PHILCO

REG. U.S. PAT. OFF

Service Bulletin — No. 146

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.

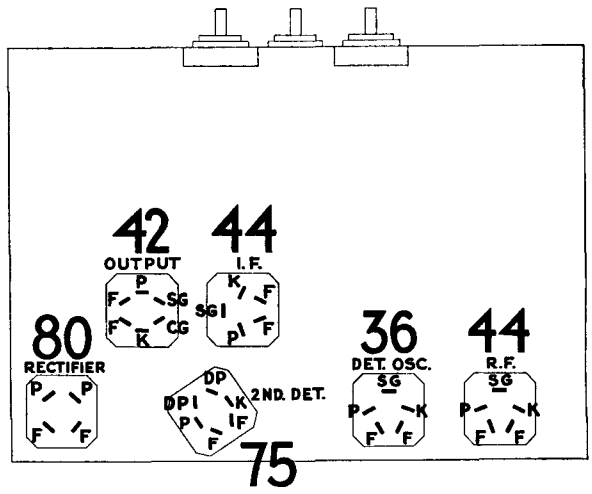
Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

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.

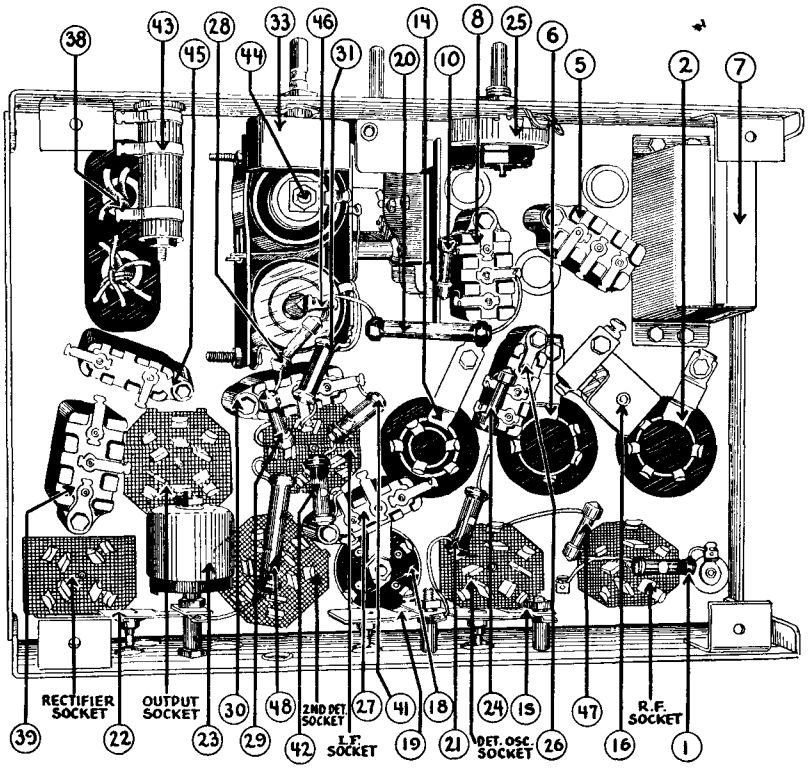


Figure 2—Bottom View of Chassis, Showing Parts

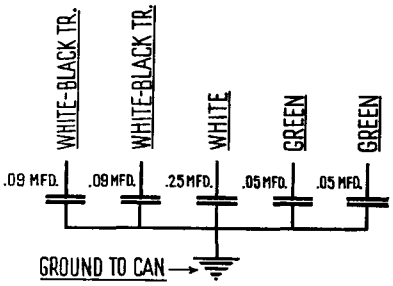


Figure 3—Internal Connections Filter Condenser.

