ALIGNMENT FOR MODELS 78RLS, CT8RRLS, 99RLS, C99RLS

Intermediate Alignment

Attach the output motor to the receiver. Set the signal generator to 456 KC and attach the output of the generator to the control grid tap of the 6K70 I.F. amplifier tube. Adjust the trimmers on the 2nd I.F. transformer for max. gain. Knob the volume control of the receiver at max. and the attenuator of the signal generator as low as possible.

Transfer the output connection of the signal generator from the 6K70 I.F. tube to the control grid of the 6L7 tube and adjust the trimmers on the 1st I.F. transformer. Now go back over the adjustments of both I.F. transformers.

Tuning Circuit Alignment

Long Wave—Set signal generator at 150KC. Attach output of generator to ant. of receiver using a 250 MMFD dummy. Throw band switch to the extreme left, counter clockwise, to band 3. Make sure dial pointer is set properly and that dial is approx. 160KC. Adjust long wave pad for max. gain while "rocking" the gang back and forth with each adjustment. The long wave pad is near the front edge of chassis.

Set signal generator to 350KC, tune dial to 350 KC and adjust osc. trimmer. Adjust ant. and R.F. stage trimmers for max. output.

Broadcast Band—Set signal generator to 600 KC, adjust band switch to broadcast position. Tune dial to 600 KC and adjust the other pad for max. gain while "rocking" the gang back and forth with each adjustment.

Set signal generator to 1500 KC and tune dial to 1500 KC. Adjust osc. trimmer to bring in signal and adjust ant. and R.F. trimmers for max. gain.

Short Wave Band—Change dummy ant. to 400 ohm resistor. Set signal generator to 15 KC. Turn band switch to short wave band and tune dial to 15 MC. Adjust osc. trimmer to bring in signal and adjust ant. and R.F. trimmers for max. gain.

Make the usual tests for image. Take care not to peak set on image when adjusting the short wave bands.

The positions of the various trimmers are as follows:

On the trimmer strip nearest the front edge of the chassis are the three antenna trimmers. The one nearest the band switch is band 2 trimmer, the next trimmer is for band 1 and the trimmer out towards the side of chassis on this same strip is for band 2.

The center trimmer strip of 3 trimmers is for osc. adjustments.

The trimmer strip of 3 trimmers just back of the band switch is for R.F. interstage adjustments.

The trimmers for each band are in the same respective positions on all three trimmer strips.
This receiver is made to cover from 1750 KC. to 535 KC., which covers the standard broadcast band and the first police band.

The receiver will operate on either alternating or direct current, from a power supply of 105 to 125 volts. Do not connect it to any other source.
BOTH ARE EARLY TYPES OF MODEL 660
WARWICK MFG. CO.
MODELS 1-40, 1-400 to 1-409
MODEL 1-41
MODELS 0-540 to 0-549

ALL MODELS: THESE RECEIVERS COVER A FREQUENCY RANGE FROM 540 KC TO 1750 KC.

CONVENTIONAL ALIGNMENT
Follow the procedure outlined below in order to adjust the push buttons properly:

1. By means of the tuning knob, tune in as accurately as possible your first desired station.
2. Lift up the button for that station and with a small screw-driver loosen set screw about two turns counter-clockwise.
3. Push the set screw in as far as it can go with the screw-driver, and while holding the set screw in this position, make sure that your desired station is tuned in properly. It may be necessary to test-tune your station.
4. While holding set screw firmly, the push-button tuning system is now correctly set up for your first selected station. Follow through with this same procedure in setting up the other three stations.
FOR TUNER. SEE INDEX

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.

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 1730 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1730 K.C. broadcast oscillator trimmer until maximum output is shown. Set the generator to 1400 K.C. and tune in this signal on the receiver. Then adjust the 1400 K.C. broadcast antenna trimmer to maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output while tuning 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 6.0 M.C. short wave trimmer to maximum output.
INSTAMATIC TUNING

The purpose of Instamatic tuning is to give the user instant, automatic tuning of any one of a selection of favorite broadcast stations. The control buttons are conveniently located just below the tuning dial. Pushing in any button will release any other button which happens to be already in. After the Instamatic tuning feature has been properly adjusted, this will instantly and automatically tune in the station selected by this button.

Before attempting to adjust or use Instamatic tuning, the “Installation” and “Operation” instructions must be carefully followed. When the receiver is operating satisfactorily using the tuning dial with the “Dial Tuning” button pressed in, the Instamatic feature may be easily adjusted by carefully following these instructions.

Located on the back of the chassis is a row of five pair of small bakelite adjustment knobs. Each pair of these knobs controls the tuning of the station for the Instamatic button which is in the same relative position.

With the receiver operating with the “Dial Tuning” button in and the wave switch on broadcast position, turn the tuning knob to the right until the 540 KC end of the band has been reached. Then turn the tuning knob to the right until a station, for which it is desired to have Instamatic tuning, is heard. Press in the Button No. 1. This is the button at the left hand end of the row. Reach around to the back of the receiver and turn upper knob of the Pair No. 1 until the same program is heard. Unless the wrong knob is being turned, several different stations will be heard during this procedure. If necessary to check that the same program is now tuned in, the “Dial Tuning” button may again be pressed. In this way it can be determined that the same station is tuned in with the Instamatic button as when the “Dial Tuning” button is in. If it is not the same station the adjustment knob should be turned again and these operations repeated until the same program is heard when either of these two buttons is pressed.

The bottom adjustment knob of the first pair is now turned until the station is heard the best. Both top and bottom knobs may then be adjusted to exact tuning by watching the magic eye and adjusting until the two edges of the green section are as close together as it is possible to get them.

The first Instamatic button is now properly adjusted for the station which was tuned in on the dial and the station’s call letters may be pushed out of the station list, moistened on the back, and pressed into the hollow end of the button.

With the “Dial Tuning” button pressed in, the tuning knob is again turned to the right until the next station for which Instamatic tuning is wanted, is tuned in. The adjustment process for this station is the same as before, except that Button No. 2 and Pair No. 2 adjustment knobs are used. Proceeding in this way all five of the buttons may be properly adjusted for the stations desired.

It must be remembered that the “Dial Tuning” button must be pressed in whenever it is desired to tune in stations with the tuning knob, regardless of which wave band is in use. It must also be remembered that the wave switch must be in the broadcast position when Instamatic tuning is being used.

If desired the tuning dial may be left set to a station which is not set up on one of the buttons. The “Dial Tuning” button will then tune in this station when it is pressed. This will give an extra Instamatic tuned station, making a total of six different stations which can be instantly tuned in by simply pressing a button.
ALL MODELS
CONVENTIONAL
ALIGNMENT
SEE
SPECIAL
SECTION
VOL.VIII

I.F. PEAK 456 KC
MODEL 6V-600

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WATTb.KS()N PAGE 12-3

WATCtSON RADIO MFG. CO.

MODEL 79
MODEL 406
MODEL 669

IF PEAK 455 KC

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READERS AT INDICATED SOCKET POSITIONS ARE TO BE USED.
VOLTAGE MIGHT BE UNUSUAL WITH AC SUPPLY.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES INDICATED.
开关无须用在所指示的频率为读数用，与交流电源有关。

MODEL 79

IF PEAK 455 KC

Conventional Alignment

IF PEAK 465 KC

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**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Power Consumption</th>
<th>57 Watts (At 117 volts 60 cycles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>1.7 Watts Undistorted</td>
</tr>
<tr>
<td>Selectivity</td>
<td>40 KC Broad at 1000 times Signal</td>
</tr>
<tr>
<td>Intermediate Frequency</td>
<td>456 KC</td>
</tr>
<tr>
<td>Speaker</td>
<td>8&quot; Electro-Dynamic</td>
</tr>
</tbody>
</table>

**ALIGNMENT PROCEDURE**

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY CONNECTION AT RADIO</th>
<th>DUMMY ANTENNA</th>
<th>BAND</th>
<th>SWITCH</th>
<th>SETTING</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.F.</td>
<td>456 KC</td>
<td>Grid of 1st Det.</td>
<td>.1 mf</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>1st L.F.</td>
<td>(C13) &amp; (C14)</td>
</tr>
<tr>
<td>RANGE B</td>
<td>1600 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>100 mmf</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>Oscillator Range B</td>
</tr>
<tr>
<td></td>
<td>1400 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>100 mmf</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Range B</td>
</tr>
<tr>
<td></td>
<td>600 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>See Note B</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>600 KC</td>
</tr>
<tr>
<td>RANGE D</td>
<td>18,300 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>400 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Full Open</td>
<td>Oscillator Range D</td>
</tr>
<tr>
<td></td>
<td>17,000 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>400 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Range D</td>
</tr>
<tr>
<td>LOOP RANGE B</td>
<td>1400 KC</td>
<td>External Antenna</td>
<td>Clip or Lead</td>
<td>See Note D</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Range B</td>
</tr>
</tbody>
</table>

**ATTACHMENT**

- External ground clip on loop antenna (Table Model) or ground screw on chassis (Console Model).
- **NOTE A**—If the pointer is not at 1400 KC on the dial, remove pointer from drive cord. Tune in a 1400 KC signal, set pointer at the 1400 KC mark on the dial scale. Adjust pointer to drive cord.
- **NOTE B**—(Table Model) By means of wooden blocks, stand the loop aerial assembly upright exactly 4 inches from the back of the chassis.
- **NOTE C**—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.
- **NOTE D**—(Table Model) Re-assemble chassis in cabinet. Replace back on cabinet. Connect ground post of signal generator to external ground clip on loop antenna (Table Model) or ground screw on chassis (Console Model).

**CHANGES**

7/26/40

**On later models, two resistors were added to the phono circuit. One, a 1.5 Megohm resistor, was connected in series with No. 2 terminal on the band switch (Section No. 1) and the ungrounded terminal of the phono socket. The other resistor, .5 Megohm, was connected between the ungrounded terminal of the phono socket and ground.**

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SPECIFICATIONS

Selectivity - 50 KC Broad at 1000 Times Signal
Intermediate Frequency - - - - 456 KC
Speaker - - - - - - 6" P.M. Dynamic
Tuning Frequency Range - - 540 to 1600 KC
Sensitivity (For 05 Watt Output)
External Antenna - - 10 Microvolts Average

POWER OUTPUT
- Battery Operation - - - - - - - 150 Watt Undistorted
- 350 Watt Maximum
- AC Operation - - - - - - - 200 Watt Undistorted
- 400 Watt Maximum

ALIGNMENT PROCEDURE

Volume Control - Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for
several minutes.

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>SELECTIVITY</th>
<th>POWER OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQUENCY SETTING</td>
<td>POWER OUTPUT</td>
<td>NOTES</td>
</tr>
<tr>
<td>456 KC</td>
<td>50 Watt</td>
<td>Max at 1000 Times Signal</td>
</tr>
<tr>
<td>1600 KC</td>
<td>75 Watt</td>
<td>Max at 1000 Times Signal</td>
</tr>
<tr>
<td>1400 KC</td>
<td>100 Watt</td>
<td>Max at 1000 Times Signal</td>
</tr>
</tbody>
</table>

NOTE A - Re-assemble chassis in cabinet.
Close back on cabinet.

CALIBRATION - To obtain dial scale cali-

BRING OUT TO THE 456 KC MARK. If

CAUTION

The metal chassis is connected to one
side of the line through 2.6 milli-
Both AC and DC power lines are
generally grounded on one side. If
the front of the line not connected to
the metal chassis through this ca-
pacity is grounded and the metal
chassis comes in contact with an
external ground, this capacity will
be connected across the line and
there will be an increase in hum.

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ALIGNMENT PROCEDURE

Remove Grille, Speaker, Trimmer Caps and Rear Cover From Chassis Case—(See Figs. 3 and 5).
Volume Control—Maximum All Adjustments.
Local-Distance Switch—"Distance" Position.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several minutes.
The following equipment is required for aligning:
A Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antenna—.05 mF., See Note A.

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>ADJUST TRIMMERS TO MAXIMUM (See Figs. 3 and 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.F. Control Grid</td>
<td>1st I.F. (C11) &amp; (C12)</td>
</tr>
<tr>
<td>456 KC (Hole No. B)</td>
<td>2nd I.F. (C15) &amp; (C16)</td>
</tr>
</tbody>
</table>

Oscillator

1500 KC
Antenna Cable—See Note A
Tune to Max. Output with Tuning Knob
Extrem Position out of Coil
Oscillator (C6)

1000 KC Adjustments
Antenna Cable—See Note A
Tune to Max. Output with Tuning Knob
Int. (C5)
Ant. (C4)

Car Antenna Readjustment—Tune in weak signal near 1000 KC—Readjust Antenna Trimmer C4 for maximum output.

NOTE A—Insert the antenna cable plug in the antenna socket on the chassis. The total capacity of the antenna cable and dummy antenna should be 60 mF. If the cable, for example, has a capacity of 30 mF, use a 30 mF. condenser for a dummy antenna. Connect the other end of the antenna cable through the dummy antenna capacity to the output of the signal generator.

CALIBRATION—To calibrate the radio, tune in a station of known frequency. At the back of the control unit is the calibration knob. Remove the dial lamp assembly, hold the tuning knob. Insert a fine pointed screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received.

A 36 inch shielded antenna cable (30 mF. capacity) with bayonet connector plug is furnished. Whenever possible, this cable should be used rather than the one which may be supplied with the antenna.

The plug on the antenna cable is inserted in the socket at the side of the chassis case as shown in Fig. 3. The wire at the other end of the cable is connected to the antenna.

LOW CAPACITY ANTENNA
This radio is designed for a low capacity car antenna. The total capacity of antenna and shielded cable should be 35 to 50 mF.

HIGH CAPACITY ANTENNA
If this radio is to be installed with a high capacity car antenna (70 to 900 mF. total capacity of antenna and shielded cable), a 24 inch shielded adapter extension cable is necessary. The adapter is inserted in the socket at the side of the chassis case. Then the antenna cable plug is inserted in the socket at the other end of the adapter.

ANTENNA CABLE
CAUTION—Be careful not to bend the antenna cable too sharply or to clamp it tightly as the small wire inside the cable may be broken.
### Procedure for Setting the Station Buttons

**Model TA40**

1. **Turn on the radio.**
2. **Set the frequency.**
3. **Adjust the volume.**
4. **Fine-tune the station.**

**Model TA41**

1. **Turn on the radio.**
2. **Set the frequency.**
3. **Adjust the volume.**
4. **Fine-tune the station.**

### Alignment Procedure

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Antenna Lead</th>
<th>Condenser Setting</th>
<th>Advance Adjustments to</th>
</tr>
</thead>
<tbody>
<tr>
<td>650 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>Ant. Rater Max. Output</td>
</tr>
<tr>
<td>1400 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>Ant. Rater Max. Output</td>
</tr>
<tr>
<td>2200 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>Ant. Rater Max. Output</td>
</tr>
<tr>
<td>3000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>Ant. Rater Max. Output</td>
</tr>
</tbody>
</table>

### Television Sound or Phonograph Connections

- **Television Sound or Phonograph Connections**
  - On the back panel of the receiver, there is a switch and a jack for receiving the sound from the television set. The jack should be moved to the position corresponding to the television receiver. The switch allows you to select AM or FM broadcast. The switch should be in the "Off" position.
  - **Television Sound or Phonograph Connections**: Plug the phonograph in the socket of the receiver and the television set in the other socket.

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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.
- Output indicating Meter—Non-Metallic Screwdriver.
- Dummy Antennas—1 mf, 100 mf, and 400 ohms.

**SIGNAL GENERATOR**

**FREQUENCY CONNECTION AT RADIO DUMMY ANTENNA SWITCH**

L.F. 456 KC Grid of 1st Det. 3 mf B Range

**RANGE**

B 1600 KC Antenna Lead 100 mf B Range

4100 KC Antenna Lead 100 mf B Range

1000 KC Antenna Lead 100 mf B Range

D 18,100 KC Antenna Lead 400 Ohm D Range

17,000 KC Antenna Lead 400 Ohm D Range

**LOOP RANGE B**

14000 KC Notebook B Range

22,000 KC Notebook B Range

Remove chassis and top plate from cabinet as explained in the article on this subject. Remove top plate from chassis.插件 can be inserted in the loop coils on the chassis.

**Television-Frequency Modulation - Home Recorder**

**Television Sound Connections**

If television programs ever become available in your community, the audio amplifier and speaker of this radio may be used to reproduce Television sound in conjunction with any "Television Picture Receiver and Sound Converter.

On the top of the chassis base is a socket to which is connected the phaseable cable shielded pin tip. Upon removal of this pin tip, the connector on the cable from a television receiver can be inserted in the socket. (The cable connector must be a single shielded pin tip type. Part No. 6A224.)

When Television sound reproduction is desired, the Phonograph-Radio knob should be turned to the Phonograph (P) position. For radio reception, the knob should be turned to one of the two Radio positions.

**Frequency Modulation Connections**

If Frequency Modulated programs ever become available in your community, the audio amplifier and speaker of this radio may be used to reproduce these programs in conjunction with any Frequency Modulation Converter.

The connection to the chassis is exactly the same as explained in the preceding article "Television Sound Connections."

When Frequency Modulated programs are desired, the Phonograph-Radio knob should be turned to the Phonograph (P) position. For radio reception, the knob should be turned to one of the two Radio positions.

**Home Recorder**

This radio is designed so that you may take advantage of a new and extremely interesting form of entertainment. By replacing the record changer unit in this radio with a unit which includes a record cutter and a record changer, the new world of making your own records is opened to you.

Your favorite radio programs, comedy, dance or symphony may be permanently recorded. By means of a microphone attachment, voice or music of your own production may be recorded.

For detailed information regarding this record cutter unit, get in touch with the dealer from whom the radio was purchased.

---

**Operating the Automatic Phonograph**

The operation of the phonograph is simple, but the phonograph instruction folder packed with this instruction book should be carefully read and understood before an attempt is made to put the record changer in operation.

The volume and tone controls are used in the same manner for phonograph reproduction as they are for radio reception—See article "Operating the Radio."

**To Turn the Phonograph On**

Turn on the switch to the right. (See illustration—Page 2.) A click will be heard and the dial will light. Wait 30 seconds for the tubes to heat.

**To Turn the Phonograph Off**

The instructions for turning off the automatic record changer are given in the phonograph instruction folder. Be sure to turn the radio on-off switch knob to the left. A click will be heard and the dial lamps will be off.
Suppression of Motor Noise

The following procedure has been found effective in reducing motor noise to a satisfactory level in most cases, as given in the order given. Additional procedure, Chapter 14, Book 1, may be required in exceptional cases of motor noise, not covered here and will be found by referring to current literature on this subject.

**Generator Condenser** — A generator condenser is required in all cases. Connect the condenser to the lead to the battery terminal of the generator. The case and mounting strap connect the other side of the condenser to ground. This unit must, therefore, be well grounded at its mounting.

**CAUTION** — In cars with automatic regulators, it is important not to connect the condenser across the field terminal. Most manufacturers at the present time have a recommendation for the proper point at which to connect the condenser.

**Distributor Suppressor** — A distributor suppressor will be required in most cases. Remove the high tension lead to the distributor. Insert a suppressor under the wire to the other end of the suppressor (See Fig. 7). This is not practical, cut the high tension lead close to the distributor and use a screwwood and type distributor suppressor in this line.

**Withdraw Antenna Cable Plug**

Turn on the radio and start the motor. If noise is heard, proceed as follows:

**BONDING CABLES** — Try wiring the fire wall and interlocks which pass through it. Such as oil lines, gas lines, etc. By means of a slip contact can be established between any of the wires and the fire wall in order to determine whether such a ground will reduce the noise. To bond the cables to the fire wall, the point of contact, wrap a length of braded shielding around the wire, and solder the connection.

**Tune Reinsert Antenna Cable Plug**

If motor noise is heard when the antenna cable is reconnected, proceed as follows until the noise is significantly reduced.

**Dome Light Lead** — Noise due to radiation from the dome light lead is generally experienced only when a roof antenna is being used. Disconnect the dome lead connection at the back of the instrument panel and ground this wire. If this is found to reduce the noise, the piece of shielding may be under a screw head, nut, or may be soldered in position.

**Procedure for Setting the Stations**

In stations with lower kilocycle numbers while turning the screw counterclockwise, you will tune in stations with higher kilocycle numbers.

There is a card supplied with the radio on which the frequency (kilocycle number) at which the setting screw is to be turned counterclockwise is marked. Be sure not to turn in any other station broadcasting the same program. Turn the screw slowly back and forth until the station is clearly heard. When the highest point of the set is reached, the station is the desired one. The set is now set for position No. 1.

Next advance the mechanism to position No. 2 by depressing the Automatic Station knob once. If no stations are heard, advance the knob twice. In the second station on your list by adjusting the screw No. 2 as explained above.

If you have difficulty in hearing when this station is tuned, turn the knob to another position. The set is now set for position No. 2.

Next advance the mechanism to position No. 3 by depressing the Automatic Station knob once. If no stations are heard, advance the knob twice. The set is now set for position No. 3.

Proceed in like manner to set any remaining stations on your list.
Antenna

Practically all car antennas at the present time are supplied with a shielded lead-in cable. The total capacity of the antenna and shielded lead-in should be 35 to 60 mfd. It is recommended that the antenna and lead-in be of a type approved by the manufacturers.

The plug on the antenna cable is inserted in the socket at the side of the chassis as shown in Fig. 3. The wire at the other end of the coil is connected to the frame.

LOW CAPACITY ANTENNA

This radio is designed for a low capacity car antenna. The total capacity of the antenna and shielded lead-in should be 35 to 60 mfd.

Types of Low Capacity Antennas: "Clappole" type, such as door hinge and oval, are one type which are short and are mounted quite a distance from the metal roof of the car. Mount the antenna on the same side of the car as the radio.

HIGH CAPACITY ANTENNA

If this radio is to be installed with a high capacity car antenna (70 to 300 mfd), total capacity of antenna and shielded lead-in must be limited to 30 mfd. A 24 inch shielded adapter extension cable may be obtained. A high capacity 10 inch antenna cable such as a 10 inch antenna cable is being used with the high capacity antenna and the shielded adapter extension cable must be purchased.

Either of these two procedures will adapt the high capacity antenna for use in the low capacity antenna input circuit. In both cases the correct adapter should be inserted in the socket at the side of the chassis case. Then antenna cable plug should be inserted into this adapter.

Types of High Capacity Antennas: "On-the-roof" type which are long and are mounted close to the metal roof of the car; ordinary built-in or "in-the-wall" type. Under car antennas (These are usually built-in types) are not recommended for this radio.

ANTENNA CABLE

Keep the antenna cable as far away from the wiring as possible and avoid the signal antenna coil and the metal antenna coil should be at the antenna end, otherwise ignition noise may be picked up. The length of the plug from the grounding point to the end of the metal coil should be kept short as possible, preferably not over one inch.

For the "Clappole" and over-the-top type antenna, the lead must be shielded from radio frequencies from the radio to the point where the lead goes through the car body to the outside.

ALIGNMENT PROCEDURE

Remove Grille, Speaker, Trimmer Caps and Rear Cover From Chassis Case—See Figs. 3 and 5.

Volume Control—Maximum All Adjustments. Local Distance Switch—"Distance" Position. Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Cord.

NOTE—Insert antenna cable plug in the antenna socket on the chassis case. High capacity of the antenna cable and dummy antenna are as follows: For example, a 20 inch antenna, if the car battery is grounded, line up the + mark on the top of the speaker with the arrow on the chassis base. One side of the chassis case is a hole (see Fig. 3) through which may be seen the oscillator. If a red stripe is seen on the side of the oscillator, the oscillator is inserted for cars with the positive terminal of the battery grounded. If no positive mark is visible, the oscillator is inserted for cars with the negative terminal of the battery grounded.

Adjust the Antenna Trimmer After the antenna is connected, tune in a weak signal at approximately 1000 kc. Then continue to turn the "distance" control until the lowest point is reached. The position of turn-off or "Distance" control is the same as in Fig. 3. Where the "Distance" control is shown as in Fig. 4, it is necessary to tune the radio. Cut the tube ground wire on the speaker as shown in Fig. 4.

At one side of the speaker grille is a rectangular cover. Unscrew the screw at each end and remove this cover. Three clips, each a different color, will be seen. Using the 2 inch, 3 wire cable supplied with the radio, connect the color of each with a clip and install the solid plug in the clip—see Fig. 4. Leave the cable through the hole in the cover provided for the other wires. Push each of the connectors until the connector is in the proper position of the speaker plug, matching the color as shown in Fig. 4. Be sure the insulating sleeve covers the connectors completely. Tape over the speaker plug and connectors. Replace the cover.

Two perforated strips are provided which may be used as mounting brackets to secure the speaker on the back of the grille. The mounting of mounting will vary in different cars. If the screw clamps on the back of the speaker frame interfere with the mounting, they may be cut off. Turn on a station of known frequency. At the back of the speaker a disk will be turned into the curve until the discriminator is in the calibrator angle. Turn the screw with the thumb until the pointer on the dial scale is in the frequency of the station being received.

The speaker may be made out of a piece of rubber. A piece of cordboard is provided for use as a cushion. This is cut for a 3/4 inch speaker which may be purchased at a reasonable price. The outline of the hole necessary for a 3/4 inch speaker (speaker in rad) is shown on the cardboard. Cut the cardboard to size so that it covers all of the grille opening. It is not covered by the speaker.

Several pieces of felt are also provided to be used around the rim of the speaker in those cars in which an interference occurs most.

Replacing Tubes and Vibrator

To replace the tubes or vibrator, remove the screw in the center of the grille. Take off the grille plate and pull the speaker out of the case. The speaker is held in place by two spring clamps. The tubes and vibrator are now accessible for replacement.
ALIGNMENT PROCEDURE

Volume Control—Maximum All adjustments. Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead. Allow Chassis and Signal Generator to "Heat Up" for Several minutes.

<p>| FREQUENCY CONNECTOR DUMMY SWITCH ADJUST TRIMMERS TO |</p>
<table>
<thead>
<tr>
<th>SETTING</th>
<th>AT RADIO</th>
<th>ANTENNA</th>
<th>SETTINGS</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 KC</td>
<td>Grid of 1st Det</td>
<td>3 mil</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
</tr>
<tr>
<td>RANGE B</td>
<td>1700 KC</td>
<td>Antenna Lead</td>
<td>100 mil</td>
<td>B Range</td>
</tr>
<tr>
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<td></td>
<td>Oscillator Range B (C6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5000 KC</td>
<td>Antenna Lead</td>
<td>100 mil</td>
<td>B Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range R (C5)</td>
<td>See Note A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000 KC</td>
<td>Antenna Lead</td>
<td>100 mil</td>
<td>B Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range D (C6)</td>
<td>See Note B</td>
<td></td>
</tr>
<tr>
<td>RANGE C</td>
<td>1400 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>C Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oscillator Range C (C16)</td>
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<td></td>
<td>7000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>C Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range R (C5)</td>
<td>See Note A</td>
<td></td>
</tr>
<tr>
<td>RANGE D</td>
<td>12,300 KC</td>
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<td>D1 Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oscillator Range D1 (C4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,450 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D1 Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range D1 (C4)</td>
<td>See Note B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,750 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D1 Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range D1 (C4)</td>
<td>See Note B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21,600 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D2 Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oscillator Range D2 (C13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21,500 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D2 Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range D2 (C13)</td>
<td>See Note B</td>
<td></td>
</tr>
<tr>
<td>LOOP RANGE B</td>
<td>1600 KC</td>
<td>Antenna Lead</td>
<td>See Note C</td>
<td>100 mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ant Range R (C5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Replace chassis from cabinet—Reconnect loop antenna plugs.

PROCEDURE FOR SETTING THE STATION BUTTONS

There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning.

MAKE a list of your favorite stations which you tune in regularly. There may be any number up to 6 in this list.

It is best to list the station with the lowest kilocycle number first, then the station with the next higher kilocycle number next, and so on.

