Chassis Layout
Below Serial 1400

For sets with serial numbers below 1400
Model 3026
Above serial 1400
Chassis layout

Bottom of Chassis
For Sets with Serial Numbers above 1400
CABLE COLOR CODE:

**BATTERY CABLE**

<table>
<thead>
<tr>
<th>Color</th>
<th>Battery end</th>
<th>Terminal No. (Plug on Receiver Case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>B+180V.</td>
<td>8</td>
</tr>
<tr>
<td>Maroon</td>
<td>B+67½ V.</td>
<td>6</td>
</tr>
<tr>
<td>Yellow</td>
<td>B-</td>
<td>12</td>
</tr>
<tr>
<td>Black-Yellow</td>
<td>A (hot side)</td>
<td>11</td>
</tr>
<tr>
<td>Black</td>
<td>A (ground side)</td>
<td>2</td>
</tr>
</tbody>
</table>

**CONTROL UNIT CABLE**

FROM TERMINAL NO. TO TERMINAL NO. CONNECTS

<table>
<thead>
<tr>
<th>COLOR (Control Unit Term. Strip)</th>
<th>(Plug on Rec. Case)</th>
<th>Connects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-Yellow</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Black</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Green</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Red</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Maroon</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Yellow</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

**SPEAKER CABLE**

FROM TERMINAL NO. TO TERMINAL NO. CONNECTS

<table>
<thead>
<tr>
<th>COLOR (Spkr. Term. Strip)</th>
<th>TO TERMINAL NO. (Plug on Rec. Case)</th>
<th>Connects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-Yellow</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Black</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Yellow</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Red</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Maroon</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>
Remove the control drive cable from the rear of control unit.

Remove the control unit from the dash. Remove the top of the control unit, and the escutcheon plate.

Remove the stop pin from the selector drive shaft and loosen the two set screws in the cable windlass and the set screws in the selector shaft collar. Then push the selector drive shaft to the rear far enough to remove the windlass and cable assembly.

Hold the new windlass and cable, with the end containing the set screws in the left hand, and wind one complete turn of the short end of the cable around the windlass in a counterclockwise direction, winding the cable in the groove away from the set screws.

Then wind three and one half turns of the long end of the cable around the windlass in a counterclockwise direction, winding the cable in the groove toward the set screws.

Slip the cable clamp, Tool No. 479, over the windlass to hold the cable in place.

Place the windlass and cable in position with the set screws to the rear and push the selector drive shaft forward into position through the windlass. The long end of the cable should lead away from the windlass at the bottom. The short end of the cable should lead away from the windlass at the top.

Pull the long end of the cable under the small idler pulley near the windlass and around the larger idler pulley from bottom to top. Hook the spring on the loop at the end of the long section of the cable then lead the cable through the slot in the face of the selector dial drum and hook the free end of the spring over the ear in the drum, nearest the 50 mark.

Lead the short end of the cable once around the outside of the selector drum in a counterclockwise direction and through the slot in the face of the drum. Hook the loop at the end of the cable over the ear in the drum nearest the 50 mark.

Note:

On a number of sets of early production, the two ends of the cable are connected by the cable spring. The selector drum in this case has two notches and the cable is wound around the drum with the spring in the position shown in Figure 6.

If it should be necessary to replace either the windlass and cable assembly or the dial and drum assembly described above, both parts should be replaced by the later type as listed in the part section of this manual.
### Voltage, Resistance Plug data

<table>
<thead>
<tr>
<th>Type</th>
<th>Position</th>
<th>Control</th>
<th>Screen</th>
<th>Pentode</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
<td>of Tube</td>
<td>Fils.</td>
<td>Plate</td>
<td>Grid</td>
<td>Grid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volts</td>
<td>Volts</td>
<td>Volts</td>
<td>Volts</td>
</tr>
<tr>
<td>37</td>
<td>Oscillator</td>
<td>5.5</td>
<td>65</td>
<td>-----</td>
<td>5.0</td>
</tr>
<tr>
<td>36</td>
<td>R. F.</td>
<td>5.5</td>
<td>105</td>
<td>.15</td>
<td>65</td>
</tr>
<tr>
<td>36</td>
<td>1st Detector</td>
<td>5.5</td>
<td>165</td>
<td>5.50</td>
<td>80</td>
</tr>
<tr>
<td>36</td>
<td>I. F.</td>
<td>5.5</td>
<td>110</td>
<td>2.50</td>
<td>75</td>
</tr>
<tr>
<td>37</td>
<td>A.V.C.</td>
<td>5.5</td>
<td>15</td>
<td>-----</td>
<td>7.5</td>
</tr>
<tr>
<td>37</td>
<td>2nd Detector</td>
<td>5.5</td>
<td>150</td>
<td>10.00</td>
<td>5.0</td>
</tr>
<tr>
<td>47*</td>
<td>A.F.</td>
<td>2.5</td>
<td>150</td>
<td>18.00</td>
<td>160</td>
</tr>
<tr>
<td>47*</td>
<td>A.F.</td>
<td>2.5</td>
<td>150</td>
<td>18.00</td>
<td>160</td>
</tr>
<tr>
<td>0A#</td>
<td>A.F.</td>
<td>5.0</td>
<td>150</td>
<td>18.00</td>
<td>160</td>
</tr>
</tbody>
</table>

---

**Volume Control on Max. "B" Battery Voltage 180**

*Do not attempt to take readings on the type 47 (Pentode) tube unless your set analyzer is equipped to test sets using this type of tube. Otherwise, readings taken at the 47 sockets will be misleading.*

**A pentode used in Models 2027-A and 2029-A in place of '47 pentode output tubes.**

**NOTE:** It should be noted that readings obtained with different set analyzers will vary with battery voltage and with different tubes. The readings shown, therefore, are only average readings. For this reason, each service man should compile a chart similar to the one illustrated, using his own set analyzer with a set, and batteries that are known to be operating properly.

<table>
<thead>
<tr>
<th>Test from</th>
<th>to</th>
<th>Correct Voltage</th>
<th>Probable cause of trouble if voltage is below Min. Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>contact No.</td>
<td>contact No.</td>
<td>Readings</td>
<td>Min.</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>120 180</td>
<td>Low &quot;B&quot; Batteries</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>45 70</td>
<td>Low &quot;B&quot; Batteries</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>120 180</td>
<td>Open volume control</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>120 180</td>
<td>Defective volume control</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>120 180</td>
<td>Open speaker transformer</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>6.0 6.8</td>
<td>Low storage battery</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>6.0 6.8</td>
<td>Open speaker field</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6.0 6.8</td>
<td>(If reading is obtained &quot;B&quot; Batteries may be grounded or &quot;B&quot; Battery wires may be grounded due to moisture between the Batteries and &quot;B&quot; Battery box.)</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>No Reading</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>No Reading</td>
<td></td>
</tr>
</tbody>
</table>

---

Sets with serial numbers **Below 1400**

View of plug in case with chassis removed.

Sets with serial numbers **Above 1400**

Guide Pin

Guide Pin

www.americanradiohistory.com
MODELS 2027-A AND 2029-A

WIRING CHANGE FROM TYPE 247 PENTODE TO TYPE GA PENTODE

In order to re-operate the 2027 or 2029 chassis to the new 2027-A or 2029-A, there are three distinct operations which are as follows:

1. Change Filament leads which are connected in series, for use with the 247 tubes, to parallel connections.

2. Insert the Black tubular 1-OHM Resistor in the positive lead. This does not necessitate moving the resistor.

3. Connect a .01 Mfd. condenser from the plate terminal on one pentode socket to ground.

The choke coils, which were mounted on the 2027-A and 2029-A sets received from the factory, are not necessary in making this change.

---

### TABLE OF CAPACITORS AND RESISTORS:

<table>
<thead>
<tr>
<th>CODE</th>
<th>OHMS</th>
<th>WATTS</th>
<th>BODY</th>
<th>END</th>
<th>SPOT</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1</td>
<td>5</td>
<td>Tubular Enamelled Resistor</td>
<td>1206834</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>250</td>
<td>1/2</td>
<td>Red</td>
<td>Green</td>
<td>Brown</td>
<td>1206834</td>
</tr>
<tr>
<td>R3</td>
<td>1,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Black</td>
<td>Red</td>
<td>1206834</td>
</tr>
<tr>
<td>R4</td>
<td>1,000</td>
<td>1</td>
<td>Brown</td>
<td>Black</td>
<td>Red</td>
<td>1206834</td>
</tr>
<tr>
<td>R5</td>
<td>6,000</td>
<td>1/2</td>
<td>Blue</td>
<td>Black</td>
<td>Red</td>
<td>1206834</td>
</tr>
<tr>
<td>R6</td>
<td>8,000</td>
<td>1/2</td>
<td>Gray</td>
<td>Black</td>
<td>Red</td>
<td>1206834</td>
</tr>
<tr>
<td>R7</td>
<td>10,000</td>
<td>1</td>
<td>Brown</td>
<td>Green</td>
<td>Orange</td>
<td>1206834</td>
</tr>
<tr>
<td>R8</td>
<td>40,000</td>
<td>1/2</td>
<td>Yellow</td>
<td>Black</td>
<td>Orange</td>
<td>1206834</td>
</tr>
<tr>
<td>R9</td>
<td>90,000</td>
<td>1/2</td>
<td>White</td>
<td>Black</td>
<td>Orange</td>
<td>1206834</td>
</tr>
<tr>
<td>R10</td>
<td>100,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Black</td>
<td>Yellow</td>
<td>1206834</td>
</tr>
<tr>
<td>R11</td>
<td>1,000,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Black</td>
<td>Green</td>
<td>1206834</td>
</tr>
<tr>
<td>R12</td>
<td>90,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Green</td>
<td>Orange</td>
<td>1206834</td>
</tr>
<tr>
<td>R13</td>
<td>15,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Black</td>
<td>Yellow</td>
<td>1206834</td>
</tr>
<tr>
<td>R14</td>
<td>100,000</td>
<td>1/2</td>
<td>Brown</td>
<td>Black</td>
<td>Yellow</td>
<td>1206834</td>
</tr>
</tbody>
</table>
MODEL 50
Schematic

DEWALD RADIO

Dewald

7500\(\Omega\)

MODEL 50

7072

7500\(\Omega\) 100\(\Omega\) 50 \%

ON-OFF SWITCH

TO
R.C. 110-120 V
50-60\(\text{Hz}\)
SUPPLY

PILOT LAMP
2.5 VOLTS

\(\text{VOLUME CONTROL}
7500\(\Omega\)
*8240 A

\(\text{500\(\Omega\)}

\(\text{0.008 MFD.}

\(\text{0.001 MFD.}

\(\text{0.005 MFD.}

\(\text{3,000\(\Omega\) 4\%}

\(\text{40,000\(\Omega\) 4\%}

\(\text{30,000\(\Omega\) 4\%}

\(\text{45,000\(\Omega\) 4\%}

\(\text{.01 MFD.}

\(\text{1 MFD.}

\(\text{.5 MFD.}

\(\text{.25 MFD.}

\(\text{.05 MFD.}

\(\text{1500 \text{pf}}

\(\text{3000 \text{pf}}

\(\text{.5 MEG. 4\%}

\(\text{.006 MFD.}

\(\text{140 M.M.MFD.}

\(\text{7.3 M.H.}

\(\text{a}

\(\text{b}

\(\text{7-27-32}

\(\text{7-28-32}

\(\text{M.G.}

\(\text{E.R.}

\text{CHECKED}

\text{DRAWN}

\text{MODEL 50}
C1: TWO GANG .00037 MFD. VAR. COND.
C2: 140 M. MFD.

"B" BATTERY HOOKUP

ELIMINATOR HOOKUP

TO HOT SIDE BAT.

TUNING CABLE

VOLUME CONTROL. 500,000 .

EITHER 3 BATTERIES OR
ELIMINATOR MAY BE USED.

DESIGN
DRAWN
APPROVED

MODEL 52 7081
To align the I.F. circuit, an oscillator supplying 456 K.C. should be connected to the control grid of the 6A7 and the variable condenser frame. The grid cap normally on the 6A7 should be removed. The oscillator section of the variable condenser should be short circuited. This may be done by putting a small clip on the terminal of the oscillator condenser trimmer and running a wire to ground. It is preferable to use an output meter for accurate work, which may be connected into circuit of the 41 by means of an adapter having leads brought out from plate and screen through a .5 mfd stopping condenser. See Fig. #4.

The volume control on the receiver should be turned to maximum and the three I.F. adjusting screws shown in Fig. #2 set to give maximum on the output meter. This operation may be performed with the receiver in the can if a pair of long nose pliers or offset screw driver is used.

For R.F. alignment, remove oscillator condenser short circuit, replace grid cap on 6A7 and connect oscillator covering broadcast range to antenna wire and its shield.

---

**Fig. 2**

- **37** First Audio Tube
- **85** Diode Detector
- **41** Power Tube
- **'78** I.F. Amplifier
- **Antenna Coil**
- **Oscillator Section**
- **R. F. Section**
- **6A7 Oscillator Detector**
- **Battery Cable**
- **Screws**
- **Holding Eliminator**
- **Vibrator Case**
- **Second I.F. Adjusting Screw**
- **Spring Grounding Vibrator Case**
- **94 Rectifier for B" Supply**
- **Two I.F. Adjusting Screws**
- **Antenna Cable Shield Grounded To Car**
DeWald Radio

Notes

Be sure shield of battery cable is soldered to can at left side of receiver.

When cover is placed on can, a heavy spring on the inside grounds the top of "B" supply unit. Be sure contacts is good and pressure heavy.

Condenser from antenna transformer should run to front of variable condenser. If further difficulty is experienced check ground of chassis and "B" supply unit to can at various points with heavy screw driver.

The wire on vibrator which runs from its coil to the frame, should be securely soldered on frame and on inside of vibrator case.

Possible Set Troubles

A. Low volume or weak signals
1. Defective tubes.
2. Poor antenna (small size shielded wire must not be used to extend present antenna, as capacity between shield and inside is too great.
3. Open circuit in radio frequency or audio stage.
4. Defective resistors.
5. Defective by pass condensers.
6. Defective volume control.
7. Low "B" voltage.

B. Intermittent reception.
1. Antenna shorting (use high resistance continuity to check car antenna-set disconnected)
2. Defective tubes.
3. Loose connection.
4. Film breaking down in electrolytic condenser
5. Defective speaker.
6. Defective volume control.
7. Defective by pass condenser.

