
CHANGES IN PARTS AND THEIR VALUES ARE:

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<th>Dia #</th>
<th>Part #</th>
<th>Description and Value of Parts</th>
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<tr>
<td>2</td>
<td>CW 2-100</td>
<td>1 MFD, 200 Volt condenser</td>
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<td>50</td>
<td>CW 2-25</td>
<td>.25 MFD, 200 Volt condenser</td>
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<td>62</td>
<td>SA10528</td>
<td>1500 Ohm, 1/4 watt resistor</td>
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<td>RP6584</td>
<td>.1 Megohm, 1/4 watt resistor</td>
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<td>76</td>
<td>VR6637</td>
<td>1 Megohm tone control, 5000 Ohm min.</td>
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<td>88</td>
<td>LP6610</td>
<td>Tuning indicator lamp, 6.3 V, .25 Amp.</td>
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<td>RP6610</td>
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<td>CW 2-05</td>
<td>.06 MFD, 200 Volt condenser</td>
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The Model 660 is a thirteen-tube, four-band, band-high, fidelity, superheterodyne, employing multi-socket tubes, with the exception of the rectifiers. This model is built in two units, namely, the receiver proper and the class A-B1 amplifier, both of which are provided with an independent power supply. Among the refinements and features incorporated are high fidelity, bass and treble control, and a triple automatic volume control system. The second A.V.C. operates in the usual manner and controls the first I.F. amplifier tube. The third A.V.C., which controls the second I.F. amplifier tube, is designed to give proper tuning-meter indications under all conditions. The first I.F. A.V.C. controls the R.F. and first detector and does not start to function until a comparatively strong signal is received, thus the highest possible reliable sensitivity is maintained at low signal level. Due to the fact that the first A.V.C. voltage is essentially flat ± 2 volts, the static-condenser leak first detector, first A.V.C. voltage is supplied, the receiver is used. When a very weak signal is present, the entire system is always visible. The delay system, which is provided between-transistor lobes, automatically becomes inactive when a signal is received.

A type 675 tube is used as an R.F. amplifier, a type 641 as a first detector, a type 660 as an oscillator, two 6X7s as a second detector, and second and third A.V.C. amplifiers. A type 649 as an audio amplifier, the second B type 645 as a rectifier in the line. A type 660 is used as a rectifier in the power amplifier chassis.

If a component part located underneath the switch and other elements of the "Centron's" unit has to be removed for insulation, it can be easily removed and replaced. Simply follow these steps:

1. Remove the two screws which fasten the mounting plate of the wave-change switch to the chassis frame. Pull switch shaft straight out.
2. Unsolder the stator and rotor leads on the switch.
3. The fastening screws for the switch terminals are located on top of the "Centron's" unit and are indicated by Y and Z in Figure 1. Remove the corresponding screws.
4. Each individual section can then be pulled out straight.

NOTE: On the R.F. section, the plate lead X the 675 socket will have to be unsoldered from the switch terminal before the section can be removed.

On the oscillator section, the plate lead to the 660 socket and the plate supply lead will have to be unsoldered from the switch terminal before the section can be removed.

After repairs have been made, replace the plate leads mentioned above and re-

The switch, being careful to ob-
serve that the soldered holes in the switch bracket line up with the round guide pins on the base plate of the "Centron's" unit. It is important that the switch does not fail if the switch brackets do not line up.

Replace all radio components and fasten securely.

The stator and rotor leads on the switch will be replaced in the same manner.

9. Replace the switch shaft and the mounting

The fastening screws are removed by inserting the switch shafts in the chassis holes, and the switch discs are in the same position, otherwise the switch shaft will not slide in. NEVER force the shaft into the switch holes. If the shaft does not slide in freely, examine the position of the switch discs and adjust the A.V.C. condensers of the variable tuning condenser.

LINEUP CAPACITOR ADJUSTMENTS

To align the circuits of this receiver, it is essential to use a high grade modulated test oscillator, the output of which can be continuously varied with absence. If the overload is too severe, the range may possibly be increased. If the overload is too severe, the range may possibly be increased.

To align the circuits of this receiver, it is essential to use a high grade modulated test oscillator, the output of which can be continuously varied with absence. If the overload is too severe, the range may possibly be increased. If the overload is too severe, the range may possibly be increased.

1. Set wave-change switch to Blue Band position.
2. Set test oscillator and dial indicator to 1400 KC, and adjust #29 and #80 for maximum output.
3. Set test oscillator and dial indicator to 1400 KC, and adjust #29 and #30 for maximum output.
4. Return to 1400 KC, and make further adjustment of #71 and #72.
Aligning I-F Stages at 262 K.C.

Set signal generator to 262 K.C. and connect signal lead to grid cap of 6AG6 tube, through a .1 mfd. condenser. Adjust trimmers on both I-F coils located on under side of chassis sub-panel. Repeat adjustments until maximum output is obtained, using a weak signal.

Aligning R-F Stages

Set signal generator to 1530 K.C. and connect signal lead to antenna terminal of receiver through a .0002 mfd. mica condenser. Adjust oscillator trimmer on middle section of condenser gang. Set signal generator at 1400 K.C. and turn condenser gang until this signal is tuned in. Adjust the other two sections of condenser gang. Set signal generator to 600 K.C. and turn condenser plates until this signal is tuned in. Adjust antenna compensating condenser (located near antenna connector) while rocking the condenser gang plates back and forth until maximum output is obtained. Repeat adjustments made at 1400 K.C.
(a) Connect the grid lead of the signal generator to the grid cap of the 6J7 tube, through a .1 mfd. condenser. Connect the signal lead of the signal generator to the receiver case.

(b) Connect output meter from tone control jack to receiver case.

(c) Turn condenser gang plates to approximately 1000 K.C. and volume control on full.

(d) Adjust screws "A" and "C", located on the top of each I-F transformer, for maximum output. (See Parts Layout.)

(e) Adjust screw "B" (third I-F adjustment) on bottom of chassis, accessible through hole provided in bottom cover of receiver. DO NOT REMOVE BOTTOM COVER OF RECEIVER FOR THIS ADJUSTMENT.

(f) Repeat (d) and (e) until no further increase in output can be obtained.

Note: In order not to actuate the A.V.C. circuit, always use the lowest output from the signal generator, which will give a readable indication on the output meter.
2. Aligning at 1530 Kilocycles

(a) Leave signal lead of signal generator connected to grid cap of 6J7 tube. Turn condenser gang plates all the way out of mesh and against high frequency stop.

(b) Set signal generator to exactly 1530 kilocycles and remove small plate on side of chassis covering trimmer screws.

(c) Adjust trimmer "D" on condenser gang carefully until generator signal is tuned in with maximum output.

3. Aligning at 1400 Kilocycles

(a) Connect generator signal lead to antenna connection of receiver. Remove small button plug on control side of receiver. Adjust Delco Super-Tuning condenser (Illus. #11) while rocking tuning condenser plates back and forth slightly until maximum output is obtained.

(b) Repeat adjustments of trimmers "E" and "F" at 1400 kilocycles as covered in paragraphs (b) and (c) under Aligning at 1400 Kilocycles.

(c) Adjust trimmers "E" and "F" for maximum output. Do not disturb the adjustment of trimmer "D" set at 1500 K.C.
### MODEL R-642 Delco
### Parts List
### MODEL R-644 Delco
### Voltage, Parts

#### Parts List

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In making tests with the Cathode Ray Oscillograph, connect to black lead of 2nd I-F coil (Illus. #5) and to chassis ground.
1. Peaking I-F Stages at 262 Kilocycles
   (a) Connect the ground lead of the Signal Generator to the chassis case. Connect the signal lead of the Signal Generator to the grid cap of the 6AG7 tube, through a .1 mfd. condenser, leaving the tube's grid clip in place.
   (b) Connect output meter from plate of 6V6G tube to ground.
   (c) Set Signal Generator to exactly 262 kilocycles and turn volume control on full.
   (d) Turn condenser gang to a position where no squeals or beat notes can be noticed, also so that when the tuning condenser is rotated within narrow limits there is no appreciable change in output.
   (e) Adjust trimmers A-B-C-D on the top of the I-F coils (Illus. 4 & 5) carefully for maximum output.
   (f) Repeat adjustments of I-F trimmers A-B-C-D with as low an output from the Signal Generator as possible, for more accurate alignment.

2. Aligning at 1530 Kilocycles
   (a) Leave Signal Generator leads connected the same as for I-F adjustments.
   (b) Turn tuning condenser plate all the way out and against high frequency stop.
   (c) Set Signal Generator to exactly 1530 kilocycles and adjust oscillation trimmer "E" on middle section of condenser gang carefully for maximum output.

3. Aligning at 1400 Kilocycles
   (a) Remove signal lead of Signal Generator from grid cap of 6AG7 tube and connect to antenna terminal of receiver through a .0002 mfd. mica condenser.
   (b) Set the Signal Generator to 1400 kilocycles and tune the receiver to this signal.
   (c) Adjust the parallel trimmers "F" and "G" of the condenser gang carefully for maximum output. Do not disturb the 1350 kilocycle adjustment of the middle section of the condenser gang.

4. Aligning at 600 Kilocycles
   (a) Set Signal Generator to approximately 600 kilocycles and turn condenser gang plates until this signal is tuned in with maximum output.
   (b) Adjust Delco Syncro-Tuning condenser (Illus. 52) located on side of chassis near antenna connector, rocking gang condenser plates back and forth through the signal until maximum output is obtained. (It will be necessary to readjust this condenser to the car antenna upon installation of the set.)
   (c) Repeat adjustments made under—"Aligning at 1400 K.C."
OSCILLOGRAPH CONNECTIONS

In making tests with the Cathode Ray Oscillograph, connect to black lead of 2nd I-F coil (Illus. #5) and to chassis ground.
1. Peaking I-F Stages at 262 Kilocycles
   (a) Connect the ground lead of the Signal Generator to the chassis case. Connect the signal lead of the Signal Generator to the grid cap of the 6AK5 tube, through a .1 mfd. condenser, leaving the tube's grid clip in place.
   (b) Connect output meter from plate of 6V6G tube to ground.
   (c) Set Signal Generator to exactly 262 kilocycles and turn volume control on full.
   (d) Turn condenser gang to a position where no squeals or buzz notes can be noticed, also so that when the tuning condenser is rotated within narrow limits there is no appreciable change in output.
   (e) Adjust trimmers A-B-C-D on the top of the I-F coils (Illus. 4 & 5) carefully for maximum output.
   (f) Repeat adjustments of I-F trimmers A-B-C-D with as low an output from the Signal Generator as possible, for more accurate alignment.

2. Aligning at 1030 Kilocycles
   (a) Leave Signal Generator leads connected the same as for I-F adjustments.
   (b) Set tuning condenser plates all the way out and against high frequency stop.
   (c) Set Signal Generator to exactly 1030 kilocycles and adjust oscillator trimmer "E" on middle section of condenser gang carefully for maximum output.

3. Aligning at 1400 Kilocycles
   (a) Remove signal lead of Signal Generator from grid cap of 6AK5 tube and connect to antenna terminal of receiver through a .0002 mfd. mica condenser.
   (b) Set the Signal Generator to 1400 kilocycles and tune the receiver to this signal.
   (c) Adjust the parallel trimmers "F" and "G" of the condenser gang carefully for maximum output. Do not disturb the 1530 kilocycle adjustment of the middle section of the condenser gang.

4. Aligning at 600 Kilocycles
   (a) Set Signal Generator to approximately 600 kilocycles and turn condenser gang plates until this signal is tuned in with maximum output.
   (b) Adjust Delco Syncro-Tuning condenser (Illus. 56) located on side of chassis near antenna connector, rocking gang condenser plates back and forth through the signal until maximum output is obtained. (It will be necessary to readjust this condenser to the car antenna upon installation of the set.)
   (c) Repeat adjustments made under "Aligning at 1400 KC."
The Delco Model R-644 is an 8 tube, dash speaker auto radio, with bass compensation, octal base tubes and tone control. Two of the new 6V6G "Beam" power tubes are used in the output stage.
1. Peaking I-F Stages at 262 Kilocycles

(a) Connect the ground lead of the Signal Generator to the chassis case. Connect the signal lead of the Signal Generator to the grid cap of the 6AG5 tube, through a .1 uf. condenser, leaving the tube's grid clip in place.

(b) Connect output meter across plate of 6V6G output tube. (If an A.C. meter is available having a full scale range of 4 volts or less, it can be connected directly across the voice coil connection on the speaker socket provided on the dash speaker for an additional speaker.)

(c) Set Signal Generator to exactly 262 kilocycles and turn volume control on full.

(d) Turn condenser gang to a position where no squeals or beat notes can be noticed, also so that when the tuning condenser is rotated within narrow limits there is no appreciable change in output.

(e) Adjust trimmers A-B-C-D on the top of the I-F coils (Illus. 4 & 5) carefully for maximum output.

(f) Adjust I-F trimmer "E" located on chassis sub-panel carefully for maximum output.

(g) Repeat adjustments of I-F trimmers A-B-C-D-E with an low an output from the Signal Generator as possible, for more accurate alignment.

2. Aligning at 1550 Kilocycles

(a) Leave Signal Generator leads connected the same as for I-F adjustments.

(b) Turn tuning condenser plates all the way out and against high frequency stop.

(c) Set Signal Generator to exactly 1550 kilocycles and adjust oscillator trimmer on middle section of condenser gang carefully for maximum output.

3. Aligning at 1400 Kilocycles

(a) Remove signal lead of Signal Generator from grid cap of 6AG5 tube and connect to antenna terminal of receiver through a .0002 uf. mica condenser.

(b) Set the Signal Generator to 1400 kilocycles and tune the receiver to this signal.

(c) Adjust the parallel trimmers on the top and bottom sections of the condenser gang carefully for maximum output. Do not disturb the 1550 kilocycle adjustment of the middle section of the condenser gang.

4. Aligning at 600 Kilocycles

(a) Set Signal Generator to approximately 600 kilocycles and turn condenser gang plates until this signal is tuned in with maximum output.

(b) Adjust Delco Syncro-Tuning condenser (Illus. #17) located on side of chassis near antenna connector, rocking gang condenser plates back and forth through the signal until maximum output is obtained. (It will be necessary to readjust this trimmer to the car antenna upon installation of the set.)

(c) Repeat adjustments "Aligning at 1400 K.C."
**NOTE:** On early production run, condenser #17 was returned to ground.

MODEL R-1115 Delco
Below Ser., 100,000
Socket, Voltage Schematic

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UNITED MOTORS SERVICE

FREQUENCY RANGES -
1730 to 525 KC
2.3 to 2.6 MC

MODEL R-1115 Delco
Above Ser. 100,000
Schematic, Socket
Trimers, Chassis
Voltage, Alignment

BOTTOM VIEW OF CHASSIS

BOTTOM VIEW

VOLTAGES MEASURED BETWEEN
SOCKET TERMINALS AND CHASSIS
AC LINE VOLTAGE 115 VOLTS

REAR OF CHASSIS

CONVENTIONAL ALIGNMENT SEE
SPECIAL SECTION VOLUME VIII
NO ADJUSTMENTS REQUIRED
ON THE SHORTWAVE BAND

MODEL
R-1115
1-13-37.
Adjust IP Trimmers 4A, 4B, 3A, 3B, at 465 KC (Do not remove control-grid clip from 6A7).
Adjust SW Osc. Trimmer "10A" at 1810K and Ant. Trimmer "9A" at 16 MC (while rocking variable condenser). Dummy Antenna, IP= .02 Mfd., Wave Trap, RF, & Co. = .00025.
The receiver should be aligned in a location free from local interference (interference caused by motors, flashlights, automobile ignition, etc.) as high frequency disturbances will cause difficulties in adjusting the short wave circuits.

**DIAL SETTING CHECK:** Turn the tuning knob until the motor plate of the condenser is fully meshed. The dials pointer should be on the white horizontal line below 500 K.C. on the dial. This should be done before attempting any trimmer adjustments.

1. **Peaking I-F Stage at 456 Kilocycles**
   - (a) Connect the signal lead of the test oscillator to the grid cap of the 6AB tube through a .1 or 25 mfd condenser. DO NOT REMOVE THE GRID CLIP FROM THE TUBE.
   - (b) Connect the ground lead of the test oscillator to the receiver chassis.
   - (c) Place the test oscillator in operation at 456 K.C.
   - (d) Change the band switch to the broadcast position (fully clockwise).
   - (e) Set the receiver dial pointer to any position where it has no tuning effect on the I-F signal from the oscillator.
   - (f) Turn the receiver volume control to the maximum position.
   - (g) Adjust the four I-F trimmers A, B, C & D on the two I-F coils Illus. 30 and 56 (Fig. 2) carefully for maximum output in the following sequence—A-B-D-C. Then repeat the four trimmer adjustments during alignment as is consistent with obtaining at least half scale indication on the output meter.

2. **Aligning at 1500 Kilocycles (Broadcast Band)**
   - (a) Connect the signal lead of the test oscillator to the antenna terminal on the chassis through a 400 or 500 ohm carbon resistor. Leave test oscillator ground lead connected to the receiver chassis.
   - (b) Place test oscillator in operation at 1500 K.C.
   - (c) Turn dial pointer to 1500 K.C. setting.
   - (d) Adjust the Broadcast Band oscillator parallel condenser. Illus. 36 (Fig. 4) to maximum output.
   - (e) Adjust the Broadcast Band detector parallel trimmer. Illus. 33 (Fig. 2) to maximum output.
   - (f) Adjust the Broadcast Band antenna parallel trimmer, Illus. "F" (Fig. 2) to maximum output.

3. **Aligning at 600 Kilocycles (Broadcast Band)**
   - (a) Place test oscillator in operation at 600 K.C.
   - (b) Tune in the 600 K.C. test oscillator with the receiver dial for maximum output. (This point does not have to be exactly at the 600 K.C. dial setting.)

4. **Aligning the Wave Trap**
   - (a) Place test oscillator in operation at 456 K.C. but leave it connected to the antenna terminal through a carbon resistor.
   - (b) Set the receiver dial pointer to any position where it has no tuning effect on the wave trap signal from the oscillator.
   - (c) Adjust the wave trap trimmer, Illus. 16 (Fig. 2) for minimum output, increasing the oscillator output as necessary to obtain a clearly defined point of minimum output.

5. **Aligning at 5 Megacycles (5000 K.C. Police Band)**
   - (a) Place test oscillator in operation at 5 megacycles.
   - (b) Turn dial pointer to 5 megacycles and turn band change switch to the Police Band (center position).
   - (c) Adjust the Police Band oscillator parallel trimmer, Illus. 37 (Fig. 4) for maximum output. If there are two peaks, the proper one is with the trimmer screwed out the least.
   - (d) Adjust the Police Band antenna parallel trimmer, Illus. 34 (Fig. 2) to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the receiver dial.

6. **Aligning at 16 Megacycles (16000 K.C. Foreign Band)**
   - (a) Place the test oscillator in operation at 16 megacycles.
   - (b) Turn dial pointer to 16 megacycles and turn band change switch to the Foreign Band (fully counter-clockwise).
   - (c) Adjust the Foreign Band oscillator parallel trimmer, Illus. 36 (Fig. 3) to maximum output. Check to see if it has been adjusted to the proper peak by tuning the receiver to approximately 10.1 megacycles. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retune the receiver to 16 M.C. and adjust the trimmer. Illus. 36, to the proper peak with the trimmer screw further out (less capacity).
   - (d) Adjust the Foreign Band antenna trimmer, Illus. 35 (Fig. 2) to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the dial until a maximum output is secured.
   - (e) Check the adjustment by tuning the receiver to the image at about 16.1 M.C. The image should be much weaker than the 16 M.C. signal. If the image is equal to or stronger than the 16 M.C. signal, trim Illus. 35 not at the proper peak. Turn the trimmer in a turn or so, then readjust as above.

**NOTES ON TUBE SOCKET VOLTAGES**

**NOTE A:** The grid bias for the 6AG6, 6NU, and the anode voltage for the 6SN7 should be 1.4 volts across the grid resistor 29 and 50.

**NOTE B:** The grid bias for the 6SK7 is 1.3 volts measured across the 50 and 54, and anode voltage is 9.5 volts measured across the 53 and 54.

**NOTE C:** The grid bias for the 69J is 1.4 volts measured across the grid resistor 28 and 51, and anode voltage is 9.5 volts measured across the 53 and 54.
FIG. 3--PARTS LAYOUT - Bottom View

Note A: 2.6 volts measures across resistor #43.

Note B: On sets below serial #415,215, the lead indicated by "Note B" was bypassed directly to ground through the .05 mfd condenser Illus. #51, and condenser #78 and resistor #79 were not used.
The receiver should be aligned in a location free from local interference (interference caused by motors, flashers, automobile ignition, etc.) as high frequency disturbances will cause difficulties in adjusting the short wave circuits.

DIAL SETTING CHECK: Turn the tuning knob until the rotor plates of the condenser gang are fully meshed. The slow moving dial pointer should then coincide with the low frequency end of the dial scale. This check should be made before attempting any trimmer adjustments.

1. Peaking 1-F Stages at 456 Kilocycles

(a) Connect the signal lead of the test oscillator to the grid cap of the 6AJ6 tube through a .1 or .25 mfd. condenser. DO NOT MOVE THE GRID CLIP FROM THE TUBE.

(b) Connect the ground lead of the test oscillator to the receiver chassis.

(c) Place the test oscillator in operation at 456 KC.

(d) Change the band switch to the broadcast position (fully clockwise).

(e) Set the receiver dial pointer to any position where it has no tuning effect on the 1-F signal from the oscillator.

(f) Turn the receiver volume control to the maximum position.

(g) Adjust the four 1-F trimmers A, B, C, and D on the two 1-F coils, Illus. #66 and #67 (Fig. 2) carefully for maximum output in the following sequence: A-B-C-D. Then repeat the four trimmer adjustments. During alignment, maintain as few a signal output from the test oscillator as is consistent with obtaining at least half scale indication on the output meter.

2. Adjusting the Wave Trap

(a) Leave test oscillator in operation at 456 KC, but connect the oscillator output to the "A" and "D" terminals of the receiver with a 400 or 500 ohm carbon resistor in series with the "A" terminal and the oscillator signal lead.

(b) Set the receiver dial pointer to any position where it has no tuning effect on the 456 KC signal.

(c) Adjust the wave trap trimmer, Illus. #68 (Fig. 3) for minimum output. Increasing the oscillator output as necessary to obtain a clearly defined point of minimum output. If some particular station with a frequency near 456 KC causes some interference, it may be desirable to adjust the wave trap on the actual frequency of the interfering station.

3. Aligning at 1500 Kilocycles (Broadcast Band)

(a) Leave the signal lead of the test oscillator connected to the antenna terminal on the chassis through a 400 or 500 ohm carbon resistor. Leave test oscillator ground lead connected to the receiver chassis.

(b) Place test oscillator in operation at 1500 KC.

(c) Turn receiver dial pointer to 1500 KC setting.

(d) Adjust the broadcast band oscillator parallel trimmer, Illus. #57A (Fig. 3) to maximum output.

GENERAL: The Delco Model R-1118 is a ten tube, three band, all wave receiver with A.V.C., continuously variable tone control and automatic base compensation. The receiver is equipped with a band spread dial and a "Robot Eye" tuning indicator. The complete tube complement is as follows: two type 567, R-F and 1-F Amplifiers; one type 6A8, Detector-Oscillator; one type 6AF, 2nd Detector and A.V.C.; two type 6C5, 1st and 2nd A-V Amplifiers; two type 6F6 in the Output Stage, one type 540 Rectifier and one type 605 tuning Indicator.

The frequency ranges on the three bands covered are: American Broadcast Band (yellow) 567 to 1700 KC; Police and Amateur Band (green) 1720 to 5600 KC; and the Foreign Short Wave Band (red) 5 to 18 MC.
FIG. 2--PARTS LAYOUT--Top View

FIG. 3--PARTS LAYOUT--Bottom View

CONVENTIONAL ALIGNMENT. SEE SPECIAL SECTION VOLUME VIII
Delco Model R-1120

Date: 1-5-37

If. 465 K.C.

GENERAL: The Delco Model R-1120 is a five tube, three band, table model.

110 volt 60 cycle A.C. radio with A.V.C. and tone control.

The frequency ranges on the three bands covered are: American Broadcast
Band 120 to 540 Kilocycles, Police-Amateur Band 1.8 to 5.8 megacycles
and the Foreign Short Wave Band 5.8 to 18.1 megacycles.

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MODEL R120 Delco
Socket, Trimmers
Chassis, Alignment
The frequency range of the Model R-1125 is from 535 to 1720 K.C.

I.F. 465 K.C.
Adjust IF trimmers in order of sequence - F, E, D, C.
Adjust O.C. Trim "B" at 1720 K.C.
Adjust Ant. Trim "A" at 1400 K.C.
Adjust Osc. Series Padder "12" at 900 K.C.
Use caution, only small variation is possible on "12" DUMMY ANT.-IF.-1pr.
.25 Mfd., and .0002 Mfd.

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The Delco Model R-1127 is a six tube, three band, receiver with A.V.C., tone control and "Robot" tuning eye. The complete tube complement is as follows: 6A8G Detector-Oscillator, 6U7G I.F. Amplifier, 6Q7G 2nd Detector, A.V.C. and 1st Audio Amplifier, 6K6G Output, 5W4G Rectifier and a 6U5 tuning eye.

The frequency range on the three bands covered are: American Broadcast Band 540 to 1720 K.C., Police and Amateur Band 1700 to 5600 K.C., and the Foreign Short Wave Band 5.5 to 18.0 M.C.
DIAL SETTING CHECK: Turn the tuning knob until the rotor plates of the condenser gang are fully meshed. The dial pointer should now be on the black horizontal line below 530 K.C. on the dial. This check should be made before attempting any trimmer adjustments.

1. Peaking 1-F Stages at 465 K.C.
(a) Connect the signal lead of the signal generator to the grid cap of the 6AG7 tube through a 1 or 25 mfd. condenser. DO NOT REMOVE THE CLIP LEAD FROM THE TUBE.
(b) Connect the ground lead of the signal generator to the receiver chassis.
(c) Place the signal generator in operation at 465 K.C.
(d) Turn the range switch to the broadest position (fully clockwise).
(e) Set the receiver dial pointer to the 100 K.C. point BETWEEN STATIONS.
(f) Turn the receiver volume control to the maximum position.
(g) Adjust the four 1-F trimmers, A, B, C and D on the two 1-F coils, (Fig. 2), carefully for maximum output in the following sequence A-B-C-D. Then repeat the four trimmer adjustments.

2. Adjusting the Wave Trap
(a) Connect the signal generator to the antenna terminal through a 400 or 500 ohm carbon resistor.
(b) Adjust the signal generator to 465 K.C.
(c) Turn the volume control on full.
(d) Set the dial pointer to about 1000 K.C. BETWEEN STATIONS.
(e) Adjust the wave trap trimmer, Illus. #1, (Fig. 3), for MINIMUM output, increasing the oscillator output as necessary to obtain a clearly defined point of minimum output.

3. Aligning at 16 M.C. (16,000 K.C. Foreign Wave Band)
(a) Turn the range switch to the Foreign Band position (extreme counterclockwise).
(b) Set the dial pointer to 16 megacycles.
(c) Apply a 16 M.C. Signal to the A and G terminals of the receiver through a 400 or 500 ohm carbon resistor.
(d) Adjust the Foreign Band oscillator parallel trimmer, Illus. #55, (Fig. 3), to maximum output. Check to see if it has been adjusted to the proper peak by tuning the receiver to approximately 10.1 M.C. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retrace the receiver to 16 M.C. and readjust the trimmer. Illus. #55, (Fig. 3), the proper peak is the one with the trimmer screw farthest out (least capacity).
(e) Adjust the Foreign Band antenna trimmer, Illus. #50, (Fig. 2), to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the dial until a minimum output meter deflection is secured.
(f) Check the adjustment by tuning the receiver to the image at about 10.1 M.C. The image should be much weaker than the 16 M.C. signal. If the image is equal to or stronger than the 16 M.C. signal, the trimmer, Illus. #50, is not at the proper peak. Turn the trimmer in a turn or so, then readjust as above.

Aligning at 3 M.C. (3,000 K.C. Police Band)
(a) Place the signal generator in operation at 5 M.C. and apply the signal to the A and G terminals of the receiver through a 400 or 500 ohm carbon resistor.
(b) Turn the dial pointer to 5 megacycles and the band change switch to the Police Band (center) position.
(c) Adjust the Police Band oscillator parallel trimmer, Illus. #54, (Fig. 3), for maximum output. If there are two peaks, the proper one is with the trimmer screw farthest out (least capacity).
(d) Adjust the Police Band antenna parallel trimmer, Illus. #51, (Fig. 2), to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the receiver dial. If this causes the output to go down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured.

Aligning at 1500 K.C. (Broadcast Band)
(a) Place the signal generator in operation at 1500 K.C. and apply a 1500 K.C. signal to the A and G terminal of the receiver through a 400 or 500 ohm carbon resistor.
(b) Turn the range switch to the Broadest position (fully clockwise) and set the dial pointer to 1500 K.C.
(c) Adjust the Broadband oscillator parallel trimmer, Illus. #55, (Fig. 3), to maximum output.
(d) Adjust the Broadband Band antenna parallel trimmer, Illus. #52, (Fig. 3), to maximum output.

Aligning at 600 K.C. (Broadcast Band)
(a) Leave the signal generator connected as above but readjust to 600 K.C.
(b) Tune in the 600 K.C. Signal generator signal with the receiver dial for maximum output. (This point does not have to be exactly at the 600 K.C. dial setting.)
(c) Adjust the Broadband Band oscillator tracking condenser, Illus. #8, (Fig. 3), thus, rocking the tuning condenser plates back and forth through resonance until no further increase in output can be obtained.
(d) Repeat operations under paragraph 5, "Aligning at 1500 Kilocycles" for accurate adjustments.
The Delco Models R-1128 (Table) and R-1129 (Console) are seven tube, three band receivers with A.V.C., tone control and Robot Eye tuning indicators. Both of these models employ the same chassis and use octal base glass type tubes.

The frequency ranges on the three bands covered are: American Broadcast Band, 555 to 1720 K.C.; Police and Amateur Band, 1650 to 3500 K.C.; and the Foreign Short Wave Band, 5.2 to 18.1 M.C.

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Voltage, Alignment

UNITED MOTORS SERVICE

MODELS RL128, RL129 Delco

Aligning

1. Aligning at 1200 and 1550 Kilocycles (Broadcast Band)
   (a) Connect the signal lead of the Signal Generator to the antenna terminal on the chassis through a 000 mica condenser. Leave signal generator ground lead connected to the receiver chassis.
   (b) Place Signal Generator in operation at 1200 K.C.
   (c) Turn dial pointer to 1200 K.C. setting (gang condenser open).
   (d) Adjust the oscillator trimmer condenser "F", Illus. 36 (Fig. 4) to maximum output.
   (e) Place Signal Generator in operation at 1550 K.C.
   (f) Turn dial pointer until 1550 K.C. signal is tuned in with maximum output.
   (g) Adjust the detector parallel trimmer condenser "D", Illus. 33 (Fig. 4) to maximum output.
   (h) Adjust the pre-selector parallel trimmer condenser "A", Illus. 14A (Fig. 3) to maximum output.
   (i) Turn the receiver volume control to the maximum position.

2. Aligning at 600 Kilocycles (Broadcast Band)
   (a) Place Signal Generator in operation at 600 K.C.
   (b) Tune in the 600 K.C. signal with the receiver dial for maximum output.
   (c) Adjust the oscillator tracking condenser, Illus. 13 (Fig. 4) while rocking the tuning condenser plates back and forth through resonance until no further increase in output can be obtained.
   (d) Repeat operations under paragraph #2 "Aligning at 1200 and 1550 Kilocycles" for accurate adjustments.

3. Aligning at 17 Megacycles (Foreign Band)
   (a) Place the Signal Generator in operation at 17 megacycles.
   (b) Turn dial pointer to 17 megacycles and turn band change switch to the Foreign Band (fully clockwise).
   (c) Adjust the oscillator parallel trimmer condenser "B", Illus. 37 (Fig. 4) to maximum output.
   (d) Adjust the antenna trimmer condenser "B", Illus. 34 (Fig. 4) to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the dial until a maximum output meter deflection is secured.
   (e) Check the adjusters by tuning the receiver to the image at about 16.1 M.C. The image should be much weaker than the 17 M.C. signal. If the image is equal to or stronger than the 17 M.C. signal, trimmer "E", Illus. 39, is not at the proper peak. Turn the trimmer out a turn or two, then readjust as above.

4. Aligning at 5 Megacycles (5000 K.C. Police Band)
   (a) Place Signal Generator in operation at 5 megacycles.
   (b) Turn dial pointer to 5 megacycles and turn band change switch to the Police Band (center position).
   (c) Adjust the oscillator parallel trimmer condenser "C", Illus. 37 (Fig. 4) for maximum output. If there are two peaks, the proper one is with the trimmer screw farthest out (less capacity).
   (d) Adjust the antenna trimmer condenser "C", Illus. 34 (Fig. 4) to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the receiver dial. If this causes the output to go down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured.

Voltage measurements made with a D.C. voltmeter having a resistance of 1000 ohms per volt. A.C. line voltage--115 volts.
The frequency ranges on the three bands covered are:

- **American Broadcast Band**: 540 to 1720 K.C.
- **Police and Amateur Band**: 1.7 to 5.6 M.C.
- **Foreign Short Wave Band**: 5.5 to 18 M.C.

### Tube Socket Voltages

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</table>

* A.C. Tuning Eye Target Voltage: 230 volts.

Voltage measurements (except heaters) made with 1000 ohm per volt D.C. voltmeter from tube socket contacts to ground.

**Note A:** The bias on the control grids of the 6L7G, 6K7 and 6U5 tubes is -2.5 volts measured across resistors 53 and 54.

**Note B:** The bias on the control grid of the 6F5 tube is -1.2 volts measured across resistor 53.

**Note C:** The bias on the control grid of the 6V6G tube is -14 volts measured across resistors 53, 54 and 55.
The receiver should be aligned in a location free from local interference (interference caused by motors, flashers, automobile ignition, etc.) as high frequency disturbances will make it difficult to adjust the short wave circuits.

DIAL SETTING CHECK: Turn the tuning knob until the rotor plates of the condenser bank are fully mutualized. The dial pointer should be on the 510 K.C. line on the dial. This check should be made before attempting any trimmer adjustments. Alignment of the chassis MUST be in the following order:

1. Peaking I-F Stages at 465 K.C.
   - (a) Connect the signal lead of the signal generator to the grid tap of the 6F4G tube through a .1 or .22 mfd. condenser. DO NOT REMOVE THE GRID CLIP FROM THE TUBE.
   - (b) Connect the ground lead of the signal generator to the receiver chassis.
   - (c) Place the signal generator in operation at 465 K.C.
   - (d) Set the receiver band switch to the broadcast position (fully clockwise).
   - (e) Set the dial pointer at the 1000 K.C. BETWEEN STATIONS.
   - (f) Turn the volume control full on (to extreme clockwise position).
   - (g) Adjust the four I-F trimmers, A, B, C and D on the two I-F coils, Illus. #62 and 63, carefully for maximum output in the following sequence—A-B-C-D. Then repeat the four trimmer adjustments.

2. Adjusting the Wave Trap
   - (a) Place the signal generator in operation at 465 K.C. and connect it to the receiver "A" terminal with a 400 or 500 ohm carbon resistor in series. (Leave the "D" and "G" terminals connected together during the complete alignment.) Connect the grid lead of the signal generator to the "G" terminal.
   - (b) With the volume control full on and the range switch in the broadcast position, tune the set to about 1000 K.C. BETWEEN STATIONS.
   - (c) Adjust the wave trap trimmer, Illus. #1, (Fig. 2), for minimum output, increasing the signal generator output as necessary to obtain a clearly defined point of minimum output.

3. Aligning at 16 K.C. (16,000 K.C. Foreign Band)
   - (a) Place the signal generator in operation at 16 K.C. leaving it connected to the "A" terminal of the set through a 400 or 500 ohm carbon resistor, and with the grid lead connected to the "G" terminal as above.
   - (b) With the volume control full on, turn the range switch to the Foreign Band position (fully counter-clockwise) and tune the receiver dial pointer to 16 K.C.
   - (c) Adjust the Foreign Band oscillator parallel trimmer, Illus. #17, (Fig. 3), to maximum output. Check to see if it has been adjusted to the proper peak by tuning the receiver to approximately 15.1 K.C. A repeat signal should be heard at this point. If none is present, even with greatly increased signal generator output, reduce the receiver to 16 K.C. and adjust the trimmer, Illus. #17, to the proper peak with the trimmer screw farther out (least capacity).

