### Delco Radio Model 3002

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Position of Tube</th>
<th>Filament Volts</th>
<th>Plate Volts</th>
<th>Control Grid Volts</th>
<th>Screen Volts</th>
<th>Plate M.A. Current</th>
<th>Plate M.A. Grid Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>224</td>
<td>1—R. F.</td>
<td>1.9</td>
<td>125</td>
<td>4.8</td>
<td>100</td>
<td>3.2</td>
<td>5.4</td>
</tr>
<tr>
<td>224</td>
<td>2—R. F.</td>
<td>1.9</td>
<td>72</td>
<td>0</td>
<td>42</td>
<td>2.2</td>
<td>2</td>
</tr>
<tr>
<td>224</td>
<td>Detector</td>
<td>1.9</td>
<td>15</td>
<td>0</td>
<td>10</td>
<td>.13</td>
<td>0</td>
</tr>
<tr>
<td>227</td>
<td>1—A. F.</td>
<td>1.9</td>
<td>45</td>
<td>1</td>
<td>10</td>
<td>.19</td>
<td>.27</td>
</tr>
<tr>
<td>212-A</td>
<td>2—A. F.</td>
<td>3.9</td>
<td>137</td>
<td>.2</td>
<td></td>
<td>5.5</td>
<td>10.5</td>
</tr>
</tbody>
</table>
After the set is in operation on a powerful signal, it will be necessary to tune the antenna circuit so that weaker signals will be received with the maximum volume. The best way to do this is to connect a milliammeter, with a zero to ten milliampere scale, in series with the B Plus 67.5 volt maroon lead. (Connect positive side of meter to set.) Insert a small screw driver in the hole in the bottom of the receiver located nearest the antenna terminal and adjust the large screw on the first balancing condenser. This is located about two inches above the hole. Adjustments should be made by turning the screw until the minimum reading on the meter is obtained. While this adjustment is being made, the station selector should be turned slightly in either way to determine whether or not the reading can be further decreased. This adjustment is a very delicate operation and requires only a slight movement in either direction, not to exceed one full turn. If a meter is not available, a weaker signal should be selected and the set adjusted to maximum volume by varying the position of the screw. Care should be taken not to apply excessive pressure in making this adjustment. While it will do no damage to ground the screw driver to the set while adjusting the screw, the signals will be cut out whenever the screw driver touches the case. A little tape wound around the screw driver will prevent this. It is impossible to receive a shock while making this adjustment. Make above adjustment only through the hole located nearest the aerial connection. After installation is complete, check all connections for correct locations and tightness.
MODEL 24 DC
MODEL 31 DC, 32 DC
MODEL 33-S AC

Schematic

Model 24 DC, 31 DC, 32 DC

31DC, 32DC (D.C.)

Model 33-S AC
ECHOPHONE PAGE 1-1

ECHOPHONE RADIO MFG. CO.

MODEL S-3
MODEL S-3 (Rev.)
Schematic

NOTICE. It is not possible to make plate current and grid bias measurements upon the 145 output tube by plugging into the output tube socket. This applies to both models.

IMPROVED ECHOPHONE S3
Model S-3

Voltage Notes

1. Plate of 245 Tube
   #5 to ground
   Normal: 250 volts
   Low: 235 volts
   High: 275 volts

2. R.F. Plate
   #25 to ground
   Normal: 140 volts
   Low: 120 volts
   High: 160 volts

3. R.F. Screen
   #14 to ground
   Normal: 60 volts
   Low: 50 volts
   High: 75 volts

4. Detector Plate
   #13 to ground
   Normal: 80 volts
   Low: 70 volts
   High: 90 volts

5. Detector Screen
   #9 to ground
   Normal: 25 volts
   Low: 20 volts
   1/2 channel: 30 volts

6. Detector Cathode
   #10 to ground
   5 to 10 volts

7. R.F. Cathode
   #15 to ground
   1.5 to 2.5 volts

8. 245 Bias
   #48 to ground
   Normal: 50 volts
   Low: 40 volts
   High: 55 volts

---

Drawing showing corresponding terminal positions on two types of power transformers used on S-3.

**Type HA**

**Type JE**

Power Transformer

- 75-73 Pri. winding 74 low voltage tap.
- 72-71 Fil. winding 280 tube 70 center tap.
- 69-67 High voltage Sec. 68 center tap.
- 76-80 Fil. winding for 224 tubes.
- 77-79 Fil. winding for 245 tube 78 center tap.
The Antenna coil has a bobbin primary and also a single close-coupled incomplete turn around grid end of secondary coil. The R. F. coils have a bobbin primary and also a close-coupled primary. A .00005 condenser is connected across the bobbin primary.