Observer Meter

Output Meter

.5 Mfd., 200 V.
Condenser

Fig. 3b

View Showing Eliminator Three Terminals & Color Code of Connections

Adapter for 41 Showing Wires to Screen Grid & Plate Plus Circuit

Fig. 4
To examine vibrator, remove "B" supply unit from can by unsoldering 3 leads (see Fig.3) removing 6 screws at ends of unit and vibrator may be removed without unsoldering its leads.

Take cover off vibrator case and vibrator may be removed without unsoldering its leads wires. It will be seen that there are a top and a bottom set of contacts. The normal clearance on these contacts is .003" to .004" and this may be adjusted with screws provided.

Any dirt on contacts should be removed with pipe cleaner before adjustment. If top clearance is too great vibrator may operate but not close this circuit (operate half wave) and the voltage will be low. If bottom clearance is too great, vibrator will pull down but not vibrate. Too small a bottom clearance may short bottom contacts and cause inoperative vibrator and heavy current drain.

If both contact clearances are small, the vibrator will operate at a higher pitch and voltage, but sparking will occur.

Check of vibrator operation may be made by running three temporary jumpers from "B" supply unit outside can to the receiver, (See Fig.3) and operating the vibrator outside its case so it is visible. The tone should be low pitched, even and regular, and no appreciable sparking should occur. To remove vibrator for replacement purposes, unsolder the three vibrator wires at the terminals of the step up transformer and at the ground terminal near the tube. Leads should be left attached to vibrator.

If set is not available or is in doubtful condition a 4000 ohm load resistance of 5 watts or larger may be used from plus "B" to ground of eliminator in place of set. The 6-volt supply is applied to the two terminals at the vibrator end of "B" unit.

If gaps are okay, and sparking persists, check for dirty contacts or open condenser across primary of step-up transformer.
DEWALD RADIO

Set test oscillator at 1500 K.C. and receiver variable condenser at minimum capacity. Adjust to maximum output with trimmers on top of variable condenser.

Apply 600 K.C. from test oscillator, tune in on receiver and check variable condenser alignment by bending one R.F. condenser rotor plate in or out slightly to give maximum output. Repeat procedure at 800, 1000, and 1200 kilocycles.

MODEL #61 RECEIVER

NUMBERS AND LIST PRICES OF REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1165</td>
<td>Second Detector Transformer</td>
<td>$1.40</td>
</tr>
<tr>
<td>1166</td>
<td>Dual I.F. Tuned Transformer</td>
<td>$1.70</td>
</tr>
<tr>
<td>1168</td>
<td>Oscillator Coil</td>
<td>.70</td>
</tr>
<tr>
<td>1169</td>
<td>Antenna Coil</td>
<td>.85</td>
</tr>
<tr>
<td>2033</td>
<td>.25 Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2046</td>
<td>.05 Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2047</td>
<td>.0025 Mica Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2056</td>
<td>.01 Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2081</td>
<td>.0015 Mica Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2123</td>
<td>.0001 Mica Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2133</td>
<td>5 Mfd Elect. Condenser</td>
<td>.75</td>
</tr>
<tr>
<td>2135</td>
<td>2 X .05 Cub Condenser</td>
<td>.45</td>
</tr>
<tr>
<td>2147</td>
<td>8 Mfd Elect. Condenser</td>
<td>1.00</td>
</tr>
<tr>
<td>2152</td>
<td>.25 Gen. Condenser</td>
<td>.50</td>
</tr>
<tr>
<td>3192</td>
<td>Spark Plug Suppressor</td>
<td>.50</td>
</tr>
<tr>
<td>3193</td>
<td>Distributor Suppressor</td>
<td>.50</td>
</tr>
<tr>
<td>5064</td>
<td>Antenna Cable</td>
<td>.50</td>
</tr>
<tr>
<td>5069</td>
<td>Battery Cable</td>
<td>.50</td>
</tr>
<tr>
<td>7095</td>
<td>Speaker</td>
<td>5.20</td>
</tr>
<tr>
<td>8308</td>
<td>Combination Controls (Vol Cont. &amp; Switch)</td>
<td>1.15</td>
</tr>
<tr>
<td>9257</td>
<td>Drive Cover</td>
<td>.50</td>
</tr>
<tr>
<td>9270</td>
<td>Baffle Board</td>
<td>.15</td>
</tr>
</tbody>
</table>

MODEL #61 ELIMINATOR

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1163</td>
<td>Choke R.F.</td>
<td>.60</td>
</tr>
<tr>
<td>1162</td>
<td>Transformer</td>
<td>2.50</td>
</tr>
<tr>
<td>2070</td>
<td>.5 Mfd Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2033</td>
<td>.25 Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2145</td>
<td>.025 Mfd Cub Condenser</td>
<td>.35</td>
</tr>
<tr>
<td>2147</td>
<td>8 Mfd Elect. Condenser</td>
<td>1.00</td>
</tr>
<tr>
<td>8304</td>
<td>Vibrator</td>
<td>5.00</td>
</tr>
<tr>
<td>9289</td>
<td>T. &amp; B. Cushion 3/8 X 2-1/16 X 4-3/8</td>
<td>.25</td>
</tr>
<tr>
<td>9290</td>
<td>Side Cushion 3/8 X 1-3/16 X 3-5/8</td>
<td>.20</td>
</tr>
<tr>
<td>9291</td>
<td>End Cushion 3/8 X 1-3/16 X 2-1/16</td>
<td>.20</td>
</tr>
<tr>
<td>1161</td>
<td>Filter Choke</td>
<td>.75</td>
</tr>
<tr>
<td>9202-9203</td>
<td>Drive Cable Ably</td>
<td>1.75</td>
</tr>
<tr>
<td>8317</td>
<td>Driven Gear Ably</td>
<td>1.00</td>
</tr>
</tbody>
</table>
1. DRIVE MECHANISM. Twenty pound test line is specified and used for driving the dial mechanism. Each end of the belt is secured to the large pulley wheel. The ends pass through holes on opposite sides of this pulley and are held by knots tied in the belt itself. The belt passes over two smaller pulleys in a spring-actuated take-up assembly, thence to a worm which slips over the tuning knob shaft. Five turns are made by the belt around this worm. The worm is not directly secured to the tuning knob shaft but is held in position between two collars locked to the shaft. A spring washer is inserted between the worm and the front collar. The spring washer being adjusted so as to provide friction to a sufficient degree, exceeding the driving resistance of the dial mechanism itself and its associated condensers; yet insufficient friction to resist continued rotation of the tuning knob when the dial mechanism has been rotated to either extreme end, thus preventing slippage or breakage of the belt after proper adjustment has once been made.

2. SPRING-WASHER. Receiver units bearing serial numbers ranging above 785000 have been equipped with a spring washer of improved design, greatly diminishing the possibility of dial slippage. The improved washer may be distinguished from the earlier style washer by its cup-shaped appearance, much of which it retains even when adjusted to a position for maximum friction.

3. DIAL SLIPS OR STICKS. Sticking or slipping of the dial may result if the spring washer is not adjusted for sufficient friction against the drive worm or if the belt is too loose.

4. ADJUSTMENT OF SPRING WASHER FOR INCREASED FRICTION. Note Figure 12. Observe the relative positions of front collar, spring washer, drive worm, rear collar and bearing plate "B".

NOTE: If dial slips and continues to slip after collar has been forced forward for maximum friction of spring washer against worm, then inspect "take-up assembly. If distance "x" is less than 1-16th inch, belt should be tightened in accordance with instructions.
Rotate dial to approximate position as shown in Figure No. 12 so that these parts are most readily accessible with long blade screw driver. Loosen both set screws in rear collar. Insert screw driver blade between rear collar and bearing bracket, indicated by "Z". Force the rear collar forward, in the direction of the tuning knob, by twisting the blade or prying against the bearing bracket. This action compresses the spring washer between the worm and front collar, providing greater friction. Then, with a narrow blade screw driver, tighten set screws in rear collar, making sure that rear collar does not shift before the second set screw is tightened. This operation properly performed will eliminate slippage of the worm.

5. OIL should not be applied to the spring washer or worm. The application or presence of oil on these parts promotes slipping and will defeat proper functioning.

6. TO TIGHTEN BELT. Although not absolutely necessary greater accessibility may be had by removal of the front panel. Then remove the right hand variable condenser shield. Loosen the two set screws in dial mechanism that hold the shaft of the right hand variable condenser, and then push the rotor plate assemblies into position of maximum capacity so that the possibility of damage to them is reduced to a minimum. Consult Figure No. 13. Rotate the tuning knob until the large pulley with the knot "K" is in the approximate relative position shown in Figure No. 13. Insert screw driver blade as shown between chassis shelf and take-up assembly bracket. Lift upward on this screw driver, compressing take-up assembly spring "S", and loosening belt "3". Block screw driver blade as illustrated at point "X", thus maintaining looseness of belt. Then pull knot "K", taking up slack in belt "3". Then tie a new knot in this belt as near as possible to the pulley face. It is usually advisable, if possible, to untie the original knot to avoid its rubbing against the condenser shield. When the new knot has been formed, remove the screw driver, rotate the tuning knob in a counter clockwise direction (to the left), turning it as far as possible. Then tighten the set screws that hold the dial mechanism to the shaft of the right hand variable condenser. Replace the right hand condenser shield, front panel and knobs.

7. NOTE. It is always advisable, after removal or replacement of panel or when any adjustment of the variable condensers is made, to reneutralize and then recompensate to insure most accurate calibration. These operations are explained in detail in bulletins numbered 3 and 4.
1. A cup-shaped friction washer is now being used on Light-O-Matic Models to prevent slipping of the belt driving worm.

2. It is recommended that this cup-shaped friction washer be installed in addition to the regular friction washer wherever the worm has a tendency to slip. This is done in the following manner.

3. Remove left hand gang condenser shield housing.

4. Loosen both set screws in clutch collars "A" and "B". (See Figure No. 9.)

5. Pull out tuning knob shaft slowly about $\frac{1}{2}$ inch or until collar "A" can be removed, taking care to hold shaft straight so drive cord will not change its position on worm.

6. Push tuning shaft back in slightly and place cup-shaped washer on end of this shaft.

7. Replace collar "A" in position and push tuning knob shaft through into its original position.

8. Tighten both set screws in collar "B".

9. Insert a screwdriver between collar "A" and frame bearing at point "C".

10. Twist screwdriver, forcing collar "A" toward panel thereby compressing friction washer, and while holding it in this position, tighten one set screw.

11. If friction clutch does not slip, tighten the other set screw in collar "A".

12. If clutch still slips, loosen set-screw in collar "A", reinsert screwdriver at point "C" and exert greater twisting force before tightening set-screw.

13. If the clutch does not slip, tighten the other set-screw in collar "A" and replace gang condenser shield housing.
MODEL 072-A

Installation notes

The chassis is received with the condenser pulley, spring and centering ring mounted in the proper position on the tuning condenser and the cable chuck through which the drive cable passes mounted on the chassis box.

All that it is necessary to do is to mount the control unit on the steering column, cut the cable and housing to length if necessary, attach the cable to the drive pulley, and secure the housing in the chuck.

MOUNTING THE CONTROL UNIT

The control unit is mounted on the steering column with the knobs extending toward the right hand side. The proper distance below the steering wheel can be determined by trial.

Two clamps are provided to secure the control unit to the steering column. Use the lockwashers supplied under the heads of the clamp screws to secure the clamps on the control unit.

If the steering column is 1-3/8" in diameter, use the leather spacers supplied. If 1-5/8", split the spacers or wrap the column with about 1/16" of friction tape under the brackets. If the column is 1-3/4", no spacers are required.

ATTACHING THE CABLE

The drive cable should be run in as straight a line as possible. Avoid any sharp bends.

After the control unit has been mounted and before securing the drive cable and housing at the chassis, cut it to length if necessary. Be sure that enough cable is allowed to avoid any sharp bends. Do not coil the excess length in short loops.

To cut the cable proceed as follows: With a sharp three-corner file, file across one of the turns of the tubular housing until it is practically severed. Then bend it only slightly back and forth until it breaks off. Do not bend sharply as in so doing permanent injury to the inner element of the cable might result.

Turn the station selector knob on the control unit as far as it will go in a counter-clockwise direction. The cable will then extend out of the housing the greatest distance.

Loosen the large jam nut on the cable chuck. Insert the free end of the cable and its tubular housing. Be sure that the housing with its weatherproof covering is inside the chuck. Then tighten the jam nut. This will secure the housing and weatherproof braid in place. As explained above, the station selector knob should be turned to the extreme counter-clockwise position. The rotor of the tuning condenser is held at the extreme clockwise position by the action of the spring. Bring the free end of the cable around the pulley, loosen the cable clamp screw at the top of the pulley, insert the cable under the clamp washer and then tighten in place. Cut off any excess cable to prevent tangling with other parts of the receiver. Care should be taken not to put a sharp bend in the exposed portion of the drive cable, as the latter may be permanently injured.

If necessary to re-center, loosen the nut which secures the chuck to the chassis box. Then move the chuck until the cable is centered relative to the groove in the pulley and re-tighten the nut.

DIAL LAMP

The dial lamp may be replaced by removing the station selector knob and the two screws on the sides of the control housing. Use a standard 6-8 V. screw base lamp which may be procured from the factory. As a temporary measure, a 6 volt pilot light bulb may be procured from any radio store.
Instructions for Installing Electronic "B" Power Supply

1. Install eliminator in most convenient position in car, being sure that eliminator is securely grounded to some grounded metal part of the car.
2. Connect "hot" set lead to N.T. terminal of eliminator.
3. Connect "hot" battery lead to A.H. terminal of eliminator.
4. Connect negative radio set lead to B- terminal of eliminator.
5. Connect positive radio set lead to B+ terminal of eliminator.
6. If radio set has an intermediate voltage tap, connect it to Bx terminal of eliminator. This intermediate voltage should be adjusted in accordance with set manufacturer's instructions, the voltage being measured with a high resistance voltmeter.
7. If this tap is not available, the slotted adjusting shaft in the center of the B terminal strip should be turned to about the center position and varied a little either way until best radio reception is obtained.
8. If radio set B cable has shielding, connect it to the G terminal of eliminator.

Note: Some radio sets have only one B lead which is positive. The negative lead being the shielding. In this case connect the shielding to the B- terminal and to the G terminal.

