SERVICE MANUAL FOR 1940 HUDSON AUTOMOBILE RADIO RECEIVERS

SPECIFICATIONS AND CIRCUIT FEATURES

SA-40 — SIX TUBE DELUXE

TUBE COMPLEMENT
6SK7 — R.F. amplifier
6A8 — Oscillator & 1st detector
6SK7 — I. F. Amplifier
6S07 — 2nd det., A.V.C. Audio
6K5GT — Output
6X5 — Rectifier

TUNING RANGE
540 to 1580 KC

SPEAKER
Type — dynamic (6 inch)
Field Resistance — 4 ohms
Voice coil impedance — 3.5 ohms at 400 cycles

OUTPUT RATING
Maximum — 3 watts
Undistorted — 2 watts

VIBRATOR
Non-synchronous type

POWER RATING
Current Drain — 6.5 amps at 6.0 Volts
Current drain with push button depressed — 13.5 amps at 6.0 Volts
Fuse protection — 20 amps

GENERAL SPECIFICATIONS
Tuning Ratio — 4:1
Temperature compensated oscillator
Automatic tone compensation
Dash mounting control head and speaker
Feather touch instantaneous push-button tuning

DB-40 — SEVEN TUBE CUSTOM

TUBE COMPLEMENT
6SK7 — R.F. amplifier
6A8 — Oscillator & 1st detector
6SK7 — I. F. Amplifier
6H6 — 2nd det. & A.V.C.
6SF5 — 1st Audio
6V5GT — Output
6X5 — Rectifier

TUNING RANGE
540 to 1580 KC

SPEAKER
Type — dynamic (8 inch)
Field Resistance — 4 ohms
Voice coil impedance — 3.5 ohms at 400 cycles

OUTPUT RATING
Maximum — 5 watts
Undistorted — 2.8 watts

VIBRATOR
Non-synchronous type

POWER RATING
Current Drain — 7.0 amps at 6.0 Volts
Current drain with push button depressed 14 amps at 6.0 Volts
Fuse protection — 20 amps

GENERAL SPECIFICATIONS
Tuning Ratio — 4:1
Temperature compensated oscillator
Variable tone control
Automatic tone compensation and bass boost
Delayed A.V.C. for maximum sensitivity
Dash mounting control head and speaker
Feather touch instantaneous push-button tuning
RADIO RECEIVER KITS
HA-160321—6 tube, 6 volt Radio, Model SA-40
HA-160322—7 tube, 6 volt Radio, Model DB-40

Items included in above kits are:
Radio receiver—lower unit
Mounting bolt, nut and washers for lower unit
Radio receiver—control unit
Mounting bolts, wing nuts, clips and washers for control unit
Speaker—6 inch (for SA-40)
Speaker—8 inch (for DB-40)
Mounting bolts, nuts, and washers for speaker
Distributor suppressor
Generator Condenser
(Identification No. 11456)
Heat Temperature Gauge Condenser
(Identification No. 11454)
Ignition Lock Condenser
(Identification No. 116404)
Gas Gauge Condenser
(Identification No. 11455)
"A" Lead and Fuse Assembly

Station call letter tabs
Bonnet Ground Strip
Bonnet Ground Strip Screw
Ground strap—engine
Ground strap attaching parts
Generator condenser attaching screw and Lockwasher

HOOD LACING

FACE CURVE TOWARD FRONT OF CAR
BEND STRIP AS SHOWN

RADIO ANTENNA KITS
HA-160348 Antenna Kit
(Manually operated cowl type)
HA-159201 Antenna Kit
(Vacuum operated type)
Antenna
Lead-In
Attaching Parts
INSTALLATION INSTRUCTIONS

Models SA-40 SIX TUBE DELUXE and DB-40 SEVEN TUBE CUSTOM

RADIO INSTALLATION INSTRUCTIONS:

1. Punch out the 7/16 inch knockout plug on the engine side of the dash located directly above the voltage regulator. Clean paint from surface in 1/4 inch circle around hole on engine side of dash.

