



FOR MEMBERS OF RADIO MANUFACTURERS SERVICE

SERVICE BULLETIN
No. 254

SERVICE DATA

DESCRIPTION

Model 37-3650 is an 8 tube superheterodyne receiver for operation on alternating current. It has three tuning ranges, covering standard broadcast and short-wave frequencies. The chassis is constructed in four basic assembly units, concentrating the R.F., I.F., Audio and Power Circuits in individual units.

The circuit includes the Philco Foreign Tuning System—controlled by the range switch—providing maximum sensitivity and noise reduction, when used with the **Philco High Efficiency Aerial**; one stage of radio frequency amplification before the Detector-Oscillator tube; Automatic Bass Compensation in the Volume Control Circuit; Shadow Tuning; Automatic Volume Control, and a Push-Pull Pentode Output Circuit.

AERIAL CONNECTIONS

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground lead to terminal 3. A good ground connection is desirable in all installations.

REPLACING DIAL

To replace the dial, remove the clamp holding the dial to the hub by turning clamp counter-clockwise, using the two holes provided on the clamp for this purpose.

REMOVING MASK ARM & LINK ASSEMBLY

First remove dial, then loosen set screw of dial hub and remove the hub and felt washer from the shaft. Now loosen screws holding indicator bracket and lens assembly, and move bracket forward about 1/2 inch. The assembly may now be removed by loosening set screw of range switch arm, then pull arm off of range switch shaft.

REMOVING SWITCH & COIL ASSEMBLIES OF R.F. UNIT

To replace any part in the switch and coil assemblies of the R.F. Unit, each assembly can be removed separately as follows:

First remove the tuning dial, mask and arm assembly. Remove the center mounting screw on the rear of the R.F. Unit. Then lift the rear of the unit and push forward until the rubber mounting grommets, on each side of the unit, clear the mounting slots. The unit is then lifted far enough from the chassis for removal of the two screws holding the selector switch indexing plate and shaft (front of unit). Then pull shaft straight out from unit. Also, remove the volume control shaft by releasing the retaining clip, inside the chassis, from the shaft.

IMPORTANT—When selector switch shaft is replaced, care should be taken to have all wafer rotors in the same position, so that the key on the switch shaft will slide freely into the notched hole in each wafer rotor. **NEVER** force shaft into rotors.

Servicing Stages—It is necessary to unsolder some connecting leads in order to release the stage for servicing. If all the following connections are unfastened the stage will be entirely released. Ordinarily only one or two leads need be loosened in order to change coils, replace coupling condensers, or replace switch sections.

Antenna Stage Assembly—Rear Section of Unit

A. Remove screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate, facing rear underside of the chassis.

B. Unsolder the wires at the I.F. and Aerial terminal panels which connect to the range switch, also wires from tuning condenser housing to tubular condenser (6); tuning condenser stator plate to selector switch contact (B3), and ground lead from assembly shield to unit frame. After disconnecting these wires assembly may be removed.

R.F. Stage Assembly—Middle Section

A. Remove screw (right side of assembly) holding shield plate to unit base.

B. Unsolder the two wires connecting the I.F. Unit to range switch contacts (C3) and (D12); also wires connecting tuning condenser housing to tubular condenser (13) and stator plates to selector switch contact (D3); selector switch contact (D2) to the grid of the 6A8G tube, and ground lead from shield to unit frame. Remove assembly from the unit.

Oscillator Stage Assembly—Front Section

A. The oscillator assembly may be removed by unscrewing the four screws holding shield to R.F. base. These screws are located on each side of the R.F. Unit.

B. Unsolder the wires connecting range switch contacts (E2) and (F2) to the 6A8G socket; tuning condenser stator plates to range switch contact (F3); mica condenser (19) to the tuning condenser housing; range switch to resistor (60) and (61), and ground lead to I.F. Unit. With these leads disconnected unit may be removed.

Replace the units by following the above procedure in the reverse order.

Electrical Specifications

Power Supply:	Voltage	Frequency Cycles	Consumption
	115	50-60	110 watts
	115	25-40	110 watts

Intermediate Frequency: 470 K.C.

Output: Undistorted 7 watts.