   - (a) Place the signal generator in operation at 5 K.C. leaving it connected to the "A" terminal of the set through a 400 or 500 ohm carbon resistor.
   - (b) With the volume control full on turn the range switch to the Police and Amateur Band position (center position), and tune the receiver dial pointer to 5 K.C.
   - (c) Adjust the oscillator parallel trimmer, Illus. #18, (Fig. 3) to maximum output. If there are two peaks, the proper one is with the trimmer screw farthest out (least capacity).
   - (d) Adjust the antenna parallel trimmer, Illus. #6, (Fig. 2), to maximum output. Then try to increase the output by detuning the trimmer slightly and retuning the receiver dial. If this causes the output to go down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output is secured.

5. Aligning at 1000 K.C. (Broadcast Band)
   - (a) Place the signal generator in operation at 1000 K.C. leaving it connected to the "A" terminal of the set through a 400 or 500 ohm carbon resistor.
   - (b) With the volume control full on turn the range switch to the Broadcast position (fully clockwise) and tune the receiver dial pointer to 1500 K.C.
   - (c) Adjust the oscillator parallel condenser, Illus. #19, (Fig. 5), to maximum output.
   - (d) Adjust the preselector trimmer, Illus. E, (Fig. 2), to maximum output.

6. Aligning at 600 K.C. (Broadcast Band)
   - (a) Place the signal generator in operation at 600 kilocycles leaving it connected to the "A" terminal of the receiver through a 400 or 500 ohm carbon resistor.
   - (b) With the volume control full on and the range switch in the Broadcast Band position, tune the receiver to the 600 K.C. signal generator signal for maximum output. (This point does not have to be exactly at the 600 K.C. dial setting.)
   - (c) Adjust the oscillator tracking condenser, Illus. #22, (Fig. 2), while rocking the tuning condenser plate back and forth through present, even with greatly increased signal generator output, no further increase in output can be obtained.

(d) Repeat operations under paragraph 5, "Aligning at 1500 Kilocycles" for accurate adjustments.
The Delco Model R-1131 is a nine tube, three band, all wave receiver with A.V.C., "Robot" tuning eye, automatic bass compensation, tone control and permeability tuned--iron core I-F transformers. Seven of the tubes in this receiver are of the metal type, and two are of the glass type. The tube complement is as follows: 6K7 R-F Amplifier, 6L7 Modulator, 6C5 Oscillator, 6K7 I-F Amplifier, 6H6 2nd Detector and A.V.C., 6F5 Audio Amplifier, 6L6 Audio Output, 5Y3G Rectifier and a type 6U5 Tuning Eye.
The receiver should be aligned in a location free from local interference. 

Alignment of the chassis MUST be in the following order:

1. Packing 1-F Stages at 45 Kilocycles (a) Connect the signal lead of the signal generator to the grid clip of the 6F7 tube through a .1 or 25 mfd. condenser. DO NOT REMOVE THE GRID CLIP FROM THE TUBE.
(b) Adjust the ground lead of the signal generator to the chassis.
(c) Place the signal generator in operation at 45 KC.
(d) Set the receiver band switch to the broadcast position (counter clockwise).
(e) Set the dial pointer at any point where it does not affect the signal.
(f) Turn the volume control full on (to extreme clockwise position).
(g) Adjust the four 1-F trimmers A, B, C, and D on the (2) 1-F coils, Illus. 63 and 84, Fig. 2, carefully for maximum output in the following sequence- A, B, C and D. Then repeat the four trimmer adjustment. During alignment, maintain as close a signal output from the signal generator as is consistent with obtaining at least half scale indication on the output meter.

2. Adjusting the Wave Trap
(a) Place the signal generator in operation at 45 KC and connect it to the receiver A terminal with a 400 or 500 ohm carbon resistor in series. (Leave the D and C terminals connected together during the alignment.) Connect the ground lead of the signal generator to the G terminal.
(b) With the volume control full on and the range switch in the broadcast position, tune the set to about 1500 KC, BETWEEN SCALES.
(c) Adjust the wave trap trimmer, Illus. B, Fig. 3, for minimum output, increasing the signal generator output as necessary to obtain a clearly defined point of minimum output.

3. Aligning at 1500 Kilocycles (Broadcast Band)
(a) Place the signal generator in operation at 1500 kilocycles leaving it connected to the A terminal of the set through a 400 or 500 ohm carbon resistor.
(b) With the volume control full on turn the range switch to the broadcast position (counter clockwise) and tune the receiver dial pointer to 1500 KC.
(c) Adjust the oscillator trimmer condenser, Illus. 20, Fig. 3, to maximum output.
(d) Adjust the antenna trimmer, Illus. 16, Fig. 3, to maximum output.
(e) Adjust the detector trimmer, Illus. 21, Fig. 3, to maximum output.

4. Aligning at 600 Kilocycles (Broadcast Band)
(a) Place the signal generator in operation at 600 kilocycles leaving it connected to the A terminal of the receiver through a 400 or 500 ohm carbon resistor.
(b) With the volume control full on and the range switch in the Broadcast Band position, tune the receiver to the 600 KC signal generator signal for maximum output. (This point does not have to be exactly at the 600 KC dial setting.)
(c) Adjust the oscillator tuning condenser, Illus. 26, Fig. 3, while rocking the tuning condenser plate back and forth through resonance until no further increase in output can be obtained.
(d) Repeat operations under "Aligning at 1500 Kilocycles" for accurate adjustments.
The Delco Model R-1132 is a twelve tube, three band, all wave receiver with the entirely new and different "Delcomic Tuner". Other features which this receiver embodies are A.V.C., "Robot" tuning eye, A.F.C., automatic bass compensation, tone control and permeability tuned iron core I-F transformers. Ten of the tubes in this receiver are of the metal type, and two are of the glass type. The tube complement is as follows: One type 6K7 R-F amplifier, one type 6L7 modulator, one type 6C5 oscillator, one type 6K7 1st I-F amplifier, one type 6K7 2nd I-F amplifier, one type 6H6 second detector, A.V.C., and discriminator, one type 6C5 1st audio, two type 6V6 audio output, one type 5U4G rectifier, and one type 6U5 tuning eye.

**FIG. 5 -- CIRCUIT DIAGRAM**

**DELCO MODEL R-1132**

Date: 10-1-37

**UNITED MOTORS SERVICE**
Before starting to thread the dial drive cord, note that the gang condenser is fully meshed (plates fully closed). Insert one end of the cord through the upper eye on Drum "A" and knot it on the inside of the drum. Thread the cable over pulley "B" to the lower side of pulley "C", returning over pulley "D" to the upper side of pulley "G", thence to the rear of pulley "B". Lead the cord under pulley "E" and up to the front of drum "A". Wind two complete turns around drum "A", thread the cord through the lower eyelet on the drum and tie the end to the tension spring. Adjust the length of the cord so that the tension will be maintained on the cord when the spring is fastened to the small clip on the inside of the drum. Set the dial pointer to the last division on the left of the broadcast band scale, and clip the cord to the pointer slider.

INSTALLING THE BAND INDICATOR CORD

Before starting to thread the band indicator cord, tie a knot loosely in one end of the cord so that the tension spring may be connected to it. Tie a full knot about 3 inches from the knotted end of the cord. Place the range switch in the short wave position.

To thread the cord, take the end which has not been knotted and wind one complete turn around drum "F", winding the turn from front to back. The cord should pass under the small metal pin which spans the drum. Loop the cord around the pin and wind one more complete turn around the drum. Run the knotted end of cord under pulley "H" to the lower side of pulley "I" and make one complete turn around "I". Insert the knot which has been tied 3 inches from the end of the cord into the slot in the pulley "I", and adjust the position of the dial scale so that the end of the pointer comes opposite the horizontal line across the dial scale. When the cord between the pulley "I" and "H" is fairly taut, run the free end of the cord under pulley "G" and tie it to the tension spring. Adjust the length so that the tension will be maintained when the free end of the spring is connected to the knot at the other end of the cord. If the scale is not in exact alignment with the pointer, loosen the set screw which holds pulley "I" to the range switch shaft and adjust for correct position.

CIRCUIT ALIGNMENT

Individual coils and trimmer condensers are provided for each band, so that each circuit can be adjusted to give maximum efficiency on every tuning range. If realignment is found necessary, the circuits can be properly adjusted only with the use of a calibrated signal generator and an output meter.

The receiver should be aligned in a location free from local interference (interference caused by motors, flashers, automobile ignition, etc.) as high frequency disturbances will make it difficult to adjust the short wave circuits.

DIAL AND CAM SETTING CHECK: Turn the tuning knob until the rotor plates of the condenser gang are fully meshed. If the condenser will not close completely, proceed to loosen the set screws on the brace dial drive gear at the left side of the receiver and also the set screw on the flexible coupler on the gang condenser shaft. Then press the gang condenser plates closed and set the dial pointer to the 500 K.C. line on the dial scale by turning the cord drive drum on the left side of the mechanism. This check should be made before attempting any trimmer adjustment.

Alignment of the chassis MUST be in the following manner:

1st - Intermediate frequency 5th - A.F.C. alignment
2nd - Wave trap 6th - Police and amateur band
3rd - Broadcast band (1500 K.C.) 7th - Short wave band
1. Peaking I-F Stages at 455 Kilocycles Delco Model R-1132 Date: 10-1-37

(a) Connect the signal lead of the signal generator to the grid cap of the 6L7 tube through a .1 or .25 mfd. condenser. DO NOT REMOVE THE GRID CLIP FROM THE TUBE.

(b) Connect the grid lead of the signal generator to the receiver chassis and leave it connected throughout the entire alignment procedure.

(c) Place the signal generator in operation at 455 K.C.

(d) Set the receiver band switch to the broadcast position (counter clockwise).

(e) Set the A.F.C. switch to the MANUAL TUNING POSITION (center position).

(f) Set the dial pointer at any point where it does not affect the signal.

(g) Turn the volume control full on (to extreme clockwise position).

(h) Adjust the six trimmers A, B, C, D, E and F on the three I-F coils, Illus. 109, 110 and 111 (Figs. 6 & 7), carefully for maximum output. (This point does not have to be exactly at 455 K.C. between stations.

(i) Adjust the wave trap trimmer, Illus. G, (Fig. 6.) for MINIMUM output, increasing the signal generator output as necessary to obtain a clearly defined point of minimum output.

2. Adjusting the Wave Trap

(a) Place the signal generator in operation at 455 K.C. and connect it to the receiver A terminal with a .002 mfd. mica condenser in series. (Leave the D and E terminals connected together during the complete alignment.)

(b) With the volume control full on, the range switch in the broadcast position, and the A.F.C. switch in the manual (center) position tune the set to about 1000 K.C. BETWEEN STATIONS.

(c) Adjust the wave trap trimmer, Illus. G, (Fig. 6.) for MINIMUM output, increasing the signal generator output as necessary to obtain a clearly defined point of minimum output.

3. Aligning at 1500 Kilocycles (Broadcast Band)

(a) Place the signal generator in operation at 1500 kilocycles leaving it connected to the Aterminal of the set through the .002 mfd. mica condenser.

(b) With the volume control full on, turn the range switch to the broadcast position (counter-clockwise) and tune the receiver dial pointer to 1500 K.C. BE SURE THAT A.F.C. SWITCH IS IN THE MANUAL (CENTER) POSITION.

(c) Adjust the oscillator parallel trimmer, Illus. 35, (Fig. 6.) to maximum output.

(d) Adjust the antenna parallel trimmer, Illus. 18, (Fig. 6.) to maximum output.

(e) Adjust the detector parallel trimmer, Illus. 22, (Fig. 6.) to maximum output.

4. Aligning at 600 Kilocycles (Broadcast Band)

(a) Place the signal generator in operation at 600 kilocycles leaving it connected to the A-terminal of the receiver through a .002 mfd. mica condenser.

(b) With the volume control full on, turn the range switch to the broadcast position, and the A.F.C. switch in the manual (center) position, tune the receiver to the 600 K.C. signal for maximum output. (This point does not have to be exactly at the 600 K.C. dial setting.)

(c) Adjust the oscillator tracking condenser, Illus. 38, (Fig. 6.) while 'rocking' the tuning condenser plates back and forth through resonance until no further increase in output can be obtained.

(d) Repeat operations under 'Aligning at 1500 Kilocycles' for accurate adjustments.

5. Automatic Frequency Control Alignment (A.F.C.)

(a) Place the signal generator in operation at 455 K.C. and couple it loosely to the 6L7 grid (connect the oscillator signal lead to the insulation on the grid lead of the 6L7). Switch off the modulation of the signal generator.

(b) Leave the A.F.C. switch in the manual (non A.F.C. or center) position.

(c) Connect the antenna A post to an outside aerial.

(d) Tune in a strong local station in the region of 1000 K.C. or lower (avoid stations around 900 K.C. which might beat with the second harmonic of the signal generator).

(e) Tune the receiver to zero beat (UNTIL AUDIO WHISTLE VANISHES COMPLETELY. (Tuning to either side of zero beat will cause the whistle to be heard.)


(g) If the A.F.C. system is out of alignment, the best note or whistle will again appear. If the best note is heard adjust the discriminator trimmer, Illus. F, (Fig. 6), until zero beat is again obtained.

(h) If the above procedure has been followed correctly, opening or closing the A.F.C. switch will have no effect on zero beat.

Alternate Method of A.F.C. Alignment

(For Signal Generators Necessary)

(a) Connect one of the signal generators to the antenna A terminal and place it in operation at 1000 K.C. The 1000 K.C. signal should be unmodulated and its output should be rather high.

(b) Now proceed to connect the other generator as described in the previous method and place it in operation at 455 K.C. (unmodulated).

(c) The remaining procedure is the same as in a, E, G and H of the previous method of A.F.C. alignment.

NOTE: This method in preferable to the first as both signals being unmodulated, the zero beat setting is more easily distinguished.

5A. Aligning at 3 Megacycles (1000 K.C. Police Band)

(a) Place the signal generator in operation at 3 megacycles leaving it connected to the A terminal of the set through .002 mfd. mica condenser.

(b) With the volume control full on, turn the range switch to the police and amateur band position (center position). Then tune the receiver dial pointer to 3 megacycles.

(c) Adjust the oscillator parallel trimmer, Illus. 34, (Fig. 6.), to maximum output. If there are two peaks, the proper one is with the trimmer screw farther out. (Least capacity.)

(d) Adjust the antenna parallel trimmer, Illus. 17, (Fig. 6.), to maximum output. Then try to increase the output by detuning the trimmer slightly and returning the receiver dial. If this causes the output to go down, detune the trimmer in the opposite direction. Continue detuning the trimmer and returning the receiver dial until maximum output meter deflection is secured.

(e) Adjust the detector parallel trimmer, Illus. 22, (Fig. 6.), to maximum output. Try to increase output by rocking the dial through resonance and returning the trimmer until maximum output is obtained.

6. Aligning at 16 Megacycles (16,000 K.C. Foreign Band)

(a) Place the signal generator in operation at 16 megacycles leaving it connected to the A terminal of the set through a .002 mfd. mica condenser.

(b) With the volume control full on, turn the range switch to the foreign band position (fully clockwise), and tune the receiver dial pointer to 16 megacycles.

(c) Adjust the oscillator parallel trimmer, Illus. 33, (Fig. 6.), to maximum output. Check to see if it has been adjusted to the proper peak by tuning the receiver to approximately 15.1 megacycles. A repeat signal should be heard at this point. If none is present even with greatly increased signal generator output, return the receiver to 15 K.C. and adjust the trimmer, Illus. 33, to the proper peak with the trimmer screw farther out.

(d) Adjust both the antenna trimmer, Illus. 16, (Fig. 6.), and the detector parallel trimmer, Illus. 26, (Fig. 6.), to maximum output. Then try to increase the output by detuning the trimmer slightly and returning the dial until a maximum output meter deflection is obtained.

Check the adjustment by tuning the receiver to the image at about 15.1 K.C., the image should be much weaker than the 16 K.C. signal. If the image is equal to or stronger than the 16 K.C. signal, trims no. 16 and 26 are not at the proper peak. Turn the trimmer in a turn or so, then readjust as above.
The "Delomatic Tuner" is a mechanical device which has for its prime purpose the accurate, noiseless and speedy tuning of a station, by the mere push of a button. This function is performed in the following manner:

As the push button on the keyboard is depressed, a pawl arm at the rear of the tuning shaft will engage the drive disc, thus causing a circular rotation. It will be noted that those cases have two different heights (that is, a high and a low side). The purpose of the two different levels will be self-evident as the operation progresses.

Projecting from the rear of the unit is a set of switches which are actuated by a Bakelite cam arm. This arm is in turn operated by the movement of the pawl. Therefore, it is readily seen that the position of the pawl arm will control the setting of the electrical contacts of the switches in question.

Also located directly above the tuning shaft will be found an auxiliary pair of contacts known as the power contacts.

Before any button is depressed or with the tuner in the manual tuning position, all contact switches are in the position shown in Figure 1.

Now as a button is depressed, the power contacts will automatically be closed and the pawl arm will fall forward to rest upon either the high or the low side of the cam, depending upon its position. This will move the Bakelite switch arm to the position shown in Figures 2 or 3. (See Note below.) In either of these positions, the reversing contact will be closed (this contact governs the direction of travel) of the tuner in order that the pointer may travel directly to the station. Also, with the Bakelite arm in this position, the starting contacts will close, supplying power to start the motor.

The mute contacts will be closed in order that no noise or signal may come through the set until the station is properly tuned in.

Lastly, the A.F.C. contacts are also closed, at the same time, and this serves to remove A.F.C. until the station is tuned in, thus eliminating the possibility of "grappling" the wrong station before the tuner can rest.

Now the motor proceeds to drive the mechanism to the proper position for the desired station and as it comes to rest, the following events will occur.

First, the pawl arm will fall into a notch in the circular cam. This in turn causes the Bakelite cam arm to rest the rear contact switches in a new position where all contacts are now open and the motor power supply is cut off; also, the mechanism is at rest.

NOTE: IN CHECKING THESE POSITIONS BE SURE TO TURN THE POWER OFF.

The A.F.C. and mute contacts are both open, thus allowing the signal to come through the receiver and also allowing the A.F.C. to function which in turn puts the finishing touches on a perfectly tuned-in program. This position of the switch showing the tuning shaft is tuned in is shown in Figure 4.

Thus we have completed one entire cycle from push button to the completely tuned program, utilizing the Delomatic Tuner.

There remain, however, two mechanical features which may be of interest to the service man. One of these is a small gear which drives the tuning shaft. When changing from manual tuning to auto tuning, the button is released by merely turning the tuning knob. This is accomplished by the star gear in question, which pushes the kick-out bar, thus releasing the button.

The second feature mentioned is the friction drive of the tuning mechanism. The rubber ring on the end of the motor shaft engages a metal drive disc on the tuning shaft which serves to drive the mechanism when in the manual tuning position.

Should slippage between these parts occur, due to wear, it is possible to increase the contact pressure by loosening the set screw of the drive disc on the motor shaft. When this is done, then push the rubber wheel to a closer contact and re tighten the set screw.

NOTE: DO NOT ATTEMPT TO OPERATE DELOMATIC TUNER ON ANY VOLTAGE LOWER THAN 105 VOLTS A.C.

SERVICING DELOMATIC TUNER

1. Be sure the principle of operation, both electrically and mechanically is understood before attempting to service the Delomatic Tuner.

2. Do not attempt to operate Delomatic Tuner on any voltage lower than 105 volts A.C.

3. In case of trouble, first check switch contact positions with A.F.C. power. You should find 1 to 6 to be correct. If not, then you should proceed as illustrated. If switch contact springs do not correspond to those illustrated, adjust complete switch assembly by loosening the two screws in the switch support bracket and moving entire switch assembly so that their respective contact positions line up with those as illustrated. Tighten screws in support bracket firmly after proper switch adjustment has been made. If satisfactory operation of switch cannot be obtained by this adjustment, certain of the switch contact springs may be out of adjustment. In this case, if adjustment is required to move one or more switch contacts, excess movement in brackets firmly after proper switch adjustment has been made. If satisfactory operation of switch cannot be obtained by this adjustment, certain of the switch contact springs may be out of adjustment. In this case, if adjustment is required to move one or more switch contacts, excess movement in brackets firmly after proper switch adjustment has been made.

4. A clutch is provided on the main assembly shaft to absorb the shock from the motor when the pawl drops down into the cam slots. Clutch action is obtained by pressure of a small horseshoe shaped spring against the #101050 Drive Gear and Bushing. Thus, if this clutch slips it will be necessary to remove any oil or grease with carbon tetrachloride, which may have entered the clutch. If after cleaning any oil or grease between the gear and spring, the clutch continues to slip, it will then be necessary to replace the spring, Part #101165.1

5. If motor runs slow and line voltage is over 105 volts, check all mechanical parts to see that they turn freely with power off.

6. If motor does not operate, check to see that switch or front of contacts is in an A.F.C. position. Also, when button is depressed, the motor power contacts above tuning shaft and starting contacts on switch behind should be checked to see that they are closed. One set of reversing contacts, depending on whether pawl is on high or low side of cam, should also be closed.

7. It should be noted that when Delomatic Tuner is in the process of tuning a station, that the "mute" contacts short the control ends of the grid output tubes together. Also, that the "A.F.C." contacts are closed, causing the A.F.C. circuit to be inoperative until station new drops in cam slot.

Delco Model R-1132

Date: 10-1-37

"SETTING UP" THE DELOMATIC TUNER

1. Remove the knob on tuning control shaft which is the control in the upper right hand corner of the receiver panel. This knob may be removed by simply pulling it away from the panel. As this knob is removed another knob on the same shaft, partly hidden behind the panel face, will appear.

2. Grasp this knob and pull it out as far as it will go and at the same time "route" it so that the gears in the mechanism at the rear will mesh properly.

3. The knob should now be rotated to the right (clockwise) as far as it will go. BE SURE THAT THIS KNOB IS TURNED ALL THE WAY UNTIL IT REACHES A DEFinite STOP.

4. Push any button which you wish to set to a particular station. Be sure the button is pushed all the way in.

5. Grasp the small tuning control knob again and turn the receiver to the desired station. TUNE CAREFULLY MAKING USE OF THE "ROBOT EYE" TO BE SURE THAT YOU ARE CURRENTLY TUNED TO THE STATION IN QUESTION.

6. Push in the next button you wish to set. You will notice that as the second button is pushed in the first one will be released. Now tune in the next station that you wish to set up, again making use of the "robot eye" to be sure that you are correctly tuned to the station.

7. Repeat above operations until all buttons have been set to stations.

8. In order to release the last button, which now remains depressed, grasp the knob on the tuning control shaft and push it back into the cabinet as far as it will go and then pull it out again. Do not forget to "route" the control when pulling it out in order that its gears may mesh properly.

9. Turn the knob to the left until you reach a definite stop. A firm pressure must be applied, otherwise you will not lock all of the internal controls.

10. Push the small tuning knob back into the cabinet again and put on the large knob that was originally pulled off of this shaft at the start of operations.

The "automatic tuner" is now ready for operation and will tune to any station that you have previously selected by merely pushing the button for which that station was set. Labels bearing the names of all stations are supplied with the receiver for use in labeling the push buttons. To label the push buttons you must first remove the cap of the push button. The cap should be pulled off by pulling on the top end which has a small hump that holds the cap on. Then remove the white cardboard tab and insert the label for the station to which the button was set. In replacing the cap start at the bottom and press on the top.

11. The "automatic tuner" is now ready for operation and will tune to any station that you have previously selected by merely pushing the button for which that station was set. Labels bearing the names of all stations are supplied with the receiver for use in labeling the push buttons. To label the push buttons you must first remove the cap of the push button. The cap should be pulled off by pulling on the top end which has a small hump that holds the cap on. Then remove the white cardboard tab and insert the label for the station to which the button was set. In replacing the cap start at the bottom and press on the top.

12. IT IS NOT NECESSARY TO USE THE AUTOMATIC TUNER AGAIN UNLESS YOU DESIRE TO SET ANY ONE OF THE BUTTONS TO A DIFFERENT STATION.

13. IF YOU SHOULD DESIRE TO RETURN TO YOUR OLD STATIONS, SIMPLY TURN THE A.F.C. CONTROL KNOB (LOWER CENTER KNOB) TO THE CENTER POSITION. THIS WILL RE-TUNING THE AUTOMATIC TUNING MECHANISM COMPLETELY.

14. WHEN USING DELOMATIC TUNING THE A.F.C. CONTROL KNOB MUST BE TURNED TO THE EXTREME RIGHT HAND POSITION.

15. It is not advisable to set up the "automatic tuner" for operation on the Short Wave or Police band. However, the "tuner" may be set up for stations on the police band but extremely accurate tuning such as is obtained on the broadcast band cannot be expected. In this case the automatic tuner will only serve to give the approximate location of the station.
UNITED MOTORS SERVICE

MODEL R1132 Delco "Delomatic" Tuner Switch Data

FIG. 1--WIRING DIAGRAM--DELCOMATIC TUNER CIRCUIT.
SWITCHES SHOWN ABOVE IN MANUAL TUNING POSITION.

FIG. 2--DELCOMATIC TUNER SWITCHES SHOULD BE IN POSITIONS AS ILLUSTRATED WHEN STATION BUTTON IS DEPRESSED AND PAWL ARM RESTING ON HIGH SIDE OF CAM.

FIG. 3--DELCOMATIC TUNER SWITCHES SHOULD BE IN POSITIONS AS ILLUSTRATED WHEN STATION BUTTON IS DEPRESSED AND PAWL ARM RESTING ON LOW SIDE OF CAM.

FIG. 4--DELCOMATIC TUNER SWITCHES SHOULD BE IN POSITIONS AS ILLUSTRATED WHEN STATION IS TUNED IN AND MECHANISM IS AT REST.

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The Delco Model R-2050 is a five tube, two volt, two band, battery operated receiver with A.V.C. and a voltage regulator. The tubes use are: 1C6 Oscillator-Modulator, 34 I-F Amplifier, 1F6 Diode Detector—A.V.C. and 1st A-F Amplifier, 33 Power Output and a 5E1 Voltage Regulator.

The Delco Model R-2050 is a five tube, two volt, two band, battery operated receiver with A.V.C. and a voltage regulator. The tubes use are: 1C6 Oscillator-Modulator, 34 I-F Amplifier, 1F6 Diode Detector—A.V.C. and 1st A-F Amplifier, 33 Power Output and a 5E1 Voltage Regulator.

The band coverage of the R-2050 receiver is from 540 to 1720 kilocycles.

The receiver is designed to be operated from 3-45 volt "B" batteries and either a 3 volt dry "A" battery, a 2 volt wet storage battery, or an "Aircell" battery.

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1. Peaking I-F Stages at 465 Kilocycles
   (A) Connect the ground lead of the test oscillator to the chassis frame. Connect the other lead to the grid cap of the 106 tube through a .02 mfd. series condenser. DO NOT REMOVE THE GRID CLIP.
   (B) Set the test oscillator to exactly 465 kilocycles.
   (C) Turn the volume control of the receiver on full.
   (D) Peak each of the trimmers on the second I-F coil, Illus. #5 on Fig. 1.
   (E) Peak each of the trimmers on the first I-F coil, Illus. #4 on Fig. 1.
   (F) In order to assure accurate settings of the I-F trimmers the above adjustments should be repeated using the lowest test oscillator output that will give a reasonable output scale deflection.
2. Aligning R-F Circuits
   (A) Remove the test oscillator lead from the grid of the 106 tube and connect it to the receiver "Ant." terminal through a .00025 mfd. series condenser.
   (B) Check to see that the tuning dial has not slipped on the condenser gang shaft by turning the rotor plates of the gang condenser until they are completely out of mesh. At which point the dial pointer should be at the high frequency end of the dial calibration.
   (C) Set the test oscillator frequency and receiver dial to exactly 1720 kilocycles.
   (D) Adjust the trimmer mounted on top of the "Osc." section of the gang condenser, Illus. #6B on Fig. 1, to bring in the 1720 kilocycle test oscillator signal to maximum output.
   (E) Set the test oscillator frequency and the receiver dial to exactly 1400 kilocycles.
   (F) Adjust trimmer on top of the "Ant." section of the gang condenser, Illus. #6A on Fig. 1, for maximum output.
   (G) Set receiver dial at approximately 600 kilocycles, leave the test oscillator connected to the antenna and ground terminals of the receiver.
   (H) Set test oscillator frequency to 600 kilocycles.
   (I) Adjust the 600 kilocycle oscillator paddler condenser accessible through the hole in the top of the chassis adjacent to the gang condenser, while rocking the tuning condenser back and forth for maximum 600 kilocycle signal response.

Connect the set cable wires exactly as indicated on the cable markers. Remove the tubes from their sockets when hooking up batteries and recheck all connections before placing the tubes back in their sockets. The battery connections are as follows:

BATTERY CONNECTIONS

FIG. 2--PARTS LAYOUT--Top View Delco Model R-2050
Date: 9-3-36

FIG. 3--PARTS LAYOUT--Bottom View

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BATTERY CONNECTIONS

PLUG-IN TYPE CONNECTORS ARE ATTACHED TO ENDS OF SET BATTERY CABLE LEADS---INSERT THESE PLUGS INTO THE PROPER TERMINAL ON TOP OF BATTERIES AND ALL BATTERY CONNECTIONS WILL BE CORRECTLY MADE. IF BATTERIES USED HAVE SCREW TYPE OR FANNESTOCK TERMINALS REMOVE PLUGS FROM CABLE AND CONNECT WIRES IN ACCORDANCE WITH COLOR CODE.

Connect the set cable wires exactly as indicated on the cable markers. Remove the tubes from their sockets when hooking up batteries and recheck all connections before placing the tubes back in their sockets. The battery connections are as follows:

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1. Peaking I-F Stages at 465 Kilocycles
   (a) Connect the ground lead of the test oscillator to the chassis frame. Connect the signal lead to the grid cap of the 1C6 tube through a .1 mfd. series condenser. DO NOT REMOVE THE GRID CLIP.
   (b) Set the signal generator to exactly 465 kilocycles.
   (c) Turn the volume control of the receiver on full.
   (d) Peak each of the trimmers on the 2nd I-F coil, Illus. #3 on Fig. 2.
   (e) Peak each of the trimmers on the 1st I-F coil, Illus. #2 on Fig. 2.
   (f) In order to assure accurate settings of the I-F trimmers, the above adjustments should be repeated using the lowest signal generator output that will give a reasonable output scale deflection.

2. Aligning R-F Circuits
   (a) Remove the signal generator lead from the grid of the 1C6 tube and connect it to the receiver "Ant." terminal through a .00025 mfd. series condenser.
   (b) Check to see that the tuning dial has not slipped on the condenser gang shaft by turning the rotor plates of the gang condenser until they are completely out of mesh, at which point the dial pointer should be at the high frequency end of the dial calibration.
   (c) Set the signal generator frequency and receiver dial to exactly 1720 kilocycles.
   (d) Adjust the trimmer mounted on the "Osc." section of the gang condenser, Illus. #6A, Fig. 2, to bring in the 1720 kilocycle signal generator signal to maximum output.
   (e) Set the signal generator frequency and the receiver dial to exactly 1400 kilocycles.
   (f) Adjust trimmer on the "Ant." section of the gang condenser, Illus. #6A on Fig. 2, for maximum output.
   (g) Set receiver dial at approximately 600 kilocycles, leave the signal generator connected to the antenna and ground terminals of the receiver.
   (h) Set signal generator frequency to 600 kilocycles.
   (i) Adjust the 600 kilocycle oscillator padder condenser, Illus. #7, Fig. 3 accessible through the hole in the top of the chassis adjacent to the gang condenser, while rocking the tuning condenser back and forth for maximum 600 kilocycle signal response.

The SEI Voltage Regulator is used to maintain the filament voltage on the receiver tubes at the correct value of approximately 2 volts in order to adapt the receiver to operation on a 3 volt dry "A" battery and to take care of the normal charge to discharge battery voltage variations.

The Delco Model R-2055 is a five tube, two volt, single band, battery operated receiver with A.V.C. and a voltage regulator. The tubes used are: 1C6 Oscillator-Modulator, 34 I-F Amplifier, 1PS Diode Detector--A.V.C. and 1st A-F Amplifier, 33 Power Output and a SEI Voltage Regulator.

The band coverage of the R-2050 receiver is from 540 to 1720 kilocycles. The receiver is designed to be operated from 3-45 volt "B" batteries and either a 3 volt dry "A" battery, 2 volt wet storage battery, or an "Aircell" battery.
Models R-3208 & R-3209

Date: 8-5-36

UWU

FIG. 2

PARS LAYOUT--Top View

Models R-3208 & R-3209 Delco

Schematic, Socket

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1. Peaking I-F Stages at 450 Kilocycles
   (a) Connect the antenna of the signal generator to the control grid connection on top of the
       5A4 tube through a .32 mfd. series condenser. DO NOT REMOVE THE GRID CLIP.
   (b) Connect the ground terminal of the signal generator to the ground terminal of the re-
       ceiver.
   (c) Set the signal generator to exactly 450 kilocycles.
   (d) Rotate the receiver tuning condenser until the rotor plates are completely out of mesh.
   (e) Turn the band selector switch to the Red Band. (First position on left)
   (f) Adjust the line voltage to 32 volts.
   (g) Turn the volume control and sensitivity control knobs all the way to the right.
   (h) With the signal generator set to the lowest usable output level, adjust the I-F trimmer
       condensers for maximum signal output.

   NOTE: The I-F trimmers are located on top of the I-F coils, Fig. 1, and may be adjusted with
   an insulated screw driver. Always make the adjustments very carefully, going over them several
   times to insure that the final setting is at resonant frequency.

2. Aligning RF Circuits - Blue Band (460-4800 K.C.)
   (a) Turn the band selector switch to the first position on the right. (Blue Band)
   (b) Rotate the receiver tuning condenser until the rotor plates are completely IN WHE and
       adjust the dial pointer, if necessary, so that it is exactly horizontal.
   (c) Connect the antenna terminal of the signal generator to terminal on the rear of the re-
       ceiver through a .00025 df. blue series condenser.
   (d) Set the signal generator to 400 kilocycles.
   (e) Rotate the station selector until the rotor plates are completely OUT OF WHE.
   (f) Adjust the Blue Band "Ant." parallel trimmer (Fig. 2), for maximum output.

   NOTE: If electrical interference causes an excessive reading on the output meter, making
   alignment difficult, it can be reduced by connecting a 5 to 10 mfd. paper condenser between
   the ground terminal of the receiver and the chassis frame.
   (g) Adjust the Blue Band "R-F" parallel trimmer, (Fig. 2), for maximum output.
   (h) Adjust the Blue Band "Ant." parallel trimmer, (Fig. 2), for maximum output.
   (i) Repeat operations (f), (g) and (h) until no further improvement in output can be obtained.
   (j) Set the signal generator to 180 kilocycles.
   (k) Tune in the 180 kilocycle signal with the station selector in the region of 18 on the
       dial (Blue Band), for maximum reading on the output meter.
   (l) Adjust the Blue Band oscillator series trimmer, (Illus. #18, Fig. 2) while rocking the
       condenser gang plates back and forth slightly, until no further increase in output can be
       obtained.
   (m) Repeat operations (f), (g), and (h) for more accurate adjustments.

3. Aligning RF Circuits - Yellow Band (440-4000 K.C.)
   (a) Turn the band selector switch to the second position from the right. (Yellow Band)
   (b) Set the signal generator to 1400 kilocycles.
   (c) Rotate the station selector until the pointer points to 140. (Yellow Band)
   (d) Adjust the Yellow Band "Ant." parallel trimmer, (Fig. 2), for maximum signal output.
   (e) Adjust the Yellow Band "R-F" parallel trimmer, (Fig. 2), for maximum signal output.

   GENERAL: The Delco Models R-3208 (table model) and R-3209 (console model) employ the same chassis
   which is a tube, 32 volt, four band receiver. The tubes used are 6GS R-F amplifier, 6A7
   Oscillator-Modulator, 6GS I-F Amplifier, 6B Detector and 4F Amplifier and four type 48 output
   tubes in push-pull parallel.
FIG. 1--DELCO MODEL R-3212 CIRCUIT DIAGRAM & VOLTAGE CHART
Delco Model R-3212 is a nine tube, three band 32 volt operated superheterodyne receiver with AVC, tone control and an electro-dynamic speaker. The tubes used are: 6A7 Oscillator-Modulator, 6D6 R. F. Amplifier, 6D6 I. F. Amplifier, 75 Detector A.V.C and 76 Driver, and four type 46 Output Tubes in push-pull parallel.

The frequency ranges on the bands covered are: American Broadcast Band 540-1720 Kilocycles, Police and Amateur Band 2250 to 7500 Kilocycles, and the Foreign Short Wave Band 7.15-18.5 Megacycles.

Delco Model R-3212

Date: 9-7-37

A bottom view of the chassis is shown in Fig. 1 (Circuit Diagram) on which the voltages to ground at each of the tube socket contacts are indicated.

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MODEL R3212 Delco Alignment

Peaking I.F. Stages at 172 K.C.

