PHILCO

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Service Bulletin — No. 193

Model 144

Philco Model 144 is a six-tube superheterodyne receiver operating on alternating current (A. C.) and designed for reception of any frequency from 520 K.C. to 23,000 K.C. (23 megacycles). It is equipped with shadow-tuning, four-point tone-control with fixed bass compensation; Model 144 has 5 watts output. The intermediate frequency (I. F.) is 460 K.C. Tubes used are the following Philco high-efficiency types:—

Detector-Oscillator	Type 6A7
1st I. F.	Type 78
2nd I. F.	Type 78
2nd Detector 1st A. F.	Type 75
Output	Type 42
Rectifier	Type 80

The power consumption of model 144 is 70 watts.

Tube Socket Voltages—Line Voltage 115

CIRCUIT	Det.-Osc.	1st I. F.	2nd I. F.	A. F.	Output	Rectifier
TUBE	6A7	78	78	75	42	80
Filament Volts (F-F)	6.3	6.3	6.3	6.3	6.3	5.0
Plate Volts (P-K)	250	230	230	185	300	350
Screen Grid Volts (SG-K)	60	75	75	...	310	...
Cathode Volts (K-Gnd)	1.4	2	2	0	0	...
6A7—G2 to K	160	...	...	...	...	...
6A7—G1 to K	20	...	...	...	...	...

Above values were obtained by means of an A. C. voltmeter for filament voltages and a high resistance D. C. voltmeter for all others. All values obtained from underside of chassis with test prods. Positions of controls were: Volume Control—maximum; Wave-Band Switch—extreme left (counter-clockwise); Dial at 520 K.C.

Philco Model 048 All-Purpose Tester is recommended for making the above tests. Use the illustration below (Fig. 1) as a guide to determine the points to be voltage-tested.

Power Transformer Voltages

Terminals	A. C. Volts	Circuit	Color of Leads
1–2	120	Primary	White
3–4	6.3	Filaments	Black
6–7	5.0	Filament of 80	Blue
8–10	746	Plates of 80	Yellow
5	...	Center tap of 3–4	Black—Yellow tracer
9	...	Center tap of 8–10	Yellow—Green tracer

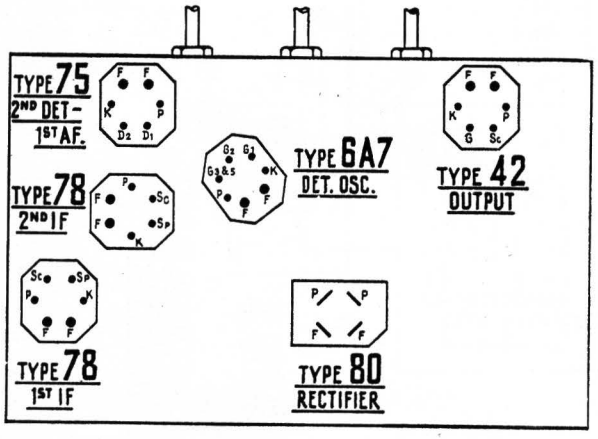

Fig. 1—Tube Sockets (underside)