Tubes: 6K7G—I.F. Amplifier; 6A8G—Oscillator and first detector; 6K7G—I.F. Amplifier; 6J5G—2nd Detector, A.V.C.; 6K5G—1st Audio; 2-6F6G—Output; 5Y4G—Rectifier.

Tuning Ranges: Range 1—530 to 1720 K.C.; Range 2—5.7 to 11.6 M.C.; Range 3—11.5 to 18.2 M.C.

Speaker: X Cabinet—H-26.

POWER TRANSFORMER DATA

Schematic Lead No.	A. C. Volts	Current	Circuit	Color	Resistance
1-2	120	—	Pri.	White	2.0 ohm
3-4	5.	2.0A	Rect. Fil.	Blue	Less than 0.1 ohm
5-7	700	135 MA	High Volt. Sec.	Yellow	55 ohms 60 ohms
6	—	—	Center Tap 5-7	Yellow Green tr.	—
8-9	6.7	3.3 A	Fil.	Black	Less than 0.1 ohm

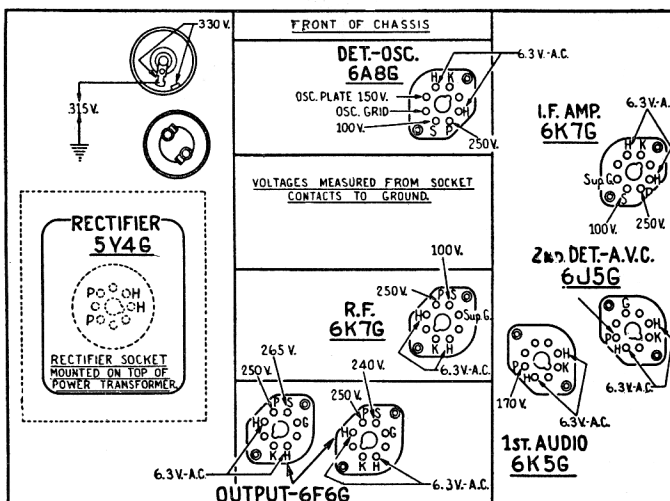
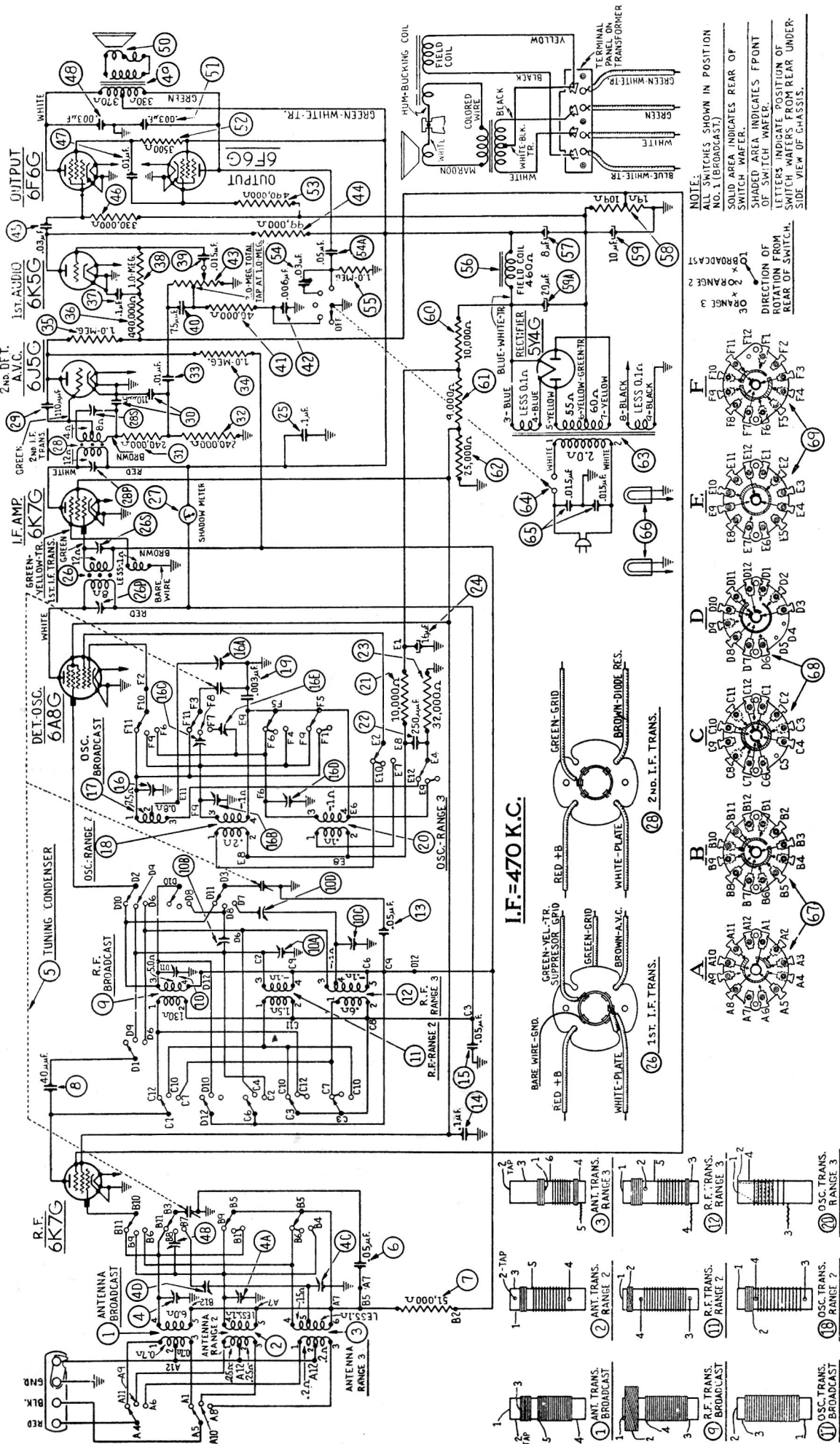


