PHILCO
REG. U.S. PAT. OFF.

Service Bulletin—No. 165-B
(This Bulletin Supersedes Service Bulletin No. 165)

**Model 16**

The PHILCO Radio Model 16 is an eleven-tube superheterodyne broadcast and short-wave receiver, operating upon alternating current and employing the high-efficiency 6.3 volt tubes, automatic interstation noise suppression, and a frequency (wave-band) coverage that permits reception of the short-wave (high-frequency) broadcast programs. The same superheterodyne circuit is used for all reception. The Receiver is equipped with a five-point wave-band switch. The ranges are—the.

1. 520 K.C. to 1500 K.C.
2. 1.5 M.C. to 4.0 M.C.
3. 3.2 M.C. to 6.0 M.C.
4. 5.8 M.C. to 12.0 M.C.
5. 11.0 M.C. to 23.0 M.C.

The Receiver employs a Philco Type 77 tube for first detector, a Type 76 for oscillator, a Type 78 for first I.F., a Type 78 for second I.F., and a Type 37 for second detector. The automatic interstation noise suppression circuit uses a Type 78, the first A.F., a Type 77. The driver (second A.F.) is a Type 42; the class “A” amplification is accomplished with two Type 42 tubes as triodes; the rectifier is a Type 5-Z-3. The intermediate frequency is 460 kilocycles. The power consumption of Model 16-122 is 130 watts; of Model 16-121, 120 watts.

**Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts**

<table>
<thead>
<tr>
<th>Circuit</th>
<th>1st Det.</th>
<th>2nd Det.</th>
<th>Inter-Station Noise Sup.</th>
<th>1st A.F.</th>
<th>2nd A.F. (Driver)</th>
<th>Output</th>
<th>Rectifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Tube</td>
<td>77</td>
<td>78</td>
<td>78</td>
<td>78</td>
<td>78</td>
<td>77</td>
<td>42</td>
</tr>
<tr>
<td>Filament Volts—F to F</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Plate Volts—P to K</td>
<td>220</td>
<td>225</td>
<td>225</td>
<td>220</td>
<td>0</td>
<td>1.8</td>
<td>130</td>
</tr>
<tr>
<td>Screen Grid Volts—SG to K</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>—</td>
<td>1.8</td>
<td>1.8</td>
<td>220</td>
</tr>
<tr>
<td>Control Grid Volts—CG to K</td>
<td>1.6</td>
<td>6.4</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Cathode Volts—K to F</td>
<td>4.2</td>
<td>1.0</td>
<td>2.2</td>
<td>2.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*All of the above readings were taken from the underside of the chassis, using test prods and leads with a suitable A.C. voltmeter for filament voltages, and a high-resistance multi-range D.C. voltmeter for other readings.

**Table 2—Power Transformer Data**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>A. C. Volts</th>
<th>Circuit</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1—2</td>
<td>105—125</td>
<td>Primary</td>
<td>White</td>
</tr>
<tr>
<td>3—5</td>
<td>6.3</td>
<td>Filament</td>
<td>Black</td>
</tr>
<tr>
<td>6—7</td>
<td>5.0</td>
<td>Filament of 5-Z-3</td>
<td>Blue</td>
</tr>
<tr>
<td>8—10</td>
<td>800</td>
<td>Plates of 5-Z-3</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>Center Tap of 3—5</td>
<td>Black—Yellow Tracer</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Center Tap of 8—10</td>
<td>Yellow—Green Tracer</td>
<td></td>
</tr>
</tbody>
</table>

Note—These values are for Model 16-122. Model 16-121 uses a Type 80 Rectifier Tube. See Note, page 4, at end of Replacement Parts List.
Fig. 2—Schematic Wiring Diagram

