C. and the I. F. adjustments at 175 K. C. The R. F. adjustments can be made with the receiver in its case, access to the adjusting screws being obtained through a slot in the bottom of the case. For the I. F. adjustments, however, it is necessary to remove the rear cover in order to couple the oscillator to the first detector. The following procedure should be used for either adjustments:

R. F. Adjustment

The three R. F. line-up capacitors are adjusted at 1400 K. C. Proceed as follows:

(a) A fairly accurate adjustment can be made by using the ear for an indicating device, thus eliminating the need of an output meter and the necessity of removing the rear cover to connect it.

(b) Procure a modulated oscillator giving a signal at 1400 K. C. and a non-metallic screw driver.

(c) Couple the output of the oscillator from antenna to ground, set the dial at 140, and the oscillator at 1400 K. C.

(d) Place the oscillator and receiver in operation and adjust the oscillator output so that a weak signal is obtained in the loudspeaker when the volume control is at its maximum position.

(e) Then adjust the three line-up capacitors until maximum sound in the speaker is obtained. Readjust these capacitors a second time as there is a slight interlocking of adjustments.

For a more accurate adjustment, the use of an output meter is recommended. However, this will require the removal of the rear cover in order to connect the output meter across the cone coil. Also the bottom and Radiotron side of the chassis must be shielded together with the transformer so that vibrator noise will not be obtained, due to the removal of the case shielding.

I. F. Adjustments

In order to make the I. F. adjustments, it is necessary to remove the rear cover, due to the fact that the external oscillator must be connected between the control grid of the first detector and ground. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver and an output meter.

(b) Remove the receiver from its case, shield the transformer and Radiotrons as described under R. F. adjustments, place the receiver in operation and connect the oscillator output between the first detector grid and ground. Connect the output meter across the voice coil of the loudspeaker. Then connect the antenna lead to ground and adjust the tuning capacitor so that no signal except the I. F. oscillator is heard at maximum volume. With the volume control at maximum, reduce the external oscillator output until a small deflection is obtained. Unless this is done, the action of the A. V. C. will make it impossible to obtain correct adjustments.

(c) Each transformer has but one winding that is tuned by means of an adjustable capacitor, the other windings being untuned. The capacitors should be adjusted for maximum output.

At the time I. F. adjustments are made it is good practice to follow this adjustment with the R. F. adjustments, due to the interlocking that always occurs. The reverse of this, however, is not always true.

Practical Hints on Installation

The following suggestions may prove useful when making installations on the particular cars mentioned.

Chevrolet 1933—Mount chassis on left side, end against car bulkhead and use short flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors. Place a copper screen under the toe board on right side, 10" x 10" to prevent the body from radiating ignition interference which may be picked up by the antenna. This screen must be grounded.

Plymouth 1933—Mount chassis on left side, back against car bulkhead and use 33¾" flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors.

Ford V-8 1932—Mount chassis on left side, end against car frame and use short flexible shaft. Use one capacitor, connected to the generator. Install eight spark plug type suppressors only, no distributor suppressor being necessary.

The majority of cars will be found to be entirely free from ignition noise when the standard equipment is used. Usually mounting the chassis on the right side of the bulkhead will be found most desirable, although if a heater is used, the left side will be preferable.

RADIOTRON SOCKET VOLTAGES

6.3 Volt Battery

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

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R. C. A. VICTOR CO., INC.

MODEL M-34
Auto Radio
Vibrator Notes

SERVICE DATA FOR VIBRATOR UNIT

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

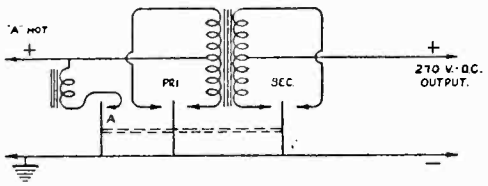

Figure C—Schematic of Vibrator Unit

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

(1) Spring and Contact Adjustment Limits.

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

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

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

(2) Adjustment for the Reduction of Sparking.

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

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

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

(3) Output Voltage.

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

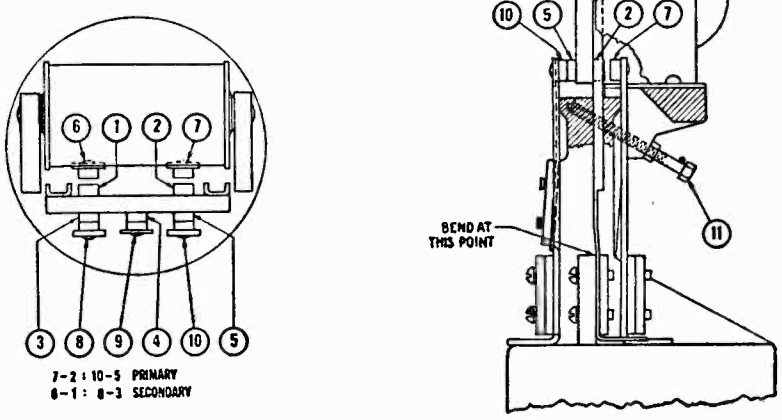

Figure D—Vibrator Contacts

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MODEL M-34
Auto Radio
Schematic
Chassis

R. C. A. VICTOR CO., INC.

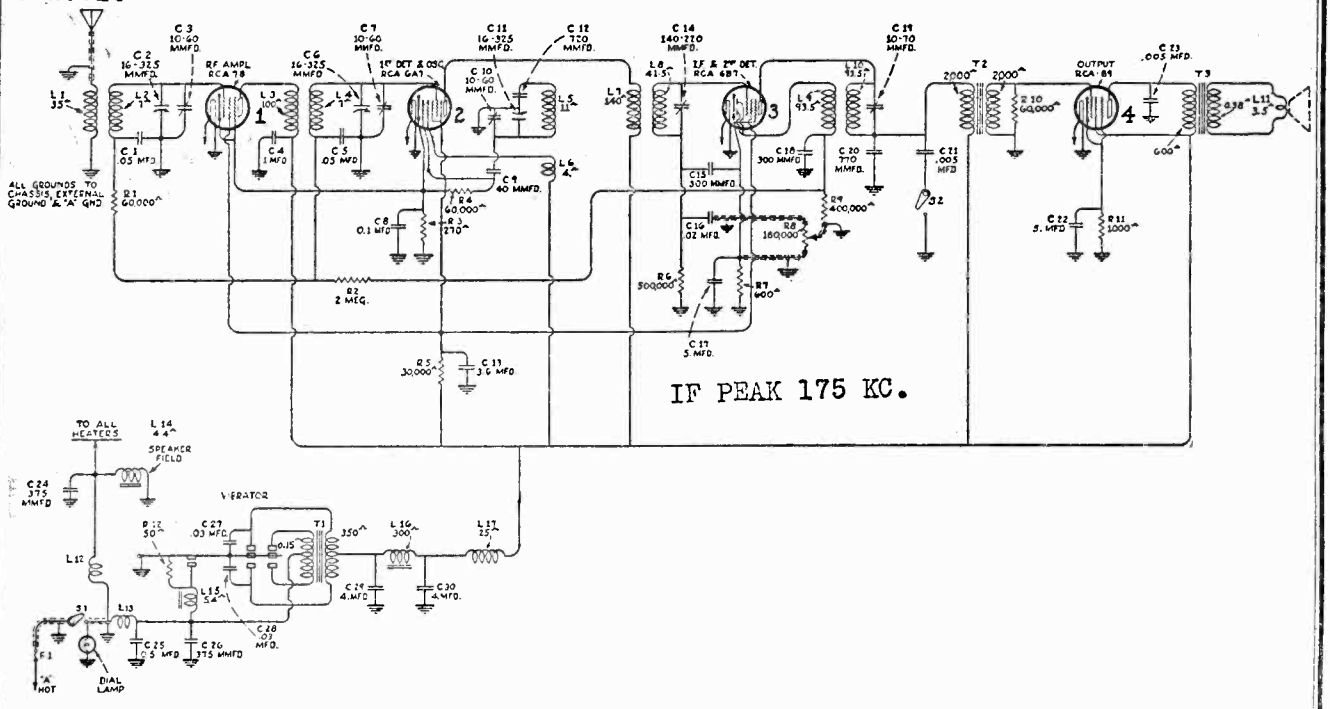

Figure A—Schematic Diagram

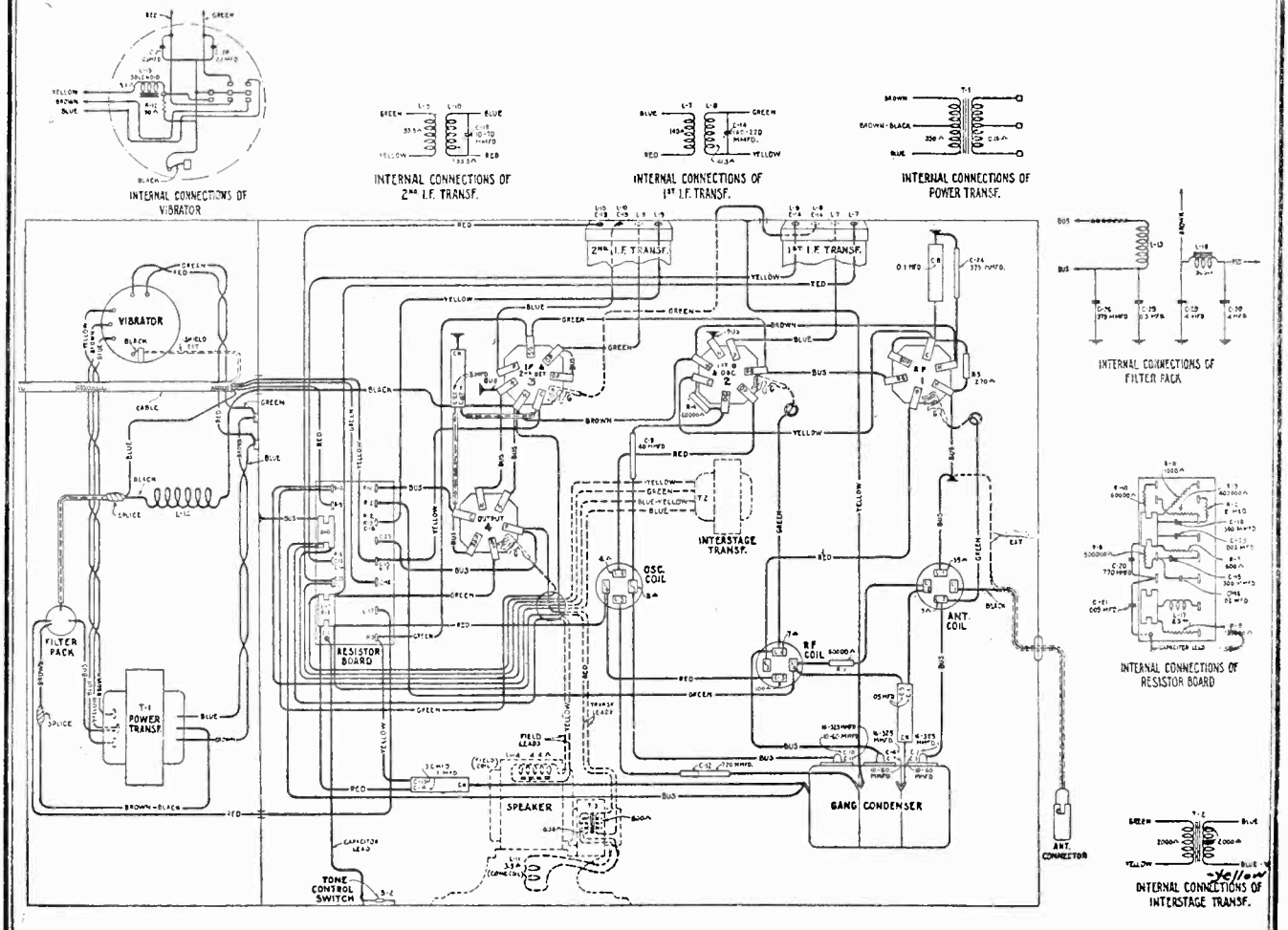

Figure B—Wiring Diagram

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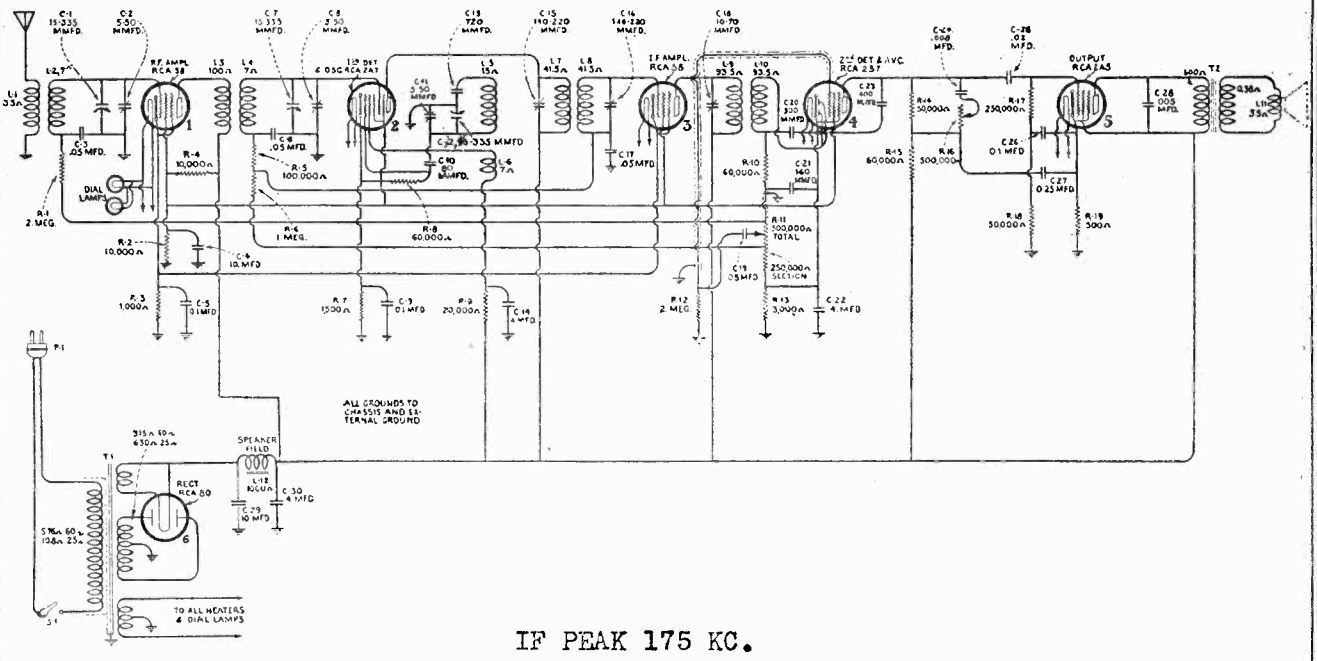
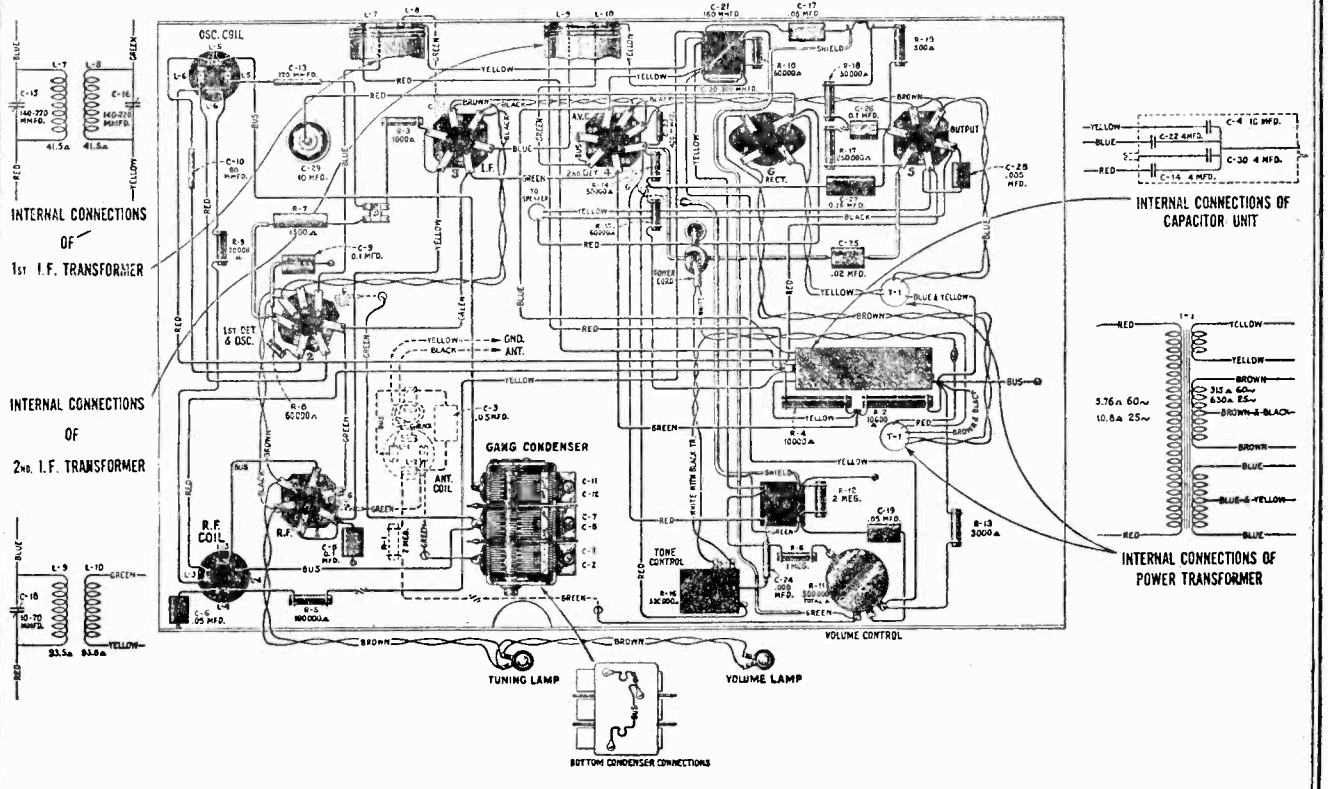
MODEL R-37, R-38
Schematic



IF PEAK 175 KC.



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MODEL R-37, R-38
Voltage-Data

R. C. A. VICTOR CO., INC.

SERVICE DATA

Electrical Specifications

Voltage Rating.....115 Volts
Frequency Rating.....25–60 and 50–60 Cycles
Power Consumption...60 Cycle 75 Watts, 25 Cycle 80 Watts
Number and Types of Radiotrons..2 RCA-58, 1 RCA-2A7, 1 RCA-2B7, 1 RCA-2A5, 1 RCA-80—Total 6
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

This receiver is a six tube Superheterodyne incorporating a Dynamic Loudspeaker as a part of the chassis, automatic volume control, single heater type Pentode output tube, continuosly variable type tone control and the inherent sensitivity, selectivity and tone quality of the Superheterodyne.

The circuit consists of an R. F. stage using Radiotron RCA-58, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage using Radiotron RCA-58, an RCA-2B7 functioning a combined second detector and automatic volume control, an output stage using the new heater Pentode RCA-2A5 and the RCA-80 functioning as a rectifier.

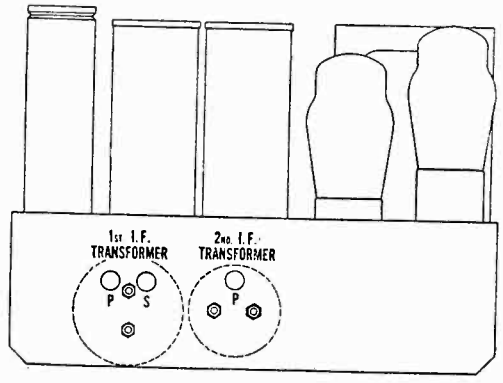

Figure C—Location of I. F. Line-up Adjustment Screws

Service work in conjunction with this receiver will be similar to that of other Superheterodyne receivers incorporating a similar type automatic volume control.

Line-up Adjustments

I. F. Tuning Adjustments—Two transformers comprising three tuned circuits (the secondary of the second transformer is untuned) are used in the intermediate amplifier. These are tuned to 175 K. C. and the adjustment screws are accessible as shown in Figure C. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.

(b) Short-circuit the antenna and ground leads and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the chassis.

(c) Connect the oscillator output between the 1st detector control grid and chassis ground. Connect the output meter across the voice coil of the loudspeaker and adjust the oscillator output so that with the receiver volume control at maximum, a slight deflection is obtained in the output meter.

(d) Adjust the primary of the second, and the secondary and primary of the first I. F. transformers until a maximum deflection is obtained. Keep the oscillator output at a low value so that only a slight deflection is obtained on the output meter at all times. Go over these adjustments a second time as there is a slight interlocking of adjustments. This completes the I. F. Adjustments.

R. F. and Oscillator Adjustments—The three gang capacitor screws are accessible at the top of the chassis. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 1400 K. C., a non-metallic screw driver such as Stock No. 7065 and au output meter.

(b) Connect the output of the oscillator to the antenna and ground lead of the receiver. Check the dial at the extreme maximum position of the tuning capacitor. The indicator should be at the last division. Then set the dial at 140, the oscillator at 1400 K. C. and connect the output meter across the cone coil. Adjust the oscillator output so that a slight deflection is obtained when the receiver volume control is at maximum.

(c) Adjust the three tuning condenser line-up capacitors until maximum deflection is obtained in the output meter.

When making both the I. F. and R. F. adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

RADIOTRON SOCKET VOLTAGES

115 Volts. A. C. Line—No Signal

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

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

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R. C. A. VICTOR CO., INC.

MODEL RE-40
Schematic
Chassis

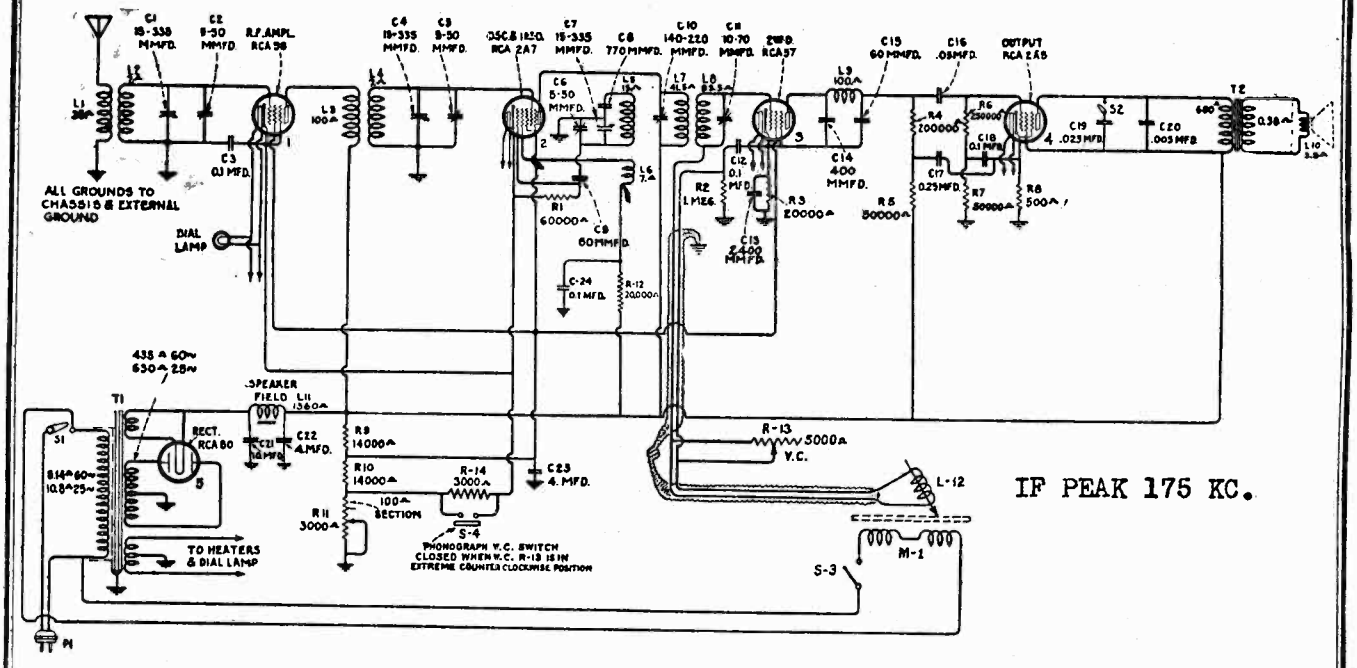

Figure C—Schematic Circuit

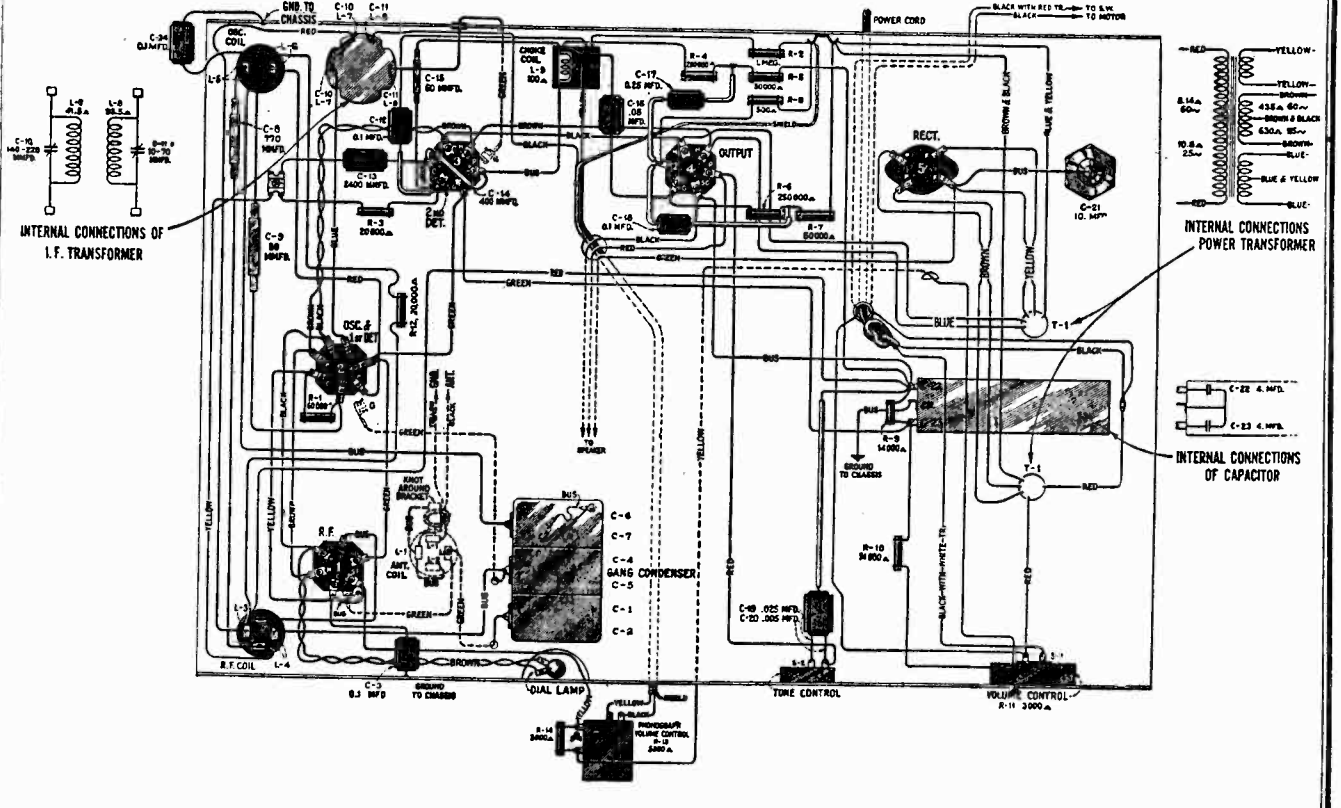

Figure D—Wiring Diagram

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MODEL RE-40
Voltage

R. C. A. VICTOR CO., INC.

SERVICE DATA

Voltage Rating.....105–125 Volts
Frequency Rating.....25, 30, 40, 50 and 60 Cycles
Power Consumption.....60 Cycles, 95 Watts
Number and Types of Radiotrons.....1 UX-280, 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total 5
Undistorted Output.....1.75 Watts
Frequency Range.....540 K. C. to 1500 K. C.

This combination radio-phonograph instrument uses a five-tube Super-Heterodyne receiver incorporating a dynamic loudspeaker, two-point tone control, single heater type Pentode Output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The standard RCA Victor two speed motor board equipment is used and the entire assembly enclosed in a table type cabinet.

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

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

Service data for the magnetic pickup is included below.

RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

MAXIMUM VOLUME CONTROL SETTING—NO SIGNAL

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

SERVICE DATA ON MAGNETIC PICKUP

This magnetic pickup is of a new design that results in excellent reproduction. While in physical appearance, it is similar to that of the older type, details of construction are considerably different. It consists of essentially a chromium steel magnet, two thin pole pieces, a mechanism support and bracket, a coil, and an armature.

REPLACING MAGNET COIL, PIVOT RUBBERS, OR ARMATURE

In order to replace a defective magnet coil or hardened pivot rubbers, it is necessary to proceed as follows:

(a) Remove the pickup cover by removing the center holding screw and needle screw.

(b) Remove the pickup magnet and the magnet clamp by pulling them forward.

(c) Unsolder the coil leads and remove the mechanism assembly from the back plate by releasing the two mounting screws.

(d) Remove screws A and B, Figure A, and then remove the mechanism assembly from the pole pieces.

(e) The coil or the front pivot rubber may now be removed and replaced. If it is desired to replace the rear pivot rubber, then the end of the armature soldered to the mechanism support must be unsoldered.

(f) The mechanism should now be reassembled except for the magnet which must be magnetized. After being magnetized the mechanism—with the pole pieces upward, should be placed so that the magnet may be slid from the magnetizer onto the pole pieces without breaking physical contact. After placing the pole pieces on the magnet, the entire assembly should be remagnetized thoroughly, being careful not to change polarity.

(g) After reassembling to the mechanism, the entire assembly should be fastened to the back plate by means of the two screws provided, making sure support is down against pads on back. At the same time, the metal dust cover must be placed in position.

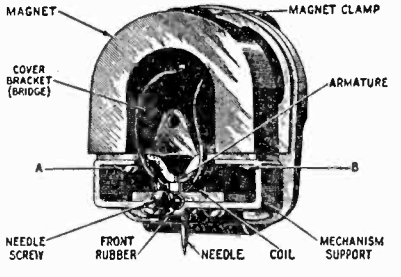

Figure A—View of Pickup showing parts

(h) After remagnetizing, it is necessary to correctly center the armature. This may be done quite accurately by feeling its play after the needle is inserted. A little practice will quickly show which way an adjustment is necessary to have the armature centered properly. The adjustment is made by loosening screws A and B (Figure A), and sliding the mechanism slightly in relation to the pole pieces.

(i) The cover may be now replaced over the entire assembly, and the pickup returned to the tone arm.

Only rosin core solder should be used for any soldering in conjunction with the pickup. However, if great care to wipe clean and use as small amount as possible is exercised, paste or liquid flux may be used for soldering the end of the spring.

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Radiola 42 Schematic
Model R-43 Notes

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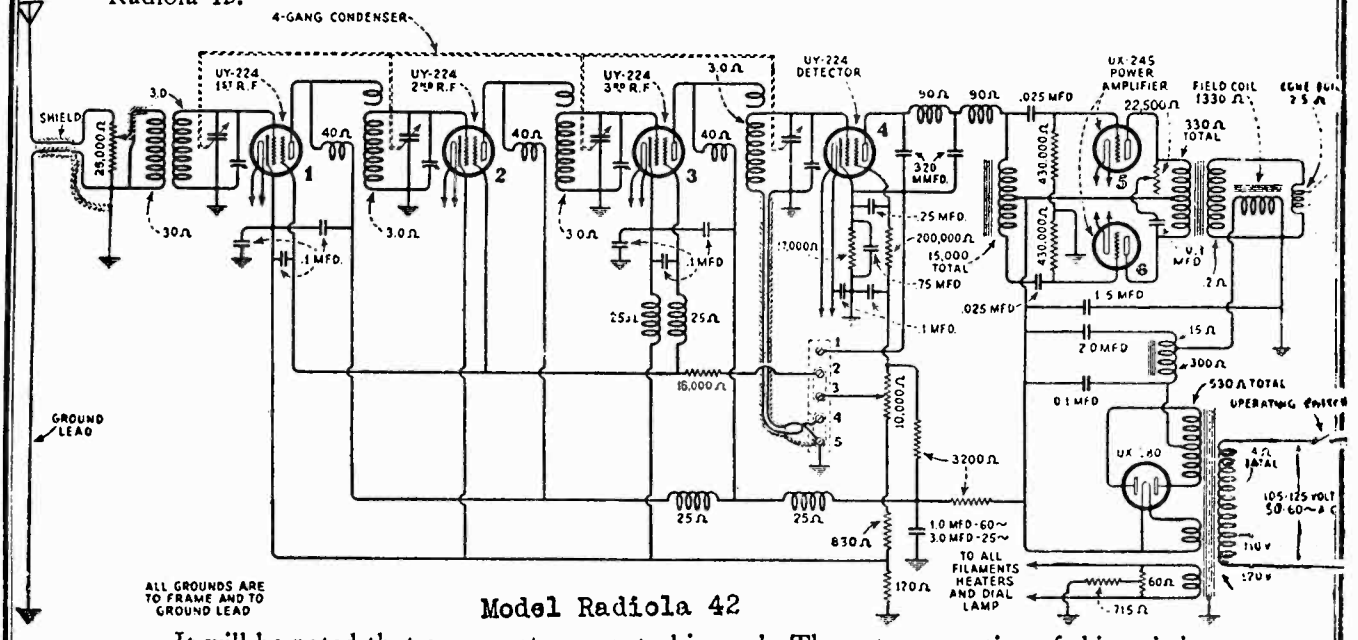
All the information contained in the Radiola 48 Service Notes will therefore apply to the Radiola 42.



Model Radiola 42

It will be noted that a new volume control is used. The antenna section of this unit has a value of 25,000 ohms instead of 50,000 ohms as used in the Radiola 48. This volume control is also being used as a replacement in Radiola 48. The screen grid voltage section has a value of 10,000 ohms and the 12,000 ohm shunt resistor is not used. The 0.005 mfd. condenser across the plates of Radiotrons UX-245 has been omitted due to the connection of the tone control in the same position. When making replacements of the condenser and reactor unit it will be necessary to clip the two leads that are connected to the .005 mfd. condenser close to the container. The reason for this is that the replacement unit supplied is suitable for either the Radiola 42 or 48.

Model R-43 Service Notes

The RCA Victor Console, R-43 is an eight tube screen grid battery operated Super-Heterodyne radio receiver.

Three Radiotrons RCA-232 are used in the R.F., 1st detector and I.F. stages respectively. Five Radiotrons RCA-230 are used in the Oscillator, 2nd detector, 1st audio and push-pull power stage.

A reference to the RCA Victor Radiola Superette Service Notes will give the details of circuit operation up to and including the second detector. The audio circuits of the R-43 are however, considerably different from the R-7. A discussion of their function follows:

The first audio stage operates in the usual manner, its output being fed into the grid circuit of the push-pull stage. The output stage is of the push-pull type, in which the tubes are biased to substantially plate current cut-off. The arrangement is such that the output stage may deliver substantially four times the output that would be obtained with the same tubes operated in the usual circuit. This system is very economical due to there being but a small amount of residual plate current flowing in the output stage. Current is drawn only when a modulated signal is being received.

An extra winding, shunted by a capacitor, is placed on the output transformer. The purpose of this circuit is to provide a high frequency cut-off for the audio amplifier.

A tone control is provided, which consists of a 0.1 mfd. capacitor and a 50,000 Ohm variable resistor connected across one half of the secondary of the input transformer. This circuit functions to reduce the high frequency output as the resistance is decreased.

The permanent magnet dynamic loudspeaker used with this receiver is a new development and gives all the fine quality and life-like reproduction inherent in this type of reproducer.

The receiver is designed for use with the new Eveready Aircell "A" battery which provides a life in excess of 600 ampere hours. The receiver draws but .48 amperes, giving approximately 1200 hours life from a single filament battery.

The plate and grid supply for all Radiotrons is furnished from four heavy duty "B" batteries. Due to the low current drain—8 to 15 M.A.—excellent life is obtained from this source of current.

SERVICE DATA

A reference to the RCA Victor Superette, R-7 Service Notes will give complete details on R.F., oscillator and I.F. adjustments as well as the usual service information required with this type of receiver.

BATTERIES

The Eveready Aircell "A" battery must be kept clean and the plates covered with water at all times. Operation at temperatures of 40 degrees Fahrenheit or lower is not recommended and if attempted will result in damage to the battery. Having the battery idle at this temperature does not in any way affect it. If it is essential that an installation be made where the receiver is to be operated at 40 degrees Fahrenheit or less, a single cell storage battery should be used. Due to the low current drain, excellent life from one charging will be obtained.

"B" batteries should be replaced when their output voltage has dropped 25% under load.

SPECIAL NOTE*** Material within border very important information

Schematic of Model R-43 on page 504-6, Vol. I.

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MODEL Radiola 64
Alignment

R. C. A. VICTOR CO., INC.

ADJUSTMENT OF R. F. COMPENSATING CONDENSER

A cause of insensitivity may be a poor tube in the tuned R.F. stage or incorrect adjustment of the R.F. compensating condenser. Try changing tubes first to improve the sensitivity and if not successful adjust the compensating condenser. A step-by-step procedure for making proper adjustment follows:

(a) Procure a non-metallic screwdriver
(b) Connect a resistance of about 1.5 ohms across the cone coil leads. This will prevent damage to the cone spider should the Radiola go into oscillation.
(c) Place Radiola in operation and tune in a station, preferably at about the center of the dial scale.
(d) Locate the position of the compensating condenser.
(e) With the volume control at its maximum position and the sensitivity control set near minimum, adjust the screw of the condenser until the Radiola goes into oscillation. This will cause a whistle whenever a signal is tuned in. Then turn the screw in the opposite direction until the set just goes out of oscillation and no howl is experienced when receiving stations at any part of the scale. The condenser is now in correct adjustment.
(f) After the adjustment of the R.F. compensating condenser has been made the tube in the second socket should not be interchanged.

ADJUSTMENT OF OSCILLATOR TRIMMING CONDENSERS

Two trimming condensers are provided for adjusting the oscillator circuit so that the beat note will always be 180 K.C. throughout the tuning range of the receiver.

The most noticeable symptom of the oscillator trimming condensers being out of adjustment is insensitivity of the Radiola in some sections or throughout the tuning range. To check the adjustment of the trimming condensers as a possible cause of any noticeable insensitivity in the receiver proceed in the following manner:

(a) Procure the following equipment:

A modulated oscillator giving signals at 1,400 and 600 Kilocycles.

A non-metallic screwdriver.

(b) Open the rear doors of the Radiola. Remove the two wood screws that hold the tuning meter in place and release the meter lead clamp so the meter can be dropped below the baffle board and pulled out to read the scale from the rear of the Radiola.
(c) With the Radiola in operation, place the oscillator in operation at 1,400 K. C., close to the antenna lead, and tune the Radiola by adjusting the station selector until a deflection caused by the external oscillator is obtained in the tuning meter.
(d) Now adjust the oscillator trimming condenser on the right with the non-metallic screw-driver until a maximum deflection is obtained in the tuning meter.
(e) Adjust oscillator for 600 K.C. Tune in the Radiola with station selector and then adjust the trimming condenser to the left for maximum deflection of the tuning meter.
(f) Now readjust at 1,400 K.C. as indicated in (c) and (d).

With this adjustment the trimming condensers are correctly adjusted for maximum efficiency, that is, so adjusted that the beat signal will be 180 K.C. throughout the tuning range.

(g) Remount tuning meter in its original position.

ADJUSTMENT OF I. F. TRANSFORMERS

The three I.F. transformers used in Radiola 64 are of the air core, tuned primary and tuned secondary type. The primary condenser is of the fixed type, while the secondary is adjustable. Also in each assembly an adjustable condenser is provided for neutralizing the I.F. stage. Figure 17 illustrates the internal connections.

Schematic on page 498, Vol. I.

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(a) Remove receiver assembly from cabinet Do not remove chassis from shelf and do not disconnect cable at S.P.U. terminals.

(b) Remove main tuning condenser assembly

(c) Replace screw holding ground lead on under side of receiver assembly and make certain that ground lead makes good contact with the chassis frame.

(d) Remove the two wood screws that hold down the tuning meter in place and release meter lead clamp. Slip the meter down below the baffle board and out to a position convenient for reading.

(e) Now place the coupling coil from the Driver under the center coil of the R.F. and Oscillator assembly. This is the transformer between the tuned R.F. stage and the first detector. Replace all Radiotrons except the Oscillator (No. 6) and turn operating switch "ON."

(f) Place Driver in operation by turning switch "ON," and set switches and vernier condenser at 180 K.C. The note from the Driver will then be heard in the reproducer unit of the receiver.

The I.F. transformer tuning condensers may now be adjusted

(a) Adjust the tuning condensers successively on the third, second and first I.F. transformers (Figure 19) for maximum signal in the loudspeaker and maximum reading on the tuning meter. After making one adjustment on the transformers it is a good plan to repeat, as slight changes may have occurred in tuning the other circuits. No signal, or a loud howl indicates neutralizing condensers are at either extreme, and should be readjusted.

A maximum reading by adjusting all three tuning condensers indicates correct tuning of the intermediate stages.

Neutralization of I-F Stages

Leave all adjustments and apparatus in position on completion of tuning. Connect a pair of phones across the cone coil of the reproducer unit. Turn the power off while making this connection. Place dummy Radiotron in first I.F. socket. Now adjust the neutralizing condenser on the first I.F. transformer (Figure 19) for the position of minimum or no signal. This is easily identified and the adjustment is not critical.

Replace the first I.F. tube and place "dummy" tube in second I.F. stage. Repeat the same adjustment as in (a) only adjusting with the neutralizing condenser on the second I.F. transformer. It will be noted that the two condensers on the third transformer are connected in parallel for tuning. This stage does not require neutralizing.

The approximate transformer primary D.C. resistance is 20 ohms; secondary 100 ohms. Due to the circuit arrangement (See Figure 17) it will only be possible to get a reading of 50 ohms on the secondary as the end connection goes to the neutralizing condenser and the reading must be made at the center tap connection. This test can be made from the underside of the chassis. (See wiring diagram

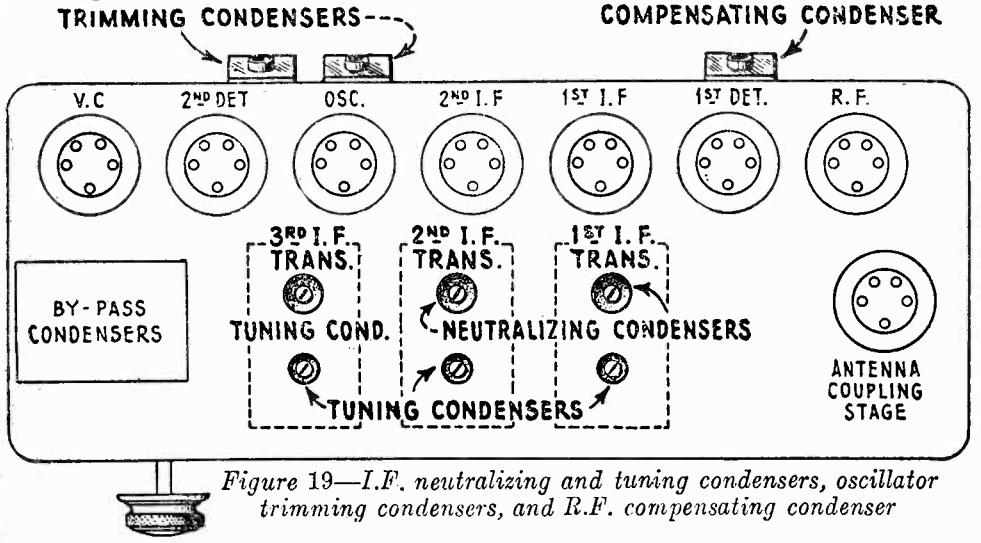

Figure 19—I.F. neutralizing and tuning condensers, oscillator trimming condensers, and R.F. compensating condenser

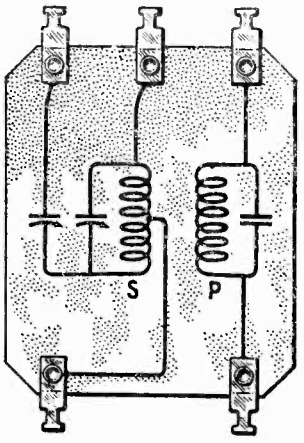

Figure 17—Internal connections of I.F. transformers

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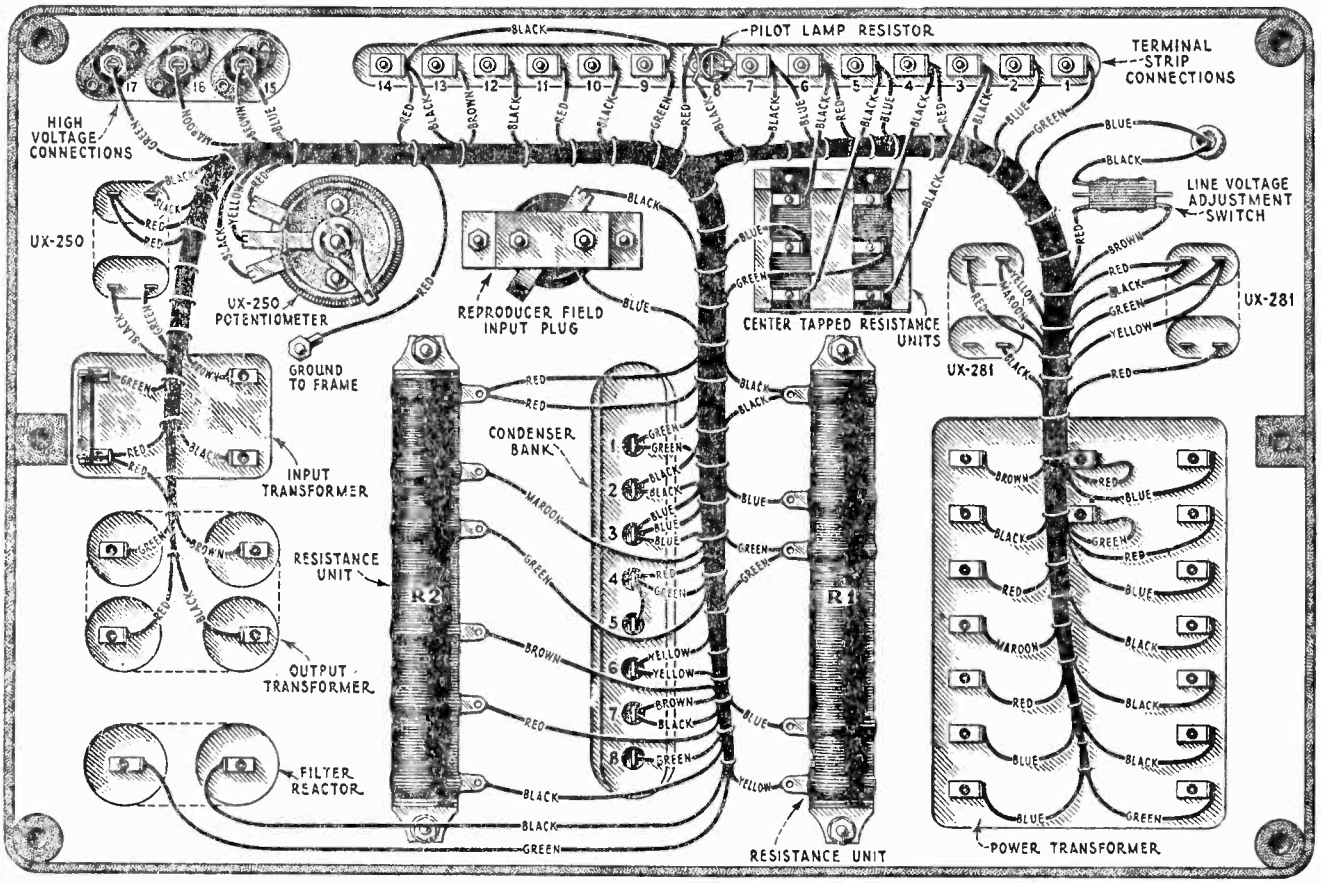
MODEL Radiola 64
SPU Chassis
AVC Data

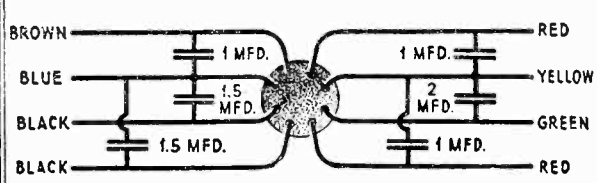
R. C. A. VICTOR CO., INC.



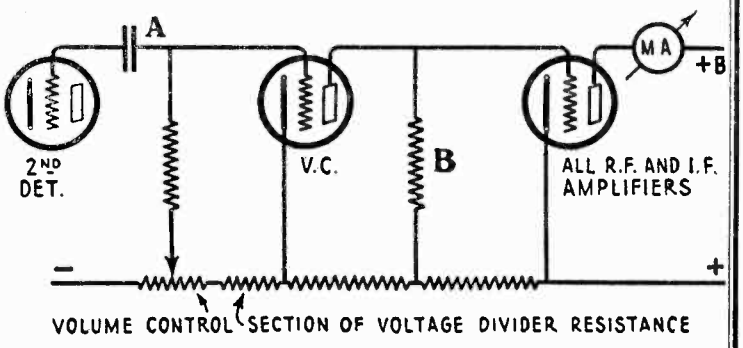
Wiring diagram of the socket power unit

OPERATION OF TUNING METER

In the foregoing explanation it is evident that practically all incoming signals will cause an increased negative bias on the radio frequency amplifying tubes. This increased bias will naturally cause a decrease in the plate current of these tubes. Placing a milliammeter in the plate circuit of these four tubes and tuning in a signal will cause a decreased reading. In Radiola 64 the milliammeter is a reversed scale instrument with a maximum rating equal to the total plate current of these four tubes. By having a reversed reading scale, turning the current on and not tuning in a station the meter will read maximum current or zero scale reading. Tuning in a station and thus registering a smaller amount of plate current the meter will give an increased reading. The amount of this increased reading will depend on the accuracy of tuning and the setting of the volume control.



Internal connections of the receiver by-pass condensers



Schematic of automatic volume control system

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MODEL Radiola 67
Voltage
Socket- Data

R. C. A. VICTOR CO., INC.

VOLTAGE READINGS AT RADIOTRON SOCKETS

"Radio-Record" Switch in Radio Position—Volume Control at Minimum

Socket No.	Cathode to Heater Volts	Cathode to Grid Volts	Cathode to Plate Volts	Plate Current Milamps.	Filament or Heater Volts (rms.)
1 (R.F.)	19.	—35.	160.	0.0	2.40
2 (No. 1 Det.)	14.	—8.	68.	1.2	2.35
3 (No. 1 I.F.)	19.	—35.	160.	0.0	2.40
4 (No. 2 I.F.)	19.	—35.	160.	0.0	2.40
5 (Osc.)	14.	0.0	68.	6.2	2.35
6 (No. 2 Det.)	14.	—28.	215.	0.7	2.35
7 (V.C.)	0.	—1.5*	25.*	0.7	2.35
UX-250	—	—65.	435.	49.	7.2
Volume Control at Maximum					
1	16.	—8.	120.	4.5	2.40
2	14.	—8.	73.	1.5	2.35
3	16.	—8.	120.	4.5	2.40
4	16.	—8.	120.	4.5	2.40
5	14.	0.0	73.	5.8	2.35
6	14.	—29.	235.	0.6	2.35
7	0.	—2.5*	78.*	0.0	2.35
UX-250	—	—80.	440.	55.	7.2
Switch in "Record" Position					
6	14.	—20.	200.	1.8	2.35
7	0.	—1.5*	25.*	0.7	2.35

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

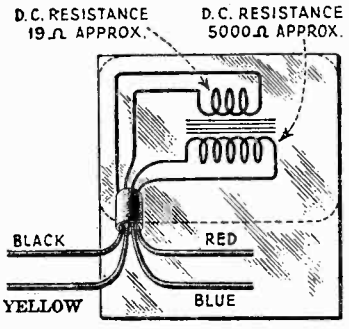


Figure 6—Internal connections of phonograph input transformer

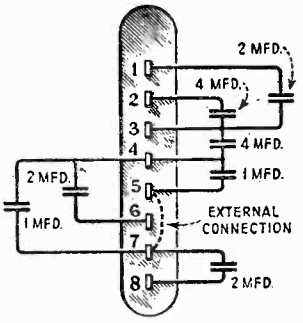


Figure 7—Internal connections of SPU filter condensers

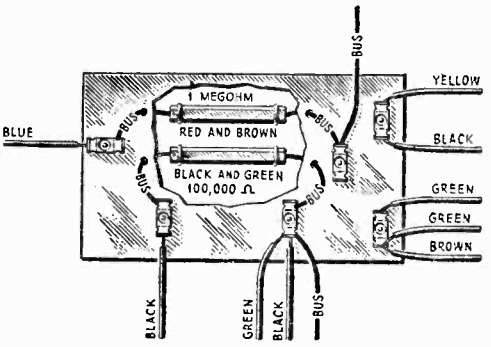
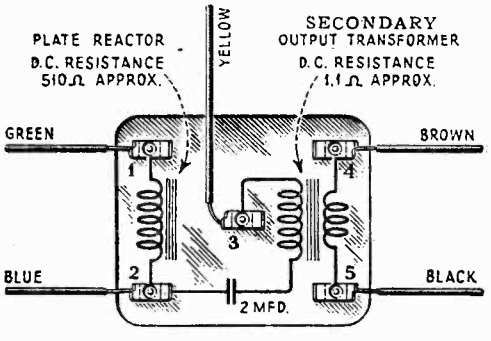
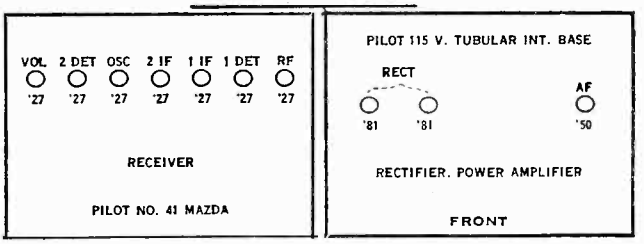


Figure 8—Connections of volume control resistors



-Output coupling device

Model Radiola 67 (1929)



Schematic on page 500, Vol. I.

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R. C. A. VICTOR CO., INC.

MODEL R-71,R-72
Voltage - Data

RCA Victor Models R-71 and R-72

ELECTRICAL SPECIFICATIONS

Voltage Rating ..... 105–125 Volts
Power Consumption ..... 25–40 Cycles, 90 Watts; 50–60 Cycles, 80 Watts
Type of Circuit ..... Super-Heterodyne
Type and Number of Radiotrons ..... 3 RCA-58, 3 RCA-56, 1 RCA-247, and 1 UX-280—Total 8
Number of R. F. Stages ..... One
Number of I. F. Stages ..... One
Type of Second Detector ..... Power Self Biasing
Type of Tone Control ..... Variable resistance in series with condenser that tunes secondary of interstage transformer at "low" position
Type of Automatic Volume Control ..... RCA-56 controlling R. F. and I. F. stages by means of drop across resistor in plate circuit constituting bias on R. F. and I. F. stages. Manual volume control varies grid bias on A. V. C. tube
Number of Audio Stages ..... One—Single Pentode
Type of Rectifier ..... Full Wave, UX-280
Undistorted Output ..... 2.25 Watts

PHYSICAL SPECIFICATIONS—R-71

Height ..... 18 11/16 Inches
Depth ..... 10 21/32 Inches
Width ..... 14 Inches
Weight Alone ..... 34 Pounds
Weight Packed for Shipment ..... 42 Pounds

PHYSICAL SPECIFICATIONS—R-72

Height ..... 38½ Inches
Depth ..... 11 11/16 Inches
Width ..... 23 Inches
Weight Alone ..... 58 Pounds
Weight Packed for Shipment ..... 79 Pounds

RCA Victor Models R-71 and R-72 are eight tube Super-Heterodyne radio receivers incorporating such features as Automatic Volume Control, Pentode output, New R. F. Super Control Pentodes, High Efficiency General Purpose Radiotrons and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-Heterodyne.

