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PHILCO . . . . . Model 37-660

FOR MEMBERS OF
RADIO MANUFACTURERS SERVICE

SERVICE BULLETIN
No. 257

SERVICE DATA

Model 37-660 is a 9 tube superheterodyne receiver designed for operation on alternating current. It has four 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; 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 on 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 ½ 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 the 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 ASSEMBLY—Rear Section

1. Unsolder the wires which connect the antenna panel and I.F. Unit to the range switch and assembly shield plate ground leads.

2. Unsolder the two leads from the gang condenser terminal panel which connect to the range switch. Also lead of tubular condenser (7) at the ground lug on the R.F. Unit.

3. Remove screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate, facing the rear underside of the chassis. The assembly can then be removed.

R.F. ASSEMBLY—Middle Section

1. Unsolder the wires from the I.F. Unit and the 6K7G plate contact in R.F. Unit which connects to the range switch. Then remove ground leads of shield plate.

2. Unsolder the leads from the gang condenser terminal panels and the lead of tubular condenser (18) at the ground lug on R.F. Unit base.

3. Remove the screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate facing the rear underside of the chassis. Then pull assembly straight out.

OSCILLATOR ASSEMBLY—Front Section

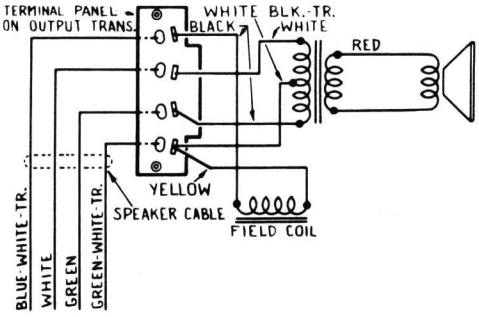
1. The oscillator assembly can be removed by unscrewing the two screws located on each side of the R.F. Unit.

2. Unsolder the wires connecting range switch to bakelite condenser (78) in the power unit, electrolytic condenser (21) in the R.F. Unit and OSC plate contact on the 6A8G socket.

3. Remove the leads from the gang condenser terminal panels and the lead of Mica condenser (24) at the ground lug on R.F. Unit base.

Electrical Specifications

Power Supply: 115 V.
Frequency: 50-60 cycle.
For 25 to 40 cycle operation, use the Power transformer marked with asterisk in the parts list.
Consumption: 130 Watts.
Intermediate Frequency: 470 K. C.
Output: 10 Watts.
Philco Tubes: 6K7G—R.F. Amplifier; 6A8G—Oscillator and first detector; 6K7G—I.F. Amplifier; 6J5G—2nd detector, A.V.C.; 6K5G—1st Audio; 6J5G Phase Inverter; 2-6F6G—Output; 5Y4G—Rectifier.
Tuning Ranges: Range 1—530 to 1720 K. C.; Range 2—2.3 to 7.4 M. C.; Range 3—7.35 to 11.6 M. C.; Range 4—11.5 to 18.2 M. C.
Speakers: X cabinet—H-27; B cabinet—K-36.



Speaker Wiring for Types K-36 and H-27

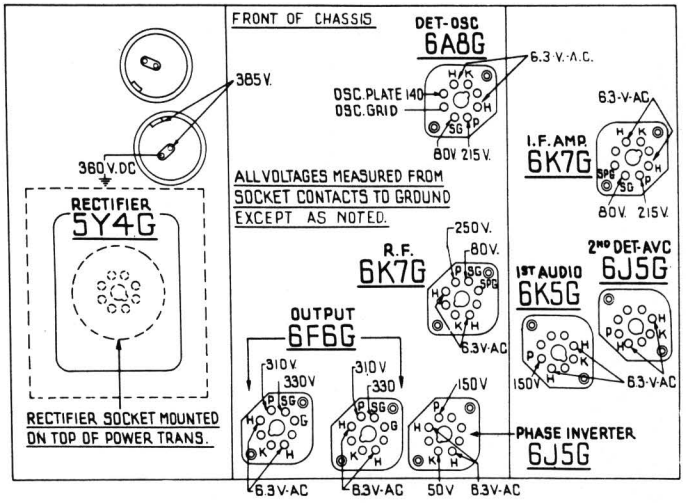


Fig. 1—Socket Voltages—Underside of Chassis View

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.

