

PHILCO Model 38-1, Code 121



SERVICE BULLETIN No. 293 for members of RADIO MANUFACTURERS SERVICE

A PHILCO Service Plan

Electrical Specifications

Model 38-1, Code 121 is a twelve-tube, A.C. operated superheterodyne receiver with three tuning ranges covering the frequencies listed below and employs the **Philco Automatic Tuning Dial Mechanism**. Additional design features incorporated in this receiver are: Magnetic Tuning Control on the broadcast tuning range; Automatic Volume Control; bass compensation; special push-pull pentode audio output circuit designed for the reduction of harmonic distortion; Adjustable Iron Core I. F. Transformers; Four Point Tone Control; R. F. Circuit completely shielded and contained in one unit; all aligning compensators accessible from the top of the chassis.

POWER SUPPLY:	Voltage	Frequency Cycles	Power Consumption
	115	50 to 60	150 Watts
	115	25 to 40	150 Watts
	115 or 230	50 to 60	150 Watts

Different transformers are required for operation on the voltages and frequencies listed above. The part numbers for these transformers are listed on page 3. A special transformer for operation on either 115 or 230 volt—50 to 60 cycle A.C. power circuit can be obtained. This transformer is provided with a plug and socket for selection of either voltage rating. Place the plug with arrow pointing toward voltage being used.

FREQUENCY RANGES: Three.

- Range one—530 to 1720 K. C.
- Range two—2.3 to 7.4 M. C.
- Range three—7.35 to 22.0 M. C.

INTERMEDIATE FREQUENCY: 470 K. C.

AUDIO OUTPUT: 10 watts.

PHILCO TUBES USED: 6U7G, R. F. amplifier; 6A8G, Det. Osc.; 6N7G, Osc. Control; 6K7G, I. F. amplifier; 6H6G, Magnetic Tuning Discriminator; 6R7G, 2nd detector, 1st Audio; 6J5G, Audio Phase inverter; two 6J5G, Driver; two 6F6G, output; and a 5X4G, rectifier.

tone CONTROL: Four Point.

- A. Brilliant—for speech.
- B. Bright—for normal reception of music.
- C. Mellow—first noise-reducing stage.
- D. Deep—noise-reducing for distant reception.

PHILCO SPEAKER: U-28.

CABINET: Type XX.

Aerial Connections

To obtain the full advantage of the sensitivity of this receiver the **Philco High Efficiency Aerial** supplied with the instrument must be used. Connect the aerial as follows:

The aerial terminal panel located on the rear of the chassis, contains three terminals marked "Red," "Blk" and "Gnd". Connect the red and black wires of the aerial lead in (Transmission Line) to the "Red" and "Blk" terminals respectively. Connect the "Gnd" terminal to a good ground source. If a temporary aerial is used, connect it to the "Red" terminal.

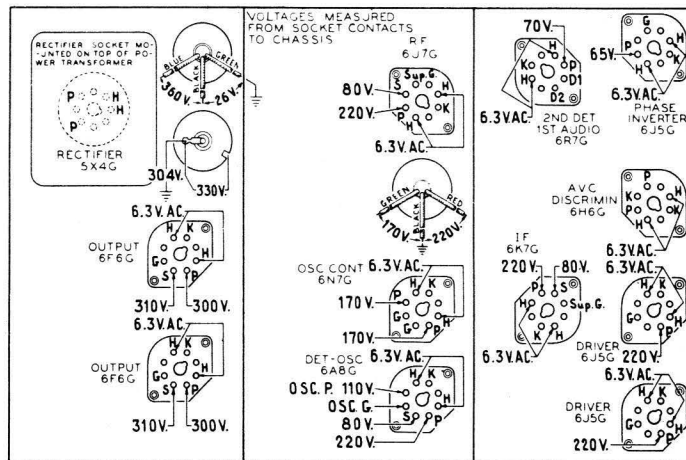


Fig. 1. Underside View of Chassis showing Socket Voltages

The voltages indicated by the arrows were measured with a **Philco 026 Circuit Tester**, which contains a sensitive voltmeter. Line voltage 115 A. C.—Volume control minimum—Dial set at point where no signal is present—Range Switch in broadcast position.