Model R-71 is a table type receiver and the R-72 is of the Console type. Except for the loudspeaker, both models are identical. The R-71 uses a six inch speaker while the R-72 uses an eight inch unit.

A reference to the Service Notes already published on the R-11 and R-7 will give details of any service information required on these receivers. Figure 1 shows the schematic diagram and Figure 2 the wiring. The voltage readings are listed below and the replacement parts on the following pages.

120 VOLT A. C. LINE

Radiotron No.	Cathode to Heater, Volts, D. C.	Cathode or Filament to Control Grid, Volts, D. C.	Cathode or Filament to Screen Grid, Volts, D. C.	Cathode or Filament to Plate, Volts, D. C.	Plate Current, M. A.	Heater or Filament, Volts, D. C.
VOLUME CONTROL AT MINIMUM						
1—R. F.	**2.0	*1.2	110	280	0	2.5
2—1st Det.	0	*1.5	110	280	0	2.5
3—Osc.	——	——	——	90	5.5	2.5
4—I. F.	**2.0	*2.0	110	280	0	2.5
5—A. V. C.	——	1.0	——	10	0	2.5
6—2nd Det.	——	6.0	——	260	1.0	2.5
7—Pwr.	——	20.0	275	265	35.0	2.5
VOLUME CONTROL AT MAXIMUM						
1—R. F.	**4.0	*0.1	100	260	5.0	2.5
2—1st Det.	**10.0	*1.0	95	250	2.0	2.5
3—Osc.	——	——	——	75	4.5	2.5
4—I. F.	**4.0	*1.8	100	260	3.0	2.5
5—A. V. C.	——	2.0	——	20	0	2.5
6—2nd Det.	——	7.0	——	240	1.0	2.5
7—Pwr.	——	20.0	275	265	30.0	2.5

*On 5 Volt, 1000 Ohm per Volt Meter.
**On 50 Volt, 1000 Ohm per Volt Meter

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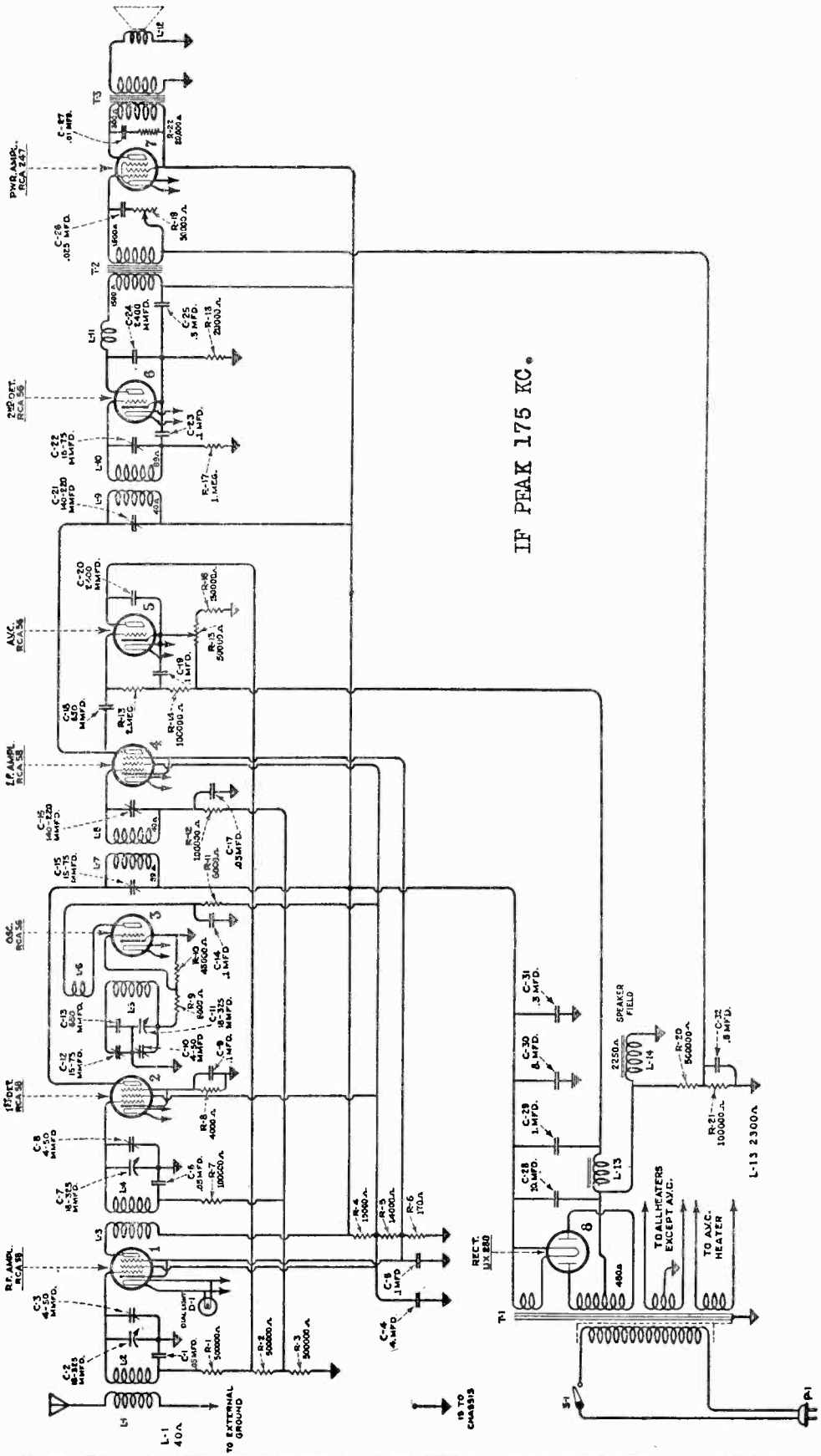
MODEL R-71, R-72
Schematic

R. C. A. VICTOR CO., INC.



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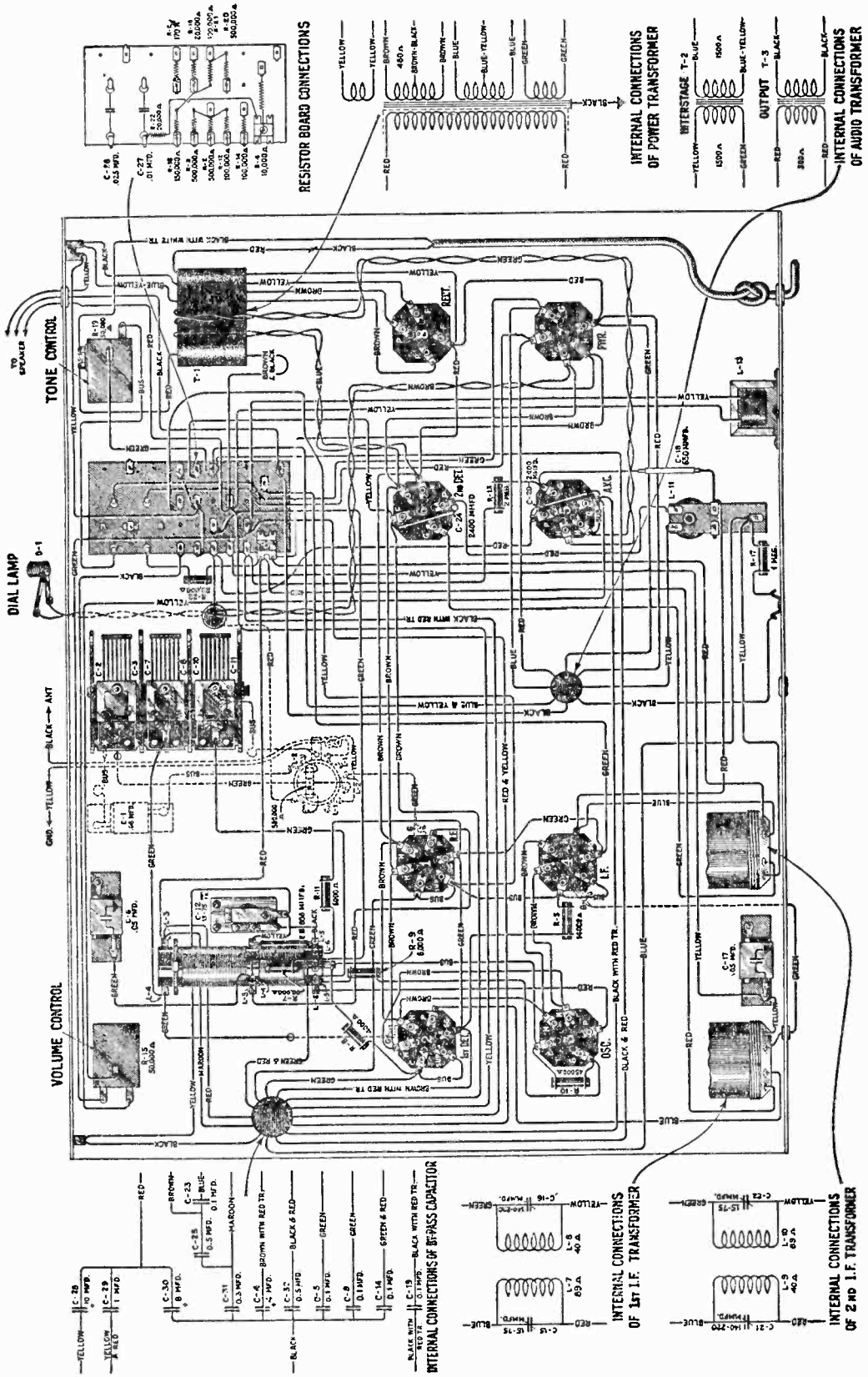
MODEL R-71,R-72
Chassis

R. C. A. VICTOR CO., INC.



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MODEL R-71, R-72
Parts List

R. C. A. VICTOR CO., INC.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2563	Resistor—6,000 ohms—Carbon type—1 watt—Package of 5	$3.00
2746	Socket—Dial lamp socket	.50
2747	Cap—Grid connector cap—Package of 5	.50
2749	Capacitor—2,400 mmfd.	1.50
3003	Cushion—Sponge rubber cushion for mounting receiver chassis—Package of 4	.50
3048	Resistor—500,000 ohms—Carbon type—½ watt—Package of 5	2.50
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	2.50
3252	Resistor—100,000 ohms—Carbon type—½ watt—Package of 5	2.75
3360	Resistor—150,000 ohms—Carbon type—½ watt—Package of 5	2.50
6142	Resistor—6,000 ohms—Carbon type—½ watt—Package of 5	2.00
6186	Resistor—500,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	2.00
6192	Spring—Condenser drive cord tension spring—Package of 10	.50
6250	Resistor—4,000 ohms—Carbon type—½ watt—Package of 5	2.00
6288	Knob—Station selector—Volume control or tone control knob—Package of 5	1.50
6298	Cord—Tuning condenser drive cord—Package of 5	1.00
6300	Socket—4 prong radiotron socket—1 used	.55
6301	Reactor—Filter reactor	2.00
6302	Bracket—Dial lamp bracket assembly	.50
6303	Resistor—20,000 ohms—Carhon type—½ watt—Package of 5	2.50
6304	Resistor—170 ohms—Carbon type—½ watt—Package of 5	2.50
6306	Resistor—14,000 ohms—Carbon type—1 watt—Package of 5	2.50
6307	Tone control complete with mounting nut	1.60
6308	Coil—R. F. coil	1.90
6309	Transformer—1st intermediate transformer	3.00
6310	Transformer—2nd intermediate transformer	3.00
6311	Board—Resistor board less resistors and capacitors	1.75
6312	Capacitor—650 mmfd.—Oscillator series capacitor—Package of 5	2.50
6315	Resistor—45,000 ohms—Carbon type—½ watt—Package of 5	2.50
6317	Capacitor—0.05 mfd. capacitor	.70
6318	Resistor—10,000 ohms—20 watt	1.00
6319	Capacitor—0.01 mfd.—Located on resistor board	.60
6321	Coil—2nd detector plate choke coil	1.10
6322	Volume control complete with mounting nut	1.65
6323	Shaft—Tuning condenser drive shaft complete with one flat washer and two "C" washers—Package of 2	.85
7054	Cord—Power cord	1.00
7062	Capacitor—Adjustable capacitor—15 to 70 mmfd.	1.00
7362	Capacitor—0.025 mfd.—Located on resistor board	1.00
7439	Drum—Dial drum with set screws	.50
7440	Scale—Tuning dial scale	.75
7484	Socket—5 contact radiotron socket—4 used	.65
7485	Socket—6 prong radiotron socket—3 used	.70
7487	Shield—Radiotron shield—6 used—Plain Finish	.50
7488	Shield—Radiotron shield top—1 used—Plain Finish	.50
7501	Capacitor—3 gang variable tuning capacitor—Less drive shaft and drum	$5.20
7502	Capacitor pack—Comprising one 10. mfd., one 1 mfd., two 0.5 mfd., one 8. mfd., five 0.1 mfd., one 0.3 mfd., and one 4. mfd. capacitors in metal container	8.25
7504	Coil—1st detector and oscillator coil complete with mounting bracket	3.50
8837	Support—Receiver chassis metal mounting support—Package of 4	.70
8917	Transformer—Audio transformer assembly comprising interstage and output transformer in metal container	4.50
8918	Transformer—Power transformer—110–120 volts—50–60 cycles	8.00
8922	Transformer—Power transformer—110–120 volts, 25–50 cycles	10.00
8923	Transformer—Power transformer—220–240 volts, 50–60 cycles	7.00
	R-71 CABINET ASSEMBLIES (Prices Furnished Upon Application)	
X118	Baffle board and grille cloth	
X119	Cabinet—Complete less equipment	
6113	Foot—Cabinet felt foot—Package of 15	
7441	Escutcheon—Station selector escutcheon with mounting screws	
	R-72 CABINET ASSEMBLIES (Prices Furnished Upon Application)	
X64	Foot—Cabinet foot	
X109	Top—Cabinet top	
X110	Panel—Control panel	
X111	Stretcher assembly—Comprising 1 center and 2 end rails	
X112	Board—Baffle board and grille cloth	
X113	Moulding—Control panel moulding	
X114	Moulding—Front end rail moulding—1 pair	
X115	Ornament—Control panel ornament—1 pair	
X116	Moulding—Control panel bottom moulding	
X117	Cabinet—Complete less equipment	
7441	Escutcheon—Station selector escutcheon	
	R-71 REPRODUCER ASSEMBLIES	
2975	Rivet—Cone retaining ring mounting rivet—Package of 100	.50
3237	Screw assembly—Reproducer mounting screw assembly—Comprising 4 screws, 8 nuts, 4 washers, and 4 eyelets—Package of 1 set	.50
6182	Board—Terminal board with three terminals—Package of 5	.50
8702	Ring—Cone retaining ring	.80
8921	Cone—Reproducer cone with voice coil—Package of 5	7.50
9417	Coil—Reproducer field coil assembly—Comprising coil, cone housing and magnet	6.00
	R-72 REPRODUCER ASSEMBLIES	
3237	Screw assembly—Reproducer mounting screw assembly—Comprising 4 screws, 8 nuts, 4 washers, and 4 eyelets—Package of 1 set	.50
6184	Board—Terminal board—3 terminals	.50
8919	Cone—Reproducer cone complete with voice coil—Package of 5	12.50
8920	Ring—Cone retaining ring	.50
9416	Coil—Reproducer field coil—Comprising coil, cone housing, and magnet	5.00

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MODEL R-71-B
Voltage
Data

R. C. A. VICTOR CO., INC.

RCA Victor Model R-71-B

ELECTRICAL SPECIFICATIONS

"A" Batteries Required ..... Eveready Aircell "A" Battery
"B" Batteries Required ..... Four 45 Volt Blocks, Preferably of Heavy Duty Type
"A" Battery Current ..... 0.48 Amperes
Average "B" Battery Current ..... 18 M. A.
Type of Circuit ..... Super-Heterodyne with A. V. C., Class "B" Output Stage and Compensated Volume Control
Type and Number of Radiotrons ..... 3 RCA-234, 1 RCA-232, 4 RCA-230—Total 8
Number of R. F. Stages ..... One
Number of I. F. Stages ..... One
Type of Second Detector ..... Pentode, Combining Detector, A. V. C. and Audio Amplification
Number of Audio Stages ..... Two
Undistorted Output ..... 1.00 Watt

PHYSICAL SPECIFICATIONS

Height ..... 18 11/16 Inches
Depth ..... 10 21/32 Inches
Width ..... 14 Inches
Weight Alone ..... 34 Pounds
Weight Packed for Shipment ..... 40 Pounds

RCA Victor Model R-71-B is an eight tube battery operated Super-Heterodyne radio receiver incorporating such features as Super-Control R. F. Amplifier Pentode Radiotrons in the R. F. and I. F. stages, automatic volume control, combination Pentode second detector, compensated Class "B" audio amplifier and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-Heterodyne. The chassis and permanent magnet dynamic loudspeaker are enclosed in a standard R-71 cabinet. The performance of this receiver is comparable in all respects to the A. C. model of the same designation, except in output volume.

SERVICE DATA

Except for different chassis design the circuit used in the R-71-B is very similar to that of the P-31 Portable Radiola. A reference to this Service Note should therefore be made for a description of the circuit and manner of making adjustments. The voltage readings are given below and the replacement parts on page 3. Figure 1 shows the schematic circuit diagram and Figure 2 the chassis wiring diagram.

RADIOTRON SOCKET VOLTAGES

(No signal being received)

Radiotron No.	Control Grid to Filament Volts	Screen Grid to Filament Volts	Plate to Filament Volts	Screen Current M. A.	Plate Current M. A.	Filament Volts
1. R. F.	0.2	65	157	1.0	3.0	2.0
2. 1st Detector	0.5	65	157	0.1	0.2	2.0
3. Oscillator	1.0	—	65	—	4.0	2.0
4. I. F.	0.5	65	157	1.0	3.0	2.0
5. 2d Detector	2.0	155	0	4.0	0	2.0
6. 1st A. F.	1.0	—	155	—	2.5	2.0
7. Power	14.0	—	155	—	1.2	2.0
8. Power	14.0	—	155	—	1.2	2.0

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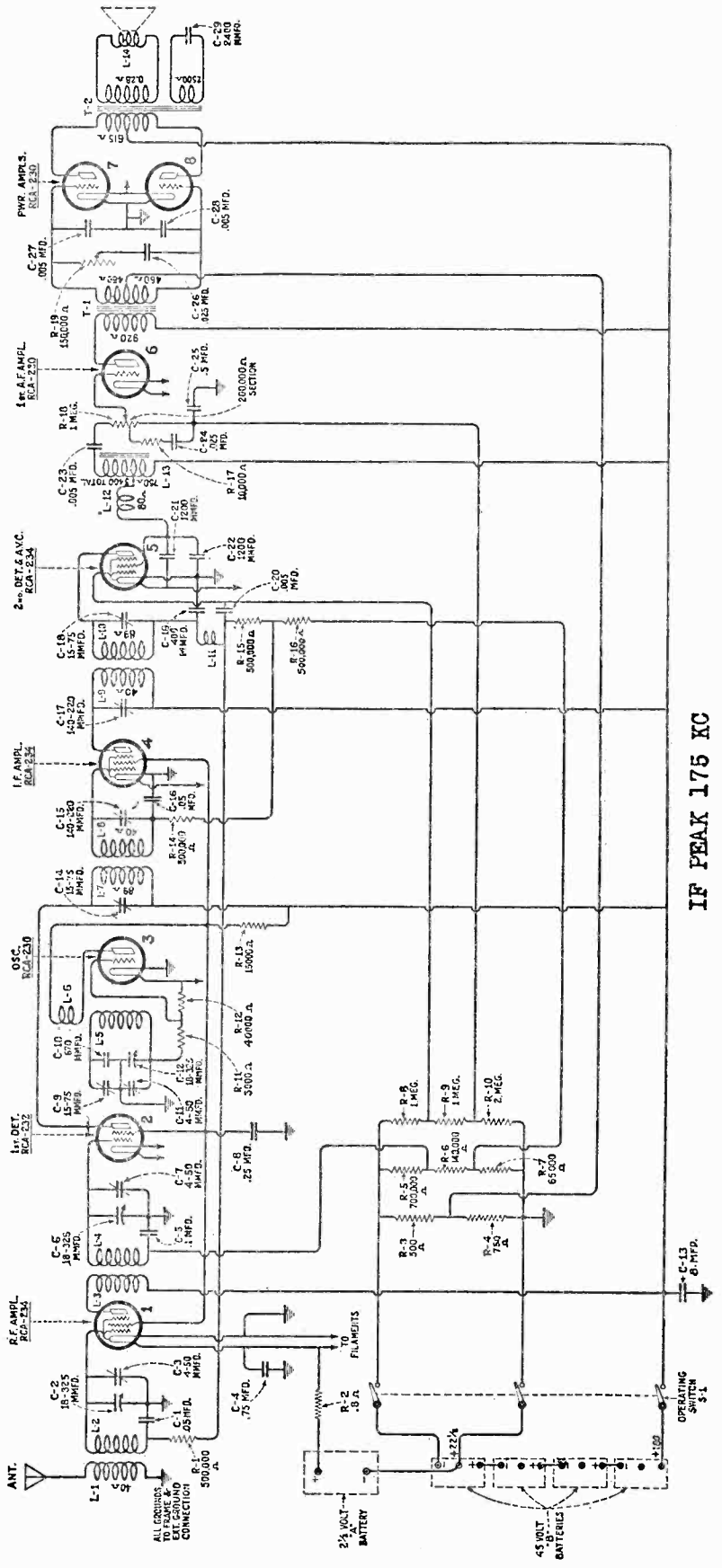
MODEL R-71-B
Schematic

R. C A. VICTOR CO., INC.



The circuit used in this receiver is very similar to that used in the Model P-31 battery operated portable receiver. However, the chassis arrangement is different.

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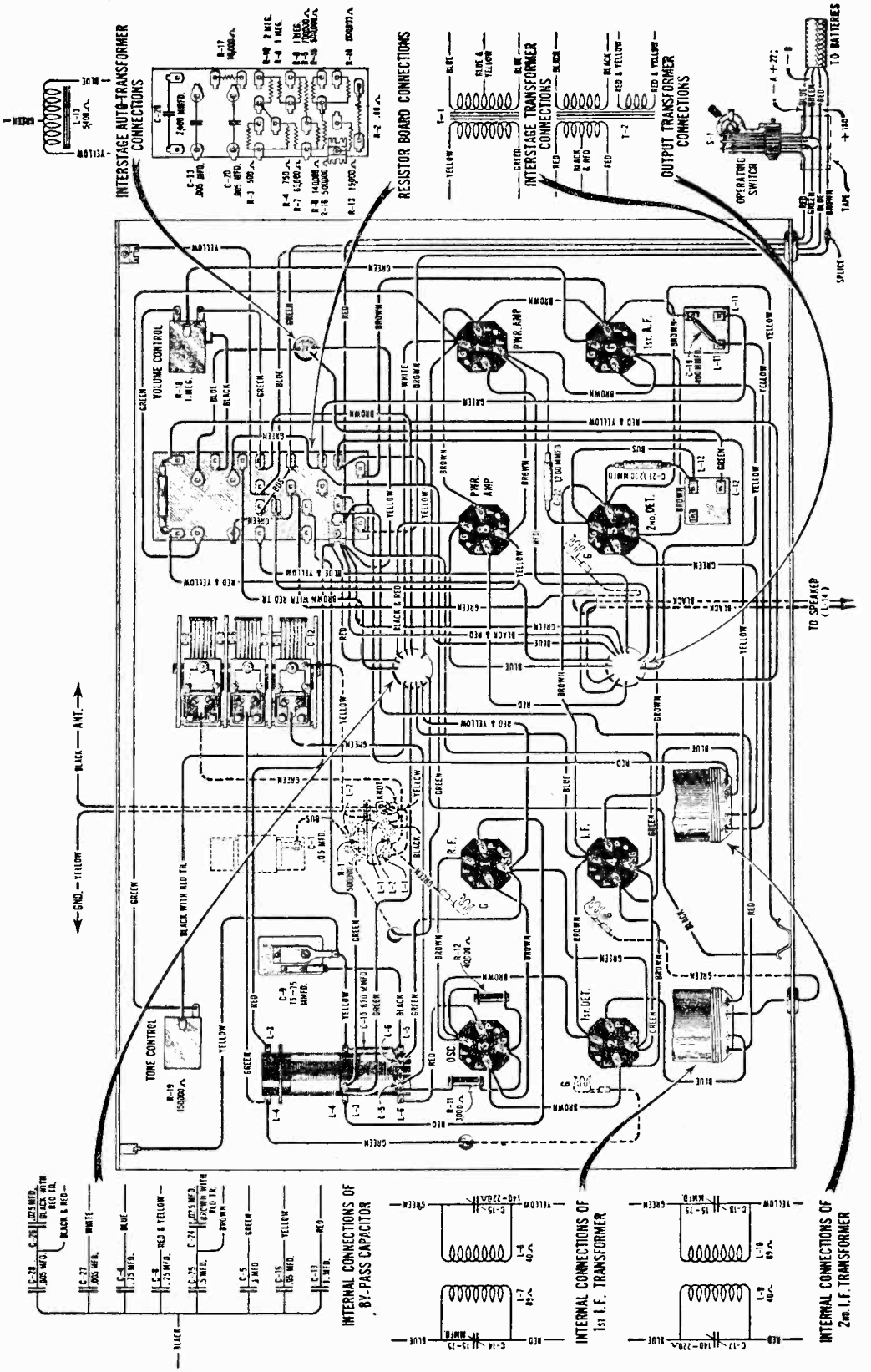
MODEL R-71-B
Chassis



Chassis Wiring Diagram of R-71-B

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MODEL R-71-B
Parts List

R. C. A. VICTOR CO., INC.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2012	Capacitor—1200 mmfd. capacitor	$0.55
2747	Contact cap—Package of 5	.50
2749	Capacitor—2400 mmfd.	1.50
2962	Capacitor—0.005 mfd. capacitor	.75
3003	Cushion—Sponge rubber chassis support cushions—Package of 4	.50
3033	Resistor—1 megohm—¼ watt—Carbon type—Package of 5	2.00
3043	Resistor—0.8 ohms—Wire wound	.50
3085	Capacitor—400 mmfd. capacitor	.60
3088	Knob—Operating switch knob—Package of 5	.50
3238	Screw—Set screw for switch knob No. 3088—Package of 10	.50
3252	Resistor — 100,000 ohms — ½ watt — Carbon type—Package of 5	2.75
3358	Resistor—3,000 ohms—½ watt—Carbon type—Package of 5	2.50
3380	Board—Resistor board—Less resistors and capacitors	1.00
3381	Resistor—10,000 ohms—¼ watt—Carbon type—Package of 5	2.00
3382	Resistor—750 ohms—½ watt—Carbon type—Package of 5	2.50
3383	Resistor—500 ohms—½ watt—Carbon type—Package of 5	2.50
6176	Escutcheon—Operating switch escutcheon—Engraved "OFF—ON"—Package of 5	.50
6186	Resistor — 500,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6192	Spring—Condenser drive cord tension spring—Package of 10	.50
6241	Resistor — 140,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6242	Resistor—2 megohm—¼ watt—Carbon type—Package of 5	2.00
6244	Resistor — 700,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6245	Resistor — 65,000 ohms — ¼ watt — Carbon type—Package of 5	2.00
6279	Resistor — 15,000 ohms — ½ watt — Carbon type—Package of 5	2.50
6285	Choke coil—2nd detector plate choke coil	1.10
6288	Knob—Station selector, volume control or tone control knob—Package of 5	1.50
6298	Cord—Tuning condenser drive cord—Package of 5	1.00
6300	Socket—4 prong Radiotron socket	.55
6308	Coil—R. F. coil complete with mounting bracket	1.90
6317	Capacitor—0.05 mfd. capacitor	$0.70
6320	Capacitor — 670 mmfd. capacitor — Package of 5	2.50
6323	Shaft—Tuning condenser drive shaft with one flat washer and two "C" washers—Package of 2	.85
6326	Transformer — 1st intermediate frequency transformer	3.00
6327	Transformer — 2nd intermediate frequency transformer	3.00
6328	Volume control—Complete with mounting nut	1.60
6329	Tone control—Complete with mounting nut	1.90
6330	Scale—Tuning dial scale	.90
6331	Shield—Radiotron shield	.50
6332	Switch—Operating switch	1.60
6333	Cable—Battery connecting cable	1.50
7062	Capacitor—Adjustable trimming capacitor—15 to 70 mmfd.	1.00
7439	Drum—Dial drum with set screws	.50
7501	Capacitor—3 gang variable capacitor, less drive shaft and drum	5.20
7524	Coil—Detector and oscillator coil complete with mounting bracket	3.50
7525	Capacitor pack—Comprising one 8.0 mfd., one 0.05 mfd., one 0.1 mfd., one 0.5 mfd., one 0.25 mfd., one 0.75 mfd., two 0.005 mfd. and one 0.025 mfd. capacitors in metal container	6.00
7526	Transformer—Audio input transformer	3.50
7527	Transformer—Audio transformer pack comprising interstage and output transformers in metal container	4.50
	CABINET ASSEMBLIES (Prices furnished upon request)	
6113	Felt—Cabinet felt foot—Package of 15	
7523	Escutcheon—Station selector escutcheon	
X118	Baffle board and grille cloth	
X146	Cabinet—Complete less equipment	
	REPRODUCER ASSEMBLIES	
2975	Rivet—Eyelet rivet for mounting cone—Package of 100	.50
6166	Board—Terminal board with two terminals—Package of 5	1.00
8702	Ring—Cone retaining ring	.80
8828	Bracket—Cone bracket and magnet assembly	4.60
8921	Cone—Reproducer cone complete with voice coil—Package of 5	7.50

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R. C. A. VICTOR CO., INC.

MODEL R-74, R-76, R-77
Schematic

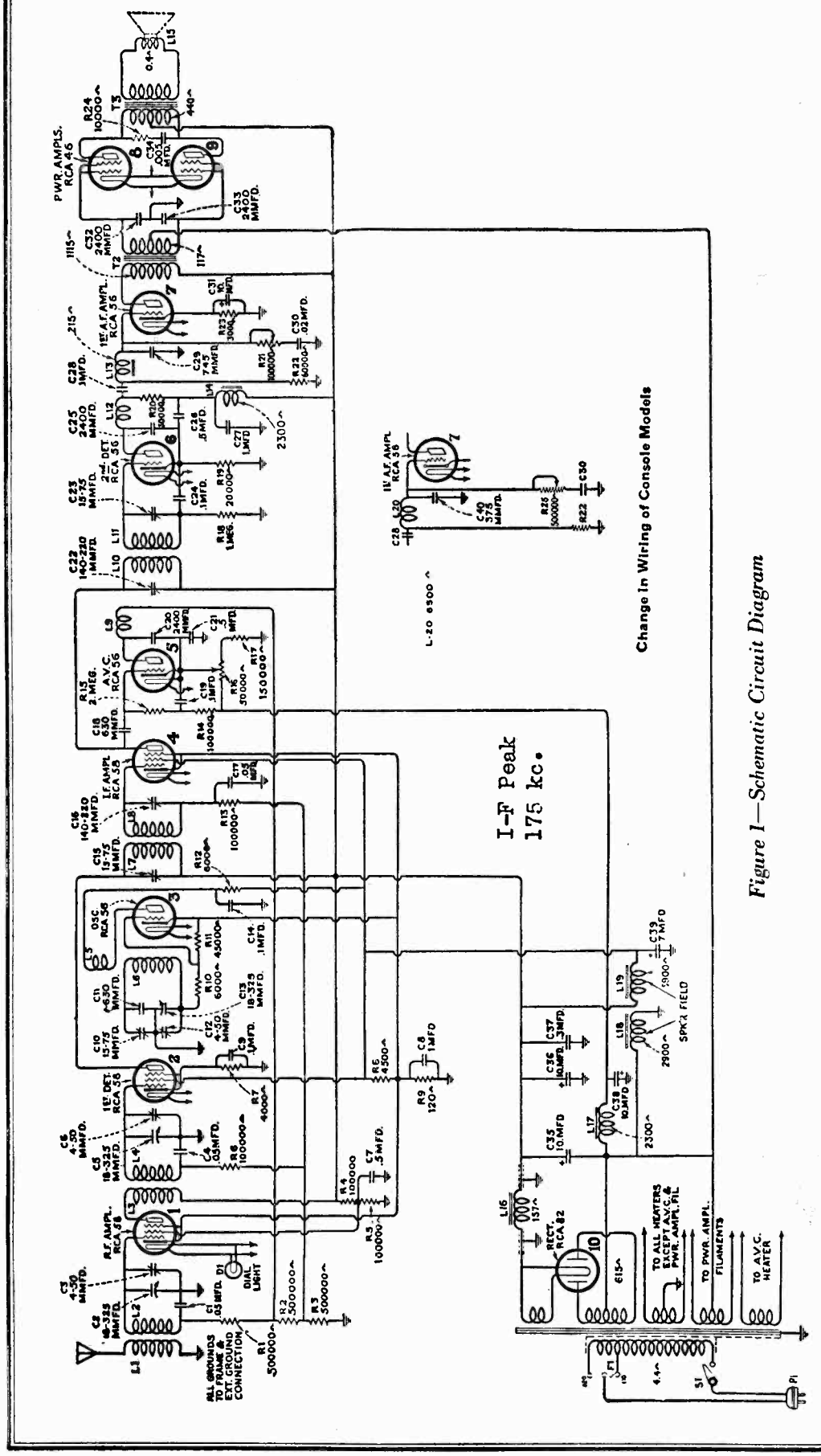

Figure 1—Schematic Circuit Diagram

Take note of the fact that a wiring change is to be found in the console model.

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MODEL R-74
Chassis

R. C. A. VICTOR CO., INC.

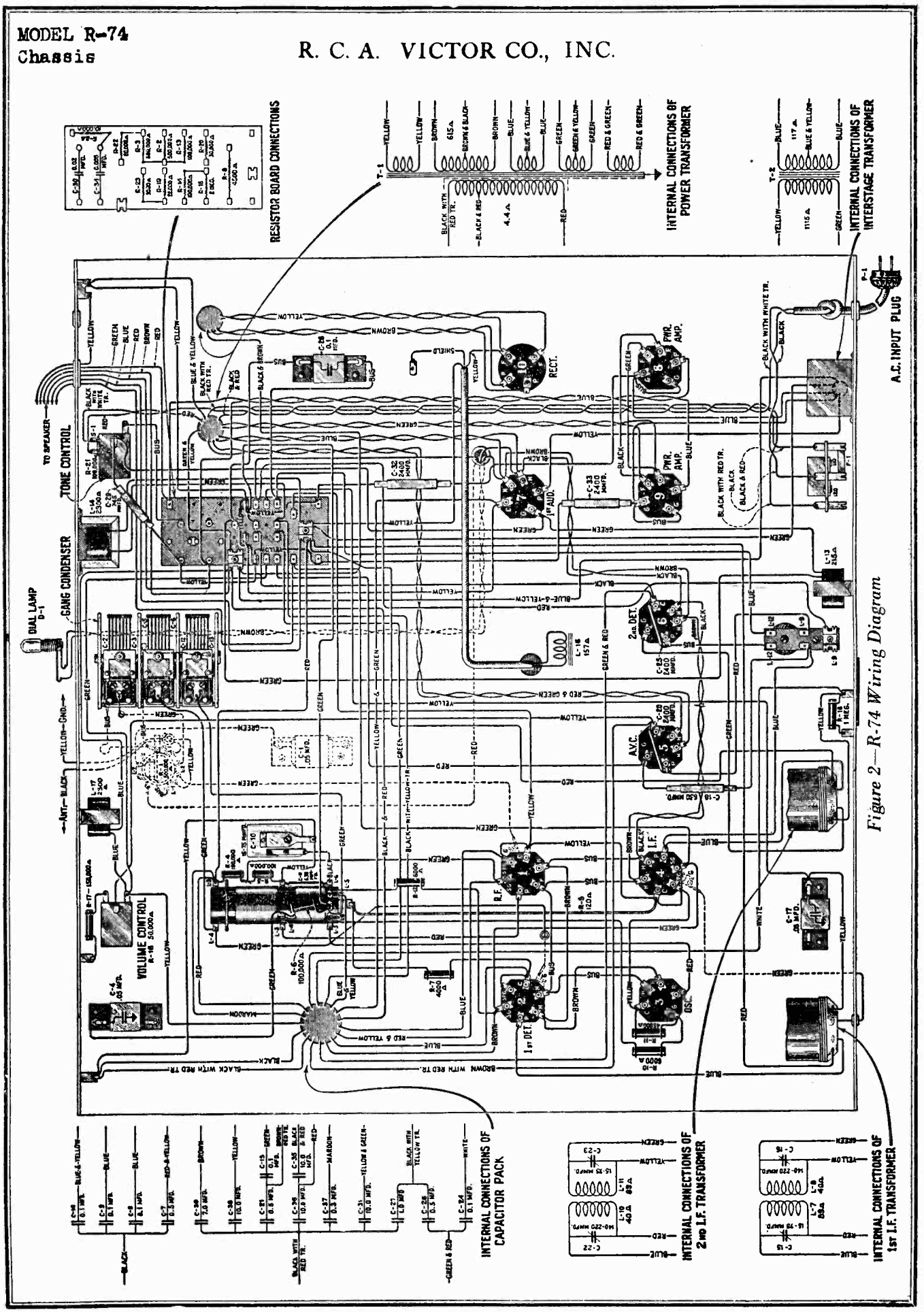

Figure 2—R-74 Wiring Diagram

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R. C. A. VICTOR CO., INC.

MODEL R-74, R-76, R-77
Voltage Data

SERVICE DATA

Service data in conjunction with these receivers will be found to be similar to that of other RCA Victor Super-Heterodyne receivers employing automatic volume control. A dummy Radiotron RCA-56 should replace the tube normally in the A. V. C. socket when making R. F., oscillator and I. F. adjustments. The Radiotron socket voltages are given below and the Replacement Parts on Pages 7 and 8.

Figure 1 shows the schematic diagram for all models. Figures 2 and 4 show the wiring diagrams while Figure 3 shows the loudspeaker wiring. Figures 5, 6, and 7 show various magnetic pickup connections and Figure 8 gives the correct manner of attaching the RCA Victor Short Wave Adaptor.

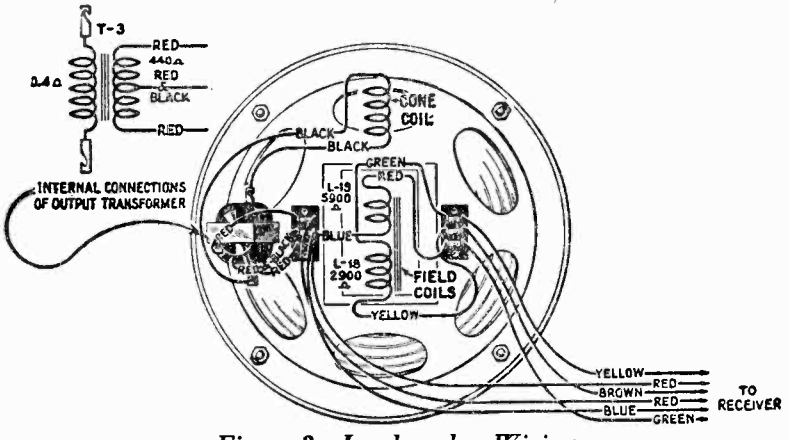

Figure 3—Loudspeaker Wiring

RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line

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

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

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MODEL R-76, R-77
Chassis

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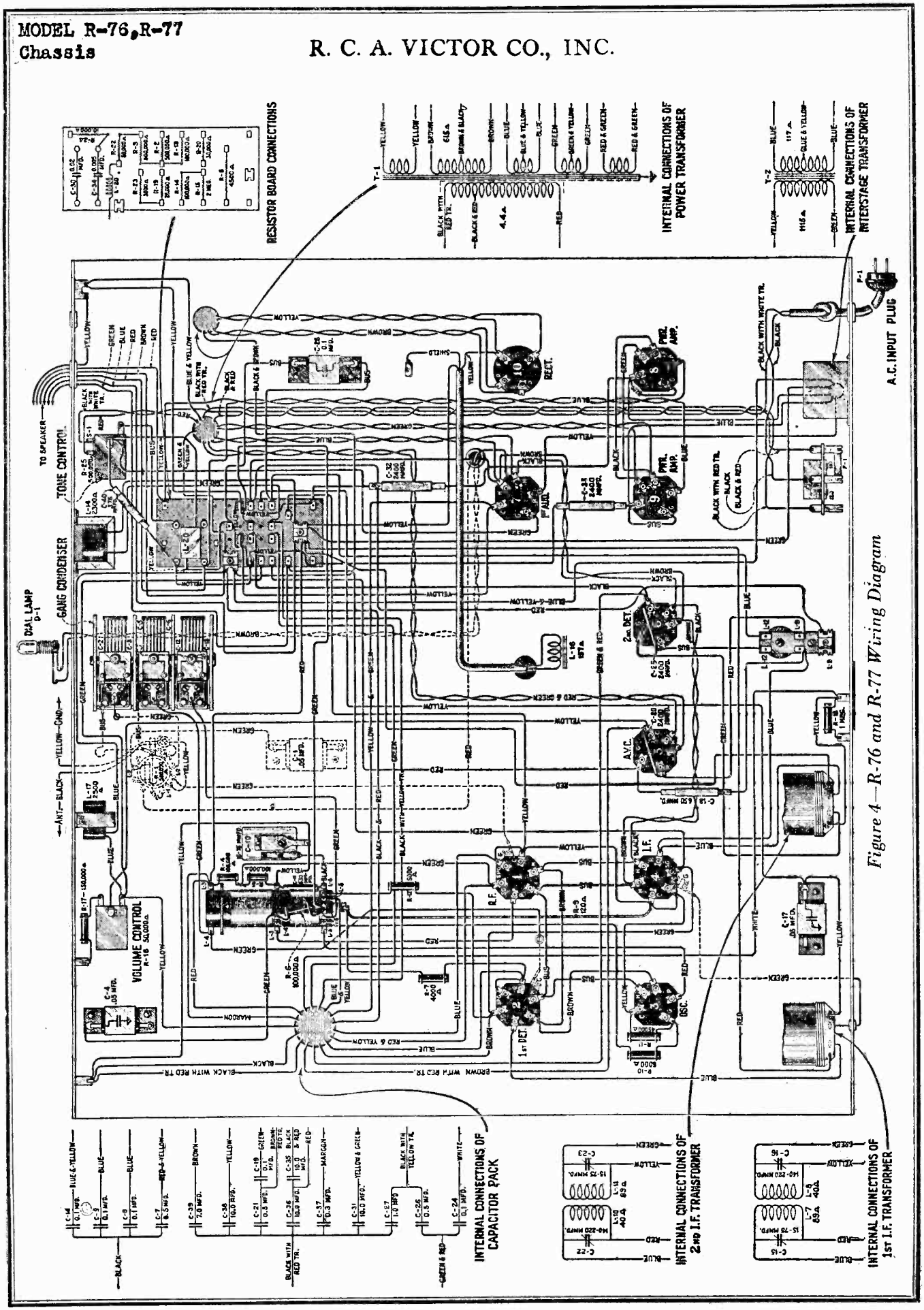

Figure 4—R-76 and R-77 Wiring Diagram

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RCA Victor R-78

(Bi-Acoustic Super-Heterodyne)

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts
Frequency Rating	50–60 Cycles
Power Consumption	110 Watts Average
(The input wattage may vary from 70 to 130 watts depending on the output volume being used)	
Recommended Antenna Length	25–100 Feet
Type of Circuit	Super-Heterodyne with A.V.C., Compensated A.F. system and Class "B" output stage
Type and number of Radiotrons	4 RCA-58, 5 RCA-56, 2 RCA-46, and 1 RCA-82, Total 12
Number of R. F. Stages	One
Type of first detector	Exponential with control grid voltage varied by A.V.C. tube
Number of Intermediate Stages	Two, one for signal and one for A.V.C.
Type of Second Detector	Power Grid Bias
Number of A. F. Stages	Two, one Push-Pull driver and one Class "B" output
Type of tone control	Reactor capacitor and variable resistor for reducing high frequency response
Type of Rectifier	Mercury vapor full wave RCA-82
Undistorted output	Approximately 20 watts Maximum

PHYSICAL SPECIFICATIONS

Height	43 inches
Width	28¼ inches
Depth	14 inches
Weight Packed for Shipment	168 Lbs.

The RCA Victor R-78 is a 12-tube Bi-Acoustic Super-Heterodyne Radio Receiver incorporating all the usual Super-Heterodyne features, together with the New RCA Victor Automatic Volume Control, Compensated Audio System and Class "B" output amplifier. These features, mainly evidenced by the greatly improved tone quality and high output, give the R-78 a degree of performance not obtainable with any existing type of Radio Receiver.

In order to economically build the R-78 several new types of Radiotrons have been produced. These are namely the RCA-58, a new R. F. Amplifier Pentode, the RCA-56, a high efficiency general purpose tube similar to the UY-227, the RCA-46, a new output tube designed for Class "B" operation and the RCA-82, a new mercury vapor rectifier Radiotron giving the degree of voltage regulation necessary for a Class "B" Amplifier.

A brief technical description of this remarkable new receiver follows. Figure 2 shows the schematic wiring diagram.

In order to understand the reasons for many of the design features of the R-78 it is necessary to first review some of the requirements of a radio receiver. These may be listed in the following order:

Sensitivity. The primary requirement for any Radio receiver is its ability to bring in a station. The R-78 has sensitivity that reaches into the noise level even in a quiet location.

Selectivity. The ability of a receiver to separate stations even on adjacent channels is that quality known as selectivity. The R-78 has the ability to separate stations on adjacent channels even though one is a local station. In addition, the Automatic Volume Control is so designed that it does not tend to spread the band of any particular station due to its action.

Fidelity. Fidelity is that quality of a radio receiver that determines how exact the reproduced sound follows that produced in the broadcasting studio, of course, excepting any distortion that may originate in the transmitting station. Fidelity must cover every quality of a set from input to sound pressure output. Not only must the receiver and amplifier be considered but also the loudspeaker and cabinet, the latter being very important. Fidelity also includes distortion that occurs at reduced volume due to certain characteristics of the human ear. These will be discussed later.

The Automatic Volume Control used in the new R-78 has a very definite relation to sensitivity and selectivity. It is of the two-element (diode) type and has a special I. F. stage to drive it. This volume control is many times more effective than any existing type. Due to its action the R. F. voltage applied to the Second Detector is substantially constant, for a signal of from 100 microvolts input to that of several volts. Such regulation, in addition to being desirable from an entertainment viewpoint is also essential in this receiver due to the location of the volume control. Since there is no danger of overload on the detector grid the volume control may therefore be located in the audio circuit.

Referring to the schematic circuit Figure 2, it will be noted that the A.V.C. functions in the following manner:

The input signal voltage for the I.F. Amplifier is applied also to the A.V.C. amplifier tube due to the grids of both being coupled together by means of the 300 mmfd. capacitor C-19. The output of the I.F. amplifier is applied to the Second Detector through a sharply tuned transformer. However, the output of the A.V.C. amplifier is coupled to the A.V.C. tube through a broadly tuned transformer. The reason for the location of the A.V.C. and coupling it in this manner is due to two reasons. First, too much selectivity ahead of the A.V.C. is not desirable as it introduces excessive distortion and overload as a station is tuned in. However, a certain amount of selectivity is essential, otherwise the A.V.C. will be caused to function by a local station when it is desired to tune in a weaker station on an adjacent channel. It will be noted that the grid and plate of the A.V.C. tube are tied together.

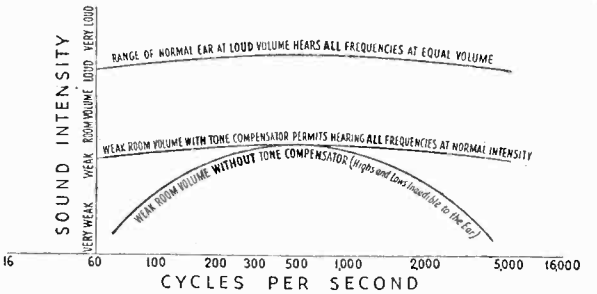

Figure 3—Graph Showing Compensation Used in R-78

This gives a straight rectifier action and the drop across Resistors R-2, R-3, and R-4 gives the bias for the R.F. Stage. The drop across R-3 and R-4 comprises the grid voltage for the First Detector, and that across R-4, the grid voltage for the I. F. Amplifier. As the drop in these Resistors is due to the signal voltage applied to the A.V.C. tube and this voltage is in turn dependent on the bias of the R.F., 1st Detector and I.F. Amplifier, an automatic action is obtained. The reason for the greater voltage applied to the R.F. stage and first detector than that applied to the I.F. is to prevent overloading of these tubes on the side of a strong carrier.

We may now bring our attention to the audio stage and manual volume control. Both of these features are of entirely new design. However, before discussing them it is well to review a few of the requirements of a receiver that is to have good quality. First, the receiver must have good fidelity. That is, it must be capable of reproducing the very low notes as well as the high ones. The R-78 covers the range from approximately 35 cycles to 5000 cycles. Second, the receiver must have a large undistorted output otherwise signals of high amplitude will overload the output stage. The R-78 has between ten and twenty Watts undistorted output, the exact maximum depending on the percentage of modulation of the incoming signal. Third, the fidelity of the receiver must be changed with different settings of the volume control to compensate for the sensitivity of the ear in relation to different frequencies at various intensities. The ear is far less sensitive to both low and high frequencies at low degrees of volume than it is to the middle register. The R-78 volume control tends to bring up the low and high frequency response in relation to the middle frequencies as the volume is reduced. This greatly improves the quality of output at a room volume. The manner in which this is done follows:

The output of the Second Detector is coupled to the grid circuit of the driver stage by means of impedance-transformer coupling. The plate supply to the Detector is fed through the coupling reactor L-14 and the audio component passes through the 0.5 mfd. coupling Capacitor C-30 and the .02 mfd. capacitor C-36. The volume control is located between these stages and functions to reduce the voltage applied to the primary of the interstage transformer. It will be noted that the first section of the volume control is 30,000 ohms and at this point a trap circuit consisting of reactor L-15 and capacitor C-31 are directly in the output circuit of the Detector.

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MODEL R-78
Schematic

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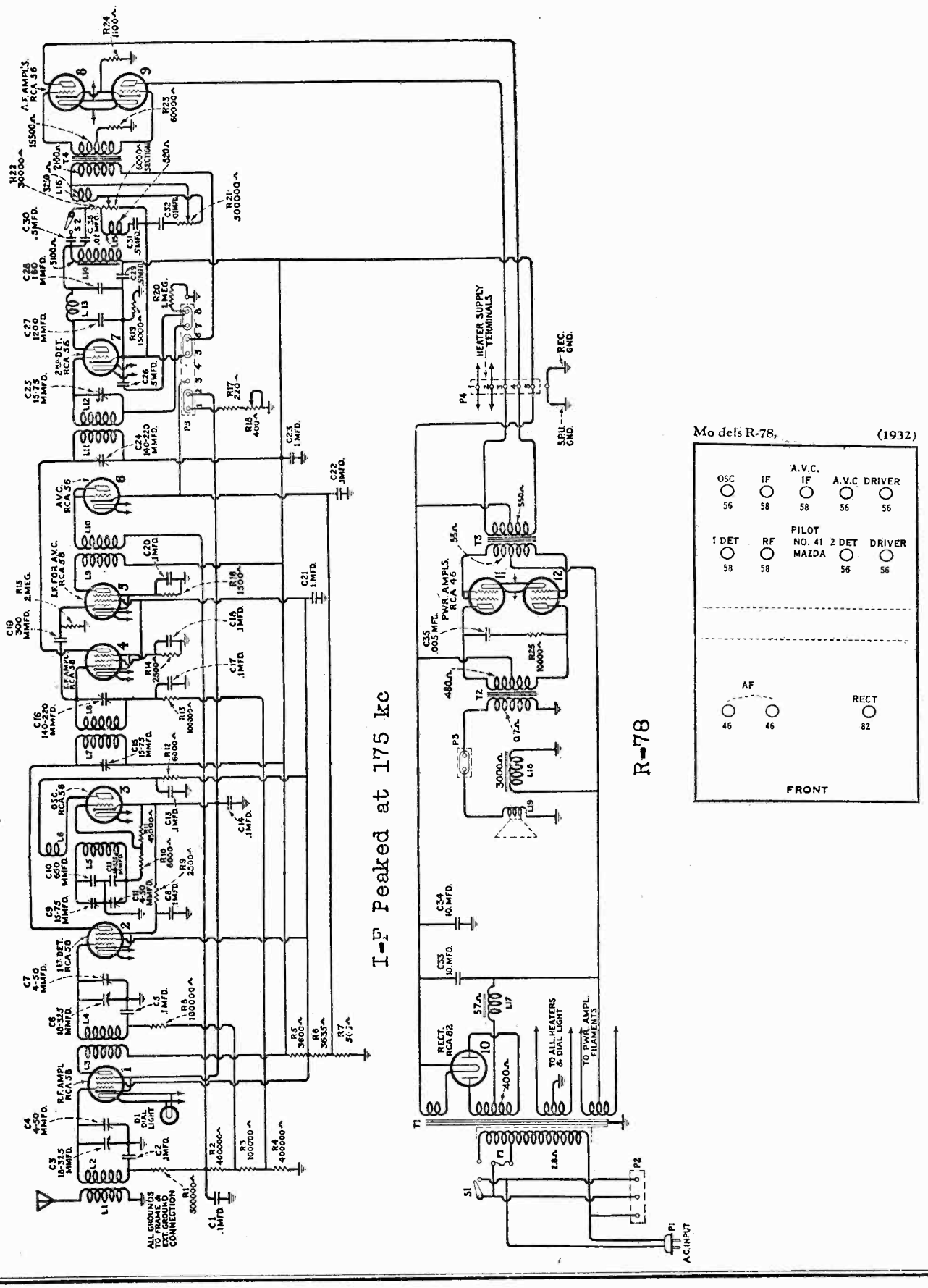

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The trap circuit tunes to approximately the middle of the audio response range and causes greater attenuation of the middle register than at either end as the volume is reduced. The effect as this point is reached is to reduce the general volume level but the middle register a greater amount than at the low and high ends. From this point to the minimum position the volume control acts as a potentiometer across the trap circuit and reduces the volume without changing the response to any greater degree. One has to but use this volume control to appreciate its great advance over existing types. Figure 3 gives an illustration of the manner in which this compensation is made.

The foregoing description applies only to one section of the volume control. Actually there are two sections, the other being between the R.F. and 1st detector cathodes and varying the overall sensitivity. This control prevents all noises and signals of a very weak character from being received and only functions over last 20° of the angular movement of the volume control. However if such signals are desired it is only necessary to advance the volume control in the usual manner to its maximum position.

It will be noted that the value of the coupling capacitors in the circuit varies, depending on the position of the switch S-2. The purpose of this switch is to decrease the low frequency output when receiving stations that have carrier waves with an excessive hum component. Also a certain amount of low frequency growl due to heterodyning of stations may be eliminated by this switch.

