VOLUME X

PERPETUAL

TROUBLESHOOTER'S
MANUAL

REG. U.S. PAT. OFF.

JOHN F. RIDER
Schematic, Voltage, Chassis, Color Code

SEARS-ROEBUCK & CO.

MODEL 3972
Chassis 113.972

SEARS PAGE 10-1

LOCATION OF PARTS UNDER CHASSIS

COLOR CODE-POWER TRANS LEADS

BLUE

PART NO. 111791241

LOCA 6.3v 5sc. FILS.

BROWN SOLID

PRIM.

BROWN 105-120v 60-50Hz

BLACK CT.

RED HV.

COLOR CODE-OUTPUT TRANS. LEADS

COPPER FLEX

BLUE

BEIGE

803G DEL-PWC; AF.

BLACK

WO DZ 41

OUTPUT

LOW FREQ = 463 KC.

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS

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GENERAL INFORMATION & SERVICE HINTS

Should it be necessary to remove the chassis from the cabinet it is important when reassembling the receiver that the selector knob not be pushed on the shaft so far that it will exert pressure on the front of the cabinet, as any friction at this point will cause difficulty in operating the push buttons.

Should there be instances where it is difficult to set the push buttons accurately on a station it is very possible that the trouble is caused by a slight burr on the end of the screw insert in the push button knobs. Remove the push button in question and remove the burr that might be on the end of the screw.

ELECTRICAL SPECIFICATIONS

TUBES AND FUNCTIONS:
- 6A7: Translator-Oscillator
- 41: Output
- 606: Rectifier
- 6Q7: AVC detector, 1st audio

POWER SUPPLY:
105 - 120 Volts, 50-60 Cycle A.C.

ALIGNMENT FREQUENCIES:
- Broadcast: 540-1750 KC
- Intermediate: 47 Watts

LOUD SPEAKER:
- Dynamic: Type 6, 6 inch, Field resistance 1600 ohms

FREQUENCY RANGE:
- Broadcast: 540-1750 KC
- Intermediate: 47 Watts

POWER OUTPUT:
- Type: Single Pentode
- Undistorted: 1000 Watts
- Maximum: 3000 Watts

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:
1. Left knob: "On-Off" switch and volume control
2. Center knob: Tone control
3. Right knob: Station selector tuner ratio: 1.1

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SEARS PAGE 10-3

JULY 5, 1938

POWER SUPPLY:
"A" Battery (4 volt dry) 1 - #6033P
"A" Battery (4 volt storage) 1 - #6049
"B" Batteries 2 - #5131P

FREQUENCY RANGES:
Band "A" 540-1780 kc
Band "P" 1760-6300 kc
Band "F" 5975-18500 kc

ALIGNMENT FREQUENCIES:
Oscill. Trimmer Trimmer Padder
Band "A" 1400 kc 1400 ko 600 kc
Band "P" 5 mc 5 mc Fixed
Band "F" -- 15 mc Fixed

INTERMEDIATE FREQUENCY

POWER OUTPUT:
Type Class "B"
Undistorted 0.45 watts
Maximum 0.9 watts

OPERATING FEATURES:
Three position Tone Control
Automatic Volume Control
"On-Off" Indicator
Flash-O-Light Dial Illumination
Short Wave Stations marked on dial
Wave Band Indicator

LOAD SPEAKER:
Type Permanent Magnet Dynamic
Size 5 and 8 inch

CHASSIS FEATURES:
Number RF stages One on Broadcast Band
Number IF stages Two
Number condensers in gang Three
Antenna Conventional
Plugs attached to battery cable

LOCATIONS OF PARTS ON TOP OF CHASSIS

©John F. Rider, Publisher
MODEL 4700, CHASSIS 104.252

ALIGNMENT PROCEDURE

PRELIMINARY:
Output meter connections ........................................... Across speaker noise coil
Output meter reading to indicate 1 volt: ................................ 1.0 volts
Average sensitivity in microvolts for 1 volt output: .......... See chart below
Generator ground lead connection: .......................... Receiver Chassis
Generator modulation: .......................................... 30K, 400 cycles
Position of volume control: ...................................... Fully clockwise
Cover must be on when making R, F adjustments.

Position of Dial Pointer Generator Frequency Dummy Antenna Generator Connections Adjustment Symbol Circuit Adjusted Approx. Microvolts
No Signal 425 EC .001 MFD. 657 grid C-10 End IF 3500
No Signal 550-750 EC .001 MFD. 657 grid C-10 Trans.
1500 EC 1500 EC .0001 MFD. C-3 Ant. Lead 80
1500 EC 600 EC .0001 MFD. Ant. Lead 15
1500 EC 1400 EC .0001 MFD. Ant. Lead 15
1500 EC 800 EC .0001 MFD. Ant. Lead C-2 ** Ant. 15

IMPORTANT ALIGNMENT NOTES

Make the generator connections to the receiver through a shielded lead having not more than 50 MF (0.0005) capacity. If a series condenser has been employed as outlined in the first paragraph under "General Information and Service Hints", the dummy antenna should be the same as the antenna itself.

"Westjet 2-2 after installation as outlined under "Antenna Matching in Service Hints," each step of the Alignment Procedure should be repeated in order to avoid greater accuracy. Always keep the output from the signal generator at its lowest possible value to prevent any possible AC feed through. Therefore, it is essential to have the receiver completely ready for alignment. The alignment adjustment screws are shown in Figures 3 and 4.

Baltic circuit alignment can be made only at high frequencies. A fixed resistor is used in series with the return of the oscillator coil secondary. Oscillator coil inductance is predicated at 300KHz.

Values shown in "Microvolts" are only approximate.

Dial Adjustments:

Rotate dial completely to the right. Then rotate dial completely to the left. Now dial will be set properly.

If contacts operate with too much difficulty it indicates that the control cables are bent too sharply. This should be avoided.

CABINETS AND REMENDS FOR UNUSUAL NOISE CONDITIONS

If after making proper installation of receiver, you encounter noise you cannot eliminate refer to section on Noise Suppression and Equalization.

ELIMINATING WHISTLE AT 900 TO 500 KC

In addition where a strong 30 KC station is operating, a whistle may be experienced at 900 to 500 KC. This whistle is due to a beat between the second harmonic (810 KC) of the 455 KC I-F. and the 900 KC station. Such a condition may be corrected by changing the I-F. frequency to a higher or lower value until the whistle disappears. However, the I-F. amplifier should not be shifted to a frequency higher than 460 KC nor lower than 440 KC but should be as close to 455 KC as possible.

If the I-F. frequency is changed, it will be necessary to realign the rest of the receiver as described under "Alignment Procedure".

Antenna Matching:

An antenna padder condenser is used to match antenna capacities up to 500 MF. If, in the installation this padder is not effective, it is because the capacity of the antenna is over 500 MF. In that case a fixed capacity of 0.0005 MF or less should be connected in series with the antenna. The location of the antenna adjustment is found on Fig. 3.
<table>
<thead>
<tr>
<th>PART LOCATION</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>6076, 6077, 6106, 6107, 6116, 6117</td>
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<td>6075, 6078, 6105, 6108, 6115, 6118</td>
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John F. Rider, Publisher
MODELS 4632A, 4633A, 6014, 6015, 6044, 6045, 6144, 6154,
6064 Ch. 101.505, 101.505X
Socket, Chasis, Notes

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Arrangement of Batteries

Power Output:
- Type: Single Pentode
- Undistorted: 0.25 watts
- Maximum: 0.4 watts

 Loud Speaker:
- Type: P.M. Dynamic
- Size: 5 inches

Frequency Range:
- Broadcast: 540-1750 kHz

Alignment Frequencies:
- Oscillator
- Antenna-Transl.
- Trimmer
- Trimmer
- Fader
- 1400 kHz
- 1400 kHz
- 600 kHz

Intermediate Frequency: 465 kHz

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Socket, Chassis MODELS 6044, 6045

Output meter connections, Models 6044, 6010, 6052

Output reading to indicate 50 millivolts

Generator Ground lead connection

Dummy antenna value to be in series with generator output

Generator modulation

Approximate sensitivity in microvolts for 50 milliwatts output

Position of volume control

Position of Tone control, Models 6044, 6010, 6052

TRIMMER ADJUSTMENTS (IN ORDER SHOWN)

TRIMMER FUNCTION

APPROXIMATE MICROVOLTS

M O D E L S

800 kc

1400 kc

800 kc (sym)

300 kc

ANTENNA CONNECTION

GND.

1/2 kc

1/2 kc

1039 Trnl.

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Schematic, Voltage Changes for Jacks

SEARS-ROEBUCK & CO.

MODELS 4667, 4677, 4767, 4777
4798 Chassis 101.490

POWER SUPPLY:
All models available ............. 105-185 volts, 50-60 cycle, 75 watts
All models available ............. 125-185 volts, 35 cycle, 75 watts

FREQUENCY RANGES:
Band *A* ..................... 540-1750 kc
Band *F* ..................... 2150-2300 kc
Band *M* ..................... 6-18.2 mc

LOUD SPEAKER:
Type ...................... Dynamic
Size ..................... 6" x 8" x 8" (8" dia.)
App. field coil resistance .. 1000 ohms
App. field coil voltage drop .. 110 volts

INTERMEDIATE FREQUENCY
455 kc

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GENERAL INFORMATION & SERVICE HINTS

INSTRUCTIONS FOR SETTING UP PUSH BUTTON STATIONS:

1. The trap has two terminals marked "ANC" and "ANT". Disconnect the antenna lead from the receiver and connect it to the "ANT" terminal of the trap. Connect a wire from the "ANT" terminal of the trap to the "ANC" terminal of the chassis. When the trap is in series between the antenna and the receiver, the last antenna and the interfering station will be shorted out. The sensitivity of the receiver will be reduced in the region of frequency to which the trap is tuned.

INSTALLATION OF A PHONOGRAPH PICKUP JACK OR AN EARPHONE JACK: FOR CHASSIS 101,498 ONLY

A kit, part 010417188, can be ordered from Colonial Radio, 2560 Broadway, Buffalo, N.Y. It contains the necessary parts for installing either a phonograph pickup jack or an earphone jack. If the customer desires both, a phonograph pickup jack and an earphone jack, it will be necessary to use two kits and to drill an additional hole in the back of the chassis for the additional jack.

PHONOGRAPH PICKUP JACK: A hole, covered with a brass insert, is provided in the back of the chassis. Clearance the brass insert and mount the jack in this hole. This kit contains the necessary parts for installing either a phonograph pickup jack or an earphone jack. If you desire both, you must install both a phonograph pickup jack and an earphone jack. The kit will contain two kits and two additional holes in the back of the chassis for the additional jack.

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SEARS-ROEBUCK & CO.

**Model 36**

- Variable resistor wired from 17 to 400,000 ohm.
- 800 ohm resistors are used only on 40 cycle sets.
- The two 40,000 ohm resistors and the ground leads are connected together on 25 cycle sets.

**Model 36-P**

- Variable resistor wired from 17 to 400,000 ohm.
- 800 ohm resistors are used only on 40 cycle sets.
- The two 40,000 ohm resistors and the ground leads are connected together on 25 cycle sets.

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OPERATING FEATURES:

POWER SUPPLY:

FREQUENCY RANGES:

INTERMEDIATE FREQUENCY

POWER OUTPUT:

OPERATING FEATURES:

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:

CONTROL OPERATION:

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ALIGNMENT PROCEDURE:

Output meter readings to indicate 8000 volt. Output meter readings to indicate 8000 volt.

Average sensitivity to be measured with generator output at 8000 volt. Average sensitivity to be measured with generator output at 8000 volt.

Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration: Generator calibration:


B.C. 300 1000 600 400 300 100 60 30 10 5

B.C. 150 150 150 150 150 150 150 150 150 150

57RL 75

FEB.16.1938

SEARS-ROEBUCK & CO.

MODEL 4668, Ch. 103 AR166

Socket, Trimmers

Alignment

Located of parts top of chassis

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INSTALLATION OF A PHONOGRAPH PICKUP JACK OR AN EARPHONE JACK:

A kit, part #101817189, can be ordered from Colonial Radio Corporation, 254 Rano Street, Buffalo, N. Y. The retail selling price is $1.11. This kit contains the necessary parts for installing either a phonograph pick-up jack or an earphone jack. If the customer desires both a phonograph pick-up jack and an earphone jack, it will be necessary to use two kits and to drill an additional hole in the back of the chassis for the additional jack.

PHONOGRAPHE PICK-UP JACK: A hole, covered with a brass insert, is provided in the back of the chassis. Remove the brass insert and mount the jack in this hole. Insulate the jack from the chassis by means of the two insulating washers supplied in the kit. The Schematic Section shows the connections to the jack.

Disconnect the jumper that is between prongs #1 and #4 of the speaker socket and move the lead on prong #1 to prong #4.

Locate the electrolytic condenser mounted alongside the power transformer. A green lead runs from the anode (center terminal) of this electrolytic to prong #3 of the speaker socket. Transfer the connections of this lead from the anode to the cathode (mounting nut) of the electrolytic and from prong #2 to prong #1 of the speaker socket.

There is a jumper between the cathodes of the two electrolytics. Disconnect this jumper. Run a jumper between the anodes of the two electrolytics.

There is a four-terminal board mounted under the nut that holds the IF output transformer. Run a lead from the terminal nearest the speaker socket on this board to prong #3 of the speaker socket.

Run a lead from lug #1 of the jack to the cathode of the 6K7G tube.

Connect the .05 mf condenser from lug #2 of the jack to the blank prong (3rd one clockwise from the locating pin when viewed from the underside) of the 6K7G tube socket.

Run a lead from lug #3 of the jack to the coil terminal shown in the illustration.

Connect the 500M ohm resistor, supplied in the kit, between lug #4 of the jack and prong #1 of the speaker socket.

The radio Volume Control and Tone Control will operate for the phonograph pick-up.

EARPHONE JACK: Mount the jack in the hole in the back of the chassis. The jack frame must be grounded to the chassis. Therefore, do not use the insulating washers.

Connect the .05 condenser from terminal #2 of the jack to the grid prong of the 6V6G output tube.

Connect terminal #3 of the jack to terminal #5 of the speaker socket.

Connect terminal #4 of the jack to terminal #3 of the speaker socket.

This is the only wiring necessary. The wiring changes mentioned above for connection of the phonograph pick-up jack are not to be done if only an earphone jack is used.

With the connections as described, the loud speaker will not operate when the earphones are plugged in. If it is desired to have the loud speaker operate at the same time the earphones are plugged in, the connections to terminals 3 and 4 of the jack should be omitted.
SEARS-ROEBUCK & CO.

1. Left knob . . . "On-Off" switch and Volume
2. Next to left knob . . . Wave Band switch and Push Button Tuning
3. Center knob . . . . Tuning
4. Next to right knob . . Selectivity
5. Right knob . . . Tone Control

DIAL & KNOB FUNCTIONS

The trap has two terminals marked, "ANT" and "SET". If a conventional antenna is being used (not a doublet), the trap will be connected as follows. Disconnect the antenna lead-in from the receiver and connect it to the "ANT" terminal of the trap. Connect a wire from the "SET" terminal of the trap to the "ANT" terminal of the chassis. The ground connection to the chassis remains as it was. The trap then is in series between the antenna and the receiver. The trap should be tuned to eliminate the interfering station. The sensitivity of the receiver will be reduced in the region of the frequency to which the trap is tuned.

If a doublet antenna is installed with the receiver, the trap must be connected between the antenna lug of the broadcast antenna coil primary and the Wave Switch. Remove the lead between the antenna lug of the primary and the wave switch. Connect the "ANT" terminal of the trap to the wave switch lug. Connect the "SET" terminal of the trap to the antenna coil lug. See Illustration below.

ANTENNA CONNECTIONS

1. Trap for eliminating broadcast station interference.

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**ALIGNMENT PROCEDURE**

**Preliminary**

- Output meter connections: Across speaker voice coil
- Output meter reading to indicate .5 watts output: 1.21 volts
- Approximate average sensitivity in microvolts for .5 watts output: See chart below
- Dummy antenna value to be in series with generator output: See chart below
- Connection of generator output lead: To chassis
- Connection of generator ground lead: To chassis
- Generator modulation: 30%, 400 cycles
- Position of volume control: Fully clockwise
- Position of tone control: Fully clockwise
- Position of selectivity control: Sharp
- Position of dial pointer with variable fully closed: To fall on last calibration mark at 550 kc end of AMERICAN band.

<table>
<thead>
<tr>
<th>Wave Band</th>
<th>Switch Position</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection</th>
<th>Trimmer Adjacent (1 in order shunted)</th>
<th>Trimmer Approximate</th>
<th>Function</th>
<th>Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>INT</em></td>
<td>1.8 mc</td>
<td>400 kc</td>
<td>.1 mfd.</td>
<td>600G Grid</td>
<td>T2, T1</td>
<td>IP</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td><em>AM</em></td>
<td>Closed</td>
<td>465 kc</td>
<td>.0005 mfd.</td>
<td>Ant. Term.</td>
<td>01 * IP trap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>AM</em></td>
<td>1500 kc</td>
<td>1500 kc</td>
<td>.0005 mfd.</td>
<td>Ant. Term.</td>
<td>02, 04, Oscillator, 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>AM</em></td>
<td>900 kc (rock)</td>
<td>900 kc</td>
<td>.0005 mfd.</td>
<td>Ant. Term.</td>
<td>03</td>
<td>Pedder</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><em>INT</em></td>
<td>5 mc</td>
<td>5 mc</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>05</td>
<td>Oscillator</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>INT</em></td>
<td>5 mc (rock)</td>
<td>5 mc</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>05, 03</td>
<td>Transl., RF</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>INT</em></td>
<td>2 mc (rock)</td>
<td>2 mc</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>03</td>
<td>Pedder</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><em>FDR</em></td>
<td>16 mc</td>
<td>16 mc</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>03</td>
<td>Oscillator</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>FDR</em></td>
<td>15 mc (rock)</td>
<td>15 mc</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>03, 04</td>
<td>Transl., RF</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Important Alignment Notes**

- If the frequency of an interfering code station is known, the generator should be adjusted a frequency instead of to 480 kc. The trap should be adjusted to give optimum output meter deflection instead of the usual maximum reading.

- Where indicated by the word 'rock', the variable should be rocked back and forth a degree or two while making the adjustment.

- It is necessary to repeat the entire alignment procedure step by step in the original order to assure proper alignment. Perfect alignment is not possible with one adjustment of the trimmers.

- Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

- The shield plate that covers the coil assembly should be left in place while making the alignment adjustments. The trimmer screws are accessible through the holes in the shield. Only the dummy antenna indicated in the chart for any particular band should be used. Never use the dummy antenna used for alignment of any other band.

- No connection should be made to the doublet terminal on the antenna connection block.
Automatic Tuner Data

The Automatic Tuning Dial on the 4786 Model is designed to select any station without the need for manual tuning. To make sure the Automatic Tuning Dial is used, it must first be turned to the desired frequency. The Automatic Tuning Dial can be turned to any frequency simply by pressing the button on the side of the dial. Once the button is pressed, the dial will turn to the desired frequency and the station will be tuned in automatically.

To set the Automatic Tuning Dial, simply press the button on the side of the dial and turn to the desired frequency. The dial will turn to the correct frequency automatically. Once the button is released, the dial will stop and the station will be tuned in. The Automatic Tuning Dial can be set to any frequency simply by pressing the button and turning to the desired frequency.

Once the Automatic Tuning Dial is set to the desired frequency, the station will automatically be tuned in. The station will remain tuned in until the button is pressed again to select a different frequency. The Automatic Tuning Dial is a convenient feature for those who do not want to manually tune in to each station.

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After the AUTOMATIC TUNING DIAL button has been adjusted properly and the mechanism locked as described, you are ready to insert the cap with the station's call letters on it. This will orient your radio from a "common" Retail Store model as follows:

**RETAIL STORE MODELS**

Push out the disc containing the call letters of your selected station. Place one of the clear celluloid discs into one of the metal envelopes and cover the call letters in the disc. Be sure to put the disc in so that the call letters are readable from the front of the cap. See Fig. 17. Then, place the cap into the button for your station. See Fig. 18. Be sure the cap is put in so that the call letters are upright and can be read easily.

The cap is held on the dial mechanism by the forefinger and forefinger as shown in Fig. 8. As before, the mechanism must be held firmly with one hand, being careful not to touch the knob with your finger. The knob should be turned until the pointer reaches the mark on the dial corresponding to the call letters in the disc. Be sure to mount the correct pattern to the bottom of the cap. See Fig. 20.

**MAIL ORDER MODELS**

In mail order made models, the call letters on the disc are mounted behind a second station on your selected list. This can be done by rotating the center tuning shaft as shown in Fig. 21. In the illustration, the 600 kc station has been chosen as an example. When the 600 kc station is approximately 500 and 600 kw, the Tuning Eye should be set at the call letters and that button #1 will be pointed toward the center tuning shaft. Your station button #1 will be any station between approximately 500 and 600 kw since this is the frequency range for buttons. See Fig. 22 and 24.

Insert the key (Fig. 23) into button #1. Push the button all the way in by means of one key and turn the button. As before, you cannot turn the button on the knob of the knob that will tell you. In that direction to turn the button, the button should be turned so that the nut will fall on an imaginary line. When the button is pointed at the center of the AUTOMATIC TUNING dial, when the button reaches this point you will find that the button of the button will cause the entire AUTOMATIC TUNING mechanism to move and will also cause the pointer to move to the side of the dial. Carefully turn the knob so that your selected station will be pointed toward the center tuning shaft. The station must be set while the button is pointed in the sides of the station that the Tuning Eye is not in exactly the position that the Tuning Eye is not exactly at 500 kw. See Fig. 25.

Carefully pull out the key allowing the button to snap back into position. If the button does not snap back into position, it should be replaced. See Fig. 26. The button should not be turned after being replaced. The button should be turned again until the mechanism has been locked as described in the following paragraph.

The button is locked by sliding the knob to the right as indicated by the forefinger and forefinger as shown in Fig. 27. To check the security of your setting of the button by turning the knob AUTOMATIC mechanism is in the position shown or on, that your station is not the proper 

button that you have just adjusted all the way in with your finger and turn the button so that the button reaches its stop. Then remove your finger from the button and your station will be tuned in. Here again, rotating the correct station number as illustrated in Fig. 28. Use the Tuning Eye to determine exactness of tuning. If you find that you can tune the station in error by means of the center tuning shaft or by means of the AUTOMATIC TUNING DIAL button, it indicates that you have not adjusted the button carefully enough and the procedure should be repeated more carefully.

After the AUTOMATIC TUNING DIAL button has been adjusted properly and the mechanism locked as described, the button is ready to be inserted with the station's call letters.

If you purchased your radio from a Sears Retail Store model proceed as follows:

**RETAIL STORE MODELS**

Push out the disc containing the call letters of your selected station. Place one of the clear celluloid discs into one of the metal envelopes and cover the call letters in the disc. Be sure to put the disc in so that the call letters are readable from the front of the cap. See Fig. 17. Then, place the cap into the button for your station. See Fig. 18. Be sure the cap is put in so that the call letters are upright and can be read easily.

**MAIL ORDER MODELS**

In mail order made models, the call letters on the disc are mounted behind a second station on your selected list. This can be done by rotating the center tuning shaft as shown in Fig. 21. In the illustration, the 600 kc station has been chosen as an example. When the 600 kc station is approximately 500 and 600 kw, the Tuning Eye should be set at the call letters and that button #1 will be pointed toward the center tuning shaft. Your station button #1 will be any station between approximately 500 and 600 kw since this is the frequency range for buttons. See Fig. 22 and 24.

Insert the key (Fig. 23) into button #1. Push the button all the way in by means of one key and turn the button. As before, you cannot turn the button on the knob of the knob that will tell you. In that direction to turn the button, the button should be turned so that the nut will fall on an imaginary line. When the button is pointed at the center of the AUTOMATIC TUNING dial, when the button reaches this point you will find that the button of the button will cause the entire AUTOMATIC TUNING mechanism to move and will also cause the pointer to move to the side of the dial. Carefully turn the knob so that your selected station will be pointed toward the center tuning shaft. The station must be set while the button is pointed in the sides of the station that the Tuning Eye is not in exactly the position that the Tuning Eye is not exactly at 500 kw. See Fig. 25.

Carefully pull out the key allowing the button to snap back into position. If the button does not snap back into position, it should be replaced. See Fig. 26. The button should not be turned after being replaced. The button should be turned again until the mechanism has been locked as described in the following paragraph.

The button is locked by sliding the knob to the right as indicated by the forefinger and forefinger as shown in Fig. 27. To check the security of your setting of the button by turning the knob AUTOMATIC mechanism is in the position shown or on, that your station is not the proper 

button that you have just adjusted all the way in with your finger and turn the button so that the button reaches its stop. Then remove your finger from the button and your station will be tuned in. Here again, rotating the correct station number as illustrated in Fig. 28. Use the Tuning Eye to determine exactness of tuning. If you find that you can tune the station in error by means of the center tuning shaft or by means of the AUTOMATIC TUNING DIAL button, it indicates that you have not adjusted the button carefully enough and the procedure should be repeated more carefully.
SUBJECT:  READJUSTING THE AUTOMATIC TUNING DIAL STOP BUTTON TO MAKE IT POSSIBLE TO SET UP DESIRED STATIONS, THAT ARE CLOSE IN FREQUENCY, ON ADJACENT BUTTONS.

By referring to ranges it will be seen that WMAQ, 870 kc, would be set up on button #4. WGN, 730 kc, would be set up on button #5. WBMM, 770 kc, would be set up on button #6. Since these three stations come within the frequency range of only two of the buttons, the customer would ordinarily have to give up one of the three stations for AUTOMATIC TUNING.

It is possible, however, to change the setting of the "fixed" button and make it possible to set up three such stations, close together in frequency, on three separate buttons. The method of doing this is as follows:

FIRST:- Make a full size reproduction of button frequency ranges on a suitable paper or cardboard, an eleven division scale, one division for each button range as illustrated.

SECOND:- Likewise make a full size reproduction of the AMERICAN band on suitable paper or cardboard.

Make a light pencil mark on the reproduction of the tuning scale at the frequency of each of the eleven desired stations. Then lay the eleven division scale against the reproduction of the tuning scale and move the eleven division scale to such a position that each of the eleven marked positions for the eleven desired stations will fall within the range of a different button. However, the eleven division scale can only be moved so that its left index mark comes between the dotted lines of the reproduction of the tuning scale, as shown in Fig. 2. In Fig. 2 it will be seen that by moving the eleven division scale to the point shown, WMAQ will be within the range of button #5; WGN will be within the range of button #4; and WBMM will be within the range of button #6. When a position of the eleven division scale is found that will allow the eleven desired stations to fall within the range of separate buttons, carefully note at what point on the reproduction of the dial scale the left index mark of the eleven division scale comes. In the illustration for stations WMAQ, WGN, and WBMM, the index mark is just about opposite 550 kc on the dial scale. (Fig. 2).

Remove the chassis from its cabinet. Leave the AUTOMATIC TUNING dial escutcheon off.

Turn the AUTOMATIC TUNING dial to its stop so that the variable is fully meshed. Now move the pointer along its drive cable to the point on the dial that corresponds exactly to the position of the left index mark of the eleven division scale, as described in the preceding paragraph. As can be seen by inspection, the pointer is pinched onto the drive cable and it will be necessary to pry this pinching open slightly so that the pointer can be moved along the cable. The AUTOMATIC TUNING dial must be kept turned all the way to the left to its stop during the operation of moving the pointer. After the pointer has been moved to its new position it should be pinched onto the cable again so that it cannot slip.

Loosen the set screw that holds the variable condenser drive drum to the variable condenser shaft.

Unlock the AUTOMATIC TUNING dial mechanism by moving the studs counter-clockwise. Pull out the "hair pin" clip that will be found on the unnumbered stop button. This button can then be pushed in and turned the same as the other eleven numbered buttons. Push in the unnumbered button and turn it to such position that when the AUTOMATIC TUNING dial mechanism is turned to its limit the pointer will be at its original stop at the left end of the dial. Then lock the mechanism by rotating the studs clockwise. (Be careful not to push in button #1 while the unnumbered button is pushed in as this may jam the mechanism. If this should happen the mechanism can be freed by pushing in the stop latch, as will be seen by inspection.) Replace the "hair pin" clip on the unnumbered button.

With the mechanism turned all the way to the left to its stop and with the dial pointer at its left limit on the dial, fully mesh the variable condenser by turning the movable plates with the fingers. Then re-tighten the set screw that holds the condenser drive drum to the variable condenser shaft.

The eleven desired stations can then be set up on the eleven adjustable buttons in accordance with the instructions (see preceding page). The new frequency ranges for the buttons will be determined by holding the eleven division scale against the reproduction of the tuning scale, with the left index mark of the eleven division scale at the proper point between the dotted lines on the reproduction of the Tuning dial scale.

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ALIGNMENT

1- Apply 456 KC note to control grid of 6A7 and peak IF trans. for max. gain.
2- Apply 4000 KC note to antenna wire; set band switch to 2nd band and align trimmer on oscillator section of variable condenser to track with 4000 KC on dial.
3- Turn Band switch to Broadcast band; apply 1500 KC note to antenna wire, adjust trimmer on RF section of variable condenser for maximum gain.
4- Apply 600 KC note to antenna, adjust plate condenser for maximum gain, swinging condenser back and forth across 600 KC signal.
5- Check 1400 KC signal for alignment.
6- Turn band switch to 2nd band; check 4000 KC signal for alignment and adjust trimmer on antenna coil for greatest gain at 4000 KC.
7- Turn band switch to last band and adjust trimmer on antenna coil for greatest noise on 12 megacycles.

RECEIVER RANGE - THREE WAVE BANDS

S4C - 1720 kilocycles; 1720 - 5000 kilocycles; 5.5 - 16 megacycles
**ALIGNMENT PROCEDURE**

**PRELIMINARIES:**
- Output meter connections
- Approximate average sensitivity in microvolts for 1.0 watt output
- Dummy antenna value to be inserted in series with generator output
- Generator modulation
- Position of Volume Control
- Position of Dial Pointer with variable tuning condenser fully closed
- To fall on last calibration mark at 540 kc and of "American" band.

**WAVE-BAND POSITION OF DIAL FUNCTION**

<table>
<thead>
<tr>
<th>Switch</th>
<th>Generator Output Antenna</th>
<th>Generator (in order)</th>
<th>Threshnads Adjusted</th>
<th>Threshnads Function</th>
<th>Approximate Microwave</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>500-750 kc</td>
<td>450 kc</td>
<td>.061 mf.</td>
<td>500 kc, 600 kc</td>
<td>200 kc</td>
</tr>
<tr>
<td>AM</td>
<td>500-750 kc</td>
<td>450 kc</td>
<td>.061 mf.</td>
<td>500 kc, 600 kc</td>
<td>200 kc</td>
</tr>
<tr>
<td>&quot;FOR&quot;</td>
<td>15 kc</td>
<td>300 ohms</td>
<td>Ant. Lead (yellow)</td>
<td>&quot;FOR&quot; Int. (yellow)</td>
<td>500 kc</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>1500 kc</td>
<td>600 kc</td>
<td>.0006 mf.</td>
<td>Ant. Lead (yellow)</td>
<td>&quot;AM&quot; Oc. (yellow)</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>1500 kc</td>
<td>600 kc</td>
<td>.0006 mf.</td>
<td>Ant. Lead (yellow)</td>
<td>&quot;AM&quot; Oc. (yellow)</td>
</tr>
</tbody>
</table>

**INSTRUMENT ALIGNMENT NOTES:**
- Use minimum capacity peak if two peaks can be obtained.
- Use maximum capacity peak if two peaks can be obtained.

**IMPORTANT ALIGNMENT NOTES:**
- Where indicated by the word "note," the variable tuning condenser should be turned down and forth a degree or two while making this adjustment.
- Each step of the alignment should be repeated in its original order for greater accuracy.
- Always keep the output from the generator at its lowest possible value, to prevent the a-v-o action of the set from interfering with accurate alignment.
- Alignment locations are shown on the top and bottom parts location views of chassis.
- Only the dummy antenna indicated in the chart for any particular band should be used, remove the dummy antenna used for alignment in any other band. Grid cap leads should remain in place during alignment.
- Values shown under "microvolts" are only approximate.

**GENERAL INFORMATION AND SERVICE HINTS**

**ELIMINATING WHISTLE AT 450 kc:**

A whistle due to a beat between the second harmonic (900 kc) of the 450 kc I.F. and a 900 kc signal at the experience. In localities where the 900 kc station is one that is frequently heard to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This can be done by shifting the I.F. frequency of the receiver.

**Determine at what point between 900 kc and 900 kc the whistle will be least objectionable.**

Dividing this frequency by two will give the new I.F. frequency to which the receiver should be aligned. For example, if it is determined that a whistle at 900 kc would not be objectionable, the I.F. should be re-aligned at 450 kc or 90.1 kc. Try to select the new I.F. frequency as close as possible to 450 kc.

An interfering whistle may also be caused by two stations having a frequency difference equal to the I.F. frequency (450 kc) of the receiver and will be evident by a whistle appearing when the receiver is tuned to either of the stations. It may be further localized by tuning the receiver to each of these stations and then stopping the oscillator in each case, by grounding the oscillator stator section of the variable tuning condenser 60 to the chassis. If the whistle, in each case, still persists, it is being caused by the beat between these two stations and may be corrected by shifting the I.F. frequency of the receiver to a frequency other than the difference frequency of the two (usual) strong signals (stations). The I.F. amplifier should not be shifted to a frequency higher than 475 kc, or lower than 450 kc, but should as close to 450 kc as possible.

**Align the I.F., at the new frequency and then re-align the rest of the receiver as described under "Alignment Procedure."**

**AUTOMATIC REPEATER MECHANISM:**

The record changing mechanism is designed to be simple and fool-proof. Certain adjustments may be required occasionally. The adjustments are illustrated in this booklet.

**It is important, when servicing the automatic mechanism, to have it placed on a level support. It is also important to refrain from forcing the mechanism if there is a tendency to bind or jam, since bent springs and broken parts may result. Application of oil to the felt pad which rubs against the motor governor disk will insure smooth operation.**

**REPLACEMENT:**

--Do not leave records stacked on record-holder posts, when not in use, as they are liable to warp, particularly so in warm climates.

**DUAL POITER AND COUNTERPOINTER DIAL-HOOK-UP:**

The drive hook-up for the dial pointer and the variable condenser is illustrated.
OPERATING CONTROLS:

RADIO PANEL:
1. Left knob . . "Radio-Phono." Switch
2. Next to left knob . "On-Off" Switch and Volume
3. Center knob . . . Wave-Band Switch
4. Next to right knob . . . Tuning
5. Right knob . . . Tone Control

PHONO. COMPARTMENT:
6. Turntable Switch
7. Index Lever
8. Record Ejector

CONTROL OPERATION:

Turning right: Radio; Phonograph Power on; Volume Increase
Turning right: "American," "Foreign" Tuning ratio: 10 to 1
Turning right: Bass, Treble

Toggle: Phono. Motor "On-Off"
Front 10" Automatic or Manual Operation
Rear 12" Manual Operation
Pushing to Left Rejects When "Index Lever" is in 10" Position

LOCATION OF PARTS AND ALIGNMENT ADJUSTMENTS TOP OF CHASSIS

LOCATION OF PARTS AND ALIGNMENT ADJUSTMENTS BOTTOM OF CHASSIS

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USE ONLY WITH ALTERNATING CURRENT

UNLESS OTHERWISE SPECIFIED ON BACK OF CHASSIS, THIS RECEIVER IS FOR USE WITH 105 TO 120 VOLT ALTERNATING CURRENT, ONLY.
ELECTRICAL SPECIFICATIONS

Power Supply . . . . . . . . . . . 5 to 8 volts D.C. Starting current . . 5 amps. for 1 second
No current used while at rest
Returning current . . 5 amps. for 2 seconds

GENERAL INFORMATION AND SERVICE HINTS

MOUNTING MOTO-MATIC TUNER:

Fasten mounting brackets A and B to receiver with four #8-32 machine screws and lockwashers.

Determine the angular position of key in variable condenser drive fitting that is located directly under the tuning cable opening in the radio case. Lower Muto-matic tuner into place between mounting brackets and rotate shaft on Moto-matic tuner so that slot has the same angular position as the key on variable condenser drive fitting. When lowered all the way into place no play should exist between key on variable condenser drive fitting and the slot on Moto-matic shaft. This is very important, and if there is play it should be corrected by lightly pinching together the slot on Moto-matic shaft.

Fasten tuner with four #8-32 machine screws and lockwashers. Remove plug button C as shown in Fig. 1 and plug in power lead.

NOTE: Check worm gear on the gang condenser for slippage of the clutch which is provided, as this will cause the tuner to tune inaccurately. This gear should not slip except when the condenser plates are all the way open or all the way closed when the worm is rotated in the direction to open or close the plates.

SUBJECT: ADDITION OF A DRIFT COMPENSATING CONDENSER TO MAINTAIN ACCURACY OF STATION TUNING.

A drift compensating condenser, to eliminate frequency drift of the receiver as it warms up, is available from source 101. This condenser is connected across the oscillator trimmer as shown by the schematic sections in this Supplement.

CHASSIS 101.496 & 101.496X
CHASSIS 101.495 & 101.495X

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MODEL 5731
Moto-Matic Tuner
Part 128.15600
Adjustments, Part 1

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Angular Adjustment of the Armature ATT - 1 -

The angular position of the sides of the VP of the armature assembly can be set when the angle of each side is equal with respect to the radius of the armature disc. (See Fig. 6.) Too much angle will cause a slipping out of the armature assembly when setting out the sides. Under some conditions not enough angle will cause the armature to stick. Any adjustments to the angle of the armatures are "P" should be made carefully with a pair of long nose pliers. Sticking armature assembly may be caused by a burr on the face of the armature assembly "P" that is cut into the metal by the edge of the groove of the position disc. Any burr may be removed by carefully filing this surface with a fine file.

INSIDE ALIGNMENT OF CONDENSER DRIVE SHAFT WITH MAIN DRIVE FITTING ON VARIABLE CONDENSER

On earlier production the mounting bracket holes were the same to allow for production variations. If trouble is experienced with the mounting of the unit to the receiver case or if it is found necessary to adjust the condenser drive shaft with respect to the main drive fitting, drill the mounting holes of the bracket with a 3/16" drill.

Remove the cover of the receiver and mount the automatic tuner making sure the condenser drive shaft is centered in the FDR drive fitting on the variable condenser.

MAGNETIC FIELD ARMATURE

There may be an occasional misalignment or obstruction of a sliding or chopping of the Magnetic field armature switch due to the influence of the mains. This may cause the armature switch to be engaged during the process of breaking so that the armature does not ride or follow the armature. Second - it is important that the armature switch be clean and free from obstructions. Clean the armature switch with the impressed voltage to the armature and removing a pre-wound brush from the armature. Clean the armature switch by seating the brush to the armature. Clear any differences by seating slightly the locked section of the armature switch.

SELECTOR SWITCH

Failure of tune to operate may lie in the selector switch. Remove back plate and place jumper wire from the first terminal on the side where load is placed with equal to the red wire terminal. This should cause current to flow on the selector. If no movement is noted, the selector is not being used. In the event the selector switch case may be removed in the center. The selector switch is now the selector switch handle and the selector switch case may be removed in the center. The selector switch may be opened by placing a strip across both sides.

The selector switch is the selector switch that is placed between the plate and the selector switch case. This selector switch should be replaced if it is found that the plate and the selector switch case may be removed in the center.
SEARS-ROEBUCK & CO.

MODEL 5002, 6021, 6031
6121, 6131, Ch. 100, 195
Schematic, Voltage

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ALIGNMENT PROCEDURE

Before attempting to align the receiver check to see that the dial pointer is in a horizontal position when the gang condenser is in full mesh. If the pointer is incorrectly set, it is merely necessary to move the pointer to the correct position by hand, while holding the gang condenser in the full mesh position.

Output meter connections
Output meter reading to indicate 0.2 watt output
Average sensitivity in microvolts for 0.2 watt output
Connection of Generator Ground
Connection of Generator Output Lead
Dummy Antenna in series with Generator Output Lead
Generator modulation
Position of volume control

<table>
<thead>
<tr>
<th>DUTY ANT IN SERIES</th>
<th>CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>RANGE SWITCH POSITION</th>
<th>RECEIVER DIAL SETTING</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>SENSITIVITY MICROS.</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MF C. CONDENSER</td>
<td>CONTROL GRID OF 6A8-J TUBE</td>
<td>465 KC</td>
<td>AMERICAN 'ANT' (Center)</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>85</td>
<td>Adjust for maximum output, then repeat adjustment.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>465 KC</td>
<td>AMERICAN 'ANT' (Center)</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>3-4</td>
<td>1st I.F.</td>
<td>-</td>
<td>Adjust for minimum output using a strong generator signal.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>1500 KC</td>
<td>AMERICAN 'ANT' (Center)</td>
<td>1500 KC</td>
<td>5</td>
<td>WAVE TRAP</td>
<td>-</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>1500 KC</td>
<td>AMERICAN 'ANT' (Center)</td>
<td>TUNE TO 1500 KC GENERATOR SIGNAL</td>
<td>6</td>
<td>'AMERICAN' OSCILLATOR (Shunt)</td>
<td>-</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>600 KC</td>
<td>AMERICAN 'ANT' (Center)</td>
<td>TUNE TO 600 KC GENERATOR SIGNAL</td>
<td>7</td>
<td>'AMERICAN' ANTENNA</td>
<td>40</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>14 MC</td>
<td>FOREIGN 'FIR' (Counter-clockwise)</td>
<td>14 MC</td>
<td>9</td>
<td>'FOREIGN' OSCILLATOR (Series Pad)</td>
<td>30</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and returning receiver dial until maximum output is obtained.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>14 MC</td>
<td>FOREIGN 'FIR' (Counter-clockwise)</td>
<td>14 MC</td>
<td>10</td>
<td>'FOREIGN' ANTENNA</td>
<td>30</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and returning receiver dial until maximum output is obtained.</td>
</tr>
</tbody>
</table>

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www.americanradiohistory.com
SUBJECT: CONNECTION OF EARPHONE AND PHONOGRAPH PICKUP JACKS:

Part number 1015193531 jack, for connection of earphones or phonograph pick-up, can be ordered directly from source 101. Retail selling price is 79c.

The schematic section on the back of this sheet shows the connections.

If a crystal pickup is used, a filter composed of a .01 mfd. condenser and a 100K ohm resistor connected in series, should be connected across the pick-up to prevent excessive bass response. This filter will also act as a partial scratch filter.
SEARS-ROEBUCK & CO.
MODELS 6003, 6004, 6024, 6034, 6124, 6134
Chassis 101.510

Schematic, Voltage
Drive Data

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JUNE 9, 1938

POWER INPUT:
- All models available: 105-125 volts, 50-60 cycle, 75 watts
- All models available: 110-125 volts, 60 cycle, 80 watts

FREQUENCY RANGES:
- Band FM: 160-1720 kc
- Band gF: 9.6 to 19.2 mc

INTERMEDIATE FREQUENCY:
- 460 kc

POWER OUTPUT:
- Type: Swing Tube
- Number of tubes: 6 and 6 inch
- Maximum: 1.5 watts

OPERATING FEATURES:
- Tone Control: Three Positions
- Spread Band Tuning
- Push button tuning (6 button)

CHASSIS FEATURES:
- Preset selector on hand "FM"
- Antenna: Conventional
- Tuning key

A whistle, due to a beat between the second harmonics (900 kc) of the 50 kc IF and a 900 kc signal may be experienced. In localities where the 900 kc station is one that is frequently listened to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This can be done by shifting the IF frequency of the receiver.

Determine at what point between 900 kc and 800 kc the whistle will be least objectionable. Shifting this frequency by two will give the new IF frequency to which the receiver should be aligned. For example, if it is determined that a whistle at 900 kc would not be objectionable, the IF should be realigned at 825 kc or 875 kc. Try to select the new IF frequency as close as possible to 450 kc.

Align the IF at the new frequency and then realign the rest of the receiver as described under "Alignment Specifications."
Silvertone Battery Chargers Available:

The customer should be told about the Silvertone Gas-O-Power and the Silvertone Super Air-Charger. Either of these units provides an economical means of keeping the storage battery charged. The customer should be informed of the advisability of frequent hydrometer testing of the storage battery to prevent it from becoming too low in charge. A battery that is allowed to run too low before re-charging will not have as long a life as one that is recharged more frequently.

 Loud Speakers:

- Type: FM Dynamic
- Size: 6" (inches)
- Power Output: .25 watts
- Undistorted: .85 watts
- Maximum: 1.0 watts

Chassis Features:

- Number of IF stages: One
- Number of condenser in gang: Two
- Type: Conventional
- Tuning Eye: Built-in IF Wave Trap
- Synchronous Vibrator-Rectifier

Locations of Parts Under Power Supply
### Alignment 101.517, 101.624, 101.534

**Models Indicated As 6008 Includes Models, 6009, 6016, 6019, 6048, 6046, 6068, 6069, 6148, 6146, Chassis 101.624, 6026, 6026, 6158, Chassis 101.617, 6028, 6036, 6158, Chassis 101.617.**

**Product Location of Trimmers See Index.**

Output meter connection: Across loud speaker voice coil.

Output meter readings to indicate 600 millivolti, Model 6006, 6074, 0.37 volts, to indicate 600 millivolti, Models 6036, 6046, 0.39 volts; for Models 5038, 1.96 volts.

Approximate microvolt for 600 millivolti output:

- For Models 6008, 6008, 6074, see chart below.
- For 600 millivolti output, for Models 6036, 6036, 6046, see chart below.
- For generator output readout, see chart below.
- For dummy antenna value to be in series with generator output, see chart below.
- For generator modulation, see chart below.
- For position of volume control, see chart below.
- For position of tone control, see chart below.
- For position of dial pointer with variable fully closed, see chart below.
- For position of knob block to left, see chart below.
- For 500 kHz calibration mark, see chart below.

### Model 6008

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Generator Frequency</th>
<th>Generator Output</th>
<th>Generator Antenna</th>
<th>Generator Wavelength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.995</td>
<td>0.995</td>
<td>0.995</td>
<td>0.995</td>
<td>0.995</td>
</tr>
<tr>
<td>0.996</td>
<td>0.996</td>
<td>0.996</td>
<td>0.996</td>
<td>0.996</td>
</tr>
<tr>
<td>0.997</td>
<td>0.997</td>
<td>0.997</td>
<td>0.997</td>
<td>0.997</td>
</tr>
</tbody>
</table>

**Models 6036, 6036, 6140, Important Alignment Notes**

The alignment must be done in the sequence given:

1. **The generator should be adjusted high output.** The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 665 kHz is known, the generator should be adjusted to the frequency of that station instead of 665 kHz.

2. **Where indicated by the word, 'Rock,' the variable should be rocked back and forth a degree or two while making the adjustment.**

3. **The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy.** Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.
BATTERY REPLACEMENT:

The dry 6 volt AG battery should be replaced when its voltage drops to 5.4 volts, under load. The dry 6 volt AG battery should be replaced when the voltage of the battery has dropped to 4.8 volts, under load. The life rating of the various size batteries, given on the next page, are for an average use of three hours a day.

THE FILAMENT CIRCUIT:

Since the "A" supply is four volts and the tube filaments are rated at two volts, a series parallel arrangement is used for the filament circuit. A simplified diagram is shown below. If any one tube burns out (except the 1N40 first AF), the filament voltage and current of the other tubes will be affected.

A Catalog #5000 adaptor must be used on the "A" cable plug when a storage "A" battery is used. The owner should be warned not to attempt the use of a six volt automobile storage battery. Only a four volt storage "A" battery should be used.
LOCATIONS OF PARTS UNDER CHASSIS.

LOCATIONS OF PARTS ON TOP OF CHASSIS.

OPERATING FEATURES:

POWER OUTPUT:
Type: Class "B"
Undistorted: 0.4 watts
Maximum: 0.8 watts

Tone control: Three position

Automatic Volume Control
"On-Off" indicator
Dial FLASH-O-LITE
Push Button Tuning

LOUD SPEAKER:
Type: FM Dynamic
Size: 5"
OPERATING CONTROLS:
1. Left knob . . . . . . . . . . Volume
2. Next to left knob . . . . Wave Band Switch
3. Next to right knob . . . Station Selector knob
4. Right knob . . . . . . . . . . On-off switch and tone

SPEAKER PLUG CONNECTIONS

1. Yellow
2. Black
3. Green
4. White
5. Gray

POWER SUPPLY AND HEATER CIRCUIT:
Type = Beam...500-1250 kV
Power Supply  = 1.5 watt
Heater Voltage  = 6.3 VDC

ALIGNMENT FREQUENCIES:
1. 105-125 kV
2. 530 kHz
3. 1470 kHz
4. 3690 kHz

LOUD SPEAKER:
Type = Baffle...Hi-Lo
Power Supply  = 1.5 watt

TUBE SOCKETS ARE VACUUM-TIGHT UNDER SIDE OF CHASSIS. ALL VOLTAGE READINGS ARE SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL APPLIED TO TUBE. THE VOLTAGE IS"
Motor Coil Wiring

Power Supply Ratings Available

Frequency Supply Range:
- Broadcast: 540-1,720 kc

Alignment Frequency:
- Broadcast: 1,500 kc (osc., ant.)

Intermediate Frequency...

Loudspeaker:
Centering of the loudspeaker voice-coil is made in the usual manner with three, narrow-paper feelers, after first removing the front dust-cover. This may be removed by softening its cement with a light application of acetone, using care not to allow the acetone to flow into the air gap. The dust cover should be cemented back in place with ambroid after adjustment has been completed.

IF Peak 455 kc

Conventional Alignment, See Special Section, Vol. VIII

PICKUP CONNECTIONS
- Dial lamp: 6.3 volts, 0.25 ampere
- 105-125 volts, 60 cycles, 80 watts
- 105-125 volts, 50 cycles, 80 watts

Power Output:
- Type: Pentode
- Undistorted: 2.0 watts
- Maximum: 3.5 watts

455 kc

Phono Coil Wiring

Type: 5-inch electrodynamic
V.C. Impedance: 5 ohms at 400 cycles
Field Coil Resistance: 1,300 ohms
App. Field Coil Voltage Drop: 100 volts

Phonograph:
- Type: Manual
- Turntable Speed: 78 R.P.M.
- Type of Pickup: Crystal
- Pickup Impedance: 80,000 ohms at 1,000 cycles
ALIGNMENT PROCEDURE

Model 6028, 6138 Chassis 101, 517

Output meter connections: Across speaker voice coil
Output meter reading to indicate 1.0 watt output: 1.05
Approximate average sensitivity in microvolts for 1.0 watt output: See chart below
Darny antenna value to be inserted in series with generator output: See chart below
Connection of generator output lead: To chassis
Connection of generator ground lead: To chassis
Generator modulation: 30%, 400 cycles
Position of Volume Control: Fully clockwise
Position of Radio-Phono Switch: Second position from left
Position of Dial Pointer with variable tuning condenser fully closed: Provide with horizontal line on dial

IMPORTANT ALIGNMENT NOTES

- Trimmer C13, on opposite side of gang condenser from C18, should be screwed clockwise for maximum capacity before adjusting C18.
- Each step of the alignment should be repeated in its original order for proper accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-c action of the set from interfering with accurate alignment.
- Adjustment locations are shown on the top and bottom parts location views of chassis.
- The dummy antennas indicated on the chart for any particular frequency should be used. Remove the dummy antennas used for alignment at any other frequency. Grid cap leads should remain in place during alignment.
- Values shown under "Microvolts" are approximate.

Eliminating Whistle at 910 Kc:

A whistle, due to a beat between the second harmonic (1820 kc) of the 455 kc I.F., and a 910 kc signal may be experienced. In localities where the 910 kc station is one that is frequently listened to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This can be done by shifting the i.f. frequency of the receiver.

Determine at what point between 880 kc and 940 kc the whistle will be least objectionable. Dividing this frequency by two will give the new v.f. frequency to which the receiver should be aligned. For example, if it is determined that a whistle at 911 kc would be least objectionable, the I.F. should be reconditioned at 455.5 kc. Try to select the new frequency of near to 455 kc as possible.

Align the I.F. at the new frequency and then realign the rest of the receiver as described under "ALIGNMENT PROCEDURE".

Phonograph Motor:

Starting.—The phonograph motor switch (S1) is turned "on" in two of the two photograph positions of the Radio-Phono switch, and it is turned "off" in the two radio positions. To start the phonograph motor, turn the Radio-Phono switch to one of the two photograph positions, which applies power to the motor, and then give the motor a clockwise turn with the hand.

Hum and Vibration.—A small amount of hum when stopping, decreasing to a negligible amount when running, is normal. If excessive vibration occurs it may be due to:
- Insufficient lubrication, or any failure that will cause:
  - Bearing washer not tipped. (Check to make certain that the bearing washer is above the shaft washer.)
  - Motor not properly supported from motor board.
  - Bums on poles of rotor or stator. Remove with fire before cloth.

Removing Rotor.—The rotor and turntable assembly simply rests on the half bearing at bottom of vertical bearing. Remove by lifting up.

Rotor Adjustment.—Loosen the three screws that hold the rotor to the turntable, insert three (1/16" slits at equal distances around the edge between the rotor and turntable, and then slowly tighten the three screws. The rotor should be flush with the top of the motor, and additional steel washers below the stator if necessary.

 Lubrication.—Oiling points are indicated on "Details of Motor".

OPERATING FEATURES:

- Phonograph-Radio operation
- Manual-turning, synchronous-type motor
- Two-point Tone Control
- Automatic Volume Control

CHASSIS FEATURES:

No. 5 F.F. Stages: One Antenna: One Double or Conventional Line Noise Electronic Transformer Shield: Magnet x-Core Adjusted I.F. Transformers

LUMINATING WHISTLE AT 930 Kc:

A whistle, due to a beat between the second harmonic (1860) of the 455 kc I.F., and a 930 kc signal may be experienced. In localities where the 930 kc station is one that is frequently listened to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This can be done by shifting the I.F. frequency of the receiver.

Determine at what point between 900 kc and 960 kc the whistle will be least objectionable. Dividing this frequency by two will give the new I.F. frequency to which the receiver should be aligned. For example, if it is determined that a whistle at 930 kc would be least objectionable, the I.F. should be reconditioned at 465.5 kc. Try to select the new frequency as close to 455 kc as possible.

Align the I.F. at the new frequency and then realign the rest of the receiver as described under "ALIGNMENT PROCEDURE".
SUBJECT: CONNECTION OF EARPHONE AND PHONOGRAPH PICKUP JACKS.

OPERATING CONTROLS:
1. Upper left knob: Volume
2. Lower left knob: Tuning Eyehand Switch and Tone
3. Lower right knob: Wire Band Switch
4. Upper right knob: Station Selector

X INDICATES LEAD TO BE BROKEN.
DOTTED LINES INDICATE NEW CONNECTIONS.

OPERATING FEATURES:
- Three position Automatic Volume Control
- Push Button Tuning (8 button)
- Band Selector

THE AVC CIRCUIT:
The diode current of one of the 6Q7G diode plates, flowing through the 250 ohm resistor, creates a voltage drop across it. This voltage is applied to the control grids of the IF, translator, and RF tubes, to provide AVC.

ELIMINATING WHISTLE AT 930 KC:
A whistle, due to a beat between the second harmonic (930 kc) of the 485 kc IF and a 900 kc signal, may be experienced. In localities where the 900 kc station is one that is frequently listened to, it will be desirable to shift the whistle, if possible, to another point where it will not be objectionable. This can be done by shifting the IF frequency of the receiver.

Determine at what point between 900 kc and 850 kc the whistle will be least objectionable. Dividing this frequency by two will give the new IF frequency in which the receiver should be aligned. For example, if it is determined that a whistle at 915 kc would not be objectionable, it should be realigned at 457.5 kc or 457.2 kc. Try to select a new IF frequency as close to 457.2 kc as possible.

Align the IF at the new frequency and then realign the rest of the receiver as described under, 'ALIGNMENT PROCEDURE'.
PUSH BUTTON TUNING

Setting Up:

1. Make a list of the stations that you want to set up for push button tuning. It is advisable, but not necessary, to arrange the stations in the order of their frequency (low to high); that is, the stations of lower frequency will be first, the stations of next higher frequency will be second, etc. The top left push button can be used for station 1, the lower left one for station 2, etc. The stations selected must give strong and reliable reception. The band switch knob must be turned to the proper position for the stations selected.

2. Pull the volume control and tuning knobs off of their shafts. Remove the snap-in buttons that were covered by the knobs. The sunflower (the plate through which the push button protrudes) can then be removed. Be careful not to lose the snap-in buttons.

3. Replace the tuning knob on its shaft. Push the knob in and turn it so that the dial pointer comes to the left end of the dial. A key will be found in the instruction leaflet enclosed. Engage this key with the slotted shaft that is between the tuning knob and the push buttons. Unlock the mechanism by pushing the shaft in and unwrapping it from the counter-clockwise direction as far as it will go. Do not force it. About 4 turns is sufficient to loosen it completely. (A screwdriver can be used for unlocking the mechanism instead of the key supplied.) Then remove the key.

4. Push the button that you wish to use for your 1 station (the way in and hold it firmly). Push the tuning knob in and turn it until your 1 station is tuned in exactly as indicated by the tuning eye. Be as exact as possible to tune your station, since this will determine how accurately your station will be tuned when you use the push button. Then stop the tuning knob and let go of the button. (Turning the knob while the button is pushed in would spoil the accuracy of the adjustment.)

5. Push in your 2 button. Hold it firmly and tune in your 2 station accurately. Then let go of the push button and then the tuning knob. Proceed in the same manner for the other stations on your list.

When all of the stations have been set up, push the tuning knob in and turn it so that the dial pointer comes to the right end of the dial. Then lock the mechanism by securely tightening (turning clockwise) the slotted shaft, using the key supplied or a screwdriver.

Push out the call letters of your desired stations from the call letter sheets supplied. Insert the call letters in the celluloid holders at the back of the sunflower. Be sure to insert the call letters so that they are opposite their respective push buttons. Then replace the sunflower.

You may change your choice of stations at any time by unlocking the mechanism as described in Step 6, selecting the new station, and adjoining the button to the new station, then relocking the mechanism as described in Step 6. The call letters of the new station should be inserted in the call letter holder in their proper position.

OPERATION:

Push the button, indicated for your desired station, all the way in. Your station then will be tuned in. If you have selected short wave stations for push button tuning, be sure the band switch is turned to the proper band. The button will remain in the position it was in, indicating what station is tuned in, until you push another button or the tuning knob.
ALIGNMENT PROCEDURE: 

FOR CONVENTIONAL ALIGNMENT - SEE SPECIAL SECTION 
VOL. VIII INDEX

Either a broadcast station of about 1400 kc or a signal generator can be used for alignment. The chassis must be taken out of the cabinet for alignment of the trimmer, C8. The volume control setting should be reduced so that the signal is just audible in order to facilitate accuracy of alignment. This set has no AVC so that a strong input signal may be used.

Chassis MODELS 6110, 6111

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ALIGNMENT PROCEDURE

Model 6070, 6170 Chassis 100.189

Before attempting to align the receiver check to see that the dial pointer is opposite the last scale division on the low frequency end of the dial scale when the gap condenser is in full scale. If the pointer is incorrectly set, it is necessary to move the pointer to the correct position by hand, while holding the gap condenser in the full scale position. After the dial pointer is correctly set, proceed with the alignment procedure below.

Output meter connections: Across primary output leads. Output meter reading to indicate 0.00 volt output.

Type of Adjustment

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Generator Frequency</th>
<th>Generator Output</th>
<th>Trimmer Function</th>
<th>Trimmer Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 05</td>
<td>325 kHz</td>
<td>325 kHz</td>
<td>Trimmer 1</td>
<td>+100%</td>
</tr>
<tr>
<td>1500 15</td>
<td>325 kHz</td>
<td>325 kHz</td>
<td>Trimmer 2</td>
<td>–100%</td>
</tr>
<tr>
<td>1500 20</td>
<td>325 kHz</td>
<td>325 kHz</td>
<td>Trimmer 3</td>
<td>0</td>
</tr>
</tbody>
</table>

Important Alignment Notes

1. Short oscillator circuit of variable condenser.
2. After a.f. alignment is made, recheck for the highest possible output. If the output is not at maximum, adjust for maximum output.
3. After alignment is completed, turn off power for 15 minutes before proceeding to the next step.