Any button may be used for any station you can receive, although it will be more convenient to set the stations so that the kilocycle numbers increase from left to right.

SETTITG A STATION BUTTON

Unlock the push button tuning mechanism from the back of the radio. Then turn the tuning knob slowly to the setting approximate to the kilocycle number desired. The tuning knob can be used for coarse tuning.

CAUTION—Do not touch this button again while the mechanism is unlocked as the setting may be altered.

Carefully tune in the second station on your list. Then hold the button and push the second button slowly and firmly all the way in. Check for accurate tuning.

Proceed in the same manner to set any additional stations on your list on the remaining station buttons.
WESTERN AIR PATROL
MODEL 25G, Ch. W419

I.F. 175 KC.

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMprise DISTINCT MECHANICAL ASSEMBLIES.

1936

C1 150 MAF MouldED
C2 GAIN TRIMMER
C3 GAIN TRIMMER
C4 35 KAT MouldED
C5 GAIN TRIMMER
C6 25 MA 100 V
C7 40-100 MA DUAL
C8 20-70 MA (P-17A37)
C9 0.5 MA 100 V
C10 40-100 MA (P-17A38)
C11 50 MA MouldED
C12 10 MA 100 V
C13 4.0 MA 150 V ELECTROLYTIC (P-45X18)
C14 10 MA 100 V
C15 0.002 MA 300 V
C16 0.006 MA 300 V
C17 0.002 MA 300 V

R1 1.0 MEGOHM .2 W
R2 10000 OHM
R3 60000 OHM VOLUME CONTROL (P-36X20)
R4 3000 OHM .2 W
R5 3000 OHM .2 W
R6 2.0 MEGOHM .2 W
R7 100000 OHM .5 W
R8 400000 OHM .5 W
R9 10 MEGOHM .5 W

L1 SINGLE FILAMENT REACTOR (P-9A20)
L2 SINGLE FILAMENT REACTOR (P-9A20)
T1 DOUBLE TUNED ANTENNA COIL (P-9A381)
T2 1ST I.F. COIL (P-9A383)
T3 OSC. COIL (P-9A382)
T4 2ND I.F. COIL (P-9A384)
T5 AUDIO INPUT TRANS. (P-50X4)

Fig. 3—Tube Arrangement
"A" Battery and Regulator

This receiver is designed to operate with a 2 volt storage cell, but may be operated with a 3 volt dry "A" battery if used with a voltage regulator. The receiver may also be used with an air cell "A" battery provided a voltage regulator is used.

3 Volt "A" Battery: The voltage regulator should operate correctly the type of battery as illustrated in Fig. 4 is not supplied with the receiver unless specified. This device consists of a rheostat which controls the voltage, a voltmeter for measuring its value supplied to the receiver, and a small push button switch for cutting the voltage in and out of the circuit. It has two prongs at the bottom which plug into the socket in the platform at the rear left corner of the chassis. The circuit diagram of the regulator is shown in Fig. 5.

The receiver is shipped from the factory with a jumper between the two socket connections and a fuse strip over the socket. This strip must be removed and the jumper taken out as illustrated in Figs. 6 and 7 before the receiver can be inserted as shown in Fig. 4. The jumper is in the "A" line.

Replacing Drive Cord

Remove chasms from cabinet.
Take off the pointer by removing the screw at the center of the dial.
Remove the dial by taking out the six rivets from the back of the dial and four from the front.
Remove the on-off indicator dial by pulling it forward.
With the condenser plates in a completely open position, slip the new drive cord thru hole "A" (from the front) in the drive drum. See Fig. 9.
Pull the cord thru this hole far enough to tie a knot near the end. Make this knot large enough so that it will not pull back thru the hole.
Slop the opposite end of the drive cord thru hole "B" of the drive drum.
Now slip the piece of fine tubing (about .14" long) over the drive cord and insert about half of this tubing into hole "B" as shown in the illustration. This is important to prevent the cord from being out.
Bring the drive cord down to the drive shaft and wrap it in a clockwise direction about two and one-half times around this shaft, progressing toward the front.
Bring the cord up from the drive shaft and wrap it around the drive drum approximately one and one-half times in a clockwise direction, progressing toward the front until the cord is up to the turned-in portion of the flange "C." See Fig. 9.

Pull the cord tight and tie the end of the cord to the tension spring as shown in the illustration. The knot should be at the bend in the flange so that the spring will be under sufficient tension to prevent the drive cord from slipping.

Now, by applying a little tension on the spring, hook the other end of the spring into hole "D" on the opposite side of the drum. Hook the spring from the inside (in later models hole "D" is replaced by a hook on the inside of the drive drum).

Turn the drive shaft back and forth several times to take out the slack and see if the drive is operating properly. If the cord slips on the drive shaft, repeat the spring from the drive drum and add an additional knot in the cord at the spring in order to put some tension on the spring.

Replace the on-off indicator dial, care being taken that the indicator is so placed that it will properly show the on and off positions.
Re-assemble the pointer and dial to the drive assembly. If the rivets are broken use No. 28 or 34 long round head machine screws and nuts.

Testing Batteries

If the receiver does not operate satisfactory test the batteries under load. A high resistance meter is required for the "B" and "C" voltages. If any of the batteries are considered low below their rated voltage, new ones should be used. When the "B" batteries are replaced the "C" batteries should also be replaced. The reason for this is that the "C" drain is such that the "C" batteries are run down in about the same time as the "B" batteries.

Alignment Procedure and Dial Calibration

Misalignment or mistracking of condensers generally manifests itself as a broad tuning and lack of volume at portions of all of the standard wave band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide accurately calibrated signals over the standard wave band and at intermediate frequency and an output meter are required for indicating the effect of adjustments.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

1. F. Adjustment

Set the signal generator for a signal of 175 KC.
Connect the antenna lead of the signal generator thru a 1 MF condenser to the coil end of the grid leak resistor R1. There is a lead which runs from the crystal tuning condenser to a lug on the bottom of the R. F. coil assembly. This connection can be made at the lug on the coil to which this lead is connected.
Connect the ground lead of the receiver to the ground post of the signal generator.
Turn the volume control to the maximum position.
Then adjust the three IF. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 8.

As stated above, use a non-metallic screwdriver to make the adjustments.

1750 KC Adjustment

Set the signal generator for 1750 KC.
Turn the rotor of the tuning condenser to the full open position.
Connect the antenna lead of the receiver thru a 500 MF. condenser to the output of the signal generator.
Keep the volume control at the maximum position.
Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained. The location of this trimmer is shown in Fig. 8.

1500 KC Adjustment

Set the signal generator for 1500 KC.
Turn the rotor of the tuning condenser carefully until maximum output is obtained.
Adjust the 1st detector and antenna trimmers for maximum output.
Do not change the setting of the oscillator trimmer.

Dial Calibration

To obtain dial scale calibration turn in an 800 KC signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

Specifications

- Sensitivity: 15 Microvolts Absolute
- Tuning Range: 530 to 1750 KC
- Intermediate Frequency: 175 KC
- Power Output: 1 Watt (Unmodified)
WESTERN AIR PATROL

Power Consumption - 1.8 Amps at 6.3 Volts
Power Output - 1 Watt Undistorted

Tuning Frequency Range

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>535 to 1730 KC.</td>
</tr>
<tr>
<td>C</td>
<td>1660 to 4800 KC.</td>
</tr>
<tr>
<td>D</td>
<td>5650 to 16000 KC.</td>
</tr>
</tbody>
</table>

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VOLTAGES AT SOCKETS

Antenna Shorted to Ground—Battery 6 Volts under load

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Function</th>
<th>Across Filament</th>
<th>Plate to Ground</th>
<th>Screen to Ground</th>
<th>Bias Voltage (See Notes)</th>
<th>Normal Plate M. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 R.F.</td>
<td>2.0</td>
<td>135</td>
<td>45</td>
<td>1.5(1)</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>1C6 1st Det.</td>
<td>2.0</td>
<td>135</td>
<td>80(2)</td>
<td>70</td>
<td>2.0(3)</td>
<td>3.2(2)</td>
</tr>
<tr>
<td>34 1st I.F.</td>
<td>2.0</td>
<td>135</td>
<td>45</td>
<td>1.5(1)</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>34 2nd I.F.</td>
<td>2.0</td>
<td>135</td>
<td>80</td>
<td>4.0(3)</td>
<td>3.2</td>
<td></td>
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<tr>
<td>30 2nd Det.</td>
<td>2.0</td>
<td>135</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>30 1st A.F.</td>
<td>2.0</td>
<td>135</td>
<td></td>
<td></td>
<td>8.0(4)</td>
<td>2.3(3)</td>
</tr>
<tr>
<td>19 Power</td>
<td>2.0</td>
<td>135</td>
<td></td>
<td></td>
<td>3.9(3)</td>
<td>2.3(3)</td>
</tr>
</tbody>
</table>

(1) As read from negative filament leg to low potential end of resistor R12.
(2) Anode Grid
(3) As read from negative filament leg to ground.
(4) Total voltage drop from negative filament leg to ground and across R18.
(5) As read across R18.

Battery Connections—CAUTION

CAUTION: Do not turn the switch on unless ALL the tubes are in the sockets.

CAUTION: Be sure that the battery clips are properly connected to the battery. If the connections are reversed, the receiver may be damaged.
A signal generator that will provide an accurate calibrated signal at 465, 720, 1320, 600, 4800, 4820, 16,000, 18,000, 15,000, and 18,000 Kc and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I.F. Adjustment
Set the signal generator for a signal of 465 Kc.
Connect the output of the signal generator through a 0.1-m. condenser to the switch end of condenser C3—see Fig. 2. There is a lead which goes to the lug on the top center section of the tuning condenser—see Fig. 4. The connection can be made at this lug. Connect the ground lead of the receiver to the ground post of the signal generator. Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the volume control to the maximum position.

Adjust the signal from the signal generator to prevent the leveling-off action of the A.V.C.

Turn the tuning condenser to the full open position.

Connect the antenna lead of the receiver through a 200 ma. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (O5) until maximum output is obtained. The location of this trimmer is shown in Fig. 5.

1500 Kc Adjustment
Set the signal generator for 1500 Kc.

Turn the rotator of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 Kc mark on the standard wave band scale. Retighten the set screw.

Adjust the interstage Range B trimmer (O4) until maximum output is obtained.

Do not change the setting of the oscillator Range B trimmer.

600 Kc Adjustment
Set the signal generator for 600 Kc.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotator of the tuning condenser slowly back and forth at the same time adjusting the 600 KC trimmer un until the peak of the greatest intensity is obtained. See Fig. 3 for location of this trimmer. Be sure to use non-metallic screwdriver for this adjustment.

Range C Alignment
4800 Kc Adjustment
Set the signal generator for 4800 Kc. Connect the antenna lead of the receiver through a 400-ohm resistor to the output of the signal generator.

Turn the rotator of the tuning condenser to the full open position.

Connect the band selector to the Range C position (last short wave band—green dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range C trimmer (O4) until maximum output is obtained. See Fig. 3 for location of this trimmer.

6000 Kc Adjustment
Set the signal generator for 6000 Kc.

Turn the rotator of the tuning condenser rotor until maximum output is obtained.

Adjust the interstage Range C trimmer (O3) until maximum output is obtained.

Adjust the interstage Range B trimmer (O2) and antenna Range B trimmer (O1) to maximum.

Do not change the setting of the oscillator Range B trimmer.

15,000 Kc Adjustment
Set the signal generator for 15,000 Kc.

Turn the rotator of the tuning condenser rotor slowly back and forth at the same time adjusting the 15,000 Kc trimmer until the peak of the greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Replacing Drive Cord
Remove the chassis from the cabinet. Take off the stator cover, remove the screws which secure the bottom of this assembly to the chassis and the screw at the top which secures this assembly to the bracket. Pull the dial assembly forward until the collar is free of the back selector switch and the assembly faces downward in front of the chassis.

Turn the drive wheel until the opening in the drum is approximately vertical and with the hole at the top. Remove the tension spring and the old drive cord. Insert the new drive cord into the hole in the eyepiece. Start the drive cord through the hole in the eyepiece in the drive drum. Insert one end of the new drive cord into the hole in the eyepiece until the cord is approximately one and one half turns, progressing towards the front. Then install the eyepiece on its back panel and bring the cord through the hole in the eyepiece in the drive drum. Wrap the cord tightly around the drive shaft approximately one and one half times and bring the drive cord to the drive wheel until it is up to the eyepiece in the drive drum.

Now insert the free end of the cord through the hole in the eyepiece and tie it to the end of the tension spring. The end of the spring should rest on the dial and with the slack taken out of the drive cord should be three or four times the length of the drum. Cut off a surplus length of the cord after it has been knotted.

Now secure the other end of the tension spring over the spool on the drive drum and then drive the drive wheel back and forth several times. Replace the dial assembly and pointer.

Replace the chassis in the cabinet.
MODEL 79-7, Ch. W224
WESTERN AIR PATROL

1933
W224

79-7 TUBE CONSOLE

70 SERIES (7 TUBES)

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WESTERN AIR PATROL

MODEL 79-8, Ch. W224

80 Series
(8 Tubes)

262½ K.C.I.F.

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VOLTAGES AT SOCKETS

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Function</th>
<th>Across Filament</th>
<th>Plate to Ground</th>
<th>Screen to Ground</th>
<th>Bias Voltage (Volts)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>34</td>
<td>R.F.</td>
<td>2.0</td>
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<td>55</td>
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<td>55</td>
<td>1.0</td>
<td>(2)</td>
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<td>140</td>
<td>60</td>
<td>2</td>
<td>(3)</td>
</tr>
<tr>
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<td>2nd I.F.</td>
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<td>140</td>
<td>60</td>
<td>2</td>
<td>(4)</td>
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<tr>
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<td>1st A.F.</td>
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<td>140</td>
<td>60</td>
<td>9</td>
<td>(5)</td>
</tr>
<tr>
<td>34</td>
<td>Power</td>
<td>2.0</td>
<td>140</td>
<td></td>
<td>5</td>
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</tr>
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</table>

(1) As read from negative filament leg to tap of resistor R13.
(2) Anode grid to ground.
(3) As read from negative filament leg to A--.
(4) Total voltage drop from negative filament leg to low potential end of resistor R1B.
(5) As read across resistor R1B.

ALIGNMENT

Peak I.F. trimmers at 456 KC.
Range B-
Peak osc. trimmer (C21) at 1730 KC. Peak C11 and C4 at 1500 KC. Pad C22 at 600 KC.
Range C-
Peak C13 at 6700 KC.
Peak C5 and C10 at 6000 KC.
Pad C19 at 2400 KC.
Range D-
Peak C15 at 18,400 KC.
Peak C9 and C2 at 15,000 KC.
Pad C16 at 6800 KC.

NOTE
When adjusting interstage and antenna trimmers, rock gang condenser rotor until peak is obtained.

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**MODEL 708, Ch. 832**  
**MODEL 56, Ch. W485**

**MOD. 708  
**W832**

**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 Screwdriver.
- Dummy Antennas — 1 mf., 200 mf., and 400 ohms.

<table>
<thead>
<tr>
<th>STEP</th>
<th>BAND SWITCH SETTING</th>
<th>DUMMY ANTENNA</th>
<th>FREQUENCY SETTING</th>
<th>CONNECTION AT RADIO</th>
<th>TRIMMERS ADJUSTED</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>2nd I.F. Adj.</td>
<td>2nd I.F. Adj.</td>
<td>2nd R (C19) &amp; (C20)</td>
<td>Grid of I.F. Tube</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
</tr>
<tr>
<td>I. F.</td>
<td>2nd I.F. Adj.</td>
<td>2nd I.F. Adj.</td>
<td>2nd R (C19) &amp; (C20)</td>
<td>Grid of I.F. Tube</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
</tr>
<tr>
<td>RANGE D</td>
<td>Range D</td>
<td>Range D</td>
<td>22,000 KC</td>
<td>Antenna Lead</td>
<td>Oscillator Range D (C1)</td>
<td>Turn Rotor to Full Open</td>
</tr>
<tr>
<td>RANGE D</td>
<td>Range D</td>
<td>Range D</td>
<td>22,000 KC</td>
<td>Antenna Lead</td>
<td>Oscillator Range D (C1)</td>
<td>Turn Rotor to Full Open</td>
</tr>
<tr>
<td>RANGE D</td>
<td>Range C</td>
<td>Range C</td>
<td>400 Ohm</td>
<td>Antenna Lead</td>
<td>Antenna Range D (C2)</td>
<td>Turn Rotor to Full Output</td>
</tr>
<tr>
<td>RANGE D</td>
<td>Range C</td>
<td>Range C</td>
<td>400 Ohm</td>
<td>Antenna Lead</td>
<td>Antenna Range C (C4)</td>
<td>Turn Rotor to Full Output</td>
</tr>
<tr>
<td>RANGE B</td>
<td>Range B</td>
<td>Range B</td>
<td>200 mf.</td>
<td>Antenna Lead</td>
<td>Oscillator Range B (C5)</td>
<td>Turn Rotor to Full Output</td>
</tr>
<tr>
<td>RANGE B</td>
<td>Range B</td>
<td>Range B</td>
<td>200 mf.</td>
<td>Antenna Lead</td>
<td>Oscillator Range B (C5)</td>
<td>Turn Rotor to Full Output</td>
</tr>
<tr>
<td>1500 KC</td>
<td>Range B</td>
<td>Range B</td>
<td>200 mf.</td>
<td>Antenna Lead</td>
<td>1st Ant Range B (C5)</td>
<td>Set Indicator to 1500 KC — See Note A</td>
</tr>
<tr>
<td>400 KC</td>
<td>Range B</td>
<td>Range B</td>
<td>200 mf.</td>
<td>Antenna Lead</td>
<td>2nd Ant Range B (C6)</td>
<td>Set Indicator to 400 KC — See Note A</td>
</tr>
</tbody>
</table>

**ATTENTION**
- The signal from the signal generator to prevent the loading-off action of the AVC.
- After each range is completed, repeat the procedure as a final check.
- Note A — Turn the rotor back and forth and adjust the trimmer until the peak of signal intensity is obtained.
- Adjust to Maximum Output
- Rock Rotor — See Note B

**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 image signal, which is much weaker, will be heard at approximately 5000 plus 92 KC or 4848 KC on the dial. It may be necessary to increase the input signal to hear the signal.

**Resistors**

- R1 2000 Ohms - 1 Watt - Wire wound 10%
- R2 2500 Ohms - 1 Watt - Carbon
- R3 5000 Ohms - 1 Watt - Carbon
- R4 500,000 - 100 W
- R5 500,000 - Volume Control
- R6 500 - 1 Watt - Carbon
- R7 300 - 1 Watt - Carbon
- R8 50,000 - 1 Watt - Carbon
- R9 100,000 - 1 Watt - Carbon

**Condensers**

- C3 3-30 MFD Single Plate Form
- C5 0.005 MFD Micro 10%
- C6 200,000 Volts
- C1 0.005 MFD 200 Volts
- C2 0.005 MFD 200 Volts
- C4 0.005 MFD 200 Volts
- C6 0.005 MFD 200 Volts

**Power Supply**

- Mod. 708
- W485
- 1937
Broadcast Band 6-Volt Storage Battery Operated Superheterodyne Receiver WITH FOUR BUTTON AUTO-TUNER
Frequency Range—535 - 1735 Kilocycles

©John F. Rider, Publisher
PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are four levers on the dial by means of which four stations may be selected. (See "B" Fig. 2).

Above each automatic tuning lever an opening in the escutcheon is provided for inserting the call letter tabs, (See "A" Fig. 2).

Press DOWN ALL THE WAY any one of the automatic tuning levers. Holding it down firmly, turn in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Now rotate the tuning knob (No. 2) to the right (clockwise) as far as it will turn and with a coin (half dollar) tighten the special locking screw ("C") in the center of the tuning knob, (See Fig. 2).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

Volume control—Maximum all adjustments.

Connect radio chassis to ground post of signal generator with a short heavy lead.

Connect dummy antenna value in series with generator output lead.

Connect output meter across primary of output transformer.

Allow chassis and signal generator to "heat up" for several minutes.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Variable Condenser Setting</th>
<th>Trimmer Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L. F.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>465 Kc.</td>
<td>MFD.</td>
<td>Grid of 68G</td>
<td>Rotor full open</td>
<td>Two trimmers on top</td>
<td>Output I. F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465 Kc.</td>
<td>MFD.</td>
<td>Grid of 68G</td>
<td>Rotor full open</td>
<td>Two trimmers on top</td>
<td>Input I. F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BROAD-</td>
<td>C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAST</td>
<td>BAND</td>
<td>200 mfd.</td>
<td>Rotor full open</td>
<td>Trimmer—Top of rear section of gang (See Fig. 1)</td>
<td>Broadcast Oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>1735 Kc.</td>
<td>200 mfd.</td>
<td>Antenna lead</td>
<td>Rotor full open</td>
<td>Trimmer—Top of front section of gang (See Fig. 1)</td>
<td>Antenna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400 Kc.</td>
<td>200 mfd.</td>
<td>Antenna lead</td>
<td>Set dial at 1400 Kc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Attenuate the signal from the signal generator to prevent the leveling off action of the AVC.

After each band is completed, repeat the procedure as a final check.

FREQUENCY RANGE
335 to 1755 Kc.

Power Consumption........2.1 Ampères at 6.3 Volts
Power Output..............350 Milliwatts Undistorted, 800 Milliwatts Maximum
Intermediate Frequency.......465 Kc.
IF PEAK 465 KC.

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 the grid cap of the type 6A7 tube.

2. Adjust trimmer condensers of both input (108-56) and output (108-57) I.F. transformers to resonance with oscillator. See top view for location of these transformers. There are two adjustments 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 150 K.C. and 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 end section of the three gang condenser—see top view).

SERVICE NOTES:
Voltages taken from different points of circuit to chassis are measured with volume 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.

3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. (center) and cathode (front) trimmers to resonance, see top view.

4. Reset external oscillator to 600 K.C. and adjust series pad to resonance, rotate condenser and move dial pointer to 600 K.C. by gently rocking condenser to and fro. Pick up oscillator signal while adjusting series pad to resonance. This adjustment is accessible from the bottom of the chassis.

(a) Check for sensitivity at 1000, 800 and 600 K.C. by setting test oscillator to these frequencies and picking up the signal by rotating variable condenser. Under no circumstances bend plates of oscillator section, bend R.F. and antenna plates only if absolutely necessary.
MODEL S-741
Series A, B, C

Arrangement of Series A & C is similar to Series B, except that Series A & C have no Sensitivity Control Switch.
**TRITETONE**

**Symbol** | **Part No.** | **Description**
--- | --- | ---
C-1 | 3137 | .001-400 V.
C-2 | 2559 | 180 MMF Trimmer
C-3, 4, 5, 6, 7 | 2592 | 1-10 MMF Trimmer
C-8 | 1611 | 3-35 MMF Trimmer
C-9 | 10 | 2871 | 350 MMF Variable
C-11 | 133 | 2780 | 50 MMF Mica
C-12 | 13 | 580 | .05-200 V.
C-14 | 17 | 572 | 1-200 V.
C-15, 16 | 2445 | IF Trimmer
C-18, 20, 21, 22 | 576 | .02-400 V.
C-19 | 1256 | 250 MMF Mica
C-23 | 226 | 5-200 V.
C-25 | 501 | .005-600 V.
C-26 | 2600 | .02-600 V.
C-27 | 621 | 20 MF-150 V.
C-28 | 4298 | 30 MF-150 V.
C-29 | 10 MF-150 V.
C-30 | 2560 | 220-550 MF Padder
C-31 | 2741 | 1330 MF 50%
C-32 | 2740 | 3850 MF 50%
R-1 | 2 | 631 | 50 M-3/4 W.
R-3 | 13 | 4302 | 20 M-3/4 W. 10%
R-4 | 2689 | 100 OHM-.5 W.
R-5, 6, 7 | 624 | 1 Meg-3/2 W.
R-8 | 2599 | 1 Meg-3/2 W. 10%
R-9 | 4300 | 250 M-3/2 W. 10%

**Model D-724U**

**Symbol** | **Part No.** | **Description**
--- | --- | ---
R-10, 12 | 2731 | 500 M-3/4 W. 10%
R-11 | 2568 | 300 M-3/4 W. 10%
R-13 | 2880 | 100 M-3/4 W. 10%
R-15 | 2737 | 2 Meg. Tone Control
R-16 | 2726 | 500 M Volume Control
R-17 | 2730 | 200 M-3/4 W. 10%
R-18 | 2866 | 500 OHM-1 W. 10%
R-19 | 3580 | 100 OHM-.5 W.
R-20, 21 | 4296 | 32 OHM 8 W.
R-22 | 35 OHM-4 W. Wire Wound

**Model D-905**

6A7—Oscillator Translator
6G7G—Detector-AVC-1st Audio
2SL6—Power Output
25Z5—Rectifier
B490B—Ballast

FOR CONVENTIONAL ALIGNMENT, SEE SPECIAL SECTION VOLUME VIII
The tube complement of this chassis consists of the following metal and octal base glass tubes which are interchangeable with metal tubes.

1—Type No. 6SA7—Mixer first detector and oscillator.
1—Type No. 6SK7—Remote Cut-off Pentode as an I.F. Amplifier.
1—Type No. 6SQ7—Duplex Diode Triode Second Detector, A.V.C. and First Audio.
1—Type No. 6K6G—Pentode Output Amplifier.
1—Type No. 6X5G—High Vacuum Rectifier.
### SIGNAL GENERATOR

<table>
<thead>
<tr>
<th>BAND</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Pushbutton Indicated Below</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>465 Kc. 1 MFD.</td>
<td>Grid of 6K7 I.F. Tube</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output I. F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>465 Kc. 1 MFD.</td>
<td>Grid of 6K8G</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input I. F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>SHORT</td>
<td>17 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave</td>
<td>Set dial at 17 Mc.</td>
<td>Trimmer (C22) (See Fig. 1)</td>
<td>Short wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>WAVE</td>
<td>17 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave</td>
<td>Set dial at 17 Mc.</td>
<td>Trimmer (C19) (See Fig. 1)</td>
<td>Short wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>17 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Med. Wave</td>
<td>Set dial at 5 Mc.</td>
<td>Trimmer (C23) (See Fig. 1)</td>
<td>Medium wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>MEDIUM</td>
<td>5 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Med. Wave</td>
<td>Dial set at 5 Mc.</td>
<td>Trimmer (C23) (See Fig. 1)</td>
<td>Medium wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>WAVE</td>
<td>5 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Med. Wave</td>
<td>Dial set at 5 Mc.</td>
<td>Trimmer (C23) (See Fig. 1)</td>
<td>Medium wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>1600 Kc. 200 mmd.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C29) (See Fig. 1)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>BROADCAST</td>
<td>1400 Kc. 200 mmd.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set dial at 100 Kc.</td>
<td>Trimmer (C12) (See Fig. 1)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 Kc. 200 mmd.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set dial at 600 Kc.</td>
<td>Trimmer (C18) (See Fig. 1)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum rock dial (See note &quot;A&quot;)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE "A."

Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

**NOTE "B."

1930 Kc. is the image frequency of 1000 Kc. Adjust Trimmer (L3) until a minimum output is obtained.

*ATTENUATE THE SIGNAL FROM THE SIGNAL GENERATOR TO PREVENT THE LEVELING-OFF ACTION OF THE AVC.*

After each band is completed, repeat the procedure as a final check.