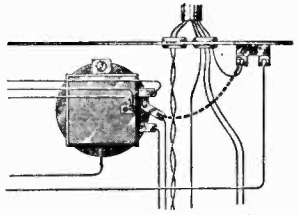

Figure 4—Wiring Change for Altering Volume Control Action
(Dotted Line Indicates Position of New Wire)

Two Radiotrons RCA-56 act as a driver stage for the output Class "B" Amplifier. In order to properly understand it, let us review the general principals of the Class "B" Amplifier.

There are two general types of audio amplifiers, namely, the Class "A" and the Class "B." Up to the present practically all modern radio receivers use the Class "A" Amplifier either in single or in a push-pull connection. In the Class "A" Amplifier the grid bias is so adjusted that either a positive or a negative voltage impressed on the grid will cause an equal increase or decrease in the normal plate current flowing. This increase and decrease is but a fraction of the total plate current and is the only useful part of it. Therefore, the major portion of plate circuit is entirely of a wasted nature.

In the Class "B" Amplifier, the grid bias is so adjusted that very little plate current is flowing, it virtually being biased to cut-off. As the grid swings negative there is very little reduction possible so that the practical effect is nil. However, as the grid swings positive the plate current increases tremendously and this is entirely of an A.C. character, there being no residual current. Due to the use of two tubes both sides of the cycle are taken care of, first by one tube and then by the other. This gives an output greatly in excess of the Class "A" Amplifier because less energy is dissipated as losses in the tube and not appearing as useful output. The R-78 uses the new dual grid output tube RCA-46 in which the grids are tied together which in effect acts as a high bias resulting in plate current cut-off even though the tubes are operated at zero bias. Due to the grids only functioning on the positive half of the cycle considerable grid current flows on the positive half signal waves and a low impedance input circuit is necessary. The transformer between the driver stage and the power stage is therefore a step-down transformer with a low resistance secondary. The limit of power output is determined by the point at which the driver stage overloads. On a highly modulated signal, the maximum undistorted output may exceed 20 watts.

From the above description it is obvious that the load on the plate supply system will be highly variable. In order to provide suitable regulation for such a load the new mercury rectifier RCA-82 has been provided. The internal drop in this tube remains constant for practically all loads. The output current peaks therefore have no appreciable effect on the output voltage.

The loudspeaker has been designed to handle the increased power output and is designed to have increased frequency range.

The cabinet has two sound chambers that nullify the effect of cabinet resonance. This, together with the large baffle area of the cabinet, gives the loudspeaker and amplifier full expression to their high quality output.

SERVICE DATA

(1) HUM

It is very important that a good ground always be connected to the yellow lead of the Receiver Chassis. Unless this is done excessive hum and noise will be obtained, even at low volume, from the RCA-82. Also lack of a good twist in the volume control leads will cause an undue amount of hum due to the pickup by the tone control reactor.

(2) CHANGE IN RECEIVER ASSEMBLY FOR LOW INTENSITY STATIONS

The automatic volume control in the R-78 is so designed that it maintains a constant output only on signals in excess of 100 microvolts. In the vast majority of locations this action is entirely satisfactory as stations rarely drop below this value. Having it work at a low value would greatly increase the noise between stations.

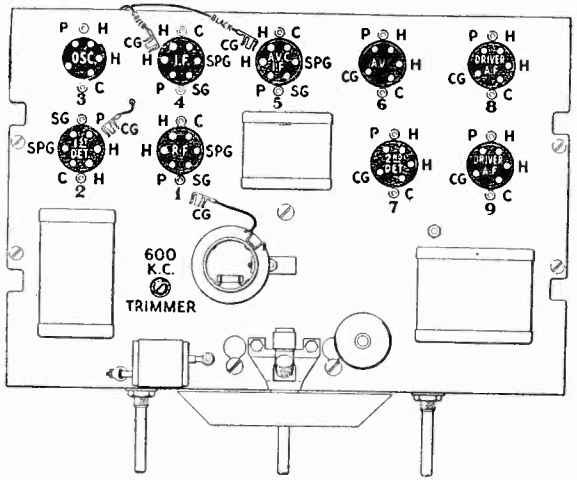

Figure 5—Radiotron Socket Layout

However if the receiver is to be operated in a locality remote from stations where the usual signal intensity is low, a slight change may be made in the receiver chassis that will extend the A.V.C. action to signals of much lower input. This may be done by removing the chassis and connecting a wire from the terminal on the 400 ohm section of the volume control to ground. Figure 4 shows the details of this change. It should be remembered when making this change that the noise level between stations will greatly increase when the change is made, due to the secondary section of the volume control not being in the circuit.

(3) R.F. AND OSCILLATOR LINE-UP CAPACITOR ADJUSTMENTS

Four adjustable capacitors are provided for aligning the R.F. circuits and adjusting the oscillator frequency so that the oscillator will maintain a constant frequency — 175 K.C.— difference from that of the incoming signal. Poor quality, insensitivity, poor A.V.C. action and possible inoperation of the receiver may be caused by these capacitors being out of adjustment

If the other adjustments have not been tampered with — the intermediate transformer tuning capacitors — the following procedure may be used for aligning these capacitors.

(a) Procure an R.F. Oscillator giving a modulated signal at 600 K.C. and 1400 K.C. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0-5 milliammeter connected in series with the plate supply to the second detector or a low range A.C. voltmeter connected across the reproducer unit cone coil.

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MODEL R-73
Chassis

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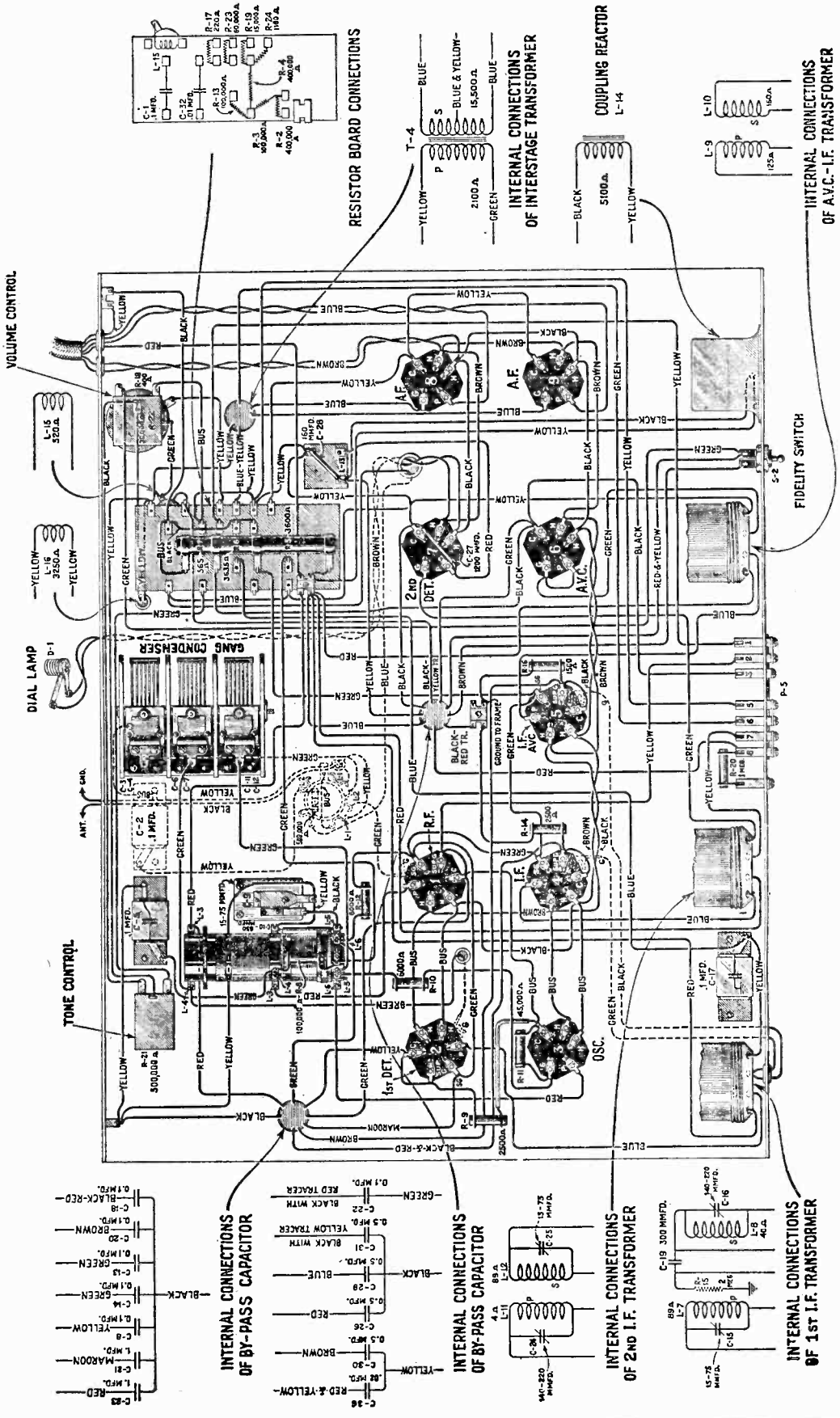

Figure 6—Receiver Assembly Wiring Diagram

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(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A.V.C. socket. This should be a tube that is otherwise normal in all respects but having one heater prong removed. Insert this tube in the A.V.C. socket.

(d) First check the chassis and carefully ascertain that the dial pointer reads exactly at the short line on the scale when the tuning capacitor rotor plates are fully meshed with the stator plates.

(e) Place the oscillator in operation at exactly 1400 K.C. and couple its output to the antenna. Set the dial scale at exactly 1400. Connect the output meter to the set and place the volume control at its maximum position. Adjust the oscillator input so that an excessive reading on the output meter is not obtained.

(f) With a suitable socket wrench — the nuts are at ground potential — adjust the oscillator, first detector and R.F. line-up capacitors, until a maximum deflection is obtained in the output meter. These capacitors are accessible through holes located in the bottom cover of the chassis, the one to the front being the R.F., the detector next and the oscillator to the rear.

(g) Set the oscillator at 600 K.C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K.C. series capacitor, Figure 5, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.

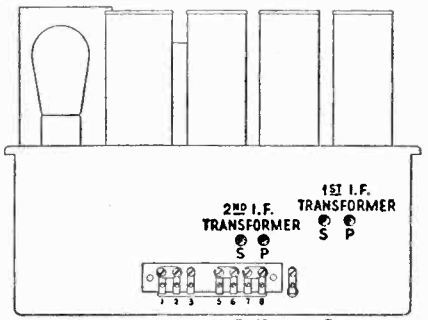

Figure 7—Location of I. F. Tuning Capacitors

(h) Change the frequency of the oscillator to 1400 K.C. and set the dial at 1400. Again make the adjustments given under (f) and (g).

So adjusted, the R.F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R.F. signal.

(4) I.F. TUNING CAPACITOR ADJUSTMENTS

Although this receiver has two I.F. stages, one for the second detector and one for the A.V.C., only two of the three I.F. transformers are tuned by adjustable capacitors and require adjustment. The stage used for the A.V.C. is broadly tuned and does not require any adjustment.

The transformers are all tuned to 175 K.C. and the circuits broadly peaked.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R.F. oscillator that gives a modulated 175 K.C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0-5 milliammeter connected in series with the plate supply to the second detector or a low range A.C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A.V.C. socket.

(d) Remove the oscillator tube, see Figure 5, and make a good ground connection to the chassis. Place the oscillator in operation and couple its output from the control grid of the first detector to ground. Adjust the oscillator output, with the receiver volume control at maximum, until a deflection is obtained in the output meter.

(e) Refer to Figure 7. Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

When the adjustments are made the set should perform at its maximum efficiency. However due to the interlocking of adjustments, it is good practice to follow the I.F. adjustments with the R.F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the proceeding section.

(5) VOLTAGE READINGS

The following voltages taken at each Radiotron socket with the receiver operating but no signal being received should prove of value when checking with the usual set analyzer. The plate currents given are not necessarily accurate for each tube due to the cable in the test box causing some circuits to oscillate. Small variations may be caused by different tubes and line voltages. Therefore the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the socket numbers shown in Figure 5.

It will be noted that the present type set analyzers do not have provision for the new six prong Radiotrons. In such cases a set of adapters will be necessary in order to take suitable readings.

RADIOTRON SOCKET VOLTAGES

120 Volt A.C. Line

No signal being received — Volume Control at minimun

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

(6) MAGNETIC PICKUP CONNECTIONS

Due to the audio system of the receiver being designed to compensate for the radio end of the receiver, its characteristics must be altered slightly for phonograph operation. It is therefore necessary to use the auxiliary switches, resistors and capacitors with the T-5 and PT-33 shown in Figures 9 and 10 as well as the complete switching shown in Figure 11 when making connections to magnetic pickups. When using these devices, the usual record volume control should be set at maximum and the volume adjusted by means of the "Radio" volume control. In some cases a slight reduction of the high frequencies by means of the tone control may prove desirable. If the degree of compensation is too great—too many highs and lows—this may be remedied by reducing the record volume control setting and advancing the radio volume control.

(7) SHORT WAVE ADAPTOR CONNECTIONS

Figure 12 shows the correct connections for attaching the Short Wave Adaptor SW-2 to the R-78.

It will be noted that the Wafer Connector is not used due to the output rectified voltage being too high. The output voltage from terminal No. 5 on the amplifier is approximately 230 volts and is therefore suitable for this use.

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MODEL R-78
A-F Chassis
Attachments

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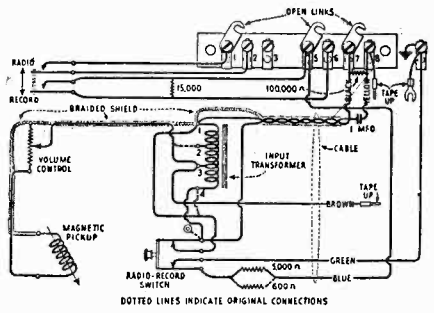

Figure 9—Connections for Attaching End Table Model T-5

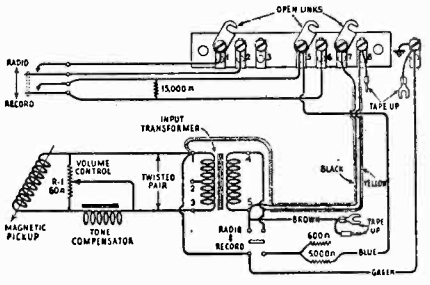

Figure 10—Connections for Attaching Portable Turntable Model PT-23

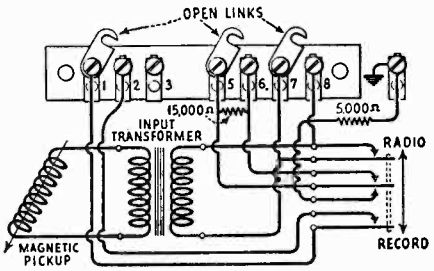

Figure 11—Connections for Attaching Magnetic Pickup

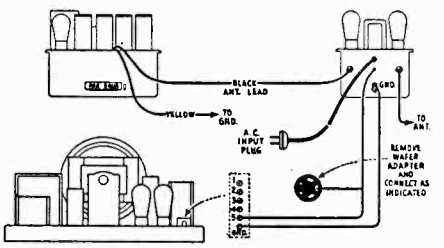

Figure 12—Connections for Attaching Short Wave Convertor Model SW-2

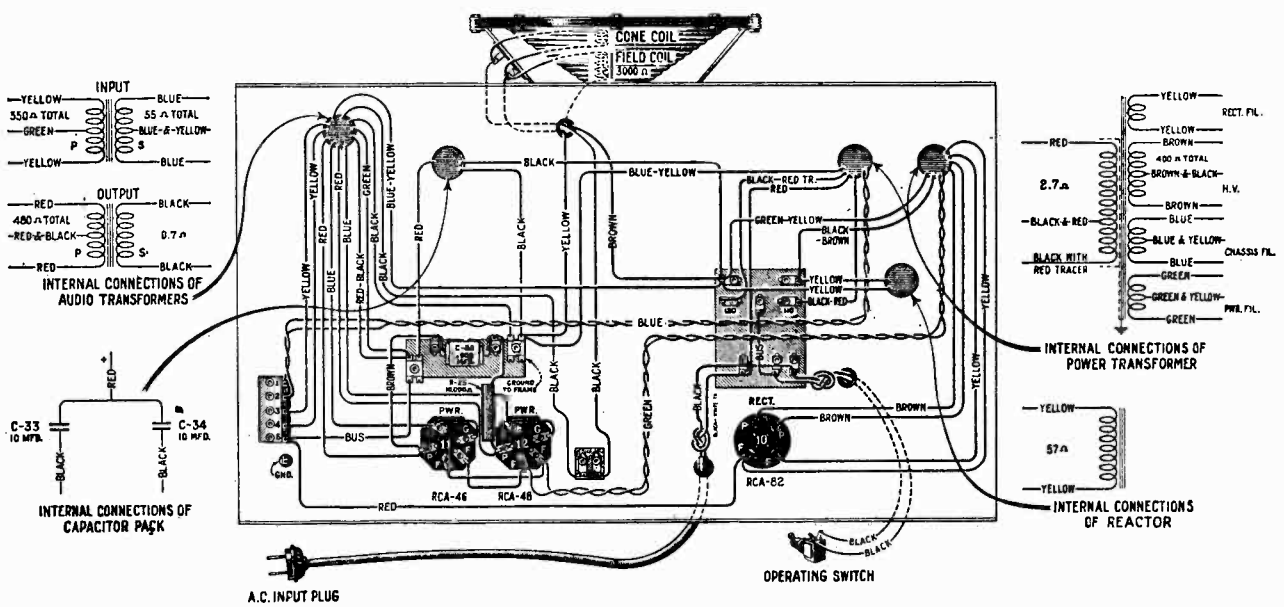

Figure 8—Amplifier Wiring Diagram

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SERVICE NOTES

for

RCA Victor Model RE-81

ELECTRICAL SPECIFICATIONS

Voltage Rating ..... 105–125 Volts
Frequency Rating ..... 25, 30, 50 and 60 Cycles
Power Consumption ..... 25, 135 Watts; 30, 130 Watts; 50, 139 Watts; 60, 135 Watts
Recommended Antenna Length ..... 25–100 Feet
Type of Circuit ..... Super-Heterodyne with A. V. C. and Class "B" Output Stage
Type and Number of Radiotrons ..... 4 RCA-56, 3 RCA-58, 2 RCA-46, 1 RCA-82—Total 10
Number of R. F. Stages ..... One
Number of I. F. Stages ..... One
Number of A. F. Stages ..... Radio: Two, One Single and One Class "B" RCA-46
Record: Three, Two Single and One Class "B" RCA-46
Recording: Three, Two Single and One Class "B" RCA-46
Type of A. V. C. RCA-56
Grid voltage supplied by output of I. F. Drop across resistor in plate circuit of A. V. C. constitutes bias voltage for R. F., 1st detector and I. F. Manual volume control adjusts grid bias of A. V. C. tube
Type of Second Detector ..... Power Grid Bias
Type of Tone Control ..... Variable Resistor and capacitor for reducing high frequency output of driver A. F. stage
Type of Rectifier ..... Mercury Vapor Full Wave RCA-82
Undistorted Output ..... 7.0 Watts
Type of Microphone ..... Carbon Two Button
Type of Phonograph Motor ..... Induction Running at Synchronous Speed
Diameter of Turntable ..... 12 Inches
Turntable Speed ..... 33⅓ and 78 R. P. M.
Type of Speed Reducer ..... Ball Bearing Giving Very Smooth Operation
Type of Pickup and Tone Arm ..... Low Impedance Pickup with Inertia Type Tone Arm

PHYSICAL SPECIFICATIONS

Height ..... 43 Inches
Width ..... 25⅞ Inches
Depth ..... 15¼ Inches
Weight Alone ..... 113 Pounds
Weight Packed for Shipment ..... 158 Pounds

RCA Victor Radiola Electrola RE-81 is a ten tube Super-Heterodyne phonograph combination instrument using the chassis of Model R-76 and R-77. Features such as Class "B" output stage, tone chambers for eliminating cabinet resonance, automatic volume control, continuously variable tone control, ball bearing speed reducer for two-speed turntable operation and the sensitivity, selectivity and tone quality of RCA Victor receivers are included in Model RE-81. Also an improved type of home recording is incorporated in this model.

A reference to Service Notes of Models R-74, R-76 and R-77 will give the details of any service information necessary for Model RE-81. Figures 1, 2 and 3 show the schematic, wiring and assembly diagrams respectively. The replacement parts are given on page 5.

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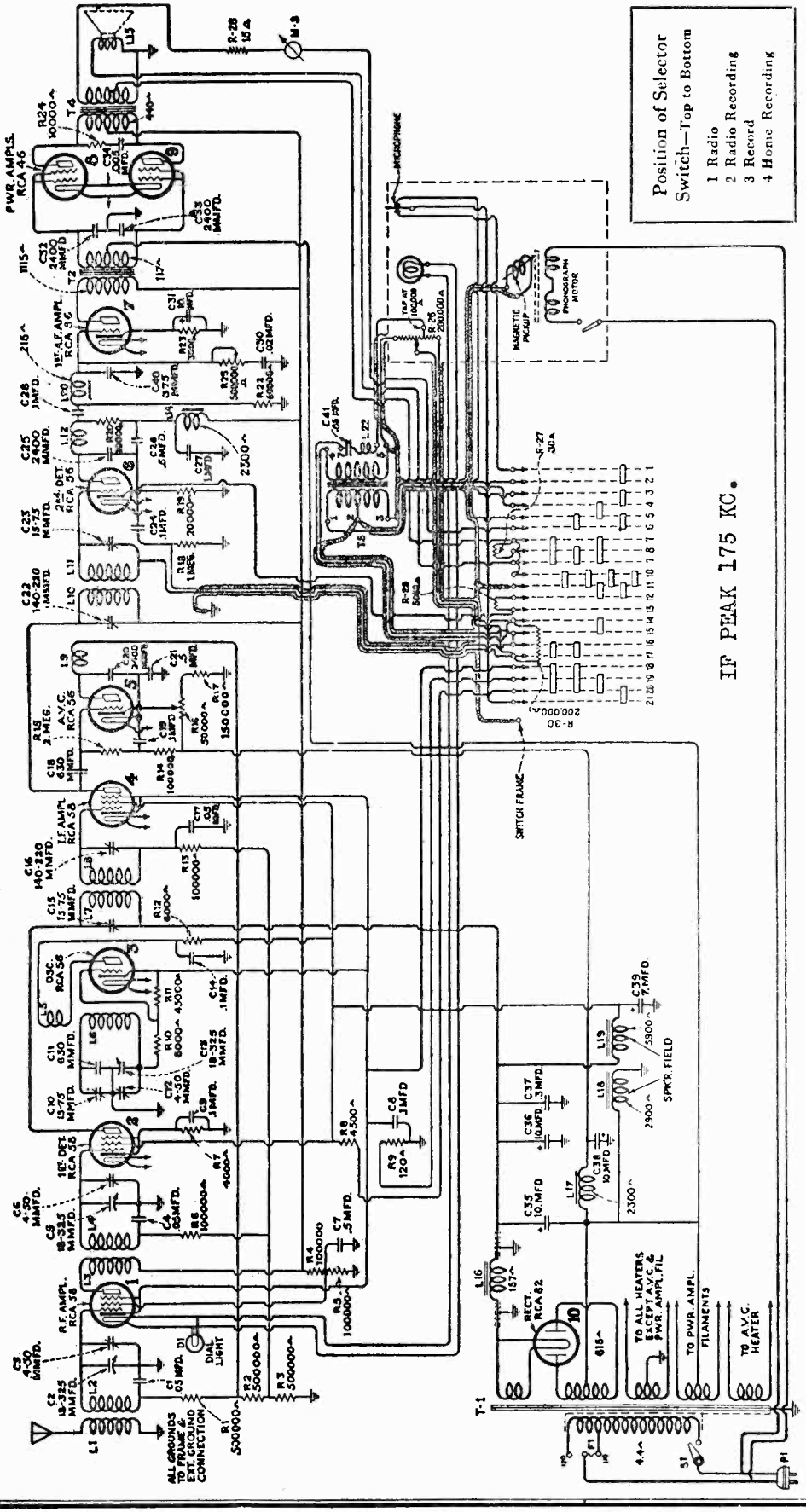
MODEL RE-81
Schematic

R. C. A. VICTOR CO., INC.



Schematic Diagram of RE-81

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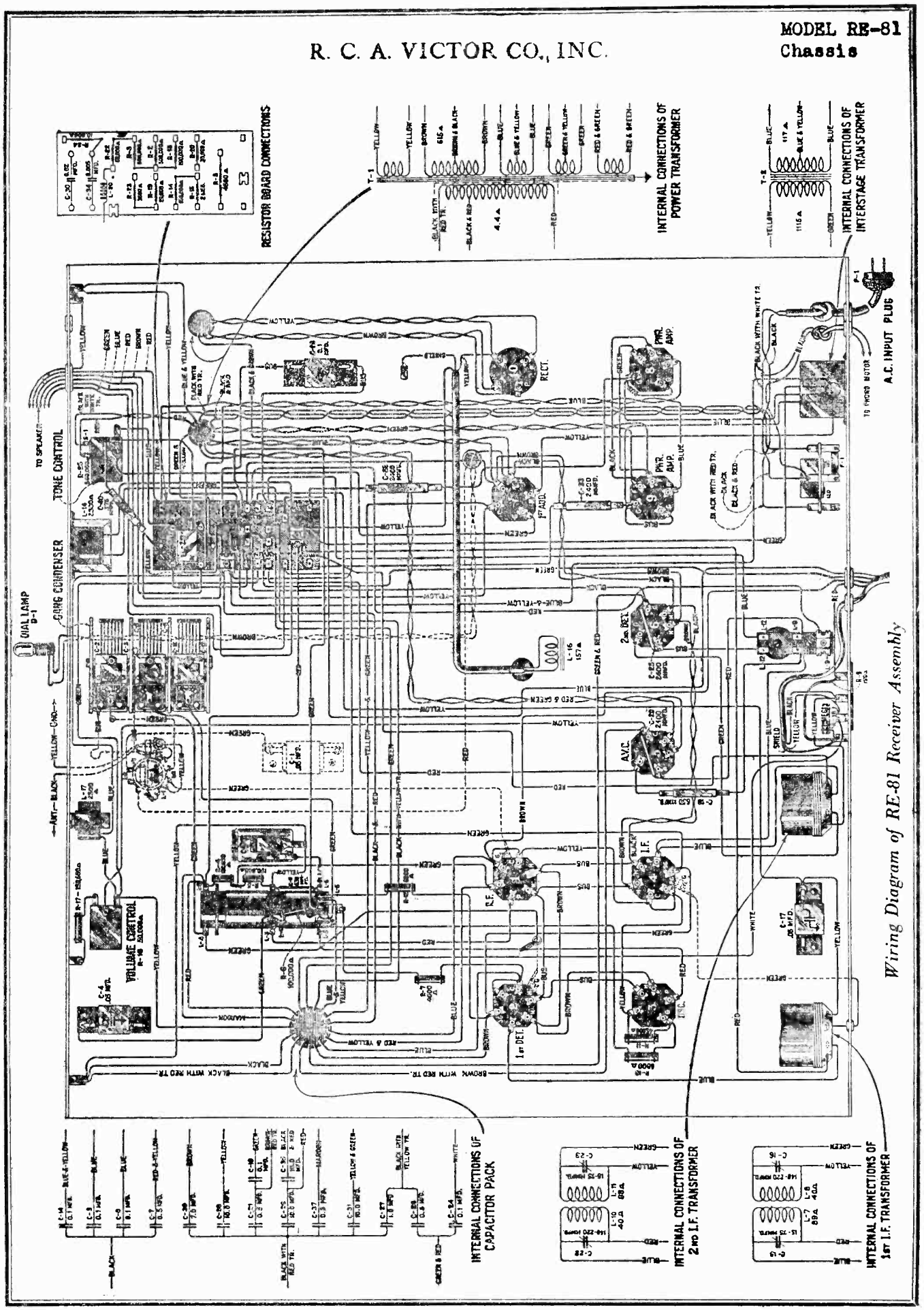
R. C. A. VICTOR CO., INC.

MODEL RE-81
Chassis



Wiring Diagram of RE-81 Receiver Assembly

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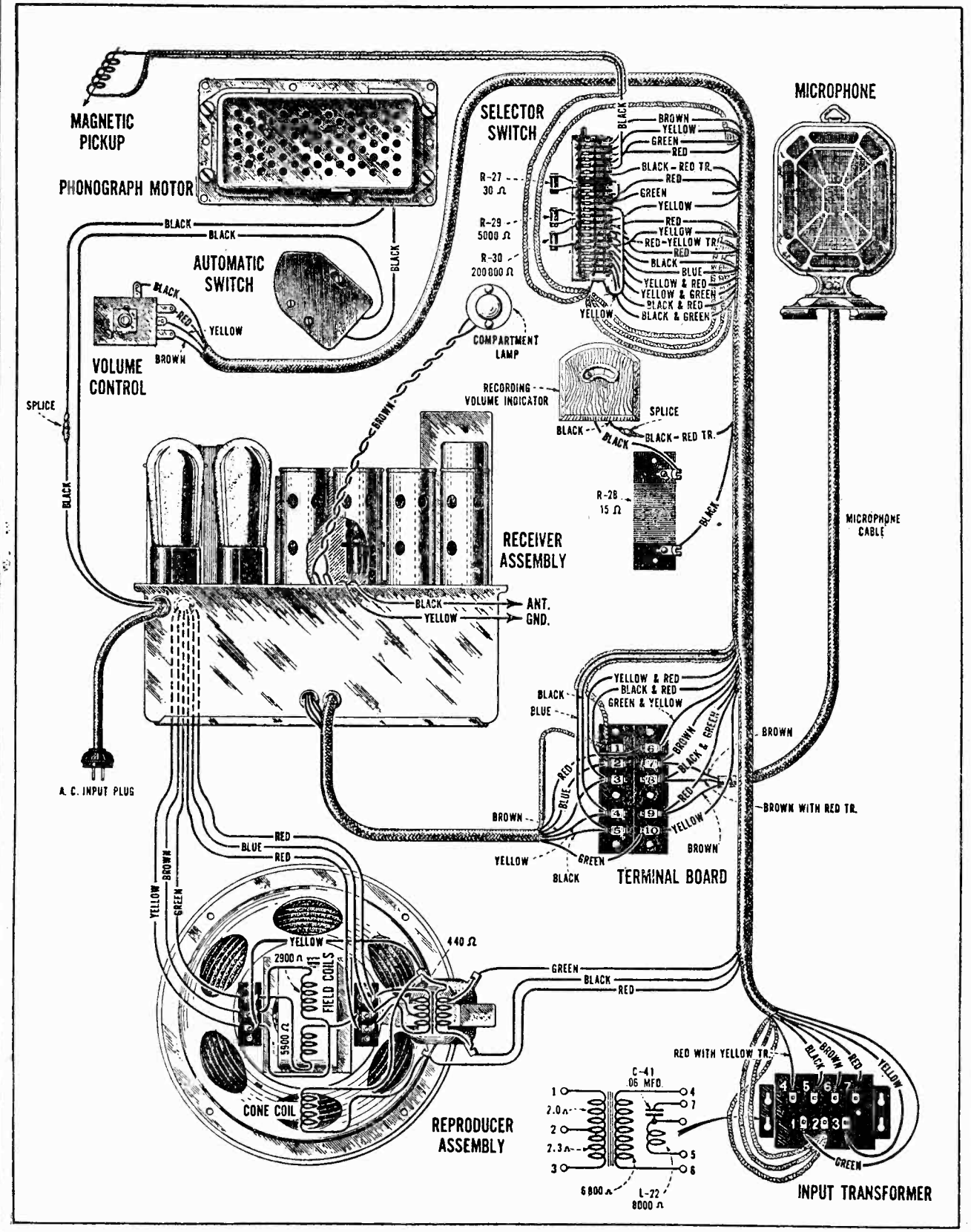
MODEL RE-81
Assembly Wiring

R. C. A. VICTOR CO., INC.



Assembly Wiring Diagram of RE-81

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R. C. A. VICTOR CO., INC.

MODEL RAE-84
Schematic

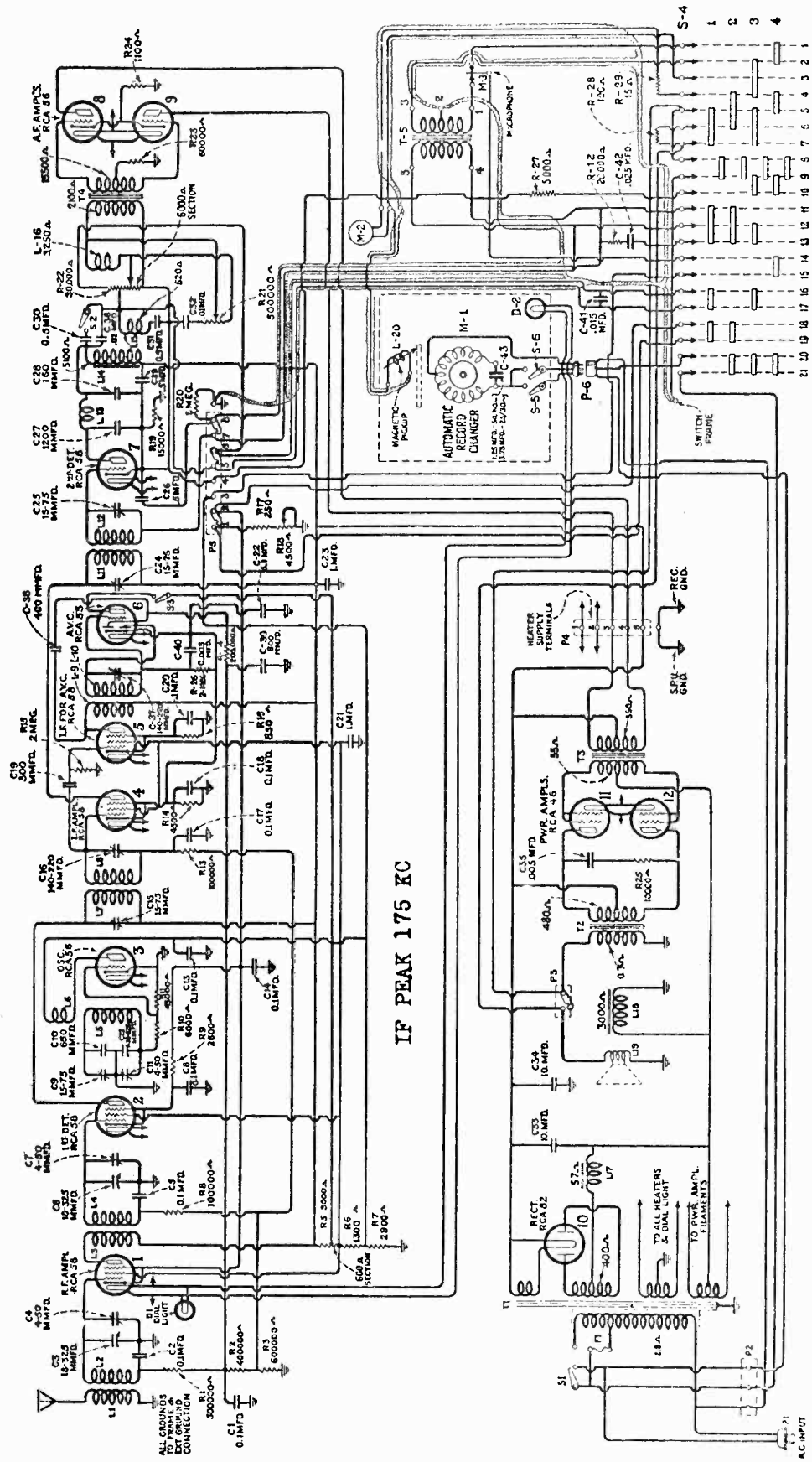

Figure 1—Schematic Wiring Diagram of RAE-84

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MODEL RAE-84
Receiver Chassis

R. C. A. VICTOR CO., INC.

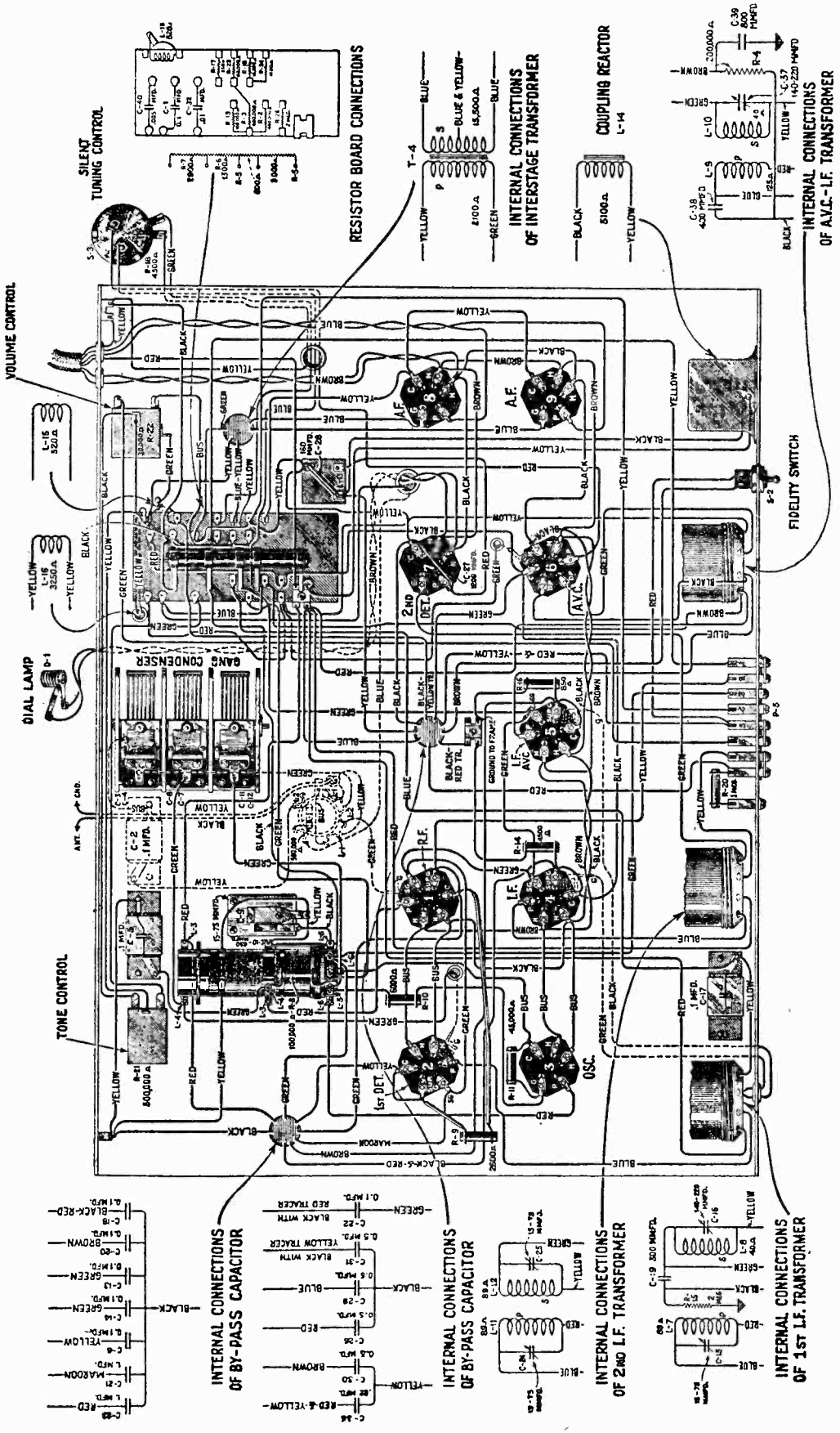

Figure 2—Receiver Wiring Diagram of RAE-84

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RCA Victor RAE-84

(BI-ACOUSTIC PHONOGRAPH COMBINATION)

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts
Frequency Rating	50–60 Cycles
Power Consumption	130 Watts Average. (The input wattage may vary from 90 to 150 watts depending on the output volume being used)
Recommended Antenna Length	25–100 Feet
Type of Circuit	Super-Heterodyne with A. V. C., Compensated A. F. System, Class "B" Output Stage and Noise Suppressor
Type and Number of Radiotrons	1 RCA-55, 4 RCA-58, 4 RCA-56, 2 RCA-46, 1 RCA-82—Total 12
Number of R. F. Stages	One
Type of First Detector	Exponential with Control Grid Voltage Varied by A. V. C. Tube
Number of Intermediate Stages	Two, One for Signal and One for A. V. C. and Noise Suppressor
Type of Second Detector	Power Grid Bias
Number of A. F. Stages	Radio: Two, One Push-Pull Driver and One Class "B" Output Record: Three, One Single, One Push-Pull Driver and One Class "B" Output Home Recording: Three, One Single, One Push-Pull Driver and One Class "B" Output
Type of Tone Control	Reactor Capacitor and Variable Resistor for Reducing High Frequency Response
Type of Rectifier	Mercury Vapor Full Wave RCA-82
Undistorted Output	Approximately 20 Watts Maximum
Type of Record Changer	Perfected RCA Victor Ten 10-Inch Record Continuous Type
Type of Pickup and Tone Arm	Low Impedance Pickup with Inertia Tone Arm
Type of Microphone	Two Button Carbon

PHYSICAL SPECIFICATIONS

Height	46 Inches
Width	29¼ Inches
Depth	20¾ Inches
Weight Alone	198 Pounds
Weight Packed for Shipment	263 Pounds

RCA Victor Radiola Automatic Electrola Model RAE-84 is a twelve tube Bi-Acoustic Radio Phonograph combination. A brief description of its four major functions follows:

Radio. The radio receiver, amplifier and loudspeaker are identical to that used in the famous RCA Victor R-78. This unit is characterized by its excellent performance in respect to sensitivity, selectivity and sensational tone quality. This latter feature is taken a step further in the RAE-84 due to the large area of the cabinet. This results in increased baffle area for the loudspeaker with the resulting greater and smoother low frequency response. A new feature of the RAE-84 is the inclusion of a noise suppression circuit in conjunction with the new Radiotron RCA-55. This feature eliminates background noises when tuning from station to station. The degree of suppression is adjustable by means of the sensitivity control.

Phonograph. The phonograph mechanism of the RAE-84 consists of the perfected RCA Victor continuous type record changing mechanism together with the low impedance pickup and tone arm. The output of the pickup is fed through the same amplifier and speaker as the radio receiver and gives an even greater degree of fidelity of reproduction. The automatic record changing mechanism is similar to that used in other RCA Victor combinations but has a number of improvements. These improvements are: turntable trip for manual operation that is operated by both concentric and eccentric groove records, 10-inch automatic trip for Brunswick and Columbia records that may be used to start and stop while playing manually by moving the tone arm, safety shift lever that prevents jamming while attempting to change from automatic to manual operation when the mechanism is in cycle and a record light to provide better illumination. The tone arm is mounted on rubber which gives a greater degree of freedom from motor vibration.

Recording. Facilities of the RAE-84 make it the ideal instrument for home recording. This may be either voice, music or other sounds directed into the microphone or a radio program being broadcast on the air. The records so made are of practically studio quality. A feature of the home recording is the inclusion of a recording level meter which gives a visual indication of the output current so that the optimum value is used for making records. This gives a uniform quality to the records which heretofore has been impossible to maintain.

SERVICE DATA—RADIO

A reference to the R-78 Service Notes gives the details of any service data necessary in conjunction with this receiver. It will be noted that an additional terminal has been added to the terminal strip at the rear of the receiver chassis. This will be included in later models of the R-78 as well as all models of the RAE-84. Figures 1, 2 and 3 show the schematic, receiver wiring and amplifier diagrams respectively while Fig. 5 showing the assembly wiring. The amplifier and loudspeaker are identical with that used in the R-78. The replacement parts are shown on pages 10 and 11.

Due to the use of the noise suppressor circuit, which is not included in the older models of the R-78, a brief description of the functioning of this circuit follows:

The function of the noise suppressor circuit is to reduce noise, by greatly decreasing the sensitivity of the receiver when no carrier waves are being received. A manually operated sensitivity control is also provided so that the overall sensitivity of the receiver may be adjusted, thereby eliminating the reception of signals having too great a noise level. This feature operates without introducing distortion, a quality not present in other type noise suppressor circuits.

A reference to the schematic diagram, Figure 1, will show the circuit used in conjunction with the Radiotron RCA-55 for obtaining the noise suppressor action.

The two channel intermediate amplifiers are similar in operation to the older model R-78 with one channel supplying the signal voltage to the second detector and the other supplying signal voltage to the A. V. C. and noise suppressor circuit.

The untuned intermediate I. F. transformer used in the older model R-78 has been changed to a natural period plate coil L-9 and a sharply tuned secondary coil L-10. Coil L-9 supplies the voltage to operate the A. V. C. circuit, while Coil L-10 supplies that used to operate the suppressor circuits. An examination of this circuit will show that with no signal voltage impressed on Coil L-10, no current is rectified in the Diode plate and hence the grid of the Radiotron RCA-55 operates at zero bias. The plate current is then at a maximum value—approximately 10 M. A.—and since the cathodes of the Radiotron RCA-55 and the signal channel I. F. tube are common, the I. F. tube is biased to cut-off. This, therefore, prevents signal voltage from reaching the second detector.

When the receiver is tuned to a signal, the signal voltage is amplified in the A. V. C. amplifier and impressed on coils L-9 and L-10.

On the positive half of the signal voltage, the signal is rectified in the suppressor circuit which generates a negative potential on the grid of the Radiotron RCA-55. The plate current is thereby reduced to approximately zero which releases the high bias potential on the signal channel I. F. amplifier. Signal voltage will then be impressed on the second detector.

A. V. C. bias for the R. F., first detector and I. F. tubes will be generated when the I. F. voltage on the A. V. C. Diode overcomes and exceeds the positive potential on the cathode of the Radiotron RCA-55. This bias is approximately 10 volts when the receiver is tuned to signal.

The second I. F. transformer feeding the second detector has been changed to two high impedance circuits in order to provide the proper amplification with the increased bias resistor in the I. F. cathode circuit.

The suppressor circuit L-10 has been designed to be a sharp circuit so that the action of the suppressor comes as near the center of the carrier as possible.

The sensitivity control is in the cathode circuit of the R. F. and first detector and reduces the sensitivity of the receiver by increasing the residual bias on these Radiotrons. One end of the sensitivity control has a switch which is provided so that the noise suppression circuit may be cut out. Under this condition, the full sensitivity of the receiver is obtained.

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(1) I. F. TUNING ADJUSTMENTS

Although this receiver has two I. F. stages, one for the second detector and one for the A. V. C., only five of the circuits are tuned by adjustable capacitors and require adjustment. The coil used for the A. V. C. is broadly tuned and does not require any adjustment, while the one used for the noise suppressor circuit is sharply tuned. Refer to Figure 4 for location of the adjusting screws.

The transformers are all tuned to 175 K. C., and adjustments are made for maximum output.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R. F. oscillator that gives a modulated 175 K. C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvanometer connected to the secondary of the output transformer instead of the cone coil, or a low range A. C. voltmeter connected across the reproducer unit cone coil.

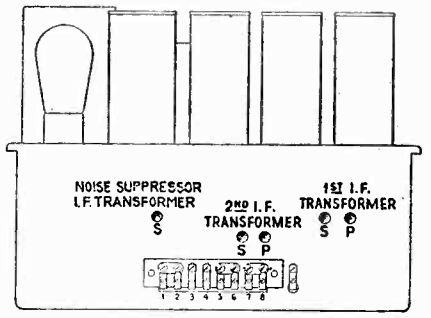

Figure 4—Location of I. F. Capacitors

(c) Remove the oscillator tube and make a good ground connection to the chassis. Place the test oscillator in operation and couple its output from the control grid of the first detector to ground. With the receiver volume control at maximum, the noise suppressor control at its extreme counter-clockwise position and the noise suppressor switch open, adjust the oscillator output until a deflection is obtained in the output meter.

(d) Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

(e) Then close the noise suppression control switch by advancing slightly clockwise, but do *not* advance the control beyond the snapping of the switch. The single noise suppressor circuit should then be adjusted for maximum output.

The points to remember when making these adjustments are that no dummy Radiotron is used and a minimum of input signal is necessary. An excessive signal will make it impossible to get correct adjustments of the signal channel I. F. and especially the suppressor circuit.

It is necessary, when adjusting the suppressor circuit, that the input signal be kept just as low as possible so that the output meter follows every change in the adjustment of the suppressor I. F. circuit.

When the adjustments are made the set should perform at its maximum efficiency. However, due to the interlocking of adjustments, it is good practice to follow the I. F. adjustments with the R. F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the R-78 Service Notes.

(2) RADIOTRON SOCKET VOLTAGES

Due to the wide variation in Set Analyzers, the RCA Victor Company will, in the future, list the actual voltages at which the Radiotrons operate, rather than those that will be obtained with a particular Set Analyzer. It is therefore necessary that the serviceman allow corrections for circuits having high resistance and for meter scales having a relative low resistance. Usually an application of Ohms Law will give an approximate value of the voltage that will be read on a particular meter, assuming that the resistance of the meter is known.

RADIOTRON SOCKET VOLTAGES

120 Volt Line—Fuse at 120 Volt Tap—Antenna Shorted to Ground—No Signal

Radiotron No.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts D. C.	Cathode or Filament to Plate Volts D. C.	Diode Plate No. 1 to Cathode Volts D. C.	Diode Plate No. 2 to Cathode Volts D. C.	Plate Current M. A.	Heater or Filament Volts D. C.
1. RCA-58—R. F.	— 3.5	106	212	—	—	6.5	2.5
2. RCA-56—Osc.	—	—	65	—	—	4.5	2.5
3. RCA-58—1st Det.	— 9	101	206	—	—	1.8	2.5
4. RCA-58—I. F.	—12	93	203	—	—	2.0	2.5
5. RCA-58—A. V. C. I. F.	— 5	106	210	—	—	4.0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Minimum)	0	—	0	0	—12	0	2.5
6. RCA-55—A. V. C. Sup. (Sensitivity Control At Maximum)	0	—	69	0	36	8.0	2.5
7. RCA-56—2nd Det.	—15	—	200	—	—	1.0	2.5
8. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
9. RCA-56—Driver	—11	—	204	—	—	5.0	2.5
10. RCA-46—Power	0	0	400	—	—	6.0	2.5
11. RCA-46—Power	0	0	400	—	—	6.0	2.5
12. RCA-82—Rectifier	462.5 Volts R. M. S. Each Plate—72 M. A. Total Plate Current.						

SERVICE DATA—AUTOMATIC MECHANISM

The automatic mechanism used in the RAE-84 is similar to that used in other RCA Victor automatic combinations such as Models RAE-26, 59 or 79. Several minor changes have been made in these machines as follows:

1. Concentric Groove Trip. A trip so that either Brunswick or Columbia records may be mixed with Victor records in the automatic magazine has been provided.

2. An automatic starting switch, operated by pulling the tone arm to the right has been added for manual playing.

3. A trip to stop the motor when playing either 10- or 12-inch records manually has been added.

4. An interlock has been provided so that the manual lever cannot be moved while the mechanism is in cycle. This prevents jamming due to improper operation.

5. A ball race speed reducer is used for changing the turntable speed from 78 to 33⅓ R. P. M. This is simple in operation and gives a greater freedom from "wows" than the gear type reducers.

6. Needle Lamp. A small electric lamp is provided so that proper illumination of the record and pickup is obtained. This assists in properly inserting the needle into the pickup as well as lowering the needle onto the record.

Service in conjunction with this mechanism will therefore be practically the same as that of the older type automatic record changing mechanisms. However due to the new trips several additional adjustments are now included.

(1) ADJUSTMENT OF AUTOMATIC SWITCH

The automatic switch should be adjusted so that the contacts are at least 0.025 inches apart when the switch mechanism has been tripped. This is important as otherwise arcing at the switch may occur.

(2) ADJUSTMENT OF 10-INCH AUTOMATIC SPIRAL GROOVE TRIP LEVER

The 10-inch automatic spiral groove trip lever should be adjusted by means of the screw assembled thereon. Proper adjustment is obtained when it forces the four finger lever out of contact with the clutch pawl, which trips the mechanism, when the needle is between a $1^{27}/_{32}$ inch and a $1^{7}/_{8}$ in. radius from the center of the turntable spindle.

(3) ADJUSTMENT OF 12-INCH ATOMATIC SPIRAL GROOVE SWITCH

The 12-inch automatic spiral groove switch should he adjusted by means of the adjusting screw assembled in the trip lever so that it forces the switch lever out of contact with the switch trip lever causing the latter to open the switch when the needle is between a $1^{27}/_{32}$ inch and a $1^{7}/_{8}$ inch radius from the center of the turntable spindle.

(4) LUBRICATION

The mechanism will seldom require lubrication. The motor gears run in grease. Unless gear replacements are made, it should not be necessary to relubricate this section. RCA Victor motor oil should be placed in the oil wells at each end of the motor occasionally. Wicks in these wells hold sufficient oil for normal operation from six months to one year. Oil should also be placed on the gear bearings, visible when the turntable is removed, and on the elevator shafts. RCA Victor motor grease should be placed on the slide and the mechanism gears once every six months.

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R. C. A. VICTOR CO., INC.