(a) Connect the ground lead of the test oscillator to the chassis frame. Connect a .05 mfd. condenser in series with the other lead and connect this lead to the grid cap of the 847 tube. Leave the tube's grid cap in place. The .05 mfd. condenser is necessary to prevent the oscillator circuit of the receiver from affecting the I.F. adjustments.

(b) Set the test oscillator at 172 kilocycles.

(c) Tune the volume control of the receiver on full.

(d) Peak each of the I.F. trimmers on the 2nd I.F. coil. Illus. #9 on Fig. 1.

(e) Then peak each of the trimmers on the lst I.F. coil. Illus. #8 on Fig. 2.

NOTE: In order to insure accurate settings of the I.F. trimmers the above adjustments should be repeated using the lowest oscillator output that will give a reasonable output meter scale deflection. Make all adjustments for maximum output.

Peaking Gang Condenser at 1500 K.C.

(a) Connect the output of the test oscillator to the antenna connection of the receiver and to the chassis ground. (Do not use the .05 mfd. condenser that was required in adjusting the I.F. stages.)

(b) Turn the rotor plates of the gang condenser until they are COMPLETELY OUT OF MESH.

(c) Set the test oscillator at 1500 kilocycles.

(d) Adjust the trimmer for the oscillator section of the gang condenser (middle section) CIRCUIT CHANGES for maximum output. Then adjust the trimmers for the "B.F." and "ANT." sections of the gang condenser also for maximum output.

Tracking Oscillator at 340 K.C.

(a) Tune the condenser plates until they are COMPLETELY IN MESH.

(b) Set test oscillator at 340 kilocycles. (Leave test oscillator tuned to antenna and ground of receiver.)

(c) Adjust the oscillator tracking condenser (Illus. #6 on Fig. 3) located on the bottom of the chassis until the 340 K.C. signal is tuned in with maximum output.

Peaking Gang Condenser at 1400 K.C.

(a) Set the test oscillator at 1400 kilocycles.

(b) Turn the condenser rotor plates until the 1400 K.C. signal from the test oscillator is tuned in with maximum output.

(c) Readjust the parallel trimmers for the "B.F." and "ANT." sections of the gang condenser as above is adjusted at 1500 K.C. only, and any further adjustments at this point will affect both the tuning range of the receiver and the functioning of its circuits.

Adjusting Bezier to Car Antenna

NOTE: An antenna compensating condenser is provided in the antenna circuit of this receiver that must be adjusted to the particular car antenna the receiver is to be used on. The test oscillator cannot be used for this adjustment due to the fact that capacity of its output circuit will not match the wire range of antenna capacities being used.

Therefore, it is necessary that the adjustment be made after the receiver is installed in the car and is done in the following manner.

(a) Tune the receiver to a weak broadcast station on the low frequency end of the dial 550 to 700 K.C.

(b) Adjust the antenna compensating condenser for maximum response from the broadcast station. This condenser is shown as Illus. #25 on Fig. 5 and is located immediately to the rear of the speaker plug on the side of the receiver.

CIRCUIT CHANGES

On the parts R21000 Condenser Block, it will be found on some receivers that the sections having a black lead (18G) and blue lead (19G) are not used. Using the service replacement stock of parts R21000 Condenser Blocks, simply cut off either or both of the blue or black leads close to the block if they are not found on the defective block removed from the receiver. A number of receivers used a small tubular .01 mfd. condenser in place of the .01 section (18G) on this Condenser Block. If this condenser becomes defective—replace with a part R210000 Condenser.
The following changes have been made in the Circuit Diagram of the R-6011 receiver as shown in Fig. 1.

1. The .01 mfd. 1200-volt condenser, Illus. 32, connected across secondary of vibrator transformer was removed.

2. A 5000 ohm 1-watt resistor was added to the chassis and connected in series with condenser .01 mfd. Illus. #31.

3. A 150 ohm 1/3-watt resistor was added to the chassis and connected in the primary circuit of the vibrator transformer.
The frequency ranges on the bands covered are: American Broadcast Band (Yellow) 540 to 1720 kilocycles, Police and Amateur Band (Green) 1800 to 5800 kilocycles, and the Foreign Short Wave (Red) 5.8 to 18.3 megacycles.
1. Peaking 1-F Stages at 465 Kilocycles
   (a) Connect the ground lead of the test oscillator to the chassis frame. Connect the other lead to the grid cap of the 6A7 tube through a .1 mfd. series condenser. DO NOT REMOVE THE GRID CLIP.
   (b) Set the test oscillator to exactly 465 kilocycles.
   (c) Turn the volume control of the receiver on full.
   (d) Peak each of the trimmers on the 2nd I-F coil, Illus. #10 on Fig. 1.
   (e) Peak each of the trimmers on the 1st I-F coil, Illus. #9 on Fig. 1.
   (f) In order to ensure accurate settings of the I-F trimmers the above adjustments should be repeated using the lowest test oscillator output that will give a reasonable output meter scale deflection.

2. Aligning R.F. Circuits—Foreign Band (5.6-18.3 Megacycles)
   (a) Remove the test oscillator lead from the grid of the 6A7 tube and connect it to the receiver antenna terminal through a 400 ohm carbon resistor.
   (b) Check to see that the tuning dial has not slipped on the condenser gang shaft by turning the rotor plates of the gang condenser until they are completely out of mesh, at which point the dial pointer should be at the high frequency end of the dial calibration.
   (c) Set the test oscillator frequency and receiver dial to exactly 10.3 megacycles.
   (d) Adjust the 10.3 megacycle oscillator trimmer, Illus. #43 on Fig. 2, to bring in the 10.3 megacycle test oscillator signal with maximum output. NOTE: When adjusting this trimmer two peaks, the fundamental and the image peak will be noticed. CARE MUST BE TAKEN THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED.
   (e) Remove the trimmer from the receiver at 18.3 MEGACYCLES. Always back off the trimmer to minimum capacity, then screw down the trimmer (add capacity) until the first peak which is the fundamental and the proper one to use is tuned in. If the trimmer is screwed down beyond the point where the first peak is received, the incorrect image peak will be tuned in. After completing adjustment of the oscillator trimmer at 18.3 megacycles always check to see if the proper peak has been used. To do this leave test oscillator frequency at 18.3 megacycles, increase the output of the test oscillator and tune the receiver dial to approximately 17.3 megacycles. Then vary the receiver dial slightly to the right and left of 17.3 megacycles, and if the fundamental peak was used in adjusting at 18.3 megacycles the test oscillator signal will be heard at approximately 17.3 megacycles on the receiver dial. If it is not possible to receive the signal, then the fundamental peak was not used and the 18.3 megacycle oscillator trimmer must be properly rechecked.
   (f) Set the test oscillator frequency and the receiver dial to exactly 15 megacycles.
   (g) Adjust 15 megacycle antenna trimmer, Illus. #39 on Fig. 2, to maximum output.

3. Aligning R.F. Circuits—Police-Amateur Band (1.8-5.8 Megacycles)
   (a) Set test oscillator frequency and receiver dial to exactly 5.8 megacycles.
   (b) Adjust 5.8 megacycle oscillator trimmer, Illus. #44 on Fig. 2, to bring in 5.8 megacycle test oscillator signal with maximum output.
   (c) Set test oscillator frequency and receiver dial to exactly 5 megacycles.
   (d) Adjust 5 megacycle antenna trimmer, Illus. #40 on Fig. 2, for maximum output.

4. Aligning R.F. Circuits—American Broadcast Band (1720-540 Kilocycles)
   (a) Set test oscillator frequency and receiver dial to exactly 1720 kilocycles. Replace 400 ohm series resistor with a .0005 mfd. condenser.
   (b) Adjust 1720 kilocycle oscillator trimmer, Illus. #45 on Fig. 2, to bring in 1720 kilocycle test oscillator signal to maximum output.
   (c) Set test oscillator frequency and receiver dial to exactly 1400 kilocycles.
   (d) Adjust 1400 kilocycle antenna and preselector trimmers, Illus. #41 and #42 on Fig. 2, for maximum output.
   (e) Set receiver dial and test oscillator frequency to approximately 600 kilocycles, leaving the test oscillator connected to antenna and ground terminals of the receiver.
   (f) Adjust 600 kilocycle oscillator pad condenser, Illus. #46 on Fig. 2, rocking tuning condenser back and forth for maximum 600 kilocycle signal response.

### Tube Socket Voltages

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<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>F</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>K</th>
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<td>130</td>
<td>60</td>
<td>0</td>
<td>75</td>
<td>0</td>
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<td>I-F Amp.</td>
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<td>130</td>
<td>60</td>
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<td>--</td>
<td>0</td>
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<td>76</td>
<td>Dat.-A.D.C.</td>
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<td>0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
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<tr>
<td>19</td>
<td>Output</td>
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<td>130</td>
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<td>--</td>
<td>--</td>
<td>4</td>
</tr>
</tbody>
</table>

Bendings: (+) on a 6-volt battery from tube socket contacts to ground, with a 1000-ohm per volt D.C. meter.

Ampere drain: -2.3 amps.
FIG. 1A—DELCO MODEL R-6012 CIRCUIT DIAGRAM AND VOLTAGE CHART
(Chassis marked with letter "C" on rear)

Note: All voltages measured from socket terminals to ground with
a 1000 ohm per volt voltmeter.

1. Condenser 13 was 2 mfd.
2. Resistor 56 was 400 ohms.
3. Resistor 71 (5000 ohms) was added.
4. Resistor 72 (150 ohms) was added.

Note 1: In early models, a .005-mf condenser was connected between each end of
the vibrator transformer secondary and ground. Both these condensers
were removed in later models.

Note 2: In early models, a .01 mf condenser was connected across the secondary
of the vibrator transformer. This was removed in later models.

Note 3: The receivers in which these changes have been made can be identified
by the letter "A" stamped on the rear of the chassis.
The Delco Model R-6012 is a seven tube, three band, six volt battery operated superheterodyne receiver with A.V.C., tone control and a permanent magnet dynamic speaker. The tubes used are: 15 R-F Amplifier, 6A7 Oscillator-Modulator, 15 I-F Amplifier, 76 Detector--A.V.C. 15 1st Audio, 76 Driver and a type 19 Output tube.

The frequency ranges on the bands covered are: American Broadcast Band (yellow) 540 to 1700 kilocycles, Police and Amateur Band (green) 1720 to 5900 kilocycles, and the Foreign Short Wave Band (red) 5-8 to 20 megacycles.

This receiver is designed to be operated from a six volt storage battery.

Date: 9-23-36

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1. Peaking-If Stand-off is 465 Kilocycles
   (a) Connect the ground lead of the test oscillator to the chassis frame. Connect the other lead to the grid one of the 6AU6 grid-cathode amplifier.
   (b) Set test oscillator to exactly 465 Kilocycles.

2. Alignment R-F Circuits--"Police-Amateur" Band (1.58-5.75 Megacycles)
   (a) Set test oscillator frequency and receiver dial to exactly 5.25 megacycles.
   (b) Adjust 5.75 megacycle oscillator trimmer, Illus. #42H on Fig. 3, to bring the 5.75 megacycle test oscillator signal to maximum output.
   (c) Set test oscillator frequency and receiver dial to exactly 5 megacycles.
   (d) Adjust 5 megacycle antenna R-F trimmers, Illus. #42B & #42E on Fig. 3, for maximum output.

3. Aligning R-F Circuits--"American" Broadcast Band (1720-536 Kilocycles)
   (a) Set test oscillator frequency and receiver dial to exactly 1720 kilocycles. Replace 400 ohm series resistor with .00025 condenser.
   (b) Adjust 1720 kilocycle oscillator trimmer, Illus. #42G on Fig. 3, to bring in 1720 kilocycle test oscillator signal to maximum output.
   (c) Set test oscillator frequency and receiver dial to exactly 1000 kilocycles.
   (d) Adjust 1500 kilocycle antenna and R-F trimmers, Illus. #42A and #42D on Fig. 3, for maximum output.

4. Service Hint--Vibrator Hash
   In cases where a slight amount of vibrator hash or interference is noticeable on the R-6012, the reversing of the red and yellow leads on the dual 8-mfd. electrolytic condenser (Illus. #12) will usually eliminate the trouble. Letter "B" is stamped on the rear of all R-6012 chassis in which this change has been made in receiver production.
The Delco Model R-6015 is a six tube, three band, six volt battery operated superheterodyne receiver. It features a permanent magnet dynamic speaker, 6SL7 G I.F. Amplifier, 6SL7 G E.C., tetrode, 6SL7 G T.R. Driver, and a type 19 output tube.

The frequency ranges on the bands covered are: American Broadcast Band 540.1-1,720 kilocycles, Police and Amateur band 1.7-5.8 megacycles, and the Foreign Short Wave band 5.7-18.3 megacycles. This receiver is designed to be operated from a six volt storage battery.

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(A) Connect the ground lead of the signal generator to the chassis from 20 100,000 ohm series condenser. DO NOT REMOVE THE GRID BOOST.

(B) Peak each of the trimmers on the last I-F coil, Illus. #8 (Figs. 2).

(C) Turn the volume control of the receiver on full.

(B) In order to assure accurate setting of the I-F trimmers, the above adjustments should be repeated using the lowest signal generator output that will give a reasonable output meter scale deflection.

(B) Remove the signal generator lead from the grid of the 600 tube.

(C) Set the signal generator frequency and receiver dial to exactly 18.3 megacycles.

(D) Adjust the 18.3 megacycle oscillator trimmer, Illus. #11 (Fig. 3) to bring in the 18.3 megacycle signal with maximum output. NOTE: When adjusting this trimmer two peaks, the fundamental and the image peak will be noticed. CARE MUST BE TAKEN THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 18.3 MEGACYCLES. Always back off the trimmer to minimum capacity, then screw down the trimmer (add capacity) until the first peak which is the fundamental and the proper one to use is tuned in. If the trimmer is screwed down beyond the point where the first peak is received, the incorrect image peak will be tuned in. After completing adjustment of the oscillator trimmer at 18.3 megacycles always check to see if the proper peak has been used. To do this leave signal generator frequency at 18.3 megacycles, increase the output of the signal generator and tune the receiver dial to approximately 17.3 megacycles. Then vary the receiver dial slightly to the right and left of 17.3 megacycles, and if the fundamental peak was used in aligning at 18.3 megacycles the test signal will be heard at approximately 17.3 megacycles on the receiver dial. If it is not possible to receive the signal, then the fundamental peak was not used and the 18.3 megacycle oscillator trimmer must be properly readjusted.

(E) Set the signal generator frequency and the receiver dial to exactly 10 megacycles.

(F) Adjust 15 megacycle antenna trimmer, Illus. #10 (Fig. 3) to maximum output.

3. Aligning R-F Circuits--Police-Amateur Band (1.7-5.8 Megacycles)

(A) Set signal generator frequency and receiver dial to exactly 5.8 megacycles.

(B) Adjust 5.8 megacycle oscillator trimmer, Illus. #11 (Fig. 3) to bring in 5.8 megacycle signal generator signal with maximum output.

(C) Set signal generator frequency and receiver dial to exactly 5 megacycles.

(D) Adjust 5 megacycle antenna trimmer, Illus. #10 (Fig. 3) for maximum output.

4. Aligning R-F Circuits--American Broadcast Band 1720-540 Kilocycles

(A) Replace 400 ohm series resistor with a .00025 mfd. condenser.

(B) Set signal generator frequency and receiver dial to exactly 1720 kilocycles.

(C) Adjust 1720 kilocycle oscillator trimmer, Illus. #11 (Fig. 3) to bring in 1720 kilocycle signal generator signal to maximum output.

(D) Set signal generator frequency and receiver dial to exactly 1400 kilocycles.

(E) Adjust 1400 kilocycle antenna trimmer, Illus. #10 (Fig. 2), for maximum output.

(F) Adjust 1400 kilocycle preselector trimmer, Illus. #10 (Fig. 3), for maximum output.

(G) Set receiver dial and signal generator frequency to approximately 600 kilocycles, leaving the signal generator connected to antenna and ground terminals of the receiver.

(H) Adjust 600 kilocycle oscillator pad condenser, Illus. #13 (Fig. 3), while rocking tuning condenser back and forth for maximum 600 kilocycle signal response.

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The audio output of the detector circuit is coupled to the triode portion of the 6F7 tube for audio frequency amplification. The pentode section of this same tube is used as a radio frequency amplifier.
1. Peaking I-F Stages at 465 Kilocycles
   (a) Connect the ground lead of the signal generator to the chassis frame. Connect the other lead to the grid cap of the 6A7 tube through a .1 mfd. series condenser. DO NOT REMOVE THE GRID CLIP.
   (b) Set the signal generator to exactly 465 kilocycles.
   (c) Turn the volume control of the receiver on full.
   (d) Peak each of the trimmers on the 2nd I-F coil, Illus. #6A and 6B (Fig. 2).
   (e) Peak each of the trimmers on the 1st I-F coil, Illus. #5A and 5B (Fig. 2).
   (f) In order to assure accurate settings on the I-F trimmers the above adjustments should be repeated using the lowest signal generator output that will give a reasonable output meter scale deflection.

2. Aligning Circuits--Foreign Band 7.15-18.5 Megacycles
   (a) Remove the signal generator lead from the grid of the 6A7 tube and connect it to the receiver antenna terminal through a 400 ohm carbon resistor.
   (b) Check to see that the tuning dial has not slipped on the condenser gang shaft by turning the rotor plates of the gang condenser until they are completely in mesh, at which point the dial pointer should point to the last line at the low frequency end of the dial calibration.
   (c) Turn band selector switch for operation on 18.5-7.15 megacycles band and set signal generator frequency and receiver dial to exactly 18.5 megacycles.
   (d) Adjust the 18.5 megacycle oscillator trimmer, Illus. #12A (Fig. 3) for maximum 18.5 megacycle signal generator signal output. NOTE: When adjusting this trimmer two peaks may be noticed, in which case CARE MUST BE TAKEN THAT THE PROPER PEAK IS USED FOR ALIGNING THE RECEIVER AT 18.5 MEGACYCLES. Always back off the trimmer to minimum capacity, then screw down the trimmer (add capacity) until the second peak which is the proper one to use is tuned in.
   (e) Set the signal generator frequency and the receiver dial to exactly 10 megacycles.
   (f) Adjust 5 megacycle antenna trimmer, Illus. #10A (Fig. 3) for maximum output.
   (g) Adjust 10 megacycle R-F trimmer, Illus. #11A (Fig. 3) for maximum output.

3. Aligning Circuits--Police-Amateur Band 2230-7500 Kilocycles
   (a) Turn band selector switch for operation on 2230-7500 kilocycle band, set signal generator frequency and receiver dial to exactly 7.5 megacycles.
   (b) Adjust 7.5 megacycle oscillator trimmer, Illus. #12B (Fig. 3) for maximum 7.5 megacycle signal output.
   (c) Set signal generator frequency and receiver dial to exactly 6 megacycles.
   (d) Adjust 6 megacycle antenna trimmer, Illus. #10B (Fig. 3) for maximum sensitivity.
   (e) Adjust 6 megacycle R-F trimmer, Illus. #11B (Fig. 3) for maximum sensitivity.
   (f) Set signal generator and receiver dial to approximately 2.5 megacycles--then while rocking gang condenser back and forth adjust 2.5 megacycle oscillator/padder condenser, Illus. #9 (Fig. 2) for maximum sensitivity.

4. Aligning Circuits--American Broadcast Band 1720-540 K.C. Band
   (a) Turn band selector for operation on 1720 to 540 kilocycle band, set signal generator frequency and receiver dial to exactly 1702 kilocycles. Replace 400 ohm series resistor in signal lead connected to antenna terminal with a .00025 mfd. condenser.
   (b) Adjust 1720 kilocycle oscillator trimmer, Illus. #12C (Fig. 3) for maximum 1720 kilocycle signal generator signal output.
   (c) Set signal generator frequency and receiver dial to exactly 1400 kilocycles.
   (d) Adjust 1400 kilocycle antenna and R-F trimmers, Illus. #10C and 11C (Fig. 3) for maximum output.
   (e) Set receiver dial and test oscillator frequency to approximately 600 kilocycles.
   (f) Adjust 500 kilocycle oscillator/padder condenser, Illus. #8 (Fig. 2) while rocking tuning condenser back and forth for maximum 500 kilocycle signal response. All of the adjustable condensers are very accurately adjusted at the factory and should need no further adjustment unless tampered with in the field or a defective coil has been replaced. If realignment is found necessary, the set can be properly adjusted only by using a calibrated test signal oscillator or signal generator and an output meter.

Delco Model R-3212  Date: 9-7-37
Schematic, Socket, Chassis, MODELS 544290, 544291
Trimmers, Voltage

UNITED MOTORS SERVICE Serials with prefix "A"

FIG. 1--PONTIAC 544290 & 544291 CIRCUIT DIAGRAM
With Serial No. Prefix "A". Date: 2-25-38

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Note: Data for Models 544290 and 544291, having serial numbers with the prefix "A" is given on this page.

FIGURE 2--PARTS LAYOUT--Top View

FIGURE 3--PARTS LAYOUT--Bottom View

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CIRCUIT ALIGNMENT
If realignment is found necessary, the circuits can be adjusted only with the chassis in its case, using a calibrated test oscillator or signal generator and an output meter.

1. Aligning 1-F Stages at 262 Kilocycles
   (a) Connect the signal lead of the signal generator to the grid cap of the 6A7 tube through a .5 mfd. condenser, leaving the tube’s grid clip in place.
   (b) Connect the ground lead of the signal generator to the chassis frame.
   (c) Connect the output meter to the plate prong of the 42 type tube.
   (d) Set the signal generator to 262 kilocycles.
   (e) Adjust the 2nd 1-F trimmers (Illus. 9, Fig. 2) and then the last 1-F trimmers (Illus. 8, Fig. 2) for maximum output. This operation should be repeated until no further increase in output is obtained.

2. Aligning at 1530 Kilocycles
   (a) Disconnect the signal lead of the signal generator from the grid of the 6A7 tube and connect to the antenna terminal of the receiver.
   (b) Turn the rotor plates of the gang condenser completely out of phase and against the high-frequency stop.
   (c) Set the signal generator to 1530 kilocycles.
   (d) Adjust the trimmer for the oscillator section of the gang condenser (middle section) CAREFULLY for maximum output. Then adjust the trimmer for the “R-F” and “ANT” sections of the gang condenser also for maximum output.

3. Aligning at 1410 Kilocycles
   (a) Set the signal generator to 1400 kilocycles.
   (b) Turn the condenser rotor plates until this signal is tuned in with maximum output.
   (c) Readjust only the parallel trimmers for the “R-F” and “ANT” sections of the gang condenser (Fig. 3) for maximum output.

4. Aligning at 600 Kilocycles
   (a) Set the signal generator to 600 kilocycles.
   (b) Turn the condenser rotor plates until this signal is tuned in with maximum output.
   (c) Adjust the antenna compensating condenser (Illus. 16, Fig. 5) for maximum output.
   (d) Return the condenser plates for maximum output.

Repeat these operations alternately until no further improvement in output can be noted.

5. Realigning at 1400 Kilocycles
   (a) Set the signal generator again to 1400 kilocycles.
   (b) Turn the condenser rotor plates until this signal is tuned in with maximum output.
   (c) Readjust the trimmers for the “ANT” section of the gang condenser CAREFULLY for maximum output.

6. Adjusting Receiver to Car Antenna
   (a) Tune the receiver to a weak broadcast station on the low frequency end of the dial, 550 to 700 K.C.
   (b) Adjust the antenna compensating condenser (Illus. 16, Fig. 3) for maximum response from the broadcast station.

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VOLTAGE CHART

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Peaking I.F. Stages at 262 K.C.

The only way the I.F. stages can be peaked properly is with the use of an oscillator and output meter. Connect the output meter to the plate prongs of the 41 output tube. Make sure that the output meter is protected with a series condenser internally; if not, connect a 1/10 mfd. condenser in series with one of the output meter leads. The Dayrad #875 Universal Test Meter and Series #61 Volt-Ohmmeter have this protective condenser included in them.

(a) Connect the output of the oscillator to the grid cap of the 6F7 tube (leave grid cap in place) and to the chassis ground.

(b) Turn the condenser gang until the plates are entirely out of mesh.

(c) Set the oscillator on 262 K.C. and feed this signal through the I.F. stages of the set.

(d) Peak the I.F. trimmer which is on the I.F. coil having only one adjusting screw first. Then peak the two condensers of the 2nd I.F. coil.

(e) Set the oscillator output at the lowest level that will give a reasonable scale deflection on the output meter. This should be less than half the maximum output available.

(f) Make all trimmer adjustments for maximum deflection on the output meter scale.

Peaking Gane Condenser at 1400 K.C.

(a) Connect the output of the oscillator to the antenna connection of the set and to the chassis ground.

(b) In order that the position of the condenser plates for 1400 K.C. may be accurately determined, a wood calibration block (painted red, part number 1606078) should be used. This block may be used also in peaking all of the U.M.S., B-O-F, and Chevrolet radios that use the tubeless rectifier.

(c) Insert the RED block under the middle section of the gang condenser, so that the largest flat side rests on the chassis base and the square notch stops solidly against the stationary plate support bracket.

(d) Open the condenser plates until they stop solidly against the beveled edge of the block as shown in Fig. 1.

(e) Peak the parallel trimmers on top of the condenser gang, the oscillator section first at 1400 K.C. for maximum deflection on the output meter.

(f) To insure sharp peaking of all trimmers reduce the oscillator output to the lowest level that will give a reasonable deflection on the output meter scale.

NOTE: Always use the red calibration block when aligning the parallel trimmers on the gang condenser. Do not rely on the logging of the dial to determine the 1400 K.C. setting. When the aligning procedure is completed, the logging of the dial may be slightly off and should be re-set.

GENERAL: The model 60065 auto radio is a powerful, two unit type, six tube superheterodyne radio receiver with airplane dial.

VIBRATOR NOISE

Examination of the mechanical construction of the transformer vibrator assembly will show that the bottom plate of the vibrator case is riveted to the chassis. The transformer-vibrator assembly is fastened to the bottom plate with two Parker Kalon screws through each end of the lid. For complete elimination of vibrator noise it is necessary that the bottom plate of the vibrator assembly make a good contact with the vibrator case at all points. Placing screws on all four sides of the bottom plate would make the servicing of the vibrator rather difficult, consequently screws were placed in the ends only. The press fit of the bottom plate must be depended upon to eliminate the vibrator noise.

Do not change a vibrator that is noisy electrically before checking the grounding of the vibrator assembly to its bottom plate. Use a pair of pliers to bend the longest sides of the bottom plate inward just enough to insure a pressure contact with the vibrator assembly at all points.
GENERAL: The Models 601177 is a four tube, single unit, superhet-rodynes auto radio. It is designed specifically for Chevrolet automobiles and equipped with a remote control and a plug-in vibrator of the full wave, self rectifying type.

VOLTAGE DATA OF LATE MODEL CHEVROLET 601177 SAME AS GIVEN FOR EARLY MODEL.

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Several changes were made in the receiver circuit starting at serial #1748809. It will be necessary to use Figures 1, 2 and 3 for receivers below serial #1748809 and to use Figures 1A, 2A and 3A for receivers above serial #1748809. Parts shown in Phantom.

It will be noted on some receivers that the .008 mfd. section (Illus. 21C) of the part #1209048 Condenser Block has its lead cut off close to the block and a .008 mfd. tubular condenser connected from the plate of the 42 tube in its place. This change was made because it was found necessary to change the voltage rating of the .008 mfd. section of the condenser block after production started and a .008 mfd. tubular condenser was simply used until a new block could be manufactured. The tubular condenser used is part #1209212 and is located alongside of the power filter choke. All of the service replacement stock of #1209048 condenser blocks have a .008 mfd. section of a higher voltage rating and in installing these blocks in a receiver where the tubular condenser was used it will be necessary to either remove the tubular condenser or clip the lead off of the .008 section of the block.

The capacity of two sections of the part #1209050 Condenser Block (Illus. 23A to F) were changed at serial #1748809 along with several other circuit changes. The "D" section which was originally .04 mfd. was changed to .01 mfd. and the "E" section which was originally .01 mfd. was changed to .1 mfd. All of the service replacement stock of the part #1209050 Condenser Blocks are of the new type incorporating the above changes and should be used in the service replacement of all part #1209050 condenser blocks used below serial #1748809.
Peaking I.F. Stages at 262 K.C.

(a) Connect the ground lead of the test oscillator to the chassis frame. Connect a 1 mfd. condenser in series with the other lead and connect this lead to the grid cap of the 6A7 tube, leaving the tube's grid clip in place. The 1 mfd. condenser is necessary to prevent the oscillator circuit of the receiver from affecting the I.F. adjustments.

(b) Set the test oscillator on 262 kilocycles.

(c) Turn the volume control of the receiver on full.

(d) Peak the I.F. trimmer P-3 for the 2nd I.F. coil shown on Figure 2.

(e) Then peak trimmers P-2 and P-1 of the first I.F. coil also shown on Figure 2.

(f) In order to insure accurate settings of the I.F. trimmers the above adjustments should be repeated using the lowest oscillator output that will give a reasonable output meter scale deflection. Make all adjustments for maximum output.

Peaking Gang Condenser at 1530 and 1400 K.C.

(a) Connect the output of the test oscillator to the antenna connection of the receiver and to the chassis ground. Do not use the 1 mfd. condenser that was required in aligning the I.F. stages.

(b) Turn the rotor plates of the gang condenser until they are COMPLETELY OUT OF MESH.

(c) Set the test oscillator on 1530 kilocycles.

(d) Adjust the oscillator section (middle section) of the gang condenser CAREFULLY for maximum output. Then adjust the trimmers for the "R.F." and "ANT" sections of the gang condenser.

(e) Set the test oscillator on 1400 kilocycles.

(f) Turn the condenser rotor plates until the 1400 K.C. signal from the test oscillator is tuned in with maximum output. (No calibration blocks should be used as the oscillator circuit is adjusted at 1530 K.C. on this set.)

(g) Readjust the parallel trimmers for the "R.F." and "ANT" sections of the gang condenser (shown on Fig. 2) for maximum output. DO NOT disturb the oscillator trimmer (middle section) as this is adjusted at 1530 K.C. only, and any further adjustments at this point will affect both the tuning range of the receiver and the tracking of its circuits.

CAUTION: Always use the lowest possible test oscillator output that will give a reasonable deflection of the output meter pointer, in order to prevent the A.V.C. from leveling out the output as the adjustments are made.
This receiver was designed specifically for 1936 Buicks
This receiver is designed specifically for 1936 Model Buicks.
The Model 165 Cathode Ray Oscillograph should be used to check the I-F band spread after completing the "Alignment Procedure". Slight adjustments to the I-F stages may be found necessary in order to obtain a symmetrical selectivity curve.
GENERAL: The Buick Model 980526 is a five tube, single unit, superheterodyne auto radio, designed specifically for 1936 Buicks, and is equipped with an instrument panel tuning control and tone control.
These receivers are designed specifically for the 1937 Model Buicks. Model 980535 is identical to Model 980534 except that an additional speaker is supplied.
Models 980534 and 980535

Buick Chassis Wiring

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CIRCUIT ALIGNMENT

NOTE: BEFORE STARTING ALIGNMENT PROCEDURE, SEE THAT EITHER A JUMPER IS INSTALLED IN THE DUAL SPEAKER PLUG SOCKET (SEE CIRCUIT DIAGRAM) OR THE DUAL SPEAKER ITSELF IS CONNECTED. FAILURE TO DO THIS WILL RESULT IN AN OPEN CIRCUIT IN THE VOICE COIL.

1. Aligning R-F Stages at 260 Kilocycles

(a) Remove the top and bottom covers from the receiver case and place the receiver so that all adjustments are accessible. Connect the signal generator to the control grid cap of the 6A7 tube through a .25 uf condenser (with disconnecting the grid lead) and connect the ground of the signal generator to the receiver chassis. Connect the Output Meter across the two plates of the 6A6 power tube for output indication. Tune the signal generator accurately to 260 KC. Adjust the four screws of the two I-F transformers, one on top and one on bottom of each transformer (Illus. #61 and 62, Figs. 2 & 3) for maximum output. Repeat these adjustments a second time for greater accuracy.

Checking I-F Band Spread

The Model 165 Cathode Ray Oscillograph should be used to check the I-F band spread after completing the "Alignment Procedure." Slight adjustments to the I-F stages may be found necessary in order to obtain a symmetrical selectivity curve. Complete information concerning this check with the Oscillograph Manual, included with each instrument.

2. R-F Stage Alignment

The antenna and R-F coils used in these receivers contain adjustable iron cores, which require very careful adjustment at the factory. These adjustments are sealed and no further attempts to adjust them in service should be made unless they show evidence of being disturbed or tampered with. In any event where realignment is deemed necessary, the capacity adjustments should be made first in an effort to obtain normal sensitivity.

Two separate procedures are given for aligning the R-F circuits of these receivers and the procedure to be used will depend on whether the sealed iron core adjustments have been disturbed. The first procedure contains only capacity adjustments, while the second procedure contains both capacity and inductance adjustments.

The service replacement iron core antenna and R-F coils are pre-set at the factory and in most instances will require no further adjustment.

Proceedly align the tuning dial pointer to the gang tuning condenser by turning the receiver tuning control clockwise until all stops are reached at the high-frequency end of the dial, then rotate the tuning control counter-clockwise until all stops are reached at the low-frequency end of the dial.

IN THE FOLLOWING PARAGRAPHS WHEN ALIGNMENT IS MADE AT 500 K.C., THE DIAL POINTER ON THE CONTROL HEAD SHOULD BE SET TO THE CENTER OF THE "O" IN "60" WHEN LOOKING STRAIGHT INTO THE DIAL.

3. Aligning R-F Stages--Capacity Adjustments

(a) Connect the signal generator to the control grid cap of the 6A7 detector-oscillator tube through a .25 mfd condenser. Adjust the signal generator to 1560 KC. Set the receiver tuning control to its minimum capacity (full open) position. Adjust the oscillator parallel trimmer (Illus. 1-F, Fig. 2) for maximum output.
(b) Connect the signal generator to the antenna connection on the receiver through a .0005 mica condenser and adjust to 1400 KC. Tune the receiver to this signal and adjust the R-F and antenna trimmers (Illus. 1-D and 1-B, Fig. 2) on gang condenser for maximum output.
(c) Adjust signal generator to 600 KC and tune receiver to 600 KC.
(d) Adjust the oscillator parallel trimmer (Illus. #1-F, #1-D, #1-B, Fig. 2) while rocking the gang tuning condenser back and forth through the signal for maximum output.
(e) Adjust signal generator to 1400 KC and tune receiver to this signal. Readjust the oscillator, R-F, and antenna trimmers (Illus. #1-F, #1-D and #1-B, Fig. 2) for maximum output.

4. Aligning R-F Stages--Capacity and Inductance Adjustments

This procedure covers all R-F adjustments and should not be resorted to, unless the adjustments outlined in section "3" fail to restore normal sensitivity.

(a) Connect the signal generator to the control grid cap of the 6A7 tube through a .25 mfd condenser. Adjust the signal generator to 1560 KC. Set the receiver tuning control to its minimum capacity (full open) position. Adjust the oscillator parallel trimmer (Illus. 1-F, Fig. 2) for maximum output.
(b) Adjust the signal generator to 600 KC and set the receiver dial to 600 KC. Adjust the oscillator series condenser (Illus. #2, Fig. 2) for maximum output.
(c) Adjust the signal generator to 1560 KC and set the receiver tuning to its minimum capacity (full open) position. Adjust the oscillator parallel trimmer (Illus. #1-F, #1-D, #1-B, Fig. 2) for maximum output.
(d) Connect signal generator to the antenna connector of the receiver through a .0005 mica condenser. Adjust the signal generator to 600 KC and tune the receiver to this signal. Adjust the magnetite core screws of the R-F and antenna coils (Illus. #35 and #32, Fig. 3) for maximum output.
(e) Adjust signal generator to 1400 KC and tune receiver to this signal. Adjust the oscillator, R-F and antenna trimmers (Illus. #1-F, #1-D and #1-B, Fig. 2) for maximum output.
(f) Adjust signal generator to 600 KC and tune the receiver to this signal. Adjust the R-F and antenna magnetite core screws (Illus. #35 and #32, Fig. 3) for maximum output.
(g) Adjust signal generator to 600 KC and tune receiver to 600 KC. Adjust the oscillator series condenser (Illus. #2, Fig. 2) while rocking the gang tuning condenser back and forth through the signal for maximum output.
(h) Adjust signal generator to 1400 KC and tune receiver to this signal. Readjust the oscillator, R-F, and antenna trimmers (Illus. #1-F, #1-D and #1-B, Fig. 2) for maximum output.
MODEL 1304873(980566)
Buick
Schematic, Voltage
Socket, Trimmers, Chassis

![Diagram of Buick Model 1304873 (980566) Schematic]

**TUBE SOCKET VOLTAGES**

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**HF 262 KC**

**Fig. 2--Buick Model 1304873 (980566)**

**Buick Model 1304873 (980566)**

Date 11-4-37.

