

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.

- Brilliant—for speech.
- Bright—for normal reception of music.
- Mellow—first noise-reducing stage.
- 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.

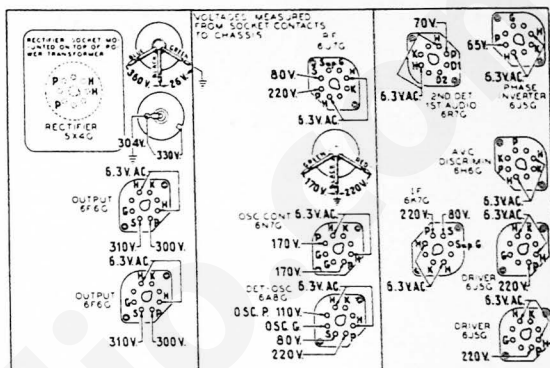


Fig. 1. Underside View of Chassis showing Socket Voltages

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 number 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.

Replacement Parts

Model 38-1, Code 121

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2575	10.70
2	Antenna Transformer (Range 2)	32-2576	7.70
3	Antenna Transformer (Range 3)	32-2577	7.70
4	Grounding Antenna (Range 3)	31-6180	20.00
5	Condenser (.05 μ f tubular)	30-4519	20.00
6	Condenser (.05 μ f Bakelite)	30-4518	20.00
7	Resistor (10,000 Ω , 1/2 watt)	30-10330	40.00
8	Resistor (10,000 Ω , 1/2 watt)	30-10330	40.00
9	Resistor (10,000 Ω , 1/2 watt)	30-10330	40.00
10	Resistor (10,000 Ω , 1/2 watt)	30-10330	40.00
11	R. F. Transformer (Range 1)	32-2578	1.00
12	R. F. Transformer (Range 2)	32-2579	1.00
13	R. F. Transformer (Range 3)	32-2580	1.00
14	Compensator (R. F. Range 3)	30-1092	20.00
15	Compensator (R. F. Range 3)	31-6212	20.00
16	Condenser—Part of 8	30-4519	20.00
17	Compensator (R. F. Range 1)	32-2578	1.60
18	Compensator (R. F. Range 2)	32-2579	1.60
19	Compensator (R. F. Range 3)	32-2580	1.60
20	Compensator (Range 3)	32-2586	40.00
21	Compensator (Range 3)	31-6181	40.00
22	Compensator (Range 3)	31-6181	40.00
23	Compensator (Range 3)	31-6181	40.00
24	Compensator (Range 3)	31-6181	40.00
25	Condenser (100 μ f tubular)	33-10259	20.00
26	Condenser (100 μ f tubular)	30-10318	20.00
27	Condenser (110 μ f mica)	30-10318	20.00
28	Resistor (85,000 Ω , 1/2 watt)	33-10339	20.00
29	Resistor (98,000 Ω , 1/2 watt)	33-10339	20.00
30	Resistor (98,000 Ω , 1/2 watt)	33-10339	20.00
31	Condenser (2 sections)	62-8710	20.00
32	Compensator (3 μ f Bakelite)	31-6211	20.00
33	Compensator (3 μ f Bakelite)	31-6211	20.00
34	Resistor (32,000 Ω , 1/2 watt)	30-10329	20.00
35	Resistor (10,000 Ω , 1/2 watt)	30-10329	20.00
36	Resistor (4250 μ f mica)	33-10339	40.00
37	Set 1, F. Transformer	32-2741	3.50
38	Resistor (110 μ f tubular)	30-1031	20.00
39	Resistor (330,000 Ω , 1/2 watt)	33-43339	20.00
40	Resistor (330,000 Ω , 1/2 watt)	33-43339	20.00
41	Resistor (330,000 Ω , 1/2 watt)	33-43339	20.00
42	Resistor (330,000 Ω , 1/2 watt)	33-43339	20.00
43	Resistor (4.0 meg., 1/2 watt)	33-44039	20.00
44	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
45	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
46	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
47	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
48	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
49	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
50	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
51	Condenser (10 μ f tubular)	30-1031	20.00
52	Condenser (10 μ f mica)	30-1031	20.00
53	Resistor (110 μ f tubular)	30-1031	20.00
54	Resistor (490,000 Ω , 1/2 watt)	33-44039	20.00
55	Resistor (490,000 Ω , 1/2 watt)	33-44039	20.00
56	Resistor (490,000 Ω , 1/2 watt)	33-44039	20.00
57	Condenser (.15 μ f, -15 μ f Bakelite)	62-8710	40.00
58	Condenser (.15 μ f, -15 μ f Bakelite)	62-8710	40.00
59	Resistor (100 μ f tubular)	30-4226	20.00
60	Resistor (100 μ f tubular)	30-4226	20.00
61	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
62	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
63	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
64	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
65	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
66	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
67	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
68	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
69	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
70	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
71	Resistor (32,000 Ω , 1/2 watt)	33-32339	20.00
72	Condenser (.02 μ f Bakelite)	30-4139	20.00
73	Condenser (.02 μ f Bakelite)	30-4139	20.00
74	Resistor (1.0 meg., 1/2 watt)	33-51039	20.00
75	Resistor, wire-wound (7,500 Ω -8,000 Ω)	33-3320	65.00

