

# PHILCO RADIO-CLOCK, MODELS 50-527 and 50-527-I

## SPECIFICATIONS

|                        |  |
|------------------------|--|
| CABINET                |  |
| Model 50-527           | Molded Phenolic, brown                             |
| Model 50-527-I         | Molded Phenolic, Ivory                             |
| FREQUENCY RANGE        | 540—1600 kc.                                       |
| AUDIO OUTPUT           | 1 watt   |
| OPERATING VOLTAGE      | 117 volts, a.c.                                    |
| POWER CONSUMPTION      | 30 watts   |
| AERIAL                 | High-impedance loop; connector for external aerial |
| INTERMEDIATE FREQUENCY | 455 kc.  |
| PHILCO TUBES (5)       | 7A8, 14A7, 14B6, 50L6GT, 35Y4                      |



TP-7964

## Circuit Description

Philco Radio-Clock Models 50-527 and 50-527-I are 5-tube table-model superheterodynes, providing reception in the standard broadcast band and the functions of an electric alarm clock.

A high-impedance loop aerial normally provides adequate signal pickup. An external aerial may be connected, if desired, by detaching the aerial lead from the chassis and connecting it to the external aerial leadin. Do not use a ground.

The loop aerial is coupled to the 7A8 converter. The aerial and oscillator circuits are tuned by ganged variable condensers, and the oscillator rotor-section plates are properly shaped to obtain tracking, thus eliminating the necessity for a series padding condenser.

The 7A8 converter is transformer-coupled to the 14A7 i-f amplifier, which is also transformer-coupled to the diodes of the 14B6 second detector — first audio amplifier. A-v-c voltage is applied to the control grids of both the i-f amplifier and converter tubes. The triode section of the 14B6 is the first audio stage, and is resistance-coupled to the 50L6GT output tube. The output tube works into a permanent-magnet speaker.

D-c operating voltages are supplied from a 35Y4 half-wave rectifier, and filtered by a three-section resistor-condenser network.

R102, a 150,000-ohm resistor, prevents hum which might otherwise occur under conditions of high humidity.

In addition to the normal features of a table-model radio and an electric clock, a radio alarm is included, which turns the radio on at any preset time; there is also a "delayed off" feature that automatically shuts the set off after any desired period up to an hour. These functions are available by the following control settings: For alarm action, the AUTO-OFF-ON switch is set to the AUTO position, and the alarm is set to the desired time. When the delayed off action is required, as when retiring, the DELAYED OFF switch is turned to the right, and the AUTO-OFF-ON switch is set to the AUTO position. The two actions may be combined, i.e., before retiring, the alarm may be set for the morning time, and the DELAYED OFF switch also set. The radio then plays for an hour, shuts itself off, and comes on again in the morning. When the AUTO-OFF-ON

switch is set to the ON position, the radio operates independently of the clock. When the switch is set to the OFF position, the radio is turned off, and is not under the control of the clock.

## Philco TROUBLE-SHOOTING Procedure

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

## Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.
2. Measure the resistance between B+ (pin 7 of the 35Y4) and B-, test point B. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condensers C101A, C101B, C101C, and C203 for leakage or shorts. The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

**Section 1**

**TROUBLE SHOOTING**

**POWER SUPPLY**

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B-, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, and set the volume control to minimum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

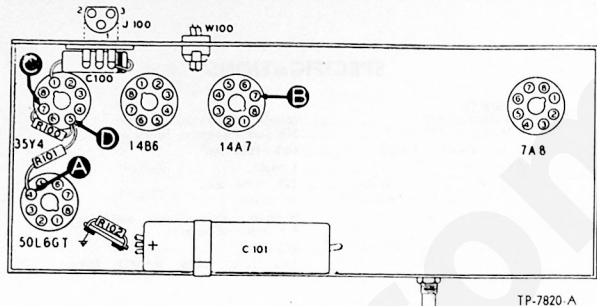


Figure 1. Bottom View, Showing Section 1 Test Points

| STEP | TEST POINT | NORMAL INDICATION | ABNORMAL INDICATION                       | POSSIBLE CAUSE OF ABNORMAL INDICATION  |
|------|------------|-------------------|---|--|
| 1    | A          | 95v               |   | Trouble within this section. Isolate by the following tests.   |
| 2    | C          | 108v              | No voltage<br>Low voltage<br>High voltage | Defective: 35Y4. Shorted: C101A. Open: S100, W100, J100.<br>Defective: 35Y4. Open: C101A. Leaky: C101A.<br>Open: R100. |
| 3    | D          | 120v              | No voltage<br>Low voltage<br>High voltage | Shorted: C101B. Open: R100.<br>Open: C101B. Leaky: C101B, C203*.<br>Open: R101, T200*, R203*.                          |
| 4    | A          | 95v               | No voltage<br>Low voltage                 | Shorted: C101C. Open: R101.<br>Leaky: C101C.   |

Listening Test: Abnormal hum may be caused by open C101A, C101B, or C101C.