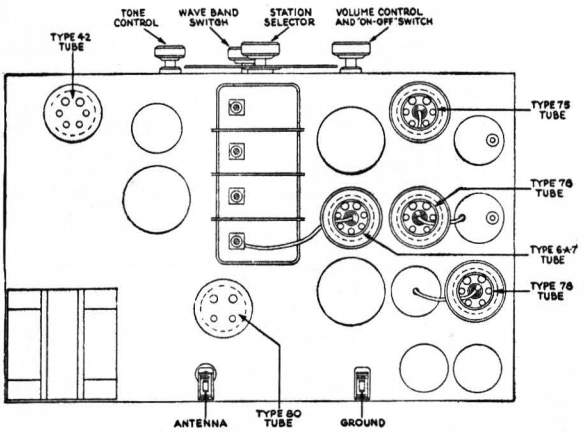

Fig. 2—Chassis—Top View

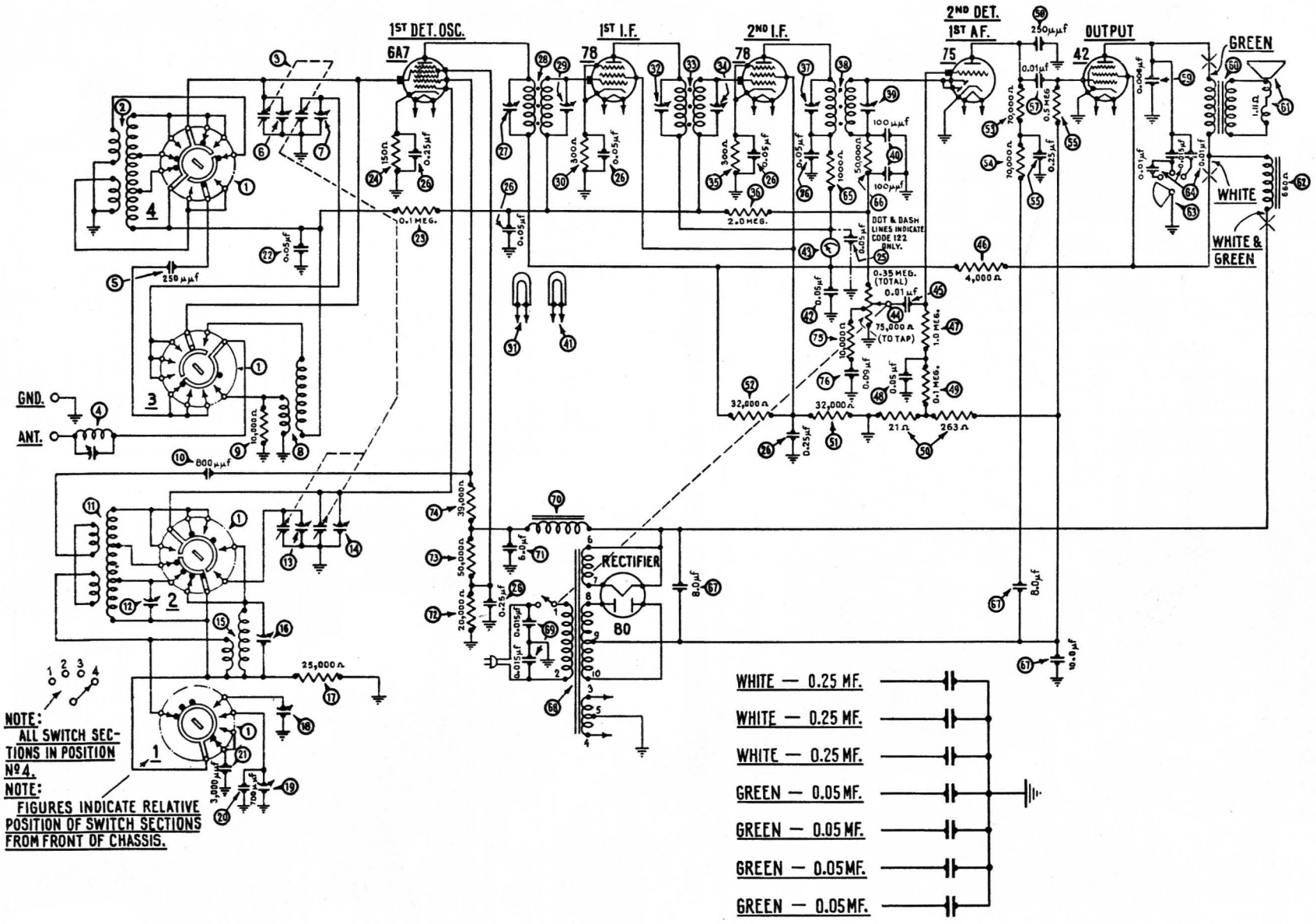

Fig. 3—(Schematic Diagram)