2. Drill a 7/16 inch hole thru dash silencer pad.

3. Mount the receiver in the hole you just drilled, so that the control cable socket points toward the center of the car. Secure the case to the dash using the shakeproof lockwasher and nut, provided.

4. Remove the two Phillips screws at the bottom of the instrument panel grill. Lift out the grill.

5. Remove the ash tray assembly by taking out the 2 screws holding it to the windshield wiper bracket.

6. Connect the "A" lead (with fuse housing) to the battery terminal "B" of fuse block "N" (see Fig. A on opposite page).

7. Connect the short lead of the ignition lock condenser (No. 118494) to the AM terminal on the ignition lock. Ground the long lead to the instrument panel under the rear left ventilator handle guide mounting nut. The end of the condenser identified by the black band is the one to be grounded.

8. Install radio control unit as follows:
   (a) Insert both "T" bolts in the holes in the windshield wiper brackets with the heads upwards and place a "hairpin clip", supplied, around each "T" bolt to keep the bolt from slipping out of its hole while the control unit is being put in place.
   (b) Install the control unit through the grill hole being careful that you do not scratch or mar the finish on the face plate. If there is no air conditioner, the control unit may be installed somewhat easier by placing it up into position from behind the instrument panel.
   (c) Fasten the control unit to the bottom of the windshield wiper brackets with the two "T" bolts, flat washers, lockwashers and wing nuts.

9. Place the main cable (larger cable) and "A" cable from the control unit over the left hand windshield wiper bracket. Keep the radio cables as far from the ignition lock cable as possible. Plug cables into their respective receptacles on the left end of the receiver case.

10. Plug ammeter cable from fuse block into the receptacle "C" on the left end of the control unit, being sure that the fuse and fuse insulator sleeves are in place.

11. Connect the antenna lead-in to socket "D" on left end of the control unit. Keep antenna lead away from ignition lock cable.

12. Plug the speaker cable into the plug on the speaker.

13. Place the speaker and plate in the grill opening. Slip the lower edge of the plate behind the instrument panel and allow it to rest against the front of the grill opening. Fasten the plate using four machine screws, flat washers, and lockwashers.

14. Replace the chrome grill and fasten it in place with the original Phillips screws and nuts.

15. Attach condenser, part No. 114456, to rear of generator with machine screw and lockwasher provided. Scribe paint all around new hole. Connect condenser terminal to generator "A" terminal (insert "AA").

16. Attach one condenser, part No. 114455 on the gasoline tank gauge unit under one of the unit mounting screws.

17. Attach one condenser, part No. 114454, to the upper rear cap screw in the engine water manifold plate and attach condenser terminal to gauge terminal of water temperature gauge element (insert "CC").

18. Install suppressor in central terminal of distributor.

19. Install the flat ground strap (Hudson Part No. 155821) from left rear cylinder head bolt to dash. Fasten it to the dash with a metal screw and a shakeproof lockwasher. Point and dirt must be removed from the points of attachment to insure good electrical contact.

20. Mount a bonnet (hood) grounding strap as follows: Lift bonnet (hood) lacing. Drill 1/4" hole at a point 23/4" from center of car on the antenna side of body, as illustrated in Fig. B. Clean paint from body around hole. Mount grounding strap (Stewart-Warner Part No. 118717) with a 9/16 & 3/8 Flattening Screw (Stewart-Warner Part No. 118717) and bend strap back over lacing so projection will make good contact with bonnet. Clean paint from bonnet at point of contact.