\* This part, located in another section, may cause abnormal indication in this section.

**Section 2**

**TROUBLE SHOOTING**

**AUDIO CIRCUITS**

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B-, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

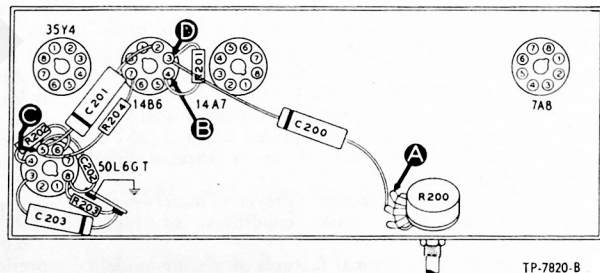


Figure 2. Bottom View, Showing Section 2 Test Points

| STEP | TEST POINT | NORMAL INDICATION  | POSSIBLE CAUSE OF ABNORMAL INDICATION                            |
|------|------------|--|--|
| 1    | A          | Loud, clear speaker output with weak signal-generator input. | Trouble within this section. Isolate by the following tests.     |
| 2    | C          | Clear output with strong input.                              | Defective: 50L6GT, LS200. Shorted: C202, C203. Open: R203, T200. |
| 3    | D          | Clear output with moderate input.                            | Defective: 14B6. Shorted: C201. Open: C201, R202, R204.          |
| 4    | A          | Same as step 1.  | Shorted: C301D*. Open: R200, R201, C200.                         |

Listening Test: Distortion may be caused by shorted or leaky C201.

\* This part, located in another section, may cause abnormal indication in this section.

**Section 3**

**TROUBLE SHOOTING**

**I-F, DETECTOR, AND A-V-C CIRCUITS**

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B-, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and rotate the tuning control until the tuning condenser is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

To provide a complete i-f-amplifier check, test point A for this section is placed at the grid of the mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

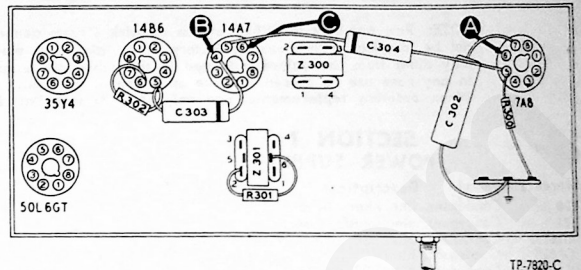


Figure 3. Bottom View, Showing Section 3 Test Points

| STEP | TEST POINT | NORMAL INDICATION  | POSSIBLE CAUSE OF ABNORMAL INDICATION   |
|------|------------|--|---|
| 1    | A          | Loud, clear speaker output with weak signal-generator input. | Trouble within this section. Isolate by the following tests.  |
| 2    | C          | Same as step 1.  | Defective: 14A7, 14B6 (diode section). Shorted: L300B, C300B, L301A, C301A, L301B, C301B, C301C, C301D. Open: L301A, L301B, C301A, C301B, R300, R301, C304. Misaligned: Z301. |
| 3    | A          | Same as step 1.  | Defective: 7A8*. Shorted: C400*, C400A*, L300A, C300A. Open: L300A, L300B, C300A, C300B. Misaligned: Z300.  |

Listening Test: Hum and instability may be caused by open C302, C303.

\* This part, located in another section, may cause abnormal indication in this section.

**Section 4**

**TROUBLE SHOOTING**

**R-F AND CONVERTER CIRCUITS**

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator, with modulated output. Connect the generator ground lead to B-, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and set the tuning control and the signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in this section. If the trouble is not revealed by the tests for this section, check the alignment.