Automatic Tuning Mechanism Service Data

Service data and a complete parts list for the Automatic Tuning Mechanism of this receiver will be found in Service Bulletin 273. When referring to bulletin 273, use the dial parts list for Model 37-10 as the same parts are used on Model 38-1. There are four automatic dial parts, however, which differ from those shown in bulletin 273. These parts are marked with an asterisk on page 3 of this bulletin.

Service Notes

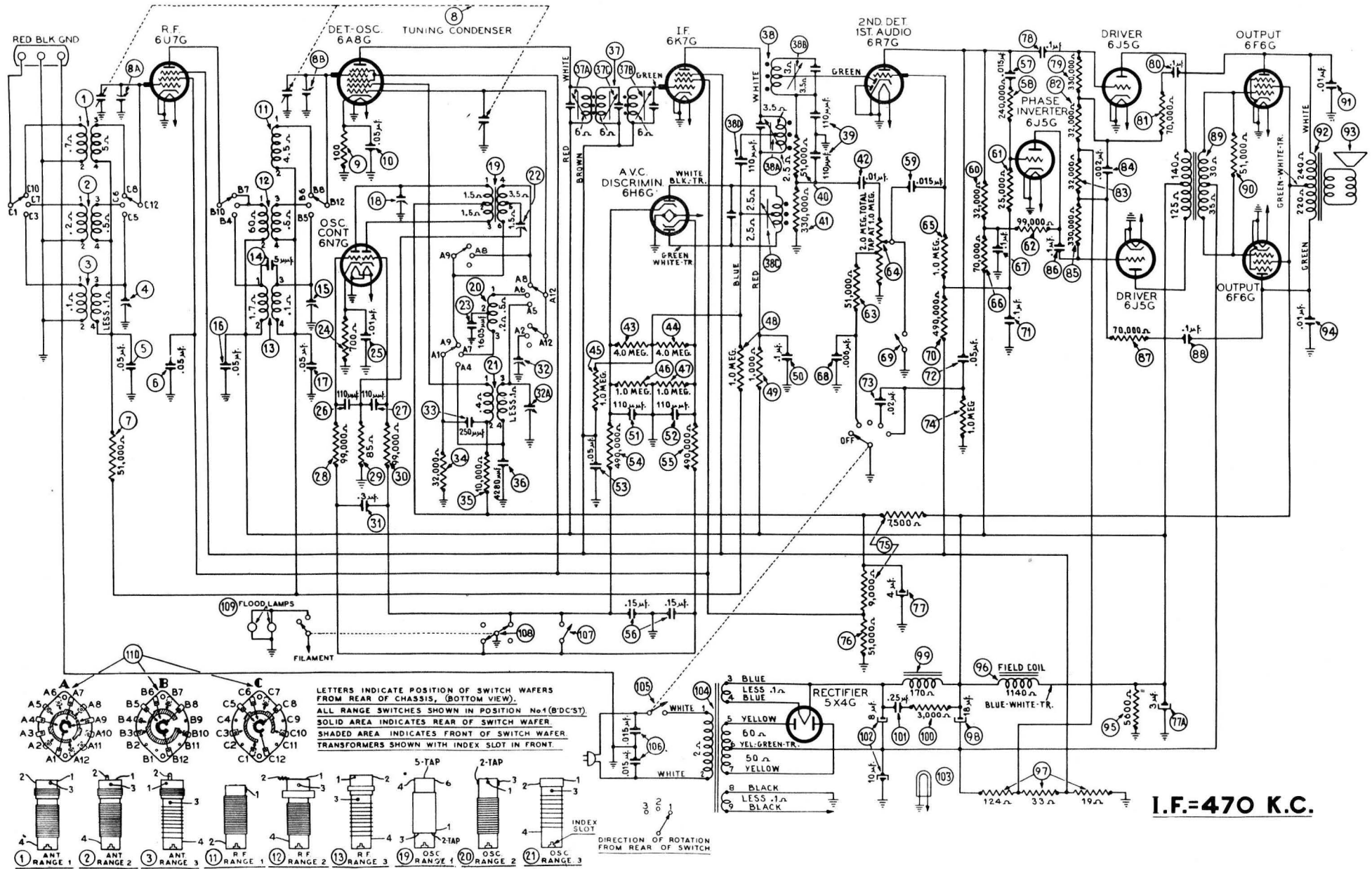
For reference between illustrations, Parts List, and for replacement of parts, the various diagrams in this bulletin are marked with "circled numbers" indicating a particular part.