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<td></td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>6J5G DRIVER</td>
<td>5.75</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>6N7G OUTPUT</td>
<td>5.8</td>
<td>230</td>
<td></td>
<td></td>
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<td></td>
<td>8.5</td>
</tr>
<tr>
<td>6J5G RECT</td>
<td>5.75</td>
<td>A.C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>240</td>
</tr>
</tbody>
</table>

**NOTE:** Above readings taken from tube socket contacts to ground with a D.C. voltmeter having a resistance of 1000 ohms per volt; "A" battery 6 volts. Current drain 7.5 amperes. "B" supply drain approximately 52 ma.

---

**FIG. 1—PONTIAC MODEL 983526 CIRCUIT DIAGRAM**

**GENERAL:** The Pontiac Model 983526 is a seven tube, "dash" speaker receiver with a "Local- Distance" switch and tone control. The receiver was designed for operation in 1957 Pontiacs and is equipped with an instrument panel tuning control having a tone control in addition to the tuning and volume controls.

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Aligning I-F Stages at 262 Kilocycles

IMPORTANT: The "Local-Distance" switch on the tuning control used with this receiver is used to control the alignment of the first I-F coil windings. It is important, therefore, in peaking the I-F stages, that the "Local-Distance" switch be placed in the "Distance" position.

Connect the signal lead of the signal generator to the grid cap of the 6AG6 Translator Tube through a .1 mfd. condenser, leaving the tube's grid clip in place. Connect the ground lead of the signal generator to the chassis frame.

Turn "Local-Distance" switch on to "DISTANCE" position.

Connect the output meter across the plate prongs of the 6NT7G tube.

Set the signal generator to exactly 262 kilocycles.

Adjust the trimmers on the I-F coils (Illus. 6 & 10, Fig. 3) for maximum output. These adjustments should be repeated several times.

Aligning at 1530 Kilocycles

Leave the signal generator leads connected the same for aligning the I-F circuits. Turn the rotor plates of the gang condenser all the way out and against the high frequency stop. Set the signal generator to 1530 kilocycles. Adjust the parallel trimmer for the oscillator section of the condenser gang (Illus. 12C, Fig. 2) for maximum output. (It is very important that this frequency be set accurately as a slight mis-setting will cause the receiver to be out of track over the entire high frequency end of the dial.)

Aligning at 540 Kilocycles

Leave signal generator leads connected the same as before. Turn the rotor plates of the gang condenser all the way into mesh so that they rest against the low frequency stop. Set the signal generator to 540 K.C. Adjust the oscillator padding condenser (Illus. 29, Fig. 3) located on the under-side of the receiver sub-panel to maximum output.

Aligning at 1400 Kilocycles

Remove the signal lead of the signal generator from the grid of the 6AG6 Translator tube and connect to the antenna terminal of the receiver THROUGH A .0002 mfd. MICA CONDENSER connected in place of the .1 mfd. condenser previously used. Set the signal generator to 1400 K.C. Turn the condenser rotor plates until this frequency is tuned in with maximum output. Adjust the R-F parallel trimmer on the condenser gang (Illus. 12B, Fig. 2) and the antenna compensating condenser (Illus. 28, Fig. 3) located on the side of the receiver case for maximum output.

Aligning at 600 Kilocycles

Set the signal generator on 600 K.C. Turn the condenser rotor plates until the signal from the signal generator is tuned in with maximum output. Maintain a low output signal from the signal generator and readjust the oscillator tracking condenser (Illus. 29, Fig. 3) while Fig. 4--PARTS LAYOUT--Vibrator Filter rocking the variable condenser gang tuning shaft back and forth through the signal. This operation should be continued until no further increase in output can be obtained.
GENERAL: The Pontiac Model 983527 is a six tube single unit receiver with a "Local-Distance" switch, tone control and 6" Dynamic Speaker. This receiver was designed for operation in 1937 Model Pontiacs and is equipped with an instrument panel type tuning control.

TUBE SOCKET VOLTAGE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FUNCTION</th>
<th>N</th>
<th>P</th>
<th>S</th>
<th>G3</th>
<th>O</th>
<th>G4</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>6U7G</td>
<td>R.F.</td>
<td>60 230</td>
<td>60 3.0</td>
<td>29 2.5</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6AB8S</td>
<td>OSC-TRANS.</td>
<td>60 230</td>
<td>40 3.0</td>
<td>60 2.5</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6S7GT</td>
<td>AUDIO</td>
<td>60 230</td>
<td>60 3.0</td>
<td>5.0 5.0</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6S7GT</td>
<td>DET.-I.F.</td>
<td>60 230</td>
<td>60 3.0</td>
<td>4.0 4.0</td>
<td>8.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>607G</td>
<td>OUTPUT</td>
<td>60 230</td>
<td>60 3.0</td>
<td>4.0 4.0</td>
<td>8.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: ABOVE READINGS TAKEN FROM TUBE SOCKET CONTACTS TO GROUND WITH A D.C. VOLTOMETER HAVING A RESISTANCE OF 1000 OHMS PER VOLT; "A" BATTERY 6 VOLTS.

CURRENT DRAIN: 6.8 AMPERES
"8" SUPPLY DRAIN APPROXIMATELY 52 MA.

Date: 3-7-38

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2. Aligning at 1530 Kilocycles

(a) Leave the signal generator leads connected the same as for aligning the I-F circuits.

(b) Turn the rotor plates of the gang condenser all the way out and against the high frequency stop.

(c) Set the signal generator to 1530 kilocycles.

(d) Adjust the parallel trimmer for the oscillator section of the condenser gang (Illus. 12C, Fig. 2) for maximum output. It is very important that this frequency be set accurately as a slight mis-setting will cause the receiver to be out of track over the entire high frequency end of the dial.

3. Aligning at 540 Kilocycles

(a) Leave signal generator leads connected the same as before.

(b) Turn the rotor plates of the gang condenser all the way into mesh so that they rest against the low frequency stop.

(c) Set the signal generator to 540 K.C.

(d) Adjust the oscillator tracking condenser (Illus. 29, Fig. 3) located on the under-side of the receiver sub-panel to maximum output.

4. Aligning at 1400 Kilocycles

(a) Remove the signal lead of the signal generator from the grid of 5AG tube and connect to the antenna terminal of the receiver THROUGH A .0002 mfd. MICA CONDENSER connected in place of the .1 mfd. condenser previously used.

(b) Set the signal generator to 1400 K.C.

(c) Turn the condenser rotor plates until this frequency is tuned in with maximum output.

(d) Adjust the R-F parallel trimmer on the condenser gang (Illus. 12B, Fig. 2) and the antenna compensating condenser, (Illus. 28, Fig. 3) located on the side of the receiver case for maximum output.

5. Aligning at 600 Kilocycles

The oscillator padding condenser was previously adjusted at 540 K.C.; however, it is necessary in most cases to re-peak this condenser at 600 K.C. in order to make the receiver track properly and to secure full sensitivity

(a) Set the signal generator on 600 K.C.

(b) Turn the condenser rotor plates until the signal from the signal generator is tuned in with maximum output.

(c) Maintain a low output signal from the signal generator and readjust the oscillator tracking condenser (Illus. 29, Fig. 3) while rocking the variable condenser gang tuning shaft back and forth through the signal. This operation should be continued until no further increase in output can be obtained.
If realignment is found necessary, the circuits can be properly adjusted only with the use of a calibrated test oscillator, or signal generator, and an output meter.
CIRCUIT ALIGNMENT

1. Aligning 1-F Stages at 262 Kilocycles
   (a) Connect the signal lead of the signal generator to the grid cap of the 6AG6 translator tube, through a .1 mfd. condenser, leaving the tube's grid clip in place. Connect the ground lead of the signal generator to the chassis frame.
   (b) Connect the output meter from the plate of the 6N6G to ground. (Care should be taken when connecting the output meter to insert a series condenser to protect the meter from D.C. voltages.)
   (c) Set the signal generator to exactly 262 K.C.
   (d) Turn receiver volume control on full and tuning condenser plates out of mesh. Adjust the trimmers on the 1-F coils (Illus. 4 and 5, Fig. 2) for maximum output. These adjustments should be repeated several times and during alignment the signal generator output should be kept to as low a value as is consistent with obtaining a readable indication on the output meter.

2. Aligning at 1500 Kilocycles
   (a) Leave the signal generator leads connected the same as for aligning the 1-F circuits.
   (b) Turn the rotor plates of the gang condenser all the way out and against the high frequency stop.
   (c) Set the signal generator to 1500 K.C.
   (d) Adjust the parallel trimmer for the oscillator section (middle) of the condenser gang (Illus. 11, Fig. 2) for maximum output. (It is very important that this frequency be set accurately as a slight mis-setting will cause the receiver to be out of track over the entire high frequency end of the dial.)

3. Aligning at 1400 Kilocycles
   (a) Remove the signal lead of the signal generator from the grid of the translator (6AG6) tube and connect to the antenna terminal of the receiver THROUGH A .0002 mfd. MICA CONDENSER connected in place of the .1 mfd. condenser previously used. (It is very important that this mica condenser be used in aligning the antenna stage of these receivers in order that this circuit can be made to track properly.)
   (b) Set the signal generator to 1400 K.C.
   (c) Turn the condenser rotor plates until the frequency is tuned in with maximum output.
   (d) Adjust the R-F parallel trimmer on the condenser gang (top section) and the antenna compensating condenser, (Illus. 27, Fig. 3) for maximum output.

4. Aligning at 600 Kilocycles
   (a) Set the signal generator on 600 K.C.
   (b) Turn the condenser rotor plates until the signal from the signal generator is tuned in with maximum output.
   (c) Maintain a low output signal from the signal generator and readjust the oscillator tracking condenser (Illus. 28, Fig. 3) while rocking the variable condenser gang tuning shaft back and forth through the signal.
   (d) This operation should be continued until no further increase in output can be obtained.

5. Realigning at 1400 Kilocycles
   (a) Recheck alignment of R-F section of condenser gang and antenna compensating condenser (Illus. 27, Fig. 3) as given in paragraph 3.
   (b) It will be necessary to readjust the antenna compensating condenser upon installation in a car.
### UNITED MOTORS SERVICE

**MODEL 983569 Pontiac**

**Schematic, Vibrator Condenser Data**

---

**Fig. 5 - Parts Layout - Vibrator Filter**

- **6U7G**
- **6R7G**
- **6U5G**
- **6A9G**
- **6U7G**

- **6N7G** Output
- **6A8G** Oscillator-Mixer

---

<table>
<thead>
<tr>
<th>Condenser Block Connections</th>
</tr>
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<tbody>
<tr>
<td>14E</td>
</tr>
<tr>
<td>BROWN 10 - 160V</td>
</tr>
<tr>
<td>WHITE 4 - 160V</td>
</tr>
</tbody>
</table>

---

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FIG. 3--PARTS LAYOUT--Top View

Pontiac 983569
Date: 10-11-37

FIG. 4--PARTS LAYOUT--Bottom View

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FIG. 1—CHEVROLET MODEL 985252 CIRCUIT DIAGRAM

GENERAL: The Chevrolet Model 985252 is a six tube, single unit auto radio with an under panel mounting tuning control. All of the receiver tubes are octal base types and a separate rectifier tube (6X56) is employed in the power supply. Date: 12-2-36

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CIRCUIT ALIGNMENT

If realignment is found to be necessary, the circuits can be adjusted only with the use of a calibrated test oscillator or signal generator, and an output meter.

Peaking I-F Stages at 262 Kilocycles

(a) Connect the signal lead of the test oscillator to the grid cap of the 6A8G Oscillator Tube through a .1 mfd. condenser, leaving the tube's grid clip in place. Connect the ground lead of the test oscillator to the chassis frame.

(b) Connect the output meter from the plate prong of the 6F6G to ground. Care should be taken when connecting the output meter to insert a series condenser to protect the meter from D.C. voltages.

(c) Set the test oscillator to exactly 262 K.C.

(d) Adjust the trimmers on the I-F coils (Illus. 4 & 5) for maximum output. These adjustments should be repeated several times and during alignment the test oscillator output should be kept to as low a value as is consistent with obtaining a readable indication on the output meter.

Aligning at 1560 Kilocycles

(a) Leave the test oscillator leads connected the same as for aligning the I-F stages.

(b) Turn the rotor plates of the condenser gang all the way out and against the high frequency stop.

(c) Set the test oscillator to exactly 1560 K.C.

(d) Adjust the parallel trimmer for the oscillator section (middle) of the condenser gang (Illus. #6) for maximum output.

NOTE: It is very important that this frequency be set accurately as a slight mis-setting will cause the set to be out of track over the entire high frequency end of the dial.

Aligning at 1400 Kilocycles

(a) Remove the signal lead of the test oscillator from the grid of the 6A8G Oscillator Tube and connect to the Antenna terminal of the receiver through a .0002 mfd. mica condenser.

(b) Set the test oscillator to 1400 K.C.

(c) Turn the condenser rotor plates until this frequency (1400 K.C.) is tuned in with maximum output.

(d) Adjust the R-F and Antenna parallel trimmer on the condenser gang (Illus. 6 & 7) for maximum output.
GENERAL: The Chevrolet Model 985253 is a six tube auto radio with a
rectifier in the power supply.

Chevrolet 985253
Date: 12-7-36

Readings taken with a D.C. voltmeter having a resistance of 1000 ohms
per volt.
1. Peaking I-F Stages at 262 K.C.

(a) Connect the signal lead of the test oscillator to the grid cap of the 6A8G Modulator-Oscillator tube, through a .1 mfd. condenser. Connect the ground lead of the test oscillator to the chassis frame.

(b) Set the Test Oscillator at 262 K.C.

(c) Turn volume control on full and tuning condenser plates completely out of mesh.

(d) Adjust trimmers on the I-F coils (Illus. 4 and 5) for maximum output. These adjustments should be repeated several times and during alignment the test oscillator output should be kept to as low a value as is consistent with obtaining a readable indication on the output meter.

2. Aligning at 1560 Kilocycles

Leave the test oscillator leads connected the same as for aligning the I-F Stages. Make sure the rotor plates of the condenser are turned all the way out and against the high frequency stop. Set the test oscillator to exactly 1560 K.C. Adjust the parallel trimmer for the oscillator section (middle) of the condenser gang (Illus. #11) for maximum output.

3. Aligning at 1400 Kilocycles

Remove the signal lead of the test oscillator from the grid of the 6A8G Tube and connect to the antenna terminal of the receiver THROUGH A .0002 MFD. MICA CONDENSER. Set the test oscillator to 1400 K.C. Turn the condenser plates until this frequency is tuned in with maximum output. Adjust the R-F parallel trimmers on the condenser gang (Top section) for maximum output. Adjust the antenna compensating condenser (Illus. #27) for maximum output.

4. Aligning at 600 Kilocycles

Set the test oscillator on 600 K.C. and turn the condenser plates until this signal is tuned in with maximum output (at approximately 600 K.C. position of plates). Maintain a low test oscillator signal and adjust the oscillator tracking condenser (Illus. #28) while rocking the condenser gang plates back and forth through the signal. This operation should be continued until no further increase in output can be obtained.

5. Realigning at 1400 Kilocycles

Recheck alignment of the R-F section of the condenser gang and antenna compensating (Illus. #27) at 1400 K.C. as given in paragraph #3.
TUBE SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>P2</th>
<th>S</th>
<th>Su</th>
<th>Ga</th>
<th>Go</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7G</td>
<td>R-F Amp.</td>
<td>6.0</td>
<td>235</td>
<td></td>
<td>100</td>
<td>5.5</td>
<td></td>
<td></td>
<td>5.5</td>
</tr>
<tr>
<td>6A8G</td>
<td>Occ.-Mod.</td>
<td>7.0</td>
<td>235</td>
<td></td>
<td>100</td>
<td></td>
<td>135</td>
<td>18</td>
<td>5.5</td>
</tr>
<tr>
<td>6K7G</td>
<td>I-F Amp.</td>
<td>6.0</td>
<td>235</td>
<td></td>
<td>100</td>
<td>3.6</td>
<td></td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>6R7G</td>
<td>Det.-A-F</td>
<td>6.0</td>
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<td></td>
<td></td>
<td>7.5</td>
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<tr>
<td>*6N6G</td>
<td>Output</td>
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<td>240</td>
<td>235</td>
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<td></td>
<td></td>
<td></td>
<td>5.0</td>
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<tr>
<td>6X5G</td>
<td>Rectifier</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Readings taken with a D.C. voltmeter having a resistance of 1000 ohms per volt.

* Same for both 6N6G tubes.
CIRCUIT ALIGNMENT

Aligning I-F Stages at 262.5 Kilocycles

(a) Connect the signal lead of the test oscillator to the grid cap of the 6K7G I-F Amplifier tube, through a .1 mfd. condenser, leaving the tube's grid clip in place. Connect the ground lead of the test oscillator to the chassis frame.

(b) Connect the output meter from the plate (P2) of one of the 6N6G Output tubes to the plate (P2) of the other 6N6G Output tube.

(c) Set the test oscillator carefully to 262.5 K.C.

(d) Turn the "Volume Expander" switch on the receiver to the "Off" position. Turn the volume control on full and turn the condenser gang plates so that they are completely in mesh. Leave the "Fidelity Control" Cable disconnected from the chassis.

Aligning I-F Stages at 262.5 Kilocycles--Cont'd.

(e) Adjust both trimmers located on the 2nd I-F coil (Illus. #9) for maximum output.

(f) Connect the signal lead of the test oscillator to the grid cap of the 6A8G Oscillator-Modulator tube, leaving the tube's grid clip in place.

(g) Adjust both trimmers located on the 1st I-F coil (Illus. #8) for maximum output.

NOTE: DO NOT READJUST THE TRIMMERS ON THE 2ND I-F COIL, ILLUS. #9.

Aligning at 1550 Kilocycles

Leave the test oscillator signal lead connected to the grid cap of the 6A8G tube. Turn the condenser rotor plates all the way out and against the high frequency stop. Set the test oscillator to exactly 1550 K.C. Adjust the parallel trimmer for the oscillator section (middle) of the condenser gang (Illus. #10C) carefully for maximum output.

Aligning at 1400 Kilocycles

Remove the signal lead of the test oscillator from the grid of the 6A8G tube and connect to the antenna terminal of the receiver THROUGH a .0002 MFD. MICA CONDENSER. Set the test oscillator to 1400 K.C. Turn the condenser plates until this frequency is tuned in with maximum output. Adjust the "R-F" and "ANT." sections of the condenser gang (Illus. #10) carefully for maximum output.

Adjusting Antenna Compensating Condenser

Leave the test oscillator leads connected the same as before. Set the test oscillator to 600 kilocycles. Tune in the 600 K.C. signal with the station selector for maximum output. Adjust the antenna compensating condenser (Illus. #12) while rocking the tuning condenser setting back and forth through the signal, until no further improvement in output can be obtained. Recheck the alignment of the "ANT" section of the condenser gang as given in paragraph #3.
FIG. 1—TUBE SOCKET VOLTAGES  
VOLTAGES MEASURED WITH 1000-Ω PER VOLT VOLTMETER FROM CHASSIS TO TUBE PRONG AND MAY VARY PLUS OR MINUS 10% OF VALUES GIVEN.  
* MEASURED BY MICROAMMETER IN GRIDLEAK CIRCUIT.  
J.B. = JUNCTION BLOCK

FIG. 2—PARTS LAYOUT—Vibrator Filter

FIG. 3—PARTS LAYOUT—Bottom View

FIG. 4—PARTS LAYOUT—Top View

FIG. 5—PARTS LAYOUT—Parts Layout
MODEL 985284 Chevrolet Schematic, Socket, Chassis Trimmers, Voltage

**Fig. 2 — Chevrolet Model 985284 Circuit Diagram**

**Tube Socket Voltages**

<table>
<thead>
<tr>
<th>Tube</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>Su</th>
<th>K</th>
<th>Pl</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7G</td>
<td>6.0</td>
<td>222</td>
<td>89</td>
<td>11.8</td>
<td>11.8</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6J7G</td>
<td>6.0</td>
<td>222</td>
<td>89</td>
<td>4.5</td>
<td>4.5</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6K7G (RF)</td>
<td>6.0</td>
<td>238</td>
<td>89</td>
<td>7.5</td>
<td>7.5</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6R7G</td>
<td>6.0</td>
<td>118</td>
<td>--</td>
<td>---</td>
<td>5.9</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6J5G</td>
<td>6.0</td>
<td>230</td>
<td>--</td>
<td>---</td>
<td>7.5</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6N7G</td>
<td>6.0</td>
<td>250</td>
<td>--</td>
<td>---</td>
<td>---</td>
<td>250</td>
<td>---</td>
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<tr>
<td>O24G</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>260</td>
<td>APPROX. 58 M.A.</td>
</tr>
</tbody>
</table>

Voltage readings between socket terminals.

- Minus and ground with a D.C. voltmeter.
- Having a resistance of 1000 ohms/volt.
- Current drain: 6 A. without dial light or speaker current drain 7.7 A. with.
- Dial light and speaker "B" supply drain.

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FIG. 3--PARTS LAYOUT--Top View

FIG. 4--PARTS LAYOUT--Bottom View

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**Ground**

Caution: Under no circumstance should a ground connection be used, or the far end of the aerial connected to radiators, water pipes, etc.

**Current Supply**

Any outlet used for household purposes and having a voltage of at least 105 volts and no more than 125 volts can be used. This current can be either direct or alternating current. If in doubt about the line voltage, consult your local power company. They will be pleased to furnish the necessary information. Do not attempt to operate receiver on a current of more than 125 volts.

Should the line voltage be more than 125 volts, a special line voltage reducer is available at your neighborhood Walgreen Drug Store.

**Aerial**

The aerial can be either indoors or outside and in most instances should be no less than 20 feet in length or more than 40 feet. The aerial is to be connected to the short green wire protruding from the rear of the cabinet. When an indoor aerial is used it may be concealed under the base board or tacked to the top of the picture molding around the room.

Should the receiver be operated in localities where there are no local broadcast stations, a longer outside aerial will be necessary for satisfactory reception. In highly congested metropolitan districts, where most of the apartments are in tall steel reinforced concrete buildings, it will be necessary to have an outside aerial to obtain satisfactory performance. The use of so called aerial eliminator's is not advised.

**PARTS**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
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<td>Speaker</td>
<td>$4.50</td>
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<tr>
<td>138</td>
<td>Transformer—Input</td>
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<tr>
<td>577</td>
<td>Transformer—Output</td>
<td>1.25</td>
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<tr>
<td>151</td>
<td>Field Coil</td>
<td>1.25</td>
</tr>
<tr>
<td>1633</td>
<td>Type A—with Gear Outside</td>
<td>3.00</td>
</tr>
<tr>
<td>1631</td>
<td>Type B—with Gear Inside</td>
<td>3.00</td>
</tr>
<tr>
<td>461</td>
<td>For Type A Variable Condenser</td>
<td>.60</td>
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<td>462</td>
<td>For Type B Variable Condenser</td>
<td>.75</td>
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**Prices Subject to Change Without Notice**

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ALIGNMENT PROCEDURE

First, adj. IF transf. to 456 KC by feeding the signal thru the control grid of the 6A7 tube. Adj. the short wave band next; set pointer at 6 MC & adj. osc. trimmer, located under chassis near filter conds. carefully to the fundamental rather than image (fund. is second peak as you adj. from max. cap.);
then adj. short wave ant. trimmer, located on top of chassis near var. cond., for max. signal: next dial across short wave band checking it at 2.5 and 4 MC to see that it does not stop oscillating.
If this should occur, try changing 6A7 tubes to find one that will oscillate at 2.2 MC. If you experience any difficulty in finding a satisfactory tube, it may be necessary to use separate bias on 6A7 (200 ohm res. and .1/4 mfd cond.) in order to use the tubes available.
Now, set band switch to broadcast position and adj. padder at about 600 Kc for max. gain, rocking the var. cond. with each adj. of the padder - then with gang all the way open, adj. B.C. osc. trimmer located under chassis near outer edge, to 1717 KC and set B.C. ant. trimmer located on top of chassis near outer edge, for maximum gain.
This set is designed to operate on 105-125 volts AC-DC

DO NOT CONNECT A GROUND TO THIS SET.
6 Tube A.C. Superheterodyne with Cathode Ray Magic Eye

A good ground connection to a water pipe or other metallic conductor entering the ground for some distance is ESSENTIAL.
WARNING. IF WINDCHARGER IS USED DO NOT OPERATE SET WITH CHARGER CONNECTED!

1. Connect the oscillator through a 1 condenser to the grid of the 6.7 tube and set the oscilator to 450 kilocycles. Peak each 1. F. stage to resonance as indicated by maximum output on the output meter.

2. With the wave change switch in the broadcast position, set the oscillator to 1700 kilocycles and connect the output to the broadcast section.

3. Set the oscillator to 3000 kilocycles and set the output to the 3000 position of the broadcast section.

A good ground is ESSENTIAL.
I. F. Alignment:

Connect the oscillator through a 1 condenser to the grid of the 1C6 tube and set the oscillator to 456 kilocycles. Peak each I. F. stage to resonance as indicated by maximum output on the output meter.

R. F. Alignment:

With the wave change switch in the broadcast position, set the oscillator to 1700 kilocycles and connect in series with a 1M025 condenser to the antenna of the receiver. Rotate the variable condenser to the 1700 setting of the dial and adjust the trimmer condenser of the broadcast oscillator to resonance. The location of oscillator trimmer is on rear section of variable condenser. Reset the test oscillator to 1400 kilocycles and adjust antenna trimmer located corner front section of variable condenser. Now set oscillator to 600 kilocycles and adjust padding located on side of chassis. Check alignment at 1000 kilocycles.

For aligning police band, set test oscillator to 6 megacycles. Turn band switch to short wave. Rotate variable condenser until signal is heard. Peak antenna trimmer (across antenna coil under chassis) to maximum. Rock variable condenser slightly backward and forward until maximum peak is reached.

The frequency range covered by this receiver is as follows: Broadcast band 535 KC to 1500 KC. The short wave band covers a range of 22 megacycles to 64 megacycles and other of these bands are selected at will by the wave band covers #5 to 1730 KC.
A good ground connection to a water pipe or other metallic conductor entering into the ground for some distance is ESSENTIAL.

WARNING: IF WINDCHARGER IS USED DO NOT OPERATE SET WITH CHARGER CONNECTED.

Warning: Place Storage Battery in such a position that clips on Battery Cable may be fastened directly to Battery Terminals. Do not add any additional wire length to cables as this will make the set hum.

I. F. Alignment:
Connect the oscillator through a .1 condenser to the grid of the 1C6 tube and set the oscillator to 436 kilocycles. Peak each I. F. stage to resonance as indicated by maximum output on the output meter.

R. F. Alignment:
With the wave change switch in the broadcast position, set oscillator to 1700 kilocycles and connect in series with a .0025 condenser to the antenna of the receiver. Rotate the variable condenser to the 1700 setting of the dial and adjust the trimmer condenser of the broadcast oscillator to resonance. This trimmer is located on the right side of the chassis, second position from the front. Reset the test oscillator to 1400 kilocycles and adjust antenna trimmer located on top of rear section of variable condenser. Peak detector trimmer located across preselector coil under chassis. Now set oscillator to 600 kilocycles and adjust padder located on top of the chassis. Check alignment at 1600 kilocycles.

For aligning the police band, set test oscillator to 5 megacycles and switch to the police band position on the set. With the condenser rotated to this frequency setting as indicated on the dial, adjust oscillator trimmer located on the right side of the chassis, first position from the front. Now adjust antenna trimmer located on the front of the chassis, left position, to resonance.

The short wave band is aligned by setting the condenser to 28 megacycles and adjust the oscillator trimmer located on the right side of the chassis, first position from the front to resonance with an 18 megacycle signal from the test oscillator. Turn dial to 16 M. C. Set test oscillator to 16 M. C. and adjust antenna trimmer through right hand hole in front of chassis, rocking variable condenser slightly back and forth to get maximum peak.
A good ground connection to a water pipe or other metallic conductor entering into the ground for some distance is ESSENTIAL.

WARNING: IF WINDCHARGER IS USED DO NOT OPERATE SET WITH CHARGER CONNECTED.

Warning: Place Storage Battery in such a position that clips on Battery Cable may be fastened directly to Battery Terminals. Do not add any additional wire length to cables as this will make the set hum.

I. F. Alignment:
Connect the oscillator through a .1 condenser to the grid of the 1C6 tube and set the oscillator to 456 kilocycles. Peak each I. F. stage to resonance as indicated by maximum output on the output meter.

R. F. Alignment:
With the wave change switch in the broadcast position, set the oscillator to 1700 kilocycles and connect in series with a .0025 condenser to the antenna of the receiver. Rotate the variable condenser to the 1700 setting of the dial and adjust the trimmer condenser of the broadcast oscillator to resonance. This trimmer is located on the right side of the chassis, second position from the front. Reset the test oscillator to 1400 kilocycles and adjust the antenna trimmer located on rear section of variable condenser. Adjust 1st detector trimmer under the chassis across preselector. Now set oscillator to 600 kilocycles and adjust paddler located on side of chassis. Check alignment at 1000 kilocycles.

For aligning the police band, set test oscillator to 5 megacycles and switch to the police band position on the set. With the condenser rotated to this frequency setting as indicated on the dial, adjust oscillator trimmer located on the right side of the chassis, first position from the front. Now adjust antenna trimmer located on the front of the chassis, left position, to resonance.

The short wave band is aligned by setting the condenser to 18 megacycles and adjust the oscillator trimmer located on the right side of the chassis, third position from the front to resonance with an 18 megacycle signal from the test oscillator. Turn dial to 10 M. C. Set test oscillator to 16 M. C. and adjust antenna trimmer through right band hole in front of chassis, rocking variable condenser slightly back and forth to get maximum peak.
MODEL 701
Schematic, Socket

A good ground materially aids in the reception of distant stations.

MODEL 701
IF PEAK 456 KC

ALIGNMENT PROCEDURE

The equipment required for re-aligning this receiver is an output meter and a modulated source of radio frequency (a signal generator or microvolter). This source of radio frequency must be accurately calibrated in frequency and must have a method of varying the output.

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible, while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

1. Connect the signal generator to the grid cap of the 6A7 tube through a 1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 KC., feed in a 356 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

2. Leaving the wave switch on broadcast position, turn the receiver antenna trimmer for maximum output and tune the receiver to the 600 KC. broadcast oscillator. Adjust the 15 M.C. trimmer for maximum output. Set the generator output to 600 K.C. and adjust the 600 K.C. broadcast oscillator coupled to the signal from the generator. This completes the alignment of the broadcast band.
A good ground connection to a water pipe or other metallic conductor entering into the ground for some distance is ESSENTIAL.

MODEL 725
Schematic, Socket Trimmers, Alignment

MODEL 725
7-Tube, 2-Volt Battery Operated Superheterodyne

1. Connect the oscillator through a 1 condenser to the grid of the 108 tube and set the oscillator to 456 kilocycles. Peak each i.f. stage to resonance as indicated by maximum output on the output meter.

2. With the switch in position for broadcast, connect the oscillator to the broadcast condenser. Peak the oscillator to 1400 kilocycles. Replace the broadcast condenser with a crystal and set the oscillator at 1400 kilocycles and adjust antena trimmer located on rear of chassis. Check alignment at 1400 kilocycles.

3. For aligning the voltage regulator, set test oscillator 5 megacycles and switch to the radio band position on the rear of the chassis. Now set oscillator to 456 kilocycles and adjust antena trimmer located on rear of chassis. For maximum peak.

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The tubes used are a 76 as oscillator, a 6A7 as modulator, a 6GS as i.f. amplifier, a 290 as a.v.c. and audio rectifier and audio voltage amplifier, a 41 as power audio amplifier, an 80 as a power rectifier and a 6G5 as tuning indicator.

**ALIGNMENT PROCEDURE**

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the two small pins of the speaker plug. The output meter remains connected throughout the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the first and second i.f. transformers until the maximum output is obtained. This aligns the i.f.

Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1250 K.C. signal to the receiver antenna lead through trimmers and maximum output is shown. Set the generator to 1400 K.C. and turn in the trimmester on the receiver. Adjust the generator to 1400 K.C. and adjust trimmers on i.f. transformers to maximum output. Then adjust the receiver back and forth across the signal from the generator. This completes the alignment of the broadcast band.

The short wave band is aligned while feeding a 6.0 M.C. signal to the receiver antenna lead through a 00025 M.F. mica condenser. Turn the wave switch to short wave position and tune in the 6.0 M.C. signal. Adjust the wave M.C. short wave trimmer to maximum output.
Tube sockets are viewed from under side of chassis. Voltage readings at indicated socket prongs are to zero voltage point on circuit which is \( V \) on 25L6G tube. Voltages must be measured with no signal. Alignment is to be made at the frequencies shown on the trimmer condensers.

Wave trap adjustment at 456 KC. Input is made to provide maximum reduction of signal. Where no voltage reading is shown at socket prongs, it indicates zero voltage or very low reading.

**IF PEAK 456 KC**

1. By means of the Station Selector Knob, tune in **WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE** the station having the lowest frequency—that is, your selected station which is tuned in nearest the right-hand side of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, **PUSH THE PUSH-BUTTON IN ALL THE WAY** with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

Follow through with this same procedure, setting up the other 5 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your six selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner, push in the Station Selector Knob and turn it to the frequency of the station desired.

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ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total resistance approximately 10,000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 1A6 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 455 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1380 K.C. signal to the receiver antenna post through the 00025 M.F. meter condenser. Adjust the generator to 1380 K.C. and adjust the trimmers for maximum output. Set the generator to 600 K.C. and adjust the trimmer for maximum output. Set the generator to 600 K.C. and adjust the trimmer for maximum output. Set the generator to 600 K.C. and adjust the trimmer for maximum output. Set the generator to 600 K.C. and adjust the trimmer for maximum output. Set the generator to 600 K.C. and adjust the trimmer for maximum output.
Identification of Dial and Chassis

The following description will identify the different dial and station components:

No. 9 Dial — 17 Button Telephone Dial—Station call, button is black or push button.

No. 11 — Same as No. 9 Dial except push buttons are brown.

No. 10 Dial — 17 Button Telephone Dial—Station call letters are rectangular in shape and are mounted in rectangular openings in escutcheon ring. Equipped with visible tone and volume indicators.

No. 3 Dial — Glass dial—Moving beam of light indicators—Tone and volume indicated by series of circles.

No. 7 Dial — Glass dial—Moving beam of light indicators—Tone and volume indicated by slanting lines.

The following description will identify the chassis used with the above dial:

7 Tube-Series A1
8 Tube-Series A2 (Revol)
11 Tube-Series A2
9 Tube-Series A5
13 Tube-Series A3

Telephone Dial Assembly

The telephone dial assembly provides a means of printing a number of broadcasting stations and tuning in stations at any time by depressing a button and rotating the dial to a stop position.

The apparatus is mounted on an assembly attached to the front of the chassis. An examination of this assembly will clearly show the method of operation.

Silencer Circuit — A silencer circuit is provided which results in silent tuning between stations when using the telephone dial buttons.

When a telephone dial button is depressed, a current is established between the ungrounded end of the volume control and the chassis ground. Referring to Fig. 1 it will be noted that contact is made between the line from the volume control, contact ring, contact washer arm (when button is depressed), spring and pulley ring shaft. Since the pulley ring is at ground potential, this ground the audio voltage and no signal will be heard until the button is released to break the contact.

It should be noted that the contact ring is part of the pulley ring assembly, but is insulated from it.

In the case of powerful local stations a slight amount of signal may be heard when the button is depressed.

Telephone Dial Adjustments

Noise When Tuning in a Signal with a Telephone Dial Button

As explained in the article on "Silencer Circuit" in this manual, no noise or signal should be heard when tuning in a signal with a telephone dial button until the button is released. If noise is heard while tuning in a signal with one of these buttons, it can be corrected as follows:

If Noise Occurs on All Buttons — This is probably due to a poor contact between the flat contact spring and the contact ring—See Fig. 1. Clean the flat contact spring and contact ring to assure a good electrical connection. Ordinary cleaning fluid may be used and will be effective in most cases in cleaning the surface without affecting the plating. If the contact is still not satisfactory, a piece of fine emery cloth may be used.

If Noise Occurs on One Button Only — This is due to a poor contact between the pulley ring stud, spring, contact washer, and contact ring—See Fig. 1. Clean all of these items of the particular button, in the manner as just mentioned, or as necessary to correct the condition or to provide a good electrical connection.

Telephone Dial Drive Cord Slipping

If the telephone dial drive cord slips on the tuning dial pulley shaft, this may be remedied by adjusting the drive cord tension pulley. Loosen the tension pulley screw and remove and adjust pulley assembly until the desired tension is obtained.