Fig. 1—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.



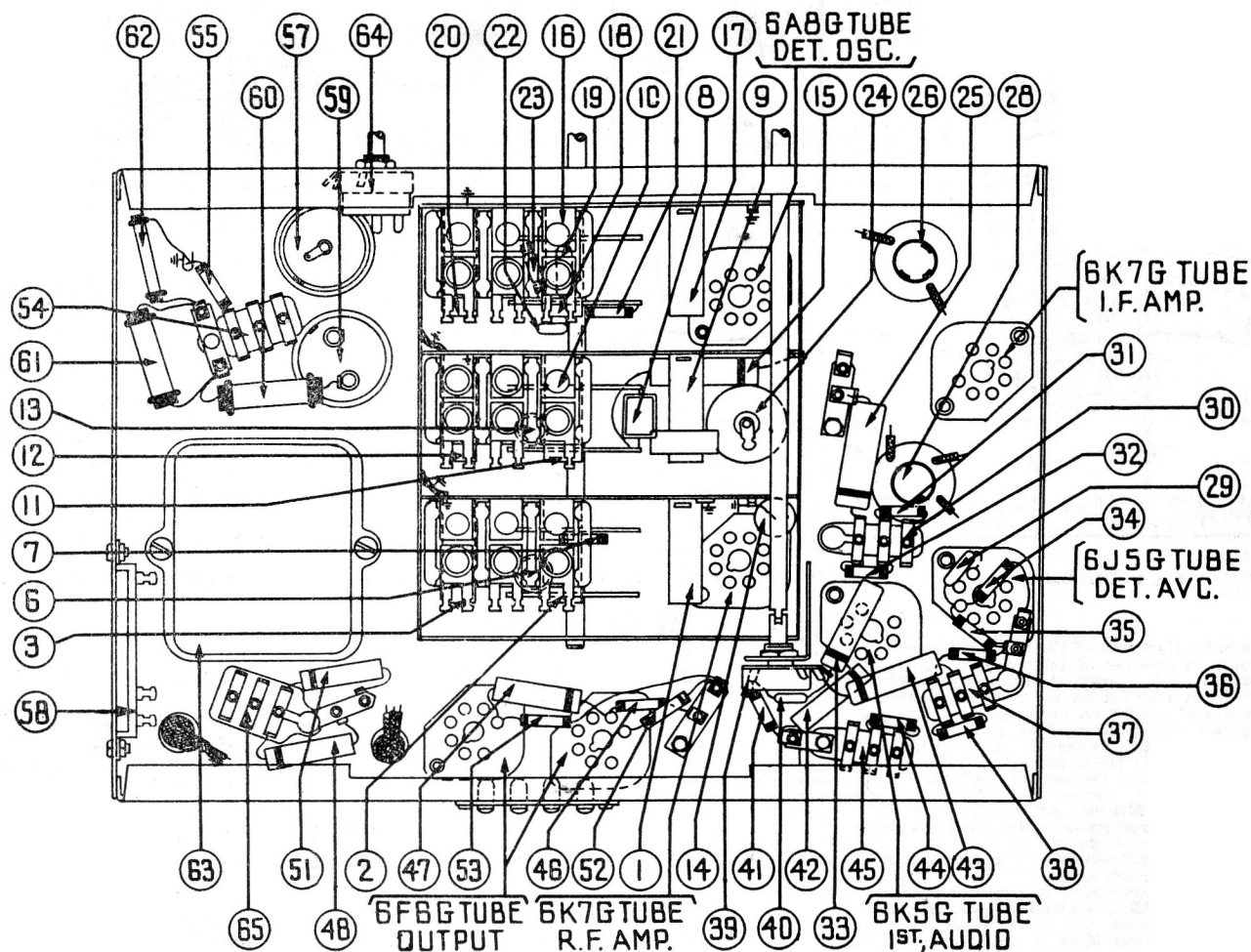


Fig. 3—Base View

Replacement Parts—Model 37-3650

Schem. No.	Description	Part No.
1	Ant. Transformer (Broadcast).....	32-2108
2	Ant. Transformer.....	32-2150
3	Ant. Transformer (S.W.).....	32-2175
4	Compensator Ant. (Five sections).....	31-6104
5	Tuning Condenser.....	31-1855
6	Condenser (.05 mfd. tubular).....	30-4020
7	Resistor (51000 ohms, ½ watt).....	33-351339
8	Condenser (40 mmfd. mica).....	30-1076
9	R.F. Transformer (Broadcast).....	32-2105
10	Compensator (R.F.) (Five sections).....	31-6110
11	R.F. Transformer.....	32-2151
12	R.F. Transformer (S.W.).....	32-2176
13	Condenser (.05 mfd. tubular).....	30-4020
14	Condenser (.1 mfd. tubular).....	30-4170
15	Condenser (.05 mfd. tubular).....	30-4123
16	Compensator Osc. (Six sections).....	31-6111
17	Osc. Transformer (Broadcast).....	32-2120
18	Osc. Transformer.....	32-2152
19	Condenser (.003 mfd. mica).....	30-1028
20	Osc. Transformer (S.W.).....	32-2182
21	Resistor (10000 ohms, ½ watt).....	33-310339