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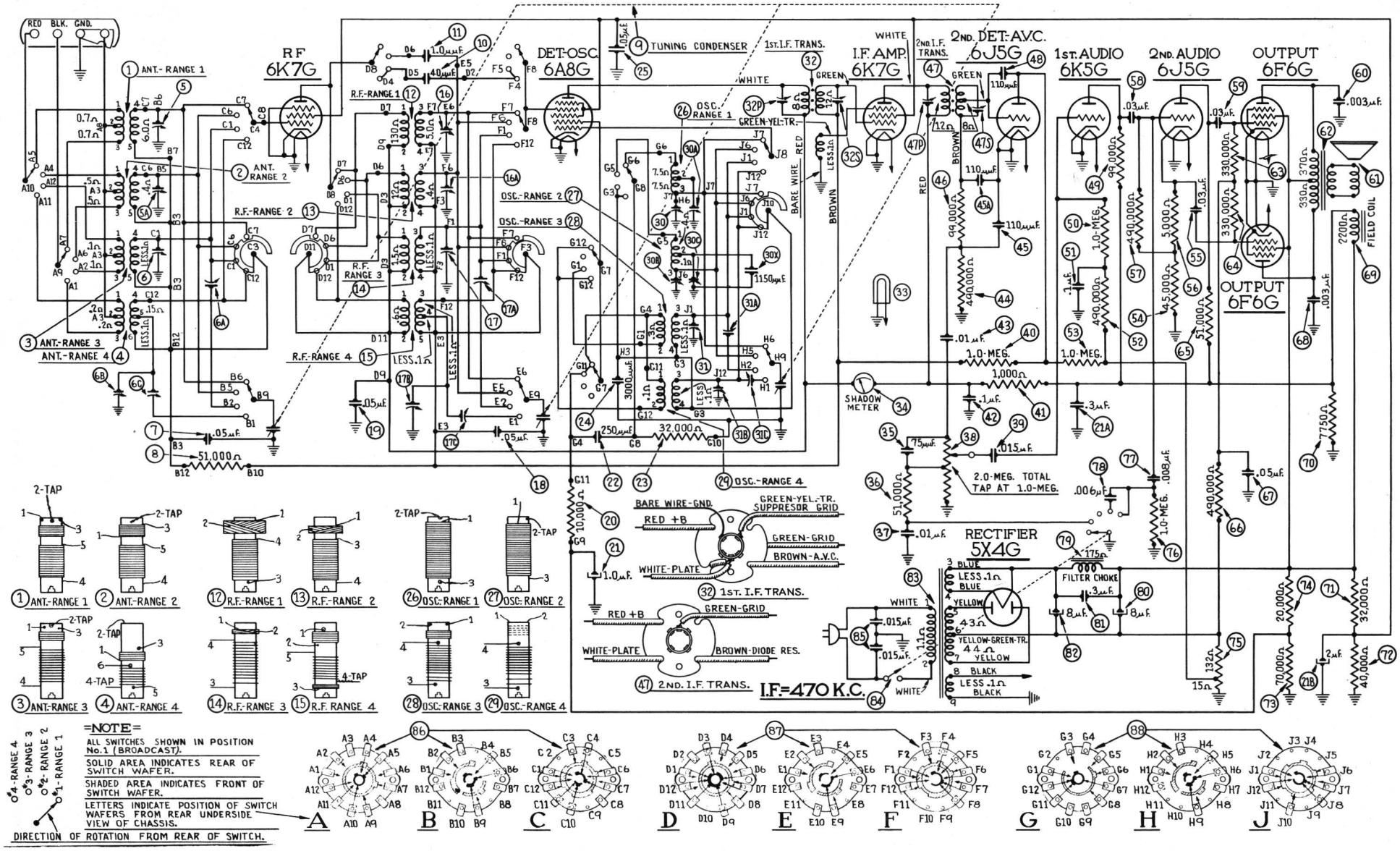