In some of the later S-4 models bank-wound "Litz" wire coils are used. These R. F. coils have a small honey-comb primary coil mounted in the ground end of the secondary coil and a capacitor across the plate and grid terminals of the coil. The "Litz" antenna coil has a tight-coupled primary wound over the ground end of the secondary coil.

1. Plate of 245 Tube.
   #5 to ground
   Normal—225 volts
   Low— 200 volts
   High— 250 volts

2. R. F. Plate.
   #25 to ground
   Normal—110 volts
   Low— 100 volts
   High— 120 volts

   #14 to ground
   Normal—50 volts
   Low— 40 volts
   High— 60 volts

4. Detector Plate.
   #13 to ground
   Normal—30 volts
   Low— 25 volts
   High— 50 volts

5. Detector Screen.
   #9 to ground
   Normal—20 volts
   Low— 15 volts
   High— 30 volts

6. Detector Cathode.
   #10 to ground
   3 to 6 volts

7. R. F. Cathode.
   #15 to ground
   1.5 to 2.5 volts

8. 245 Bias.
   #48 to ground
   Normal—50 volts
   Low— 40 volts
   High— 55 volts

---

Cont. Chart For Litz Wire Bank Wound Coils

Echophone Model — S-4
ECHOPHONE RADIO MFG. CO.

ECHOPHONE Model S-4
On all sets having serial numbers above 100050, two wires are brought through the chassis pan from the primary lugs on the transformer.

One of these (for 115-130 volts) is connected to one of the service cord wires and the other is taped up and is not connected.

To change set for 100 to 115 volts, disconnect the service cord from transformer lead and connect to taped lead from transformer. Be sure to retape end of transformer lead which is not used.

**Model S-5 Special (1931)**

**Pie Diagram**

**Echophone Superheterodyne S-5—Circuit Diagram**

With Dynatron Oscillator

**Peak Frequency**

175 KC
THOMAS A. EDISON, INC.

MODELS R1, R2, C2
CHASSIS Jr and Jc
Power Unit Assembly

Diagrammatic View of Power Unit, Dynamic Speaker Connected.
Models R1, R2 and C2
Chassis Jr and Jc
25 Cycle
THOMAS A. EDISON, INC.

MODELS R1, R2, C2
CHASSIS Jr and Jc
Schematic Voltage
### Identification of Parts

**To Accompany Plate No. 1-A**

#### "Light-O-Matic" Models R-1, R-2 and C-4

<table>
<thead>
<tr>
<th>No.</th>
<th>Name and Function</th>
<th>Electrical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td>Tuning condenser, 1st r. f. stage.</td>
<td>2-gang variable condenser, maximum capacity. Each section 355 mfd.</td>
</tr>
<tr>
<td>C-2</td>
<td>Tuning condenser, 2nd r. f. stage.</td>
<td>2-gang variable condenser, maximum capacity. Each section 355 mfd.</td>
</tr>
<tr>
<td>C-3</td>
<td>Tuning condenser, 3rd r. f. stage.</td>