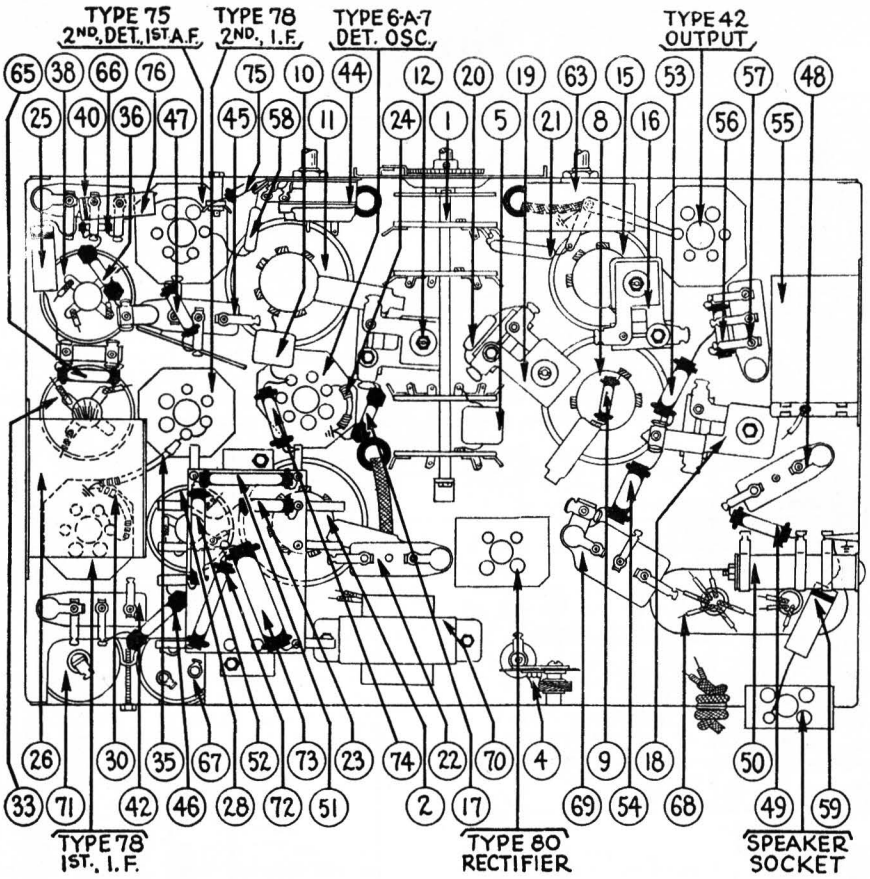

Fig. 4—(Base View)