22	Condenser (250 mmfd. mica).....	30-1032
23	Resistor (32000 ohms, ½ watt).....	33-332339
24	Electrolytic Condenser (16 mfd.).....	30-2118
25	Condenser (.1 mfd. tubular).....	30-4170
26	1st I.F. Transformer & Compensators.....	32-2169
27	Shadow meter.....	45-2189
28	2nd I.F. Transformer & Compensators.....	32-2171
29	Condenser (110 mmfd. mica).....	30-1031
30	Condenser (110 mmfd. double bakelite).....	8035-DG
31	Resistor (240000 ohms, ½ watt).....	33-424339
32	Resistor (240000 ohms, ½ watt).....	33-424339
33	Condenser (.01 mfd. tubular).....	30-4124
34	Resistor (1 megohm, ½ watt).....	33-510339
35	Resistor (1 megohm, ½ watt).....	33-510339
36	Resistor (490000 ohms, ½ watt).....	33-449339
37	Condenser (.1 mfd. bakelite).....	4989-SG
38	Resistor (1 megohm, ½ watt).....	33-510339
39	Volume Control.....	33-5158
40	Condenser (.75 mmfd. mica).....	30-1053
41	Resistor (40000 ohms, ½ watt).....	33-340339
42	Condenser (.006 mfd. tubular).....	30-4125
43	Condenser (.015 mfd. tubular).....	30-4358
44	Resistor (99000, ½ watt).....	33-399339