<td>Each a fixed condenser tuning the long wave primary circuit of the associated transformer to approximately 450 kilocycles.</td>
</tr>
<tr>
<td>C-4</td>
<td>Tuning condenser, detector stage.</td>
<td>Each an adjustable condenser, 40 to 80 mfd.</td>
</tr>
<tr>
<td>C-5</td>
<td>Plate by-pass condenser, 1st r. f. stage.</td>
<td>.0001 mfd. fixed moulded mica condenser.</td>
</tr>
<tr>
<td>C-6</td>
<td>Plate by-pass condenser, 2nd and 3rd r. f. stage.</td>
<td>.0001 mfd. fixed moulded mica condenser.</td>
</tr>
<tr>
<td>C-7</td>
<td>Plate by-pass condenser, 2nd and 3rd r. f. stage.</td>
<td>.0001 mfd. fixed moulded mica condenser.</td>
</tr>
<tr>
<td>C-8</td>
<td>A. F. by-pass condenser, detector plate.</td>
<td>.0001 mfd. fixed moulded mica condenser.</td>
</tr>
<tr>
<td>C-9</td>
<td>A. F. by-pass condenser, detector plate.</td>
<td>.0001 mfd. fixed moulded mica condenser.</td>
</tr>
<tr>
<td>C-10</td>
<td>Tuning condenser, 1st r. f. stage.</td>
<td>Each an adjustable condenser, 40 to 80 mfd.</td>
</tr>
<tr>
<td>C-11</td>
<td>Tuning condenser, 2nd r. f. stage.</td>
<td>Each an adjustable condenser, 40 to 80 mfd.</td>
</tr>
<tr>
<td>C-12</td>
<td>Tuning condenser, 3rd r. f. stage.</td>
<td>Each an adjustable condenser, 40 to 80 mfd.</td>
</tr>
<tr>
<td>C-13</td>
<td>Tuning condenser, detector stage.</td>
<td>Each an adjustable condenser, 40 to 80 mfd.</td>
</tr>
<tr>
<td>C-14</td>
<td>1st filter condenser.</td>
<td>100 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>C-15</td>
<td>1st filter condenser.</td>
<td>100 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>C-16</td>
<td>2nd filter condenser.</td>
<td>100 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>C-17</td>
<td>3rd filter condenser.</td>
<td>100 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>C-18</td>
<td>Tuning compensator, 1st r. f. stage.</td>
<td>Each an adjustable air and mica dielectric condenser mounted on side of variable condenser section which it bypasses.</td>
</tr>
<tr>
<td>C-19</td>
<td>Tuning compensator, 2nd r. f. stage.</td>
<td>Each an adjustable air and mica dielectric condenser mounted on side of variable condenser section which it bypasses.</td>
</tr>
<tr>
<td>C-20</td>
<td>Tuning compensator, 3rd r. f. stage.</td>
<td>Each an adjustable air and mica dielectric condenser mounted on side of variable condenser section which it bypasses.</td>
</tr>
<tr>
<td>C-21</td>
<td>Tuning compensator, detector.</td>
<td>Each an adjustable air and mica dielectric condenser mounted on side of variable condenser section which it bypasses.</td>
</tr>
</tbody>
</table>