Model 7220 Chassis 110.258

Output Meter Connections............. Across Primary Output Terminals
Output Meter reading to indicate 0.00 volt output, 10 Microvolts for 0.50 volt output.

Position of dial pointer..............

<table>
<thead>
<tr>
<th>Generator Frequency</th>
<th>Generator Output</th>
<th>Trimmer Function</th>
<th>Trimmer Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>456 kHz</td>
<td>Grid 406</td>
<td>74.75</td>
<td>I.F.</td>
</tr>
<tr>
<td>456 kHz</td>
<td>Grid 67</td>
<td>74.75</td>
<td>I.F.</td>
</tr>
<tr>
<td>600 kHz</td>
<td>Ant.</td>
<td>72.75</td>
<td>Geo</td>
</tr>
<tr>
<td>1500 kHz</td>
<td>Ant.</td>
<td>72.75</td>
<td>Geo,A.F.</td>
</tr>
<tr>
<td>600 kHz</td>
<td>Ant.</td>
<td>71</td>
<td>Wave trap</td>
</tr>
</tbody>
</table>
SEARS-ROEBUCK & CO.

MODELS 6072, 6077, 6172
Chassis 101.513
Schematic, Voltage

JUNE 15, 1938

©John F. Rider, Publisher
LOUD SPEAKER:
Type: PM Dynamic
Size: 6 inch

JULY 11, 1938

SEARS ROEBUCK & CO.
MODELS 6073, 6173, CH. 101, 528
Schematic, Voltage

POWER SUPPLY:
6 volt storage battery
3 ampere, 3.8 watts

ALLOCATION FREQUENCIES:

FREQUENCY RANGES:
Band AM "FOR:" 645-1790 kc
Band "FOR:" 645-1790 kc

INTERMEDIATE FREQUENCY:
550 kc

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LOCATIONS OF PARTS UNDER POWER SUPPLY
USE INSULATED TYPE RESISTORS FOR REPLACEMENT
WHERE USED ORIGINALLY

LOCATIONS OF PARTS UNDER CHASSIS
USE INSULATED TYPE RESISTORS FOR REPLACEMENT
WHERE USED ORIGINALLY

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**Alignment Procedure**

The receiver need not be taken out of the cabinet for alignment.

Either a broadcast signal of about 1500 kc should be tuned in or else a signal generator, connected through a .0002 mfd. condenser to the set's antenna, should be used.

Tune in the signal and adjust the trimmer (accessible through the hole in the bottom of the cabinet) for maximum loud speaker response. This can be done most accurately, if the volume control setting is reduced to give low volume level. (This set has no A.C.) The variable should be rocked a degree or two during the adjustment. An insulated screwdriver should be used, since the chassis may be above ground potential as explained previously.

**Subject: Changes in Push Button Mechanism**

Chassis embodying these changes have the identification number 1015086-1. The suffix letter "A" has also been added to the catalog number.

The design of the push button tuning mechanism has been changed somewhat. Stations are set up as follows:

Pull the push buttons off of their levers. Use the small screwdriver supplied, unscrew the push button screw two or three turns. With screw and lever pushed in firmly, turn in the desired station. Then securely tighten the screw. Check the accuracy of the setting by pushing the lever to get the station and then seeing if the station can be still made more accurately tuned with the tuning knob. If necessary, repeat the adjustment to obtain a more accurate setting. Punch out the station's call letters from the sheet, insert then in the recess in the front of the button, cover them with the clear celluloid disc, and replace the button. Proceed in the same manner for the remaining buttons.
FREQUENCY RANGE: 550-1,550 kc

POWER OUTPUT:
- Type: Pentode
- Undistorted: 2.1 watts
- Maximum: 4.1 watts

POWER SUPPLY:
- "A": 6.3 volt Auto Storage Battery
- "B": Non-Synchronous Vibrator
- Current Drain: 6.75 amps

ALIGNMENT FREQUENCIES:
- I.F.: 455 kc
- Ant.: 600 and 1,400 kc
- Oscil.: No Adjustment

LOUDSPEAKER:
- Type: Electrodynamic
- Size: 5 inches
- V.C. Impedance: 3.2 ohms at 400 cycles
- Field Coil Resistance: 3 ohms
- App. Field Coil Voltage Drop: 6 volts

JUNE 30, 1938
Push Button Tuning Mechanism:

The push button tuning mechanism used in this receiver is of the mechanical type, wherein the movement of the button actually turns the tuning condenser to any pre-determined setting. The movement is actuated thru a Push-Arm, Cam, Rocker Plate and Sector Gear, which meshes with a Scissors Gear directly fastened to the tuning condenser shaft. (See Figures 1 and 2.) The scissors gear prevents backlash between the sector gear and the tuning condenser. Since the sector gear is mounted directly on the rocker plate shaft, the position of the rocker plate will accurately determine the position of the tuning condenser.

The cams (Figure 2) which determine the stop points for each button are mounted on the push arms and are locked in place by the locking screws and lock-shoes, which press firmly against the cams when the locking screws are tightened. Care should be used when locking screws are tightened not to use excessive force as the threads may become damaged or stripped.

Adjustments for Push Button Tuning are very easily made. To adjust a push button for any station proceed as follows:

1. Pull the push button off the push arm.
2. Loosen the cam locking screw one-half turn.
3. Using the Dial Tuning Control tune in the station.
4. Press the push arm in as far as it will go and accurately retune station.
5. With the push button still held down, tighten cam locking screw.
6. Replace the push button.

With the locking screw tight, the cam is locked in position and when the button is pushed in, the cam pressure causes the rocker plate to assume the position that tunes in the desired station (See Figure 2.)

Manual Tuning Dial:

A manual tuning knob is provided so that additional stations may be tuned in as desired. The manual tuning shaft is connected thru a cord drive to a drum on the rocker plate shaft. This same cord drives the dial drum by passing over a pulley on the drum shaft. Figure 6 shows the complete cord drive assembly and the correct number of turns which the cord should be wrapped around the drive shaft and dial drum pulley. Stops are provided on the dial drum so that dial scale adjustment is made by tuning the set to the extreme ends of the band.
PRELIMINARY:
Output meter connections: 
Output meter readings to indicate 1 volt: 
1.8 volts.
Generator ground lead connections: 
To chassis.
Dummy antenna value to be in same with generator output: 
See Chart below.
Generator of generator output leads: 
10K, 400 cycles.
Position of Volume Control: 
Fully clockwise.
Chassis must be in case with front end removed, when aligning R-F circuit.

ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>Position of Dial Pointer</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection Symbol</th>
<th>Circuit Adjusted</th>
<th>Approx. Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Signal 500-750 kc</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6L7 Grid</td>
<td>L-10</td>
<td>1st I.F. Trimmer</td>
</tr>
<tr>
<td>No Signal 500-750 kc</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6L8 Grid</td>
<td>L-1, L-2</td>
<td>1st I.F. Trimmer</td>
</tr>
<tr>
<td>1,400 kc</td>
<td>1,400 kc</td>
<td>.001 mfd.</td>
<td>Ant. Lead</td>
<td>C-1</td>
<td>Ant.</td>
</tr>
<tr>
<td>400 kc</td>
<td>600 kc</td>
<td>.001 mfd.</td>
<td>Ant. Lead</td>
<td>L-2</td>
<td>Ant.</td>
</tr>
<tr>
<td>1,400 kc</td>
<td>1,400 kc</td>
<td>.001 mfd.</td>
<td>Ant. Lead</td>
<td>C-3*</td>
<td>Ant.</td>
</tr>
</tbody>
</table>

NOTE: No oscillator alignment adjustments are required in this receiver.

IMPORTANT ALIGNMENT NOTES

1. Make the generator connection to the receiver through a shielded lead-in having not more than 50 mfd (0.00005) capacity with a male connector attached for connection to antenna socket. If C-2 has been changed, as outlined under "Antenna Circuit," for reason of a high capacity antenna, the Dummy Antenna should be the same value as the antenna itself.

2. Re-adjust C-2 after installing as outlined under "Antenna Circuit" in "Service Notes."

3. Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value, to prevent the A.V.C. screen of the receiver from interfering with accurate adjustment. Alignment adjustment locations are shown on the top and bottom parts location views of chassis.

4. Only the dummy antenna indicated in the chart for any particular frequency should be used. Grid cap leads should remain in place during alignment.

5. Oscillator circuit alignment is not required in this receiver as either end of the band, the oscillator coil is pre-adjusted for inductance in the factory.

6. Since the oscillator coil is unshielded, the case has more effect on its inductance. Therefore alignment must be done either with the chassis in the case or with a steel plate (covering the bottom of chassis), substituting for the case.

Values shown under "Microvolts" are only approximate.
Sears-Roebuck & Co.

MODELS 6110, 6111
Chassis 101.508
Schematic, Voltage

57 RL 122
JULY 1, 1938

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www.americanradiohistory.com
TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL. LINE VOLTAGE AT 110 VOLTS WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ. VOLUME CONTROL TO BE ON FULL.

* * PART OF L1
** PART OF L2

ALIGNMENT PROCEDURE

Every broadcast station of about 1400 kc on a signal generator can be used for alignment. The chassis must be taken out of the cabinet for alignment of the trimmers. The set must be kept dark as a strong light may be used.

SEARS ROEBUCK & CO.

ALIGNMENT PROCEDURE.

SEARS PAGE 6113, 6112, 6118

SEARS RADIO HISTORY

Chassis: 101.521
Model: 6112

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Adjusting the Push Buttons:

Unlock the mechanism by loosening the screw at the center of the tuning knob, for a few turns. Push the button all the way in and tune in the desired station while the button is held in firmly. Then release the button before tuning in the next station. Proceed in the same manner for the remaining buttons. Lock the mechanism by tightening the screw in the tuning knob. Punch out the station call letters from the sheet supplied and insert them in the recess in each button. Cover the call letters with the clear celluloid discs, supplied. Be careful not to drop the call letter tube inside the receiver when inserting them in the push buttons.

OPERATING FEATURES:

Push button tuning (5 button)
Frequency calibrated tuning knob

POWER OUTPUT:

Type: Pentode
Undistorted: 0.85 watts
Maximum: 1.5 watts

POWER SUPPLY:

All models available: 105-125 volts, 50-60 cycles, 40 watts

FREQUENCY RANGE: 545-1730 kc

ALIGNMENT: 1400 kc

© 1938 SEARS ROEBUCK & CO.
ADJUSTING THE PUSH BUTTONS:

Unlock the mechanism by loosening the screw at the center of the tuning knob, for a few turns. Push the button all the way in and tune in the desired station while the button is held in firmly. Then release the button before tuning in the next station. Proceed in the same manner for the remaining buttons. Lock the mechanism by tightening the screw in the tuning knob. Punch out the station call letters from the sheet supplied and insert them in the recess in each button. Cover the call letters with the clear celluloid discs, supplied. Be careful not to drop the call letter tabs inside the receiver when inserting them in the push buttons.

ALIGNMENT PROCEDURE:

Either a BC Station of about 1400 KC or a sig. gen. can be used for align. Chassis to be removed for C8 trimmer align. - Volume Cont. setting be reduced so signal is just audible to facilitate accurate adj. This set has no AVC so that a strong input signal may be used.
OPERATING CONTROLS:
1. Upper left knob: Volume
2. Lower left knob: Wave Band Switch
3. Lower right knob: "On-Off" Switch and Tone
4. Upper right knob: Station Selector

OPERATING FEATURES:
- Two position Automatic Volume Control
- Push Button Tuning (5 button)
- Tuning Eye

CHASSIS FEATURES:
- Number of stages: One
- Number of condensers in gang: Two
- Antenna: Conventional
- Built-in IF Wave Trap

POWER OUTPUT:
- Type: Beam Tube
- Undistorted: 1.75 watts
- Maximum: 3 watts

LOUD SPEAKER:
- Type: Dynamic
- Size: 6 and 8 inch
- Field coil resistance: 480 ohms

FREQUENCY RANGES:
- Band "AM": 540-1730 kc
- Band "SW": 5.9 to 16.3 mc

POWER SUPPLY: 105-125 volts, 50-60 cycle, 50 watts

FOR ALIGNMENT, SEE INDEX.
ALIGNMENT FREQUENCIES:
- Oscill. Ant. Trans.:
  - Trimmer Padder
  - Band "AM": 1400 kc
  - Band "SW": 16 mc Fixed

OPERATING FEATURES:
- Tone Control
- Automatic Volume Control
- Push Button Tuning (5 button)
- Tuning Eye

SEARS PAGE 10-81

©John F. Rider, Publisher
IF PEAK 465 KC

POWER SUPPLY:
All models available
105-135 volts, 50-60 cycle, 105 watts
All models available
105-125 volts, 35 cycle, 120 watts

FREQUENCY RANGES:
Band "AM" .......... 540-1700 kc
Band "SW" .......... 5.95 mc-18.3 mc
Band "FM" .......... 9.4 mc-9.7 mc

INTERMEDIATE FREQUENCY

POWER OUTPUT:
Type ................. Push pull beam tubes
Undistorted .......... 8 watts
Maximum ............. 10 watts

OPERATING FEATURES:
Tone Control .......... Three position
Automatic Volume Control
Spread Band Tuning
Push Button Tuning (A button)

OPERATING CONTROLS:
1. Upper left knob .......... Volume
2. Lower left knob .......... "On-off" switch & Tone
3. Lower right knob .......... Band switch
4. Upper right knob .......... Station Selector

ALIGNMENT FREQUENCIES:
Oscill. Ant. - Transil.
Trimmer Trimmed Padder
Band "AM" .......... 1400 kc 1400 kc 600 kc
Band "SW" .......... 15 mc Fixed
Band "FM" .......... 9.55 mc 9.55 mc

LOUD SPEAKER:
Type ................. Dynamic
Size Models 6/9/10 ........ 13 inch
Size Models 6/4/8.5/3/6.5/2.5/1 ........ 10 inch
Field coil resistance .......... 300 ohms
App. field coil voltage drop .......... 70

CHASSIS FEATURES:
Preselector on band "AM"
Antenna .......... Conventional
Tuning Eye

CONTROL OPERATION:
Turning right .......... Volume increase
Turning right .......... "HI", "MED", "LO"
Turning right .......... "AM", "SW", "FM"
Turning ratio .......... 13:1
The lamps that illuminate the push button call letters are made accessible for replacement by removing the push button escutcheon.

**MAL LIGHT REPLACEMENT:**

**SUBJECT: CONNECTION OF EARPHONE AND PHONOGRAPh PICKUP JACKS:**

Part number 101619531 jack, for connection of earphones or phonograph pick-up, can be ordered directly from source 101.

If a crystal pick-up is used, a filter composed of a .01 mfd. condenser and a 100 ohm resistor connected in series, should be connected across the pick-up to prevent excessive bass response. This filter will also act as a partial scratch filter.
NOTE: TERMINALS OF ALL SWITCHES AND COILS ARE Labeled TO CORRESPOND WITH PICTORIAL VIEWS OF THESE PARTS.

INTERMEDIATE FREQUENCY ........................................ 465 KC.
POWER OUTPUT ...................................................... Push-Pull Pentodes
Type ................................................................. 6 watts
Maximum .............................................................. 10 watts

Use high resistance voltmeter of at least 1000 ohms per volt. The bias on the control grids of the 6AS-9, 6US and 6K7-G and the delay voltage on the diode plate (D1) of the 6H6-G is -4.3 volts, measured across resistor R26.

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ALIGNMENT PROCEDURE

Before attempting to align the receiver, see that the dial pointer is in correct set. With the gang condenser in full mesh, set the pointer to the last mark on the left side of the dial scale. If the pointer is incorrectly set, it is only necessary to loosen the set screw on the dial cord drive drum and push the gang condenser in full mesh with the pointer properly set, then tighten the set screw.

Output meter connections: Across voice coil leads, Output meter reading to indicate 0.5 watt output. Average sensitivity in accordance for 0.5 watt output. Connection of Generator Grounds: Resistance to chassis, Generators Output Leads: Generator regulation:

Position of volume control:

### Alignment Chart

<table>
<thead>
<tr>
<th>Connection of Output Leads</th>
<th>Output Frequency</th>
<th>Brand Description</th>
<th>Receiver Setting</th>
<th>Transmit Number</th>
<th>Transmit Description</th>
<th>Generator Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-4</td>
<td>600 Kc</td>
<td>Broadcast</td>
<td>1-2 D.I.F.</td>
<td>600</td>
<td>10pf I.F.</td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>5</td>
<td>1500 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>1500</td>
<td></td>
<td>Adj for Maximum Output. Using a strong Generator Signal.</td>
</tr>
<tr>
<td>6</td>
<td>5000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>5000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>7</td>
<td>10000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>10000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>8</td>
<td>15000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>15000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>9</td>
<td>20000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>20000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>10</td>
<td>25000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>25000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>11</td>
<td>30000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>30000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>12</td>
<td>35000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>35000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>13</td>
<td>40000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>40000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
</tbody>
</table>

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**Alignment Chart**

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<td>600</td>
<td>10pf I.F.</td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>5</td>
<td>1500 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>1500</td>
<td></td>
<td>Adj for Maximum Output. Using a strong Generator Signal.</td>
</tr>
<tr>
<td>6</td>
<td>5000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>5000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>7</td>
<td>10000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>10000</td>
<td></td>
<td>Adj for Maximum Output.</td>
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<tr>
<td>8</td>
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<td>20000</td>
<td></td>
<td>Adj for Maximum Output.</td>
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<td>25000 Kc</td>
<td>Broadcast</td>
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<td>25000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
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<td>Broadcast</td>
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<td>30000</td>
<td></td>
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</tr>
<tr>
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<td>Broadcast</td>
<td>5</td>
<td>35000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
<tr>
<td>13</td>
<td>40000 Kc</td>
<td>Broadcast</td>
<td>5</td>
<td>40000</td>
<td></td>
<td>Adj for Maximum Output.</td>
</tr>
</tbody>
</table>

---

**How to Set Up and Use Your Push Button Tuner**

1. **Before you begin.** In connection to a good antenna system, use the push button tuner in place of the tuning knob. After tuning, the push button tuner should be used in place of the tuning knob.

2. **Alignment Chart.** The position of the button must be set to indicate the correct set. With the gang condenser in full mesh, set the pointer to the last mark on the left side of the dial scale. If the pointer is incorrectly set, it is only necessary to loosen the set screw on the dial cord drive drum and push the gang condenser in full mesh with the pointer properly set, then tighten the set screw.

---

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SEARS ROEBUCK & CO.

MODEL 6226, Chassis 134.802
Wireless Record Player
Schematic
Chassis 134.802-1
Schematic Changes, Notes
SIGNED 30 MHAL WOLLEN

25Z5

R1 C1 R2 C2
C3 6A7 R3 C4

P1

R2 C5

R3

C6

L1

C7

R4

R5

R6

6-8 VOLT 150 MA.
25Z5 6A7

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www.americanradiohistory.com
ELECTRICAL SPECIFICATIONS

TUBE EQUIPMENT: S.A.

Operating, Set-up Data

MODEL 6276, Ch. 134, 802

FREQUENCY RANGE: The frequency range is 700 to 540 kilocycles.

POWER INPUT: The power output of this unit is arranged so that it can be operated at distances of 20 to 30 feet from the receiver.

OPERATING FEATURES: Fidelity ranges 50 to 00 cycles.

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS: Turning the switch to right hand knob "Motor" switch.

CONTROL OPERATIONS: Turning the switch to right hand knob "Motor" switch.

The Model 6226, carrying identification No. 134662021, is so designed that it has a tuning range of 700 to 450 kilocycles. This range is selected on the lower part of the broadcast band and is ample in latitude being in any practical location of the broadcast band. There are no more channels in this portion of the broadcast band than in the higher part of the band.

This wireless remote record player is designed to be connected to any additional antenna and during times when there is high atmospheric interference or severe static freedom from heterodyne signals cannot be affected by opening the player with its normal antenna array, it may be more closely connected with the receiver with which it is being operated by connecting a wire to the feed that is seen to produce from the I.F. plug and wrapping this wire or wires around the antenna lead to the receiver. This will not in any way interfere with the operation of the receiver.

The circuit network used in the wireless remote record player is of conventional design in no way connected with the player itself. However, the oscillator circuits are connected to the receiver by the antenna lead when the receiver is operated in the broadcast band. The oscillator circuits are connected to the receiver by the antenna lead when the receiver is operated in the broadcast band. The oscillator circuits are connected to the receiver by the antenna lead when the receiver is operated in the broadcast band. The oscillator circuits are connected to the receiver by the antenna lead when the receiver is operated in the broadcast band. The oscillator circuits are connected to the receiver by the antenna lead when the receiver is operated in the broadcast band.

When there is a signal in the output of this device, it will probably be caused by a defective tube, a defective wire, or a worn-out needle. First of all, the quality of the needle should be investigated. Then a tube, known to give disturbance and volume in the wireless remote record player, should be inserted and last of all, the crystal cartridge in the arched shape should be replaced.

A. Set up the equipment so that a 20 feet length of some point of the antenna system of the radio set in which it is going to be used will be operated.

B. Turn the phone on the receiver and allow time for the tubes to come to operating temperature. Tune through the frequency spectrum between 700 and 450 kilocycles and locate a channel which is quiet and on which you do not hear broadcasting.

C. Turn the "Motor" switch of your wireless remote record player to the right hand position, make a record and place it on the table, and place the transcribed player forward on the table, exposing the large hole in the bottom of the player. After turning "Motor" switch, adjust the record on the player and place the transcribed record player forward on the table, exposing the large hole in the bottom of the player. After turning "Motor" switch, adjust the record on the player and place the transcribed record player forward on the table, exposing the large hole in the bottom of the player. After turning "Motor" switch, adjust the record on the player and place the transcribed record player forward on the table, exposing the large hole in the bottom of the player. After turning "Motor" switch, adjust the record on the player and place the transcribed record player forward on the table, exposing the large hole in the bottom of the player.

D. After the above adjustments have been made, all subsequent operation is taken care of at the radio receiver, such as adjusting time control, volume control, and what not. The operation of the record player, it will be heard in the same place on the scale of the receiver where it has now been adjusted.
ALIGNMENT PROCEDURE

Either a broadcast signal between 1400 and 1500 KC may be used.

The antenna of the receiver should be extended as in normal use. Tune in a station between 1400 and 1500 KC. and adjust the trimmers on top of the variable condenser for maximum signal.

If a signal generator is used, extend the antenna as described above, run a wire from the generator parallel to, but insulated from the antenna. Set the generator at 1720 KC. Turn the variable condenser all the way to the right (minimum capacity). Tune in the signal from the generator with the trimmer on the front section of the variable condenser. Set the generator at about 1400 KC. Tune in the signal and adjust the trimmer on the rear section of the variable condenser for maximum signal.

The signal generator method is most satisfactory and should always be used when available.

CAUTION:
Under no condition should a ground be attached to this receiver, also no grounded object should be allowed to come in contact with the chassis.

POWER SUPPLY:
105-125 volts, 50-60 cycle or D. C. 43 Watts on 117 volt line.

FREQUENCY RANGE:
Broadcast and other services 540 to 1720 KC.

ALIGNMENT FREQUENCIES:
1720 and 1500 KC.

POWER OUTPUT:
Type ........................................ Beam Power
Undistorted .................................... 1 Watt
Maximum ...................................... 2.0 Watts

LOUD SPEAKER:
Type ........................................ Dynamic
Size ............................................ 3" x 3/4"
Field Resistance .................................. 450 Ohms

MECHANICAL SPECIFICATIONS

CONTROLS:
Upper Knob ......................... Tuning
Lower Knob .... Volume control, On-Off Switch

CONTROL OPERATION:
Direct Drive
Turn right to turn power on and to increase volume.

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**Sears-Roebuck & Co.**

For Conventional Alignment
See Special Section
Volume VII

**Model 7152**

Schematic, Socket Voltage

**Socket Voltages**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>EF</th>
<th>HK</th>
<th>EG2</th>
<th>EG3</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Det.</td>
<td>6.3</td>
<td>1.4</td>
<td>14</td>
<td>1.4</td>
<td>18</td>
</tr>
<tr>
<td>43</td>
<td>Pr. Output</td>
<td>25</td>
<td>16</td>
<td>110</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Line voltage 115 Volts — Voltage control all the way up
All voltages taken with 1000 ohms per volt D.C. meter except heaters, from points indicated to ground.

K - filament  
K - Cathode  
G2 - Screen Grid  
G3 - suppressor grid  
P - plate

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THE ALIGNMENT PROCEDURE

The following alignment instructions are given with the assumption that the service station has an oscillator capable of accurately covering the range of the receiver.

The only other apparatus necessary is a meter connected in the output stage to indicate resonance. This can be 0 to 2 volt AC meter connected across the voice coil of the speaker or preferably an output meter connected in the plate circuit of the 42 power tube in series with an 8 MFD paper condenser.

I THE I.F. STAGES

The I.F.'s are aligned by the usual system of feeding the intermediate frequency of 465 KC into the grid of the 6A7 tube.

The two trimmers in each of the I.F. cans should be very carefully peaked to resonance as they are very critical and will greatly affect the performance of the set. These are trimmers number C1, C2, C3, C4. (See pictorial diagram).

The sensitivity of the I.F. stages will be 40 microvolts or better.

Always use as low an output as possible from the test oscillator in making the various adjustments.

II ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C.

First check the position of the dial hand by rotating the condenser shaft to the left to full capacity. At this point the dial hand should be straight across in line with the lines dividing the scale in half. If the hand is off position it can be easily lined up by loosening the set screw behind the dial card in the drive hub.

1. Set the test oscillator to 17 megacycles.
2. Turn wave band switch all the way to right for highest S.W. band, and set dial hand to 17 M.C.
3. Peak trimmer condenser C-11 of the oscillator coil (See pictorial 6-2) to resonance with 17 M.C. fed into antenna.
4. Peak Ant. coil trimmer C-7 at same setting to 17 M.C.

III SHORT WAVE BAND 1.7 TO 5.5 M.C.

1. Turn wave switch to middle position.
2. Set dial hand to 5 megacycles on the 1.7 to 5.5 M.C. inner scale.

Peak oscillator trimmer C-10 to 5 M.C. from test oscillator. And Ant. coil trimmer C-6 to same frequency.

NOTE: After adjusting the two high bands at 17 megacycles and 5 megacycles the test oscillator input to antenna should be increased and receiver dial advanced to .9 megacycle lower and note if test oscillator signal is heard.

In case there is no response the oscillator trimmers have been pulled down too tightly. The trimmers should be released until this condition exists then go back to original point of alignment - reduce antenna input voltage and correct the trimmer adjustment.

EXAMPLE: The receiver has been adjusted to 17 megacycles. Tune receiver to approximately 16.9 M.C.

Increase oscillator signal by "opening up" the alternator. Move the dial back and forth at 16.9 M.C.

If no signal is heard, let oscillator trimmer off until it is heard at 16.9 M.C.

Reduce signal voltage from generator, go back to 17 M.C. and slightly correct this last trimmer adjustment.

The same thing applies to the 5 M.C. adjustment.

IV THE BROADCAST BAND

1. Turn wave band switch all the way to left and dial hand set to 1400 KC (the top scale).
2. Peak oscillator trimmer C-9 to 1400 KC., the Antenna preselector C-12 (variable condenser trimmer) to 1400 KC, and trimmer C-5 to 1400 KC.
3. Set dial hand to 550 KC and adjust oscillator padding condenser C-8 to 550 KC.
4. Recheck dial at 1400 KC as in number (1) and (2).
5. Points in the middle of the dial may be checked and if necessary the plates of the front section of variable condenser may be bent for alignment.

V NOTES.

1. Seal all trimmers after their final adjustment.
2. Be sure that the settings are being made to the true fundamental signal from the oscillator and not on a harmonic or image frequency.
3. Refer to the schematic for the voltages at the tube sockets.
<table>
<thead>
<tr>
<th>CONNECT</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER FREQUENCY</th>
<th>RECEIVER TUNED TO</th>
<th>TRIMMER SWITCH AT</th>
<th>OUTPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A7 Grid</td>
<td>456 KC</td>
<td></td>
<td></td>
<td></td>
<td>All I.F. Max.</td>
</tr>
<tr>
<td>Antenna</td>
<td>6. MC</td>
<td>6. MC</td>
<td>SW</td>
<td></td>
<td>Oscillator*1 Max.</td>
</tr>
<tr>
<td>Antenna</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
<td>SW antenna*2 Max.</td>
</tr>
<tr>
<td>Note:</td>
<td>SW low frequency pad, not to be adjusted, but must oscillate at 2.5 MC.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenna</td>
<td>1720 KC</td>
<td>1720 KC</td>
<td>BC</td>
<td></td>
<td>BC Oscillator*3 Max. to 1720 KC</td>
</tr>
<tr>
<td>Antenna</td>
<td>1720 KC</td>
<td>1720 KC</td>
<td>BC</td>
<td></td>
<td>Antenna *4 Max. to 1720 KC</td>
</tr>
<tr>
<td>Antenna</td>
<td>600 KC</td>
<td>600 KC</td>
<td>BC</td>
<td></td>
<td>Max.</td>
</tr>
<tr>
<td>Antenna</td>
<td>1720 KC (Recheck 1720 KC alignment for maximum output)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1- Located under chassis near electrolytic condenser.
*2- on top of chassis near diel.
*3- under chassis near outer edge.
*4- on top of chassis near IF transformers.
SEARS-ROEBUCK & CO

MODEL 7176
Schematic, Socket, Trimmers
Alignment

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL VIII

LEGEND

C17 - 360 MFD, Var. Cond.
C24 - 5 MFD, 35V, Elect.
C25 - 16-8-5 MFD
C28 - .005 MFD, 800V.
C315 - .01 MFD, 200V
C316 - .01 MFD, 400V
C320 - .02 MFD, 200V
C330 - .05 MFD, 200V
C336 - .1 MFD, 400V
C401 - .0001 Mica

R13 - 50 OHMS.
R51 - 135 OHM, Cord ohm
R68 - 400 OHMS
R307 - 2,500 OHMS
R316 - 15,000 OHMS
R322 - 50,000 OHMS
R328 - 1 MEG.
RE408 - 300,000 OHM Vol. Cont.
P.L. - Pilot Lights
S.L. - Speaker Field

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MODEL 7214
FACTORY IDENTIFICATION NO. 110.7214

ALIGNMENT PROCEDURE

PRELIMINARY
Output Meter connections ..................................... Across output transformer
Output meter reading to indicate 0.055 watt .......................... 9 volts
For Weston type 571 output meter on 15 volt scale
Average sensitivity in MF for 0.055 watt output ......................... See chart below
Dummy antenna value in series with generator output ................. 100 Mohms.
Connection of generator ground lead .............................. App. 50ø at 400 cycles
Position of volume control ........................................ Fully clockwise

NOTE: Values shown under "Microvolts" are only approximate.

RAT BAND OF DIAL GENERATOR TRIMMERS TRIMMER APPROXIMATE
SWITCH POSITION GENERATOR CONNECTION TRIMMER FUNCTION MICROVOLTS

"0A" 5 MC 450 EC SAT Grid T8, T9, IF 160

"0B" 5 MC 450 EC Ant. lead T1, T9 Det., R.F. 50

"60" 600 600 EC Ant. lead P8 Det. 30

"90" (tune) 1500 1500 EC Ant. lead T1 Det. 48

IMPORTANT ALIGNMENT NOTES

Where indicated by the word, "Note", the variable should be rocked back and forth a degree or two while making the adjustment.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

Values shown under "Microvolts" are only approximate.

MODEL 7215
FACTORY IDENTIFICATION NO. 110.7215

AUTOMATIC TUNING CONTROL ADJUSTMENT

This radio leaves the factory with the push button set at the listening position. The user will have to make the necessary adjustments to suit the hearing position.

The following is the procedure to be followed in making the adjustments for each station.

1. Decide on stations you wish to receive.

2. Turn on the radio station of your choice and set the transmitting frequency in kilometers of the stations.

3. Refer to the diagram under "Notes" and see which set of adjustment screws will have a tuning range that includes the frequency of the station desired. This is the pair of screws to be adjusted for this particular station. The ranges are listed under each pair of adjustment screws.

4. From the same diagram, after finding the proper pair of adjustment screws are located, there is a dotted line connecting these screws to one of the push buttons. This is the button which, after the adjustments are completed, will tune the station.

5. Push button located by paragraph 2 "2".

6. Turn volume control knob on full (to the extreme right) and adjust screw marked "3" until desired station is heard. When making this adjustment, a number of stations can be brought in as the screw is turned and it is doubtful which station is the correct one. Press button No. 4 (Manual Tuning) "2" and move dial pointer by tuning station selector knob to the number on the dial that corresponds to the frequency of the station. (The number on the dial must be multiplied by ten to give the frequency in kilocycles). Listening to the program being broadcast will identify the station when adjusting screw "3".

7. Adjust screw marked "4" for maximum volume, retaining the volume control and readjusting if necessary. This completes the adjustments for this particular station.

8. Cut off name of station from list supplied and insert in button.

9. Insert celluloid disc.

10. In a line manner select a station for each of the other buttons and make necessary adjustments for each station.

IMPORTANT ALIGNMENT NOTES

Where indicated by the word, "Note", the variable should be rocked back and forth a degree or two while making the adjustment.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by adjustment, the generator output should be reduced correspondingly.

Values shown under "Microvolts" are only approximate.
SEARS-ROEBUCK & CO.

MODEL 7220, Ch. 110·7220

Schematic Notes

ELECTRICAL SPECIFICATIONS

AUGUST 7, 1938

TUBES AND FUNCTIONS:
6A7 ................. Translator-Oscillator E5L6G ................. Output
6D6 .................. IF 2525 ................. Rectifier
75 .................. AVC, detector, 1st audio M40HD ................. Ballast tube

POWER SUPPLY:
All models available .................. 105-125 volts, 25-60 cycle or DC, 45 watts

FREQUENCY RANGES:
Broadcast .................. 540-1700 KC
Short Wave .................. 2150-7200 KC

ALIGNMENT FREQUENCIES:
Oscil. Oscil. Trimmer Padder
Broadcast 1500 KC 600 KC
Short Wave 6 MC Fixed

POWER OUTPUT:
Type .................. Beam Power
Undistorted ................. .6 watts
Maximum .................. 1.5 watts

LOUD SPEAKER:
Type .................. Dynamic
Size .................. 5"
Field resistance ................. 450 ohms

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:
Left Knob ...... "On-Off" switch, volume control
Center Knob ...... Wave change switch
Right Knob ...... Tuning

CONTROL OPERATION:
Turning right; power on; volume increase
Left Foreign; right Broadcast.

Under certain conditions, the chassis may be above ground potential. Do not allow any grounded object to come into contact with the chassis while the line cord is plugged in. Also, be careful when working on the chassis out of its cabinet, to avoid shocks.

If the power supply is DC, the power cord plug must be in its receptacle in the proper way. If the receiver does not operate after being turned on for a minute, reverse the polarity by removing the power cord plug from its receptacle and turning it half way around before re-inserting it in the receptacle.

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**MODEL 7220 CHASSIS 110.7220**

**ALIGNMENT PROCEDURE**

Output meter connected to base of output transformer.

<table>
<thead>
<tr>
<th>BAND</th>
<th>POSITION OF DIAL POINTER</th>
<th>GENERATOR FREQUENCY</th>
<th>GENERATOR ATTENUATION</th>
<th>TRIMMER ADJUSTED</th>
<th>APPROXIMATE MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW</td>
<td>8 MC</td>
<td>456 KC</td>
<td>Ant. lead</td>
<td>74</td>
<td>70</td>
</tr>
<tr>
<td>SW</td>
<td>8 MC</td>
<td>6 MC</td>
<td>Ant. lead</td>
<td>74, 75</td>
<td>10</td>
</tr>
<tr>
<td>BC</td>
<td>600</td>
<td>600 KC</td>
<td>Ant. lead</td>
<td>71</td>
<td>10</td>
</tr>
<tr>
<td>BC</td>
<td>1500</td>
<td>1500 EC</td>
<td>Ant. lead</td>
<td>T1</td>
<td>10</td>
</tr>
</tbody>
</table>

**IMPORTANT ALIGNMENT NOTES**

Where indicated by the word "hook", the variable should be rocked back and forth a degree or two while making the adjustment.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

Values shown under "Microvolts" are only approximate.

---

**MODEL 7220 CHASSIS 110.880**

**ALIGNMENT PROCEDURE**

Output meter connected to base of output transformer.

<table>
<thead>
<tr>
<th>BAND</th>
<th>POSITION OF DIAL POINTER</th>
<th>GENERATOR FREQUENCY</th>
<th>GENERATOR ATTENUATION</th>
<th>TRIMMER ADJUSTED</th>
<th>APPROXIMATE MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW</td>
<td>8 MC</td>
<td>456 KD</td>
<td>Grid KO</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>SW</td>
<td>8 MC</td>
<td>456 KC</td>
<td>Grid KO</td>
<td>76</td>
<td>37</td>
</tr>
<tr>
<td>BC</td>
<td>600</td>
<td>600 KC</td>
<td>Ant.</td>
<td>71</td>
<td>20</td>
</tr>
<tr>
<td>BC</td>
<td>1500</td>
<td>1500 KC</td>
<td>Ant.</td>
<td>71, 75</td>
<td>16</td>
</tr>
<tr>
<td>BC</td>
<td>600</td>
<td>600 KO</td>
<td>Ant.</td>
<td>T1</td>
<td>Wave Temp</td>
</tr>
</tbody>
</table>

**IMPORTANT ALIGNMENT NOTES**

Where indicated by the word "hook", the variable should be rocked back and forth a degree or two while making the adjustment.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

Values shown under "Microvolts" are only approximate.

*First time T1 is misaligned about one turn by loosening center screw.

*Short oscillator section of variable condenser.

*Wave trap is aligned to assure minimum output with maximum signal input.
SEARS ROEBUCK & CO.

SEARS PAGE 10-105,106

MODEL 7261, Chassis 106.202
Schematics, Voltage, Drive Data, Specifications & F6G

DIAL DRIVE SYSTEM
AND POINTER DRIVE HOOKUP

57 RL 106
MAY 27, 1938

POWER SUPPLY RATINGS AVAILABLE
105-125 volts, 60 cycles
120 watts
105-155 volts, 50 cycles
120 watts
105-125 volts, 25 cycles
120 watts

ALIGNMENT FREQUENCIES:
Band "W"............ 10 mc (oc., ant.)
Band "M.W."........ 50 mc (oc.)
Band "B.B."........ 1.250 mc (oc., ant.), 600 kc (oc.)

FREQUENCY RANGES:
Standard Broadcast (S.B.)....... 540-1,720 kc
Medium Wave (M.W.)........ 1.76-7.5 mc
Short Wave (S.W.)........ 7.5-12 mc

INTERMEDIATE FREQUENCY

POWER OUTPUT:
Type........ Push-Pull Pentode
Unmodulated........... 10 watts
Maximum........ 12 watts

OPERATING FEATURES:
Photograph-Radio operation
Automatic Photograph Mechanism with
inducing, synchronous type motor
Four-Point Tone Control
Automatic Volume Control

PHONOGRAPH:
Type........ Automatic—Manual
Record-Playing........ 12-inch or Seven 12-inch
Turntable Speed........ 78 R.P.M.
Type of Pickup........ Crystal
Pickup Impedance........ 80,000 ohms at 1,000 cycles

LOUDSPEAKER:
Type........ Electrodynamic
Size........ 12 inches
V.C. Impedance........ 2,250 ohms at 400 cycles
Field Coil Resistance........ 1,800 ohms
App. Field Coil Voltage Drop........ 115 volts

CHASSIS FEATURES:
No. R.F. stages (Band "B.B.")........ One
No. P.P......... One
Antenna........ Doublet or Conventional
Tuning Eye........ Line Noise Electrostatic Transformer Shield
Aural-Compensated Volume Control
Magnet coils and E.F. Transformers and Band "B.B." Low-Frequency Oscillator Tracking
SEARS-ROEBUCK & CO.

MODEL 7221, Ch. 126, 202

Sockets, Trimmers
Alignment by Phone Data

ALIGNMENT PROCEDURE

The following alignment procedures are to be followed:

1. Center any weak signal
2. Adjust picture
3. Adjust sound
4. Adjust stereo
5. Adjust stereo sound

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:

RADIO PANEL:
1. Rear Knob: Radio or Phonograph Volume
2. Center Knob: Tuning
3. Front Knob: "On-Off" Switch and Tone

PHONOGRAPH COMPARTMENT:
4. Turntable Switch
5. Index Lever

SPECIFICATIONS

- Power Requirements: 115 V, 60 Hz
- Frequency Range: 500 to 10,000 Hz
- Sensitivity: 0.5 mV
- Distortion: 0.1%
- Harmonic Distortion: 0.05%
- Signal-to-Noise Ratio: 60 dB
- Tonal Response: +/- 0.5 dB

LOCATION OF PARTS AND ALIGNMENT ADJUSTMENTS ON BOTTOM OF CHASSIS

ELECTRONIC CIRCUITS

- Power Supply: 12 V
- Oscillator: Crystal
- Frequency Modulation: 500 kHz
- AM: 550 kHz
- FM: 90 MHz

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www.americanradiohistory.com
Lubricate with medium motor oil.

©John F. Rider, Publisher
MODEL 7215, CH. 110, 7215
Schematic, Socket, Tuner

SEARS-ROEBUCK & CO.

POWER SUPPLY:
All models available ........................................ 105-125 volts, 25-60 cycle or DC, 45 watts

FREQUENCY RANGES:
Broadcast ........................................ 540-1700 KG

ALIGNMENT FREQUENCIES:
Oscil. Oscil.
Trimmer Padder
Broadcast ........................................ 1500 KG 600 KG

POWER OUTPUT:
Type Beam Power
Undistorted ........................................ 1.8
Maximum ........................................ 1.6

LOUD SPEAKER:
Type ........................................ Dynamic
Size ........................................ 5" 
Field resistance ........................................ 450 ohms

AUTOMATIC TUNING CONTROL:
There are six buttons on the front panel. Five of them can be set so that by simply pushing the button marked with the station's call letters, any of five different broadcast stations can be received.

The sixth button is used to cut out the automatic tuning and convert the set for use with the regular dial and manual tuning.

AUTOMATIC TUNING ADJUSTMENTS

APRIL 7, 1938

©John F. Rider, Publisher
MODEL 7225, Ch. 110-255
Schematic, Socket
Trimmer, Voltage, Alignment

FOR TUNER, SEE INDEX

POWER SUPPLY:
All models available............ 105-125 volts, 25-60 cycle or DC, 45 watts

POWER OUTPUT:
Type......................... Beam Power
Undistorted................. 1.0
Maximum..................... 1.6

FREQUENCY RANGE:
Broadcast..................... 540-1740 KC

ALIGNMENT FREQUENCIES:
Gcyl. Nscol. Trimmer Padder
Broadcast 1600 KC 600 KC

LOUD SPEAKER:
Type......................... Dynamic
Size......................... 5"
Field resistance........... 460 ohms

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:
Left knob, "On-Off" switch, volume control
Upper Right knob............. tuning

CONTROL OPERATION:
Turning right; power on; vol. increase

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THE GROUND:

In noisy locations, it may be desirable to connect the black lead in rear of chassis to a water pipe or radiator. This may eliminate much of the interference.

CAUTION: Do not connect a ground wire directly to the chassis; otherwise harm will result.
SERVICE NOTES for "AUTOMATIC-TUNE" WHEEL DIAL
USED WITH MODELS 78E, 78F, 82A, 82B, 86A, 92B and 95B

1. INSERT CELLULOID ENVELOPE INTO METAL TAB FRAME BY
(a) Hold curved end of celluloid envelope toward metal tab holder and insert into metal frame.
(b) Gently push celluloid inward until curved end of envelope touches edge of celluloid envelope tab frame.
(c) Arrange tabs in numerical order according to station frequency.

2. PLACE SELECTED STATION CALL LETTERS PAPER STRIP INSIDE OF CELLULOID ENVELOPE
(a) Hold celluloid envelope with curved end uppermost.
(b) Place station call letter paper strip inside of celluloid envelope with printed call letters upward.

REPLACING No. 4000 DIAL GLASS SCALE ASSEMBLY
As it requires special tools to properly set part No. 4005 shaft assembly on part No. 4000 glass scale—we will ship all orders for No. 4000 glass scales with the No. 4005 shaft assembly on the glass scale.

WHEN INSTALLING PART No. 4000 GLASS ASSEMBLY WITH No. 4005 SHAFT ATTACHED carefully follow procedure in order given:
(a) Insert No. 4005 shaft into main bushing attached to the cadmium plated bracket on back of dial face.
(b) Place steel spacer washer and brass tension spring in order named over end of No. 4005 shaft.
(c) Place the small die cast primary pulley No. 4009 on shaft—do not tighten No. 2754 set screws.
(d) Loosen the two small screws in brass spacer collar on the No. 4005 shaft.
(e) Adjust brass spacer collar—by sliding collar on shaft—that so there will be approximately 1/8" clearance between the bottom of metal tab holder and the face plate. Firmly retighten brass collar and No. 2754 die cast pulley set screws. Failure to provide proper clearance will result in scratches on dial face and the dial mechanism will not operate freely.

TO INSTALL No. 3814 PRIMARY DRIVE CORD:
(a) Looking at back of dial, wrap dial cord twice around No. 3835 drive shaft in COUNTERWISE direction.

(b) Hook No. 3462 tension spring into loops at end of dial cord.
TO INSTALL No. 4013 SECONDARY DRIVE CORD:
The dial mechanism picture shows and refers to eye terminals on drive cord—these were used in early production. Loops made by knots in the cords are now used to attach cord to lugs in the No. 4009 die cast pulley and to the No. 4352 & 3462 tension springs.
(a) Looking at the front of the dial rotate dial scale COUNTER-CLOCKWISE until dial stop is reached.
(b) Loosen the two No. 3754 set screws in small die cast pulley No. 4009.
(c) Looking at front of dial turn the small die cast pulley so that the cut out in pulley will be towards the left and approximately in line with the upper edge of the dial light bracket. This bracket which is only used in six volt battery and 120 volt AC models is shown mounted on the cadmium plated dial face plate bracket in dial mechanism picture.
(d) Hook No. 4352 tension spring in dial cord loop.
(e) Turn No. 4011 drum so that the hole in the No. 4012 large die cast pulley—through which the secondary drive cord is pulled—is towards the top of face plate. This will bring the hole approximately in line with the left hand edge (looking at back of dial) of dial face plate.

![Diagram of dial mechanism](image.png)

4000 GLASS SCALE ASSEMBLY WITH FRONT AND REAR RINGS

3142 TENSION SPRING FOR PRIMARY CORD

Take long end of No. 4013 secondary drive cord—measured from knot at spring to end of cord—then looking at the front of dial, wrap cord one complete turn CLOCK WISE around the No. 4009 small die cast pulley. The other end of the cord (short end) is placed on bottom ball of secondary and primary die cast pulleys.

(f) Firmly tighten No. 3754 set screws in small die cast pulley.

COMPLETE WHEEL DIAL ASSEMBLY LESS ESCUTCHEON

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>205</td>
<td>Dial Assembly</td>
<td>Used With Model 7B8 Complete Assembly Less Escutcheon</td>
<td>$12.75</td>
</tr>
<tr>
<td>206</td>
<td>Dial Assembly</td>
<td>Used With Model 7B8 Complete Assembly Less Escutcheon</td>
<td>$12.75</td>
</tr>
<tr>
<td>207</td>
<td>Dial Assembly</td>
<td>Used With Model 8A Complete Assembly Less Escutcheon</td>
<td>$12.75</td>
</tr>
<tr>
<td>208</td>
<td>Dial Assembly</td>
<td>Used With Model 8A Complete Assembly Less Escutcheon</td>
<td>$12.75</td>
</tr>
<tr>
<td>209</td>
<td>Dial Assembly</td>
<td>Used With Model 11B &amp; 9B Complete Assembly Less Escutcheon</td>
<td>$12.75</td>
</tr>
</tbody>
</table>

MISCELLANEOUS PARTS USED IN ABOVE ASSEMBLIES

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4016</td>
<td>Cardboard Envelope</td>
<td>Station Call Letter Cover</td>
<td>.65</td>
</tr>
<tr>
<td>4014</td>
<td>Card</td>
<td>Primary Drive Cord</td>
<td>.15</td>
</tr>
<tr>
<td>4013</td>
<td>Card</td>
<td>Secondary Drive Cord</td>
<td>.15</td>
</tr>
<tr>
<td>5996</td>
<td>Band Indicator Assem.</td>
<td>For Model 7B8/7B8/9B/9B</td>
<td>.75</td>
</tr>
<tr>
<td>5992</td>
<td>Band Indicator Assem.</td>
<td>For Model 8A/8A</td>
<td>.75</td>
</tr>
<tr>
<td>4011</td>
<td>Drive Drum Asmem. with 4012 Secondary Pulley and Rubber Disc Coupler</td>
<td>1.55</td>
<td></td>
</tr>
<tr>
<td>4353</td>
<td>Drive Shaft</td>
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SENTINEL RADIO CORP.

MODEL 56U
Schematic, Voltage Socket, Trimmers

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MODEL 65U  
MODEL 67L  
MODELS 68B, 68Bb  
Alignment

**Model 65U**  
Eight Tube AC-DC Superheterodyne Receiver

**ALIGNING I.F. STAGE AT 445 METERS:**  
(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead to the grid cap of the 6A7 tube through a 0.0025 mf condenser. Adjust band selector switch to 445 meter band.  
(b) Tune receiver dial and set test oscillator frequency to EXACTLY 445 kilocycles.  
(c) Adjust each of the second I.F. transformer trimmers.  
(d) Adjust each of the first I.F. transformer trimmers.

**ALIGNING 16-57.7 METER BAND:**  
(a) Connect the ground lead of the test oscillator through a 400 ohm resistor to receiver antenna lead and the low side to the set ground through a 0.0025 mf condenser.  
(b) Tune receiver dial and set test oscillator frequency to exactly 16.577 kilocycles.  
(c) Adjust each of the second I.F. transformer trimmers.  
(d) Peak each of the first I.F. transformer trimmers.

**ALIGNING 177-240 METER BAND:**  
(a) Tuner receiver dial and set test oscillator frequency to EXACTLY 177.240 kilocycles.  
(b) Peak each of the first I.F. transformer trimmers.

---

**Model 67L**  
Six Tube Superheterodyne Receiver

**ALIGNING I.F. STAGE AT 445 KILOCYCLES:**  
(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead to the grid cap of the 6A7 tube through a 0.0025 mf condenser.  
(b) Set test oscillator to EXACTLY 445 kilocycles and turn receiver volume control on full.  
(c) Peak each of the second I.F. transformer trimmers.  
(d) Peak each of the first I.F. transformer trimmers.

**ADJUSTING 445 KILOCYCLE WAVE TRAP:**  
(a) Connect the high output side of the test oscillator to exactly 445 kilocycles and adjust the 445 K.C. wave trap trimmer condenser mounted on and accessible through hole in rear of chassis for MINIMUM 445 kilocycle signal response.

**ALIGNING 1720-50 METER BAND:**  
(a) Adjust band selector switch for operation on 1720-540 kilocycle band and leave test oscillator lead connected to receiver antenna lead through the 0.0025 mf series condenser.  
(b) Set test oscillator frequency and receiver dial to EXACTLY 1720 kilocycles.  
(c) Adjust 1720 K.C. oscillator trimmer to bring in 1720 kilocycle test oscillator signal to maximum output.  
(d) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles.  
(e) Adjust 1400 K.C. antenna trimmer for maximum sensitivity.  
(f) Set receiver dial and test oscillator frequency to approximately 600 kilocycles.  
(g) While rocking gain condenser slightly to right and left adjust 600 K.C.P. padder for maximum sensitivity.

**ALIGNING 2-3-1 MEGACYCLE BAND:**  
(a) Replace 0.0025 mf test oscillator condenser with a 400 ohm resistor. Adjust band selector switch for operation on 6.3 to 23 megacycle band.  
(b) Tune receiver dial and set test oscillator frequency to EXACTLY 6.3 megacycles.  
(c) Tune receiver dial and set test oscillator frequency to 58 megacycles.  
(d) No adjustment is required at low frequency end of this band as a fixed condenser is used.

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SENTINEL RADIO CORP.

MODEL 67L
Schematic, Voltage Socket, Trimmers

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CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL. VIII.
The 5E1 Voltage Regulator, which is used to maintain the filament voltage on the receiver tubes at the correct value of approximately 2 volts, in order to adapt the receiver to operation on 115 volt A.C. battery or 12 volt D.C. battery automatically, takes care of the normal change of battery voltage variations.

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SERVICE NOTES for PUSH BUTTON DIAL

FROM ONE TO TEN STATIONS OPERATING ON FREQUENCIES SEPARATED BY FORTY KILOGRAMS OR MORE MAY BE AUTOMATICALLY TUNED BY PROPERLY SETTING PUSH BUTTONS.

AFTER IT IS DETERMINED WHAT STATIONS YOU WISH TO AUTOMATIC PUSH BUTTON TUNE, DETERMINE THE FREQUENCY TUNING AND SET THE PUSH BUTTONS FOR THE SECTIONS OF THESE STATIONS AND SET PUSH BUTTONS BY:

a. Gently press designated push button and allow it to return to its normal position. If the push button is not set to the desired station, the station will not be heard. Adjust the push button until the desired station is heard.

b. Carefully set the station selector to the desired station and adjust the push button until the desired station is heard.

AFTER THE TEN PUSH BUTTONS HAVE BEEN PROPERLY SET THEY WILL NOT REQUIRE FURTHER ATTENTION EXCEPT WHEN MOVED FROM THEIR POSITION OR WHEN AN ADDITIONAL TAB IS INCLUDED WHICH WOULD DISTURB THE POSITION OF THE OTHER TABS.

PARTS LIST

FOR OTHER ASSEMBLIES SEE "AUTOMATIC TUNE" WITHIN DIAL ASSEMBLIES.

COMPLETE PUSH BUTTON DIAL ASSEMBLY LESS ESCUTCHEON

<table>
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MISCELLANEOUS PARTS USED IN ABOVE ASSEMBLIES

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Prices are subject to change without notice.

When ordering parts be sure to mention part number and order all parts from:

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MODEL 86AE
Alignment Trimmers
Chassis

SENTINEL RADIO CORP.

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

IC6
OSC-MOD

34
I.F.
AVC-DET

184
AUDIO

30
DRIVER
POWER

30
POWER

NOTE: ALL MEASUREMENTS MADE FROM SOCKET CONTACIT TO GROUND WITH A 1000
OHM PER VOLT VOMETER AND 330 OHM WIRE CONNECTOR. THERMISTORS WITH A 5
VOLT DRY K ERATOR AS SUPPLY WHEN A 5 VOLT STORAGE OR AIR CELL
IS USED, THE ANTENNA VOLTAGE WILL VARY SLIGHTLY.

VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

Looking at bottom of chassis, the three antenna trimmers on coil attached
to front of chassis, reading from front to rear are: 1400 KC, 5 MC & 18 KC.

The three oscillator trimmers on the coil mounted on side of chassis,
reading from chassis to end of coils are: 1720 KC, 5.8 MC & 18.3 KC.

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MODEL 96BE
Schematic, Voltage Socket

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MODEL 96BE  
Alignment, Trimmers  
Chassis

MODEL 106A  
Trimmers, Chassis

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ALIGNMENT PROCEDURE:

Lack of sensitivity, selectivity or poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, inadequate or excessively long antenna, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proven not to be the cause.

NOTE: BE SURE TO FOLLOW PROCEDURE CAREFULLY WHEN ALIGNING. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT.

IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER.

ALIGNING I.F. STAGE AT 465 KILOCYCLES:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 6AQ tube through a .02 Mfd. series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator frequency to EXACTLY 465 kilocycles and turn receiver volume control on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

To assure most accurate trimmer setting, repeat above adjustment several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.

ALIGNING 1720-510 KILOCYCLE BAND:

(a) Remove test oscillator lead from grid of the 6AQ tube and attach it to the receiver antenna lead through a .00025 Mfd. series condenser.

(b) Check tuning dial adjustment by turning gang condenser until plate touches maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line of the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.

(c) Set receiver dial and test oscillator frequency to EXACTLY 1720 kilocycles.

(d) Bring in 1720 KC test oscillator signal to maximum output by adjusting the trimmer condenser mounted on top of the oscillator section of the gang condenser. Looking at the front of the receiver the rear section of the gang condenser is the oscillator section.

(e) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles:

(f) Adjust trimmer on top of the front section gang condenser (antenna section) for maximum 1400 kilocycle test signal response.

(g) Tune receiver dial and set test oscillator frequency to approximately 600 kilocycles.

(h) While rocking the tuning condenser back and forth adjust 600 KC oscillator padder condenser which is accessible through the hole in the top of the chassis adjacent to the gang condenser for maximum 600 kilocycle signal response.

ALIGNING 23.6 MEGACYCLE BAND:

(a) Replace .00025 Mfd. Test oscillator antenna lead series condenser with a 460 ohm resistor.

(b) Adjust band selector switch for 23.6 megacycles band operation, tune receiver dial and set test oscillator frequency to EXACTLY 6.3 megacycles.

(c) Bring in 6.3 megacycle test oscillator signal to maximum output by adjusting 6.3 M.C. oscillator trimmer on top of coil located underneath chassis.

(d) Tune receiver dial and test oscillator frequency to EXACTLY 6 megacycles, and adjust 6 M.C. antenna trimmer which is mounted on coil located on top of chassis for maximum sensitivity.
SENTINEL-ERLA MODEL 99AE
ALIGNMENT PROCEDURE:

Lack of sensitivity, selectivity, or poor tone quality may be due to one or a combination of causes such as weak or defective tubes or speakers, open or grounded bias resistors, bypass condensers, inadequate or excessively long antennas, etc. Never attempt to realign set until all other possible sources of trouble have been thoroughly investigated and definitely proven not to be the cause.

NOTE: BE SURE TO FOLLOW PROCEDURE CAREFULLY WHEN ALIGNING. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMER AND PADDED CONDENSERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON PARTS DIAGRAM.

It is absolutely necessary that an accurately calibrated test oscillator with some type of output measuring device be used when aligning the receiver.

ALIGNING IF STAGE AT 465 Kilocycles:
(a) Connect the ground lead of the test oscillator to the chassis or set ground post. Connect the other lead of the test oscillator to the grid cap of the 6L7 tube through a 02 Mfd. series condenser. DO NOT REMOVE GRID CLIP.
(b) Set test oscillator to exactly 465 kilocycles and turn receiver volume control on full.
(c) Peak each of the second IF transformer trimmers.
(d) Peak each of the first IF transformer trimmers.
To assure most accurate trimmer setting repeat above adjustment several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.

ADJUSTING 465 Kilocycle Wave Trap:
(a) Connect the high output side of the test oscillator through a 0.0026 Mfd. condenser to the receiver antenna "A" post and the low side to the set ground.
(b) Set test oscillator frequency to EXACTLY 465 kilocycles and adjust 465 kilocycle wave trap trimmer condenser for MINIMUM 465 kilocycle signal response.

ALIGNING 137-411 Kilocycle Band:
(a) Check tuning dial adjustment by turning any for condenser until plate DC maximum capacity stop is reached at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.
(b) Leave test oscillator lead connected to receiver antenna "A" post through a 0.0026 Mfd series condenser.
(c) Adjust band selector switch for operation on 137-411 kilocycle band, tune receiver dial and set test oscillator frequency to EXACTLY 411 kilocycles.
(d) Bring in 411 kilocycle test signal to maximum output by adjusting 411 K.C. 02 Mfd. trimmers for maximum sensitivity.
(e) Tune receiver dial and set test oscillator frequency to EXACTLY 350 kilocycles. Adjust 350 K.C. antenna and R.F. trimmers for maximum sensitivity.
(f) Tune receiver dial and set test oscillator frequency to approximately 150 kilocycles—then while rocking any condenser slightly to right and left adjust 150 kilocycle oscillator condenser for maximum sensitivity.