21. Test the radio and if there is excessive ignition noise after the above procedure has been carried out, check the following points:
   (a) Check to see that condenser on ignition lock in No. 118494 (0.5 mfd.) instead of No. 11455 (0.25 mfd.). No. 118494 must be used.
   (b) Check ground strap from motor block to firewall, and be sure it is tight and that contact surfaces are clean.
   (c) Remove ignition coil mounting screws. Clean the paint from the coil mounting bracket and from the firewall beneath the bracket and then replace the mounting screws making sure they are tight.
   (d) Remove screws holding bonnet catch bar mounting brackets to firewall, then clean paint from brackets and form firewall and ground contact is made. Replace the screws tightly. Also clean paint where latch hooks bonnet.
   (e) Check antenna installation, making sure that the grounding bracket is making good contact with the automobile body, and that the lead-in shield is properly grounded and has not pulled loose.
   (f) Check the ground contacts on the 10 prong plug connecting the upper unit and lower radio units, and bend clips outward to make better contact.
   (g) Dress antenna lead-in so that it lies along the top of the cowling for as far away from the auto wiring harness as possible.

If ignition noise is still excessive after the above procedure has been carried out, see the paragraph on "Ignition Noise" on page 10 of this manual.

22. IMPORTANT

After the set is installed, the antenna compensator must be adjusted. Carefully tune the set to a weak station around 1450 KC. Remove the plug button located adjacent to the antenna lead-in plug on the left side of the control unit. Adjust the compensator for maximum volume. This adjustment insures maximum sensitivity.
CHASSIS WIRING DIAGRAMS & COIL TERMINAL DRAWING FOR MODEL SA-40

Terminals of coils shown in the circuit diagrams on the adjacent page are lettered to correspond to similarly lettered terminals on the chassis wiring diagrams and coil illustrations shown on this page. Terminals which are connected together carry the same letter.

MODEL SA-40
(FOR LOWER UNIT)

REFERENCE NICK

OSCILLATOR COIL
CHASSIS WIRING DIAGRAMS & COIL TERMINAL DRAWING FOR MODEL DB-40

Terminals of coils shown in the circuit diagrams on the adjacent page are lettered to correspond to similarly lettered terminals on the chassis wiring diagrams and coil illustrations shown on this page. Terminals which are connected together carry the same letter.

MODEL DB-40
(FOR LOWER UNIT)

REFERENCE NICK

OSCILLATOR COIL
ALIGNMENT PROCEDURE

For alignment an output meter and accurately calibrated signal generator are required.
1. Connect the output meter across the voice coil or between the plate of the output tube and chassis in series with a .1 mfd. condenser. The more sensitive type of meter should be connected across the voice coil.
2. Remove only the top cover of the lower unit and the bottom cover of the control unit.
3. Connect the ground lead of the signal generator to the receiver chassis and leave it connected in this manner through the entire alignment procedure.
4. Turn the volume control to maximum volume position and leave it throughout the entire alignment procedure.

<table>
<thead>
<tr>
<th>DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR</th>
<th>CONNECTION OF SIG. GEN. 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 6A8</td>
<td>455 KC.</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>2nd I.F. LOWER UNIT</td>
<td>ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.</td>
</tr>
<tr>
<td>80 MMFD. MICA CONDENSER</td>
<td>ANTENNA CONNECTION ON SET</td>
<td>1580 KC.</td>
<td>SET SO THAT GANG COND. IS ENTIRELY OUT OF MESH</td>
<td>3</td>
<td>1st I.F. LOWER UNIT</td>
<td>CAREFULLY ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>80 MMFD. MICA CONDENSER</td>
<td>ANTENNA CONNECTION ON SET</td>
<td>1400 KC.</td>
<td>ACCURATELY TUNE TO 1400 KC. GENERATOR SIGNAL</td>
<td>6</td>
<td>ANTENNA (SHUNT) CONDENSER UNDER PLUG BUTTON ON END OF CONTROL UNIT</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
</tr>
<tr>
<td>80 MMFD. MICA CONDENSER</td>
<td>ANTENNA CONNECTION ON SET</td>
<td>600 KC.</td>
<td>TUNE TO 600 KC. GENERATOR SIGNAL</td>
<td>7</td>
<td>OSCILLATOR (SERIES) CONDENSER</td>
<td>ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY DETUNING TRIMMER AND RETURNING RECEIVER DIAL.</td>
</tr>
</tbody>
</table>

Now repeat adjustments made on trimmer numbers 5, 6 and 7.