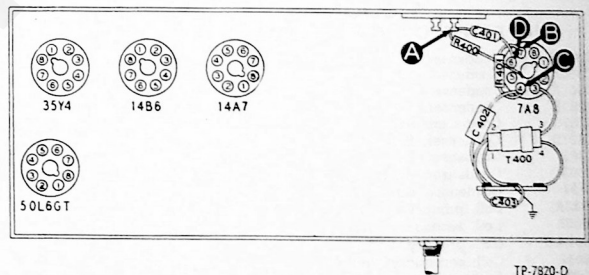


Figure 4. Bottom view, Showing Section 4 Test Points

| STEP | TEST POINT                        | SIG. GEN. FREQUENCY | RADIO TUNING          | NORMAL INDICATION                                      | POSSIBLE CAUSE OF ABNORMAL INDICATION                                     |
|------|-----------------------------------|---------------------|-----------------------|--|---|
| 1    | A                                 | 1000 kc.            | 1000 kc.              | Clear speaker output with weak signal-generator input. | Trouble within this section. Isolate by the following tests.              |
| 2    | C<br>(Osc. test; see note below.) |                     | Rotate through range. | Negative 4v to 6v.                                     | Defective: 7A8. Open: C402, R401, T402. Shorted: T400, C400, C400B, C403. |
| 3    | D                                 | 1000 kc.            | 1000 kc.              | Same as step 1.  | Defective: 7A8. Open: LA400. Shorted: C400, C400A, LA400.                 |
| 4    | A                                 | 1000 kc.            | 1000 kc.              | Same as step 1.  | Open: C401.   |

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to the B-, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the 7A8 oscillator grid (pin 4), test point C. Use a suitable meter range, such as 0-10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