Adjustment of Models 89 and 19

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

Models 89 and 19

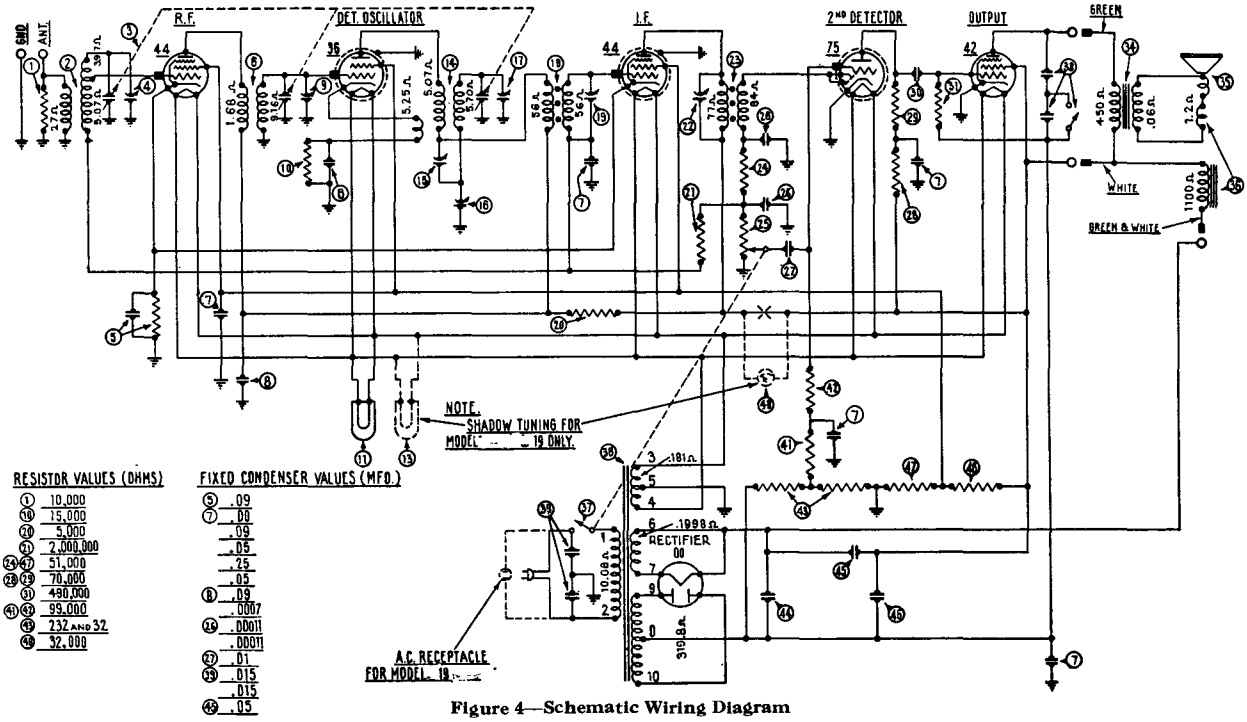


Figure 4—Schematic Wiring Diagram

Replacement Parts for Models 89 and 19

①	Resistor (10,000 Ohms) Brown—Black—Orange	4412
②	Antenna Transformer	06619
③	Tuning Condenser Assembly	06577
④	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑤	Condenser and Resistor—(.09 Mfd. and 200Ω)	4989-W
⑥	Interstage Transformer	06662
⑦	Filter Cond. Bank (.09—.09—.05—.05—.25)	06624
⑧	Condenser (Double—.09 and .0007 Mfd.)	8174-B
⑨	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑩	Resistor (15,000 Ohms) Brown—Green—Orange	6208
⑪	Pilot Lamp	6608
⑫	Dial Scale	7882
⑬	Pilot Lamp—(Shadow Tuning)	6608
⑭	Oscillator Transformer	06620
⑮	Compensating Condenser — (1st I.F. Primary)	04000-M
⑯	Compensating Condenser — (Low Frequency	04000-S
⑰	Compensating Condenser—(R.F. Part of Tuning Condenser Assembly)	
⑱	First I.F. Transformer	06621
⑲	Compensating Condenser (1st I.F. Secondary)	04000-M
⑳	Resistor (5,000 Ohms) Green—Black—Red	3526
㉛	Resistor (2,000,000 Ohms) Red—Black—Green	5872
㉒	Compensating Cond. (2nd I.F. Primary)	04000-A
㉛	Second I.F. Transformer	06622
㉔	Resistor (51,000 Ohms) Green—Brown—Orange	6098
㉕	Volume Control and A.C. Switch	8003
㉙	Condenser (Double—.00011 & .00011 Mfd.)	8035-C
㊲	Condenser (.01 Mfd.)	3903-AB
⑳	Resistor (70,000 Ohms) Violet—Black—Orange	5385
㉙	Resistor (70,000 Ohms) Violet—Black—Orange	5385
㉙	Condenser (.01 Mfd.)	3903-T
㉛	Resistor (490,000 Ohms) Yellow—White—Yellow	4517
㉜	Bezel	8055
㉝	Tone Control	06764
㉞	Output Transformer	2580
㉟	Voice Coil and Cone Assembly	02823
㉟	Speaker Field and Bucking Coil Assembled with Pot (K-7)	02761
㊲	Switch (A.C.) Part of Vol. Control Assembly	
㊳	Power Transformer (50-60 Cycles, 115 Volts)	8046
	Power Transformer (25-40 Cycles—115 Volts)	8047
	Power Transformer (50-60 Cycles—230 Volts)	8048
㉙	Condenser (Double—.015 and .015 Mfd.)	3793-E
㊵	Shadow Tuning	6497-G
㊶	Resistor (99,000 Ohms) White—White—Orange	4411
㊷	Resistor (1,000,000 Ohms) Brown—Black—Green	4409
㊶	B.C. Resistor (235 Ohms and 32 Ohms—Wire Wound)	7998
㊹	Electrolytic Condenser—6 Mfd.	8165
㊶	Condenser (.05 Mfd.)	3615-E
㊻	Electrolytic Condenser—6 Mfd.	8166
㊼	Resistor (51,000 Ohms) Green—Brown—Orange	4518
㊽	Resistor (32,000 Ohms) Orange—Red—Orange	3525
	Tube Shield	8005
	Knob (Large)	03063
	Knob (Small)	03064
	Knob Spring	5262
	Grid Clip	4897
	Four Prong Socket	7544
	Five Prong Socket	7546
	Six Prong Socket	7547
	Pilot Lamp Shield	5760