#### Identification of Parts (Continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name and Function</th>
<th>Electrical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-1</td>
<td>Bias resistor, 1st r. f. stage.</td>
<td>Hum balance resistor (1st a. f.) 6,000 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>R-2</td>
<td>Isolating resistor, 1st r. f.</td>
<td>Bias resistor, 1st a. f. stage. 3,000 ohm resistance, 1 watt.</td>
</tr>
<tr>
<td>R-3</td>
<td>Minimum bias resistor, and 3rd r. f.</td>
<td>R. f. and a. f. heater center tapped resistor. 300 ohm center-tapped potentiometer.</td>
</tr>
<tr>
<td>R-4</td>
<td>1st section detector filter resistor.</td>
<td>Push-pull balancing resistor. 300 ohm center-tapped potentiometer.</td>
</tr>
<tr>
<td>R-5</td>
<td>1st section detector filter resistor.</td>
<td>Bias resistor, and a. f. stage. 750 ohm, 5 watt resistance.</td>
</tr>
<tr>
<td>R-6</td>
<td>1st section detector filter resistor.</td>
<td>Power supply loss current resistor. 10,000 ohms, 5 watt resistance.</td>
</tr>
<tr>
<td>R-7</td>
<td>1st section detector filter resistor.</td>
<td>Long wave primary, 1st r. f. transformer. Each a 150 microhenry coil.</td>
</tr>
<tr>
<td>R-8</td>
<td>1st section detector filter resistor.</td>
<td>Long wave primary, 2nd r. f. transformer. Each a 5 turn coil.</td>
</tr>
<tr>
<td>R-9</td>
<td>1st section detector filter resistor.</td>
<td>Short wave primary, 3rd r. f. transformer. Each a 150 microhenry coil.</td>
</tr>
<tr>
<td>R-10</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 1st r. f. transformer. Each a 245 microhenry coil, (measured in shield).</td>
</tr>
<tr>
<td>R-12</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 3rd r. f. transformer. Each a 245 microhenry coil, (measured in shield).</td>
</tr>
<tr>
<td>R-14</td>
<td>1st section detector filter resistor.</td>
<td>Primary, 1st a. f. transformer. 6.1 ratio a. f. transformer.</td>
</tr>
<tr>
<td>R-15</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 1st a. f. transformer. 6.1 ratio a. f. transformer.</td>
</tr>
<tr>
<td>R-16</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 2nd a. f. transformer. 6.1 ratio a. f. transformer.</td>
</tr>
<tr>
<td>R-17</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 3rd a. f. transformer. 6.1 ratio a. f. transformer.</td>
</tr>
<tr>
<td>R-18</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, 4th a. f. transformer. 6.1 ratio a. f. transformer.</td>
</tr>
<tr>
<td>R-19</td>
<td>1st section detector filter resistor.</td>
<td>Half primary, speaker input transformer. Speaker input transformer, mounted in speaker frame, utilizing center tapped primary.</td>
</tr>
<tr>
<td>R-20</td>
<td>1st section detector filter resistor.</td>
<td>Half primary, speaker input transformer. Speaker input transformer, mounted in speaker frame, utilizing center tapped primary.</td>
</tr>
<tr>
<td>R-21</td>
<td>1st section detector filter resistor.</td>
<td>Secondary, speaker input transformer. Speaker input transformer, mounted in speaker frame, utilizing center tapped primary.</td>
</tr>
<tr>
<td>R-22</td>
<td>1st section detector filter resistor.</td>
<td>Field coil, dynamic speaker. 4,500 ohm field coil.</td>
</tr>
<tr>
<td>R-23</td>
<td>1st section detector filter resistor.</td>
<td>Voice coil, dynamic speaker. 4,500 ohm field coil.</td>
</tr>
<tr>
<td>R-24</td>
<td>1st section detector filter resistor.</td>
<td>Inside third of filter choke. 20 henry, 375 ohm choke.</td>
</tr>
<tr>
<td>R-25</td>
<td>1st section detector filter resistor.</td>
<td>Outside two thirds of filter choke. 20 henry, 375 ohm choke.</td>
</tr>
<tr>
<td>R-26</td>
<td>1st section detector filter resistor.</td>
<td>Detector heater secondary winding.</td>
</tr>
<tr>
<td>R-27</td>
<td>1st section detector filter resistor.</td>
<td>R. f. and a. f. heater secondary winding.</td>
</tr>
<tr>
<td>R-28</td>
<td>1st section detector filter resistor.</td>
<td>2nd a. f. filter secondary winding.</td>
</tr>
<tr>
<td>R-29</td>
<td>1st section detector filter resistor.</td>
<td>Rectifier filter secondary winding.</td>
</tr>
<tr>
<td>R-30</td>
<td>1st section detector filter resistor.</td>
<td>Half high voltage secondary winding.</td>
</tr>
<tr>
<td>R-31</td>
<td>1st section detector filter resistor.</td>
<td>Half high voltage secondary winding.</td>
</tr>
<tr>
<td>R-32</td>
<td>1st section detector filter resistor.</td>
<td>Low line voltage primary winding.</td>
</tr>
<tr>
<td>R-33</td>
<td>1st section detector filter resistor.</td>
<td>Additional section of primary winding for medium voltage.</td>
</tr>
<tr>
<td>R-34</td>
<td>1st section detector filter resistor.</td>
<td>Additional section of primary winding for high line voltage.</td>
</tr>
<tr>
<td>S-4</td>
<td>1st section detector filter resistor.</td>
<td>Motor Receptacle (Brown). This plug provides 110 volts A. C. for operation of phonograph motor in radio phonograph combination model.</td>
</tr>
<tr>
<td>S-5</td>
<td>1st section detector filter resistor.</td>
<td>Volume Control A—Wire wound, 5,000 ohms. B—Graphite, 10,000 ohms.</td>
</tr>
</tbody>
</table>
MODEL RF Unit
MODEL AF Unit
Schematic