Position of Stop Pin

When the telephone dial assembly is on the chassis, the gang condenser rotor should not come

plenty open or close. The travel of the rotor in this respect is controlled by the gang stop pins on the pulley ring—See Fig. 4. This is necessary to protect the gang condenser in case the telephone dial is swung rapidly in either of the extreme positions. When the gang stop pin is properly set, it will serve as the stop at both extreme positions. If the rotor is seen to open completely or close completely, the stop pin should be pulled back and reset to overcome this condition.

Greasng and Oiling

After a period of time, put some light grease on the pulley ring shaft and on the teeth of the pulley ring. Use light oil on the drive shaft assembly—bearing, care being taken not to get any on the drive cord.

Telephone Dial Replacements

Replacing Complete Dial and Condenser Assembly

Remove the grille lead clip from the contact spring assembly. Unsolder dial lamp lead from terminal of tube socket.

Unsolder the three static section connections of the gang condenser. Unsolder the three terminal studs which ground the gang condenser frame to the chassis, taking care not to loosen the connections of any other units which are grounded at these common points.

At the back of the gang condenser is a stud which secures the assembly to an "L" bracket which is secured to the chassis.

Through this stud is a cotter pin. Remove only the cotter pin, metal washer, and rubber washer.

Viewing the assembly from the back, on the left is a brass bolt which holds the dial support bracket to the chassis—remove this bolt from underneath the chassis.

Grasp the dial support brace and move entire assembly toward the front of the chassis. When the support casting rubber cushions slip clear of the slot in front of chassis, lift entire assembly clear of chassis.

To replace this assembly, reverse the procedure as given above.

Replacing Pulley and Button Ring Assembly Only

Remove drive cord.

From underneath the chassis, unsolder the dial lamp lead from prong of the tube socket. Pull this lead through and out from the front of the assembly.

Remove the four escutcheon screws which hold the escutcheon ring and glass crystal in place. The dial scale pointer is removed by unlatching it from the center stud. Unscrew and remove center stud, washers, and dial scale. Slide pulley ring assembly off the center shaft.

On the No. 10 dial, two strips of celluloid between the escutcheon ring and the glass crystal will have to be removed.

To replace the pulley ring assembly, proceed as follows: Lay the assembly face down and adjust the stop pin. The stop pin (Fig. 4) is directly in back of the wide opener on the dial button ring. Pull this pin back and adjust it to the center position—See Fig. 2.

Rotate tuning condenser rotor counter-clockwise (from front) as far as possible—See Fig. 2.

Place the pulley ring assembly on the shafts with the knob of the dial lamp lead at the top—do not engage the gears.

Pull the dial lamp lead through the slot in the pulley ring gears and through the long slot in the dial support casting. Then place this lead through the clip under the dial support brace and out through the opening in the back of this brace.

With the gears still disengaged, rotate the pulley ring clockwise (from front) 1 1/2 revolutions until the stop pin passes over the right gate and comes to rest against the left gate—See Fig. 2.

With the condenser rotor fully closed, push the pulley ring on the shaft until the pulley ring gear engages the fixed gear only (front) of the condenser drive gear assembly. Engage the pulley ring and assembly with a fine blade screw driver, move the movable (back) gear until the tooth relative to the fixed gear—See Fig. 2. Then push the pulley ring all of the way on, engaging the movable gear.

Now lay the chassis on its back. Replace in the order given the large washer with rectangular hole, dial scale, washers, center stud, dial pointer, glass crystal, and escutcheon. Reassemble the lamp lead.

For the No. 10 dial, before putting the escutcheon on, lay the two celluloid strips on the glass crystal with the inside flange facing away from the glass. Then lay the escutcheon on top of the celluloid strips. The section not cut out for station call letters should be at the wide side in the button spacer ring. Center the small holes in the celluloid discs in the station call letter openings and then tighten the escutcheon screws.

The stop pin must now be adjusted, as explained in article "Position of Stop Pin," until the condenser does not open or close fully. Injury to the condenser will result if allowed to open or close fully.

Replace the drive cord as explained in the article "Replacing Drive Cord."

Replacing Gates

After a great amount of use, one or both of the stop gates may wear, making it necessary to replace the stop gate assembly. This is done by first removing the pulley ring assembly as explained in the article "Replacing Pulley Ring Assembly."

The stop gate assembly is then removed by taking out the two screws at the bottom of the assembly.
Replacing Drive Cord

Remove the old drive cord and tension spring. Rotate telephone dial clockwise (from back of chassis) as far as it will go.

Viewing the pulley ring drum from above and to the back, place the knotted end of the drive cord in the slot provided for it, catching the knot in back of the rib as shown in Fig. 3.

Bring the cord down and around the right side (from back) of the drum at front part of groove in pulley ring drum and under the drive shaft pulley making one-half turn on this pulley. Then bring the cord around the right side (from back) of the adjustable tension pulley and up to the upper left side of the pulley ring drum in front of the cord already on.

Hold the cord in the left hand and rotate the dial counter-clockwise with the right hand. Feed the cord on the drum in such a way that after passing the two openings at the top of the pulley ring drum, it passes to the back of the groove in the drum. After the pulley ring drum makes one complete revolution, place the cord through the left drum opening into the slot and secure the tension spring hook over the pin provided for it—See Fig. 3.

Replacing a Telephone Dial Button or Button Shaft

A telephone dial button or button shaft may be replaced without removing the chassis from the cabinet.

Rotate the dial until the button shaft to be replaced is in the position shown in Fig. 4. Using a wooden wedge block or any other wedge, hold this button shaft in place as shown. Remove the clear celluloid disc and the call letter disc with the point of a pin from the button of the shaft to be replaced (No. 10 dial—brown opaque celluloid disc only).

Remove the hairpin spring from the front of this shaft, spreading it with an ice pick or screwdriver. Take off the button, metal washer, molded bushing, and spring. Take out the wedge block, remove the button shaft to be replaced from the back of the dial assembly and put in the new one. Then put the wedge block back in place again as illustrated.

Lay the cabinet back down against a chair so that it will be about 30 degrees from the vertical position.

Assemble the spring, molded bushing, metal washer, and button in the order shown in Fig. 5. (Last three items may be in one unit). Push the button and spring assembly over the button shaft with the tab of the metal washer in the normal position—See illustration in instruction book. Hold the tab and rotate the button until the flat in the shank coincides with the flat on the shaft. Push the button all of the way on.

Put the hairpin spring in place, as shown in Fig. 5, with the upper part of the slot near the end of the button shaft and the lower part over the end of the shaft. Place the blade of a screwdriver at the center of the lower part of the spring and push down until the spring snaps into place in the slot on the shaft. Remove the wedge block.
**Telephone Dial Replacement Parts**

See article "Identification of Dial and Chassis" in this manual in order to determine the correct dial and chassis assembly number.

The parts in the 3 lists shown below apply to the A1, A2, A3, A5, and A7 chassis unless otherwise specified.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>No. 9 DIAL PARTS</th>
<th>No. 11 DIAL PARTS</th>
<th>No. 10 DIAL PARTS</th>
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<td>211-11A</td>
<td>211-14A</td>
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<td>211-14A</td>
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<td>211-08A</td>
<td>211-11A</td>
<td>211-14A</td>
</tr>
</tbody>
</table>

**Phantom Light Dial Replacement Parts**

See article "Identification of Dial and Chassis" in this manual in order to determine the correct dial and chassis assembly number.

The No. 3 Dial is used on the Series A1, A4, and A5 chassis. The No. 7 Dial is used on the Series A1 and A4 chassis only. The following parts are common to both groups unless otherwise specified.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>No. 3 DIAL PARTS</th>
<th>No. 7 DIAL PARTS</th>
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For the Phantom Light Dial Assembly, the replacement of the correct dial and chassis assembly is necessary.
Possible Troubles and Means of Correcting

The following list of possible troubles has been made up for your convenience in any servicing that may be required on the electric drive panel. Almost every condition that may be met with in the field is listed. A statement of the manner in which the difficulty may manifest itself and a brief statement of its cause and correction is made. In most cases, a reference is made to an appropriate paragraph number in which the matter is discussed more fully. It may be necessary, occasionally, to read the entire article or a portion of it to fully understand the paragraph referred to. Undoubtedly very few of these manifestations will present themselves to the service man but it is our belief that any difficulty that may arise can be handled by the service man by referring to this manual.

A—If dial pointer reaches the end of the scale and stops:

1. The reversing switch does not operate properly—Adjust reversing switch and put on centering spring (early models).—Par. 185—Figs. 6 and 23.
2. Reversing switch defective—Replace switch or check wiring.—Par. 186—Figs. 6 and 24.
3. If the stop lever does not go up into notch on setting disc far enough—Loosen set screws of setting disc corresponding to button which is depressed and adjust position of this disc relative to stop lever.—Par. 110—Figs. 10 and 15.
4. Stop lever spring may be too weak—Tighten.—Fig. 9—Fig. 8.
5. Friction disc may slip in friction drive models or hub on gear No. 1 may slip on early gear drive models—Change friction drive panel to gear drive panel or replace faulty gear No. 1.—Par. 42—Fig. 7.

B—If a tuning button has been depressed, the dial pointer back and forth without stopping:

1. Pawl on setting disc does not extend far enough—Pinch into position.—Par. 102—Fig. 12.
2. Button may be too close to end of the dial pointer travel—Move drum in setting disc.—Par. 105—Fig. 13.
3. Pawl stick—See that pawl slides back freely.—Par. 104—Fig. 12.
4. Motor On-Off switch may be stuck in On position—Adjust switch or release plunger.—Par. 136—Fig. 9—Fig. 8.
5. If the dial pointer does not stop at the same point each time the tuning button is depressed:

This occurs on one button only:

1. Drum in setting disc—Replace setting disc.—Par. 99—Figs. 10 and 11.
2. Drum or stop on setting disc may move the stop lever sufficiently to break the switch contact—Adjust the motor on-off switch a slight amount or file down high spot on setting disc.—Par. 96—Fig. 9.
3. Set screws of setting disc loose—Tighten set screws.—Figs. 6.
4. Brake drum not perfectly round—Replace setting disc.—Par. 95—Figs. 10 and 11.
5. Motor is not running too fast after adjustment is reached due to stop lever being too low or high—Adjust height of stop lever or switch lever until proper position on switch is reached.—Par. 138—Figs. 6 and 9.
6. Tuning eye cable may be caught in setting disc—Remove cable from setting disc assembly.

If this occurs on all buttons:

1. Main drive cable loose—Tighten by means of—Par. 177—Fig. 21.
2. Set screws in top pulley of main drive cable loose—Tighten these.—Par. 147—Fig. 7.
3. Spring clip on drive arm may slip—Tighten this clip.—Par. 147—Fig. 7.
4. Silencer spring switch assembly may not have sufficient tension to push back the motor armature after the circuit is broken—Increase tension by bending the spring.—Par. 29—Figs. 4 and 5.
5. Faulty action of Motor On-Off switch—Adjust switch and switch lever.—Par. 135—136—137—138—Fig. 9—9—9—16.

D—If, when a setting button is depressed, dial pointer does not move at all or does not move properly when tuning knob is turned:

1. The back of the setting button plunger does not engage the rocker arm-Line up the rocker arm with the back of the plunger by bending.—Par. 97—Fig. 11.
2. The top of the rocker arm does not engage the operating lever which releases the drum of setting disc—Loosen the setting disc set screws and line up the disc with the rocker arm.—Par. 98—Fig. 11.
3. Clutch plate does not engage drive pulley—Bend clutch plate forward.—Par. 174—Fig. 6.
4. Setting button may not be pushed in sufficiently—Push button in further.—Fig. 11.

E—After a tuning button has been depressed, the manual tuning knob rotates while the motor is in operation:

1. Chassis may be too far forward in cabinet and prevents clutch release lever from returning to electric position—Move chassis back.—Par. 51—Fig. 12.
2. Electric-manual die cast lever arm does not turn freely on the clutch assembly bearing and does not return to electric position—Bend or file down bearing so that this lever turns freely.—Par. 172—Fig. 6.
3. Tuning knob on shaft while lever is in manual position—Loosen this knob and put it on lever when lever is in electric position.—Par. 172—Fig. 6.
4. Clutch release spring broken or of insufficient tension—Put on new spring or increase tension of old spring.—Par. 172—Fig. 6.

F—Manual tuning knob turns with difficulty when tuning the radio manually:

1. Motor pinion jammed against gear No. 1—Pull motor away from gear.—Par. 44—Fig. 6.
2. Fibre gear No. 1 riding on washer of motor pinion—Change to new type pinion.—Par. 46—Fig. 6.
3. Motor pinion sticks on bearing—Change to new type pinion.—Par. 46—Fig. 6.
4. Clutch releasing spring does not turn freely—Bend this spring so that it rotates freely.—Par. 173—Fig. 6.

G—Jumpy action when tuning the radio manually:

1. Fraility of drive in original issue panels—Change to gear drive panel.—Par. 42.
2. Silencer spring has not enough tension to disengage motor from pinion—Readjust tension of silencer spring.—Par. 39—Fig. 4 and 5.

H—Excessive backlash when tuning the radio manually:

1. Loose set screws on drive drum on tuning condenser—Tighten these screws.—Par. 61A.
2. Compression springs in gears of train of gears missing or not set properly—Replace or resets springs in gears.—Par. 60—Fig. 7.
3. Take-up spring on gear No. 5 missing or anchor point of this spring broken.—Par. 60—Fig. 7.
4. Spring clip on drive drum on tuning condenser fits loosely on drive arm—Tighten this clip.—Par. 22—Fig. 5.
5. Loosen bearings on setting disc shaft—Tighten right hand bearing (from back of panel).—Par. 112—Fig. 6.

I—Drive belt slips when tuning the radio manually:

1. Excessive amount of oil on drive belt—Clean off oil.—Fig. 6.
2. Increase tension on drive belt by readjusting position of idler (early models only).—Par. 67.
3. Main drive cable too tight—Loosen tension on main drive cable by means of turn buckle.—Fig. 21.
4. (Early models only) Friction disc in motor—Change to gear drive panel.—Par. 42.
5. Motor pinion jammed against gear No. 1—Pull motor away from gear.—Par. 46—Fig. 3.
6. Motor pinion sticks on bearing—Put in new type pinion.—Par. 46—Fig. 6.
7. Gear train jammed—Free gears which are not working smoothly.—Par. 61—Fig. 7.

J—Electric-manual lever cannot be pushed to manual position:

Early Models Only

Bend yoke back away from clutch release lever until it engages yoke of clutch shaft properly.—Par. 174—Fig. 22.

Early and Late Models

1. One or more of the tuning button plungers has not returned to the normal position—Loosen tuning plunger spring.—Par. 111—Fig. 8.
2. Chassis too far forward in cabinet—Move chassis back.—Par. 51.
3. Locking plate screws loose—Turn down screws.—Par. 181—Fig. 3.

K—Electric-manual lever will not stay in the manual position:

The tip on the clutch release lever slot may be broken off of or not returned to the normal position—Loosen clutch release lever.—Par. 175—Fig. 3.

L—Electric-manual lever cannot be pushed back into electric position from manual:

1. The tip on the clutch release lever slot may be too high—Cut off or file the end of this tip.—Par. 175—Fig. 3.
2. Washers which hold locking plate are too tight—Loosen these washers.—Par. 159—Fig. 3.
3. Interlocking lever breaks—Free lever.—Par. 175—180—Fig. 3.
4. Clutch release lever breaks—Free lever.—Par. 175—Fig. 3.

M—Electric-manual lever apparently has no effect on mechanism:

1. Pin of electric-manual lever casting is not hole in clutch release lever—Remove manual tuning knob and place pin of electric-manual lever in hole of clutch release lever—Replace manual tuning knob—see instructions in Par. 176—Fig. 3.
2. Washer in front of clutch release lever loose from bearing—Return electric drive panel assembly to factory for replacement of this item.—Fig. 3.

N—Motor rotators but dial pointer does not move (early models only):

1. Friction disc in motor may slip—Change to gear drive panel.—Par. 42.
2. Fibre gear No. 1 may be slipping on its hub—Replace this gear.—Par. 62—Fig. 7.

O—Motor rotators when no button is depressed:

Plunger of motor On-Off switch sticks in On position—Release, switch plunger.—Par. 136—136—Fig. 8—9—16.

P—After a tuning button has been depressed, the motor does not operate:

1. Motor On-Off switch out of adjustment—Readjust or replace switch.—Par. 136—136—137—Figs. 8—9—16.
2. Motor pinion jammed against gear No. 1—Move motor away from gear.—Par. 44—Figs. 3 and 6.
3. Fibre gear No. 1 riding on washer of motor pinion—Change to new type pinion.—Par. 46—Fig. 7.
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MODELS 14, 15, 16 Electric Drive Dials Notes, Changes Replacement Data

4. Early type drive cable—Cable slips—Turn buckle forward, top pulley or bottom idler—Return panel to factory for later type panel.—Par. 6.

Q—Excessive motor noise.

1. Chassis too far forward in cabinet and touching panel at some point—Move chassis back a slight amount by loosening wood support screws.—Par. 51.


(a) Silencer spring tension too great—Bend spring back to lessen tension.—Par. 40—Figs. 4 and 9.

(b) Faulty pinion in motor—Replace pinion.

(c) Pins on armature shaft or uneven so that they do not engage pinion properly—Replace motor.—Par. 49.

3. Drive cable riding over itself in the locking plate—Par. 45.

R—After one tuning button has been depressed, pressing in another does not release the first nor permit the second to stay in.

(a) Locking plate slightly distorted—Depress the first button again and then the second quickly.

(b) Condition can be corrected by screwing in the locking plate screws in case they are out too far and by hitting the locking plate.—Par. 183—Fig. 3.

S—Tuning button does not push in easily or does not remain depressed.

1. Chassis may be too far back in cabinet and prevent clutch release lever from returning to electric position—Move chassis back.—Par. 172.

2. Electric manual die cast lever arm does not turn freely on the clutch assembly bearing and does not return to electric position—Bend or file down bearing so that clutch release lever turns freely.—Par. 172—Fig. 3.

3. (Applies only to buttons not pushing in easily) No grease on button shaft—Put some grease on shaft at point where it passes through locking plate.—Fig. 3.

T—Tuning button cannot be pushed all the way in.

1. Chassis far back in cabinet—Move chassis forward but do not touch front panel.

2. Chassis far too forward in cabinet causing locking plate to contact cabinet—Move chassis back.—Par. 51.

U—If dial pointer does not move when tuning button is depressed.

1. Early type friction drive only—Motor far enough away from gear No. 1 so that it does not engage friction disc.—Move motor closer to friction disc.—Par. 6—Fig. 42.

2. Armature tight in bearings and will not push back after switch is off—Free shaft in bearing or replace motor.—Par. 45—Fig. 5.

W—Signals can be heard with full volume between stations while tuning the radio electrically.

Silencer switch or silencer circuit open—Bend switch into position and check silencer circuit.—Par. 41—Figs. 4 and 5.

X—If creaking noise is heard on all buttons when tuning radio electrically.

Drive cable riding over itself on pulley—Lay cable properly on pulley.—Par. 158—Fig. 21.

Y—if setting disc stops in both directions of rotation. 

Par. 104—Fig. 12.

Changes Since Early Models

1. A number of changes in the electric drive assembly have been made in the course of production. The following listing summarizes these changes and identifies the chassis which have these changes.

Issue No. 20—Blank

(2) The make number of the electric drive panel is stamped on the brackets behind the motor switch. See Fig. 6. In the early models, no issue numbers were used.

(3) Early 7 tube sets may be identified by the fact that when the electric/manual lever is in the electric position, all four red mounting screws are located, as shown in Fig. 1.

(4) In case major trouble is experienced on the electric drive panel of these sets, it will be necessary to return the entire chassis or complete radio to the factory for replacement. Replacement parts cannot be satisfactorily mounted on these models.

(5) Early 9, 11, 13, and intermediate 7 tube sets may be identified by the fact that the two red top screws are in the position shown in Fig. 2. (This is also true of all subsequent models.)

(6) In case of major difficulty on the electric drive panel of these sets, which cannot be repaired locally, the panel can be removed from the chassis and returned to the factory for replacement.

(7) A number of changes were made during production of the early models which can be summarized as follows: A new type drive cable (Fig. 6) was used. A reversing switch centering spring (Fig. 23) was added. An improved type clutch lever (Fig. 55) was used. 12 Nos. 2, 3, and 4 compound gears (Fig. 6) were changed to die castings. The reversing switch lever was modified and an improved rocker arm (Fig. 8) was used which permitted greater movement of the setting button plunger. The mounting screw hole on the On-Off switch mounting was enlarged to facilitate adjustment. The clutch release spring (Par. 172) was added.

Issue No. 2

(8) All shipments made after August 25, 1917, incorporate the above changes and two additional major changes as follows: Originally a friction drive was used between the motor and the first gear of the train of gears. This friction drive was replaced with a gear drive (Fig. 6) starting with the No. 2 issue panels. A new method of stringing the main drive cable (Fig. 23) was also used in No. 2 panels. This new method is not applicable to the old drive cable.

(9) Allow any difficulty which may be encountered in these and subsequent issue number panels can be corrected in the field. The information contained in this manual will serve as a guide in making practically any repairs which may be required.

(10) In late No. 2 issue panels, a new reversing switch (Fig. 24) was used. A change was also made in the silencer spring, a heavier spring with silver contact being added.

Issue No. 3

(11) The guard was placed over the silencer spring assembly (Fig. 4) in panels with this issue number. A specially hardened motor pinion replaced the previous type. Rubber cushions were placed on the back of the cabinet panel to prevent the chassis from touching.

Issue No. 4

(12) A covering was placed over the reversing switch and an adjustment stud added to the base of the motor On-Off switch.

Replacing Electric Drive Panel on Chassis

(13) The electric drive panel assembly is the same for all chassis and may be removed from the chassis and replaced as explained below (the early type chassis as explained at the last part of this article, is an exception).

(14) Remove the chassis from the cabinet using extreme care not to damage the setting button chassis. Remove the electric tuning buttons by pushing down the lower end of the small hairpin spring at the back of the button and at the same time, pulling the button off the shaft. It is not necessary to remove the setting buttons.

(15) The screws in the wooden support behind the electric drive panel must be unscrewed and the support removed from the cabinet.

(16) Remove the speaker plug from the socket at the back of the chassis and also the tuning eye tube from its clamp bracket. Loosen the screw holding the back panel sheath connection in the back of the chassis. Unscrew and remove the two "L" bolts located under the chassis shell which are secured to the rear chassis mounting feet.

(17) To remove the panel from the chassis, turn the electric/manual lever to the electric position. Consider the wire on the silencer switch on the front panel and also the motor connections under the chassis.

(18) Remove the dial pointer by pulling it off.

(19) Remove the dial scale bracket from the panel by taking out the two top screws and one bottom. Pull off dial lamp sockets and unlock clutch release lever tension spring.

(20) Remove the four RED SCREWS shown in Figs. 1 and 2. DO NOT remove the screw on each side of the shaft extending through the center of the panel in the case of late Models (Fig. 21). See special procedure at the last of this article for early 7 tube models.

(21) The panel can then be pulled straight out from the chassis.

(22) To replace the assembly, reverse the above procedure. When mounting the panel, care must be taken that the drive arm (Fig. 6) on the drive gear and spring clip on gang condenser drive drum line up properly. To do this allow the front part of the chassis to project 2 or 3 inches over the edge of the table. Turn the gang condenser until the spring clip on the drive drum is at its lowest position. Spread this spring clip with small screwdriver, bringing this screwdriver up from beneath the chassis. Care should be taken not to spread the spring clip too far. Turn the gears on the electric drive panel until the drive arm is at its lowest position. Gently push the drive arm into position in the spring clip on the drive drum. The screwdriver will drop to the floor.

(23) When installing a new replacement panel on a late model, the following points must be observed carefully:

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(23) MOTOR CONNECTIONS—The motor cable assembly in the new panel has only two lead wires extending from it, while the old motor cable assembly has three. The third lead on the old cable assembly was connected to a condenser which is not necessary when the new drive assembly is used.

(26) The two leads from this condenser (metal shell, tubular type) to the terminal strips should be disconnected. The condenser can be left in the chassis, or it may be removed.

(27) One cable lead is soldered to the terminal strip lug to which is connected one wire of the power cord and one power transformer primary lead. The other cable lead is soldered to the terminal strip lug to which is also connected the lead from the On-Off switch and the other power transformer primary lead.

(28) CAUTION—When the electric drive panel is removed from the chassis, lay it face down and do not back down. The reason for this is that there is a possibility that the motor On-Off switch on the back of the unit will be damaged or thrown out of adjustment.

(29) When handling the electric drive panel, do not carry it by the switch lever (See Fig. 6) which actuates the motor On-Off switch. This bar may be bent and damaged by such handling.

A New Electric Drive Panel Cannot Be Mounted on the Early 7-Tube Models

(30) These models may be identified by the fact that when the chassis is removed from the cabinet and the electric-manual lever is in the electric position all four red mounting screws are located as shown in Fig. 1. On late models, the two top red screws are shown in Fig. 2.

(31) If trouble serious enough to require replacement of the electric drive panel develops in the early model radio, it will be necessary to send the entire chassis and motor radio to the factory to have this done. A replacement panel should not be ordered as it cannot be mounted on the early type 7-tube chassis.

(32) The following procedure for removing the panel from early models is given only in case motor repairs are necessary.

(33) Unthread wires and remove mounting screws. Pull the panel away from the chassis about 1/2 inch, being careful not to damage the leads and tubular type) has three.

(34) This occurs the pinion will not turn at all or a chattering caused by the armature pins and pinion extensions will be heard. The remedy, of course, is to reduce the tension of the spring by bending.

(41) The contact and the spring of this assembly must close while the armature is in its operating position—otherwise the radio will not be silent between stations. Be sure that the assembly is not so tight that the contact and spring are permanently in contact. This condition would, of course, short out all signals.

(42) The early electric drive panels, those with no number on the switch bracket, used a friction drive between the motor and the gear case. A friction disc was used instead of the large toothed gear of gear assembly No. 1 shown in Fig. 7. This friction disc engaged a friction drive pinion on the motor. Nos. 3 and later models will use the gear drive.

(43) There are several conditions under which the motor will not operate. External electrical faults, mainly open circuits, are discussed in other articles. Open windings within the motor will, of course, prevent its operation.

(44) As the motor is jammed against compound gear assembly No. 1 (see Fig. 6) it will not operate. The remedy is to loosen the two motor mounting screws (Fig. 6) slightly. Then insert a screwdriver between the upper right side of the bakelite motor case and the die cast frame at point "B" (Fig. 3). Turn the screwdriver to move the motor away from the frame and tighten the mounting screws. Care should be taken not to crack the bakelite case. In some cases it will be necessary to replace the top 8-32 screw with a 6-32 screw and nut in order to get proper spacing between the motor and the first gear.

(45) Tight bearings or a bent shaft will prevent motor operation. The remedy for tight bearings is to disassemble the motor, free and oil the bearings. In the case of a bent shaft a new motor will usually be required. On occasion, the bearing clamps may become loose—tighten the bearings or replace the motor.

(46) Still another item which prevents motor operation is the pinion gear jammed against the bearing. The bearing has a filet or slightly rounded corner, Gear No. 1 pressing against the washer of the pinion gear may jam this gear against the bearing. Or, the pinion itself may jam against the bearing. In either case it will not turn. The remedy is to replace the pinion with a new type pinion that is rounded out to take care of the bearing filet. One of these may be obtained at the factory.

(47) Jamming and tightness at various points of the rotating mechanism such as gears, bearings, shafts and pulleys will cause an excessive load and prevent motor operation.
If the motor operates but does not drive the revolving mechanism, the following remedial steps may prevail: The early type friction drive disc may be slopping. The remedy is to replace the early friction electric drive panel with the gear type panel.

In a few of the first sets incorporating the gear drive from the motor, the fibre gear of compound gear No. 1 (see Fig. 7) may slip on its hub. There is a spring washer which holds this gear to its hub and this washer may become too loose. The method of detecting this trouble and the correction of it are explained fully in the article “Train of Gears.”

Worn pins on the armature and worn projections on the pinion gear will prevent engaging of these two parts. The silencer spring assembly may be too tight as explained above.

If the motor runs only in one direction, check for a defective reversing switch or open wiring.

If the electric drive panel or chassis comes in contact with the cabinet at any point, motor vibration may be transmitted to the cabinet and excessive noise will be heard while the motor is in operation. If the chassis is too far forward, it may touch at some point. There are four wood screws 2 at each side of the wood support at the back of the electric motor panel. Unscrew these screws 2 or 3 turns or enough to pull the chassis back about 36 inches. This will prevent the electric panel from touching the cabinet. Do not pull the chassis too far back as this would prevent the buttons from being properly depressed.

Replacing Silencer Spring Assembly

Unscrew the wire connected to the switch. Unscrew and remove the large brass screws at the center of the switch. All parts may now be removed from the front of the panel. Replace the assembly in the following order: Armature shaft spring, fibre strip, contact arm, fibre washer, guard, and brass screw. The guard is used on issue No. 3 or higher models only. Replace the wire to the switch.

Replacing Motor

Remove the drive panel from the chassis. It is not necessary to unscrew the silencer switch wire.

Loosen the screws holding the cable clamp enough so that the cable is not too tight. The motor on-off switch can be removed. Unscrew the cable wires connected to the reversing switch, motor on-off switch and to the terminal strip under the chassis base. Save the varnished tubing and the wire connected between the motor on-off switch and the terminal strip under the chassis base. If the chassis is of the early type using the tubular condenser connected to the reversing switch, save this connecting wire also.

Remove the two screws holding the motor to the support casting from the back of the panel. The motor and cable assembly can now be removed.

To replace the motor, reverse the above procedure. The five leads from the motor are connected as shown in Fig. 24. Be sure to connect these leads and the other lead from the motor on-off switch to the proper varnished tubing. If the chassis is of the early type using the tubular condenser connected to the reversing switch, run the lead wire through the proper varnished tubing.

If, after the motor is replaced and all parts assembled, the motor appears to be jammed as indicated by the manual tuning knob turning very hard with the electric manual lever in the manual position, the following remedy should be tried:

Loosen the two motor mounting screws slightly and move the motor away from gear No. 1 as explained in paragraph 44.

(46) The train of gears from the motor shown in Fig. 6 reduces the speed and increases the torque. It transmits power to gear No. 1, which drives the tuning condenser, and to gear No. 4, on the shaft of which is the setting disc cable pulley. Gear No. 2 is belt connected to the clutch assembly pulley—Fig. 6. The latter permits manual tuning of the radio and the manual setting of the buttons for electric operation.

(47) Gear assemblies Nos. 3 and 4 have compression springs between the fixed and movable gears of the assembly. Gear No. 3 has a takeup spring in front of it (from back of panel). All of these springs must be properly inserted to prevent backlash. The proper method of inserting the compression spring in gear assembly No. 3 is explained below.

(48) It is essential that the train of gears mesh properly and rotate freely. In case the gears are jammed, look for a foreign object caught between the gears or a compression spring partly out of the slot.

(49) The drive arm on gear No. 3 should fit tightly in the spring clip on the tuning condenser drive drum. The drive drum is the drum secured by means of set screws at the front of the condenser shaft. Remove the panel and tighten the spring clip by bending, if it is loose. (See par. 22 for insertion of arm in clip.) If the set screws on the drive drum are loose, there will be backlash in tuning. These set screws can be reached and tightened from the bottom of the chassis with a thin blade screwdriver. Rotate the tuning condenser until first one and then the other of the screws is at the bottom.

Replacement of Gear No. 1

In a few of the first sets incorporating the gear drive from the motor, the fibre gear of compound gear No. 1 (See Fig. 7) may slip on its hub. There is a spring washer which holds this gear to its hub and this washer may become too loose. When this occurs, the large fibre gear will be seen to rotate while the hub and small metal pinion gear which engages with gear No. 2, remains stationary.

In a case of this kind, compound gear No. 1 must be replaced. In the later type, the metal hub is rigidly secured to the fibre gear. Following is the replacement procedure:

Remove electric panel assembly from chassis and lay it face down on the bench.

Remove belt and drive pulley—See Fig. 7.

Refer to turn-buckle take-up on steel drive cable—See Fig. 7. Observe position of hex nut on the stud of this turn-buckle, that is, see how many threads this nut is from the end of the stud.

Loosen the main drive cable by loosening the hex nut on turn-buckle and backing off the round knurled nut about 1 1/2 turns.

Remove horseshoe washer from gear Nos. 1 and 2, spreading the horseshoe washers by means of long nosed pliers and screwdriver.

Take out the 2 motor mounting screws and lift the motor out of place—See Fig. 7.

Lift up the main drive cable to clear the teeth at the top of gear No. 2—take care not to nick the cable.

Remove gear Nos. 2 and 1.

Put the new fibre tooth gear No. 1 on the shaft and replace horseshoe washer.
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Setting Discs, Tuning and Setting Buttons, and Associated Levers

(60) Reassembled electric drive panel to chassis.

(98) Referring to Fig. 10, the entry of the stop lever into the notch on the setting disc has raised the switch lever until the motor switch is in the Upper Off position. The motor stops and the setting disc is held by the stop lever in the notch. The rocker arm stop still rides on the edge of the setting disc, and is no longer lined up with the stop lever.

(99) In Fig. 11, the setting button is depressed. The rocker arm, stop moves toward the back and permits the rocker arm to lift the end of the drum release lever of the setting disc. As will be seen in the illustration, the drum release lever lifts the auxiliary lever and the cogs of these two levers move off of the brake drum. This allows the drum to rotate inside of the brake shoes (Fig. 8) or outer portion of the setting disc.

(100) The rocker arm can engage the drum release lever only when the rocker arm stop can move toward the back, and this can be done only when the stop lever is in the notch of the setting disc. It is only when the stop lever is in the notch that the rocker arm can engage the drum release lever properly. That is why in all other positions of the stop lever, the latter is lined up with the rocker arm stop and prevents the rocker arm from moving upward.

(101) When the setting button was depressed, the plunger of this button working against the locking plate (Fig. 3) moved this plate over sufficiently to engage the clutch. Now when the manual tuning knob is turned, the setting disc, except the one which has its setting button depressed, will rotate. The brake drum of the setting disc which are not engaged and which has its setting button depressed, will rest. The brake drum of the setting disc which are not engaged and which has its setting button depressed, will rest.

(102) Throwing the electric manual lever to the manual position will lower the switch lever to the Lower Off position. See Fig. 8. Pushing in another tuning button will release the tuning button we have discussed and bring the tuning button mechanism of the button which is depressed to the position shown in Fig. 9.
Adjustments

(93) The cam must be tight against the brake drum of the setting disc. (Fig. 8) Otherwise this drum will slip and the dial pointer will stop at the proper point. In Fig. 9 is shown the proper distance between the end of the auxiliary lever and the drum release lever bar when the latter is against its stop. If this spacing is not correct, the cam will not grip and release properly. A new setting disc will be required in this case.

(94) If the rivets which hold the drum release lever and the auxiliary lever are loose, the cam will not close tightly on the brake drum. Tighten these rivets or replace the entire setting disc.

(95) A brake drum which is not perfectly round will not be gripped properly by the cam of the auxiliary and drum release lever. A new setting disc will also be required in this case.

(96) A high spot on the outer edge of the setting disc may cause the stop lever to move sufficiently to break the free contact. File down the setting disc or adjust the motor switch if this occurs.

(97) If the rocker arm is bent, it may not engage the back of the setting button plunger as shown in Fig. 13.

(98) Bend the rocker arm to the proper position. The rocker arm may, instead of engaging the drum release lever, come between this lever and the brake drum of the setting disc. Correct this condition by bending the rocker arm and by shifting the position of the setting disc on the shaft. (See Par. 126.)

(99) As explained above, when the setting disc rotates, the stop lever will pass over the pin in one direction of rotation. In the other direction of rotation, the stop lever will engage the tip end of the pin, cause the pawl to slide over and permit the stop lever to fall into the notch of the setting disc.

(100) If the tip end of the pin does not extend a sufficient amount beyond the outer edge of the setting disc, this action will not take place and the setting disc will rotate beyond the stop lever in either direction of rotation.

(101) Should this faulty condition exist on one of the setting discs, whenever the electric tuning button corresponding to this disc is depressed, the dial pointer will continue to move back and forth without stopping.

(102) This condition is easily corrected as follows: Using a pair of side cutters, grip the tip of the pawl as shown in Fig. 13 about 1/2 inch from the edge. Push firmly and pull outward (away from the center of the pawl) to bend it upward. Do this until the tip of the pawl is a little more than 1/4 inch behind the outer edge of the setting disc.

(103) After this procedure has been followed, depress the setting button corresponding to this setting disc and see whether the stop lever edge engages the pawl properly.

