

Circuit Description

Philco Model 411 is a portable four-tube super-heterodyne providing reception on the standard-broadcast band. A high impedance loop within the cabinet normally provides adequate signal pickup. However, provisions have been made for connecting an external aerial, if required.

proper phase, back to the 1T4 grid through the tube-socket capacitance. verter, where the incoming signal is converted to the 460-kc, intermediate frequency. A 174 is used in a single high-gain stage of if amplification, which employs neutralization to suppress oscillation. A 1.5-mmf. condenser, C304, feed part of the if voltage, of the The aerial circuit works directly into a 1R5 con-

A 1U5 diode-pentode is used in the detector, a-v-c, and first audio circuits. The pentode section is resistance-coupled to a 3V4 pentode output amplifier,

The d-c operating voltages are obtained from either a battery pack, Phileo type P361, or from a 105–120 volt, a-c or d-c power line. For power-line operation, the plate, screen, and filament voltages are provided by a power supply using a selenium rectifier, CR100.

Preliminary Checks

To avoid possible damage to the radio, ing preliminary checks should be made b ing on the power: e radio, the follow-made before turn

Inspect both the top and the bottom of the chasis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources

Check the total filament resistance, with the power switch turned on, and the battery plug discon-nected from the battery, and the change-over switch of trouble.

in the battery position (power-cord plug inserted in receptacle on rear of chassis). If the resistance between

the A+ and A- pins on the battery plug is higher than 100 ohms, one of the tube filaments is probably

Note: If the 3V4 filament is open, check condenser C202 before replacing the tube.

of selenium rectifier), test point D, and B—, est point B. See figure 1. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 2000 ohms, check condensers C101A and C101B for leakage or shorts. 3. Measure the resistance between the B+ (output

The resistance value above, which is much lower than normal, does not represent a quality check of this condenser; it is the lowest value which will permit the rectifier to operate safely while the voltage checks of Section 1 (power supply) are performed.

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PORTABLE MODEL 411

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DATA SHEET

Section 1—Power Supply

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

volts, or the "B" voltage drops below The battery pack should be replaced when the "A" voltage drops below 5 Set the volume control to minimum.

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

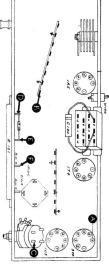


Figure 1. Bottom View, Showing Section 1 Test Points

1	1 1			1	1		1
Listenin	6	St	4	ပစ	22	1 (a) 1 (b)	STEP
g Test: Al	С	Α	Ŧ	Е	Д	C A	POINT
onormal hum ma	90v	7.5v	65v	120v	125v	7.5v 90v	INDICATION
y be caused by open	Low voltage High voltage No voltage	Low voltage High voltage No voltage	Low voltage No voltage	Low voltage No voltage	Low voltage No voltage		INDICATION
Listening Test: Abnormal hum may be caused by open C101B, C101C, or C202*.	Changed resistance: R102. Leaky: C101C. Open: R205*, T200*, S100. Open: R102, S101. Shorted: C101C.	Changed resistance: R101B. Open: One or more filaments, R205*. Open: R101B, S101.	Changed resistance: R101A. Leaky: C101B. Open: R101A. Shorted: C101B.	Changed resistance: R100. Leaky: C101A. Open: R100. Shorted: C101A.	Defective: CR100. Open C101A. Defective: CR100. Open: S100, S101.	Trouble in this section. Isolate by the following tests.	POSSIBLE CAUSE OF ABNORMAL INDICATION

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

Section 2—Audio Circuits

For the tests in this section, use an

nect the generator ground lead to B—, test point B; connect the output lead through a .l-mf. condenser to the test points indicated in the chart. nect the generator ground lead to the audio-frequency signal generator.

Set the radio volume control to maxi-

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

TROUBLE SHOOTING

Figure 2. Bottom View, Showing Section 2 Test Points TP-5355E

ΓEΡ	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	Α	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	С	Clear speaker output with strong generator input.	Defective: 3V4, LS200. Open: R204, T200. Shorted: <203, C204, C205, T200.
೮೦	A	Same as step 1.	Defective: 1U5, R200 (rotate). Open: C200, R201, R202, R203, C203. Shorted: C201, C301C*.
gnals	ng Test: Distortion may be caused b	istening Test: Distortion may be caused by leaky or shorted gnals may be caused by leaky or shorted C200.	istening Test: Distortion may be caused by leaky or shorted C203, or by changed resistance of R202. Distortion or strong grials may be caused by leaky or shorted C200.

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

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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 Fnilco TROUBLE-SHOOTING Procedure howing the locations of the test points and the com-

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

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

1-A^c-cr isolating the trouble to a single stage, the core 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 the corrected before testing to the corrected before testing the corrected before the corrected be ing further.