---

FIG. 1

---

FIG. 2
MODEL 331 6 Volt
Eliminator Schematic

MODEL 332 32 Volt
Eliminator Schematic

RELAY 6-VOLT ELIMINATOR #331

RELAY 32-VOLT ELIMINATOR #332
**ELECTRONIC LABORATORIES, INC.**

**ENGINEERING SPECIFICATIONS**

**SUBJECT:**
CIRCUIT DIAGRAM OF 32 AND 110-VOLT D-C. CONVERTERS
TYPES 338 AND 339

<table>
<thead>
<tr>
<th>PARTS LIST</th>
<th>MATERIAL</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Tap Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Condenser Block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E Fuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F Toggle Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-1 Choke (32 volts, 10 turns)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-2 Choke (100 turns)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S Resistance Cord (32 volts, 1 ohm; 110 volts, 10 ohms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T Transformer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CHANGES**

<table>
<thead>
<tr>
<th>CHANGES</th>
<th>DATE</th>
<th>SUPPLIERS</th>
<th>THEIR PART NO.</th>
<th>PRICE</th>
<th>ELECTRONIC LABORATORIES, INC.</th>
<th>DRAWN BY</th>
<th>DATE</th>
<th>APPRO. BY</th>
<th>DATE</th>
<th>USED ON</th>
<th>SEE ASS. PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CHOKES L1 &amp; L2</td>
<td>11-22</td>
<td></td>
<td></td>
<td></td>
<td>122 W. NEW YORK ST., INDIANAPOLIS, IND.</td>
<td>LK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11-22-33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Voltage Readings:

For the convenience of servicemen, the following voltage readings will serve as a guide in trouble shooting.

Readings are to be taken with all the tubes in their places, volume control turned on full and antenna wire grounded to chassis.

The D.C. Voltmeter used should be 1000 ohms per volt, or over. Line volts 117 A.C.

<table>
<thead>
<tr>
<th>Fil.</th>
<th>Ground to Plate</th>
<th>Ground to Screen</th>
<th>Ground to Grid</th>
<th>Ground to Suppressor</th>
</tr>
</thead>
<tbody>
<tr>
<td>58 Osc. 1st Det.</td>
<td>2.4 A.C.</td>
<td>80 D.C.</td>
<td>80 D.C.</td>
<td>2. D.C.</td>
</tr>
<tr>
<td>58 Osc. I. F. Amplifier</td>
<td>2.4 A.C.</td>
<td>80 D.C.</td>
<td>80 D.C.</td>
<td>11. D.C.</td>
</tr>
<tr>
<td>57 2nd Det.</td>
<td>2.4 A.C.</td>
<td>75 D.C.</td>
<td>80 D.C.</td>
<td>4.5 D.C.</td>
</tr>
<tr>
<td>47 Output</td>
<td>2.4 A.C.</td>
<td>245 D.C.</td>
<td>255 D.C.</td>
<td>4.5 D.C.</td>
</tr>
<tr>
<td>80 Rectifier</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Voltage across speaker field, 90.

Above voltages were taken with a high resistance voltmeter of 1000 ohms per volt and may vary somewhat with different sets and with the resistance of the voltmeter.

Model D-AC-5

FIVE-TUBE BROADCAST AND SHORT-WAVE SUPERHETERODYNE

110-120 Volts . A.C. . 60 Cycles

Broadcast
540—1500 Kilocycles
550—200 Meters

Short Wave
1500—3000 Kilocycles
200—100 Meters
EMERSON RADIO AND PHONOGRAPH CORPORATION

**Model 30 AW, 33 AW, 250 AW, 321 AW, 350 AW**

**Schematic, Voltage, Socket**

**Voltage Readings:**

Readings should be taken with Volume Control fully on.
Tuning control set for 550 K.C., and antenna outside the set.
Use a D.C. Voltmeter having a resistance of 1000 ohms per volt.

<table>
<thead>
<tr>
<th>Using</th>
<th>300-volt scale Plate to Ground</th>
<th>300-volt scale Screen to Ground</th>
<th>300-volt scale Cathode to Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>78—Detector Oscillator</td>
<td>98</td>
<td>98</td>
<td>1.6</td>
</tr>
<tr>
<td>78—I. F. Amplifier</td>
<td>98</td>
<td>98</td>
<td>2.8</td>
</tr>
<tr>
<td>77—2nd Detector</td>
<td>35</td>
<td>25</td>
<td>1.5</td>
</tr>
<tr>
<td>43—Power Amplifier</td>
<td>92</td>
<td>98</td>
<td>..</td>
</tr>
<tr>
<td>25Z5—Rectifier</td>
<td>..</td>
<td>..</td>
<td>98</td>
</tr>
</tbody>
</table>

Voltage across speaker field 100 volt.

Bias for 43 tube is measured across filter choke and should be 15 to 18 volts.

A.C.-D.C. . . . 100-135 Volts . . . 25-70 Cycles
Also Available for 220 Volts.

<table>
<thead>
<tr>
<th>Broadcast</th>
<th>Short Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>540—1500 Kilocycles</td>
<td>1500—3000 Kilocycles</td>
</tr>
<tr>
<td>550—200 Meters</td>
<td>200—100 Meters</td>
</tr>
</tbody>
</table>

**SCHEMATIC CIRCUIT**

**H-5-456 SUPERHETERODYNE**

(IF PEAK 456 KC)

**POWER SUPPLY**

- 110V AC - D.C.
- RED, BLUE, GREEN
- FIELD 1000
- 25Z5-Rectifier
- 25000-1000
- 50000-1000
- 0.005µf
- 0.5µf
- 5.0µf
- 100µf
- 10µf
- 25µµf
- 25µµf
- 50µµf
- 250µµf
- 1000µµf

**FILAMENT CIRCUIT**

- 175
- 500
- 500
- 0.005µf
- 0.5µf
- 5.0µf
- 100µf

**VOLUME (ON-OFF SWITCH)**

- SELECTOR

**SWITCH SHOWN AT**

**BROADCAST POSITION**

**IF PEAK 456 KC**
EMERSON PAGE 4-3
EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 35 (T-6)
Schematic

SCHEMATIC CIRCUIT OF MODEL T-6 RECEIVER.

NOTE: LIGHTS IN SERIES IF IT BURNS OUT SET WILL BE INOPERATIVE UNTIL REPLACED.
Voltage readings:
(Readings in other bulletin are void).
Readings should be made with the Volume Control fully on and the receiver tuned to a position on the dial where no broadcast comes through.

Use only a high resistance d.c. voltmeter.

<table>
<thead>
<tr>
<th>Ground To:</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillator</td>
<td>90-110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R.F. Amplifier</td>
<td>235-250</td>
<td>90-110</td>
<td>5-6</td>
</tr>
<tr>
<td>First Detector</td>
<td>235-250</td>
<td>90-110</td>
<td>5-7</td>
</tr>
<tr>
<td>I.F. Amplifier</td>
<td>235-250</td>
<td>90-110</td>
<td>5-6</td>
</tr>
<tr>
<td>Audio Amplifier</td>
<td>125-135</td>
<td></td>
<td>1.2-1.4</td>
</tr>
<tr>
<td>Output Pentode</td>
<td>215-225</td>
<td>235-250</td>
<td></td>
</tr>
</tbody>
</table>

Line Voltage — 115

The bias on the 47 cannot be read with the voltmeter.
Universal Compact Radio
FIVE TUBE SUPERHETERODYNE - - 200 - 2000 METERS
Either A. C. or D. C. - - 110 - 120 Volts - - 25 to 60 Cycles
Adaptable for 220 Volt Operation, with use of 220 Volt Resistor

Voltage Readings:
Readings should be taken with Volume Control fully on.
Tuning control set for 550 K.C., and antenna outside the set.
Use a D.C. Voltmeter having a resistance of 1000 ohms per volt

<table>
<thead>
<tr>
<th>Using</th>
<th>300-volt scale Plate to Ground</th>
<th>300-volt scale Screen to Ground</th>
<th>30-volt scale Cathode to Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>78—Detector Oscillator ..........</td>
<td>98</td>
<td>98</td>
<td>1.6</td>
</tr>
<tr>
<td>78—I. F. Amplifier .............</td>
<td>98</td>
<td>98</td>
<td>2.8</td>
</tr>
<tr>
<td>77—2nd Detector ...............</td>
<td>35</td>
<td>25</td>
<td>1.5</td>
</tr>
<tr>
<td>43—Power Amplifier .............</td>
<td>92</td>
<td>98</td>
<td>.</td>
</tr>
<tr>
<td>25Z5—Rectifier ..................</td>
<td>.</td>
<td>.</td>
<td>98</td>
</tr>
</tbody>
</table>

Voltage across speaker field 100 volt.
Ground is the electrical ground of the circuit and is not the chassis proper.
Bias for 43 tube is measured across filter choke and should be 15 to 18 volts.
CAUTION! Do not attach a ground wire to chassis except through a small condenser of about .1 mfd. capacity

Voltage Readings:
All readings were made with Volume Control fully on.
A Voltmeter having a resistance of 1000 ohms per volt was used.
LINE VOLTAGE—115-V - A.C.

<table>
<thead>
<tr>
<th>Voltmeter Scale</th>
<th>300-volt Plate to B.</th>
<th>300-volt Screen to B.</th>
<th>30-volt Cathode to B.</th>
<th>30-volt Suppressor to B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>78 First Radio Frequency</td>
<td>105</td>
<td>105</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>78 First Detector Oscillator</td>
<td>105</td>
<td>105</td>
<td>16</td>
<td>0.0</td>
</tr>
<tr>
<td>78 I. F. Amplifier</td>
<td>105</td>
<td>105</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>75 Second Detector A. V. C.</td>
<td>25</td>
<td>15</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>43 Power Amplifier</td>
<td>92</td>
<td>105</td>
<td>0.0</td>
<td>—</td>
</tr>
</tbody>
</table>

For List of Parts, see Index

Note:
The cathode voltage on the R.F. and I.F. tubes is measured with the ant. grounded to the chassis.
B refers to the electrical ground of the set and may be obtained at the chassis.
Bias for the 43 tube is measured across the filter choke and should be 15 volts.
Voltage across speaker-field — approximately 105 V.
SIX-TUBE SUPERHETERODYNE RECEIVER

A.C.-D.C. . . 100-135 Volts . . 25-70 Cycles
Also available for 220 Volts.

Bias for 43 tube measured across filter choke and should be 15 to 18 volts.
Volume control on full. Line voltage 115 volts, a-c.

<table>
<thead>
<tr>
<th>Plate to Screen to</th>
<th>Cathode</th>
<th>Suppressor to</th>
</tr>
</thead>
<tbody>
<tr>
<td>-B</td>
<td>-B</td>
<td>-B</td>
</tr>
<tr>
<td>78 R.F.</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6A7 1st Det-Osc</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6B7 I.F.-AVC</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>77 2nd Det.</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>43 Pwr.Amp.</td>
<td>98</td>
<td>100</td>
</tr>
<tr>
<td>25Z5 Rect.</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85</td>
</tr>
</tbody>
</table>

Broadcast
540—1500 Kilocycles
550—200 Meters
150—300 Kilocycles
2000—1000 Meters

Long Wave

Description:

This Universal Compact is a complete, compact universal electric screen-grid superheterodyne receiver adapted for use on common commercial power available, i.e. 100 to 135 volts, A.C. or D.C., 25-70 cycles. On 220 volt operation, Special Ballast Resistor is required.

Although extremely compact, highest efficiency is attained through the utilization of a new Electro-Dynamic Speaker in conjunction with radically new tubes including a large Power Tube, a Dual Rectifier and new R.F. Pentodes.

The wave band selector switch is mounted on the rear of the chassis and should be thrown to the right for broadcast reception or to the left for long wave reception.
Caution: Do not connect a ground wire to this set, except through a small condenser of about 0.1 Mfd. capacity and rated at least 200 Volts.
Universal Compact
Operates on either AC or DC
110-120 Volts, 25-60 Cycles
Adaptable for 220-Volt Current
with use of 220-Volt Resistor

Voltage Readings:
Readings should be taken with Volume Control fully on, Tuning Control set for 550 KC., and antenna outside of set. Use a D. C. volt-meter having a resistance of 1000 ohms per volt.

<table>
<thead>
<tr>
<th>Chassis</th>
<th>To</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>77—Detector</td>
<td>10-15</td>
<td>9-12</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>78—R.F. Amplifier</td>
<td>105-115</td>
<td>105-115</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td>38—Output Pentode</td>
<td>105-115</td>
<td>105-115</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

Voltage across filter choke is "C" bias for 38 Tube=10v.

Readings will not change materially regardless of type of power supply.
Voltage Readings:

Readings should be taken with Volume Control fully on, Tuning Control set for 550 Kc., and antenna outside of set. Use a D. C. volt-

meter having a resistance of 1000 ohms per volt.

<table>
<thead>
<tr>
<th>Chassis</th>
<th>To Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>77—Detector</td>
<td>10-15</td>
<td>9-12</td>
<td>1-2</td>
</tr>
<tr>
<td>78—R.F. Amplifier</td>
<td>105-115</td>
<td>105-115</td>
<td>2-3</td>
</tr>
<tr>
<td>38—Output Pentode</td>
<td>105-115</td>
<td>105-115</td>
<td></td>
</tr>
</tbody>
</table>

Voltage across filter choke is "C" bias for 38 Tube = 10v.

Readings will not change materially regardless of type of power supply.

For Automobiles, Motorboats and Homes Not Wired for Electricity—Farms, etc.

Directions for 6-Volt (Automobiles, Motorboats, etc.)

Attachment required: 1-EMERSON 6-volt Type "B" Eliminator.

Remove the Antenna from its compartment and place as indicated for homes or, in the case of automobiles, connect to the automobile anten-

na system.

Remove the regular power cord and plug from the set.

Attach the 7-prong socket on the eliminator cable to the 7-prong plug in rear of the set. Attach the 2-conductor cable from the eliminator to the 6-volt battery.

Where 12-Volt "A" Battery is used in automobile, care should be exercised that cable is so connected that only 6 Volts is applied to the set.

Directions for 32-Volt Farm Lighting Systems—The only additional equipment required is one EMERSON 32-volt type "B" Eliminator. The regular Power Cord and plug are not used and should be removed.

Attach the 7-prong socket on the eliminator cable to the plug in the rear of set. Connect the 2-prong plug to the 32-volt light socket and the set is ready for operation.

