

NATIONAL RADIO INSTITUTE

 *Washington D. C.* 

Radio-Trician Service Manual

(TRADE MARK REGISTERED U. S. PATENT OFFICE)

Compiled solely for  Students & Graduates

on the

Earl Receivers, Models 21, 22, 31, 32, 32-S and 41

The Earl receivers, Models 21 and 22, use a neutrodyne circuit having three '26 type tubes as Radio frequency amplifiers, one '27 type tube as a detector, one '27 tube as the first audio amplifier and two '71 type tubes as a push-pull amplifier. The schematic diagram of these receivers is shown in Figure 1.

Models 31 and 32 are also neutrodyne type of receivers using three '27 type tubes as radio frequency amplifiers, one '27 tube as a detector, one '27 tube as the first audio frequency amplifier, and two '45 type tubes in a push-pull amplifier. The schematic diagram is shown in Figure 2.

Model 41 is practically the same as Models 31 and 32, with the following exceptions: Model 41 has an additional stage of R. F. amplification using a '27 tube. In Models 31 and 32 the neutralizing condensers are connected from the grid to a tap on the secondary winding of the next R. F. transformer. In Model 41 the neutralizing condensers are connected from the grid to a special neutralizing coil connected to the plate coil of the same tube.

The power supply of Model 41 is the same as the power supply used in Models 31 and 32.

Special Service Notes

In testing the continuity of the circuits the ordinary B battery and high resistance voltmeter method may be used. Careful study of the schematic diagram

will enable the Radio-Trician to determine the approximate voltage reading that should be obtained when making such tests.

Such continuity tests, however, will not always reveal the source of trouble. The information contained in the following paragraphs will cover practically all cases of trouble encountered in servicing these receivers.

Incorrect Voltages

Low Filament Voltages—

- (a) Defective power transformer.
- (b) Poorly soldered connections in filament circuit.
- (c) Grounded filament circuit.
- (d) Defective tube or tubes.

High Plate Voltages—

- Open 15000 ohm resistor or open connection between detector tap and ground.

Low Plate Voltages—

- (a) Defective rectifying tube.
- (b) Defective power transformer.
- (c) High resistance leak in plate circuit or power supply.

No Detector Plate Voltage; All Other Plate Voltages Low—

- Short-circuited wiring in detector plate circuit.

No Detector Plate Voltage; All Other Plate Voltages High—

- Open 25000 ohm resistance.

CONTINUITY TEST FOR MODELS 21 AND 22

If the receiver is not operating properly, first determine if voltage is being applied to the plate, grid and filament of the tubes. These measurements are simplified by using Table I. Have the

receiver connected to aerial and ground, house lighting supply and loud speaker. Make the following tests with all good tubes in their sockets and the set switch on. Voltmeter used must be of the high

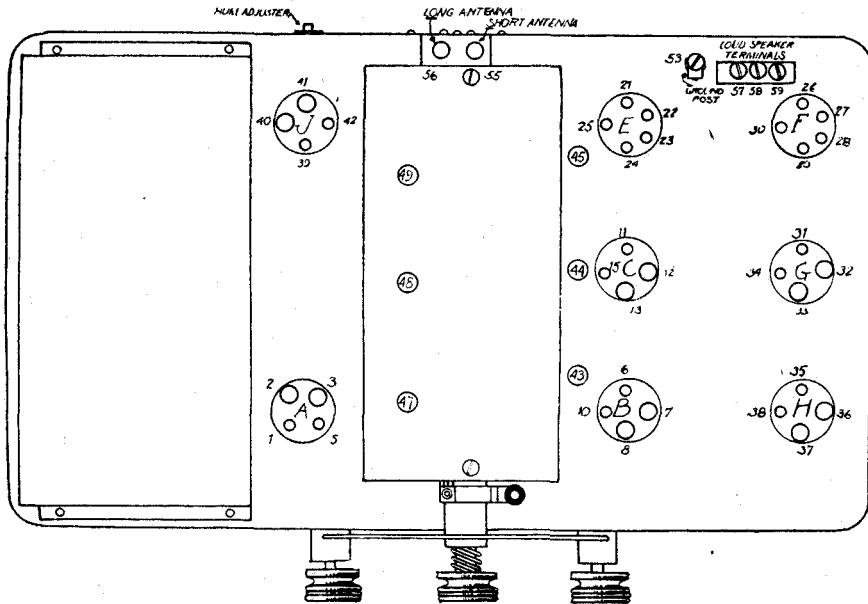


Fig. 2—Top of Chassis of Models 21 and 22.

TABLE I.
(See Fig. 2 for number code.)