Schem. No.	Description	Part No.
45	Condenser (.03 mfd. bakelite).....	8318-SU
46	Resistor (330000 ohms, ½ watt).....	33-433339
47	Condenser (.01 mfd. tubular).....	30-4169
48	Condenser (.003 mfd. tubular).....	30-4469
49	Output Transformer H26.....	32-7659
50	Cone and Voice Coil H26.....	02625
51	Condenser (.003 mfd. tubular).....	30-4469
52	Resistor (3500 ohms, ½ watt).....	33-235339
53	Resistor (490000 ohms, ½ watt).....	33-449339
54	Condenser (.05 mfd., .03 mfd. bakelite).....	3615-YU
55	Resistor (1 megohm, ½ watt).....	33-510339
56	Field Coil H26.....	36-3687
57	Electrolytic Condenser 8.0 mfd.....	30-2024
58	Bias Resistor.....	33-3280
59	Electrolytic Condenser (10, 20 mfd.).....	30-2163
60	Resistor (10000 ohms, 2 watt).....	33-310539
61	Resistor (9000 ohms, 2 watt).....	33-290539
62	Resistor (25000 ohms, 1 watt).....	33-325439
63	Power Transformer 115 V., 50-60 cycles.....	32-7606
64	Power Transformer 115 V., 25-40 cycles.....	32-7607
65	Tone Control & A.C. Switch.....	42-1232
66	Condenser (.015 mfd. double bakelite).....	3793-DG
67	Pilot Lamp.....	34-2039
68	Range Switch Ant.....	42-1189
69	Range Switch R.F.....	42-1190
70	Range Switch Osc.....	42-1191
71	Selector Switch Indexing Plate & Shaft.....	42-1192
72	Dial.....	27-5212
73	Dial Hub.....	28-7187
74	Dial Clamp.....	28-2837
75	Set Screw.....	W-1641
76	Retaining Washer.....	4436
77	Gear (Dial).....	28-7185
78	Gear Drive.....	31-1884
79	Thrust Spring.....	28-8611
80	Thrust Washer.....	28-2976
81	C Washer.....	28-3904
82	Scale Guard.....	27-8324
83	Indicator Brkt. & Lens Assembly.....	38-7912
84	Pilot Lamp Assembly.....	38-7706
85	Mask.....	27-5198
86	Mask Arm & Link Assembly.....	31-1866

Schem. No.	Description	Part No.
87	Mask Guide.....	38-7844
88	Mask Washer.....	27-8318
89	Socket 8 prong.....	27-6058
90	Socket 7 prong.....	27-6057
91	Socket, Rect.....	27-6052
92	Tube Shield Base.....	28-3898
93	Tube Shield.....	28-2726
94	Terminal Panel Assembly I.F.....	38-6306
95	Terminal Panel Antenna.....	38-7714
96	Grommet Mtg. R.F. Unit.....	27-4817
97	Sleeve Mtg. R.F. Unit.....	28-2257
98	Screw Mtg. R.F. Unit.....	W-729
99	Washer Mtg. R.F. Unit.....	28-3927
100	Washer Felt R.F. Unit.....	27-7807
101	Grommet Mtg. Tuning Condenser.....	27-4325
102	Shadowmeter Lamp Shield.....	28-2917
103	Mtg. Plate R.F. Transformer.....	28-3808
104	Mtg. Spacer R.F. Transformer.....	27-8228
105	Mtg. Screw R.F. Transformer.....	W-1635
106	Shaft Volume Control.....	38-8060
107	Clip Retaining.....	28-4394
108	Spring.....	28-4117
109	Cable Speaker.....	41-3209
110	Cord A.C.....	L-1149A
111	Insulator Electrolytic Condenser.....	27-7194
112	Vernier Drive Tuning Condenser.....	38-7984
113	I.F. Shield.....	28-8623
114	Shadowmeter Mtg. Spring.....	27-4330
115	Knob Tuning.....	27-4331
116	Knob Tuning Vernier.....	27-4332
117	Knob Tone Volume.....	27-4332
118	Knob Range Switch.....	27-4326
119	Terminal Cover Speaker.....	36-3672
"X" CABINET		
120	Speaker H-26.....	36-1239
121	Bezel Frame & Plate Assembly.....	40-5937
122	Glass.....	27-8300
123	Ring.....	28-3988
124	Gasket.....	27-8313
125	Screws.....	W-1644
126	Bottom Shield Plate.....	28-4307
127	Snap Fastener.....	28-4279
128	Screw Speaker Mtg.....	W-709
129	Nut.....	W-124
130	Washer.....	W-291
131	Screw (Chassis Mtr.).....	W-1495
132	Rubber (Chassis Mtr.).....	3558
133	Washer.....	29-2089

Figures in black type indicate circled figures in Base View.