I.F. = 460 K.C.
NOTE: DO NOT ATTEMPT TO ADJUST the compensating condensers mounted upon sections 3 and 4 of the tuning condenser. These compensating condensers are carefully adjusted, and sealed at the factory.
<table>
<thead>
<tr>
<th>No. on Page</th>
<th>Description</th>
<th>Part No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wave Band Switch, Inductance (Wave-Trap Assembly)</td>
<td>42-1037</td>
<td>2.75</td>
</tr>
<tr>
<td>2</td>
<td>Tuning Condenser Assembly</td>
<td>31-1039</td>
<td>4.50</td>
</tr>
<tr>
<td>3</td>
<td>Compensating Condenser (Wave-Trap, Ant.; H. F.; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Compensating Condenser (Ant.; H. F.; Part of (2))</td>
<td>5558</td>
<td>.16</td>
</tr>
<tr>
<td>5</td>
<td>Compensating Condenser (Ant.; H. F.; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Compensating Condenser (Resistor; and Police; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Antenna Transformer (H. F. Bands)</td>
<td>32-1183</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Antenna Transformer (Broadcast &amp; Police B'ds)</td>
<td>32-1182</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Resistor (Brown-Black-Orange)</td>
<td>4412</td>
<td>.20</td>
</tr>
<tr>
<td>10</td>
<td>Compensating Condenser (Range 3)</td>
<td>04000-V</td>
<td>.16</td>
</tr>
<tr>
<td>11</td>
<td>Condenser</td>
<td>30-1000</td>
<td>.20</td>
</tr>
<tr>
<td>12</td>
<td>Compensating Condenser (Range 2; series)</td>
<td>04000-R</td>
<td>.35</td>
</tr>
<tr>
<td>13</td>
<td>Compensating Condenser (Range 1; series)</td>
<td>04000-L</td>
<td>.35</td>
</tr>
<tr>
<td>14</td>
<td>Resistor (Green-Black-Red)</td>
<td>5310</td>
<td>.20</td>
</tr>
<tr>
<td>15</td>
<td>Condenser</td>
<td>5886</td>
<td>.25</td>
</tr>
<tr>
<td>16</td>
<td>Resistor (Brown-Black-Orange)</td>
<td>4412</td>
<td>.20</td>
</tr>
<tr>
<td>17</td>
<td>Oscillator Coil (Broadcast and Police)</td>
<td>32-1185</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Compensating Condenser (Occ.; H. F.; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Compensating Condenser (Occ.; H. F.; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Resistor (Flexible Wire-wound; Green-Black-Brown)</td>
<td>6977</td>
<td>.20</td>
</tr>
<tr>
<td>21</td>
<td>Condenser</td>
<td>5863</td>
<td>.18</td>
</tr>
<tr>
<td>22</td>
<td>Resistor (Green-Black-Orange)</td>
<td>4237</td>
<td>.25</td>
</tr>
<tr>
<td>23</td>
<td>Condenser</td>
<td>31-6000</td>
<td>.25</td>
</tr>
<tr>
<td>24</td>
<td>1st. I. F. Transformer</td>
<td>32-1186</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Compensating Cond'r (1st, I. F. Secondary)</td>
<td></td>
<td>.20</td>
</tr>
<tr>
<td>26</td>
<td>Condenser</td>
<td>3015-AB</td>
<td>.20</td>
</tr>
<tr>
<td>27</td>
<td>Resistor (Flexible Wire-wound; Orange-Black-Brown)</td>
<td>3015-BK</td>
<td>.15</td>
</tr>
<tr>
<td>28</td>
<td>Condenser</td>
<td>3015-BK</td>
<td>.15</td>
</tr>
<tr>
<td>29</td>
<td>Resistor (Red-Black-Green)</td>
<td>5572</td>
<td>.20</td>
</tr>
<tr>
<td>30</td>
<td>Resistor (Brown-Green-Green)</td>
<td>3015-BL</td>
<td>.15</td>
</tr>
<tr>
<td>31</td>
<td>Resistor (Brown-Green-Green)</td>
<td>7009</td>
<td>.20</td>
</tr>
<tr>
<td>32</td>
<td>Resistor (White-Black-Orange)</td>
<td>4411</td>
<td>.20</td>
</tr>
<tr>
<td>33</td>
<td>Resistor (Yellow-White-Yellow)</td>
<td>4517</td>
<td>.20</td>
</tr>
<tr>
<td>34</td>
<td>Compensating Cond'r (2d, I. F. Primary)</td>
<td>31-6002</td>
<td>.35</td>
</tr>
<tr>
<td>35</td>
<td>2d, I. F. Transformer</td>
<td>32-1186</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Compensating Cond'r (2d, I. F. Secondary)</td>
<td></td>
<td>.20</td>
</tr>
<tr>
<td>37</td>
<td>Condenser</td>
<td>3015-BK</td>
<td>.15</td>
</tr>
<tr>
<td>38</td>
<td>Resistor (Flexible Wire-wound; Orange-Black-Brown)</td>
<td>3015-BK</td>
<td>.15</td>
</tr>
<tr>
<td>39</td>
<td>Pilot Lamp (Station Selector)</td>
<td>6608</td>
<td>.12</td>
</tr>
<tr>
<td>40</td>
<td>Shadow Tuning Meter</td>
<td>6497</td>
<td>2.25</td>
</tr>
<tr>
<td>41</td>
<td>1st Lamp (Shadow Tuning Meter; Part of (2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Compensating Cond'r (3d, I. F. Primary)</td>
<td>31-6003</td>
<td>.35</td>
</tr>
<tr>
<td>43</td>
<td>3d. I. F. Transformer</td>
<td>32-1188</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Model 16-121 uses a Type 80 tube in lieu of 5-Z-3. Parts used in the 16-121 chassis that differ from the 16-122 parts listed above are:

- Power Transformer (50-60 —) 32-7080 4.50
- Condenser (Electrolytic) (8.0 Mfd.) 6706 1.50
- Condenser (Electrolytic) (8.0 Mfd.) 7461 1.25

---

**USE PHILCO REPLACEMENT PARTS AND TUBES FOR EVERY MAKE RADIO. GET COMPLETE CATALOG FROM YOUR DISTRIBUTOR.**

---

PHILCO RADIO & TELEVISION CORPORATION

Service Department

September 1033

Printed in U. S. A.
PHILCO 14X, 14LZX—(Cont’d)

Inoperative—1) failure or "open" circuit in shadowgraph. (Connected in "B"-plus circuit of the r-f and i-f tubes)

Interruption—1) snapped coil leads at lugs of oscillator coil

Insufficient—1) small antenna. Increase size of antenna

Shadowgraph

2) weak type '44 tubes in r-f and i-f stages

3) increase value of diode detector secondary-return resistor

Shadowgraph—1) receiver circuits out of alignment

No control of—1) check type '27 tube in first audio stage

Signal drift—1) after set is turned on, the tuning of the station "creeps" for as long as 30 to 60 minutes. Replace tension spring on back of gang condenser—use new type Philo spring (part No. 77750)

Noisy volume—1) disconnect end of control that goes to detector and from this detector lead connect a 300,000-ohm 1/2-watt resistor to ground. Also from this lead bridge a 0.05 or 0.06-mfd. condenser to the disconnected end of the volume control. This removes the d-c from the volume control and permits quiet operation

Motorboating—1) eliminate by connecting 100,000-ohm resistor from first audio grid to chassis

Hum

Broad tuning—1) r-f and i-f compensating condensers out of alignment

Whistling—1) move all leads adjacent to oscillator coil further away from it.

PHILCO CT-14 Auto Radio

Weak reception—1) check alignment—especially of antenna section of tuning gang. To improve performance, move the lead that goes from first grid section of gang to the coil away from all other leads and the chassis

PHILCO TH-14

Modulation hum—1) replace condenser No. 12 with a 4-mfd. electrolytic unit

PHILCO 15

Inoperative—1) tuning meter No. 57 "open" (indicated by narrow shadow)

2) check condenser No. 13 (0.25-mfd.) from first detector plate return to ground for breakdown

3) check condenser No. 26 (0.05-mfd.) from first i-f plate return to ground for breakdown

4) check filter condenser block No. 55

5) "open" primary of input transformer No. 56

6) check No. 25, coupling condenser connected from oscillator plate to coil

(Cant’d)

PHILCO 15—(Cont’d)

Intermittent reception—1) replace the 200-ohm oscillator cathode resistor and the 0.09-mfd. by-pass condenser. Use a 0.1-mfd. condenser to replace the odd-size 0.09-mfd. unit

2) replace coupling condensers No. 44 and No. 49 (0.01-mfd. each) in first and second a-f stages. Although these condensers may test O.K. it is best to replace them

Distortion—1) connect a 0.25-meg. resistor across the normal volume control, and a 0.002-mfd. condenser between the plates of the power tubes

2) check condensers No. 48 (twin 0.25-mfd.) for breakdown. Common ground. One goes to filter resistor of first audio plate supply, the other to filter resistor of all audio grid biases

3) breakdown in filter condenser block No. 32 between sections. Capacities 3—0.5-mfd., 1—0.015-mfd., 1—1-mfd.