ALIGNING 170-540 kilocycle band:
(a) Leave 0.0026 Mfd. condenser in series with test oscillator lead. Adjust band selector switch for operation on the 170-540 kilocycle band.
(b) Set test oscillator frequency and receiver dial to exactly 1720 kilocycles. ADJUST 1720 Kilocycle Oscillator TRIMMER (3) TO BRING IN 1720 Kilocycle Test Oscillator Signal to Maximum Output.
(c) Tune receiver dial and set test oscillator frequency in 1720 Kilocycle band approximately 1400 kilocycles. Adjust 1400 K.C. antenna (C3) and R.F. (F) trimmers for maximum sensitivity.
(d) Set test oscillator frequency and receiver dial to approximately 600 kilocycles. Then while rocking any condenser slightly to right and left, adjust 600 K.C. oscillator condenser for maximum signal response.

ALIGNING 2.3-7.5 Megacycle Band:
(a) Replace 0.0026 Mfd. test oscillator lead series condenser with a 400 ohm carbon resistor.
(b) Adjust band selector switch to 2.3-7.5 Megacycle band, tune receiver dial and set test oscillator frequency to EXACTLY 7.5 megacycles—then adjust 7.5 Megacycle oscillator 02 Mfd. trimmer for maximum 7.5 Megacycle test signal output.
(c) Tune receiver dial and set test oscillator frequency to EXACTLY 6 megacycles—adjust 6 M.C. antenna (G) and R.F. (U) trimmers for maximum sensitivity.

ALIGNING 7.5-24.3 Megacycle Band:
(a) Leave 400 ohm resistor in series with test oscillator lead and place band selector switch for operation on 7.5-24.3 Megacycle band, tune receiver dial and set test oscillator frequency to EXACTLY 24.3 megacycles.
(b) Adjust 24.3 M.C. oscillator trimmer (G) to bring in 24.3 megacycle test signal to maximum output.
NOTE: When adjusting this trimmer two peaks, the fundamental and the image peak will be noticed. Care must be taken that the fundamental peak and not the image peak is used for alignment, the receiver at 24.3 megacycles, always check to see if the proper peak has been used. To do this leave test oscillator frequency at 24.3 megacycles, increase the output of the test oscillator and tune receiver dial to approximately 23.3 megacycles, then vary the receiver dial to stability to the right and left of 23.3 megacycles and if the fundamental peak was used in aligning at 24.3 megacycles the receiver signal will be heard at approximately 23.3 megacycles on the receiver dial.
(d) Tune receiver dial and set test oscillator frequency to EXACTLY 20 megacycles.
(e) Adjust 20 M.C. antenna (A) and R.F. (U) trimmers for maximum 20 Megacycle test signal response.

To assure most accurate trimmer setting repeat above adjustments several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.
ALIGNMENT PROCEDURE:

Lack of sensitivity, selectivity, or poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, inadequate or excessively long antenna, etc. Never attempt to station great or 300 ohm resistor 1700 KC and test oscillator frequency to 1700 KC. When the trimmer and transformer mounted on 1700 KC test oscillator is located at the front of the receiver, the receiver will be found that the approximate location will be indicated, the station and transformer will be either horizontally or vertically correct, and the trimmer and diagonal. The stations selected must operate on a frequency of 40 kilocycles more or less, and other tubes in their proper position in cabinet depressions.

While it will be found that only the approximate location will be indicated, the station call letters properly located will be an extremely helpful tuning aid. To set the proper station call letter tabs into the cabinet depressions proceed as follows:

a. Determine which nine stations call letters you wish to have on the cabinet—press call letter tabs out of the call letter sheets provided.

b. Carefully tune in the selected station that broadcasts on the lowest frequency—the least number of kilocycles.

c. Place a little mucilage or celluloid on back of paper tab. Press the paper call letter tab—so that the printed call letters of the station tuned in are at the same angle as the printing on the dial—into the round depression on the cabinet front that is nearest to the dial. By placing call letter tab on angle the call letter can easily be read with cabinet in either a horizontal or upright position.

d. Tune in the next selected station having the next lowest station frequency, pressing the call letter for this station into the round cabinet depression nearest to the dial point. Continue this procedure in this way until station call letters have been placed into all nine cabinet depressions.

After the station call letters are set it will be a simple matter to determine the approximate dial position of any of these stations—just rotate tuning knob until dial pointer needle points to the corresponding call letter of desired station. It must be remembered that only the approximate tuning location will be indicated by the dial pointer needle—each station must be corrected tuning, by rotating the tuning control knob until a station is tuned in with greatest clarity.

ALIGNMENT PROCEDURE:

Lack of selectivity, selectivity, or poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, inadequate or excessively long antenna, etc. Never attempt to equalize set until all other possible sources of trouble have been first thoroughly investigated and definitely proven to be the cause.

NOTE: Be sure to follow procedure carefully when aligning. Otherwise the receiver will not be sensitive and the dial calibration will be incorrect. The trimmers and padding condensers will be referred to by their function as indicated on the parts diagram.

IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER.

ALIGNING I.F. STAGE AT 465 Kilocycles:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 6AT tube through a 0.012 MF series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 kilocycles and turn receiver control volume on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

To ensure most accurate trimmer setting repeat above adjustment several times always using lowest possible test oscillator output consistent with readily measurable scale deflection.

ALIGNING 1700-540 Kilocycle Band:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 9AG tube through a 0.0025 MF series condenser.

(b) Check tuning dial adjustment by tuning gang condenser until plates touch maximum appropriate step (completely in mesh), at which point the dial needle must be exactly even with the last line on the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.

(c) Place band selector switch for 1700-540 KC operation. Press in manual push-button disengagement and set receiver dial and test oscillator frequency to EXACTLY 1700 kilocycles.

(d) Bring in 1700 KC test oscillator signal to maximum output by adjusting the trimmer condenser mounted on top of the oscillator section of the gang condenser. Locking at this point the receiver as the rear section of the gang condenser is the oscillator section.

(e) Tune receiver dial and test oscillator frequency to EXACTLY 1400 kilocycles.

(f) Adjust trimmer on top of front section gang condenser (antenna section) for maximum 1400 kilocycle signal response.

ALIGNING 230-63 Megacycle Band:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 9AG tube through a 0.0025 MF series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 kilocycles and turn receiver control volume on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

To assure most accurate trimmer setting repeat above adjustment several times always using lowest possible test oscillator output consistent with readily measurable scale deflection.

ALIGNING 1700-540 Kilocycle Band:

(a) Remove test oscillator lead from grid of 9AG tube and attach it to the receiver antenna lead through a 0.0025 MF series condenser.

(b) Check tuning dial adjustment by tuning gang condenser until plates touch maximum appropriate step (completely in mesh), at which point the dial needle must be exactly even with the last line on the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.

(c) Set receiver dial and test oscillator frequency to EXACTLY 1700 kilocycles.

(d) Bring in 1700 KC test oscillator signal to maximum output by adjusting the trimmer condenser mounted on top of the oscillator section of the gang condenser. Looking at the front of the receiver the rear section of the gang condenser is the oscillator section.

(e) Tune receiver dial and test oscillator frequency to EXACTLY 1400 kilocycles.

(f) Adjust trimmer on top of the front section gang condenser (antenna section) for maximum 1400 kilocycle signal response.
PUSH BUTTON ADJUSTMENT

Nine stations operating in the 1500-540 kilocycle band may be automatically pushed button tuned by properly setting each station selector push button. As the push buttons are not preset at the factory for any definite stations be sure to set each one.

Before Attempting to Set Push Buttons Be Sure to:

(a) Have aerial which will be used with the radio attached to the receiver when setting push buttons.
(b) Operate radio at least 15 minutes before adjusting push buttons.
(c) Obtain transmitter frequency—number of kilocycles—and call letters of the nine stations you wish to push button tune from radio log or newspaper station lists.

Adjust Push Buttons for Selected Stations by:

(a) Rotate band switch knob to the NEXT TO MAXIMUM RIGHT HAND POSITION—540-1700 Kilocycle Band Manual Tuning Position.
(b) Using regular manual tuning knob, carefully tune in one of the selected stations whose transmitter frequency is somewhere between 555-880 kilocycles. Make a mental note of the kind of program on the station as that push button is adjusted. For this particular station as instructed in paragraphs (a), (b), (c) it will be easy to recognize the station by the type of program being transmitted.
(c) Rotate band switch knob to maximum right hand position.
(d) Press in one of the three push buttons marked 555-880 kilocycles on diagram.

NOTE: STATION MAY DISAPPEAR OR BE DISTURBED OR IN SOME INSTANCES ANOTHER STATION MAY BE HEARD.

(e) GRASP PANEL OF PUSH BUTTON LEVER PROPELLED IN AND BY SLOWLY TUNING THIS BUTTON CAREFULLY TUNE IN THE SELECTED 555-880 Kilocycle Station that was previously tuned in with manual control. Slowly—turn left in one direction, then a different way if the wanted station is not heard in a different direction. Watch tuning eye and adjust so that the two open ends of the green inverted "V" on the tuning eye are closest together—At which point point of the signal will be heard with greatest Volume and clearest tone.

(f) Press station card letter of the station just tuned in out of call letter sheet printed and insert into depression adjacent to push button just adjusted.

(g) After the first 555-880 kilocycle push button has been properly set, the other eight push buttons should be adjusted in the same manner preceded by the following order:
1. Set remaining two push buttons marked 555-880 kilocycles on diagram for any two stations operating between 555 and 880 kilocycles.
2. The three push buttons marked 880-1170 kilocycles on diagram should be adjusted for any three selected stations operating between 880 and 1170 kilocycles.

IMPORTANT:

For Manual Tuning the Band Switch must be in next to maximum right hand position. When adjusting Push Buttons or when Push Button tuning after Push Buttons have been set, Band Switch must be in maximum right hand position.

INSTRUCTIONS FOR INSTALLING AND OPERATING "AUTOMATIC PUSH BUTTON"

Five stations operating in the 1720-540 kilocycle band may be automatically pushed button tuned by properly setting the ten trimmer screws accessible through holes in the back of the chassis.

In the push buttons are not pre-set at the factory for any definite stations be sure to set them by:

(1) It is important to have the serial number which will be used with the set attached to the radio when adjusting.
(2) Be sure to OPERATE the SET AT LEAST one-half hour before adjusting trimmers. If set is not thoroughly warmed up when trimmers are adjusted, the trimmers may shift position after they become warm resulting in poor tone, weak signal and excessive background noise.
(3) For best results set push buttons for local or nearby stations only. Obtain the transmitter frequency—number of kilocycles—and call letters of the stations you wish to “Push Button” tuned.
(4) Place band selector switch for operation as 1720-540 kilocycle band.
(5) Press in “MANUAL” tuning button—see diagram.
(6) Press push button tuned in selected station whose transmitter frequency is somewhere between 555-880 kilocycles that the trimmer is to be adjusted. Note the transmitter frequency marked on paper label attached to back of chassis be adjusted for.
(7) Place trimmer in “MANUAL” tuning button—see diagram.
(8) Set trimmer tuned in selected station whose transmitter frequency is between 540-880 kilocycles.
(9) Press in push button marked “640-935 K.C.”—see diagram.

NOTE: STATION SIGNAL WILL DISAPPEAR OR MAY BE DISTURBED OR IN SOME INSTANCES ANOTHER STATION MAY BE HEARD. Use the trimmer that moves to the middle of the range. These trimmers should never be too loosely or too tightly adjusted. It is important that the trimmers marked “1A and 1B” or trimmers marked “2A and 2B” trimmers marked “1A and 1B” or trimmers marked “2A and 2B” should not be used because they would have to be barely adjusted, which is objectionable because trimmers should be too loosely or too tightly adjusted. However, because the trimmers should be too loosely or too tightly adjusted.

IMPORTANT: WHEN LISTENING TO STATIONS ON BROADCAST BAND, THE "MANUAL PUSH BUTTON" OR ONE OF THE "OTHER PUSH BUTTONS" MUST BE PUSHED IN—OTHERWISE NO STATION WILL BE HEARD. DO NOT PRESS IN MORE THAN ONE "PUSH BUTTON" AT ONE TIME. IF MORE THAN ONE "PUSH BUTTON" IS PRESSED INWARD ONLY THE HIGHEST FREQUENCY STATION WILL BE HEARD.
ALIGNMENT PROCEDURE:

SHOULD REALIGNMENT BE NECESSARY, THERE ARE SEVERAL PRECAUTIONS THAT MUST BE CAREFULLY OBSERVED, THESE ARE:

1. Do not align set until it has reached normal operating temperature. Place the receiver in operation at least 15 minutes before attempting to realign the set.

2. The importance of using the proper type of test equipment and following the ALIGNMENT PROCEDURE EXACTLY AS GIVEN CANNOT BE TOO STRONGLY EMPHASIZED—failure to do so will result in low sensitivity, poor selectivity, incorrect dial calibration, and inconsistent satisfactory operation of the automatic frequency control.

3. It is absolutely necessary that an accurately calibrated test oscillator with some type of output measuring device and a double scale milliammeter—0 to 1 M. A. and 0 to 5 M. A. be used.

ALIGNING IF. STAGE AT 465 KILOCYCLES:

(a) Place automatic frequency control knob in the middle of A.F.C. "off" position.

(b) Attach the ground lead of the test oscillator to the chassis. Connect the other lead to the grid cap of the 6AB tube through a 0.1 M.Ω series condenser. DO NOT MOVE GRID CAP.

(c) Set test oscillator to EXACTLY 465 kilocycles and turn volume control on full.

(d) Remove shields held in position by stop fasteners over A.F.C. test jack and over trimmer screw holes in the first and second I.F. transformer shield cans.

(e) Peak second I.F. transformer trimmers for maximum 465 kilocycle output by adjusting the two trimmers accessible through the two top holes in the second I.F. transformer shield can. DO NOT TOUCH DISCRIMINATOR (BOTTOM) SCREW.

(f) Peak each of the first I.F. transformer trimmers for maximum 465 kilocycle signal output.

ALIGNING DISCRIMINATOR CIRCUIT:

(a) Place switch underneath push plate assembly (allowing condenser) in A.F.C. "on" position. Leave test oscillator set to EXACTLY 465 KILOCYCLES and connect to grid of 6AB tube through a 0.1 M.Ω, 0 to 1 M.Ω, or 0 to 5 M.Ω milliammeter into A.F.C. test jack located on top of chassis adjacent to the 637 tube. To avoid possibility of damaging the meter should one of the milliammeters lead short to the metal chassis, ALWAYS TURN OFF RECEIVER WHEN INSERTING OR REMOVING MILLIAMMETERS LEADS FROM A.F.C. TEST JAC.

(b) Short out A.F.C. meter switch by grounding the second from the left (looking at the front of the chassis) of the four lugs mounted on top of the dial assembly. The proper lug to ground is indicated in the "Note X" on chassis top para view.

(c) Turn receiver on, place A.F.C. switch knob in left position and if meter needle jumps off scale adjust output of test oscillator until an approximate 2 M.Ω deflection is obtained on the 0 to 5 milliammeter scale.

(d) Place band selector switch for operation on 1720-540 KILOCYCLE broadcast band—set receiver dial somewhere near 1000 kilocycles at a point where no station is heard.

(e) Listate A.F.C. switch knob from maximum left hand to middle position and note whether the milliammeter readings change as the position of the A.F.C. switch is changed. No change in reading indicates proper discriminator trimmer adjustment, while a noticeable change indicates improper discriminator trimmer adjustment.

(f) IMPORTANT: DO NOT ADJUST DISCRIMINATOR TRIMMER UNTIL IT IS ABSOLUTELY NECESSARY. Place A.F.C. switch in middle position and note milliammeter reading then place A.F.C. switch in maximum left hand position. With A.F.C. switch in maximum left hand position, CAREFULLY ADJUST DISCRIMINATOR TRIMMERS UNTIL MILLIAMMETER READING IS EXACTLY THE SAME IN BOTH POSITIONS.

NOTE: As the discriminator trimmer screw is screwed in (increasing capacity) the milliammeter reading should decrease and as the discriminator trimmer is unscrewed (decreasing capacity) the milliammeter reading should increase. IF WHEN ADJUSTING THE DISCRIMINATOR TRIMMER THE MILLIAMMETER READING DOES NOT SHARPLY INCREASE OR DECREASE AS THE TRIMMER IS ADJUSTED EVEN AFTER SEVERAL TURNS OF THE TRIMMER SCREW, THIS DOES NOT INDICATE PROPER BALANCING BUT DOES INDICATE CORRECT ADJUSTMENT AND THE DISCRIMINATOR TRIMMER SHOULD BE SET TO ABOUT 0 TO 1 M.Ω MILLIAMMETER. THE POSITION OF THE DISCRIMINATOR TRIMMER MADE ALL OVER AGAIN.

ALIGNING 1720-540 KILOCYCLE BAND:

(a) Check tuning dial adjustment by turning tuning condenser until plate meter reads maximum capacity strip (completely in mesh), at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line, move needle to correct position.

(b) Remove test oscillator lead from grid of 6AB tube and connect to receiver "A" antenna post through a 0.0025 M.Ω, 0.1 M.Ω, or 1 M.Ω milliammeter into A.F.C. test jack located on top of chassis adjacent to the 637 tube. To avoid possibility of damaging the meter should one of the milliammeters lead short to the metal chassis, ALWAYS TURN OFF RECEIVER WHEN INSERTING OR REMOVING MILLIAMMETERS LEADS FROM A.F.C. TEST JAC.

(c) Place A.F.C. central knob in middle of A.F.C. "off" position. Adjust band selector switch for operation on the 1720-540 kilocycle band.

(d) Set test oscillator frequency and receiver dial to EXACTLY 1720 kilocycles, and BRING IN 1720 KILOCYCLE TEST OSCILLATOR SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING 1720 KILOCYCLE OSCILLATOR TRIMMER.

(e) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles. Adjust 1400 K.C. R.F. and antenna trimmers for maximum sensitivity.

(f) Set test oscillator frequency and receiver dial to approximate 600 kilocycles. Then slowly rock gain condenser slightly to right and left, adjust 600 K.C. oscillator potentiometer for maximum signal response.

ALIGNING 163.5-5.6 MEGACYCLE BAND:

(a) Replace 0.0025 M.Ω test oscillator antenna lead series condenser with a 0.00025 M.Ω trimmer.

(b) Adjust band selector switch to 163.5-5.6 megacycles, tune receiver dial and set test oscillator frequency to EXACTLY 5.6 megacycles. Bring in 5.6 megacycle test signal to maximum output by adjusting 5.6 M.Ω oscillator trimmer.

(c) Tune receiver dial and test oscillator frequency to EXACTLY 6 Megacycles and adjust 6 M.Ω extra trimmer for maximum sensitivity.

ALIGNING 5.5-18.5 MEGACYCLE BAND:

(a) Leave 400 ohm resistor in circuits with test oscillator lead and place band selector switch for operation on 5.5-18.5 megacycle band, tune receiver dial and set test oscillator frequency to EXACTLY 18.5 megacycles.

(b) Adjust 18.5 M.Ω oscillator trimmer to bring in 18.5 megacycle test signal to maximum output.

NOTE: When adjusting this trimmer (two peaks, the fundamental and the image peak will be noticed. USE MUST BE TAKEN THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 18.5 MEGACYCLES. Always back off the trimmer to minimum capacity, then screw down the trimmer (add capacity) until the first peak which is the fundamental and the proper one to use is obtained. In this case it is to be checked that the oscillator trimmer at 18.5 megacycles is the oscillator trimmer and not receiver dial to approximately 17.5 megacycles. Then vary the receiver dial slightly to the right and left of 17.5 megacycles, and if the fundamental peak was used in aligning at 18.5 megacycles the test oscillator signal will be heard at approximately 17.5 megacycles on the receiver dial.

(c) Tune receiver dial and set test oscillator frequency to EXACTLY 15 megacycles. Rock gain condenser slightly to right and left and adjust 15 M.Ω antenna trimmer for maximum 15 megacycle test signal response.

To assure more accurate trimmer setting, repeat all above adjustments several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.
ALIGNMENT: I.F. 465 KC THROUGH .02 MFD. CONDENSER TO GRID CAP OF 1A70 TUBE—DO NOT REMOVE GRID CAP—ADJUST IF TRIMMERS TO MAXIMUM OUTPUT AT 1730 KC THROUGH .0025 MFD. CONDENSER TO RECEIVER ANTENNA (BLUE) LEAD, ADJUST OSCILLATOR TRIMMER TO MAXIMUM AT 1400 KC ANT. TRIMMER TO MAX.

MODEL 118-B

COLOR CODE
- RED—A + 15V
- BLACK—A + 15V
- BLUE—B + 90V
- YELLOW—B —

22 1F TRIMMERS
455 KC

IAG POWER

MODEL 119-B

COLOR CODE
- RED—A + 15V
- BLACK—A + 15V
- BLUE—B + 90V
- YELLOW—B —

22 1F TRIMMERS
455 KC

IAG POWER

BATTERY PLUG AND UP INSERT INTO BACK BATTERY PACK

COPPER PLUG AND UP INSERT INTO BACK BATTERY PACK

DOTTED LINES SHOW PARTS UNDERNEATH SUB-BASE OF B ELIM. UNIT

3730 KC OSC TRIMMER FOR 540-3730 KC BAND

4200 KC ANT TRIMMER FOR 540-4200 KC BAND

4000 KC ANT TRIMMER FOR 540-4000 KC BAND

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ALIGNMENT PROCEDURE IN TABULATED FORM

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely intermesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move needle to correct position.
(b) Use an accurately calibrated test oscillator with some type of output measuring device.
(c) Have ground lead of test oscillator attached to chassis.
(d) Press in manual tuning button.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial for</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator containing cd:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any point where no</td>
<td>455 K.C.</td>
<td>0.02 MFD. condenser</td>
<td>High side to grid terminal of 6AB2 tube</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td></td>
<td>interfering signal is</td>
<td></td>
<td></td>
<td>DO NOT REMOVE CAP.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>received</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Exactly</td>
<td>1730 K.C.</td>
<td>1730 K.C.</td>
<td>0.0025 MFD condenser</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>(2) Exactly</td>
<td>1400 K.C.</td>
<td>1400 K.C.</td>
<td>0.0025 MFD condenser</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td>(3) Approx.</td>
<td>600 K.C.</td>
<td>600 K.C.</td>
<td>0.0025 Mfd condenser</td>
<td>Receiver blue antenna lead</td>
<td>Wire noting gang condenser adjust 600 K.C. oscillator pad for maximum output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** 870 K.C. oscillator trimmer need be adjusted only if 870-1250 K.C. Push button does not tune from 870 to 1520 K.C.

If necessary to adjust, proceed by:
(a) Attach test oscillator to set antenna and ground leads.
(b) Set test oscillator to exactly 850 K.C.—with attenuator adjusted for maximum signal output.
(c) Press in 870-1250 K.C. push button.
(d) Adjust 870-1250 K.C. oscillator push button to bring in 850 K.C. test signal to maximum output & leave in this position.
(e) Adjust 870 K.C. oscillator trimmer to bring in 870 K.C. test oscillator signal to maximum output.
ALIGNMENT PROCEDURE IN TABULATED FORM

(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move needle to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) Have ground lead of test oscillator attached to chassis.

(d) Push in manual push button.

<table>
<thead>
<tr>
<th>Plate band switch for operation:</th>
<th>Set receiver dial to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. alignment use any band position</td>
<td>Adjust test oscillator frequency to:</td>
</tr>
</tbody>
</table>

- Use dummy antenna in series with output of test oscillator consisting of:
- Attach output of test oscillator to:

| Point where no interfering signal is received | .02 Mfd. condenser | High side to grid cap of 6A8 tube, do not remove cap.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) 2020 K.C.</td>
<td>Exact 15 M.C.</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td>(2) 1400 K.C.</td>
<td>Exact 13.3 M.C.</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td>(3) Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>Receiver blue antenna lead</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1750 to 540 K.C. Band</th>
<th>5.7 to 18.3 M.C. Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 K.C. antenna pad for 870-1520 K.C. (No. 5) pushbutton need be adjusted only if there is an appreciable change in volume when same station is push button and manual tuned.</td>
<td></td>
</tr>
</tbody>
</table>

- Should there be a great difference adjust 1100 K.C. antenna pad as: (a) Attach test oscillator to set antenna and ground leads with .00025 Mfd. dummy antenna. (b) Screw any two push buttons—except 870-1520 K.C. (No. 5) push button—all the way in—and the other two push buttons all the way out.
- (c) Set test oscillator to exactly 1100 K.C.
- (d) Press in 870-1520 K.C. push button and adjust this button for maximum test signal response.
TWO BAND—SIX TUBE INCLUDING BALLAST TUBE
2 Volt Battery Operated Superheterodyne Receiver

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SENTINEL RADIO CORP.

MODELS 142A, 142AE
MODEL 143L
Trimmers, Chassis

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SENTINEL RADIO CORP.

MODEL 145AE

Chassis

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**ALIGNMENT PROCEDURE IN TABULATED FORM**

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<thead>
<tr>
<th>MODEL 148A</th>
<th>MODEL 151BL</th>
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<tbody>
<tr>
<td><strong>Alignment, Trimmers</strong></td>
<td><strong>Alignment</strong></td>
</tr>
<tr>
<td><strong>Chassis</strong></td>
<td><strong>Chassis</strong></td>
</tr>
</tbody>
</table>

---

**TEST OSCILLATOR**

- **Set receiver dial to:**
- **Adjust test oscillator frequency to:**
- **Refer to parts layout diagram for location of trimmers mentioned below:**
- **Attach output oscillator to:**
- **Remove CAP.**

**Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.**

---

**Alignment Procedure**

1. **Set receiver dial to:**
   - **1st I.F. TRIMMERS 455 KC.**
2. **Attach output oscillator to:**
   - **0.0025 MFD condenser.**
3. **Remove CAP.**
4. **Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.**

---

**Receiver BLUE antenna lead:**

---

**2nd. I.F. TRIMMERS 455 KC.**

---

**1730 KC. OSC. TRIMMER FOR 540-1730 KC. BAND**

---

**1400 KC. ANT. TRIMMER FOR 540-1730 KC. BAND**

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ALIGNMENT PROCEDURE IN TABULATED FORM

**MODEL 167U**

Before aligning, place loop antenna and the "A" and "B" batteries in the same approximate position in the back of chassis that they will be in when the set is in the cabinet and the cabinet back closed. When adjusting 1500 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, place test oscillator in series with set loop by:

1. Remove the black with white tracer wire used to connect loop antenna to Fohannock clip on chassis.
2. Attach test oscillator to terminals marked "A" and "B" on parts layout diagram.

**IMPORTANT**—No condenser should be in series with generator leads.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna in series with output of test oscillator connecting ab</th>
<th>Attach output of test oscillator to</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>455 K.C.</td>
<td>.02 MF condenser</td>
<td>High side to grid terminal of 6AG tube. Low side to chassis. <strong>DO NOT REMOVE CAP.</strong></td>
<td>Refer to parts layout diagram for location of trimmers mentioned below—(and).</td>
</tr>
</tbody>
</table>

**Model 178BL**

**IMPORTANT**—Before aligning, place loop antenna in the same approximate position in the back of chassis; it will be in when the set is in the cabinet and the back attached.

When adjusting 1500 K.C. oscillator trimmer and 1400 K.C. antenna trimmer, couple test oscillator to set loop by placing lead from high side of test oscillator on top of or near set loop. Be sure that neither the loop or test oscillator lead moves during alignment.

**DO NOT ATTACH LOW SIDE OF TEST OSCILLATOR TO RECEIVER—LEAVE UNCONNECTED.**

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna in series with output of test oscillator connecting ab</th>
<th>Attach output of test oscillator to</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>455 K.C.</td>
<td>.02 MF condenser</td>
<td>High side to grid terminal of 6AG7 tube. <strong>DO NOT REMOVE CAP.</strong></td>
<td>Refer to parts layout diagram for location of trimmers mentioned below—(and).</td>
</tr>
</tbody>
</table>

**MODEL 167U**

**LINE CORO PLUS**

1. I.F. TRIMMERS 455 K.C.

**ALIMENTATION PROCEDURE SET INDEX.**

**MODEL 178BL**

**LINE CORO PLUS**

1. I.F. TRIMMERS 455 K.C.

**ALIGNMENT:**

- **MODEL 167U**
- **MODEL 178BL**
ALIGNMENT PROCEDURE IN TABLED FORM

<table>
<thead>
<tr>
<th>Model</th>
<th>Alignment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>127B</td>
<td>As usual</td>
<td>As usual</td>
</tr>
<tr>
<td>128B</td>
<td>As usual</td>
<td>As usual</td>
</tr>
<tr>
<td>137U</td>
<td>As usual</td>
<td>As usual</td>
</tr>
<tr>
<td>138AE</td>
<td>As usual</td>
<td>As usual</td>
</tr>
<tr>
<td>140B, 140BE</td>
<td>As usual</td>
<td>As usual</td>
</tr>
</tbody>
</table>

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MODEL 177U
Schematic, Voltage Socket

SENTINEL RADIO CORP.

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SPARTON PHONO-SET MODEL 219-P AND 219-PD.

TOP VIEWS OF ALL SOCKET CONNECTIONS

NOTE: Original production models did not have resistor R6 and condenser C10 included in the circuit as shown above. In these first run production sets resistor R1 connected across the microphone tip jacks in the same position as shown for resistor R6. The above change can be made easily, when servicing any of the first run Models 219-P Wireless Phonographs.

The SPARTON Wireless Phonograph Models 219-P and 219-PD are shipped from the factory for operation at approximately 1550 kilocycles.

This frequency may be changed by adjusting a trimmer condenser which is reached through the hole in the bottom of the chassis. An insulated shaft screwdriver should be used. Turning the screw clockwise lowers the frequency and turning the screw counter-clockwise increases the frequency. The normal range of adjustment is from approximately 1200 kilocycles to approximately 1700 kilocycles.

VOLTAGE CHART

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A7</td>
<td>Oscillator-Modulator</td>
<td>No. 1  100  80  45  0  4.5  6.5  -  0</td>
</tr>
<tr>
<td>2525</td>
<td>Rectifier</td>
<td>No. 2  117*  150  150  117*  6.5  -  0</td>
</tr>
<tr>
<td>HK-80B</td>
<td>Ballast</td>
<td>No. 3  117*  150  150  117*  6.5  -  0</td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram on back of sheet. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are DC voltages.

*AC volts.

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SPARKS-WITHINGTON CO.

SPARTON PAGE 10

Wiring, Voltage, Adjustments, Charges

Schematic, Wiring, Voltage

Adjustments, Charges

SPARTON PAGE 10

(Original) Effective November 1, 1928
**MODEL 409-GL**

**INTERMEDIATE FREQUENCY 456 K.C.**

**SPARKS WITHINGTON CO.**

**BALLAST BK3AJ**

**RECTOR 25Z6GT**

**DETECTOR 6J7GT**

**CONVERTER 25L6GT**

**POWER OUTPUT SOCKET**

**2000A OUTPUT TRANS.**

**FIELD COIL 500 V.**

**SPEAKER C-3250-64**

**25L6GT 25ABGT 6J7GT**

**ALIGNMENT TRIMMERS**

**VOLTAGE CHART**

**Line Voltage: 115 volts**

**Position of Volume Control: Full with Antenna Disconnected**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
<th>Grid Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABGT</td>
<td>Converter</td>
<td>0 11* 115 42 -2.8 116 5* 1.8 0</td>
<td></td>
</tr>
<tr>
<td>6J7GT</td>
<td>Detector</td>
<td>0 54* 105 115 0 5 7* 7.2 -</td>
<td></td>
</tr>
<tr>
<td>25L6GT</td>
<td>Rectifier</td>
<td>0 58* 115 140 116 0 54* 140 -</td>
<td></td>
</tr>
<tr>
<td>BK3AJ</td>
<td>Ballast</td>
<td>0 0 62* 62* 0 0 50* 0 -</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Voltage readings are for schematic diagram. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages measured with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages.

**Alignment**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment of Generator Connected To Dummy Antenna</th>
<th>Generator Frequency</th>
<th>Tuning Cond. Setting</th>
<th>Trimmer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set dial pointer to last mark on scale when condensers plates are flush.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(Back off i.e. turn counter-clockwise regeneration cond. C5C &quot;red spot&quot; before I.F. is aligned)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(Adjust CSC &quot;red spot&quot; turning in clockwise until greatest sensitivity is obtained. If oscil. occurs, turn out CSC until oscil. stops)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(Connect set to regular antenna and check reception of stations. Readjust CSC if set howls or oscillates on strong signals. Then recheck sensitivity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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MODELS 510 & 510-D

INTERMEDIATE FREQUENCY 456 K.C.

Alignment Chart for Models 510-DG, 510-DR

On Deluxe Models set pointer parallel to horizontal lines with condenser plates fully meshed.

2. Rejection Ant. 200 mfd. 456 K.C. Closed C3 Adjust to minimum
4. (Check calibration and sensitivity at 1500 K.C. 900 K.C. and 600 K.C.)
5. (Check operations 1 to 5 inclusive)

Alignment Chart for Models 510-B, 510-BY, 510-BW

2. Rejection Ant. 200 mfd. 456 K.C. Closed C3 Adjust to minimum
4. (Check calibration and sensitivity at 1500 K.C. 900 K.C. and 600 K.C.)
5. (Check operations 1 to 4 inclusive)

(Original) Effective May 1, 1939
MODEL 699
Schematic
Speaker Connections

©John F. Rider, Publisher
**Model 549-1**

**ALIGNMENT**

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>BAND SWITCH SETTING</th>
<th>TUNING CONDITION SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set pointer to end of scale with tuning condenser gang closed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6A7 Grid</td>
<td>.1 mf.</td>
<td>456 KC</td>
<td>BC</td>
<td>Open</td>
<td>C14 A,B</td>
<td>3. I.F. Transformer</td>
</tr>
<tr>
<td>3</td>
<td>Broadcast</td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>1500 KC</td>
<td>C15 A,B</td>
<td>2. I.F. Transformer</td>
</tr>
<tr>
<td>4</td>
<td>Band</td>
<td></td>
<td></td>
<td>600 KC</td>
<td>BC</td>
<td>600 KC</td>
<td>C3</td>
<td>Peak accurately</td>
</tr>
<tr>
<td>5</td>
<td>(Repeat operation 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Check calibration and sensitivity at 600 KC, 900 KC, and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SW Band</td>
<td>Ant.</td>
<td>*</td>
<td>10 MC</td>
<td>SW</td>
<td>10 MC</td>
<td>C4</td>
<td>**</td>
</tr>
<tr>
<td>8</td>
<td>(Check calibration and sensitivity at 6 MC and 12 MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
- *200 mmf. condenser and 100 ohm non-inductive resistor in series.
- **Rock tuning control around 18 MC while adjusting this trimmer, and make sure that the signal is peaked on the fundamental rather than on the image.

**Sparton Superheterodyne Model 699**

**CHASSIS DIAGRAM** (Bottom View)

**VOLTAGE CHART**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6D6</td>
<td>R.F. Amp.</td>
<td>No. 1 No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8 Grid Cap</td>
</tr>
<tr>
<td>6A7</td>
<td>Converter</td>
<td>0 200 75 6.2* 6.2* 5.6 0 0</td>
</tr>
<tr>
<td>6D6</td>
<td>I.F.</td>
<td>0 200 75 6.2* 6.2* 5.6 0 0</td>
</tr>
<tr>
<td>6Q7</td>
<td>2nd Det. AVC 1st Audio</td>
<td>0 0 7.2 1.1 1 1.1 5.6 1.2 0 0 0</td>
</tr>
<tr>
<td>41</td>
<td>P.A.</td>
<td>5.6 195 200 8 0 0 0 0 205 -</td>
</tr>
<tr>
<td>024</td>
<td>Rectifier</td>
<td>0 0 200 0 200 0 0 0 205 -</td>
</tr>
</tbody>
</table>

*Or 8.6 volts depending on position of sensitivity switch.
**AC volts.

**ALIGNMENT**

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>TUNING CONDITION SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I.F.</td>
<td>6A7 Grid</td>
<td>.1 mf.</td>
<td>282</td>
<td>Closed</td>
<td>2 trimmers</td>
<td>2nd I.F.</td>
</tr>
<tr>
<td>2</td>
<td>Broad. Osc.</td>
<td>Ant.</td>
<td>260 mmf.</td>
<td>1580</td>
<td>Open</td>
<td>2 trimmers</td>
<td>1st I.F.</td>
</tr>
<tr>
<td>3</td>
<td>Broad.</td>
<td>Ant.</td>
<td>260 mmf.</td>
<td>1400</td>
<td>Ant.</td>
<td>Adj. to max.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Check sensitivity at 1500 KC and 1200 KC.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Check operations 1 to 4 inclusive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Note: Practical alignment of these chasses, the procedure should be followed in the same order as given.

The dial pointer should be exactly parallel with the horizontal line of the dial scale when the condenser plates are fully meshed. If the pointer does not read correctly, loosen the two small set screws directly back of the diffusion disc and dial drum, hold the rotor plates fully meshed with the stator plates and set the pointer so that it is parallel with the horizontal lines on the kilocycle scale, then tighten the set screws.

IMPORTANT: Alignment of these models should not be attempted until the voltage is maintained by a fully charged 6-volt storage battery.

A. Alignment of Intermediate-Frequency Stages
1. Turn on receiver and test oscillator and allow both to operate several minutes before attempting to adjust any condensers.
2. Turn the band selector switch to the broadcast position and turn the station selector knob until the rotor plates are completely out of mesh with the stator plates.
3. Connect "antenna" of test oscillator to grid cap of Type 1E7G converter tube and "ground" of test oscillator to chassis frame to receiver. Connect output meter "high tap" from plate of Type 1E7G tube to ground.

Note: It is advisable to read carefully the operating instructions included with the test oscillator being used in the alignment procedure.
4. Tune test oscillator to obtain a signal of 456 kilocycles.
5. Turn the volume control of receiver on full and adjust I-F condensers which are reached from the top of the chassis.

Note: Care should be taken when adjusting the I-F stages in order to insure proper and accurate adjustment.
6. Disconnect "antenna" lead of test oscillator from grid cap of converter tube Type 1E7G and connect to the antenna terminal of the chassis.
7. Tune test oscillator to a frequency of 456 kilocycles and adjust condenser C54[reached from back of the chassis] to a point where the output of the receiver is at an absolute minimum. C54 in Models 527-2, 587-2

Note: This condenser is the adjustment for the code rejector circuit and must be very carefully adjusted if best performance of the receiver is to be expected.

B. Alignment of Broadcast Band
1. Connect 150 mm. dummy antenna in series with the antenna lead, tune test oscillator and receiver to a frequency of 1500 kilocycles and adjust condensers C4(broadcast band oscillator trimmer) and C64(broadcast band trimmer) reached from the bottom of the chassis. C2 in Models 527-2, 587-2
2. Tune test oscillator and receiver to 600 kilocycles and adjust condenser C6 (broadcast oscillator trimmer) reached from the front of the chassis.
3. Return test oscillator and receiver to 1500 kilocycles and check adjustments of condenser C4 and condenser C64. Calibration of the broadcast band should also be checked at 600 kilocycles and 600 kilocycles. C2 in Models 527-2, 587-2.

C. Alignment of Short-Wave Band
1. Turn the band selector switch to the short wave or "Foreign" band.
2. Remove the 150 mm. condenser from the test oscillator "antenna" lead and replace with a 400 ohm non-inductive resistor dummy antenna.
3. Tune test oscillator and receiver to 30,000 kilocycles (15 megacycles) and adjust condenser C5 (short-wave antenna trimmer) reached from the bottom of the chassis. C3 in Models 527-2, 587-2.

Caution: On this band care must be taken to adjust this condenser to the fundamental of the 15 megacycle signal and not to the image. The image signal is equal to the fundamental minus twice the intermediate frequency of the receiver.

A set that is adjusted to the image frequency instead of to the fundamental may be detected by tuning over the band and checking the sensitivity at various points. If a dead spot appears near the center of the band, the adjustable condenser for that band has probably been adjusted to the image instead of to the fundamental.

This type of mis-alignment may also be detected by tuning the test oscillator to a frequency of 15 megacycles and the station selector of the receiver to approximately 15,000 kilocycles. If a strong signal is found approximately at this frequency, it indicates that the band has been adjusted to the image frequency. The normal image frequency for 10,000 kilocycles would be 15,000 kilocycles minus twice 456 kilocycles or approximately 14,100 kilocycles. Therefore, a signal of this frequency may be found with the test oscillator generating a 15,000 kilocycle signal.

Note: There are no other trimmers for the short-wave or foreign band.

Important: All adjustments should be rechecked to maintain accuracy and stability of adjustment and calibration.
Sparton Superheterodyne Models

649-6L  649-6S

VOLTAGE CHART

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd.(See Prong Nos. on Schematic Diagram)</th>
<th>Grid Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>6J8G</td>
<td>Converter</td>
<td>No. 1  6.2 140 140 140 -14 140 0 0 .14</td>
<td></td>
</tr>
<tr>
<td>1D5GP</td>
<td>1st I-F Amp.</td>
<td>No. 2  0 140 140 42 140 - 2.4 0 .2</td>
<td></td>
</tr>
<tr>
<td>1D5GP</td>
<td>2nd I-F Amp.</td>
<td>No. 3  2.4 150 150 49 0 - 0 0 .2</td>
<td></td>
</tr>
<tr>
<td>6L7G</td>
<td>Det-AVC-1st A.F.</td>
<td>No. 4  0 5.0 A -2 B -2 B - 6.2 0 .02</td>
<td></td>
</tr>
<tr>
<td>1G5G</td>
<td>Power Amplifier</td>
<td>No. 5  0 155 155 138 -1 C - 2.4 0 -</td>
<td></td>
</tr>
<tr>
<td>6E6G</td>
<td>Rectifier</td>
<td>No. 6  6.3 180* 0 180* 6 0 150 -</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram on back of sheet. Allow 15% or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are - DC voltages.

*AC
A - 10 V. Scale  B - 25 V. Scale  C - 1 V. Scale

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ALIGNMENT

649-6L

OPERATION | ALIGNMENT OF | GENERATOR CONNECTED TO | DUMMY ANTENNA | GENERATOR FREQUENCY | BAND SWITCH SETTING | TUNING COND. SETTING | TRIMMER | REMARKS
--- | --- | --- | --- | --- | --- | --- | --- | ---
3 | Rejection | Ant. | 200 mmf. | 456 KC | BC (Open) | C22 A&B | Adj. to minimum
4 | Broad- cast | Ant. | 200 mmf. | 1500 KC | BC | C8 Osc. | Adj. to minimum
5 | Band | Ant. | 200 mmf. | 600 KC | BC | C10 Pad. | Adj. to minimum
6 | (Repeat operation 4) | | | | | | | | | | | |
7 | (Check calibration and sensitivity at 600 KC, 1000 KC and 1500 KC) | | | | | | | | | | | |
8 | Low- Wave Band | Ant. | 200 mmf. | 400 KC | LW | 400 KC | C5 Ant. | Adj. to minimum
9 | | | | | | | | | | | |
10 | (Check operation 8) | | | | | | | | | | | |
11 | (Check calibration and sensitivity at 1500 KC, 2500 KC and 4000 KC) | | | | | | | | | | | |
12 | Short | Wave Band | Ant. | * | 15 MC | SW | 15 MC | C5 Ant. | Adj. to minimum
13 | (Check calibration and sensitivity at 6 MC, 15 MC and 18 MC) | | | | | | | | | | | |
*200 mmf. condenser and 100 ohm non-inductive resistor in series.

649-6S

OPERATION | ALIGNMENT OF | GENERATOR CONNECTED TO | DUMMY ANTENNA | GENERATOR FREQUENCY | BAND SWITCH SETTING | TUNING COND. SETTING | TRIMMER | REMARKS
--- | --- | --- | --- | --- | --- | --- | --- | ---
3 | Rejection | Ant. | 200 mmf. | 456 KC | BC (Open) | C22 A&B | Adj. to minimum
4 | Broadcast | Ant. | 200 mmf. | 1500 KC | BC | C8 Osc. | Adj. to minimum
5 | Band | Ant. | 200 mmf. | 600 KC | BC | C10 Pad. | Adj. to minimum
6 | (Repeat operation 4) | | | | | | | | | | | |
7 | (Check calibration and sensitivity at 600 KC, 1000 KC and 1500 KC) | | | | | | | | | | | |
8 | 1st short wave Band | Ant. | * | 7.0 MC | 1 SW | 7.0 MC | C5 Ant. | Adj. to minimum
9 | (Check calibration and sensitivity at 2.5 MC, 4.0 MC & 7.0 MC) | | | | | | | | | | | |
10 | 2nd SW Band | Ant. | * | 21.0 MC | 2 SW | 23.0 MC | C5 Ant. | Adj. to minimum
11 | (Check calibration and sensitivity at 7.0 MC, 15 MC & 21 MC) | | | | | | | | | | | |
*200 mmf. condenser and 100 ohm non-inductive resistor in series.
** Rock dial while trimming.
If dial reading is off calibration, some adjustment may be made by moving the oscillator condenser lead toward or away from the chassis base plate.
Sparton Superheterodyne Model 728-X

(Original) Effective Jan. 2, 1938

Line Voltage: 115 volts
Position of Volume Control: Full with Antenna Disconnected

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd (See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7G</td>
<td>R.F.</td>
<td>No. 1  No. 2  No. 3  No. 4  No. 5  No. 6  No. 7  No. 8  Grid Cep</td>
</tr>
<tr>
<td>6A8G</td>
<td>1st Det. Osc.</td>
<td>0       0       250    100    -42    148    6.1    0       -1</td>
</tr>
<tr>
<td>6K7G</td>
<td>1st I.F.</td>
<td>0       0       250    100    0      -61    6.1    0       -2</td>
</tr>
<tr>
<td>647G</td>
<td>2nd Det. AVG - 1st Audio</td>
<td>0       0       52      -2.2   -4      -2     -6.1   0       -2</td>
</tr>
<tr>
<td>6F6G</td>
<td>P.I.</td>
<td>0       0       260    250    -4      -4     -6.1   0       -2</td>
</tr>
<tr>
<td>5Y3</td>
<td>Rect.</td>
<td>0       330*    -       -310*   310*   -       -350*  -       -</td>
</tr>
<tr>
<td>6E5</td>
<td>Viso-Glo</td>
<td>6.1      1.9    -2.2    250     -3.5   -       -       -       -</td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram on back of sheet. Allow 15% or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages. *AC volts.
SPARKS WITHINGTON CO.

MODEL 1089
Voltage Alignment Trimmers

Viso-Glo tube in socket
AFC Switch "OFF"

ALIGNMENT (see note)

<table>
<thead>
<tr>
<th>OPER-</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>BAND SWITCH SETTING</th>
<th>TUNING COND. SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C49 B</td>
<td>3rd I.F. (Pri.)</td>
</tr>
<tr>
<td>3</td>
<td>Broadcast</td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>1500</td>
<td>BC</td>
<td>1500</td>
<td>C8 Osc.</td>
<td>Adjust to minimum</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>600</td>
<td>BC</td>
<td>600</td>
<td>C2 Ant.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(Repeat operation 5)</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>6 MC.</td>
<td>1st S.W.</td>
<td>6 MC.</td>
<td>C9 Osc.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Check calibration and sensitivity at 1500 KC, 900 KC and 600 KC)</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>6 MC.</td>
<td>1st S.W.</td>
<td>6 MC.</td>
<td>C6 RF</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1st Short Wave</td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>1.95 MC.</td>
<td>1st S.W.</td>
<td>1.95 MC.</td>
<td>C5 Ant.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>1.95 MC.</td>
<td>1st S.W.</td>
<td>1.95 MC.</td>
<td>C12 Pad</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(Repeat operation 7)</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>6 MC.</td>
<td>2nd S.W.</td>
<td>6 MC.</td>
<td>C10 Osc.</td>
<td>Rock dial slightly while adjusting</td>
</tr>
<tr>
<td>10</td>
<td>(Check calibration and sensitivity at 6 MC. and 1.95 MC.)</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>6 MC.</td>
<td>2nd S.W.</td>
<td>6 MC.</td>
<td>C4 Ant.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2nd Short-Wave Band</td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>18 MC.</td>
<td>2nd S.W.</td>
<td>18 MC.</td>
<td>C13 Pad</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Ant.</td>
<td>6 MC.</td>
<td>2nd S.W.</td>
<td>6 MC.</td>
<td></td>
<td>C15 Pad</td>
<td></td>
</tr>
</tbody>
</table>

* Check AFC by connecting generator to converter grid cap and tuning generator and receiver to 1500 KC. Note output meter reading with AFC switch "off". Switch AFC "on" and if output changes appreciably, touch up discriminator trimmer until there is no change in sensitivity.

NOTE: Check to see that dial pointer is parallel to horizontal lines on dial when variable condenser rotor plates are fully meshed with stator plates.

TRIMMER LOCATIONS (under chassis)

VOLTAGE CHART

Line Voltage: 115 volts
Position of Volume Control: Full with Antenna Disconnected

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G67G</td>
<td>R.F.</td>
<td>0</td>
</tr>
<tr>
<td>G68G</td>
<td>Converter</td>
<td>0</td>
</tr>
<tr>
<td>G67G</td>
<td>I.F.</td>
<td>0</td>
</tr>
<tr>
<td>G67G</td>
<td>2nd I.F.</td>
<td>0</td>
</tr>
<tr>
<td>G66G</td>
<td>Discriminator</td>
<td>0</td>
</tr>
<tr>
<td>G67G</td>
<td>A.F.C.</td>
<td>0</td>
</tr>
<tr>
<td>G67G</td>
<td>2nd Det. AVC-1st audio</td>
<td>0</td>
</tr>
<tr>
<td>G66G</td>
<td>P.A.</td>
<td>0</td>
</tr>
<tr>
<td>G65G</td>
<td>Rect.</td>
<td>-</td>
</tr>
<tr>
<td>G65</td>
<td>Viso-Glo</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram on back of sheet. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages.

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**Alignment, Trimmers**

Model 1867

**Chassis Diagram**

- **Band Selector Switch**
- **Volume Control**
- **Symphonic Expander**
- **VISO-GLO**

**Station Selector On-Off Switch & Tone Control**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment GP</th>
<th>Generator Connected To</th>
<th>Dipper Antenna Frequency</th>
<th>Band Switch Setting</th>
<th>Tuning Cond.</th>
<th>Trigger</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L.F.</td>
<td>Conv. Grid</td>
<td>456 BC</td>
<td>Open</td>
<td>C30 L.P.</td>
<td>C16 L.P.</td>
<td>1st L.F. Transmitter</td>
</tr>
<tr>
<td>3</td>
<td>Broadcast</td>
<td>Ant.</td>
<td>2500 af. 1500 BC</td>
<td>C6 4-5</td>
<td>C7 L.P.</td>
<td>C16 L.P.</td>
<td>C19 Ant.</td>
</tr>
<tr>
<td>4</td>
<td>Ant.</td>
<td>200 af. 600 BC</td>
<td>600 BC</td>
<td>C11 Pad</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(Repeat operation 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 6         | (Check calibration and sensitivity at 1000 KC, 900 KC and 600 KC) **
| 8         | Wave        | Ant.                   | 200 af. 150 L.F. 110      | C66 Pad             | **          |         |         |
| 9         | (Repeat operation 7. Also repeat operations 7, 8 and 9 if necessary) |
| 11        | Wave        | Ant.                   | 200 af. 1500 1.95 WC.     | 1.95 WC. 1.95 WC.   | C10 Pad     | **       |         |
| 12        | (Repeat operation 10) |
| 13        | (Check calibration and sensitivity at 6 WC and 1.95 WC) |
| 15        | Wave        | Ant.                   | 6 WC. 2nd S.M. 6 WC.      | C16 Ant.            | **          |         |         |
| 16        | (Repeat operation 14) |
| 17        | (Check calibration and sensitivity at 18 WC, and 6 WC.) |
| 18        | (Check operations 1 to 18 inclusive) |

* Check AFC by connecting generator to converter grid cap and tuning generator and receiver to 1000 KC. Note output meter reading with AFC switch "Off." Switch AFC "on" and if output changes appreciably, touch up discriminator trimmer until there is no change in sensitivity.

** Back variable condenser slightly while adjusting for maximum output.**

**NOTE:** Check to see that dial pointer is parallel to horizontal lines on dial when variable condenser rotor plate are fully meshed with stator plate.

(Original) Effective Jan. 2, 1953
**Sparton Superheterodyne Model**

**1568**

**VOLTAGE CHART**

**OPERATION** | **ALIGNMENT OF** | **GENERATOR CONNECTED TO** | **DIMENSION** | **HAND SWITCH** | **TUNING** | **TRIMMER** | **REMARKS**
--- | --- | --- | --- | --- | --- | --- | ---
1 | I.F. | Conv. Grid 1.1 mV | .456 | DC Open | CS2 A. P | 1st I.F. Trans.
2 | Resistor | Conv. Grid | 1.1 mV | .456 | DC Open | CS2 A. P | 2nd I.F. (Prov.)
3 | Broadcast Band | Ant. | 200 mV | 1500 | DC | CS2 | CS2 B | Adjust to minimum
4 | Ant. | 200 mV | 600 | DC | 600 | CT1 Pad | **
5 | (Repeat operation 5)
6 | (Check well and sensitivity at 1500 KC, 400 KC, and 400 KC)
7 | 1st Short-Wave Band | Ant. 100 ohms | 6 W | 1st S.W. | 6 W | CS2 | CS Ant.
8 | Ant. | 200 mV | 1.5 W | 1st S.W. | 1.5 W | CT2 Pad | **
9 | (Repeat operation 7)
10 | (Check well and sensitivity at 6 W and 1.5 W.)
11 | 2nd Short-Wave Band | Ant. 100 ohms | 100 ohms | 2nd S.W. | 10 W | CT2 | CS Ant. | **
12 | Ant. | 6 W | 2nd S.W. | 6 W | CT2 Pad | **
13 | (Repeat operation 11)
14 | (Check well and sensitivity at 400 ohms and 6 W)
15 | (Repeat operations 1 to 14 inclusive)

**Notes:** Voltage readings are for schematic diagram only. Allow 1% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are DC voltages.

### SELECTRONNE TRIMMERS C50 (ANT.)
### SELECTRONNE TRIMMERS C51 (OSC.)
### SELECTRONNE TRIMMERS C52 (R.P.)

**6J7G AUTOMATIC FREQUENCY CONTROL**

**5Y3 RECTIFIER**

**6AG CONVERTER**

**6KG**

**R.F.**

**C-59 B DISC.TRIMMER**

**56A 3RD I.F. TRIMMER**

**C 50 A.B. 2ND I.F.**

**C 5A A.B. 1ST I.F.**

**6J7G 1ST I.F.**

**6KG 2ND I.F.**

**A.Y.C-.A.F.**

**6J7G EXPANDER AMP.**

**56G DISCRIMINATOR**

**6S6 EXPANSER**

**6AG AUDIO DRIVER**

**CHASSIS ILLUSTRATION**

**TRIMMER LOCATIONS**

(under chassis)
SPARKS WITHINGTON CO.

Schematic Diagram Changes

(Serial Nos. 000751 and up)

The following changes, which should be made in the Model 1867 schematic diagram are effective Nov. 30, 1936, and are included in all SPARTON Model 1867 chassis with serial numbers above 000750:

1. Replace capacitor C49 Part No. C-720-158 (.005 mf. 250v.), by Part No. C-720-144 (.002 mf. 250v.). This capacitor connects from ground to the mid-point between the tone control (R14) and resistor R65.

2. Add resistor R67 Part No. C-2795-82B (47000 ohms ½ W.)

This resistor connects across condenser C49.

3. Replace resistor R56 Part No. C-2795-63C (12000 ohms ½ W.) by resistor Part No. C-2795-74C (10000 ohms ½ W.). This resistor is in the cathode circuit of the Type 6X7G 1st. I-F amplifier tube.

SPARTON Superheterodyne Model 1867
Intermediate Frequency 455 K.C.
STEP BY STEP PROCEDURE

1. Tune all receiver condensers to 4 megacycles and adjust calibration.
2. Turn receiver selector switch to 'OFF'.
3. Turn receiver on.
4. Adjust oscillator trimmer (of Type 820 receiver) to 3000 kilocycles and adjust the calibration.
5. Turn receiver selector switch to 'OFF' and check the adjustments of condensers C1, C4, and C8.
6. Adjust oscillator trimmer to 3000 kilocycles and adjust the calibration.
7. Check operation of receiver at all megacycles.

A. Alignment of Intermediate-Frequency Stage

1. Turn receiver on and select oscillator 10 megacycles and adjust the calibration.
2. Turn receiver selector switch to 'OFF' and check the adjustments of condensers C1, C4, and C8.
3. Adjust oscillator trimmer (of Type 820 receiver) to 3000 kilocycles and adjust the calibration.
4. Check operation of receiver at all megacycles.

B. Alignment of Broadband Band

1. Turn receiver on and select oscillator 5 megacycles and adjust the calibration.
2. Turn receiver selector switch to 'OFF' and check the adjustments of condensers C1, C4, and C8.
3. Adjust oscillator trimmer (of Type 820 receiver) to 3000 kilocycles and adjust the calibration.
4. Check operation of receiver at all megacycles.

C. Alignment of Ultra-High-Frequency Band

1. Turn receiver on and select oscillator 50 megacycles and adjust the calibration.
2. Turn receiver selector switch to 'OFF' and check the adjustments of condensers C1, C4, and C8.
3. Adjust oscillator trimmer (of Type 820 receiver) to 3000 kilocycles and adjust the calibration.
4. Check operation of receiver at all megacycles.

D. Alignment of Low-Frequency Band

1. Turn receiver on and select oscillator 10 megacycles and adjust the calibration.
2. Turn receiver selector switch to 'OFF' and check the adjustments of condensers C1, C4, and C8.
3. Adjust oscillator trimmer (of Type 820 receiver) to 3000 kilocycles and adjust the calibration.
4. Check operation of receiver at all megacycles.
ALIGNMENT

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>ALIGNMENT OF TRIMMERS</th>
<th>PUSH BUTTON NO.</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R.F. &amp; Det.</td>
<td>1</td>
<td>Ant.</td>
<td>100 ma.</td>
<td>1000 kc.</td>
</tr>
<tr>
<td>2</td>
<td>R.F. &amp; Det.</td>
<td>2</td>
<td>Ant.</td>
<td>100 ma.</td>
<td>1400 kc.</td>
</tr>
<tr>
<td>3</td>
<td>R.F. &amp; Det.</td>
<td>3 or 4</td>
<td>Ant.</td>
<td>100 ma.</td>
<td>1000 kc.</td>
</tr>
<tr>
<td>4</td>
<td>R.F. &amp; Det.</td>
<td>5 or 5</td>
<td>Ant.</td>
<td>100 ma.</td>
<td>600 kc.</td>
</tr>
<tr>
<td>5</td>
<td>(Check operations 1 to 4 inclusive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HOW TO ADJUST THE SPARTON SELECTRONNE IN THE MODELS

5218 6218 7618

1. Select six favorite nearby broadcast stations and detach the corresponding call letter tabs from the station call letter tab sheets.

2. Remove the Selectronne escutcheon plate from the front of the cabinet by means of the two screws and insert the station call letter tabs. Any tab may be used for any button, but it is usually more convenient for the operator if the tabs are arranged in sequence so that the tab for the lowest frequency station (station having lowest number of kilocycles (K.C.)) will be at the extreme left. Set the six favorite nearby broadcast stations in as far as it will go and turn to the right or left until the dial pointer has moved to the desired station frequency. Be sure the button is pushed all the way in and the station is tuned accurately.

3. Using a small screwdriver or other tool that will fit the slot in the end of the button, push the button in as far as it will go and turn to the right or left until the dial pointer has moved to the desired station frequency. Be sure the button is pushed all the way in and the station is tuned accurately.

4. Repeat the procedure in paragraph 3 for each of the remaining five buttons. Check all buttons by pushing them in, one at a time, to determine whether desired stations are tuned properly.

5. Replace Selectronne escutcheon.

6. Any of the six stations to which the SPARTON Selectronne has been adjusted may now be received simply by pushing the Selectronne button for the desired station.

