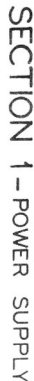


SECTION 3 – IF, DETECTOR AND AVC CIRCUITS



SECTION 2 – AUDIO CIRCUITS

Circuit Description

The aerial circuit works directly into a IR5 converter, where the incoming signal is converted to the preliminary checks should be made before turning on the power:

proper phase, back to the IT4 grid through the tube-connections, burned resistors, or other obvious sources of trouble.

2. Check the total filament resistance, with the power switch turned on, and the battery plug disconnected from the battery, and the change-over switch in the battery position (power-cord plug inserted in receptacle on rear of chassis). If the resistance between

AC-DC BATTERY

1948-49 **MODEL 411**

TROUBLE SHOOTING

The battery pack should be replaced when the "A" voltage drops below 5 volts, or the "B" voltage drops below 60 volts.

Figure 1. Bottom View, Showing

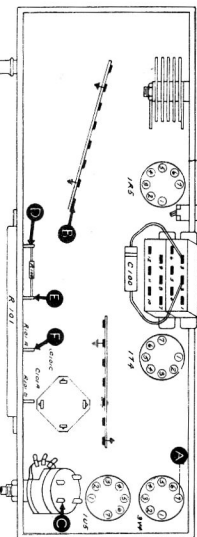


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
Trouble in this section. Isolate by the following tests.				
1 (a) 1 (b)	A C	7.5v		Defective: CR 100. Open: C101A.
2	D	125v	Low voltage No voltage	Defective: CR 100. Open: S100, S101.
3	E	120v	Low voltage No voltage	Changed resistance: R100. Leaky: C101A. Open: R100. Shorted: C101A.
4	F	65v	Low voltage No voltage	Changed resistance: R101A. Leaky: C101B. Open: R101A. Shorted: C101B.
5	A	7.5v	Low voltage High voltage No voltage	Changed resistance: R101B. Open: One or more filaments, R205*. Open: R101B, S101.
6	C	90v	Low voltage High voltage No voltage	Changed resistance: R102. Leaky: C101C. Open: R205*, T200*, S100. Open: R102, S101. Shorted: C101C.
Listening Test: Abnormal hum may be caused by open C101B, C101C, or C202*.				

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

TROUBLE SHOOTING

Set the radio 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.

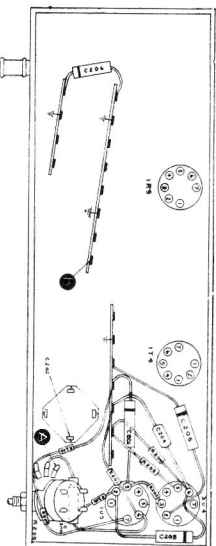


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Load, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	C	Clear speaker output with strong generator input.	Defective: 3Y1, L5200. Open: R204, T200. Shorted: +20S, C204, C205, T200.
3	A	Same as step 1.	Defective: J15, R200 (route). Open: C200, R201, R202, R203, C203. Shorted: C201, C201C*.

Listening Test: Distortion may be caused by leaky or shorted signal may be caused by leaky or shorted C200, C203, or by changed resistance of R202. Distortion or strong

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

After isolating the trouble to a single stage, the root is located by first testing the tube.

For target shooting, the target was divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The troubleshooting 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 chart.

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.

**CIRCUIT DATA ON
SHEET 174
FURTHER DATA ON
SHEET 176**

1948-49 IF. = 460 KC.

TROUBLE SHOOTING

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 the output lead through a 1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

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 id amplifier che tion 4; therefore, the effectiveness of step the mixer circuit. These parts are listed

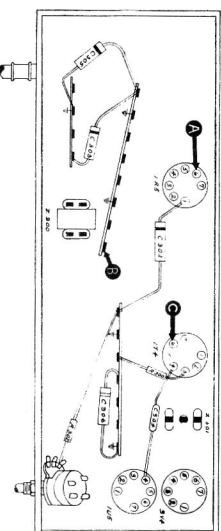


Figure 3. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests:
2		Loud, clear output with moderate input.	Detective: 1T74, 1U6 (diode section), Missalrigged: Z800, Open: R300, C303, L301A, R301, L301B, C301A, C301B, L301A, L301B, C301A, C301B.
3	A	Same as step 1.	Detective: 1R57, Missalrigged: Z800, Open: C303, L1300A, L1300B, C303B, T400*, Shorted: C400A*, C400B*, C303A, L1300A, L1300B.