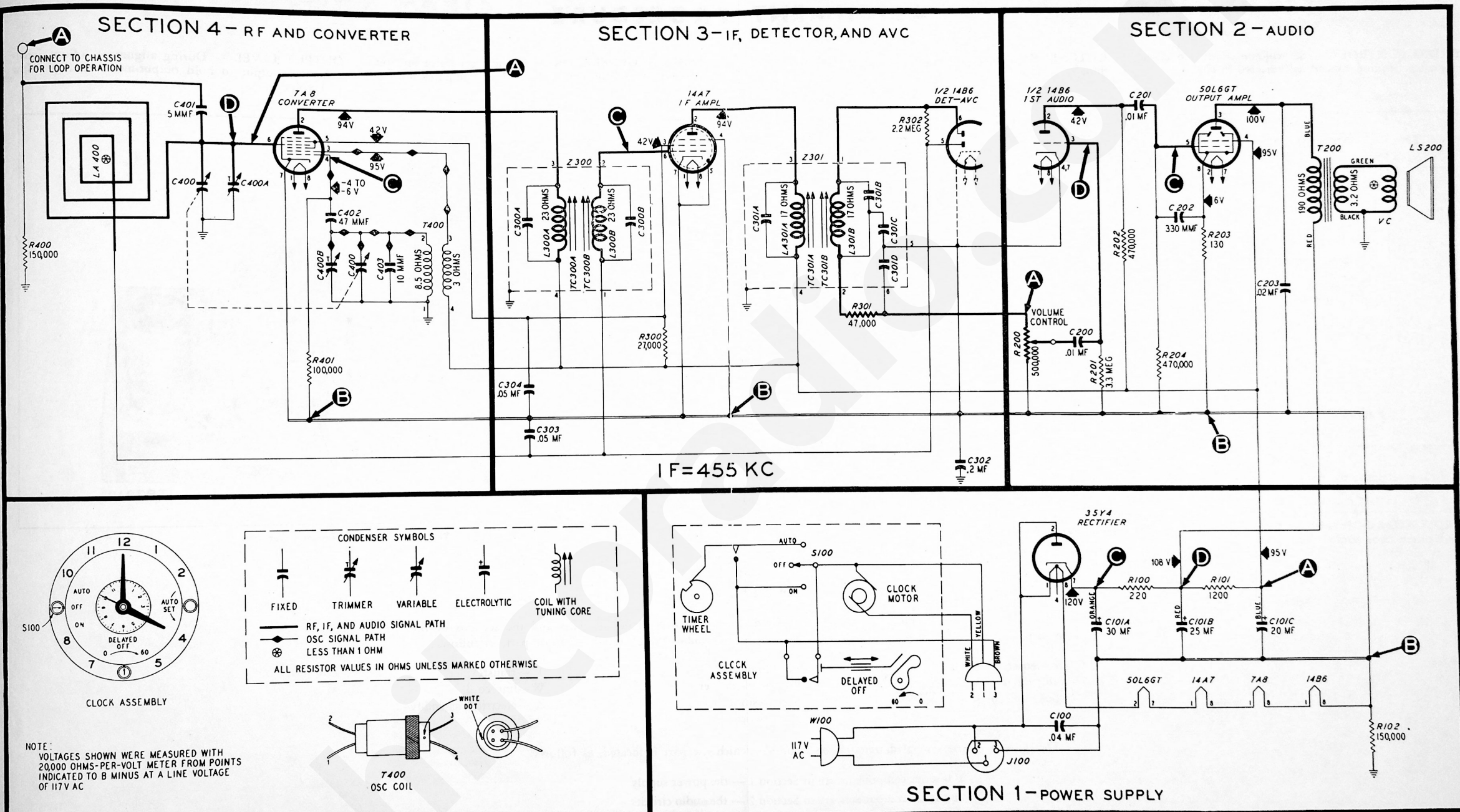


Figure 5. Philco Radio-Clock Models 50-527 and 50-527-1, Sectionalized Schematic Diagram, Showing Test Points

## ALIGNMENT PROCEDURE

**RADIO CONTROLS** — Set volume control to maximum. Set tuning control as indicated in chart.

**OUTPUT METER** — connect across voice-coil terminals.

**SIGNAL GENERATOR** — Connect generator and set frequency as indicated in chart. Use modulated output.

**OUTPUT LEVEL** — During alignment, adjust signal-generator output to hold output-meter reading below 1.25 volts.

| STEP | SIGNAL GENERATOR  |              | RADIO                          |  | ADJUST   |
|------|---|--------------|--------------------------------|--|--|
|      | CONNECTION TO RADIO   | DIAL SETTING | DIAL SETTING                   | SPECIAL INSTRUCTIONS                                     |  |
| 1    | Connect ground lead to B-; output lead through .1-mf. condenser to grid (pin 6) of 7A8. | 455 kc.      | Tuning condenser fully meshed. | Adjust tuning cores, in order given, for maximum output. | TC301B—2nd i-f sec.<br>TC301A—2nd i-f pri.<br>TC300B—1st i-i sec.<br>TC300A—1st i-f pri. |
| 2    | Radiating loop (see note below).  | 1600 kc.     | 1600 kc.                       | Adjust trimmer for maximum output.                       | C400B—Osc.   |
| 3    | Same as step 2.   | 1500 kc.     | 1500 kc.                       | Adjust trimmer for maximum output.                       | C400A—Aerial   |

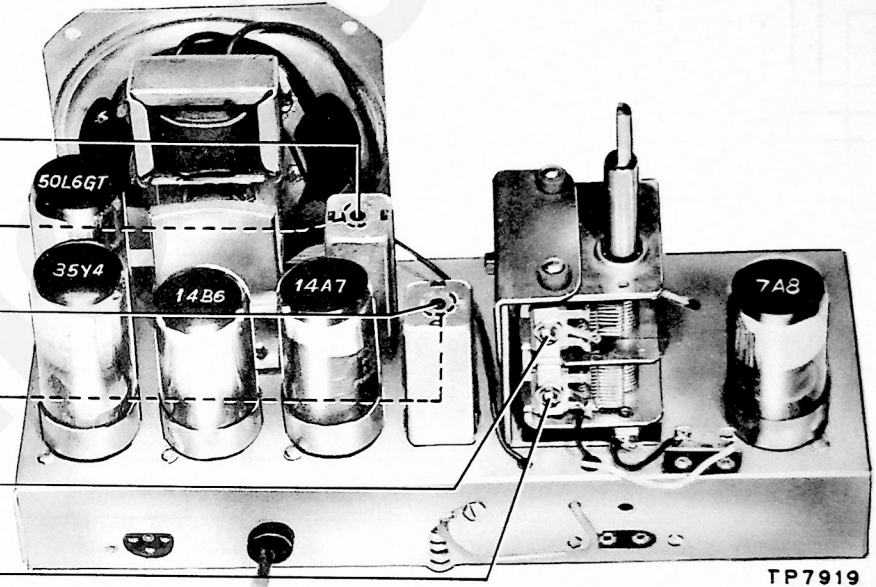


Figure 6. Top View, Showing Trimmer Location

**RADIATING LOOP:** Make up a 6—8 turn, 6-inch-diameter loop, from insulated wire; connect to signal-generator leads and place near radio loop aerial.

### SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

|                 |                 |                       |
|-----------------|-----------------|-----------------------|
| C—condenser     | LA—loop aerial  | T—transformer         |
| I—pilot lamp    | LS—loud-speaker | W—line cord           |
| L—choke or coil | R—resistor      | Z—electrical assembly |
|                 | S—switch        |                       |

The number of the symbol designates the section in which the part is located, as follows:

- 100-series components are in Section 1 — the power supply
- 200-series components are in Section 2 — the audio circuits
- 300-series components are in Section 3 — the i-f, detector, and a-v-c circuits
- 400-series components are in Section 4 — the r-f and converter circuits

# REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (\*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

## SECTION 1 POWER SUPPLY

| Reference Symbol | Description                              | Service Part No.       |
|------------------|--|------------------------|
| C100             | Condenser, line filter, .04 mf. ....     | 45-3500*               |
| C101             | Condenser, electrolytic, 3-section ..... | 30-2573                |
| C101A            | Condenser, filter, 30 mf., 150v .....    | Part of C101           |
| C101B            | Condenser, filter, 25 mf., 150v .....    | Part of C101           |
| C101C            | Condenser, filter, 20 mf., 150v .....    | Part of C101           |
| J100             | Socket, clock motor and switch .....     | 27-6126                |
| R100             | Resistor, filter, 220 ohms, 1 watt ..... | 66-1224340*            |
| R101             | Resistor, filter, 1200 ohms .....        | 66-2128340*            |
| R102             | Resistor, leakage, 150,000 ohms .....    | 66-4158340*            |
| S100             | Switch, AUTO-OFF-ON .....                | Part of clock assembly |
| W100             | Line cord and plug .....                 | L-2183*                |

## SECTION 2 AUDIO CIRCUITS

|       |   |               |
|-------|---|---------------|
| C200  | Condenser, d-c blocking, .01 mf. ....             | 61-0120*      |
| C201  | Condenser, d-c blocking, .01 mf. ....             | 61-0120*      |
| C202  | Condenser, parasitic suppressor,<br>330 mmf. .... | 60-10335400*  |
| C203  | Condenser, tone compensation, .02 mf. ....        |               |
| LS200 | Speaker, p-m .....                                |               |
| R200  | Volume control, 500,000 ohms .....                |               |
| R201  | Resistor, grid return, 3.3 megohms .....          | 66-5338340*   |
| R202  | Resistor, plate dropping, 470,000 ohms .....      | 66-4478340*   |
| R203  | Resistor, cathode bias, 130 ohms .....            | 66-1138340*   |
| R204  | Resistor, grid return, 470,000 ohms .....         | 66-4478340*   |
| T200  | Transformer, output .....                         | Part of LS200 |

## SECTION 3 I-F, DETECTOR, AND A-V-C CIRCUITS

|        |  |              |
|--------|--|--------------|
| C300A  | Condenser, fixed trimmer .....               | Part of Z300 |
| C300B  | Condenser, fixed trimmer .....               | Part of Z300 |
| C301A  | Condenser, fixed trimmer .....               | Part of Z301 |
| C301B  | Condenser, fixed trimmer .....               | Part of Z301 |
| C301C  | Condenser, fixed trimmer .....               | Part of Z301 |
| C301D  | Condenser, fixed trimmer .....               | Part of Z301 |
| C302   | Condenser, by-pass, 2 mf. ....               | 45-3500-3    |
| C303   | Condenser, a-v-c filter, .05 mf. ....        | 61-0122*     |
| C304   | Condenser, screen by-pass, .05 mf. ....      | 61-0122*     |
| L300A  | Coil, primary, 1st i-f .....                 | Part of Z300 |
| L300B  | Coil, secondary, 1st i-f .....               | Part of Z300 |
| L301A  | Coil, primary, 2nd i-f .....                 | Part of Z301 |
| L301B  | Coil, secondary, 2nd i-f .....               | Part of Z301 |
| R300   | Resistor, screen dropping, 27,000 ohms ..... | 66-3278340*  |
| R301   | Resistor, diode load, 47,000 ohms .....      | 66-3478340*  |
| R302   | Resistor, a-v-c filter, 2.2 megohms .....    | 66-5228340*  |
| TC300A | Tuning core, primary, 1st i-f .....          | Part of Z300 |
| TC300B | Tuning core, secondary, 1st i-f .....        | Part of Z300 |
| TC301A | Tuning core, primary, 2nd i-f .....          | Part of Z301 |
| TC301B | Tuning core, secondary, 2nd i-f .....        | Part of Z301 |
| Z300   | Transformer, 1st i-f .....                   |              |
| Z301   | Transformer, 2nd i-f .....                   | 32-4240      |