---

**IMAGE REJECTION ADJUSTMENTS**

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>TRIMMER (C9)</th>
<th>IMAGE REJECTION</th>
<th>ADJUST FOR MINIMUM OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAND FREQUENCY RANGE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadcast</td>
<td>535 to 1600 Kc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Wave</td>
<td>1.5 to 5.5 Mc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Wave</td>
<td>1.5 to 18.5 Mc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Power Consumption.**

- 130 Watts (At 115 volts 60 cycles)
- Power Output: 8 Watts Undistorted, 12 Watts Maximum

---

**MODELS D-920B, D-921**

**FIG. 3—SHOWING STATION ADJUSTMENT SCREWS.**

**PROCEDURE FOR SETTING THE AUTOMATIC STATION PUSHDUTTONS:**

Only a single adjustment for each station is required in setting up your favorite stations for automatic pushbutton operation. These adjustments are located at the front of the chassis shown in Fig. 3 and are accessible through the station call letter tab holes. The only equipment needed is a small screwdriver to make the adjustments.

After you have made up your list of stations, press button marked "Broadcast" and tune set manually until station selected having the highest frequency is tuned in and the program noted. Press button covering frequency range in which station is located (See Fig. 3). Adjust screw through station tab opening above button pressed until the same station is heard clearly and tuning indicator indicates that it is correctly tuned.

---

**7 Tube Including Cathode-Ray Tuning Indicator**

**2-Band A. C. Superheterodyne Receiver**
### TUBES:
The tube complement of this chassis consists of the following octal base glass and metal tubes:

- Type 6K8G Converter (Oscillator and First Detector).
- Type 6K7 Remote Cut-Off Pentode, I. F. Amplifier.
- Type 6J5G Second Detector and A. V. C.
- Type 6Q7G First Audio Amplifier.
- Type 6J5G Phase Inverter.
- Type 6K6G Pentode Push-Pull Output Amplifiers.
- Type 5Y3G High Vacuum Rectifier.
- Type 6U5 Cathode-Ray Tuning Indicator.

### 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 mfd, 200 mfd, and 400 ohms.

#### BAND

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F. 1750 kHz</td>
<td>465 Kc. 1 MFD.</td>
<td>Grid of 6K7</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output I. F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>200 mfd. Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BROADCAST BAND</td>
<td>1500 Kc. 200 mfd.</td>
<td>Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C1) (See Fig. 1)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>600 Kc. 200 mfd.</td>
<td>Broadcast (Extreme left rotation)</td>
<td></td>
<td></td>
<td></td>
<td>Trimmer (C5) (See Fig. 1)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>465 Kc. 200 mfd.</td>
<td>Broadcast (Extreme left rotation)</td>
<td></td>
<td></td>
<td></td>
<td>Trimmer (C3) (See Fig. 1)</td>
<td>I. F. Wave Trap</td>
<td>Adjust for minimum output</td>
<td></td>
</tr>
</tbody>
</table>

#### IMAGE REJECTION ADJUSTMENTS

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2430 Kc. 700 mfd.</td>
<td>Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Pick up signal at 150 Kc. on dial</td>
<td>Trimmer (C4) (See Fig. 1)</td>
<td>Image rejection</td>
<td>Adjust for minimum output (See note &quot;B&quot;)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### SHORT WAVE BAND

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set Dial at 17 MC.</td>
<td>Top of chassis (See Fig. 1)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set Dial at 17 MC.</td>
<td>Top of chassis (See Fig. 1)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set Dial at 6 MC.</td>
<td>Top of chassis (See Fig. 4)</td>
<td>Short Wave oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note &quot;A&quot;)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### NOTE "A."

Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

#### NOTE "B."

2430 Kc. is the image frequency of 1500 Kc. Adjust Trimmer (C4) until a minimum output is obtained. Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC. After each band is completed, repeat the procedure as a final check.
7 Tube Including Cathode-Ray Tuning Indicator

2-Band A.C. Superheterodyne Receiver

POWER SUPPLY:

Caution:—This radio, unless otherwise marked, must be operated from 105–115 volts, 50-60 cycle A.C. supply only. If you are in doubt as to the voltage and frequency rating of the power supply, consult your local power company before inserting plug. Do not insert plug unless all tubes and speaker plug are in their proper sockets.

TUBES:

The tube complement of this chassis consists of the following octal base glass and metal tubes:

1—Type 6K8G Triode Hexode, First Detector-Oscillator.
1—Type 6Q7G Duplex Diode Triode Second Detector, A. V. C. and First Audio.
1—Type 6P5G Driver Stage.
1—Type 6AC5G Positive Grid Triode Output Amplifier.
1—Type 5Y3G High Vacuum Rectifier.
1—Type 6U5 Cathode-Ray Tuning Eye.

I. F. FREQUENCY 465 KC.

---

Circuit Diagram
Ref. Part No. Description
C6 1247 2B.C. Oscillator Trimmer
C4 1294 .0001 mica
C10 1245 .003 x 600 v.
C11 1246 R.C. Oscillator Series Pad
C12 1247 S.W. Oscillator Series Pad
C13 1295 20 x 400 v.
C14 1245 1 x 400 v.
C15 1018 .001 x 400 v.
C16 1294 .001 mica
C17 1296 600 x 600 v.
C18 1230 1 x 200 v.
C19 291 .001 mica
C20 1011 .01 x 400 v.
C21 1002 30 x 600 v.
C22 1296 12 mfd. bleeder—450 v.
C23 1296 12 mfd. bleeder—450 v.
C24 1007 .001 x 600 v.

PARTS

T1 1012 Wave Trap
T2 111111 Antenna Coils
T3 1204 Oscillator Coils
T4 1292 Input F—465 kc
T5 1206 Output 1 F—465 kc
T6 1140 10 in. Dynamic Speaker (Field Resis.
T7 129210 Power Transformer
S1 1246 Wave Band Switch
S2 1294 V.I.O. switch on tone control
P1 1294 6-8 v. pilot light
### 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 screwdriver.
- Dummy antennas—1 mlf, 200 mml, and 400 ohms.

#### TABLE

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>465 Kc.</td>
<td>1 MFD. Grid of 6K7</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output</td>
<td>I. F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>1 MFD. Grid of 6K8</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input</td>
<td>I. F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>SHORT WAVE BAND</td>
<td>17 Mc. 400 ohms Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set dial at 17 MC</td>
<td>Trimmer (C)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 Mc. 400 ohms Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set dial at 17 MC</td>
<td>Trimmer (C)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Mc. 400 ohms Antenna lead</td>
<td>Short Wave (Extreme right rotation)</td>
<td>Set dial at 6 MC</td>
<td>Trimmer (C12)</td>
<td>Short Wave oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note “A”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BROADCAST BAND</td>
<td>1750 Kc. 200 mml. Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1750 Kc. 200 mml. Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 Kc. 200 mml. Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C11)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note “A”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>465 Kc. 300 mml. Antenna lead</td>
<td>Broadcast (Extreme left rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C12)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: “A”</td>
<td>Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SERVICE NOTES:

- Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.
- All voltages as indicated on the voltage chart are measured with 115 volts on the primary of the power transformer.
- Resistances of coil windings are indicated in ohms on the schematic circuit diagram.
- To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.
- Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

### FREQUENCY RANGE

#### BAND

- **Short Wave** 5.6 to 18.3 MC. (Megacycles)
- **Broadcast** 540 to 1735 KC.
- **Power Consumption** 7.0 Watts (At 115 volts 50-60 cycles)
- **Power Output** 3 Watts Undistorted, 5 Watts Maximum

#### INTERMEDIATE FREQUENCY

- **465 KC.**

### NOTE:

On the back of the string dial drum a calibrated scale is provided for aligning this chassis to the frequencies listed in the alignment procedure. Attach a pointer so that it will indicate proper dial setting in respect to the position of the variable condenser.
SETTING UP THE PUSH BUTTON STATION SELECTOR

Call station nearest 1600 KC end of dial the No. 1 station and number five other stations consecutively as they are tuned in on the dial, tuning from left to right. Set band selector at "B", or second position from left, and tune in station No. 1. Observe program. Turn band selector knob to extreme left position. Push No. 1 button in as far as it will go. Insert screwdriver thru opening directly above No. 1 button and turn screwdriver until same station is heard. If station is not heard reverse direction of rotation.

Tubes required are:
1—6A7 Oscillator-translator
1—6D6 Intermediate Frequency Amplifier
1—6G5 Cathode Ray Tuning Tube (on models equipped with "eye" tuning indicator)
1—6Q7G Detector AVC—First Audio Amplifier

- Trimming Adjustment

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part No.</th>
<th>Description</th>
<th>Symbol</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>5092</td>
<td>3-gang 362 mmd. variable</td>
<td>R4</td>
<td>4529</td>
<td>10M 1/3 W.</td>
</tr>
<tr>
<td>C2</td>
<td>5092</td>
<td>3-gang 362 mmd. variable</td>
<td>R5</td>
<td>636</td>
<td>40M 1/3 W.</td>
</tr>
<tr>
<td>C5</td>
<td>1611</td>
<td>1.0 mmd. trimmer</td>
<td>R6</td>
<td>2605</td>
<td>200 ohms 1/3 W.</td>
</tr>
<tr>
<td>C6</td>
<td>2597</td>
<td>1.0 mmd. trimmer</td>
<td>R8</td>
<td>5099</td>
<td>2 meg. tone control</td>
</tr>
<tr>
<td>C8</td>
<td>9, 10, 11</td>
<td>I.F. Trimmers</td>
<td>R9</td>
<td>5100</td>
<td>500 M Volume Control</td>
</tr>
<tr>
<td>C12</td>
<td>30, 37</td>
<td>.0005 400 V.</td>
<td>R10</td>
<td>2647</td>
<td>50 ohms 1/3 W. on models</td>
</tr>
<tr>
<td>C13</td>
<td>5193</td>
<td>.002 Special 5%</td>
<td></td>
<td></td>
<td>using tuning eye</td>
</tr>
<tr>
<td>C14</td>
<td>28</td>
<td>.0005 400 V.</td>
<td>R12</td>
<td>2730</td>
<td>200M 1/3 W.</td>
</tr>
<tr>
<td>C15</td>
<td>3272</td>
<td>30-140 mmd. trimmer</td>
<td>R13</td>
<td>2881</td>
<td>400M 1/3 W. 10%</td>
</tr>
<tr>
<td>C16</td>
<td>31, 33</td>
<td>.02 400 V.</td>
<td>R14</td>
<td>2880</td>
<td>100M 1/3 W. 10%</td>
</tr>
<tr>
<td>C17</td>
<td>18</td>
<td>.02 400 V.</td>
<td>R15</td>
<td>2883</td>
<td>5M 1/3 W. 10%</td>
</tr>
<tr>
<td>C19</td>
<td>563</td>
<td>.08 400 V.</td>
<td>R16</td>
<td>2731</td>
<td>500M 1/3 W.</td>
</tr>
<tr>
<td>C23</td>
<td>2560</td>
<td>350 mmd. Var. Padder</td>
<td>R17</td>
<td>5184</td>
<td>310 ohm 5% Flexohm</td>
</tr>
<tr>
<td>C24</td>
<td>2741</td>
<td>1330 mmd. Padder</td>
<td>R18</td>
<td>5091</td>
<td>Power Transformer</td>
</tr>
<tr>
<td>C25</td>
<td>2793</td>
<td>.006 600 V.</td>
<td></td>
<td>3463-5 1st I.F. Transformer</td>
<td></td>
</tr>
<tr>
<td>C26</td>
<td>2790</td>
<td>50 mmd. Mica</td>
<td></td>
<td>3463-5 2nd I.F. Transformer</td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>2792</td>
<td>2.000 V.</td>
<td></td>
<td>5096</td>
<td>Oscillator Coils</td>
</tr>
<tr>
<td>C29</td>
<td>2695</td>
<td>.003 600 V.</td>
<td></td>
<td>5095</td>
<td>Antenna Coils</td>
</tr>
<tr>
<td>C32</td>
<td>568</td>
<td>.01 400 V.</td>
<td></td>
<td>2845</td>
<td>B.C. Antenna Coil</td>
</tr>
<tr>
<td>C34</td>
<td>824</td>
<td>.002 600 V.</td>
<td></td>
<td>2163</td>
<td>Drive Cable</td>
</tr>
<tr>
<td>C35</td>
<td>3285</td>
<td>16 mfd. 350 W. V. Elect.</td>
<td></td>
<td>5185</td>
<td>Speaker 8&quot;</td>
</tr>
<tr>
<td>R1</td>
<td>617</td>
<td>20M 1/3 W.</td>
<td></td>
<td>5832</td>
<td>Push Button Tuning Assembly</td>
</tr>
<tr>
<td>R2</td>
<td>624</td>
<td>1 Meg. 1/3 W.</td>
<td></td>
<td></td>
<td>Complete.</td>
</tr>
<tr>
<td>R3</td>
<td>631</td>
<td>50M 1/3 W.</td>
<td></td>
<td></td>
<td>(Replacement of individual component parts not recommended.)</td>
</tr>
<tr>
<td>R4</td>
<td>618</td>
<td>20M 1/3 W.</td>
<td></td>
<td>5810</td>
<td>Glass Indicator</td>
</tr>
</tbody>
</table>

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WESTERN AUTO SUPPLY CO.
MODELS D926, D711

TRUETONE PAGE 12-13
**Antenna and Ground**

Two built-in antennas are incorporated in the speaker compartment. One of these, the Truetone Stratoscope loop antenna may be used for reception of local or nearby stations, an outside antenna and ground are usually not required. The use of the Stratoscope antenna may, in some locations, provide best broadcast band operation.

The other, a counterpoise foil antenna, is used for reception on the short wave bands.
SPECIFICATIONS

Power Consumption - 103 Watts (At 117 volts 60 cycles)
Power Output .................................................. 8 Watts Undistorted
................................................................. 9 Watts Maximum
Selectivity - 23.5 KC Broad at 1000 times Signal
(Sharp) .......................................................... Intermediate Frequency - 456 KC
Speaker .......................................................... 12" Electro-Dynamic

ISSUE A
MARCH 1940
SERIAL NO
575,001 UP

6 STATION BUTTONS
11 TUBES
3 BANDS

TRUETONE
CHROMATIC
CONTROL

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**IMPORTANT:** See Aligning Instructions on Page 4

**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 screwdriver.
- Dummy antenna, 2 Mfd., and 200 Mfd.

**SIGNAL GENERATOR**

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Iron Cores (Dial Setting)</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal “A” (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal “A” (See Fig. 4)</td>
<td>Iron Cores. All the way out</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>1690 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal “A” (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Trimmer (C4) (See Fig. 4)</td>
<td>Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BROAD-</td>
<td>1690 Kc.</td>
<td>200 MFD.</td>
<td>Connect to Terminal “B” (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Trimmer (C3) (See Fig. 4)</td>
<td>Antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>CAST</td>
<td>1400 Kc.</td>
<td>200 MFD.</td>
<td>Connect to Terminal “B” (See Fig. 4)</td>
<td>Turn Dial to 1400 Kc.</td>
<td>Adjust position of antenna coil right or left. (See Fig. 3)</td>
<td>Antenna Coil Adjustment</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>
|       | 1690 Kc.         | 200 MFD.      | Connect to Terminal “B” (See Fig. 4) | Turn Dial to 1690 Kc. | Adjust trimmer (C3) (See Fig. 4) | Antenna | Check for tracking (See Note “B”)

**NOTE “A”**—The antenna coil assembly is made so that it is movable right or left. When making the adjustment as given in the alignment procedure, move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

**NOTE “B”**—The antenna coil assembly is made so that it is movable left or right. When making the adjustment as given in the alignment procedure, move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

**TUBES:**

The tube complement of this chassis consists of the following octal base glass and metal tubes.

The type and function of each tube is as follows.

1—Type 12SA7 Mixer, First Detector-oscillator.
1—Type 12SK7 I.F. Amplifier.

**FREQUENCY RANGE**

535 to 1600 K.C.

Power Consumption: Radio Only 30 Watts
Power Output: 900 Milliwatts Undistorted, 1.7 Watts Maximum
Intermediate Frequency: 465 K.C.

**TRIMMERS**

1—Type 12SQ7 Second Detector, A.V.C. and First Audio.
1—Type 50L6GT Beam Output Amplifier.
1—Type 35Z5GT Rectifier.
### Specifications - Model D-937

#### Input Voltages and Currents
- DC Power Supply: 6 V, 10 ma
- AC Power Supply: 120 V, 60 Hz

#### Power Output
- 100 milliwatts @ 400 kHz

#### AGC Operation
- AGC On: 50 kHz - 30 MHz
- AGC Off: 30 MHz - 300 MHz

#### Tuning and Alignment
- Adjustable trimmer caps for fine-tuning
- Calibration for specific model

---

### Adjusting Antenna Trimmer

1. Loosen the antenna trimmer screw.
2. Tune the receiver for best reception.
3. Adjust the trimmer for maximum reception.
4. Tighten the screw to lock in the adjustment.

---

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Alignment Frequencies:
IF = 465 KC
B-C Osc. = 1560 KC
B-C Ant. (C-36) = 1400 KC

The tube complement of this chassis consists of the following tubes:

1A7GT Mixer, First Detector-oscillator.
1H5GT Second Detector, A.V.C. 1st Audio.
1A5GT Output Amplifier.
35Z5GT Rectifier.
5459 Ballast Resistor.
Roof Speaker and Dual Speaker Connections

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.
## Changes in Later Models

June, 1937

Later models of the Series 65 have changes incorporated in them which are explained below. The models which have these changes may be identified by the issue letter which is a large letter stamped on top of the chassis base. The tube arrangement label on the chassis case cover also shows this 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 65 is different from the “B” and “C” models. The gang condenser used in the “D” issue radio does not have the cut plate oscillator section. A padding condenser (600 KC) was added in series with the oscillator section of this gang condenser and the oscillator coil. The padding condenser is a part of the 2nd I. F. trimmer unit and is mounted in 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.

## Supplemental Replacement Parts

The parts of the Series 65 are used on the Series “D” issue radio with the following exceptions:

**Prices are subject to change.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A650</td>
<td>T1</td>
<td>Antenna Transformer and Can Assembly</td>
<td>$1.65</td>
</tr>
<tr>
<td>9A651</td>
<td>T2</td>
<td>R.F. Interstage Transformer and Can Assembly</td>
<td>$1.75</td>
</tr>
<tr>
<td>9A652</td>
<td>T3</td>
<td>Oscillator Coil and Can Assembly</td>
<td>$.95</td>
</tr>
<tr>
<td>9A653</td>
<td>T5</td>
<td>2nd I. F. Transformer and Can Assembly</td>
<td>$2.35</td>
</tr>
<tr>
<td>47X57</td>
<td>C17</td>
<td>100 mf. Molded Condenser</td>
<td>$.10</td>
</tr>
<tr>
<td>17A79</td>
<td>C16</td>
<td>30-100 mf. 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 65 are not used on the Series “D” issue radio:

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/740</td>
<td>T1</td>
<td>Antenna Transformer and Can Assembly</td>
<td>$1.65</td>
</tr>
<tr>
<td>9/741</td>
<td>T2</td>
<td>R.F. Interstage Transformer and Can Assembly</td>
<td>$1.70</td>
</tr>
<tr>
<td>9/742</td>
<td>T3</td>
<td>Oscillator Coil and Can Assembly</td>
<td>$.85</td>
</tr>
<tr>
<td>9/744</td>
<td>T5</td>
<td>2nd I. F. Coil and Can Assembly</td>
<td>$1.60</td>
</tr>
<tr>
<td>17/565</td>
<td>C16</td>
<td>30-100 mf. 2nd I. F. Trimmer</td>
<td>$.20</td>
</tr>
<tr>
<td>14/655</td>
<td></td>
<td>3 Section Gang Condenser Complete with Drive Gears</td>
<td>$5.85</td>
</tr>
</tbody>
</table>

### The Following Changes Apply to All Issues of the Series 65:

- 46X013 C29 .5 mf. 180 volt Tubular Condenser | $0.30
- 16X16 15 Amp Fuse | $.10
- 46X007 C29 .5 mf. 180 volt Tubular Condenser | $0.30
- 16X14 20 Amp 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.

### 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 175 KC and connect the output of the signal generator through a .01 mf. condenser to the input of 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 three IF trimmers until maximum output is obtained.

Set the signal generator for 1581 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.

### 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 200 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.**
- **If the total capacity of the antenna and shielded lead is approximately 70 mmf., such as in the case if a "Salt pole" antenna is used, insert the antenna plug with the mark on the LC side.**
SERVICES INFORMATION

Voltaiges taken from the different points of the circuit to chassis are measured with volume control in maximum position, all tubes in their sockets and with a volt meter having a resistance of 1000 ohms per volt, on the 300 volt scale. These voltages are clearly indicated on the voltage chart.

SERVICE INFORMATION

Speaker (Part No. P4206) 6½" PM.
D. C. voice coil resistance .................................................. 3.6 ohms
Voice coil impedance at 400 cycles ....................................... 4.0 ohms

S. W. Antenna Coil (Part No. P3198)
Looking at the connection end and starting at the chassis in a clockwise direction the terminals are: No. 1. plate; No. 2. B+; No. 3. grid; No. 4. plate.
Primary—No. 3 and No. 4—Resistance ................................. .08 ohm
Secondary—No. 1 and No. 2—Resistance ............................... .37 ohm

Oscillator Coil (Part No. P4194)
Looking at the mounting strip end in a clockwise direction starting at the chassis, the terminals are: No. 1. ground; No. 2. cathode; No. 3. plate; No. 4. grid; No. 5. plate; No. 6. grid; No. 7. grid; No. 8. open.
B.C. Primary—No. 1 and No. 5—Resistance ............................ .28 ohms
S.W. Primary—No. 4 and No. 6—Resistance .......................... .60 ohms
B.C. Secondary—No. 4 and No. 6—Resistance ........................ .57 ohms
S.W. Secondary—No. 2 and No. 7—Resistance ........................ .08 ohms

First I.F. Transformer (Part No. P4108)
Primary—Blue, plate; red B+—Resistance ............................... 18.2 ohms
Secondary—White, grid; black. AVC—Resistance ..................... 15.1 ohms

Second I.F. Transformer (Part No. P4109)
Primary—Blue, plate; red B+—Resistance ............................... 20.8 ohms
Secondary—White, diode; black. AVC—Resistance ..................... 17.4 ohms

CONDENSERS

No. Capacity (Mfd.) Volts No. Capacity (Mfd.) Volts
C1 .0001 Mica C18 .0003 Mica 600
C2 .05 400 C19 .0001 Mica 200
C3 .0001 Mica C20 .025 400
C4 .00005—5% Mica C21 .05 400
C5 .0001 Mica C22 .005 400
C6 .003—5% Mica C23 .005 400
C7 .05 200 C24 .025 25
C8 .0001 Mica C25 .025 25
C9 .00025 Mica C26 .025 25

All voltages should be measured with 117 volts A.C. input to receiver. Resistance and actual connections of coils and transformers, electrolytic condenser information and speaker data are given under Service Information.

To check for open by pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good until the defective unit is located.
PROCEDURE FOR SETTING UP PUSH BUTTONS

There are six push buttons by means of which six stations may be selected. Make a list of six stations tuned in regularly. Loosen one of the push buttons by inserting a screw driver thru the center hole in the push button to the locking screw and turn the locking screw counter-clockwise one full turn and push in, while holding this screw in tune in the desired station by means of the station selector.

Turn the selector very slowly back and forth until the signal is clearest. Now while still holding the above screw in, tighten it by turning clockwise. Release and turn the station selector to one end of the dial; then check the button by pushing it down and if the station is tuned to the center of the area on the dial covered by the station the adjustment is correct.

Releasing the push button and repeat the above procedure for the remaining buttons.

If it is desired to change a button to a different station simply re-set by repeating the above procedure.

Punch the correct station call letter and the set of sheets supplied and insert them from the side into the grooves in the front of the push buttons. Punch six celluloid squares from the set of sheets supplied and insert them in the above mentioned grooves over the station call letter tabs.

The dial is now set up for quick tuning and all that is necessary is to push the button of the desired station down and then release.

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 indicatronics meter.
- Non-metallic screwdriver.
- Dummy antenna—1 mid., 200 mm., 400 ohms.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.F.</td>
<td>455 KC.</td>
<td>.1 Mfd.</td>
<td>Grid of 6SK7 LF.</td>
<td>Grid of 6SK7 LF.</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output F.L.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>455 KC.</td>
<td>.1 Mfd.</td>
<td>Grid of 6SA7 tube</td>
<td>Grid of 6SA7 tube</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input F.L.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>1,630 KC.</td>
<td>200 Mnf.</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer—Upper left, front of chassis</td>
<td>Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BROAD.</td>
<td>1,400 KC.</td>
<td>200 Mnf.</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Set dial at 1400 KC.</td>
<td>Trimmer—Lower right, front of chassis</td>
<td>Broadcast Antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>CAST</td>
<td>500 KC.</td>
<td>200 Mnf.</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Set dial at 600 KC.</td>
<td>Trimmer—Underside of chassis, center</td>
<td>Oscillator Series Pot.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>18,100 KC.</td>
<td>400 ohms</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer—Lower left, front of chassis</td>
<td>Short Wave Amplifier</td>
<td>Adjust to receive signal</td>
</tr>
<tr>
<td>SHORT WAVE</td>
<td>16,000 KC.</td>
<td>400 ohms</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Tune signal</td>
<td>Trimmer—Upper right, front of chassis</td>
<td>Short Wave Amplifier</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

Note "A"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of intensity is obtained. Note "B"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of intensity is obtained.

Power output 2.6 watts undistorted — 4.1 watts maximum.
Intermediate Frequency 455 K.C.
Power Consumption—50 watts.
**TECHNICAL DATA**

- **Power Consumption**
  - Radio Only: 70 Watts
  - Motor Only: 20 Watts

- **Power Output**: 2.1 Watts Undistorted

- **Sensitivity for 500 Milliwatt Output**: 15 Microvolts Average

- **Selectivity**: 51 Kc Broad at 1000 Times Signal at 1000 Kc

- **Tuning Frequency Range**
  - Broadcast Band: 530 to 1600 Kc
  - Shortwave Band: 5.46 to 18.3 M C

- **Intermediate Frequency**: 455 Kc

- **Speaker**: 8 in. Electro Dynamic

---

**ALIGNMENT PROCEDURE**

- **Volume control**—Maximum all adjustments.
- **Connect radio ground to ground post of signal generator with a short heavy lead.**
- **Connect dummy antenna value in series with generator output lead.**
- **Connect output meter across primary of output transformer.**
- **Allow chassis and signal generator to “heat up” for several minutes.**

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 screwdriver.
- Dummy antennas—1—mf., 200 mmf., 400 ohms.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>DUMMY ANTENNA</th>
<th>POSITION OF BAND SWITCH</th>
<th>VARIABLE CONDENSER SETTING</th>
<th>TRIMMERS (IN ORDER SHOWN)</th>
<th>TRIMMER FUNCTION</th>
<th>ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>455 Kc.</td>
<td>.1 MFD</td>
<td>Grid of 6SA7 Mixture</td>
<td>Broadcast</td>
<td>Rotor full open</td>
<td>Trimmers on top</td>
<td>I. F.</td>
</tr>
<tr>
<td>SHORT WAVE BAND (See Note A)</td>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C4</td>
<td>Short Wave oscillator</td>
</tr>
<tr>
<td></td>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C1</td>
<td>Short Wave antenna</td>
</tr>
<tr>
<td></td>
<td>6 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 6 Mc.</td>
<td>Trimmer C7</td>
<td>Short Wave oscillator series pad</td>
</tr>
<tr>
<td>BROADCAST BAND (See Note A)</td>
<td>1600 Kc.</td>
<td>200 mmf.</td>
<td>Grid of 6SA7 Mixture</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer C5</td>
<td>Broadcast oscillator</td>
</tr>
<tr>
<td></td>
<td>530 Kc.</td>
<td>200 mmf.</td>
<td>Grid of 6SA7 Mixture</td>
<td>Broadcast</td>
<td>Rotor full closed</td>
<td>Trimmer C6</td>
<td>Broadcast oscillator series pad</td>
</tr>
<tr>
<td>LOOP ALIGNMENT (See Note B)</td>
<td>1400 Kc.</td>
<td>200 mmf.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 1400 Kc. (See Top View)</td>
<td>Trimmer C2</td>
<td>Broadcast oscillator</td>
</tr>
<tr>
<td></td>
<td>600 Kc.</td>
<td>200 mmf.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 600 Kc. (See Top View)</td>
<td>Trimmer C6</td>
<td>Broadcast oscillator series pad</td>
</tr>
</tbody>
</table>

**NOTE "A"**—The signal generator is connected to the "ANT." and "GND" leads when aligning the Short Wave Band and to the grid of the 6SA7 tube and ground terminal when setting the Broadcast Band oscillator end frequencies, (1600 and 530 K. C.). The loop antenna should be connected to the radio when making these adjustments.