ELECTRICAL RESEARCH LABORATORIES, Inc.

Gang Condenser

Model "R-2" RF Unit

Model "A-2" AF Unit

Model Erla R2-A2 (1929)

www.americanradiohistory.com
ERLA PAGE 1-3

[Diagram of an electrical schematic with various components labeled and connections indicated.]

NOTE:
1. DOTTED LINES DENOTE SHIELDING
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NO.
3. NUMBERS SHOWN WITH PREFIX "A" ARE COMPLETE ASSEMBLIES

224

ERLA 224 A.C.
Sceen Grid Receiver.

MODEL 224 AC
Schematic

ERLA PAGE 13

www.americanradiohistory.com
ERLA MODEL 224 AC
Chassis
Voltage

Details of Power Supply Terminal Connections

<table>
<thead>
<tr>
<th>Tube</th>
<th>Fil.</th>
<th>Screen Grid to cathode</th>
<th>Plate to cathode</th>
<th>Ground to cathode</th>
<th>Grid to Filament</th>
</tr>
</thead>
<tbody>
<tr>
<td>280</td>
<td>4.8 to 5v AC</td>
<td>340 to 360v DC</td>
<td>240 to 250v DC</td>
<td>4.5v DC</td>
<td>45 to 50v DC</td>
</tr>
<tr>
<td>245</td>
<td>2.4 to 2.5v AC</td>
<td>90 to 100v DC</td>
<td>60 to 75v DC</td>
<td>6 to 7.5v DC</td>
<td></td>
</tr>
<tr>
<td>Audio</td>
<td>227</td>
<td>2.35 to 2.4v AC</td>
<td>160 to 170v DC</td>
<td>1.5 to 2v DC</td>
<td></td>
</tr>
<tr>
<td>DET.</td>
<td>227</td>
<td>2.35 to 2.4v AC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>224</td>
<td>2.35 to 2.4v AC</td>
<td>75 to 80v DC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(The above are based on line voltage of 110 volts and the switch in the 95-115 position.)

(Volume control set to full volume position.)
C1 Tuning Condenser.
C2 Neutralizing Condenser.
C3 R.F. Grid Bias Condenser .25 MF.
C4 R.F. Plate By-Pass Condenser .25 MF.
C5 Antenna Condenser .00025 MF.
C6 Det. Padding Condenser.
C7 Det. Screen Grid Bias Condenser .25 MF.
C8 Det. Control Grid Condenser .0001 MF.
C9 Det. Plate Condenser .0005 MF.
C10 1st Audio Coupling Condenser .01 MF.
C11 1st Audio Grid Condenser 0.5 MF.
C12 Filter Condensers 8.0 MF Each.
L1 Filter Choke.
L2 Speaker Field 2500 Ohms.
J Phonograph Jack.
D Dial Lamp.
R1 Volume Control 15,000 Ohms.
R2 R.F. Grid Bias Resistance 620 Ohms.
R3 Det. Control Grid Resistance .5 Megohm.
R4 Det. Screen Grid Resistance .3 Megohm.
R5 1st Audio Coupling Resistance .1 Megohm.
R6 1st Audio Grid Resistance .5 Megohm.
R7 1st Audio Grid Bias Resistance 1750 Ohms.
R8 Hum Control 20 Ohms.
R9 Loss Current Resistance 4500 Ohms.
R10 245 Grid Bias Resistance 650 Ohms.
T1 Antenna Transformer.
T2 R.F. Inter stage Transformer.
T3 Input Audio Transformer.
T4 Power Transformer.
B1 Hi-Lo S.P.D.T. Toggle Switch.
B2 S.P.S.T. Toggle Switch.
“Special” A.C. Receiver

265-UA or CA and RP-65-UA or CA
262-UA or CA and RP-62-UA or CA

For Power Unit See Model "ca"

Model Fada's 262UA, 265UA, 262CA, 265CA

<table>
<thead>
<tr>
<th>Rect 10 in Separate Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1212-MS</td>
<td>Condenser</td>
<td>Detector filter - 0.001 mfd</td>
</tr>
<tr>
<td>1238-MS</td>
<td>Condenser</td>
<td>By-pass - 1.0 mfd - 200 Volts (small)</td>
</tr>
<tr>
<td>1242-MS</td>
<td>Condenser</td>
<td>By-pass - 0.5 mfd - 200 Volts (small)</td>
</tr>
<tr>
<td>1311-MS</td>
<td>Resistance</td>
<td>carbon - 250,000 ohms (yellow)</td>
</tr>
<tr>
<td>1375-MS</td>
<td>Resistance</td>
<td>carbon - 125,000 ohms (grey)</td>
</tr>
<tr>
<td>1407-MS</td>
<td>Grid Condenser</td>
<td>0.000125 mfd</td>
</tr>
<tr>
<td>1408-MS</td>
<td>Grid Leak</td>
<td>2 meg</td>
</tr>
<tr>
<td>1418-MS</td>
<td>Condenser</td>
<td>By-pass - 0.25 - 0.25 mfd 200-400V.</td>
</tr>
<tr>
<td>1540-MS</td>
<td>Resistance</td>
<td>carbon (green) 20,000 ohms</td>
</tr>
<tr>
<td>1410-MS</td>
<td>Main filter</td>
<td>condenser bleek - 100 mfd</td>
</tr>
<tr>
<td>1414-MS</td>
<td>Resistance</td>
<td>W.W. (yellow &amp; white) - 250 ohms</td>
</tr>
<tr>
<td>1415-MS</td>
<td>Resistance</td>
<td>W.W. (green &amp; white) 2,000 ohms</td>
</tr>
<tr>
<td>1416-MS</td>
<td>Resistance</td>
<td>W.W. (white &amp; white) 3,000 ohms</td>
</tr>
<tr>
<td>1417-MS</td>
<td>Resistance</td>
<td>carbon (blue) - 50,000 ohms</td>
</tr>
<tr>
<td>1419-MS</td>
<td>Condenser</td>
<td>(line buffer) - 0.5 mfd - 400 volts</td>
</tr>
</tbody>
</table>
For Power Unit See Model "C"