4) check push-pull input transformer No. 56 for breakdown (indicated by "frying" noise)

Audio whistle—1) replace both '47 push-pull output tubes

Squealing—1) check for loose shield cans on r-f and i-f transformers

(Squealing—1) replace condenser No. 12 (0.09-mfd. condenser) from screens to ground. Condenser may test O.K. but may be intermittently "open"

2) replace condenser No. 18, (0.25-mfd.) from first detector plate returns to ground. Condenser may test O.K. but may be intermittently "open"

3) replace condenser No. 31 (0.05-mfd.) from first i-f AVC filter resistor to ground. Condenser may test O.K. but may be intermittently "open"

4) replace condenser No. 26 (0.05-mfd.) first i-f plate return to ground. Condenser may test O.K. but may be intermittently "open"

No zero volume—1) "open" AVC Condenser No. 42 (0.00011-mfd.) connected from volume control to ground

"Shadowgraph”—1) replace first detector and i-f tubes does not indicate on weak signals

Tuning condenser—1) faulty spring used to hold drive cable slipping

PHILCO 16, 16B, 16X, 16RX—(Codes 121, 122)

Inoperative—1) open circuit in tuning meter No. 43

2) check condenser block No. 66. Common goes to cen; condenser A (2-mfd.) to oscillator plate filter resistor; condenser B to tuning meter; condenser C (0.5-mfd.) to first a-f plate supply filter resistor; condenser D (0.5-mfd.) to screen supply of first a-f tube; condenser E (1-mfd.) to screen grid supply of first detector and i-f tubes

3) check condenser No. 35 (0.05-mfd.) from first detector and first i-f plate supply to ground. Faulty condenser here indicated by narrow shadow on tuning meter

4) check for breakdown between sections of condenser block No. 66. (Capacities 2—2-mfd., 2—0.5-mfd., 1—1-mfd.)

(Cont’d over)
PHILCO 16, 16B, 16X, 16RX—(Codes 121, 122)—(Cont’d)

Inoperative ______1) wire from first section of tuning condenser pulled too tight and grounding against chassis

Inoperative ______1) high-voltage lead (black wire) from i-f transformer (first facing front of chassis) grounded. This does not effect audio

2) compensators in top of i-f can grounded to can

Inoperative, ______1) check contacts on band switch. These contacts may shift or drop out completely. This may be indicated by short wave reception on the broadcast band, and by improper tracking of the oscillator

Inoperative at ______1) check for intermittently “open” 0.003-mfd. condenser No. 20

low end of short-wave band

2) check for intermittently “open” 0.0007-mfd. condenser connected to 76 tube

Inoperative ______1) replace condenser from lug 1 on bottom of waveband switch to ground marked with orange and yellow dots with one of the “lug” type (value 700-mmfds.). A poor connection internally in the pigtail condenser stops oscillation

Inoperative before ______1) high resistance tuning condenser gang rotor contacts. Bond rotor to tuning condenser frame with flexible wire pigtails

low 15 me

2) tighten screw holding the bottom soldering lug to the tuning assembly

Inoperative at ______1) if this is due to failure of 76 oscillator to function at the high frequencies, first try a new 76 oscillator tube. If this does not help, change the 500-ohm oscillator cathode resistor to a 300-ohm unit

high-freq. end of broadcast band

Interruption ______1) “open” 250-ohm resistor in plate circuit of second i-f stage. This resistor is contained within the case of the small black bakelite condenser for this stage and is located adjacent to the 2nd i-f socket

tube, and

“shadow- graph” indication widths

Interrupt ______1) check 0.01-mfd. tubular audio diode-coupling condenser connected between bottom terminal of volume control and the junction of the two diode load resistors

shadow- graph operates normally

2) replace volume control

3) replace 78 tube (even though it checks O.K.)

4) replace coupling condenser No. 59 (0.05-mfd.) connected from first a-f to second a-f tubes

5) check transformer No. 46

Interruption ______1) check compensator condensers No. 30, 39, 45 located in first, second and third i-f transformer cans. Fault may be due to loose rivets or dirt between plates. Tap cans to locate trouble, and replace assembly

Low sensitivity, ______1) check contacts on band switch. These contacts may shift or drop out completely. This may be indicated by short wave reception on the broadcast band, and by improper tracking of the oscillator

PHILCO 16, 16B, 16X, 16RX—(Codes 121, 122)—(Cont’d)

Bass distortion ______1) check for reduction in value of 10,000-ohm resistor No. 83 connected in network between noise potentiometer and No. 91 15,000-ohm resistor. Replace with 20-watt wire-wound resistor. Realign receiver

Distortion at ______1) replace 0.05-mfd. first to second stage audio coupling condenser No. 59

low volume

2) check 10-mfd. electrolytic condenser No. 76 connected from high voltage center-tap to chassis

Distortion at ______1) check for breakdown between sections of condenser block No. 62 (capacities 2-2-mfd., 2-0.05-mfd., 1-1-mfd.)