**NOTE "B"**—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected. The signal generator is connected to the "ANT." and "GND." leads.

**NOTE "C"**—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained. Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.
Automatic Record Changer—Operating Instructions

Setting for Size of Record

The Changer plays up to fourteen 10" or ten 12" records at one loading. All records must be the same size for each loading.

On each post you will see selecting arms. The position of these arms determines the setting for different size records. To set for 10 or 12 inch records, it is merely necessary to grasp the posts by the knobs at the top, lift, and turn until the 10" or 12" arrows are pointing toward the center of the turntable. When in either the 10" or 12" position, the posts will snap into place except when they are lifted by hand. Be sure to set both posts for the same size record.

Loading

See that the selecting arms of both posts are turned toward the center of the turntable as indicated by the engraved arrows, and that both sets of arms are set for the same size (10" or 12") records as described in the preceding paragraph.

Place the stack of records (up to fourteen 10" or ten 12") over the center pin so that they will rest on the selecting arms.

Starting the Changer

1. Turn on the radio (allowing approximately 30 seconds for the tubes to warm up) and turn the phonograph-radio knob, to the phonograph position.

2. Turn the switch knob on the Record Changer panel to "ON." The motor will then start and the record changer will go into automatic operation of its own accord.

How to Reject a Record

Merely press the switch knob on the Changer panel. You can do it any time after the needle has come into contact with that record.

Playing Individual Records

Should it be desired to play an individual record merely set up the machine as described above for the proper size (10" or 12") as indicated on the selecting arms, place the record on top of the arms as described under "Loading", and set the machine in operation by means of the switch knob described under "Starting the Changer." In other words, play an individual record in the same manner as you would play a stack of that size.

Unloading

First switch off the motor. Grasp each post by its knob at the top and turn them out of the way.

Lift the played records from the turntable. Then return the posts to the proper playing position as indicated by the arrows on the selecting arms.

The Changer may then be loaded with a new stack of records according to the size shown on the selecting arms.

Turning Off Changer

Throw Changer switch knob to "OFF" position.

Lift tone arm and place it in the rest position. If you happen to turn off the Changer switch while the mechanism is going through a "change cycle," you will notice that it does not stop until the cycle has been completed, and the tone arm is again in playing position, at which point it is ready to be lifted to the rest position. If you prefer to turn off your Changer with the radio switch, be sure to turn it off while the needle is resting upon a record; otherwise, the selecting arms cannot be correctly reset.

To avoid warping of records, never leave records resting on posts.

If Changer is Left Running

No damage will be done if you forget to turn off Changer after it has played its entire load of records. It will simply repeat the last record until stopped or overloaded.

Phonograph Needles

Various types and kinds of needles are available for use in phonograph tone arms. All have their virtues, as well as their faults, for use in ordinary phonographs, where needles can be changed after each record. For playing ten or more records at one set-up, as with this Changer, no attempt should be made to use ordinary steel or fibre points, since continued use of worn points will be likely to ruin both quality of reproduction and the records as well. Any kind of needle can be used which has point durable enough to play ten records or more without damaging them.

It should be remembered that no matter what the quality of the tone arm, amplifying system and speaker, all of the recorded music must pass through the needle. For this reason, it is absolutely essential that particular care be taken to use good needles, and to see that they are changed often enough so that the records are not damaged and the quality of the music is not impaired.

In general there are two types of needles which can be satisfactorily used on an Automatic Record Changer: those which require changing after approximately 12 records, and the so-called permanent type needles which are rated in terms of "hours of service." In no case should the manufacturers' claims for these needles be exceeded, since in all probability the needles are rated in terms of their maximum life. If at any time short of the rated life, particularly in the case of the semi-permanent type needles, there is any reason to suspect that the needle has become unduly worn, it would probably be advisable to replace it with a new one. Never under any conditions should a needle be removed from the tone arm head and then replaced—needle manufacturers' claims notwithstanding.

For convenience, the tone arm on your changer may be raised to a nearly vertical position, so that the needle may be easily inserted; the needle screw should be tightened firmly.

Care of Records

To insure long life for your records requires only slight effort. Do not expose them to heat from the sun, nor to heat from Nearby stoves or radiators. Store them preferably in albums, but in any case keep them always in a cool, dry place, resting vertically. Remove dust and dirt, using soft cloth and lights circular motion. If fluids are used for lubricating record surfaces, keep in mind that these often tend to attract dust, and extra effort is necessary to keep the record clean. Even a fine film of dust very often contains abrasive particles which, when grounded against the record surface by the steel needle, can cause very rapid wear of the recorded music.
CONVENTIONAL ALIGNMENT - SEE THE SPECIAL SECTION VOl. VIII

FREQUENCY RANGES - BROADCAST - 540 to 1700 KC - Adjust the OSC, RF and ANT trimmers to a maximum peak of 1400 KC, then pad the Oscillator circuit at 600 KC while rocking gang condenser.

SHORTWAVE - 5800 to 16200 KC - Adjust the OSC and ANT trimmers to a maximum peak of 14000 KC. No padding required.

POLICE - 1700 to 5000 KC - Adjust the ANT coil trimmer to a maximum peak of 4000 KC. No other adjustments required.

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MODEL D-1117

WESTERN AUTO SUPPLY CO.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>28 Watts (At 117 volts AC Supply)</td>
</tr>
<tr>
<td>Power Output</td>
<td>75 Watt Undistorted</td>
</tr>
<tr>
<td>Selectivity</td>
<td>49 KC Broad at 1000 times Signal</td>
</tr>
<tr>
<td>Intermediate Frequency</td>
<td>456 KC</td>
</tr>
<tr>
<td>Speaker</td>
<td>5&quot; Electro-Dynamic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tuning Frequency Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Range</td>
<td>528 to 1600 KC</td>
</tr>
<tr>
<td>D Range</td>
<td>5750 to 18,300 KC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(For .05 watt output) — External Antenna</td>
<td>5 Microvolts Average</td>
</tr>
<tr>
<td>D Range</td>
<td>40 Microvolts Average</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments. Allow Chassis and Signal Generator to “Heat Up” for several minutes.
The equipment in column at right is required for aligning:

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY</th>
<th>ANTENNA CONNECTION</th>
<th>GROUND CONNECTION</th>
<th>DUMMY ANTENNA</th>
<th>BAND switch setting</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>456 KC</td>
<td>Point “X”</td>
<td>.1 mf</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>1st I.F. (C10) &amp; (C11)</td>
<td>3rd I.F. (C17) &amp; (C18)</td>
</tr>
<tr>
<td>RANG E B</td>
<td>1600 KC</td>
<td>Point “X”</td>
<td>.1 mf</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>Oscillator Range B (C3)</td>
<td>See Note A</td>
</tr>
<tr>
<td></td>
<td>1400 KC</td>
<td>External Antenna Lead</td>
<td>Point “X”</td>
<td>200 mmf</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>See Note B</td>
</tr>
<tr>
<td></td>
<td>600 KC</td>
<td>External Antenna Lead</td>
<td>Point “X”</td>
<td>200 mmf</td>
<td>B Range</td>
<td>External Antenna Lead</td>
<td>600 HC (C6) Rock Rotor—See Note C</td>
</tr>
<tr>
<td>RANGE D</td>
<td>18,300 KC</td>
<td>External Antenna Lead</td>
<td>Point “X”</td>
<td>40 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Full Open</td>
<td>Oscillator Range D (C4)</td>
</tr>
<tr>
<td></td>
<td>17,000 KC</td>
<td>External Antenna Lead</td>
<td>Point “X”</td>
<td>40 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Rang e D (C1)</td>
</tr>
</tbody>
</table>

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC. After each range is completed, repeat the procedure as a final check.

NOTE A—Adjust Oscillator Range B (C3) trimmer on gang condenser. Oscillator Range B (C7) auxiliary trimmer on side of chassis is adjusted at factory and ordinarily need not be readjusted in the field.

NOTE B—If the pointer is not at 1400 KC on the dial, set pointer at this mark on the dial scale.

DRIVE CORD REPLACEMENT

Turn gang condenser to completely closed position—see illustration.

Using a new drive cord approximately 50 inches in length, tie one end to tension spring. Pass other end of cord down through hole in groove of drive pulley. Pull spring flush against inside of pulley rim. Wind cord 1/4 turn clockwise (from front of chassis) around drive pulley. Then pass over idler pulleys A, B, and C as shown.

Wind cord 41/2 turns counter-clockwise (from front of chassis) around tuning control shaft. These turns should progress away from the chassis. Then wind cord 3/4 turn clockwise (from front of chassis) around drive pulley. This turn should be on the left side (from gang condenser side of chassis) of pulley groove. Pass cord through hole in pulley groove. Tie cord to tension spring. Stretch tension spring and secure free end to hook on pulley.

Dial Pointer Attachment—Tune in a signal of known frequency. Set pointer at this frequency mark on dial scale. Fasten pointer to cord—See illustration.

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When removing the "Protector Switch" located on the left side of the cabinet, it is necessary to insert a piece of metal, similar to the one on the cardboard back, into the "Protector Switch" to close the line circuit.

**Speaker** (Part No. P-4572) 6" PM Type.

- D.C. voice coil resistance: 7.3 ohms
- Voice coil impedance at 400 cycles: 8.0 ohms

**B.C. and S.W. Antenna Coil** (Part No. P4582)

Starting with the lug that is connected to ground lead in a clockwise direction, the terminals are: No. 1, ground; No. 2, cond; No. 3, pad; No. 4, grid; No. 5, grid; No. 6, ant.

- S.W. Primary—No. 6 and No. 2—Resistance: 35 ohms
- B.C. Primary—No. 1 and No. 2—Resistance: 24.1 ohms
- S.W. Secondary—No. 3 and No. 4—Resistance: 0.07 ohm
- B.C. Secondary—No. 3 and No. 5—Resistance: 29.9 ohms

**B.C. and S.W. Oscillator Coil** (Part No. P4566)

In a clockwise direction starting at the mounting lug on some side as single lug on other end, the connections are: No. 1, plate; No. 2, grid; No. 3, S.W. pad; No. 4, B.C. pad; No. 5, grid, No. 6, switch; other end, No. 7, B+.

- S.W. Primary—No. 1 and No. 6—Resistance: 8.0 ohm
- B.C. Primary—No. 7 and No. 6—Resistance: 3.8 ohms
- S.W. Secondary—No. 2 and No. 3—Resistance: 0.05 ohm
- B.C. Secondary—No. 5 and No. 4—Resistance: 4.5 ohms

**First I.F. Transformer** (Part No. P-4569)

- Primary—Blue white, plate; red white B+—Resistance: 12.1 ohms
- Secondary—White, grid; black white, AVC—Resistance: 24.9 ohms

**Second I.F. Transformer** (Part No. P-4420)

- Primary—Blue white, plate; red white B+—Resistance: 15.1 ohms
- Secondary—White, grid; black white, AVC—Resistance: 11.8 ohms

**Voltage Chart**

All voltages measured with a 1,000 ohm per volt meter on the 150 volt scale (except AC readings). Line voltage 117 volts AC. Volume control maximum and no signal tuned in.

**1A7GT Tube**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate (3) to ground</th>
<th>Screen (4) to ground</th>
<th>Grid (6) to ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>98</td>
<td>60</td>
<td>99</td>
</tr>
</tbody>
</table>

**1NSGT (1st I.F.) Tube**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate (3) to ground</th>
<th>Screen (4) to ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76</td>
<td>100</td>
</tr>
</tbody>
</table>

**1NSGT (2nd I.F.) Tube**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate (3) to ground</th>
<th>Screen (4) to ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>91</td>
<td>93</td>
</tr>
</tbody>
</table>

**30SGT Tube**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate (3) to ground</th>
<th>Screen (4) to ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>97</td>
<td>100</td>
</tr>
</tbody>
</table>

**352SGT Tube**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate (5) to ground</th>
<th>Cathode (8) to ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>117 (AC)</td>
<td>120</td>
</tr>
</tbody>
</table>
SERVICE NOTES

Voltages taken from the different points of the circuit to chassis are measured with volume control in maximum position, all tubes in their sockets and with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the voltage chart.

In order to prevent the signal from acting upon the AVC and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages should be measured with 117 volts AC input to receiver. Resistance and actual connections of coils and transformers and speaker data are given under Service Information.

To check for open by pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good until the defective unit is located.

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 screwdriver.
- Dummy antennas—1 mfd., 200 mmfd., 400 ohms.

Note “A”—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of intensity is obtained. Attenuate the signal from the signal generator to prevent the leveling-off action of the A.V.C. Do not bend variable condenser to correct tracking.

TUBE COMPLEMENT

The tube complement of this receiver consists of the following tubes:

1-Type 1A7GT—Pentagrid Converter (Composite first detector and oscillator).
1-Type 1N5GT—Sharp cut-off Pentode as 1st IF Amplifier (455 KC).
1-Type 1N5GT—Sharp cut-off Pentode as 2nd IF Amplifier (455 KC).
1-Type 1H5GT—Duplex Diode Triode Second Detector, AVC and First Audio.
1-Type 3Q5GT—Beam Power Amplifier.
1-Type 35Z5—Rectifier.

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.

ALIGNING INSTRUCTIONS

All of the adjustments have been very carefully set with signal generators at the factory and require no further adjustment, unless it becomes necessary to replace a coil or transformer, or if the adjustments have been tampered with in the factory. Under no circumstances attempt any adjustments without first making certain that adjustment is necessary and only alter voltages, tubes and condensers have been checked and found to be normal. To properly re-align this receiver, a signal generator as well as an output meter, must be used.
**Schematic Circuit Diagram**

### Specifications

- **Power Consumption**: 8.2 Amperes at 6.6 Volts
- **Power Output (6.6 Volts)**: 3.0 Watts Undistorted
- **Power Output (8.6 Volts)**: 5.5 Watts Maximum
- **Sensitivity**: 1 Microvolt at .5 Watt Output
- **Selectivity**: 38 KC Broad at 1000 Times Signal
- **Tuning Frequency Range**: 540 to 1600 KC
- **Intermediate Frequency**: 456 KC
- **Speaker**: 6" Electro-Dynamic
Adjusting Antenna Trimmer

After the antenna is connected, tune in a weak signal at approximately 1400 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna trimmer (C4) up or down until maximum output is obtained. See Fig. 3 for location of this trimmer.

Calibrating the Radio

To calibrate the radio, tune in a station of known frequency. Remove the dial lamp assembly from the back of the control unit. The calibration screw is at the bottom of the dial lamp tube. Insert a fine bladed screwdriver and turn this screw until the pointer is at the frequency of the station being received.

A short insulated screwdriver will be helpful.

Fig. 3—General Installation View

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to “Heat Up” for Several minutes.

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>SIGNAL GENERATOR</th>
<th>CONNECTION AT RADIO</th>
<th>DUMMY ANTENNA</th>
<th>IRON CORE SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
<th>(See Figs 3 and 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>455 KC</td>
<td>Control Grid (prong No. 8) 6SA7 1st Det. Tube</td>
<td>.05 mf.</td>
<td>Extreme Position</td>
<td>out of Coil</td>
<td>Ist. F. (C11) &amp; (C12)</td>
<td></td>
</tr>
<tr>
<td>1600 KC</td>
<td>Antenna Cable</td>
<td>See Note A</td>
<td></td>
<td>Extreme Position</td>
<td>out of Coil</td>
<td>2nd. F. (C15) &amp; (C16)</td>
</tr>
<tr>
<td>1400 KC ADJUSTMENT</td>
<td>Antenna Cable</td>
<td>See Note A</td>
<td>Tune to Max. Output with Tuning Knob</td>
<td>Int. (C5)</td>
<td>Ant. (C4)</td>
<td></td>
</tr>
</tbody>
</table>

Reassemble Radio—Install in Car—Connect Car Antenna to Radio.

Car Antenna Readjustment—Tune in weak signal near 1400 KC—Readjust Antenna Trimmer C4 for maximum output.

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

NOTE A—Insert the antenna cable plug in the antenna socket on the chassis. The total capacity of the antenna cable and dummy antenna should be 60 mfd. If the cable, for example, has a capacity of 30 mfd, use a 30 mfd. condenser for a dummy antenna. Connect the other end of the antenna cable through the dummy antenna capacity to the output of the signal generator.

CALIBRATION—To calibrate the radio, tune in a station of known frequency. At the back of the control unit is the calibration screw. Remove the dial lamp assembly. Insert a fine bladed screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received.

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*NOTE: Values with star (*) are operating voltages in circuits with high-series-resistance. These voltages will be lower when measured with a voltmeter drawing current through the circuit. Exact voltage may be measured with a vacuum-tube voltmeter if desired. The other values will not be affected by measuring with an ordinary high-resistance voltmeter. Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

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ALIGNMENT PROCEDURE

Cathode-Ray Alignment is the preferable method. Connections for the test circuit are shown in the chassis drawing. Turn the receiver volume control to maximum.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the black lead and keep the output as low as possible to avoid a-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc and 1,500 kc have been stamped in the plate on the front of the chassis, as shown in the accompanying drawing. These marks are used for reference during alignment.

Drum and Dial Indicator Adjustment.—As the first step in r-f alignment, check the position of the drum on the front shaft of the gang condenser. With the gang at maximum (full mesh) the drum set-screw should be pointing directly down as shown in the drawing. With the drum in this position, and the gang at maximum, move the dial indicator along the drive cord to coincide with the left-hand line as shown. The indicator is held to the drive cord by means of spring clips.

After completion of alignment, and after the chassis has been fastened in the cabinet, turn the drum and note whether the dial indicator is at the left-hand end mark on the dial; if it is not, loosen the drum set-screw (which is accessible through a slot in the bottom of the cabinet), turn the drum slightly so that the indicator is at this mark, and then tighten the set-screw.

After completion of alignment, seal the i-f core-adjustment screws with household cement.

The dial tuning (right hand) push-button must be pushed in for steps 1 to 3, inclusive.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 I-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>Quiet point between 550-750 kc</td>
<td>L7 and L8 (3rd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6A8-G grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>L5 and L6 (1st I-F Trans.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (blue) in series with 500 mmf.</td>
<td>1,500 kc</td>
<td>1,500 kc calibration mark</td>
<td>C6 (osc.)*</td>
</tr>
</tbody>
</table>

Follow "Adjustments for Electric Tuning"

* Use minimum capacity peak if two peaks can be obtained.

The oscillator section of the gang condenser has two trimmers, one on top, accessible through a hole in the chassis, and the other on bottom. It may be necessary to adjust both of these trimmers to secure a peak on 1,500 kc.

Push-Button Adjustments

Nos. 1, 2—Approximately 550-580 kc.
No. 3—Approximately 650-1,060 kc.
Nos. 4, 5—Approximately 860-1,500 kc.

Adjustments for Electric Tuning

These models have six push-buttons. The right-hand button connects the gang condenser for dial tuning. The other five buttons are for electric tuning of five different stations in the standard-broadcast range. The station buttons connect to separate magnetically-tuned oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool. Allow at least five minutes warm-up period before making adjustments. Use a regular antenna for the preliminary adjustments.

The procedure is as follows:
1. Make a list of the five desired stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning (right-hand) button, and manually tune in the first station on the list.
3. Push in station-button No. 1 (left-hand) and adjust No. 1 oscillator core (L12) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until the station it received.
4. Adjust No. 1 antenna trimmer (C20) for maximum output on this station.
5. Adjust for each of the remaining four stations in the same manner.

(Diagram shows Realty of the "calibration marks" shown in this drawing.

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WR-172 is a table model with a six inch speaker; WR-373Y is a console model with a twelve inch speaker. Both models have six tubes, are AC-DC operated, have six push buttons for tuning, a horizontal Slide Rule dial, and a Precision Eye for precise manual tuning.

**Power Output** (125 volts, 60 cycle supply)
- Undistorted: 0.8 watts
- Maximum: 1.4 watts

**Power Supply Ratings**
- A-C Rating: 105-125 volts, 50-60 cycles, 35 watts
- D-C Rating: 105-125 volts, direct current, 35 watts
- Loudspeaker
  - Type: Permanent Magnet Dynamic
  - Model WR-172: 6-inch
  - Model WR-373Y: 12-inch

**Voice Coil Impedance at 400 cycles**
- 3.5 ohms
- 4 ohms

---

**Phonograph Terminal Board**—A 3-terminal board is located on the rear of the chassis for connecting a phonograph pickup, or Record Player, into the audio amplifier of the receiver. The accompanying schematic shows connections for a high-impedance pickup with a switch for changing from radio to records. For low-impedance pickups, a suitable step-up transformer should be used to provide proper impedance matching, and should be connected between the pickup and radio-phono switch.

**Record Player Connections, Using a Double-Pole, Double-Throw Toggle Switch**

—

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Alignment Procedure

**WR-175 and WR-176**

**Output Meter Alignment.**—Connect the meter across the voice coil and turn the receiver volume control to maximum.

**Test-Oscillator.**—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd capacitor, and keep the output as low as possible.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test osc. to—</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna terminal</td>
<td>455 kc</td>
<td>&quot;A&quot; Band Quiet point between 500-750 kc</td>
<td>C3 and C4 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna terminal in series with 300 ohms</td>
<td>20 mc</td>
<td>&quot;C&quot; Band 20 mc calibration mark</td>
<td>C5 (osc.)*</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal in series with 300 mfd.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; Band 1,500 kc calibration mark</td>
<td>C7 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal in series with 200 mfd.</td>
<td>600 kc</td>
<td>&quot;A&quot; Band 600 kc calibration mark</td>
<td>C8 (osc.) Rock gang</td>
</tr>
<tr>
<td>5</td>
<td>Repeat step 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum peak if two can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

**Note:** Oscillator tracks above signal on both bands.

---

**Alignment Procedure**

**WR-172 and WR-372**

**Output Meter Alignment.**—Connect the meter across the voice coil and turn the receiver volume control to maximum.

**Test-Oscillator.**—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd capacitor, and keep the output as low as possible.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test osc. to—</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tuning condenser (osc.) in series with .01 mfd</td>
<td>455 kc</td>
<td>Quiet point at 1,600 kc end of dial</td>
<td>C1, C2, C3, C4 (1st and 2nd I-F transformers)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna terminal in series with 100 mfd.</td>
<td>1,600 kc</td>
<td>Full clockwise (out of mesh)</td>
<td>C5 (oscillator)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal in series with 100 mfd.</td>
<td>1,500 kc</td>
<td>Resonance on 1,500 kc signal</td>
<td>C6 (antenna)</td>
</tr>
</tbody>
</table>

**Record Player Connections, WR-272, WR-372**

Phonograph or Television Attachment.—A terminal board is provided on the rear of the chassis for connecting a record player or television attachment into the audio-amplifying circuit.

---

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Schematic Circuit Diagram Model WR-173L

Precautionary Lead Dress

1. Dress 1st I.F plate and grid leads against chassis and away from each other. Dress plate lead from 12SK7 close to chassis.

2. Dress electrolytic capacitor against rear apron.

Schematic Circuit Diagram Model WR-174L

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Precautionary Lead Dress
1. Dress 1-F plate and grid leads against chassis and away from each other. Dress plate lead from 12SK7 close to chassis.
2. Dress leads from terminal board on loop support away from loop.

Power Supply Ratings
105-125 volts, 50-60 cycles, 30 watts
105-125 volts, direct current, 10 watts

For other data see Index

BROADCAST BAND ALIGNMENT: Apply 465 kc to antenna lead. Adjust wavetrap trimmer 4 for minimum output.

Apply 1700 kc through 0.002 mf dummy; adjust trimmer 11 until signal is received. Adjust trimmer 3 (middle). Set dial and generator to 600 kc; adjust trimmer 12.

F-BAND ALIGNMENT: Wave switch to a-m position. Set dial and generator to 6000 kc; adjust trimmer 10 until signal is received. Adjust trimmer 2 (top) for maximum output.
Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push buttons by turning counter-clockwise about one turn from their tight position so they turn freely.

2. Check to be sure the link connection on back of chassis is in 'Radio' position (connected between terminals 2 and 3).

3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, return station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than ¼ turn after the screw begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

5. Insert the station marker tabs in the recesses above the push-buttons.

Frequency Range

- Standard Broadcast (A) .................................................. 540-1,560 kc
- Short Wave (C) ............................................................... 5.8-10 mc
- Intermediate Frequency .................................................. 455 kc

Power Supply Rating

- Rating A ................................................................. 105-125 volts, 60 cycles, 60 watts
- Rating B ................................................................. 105-125 volts, 25-60 cycles, 60 watts
Alignment Procedure

Before proceeding with alignment the following lead dress should be carefully checked.

1. Dress loop lead (3) away from tap lead (4) and chassis.
2. Dress AC power leads away from sockets.
3. Dress leads from band switch to trimmers away from each other and away from chassis.
4. Dress blue lead and two green leads from terminal board away from chassis and away from each other.
5. Dress green lead from volume control to rear terminal away from all parts and against chassis.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Output Meter Alignment—If this method is used, connect the meter across the voice coil, and tune the receiver volume control to maximum.

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a.v.c. action.

Calibration Scale on Indicator-Drive-Cord Drum—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

Pointer for Calibration Scale—Improves a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator 1/16 inch to the left of the mark at the extreme left (540 kc) end of the dial scale, with gang condenser fully meshes. The indicator has a spring clip for attachment to the cable.

**Receiver Dial Scales, and Corresponding 0-180° Calibration Scales**

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 24° on the calibration scale corresponds to 650 kc on "A" band. Read instructions under "Alignment Procedure."

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Westinghouse Electric Supply Co. Inc.

Model WR-272 Schematic Circuit Diagram

FOR OTHER DATA SEE INDEX

Model WR-272, Tube and Trimmer Locations

Tube Complement
Model WR-272
(1) RCA-6SA7 ............ First Detector-Oscillator
(2) RCA-6SK7 ............ I-F Amplifier
(3) RCA-6SQ7 ......... Second Det., A.V.C. and A-F Amplifier
(4) RCA-6FG6 ............ Power Output
(5) RCA-6U5 ............ Precision Eye
(6) RCA-5Y4G ............ Full Wave Rectifier

Dial Lamp ............ Mazda 51, 7.5 volts, 0.2 amp.
ELECTRICAL SPECIFICATIONS

Power Consumption ........................................ 115 Watts
Maximum Output ......................................... 14 Watts
Maximum Undistorted Output ............................ 10 Watts
Tuning Ranges ..............................................
  (Brown Band 535 - 1800 KC.
  (Green Band 1700 - 6000 KC.
  (Red Band 5600 - 18500 KC.
Line-Up Frequencies ................................. L.F. 465 KC., 1500 KC., 6000 KC., 12,000 KC.

FOR OTHER DATA, SEE INDEX

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WINDING RESISTANCE

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>SECONDARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
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<td>4</td>
<td>5</td>
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<td>6</td>
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<tr>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

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To properly align the circuits of the receiver, it is essential to use a high grade oscillator with good tone and output. The output of which can be continuously varied when the individual circuits are brought into alignment. A conventional output meter modified to connect the speaker voice coil terminals to indicate proper alignment. The sensitivity of the output meter must be sufficient to give a satisfactory reading with a low input signal.

A zero center micro-ammmeter with an approximate 0-30 scale is absolutely essential for the proper alignment of the discriminator circuit.