TABLE OF CABLE CONNECTIONS

<table>
<thead>
<tr>
<th>NUM.</th>
<th>CABLE CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POWER PLUG BLACK</td>
</tr>
<tr>
<td>2</td>
<td>POWER PLUG BLACK</td>
</tr>
<tr>
<td>3</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>4</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>5</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>6</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>7</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>8</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>9</td>
<td>AMP FIL BLACK</td>
</tr>
<tr>
<td>10</td>
<td>RED W/ BLACK BRAID</td>
</tr>
</tbody>
</table>

OTHER END OF LEADS CONNECTED TO POINTS DESIGNATED ON ASSEMBLY SHEET IN ACCORDANCE WITH TABLE OF CABLE CONNECTIONS

“7” AC Receiver
475-UA or CA and SF45/75-UA or CA
472-UA or CA and SF45/72-UA or CA
Actual Wiring Diagram

Table of Cable Connections

1) POWER FILAMENT
2) AMP FILAMENT
3) C. COMMON
4) C. PWR
5) C. AUR & RAD
6) +B DET
7) +B PWR
8) -B DET
9) -B PWR
10) +B

Type "J" unit for 25 cycle current is similar, except that a 1706X power transformer is used instead of the 1696X transformer as indicated on the type "C" unit for 60 cycles.

Schematic Wiring Diagram

1341 Ms Carbon 20,000 ohms red and green or green only
1414 Ms Wire 250 ohms yellow and white
1415 Ms Wire 2,000 ohms green and white
1416 Ms Wire 3,000 ohms white and white
1417 Ms Carbon 50,000 ohms blue

Type "C" Electric Unit, used with "Special" and "7" AC Receivers
"ABC" Six Volt Tube Supply Unit — Types 66-Q and 62-R
"ABC" Six Volt Tube Supply Unit — Types 86-V and 82-W
1235-Ms  1.0 mfd - by-pass (200 volts)
1242-Ms  0.5 mfd - by-pass (200 volts)
1341-Ms  20,000 ohms (green)
1375-Ms  125,000 ohms (grey)
1417-Ms  50,000 ohms (blue)
1467-Ms  2,000 ohms (black)
1468-Ms  W.W. - Superseded by 2-1299-Ms
1469-Ms  Volume control - 20,000 ohms
1477-Ms  .000125 mfd moulded mica (green dot)
1478-Ms  Condenser - .001 mfd moulded mica (yellow)
1486-Ms  Pilot lamp - 6 volts (orange)
2-1299-Ms Resistor - 250 ohms (light brown)
2094-Y  Choke - 1,400 ohms
2163-Y  Choke - 3,500 ohms

10, 11, 30 and 31 Receivers—60 cycles
10Z, 11Z, 30Z and 31Z Receivers—25 cycles
FADA RADIO & ELECTRIC CORP.

MODEL 20, MODEL 20Z
Schematic

Line Voltage 115—Set on High Voltage—Volume Control Position Max

Model Fada's 20, 20Z

20 Receiver—AC 60 cycles 20Z Receiver—AC 25 cycles
MODEL 22 Battery
Schematic

FADA RADIO & ELECTRIC CORP.

22 Battery Model Receiver

CX-112A CX-112A CX-121A CX-112A CX-112A CX-112A CX-112A
### Schematic Diagram

#### 35Z Receiver — AC 25 cycles

- **Line Voltage 115**: Set on High Volt Tap — Volume Control — Position Max.
- **Note**: When adjusting grid tube readings, ground control grid.

#### 35 Receiver — AC 60 cycles

- **Part List**

---

### Table: Part List

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Resistor</td>
</tr>
<tr>
<td>20</td>
<td>Capacitor</td>
</tr>
<tr>
<td>30</td>
<td>Transformer</td>
</tr>
<tr>
<td>40</td>
<td>Diode</td>
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<tr>
<td>50</td>
<td>Transistor</td>
</tr>
</tbody>
</table>

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### FADA Radio & Electric Corp.