Directions for 220 Volt AC-DC—The 220-volt Ballast Adapter is re-

quired. Insert the 220-volt Ballast Adapter in the 220-volt supply and insert the two-prong set plug into the adapter socket; then follow in-

structions for operation for home use.

For List of Parts, see Index
INSTALLATION PROCEDURE

(Follow closely for easy installation)

1. Open carton, unpack set and check equipment furnished.

2. Remove the two thumb-screws holding the mounting plate to the radio cabinet proper. Tip the mounting plate back and unhook it.

3. Remove the top cover and check visually conditions in general, i.e., tubes, grid caps, remote tuning drive, etc.

4. Using the mounting plate (Figure I) for exploring, determine the most satisfactory position for mounting in the car. As the mounting plate has the same area as the frontal area of the radio cabinet, any space which will accommodate the mounting plate will be satisfactory, (allowing clearance for the set to tilt forward for inspection after being installed).

5. Using the mounting plate as a template, locate the holes for the three mounting bolts. Check under engine hood to see if bolts will be clear. Optional mountings may utilize 2, 3, 4 or 5 mounting bolts.

6. Drill these three holes. Suggest using 1/8" drill as a pilot hole then finish with 3/8" drill.) Put one lock washer on each 5/16" bolt and insert thru the plate. Put a nut on each bolt and fasten securely against plate. Put a spacer nut and lock-washer on each bolt and mount the plate on auto bulk-head. Allow 3/8" to 1" clearance between back of mounting plate and bulk-head for ventilation and good tone quality. Now tighten the bolts from the engine side of the bulk-head using a lock-washer and nut for each bolt.

7. Before proceeding further, at this time, check the polarity of the car battery; that is, determine which side of the battery is grounded. This may be done most conveniently with a low reading D.C. volt-meter. However, experienced mechanics may recognize the positive terminal of the battery by the fact that it is usually larger and blacker than the negative terminal. If there is any corrosion present, GREEN corrosion will be found at the POSITIVE terminal. Do not take chances or guess at the polarity but use every means to determine it correctly, as the wrong connections may cause serious damage to the receiver and car battery!

8. If the POSITIVE terminal of the battery is grounded, no changes are necessary and the installation may proceed.

If the NEGATIVE terminal of the battery is GROUNDDED, it is required to make a slight change in the receiver. This is done quite conveniently by removing the top screw and loosening the bottom screw holding the serial number plate to the right side of the receiver cabinet. Tip the plate down and reverse the red and black-marked spade lugs. When this is done, the black-marked lug will be on top and the red-marked lug will be the lower one. (See Figure II and red tag on battery cable.)
9. Replace the top cover on the receiver cabinet, using the screws to fasten it and attach the radio cabinet to the mounting plate; first, by hooking the two hooks on rear of the cabinet into the slots of the mounting plate; second, by inserting the two thumb-screws into the holes on the top of the mounting plate and screwing them into the holes of the cabinet. This completes the mounting of the radio cabinet.

10. Attach Remote-Control Unit to a convenient position on the steering wheel column, allowing the cables to take a smooth path to the set. Leather strips are furnished to accommodate unusual size steering wheel columns and also to prevent marring finish. Screw down the set screws in the center of the clamps in order to ground the remote-control unit to the steering post. Fasten the cable to the steering column and other points in order to prevent vibration and interference with the operation of the car.

11. Connect the two-conductor shielded cable to the battery, the BLACK wire always connects to the GROUNDED terminal of battery and the YELLOW wire always connects to the HOT terminal of battery regardless of polarity. (Re-read and check paragraph 7.) It is advisable to run this cable as directly as possible to the battery, keeping away from the engine compartment and other high tension wires. Grounding the cable as often as possible along its entire length reduces motor noise and is recommended. Poor connections at the battery terminals cause noise; therefore, clean the terminals and make good connections. (Connections to the ammeter are not recommended, in general.)

12. Before connecting the antenna, check it for a possible ground. If ungrounded, connect to the antenna lead of the radio by splicing a good connection, taping the joint and sliding the section of insulated tubing over the connection. In the event that the antenna lead-in is shielded, do not neglect to connect the shielding to the shielding on the antenna lead from the set. A word of caution here: **Do not run the antenna lead-in thru the engine compartment and keep it away from all high-tension parts and leads.** Ground the shielding of the antenna lead-in along its entire length, if possible.

13. Turn switch-key halfway in remote control unit. The dial should light up immediately if everything is correct. Turn volume control (small knob) clockwise to a position for loud volume and when the tubes are warmed up, turning the station dial (large knob) will tune in stations. Adjust volume by the volume control knob, never by detuning the station, as this ruins quality. The separate, delayed automatic volume control will counteract fading and blasting and requires little or no adjustment by the manual control.

14. If the installation thus far has been carefully followed, starting and running the motor causes very little interference generally. However, the amount of motor noise WITHOUT SUPPRESSION may be noted as a check on a good installation.

15. Fasten the condenser supplied for generator-noise-suppression by slipping the grounded lug of the condenser under a screw in the generator frame. Connect the live lead of the condenser to the generator side of the cut-out relay mounted on the generator (connecting the live lead to the battery side of the cut-out relay is more effective in some cases. This may be determined by test.)

16. Fasten a spark plug suppressor to each spark plug (see Figure III) and the distributor suppressor in the head of the distributor. Fasten the suppressors firmly to the plugs and to the leads so that the connections will not shake loose and ground. If special types of suppressors are required for certain cars, these may be obtained.

17. In general, this should suppress motor noise effectively. However, an auxiliary suppressor condenser connected from ground to battery side of ammeter may sometimes prove effective. (See further details under "Notes on Ignition Suppression."
Tubes: 1—78, 1—6A7, 1—6B7, 2—41 (5 tubes).
Total Battery Drain: 4.8 amperes.
Max. output: 4 watts.
Electro-Dynamic Speaker Field Resistance: 6 ohms.
Vibrator: Full wave synchronous rectifier.

Tube-Functions and circuit analysis:

- 78: Radio-frequency amplifier
- 6A7: Automatic fidelity control
- 6B7: Automatic selectivity control
- 5: High gain modulator
- 6: Electron coupled oscillator
- 7: Neutralized space-charge diode detector
- 8: Separate delayed automatic volume control
- 9: Automatic noise suppression
- 10: Reflexed audio-frequency amplifier

41: Push-pull output tube Class A
41: Push-pull output tube Class A
13: Full wave synchronous vibrator rectifier

Voltage Analysis

Use a high resistance voltmeter. Storage battery should be fully charged. Readings taken with no signals received.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Cathode to Ground</th>
<th>Screen Grid to Ground</th>
<th>Plate to Ground</th>
<th>Heater to Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>3-3.5V</td>
<td>75-85V</td>
<td>200-210V</td>
<td>6V</td>
</tr>
<tr>
<td>6A7</td>
<td>3-3.5</td>
<td>75-85</td>
<td>200-210</td>
<td>6</td>
</tr>
<tr>
<td>6B7</td>
<td>3.5-4.5</td>
<td>75-85</td>
<td>200-210</td>
<td>6</td>
</tr>
<tr>
<td>41</td>
<td>14-18</td>
<td>200-210</td>
<td>190-200</td>
<td>6</td>
</tr>
<tr>
<td>41</td>
<td>14-18</td>
<td>200-210</td>
<td>190-200</td>
<td>6</td>
</tr>
</tbody>
</table>

Voltage across speaker field—6 volts.

Adjustments

The receiver was carefully adjusted and aligned when it left the factory. Under no conditions should these adjustments be disturbed unless there is no question that it is absolutely necessary.

Intermediate-Frequency

To line up the Intermediate Frequency Amplifier, use a good modulated oscillator giving 172½ K.C. and a rectifier type output meter. Connect the oscillator output to the grid cap of the 6A7 and ground. Connect the output meter across the voice coil of the speaker or across primary of speaker transformer.

Ground the antenna lead and turn the tuning dial so that no signal is received (other than the test oscillator), with the volume control set at maximum volume.

Using the smallest output from the test oscillator to get an output reading, adjust the double-tuned input transformer and the single tuned output transformer for maximum output. It is preferable to use a non-metallic screw driver for this purpose. (See Figure IV.)

Radio-Frequency

To line up the R.F. section, due to the extreme sensitivity of the receiver, use only a high-grade oscillator. Couple the oscillator through a standard dummy antenna to the antenna lead and ground of the receiver. Attach the output meter to the voice coil of the speaker and align the trimmers on the variable condenser for a weak high frequency signal (between 1350—1450 K.C.). Readjust the trimmers to get accurate settings. (See Figure IV.)

If a high grade oscillator and output meter is not available, it is suggested that the alignments be made on broadcast. Tune in a weak station between 1350—1450 K.C. and align the trimmers carefully. Readjust the trimmers as above.
The following changes and additions are the effects of improvements in mechanical and electrical construction made on the "Auto Dynamic"—Model 678—since the release of the "Service Manual."

Paragraph 10 of the section "Installation Procedure" should read:

10. By means of the adjustable strap supplied, fasten the remote-control unit in a convenient position on the steering column, allowing the cables to take a smooth path to the set. The procedure to follow being to place the end of the strap with a single hole under one of the holes in either flange on the control head. Place a bolt through the holes, slipping a lockwasher and nut on the other end. Do not fasten the bolt; leave it loose temporarily. Twist the strap around the steering column so that with a snug fit one of the three remaining holes in the strap lines up with the hole in the other flange of the control head. Insert a bolt through the two holes that line up under these conditions and slip a lockwasher and nut on this bolt. Finally fasten both bolts securely so that the control head will not turn. Bond the cables at numerous points along the steering column to eliminate vibration and prevent interference with the operation of the car.

Paragraph 13 of the same section should read:

13. Place the switch-key in the slot provided for it and turn clockwise until a snap is felt and the dial illuminated. The light will indicate that the receiver is properly wired and ready to operate or ready for advance in installation procedure. Turn the volume control completely clockwise by means of the switch key to the maximum volume level. When the receiver is warmed up (this will be indicated by noise) tune a station carefully to resonance by means of the right-hand knob. Re-adjust the volume to a satisfactory level. Never attempt volume attenuation by de-tuning the station, as this will distort the quality of tone translation. The separate, delayed-automatic-volume control incorporated internally will tend to counteract fading and blasting, retaining the volume at the level determined by the manual volume control.

The illuminated dial and the tuning control mechanism are mutually self-aligning. If the calibration of the dial does not check reasonably well with the frequencies of the stations received, it is only necessary to turn the tuning control knob slowly clockwise until it stops. If the dial pointer is at the extreme counter-clockwise position they are aligned. If not, turn the knob slowly, counter-clockwise, until it stops and the dial is completely clockwise. If either or both these instructions are carried out the calibration should check.

THE FOLLOWING NOTES APPLY TO THE SERVICE SECTION

If it becomes necessary to disconnect the remote control unit; progress by loosening the two set screws which clamp the volume control cable to the lower stud of the receiver case, and by pulling the cable totally out of the recess provided for it. To detach the turning control cable, remove the cover of the receiver box and loosen the set screws which hold the cable to the worm gear drive. Unbind the two set screws which hold the cable to the receiver box and pull the cable out. Lastly, remove the bottom of the set and unsolder the two connections for the pilot light, pull it out of the grommet and the operations are complete.

To replace the control unit, it is only necessary to reverse the above process, being sure that the "tongue" of the volume control cable slips into the slot provided for it. This may be accomplished by rotating the volume control knob slowly, and pushing the cable in simultaneously until the tongue engages the slot.

Replacement of the fuse in the event of a burn-out requires a removal of the floor board of the car. Remove both cables from the battery and unlock the fuse receptacle in the yellow lead, the fuse should drop out easily. A fuse of 10 ampere capacity, as indicated on the defective fuse, should replace it. The cause for the burn-out of the fuse should be determined before a new one is put in.

TONE CONTROL ADJUSTMENT

The adjustment as the receiver leaves the factory is set for full register reproduction. This is recommended for closed cars and for vocal programs. Turning the control clockwise brings up the low tones and is recommended for open cars and musical programs. Incidentally in this position, static and other noises are decreased greatly. Do not turn clockwise more than necessary as definition of speech may be lost due to the attenuation of higher tones by the car interior.
The L-755 is a de luxe superheterodyne receiver incorporating the latest features in medium and long wave receiver design to achieve unusual performances on both the 1500-535 kilocycle and 150-320 kilocycle bands.

The upper center knob is the Station Selector Control governing the frequency calibrated dial directly above it. The lower center knob is the Band Selector; when turned to the left (counter-clockwise) the medium frequency band is the reception band and the lower dial numbers indicate the frequency; when turned to the right (clockwise), the low frequency band will be received and the upper numbers will indicate the frequency.

The left hand knob is the Tone Control; the right hand knob the Combined Volume Control and Switch.

The black wire protruding from the rear of the chassis is the ground wire; the colored wire next to it is the lead to be connected to the antenna.

**Voltage Readings**

Readings should be taken with the Volume Control turned clockwise as far as it will go and the Station Selector set for 550 K. C. Use a high resistance (1000 ohms per volt) voltmeter.

For List of Parts, see Index

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**TUBE LAYOUT**

Corrections: Omit 50,000 ohm Resistor from Triode Plate to Coupling Condenser. GR-34, 59 Grid Resistor changed to JR-47, 3 meg. Resistor.
M-A C-7

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT-20</td>
<td>Antenna Coil</td>
<td>$ .65 each</td>
</tr>
<tr>
<td>GT-21</td>
<td>Interstage R.F. Coil</td>
<td>.65 &quot;</td>
</tr>
<tr>
<td>GT-22</td>
<td>Oscillator Coil</td>
<td>.65 &quot;</td>
</tr>
<tr>
<td>ET-17</td>
<td>I. F. Transformer</td>
<td>1.15 &quot;</td>
</tr>
<tr>
<td>GT-23</td>
<td>Power Transformer</td>
<td>1.95 &quot;</td>
</tr>
<tr>
<td>GR-28</td>
<td>Volume Control</td>
<td>.80 &quot;</td>
</tr>
<tr>
<td>GR-29</td>
<td>Tone Control</td>
<td>.60 &quot;</td>
</tr>
<tr>
<td>GR-30</td>
<td>12,500 ohm 2 wt. Resistor</td>
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<td>Any other Carbon Resistor</td>
<td>.15 &quot;</td>
</tr>
<tr>
<td></td>
<td>(specify Part No. and value—refer to diagram for value)</td>
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<tr>
<td>EC-16</td>
<td>3-Gang Variable Condenser</td>
<td>2.45 &quot;</td>
</tr>
<tr>
<td>BC-9</td>
<td>8 &amp; 8 mfd. Electrolytic Condenser</td>
<td>.65 &quot;</td>
</tr>
<tr>
<td></td>
<td>Any Size Tubular or Mica Condenser</td>
<td>.10 &quot;</td>
</tr>
<tr>
<td></td>
<td>(specify Part No. and Value—Refer to diagram for Value)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any socket (specify tube number marked on socket)</td>
<td>.08 &quot;</td>
</tr>
<tr>
<td>GD-5</td>
<td>Dial Assembly</td>
<td>.90 &quot;</td>
</tr>
<tr>
<td>AL-2</td>
<td>Pilot Light</td>
<td>.08 &quot;</td>
</tr>
<tr>
<td>AK-1</td>
<td>Knobs</td>
<td>.10 &quot;</td>
</tr>
<tr>
<td>GS-19</td>
<td>Dynamic Speaker</td>
<td>5.65 &quot;</td>
</tr>
</tbody>
</table>

Voltage Readings:

- Readings should be taken with the Volume Control fully on and the Station Selector set for 550 K.C.
- Use a high resistance D.C. voltmeter.