Before attempting to align the receiver, the circuit, position of alignment adjustment and chassis layout should be familiarized. The top and bottom views of the chassis are shown in Figures #1 and #2.

### ADJUSTMENT OF THE I.F. BOARD COIL 465 KC.

1. Refer to bottom view of chassis and connect a 50,000 ohm resistor between points #1 and #2 on I.F. coil #44.
2. Turn the receiver "Off" and to the position immediately after set is turned on. Set volume control on full. Set A.P.C. switch in "099" position. Set high fidelity control in a left hand or middle position. Set wave change switch to broadcast position.
3. Connect the output meter across the speaker voice coil.
4. Set the test oscillator to 605 KC. and adjust the oscillator trimmer #18. Two positions may be found which the signal can be heard. Use the one with the least capacity or with the trimmer further out.
5. Adjust the top adjustment screw on coil #44 for maximum output.

### ADJUSTMENT OF THE DISCRIMINATOR COIL

1. Connect the micro-amometer between the #4 terminal of the 466 discriminator resistor tube and ground on the oscillator circuit. Set the test oscillator to #465 KC. and adjust the oscillator trimmer #18. Two positions may be found which the signal can be heard. Use the one with the least capacity or with the trimmer further out.
2. With test signal applied to the I.F. tube increase the signal output of the oscillator.
3. Adjust the bottom screw applied to the discriminator coil #75 for maximum deflection of the micro-ammeter (either direction).
4. Adjust the top screw on the discriminator coil until a zero reading on the micro-ammeter is reached. To check this alignment, vary the I.F. signal slightly to each side of the 465 setting and the micro-amometer should show a deflection first on one side then the other of the zero point.

### ADJUSTMENT OF THE BROADCAST BAND

1. With the gang condenser completely in reset, check the position of the dial pointer which should be at the end horizontal line of the scale.
2. Set the test oscillator and dial pointer to 600 KC.
3. Adjust the oscillator trimmer #1.
4. Connect the test oscillator to the antenna terminal of the Receiver through a 2000 ohm condenser.
5. Adjust the R.F. and antenna trimmers #15 and #16 for maximum output.
6. Set the test oscillator and dial pointer to 600 KC.

### ADJUSTMENT OF THE GREEN BAND

1. Turn the wave change switch to the green band position.
2. Set the test oscillator and dial pointer at 5000 KC.
3. Adjust the oscillator trimmer #2.
4. Check sensitivity and calibration over the scale.

### ADJUSTMENT OF THE RED BAND

1. Turn the wave change switch to the red band position.
2. Set the test oscillator and dial pointer at 10,000 KC.
3. Adjust the oscillator trimmer #1. Two positions may be found which the signal can be heard. Use the one with the least capacity or with the trimmer further out.
4. Adjust the R.F. and antenna trimmers #17 and #18 for maximum output.
5. Check calibration and sensitivity over the scale.

### ADJUSTMENT OF FIRST SHORT-WAVE BAND

1. Turn the wave-change switch to the first short-wave position (470-6000 KC. scale).
2. Set the test oscillator and dial pointer to 2500 KC, and adjust the oscillator and antenna trimmers #7, #71 and #2.
3. Check sensitivity and calibration over the scale.

### ADJUSTMENT OF SECOND SHORT-WAVE BAND

1. Turn the wave-change switch to the second short-wave position (1070-14,500 KC. scale).
2. Set the test oscillator and dial pointer to 3500 KC, and adjust the oscillator trimmer #2.
3. Two positions may be found. Use the one with the least capacity, that is, with the trimmer screw furthest back. A 2000 ohm resistor should be inserted between oscillator terminal and the oscillator terminal of the receiver. This combination is the approximate equivalent of a short-wave antenna.

### MODEL WR - 342

This model is an eight-tube, alternating-current, threelband, superheterodyne receiver, designed to operate over the standard Broadcasting band, extending from 535 to 16,500 KC. The first short-wave band including frequencies between 1700 and 6000 KC., and the second short-wave band including frequencies between 2700 and 18,600 KC.

### LINE-UP CAPACITOR ADJUSTMENTS

To properly align the circuits of this receiver, it is essential to use a high grade modulated low grade oscillator. The output of which can be continuously varied and resistance from 1000 to 12,000 KO. 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 signals.

### ALIGNMENT OF I.F. (465 KC.)

1. Set the volume control to maximum position, the wave-change switch to the standard broadcast band and the dial pointer to approximately 600 KC.
2. Connect the output meter across the speaker voice coil terminals of the speaker.
3. Set the test oscillator to 465 KC. and adjust its output to produce a measurable signal. The test signal is applied to the grid of the first detector-oscillator tube through a .005 mfd. blocking condenser.
4. Adjust the trimmer capacitors #1B, #1C, #1E and #5S to maximum output.
5. Adjust the four I.F. trimmer condensers #1B, #1C, #1E and #5S to maximum output.

### ALIGNMENT OF DISCRIMINATOR BAND

1. Check the pointer setting to be sure that it is exactly horizontal when the tuning condenser is completely closed.
2. Set the oscillator and dial indicator to 1500 KC., and adjust the broadcast oscillator trimmer #40.
3. Set the test oscillator and dial pointer to 600 KC.
4. Adjust the oscillator lag condenser #70 for maximum output, at the same time rocking the gang condenser.
5. Reset test oscillator and gang condenser to 1600 KC., and readjust trimmer #60.
6. Connect the test oscillator to the antennas terminal through a .0002 mfd. condenser and adjust the R.F. and antenna trimmers #11 and #56.
7. Check sensitivity and calibration over the scale.

### NOTE: In adjusting the two short-wave bands, a .0002 mfd. condenser and a 500 ohm resistor in series should be inserted between antenna terminal and the side of the test oscillator. This combination is the approximate equivalent of a short-wave antenna.©John F. Rider, Publisher

www.americanradiohistory.com
DIAL LAMP: Mazda 44, 6.3 volts, 25 amp.

POWER SUPPLY RATINGS

<table>
<thead>
<tr>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR-274</td>
<td>WR-374</td>
</tr>
</tbody>
</table>

Rating A—105-125 volts, 50-60 cycles..... 65 watts 75 watts
Rating B—105-125 volts, 25-60 cycles..... 65 watts 75 watts
Rating C—100-130, 140-160, 195-250 volts, 50-60 cycles........ 65 watts 75 watts

Power Output (125 volts, 60 cycle supply)

Undistorted..... 2.5 watts 5.0 watts
Maximum........... 4.5 watts 5.5 watts

LOUDSPEAKER (Electrodynamic)..... 6-inch 12-inch

FOR ALIGNMENT, PUSH-BUTTON DATA, DRIVE CABLE, SEE INDEX.

Speaker Connections: Model WR-374

TUBE AND TRIMMER LOCATION, WR-374
### Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-buttons by turning counter-clockwise about one turn from their tight position so they turn freely.
2. Check to be sure the Phon-Radio switch is in “Radio” position.
3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.
4. Proceed in a similar manner for the remainder of the push-buttons.
5. Insert the station marker tabs in the recesses above the push-buttons.

---

* Use minimum capacity peak if two can be obtained. Check to determine that C1 has been adjusted to correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C3 has been adjusted to correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

Note.—Oscillator tracks above signal on all bands.

---

Loudspeaker.—To center the loudspeaker voice coil, first remove the front dust cover, then loosen the screws holding the spider assembly. Insert three narrow feelers into the air gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

Phonograph or Television Attachment.—A terminal board is provided on the rear of the chassis for connecting a record player or Television attachment into the audio-amplifying circuit. The cable from the record player should be connected to terminals 1 and 2, the cable from the Television attachment going to terminals 2 and 3. Terminal 2 is chassis ground and the shield or ground lead from either of the attachments should be connected to this terminal.

Precautionary Lead Dress.—

On Model WR-274, the lead from 6S5 plate to 6F6G should be dressed close to chassis.

Power cord should be dressed away from power transformer.
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 37.5° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."

**Adjustments for Push-Button Tuning**

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-buttons by turning counter-clockwise about one turn from their tight position so they turn freely.

2. Check to be sure the Phono-Radio switch is in "Radio" position.

3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

5. Insert the station marker tabs in the recesses above the push-buttons.

**Alignment Procedure**

Before proceeding with alignment the following lead dress should be carefully checked:

1. Dress AC switch leads away from tube sockets.
2. Do not twist loop leads together or around each other.
3. Spacing between leads from "C" band loop to chassis is important—see alignment step "G" below.
4. "High side" leads from loop sockets, range switch, oscillator coil, and trimmers must be fastened tightly to chassis and each other.
5. Dress the 470 m.m.f. and 36 m.m.f. condensers going to the grid and grid of the 6SA7 tube away from each other.

**Calibration Scale on Indicator-Drive-Cord Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 120° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

**Pointers for Calibration Scale.**—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

**Dial-Indicator Adjustment.**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator set 1/8 inch to the left of the 340 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.
Push Button Adjustments

Calibration Scale on Indicator-Drive Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in radio alignment, check the position of the drum. The "0" mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the accompanying drawing which shows the dial with 0-140° calibration scales drawn at top and bottom.

For Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cord with indicator at the 540 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Precautionary Lead Dress.—
1. Dress 2nd 1-18 leads close to chassis.
2. Dress leads from volume control and tone switch away from filaments, diode and power leads.
3. Dress 0.05 mil, volume control condenser away from electrolytic.

Arrangement of Drive Cord for Condenser and Dial Indicator

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to:</th>
<th>Tune test osc. to:</th>
<th>Range switch</th>
<th>Turn radio dial to:</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 1-F grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot;</td>
<td>L3 and L4</td>
<td>L3 and L4 (2nd 1-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 1st Detector in series with .01 mfd.</td>
<td>100 kc</td>
<td>&quot;B&quot;</td>
<td>L1 and L2</td>
<td>L1 and L2 (1st 1-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal &quot;A&quot; in series with 47 mmf.</td>
<td>15.5 mc</td>
<td>&quot;C&quot;</td>
<td>C1 (ant.)</td>
<td>C1 (ant.) (osc.)*</td>
</tr>
<tr>
<td>4</td>
<td>Ant. section of gang condenser in series with 300 ohms</td>
<td>2.44 mc</td>
<td>&quot;D&quot;</td>
<td>C4 (osc.)*</td>
<td>C4 (osc.)*</td>
</tr>
<tr>
<td>5</td>
<td>1,500 kc</td>
<td>100°</td>
<td>&quot;E&quot;</td>
<td>C5 (osc.)*</td>
<td>C5 (osc.)*</td>
</tr>
<tr>
<td>6</td>
<td>600 kc</td>
<td>30°</td>
<td>&quot;F&quot;</td>
<td>L5 (osc.)</td>
<td>L5 (osc.) (Rock gang)</td>
</tr>
</tbody>
</table>

Fasten chassis in cabinet. Connect loop, see that link is closed on the antenna board, attach dial indicator to drive cord, with indicator at 540 kc mark and gang at maximum capacity.

Radiation loop consisting of two turns of wire 18 in. in diameter located 4 to 6 feet from receiver

Repeat steps 8 and 9

*Use minimum capacity if two peaks can be obtained.

Note: Oscillator tracks above signal on all bands.

Calibration Scale

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale in the same point on the top calibration scale. For example, 30° on the calibration scale corresponds to 600 kc on the "A" band. Read instructions under "Alignment Procedure.”
Models WR-473, WR-474, WR-474L

Automatic Record Changer

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled and balanced.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to “Reject” and releasing the index lever by hand. Six turntable revolutions are required for one change cycle.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

Adjustments

F. & G. Record Separating Knife.—The upper plate (knife) “F” on each of the record posts serves to separate the lower record from the stack of records to support the remaining records during the change cycle. It is essential that the space between the knife and the record be maintained for the 10 inch record “27” to be accurately maintained. The spacing for the 10 inch record is nominally .058 inch, and for the 12 inch record .075 inch.

To adjust, rotate the knife to the point of minimum contact from the record shell and turn screw and locknut “F” to give .055—.061 inch separation. Screw “G” must not be de-pressed during this adjustment. After setting screw “F” and screw “G” so that when its tip is depressed flush with top of record shell, the vertical spacing between the knife, in its lowest rotational position, and the shell is about .018 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both record posts are rotated simultaneously by a gear and 10 inch record is connected to the main lever “16,” and it is necessary that adjustment be such that the record is released from both shelves at the same instant. To adjust, place the record in the right turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws “H” and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least .3/16 inch from record edge. Tighten the blunt nose screw “H” until mechanism engages cycle several times to check action, then tighten cone pointed screw “H.”

Record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out of cycle, the front lower edge of the pickup head should be of the same distance above surface of motor board. The side which is adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop “H” in relation to the main lever “15” must be the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam sooner or later, respectively, so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petroleum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

Apply a few drops of light machine oil to the motor spindle bearing and hole adjacent to the spindle bearing. The oil hole has a screw plug.

Do not allow oil or grease to come in contact with, rubber mounting, tone arm base, rubber bumper, or rubber spindle cap.

Miscellaneous Service Hints

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable the adjustment in most cases:

1. For any irregularity of operation, the adjustment of the main lever “15” should be checked first as in “A.”

2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments “D” and “E.”

3. Needle does not land properly on 12 inch record but correct on 10 inch—Be sure tone arm adjustments “J” are correct.

4. Failure to trip at end of record—Increase clutch “G” friction by means of screw “B.” Also, see that levers “7” and “12” are free to move on pivot towards clutch stud “K.”

5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable perch to adjustment “C.”

6. Needle does not track after landing—Friction clutch “G” adjustment “B” may be too tight. Bind in tone arm vertical bearing; levers “7” and “12” foaled; or pickup output cable twisted.

7. Cycle commences before record is complete—Record is defective, or adjustment “B” of friction clutch “5” is too tight.

8. Wow in record reproduction—Record is defective; or instrument is not being operated at normal room temperature (65°F).

9. Record knives strike edge of records—Record warped; record edges rough; or knife adjustments “F” and “G” are incorrect.

10. Record not released properly—Adjust record shelf assemblies in reversed position on opposite side. Move tone arm until release coincides with points “B” and “E.”

11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring “34.”

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### Automatic Record Changer

**Top View of Automatic Record Changer**

![Top View Diagram](image1)

**Details of Record Shelf Posts, and Locating Lever Assemblies**

The crystal pickup is sealed in a metal case as protection against extreme changes of climate. If failure occurs, do not attempt to repair the unit, but install a new crystal unit.

The phonograph motor is a self-starting constant-speed induction type.

Motor Lubrication—Apply a few drops of light machine oil to the spindle bearing and oil hole every six months. The oil hole is located in the motor casting, adjacent to the spindle bearing, and on Model WR 474 is covered with a screw plug.

The automatic stop (Model WR 473) should be adjusted so that the lever will snap to the “off” position when the pickup needle is 1 1/2 inches from the center line of the spindle.

**Motorboard and Controls WR-474**

![Motorboard Diagram](image2)

**Controls, WR-473**

![Controls Diagram](image3)

**Turntable Assembly (All Models)**

![Turntable Diagram](image4)

**Adjustments for Push-Button Tuning**

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-buttons by turning counter-clockwise about one turn from their tight position so they turn freely.

2. Check to be sure the Phono-Radio switch is in “Radio” position.

3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

5. Insert the station marker tabs in the recesses above the push-buttons.

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Frequency Range
Standard Broadcast (A) .................. 540-1,560 kc
Short-Wave (C) .................. 5.8-18 mc
Intermediate Frequency .................. 455 kc

Power Supply Rating
Rating A .................. 105-125 volts, 60 cycle, 105 watts

Power Output
Undistorted .................. 5 watts
Maximum .................. 6 watts

 Loudspeaker (RL-70K4) .................. 12-inch electrodynamic
 V.C. Impedance .................. 2.2 ohms at 400 cycles

For other data, see Index

Tube and Trimmer Locations

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Alignment Procedure

Before proceeding with alignment the following lead dress should be carefully checked:

1. Dress AC switch leads away from 6SQ7 tube socket.
2. Do not twist loop leads together or around each other. Spacing between leads from “C” band loop to chassis is important—see alignment step “5” below.
3. “High side” leads from loop sockets, range switch, oscillator coil, and trimmers must be dressed away from chassis and each other.
4. Dress the two 100 muf. condensers going to the grid and osc. grid of the 6SA7 tube away from each other.
5. Dress the .01 mfd. 6F6-G grid condenser away from power switch.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematics.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, keep the oscillator output as low as possible to avoid a-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore, calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

Dial Indicator and Drive Mechanism

Refer to “Alignment Procedure” for explanation of the “calibration marks” shown in this drawing.

Speaker and Cable Connections

© John F. Rider, Publisher
Frequency Range
- Standard Broadcast (A) ........................................ 540-1,560 kc
- Short-Wave (C) .................................................. 5.8-18 mc
- Intermediate Frequency ...................................... 455 kc

Power Output
- Undistorted ....................................................... 5 watts
- Maximum ......................................................... 6 watts

Loudspeaker (RL-70K1) ......................... 12-inch electrodynamic
V.C. Impedance ............................................... 2.2 ohms at 400 cycles

For other data, see Index

Back of Chassis

Tube and Trimmer Locations

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POWER CONSUMPTION 110 WATTS  FOR OTHER DATA SEE INDEX

Schematic Circuit Diagram—Model WR-482

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Alignment Procedure

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band</td>
<td>L3 and L4 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SAT grid in series with .01 mfd.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band</td>
<td>L1 and L2 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal (open link) in series with 200 mfd.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band</td>
<td>C1 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>Ant. terminal (open link) in series with 47 mfd.</td>
<td>600 kc</td>
<td>&quot;A&quot; band</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>5</td>
<td>Ant. terminal (open link) in series with 47 mfd.</td>
<td>15 mc</td>
<td>&quot;C&quot; band</td>
<td>C3 (osc.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained.
The oscillator tracks above the signal frequency on all bands.
Note: C2 omitted on some production—adjust grid lead (65A7) for resonance.

<table>
<thead>
<tr>
<th>Tube and Trimmer Locations—Model WR-482</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2 ANT. 1500KC</td>
</tr>
<tr>
<td>L1 BOTTOM</td>
</tr>
<tr>
<td>L2 TOP</td>
</tr>
<tr>
<td>C3</td>
</tr>
<tr>
<td>C4</td>
</tr>
</tbody>
</table>

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button screw with a small screwdriver.
2. Set the radio-phonograph switch to "radio" position and the range switch to "Broadcast" position. Now accurately tune in the station for which the first button is to be set.
3. Press in push-button and No. 1 as far as it will go without undue pressure, hold in, return station with manual control if necessary for best reception, and then carefully tighten up the screw. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.
4. Replace the push-button on its shaft.
5. Proceed in a similar manner for the remainder of the push-buttons.
6. Moisten and insert the station marker tabs in the recesses in the push-buttons.

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Alignment Procedure

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-oscillator to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1N5-G grid cap, in series with .001 mfd.</td>
<td>455 kc</td>
<td>Quiet point</td>
<td>L5 and L6 (2nd I-F transformer)</td>
</tr>
<tr>
<td>2</td>
<td>1A7-G grid cap, in series with .001 mfd.</td>
<td>455 kc</td>
<td></td>
<td>L3 and L4 (1st I-F transformer)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal, in series with .002 mfd.</td>
<td>1500 kc</td>
<td>1500 kc*</td>
<td>C17 (osc.) R1 Rock (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal, in series with .002 mfd.</td>
<td>600 kc</td>
<td>600 kc*</td>
<td>L2 (osc.) Rock in</td>
</tr>
<tr>
<td>5</td>
<td>Low side of test-osc. to &quot;G&quot; term.</td>
<td>600 kc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Repeat steps 4 and 5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Use bottom of "1" in "1500" for 1500 kc calibration point, and use center of the last "0" in "600" for 600 kc calibration point.

Precautionary Lead Dress.
1. Dress speaker leads down to chassis.
2. The green lead from the loop to the antenna section of the gang should be dressed between the output and detector tube shields and pulled toward the far corner of the box by means of the rubber band.
3. The spiral shield on the 1st A.F. grid lead should be brought as close as possible to the grid cap.
4. Leads to the high side and tap of the volume control should be dressed down to the chassis and away from the output tube plate lead.

Antenna.—An antenna and ground may be connected to "A" and "G" at bottom of cabinet. If total length of antenna and lead-in is more than 150 feet, connect a 300 mmd capacitor in series with lead-in.

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Replacing Lid or Front Panel:

When the molded lid (which contains the loop-antenna) or the chrome front panel requires replacement, it is not necessary to replace the complete assembly of lid and front panel, as either one may be replaced separately in a few minutes by taking out the hinge pins as described below.

1. **Lid.**
   - **PART No.:** 37808 Lid and antenna (type without lid support)
   - **PART No.:** 37812 Chrome front panel (type without lid support)
   - **PART No.:** 37809 Lid and antenna (type with lid support)
   - **PART No.:** 37813 Front chrome panel (type with lid support)
   - **PART No.:** 37857 Two hinge pins and two hinge springs

Installation Instructions:

First remove the three self-tapping screws that hold the chassis in the center case, and remove the case. Un solder the leads from the loop base.

(a) With lid closed, cut hinge pins at point "A" with sharp cutters.
(b) Start removal of pin sections as shown, using long-nose piers.
(c) Grasp end of pin section with long-nose piers and pull out of hinge.
(d) Install new lid, or new front panel, using the replacement hinge pins and springs that are provided with replacement lids and panels. Arrange springs as shown. Apply a small amount of "Thermoplastic Cement" (G.E. 5V 1507) near outer end of each pin to assure tight and permanent fit.

Loose Control Knobs:

If for any reason either the tuning or volume control knob should become loose on its shaft, it may be rigidly mounted in the following manner:

(a) Remove the loose control knob from its shaft and scrape off the old cement from both shaft and control knob.
(b) Apply a generous even coating of a good cement to the shaft region which is to engage the knob. G.E. Thermoplastic cement, ZV-5007, is excellent for this purpose; it is a green fluid, easily thinned with acetone if necessary.
(c) Allow the cement on the shaft to air-dry, to evaporate any acetone present.
(d) Apply a small amount of heat to the shaft, sufficient to soften the cement.
(e) Mount knob on shaft while cement is still soft, and allow a few minutes for drying.
**Alignment Procedure**

| Steps | Connect high side of test oscillator to— | Tune test osc. to— | Turn radio dial to— | Adjust the following for maximum peak output— |
|-------|----------------------------------------|--------------------|-------------------|--------------------------------|---|
| 1     | 6SK7 1-F grid in series with 0.01 mfd. | 455 kc             | "A" band          | L-21 and L-22                  |
| 2     | 6SK7 grid in series with 0.01 mfd.    |                    | Quiet Point       | L-10 and L-20                  |
| 3     | Antenna terminal in series with 300 ohms | 15.6 mc           | (140) C band      | C-24 (Osc.)*                   |
| 4     | Antenna terminal in series with 300 ohms | 2.44 mc           | (91.5) B band     | C-16 (Det.)                    |
| 5     | Antenna terminal in series with 200 mm | 600 kc             |                   | C-27 (Osc.)                    |
| 6     | Antenna terminal in series with 200 mm | 1,500 kc           |                   | C-28 (Det.)                    |
| 7     | Repeat step 5, then 6                 |                    |                   | C-11 (Det.)                    |
| 8     | Antenna terminal in series with 300 ohms | 15.6 mc           | (149) C band      | C-1 (R-F)                      |

**Loop Connections and Trimmers**

**Push Button Adjustment**

The push buttons connect to separate magnetic core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool. Allow at least five minutes warm-up period before making adjustments.

In the event that the receiver is to be used with an external antenna, it is recommended that a 300 ohm. 1 watt resistors be used as the antenna terminals for the desired stations. Use an insulated screwdriver or alignment tool. Allow at least five minutes warm-up period before making adjustments.

**Cathode Ray Alignment** is the preferable method. Connections for the cathode are shown in the chassis drawings.

**Test Oscillator** — For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output as low as possible to avoid a voice action.

**Calibration for Alignment** — The proper dial calibration for alignment purposes may be set up in two ways:

1. The dial may be removed from the cabinet by sliding it out the two, spring clips which clamp it in its mounting position. The bobbin plates should be then turned into full motion, the pointer adjusted to the scratch at the left end of the dial backing plate, and the dial slipped into the receiver so that its extreme left calibration mark coincides with the pointer. The dial may be held in place with scotch tape. When alignment is finished, the scale should be replaced including the other light shields which are held under the nuts at the clamp scale.

2. A calibration scale is attached to the tuning dial. The correct setting of the gains, in degrees, for each alignment frequency is given in the alignment chart. Check the position of the dial, making sure that the 0 degree mark for the desired stations is horizontal with the arm in full motion.

**Pointer for Calibration Scale** — If method (2) is used, improve a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0 degree mark on the calibration scale when the plates are fully meshed.

*Use minimum capacity peak if two can be obtained. Check to determine that C-24 has been adjusted to correct peak by turning the control to approximately 1420 mc with no speaker signal should be received.

**Note** — Oscillator tracks above signal on all bands.

To reduce sensitivity during RF Alignment connect a 5,000 ohm, 1 watt resistor across secondary of 1 st IF transformer.

**FREQUENCY RANGES**

| Broadcast | 540-1,600 kc   |
| Short Wave | 5.6-18.0 mc    |
| Intermediates | 455 kc         |

**Power Output Rating**

Undistorted: 5.0 watts
Maximum: 5.5 watts

**Loadbreaker (RL-78-A5)**

Type: 6-inch Electrodynamic
V.C. Impedance: 3.0 ohms at 400 cycles

**Power Supply Ratings**

105-125 volts, 60-60 cycles, 60 watts
105-125 volts, 20-60 cycles, 50 watts
ALIGNMENT MODEL 6J4

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>SIGNAL GENERATOR CONNECTION</th>
<th>DIAL FREQUENCY POSITION</th>
<th>TRIGGER MODELS</th>
<th>OUTPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove Grid Clip from 6A7</td>
<td>Control Grid of 6A7 175 K.C.</td>
<td>1400 K.C. Broadcast (Left)</td>
<td>1 Max.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connect Grid clip to 6A7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ant. &amp; Ground Posts</td>
<td>1400 K.C.</td>
<td>1400 K.C.</td>
<td>5 Max.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.0 K.C. 4.0 K.C.</td>
<td>Police (Right)</td>
<td>8 Max.</td>
<td></td>
</tr>
</tbody>
</table>

Volume Control in "Full-On" position at all times.

Note 1: Signal across primary of output transformer to be maintained at approximately 10 volts by adjusting signal generator.

ALIGNMENT MODEL 6P6

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>SIGNAL GENERATOR CONNECTION</th>
<th>DIAL FREQUENCY POSITION</th>
<th>TRIGGER MODELS</th>
<th>OUTPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove Grid Clip from 616</td>
<td>Control Grid of 616 175 K.C.</td>
<td>1400 K.C.</td>
<td>1 Max.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ant. &amp; Ground Posts</td>
<td>1400 K.C.</td>
<td>1400 K.C.</td>
<td>5 Max.</td>
</tr>
<tr>
<td></td>
<td>600 K.C. 600 K.C.</td>
<td>Police (Center)</td>
<td>8 Max.</td>
<td></td>
</tr>
</tbody>
</table>

Volume Control in "Full-On" position at all times.

Note 1: Signal across primary of output transformer to be maintained at approximately 10 volts by adjusting signal generator.

Note 2: Due to forced oscillator plate, set should track. If not, bend slotted plates at this point and recheck at 1400 K.C.