MODEL RAE-84
A-F Chassis
Assembly Wiring

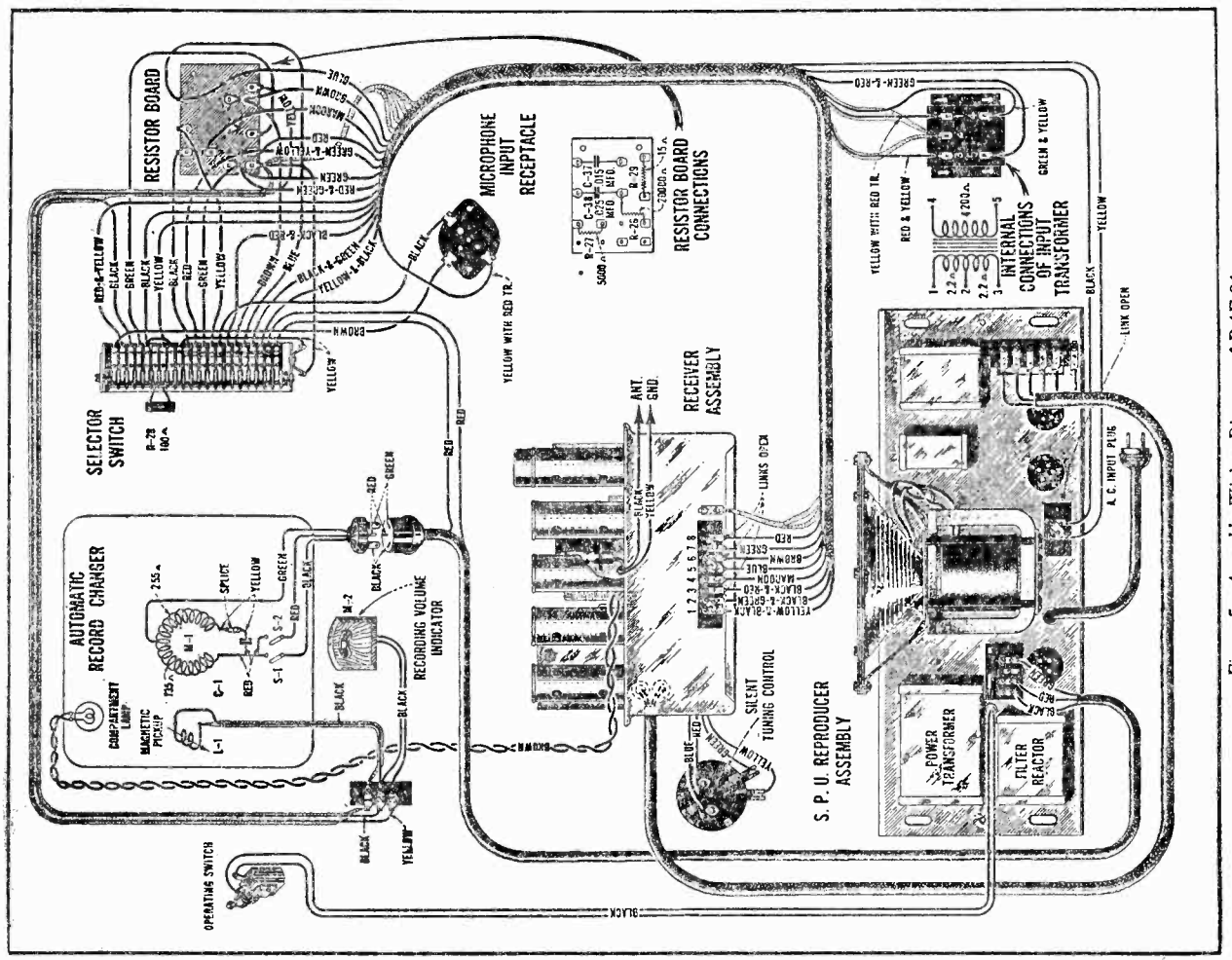

Figure 5—Assembly Wiring Diagram of RAE 84

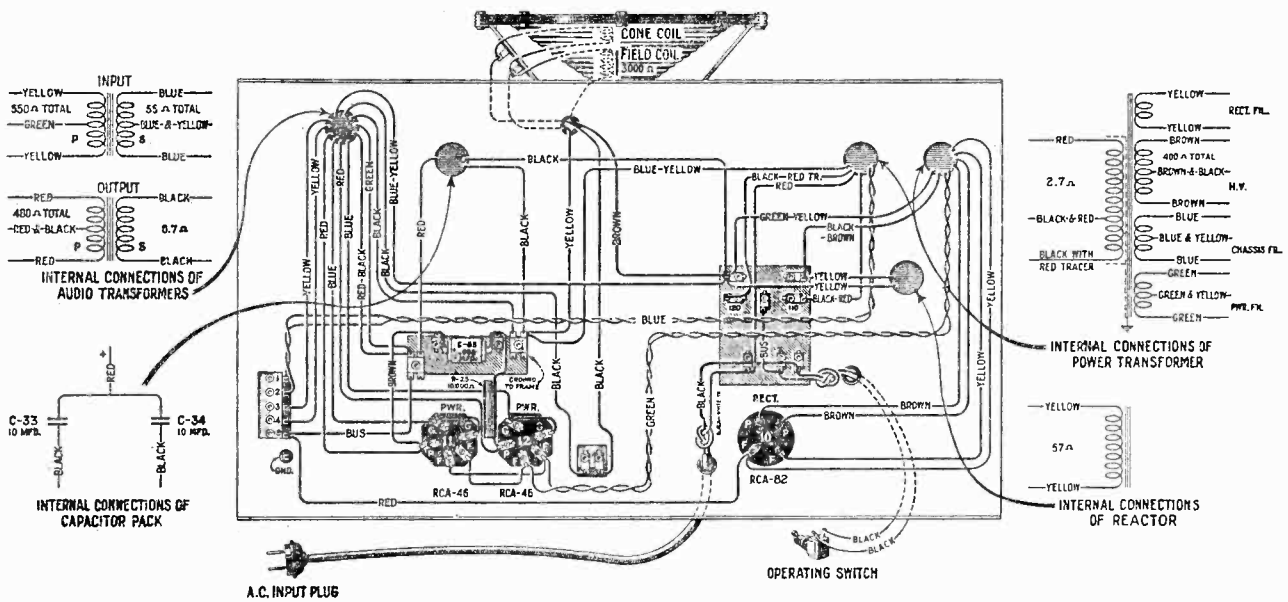

Figure 3—Amplifier Wiring Diagram of RAE 84

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REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2723	Switch—Fidelity switch—Package of 5	$3.00
2746	Socket—Dial lamp socket	.50
2747	Contact cap—Package of 5	.50
3047	Resistor—1,500 ohms—Carbon type—½ watt—Package of 5	2.50
3055	Cushion—Sponge rubber chassis support cushions—Package of 4	.50
3076	Resistor—1 megohm—Carbon type—½ watt—Package of 5	2.50
3252	Resistor—100,000 ohms—Carbon type—½ watt—Package of 5	2.75
3435	Resistor—250 ohms—Carbon type—½ watt—Package of 5	2.50
3437	Knob—Noise suppressor rheostat knob	.60
3439	Resistor—600,000 ohms—Carbon type—1 watt—Package of 5	2.50
3440	Resistor—4,500 ohms—Carbon type—½ watt—Package of 5	2.50
3441	Resistor—850 ohms—Carbon type—½ watt—Package of 5	2.50
6142	Resistor—6,000 ohms—Carbon type—½ watt—Package of 5	2.00
6188	Resistor—2 megohm—Carbon type—½ watt—Package of 5	2.00
6189	Bracket—Dial lamp bracket and indicator—Package of 3	.65
6192	Spring—3 gang tuning capacitor drive cord tension spring—Package of 10	.50
6251	Capacitor—1200 mmfd.—Package of 5	2.30
6276	Tone Control—Complete with mounting nut and washer	2.10
6277	Capacitor—0.1 mfd. capacitor—Located in back of oscillator tube socket	.75
6279	Resistor—15,000 ohms—Carbon type—½ watt—Package of 5	2.50
6280	Resistor—400,000 ohms—Carbon type—½ watt—Package of 5	2.50
6281	Resistor—1,100 ohms—Carbon type—½ watt—Package of 5	2.50
6282	Resistor—60,000 ohms—Carbon type—½ watt—Package of 5	2.50
6284	Reactor—Tone control reactor	1.25
6285	Choke coil—Second detector plate choke coil	1.10
6288	Knob—Station selector, tone control, radio or phonograph, volume control knob—Package of 5	1.50
6298	Cord—3 gang tuning capacitor drive cord—Package of 5	1.00
6308	Coil—R. F. coil complete with mounting bracket	1.90
6312	Capacitor—650 mmfd.—Oscillator series—Package of 5	2.50
6314	Capacitor—160 mmfd.—Package of 5	2.50
6315	Resistor—45,000 ohms—Carbon type—½ watt—Package of 5	2.50
6316	Resistor—2,500 ohms—Carbon type—½ watt—Package of 5	2.50
6323	Shaft—Tuning condenser drive shaft with one flat washer and two "C" washers—Package of 2	.85
6351	Resistor—Voltage divider resistor	1.00
6352	Transformer—Third intermediate transformer	3.00
6353	Transformer—Second intermediate transformer	3.00
6354	Rheostat—Noise suppressor rheostat	1.90
6355	Volume control—Complete with mounting nut	1.90
6356	Capacitor—0.1 mfd. capacitor—Located on resistor board	.70
7062	Capacitor—Adjustable trimming capacitor—15 to 70 mmfd.	1.00
7065	Screw driver—Non-metallic screw driver for oscillator and I. F. adjustments	1.10
7298	Capacitor—0.01 mfd. capacitor—Located on resistor board	.80
7438	Capacitor—3 gang variable tuning capacitor complete with mounting screws and washers	5.20
7439	Drum—Dial drum with set screws and 3 dial mounting nuts	.50
7440	Scale—Dial and dial scale	.75
7477	Capacitor pack—Comprising two 1.0 mfd. and five 0.1 mfd. capacitors in metal container	2.90
7478	Capacitor pack—Comprising four 0.5 mfd., one 0.02 mfd., and one 0.1 mfd. capacitors in metal container	3.00
7479	Transformer—Interstage audio transformer in metal container	$3.90
7480	Transformer—First intermediate frequency transformer	3.15
7483	Reactor—Compensating reactor	1.00
7484	Socket—UY type Radiotron socket—4 used	.65
7485	Socket—Radiotron six contact socket—5 used	.70
7486	Board—Phonograph terminal board—8 terminals and 3 links	1.60
7490	Board—Resistor board—Less resistors and capacitors	1.10
7493	Reactor—Coupling reactor	2.50
7500	Cable—Six conductor—From receiver to S. P. U.	1.50
7505	Shield—Tube shield top—1 used—Maroon	.50
7506	Shield—Radiotron tube shield—7 used—Maroon	.55
7540	Coil—Detector and oscillator coil complete with mounting bracket	3.50
	AMPLIFIER ASSEMBLIES	
2725	Fuse—1.5 ampere—Cartridge type fuse—Package of 5	.50
2731	Resistor—10,000 ohms—1 watt—Carbon resistor—Package of 5	2.00
2757	Strip—Terminal strip—2 terminals	.50
3032	Socket—UX type Radiotron socket with insulator	.50
3035	Shield—Radiotron tube shield—Package of 2	.50
3099	Capacitor—0.005 mfd. capacitor	.75
3147	Cover—Fuse cover with bushing and insulator	.95
6289	Strip—Terminal strip—5 terminals	.55
6290	Board—Terminal board complete with terminals, fuse clips, and insulator	1.00
6291	Board—Terminal board complete with terminals and insulator—Less capacitor	.90
6292	Switch—Operating switch	1.25
7054	Cord—Power cord	1.00
7370	Cover—Terminal strip cover with insulator—5 terminals	.55
7491	Socket—UY type Radiotron socket with insulator	.70
8910	Capacitor pack—Comprising two 10 mfd. capacitors in metal container	7.00
8911	Reactor—Filter reactor	4.75
8912	Transformer—Audio transformer pack comprising input and output transformer in metal container	6.50
8913	Transformer—Power transformer—105-125 volts, 50-60 cycles	12.50
8914	Transformer—Power transformer—105-125 volts, 25-50 cycles	1600
8915	Transformer—Power transformer—200-250 volts, 50-60 cycles	13.50
10907	Fuse—3 ampere fuse (for 25 cycle use)—Package of 5	.50
	REPRODUCER ASSEMBLIES	
7292	Screw assembly—Comprising two screws, two nuts, two lock washers, and one plate—For mounting speaker to amplifier	.95
6559	Ring—Cone retaining ring	.80
8916	Cone—Reproducer cone complete with voice coil—Package of 5	15.00
9418	Coil assembly—Comprising field coil, magnet, and cone support	12.00
	AUTOMATIC RECORD CHANGING MECHANISM ASSEMBLIES	
2893	Spring—Eccentric and spiral trip lever tension spring—Package of 10	.60
2894	Pulley—Cable pulley complete with mounting stud—Mounted horizontally—Package of 5	.50
2896	Spring—Cable lever adjustment spring—One end fastened to adjustment stud—Package of 10	.50
2904	Lever—Front elevator actuating lever	.50
2905	Screw—Gear and bracket mounting screw—Package of 10	.50
2906	Spring—Check lever spring—Package of 10	.50
2907	Screw—Gear and ratchet set screw—Package of 10	.50
2909	Spring—Four finger lever spring—1¼" long—Package of 10	.60
2910	Spring—Four finger extension lever tension spring—1¼" long—Package of 10	.60
2911	Screw—Slide bracket mounting screw—Package of 10	.50
2912	Roller—Slide roller complete with screw and stud—Package of 5	1.50
2913	Spring—Cable lever tension spring—Package of 10	.60
2914	Spring—Flat spring and screw for locating lever—Package of 10	.50

REPLACEMENT PARTS—(Continued)

Stock No.	DESCRIPTION	List Price
2916	Plate—Four finger lever and motor switch latch plate with mounting screws—Package of 5	$ .60
2917	Washer—Spring "C" washer for locating cable, four finger levers and manual index levers—Package of 10	.50
2918	Spring—Locating and extension lever tension spring—Package of 10	.50
2919	Screw and nut—Locating lever stop screw with nut—Package of 10	.50
2920	Washer—Friction washer for slide and elevator actuating lever—Package of 10	.50
2929	Lever—Rear elevator actuating lever—Package of 2	.50
3214	Pulley—Cable pulley with mounting stud—Mounted vertically—Package of 5	.50
3217	Lever—Check lever	.50
3322	Switch—Motor switch complete	1.40
3401	Spring—Automatic trip lever tension spring—Package of 10	.50
3402	Screw—Elevator pad screw—Package of 10	.75
3403	Spring—Clutch pawl spring—Package of 10	.65
3404	Spring—Brake lever tension spring—Located on motor starting switch plate—Package of 10	.50
6340	Lever—Automatic trip lever	.90
6341	Lever—Manual index lever	.90
6342	Pawl—Clutch pawl complete	2.00
6343	Gear—Gear and ratchet with set screw	2.10
6344	Lever—Eccentric and spiral trip lever complete—For manual position	1.50
7136	Gear—Gear and bracket	1.40
7188	Bracket—Slide bracket with roller	.75
7189	Lever—Front and rear elevator cam lever—Package of 5	2.20
7190	Lever—Locating lever	.85
7191	Lever—Cable lever	.60
7192	Cam—Cam gear and cam	1.50
7321	Lever—Tone arm cable guide lever with pulley	.90
7363	Pad—Front elevator rubber pad—Package of 10	.50
8646	Slide	2.20
8647	Lever—Four finger lever	1.20
	MOTOR BOARD ASSEMBLIES	
2779	Pointer—Selector switch pointer—Package of 10	.50
3262	Screw and nut—Record transfer lever adjusting screw and nut—Package of 10	.60
3394	Socket and base assembly—For compartment lamp	.80
3395	Shade—Compartment lamp shade	.50
3405	Spring—Record transfer lever spring—Package of 10	.50
3406	Escutcheon—Engraved "AUTOMATIC"	.50
3407	Escutcheon—Engraved "MANUAL"	.50
3408	Escutcheon—Engraved "33⅓—78"	.50
3409	Post—Roller post assembly for supporting record magazine	.75
3410	Suspension spring and washer for motor board—Comprising 1 bolt, 1 top spring, 1 bottom spring, 2 cup washers, 1 "C" washer and 1 nut	.90
3431	Escutcheon—Selector switch escutcheon	1.00
6286	Knob—Selector control switch knob—Package of 5	1.50
6315	Lever—Record transfer lever assembly complete	1.05
7535	Switch—Selector control switch complete, less knob and escutcheon	6.40
	TURNTABLE ASSEMBLIES	
3238	Ring—Clamp ring assembly—Comprising spring, latch lever and stud	.60
3310	Washer—Thrust washer—Package of 2	.60
3341	Pin—Cross Pin—Package of 2	.60
3411	Sleeve—Sleeve assembly complete with ball race	3.05
8950	Turntable—Turntable complete	8.50
	MAGAZINE ASSEMBLIES	
2900	Screw—Magazine lever set screw—Package of 10	.50
3210	Lever—Magazine lever	.65
6172	Washer—Metal Washer located under record magazine—Package of 20	.50
8951	Magazine—Record magazine	4.00
	PICKUP, ARM, MICROPHONE AND VOLUME INDICATOR ASSEMBLIES	
3183	Socket—Microphone socket—Package of 5	2.00
3204	Cable—Pickup arm cable—Package of 5	1.50
3215	Plug—Microphone cord plug	.50
3216	Cushion—Microphone rubber cushion—Package of 6	.50
3385	Coil—Pickup coil	.50
3386	Cover—Pickup cover	.75
3387	Screw assembly—Pickup mounting screw assembly, comprising one screw, one nut and one washer—Package of 10	.60
3388	Screw—Pickup needle holding screw	.80
3389	Rod—Automatic brake trip rod with lock nut—Package of 5	.50
3390	Escutcheon—Pickup arm escutcheon complete with mounting rivets	.65
3412	Board—Volume indicator meter and pickup terminal board	.60
3417	Armature—Pickup armature	.75
3418	Cushions—Pickup rubber cushions—Comprising one damper, two spacer cushions and 1 damper bushing—Package of 5 sets	1.25
3419	Screw—Pickup cover mounting screw—Package of 10	.50
6335	Pickup—Pickup unit complete	12.00
6336	Weight—Home recording weight	1.40
6346	Back—Pickup housing back	.65
7532	Meter—Home recording volume indicator meter	2.50
7533	Mechanism—Microphone mechanism—Less housing	7.50
7534	Cord—Microphone cord	1.10
7538	Arm—Pickup arm complete less escutcheon, pickup, pickup mounting screw and washer	6.00
	MOTOR ASSEMBLIES	
3398	Motor mounting washer assembly—Comprising 2 cup washers, 1 springs and 1 "C" washer—One set	.75
7330	Capacitor—Motor capacitor—3.75 mfd.—For 25 cycle operation	4.00
8641	Capacitor—Motor capacitor—1.25 mfd.—For 50 or 60 cycle operation	1.40
8952	Motor—Motor complete—105-125 volts—60 cycles	38.00
8953	Motor—Motor complete—105-125 volts—25 cycles	48.80
8954	Motor—Motor complete—105-125 volts—50 cycles	44.60
8955	Rotor and shaft for 60 cycle motor	9.00
8956	Rotor and shaft for 50 cycle motor	9.00
8957	Rotor and shaft for 25 cycle motor	6.00
8958	Spindle—Turntable spindle with fibre gear for 60 cycle motor	7.00
8959	Spindle—Turntable spindle with fibre gear for 50 cycle motor	7.00
8960	Spindle—Turntable spindle with fibre gear for 25 cycle motor	8.00
	MISCELLANEOUS PARTS	
2737	Escutcheon—Operating switch escutcheon—Package of 5	.80
2857	Plug—Three prong (male section) connector plug for power cable	.70
3173	Plug—Three prong (female section)—connector plug for power cable	1.30
3413	Resistor—5,000 ohms—Carbon type—½ watt—Package of 5	2.50
3414	Resistor—15 ohms—Porcelain type—20 watt	.90
3415	Receptacle—Needle receptacle	.60
3416	Box—Needle box with lid	.60
3432	Capacitor—0.025 mfd.	.60
3433	Capacitor—0.015 mfd.	.60
3442	Resistor—100 ohms—Carbon type—½ watt—Located on selector switch—Package of 5	2.50
6292	Switch—Operating switch—Toggle type located on side of cabinet	1.25
6303	Resistor—20,000 ohms—Carbon type—½ watt—Package of 5	2.50
6338	Cable—Power three conductor power cable	1.90
6349	Cable—Shielded two conductor cable—From selector switch and resistor board to indicator meter and pickup terminal board	.60
7312	Transformer—Phonograph input transformer	6.55
7536	Cable—Braid covered interconnecting cable from receiver terminal strip to phonograph input transformer, S. P. U. terminal strip, selector switch and resistor board assembly	2.30
	CABINET ASSEMBLIES (PRICES FURNISHED UPON REQUEST)	
2776	Catch assembly—Door catch and strike with nails	
6921	Hinges—Door hinges—One set of 4 hinges with mounting screws	
8949	Board—Motor board, less equipment	
X161	Panel—Control panel	
X162	Grille	
X163	Lid—Cabinet lid	
X164	Leg—Cabinet leg	
X165	Foot—Cabinet foot	
X166	Doors—Record compartment—One pair	
X167	Baffle board and grille cloth	
X168	Escutcheon—Station selector escutcheon	
X169	Support—Lid support with mounting screws	
X170	Doors—Cabinet center doors—One pair	
X171	Knob—Record compartment door knob with mounting screw	
X172	Pull—Door pull with mounting screw	
X173	Hinge—Lid hinge with mounting screw—Package of 2	

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MODEL R-90
Schematic

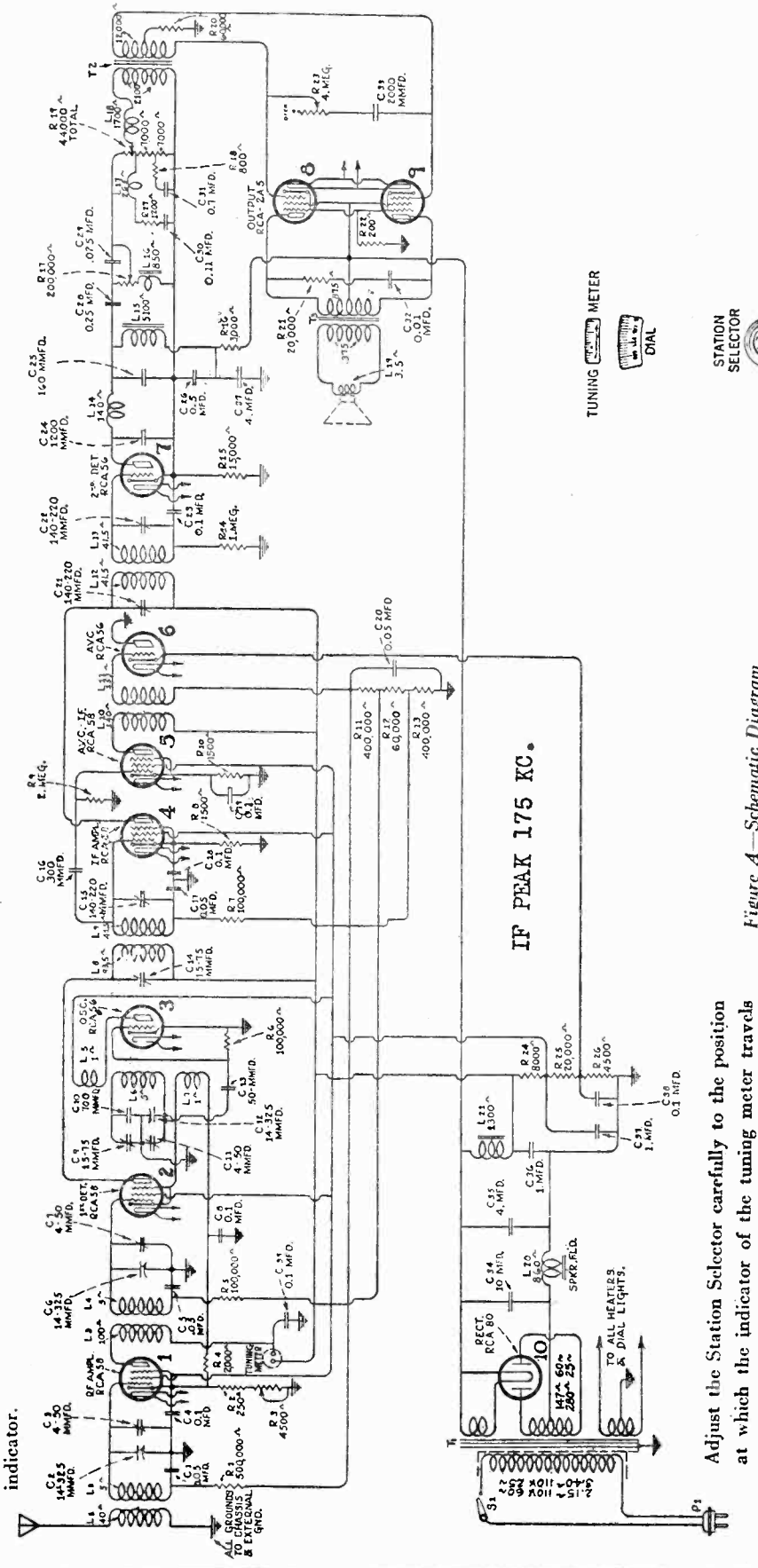

Figure A—Schematic Diagram

To reduce the high-frequency (treble) response, or to decrease the background noise (static) interference on *station settings*, turn the right-hand tone control knob counter-clockwise. The extent of high-frequency cut-off thus obtained is indicated by shading of the *yellow* illumination at the right-hand side of the tone color indicator.

To reduce the low-frequency (bass) response, or to decrease low pitched hum present on the signals of some stations, turn the left-hand tone control knob clockwise. The extent of low-frequency cut-off thus obtained is indicated by shading of the *blue* illumination at the left-hand side of the tone color indicator.

The *red* illumination at the center of the tone color indicator represents the middle range of musical response. This illumination is not cut off by rotation of either of the tone control knobs as described in the preceding paragraphs (a) and (b).

Adjust the Station Selector carefully to the position at which the indicator of the tuning meter travels furthest to the right (as designated by the arrow on the meter scale). When receiving a powerful local station, the Station Selector dial should be set at the *center* of the scale *range* for which the meter deflection is maximum (this range may be narrowed somewhat by turning the Silent-Tuning Control clockwise).

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MODEL R-90
Voltage
I-F Trimmers
Notes

R. C. A. VICTOR CO., INC.

SERVICE DATA

Electrical Specifications

Voltage Rating.....105–125 Volts
Power Consumption.....120 Watts
Type and Number of Radiotrons.....3 RCA-56, 4 RCA-58, 1 UX-280, 2 RCA-2A5—Total, 10
Frequency Range.....540 K. C.–1500 K. C.
Undistorted Output.....4.0 Watts

This receiver is a ten tube Super-Heterodyne radio receiver. Features such as illuminated control, improved automatic volume control, noise suppressor, compensated volume control, heater pentode output tubes operated as a push-pull stage, acoustically correct cabinets and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne are included in this instrument.

Figure A shows the schematic circuit, Figure B the wiring diagram, Figure C the location of the adjustable capacitors and Figure D, the loudspeaker wiring. The Radiotron socket voltages, the line-up procedure and the replacement parts are given on the following pages.

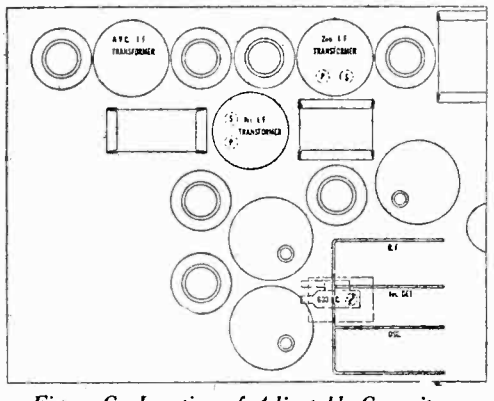

Figure C—Location of Adjustable Capacitors

R. F. And Oscillator Line-Up Capacitor Adjustments

Four adjustable capacitors are provided for aligning the R. F. circuits and adjusting the oscillator frequency so that the oscillator will maintain a constant frequency—175 K. C.—difference from that of the incoming signal. Poor quality, insensitivity, poor A. V. C. action and possible inoperation of the receiver may be caused by these capacitors being out o adjustment.

If the other adjustments have not been tampered with—the intermediate transformer tuning capacitors—the following procedure may be used for aligning these capacitors.

(a) Procure an R. F. Oscillator giving a modulated signal at 600 K. C. and 1400 K. C. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket. This should be a tube that is otherwise normal in all respects but having one heater prong removed. Insert this tube in the A. V. C. socket.

(d) First check the chassis and carefully ascertain that the dial pointer reads exactly at the first line on the scale when the tuning capacitor rotor plates are fully meshed with the stator plates.

(e) Place the oscillator in operation at exactly 1400 K. C. and couple its output to the antenna. Set the dial scale at exactly 1400. Connect the output meter to the set and place the volume control and suppressor control, if noise level will permit, at its maximum position. Adjust the oscillator input so that an excessive reading on the output meter is not obtained.

(f) With a suitable socket wrench—the nuts are at ground potential—adjust the oscillator, first detector and R. F. line-up capacitors, until a maximum deflection is obtained in the output meter.

(g) Set the oscillator at 600 K. C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K. C. series capacitor, Figure C, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.

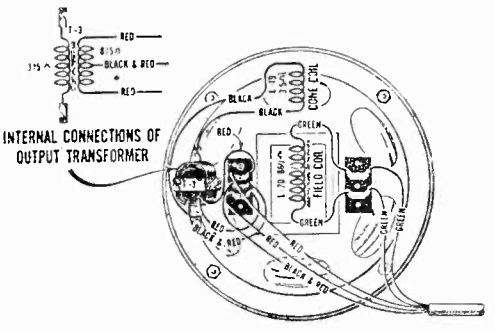

Figure D—Loudspeaker Wiring

(h) Change the frequency of the oscillator to 1400 K. C. and set the dial at 1400. Again make the adjustments given under (f) and (g).

So adjusted, the R. F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R. F. signal.

I. F. Tuning Capacitor Adjustments

Although this receiver has two I. F. stages, one for the second detector and one for the A. V. C., only two of the three I. F. transformers are tuned by adjustable capacitors and require adjustment. The stage used for the A. V. C. is broadly tuned and does not require any adjustment.

The transformers are all tuned to 175 K. C. and the circuits broadly peaked.

A detailed procedure for making this adjustment follows:

(a) Procure a modulated R. F. Oscillator that gives a modulated 175 K. C. signal. Also procure a non-metallic screw driver such as Stock No. 7065.

(b) An output meter is necessary. This may be a current squared galvonometer connected to the secondary of the output transformer instead of the cone coil, a 0.5 milliammeter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) A dummy Radiotron RCA-56 is necessary to substitute for the one normally used in the A. V. C. socket.

(d) Remove the oscillator tube and make a good ground connection to the chassis. Place the oscillator in operation and couple its output from the control grid of the first detector to ground. Adjust the oscillator output, with the receiver volume control at maximum, until a deflection is obtained in the output meter.

(e) Refer to Figure C. Adjust the secondary and primary of the second and then the first I. F. transformer until a maximum deflection is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

When the adjustments are made the set should perform at its maximum efficiency. However, due to the interlocking of adjustments, it is good practice to follow the I. F. adjustments with the R. F. and oscillator line-up capacitor adjustments. The correct method of doing this is given in the preceding section.

RADIOTRON SOCKET VOLTAGES

120 Volt, A. C. Line—No signal being received—Volume Control at minimum

Radiotron No.	Cathode to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current, M. A.	Heater or Filament Volts, A. C.
1. R. F	3.0	100	230	7.0	2.4
2. 1st Detector	8.0	95	220	2.5	2.4
3. Oscillator	—	—	105	6.0	2.4
4. I. F.	7.5	100	225	2.5	2.4
5. A. V. C.—I. F.	7.5	100	225	2.5	2.4
6. A. V. C.	20.0	—	0	—	2.4
7. 2nd Detector	17.0	—	250	1.2	2.4
8. Power	18.0	255	245	33.0	2.4
9. Power	18.0	255	245	33.0	2.4

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MODEL CE-29
Schematic

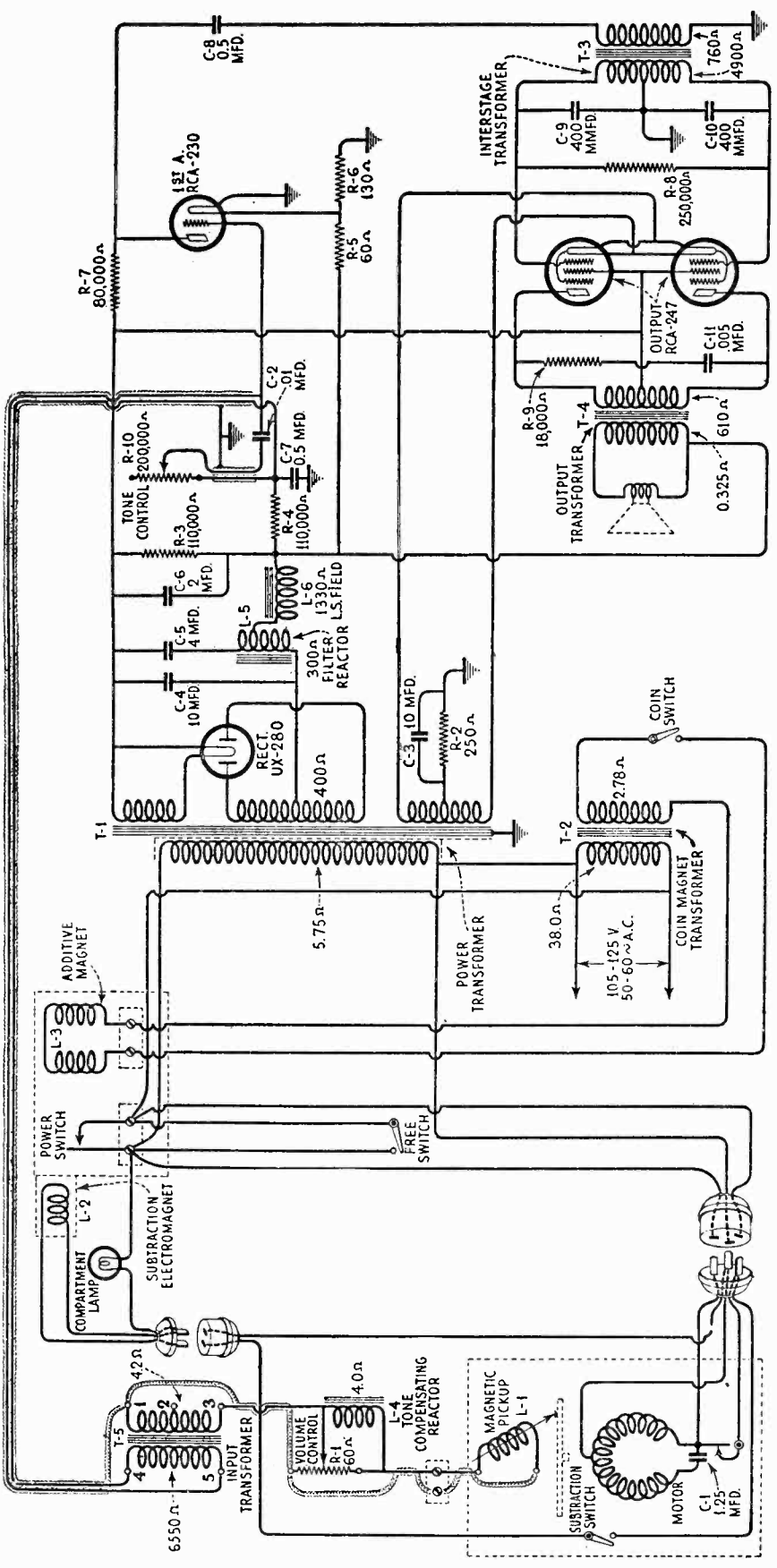
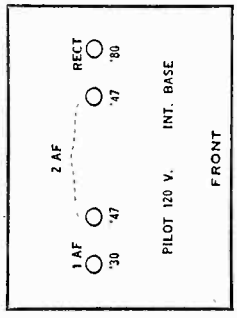


Figure 1—Schematic Circuit

RCA CE-29 Coin Operated Automatic Electrola

Basically this unit is an audio amplifier and the usual service routine applied to an audio amplifier is applicable to this system.

Model CE-29 (1932)



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MODEL CE-29
Chassis

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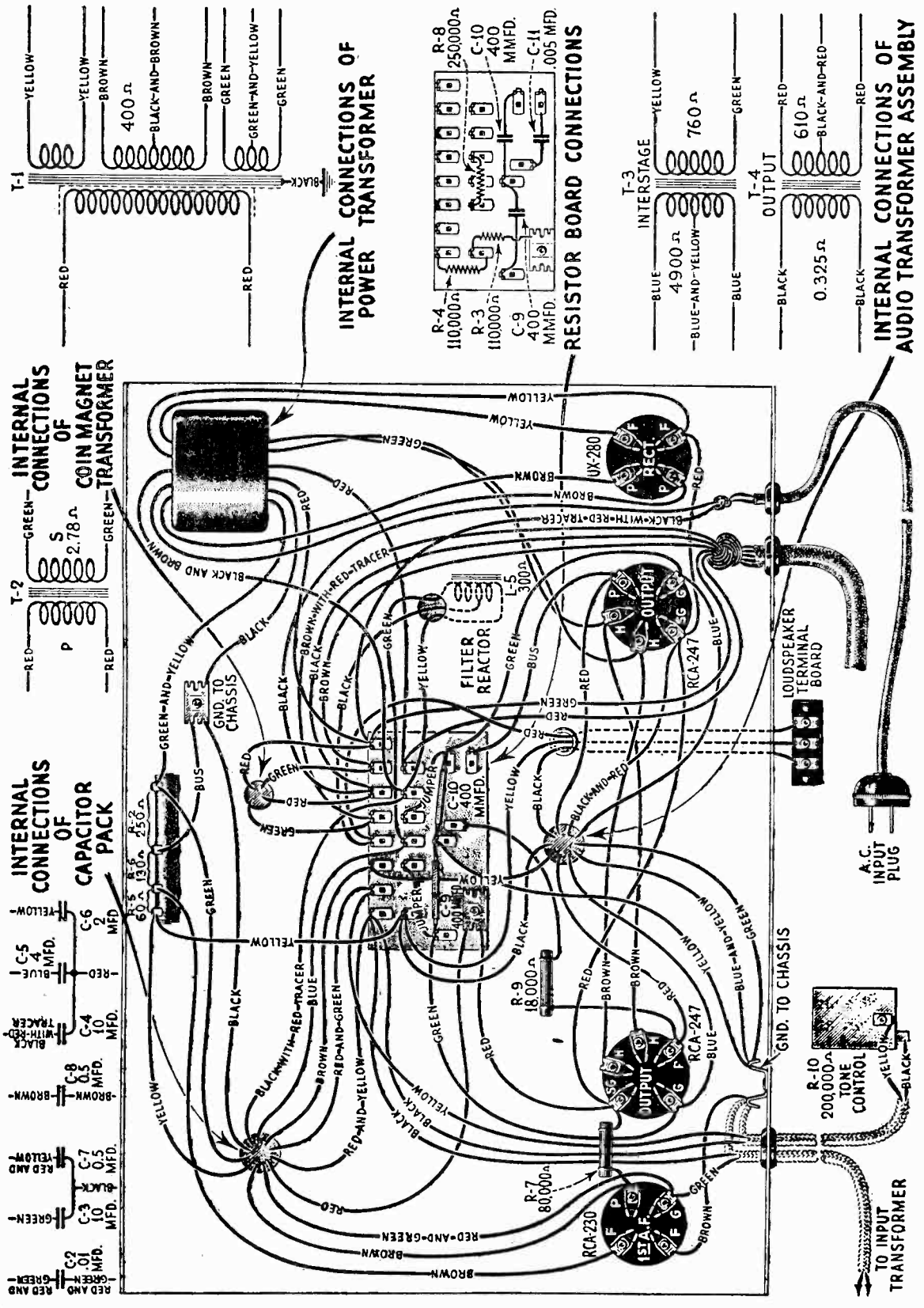

Figure 2—Amplifier Wiring Diagram

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SERVICE NOTES

for

RCA Victor Model CE-29

(Coin Operated Automatic Electrola)

ELECTRICAL SPECIFICATIONS

Voltage Rating	105-125 Volts
Frequency Rating	25, 50 and 60 Cycles
Power Consumption	130 Watts
Type of Circuit	Two Stage Audio Amplifier (Push-Pull Power Stage)
Type and Number of Radiotrons	One RCA-230, Two RCA-247, One UX-280—Total 4
Type of Magnetic Pickup and Tone Arm	Low Impedance Pickup with Inertia Type Tone Arm
Type of Record Changer	RCA Victor
	Continuous Type, Playing One Side of Ten 10-inch Records and Repeating Indefinitely
Turntable Speed	78 or 33⅓ R. P. M.
Type of Phonograph Motor	Induction, Operating at Synchronous Speed
Turntable Diameter	8 Inches
Type of Rectifier	Full Wave, UX-280
Type of Loudspeaker	Dynamic
Wattage Dissipation in Loudspeaker Field	10 Watts
Undistorted Output	4.0 Watts
Capacity of Coin Box	Approximately 300 Coins—Maximum of 23 May Be Inserted at Once

PHYSICAL SPECIFICATIONS

Height	46½ Inches
Depth	19⅝ Inches
Width	28⅜ Inches
Weight Packed for Shipment	200 Pounds

The RCA Victor Coin Operated Automatic Electrola Model CE-29 consists of a standard RCA Victor automatic record changing mechanism that holds ten 10-inch records, a two stage audio amplifier using Radiotrons RCA-247 as a push-pull output amplifier, a coin box with the necessary switches for controlling operation, an eight-inch dynamic type loudspeaker and a continuously variable tone control. Due to the large area of the cabinet, excellent low frequency reproduction is obtained.

The following description covers the technical features of the equipment. Refer to the Schematic Diagram, Figure 1.

The output of the magnetic pickup is connected directly across the volume control potentiometer. The arm and one side of the potentiometer are connected to the primary of the input transformer. It should be noted that a reactor is connected across the unused portion of the volume control. The The purpose of this reactor is to increase the volume of the lower frequencies—from 400 cycles down —at low volume. This compensates for the lesser sensitivity of the ear for low frequencies at low volume.

The secondary of the input transformer is connected to the grid circuit of the first stage audio amplifier, Radiotron RCA-230. The filament of this Radiotron is heated by rectified and filtered current from the UX-280. The reason for using this tube instead of the usual heater type tube is due to the thermal inertia of the latter type. Although the UX-226 would be suitable in this respect, its filament must be heated from A. C. and this would produce excessive hum.

The power stage consists of two Radiotrons RCA-247 connected in push-pull. A 200,000 ohm variable resistor connected in series with a 0.01 mfd. capacitor across the secondary of the input transformer provides a continuously variable tone control. Transformer coupling is used between the two stages as well as between the output stage and loudspeaker.

The Radiotron UX-280 provides a means of rectifying the high voltage output of the transformer which after suitable filtering is used as plate and grid supply for all Radiotrons and filament supply for the RCA-230.

Figure 3 shows a detail view of the coin mechanism with its adjacent schematic wiring. A detailed explanation of its functioning follows.

A coin inserted in the coin slot makes a momentary contact of the coin switch and thereby energizes the additive magnet. This magnet is energized by a small transformer, having a 16 volt secondary winding, the primary being permanently connected across the line.

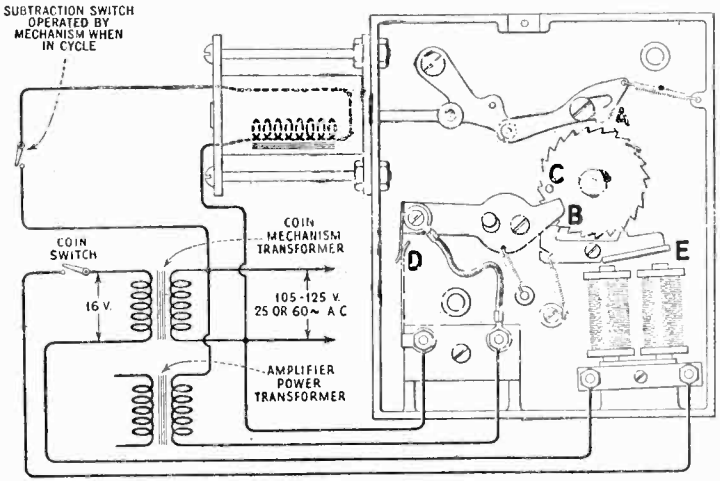

Figure 3—Coin Box Wiring

The energizing of the magnet pulls the lever "E" to the magnet and releases it after momentary contact of the coin switch. This closes the contact "D" by releasing the pressure on the contact arm by the pin "C." Also the lever "E" moves the ratchet due to its contact at "B." The ratchet will therefore move one notch for each nickel placed in the slot up to 23 nickels, it having only 23 teeth. As the contact "D" closes the power to the amplifier and turntable as soon as one nickel is inserted in the slot, the machine begins operation.

Upon completing one record the subtraction switch closes momentarily and energizes the solonoid which pulls lever "A" sufficiently to move the ratchet back one notch. If only one nickel has been inserted, the pin "C" will engage the contact lever and open the switch "D." However if more than one nickel has been inserted, the machine must go through an equal number of cycles before the pin "C" will engage the contact arm and open the circuit.

SERVICE DATA

Service work in conjunction with Model CE-29 will be similar to that of the usual amplifier and will consist of the location and replacement of parts that may prove defective. The amplifier wiring is shown in Figure 2, the assembly wiring in Figure 4 and the voltage readings and Replacement Parts on the following pages.

RADIOTRON SOCKET VOLTAGES

120 VOLT A. C. LINE

Radiotron No.	Control Grid to Filament Volts, D. C.	Screen Grid to Filament Volts, D. C.	Plate to Filament Volts, D. C.	Plate Current M. A.	Screen Current M. A.	Filament Volts
RCA-230	**2.0	—	80	2.0		*2.0 D. C.
RCA-247	17	270	250	30	6.0	2.6 A. C.
RCA-247	17	270	250	30	6.0	2.6 A. C.

*The filament voltage of the RCA-230 may vary considerably due to variations in filament resistance. The current however should be very close to 60 M. A. Measuring the current will give a much more accurate indication of correct operation than measuring voltage.
**This actual voltage is 4.5. Different resistance meters will give varying readings, the above value being approximate.

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MODEL CE-29
Assembly Wiring

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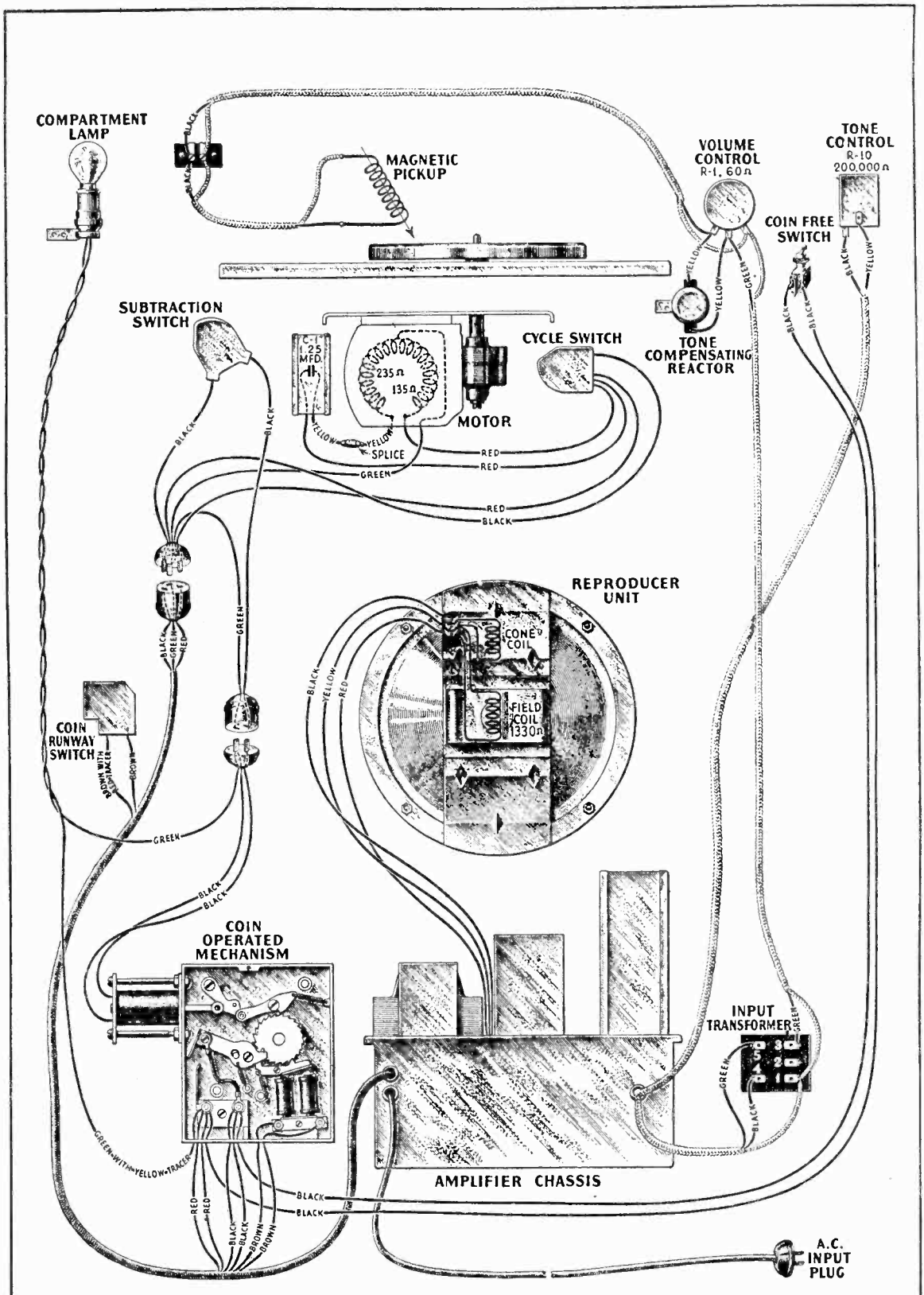

Figure 4—Assembly Wiring Diagram

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MODEL PT-15
Turntable
Schematic

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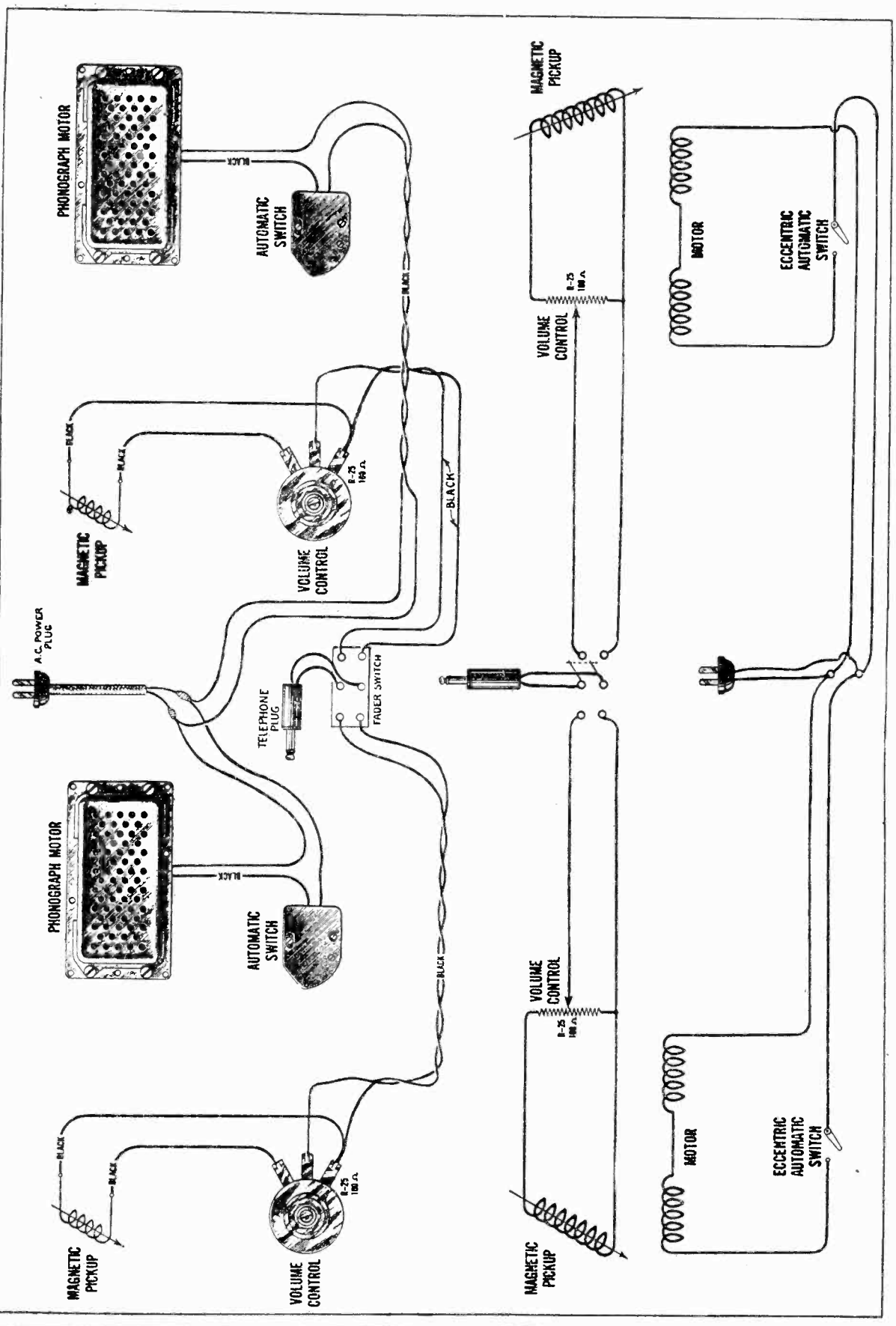

Figure 1—Wiring and Schematic Diagrams

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MODEL PG-62
Public Address
Schematic

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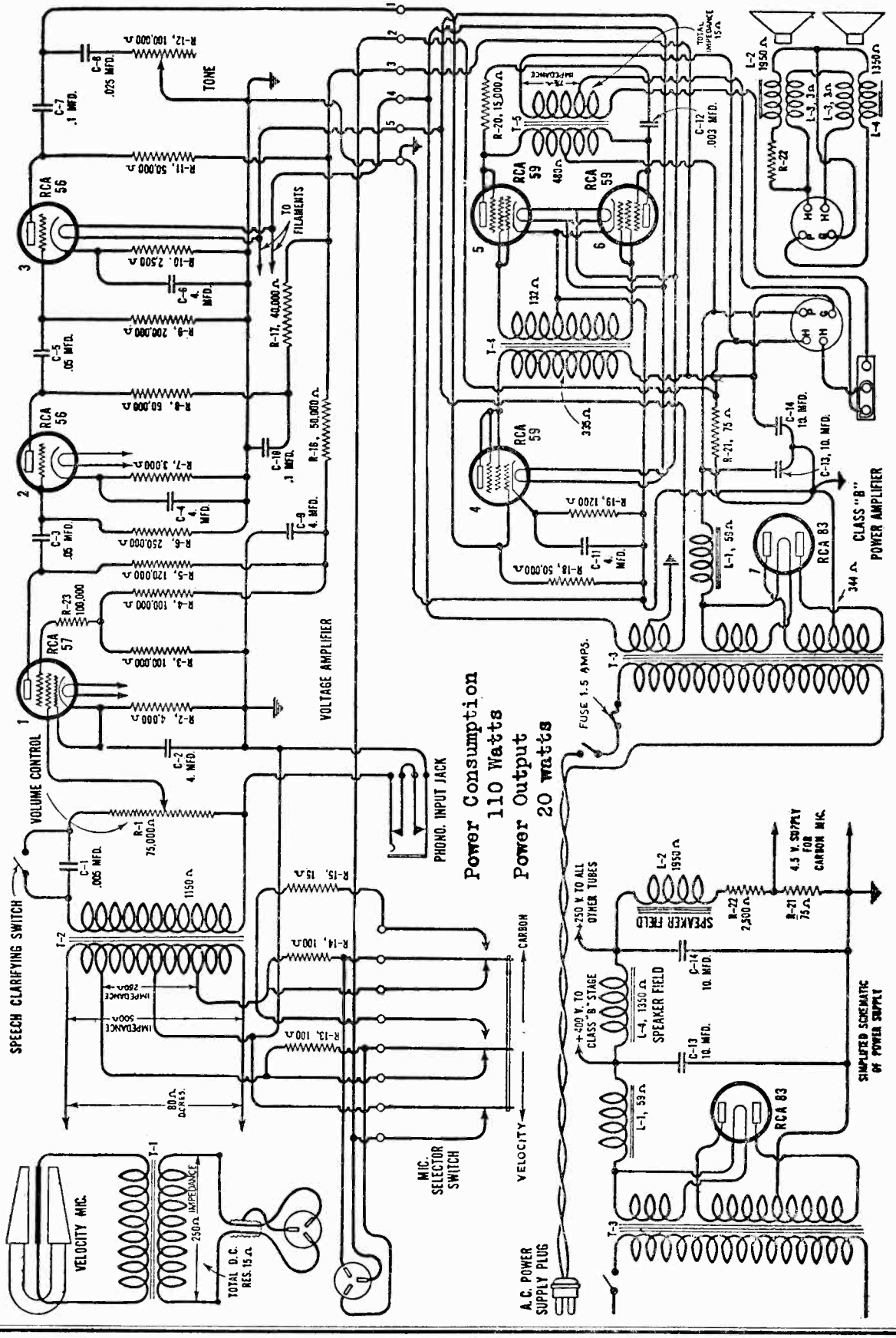

Figure 4—Schematic Circuit Diagram

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MODEL PG-62
Public Address
Chassis

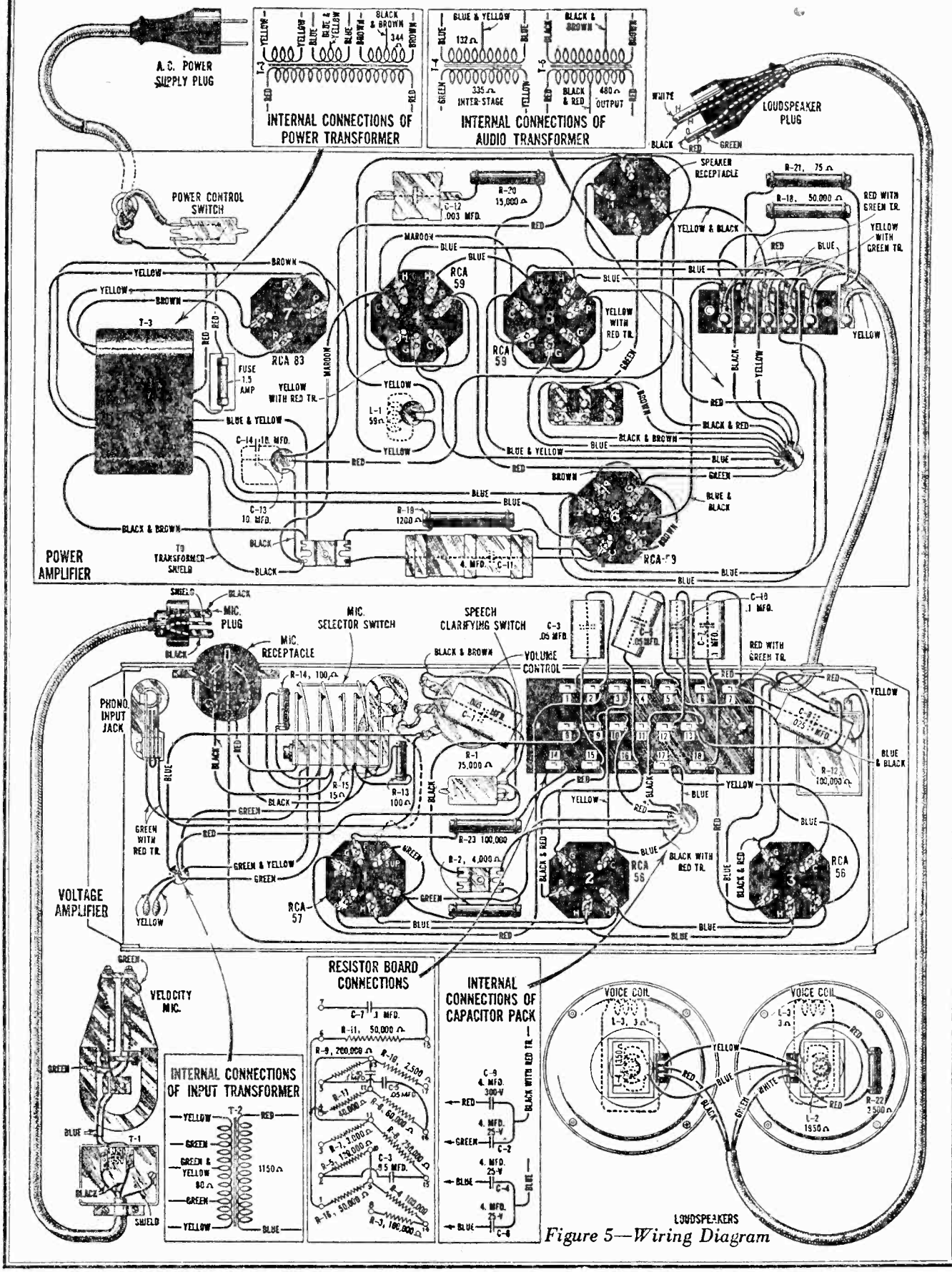

Figure 5—Wiring Diagram

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MODEL PG-62
Public Address
Voltage- Notes

R. C. A. VICTOR CO., INC.

The RCA-57 is resistance coupled to the RCA-56 in the second stage and this RCA-56 is in turn resistance coupled to the RCA-56 in the third stage of the voltage amplifier. The last stage of the voltage amplifier is coupled to the single RCA-59 which is the driver for two Radiotrons RCA-59 in the Class "B" output stage. The output stage supplies power to two loudspeakers through a step-down transformer. This transformer has an output impedance of 15 ohms with a tap at 7½ ohms.