Fig. 2—Schematic Diagram

Model 37-660

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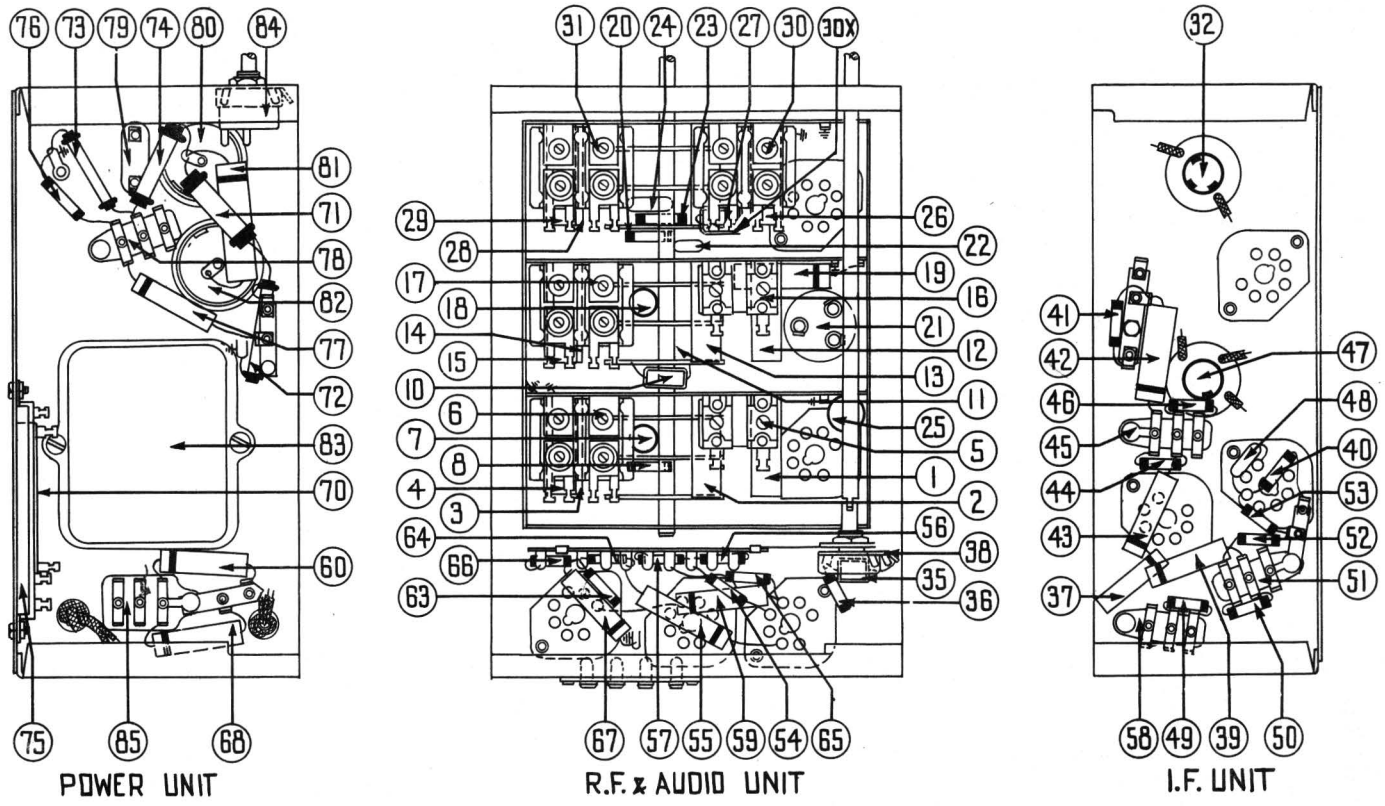

Fig. 3—Parts Locations—Underside View of Chassis.