Weak “tinny” signal

Hum

1) check grid-bias voltage for the driver and output stages. Lack of normal bias on either of these stages usually results in the control grids of the 42 tubes glowing red (a low-emission 42 tube will produce the same result). Check for a “leaky” or “shorted” 0.15-mfd. grid filter by-pass condenser in the driver stage

2) if control-grid bias on 42 tubes is low or absent, check secondary return of push-pull input transformer for grounding to the case or the laminations of the transformer internally. Replace transformer

3) leakage of the paper which is supposed to insulate the electrolytic filter condenser from the chassis. Either one, or both, condensers must usually be replaced

4) “leaky” electrolytic condenser No. 75. Replace with new unit

Weak, choked ______1) check screen-grid voltage applied to 77 first a-f tube (should be approximately 50 volts). If off, replace the 1-meg. carbon resistor which supplies this voltage

reception (with the noise suppressor tube in or out of the circuit)

How to tell ______1) in all cases of “apparent fading” of signal, shift receiver tuning 5 or 10 kc plus —then minus. If this restores the signal, the trouble is not due to fading but to frequency drift which has occurred in some part of the receiver (common causes and remedies for frequency drift in various models of receivers listed further on)

Fading ______1) intermittent open-circuit in the third i-f transformer. Replace with new unit if defective

Fading ______1) bakelite which holds stator of oscillator tuning condenser expands or contracts, allowing set-screws and rivets to loosen. This causes stator to shift its position slightly thereby changing the oscillator frequency. Remove gang condenser and tighten all set-screws and rivets. Realign receiver

Intermittent ______1) secondary of first r-f transformer has fading high-resistance connection