Physical views of the R. F. transformers are shown on page 2. Each transformer is marked with the corresponding schematic diagram circled number. The connections of the R. F. transformer are numbered to indicate the connecting points in the circuit diagram which are correspondingly marked.

The colors of the I. F. transformer leads are marked on the schematic diagram.

Range switch lugs are marked with a letter and number—example (A2)—indicating the connecting point in the circuit diagram. Each range switch section is marked with a letter indicating the position of the section from the rear of the chassis. Section "A" is used in the oscillator circuit. Section "B" the "RF" circuit, and Section "C" the antenna circuit.

The colors of the connections on the power transformer and speaker unit are also marked on the schematic diagram.



I.F.=470 K.C.

Fig. 2. Schematic Diagram Model 38-1, Code 121

Replacement Parts

Model 38-1, Code 121

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2575	\$0.70
2	Antenna Transformer (Range 2)	32-2576	.70
3	Antenna Transformer (Range 3)	32-2573	.70
4	Compensator, Antenna (Range 3)	31-6160	.30
5	Condenser (.05 μ f tubular)	30-4519	.20
6	Condenser (.05 μ f—0.05 μ f Bakelite)	3615DG	.40
7	Resistor (51,000 Ω , 1/2 watt)	33-351339	.20
8	Tuning Condenser Assembly	30-2075	.20
9	Resistor (100 Ω , 1/2 watt)	33-110339	.20
10	Condenser (.05 μ f, tubular)	30-4020	.20
11	R. F. Transformer (Range 1)	32-2379	.40
12	R. F. Transformer (Range 2)	32-2382	1.00
13	R. F. Transformer (Range 3)	32-2385	1.20
14	Condenser (5 μ f mica)	30-1097	.20
15	Compensator (R. F. Range 3)	31-6212	
16	Condenser—Part of 6		
17	Condenser (.05 μ f tubular)	30-4519	.20
18	Compensator, Osc. (Range 1)	31-6212	
19	Osc. Transformer (Range 1)	32-2373	1.60
20	Osc. Transformer (Range 2)	32-2383	.70
21	Osc. Transformer (Range 3)	32-2386	.70
22	Compensator, Range 1 series	31-6151	.40
23	Condenser (1605 μ f mica)	31-6201	.40
24	Resistor (700 Ω , 1/2 watt)	33-170339	.20
25	Condenser (.01 μ f tubular)	30-4479	.20
26	Condenser (110 μ f mica)	30-1031	.20
27	Condenser (110 μ f mica)	30-1031	.20
28	Resistor (99,000 Ω , 1/2 watt)	33-399339	.20
29	Resistor (85 Ω , 1/2 watt)	33-085339	.20
30	Resistor (99,000 Ω , 1/2 watt)	33-399339	.20
31	Condenser (.3 μ f Bakelite)	6287DG	.40
32	Compensator (2 sections)	31-6211	
33	Condenser (250 μ f mica)	30-1032	.25
34	Resistor (32,000 Ω , 1/2 watt)	33-323339	.20
35	Resistor (10,000 Ω , 1/2 watt)	33-310339	.20
36	Condenser (4280 μ f mica)	31-6202	.50
37	1st I. F. Transformer	32-2741	3.50
38	2nd I. F. Transformer	32-2742	
39	Condenser (110 μ f—110 μ f Bakelite)	8035DG	.25
40	Resistor (51,000 Ω , 1/2 watt)	33-351339	.20
41	Resistor (330,000 Ω , 1/2 watt)	33-433339	.20
42	Condenser (.01 μ f tubular)	30-4479	.20
43	Resistor (4.0 meg., 1/2 watt)	33-540339	.20
44	Resistor (4.0 meg., 1/2 watt)	33-540339	.20
45	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
46	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
47	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
48	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
49	Resistor (1,000 Ω , 1/2 watt)	33-210339	.20
50	Condenser (.1 μ f tubular)	30-4455	.25
51	Condenser (110 μ f mica)	30-1031	.20
52	Condenser (110 μ f mica)	30-1031	.20
53	Condenser (.05 μ f Bakelite)	3615SG	.35
54	Resistor (490,000 Ω , 1/2 watt)	33-449339	.20
55	Resistor (490,000 Ω , 1/2 watt)	33-449339	.20
56	Condenser (.15 μ f—15 μ f Bakelite)	6287DG	.40
57	Condenser (.015 μ f tubular)	30-4226	.20
58	Resistor (240,000 Ω , 1/2 watt)	33-424339	.20
59	Condenser (.015 μ f tubular)	30-4226	.20
60	Resistor (32,000 Ω , 1/2 watt)	33-323339	.20
61	Resistor (25,000 Ω , 1/2 watt)	33-325339	.20
62	Resistor (99,000 Ω , 1/2 watt)	33-399339	.20
63	Resistor (51,000 Ω , 1/2 watt)	33-351339	.20
64	Volume Control	33-5233	
65	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
66	Resistor (20,000 Ω , 1/2 watt)	33-370339	.20
67	Condenser (.1 μ f tubular)	30-4455	.25
68	Condenser (.006 μ f tubular)	30-4445	.20
69	Audio Shorting Switch (Part of Auto. Tuner—See parts (6) and (16) Bulletin 273)		
70	Resistor (490,000 Ω , 1/2 watt)	33-449339	.20
71	Condenser (.1 μ f tubular)	30-4499	.20
72	Condenser (.05 μ f Bakelite)	3615SU	.35
73	Condenser (.02 μ f tubular)	30-4113	.20
74	Resistor (1.0 meg., 1/2 watt)	33-510339	.20
75	Resistor, wire-wound (7,500 Ω —9,000 Ω)	33-3320	.65