**VOLTAGE CHART**

<table>
<thead>
<tr>
<th>Line Voltage: 115 volts</th>
<th>Voltage of Socket Prongs To Gnd.(See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
<td>Function</td>
</tr>
<tr>
<td>G47</td>
<td>Converter</td>
</tr>
<tr>
<td>78</td>
<td>I.F. Amp.</td>
</tr>
<tr>
<td>75</td>
<td>Predet. AVC-Audio</td>
</tr>
<tr>
<td>76</td>
<td>Driver</td>
</tr>
<tr>
<td>64650</td>
<td>P.F.</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
</tr>
<tr>
<td>665</td>
<td>Visco-Clo</td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram on back of sheet. Allow 1% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages. The Visco-Clo 665 is not used on Model 5218.

**ALIGNMENT**

<table>
<thead>
<tr>
<th>OPER-</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>BAND SWITCH SETTING</th>
<th>TUNING COND. SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set dial pointer to last mark on scale when condenser plates are flush)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I.F. Grid</td>
<td>G47</td>
<td>.1 mf.</td>
<td>458 KC</td>
<td>BC</td>
<td>Open</td>
<td></td>
<td>Adjust to approx. peak</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CSA,B;CZA,B,C</td>
</tr>
<tr>
<td>4</td>
<td>Rej.</td>
<td>Grid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2B (Transfer) Peak accurately</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>458 KC</td>
<td>BC</td>
<td>Open</td>
<td></td>
<td>Peak accurately</td>
</tr>
<tr>
<td>6</td>
<td>Broadcast</td>
<td>Ant.</td>
<td>200 mmf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>1600 KC</td>
<td></td>
<td>Peak accurately</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C7 BC osc trim</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C6 BC antrix Peak accurately</td>
</tr>
<tr>
<td>9</td>
<td>Band</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C6 BC osc pad Peak accurately</td>
</tr>
<tr>
<td>10</td>
<td>(Repeat operations 7 and 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>S.W. Band</td>
<td>Ant.</td>
<td>*</td>
<td>16 MC</td>
<td>SW</td>
<td>16 MC</td>
<td>C6 SW antrix **</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>(Check calibration and sensitivity at 600 KC, 1000 KC and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>(Check calibration and sensitivity at 6.0 MC and 16 MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>(Check operations 1 to 15 inclusive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*100 ohm non-inductive resistor
and 200 mmf condenser in series.
**Rock dial while making this adjustment. Make certain that adjustment is made on fundamental signal and not on image. Peak accurately.

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**SCHEMATIC DIAGRAM**

SPARTON SUPERHETERODYNE MODEL

INTERMEDIATE FREQUENCY 456 K.C.

**VOLTAGE CHART**

Top View of all Socket Connections

<table>
<thead>
<tr>
<th>Line Voltage</th>
<th>115 volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
<th>No. 6</th>
<th>No. 7</th>
<th>No. 8</th>
<th>Grid Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>647</td>
<td>Converter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>78</td>
<td>I.F. Amp.</td>
<td>6.2</td>
<td>250</td>
<td>69</td>
<td>170</td>
<td>-12</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>75</td>
<td>2nd Det. AVC</td>
<td>6.2</td>
<td>89</td>
<td>-1.4</td>
<td>-1.4</td>
<td>-1.4</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>1.1</td>
</tr>
<tr>
<td>42</td>
<td>Power Amp.</td>
<td>6.2</td>
<td>225</td>
<td>250</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>550</td>
<td>500</td>
<td>500</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
</tr>
</tbody>
</table>

**Notes:** Voltage readings are for schematic diagram on back of sheet. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages measured with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages.

**NOTE:** Model 5518 has 6 push-buttons only -- no manual tuning. Models 5518A and 5518AX have 4 push-buttons and manual tuning. The same chassis is used in all three models with the exceptions as noted in the parts list.

**JUNE 1938**
1. Select four favorite nearby broadcast stations and detach the corresponding call letter tabs from the station call letter tab sheets.

2. The tabs should be inserted in the ends of the knobs. For convenience it is recommended that the call letter tabs be arranged in sequence so that the tab for the station having the highest frequency (greatest number of kilocycles (k.c.)) will be at the extreme left. This, however, is not vital, since the Selectronne will operate with any arrangement of the tabs.

3. TO ADJUST SELECTRONNE BUTTONS, loosen selected button by turning one-half turn to left (counterclockwise). Push this loosened button in as far as it will go, tighten by turning button to the right (clockwise) until it can be tightened no more. Be sure the station is tuned in accurately when pushed in button is tightened.

4. Repeat the procedure in paragraph 3 for each of the remaining three buttons and stations.

5. Be sure the Selectronne buttons have been tightened firmly.

6. Check all buttons by pushing them in, one at a time, to determine whether desired stations are tuned in properly.

7. Any of the four stations to which the SPARTON Selectronne has been adjusted may now be instantly received simply by pushing the Selectronne Button for the desired station.
SPARTON SUPERHETERODYNE MODELS 6218 & 7618
INTERMEDIATE FREQUENCY 456 K.C.

CHASSIS ILLUSTRATION FOR MODELS 6218; 6218, 7618.

FOR OTHER DATA SEE INDEX

SPARTON WITHINGTON CO.

MODEL 5218

JUNE 1938

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ALIGNMENT PROCEDURE:

Realignment of this receiver should never be necessary unless one of the oscillator, antenna, or I. F. coils has been replaced. Lack of sensitivity, selectivity, and poor tone quality may be due to any one or a combination of causes, such as weak or defective tubes or speaker, inadequate or excessively long antenna, open or grounded bias resistor, bypass condenser, etc. Under no circumstances should realignment be attempted until all other possible causes have been first thoroughly investigated and have been definitely proven not to be the cause.

If an I. F. tube is replaced it is advisable to realign the I. F. Amplifier particularly if the replacement tube is one of a different manufacture than the one in the receiver. It is important when aligning to carefully follow the procedure in the order given, otherwise the receiver will lack sensitivity and the dial calibration will be incorrect.

IT IS IMPERATIVE THAT AN ACCURATELY CALIBRATED OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTANGIBLE ALIGNMENT:

1. Connect the high side of the test oscillator output to the control grid of the 6D6 modulator tube through a 0.02 Mfd condenser. Leave the grid cap connected to the grid terminal of the tube, and connect the ground side of the test oscillator to the receiver ground.

2. Set the test oscillator frequency to 465 kilocycles (this must be accurate).

3. Align the second intermediate transformer by turning one of the trimmer screws accessible through holes in the top of the transformer shield up and down (increasing and decreasing capacity) until maximum reading is obtained on the output meter, after which adjust the other trimmer screw of the same transformer for maximum sensitivity.

4. Adjust the first intermediate transformer in the same manner as the second I. F. transformer.

TO ALIGN THE VARIABLE CONDENSER:

It is important when aligning the grid condenser, padding and trimmer condensers to follow the procedure carefully, otherwise the alignment will be erroneous and the dial calibration will be incorrect. The padding and trimmer condensers located underneath the chassis will be referred to by their function as indicated on the circuit diagram.

1. Connect the high output side of the test oscillator through a 400 ohm resistor to the receiver antenna lead and the low side to the set ground.

2. Place the band selector switch for operation on the 5.8 to 8.1 megacycle band, tune the receiver dial, and set the test oscillator frequency to EXACTLY 8.1 MEGACYCLES. Tune in the 8.1 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE 8.1 MEGACYCLE OSCILLATOR TRIMMER. When adjusting this trimmer two peaks, the fundamental and the image peak will be noticed. CARE MUST BE TAKEN THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ADJUSTMENT OF THE OSCILLATOR. At all times always check to see if the proper peak has been used. To do this leave the test oscillator frequency at 8.1 megacycles, increase the output of the test oscillator and tune the receiver dial to approximately 37.1 megacycles on the receiver dial. If this is possible, then the fundamental peak was not used in aligning at 81.1 megacycles the test oscillator signal will be heard at approximately 37.1 megacycles on the receiver dial. If it is not possible to receive the signal, then the fundamental peak was not used and the 8.1 megacycle oscillator trimmer must be properly re-adjusted.

3. With band selector switch set for operation on the 5.8 to 8.1 megacycle band tune the receiver dial and set test oscillator frequency to EXACTLY 16 MEGACYCLES. Adjust 16 megacycle antenna trimmer for maximum 16 megacycle signal sensitivity.

4. Place band selector switch for operation on the 1.7 to 5.8 megacycle band, tune the receiver dial, and set test oscillator frequency to EXACTLY 5 MEGACYCLES. BRING IN 5 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT by adjusting 5 megacycle oscillator trimmer.

5. With the band selector switch for operation on the 1.7 to 5.8 megacycle band tune receiver dial and set test oscillator frequency to EXACTLY 5 MEGACYCLES. Then adjust I megacycle antenna trimmer for maximum 5 megacycle signal sensitivity.

6. Replace the 400 ohm resistor in series with test oscillator lead with a 200 Mfd condenser, place the band selector switch for operation on 5.8 to 1720 kilocycle band, tune receiver dial, and set test oscillator frequency to EXACTLY 1720 KILOCYCLES. NEXT BRING IN THE 1720 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING 1720 KILOCYCLE OSCILLATOR TRIMMER.

7. With band selector switch placed for operation on the 540 to 1720 kilocycle band set test oscillator frequency to receiver dial to EXACTLY 140 KILOCYCLES. Adjust 140 kilocycle preselector and antenna trimmers for maximum 140 kilocycle signal sensitivity.

Leave band selector switch for operation on the 540 to 1720 kilocycle band, tune receiver dial and set test oscillator frequency to approximately 600 kilocycles. While rocking grid condenser slightly to right and left adjust 600 kilocycle oscillator padding for maximum sensitivity.

Some of these model receivers were equipped with "Telecine," the cathode-ray, visual tuning indicator. A 6DS tube was used in early production models, which was replaced by a 6DJ tube in later models. The Telecine tube and connections shown in the cutaway view of the receiver and photograph show how the Telecine tube is incorporated in the receiver. The diagram below shows the tube connections.
Schematic, Socket, Trimmers
Alignment

SPIEGEL INC.

MODEL 102, 104, 112, 114, 124
172, 6750, 6752 Chassis Z4

IECHIE PAGE 10-5

SPIEGEL PAGE 10-5

IMPORTANT NOTE: The battery must never be charged while set is in operation. If a windcharger is used, it should always be disconnected from the battery when the receiver is being used. An inexpensive single pole switch can be used for disconnecting the windcharger from the battery. This will increase the life of the tubes and give additional economy to the use of the receiver.

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First, tune in a weak station at or very near to 600 KC on the dial. Second, without changing any other control, insert a small screw driver into the antenna balancer screw shown in Figure 10 and turn it to the left or right until the volume of the station is at its maximum point.
This receiver is designed to operate over three tuning ranges: the broadcast range which extends from 540 to 1700 kilocycles (K.C.) (200 to 1750 meters); Police and Aviation Band which extends from 1700 to 5500 kilocycles (K.C.) (52 to 1750 meters) and the International Short Wave Band which extends from 5500 to 18,000 kilocycles (K.C.) (18.5 to 55 meters). This latter range is the one which includes the four internationally assigned bands—the 19, 25, 31 and 49 meter bands.
This receiver is designed to operate over two tuning ranges. The broadcast range which extends from 540 K.C. to 1730 and the foreign short wave band which extends from 5800 K.C. to 18000 K.C. The short wave range includes the five important short wave channels 19, 25, 31, 39 and 40 meter bands.

ALIGNMENT DATA

The alignment of this receiver requires the use of a test oscillator that will cover the following frequencies, 465, 600, 1400, 6000, and 15000 K.C. and an output meter which is to be connected across the output transformer on the speaker. All alignments should be made with the volume control set at maximum and the output of the test oscillator set as low as possible to prevent the automatic volume control from operating and thus giving incorrect readings during alignment.

INTERMEDIATE FREQUENCY: Set oscillator to 465 K.C. Feed this to the grid of the pentagrid (6A7) converter tube. Adjust trimmers on the intermediate frequency transformers for peak readings as indicated on the output meter which is to be placed across the output transformer.

BROADCAST BAND: Set the band switch for broadcast reception. Adjust oscillator to 1400 K.C. and connect the output of the generator to the antenna connection at the rear of the chassis through a .0002 mfd. mica condenser. Set the pointer on the dial to 1400 K.C making sure that the volume control is set at its maximum position. Adjust the broadcast antenna and broadcast oscillator trimmers for maximum signal (as indicated on the output meter). Re-set the dial pointer on the receiver and on the test oscillator to 600 K.C. Slowly increase or decrease the broadcast spooling condenser while tuning back and forth across the signal with the station selector knob until the maximum reading is obtained on the output meter. Re-check the 1400 K.C alignment as the adjustment at 600 K.C may have slightly disturbed the original 1400 K.C setting.

SHORT WAVE: Set band switch on short wave position. Connect the antenna of the radio receiver to the output of the test oscillator through a 400 ohm carbon resistor. Set oscillator and receiver dial at 15 megacycles. Adjust the short wave antenna and short wave oscillator trimming condensers for maximum output as indicated by readings on the output meter. No other adjustments are necessary for aligning this band.

It is advisable to check the sensitivity at 6000 K.C to determine whether the circuits are properly aligned. Should the receiver lack sensitivity at this frequency check the .0035 mica condenser for short circuit.

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INSTALLATION: For operation on 110-120 volts, 60 cycle A.C. or D.C.
Automatic Tuner Dual Range

6 Volt Superheterodyne

This receiver is designed to operate over two tuning ranges. The broadcast range which extends from 540 K.C. to 1730 and the foreign short wave band which extends from 5800 K.C. to 18000 K.C. The short wave range includes the five important short wave channels 19, 25, 31, 39 and 49 meter bands.

ALIGNMENT DATA

The alignment of this receiver requires the use of a test oscillator that will cover the following frequencies, 465, 600, 1400, 6000, and 15000 K.C. and an output meter which is to be connected across the output transformer on the speaker. All alignments should be made with the volume control set at maximum and the output of the test oscillator set as low as possible to prevent the automatic volume control from operating and thus giving incorrect readings during alignment.

INTERMEDIATE FREQUENCY: Set oscillator to 465 K.C. Feed this to the grid of the pentagrid (6A7) converter tube. Adjust trimmers on the intermediate frequency transformers for peak readings as indicated on the output meter which is to be placed across the output transformer.

BROADCAST BAND: Set the band switch for broadcast reception. Adjust oscillator to 1400 KC and connect the output of the generator to the antenna connection at the rear of the chassis through a .0002 mfd. microcondenser. Set the pointer on the dial to 1400 KC making sure that the volume control is set at its maximum position. Adjust the broadcast antenna and broadcast oscillator trimmers for maximum signal (as indicated on the output meter). Reset the dial pointer on the receiver and on the test oscillator to 600 KC. Slowly increase or decrease the broadcast padding condenser while tuning back and forth across the signal with the station selector knob until the maximum reading is obtained on the output meter. Re-check the 1400 KC alignment as the adjustment at 600 KC may have slightly disturbed the original 1400 KC setting.

SHORT WAVE: Set band switch on short wave position. Connect the antenna of the radio receiver to the output of the test oscillator through a 400 ohm carbon resistor. Set oscillator and receiver dial at 15 megacycles. Adjust the short wave antenna and short wave oscillator trimming condensers for maximum output as indicated by readings on the output meter. No other adjustments are necessary for aligning this band.

It is advisable to check the sensitivity at 6000 KC to determine whether the circuits are properly aligned. Should the receiver lack sensitivity at this frequency check the .0035 microcondenser for short circuit.
MODELS 1104 to 1107 inc.
1154 to 1157 inc. Ch. 220
Schematic, Socket, Trimmers
MODELS 2066, 2067, 2068 Chassis 43
Socket, Trimmers

FOR ALIGNMENT SEE MODEL 1052.

SWITCH POSITION
Left
Center
Right

BAND
Broadcast
Intermediate
Short Wave (foreign)

RANGE IN KILOCYCLES
540—1710 KC
1710—5800 KC
5800—17500 KC

MODELS
1104
1105
1106
1107
1154
1155
1156
1157

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All alignments should be made with the volume control set at maximum and the output of the test oscillator set as low as possible to prevent automatic volume control from operating and thus giving incorrect readings during alignment.

**INTERMEDIATE FREQUENCY:** Set oscillator to 465 KC. Feed this to the grid of the pentagrid converter tube. Adjust trimmers on the intermediate frequency transformers for peak readings as indicated on the output meter which is to be placed across the output transformer.

**BROADCAST BAND:** Adjust oscillator to 1400 KC and connect the output of the generator to the antenna connection at the rear of the chassis through a 0.002 mil. micro condenser. Set the pointer on the dial to 1400 KC making sure that the volume control is set at its maximum position. Adjust the broadcast antenna and broadcast condenser while turning back and forth the dial until the maximum reading is obtained at 600 KC. Slowly increase or decrease the signal until the maximum reading at 1400 KC is obtained. Then check the original 1400 KC setting.

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SPIEGEL INC.

MODELS 1901, 1907, 1911, 1921
Chassis X6, BA41
Schematic, Socket, Trimmers
Alignment

ALIGNMENT FREQUENCIES:
IP 455 KC
BROADCAST 1400 and 600 KC
MIDDLE BAND
POLICE BAND
CONVENTIONAL ALIGNMENT, SEE SPECIAL
SECTION VOLUME VIII.

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TO ALIGN THE VARIABLE CONDENSER:

1. Connect the high output side of the test oscillator through a 400 ohm resistor to the receiver antenna lead and the low side to the set ground.

2. Place the band selector switch for operation on the 5.8 to 18.8 megacycle band, tune the receiver dial, and set the test oscillator frequency to EXACTLY 18.8 MEGACYCLES.

3. With the band selector switch set for operation on 1.8 to 5.8 megacycle band, tune the receiver dial, and set test oscillator frequency to EXACTLY 5.8 MEGACYCLES.

4. Leave band selector switch for operation on the 5.8 to 18.8 megacycle band, tune the receiver dial and set the test oscillator frequency to approximately 6 megacycles. While rocking gang condenser slightly to right and left adjust 6 megacycle oscillator padder for maximum sensitivity.

5. Place band selector switch for operation on 1.8 to 5.8 megacycle band, tune the receiver dial, and set test oscillator frequency to EXACTLY 5.8 MEGACYCLES.

6. Rotate gang condenser so that plates are completely out of mesh and then BRING IN 5.8 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT by adjusting 5.8 megacycle oscillator trimmer.

7. Leave band selector switch for operation on 1.8 to 5.8 megacycle band, tune receiver dial and set test oscillator frequency to approximately 2 megacycles. While rocking gang condenser slightly to right and left adjust 2 megacycle oscillator padder for maximum sensitivity.

8. Replace the 400 ohm resistor in series with test oscillator lead with a 200 Mmfd. condenser, place the band selector switch 1.8 to 5.8 megacycle band and set test oscillator frequency to EXACTLY 1730 KILOCYCLES.

9. With band selector switch set for operation on the 540 to 1730 kilocycle band set test oscillator frequency and receiver dial to EXACTLY 1400 KILOCYCLES. Adjust 1400 kilocycles R, F, and antenna trimmers for maximum 1400 kilocycle signal sensitivity.

10. Leave band selector switch for operation on 540 to 1720 kilocycle band, tune receiver dial and set test oscillator frequency to approximately 600 kilocycles. While rocking gang condenser slightly to right and left adjust 800 kilocycle oscillator padder for maximum sensitivity.

VOLTAGE TABLE

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>115 VOLTS AC</th>
<th>MEASURE VOLTAGES BETWEEN CHASSIS AND SOCKET PRONGS</th>
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<tbody>
<tr>
<td>H-6.3</td>
<td>P-125</td>
<td>H-6.3</td>
</tr>
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<td>S-265</td>
<td>K-20</td>
</tr>
</tbody>
</table>

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ALIGNMENT DATA

The alignment of this receiver requires the use of a test oscillator that will cover the following frequencies, 465, 690, 1400, 6000, and 15000 K.C. and an output meter which is to be connected across the output transformer on the speaker. All alignments should be made with the volume control set at maximum and the output of the test oscillator set as low as possible to prevent the automatic volume control from operating and thus giving incorrect readings during alignment.

INTERMEDIATE FREQUENCY: Set oscillator to 465 K.C. Feed this to the grid of the pentagrid (6AT) converter tube. Adjust trimmers on the intermediate frequency transformers for peak readings as indicated on the output meter which is to be placed across the output transformer.

BROADCAST BAND: Set the band switch for broadcast reception. Adjust oscillator to 1400 K.C and connect the output of the generator to the antenna connection at the rear of the chassis through a .0002 mfd. mica condenser. Set the pointer on the dial to 1400 K.C making sure that the volume control is set at its maximum position. Adjust the broadcast antenna and broadcast oscillator trimmers for maximum signal (as indicated on the output meter). Re-set the dial pointer on the receiver and on the test oscillator to 600 K.C. Slowly increase or decrease the broadcast padding condenser while tuning back and forth across the signal with the station selector knob until the maximum reading is obtained on the output meter. Re-check the 1400 K.C alignment as the adjustment at 600 K.C may have slightly disturbed the original 1400 K.C setting.

SHORT WAVE: Set band switch on short wave position. Connect the antenna of the radio receiver to the output of the test oscillator through a 400 ohm carbon resistor. Set oscillator and receiver dial at 15 megacycles. Adjust the short wave antenna and short wave oscillator trimmers for maximum output as indicated by readings on the output meter. No other adjustments are necessary for aligning this band.

It is advisable to check the sensitivity at 6000 K.C to determine whether the circuits are properly aligned. Should the receiver lack sensitivity at this frequency check the .0035 mica condenser for short circuit.
**Push Button Station Selector**

**ADJUSTMENT**

The five stations wanted should be decided upon as this will determine which button must be used. Button number 1 as indicated in figure one is used for stations whose transmitting frequencies are between 920 K.C. and 1500 K.C. (as shown on the dial). Buttons 2 and 3 for stations whose frequencies are between 750 and 1400 K.C. Button number 4 for stations whose frequency is from 590 to 1150 and button 5 for those stations whose frequencies are between 540 and 1000 K.C.

<table>
<thead>
<tr>
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<td>WCCO</td>
<td>WFLZ</td>
<td>WLBW</td>
<td>WMAQ</td>
</tr>
</tbody>
</table>

**OPERATION**

For normal tuning, press the release button and proceed to tune stations in the usual manner with the station selector knob.

Do not attempt to press more than one button at a time as this will not tune any additional stations. Although this will not in any way injure the unit, it may result in the radio receiver squeaking and having excessive interference.

In order to operate the automatic station tuning control it is only necessary to press in any one of the five station tuning buttons. This automatically disconnects the manual tuning control from the electrical circuit.

**NOTE**

In some models the station selector button is located to the extreme left instead of to the right as indicated in figure one. Thus if the release button is not the extreme left the adjustment screws in figure 2 are reversed. Reading from left to right they become 5B, 5A, 4B, 4A, etc.

**CAUTION**

It is important that the adjustments be carefully made otherwise the reception of the radio station will be disturbed and lacking in volume. In some instances it is advisable to re-adjust all the screws a few days after the initial setting to compensate for any drift due to room temperature, humidity, etc.

- **TUNING DATA**
  - **MODELS 2070, 2071, 4076 (1937)**

**FRONT VIEW**

If a desired station falls in the range of button 1, tune the radio to this station with the colored button on the push button control panel. In this button releases the automatic tuner and provides for manual tuning of the receiver.

Press in button 1 and with a screw driver turn adjusting screw 1B as shown in figure 2 until this same station is heard, then turn screw 2 until the station is heard with maximum volume as indicated by the closing of the electric eye on the front panel. Carefully readjust 1B and 15B equal for maximum volume.

*DO NOT FORCE* the screws on the chassis. Any excessive force may be required and rendered useless. This may happen if you do not observe what range the station falls into, and thus use the wrong push button.

Proceed with button 2 in a similar way, pressing in the manual tuning button and turning to the desired station then pressing button and adjusting screws 15B and 3A to the same program. Buttons 3, 4, and 5 are adjusted in a similar manner using screws 35B and 3A for the third button, 48B and 4A for the fourth button, etc.

**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 pairs 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 left until the 500 K.C. 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. Read 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. It is 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 those 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, mention 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.
INSTRUCTIONS FOR ADJUSTMENT AND OPERATION OF THE ELECTRIC TUNER

It is very important to read the following instructions carefully before attempting to operate the electric tuner. The electric tuner is made up of three integral units:

1. PUSH BUTTON SWITCH
2. ELECTRIC MOTOR
3. ELECTRIC PUSH BUTTON TUNER

The push button switch consists of a 10 white buttons, arranged in a circle, which are arranged so that each button is exactly 10 degrees from the next.

The electric motor is provided by a small alternating current source, the brushes being arranged in a ring around the motor. The brushes are connected to the white wires of the motor, and the white wire is connected to the outer white wires of the motor.

The electric push button tuner is made up of the selector, receiver, and push button unit.

**ELECTRIC MOTOR**

This section of the tuning unit is provided by a small alternator. A white wire is connected to the white wire of the alternator. The alternator is a device for converting electrical energy into mechanical energy, and the white wire is used as a conductor for the current.

**ELECTRIC MOTORS**

The electric motors are provided by a small alternator. The white wires of the alternator are connected to the white wires of the electric motors. The white wire is used as a conductor for the current.

**ELECTRIC PUSH BUTTON TUNER**

The push button switch consists of a 10 white buttons, arranged in a circle, which are arranged so that each button is exactly 10 degrees from the next. The white wire is connected to the white wires of the switch. The white wire is used as a conductor for the current.

How to Tune in Stations Using the Electric Push Button Tuner

Before attempting to operate the electric push button tuner, the white buttons must be in the proper position, first at all times off. Then move the white buttons in the proper order by pressing the white buttons in the proper order. When the white buttons have been moved in the proper order, it is then necessary to change the selector by pushing the white buttons in the proper order. When the white buttons have been moved in the proper order, it is then necessary to change the selector by pushing the white buttons in the proper order.

**NOTE:**

The reference section of the tuning unit is provided by a small alternator. The white wire is connected to the white wires of the alternator. The white wire is used as a conductor for the current.

**CONVENTIONAL ALIGNMENT**

See special section VIII.

ALIGNMENT - Peak 1-f trimmers at 450 kc. After all adjustments have been made on receiver, adjust wave trap to 450 kc peak. Shortwave Foreign Band - Dial and generator to 16 kc, peak the oscillator trimmer. Good

BROADCAST - Dial and generator to 1720 kc, adjust oscillator trimmer to peak. Dial and generator to 1460 kc, adjust antenna trimmer to peak. Dial and generator to 600 kc, peak oscillator trimmer, adjust antenna trimmer to maximum peak. SHORTWAVE POLICE BAND - Dial and generator to 5 kc, peak oscillator trimmer, adjust antenna trimmer to maximum peak. SHORTWAVE FOREIGN BAND - Dial and generator to 16 kc, peak the oscillator trimmer, shift dial and generator to 16 kc and peak the antenna trimmer.

**NOTE:**

- Dial and generator to 600 kc, peak oscillator trimmer.
- Adjust variable condenser during peaking adjustment on broadcast bands. No peaking required on other bands.

www.americanradiohistory.com
This receiver is a 7 tube alternating current operated superhetrodye.

The tubes used are a 76 as oscillator, a 6A7 as modulator, a 60D6 as V.F., a 41 as power audio amplifier, a 75 as A.V.C. and audio rectifier and audio voltage-amplifier, a 6D6 as tuning indicator.

This receiver is made to cover 2 tuning bands, the standard broadcast band which ranges from 1730 K.C. to 535 K.C. and the middle or police band which has a frequency range of from 64 M.C. to 21 M.C. 

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DESCRIPTION

This receiver is an 11 tube alternating current operated superheterodyne.

The tubes used are a 6C5G oscillator, a 6A8G modulator, a 6K7G I.F. amplifier, a 6C5G A.V.C. rectifier, a 6H6G detector, a pair of 6J7G audio amplifiers, a pair of 6V6G power amplifiers, an 80 rectifier, and a 6G5 tuning indicator or magic eye.

This receiver is made to cover 3 tuning bands, the standard broadcast band which ranges from 1680 K.C. to 535 K.C., the middle or police band which has a frequency range of from 5.4 M.C. to 1.7 M.C. and the high frequency or foreign band which is from 19 M.C. to 5.0 M.C.
ALIGNMENT PROCEDURE:

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, low battery voltage, open or grounded bias resistor, bypass condenser, inadequate or excessively long antenna, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proven not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT.

THE TRIMMER AND PADDLE CAPACITOR WILL BE REFERRED TO BY THEIR FUNCTION, AS SHOWN IN PARTS DIAGRAM.

ALIGNING I.F. STAGE AT 465 KILOCYCLES:

(a) Attach the ground lead of the test oscillator to the chassis. Connect the other lead to the grid of the 1C6 tube through a .02 Mfd. series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 KILOCYCLES and turn receiver volume control on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

ALIGNING 1730-530 KILOCYCLE BAND:

(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely in mesh). at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.

(b) Remove test oscillator lead from grid of 1C6 tube and connect to receiver antenna lead through an 0.025 Mfd. series condenser.

(c) Adjust band selector switch for operation on the 1730-530 kilicycle band.

(d) Set test oscillator frequency and receiver dial to EXACTLY 1730 kilocycles. Turn chassis on end and adjust 1730 kilocycle oscillator trimmer for maximum 1730 kilocycle test oscillator signal sensitivity.

(e) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles and adjust 1400 K.C. antenna trimmer for maximum sensitivity.

(f) Set test oscillator frequency and receiver dial to approximately 600 kilocycles. Then while rocking gang condenser slightly to right and left, adjust 600 K.C. oscillator trimmer for maximum sensitivity.

ALIGNING 5.8-18.1 MEGACYCLE BAND:

(a) Replace .0025 Mfd. test oscillator antenna lead series condenser with a 400 ohm resistor, and place band selector switch for operation on 5.8-18.1 megacycle band.

(b) Tune receiver dial and set test oscillator frequency to approximately 15 megacycles.

(c) Rock gang condenser slightly to right and left and adjust 15 M.C. antenna trimmer for maximum 15 megacycle test signal response.

To assure more accurate trimmer setting, repeat all above adjustments several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.
alignment procedure

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

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

Connect the output meter, through a 5 M F condenser and 7 resistance of such a value as to make the total meter resistance approximately 10,000 ohms, to the two grid pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Press in the dial tuning button. Models 2070, 2071, 4074 and 4076.

Connect the signal generator to the grid cap of the 6AG7 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 tap of the first and second I F transformers until the maximum output is obtained. This aligns the I F.

Leaving the signal generator connected to the grid cap of the 6AG7, turn the wave switch to the right hand (short wave) position. Set the dial and the signal generator to 15.0 K C Tune in the signal by adjusting the 15.0 M C oscillator trimmer. The signal will be heard at two different settings of the trimmer. The proper setting is the one where the signal is heard when the trimmer is the lowest. Also when the dial of the receiver is turned is the signal will be heard again at about 14.0 M C. If the signal is heard at about 16.0 M C on the dial instead of 14.0 M C the wrong setting has been used and should be corrected.

Set the wave switch on broadcast position. Turn the dial to the extreme high frequency end. Feed a 1600 K C signal to the receiver antenna post through a 0025 M F micro condenser. Adjust the 1600 K C broadcast oscillator trimmer for maximum output. Set the generator to 1500 K C and tune in this signal on the receiver. Then adjust the 1600 K C broadcast oscillator trimmer and the 1800 K C broadcast pre-oscillator trimmer for maximum output. Set the generator 600 K C and adjust the 600 K C broadcast oscillator pad for maximum output while tuning the receiver back and forth across the signal from the generator. This completes the alignment of the broadcast band.

The police band is aligned by feeding a 40 M C signal to the receiver antenna post through the 0025 condenser. Turn the wave switch to the center position and tune the receiver to this signal. Adjust the 40 M C police antenna trimmer for best output.

The short wave band is aligned in the same way using a 15 M C signal and adjusting the 15 M C short wave antenna trimmer after having turned the wave switch to the right hand position.

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 6AG7 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, press in the dial tuning button and set the dial to about 1000 K C. Then 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 1750 K C signal to the receiver antenna post through a 0025 M F micro condenser. Adjust the 1750 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 60 M C signal to the receiver antenna post through a 0025 M F micro condenser. Turn the wave switch to short wave position and tune in the 60 M C signal. Adjust the 60 M C short wave trimmer to maximum output.
Lack of sensitivity, selectivity or poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, improperly connected or low battery, open or grounded bias resistor, bypass condenser, inadequate or excessively long antenna, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proven not to be the cause.

**NOTE:** BE SURE TO FOLLOW PROCEDURE CAREFULLY WHEN ALIGNING. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT.

IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER.

**ALIGNING I.F. STAGE AT 465 Kilocycles:**

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the No. 6DG5 modulator tube through a .02 Mfd. condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 kilocycles and turn receiver volume control on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

To assure most accurate trimmer setting repeat above adjustment several times, always using lowest possible test oscillator output consistent with readable output meter scale deflection.

**ALIGNING ANTENNA AND OSCILLATOR CIRCUIT:**

(a) Connect the high output side of the test oscillator through a .00025 Mfd. condenser to the receiver antenna lead and the low side to the set ground.

(b) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely in mesh), at which point the dial needle must be exactly even with the last line at low frequency end of dial calibration. If the dial needle does not point exactly to the last line move needle to correct position.

(c) Set receiver dial and test oscillator frequency to EXACTLY 1720 kilocycles.

(d) Bring in 1700 KC test oscillator signal to maximum output by adjusting the trimmer condenser mounted on top of the oscillator section of the gang condenser. Looking at the front of the receiver the rear section of the condenser is the oscillator section.

(e) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles.

(f) Adjust trimmer on top of the front section gang condenser (antenna section) for maximum 1400 kilocycle test signal response.

(g) Tune receiver dial and set test oscillator frequency to approximately 600 kilocycles.

(h) While rocking the tuning condenser back and forth adjust 600 K.C. oscillator condenser which is accessible through the hole in the top of the chassis adjacent to the gang condenser for maximum 600 kilocycle signal response.
ALIGNMENT FREQUENCIES
IF 465 KC
BROADCAST 1400 and 600 KC
INTERMEDIATE 1800 KC
SHORT WAVE 15 MC
0

TUNE: 17.5 to 555 meters

FOR ALIGNMENT SEE INDEX

Tuning eye used on 23 E Chassis - Models, 2204-2205-2206-2207.
Tuning eye not used on X-23 Chassis - Models, 2200-2202-2203-2205-2207-2201-2206-2208-2213-2231-2232-2233.
I.F. ALIGNMENT. Adjust the test oscillator to 175 K.C. and connect the output directly to the grid of the first detector tube (6A7), without the use of any series condenser or resistor; the omission of series condenser and resistor to block out the AVC action. The ground on the test oscillator can be connected to the chassis ground. Align the trimmers of the first and second I.F. transformers to peak or maximum reading on the output meter.

R.F. ALIGNMENT. The next step is to adjust the center and rear trimmers of the gang condenser to peak. The center section of the gang condenser tunes the antenna amplifier stage (6D6 tube), and the rear condenser section tunes the detector grid coil of the 6A7 tube.

OSCILLATOR ALIGNMENT. Adjust the test oscillator to 1400 K.C. and connect the output to the antenna through a 0.0001 mfd. mica condenser to give the equivalent of a low capacity type average auto antenna. Set the dial pointer to 1400 K.C. and adjust the oscillator trimmer to peak.

(Front section of gang condenser.)

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CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL. VIII.

Peak IF at 465 KC. Connect oscillator at 6A7 grid cap. Use .02 mfd. series condenser, DO NOT REMOVE GRID CAP. Peak second and first IF trimmers.

Connect oscillator to antenna lead through .00025 mfd. series condenser.

Gang condenser at maximum capacity, calibrate dial so needle falls on last line in this position.

Set oscillator signal at 1720 KC, tune dial to 1400 KC. Trim osc. sect. of gang condenser to maximum output.

With oscillator signal at 1720 KC, trim antenna section of gang condenser for maximum output.

Now adjust 600 KC padder for maximum signal while rocking condenser.

2.3-6.3 MC Band

Signal at 6.3 MC through 400 ohm and .00025 mfd. dummy to antenna lead.

Band switch in 2.3-6.3 MC position. Adjust 6.3 MC osc. trimmer to maximum output.

Tune dial to 6 MC. Signal at 6 MC. Adjust 6 MC antenna trimmer for maximum sensitivity.
DESCRIPTION

This receiver is an 8 tube alternating current operated superheterodyne.
The tubes used are a 6A7 as oscillator modulator, a 6D6 as I.F. amplifier,
and a 75 as A.V.C. and audio rectifier and audio voltage amplifier. A 76 as audio
and a 42 as a push pull audio power amplifiers.

This receiver is made to cover 3 tuning bands, the standard broadcast band
which ranges from 535 K.C. to 1.7 M.C. and high frequency or foreign
band which is from 20 M.C. to 54 M.C.

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Alignment Procedure

Intermediate Frequency: Set oscillator to 455 KC and place the test oscillator in the grid of the preselector inductor. Adjust the trimmer for peak readings on the output meter. loops.

Broadcast Band: Set the band switch to broadcast reception. Adjust the trimmers to 1400 KC and broadcast the program through the antenna. Adjust the trimmers for maximum output (as indicated on the output meter). loops.

Short Wave Band: Set the receiver to 15 megacycles. Adjust the short wave oscillator and trimmers for maximum output (as indicated on the output meter). loops.
ALIGNMENT: The alignment of this receiver requires the use of a test oscillator that will cover the following frequencies 455, 1400, and 4000 KC.

The I.F. coils are arranged for maximum signal as indicated by an output meter which is to be connected across the output transformer. I.F. frequency is 455 KC. There are two adjustments for I.F. alignment.

To align broadcast band it is only necessary to align receiver at 1400 KC because of a dummy antenna. This is inserted in series with the test oscillator and the antenna connection of the radio receiver. Set the test oscillator and receiver on dial to 1400 KC and adjust the tuning condenser (C) for maximum output. Turn Band Switch to Short Wave position. Feed a 4000 KC signal from the test oscillator and check receiver.
This receiver is an 8 tube alternating current operated superheterodyne. The tubes used are a 6A7 as oscillator modulator, a 6DS as I.F. amplifier, a 6H6G as A.V.C. and audio rectifier, a 67G as audio voltage amplifier, and a 6V6 as power rectifier. A 6G5 as tuning indicator and two type 6V6G tubes as push pull audio power amplifiers.

This receiver is made to cover 3 tuning bands, the standard broadcast band which has frequency range of from 154 MHz to 510 MHz, the middle or police band which ranges from 1680 K.C. to 3535 K.C., and the high frequency or foreign band which is from 19 K.C. to 50 K.C.
**IF PEAK 175 KC**

**I.F. ALIGNMENT**
Adjust the test oscillator to 175 K.C. and connect the output directly to the grid of the first detector tube (6A7), without the use of any series condenser or resistor; the omission of series condenser and resistor to block out the AVC action. The oscillator trimmer to peak. (Front section of gang condenser.)

Align the trimmers of the first and second I.F. transformers to peak or maximum reading on the output meter.

**Oscillator**
Adjust the test oscillator to 1400 K.C. and connect the (606 tube), and the rear condenser section of the gang condenser tunes the detector grid coil of average auto antenna. Set the dial pointer to 1400 K.C. and adjust the
CONVENTIONAL ALIGNMENT — SEE SPECIAL SECTION, VOL. VIII.

Peak I-F trimmers at 465 KC. BROADCAST — Dial and trimmer to 1720 KC, peak oscillator trimmer. Dial and generator to 1400 KC, peak antenna and R-F trimmers. Dial and generator at 800 KC, pad the oscillator circuit for maximum peak, while rocking the variable gang condenser.

FOREIGN — Dial and generator at 18 MC, adjust the oscillator trimmer to peak. Dial and generator to 15 MC, adjust the R-F and antenna trimmers to maximum sensitivity while rocking the variable condenser across the signal. Dial and generator at 6.5 MC, pad the FOREIGN band oscillator circuit to maximum peak while rocking the variable condenser.

NOTE:
1. I-F = 465 K.C.
2. All vars shown relative to plates and our part numbers.
3. HANDERS SHOWN WITH PRIPX "A" AND COMPLETE ATTACHMENTS.
**VOLTAGE**

**Type of Tube**

- **Type**
- **Position of Tube**
- **Fil. Plate Voltage**
- **Screen Grid Voltage**
- **Grid Grid Voltage**

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<th>Type</th>
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<th>Fil. Plate Voltage</th>
<th>Screen Grid Voltage</th>
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</table>

* A/C. each plate

**NOTE:** Those of the 8A7 oscillator modulator tube leaving the R.F. or transformer shield with a trimmer adjustment to make certain the alignment of the secondary has not been changed by the adjustment of the primary trimmer. The first I.F. transformer is double-tuned, the trimmers of which are accessible through the top of the I.F. can. One section of which is by turning the brass nut at other sections by screwing in and out the set screw that is accessible through the hole provided in the brass box nut. The second intermediate transformer has but one trimmer which is likewise accessible from the top of the intermediate transformer shield can. After both intermediate transformers have been correctly aligned the alignment of the intermediate stage is complete and the trimmers should not be further disturbed. The grid cap should be connected to the grid of the 6A7 tube and 50,000 ohm resistor removed.

**VARIABLE CONDENSER ALIGNMENT:**

If the intermediate frequency stage has been realigned or if the antenna, R.F. or oscillator coil have been replaced it will be necessary to realign the variable condensers. If the receiver is not mounted in the set housing it will be necessary to place a metal shield along side of the variable condenser and flush against the side of the set chassis. The variable condenser trimmers. It is necessary to do this otherwise when the receiver is placed in the set housing the metal housing will deplete the receiver. Three holes should be made in the shield to correspond with the holes provided in the set housing which permits alignment of the receiver when the set is in the housing. Be sure the shield is properly grounded to the receiver chassis. When the receiver and antenna are removed from the set housing be sure to set the receiver on the top of the set unit, otherwise considerable r.f. and audio hum will be encountered. Regardless of whether the receiver is mounted in the set housing or not the alignment procedure is the same. Adjust the variable condenser to minimum capacity. Connect the high output side of the set oscillator to set antenna lead and the low side to antenna shield lead or chassis. Then adjust the test oscillator to 1000 K.C. beat, using the TUBE.chassis variable condenser and reading from the bottom up the trimmers are, oscillator, R.F. and antenna. After the oscillator and R.F. trimmers are properly peaked, adjust the antenna trimmer in the order mentioned. After the variable condenser trimmers have been correctly adjusted at 1000 K.C. tune the receiver to 600 K.C. and adjust the oscillator to this frequency. Then adjust the oscillator final condenser which is located on the lower side of the chassis, to obtain maximum reading on the output meter. If the set is mounted in the receiver housing the passing condenser is accessible through the small holes in the side of the set housing. It may be necessary to turn the variable condenser slightly to the right and left to find the point where greatest output is obtained. If the alignment procedure is correctly followed the receiver will keep track correctly over the entire tuning range. It is always advisable to align the receiver with the tubes to be used in the set whenever possible.
ALIGNMENT PROCEDURE
Correct alignment is of extreme importance in all-wave receivers. The receivers are properly aligned at the factory with precision equipment and realignment should not be attempted by the service technician until all other causes of faulty operation are corrected.

In order to properly align the receiver the following equipment is necessary:
1. A signal generator which will provide an accurately calibrated signal at any frequency from 500 kilocycles to 5 megacycles. The generator should have adjustable attenuator output.
2. An output voltmeter of the low voltage type to be connected across the moving coil of the speaker. This should be capable of providing a readable deflection for relatively low output levels to avoid the effects of overload.
3. An insulated or non-metallic screwdriver for the adjustment of trimmers.

IF ALIGNMENT 456 KC
1. Connect the output meter (low scale) across the loud speaker voice coil. Turn the wave band switch to broadcast position. Turn the volume control to its maximum position.
2. Connect the test oscillator output to chassis and the 'hot' lead from the test oscillator to the grid of the 6L6; converter tube through a series 10MΩ, condenser. Set test oscillator to 456 KC.
3. Adjust IF alignment screw of second IF transformer adjacent to 6FS power tube to maximum output, reducing output of test oscillator to keep meter reading on scale as alignment proceeds.
4. Adjust alignment of first IF transformer. (directly behind tuning condenser) to maximum output as described above.
5. Readjust these trimmers for accurate alignment. Always use the lowest possible output from the test oscillator to preclude the possibility of automatic volume control action confusing proper alignment.

NOTE: Since coils are used in series it is absolutely necessary to align the high frequency bands first, in the order indicated.

FOREIGN BAND 5.7 TO 18.5 MEGACYCLES
1. With test oscillator connected to the antenna and ground terminals through a 400 ohm resistor set oscillator at 16 megacycles.
2. Set the dial scale to 14 megacycles and adjust the oscillator trimmer condenser (C1-A) to resonance using the counterclockwise or low capacity point.
3. Adjust input circuit trimmer (C2-B) to maximum response, rocking the gang condenser back and forth a degree or two to obtain proper maximum.

POLICE OR MIDDLE BAND 1.75 TO 5.8 MEGACYCLES
1. With the test oscillator connected as above set the oscillator and dial to 1.5 megacycles.
2. Adjust input circuit trimmer (C3-D) to maximum response rocking the gang condenser as described above.

TRIMMER LAYOUT

BROADCAST BAND 535 TO 1800 KC
1. With test oscillator connected to antenna and ground through a 200 MΩ condenser set oscillator and receiver dial to 1500 kilocycles.
2. Adjust broadcast oscillator trimmer (C4-E) to obtain maximum response.
3. Adjust antenna circuit trimmer (C2-F) for maximum output.
4. Adjust preselector trimmer (C5-G) for maximum output.
5. Set test oscillator and dial to 600 kilocycles and tune in the signal, then adjust broadcast band padding condenser (C3-H) for maximum output. This padding is mounted on the aluminum coil deck near the panel and is adjusted through a hole provided in the back of the chassis pan.
6. Rock the condenser back and forth a degree or two in order to obtain proper maximum.
7. Repeat the 1500 KC adjustments described above for greater accuracy.
This radio receiver is designed for operation on standard American broadcasts, Police, Amateur, aviation, ships, foreign and U. S. governmental time and weather broadcasts. This vast coverage in radio entertainment and utility is divided into four parts or bands indicated on the tuning dial and the wave band indicating device.

The dial is calibrated with each band covering 340 degrees of tuning scale length and are each concentric with the center of the dial face. The innermost scale is calibrated from 150 to 375 K.C. (2000 to 800 meters) and covers the range necessary for receiving governmental time and weather reports. The second band from the center is for standard broadcasts covering from 550 to 1700 K.C. (175 to 545 meters). The third band from the center covers the intermediate short wave length broadcasts of Police, Amateur, Aircraft and ships and extends from 1700 to 5400 K.C. (55 to 180 meters). The fourth band covers all of the principle short wave channels for reception from countries all over the world. This band carries a calibration of from 5.5 to 18 megacycles (16.4 to 55 meters.) This short wave scale is the one which includes the five internationally assigned bands—the 19, 25, 31, 39 and 49 meter channels.

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The dial is calibrated with each band covering 340 degrees of tuning scale length and are each concentric with the center of the dial face. The innermost scale is calibrated from 150 to 375 K.C. (2000 to 800 meters) and covers the range necessary for receiving governmental time and weather reports. The second band from the center is for standard broadcasts covering from 550 to 1700 K.C. (175 to 545 meters). The third band from the center covers the intermediate short wave length broadcasts of Police, Amateur, Aircraft and ships and extends from 1700 to 5400 K.C. (55 to 180 meters). The fourth band covers all of the principle short wave channels for reception from countries all over the world. This band carries a calibration of from 5.5 to 18 megacycles (16.4 to 55 meters.) This short wave scale is the one which includes the five internationally assigned bands—the 19, 25, 31, 39 and 49 meter channels.
ALIGNMENT

IF trimmer adj. at 456 KC through .05 or .1 mf dummy condenser.
BC osc. trimmer and ant. trimmer adj. at 1400 KC through .001 mf dummy.
Padder at 600 KC. Recheck at 1400 KC.

Foreign Band: Through .0001 mf dummy, adj. at 14000 KC both the S.W. oscillator and S.W. trimmers. Check for image frequency at 13100 KC for proper weaker signal.

Police Band: Through 400 ohm resistor .0001 mf cond. series dummy, adjust osc. trimmer and ant. trimmer at 4000 KC. Padder adj. 1800 KC. Recheck at 4000 KC.

Wave Trap: At rear of chassis near grd. & ant. post adj. wave trap screw at 456 KC.

Dial Calibration - Government & Weather Reports - 150 to 375 KC.
Broadcast 550 to 1700 KC.
Police, Amateur, Aircraft & Ships 1700 to 5400 KC.
Short Wave 5.5 to 18 megacycles.
I. F. Alignment:
Connect the oscillator through a 1 condenser to the grid of the 1C6 tube and set the oscillator to 456 kilocycles. Peak each I. F. stage to resonance as indicated by maximum output on the output meter.

R. F. Alignment:
With the wave change switch in the broadcast position, set the oscillator to 1700 kilocycles and connect 4000 coils to the grid of the 1C6. Frequency control to the right side of the chassis and set the oscillator to 456 kilocycles. Check alignment on the front of the chassis. Back and forth for maximum peak.

7-Tube, 6-Volt Battery Operated Superheterodyne
### Electrical Parts

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<thead>
<tr>
<th>Diagram</th>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83783</td>
<td>Condenser—micro 110 mmfd.</td>
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<td>Resistor—insulated 470,000 ohms 1/4 watt</td>
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<td>Speaker—dynamic 3&quot;</td>
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<td>Resistor—wire wound 50 ohms 1 watt</td>
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<td>Condenser—micro 260 mmfd. 500 volt</td>
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<td>Volume control—20,000 ohms, with switch</td>
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<td>Transformer—output for R-115053 speaker</td>
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### Schematic

**I.F. 455 KC**

### Miscellaneous Parts

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<td>0.01</td>
</tr>
<tr>
<td>116583</td>
<td>Terminal Strip (for antenna)</td>
<td>0.12</td>
</tr>
<tr>
<td>116593</td>
<td>Tube shield</td>
<td>0.10</td>
</tr>
</tbody>
</table>

### Socket Voltages

**Volume Control Set at Maximum Volume Position**

- **Antenna Grounded**
- **Dial Tuned 1040 kc**

<table>
<thead>
<tr>
<th>Bottom View</th>
<th>12SA7</th>
<th>70L7GT</th>
<th>25B8GT</th>
<th>7OL7GT</th>
<th>25B8GT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>70L7GT</td>
<td>25B8GT</td>
<td>25B8GT</td>
<td>12SA7</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>12SA7</td>
<td>70L7GT</td>
<td>25B8GT</td>
<td>25B8GT</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>12SA7</td>
<td>70L7GT</td>
<td>25B8GT</td>
<td>25B8GT</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>12SA7</td>
<td>70L7GT</td>
<td>25B8GT</td>
<td>25B8GT</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>12SA7</td>
<td>70L7GT</td>
<td>25B8GT</td>
<td>25B8GT</td>
<td></td>
</tr>
</tbody>
</table>

### Rear of Chassis

**Note A:** Due to the high resistance of resistor No. 4, only a small voltage will be read on a meter having a resistance of 1000 ohms per volt.

**May 26, 1959**
ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Solder the output meter leads from output plate (P) to screen (S) of the 7015GT tube (See voltage chart). The leads must be soldered since the bottom cover must be replaced during alignment. The output meter leads can be brought through the power cord opening.

2. Connect the ground lead of the signal generator through a .25 mfd. condenser to some portion of the chassis in the VICINITY OF THE GANG CONDENSER.

3. Remove the connector between the antenna terminals on the bottom of the set.

4. Turn the volume control to the maximum volume position and keep it in this position while aligning.

5. The tuning knob should be adjusted so that the nick which appears on the outer part of the knob is accurately centered and points away from the chassis when the gang condenser is in full mesh.

### Dummy Ant in Series with Sig. Generator Connection of Sig. Generator Output to Receiver Signal Generator Frequency Receiver Dial Setting Trimmer Number Trimmer Description Type of Adjustment

<table>
<thead>
<tr>
<th>MFD. Condenser</th>
<th>Lug on bottom gang condenser</th>
<th>455 KC</th>
<th>Any point where it does not affect signal</th>
<th>1</th>
<th>2nd I.F.</th>
<th>Adjust for maximum output.</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 MMFD. Mica Condenser</td>
<td>Terminal on bottom (Terminal nearest back of chassis)</td>
<td>1500 KC</td>
<td>1500 KC</td>
<td>4</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust trimmer for maximum output.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser</td>
<td>Terminal on bottom (Terminal nearest back of chassis)</td>
<td>1500 KC</td>
<td>Tuned to 1500 KC Generator Signal</td>
<td>5</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
</tbody>
</table>

I. F. OSCILLATION

When aligning this set, I. F. oscillation may be encountered if the following precautions are not observed:

1. Keep the bottom cover plate on during alignment.

2. Keep the signal generator leads as far from the chassis as possible in order to prevent unnecessary feedback.

3. Connect the ground lead of the signal generator through a .25 mfd condenser to some part of the chassis in the VICINITY OF THE GANG CONDENSER.

4. Keep the orange lead of the volume control away from the 2nd I.F. transformer. Separating this lead from the others surrounding it at the base of the 258GT tube will also help.

### BUILT-IN ANTENNA SYSTEM

The Built-In Antenna incorporated in this receiver will generally give very satisfactory results in localities where powerful broadcast stations exist. This Built-In Antenna will function when the terminals on the bottom of the chassis are connected together. In cases where noise is excessive or greater sensitivity is desired, remove the jumper connecting these terminals and connect an external antenna to the terminal marked "External Aerial." This is the terminal nearest the back of the set.

The Built-In Antenna Condenser No. 12 couples the primary of the antenna coil to one side of the power line, which acts as the antenna. The R.F. choke No. 21 is an iron-cored choke whose impedance is high at broadcast frequencies. This choke serves to prevent condenser No. 31 from by-passing the signal voltage picked up by the power line. It also prevents feed-back into the antenna circuit of radio frequency energy generated in the set itself.

When aligning this receiver, the jumper connecting the antenna terminals on the bottom of the set should be removed. This will prevent picking up signals which might interfere with the alignment procedure.

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S-WARNER PAGE 10-3

STEWART-WARNER CORP.

MODEL 102-D (7 Tubes)
Schematic

©John F. Rider, Publisher

www.americanradiohistory.com
since weak stations will generally give poor results. Arrange the list so
stance appears first then the next lowest frethat the lowest frequency
order.
quency, continuing in this manner until stations are in numerical
The frequency of your local stations may be obtained from your newspaper
100-240
or medio call magazine.
IT IS IMOnly buttons No. 2 tc No. 9 are used for automatic tuning.
PERATIVE THAT THESE BUTTONS BE SET-UP IN THE FOLLOWING ORDER: Button No. 2
These chassis are 11 tube, Electric Push-Button Tuning, Superl¡tteterodyne reto must be set to tune in the station whose
frequency is lowest 1n your list
The tuning ranges are 535 to 1730 KC, 2.2 to 7.0 MC, and 6.8
ceivers.
next
Button No. 3 must be wet to tune in the station
of eight stations.
22.5 MC.
Continue to follow this procedure until Button No. 9
higher in frequency.
will be set to tune In the station whose frequency in highest in your list
Incorporated In each chassis Is a ruggedly constructed Electric Pushprimarily designed to give long -life and
The actual setting up of the buttons Is done as follows:
Button Tuner Unit, which was
automatic tuning system
Aside fropn the
consistent accuracy of tuning.
4.
Place the small black 'wet -up switch' button which
appears on the
following back of the chassie,
Incorporates several features described In the
this receiver
in the right
hand
position.
(See label on back of
paragraph which the service man should carefully read as they may aid him chassis.)
LEAVE THIS SWITCH BfMTee IN THIS POSITION UNTIL ALL BUTTONS
source
of
trouble.
In rapidly locating the
HAVE BEEN SET UP.
Push in the
'Manual"
5.
VARIAPLE SELECTIVITY:
Two degrees of selectivity can he obtained by proper button and use the tuning knob
When the button le in the to tune in the station (lowest
Manual'.
use of the first puih-button labelled
will
be
broad.
With
this
button
of
the
receiver
'out' position the Vining
frequency on your llat) that
Broadening is accomplished you have selected for'Button
in the
In' position the tuning will be sharp.
by inserting a resistor and colt in series with the secondary of the first No. 2.
to tune
in
Be sure
primary station
The series colt is mutually coupled into the
I. F. transformer.
correctly using the
causing a flattening of the overall
of the same I.F. transformer .thereby
The correct
Tuning Eye'.
selectivity.
tuning point is Indicated when
the two open ends of the InAUDIO SYSTEM: The audio voltage developed across the diode load resistor verted V
«Wiped
shadow In
amount of the
Is fed to the volume control which In turn couples, the desired
Tuning Eye are closest
this audio voltage to the control grid of the 8K7 let audio tute. The out- together.
put of this stage is coupled to one of the 6V6-0 output tutee. Also a por8.
PUSH IN BUTTON No. 2.
tion of the output of the 8E7 is coupled through a voltage divider neteork The"lamp mounted on the tack
consisting of resistors No. 44, 81 and 82 to the control grid of the 6y7 -G. of the chassis just to the
This tube acts as the phase inverter and Its output drives the other 6V6 -G right of the
selector drum
output tube.
A mute switch connected across the rentrol grids of the two will be illuminated when the
is
depressed.
(See
PV6-0 output tubes is utilized to silence the receiver Mille the automatic button
This Is accomplished by
operation.
placing the mute Flg. 1.)
tuning unit is in
NOTE:
the lamp deem
If
When the motor starts to operate
switch en tie back of.the tuner motor.
when
not
light
up
the
switch
which
causes
the
of
the
-tor,
st
the rotor
pulls into, Oho magnetic field
position, it Inend of the motor shaft to push arsine. the mute switch and close its con- is in this
dicates that Britton No. 2 is
tacto.

Used In Receiver Models

Chassie Model

91-111 to 91-1119
98-111 to
98-1119
910-111 to 910-1119

91-111
96-111
910-111

1+

o
y

SYMPTOM:
REMEDY:

2.

SYMPTOM:

REMEDY:

Frequency

117
117

80 cycles
25 cycles
60 cycles

SYMPTOMS.

TYPICAL TROUBLES AND THEIR

1.

yoltaje

either the second or third

button

from the lett or right

depressed the dial
pointer will
end of the Magic Keyboard 1s
travel to the end of the dial and the motor will hum.
conThis Is caused by misalignment of contactor drum and gang
Release set screw holding drum in place on shaft, and
denser.
Place a slider contactor
close the gang con sneer completely.
contactor
Now
set
the
bridge.
at each extremity of the slider
drum so that the division between the two sections (POINT X' IN
FIG. 1) is just below the contactor which you set at the extreme
from
rear). The contactor on the
(viewed
of
the
bridge
left end
extreme right of the bridge will now tall on point just above
NOTE:
the dead spot Indicated by. the white arrow on the drum.
section
The contactor on each extreme end must contact the mime
After the
drum or the drum is incorrectly set.
of the contact
setting has been performed retighten the set screw.

3.

SYMPTOM:
RENEDY:

Tuner tails to operate.
must
(1) The small black set-up switch on the back of the tuner
be in the left hand position.
thermostat on motor will open when temperature of
(2) Overload
Thermostat will
motor reaches dangerous value (approx. 950 C).
close autonetically when motor cools down.

REMOTE CONTROL

being.
With the end of the cord to which theQ tension spring le attached, take
B.
le turns counterclockwise around pulley.K,(when viewed from the right end)
and then bring the cord up through
hole C.
9.
Tie the tree
end of the
cord
hanging over
pulley H, to the upper end of the tension spring. The
spring should be extended so it is
approxlbetely li' long when the
tension
in the
cord
system
is
equalized.
If the,
Short Wave scale
on
the dial is not in the proper poeIt1on
under the pointer,
loosen
the set screw in hub 0, rotate the
dial scale to the proper
position
and tighten the set screw.