The power supply for both the voltage and power amplifiers is obtained from the RCA-83 and a filter system located on the power amplifier base. The field coil of one loudspeaker is used as a filter reactor in the power supply system in the power amplifier.

(2) CARBON MICROPHONE CONNECTIONS

The amplifier equipment is designed so that it will operate with a double button carbon microphone of 250 ohms impedance. A three-pole plug, similar to that employed with the velocity microphone, should be used. Each button on the microphone should be connected to each of the symmetrical poles on the plug. The remaining pole on the plug should be used to connect to the midpoint of the microphone. When using the carbon microphone the microphone selector switch should be placed at the "Carbon" position.

(3) PHONOGRAPH CONNECTIONS

An input jack is provided in the grid circuit of the RCA-57 which permits the use of a phonograph turntable Type PT-14. The instructions for operation of the turntable are included with the phonograph equipment.

(4) WIRING

The schematic and wiring diagrams for the amplifier equipment are shown in Figure 4. The wiring diagram for the complete equipment is shown in Figure 5.

(5) RADIOTRON SOCKET VOLTAGES

The Radiotron socket voltages given in the following tabulation are the actual values at which each Radiotron should operate. In circuits containing high resistance, voltages read on a set analyzer will not agree with the values in the table, due to the relatively low resistance of the meter employed. Therefore, a correction must be applied to the meter reading to obtain the correct voltage at each socket. Usually, an application of Ohms Law will give an approximate value of the voltages at which each Radiotron is operating, assuming that the resistance of the meter is known.

RADIOTRON SOCKET VOLTAGES

115 VOLT A. C. LINE — NO INPUT SIGNAL VOLTAGE

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1. RCA-57	1.0	80	145	.25	2.5
2. RCA-56	3.5	—	120	1.2	2.5
3. RCA-56	4.0	—	165	1.6	2.5
4. RCA-59	2.8	—	242	23.0	2.5
5. RCA-59	0	—	390	13.0	2.5
6. RCA-59	0	—	390	13.0	2.5

CAUTION: Whenever the Radiotron RCA-83 rectifier is removed from or installed in its socket, the A. C. power control switch should be in the "off" position.

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MODEL ER-1240-A2
Schematic

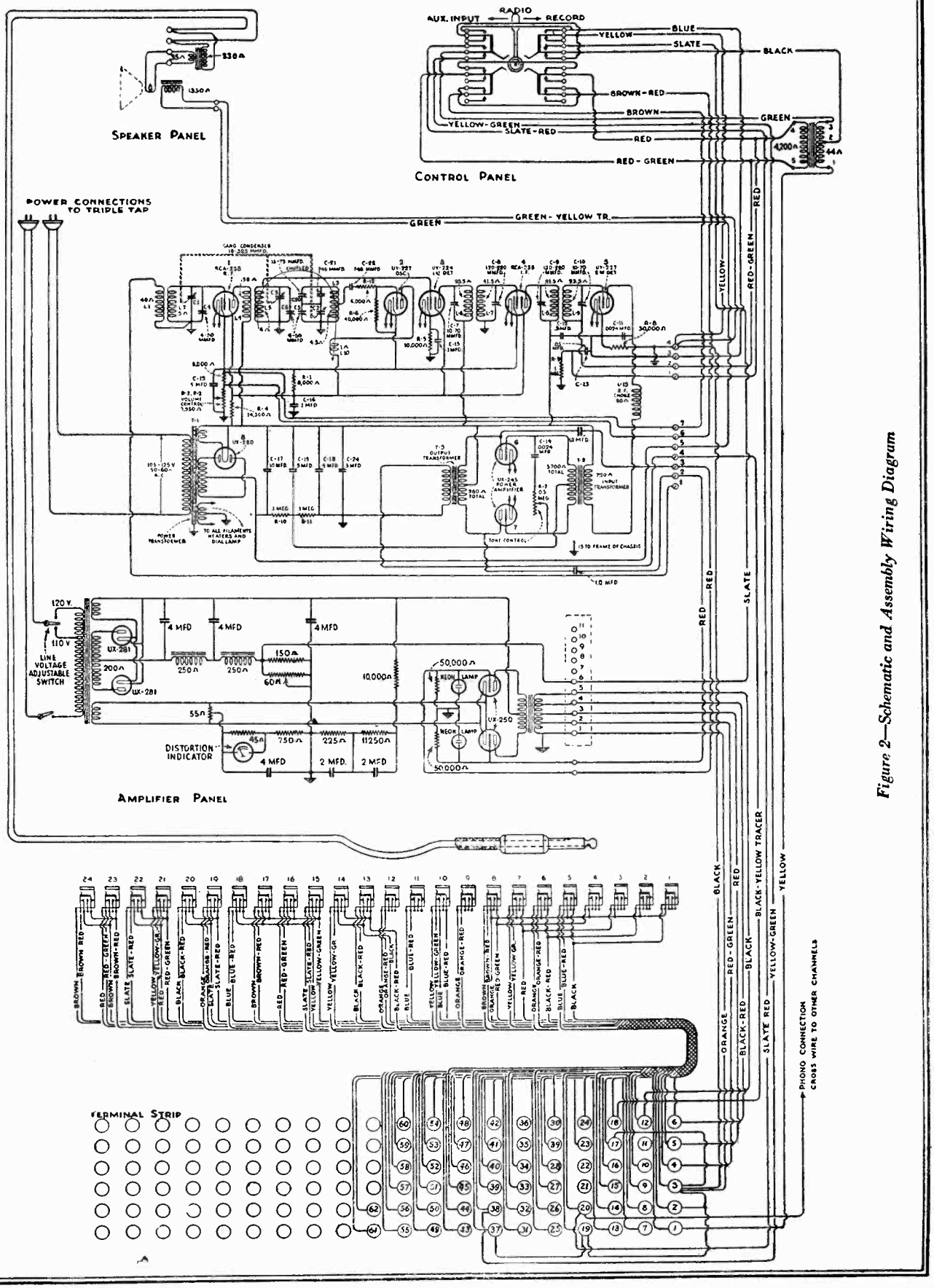

Figure 2—Schematic and Assembly Wiring Diagram

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MODEL ER-1240-A2
Sooket
Notes

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5—The next panel is that of the jack strip. The jacks provide for connecting external inputs. monitoring loudspeaker and segregrating the various loads so that a failure in any section of the load may be localized and disconnected from the other circuits until repaired. The terminal strip for correcting this external wiring is also located on this panel.

6—Two blank panels are provided for additional amplifiers if they are required. They are located directly below the jack panel.

It should be noted that the model ER-1240-A2 Panel is similar to the model ER-1240-A and the ER-1240 except for the receiver used and sligbt wiring changes. The Service Notes for these models should therefore be consulted for information other than the wiring diagrams and voltage readings of the receiver unit. The schematic, wiring, and assembly diagrams as well as voltage readings and replacement parts are given on the following pages.

Socket No.	Radiotron Type
1	RCA-235
2	UY-227
3	UY-224
4	RCA-235
5	UY-227
6	UX-245
7	UX-245
8	UX-280

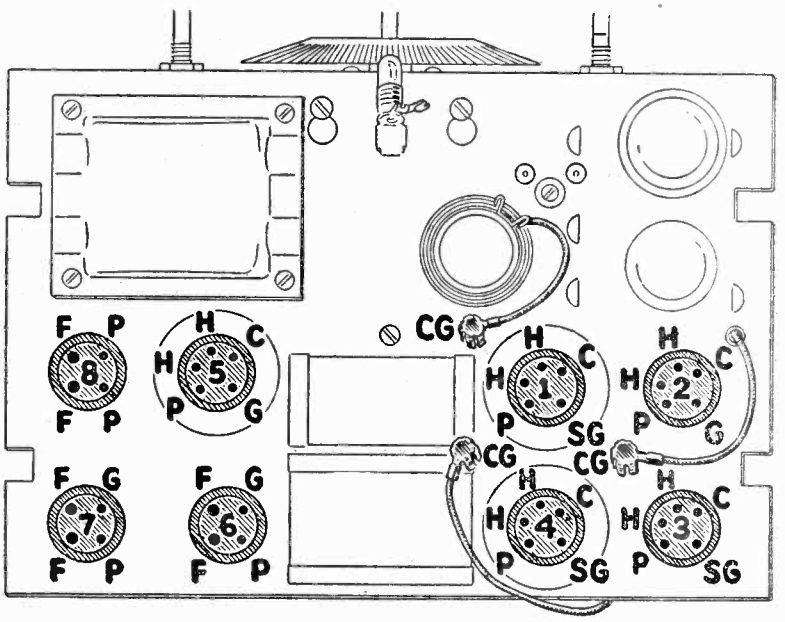

Figure 3—Socket Location and Contact Position of Receiver Assembly

ER-1240-A2 PROPORTIONAL DISTRIBUTION OF REPRODUCERS

VOLUME LEVEL	FOR USE IN	Maximum Number of Reproducer Units (with or without Vol. Cont.)
1	Auditoriums, ballrooms, etc.—Electro-Dynamic Triplet (3 Reproducers)	1
1	Auditoriums, ballrooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	20
1	Auditoriums, ballrooms, etc.—Electro-Dynamic Speakers (Model AF-6175 Terms. 1 and 5 to line)	15
2	Apartment or small assembly rooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	40
2	Apartment or small assembly rooms, etc.—Electro-Dynamic Speakers (Model AF-6175. Terms 1 and 5 to line)	30
3	Private botel rooms, etc.—Magnetic Speakers or Permanent Magnet Electro-Dynamic Speakers	125
3	RCA Victor Radio Pillows	200
4	Head telephones or RCA Victor Radio Pillows	2500

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R. C. A. VICTOR CO., INC.

MODEL ER-1240-A2
A-F Amplifier Chassis
Electrical Specs.

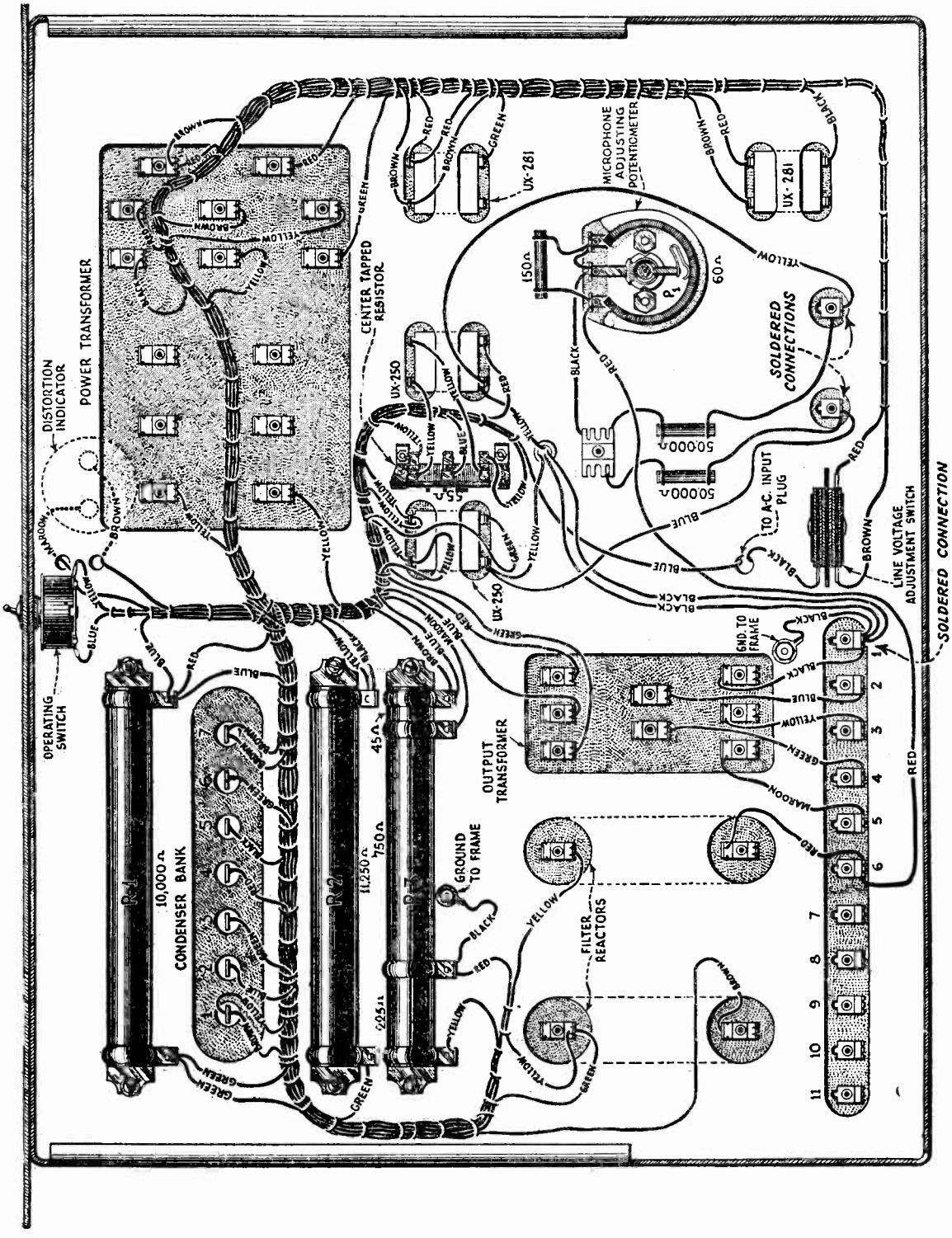

Figure 5—Wiring Diagram of Power Amplifier

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts
Frequency Rating	50 and 60 cycles
Power consumption—With 10 watt amplifier	255 watts
With extra 10 watt amplifier	415 watts
With extra 50 watt amplifier	655 watts

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MODEL ER-1240-A2
Receiver Chassis

R. C. A. VICTOR CO., INC.

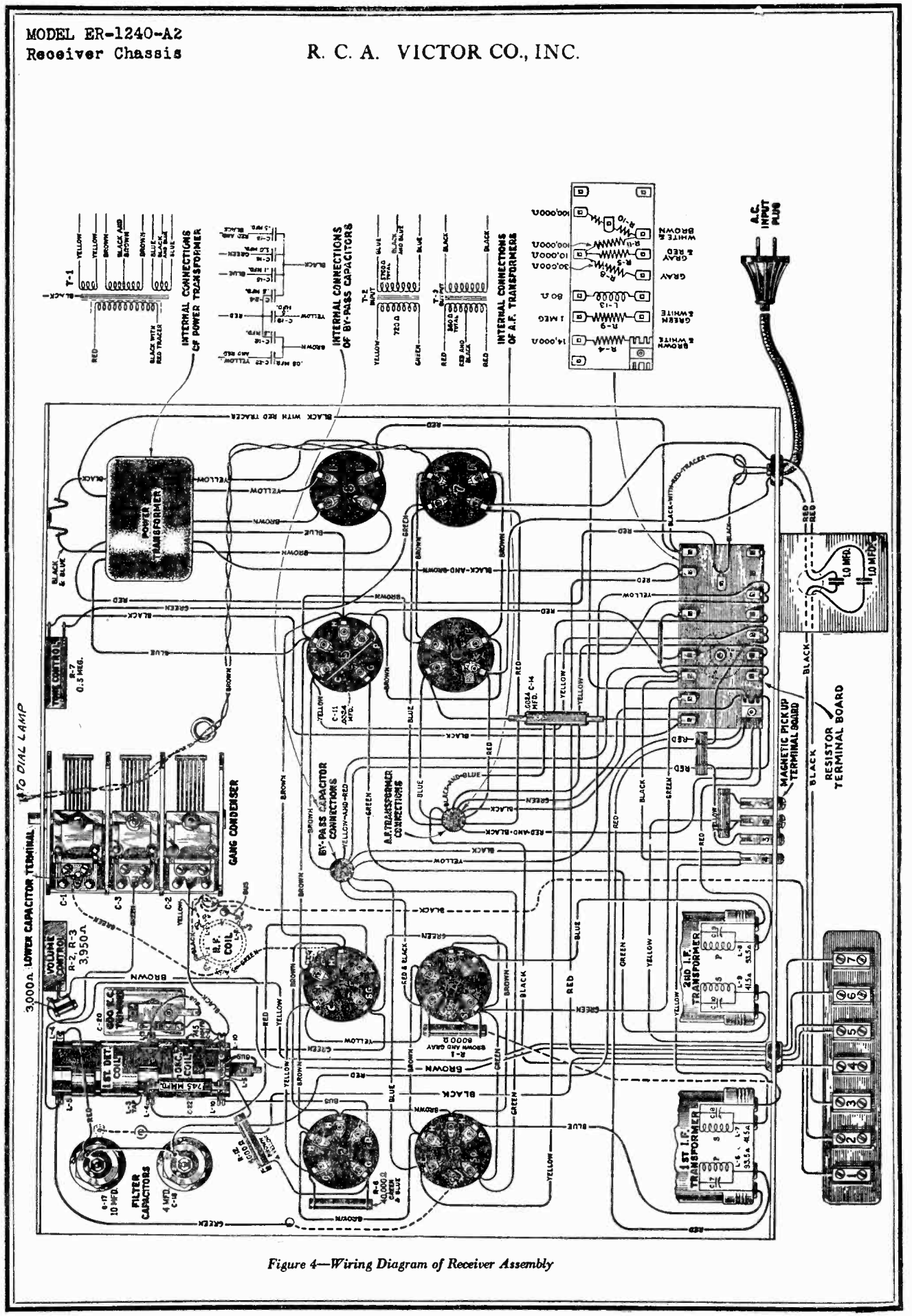

Figure 4—Wiring Diagram of Receiver Assembly

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VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron socket with the receiver in operating condition should prove of value when checking with test sets such as the Weston Model 547, Type 3, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the cable in the test set will cause some circuits to oscillate, due to its added capacity. Small variations of voltages will be caused by different tubes and line voltages. Therefore, the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the tube socket numbers shown in Figure 3.

RADIOTRON SOCKET VOLTAGES—RECEIVER ASSEMBLY
120 VOLT LINE

Tube No.	Cathode to Heater Volts, D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts, A. C.
VOLUME CONTROL AT MINIMUM							
1	40	40	55	200	0	0	2.4
2	40	0	—	50	4.0	—	2.4
3	8.0	7.0	90	240	0.5	0.25	2.4
4	40	40	55	200	0	0	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30.0	—	245	30.0	—	2.4
7	—	*30.0	—	245	30.0	—	2.4
VOLUME CONTROL AT MAXIMUM							
1	3.5	3.5	70	240	5.0	**0.7	2.4
2	2.5	0	—	65	5.5	—	2.4
3	5.0	5.0	70	235	0.5	0.25	2.4
4	3.5	3.5	70	240	5.0	**0.7	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30	—	245	25.0	—	2.4
7	—	*30	—	245	25.0	—	2.4

*Not true reading due to resistance in circuit.
**This reading may be + or − depending on age of tube.

RADIOTRON SOCKET VOLTAGES—POWER AMPLIFIER
120 VOLT LINE

VOLUME CONTROL AT ZERO—NO STATION TUNED IN				
Tube	Cathode or Filament to Grid—Volts	Cathode or Filament to Plate—Volts	Plate Current Milliamperes	Filament or Heater—Volts
Either UX-250	86.5	460	55.0	7.5
Either UX-281	—	630	75.0	7.5

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MODEL Photophone PG 29
Schematic

R. C. A. VICTOR CO., INC.

The RCA Victor Photophone Reproducing Equipment Type PG-29 is a 35 mm. "non-theatrical" unit, and is portable. PG-29s are being used a great deal for special lecturing purposes and you may run into one of them any day.

The equipment consists of three separate units, namely, the projector, the audio amplifier and the dynamic speaker. Carrying cases are provided for each unit, making them adapted for transportation.

The amplifier unit employs a 224 which is impedance-coupled to a 227. This tube in turn is transformer-coupled to a pair of 245s in push-pull. The rectifier is a 280.

Cables and plugs are provided so that when desired two projector units may be used alternately, by the throw of a fader switch, so that the showing of the film is uninterrupted.

The PG-29 Photophone is a portable 35 mm. talking motion-picture unit, with sound on film. Though, admittedly, there are not many of them being used in homes, nevertheless this equipment is being employed extensively by lecturers, etc., and one may turn up in your vicinity at any time with a cry for servicing.

Fig. 1 shows the schematic diagram of the audio amplifier with the connections to the projector, loudspeaker and power sources. Polarizing voltage for the photoelectric cell is provided by the power supply in the amplifier unit.

The output of the photocell is coupled to a high-impedance primary of an auto-transformer located in the projector housing. The secondary of this transformer is then coupled to the '24 audio amplifier tube. A 500,000-ohm potentiometer in the grid circuit of the '27 tube functions as the volume control.

A separate cable supplies the power to the projection lamp. Power for this purpose may be either a-c. or d-c. at 110 volts. Fifty or sixty-cycle a-c. power is supplied through another cable to the projector drive motor, the exciter lamp transformer and the threading lamp. The exciter lamp transformer steps down the voltage to 10 volts at which rating the exciter lamp operates. The maximum current through the exciter lamp should not exceed 7½ amperes, as a very slight increase in current above this value will greatly reduce the lamp life.

A toggle switch marked 110V-120V is provided on the top of the amplifier chassis to compensate for small line-voltage variations. If the voltage at the power source is greater than 115 volts, the switch should be set on the 120-volt position, while if less than 115 volts, the switch should be left on the 110-volt position.

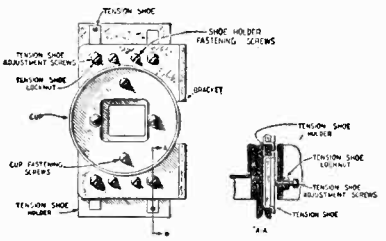


Fig. 3. Front section of the picture gate, showing the location of adjustment screws

A single pole, double throw toggle switch is provided on the base of the amplifier for fading sound from one projector to the other when two projectors are used. A special input jack is connected across the primary circuit of the input transformer, and is used for coupling a turntable or similar device to the amplifier.

A hum adjustment potentiometer, connected across the filament supply transformer for the '24 and '27 tubes is provided with a slotted shaft for adjustment with a screw driver. Adjust for minimum hum with volume control set at maximum.

Since the field winding of the dynamic speaker serves as a choke in the power supply filter unit, it should be connected at all times when the power supply is on . . . otherwise the amplifier may be seriously injured.

The tube socket voltages for the various tubes in the amplifier unit are given in Table 1. The filament voltages are normal for the tubes used.

Adjustments

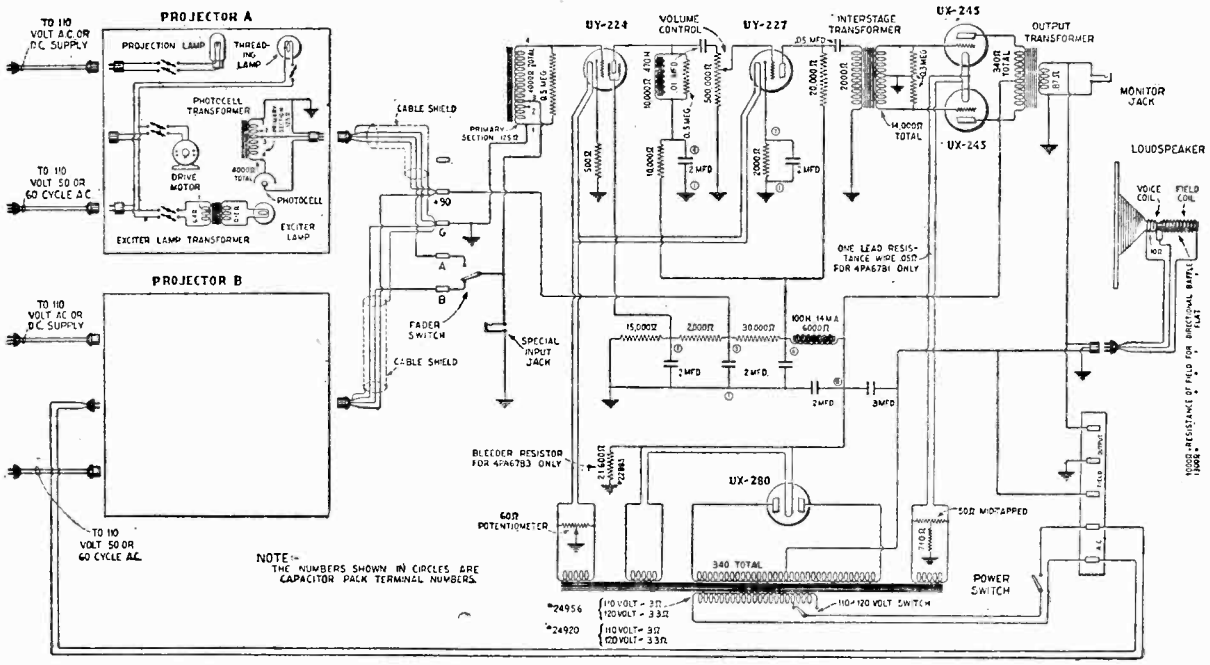
Aside from the usual reasons, low volume from the amplifier may be due to the following: Defective photocell; exciter lamp current low due to low a-c. line voltage; exciter lamp old or dirty; exciter lamp out of adjustment; optical system partially obstructed, in which case inspect the optical system lenses and sound gate for foreign material, such as dirt, oil, film emulsion, etc.

No sound whatsoever may be due to one or more of the following: Burned out exciter lamp; optical system completely obstructed, in which case inspect sound gate and objective lens of the optical system for oil, dirt or film emulsion; defective photocell; inter-

TABLE 1

Tube	*Control Grid*	*Screen Grid*	*Plate*	*Plate Current*
224	1.8	50	180	2
227	6.0	—	128	4
245	44.0	—	248	30
245	44.0	—	248	30
280	—	—	—	42-50

Fig. 1. Schematic diagram of the complete PG-29 Photophone. The wiring for Projector B is the same as shown for Projector A



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connecting cable plugs not securely attached to receptacles, inoperative fader switch.

Noise or motorboating may be due to dirty contacts on tubes or photocell, in which case clean with No. 00 sandpaper, or the sprocket holes or frame lines of film interrupting the light beam. The latter will require an adjustment of the sound gate lateral guide roller.

If low volume is due to the exciter lamp being out of adjustment, remove the photocell cap, and with the exciter lamp lighted adjust the position of the lamp in its socket so that the light spot is centrally located and evenly illuminated on the plate of the photocell.

Sound Gate

The adjustment of the sound gate lateral guide roller is not difficult. The idea is to adjust this roller so that it will keep the film in lateral alignment as the sound track passes the reproducer light beam.

For this adjustment it is necessary to obtain a section of test film (Stock No. 22898) with a "buzz-track" edge. This track consists of two chopper tracks so spaced that neither will effect the light if the film is in lateral alignment. If the film is not in alignment, one or the other of the chopper tracks will come into the line of the light and cause a fluctuation of the beam to the photocell and result in a sound in the loudspeaker. One of the chopper tracks will give a 700-cycle note and the other will give a 300-cycle note, thus giving an indication as to the direction the guide roller should be moved to correct the alignment.

When using the buzz-track film to make the lateral adjustment of the guide roller, use the following procedure.

Remove the magazines from the projector and thread the projector in the usual manner with the loop of buzz-track film. (The film being in the form of a loop can then be run continuously through the machine.)

With the exciter lamp lighted and the equipment connected for the reproduction of sound, start the projector and listen for a 300-cycle or 700-cycle note from the loudspeaker. If neither note is heard the guide roller is in proper adjustment. If either of the two notes is heard, loosen the lock nut (See Fig. 2) at the end of the guide roller assembly. Make the lateral adjustment while the film is in motion by turning the large hexagonal nut at the end of the guide roller assembly until no signal is heard. If the 300-cycle note is heard, the nut should be turned counterclockwise. If the 700-cycle note is heard, the nut should be turned clockwise. In any case, attempt to arrive at the midway position between the two signal notes.

The picture gate lateral roller (See Fig. 3) should be adjusted so as to align the film picture horizontally with the picture gate aperture. To make the adjustment, project a sound film on the screen and note whether or not a light streak shows on either side of the screen picture. If a light streak is noticed, loosen the lock nut at the end of the guide-roller-post and screw the adjustment nut in to eliminate a streak on the right-hand side of the picture, or out to eliminate a streak on the left-hand side of the picture.

"Sound Focusing"

To properly focus the sound optical system a 9,000-cycle parallel line sound track (Stock No. 22898) is used. Proceed as follows.

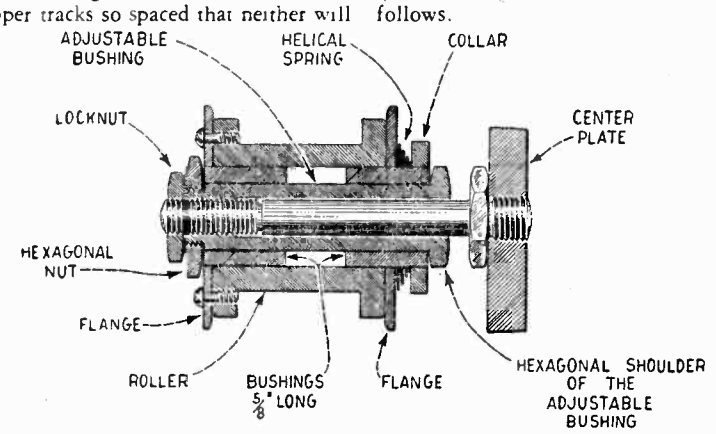

Fig. 2. A cross-sectional view of the sound gate. The proper adjustments are made by turning the hexagonal nut (held by locknut) at the left

Thread the projector with the film loop so that the 9,000-cycle recording is in front of the optical system, and be sure the emulsion side of the film is toward the optical system objective lens. Now, turn on the exciter lamp, and be sure it has been adjusted, as already described. Then remove the photocell and place a white card in the photocell shield so that the projected light spot is visible on the card. When this is O.K. pull the film very slowly by hand along the line it normally travels between the idler-roller and constant-speed sprocket. Note the direction of motion of the 9,000-cycle parallel line shadows across the light circle on the card. If the shadows move downward, loosen the optical barrel clamping screw and turn the knurled adjustment ring so that the lens system is moved closer to the film. If the shadows move upward move the lens system away from the film. When one parallel line of the film completely covers the light beam the optical system is in proper focus. This condition is indicated on the card when the light circle is alternately completely shadowed and lighted as the film is slowly moved. Also at this point there should be no apparent upward or downward motion of the shadow on the light circle.

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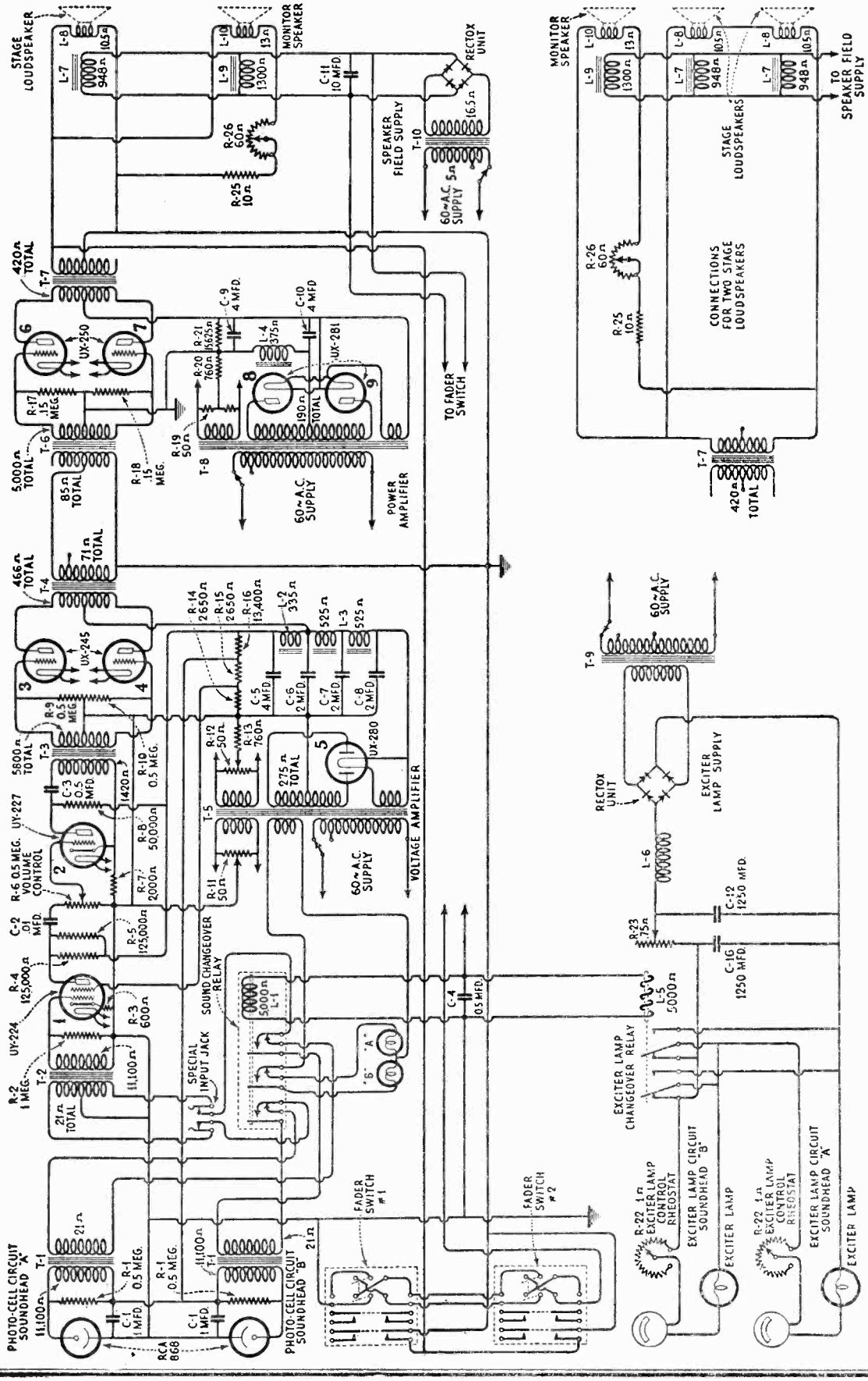
MODEL Photophone PG-30
Schematic 1st Type



PG-30 Schematic Wiring Diagram

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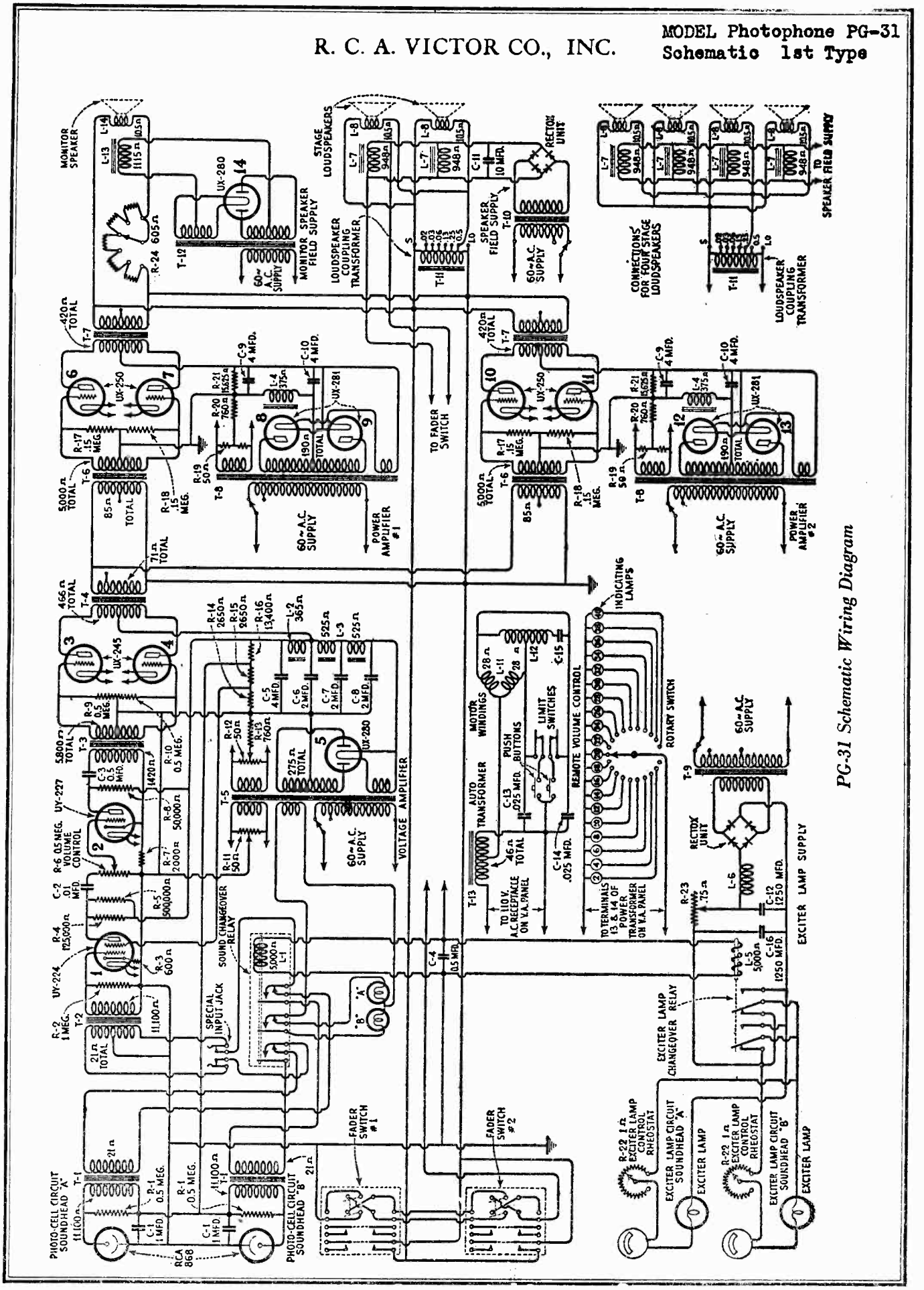
R. C. A. VICTOR CO., INC.

MODEL Photophone PG-31
Schematic 1st Type



PG-31 Schematic Wiring Diagram

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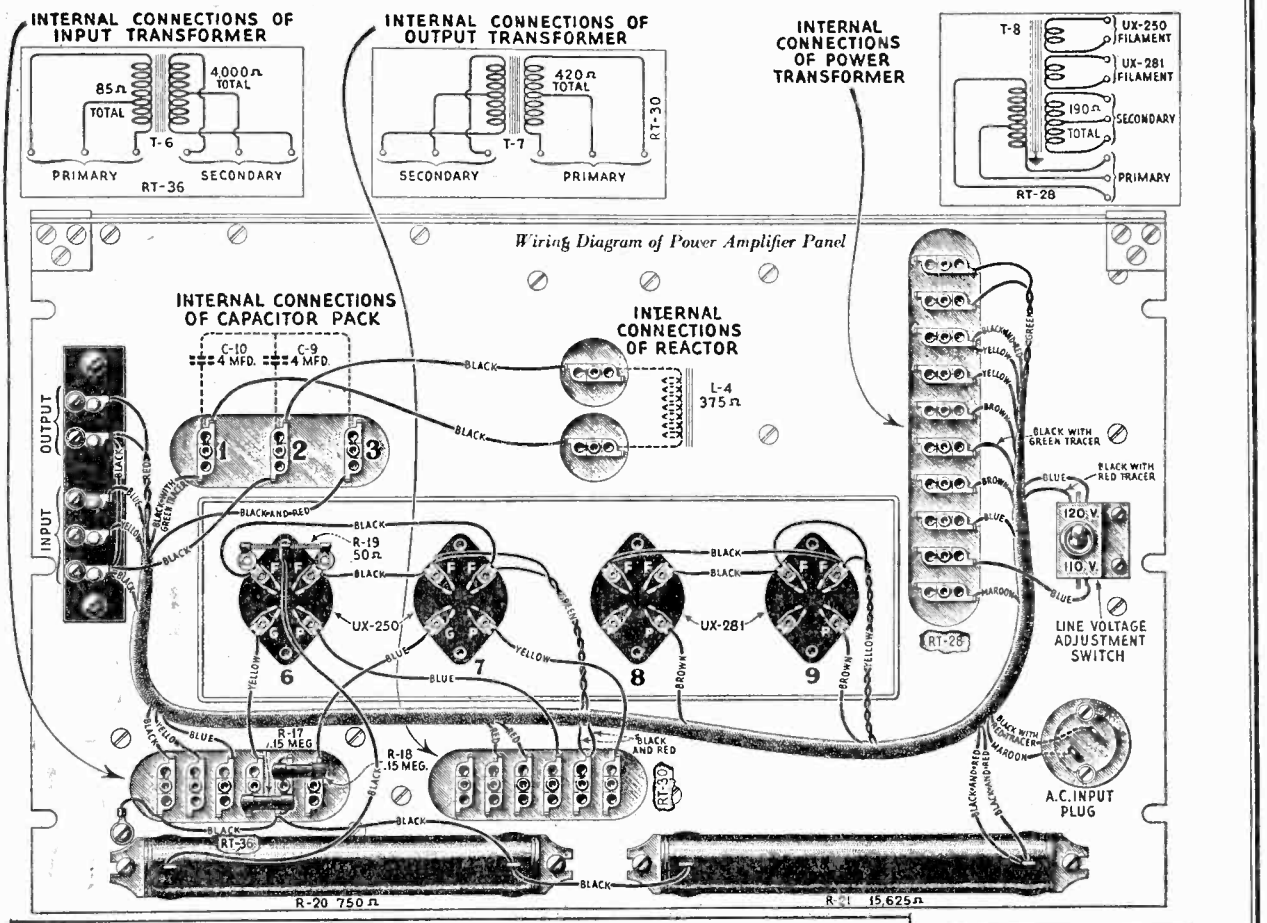
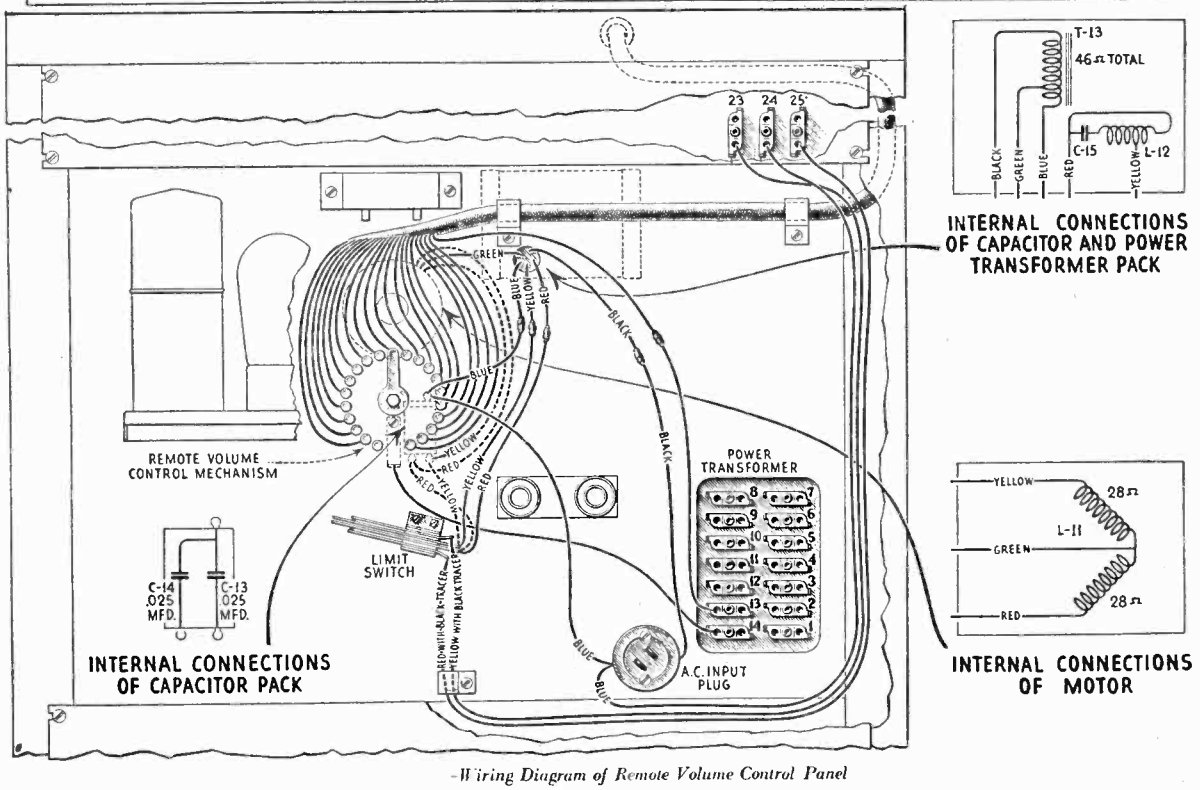
MODEL Photophone PG-30,31
Remote Volume Control
Power Amplifier Chasses





Wiring Diagram of Remote Volume Control Panel

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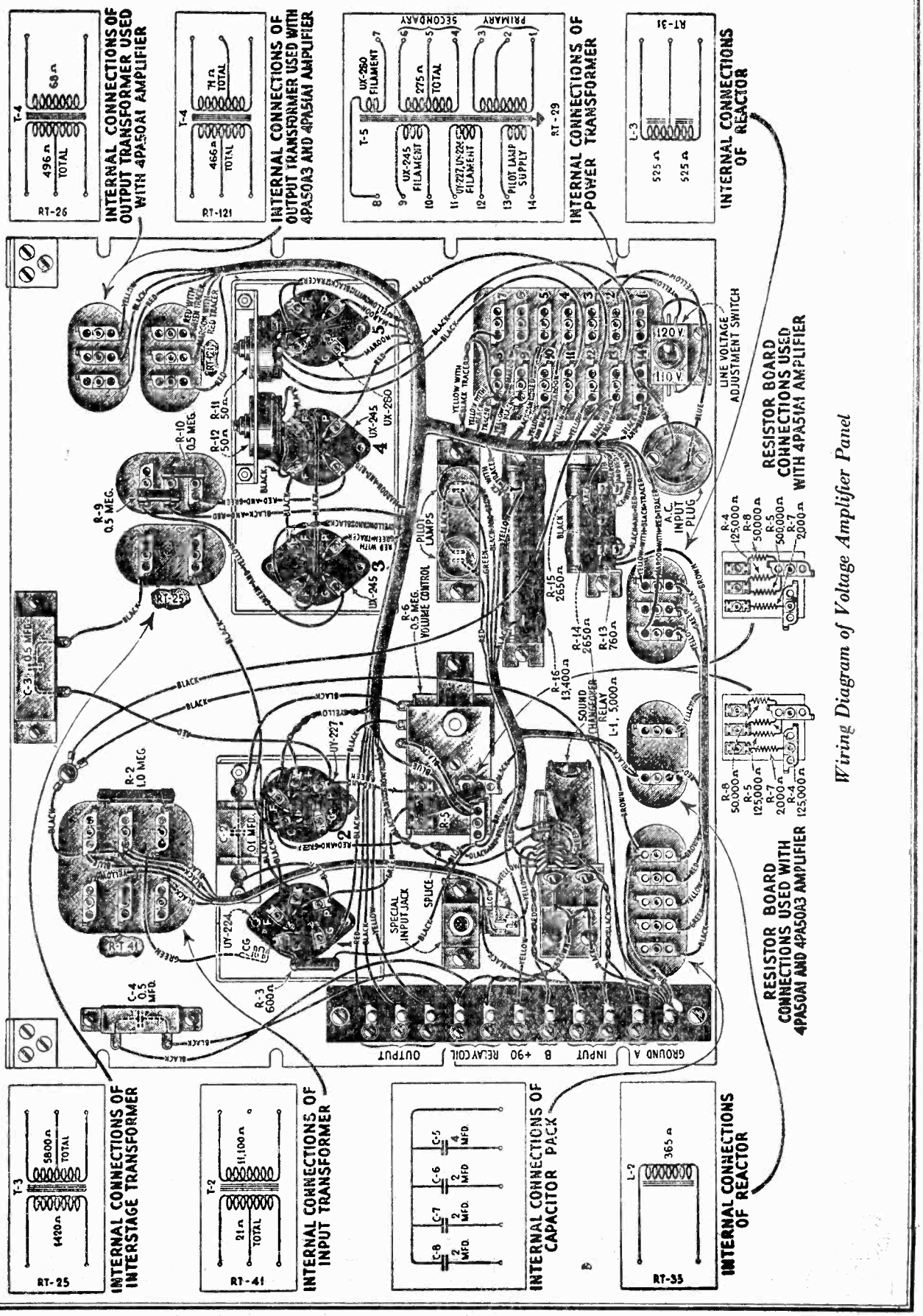
MODEL Photophone PG-30,31
Voltage Amplifier
Chassis



Wiring Diagram of Voltage Amplifier Panel

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MODEL Photophone PG-30, PG-31
Voltage - Socket
Speaker Connections

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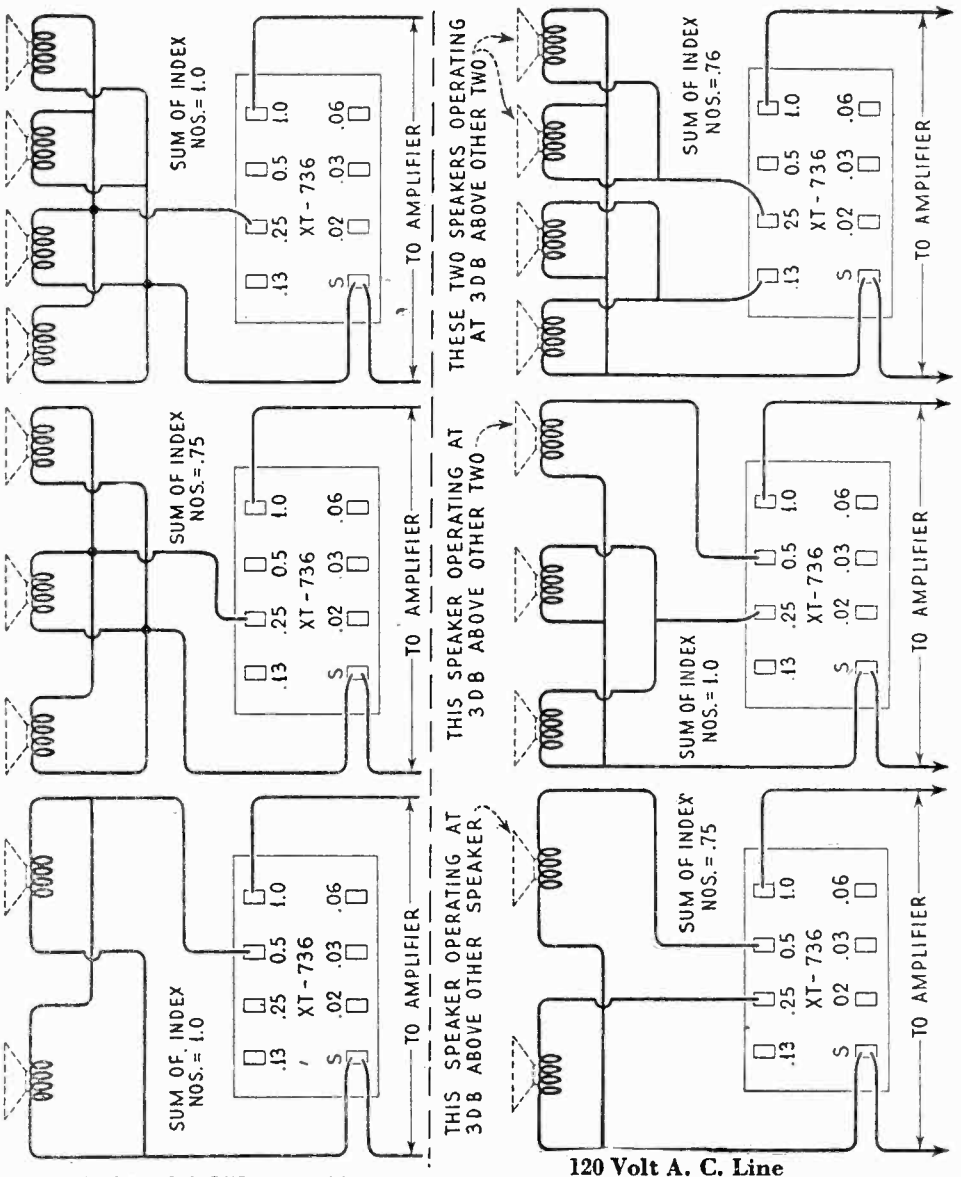
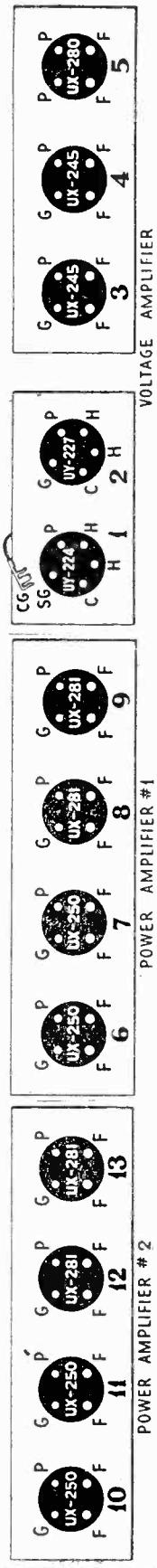