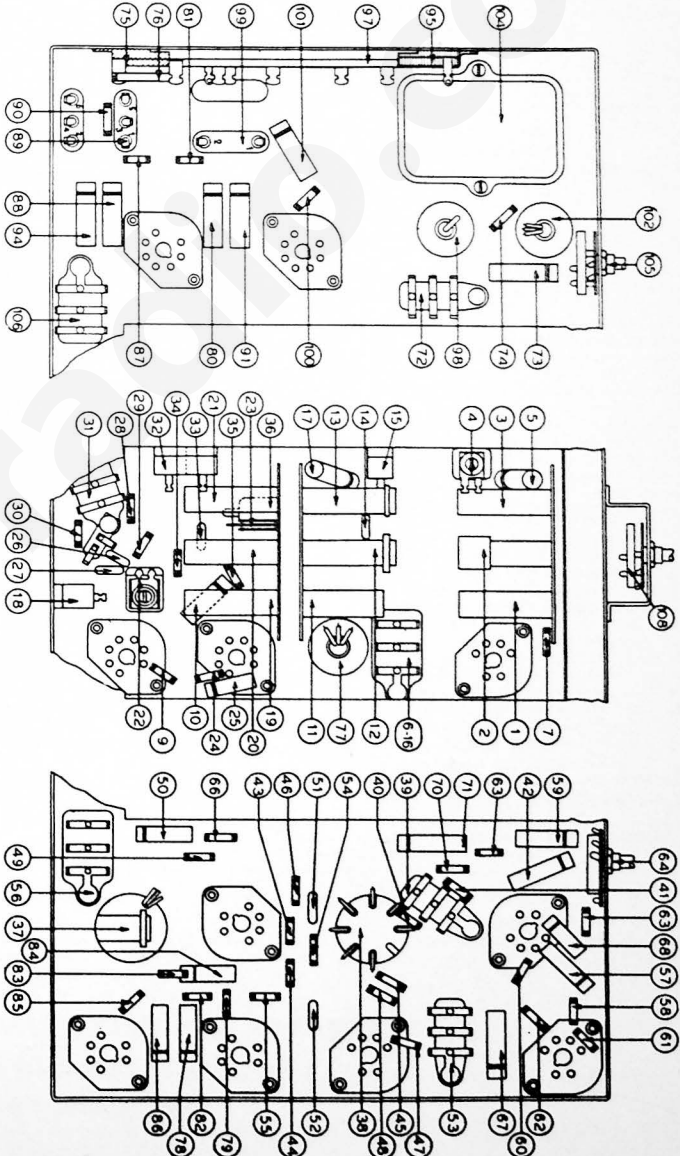


Fig. 3. Part Locations, Underside of Chassis

Schem. No.	Description	Part No.	List Price
76	Resistor (91,000 Ω , 1/2 watt)	30-251439	\$0.20
77	Electrolytic Condenser (4 μ f-3 μ f)	30-4381	1.50
78	Resistor (330,000 Ω , 1/2 watt)	33-43339	25.00
79	Resistor (330,000 Ω , 1/2 watt)	33-43339	25.00
80	Resistor (330,000 Ω , 1/2 watt)	33-43339	25.00
81	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
82	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
83	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
84	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
85	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
86	Resistor (32,000 Ω , 1/2 watt)	33-32339	25.00
87	Resistor (70,000 Ω , 1/2 watt)	30-4455	25.00
88	Resistor (70,000 Ω , 1/2 watt)	30-4455	25.00
89	Resistor (70,000 Ω , 1/2 watt)	30-4455	25.00
90	Resistor (70,000 Ω , 1/2 watt)	30-4455	25.00
91	Resistor (51,000 Ω , 1/2 watt)	33-51039	2.00
92	Output Transformer	30-4381	1.85
93	Output Transformer	32-2741	1.85
94	Output Transformer	32-2741	1.85
95	Condenser (.01 μ f tubular)	35-3780	25.00
96	Field & Pot Assembly (U78 Speaker)	33-2882	60.00
97	Resistor, Three Sections (124 Ω -33 Ω)	33-162	11.00
98	Resistor, Three Sections (124 Ω -33 Ω)	33-3319	30.00
99	Electrolytic Condenser (18 μ f)	32-1115	1.60
100	Resistor (3,000 Ω , 1/2 watt)	33-20339	20.00