2 'ÿsimr-

ese

UNIT

radio is denlgned to permit tuning from a remote
.This Stewart -Warner
point such as your armchair or any point within 20 ft. of the receiver cabpart No. 113600 is available to adapt
inet.
A special 'Remote Tuner Kit
control.
It can be purchased from any Stewart your receiver for remote
Chicago,
Warner Dealer, Distributor, or from Stewart -Warner Corporation,
This accessory kit consista of a remote control unit incorporaIllinois.
ting eight push buttons and a remote volume control. The unit le connected
prong plug, which fits Into a corby a flat flexible cable to an eleven
responding socket at the left rear of the receiver chassis. Following are
the Instructions for installation of the remote control unit:
Turn off the radio set.
1.
2.
Remove the wire connector which joins the two holes adjoining the white
If at any time you decide
dot on the eleven hole socket. IMPORTANT:
to discontinue the use of the remote control unit, remove the plug ar,
reinsert this wire connector in the two holes adjoining the white dot.
Failure to replace the connector will make the set Inoperative.
remote
locate tee
control
3.
Insert the remote
plug in its socket and
The
control unit at some convenient point within 2L ft. of the set.
floor.
cable may be placed
beneath the rug, or along t` e
connecting
4.
Piss IN THE
the
nn
Ms1.:
REMOTE'
BUTTON (#10)
Kevncard
and the
The unit is now ready for operation.

HOW TO SET UP THE PUSH BUTTONS
1.
Be eure that your set le first connected to a good entente system.
one-quarter hour
Turn on the set and allow it to operate at least
2.
before setting up the push buttons.
tune In
3.
nearby stations which you wish to
Take a list of eight
with automatic tuning buttons. Be sure to select nearby powerful station»,

IiIIIIi)`;IIi'lill
1
noo...or. m

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m..ñ5°m..Pt.. gox-( m.-oR.-r

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7`3

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No. 3

-

Red Lead

No. 4 - Orange Lead
No. 5 - Yellow Lead

Button No. 8
Button No. 7
Button No. 8
Button No. B

-

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No. 2 - Brown Used

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already correctly set to the desired station and no further adjustment
need be m de for this button.
7.
Locate the contactor corresponding to Button No. 2. This contactor has a
BROWN lead
attached to it, (see Fig. 1 or label on back of the
chassis tor the color of the wire associated with each button) and is the
extreme right hand contacton the inner circle of the wmsl-circalar brid e
when viewed from: rear of chassis.
Loosen the knurled nut on this contactalong the
Then slide this contactor
or (not more than one-half turn.)
arrowhead on the side of the
bridge to the point Indicated by the white
It the
When
point
reached,
the lamp will go out.
drum.
this
la
round
contactor 1s moved farther than the point at which the lamp extinguishes,
back and forth
will again be
illuminated.
Move the contactor
the lamp
Then tighten the knurled nut as tightly as possibetween the two points.
should still be out after tightening the
The lamp
ble, with the finger.
If it Is not, the contactor must be reset.
contactor.
8.
The set-up for Button No. 2 is now complete.
The con9.
Set-up the remaining seven buttons in a similar manner.
tactors for the buttons can be identified as follows: (See Plg. 1 or label
on back of chassis.)
Button
Button
Button
Button

ty

r

aaiii.g°g'P'2marsóóó,
nw=rmc.ñi2Ñ>'Amó;Ñ.m.A$ió

MOM MMMIll

tuner button Is depressed pointer travels to end
When electric
of dial and motor hums.
Black and brown leads from motor to contactor drum are connected
Re -erne connections at motor terminals.
in reverse.
When

4.
Place the knot on the cord in slot B.
With the long free end of the cord (not the end with the enring atttc)l5.
ed), take li turns clockwise around pulley A, then thread the end up though
hole C back of pulley D end up to the front of pulley E.
8.
Turn pulley E until the slot F is up as shorn in the figure. Now tith
the free end of the cord wind
clockwise; li turns around E, out
thrttigh
slot F, 1 turn around 0, back through slot F. and le turns around E.
7.
Bring the cord dorm back of
pulley H and leave it heng for the tlae

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Gs

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g ïTú>B pfn00,0)iO+ÓÓ<a:2Ulb:(2:9:9Lr:9Ú1,eNÓrn

Green Lead
Blue Lead
Red -Blue Lead
White Lead

...41===3m

m

BLACK
AFTER ILL BUTTONS HAVE BEEN SET-UP YOU MUST PLACE THE SMALL
SET-UP SWITCH BUTTON IN THE LEFT HAND POSITION (white dot showing) OTHERWISE THE ELECTRIC
OPERATE.
TUNER MICR WILL NOT
(See label on back of
enables
This re -connects the motor and
chassis just below this switch.)
selected stations by pushing the
proper
you to tune to any of the eight
button.
To use the 'Magic Keyboard' it Is only necessary to push the button
11.
for the station you desire.
12.
The Tragic Keyboard' push buttons may aleo be used on the Foreign
or Intermediate bands.
However, on these bends we recommend that, rather
than netting a button to a station, you set the button to some particular
location on the dial where foreign, police, aircraft or amateur stations
received.
are frequently
Attempts to set buttons to short-wave stations
are not recommended due to the extreme sharpness of tuning on these bands.
13.
Label each button with the call
letters of the
stations you have
selected, using the call letter tabs and the celluloid
covers packed with
your receiver.
The printed paper tab should be'Inserted in the button by
holding the ends and
flexing the tab slightly, allowing it to snap
into
The celluloid cover tab should be flexed In a similar manner and
place.
placed on top of the paper tab.

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REPLACING THE ROLLER
DIAL DRIVE CORD

451

4:

g

ó

Tie a tension spring, part number 113177, to one end of about 30' of
special dial cord part No. 111302.
Tie a large knot In the cord, Bi' from the tension spring.
2.
3.
Turn the range switch to the Short Wave position -- all the way countPulley A on the range switch shaft should be in the position
erclockwise.
shown in Fig. 2.
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ALIGNMENT EQUIPMENT & PROCEDURE
FOR ALIGNMENT:

erator

wit/. a

pointer to the last
mesh set the
condenser In full
With the gang
mark on the left end of the dial scale. If the pointer is Incorrectcord
neceseary to loosen the set screw on the dial
it Is only
with
the pointer prodrive drum and push the gang condenser to full mesh
perly set, then retighten the set screw.

An output meter and an accurately calibrated signal gentuning rant« from 465 KC to 20 MC. are required.

3

ly

Connect the output meter across the voice
cull or across the two
plates of the two 6V8-0 output tubes, d»pending on the type of meter.
(The more sensitive type should be connected across the voice coll.)

Connect the ground lead of the signal
generator to the '0' post on
chassis, or to the
the antenna
terminal strip at the rear or the
metal chassis.
The ground and douolst terminals on the antenna terminal strip must
be contested together throughout the alignment procedure.

2

set,

Turn the volume control to the mexlam volume position and keep it
in this position throughout the entire alignment procedure. IMPORTANT:- If the remote control unit is plugged In, be sure that its volume
control Is also in the maximum volume position.

4

- IMPORTANT -

THE FIRST PUSH-BUTTON ON THE LEFT, LABELLED "MANUAL'1MUST BE PUSHED IN WHEN
ALIGNING. FAILURE TO PUSH IN THIS BUTTON WILL MAKE CORRECT ALIGNMENT IMPOSSIBLE.
DUrr:y ANT.

IN SERIES

3IG.

GEN.

CONNECTION OF
SIG. GENE; ATOR
OUTPUT TO
RECEIVER

BAND SWITCH
POSITION

SIGNAL
buaC1ENE

(INPIC4TED

ATNCOR

BY

RCLLER DIAL)

RECEIVER
DIAL
SETTING
ANY POINT

1

MED.

CONDENSER

CONTROL GRID
OF 8L7-0 TUBE

BROADCAST
(CLOCKWISE)

465 KC.

WERE

IT

DOESNOT
THE
SIGNAL

400 0Iß1
C4RBON
RESISTOR

mere

NA

BROADCAST
(CLOCKWISE)

485 KC.

TERMINAL

ANY POINT
WHERE IT
DOES NOT
AFFECT THE

pA

TRIMMER

TRIMMERWITH

DESCRIPTION

-2
3- 4
I

TYPE OF ADJUSTMENT

2ND S.F.
ADJUST FOR MAXIMUM OUTPUT.
ADJUSTMENT.

THEN

REPEAT

1ST I.F.

5

SIGNAL.

ADJUST FOR MINIMUM OUTPUT USING A STRONG
GENERATOR

WAVE
TRAP

SIGNAL
400 OHM

ANTENNA
TERMINAL

CARBOONOR

BROADCAST
(CLOCKWISE)

1500 YC.

ANTENNABROADCAST
(=man)

400 OHM
CARBON
RESISTOR

1feC KC.

TERMINAL

1500 KC.

6

TUNE TO
1500 KC.
GENERATOR
SIGNAL

7
8

CARSIGNAL

TUNE TO

OHM

ANTENNA

400

RESISTOR

400 OHM
CARBON
RESISTOR

5CYr

TERMINAL

(CLOCKWISE)

8 MC.

ANTENNA
TERMINAL

400 OHM
CARBON

BROADCAST

KC.

INTERMEDIATE
(CENTER)

800 KC.

GENERATOR

INTERMEDIATE
IATE

MCNAL.

RESISTOR

20 MC.

(WINTER-CLOCKWISE)

20 MC.

CARBO,NN'OR

400

OHM

CARBON
RESISTOR

TO

e l-BI.ATOR

FOREIGN
TERMINAL

ANTENNA.
TERMINAL

FOREIGN
(COUNTERCLOCKWISE)

20 MC.

BROADCAST
R.

F.

ADJUST FOR MAXIMUM OUTPUT.
BROADCAST
ANTENNA
BROADCAST

(]

OSCILLA7'CA
(SERIES PAD)

7

ADJUST FOR MAXIMUM OUTPUT. TRY TO IN CREASE OUTPUT BY DETUNING TRIMER AND
NINo RECEIVER DIAL UNTIL IIhX1PUM
OUTPUT IS OBTAINED.

TY

MC.

SIGNAL

400 OHM

ADJUST FOR MAXIMUM OUTPUT.

FOR MAXIMUM
INTERMEDIATEADJUST
IF PROPER PEAK WAS

8

TUNE
8

ELTERMI

BROADCAST
OSCILLATOR

TUNE

20 MC°
GENERATOR
SIGNAL

(POLICE)
OSCILLATOR
(BRUNT)

10

II

INTERMEDIATE

12

INTERMEDIATE
ANTENNA

R. F.

FOREIGN

13

/

:

14

FR.EIGN
F.

15

FOREIGN
ANTENNA

OUTPUT. CHECK TO SNE
OBTAINED BY TUNING IN
IMAGE AT APPROX. 5.1 MC.
tIF URGE DOES
NOT APPEAR REALIGN AT 8 MC. WITH TRIMMER
SCREW FARTHER OUT.
RECHECK IMAGE.

n

o ;3$
00

ADJUST FOR MAXIMUM OUTPUT

ADJUST FOR MAXIMUM OUTPUT. CHECK TO SEE
IF PROPER PEAT( WAS OBTAINED BY TUNING IN
IMAGE
E DOES
NOT AAPAPEART PREALIG19AT 20 NCIFRESIS.WITHGTRI
TER SCREW FARTHER OUT.
RECHECK IMIAGE.

FOR MAXIMU
OUTPUT.I19^EftTO IN CREASE OUTPUT BYDETUNIMI
AND
RETUNING RECEIVER DIAL UNTIL MAXIMUM
OUTPUT IS OBTAINED.
TRADJUST

Px
n
1

i

n

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o
0

HB

R.F.

COIL

BROADCAST

OSCILLATOR COIL

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BROADCAST
ANTENNA COIL

INTERMEDIATE
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ANTENNA COIL

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MODELS 91-511 to 91-519
98-511 to 98-519
910-511 to 910-519
STEWART-WARNER CORP.

Voltage, Socket, Tuner, Drive Cord

HOW TO SET UP THE PUSH-BUTTON TUNER

1. Place the set in the desired position. On the rear of the cabinet, remove the screw holding the knob for the push button. Use a small screwdriver and only a slight pressure to remove the screw.

2. Insert the push button into the opening on the rear of the cabinet. Be sure the button is pushed all the way in.

3. Replace the knob and secure it with the screw. Be sure the knob is tight. Do not overtighten.

NOTE: Do not attempt to turn the knob until it is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight. Do not attempt to turn the knob until the button is tight.
MODELS 91-531 to 91-539
STEWART - WARNER CORP. Chassis 91-53

Schematic, Voltage, Socket, Tuner Switch, Coils

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Alignment, Trimmers

These chassis are 5-tube, two band, push-button tuning superheterodyne receivers. The tuning ranges are 540 to 1720 KC and 5.4 to 15.4 MC. The I.F. is 465 KC.

For Alignment: An output meter and an accurately calibrated signal generator with a tuning range from 468 KC to 14 MC are required.

1. Connect the output meter across the voice coil or between the plate of the 6K6-0 output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the black (ground) wire or the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the dial pointer in a horizontal position. If the pointer is incorrectly set, it is merely necessary to move the pointer to the correct position by hand, while holding the gang in the full mesh position.

<table>
<thead>
<tr>
<th>Dummy Ant.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 Mfd Condenser</td>
<td>Control Grid of 6AG-0 Tube</td>
<td>465 KC</td>
<td>Broadcast Button Pushed In</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output. Then Repeat Adjustment.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>465 KC</td>
<td>Broadcast Button Pushed In</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>3-4</td>
<td>1st I.F.</td>
<td></td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>1500 KC</td>
<td>Broadcast Button Pushed In</td>
<td>1500 KC</td>
<td>5</td>
<td>Wave Trap</td>
<td>Adjust for Minimum Output Using a Strong Generator Signal.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>1500 KC</td>
<td>Broadcast Button Pushed In</td>
<td>1500 KC</td>
<td>6</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust Trimmer to Bring in Signal.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>1500 KC</td>
<td>Broadcast Button Pushed In</td>
<td>1500 KC</td>
<td>7</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>600 KC</td>
<td>Broadcast Button Pushed In</td>
<td>600 KC</td>
<td>8</td>
<td>Broadcast Oscillator (Series Pad)</td>
<td>Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial Until Maximum Output is Obtained.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>14 MC</td>
<td>Foreign Button Pushed In</td>
<td>14 MC</td>
<td>9</td>
<td>Foreign Oscillator (Shunt)</td>
<td>Adjust to Bring in Signal. Check to See if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 Mc. If Image Does Not Appear Resolution at 14 MC, With Trimmer Screw farther Out. Recheck Image.</td>
</tr>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Lead (Blue Wire)</td>
<td>14 MC</td>
<td>Foreign Button Pushed In</td>
<td>14 MC</td>
<td>10</td>
<td>Foreign Antenna</td>
<td>Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial Until Maximum Output is Obtained.</td>
</tr>
</tbody>
</table>

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HOW TO SET UP THE PUSH-BUTTON TUNER

1. Be sure that the set is connected to a good antenna system.

2. Turn on the set and allow it to operate for at least one-half hour before setting up the push buttons.

3. Make a list of the five nearest stations to which you wish to be able to push buttons. Be sure to select near by stations, since weak signals will generally be accompanied by poor results. Also be sure to select stations which will take up the full range of the individual buttons, as shown in Fig. 1.

4. Each of the buttons on the Push-Button Tuner has a different position shown in Fig. 1; therefore it is imperative that you select a station which is in the operating range of a button before attempting to set up that button for the particular station. AS THE TRIMMER SCREWS SHOULD NEVER BE TOO LOOSELY OR TOO TIGHT.

5. By referring to Fig. 1, determine the trimmer associated with the button whose range you wish to change.

6. Unsolder the leads from the terminals on the back of this trimmer.

7. Remove the 6/20 machine screw holding the dual trimmer to the front of the chassis.

8. From the above list select a dual trimmer which will cover the desired range.

9. Mount it on the front of the chassis with the 6/20 machine screw, and solder the leads to its terminal.

The button is now ready to be set to any strong station whose frequency is within the range of this new trimmer. Be sure that the station is selected with its maximum power, and please make the volume as necessary.

HOW TO CHANGE THE OPERATING RANGE OF A BUTTON

The operating range of a button may be changed by merely changing the dual trimmer used with that button. Dual trimmers with the ranges indicated below can be obtained from your Stewart-Warner distributor, or directly from the Stewart-Warner Corporation, under the following part numbers:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Frequency Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>112922</td>
<td>Condenser - carbon, 200,000 pF, 2000 ohms</td>
<td>1100 to 1700 Kc</td>
<td>.25</td>
</tr>
<tr>
<td>112923</td>
<td>Condenser - carbon, 200,000 pF, 2000 ohms</td>
<td>700 to 1250 Kc</td>
<td>.30</td>
</tr>
<tr>
<td>112924</td>
<td>Condenser - carbon, 200,000 pF, 2000 ohms</td>
<td>550 to 1000 Kc</td>
<td>.50</td>
</tr>
</tbody>
</table>

For the 6/20 machine screw, use the same size and type as that used for the trimmer. This assures a positive connection and prevents the possibility of the trimmer being accidentally moved.

NOTES:

- Trimmer screws indicated by letter "a" are oscillator trimmers.
- Trimmer screws indicated by letter "b" are antenna trimmers.

In some instances it may be found necessary after the set has been tuned for a month or more, to readjust the push-button trimmers to compensate for the slight drift due to extreme climatic changes.
We can now supply replacement cones which can be installed without special tools or equipment as described under "INSTALLING NEW CONES." These cones have spades fastened to the outside of the voice coils. The speakers are mounted on the speaker shells by means of screws. The necessary holes are already punched in the shell. The wire leads are supplied complete with the necessary gaskets and mounting hardware under the part numbers in the table shown on page two of this bulletin.

(B) - SPEAKERS HAVING SPIRALS MOUNTED WITH SCREWS

The cones in these speakers can be replaced in the conventional manner as described later in this bulletin under "INSTALLING NEW CONES." The correct part numbers are tabulated below:

(C) - FIVE PRONG SPEAKERS WITH SPIRALS MOUNTED TO THE POLE PIECE

In order to facilitate the replacement of these cones, our 3 and 6 inch speakers with the spacers must be fastened to the center of the pole piece, we will furnish special cones which can be installed without any special tools or equipment as described under "INSTALLING NEW CONES." These cones have spades fastened to the outside of the voice coils.

In these speakers may be satisfactorily repaired without special equipment and therefore must be returned to the factory for repair. If the cone is damaged or if the speaker is not in the warranty the cost of replacing the cone will be the price of the same plus a fifty cent labor charge. We will assume no transportation charges under these conditions.

INSTRUCTIONS FOR INSTALLING NEW CONES

1. In the 6X4A, 8X200 and 8X204 speakers, place the new voice coil so that the spider mesh and the other speaker plane the small brackets, part Wo. 89028, over the speaker mounting bracket with the ends in the slits in the shell, and place the mounting screws through the holes in the shell and screw them into the brackets. Leave the screws loose.

2. Insert three or four thin shims in the inside air gap to keep the voice coil centered.

3. Firmly press down the spider mesh against the voice coil and then tighten down the power transformer mounting screws, and then remove the thin shims from the air gap.

4. Set the replacement cone in place with the voice coil in the air gap. Make sure that the cones in the speaker mounting line up with the holes in the speaker shell.

(a) In the 8X4A, 8X200 and 8X204 speakers, place the small spool bearings between the spider and the other speaker. Tie down the power transformer and the other speaker to the small brackets, part Wo. 89028, over the speaker mounting bracket with the ends in the slits in the shell, and place the mounting screws through the holes in the shell and screw them into the brackets. Leave the screws loose.

(b) In other speakers place the small brackets, part No. 89250, over the speaker mounting bracket with the ends in the slits in the shell, and place the mounting screws through the holes in the shell and screw them into the brackets. Leave the screws loose.

5. Tighten down the power transformer mounting screws, and then remove the thin shims from the air gap.

6. Make sure that the voice coil is centered by pressing it on the cone with the outer edge and listening for evidence of rubbing. If the voice coil is not centered it does not matter.

7. Tighten the speaker mounting screws, and then remove the thin shims from the air gap.

8. Seat the replacement cone in place with the voice coil in the air gap. Make sure that the cones in the speaker mounting line up with the holes in the speaker shell.

1. In the 6X4A, 8X200 and 8X204 speakers, place the new voice coil so that the spider mesh and the other speaker plane the small brackets, part Wo. 89028, over the speaker mounting bracket with the ends in the slits in the shell, and place the mounting screws through the holes in the shell and screw them into the brackets. Leave the screws loose.

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7. Tighten the speaker mounting screws, and then remove the thin shims from the air gap.

8. Seat the replacement cone in place with the voice coil in the air gap. Make sure that the cones in the speaker mounting line up with the holes in the speaker shell.
### Alignment

#### Accessories
- **Antenna**: Lead, carbon resistor (blue wire), 400 ohm, 14 me, foreign button in.
- **Switch**: Control grid of 6AB-6 tube.
- **Antenna Lead**: Carbon resistor (blue wire), 400 ohm, 600 ohm.
- **Button Switch**: Assembly for variable gang.
- **Condenser**: 400-621 to 91-629.
- **Resistor**: 10,000 ohms.
- **Carbon Tube**: Ceramic.
- **Receptacle**: 1/4 watt.
- **Cable**: Tab, clip, screw.
- **Escutcheon**: Plate, shield.
- **Light Shield**: Plate and dial scale.
- **Drive Cord**: For pilot.
- **Dial**: Scale.
- **Speech**: Station.
- **Hex Head (Self-tapping)**: Per pt.
- **Paper**: For back.
- **Gang Connection**: Full mesh.
- **Dial Pointer**: Correctly set.
- **Volume Control**: Maximum volume.

#### Table

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kit</td>
</tr>
<tr>
<td>2</td>
<td>3/8</td>
</tr>
<tr>
<td>3</td>
<td>006</td>
</tr>
<tr>
<td>4</td>
<td>260</td>
</tr>
<tr>
<td>5</td>
<td>1/8</td>
</tr>
<tr>
<td>6</td>
<td>008</td>
</tr>
<tr>
<td>7</td>
<td>001</td>
</tr>
<tr>
<td>8</td>
<td>003</td>
</tr>
<tr>
<td>9</td>
<td>004</td>
</tr>
<tr>
<td>10</td>
<td>005</td>
</tr>
</tbody>
</table>

#### Diagrams
- **Bottom View**
- **Top View**

---

**Notes:**
- With the gang connection in full mesh, set the dial pointer in a horizontal position. If the pointer is incorrectly set, it is merely necessary to move the pointer to the correct position by hand, while holding the gang in the full mesh position.
- Connect the output meter across the voice coil or between the plate of the 665-4 output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
- Connect the ground lead of the signal generator to the black (ground) wire or the chassis.
- Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

---

**Alignment Problem:**
- Adjust for maximum output.
- Try to increase output by setting trimmer and retuning receiver dial until maximum output is obtained.
INTERMEDIATE FREQUENCY
465 KC.

NOTE:
TERMINALS OF COILS SHOWN IN
THE PICTORIAL VIEWS BELOW ARE
LETTERED TO CORRESPOND TO
SIMILARLY LETTERED TERMINALS
ON THE CIRCUIT DIAGRAM ABOVE.
TERMINALS WHICH ARE CONNECTED
TOGETHER CARRY THE SAME
LETTER.

DIAGRAM
PART NUMBER
1-2 RS0589-Condenser - mica 250 mfd. ---- .20
8 RS0486-Switch- "Pono Radio" D.F.D.T. .50
9 RS0581-Condenser - mica 81 mfd. ---- .15
5-6 BE066-Condenser - paper .06 mfd. 400 V. .25
7-8 BE053-Condenser - paper .01 mfd. 400 V. .28
10 RS054-Switch - tone control. .90
11 BE119-Condenser - paper .05 mfd. 200 V. .25
12 BE153-Condenser - W.W. 270 ohm [100 ohm] .15
13-14 BE026-Condenser - paper .02 mfd. 600 V. .30
15-16 RS0582-Condenser - carb. 470000 ohm ---- .12

The triode section of the 6Q7G tube utilizes a circuit arrangement which gives a
minimum of distortion and excellent gain with zero bias on the grid. At high
signal levels, this circuit gives less distortion than if the tube is operated with
a fixed bias. The proper operation of this circuit depends largely on the
high resistance of the grid resistor, No. 24 in the circuit diagram. This resistor
is rated at 10 megohms. Do not substitute any lower value since this would in-
crease distortion and decrease amplification.

November 15, 1938
For alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 KC. to 1600 KC. are required.

1. Connect the output meter across the voice coil or between the plate of either of the 6KG tubes and ground through a 1 mfd. condenser. (These tubes should be connected in parallel, not in series.) The coupling will depend upon the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the generator to the chassis of the receiver and keep it connected in this manner throughout the entire alignment procedure.

3. Turn the volume control to the maximum volume position and leave it in this position throughout the entire alignment procedure.

4. With the condenser in full mesh, set the pointer to the last mark on the left end of the dial scale. If the pointer is only slightly off calibration, loosen the set screw in the pointer card drive drum, which is the outer drum on the left hand side of the gang condenser, and with the condenser in full mesh turn the drum until the pointer is in the correct position. If it is more, turn off the dial divisions by rotating the pointer drive drum by sliding the clip on the pointer. Then slide the pointer along the cord until it is set on the last division on the left end of the dial scale. If the gang condenser is still fully meshed, then tighten the pointer clip being careful not to cut the cord. Place a drop of household or speaker cement on the cord and pointer clip to prevent the pointer from slipping.

5. Set an antenna system. Keep the receiver in the cabinet for testing, the set will not operate unless the proper connections are made at the phonograph terminal strip. The two outside terminals must be connected together and the center terminal must be grounded to the chassis.

The connections to the phonograph unit are made at the terminal strip located on the back of the radio chassis. IMPORTANT: If the receiver chassis is removed from the cabinet for testing, must put a jumper wire between the two outside terminals of this terminal strip. Also the center terminal must be grounded to the chassis.

HOW TO SET-UP AND USE THE PUSH BUTTON TUNER.

1. Connect receiver to good antenna system.

2. Remove escutcheon surrounding push buttons.

3. Select five nearby stations to which you wish to set up the buttons. Be sure to select strong, powerful stations, since weak signals will generally give better results when tuned manually. Any button may be used for a station on any part of the dial.

4. Loosen the screw at the side of the push button shaft (about one turn counter-clockwise will be sufficient).

5. Keep the screwdriver inserted in the screw slot and push against the screw. At the same time tune the station using the tuning knobs. YOU MUST PUSm AGAINST THE SCREW DRIVER DURING THE ENTIRE TIME THAT YOU ARE TUNING. Be sure that you tune in the station to the point where the program is heard with the least hiss and croaking tone, and not to the point of greatest volume.

6. Now, still pushing against the screw driver, retighten the screw, turning it to the right (clockwise) until it is REASONABLY TIGHT. To turn further may result in damage to the mechanism.

7. The set up for this button is now complete. Set up the remaining buttons in the same manner and replace the escutcheon.

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PHONOGRAPh CONNECTIONS

This receiver is equipped with a phonograph turntable and a crystal pickup unit for phonograph operation. The crystal pickup unit is switched into the audio amplifier circuit of the radio by means of a double-pole double-throw switch attached to the turntable. With this switch in the phonograph position (marked P) the receiver volume control is disconnected from the low side of the 2nd I.F. transformer and connected across the crystal pickup unit. The radio frequency section of the receiver is at the same time silenced by the opening of the cathodes of the 6AG6 and 6X7 tubes.

The connections to the phonograph unit are made at the terminal strip located on the back of the radio chassis. IMPORTANT: If the receiver chassis is removed from the cabinet for test, you must put a jumper wire between the two outside terminals of this terminal strip. Also the center terminal must be grounded to the chassis.

HOW TO SET UP AND USE THE PUSH BUTTON TUNER

1. Connect receiver to good antenna system and operate for fifteen minutes, then remove escutcheon surrounding push buttons.
2. Select five nearby stations to which you wish to set up the buttons. Be sure to select nearby, powerful stations, since weak signals will generally give better results when tuned manually. Any button may be used for a station on any part of the dial.
3. Loosen the screw at the side of the push button shaft (about one turn counterclockwise will be sufficient). Keep the screwdriver inserted in the screw slot and push against the screw. At the same time carefully turn in the screwdriver using the tuning knob. YOU MUST PUSn AGAINST THE SCREW DRIVER DURING THE ENTIRE TIME THAT YOU ARE TUNING. Now, still pushing against the screw driver, retighten the screw, turning it to the right (clockwise) until it is REASONABLY TIGHT. To turn further may result in damage to the mechanism.
4. The setup for this button is now complete. Set up the remaining buttons in the same manner and replace the escutcheons.

©John F. Rider, Publisher
These are 8 tube, three band, push button tuning superheterodyne receivers. The tuning ranges are 526 to 1780 MC; 1.7 to 5.8 MC, and 5.3 to 18.1 MC.

Incorporated in each receiver is a special selector stage which operates in Manual Tuning for the broadcast band. When the band switch is in the automatic position the selector stage is in operation and the broadcast detector coil is connected to the grid of the 8170 tube. To select another band, it is necessary to lift the selector inverter switch. The broadcast detector coil is disconnected from the circuit when the band switch is in the automatic position.
**ALIGNMENT EQUIPMENT & PROCEDURE**

1. Connect the output meter to the output of the receiver, with a coupling meter to the output of the signal generator. The coupling meter should be able to measure from 0 to 100 feet, with an accuracy of ±1%. The sensitivity should be set to the maximum sensitivity. The coupling between the signal generator and the receiver should be adjusted so that the coupling meter shows a reading of 0.01 to 0.02. The coupling meter should be kept in this position throughout the entire alignment procedure.

2. Connect the ground lead of the signal generator to the chassis of the receiver.

3. With the gain control in full peak set the pointer on the last scale division on the high frequency end of the dial. This may be accomplished by releasing the clip on the pointer slider, where it attaches to the dial cord.

4. **IMPORTANT:** THE BROADCAST BAND MUST BE ALIGNED AFTER THE SHORT-WAVE BAND.

<table>
<thead>
<tr>
<th>DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR</th>
<th>CONNECTION OF BIG 676 OHM RESISTOR</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>RECEIVER DIAL SETTING</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MF CAPACITOR</td>
<td>CONTROL GRID OF 6L7G TUBE</td>
<td>465 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>1ST I.F.</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>465 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>3-4</td>
<td>2ND I.F.</td>
<td>ADJUST FOR MINIMUM OUTPUT USING A STRONG GENERATOR SIGNAL.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>465 KC.</td>
<td>SHORT WAVE (COUNTER-CLOCKWISE)</td>
<td>5</td>
<td>WAVE TRAP</td>
<td>ADJUST TO BRING IN SIGNAL. CHECK TO SEE IF PEAK WAVE WAS OBTAINED BY TUNING IN IMAGE AT APPROX. 16.1 KC. IF IMAGE DOES NOT APPEAR REALIGN AT 16.1 KC. WITH TRIMMER SCREW FARTHER OUT. RECHECK IMAGE.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>1500 KC.</td>
<td>TUNE TO 1500 KC. GENERATOR SIGNAL</td>
<td>7</td>
<td>SHORT WAVE ANTENNA</td>
<td>ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY DETUNING TRIMMER AND ROTATING RECEIVER DIAL UNTIL MAXIMUM OUTPUT IS OBTAINED.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>5.0 MC.</td>
<td>POLICE</td>
<td>8</td>
<td>POLICE OSCILLATOR</td>
<td>ADJUST FOR MAXIMUM OUTPUT. CHECK TO SEE IF PEAK WAVE WAS OBTAINED BY TUNING IN IMAGE AT APPROX. 4.1 KC. IF IMAGE DOES NOT APPEAR REALIGN AT 5.0 KC. WITH TRIMMER SCREW FARTHER OUT. RECHECK IMAGE.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>5.0 MC.</td>
<td>POLICE</td>
<td>9</td>
<td>POLICE ANTENNA</td>
<td>ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY DETUNING TRIMMER AND ROTATING RECEIVER DIAL UNTIL MAXIMUM OUTPUT IS OBTAINED.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>1500 KC.</td>
<td>BROADCAST (MANUAL TUNING)</td>
<td>10</td>
<td>BROADCAST OSCILLATOR (Shunt)</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>1500 KC.</td>
<td>BROADCAST (MANUAL TUNING)</td>
<td>11</td>
<td>ANTENNA</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA TERMINAL</td>
<td>600 KC.</td>
<td>BROADCAST (MANUAL TUNING)</td>
<td>13</td>
<td>BROADCAST OSCILLATOR (Series Pad)</td>
<td>ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY DETUNING TRIMMER AND ROTATING RECEIVER DIAL UNTIL MAXIMUM OUTPUT IS OBTAINED.</td>
</tr>
</tbody>
</table>

HOW TO REPLACE THE DIAL CORD

Before attempting to replace the dial cord, fully mesh the gang condenser. The holes in drum A should be in the top position as shown in the diagram above.

HOW TO SET UP THE PUSH-BUTTON TUNER

1. Be sure that your set is connected to the customer's antenna and that the push button trimmer is set-up using the light- check method (see Fig. 1). Note that the antenna switch is incorrect.

2. Turn the set on and adjust the trimmer so that it is set at one-quarter hour before setting up the push buttons.

3. Make a list of six nearby stations to which you wish to set up your tuner. Choose nearby powerful stations. (Note: In Fig. 1, a correct setting for the trimmer is shown. If the setting is incorrect, be sure to check your receiver's trimmer adjustment before setting up the push buttons.)

4. Turn the trimmer to the correct position for the push button.

5. In some cases, it may be necessary to set up the push button trimmer for a month or more, to reset the trimmer as it may drift due to exposure to temperature changes.

6. If you need to adjust the trimmer for the push buttons, set the trimmer to a position that is closer to the correct position.

7. Push in button No. 3 and turn your volume control to the maximum clockwise position.
STEWART-WARNER CORP.

MODELS 91-811 to 91-819
Chassis 91-81
98-811 to 98-819
Chassis 98-81
910-811 to 910-819
Chassis 910-819

Tuner Data,
Drive Cord Data

CHASSIS MODEL USED IN RECEIVER MODELS VOLTAGE FREQUENCY
91-81 - 117, 60 cycles
98-811 - 910-811 to 98-819
98-819 - 117, 60 cycles
910-811 - 22,5 Cycles
910-819 - 100-240 - 50-133

These chassis are 8 tube, band, push button tuning superhetedodine receivers. The tuning ranges are 530 to 1700 KC. 2.2 to 7.0 MC and 6.8 to 22.5 MC.

Incorporated in each chassis is an eight button tuner switch. The first two buttons on the left are tone controls. Four different tone qualities may be imparted by changing these positions. The remaining six buttons are used for automatic tuning. Automatic tuning is accomplished by pushing sub-setting preset trimmers for the variable gang condenser. The push-button switch provides a simple rapid method of effecting this substitution.

It should be noted that the R.F. stage in this receiver operates only on "Intermediate" and "Foreign" positions. The R.F. stage is not pulled.

A feature of this set is the special push-pull output stage. Instead of using a push-pull input transformer or a separate phase inverter tube the phase inversion is accomplished as follows. One of the 6G5 output tubes has a 3,200 ohm load resistor in its screen circuit across which is built up an audio signal. The audio frequency is applied to the various plates of the phase inverter. This phase inverted voltage obtained across the screen resistor is now applied to the grid of the output tube in this push-pull output combination. Note. It can be readily seen from the above explanation that if the 6G5 output tube, from which the phase inversion voltage is obtained, is removed from the set or becomes defective, it will be impossible for any signal to be heard in the speaker.

HOW TO SET UP THE PUSH-BUTTON TUNER

1. Be sure that the customer has an adequate antenna system and that the push button trimmers are set-up using this antenna (not the chassis in the service shop) otherwise the antenna trimmer will be incorrectly aligned.

2. Turn on the set and allow it to operate at least one quarter-hour before setting the button trimmers.

3. Make a list of the frequencies, of six nearby stations to which you wish to set-up the set. Be sure to select nearby, powerful stations, since weak signals will generally give poor results. Also BE SURE TO SELECT STATIONS FALLING WITHIN THE TUNING RANGE OF THE INDIVIDUAL BUTTONS as indicated in Fig. 1.

4. Each of the buttons on your Push Button Tuner has a defined operating range, shown in Fig. 1. Therefore, if you select a station whose frequency is in the operating range of a button before attempting to set the button trimmers for the particular station.

5. The ADJUSTING SCREWS SHOULD NEVER BE TOO LOOSELY SET OR TOO TIGHTLY ADJUSTED. IT IS IMPORTANT THAT THE PROPER BUTTON BE SELECTED. The frequencies of your local stations may be obtained from your newspaper or radio call magazine. For each station you want to set to a button station to WLW whose frequency is 760 kilocycles. Refer to Fig. 1, which shows that this frequency falls with the operating range of button No. 3 or No. 4, whose range is 530 to 1000 KC. Therefore either button No. 3 or No. 4 can be used for the automatic tuning of WLW.

It should be noted that whenever it is possible to use two different ranges, to set a given station the correct button to use will be the one within which the trimmer screws are not too loosely set. "Drifting" is a direct result of improperly set-up trimmer screws, therefore such settings of trimmer screws should be avoided if possible.

6. Remove the escutcheon around the push-button by taking out the six screws holding it to the cabinet. This will expose to view twelve adjusting screws. These screws are used to tune buttons to the correct station. The trimmers associated with each button are shown in Figure 1.

7. Turn the band switch control (right hand knob) clockwise until the BROADCAST SCALE appears on the roller dial. Then use the tuning knob control (left hand knob) to tune the station you wish to set to button No. 3. This is done so that you may identify the station by hearing its program.

8. Now turn the band switch knob to the extreme clockwise position (The words "MAGIC" or "FREQUENCY" positions is the position). The trimmer screws used to tune the roller dial are now appear in the dial scale opening. You will note when this switch is turned the station tuned in will not be heard.

9. Now usual the third button from the left (No. 3 in Fig. 1). Using a small screw driver insert it in the second screw from the left (No. 3a in Fig. 1). Rotate the screw SLOWLY until the program that you have previously tuned on button No. 3 is heard. In it cannot be heard advance the volume control. BE SURE THAT YOU ADJUST THIS POSITION TO A POINT BY PROPERLY SETTING THE BUTTON TRIMMERS FOR THIS STATION.

10. Next insert the screwdriver in the first screw on the left (No. 3b Fig. 1) and turn it until the program is received with maximum volume. The correct position in which the tuned station is to be changed closer together. Now go back to screw No. 3a and see if any im-

progressions in the reception can be made by adjusting it. Also repeat this operation for screw No. 3b.

11. Set up button No. 4 for the selected station in a similar manner, using screws No. 4a and 4b, and proceed to set the remaining buttons in the same manner, always tuning in the station initially with the 'a' screw for that particular button.

12. 10. Each button with the call letters of the station you have selected using the call letters tabs and celluloid covers placed over your receiver. The printed paper tab should be inserted in the button by holding the epdm and flexing them slightly and then allowing the tab to snap into place. The celluloid covers should be flexed in a similar manner and placed over the paper tab.

HOW TO CHANGE THE OPERATING RANGE OF A BUTTON

The operating range of a button may be changed by merely changing the dual trimmer used with that button. Dual trimmers, with the ranges indicated below, can be obtained from your Stewart-Warner distributor, directly from the Stewart-Warner Corporation, under the following parts numbers:

Part Number 112942 1100 Tuning Range 910-819 to 910-819 List Price $8.25
112943 910-819 to 1730 KC 4.50
112944 1170 to 1730 KC 1730

To make the change proceed as follows:

1. Remove the chassis from the cabinet.

2. By referring to Fig. 1, determine the dual trimmer associated with the button whose range you wish to change.

3. Unsolder the leads from the four terminals on the back of this dual trimmer.

4. Remove the 6:32 machine screw holding the dual trimmer to the front of the chassis.

5. From the above list select a dual trimmer which will cover the desired range.

6. Mount it on the front of the chassis with the 6:32 machine screw, and solder the leads to its four terminals.

The button is now ready to be set to any strong station whose frequency is within the range of this new trimmer.

REPLACING THE ROLLER DIAL DRIVE CORD

1. Tie a tension spring, part number 113177, to one end of about 30" of special dial cord part No. 113102.

2. Tie a large knot in the cord, 6 1/2" from the tension spring.

3. Make the range switch to the Short Wave position—all the way counter-clockwise. Pulley A on the range switch shaft should be in the position shown in Fig. 2.

4. Place the knot on the cord in slot B.

5. With the long free end of the cord (not the end with the spring attached) take 1/2 turns clockwise around pulley D and close to the front of pulley E.

6. Place the cord back down pulley H and leave it hang for the time being.

8. With the end of the cord to which the tension spring is attached, take 1/2 turns counter clockwise around pulley A (when viewed from the right end) and bring the cord up through hole C back of pulley D and up to the front of pulley E.

9. Tie the free end of the cord hanging over pulley H, to the upper end of the tension spring.

The spring should be extended so it is approximately 1 1/2" long when the tension in the cord system is equalized.

If the Short Wave scale on the dial is not in the proper position under the pointer, loosen the set screw in hub G, rotate the roller dial to the proper position and tighten the set screw.

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MODELS 91-811 to 91-819
98-811 to 98-819
910-811 to 910-819

STEWART-WARNER CORP.

Schematic, Voltage, Socket Tuner Switch, Coils

BROADCAST ANTENNA COIL
113295
BROADCAST R.F. COIL
113296
BROADCAST OSCILLATOR COIL
113297
INTERMEDIATE ANTENNA COIL
113298

INTERMEDIATE OSCILLATOR COIL
113299
FOREIGN ANTENNA COIL
113301
FOREIGN OSCILLATOR COIL
113302

ANTENNA GROUNDED

INTERMEDIATE ANTENNA COIL

SOCKET VOLTAGES

6K6G OUTPUT
260 250
6Q7G OUTPUT
250 10
2ND DET.-AF.-AF.
130 microV
6K7 1ST DET.
170
6A8G 1ST DET.
170
5Y3G RECTIFIER
120

NOTE A: The bias for the control grids of the 6A8.G, 6K7 R.F., 6K7 I.F., 6US and the diode plates of the 6Q7-G tubes is -3 volts measured across resistor 55B.

NOTE B: The bias for the control grid of the triode section of the 6Q7-G tube is -5 volts measured across resistors 55B and 55C.

©John F. Rider, Publisher
Schematic/Voltage
Socket, Tuner Switch

ELECTRICAL PARTS

85A -658-65C 113959 --Coll
49A 114611
114297 ----Escutcheon
32-33-34 110554--Resistor
13-14-15 89030--Condenser
60A-608
59A
57A-578
55A

SPECIAL OCCL. SOCKET
DO NOT USE THIS SOCKET SHORT CIRCUIT COIL TO CONDUCTIVE SURFACE. USE THIS SOCKET ONLY WITH WATER TIGHT EQUIPMENT.

PARTS

6411965 RECI

SOCKET VOLTAGES

PHONO. PUSH BUTTON IN OUT POSITION

MODELS 91-82, 98-82
AND 910-82 CHASSIS

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Alignment Equipment & Procedure

Alignment equipment is required to maintain the desired performance of the receiver. The following alignment equipment is recommended:

1. Test signal generator with a frequency range of 600 to 10,800 kc.
2. Signal generator with a frequency range of 600 to 10,800 kc.
3. Signal generator with a frequency range of 600 to 10,800 kc.
4. Signal generator with a frequency range of 600 to 10,800 kc.
5. Signal generator with a frequency range of 600 to 10,800 kc.

Alignment Procedure

1. Connect the test signal generator to the receiver's input terminals.
2. Tune the receiver to the desired frequency range.
3. Adjust the volume control to the desired level.
4. Adjust the tuning control to the desired position.
5. Adjust the receiver's output to the desired level.

Alignment Procedure

1. Connect the test signal generator to the receiver's input terminals.
2. Tune the receiver to the desired frequency range.
3. Adjust the volume control to the desired level.
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5. Adjust the receiver's output to the desired level.

Alignment Procedure

1. Connect the test signal generator to the receiver's input terminals.
2. Tune the receiver to the desired frequency range.
3. Adjust the volume control to the desired level.
4. Adjust the tuning control to the desired position.
5. Adjust the receiver's output to the desired level.
This chassis is a 5 tube, single band push-button tuning superheterodyne receiver. It is designed for operation on either alternating or direct current, and incorporates an L-49-B ballast resistor tube. The tuning range of this receiver is 440 to 1500 KC. The intermediate frequency is 465 KC.

Incorporated in each chassis is a four-button mechanical push-button tuner unit. These push buttons may be set to any station desired by the method described below under "How To Set Up The Push-Button Tuner".

The accuracy of tuning when using the push-button tuner, depends to a large extent upon the amount of "play" in the moving parts of this system. In cases where slight inaccuracy in tuning occurs check the following points:

1. Check to see that the button is correctly set to the station. If not, reset the button.
2. The tension must be maintained between the two sections of the anti back-lash gear on the left side of the unit in order that it functions properly—both anti back-lash springs must be in place in the gear and compressed slightly.
3. Note the small adjusting lug over the push-button shafts at the point where they slide into the tuner. The lug is held in place by a hex-head screw. These lugs should be adjusted for a minimum amount of "play". In other words the push-button shaft must have a minimum of movement in a vertical direction.

**FOR ALIGNMENT:** An output meter and an accurately calibrated signal generator with a tuning range from 465 KC to 1500 KC are required.

1. Connect the output meter across the voice coil or between the plate of the 2SL6-G output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the chassis of the receiver through a .1 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as one side of the power line may be grounded in the signal generator.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
4. With the gang condenser in full mesh, set the pointer to the last mark on the right end of the dial scale. If the pointer is only slightly off calibration, loosen the set-screw in the dial drive drum at the left side of the gang condenser and set the pointer to the last mark on the right end of the dial when the gang condenser is in full mesh. If the pointer is off calibration several dial divisions, release it from the pointer drive and by upgpring the clip on the pointer. Then slide the pointer along the cord until it is set to the last dial division on the right end of the dial. Holding it in place check to see if the gang condenser is in full mesh, and tighten the pointer clip, being careful not to cut the cord. Place a drop of household or speaker cement on the cord and pointer clip to prevent the pointer from slipping.

---

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Tumor MODELS

1VDDELS

FIRMLY

RE -TIGHTEN THE SCREW

7.

set-up

WARNING:

6.

and not to the point

5.

way

firmly and then using

set

2.

should

with your receiver. The individual call letter tab

proper call letters. The call letter sheets are supplied

the

strong nearby stations

the

knob until the station you desire

4.

Holding

3.

Proceed to set-up the next button by pushing down

the button firmly and tuning in the desired station,

using the tuning knob. The rest of the buttons should

be set-up in a similar manner.

9.

After all

of the buttons have been set-up 

YOU MUST RETIGHTEN SCREW IN THE TUNING KNOB;

OTHERWISE ALL

SETTING OF THE KNOBS WILL BE DESTROYED;

GRASP THE KNOB

FIRMLY AND THEN USE A SCREW DRIVER OR A COIN TO

TIGHTEN THE SCREW SECURELY.

SET-UP SCREW

PUSH-BUTTON

ON-OFF SWITCH & VOLUME CONTROL

5.

Push down any one of the four buttons that you wish

to set to a station. Be sure to push the button all the

way down, otherwise the setting will be incorrect.

3.

9.

10.

of the buttons have been set-up 

YOU MUST RE-TIGHTEN SCREW IN THE TUNING KNOB;

OTHERWISE ALL

SETTING OF THE KNOBS WILL BE DESTROYED;

GRASP THE KNOB

FIRMLY AND THEN USE A SCREW DRIVER OR A COIN TO

TIGHTEN THE SCREW SECURELY.

PUSH-BUTTON TUNER.

1.

Be sure that your set is connected to a good antenna

system.

2.

Turn on the set and allow it to operate at least one-

quarter hour before setting up the push buttons.

3.

Select the four stations near to which you wish to

set to. Be sure to select nearby powerful stations,

since weak signals will generally give poor results.

Any button may be set to any desired station.

Stewart Warner Corp.

Model 97-561 to 97-559

97-561S to 97-563S

Tuner Date:

Models: 97-571 to 97-573

Tuner Details

Chassis: 97-56, 97-565 and 97-57

The large tuning knob at the side of your set has a

screw located in the center. Grasp this tuning knob

firmly and then using a screwdriver or a coin turn the

screw counter-clockwise not more than two whole turns.

(When viewed from the side of the cabinet.)

4.

Insert Call Letter Tab Here

5.

Set-Up Screw

6.

Turn on the set and allow it to operate at least one-

quarter hour before setting up the push buttons.

7.

Select the four stations near to which you wish to

set to. Be sure to select nearby powerful stations,

since weak signals will generally give poor results.

Any button may be set to any desired station.

A-C OPERATION

When the set is used on alternating current, all D-C

potentials are supplied by a 25K60 rectifier tube and its

associated filter circuits. The tube is connected for

half-wave rectification of the A-C supply.

If any hum is noticed when the set is used on A-C,

reversing the power plug in the receptacle will sometimes

reduce the hum level. When the set has not been used for

some time, or the filter condensers have been replaced,

a slight hum may be audible when the set is first put

on. This hum may not clear up immediately upon reversal

of the power plug. However, it will probably be elimi-
nated after approximately five minutes operation. This

hum is caused by air in the air condenser after phos-

derection of the electrolytic capacitors in the filter

system will have reformed.

D-C OPERATION

When the set is used on direct current, all D-C

potentials are supplied by a 25K60 rectifier tube and its

associated filter circuits. The tube is connected for

half-wave rectification of the A-C supply.

If any hum is noticed when the set is used on A-C,

reversing the power plug in the receptacle will sometimes

reduce the hum level. When the set has not been used for

some time, or the filter condensers have been replaced,

a slight hum may be audible when the set is first put

on. This hum may not clear up immediately upon reversal

of the power plug. However, it will probably be elimi-
nated after approximately five minutes operation. This

hum is caused by air in the air condenser after phos-

derection of the electrolytic capacitors in the filter

system will have reformed.

I.F. TRANSFORMER & REGENERATION CONTROL

This 97-56-8 chassis employs only one intermediate

frequency transformer, the windings of which are compar-
ably coupled. The two transformers, the primary and sec-
ondary of this transformer are mounted on the

transformer assembly, and are accessible from the rear

of the chassis. Also associated with this intermediate

frequency transformer is an additional trimmer con-
denser, which is accessible through a hole in the rear of

the chassis. This condenser is used to feed back a por-
tion of the intermediate frequency signal appearing in

the plate circuit of the 6J7-G tube. This signal is intro-

duced into the 6J7-G grid circuit through a coupling

circuit, which is a part of the secondary of this trans-
former. This regeneration increases the amplifi-

cation and selectivity obtainable from the intermediate

frequency transformer, and makes the performance of this

set comparable to that which is obtained from a set employ-

ing an additional I.F. transformer.

When aligning the intermediate frequency amplifier,

the output of the signal generator is set at 455 KC and is

coupled to the grid of the 6A6-G tube in the customary

manner. The primary and secondary windings are tuned by

turning of the trimmer, which is mounted on the left

(outer) edge of the chassis, and the winding is next coupled
to the antenna lead, and Trimmer Nos. 3 and 4 are adjusted
to give a maximum output of a generator frequency of 1500 KC.

This regeneration increases the amplification and

selectivity obtainable from the intermediate frequency

transformer, and makes the performance of this set comparable
to that which is obtained from a set employing an additional I.F.

transformer.

Adjustment of Regeneration Control.

If distant stations come in with insufficient vol-

ume: Through the opening near the bottom of the con-

tiner of the back of the cabinet; you will see an adjusting

screw. Using a non-metallic instrument (a piece

of wood whittled in the shape of a screw driver or a coin

will serve the purpose), turn this screw clockwise or coun-

ter-clockwise until the sound is of the desired quality.

If the receiver howls or squeals: Using the same

screw mentioned above and a non-metallic instrument (a piece

of wood whittled in the shape of a screw driver or a coin

will serve the purpose), turn the screw clockwise very,

very slightly until the squeal or howl ceases.
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 465 KC to 1500 KC are required.

1. Connect the output meter across the voice coil or between the plate of the 25L6-G output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .1 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as one side of the power line may be grounded in the signal generator.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the indicator to the last mark on the top end of the dial scale. If the pointer is only slightly off calibration, it may be possible to slip the dial drum just enough to correct for this slight mis-calibration. If the dial is several divisions off calibration, loosen the set screw on the condenser shaft. Then grasp the end of the tuning shaft and turn the dial until the last division of the scale is directly under the indicator, when the gang is in full mesh. Then retighten the set-screw.

TO CALIBRATE THE DIAL: — Remove the chassis from the cabinet and set it on a flat surface (insulated from ground). Release the set screw in the collar which connects the gang condenser shaft with the tuning unit. Holding the gang in full mesh turn the dial until the last dial division (just below 65) on the low frequency end is exactly 4 3/8 inch above the table surface. Now retighten the set screw in the coupler collar. The 4 3/8 inch division on the ruler (when measured vertically from table surface) is to be used as the dial indicator for all calibrations and alignment.

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<th>RECEIVER DIAL SETTING</th>
<th>TRIPPER NUMBER</th>
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<th>TYPE OF ADJUSTMENT</th>
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<td>CONTROL GRID OF 6AB-9 TUBE</td>
<td>465 KC</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
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<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT. IF OSCILLATION OCCURS TURN REGENERATION CONTROL TRIMMER 5/16 QUARTER TURN</td>
</tr>
<tr>
<td>200 MFD. CONDENSER</td>
<td>ANTENNA LEAD (BLUE WIRE)</td>
<td>1500 KC</td>
<td>+ 1500 KC</td>
<td>3</td>
<td>BROADCAST OSCILLATOR (SHUNT)</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>200 MFD. CONDENSER</td>
<td>ANTENNA LEAD (BLUE WIRE)</td>
<td>1500 KC</td>
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<td>4</td>
<td>BROADCAST OSCILLATOR (SHUNT)</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>(#54) CONDENSER</td>
<td>CONTROL GRID OF 6AB-9 TUBE</td>
<td>465 KC</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>I. F.</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
</tr>
</tbody>
</table>

THIS ADJUSTMENT MUST AGAIN BE MADE AFTER THE REGENERATION CONTROL TRIMMER HAS BEEN SET.

On chassis 97-56-3 turn clockwise.

On chassis 97-56, turn counterclockwise.
FEBRUARY 1939.

CIRCUIT CHANGE

Resistor No. 18 connected in parallel with the dial bulb has been changed to a 3 watt molded wire wound resistor, Part No. 116479. This size is being used in place of the original 1/2 watt rating, to prevent failure of the resistor if the dial bulb burns out. The 3 watt resistor should be used for replacement in all cases.

TUBE CHANGE

A small percentage of these chassis were equipped with 6K7 metal I.F. tubes but most of them are using the 6K7G glass tube. Because of shield requirements, these tubes cannot be used interchangeably. In other words, a metal tube must be used to replace a metal tube, while in a chassis originally equipped with a glass I.F. tube, a glass tube must be used as a replacement.

CORRECTING OSCILLATION & SQUEALING

If a "squeal" develops with the volume control fairly well advanced, separate the 6Q7G grid lead and the speaker wires as much as possible by pulling the grid lead to the side of the 6Q7G nearest the variable condenser.

If the grid leak lead to the plate of the 6A8G cathode is to the 6Q7G cathode as close to the chassis and as far from other wires as possible. If necessary, connect a .05 mfd. 200 volt condenser to one of the above grid leads which does not already have such a condenser connected directly to it.
MODELS 97-571 to 97-579
STEWART WARNER CORP.

ALIGNMENT EQUIPMENT & PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 465 KC to 1500 KC are required.

1. Connect the output meter across the voice coil or between the plate of the 5620-0 output tube and ground through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil.

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser, and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as the signal generator may be connected to one side of the power line, or it may be grounded externally.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. To CALIBRATE THE DIAL: Remove the chassis from the cabinet and set it on a flat surface (insulated from ground). Release the set acoustics in the cabinet which connects the push button, tuner shaft with the tuning unit. Holding the gang in full stock, turn the last dial until the last dial reading, 113557 Key (left hand) is a minimum 4 1/8 inch above the table surface. Now retighten the set screw in the coupling collar. The 4 1/8 inch division on the dial (as measured vertically from the table surface) is to be used as the dial indicator for all calibrating and alignment.

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<table>
<thead>
<tr>
<th>DIAL NUMBER</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2-</td>
<td>113550-</td>
<td>Transformer - output</td>
<td>.20</td>
</tr>
<tr>
<td>2</td>
<td>113551-</td>
<td>Transformer - output</td>
<td>.20</td>
</tr>
<tr>
<td>3-4</td>
<td>113552-</td>
<td>Transformer - output</td>
<td>.20</td>
</tr>
<tr>
<td>5</td>
<td>113553-</td>
<td>Transformer - output</td>
<td>.20</td>
</tr>
<tr>
<td>6</td>
<td>113554-</td>
<td>Transformer - output</td>
<td>.20</td>
</tr>
</tbody>
</table>

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MODELS 97-571 to 97-579
97-577 CHASSIS

BUILT-IN ANTENNA SYSTEM

The Built-in Antenna incorporated in this receiver will generally give very satisfactory results in localities where powerful broadcast stations exist. This Built-in Antenna will function when terminals A and A₁ on the back of the chassis are connected together. In cases where noises are excessive or greater sensitivity is desired, remove the jumper connecting terminals A and A₁ and connect an external antenna to terminal A. In some locations, due to peculiar power line conditions, hum or noise may be excessive when the Built-in Antenna is used. In such cases reverse the power line plug. If this doesn't correct the condition, remove the connector between A and A₁ on the back of the chassis, and connect an external antenna to A.

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www.americanradiohistory.com
 CONNECTIONS FOR UNIVERSEAL TUNER MOTOR USED ON 25 TO 80 CYCLE MODELS.

ANTENNA GROUNDED

TO 6L7 PLATE

NOTE: IN SOME SETS THE BROADCAST OSCILLATOR COIL IS WIRING AS SHOWN HERE.

Reactance Damper Connections for Universal 25 to 80 Cycle Model R-185B

Reactance Damper Connections for Universal 25 to 80 Cycle Model R-185B

Bottom View of Chassis

Reactor ohms per volt.

6V6 Output

NOTE A: The bias for the control grids of the 6L7 1st det., 6BT 2nd I.F. and 6BT 2nd I.F. tubes, also the bias on the grid and cathode of the cathode and the control grid of the GQ7, is 0.6 volts measured across resistor number 101.
ALIGNMENT EQUIPMENT & PROCEDURE

To achieve the necessary checks to see that the dial is exactly centered in the middle of the scale, the generator and the detector must be connected to the receiver as shown on the diagram. If the generator and detector are not exactly centered in the middle of the scale, the dial must be turned to the nearest scale position to center the dial. Then turn the receiver dial until the receiver is exactly centered in the middle of the scale. The receiver must be connected to the receiver as shown on the diagram.

The output meter is used to check the output of the receiver. It should be placed on the receiver as shown on the diagram. If the output meter is not exactly centered in the middle of the scale, the meter must be turned to the nearest scale position to center the meter. Then turn the receiver dial until the receiver is exactly centered in the middle of the scale. The receiver must be connected to the receiver as shown on the diagram.

TABLE 1:

<table>
<thead>
<tr>
<th>TYPE OF ADJUSTMENT</th>
<th>終於 сет</th>
<th>DESCRIPTION</th>
<th>FULL MESH</th>
<th>DETUNED</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
</table>

Adjust for maximum output. Then repeat adjustment.

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Adjust for maximum output. Then repeat adjustment.
R-190-D CHASSIS

CIRCUIT DESCRIPTION MODELS 1901 to 1909

The Model R-190-D chassis is a five tube battery receiver using "A" and "B" batteries. The standard superheterodyne circuit which this receiver employs includes automatic volume control and a class A single pentode output system. The tuning range covers the standard broadcast range from 540 to 1700 Kc, and the popular short wave bands from 5.7 to 19.8 Mc. Automatic volume control is accomplished by supplying the filtered A.V.C. voltage to the control grids of both the 1C6 and 34 tubes.

An unusual arrangement of a combined off-switch and range switch is also utilized in the circuit of this receiver. The action of this switch is as follows: 1. In the extreme counter-clockwise position the receiver is turned off with both the "A" and "B" supplies open. 2. With the switch in the middle position the "A" and "B" supplies are connected and the antenna and oscillator coils for the broadcast band are now in circuit to permit tuning on that band. 3. In the extreme clockwise position, the receiver will tune in the short wave band.

 prices subject to change without notice.
POWER SUPPLY & BATTERY CONNECTIONS

The power supply of this receiver consists of three "B" batteries and one "A" battery. No "C" battery is needed as the first 22-1/2 volts of the "B" battery supply serves as a "C" battery. Proper intermediate bias voltages are secured from the tapped condenser resistor number 32.