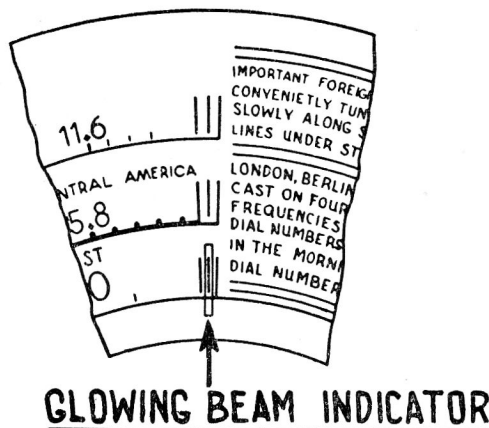


Fig. 4—Dial Calibration

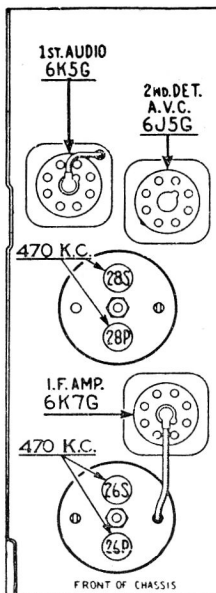


Fig. 5—I. F. Compensators—Top of Chassis

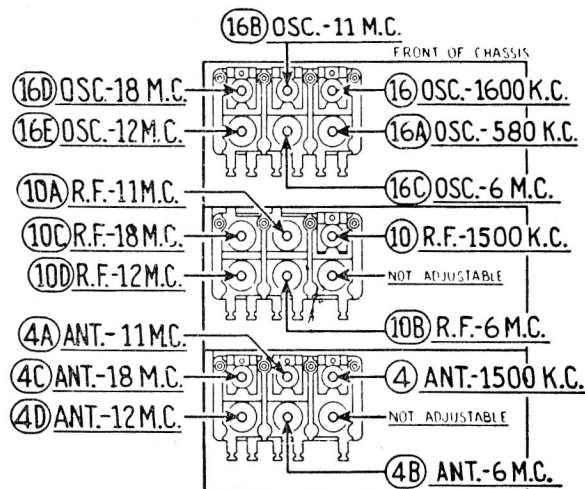


Fig. 6—R. F. Compensators—Underside of Chassis

Alignment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I.F. Circuit, six in the Oscillator Circuit, five in the R.F. Amplifier Circuit and five in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR covering from 110 to 20,000 K.C. is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-Driver No. 27-7059 completes the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 5 and 6.

The following procedure must be observed in adjusting the compensators:

SHADOWMETER ADJUSTMENT

1. Remove the aerial and allow tubes to warm up. Then adjust shadowmeter as follows: Move the coil backward and forward until opposite edges of the shadow are $\frac{1}{8}$ of an inch from each end of the shadow screen, measuring along bottom edge. Adjustment of the shadowmeter light bracket may be necessary for perfect centering.

2. Remove the (5Y4G) rectifier tube from its socket and rotate coil until shadow reaches minimum width. This width is not to exceed $\frac{3}{32}$ ".

3. Replace the (5Y4G) rectifier tube. Shadow must not widen to more than $\frac{3}{16}$ " or less than $\frac{1}{16}$ " from each side of screen. If these limits are not obtained readjust the shadowmeter as given in paragraphs 1 and 2 until they are reached.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of one of the (6F6G) tubes. Adjust the meter to use the (0-30) volt scale.

DIAL CALIBRATION—Rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the screw of dial hub, then turn dial until the glowing indicator is centered on the second index line of dial scale (see Fig. 4). Then tighten the dial hub set screw in this position.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K.C.

1. Turn volume control to maximum volume position. Connect the 088 Signal Generator output through a .1 mfd. condenser, to the control grid of the 6A8G tube and the ground connection of the output lead to the chassis.

2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise) and adjust the signal generator for 470 K.C.