After the set has been installed in the car, tune in a fairly weak station near 1400 KC, and adjust trimmer No. 6 under the plug button on the end of the control head until maximum volume is obtained.
# REPLACEMENT PARTS

FOR ELECTRICAL PARTS NOT LISTED HERE SEE PAGES 4 AND 6. PARTS LISTED BELOW ARE USED ON BOTH MODELS SA-40 AND DB-40 UNLESS OTHERWISE SPECIFIED.

## RADIO CHASSIS PARTS

<table>
<thead>
<tr>
<th>Stewart Warner Part Number</th>
<th>Hudson Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>83349</td>
<td>BC-158497</td>
<td>Fuse Insulator Tube</td>
</tr>
<tr>
<td>82226</td>
<td>BC-156500</td>
<td>Vibrator socket (4 prong)</td>
</tr>
<tr>
<td>83695</td>
<td>BC-156702</td>
<td>Fuse - 10 amps 25 volt (Model DB-40)</td>
</tr>
<tr>
<td>117248</td>
<td>BC-161491</td>
<td>Clip - coil mounting</td>
</tr>
<tr>
<td>116025</td>
<td>BC-161492</td>
<td>Choke coil in &quot;A&quot; supply (short)</td>
</tr>
<tr>
<td>116049</td>
<td>BC-170420</td>
<td>Fuse - 20 amperes 25 volt</td>
</tr>
<tr>
<td>116220</td>
<td>BC-161493</td>
<td>Vibrator - 6 volt</td>
</tr>
<tr>
<td>116690</td>
<td>BC-161494</td>
<td>Socket - small octal base</td>
</tr>
<tr>
<td>117532</td>
<td>BC-161485</td>
<td>Choke coil in &quot;A&quot; line</td>
</tr>
<tr>
<td>117499</td>
<td>BC-17550</td>
<td>Dial lamp 6-8 volt Mazda 55</td>
</tr>
<tr>
<td>117599</td>
<td>BC-161496</td>
<td>Transformer - 2nd I.F. (Model DB-40)</td>
</tr>
<tr>
<td>117012</td>
<td>BC-161497</td>
<td>Output transformer (Model DB-40)</td>
</tr>
<tr>
<td>117910</td>
<td>BC-161498</td>
<td>R. F. Coil</td>
</tr>
<tr>
<td>117923</td>
<td>BC-161499</td>
<td>Power transformer - 6 volt</td>
</tr>
<tr>
<td>117939</td>
<td>BC-161500</td>
<td>Antenna coil assembly</td>
</tr>
<tr>
<td>117944</td>
<td>BC-161501</td>
<td>Socket - 10 contact (In receiver lower unit)</td>
</tr>
<tr>
<td>117952</td>
<td>BC-161502</td>
<td>Filter choke - iron core</td>
</tr>
<tr>
<td>117955</td>
<td>BC-161503</td>
<td>Tone control - 500,000 ohms (Model DB-40)</td>
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<tr>
<td>117966</td>
<td>BC-161504</td>
<td>&quot;A&quot; lead - short lead, extends from lower receiver unit</td>
</tr>
<tr>
<td>117972</td>
<td>BC-161505</td>
<td>Transformer - 1st I.F. (In lower receiver unit)</td>
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<tr>
<td>117975</td>
<td>BC-161506</td>
<td>Oscillator coil</td>
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<tr>
<td>117977</td>
<td>BC-161507</td>
<td>Output transformer (Model SA-40)</td>
</tr>
<tr>
<td>118001</td>
<td>BC-161508</td>
<td>Cable and Plug assembly - 10 terminals</td>
</tr>
<tr>
<td>118113</td>
<td>BC-161509</td>
<td>Transformer - 1st I.F. (In control unit)</td>
</tr>
<tr>
<td>118119</td>
<td>BC-161510</td>
<td>Transformer - 2nd I.F. (Model SA-40)</td>
</tr>
<tr>
<td>118140</td>
<td>BC-161511</td>
<td>&quot;A&quot; cable from control unit to lower receiver unit</td>
</tr>
<tr>
<td>118142</td>
<td>BC-161512</td>
<td>Antenna socket and lead</td>
</tr>
<tr>
<td>118212</td>
<td>BC-161513</td>
<td>Volume control - 1 megohm with off switch</td>
</tr>
<tr>
<td>118237</td>
<td>BC-161410</td>
<td>&quot;A&quot; cable and fuse housing (from ammeter to control unit)</td>
</tr>
<tr>
<td>118726</td>
<td>BC-161580</td>
<td>Antenna motor noise choke</td>
</tr>
</tbody>
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## RADIO CONTROL UNIT, DIAL PARTS, KNOBS, ETC.—Continued