The 42-1/2 volt tap on the "B" battery is the negative connection for the plate supply and it is connected to "A-" and ground. This allows a maximum plate supply voltage of 113-1/2 volts with fresh batteries.

The "A" supply may be a 2-1/2 volt Air Cell, a 2 volt dry battery, or a 2 volt storage battery. Since the filaments of all tubes in the receiver are supplied through a type 8EI volt storage regulator tube, the purpose of this tube is to maintain a safe filament voltage with battery voltages ranging from 2 to 3 volts. The voltage drop across the tube will decrease as the battery voltage decreases thus maintaining nearly a constant filament potential.

If a 2 volt storage cell is to be used and the tube in the receiver is not new it is desirable to remove the 8EI voltage regulator tube and replace it with a plug which merely shorts out the two large terminals of the 8EI tube socket. This plug may be made up by removing the base of an old 4 prong tube and connecting the two large pins together with a piece of wire. Be careful not to connect anything to either of the small pins on the other tubes may be blown out.

In order to simplify connections to the batteries, plugs are provided and the method of connection to the batteries is shown in the diagram on the right.

ALIGNMENT EQUIPMENT & PROCEDURE

For proper alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 KC. to 16 MC. are required.

1. Connect the output meter across the voice coil, or between the plate of the 33 tube and ground, depending on the type of meter. The more sensitive type should be connected across the voice coil.
2. Connect the ground lead of the signal generator to the chassis of the receiver.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
4. With the gang condenser in full mesh set the pointer on the horizontal black line below 540 KC. on the dial.
5. Using a bakelite screwdriver proceed to align in exactly the same order as shown in the table below.

<table>
<thead>
<tr>
<th>ORDER OF ALIGN.</th>
<th>DIAL, DIAL, DIAL</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>R ange Switch Position</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1.5MF. CONDENSER DUAL TUBE CONTROL GRID OF 34 TUBE (DO NOT REMOVE GRID CLIP) 465 KC. BROADCAST (CENTER POSITION) ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL 1 2 SWD. 1.F. ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B DITTO DITTO DITTO DITTO DITTO 1700 KC. 1700 KC. BROADCAST OSCILLATOR (SHUNT) ADJUST TRIMMER TO BRING IN SIGNAL.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C DITTO DITTO DITTO DITTO DITTO 1500 KC. 1500 KC. BROADCAST ANTENNA ADJUST FOR MAXIMUM OUTPUT.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D DITTO DITTO DITTO DITTO DITTO 1500 KC. 1500 KC. BROADCAST OSCILLATOR (SERIES PAD) ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY INDUCTING TRIMMER AND NOTching RECEIVER DIAL UNtIL MAXIMUM OUTPUT IS OBTAINED.</td>
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</tr>
<tr>
<td>E DITTO DITTO DITTO DITTO DITTO 600 KC. 600 KC. 600 KC. BROADCAST OSCILLATOR (SERIES PAD) ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY INDUCTING TRIMMER AND NOTching RECEIVER DIAL UNtIL MAXIMUM OUTPUT IS OBTAINED.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F DITTO DITTO DITTO DITTO DITTO 600 KC. 600 KC. 600 KC. SHORT WAVE ANTENNA ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY INDUCTING TRIMMER AND NOTching RECEIVER DIAL UNtIL MAXIMUM OUTPUT IS OBTAINED.</td>
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</tr>
</tbody>
</table>

NOTE A: Now repeat adjustment of trimmers 3 and 4 again for greater sensitivity. This may cause oscillation. If oscillation occurs repeat steps A and B and disregard the adjustment mentioned in this note, i.e., after adjusting 1 and 2, do not repeat adjustment of 3 and 4. Important: Please note that in repeating step A, the signal generator must be connected to the 34 control grid. In step 8, the connection is to the 128 grid.

DIAL DRIVE & MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>112265</td>
<td>Cable - battery (with plugs)</td>
<td>.90</td>
</tr>
<tr>
<td>112254</td>
<td>DUAL - complete assembly</td>
<td>8.75</td>
</tr>
<tr>
<td>112267</td>
<td>Escutcheon - with window</td>
<td>1.75</td>
</tr>
<tr>
<td>112266</td>
<td>Knob - tuning</td>
<td>.25</td>
</tr>
<tr>
<td>112267</td>
<td>Knob - volume and range switch</td>
<td>.25</td>
</tr>
<tr>
<td>112267</td>
<td>Plug - &quot;B&quot; battery</td>
<td>.15</td>
</tr>
<tr>
<td>112267</td>
<td>Plug - &quot;A&quot; battery</td>
<td>.10</td>
</tr>
<tr>
<td>112267</td>
<td>Pointer - dial</td>
<td>.30</td>
</tr>
<tr>
<td>112267</td>
<td>Scale - dial</td>
<td>1.25</td>
</tr>
</tbody>
</table>

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CIRCUIT DESCRIPTION

The model R-191-D chassis is a six volt battery powered superheterodyne receiver. It has an intermediate frequency of 465 KC. and the tuning range is from 540 to 1700 KC.

The incoming signal picked up by the antenna is induced in the tuned secondary of the antenna coil and impressed on the control grid of the 6A8G first detector and oscillator tube. The oscillator circuit is tuned to a frequency 465 KC. higher than that of the incoming signal, and the resultant 465 KC. output is amplified in the I.F. stage, using a 6S7G tube. The amplified I.F. voltage is impressed on the grid of the 6L5G second detector tube. The plate of the 6L5G tube is grounded and the grid acts as the plate of a linear diode detector and A.V.C. source. The direct current voltage developed across the 1/2 megohm diode load resistor is used as A.V.C. voltage and applied to the control grids of the 6A6G and 6S7G (I.F.) tubes through a resistance capacity filter system. Self bias is obtained across the cathode resistor 26 to maintain bias at all times.

The potentiometer type volume control 49 serves as a continuously variable voltage divider of the audio voltage developed. Any portion of the audio voltage can be applied to the control grid of the 687G A.F. tube. It should be noted that the bias for the 6S7G A.F. tube is obtained from a bias cell. The 6S7G A.F. tube is resistance coupled to the 41 power output tube. Grid bias for the output tube is obtained across the cathode resistor 35.

The continuously variable resistor type tone control regulates the high note content of the audio output.

All tube heaters are connected directly to the six volt supply circuit. "B" voltage is supplied by a synchronous full wave vibrator (48). The complete "B" supply, consisting of vibrator, power transformer, chokes and condensers, is housed in a metal shield to eliminate interference. R.F. filter chokes in the power supply input and output circuit prevent interference from getting into the "A" and "B" leads.

ALIGNMENT EQUIPMENT & PROCEDURE

For proper alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 KC. to 1800 KC. are required.

1. Connect the output meter between the plate of the 41 tube and ground, or across the voice coil, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the chassis of the receiver.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure. Turn tone control to brilliant position.
4. With the gang condenser in full mesh set the pointer on the black horizontal line below 550 KC. on the dial.
5. Proceed to align in exactly the same order as shown in the table below.

<table>
<thead>
<tr>
<th>ORDER OF ALIGN</th>
<th>BATTERY IN SERIES WITH SIG. GEN.</th>
<th>SIGNAL GENERATOR CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>RECEIVER DIAL SIGNALING</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.1 MFD. CONDENSER</td>
<td>CONTROL GRID OF 6A8G TUBE</td>
<td>465 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1</td>
<td>1ST I.F.</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
</tr>
<tr>
<td>B</td>
<td>.1 MFD. CONDENSER</td>
<td>CONTROL GRID OF 6A8G TUBE</td>
<td>405 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>3</td>
<td>2ND I.F.</td>
<td>ADJUST TRIMMERS 3 &amp; 4 FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT OF TRIMMERS NO. 1 &amp; 2.</td>
</tr>
<tr>
<td>C</td>
<td>250 MFD. CONDENSER</td>
<td>ANTEナ LEAD</td>
<td>1700 KC.</td>
<td>TUNE TO 1500 KC. GENERATOR SIGNAL</td>
<td>5</td>
<td>OSCILLATOR (Ghurt)</td>
<td>ADJUST TRIMMER TO BRING IN SIGNAL.</td>
</tr>
<tr>
<td>D</td>
<td>250 MFD. CONDENSER</td>
<td>ANTEナ LEAD</td>
<td>1500 KC.</td>
<td>TUNE TO 500 KC. GENERATOR SIGNAL</td>
<td>6</td>
<td>ANTENNA</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>E</td>
<td>250 MFD. CONDENSER</td>
<td>ANTENa LEAD</td>
<td>900 KC.</td>
<td>TUNE TO 500 KC. GENERATOR SIGNAL</td>
<td>7</td>
<td>OSCILLATOR (Series Pad)</td>
<td>ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY DETUNING TRIMMER AND TUNING RECEIVER DIAL UNTIL MAXIMUM OUTPUT IS OBTAINED.</td>
</tr>
</tbody>
</table>
MODEL R-192-D CHASSIS (RECEIVER MODELS 1921 to 1929)

The model R-192-D is a six volt battery powered superheterodyne receiver. The circuit employed includes automatic volume control and a push pull class B output system.

The 6L50 second detector is connected as a diode, the plate being grounded and the control grid acting as a diode plate. "g" voltage is supplied by a synchronous full-wave vibrator.

ALIGNMENT EQUIPMENT & PROCEDURE

For proper alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 KC. to 18 MC. are required.

1. Connect the output meter across the plates of the air coil, or across the voice coil, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the chassis of the receiver and keep it connected in this manner throughout the entire alignment procedure.

3. Turn the vhf to the maximum volume position and keep it in this position throughout the entire alignment procedure. Turn the tone control for brilliant position.

4. With the gang condenser in full mesh set the pointer on the black horizontal line below 560 KC. on the dial.

5. Proceed to align in exactly the same order as shown in the table below.

### TABLE

<table>
<thead>
<tr>
<th>ORIGIN</th>
<th>NUMBER</th>
<th>DESCRIPTION</th>
<th>CONNECTION OF BIC. GENERATOR OUTPUT TO RECEIVER</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>RANGE SWITCH POSITION</th>
<th>RECEIVED DIAL DESIGNATION</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.025</td>
<td>Control grid of 6AQ5 diode</td>
<td>465 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1</td>
<td>1st I.F.</td>
<td>Adjust for maximum output. Then repeat adjustment.</td>
</tr>
<tr>
<td>B</td>
<td>0.025</td>
<td>Control grid of 6AQ5 diode</td>
<td>465 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>2</td>
<td>2nd I.F.</td>
<td>Adjust trimmers 3 &amp; 4 for maximum output. Then repeat adjustment of trimmers No. 1 &amp; 2.</td>
</tr>
<tr>
<td>C</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>1500 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>TUNE TO 1500 KC.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>1500 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>TUNE TO 1500 KC.</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>1500 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>TUNE TO 1500 KC.</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>1500 KC.</td>
<td>Broadcast</td>
<td>Clockwise</td>
<td>TUNE TO 600 KC.</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>5.0 MC.</td>
<td>Police (Center)</td>
<td>5.0 MC.</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>5.0 MC.</td>
<td>Police (Center)</td>
<td>5.0 MC.</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>18.0 MC.</td>
<td>Short-wave Counter</td>
<td>Clockwise</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>400 ohm carbon resistor</td>
<td>Antenna terminal</td>
<td>18.0 MC.</td>
<td>Short-wave Counter</td>
<td>Clockwise</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DIAL DRIVE & MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>11255-</td>
<td>Arc - for band indicator drive -</td>
<td>1.20</td>
</tr>
<tr>
<td>11256-</td>
<td>Cable - battery seems -</td>
<td>.75</td>
</tr>
<tr>
<td>11305-</td>
<td>Cord - for band indicator (2 ft.) -</td>
<td>.10</td>
</tr>
<tr>
<td>11327-</td>
<td>Dial - complete mechanism -</td>
<td>2.50</td>
</tr>
<tr>
<td>11328-</td>
<td>Escutcheon - with celluloid -</td>
<td>2.00</td>
</tr>
<tr>
<td>11329-</td>
<td>Wire - all controls -</td>
<td>.50</td>
</tr>
<tr>
<td>11330-</td>
<td>Line - for band indicator -</td>
<td>.08</td>
</tr>
<tr>
<td>11332-</td>
<td>Pointer - for dial -</td>
<td>.12</td>
</tr>
<tr>
<td>11335-</td>
<td>Retaining ring - for drive shaft -</td>
<td>.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>11255-</td>
<td>Scale - dial -</td>
<td>1.50</td>
</tr>
<tr>
<td>11256-</td>
<td>Shaft - for pointer -</td>
<td>.50</td>
</tr>
<tr>
<td>11257-</td>
<td>Shield - for pointer -</td>
<td>.10</td>
</tr>
<tr>
<td>11258-</td>
<td>Socket - dial lamp -</td>
<td>.10</td>
</tr>
<tr>
<td>11259-</td>
<td>Spring - drive control -</td>
<td>.05</td>
</tr>
<tr>
<td>11260-</td>
<td>Terminal strip G.D.A. -</td>
<td>.35</td>
</tr>
<tr>
<td>11261-</td>
<td>Pulley - for pointer drive (outside 71) -</td>
<td>.20</td>
</tr>
<tr>
<td>11262-</td>
<td>Nut - &amp; flexible coupler -</td>
<td>1.50</td>
</tr>
</tbody>
</table>
The model R-304 chassis is a five tube superheterodyne receiver. It has an intermediate frequency of 465 KC, and a tuning range from 540 to 1720 KC.

### Socket Voltages

**DIAL TUNED TO 540 KC**

**NOTE A:** The bias for the control grid of the 6A80, 6K7G and the diode plates of the 6Q7G is -2.0 volts measured across section AP of resistor number 22.

**NOTE B:** The bias for the control grid of the 6Q7G is -3.5 volts measured across section AC of resistor number 22.

**NOTE C:** The bias for the control grid of the 6K7G is -10 volts measured across section AD of resistor number 22.

**Bias for the 6Q7G control grid**

- Resistor number 22
- Chassis R-304, R-304A
- 2200 ohms per volt

### Description

- **6K6G Output**
- **6Q7G IF**
- **6A8G 1st DET & OSC**

### Parts List

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>112412</td>
<td>Cord - for dial drive (6 ft.)</td>
<td>$0.25</td>
</tr>
<tr>
<td>112415</td>
<td>Dial - assembly complete</td>
<td>$2.55</td>
</tr>
<tr>
<td>112416</td>
<td>Escutcheon - black (R-3041)</td>
<td>$0.55</td>
</tr>
<tr>
<td>112439</td>
<td>Escutcheon - blue (R-3041)</td>
<td>$0.55</td>
</tr>
<tr>
<td>112452</td>
<td>Escutcheon - gray (R-3041)</td>
<td>$0.35</td>
</tr>
<tr>
<td>112455</td>
<td>Escutcheon - walnut (R-3041)</td>
<td>$0.55</td>
</tr>
<tr>
<td>112458</td>
<td>Knob - black finish (R-3042)</td>
<td>$0.25</td>
</tr>
<tr>
<td>112461</td>
<td>Knob - gray finish (R-3042)</td>
<td>$0.25</td>
</tr>
<tr>
<td>112468</td>
<td>Knob - walnut finish (R-3042)</td>
<td>$0.35</td>
</tr>
<tr>
<td>112470</td>
<td>Pointer - dial drive</td>
<td>$0.35</td>
</tr>
<tr>
<td>112474</td>
<td>Pulley - dial cord drive</td>
<td>$0.30</td>
</tr>
<tr>
<td>112477</td>
<td>Spring - drive cord tension</td>
<td>$0.08</td>
</tr>
<tr>
<td>112477</td>
<td>Washer - spring type</td>
<td>$0.35</td>
</tr>
<tr>
<td>112479</td>
<td>Window - celluloid</td>
<td>$0.45</td>
</tr>
</tbody>
</table>
### ALIGNMENT EQUIPMENT & PROCEDURE

For proper alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 KC. to 1800 KC. are required.

1. Connect the output meter between the plate of the 6K8G tube and ground, or across the voice coil, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the chassis of the receiver.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh set the pointer to the 540 KC. division on the dial.

5. Proceed to align in exactly the same order as shown in the table below.

#### ORDER OF ALIGN.

<table>
<thead>
<tr>
<th>ORDER OF ALIGN.</th>
<th>DUMMY ANT. IN SERIES WITH SIG. GEN.</th>
<th>CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>RECEIVER DIAL SETTING</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.1 MFD. CONDENSER</td>
<td>CONTROL GRID OF GAG TUBE</td>
<td>465 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1</td>
<td>2ND I.P.</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
</tr>
<tr>
<td>B</td>
<td>.1 MFD. CONDENSER</td>
<td>CONTROL GRID OF GAG TUBE</td>
<td>465 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>3</td>
<td>1ST I.P.</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
</tr>
<tr>
<td>C</td>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD</td>
<td>1800 KC.</td>
<td>1600 KC.</td>
<td>5</td>
<td>OSCILLATOR</td>
<td>ADJUST TO BRING IN SIGNAL. SEE NOTE BELOW TABLE.</td>
</tr>
<tr>
<td>D</td>
<td>400 OHM CARBON RESISTOR</td>
<td>ANTENNA LEAD</td>
<td>1500 KC.</td>
<td>TUNE TO 1500 KC.</td>
<td>6</td>
<td>ANTENNA</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
</tbody>
</table>

#### DIAL CORD INSTALLATION:

The dial cord to be used should be approximately 27 inches long.

1. Open the gang condenser all the way (plates all out) and unclip the tension spring from drum A.

2. Wind one complete turn counter-clockwise around drum A. (Use only one end of the cord).

3. Run the cord around pulley B from back to front, then across to the front of pulley C.

4. Run the cord around pulley C, over drum A (in back of windings) down to shaft D.

5. Wind three complete turns around shaft D.

6. Run the cord up to drum A and wind one complete turn counter-clockwise around the drum.

7. Fasten the tension spring to the clip inside the drum.

8. With the gang condenser fully closed clip the pointer to the dial cord so that it comes opposite the 540 KC. marking on the dial.

#### ELIMINATION OF OSCILLATION:

Some of the model R-304 receivers may oscillate or "growl" especially when tuned to stations or between stations. This oscillation can always be eliminated by connecting a ground to the receiver. However, if the set is to be used without a ground, it can be kept from oscillating by connecting a buffer condenser from one side of the power line to the chassis within the receiver. The condenser should have a capacity of .01 mfd. and a voltage rating of 1000 volts.

Later production receivers are built with such a line buffer condenser to prevent oscillation. Sets using the condenser can be identified by the letter "S" on the back of the chassis also on the packing carton near the serial number.
01-54, 10-54S, 08-54, 010-54, and 010-54S CHASSIS
ALIGNMENT EQUIPMENT & PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 485 KC to 14 MC are required.

1. Connect the output meter across the voice coil or between the plates of the 6KB-6 output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the black (ground) wire or the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the pointer to the last mark on the right end of the dial scale. If the pointer is only slightly off calibration, loosen the set screw in the dial drive drum at the left side of the gang condenser and set the pointer to the last mark on the right end of the dial when the gang condenser is in full mesh. If the pointer is off calibration several dial divisions release it from the pointer drive cord by spreading the clip on the pointer. Then slide the pointer along the cord until it is set to the last dial division on the right end of the dial. Holding it in place check to see if the gang condenser is in full mesh, and tighten the pointer clip, being careful not to cut the cord. Place a drop of household or speaker cement on the cord and pointer clip to prevent the pointer from slipping.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Midget Condenser</td>
<td>Top Joint When it is Not in Use</td>
<td>485 KC</td>
<td>12</td>
<td>1.2</td>
<td>Adjust for Maximum Output</td>
<td></td>
</tr>
<tr>
<td>200 Midget Condenser</td>
<td>Top Joint When it is Not in Use</td>
<td>485 KC</td>
<td>5</td>
<td>1.2</td>
<td>Adjust for Maximum Output</td>
<td></td>
</tr>
<tr>
<td>500 Midget Condenser</td>
<td>Top Joint When it is Not in Use</td>
<td>1500 KC</td>
<td>6</td>
<td>1.5</td>
<td>Adjust for Maximum Output</td>
<td></td>
</tr>
<tr>
<td>5-700 Midget Condenser</td>
<td>Top Joint When it is Not in Use</td>
<td>1500 KC</td>
<td>7</td>
<td>1.5</td>
<td>Adjust for Maximum Output</td>
<td></td>
</tr>
</tbody>
</table>

HOW TO SET UP PUSH BUTTONS
1. Before setting up a push button, turn out all of the buttons and pull out the button and spring loaded in it. When the button is released, the button spring will be checked to see that there is no button and that it is the button spring.

2. Push the button all the way in. When the button is released, the button spring will be checked to see that there is no button and that it is the button spring.

HOW TO REPLACE DIAL POINTER DRIVE CORD
1. Open the gang condenser. Set a screw in the drum, Fig. 1. Note: The drum is a right hand drum. The drum is a right hand drum. The drum is a right hand drum.

2. Using the drum and drum to remove the drum, Fig. 1. Note: The drum is a right hand drum. The drum is a right hand drum. The drum is a right hand drum.

3. Replace the drive cord being sure the other end is to replace it. If the drum is not in place it will be returned to initial position. If the drum is not in place it will be returned to initial position. If the drum is not in place it will be returned to initial position. If the drum is not in place it will be returned to initial position.
ELECTRICAL PARTS

TERMINALS OF SWITCHES AND COILS SHOWN IN THE PICTORIAL VIEWS ARE LETTERED TO CORRESPOND TO SIMILARLY LETTERED TERMINALS ON THE CIRCUIT DIAGRAM.

DIAL AND MISCELLANEOUS PARTS

STEWART-WARNER CORP.

DIAGRAM NO. 41
PART NO. 112995
BROADCAST ANTENNA COIL

DIAGRAM NO. 42
PART NO. 112996
BROADCAST R.F. COIL

DIAGRAM NO. 43
PART NO. 113297
BROADCAST OSC. COIL

DIAGRAM NO. 49
PART NO. 114893
SHORT WAVE ANTENNA COIL

DIAGRAM NO. 48
PART NO. 114892
SHORT WAVE OSC. COIL

DIAGRAM NO. 52
PART NO. 114920
PUSH BUTTON SWITCH

DIAGRAM NO. 55
PART NO. 114929
RANGE SWITCH

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### Alignment Equipment & Procedure

<table>
<thead>
<tr>
<th>DUMMY ANT.</th>
<th>CONNECTION OF DUMMY GENERATOR TO RECEIVER</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>BAND SWITCH POSITION</th>
<th>RECEIVER DIAL SETTING</th>
<th>TRIMMER NUMBER</th>
<th>TRIMMER DESCRIPTION</th>
<th>TYPE OF ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 OHM CONDENSER</td>
<td>CENTRAL GRID OF GANTRY TUBE</td>
<td>465 KC</td>
<td>4</td>
<td>1-2</td>
<td>END F.P.</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>TUNE POWER TUBE.</td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>ANTENNA TERMINAL</td>
<td>465 KC</td>
<td>4</td>
<td>3-4</td>
<td>END F.P.</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>TUNE POWER TUBE.</td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>ANTENNA TERMINAL</td>
<td>1500 KC</td>
<td>6</td>
<td>5</td>
<td>NO WAVE TRAP</td>
<td>ADJUST FOR MINIMUM OUTPUT.</td>
<td>USE SIGNAL GENERATOR SIGNAL.</td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>ANTENNA TERMINAL</td>
<td>1500 KC</td>
<td>6</td>
<td>7</td>
<td>NO WAVE TRAP</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>USE SIGNAL GENERATOR SIGNAL.</td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>OSCILLOSCOPE DIODE</td>
<td>600 KC</td>
<td>9</td>
<td>NO WAVE TRAP</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>USE SIGNAL GENERATOR SIGNAL.</td>
<td></td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>ANTENNA TERMINAL</td>
<td>14 MC</td>
<td>10</td>
<td>NO WAVE TRAP</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>USE SIGNAL GENERATOR SIGNAL.</td>
<td></td>
</tr>
<tr>
<td>400 OHM CONDENSER</td>
<td>ANTENNA TERMINAL</td>
<td>14 MC</td>
<td>11</td>
<td>NO WAVE TRAP</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td>USE SIGNAL GENERATOR SIGNAL.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Some sets trimmer No. 8 is located on the rear section of the gang condenser, while on others it is located underneath the chassis.

---

### Circuit Features

This circuit is an A type, two band push button tuning superheterodyne receiver. The tuning ranges are 500 to 1700 KC and 550 to 3500 KC.

In each circuit, the tuned circuits are in the lower band section.

**TUNING CONTROLS**

1. **Volume Control:**
   - Controls the volume of the receiver.
   - Sets the sensitivity of the receiver.

2. **Tuner:**
   - Advances the volume control in one step.
   - Sets the desired frequency.

**BAND SWITCH:**

1. **500 to 1500 KC:**
   - For listening to the shorter wavelength bands.
   - Selects the desired frequency band.

2. **1500 to 3500 KC:**
   - For listening to the longer wavelength bands.
   - Selects the desired frequency band.

**ATTACHMENTS:**

1. **Antenna Terminal:**
   - Attaches to the antenna input.

2. **Speaker Terminal:**
   - Connects to the external speaker.

3. **Volume Control:**
   - Adjusts the volume level.

4. **Audio Transformer:**
   - Transfers the audio signal to the output.

---

### How to Set Up the Push Button Tuner

1. Connect your receiver to a good antenna system.
2. Tune the receiver for the desired frequency before setting the push button.
3. Turn the receiver on and off. Then, while tuning, select the desired frequency band.
4. Press the button corresponding to the desired frequency band.
5. Adjust the volume control until the desired sound level is achieved.
6. Adjust for maximum output. Then, try to get the strongest output. Check to make sure the output is not too low.
7. Adjust for maximum output. Then, try to get the strongest output. Check to make sure the output is not too high.
8. Adjust for maximum output. Then, try to get the strongest output. Check to make sure the output is not too weak.
9. Adjust for maximum output. Then, try to get the strongest output. Check to make sure the output is not too loud.
10. Adjust for maximum output. Then, try to get the strongest output. Check to make sure the output is not too quiet.

---

### Replacing the Dial Pointer Drive Cord

1. Remove the cord from the dial pointer drive cord.
2. Connect the new cord to the inside of the drum.
3. Check the new cord to make sure it is working properly.
4. Replace the cover on the drum.

---

### Notes

- This circuit is an A type, two band push button tuning superheterodyne receiver.
- The tuning ranges are 500 to 1700 KC and 550 to 3500 KC.
- In each circuit, the tuned circuits are in the lower band section.
- **NOTE:** Some sets trimmer No. 8 is located on the rear section of the gang condenser, while on others it is located underneath the chassis.
ALIGNMENT EQUIPMENT & PROCEDURE

FOR ALIGNMENT an output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the IC5G output tube and ground through a 0.1 Mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the Ground Terminal or the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position while aligning.

4. With the gang condenser in full mesh, set the dial pointer in a horizontal position. If the pointer is incorrectly set, it is merely necessary to move the pointer to the correct position by hand, while holding the gang in the full mesh position.

Below is a table summarizing the connection of signal generator output to receiver, signal generator frequency, receiver dial setting, trimmer number, trimmer description, and type of adjustment:

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD. Condenser</td>
<td>Control Grid of 1A7G</td>
<td>465 KC</td>
<td>Any Point Where It Does Not Affect Signal</td>
<td>1</td>
<td>2nd I.F.</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2-3</td>
<td>1st I.F.</td>
<td>Repeat adjustment.</td>
</tr>
</tbody>
</table>

Before proceeding further with alignment, disconnect the output meter, and replace chassis, batteries and loop in cabinet, being sure to connect the loop. Using a weak signal from the signal generator, make the following adjustments by ear. The trimmers may be reached through the holes in the bottom of the cabinet by removing corks.

<table>
<thead>
<tr>
<th>400 Ohm Carbon Resistor</th>
<th>Antenna Terminal On Bottom Of Cabinet</th>
<th>1500 KC</th>
<th>1500 KC</th>
<th>4</th>
<th>Broadcast Oscillator (Shunt)</th>
<th>Adjust trimmer for maximum output.</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 Ohm Carbon Resistor</td>
<td>Antenna Terminal On Bottom Of Cabinet</td>
<td>1500 KC</td>
<td>Tune To 1500 KC Generator Signal</td>
<td>5</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
</tbody>
</table>

INSTALLATION OF BATTERIES

The following installation of batteries will fill the space provided:

- Burgess No. 4FAPI, Eveready No. 742, or Ray-O-Vac No. P34A.
- “B” batteries of the proper size are Burgess B30IF, Eveready No. 762 and Ray-O-Vac No. 5303.

A plug and clip connection on the loop is provided to facilitate the installation of batteries. Before replacing the back of the cabinet always be sure that this plug is pushed into the clip and that the blocks are holding the batteries firmly in their positions.

Do not permit any of the battery cable plugs to come in contact with the receiver chassis or any battery terminal other than that to which it is to be connected.

Loop Antenna

A built-in loop antenna is incorporated in this receiver. Due to the directional effect of this type of antenna it will often be possible to increase the signal volume by rotating the entire set.

In some locations it may be desirable to install an external antenna to increase the volume of weak or distant stations. This external antenna should be connected to the screw marked A on the terminal strip located on the bottom of the receiver case. Connect a ground wire to the post marked G on the same terminal strip.

NOTE: You must connect a ground wire to this receiver when using a separate outside aerial, otherwise you will not obtain a satisfactory increase in signal pickup.
For him or noise (using built-in antenna)

1. Try reversing power line plug.
2. If not corrected, remove connector between A and AL on back of chassis, and connect an external antenna to A.

Bottom View of Chassis

Voltages measured between socket terminals and chassis unless otherwise shown.

Line voltage 117 volts.
Voltage across speaker field 20 volts.

Rear of Chassis

Resistor No. 17 changed to a 3 watt molded wire-wound resistor, part 110479 to prevent failure of the resistor if the filament burns out.

NOTE

Terminals of coils shown in pictorial views above are lettered to correspond to similarly lettered terminals on the circuit diagram.
**ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 465 KC to 1500 KC are required.**

Connect the output meter across the voice coil or between the plate of the 25L6-7T output tube and ground through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil.

Connect the ground lead of the signal generator to the chassis of the receiver through a.25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as the signal generator may be connected to one side of the power line, or it may be grounded externally.

Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

Remove the connector between Terminals A and A1.

---

**DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR**

- **200 MFD. MICA CONDENSER**
  - Control Grid of 6A8-G Tube
  - **465 KC**
  - **ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL**
  - **TRIMMER NUMBER:** 1-2
  - **TRIMMER DESCRIPTION:** 1ST I.F., ADJUST FOR MAXIMUM OUTPUT, THEN REPEAT ADJUSTMENT

- **200 MFD. MICA CONDENSER**
  - Antenna Terminal (A)
  - **1500 KC**
  - **1500 KC**
  - **TUNE TO GENERATOR SIGNAL**
  - **TRIMMER NUMBER:** 5
  - **TRIMMER DESCRIPTION:** BROADCAST ANTENNA (Shunt), ADJUST FOR MAXIMUM OUTPUT.

---

**BUILT-IN ANTENNA SYSTEM**

The built-in antenna incorporated in this receiver will generally give very satisfactory results in localities where powerful broadcasting stations exist. This built-in antenna will function when terminal A and A1 on the back of the chassis are connected together. In cases where noises are excessive or greater sensitivity is desired, remove the jumper connecting terminals A and A1 and connect an external antenna to terminal A.

Refer to the circuit diagram on the opposite page. Condenser No. 35 couples the primary of the antenna coil to one side of the power line, which acts as the antenna. The R.F. choke No. 36 is an iron-cored choke whose impedance is high at broadcast frequencies. This choke serves to prevent feedback into the antenna circuit, of radio frequency energy generated in the set itself. It also prevents coupling of No. 16 from bypassing the signal voltage picked up by the power line.

When aligning this receiver, the jumper connecting terminals A and A1 should be removed. This will prevent picking up signals which might interfere with the alignment procedure. When the I.F. channel is being aligned, the gang condenser should be set at a point where no interfering signal will be received.

---

**MISCELLANEOUS PARTS**

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>112745</td>
<td>Clip - col1 mounting</td>
<td>.01</td>
</tr>
<tr>
<td>114975</td>
<td>Socket - octal base</td>
<td>.15</td>
</tr>
<tr>
<td>114982</td>
<td>Socket - for dial lamp</td>
<td>.20</td>
</tr>
<tr>
<td>116233</td>
<td>Terminal strip - for antenna (A-A1)</td>
<td>.12</td>
</tr>
<tr>
<td>114900</td>
<td>Cabinet - ivory (plaskon) for 07-512-5</td>
<td>5.50</td>
</tr>
<tr>
<td>114950</td>
<td>Cabinet - walnut for 07-511-5</td>
<td>3.00</td>
</tr>
<tr>
<td>116386</td>
<td>Cabinet - sprayed ivory for 07-513-5</td>
<td>4.25</td>
</tr>
<tr>
<td>116329</td>
<td>Cabinet - metallic blue</td>
<td>4.25</td>
</tr>
<tr>
<td>116340</td>
<td>Cabinet - metallic red</td>
<td>4.25</td>
</tr>
<tr>
<td>116341</td>
<td>Cabinet - metallic green</td>
<td>4.25</td>
</tr>
<tr>
<td>116369</td>
<td>Cabinet back (ivory) for 07-512-5</td>
<td>.10</td>
</tr>
<tr>
<td>116370</td>
<td>Cabinet back (ivory) for 07-512-8</td>
<td>.10</td>
</tr>
<tr>
<td>116371</td>
<td>Cabinet back (walnut) for 07-511-4 &amp; 07-513-4</td>
<td>.10</td>
</tr>
<tr>
<td>114975</td>
<td>Knob - tuning (red)</td>
<td>.45</td>
</tr>
<tr>
<td>116297</td>
<td>Knob - tuning (ivory)</td>
<td>.40</td>
</tr>
<tr>
<td>114977</td>
<td>Knob - volume (red)</td>
<td>.08</td>
</tr>
<tr>
<td>116296</td>
<td>Knob - volume (ivory)</td>
<td>.08</td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. On the 07-51H, connect the output meter across the voice coil or between the plate of the 35L6GT output tube and chassis through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil. THE CONNECTIONS FOR THE 07-55 ARE THE SAME EXCEPT CONNECT THE GROUND LEAD TO THE POINT SHOWN IN FIG. 2 INSTEAD OF TO CHASSIS.

2. When aligning the 07-51H chassis, connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. FOR THE GROUND LEAD CONNECTION TO THE 07-55 CHASSIS, REFER TO "BOTTOM VIEW," FIG. 3.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. Remove the connector between Terminals A and A/.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 MMFD. Mica Condenser</td>
<td>Trimmer Lug On Front Section Of Variable Condenser</td>
<td>465 KC</td>
<td>1750 KC</td>
<td>1</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output, Then Repeat Adjustment.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser</td>
<td>Antenna Terminal (A)</td>
<td>1500 KC</td>
<td>1500 KC</td>
<td>4</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser</td>
<td>Antenna Terminal (A)</td>
<td>1500 KC</td>
<td>Tune To 1500 KC</td>
<td>5</td>
<td>Broadcast Antenna (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
</tbody>
</table>

IMPORTANT WHEN ALIGNING THE 07-55 CHASSIS, CONNECT THE GROUND LEAD OF THE SIGNAL GENERATOR TO THE LUG IN THE 25 MF CONDENSER IF THIS IS NOT DONE, OSCILLATION OR HUM MAY BE ENCOUNTERED. ALSO CONNECT THE OUTPUT METER GROUND TO THIS POINT.

BUILT-IN ANTENNA SYSTEM

The Built-In Antenna incorporated in this receiver will generally give very satisfactory results in localities where powerful broadcast stations exist. This Built-In Antenna will function when terminals A and A/ on the back of the chassis are connected together. In cases where noise is excessive or greater sensitivity is desired, remove the jumper connecting terminals A and A/ and connect an external antenna to terminal A.

The Built-In Antenna Condenser No. 27 couples the primary of the antenna coil to one side of the power line, which acts as the antenna. The R. F. choke No. 28 is an iron-core choke whose impedance is high at broadcast frequencies. This choke serves to prevent condenser No. 19 from by-passing the signal voltage picked up by the power line. It also prevents feedback into the antenna circuit of radio frequency energy generated in the set itself.

When aligning this receiver, the jumper connecting terminals A and A/ should be removed. This will prevent picking up signals which might interfere with the alignment procedure.

MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116485</td>
<td>Antenna Pad-Model 07-55 only</td>
<td>$0.03</td>
</tr>
<tr>
<td>116487</td>
<td>Cover-Condenser Mounting</td>
<td>$0.05</td>
</tr>
<tr>
<td>116471</td>
<td>Cover for elect. condenser-07-55 only</td>
<td>$0.02</td>
</tr>
<tr>
<td>116501</td>
<td>Clamp for power cord-07-55 only</td>
<td>$0.01</td>
</tr>
<tr>
<td>112745</td>
<td>Clip-equip mounting</td>
<td>$0.10</td>
</tr>
<tr>
<td>114682</td>
<td>Socket-dial lamp</td>
<td>$0.50</td>
</tr>
<tr>
<td>114687</td>
<td>Socket-actual base</td>
<td>$0.15</td>
</tr>
<tr>
<td>825040</td>
<td>Screw No. 6 Hex. Head-Peer C</td>
<td>$0.35</td>
</tr>
<tr>
<td>116223</td>
<td>Terminal strip-antenna (A, A)</td>
<td>$0.12</td>
</tr>
</tbody>
</table>

CABINETS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116750</td>
<td>Cabinet wood-07-51H and 07-51H</td>
<td>$0.60</td>
</tr>
<tr>
<td>116744</td>
<td>Cabinet metallic green-07-51H and 07-51H</td>
<td>$2.75</td>
</tr>
<tr>
<td>116340</td>
<td>Cabinet metallic red-07-51H and 07-51H</td>
<td>$2.75</td>
</tr>
<tr>
<td>116339</td>
<td>Cabinet metallic blue-07-51H and 07-51H</td>
<td>$2.75</td>
</tr>
<tr>
<td>116338</td>
<td>Cabinet sprayed ivory-07-51H and 07-51H</td>
<td>$2.75</td>
</tr>
<tr>
<td>114550</td>
<td>Cabinet (wheat)-07-51H and 07-51H</td>
<td>$0.90</td>
</tr>
<tr>
<td>114480</td>
<td>Cabinet (ivory plissade)-07-51H and 07-51H</td>
<td>$3.40</td>
</tr>
</tbody>
</table>

CABINET BACK

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116497</td>
<td>Cabinet Back (walnut)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
<tr>
<td>116486</td>
<td>Cabinet Back (ivory)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
<tr>
<td>116480</td>
<td>Cabinet Back (wheat)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
<tr>
<td>116477</td>
<td>Cabinet Back (ivory)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
</tbody>
</table>

TUNING KNOBS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116979</td>
<td>Knob-tuning (ivory)-07-51H and 07-51H</td>
<td>$0.40</td>
</tr>
<tr>
<td>114975</td>
<td>Knob-tuning (wheat)-07-51H and 07-51H</td>
<td>$0.45</td>
</tr>
<tr>
<td>114973</td>
<td>Knob-tuning (red)-07-51H and 07-51H</td>
<td>$0.45</td>
</tr>
</tbody>
</table>

VOLUME KNOBS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116299</td>
<td>Knob-tuning (ivory)-07-51H and 07-51H</td>
<td>$0.08</td>
</tr>
<tr>
<td>114875</td>
<td>Knob-tuning (wheat)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
<tr>
<td>114867</td>
<td>Knob-tuning (red)-07-51H and 07-51H</td>
<td>$0.12</td>
</tr>
</tbody>
</table>

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ALIGNMENT EQUIPMENT & PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 465 KC to 1500 KC are required.

1. Connect the output meter across the voice coil or between the plate of the 25L6-G output tube and chassis through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil.

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as the signal generator may be connected to one side of the power line, or it may be grounded externally.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the pointer to the last mark on the right end of the dial scale. If the pointer is only slightly off calibration, loosen the set-screw in the dial drive drum at the left side of the gang condenser and set the pointer to the last mark on the right end of the dial when the gang condenser is in full mesh. If the pointer is off calibration several dial divisions, release it from the pointer drive cord by spreading the clip on the pointer. Then slide the pointer along the cord until it is set to the last dial division on the right end of the dial. Holding it in place check to see if the gang condenser is in full mesh, and tighten the pointer clip, being careful not to cut the cord. Place a drop of household or speaker cement on the cord and pointer clip to prevent the pointer from slipping.

### Dummy Ant.
<table>
<thead>
<tr>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Grid of 8A8-G Tube</td>
<td>465 KC</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>1st I.F.</td>
<td>Adjust for Maximum Output. Then Repeat Adjustment.</td>
</tr>
<tr>
<td>Antenna Lead (Blue Wire)</td>
<td>465 KC</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>3-4</td>
<td>2nd I.F.</td>
<td></td>
</tr>
<tr>
<td>Antenna Lead (Blue Wire)</td>
<td>1500 KC</td>
<td></td>
<td>5</td>
<td>Wave Trap</td>
<td>Adjust for Minimum Output Using a Strong Generator Signal.</td>
</tr>
<tr>
<td>Antenna Lead (Blue Wire)</td>
<td>1500 KC</td>
<td></td>
<td>6</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust Trimmer to Bring in Signal.</td>
</tr>
</tbody>
</table>

**HOW TO SET UP PUSH BUTTONS**

1. Before setting up buttons, turn on set for about 15 minutes. To set up a push button, pull off the button cap by grasping the button and pulling outward on it. When the button is removed, the set-up screw will be exposed to view (See Fig. 1). Insert a screw-driver in this screw and loosen it (about one turn counter-clockwise will be sufficient).

2. Keeping the screw-driver in the screw slot, PULL AGAINST THE SCREW-DRIVER UNTIL THE PUSH BUTTON SHAFT IS FORCED ALL THE WAY IN. While the button is held in this position, grasp the tuning knob and tune in the desired station. Then tighten the adjusting screw, turning clockwise until reasonably tight.

**WARNING:** Do not attempt to turn the screw until it reaches a definite stop. Merely turn until you meet with appreciable resistance. To turn further may result in damage to the mechanism.

**HOW TO REPLACE THE DIAL CORD DRIVE**

1. Close the gang condenser. The set screw in the drum, Fig. 1, must be on the top side.

2. Tie one end of the dial cord to the spring L and thread the other end through hole A and down the front of the drum to the tuning shaft. Continue around the shaft, then over pulley 8 and up the rear side of the drum.

### Diagram

**HOW TO REPLACE DIAL POINTER DRIVE CORD**

1. Close the gang condenser and thread one end of the cord through eyelet G and tie it to spring K.

2. Carry the other end of the cord over the drum to the front around pulley H and then across to pulley 1 and counter clockwise around it.

3. Continue back to pulley 1 and down the front of the drum. Carry the end of the cord around the drum and thread through eyelet G.

4. Tie both ends extending through eyelet G to tension spring K.

5. Adjust the spring to a tension that will spring G is hooked in place in the drum. It will be extended only a very little. If the spring is extended too much, it will tend to make the push button operate too hard because of overloading.

6. Be sure the gang condenser is closed, then set the dial pointer to the last dial division mark on the right and clip it to the cord.

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Dial Adjustment

Before aligning the circuits of these receivers, the tuning dial must be properly aligned to "lock" with the gang tuning-control knob. To do this, the dial should be turned to the "off" position. Then, in the left-hand position of the dial indicator line, both the two setscrew located on the hub of the dial. Then, rotate the dial so that the alignment dial indicators are centered on the dial, and the two setscrew located on the hub shall then be securely tightened.

Intermediate Frequency and A. F. C. Circuit Adjustments

The intermediate frequency system employed in these receivers is 855 kilocycles. Because of the necessity of obtaining the proper shape of resistance curve of their stages in a high fidelity receiver, it is recommended that unless it is absolutely essential, these I. F. adjustments be unmbarked. In the factory these adjustments are made using a visual system which allows the operator to see the final shape of the resonant curve. To reduce this to the best value. These instructions should be followed carefully.

1. Operate the Range Switch on the receiver's chassis to the "A" range position and set the tuning dial to its extreme low frequency position. The Fidelity Control knob to its "Normal" position, the Automatic Frequency Control knob to the "off" position and the "On-Off-Bass Control knob to its "Normal" position.
2. The same adjustments are made to the receiver with respect to the output terminal of the signal generator and the grid of the 8A6 tube. Do not remove the chassis lead connecting to this tube. The grid (or low side) terminal of the signal generator should be connected to either the chassis bus or the ground terminal.
3. Starting from Figure 1, the alignment adjustments for the First, Second, Third, and Fourth I. F. transformers, the L. F. circuits in the following manner:
   - Adjust the third I. F. transformer primary circuit for maximum output.
   - Adjust the fourth I. F. transformer primary circuit for maximum output.
   - Adjust the third I. F. transformer "Dissociator" circuit midway between the peaks where maximum output is obtained.
   - Adjust the second I. F. transformer secondary circuit for maximum output.
   - Adjust the second I. F. primary circuit for maximum output.
   - Adjust the first I. F. secondary circuit for maximum output.
   - Adjust the first I. F. primary circuit for maximum output.
   - Carefully make all the above adjustments, watching carefully the output meter and reducing the output of the test oscillator as required.

To make the final adjustment of the "Dissociator" circuit proceed as follows:

Check the position of the A. F. C. control knob which should be set to the "off" position. Before making these adjustments be sure that the I. F. Amplifier is in exactly the same position of the receiver. With the signal generator set at a frequency of 855 kilocycles, adjust the signal generator's output control so that a signal of 6,000 to 10,000 microvolts is fed into the input of the No. 6A8 modulator tube. Now observe the frequency meter which is connected in series with the cathode of the No. 67 oscillator control tube. Rotate the A. F. C. Control knob to the "off" position, and observe whether there is any difference in the reading of the meter. This is the same condition as the one where the A. F. C. Control knob is rotated from the "off" to the "on" position. If there is no difference in the readings of the meter the Automatic Frequency Control circuit is working properly. If there is, at a rate of about two cycles per second, adjust the "Dissociator" control by means of the screw adjustment located on the chassis bus, and observe the frequency meter. If the same condition exists, the A. F. C. Control knob is rotated to the "on" or "off" position. When this condition is obtained, the "Dissociator" circuit of these receivers is properly aligned.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be very carefully made and in the order specified.

When making any aligning adjustments of these circuits, the A. F. C. Control knob should be rotated to the "off" position, the Fidelity Control knob should be set for "Normal" operation, and the "On-Off-Bass-Phono-Graph" Control knob should also be set for "Normal" operation.

Alignment of Ultra-Short Wave Range (Also referred to as "B" Band)

In order to align the circuits of this range, it is desirable to have a signal generator whose high frequency range will go to 60 megacycles. Such equipment, however, is rare and costly, and in most cases it will be necessary to make use of a signal generator whose high frequency range does not extend beyond 20 megacycles, using harmonics of 20 megacycles for aligning this range on 60 megacycles.

Alignment of Short Wave Range (Also referred to as "D" Band)

In aligning the radio frequency circuits for this range use the same artificial antenna (400-micron carbon resistor) in series with the output terminals of the signal generator as was used for aligning the Ultra-Short Wave Range. Connect this lead to the antenna binding post marked "A" located on the rear of the receiver chassis, and align as follows:

1. Operate the Range Switch on the receiver chassis to the "D" range position and set the signal generator's frequency and the receiver's tuning dial to 20 megacycles.
2. Adjust the aligning capacitors C-15, C-22, and C-8 respectively.
3. Set the signal generator's frequency to 20 megacycles and adjust aligning capacitors C-14, C-21, and C-11 respectively.

Alignment of Short Wave Range (Also referred to as "C" Band)

In aligning the radio frequency circuits for this range use the same artificial antenna and binding post as was used for aligning the "D" range, at the same time rotate the gang tuning capacitor back and forth through resonance until maximum voltage output is obtained on the output meter.

Alignment of Aircraft Range (Also referred to as "B" Band)

In aligning the radio frequency circuits for this range, use the same artificial antenna and binding post as was used for aligning the "C" range, and align as range as follows:

1. Operate the Range Switch on the receiver chassis to the "C" range position and set the signal generator's frequency and the receiver's tuning dial to 20 megacycles.
2. Adjust the aligning capacitors C-14, C-21, and C-7 respectively.
3. Set the signal generator's frequency and the receiver's tuning dial to 20 megacycles and adjust the alignment capacitors C-19, C-29, and C-14 respectively.
4. Re-set both the signal generator's frequency and the receiver's tuning dial to 20 megacycles and repeat operation No. 2.

Alignment of Standard Broadcast Range (Also referred to as "A" Band)

In aligning the radio frequency circuits for this range, replace the 400-micron resistor in series with the signal generator's output with a 200 micropharad capacitor and align this range as follows:

1. Operate the Range Switch to the "A" range position and set the signal generator's frequency and the receiver's tuning dial 1.5 megacycles.
2. Adjust the aligning capacitors C-14, C-19, C-4, and C-5 respectively.

Alignment of Aircraft Range (Also referred to as "B" Band)

In aligning the radio frequency circuits for this range, use the same artificial antenna and binding post as was used for aligning the "C" range, and align as follows:

1. Operate the Range Switch on the receiver chassis to the "B" range position and set the signal generator's frequency and the receiver's tuning dial to 45 megacycles.
2. Adjust the aligning capacitors C-15, C-20, and C-6 respectively.

Alignment of Standard Broadcast Range (Also referred to as "A" Band)

In aligning the radio frequency circuits for this range, use the same artificial antenna and binding post as was used for aligning the "C" range, and align as follows:
Type of Circuit

Tuning Ranges

Number and Types of Tubes

Voltage Rating

Input Power Frequency

Input Power Rating

Frequency of Intermediate Amplifier

Superheterodyne

A—530 to 1700 Kc.; C—5900 to 18,000 Kc.

1 No. 6A8, 1 No. 6K7, 1 No. 6Q7G, 1 No. 6V6G, 1 No. 80

105 to 125 Volts, A. C.

25 to 60 Cycles and 50 to 60 Cycles

40 Watts

455 Kilocycles

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Receiver tuned to 1000 Kc., no signal. A. C. voltages are indicated by italics.

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ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no readjustments are necessary. However, should it become necessary to make any readjustments, the alignment procedure is given in the following paragraphs. The paragraphs should be followed in the order given. In order to make this alignment procedure a simple and satisfactory manner, it is recommended that the Stromberg-Carlson F-280F and F-280B tuning links be used.

To accurately align the circuits in these receivers, it is necessary to use a high grade, modulated test oscillator, the output voltage of which can be varied. In conjunction with this test oscillator, a sensitive output meter should be used for determining the maximum signal voltage developed across the antenna terminals.

In making any alignment adjustments, always adjust the test oscillator’s output voltage to the maximum value of 0.5 volts. Any time a high frequency aligner is used, never attempt to make alignment adjustments under strong signal. Before proceeding with the alignment of these circuits, be sure of the “Off-On” trap switch position. Only with the tuner switch in the “Off-On” position, will the receiver be in its maximum clockwise position (maximum volume). If the tuner switch is set for the “Off-On” trap switch position, the tuner switch will be in its minimum position. Set the “Off-On” trap switch position prior to making measurements and any time the receiver is turned on.

Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 105 kilocycles. In order to align these adjustments always use the voltages and circuits in the order given in these instructions.

1. Set the dial pointer to the extreme low frequency position on the receiver’s dial. Rotate the “Off-On” trap switch clockwise starting from its extreme counterclockwise position (counterclockwise position) to the “on” position.

2. Apply between the chassis low or ground binding post of the receiver and the grid of the No. 6450 or 6455 transformer a direct voltage of 10 volts. If a coupled signal from the grid of the no. 6450 or 6455 transformer is not present, a high voltage signal is present in the intermediate frequency circuits of the receiver, and the receiver is at its maximum clockwise position (maximum volume). If a direct voltage signal is not present, the intermediate frequency circuits of the receiver are not correctly adjusted.

3. Now, noting from Figure 1, the alignment resistors for the first and second I.F. transformers, align the I.F. circuits in the following order:

   b. Primary of second I.F. transformer.
   c. Primary of first I.F. transformer.

Adjusting the circuits to obtain maximum reading on the output meter, reducing the output of the test oscillator as required.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be carefully made and in the order specified.

Alignment of Short Wave Range (Also Referred to as "C" Range)

In aligning the radio frequency circuits for this range, replace the 8-ohm earphone which was placed in series with the test oscillator’s output load for the L.F. alignment, with a 360 ohm carbon type resistor. If the 8-ohm earphone is then connected in the antenna binding post and the receiver is at its maximum clockwise position (maximum volume), the antenna binding post can be used toot out maximum clockwise position (maximum volume) to the receiver. The ground terminal of the test oscillator should be connected to the ground binding post on the receiver.

1. Rotate the tuner switch to the Short Wave (C) range position and set the test oscillator’s frequency and the receiver’s tuning dial to 1175 kilocycles.

2. Adjust the oscillator’s "C" range high frequency aligner to maximum output.

REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>Place</th>
<th>Number</th>
<th>Circuit Designation</th>
<th>Part</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>26A55</td>
<td>RR1</td>
<td>Rectifier, 30 VDC</td>
<td>C1</td>
<td>2.2 A</td>
</tr>
<tr>
<td>26A45</td>
<td>R5</td>
<td>Rectifier, 30 VDC</td>
<td>C2</td>
<td>2.2 A</td>
</tr>
<tr>
<td>26A35</td>
<td>R6</td>
<td>Rectifier, 30 VDC</td>
<td>C3</td>
<td>2.2 A</td>
</tr>
<tr>
<td>26A25</td>
<td>R7</td>
<td>Rectifier, 30 VDC</td>
<td>C4</td>
<td>2.2 A</td>
</tr>
<tr>
<td>26A15</td>
<td>R8</td>
<td>Rectifier, 30 VDC</td>
<td>C5</td>
<td>2.2 A</td>
</tr>
</tbody>
</table>

3. Adjust the antenna’s "C" range high frequency aligner for maximum output, at the same time rotate the test oscillator’s frequency and the receiver’s tuning dial to 1175 kilocycles.

4. Complete the alignment procedure by adjusting the test oscillator’s frequency and the receiver’s tuning dial to 1175 kilocycles.

PROCEDURE FOR OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS

In order to obtain reproduction of phonograph records in conjunction with the No. 200 Receiver, the following instructions should be followed.

To equip three receivers for phonograph operation, it will be necessary to purchase and install a Stromberg-Carlson Record Player. The record player is provided with a magnetic head coil and a single record playing motor unit, and uses a crystal type pickup to carryout a specially equalized circuit.

If a Stromberg-Carlson Record Player is not used and the electric pickup is to be used it at the high impedance type, it will be necessary to connect a low capacity, shielded cable between the three-pole plug of the record player and the 399000 Switch Assembly and the pickup plug. This shielded cable should be of the low capacity type, and the shielding of the high frequencies which is to receive the shielded cable, making it very difficult to use a shielded cable.

To connect the record player to the receiver, the shielded cable should be connected as near to the receiver as possible, in which case it will not be necessary to use a shielded cable.
ELECTRICAL SPECIFICATIONS

Type of Circuit: Superheterodyne with Electric Tuning

Tuning Ranges: A - 530 to 1700 Kc.; C - 5800 to 18,000 Kc.

Number and Type of Tubes: 1 No. 6A8, 1 No. 6K7, 1 No. 6Q7G, 1 No. 6V6G, 1 No. 80

Voltage Rating: 105 to 125 Volts

Power Frequency Rating: 25 to 60 Cycles and 50 to 60 Cycles

Input Power Rating: 42 Watts

Frequency of Intermediate Amplifier: 455 Kilocycles

APPARATUS SPECIFICATIONS

No. 325-J Receiver: 50 to 60 Cycles; P-28816 Chassis Assembly
No. 325-JB Receiver: 25 to 60 Cycles; P-28817 Chassis Assembly
No. 325-N Receiver: 50 to 60 Cycles; P-28816 Chassis Assembly
No. 325-NB Receiver: 25 to 60 Cycles; P-28817 Chassis Assembly
No. 325-S Receiver: 50 to 60 Cycles; P-28816 Chassis Assembly
No. 325-SB Receiver: 25 to 60 Cycles; P-28817 Chassis Assembly

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Chassis Wiring

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NORMAL VOLTAGE READINGS

The various values of voltages listed in the following table are obtained by measuring the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in operation when the measurements are made. Figure 1 shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D.C. voltages. Voltage values shown are those obtained on the lowest possible scale of a meter having the following ranges: 0-25, 0-10, 0-400, 0-600, 0-1000 volts except when an asterisk appears after any given voltage value in which case the 250 volt scale was used.

<table>
<thead>
<tr>
<th>Terminals of Sockets</th>
<th>Heater Voltages Between Heater Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
<td>Cap</td>
</tr>
<tr>
<td>6A8</td>
<td>0</td>
</tr>
<tr>
<td>6K7</td>
<td>0</td>
</tr>
<tr>
<td>617G</td>
<td>Dem.-A.C.</td>
</tr>
<tr>
<td>66G</td>
<td>Audio Output</td>
</tr>
<tr>
<td>60</td>
<td>Rectifier</td>
</tr>
</tbody>
</table>

Receiver tuned manually to 1000 kc, no signal. A.C. voltages are indicated by italics.

ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no adjustments are necessary. If it is desired, however, it should be made as follows, but this should be done by an experienced person with proper equipment. When making the alignment it is best to have a moderate load on the receiver, and the antenna should be connected to the receiver. If the alignment is made with the antenna connected to the receiver, the alignment would be altered by the antenna impedance.

To align the circuits in these receivers, it is necessary to have a high, moderate, and low modulation test oscillator (Signal Generator), the output voltage of which can be varied. In conjunction with this test oscillator, a sensitive output meter should be used for determining the maximum signal voltage developed across the voice coil of the loudspeaker.

In making any alignment adjustments, always adjust the test oscillator output voltage to the maximum value where an alignment may still be obtained. Never attempt to make any alignment adjustments beyond this point. If the alignment appears to be too extreme for the alignment, the alignment should be changed to a lower value.

In making any alignment adjustments on these receivers, it will not be necessary to remove the chassis from the cabinet. The alignment capacitors for the intermediate frequency circuits of these receivers are easily accessible from the rear of the receiver, and the alignment capacitors for the radio frequency circuits are easily accessible either through the bottom of the cabinet or through the bottom of the cabinet shelf depending upon the style of cabinet.

Dial Adjustment

Before aligning the circuits of any of these receivers, the tuning dial must be properly aligned to track the gang tuning capacitors. To do this, with the dial set on the high position and the gang tuning capacitors in this position, the dial pointer should be placed on the horizontal center line of the dial. To align the pointer with the short black line, located at the extreme right-hand edge of the dial plate.

Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 455 kilocycles. In making these circuit adjustments always align the circuits in the order given in these instructions.

1. Rotate the Electric Tuning and Range Switch control knob to the Standard Broadcast Range position.

2. Apply between the chassis base (or ground binding post) of the receiver and the grid of the No. 6A8 modulator-oscillator tube, a modulated signal of 455 kilocycles from the test oscillator, using a 0.1-microfarad capacitor in series with the connection between the output terminal of the test oscillator and speaker terminals. Do not remove the chassis ground lead connecting to this tube. The ground (or low side) terminal of the test oscillator should be connected to either the chassis base or the ground terminal of the test oscillator.

3. Now, noting from Figure 1, the alignment capacitors for the first and second I. F. transformers, align the I. F. circuits in the following manner:

   - Secondary of first I. F. transformer.
   - Primary of second I. F. transformer.
   - Secondary of first I. F. transformer.
   - Primary of first I. F. transformer.

Adjusting the circuits to obtain maximum output on the output meter, reducing the output of the test oscillator as required.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be very carefully made in the order specified.

Alignment of Short Wave Range (Also referred to as "C" Range)

In aligning the radio frequency circuits for this range, replace the 0.1 microfarad capacitor which was placed in series with the test oscillator's output lead for the I. F. transformer with a 400 ohm carbon type resistor. This lead should then be connected to the antenna binding post located on the rear of the receiver chassis. The ground terminal (or low side) of the test oscillator should be connected to the ground binding post on the receiver.