Ground to Plate: 90-100 25-35 90-110 225-250 225-250 225-250 225-250

Line Voltage—115: The bias on the 47 cannot be read with the voltmeter.

IF Peak 175 KC
Voltage Readings:

Readings should be made using a D.C. voltmeter having a resistance of 1,000 ohms per volt. Volume control should be on full.

58 Oscillator Ground to plate 230-245
58 R.F. Amplifier 235-250 90-110 3-4
58 1st Detector 235-250 1-2
58 I.F. Amplifier 235-250 90-110 3-4
57 2nd Detector 100-125 90-110 4-6
59 Output tube 230-245 235-250

Line voltage, 115v.

The bias on the 59 and the screen voltage of the 1st detector cannot be read with the usual voltmeter.

For List of Parts, see Index
## EMERSON RADIO AND PHONOGRAPH CORPORATION

### Parts List

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Model 375, 40 List Price</th>
<th>Model 420 List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-T-67</td>
<td>Antenna Coil in Shield</td>
<td>$0.80 each</td>
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</tr>
<tr>
<td>P-T-68</td>
<td>Interstage R.F. Coil in Shield</td>
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<td>P-T-66</td>
<td>Composite I.F. and Oscillator Coil</td>
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<td>L-T-41</td>
<td>2nd I.F. Transformer in Shield</td>
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<tr>
<td>L-T-45</td>
<td>Filter Choke</td>
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<tr>
<td>P-C-82</td>
<td>Variable Condenser—3-Gang</td>
<td>$2.40</td>
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</tr>
<tr>
<td>P-C-83</td>
<td>Filter Condenser—Triple 4, 12 and 16</td>
<td>$1.40</td>
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</tr>
<tr>
<td>L-C-43</td>
<td>Roll Type Electrolytic Condenser—5 Mfd.</td>
<td>$0.50</td>
<td></td>
</tr>
<tr>
<td>E-C-19</td>
<td>.5 Mfd. Roll Type Paper Condenser</td>
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<td>Any other Roll Type Paper Condenser</td>
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<td>Give size or location in circuit.</td>
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<td>Any Socket—Give Tube Number</td>
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<td>Any Carbon Resistor</td>
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<td>Give size or location in circuit.</td>
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<td>L-R-59</td>
<td>Ballast-Resistor 160-ohm 15-watt Wire Wound</td>
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<td>P-D-9</td>
<td>Vernier Dial Complete</td>
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<tr>
<td>L-B-3</td>
<td>Pilot Lamp Socket</td>
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<tr>
<td>K-L-6</td>
<td>Pilot Lamp Bulb</td>
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<tr>
<td>PR-81</td>
<td>Volume Control with Switch</td>
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</tr>
<tr>
<td>PS-52</td>
<td>Dynamic Speaker</td>
<td>$4.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special 220-Volt Ballast Resistor</td>
<td>$2.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For operation on 220-volts.</td>
<td></td>
<td></td>
</tr>
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### Model List

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Model S-755, S-50 List Price</th>
</tr>
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<tbody>
<tr>
<td>IT-27</td>
<td>Antenna Coil</td>
<td>$0.90 each</td>
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<tr>
<td>IT-28</td>
<td>R. F. Coil</td>
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<td>IT-29</td>
<td>Oscillator Coil</td>
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<td>IT-31</td>
<td>I. F. Transformer</td>
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<td>GT-23</td>
<td>Power Transformer</td>
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<td>GR-28</td>
<td>Volume Control</td>
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<td>Any Carbon Resistor (specify Part No. and Value—refer to Diagram for Value)</td>
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<tr>
<td>IC-41</td>
<td>3-Gang Variable Condenser</td>
<td>$2.30</td>
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<td>IC-42</td>
<td>Double 8 Mfd. Electrolytic Condenser</td>
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<td>Any size Tubular or Mica Condenser (specify Part No. and Value—refer to Diagram for Value)</td>
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<td>Any Socket (Specify Tub No. marked on Socket)</td>
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<tr>
<td>ID-5</td>
<td>Dial Assembly</td>
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<td>AL-2</td>
<td>Pilot Light</td>
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<td>Knobs</td>
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<td>IS-29</td>
<td>Dynamic Speaker</td>
<td>$5.90</td>
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<td>IT-30</td>
<td>Four Section Universal Choke Coil</td>
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<td>IC-39</td>
<td>Selectivity Control Condenser</td>
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<td>IS-27</td>
<td>Band Switch</td>
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<td>IC-40</td>
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<td>Phonograph Jack</td>
<td>$0.30</td>
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### List Price

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<tr>
<th>Part No.</th>
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<th>Model 375, 40 List Price</th>
<th>Model 420 List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC-53</td>
<td>3-Gang Variable Condenser</td>
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<td>IC-42</td>
<td>Dual Electrolytic Condenser</td>
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<td></td>
</tr>
<tr>
<td>IC-43</td>
<td>5 Mfd. Tubal Condenser</td>
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<td>Any Other Size Tubal or Mica Condenser (Refer to Part Number)</td>
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<tr>
<td>IC-39</td>
<td>Selectivity Control Condenser</td>
<td>$0.60</td>
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<tr>
<td>IS-29</td>
<td>Dynamic Speaker</td>
<td>$5.90</td>
<td></td>
</tr>
<tr>
<td>IS-27</td>
<td>Band Switch</td>
<td>$1.50</td>
<td></td>
</tr>
<tr>
<td>IZ-29</td>
<td>Phonograph Jack</td>
<td>$0.30</td>
<td></td>
</tr>
</tbody>
</table>
EMPIRE ELECTRICAL PRODUCTS

MODEL 30 Schematic

Universal Superhetronic
102 Wooster St., N.Y.C.

3Gang Tuning Condenser
with special oscillator tracking section

For I.F. = 125 kc.
MODEL 575
Schematic

EMPIRE ELECTRICAL PRODUCTS

EMPIRE PAGE 4-7

www.americanradiohistory.com
COMPENSATING INSTRUCTIONS FOR
RX RECEIVER - MODELS 93 & 95

In order to accurately adjust the various trimmer
condensers of this Receiver in accordance with the following
instructions, it is essential to use a shielded generator cap-
able of giving a modulated carrier frequency which can be ac-
curately attenuated at 2402 meters (125 kilocycles), 1990
meters (150 kilocycles), 858.6 meters (350 kilocycles), 499.7
meters (500 kilocycles) and 214.2 meters (1400 kilocycles).

ADJUSTMENT OF I.F. CONDENSERS

The four (4) I.F. condensers are located in the rear
of the chassis as indicated in the sketch.

1st - Disconnect the outside antenna system from
the Receiver.

2nd - Connect a lead wire from the output system
of the signal generator to the control grid
of the first detector tube. Do not discon-
nect the control grid connector from the
tube nor remove the tube shield. Connect
the ground (plate) lead of the Receiver to
the ground post of the signal generator. In-
stall a 250 mfd. condenser in series with
the signal generator lead wire.

3rd - Place an output meter across the secondary
of the Receiver output transformer (which is
mounted on the speaker) so that the vari-
tions in signal output can be noted.

4th - Turn the band selector switch to the long-
wave position.

5th - Place the signal generator in operation and
adjust the frequency output to 2402 meters
(125 kilocycles). Regulate the attenuator
control so that the output signal is low
enough to insure accuracy in adjusting the
I.F. condensers of the receiver.

6th - With the aid of a 1/4" (#4) socket wrench,
adjust the four (4) I.F. condensers to
resonance as indicated by the greatest
swing of the needle on the output meter.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

The compensators are located at the top of their re-
spective tuning condensers and can be adjusted with the aid of
an ordinary screwdriver. There are three (3) holes in the
overall condenser shield housing cover to permit the insertion
of a screwdriver for compensating purposes.

1st - Remove the lead wire which is connected to
both the control grid of the first detec-
tor tube and to the antenna system of the
signal generator.

2nd - Connect the antenna (red) wire of the Re-
ceiver to the output system of the signal
generator. The ground (plate) wire should
remain connected to the ground post of the
signal generator.

3rd - Set the band selector switch to the normal-
wave position.

4th - Adjust the carrier frequency output of the
signal generator to 214.2 meters (1400 kil-
ocycles).

5th - Set the calibrated dial of the Receiver to
read 214.2 meters (1400 kilocycles).

6th - Adjust each compensator in the order given
on the sketch, that is, first, second, etc.
for maximum signal output as indicated on
the output meter. Do not disturb the set-
ting of the gang condenser during these
operations. Leave the volume control at
maximum and regulate the signal output with
the attenuator control of the signal gener-
ator.

ADJUSTMENT OF THE NORMAL WAVE OSCILLATOR SERIES CONDENSER

The oscillator series condenser can be adjusted
through the hole in the side of the chassis as indicated in the
sketch.

1st - Adjust the carrier frequency output of the
signal generator to 499.7 meters (500 kil-
ocycles).

2nd - Set the calibrated dial of the Receiver to
read 499.7 meters (500 kilocycles).

3rd - With the aid of a 1/4" (#4) socket wrench,
adjust the normal wave oscillator series
condenser until a maximum output signal is
indicated on the output meter. To insure
perfect adjustment it is necessary to "rock"
the variable gang condenser back and forth
in order to follow the maximum signal output.

4th - After the normal wave oscillator series con-
denser is properly adjusted, turn the cal-
ibrated dial of the Receiver to 214.2 meters
(1400 kilocycles) and set the signal genera-
tor to the same frequency. Readjust all vari-
able condenser compensators as outlined in
the foregoing instructions.
ADJUSTMENT OF LONG-WAVE PADDING COMPENSATORS

Two (2) of the compensators are located on the right side of the chassis and one in the front as indicated in the sketch. These compensators can be readily identified by the red mark placed on the adjustment hole.

1st - Turn the band selector switch to the long-wave position and adjust the carrier frequency output of the signal generator to 656.6 meters (350 kilocycles).

2nd - Set the calibrated dial of the Receiver to read 856.6 meters (350 kilocycles).

3rd - With the aid of a 1/4" (#4) socket wrench, adjust all three (3) padding compensators in the order marked in the sketch.

ADJUSTMENT OF LONG-WAVE OSCILLATOR SERIES CONDENSER

The long wave oscillator series condenser can be adjusted through the hole in the side of the chassis as indicated on the sketch.

1st - Adjust the carrier frequency output of the signal generator to 1999 meters (150 kilocycles).

2nd - Set the calibrated dial of the Receiver to read 1999 meters (150 kilocycles).

3rd - With the aid of a 1/4" (#4) socket wrench, adjust the long wave oscillator series condenser until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is permissible to "rock" the variable condenser back and forth in order to follow the maximum signal output.
IDENTIFYING BY-PASS CONDENSERS

<table>
<thead>
<tr>
<th>PART #</th>
<th>CAP.</th>
<th>VOLTS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1233 Ms</td>
<td>1.0</td>
<td>200 Volts</td>
<td>I</td>
</tr>
<tr>
<td>1239 Ms</td>
<td>2.0</td>
<td>200</td>
<td>I</td>
</tr>
<tr>
<td>1240 Ms</td>
<td>1.0</td>
<td>400</td>
<td>I</td>
</tr>
<tr>
<td>1241 Ms</td>
<td>0.5</td>
<td>200</td>
<td>I</td>
</tr>
<tr>
<td>1242 Ms</td>
<td>0.5</td>
<td>200</td>
<td>I</td>
</tr>
<tr>
<td>1413 Ms</td>
<td>.25-.25</td>
<td>200-400</td>
<td>II</td>
</tr>
<tr>
<td>1419 Ms</td>
<td>.5</td>
<td>400</td>
<td>I</td>
</tr>
<tr>
<td>1450 Ms</td>
<td>.15</td>
<td>400</td>
<td>I</td>
</tr>
<tr>
<td>1225 Ms</td>
<td>.25</td>
<td>400</td>
<td>I</td>
</tr>
<tr>
<td>2-1307 Ms</td>
<td>.07</td>
<td>400</td>
<td>I</td>
</tr>
<tr>
<td>2-1340 Ms</td>
<td>.25</td>
<td>200</td>
<td>I</td>
</tr>
<tr>
<td>2-1341 Ms</td>
<td>.25-.25</td>
<td>400-400</td>
<td>III</td>
</tr>
<tr>
<td>2-1353 Ms</td>
<td>.25-.25</td>
<td>200-200</td>
<td>II</td>
</tr>
<tr>
<td>2-1363 Ms</td>
<td>.25-.25</td>
<td>200-200</td>
<td>III</td>
</tr>
</tbody>
</table>

On the above, type I has two lugs. Type II has three lugs and a red lead connects to a 400 volt section, a brown lead to a 200 volt section and the black lead is common.

Type III condensers have four leads. A red lead connects to 400 volt sections and a brown lead to 200 volt sections. Thus a 400-400 condenser has two red leads and two black leads, a 200-200 condenser has two brown leads and two black leads. The black leads are not common in type III.