- **Model 35**
- **Model 35Z**
- **Schematic**

---

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SPECIAL DATA FOR MODELS 45, 48 and 49 RECEIVERS

Trimmer adjustment frequencies are 175 KC, 600 KC and 1400 KC. The trimmer condensers on the model 45 receiver are located in the rear right hand corner of the chassis looking at the chassis from the front. Two of the IF trimmers are on the right hand side, near the rear and the third trimmer condenser (IF) is that most distant from the right hand rear corner of the chassis. The trimmer upon the rear of the chassis, near the right hand corner is the oscillator series condenser.

In the models 48 and 49, the oscillator series condenser control is accessible from the top of the chassis, on the left end of the chassis to the left of the shields. The four IF trimmers are accessible through the rear of the chassis, one the left end, looking at the chassis from the front.

The suggested output meter is of the type suitable for connection across the speaker voice coil. The 1st detector control grid must be disconnected for the IF trimmer adjustments and the oscillator "A" lead is connected to the 1st detector control grid cap upon the tube.

The variable gang condenser compensators for the model 45 are located on top of their respective tuning condenser sections. They can be adjusted with a screw driver. The compensator adjusting screws are at ground potential. The adjustment is made at 1400 KC without disturbing the main tuning sections. The suggestion is made to connect the antenna circuit of the receiver through a dummy antenna or a 250 mmfd condenser. The oscillator series condenser is adjusted at 600 KC.

The main tuning condenser compensators are located at the top of their main tuning sections in the 48 and 49 models. They can be adjusted with a screw driver and since the screws are at ground potential and insulated screw driver is not required. There are four holes in the overall condenser and tube housing cover. The screw driver is inserted through these holes.

The tuning condenser compensators are adjusted at 1400 KC. The oscillator series condenser is adjusted at 600 KC. The intermediate trimmers are adjusted at 175 KC. Due to the physical location of the oscillator series condenser it is permissible to remove the overall condenser and tube shield housing cover to permit the insertion of the standard #4 socket wrench for adjustment purposes.

The suggestion is made to check the 175 KC adjustment of the test oscillator by beating that signal against one of its harmonics represented by the carrier frequency of a broadcasting station of correct frequency which is tuned in with the receiver operated in normal manner. Some of the harmonics of a 175 KC signal are 1400 KC, 1225 KC, 1050 KC, 875 KC, and 700 KC.
MODEL E-180, E-180Z
Electric Unit
for 50, 70, 71, 72

FADA RADIO & ELECTRIC CORP.

ACTUAL WIRING DIAGRAM OF E-180 & E-180Z ELECTRIC UNIT

Nor should it be a difficult matter to keep in mind that all "E-180" sets can be identified by their having two round cans in the "rear row" (the power pack). This immediately identifies the set as requiring a 280 rectifier tube and type 171-A amplifier tubes.

SCHEMATIC WIRING DIAGRAM OF E-180 & E-180Z ELECTRIC UNIT

ELECTRICAL VALUES

ELECTRIC UNIT TYPE E-180

1225-MS 25 mfd 400 volts
1341-MS carbon 20,000 ohms (green)
1461-MS wire 750 ohms red-green
1462-MS wire 6000 ohms red-yellow
1492-MS condenser block 10.5 mfd
2-1218-MS wire 2500 ohms blue-white
2-1219-MS wire 1200 ohms green-yellow
1727-X choke 600 ohms
1729-X choke 3500 ohms
FADA RADIO & ELECTRIC CORP.

MODEL E-420, E-420Z
Electric Unit for 50, 70, 71, 72

Actual Wiring Diagram of E-420 Electric Unit

Now it should not be a difficult matter to keep in mind that all "E-420" sets can be identified by their having three round cans in the "rear row" (the power pack). This immediately identifies the set as requiring a 281 rectifier tube and type 210 amplifier tubes.

Schematic Wiring Diagram of E-420 Electric Unit

Electrical Values
Electric Unit Type E-420

1225-MS .25 mfd 400 volts
1341-MS carbon 20,000 ohms green
1461-MS wire 750 ohms red-green
1462-MS wire 6000 ohms red-yellow
1492-MS condenser block 10.5 mfd

2-1218-MS wire 2500 ohms blue-white
2-1219-MS wire 1200 ohms green-yellow
1727-X choke 600 ohms
1729-X choke 3500 ohms
MODEL 192-A Receiver
192-S
192-BS Units
MODEL 160 Neutrodyne

FADA RADIO & ELECTRIC CORP.

Model Fada's 170A, 192A

<table>
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<th>2 AF</th>
<th>1 AF</th>
<th>DET</th>
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</thead>
<tbody>
<tr>
<td>71A</td>
<td>71A</td>
<td>71A</td>
</tr>
</tbody>
</table>

Model 192-A Receiver, 192-S and 192-BS Units

Model 160 Neutrodyne Reflex.