Test No.	Between Terminal No. and No.	Approximate Voltage Reading	No Reading Indicates the Following:
I	1 2	90	Open Primary 1st R. F. Coil.
II	6 7	90	Open Primary 2nd R. F. Coil.
IV	11 12	90	Open Primary Detector Coil.
V	21 24	20	Open Primary 1st A. F. Transformer. Open 25000 Ohm (Yellow) Resistance. Shorted .002 Mfd (Blue Spot) By-pass Condenser. Shorted 1 Mfd. By-pass Condenser.
VI	26 29	85	Open Primary 2nd A. F. Transformer. Open 2000 Ohm (Gray) Resistance.
VII	31 33	135	Open Speaker Coil or Output Transf. Coil. Open 1000 Ohm (Green) Resistance.
VIII	35 37	135	Open Speaker Coil or Output Transf. Coil. Open 1000 Ohm (Green) Resistance.
IX	2 5	5.5	Open Inductor (Volume Control in full on position).
X	7 10	5.5	Open Secondary 1st R. F. Coil.
XI	12 15	5.5	Open Secondary 2nd R. F. Coil.
XIII	29 30	3.5	Open Secondary 1st A. F. Transformer.
XIV	34 32	28	Open Secondary 2nd A. F. Transformer.
XV	36 38	28	Open Secondary 2nd A. F. Transformer.
XVI	2 3	1.5	Open Secondary Power Transformer.
XVII	33 32	5.0	Open Secondary Power Transformer.
XVIII	42 41	5.0	Open Secondary Power Transformer.
XIX	27 28	2.5	Open Secondary Power Transformer.

resistance type (approx. 1000 ohms per volt).

Table I gives the location of the trouble providing no voltage reading is obtained in only one of the tests listed in the table. If no voltage reading is ob-

tained in more than one of the tests in Table I, consult Table II for location of trouble.

As the socket prongs are not accessible, use the eyelets supporting the socket prongs when taking voltage readings.

TABLE II.

No Reading on Test No. of Table I	Indicates the Following:
I, II, and IV	Potentiometer arm not making contact. Open 500 Ohm (Black) Resistance.
I, II, IV, V, VI	Shorted .5 mfd. (Green Lead) By-pass Condenser. Open 4700 Ohm (Yellow) Resistance. Shorted 2 mfd. By-pass Condenser (Yellow Lead).
I, II, IV, V, VI, VII, VIII	Open High Voltage Secondary Power Transformer. Open Filter Choke Coils. Shorted Filter Condenser (Blue, Red, or Green Lead).
IX, X, XI	Shorted .5 mfd. By-pass Condenser (Green Lead). Grounded R. F. Filament.
No Voltage Reading Obtained in Table I	Open Primary Power Transformer. Open Attachment Cord. Defective Line Switch.

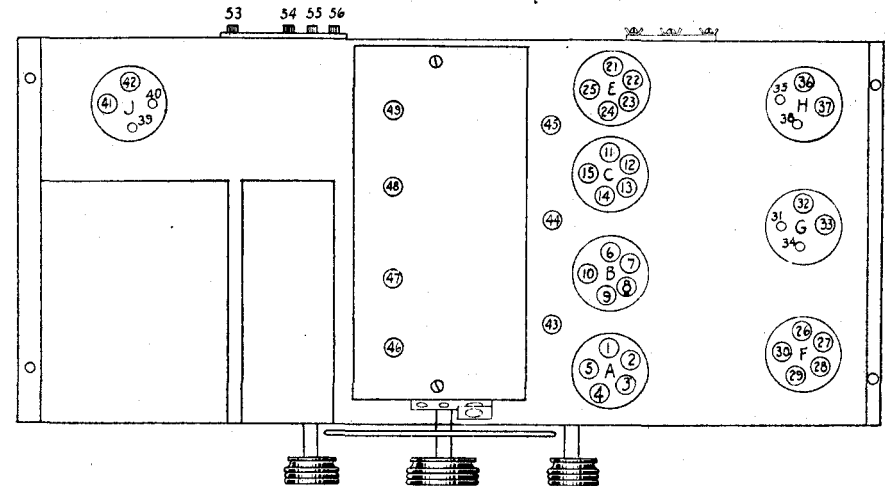


Fig. 3—Top of Chassis of Models 31 and 32.

CONTINUITY TEST FOR MODELS 31 AND 32

If the receiver is not operating properly, first determine if voltage is being applied to the plate, grid and filament of the tubes. These measurements are simplified by using Table III. Have the receiver connected to aerial and ground, house lighting supply and loud speaker. Make the following tests with all good tubes in their sockets and the set switch on. Voltmeter used must be of the high resistance type (approx. 1000 ohms per volt).

Because of the method of controlling volume, the grid and plate voltages on the tubes in the receiver depend upon the position of the volume control at the

time of taking the readings. Hence, a minimum and maximum value is given in each case, corresponding to the maximum and minimum positions of the volume control knob.

Table III gives the location of the trouble providing no voltage reading is obtained in only one of the tests listed in the table. If no voltage reading is obtained in more than one of the tests in Table III, consult Table IV for location of trouble.

As the socket prongs are not accessible, use the eyelets supporting the socket prongs when taking voltage readings.