Replacement Parts—Model 37-660

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (530 to 1720 K.C.)	32-2108	$0.80
2	Antenna Transformer (2.3 to 7.4 M.C.)	32-2119	.65
3	Antenna Transformer (7.35 to 11.6 M.C.)	32-2185	.70
4	Antenna Transformer (11.5 to 18.2 M.C.)	32-2175	.80
5	Compensator (Two sections) brown dot	31-6120	
6	Compensator (Four sections) brown dot	31-6105	
7	Condenser (.05 mfd. tubular)	30-4020	.20
8	Resistor (51000 ohms, ½ watt)	33-351339	.20
9	Tuning Condenser	31-1855	4.50
10	Condenser (40 mmfd. mica)	30-1076	.20
11	Condenser twisted wire & lugs		
12	R.F. Transformer (530 to 1720 K.C.)	32-2105	.75
13	R.F. Transformer (2.3 to 7.4 M.C.)	32-2106	.65
14	R.F. Transformer (7.3 to 11.6 M.C.)	32-2178	.60
15	R.F. Transformer (11.5 to 18.2 M.C.)	32-2176	.70
16	Compensator (Two sections) brown dot	31-6120	
17	Compensator (Four sections) red dot	31-6106	
18	Condenser (.05 mfd. tubular)	30-4020	.20
19	Condenser (.05 mfd. tubular)	30-4123	.20
20	Resistor (10000 ohms, ½ watt)	33-310339	.20
21	Electrolytic Condenser (three sections 1, 2, 3 mfd.)	30-2122	1.85
22	Condenser (250 mmfd. mica)	30-1032	.25
23	Resistor (32000 ohms, ½ watt)	33-332339	.20
24	Condenser (.003 mfd. mica)	30-1028	.45
25	Condenser (.05 mfd. tubular)	30-4123	.20
26	Oscillator Transformer (530 to 1720 K.C.)	32-2120	.65
27	Oscillator Transformer (2.3 to 7.4 M.C.)	32-2121	.40
28	Oscillator Transformer (7.3 to 11.6 M.C.)	32-2186	.70
29	Oscillator Transformer (11.5 to 18.2 M.C.)	32-2182	.70
30	Compensator (Four sections) yellow dot	31-6108	
30x	Condenser (1150 mmf)	30-1081	
31	Compensator (Four sections) brown dot	31-6105	
32	1st I.F. Transformer	32-2169	
33	Pilot Lamp Shadowmeter	34-2039	.15
34	Shadowmeter	45-2189	2.50
35	Condenser (75 mmfd. mica)	30-1053	.20
36	Resistor (51000 ohms, ½ watt)	33-351339	.20
37	Condenser (.006 mfd. tubular)	30-4125	.20
38	Volume Control	33-5158	1.00
39	Condenser (.015 mfd. tubular)	30-4358	.20
40	Resistor (1 megohm, ½ watt)	33-510339	.30
41	Resistor (1000 ohms, ½ watt)	33-210339	.20
42	Condenser (.1 mfd. tubular)	30-4170	.25
43	Condenser (.01 mfd. tubular)	30-4124	.25
44	Resistor (490000 ohms, ½ watt)	33-449339	.20
45	Condenser (110 mmfd. twin bakelite)	8035-DG	.25
46	Resistor (99000 ohms, ½ watt)	33-399339	$0.20
47	2nd I.F. Transformer	32-2171	
48	Condenser (110 mmfd. mica)	30-1031	.20
49	Resistor (99000 ohms, ½ watt)	33-399339	.20
50	Resistor (1 megohm, ½ watt)	33-510339	.30
51	Condenser (.1 mfd. bakelite)	4989-SG	.35
52	Resistor (490000 ohms, ½ watt)	33-449339	.20
53	Resistor (1 megohm, ½ watt)	33-510339	.30
54	Resistor (45000 ohm, ½ watt)	33-345339	.20
55	Condenser (.03 mfd. tubular)	30-4380	.20
56	Resistor (5000 ohms, ½ watt)	33-250339	.20
57	Resistor (490000 ohms, ½ watt)	33-449339	.20
58	Condenser (.03 mfd. bakelite)	8318-SU	.35
59	Condenser (.03 mfd. tubular)	30-4380	.20