(104) If the pawl spring is missing, the stop lever can drop into the notch of the setting disc in both directions of rotation. This same condition can take place if the pawl should stick in the closed position. If the pawl should stick in the closed position, the setting disc will continue to rotate, first in one direction and then in the other without stopping. The remedy is to replace the pawl so that it slides back easily. Do this by loosening the rivet with a screwdriver.

(105) It is not advisable to set a station close to the end of the dial pointer travel, at the point where the reversing switch operates. If, when a setting button is depressed, you should turn the tuning knob too far, a click will be heard near the end of the dial pointer travel. Then, whenever THIS electric tuning button is depressed, the dial pointer will continue to move back and forth without stopping.

(106) This condition is easily corrected as follows. Turn the electric manual lever in the manual position. Then turn the tuning knob and observe the setting disc corresponding to the button on which the condition exists. Step 3 (a) of the earlier section of this chapter applies. Step 1 (a), step 2 (a), and step 1 (b) (a) of the earlier section of this chapter applies. Then turn the tuning knob "in position, as shown in Fig. 13.

(107) Then with the flat end of a long pen or thin piece of wood, carefully depress the drum release lever (Fig. 13) and rotate the setting disc about one inch in the direction shown by the arrow. Do not use a metal rod or the pointed end of the pin. The setting disc will turn readily after the drum release lever has been depressed.

(108) This will be observed if the condition, the stations may be set, and the radio operated in the usual manner.

(109) Of course, when tuning in a station manually, as explained in the instructions book, you can tune to the extreme end of the dial pointer travel without the above condition taking place.

(110) The stop lever may not enter far enough into the notch in the setting disc due to the setting disc being at the incorrect position on the shaft. (See Par. 129) or the lever spring (Fig. 8) may be insufficient tension to force this lever into the notch. In the case of this kind, the brake shoe (Fig. 8) stops the brake drum continues to rotate with the motor. The motor has sufficient power through the gears to rotate the brake drum even through the cams (Fig. 8) have not been released. When the end of the dial scale is reached, the bump of the reversing switch usually sufficient to force the stop lever into the notch sufficiently to throw the motor switch to the OFF position. If in consequence the setting disc sets screws and move the disc to the correct position—See Fig. 11—Par. 129. If the main drive cable has been stretched, take up the slack by means of the turnbuckle take-up (Fig. 21). If the stop lever spring (Fig. 8) was responsible for the above condition, tighten this spring.

(111) If the tuning plunger spring (Fig. 8) is weak, it will not return the tuning button to its normal position and it will not be possible to push the electric manual lever to the manual position as the movement of the backing plate will be prevented. The remedy is to stretch the tuning plunger spring. This can be removed and replaced as explained in the article on replacement of the tuning plunger button plunger. (Par. 129) Move the rocker arm shaft to the left or right, as necessary, to allow the stop lever and rocker arm above the setting button plunger to be removed from the rocker arm shaft. After these are removed the setting button plunger may be put out from the front of the panel.

(112) Replace the new plunger from the back of the panel and reassemble rocker arm and stop lever to the rocker arm shaft.

(113) Replace the setting disc.

(114) When replacing the setting disc, it must be placed on the shaft with the hub toward the left (from back). The edge of the setting disc should be flush with the middle of the rocker arm stop—See Fig. 15.

(115) If the disc is set too far to the right (from the back) a condition may exist in which a station cannot be set because the rocker arm will not engage the drum release lever. If this disc is set too far to the left (from the back), the plunger will prevent the stop lever from falling far enough into the notch in the setting disc to operate the rocker arm lever although the setting disc is stopped.

Replacing an Electric Tuning Button

(116) To replace the plunger push it into the housing from the back at the same time moving the clutch release lever slowly toward the manual position until the plunger slides all the way into place.

(117) Replace the spring in the tuning housing depressing it and at the same time moving the spring retainer into position to hold the spring in place. Back the stop lever spring to the back of the plunger.

(118) Insert the smooth end of the new stop pin in the hole in the front of the shaft, forcing it in by squeezing with pliers. Caution—Leave about 1/16 inch of the pin extending above the surface of the plunger.

Replacing a Setting Button Plunger

(119) It is advisable to replace the electric drive panel from the chassis and mount it in a vertical position by means of clamps or a vise. Turn the clutch release lever to the manual position.

(120) Remove the switch lever as explained in the article "Replacing Switch Lever.

(121) Replace the switch lever and replace the electric drive panel on the chassis.

Replacing a Setting Disc

(122) Turn the clutch release lever to the manual position.

(123) Remove the support bracket at either end of the setting disc shaft by loosening the two screws holding it in place. The bracket to be removed depends upon which side of the center of the setting disc shaft is to be taken out.

(124) Unscrew the two set screws in the hub of the disc. If the disc to be replaced is any other than the end one, all discs from the end of the shaft to the one being replaced must also be removed.

Replacing an Electric Tuning Button Plunger

(113) Remove electric drive panel from the chassis and mount it in a vertical position by means of clamps or a vise. Turn the clutch release lever to the electric position.

(114) Remove the pin from the front of the button plunger—See Fig. 8—by pulling it out. If this cannot be done, file the pin flush with the plunger. Unhook the stop lever spring from the back end of the button.

(115) File a V shaped notch in the rectangular spring retainer at the back of the tuning plunger housing—See Fig. 14. The location of the notch is illustrated. Then turn the spring retainer to the position shown in Fig. 14 and slide it toward the outer left corner of the housing. When this is done the spring in the housing will spring out. Then push the plunger out from the front of the panel.

(116) To replace the plunger push it into the housing from the back at the same time moving the clutch release lever slowly toward the manual position until the plunger slides all the way into place.
Motor On-Off Switch and Switch Lever

(130) The function of the motor On-Off switch is to complete the electric circuit through the motor when an electric actuating button is depressed and to break the circuit at the proper instant when the station has been tuned in by the rotating mechanism.

(131) The essential parts of the switch, see Figs. 8 and 16, are an insulated base, two contacts, one fixed and the other on a moveable reed, and a plunger. The latter, when pushed in, causes the moveable reed to bend until the contact which is on it, touches the fixed contact. When the plunger is out the reed bends back and the two contacts separate.

(132) There are three positions of the switch known as the Upper Off, the On, and the Lower Off position.

(133) These positions are illustrated in Figs. 8, 9, and 10. As will be seen in Fig. 8, the switch is in the On position when the ball on the switch lever moves against the rounded outside face of the plunger and forces it inward. When the plunger is in its off position, the ball is out until the switch lever springs from the left side of the lever. Remove the horseshoe washer from the left end of the rocker arm shaft. Push shaft toward right side far enough so that the horseshoe washer on the right end of the shaft is accessible. Remove this washer. Then lift the left end of the switch lever high enough so that the rocker arm shaft will slide under the lever when the shaft is pushed toward the left. Push the shaft toward the left far enough to allow the right end of the lever to slip off the shaft. To replace this section, reverse the above procedure.

(134) RIGHT SECTION—Unlock the switch lever from the right side of the lever. Remove the horseshoe washers from the ends of the rocker arm shaft. Push the shaft to the right enough to allow the left end of the lever to be lifted. Then push the shaft to the left enough to allow the right end of the lever to slip off the shaft. To replace this section, reverse the above procedure.

Replacement

(146) EARLY MODEL CABLE.—Early electric drive panels, those without an issue number on the switch bracket, use a different drive cable than the one shown in Fig. 21. If the cable breaks on these models, do not attempt to restring the cable. Instead, the electric drive panel will have to be returned to the factory to have this done.

(149) LATER MODEL CABLE.—These can be identified by the issue No. 2 or higher number stamped on the switch bracket. Should cable restringing be required in the case of the later type, this can readily be accomplished by ordering a new drive cable, if one is necessary, and putting it in accordance with the following instructions:

(150) Remove electric drive panel from chassis.

(151) Remove the old drive cable. It will have to be unthreaded at pulleys B and D. See Fig. 21. Turn clutch release lever to manual position.

(152) From the front of the panel, turn manual tuning knob to the right (clockwise) as far as it will go. This will bring the drive arm on gear No. 5 to the left (from back of panel)—See Fig. 7.

(153) Now support the panel in such a manner that it is held firmly in an upright position, the back of the panel toward the operator. The bottom of the casing can be gripped at a number of points in a wise or clamp—care should be taken not to distort the casing.

Main Drive Cable

(145) The function of the main drive cable is to rotate the setting discs in conjunction with the train of gears and keep the rotation at a definite fixed position in relation to the rotational position of the drive gears. The cable is rigidly secured to a pulley on the shaft of gear No. 4 and passes over a series of other pulleys to a pulley on the setting disc shaft where it is also rigidly secured.

(146) It is important that this cable ride freely over all pulleys and with all slack taken out. The turn-buckle take-up, as shown in Fig. 21, is provided to take up slack.

(147) If the drive cable is loose the dial pointer will not stop at the same point each time a tuning button is depressed, because of the lack of fixed relation between the setting discs and the drive gears. Take up the slack by means of the turn-buckle. Loosen set screws on the top pulley of this cable will also bring about this same condition. Tighten these screws.
Clutch Assembly and Electric Manual Lever Notes

- Bring the screw end of the cable over to pulley A and hold it in this position. This can be done by fastening a 10-in. stout cord to the end of cable F. Attach a weight to the other end of this cord and let the weight hang over the top of the panel as shown in Fig. 17. Instead of a stout cord, the round knurled nut and old cable can be secured to the screw end of the new cable.

- Now refer to the portion of the cable that is in the slot at point H pulley B. Using a small wooden prop, bend this cable and bring it back onto pulley B at groove J. CAUTION: Do not use a metal prop as this may damage the cable. It is important that the cable at groove J be kept close to the front flange of pulley B (flange nearest panel) while the portion of the cable which extends downward from point G be kept close to the back flange of this pulley so that the cable from pulley A will ride freely in the center of pulley B as shown in Fig. 18.

- Then from groove J bring the cable in a counter-clockwise direction 1/4 turn around pulley B, over to pulley C, 1/4 turn around pulley C, over to the bottom of pulley D, and then up to the shaft of the right of pulley E. Be sure the cable is well down in slot H, pulley B.

- Wind the cable LOOSELY one and one-half turns around this shaft, progressing toward the left as shown in Fig. 18.

- Rotate the setting discs until pulley E is approximately in the position shown in Fig. 19. Using a thin wooden prop, place cable in slot L with knee on hole at point K of pulley E. Rotate the setting discs a short distance in both directions. This will provide clearance while getting the cable in the slot. Pull the cable well down into slot L—See Fig. 19.

- Rotate the setting discs 1/4 of a complete revolution in such a direction that the top of the discs move toward the front of the panel. Bring the round knurled nut over the loop of the cable as shown in Fig. 20.

- Place cable from pulley D on pulley E at left flange (from back of panel). Now holding cable from pulley D, rotate setting discs in such a direction that the top of the discs move away from the front of the panel. Rotate the discs approximately 1/4 of a turn or until the slack in the cable from pulley D is all taken up. Pulley E and the cable will then be in the position shown in Fig. 21 and the knurled nut end M of the cable will be hanging down from pulley E and must be held in tension.

Wells-Gardner Co.

Electric Drive Dials

Models 14, 15, 16

Cable Data Part 2

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Before removing the electric-manual lever turn it to the electric position. When replacing the lever, place it on the tuning shaft, line up the pin on the back of the lever with the hole in the clutch release lever and push the lever on the shaft. When replacing the tuning knob on the shaft, push it all the way on and tighten the set screw.

Replacing Clutch Releasing Spring or Clutch Plate

Remove the electric drive panel from the chassis and lay it face down in front of the chassis. It is not necessary to unwind the wire on the silencer assembly or the wires on the motor cable assembly to the chassis.

Hold the front end of the tuning knob shaft with pliers and, at the same time, loosen the hex nut at the back end of the shaft. Remove the nut, lock washer, and clutch plate. Replace the clutch spring and, if necessary, the clutch plate, and reassemble, reversing the above procedure. Correct adjustment of the clutch plate is important and the instructions given in Par. 171 should be carefully followed.

Locking Plate

The locking plate (Fig. 1) has three main functions. First, it holds the tuning button in, after the button has been depressed and releases any other tuning buttons which have previously been depressed. Second, it shifts the electric-manual lever, when the setting button is depressed, to engage the clutch. It does this by moving the interlocking lever which, in turn, shifts the clutch release lever. Third, when the electric-manual lever is turned to the manual position, the locking plate releases any buttons that are depressed and locks these buttons to keep them from being depressed.

The locking plate must slide freely on the 4 shafts and in back of the 4 washers (Fig. 3) which hold it in place. If the plate appears to bend at these washers, loosen them with a screwdriver and place a small amount of grease in back of the washer. The interlocking lever (Fig. 3) must also work freely and should be lubricated until it turns easily.

Reversing Switch

The function of the reversing switch is to provide a means of reversing the direction of the motor rotation just before the gang condenser rotor reaches maximum open or closed position as the radio is being tuned electrically. This is accomplished by means of the pin on the No. 4 gear shaft causing operating the reversing switch lever. The lever trips the reversing switch which changes one of the motor windings from one side of the line to the other causing a reversal of the direction of rotation of the motor. The electrical connections for this circuit are shown in Fig. 24.

If the dial pointer reaches the end of the scale and stops, but the motor continues to operate, loosen the reversing switch mounting screws and adjust the position of the bracket up or down until the rotor stops. If this procedure does not remedy the condition, put one of the centering spring on the reversing switch—one of these can be obtained from the factory. Later models are already equipped with this spring—See Fig. 23.

Electric Circuit of the Motor Drive

The diagram of the motor drive includes the wiring of the electric drive panel. Three distinct units, the motor, the on-off switch, and the reversing switch enter into the electrical operation. Since the operation of each of these units is discussed fully in the articles covering them, it will not be repeated here.

Field—tap to black wire—13.6 ohms
Field—tap to red wire—16.3 ohms
Shading Winding — 99.7 ohms

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**25 Cycle Electric Drive Panel**

The 25 cycle electric drive panel assembly is identical to the 60 cycle assembly except that a 25 cycle motor and a different gear No. 1 (see Fig. 6 in electric drive notes) are used.

The pinion gears in the 25 and 60 cycle motors are not the same. If, therefore, one of these pinions is ordered, the type of motor must be specified. (Both 25 and 60 cycle motors are furnished with pinion included.)

### Electric Drive Panel Replacement Parts

There is a number on the On-Off switch bracket which identifies the panel as to major part changes. Be sure to mention this number issue when ordering parts for the Electric Drive Panel.

For names of parts shown in the Electric Drive Panel list, refer to the illustrations in the Electric Drive NOTES, especially Figs. 3, 6, 7, 8, 9, 10 and 11.

### 40 Cycle Power Supply

An electric drive chassis equipped with a 117-234 volt 40 to 60 cycle power transformer can be used on a 60 cycle power supply only, unless changed as mentioned below. The electric drive panels of these sets are equipped with 60 cycle motors and these will function satisfactorily only at that frequency.

If one of these radios is to be used on a 40 cycle power supply, it will be necessary to change the motor. The motor regularly supplied with the 25 cycle model is used for this purpose.
Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram Fig. 2. On the side panel of the chassis base is a round knockout 1 1/4 inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

A phone cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.

Some models are shipped from the factory equipped with the phone socket. A jumper is inserted in this socket which must be removed if the phonograph installation is made—See Fig. 2.

Early Models—A few of the early models did not have the circular knockout for the phonograph socket as mentioned above. If a phonograph installation is to be made in connection with one of these early models, write the factory for detailed instructions.

117-234 Volt Power Transformers

Some models are equipped with a 117-234 volt 40 to 60 cycle power transformer. Connections as shown in Fig. 2 are completed to a special octal socket mounted on the back panel of the chassis. A plug which goes with this socket may then be inserted for either the 117 volt or 234 volt connection.

If one of these transformers is to be installed in a chassis equipped with a regular transformer, there is a 1 1/4 inch round knockout on the back panel which may be removed to permit installation of the octal socket mentioned above.

Dial and Drive Assembly

Complete information regarding the dial and drive assemblies will be found in the Dial and Drive Service Notes issued for this chassis (see index).
Power Consumption: 67 Watts
Power Output: 2.5 Watts (Unlimited)
Selectivity: 30 KC (Brood at 1000 times Signal-to-Noise Ratio)
Intermediate Frequency: 528 to 1830 KC.
Speakers: 8", 10" or 12" Dynamic

Model: A-1 Series
Schematic, Specifications, Sensitivity, Phono.

Fig. 2 — Schematic Circuit Diagram

Tuning Frequency Range
B Range: 528 to 1830 KC.
C Range: 1810 to 6350 KC.
D Range: 6300 to 22000 KC.

Sensitivity
B Range: 8 Microvolts Average
C Range: 13 Microvolts Average
D Range: 9 Microvolts Average

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ALIGNMENT PROCEDURE

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

With an indicating meter—Non-Metallic Screwdriver.

Dummy Antennas—1 m., 200 m., and 400 ohms.

ATTENTION: Whenever aligning any circuit, observe a 2000 kc range. iq not to adjust at the image frequency. This can be checked by tuning. Now the signal generator is set for 5000 kc. The signal will then be heard at 5000 kc on the dial of the radio. The signal, which is much weaker, will be heard at 1000000 kc or 4000 kc on the dial. It may be necessary to increase the input signal to hear the image.

Notice—Alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

CAUTION—When aligning the short wave bands, be sure not to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 kc. The signal will then be heard at 5000 kc on the dial of the radio. The signal, which is much weaker, will be heard at 10000000 kc or 4000000 kc on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.
Series A6 Chassis

The Series A6 is identical to the Series A3 except for the speaker circuit. The Series A6 employs two speakers, the connections for which are shown in the schematic circuit diagram, Fig. 2.
Selectivity  27 KC Broad at 1000 times Signal (Sharp)

Power Consumption  100 Watts

Power Output  9.8 Watts Undistorted 12 Watts Maximum

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MODEL A2 Series
Trimmers, Alignment
Circuit Data, Coils

WELLS-GARDNER & CO.

ALIGNMENT PROCEDURE

The following equipment is required for aligning:
- All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output Indicating Meter — Non-Metallic Screwdriver.
- Dummy Antennas — 1.0 ft., 200 mill. and 400 ohms.

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<tr>
<td>0.556 KC</td>
<td>Grid to Grid</td>
<td>0.556 KC</td>
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<td>Range B</td>
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<td>1.500 KC</td>
<td>Antenna Lead Ant Range B (C14)</td>
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<td>0.600 KC</td>
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<td>Range C</td>
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<td>Antenna Lead 7000 KC (C19)</td>
<td>To Full Open</td>
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INITIAL STEPS
- Upon setting the input signal on the generator, move the light assembly until the beam is at the 1500 KC mark on the dial. Tighten the screw.
- NOTE: Turn the trimmer backward and forth and adjust the trimmer until the beam is in the center of the 1500 KC mark.
- CAUTION: When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked for nulls. Let in any the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, may be increased by increasing the input signal to hear the image.
- NOTES: Alignment is necessary if glass tubes are replaced by the equivalent in metal tubes, or vice versa. In the L.F. and I.F. stages.

Circuit

This model is a three-band AC operated radio circuit shown in the specifications and a tuning range as shown in the specifications.

1/2 TUBE - 3 BAND - ALL WAVE

Amplifiers are tuned by small adjustments of the trimmers as shown by the schematic diagram.

The receiver is divided into three sections: 1) and 2) signal changes, 3) audio output.

1. TUBE B - C - D are reconnected by the speaker terminals, and the tubes are substituted by the standard equipment. The lines which are shown in the schematic diagram, and the connections of the tubes are shown in the schematic diagram.

The set is divided into three sections: 1) and 2) signal changes, 3) audio output. The signal changes are always tuned by small adjustments of the trimmers as shown by the schematic diagram.

A separate control is employed using the following equipment:

- Signal Generator
- Output Indicating Meter
- Non-Metallic Screwdriver
- Dummy Antennas

When the trimmer is on the generator, move the light assembly until the beam is at the 1500 KC mark on the dial. Tighten the screw.
Twenty-Five Cycle Models

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true—the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram. Fig. 2. On the front panel of the chassis is a round knockout 13/4 inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic diagram.

Some models are shipped from the factory equipped with the phono socket. A jumper is inserted in this socket which must be removed if the phonograph installation is made—see Fig. 2.

117-234 Volt Power Transformers

Some models are equipped with a 117-234 volt or 60 cycle power transformer. Connections as shown in Fig. 2 are completed to a special octal socket mounted on the back panel of the chassis. A plug which goes with this socket may then be inserted for either the 117 or 234 volt connection.

A tape transformer is to be installed in a chassis equipped with a regular transformer, there is a 13/4 inch round knockout on the back panel which may be removed to permit installation of the octal socket mentioned above.

Dial and Drive Assembly

Complete information regarding the dial and drive assemblies will be found in the Dial and Drive Service Notes issued for this chassis (see Index).

Changes in Later Models

Later models of this series have the following changes incorporated in them.

On the first models, the 2nd I.F. Coil was not expanded. In other words, the extra selectivity coupling winding was not incorporated in the early type coil. Models with the letter "C" or any later issue stamp on the chassis use the new type coil with the selectivity coupling winding. Because of the change in coil connections, the selectivity switch used on the late model is not interchangeable with that on the early model.

When ordering parts, therefore, it is important that the issue letter on the chassis be noted and the correct part number as shown in the parts list be specified.
### MODEL A4 Series

**Parts List**

#### Series A4 - Replacement Parts

**NOTICE**—There is a large letter on the chassis which identifies its model. For major part changes, be sure to mention the series number and this large letter.

#### MISCELLANEOUS

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#### SOCKETS

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<th>List Price</th>
</tr>
</thead>
<tbody>
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#### SPEAKERS

When ordering parts for speakers, specify part number of speaker and letter preceding part number on speaker. Specify part name, spindle or star, and voice coil assembly for any speaker.

#### KNOBS

<table>
<thead>
<tr>
<th>Part No.</th>
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#### GENERAL

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#### TRANSFORMERS AND COILS

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#### CONDENSERS

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#### ELECTROLYTIC

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**PHONO ATTACHMENT PARTS**

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<tbody>
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</table>

**DIAL AND DRIVE ASSEMBLY**

Dial and Drive parts will be found in SPECIAL DIAL AND DRIVE 7 TUBE 2 BAND 1937 Edition. Prices Subject to Change Without Notice.

---

©John F. Rider, Publisher
Selectivity - 28 KC Broad at 1000 times Signal

Intermediate Frequency - 456 KC

Speaker - 8" Dynamic

Power Consumption - 67 Watts (At 117 volts 60 cycles)

Power Output - 2.5 Watts Undistorted

Maximum - 4.5 Watts Maximum
**ALIGNMENT PROCEDURE**

The following equipment is required for aligning:
- An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output Indicating Meter, Non-Metallic Soldering Wire.
- Dummy Antennas — 1 mf, 200 mf, and 400 ohms.

### STEP 1

<table>
<thead>
<tr>
<th>Band Switch Setting</th>
<th>Dummy Antenna</th>
<th>Frequency Setting</th>
<th>Connection at Radio</th>
<th>TRIMMERS ADJUSTED</th>
<th>Initial Steps</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low I.F.</td>
<td>B</td>
<td>450 KC</td>
<td>Grid of I.F. Tube</td>
<td>1st I.F.</td>
<td>Adjust to Full Open</td>
<td>Adjust to Maximum Output</td>
</tr>
<tr>
<td>High I.F.</td>
<td>B</td>
<td>450 KC</td>
<td>Grid of I.F. Tube</td>
<td>1st I.F.</td>
<td>Adjust to Full Open</td>
<td>Adjust to Maximum Output</td>
</tr>
</tbody>
</table>

### Procedure

1. ATTENUATE the front of the drive drum by moving the peak of greatest intensity obtained.

### NOTE A

- IN each setting, the proper frequency to adjust is the nearest frequency on the dial. Move the tuning until the signal is heard.

### NOTE B

- TURN the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

### CAUTION

- When the signal generator is turned on, make sure NOT to adjust at the signal generator frequency as it will be heard on the dial.

### ADJUSTMENTS

- The signal generator is turned off, the signal generator is turned on, and the signal generator is turned off.

### Notes

- The signal generator is turned on, the signal generator is turned on, and the signal generator is turned off.

---

**Circuit Data**

**Model A4 Series Trimmers Alignment Circuit Data, Socket**

---

**Fig. 1—Location of Trimmers**
WELLS-GARDNER & CO.

MODEL A5 Series
Schematic, Specs.,
Sensitivity, Phono.

Intermediate Frequency
455 KC.

Speakers - 8" or 10" Dynamic

Sensitivity
A Range
B Range
C Range
D Range

Tuning Frequency Range

150 to 1500 KC
1500 to 6000 KC
6000 to 22000 KC

NOTE: RESISTANCES OF WINDINGS LESS THAN 0.1 OHM NOT SHOWN

Power Output - 3.0 Watts Undistorted
Selectivity - 27 KC Broad at 1000 times Signal

Power Consumption - 75 Watts (At 117 volts 60 cycles)

©John F. Rider, Publisher
Model A5 Series
Trimmers Alignment
Circuit Data, Voltage

Wells-Gardner & Co.

Alignment Procedure

The following equipment is required for aligning:

An all-wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed. Output indicating meter, non-metallic screwdrivers, dummy antennas - 1 m, 200 mm, and 400 ohms.

<table>
<thead>
<tr>
<th>STEP Number</th>
<th>Band Switch Setting</th>
<th>Dummy Antenna</th>
<th>Signal Generator</th>
<th>Frequency Setting</th>
<th>Connection at Radio</th>
<th>Trimmers Adjusted</th>
<th>Initial Steps</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2nd I.F. Adj</td>
<td>Range B</td>
<td>0.1 m</td>
<td>456 KC</td>
<td>Grid of I.F. tube</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>1st I.F. Adj</td>
<td>Range B</td>
<td>0.1 m</td>
<td>456 KC</td>
<td>Grid of I.F. tube</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
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</tr>
<tr>
<td></td>
<td>Range B</td>
<td>1800 KC</td>
<td>300 mm</td>
<td>1800 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Maximum Output</td>
<td>Adjust to Maximum Output</td>
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<td>1500 KC</td>
<td>200 mm</td>
<td>1500 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Max. Output</td>
<td>Set Indicator to 1500 KC</td>
<td>See Note A</td>
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</tr>
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<td></td>
<td>Range B</td>
<td>600 KC</td>
<td>200 mm</td>
<td>600 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Max. Output</td>
<td>Set Indicator to 600 KC</td>
<td>See Note A</td>
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</tr>
<tr>
<td></td>
<td>Range C</td>
<td>6300 KC</td>
<td>400 Ohm</td>
<td>6300 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>Range C</td>
<td>22000 KC</td>
<td>400 Ohm</td>
<td>22000 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
</tr>
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</tr>
<tr>
<td></td>
<td>Range C</td>
<td>7000 KC</td>
<td>400 Ohm</td>
<td>7000 KC</td>
<td>Antenna Lead</td>
<td>Turn Rotor to Max. Output</td>
<td>Set Indicator to 7000 KC</td>
<td>See Note B</td>
</tr>
</tbody>
</table>

**ATTENTION**
- The signal generator must remain on the radio and connected to the I.F. output terminals during all alignment operations.
- To change the signal generator frequency, turn the radio off and on between changes.

**NOTES**
- No batteries are required in the Model A5 Series.
- All transformers are small by modern standards.
- All sockets are mounted on the chassis.

John F. Rider, Publisher
General Service Data

117-234 Volt Power Transformer

Some models are equipped with a 117-234 volt 40 to 60 cycle power transformer. Connections as shown in Fig. 2 are completed to a special octal socket mounted on the back panel of the chassis. A plug which goes with this socket may then be inserted for either the 117 volt or 234 volt connection.

If one of these transformers is to be installed in a chassis equipped with a regular transformer, there is a 3/4 inch round knockout on the back panel which may be removed to permit installation of the octal socket mentioned above.

Twenty-Five Cycle Models

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true—the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

Dial and Drive Assembly

Complete information regarding the dial and drive assembly will be found in the Dial and Drive Service Notes issued for this chassis (see index).

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram Fig. 2. On the front panel of the chassis base is a round knockout 1½ inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

A phone cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip plug.

Some models are shipped from the factory equipped with the phonograph. A jumper is inserted in this socket which must be removed if the phonograph installation is made—See Fig. 7.

©John F. Rider, Publisher
### Series C6 Replacement Parts

The following parts list covers two types of the Series C6 auto radio. Type "A" has a rectangular dial scale with a sliding pointer. Type "B" has a circular dial scale with a rotating pointer disc.

**NOTICE**—There is a chassis number label or the inside of the bottom chassis cover. This chassis number identifies the radio as to changes, dial scale, or sliding pointer. When ordering parts or writing to be sure to mention this number.

**Manufacturer**—Wells-Gardner & Co., 2701 N. Kildare Avenue, Chicago, Illinois, U.S.A.

### MISCELLANEOUS

#### SOCKETS

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<tr>
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<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>424982</td>
<td></td>
<td>Tube Socket-Outer (6 pins)</td>
<td>15.00</td>
</tr>
<tr>
<td>424971</td>
<td></td>
<td>Tube Socket-Core (7 pins)</td>
<td>10.00</td>
</tr>
<tr>
<td>424973</td>
<td></td>
<td>Tube Socket-Outer (6 pins)</td>
<td>10.00</td>
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</tbody>
</table>

When ordering parts for speakers, specify part number of speaker and letters preceding part number stamped on the speaker.

#### ELECTRICAL

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<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
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<td>1220 40 mm</td>
<td>10.00</td>
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<tr>
<td>427425</td>
<td>1220 15 mm</td>
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<td>427426</td>
<td>1220 20 mm</td>
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#### MOLEX

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<tr>
<td>427436</td>
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#### TRIMMER

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#### RESISTORS

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<td>AR101</td>
<td>100 Ohm</td>
<td>0.25</td>
<td>0.15</td>
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<tr>
<td>427410</td>
<td>AR102</td>
<td>100 Ohm</td>
<td>0.50</td>
<td>0.15</td>
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<tr>
<td>427411</td>
<td>AR103</td>
<td>100 Ohm</td>
<td>1.00</td>
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<tr>
<td>427412</td>
<td>AR104</td>
<td>100 Ohm</td>
<td>2.00</td>
<td>0.15</td>
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<tr>
<td>427413</td>
<td>AR105</td>
<td>100 Ohm</td>
<td>5.00</td>
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#### INSTALLATION ITEMS

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### CABLES

#### INSTALLATION ITEMS

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### TRANSMITTERS AND COILS

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<tr>
<td>427411</td>
<td>AR103</td>
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<td>AR104</td>
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<td>100 Ohm</td>
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#### INSTALLATION ITEMS

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### PUSH BUTTON TUNING AND DIAL AND DRIVE ASSEMBLY

#### TYPE "B" RADIO

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</thead>
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#### TYPE "A" RADIO

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<tr>
<td>427436</td>
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</tbody>
</table>

### ISSUE NUMBER

The last number of the number on the chassis number label identifies the radio as to the issue number of this model, this label will be found on the inside of the bottom chassis cover.

#### ISSUE NO. 1

**Mechanical Changes**—The chassis is supplied with a front mounting bracket and this bracket is secured to the instrument panel of the car by means of 2 separate bolts. The I.F. cans are used a threaded spade lug which extends through the chassis base and is secured in place with nuts and lock washers.

#### ISSUE NO. 2

**Mechanical Changes**—The chassis case is supplied with a front mounting bracket and this bracket is secured to the instrument panel of the car by means of 2 separate bolts. The I.F. cans are used a threaded spade lug which extends through the chassis base and is secured in place with nuts and lock washers.

**Electrical Changes**—The following changes are all illustrated in the schematic—Fig. 1.

#### INSTALLATION ITEMS

<table>
<thead>
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<th>Description</th>
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<tbody>
<tr>
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### SPEAKER AND CHASSIS MOUNTING PARTS

#### INSTALLATION ITEMS

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</tr>
<tr>
<td>427426</td>
<td>1220 20 mm</td>
<td>2.00</td>
</tr>
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</table>

#### INSTALLATION ITEMS

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<tbody>
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<td>1220 40 mm</td>
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<td>2.00</td>
</tr>
<tr>
<td>427426</td>
<td>1220 20 mm</td>
<td>2.00</td>
</tr>
</tbody>
</table>

### TWO MODELS OF C6 RADIOS

#### Two Models of C6 Radio

There are 2 models of Series C6 auto radios.

One model has a rectangular dial scale with a sliding pointer.

The other model has a circular dial scale with a rotating pointer disc.

The 2 models also differ in the capacitors and the systems which may be used. The values are shown in article "Antenna Capacity."
WELLS-GARDNER & CO.

MODEL C6 Series
Schematic, Coils
Specifications

Power Consumption: 5.5 Amperes at 6.3 Vols
Power Output: 8 Watt Undistorted
Sensitivity: 10 Microvolts at .5 Watt Output
Selectivity: 42.5 KC BROAD at 1000 Times Signal

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WELLS-GARDNER & CO.

MODEL C6 Series Circuit Data
Socket Circuit Model
Drive Cord Data Alignment

This model is a 5 tube automobile radio with a tuning range as shown in the specifications above. The signal is fed through an antenna transformer with tuned secondary into a 6AK5 tube which functions as the 1st detector and oscillator. The end connection and tap connection on the primary of the antenna transformer permit the use of a high or low capacity car antenna.

The oscillating circuit is always resonant at 456 KC above the frequency to which the antenna circuit is tuned.

Resistance coupling is used between the 1st audio stage and the output stage, which employs a 2nd detector and AVC tube. AVC voltage is applied to the central grid circuits of the 1st detector and I.F. tubes.

One stage of I.F. amplification is employed using a 6UG tube.

A type 6H6 tube functions as the 2nd detector and AVC tube. AVC voltage is applied to the central grid circuits of the 1st detector and I.F. tubes.

A 6FG tube is used in the first audio stage.

S E R I E S C 6
5 TUBE
A U T O R A D I O

Component Value in the Table of Electrical Data.

The component values in the table of electrical data are given in the specifications below. The circuit diagram represents the basic circuit of the model.

Synchronous type vibrator is used in the power unit. This vibrator interrupts the current through the primary of the power transformer and also rectifies the current in the secondary circuit.

Polarization in inserting the vibrator must be observed. It can be inserted in two ways, and the correct method depends on which terminal of the car storage battery is grounded.

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Calibrating the Radio

To calibrate the radio, tune in a station of known frequency. At the back of the control head is the calibration screw—see Fig. 10. Remove the pilot lamp assembly. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by setting the pointer from the front. Remove the crystal by inserting a knife blade under the lower edge. Loosen the pointer screw, set the pointer and retighten.

Inserting Vibrator Unit

Note that the vibrator unit can be inserted in two ways. The proper method of insertion will depend on which side of the car battery is grounded. Complete information is shown on the label on the vibrator.
SERIES 6J

Later models of the Series 6J have changes incorporated in them which are explained below. The models which have these changes may be identified by the issue letter or number, which is a large letter stamped on top of the chassis base. The tube arrangement label on the chassis case cover also shows the issue letter.

When ordering parts, it is important that the issue letter be noted and the correct part number, as shown in the parts list, be specified.

The "D" issue Series 6J is different from the "B" and "C" issue radios does not have the cut plate oscillator section. A bridging condenser (600 KC) was added in series with the oscillator section of this gang condenser and the oscillator coil. The bridging condenser is a part of the 2nd I.F. trimmer unit and is mounted on the 2nd I.F. coil can.

The capacity (C17) shown within a dotted circle in the 2nd I.F. coil assembly on the schematic has been changed to an actual part as shown in the supplementary parts list.

The antenna, R.F. Interstage, oscillator, and 2nd I.F. coil assemblies have been changed and have been given new part numbers as shown in the supplementary parts list.

SUPPLEMENTARY REPLACEMENT PARTS

The PARTS of the Series 6J are used on the Series 6J "D" issue Radio with the following exceptions: the following new parts are used: without notice.