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PHILCO RADIO & TELEVISION CORPORATION
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BULLETIN No. 146B

For Members of
RADIO MANUFACTURERS SERVICE
A PHILCO SERVICE PLAN

Model 89 (Code 123)

Features

TYPE CIRCUIT: Superheterodyne.

BANDS: Two.

BAND COVERAGE: Number one—550 to 1500 K. C.; number two—1.5 to 3.2 M. C.

NUMBER OF TUBES: Six.

NUMBER OF ACTUAL TUBE FUNCTIONS: Nine.

FUNCTION AND RESPECTIVE CIRCUIT LOCATION OF TUBES: 1 type 44, R. F. amplifier; 1 type 77, 1st detector and oscillator; 1 type 44, I. F. amplifier; 1 type 75, 2nd detector, 1st audio and automatic volume control; 1 type 42, output; 1 type 80 rectifier.

POWER SUPPLY: 115 volts, alternating current.

CURRENT CONSUMPTION: 60 watts.

SPEAKER: K-21.

TONE CONTROL: 2 point.

INTERMEDIATE FREQUENCY: 260 K. C.

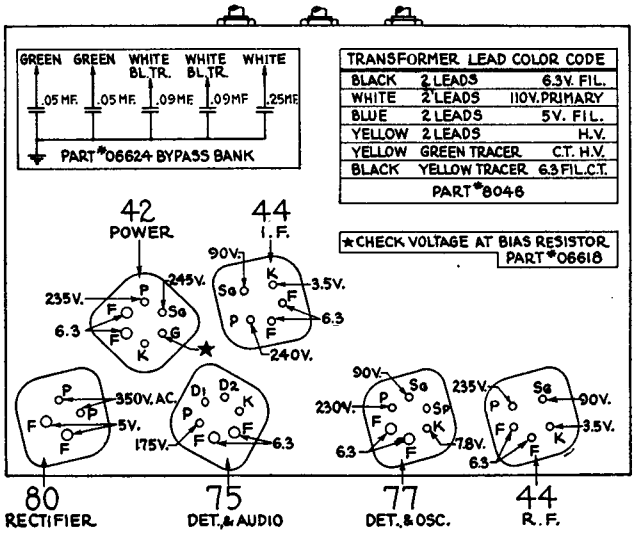

Fig. 1. Bottom View of Tube Sockets (Showing Voltages)

Description

The **PHILCO Model 89,** code 123, is of advanced design, incorporating a highly selective and very efficient R. F. Preamplifier, using the type 44 high mu tube.

The 1st detector and oscillator are combined in one tube, a type 77. The design of the oscillator circuit is such that changes in climatic conditions do not affect its stability. A single intermediate frequency stage designed around the high gain type 44 tube is used, insuring a maximum of power; a saving of two tubes is accomplished in the second detector unit by using a type 75 tube. This tube is a combination diode, triode; the diode functioning as a detector and automatic volume control and the triode as a separate audio amplifier.

The power or output stage uses a type 42 (6.3 fil.) pentode and is capable of delivering 3 watts undistorted output.