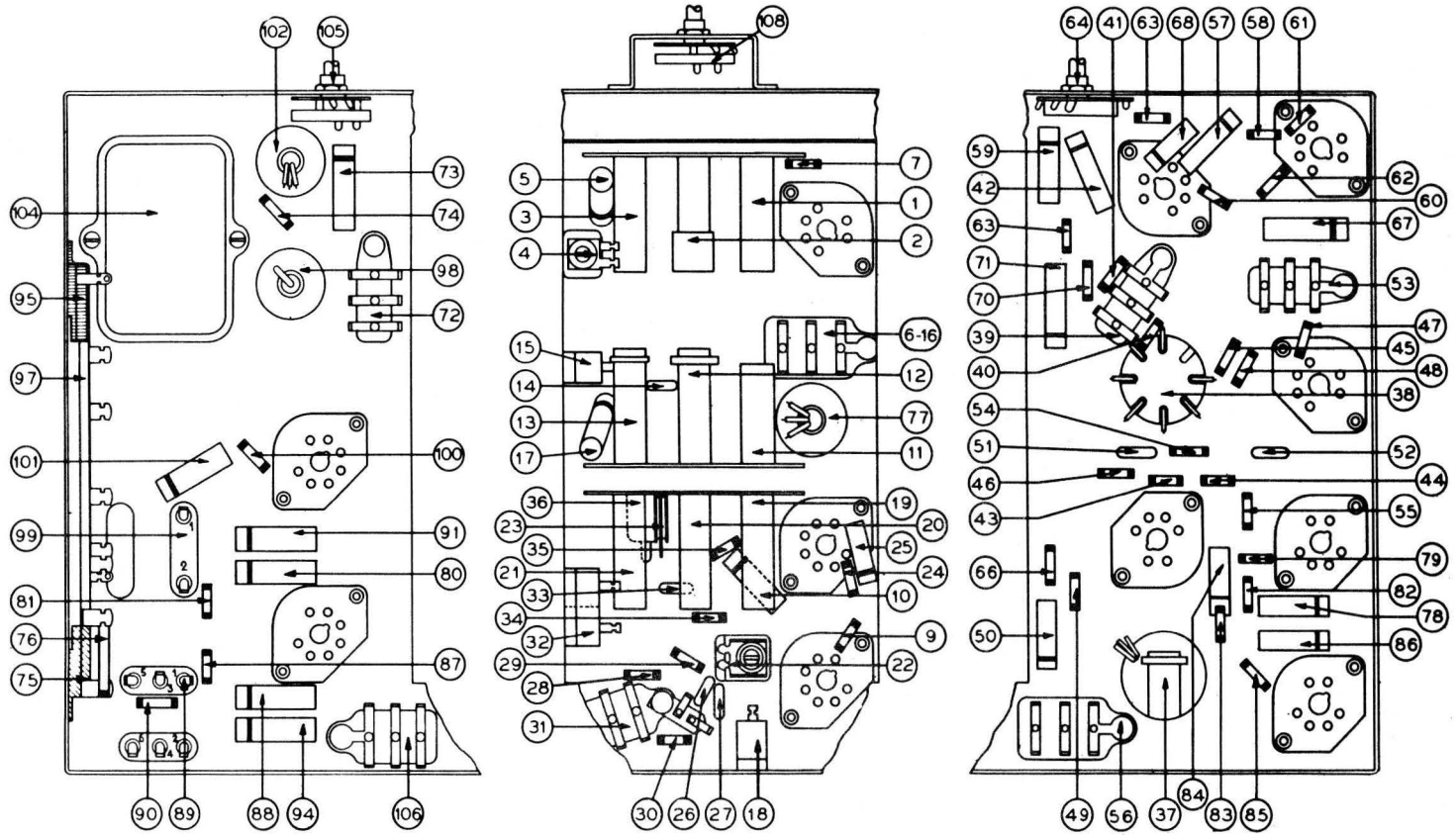


Fig. 3. Part Locations, Underside of Chassis

Schem. No.	Description	Part No.	List Price
76	Resistor (51,000 Ω , 1 watt)	33-351439	\$0.20
77	Electrolytic Condenser (4 μ f—3 μ f)	30-2243	1.50
78	Condenser (.1 μ f tubular)	30-4455	.25
79	Resistor (330,000 Ω , 1/2 watt)	33-433399	.20
80	Condenser (.1 μ f tubular)	30-4455	.25
81	Resistor (70,000 Ω , 1/2 watt)	33-370339	.20
82	Resistor (32,000 Ω , 1/2 watt)	33-323339	.20
83	Resistor (32,000 Ω , 1/2 watt)	33-323339	.20
84	Condenser (.05 μ f tubular)	30-4177	.25
85	Resistor (330,000 Ω , 1/2 watt)	33-433339	.20
86	Condenser (.1 μ f tubular)	30-4455	.25
87	Resistor (70,000 Ω , 1/2 watt)	33-370339	.20
88	Condenser (.1 μ f tubular)	30-4455	.25
89	Input Transformer	32-7671	2.50
90	Resistor (51,000 Ω , 1/2 watt)	33-351339	.20
91	Condenser (.01 μ f tubular)	30-4381	.25
92	Output Transformer	32-7914	1.85
93	Cone & Voice Coil Assembly (U28 Speaker)	36-3799	
94	Condenser (.01 μ f tubular)	30-4381	.25
95	Resistor (5,600 Ω , wire-wound)	33-3282	.60
96	Field & Pot Assembly (U28 Speaker)	36-3162	11.00
97	Resistor, Three Sections (124 Ω —33 Ω —19 Ω)	33-3319	.50
98	Electrolytic Condenser (18 μ f)	30-2200	1.40
99	Choke	32-7115	1.80