Wound Resistances in Fada Sets

Wire wound resistances used in Fada receivers are identified by spots of color in accordance with the listing below. If you wish to order any of these resistances, be sure to specify both the part number and the value of the resistance in ohms. Your careful attention to this detail will result in our being able to give you much prompter service.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Resistance in Ohms</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1458-Ms</td>
<td>75</td>
<td>Red &amp; White</td>
</tr>
<tr>
<td>1459-Ms</td>
<td>250</td>
<td>Yellow &amp; White</td>
</tr>
<tr>
<td>1460-Ms</td>
<td>500</td>
<td>Blue &amp; Green</td>
</tr>
<tr>
<td>1461-Ms</td>
<td>750</td>
<td>Red &amp; Blue</td>
</tr>
<tr>
<td>149-Ms</td>
<td>1,000</td>
<td>Yellow</td>
</tr>
<tr>
<td>145-Ms</td>
<td>2,000</td>
<td>Green &amp; Yellow</td>
</tr>
<tr>
<td>146-Ms</td>
<td>3,000</td>
<td>Green &amp; White</td>
</tr>
<tr>
<td>1462-Ms</td>
<td>6,000</td>
<td>Blue &amp; White</td>
</tr>
<tr>
<td>1463-Ms</td>
<td>10,000</td>
<td>White &amp; Red</td>
</tr>
<tr>
<td>2-1249 Ms</td>
<td>65</td>
<td>Red &amp; Yellow</td>
</tr>
<tr>
<td>2-1250 Ms</td>
<td>65 Tsp at 40</td>
<td>Blue &amp; Yellow</td>
</tr>
<tr>
<td>2-1251 Ms</td>
<td>10</td>
<td>Red</td>
</tr>
<tr>
<td>2-1311 Ms</td>
<td>20</td>
<td>Blue</td>
</tr>
<tr>
<td>2-1312 Ms</td>
<td>200 taps at 10 &amp; 160</td>
<td>Yellow</td>
</tr>
<tr>
<td>2-1375 Ms</td>
<td>1500</td>
<td>Green</td>
</tr>
<tr>
<td>2-1390 Ms</td>
<td>5000</td>
<td>Red &amp; Red</td>
</tr>
<tr>
<td>2-1390 Ms</td>
<td>5000</td>
<td>Blue &amp; Blue</td>
</tr>
</tbody>
</table>

How to Identify Fada Carbon Resistances

All fixed resistances used in Fada sets are identified by color. If you wish to order any of these resistances, please be sure to specify both the part number and the value of the resistance in ohms. This will result in giving you much prompter service.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Resistance in Ohms</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1408-Ms</td>
<td>2 Megas</td>
<td>Red 1/4&quot;</td>
</tr>
<tr>
<td>1409-Ms</td>
<td>250</td>
<td>Light Brown 1/4&quot;</td>
</tr>
<tr>
<td>1410-Ms</td>
<td>750</td>
<td>Green 1/4&quot;</td>
</tr>
<tr>
<td>1411-Ms</td>
<td>2000</td>
<td>Black 1/4&quot;</td>
</tr>
<tr>
<td>1412-Ms</td>
<td>3000</td>
<td>White 1/4&quot;</td>
</tr>
<tr>
<td>1413-Ms</td>
<td>5000</td>
<td>Orange 1/4&quot;</td>
</tr>
<tr>
<td>1414-Ms</td>
<td>70,000</td>
<td>Violet 1/4&quot;</td>
</tr>
<tr>
<td>1415-Ms</td>
<td>125,000</td>
<td>Gray 1/4&quot;</td>
</tr>
<tr>
<td>1416-Ms</td>
<td>250,000</td>
<td>Yellow 1/4&quot;</td>
</tr>
<tr>
<td>1417-Ms</td>
<td>500,000</td>
<td>Brown 1/4&quot;</td>
</tr>
<tr>
<td>1418-Ms</td>
<td>2000</td>
<td>None 1/6&quot;</td>
</tr>
<tr>
<td>1419-Ms</td>
<td>1000</td>
<td>Yellow end 1/8&quot;</td>
</tr>
<tr>
<td>1420-Ms</td>
<td>2500</td>
<td>Red with 1/8&quot;</td>
</tr>
<tr>
<td>1421-Ms</td>
<td>125</td>
<td>Gray with 1/4&quot;</td>
</tr>
<tr>
<td>1422-Ms</td>
<td>10,000</td>
<td>Yellow end 1/4&quot;</td>
</tr>
<tr>
<td>1423-Ms</td>
<td>500</td>
<td>Brown with 1/4&quot;</td>
</tr>
<tr>
<td>1424-Ms</td>
<td>7500</td>
<td>Blue with 1/4&quot;</td>
</tr>
<tr>
<td>1425-Ms</td>
<td></td>
<td>Yellow with 1/4&quot;</td>
</tr>
</tbody>
</table>

Carbon Resistances

Carbon resistances will be noticed are of two different styles. The black units with tinned ends have small spots of paint for identification of their resistance values. Another type has leads soldered on them and the entire unit dipped in an insulating paint of identifying color. In addition some of these units will have the part number stamped on them. The following is a table of identification.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Resistance in Ohms</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1265-Ms</td>
<td>5,000 ohms</td>
<td>White and Yellow</td>
</tr>
<tr>
<td>1311-Ms</td>
<td>250,000 ohms</td>
<td>Gray and Yellow</td>
</tr>
<tr>
<td>1341-Ms</td>
<td>20,000 ohms</td>
<td>Red and Green</td>
</tr>
<tr>
<td>1375-Ms</td>
<td>125,000 ohms</td>
<td>Green and Gray</td>
</tr>
<tr>
<td>1408-Ms</td>
<td>50,000 ohms</td>
<td>Yellow and Black</td>
</tr>
</tbody>
</table>

Part No. Identification

- Black Unit
- Other Type

Identification

- Red
- Yellow
- Gray
- Green
- Other Type
MOTOSSET -- MODEL 102

In order to accurately adjust the various trimmer condensers of the MOTOSSET in accordance with the following instructions; it is essential to use a shielded signal generator capable of giving a modulated carrier frequency which can be accurately attenuated at 175 K.C., 500 K.C. and 1400 K.C.

The MOTOSSET is equipped with an automatic volume control which necessitates setting the manual volume control of the Receiver to its maximum position, to insure accuracy in alignment of compensators. To control the signal output of the Receiver it will be necessary to use the attenuator of the signal generator.

Before any adjustments can be made it will be necessary to remove the chassis from its housing in accordance with "Instructions for Removing MOTOSSET chassis from its Housing."

ADJUSTMENT OF I.F. COMPENSATORS

The three (3) I.F. compensators are located in the side of the chassis itself as indicated in the sketch.

(1) Insert the speaker plug into the receptacle of the MOTOSSET chassis.
(2) Connect a lead wire from the output of the signal generator to the control grid of the first detector tube. Do not disconnect the control grid connector from the tube.
(3) Connect a wire from the ground terminal of the signal generator to some part of the MOTOSSET chassis proper.
(4) Remove the F-37 oscillator tube from the Receiver socket.
(5) Place the signal generator in operation and adjust the carrier frequency output to 175 K.C. Regulate the attenuator control so that the output signal is low enough to insure accuracy in adjusting the I.F. compensators of the MOTOSSET.
(6) With the aid of a #4 Stevens Spinlite Socket Wrench or its equivalent, adjust the compensators to resonance as indicated by the loudest signal from the speaker.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

The compensators are located at the top of their respective tuning condensers and can be adjusted with the aid of a screw driver.

(1) A six (6) inch length of 1/4" brass rod with a standard tuning knob attached can be inserted in the condenser coupling for test purposes, thus eliminating the necessity of using the remote control.
(2) The wire from the output of the signal generator should be removed from the control grid of the first detector tube and attached to the antenna terminal of the MOTOSSET instead.
(3) Place the F-37 oscillator tube back in its socket.
(4) Adjust the carrier frequency output of the signal generator to 1400 K.C.
(5) With the aid of the brass shaft inserted in the condenser coupling, turn the gang condensers until the 1400 K.C. signal is tuned in.
(6) Adjust each compensator in the order given (that is, 1st, 2nd, 3rd) in the sketch, for maximum signal output as indicated by the loudest signal from the speaker. Do not disturb the setting of the gang condenser during these operations. Leave the volume control on full and regulate the signal output with the attenuator of the signal generator.

ADJUSTMENT OF OSCILLATOR SERIES CONDENSER

The oscillator series condenser can be adjusted through the hole in the side of the chassis as indicated in the sketch. It will be noted that it is close to the F-37 oscillator tube.

(1) Adjust the carrier frequency output of the signal generator to 600 K.C.
(2) With the aid of the brass rod inserted in the condenser coupling, turn the gang condenser until the 600 K.C. signal is received from the signal generator.
(3) With the aid of a #4 Stevens Spinlite Socket Wrench or its equivalent, adjust the oscillator series condenser until the loudest possible signal is heard through the speaker. In order to adjust the oscillator series condenser to its maximum peak it will be necessary to "rock" the variable gang condenser back and forth to follow the strongest signal.
(4) After the oscillator series condenser is properly adjusted, set the signal generator in operation at 1400 K.C. and tune the signal on the MOTOSSET, then readjust all variable condenser compensators as outlined in the foregoing instructions.
### Resistance Continuity Readings for RN Chassis - Models 106 and 107

Tests to be made with all tubes removed from chassis and line plug disconnected from electric socket.

<table>
<thead>
<tr>
<th>K-Cathode</th>
<th>P-Plate</th>
<th>D-Detector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cg-Control grid</td>
<td>Sg-Screen grid</td>
<td></td>
</tr>
</tbody>
</table>

#### TEST FROM
- Osc. grid to K
- Osc. P to IF Sg
- 1 D P to IF Sg
- IF Cg to antenna series
- Cond. (.003 mfd.) wave-band switch set to 75-200 meters
- IF K to chassis
- IF P to Sg
- 2 D K to chassis
- 2 D P to K
- 1 AF Sg to chassis
- 1 AF P to chassis
- Per. Cg to chassis
- Per. Sg to chassis
- Per. Sg to P
- Per. K to chassis
- 1 AF Cg to chassis (Vc.max.)
- Rect. P to Per. Sg
- IF Cg to 1 AF K

#### CORRECT OHM
- 25,000
- 7.6
- 45
- See (3) & (17)
- 300
- 45
- 3,000
- 1,000,000
- 29,300
- 54,300
- 500,000
- 4,300
- 366
- See (9)
- 650
- 1,000,000
- 300
- 3,000,000
- 4,135-56

#### INCORRECT CHECK:
- (1) 4,130-56
- (2) 4,134-56
- (3) 1971-1 X, 2-1976-1 Y
- (4) 1975-1 X, 4-1346-56
- See (3) & (17)
- (5) 4,1336-56
- (6) 1974-1 X, 2-1976-1 Y
- (7) 4,1332-56
- (8) 1974-1 X, 4-1347-56
- (9) 4,1320-56
- (10) 4,130-56
- (11) 1,000,000
- (12) See (9)
- (16) 1,000,000
- (17) 1,000,000

### Contingency and Voltage Readings of RN Receivers - Models 106 and 107

Line voltage 110 volts A.C. - Input watts 41
(Voltage readings will be slightly lower on D.C. line)

<table>
<thead>
<tr>
<th>TYPE OF TUBE</th>
<th>POSITION OF PLATE</th>
<th>PLATE</th>
<th>CONTROL</th>
<th>SCREEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-6-A-7</td>
<td>1st Det. Osc.</td>
<td>98</td>
<td>1.2</td>
<td>4.2</td>
</tr>
<tr>
<td>F-6-B-7</td>
<td>Int. Freq.</td>
<td>96</td>
<td>8.7</td>
<td>4.2</td>
</tr>
<tr>
<td>F-6-B-7</td>
<td>2nd Det. A.F. Amp.</td>
<td>34*</td>
<td>1.1</td>
<td>3.1</td>
</tr>
<tr>
<td>F-43</td>
<td>Pwr. Pentode</td>
<td>82</td>
<td>20.</td>
<td>12.</td>
</tr>
<tr>
<td>F-25-2-5</td>
<td>RECTIFIER</td>
<td>60.</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

* These readings were taken with a 1,000 ohm per volt meter and are not indicative of effective voltages.

### Voltage Across Electrolytic Condenser

**1st Section**: 115 volts
**2nd Section**: 105 volts

Voltage across 4,000 ohm speaker field (3-B) 120 volts
300 A.F. choke (4-1336-56) 8

### D.C. Resistance Values

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>SECONDARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1346-56</td>
<td>8.7 ohms</td>
</tr>
<tr>
<td>4-1345-56</td>
<td>7.5 ohms</td>
</tr>
<tr>
<td>4-1345-56</td>
<td>8.0 ohms</td>
</tr>
<tr>
<td>4-1345-56</td>
<td>45.0 ohms</td>
</tr>
<tr>
<td>4-1345-56</td>
<td>45.0 ohms</td>
</tr>
<tr>
<td>3-g</td>
<td>300.0 ohms</td>
</tr>
<tr>
<td>3-B</td>
<td>368.3 ohms</td>
</tr>
</tbody>
</table>

**NOTE**: Above voltage readings taken on series of receivers which had cathodes of 25-2-5 rectifier tube connected together.

### Top Edge

![Top Edge View of Chassis](image)

### Bottom Edge

![Bottom Edge View of Chassis](image)
MODEL "RU" (131,132)
Schematic

FADA RADIO & ELECTRIC CORP.

This Diagram applies to all receivers with serial Nos. up to 3000 Inclusive.
COMPENSATING INSTRUCTIONS FOR BU RECEIVER
MODELS 131 and 132 -- AC-OK

In order to accurately adjust the various trimmer condensers
of the Receiver in accordance with the following instructions, it
is essential to use a shielded signal generator capable of giving
a modulated carrier frequency which can be accurately attenuated
at 285 KC., 600 KC. and 1400 KC.

This Receiver is equipped with an automatic volume control
which necessitates setting the manual volume control of the Re-
ciever to its maximum position, to insure accuracy in alignment.
To control the signal output of the Receiver it will be neces-
sary to use the attenuator of the signal generator.

It will be found advantageous to change the capacity in the
output circuit of the signal generator from the conventional 250
mfd. to 100 mfd. in order to insure correct alignment of the
antenna condenser.

ADJUSTMENT OF THE I.F. CONDENSERS

The four (4) I.F. condensers are located at the rear of the
chassis as shown in the sketch.

(1) Turn rotor plates of variable condensers all the
way out to avoid possible interference from
broadcast stations.