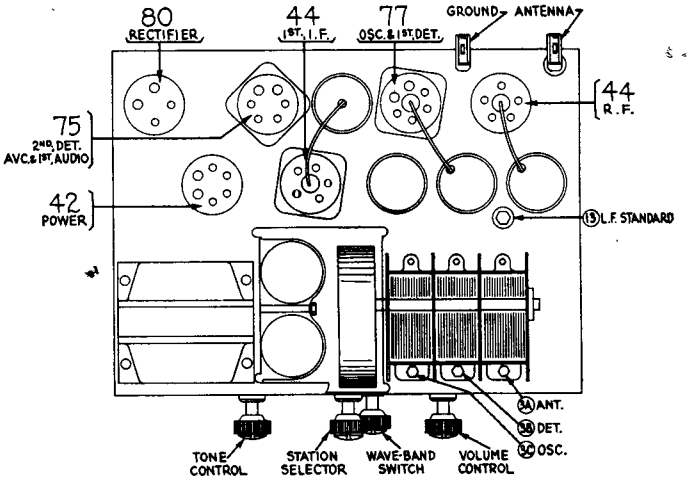

Fig. 2. Location of Compensating Condensers

Adjusting Compensating Condensers

Adjustment of compensating condensers in the Model 89 requires an accurate signal generator covering the intermediate frequency as well as the standard broadcast range. The **PHILCO Model 088** or **024** can be used for this purpose.

Some instrument for measuring the output of the receiver while adjustments are being made is necessary. The **PHILCO 025 Circuit Tester** incorporates an output meter that is ideal for this purpose.

A **PHILCO No. 3164 Fibre Wrench** completes the equipment needed.

The location of the various compensating condensers is shown in Fig. 2 and Fig. 3. Connect the output meter to the plate and cathode terminals of the type 42 power tube, using the adapters provided with the "025" and set it for the 0–30 volt range.

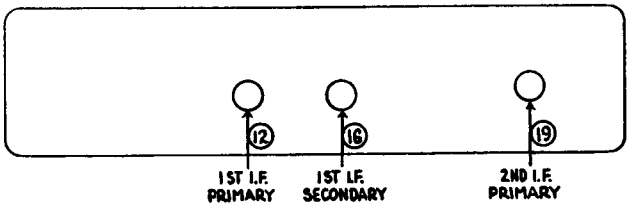

Fig. 3. I. F. Padder View from Rear of Chassis

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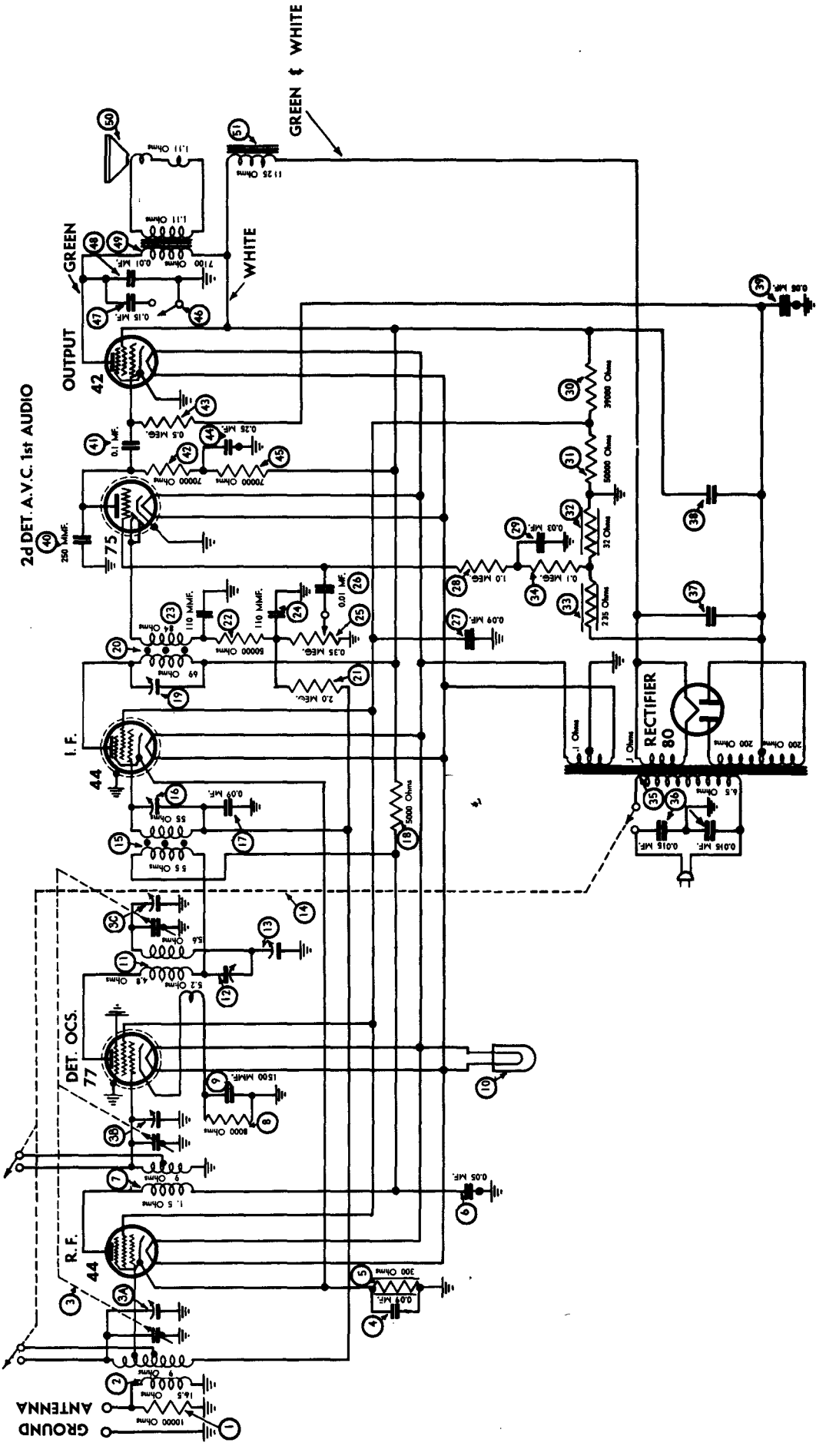