REPLACEMENT PARTS — MODEL 144

Nos. on Diagram	Description	Part No.	List Price
1	Wave-Band Switch	42-1045	$3.60
2	Antenna Transformer (H. F. Bands)	32-1271	.70
3	Tuning Condenser Assembly	31-1175	....
4	Wave Trap	38-5487	.55
5	Condenser (.00025 Mica)	3082	.35
6	Compensating Condenser (Ant. H. F.)	Part of 3	....
7	Compensating Condenser (Ant. Broadcast)	Part of 3	....
8	Antenna Transformer (Broadcast Band)	32-1270	.55
9	Resistor (10,000 ohms) (Brown-Black-Orange)	33-1000	.25
10	Condenser (.0008 Mfd. Mica)	6021	.35
11	Oscillator Transformer (H. F. Bands)	32-1273	.35
12	Compensating Condenser (Range 2)	04000C	.15
13	Compensating Condenser (Osc. Range 4)	Part of 3	....
14	Compensating Condenser (Osc. Range 3)	Part of 3	....
15	Oscillator Transformer (Broadcast)	32-1272	.70
16	Compensating Condenser (Osc. Broadcast)	04000A	.15
17	Resistor (25,000 ohms) (Red-Green-Orange)	33-1013	.25
18	Compensating Condenser (Broadcast Series)	04000S	.35
19	Compensating Condenser (Range 2; Series)	04000R	.45
20	Condenser (.0007 Mfd. Mica)	4520	.35
21	Condenser (.003 Mfd. Mica)	7301	.45
22	Condenser (.05 Mfd. Bakelite Block)	3615-L	.35
23	Resistor (100,000 ohms) (White-White-Orange)	4411	.25
24	Resistor (150 ohms Flexible Wire-Wound)	33-3140	.20
25	Condenser (.05 mfd. tubular) (Used in Code 122 only)	30-4123	.35
26	Condenser Block (.25, .25, .25, .05, .05, .05, .05)	30-4167	1.15
27	Compensating Condenser (1st I. F. pri.)	Part of 28	....
28	1st I. F. Transformer	32-1369	1.50
29	Compensating Condenser (1st I. F Sec.)	Part of 28	....
30	Resistor (300 ohms Flexible Wire-Wound)	33-3010	.20
31	Pilot Lamp	6608	.11
32	Compensating Condenser (2d I. F. Pri.)	Part of 33	....
33	2d I. F. Transformer	32-1306	.90
34	Compensating Condenser (2d I. F. Sec.)	Part of 33	....
35	Resistor (300 ohms Flexible Wire-Wound)	33-3010	.20
36	Resistor (2 Megs.) (Red-Black-Green)	33-1025	.25
37	Compensating Condenser (3d I. F. Pri.)	Part of 38	....
38	3d I. F. Transformer	32-1307	.80
39	Compensating Condenser (3d I. F. Sec.)	Part of 38	....
40	Condenser (.0001 Mfd. Twin—Bakelite Block)	8035-L	.25
41	Pilot Lamp for Shadowmeter	Part of 43	....
42	Condenser (.05 Mfd. Bakelite Block)	3615AB	.35
43	Shadowmeter	6497	2.50
44	Volume Control & On-Off Switch	33-5068	1.45
45	Condenser (.01 Mfd. Bakelite Block)	3903J	.25
46	Resistor (4,000 ohms) (Yellow-Black-Red)	7832	$0.25
47	Resistor (1 Meg.) (Brown-Black-Green)	4409	.25
48	Condenser (.05 Mfd. Bakelite Block)	3615-L	.35
49	Resistor (100,000 ohms) (White-White-Orange)	4411	.25
50	Resistor BC (263 ohms, 21 ohms, Wire-Wound)	33-3069	.25
51	Resistor (32,000 ohms) (Orange-Red-Orange)	3525	.25
52	Resistor (32,000 ohms) (Orange-Red-Orange)	3525	.25
53	Resistor (70,000 ohms) (Violet-Black-Orange)	5385	.25
54	Resistor (70,000 ohms) (Violet-Black-Orange)	5385	.25
55	Condenser (25 Mfd.) (Metal Case)	4264	.60
56	Resistor (500,000 ohms) (Yellow-White-Yellow)	4517	.25
57	Condenser (.01 Mfd. Bakelite Block)	3903AN	.25
58	Condenser (.00025 Mfd. Mica)	30-1032	.35
59	Condenser (.006 Mfd. Tubular)	30-4024	.40
60	Output Transformer	32-7178	1.60
61	Voice Coil & Cone Assembly	(H-16) 02625 (K-23) 36-3174	.80 .40
62	Field Coil & Pot Assembly	H-16 (36-3218) K-23 (36-3239)	3.50 3.75
63	Tone Control	30-4168	.75
64	Condensers (Inside 63)	Part of 63	....
65	Resistor (1,000 ohms) (Brown-Black-Red)	5837	.25
66	Resistor (50,000 ohms) (Green-Brown-Orange)	6098	.25
67	Condenser—Electrolytic (8-8-10 Mfd.)	30-2073	3.45
68	Power Transformer	32-7234	4.75
69	Condenser (.015 Mfd. Twin)	3793-H	.40
70	Filter Choke	5930	1.75
71	Condenser (6 Mfd. Electrolytic)	30-2020	1.40
72	Resistor (20,000 ohms) (Red-Black-Orange)	6649	.25
73	Resistor (50,000 ohms) (Green-Brown-Orange)	5868	.35
74	Resistor (39,000 ohms) (Orange-White-Orange)	33-1027	.25
75	Resistor (10,000 ohms) (Brown-Black-Orange)	33-1000	.25
76	Condenser (.02 Mfd. Tubular)	30-4113	.30
	A. C. Cord and Plug Assembly	L-943A	.60
	Dial Assembly	31-1206	1.25
	Dial Scale	27-5044	.65
	Chassis Mounting Screw	W-1358A	2.60 C.
	Chassis Mounting Foot (Rubber)	27-4116	.05
	Chassis Mounting Foot (Plate)	27-7497	.35 C.
	Tube Shield	28-1107	.10
	4 Prong Tube Socket	7544	.10
	6 Prong Tube Socket	7547	.11
	7 Prong Tube Socket	27-6005	.11
	Speaker Socket	4957	.10
	Knob (Large)	27-4051	.10
	Knob (Small)	27-4052	.10
	Knob (Station Selector)	27-4127	.10

Adjusting Compensating Condensers

The compensating condensers of Model 144 have been adjusted accurately before shipment. If later adjustment is required, in most cases only the intermediate frequency and low frequency compensating condensers should be done. Extreme care must be given the adjustment of the high frequency circuits, and the adjustment should NOT be undertaken unless the receiver is seriously out of alignment.

DO NOT ATTEMPT TO ADJUST the compensating condensers mounted upon sections numbered 3 and 4 of the Tuning Condenser Assembly (Fig. 5). These have been adjusted, and sealed, at the factory.

Philco Model 024, an accurately calibrated signal generator covering broadcast and police band frequencies, is recommended for the adjustment of the intermediate frequency and low frequency compensating condensers.

Philco Model 091 crystal-controlled Signal Generator is recommended for the high frequency adjustments. It gives an accurate and constant 3600 kilocycle (3.6 megacycle) signal, the harmonics of which include the necessary high frequencies for adjusting the compensating condensers in the high frequency circuits.