<table>
<thead>
<tr>
<th>Stewart Warner Part Number</th>
<th>Hudson Part Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>118113</td>
<td>BC-161518</td>
<td>Dial scale</td>
</tr>
<tr>
<td>118126</td>
<td>BC-161520</td>
<td>Cord cover for dial</td>
</tr>
<tr>
<td>118231</td>
<td>BC-161521</td>
<td>Pin - for mtg. push buttons</td>
</tr>
<tr>
<td>118252</td>
<td>BC-161522</td>
<td>Push button</td>
</tr>
<tr>
<td>118266</td>
<td>BC-161523</td>
<td>Gathering bar - operates key with pilfer assembly</td>
</tr>
<tr>
<td>117946</td>
<td>BC-161524</td>
<td>Gear sector - for gang condenser drive</td>
</tr>
<tr>
<td>117990</td>
<td>BC-161525</td>
<td>Station coil letter tabs</td>
</tr>
<tr>
<td>118020</td>
<td>BC-161526</td>
<td>Knob - for tone control (Model DB-40)</td>
</tr>
<tr>
<td>118132</td>
<td>BC-161527</td>
<td>Screw - C type</td>
</tr>
<tr>
<td>118217</td>
<td>BC-161528</td>
<td>De-clutch arm - releases clutch during push button tuning</td>
</tr>
<tr>
<td>118143</td>
<td>BC-161529</td>
<td>Magnet coil (coil only)</td>
</tr>
<tr>
<td>119154</td>
<td>BC-161530</td>
<td>Spring - Magnet plunger return</td>
</tr>
</tbody>
</table>

## SPEAKER AND SPEAKER PARTS

<table>
<thead>
<tr>
<th>Stewart Warner Part Number</th>
<th>Hudson Part Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>12249</td>
<td>BC-161548</td>
<td>Nut - 8-32 for speaker mtg.</td>
</tr>
<tr>
<td>12308</td>
<td>BC-170547</td>
<td>Speaker mounting bolt No. 10-32 x 1/2&quot;</td>
</tr>
<tr>
<td>37124</td>
<td>BC-161555</td>
<td>Lockwasher - for mtg. speaker to mtg. plate</td>
</tr>
<tr>
<td>118358</td>
<td>BC-161556</td>
<td>Plain washer - speaker mounting</td>
</tr>
<tr>
<td>118372</td>
<td>BC-170546</td>
<td>Grummetts - speaker mounting</td>
</tr>
<tr>
<td>118388</td>
<td>BC-161557</td>
<td>Special screw for mtg. speaker to mtg. plate</td>
</tr>
<tr>
<td>U-115072</td>
<td>BC-161558</td>
<td>Speaker - dynamic 6 inch (for model SA-40)</td>
</tr>
<tr>
<td>M-115073</td>
<td>BC-161559</td>
<td>Speaker - dynamic 8 inch (for Model DB-40)</td>
</tr>
<tr>
<td>117927</td>
<td>BC-161560</td>
<td>Mounting plate for 8&quot; speaker (for Model DB-40)</td>
</tr>
<tr>
<td>117938</td>
<td>BC-161561</td>
<td>Mounting plate for 6&quot; speaker (for Model SA-40)</td>
</tr>
<tr>
<td>M-118119</td>
<td>BC-161562</td>
<td>Cone and Voice coil assembly for M-115073 speaker (Model DB-40)</td>
</tr>
<tr>
<td>U-118205</td>
<td>BC-161563</td>
<td>Cone and Voice assembly for U-115072 speaker (Model SA-40)</td>
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</tbody>
</table>