60	Condenser (.003 mfd. tubular)	30-4469	
61	Cone & Voice Coil (H-27)	02625	1.20
	Cone & Voice Coil (K-36)	36-3020	
62	Output Transformer (H-27, K-36)	32-7634	1.50
63	Resistor (330000 ohms, ½ watt)	33-433339	.20
64	Resistor (330000 ohms, ½ watt)	33-433339	.20
65	Resistor (51000 ohms, ½ watt)	33-351339	.20
66	Resistor (490000 ohms, ½ watt)	33-449339	.20
67	Condenser (.05 mfd. tubular)	30-4444	.20
68	Condenser (.003 mfd. tubular)	30-4469	
69	Field Coil (H-27, K-36)	36-3673	
70	Resistor (7750 ohms, wirewound)	33-3279	
71	Resistor (32000 ohms, 2 watts)	33-332539	
72	Resistor (40000 ohms, 1 watt)	33-340339	
73	Resistor (70000 ohms, 1 watt)	33-370439	.20
74	Resistor (20000 ohms, 2 watt)	33-320539	
75	Bias Resistor (Wirewound)	33-3278	
76	Resistor (1 megohm, ½ watt)	33-510339	.20
77	Condenser (.008 mfd. tubular)	30-4112	.20
78	Condenser (.006 mfd. bakelite)	7625-SU	.25
79	Filter Choke	32-7115	1.80
80	Electrolytic Condenser 8 uf	30-2026	1.05
81	Condenser (.3 mfd. tubular)	30-4465	
82	Electrolytic Condenser 8 uf	30-2026	1.05
83	Power Transformer (115 V., 50-60 Cycles)	32-7615	
*	Power Transformer (115 V., 25-40 Cycles)	32-7616	
84	Tone Control & AC Switch	42-1184	.75
85	Condenser (.015 Twin Bakelite)	3793-DG	.40
86	Antenna Range Switch	42-1202	1.50
87	R.F. Range Switch	42-1203	1.50
88	Oscillator Range Switch	42-1204	1.50
	Switch Indexing Plate & Shaft	42-1186	
	Dial	27-5209	.55
	Hub	28-7187	.12
	Clamp	28-2837	.10
	Screw Set	W-1641	
	Dial Gear	28-7185	$0.10
	Drive Gear	31-1884	.25
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30 C
	C Washer	28-3904	.01
	Vernier Drive Assem.	31-1871	
	Mask	27-5240	
	Mask Arm & Link Assembly	31-1887	
	Mask Washer	27-8318	.50 C
	Mask Guide Bracket	38-7876	
	Screen & Lens Holder Assembly	31-1900	
	Pilot Lamp Assembly	38-7706	.35
	Shadow Meter Lamp Shield	28-2917	.02
	Shadow Meter Mtg. Spring	28-8623	.70 C
	Socket, 7 Prong	27-6057	.11
	Socket, 8 Prong	27-6052	
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	Volume Control Shaft	28-6500	.12
	Retaining Clips	28-8610	.03
	Washer (Volume Control)	28-4186	.75 C
	Washer Volume Control (Spring)	4436	1.50 C
	Spring	28-4117	.40 C
	Grommet Mtg. R.F. Unit	27-4317	.04
	Sleeve Mtg. R.F. Unit	28-2257	.01
	Screw Mtg. R.F. Unit	W-729	.45 C
	Washer	28-3927	.01
	Mtg. Rubber Tuning Condenser	27-4325	.02
	Speaker Cable	41-3202	
	A. C. Cord	L-2183	.40
	Terminal Panel Ant.	38-7714	.15
	Knob Assembly	27-4330	.10
	Knob Assembly	27-4331	.10
	Knob Assembly	27-4332	.10
	Knob Assembly	27-4326	.10
	"B" CABINET		
	Speaker K-36	36-1233	
	Bezel Frame & Plate Assembly	40-5946	
	Gasket	27-8312	.01
	Glass	27-8299	.06
	Ring	28-3987	.40
	"X" CABINET		
	Speaker H-27	36-1240	
	Screw Mtg. Speaker	W-709	
	Bezel Frame & Plate Assembly	40-5948	
	Glass	27-8300	.06
	Ring	28-3988	.45
	Gasket	27-8313	.01
	Bottom Shield Plate	28-4031	.45