Typical Connections to Coupling Transformer XT-736



Radiotron Socket Layout

RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line
VOLTAGE AMPLIFIER

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1—UY-224	0.6	30	175	1.0	2.25
2—UY-227	7.5	—	100	3.0	2.25
3—UX-245	48	—	230	33.0	2.5
4—UX-245	48	—	230	33.0	2.5
5—UX-280	—	—	—	45.0	5.0

POWER AMPLIFIER No. 1

6—UX-250	80	—	450	55.0	7.5
7—UX-250	80	—	450	55.0	7.5
8—UX-281	—	—	—	75.0	7.5
9—UX-281	—	—	—	75.0	7.5

POWER AMPLIFIER No. 2—PG-31 ONLY

10—UX-250	80	—	450	55.0	7.5
11—UX-250	80	—	450	55.0	7.5
12—UX-281	—	—	—	75.0	7.5
13—UX-281	—	—	—	75.0	7.5

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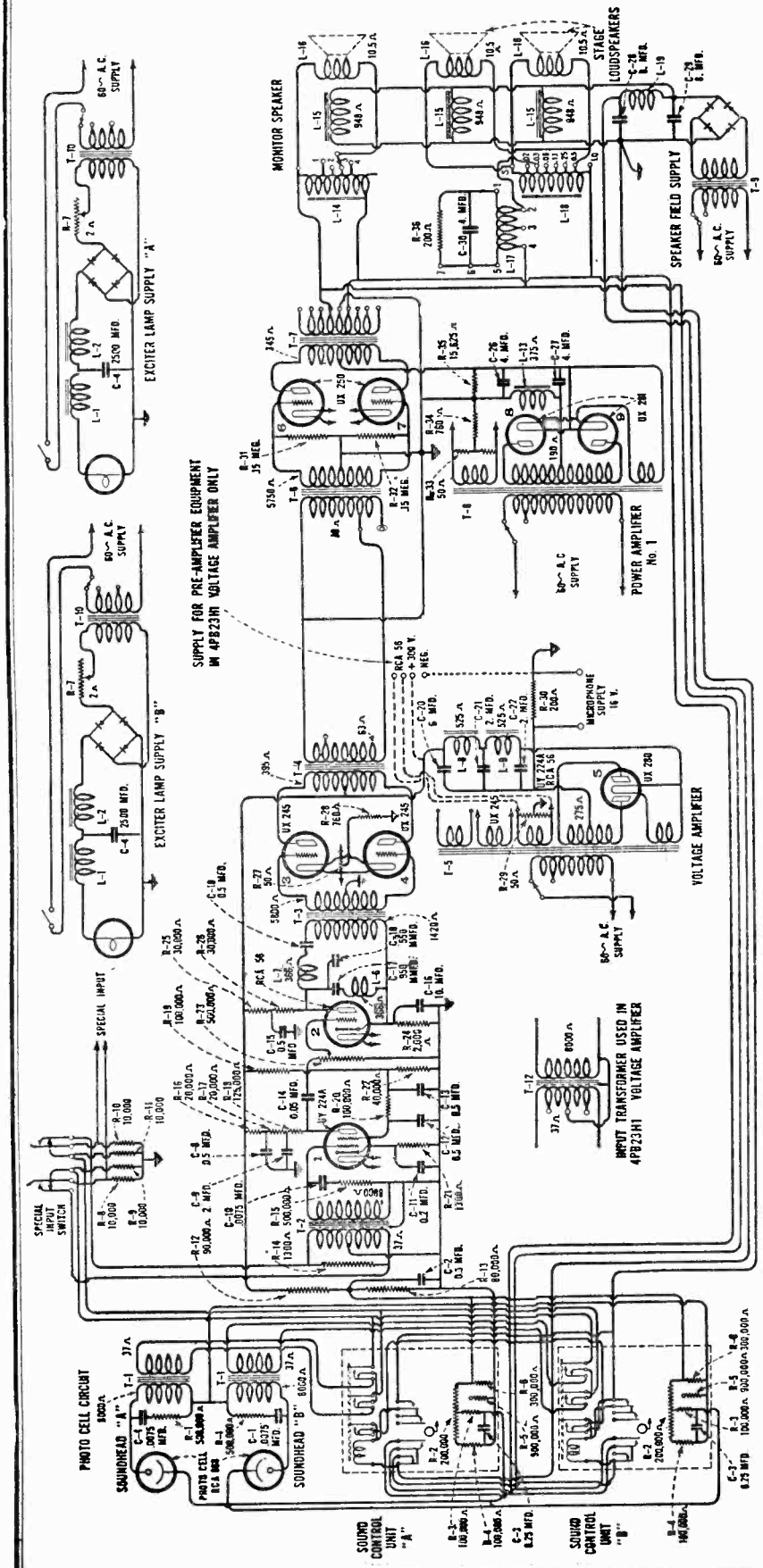
MODEL Photophone PG-30
High Fidelity
Schematic



RADIOTRON SOCKET VOLTAGES

120 Volt A. C. Line

Radiotron No.	Control Grid to Cathode or Filament Volts	Screen Grid to Cathode or Filament Volts	Plate to Cathode or Filament Volts	Plate Current M. A.	Filament or Heater Volts
1. UY-224-A	1.3	45	185	.7	2.5
2. RCA-56	6.0	—	130	2.3	2.5
3. UX-245	48.0	—	250	30.0	2.5
4. UX-245	—	—	250	30.0	2.5
5. UX-280	—	—	—	50.0	5.0
6. UX-250	80	—	450	55.0	7.5
7. UX-250	80	—	450	55.0	7.5
8. UX-281	—	—	—	75.0	7.5
9. UX-281	—	—	—	75.0	7.5

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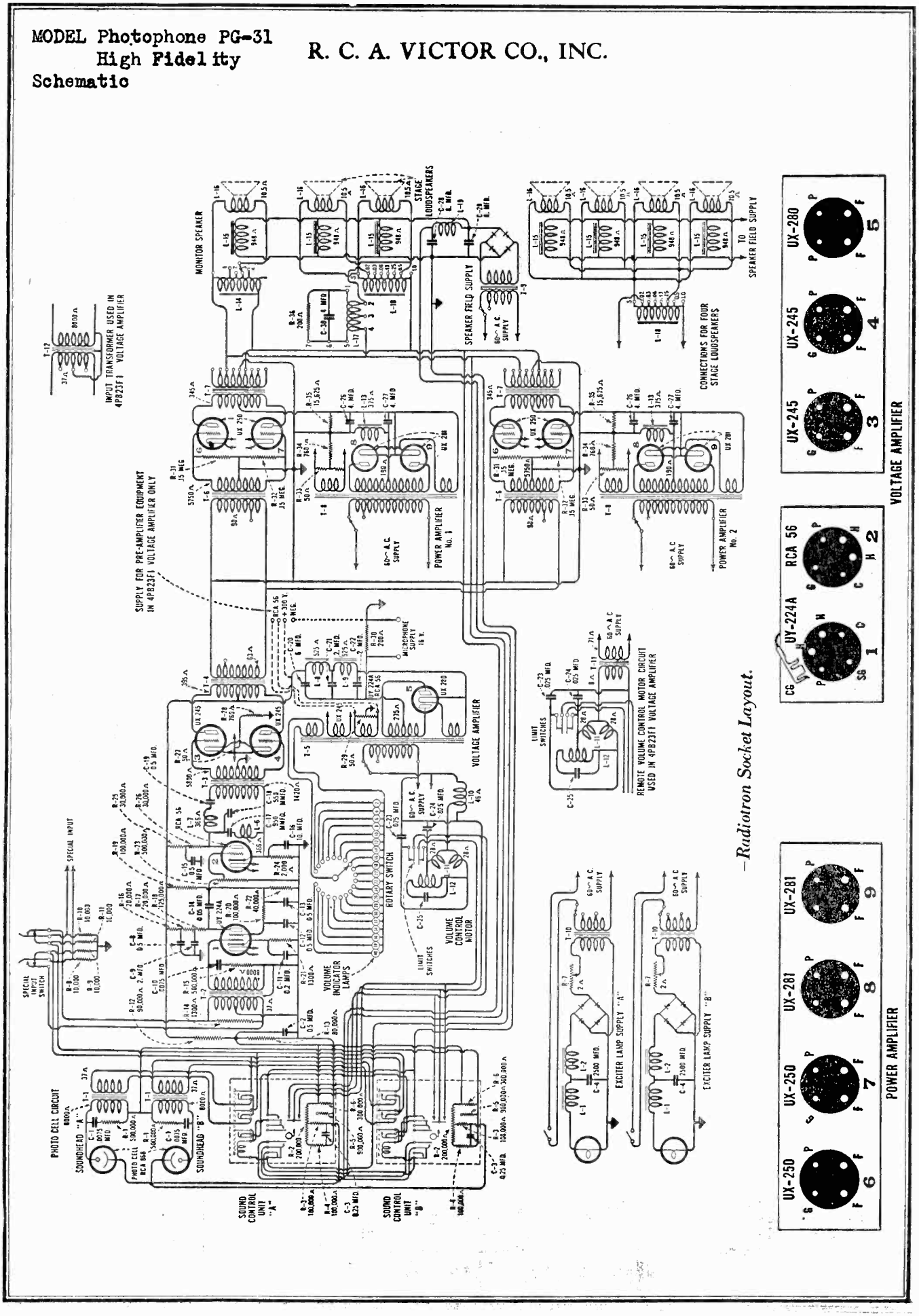
MODEL Photophone PG-31
High Fidelity
Schematic

R. C. A. VICTOR CO., INC.



–Radiotron Socket Layout.

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R.C.A. RADIOTRON CO.

Detectors Amplifiers

DETECTORS AND AMPLIFIERS

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

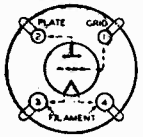

FIG. 1

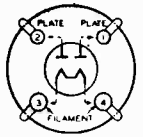

FIG. 2

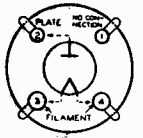

FIG. 3

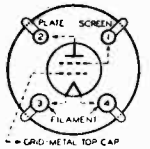

FIG. 4

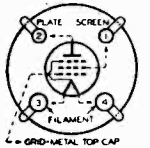

FIG. 4A

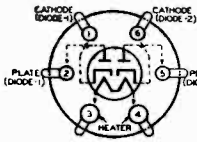

FIG. 5

TYPE	PURPOSE	BASE	SOCKET CONNECTIONS	DIMENSIONS MAX. OVERALL LENGTH	DIMENSIONS MAX. OVERALL DIAM.	CATHODE TYPE	RATING FILAMENT (OR HEATER) VOLTS	RATING FILAMENT (OR HEATER) AMPERES	RATING FILAMENT (OR HEATER) SUPPLY	RATING PLATE MAX. VOLTS	RATING SCREEN MAX. VOLTS	PLATE SUPPLY VOLTS	NEGATIVE GRID BIAS VOLTS D C ON FIL.	NEGATIVE GRID BIAS VOLTS A C ON FIL.	SCREEN VOLTS	PLATE CURRENT MILLIAMP.	SCREEN CURRENT MILLIAMP.	A C PLATE RESISTANCE OHMS	MUTUAL CONDUCTANCE MICROMHOS	VOLTAGE AMPLIFICATION FACTOR	OHMS LOAD FOR STATED POWER OUTPUT	POWER OUTPUT MILLIWATTS
RCA-2A7	RADIO FREQ. CONVERTER×	SMALL 7-PIN	FIG. 20	4 1/2"	1 5/16"	HEATER	2.5	0.8	A C or D C	250	100	250	3.0	3.0	100	4.0	2.0	300000	Anode-Grid (#2) 250 Max. Volts, 3.5 Ma. Oscillator Grid (#1) Resistor, 50000 Ohms Conversion Conductance, 475 Micromhos				
RCA-287	DIODE-DETECTOR R-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 1/2"	1 5/16"	HEATER	2.5	0.8	A C or D C	250	125	100 250	3.0 3.0	3.0 3.0	100 125	5.8 9.0	1.7 2.3	300000 650000	950 1125	285 730	——	——
RCA-2B7	DIODE-DETECTOR A-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 1/2"	1 5/16"	HEATER	2.5	0.8	A C or D C	250	125	250‡	4.5	4.5	50	0.65	0.15	——	——	——	——	——
RCA-6A7	RADIO FREQ. CONVERTER×	SMALL 7-PIN	FIG. 20	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	100	250	3.0	3.0	100	4.0	2.0	300000	Anode-Grid (#2) 250 Max. Volts, 3.5 Ma. Oscillator Grid (#1) Resistor, 50000 Ohms Conversion Conductance, 475 Micromhos				
RCA-6B7	DIODE-DETECTOR R-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	125	100 250	3.0 3.0	3.0 3.0	100 125	5.8 9.0	1.7 2.3	300000 650000	950 1125	285 730	——	——
RCA-6B7	DIODE-DETECTOR A-F AMPLIFIER☒	SMALL 7-PIN	FIG. 21	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	125	250‡	4.5	4.5	50	0.65	0.15	——	——	——	——	——
UX -201-A	DETECTOR, * AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 1/16"	1 1/8"	FILAMENT	5.0	0.25	B C	135	——	90 135	4.5 9.0	——	——	2.5 3.0	——	11000 10000	725 800	8.0 8.0	——	——
UX -112-A	DETECTOR, * AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 1/16"	1 1/8"	FILAMENT	5.0	0.25	B C	180	——	90 135	4.5 9.0	——	——	5.0 6.2	——	5400 5100	1575 1650	8.5 8.5	——	——
RCA- 22	RADIO FREQ. AMPLIFIER	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 1/8"	FILAMENT	3.3	0.132	B C	135	67.5	135 135	1.5 1.5	——	45 67.5	1.7 3.7	0.6* 1.3*	725000 325000	375 500	270 160	——	——
RCA- 24-A	RADIO FREQ. AMPLIFIER	MEDIUM 5-PIN	FIG. 9	5 1/32"	1 1/8"	HEATER	2.5	1.75	A C or D C	275	90	180 250	3.0 3.0	3.0 3.0	90 90	4.0 4.0	1.7 max.	400000 600000	1000 1050	400 630	——	——
RCA- 24-A	BIASED DETECTOR	MEDIUM 5-PIN	FIG. 9	5 1/32"	1 1/8"	HEATER	2.5	1.75	A C or D C	275	90	275‡	5 approx.	3 approx.	20 to 45	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA- 26	AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 1/16"	1 1/8"	FILAMENT	1.5	1.05	A C or D C	180	——	135 180	9.0 13.5	10.0 14.5	——	5.5 6.2	——	7600 7300	1100 1150	8.3 8.3	——	——
UY -227	AMPLIFIER	MEDIUM 5-PIN	FIG. 8	4 1/16"	1 1/8"	HEATER	2.5	1.75	A C or D C	275	——	135 250	9.0 21.0	9.0 21.0	——	4.5 5.2	——	9000 9250	1000 975	9.0 9.0	——	——
UY -227	BIASED * DETECTOR	MEDIUM 5-PIN	FIG. 8	4 1/16"	1 1/8"	HEATER	2.5	1.75	A C or D C	275	——	275§	33.0 approx.	33.0 approx.	——	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA- 30	DETECTOR, * AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/2"	1 5/16"	FILAMENT	2.0	0.06	B C	180	——	90 135 180	4.5 9.0 13.5	——	——	2.5 3.0 3.1	——	11000 10300 10300	850 900 900	9.3 9.3 9.3	——	——
RCA- 32	RADIO FREQ. AMPLIFIER	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 1/8"	FILAMENT	2.0	0.06	B C	180	67.5	135 180	3.0 3.0	——	67.5 67.5	1.7 1.7	0.4 max.	950000 1200000	640 650	610 780	——	——
RCA- 32	BIASED DETECTOR	MEDIUM 4-PIN	FIG. 4	5 1/32"	1 1/8"	FILAMENT	2.0	0.06	B C	180	67.5	180×	6 approx.	——	67.5	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA- 34	SUPER-CONTROL R-F AMPLIFIER	MEDIUM 4-PIN	FIG. 4A	5 1/32"	1 1/8"	FILAMENT	2.0	0.06	B C	180	67.5	135 180	3.0 min.	——	67.5 67.5	2.8 2.8	1.0 1.0	600000 1000000	600 620	360 620	——	——
RCA- 35	SUPER-CONTROL R-F AMPLIFIER	MEDIUM 5-PIN	FIG. 8	5 1/32"	1 1/8"	HEATER	2.5	1.75	A C or D C	275	90	180 250	3.0 min.	3.0 min.	90 90	6.3 6.5	2.5 max.	300000 400000	1020 1050	305 420	——	——
RCA- 36	RADIO FREQ. AMPLIFIER	SMALL 5-PIN	FIG. 9	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	180	90	135 180	1.5 3.0	1.5 3.0	67.5 90	3.0 3.1	1.7 max.	300000 350000	1050 1050	315 370	——	——
RCA- 36	BIASED DETECTOR	SMALL 5-PIN	FIG. 9	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	180	67.5	180‡	6.0 approx.	6.0 approx.	67.5	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA- 37	AMPLIFIER	SMALL 5-PIN	FIG. 8	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	180	——	90 135 180	6.0 9.0 13.5	6.0 9.0 13.5	——	2.6 4.3 4.7	——	11500 10000 10000	780 900 900	9.0 9.0 9.0	——	——
RCA- 37	BIASED * DETECTOR	SMALL 5-PIN	FIG. 8	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	180	——	90 180	10.0 20.0	10.0 20.0	——	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA- 39	SUPER-CONTROL R-F AMPLIFIER	SMALL 5-PIN	FIG. 9A	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	180	90	90 135 180	3.0 3.0 3.0	3.0 3.0 3.0	90 90 90	4.4 4.4 4.5	1.3 1.2 1.2	375000 540000 750000	960 980 1000	360 530 750	——	——
RCA- 44	SUPER-CONTROL R-F AMPLIFIER	SMALL 5-PIN	FIG. 9A	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	90	250	3.0 min.	3.0 min.	90	5.8	1.4	600000	1050	630	——	——
RCA- 55	DIODE-DETECTOR AMPLIFIER ■	SMALL 6-PIN	FIG. 13	4 1/32"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	——	250	20	20	——	8.0	——	7500	1100	8.3	20000	350
RCA- 56	AMPLIFIER	SMALL 5-PIN	FIG. 8	4 1/2"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	——	250	13.5	13.5	——	5.0	——	9500	1450	13.8	——	——
RCA- 56	BIASED * DETECTOR	SMALL 5-PIN	FIG. 8	4 1/2"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	——	250§	20 approx.	20 approx.	——	Plate current to be adjusted to 0.2 milliampere with no signal.						
RCA- 57	RADIO FREQ. AMPLIFIER	SMALL 6-PIN	FIG. 11	4 1/16"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	100	250	3.0	3.0	100	2.0	0.5	exceeds 1.5 meg.	1225	exceeds 1500	——	——
RCA- 57	BIASED DETECTOR	SMALL 6-PIN	FIG. 11	4 1/16"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	100	275‡	6.0 approx.	6.0 approx.	100	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA- 58	SUPER-CONTROL R-F AMPLIFIER	SMALL 6-PIN	FIG. 11	4 1/16"	1 5/16"	HEATER	2.5	1.0	A C or D C	250	100	250	3.0 min.	3.0 min.	100	8.2	2.0	800000	1600	1280	——	——
RCA- 75	DIODE-DETECTOR AMPLIFIER ■	SMALL 6-PIN	FIG. 13	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	——	250×	2.0	2.0	——	0.8	——	91000	1100	100	——	——
RCA- 77	RADIO FREQ. AMPLIFIER	SMALL 6-PIN	FIG. 11	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	100	250	3.0	3.0	100	2.3	0.6	1500000	1250	1500	——	——
RCA- 77	BIASED DETECTOR	SMALL 6-PIN	FIG. 11	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250‡	100	250	7.0 approx.	7.0 approx.	100	Plate current to be adjusted to 0.1 milliampere with no signal.						
RCA- 78	SUPER-CONTROL R-F AMPLIFIER	SMALL 6-PIN	FIG. 11	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	100	180 250 250	3.0 min.	3.0 min.	75 100 125	4.0 7.0 10.5	1.1 2.0 3.0	1000000 800000 600000	1100 1450 1650	1100 1160 990	——	——
RCA- 85	DIODE-DETECTOR AMPLIFIER ■	SMALL 6-PIN	FIG. 13	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	250	——	135 180 250	10.5 13.5 20.0	10.5 13.5 20.0	——	3.7 6.0 8.0	——	11000 8500 7500	750 975 1100	8.3 8.3 8.3	25000 20000 20000	75 160 350
UV -199 UX -199	DETECTOR, * AMPLIFIER	SMALL 4-NUB SMALL 4-PIN	FIG. 10 FIG. 1	3 1/2" 4 1/2"	1 1/16" 1 1/16"	FILAMENT	3.3	0.063	B C	90	——	90	4.5	——	——	2.5	——	15500	425	6.6	——	——
RCA-864	AMPLIFIER	SMALL 4-PIN	FIG. 1	4"	1 1/16"	FILAMENT	1.1	0.25	B C	135	——	135	9.0	——	——	3.5	——	12700	645	8.2	——	——

*For Grid-leak Detection—plate volts 45, grid return to + filament or to cathode.
†Applied through plate coupling resistor of 250000 ohms.
×Grids #3 and #5 are screen. Grid #4 is signal-input control-grid.
*Maximum.
§Applied through plate coupling resistor of 50000 ohms.
×Applied through plate coupling resistor of 100000 ohms.
☒Characteristics are for Pentode Unit only.
‡Applied through plate coupling resistor of 250000 ohms or 500 henry choke shunted by 0.25 megohm resistor.
■Characteristics are for Triode Unit only.
‡Applied through plate coupling resistor of 200,000 ohms.

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

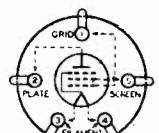

FIG. 6

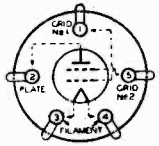

FIG. 7

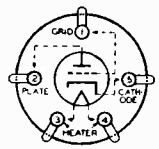

FIG. 8

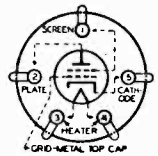

FIG. 9

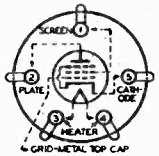

FIG. 9A

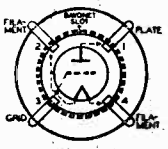

FIG. 10

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POWER AMPLIFIERS

TYPE	PURPOSE	BASE	SOCKET CONNECTIONS	DIMENSIONS MAX. OVERALL LENGTH	DIMENSIONS MAX. OVERALL DIAM.	CATHODE TYPE	RATING FILAMENT (OR HEATER) VOLTS	RATING FILAMENT (OR HEATER) AMPERES	RATING FILAMENT (OR HEATER) SUPPLY	RATING PLATE MAX. VOLTS	RATING SCREEN MAX. VOLTS	PLATE SUPPLY VOLTS	NEGATIVE GRID BIAS VOLTS D C ON FIL.	NEGATIVE GRID BIAS VOLTS A C (RMS) FIL.	SCREEN VOLTS	PLATE CURRENT MILLI-AMP.	SCREEN CURRENT MILLI-AMP.	A C PLATE RESISTANCE OHMS	MUTUAL CONDUCTANCE MICRO-MHOS	VOLTAGE AMPLIFICATION FACTOR	OHMS LOAD FOR STATED POWER OUTPUT	POWER OUTPUT MILLI-WATTS
RCA-2A3	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 3/8"	2 1/16"	FILAMENT	2.5	2.5	A C or D C	250	—	250	43.0	45.0	—	60.0	—	800	5200	4.2	2500	3500
RCA-2A5	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	2.5	1.75	A C or D C	250	250	250	16.5	16.5	250	34.0	6.5	100000	2200	220	7000	3000
RCA- 10	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 3/8"	2 1/16"	FILAMENT	7.5	1.25	A C or D C	425	—	350 425	27.0 35.0	31.0 39.0	—	16.0 18.0	—	5150 5000	1550 1660	8.0 8.0	11000 10200	900 1600
UX - 20	POWER AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/2"	1 5/16"	FILAMENT	3.3	0.132	D C	135	—	90 135	16.5 22.5	— —	— —	3.0 6.5	— —	8000 6300	415 525	3.3 3.3	9600 6500	45 110
RCA- 31	POWER AMPLIFIER	SMALL 4-PIN	FIG. 1	4 1/2"	1 5/16"	FILAMENT	2.0	0.130	D C	180	—	135 180	22.5 30.0	— —	— —	8.0 12.3	— —	4100 3600	925 1050	3.8 3.8	7000 5700	185 375
RCA- 33	POWER AMPLIFIER	MEDIUM 5-PIN	FIG. 8	4 11/16"	1 13/16"	FILAMENT	2.0	0.26	D C	135	135	135	13.5	—	135	14.5	3.0	50000	1450	70	7000	700
RCA- 38	POWER AMPLIFIER	SMALL 6-PIN	FIG. 9A	4 1/32"	1 5/16"	HEATER	6.3	0.3	A C or D C	135	135	100 135	9.0 13.5	9.0 13.5	100 135	7.0 9.0	2.0 2.5	84000 102000	950 975	80 100	8500 13500	200 525
RCA- 41	POWER AMPLIFIER	SMALL 6-PIN	FIG. 15A	4 1/2"	1 5/16"	HEATER	6.3	0.4	A C or D C	180	180	125.0 167.5	10.0 12.5	10.0 12.5	125.0 167.5	11.0 17.0	2.0 3.0	100000 85000	1525 1800	150 150	11000 9500	650 1250
RCA- 42	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	6.3	0.7	A C or D C	250	250	250	16.5	16.5	250	34.0	6.5	100000	2200	220	7000	3000
RCA- 43	POWER AMPLIFIER	MEDIUM 6-PIN	FIG. 15A	4 11/16"	1 13/16"	HEATER	25.0	0.3	A C or D C	135	135	95 135	15.0 20.0	15.0 20.0	95 135	20.0 34.0	4.0 7.0	45000 35000	2000 2300	90 80	4500 4000	900 2000
RCA- 45	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	5 3/8"	2 1/16"	FILAMENT	2.5	1.5	A C or D C	275	—	180 250	30.0 48.5	31.5 50.0	— —	31.0 34.0	— —	1650 1610	2125 2175	3.5 3.5	2700 3900	825 1600
RCA- 46	POWER AMPLIFIER CLASS A ①	MEDIUM 5-PIN	FIG. 7	5 3/8"	2 1/16"	FILAMENT	2.5	1.75	A C or D C	250	—	250	31.5	33.0	—	22.0	—	2380	2350	5.6	6400	1250
RCA- 46	POWER AMPLIFIER CLASS B ⑥	MEDIUM 6-PIN	FIG. 7	5 3/8"	2 1/16"	FILAMENT	2.5	1.75	A C or D C	400	—	300 400	0 0	0 0	Power output values are for 2 tubes operating at indicated plate-to-plate load. For other characteristics, refer to Manual text.						5200 5800	16000 20000
RCA- 47	POWER AMPLIFIER	MEDIUM 5-PIN	FIG. 8	5 3/8"	2 1/16"	FILAMENT	2.5	1.75	A C or D C	250	250	250	15.0	16.5	250	31.0	6.0	60000	2500	150	7000	2700
RCA- 48	POWER AMPLIFIER TETRODE	MEDIUM 5-PIN	FIG. 15	5 3/8"	2 1/16"	HEATER	30.0	0.4	D C	125	100	95 125	20.0 22.5	— —	95 100	47.0 50.0	9.0 9.0	10000 10000	2800 2800	28 28	2000 2000	1600 2500
RCA- 49	POWER AMPLIFIER CLASS A ①	MEDIUM 5-PIN	FIG. 7	4 11/16"	1 13/16"	FILAMENT	2.0	0.12	D C	135	—	135	20.0	—	—	5.7	—	4000	1125	4.5	6000	170
RCA- 49	POWER AMPLIFIER CLASS B ⑥	MEDIUM 5-PIN	FIG. 7	4 11/16"	1 13/16"	FILAMENT	2.0	0.12	D C	180	—	180	0	—	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						12000	3500
UX - 50	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	6 1/2"	2 11/16"	FILAMENT	7.5	1.25	A C or D C	450	—	350 450	59.0 80.0	63.0 84.0	—	45.0 55.0	— —	1900 1800	2000 2100	3.8 3.8	4100 4350	2400 4600
RCA- 59	POWER AMPLIFIER TRIODE ①	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	250	—	250	28.0	28.0	—	26.0	—	2400	2600	6.0	5000	1250
RCA- 59	POWER AMPLIFIER PENTODE ⑤	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	250	250	250	18.0	18.0	250	35.0	9.0	40000	2500	100	6000	3000
RCA- 59	POWER AMPLIFIER CLASS B ⑥	MEDIUM 7-PIN	FIG. 18	5 3/8"	2 1/16"	HEATER	2.5	2.0	A C or D C	400	—	300 400	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						4600 6000	15000 20000
RCA- 71-A	POWER AMPLIFIER	MEDIUM 4-PIN	FIG. 1	4 11/16"	1 13/16"	FILAMENT	5.0	0.25	A C or D C	180	—	135 180	27.0 40.5	29.5 43.0	—	17.3 20.0	—	1820 1750	1650 1700	3.0 3.0	3000 4800	400 790
RCA- 79	TWIN AMPLIFIER CLASS B	SMALL 6-PIN	FIG. 19	4 1/32"	1 5/16"	HEATER	6.3	0.6	A C or D C	180	—	180	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						7000	5500
RCA- 89	POWER AMPLIFIER TRIODE ①	SMALL 6-PIN	FIG. 14	4 1/32"	1 5/16"	HEATER	6.3	0.4	A C or D C	180	—	160 180	20.0 22.5	20.0 22.5	—	17.0 20.0	—	3000 2750	1570 1700	4.7 4.7	7000 6500	300 400
RCA- 89	POWER AMPLIFIER PENTODE ⑤	SMALL 6-PIN	FIG. 14	4 1/32"	1 5/16"	HEATER	6.3	0.4	A C or D C	180	180	163 180	17.0 18.0	17.0 18.0	163 180	17.0 20.0	2.5 3.0	79000 82500	1575 1635	125 135	9000 8000	1250 1500
RCA- 89	POWER AMPLIFIER CLASS B ⑥	SMALL 6-PIN	FIG. 14	4 1/32"	1 5/16"	HEATER	6.3	0.4	A C or D C	180	—	180	0	0	Power output values are for two tubes at indicated plate-to-plate load. For other characteristics, refer to Technical Bulletin.						13600 9400	2500 3500

●Two grids tied together. ●Grid next to plate tied to plate.
●Grid #1 is control grid. Grid #2 is screen. Grid #3 tied to cathode.

¶Grid #1 is control grid. Grids #2 and #3 tied to plate.
●Grids #1 and #2 connected together. Grid #3 tied to plate.

RECTIFIERS

RCA-5Z3	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8"	2 1/16"	FILAMENT	5.0	3.0	A C	Maximum A-C Voltage per Plate.....500 Volts, RMS Maximum D-C Output Current.....250 Milliamperes
RCA-25Z5	FULL-WAVE RECTIFIER	SMALL 6-PIN	FIG. 5	4 1/2"	1 5/16"	HEATER	25.0	0.3	A C or D C	Maximum A-C Voltage per Plate.....125 Volts, RMS Maximum D-C Output Current.....100 Milliamperes
RCA- 1	HALF-WAVE ● RECTIFIER	SMALL 4-PIN	FIG. 22	4 1/2"	1 5/16"	HEATER	6.3	0.3	A C or D C	Maximum A-C Voltage per Plate.....350 Volts, RMS Maximum D-C Output Current, Continuous.....50 Milliamperes Maximum Peak Inverse Voltage.....1000 Volts Maximum Peak Plate Current.....400 Milliamperes
RCA- 80	FULL-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8"	2 1/16"	FILAMENT	5.0	2.0	A C	A-C Voltage per Plate (Volts RMS).....350 400 550 D-C Output Current (Maximum MA.).....125 110 135 The 550 volt rating applies to filter circuits having an input choke of at least 20 henries.
UX - 81	HALF-WAVE RECTIFIER	MEDIUM 4-PIN	FIG. 3	6 1/2"	2 1/16"	FILAMENT	7.5	1.25	A C	Maximum A-C Plate Voltage.....700 Volts, RMS Maximum D-C Output Current.....85 Milliamperes For d-c output voltage delivered to filter of typical rectifier circuit refer to curves in Manual.
RCA- 82	FULL-WAVE ● RECTIFIER	MEDIUM 4-PIN	FIG. 2	4 1/16"	1 13/16"	FILAMENT	2.5	3.0	A C	Maximum A-C Voltage per Plate.....500 Volts, RMS Maximum D-C Output Current, Continuous.....125 Milliamperes Maximum Peak Inverse Voltage.....1400 Volts Maximum Peak Plate Current.....400 Milliamperes
RCA- 83	FULL-WAVE ● RECTIFIER	MEDIUM 4-PIN	FIG. 2	5 3/8"	2 1/16"	FILAMENT	5.0	3.0	A C	Maximum A-C Voltage Per Plate.....500 Volts, RMS Maximum D-C Output Current, Continuous.....250 Milliamperes Maximum Peak Inverse Voltage.....1400 Volts Maximum Peak Plate Current.....800 Milliamperes
RCA- 84	FULL-WAVE RECTIFIER	SMALL 6-PIN	FIG. 23	4 1/2"	1 5/16"	HEATER	6.3	0.5	A C or D C	Maximum A-C Voltage per Plate.....350 Volts, RMS Maximum D-C Output Current.....50 Milliamperes
RCA-866	HALF-WAVE ● RECTIFIER	MEDIUM 4-PIN	FIG. 18	6 3/8"	2 7/16"	FILAMENT	2.5	5.0	A C	Maximum Peak Inverse Voltage.....7500 Volts Maximum Peak Plate Current.....0.6 Ampere For additional information refer to Technical Bulletin.

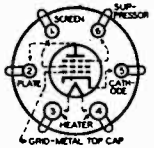
● Mercury Vapor Type. Tube Voltage drop is 15 volts, approx.

PHOTOTUBES

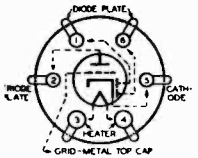
RCA-868	PHOTOTUBE	SMALL 4-PIN	FIG. 1 See Note →	4 1/8"	1 5/8"	Max. Anode Supply Voltage.....90 Volts Max. Anode Current.....20 Microamperes. Static Sensivity..55 Microamperes per Lumen. Dynamic Sensitivity.....50 and 48 Microamperes per Lumen at 1000 and 5000 Cycles per second, Respectively. Note: Pins #1 and #3—No Connection, Pin #2—Anode (+), Pin #4—Cathode (−). Refer to FIG. 1 for Pin Numbers.

The first digits of many type numbers have been dropped. These types are identified now by the last two digits only.

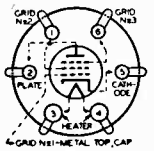
TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS



6-GRID-METAL TOP CAP
FIG.11



GRID-METAL TOP CAP
FIG.13



GRID No1-METAL TOP CAP
FIG.14

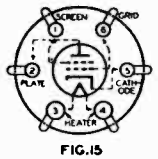


FIG.15

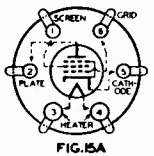
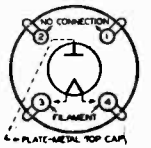


FIG.15A



6-PLATE-METAL TOP CAP
FIG.16

TUBE SYMBOLS AND BOTTOM VIEWS OF SOCKET CONNECTIONS

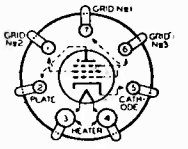


FIG.18

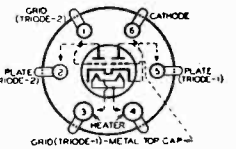
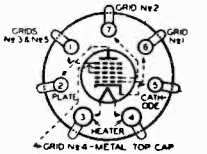
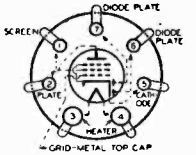


FIG.19



GRID No4-METAL TOP CAP
FIG.20



GRID-METAL TOP CAP
FIG.21

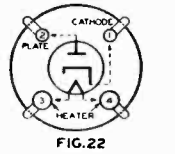


FIG.22

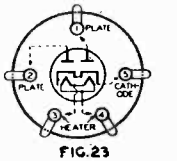


FIG.23

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MODEL R-5 DC

R. C. A. VICTOR CO., INC.

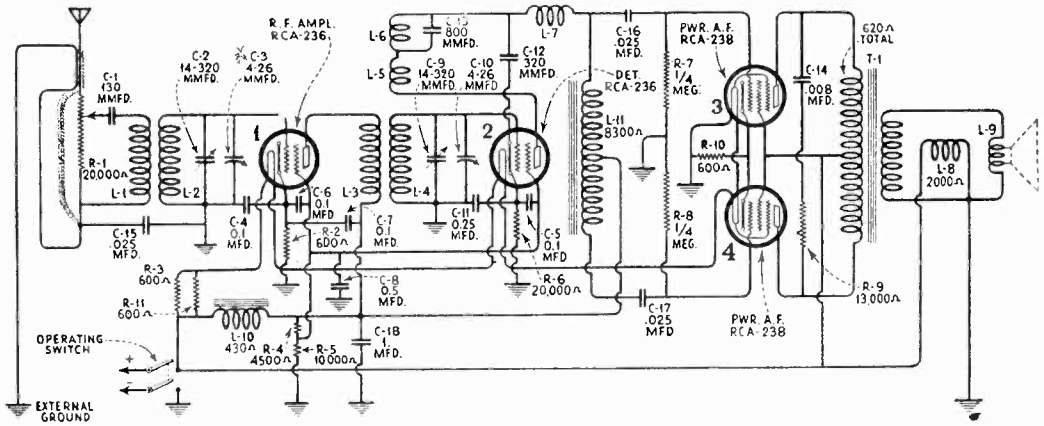

Figure 1—Schematic Circuit Diagram

RADIOTRON SOCKET VOLTAGE

110 VOLT D. C. LINE

These readings are obtained with the usual set analyzers and are not true readings of the voltage at which the Radiotrons operate.

Radiotron No.	Cathode to to Control Grid Volts	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
1	1.5	62	98	2.0	6.0
2	3.2	54	92	0.2	6.0
3	0.3	99	95	5.5	6.0
4	0.3	99	95	5.5	6.0

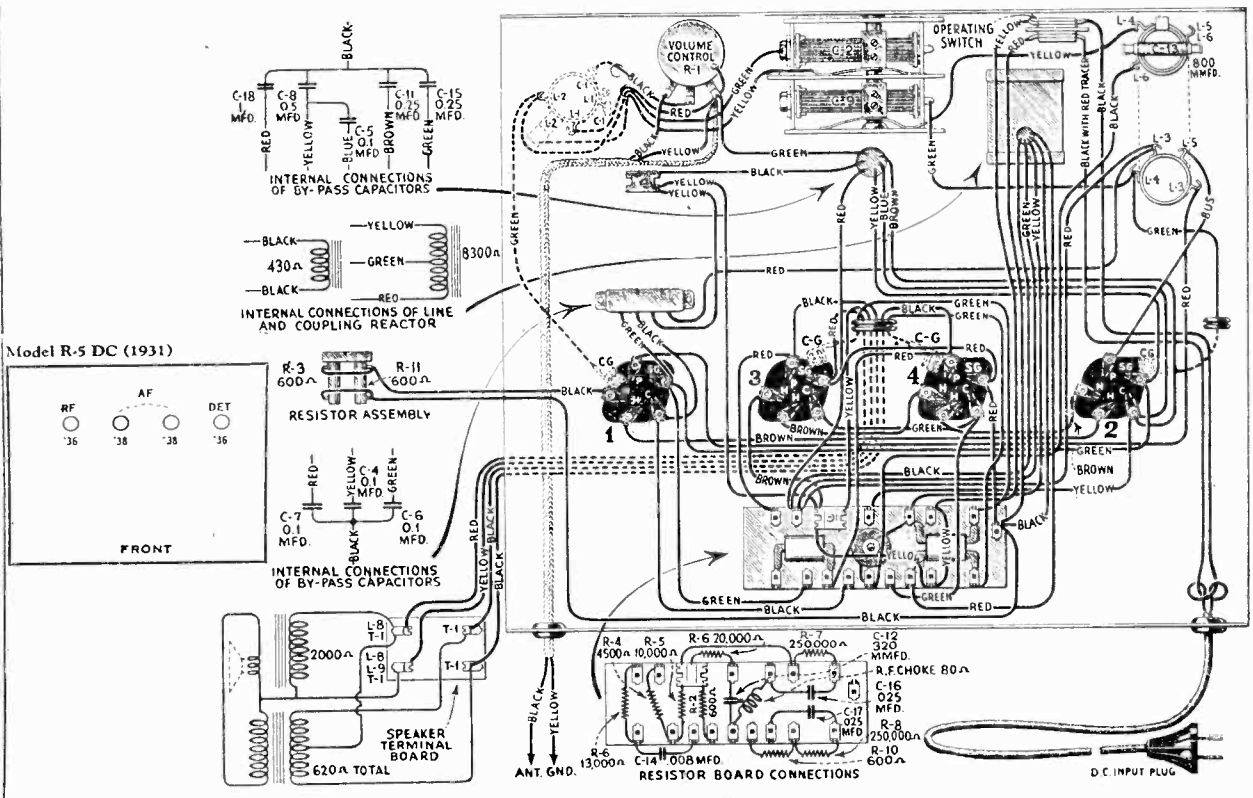

Figure 2—Wiring Diagram

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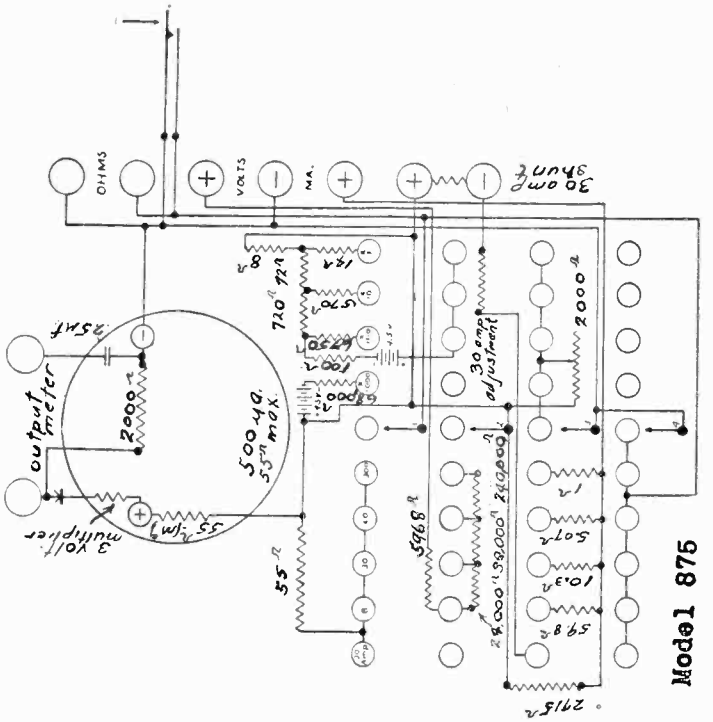
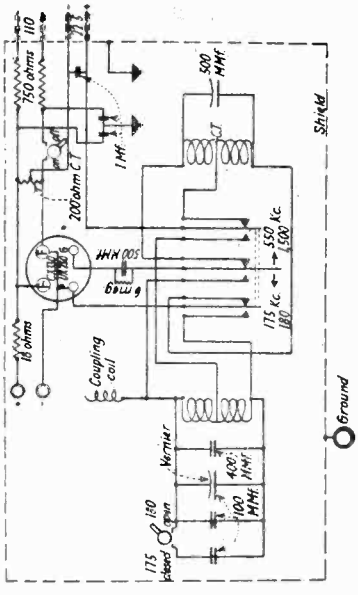
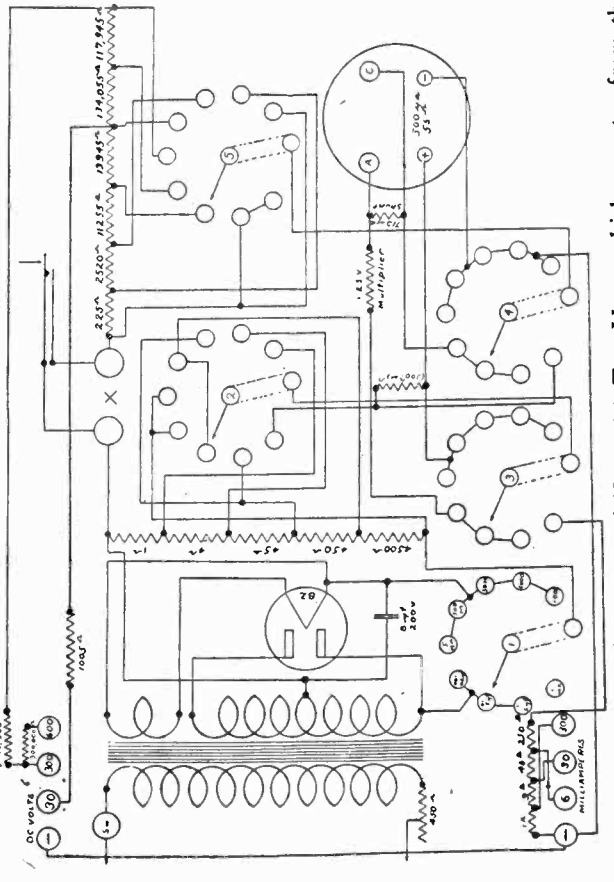
RADIO PRODUCTS CO.

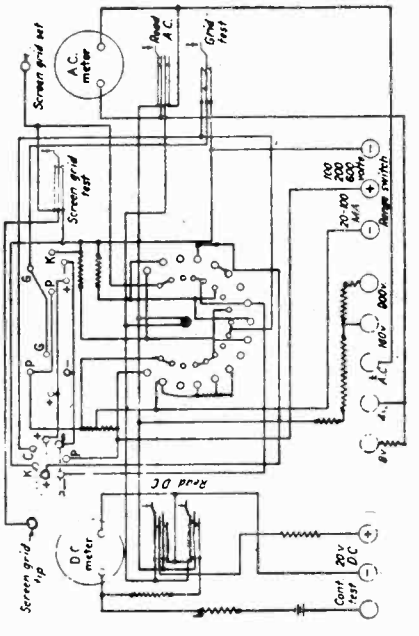
MODEL Dayrad 180
MODEL Dayrad HR
MODEL Dayrad 870
MODEL Dayrad 875







Schematic diagram of the Dayrad Type 870 Test Meter, which operates from the 110-volt, 60-cycle line. All values are given



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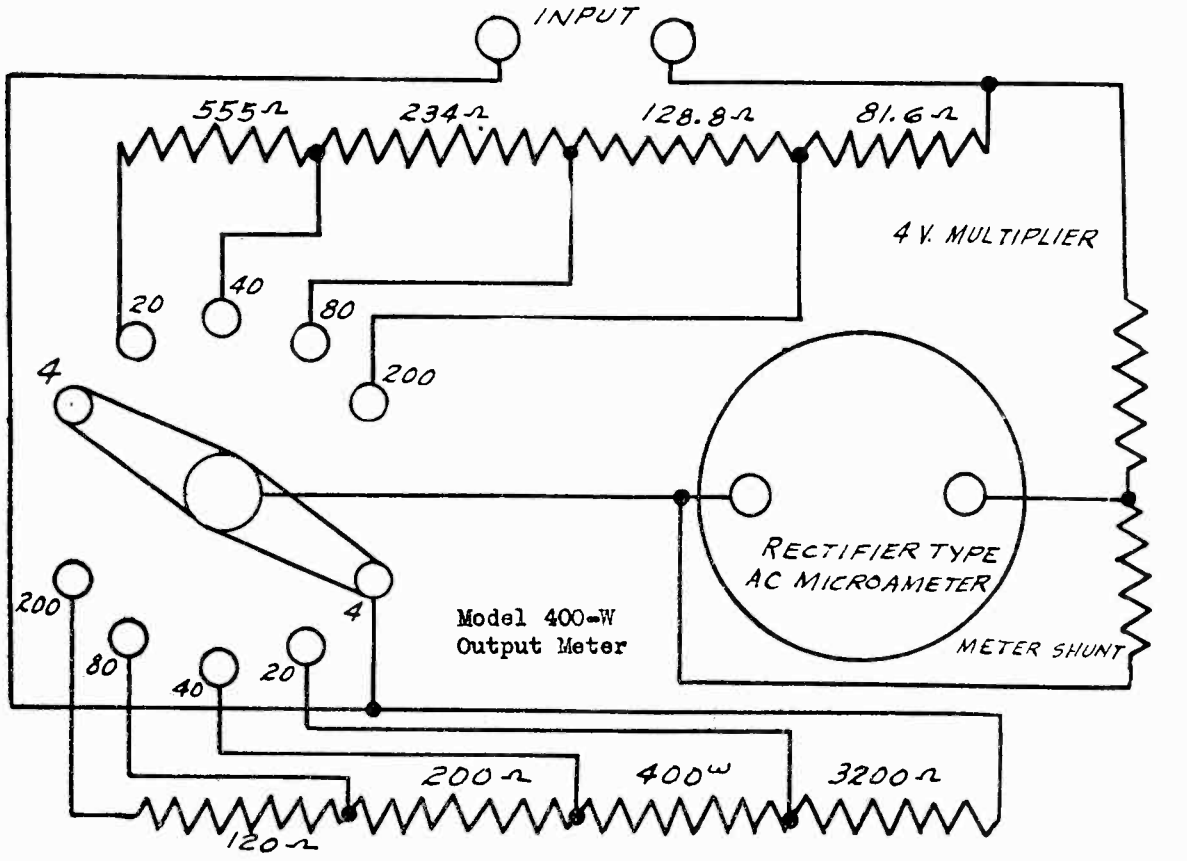
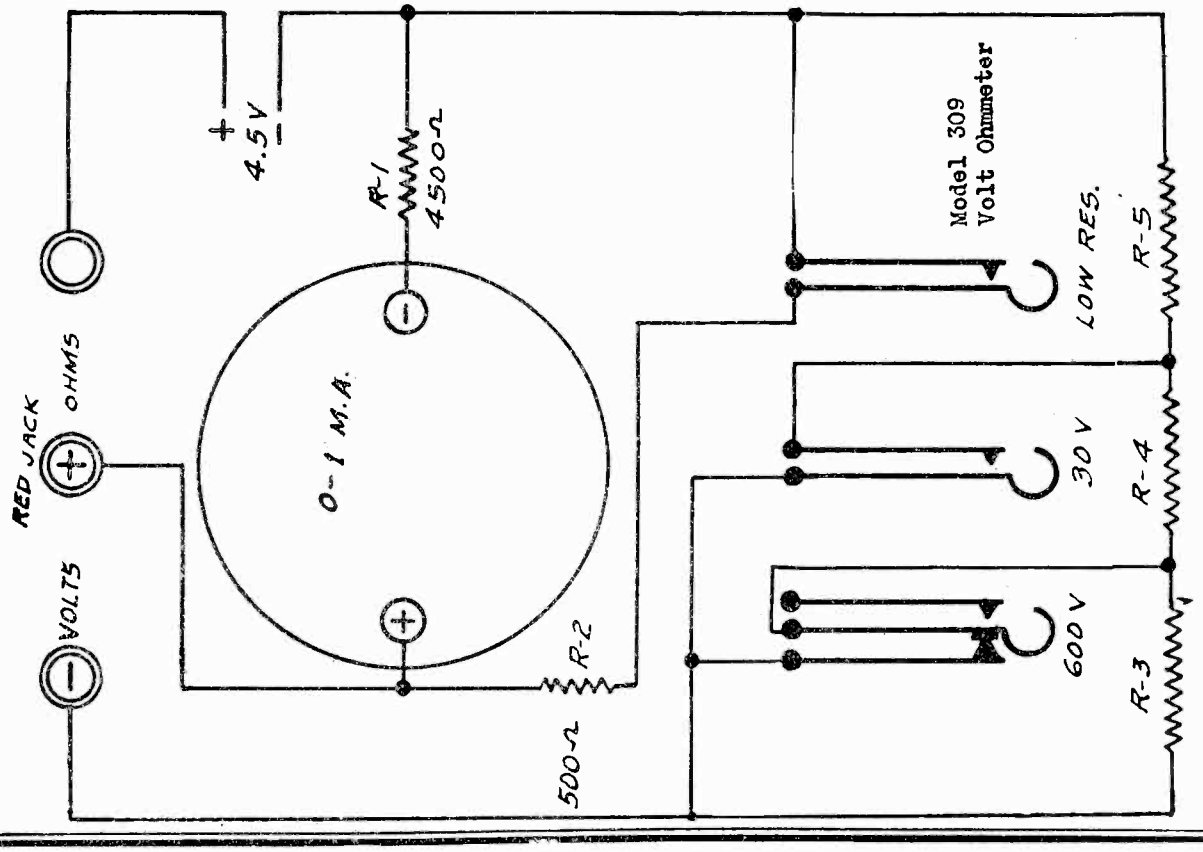
MODEL Dayrad 309
Volt-Ohmmeter
MODEL Dayrad 400-W
Output Meter

RADIO PRODUCTS CO.





