TYPE OF CIRCUIT: Model 38-116, code 121 employs a fifteen tube A.C. operated superheterodyne circuit with a spread-band dial having tuning ranges covering a frequency range from 530 K.C. to 18.2 M.C.

Incorporated in this model are design features such as: magnetic tuning control on each tuning range; automatic volume control; treble-selectivity expander unit in the intermediate frequency circuit; audio bass compensation; acoustic clarifiers to eliminate cabinet resonance; special push-pull audio output circuit using 6L6G beam tubes, and the Philco automatic tuning mechanism.

POWER SUPPLY: Voltage Frequency Power
115 50 to 60 165 watts
115 25 to 40 165 watts

Different transformers are required for operation on the voltages and frequencies listed above. The part numbers for these transformers are listed on page 4. 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.

INTERMEDIATE FREQUENCY: 470 K.C.

FREQUENCY RANGES: Range One 530 to 1600 K.C.
Two 4.7 to 7.4 M.C.
Three 11.6 to 18.2 M.C.

UNDISTORTED OUTPUT: 15 watts.

PHILCO TUBES USED: 6K7G R.F.; 6L7G Mixer; 6A8G Oscillator; 6N7G Oscillator control; two 6K7G I. F.; 6K7G 2nd Detector Magnetic tuning amplifier; two 6J5G Discriminator; 6J5G A. V. C.; 6R7G 1st audio; 6J5G Audio driver; two 6L6G audio output, and one 5X4G rectifier.

TONE CONTROLS: Two—1. High audio-frequency tone varied by Treble-Selectivity control.
2. Low audio-frequency tone varied by “Bass Tone Control,” in the volume control circuit.

PHILCO SPEAKERS USED: One type “W4” with three acoustic clarifiers.

CABINET: Type XX.

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. and I. F. transformers and the range switch sections are shown on pages 2 and 3. Each part is marked with the corresponding schematic diagram circled number.

The leads and lugs of the R. F. and I. F. transformers are either numbered or the color of the wire marked to indicate the connecting point in the circuit diagram, which is also correspondingly marked.

Range switch lugs are marked with a letter and number—example (A2)—indicating the connecting point in the circuit diagram.

Speaker wiring is shown in Fig. 3 and the power transformer wire colors are marked on the schematic diagram.

Fig. 1. Underside View of Chassis showing Socket Voltages
The voltages indicated by the arrows were measured with a Philco 36 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 and a complete parts list for the Automatic Tuning Mechanism of this receiver will be found in Service Bulletin 273. There are four automatic dial parts, however, which differ from those shown in bulletin 273. These parts are marked with an asterisk on page 4 of this bulletin.

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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Fig. 2. Underside View of Chassis

Fig. 3. Speaker Wiring

Fig. 4. I.F. Transformer Connections
Fig. 5. Schematic Diagram Model 28-136, Code 128
Fig. 7. I.F. Compensators

Fig. 8. R.F. Compensator Underside of Chassis
Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator, having a fundamental frequency in the frequency range of the receiver to be tested, and intermediate frequencies of the receiver.

Philco Model 077 Signal Generator which has a fundamental frequency range from 44 to 465 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 No. 21-7059 and Fiber Wrench Part No. 3104.

OUTPUT METER: The 0/6 Output Meter is connected to the plate and cathode terminals of one of the 6L7G tubes. Adjust the meter to read 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 the stage being adjusted.

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

1. Set the set wavemeter 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 the broadcast band. See Fig. 6. With dial and tuning condenser in this position tighten set screws.

2. Turn the tuning condenser control until the indicator is on the 520 K.C. mark. See Fig. 6.

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

INTERMEDIATE FREQUENCY CIRCUIT

1. Viewing each instrument from the front, set the receiver and Signal Generator controls as follows:
   a. Selectivity-fidelity control (clockwise)
   b. Volume-Control at maximum (clockwise)
   c. Magnetic Switching switch (off)
   d. Bass Compensation switch first position from "off"
   e. Range Switch position one (broadcast)
   f. Receiver dial 580 K.C.
   g. Signal Generator indicator set at 470 K.C. and the "Attenuator" control for maximum output.

2. Connect the Signal Generator output cable through a .1 mfd. condenser to the grid of the second 6K7G I.F. tube. Then adjust the I.F. compensators as follows:
   a. Close compensator (82B) by turning to the extreme clockwise position, then pad compensator (82A) for maximum output. Now readjust compensator (82B) for maximum output.
   b. Connect the Signal Generator output lead through the .1 mfd. condenser to the grid of the 6L7G tube, and adjust the following compensators for maximum output: (81D), (81C), (81A), (81B).
   c. Repad (82A)—See Note A. Check for two equal peaks. Fidelity control in expanded position (counter-clockwise).

RADIO FREQUENCY CIRCUIT

1. Set the controls as given under "Intermediate Frequency Circuit" and set the Signal Generator Signal Switch and Receiver Dials for the adjustments of each tuning range in the following procedure.

   a. Connect the Signal Generator Signal Switch to "Red" and "Blk" terminals on the aerial panel (rear of chassis). The ground connection of the cable should be connected to the "Blk" terminals.

2. Set the controls and adjust the compensators for maximum output as follows:

   a. 530 to 1600 K.C.
      Range Switch and Receiver Dial
      Position 1 1500 K.C.
      Position 2 580 K.C.

   b. 4.7 to 7.4 M.C.
      Range Switch and Receiver Dial
      Position 1 60 K.C.
      Position 2 5.0 M.C.
      Position 3 7.0 M.C.
      Position 4 8.0 M.C.

   c. 7.35 to 11.6 M.C.
      Range Switch and Receiver Dial
      Position 1 100 K.C.
      Position 4 6.0 M.C.
      Position 4 7.5 M.C.
      Position 4 8.0 M.C.

3. The above adjustments are now checked for accuracy as follows:

   a. Set the Magnetic Tuning Switch in the "out" position (counter-clockwise).
   b. Variable control maximum (extreme clockwise).
   c. Turn Treble-Selectivity control to the expanded position.
   d. Now, adjust the "Attenuator" control of the signal generator for a weak signal, and turn the indicator to 1000 K.C. Then adjust the receiver dial for maximum output at this frequency.

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