Figures in black type indicate circled figures in Base View.

Prices Subject to Change without Notice

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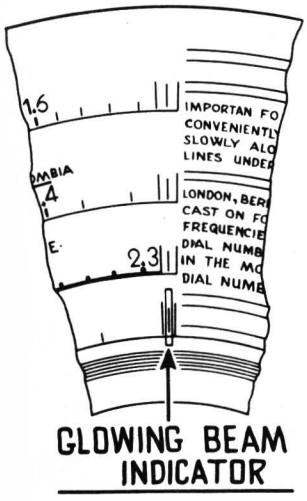

Fig. 4—Dial Calibration

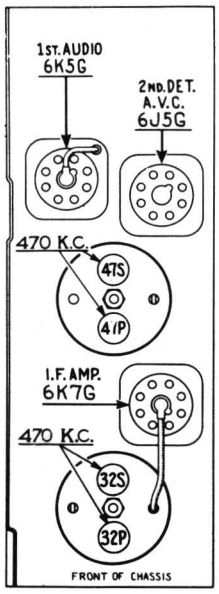

Fig. 5—Locations of I.F. Compensators Top of Chassis

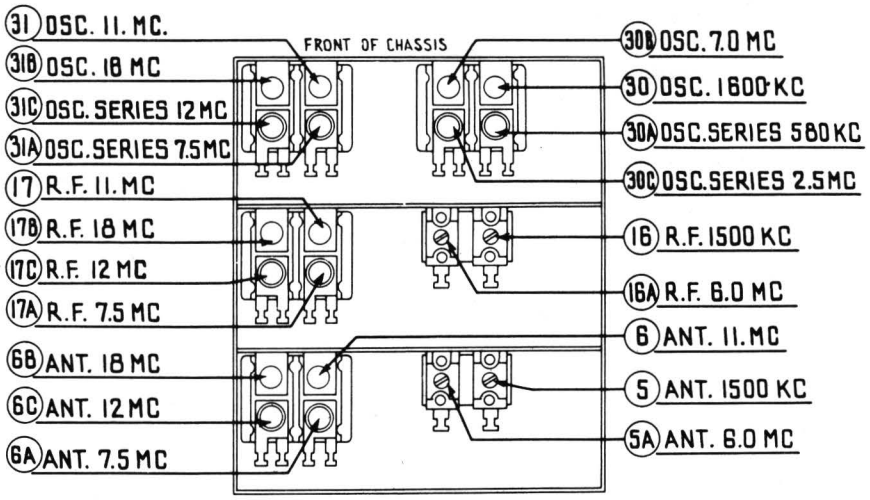

Fig. 6—Locations of R.F. Compensators Underside of Chassis

Alignment of Compensators

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.

The following procedure must be observed in adjusting the compensators:

DIAL CALIBRATION—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this rotate the tuning control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of the dial hub, then turn dial until the glowing indicator is centered between the first and second index lines of dial scale (see Fig. 4). Now tighten the dial hub set screw in this position.

SHADOW METER ADJUSTMENT—Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1. Move the shadow meter coil backwards and forwards, until the opposite edges of the shadow are 1/8 of an inch from each end of the shadow screen, measuring along the bottom edge of the screen. Adjustment of the shadow meter light bracket may be necessary for perfect centering.

2. Remove the rectifier tube from its socket, and rotate coil until shadow reaches minimum width. This width must not exceed 3/32 of an inch.

3. Replace the 5X4G rectifier tube in its socket. The shadow should then widen to not more than 3/16 inch or less than 1/16 inch from each side of the screen measuring along the bottom edge. If these limits are not obtained readjust the shadow meter as given in paragraphs 1 and 2 until they are reached.

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

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

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

2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to approximately 580 K. C. and adjust the signal generator for 470 K. C.

3. Adjust compensators (47)s 2nd I.F. sec., (47)p 2nd I.F. Pri., (32)s 1st I.F. Sec. and (32)p 1st I.F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—11.5 to 18.2 M. C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it with 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.

2. Set the range switch in position 4. Turn the receiver and signal generator dials to 18 M. C. Now adjust compensator (31)b by turning the screw (clockwise) to the maximum capacity position, then slowly turning 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 adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 17.06 M. C., by advancing signal generator attenuator and turning receiver dial to this frequency mark on the dial.