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

TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-1 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.

test points indicated in the chart

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

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

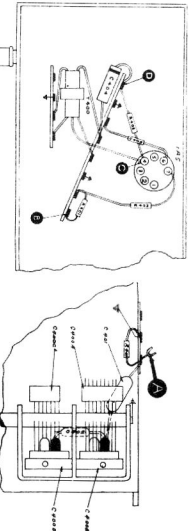


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIGNAL GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	Tune to signal.	Tand. clear speaker output with tank generator input.	Trouble in this section. Isolate by the following tests.
2	C to D (Occ. test; see note below)		Rotate through range.	Negative 5 to 10 volts.	Defective: R ₅ , Open: R ₄₀₂ , T ₄₀₀ . Shorted: C ₄₀₂ , C _{400C} , C _{400D} .
3	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C ₄₀₁ , C ₄₀₃ , R ₄₀₁ , R ₄₀₃ , L _{4A00} .

AC-DC
BATTERY
PORTABLE MODEL
411
TROUBLE SHOOTING DATA

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

RADIO CONTROLS—Set volume control to maximum.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Use modulated output.

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

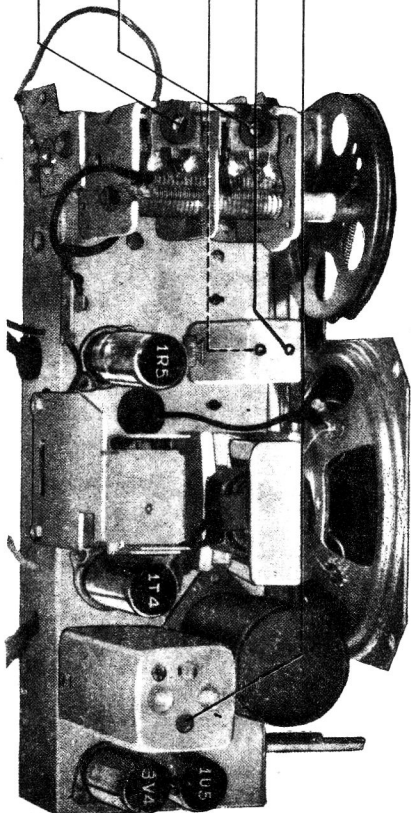


Figure 6. Top View, Showing Trimmer Locations

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

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.

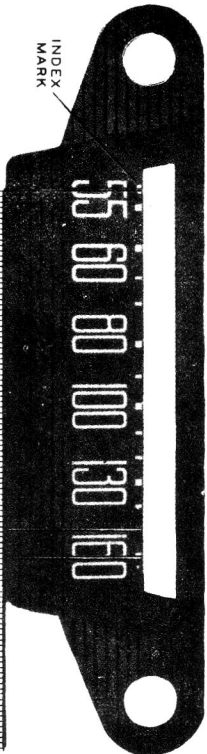


Figure 7. Dial-Backplate Calibration Measurements

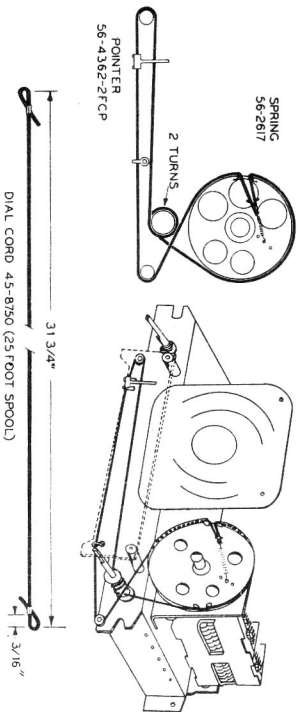


Figure 8. Drive-Cord Installation Details

OUTPUT LEVEL: During alignment, adjust signal-generator output to maintain output-meter indication below .5 volt.

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.

SYMBOLIZATION

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:

- 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

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 circuit.
- 300 series components are in Section 3—the i-f, detector, and a-v-c circuits.
- 400 series components are in Section 4—the f-i and converter circuits.

A suffix letter identifies the part as a component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

ALIGNMENT DATA

1948-49

IF. = 460 KC.

CIRCUIT DATA ON
SHEET 174

FURTHER DATA ON
SHEET 175

AC-DC
BATTERY
PORTABLE
MODEL
411

PHILCO

DATA SHEET 176