3. Adjust compensators (28S) 2nd I.F. Sec., (28P) 2nd I.F. Pri., (26S) 1st I.F. Sec. and (26P) 1st I.F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 18.0 M.C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it through the .1 mfd. condenser to terminal No. 1 on aerial input panel and the generator ground lead to terminal No. 3, rear of chassis. Terminals 2 and 3 must be connected with the shorting link provided on the panel during these adjustments.

2. Set the range switch in position No. 3. Turn the receiver and signal generator dials to 18 M.C. Now adjust compensator (16D) by turning the screw (clockwise) to the maximum capacity position. Then slowly turn it counter-clockwise until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE: In some cases only one peak will be found,

therefore, tune the compensator to this peak. If the above procedure is correctly performed, the image signal will be found at 17,060 M.C., by advancing signal generator input and turning receiver dial to this frequency mark on the dial.

3. The antenna and R.F. compensators (4C) and (10C) are now adjusted by connecting a variable condenser of approximately 350 mmfd.,—having a good vernier drive—across the oscillator compensator (16D) contact (first contact from left side of receiver facing rear underside view of chassis) and ground. Leaving the signal generator and receiver dials at 18 M.C., tune the added condenser until the second harmonic of the receiver oscillator beats against the signal from the generator, thereby giving an indication on the output meter. It may be necessary to increase the signal generator output to obtain a signal of sufficient strength for reading on the output meter. The antenna and R.F. compensators (4C) and (10C) should then be adjusted for maximum output. Then remove external condenser and readjust compensator (16D) as given in paragraph 2 above.

4. Turn signal generator and receiver dials to 12 M.C. and adjust compensators (16E), (10D), (4D) for maximum output.

5. Now turn signal generator and receiver dials to 18 M.C. and readjust compensators (16D), (10C) and (4C) as given in Paragraphs 2 and 3 above.

Tuning Range—5.7 to 11.6

1. Set range switch in position No. 2. Rotate signal generator and receiver dials to 11 M.C. Compensator (16B) is now adjusted as given in Paragraph 2, under tuning range 7.3 to 18 M.C. above. Check image signal on the 10.06 dial mark. The only difference in the two procedures is the frequency used.

2. Turn the signal generator to 11 M.C. Then connect a 350 mmfd. variable condenser from the oscillator compensator (16P) contact (third contact from left side of the receiver, facing rear underside view of chassis) and ground. Tune the added condenser, as given in Paragraph 3 under tuning range 7.3 to 18 M.C. Now adjust compensators (10A) and (4A) for maximum output. The only difference in the two procedures is in the connection of the variable condenser and the frequency used.

3. Readjust compensator (16B) as given in Paragraph 1 for maximum output.

4. Turn signal generator and receiver dials to 6 M.C. and adjust compensators (16C), (10B) and (4B) for maximum output.

5. After the 6 M.C. end of scale is adjusted, the high frequency end is readjusted as given in Paragraphs 1, 2 and 3 above.

Tuning Range—530 to 1720 K.C.

1. Turn signal generator and receiver dials to 1600 K.C.—If signal generator scale is not calibrated for 1600 K.C. the dial of the generator may be rotated to 800 K.C. and the second harmonic of this frequency (1600 K.C.) may be used for following adjustments. Compensators (16), (10) and (4) are now adjusted for maximum output.

2. Turn signal generator and receiver dials to 580 K.C. and adjust compensator (16A) for maximum output. This is accomplished as follows: First tune compensator (16A) for maximum output. Then vary the tuning condenser for maximum output about the 580 K.C. scale mark. Now retune compensator (16A), and again vary the tuning condenser back and forth about 580 K.C. for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained on or about the 580 K.C. dial mark.

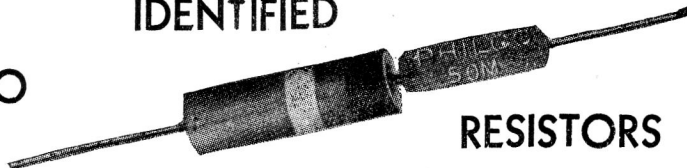
3. Turn signal generator and receiver dials to 1600 K.C. and readjust compensator (16) for maximum output.

4. Now rotate signal generator and receiver dials to 1500 K.C. and adjust compensators (10) and (4) for maximum output.

Use the New

PHILCO

IDENTIFIED



RESISTORS

YOUR DISTRIBUTOR CAN SUPPLY YOU

Save Time
and Trouble
on all
Service Jobs