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)	36-2201	1.75
103	Pilot Lamp	34-2064	.70
104	Power Transformer (115 v., 50 to 60 cycles)	32-7666	2.00
105	Power Transformer (115 v., 25 to 40 cycles)	32-7870	2.00
106	Power Transformer (115/220 v., 50 to 60 cycles)	32-7871	2.00
107	Tone Control	42-1566	40.00
108	Condenser (.015 μ f, -015 μ f Bakelite)	3793DG	75.00
109	F.P.C. Shorting Switch (Part of Auto. Wave Switch Manual)	34-1260	1.80
110	Wave Switch Complete	42-1362	3.00

Schem. No.	Description	Part No.	List Price
111	Automatic Tuning Mechanism Complete	38-9145	38.9145
112	Bezel (Automatic Mechanism)	28-4119	28.4119
113	Bezel (Automatic Mechanism)	41-3329	41.3329
114	Clip (Mag. R. F. Coil)	28-4082	28.4082
115	Coupling (Tuning Condenser)	31-1861	31.1861
116	Coupling (Range Switch & Mask)	38-8693	38.8693
117	Knob (Range Switch)	27-4328	27.4328
118	Knob (Volume)	27-4330	27.4330
119	Knob (Tuning)	27-4331	27.4331

Schem. No.	Description	Part No.	List Price
120	Bezel Assembly (Control)	38-8833	38.8833
121	Cover (Bezel)	38-8834	38.8834
122	COVER (BEZEL).....	38-8834	38.8834
123	Dial Bezel Holder	28-5092	28.5092
124	Speaker Assembly (Station Label)	37-5338	37.5338
125	Speaker Assembly (Station Label)	31-2055	31.2055
126	Support (Bezel of R. F. Unit)	49-2472	49.2472

*These Automatic Tuning Mechanism parts differ from those shown in Service Bulletin 270.

The Genuine PHILCO Replacement Parts listed above must be used to obtain the Accurate Balanced Performance built into this Philco Model

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) vol 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:

- 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.

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

- 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:

- Range Switch (Broadcast Position)
- Volume Control (Maximum)
- Magnetic Tuning Switch "Off"
- Tone Control First Position
- 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 cable ground to the receiver chassis. Set the generator "attenuator" for maximum output. Adjust the I. F. Compensators as follows:

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

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

- 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

- 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.

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

Tuning Range: 530 to 1770 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

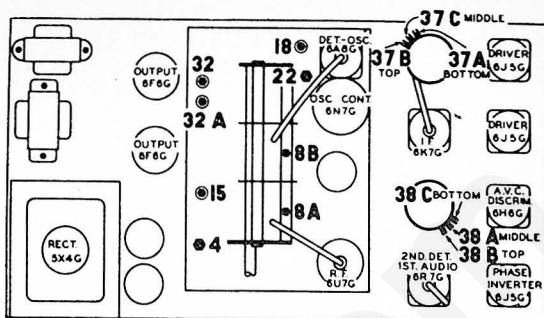


Fig. 5. Compensator Locations

Tuning Range: 7.35 to 22.0 M. C.

Range Switch Position

Signal Generator and Receiver Dial

3 18.0 M. C.

3 18.0 M. C.

Compensators in Order

(32A), (15), (4)

Roll tuning condensers when adjusting (15) and (4). See Note B, check image at 17.060. See Note A.

MAGNETIC TUNING CIRCUIT ADJUSTMENTS

- Set the Magnetic Tuning switch in the "out" position.
- Turn the signal generator indicator to 1000 K. C. and adjust the "Attenuator" control for a weak signal.
- Adjust volume control for a readable indication on the output meter.
- 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.
- 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 vary 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:

- 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.
- 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.

Printed in U. S. A.