100	Resistor (3,000 Ω , 1/2 watt)	33-230339	.20

Schem. No.	Description	Part No.	List Price
101	Condenser (.25 μ f tubular)	30-4446	\$0.25
102	Electrolytic Two Sections (8 μ f—10 μ f)	30-2201	1.75
103	Pilot Lamp	34-2064	.09
104	Power Transformer (115 v. 50 to 60 cycles)	32-7889	
	Power Transformer (115 v. 25 to 40 cycles)	32-7870	
	Power Transformer (115/230 v. 50 to 60 cycles)	32-7871	
105	Tone Control	42-1268	.75
106	Condenser (.015 μ f—0.015 μ f Bakelite)	3793DG	.40
107	A.F.C. Shorting Switch (Part of Auto. Tuner—See part (8) Bulletin 273)	45-2330	
108	A.F.C. Switch Manual	42-1269	1.80
109	Flood Lamp	34-2064	.09
110	Wave Switch Complete	42-1362	3.00

Schem. No.	Description	Part No.	List Price
	Knob (Tone, Volume)	27-4332	
	Mtg. Rubber (Chassis)	27-4564	
	Mtg. Rubber (Rear of R. F. Unit)	27-4197	
	Mtg. Rubber (Front of R. F. Unit)	27-4581	
	Pilot Lamp Assembly	38-9100	
	Shield (R. F. Unit)	38-8969	
	Shield Base (Round)	8004	
	Shield Base	28-2725	
	Shield (Tube) (Square)	28-2726	
	Shield (6U7G Tube)	28-5031	
	Shield (Round)	8005	
	Socket (6 prong)	27-6086	
	Socket (7 prong) (6F6G Tubes)	27-6057	
	Socket (7 prong)	27-6087	
	Speaker (U-28)	36-1361	
	Support (Rear of R. F. Unit)	38-8923	
	Terminal Panel (Ant.)	38-8746	