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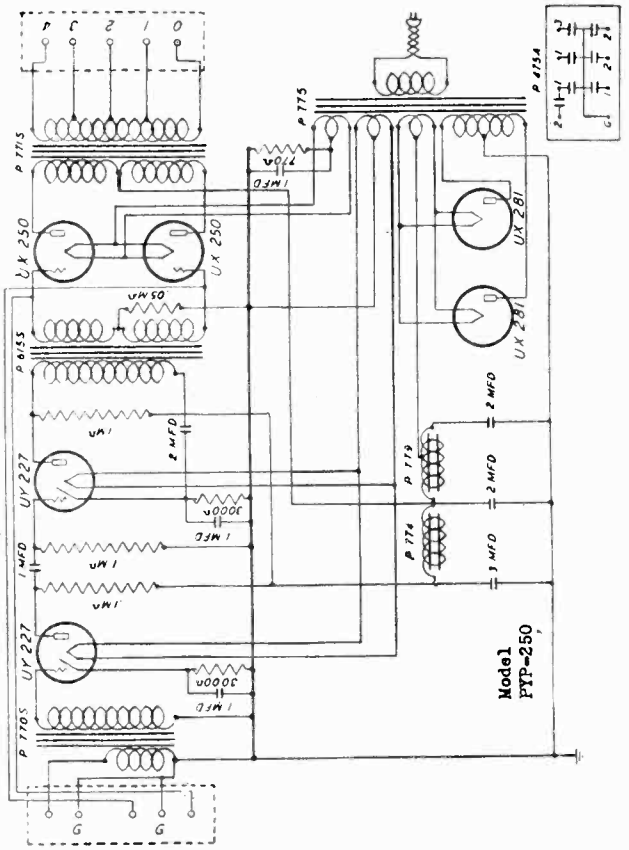
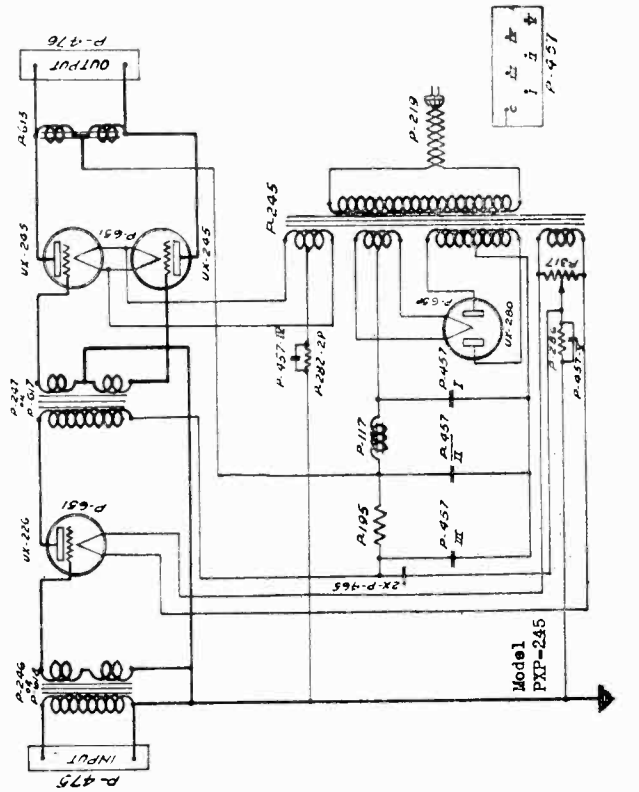
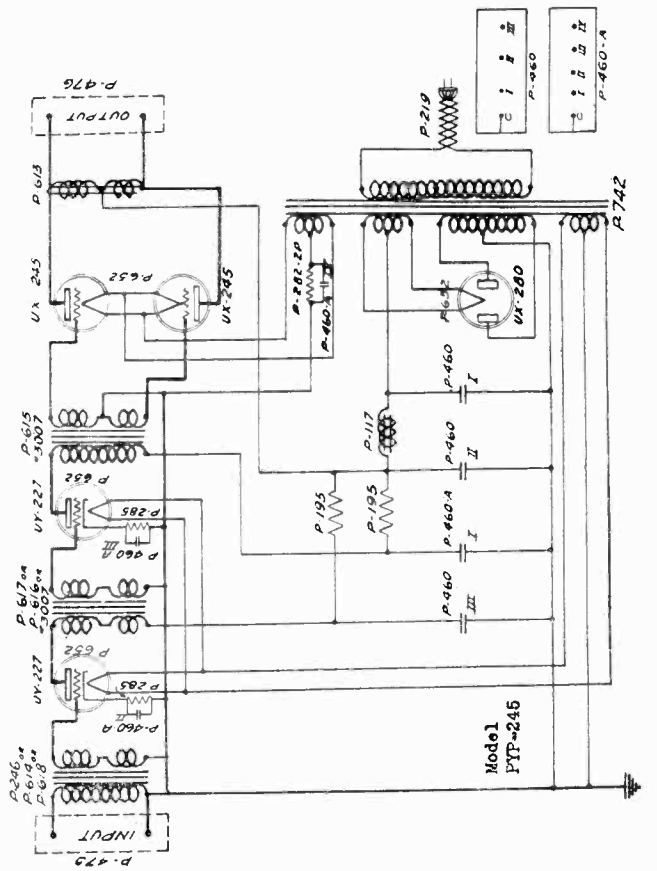
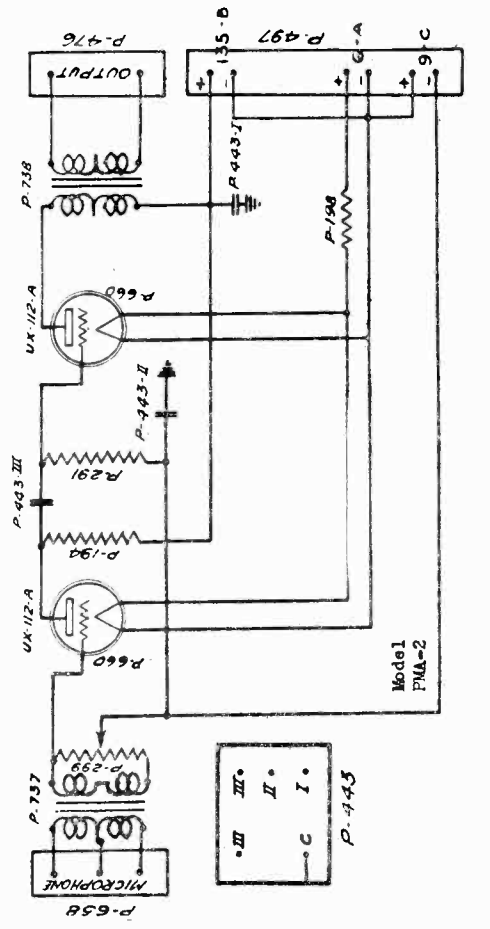
RADIO RECEPTOR CO.

MODEL PMA-2
MODEL PYP-245
MODEL PYP-250
MODEL PXP-245









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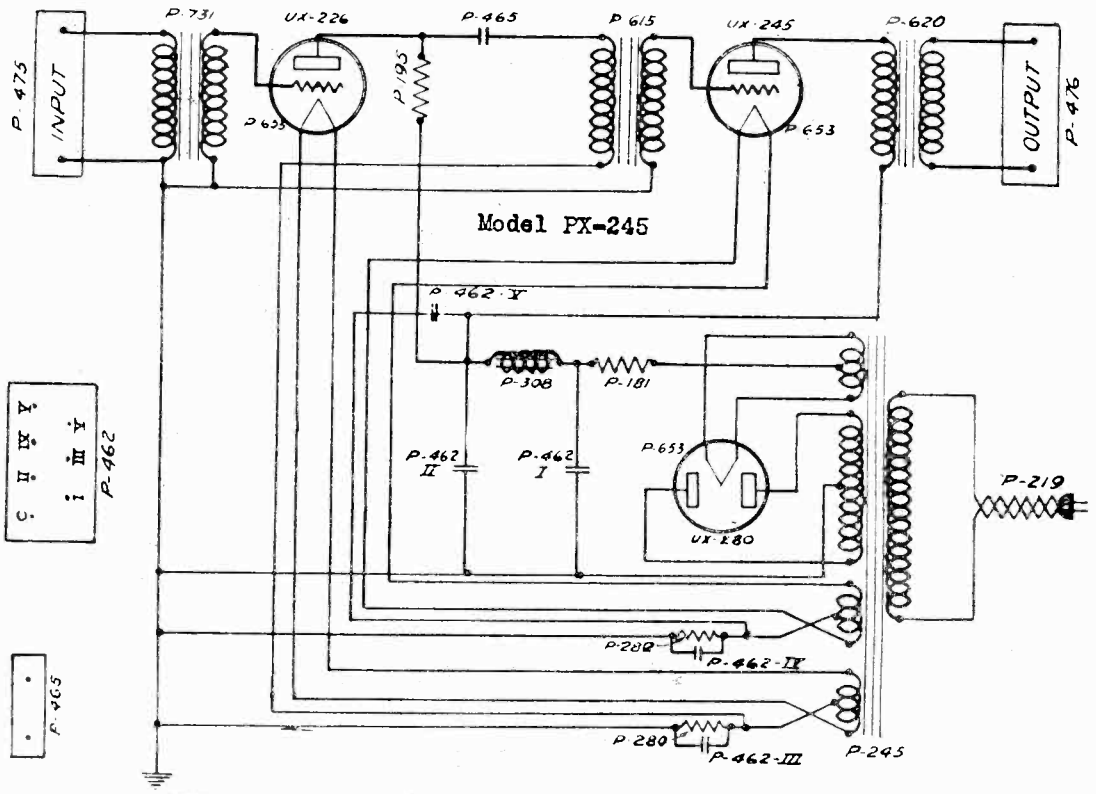
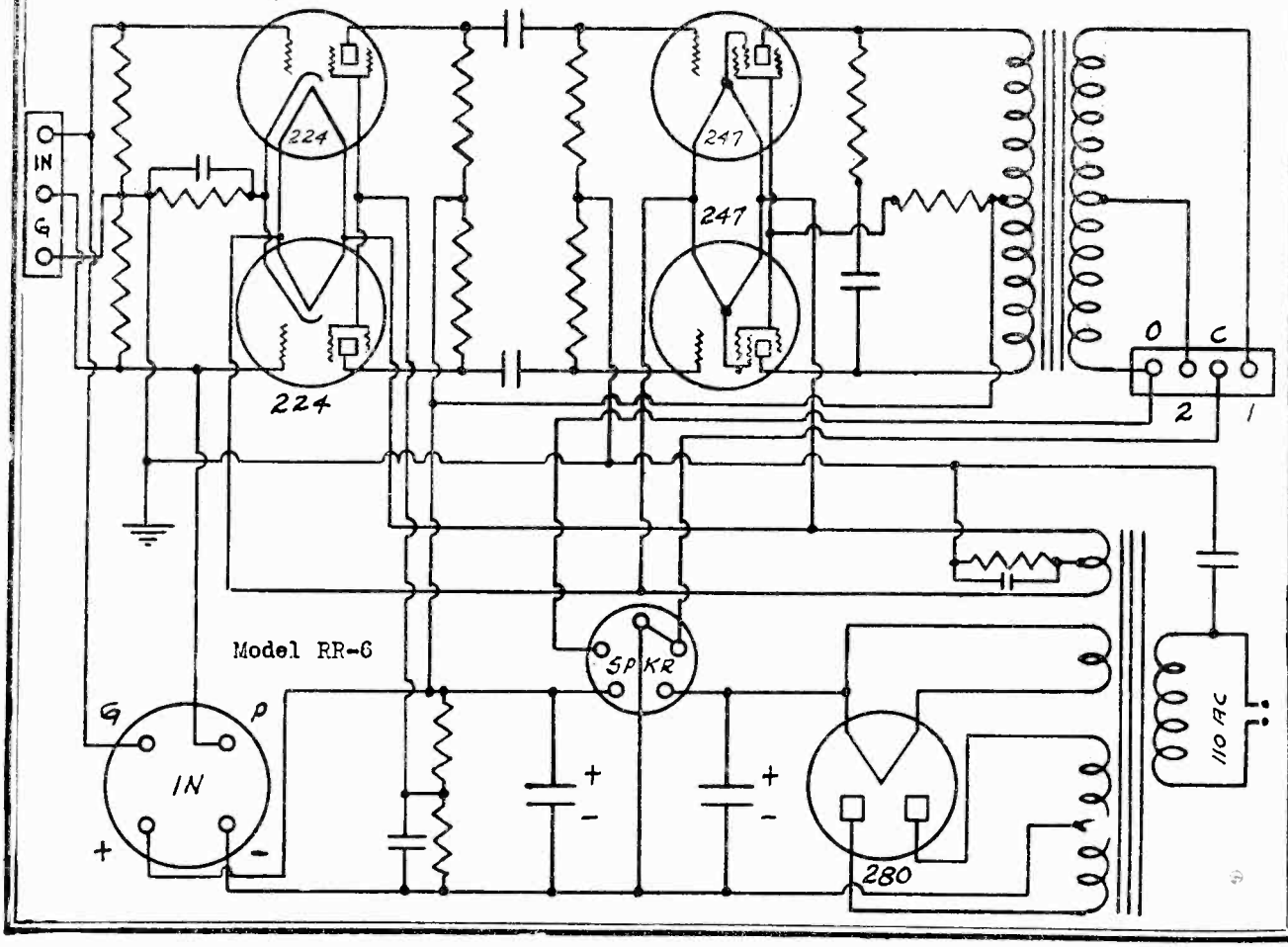
MODEL RR-6
MODEL PX-245

RADIO RECEPTOR CO.





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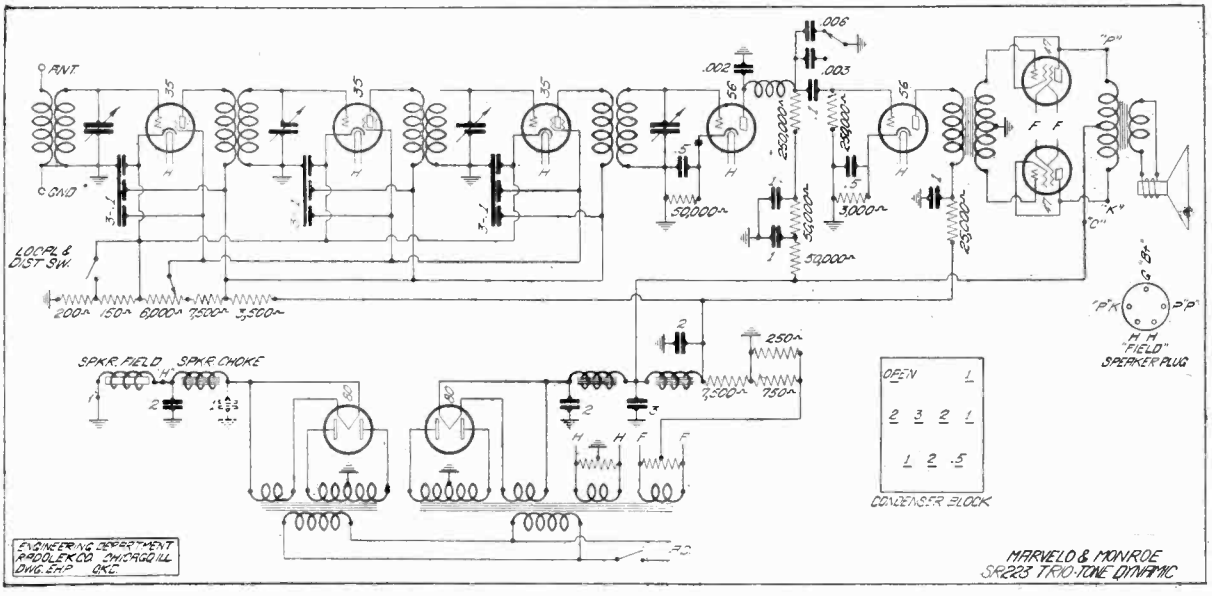
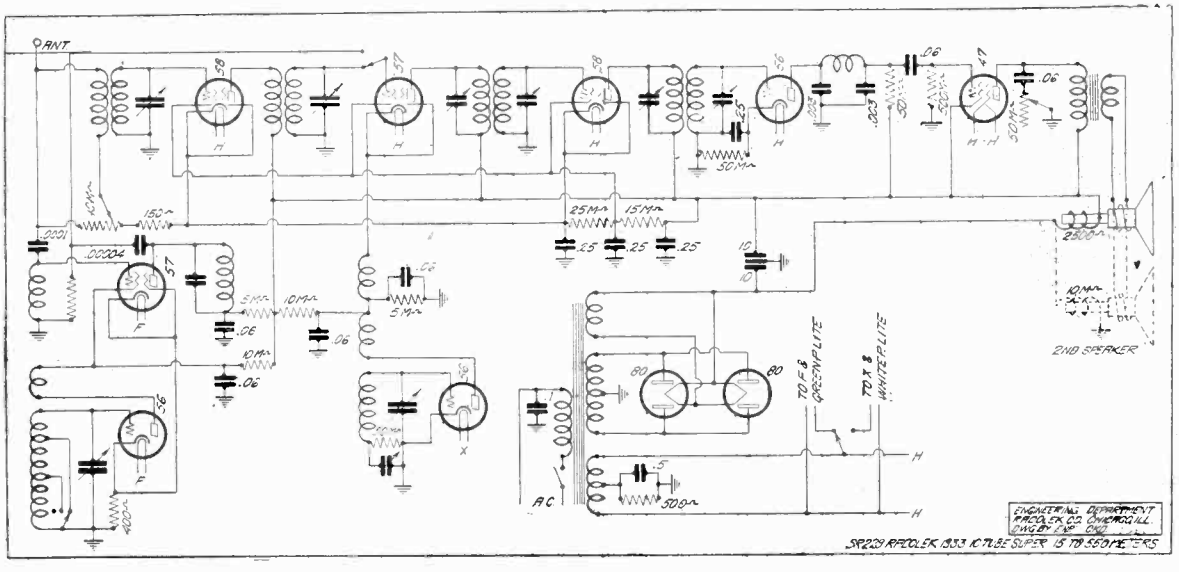
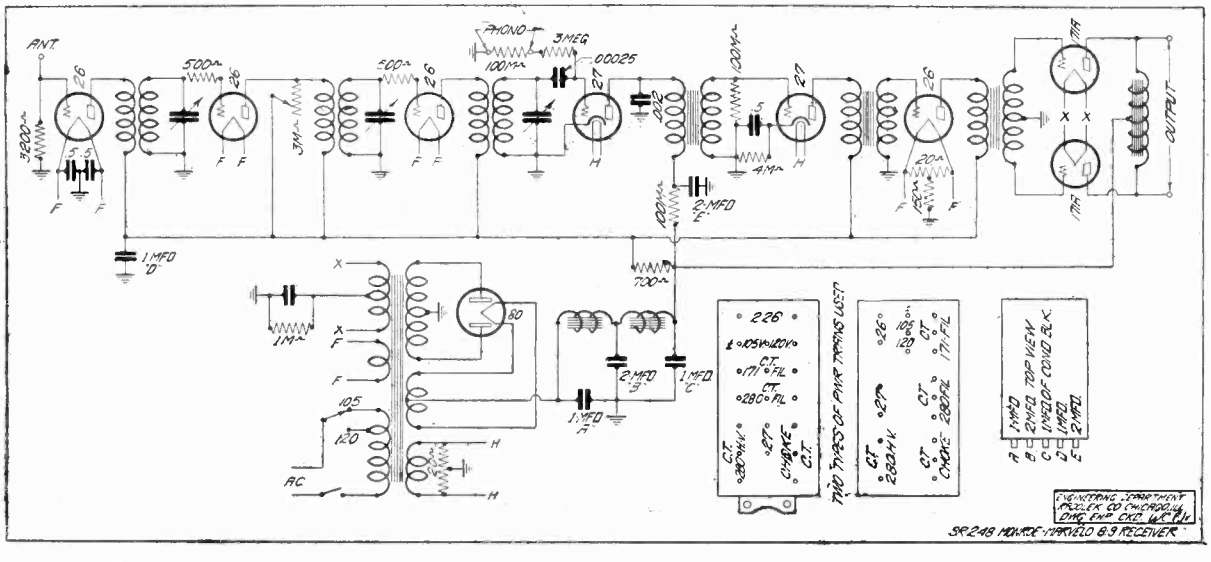
RAD OLEK

MODEL Monroe-Marvelo Trio-Tone
MODEL Radolek 10 Tube Super
MODEL Monroe-Marvelo 8-9







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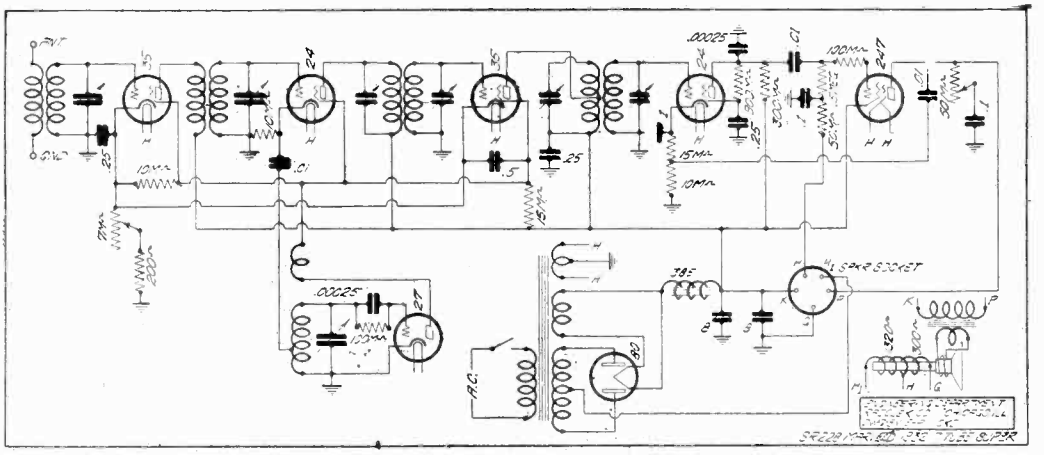
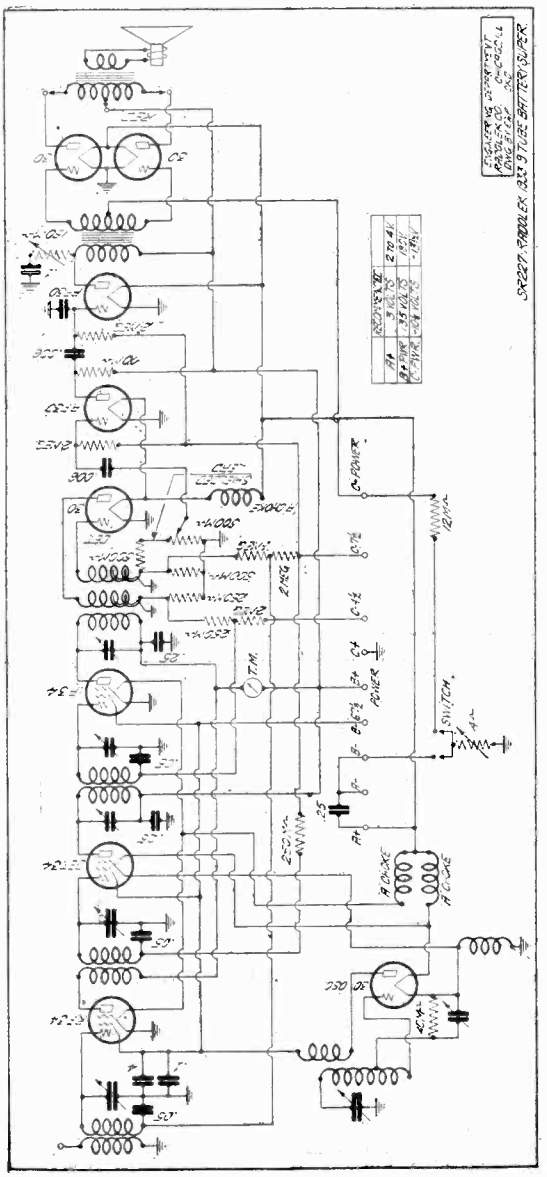
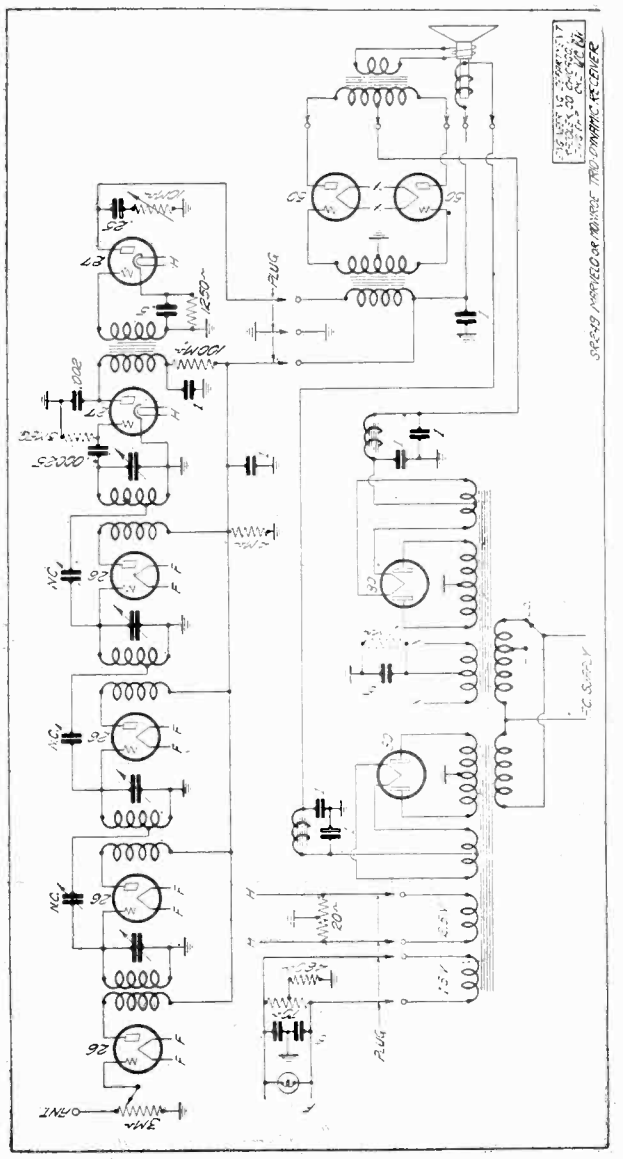
MODEL Marvelo 7 Tube Super
MODEL 9 Tube Battery Super
MODEL Marvelo-Monroe Trio-Dynamic

RAD OLEK







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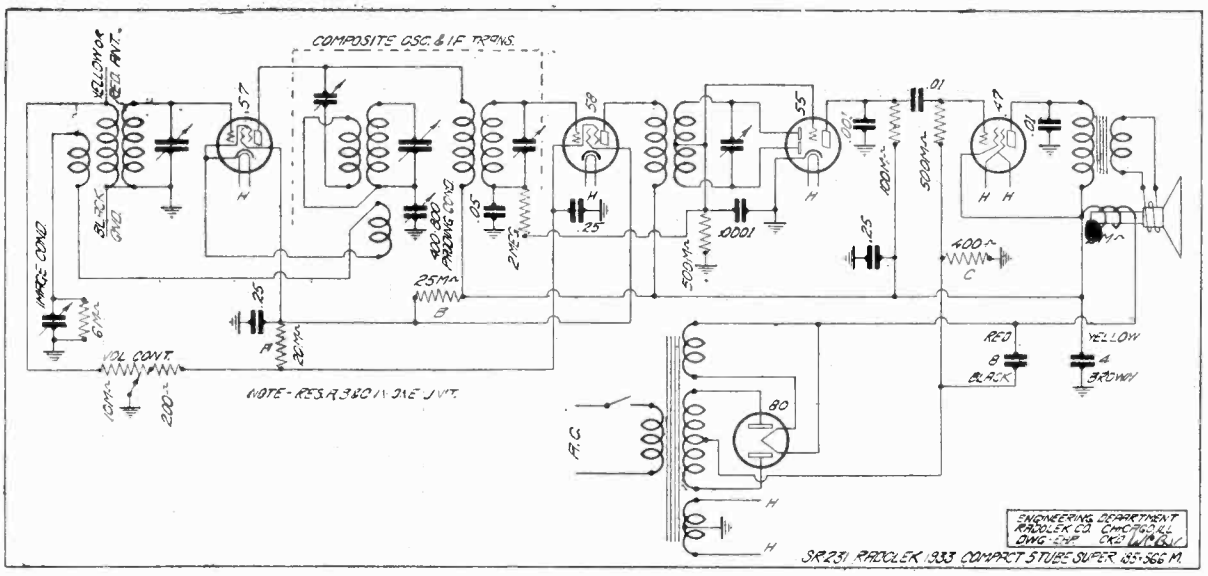
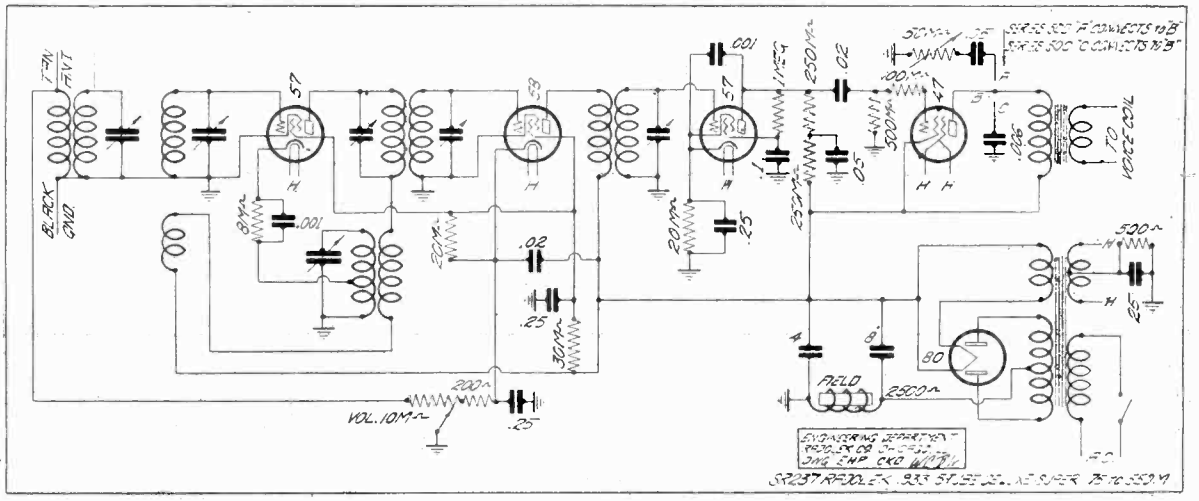
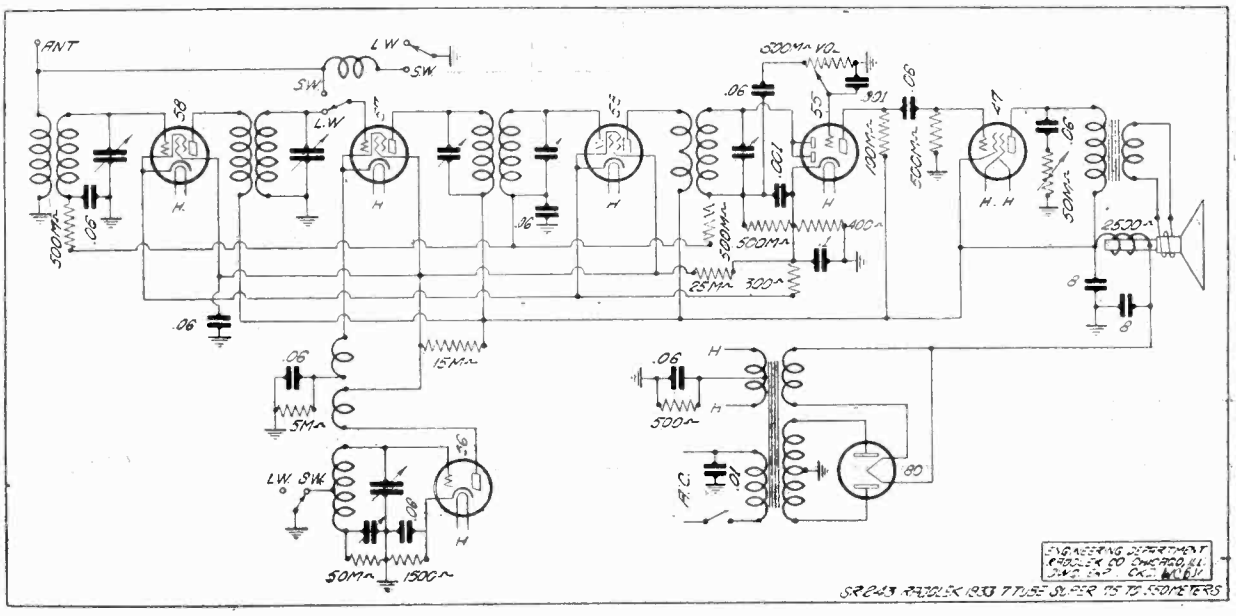
RAD OLEK

MODEL Radolek 5 Tube Super Compact
MODEL Radolek 5 Tube De Luxe
MODEL Radolek 7 Tube Super







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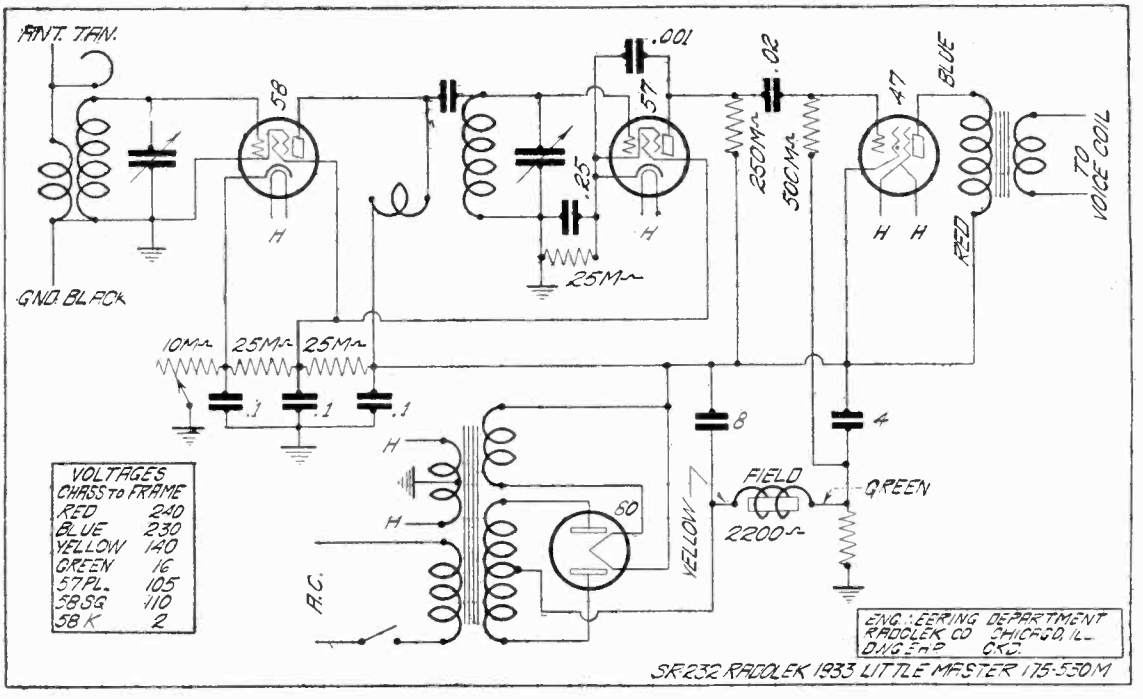
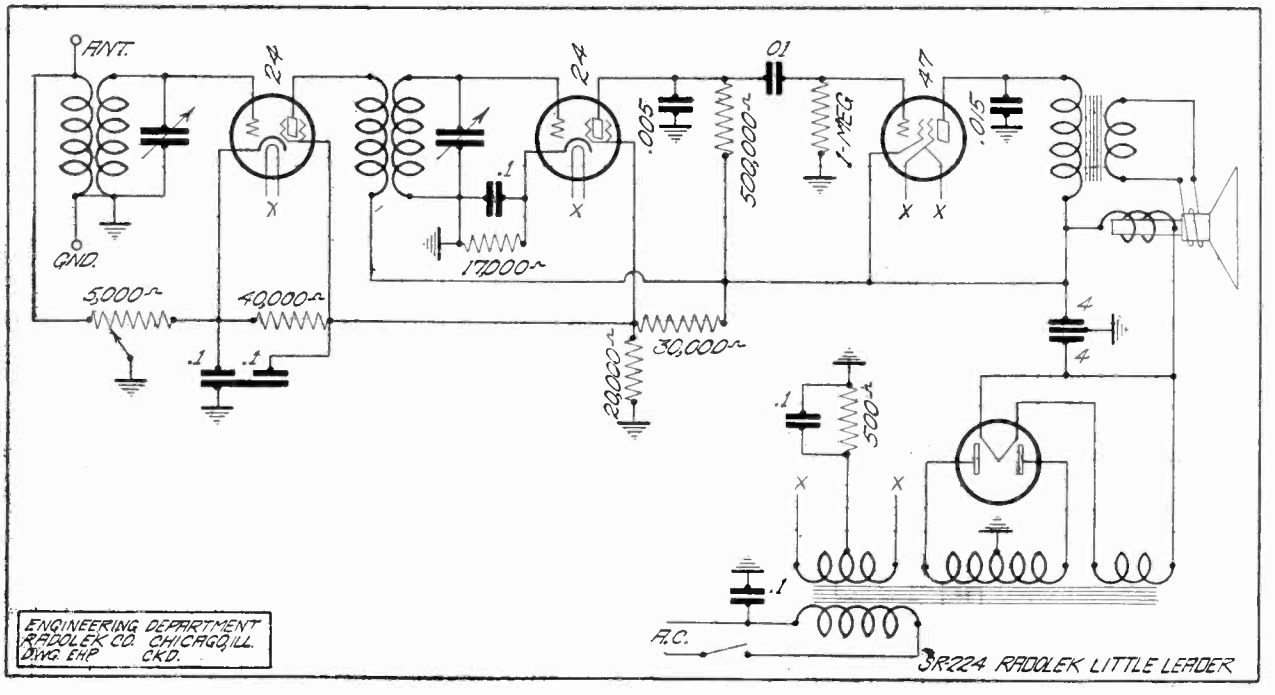
MODEL Radolek Little Master
MODEL Radolek Little Leader

RAD OLEK





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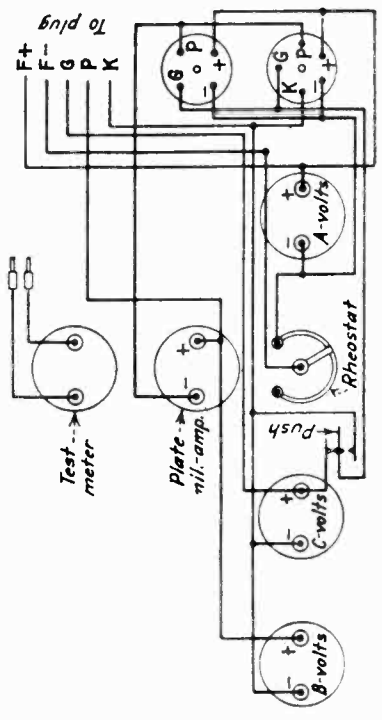
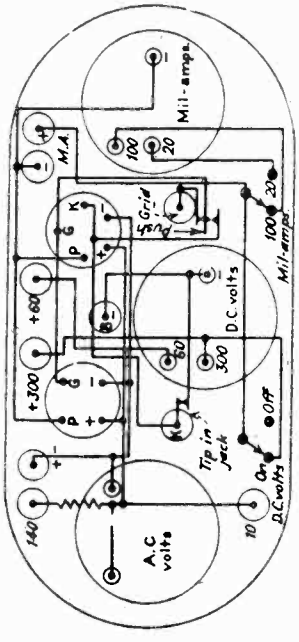
READRITE METER WORKS

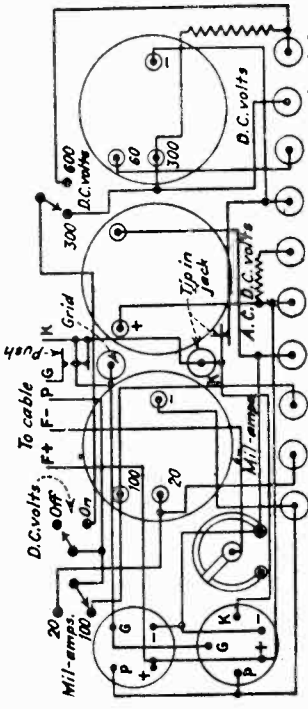
MODEL 6
MODEL 15
MODEL 245
MODEL 610-710
MODEL 1000



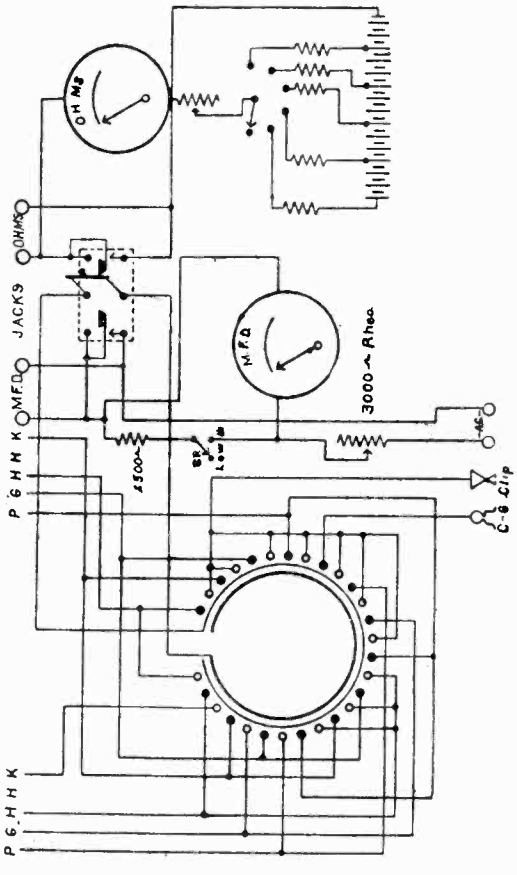
Readrite 6



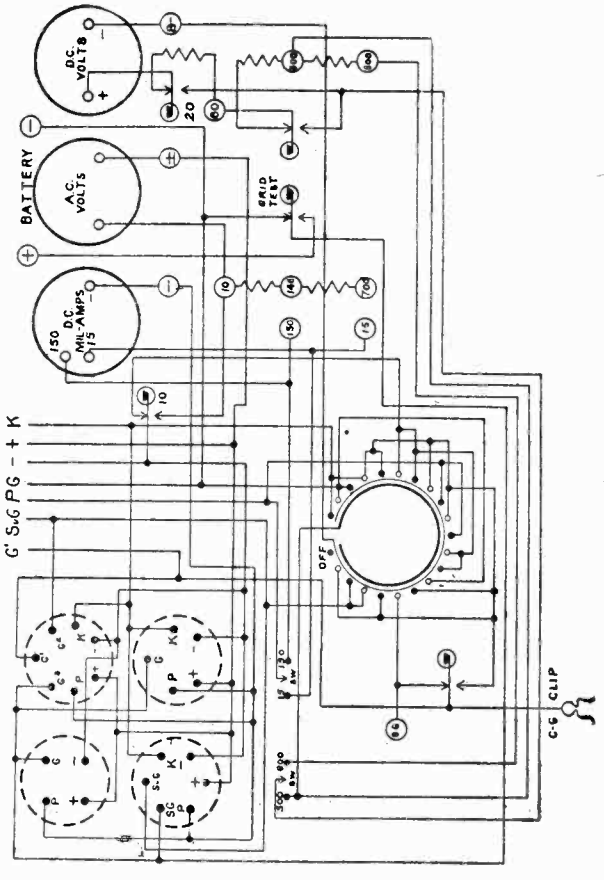
Readrite 15



Readrite 245



Readrite No. 1000 Set Tester.



Readrite No. 710 Set Analyzer

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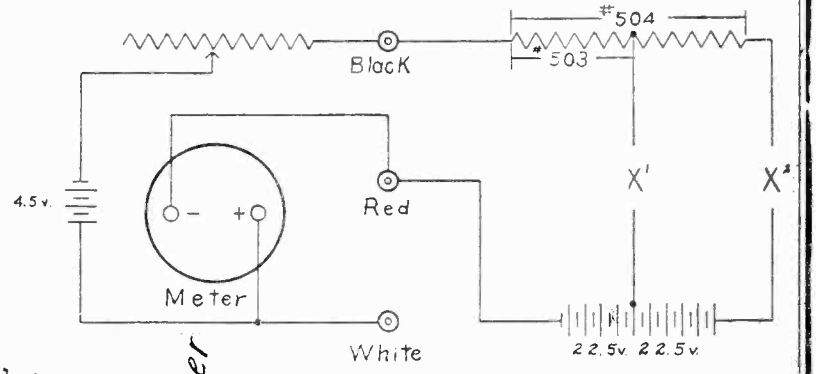
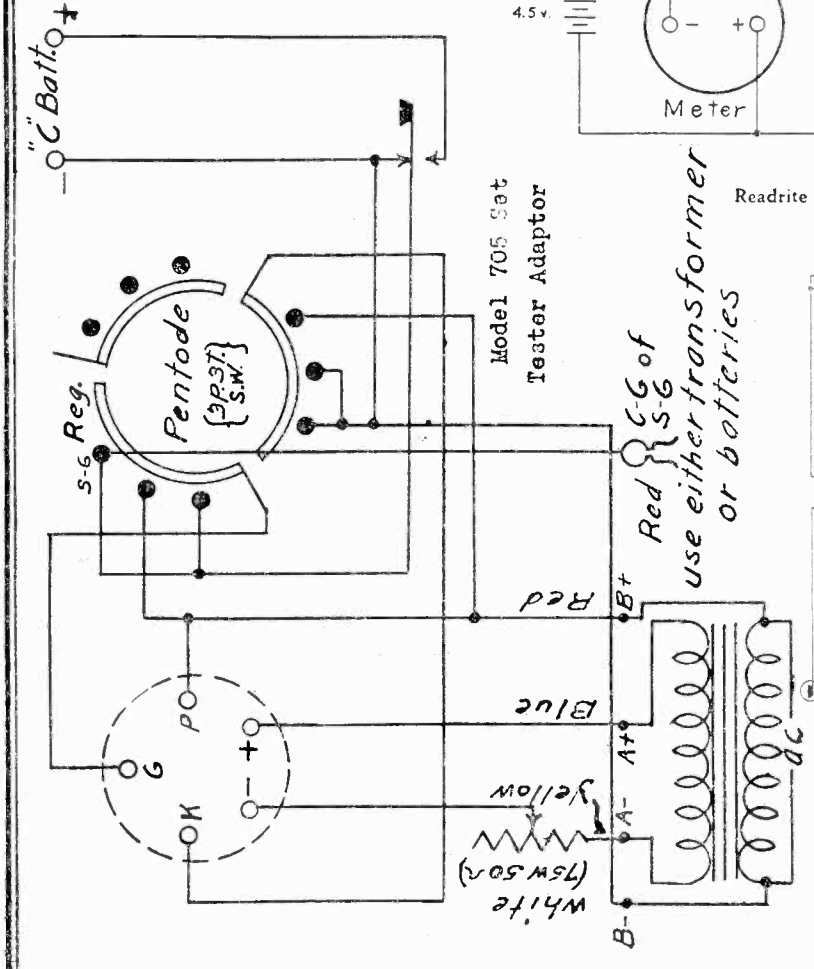
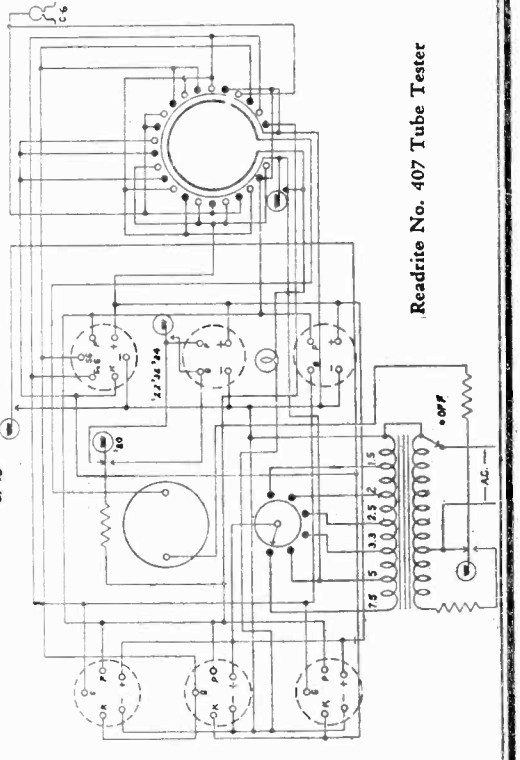
MODEL 407 Tube Tester
MODEL 502 Ohmmeter
MODEL 705 Set Tester
Adaptor
MODEL 900 Electric
Refrigerator Tester

READRITE METER WORKS

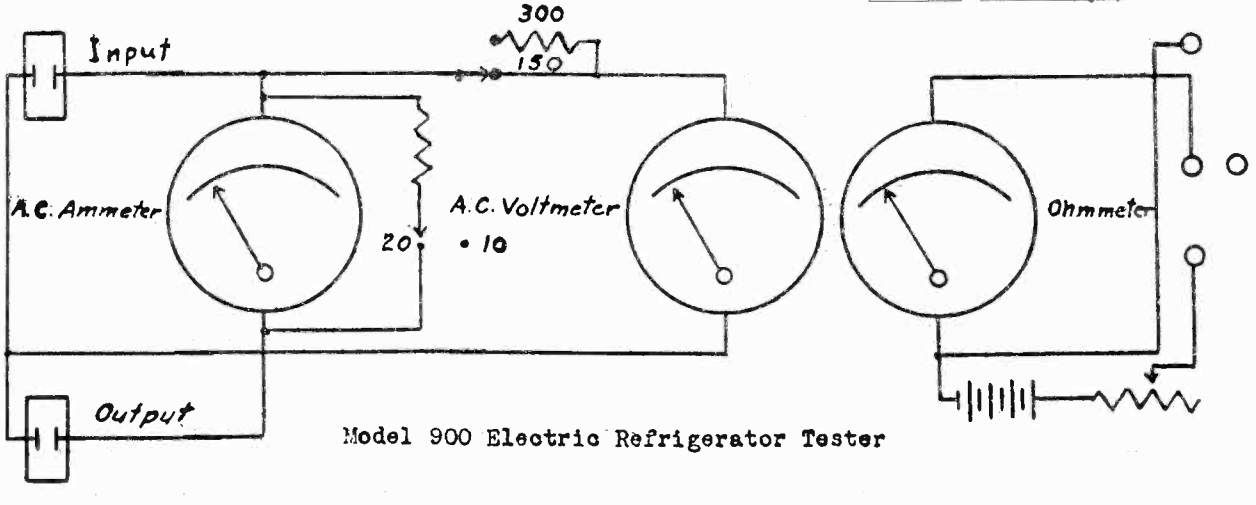


Readrite No. 502 Ohmmeter.





Readrite No. 407 Tube Tester



Model 900 Electric Refrigerator Tester

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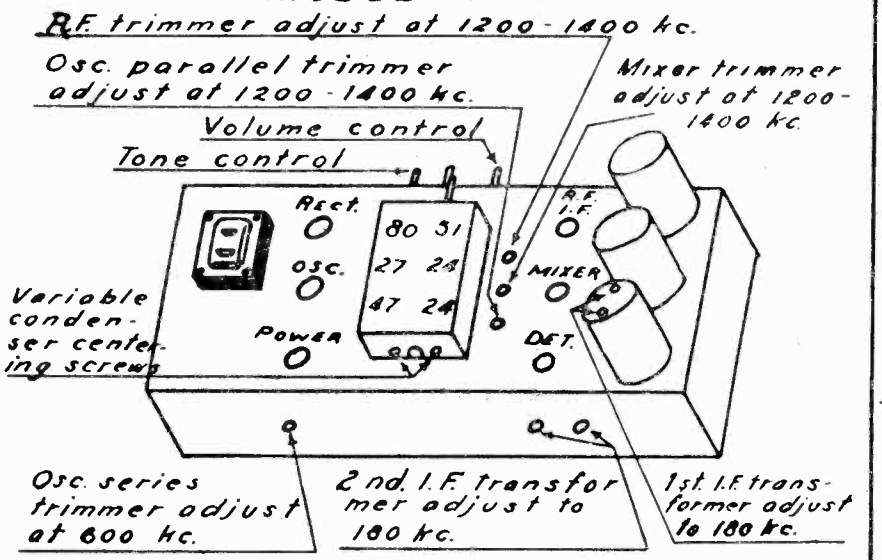
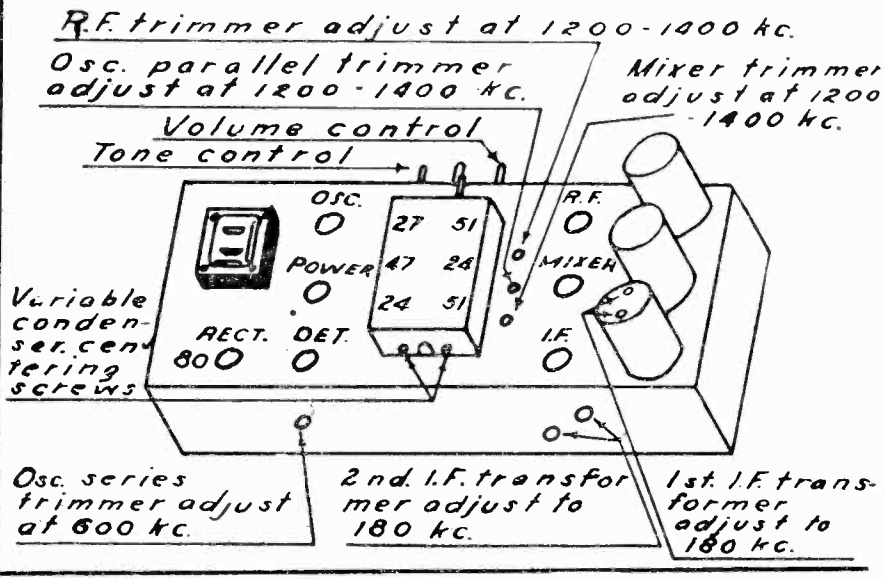
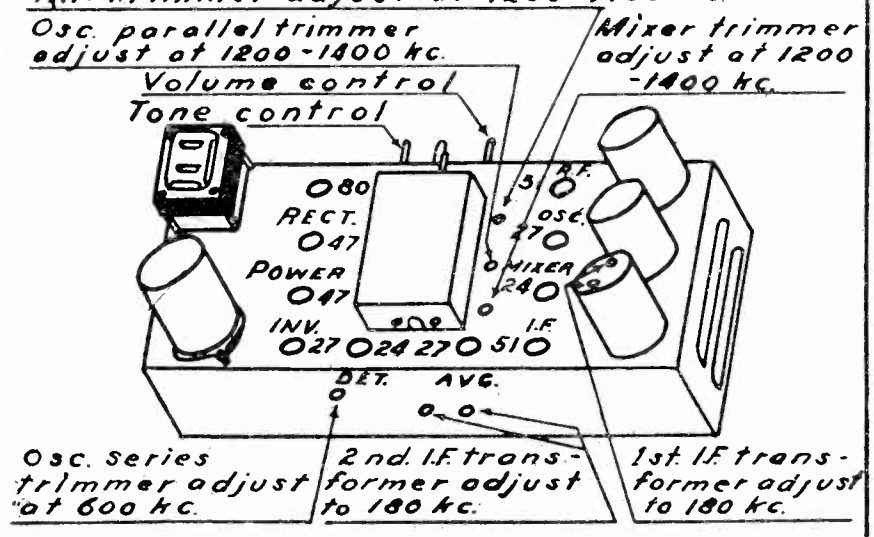
MODEL 10-11



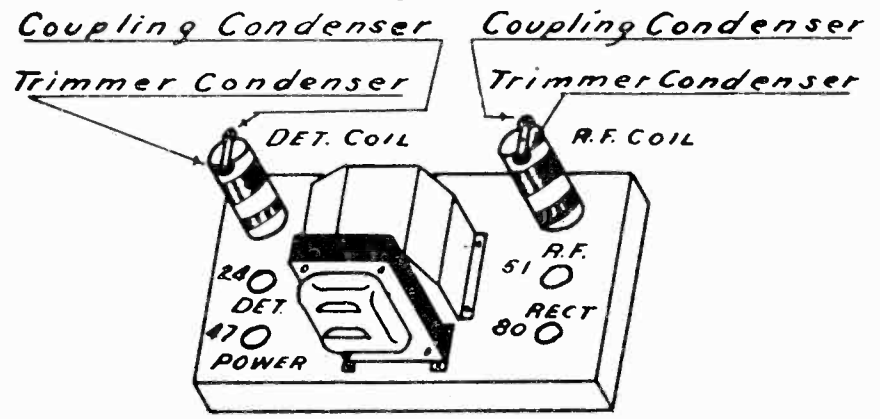
MODEL 15



MODEL 19



MODEL 21



To increase selectivity loosen coupling condensers slightly and balance set at 1200-1400 kc. with the trimming condensers.