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A859</td>
<td>T1</td>
<td>Antenna Transformer and Can Assembly</td>
<td>$1.65</td>
</tr>
<tr>
<td>9A860</td>
<td>T2</td>
<td>R.F. Interstage Transformer and Can Assembly</td>
<td>1.75</td>
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<tr>
<td>9A862</td>
<td>T3</td>
<td>Oscillator Coil and Can Assembly</td>
<td>.95</td>
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<tr>
<td>9A866</td>
<td>T6</td>
<td>End I.F. Transformer and Can Assembly</td>
<td>2.35</td>
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<tr>
<td>47X57</td>
<td>C17</td>
<td>100 mmf. Molding Condenser</td>
<td>.10</td>
</tr>
<tr>
<td>17A79</td>
<td>(C16)</td>
<td>30-100 mmf 2nd I.F. Trimmer</td>
<td>.45</td>
</tr>
<tr>
<td>14A77</td>
<td></td>
<td>3 Section Gang Condenser Complete with Drive Gears</td>
<td>5.05</td>
</tr>
</tbody>
</table>

The following parts of the Series 6J are not used on the Series 6J "D" ISSUE RADIO:

- 9A740 | or T1 | Antenna Transformer and Can Assembly | $1.65 |
- 9A741 | or T2 | R.F. Interstage Transformer and Can Assembly | 1.75 |
- 9A742 | or T3 | Oscillator Coil and Can Assembly | .95 |
- 9A744 | T6 | End I.F. Transformer and Can Assembly | 1.60 |
- 17A65 | C16 | 30-100 mmf 2nd I.F. Trimmer | .20 |
- 14A65 | | 3 Section Gang Condenser Complete with Drive Gears | 5.85 |

The Following Changes apply to all issues of the Series 6J:

The following new parts are used:

- 46X218 C29 .5 mmf. 180 volt Tubular Condenser | $0.30 |
- 16X16 15 Ampere Fuse | .10 |

The following parts are not used:

- 46X207 C29 .5 mmf. 180 volt Tubular Condenser | $0.30 |
- 16X14 20 Ampere Fuse | .10 |

Set the signal generator for 1400 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Adjust the 1st detector and antenna 1400 KC trimmers for maximum output. Do not change the setting of the oscillator trimmer.

Then set the signal generator for 600 KC and adjust the 600 KC antenna trimmer to maximum (see Fig. 10 for location of this trimmer).

After the alignment procedure is completed, the antenna plug may be withdrawn and reinserted on the LC side if a low capacity (70 mmf) car antenna is used.

Location of Tubes and Vibrator

Adjusting Antenna 600 KC Trimmer

Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 9 for location of this trimmer.

Alignment Procedure

Set the signal generator for 178 KC and connect the output of the signal generator through a .05 mmf condenser to the 1st detector section of the tuning condenser. Set the volume control at the maximum position and attenuate the signal from the signal generator to prevent the levelling off action of the AVC. Then adjust the trimmers until maximum output is obtained.

Set the signal generator for 1381 KC. Turn the rotor of the tuning condenser to the full open position. Insert the antenna plug with the mark on the high capacity (HC) side. Connect the shielded antenna lead from the chassis through a 120 mmf. condenser to the antenna post of the signal generator. Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained.

Antenna

Fig. 9—Antenna Plug Insertion

IMPORTANT—The antenna plug can be inserted in two ways depending on whether the antenna is of high or low capacity:

If the total capacity of the antenna and shielded lead is approximately 300 mmf., which would be the case in a running board or ordinary roof antenna (not metal roof), insert the antenna plug with the mark on the HC side. See Fig. 9.

If the total capacity of the antenna and shielded lead is approximately 70 mmf., such as is the case if a "tubular" antenna is used, insert the antenna plug with the mark on the LC side.
Circuit

Ten buttons are provided on the front panel. Three buttons activate linear band switches for a broadcast and 2 short wave manual tuning ranges. Six buttons activate switches which connect fixed tuned circuits for automatic tuning. Depressing any of the 9 band and automatic tuning buttons also turns on the radio. Depressing the 10th button will turn the radio to the off position.

The band switch has 4 arms as shown in Fig. 5. One each for the B, C, and D bands (broadcast, 1st and 2nd short wave, respectively) and one called the "Master" arm. The master arm switches from manual to automatic tuning and vice versa. This arm is actually over the 3 arms rather than in back of them, as shown in the illustration. Depressing any of the B, C, or D band butts activates the arm for that band and also the master arm. The latter is in only when one of the 3 band buttons is depressed.

In manual tuning, an R.F. antenna transformer with tuned secondary is used before the 6UTG R.F. tube. The output of this tube is fed through another R.F. transformer with tuned secondary to the 6UTG detector tube. A 6JG3 tube functions as a separate oscillator. The antenna, interstage, and oscillator circuits are tuned by sections of the gang condenser.

In automatic tuning, the gang condenser is not used. A single tuned circuit is employed before the F.T. tube while a stage of resistance coupling is employed between this tube and the 1st detector. The other automatic tuned circuit is the oscillator grid circuit. Twistings, radio frequency, and oscillator fixed tuned circuits to the desired frequency is accomplished by varying the inductance of tuning coils by changing the permeability of the magnetic circuit. This is done by moving iron core in and out of the coil.

The iron cores within the automatic tuning antenna and oscillator coil forms are secured to a brass rod. This rod is moved back and forth by a screw at the front of the radio. Alignment between the oscillator and antenna automatic tuning coils is obtained by changing the antenna (iron) core back and forth. The iron core is held in place on the shaft by the other three button terminals.

In the automatic tuning, the gang switch and the automatic tuning switch are broken into sections each of which is given a name that is, to some extent, descriptive of its location in the circuit. Ant. D, for example, contains the automatic tuning coil arm and band connections when the D range button is depressed. The other A, B, or D connections on the band switch is shown in Fig. 6. All of the switches have only 2 positions. In the schematic, they are in the normal or button out position.

Now, to describe the connections for one manual tuning range. Let us assume that the B band button is depressed. The antenna transformer B band secondary is connected to the R.F. tube grid circuit through the Ant. B and Ant. M sections of the band switch and the oscillator grid circuit. The antenna transformer C and D band secondaries are in the interstage circuit.

The interstage transformer B band secondary is connected to the 1st detector tube primary through the Int. B and Int. M sections of the switch arms mentioned above. The interstage transformer C band secondary is short circuited and the D band secondary is open circuited.

The oscillator B band grid coil is connected through a bias condenser to the grid of the oscillator tube. The oscillator cathode circuit is connected through the cathode resistor to the ground. The oscillator grid circuit is connected through a bias condenser to the grid of the oscillator tube. The oscillator cathode circuit is connected through the cathode resistor to the ground. The oscillator grid circuit is connected through a bias condenser to the grid of the oscillator tube. The oscillator cathode circuit is connected through the cathode resistor to the ground. The oscillator grid circuit is connected through a bias condenser to the grid of the oscillator tube. The oscillator cathode circuit is connected through the cathode resistor to the ground. The oscillator grid circuit is connected through a bias condenser to the grid of the oscillator tube. The oscillator cathode circuit is connected through the cathode resistor to the ground.
Drive Cord Replacement

LATE MODELS—Tie a knot with a small loop at one end of the new drive cord. Slide a 1½ inch length of fabric tubing on the cord. The free end of the drive cord should be tied to the tension spring in such a manner that there is a distance of 56¾ inches between the knots.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See Fig. 2. Bring the cord up through the slot in the drum rim and pass to the right (from back of chassis) and around pulley B. Then bring the cord to the left and over pulley C. See that the fabric tubing is now between pulleys B and C. Continue cord down to control shaft D and wind 3½ turns counter-clockwise (from back of chassis) on shaft D. Bring cord up to and over pulley E. Bring cord down to top of drive drum A and wind one turn clockwise around the drum rim.

Pass the remaining drive cord and tension spring through the slot in the drum. Place free end of spring over the hook on the condenser drive drum.

EARLY MODELS—The procedure is the same as for the late models with the following exceptions:

The distance between the knots on the drive cord should be 49¼ inches.

Leaving shaft D (Fig. 3), the drive cord is brought directly to the top of drive drum A and then continued as in late models.

Permeability Tuning and Band Switch Assemblies—Differences in Early Models

A few of the first models used a station button plunger 6½ inches long. These models may be identified by a red paint mark on the front bracket of the tuning unit at the upper right corner. On later models, this length was changed to 6¾ inches. These models have an orange paint mark in place of the red mark. It is important, therefore, that the length be noted when ordering this part and the correct part number, as shown in the parts list, be specified.

ATTACHING DIAL POINTER—Tune in a 1500 KC signal. Move the pointer to the 1500 KC mark on the dial and clamp it tightly over the fabric tubing on the cord.
### Replacement Parts

**NOTICE:** There is a chassis number label on the chassis base. The chassis number identifies the radio as to chassis, dial, and issue number. When ordering parts or writing, be sure to mention the chassis number.

Manufacturer—Wells-Gardner & Co., 2701 N. Kildare Ave., Chicago, Ill., U. S. A.

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### MISCELLANEOUS

#### SOCKETS

<table>
<thead>
<tr>
<th>Part No.</th>
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<th>List Price</th>
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<tbody>
<tr>
<td>1A35</td>
<td>Tube Socket-Dual (8 Pin)</td>
<td>0.50</td>
</tr>
<tr>
<td>1A46</td>
<td>Tube Socket-Dual (7 Pin)</td>
<td>0.50</td>
</tr>
<tr>
<td>1A48</td>
<td>Tube Socket-Tritronics (7 Pin)</td>
<td>0.50</td>
</tr>
<tr>
<td>1A53</td>
<td>Speaker Socket [2 Pin]</td>
<td>0.50</td>
</tr>
<tr>
<td>1A58</td>
<td>Miniature Socket and Cable Assembly</td>
<td>0.50</td>
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**SPEAKER**

When ordering parts for speakers, specify part number and letters identifying part number located on the speaker.

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<th>Description</th>
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<tr>
<td>1A69</td>
<td>5.5 Ohm, 640 Volts</td>
<td>0.50</td>
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<tr>
<td>1A54</td>
<td>50 Ohms, 640 Volts</td>
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</tr>
<tr>
<td>1A44</td>
<td>20,000 Ohms, 640 Volts</td>
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**NOCKS AND BUTTONS**

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<tr>
<td>2A15</td>
<td>Tone Control Knob</td>
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<td>2A46</td>
<td>Tone Control Knob, Round</td>
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</tr>
<tr>
<td>2A48</td>
<td>Tone Control Knob, Round (Model 600)</td>
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### RESISTORS

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<tr>
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<tr>
<td>458-902</td>
<td>C1</td>
<td>1,000 ohms</td>
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<tr>
<td>458-904</td>
<td>C2</td>
<td>2,000 ohms</td>
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<tr>
<td>458-905</td>
<td>C3</td>
<td>3,000 ohms</td>
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<td>458-906</td>
<td>C4</td>
<td>4,000 ohms</td>
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### ELECTROYLIC

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<td>C1</td>
<td>0.15 microfarads</td>
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<td>458-902</td>
<td>C2</td>
<td>0.25 microfarads</td>
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<tr>
<td>458-903</td>
<td>C3</td>
<td>0.35 microfarads</td>
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### TRIMMER

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<td>458-902</td>
<td>C2</td>
<td>2,000 ohms</td>
</tr>
<tr>
<td>458-903</td>
<td>C3</td>
<td>3,000 ohms</td>
</tr>
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### DIAL AND DRIVE ASSEMBLY

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<th>Description</th>
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<tr>
<td>458-901</td>
<td>Dial Mounting Plate Complete with 3 Dial Buttons and 3 Dial jewels</td>
<td>0.50</td>
</tr>
<tr>
<td>458-902</td>
<td>Dial Mounting Plate Complete with 3 Dial Buttons and 3 Dial jewels</td>
<td>0.50</td>
</tr>
<tr>
<td>458-903</td>
<td>Dial Mounting Plate Complete with 3 Dial Buttons and 3 Dial jewels</td>
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### CONDENSERS

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<th>Code</th>
<th>Capacitance</th>
</tr>
</thead>
<tbody>
<tr>
<td>458-901</td>
<td>C1</td>
<td>0.15 microfarads</td>
</tr>
<tr>
<td>458-902</td>
<td>C2</td>
<td>0.25 microfarads</td>
</tr>
<tr>
<td>458-903</td>
<td>C3</td>
<td>0.35 microfarads</td>
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### PHONO ATTACHMENT PARTS

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<th>Description</th>
<th>List Price</th>
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<tbody>
<tr>
<td>458-901</td>
<td>30&quot; Phone Cable Assembly (Includes Plug, Double Up Photo Jack, Switch, and Knob)</td>
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</tr>
<tr>
<td>458-902</td>
<td>30&quot; Phone Cable Assembly (Includes Plug, Double Up Photo Jack, Switch, and Knob)</td>
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### PERMEABILITY TUNING AND BAND SWITCH ASSEMBLIES

<table>
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<th>Description</th>
<th>List Price</th>
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<tbody>
<tr>
<td>458-901</td>
<td>Band Change Switch Assembly Complete with Tripper Control (Model 600)</td>
<td>0.50</td>
</tr>
<tr>
<td>458-902</td>
<td>Band Change Switch Assembly Complete with Tripper Control (Model 600)</td>
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</tbody>
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---

### MODELS AL2-A12

**Series A12**

**Series A14**

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Price: Subject to change without notice.

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Fig. 6 — Permeability Tuning Unit.
WELLS-GARDNER & CO.

SPECIFICATIONS

Power Consumption - 70 Watts (A.C.220-volt,3-cycle)
Power Output - - 3.6 Watts Maximum
Selectivity - 31.5 KC Broad at 1000 times Signal

Sensitivity

A Range (Manual Tuning) 1.0 Microvolt Average
B Range (Automatic Tuning) 1.0 Microvolt Average
C Range 3.0 Microvolts Average
D Range 0.5 Microvolts Average

Intermediate Frequency - - - 456 KC.
Speaker - - - 10" or 12" Dynamic

Tuning Frequency Range

B Range (Manual Tuning) 500 to 1800 KC
B Range (Automatic Tuning) 800 to 6300 KC
D Range (Manual Tuning) 4200 to 52000 KC
D Range (Automatic Tuning) 520 to 9900 KC
Buttons 1 & 2 (Automatic Tuning) 520 to 9900 KC
Buttons 3 & 4 (Automatic Tuning) 800 to 11000 KC
Buttons 5 & 6 (Automatic Tuning) 800 to 16000 KC

Fig. 1 - Schematic Circuit Diagram - Issue No. 1

Fig. 2 - Schematic Circuit Diagram - Issue No. 2

Fig. 3 - Schematic Circuit Diagram - Issue No. 2
### RESISTORS

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>R1</td>
<td>130-12</td>
<td>50M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R2</td>
<td>130-48</td>
<td>15M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R3</td>
<td>130-103</td>
<td>100M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R4</td>
<td>130-27</td>
<td>50 ohms - 1/3 w.</td>
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<tr>
<td>R5</td>
<td>130-96</td>
<td>25M ohms - 1/3 w.</td>
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<tr>
<td>R6</td>
<td>130-4</td>
<td>3 megohm - 1/3 w.</td>
</tr>
<tr>
<td>R7</td>
<td>101-74</td>
<td>1 megohm - Volume Control</td>
</tr>
<tr>
<td>R8</td>
<td>130-4</td>
<td>3 megohm - 1/3 w.</td>
</tr>
<tr>
<td>R9</td>
<td>101-75</td>
<td>300M ohms - Tone Control</td>
</tr>
<tr>
<td>R10</td>
<td>130-103</td>
<td>100M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R11</td>
<td>130-22</td>
<td>5M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R12</td>
<td>130-163</td>
<td>400M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R13</td>
<td>130-103</td>
<td>100M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R14</td>
<td>130-12</td>
<td>50M ohms - 1/3 w.</td>
</tr>
<tr>
<td>R15</td>
<td>130-100</td>
<td>150M ohms - 1/3 w.</td>
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<tr>
<td>R16</td>
<td>106-37</td>
<td>20 ohms - Muter</td>
</tr>
<tr>
<td>R17</td>
<td>106-37</td>
<td>42 ohms - Muter</td>
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<tr>
<td>R18</td>
<td>106-37</td>
<td>250 ohms - Muter</td>
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<tr>
<td>R19</td>
<td>130-110</td>
<td>1 megohm - 1/10 w.</td>
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</table>

### CONDENSERS

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<thead>
<tr>
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<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>C1</td>
<td>100-22</td>
<td>.05 x 200 v.</td>
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<tr>
<td>C2</td>
<td>129-39</td>
<td>.0005 Mica</td>
</tr>
<tr>
<td>C3</td>
<td>100-22</td>
<td>.05 x 200 v.</td>
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<tr>
<td>C4</td>
<td>129-55</td>
<td>.0034 Mica</td>
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<td>C5</td>
<td>129-54</td>
<td>.001 Mica</td>
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<tr>
<td>C6</td>
<td>129-5</td>
<td>.001 Mica</td>
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<tr>
<td>C7</td>
<td>100-11</td>
<td>.01 x 400 v.</td>
</tr>
<tr>
<td>C8</td>
<td>129-2</td>
<td>.0005 Mica</td>
</tr>
<tr>
<td>C9</td>
<td>100-57</td>
<td>.006 x 600 v.</td>
</tr>
<tr>
<td>C10</td>
<td>100-26</td>
<td>.02 x 400 v.</td>
</tr>
<tr>
<td>C11</td>
<td>100-26</td>
<td>.02 x 400 v.</td>
</tr>
<tr>
<td>C12</td>
<td>100-12</td>
<td>.003 x 600 v.</td>
</tr>
<tr>
<td>C13</td>
<td>103-37</td>
<td>8 mfd. x 350 v.</td>
</tr>
<tr>
<td>C14</td>
<td>103-14</td>
<td>16 mfd. x 250 v.</td>
</tr>
<tr>
<td>C15</td>
<td>100-20</td>
<td>.1 x 200 v.</td>
</tr>
<tr>
<td>C16</td>
<td>100-19</td>
<td>.1 x 400 v.</td>
</tr>
<tr>
<td>C18</td>
<td>100-12</td>
<td>.003 x 600 v.</td>
</tr>
</tbody>
</table>

---

**PARTS**

- C102-47 One section of three gang condenser
- T1 111-51 B.C. Pre-Selector
- T2 111-49 B.C. Antenna Coil Assembly
- T3 111-50 M.W. - SW Antenna Coil Assembly
- T4 130-39 M.W. - SW Oscillator Coil Assembly
- T5 110-55 B.C. Oscillator Coil Assembly
- L1 114-66 6" Speaker (Field Resistance 900 ohms)
- L2 104-87 Power Transformer (60 cycle) 115 volts
- S 125-17 Band Switch
- S1 101-74 On-off Switch on volume control.

---

**FIG. 1—TOP VIEW**

**MODEL D699**

FACTORY NO. 644

©John F. Rider, Publisher
**Factory Number 840**

8 Tube Including Cathode-Ray Tuning Indicator
3-Band All-Wave A.C. Superheterodyne Receiver

**INSTRUCTIONS FOR INSTALLING, OPERATING AND SERVICING**

<table>
<thead>
<tr>
<th>BAND</th>
<th>DIAL SCALE</th>
<th>FREQUENCY RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcast</td>
<td>Outer Scale</td>
<td>540 to 1725 K.C. (Kilocycles)</td>
</tr>
<tr>
<td>Middle Wave</td>
<td>Center Scale</td>
<td>1090 to 5000 K.C. (Kilocycles)</td>
</tr>
<tr>
<td>Short Wave</td>
<td>Inner Scale</td>
<td>5.25 to 18.1 M.C. (Megacycles)</td>
</tr>
</tbody>
</table>

**TUNING**

Set Band changing switch to the band desired, turn volume control to the right approximately three-quarters of its rotation, turn tuning knob slowly until a signal is heard, then slowly back and forth, noting the width of the shadow indicated on the scale of the Cathode-Ray Tuning Indicator. Minimum indication of the ideal tuning position (resonance) is attained for any particular station (see dotted lines an illustration of cathode-ray tuning indicator (Fig. 2, Page 2.).

**CATHODE-RAY TUNING INDICATOR**

A cathode-ray tube is used for visually indicating when the receiver is accurately tuned to the incoming signal. The signal from the receiver is applied to the tube in such a manner as to cause a triangular shadow on the illuminating screen. The size of the shadow is determined by the strength of the incoming signal so that a change of tuning is readily exhibited on the cathode-ray screen, and therefore tuning to exact resonance can be definitely obtained.

The cathode-ray screen shows the dark sector (shadow) in the middle portion of the illuminated area at its minimum width when ideal tuning position (resonance) is attained for any particular station (see dotted lines an illustration of cathode-ray tuning indicator (Fig. 2, Page 2.).

**RESONANCE INDICATOR**

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 3-prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

**DUMMY ANTENNAS**

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

**TUNING**

Set Band changing switch to the band desired, turn volume control to the right approximately three-quarters of its rotation, turn tuning knob slowly until a signal is heard, then slowly back and forth, noting the width of the shadow indicated on the scale of the Cathode-Ray Tuning Indicator. Minimum indication of the ideal tuning position (resonance) is attained for any particular station (see dotted lines an illustration of cathode-ray tuning indicator (Fig. 2, Page 2.).

**ALIGNING I.F. TRANSFORMERS**

Part No. 108-105 Output I.F. Transformer
Part No. 108-106 Input I.F. Transformer

Three I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view). The band changing switch in the broadcast position, the extreme left of its rotation, and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

- Move dial pointer to 1000 kilocycles and adjust middle wave antenna (Adjustment number 2) to resonance.
- Re-set external oscillator and check set at 183 megacycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 161 megacycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 500 kilocycles and pick up signal by rotating variable condenser and check sensitivity.

**TUNING**

Set Band changing switch to the broadcast position, extreme left of its rotation, and with gain condenser in its minimum capacity position, plate entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to the antenna lead, and black ground lead, to make following adjustments:

- Set external oscillator to 1270 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 1); set bottom view of coil washer (Fig. 3.)
- Re-set external oscillator to 1550 K.C. rotate variable gain condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear panel at the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of these adjustments.)
- Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating condenser to approximately 400 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is obtained. This adjustment is located on the bottom of the chassis directly under the variable gain condenser. (See bottom view of chassis, Fig. 2.)
- Re-set trimmers I, S, and B until readability is at its maximum.
- Re-set trimmers P, A, and X at 1000 kilocycles. Under no circumstances bend plate of variable condenser sections to correct breaking.

**SHORT WAVE BAND ALIGNMENT**

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 174 megacycles and connected in series with "Dummy 3" to the top antenna and black ground lead, make the following adjustments:

- Move dial pointer to 17 megacycles and adjust short wave oscillator and check sensitivity.
- Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 481 megacycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 161 megacycles and pick up signal by rotating variable condenser and check sensitivity.

**MIDDLE WAVE BAND ALIGNMENT**

1060 to 3000 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5090 kilocycles and connected in series with "Dummy 2" to the top antenna and black ground lead, make the following adjustments:

- Move dial pointer to 5090 kilocycles and adjust middle wave oscillator (Adjustment number 2) to resonance.
- Re-set external oscillator and check set at 161 megacycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 500 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
- Re-set external oscillator and check set at 1700 kilocycles and pick up signal by rotating variable condenser and check sensitivity.

**CHECK BROADCAST BAND ALIGNMENT**

With "Dummy 1" still connected, move output indicator from 1270 K.C. and adjust input I.F. transformer (No. 108-101) to resonance.
CATHODE-RAY TUNING INDICATOR

A cathode-ray tube is used for visually indicating when the receiver is correctly tuned to the incoming signal. The signal from the receiver is applied to the tube in such a way as to cause a triangular shadow on the luminous screen. The size of the shadow is determined by the strength of the incoming signal so that a change of tuning is readily exhibited on the cathode-ray screen, and therefore tuning to exact resonance can be definitely obtained.

The cathode-ray screen shows the dark sector (shadow) in the middle portion of the illuminated area at its minimum width when ideal tuning conditions (resonance) is attained for any particular station (see dotted lines on illustration of cathode-ray tuning indicator (Fig. 2-2, p. 4).

TUNING:

Set band changing switch to the band desired, turn volume control to the right approximately three-quarters of its rotation, turn tuning knob slowly until a signal is heard, then turn slowly and watch the shadow indicated on the screen of the Cathode-Ray Tuning Indicator. Minimum width indicates the ideal tuning position (resonance).

NOTE: Tuning on the short wave band is very critical. The tuning knob has been provided with a vernier mechanism to assist in tuning. The knob should be turned very slowly at the point where the width of the shadow first indicates the correct tuning position of the short wave band. Assignal of suitable strength could easily be passed if tuned through in a rapid or haphazard manner.

The operation of this receiver is like that of any conventional receiver, with the exception that greater care must be exercised when tuning on the short wave band. It is also desirable that the user has a practical knowledge of the operating station and general time differences of the broadcasting stations. A short wave map is included with your radio for your convenience.

Antenna and Ground Leads:

A GOOD ANTENNA IS ESSENTIAL FOR SATISFACTORY RECEPTION ON SHORT WAVES.

ANTENNA AND GROUND LEADS:

There are three wires coming out of the back of the chassis—the yellow wire and the black with yellow tracer wire for antenna connections. The black wire is the ground connection.

For conventional types of antennas connect the yellow wire to the antenna lead and the yellow with black tracer wire to the daylight antenna and the solid black wire to the ground lead. (See Fig. 1—Top View)

Figure 3—Bottom View Showing Trimmers

TUBES:

The tube complement of this chassis consists of the following six types of glass tubes which are interchangeable with metal tubes.

- Type 657G Remote cut-off tube type A.C. amplifier
- Type 657G Pentagrid first detector
- Type 6L5G Oscillator
- Type 657G Remote cut-off tube type D.C. amplifier
- Type 657G-101 detector tube type D.C. second detector

SERVICE NOTES:

Any tubes taken from different points of circuit to chassis are measured with voltage control full on, all tubes in their sockets and speaker connected, with a watt meter having a resistance of 1000 ohms at 50 cycles. All voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.C. and affecting accuracy of voltage measurements, aerial and ground leads should be shorted while making measurements.

MIDDLE WAVE BAND ALIGNMENT:

1000 to 1550 Kilocycles

1. With band changing switch in the middle wave position, upper (61.5) rotation, and with external oscillator set at 55 megacycles and connected to the antenna and ground points make the following adjustments:

(a) Move dial pointer to 55 megacycles and adjust middle wave oscillator trimmer (adjustment number 3) to resonance.

(b) Re-set external oscillator to 55 megacycles and pick up signal by rotating variable condenser and adjust middle wave R.F. trimmer (adjustment number 8) to resonance.

(c) Re-set external oscillator and check set at 181 megacycles and 3 megacycles for band coverage.

BROADCAST BAND ALIGNMENT:

450 to 1718 Kilocycles

1. With band changing switch in the broadcast position, upper (61.5) rotation, and with external oscillator set at 3 megacycles and connected to the antenna and ground points make the following adjustments:

(a) Move dial pointer to 3 megacycles and adjust middle wave oscillator trimmer (adjustment number 3) to resonance.

(b) Re-set external oscillator to 3 megacycles and pick up signal by rotating variable condenser and adjust broadcast R.F. trimmer (adjustment number 7), and middle wave antenna trimmer (adjustment number 5) to resonance.

(c) Re-set external oscillator and check sensitivity at 1700 kilocycles.

FIG. 3—BOTTOM VIEW SHOWING TRIMMERS

RESONANCE INDICATOR

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the two plates of the type 19 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy A," "Dummy B," and " Dummy C."

Dummy 1: (190) and Dummy 2: (192) consists of a 1900 ohm resistor and 25 ohm resistor connected in series with each other and in series with the external oscillator.

Dummy 3: (Middle and Short Wave) consists of a 1900 ohm resistor and a 25 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING INSTRUCTIONS:

CAUTION: No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as run down battery, defective tubes, poor antenna connections, defective condensers and resistors.

In order to properly align this chassis, an oscillator (generator) is necessary. All adjustments should be made with a non-metallic screwdriver.

- With "Dummy 1" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonance.

- With "Dummy 2" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonate.

- With "Dummy 3" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonate.

- With "Dummy 1" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonate.

- With "Dummy 2" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonate.

- With "Dummy 3" still connected, move oscillator output dip to grid of 6S7G tubes and adjust output 192 transformer (number 10) to resonate.
WESTERN AUTO SUPPLY CO.

NOTE- IF. FREQ. 465 K.C.
ALL VOLTAGES MEASURED FROM GROUND WITH A 1000 x VOLT VOLTMETER. * MEASURED WITH 300M x VOLTMETER.

No.  Part No.  Description

CONDENSERS

C  102-27  2 Gang Variable Condenser
C1  100-39  .05 x 200 25%
C2  116-31  .05 x 200 (Yellow lead) 20%
C3  129-12  .0025 Mica 20%
C4  124-37  Series Pad 350 mmf. w. v.
C5  116-21  .1 x 400 (Red lead) 20%
C6  116-21  .1 x 400 (Green lead) 20%
C7  116-21  .15 x 200 (Black lead) 20%
C8  100-60  .25 x 200 25%
C9  129-12  .0025 Mica 20%
C10  100-15  .01 x 400 25%
C11  119-33  8 mfd. Lyric 300 w. v.
C12  119-33  4 mfd. Lyric 300 w. v.
C13  100-11  .05 x 120 10 - 50%
C14  129-5  .001 Ceramic 20%
C15  100-11  .01 x 400 25%
C16  100-60  .25 x 200 25%
C17  100-54  .006 x 600 w. 25%
C18  100-58  .005 x 1200 20 - 10%
C19  100-31  .5 x 120 10 - 50%
C20  100-31  .5 x 130 10 - 50%
  4 Spark Platers
C1, C6 and C7 in same block
C11, C12 in same block
C8, C16 in same block

RESISTORS

R1  103-54  500 ohm--/3 w. --20%
R2  130-162  50M ohm--/3 w. --20%
R3  130-164  50M ohm--/4 w. --20%
R4  130-137  1500 ohm--/3 w. --20%
R5  130-24  400 ohm--/3 w. --20%
R6  130-50  25M ohm--1 w. --20%
R7  130-139  40M ohm--/3 w. --20%
R8  130-142  1 meg ohm--/3 w. --20%
R9  130-91  500 M ohm Volume Control
R10  130-153  760 ohm--/1 w. --20%
R11  130-119  1 meg ohm--/1 w. --20%
R12  130-141  250M ohm--/1 w. --20%
R13  130-5  50M ohm--/1 w. --20%
R14  130-11  250M ohm--/1 w. --20%
R15  130-54  20M ohm--/1 w. --20%

PARTS

L1  111-76  Antenna filter choke
L2  105-26  "A" Choke
L3  105-40  "B" Filter choke (335 ohms)
L4  114-59  Speaker field--4 ohm
L5  115-19  "A" Choke
L6  115-34  Speaker
L7  114-59  Speaker
L8  136-7  Switch on Volume Control
V1  136-1  Vibrator

TRUTONE PAGE 9-5

FIG. 2—TOP VIEW

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DESCRIPTION

Model No. 567 is a five-tube superheterodyne receiver having a tuning range of 520 K.C. to 1550 K.C., operates from a 6.3 volt storage battery and uses the automotive type 6L6 volute tubes. The "B" supply is obtained from a vibrator with a tube rectifier.

The I.F. frequency used is 465 K.C., the R.F. end of the receiver consisting of a high gain iron core transformer circuit which gives high signal to noise ratio. The I.F. transformers are designed to give high gain and selectivity and yet to have a broad noise for ease of tuning and bi-fid response. They are of the air core type and wound with solid wire to give minimum drift and variation of gain due to climatic changes.

This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened by spring clips, self tapping screws and trimout buttons.

All adjustments are accessible and any part replaceable without removing the chassis from the case.

TUBE COMPLEMENT


ANTENNA CONNECTION

Insert the antenna plug in the chassis. The wire at the other end of the antenna cable is connected to the lead-in wire from the antenna. Keep the antenna cable as far away from car wiring as possible and ground the pickup of the antenna cable shield to the chassis end.

A 24 inch shielded antenna cable is regularly supplied. If a roof antenna is used, this cable will be long enough in practically all cases to reach the corner post or column at which the leads come down. If shielded should be pushed up into the column as far as possible. The reason for this is that intermodulation interference may be picked up by the shielded portion of the antenna cable.

If an under car or running board antenna is used, the shielding must be extended to the antenna in all cases. The pigtail on the end of the antenna cable must be well grounded at the extreme antenna end. If it is necessary to extend the cable, use a shielded cable as described on following page, be sure that a pigtail is put at the end of the shielded extension and that it is well grounded at the extreme antenna end.

To extend the antenna cable shielding, the antenna lead wire should be covered with heavy insulation, such as boom, to properly separate the shielding from the wire. Then connect the two wires together and connect the two shields together, care being taken that no strand of the shield touches the antenna wire.

Aerials suitable for steel roof and convertible cars can be purchased from your dealer. They should be mounted as far to the rear of the car as possible.

The majority of 1937 cars have steel roofs, and a running board or other type car antenna must be used. The 1936 Chrysler Motors cars (except Plymouth) including Chrysler, Dodge and DeSoto have a steel roof separated from the body proper, which is used as an antenna. Other cars without steel roofs such as Ford and Plymouth have a built-in roof transformer.

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with voltmeter control full on. All tubes in their sockets and speaker connected, with a voltmeter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagram.

To check for open by-pass condensers, shut each condenser with a meter and note the change in meter reading, which is known to be good, until the defective unit is located.

Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with sockets or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. If fuse blows out frequently and insulating sleeve has been properly placed over fuse, the trouble is probably in the vibrator, it should be replaced. Do not attempt to make any adjustments on the vibrators.

ALIGNING INSTRUCTIONS

All of the adjustments have been very carefully set with signal generator at the factory and require no further adjustment. After operation becomes necessary to replace a coil or transformer, or if the adjustments have been tampered with in the field. Under no circumstances attempt any adjustments without first making certain that adjustment is necessary and only after volt- age tests and condensers have been checked and found to be normal. To properly realign this receiver a test oscillator, as well as an output meter, must be used.

DUMMY ANTENNAS

The dummy antennas referred to in the following instructions are:‘

T.F. Dummy’—A .5 mfd. condenser connected in series with the test oscillator output.

“Broadcast Dummy” — A .175 mfd. condenser connected in series with the output lead of the test oscillator.

RESONANCE INDICATOR

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 6A8 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low side of a multi-range meter should be used.

L.F. ALIGNMENT: (465 K.C.)

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6A7 I.F. tube.

2. Adjust trimmer condensers of output I.F. transformer No. 108-95 to resonance with oscillator.

3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer No. 108-96 to resonance with oscillator. See top view for location of these transformers. There are two trimmer condensers on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screwdriver.

BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 3550 K.C. in series with broadcast dummy to the antenna lead of receiver.

2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the section of the gang condenser nearest to the drive—see top view, Fig. 2.)

3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust antenna trimmer to resonance (see top view, Fig. 2).

4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series pad rocking gang condenser to 1 and 0 at the same time adjusting series pad for maximum gain. This adjustment is accessible from the top of the chassis (see top view).

5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.

6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

DIAL ADJUSTMENT

Tune set to some station of a known frequency (between 800 and 1200 K.C.) hold selector knob, then with a screw driver adjust the slotted screw on the back of the control head, and in that way adjust the dial pointer to the correct frequency setting.
### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type and Number of Tubes</th>
<th>1 4A60, 1 5RT7, 1 6Q7, 1 6AG6, 1 7x30 - Total 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Characteristics</td>
<td>105-125 volts, 50-60 cycle A.C.</td>
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<tr>
<td>Power Consumption</td>
<td>0.3 Watts</td>
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<tr>
<td>Total Output Power</td>
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<tr>
<td>Undistorted Output Power</td>
<td>1/4 Watts (Broadcast Band 620 to 1500 KC. and a short wave band extending from 1500 to 3000 KC.)</td>
</tr>
<tr>
<td>Tuning Ranges</td>
<td>(Short wave Band 1550 to 3200 KC. 1. F. 450 KC, 1400 KC. 2. I. F. 900 KC, 440 KC)</td>
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<tr>
<td>Line-Up Frequencies</td>
<td>10.5-Mc.</td>
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### GENERAL DESCRIPTION

**ALIGNMENT OF OSCILLATOR AND I.F.**

1. Check the pointer setting to be sure that it is exactly horizontal when the tuning condenser is completely closed.

2. Set the test oscillator and dial indicator to 1400 KC. and adjust the oscillator trimmer condenser (rear section of gang) to maximum output.

3. Apply the test signal to coil end of the antenna cable through a .0005 mfd. blocking condenser and adjust trimmer condenser (front section of gang) to maximum and reduced sufficiently to prevent overload as the individual circuits of the receiver are brought into alignment. A conventional output meter should be connected across the terminals of the speaker voice coil to indicate when the individual circuits are correctly aligned. The sensitivity of the meter must be sufficient to give satisfactory readings with low input levels.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, location of the various tubes and alignment condensers.

**ALIGNMENT OF I.F. (455 KC)**

1. Set the volume control to maximum position, the wave-change switch to standard broadcast band, and the dial pointer to approximately 600 KC.

2. Connect the output meter across the voice coil terminals of the speaker.

3. Set the test oscillator to 455 KC. and adjust its output to produce a measurable reading on the output meter when the test signal is applied to the grid of the type 6AG6 first detector-oscillator tubes through a .01 mfd. blocking condenser.

4. Adjust the four I.F. trimmer condensers underneath the chassis (under the square coil housing) to maximum output.

## TABLE OF PARTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Description of Parts</th>
<th>Description of Parts</th>
<th>List Price</th>
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<td>- &quot;B&quot; models</td>
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<td>Antenna coil assembly</td>
<td>- &quot;B&quot; models</td>
<td>$1.00</td>
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</table>
WILCOX-GAY CORP.