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TROUBLE SHOOTING Section 3—I-F, Detector, and A-V-C Circuits

chart. the output lead through a .1-mf. con-denser to the test points indicated in the For the tests in this section, use an r-f signal generator, with modulated output, set at 460 kc. Connect the generator ground lead to B-, test point B; connect

Set the radio volume control to maxi-

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

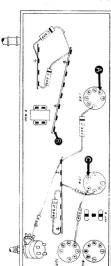


Figure 3. Bottom View, Showing Section 3 Test Points TP-5355

To provide a complete if 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."

Defective: 1R5*, Misaligned: Z800. Open: C300A, L300A, L300B, C300B, T400*, Shorted: C400A*, C400B*, C300A, L300A, L300B,	Same as step 1.	A	రు
Defective: 174, 1U5 (diode section), Misaligned: Z301, Open: R300, C303, L301A, R301, L301B, C301A. Shorted: C300B, C303, L301A, L301B, C301A, C301B.	Loud, clear output with moderate input.	c	20
Trouble in this section. Isolate by the following tests.	Loud, clear speaker output with weak generator input.	Α	-
POSSIBLE CAUSE OF ABNORMAL INDICATION	NORMAL INDICATION	TEST POINT	STEP

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

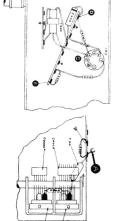
Section 4—R-F and Converter Circuits

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. For the tests in this section, with the exception of the oscillator test, use an r-f

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

obtained in step 1, further tests should be unnecessary; if not, isolate and correct If the "NORMAL INDICATION" is

TROUBLE SHOOTING



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

30	22	-	STEP
Α	C to D (Osc. test; see note below.)	A	TEST POINT
1000 kc.		1000 kc.	SIGNAL GEN. FREQUENCY
Tune to signal.	Rotate through range.	Tune to signal.	RADIO TUNING
Same as step 1.	Negative 5 to 10 volts.	Loud, clear speaker output with weak generator input.	NORMAL
Open: C401, C403, R401, R403, LA400.	Defective: 1R5, Open: R402, T400. Shorted: C402, C400C, C400D.	Trouble in this section. Isolate by the following tests.	POSSIBLE CAUSE OF ABNORMAL INDICATION

TROUBLE SHOOTING DATA

TROUBLE SHOOTING

condenser fully meshed, set pointer to index mark. DIAL-Calibration and pointer index measurements are shown in figure 7. With tuning

RADIO CONTROLS-Set volume control to maximum

OUTPUT METER—Connect across voice-coil terminals

SIGNAL GENERATOR-Use modulated output

OUTPUT LEVEL-During alignment, adjust signal-generator output to maintain output

SPECIAL NOTE—The orientation of the loop with respect to the chassis is critical for correct tracking. During alignment, with the cabinet back (containing the loop) laid down on the bench, the chassis should be laid on its back. in approximately its normal relation to the loop.

STEP N Same as step 2. Radiating loop (see note below). nected to radio. point B in figure 4). Posi-CONNECTION TO RADIO radio loop aerial is conial lead. Make sure that condenser to external aertive lead through .05-mf. Ground lead to B— (test SIGNAL GENERATOR SETTING 1600 kc. 1500 kc. 460 kc. Tuning con-denser fully meshed. DIAL 1500 kc. 1600 kc. SPECIAL INSTRUCTIONS Adjust, in order given, for maximum output. Adjust for maximum output while rocking tuning condenser. Adjust for maximum out-put. C302B-1st i-f sec C301A-2nd i-f se C300A—1st i-f pri ADJUST C400B-aeria C400D—osc

RADIATING LOOP: Make up a 6—8 turn, 6-inch-diameter loop, using insulated wire; connect to signal-gener ator leads and place near radio loop aerial. Make sure that radio loop aerial is connected to radio.

DIAL BACKPLATE CALIBRATING

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial (chassis) backplate at the end of the pointer with a pencil. The method of measuring for these points is illustrated in figure 7.

With the tuning gang fully meshed, the pointer should be adjusted on the dial-drive cord to coincide with the index mark.

MODEL 411

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

SYMBOLIZATION

Figure 6. Top View, Showing Trimmer Locations

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

C-condenser
I-pilot lamp
L-choke or coil
LA-loop aerial

LS—loud-speaker R—resistor S—switch

T-transformer W-line cord Z-electrical assembly

with perhaps a different prefix letter 200-series components are in Section 2-the audio circuits.
300-scries components are in Section 3-the i-f, detector, and a-v-c circuits A suffix letter identifies the part as a component of the assembly which bears an identical number without a suffix letter, and 400-series components are in Section 4-the r-f and converter circuits.

948-49 F = 460KC

FROM EXTREME LEFT EDGE OF DIAL BACK PLATE

Figure 7. Dial-Backplate Calibration Measurements

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ALIGNMENT DATA

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CIRCUIT DATA ON

Figure 8. Drive-Cord Installation Details

DIAL CORD 45-8750 (25 FOOT SPOOL)

1 3/16"

POINTER 56-4362-2FCP

PHILCO

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