## SECTION 4 R-F AND CONVERTER CIRCUITS

|       |   |              |
|-------|---|--------------|
| C400  | Condenser, tuning gang, 2-section .....                     | 31-2731-1    |
| C400A | Condenser, trimmer, aerial .....                            | Part of C400 |
| C400B | Condenser, trimmer, osc. ....                               | Part of C400 |
| C401  | Condenser, aerial coupling, 5 mmf. ....                     | 30-1224-5*   |
| C402  | Condenser, d-c blocking, 47 mmf. ....                       | 60-00515300* |
| C403  | Condenser, ceramic, oscillator compensator,<br>10 mmf. .... | 30-1224-26   |
| LA400 | Loop aerial .....   | 32-4052-32   |
| R400  | Resistor, isolating, 150,000 ohms .....                     | 66-4158340*  |
| R401  | Resistor, grid return, 100,000 ohms .....                   | 66-4108340*  |
| T400  | Transformer, oscillator .....                               | 32-4263      |

## MISCELLANEOUS

| Description                      | Service Part No. |
|----------------------------------|------------------|
| Back .....                       | 54-7631          |
| Cabinet .....                    |                  |
| Model 50-527 .....               | 10745            |
| Model 50-527-1 .....             | 10745-1          |
| Clock, with cable assembly ..... |                  |
| Model 50-527 .....               | 56-6710          |
| Model 50-627-1 .....             | 76-4840          |
| Clock cover .....                |                  |
| Model 50-527 .....               | 76-4640          |
| Model 50-527-1 .....             |                  |
| Dial, tuning .....               | 54-5055          |
| Knob, volume control .....       |                  |
| Model 50-527 .....               | 27-4820          |
| Model 50-527-1 .....             | 54-4118          |
| Socket, Loktal .....             | 27-6177          |

## CORRECTIONS TO PARTS LIST

| Reference Symbol | Description  | Service Part No. |
|------------------|--|------------------|
| C101             | Condenser, electrolytic, 3-section .....                               | 30-2575-25       |
| C101             | Condenser, electrolytic, 3-section (used in<br>later production) ..... | 30-2575-27       |
| C101A            | Condenser, filter, 40 $\mu$ f., 150v .....                             | Part of C101     |
| C101B            | Condenser, filter, 30 $\mu$ f., 150v .....                             | Part of C101     |
| C101C            | Condenser, filter, 30 $\mu$ f., 150v .....                             | Part of C101     |
| C203             | Condenser, tone compensation, .02 $\mu$ f. ....                        | 61-0108*         |
| LS200            | Speaker, p-m .....   | 36-1627          |
| R200             | Volume control, 500,000 ohms .....                                     | 33-5565-6        |
| Z300             | Transformer, 1st i-f .....   | 32-4160-6A       |
|                  | Clock cover (50-527-1) .....   | 56-6710          |

## ADDITIONS TO PARTS LIST

| Description                                      | Service Part No. |
|--|------------------|
| Baffle-and-cloth assembly .....                  |                  |
| Model 50-527 .....                               | 40-7730          |
| Model 50-527-1 .....                             | 40-7730-1        |
| Clock-and-cable assembly (50 cycle) .....        | 76-5117          |
| Clock-and-cable assembly (50 cycle), ivory ..... | 76-5118          |
| Knobs, Clock Control .....                       |                  |
| Model 50-527 .....                               |                  |
| OFF-ON-AUTO .....                                | 54-4736          |
| DELAYED OFF .....                                | 54-4736          |
| AUTO SET .....                                   | 54-4738-2        |
| TIME SET (brown and ivory) .....                 | 54-4736-8        |
| Model 50-527-1 .....                             |                  |
| OFF-ON-AUTO .....                                | 54-4736-1        |
| DELAYED OFF .....                                | 54-4736-1        |
| AUTO SET .....                                   | 54-4736-3        |

## ADDITION OF PILOT LAMP

In first production, a pilot lamp, I100, was added. The pilot lamp is connected between the plate lead and the plate, pin 2, of the 35Y4 rectifier tube. A jumper is connected from the plate of the rectifier to the filament tap, pin 4. The parts required for this change are listed below.

| Description                      | Service Part No. |
|----------------------------------|------------------|
| Clip .....                       | 56-3545-6        |
| Jewel .....                      | 54-4304          |
| Pilot lamp (I100) .....          | 34-2088          |
| Pilot lamp shield .....          | 56-8307-4FA3     |
| Pilot lamp socket assembly ..... | 27-8233-6        |