ALIGNMENT MODELS 6J4, 6J5, 6J4, 6S12, 7C6, 7CB6, 7D6

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>SIGNAL GENERATOR CONNECTION</th>
<th>DIAL FREQUENCY POSITION</th>
<th>TRIGGER MODELS</th>
<th>OUTPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove Grid Clip from 6A7</td>
<td>Control Grid of 6A7 115 K.C.</td>
<td>214.5 Meters Broadcast (Center)</td>
<td>1 Max.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ant. &amp; Chassis (Right)</td>
<td>1400 K.C.</td>
<td>1400 K.C.</td>
<td>5 Max.</td>
</tr>
<tr>
<td></td>
<td>600 K.C. 600 K.C.</td>
<td>Police (Center)</td>
<td>8 Max.</td>
<td></td>
</tr>
</tbody>
</table>

Volume Control in "Full-On" position at all times.

Note 1: Signal across primary of output transformer to be maintained at approximately 10 volts by adjusting signal generator.

Note 2: Repeat above procedure and critically trim each adjustment to assure perfect alignment.

Note 3: Check alignment at this point.

Note 4: Investigate scale reading and sensitivity at this point and bend slotted rotor plates if necessary.
GANGING INSTRUCTIONS

An OUTPUT METER or other indicating device should be used for accuracy in making ganging adjustments.
If an output meter is not available, the magic eye (G65) may be used as an output indicator as follows:
(a) Depress push-button No. 4
   "To Record Radio"
(b) Disconnect cutting-head from chassis.
(c) Adjust volume control to near maximum.

Connect signal generator to control grid of the G68 tube.

** SIGNAL GENERATOR **

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>DIAL POSITION</th>
<th>WAVE BAND SWITCH POSITION</th>
<th>TRIMMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>456 K.C.</td>
<td>1500 K.C.</td>
<td>Broadcast</td>
<td></td>
</tr>
<tr>
<td>** 600 K.C.</td>
<td>** 600 K.C.</td>
<td>Broadcast</td>
<td></td>
</tr>
<tr>
<td>** 1400 K.C.</td>
<td>** 1400 K.C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** 18-16 K.C.</td>
<td>** 18-16 K.C.</td>
<td>Short Wave</td>
<td></td>
</tr>
<tr>
<td>** Not used **</td>
<td>** Not used **</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The entire alignment procedure should be repeated to obtain greatest accuracy in the adjustment of the trimming condensers.
* Adjust C-35 trimmer for MINIMUM signal.
** Connect antenna to receiver, and adjust dial so that no station is received. Advance volume control until a fair volume of noise is received. Adjust trimmer for greatest noise.

<table>
<thead>
<tr>
<th>TUBE</th>
<th>POSITION</th>
<th>PLATE</th>
<th>SCREEN</th>
<th>CATHODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G68</td>
<td>1st. Det.</td>
<td>250</td>
<td>75</td>
<td>.2</td>
</tr>
<tr>
<td>** G67</td>
<td>** I.P.</td>
<td>** 230</td>
<td>** 75</td>
<td>** 3.0</td>
</tr>
<tr>
<td>** G27</td>
<td>** 2nd. Det.</td>
<td>90+</td>
<td>** 1.6</td>
<td></td>
</tr>
<tr>
<td>** G47</td>
<td>** Mike Amp</td>
<td>45 to 65*</td>
<td>** 30</td>
<td>** .8</td>
</tr>
<tr>
<td>** G85</td>
<td>** Output</td>
<td>** 215</td>
<td>** 235</td>
<td>** 13.5</td>
</tr>
</tbody>
</table>

VOLTAGE

Line Voltage-----------118
P5 or C26 to GND.-------550
P1 or C77 to GND.-------240
P5 to P1 (sp' in field)----110
C30 to GND.-----------110

NOTE: This is a typical voltage analysis made by use of standard 1000 ohm per volt voltmeter, using the 300 volt scale for plate and screen voltage readings.

- Set actual voltages due to large values of resistance in circuit between supply voltage and point of measurement. These voltage values may vary considerably, depending upon the resistance of voltmeter used.

- The above voltages should be considered as being approximate, as different in line voltage, type of testing equipment used, normal tolerance limits of component parts in the chassis, all have an effect upon these readings. A tolerance of 10% is usually considered permissible.

Aerial disconnected.
All voltage measurements made against ground (chassis) except as noted.
Motor Volume TONE SW-BC. TUNING

R34
R8
R35
R7
R36
C16
T1

Line Voltage---115 C28 to GND---250 C29 to GND---250 C30 to GND---150
VOLTAGE DATA C29 to GND---350
Speaker Field---110

Aerial disconnected.
Volume control at minimum.
All voltage measurements made against ground (chassis) except as noted.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>6T7</td>
<td>R.F.</td>
<td>250</td>
<td>83</td>
<td>2.8</td>
</tr>
<tr>
<td>6A8</td>
<td>1st. Det.</td>
<td>250</td>
<td>83</td>
<td>2.8</td>
</tr>
<tr>
<td>6E7</td>
<td>1st. Det.</td>
<td>250</td>
<td>83</td>
<td>3.3</td>
</tr>
<tr>
<td>6K7</td>
<td>2nd. Det.</td>
<td>60+</td>
<td>--</td>
<td>1.5</td>
</tr>
<tr>
<td>6U7</td>
<td>Inverter</td>
<td>85+</td>
<td>--</td>
<td>1.5</td>
</tr>
<tr>
<td>6L7</td>
<td>Mike Amp.</td>
<td>40 to 65+</td>
<td>35+</td>
<td>1.1</td>
</tr>
<tr>
<td>6K6</td>
<td>Output</td>
<td>245</td>
<td>250</td>
<td>17.0</td>
</tr>
</tbody>
</table>

NOTES: This is a typical voltage analysis made by use of standard
1000 ohm per volt voltmeter, using the 500 volt scale for plate and
screen voltage readouts.
- Not actual voltages due to large values of resistance in circuit
  between supply voltage and point of measurement. These voltage
  values may vary considerably, depending upon the resistance of
  voltmeter used.

The above voltages should be considered as being approximate.
As difference in line voltage, type of testing equipment used, normal
tolerance limits of component parts in the chassis, all have an
effect upon these readings. A tolerance of ±10% is usually consid-
ered permissible.


CONNECTION FOR HIGH SET LEVEL

In the operation of Recordio Models A-90, A-91, A-92,
A-93, A-94 and A-101, bearing serial numbers prior to 86,
628000, if the residual hum, noted with the volume control
turned to minimum position, appears to be abnormally high
or objectionable, a correction may be effected by a rear-
angement of the ground connections to the volume control
and cathode by-pass condenser C18.

These connections should be changed as follows:

1. Disconnect the spiral shield connecting the volume
   control leads, from the volume control terminal and
   solder the shielding directly to the volume control
   switch cover.

2. Remove the wire placed through the rubber grommet in
   the vertical shield pin, which connects the ground
   terminal of the volume control to chassis.

3. Run a wire from the ground terminal of the volume con-
   tral through the fibre grommet in the chassis base di-
   rectly below the volume control, to the ground lug lo-
   cated near the electrolytic condenser in the approxi-
   mate center of the underside of the chassis. (Note:
   89S and 18S are already connected to this lug.) Do not
   permit the volume control ground terminal to contact
   the chassis through any other medium.

4. Move the ground connection of the 6K7 cathode by-pass
   condenser, C18, from its present location on the as-
   sembly lug of the electrolytic condenser, to the chas-
   sis ground lug to which the volume control has been
   grounded.
This receiver is designed for operation on 110-120 volts AC or DC.

**MODELS**

- A-51
- A-89
- A-91
- A-92
- A-93
- A-94

**PARTS LIST**

<table>
<thead>
<tr>
<th>Code</th>
<th>Part No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>20-2510</td>
<td>115 Ohm Resist. in Power Cord</td>
</tr>
<tr>
<td>R2</td>
<td>32-2016</td>
<td>26 Ohm 234 Watt Resistor</td>
</tr>
<tr>
<td>R3</td>
<td>32-2017</td>
<td>25,000 Ohm Vol. Cont. &amp; Switch</td>
</tr>
<tr>
<td>R4</td>
<td>32-2018</td>
<td>25,000 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>R5</td>
<td>32-2019</td>
<td>1000 Ohm 12 Watt Resistor</td>
</tr>
<tr>
<td>R6</td>
<td>32-2020</td>
<td>25 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>R7</td>
<td>32-2021</td>
<td>25 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>R8</td>
<td>32-2022</td>
<td>300,000 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>R9</td>
<td>32-2023</td>
<td>100,000 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>R10</td>
<td>32-2024</td>
<td>150 Ohm 24 Watt Resistor</td>
</tr>
<tr>
<td>C1</td>
<td>17-2025</td>
<td>1002 Mfd. 600 V. Paper Cond.</td>
</tr>
</tbody>
</table>

**TUBE CIRCUIT**

<table>
<thead>
<tr>
<th>TUBE</th>
<th>CIRCUIT</th>
<th>PLATE TO GROUND</th>
<th>SCREEN TO GROUND</th>
<th>CATHODE TO GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7</td>
<td>R. F. Amplifier</td>
<td>108</td>
<td>108</td>
<td>2.8</td>
</tr>
<tr>
<td>6J7</td>
<td>Detector</td>
<td>24</td>
<td>.2</td>
<td>0</td>
</tr>
<tr>
<td>25L6</td>
<td>Power Output</td>
<td>100</td>
<td>108</td>
<td>6.2</td>
</tr>
</tbody>
</table>

**Speaker Field Drop 22**

**B + Voltage** 108

**Line Voltage** Was 120 V. 60 cycle

**Meter 1000 ohms per volt**
An OUTPUT METER or other indicating device should be used for accuracy in making ganging adjustments. If an output meter is not available, the magic eye (605) may be used as an output indicator as follows:

(a) Degress push-button No. 6 "To Record Radio".
(b) Disconnect cutting head from chassis.
(c) Adjust volume control to near maximum.
(d) Connect signal generator to control grid of 6AS tubes. Make connection to side of middle section, (C8), of condenser gang. (Fig. 11)

As resonance is approached by adjustment of the trimmers, the signal generator attenuator should be adjusted for a minimum signal that will provide a low reading on the output indicator.

It is advisable to repeat the entire alignment procedure to correct the slight effect one adjustment may have upon the other.

* Adjust C-6 for KINOSW signal.
** First note the position of the dial pointer with the condenser gang turned to full maximum capacity. The left edge of the pointer should be slightly to the right of the right end dial graduation.

In adjusting the L.F. P.d. (C-6) rock the condenser gang back and forth across the 600 K.C. signal and note that maximum output meter reading occurs with the 600 K.C. dial graduation. If the dial reading is other than 600 K.C., reset the dial pointer on the dial cord, to read 600 K.C. at maximum output meter indication.

** Connect antenna to receiver, and adjust dial so that no station is received. Advance volume control until a fair volume of noise is received. Adjust trimmer C-6 for greatest noise.

---

**TURNTABLE SPEED VARIATION**

In order to satisfactorily correct any variation in the speed of the turntable, which is usually evidenced by "wow" or a waver in the pitch of musical tones during the playing of records or home recordings, it is first necessary to determine the kind of speed variation encountered.

As the various types of turntable speed variation usually fall under two distinct classifications—INTERMITTENT VARIATION and VARIATION SYNCHRONIZED WITH TURNTABLE ROTATION—the matter of diagnosis in any particular case of trouble is simplified.

**Intermittent Variation**

It is important that the rubber rimmer intermediate drive wheels be kept clean and free from oil, to avoid slipping or irregular operation of the wheels. The drive wheel bearings are of Oilite bronze and require no oiling to prevent wear; however, one drop of light lubricating oil may be applied to each drive wheel bearing if desired to "quiet" their operation.

All record sleeves and other dirt particles that may have gotten under the turntable should be removed, as such foreign material may seriously interfere with the smooth operation of the mechanism.

If the drive wheels appear to slip although the rubber rims and the turntable rim are free from oil, the tension of the drive wheel tension spring should be increased.

The round movable disc on which the dual drive wheel assembly is mounted, should be adjusted to a degree of tightness that affords minimum looseness of the assembly, at the same time maintaining, entire freedom of movement, of the drive wheel assembly. The drive wheel assembly is allowed to tip while in motion, resulting in the drive wheels rotating out of the horizontal plane, the rim of the top wheel may ride high and intermittently touch the undersides of the wheels.

The wire leads connected to the cutting head inside the recording arm should not be permitted to drag on the record or turntable, as this produces an intermittent braking effect causing the turntable to be slowed down, or to rotate with varying speed. Intermittent variation in turntable speed may also be due to a binding of the lateral feed screw bearing. An adjustment is provided on the rear housing of the feed screw assembly, to take up and play in the feed screw, only a very slight amount of end play should be perceptible, however, it should be determined that this end play exists throughout the complete rotation of the feed screw.

CONTINUED ON NEXT PAGE
Variation Synchronised With Turntable Rotation

If "now" resulting from variation in the speed of the turntable is evidenced to be in the order of a fraction per turntable revolution, this would indicate a defect in the rubber rimmed drive wheel. The wheel may be out of round, or warped, or may have a flat spot or bump on the rubber rim.

If the "now" is noticed to be one per turntable revolution, however, this would indicate some irregularity in the rim of the turntable. In handling, avoid bumping or dropping the turntable, as any pronounced dent in the rim of the table will out of round will result in a very noticeable variation in turntable speed.

Runnng the finger tips lightly over the inside surface of the turntable rim will show up any irregularity sufficiently pronounced to produce "now" in the recording or record reproduction. If the bearing surface of the turntable rim does not necessarily have to be perfectly smooth, as the effect of minute irregularities of the surface are absorbed by the rubber rim of the drive wheel.

A badly warped record, either a home recording or commercial record, on which the center hole is worn or oversize, will tend to produce "now" during its reproduction, and it is suggested that this be taken into consideration in investigating a complaint pertaining to waver or "now" in record reproduction.

Ordinarily, recordings made on record blanks which are only slightly warped, will prove to be satisfactory. However, "nows" may be cut into the recording if the cutting head damper is incorrectly adjusted so that the felt damper bears against the cutting head with too much pressure.

To correctly adjust the Cutting Head Damper, proceed as follows:

1. Turn the adjusting screw to the RIGHT so that no pressure is exerted on the cutting head by the felt damper.

2. Raise the recording arm to a near vertical position so that the stylus is midway in the slot in the front end of the arm. Observe that when the stylus is moved to one end of the slot and released, it will move back and forth a few times, before coming to rest in the center of the slot.

3. Turn the damper adjusting screw to the LEFT until, when the stylus is moved to one end of the slot and released, it will return to a midway position and stop. The tendency to continue moving back and forth should be eliminated.

In order to determine if "now" is actually "cut" into a home recording, or if a variation in turntable speed exists during all functions of the turntable, first play an especially selected regular phonograph record, known to be entirely free from "now." If the record plays satisfactorily, but "now" is noticed in playing home recordings made on the same instrument, this gives evidence of the existence of some mechanical fault in the recording mechanism. As previously stated, the cutting head may be dragging on the record or turntable during recording, or the rubber rimmed drive wheel may slip at the point of contact with the motor pulley or the turntable rim. Although the drive wheel location may be sufficient to provide adequate speed of the turntable during the playing of records, the greater power demand placed upon the motor during recording, due to the work involved in cutting the record groove, may cause the drive wheel to slip.

Written by John F. Rider, Publisher

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MODEL A-93-A-94

WILCOX/GAY CORP.

WILCOX/GAY PAGE 12-15

bearings, resulting in failure of the motor to operate when turned on. In the event a tight shaft is encountered, it may be freed in the bearing by lightly tapping the end of the motor shaft.

In motors of more recent production, a fibre washer is placed on the motor shaft to take up a sufficient amount of end play so that the shaft cannot become stuck in the bearing.

Oiling

When the R3504B leaves the factory, the equipment is properly lubricated and requires no immediate attention.

Frequent oiling of the recording mechanism is not required, although the use of a small amount of oil judiciously applied about once a year, in accord with the following directions, will suffice to maintain the equipment in good order.

Remove the turntable by applying upward pressure at the rim of the table, at the same time lightly tapping the top of the turntable spindle with a small tool.

Lift the dual drive wheel assembly from its mounting.

Lubricate the oiling positions indicated in the accompanying drawings, using only two or three drops of electric motor oil at each position, unless otherwise specified.

A. Turntable shaft bearing.
B. Motor bearing.
C. Between drive wheel mounting disc and bed plate.
D. Place a coating of petroleum jelly on the tip of the master arm.
E. Recording arm pivot post.
F. Pivot post straddle plate slot.

Carefully apply one or two drops of oil to each drive wheel bearing, so that the oil will not run out to the rubber tires of the wheels.

The lower motor bearing may be lubricated by application of oil to the felt with surrounding the lower end of the motor shaft.

Replace dual drive wheel and turntable as follows:

Place the dual drive wheel assembly (1) on the pin in the center of the movable mounting plate (2). The shift lever (3) of the wheel assembly should be positioned against the stop pin (4) as shown in the drawing. Likewise, the switch arm (6) should be positioned as shown so that the switch actuating finger (7) will engage in the wide slot of the switch arm (6) as the shift lever (3) is moved between the stop pins (4) and (5).

Place the shift lever (3) against stop pin (5) so that the switch arm (6) is moved to the position opposite that shown in the drawing.

Carefully lower the turntable on the spindle. It will be observed that one of the rubber rimmed drive wheels protrudes beyond the rim of the turntable. With the finger tips, press the drive wheel into position so that the rubber rim of the wheel bears against the inside surface of the turntable rim.

Rotate the turntable by hand, permitting the key pin of the turntable spindle to engage the key slot in the turntable hub.
AUTOMATIC RECORD CHANGER ADJUSTMENTS

MODEL No. A93, A94, 496

1. In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the grooves at the end of the main grooves in all standard records.

2. All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

3. This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.

4. To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (A) to either the 10 or 12 inch position.

5. To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (H) swings inward, the trip rod (E) moves toward the pickup base until the serrations on the trip rod seen at (I) are in contact with the knife edge of the trip latch (L). If the pickup arm (H) is now moved outward, the serrations at (I) will engage with the trip latch (L), permitting the trip can lift lever (C) to be released so that it will drop in and engage the trip cam (F).

6. To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (H) inwardly until the trip dog (G) comes in contact with the trip latch (L) and releases trip cam lift lever (C).

7. The reject button (B) it will be noted also operates to trip the mechanism by imparting motion to latch (I).

8. After trip can lift lever (C) has been released so that it can engage trip cam (F), the pressure required to operate the balance of the trip mechanism is derived from the motor.

9. As trip cam (F) engages trip cam lift lever (C), can (2) is lifted upward so that it engages the change mechanism drive wheel control lever (1) and forces the drive wheel (L) from positive frictional engagement with the inside of the turntable rim.

10. To keep wheel (L) in engagement with the turntable rim after lever (2) carries past cam (F), lever (1) is engaged by latch (I) and the tripping operation is complete.

DESCRIPTION OF SPEED REGULATOR AND CAN SHAFT

11. Driven by the wheel (L) through a double worm and gear reduction, the can shaft (S) carries cans which control the pickup arm movements, the dropping of records, and at the conclusion of the change cycle, the release of latch (T).

12. Can (2) which is mounted on the lower end of can shaft (S) raises and lowers the pickup arm (H) through a rocker arm and push rod.

13. The positioning of the pickup arm (H) for 10 or 12 inch records is controlled by two cans which control the lower can shaft bearing. The lower of these two cans (with short throw) positions the pickup for 12 inch records and the upper can (with long throw) positions the pickup for 10 inch records.

14. An examination of the pickup positioning cans will reveal spring fingers at the termination of the set position to spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

15. When lever (A) is set in the 10 or 12 inch position, the pickup positioning can follower is shifted up or down so as to engage the proper can. The pickup positioning can follower can easily be shifted upward by the coil spring mounted therein, and lifting the can follower to its extension. This coil spring will extend preventing damage, if for any reason the pickup arm (H) becomes obstructed while the pickup positioning can is forcing the pickup arm (H) inwardly.

16. Just above the pickup positioning can is the pickup removal can which has the function of swinging the pickup arm (H) outwardly when the mechanism has been tripped.

17. The last and uppermost can operates through can follower (I) to release the wheel latch (L) thus disengaging wheel (L) from the turntable rim at the completion of the change cycle.

18. On the upper side of the latch control can is mounted a roller which engages lever (Q) and actuates the record handling fingers (B) through the connecting links provided.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

19. To adjust the spiral trip to operate farther from the center of the record, loosen the set screws holding dog (G), and move the dog (G) away from the end of the trip rod (E). (Read paragraph 20 before making adjustment.)

20. Dog (G) is set at the factory to trip when the pickup needle is 1 3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. It is necessary to maintain this setting in order to hold a scale with the end touching the turntable rim (E) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1 3/4" graduation. NOTE: If for any reason the position of the pickup arm (H) with relation to the pickup base becomes changed, the trip dog (G) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (G). (This pickup adjustment is covered in paragraph 34.)

MECHANISM FALLS TO TRIP

21. If the mechanism falls to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be worn or scratched in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have become damaged.

22. The trip rod (E) is held in contact with the trip latch (L) by the trip rod tension spring (F). If the trip mechanism fails to operate, it may be necessary to increase the pressure of spring (F) against the trip rod (E) before changing the adjustment, observe the following:

   (1) Make sure that the trip rod does not bind in the bearing where it is linked to the pickup base.

   (2) Be sure that the trip rod moves freely.

   (3) Examine the serrations at (I) to be certain that the sharp edges have not been damaged.

   (4) Remove any dirt which may be embedded in the serrations, and which would prevent the trip latch (L) from being engaged.

   (5) Examine the knife edge of trip latch (L) to see if it has become damaged.

NOTE: Do not increase the pressure of spring (F) against trip rod (E) any more than is necessary to insure proper operation of the eccentric trip because excessive spring pressure will cause:

   (1) Jumping of the pickup needle out of spiral trip grooves at the tripping point.

   (2) The eccentric tripping action will require more power and the needle may jump the grooves and fall to trip altogether.

23. If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (L) and the trip can lift lever (C) to make sure that they work freely and do not bind on the studs on which they are mounted. If either of these levers are warping on the base plate, make sure that the studs which carry them have not worked loose.

24. If the lever (C) moves freely when it clears the trip latch (L) but does not swing into the path of the trip can (F) then the spring which connects to lever (C) is either stretched or missing. If lever (C) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place.
If the trip mechanism functions in a satisfactory manner and wheel (L) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen screws at (B) and move the wheel control lever extension outward a distance which will bring wheel (L) into positive contact with the turntable rim. CAUTION: This adjustment is very critical and should be carefully made. If wheel (L) is forced too tightly against the turntable rim, the latch (Y) will stick at the completion of the change cycle and prevent the wheel from becoming disengaged from the turntable rim. As an aid in making this adjustment, it is well to scribble a line on the wheel control lever at the end of the wheel control lever extension, so that it can be seen how far the extension is being moved each time. Before making any adjustment, it is also advisable to check the set screws in wheel (L) to make sure that wheel (L) is tight and not turning on the shaft which carries it.

If latch (Y) fails to hold wheel (L) in position:
1. Lever (I) may not be following through completely on one (P), due to either lever (C) being bent down, or lever (I) bent up too far.
2. At the end of lever (I) in vicinity of wheel (L) is noted a dog (W) which is meant to engage in latch (Y). This dog may have been bent outward so that it does not completely enter latch (Y), when lever (I) has completed its travel on car (P).
3. The adjustment of fingers on latch lever (Y) is such that the clearance for the dog (W) should be approximately "0.04." This can be determined by moving lever (I) outward from the center so that the dog (W) will move into latch (Y) and a 0.04 gauge inserted between the dog, and finger to establish this clearance. To adjust for proper clearance, the finger on latch (Y) may be bent in or out.
4. Check the spring on lever (Z) to make sure that the spring is not defective or missing.

MECHANISM REPEATS
If the mechanism repeats (continues to change records without playing them), the wheel (L) may not be disengaging from the turntable rim. This failure to disengage may be due to the following:
1. Faulty action of the latch (Y). (See "Caution" in paragraph 25.)
2. A defective or missing return spring on wheel control lever (I).
3. A defective or missing spring on lever (Z).
4. Lever (Z) may be bent so that it is not contacting the wheel release arm. (See paragraph 17.)

If wheel (L) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked:
1. Reject button (B) may be sticking in the depressed position.
2. The trip can (P) may be sticking in the raised position.
3. The reset spring on trip latch (X) may be defective or missing.
4. The stud on which wheel control lever (I) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE
If the mechanism trips during the playing of a record and before the pickup arm has swung inward to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked:
1. Weak or missing reset spring on latch (X). Tension of spring may be increased by turning the spring anchor lug.
2. Defective shoulder or trip latch (X) or rounded corner can lift lever (C), permitting lever (C) to slip off of the shoulder on trip latch (X).
3. Rubber bumper (B), against which wheel control lever (I) strikes, may have worked up away from the base plate, permitting lever (I) to over-travel and lock trip rod (X) in place. NOTE: When over-travel of lever (I) due to lever (C) being bent down, or lever (I) turned up too far.
4. If trump lever (I) causes tripping during the playing cycle, it is possible that either a weak reset spring on latch (X) or a damaged shoulder on latch (X) is a contributing factor.

RECORD ARM STICKERS OR JAMS
If during normal operation of the unit the pickup arm acts as though it were jammed in any manner, the following procedure should be followed:
1. First, stop the motor, mount the turntable, and trip the mechanism. The pickup arm (I) should now be capable of some motion between the normal limits of its travel from edge of base plate to within approximately 1° of the center pin (P) depending on the adjustment of trip dog (G).
2. If trip dog (G) will not slip by the lug, against which it strikes on trip latch (X), the sprocket at (E) on trip rod (X) may be bent or broken. The function of this extension is to swing trip rod (X) clear of trip latch (X) as soon as tripping takes place.

RECORD SUPPORT ADJUSTMENT
An examination of the unit will disclose the rear record support (front support on A-96) has clamps (F) which are determined by means of overlocking connecting links between the two support bases, underneath the changer unit.

The support posts should be equidistant from the center of the turntable, so that the opposite sides of the record will be released at nearly the same instant, and so that only one record at a time will be dropped to the turntable. The correct adjustment may best be determined by placing a 10 inch record on the supports, with the support posts in the 10 inch position, and marking the adjustment by loosening the screws shown at (Y) and moving the record support post (O) to a position where the centering edges of both separating fingers (B) are equidistant from the edge of the record. (NOTE: The record selected for making this adjustment must be flat and the center hole must fit the center post (B) without excessive looseness.) CAUTION: Before making this adjustment always make sure that lever (I) is firmly located in the proper detent, and that the screw assembly is tight. (Vertical alignment of the record centering pin (E) is dependent upon correctfeed screw mounting.)

After the adjustment has been made, and the two screws tightened, turn on the motor and observe that the record is released from both support fingers at nearly the same instant. Then place a full stack of records on the supports and observe the dropping of each record. It will be noticed that the combined weight of ten or twelve records resting on the supports, will cause the support posts to spring outward slightly as the change mechanism goes through cycle, and the degree to which the posts spring outward is assessed with a decrease of total record weight. It will also be observed that one post may spring out more than the other during the change cycle, and this should be taken into consideration in making an adjustment of supporting posts, so that the degree of unevenness with which the records are released from the support fingers will be "averaged" for the entire stack of records.

RECORD SUPPORT AND SEPARATING FINGERS
As there is a difference in thickness between 10 inch and 12 inch records, and the equipment is designed to accommodate both; the separating fingers (B) must be in proper adjustment so that they will slide in between the two lower records of the stack, and have no tendency to strike the edge of either record. The record supports (B) and the record
An OUTPUT Meter, connected to the speaker voice coil terminals, should be used for accuracy in making ganing adjustments.

The voice coil terminals, as well as the L.F. trimmers, may be made accessible by removing the screws by which the motor panel is mounted in the cabinet. Before lifting off the phone-recorder unit, NOTE: The phone, 48V to the CENTER of THE TURNTABLE, and permit the arm to remain in this position until after the unit has been restored to the cabinet. In this way, the follower arm which engages the internal feed screw will be protected against damage.