Phones

Horn
FEDERAL RADIO CORP.

MODEL C
Schematic
FEDERAL RADIO CORP.

MODEL F-10 DC
F-11 DC

NOTE: For F-10 DC, rect input is for loop operation as shown. For F-11 DC, rect input is for antenna operation. See auxiliary view.

www.americanradiohistory.com
Model 35, 40

ADJUSTMENTS The 175 kc. oscillator must be accurately tuned to 175 kc. and only 175 kc. If this precaution is not observed it will be impossible to align the oscillator to the rest of the set and the set will not operate correctly as the oscillator is designed for exact 175 kc. operation.

The second intermediate frequency amplifier transformer shield can is removed and one side of the small variator condenser is disconnected from the primary coil. This coil is connected so that it still is in the plate circuit of the tube but the tuning condenser is not connected in the circuit. Now remove the grid cap from the intermediate amplifier tube and connect a 3 megohm resistor from the control grid to ground. Now connect the output from the 175 kc. oscillator to the grid of the intermediate frequency amplifier tube and tune the secondary for maximum deflection of the output meter. (Low voltage alternating current meter, 0 to 3 volts, connected across the voice coil of speaker). Now remove the shield can and connect the small tuning condenser that was previously removed back across the primary coil. With the 175 kc. oscillator connected the same as before, tune the primary for a maximum deflection of the output meter. (Caution: Do not under any circumstances try to retune the secondary after having tuned the primary. This is important.) After having tuned this stage proceed to the next intermediate frequency:

(b) Replace the grid cap on the intermediate frequency amplifier and proceed to the first detector tube. Remove this tube cap and connect the 175 kc. oscillator as before, being sure to connect the 3 megohm resistor from control grid to ground. Now proceed to tune the intermediate frequency transformer by tuning the secondary first for maximum deflection of the output meter and then tuning the primary for maximum deflection. Tuning this transformer must be done very carefully as the selectivity of the whole receiver depends entirely on the tuning of this transformer.
Model NR-7

CX-301A  CX-301A  CX-301A  CX-301A
1st R.F.  2nd R.F.  Det.  1st A.F.  2nd A.F.

*CX-301A or CX-371A
or CX-112A

NR-8

CX-301A  CX-301A  CX-371A  CX-301A  CX-301A
1st R.F.  2nd R.F.  2nd A.F.  3rd R.F.  1st A.F.

If CX-301A's are used, use both stages in parallel. If power tubes are used, one tube in either 2nd A.F. socket is sufficient.
FREED RADIO AND TELEVISION CORP.

MODEL NR-9, NR-9A

MODEL NR-10

Models

<table>
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<tr>
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FRONT

Model NR-10

<table>
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<th>NR-10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 RF</td>
</tr>
</tbody>
</table>

FRONT
This is an A.C. series filament receiver. All tubes except the 2nd A.F. stage tube must be ¼ ampere tubes.
FREED RADIO AND TELEVISION CORP.

A strict observance of the confidential character of this drawing is required.

Model NR-57
Schematic
Model NR-457
Power Unit
Attachment Plug

Model NR-457

A strict observance of the confidential character of this drawing is required.

Model NR-57

NR-57

(C.A.)

CX-326
CX-326
CX-371A
CX-326
CX-326
C-327

Power unit uses CX-380.
MODEL NR-66, 66A
FREED RADIO AND TELEVISION CORP.

Models 66 and 66A

NR-66

(Batt.)

www.americanradiohistory.com
Note — Where two wires are same color they may be connected to either terminal marked that color. Red wire should connect between wires brought out of same large tubing.
CHARLES FRESHMAN CO., INC.

MODEL G, with G-60-S Power Unit
Two Types.

Model G.
(One filter choke)

Schematic diagram of Model "G" Chassis and Model G-60-S Power Supply.
Note the one choke coil in Power Supply Circuit.

Model G.
(Two filter chokes)

Circuits of the Freshman "Model G" Equaphase and the "Model G—60-S" Power Supply Unit.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Fill Voltage</th>
<th>Plate Voltage</th>
<th>Grid Voltage</th>
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<td>RF1</td>
<td>1.5</td>
<td>130</td>
<td>7.0</td>
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<tr>
<td>RF2</td>
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<tr>
<td>RF3</td>
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<tr>
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<tr>
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<td>180</td>
<td>40.0</td>
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</table>

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FRESHMAN—Model "3QD".
Line Voltage 119—120 Volt Tap