1. Rotate the Electric Tuning and Range Switch control knob to the Short Wave ("C") range position, and set the test oscillator's frequency and the receiver's tuning dial to 17 megacycles.

2. Adjust the oscillator's "C" range high frequency slug for maximum output.

3. Adjust the antenna's "C" range high frequency slug for maximum output, and at the same time rotate the gang tuning capacitor slightly back and forth through resonance until maximum output is obtained.

4. Reset both the test oscillator's frequency and receiver's tuning dial to 17 megacycles and repeat operations Nos. 2 and 3.

Alignment of Standard Broadcast Range (Also referred to as "A" Range)

In aligning the radio frequency circuits for this range, replace the 400 ohm carbon type resistor in series with the test oscillator's output lead with a 0.2 microfarad capacitor and align these circuits as follows:

1. Rotate the Range Switch control knob to the Standard Broadcast ("A") range position, and set the test oscillator's frequency and the receiver's tuning dial to 15 megacycles.

2. Adjust the oscillator's "A" range high frequency slug for maximum output.

3. Adjust the antenna's "A" range high frequency slug for maximum output.

4. Set the test oscillator's frequency and the receiver's tuning dial to 65 megacycles.

5. Adjust the oscillator's "A" range low frequency slug (tuning slug) for maximum output, and at the same time rotate the gang tuning capacitor slightly back and forth through resonance until maximum output is obtained.

Wave Trap Adjustment

In aligning the wave trap circuit, connect the Electric Tuning and Range Switch control knob to the Standard Broadcast range position and set the dial pointer to 1000 kilocycles.

Connect a 200 micro-micro-farad capacitor in series with the output terminal of the modulated test oscillator and the antenna binding post on the receiver, and the ground terminal of the test oscillator to the ground binding post on the receiver. Then, with the modulated test oscillator at the frequency of the intermediate amplifier, 455 kilocycles, apply a fairly strong signal to the receiver and adjust the wave trap until a minimum indication is obtained on the output meter.

PROCEDURE FOR OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS

In order to obtain reproduction of phonograph records in conjunction with the No. 355 Receiver, the following instructions should be followed.

To equip these receivers for phonograph operation, it will be necessary to purchase and install a Stromberg-Carlson, P-2890 Switch Assembly. The rear of the chassis base of the receiver is drilled and mounted with the switch assembly. Complete instructions on how to install and operate this switch are furnished with each P-2890 Switch Assembly.

To obtain the best quality of phonograph reproduction from this receiver, a Stromberg-Carlson Phono Record Player is used and the electric pick-up to be used is of the high impedance type. If the high speed recording is used, the pick-up should be at least 20,000 ohms. A medium speed pick-up should be at least 10,000 ohms. A low speed pick-up should be at least 5000 ohms.

If the Stromberg-Carlson Phono Record Player is not used and the electric pick-up to be used is of the high impedance type, then it will be necessary to connect a low resistance shielded cable between the three-prong socket and the output terminal of the P-2890 Switch Assembly. The length of the shielded cable should be at least 4 inches.

If the pick-up of the low impedance type is used, it will be necessary to connect a matching transformer to the three-prong socket and the output terminal of the P-2890 Switch Assembly. The transformer should be located near the receiver. In this case, the transformer should be located near the receiver.
**PROCEEDURE FOR OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS**

To make these records for phonograph operation, it will be necessary to purchase and install in the receiver the mechanical and electronic equipment necessary for reproduction of the records. Complete instructions on how to install and operate the strain gauges are furnished with each 

**STROMBERG CARLSON TEL. MFG. CO.**

**MODELS 332, 333, 336, 350, 351, 345, 342, 340, 320**

**INSTRUCTIONS FOR SETTING UP THE ELECTRICAL ARRANGEMENT**

1. Before proceeding to set up the strain gauges for electronic tuning, the radio receiver should be turned "on" for approximately 10 minutes.
2. Set the Range Switch control knob to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows). Set the particular model in a No. 336 F. If necessary, check the position of the "Range Point" control knob. If this knob is not set to the correct position, the tuning range should be adjusted so that the arrow is in the direction of the short "Range Point." Set the Zero knob to the left of the meter face in the direction of the short "Range Point."
3. Remove the any strain from the strain gauges which your package assembly consists of the necessary components. This can be achieved by removing the strain gauges from the strain gauges. This can be achieved by aligning the strain gauges in the direction of the short "Range Point."
4. Remove the strain from the strain gauges which hold the electric tuning terminals to the strain gauge plate. Then, remove the strain from the strain gauges which hold the electric tuning terminals to the strain gauge plate. This can be achieved by removing the strain gauges from the strain gauges. This can be achieved by aligning the strain gauges in the direction of the short "Range Point."

**Alignment of Strain Gauge Arrangement**

1. Set the Fine Tune control knob to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows). Set the particular model in a No. 336 F. If necessary, check the position of the "Range Point" control knob. If this knob is not set to the correct position, the tuning range should be adjusted so that the arrow is in the direction of the short "Range Point." Set the Zero knob to the left of the meter face in the direction of the short "Range Point."
2. Remove the strain from the strain gauges which hold the electric tuning terminals to the strain gauge plate. Then, remove the strain from the strain gauges which hold the electric tuning terminals to the strain gauge plate. This can be achieved by removing the strain gauges from the strain gauges. This can be achieved by aligning the strain gauges in the direction of the short "Range Point."
3. With the receiver tuned "on" and the Range Switch control knob set to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point," set the Fine Tune control knob to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point."
4. With the electric tuning terminals removed from the strain gauge plate, for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point," set the Fine Tune control knob to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point."
5. With the electric tuning terminals removed from the strain gauge plate, for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point," set the Fine Tune control knob to the maximum tuning position for the shortest broadcast range (i.e., for a full band in the direction of the arrows) and the Zero knob to the left of the meter face in the direction of the short "Range Point."
Fig. 2. Schematic Circuit of Receiver.

Type of Circuit: Superheterodyne with Electric Tuning

Tuning Ranges: Range "A", 530 to 1700 Kc.; Range "C", 5900 to 18,000 Kc.

Number and Type of Tubes: 1 No. 6A8; 1 No. 6K7; 1 No. 6H6; 1 No. 6F5; 1 No. 6F6G; 1 No. 6U8; 1 No. 80

Power Supply Voltage: 150 to 125 Volts, A.C.

Power Frequency Rating: 50 to 60 Cycles and 25 to 60 Cycles

Input Power Rating:
- Radio Models Only: 65 Watts
- Radio-Phono Models: 80 Watts

Frequency of Intermediate Amplifier: 455 Kilocycles
Fig. 2. Schematic Circuit of Receiver.

**Type of Circuit**: Superheterodyne with Electric Tuning

**Tuning Ranges**: 53 to 1.7 Mc.; 2.25 to 7.6 Mc.; 7.6 to 23 Mc.

**Number and Type of Tubes**: 1 No. 6K8, 1 No. 6K7, 1 No. 6H6, 1 No. 6F5, 1 No. 6F6G, 1 No. 6U5, 1 No. 80

**Voltage Rating**: 105 to 125 Volts

**Power Frequency Rating**: 25 to 60 Cycles and 50 to 60 Cycles

**Input Power Rating**: 70 Watts

**Frequency of Intermediate Amplifier**: 455 Kilocycles
OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS

These receivers are equipped with a three-contact phonograph socket, which is connected to the receiver by a shielded cable. A three-prong plug is also furnished for connecting the pick-up cable to the phonograph socket.

The Strohm-Carlson Record Player is recommended. The Record Player is equipped with a specially designed single record playing motor and uses a special type pick-up in conjunction with a specially designed magnetic pickup system, which is located on the front panel of the record receiver.

In order to prevent radio signals from interfering with the phonograph reproduction, it is necessary to connect the shielded cable between the three-prong socket plug and the record-receiving system. The shielded cable should be inserted into the hole in the center of the three-prong plug and the shielded end of the cable should be connected to the shielded end of the plug.

The Strohm-Carlson Record Player is not used and the electric pick-up is used in the high impedance models, for the purpose of connecting the shielded cable to the three-prong plug, the shielded end of the cable should be connected to the shielded end of the plug.

Instructions for Setting Up the Electric Tuning Arrangement

1. To set up the receiver, follow the steps below:
   - Set the receiver on the desired position and the receiver should be located in the front panel of the record receiver.
   - Connect the shielded cable to the three-prong plug and the shielded end of the cable should be connected to the shielded end of the plug.
   - Connect the electric tuning unit to the receiver by the shielded cable.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be made as described in the instructions below.

Alignment of Short Wave Range (Also Referred to as "C Range"

In aligning the radio frequency circuits for this range, replace the 0.1-ohm coupled capacitor with a 0.1-ohm coupled capacitor and the 600-ohm coupled capacitor with a 600-ohm coupled capacitor. The antenna should be connected to the antenna binding post located on the rear of the receiver's chassis. The antenna terminal should be connected to the antenna binding post located on the rear of the receiver's chassis. The antenna terminal should be connected to the antenna binding post located on the rear of the receiver's chassis.

1. Rotate the Electric Tuning and Range Switch control knobs to the Short Wave ("C") range position, and set the tuning to the desired frequency and receiver's tuning dial to 25 megacycles.

2. Adjust the receiver's oscillator "C" range high frequency aligner for maximum output.

3. Adjust the antenna "C" range high frequency aligner for maximum output and at the same time rotate the tuning capacitor back and forth through resonance until maximum output is obtained.

Alignment of Standard Broadcast Range (Also Referred to as "A Range"

In aligning the radio frequency circuits for this range, replace the 400-ohm carbon type resistor in series with the tuning capacitor with a 200-ohm carbon type resistor and align these circuits as follows:

1. Rotate the Electric Tuning Range Switch control knobs to the Standard Broadcast ("A") range position and set the tuning capacitor's frequency and the receiver's tuning dial to 1.5 megacycles.

2. Adjust the receiver's oscillator "A" range high frequency aligner for maximum output.

3. Adjust the antenna "A" range high frequency aligner for maximum output.

4. Set the tuning capacitor's frequency and the receiver's tuning dial to 1.5 megacycles.

5. Rotate the tuning capacitor slightly back and forth through resonance until maximum output is obtained.

6. Reset both the tuning capacitor's frequency and receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2 and 3.

Manual or electric tuning for the Standard Broadcast range is easily obtainable by simply rotating the Range Switch control knob so that the arrow on the knob points in the direction of tuning. When manually tuning the receiver, the antenna should be connected to the antenna binding post located on the rear of the receiver's chassis. When manually tuning these receivers at the desired station, the antenna should be connected to the antenna binding post located on the rear of the receiver's chassis.

1. Set the Electric Tuning and Range Switch control knobs to the Standard Broadcast position and set the tuning capacitor's frequency to the desired frequency and receiver's tuning dial to 1.5 megacycles.

2. Adjust the receiver's oscillator "A" range high frequency aligner for maximum output.

3. Adjust the antenna "A" range high frequency aligner for maximum output.

4. Set the tuning capacitor's frequency and the receiver's tuning dial to 1.5 megacycles.

5. Rotate the tuning capacitor slightly back and forth through resonance until maximum output is obtained.

6. Reset both the tuning capacitor's frequency and receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2 and 3.

STROMBERG-CARLSON TEL. MFG. CO. 353 S. L. ST. TWIN FALLS, IDAHO
APPARATUS SPECIFICATIONS

No. 337-H
No. 337-HB
No. 337-L
No. 337-LB

50 to 60 Cycles; P-29588 Chassis Assembly-P-27587 Speaker
55 to 60 Cycles; P-29589 Chassis Assembly-P-27587 Speaker
55 to 60 Cycles; P-29588 Chassis Assembly-P-27588 Speaker
55 to 60 Cycles; P-29589 Chassis Assembly-P-27588 Speaker

A special temperature controlled compensating capacitor is used in the oscillator circuit of these receivers when operating the electric timer arrangement in order to eliminate drift in the oscillator's frequency. These receivers are also provided with a low level bass frequency compensating circuit in conjunction with the volume control circuit so that balanced reproduction is obtained for any setting of the volume control.

NORMAL VOLTAGE READINGS

The values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in full operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 150 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D.C. voltages. Voltage values shown are obtained on the lowest possible scale of a meter having the following ranges: 0-25, 0-100, 0-250, 0-500, 0-1000 volts except when an asterisk appears after any given voltage value in which case the 250 volt scale was used.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K8</td>
<td>Mod. Osc.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+230</td>
<td>-92</td>
<td>-6.5</td>
<td>+73</td>
<td>6.3</td>
<td>0</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+230</td>
<td>-70</td>
<td>-220</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6H8</td>
<td>Dem., A. V.C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6B5</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>-230</td>
<td>-56</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6F9G</td>
<td>Output</td>
<td>0</td>
<td>0</td>
<td>-212</td>
<td>+227</td>
<td>0</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>6L5</td>
<td>Tuning Ind.</td>
<td>0</td>
<td>0</td>
<td>+220</td>
<td>0</td>
<td>+45*</td>
<td>6.3</td>
<td>0</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Rect.</td>
<td>+350</td>
<td>345</td>
<td>345</td>
<td>+350</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Speaker Socket</td>
<td>+350</td>
<td>0</td>
<td>0</td>
<td>+350</td>
<td>0</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Receiver tuned manually to 1000 Kc, no signal. A. C. voltages are indicated by italics.

![Diagram of Model 350](image)

Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Aligning Capacitors.

The various values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with all the tubes in their respective sockets except the No. 6G5 tube. The receiver is, therefore, in operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 150 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D.C. voltages. Voltage values shown are obtained on the lowest possible scale of a meter having the following ranges: 0-25, 0-100, 0-250, 0-500, 0-1000 volts except when an asterisk appears after any given voltage value, in which case the 250 volt scale was used.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7</td>
<td>R. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+206</td>
<td>+99</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>0</td>
</tr>
<tr>
<td>6A8</td>
<td>Modulator</td>
<td>0</td>
<td>0</td>
<td>+227</td>
<td>+99</td>
<td>-5.9</td>
<td>+99</td>
<td>6.2</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6F8-G</td>
<td>Oscillator and Oscillator Control</td>
<td>0</td>
<td>0</td>
<td>+153</td>
<td>-7.8</td>
<td>-5.9</td>
<td>+152</td>
<td>6.2</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>+210</td>
<td>-57</td>
<td>0</td>
<td>0</td>
<td>+57</td>
<td>6.2</td>
<td>0</td>
</tr>
<tr>
<td>6H6</td>
<td>Discriminator, Demodulator, A. V.C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6F8</td>
<td>Discriminator, Audio Amplifier</td>
<td>0</td>
<td>0</td>
<td>+20*</td>
<td>0</td>
<td>0</td>
<td>+38*</td>
<td>6.2</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6C5</td>
<td>Audio Inv.</td>
<td>0</td>
<td>0</td>
<td>+120</td>
<td>+251</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>+5.9</td>
<td>2.7</td>
</tr>
<tr>
<td>6F6</td>
<td>Audio Output</td>
<td>0</td>
<td>0</td>
<td>+300</td>
<td>+308</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>+19</td>
<td>2.7</td>
</tr>
<tr>
<td>6F6</td>
<td>Audio Output</td>
<td>0</td>
<td>0</td>
<td>+300</td>
<td>+308</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>+19</td>
<td>2.7</td>
</tr>
<tr>
<td>6L5J</td>
<td>Tuning Ind.</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>+19</td>
<td>0</td>
<td>0</td>
<td>217</td>
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<td>1.6</td>
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<tr>
<td>523</td>
<td>Rectifier</td>
<td>+410</td>
<td>397</td>
<td>397</td>
<td>+410</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Speaker Socket</td>
<td>+300</td>
<td>0</td>
<td>0</td>
<td>+410</td>
<td>+410</td>
<td>0</td>
<td>+308</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Receiver tuned manually to 1000 Kc, no signal. A. C. voltages are indicated by italics.
Stromberg-Carlson Nos. 340 and 341 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
ROCHESTER, NEW YORK

ELECTRICAL SPECIFICATIONS

Type of Circuit: Superheterodyne with Electric Tuning

Tuning Ranges: 530 to 1600 kc. (Standard Broadband) 2500 to 8000 kc. (Short Wave Range)

Number and Type of Tubes: 1 No. 6AS; 1 No. 6K7; 1 No. 6H6; 1 No. 6FS, 2 No. 6F5; 2 No. 6X7; 2 No. 6G7; 2 No. 6G8; 1 No. 7G8 in each model.

Power Supply: 120 to 220 Volts, A. C.

Frequency of Intermediate Amplifier: 455 Kilocycles

APPARATUS SPECIFICATIONS

No. 340-P Receiver: 60 to 60 Cycles; 48011 Chassis Assembly; P-10010 Speaker
No. 341-P Receiver: 60 to 60 Cycles; 48012 Chassis Assembly; P-10011 Speaker
No. 343-P Receiver: 60 to 60 Cycles; 48013 Chassis Assembly; P-10012 Speaker
No. 344-P Receiver: 60 to 60 Cycles; 48014 Chassis Assembly; P-10013 Speaker
No. 345-P Receiver: 60 to 60 Cycles; 48016 Chassis Assembly; P-10014 Speaker
No. 346-P Receiver: 60 to 60 Cycles; 48017 Chassis Assembly; P-10015 Speaker
No. 347-P Receiver: 60 to 60 Cycles; 48018 Chassis Assembly; P-10016 Speaker
No. 348-P Receiver: 60 to 60 Cycles; 48019 Chassis Assembly; P-10017 Speaker

CIRCUIT DESCRIPTION

These receivers are nine tube, instantaneous "Electric Tuning" superheterodyne receivers employing solid tubes and a highly efficient directional speaker. There are two tuning ranges, the frequency limits of each being listed under the "Electrical Specifications," given above.

The dial on the front panel is arranged so that eight favorite stations located in the Standard Broadcast range may be set up for instant selection by means of the push buttons. (Local and other stations that give the best dial-in and receiver tone are selected.) The top push button of the unit is the "Tuning Indicator," and the remaining seven push buttons provide a means of tuning in the eight favorite stations as designated by the numbers on the dial. These push buttons are marked clearly for ease of identification. The "Tuning Indicator" light is a means of indicating the station selected if the light is on. The "Tuning Indicator" key is a means of switching on and off the "Tuning Indicator" light.

The "Ganged Tuning Control" key is a means of tuning in the station selected by means of the push buttons. The "Ganged Tuning Control" key is a means of tuning in the station selected by means of the push buttons. The "Ganged Tuning Control" key is a means of tuning in the station selected by means of the push buttons.

The "Tone Control" key is a means of controlling the tone of the directional speaker. The "Tone Control" key is a means of controlling the tone of the directional speaker. The "Tone Control" key is a means of controlling the tone of the directional speaker.

The "Volume Control" key is a means of controlling the volume of the directional speaker. The "Volume Control" key is a means of controlling the volume of the directional speaker. The "Volume Control" key is a means of controlling the volume of the directional speaker.

The "Mute Control" key is a means of muting the directional speaker. The "Mute Control" key is a means of muting the directional speaker. The "Mute Control" key is a means of muting the directional speaker.

The "Radio-Phone Jack" is a means of connecting the unit to an external amplifier or telephone line. The "Radio-Phone Jack" is a means of connecting the unit to an external amplifier or telephone line. The "Radio-Phone Jack" is a means of connecting the unit to an external amplifier or telephone line.

The "Radio-Phone Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Switch" key is a means of selecting either the radio or the phone.

The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position.

The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position.

The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position.

The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone.

The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position.

The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position.

The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position.

The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone.

The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position.

The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position.

The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position.

The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone.

The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position. The "Tone Control Switch" key is a means of selecting the tone control position.

The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position. The "Volume Control Switch" key is a means of selecting the volume control position.

The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position. The "Mute Control Switch" key is a means of selecting the mute control position.

The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone. The "Radio-Phone Jack Switch" key is a means of selecting either the radio or the phone.
ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no real
adjustments are necessary. However, should it become necessary to make any realignment, the alignment
procedures given in the following paragraphs should be carefully followed. In order to make these alignment
adjustments in an easy and satisfactory manner, it is recommended that the Stromberg-Carlson P-25712 align-
ning tool be used.

To accurately align the circuits in these receivers, it is necessary to use a high grade, modulated test oscil-
lator (Signal Generator), the output voltage of which can be varied. In conjunction with this test oscillator, a
sensitive output meter should be used for determining the maximum signal voltage developed across the value
circuit of the loud speaker.

In making any alignment adjustments, always adjust the test oscillator output voltage to the minimum
value where a good alignment may still be obtained. Never attempt to make alignment adjustments using a
receiver that is not receiving a signal strong enough to rotate the signal meter and cause the alignment
adjustments to be made with the signal meter in the vicinity of the observed maximum. When making the
alignment, always start the alignment by adjusting the trimmer capacitors in the first stage of the receiver to
the minimum capacity position. Then, with the tuning capacitors in this position, the dial pointer should be
placed on the horizontal center line of the dial. To do this, align the pointer with the short black line located
at the extreme right-hand edge of the dial.

Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 455 kilocycles. In making these circuit adjust-
ments always align the circuits in the order given in these instructions.

1. Set the Electric Tuning and Range Switch control knob to the manual tuning standard broadcast posi-
tion (arrow on knob pointing in direction of letters "HII."). Set the dial pointer by means of the Sta-
tion Selector knob to the extreme low frequency position on the receiver's dial. (Rotate the "Off-On-
Tone" control knob to the extreme low frequency position on the receiver's dial. Rotate the dial pointer
two complete turns to the extreme low frequency position on the receiver's dial.)

2. Apply the closed loop or ground binding post of the receiver and the grid of the No. 68 modulator-oscillator tube, a modulated signal of 455 kilocycles from the test oscillator, using a 0.1-
microfarad capacitor to series with the connection between the output terminal of the test oscillator and
ground the grid of the No. 68 tube. Do not remove the closed loop or ground binding post or the grid of the
oscillator when this adjustment is made. The closed loop or ground binding post should be connected to either
the chassis base or the ground binding post terminal.

3. Now, noting from Figure 1, the aligning capacitors for the first and second I.F. transformers, align the
first I.F. circuits in the following manner:

   Secondary of second I.F. transformer.

   Primary of second I.F. transformer.

   Secondary of first I.F. transformer.

   Primary of first I.F. transformer.

Adjusting the circuits to obtain maximum reading on the output meter, reducing the output of the test
oscillator as required.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be very carefully made and in the
order specified.

Alignement of Short Wave Range (Also Referenced as "C Range")

In aligning the radio frequency circuits for this range, replace the 0.1-microfarad capacitor which was
placed in series with the test oscillator's output load for the I.F. alignment, with a 100-ohm carbon type resistor.
This lead should then be connected to the antenna binding post located on the rear of the receiver chassis.

1. Rotate the Electric Tuning and Range Switch control knob to the Short Wave ("C") range position, and
set the test oscillator's frequency and the receiver tuning dial to 15 nanocycles.

2. Adjust the oscillator's "C" range high frequency aligner for maximum output.

3. Adjust the antenna's "C" range high frequency aligner for maximum output and at the same time rotate
the gang tuning capacitor back and forth through resonance until maximum output is obtained.

Alignement of Standard Broadcast Range (Also Referenced as "A Range")

In aligning the radio frequency circuits for this range, replace the 600-ohm carbon type resistor in series
with the test oscillator's output load with a 200-microfarad capacitor and align these circuits as follows:

1. Rotate the Electric Tuning and Range Switch control knob to the manual tuning, Standard Broadcast
("A") range position and set the test oscillator's frequency and the receiver's tuning dial to 1.5 nano-
cycles.

2. Adjust the oscillator's "A" range high frequency aligner for maximum output.

3. Adjust the antenna's "A" range high frequency aligner for maximum output.

4. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 nanocycles.

5. Adjust the oscillator's "A" range low frequency aligner (series aligner) for maximum output, and at the
same time rotate the gang tuning capacitor slightly back and forth through resonance until maximum
output is obtained.

6. Reset both the test oscillator's frequency and receiver's tuning dial to 1.5 nanocycles and repeat opera-
tions Nos. 2 and 3.

Wave Trap Adjustment

In aligning the wave trap circuit, set the Electric Tuning and Range Switch control knob to the manual
tuning, Standard Broadcast position (arrow on knob pointing in direction of letters "HII."). Set the dial pointer
to 1060 kilocycles and the Electric Tuning Set-Up Switch located on the back of the receiver chassis, to the
"Set-Up" position.

Connect a 200-microfarad capacitor in series with the output terminals of the modulated test oscil-
lator and the antenna binding post to the receiver, and the ground terminal of the test oscillator to the ground
binding post on the receiver. Then, with the modulated test oscillator set at the frequency of the intermediate
amplifier, 50 kilocycles, supply a fairly strong signal to the receiver and adjust the wave trap aligner until a
maximum indication is obtained on the output meter.

IMPORTANT: When all the aligning adjustments have been completed, it is important that the Electric
Tuning Set-Up Switch (located on the rear of the receiver chassis) be reset to the "Operate" position.

OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS FOR NOS. 340, 341 AND 342 RECEIVERS NOT EQUIPPED WITH A RECORD PLAYING UNIT

In order to obtain reproduction of phonograph records in conjunction with these receivers, the following
instructions should be followed.

To equip these receivers for phonograph operation, it will be necessary to purchase and install a Strom-
berg-Carlson, P-25712 Package Assembly. The rear of the chassis base of the receiver is already drilled for this
assembly. Complete instructions on how to install and operate this assembly are furnished with each P-25712
Package Assembly.

To obtain the best quality of phonograph reproduction from these receivers, a Stromberg-Carlson Record
Player is recommended. The record player is equipped with a correctly designed single record playing motor
unit, and uses a crystal type pick-up in conjunction with a specially balanced circuit.

If the Stromberg-Carlson Record Player is not used and the electric pick-up is used in the high ins-
ulation type, it will be necessary to connect a coaxial shielded cable between the three-prong socket and 25712 Package Assembly, and the pick-up. This shielded cable should be of low capacity type.

The length of the shielded cable used should be kept as short as possible.

If a pick-up of the low impedance type is used, it will be necessary to connect a "matching transformer"
between the three-prong socket and plug of the P-25712 Package Assembly, and the pick-up. The transformer
should be located in rear to the receiver as possible in which case is it will not be necessary to use a shielded
 cable.
ELECTRICAL SPECIFICATIONS

Type of Circuit: Superheterodyne with Electric Tuning

Tuning Ranges: A—53 to 1.7 Mc.; B—2.25 to 7.6 Mc.; C—7.6 to 23 Mc.

Number and Type of Tubes: 1 No. 6K8, 2 No. 6K7, 1 No. 6H6, 1 No. 6F5, 1 No. 6C5, 2 No. 6VG, 1 No. 6U5, 1 No. 80

Voltage Rating: 105 to 125 Volts

Power Frequency Rating: 25 to 60 Cycles and 50 to 60 Cycles

Input Power Rating: 85 Watts

Frequency of Intermediate Amplifier: 450 Kilocycles

APPARATUS SPECIFICATIONS

No. 345-F Receiver: 50 to 60 Cycles; P-29447 Chassis Assembly; P-26170 Speaker
No. 345-FB Receiver: 25 to 60 Cycles; P-29448 Chassis Assembly; P-26170 Speaker
No. 345-M Receiver: 50 to 60 Cycles; P-29447 Chassis Assembly; P-26170 Speaker
No. 345-MB Receiver: 25 to 60 Cycles; P-29448 Chassis Assembly; P-26170 Speaker
NORMAL VOLTAGE READINGS

The values of voltages listed in the following table are obtained by measuring between the various tube sockets and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in full operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring D.C. voltages. Voltages shown below are obtained on the lowest possible scale of a meter having the following ranges: 0.25, 0.5, 1.0, 0.005, 0.025, 0.050, 0.010 volts except when an asterisk appears after any given voltage value in which case the 200 volt scale was used.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Voltage (Volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7</td>
<td>R. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+240</td>
<td>-81</td>
<td>-1.25</td>
<td>+240</td>
<td>6.3</td>
<td>+2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>6K8</td>
<td>Mod. Osc.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+215</td>
<td>+75</td>
<td>-6</td>
<td>-81</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+240</td>
<td>+81</td>
<td>+1.25</td>
<td>0</td>
<td>6.3</td>
<td>+2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>616</td>
<td>Dem. A. V. C.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>615</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+83*</td>
<td>-1.0</td>
<td>+190</td>
<td>6.3</td>
<td>0</td>
</tr>
<tr>
<td>6C5</td>
<td>Audio Inv.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+100</td>
<td>+210</td>
<td>+1</td>
<td>-5</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
</tr>
<tr>
<td>6V6G</td>
<td>Audio Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+235</td>
<td>+240</td>
<td>0</td>
<td>6.3</td>
<td>+14</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6V6G</td>
<td>Audio Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+235</td>
<td>+240</td>
<td>0</td>
<td>6.3</td>
<td>+14</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6U5</td>
<td>Tuning Ind.</td>
<td>6.3</td>
<td>+20*</td>
<td>+1</td>
<td>+240</td>
<td>0</td>
<td>0</td>
<td>1-6</td>
<td>6.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Rectifier</td>
<td>—</td>
<td>+770</td>
<td>360</td>
<td>360</td>
<td>+240</td>
<td>—</td>
<td>—</td>
<td>1-4</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Speaker Socket</td>
<td>—</td>
<td>+770</td>
<td>0</td>
<td>0</td>
<td>+240</td>
<td>0</td>
<td>4-370</td>
<td>0</td>
<td>0</td>
<td>+240</td>
<td>0</td>
</tr>
</tbody>
</table>

Receiver tuned manually to 1000 Kc, no signal. A. C. voltages are indicated by italics.

ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no readjustments are necessary. However, should it become necessary to make any readjustments, the alignment procedure given in the following paragraphs should be carefully followed. In order to make these alignment adjustments in an easy and satisfactory manner, it is recommended that the Stromberg-Carlson P-24608 aligning tool be used.

To accurately align the circuits in these receivers, it is necessary to use a high grade, modulated test oscillator (Signal Generator), the output voltage of which can be varied. In conjunction with this test oscillator, a sensitive output meter should be used for determining the maximum signal voltage developed across the volume control of the loud speaker.

IMPORTANT: In making any R. F. or I. F. alignment adjustments, always adjust the test oscillator's output voltage to the minimum value where a good alignment may still be obtained. Never attempt to make any alignment adjustments using a strong signal. Before proceeding with the alignment of any R. F. or I. F. circuits in these receivers, be sure that the "Off-On-Tune" control knob is set for maximum treble response, and that the Electric Tuning Set-Up Switch, located near the rear of the chassis base, is set to the "Off-On-Tune" position. When the alignment adjustments have been completed the Electric Tuning Set-Up Switch should be reset back to the "Operate" position. Figure 1, shows the location of the all the alignment capacitors in these receivers.

Tune" control knob slightly clockwise from its most counter-clockwise position. By aid of a screwdriver rotate the slotted shaft of the Electric Tuning Set-Up Switch located at the rear of the chassis base, so that the slot points in the direction of the word "Set-Up". Rotate the Volume control knob to its maximum clockwise position (maximum volume).

2. Adjust the gang tuning capacitors (or ground binding post) of the receiver and grid of the No. 6K8 modulator-oscillator tube, a modulated signal of 455 kilocycles from the test oscillator, using a 01 micrometer screwdriver. Set receiver in series with the connection between the output terminal of the test oscillator and the grid of the No. 6K4 tube. Do not remove the chassis grid lead connecting to this tube. The ground (or low side) terminal of the test oscillator should be connected to either the chassis base or the ground binding post terminal of the receiver.

3. Now, noting from Figure 1, the aligning capacitors for the first and second I. F. transformers, align the I. F. circuits in the following manner:

Second of second I. F. transformer.
Primary of second I. F. transformer.
Primary of first I. F. transformer.

Adjust the circuits to obtain maximum reading on the output meter, reducing the output of the test oscillator as required.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be very carefully made and in the order specified.

ALIGNMENT:

1. Be sure that the Electric Tuning Set-Up Switch is set to the "Set-Up" position.
2. Adjust the receiver's oscillator "C" range H. F. aligner for maximum output.
3. Adjust the R. F. transformer "C" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.
4. Adjust the antenna "C" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.

ALIGNMENT OF SHORT WAVE RANGE, "B"

1. In aligning the radio frequency circuits for this range, use the same artificial antenna (400 ohms resistor) and binding post as was used for aligning the "C" range, and align as follows:

2. Adjust the receiver's oscillator "B" range H. F. aligner for maximum output.
3. Adjust the R. F. transformer's "D" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.
4. Adjust the antenna "B" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.

ALIGNMENT OF STANDARD BROADCAST RANGE, "A"

In aligning the radio frequency circuits for this range, replace the 400-ohm carbon type resistor in series with the test oscillator's output lead with a 200-micro-microfarad capacitor and align these circuits as follows:

1. Rotate the Electric Tuning and Range Switch control knobs to the "Station Select" position and set the test oscillator's frequency and the receiver's tuning dial to 1.5 megacycles.
2. Adjust the receiver's oscillator "A" range H. F. aligner for maximum output.
4. Adjust the antenna "A" range H. F. aligner for maximum output.
5. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 megacycles.
6. Adjust the receiver's oscillator "A" range L. F. aligner (series aligner) for maximum output, and at the same time rotate the gang tuning capacitors slightly back and forth through resonance until maximum output is obtained.
7. Reset both the test oscillator frequency and the receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2, 3 and 4.
Increasing Pass Response Of 345 Receivers

Remove the 4700 ohm resistor (R-17) from the volume control tap and replace with a 10,000 ohm resistor, P.A. 26345.

Remove the .15 mf capacitor (C-37) from the volume control tap and replace with a .1 mf capacitor, P.A. 24402.

Remove the .001 mf capacitor (C-42) from the high side of the volume control and replace with a .04 mf capacitor, P.A. 24405.

Caution: Do not mistake capacitor C-38 for one of the capacitors to be changed.

September 7, 1938.

Voluntary Socket, Trimmers

Bass
Response

Dat

MODEL 345

Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

Receiver tuned manually to 1000 Kc. no signal. A. C. voltages are indicated by italics.

APPARATUS SPECIFICATIONS

No. 345-L Receiver. 50 to 60 Cycles; P-28118 Chassis Assembly; P-2660 Loud Speaker
No. 345-LB Receiver. 25 to 60 Cycles; P-28118 Chassis Assembly; P-2706 Loud Speaker
No. 346-P Receiver. 60 Cycles Only; P-28416 Chassis; P-2949 Phono Unit; P-2944 Loud Speaker
No. 346-PP Receiver. 25 Cycles Only; P-29416 Chassis; P-2949 Phono Unit; P-2944 Loud Speaker

NORMAL VOLTAGE READINGS

The values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in full operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1500 ohms per volt should be used for measuring the D. C. voltages. Voltage values shown are those obtained on the lowest possible scale of a meter having the following ranges: 6.25, 25, 100, 0.1, 0.01, 0.005, and 0.001 volts except when an asterisk appears after any given voltage value in which case the 250 volt scale was used.

Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Aligning Capacitors.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Heaters</th>
<th>Socket Terminal Numbers</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Mod. Osc.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>245</td>
<td>6</td>
<td>10</td>
<td>245</td>
<td>6.2</td>
<td>2.7</td>
<td>6.2</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>250</td>
<td>2.8</td>
<td>280</td>
<td>6.2</td>
<td>2.7</td>
<td>6.2</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6H6</td>
<td>Dem. A. V. C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.2</td>
<td>2.7</td>
<td>6.2</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6I5</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>250</td>
<td>6</td>
<td>0</td>
<td>6.2</td>
<td>2.7</td>
<td>6.2</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6F6G</td>
<td>Audio Output</td>
<td>0</td>
<td>0</td>
<td>235</td>
<td>250</td>
<td>0</td>
<td>6.2</td>
<td>14.5</td>
<td>2.7</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6U5</td>
<td>Tuning Ind.</td>
<td>6.2</td>
<td>181</td>
<td>1.5</td>
<td>250</td>
<td>0</td>
<td>1-6</td>
<td>6.2</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>+360</td>
<td>350</td>
<td>350</td>
<td>+300</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1-4</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker Socket</td>
<td>360</td>
<td>0</td>
<td>0</td>
<td>350</td>
<td>350</td>
<td>260</td>
<td>0</td>
<td>250</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Type of Circuit: Superheterodyne with A. F. C. Electric Tuning
Tuning Ranges: A—530 to 1700 Ke.; B—1700 to 5600 Ke.; C—5600 to 18,000 Ke.

Voltage Rating: 105 to 125 Volts, A. C.
Power Frequency Rating: See “Apparatus Specifications”
Power Input Rating:
- Radio Models Only: 120 Watts
- Radio-Phono Models: 140 Watts
Frequency of Intermediate Amplier: 455 Kilocycles

APPARATUS SPECIFICATIONS

FOR TUNER

No. 350-M Receiver. 50 to 60 Cycles; P-29043 Chassis; P-27504 Speaker
No. 350-MB Receiver. 25 to 60 Cycles; P-29044 Chassis; P-27504 Speaker
No. 350-R Receiver. 50 to 60 Cycles; P-29043 Chassis; P-27504 Speaker
No. 350-RB Receiver. 25 to 60 Cycles; P-29044 Chassis; P-27504 Speaker
No. 350-P Receiver. 60 Cycles Only; P-29066 Chassis; P-27504 Speaker; P-29443 Phono. Motor Unit
No. 350-PB Receiver. 25 Cycles Only; P-29067 Chassis; P-27504 Speaker; P-29444 Phono. Motor Unit
No. 350-V Receiver. 50 to 60 Cycles; P-29043 Chassis; P-27504 Speaker
No. 350-VB Receiver. 25 to 60 Cycles; P-29044 Chassis; P-27504 Speaker

SEE INDEX
Fig. 3. Wiring Diagram, No. 350 Receiver.

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ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no readjustments are required later. However, should it be necessary to make any adjustments, the procedure given in these instructions should be carefully followed. The preferred method of aligning the receivers is by the use of a suitable millivoltmeter and audio oscillator (the same device as the microphone). The method described will also permit generation of audio output voltages of at least 0.25 Millivolt. The output should be monitored, and the knob is turned until the signal generator's output control so that a signal of 50,000 to 100,000 millivolts is fed into the No. 648 modulator tube. Now, observe the reading of the millimeter which is connected in series with the cathode of the No. 6F8-G oscillator control tube, and rotate the Range Switch control knob to the "Electric" position, observing the difference in the reading of millimeter. When this circuit is correctly adjusted, there should be no difference in the reading of the millimeter when the Range Switch is rotated from the manual tuning Standard Broadcast to the "Electric" position. If there is any difference in the reading of the millimeter while rotating this control knob from the manual tuning Standard Broadcast to the "Electric" position and vice versa, adjust the "Discriminator" circuit by means of the screw adjustment until the meter reading has the same value regardless of whether the Range Switch is set to Standard Broadcast or to the "Electric" position. When this condition is obtained, the Discriminator circuit is properly adjusted.

Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be carefully made and in the order given below to ensure exact tuning. When making any aligning adjustments of these circuits, the Fidelity Control knob should be set for "Normal" operation and the "Off-Grid" control knob should also be set in this mode.

1. Operate the Range Switch on the receiver chassis to the short wave ("C") range position, and set the test oscillator's frequency and the receiver's tuning dial to 10 megacycles.
2. Adjust the receiver's oscillator "C" range high frequency aligner for maximum output.
3. Adjust the antenna "C" range high frequency aligner for maximum output, at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
4. Set the test oscillator's frequency and the receiver's tuning dial to 6 megacycles.
5. Adjust the receiver's oscillator "C" range low frequency aligner (series aligner), and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
6. Reset both the test oscillator's frequency and the receiver's tuning dial to 15 megacycles and repeat operations Nos. 2 and 3.

Alignment of Medium Wave Range (Also Referred to "B" Range)

In the medium wave range, circuits for this range use the same artificial antenae (400-ohm carbon type resistor) in series with the output terminal of the test oscillator as was used for aligning the short-wave range.

1. Operate the Range Switch on the receiver chassis to the Medium Wave ("B") range position, and set the test oscillator's frequency and the receiver's tuning dial to 5 megacycles.
2. Adjust the receiver's oscillator "B" range high frequency aligner for maximum output.
3. Adjust the antenna "B" range high frequency aligner for maximum output, at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.

Alignment of Standard Broadcast Range (Also Referred to as "A" Range)

In the standard broadcast range, the 400-ohm carbon type resistor in series with the oscillator's output lead with a 200-micro-photocapacitor and align circuits as follows:

1. Operate the Range Switch to the manual tuning Standard Broadcast position and set the test oscillator's frequency and the receiver's tuning dial to 1000 kilocycles.
2. Adjust the receiver's oscillator "A" range high frequency aligner for maximum output.
3. Adjust the antenna "A" range high frequency aligner for maximum output.
4. Set the test oscillator's frequency and the receiver's tuning dial to 6 megacycles.
5. Adjust the receiver's oscillator "A" range low frequency aligner (series aligner) for maximum output.
6. Set both the test oscillator's frequency and the receiver's tuning dial to 15 megacycles and repeat operations Nos. 2, 3, and 4.

Wave Trap Adjustment

In aligning the wave trap circuit, select the Electric Tuning and Range Switch control knob to the manual tuning, Standard Broadcast position (arrow on knob pointing in direction of gold dot). Set the tuning dial to 1000 kilocycles. Connect a 200-micro-photocapacitor in series with the output terminal of the modulated test oscillator and the antenna terminal on the receiver, and the ground terminal of the test oscillator to the ground binding post on the receiver. Then, with the modulated test oscillator set at the frequency of the intermediate amplifier's carrier frequency, smoothly turn the Wave Trap adjustment until the modulated signal is heard, and then slowly increase the frequency until a clear modulated signal is heard. This is the condition for minimum indication on the output meter.

1. Test speaker socket with speaker left out.
2. Plug speaker in speaker socket for all other tests.
3. Set A.F.C. Switch on rear of chassis base to "Operate" position for all tests unless otherwise specified.
   A. Operate A.F.C. switch on rear of chassis to "Set Up" position; should read 120W.

   Operate A.F.C. switch on rear of chassis to "Operate" position; should read 4 M.

   B. Operate A.F.C. switch on rear of chassis to "Set Up" position; should read 550,000W.

   Operate A.F.C. switch on rear of chassis to "Operate" position; should read 4 M.

   C. Operating volume control clockwise should read from "S" to 800,000W.

Other tests not shown on chart.

Test from Electric tuning pilot lamp socket. Operate Manual-Electric switch to "Manual" position; should read "O". Operate Manual-Electric switch to "Electric" position; should read "S".

Test from main dial pilot lamp socket. Operate Manual-Electric switch to "Manual" position; should read "S". Operate Manual-Electric switch to "Electric" position; should read "O".

Test from Ant. terminal on back of chassis base. Operate range switch to "A" band; should read 5W. Operate range switch to "B" band; should read 1W. Operate range switch to "C" band; should read .5W.

Test from Grid. terminal on back of chassis base; should read "S".

Test from terminals of A.C. plug to chassis base; should read "O". Test between terminals of A.C. plug; should read 5W with A.C. switch closed; should read "O" with A.C. switch open.

Test from the Stator Plates of the oscillator section of the variable capacitor (located near front of chassis) to the switch side of the .001 capacitor (located next to the "A" and "B" band series aligner). Operate range switch to "A" band; should read 10W. Operate range switch to "B" band; should read 10W. Operate range switch to "C" band; should read 1W.

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The Stromberg-Carlson Model 300 Radio Receivers are twelve tubes, electronic, transistorized units, which make use of the new triode, pentode, and tetrode tubes in combination. With these units, the tubes are arranged to form a complete radio circuit, the complete radio circuit being divided into four groups: The first group contains the tubes, which provide the necessary amplification, the second group contains the tubes, which provide the necessary frequency control, the third group contains the tubes, which provide the necessary frequency control, and the fourth group contains the tubes, which provide the necessary frequency control. These tubes are also provided with a low level frequency control circuit, which increases or decreases the response of the receiver as the user desires. The new tubes are arranged to form a complete radio circuit, the complete radio circuit being divided into four groups: The first group contains the tubes, which provide the necessary amplification, the second group contains the tubes, which provide the necessary frequency control, the third group contains the tubes, which provide the necessary frequency control, and the fourth group contains the tubes, which provide the necessary frequency control. These tubes are also provided with a low level frequency control circuit, which increases or decreases the response of the receiver as the user desires.

Circuit Description

These receivers are also provided with a low level frequency control circuit. This control is adjusted with a screwdriver to finally identify the service and frequency control circuit. Four sets of controls are arranged to form a complete radio circuit, the complete radio circuit being divided into four groups: The first group contains the tubes, which provide the necessary amplification, the second group contains the tubes, which provide the necessary frequency control, the third group contains the tubes, which provide the necessary frequency control, and the fourth group contains the tubes, which provide the necessary frequency control. These tubes are also provided with a low level frequency control circuit. This control is also provided to increase or decrease the response of the receiver as the case may be.
Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Aligning Adjustments.

NORMAL VOLTAGE READINGS

The various values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with all the tubes in their respective sockets. The receiver is therefore, in operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

| Tube          | Circuit          | Cap | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | Socket Terminal Numbers | Heater Voltages Between Heater Terminals | Volts |
|---------------|------------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------------------------|---------------------------------|-------|
| 6K7           | R. F. Amp.       | 0   | 0  | 0  | 220| -104| 0   | -82| 6  | 2  | 0   | 2-7 | 6.2 |    |    |    |    |    | 6.2                    |                                | 6.2   |
| 6A8           | Modulator       | 0   | 0  | 0  | -227| +82 | -8.6**| +82| 6  | 2  | 0   | 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6F8-G         | Oscillator and Oscillator Control | 0   | 0  | 0  | -172| +8.3 | -8.6**| +170| 6  | 2  | 0   | 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6K7           | I. F. Amp.       | 0   | 0  | 0  | +240| +104| +3.3 | 0  | 6  | 2  | +3.3| 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6B8           | I. F. Amp. and A. V. C. | 0   | 0  | 0  | -218| 0   | -104| 6  | 2  | 0   | 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6R7           | Demodulator and Bass Amp. | 0   | 0  | 0  | -100**| 0   | +25*| 6.2 | +3.8| 2-7 | 6.2 |    |    |    |    |    |    |    |                         |                                | 6.2   |
| 6H6           | Discriminator   | -   | -  | -  | -   | -   | -   | 0  | 6  | 2  | 0   | 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6N7           | Audio Inv.      | -   | -  | -  | -   | -   | -   | 0  | 6  | 2  | +29 | 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6F6           | Audio Output    | -   | -  | -  | -   | -   | -   | 0  | 6  | 2  | +19.5| 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6F6           | Audio Output    | -   | -  | -  | -   | -   | -   | 0  | 6  | 2  | +19.5| 2-7 | 6.2 |    |    |    |    |    |                         |                                | 6.2   |
| 6U5           | Tuning Ind.     | 6.2 | +12.4| -1.4 | +237| +2.8| 0   | -   | -   | -   | 1-6 | 6.2 |    |    |    |    |    |    |                         |                                | 6.2   |
| 523           | Rectifier       | +435| +420| +420| +435 | -   | -   | -   | -   | -   | 1-4|-- | 4.8 |    |    |    |    |    |    |                         |                                | 4.8   |
| Voltage Socket|                  | +115| 0   | 0   | +440| +440| 0   | +320|     |     |     |     |     |     |     |     |     |     |     |                         |                                |       |
| Motor Winding |                  | 22  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                         |                                |       |

Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Aligning Adjustments.

CIRCUIT DESCRIPTION

The Stroemberg-Carlson No. 370 Radio Receivers are fourteen tube, "Electric Tuning", adjustable high fidelity receivers with four tuning ranges. The electric tuning circuit combines a highly efficient motor and selector circuit in combination with an automatic frequency control circuit. The electric tuning circuit is arranged so that eight favorite stations located in the standard broadcast range may be set up for selection by means of the push buttons (local and other stations that give the best daytime and evening service should be selected). To properly set up the electric tuning arrangement for the eight favorite broadcast stations, read the section, "Instructions for Setting Up Electric Tuning Arrangement".

When manually tuning these receivers or when setting up the eight desired stations for electric tuning, resonance with a signal is indicated by means of the tuning indicator tube which operates on the cathode-ray principle. The strength of a received signal may be determined by observing the size of the aperture (inception of glow) or the width of the aperture (inception of glow by cathode-ray). The aperture of the receiver must be directed to the target of the tube; the stronger the received signal the greater the width of the aperture.

These receivers are also provided with a low level bass frequency compensating circuit in conjunction with the volume control circuit so that balanced reproduction is obtained for any setting of the volume control. A separate bass control is also provided to increase or decrease the response at the lower (bass) audio frequencies when desired.

These receivers are also equipped with a special arrangement of the Stroemberg-Carlson, Selector dial indicator. This design of dial arrangement enables the operator to easily identify the source and frequency range in which the range switch control knob is set by means of the yellow disc (located at the right-hand edge of the dial), which moves in a vertical direction in conjunction with the rotation of the range switch control knob.

The various tubes used in these receivers as follows: One No. 6K7 is used in the R. F. Amplifier and the other two are used in the I. F. Amplifier. The No. 6A8 tube is used as the Modulator tube and the No. 6F8-G tube is used for both Oscillator and Oscillator Control tube. One No. 610 tube is used as the Demodulator and Automatic Volume Control tube. The other No. 686 tube is used in the Discriminator circuit for Automatic Frequency control. The No. 627 tube is used in the Bass Amplifier and the No. 615 tube is used in the Audio Amplifier. The No. 625 tube is used as the Phase Inverter tube of the Audio Amplifier circuit and the two No. 516 tubes are used in the Audio Power Output Stage. The No. 623 tube is used for indicating resonance in the Tuning Indicator System. The No. 323 tube is the Rectifier tube of the power supply for these receivers designed for operation on a power supply having a frequency of 50 to 60 cycles; models of these receivers designed for operation on a power supply having a frequency of 25 to 60 cycles, use a No. 524 tube as the Rectifier tube of the power supply.

Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Aligning Adjustments.

The various voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with all the tubes in their respective sockets. The receiver is therefore, in operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.
No. 370-M Receiver
50 to 60 Cycles; P-29070 Chassis; P-29072 Speaker

No. 370-MB Receiver
20 to 60 Cycles; P-29071 Chassis; P-29072 Speaker

Voltage Rating
100 to 125 Volts, A. C.

Power Frequency Rating
See "Apparatus Specifications"

Input Power Rating
150 Watts

Frequency of Intermediate Amplifier
455 Kilocycles

---

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The antenna for the Model EQ (table model) and FQ (console) should be about 100 feet long and as high as possible. No ground connection is necessary. A continuously variable tone control is used in Model FQ.
Plates 6A7, 78, and 42's ... 200 v.  Cathode 6A7  ...  .25 v
Plate 37  .................  50 v.  "  78  ........  2 v.
Plate 75  .................  30 v.  "  75  ........  .5 v
Screens 6A7 and 78 .......  50 v.  "  37  ........  4 v.
  "  42's  .......  15 v.

1  Gang condenser  18  \( \frac{1}{2} \) megohm  35  \( \frac{1}{2} \) megohm
2  .1 mfd.  19  55 ohms  36  400 ohms
3  .0001 mica  20  25M ohms  37  33 ohms
4  .002 mfd.  21  \( \frac{1}{2} \) megohm  38  Freqselector coil
5  .01 mfd.  22  800 ohms  39  Antenna coil
6  .0005 mfd.  23  \( \frac{1}{2} \) megohm  40  Oscillator coil
7  10 mfd.  electr.  24  \( \frac{1}{2} \) meg. control  41  I.F. coil
8  .005 mfd.  25  7500 ohms  42  I.F. coil
9  5 mfd.  electr.  26  \( \frac{1}{2} \) megohm  43  Speaker
10  .0025 mfd.  27  25M ohms  44  Filter choke
11  8 mfd.  electr.  28  2500 ohms  45  R.F. choke
12  16 mfd.  electr.  29  100M ohms  46  Power trans.
13  .25 mfd.  30  20 ohms  47  Stepdown trans.
14  .02 mfd.  31  50 ohms  48  Band switch
15  .25 mfd.  32  800 ohms  49  Off-on switch
16  1 mfd.  33  50M ohms  50  Power switch
17  .25 mfd.  34  \( \frac{1}{2} \) meg. control  51  2 amp. fuse

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ALIGNMENT PROCEDURE

Adjust IF coils to 456 EC.

Model 8Q-39 and PQ-39
Switch to shortwave band: turn dial to 5 MC and adjust trimmer on the rear section of the gang condenser to maximum output.
Switch to broadcast band: turn dial to 1400 KC. Adjust trimmer connected to switch to maximum output. Track antenna by adjusting trimmer on antenna section of the gang condenser.
Switch to shortwave, turn dial to 5 MC and track antenna by adjusting trimmer on top of the antenna coil.

Model 72 channel layout

Control panel 8Q

Model 72 channel layout

Control panel 72

Model PQ-39 may be operated on either 32 volts DC or 110 volts AC. To switch the set for 110 volt operation, the following instructions must be carried out:
1. Disconnect set from 22 volt line.
2. Remove cover from power pack and pull out vibrator.
3. Replace cover and fit switch lever back into slot in switch shaft.
4. Remove screw holding lever and throw switch to right.
5. Reset screw in hole at the right.

If set is inoperative, check fuse (2 amp, 250 volt). An ordinary fuse may be substituted. The fuse protects the set from lightning as well as from line voltage overloads.

ALIGNMENT PROCEDURE

Turn dial to closed gang position and make certain that the dial needle coincides with the end of the scale. Turn dial to about midpoint and adjust the I.F. coils to 456 EC.

Switch to shortwave band: set dial needle to 15 MC and adjust bottom trimmers in antenna and oscillator coils to maximum output.

Switch to police band (middle band) set dial at 5 KC and adjust the second trimmers from the bottom to maximum output.

Switch to broadcast, set dial at 1400 KC and adjust the third trimmers from the bottom to maximum output. This is the series tracking condenser.

The type 6A9G tube has been found to give better oscillator performance than the 6D9 and is used in present production. The switch which turns the tuning eye and dials off and is located on the back of the panel.

Chassis layout 72-67

6A9G 6Q7 6Q7A 6Q7M 6Q7C 6A9C

Model 8Q-39, PQ-39

Adjust IF coils to 456 EC.

Switch to shortwave band: turn dial to 5 MC and adjust trimmer on the rear section of the gang condenser to maximum output.

Switch to broadcast band: turn dial to 1400 KC. Adjust trimmer connected to switch to maximum output. Track antenna by adjusting trimmer on the antenna section of the gang condenser.

Switch to shortwave, turn dial to 5 MC and track antenna by adjusting trimmer on top of the antenna coil.

Model 8Q channel layout

Control panel 8Q

Model PQ channel layout

Control panel PQ

Model 72 channel layout

Control panel 72

Model 8Q-39 has the same circuit as the PQ plus a tuning eye. The type 6A9G tube has been found to give better oscillator performance than the 6D9 and is used in all Model 8Q's except those built in the earlier part of the season.

ALIGNMENT PROCEDURE

Turn dial to closed gang position and make certain that the dial needle coincides with the end of the scale. Turn dial to about midpoint and adjust IF coils to 456 EC.

Switch to shortwave band: set dial needle to 15 MC and adjust bottom trimmers on antenna and oscillator coils to maximum output.

Switch to police band (middle band) set dial at 5 MC and adjust second trimmers from the bottom to maximum output.

Switch to broadcast, set dial at 1400 KC and adjust the third trimmers from the bottom. Then adjust the raddar located on the front section of the gang condenser. Turn to 600 KC and adjust the top trimmer in the oscillator coil. This is the series tracking condenser.

ALIGNMENT PROCEDURE

Turn dial to closed gang position and make certain that the dial needle coincides with the end of the scale. Turn dial to about midpoint and adjust IF coils to 456 EC.

Switch to shortwave band: set dial needle to 15 MC and adjust bottom trimmers on antenna and oscillator coils to maximum output.

Switch to police band (middle band) and set dial at 5 MC. Adjust second trimmers from the bottom to maximum output.

Switch to broadcast, set dial at 1400 KC and adjust the third trimmers from the bottom. Then adjust the radder located on the front section of the gang condenser. Turn to 600 KC and adjust the top trimmer in the oscillator coil. This is the series tracking condenser.
Alignment procedure
To adjust I.F. coils Oscillator at 175KC to grid of 6D8G tube; adjust I.F. trimmers to maximum output.
To adjust R.F. coils Set oscillator at 1400 KC connect to antenna lead, dial at 1400 KC, adjust oscillator padder located on the rear of the gang condenser, to maximum. Then adjust the two other padders on the gang condenser to maximum output.

Voltages (As measured by a 1000 ohm per volt meter)

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+ 140 - 160 volts</td>
<td>Cathode voltages</td>
</tr>
<tr>
<td>Anode grid 6D8G 60-70 v.</td>
<td>6S7G's</td>
</tr>
<tr>
<td>Plate RF 6S7G 60-70 v.</td>
<td>6D8G</td>
</tr>
<tr>
<td>Screens 6D8G &amp; 6S7G 50-60 v.</td>
<td>6T7G</td>
</tr>
<tr>
<td>41</td>
<td>11 volts</td>
</tr>
</tbody>
</table>

Voltages on the Model NO (table model) are somewhat lower than the above. Some changes in circuit constants in sets built prior to Aug. 1937, will be found. "Motorboating on this set can be corrected by seperating the grid leads on the gang condenser as far as possible.

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The TP-67 is a console model; the SF-67 is a table model. The antenna should be as high as possible and about 100 feet long. A good ground is essential for good reception. The blue wire from the set is the antenna lead. If the set is to be operated on 110 volts continuously, the vibrator should be removed.

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L'TATRO MFG. CO.

MODELS AQ-G9,BQ-69

Schematic

FOR ALIGNMENT SEE INDEX

NOTE: IF SET APPEARS DEAD, TAP VIBRATOR RECT ON TRADITIONAL CENTER. IF SET IS OPERATED CONTINUOUSLY ON DC VOLTAGE, REMOVE VIBRATOR.

IF PEAK 456 KC

110 V. AC.

VOLTAGES

Plates 6D8G, 6S7G, and 41 150 volts
Plate 6T7G 50 volts
Screen 6D8G and 6S7G 50 volts.

Cathode 6D8G 0.5 volt
6S7G 1.5 volt
6T7G 0.5 volt
41 15 volts

When set is on AC, voltages will be somewhat higher.

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mfd.</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>0.002 mfd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ant. section of gang</td>
<td>20</td>
<td>50M ohms</td>
</tr>
<tr>
<td>21</td>
<td>25M ohms</td>
<td></td>
</tr>
<tr>
<td>Osc. section of gang</td>
<td>22</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>23</td>
<td>1.5 Megohm</td>
<td></td>
</tr>
<tr>
<td>Ant. coil</td>
<td>24</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>25</td>
<td>1.5 Megohm</td>
<td></td>
</tr>
<tr>
<td>RF choke</td>
<td>26</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Tone-light switch</td>
<td>27</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Antenna coil</td>
<td>28</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Tune control</td>
<td>29</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Filter choke</td>
<td>30</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Dailite switch</td>
<td>31</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Speaker</td>
<td>32</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Power trans.</td>
<td>33</td>
<td>1.5 Megohm</td>
</tr>
<tr>
<td>Power trans.</td>
<td>34</td>
<td>1.5 Megohm</td>
</tr>
</tbody>
</table>

Items 36, 45 and 46 are used in Model BQ only. Items 42, 43 and 44 are used in Model AQ only.

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SERVICE SUGGESTIONS

CIRCUIT: The receiver uses a superhet circuit. The tubes used are: type 6C6 as oscillator and modulator, a type 6O6 in the I.F. stage, a type 6C6 as second detector and audio amplifier and a type 45 output tube. The I.F. is 456 K.C.

ALIGNING THE SET: Only in rare cases will it be found necessary to adjust any trimmers. If the volume is low, everything else should be checked before attempting to align the set. The only case where the fault is in the alignment is when both low volume and poor selectivity are present. To align the I.F. set, connect the test oscillator to 456 K.C. and connect it to the grid of the first 6C6 tube and adjust the upper screw on the first I.F. transformer. The signal should come in between 15 and 50 on the dial. Adjust the two trimmers on the tuning condenser for maximum output. Check at 600 K.C. The lower trimmer on the first I.F. transformer is the oscillator coupling condenser and should not be changed.