The R.F. trimmers may be reached through the opening provided in the bottom of the cabinet.

Connect signal generator to control grid of G & A valve.

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>DIAL POSITION</th>
<th>TRIMMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>426 kHz</td>
<td>1700 kHz</td>
<td>15-5**</td>
</tr>
<tr>
<td>417 kHz</td>
<td>14-5**</td>
<td></td>
</tr>
<tr>
<td>411 kHz</td>
<td>14-5**</td>
<td></td>
</tr>
</tbody>
</table>

Connect signal generator to ANT. and GND. terminals.

1400 kHz

• Check the alignment of pointers with reference line below 580 kHz on the scale. The pointers may be slipping on the chart to correct for misalignment.

• In running the L.F. amplifier, use a low signal input to avoid setting up of oscillation in the amplifier.

NOTE: In the event of loop antenna replacement, the R.F. alignment should be checked at 600 kHz, and if necessary, adjustments of the loop may be made to bring about correct alignment of the dial at 600 kHz, by drawing the end of the inductive loop turn to provide more or less inductance as required.

An adjustment of loop inductance should be followed by re-alignment of the R.F. trimmers at 1400 kHz.

VOLTAGE DATA

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>6N8</td>
<td>1st. Det.</td>
<td>132</td>
<td>80</td>
<td>2.6</td>
</tr>
<tr>
<td>6L7</td>
<td>L.F.</td>
<td>150</td>
<td>50</td>
<td>3.7</td>
</tr>
<tr>
<td>6B6</td>
<td>2nd. Det.</td>
<td>80</td>
<td>--</td>
<td>1.3</td>
</tr>
<tr>
<td>6G5</td>
<td>Output</td>
<td>225</td>
<td>150</td>
<td>17.0</td>
</tr>
</tbody>
</table>

• Not actual voltage due to large value of resistance in circuit between supply voltage and point of measurement.

MODEL A-100

RECORDER UNIT--COMPLETE

55-2404 PIVOT POST ASSEMBLY
5-2374 PIVOT POST LOCK SPRING ASSEMBLY
6-2089 PIVOT POST BUSHING
72-2056 PIVOT POST BUSHING WASH 2 1/2" DIA. 1/8", STAINLESS
72-2067 PIVOT POST BUSHING WASH 2 1/2" DIA. STAINLESS, BLANK
72-2056 PIVOT POST BUSHING WASH 2 1/2" DIA. PLAIN
8-2056 PIVOT POST BUSHING LOCK SPRING

REORDER PICKUP ARM ASSEM. (WITH CARTRIDGE)

Z-2401 ARM CHASSIS SUB ASSEMBLY
Z-2406 CORP. RETAINER CLIP
23-2055 CRYSTAL CARTRIDGE (L-26)
51-2117 CARTRIDGE CLAMP PLATE
57-2063 CARTRIDGE MOC, SCREW
57-2019 CORE POINT PIVOT SCREW
48-2016 CORE POINT SCREW LACONIT
2-2048 FOLLOWER ARM ASSEMBLY
5-2076 FOLLOWER ARM STOP BRACKET
75-2010 INTERMEDIATE DRIVE WHEEL
9-2046 DRIVE WHEEL SUB CLIP
57-2136 LACONIT PIVOT SCREW ASSEM. (WITH T.T. SHAFT)
47-2029 MOTOR & PLATE ASSEM. (LESS T.T. & PIVOT SCREW)
60-2042 MOTOR SWITCH
40-2063 MOTOR SWITCH ENDS
57-2100 MOTOR END SCREWS
51-2166 NEEDLE BEARINGS
87-2006 NEEDLE SCREW

MODEL No A-100

RECORDING J.S. PARTS LIST

40-2006 PIVOT POST BUSHING W G NUT
5-2374 PIVOT ARM ASSEM.
70-2052 TRANSISTOR (WITH PIN MOUNTED)
58-2133 TRANSISTOR PIVOT W S.
87-2060 TRANSISTOR PIVOT W S.
57-2169 TRANSISTOR SWING MOC. SCREW
73-2162 TRANSISTOR SWING MOC. LOCK SCREW
NOTE

Chassis 4A01 has attached speaker.
Chassis 4A03 has remote speaker.

CHASSIS MODEL SPEAKER

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<th>MODEL</th>
<th>SPEAKER</th>
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<td>4A01</td>
<td>4B515</td>
<td>49-345</td>
</tr>
<tr>
<td>4A03</td>
<td>4B536</td>
<td>49-328</td>
</tr>
</tbody>
</table>

8 CHASSIS MODEL SPEAKER

5 4A01 4B515 49-345 5"
4A03 4B536 49-328 6"

© John F. Rider, Publisher
Stage Gains:
Ant. to conv. grid—6.2× at 1000 Kc.
Conv. grid to I.F. grid—56× at 455 Kc.
Overall audio—33 db. at .050 watt.

Chassis 4A02—attached speaker.
All voltages measured with a 1000 ohm per volt meter from chassis to battery pack.

NOTE:
Chassis 4A04—remote speaker.

©John F. Rider, Publisher
Stage Gains:
Ant. to conv. grid—5.2× at 1000 Kc.
Conv. grid to I. F. grid—86× at 455 Kc.
Overall audio—224× at .050 watt.
400 cycles.
Tuning Range—540 Kc.—1570 Kc.

ADJUST A, B, C, D, at 455 KC
TRIM G, F, at 1400 KC RF signal loosely coupled to loop

All voltages measured from point indicated to Neg. B. using 20000 ohm per volt meter.

Line voltage—117 v. A.C.
Power consumption—117 v.—20 watts.
Power consumption, battery—1.02 watts.
Stage Gains:
Ant. to conv. grid—4.9 × at 1000 Kc.
Conv. grid to I. F. grid—53 × at 455 Kc.
Overall audio—280 × at .050 watt.
400 cycles.
Tuning Range—540 Kc.—1600 Kc.

Power consumption—117 v.—20 watts.
117Z6G Rect.
Power consumption, battery—1.02 watts.
Power output—170 milliwatts.

I.F. ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII

I.F. TRIMMERS A,B,C,D
For R.F. Alignment
Couple test oscillator thru single turn loop
to "avemagnet"
-19 40-
I.F. 455 Kc.
Tuning range—540 Kc.—1600 Kc.

DENOTES CHASSIS "GROUND"

12J7G
R.F.

12K7GT
I.F.

12SQ7GT
DEI-AMP

12S576
PWR. AMP.

35Z5G
RECT.

35L6G
PWR. AMP.

12S576
CONVERTER

12S57G
CONVERTER

12SA7G
CONVERTER

35Z5G
RECT.

35L6G
PWR. AMP.

FOR OTHER DATA SEE INDEX

6A01 uses dynamic speaker.
6A08 has phone connections
6A08 and 6A10 use P.M. speaker with choke to replace field winding.
Power consumption—6A01-6A10—
25.5 watts.
Power consumption—6A08—40.5 watts.
Power output—1 watt.

All voltages measured with a
20,000 ohm per volt meter from Neg.
B to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control on full.
Line voltage 117 v. A.C.
Stage Gains:
Ant. to R.F. grid—4.2 × at 1000 Kc.
R.F. grid to conv. grid—10.3 × at 1000 Kc.
Conv. grid to I.F. grid—52.6 × at 455 Kc.
Overall audio—423 × at .25 watt.

400 cycles.

I.F. ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII
I.F. TRIMMERS A, B, C, D. ALIGN AT
455 KC. ADJUST WAVE TRAP E FOR
MIN. SIGNAL AT 455 KC. SIG. P.E.D
TO 14H7 GRID. TRIM SW (F, G) 15 KC
TRIM BC OSC 1500 KC (H)

All voltages measured with a
20000 ohm per volt meter from Neg.
B to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control on full.
Line voltage 117 v. A.C.
Power consumption—27 watts.
Tuning Range—540 Kc. – 1600 Kc.
5600 Kc.–16000 Kc.
**SERVICE NOTES**

All chassis

Weak short wave—Open R.F. choke in plate circuit of 1232 tube.

Noisy—Dial rubbing against escutcheon. Stator lugs on braid of gang condenser rubbing against side of opening in chassis. Make sure all lortal type tubes are firmly seated in sockets.

Cannot be aligned—Check for open or rain connection on primary winding of wavemagnet.

Overloads—Usually due to open resistor in A.V.C. circuit of first detector.

Phono Models

Distortion—Check for broken crystal in pickup.

Low Volume—Check for poor contact in phono switch and plug contacts—check shield on lead from crystal for poor ground.

**6A02-6A04**

Noisy—right hand pilot light wiring may be pinched by automatic bracket.

Check for poor contact on manual push button.

Check for loose or poor contacts on pilot lights.

Oscillation on short wave band—Push black lead of automatic away from automatic adjustments. Keep white and green leads of automatic away from 7L7-7H7 socket.

**7A02-7A04**

Dead—480 mmd condenser on automatic may be grounded against automatic frame or latch bar.

Oscillation—Push leads of wave trap close to chassis keeping them away from antenna coil.

**12A3**

Hum—Change 675 in first audio socket.

**ALIGNMENT-CHASSIS 5A03**

PEAK I.F. TRIMMERS A B C D

AT 455 KC, COUPLE TEST OSCILLATOR VIA SINGLE TURN LOOP LOOSELY TO WAVE MAGNET AND TRIM F AND G AT 1400 KC

**ALIGNMENT-CHASSIS 6A01-6A10**

PEAK I.F. TRIMMERS A B C D

AT 455 KC, FEED 455-KC SIGNAL TO R-F GRID AND ADJUST WAVE TRAP TRIMMER E FOR MINIMUM RESPONSE.

TRIM F AT 1800 KC

TRIM G AT 1400 KC
Stage Gains:

Ant. to R.F. grid—5× at 1000 Kc.
R.F. grid to conv. grid—6.5× at 1000 Kc.
Conv. grid to I.F. grid—49.1× at 455 Kc.

Overall audio—322× at .05 watt.
400 cycles.

Tuning Range—540 Kc. to 1570 Kc.

ALIGNMENT

I.F. ALIGNMENT CONVENTIONAL

SEE SPECIAL SECTION VOL. VIII

WAVETRAP (E)

ADJUST FOR MINIMUM RESPONSE

FEEDING 455 KC SIGNAL TO MIXER GRID

TRIM OSC-ANT AT 1400 KC

110V A.C.-D.C. BATTERY PACK

UNIVERSAL PORTABLE

I.F. FREQUENCY 455 KC.
Power consumption—60 watts.
Power output—6 watts.
### ALIGNMENT PROCEDURE

#### CHASSIS 6A05

**Stage Gains**
- Ant. to R.F. grid—3× at 1000 Kc.
- R.F. grid to conv. grid—7× at 1000 Kc.
- Conv. grid to I.F. grid—92× at 465 Kc.
- Overall audio—778× at 1 watt 400 cycles.
- Tuning ranges—545 Kc.—1570 Kc.
- 5700 Kc.—18300 Kc.

#### CHASSIS 10A3

**Operation**
- **Connect Test Oscillator To**
- **Dummy Antenna**
- **Input Signal Frequency**
- **Bond**
- **Set Dial At**
- **Connect Output Meter To**
- **Timers**
- **Purpose**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator To</th>
<th>Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Bond</th>
<th>Set Dial At</th>
<th>Connect Output Meter To</th>
<th>Timers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Con. Grid</td>
<td>0.5 Mfd.</td>
<td>455 Kc.</td>
<td>B.C.</td>
<td>600 Kc.</td>
<td>EV6G Output</td>
<td>A B C D</td>
<td>Align I.F.</td>
</tr>
<tr>
<td>2</td>
<td>R.F. Grid</td>
<td>0.5 Mfd.</td>
<td>455 Kc.</td>
<td>B.C.</td>
<td>600 Kc.</td>
<td>EV6G Output</td>
<td>E</td>
<td>I.F. Traps Adjust for Minimum</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminals marked 2 and G</td>
<td>400 Ohms</td>
<td>18 Mc.</td>
<td>S.W.</td>
<td>18 Mc.</td>
<td></td>
<td>K</td>
<td>Set to Scale</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>5.0 Mc.</td>
<td>Med.</td>
<td>5.0 Mc.</td>
<td></td>
<td>N</td>
<td>Set to Scale</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>4.5 Mc.</td>
<td>Med.</td>
<td>4.5 Mc.</td>
<td></td>
<td>Q</td>
<td>Align Ant.</td>
</tr>
<tr>
<td>7</td>
<td>Single turn Loop Loosely coupled to loop</td>
<td>1400 Kc.</td>
<td>B.C. 1400 Kc.</td>
<td>F</td>
<td></td>
<td>Set for Osc. to Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1400 Kc.</td>
<td>B.C.</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Align Ant.</td>
<td>Broadcast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>600 Kc.</td>
<td>B.C.</td>
<td>600 Kc.</td>
<td>J</td>
<td>(Rock Gong)</td>
<td>Padder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1832 Grid</td>
<td>0.5 Mfd.</td>
<td>4.3 Mc.</td>
<td>Manual F.M.</td>
<td>4.3 Mc.</td>
<td>F.M. Output Meter Across Full Disc. Load</td>
<td>B4</td>
<td>Align for Zero Deflection</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A3B0</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>757 1232 Grid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A2B2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>757 Grid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A B</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>F.M. Ant. Terminals</td>
<td>100 Ohms</td>
<td>46.0 Mc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adjust cam on gang shaft for scale</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>42.5 Mc.</td>
<td></td>
<td></td>
<td></td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td>49 Mc.</td>
<td></td>
<td></td>
<td></td>
<td>P2</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td>46 Mc.</td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
<td></td>
</tr>
</tbody>
</table>

**During F.M. Alignment keep input low. To obtain max. sensitivity for alignment. This is necessary because, with large inputs the limiting action of the limiters masks alignment operations.**

**NOTE:** A 10M ohm per volt or higher voltmeter may be used as an F.M. output meter.
All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control full on.
Line voltage 117 A.C.
Power consumption 6A02-6A13-6A14—40 watts.
Power consumption 6A04 — 55 watts.
Power output—2.6 watts.

Stage Gains:
Ant. to R.F. grid—3.8 X at 1000 Kc.
R.F. grid to conv. grid—10 X at 1000 Kc.
Conv. grid to I.F. grid—71 X at 455 Kc.
Overall audio—594 X at .25 watt, 400 cycles.

NOTE
Chassis 6A04 has phono connections added
Chassis 6A13 and 6A14 are identical with 6A02 except for color of automatic knobs.
Stage Gains:
- Ant to R.F. grid—5.2× at 1000 Kc.
- R.F. grid to conv. grid—5.9× at 1000 Kc.
- Conv. grid to I.F. grid—57.5× at 455 Kc.
- Overall audio—735× at 1 watt, 400 cycles.

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.
Volume control on full.
Power consumption—55 watts.
Line voltage 117 v. A.C.
SOCKET VOLTAGES AND ALIGNMENT
CHASSIS 7A02-7A04

All voltages measured with a 23,000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

Volume control full on.

Line voltage 117 V.

I.F. ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII
I.F. 455 KC. ADJUST A B C D
ADJUST WAVE TRAP E FOR MIN. SIGNAL
AT 455 KC; SIGNAL FED TO RF GRID
TRIM K AT 18 MC; M AT 16 MC
TRIM Q AT 4.5 MC
TRIM F AT 1500 KC
TRIM G AT 1400 KC
PAD J AT 600 KC

Models 12S550-12S568-12S569-12S595

Chassis 12A3-12A4

All voltages measured with a 1000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

Volume control full on.

Line voltage 117 V.

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Stage Gains
Ant. to R.F. grid—4.9X at 1000 Kc.
R.F. grid to conv. grid—12X at 1000 Kc.
Conv. grid to I.F. grid—66X at 455 Kc.
Overall audio—743X at 1 watt
400 cycles.
Chassis 8A03 has phono connections added (see page 31).
Tuning ranges—540 Kc.—1600 Kc.
1500 Kc.—5200 Kc.
5700 Kc.—18300 Kc.
Power consumption—8A02—65 watts. 8A03—85 watts.

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

Volume control full on.

Line voltage 117 v.
Model 8S586
Chassis 8A01
All voltages measured with a 1000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Sensitivity switch in distance position.
Volume control full on.
Line voltage 112 A.C.
Power consumption—85 watts.
Power output—6 watts.
Tuning ranges—540 Kc.—1600 Kc.
1505 Kc.—5200 Kc.
5600 Kc.—18500 Kc.

Alignment-Chassis 8A01
I.F. 455 KC-Peak A,B,C,D
SW-TRIM K 18 MC
TRIM M 16 MC
POLICE—
TRIM N,Q 4.5 MC
BROADCAST
TRIM F 1400 KC
TRIM G (on loop)
AT 1400 KC WITH
WAVEMAGNET SWITCH
FOR LOOP OPERATION

Model 7S585
Socket layout
Voltage data
Chassis 7A01
All voltages measured with a 1000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control full on.
Line voltage 112 A.C.
Stage Gains:

- Ant. to R.F. grid—5× at 1000 Kc.
- R.F. grid to conv. grid—4.2× at 1000 Kc.
- Conv. grid to I.F. grid—76.6× at 455 Kc.
- Overall audio—865× at 1 watt, 400 cycles.
Power consumption—90 watts.
Power output—6.5 watts.
Tuning Range—540 Kc. to 1600 Kc.
1.5 Mc. to 5.2 Mc. 5.7 Mc. to 18.5 Mc.
41.5 Mc. to 50.5 Mc.

Stage Gains:

Bc. and 455 Kc.—I.F.
Ant. to R.F. grid—6.5 at 1000 Mc.
R.F. grid to conv. grid—28.1 at 1000 Mc.
Conv. grid to I.F. grid—31.3 at 455 Kc.
Overall audio—1840 at 1 watt, 400 cycles.

Models 10H551-10H571
Chassis No. 10A3
MODEL SPEAKER
10H551 49-424 12
10H571 49-424 13
AMP MOD I.F. FREQUENCY 455 KC.
FREQ. MOD. I.F. FREQUENCY 4.3 MC.
10 TUBE SUPER-HETERODYNE
CHASSIS NR 10A3-AC-4 BAND
ZENITH RADIO CORPORATION
CHICAGO ILL.
POWER CONSUMPTION—12A3—95 watts.

Stage Gains

Ant. to R.F. grid—2.08 x at 1000 Kc.
R.F. grid to conv. grid—7.5 x at 1000 Kc.
Conv. grid to I.F. grid—43 x at 455 Kc.
Overall audio—2127 x at 1 watt 400 cycles.

NOTE

Chassis 12A4 has phono connections added.

Tuning ranges—540 Kc—1600 Kc.
1500 Kc—5200 Kc.
5700 Kc—18300 Kc.

FOR VOLTAGES, P.B. DATA, SEE INDEX
ALIGNMENT - CHASSIS 5A02
I.F. ALIGNMENT CONVENTIONAL
ADJUST TRIMMERS A B C D 455 KC
TRIM K 18 MC
TRIM F, G 1700 KC
PAD J AT 600 KC
TRIM M AT 18 MC

ALIGNMENT - CHASSIS 6A20
I.F. SAME AS CHASSIS 5A02
TRIM K AT 18 MC
TRIM M AT 15 MC
TRIM F, G AT 1500 KC
PAD J AT 600 KC
WITH 455-KC SIGNAL
PFD TO RF GRID, ADJUST
WAVETRAP E FOR MINIMUM
RESPONSE.

ALIGNMENT - CHASSIS 8A04
SAME AS FOR CHASSIS 6A20

VOLTAGE DATA
CHASSIS 10A1-10A2
ALL VOLTAGES MEASURED WITH
20,000 OMS-PER-VOLT METER
FROM CHASSIS TO POINT INDIC
ATED
ALIGNMENT

CHASSIS 6A02, 6A04, 6A13, 6A14
I.F.TRIMMERS A B C D
PEAK AT 455 KC
WAVETRAP E-ADJUST FOR
MIN. SIGNAL RESPONSE
AT 455 KC SIGNAL AT
R-F GRID.
TRIM K 18 MC
TRIM F.G 1500 KC
PAD J 600 KC
TRIM M 16 MC

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### ZENITH RADIO CORP.

#### PHONO CIRCUIT DATA

**MODEL SPEAKER**

<table>
<thead>
<tr>
<th>CHASSIS NO.</th>
<th>SPEAKER DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A04</td>
<td>49-369 10&quot;</td>
</tr>
<tr>
<td>7A04</td>
<td>49-396 10&quot;</td>
</tr>
<tr>
<td>7A04</td>
<td>49-397 12&quot;</td>
</tr>
</tbody>
</table>

#### DIAG CHART

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>22-887</td>
</tr>
<tr>
<td>C2</td>
<td>22-042</td>
</tr>
<tr>
<td>R1</td>
<td>63-597</td>
</tr>
<tr>
<td>R2</td>
<td>63-855</td>
</tr>
<tr>
<td>R3</td>
<td>63-959</td>
</tr>
<tr>
<td>R4</td>
<td>63-543</td>
</tr>
</tbody>
</table>

**NOTE:** BANDSWITCH ON THIS CHASSIS IS PART NO. 85-227.

#### PHONO CIRCUIT DATA

**MODEL SPEAKER**

<table>
<thead>
<tr>
<th>CHASSIS NO.</th>
<th>SPEAKER DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A04</td>
<td>49-387 5&quot;</td>
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#### DIAG CHART

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>C1</td>
<td>22-042</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
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<td>63-855</td>
</tr>
<tr>
<td>R3</td>
<td>63-959</td>
</tr>
<tr>
<td>R4</td>
<td>63-543</td>
</tr>
</tbody>
</table>

#### PHONO CIRCUIT DATA

**MODEL SPEAKER**

<table>
<thead>
<tr>
<th>CHASSIS NO.</th>
<th>SPEAKER DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A03</td>
<td>49-397 12&quot;</td>
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</tbody>
</table>

#### DIAG CHART

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>22-042</td>
</tr>
<tr>
<td>C2</td>
<td>22-887</td>
</tr>
<tr>
<td>R1</td>
<td>63-597</td>
</tr>
<tr>
<td>R2</td>
<td>63-855</td>
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<tr>
<td>R3</td>
<td>63-959</td>
</tr>
<tr>
<td>R4</td>
<td>63-543</td>
</tr>
</tbody>
</table>

#### PHONO CIRCUIT DATA

**MODEL SPEAKER**

<table>
<thead>
<tr>
<th>CHASSIS NO.</th>
<th>SPEAKER DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12A2</td>
<td>49-401 15&quot;</td>
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#### DIAG CHART

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>C1</td>
<td>22-887</td>
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<tr>
<td>C2</td>
<td>22-042</td>
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<tr>
<td>R1</td>
<td>63-597</td>
</tr>
<tr>
<td>R2</td>
<td>63-855</td>
</tr>
<tr>
<td>R3</td>
<td>63-959</td>
</tr>
<tr>
<td>R4</td>
<td>63-543</td>
</tr>
</tbody>
</table>
**ZENITH RADIO CORP.**

**MODEL S8500Z**

FREQUENCY RANGE
C1 CONNECTED AT 540-900 KC.
C1 CONNECTED AT 900-1500 KC.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>D/I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>222470</td>
<td>TUNING CONDENSER</td>
</tr>
<tr>
<td>C2</td>
<td>222177</td>
<td>25,000 MFD</td>
</tr>
<tr>
<td>C3</td>
<td>221820</td>
<td>00025 MFD</td>
</tr>
<tr>
<td>C4</td>
<td>228295</td>
<td>05 MFD</td>
</tr>
<tr>
<td>C5</td>
<td>228277</td>
<td>1000 MFD</td>
</tr>
<tr>
<td>C6</td>
<td>22-1061</td>
<td>1/8 W ALC ELECTROLYTIC</td>
</tr>
<tr>
<td>C7</td>
<td>228696</td>
<td>150 MFD</td>
</tr>
<tr>
<td>C8</td>
<td>228696</td>
<td>200 MFD</td>
</tr>
</tbody>
</table>

**PHONOGRAPH OSCILLATOR**

ZENITH RADIO CORPORATION
CHICAGO, ILL.

- **PARTS LIST**
  - C1: 5193, 47 M OHM
  - C2: 63-70, 4700 OHM
  - C3: 63-35, 4700 OHM
  - C4: 63-70, 4700 OHM
  - C5: 63-35, 4700 OHM
  - C6: 63-35, 4700 OHM
  - C7: 63-35, 4700 OHM
  - C8: 63-35, 4700 OHM

**MODEL S9000**

FREQUENCY RANGE
C1 CONNECTED AT 540-900 KC.
C1 CONNECTED AT 900-1500 KC.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>D/I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>222470</td>
<td>TUNING CONDENSER</td>
</tr>
<tr>
<td>C2</td>
<td>222177</td>
<td>25,000 MFD</td>
</tr>
<tr>
<td>C3</td>
<td>221820</td>
<td>00025 MFD</td>
</tr>
<tr>
<td>C4</td>
<td>228295</td>
<td>05 MFD</td>
</tr>
<tr>
<td>C5</td>
<td>228277</td>
<td>1000 MFD</td>
</tr>
<tr>
<td>C6</td>
<td>22-1061</td>
<td>1/8 W ALC ELECTROLYTIC</td>
</tr>
<tr>
<td>C7</td>
<td>228696</td>
<td>150 MFD</td>
</tr>
<tr>
<td>C8</td>
<td>228696</td>
<td>200 MFD</td>
</tr>
</tbody>
</table>

**PHONOGRAPH OSCILLATOR**

ZENITH RADIO CORPORATION
CHICAGO, ILL.

- **PARTS LIST**
  - C1: 63-35, 4700 OHM
  - C2: 63-35, 4700 OHM
  - C3: 63-35, 4700 OHM
  - C4: 63-35, 4700 OHM
  - C5: 63-35, 4700 OHM
  - C6: 63-35, 4700 OHM
  - C7: 63-35, 4700 OHM
  - C8: 63-35, 4700 OHM

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Stage Gains:
Bc. and 455 Kc. I.F.
Loop to Conv. grid down 1/3 x at 1000 Kc.
Conv. grid to I.F. grid 49 x at 455 Kc.
Overall audio 317 x at .05 watt, 400 cycles.

Tuning Ranges 540 Kc. to 1620 Kc.
DENOTES CHASSIS 'GROUND"

MODEL SPEAKER
4K600 49-433 3½"
4 TUBE SUPERHETERODYNE
1/2-V. BATTERY-PORTABLE
CHASSIS NO. 4BO!

Operation | Connect Test Oscillator to | Dummy Antenna | Input Signal Frequency | Band | Set Dial At | Trimmers | Purpose
--- | --- | --- | --- | --- | --- | --- | ---
1 | Converter Grid | .1 mfd. | 455 Kc. | — | 1800 Kc. | A, B, C, D | Align I.F.
2 | 1 Turn Loop Made from Generator Leads. Diameter Approx. 10" See Note! | — | — | 1600 Kc. | — | 1600 Kc. | F | Set Oscillator to Scale
3 | — | — | — | 600 Kc. | — | 600 Kc. | F | Rock Gang and Adjust for Max.
4 | — | — | — | 1400 Kc. | — | 1400 Kc. | G | Align Antenna

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control full on.
**7F.NITH**

7SA7G CONVERTER

I2K7GT LF

I2SQ7GT DET-AMP

50L6GT PWR. AMP

**MODELS S5610, S5610W**

5D625, Chassis S5B01

**CONVERTER**

DENOTES CHASSIS 'GROUND'

Power output 1.3 watts.

Tuning Ranges 540 Kc. to 1620 Kc.

- **MODEL** 5D610 49-439 4'
- **MODEL** 5D625 49-439 4'

**IF FREQUENCY** 455 Kc.

5 TUBE SUPERHETERODYNE

CHASSIS S5B01 A.C.-D.C.

- **IF** 455 Kc.
- **LF** 1500 Kc.
- **AF** 1500 Kc.

