**PHILCO ............ Model 38-1, Code 121**

**SERVICE BULLETIN No. 293 for members of R A D I O  M A N U F A C T U R E R S S E R V I C E**

A PHILCO Service Plan

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**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:**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Frequency Cycles</th>
<th>Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>50 to 60</td>
<td>150 Watts</td>
</tr>
<tr>
<td>115</td>
<td>25 to 40</td>
<td>150 Watts</td>
</tr>
<tr>
<td>115 or 230</td>
<td>50 to 60</td>
<td>150 Watts</td>
</tr>
</tbody>
</table>

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 6FG6, output; and a 5X4G, rectifier.

**TONE CONTROL:** Four Point.
- A. Brilliant—for speech.
- B. Bright—for normal reception of music.
- C. Mellow—for noise-reducing stage.
- D. Deep—noising-reducing for distant reception.

**PHILCO SPEAKER:** U-28.

**CABINET:** Type XX.

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**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.

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**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 dialed 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.

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**Service Data**

- **F. transformers; Four Point Tone Control;**
  - **6.3VAC.**
  - **6.3VAC.**
  - **6.3VAC.**

**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.

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Fig. 2. Schematic Diagram

Model 38-1, Code 121
**PHILCO SERVICE BULLETIN**

**Page 3**

**Replacement Parts**

**Model 38-1, Code 121**

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Transformer (Range 1)</td>
<td>32-2272</td>
<td>$0.20</td>
</tr>
<tr>
<td>2</td>
<td>Antenna Transformer (Range 2)</td>
<td>32-2273</td>
<td>$0.20</td>
</tr>
<tr>
<td>3</td>
<td>Antenna Transformer (Range 3)</td>
<td>32-2274</td>
<td>$0.20</td>
</tr>
<tr>
<td>4</td>
<td>Compensator, Antenna (Range 3)</td>
<td>31-0130</td>
<td>$0.30</td>
</tr>
<tr>
<td>5</td>
<td>Condenser (0.5 µf tubular)</td>
<td>30-4216</td>
<td>$1.50</td>
</tr>
<tr>
<td>6</td>
<td>Condenser (0.05 µf to 0.03 µf Bakelite)</td>
<td>36155G</td>
<td>$0.50</td>
</tr>
<tr>
<td>7</td>
<td>Resistor (31,000 ohm watt)</td>
<td>30-6109</td>
<td>$1.40</td>
</tr>
<tr>
<td>8</td>
<td>Tuning Condenser Assembly</td>
<td>30-3072</td>
<td>$4.90</td>
</tr>
<tr>
<td>9</td>
<td>Resistor (100 µf, 1/2 watt)</td>
<td>30-6720</td>
<td>$0.40</td>
</tr>
<tr>
<td>10</td>
<td>Resistor (0.5 µf, 1/2 watt)</td>
<td>30-6721</td>
<td>$0.40</td>
</tr>
<tr>
<td>11</td>
<td>R.F. Transformer (Range 1)</td>
<td>32-2282</td>
<td>$1.50</td>
</tr>
<tr>
<td>12</td>
<td>R.F. Transformer (Range 2)</td>
<td>32-2283</td>
<td>$1.50</td>
</tr>
<tr>
<td>13</td>
<td>R.F. Transformer (Range 3)</td>
<td>32-2284</td>
<td>$1.50</td>
</tr>
<tr>
<td>14</td>
<td>Condenser (500 µf mica)</td>
<td>30-1077</td>
<td>$0.50</td>
</tr>
</tbody>
</table>

**Fig. 3. Part Locations, Underside of Chassis**

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Condenser (0.005 µf)</td>
<td>30-4446</td>
<td>$1.75</td>
</tr>
<tr>
<td>102</td>
<td>Electrolytic Two Sections (8 µf-10 µf)</td>
<td>30-3221</td>
<td>$0.20</td>
</tr>
<tr>
<td>103</td>
<td>Osc. Control</td>
<td>30-4445</td>
<td>$1.50</td>
</tr>
<tr>
<td>104</td>
<td>Power Transformer (150 v. 50 to 60 cycle)</td>
<td>30-3702</td>
<td>$1.75</td>
</tr>
<tr>
<td>105</td>
<td>Tone Control</td>
<td>30-4447</td>
<td>$1.50</td>
</tr>
<tr>
<td>106</td>
<td>Condenser (.015 µf to .015 µf Bkaklote)</td>
<td>30-4448</td>
<td>$1.50</td>
</tr>
<tr>
<td>107</td>
<td>A.F.C. Shorting Switch (Part of Auto. Tuner—See part (B) Bulletin 275)</td>
<td>30-4449</td>
<td>$1.50</td>
</tr>
<tr>
<td>108</td>
<td>A.F.C. Switch Manual</td>
<td>30-4450</td>
<td>$1.50</td>
</tr>
<tr>
<td>110</td>
<td>Wave Switch Complete</td>
<td>30-4451</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

**CABINET PARTS**

*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 3600 K.C. is the correct instrument for this purpose; (2) Output Meter, Philco Model 024 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 6AG5 getters. 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 6AG5 Det. Osc. tube and connect the cathodeground 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

A. 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.

B. 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 6AG5 aerial (rear chassis). The ground connection of the cable should be connected to the "Bik" terminal.

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

- Tuning Range: 530 to 1728 K.C.
  - Range Switch Position and Receiver Dial
  - K.C. (18), (8B), and (8A)
  - 1550 K. C. (22), Roll Tuning Condenser. See Note B.
  - 580 K. C.
  - 1550 K. C. (18), (8B), (8A)

- Tuning Range 2.3 to 7.4 M. C.
  - Range Switch Position and Receiver Dial
  - 5 M. C.
  - 6.0 M. C.

INDEX LINE

Fig. 4. Dial Calibration

Fig. 5. Compensator Locations

Tuning Range: 7.35 to 22.0 M. C.

<table>
<thead>
<tr>
<th>Range Switch Position</th>
<th>Signal Generator and Receiver Dial</th>
<th>Compensators in Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>18.0 M. C.</td>
<td>(32A), (15), (4) Roll tuning condenser when adjusting (15) and (4). See Note B, check image at 17.060. See Note A.</td>
</tr>
</tbody>
</table>

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Parts and Service Division

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