1—ADJUSTMENT OF THE INTERMEDIATE FREQUENCY—Remove the grid clip from the type 6A7 tube and connect the "ANT" output terminal of the signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Connect an output meter to the primary terminals of the output transformer. Set the signal generator at 460 K.C. (the intermediate frequency of Model 144) and adjust each of the I. F. compensating condensers in turn, to give maximum response in the output of the receiver. The location of the I. F. compensating condensers is shown in Figure 5. Each of the I. F. transformers has a dual compensating condenser mounted at its top, and accessible thru a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

2—ADJUSTMENT OF THE WAVE TRAP—Replace the grid clip upon the Detector-Oscillator tube (Type 6A7). Connect the output leads from the signal generator directly to the antenna and ground terminals of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (extreme left) and the Station Selector at the low frequency (520 K.C.) end. Adjust the Wave Trap ④ condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap ④ is located at rear and underneath the chassis, and is shown in Figures 4 and 5. It is reached from the rear of the chassis.

3—ADJUSTMENT OF THE DIAL FREQUENCIES—Model 144 has four separate frequency bands or ranges, each obtained by one of the four positions of the wave-band switch. There is a compensating condenser for each range, which must now be adjusted. In the following procedure, the frequency ranges referred to, and obtained by the different positions of the switch are:

Range 1.....520 K.C.—1500 K.C.
Range 2.....1.5 M.C.—4.0 M.C.
Range 3.....4.0 M.C.—11.0 M.C.
Range 4.....11.0 M.C.—23.0 M.C.

Connect the output terminals of the Model 091 or equivalent Signal Generator, to the "ANT" and "GND" terminals of the receiver chassis. Connect an output meter to the primary terminals of the Output Transformer of the receiver. Set the Wave-Band Switch to Range 4, and the Station Selector at 21.6 M.C. The sixth harmonic of the 3.6 M.C. crystal in the Model 091 Signal Generator is picked up at this point. Adjust the compensating condenser ⑬ on Section 1 of Tuning Condenser for maximum response in the output of the receiver. Turn the Wave-Band Switch to Range 3, and the Station Selector to 10.8 M.C. Here, the third harmonic of the 3.6 M.C. crystal will be heard. Adjust the compensating condenser ⑭ on Section 2 of Tuning Condenser for maximum response in the output of the receiver.

Turn the Wave-Band Switch to Range 2, and adjust the Station Selector to 3.6 M.C. The "Antenna" connection between the Signal Generator and the receiver chassis must be removed for this adjustment, otherwise the output of the Signal Generator will be too great. Adjust the compensating condenser ⑫ to give maximum response in the output meter. This compensating condenser is located underneath the chassis and is not accessible from above. See Figure 4.

This concludes adjustments requiring the Model 091 (or equivalent) high frequency signal generator.

The Model 024 or its equivalent is now used again. Turn the Wave-Band Switch of the set to Range 2 and the Station Selector to 1.5 M.C. Set the Signal Generator at 1500 K.C. Make sure the "Antenna" connection between the Signal Generator and the Chassis has been restored. Adjust compensating condenser ⑲ located underneath the chassis, (Figure 4). Adjustment is made from the underside of the chassis.

Turn the Wave-Band Switch to Range 1 and the Station Selector to 1400 K.C. Set the Signal Generator at 1400 K.C. Adjust compensating condenser ⑯, which is located underneath the chassis. (See Figure 4). This adjustment is made from the underside of the chassis.

Finally, with Wave-Band Switch at Range 1, and Station Selector at 520 K.C., set the Signal Generator at 520 K.C. and adjust compensating condenser ⑱ (Figure 4). This compensating condenser is also mounted underneath the chassis, and reached from below.

For proper and accurate adjustment of Model 144, the procedure must be followed exactly in the order given. The adjustment should not be undertaken without proper equipment as mentioned above.

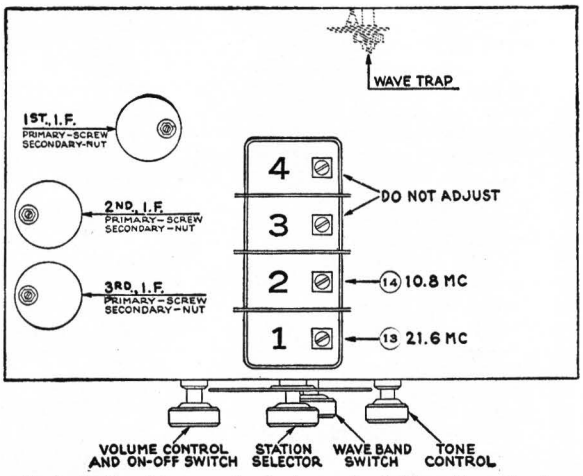

Fig. 5—Position of Compensating Condensers Reached from Above Chassis

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Service Department

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