**IF FREQUENCY** 455 Kc.

**TUBE SUPERHETERODYNE**

CHASSIS S5B01 A.C.-D.C.

**TRIMMER LOCATIONS**

**SOCKET VOLATGES**

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

Volume control full on.

Line voltage 117 A.C.

Power consumption 29 watts.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter Grid</td>
<td>.1 mfd.</td>
<td>455 Kc.</td>
<td>—</td>
<td>600 Kc</td>
<td>A, B, C, D</td>
<td>Align I. F.</td>
</tr>
<tr>
<td>2</td>
<td>1 Turn Loop Made from Generator</td>
<td>—</td>
<td>1500 Kc.</td>
<td>—</td>
<td>1500 Kc</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>3</td>
<td>Leads. See Note!</td>
<td>—</td>
<td>1500 Kc.</td>
<td>—</td>
<td>1500 Kc</td>
<td>G</td>
<td>Adjust for Maximum</td>
</tr>
</tbody>
</table>

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All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control full on.

Line voltage 117 A.C.
Power consumption 25.5 watts.
Power output 1 watt.
Tuning Range 540 Kc. to 1600 Kc.

Stage Gains:
Bc. and 455 Kc. I.F.
Ant. to R.F. grid 5.5\times\text{at} 1000 \text{Kc.}
R.F. grid to conv. grid 6.2\times\text{at} 1000 \text{Kc.}
Conv. grid to I.F. grid 51\times\text{at} 455 \text{Kc.}
Overall audio 289\times\text{at} .25 \text{watt.}
400 cycles.

I.F. FREQUENCY 455 KC.
6 TUBE SUPERHETERODYNE
CHASSIS NR.6A24 A.C.-D.C.

SPEAKER
12SA7G
12SQ7GT
35L6G
Speaker
560A (Hot)

DENOTES CHASSIS "GROUND"

1.2J7G R.F.
12SA7G CONVERTER
12K7GT I.F.
12SQ7GT DET-AMP
35L6G PWR.AMP SPEAKER

**MODELS 6D516, CHASSIS 6A24**

**DENOTES CHASSIS "GROUND"**

**12J7G R.F.**
**12SA7G CONVERTER**
**12K7GT I.F.**
**12SQ7GT DET-AMP**
**35L6G PWR.AMP SPEAKER**

**Line voltage 117 A.C.**
**Power consumption 25.5 watts.**
**Power output 1 watt.**
**Tuning Range 540 Kc. to 1600 Kc.**

**Operation** | **Connect Test Oscillator to** | **Dummy Antenna** | **Input Signal Frequency** | **Band** | **Set Dial At** | **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>Converter Grid</td>
<td>.5 mfd.</td>
<td>455 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>A, B, C, D</td>
<td>Align I.F.</td>
</tr>
<tr>
<td>2</td>
<td>R.F. Grid</td>
<td>.5 mfd.</td>
<td>455 Kc.</td>
<td>&quot;</td>
<td>600 Kc.</td>
<td>E</td>
<td>Adl Wave Trap for Minimum</td>
</tr>
<tr>
<td>3</td>
<td>1 Turn Loop Made from Generator Leads</td>
<td>—</td>
<td>1600 Kc.</td>
<td>&quot;</td>
<td>1600 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>4</td>
<td>See Note!</td>
<td>—</td>
<td>1400 Kc.</td>
<td>&quot;</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Align Antenna</td>
</tr>
</tbody>
</table>

**Socket voltages**

12SQ7GT | 12K7GT | 12J7G | 12SA7G | 35L6G | 35Z5G | DIAL LIGHT
Power output 1 watt.

Tuning Ranges 540 Kc to 1600 Kc.

DENOTES CHASSIS GROUND

SOCKET VOLTAGES

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Oscillator to Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter Grid</td>
<td>.5 mfd.</td>
<td>455 Kc.</td>
<td>BC 600 Kc.</td>
<td>A, B, C, D</td>
<td>Align I. F.</td>
</tr>
<tr>
<td>2</td>
<td>R. F. Grid</td>
<td>.5 mfd.</td>
<td>455 Kc.</td>
<td>BC 600 Kc.</td>
<td>E</td>
<td>Adj Wave Trap for Minimum</td>
</tr>
<tr>
<td>3</td>
<td>1 Turn Loop Made from Generator Leads.</td>
<td></td>
<td>1600 Kc.</td>
<td>BC 1600 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>1400 Kc.</td>
<td>BC 1400 Kc.</td>
<td>G</td>
<td>Align Antenna</td>
</tr>
</tbody>
</table>

See Note!
MANUAL TUNING:
Automatically. Five

1. Remove covers from D.
2. Turn band switch to F.M., broadcast and then tune in the selected station. Repeat the operation for greatest accuracy.
3. Adjust the screw and then the hexagonal latch pin (See Figure 1) to give the loudest and clearest reception on the desired station. Repeat the operation for greatest accuracy.

AUTOMATIC-FREQUENCY MODULATION BAND

The six push buttons across the lower part of the control panel (See Figure 2) provide means of tuning F.M. stations either manually or automatically. Five of these push buttons may be preset for five F.M. stations as follows:

(1) Select station within range of No. 1 button.
(2) Remove covers from adjusting screws by pulling latch pin and lifting covers.
(3) Turn band switch to F.M., press No. 1 button and tune in desired station on adjacent automatic adjustments by using the special wrench furnished with the receiver. (See Fig. 4.) First, adjust the screw and then the hexagonal nut to the setting which gives the loudest and clearest reception on the desired station. Repeat the operation for greatest accuracy.

Adjusting wrench furnished with receiver.

**ALIGNMENT AND TRIMMER LOCATIONS FOR MODELS 6A05, 6A05R**

**MODELS 1CH571R, 1CH573**

It will be necessary to first set the automatic tuning adjustments to six preselected stations before the automatic tuning can be used.

Each button and its associated tuning adjustment will tune over a portion of the broadcast band, and any station within its tuning range may be selected for automatic tuning on that button. The tuning ranges are as follows: (See Fig. 2)

- **No. 1 button:** upper left . . . . . 455 Kc. to 940 Kc.
- **No. 2 button:** upper center . . . 455 Kc. to 1350 Kc.
- **No. 3 button:** upper right . . . 600 Kc. to 1550 Kc.
- **No. 4 button:** lower left . . . . 740 Kc. to 1200 Kc.
- **No. 5 button:** lower center . . . 800 Kc. to 1550 Kc.
- **No. 6 button:** lower right . . . . 850 Kc. to 1350 Kc.

To adjust the automatic tuning proceed as follows:

A. Remove the automatic cover plate by pressing on latch pin and lifting away from escutcheon.
B. Select a station within the range of the No. 1 button.
C. Turn the band switch to Broadcast and then tune in the selected station on the dial—then turn band switch to Automatic position.
D. Press the No. 1 button and tune in the same station on the adjacent automatic adjustments by using the special wrench furnished with the receiver. (See Fig. 4.) First, adjust the screw and then the hexagonal nut to the setting which gives the loudest and clearest reception on the desired station. Repeat the operation for greatest accuracy.

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Stage Gains:
Bc. and 455 Kc. I.F.
Ant. to R.F. grid 3.8× at 1000 Kc.
R.F. grid to conv. grid 7× at 1000 Kc.
Conv. grid to I.F. grid 92× at 455 Kc.
Overall audio 778× at 1 watt 400 cycles.

All voltages measured with a 20,000 ohm per volt meter from chassis to socket contact indicated.
All voltages are positive D.C. unless marked otherwise.
Volume control full on.
Line voltage 117 A.C.
Power consumption 60 watts.
### Alignment Procedure

#### Model 75598

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter Grid</td>
<td>5 mfd.</td>
<td>455 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>A, B, C, D</td>
<td>Align I. F.</td>
</tr>
<tr>
<td>2</td>
<td>R. F. Grid</td>
<td>5 mfd.</td>
<td>455 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>E</td>
<td>Adj. Wave Trap for Minimum</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>18 Mc.</td>
<td>SW</td>
<td>18 Mc.</td>
<td>K</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>4</td>
<td>1 Turn Loop Made</td>
<td></td>
<td>16 Mc.</td>
<td>SW</td>
<td>16 Mc.</td>
<td>M</td>
<td>Align Antenna</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>4.5 Mc.</td>
<td>Med.</td>
<td>4.5 Mc.</td>
<td>Q</td>
<td>Rock Gm and Adjust for Max.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>1500 Kc.</td>
<td>BC</td>
<td>1500 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>1400 Kc.</td>
<td>BC</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Align Antenna</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>600 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>J</td>
<td>Rock Gm and Adjust for Max.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Repeat operations 6 - 7 and 3 - 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Models 10H571R, 10H573

<table>
<thead>
<tr>
<th>Optr.</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set Dial At</th>
<th>Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter Grid</td>
<td>5 mfd.</td>
<td>455 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>A, B, C, D</td>
<td>Align I. F.</td>
</tr>
<tr>
<td>2</td>
<td>R. F. Grid</td>
<td>5 mfd.</td>
<td>455 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>E</td>
<td>Adj. Wave Trap for Minimum</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>18 Mc.</td>
<td>SW</td>
<td>18 Mc.</td>
<td>K</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>4</td>
<td>1 Turn Loop with Generator</td>
<td></td>
<td>16 Mc.</td>
<td>SW</td>
<td>16 Mc.</td>
<td>M</td>
<td>Align Antenna</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>4.5 Mc.</td>
<td>Med.</td>
<td>4.5 Mc.</td>
<td>Q</td>
<td>Rock Gm and Adjust for Max.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>1500 Kc.</td>
<td>BC</td>
<td>1500 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>1400 Kc.</td>
<td>BC</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Align Antenna</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>600 Kc.</td>
<td>BC</td>
<td>600 Kc.</td>
<td>J</td>
<td>Rock Gm to Touch BC Finder</td>
<td></td>
</tr>
</tbody>
</table>

Note: Adjust FM LF. frequency to value designated on LF. transformer.
FREQUENCY MODULATION

Broadcasting by the Frequency Modulation method has already proved to be the most satisfactory means of "local" radio transmission with reduced noise and high fidelity. It is not generally understood that these two features of FM are due in a great measure to the wide frequency band which this method of modulation employs. The FM receiver must be accurately aligned because much of the FM system's noise reducing ability is lost if the FM IF and discriminator circuits are misaligned.

The alignment of FM receivers differs from the familiar AM receiver alignment procedure where a modulated signal from the generator is used and the output is measured with an A.C. voltmeter across the voice coil.

The signal generator for FM alignment must be capable of supplying an unmodulated signal of at least 5 volts at the IF frequencies (4 to 9 Mc) and a moderate unmodulated signal at the FM frequencies (45.5 to 55.5 Mc). A 50-650 microammeter, such as Triplet #221 or #222, makes an excel lent output meter when used with our #98614 four-prong plug and cable assembly and a 5.0 P.F. switch (see fig. 1).

The output meter is connected across HALF the diode load resistor for quin alignment and is connected across the FULL diode load resistor for frequency settings. A polarized socket is provided (near the TAS tube) which accommodates the output meter plug to facilitate switching the meter across either FULL or HALF the diode load resistor.

IMPORTANT—The FM IF and discriminator alignment must be followed in a stage-by-stage sequence, beginning at the discriminator and working forward to the converter stage. This differs from the conventional AM IF alignment procedure where the signal is applied to the converter grid and all the IFs are aligned simultaneously.

The signal from the generator must be kept just below the point where the limiter action of the receiver begins. To explain further we should consider the purpose of the limiter. It does what its name implies; it limits the amount of signal applied to the discriminator circuit. When the input signal is strong the limiter cuts off, allowing only a portion of the signal to pass, while at low signal levels the limiter acts as an IF amplifier. Therefore, it is easy to understand why the signal input to the receiver and IFs must be held below the limiter operating range during alignment. The most practical way of determining the proper amount of input signal is to watch the output meter (connected across HALF the diode load) while the signal from the generator is increased. The meter will indicate the increase in signal until limiting action begins, from which point on no appreciable increase can be noted on the meter even though the generator signal has been increased considerably. The desired signal level (from the generator) is just below the limiting point which may be determined by increasing the generator output while watching the output meter, then reducing the generator output slightly when the limiting point is reached.

IF AND DISCRIMINATOR ALIGNMENT

Holes have been placed at the top of all the FM IF transformer shields so that a signal generator may be connected across the transformer secondaries to facilitate frequency alignment (see fig. 2). A very high input signal will be necessary to get an output indication for the discriminator alignment. Should the generator be unable to supply sufficient signal, the Discriminator input may be aligned first in order that its signal input below the point of limiting action.

1. Connect the output meter across the FULL discriminator load. (fig. 1).

2. Feed an unmodulated signal at the IF frequency through the dummy antenna (fig. 2) to the 3rd IF transformer secondary. (The IF frequency is stamped on the IF transformer shields.) Adjust the slug #4 for resonance. Rotating the slug #4 through the resonance point will cause the output meter to swing through zero from positive to negative or vice versa. A zero reading on the meter indicates the desired resonance point.

3. Switch the output meter to HALF discriminator load (fig. 1). Adjust trimmer #4 for maximum output, keeping the signal input below the point of limiting action.

4. (Meter at HALF load) Connect the generator to the 2nd IF transformer secondary and adjust the 3rd IF trimmers #3 and #5 for maximum output.

5. (Meter at HALF load) Connect the generator across the 1st IF transformer secondary and adjust the 2nd IF transformer trimmers #2 and #5 for maximum output.

6. (Meter at FULL load) Connect the generator to the converter grid. A small socket is provided near the converter tube which will accommodate the side pin of the #98615 Dummy Antenna assembly (fig. 2) to facilitate this generator connection. Adjust the 1st IF transformer trimmers #1 and #2 for maximum output.

FM OSCILLATOR AND RF ALIGNMENT

7a. (Meter at FULL load) Connect the generator, through a 100 ohm dummy antenna, to the FM antenna terminals. Set the generator at 50 Mc. and tune in the signal on the receiver. As the pointer passes the 50 Mc. calibration the output meter will swing from negative through zero to a positive reading or vice versa. The resonance point is apt to be at the zero setting. Should the pointer be off calibration more than plus or minus .5 Mc., which is tolerable, the oscillator may be set by adjusting the two flexible green leads between the manual tuning oscillator coil end and the band switch. If the pointer is below 50 Mc. it can be raised by bringing the two green leads together and in the same manner the pointer can be lowered by separating the leads.

7b. (Meter still at FULL load) Set the generator at 40 Mc. and check the dual calibration (zero on meter). 40 Mc. should be on scale unless the cam on the condenser shaft has been loosened. If the cam has to be adjusted to scale the oscillator at 40 Mc. the 50 Mc. oscillator adjustment must be repeated. The converter stage is aligned after the receiver has been adjusted to scale within the .5 Mc. limits.

8a. (Meter at FULL load) With generator connected to the FM antenna terminals through 100 ohm dummy, set the generator at 49 Mc. and tune in signal on receiver to get a zero output meter reading. Switch the meter to HALF load and adjust P1 for maximum output.

8b. (Meter at FULL load) Set generator at 46 Mc. and tune in on receiver. Switch meter to HALF load and adjust P2 for maximum output.

8c. (Meter at FULL load) Set generator at 42.5 Mc. and tune in on receiver. Switch meter to HALF load and adjust P2 for maximum output.

There are no RF adjustments for the FM push buttons when the push buttons are used on automatic. Button #1 is checked at 50 Mc., button #2 and #3 checked at 49 Mc., buttons #5 and #8 checked at 45.5 Mc. and button #4 is checked at 42.5 Mc.

In conclusion we again wish to emphasize the importance of keeping the signal from the generator below the point where limiter action begins, that the output meter is connected across the full diode load resistor for frequency and calibration operations, and that the output meter is connected across HALF the diode load resistor for gain checks.
ALIGNMENT:
The alignment of a receiver is one of the most important functions that a serviceman performs, and the instructions must be carefully followed.

CAUTION:
Care should be taken while making all adjustments on the receiver to have the volume control turned all the way down. The intensity of the signal should be reduced only to the point where it is audible.

The signal for the entire alignment procedure, both I.F. and R.F., is fed through a special Zenith dummy which can be purchased from your Zenith distributor.

The capacitors in the Zenith dummy antennas shown in Fig. 2 are identical with the Ford antennas.

NOTE:
This receiver is equipped with an adjustable sensitivity control located on the bottom of the chassis as shown in Fig. 1. The control is set at the factory to a position which gives sensitivity of 7 microvolts at 1 watt output. It is found advisable to hold the receiver at this level as any higher sensitivity may result in excessive background noise and unless laboratory equipment is available for measuring sensitivity it is not advisable to change the setting.

R.F.—
1. The receiver is returned to manual tuning.
2. The tuning control is rotated until the condenser plates are out of mesh (1600 K.C.)

I.F.—
1. The receiver must be in one of the automatic positions.
2. The signal generator is set at 455 K.C. and led through the special Zenith dummy to the receiver.
3. The R.F. and code trap adjustment screw A (see Fig. 3) is adjusted for maximum response.

4. The adjustment screws B, C, D and E (see Fig. 3) are then adjusted in order for maximum response.
5. The code trap A is then adjusted for minimum response.

6. The signal generator is set at 1600 K.C.
7. Adjust the 1600 K.C. oscillator trimmer F (see Fig. 4) for maximum response.
8. Set the signal generator to 1400 K.C. and rotate the tuning control until a signal is heard.

9. Adjust the R.F. trimmer G (see Fig. 4) and the antenna trimmer H (see Fig. 5) for maximum response.

10. Set the signal generator to 600 K.C. and rotate the tuning control until signal is heard.
11. The condenser gang is then rocked slightly while adjusting the 600 K.C. pad (see Fig. 4).

SETTING THE ROTO-SELECTOR:
First turn the receiver on, and allow it to operate for approximately half an hour. This is necessary in order that the operating temperature may reach normal, and thereby make accurate adjustment. After the set has been on for the necessary length of time, remove the plastic escutcheon over the tuning control by first pulling off the three knobs and removing the lock nuts on the tuning and volume control shafts. With the escutcheon removed, the automatic adjusting screws become accessible as shown in Fig. 5. The adjustments are made by means of a special wrench held in the corresponding position for each adjusting screw.

The station adjusting eye can be used to great advantage in setting the stations in position by a clip as shown in Fig. 5 and this will enable you to get an accurate reading regardless of the signal strength.

The eye may also be used when aligning the receiver instead of an output meter. The eye with a special cable and plug is available at your Zenith distributor.

GANG MESHED, POINTER AT 540 K.C.

The stringing of the dial cord is very important for properly strung the cord will jump off the pulleys. Figure 6 shows the proper way to string the cord.

The jumper shown on the test socket in Fig. 1 is provided so that an output meter may be connected to the voice coil side of the output transformer. If you have the type of output meter which is usually connected to the plate of the output tube, it may be adapted for this type of connection by following the instructions shown in Fig. 7.

VOLUME CONTROL
2 TO 4 OHM TERMINAL TRANSFORMER

TO CASE OF RECEIVER
OUTPUT METER
LEADS

MODELS 6M590 6M591

ZENITH RADIO CORP.
TUBE COMPLEMENT

7A7 R.F.
7B8 Oscillator and Modulator;
7A7 I.F.;
7B6 Second Detector and A.V.C.;
7B5 Pentode power output;
6X5GT Rectifier.

CURRENT CONSUMPTION - 6 amp.

SENSITIVITY - 9 microvolts at one watt output.

POWER OUTPUT - 3 watts measured at the voice coil.
ALIGNMENT:

The alignment of a receiver is one of the most important functions that a service man performs, and the instructions must be carefully followed.

CAUTION:

Care should be taken while making all adjustments on the receiver to have the volume control turned full on. The intensity of the signal should be reduced only at the signal generator.

The signal for the entire alignment procedure, both I.F. and R.F. is fed through a special Zenith dummy which can be purchased from your Zenith distributor, Part No. S9187. The capacities in the Zenith dummy antenna as shown in Fig. 2 are identical with the Ford antenna.

NOTE:

The dummy is equipped with an adjustable sensitivity control located on the bottom of the chassis as shown in Fig. 1. The control is set at the factory in a position which gives sensitivity of 0 microvolts at 1 watt output. It is found advisable to hold the receiver at this level as any higher sensitivity may result in excessive background noise and unless laboratory equipment is available for measuring sensitivity it is not advisable to change the setting.

I.F. —

1. The tuning control is rotated until the condenser plates are fully meshed. (540 K.C.)
2. The signal generator is set at 455 K.C. and fed through the special Zenith dummy to the receiver.
3. The adjustment screws A, B, C, and D (see Fig. 3) are then adjusted in order for maximum response.
4. Set signal generator to 1400 K.C. and rotate the tuning control until the signal is heard.
5. Adjust the 1400 antenna trimmer E (see Fig. 4) for maximum response.

R.F. —

1. The tuning control is rotated until the condenser plates are out of mesh. (1000 K.C.)
2. The signal generator is set to 1000 K.C.
3. Adjust the 1000 K.C. oscillator trimmer E (see Fig. 4) for maximum response.
4. Set signal generator to 1400 K.C. and rotate the tuning control until a signal is heard.
5. Adjust the 1400 antenna trimmer F (see Fig. 5) for maximum response.
6. Set the signal generator to 600 K.C. and rotate the tuning control until the signal is heard.

GANG MESHED, DIAL AT 540 K.C.

The Zenith Radio Corporation furnishes the antenna for 1941 Ford and Mercury only.

Parts for this antenna will be available at your Zenith distributor.

The jumper shown in the test socket in Fig. 1 is provided so that an output meter may be connected to the voice coil side of the output transformer.

If you have the type of output meter which is usually connected to the plate of the output tube, it may be adapted for this type of connection by following the instructions shown in Fig. 7.
NOTE: This receiver is equipped with an adjustable sensitivity control located on the top of the chassis as shown in Fig. 3. The control is set at the lowest position which gives sensitivity of 8 microvolts at 1 watt output. It is found advisable to hold the receiver at this level on any higher sensitivity may result in excessive background noise and unless laboratory equipment is available for measuring sensitivity, it is not advisable to change this setting.

I.F.: The receiver must be in one of the automatic positions. The signal generator is set at 655 K.C. and let through the special Zenith antenna dummy in the receiver. The code trap adjustment screw A (see Fig. 5) is adjusted for maximum response. The adjustment screws B, C, D and E are then adjusted in order for maximum response on the output meter (See Fig. 5). The code trap A is then adjusted for minimum response.

R.F.: The receiver is returned to manual and the tuning control is rotated until the condenser plates are out of phase (1600 K.C.) Set the signal generator to 1600 K.C. and adjust the 1600 K.C. oscillator trimmer (See Fig. 5) for maximum response.

Set the signal generator to 1400 K.C. and rotate the tuning control until a signal is heard and adjust the R.F. trimmer G and antenna trimmer H (See Fig. 5) for maximum response.

Set the signal generator to 600 K.C. and rotate the tuning control until the signal is heard. The condenser gang is then rocked slightly while adjusting the 600 K.C. condenser I (See Fig. 5) to maximum reading on output meter.

IMPORTANT — Unless certain dummy antenna capacities are employed with either the signal generator, or in making the adjustments on stations, a receiver will not respond properly. The capacities provided in the Zenith dummy antenna set No. 57694 shown in Fig. 6 are identical with the conditions found in the Nash car, and if adjusted accordingly, the instrument will operate properly when reinstalled in the automobile. The Zenith dummy antenna is especially priced very low, and should be purchased at once for use in servicing the Zenith built Nash receiver.

A station close to 580 K.C. is set by having the figure 1 so it would appear in indicator window. The adjustment screw No. 1 (See Fig. 5) is then adjusted to the proper signal until the tuning eye gap can not be decreased in size. The No. 1 nut (See Fig. 5) is then adjusted until the gap on the tuning eye cannot be further decreased in size. A wrench for making these adjustments is located on the side of the receiver. (See Fig. 7)

(D) For stations 2, 3, etc. on the Safety Automatic Electric Tuner you set the adjustment screws and nut the same as for station 1.

The Safety Automatic Station Adjusting Eye is available on all Zenith distributors.

The stringing of the dial cord is very important for unless properly strung the cord will jump off the pulleys. Figure 9 shows the proper way to string the cords on both receivers.
Sensitivity—6 microvolts at one watt output. Power Output—6 watts measured at the voice coil. Tuning Range—540 to 1600 K.C. Speaker—full size electrodynamic. I.F.—455 K.C. Roto-Selector tuning with foot control switch—Selection of any five desired stations automatically by using the foot control or Roto-Selector on instrument panel.

Tube Complement—7A7 R.F.—7B8 oscillator and modulator—7A7 I.F.—7B6 2nd detector and A.V.C.—two 7C5 beam power push pull output—6X5GT or 0Z4 rectifier—Current consumption 8 amperes.
ALIGNMENT:
The alignment of the receiver is one of the most important functions that a service man performs, and the instructions must be carefully followed.

CAUTION:
Great care should be taken while making all adjustments on the receiver to have the volume control turned full on. The intensity of the signal should be reduced only at the signal generator.

The signal for the entire alignment procedure, both I.F. and R.F., is fed through a special Zenith dummy which can be purchased from your Zenith distributor—Part No. 95919.

The capacities in the Zenith dummy as shown in Fig. 2 are identical with the Lincoln antenna, and if the receiver is adjusted accordingly, the instrument will operate properly when installed in the car.

TUBE LAYOUT—MODEL 7ML 592

R.F.:
1. The receiver is returned to manual tuning.
2. The tuning control is rotated until the condenser plates are out of mesh (1600 K.C.)
3. The signal generator is set to 1600 K.C.
4. Adjust the 1600 K.C. oscillator trimmer F (see Fig. 4) for maximum response.
5. Set signal generator to 1400 K.C. and rotate the tuning control until a signal is heard.
6. Adjust the R.F. trimmer G (see Fig. 4) and the antenna trimmer H (see Fig. 5) for maximum response.
7. Set the signal generator to 600 K.C. and rotate the tuning control until signal is heard.
8. The condenser gang is then rocked slightly while adjusting the 600 K.C. padder I (see Fig. 4) for maximum response.

OSC. TRIMMER 1400 RF TRIMMER 1400

TRIMMER LAYOUT FIG. 4 MODEL 7ML 592

3. Adjust the No. 1 screw (see Fig. 5) with the wrench provided until the desired station is tuned to the loudest point.
4. Adjust No. 1 nut (see Fig. 5) for maximum signal.

A station adjusting eye is available at your Zenith distributor. It is especially essential when setting the Roto-Selector on a strong signal. This eye may also be used for alignment work instead of an output meter.

A jumper is provided on the test socket (see Fig. 1) located on the bottom of the receiver. Removing of this jumper will open the voice coil and allow you to connect your output meter to the voice coil side of the output transformer.

If you have the type of output meter which is usually connected to the plate of the output tube, it may be adapted for VOICE COIL TERMINAL OUTPUT TRANSFORMER

2 TO 4 OHM SEC. TO CASE OF OUTPUT METER LEADS

this type of connection by following the instructions shown in Fig. 7.

The stringing of the dial cord is most important for unless properly strung the cord will jump off the pulleys. Fig. 8 shows the proper way to string the dial cord.
AIR-KING PRODUCTS CO. INC.

MODEL 4037

This receiver comprises a five tube superheterodyne receiver, employing the new 1.4 volt battery tubes. This receiver operates on either batteries, or 110-125 volts A.C.-D.C. The frequency range covered is standard broadcast 530 to 1730 kc and some of the low frequency police transmitters.

ELECTRIC OPERATION:
A power cord and plug is provided in a compartment at the rear of the cabinet. To place the set in operation, stretch the line cord to its full length and plug it into the electric outlet. Finally, the set may be quit on by releasing the volume control knob when the set is operated on the power lines. Do not attempt to close the flap when the line cord is plugged into the electric outlet.

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