Fig. 3. Schematic Diagram of Model 89 (Code 123)

Replacement Parts for Model 89 (Code 123)

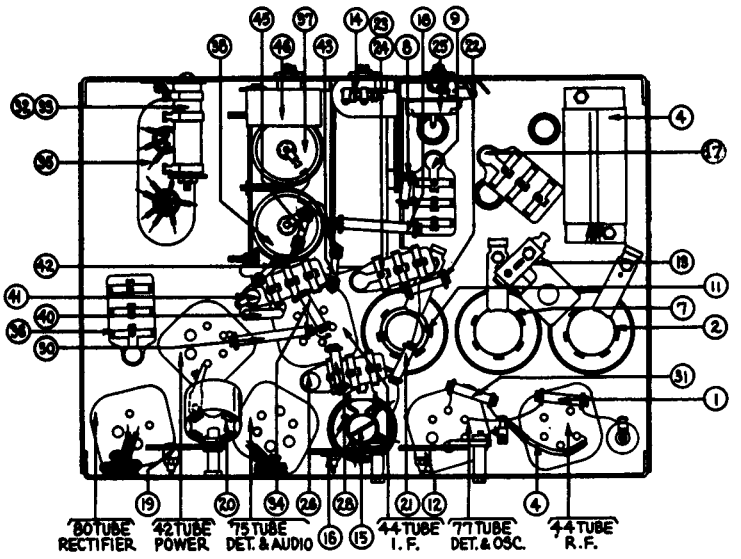

Fig. 5. Bottom View of Chassis

	Description	Part No.	List Price
①	Resistor (10,000 ohms)	4412	$0.20
②	Antenna Transformer	32-1062	.70
③	Tuning Condenser Gang	31-1053	4.80
③a	Compensator (Antenna)	Part of ③	....
③b	Compensator (R. F.)	Part of ③	....
③c	Compensator (Osc.)	Part of ③	....
④	Condenser (.09–.05–.09–.05–.25 mf.)	06624	.90
⑤	Resistor (300 ohms)	33-3010	.20
⑤	Condenser (0.05 mf.)	Part of ④	....
⑦	Detector Coil	32-1063	.50
⑧	Resistor (8,000 ohms)	33-1114	.20
⑨*	Condenser (.0015 mf. and .05 mf.)	3615-XG	.40
⑱	Pilot Light	6608	.09
⑪	Oscillator Coil	06620	.90
⑫	Compensating Condenser (Pri. 1st I. F.)	31–6024	.25
⑬	Compensating Condenser (L. F. Series)	04000-S	.35
⑭	Waveband Switch	42-1016	1.25
⑮	1st I. F. Transformer	32-1289	.60
⑯	Compensating Condenser (1st I. F. Sec.)	04000-M	.20
⑰	Condenser (0.09 mf.) (Twin)	4989-DG	.40
㊳	Resistor (5,000 ohms)	3526	.20
㉙	Compensating Condenser (2nd I. F. Pri.)	04000-A	.15

*The .05 mf. section connects the same as condenser ⑧.