Price and Parts List for Clarion TC-31

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Code No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPE2010</td>
<td>L1</td>
<td>Antenna Coil</td>
<td>.95</td>
</tr>
<tr>
<td>TPE2020</td>
<td>L2</td>
<td>Oscillator coil</td>
<td>.95</td>
</tr>
<tr>
<td>TPE2030</td>
<td>L3</td>
<td>First I.F.</td>
<td>1.50</td>
</tr>
<tr>
<td>TPE2040</td>
<td>L4</td>
<td>Second I.F.</td>
<td>1.50</td>
</tr>
<tr>
<td>TPE2050</td>
<td>L5</td>
<td>Speaker Transformer</td>
<td></td>
</tr>
<tr>
<td>TPE2060</td>
<td>L6</td>
<td>Speaker Field</td>
<td>4.50</td>
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<tr>
<td>TPE2070</td>
<td>L7</td>
<td>Choke</td>
<td>1.25</td>
</tr>
<tr>
<td>TPE2080</td>
<td>R1</td>
<td>Pilot shunt</td>
<td>.25</td>
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<tr>
<td>TPE2090</td>
<td>RSASW</td>
<td>Volume control and switch</td>
<td>1.10</td>
</tr>
<tr>
<td>TPE2100</td>
<td>R2</td>
<td>7500 ohm carbon resistor</td>
<td>.19</td>
</tr>
<tr>
<td>TPE2110</td>
<td>R4</td>
<td>Filament resistor 200 ohms</td>
<td>.10</td>
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<tr>
<td>TPE2120</td>
<td>R5</td>
<td>50,000 ohm carbon resistor</td>
<td>.19</td>
</tr>
<tr>
<td>TPE2130</td>
<td>R6</td>
<td>10,000 ohm carbon resistor</td>
<td>.19</td>
</tr>
<tr>
<td>TPE2140</td>
<td>R7</td>
<td>500,000 ohm carbon resistor</td>
<td>.19</td>
</tr>
<tr>
<td>TPE2150</td>
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<td>50,000 ohm carbon resistor</td>
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<td>TPE2160</td>
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<td>.19</td>
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<tr>
<td>TPE2180</td>
<td>R11</td>
<td>7500 ohm paper condenser</td>
<td>.14</td>
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<tr>
<td>TPC2200</td>
<td>C1</td>
<td>1 mfd. paper condenser</td>
<td>.15</td>
</tr>
<tr>
<td>TPC2210</td>
<td>C2</td>
<td>.002 mfd. paper condenser</td>
<td>.14</td>
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<td>TPC2220</td>
<td>C3</td>
<td>1 mfd. paper condenser</td>
<td>.14</td>
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<tr>
<td>TPC2230</td>
<td>C4</td>
<td>.002 mfd. paper condenser</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2240</td>
<td>C5</td>
<td>10 mfd. electrolytic condenser,70</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2250</td>
<td>C6</td>
<td>0.001 mfd. paper condenser</td>
<td>.13</td>
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<td>TPC2260</td>
<td>C7</td>
<td>0.05 mfd. paper condenser</td>
<td>.14</td>
</tr>
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<td>C8</td>
<td>0.10 mfd. paper condenser</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2280</td>
<td>C9</td>
<td>0.05 mfd. paper condenser</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2290</td>
<td>C10</td>
<td>0.05 mfd. paper condenser</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2300</td>
<td>C11</td>
<td>0.05 mfd. electrolytic condenser,70</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2310</td>
<td>C12</td>
<td>0.05 mfd. electrolytic condenser,70</td>
<td>.14</td>
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<tr>
<td>TPC2320</td>
<td>C13</td>
<td>0.05 mfd. electrolytic condenser,70</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2330</td>
<td>C14</td>
<td>0.05 mfd. electrolytic condenser,70</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2340</td>
<td>C15</td>
<td>0.05 mfd. electrolytic condenser,70</td>
<td>.14</td>
</tr>
<tr>
<td>TPC2350</td>
<td>C16</td>
<td>1/3 watt carbon resistor any value</td>
<td>.19</td>
</tr>
</tbody>
</table>
**TRANSFORMER CORP. OF AMERICA**

NEW YORK, N.Y. U.S.A

**Schematic**

MODEL TC35LW

IF PEAK 456 KC
VOLTAGE READINGS:

Readings should be taken with volume control fully on. Use a D.C. Voltmeter having a resistance of 1000 ohms per volt.

Switch Position
1. Broadcast
2. SW.

IP Peak 456 KC

Six Tube Superheterodyne Receiver
A.C. or D.C. 105-125 Volts
Also available up to 240 V.

Short Wave
17.5 - 53 Meters
17000 - 5600 Kilocycles

Broadcast
190 - 560 Meters
1580 - 535 Kilocycles

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TRANSFORMER CORP. OF AMER.

Schematics

Clarion
MODEL TC-76
MODELS TC75, TC76
Transformer Corporation of America
100-6th Ave. New York, N.Y.

TONE CONTROL

1F PEAK
456 KC

IF PEAKED AT 456 KC

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ALIGNMENT: IF, SW in B.C. position. At 456 Kc through .1 mfd. condenser to 6A7 grid cap, dial at high frequency end, adjust regeneration trimmer (below chassis on IF coil assy) turn clockwise until oscillation takes place then reverse until oscillation stops. Readjust IF trimmers.

B.C.: Dial at 1720 Kc, Gen. at 1720 Kc, dummy ant. .00026 mfd. to antenna lead; adjust "R.C. Osc Trim" to max. At 1400 Kc adjust "B.C. Ant. Trim" to max. At 600 Kc adjust "B.C. Osc Pad".0006 while rocking dial. Check adjustments at 1720 and 1400 Kc.

S.W.; Band SW in S.W. position, dial at 6 M.C. Gen. at 6 M.C., 400 ohm dummy, adjust "S.W. Osc Trim" then "S.W. Ant Trim" to max. If set tends to oscillate, readjust regeneration trimmer.

©John F. Rider, Publisher
MODEL 5-Tube-6 Volt Batt.
MODEL 400

TRAV-LE RADIO & TELEVISION CORP.

Schematics, Socket

©John F. Rider, Publisher
MODEL 5-Tube AC-DC TRF
MODEL 5-Tube AC-DC Superhet
MODEL 11-Tube A-C Superhet.
Socket, Trimmers

MODEL 6-Tube Auto
Schematic

© John F. Rider, Publisher
CURRENT SUPPLY

The current supply switch at the rear of the chassis must be set to 115 or 230 volts to correspond to the available current and should never be changed while that current is being used! Be absolutely sure this switch is set right before you plug in the radio. If it is set for 115 volts and 230 volts is used, the transformer will burn out.
MODELS 6-Tube Auto
Voltage, Socket
Trimmers, Alignment
MODELS 6-8-Tube Batt. or A-C Sets

ALIGNMENT: 8 TUBE BATTERY OR A-C. and MODEL 539M.

L.F. ALIGNMENT

From a good signal generator, connect the proper leads, one to the radio chassis, the other thru a .002 mfd. condenser to the grid cap of the 6K8 with the set's grid lead still in place. Set the radio dial at 1720 K.C. and the signal generator to 450 K.C. With the set's volume control full on, increase the generator output until the signal is heard in the radio speaker. Adjust the L.F. trimmers for maximum output. Decrease the third I.F. and working back. Decrease the generator output as the speaker output increases.

LONG WAVE ALIGNMENT

Connect the signal generator lead thru a .002 mfd. condenser as dummy antenna, to terminal "A1", with the metal strip connected across A2 and G. Set the signal generator at 120 K.C. and the L.W. oscillator trimmer for maximum output. Adjust the L.W. RF and ANT trimmers at 120 K.C. by adjusting the dial and paddler together. Check the alignment again at 320 K.C.

BROADCAST BAND ALIGNMENT

Using the .002 mfd. condenser as dummy antenna, adjust the B.C. oscillator trimmer at 1720 K.C. Set the RF and ANT trimmers at 1400 K.C. Set the B.C. oscillator paddler at 600 K.C. by adjusting the dial and paddler together. Check the alignment again at 1400 K.C.

INTERMEDIATE BAND ALIGNMENT

Using a 400 ohm resistor as dummy antenna, adjust the Intermediate Band oscillator trimmer at 6.7 M.C. and the R.F. and Antenna trimmers at 6 M.C.

Check for alignment at 2.2 M.C.

SHORT WAVE BAND ALIGNMENT

Using the 400 ohm resistor as dummy antenna, adjust the S.W. oscillator trimmer at 24.5 M.C. and the R.F. and Antenna trimmers at 22 M.C.

Check for alignment at 8 M.C.

NOTICE

If a Standard All Wave dummy antenna is available, it should be used in place of the .002 mfd condenser, and the 400 ohm resistor.

On all bands the oscillator trimmers are adjusted with the variable condenser fully open.

ALIGNMENT; MODELS 6Tube Battery or A-C., 437M, 43M, 45M, 536M, 537M, and 666M.

NOTES: No Intermediate band on Models 656M and 646M.

L.F. From a good signal generator, connect the proper leads, one to the radio chassis, the other thru a .1 mfd. condenser to the grid cap of the 6K8 with the set's grid lead still in place. Set the radio dial to 1720 K.C. and the signal generator to 450 K.C. With the set's volume control full on, increase the generator output until the signal is heard in the radio speaker. Adjust the L.F. trimmers for maximum output, decreasing the generator output as the speaker output increases.

B.C.1. Connect the signal generator lead thru a .002 mfd. condenser as dummy antenna to the "A1" terminal, with the metal strip connected across A2 and G. Set the signal generator and radio dial at 1720 K.C. and adjust the B.C. oscillator trimmer for maximum output. 2. Set the signal generator and radio dial to 1400 K.C. and adjust the B.C. RF and ANT. trimmers for maximum output.

3. Set the signal generator to 600 K.C. and the radio dial to approximately 600 K.C. and adjust the B.C. oscillator paddler for maximum output by adjusting dial and paddler together.

Check the alignment again at 1400 K.C.

ANT Connect the signal generator lead thru a 400 ohm resistor as dummy antenna to A1. Set the dial and generator to 6700 K.C. and adjust the P.B. oscillator trimmer for maximum output. Adjust the R.F. and ANT. trimmers at 6000 K.C. and check for alignment at 2200 K.C.

6A7 Still using the 400 ohm resistor as dummy antenna, adjust the S.W. oscillator trimmer at 24.5 M.C. on dial and generator. Adjust the R.F. and ANT. trimmers at 22 M.C. and check for alignment at 8 M.C.

ALIGNMENT: 6 TUBE AUTO RADIO

1. Set variable condenser with rotor plates in open position. Set the signal generator to 2000 K.C., generator to 2000 K.C., generator to grid cap of 4AT using a .1 mfd. condenser as dummy antenna for maximum output, reducing signal generator output as signal increases.

2. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

3. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

4. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

5. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

6. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

7. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

8. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

9. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

10. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

11. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

12. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

13. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

14. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

15. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.

16. Set signal generator to 2000 K.C., connecting generator lead to terminals and generator using a .0005 mfd. condenser as a dummy antenna for maximum output, reducing signal generator output as signal increases.
ULTRAMAR

MODEL 465

FOR OTHER DATA SEE INDEX

MODEL 477

115 VOLTS A.C. OR D.C.

6ZS7G 6L5G 6T7G 6G6G

MODEL 456

IF PEAK 456 KC

MODEL 856

IF PEAK 456 KC

ULTRAMAR MFG. CORP.

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ULTRAMAR MFG. CORP.

MODELS 306, 316
Schematic, Socket
Trimmers, Alignment
MODEL 467 MODEL 465
Alignment Tuner Data

MODELS 877 & 889
TECHNICAL INSTRUCTIONS
A good output meter should be used in all alignment adjustments.

I. F. ALIGNMENT

From a good signal generator, connect the proper leads, one to the radio chassis, and the other thru a 1 mfd. condenser to the grid cap of the 6K6, with the tube's grid lead still in place. Set the radio dial to 1720 K.C. and the signal generator to 456 K.C. With the set's volume control full on, increase the generator output until the signal is heard in the radio speaker. Adjust the I, F. trimmers for maximum output, decreasing the generator output as the radio output increases.

LONG WAVE ALIGNMENT

Connect the signal generator lead thru a 0.002 mfd. condenser as dummy antenna, to the A1 terminal, with the metal strip connected across A1 and G. Set the dial and generator to 362 K.C. and adjust the oscillator trimmer for maximum output.

Align the L.W., R.F., and antenna trimmers at 320 K.C.

Align the L.W. oscillator pad at 200 K.C. by adjusting the dial and pad together. Check the alignment again at 320 K.C.

BROADCAST BAND ALIGNMENT

Using the 0.002 mfd condenser as dummy antenna, adjust the B.C. oscillator trimmer at 1720 K.C. for maximum output. Align the R.F. and antenna trimmers at 1400 K.C. and the B.C. oscillator trimmer at 600 K.C. by adjusting the dial and pad together. Check the alignment again at 1400 K.C.

INTERMEDIATE BAND ALIGNMENT

Using a 400 ohm resistor as dummy antenna, adjust the Intermediate Band oscillator trimmer at 6.7 M.C. and the R.F. and Antenna trimmers at 6 M.C.

Check for alignment at 2.2 M.C.

SHORT WAVE BAND ALIGNMENT

Using the 400 ohm resistor as dummy antenna, adjust the S.W. oscillator trimmer at 24.5 M.C., and the R.F. and Antenna trimmers at 22 M.C.

Check for alignment at 8 M.C.

MODELS 456, 467, 477, & 889
TECHNICAL INSTRUCTIONS
A good output meter should be used in all alignment adjustments.

I. F. ALIGNMENT

From a good signal generator connect the proper leads, one to the radio chassis, the other thru a 1 mfd. condenser to the grid cap of the 6K6, with the set's grid lead still in place. Set the radio dial to 1720 kilocycles and the signal generator to 456 K.C. With the set's volume control "full on", increase the generator output until the signal is heard in the radio speaker. Adjust I, F. trimmers for maximum output, decreasing the generator output as the speaker output increases.

B. C. ALIGNMENT

1. Connect the signal generator lead thru a 0.002 mfd. condenser as dummy antenna to the A1 terminal, with the metal strip connected across A1 and G. Set the signal generator and radio dial to 1720 K.C. and adjust the B.C. oscillator trimmer for maximum output.

2. Set the signal generator and radio dial to 1400 K.C. and adjust the B.C. R.F. and ANT. trimmers for maximum output.

3. Set the signal generator to 600 K.C. and the radio dial to approx. 600 K.C. and adjust the B.C. oscillator pad for maximum output by adjusting dial and pad together. Check the alignment again at 1400 K.C.

INTERMEDIATE BAND ALIGNMENT

Connect the signal generator lead thru a 400 ohm resistor as dummy antenna to A1. Set the dial and generator to 6700 K.C. and adjust the P.B. oscillator trimmer for maximum output. Adjust the R.F. and ANT. trimmers at 6000 K.C. and check for alignment at 2200 K.C.

SHORT WAVE ALIGNMENT

Still using the 400 ohm resistor as dummy antenna, adjust the S.W. oscillator trimmer at 24.5 M.C. on dial and generator. Adjust the R.F. and ANT. trimmers at 22 M.C. and check for alignment at 8 M.C.

MODELS 456, 465, 477, 855, 877 & 889

PUSH BUTTON OPERATION

Six Push Button Station Selectors are incorporated in this receiver. Each button may be adjusted to select any station or frequency in the Broadcast Band. To adjust each button, perform the following operations:

1. Tune in a desired station with the Selector knob.

2. Twist the Push Button you want set up for this station, to the left about one full turn to loosen the mechanism.

3. Push this button in as far as it will go, while still holding the Selector knob firmly so the station will not be detuned.

4. With the button pressed all the way in, twist it to the right until it is tight and then release it.

5. Follow this procedure with the other five buttons, setting each for a different station.

6. When any Push Button is pressed, the station for which that button is set should appear perfectly tuned. If it is not perfectly tuned, repeat the above procedure until satisfactory results are obtained.

Select the Call Letter Tabs to correspond to the stations the buttons are set for, and insert them in place provided above each button.

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UNITED MOTORS SERVICE, INC.

MODEL R663 Delco
Schematic
Voltage

FIG. 2.--DELCO MODEL R-663 CIRCUIT DIAGRAM
VOLTAGE READINGS BETWEEN SOCKET TERMINALS AND GROUND WITH D.C. VOLTMETER HAVING RESISTANCE OF 10000Ω PER VOLTMETER.

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ALIGNMENT FOR MODELS R663, R664, R665, R666, R667, R668, and R669.

NOTE: FIGURE REFERENCES IN THE TEXT REFER TO FIGURES SHOWN WITH EACH MODEL.

1. Aligning I-F Stages at 262 Kilocycles

(a) Connect the ground lead of the Signal Generator to the chassis case. Connect the signal lead of the Signal Generator to the grid cap of the 6AD5 tube, through a .0002 mf condenser, leaving the tube's grid clip in place.

(b) Connect output meter from plate of 6V6G [R665, R667, R669] tube to ground.

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

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

(e) Adjust trimmers A-B-C-D through the cut outs on the side of the chassis [Illus. 13 & 14, Fig. 4] carefully for maximum output.

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

2. Aligning at 1530 Kilocycles

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

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

(c) Set Signal Generator to exactly 1530 kilocycles and adjust oscillator trimer "G" (Fig. 3) on middle section of condenser gang for maximum output.

3. Aligning at 1400 Kilocycles

(a) Remove signal lead of Signal Generator from grid cap of 6AD5 tube and connect to antenna terminal of receiver through a .0002 mf condenser.

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

(c) Adjust the parallel trimmers "F" and "H" (Fig. 3) of the condenser gang carefully for maximum output. Do not disturb the 1530 kilocycle adjustment of the middle section of the condenser gang.

4. Aligning at 500 Kilocycles

(a) Set Signal Generator to approximately 500 kilocycles and turn condenser gang plates until this signal is tuned in with maximum output.

(b) Adjust trimmer "E" on Delco Syncro-Tuning condenser [Illus. 12, Fig. 4] located next to antenna receptacle on bottom of chassis, rocking gang condenser plates back and forth through the signal until maximum output is obtained. (It will be necessary to re-adjust this condenser to the car antenna upon installation of the set.)

(c) Repeat adjustments made under—"Aligning at 1400 K.C."

5. Checking I-F Band Spread

The Model 155 Cathode Ray Oscillograph should be used to check the I-F band spread after completing the "Alignment Procedure". Slight adjustment of the I-F stages may be found necessary in order to obtain a symmetrical selectivity curve. Connect Cathode Ray from connection "F" (Fig. 4) to ground.
CIRCUIT CHANGE

Some sets were made with the 2 mfd. section of the electrolytic omitted (Illus. #52C) and Illus. #58 .05 mfd. 600 volt tubular condenser added. For replacement of electrolytic in these sets clip the green lead of replacement condenser.

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VOLTAGE READINGS BETWEEN SOCKET TERMINALS AND GROUND WITH D.C. VOLTMETER HAVING RESISTANCE OF 10,000 OHM PER VOLT. ALL READING TAKEN WITH 56 AMPS. FILAMENT VOLTAGE AT TUBES.

CURRENT DRAIN WITHOUT SPEAKER 4.9 AMPERES.

* This Reading is Taken Between Negative Side of 400 OHM Resistor (illus. No. 45) AND GROUND.

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FIG. 2 -- DELCO MODEL R-666-7

CIRCUIT CHANGE

Some early sets were made with 300 ohm resistor (Illus. #37). Use 500 ohm number 1211019 for ALL service replacements.

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FIG. 1--CIRCUIT DIAGRAM -- DELCO-MATIC TUNER

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880010</td>
<td>Switch</td>
<td>Motor reversing</td>
<td>134530</td>
<td>Nut</td>
<td>Pivot screw locking</td>
</tr>
<tr>
<td>122159</td>
<td>Screw</td>
<td>Switch mounting</td>
<td>7234957</td>
<td>Gear</td>
<td>Large drive</td>
</tr>
<tr>
<td>1880007</td>
<td>Lever</td>
<td>Switch contact assy.</td>
<td>7234768</td>
<td>Washer</td>
<td>Mounting</td>
</tr>
<tr>
<td>147460</td>
<td>Screw</td>
<td>Switch lever set screw</td>
<td>7234769</td>
<td>Screw</td>
<td>Mounting</td>
</tr>
<tr>
<td>7234714</td>
<td>Bracket</td>
<td>Mounting</td>
<td>7232713</td>
<td>Spacer</td>
<td>Rubber mounting</td>
</tr>
<tr>
<td>132892</td>
<td>Screw</td>
<td>Mounting bracket</td>
<td>138530</td>
<td>Washer</td>
<td>#8 int. shakeproof</td>
</tr>
<tr>
<td>1880065</td>
<td>Spring</td>
<td>Trip bar</td>
<td>7234745</td>
<td>Shaft</td>
<td>Condenser drive--flex.</td>
</tr>
<tr>
<td>7235711</td>
<td>Spring</td>
<td>Pawl</td>
<td>1880122</td>
<td>Control</td>
<td>Push button--complete</td>
</tr>
<tr>
<td>1880049</td>
<td>Screw</td>
<td>Long pivot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1880066</td>
<td>Screw</td>
<td>Short pivot</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For replacement only on late sets having metal stops between switch contact blades.

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GENERAL: The Delco Model R-667 is a six tube, two unit auto radio with "Delco-Matic" flash tuning. The service parts and alignment procedure are identical to the Delco Model R-666.

The Delco Model R-669 is a seven tube, two unit auto radio with "Delco-Matic" flash tuning. The service parts and alignment procedure are identical to the Delco Model R-666.

**SETTING UP "DELCO-MATIC" TUNER**

(a) Press a button and allow the selector mechanism to come to rest.

(b) Continue to hold the button down, and tune in the desired station by manual control.

(c) Release button, and set up remaining buttons in the same manner.

When the button is held down after the mechanism has come to rest, the pawl is held in the cam slot, locking the cam in position. The cam is allowed to slip on its shaft during the manual tuning process, by a clutch spring which is a part of the cam shaft assembly.

**OPERATION OF "DELCO-MATIC" TUNER**

The "Delco-Matic" Tunaer is a motor driven mechanical device for tuning in stations quickly and silently by remote push button control. When a button is operated, a relay coil pulls a corresponding pawl against a selector cam (Fig. 1). At the same time, a hold down coil in the control head holds the button down until the cycle of operation is complete. A trigger on the pawl premises against a switch operating trip rod, which in turn operates the power switch. The degree of movement of the trip rod, which is controlled by a high or low side on the selector cam, determines the direction of motor rotation. When the cam is rotated to a position where the pawl drops in the selector cam slot, the degree of movement of the trip rod opens the ground contact on the power switch which cuts the current to the motor and magnetic clutch and releases all relays.

1. **PUSH BUTTON HEAD**

The push buttons in the control head completely the circuit for the operation of the hold-down magnet, relay coil and the corresponding station selector pawls. The buttons are held down magnetically until released by the "cut off" switch on the tuner unit, actuated by the station selector pawl dropping into the slot in the selector cam.

2. **STATION SELECTOR PAWLS**

The station selector pawls are magnetically operated and controlled directly from the contacts in the push-button head. Upon pressing a button in the control head, a circuit is closed, energizing a station selector magnet coil which pulls a corresponding pawl down on a station selector cam. The pawl rides on the cam until it drops into the cam slot and cuts off the motor and releases all relays.

3. **STATION SELECTOR CAMS**

The station selector cams are circular discs with high and low sides for operation of the motor reversing switch and a stop slot for operation of the motor cut-off switch. Six of these cams are provided on a shaft, each with a " selector pawl which allows the cam to be slipped on the shaft in setting the cam on the desired station.

4. **REVERSING AND CUT-OFF SWITCH**

The reversing and cut-off switch is a combination switch actuated by the trigger on the station selector pawl. The reversing switch causes the motor to run in the right direction for direct to the station tuning and the cut-off switch cuts the motor off when a station is tuned in, and also releases the push-button hold-down magnets and the magnetic clutch.

The forward and reverse positions of the reversing switch are dependent upon whether the station pawl is pulled against the high or low side of the station selector cam. The cut-off switch is actuated when the pawl drops into the cam slot as a station is tuned in.

5. **MAGNETIC CLUTCH**

The magnetic clutch consists of an iron magnet and two iron discs which are held together magnetically when the field is energized. One of the discs is coupled to the motor and the other to the condenser gear.

The clutch is designed to cut the motor driving power from the tuning condenser gear at the moment the pawl drops into the cam slot and actuates the motor cut off switch.

6. **MASTER RELAY**

The master relay is controlled directly from the push-button head and the purpose is to allow the motor current to be fed directly to the motor rather than through the push-button circuits. A set of "make" contacts are provided along with the "break" power contacts for resetting the tuning control and power contacts for resetting the audio system of the set while the motor is driving the tuning mechanism.

**SERVICE PROCEDURE**

The logical procedure to employ in servicing the automatic tuner will depend on the nature of the trouble encountered and whether the tuner is partially or totally inoperative. However, in most cases the solution to the trouble will be found by checking the following points in the order named:

1. **TUNING CONTROL AND CABLE**
2. **BATTERY VOLTAGE AT TUNER**
3. **STATION SELECTOR PAWLS**
4. **PUSH BUTTON HEAD**
5. **REVERSING AND CUT-OFF SWITCH**

The tuning control and tuning cable should be checked along with the battery voltage at the "A" terminal on tuner before removing chassis or push button head from car for servicing on the bench. Make all checks on bench with a tuning control connected to the tuner for proper loading. Detailed procedure for checking the above points is as follows:

**Checking Tuning Control and Cables**

In order for the automatic tuner to operate properly it is necessary that the tuning control be free from kinks and bends, so as to not impose an excessive load on the tuner motor. Tuning control knob manually and note if drag is excessive or if any kinks or bends are apparent. If trouble is evident, disconnect flexible tuning cable from chassis case and hook up and turn tuning knob to determine whether trouble is in set or tuning control. If trouble is in set, a careful check of the large die-cast gears should be made for proper meshing.

**Checking Battery Voltage at "A" Terminal on Tuner**

The magnets, relays, and motor in the automatic tuner have been designed to operate satisfactorily on voltages as low as 4.4 volts measured at the "A" terminal on the tuner unit with the motor running. Low battery voltages will cause erratic operation of the tuner.

**Before Attempting Any Tuner Repairing, First Measure the "A" Voltage at the "A" Terminal or the Tuner Unit with the Tuner Motor Operating.**

In order to allow the motor to run long enough to get an accurate reading before it cuts off, set two cams which appear to be working normally at opposite ends of the dial and press corresponding buttons, reading meter carefully while motor is running. If voltage is lower than 4.4 volts, check all connectors and terminals for poor contact. Measure voltage at car ammeter with set load only. This should be 5.4 volts or more.

**NOTE:** In testing these automatic tuners on our Radio Test Panels, it is very important that proper voltage be available for testing these automatic tuners. Proper voltage should be applied to "A" terminals on the #652 Test Panel. This will give correct test results. All automatic tuners should be made using the power supply terminals on the left side of the panel. This will give a slightly higher "A" voltage to test.

**Checking Station Selector Pawls**

In most instances a visual inspection will determine if the station selector pawls are operating satisfactorily. A check can be made by simply pressing the push buttons and noting if the corresponding pawls pull down against the selector cam. Failure of the pawl to operate may be caused by excessive spring tension on the pawl spring, open selector magnet coil terminals, or low voltage.

To reduce spring tension on pawl spring, unhook top end of spring with a pair of long nose pliers and stretch spring slightly. Be careful not to stretch spring too far or pawl will have a tendency to stick in the cam slot when a station is tuned in.

Voltage measured at selector magnet coil terminals on base plate terminal board should not be less than 4.5 volts.

**Checking Push Button Head**

The push button head is working normally when the following actions take place:

1. Buttons should stay down magnetically when pressed, until station is tuned in or pawl drops in cam slot.
2. Corresponding station pawl in tuner should pull down against cam.
3. Both the button pressed and its corresponding station pawl in the tuner should release when a station is tuned in or when the pawl drops into cam slot.

It should be noted that buttons will not release unless tuner motor is operating and station pawl trips the cut-off switch.

If push button head does not function as covered above and a duplicate head (Part #1880122) is not available for substitution, make complete check of head as follows with push button cable plug disconnected from receiver chassis.
Testing Push Button Head

A. Mechanical Test of Push Button Head:

(a) Disconnect push button control plug from receiver chassis.

(b) Press buttons down and release slowly. Note if any button or buttons have a tendency to stick or do not extend out the full distance when released. Failure of a button to release or the full extent will cause the station selector part to stick in the cam slot when a station is tuned in (see Paragraph "C").

(c) If sticking buttons are encountered, remove the mechanism from the die-cast head, removing the back cover plate and taking out the four round head screws. A small burr in either the small baseplate fixture or the push button shaft, or in the push button holes in the die-casting or wires touching the button shafts will cause the buttons to stick. Removal of the burr with fine sandpaper will eliminate this sticking.

NOTE: Do not hold the control head in an inverted position when removing mechanism from case.

B. Checking Magnet for Hold-Down

(a) Remove control cable plug from receiver chassis.

(b) Connect 4 volts D.C. across prongs #8 and #9 as shown.

(c) Press buttons one at a time, interrupting battery circuit to release button after each test.

(d) If none of the buttons will stay down when pressed, make continuity check across prongs #9 and #10 for open circuit in hold down magnets or coil wiring.

(e) If one or two buttons will not stay down when pressed, first check to see if any wires are caught behind button shafts. If not, then remove mechanism from die-cast head and check for excessive spring tension in switch contact springs or the button shaft kick-out spring.

C. Checking Push Button Switch Contacts:

(a) Press button No. 1.

(b) The switch contacts may be checked by applying 4 volts D.C. across the prongs 5 and 9, pressing each button under test, and interrupting the circuit after each test. These remaining contacts similarly as follows:

Press Button No. Apply 4 volts D.C. across-

1 8 9 1
2 8 9 2
3 8 9 3
4 8 9 4
5 8 9 5
6 8 9 6
7 8 9 7
8 8 9 8
9 8 9 9
10 8 9 10

It will be noted that if the switch contacts are making proper contact and all preceding checks made, the hold down magnets in the head will be energized as each button is pressed.

Checking the Reversing and Cut-Off Switch

Proper operation of the switch mechanism on the tuner is of vital importance. Brisk action of the tuner due to low battery voltage very often results in the trouble being erroneously diagnosed as switch trouble. It is therefore important that all other points be checked first for possible causes of the trouble before attempting any adjustments to the switching mechanism.

There are four positions of the switch mechanism, "Normal", "Trip", on high side of cam, "Pawl on low side of cam" and "Pawl in slot". Figures 7 to 10 illustrate the exact position of the switch contacts in each of the four switch positions. These contacts can be checked visually by observing their action under actual operating conditions or by disconnecting the "A" power and duplicating the position by pressing the push buttons against the cam manually. Before making any adjustments it should first be definitely known that no adjustment is necessary.

In the normal position it will be noted that one set of reversing contacts are closed and that the ground contacts on the switch arm is making contact. Also, there should be a slight gap (1/4") on Fig. 7 between the trigger and the trip bar to prevent any movement of the switch arm when the pawl is pressed against the high side of the cam.

In this position the contacts should be in exactly the same position as in the normal position. The trigger race against the trip bar and there should not be insufficient movement of the trip bar to open the normally closed reversing contacts at any point on the high side of the cam.

When the pawl is in the normal position, the switch is "normal" and can be checked by making continuity across the prongs #6 and #10. The ground contact on the switch arm remains closed when the pawl was riding on the high side of the cam.

In this position the pawl is riding on the low side of the cam and a complete change has taken place in the reversing switch. The set of contacts which were normally closed when the pawl was riding on the high side of the cam have opened and the other set of contacts are now closed. The ground contact on the switch arm remains closed.

Switch Adjustments

In the case where not more than two or three lines are not working satisfactorily, individual adjustments can be made to the station selector pawls by binding the small trigger arm up or down with a pair of pliers, to obtain proper action of the reversing and cut-off switch.

In making these adjustments it is very important that the triggers be adjusted so that they do not open the reversing contacts normally closed when the pawl is riding on the high side of the cam. Also, there should be a slight gap in the ground contacts on the cut-off switch arm when the pawl drops to the bottom of the cam slot. This ground gap should be kept as small as possible, retaining sufficient clearance so that the contacts will remain open when the cam spring is turned from one end of the travel to the other, with the station pawl holding the cam stationary.

In cases where the switching mechanism does not operate satisfactorily under any one, a careful check should be made of the switch trip bar to see that it does not open the switch lower when the pawl is pressed against the high side of the cam.

Do not change position of either the reversing switch or switch arm as special equipment is required to obtain accurate alignment of these parts.

The normal position of the phosphor bronze switch springs with the switch arms pulled back should be as shown in Fig. 10, illustrating the switching position with the pawl in the cam slot.

If a complete test of the switching mechanism indicates that it cannot be repaired or adjusted as outlined, a replacement of the complete chassis should be made in accordance with Mr. C. D. Wymer's letter of April 11, 1938, Subject—"Service Policy—Delco Static Radio Models R-667 and R-669 Automatic Tuners".

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FIG. 3.—DELCO MODEL R-673 CIRCUIT DIAGRAM

GENERAL: The Delco Model R-673 is a seven tube two unit receiver with short wave and broadcast band. Coverage of short waves from 5000 kilocycles to 1600 kilocycles, broadcast from 500 kilocycles to 540 kilocycles. Special features such as base compensation, tone control and 6V7G push pull output.

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1. Aligning I-F Stages at 262.5 Kilocycles
   (a) Connect the ground lead of the Signal Generator to the chassis case. Connect the signal lead of the Signal Generator to the grid cap of the 6J8G tube, through a .1 mfd condenser, leaving the tube’s grid clip in place.
   (b) Connect output meter across plates of 6K7G tube.
   (c) Set Signal Generator to exactly 262.5 kilocycles and turn volume control on full.
   (d) Turn condenser gang to a position where no squeals or beat notes can be noticed, also so that when the tuning condenser is rotated within narrow limits there is no appreciable change in output.
   (e) Adjust trimmers A, B, C & D through the cut-outs on the side of the chassis (Illus. 12 & 13, Fig. 5) carefully for maximum output.
   (f) Repeat adjustments of I-F trimmers A, B, C & D with as low an output from the Signal Generator as possible, for more accurate alignment.

2. Aligning at 5000 Kilocycles
   (a) Turn band switch to police band (clockwise).
   (b) Leave Signal Generator leads connected the same as for I-F adjustments.
   (c) Turn tuning condenser plates all the way out and against high frequency stop.
   (d) Set Signal Generator to exactly 5000 kilocycles and adjust oscillator trimmer “G” (Fig. 4) carefully for maximum output, being careful to peak the signal received with trimmer screw out at minimum capacity.

3. Aligning at 1350 Kilocycles
   (a) Turn band switch to broadcast band (counter clockwise).
   (b) Set Signal Generator to 1350 kilocycles and leave the tuning condenser against high frequency stop.
   (c) Adjust oscillator trimmer “L” (Fig. 4) for maximum output.

4. Aligning at 600 Kilocycles
   (a) Connect Signal Generator leads to 6K7G, R-F grid, leaving the grid clip in place.
   (b) Set Signal Generator to 600 kilocycles and tune the receiver to the signal.
   (c) Adjust oscillator padder condenser “X” (Fig. 5) rocking gang condenser plates back and forth through the signal until maximum output is obtained.
   (d) Remove signal generator lead from 6K7G tube clip and connect to the antenna terminal through a .0002 mfd condenser.
   (e) Adjust antenna series condenser “E” (Fig. 5) for maximum output.

5. Aligning at 1400 Kilocycles
   (a) Set Signal Generator at 1400 kilocycles.
   (b) Tune set to this signal and adjust R-F trimmer “H” (Fig. 4) and antenna trimmer “M” (Fig. 4) to maximum output.

6. Aligning at 4000 Kilocycles
   (a) Turn band switch to police band.
   (b) Set Signal Generator to 4000 kilocycles and tune receiver to this signal.
   (c) Adjust police band antenna trimmer “F” (Fig. 4) for maximum output.

7. Aligning at 1800 Kilocycles
   (a) Set Signal Generator at 1800 kilocycles and tune receiver to this signal.
   (b) Adjust oscillator padder condenser “J” (Fig. 5) rocking gang condenser plates back and forth through the signal until maximum output is obtained.
   (c) Close gang and check to see if tuning range extends to 1600 kilocycles.

8. Realigning at 1400 Kilocycles
   (a) Turn band switch to broadcast band.
   (b) Set Signal Generator to 1400 kilocycles.
   (c) Tune set to this signal and adjust R-F trimmer “H” and antenna trimmer “M” to maximum output (Fig. 4).

9. Realigning at 600 Kilocycles
   (a) Check alignment of antenna series condenser “E” (Fig. 5) for maximum output.

10. Checking I-F Band Spread
    The Model 165 Cathode Ray Oscillograph should be used to check the I-F band spread after completing the “Alignment Procedure”. Slight adjustment of the I-F stages may be found necessary in order to obtain a symmetrical selectivity curve. Connect Cathode Ray from connection “I” (Fig. 3) to ground.
SETTING UP AUTOMATIC TUNING  DELCO MODELS R-1134-35-39 HOME RADIO

1. Loosen "RESET LOCK SCREW" in center of tuning knob.
2. Press any one of the automatic tuner levers all the way down. Stations may be set up in any sequence desired.
3. Hold the lever down firmly and tune set to station desired. When desired station is clearly tuned in, release the lever and follow same procedure until all levers have been set up.
4. Rotate the tuning knob to the right (clockwise) as far as it will turn and firmly tighten "RESET LOCK SCREW."

DELCO MODELS R-1134-35-39 CIRCUIT ALIGNMENT

1. Aligning I-F Stages at 465 Kilocycles
   (a) Connect the ground lead of the signal generator in series with a .1 mfd condenser to B- (pin #8 on 25L6G tube). Connect the signal lead of the signal generator to the grid cap of the 6AG6 tube, leaving grid clip in place.
   (b) Connect the output meter across the plate (pin 3) and screen (pin 4) of the 25L6G output tube.
   (c) Set signal generator to exactly 465 kilocycles and turn volume control on full.
   (d) Turn the rotor plates of the condenser gang all the way out of mesh and against the high frequency stop.
   (e) Adjust the trimmers (E-F) on the second I-F coil and then the trimmers on the first I-F coil (C-D Fig. 3) carefully for maximum output.
   (f) Repeat adjustments of the four I-F trimmers with as low an output from the signal generator as possible, for more accurate alignment.

2. Aligning at 1720 Kilocycles
   (a) Leave ground lead of signal generator connected to B- through a .1 mfd condenser as before. Connect the signal lead of signal generator through a .0001 mfd condenser to the antenna terminal.
   (b) Turn tuning condenser plates all the way out and against high frequency stop.
   (c) Set signal generator to exactly 1720 kilocycles and adjust oscillator trimmer (Fig. 3) carefully for maximum output, being careful to peak the signal with trimmer screw out or at minimum capacity.

3. Aligning at 1400 Kilocycles
   (a) Set signal generator to 1400 kilocycles and turn condenser gang plates until this signal is tuned in with maximum output.
   (b) Adjust the antenna trimmer (7A Fig. 3) for maximum output. Do not disturb the 1720 kilocycle adjustment of the oscillator trimmer.

DELCO MODEL R-3215 CIRCUIT ALIGNMENT

1. Aligning I-F Stages at 455 Kilocycles
   (a) Attach the ground lead of the signal generator to the chassis ground post. Connect the other lead to the grid cap of the 6AG tube through a .02 mfd. series condenser. DO NOT REMOVE GRID CLIP.
   (b) Set the signal generator to EXACTLY 455 kilocycles and turn receiver volume control on full.
   (c) Peak each of the 2nd I-F coil trimmers, 2A & 2B, (Illus. 2, Fig. 3).
   (d) Peak each of the 1st I-F coil trimmers, 1A & 1B, (Illus. 1, Fig. 3).
   (e) To assure most accurate trimmer setting repeat above adjustments several times always using lowest possible signal generator output consistent with readable output meter scale deflection.

2. Aligning "American Broadcast" 1730-540 Kilocycle Band
   (a) Connect signal generator antenna lead to receiver antenna terminal through a .00025 mfd. condenser, and the other signal generator lead to ground terminal.
   (b) Adjust band selector switch for operation on 1730-540 kilocycle band.
   (c) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh), at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If the needle does not point exactly to the last line move needle to correct position.
   (d) Set signal generator frequency and receiver dial to EXACTLY 1730 kilocycles, and bring in 1730 kilocycle signal generator signal to maximum output by adjusting 1730 kilocycle oscillator trimmer, (Illus. 70, Fig. 4).
   (e) Set signal generator frequency and receiver dial to approximately 600 kilocycles. Then while rocking gang condenser slightly to right and left, adjust 600 kilocycle oscillator condenser (Illus. 6, Fig. 5) for maximum output. (f) Adjust (Illus. 8, Fig. 3) for maximum signal response.

3. Aligning "Foreign Short Wave" 5.8-18.1 Megacycle Band
   (a) Place band selector switch for operation on 5.8-18.1 megacycle band, tune receiver dial and set signal generator frequency to EXACTLY 18.1 megacycles.
   (b) Adjust 18.1 megacycle oscillator trimmer (Illus. 78, Fig. 4) to bring in 18.1 megacycle test signal to maximum output. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down the trimmer (add capacity) until the second peak is tuned in.
   (c) Tune receiver dial and set signal generator frequency to EXACTLY 15 megacycles.
   (d) While rocking gang condenser slightly to right and left, adjust 15 megacycle antenna trimmer (Illus. 7A, Fig. 4) for maximum 15 megacycle test signal response.
FIG. 2--DELCO MODEL R-1140 CIRCUIT DIAGRAM
GENERAL: The Delco Model R-1440 is a 5 tube, 110 volt A.C. superheterodyne automatic electric tuning receiver with a 6" dynamic speaker. Tuning is accomplished by means of the conventional manual control or by push button switches which control adjustable permeability tuned coils. Tuning range is from 550 to 1720 kilocycles. Five push buttons are used for automatic tuning, a sixth for switching from automatic to manual tuning.

The function of each button is, left to right:
1. Automatic tuning 500-800 K.C.
2. Automatic tuning 500-1000 K.C.
3. Automatic tuning 600-1100 K.C.
4. Automatic tuning 600-1200 K.C.
5. Automatic tuning 975-1550 K.C.
6. Switch-Manual to automatic tuning

SETTING UP AUTOMATIC ELECTRIC TUNING

Setting up the stations is accomplished by means of a single adjustment for each button, accessible from the rear of the chassis.

1. Turn on the set, and allow 15 minutes for the set to "warm up" before setting the station adjustment screws for the push buttons.
2. Press button #6 and tune in the desired station by means of the manual tuning control.
3. Press one of the buttons #1 to #5 which range corresponds to the station frequency and, with a small screw driver, adjust screw on back of chassis corresponding to button pressed until the same station is accurately tuned in.
4. Press button #6, changing from "Push Button" to "Dial Tuning" to ascertain that the same program is heard for both.
5. Woisten and insert the call letters of the station on the front of the button.
6. Repeat the operation for the other buttons.

CIRCUIT ALIGNMENT

For alignment purposes, a test scale is stapled on the inside of the dial drum on the condenser shaft. Before starting alignment procedure, turn the rotor plates of the condenser gang all the way out of mesh and against the high frequency stop and make an indicating mark on the front support bracket in line with the high frequency mark on test scale for future reference.

1. Aligning I-F Stages at 665 Kilocycles
   (a) Connect the ground lead of the signal generator to the chassis frame.
   (b) Connect the signal lead of the signal generator to the grid cap of the 6ES6 tube through a .1 mf condenser, leaving grid cap in place.
   (c) Connect the output meter across the plate (pin 2) and screen (pin 4) of the 6ES6 output tube.
   (d) Press #6 button (Dial Tuning), turn the volume control on full and the tone control to extreme clockwise (treble) position.
   (e) Set the signal generator to exactly 665 kilocycles and turn the rotor plates of the condenser gang all the way out of mesh and against the high frequency stop.
   (f) Adjust the trimmers on the second I-F coil (illus. 5, Fig. 3) and then the trimmers on the first I-F coil (illus. 4, Fig. 3) carefully for maximum output.
   (g) Repeat adjustments of the four I-F trimmers with as low an output from the signal generator as possible, for more accurate alignment.

2. Aligning at 1400 Kilocycles
   (a) Connect the signal lead of signal generator through a .0001 uf condenser to the antenna terminal. Connect ground lead of signal generator to chassis.
   (b) Set signal generator to 1400 kilocycles.
   (c) Turn tuning condenser plate until test scale dial is at the 1400 kilocycles position as noted from the reference mark you made on the front support bracket.
   (d) Adjust oscillator trimmer (illus. 10A, Fig. 3) carefully for maximum output, being careful to peak the signal received with trimmer screw out at minimum capacity.
   (e) Adjust the antenna trimmer (illus. 10A, Fig. 3) for maximum output with as low an output from the signal generator as possible, for more accurate alignment.
   (f) After completing the alignment procedure, the alignment should be checked with the cathode ray oscillograph. Connect the oscillograph across the volume control.

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**FIG. 1-TUBE SOCKET VOLTAGES**

**BOTTOM VIEW OF CHASSIS**

**BOTTOM VIEW OF CHASSIS**

**VOLTAGES MEASURED WITH 1000 OHM PER VOLT METER BETWEEN SOCKET TERMINALS AND CHASSIS.**

A.C. LINE VOLTAGE 115 VOLTS.
POWER CONSUMPTION 40 WATTS

(1) BIAS -2.75 V. READ ACROSS 60Ω RESISTOR
(2) CANNOT BE READ WITH VOLT METER.
(3) 50VAC BETWEEN PINS F & P,
(4) 500 VAC BETWEEN PINS P & P,
(5) -14.5 BIAS READ BETWEEN 250Ω RES.
AND GROUND.

---

**REAR OF CHASSIS**
The Delco Model R-1141 is a six tube, two band superheterodyne receiver with a 6" dynamic speaker. Tuning is accomplished by means of the conventional manual control, or by push button switches which control adjustments are, left to right:

1. 535 to 820 K.C.
2. 535 to 820 K.C.
3. 720 to 1120 K.C.
4. 1000 to 1560 K.C.
5. 1000 to 1560 K.C.
BOTTOM VIEW OF CHASSIS

VOLTAGES MEASURED WITH 1000 OHM PER VOLT METER BETWEEN SOCKET TERMINALS AND CHASSIS.
A.C. LINE VOLTAGE 115 VOLTS.
POWER CONSUMPTION 50 WATTS

6K6G
172 195
0 0
6.3 A.C.
6Q7G
0 -2.6 0.0
6.3 A.C.
195 195
(1)
5Y3G
(2)
(3)
6K8G
195 90
0 0
6.3 A.C.
(1)
6K7
195 90
0 0
6.3 A.C.
(1)
(5)
6A8G
90 195
0 0
6.3 A.C.
(1)
(4)
(7)

(1) CANNOT BE READ WITH VOLTMETER
(2) 650 V.A.C. READ ACROSS TERMINALS P&P
(3) 155 V.A.C. READ ACROSS TERMINALS P&P
(4) 155 V IN PUSH BUTTON OPERATION
(5) 130 V IN MANUAL OPERATION
(6) 0 IN MANUAL OPERATION
(7) 0 IN PUSH BUTTON OPERATION

REAR OF CHASSIS

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MODEL R1141 Delco

Aligning Procedure

SETUP OF AUTOMATIC ELECTRIC TUNING

Setting up the push buttons for pre-selected stations is accomplished by means of a single adjustment for each button, accessible from the front of the cabinet. These screwdriver adjustments are made through the small openings in the escutcheon, in which the call letters are placed.

1. Turn the set "on" and set the band change switch to the broadcast manual (center) position and allow about 15 minutes to warm up.

2. Tune in the desired station by means of the manual tuning control.

3. Press one of the buttons which most conveniently covers the frequency of the station, turn the band change switch to the automatic (left hand) position and, with a small screwdriver, adjust the screw directly above the button, until the station is tuned in accurately.

4. Turn the band change switch back to the center position to check the accuracy of the adjustment.

5. Insert the call letters of the station in the opening and cover with the cellloid tab provided.

6. Repeat the operation for the other buttons.

ALIGNMENT FOR MODELS R1141, R1142, AND R1144

NOTE: STEPS SHOWN IN THE FIGURES SHOWN WITH EACH MODEL

1. Aligning 1-F Stages at 455 Kilocycles
   (a) Connect the ground lead of the signal generator to the chassis frame.
   (b) Connect the signal lead of the signal generator to the grid lead of the 6AC8 tube through a 1.0 mfd condenser, leaving the grid clip in place.
   (c) Connect the output meter across the plate and screen of the 6FG6 tube.
   (d) Press a button, turn the band change switch to the automatic (left hand) position, volume control on full, and the tone control in the treble position. 

2. Aligning at 17 Megacycles
   (a) Connect the signal lead of the signal generator to the grid of the 6AG8 and connect to the antenna terminal of the receiver through a 400 ohm resistor. 
   (b) Turn the band change switch to the short wave (right hand) position.
   (c) Set the signal generator to exactly 17 megacycles and rotate the variable portion of the condenser gang to indicate 17 megacycles on the test scale.
   (d) Adjust the oscillator trimmer condenser (illus. 4, Fig. 4) for maximum output.
   (e) Connect the antenna trimmer (illus. A, Fig. 4) while rocking the condenser gang back and forth through the signal until maximum output is obtained.

3. Aligning at 5 Megacycles
   (a) Press #9 button (Intermediate wave--manual tuning). 
   (b) Set the signal generator to exactly 5 megacycles and rotate the variable portion of the condenser gang to indicate 5 megacycles on the test scale.
   (c) Adjust the oscillator trimmer condenser (illus. C, Fig. 3) for maximum output.
   (d) Adjust the antenna trimmer condenser (illus. C, Fig. 3) for maximum output.

4. Aligning at 1200 Kilocycles
   (a) Connect the signal lead of the signal generator to the antenna terminal of the receiver through a .0002 mfd. mica condenser.
   (b) Press #10 button (Broadcast--manual tuning). 
   (c) Turn the variable plates of the condenser gang completely out of mesh and against the high frequency stop.
   (d) Adjust image trimmer (illus. B, Fig. 5) two turns up from tight.

5. Aligning at 1400 Kilocycles
   (a) Set the signal generator to approximately 1400 kilocycles.
   (b) Rotate the variable plates of the condenser gang until the signal is tuned in with maximum output.
   (c) Adjust the antenna trimmer (illus. C, Fig. 4) for maximum output.

6. Aligning for Image Frequency Response
   (a) Set the signal generator at 1300 kilocycles.
   (b) Rotate the variable plates of the condenser gang until the image of this signal is tuned in at 1710 kilocycles.
   (c) Adjust the two-wire capacitor (illus. 6, Fig. 4) by twisting, until a minimum output is obtained. 
   (d) Increase the signal from the signal generator and check for image frequency response. If the image does not fall at approximately 1590 megacycles, repeat section 2.

MODEL R1144 only

3. Aligning at 5 Megacycles
   (a) Press #9 button (Intermediate wave--manual tuning).
   (b) Set the signal generator to exactly 5 megacycles and rotate the variable portion of the condenser gang to indicate 5 megacycles on the test scale.
   (c) Adjust the oscillator trimmer condenser (illus. C, Fig. 3) for maximum output.
   (d) Adjust the antenna trimmer condenser (illus. C, Fig. 3) for maximum output.

4. Aligning at 1200 Kilocycles
   (a) Connect the signal lead of the signal generator to the antenna terminal of the receiver through a .0002 mfd. mica condenser.
   (b) Press #10 button (Broadcast--manual tuning). 
   (c) Turn the variable plates of the condenser gang completely out of mesh and against the high frequency stop.
   (d) Adjust image trimmer (illus. B, Fig. 5) two turns up from tight.

5. Aligning at 1400 Kilocycles
   (a) Set the signal generator to approximately 1400 kilocycles.
   (b) Rotate the variable plates of the condenser gang until the signal is tuned in with maximum output.
   (c) Adjust the antenna trimmer (illus. C, Fig. 4) for maximum output.

6. Aligning for Image Frequency Response
   (a) Set the signal generator at 1300 kilocycles.
   (b) Rotate the variable plates of the condenser gang until the image of this signal is tuned in at 1710 kilocycles.
   (c) Adjust the two-wire capacitor (illus. 6, Fig. 4) by twisting, until a minimum output is obtained. 
   (d) Increase the signal from the signal generator and check for image frequency response. If the image does not fall at approximately 1590 megacycles, repeat section 2.

7. Repeat Sections 4 and 5 for Maximum Output

8. Repeat Section 6 for Minimum Output

9. Repeat Section 2 (a) for Maximum Output

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A phono switch and connector are mounted on the rear flange of the chassis and may be used in conjunction with a crystal pickup without a matching transformer.

The switch must be in the "radio" position during the alignment procedure.

**GENERAL:** The Delco Model R-1142 is a seven tube, two band superheterodyne receiver with a 10" dynamic speaker. Tuning is accomplished by means of the conventional manual control, or by push button switches which control adjustable permeability tuned coils. The frequency ranges of the push buttons are, left to right:

1. 535 to 820 K.C.
2. 535 to 820 K.C.
3. 730 to 1120 K.C.
4. 730 to 1120 K.C.
5. 1000 to 1560 K.C.
6. 1000 to 1560 K.C.
FIG. 3--PARTS LAYOUT--Top View

FIG. 4--PARTS LAYOUT--Bottom View
FIG. 1--TUBE SOCKET VOLTAGES

<table>
<thead>
<tr>
<th>Tube</th>
<th>DC Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6F6G</td>
<td>250V</td>
</tr>
<tr>
<td>6Q7G</td>
<td>250V</td>
</tr>
<tr>
<td>6K7</td>
<td>250V</td>
</tr>
<tr>
<td>6A8G</td>
<td>250V</td>
</tr>
<tr>
<td>6K8G</td>
<td>250V</td>
</tr>
<tr>
<td>5Y3G</td>
<td>250V</td>
</tr>
</tbody>
</table>

VOLTAGES MEASURED WITH 1000-OMH PER VOLT METER BETWEEN SOCKET TERMINALS AND CHASSIS.
A.C. LINE VOLTAGE 115 VOLTS.
POWER CONSUMPTION 65 WATTS.
GENERAL: The Delco Model R-1144 is a ten tube, A.C., three band superheterodyne receiver with a 12" dynamic speaker. Tuning is accomplished by means of the conventional manual control or by push button switches which control adjustable permeability tuned coils. Band switching is accomplished by the same series of switches which are, left to right:

1. Off Switch
2. Broadcast Band (Manual Tuning) 535-1690 K.C.
3. Intermediate Band (Manual Tuning) 1660-5500 K.C.
4. Short Wave Band (Manual Tuning) 5.3 - 18.0 M.C.
5. Broadcast Band (Automatic Tuning) 980 - 1560 K.C.
6. Broadcast Band (Automatic Tuning) 980 - 1560 K.C.
7. Broadcast Band (Automatic Tuning) 700 - 1100 K.C.
8. Broadcast Band (Automatic Tuning) 700 - 1100 K.C.
9. Broadcast Band (Automatic Tuning) 520 - 830 K.C.
10. Broadcast Band (Automatic Tuning) 520 - 830 K.C.

A phono switch and connector are mounted on the rear flange of the chassis and may be used in conjunction with a crystal pickup without a matching transformer. The switch must be in the "radio" position during the alignment procedure.

FOR TUNER
SEE INDEX
9-2-38
1. Aligning 1-F Stages at 465 Kilocycles
   
   (a) Connect the ground lead of the signal generator to the chassis frame.
   
   (b) Connect the signal lead of the signal generator to the grid cap of the 6AC5G tube through a .002 mfd. condenser, leaving the grid clip in place.
   
   (c) Connect the output meter across the plates of the 6AG6 tube.
   
   (d) Press #2 button (Broadcast: Manual), turn the volume control on full and the tone control on treble and turn the variable plates of the condenser gang completely out of tune and against the high frequency stop.
   
   (e) Set the signal generator to exactly 465 kilocycles and adjust the trimmers on the second 1-F coil (Illus. B, Fig. 3) for maximum output. Use as low a signal from the signal generator as will give a readable indication on the output meter.
   
   (f) After completing the Alignment Procedure, the alignment should be checked with the Model 120 Cathode Ray Oscillograph. Connect the oscillograph from point (Fig. 4) to ground.

2. Aligning at 1400 Kilocycles
   
   (a) Disconnect the signal lead of the signal generator from the grid of the 6AC5G and connect to the antenna terminal of the receiver through a .000 mfd. wire condenser.
   
   (b) With the controls set as before, adjust the broadcast oscillator trimmer for maximum output (Illus. 1, Fig. 4).

3. Aligning at 1400 Kilocycles
   
   (a) Set the signal generator to approximately 1400 kilocycles.
   
   (b) Rotate the variable section of the condenser gang until the signal is tuned in with maximum output.
   
   (c) Adjust the antenna trimmer (Illus. B, Fig. 4) and R-F trimmer (Illus. F, Fig. 4) for maximum output.

4. Aligning at 600 Kilocycles
   
   (a) Set the signal generator to approximately 600 Kilocycles.
   
   (b) Rotate the variable section of the condenser gang until this signal is tuned in with maximum output.
   
   (c) Adjust the oscillator series condenser (Illus. J, Fig. 4) while rocking the condenser gang back and forth through the signal, until maximum output is obtained.

5. Aligning at 17 Megacycles
   
   (a) Remove the .002 mfd. condenser and connect the signal lead of the signal generator to the antenna trimmer of the receiver through a 400 ohm resistor.
   
   (b) Press #4 button (Short Wave Band: Manual).
   
   (c) Set the signal generator to exactly 17 megacycles and rotate the variable section of the condenser gang to indicate 17 megacycles on the test scale.
   
   (d) Adjust the oscillator trimmer condenser (Illus. C, Fig. 4) for maximum output.
   
   (e) Adjust the R-F trimmer condenser (Illus. B, Fig. 4) and antenna trimmer (Illus. A, Fig. 4) while rocking the condenser gang back and forth through the signal, until maximum output is obtained.
   
   (f) Increase the signal output from the signal generator and check for image frequency. If the image does not fall at approximately 1800 megacycles, repeat section 5.

6. Aligning at 5 Megacycles
   
   (a) Press #3 button (Medium Wave Band: Manual).
   
   (b) Set the signal generator to exactly 5 megacycles and rotate the variable section of the condenser gang to indicate 5 megacycles on the test scale.
   
   (c) Adjust the oscillator trimmer condenser (Illus. E, Fig. 4) R-F trimmer (Illus. G, Fig. 4) and antenna trimmer (Illus. D, Fig. 4) for maximum output.

7. Repeat Sections 2, 3 and 4.

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Delco Model R-1145

**BOTTOM VIEW OF CHASSIS**

**6AC5G**
- [1] Cannot be read with voltmeter
- [2] 625 Y.A.C. read across terminals F & F
- [3] 5 Y.A.C. read across terminals F & F

Voltages measured with 1000 ohm per volt voltmeter between socket terminals and chassis.
A.C. line voltage 115 volts.
Power consumption 50 watts.

**6P5G**
- A.C.
- 6.3
- 0
- 11.5
- 0
- 242
- [1] 11.5

**6Q7G**
- 133 [1]

**6SK7**
- 0.6 [2]

**6K8G**
- 0.6 A.C.
- [1] 6.3 A.C.

**5Y3G**

REAR OF CHASSIS
FIG. 3--PARTS LAYOUT--Top View

FIG. 4--PARTS LAYOUT--Bottom View
Fig. 2—Delco Model R-3215 Circuit Diagram

General: The Delco Model R-3215 is a six tube, two band, 32 volt radio with A.V.C. and tone control.

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MODEL R3215 Dolco
Socket, Trimmers
Chassis

25L6G
POWER

6C7G
AUDIO

6Q7G
DET-A.V.C.

6K7
IF

6K8
OSC-MOD.

25L6G
POWER

FIG. 3--PARTS LAYOUT--Top View

FIG. 4--PARTS LAYOUT--Bottom View

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