(2) Disconnect the outside antenna system from the
Receiver antenna.

(3) Connect a wire from the dummy antenna system of
the signal generator to the control grid of the
6-A-7 tube. Do not disconnect the control grid
connector from the tube, nor remove the tube
shield.

(4) A thermo-galvanometer (Weston type 425) with a
2½ volt pilot light in series can be placed di-
rectly across the speaker voice coil as a means
of obtaining visual readings of the Receiver
output in addition to the audible signal.

(5) Place the signal generator in operation and ad-
just the carrier frequency output to 285 KC.
Regulate the attenuator control so that the out-
put signal is low enough to insure accuracy in
adjusting the I.F. condensers of the Receiver.

(6) With the aid of a #4 Stevens Spintite Socket
Wrench (or equivalent) adjust the four (4) I.F.
condensers in the order given in the sketch.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

The compensators are located at the top of their respective
tuning condensers, and can be adjusted with the aid of a screw
driver.

(1) Remove the lead wire which is connected to both
the control grid of the 6-A-7 tube and the out-
put of the signal generator.

(2) Connect the Receiver antenna wire directly to
the output terminal of the signal generator.

(3) Adjust the carrier frequency output of the sig-
nal generator to 1400 KC.

(4) Tune the Receiver to pick-up the 1400 KC sig-
nal from the signal generator.

(5) Adjust the compensators to maximum signal as in-
dicated by the greatest swing of the needle on
the output meter or galvanometer. The oscilla-
tor condenser compensator (marked #1 in sketch)
should be adjusted first.

ADJUSTMENT OF OSCILLATOR SERIES CONDENSER

The oscillator series condenser is located in the top of the
chassis (see sketch) and can be adjusted with the aid of a #4
Stevens Spintite Socket Wrench (or equivalent).

(1) Adjust the carrier frequency output of the sig-
nal generator to 600 KC.

(2) Tune the Receiver to 600 KC. signal of the sig-
nal generator.

(3) With the aid of a #4 Stevens Spintite Socket
Wrench (or equivalent) adjust the oscillator
series condenser until a maximum signal out-
put is indicated by the greatest swing of the
needle on the galvanometer or output meter. To
insure perfect alignment it is necessary to "rock" the ganged variable condenser in
order to follow the maximum signal output.

(4) After the oscillator series condenser is prop-
erly adjusted, tune the Receiver to 1400 KC., set
the signal generator to 1400 KC., and then re-
adjust the three variable condenser compensators
as outlined in the foregoing instructions.
Here is the complete schematic diagram of the Franklin English Reading Tube Checker. The 3000-ohm variable resistance just below the line-voltage meter operates in conjunction with the knob and scale on the front panel of the instrument. There is a particular adjustment for each type of tube.

Complete schematic diagram of the Franklin Model 1 Volt-Ohmmeter

Above: Schematic diagram of the Franklin H-33 Tube Checker. Note that provisions are made for resistance and continuity testing. Below: Panel view of the Franklin D-33 Tube Checker
NOTE: Model 54-L covers a waveband of 200-560 and 1000-2000 meters. Model 54 covers a waveband of 200-560 meters and does not contain the padding condensers or coils 2-3 and 8-9.
ALIGNMENT OF FRANKLIN MODEL 94 ALL-WAVE RADIO RECEIVER

Receiver should be circuit tested, and any high or low voltages should be corrected. This will reasonably insure the correct use of the resistors. However, a visual inspection of the resistors and condensers should be made so that the alignment operations which are to follow will not be frustrated. A table of voltages which are to appear at the various terminals is appended. When circuit testing is completed, proceed as follows:

1. Set up signal of exactly 450 Kc, 30% modulation, 400-1000 cycles, oscillator to be very stable.

2. Either apply high resistance voltmeter (AC) across plates of 59 tubes, or insert 15 MA DC Meter in the common cathode lead of the I,F. tubes (in lead to rotor of sensitivity control), or if tuning meter is used simply observe tuning meter variations.

3. Apply I,F. Osc. signal lead to grid of #2 I,F. tube.

4. Adjust trimmers on #3 I,F. Transformer for max. signal and max. reading on sensitivity indicators.

5. Apply I,F. Osc. signal lead to grid #1 I,F. tube and repeat operation #4, adjusting trimmers on #2 I,F. Transformer.

6. Apply I,F. Osc. signal lead to antenna post and adjust trimmers on #1 I,F. Transformer and observe as in #4.

NOTE: Speaker is never disconnected so that audible signal is always present to aid peaking operations.

7. Set wave band selector switch on B.C. Band (Farthestockwise position).

8. Set tuning dial at 1500 Kc., checking that dial reads 100 when gang condenser is completely closed.

9. Apply 1500 Kc. Osc. signal (30% mod, 400-1000 cycles) to ant-gnd posts.

10. Adjust trimmer on osc. section of gang condenser (section #1) for maximum signal.

11. Adjust trimmer on first detector grid coil (Trimmer on section #4 of gang) for max. signal.

12. Adjust trimmer on B.C. Preselcetor circuit (Trimmer on section #3 of gang) for max. signal.

13. Set tuning dial on 570 Kc. and adjust osc. signal to exactly 570 Kc.

14. Adjust serfosc. padding condenser for max. signal (condenser C-3 on circuit diagram) (this condenser is located beneath chassis but is adjusted from top of chassis thru hole in chassis. It is the trimmer located nearest to front of set).

15. Check peaking at 1500 Kc and make minor adjustment if necessary repeating operation 10.
(16) Check alignment at about 900 Kc to see if osc. and 1st det. are tracking.

(16-A) If when checking alignment at 900 Kc. and it is found that 1st det. does not track with oscillator, necessitating an increase of trimmer capacity on section 4 (also then on pre-selector section #3) then proceed as follows:

(a) Turn dial to 1500 Kc.
(b) Loose set screw on dial and turn dial on the condenser shaft about 1 or 2 degrees counterclockwise and re-lock with set screw.
(c) Then proceed with operations #8, #9, #10, #11, #12, #13, #14, #15 and #16.

Alignment should now be better at 900 Kc. or perfect. If not, repeat operation set down in #16-A. Of course if in 16-A it was found that trimmer condenser had to be reduced in capacity on section #4 (also then section #3) then reverse the direction in which the dial was slipped on the gang cond. shaft (move it clockwise in this case). Repeat the same operations as outlined in 16-A-c above.

(17) Move band selector switch to next higher freq. band (1550-4200 Kc.) counterclockwise one notch.

NOTE: AFTER COMPLETION OF OPERATION 16-A DO NOT TOUCH TRIMMERS ON SECTIONS #1, #3, AND #4 OF GANG CONDENSER.

(18) Set up 4000 Kc. Osc. signal and connect leads from oscillator to ant-gnd posts on set. Turn dial of set to max. signal (will be close to 0 or 1500 Kc. on tuning dial).

(19) Adjust 1st dot air-trimmer (located on control panel, second knob from left) for max. signal. If max. signal is secured at either extremity of this control travel, then it will be necessary to make coil adjustments.

(a) If this trimmer peaked or attempted to peak at its max. capacity then 1st dot coil lacks sufficient inductance (too few turns or coil diameter incorrect).
(b) If this trimmer peaked or attempted to peak at its min. capacity (farthest counterclockwise position) then 1st det. coil has too high an inductance (too many turns). Remove 1 turn and repeat operation 19 until this first detector trimmer peaks the 4000 Kc. signal at 1/4 of its total travel from its farthest counterclockwise position.

(20) Set up oscillator signal at 1550 Kc. and turn tuning dial to farthest counterclockwise position (max. capacity).

(21) Adjust series osc. trimmer (C-2) (second from front of set, located beneath chassis but adjustable from top of chassis) until max. signal is secured. 1st dot. air-trimmer should peak this 1550 Kc. signal somewhere in its range.

NOTE: If in operation #16, tuning dial did not pick up 4000 Kc. signal at 10 or nearly 10 on dial, then oscillator coil for this band is in error having a wrong number of turns. This difficulty must be corrected before proceeding with operations #19, #20 and #21.

(22) Move band selector switch to next high freq. band (CC one notch) (11000 to 4200 Kc.).
(23) Set up oscillator signal at 11000 Kc. Move tuning dial and gang condenser to farthest clockwise position (min. cap.). Adjust cap. C-1 for max. signal. (For operations which are to follow set must be standing on LEFT END. Condenser (C-1) is mounted on rectangular coil and switch shield beneath chassis.

(24) If 11000 Kc. signal cannot be tuned in with gang condenser at min. cap., even after adjusting C-1, then osc. coil inductance is either high or low. If inductance is low than 11000 Kc. signal can be tuned in by increasing gang cond. cap. (rotating gang). If osc. inductance is too high then this fact can be determined by varying oscillator signal to some lower frequency until signal is audible in receiver.

If this osc. coil inductance is incorrect, examine the coil for correct turns and diameter. Inductance can be lowered by sliding last turn or last 2 turns away from rest of turns of coil.

(25) Check at what position the 1st det. air-trimmer peaks this 11000 Kc. signal. Max. signal should be obtained at about 1/4 total travel of this condenser from its min. cap. setting. If this does not occur, then first det. coil has wrong inductance value and must be adjusted by sliding end turn or turns. Sliding turns outward away from main body of coil decreases inductance.

(26) Set up 4200 Kc. Osc. signal and move tuning dial and gang to Max. Cap. Signal should be heard close to 100 on dial. Check 1st det. trimmer to see that it peaks this 4200 Kc. signal within its tuning range.

(27) If in checking in #26 the 4200 Kc. signal cannot be heard (receiver does not tune to 4200 Kc. signal) then the osc. coil inductance for this band is too low and consequently C-1 in operation 24 was adjusted to too high a capacity so that the facts in the case are that the osc. ind. is too low and distributed cap. too high. Therefore add 1 or 1/2 turn to osc. coil and repeat operations 23, 24, 25 and 26.

(28) Check 1st det. trimmer at several points in this band to see that it peaks properly.

(29) Move band selector switch to next higher freq. band (22000 Kc. to 11000 Kc.) (Farthestmost CC position).

(30) Set up osc. signal at 21800 Kc. and move gang condenser to min. capacity setting. Adjust trimmer on #2 section of gang cond. until signal is heard.

(31) If signal cannot be tuned in then osc. coil has too high an inductance and must be corrected and same procedure followed as in #24 except that in this case higher frequencies are used.

(32) Peak 1st det. trimmer at 21800 Kc. signal. (Be sure that #5 trimmer is set at min. cap.). Should peak at 1/4 trimmer condenser travel from min. setting. If this does not occur then ind. of 1st det. coil is incorrect and must be corrected. If air-trimmer closes more than 1/4 its travel the inductance of 1st det. coil is too low and conversely too high if trimmer cond. does not close 1/4 its travel. Adjust ind. of coil by sliding turns inward or outward.
(33) Set up osc. signal at 11000 Kc. and move tuning dial and cond. toward max. cap. At 100 or close thereto the signal should be heard. Be sure the signal received is the fundamental of osc. First det. trimmer should peak within its tuning range. No trouble should be encountered here unless some high distributed or lumped capacity has been introduced in 1st det. circuit which should not be present. This must be corrected if 1st det. trimmer does not peak correctly at 11000 Kc. signal freq.

(34) If signal is received at a much lower (5 to 10 div.) than 100 on dial then osc. coil inductance is too high and should be reduced. Then repeat operations #30, #31, #32, #33 which will give a high capacity setting on trimmer on section #2 of gang.

(35) Check air-trimmer of 1st det. in various settings of gang between high and low freq. extremes to see that trimmer peaks at these points.

**NOTE:** When performing operations set down for the two high frequency bands no violent or sudden changes should occur in 1st detector air-trimmer settings. If such is experienced then operator has peaked trimmer on frequency on wrong side of oscillator.

---

**CIRCUIT TEST VOLTAGES FOR MODEL 94 ALL-WAVE**

<table>
<thead>
<tr>
<th>Component</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode 1st det. to gnd.</td>
<td>6.5</td>
</tr>
<tr>
<td>Cathode oscillator to gnd.</td>
<td>0</td>
</tr>
<tr>
<td>Cathode 59 tubes to gnd.</td>
<td>18</td>
</tr>
<tr>
<td>Cathode 56 tube</td>
<td>13.5</td>
</tr>
<tr>
<td>Cathode 2B7 to gnd.</td>
<td>113.0</td>
</tr>
<tr>
<td>Cathode I.F. Tubes to gnd.</td>
<td>130.0</td>
</tr>
<tr>
<td>Plate 1st Det. to gnd.</td>
<td>280.0</td>
</tr>
<tr>
<td>Plate I.F. Tubes to gnd.</td>
<td>370.0</td>
</tr>
<tr>
<td>Plate 2B7 to gnd.</td>
<td>280.0</td>
</tr>
<tr>
<td>Plate 56 to gnd.</td>
<td>270.0</td>
</tr>
<tr>
<td>Plate 59 tubes to gnd.</td>
<td>260.0</td>
</tr>
<tr>
<td>Plate 57 osc. tube to gnd.</td>
<td>140.0</td>
</tr>
<tr>
<td>Screen 1st det. tube to gnd.</td>
<td>140.0</td>
</tr>
<tr>
<td>Screen I.F. Tubes to gnd.</td>
<td>270.0</td>
</tr>
<tr>
<td>Screen 2B7 to gnd.</td>
<td>140</td>
</tr>
<tr>
<td>Screen 59 Tubes to gnd.</td>
<td>260</td>
</tr>
<tr>
<td>Screen 57 osc. Tub. to gnd.</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop across 20 Henry choke</td>
<td>30</td>
</tr>
<tr>
<td>Drop across field coil</td>
<td>105</td>
</tr>
</tbody>
</table>

_Normal "B" Voltage DC from filament 5Z3 to C.T. HV Trans.----400 volts_  
_Potential between cathode of 2B7 and cathodes of 58 tubes----3 volts_  
_(Use 300 volt range)_  
_Also observe this polarity._ Cathodes of I.F. Tubes should be positive with respect to cathode of 2B7._
INSTALLATION OF SET CHASSIS AND CONNECTION OF REMOTE CONTROL

Remove radio chassis from housing and fasten steering column mount- ing bracket to bottom of housing with machine screws that are fur- nished, or if steering column can not be used, use the bolts that are furnished, to fasten housing to bulkhead of car, drawing the three bolts through the three mounting holes in back of housing. In this case, be sure to allow housing to extend about 3/4" to 1" away from bulkhead, by adjustment of a series of nuts furnished for this purpose. This will relieve any warping of housing and chassis, so as not to throw radio set out of balance.