(Cont’d)
**Sec. 1**

**"Case Histories" of Receiver Troubles and their Remedies**

<table>
<thead>
<tr>
<th>PHILCO 16, 16B, 16X, 16RX (Codes 121, 122)</th>
<th>PHILCO 16, 16B, 16X, 16RX (Codes 121, 122)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fading on short-wave bands</strong></td>
<td><strong>Choked</strong></td>
</tr>
<tr>
<td>Oscillator drift</td>
<td>1) open-circuited 2-mfd. by-pass condenser</td>
</tr>
<tr>
<td></td>
<td>2) clean the rotor-shaft contacts</td>
</tr>
<tr>
<td></td>
<td>3) tighten all screws on gang condenser, and between gang condenser and chassis</td>
</tr>
<tr>
<td></td>
<td>4) waveband switch not grounded perfectly. Ground frame of waveband switch to chassis with pigtaile</td>
</tr>
<tr>
<td></td>
<td>5) replace fibre insulator on high-frequency compensating condenser with new and thicker type</td>
</tr>
<tr>
<td><strong>Frequency drift</strong> (due to i-f drift)</td>
<td><strong>Motorboating</strong></td>
</tr>
<tr>
<td>In order to alleviate frequency drift it is recommended that the first and second i-f transformers be replaced with part No. 32-1186, using compensating condenser assemblies (Part No. 31-6080), with shunt condensers, (Part No. 30-1086) connected across both the primary and secondary sections. The third i-f transformer should be replaced with Part No. 31-1966 using compensating condenser assembly (Part No. 31-6009), no shunt condensers being used</td>
<td>1) check for &quot;open&quot; section in condenser block No. 62 (capacities 2-2-mfd., 2-0.06-mfd., 1-1-mfd.)</td>
</tr>
<tr>
<td><strong>Frequency drift</strong> (due to dial creeping)</td>
<td><strong>Inoperative</strong></td>
</tr>
<tr>
<td>replace tension spring on back of gang condenser—using improved Part No. 77760</td>
<td>1) replace 0.05-mfd. condenser No. 22 connected from filter resistor of r-f amplifier plate supply to ground (open shadow on tuning meter)</td>
</tr>
<tr>
<td><strong>Volume uncontrolled</strong></td>
<td>2) replace twin 0.05-mfd. condensers No. 25 connected from each side of shadowgraph to ground (open shadow on tuning meter)</td>
</tr>
<tr>
<td>if at zero volume control setting and with the QAVC switch in the S position the volume does not reach minimum or zero, replace the 0.02-mfd. condenser in the 78 QAVC control-grid circuit with a 0.01-mfd. condenser</td>
<td>3) check 1-mfd. condenser No. 73 connected from screen grid of 77 first audio tube to ground</td>
</tr>
<tr>
<td><strong>Code interference</strong></td>
<td>4) check 0.05-mfd. condenser No. 58 connected from filter resistor of second i-f plate supply to ground</td>
</tr>
<tr>
<td>readjust wave trap for minimum interference. In extreme cases, reduce the i-f to a lower value—say 440 kc. The high and low frequency compensating condensers of the oscillator circuit should be readjusted in order to reproduce the correct i-f</td>
<td>5) check 0.25-mfd. condenser No. 22 connected from filter resistor of first audio plate supply to ground</td>
</tr>
<tr>
<td><strong>Whistling or squealing (intermittently or steady)</strong></td>
<td><strong>Weak reception</strong></td>
</tr>
<tr>
<td>if accompanied by image signal check 0.05-mfd. condenser No. 15 for &quot;open.&quot; Connected from first detector grid return to ground</td>
<td>1) check 0.003-mfd. condenser No. 11 connected from ave load resistor of first r-f tube to ground. Breakdown indicated by inability to peak on broadcast band padder</td>
</tr>
<tr>
<td>2) check 0.05-mfd. condenser No. 48 from second i-f plate supply filter resistor to ground</td>
<td>2) check for &quot;gassy&quot; 5Z3 tube</td>
</tr>
<tr>
<td>3) solder pigtaile from all r-f, i-f and oscillator transformer shield cans to ground</td>
<td><strong>Weak reception</strong></td>
</tr>
<tr>
<td>4) replace loose tuning meter bracket</td>
<td>1) check compensating condensers No. 45 (first i-f primary), No. 49 (second i-f primary), No. 55 (third i-f primary), Tapping the i-f transformer cans will usually indicate intermittent condenser. Replace faulty one</td>
</tr>
<tr>
<td><strong>Hum</strong> (in early series)</td>
<td><strong>Weak reception</strong></td>
</tr>
<tr>
<td>replace the a-c switch jumper from switch through terminal lug mounted on condenser at back of set with shielded wire (with the shield grounded)</td>
<td>1) open-circuited 500-ohm wire-wound pigtail type second i-f tube cathode bias resistor</td>
</tr>
<tr>
<td><strong>Hum</strong></td>
<td><strong>Wide shadowgraph indication</strong></td>
</tr>
<tr>
<td>check for &quot;open&quot; 0.3-mfd. condenser No. 30 connected across filter choke</td>
<td><strong>Intermittent</strong></td>
</tr>
<tr>
<td><strong>Tone improvement (early models)</strong></td>
<td>1) open-circuiting 0.05-mfd. condenser connected between the junction of the two diode load resistors and the bottom lug of the volume control</td>
</tr>
<tr>
<td>Two peaks indicated on shadowgraph. Widening of shadow upon resonance</td>
<td>2) open-circuiting by-pass condenser. Trouble in lead contacts</td>
</tr>
<tr>
<td><strong>(Cont'd)</strong></td>
<td>3) open-circuiting 250-ohm resistor assembly blocks in i-f plate circuit</td>
</tr>
</tbody>
</table>

**PHILCO 16, 16-X, 16-RX (Code 123)**

See also the Case Histories listed for Philco 16 (Codes 121 and 122) receivers

**Inoperative** |

1) high-resistance contacts in waveband S-W band switch. Replace with new switch

**Intermittent connection between coil lead and hook-up wire in third i-f transformer**

**PHILCO 16, 16B, 16X (Codes 125, 126)**

**Inoperative** |

1) replace 0.05-mfd. condenser No. 22 connected from filter resistor of r-f amplifier plate supply to ground (open shadow on tuning meter)
“Case Histories” of Receiver Troubles and their Remedies

PHILCO 16, 16B, 16X (Codes 125, 126)—(Cont’d)

Distorted, Intermittent

1) open-circuiting, or change of resistance
   of first audio tube 1-megohm screen resis-
   tor
2) replace 0.05-mfd. coupling condenser
   No. 75 connected between first and sec-
   ond audio tubes