MODELS 10,11,15, 19,21 Supers
Socket-Trimmers

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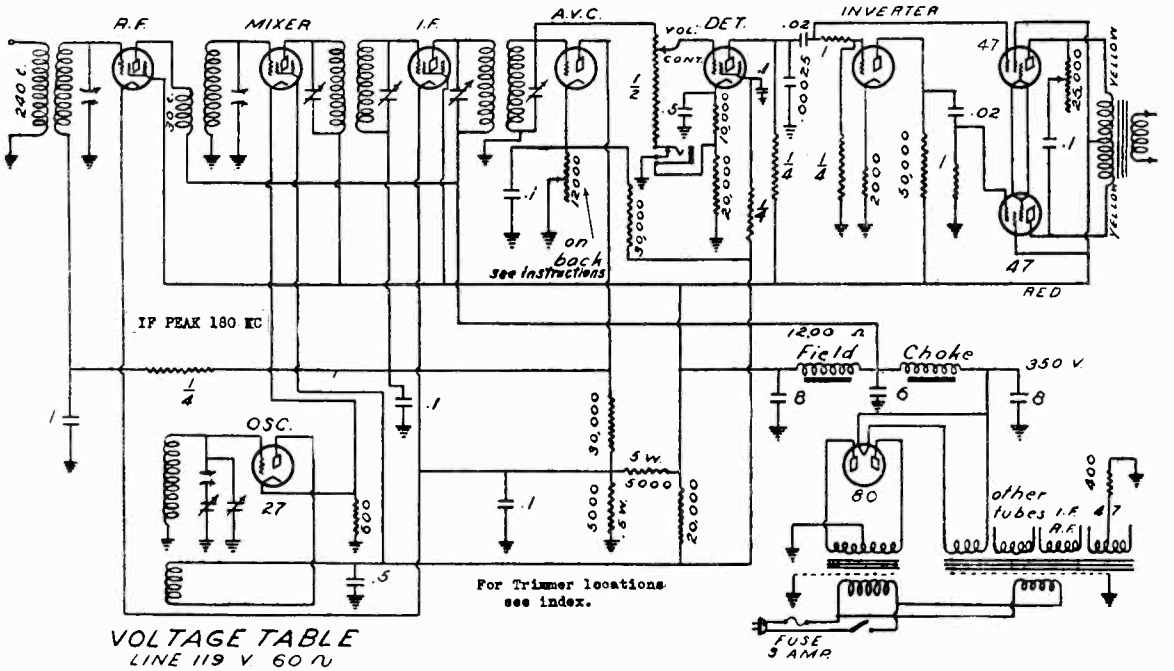
MODEL 10
MODEL 19

REMLER COMPANY, LTD.



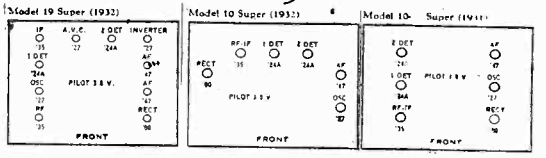
VOLTAGE TABLE

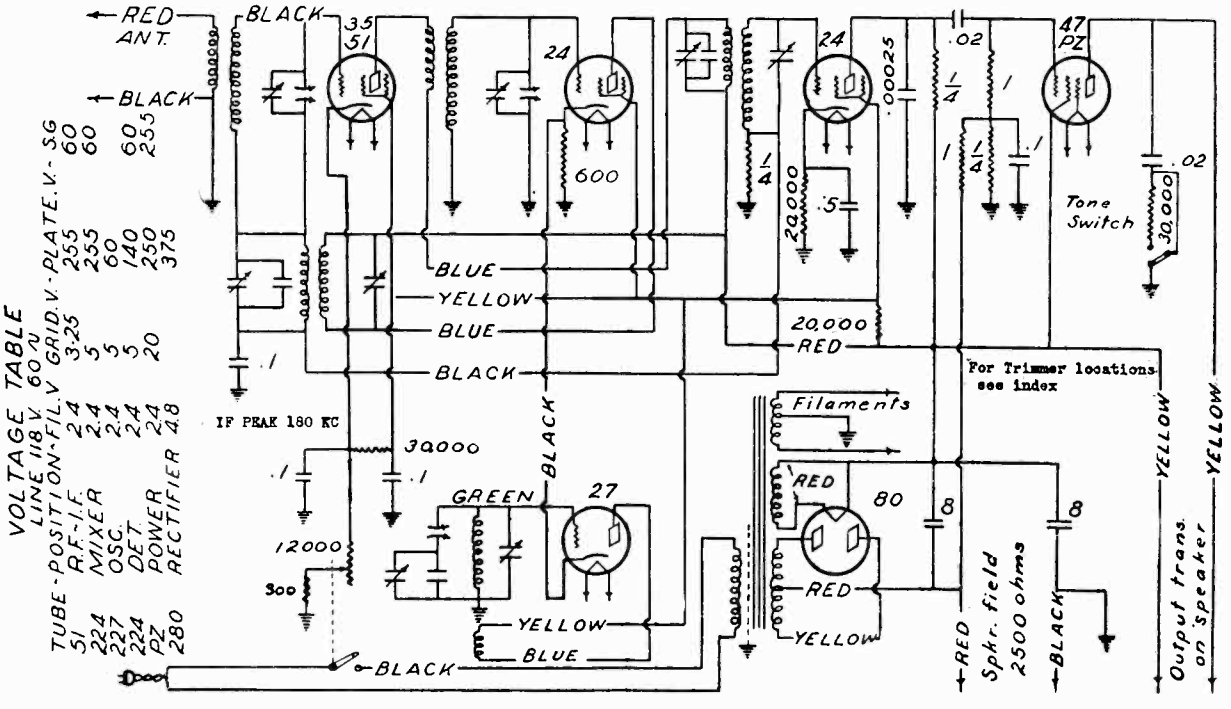
LINE 119 V 60 ∿

TUBE	POSITION	FIL. V.	GRID V.	PLATE V.	S.G. V.
35	R.F.	2.4	3-30	175	75
24	MIXER	2.4	5	225	66
27	OSC	2.4	5	65	X
35	I.F.	2.4	3-30	175	75
27	A.V.C.	2.4	15	135	X
24	DET.	2.4	5	120	65
27	INVERTER	2.4	5	80	X
47	POWER	2.5	16	205	215
80	RECTIFIER	4.8			

SPEAKER LEADS

RED - Field and center tap trans.
BLUE - Field
YELLOW - Primary of transformer





VOLTAGE TABLE

LINE 118 V. 60 ∿

TUBE	POSITION	FIL. V	GRID V.	PLATE V.	S.G.
51	R.F.-I.F.	2.4	3.25	255	60
224	MIXER	2.4	5	255	60
227	OSC.	2.4	5	60	60
224	DET.	2.4	5	140	255
42	POWER	2.4	20	250	
280	RECTIFIER	4.8		375	

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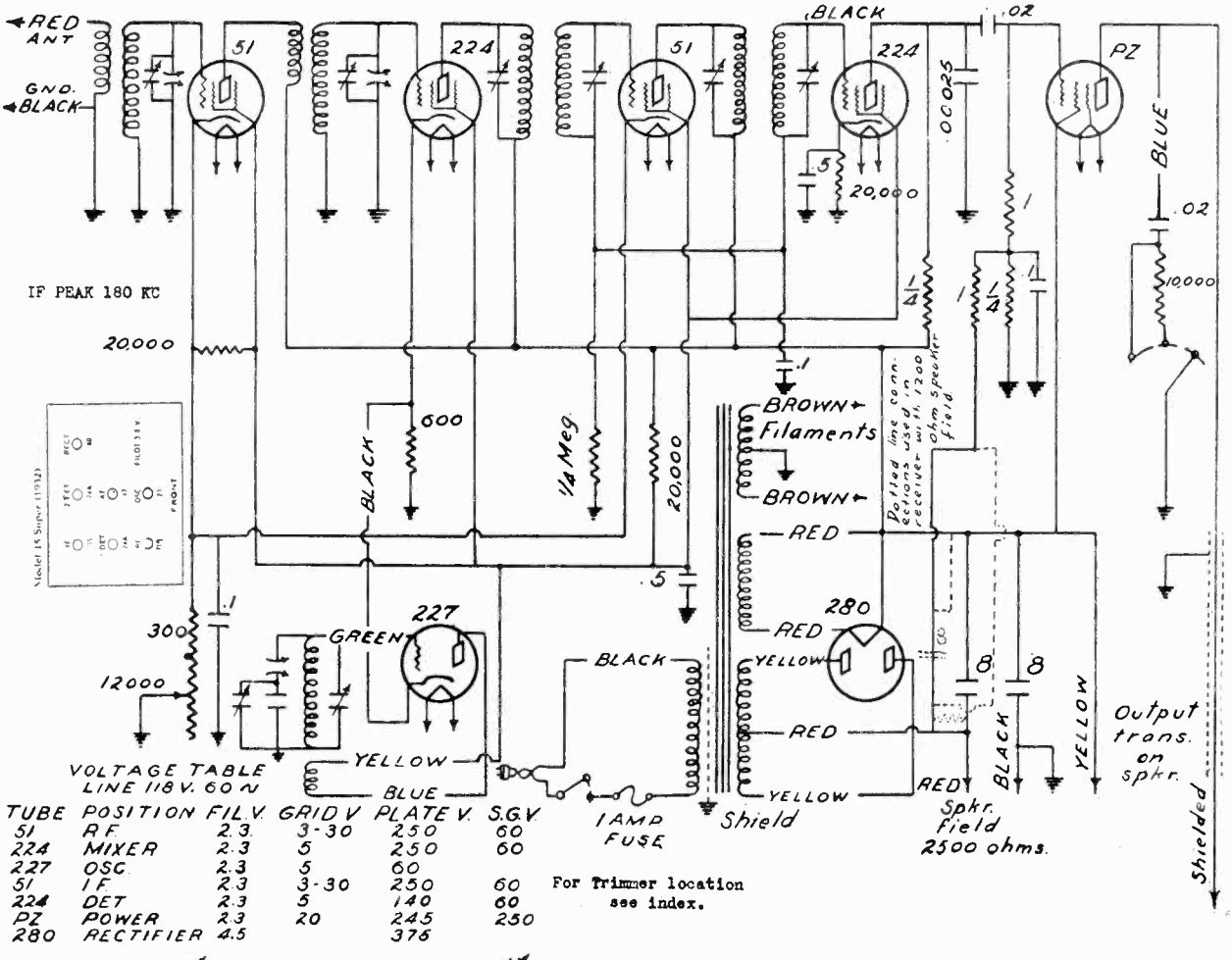
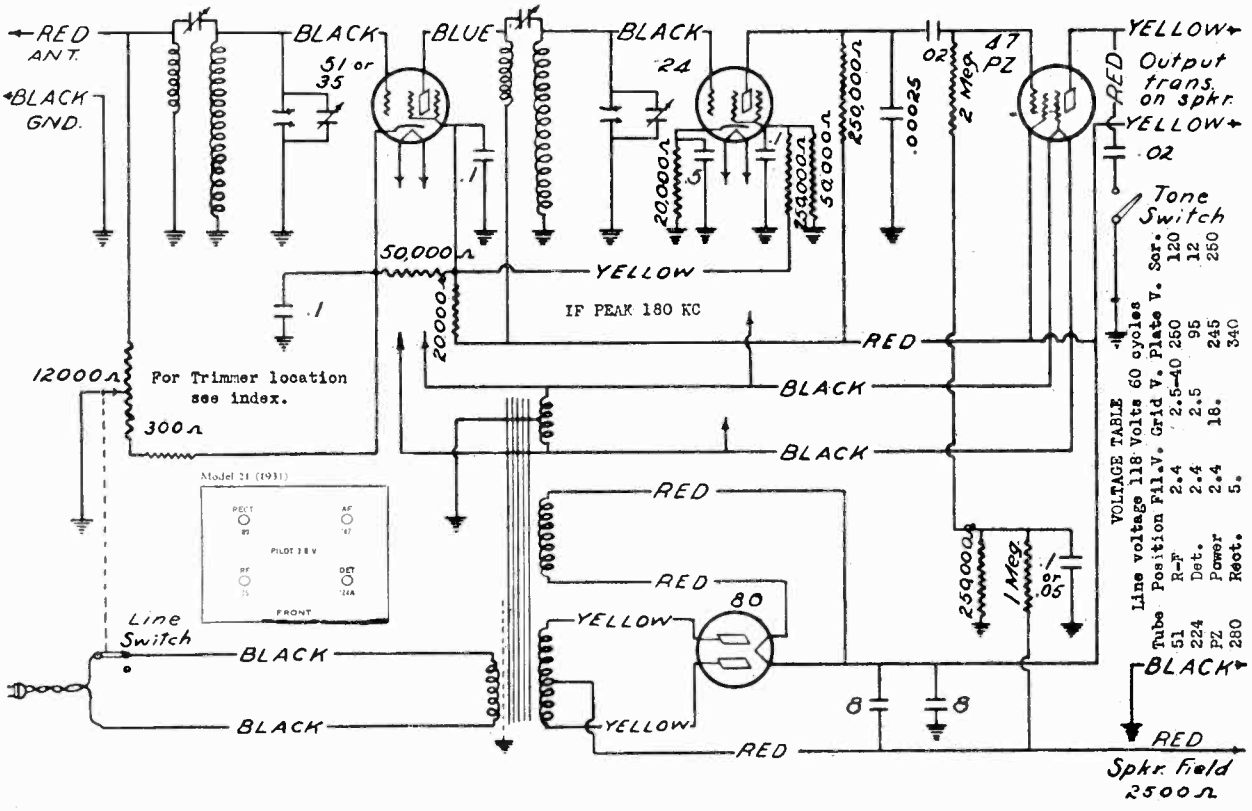
REMLER COMPANY, LTD.

MODEL 15
MODEL 21



TUBE	POSITION	FIL V.	GRID V	PLATE V.	S.G.V.
51	R.F.	2.3	3-30	250	60
224	MIXER	2.3	5	250	60
227	OSC.	2.3	5	60	
51	I.F.	2.3	3-30	250	60
224	DET	2.3	5	140	60
PZ	POWER	2.3	20	245	250
280	RECTIFIER	4.5		375	



VOLTAGE TABLE
Line voltage 118 Volts 60 cycles

Tube	Position	Fil.V.	Grid V.	Plate V.	Scr.
51	R-F	2.4	2.5-40	260	120
224	Det.	2.4	2.5	95	12
PZ	Power	2.4	18.	245	250
280	Rect.	5.		340	

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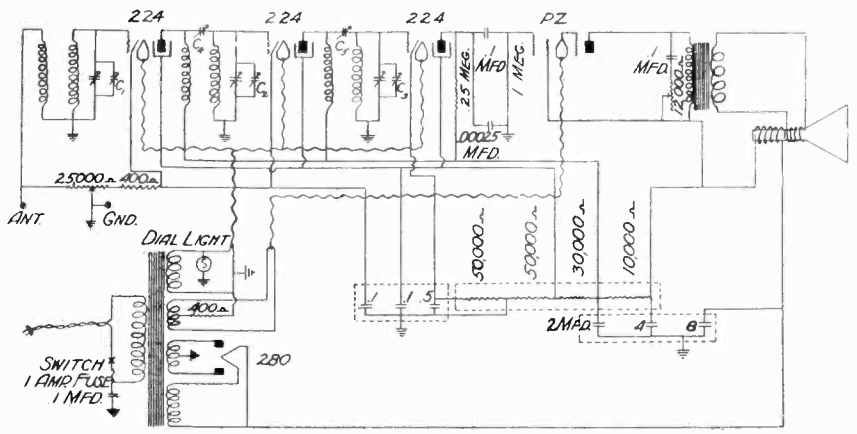
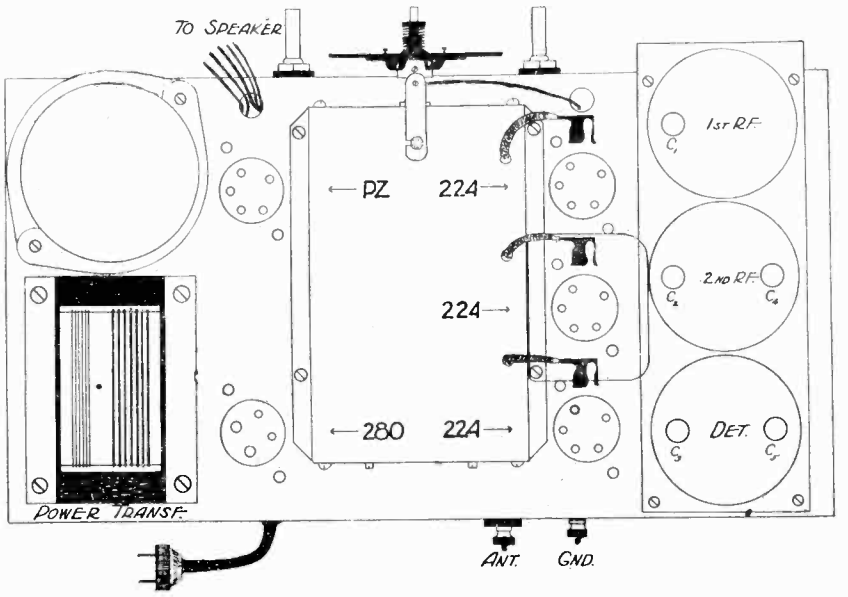




WIRE COLOR CODE

RED - FIL. RECT. - CATHODE R.F. - B+A.F. - PLATE R.F. SPEAKER FIELD

BLUE - FIL. A.F. - PLATE DETECTOR - B+R.F.

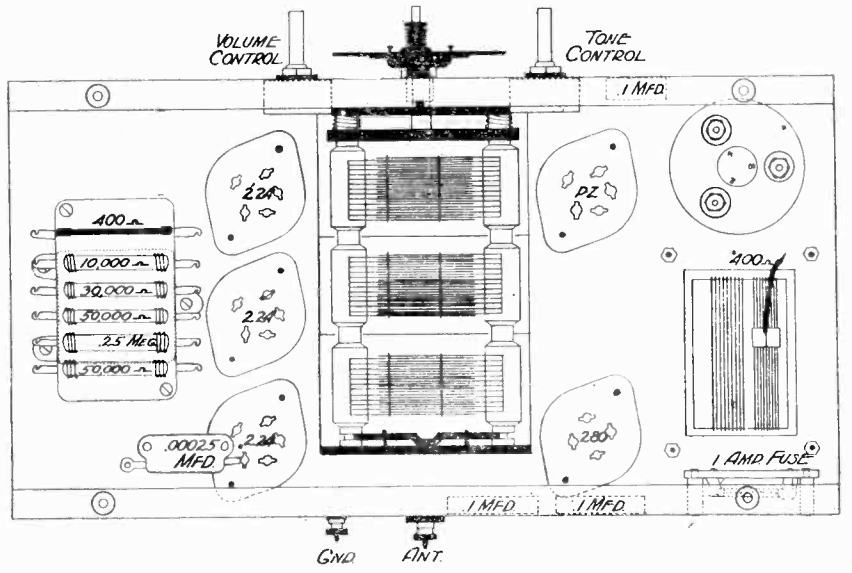
YELLOW - SHIELD GRID - PLATES OF RECTIFIER - PLATE A.F.

BLACK - FILAMENT - LINE SWITCH - DETECTOR CATHODE GROUND SPEAKER FRAME

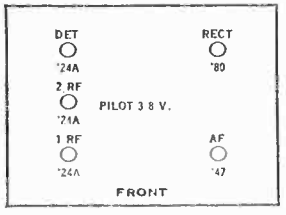
VOLTAGE TABLE

LINE 115 V. 60 CYCLE

TUBE	POSITION	FIL. V	GRID V.	PLATE V.	S.G. VOLTS
224	1ST R.F.	2.3	3-9	160-185	85-125
224	2ND R.F.	2.3	3-9	160-185	85-125
224	DET.	2.3	48-8	75-115	85-125
PZ	POWER	2.4	16	230	240
280	RECTIFIER	4.9		400	



Model 11 (1931)



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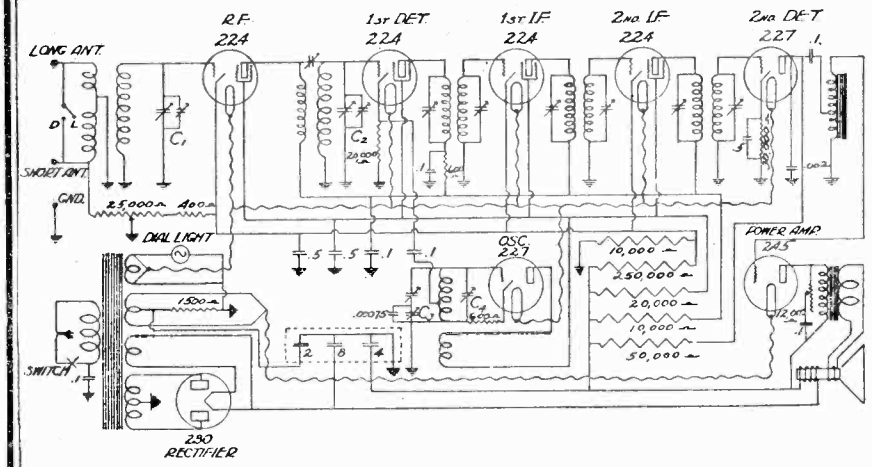
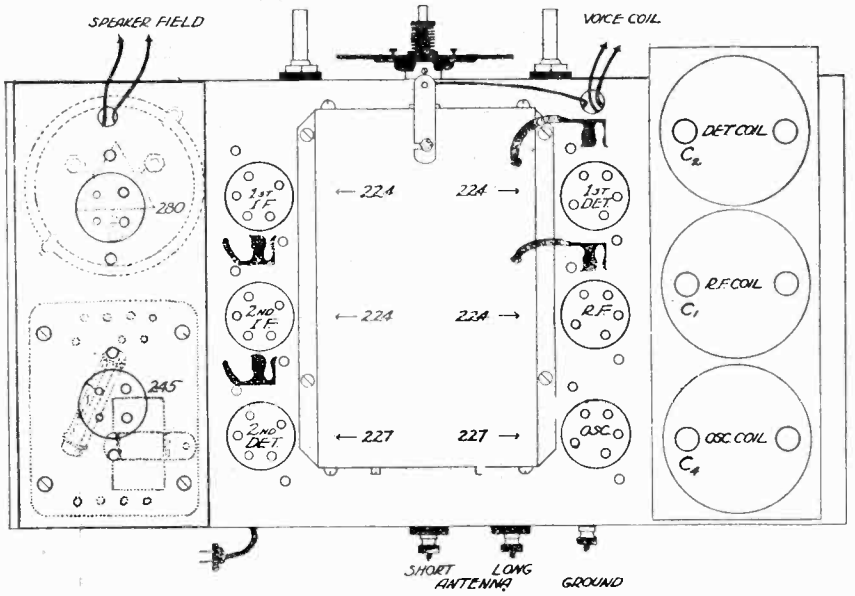




WIRE COLOR CODE

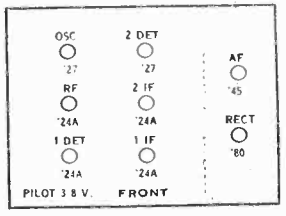
RED - FIL. RECT. - KATHODE I.F. - R.F. - +B 1st DET. - +B POWER AMP. - +B OSCILLATOR - SPEAKER FLD. - ANTENNA
BLUE - FIL. POWER TUBE - PLATE R.F. - PLATE OSC. - PLATE 2nd DET.
GREEN - GRID POWER AMPLIFIER
BROWN - FIL. R.F. - FIL. I.F. TUBES - FIL. DETECTORS
BLACK - KATHODE 2nd DET. - PLATE POWER AMPLIFIER - GROUND - VOICE COIL
YELLOW - SHIELD GRID - PLATE RECTIFIER - +B I.F.

VOLTAGE TABLE

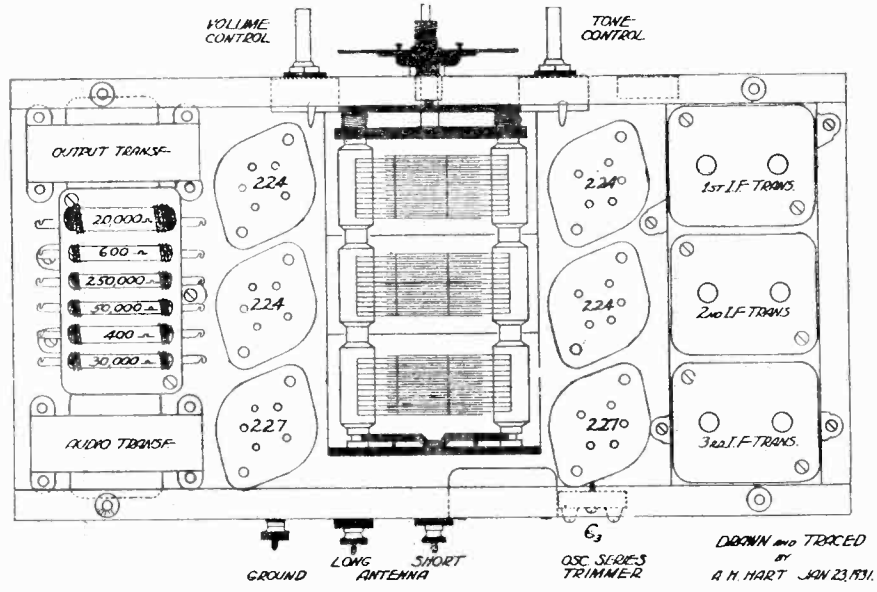
LINE 120 V. 60 CYCLE

TUBE	POSITION	FIL. V	GRID V	PLATE V	SG. VOLTS
224	R.F.	2.4-2.5	3-11	200-275	80-100
224	1st DET.	2.4-2.5	6-10	200-275	80-100
224	1st I.F.	2.4-2.5	3-11	200-275	80-100
224	2nd I.F.	2.4-2.5	3-11	200-275	80-100
227	2nd DET.	2.4-2.5	25-30	180-200	
227	OSC.	2.4-2.5	3-4	80-100	
245	POWER TUBE	2.4	40-50	205-220	
280	RECTIFIER	4.9		380	

Model 17 (1931)



IF PEAK 180 KC



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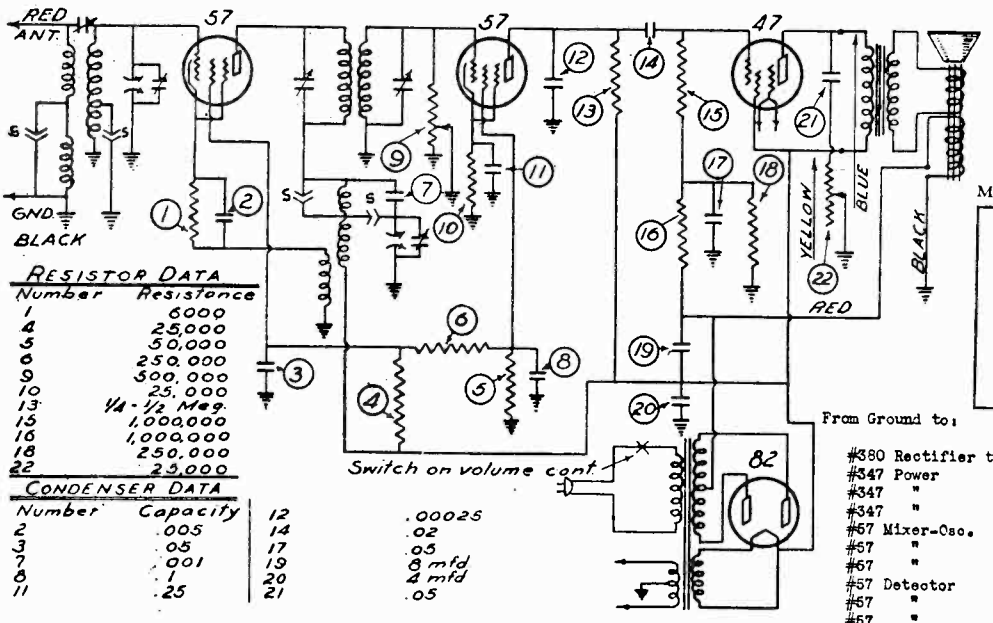
MODEL 21-3
MODEL 26 AC-DC

REMLER COMPANY, LTD.



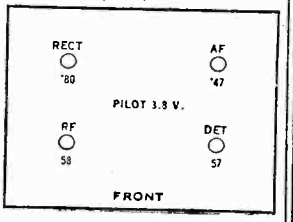
RESISTOR DATA

Number	Resistance
1	6000
4	25,000
5	50,000
6	250,000
9	500,000
10	25,000
13	½ - ½ Meg.
15	1,000,000
16	1,000,000
18	250,000
22	25,000

CONDENSER DATA

Number	Capacity	Number	Capacity
2	.005	12	.00025
3	.05	14	.02
7	.001	17	.05
8	.1	19	8 mfd
11	.25	20	4 mfd
		21	.05

Model 21-3 (1932)



From Ground to:

#380 Rectifier tube	filament	--	270 volts
#347 Power "	screen grid	--	270 "
#347 "	plate	--	265 "
#347 "	grid	--	17 "
#57 Mixer-Osc.	plate	--	270 "
#57 "	screen grid	--	215 "
#57 "	kathode	--	12 "
#57 Detector	plate	--	130 "
#57 "	screen grid	--	30 "
#57 "	kathode	--	3½ "

Due to small current, meter readings will be inaccurate on detector plate and power tube grid.

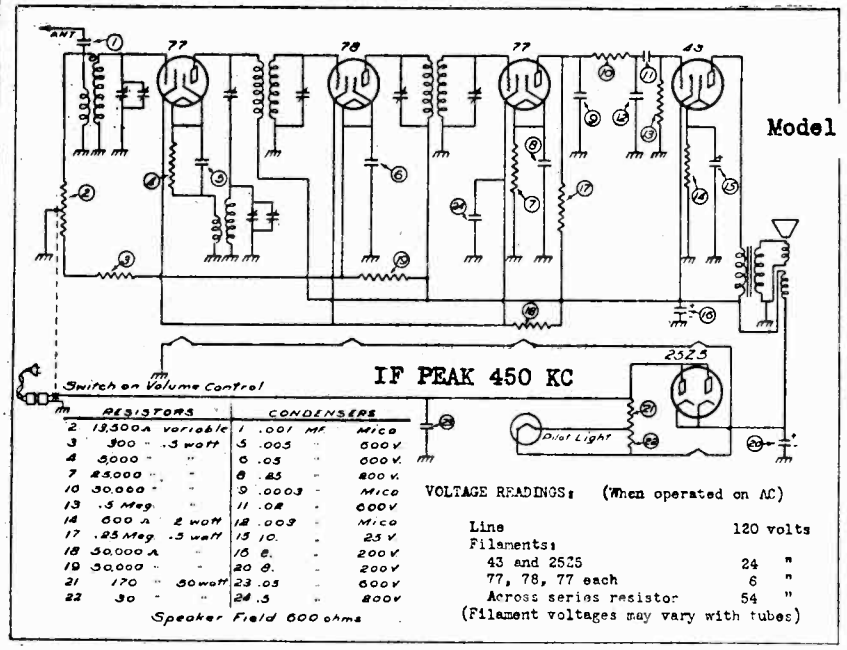
Speaker field (red lead) -- 80 volts negative.

IF PEAK 250 KC

Model 21-3

A.C. VOLTAGES:

Line	--	118 volts
Heater filaments	--	2.3 "
Power tube filament	--	2.3 "
Rectifier filament	--	5.0 "



Model 26

IF PEAK 450 KC

RESISTORS			CONDENSERS		
2	13,500Ω	variable	1	.001 MF	MICA
3	300 "	.3 watt	5	.005 "	600 V
4	5,000 "	"	6	.05 "	600 V.
7	85,000 "	"	8	.85 "	600 V.
10	30,000 "	"	9	.0003 "	MICA
13	.5 Meg.	"	11	.02 "	600V
14	600 Ω	2 watt	12	.003 "	MICA
17	.25 Meg	.3 watt	15	10. "	25 V
18	30,000 Ω	"	16	8. "	200V
19	30,000 "	"	20	8. "	200V
21	170 "	30 watt	23	.05 "	600V
22	30 "	"	24	.5 "	200V

Speaker Field 600 ohms

VOLTAGE READINGS: (When operated on AC)

Line	120 volts
Filaments:	
43 and 2525	24 "
77, 78, 77 each	6 "
Across series resistor	54 "

(Filament voltages may vary with tubes)

DC Voltages - On full volume - No signal

From Chassis to:-

2525	Rectifier tube cathode	140 volts	
43	Power " plate	123	"
43	" screen grid	124	"
43	" cathode	16	"
77	Mixer Osc. plate	123	"
77	" screen grid	73	"
77	" cathode	5	"
78	I.F. plate	123	"
78	" screen grid	73	"
78	" cathode	4	"
*77	Detector plate	50	"
77	" screen grid	73	"
77	" cathode	5	"

*Due to small current, meter readings will be inaccurate on detector tube plate.

DC voltage readings when connected to a DC source of 120 volts will be slightly less than those above.

INSTALLATION:

This set is designed to operate from a power supply of 110 to 125 volts AC or DC. Best results will be obtained when connected to a twenty foot antenna attached to the black wire extending from the back of the cabinet. No ground connection is provided.

SERVICE DATA:

The plate supply is rectified directly from the power source and the filaments of the tubes are connected in series and thru a series resistor to this source. The chassis is directly connected to the power line, and contact between chassis and ground should be avoided.

To take the chassis out of the cabinet, first, remove the knobs, then the back, and finally the hold down screw in the base of the cabinet. To replace tubes it is only necessary to remove the back.

The back may be plugged on the chassis after removal from the cabinet for testing and aligning.

The mixer coil is in the aluminum shield can in back of the variable condenser and is trimmed by the back section trimmer on the variable condenser.

The oscillator coil is inside the chassis and is trimmed with the front section trimmer on the variable condenser.

Mounted inside the oscillator coil is the first I.F. coil which is trimmed by the condensers accessable from the back of the chassis.

The second I.F. transformer is also located within the chassis and may be trimmed by the condensers located under the holes in the chassis bottom.

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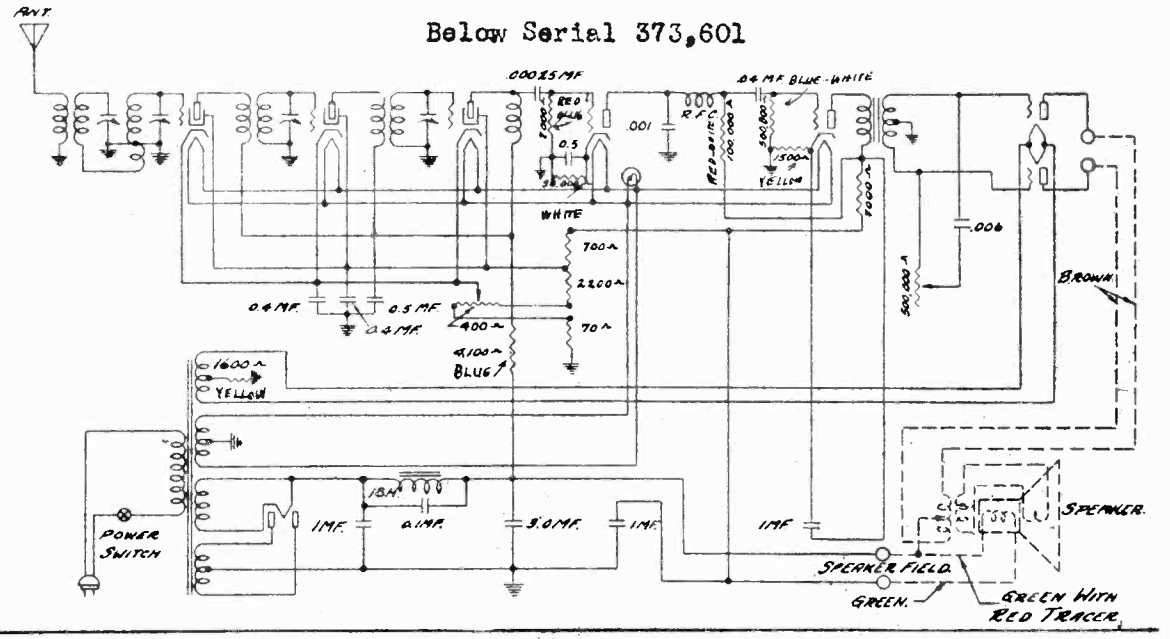
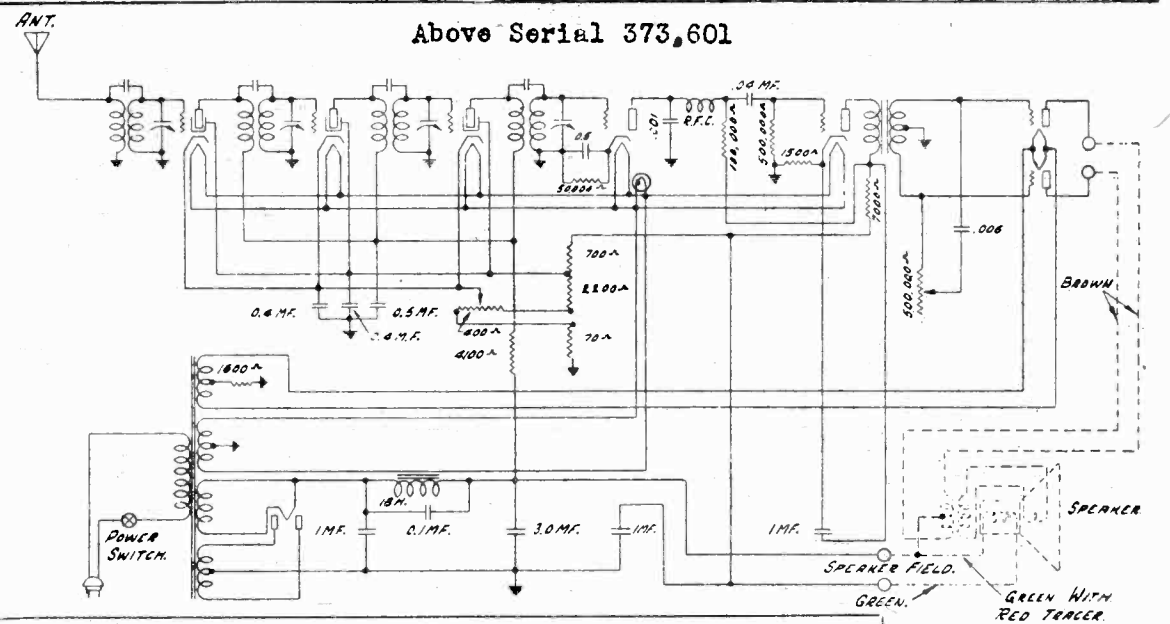
RADIOTROPE

MODEL S-2
Two Types

Below Serial 373,601



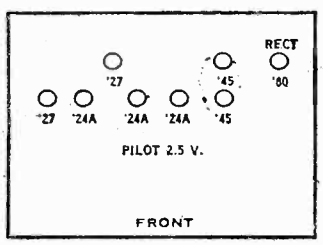
Above Serial 373,601



DOTTED LINES SHOWN ARE IN SPEAKER.

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

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Volts*	*Screen Current MA*	*Cathode Volts*	*Plate MA*	*Grid Test MA*
224	1	1st Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
224	2	2nd Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
224	3	3rd Radio	2.25	180	3.0	90	.6	3.0	3.4	5.8
227	4	Detector	2.25	60	8			8	.2	.3
227	5	1st Audio	2.25	90	6			6	3.5	4.5
245	6	2nd Audio	2.35	185	40				12.5	15.0
245	7	2nd Audio	2.35	185	40				12.5	15.0
280	8	Rectifier	5.0						38 Per Plate	



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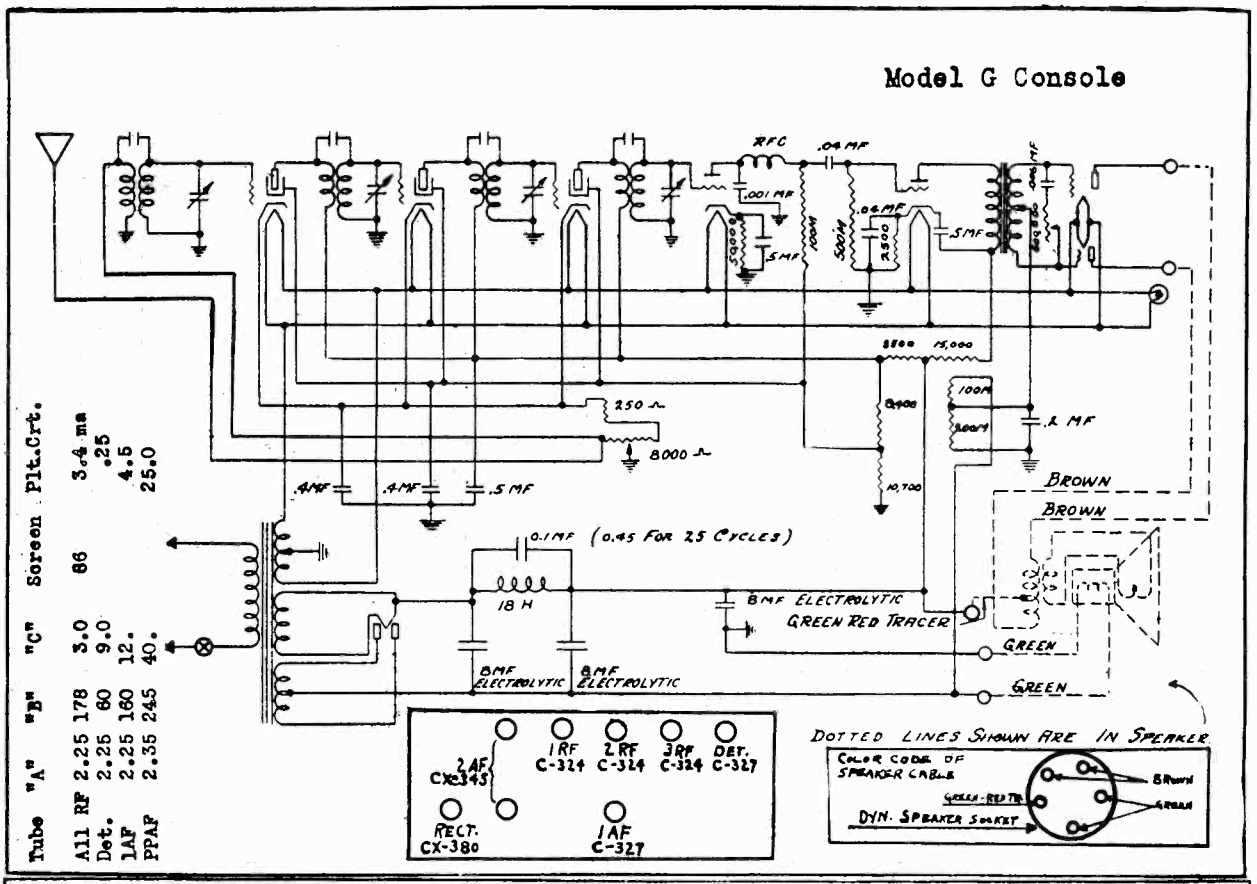
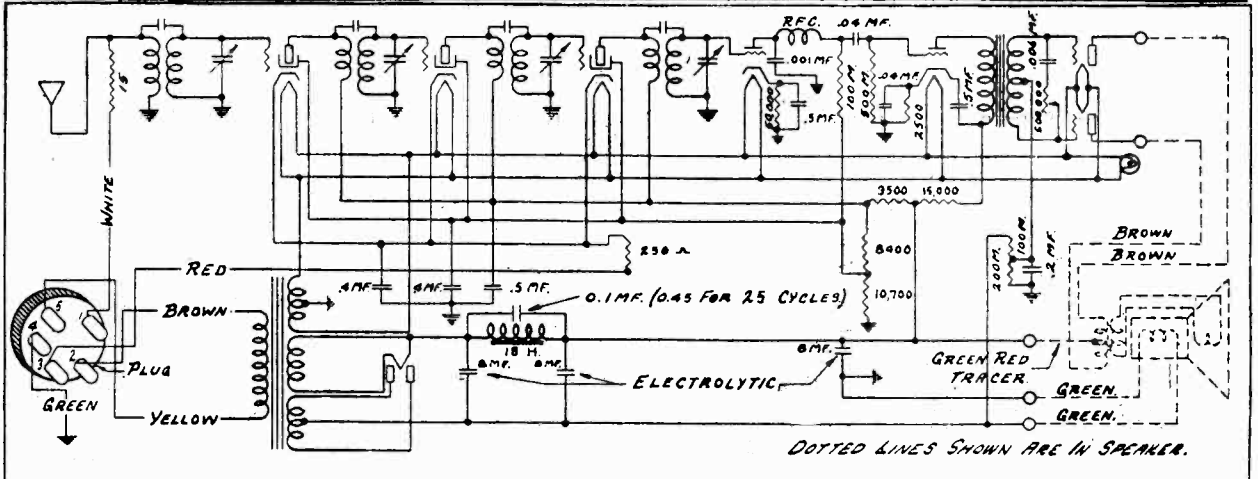
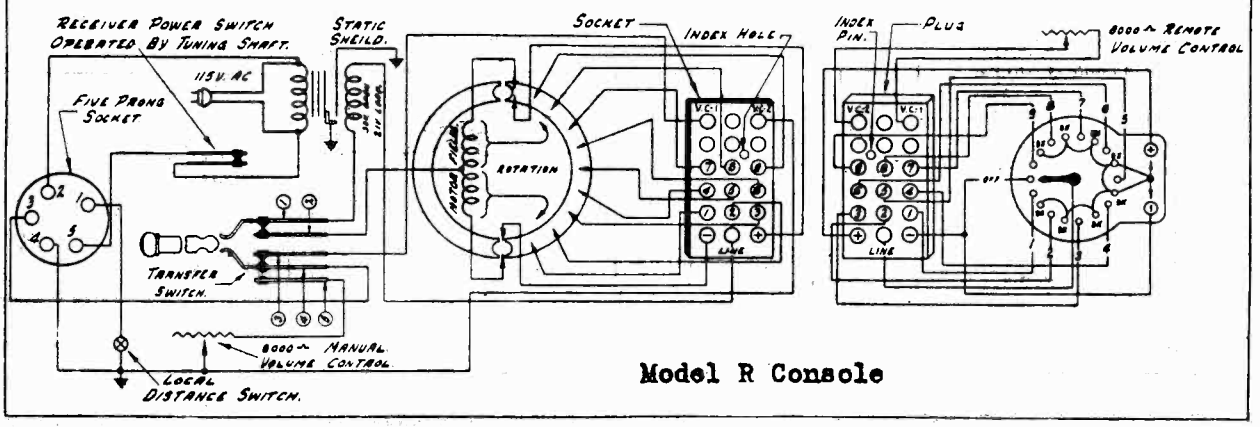
MODEL G Console
MODEL R Console

RADIOTROPE

Model G Console







Model R Console

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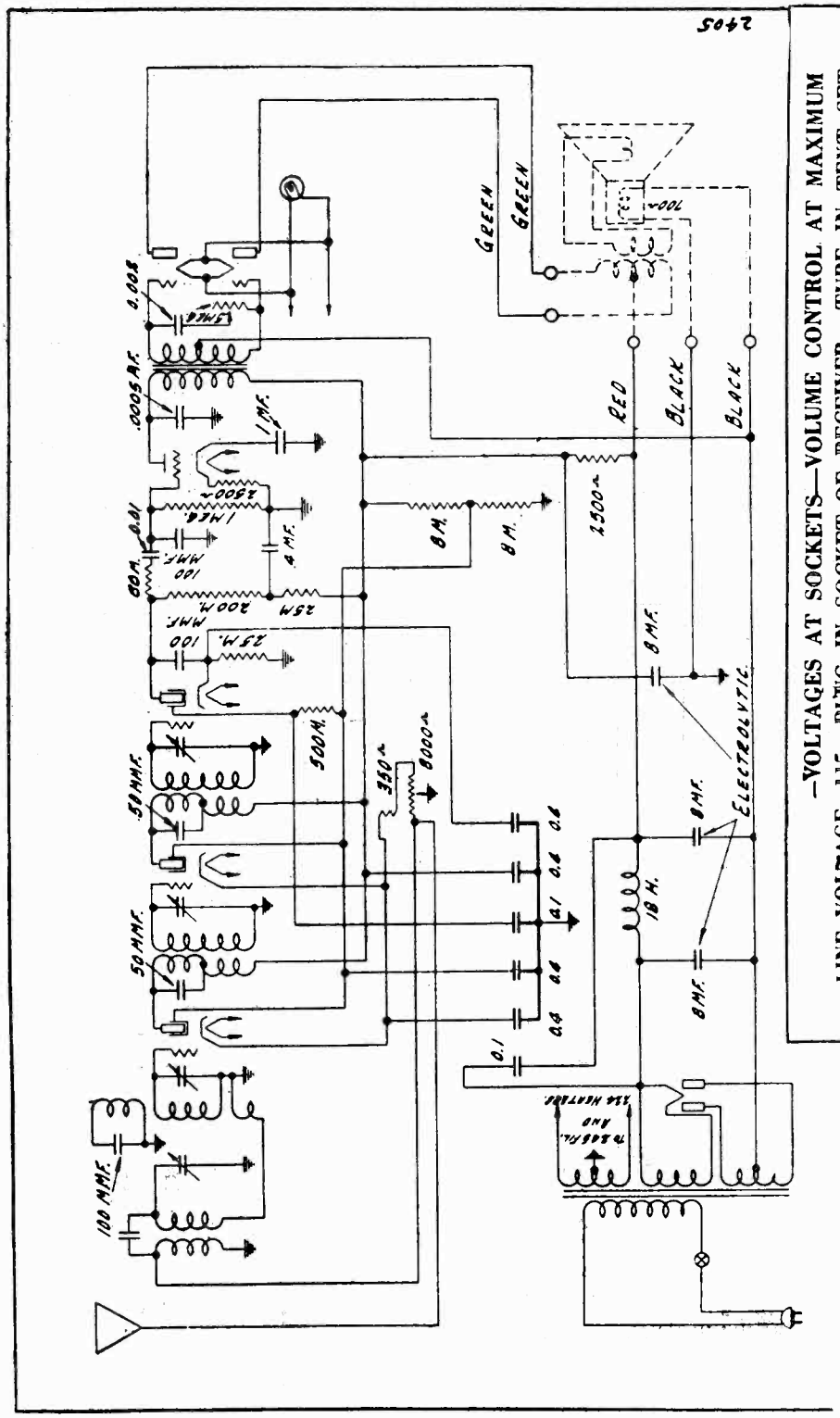
MODEL 62,64

RADIOTROPE



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

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

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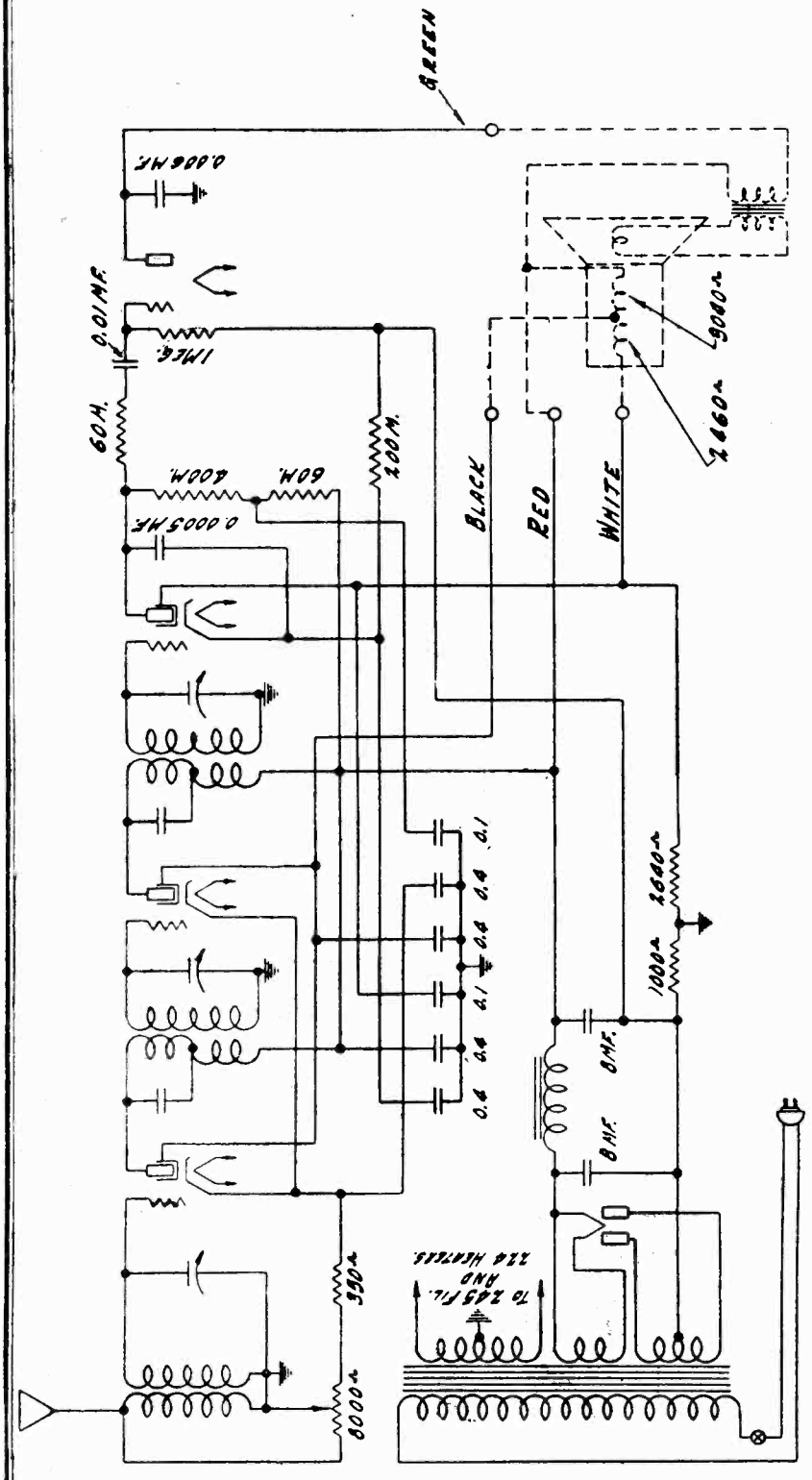
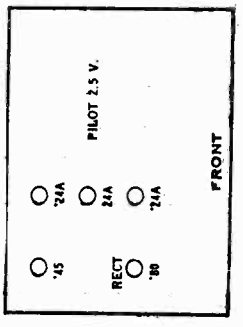
MODEL 74-R (1st Type)

RADIOTROPE





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

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Radio	2.2	245	2.5	80	.6	2.5	2.9	5.1
224	2	2nd Radio	2.2	245	2.5	80	.6	2.5	2.9	5.1
224	3	Detector	2.2	130	3.	40	.1	3.	.25	.4
245	4	Audio	2.35	245	50.				28.	31.
280	5	Rectifier	4.6						25. Per Plate	

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