	Description	Part No.	List Price
⑳	2nd I. F. Transformer	06622	$1.20
㉑	Resistor (2.0 meg.)	5872	.20
㉒	Resistor (50,000 ohms)	4518	.20
㉑	Condenser (.00011 mf.)	8035-DG	.25
㉔	Condenser (.00011 mf.)	Part of ㉑	....
㉟	Volume Control, On-Off Switch	33-5004	1.45
㉖	Condenser (0.01 mf.)	3903-SU	.25
㉗	Condenser (0.09 mf.)	Part of ④	....
㉘	Resistor (1.0 meg.)	4409	.20
㉘	Condenser (0.09 mf.)	Part of ⑰	....
㉚	Resistor (39,000 ohms)	33-1027	.20
㉛	Resistor (50,000 ohms)	4518	.20
㉒	B. C. Resistor (32 ohms)	7998	.20
㉒	B. C. Resistor (235 ohms)	Part of ㉒	....
㉞	Resistor (100,000 ohms)	4411	.20
㉟	Power Transformer	8046	3.50
㊱	Condenser (0.015–0.015 mf.)	3793-DG	.40
㊲	Condenser (Electrolytic) (8 mf.)	7558	1.25
㊳	Condenser (Electrolytic) (8 mf.)	7558	1.25
㊱	Condenser (0.05 mf.)	Part of ④	....
㊵	Condenser (250 mmf.)	5858	.25
㊶	Condenser (0.01 mf.)	3903-SU	.25
㊷	Resistor (70,000 ohms)	5385	.20
㊷	Resistor (500,000 ohms)	4517	.20
㊹	Condenser (0.25 mf.)	Part of ④	....
㊺	Resistor (70,000 ohms)	5385	.20
㊶	Tone Control	06764	.50
㊼	Condenser (0.015 mf.)	Part of ㊵	....
㊵	Condenser (0.01 mf.)	Part of ㊵	....
㊾	Output Transformer	2580	1.00
㊽	Replacement Cone Assembly (K-21)	36-3159	.80
㊶	Replacement Field Coil Assembly (K-21)	36-3245	4.00
	I. F. Shield	4450	.15
	R. F. Shield	5084	.15
	R. F. Shield	8000	.12
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Speaker Cable	02720	.35
	Drive Cord Spring	7776	2.00C
	Drive Cord	31-1457	.10
	Dial Hub and Scale	31-1590	.40
	Bezel	27-4113	.20
	Bezel Screws	W841B	.50C
	Knob (Tuning)	27-4051	.10
	Knob (Volume, Tone, Wave Switch)	27-4052	.10

(Continued from first page)

I.F.—Set the signal generator at 260 K. C. and attach its antenna lead to the grid of the type 44 I.F. tube. Connect the ground lead of signal generator to the ground post of chassis. Turn the dial of the set to 540 K. C. and the volume control to the extreme right (maximum). Wave band switch in No. 1 position (left), tone control also in No. 1 position (left), adjust the signal generator attenuator for approximately ¼ scale reading on output meter. Using the fibre tuning wrench adjust condenser 19 (2nd I.F.) for maximum output meter reading. Remove the signal generator antenna lead from the grid of the 44 I.F. tube and connect it to the grid (removing grid clip), of the type 77, 1st detector and oscillator tube. Adjust the signal generator attenuator as before for ¼ scale output meter reading. With the fibre tuning wrench adjust condensers 16 and 12 (1st I.F.) for maximum output meter reading.

STANDARD (broadcast) and POLICE: Remove the antenna lead of the signal generator from the grid of the type 77 tube (replacing grid clip) and attach it to the antenna post on the chassis. Set the signal generator at 1500 K. C. and tune the set to 150 (1500 K. C.). Adjust signal generator attenuator as before for ¼ scale output meter reading. With the fibre tuning wrench adjust condensers 3A, 3B and 3C, for maximum output meter reading. Set the signal generator at 550 K. C. and tune the set to 55 (550 K. C.) adjust condenser 13 for maximum output meter reading. Readjust condenser 3C at 1500 K. C. During adjustments keep the output meter reading approximately ¼ scale to insure proper peaking of transformers.

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