Distortion at low volume

1) breakdown in 0.05-mfd. coupling con-
   denser No. 75 connected between first and
   second audio stages
2) “open” 0.25-mfd. filter condenser No. 82
   connected in plate supply circuit of 77
   first audio amplifier

Distortion (screens of 42 tubes get red hot)

1) leakage between insulation and chassis
   of first filter condenser

Distortion (grids of 42 tubes get red hot)

1) center-tap of push-pull input transform-
   er grounded to core or can (Insulate
   from chassis with insulating bushings
   and washers)

Whistling or squealing

1) insert a 700-ohm 1-watt carbon resistor
   in series with the plate lead of the 78
   r-f tube, and remove the condenser
   shown in the circuit diagram as No. 2A
2) check for “open” twin 0.05-mfd. condens-
   ers No. 25. These are connected with
   their “common” to ground, to one each
   side of tuning meter
3) check twin 0.0001-mfd. condensers No.
   61. These are connected with their “com-
   mon” to ground, one on each side of the
   second detector grid return load re-
   sistor
4) solder pigtails from coil-mounting
   screws of r-f, oscillator and i-f trans-
   former shield cans to ground

Motorboating

1) check electrolytic condenser block No.
   78, red, blue and blue 1-mfd. each, plain
   2-mfd. Common negative connects to
   can

Hum

1) check for “open” 0.3-mfd. condenser No.
   97, connected across filter choke
2) check for “open” 8-mfd. electrolytic filter
   condenser No. 91

Dial sticks, Dial slips

1) excessive pressure exerted by felt rests
   against dial
2) dial cable worn or frayed

PHILCO TH-16

Carrier hum

1) replace condenser No. 12 with a 4-mfd.
   electrolytic unit

PHILCO 17

See also Case Histories listed for Philco 16

Inoperative

1) check for “shorted” 0.05-mfd. condenser
   No. 21 connected from oscillator screen
   grid to ground
2) “open” tuning meter No. 29 (indicated
   by narrow shadow)

Inoperative with volume control at mini-
imum setting and QA VC switch at “on”

PHILCO 17—(Cont’d)

Intermittent

1) check for “open” first audio screen re-
   sistor
2) check for increased value in first audio
   screen resistor
3) check for faulty by-pass condenser in
   grid-return of oscillator coil
4) check for faulty r-f transformer

Intermittent

1) check the 2-mfd. section of the filter con-
   denser block by-passing large 7,500-ohm
   wire-wound bleeder resistor
2) check the 0.5-mfd. condenser units by-
   passing the 70,000-ohm resistor in the
   1st audio plate circuit. They are mark-
   ed B and C, respectively

Distorted

1) gasse type 5Z3 tube

Whistling

1) check for increase in first audio grid
   (intermit-

Distortion

2) open-circuited audio coupling-condenser
   connected from tuning to ground
3) check twin 0.05-mfd. condenser
   connected between first and sec-
   ond audio transformer
4) check for “shorted” 0.05-mfd. condenser
   (narrow shadow) to ground or steady)

Hum

1) check for “open” condenser connected
   across speaker field

Whistling

1) check for “open” 0.05-mfd. condenser
   No. 21 connected from oscillator screen
   grid to ground

Apparent

1) check for loose rivets which hold the
   bakelite insulating panels in the sides
   of the tuning condenser sections, permit-
   ting the stators to shift

PHILCO 17-X

Distortion

1) 1st filter condenser leakage between in-
   type ’42 screens get red hot

Hum

1) check for “open” condenser connected
   across speaker field

PHILCO 18 (Codes 122, 123)

Inoperative

1) control grid of type ’75 tube shorting
   to shield can
2) open-circuited audio coupling-condenser
3) “shorted” tone control condenser
4) check first i-f primary for “open” or
   high-resistance joints
5) check AVC coupling condenser for
   “open” or “intermittent” joint
6) check for “shorted” 0.05-mfd. condenser
   No. 12 connected from tuning to ground
   (wide shadow)
7) check for “shorted” electrolytic filter con-
   denser No. 40 (capacities 2-1-mfd.,
   1-2-mfd. (narrow shadow)
8) check for “open” tuning meter No. 63
   (narrow shadow)
9) check “shorted” 0.05-mfd. condenser
   No. 20 connected from 6A7 tube space
   charge grid supply filter resistor to
   ground
10) check for “shorted” 0.006-mfd. conden-
    sor No. 42 connected from plate of 42
    first i-f tube to ground
11) check for “open” primary in input
    transformer No. 43

(Cont’d)