MODELS A3, A4
Chassis 5A6
Schematic, Socket

© John F. Rider, Publisher
### Model 6T11

<table>
<thead>
<tr>
<th>Signal Generator</th>
<th>Frequency</th>
<th>Dial Position</th>
<th>Wave Band Switch</th>
<th>Trigger Number</th>
<th>Output Signal</th>
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<tbody>
<tr>
<td>Remove Grid Clip from 6A8</td>
<td>455 K.C.</td>
<td>1400 K.C.</td>
<td>Broadcast (Left)</td>
<td>1</td>
<td>Max. 1</td>
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<tr>
<td>Control Grid of 6A8</td>
<td>455 K.C.</td>
<td>1400 K.C.</td>
<td>Broadcast (Left)</td>
<td>2</td>
<td>Max. 1</td>
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<td></td>
<td>455 K.C.</td>
<td>1400 K.C.</td>
<td>Broadcast (Left)</td>
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<td>455 K.C.</td>
<td>1400 K.C.</td>
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<td>455 K.C.</td>
<td>1400 K.C.</td>
<td>Broadcast (Left)</td>
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<td>455 K.C.</td>
<td>1400 K.C.</td>
<td>Broadcast (Left)</td>
<td>6</td>
<td>Max. 1</td>
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</table>

Connect Grid Clip to 6A8

- Antenna & Ground Posts: 1400 K.C. 1400 K.C. 6 | Max. 1
- 4.0 Mc. 4.0 Mc. Pollock (water) 7 | Max. 1
- 1.6 1.6 13 | Max. 1
- 1.6 1.6 13 | Max. 1
- 14 14 Foreign (Right) 14 | Max. 1

Volume Control is "Full on" position at all times.

Connect a standard dummy antenna between signal generator and receiver.

**Note 1:** Signal across primary of output transformer between 20 and 50 volts.

**Note 2:** Repeat above procedure and critically trim each adjustment to absolute resonance to insure perfect alignment. The i.f. sensitivity should be from 2 to 4 microvolts.

---

### TUBE CIRCUIT

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Plate to Ground</th>
<th>Screen to Ground</th>
<th>Grid to Ground</th>
<th>2 Plate to Ground</th>
<th>2 Grid to Ground</th>
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<tbody>
<tr>
<td>6A8</td>
<td>Osc. &amp; First Detector</td>
<td>280</td>
<td>62</td>
<td>1.5</td>
<td>200</td>
<td>15</td>
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<tr>
<td>6K7</td>
<td>L. F. Amplifier</td>
<td>270</td>
<td>62</td>
<td>1.8</td>
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<td>6K7</td>
<td>L. F. Amplifier</td>
<td>270</td>
<td>62</td>
<td>1.7</td>
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<td>6B5</td>
<td>2nd. Detector &amp; A.V.C</td>
<td>200</td>
<td>1.3</td>
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<tr>
<td>685</td>
<td>First Audio</td>
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<td>1.3</td>
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<td>1.3</td>
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<td>685</td>
<td>Output</td>
<td>270</td>
<td>278</td>
<td>18</td>
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<tr>
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<td>Rectifier</td>
<td>270</td>
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<td>Rectifier</td>
<td>270</td>
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**E Voltage** 270

**Speaker Field Voltage** 105

Meter 1000 ohms per volt

750 volt scale
NOTE

Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Battery Voltage at chassis 6.2 v.

Battery Consumption 2.3 amperes.

(A) Bias for 6G6 measured from point "B" to chassis.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
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<tr>
<td>2</td>
<td>Rec. Ant. Lead</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
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<td>3</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant.</td>
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</table>
(A) Bias for 6A8—6X7 and 6Q7 measured at 6Q7 cathode.

(B) Bias for 26L6 measured

49-237-5 INCH. 6D-311
49-237-5 6D-326
49-237-5 6D-336 between "C" at 6Q7 socket and
49-241-6 6D-360 chassis.

**ALIGNMENT PROCEDURE**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
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<tbody>
<tr>
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<td>455</td>
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<td>600 ABCD</td>
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<td>1500</td>
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<td>1500 F</td>
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<tr>
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<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
<td>1500 G</td>
<td>Alignment of Ant.</td>
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ZENITH RADIO CORP.

SOCKET VOLTAGES

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<th>Position</th>
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<th>2</th>
<th>3</th>
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<th>6</th>
<th>7</th>
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<td>Converter, Osc.</td>
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<td>129</td>
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All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected.

Line voltage 117V. Consumption 16W. Battery voltage 6.3V consumption 2.1 Amp. Power Output .84W.

ALIGNMENT PROCEDURE

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<th>Operation</th>
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<td>1500</td>
<td>”</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
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<tr>
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<td>” ” ”</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>”</td>
<td>1500</td>
<td>G</td>
<td>A’r’g.ment of Ant.</td>
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<td>600</td>
<td>”</td>
<td>600</td>
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<td>” ” ”</td>
<td>”</td>
<td>”</td>
<td>”</td>
<td>”</td>
<td>FG</td>
<td>Repeat 2 &amp; 3</td>
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<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
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<td>S.W.</td>
<td>16500</td>
<td>L</td>
<td>Rock gang &amp; adj. for max. output</td>
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</table>

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NOTE

Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 45 watts.

Power output 3.5 watts.

(A) Bias for 6A8 — 6K7 and diodes of 6Q7 measured across resistor R9.

(B) Bias for triode section of 6Q7 and 6K6 measured across R8 and R9.

LEGEND

NC — No Connection
VC — Volume Control
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
F — Filament

Location of Tubes and Trimmers

Models 5R303, 5R312, 5R316, 5R317, 5R337
CHASSIS No. 5528

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br’dc’t</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Lead</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>'</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>'</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>''</td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant.</td>
</tr>
</tbody>
</table>
ZENITH RADIO CORP.

SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>6A8</td>
<td>Converter</td>
<td>0</td>
<td>6.3</td>
<td>244</td>
<td>97</td>
<td>-9</td>
<td>149</td>
<td>0</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F.</td>
<td>0</td>
<td>6.3</td>
<td>246</td>
<td>97</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-5</td>
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<td>0</td>
<td>71</td>
<td>-2.5</td>
<td>-2.5</td>
<td>6.3</td>
<td>-2.5</td>
<td>-2.5</td>
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</tr>
<tr>
<td></td>
<td>AVC</td>
<td>0</td>
<td>0</td>
<td>231</td>
<td>246</td>
<td>-3.5</td>
<td>6.3</td>
<td>-2.5</td>
<td>-5</td>
<td></td>
</tr>
<tr>
<td>6F6</td>
<td>Power</td>
<td>0</td>
<td>0</td>
<td>231</td>
<td>246</td>
<td>-3.5</td>
<td>6.3</td>
<td>-2.5</td>
<td>-5</td>
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<tr>
<td>5Y4</td>
<td>Rect.</td>
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<td>AC</td>
<td>AC</td>
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</tbody>
</table>

All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected. Line voltage 117V. Consumption 65W. Power Output 4.5W.

BOTTOM VIEW

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to—</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>456</td>
<td>Br’dc’t</td>
<td>600</td>
<td>ABCD</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Lead</td>
<td>200 Mmfld.</td>
<td>456</td>
<td>&quot;</td>
<td>600</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfld.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
</tr>
<tr>
<td>4</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfld.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>G</td>
</tr>
<tr>
<td>5</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfld.</td>
<td>600</td>
<td>&quot;</td>
<td>600</td>
<td>J</td>
</tr>
<tr>
<td>6</td>
<td>&quot; &quot; &quot;</td>
<td></td>
<td></td>
<td></td>
<td>FG</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rec. Ant. Lead</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
</tr>
<tr>
<td>8</td>
<td>&quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>16500</td>
<td>S.W.</td>
<td>16500</td>
<td>L</td>
</tr>
</tbody>
</table>

NOTE: If receiver is used in a location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.

Chassis No. 5521AT

LOCATION OF TRIMMERS
ZENITH PAGI'9-11

In MH, 11.

ZENITH 11.11)IO CORP.

FOR TUNER DATA, SEE SPECIAL SECTION

MODELS 5529, 5532G

Schematic Parts

ZENITH RADIO CORP.

CHICAGO, ILLINOIS
NOTE
Voltages measured from chassis to socket contacts using a 1000 ohm per volt meter. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 45 watts.

Power output 3 watts.

(A) Bias for 6A8—6K7 and diodes measured across R11.

(B) Low side of volume control.

(C) Bias for triode section of 6Q7 and 6K6 measured across R10 and R11.

Models 5S319, 5S327, 5S330, 5S338, 57339
CHASSIS No. 5529

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Lead</td>
<td>200 Mmfd.</td>
<td>455</td>
<td></td>
<td>600</td>
<td>E</td>
<td>See Note</td>
</tr>
<tr>
<td>3</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>4</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant.</td>
</tr>
<tr>
<td>5</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>&quot;</td>
<td>600</td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>6</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>&quot;</td>
<td></td>
<td>FG</td>
<td>Repeat 3 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>&quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

NOTE: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.
NOTE
Voltages measured from socket contacts to chassis using a 1000 ohm per volt meter. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 55 watts.

Power output 1.6 watts.

(A) Bias for 6A8 — 6K7 and 6Q7 measured at 6Q7 cathode.

(B) Bias for 25L6 measured at point C on 6Q7 socket. Filament voltages measured across heaters of 25L6 and 25Z6 is 22 volts A.C. Other tubes 6 v A.C.

---

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
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<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Lead</td>
<td>200 Mmf'd.</td>
<td>1500</td>
<td>''</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>''</td>
<td>''</td>
<td>''</td>
<td>''</td>
<td>1500</td>
<td>G</td>
<td>Al'gment of Ant.</td>
</tr>
</tbody>
</table>

NOTE
Voltages measured for socket contacts to chassis using a 1000 ohm per volt meter. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 60 watts.

Power Output 4.5 watts.

(A) Bias for 6A8 — 6K7 and 615 measured across X which is neg. 2.3 volts.

(B) Bias for 6F5 measured across X and Y which is neg. 3.8 volts.

(C) Bias for 6F6 measured across XY and Z which is neg. 16 volts.

---

 ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmf'd.</td>
<td>455</td>
<td>''</td>
<td>600</td>
<td>E</td>
<td>See Note</td>
</tr>
<tr>
<td>3</td>
<td>''</td>
<td>200 Mmf'd.</td>
<td>1500</td>
<td>''</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>4</td>
<td>''</td>
<td>200 Mmf'd.</td>
<td>1500</td>
<td>''</td>
<td>1500</td>
<td>G</td>
<td>Al'gment of Ant.</td>
</tr>
<tr>
<td>5</td>
<td>''</td>
<td>200 Mmf'd.</td>
<td>600</td>
<td>''</td>
<td>600</td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>6</td>
<td>''</td>
<td>200 Mmf'd.</td>
<td>''</td>
<td></td>
<td>FG</td>
<td>Repeat 3 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>''</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>8</td>
<td>''</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>L</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>9</td>
<td>''</td>
<td>400 Ohms</td>
<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

NOTE: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.
FOR TUNER DATA, SEE SPECIAL SECTION

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**ALIGNMENT PROCEDURE**

**Models 6S330, 6S361**

**CHASSIS No. 5648**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Oac. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc'</td>
<td>600</td>
<td>ABCD</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
<td></td>
<td>F</td>
<td>Set Osc to Scale</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>200 Mmfd.</td>
<td>600</td>
<td></td>
<td></td>
<td>J</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
<tr>
<td>5</td>
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<td>200 Mmfd.</td>
<td>600</td>
<td></td>
<td></td>
<td>FG</td>
<td>Repeat 2 &amp; 3</td>
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<tr>
<td>6</td>
<td></td>
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<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc to scale</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>L</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
<tr>
<td>8</td>
<td></td>
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<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
</tbody>
</table>

**Line voltage 115 v. Consumption 65 watts.**

**Power Output 4.5 watts.**

**BATTERY**

- **RED** +
- **BLACK** -

**LOCATION OF TUBES AND TRIMMERS**

**MODEL No. 6B321**

**CHASSIS No. 5653**

**Operation** | **Connect Test Oscillator to** | **Dummy Antenna** | **Set Test Oac. to** | **Band** | **Set Dial At** | **Adjust Trimmers** | **Purpose** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc'</td>
<td>600</td>
<td>ABCD</td>
<td>I.F. Alignment</td>
</tr>
<tr>
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<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
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<td>F</td>
<td>Set Osc to Scale</td>
</tr>
<tr>
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<td></td>
<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>200 Mmfd.</td>
<td>600</td>
<td></td>
<td></td>
<td>J</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>200 Mmfd.</td>
<td>600</td>
<td></td>
<td></td>
<td>FG</td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc to scale</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>L</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>400 Ohms</td>
<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td>Rock gang &amp; adj for max output</td>
</tr>
</tbody>
</table>

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FOR TUNER DATA
SEE SPECIAL SECTION

MODELS 6J322, 6J357
Chassis 5654
Schematic, Parts
NOTE

Voltages measured from socket contacts to chassis using a 1000 ohm per volt meter with chassis operating on 110 volt A.C.

Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 18 watts.

Battery voltage at chassis 6v.

Consumption — switch on normal 2.3 amperes.

Consumption — switch on conserv. 1.95 amperes.

Power Output 1 watt.

(A) Bias for 6L8 and 6S7 measured at K contacts of respective sockets which is +1.8 volts.

(B) Bias for 6L6 tubes measured at K contact of sockets which is +7 volts.

(C) Bias for 6T7 triode measured at K contact of same socket which is +1 volt.

LEGEND

NC — No Connection
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
F — Filament

Location of Tubes and Trimmers

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
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<td>ABCD</td>
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<td>Rec. Ant. Lead</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
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<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>G</td>
<td>Alignment of Ant</td>
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<tr>
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<td>&quot; &quot; &quot;</td>
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<td>&quot;</td>
<td>600</td>
<td>J</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>5</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>FG</td>
<td></td>
<td>Repeat 3 &amp; 4</td>
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<tr>
<td>6</td>
<td>&quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>
 MODELS 6S254AT, 6S256AT
Chassis 5644AT
Voltage, Socket
Trimmers, Alignment

ZENITH RADIO CORP.

SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>1</th>
<th>2</th>
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<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Converter Osc.</td>
<td>0</td>
<td>6.2</td>
<td>246</td>
<td>90</td>
<td>-9</td>
<td>190</td>
<td>0</td>
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<tr>
<td>6K7</td>
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<td>0</td>
<td>6.2</td>
<td>237</td>
<td>90</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-5</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>-2.5</td>
<td>-2</td>
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<td>-2</td>
<td>-2</td>
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<tr>
<td>6F5</td>
<td>1st Audio</td>
<td>0</td>
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<td>104</td>
<td>-</td>
<td>-</td>
<td>6.2</td>
<td>-2</td>
<td>-2</td>
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<tr>
<td>6F6</td>
<td>Power</td>
<td>0</td>
<td>0</td>
<td>231</td>
<td>243</td>
<td>-3</td>
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<td>-2</td>
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<tr>
<td>5Y4</td>
<td>Rect.</td>
<td>0</td>
<td>AC</td>
<td>AC</td>
<td>314</td>
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</tr>
</tbody>
</table>

All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected.

Line voltage 117V. Consumption 65W. Power output 4.5W.

BOTTOM VIEW OF SOCKET

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>456</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>456</td>
<td>&quot;</td>
<td>600</td>
<td>E</td>
<td>See Note</td>
</tr>
<tr>
<td>3</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
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<tr>
<td>4</td>
<td>&quot; &quot; &quot;</td>
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<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>G</td>
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<tr>
<td>6</td>
<td>&quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Repeat 3 &amp; 4</td>
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<tr>
<td>7</td>
<td>&quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>16500</td>
<td>S.W.</td>
<td>16500</td>
<td>L</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>&quot; &quot; &quot;</td>
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<td>Police</td>
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<td>N</td>
<td>Rock gang &amp; adj. for max. output</td>
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</table>

NOTE: If receiver is used in a location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.

LOCATION OF TRIMMERS

Chassis No. 5644AT

©John F. Rider, Publisher
Voltage, Socket, Trimmers, Alignment

Voltages measured from socket contacts to chassis using a 1000 ohm per volt meter. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 65 watts.

Power output 4.5 watts.

(A) Bias for 6A8 — 6K7 and 6H6 measured across X which is — 2.5 volts.

(B) Bias for 6F5 measured across X and Y which is neg. 4 volts.

(C) Bias for 6F6 measured across XY and Z which is neg. 16 volts.

LEGEND
NC — No Connection
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
F — Filament

Models 6S341, 6S362
CHASSIS No. 5649

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
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<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1/2 Mfd.</td>
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<td>'</td>
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<tr>
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<td>Alignment of Ant.</td>
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<td>S.W.</td>
<td>18000</td>
<td>K</td>
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<tr>
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<td>S.W.</td>
<td>16500</td>
<td>L</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
<tr>
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<td>Police</td>
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<td>N</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

NOTE: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.

©John F. Rider, Publisher
**ALIGNMENT PROCEDURE**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
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<tbody>
<tr>
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<td></td>
<td>FGH</td>
<td>Repeat 2 &amp; 3</td>
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<td>S.W.</td>
<td>18000</td>
<td>K</td>
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**SOCKET VOLTAGES**

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<td>126</td>
<td>34</td>
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<td>15</td>
<td>1</td>
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<td>4</td>
<td>6.3</td>
<td>123</td>
<td>34</td>
<td>15</td>
<td>1</td>
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<tr>
<td>5</td>
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<td>133</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected.

Line voltage 117V. Consumption 19W. Battery voltage 6.3V. Power output 1.75W.

---

**6 VOLT CLIPS**

*(RED—POSITIVE) (BLACK—NEGATIVE)*

---

**LOCATION OF TRIMMERS**

©John F. Rider, Publisher
NOTE

Volatages measured from socket contacts to chassis using a 1000 ohm per volt meter with chassis operating on 110 volt A.C.

Line voltage 115 V. A.C. consumption 18 watts.

Battery voltage at chassis 6 volts.

Consumption with switch in

normal position 2.6 amperes.

Consumption with switch in

converv. position 22.2 amperes.

Power output 1 watt.

(A) Bias for 6Q8 and 6L7 B.F.
and IF tubes measured at K of respective sockets which is +1.5 volts.

(B) Bias for 6X7 triode section measured at K of 617 socket which is +1 volt.

(C) Bias for 6G6 tubes measured at K of respective sockets which is +7 volts.
### Zenith Radio Corp.

**Models:** 7S232AT, 7S256AT, 7S260AT

**Chassis:** 5709-AT

**Page:** 9-29

---

#### I.F. Frequency 456 K.C.

**7 Tube Superheterodyne**

**3 Band**

**Chassis No. 5709-AT**

---

### Circuit Diagram

1. **Det. Osc.**
2. **I.F. Tube**
3. **2nd Det.-A.V.C.**
4. **1st Audio Tube**
5. **Power**

---

### Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7S232AT</td>
<td>7S256AT</td>
<td>7S260AT</td>
</tr>
</tbody>
</table>

---

### Schematic, Parts

- **Variable trimmers:**
  - 1st I.F. transformer primary
  - 2nd I.F. transformer primary
  - detector broadcast (on same)
  - short wave detector (see note)
  - police band oscillator (see note)

- ** note:** trimmers P.K.L.P.N. are mounted on baffle strip **99-540**

---

### Rectifier

- **5Y4G**

---

### Speaker

- **1250 ohms**

---

**© John F. Rider, Publisher**
MODELS 7S232AT, 7S240AT
7S242AT, 7S256AT, 7S260AT
Chassis 5703AT
Voltage, Socket
Trimmers, Alignment

ZENITH RADIO CORP.

SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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</thead>
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<td>0</td>
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<td>243</td>
<td>89</td>
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<td>-</td>
<td>0</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>6H6</td>
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<td>0</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
<td>-2</td>
<td>-</td>
<td>6.4</td>
<td>-2</td>
<td>-</td>
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<tr>
<td>6F6</td>
<td>1st Audio</td>
<td>0</td>
<td>0</td>
<td>243</td>
<td>89</td>
<td>0</td>
<td>-</td>
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</tr>
<tr>
<td>6F5</td>
<td>Power</td>
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<td>0</td>
<td>243</td>
<td>89</td>
<td>0</td>
<td>-</td>
<td>0</td>
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<td>-2</td>
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<tr>
<td>5Y4</td>
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<td>6.4</td>
<td>-</td>
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All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected. Line voltage 117V. Consumption 75W. Power output 4.5W.

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to-</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
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<td>Br’dc’t</td>
<td>600</td>
<td>ABCD</td>
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<td>L</td>
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<td>Police</td>
<td>5500</td>
<td>N</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

LOCATION OF TRIMMERS

Chassis No. 5709AT

©John F. Rider, Publisher
MODELS 75323, 7S342, 7S343
Chassis 5714

NOTE: 9A ALTO
9B TREBLE
9C VOICE
9D NORMAL
9E LOW BASS
UP BASS

FOR TUNER DATA, SEE SPECIAL SECTION

ZENITH RADIO CORP.
7S363, 7S344, 7S345
Chassis 5714

ZENITH PAGE 9-31

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MODELS 7S323, 7S342, 7S343
Schematic Parts
ZENITH RADIO CORP.

NOTE

Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 V. Consumption 65 watts.

Power Output 4.5 watts.

(A) Bias for 6J5 — 6K7 and 6A8 measured across X of voltage divider is — 2 volts.

(B) Bias for 6F5 measured across X and Y sections of voltage divider is — 3.2 volts.

(C) Bias for 6F6 measured across XY and Z sections of voltage divider is — 16 volts.

Alignment Procedure

Location of Tubes and Trimmers

 Alliance No. 9714
ZENITH MODELS 9S204AT, 9S232AT
9S262AT, 9S244AT, 9S264AT

ZENITH RADIO CORP.

SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
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<th>2</th>
<th>3</th>
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<th>7</th>
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<tr>
<td>6H6</td>
<td>2nd Det. A.V.C.</td>
<td>0</td>
<td>0</td>
<td>-2.5</td>
<td>-2</td>
<td>-2.5</td>
<td>-</td>
<td>6.2</td>
<td>-2</td>
<td>-</td>
</tr>
<tr>
<td>6F5</td>
<td>1st Audio</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>82</td>
<td>-</td>
<td>6.2</td>
<td>2</td>
<td>-2</td>
<td>2.5</td>
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<tr>
<td>6F6</td>
<td>Power</td>
<td>0</td>
<td>0</td>
<td>225</td>
<td>240</td>
<td>-3.5</td>
<td>6.2</td>
<td>-4.5</td>
<td>-</td>
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<tr>
<td>5Y4</td>
<td>Rect.</td>
<td>0</td>
<td>-</td>
<td>AC</td>
<td>AC</td>
<td>-</td>
<td>298</td>
<td>298</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6T5</td>
<td>Target</td>
<td>0</td>
<td>10</td>
<td>-2</td>
<td>240</td>
<td>-2</td>
<td>6.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected. Line voltage 117V. Consumption 75W. Power output 4.5W.

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>456</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>GH</td>
<td>Algnmt.of Ant.&amp;Det</td>
</tr>
<tr>
<td>4</td>
<td>&quot;</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>&quot;</td>
<td>&quot;</td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>5</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>FGH</td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>6</td>
<td>Rec. Ant. Post</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>7</td>
<td>&quot;</td>
<td>400 Ohms</td>
<td>16500</td>
<td>S.W.</td>
<td>16500</td>
<td>LM</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>&quot;</td>
<td>400 Ohms</td>
<td>5500</td>
<td>Police</td>
<td>5500</td>
<td>N</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

LOCATION OF TRIMMERS

Chassis No. 5905AT

©John F. Rider, Publisher
ZENITH MODELS 9S307, 9S324, 9S344, 9S367, 9S369.
Chassis 5907

Voltage, Socket, Trimmers Alignment

NOTE

Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 75 watts.

Power Output 4.5 watts.

(A) Bias for 6K7 R.F. and I.F. — 6L7—SU5 and 6J5 second det. measured across X and is — 1.6 volt.

(B) Bias for 6F5 measured across X and Y and is — 3 volts.

(C) Bias for 6F6 measured across XY and Z and is — 18 volts.

LEGEND

SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
NC — No Connection
F — Filament

Location of Tubes and Trimmers

PUSH BUTTONS

PILOT LIGHT

ON/OFF SWITCH

Models 9S307, 9S324, 9S344, 9S367, 9S369

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br‘dc’t</td>
<td>600</td>
<td>ABCD</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>‘’</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>‘’ ‘’ ‘’</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>‘’</td>
<td>1500</td>
<td>GH</td>
<td>Alignment of Ant. and Det.</td>
</tr>
<tr>
<td>4</td>
<td>‘’ ‘’ ‘’</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>‘’</td>
<td>600</td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>5</td>
<td>‘’ ‘’ ‘’</td>
<td>200 Mmfd.</td>
<td>‘’</td>
<td>‘’</td>
<td>FGH</td>
<td></td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>6</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td></td>
<td>Set Osc. to scale</td>
</tr>
<tr>
<td>7</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>M</td>
<td></td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>400 Ohms</td>
<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td></td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

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**Location of Tubes and Trimmers**

**ALIGNMENT PROCEDURE**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>456</td>
<td>Br'dc't</td>
<td>600</td>
<td>ABCD</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>&quot;&quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>GH</td>
<td>Alignment of Ant. and Det.</td>
</tr>
<tr>
<td>4</td>
<td>&quot;&quot;</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>&quot;</td>
<td></td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>5</td>
<td>&quot;&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
<td>FGH</td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>6</td>
<td>Rec. Ant. Post</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>7</td>
<td>&quot;&quot;</td>
<td>400 Ohms</td>
<td>16500</td>
<td>S.W.</td>
<td>16500</td>
<td>LM</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>&quot;&quot;</td>
<td>400 Ohms</td>
<td>5500</td>
<td>Police</td>
<td>5500</td>
<td>N</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

**NOTE**

Volts measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 v. Consumption 75 watts.

Power Output 4.5 watts.

(A) Bias for 6A8—6K7 R.F. and I.F. and 6H6 measured at X is—2.6 volts.

(B) Bias for 6F5 measured at X and Y is—4 volts.

(C) Bias for 6F6 measured across XY and Z is—16 volts.

**LEGEND**

SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
NC — No Connection
F — Filament
FOR TUNER DATA SEE SPECIAL SECTION

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Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts, Antenna disconnected — volume control on full.

Line voltage 115 volts. Consumption 110 watts.

Power Output 15 watts.

(A) Bias for 6J5 first audio is measured across R14 and is +2.3 volts.

(B) Bias for 6V6 tubes measured across Y is +10 volts.

(C) Bias for 6K7 R.F. and I.F. and 6L7 measured across X is -2.6 volts.

(D) Bias for 6F8 grids shown at cathodes of 6F8 sockets.

Models 12S345, 12S370, 12S371

CHASSIS No. 1206

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br'dc'</td>
<td>600</td>
<td>112233</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td></td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>GH</td>
<td>Alignment of Ant. and Det.</td>
</tr>
<tr>
<td>4</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>&quot;</td>
<td>600</td>
<td>J</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>5</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>FGH</td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>6</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>7</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>M</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
</tbody>
</table>

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FOR TUNER DATA, SEE SPECIAL SECTION
**MODELS 15S308, 15S346, 15S372, 15S373**

Chassis 1502
Voltage, Socket Trimmers, Alignment

**LEGEND**
- **SH** — Shield
- **H** — Heater
- **P** — Plate
- **S** — Screen
- **G** — Grid
- **SU** — Suppressor
- **D** — Diode
- **K** — Cathode
- **NC** — No Connection
- **F** — Filament
- **NR** — No reading

**NOTE**
Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 volts. Consumption 160 watts.

Power Output 30 watts.

(A) Bias for 6K7 R.F. and I.F. — 6L7 — 6V5 triode and 6J5 second detector is measured across X and is — 2.6 volts.

(B) Bias for 6J5 first audio is measured between points K of 6J5 socket and Z and is 2.4 volts.

(C) Bias for 6F8 measured at K' and K2 and is 2 volts.

(D) Bias for the four 6V6 measured across X and Y and is 10 volts.

---

### ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Set Test Osc. to</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Det. Grid</td>
<td>1/2 Mfd.</td>
<td>455</td>
<td>Br’dc’t</td>
<td>600</td>
<td>ABAABAB 112233</td>
<td>I. F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>F</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>3</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>1500</td>
<td>&quot;</td>
<td>1500</td>
<td>GH</td>
<td>Rock gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>4</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>200 Mmfd.</td>
<td>600</td>
<td>&quot;</td>
<td>600</td>
<td>J</td>
<td>Repeat 2 &amp; 3</td>
</tr>
<tr>
<td>5</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>FGH</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>K</td>
<td>Set Osc. to Scale</td>
</tr>
<tr>
<td>7</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>18000</td>
<td>S.W.</td>
<td>18000</td>
<td>M</td>
<td>Rock Gang &amp; adj. for max. output</td>
</tr>
<tr>
<td>8</td>
<td>&quot; &quot; &quot; &quot;</td>
<td>400 Ohms</td>
<td>6000</td>
<td>Police</td>
<td>6000</td>
<td>N</td>
<td>Rock gang &amp; adj. for max output</td>
</tr>
</tbody>
</table>

© John F. Rider, Publisher
The Zenith automatic tuning system is designed so as to be very simple in adjustment, and to remain in adjustment regardless of changes in humidity, temperature or vibration. This system makes use of the fact that the inductance of a winding varies directly with any change in the permeability of the core material of the coil. A switch is incorporated in each receiver which allows the normal tuned circuits, consisting of a coil and variable condenser in the oscillator, first detector, and, in some cases, the R.F. section of the receiver to be disconnected and replaced by very small fixed windings which may be tuned over a considerable range of frequency by means of a change in the core material.

Specially prepared iron slugs which have very low losses at radio frequency are so arranged that they may be mechanically moved in and out of the field of the above mentioned coils. The permeability of these iron slugs is naturally much higher than that of air, and as they are moved in or out of the field of the coil, the inductance and natural period of the coil varies accordingly. It is quite easy to arrange such coils and iron slugs so that they may be tuned in tandem, that is, two or more iron slugs moved simultaneously into corresponding coils. This allows the receiver to be designed having only one tuning adjustment for each bank of coils and corresponding button.

As you will see on the circuit above, one button can be pressed to disconnect all automatic coils, and allows the normal tuning system of a coil and variable condenser to operate. On those receivers having short wave band, this switch is a part of the band switch. When the band switch is turned to the automatic position, or, in the smaller receivers, when one of the automatic buttons is pushed, this tuned circuit is disconnected, and the automatic coils are in circuit. The range of each set of coils will vary from 300 k.c. to 600 k.c., depending over which portion of the broadcast band they are designed to operate, and after being adjusted for a certain station within their range will come into operation whenever the corresponding button is pushed in.

The antenna is coupled to the input of the 1st detector by means of a 50 mmfd. condenser (C2) and an antenna compensating condenser (C5) is used to compensate for variations in antenna capacity. This condenser is preset at the factory, and under most conditions it will not be necessary to change it. However, where there is a seeming lack of sensitivity when tuning automatically, the condenser may very easily be reset by setting one of the automatic buttons at approximately the center of the broadcast band, tuning the button to a point where no station is heard, and readjusting the antenna compensating condenser to a point where the background noise is loudest. The button may then be re-set for whatever station is desired. This setting of the antenna condenser will be effective over the entire broadcast band and for all buttons.

In the oscillator circuit, it is necessary to alter the tuning curve so as to provide for tracking between the oscillator and first detector circuits. In the normal tuned circuit, this may be easily accomplished by means of a trimmer and padding condenser working in conjunction with the oscillator section of the variable condenser. However, as no variable condenser is used with the iron core coils, a different method must be resorted to. A small winding connected in series with the grid end of the automatic windings, and so placed as not to be affected by the iron core will, if properly designed, alter the shape of the tuning curve at the high frequency portion of the coil's range. Also, when two inductances are connected in parallel, the maximum inductance is limited by the size of the smaller of the two inductances. The upper portion of coil No. 3 in the above drawing is the paddler winding, and also serves as a means of coupling to the oscillator plate circuit, and when used in conjunction with the smaller winding mentioned above alters the shape of the tuning curve so as to allow excellent tracking.

Variations in humidity and temperature are compensated for by means of condenser C6 which consists of a small fixed condenser composed of silver surfaces sprayed on a special ceramic tube which changes its capacity in the opposite way from any changes in the coil, and will compensate for the same.

This automatic system is remarkably simple and trouble free, and once set up for a customer should not require any further attention until it is desired to reset for other stations which can be easily accomplished by the customer himself.
AUTOMATIC TUNER
Push Button Ranges
Alignment Data
Service Hints

AUTOMATIC RANGES

<table>
<thead>
<tr>
<th>8-B</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
</table>

NOTE—Buttons numbered from left to right, or top to bottom as they appear on receivers, except on model 6S321 (Chassis 5653) and Models 6S322 and 6S357 (Chassis 5654) which are reversed.

ALIGNMENT INSTRUCTIONS

The proper procedure for the correct alignment of each chassis is outlined on the page opposite each circuit diagram.

The operations are outlined in consecutive order, and the instructions are under the following headings—

OSC. CONNECTED TO — tells where the output of the service oscillator is to be connected.

BUMMY — gives the proper capacity or resistance which should be connected in series with the service oscillator output.

TEST OSC. — Set test oscillator to frequency shown.

BAND — Set the receiver band switch to the position shown.

DIAL — The receiver should be set at the frequency shown.

TRIMMER — This column tells which trimmer (or trimmers) are to be adjusted for each operation.

The chassis drawing has each trimmer indicated by a letter corresponding to the instructions.

PURPOSE—This column tells what is being accomplished by each operation.

If these instructions are carefully followed each chassis will be easily and correctly realigned.

SERVICE HINTS

<table>
<thead>
<tr>
<th>Chassis</th>
<th>Complaint</th>
<th>Cause and Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>5907 &amp; 1206 only</td>
<td>Distortion</td>
<td>Very much like blocking AVC action. Can usually be traced to open filter section.</td>
</tr>
<tr>
<td>1502 only</td>
<td>Won't log</td>
<td>Can be traced to loose PK screw in gang hub gear.</td>
</tr>
<tr>
<td>5714 only</td>
<td>Noisy automatic or automatic dead</td>
<td>Dirty on contacts or warped strip. Shorted at switch to ground or shorted compensating condenser.</td>
</tr>
<tr>
<td></td>
<td>Automatic dead 1 or more positions</td>
<td>Open coils — usually broken leads or poor contact at switch. Open leads to R.F. section of automatic or leaky or open compensating condenser. Padder loose — out of adjustment or all plates not soldered.</td>
</tr>
<tr>
<td></td>
<td>Automatic weak</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eye flutters</td>
<td>Open filler.</td>
</tr>
<tr>
<td></td>
<td>Eye overlaps on strong signal</td>
<td>Open AVC resistors</td>
</tr>
<tr>
<td></td>
<td>No eye action</td>
<td>Shorted condenser (C7)</td>
</tr>
<tr>
<td></td>
<td>Chirp in medium to loud signal</td>
<td>Leaky condenser across speaker</td>
</tr>
<tr>
<td>Radiator</td>
<td>No effect</td>
<td>Insulation on 33m resistor cut through and shorts to cathode lug. Open leads, poor contact at switch, open condenser. 5714 only — plate lead of I.F. too far away from chassis. Push down close to metal base.</td>
</tr>
<tr>
<td></td>
<td>Too much change on some, none on others</td>
<td>Condenser shorted or leads shorting to switch.</td>
</tr>
<tr>
<td></td>
<td>Tone changes with different settings of volume control.</td>
<td>Defective volume control or shorted terminal either of tone switch or volume control. Poor contacts and defective at shorted volume control taps.</td>
</tr>
<tr>
<td></td>
<td>Noisy when tuning</td>
<td>Dirty wipers or gang plates. Flywheel touching band switch lug. Volume control or drive shaft not making good contact to ground.</td>
</tr>
<tr>
<td></td>
<td>Volume control has two peaks and distorts at low volume.</td>
<td>Isolate 6FS grid circuit from I.F. plate leads. (Later sets have I.F. plate lead shielded.)</td>
</tr>
<tr>
<td>5714 only</td>
<td>Set whistles at medium volume.</td>
<td>Open filler condenser.</td>
</tr>
<tr>
<td></td>
<td>Noisy between signals</td>
<td>Loose connection or open condenser across RF choke.</td>
</tr>
<tr>
<td>Battery Sets</td>
<td>Hash</td>
<td>Loose cover of power pack.</td>
</tr>
<tr>
<td></td>
<td>Hash on automatic position.</td>
<td>Automatic assembly touching power pack. Insulate at point of contact.</td>
</tr>
</tbody>
</table>

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