MODEL 38-1

Automatic Tuning Mechanism Complete	38-9145
Brace (Automatic Mechanism)	28-4119
Cable (Speaker)	41-3329
Cable (Power)	L-2183
Clip (Mtg. R. F. Coils)	28-5002
Coupling (Tuning Condenser)	31-1961
Coupling (Range Switch Shaft & Mask)	38-8603
Knob (Range Switch)	27-4326
Knob (Tuning)	27-4330
Knob (Vernier)	27-4331

CABINET PARTS

Bezel Assembly	38-8833
Cover (Back of Cabinet)	27-8865

AUTOMATIC TUNING MECHANISM

*Cover (Handle)	28-5092
*Dial	27-5358
*Dial Screen Holder	31-2053
*Escutcheon Assembly (Station tabs)	45-2472

*These Automatic Tuning Mechanism parts differ from those shown in Service Bulletin 273.

Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator, having a fundamental frequency range covering the intermediate and tuning frequencies of the receiver. Philco Model 077 Signal Generator which has a fundamental frequency range from 115 to 36000 K.C. is the correct instrument for this purpose; (2) Output Meter, Philco Model 026 Circuit Tester incorporates a sensitive output meter and is recommended; (3) Philco Fiber Handle-Screw Driver, part number 27-7059 and Fibre Wrench, part number 3164.

OUTPUT METER: The 026 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 and advance the attenuator control of the generator until a readable indication is noted on the output meter after signal is applied to stage being adjusted.

DIAL CALIBRATION: In order to adjust the compensators of this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this proceed as follows:

1. Loosen the set screws on the shaft coupling of the tuning condenser. Then turn the tuning condenser until the plates are in the maximum capacity position. Now turn the dial until the glowing beam indicator is on the INDEX LINE at the low frequency end of Range 2. See Fig. 4. With dial and tuning condenser in this position tighten set screws.

2. Turn the tuning condenser control until the indicator is on the 2.2 M. C. mark.

3. With the dial in this position, loosen the shaft coupling set screws. Then turn the dial until the indicator is again on the INDEX LINE. Tighten the set screws in this position.

NOTE: Be careful when turning the dial that the position of the tuning condenser is not disturbed.

INTERMEDIATE FREQUENCY CIRCUIT

A. Set the receiver and signal generator controls as follows:

1. Range Switch (Broadcast Position)
2. Volume Control (Maximum)
3. Magnetic Tuning Switch "Off"
4. Tone Control First Position
5. Signal Generator Dial 470 K.C.

B. Connect the signal generator output cable through a .1 mfd. condenser to the grid of the 6A8G Det. Osc. tube and connect the cableground to the receiver chassis. Set the generator "attenuator" for maximum output. Adjust the I. F. Compensators as follows:

1. Turn compensator (37C) in until the output meter reading decreases almost to zero.

2. Now adjust the compensators, (37B) and (37A), for maximum output; then readjust (37C) for maximum output.

3. Turn compensator (38C) in about three turns; then adjust compensators (38B) and (38A) for maximum output. The adjustment of compensator 38C is given in the "Magnetic Tuning Circuit Adjustments" below.

RADIO FREQUENCY CIRCUIT

1. Set the controls as given under "Intermediate Frequency Circuit" 1 to 4 and set the range switch, signal generator and receiver dials as given under the adjustments of each tuning range in the following procedure.

Connect the Signal Generator output cable into the "Med" jack of the generator panel and connect the other end through a .1 mfd. condenser to the "Red" terminal of the receiver aerial panel (rear of chassis). The ground connection of the cable should be connected to the "Blk" terminal.

2. Adjust the "R. F." compensators for maximum output as follows:

Tuning Range: 530 to 1720 K. C.

Range Switch Position	Signal Generator and Receiver Dial	Compensators in Order
1	1550 K. C.	(18), (8B), and (8A)
1	580 K. C.	(22), Roll Tuning Condenser. See Note B.
1	1550 K. C.	(18), (8B), (8A)

Tuning Range 2.3 to 7.4 M. C.