New pass driving control cable through grommeted hole in front cover of housing. With radio chassis still removed from housing, fast dial scale on remote control at 0. Using a small wrench or pair of pliers, unscrew bushing headnut on variable condenser back plate about three-fourths of the way, and pass control wire through hole in bushing headnut, and with dial scale still at 0, grasp the condenser pulley in one hand and revolve same until condenser plates are all the way open and will not turn further in that direction. Holding condenser in this position, loosen clamp screw at top of the pulley and run control wire under clamp until all the slack is taken out of the wire. Then tighten clamp screw down tight on wire. Put chassis back in housing and bolt down as before removing it from housing.

The following diagram shows the connections for speaker cable, and is supplied for service purposes only, as the speaker is already con- nected to the plug of the chassis.
**MOUNTING THE RADIO SET AND SPEAKER**

**WARNING:**

When locating a position for the receiver, always bear in mind that you must allow sufficient room for mounting the speaker.

The Franklin Auto Radio has been designed to be mounted on the steering column or dash board. You may mount the set either in the driver's compartment of the car, or in the motor compartment. When locating the three mounting holes for radio, be sure that you locate them accurately. The reason for this is that if the holes are not perfectly in line with the bolts on chassis, you will badly warp the receiver on mounting it to the dash board.

After mounting the radio receiver, the next operation is to mount the speaker. We recommend that you mount the speaker as high as possible behind the instrument panel, the reason for this being that when mounted in this position, the speaker receives full advantage of the resonance effect of this space behind the instrument panel. You can easily prove this for yourself, by turning on the radio receiver and placing the speaker in various positions in the car.

You will then note the advantage of placing the speaker according to our instructions. After mounting the radio receiver, drill a 3/8" hole directly below the receiver in bucket. This hole is to be used for allowing A and B battery wires to pass through into the motor compartment. Directions for connecting these wires will be found in the following sheets.

The tuning control should be clamped on to the steering column at a height equal to that of the top of shift lever, as this makes tuning a natural motion. In cases where the steering column is of a smaller diameter than that of the clamp, use the leather shims furnished with the tuning control.

When running the wires and tuning control cable from radio to control be sure that you do not kink them excessively, as this will make the tuning control work hard. Always be sure to securely tape the tuning control at about every six inches along its length to some solid part of the car. If you do not do this and the control is left free to swing, it will go-tune the radio.

**CONNECTING "A" BATTERY**

The "A" battery connections of the Franklin Auto Radio have no polarity. By this we mean, neither negative or positive, but the heavy green wire with tracer must always be attached to the "hot" side of storage battery (the un-grounded side of storage battery). The sheath may be attached to any convenient ground connection, such as any bolt passing into the frame of the car or direct to the grounded terminal of the storage battery.

The heavy green wire with tracer may be attached either directly at the "hot" side of the storage battery or to the heavy cable running to the starter switch. Never, under any circumstances, attach this heavy green wire with yellow tracer to any of the ignition wires or light wires. Special warning is given against connecting this wire to the generator wire anywhere along its length. It is also convenient and advantageous to connect this wire to one side of the car ammeter, so that when the receiver is turned on, the battery load is indicated on the ammeter.

**MOUNTING "B" BATTERY CONTAINER**

Included with each radio is a special container for the "B" batteries. This container is to be mounted through the floor boards of the car, wherever possible. In mounting this "B" battery box, be sure that you check underneath the floor boards to see that there are no brake rods, mufflers, storage batteries or other parts of the car located directly below the space in the floor boards. The proper method for locating the place for the "B" battery container is to hold it against the floor boards from underneath car, drilling four small holes up through the floor board at the four corners of the box. After doing this, you can cut the hole from above and feel assured that you will not run into obstructions underneath the floor boards.

If it is a wooden floor board, you can very easily cut this with a key-hole saw. If, however, the floor boards are metal, we recommend cutting the hole with a cold chisel and a hammer, using a shearing action by holding the cold chisel as nearly parallel to the floor boards as possible. By using this method, you will find it very easy to cut these metal floors.

Whenever cutting through floor boards, be sure to do it in such a manner as not to weaken floor boards of the car. In some cases, you will have to fasten braces underneath the floor boards at the edge of "B" battery can to strengthen the floor of car, due to the fact that sometimes the only location for the "B" battery can necessitates cutting through the whole width of one floor board.

Then placing "B" batteries in "B" battery container, wedge cardboard or wooden shims beside the batteries to hold them securely from rattling. The proper method of connecting these batteries together is illustrated in the following diagram:
MODEL 346-4
Schematic, Socket
Parts List

FREED RADIO AND TELEVISION CORP.

1 - Volume control - 10,000 ohm
2 - Antenna coil
3 - Variable condenser
4 - 300 ohm 1/3 watt resistor
5 - .05 mf 200 volt condenser
6 - .5 mf 200 volt condenser
7 - Detector coil
8 - 30,000 ohm 1/3 watt resistor
9 - 5 mf electrolytic condenser
10 - 250,000 ohm 1/3 watt resistor
11 - .02 mf 400 volt condenser
12 - 500,000 ohm 1/3 watt resistor
13 - 500 ohm 1/2 watt resistor
14 - 5 mf electrolytic condenser
15 - .005 mf 200 volt condenser
16 - 4 mf & 8 mf filter block
17 - 1800 ohm field
18 - Power Transformer
19 - 10,000 ohm 1 watt resistor
20 - 10,000 ohm 2 watt resistor
21 - .0002 mica condenser
22 - 50,000 ohm 1/3 watt resistor
23 - .1 mf 200 volt condenser
A 1/20/33 CHANGED LOCATION OF 20 PLUS 22 REMOVED 22
B 1/30/33 REMOVED ITEMS 30 32 34 35 37
ADDED 22 23 24 25

Items 1 to 5 inclusive omitted in Model 360X.

IF PEAK 175 KC.

1 - 10 mmf mica condenser
2 - Short Wave coil
4 - Band Switch
5 - Short Wave coil
7 - Variable Condenser
8 - Preselector coil
11 - 300 ohm 1/3 watt resistor
12 - .5 mf 200 volt condenser
13 - 50,000 ohm 1/3 watt resistor
14 - Oscillator coil
15 - Double Tuned 175 KC. I.F. coil
16 - .1 mf 300 volt condenser
17 - 25,000 ohm 1 watt resistor
18 - 50,000 ohm 1/2 watt resistor
23 - Single Tuned 175 KC. I.F. coil
24 - .0003 mf mica condenser
25 - 500,000 ohm 1/3 watt resistor
26 - 50,000 ohm 1/3 watt resistor
27 - 1,500 ohm 1/3 watt resistor
28 - .02 mf 200 volt condenser
29 - 5 mf 35 volt electrolytic condenser
30 - .0002 mf mica condenser
31 - 500,000 ohm 1/3 watt resistor
32 - .1 mf 400 volt condenser
33 - .02 mf 400 volt condenser
34 - 100,000 ohm 1/3 watt resistor
35 - 50,000 ohm 1/3 watt resistor
36 - 50,000 ohm 1/3 watt resistor
37 - 3,000 ohm 1/3 watt resistor
38 - 5 mf 35 volt electrolytic condenser
39 - .02 mf 400 volt condenser
40 - 500,000 ohm 1/3 watt resistor
41 - 500 ohm 1/2 watt resistor
42 - 5 mf 35 volt electrolytic condenser
43 - Filtermatic tone control
44 - Speaker - 1800 ohms - 1/42
45 - 4 mf 450 volts filter condenser
46 - 8 mf 450
47 - Power transformer
48 - .1 mf 300 volt condenser
49 - 25,000 ohm 1/3 watt resistor
50 - 6 volt pilot light
51 - .0001 mf mica condenser
52 - .0002 mf mica condenser
53 - 10,000 ohm volume control
54 - 5,000 ohm 1/3 watt resistor
Schematic

MODEL 365, 365X
Socket layout

- 1 - Short wave coil
- 2 - Band switch
- 3 - 50-100 mmf paddler
- 4 - Short wave coil
- 5 - 10 mmf mica
- 6 - .002 mf
- 7 - 10,000 ohm volume control
- 8 - Antenna coil
- 9 - 3,000 ohm 1/3 watt
- 10 - 400 ohm
- 11 - Variable condensers
- 12 - 50,000 ohm 1/3 watt
- 13 - .0001 mf mica
- 14 - Oscillator coil
- 15 - .1 mf 200 volt
- 16 - .1 " 1/3 watt
- 17 - 30,000 ohm 1/3 watt
- 18 - .05 mf 200 volt
- 19 - 456 KO Double tuned I.F. coil
- 20 - 456 KO Single
- 21 - .0002 mf mica
- 22 - 500,000 ohm 1/3 watt
- 23 - 50,000 " 1/3 watt
- 24 - .02 mf 200 volt
- 25 - 500,000 ohm 1/3 watt
- 26 - .0002 mf mica
- 27 - 8,500 ohm 1/3 watt
- 28 - 5 mf 35 volt elec.
- 29 - .02 mf 200 volt
- 30 - 100,000 ohm 1/3 watt
- 31 - 50,000 " 1/3 watt
- 32 - 3,000 " 1/3 watt
- 33 - 25,000 " 1/3 watt
- 34 - 5 mf 35 volt Electrolytic
- 35 - .02 mf 200 volt
- 36 - 500,000 ohm 1/3 watt
- 37 - 750 " 1/3 watt
- 38 - 5 mf 35 volt elec.
- 39 - Filtermatic T.C. in 365X (.005 mf 200 volt in 365)
- 40 - 14 mf filter cond.
- 41 - 3,000 ohm field
- 42 - .270 " B choke
- 43 - 35.9 mf filter cond.
- 44 - 135 ohm line cord
- 45 - .1 mf 200 volt
- 46 - 6 volt pilot lamp
- 47 - 15 ohm Res.

* Omitted from 365X
- 48 - 50,000 ohm, 1/3 watt resistor
- 49 - .1 mf 200 volt condenser
- 50 - 6 mf 150 volt electrolytic cond.
- 51 - 1000 ohm, 1/3 watt resistor
- 52 - .0002 mf mica condenser

MODELS 365 & 365X.
G TUBE UNIV. SUPER.

FRONT.

OCT. 26, 1933   R.B.O.

www.americanradiohistory.com
The readings were made with the volume control in the full "on" position.

*These voltages are the correct values. The average test kit will give much lower readings, (as low as 1/10 of these values) due to the low resistance of the meters compared to the high resistance included in the detector plate and screen circuits and the audio grid circuit.

When the volume control is reduced the

- RF plate voltage remains constant
- RF screen voltage increases
- RF cathode voltage increases
- RF grid voltage increases

SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>1st RF</th>
<th>2nd RF</th>
<th>2nd Det.</th>
<th>Audio</th>
<th>Rect.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>4.5</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>32</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Plate current of each plate—20
MODEL 4 PW

Electrical values

Transformer notes

NOMENCLATURE
C1—Antenna Trimmer Condenser
C2—Tuning Condenser
C3—Tuning Condenser
C4—Tuning Condenser
C5—Alignment Condenser
C6—Alignment Condenser
C7—Coupling Capacity
C8—Coupling Capacity
C9—Audio Coupling Condenser .006 mfd.
C10—Det. plate By-pass .001 mfd.
C11—RF Cathode By-pass .05 mfd.
C12—RF Plate By-pass .05 mfd.
C13—RF Screen By-pass .25 mfd.
C14—RF Plate By-pass .05 mfd.
C15—Det. Cathode By-pass 1.00 mfd.
C16—Det. Screen By-pass .25 mfd.
C17—Audio Grid By-pass .01 mfd.
C18—Audio Plate By-pass .01 mfd.
C19—Filter Condenser 4. mfd.
C20—Field Condenser .08 mfd.
C21—Filter Condenser 4. mfd.
R1—Volume Control 10,000 ohms
R2—RF Cathode Resistor 300 ohms
R3—Det. Cathode Resistor 50,000 ohms
R4—Det. Screen Resistor 2 megohms
R5—Det. Plate Resistor 1 megohm
R6—Audio Grid Resistor ½ megohm
R7—Audio Grid Resistor 100,000 ohms
R8—Mid Tap Resistor
R9—Divider Resistor 50,000 ohms
R10—Screen Resistor 50,000 ohms
R11—Screen Resistor 10,000 ohms
R12—Audio Bias Resistor 400 ohms
L1—Antenna Coil
L2—Primary } of RF Coil
L3—Secondary }
L4—Primary } of RF Coil
L5—Secondary }
L6—Speaker Moving Coil
L7—Speaker Field Coil
T1—Audio Output Transformer
T2—Power Transformer

FROST-MINTON

Filter Condenser
The three leads from the main filter condenser are connected as follows:
Black—to center tap of 280 plate winding
Green—to filament terminal of 280 socket
Red—to +B connection on terminal strip

By-pass Condenser Assembly
The condensers incorporated in this unit are identified as follows:
1.0 mfd. Green Leads
.01 mfd. Green and White Leads
.05 mfd. Black Leads
.25 mfd. Red Leads

Resistors
300 ohms—Orange, Black, Brown
400 ohms—Yellow, Black, Brown
10,000 ohms—Blue, Yellow
50,000 ohms—Green, White
100,000 ohms—Blue, White
½ megohm—Gray
1 megohm—Black
2 megohm—Black, White

Power Transformer
Six leads are brought out of the transformer winding on the side next to the terminal strip. Three are located on the opposite side. The transformer is connected as follows:
Primary Winding—Stranded wires, terminal strip side
224 and 247 filaments—Heavy wires, terminal strip side
280 filament—Small wires, terminal strip side
280 plates—Two leads nearest front of set, opposite side
280 center tap—Lead nearest back of set, opposite side

The trimmer condenser mounted on the loud speaker must be adjusted for maximum volume.
Some types of the 247 Pentode operate normally with a blue glow. This action does not, therefore, denote that the tube is defective due to gas.
It is very important that no tube is removed from its socket with the receiver "on" as to do this will damage the receiver or the Pentode tube.
Make sure that the lead from the top of each 224 tube to the variable condenser follows closely along the metal partition between the tubes. Oscillation may occur if this lead lies too close to the tube itself.
The model FM-4 is said to be the same as FM-5, minus one r-f stage.