3. The antenna and R.F. compensators (6)b and (17)b are now adjusted by connecting a variable condenser of approximately 350 mmfd.—having a good vernier drive—across the oscillator compensator (31)b contact (first contact from left side of the receiver facing rear underside view of chassis) and ground. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser from the maximum capacity point until the second harmonic of the receiver oscillator beats against the signal from the generator thereby bringing in the signal. The antenna and R.F. compensators (6)b and (17)b are then adjusted for maximum output. Now remove the external condenser and readjust compensator (31)b as given in paragraph 2 above.

4. Turn signal generator and receiver dials to 12 M. C. and adjust compensator (31)c for maximum output. Then adjust compensators (17)c and (6)c for maximum output.

5. Now turn signal generator and receiver dials to 18 M. C. and readjust compensators (31)b Osc., (6)b Ant. and (17)b R.F. as given in paragraphs 2 and 3 above.

Tuning Range (7.35) to (11.6) M. C.

1. Set range switch in position 3. Rotate signal generator and receiver dials to 11 M. C. Now adjust compensator (31) 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 adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 10.06 M. C. by advancing the signal generator attenuator and turning receiver dial to this frequency mark on the dial.

2. Using the 11 M. C. signal, compensators (17) R.F. and (6) Ant. are adjusted by using the procedure given in paragraph 3, under tuning range (11.5) to (18.2) M. C., with the exception, that the external condenser is connected from compensator (31) contact to ground. This contact is the third one from left side of the receiver facing rear underside view of chassis. Also use a 11 M. C. signal.

3. Readjust compensator (31) Osc. as given in paragraph 1 above.

4. Turn signal generator and receiver dial to 7.5 M. C. and adjust compensators (31)a Osc. series (17)a R.F. and (6)a Ant. for maximum output.

5. Due to the slight interaction of the high and low frequency compensators of this range, compensators (31) osc., (17) R.F. and (6) Ant. are readjusted using procedure in paragraphs 1 and 2 above.

Tuning Range 2.3 to 7.4 M. C.

1. Set range switch in Position 2. Turn signal generator and receiver dials to 7.0 M. C. Now adjust compensators (30)b Osc., (16)a R.F. and (5)a Ant. for maximum output.

2. Turn signal generator and receiver dials to 2.35 M. C. Compensator (30)c is now adjusted for maximum as follows:

First tune compensator (30)c for maximum output. Then vary the tuning condenser for maximum output about the 2.35 dial mark. Now retune compensator (30)c, and again vary the tuning condensers back and forth about the 2.35 dial mark for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained at or about the 2.35 dial mark.

If the signal generator is not accurately calibrated the maximum point on the dial of the receiver may fall slightly above or below the dial mark.

3. Turn the signal generator and receiver dials to 7.0 M. C. and readjust compensator (30)b for maximum output. Then turn signal generator and receiver dials to 6.0 M. C. and adjust compensators (16)a R.F. and (5)a Ant. for maximum output.

Tuning Range 530 to 1720 K. C.

1. Set range switch in position No. 1 (Broadcast). Rotate signal generator and receiver dials to 1600 K. C. Now adjust compensators (30) Osc., (16) R.F. and (5) Ant. for maximum output.

2. Tune signal generator and receiver dials to 580 K. C. Compensator (30)a Osc. series is then adjusted for maximum output as given in paragraph 2 under tuning range 2.3 to 7.4 M. C., the only difference in the procedure being in the frequency used.

3. Readjust compensator (30) for maximum output, by turning signal generator and receiver dials to 1600 K. C.

4. Turn signal generator and receiver dials to 1500 K. C. and adjust compensators (16) R.F. and (5) Ant. for maximum output.

PHILCO HEADPHONE KITS

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THREE TYPES NOW AVAILABLE

1. **For octal base tubes (Part No. 45-2227)**
2. **For plain base tubes (Part No. 45-1167)**
3. **Universal type (Part No. 45-2225)**

(With separate use of speaker)

LIST PRICE **$7.50** Either Type