Range Switch Position	Signal Generator and Receiver Dial	Compensators in Order
2	6.0 M. C.	(32)



Fig. 4. Dial Calibration

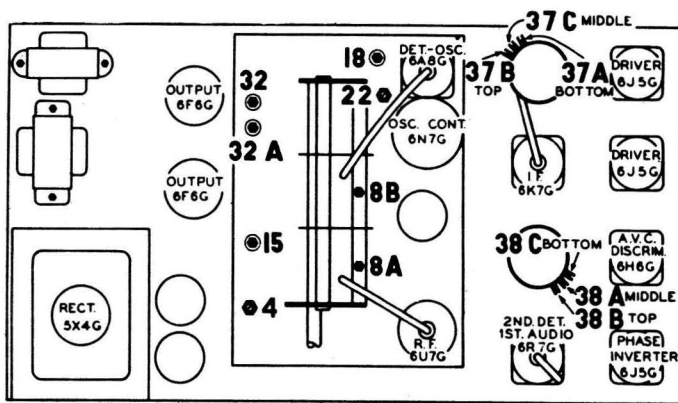


Fig. 5. Compensator Locations

Tuning Range: 7.35 to 22.0 M. C.

Range Switch Position	Signal Generator and Receiver Dial	Compensators in Order
3	18.0 M. C.	(32A), (15), (4) Roll tuning condensers when adjusting (15) and (4). See Note B, check image at 17.060. See Note A.
3	18.0 M. C.	(32A)

MAGNETIC TUNING CIRCUIT ADJUSTMENTS

1. Set the Magnetic Tuning switch in the "out" position.
2. Turn the signal generator indicator to 1000 K. C. and adjust the "Attenuator" control for a weak signal.
3. Adjust volume control for a readable indication on the output meter.
4. Now tune the receiver dial for maximum output at 1000 K. C. The dial must be tuned very accurately to the 1000 K. C. signal in order to make the following adjustment correctly.
5. Turn the Magnetic Tuning Switch "In" and adjust compensator (38C) for maximum output.

The above adjustments are now checked for accuracy as follows:

FREQUENCY TEST:

With the 1000 K. C. signal tuned for maximum output turn the Magnetic Tuning control back and forth; that is, from the "out" to "in" position. The reading of the output meter should not change in either position. If the output meter reading changes, the above magnetic tuning circuit adjustments should be repeated.

A further check on the magnetic tuning adjustment is to very carefully tune in a broadcasting station and turn the switch from the "out" to the "in" position. With the switch in either position, the tone of the station being received should not change. If a change of tone or hiss develops repeat the above Magnetic Tuning Adjustments.

SENSITIVITY TEST:

1. To check the magnetic tuning circuit for sensitivity, turn the magnetic tuning switch to the "off" position, and tune in the 1000 K. C. signal. Then adjust the "attenuator" control of the signal generator for a good audible signal. Approximately 20 volts on the output meter.

2. Now detune the signal (first above and then below the 1000 K. C. mark to a point at which the signal is weakly heard. At each point turn the magnetic tuning control "on". When the control is turned on the signal should return to normal output strength. If the magnetic tuning circuit does not pull the signal into resonance, the compensator (38C) should be carefully readjusted.

NOTE "A"—To accurately adjust the high frequency oscillator compensator to the fundamental instead of the image signal, turn the oscillator compensator to the maximum capacity position (clockwise). From this position slowly turn the compensator counter-clockwise until a second maximum peak is obtained on the output meter. Adjust the compensator for maximum output using this second peak. The first peak from maximum capacity position of the compensator is the image signal and must not be used in adjusting the compensator.

If the above procedure is correctly performed, the image signal will be found (much weaker) by turning the receiver dial 940 K. C. below the frequency being used on any high frequency range.

NOTE "B"—When adjusting the low frequency compensator of Range One (Broadcast) or the antenna and R. F. compensators of the high frequency tuning ranges; the receiver Tuning Condenser must be adjusted (rolled) as follows: First tune the compensator for maximum output, then vary the tuning condenser of the receiver for maximum output about the frequency dial mark. Now turn the compensator slightly to the right or left and vary the receiver tuning condenser for maximum output. If the out reading increases, turn the compensator in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

PHILCO RADIO AND TELEVISION CORPORATION

Parts and Service Division

Philadelphia, Pa.