## SUPPRESSOR EQUIPMENT

<table>
<thead>
<tr>
<th>Stewart Warner Part Number</th>
<th>Hudson Part Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>114226</td>
<td>BC-151399</td>
<td>Distributor suppressor</td>
</tr>
<tr>
<td>114454</td>
<td>BC-152021</td>
<td>Condenser - filter - for temperature gauge</td>
</tr>
<tr>
<td>114455</td>
<td>BC-151402</td>
<td>Condenser - filter - for gas gauge</td>
</tr>
<tr>
<td>114455</td>
<td>BC-152022</td>
<td>Condenser - filter - for generator</td>
</tr>
<tr>
<td>114849</td>
<td>BC-161418</td>
<td>Condenser - filter - for electrolyte</td>
</tr>
<tr>
<td>118717</td>
<td>BC-170304</td>
<td>Bonnet Grounding Screw No. 3 sell push button tuning</td>
</tr>
<tr>
<td>118718</td>
<td>BC-161417</td>
<td>Bonnet Grounding Strip (Continued on next page)</td>
</tr>
</tbody>
</table>
CASE SECTIONS & ASSOCIATED PARTS

Stewart Part Hudson Part Description
Number Number
117917 BO-161567 Top cover - control unit - gray (less escutcheon) (model DB-40)
117918 BO-161568 Bottom cover - gray - for control unit (model DB-40)
117968 BO-151569 Case and Name plate - gray - for lower receiver unit (wrap around section only) (model DB-40)
117970 BO-151570 Bottom cover for lower unit receiver case - gray (model DB-40)
118010 BO-151571 Case and Name plate - golden brown - for lower receiver unit (wrap around section only) (model SA-40)
118015 BO-151572 Bottom cover for lower unit receiver case - golden brown (model SA-40)
118148 BO-116573 Case for control unit - gray (wrap around section only) (model SA-40)
118211 BO-116574 Case for control unit - golden brown (wrap around section only) (Model SA-40)

CASE SECTIONS & ASSOCIATED PARTS

Stewart Part Hudson Part Description
Number Number
118214 BO-116575 Bottom cover - golden brown - for control unit (model SA-40)
118215 BO-116576 Top cover for control unit - golden brown (less escutcheon) (model SA-40)

MOUNTING PARTS

110009 BO-161584 Plug button
110238 BO-161585 Anti rattle clips for case
117845 BO-161586 Top cover for lower unit receiver case - gray (model DB-40)
117846 BO-161587 Top cover - lower unit receiver case - golden brown (model SA-40)
77827 BO-179453 Lockwasher for mounting control head
79117 BO-179451 Nut for mount set to bulkhead
114851 BO-161616 Clip - bolt pin type for holding "T" bolts while mount
117859 BO-179454 Wing nut - for mount control unit
117871 BO-161415 "T" bolt for mounting control unit
118715 BO-161469 Lockwasher - shockproof

ADDITIONAL SERVICE DATA

CIRCUIT DESCRIPTION

The control head houses the tuned antenna stage, the untuned radio frequency stage, and the tuned oscillator stage, in addition to the primary of the first I.F. transformer. The I.F. signal is fed through a shielded low-loss cable to a coupling coil in the lower receiver unit. This coupling coil is part of the lower unit first I.F. transformer. The lower unit also contains the raterminal of the I.F. stage, the second detector and the audio stage as well as the vibrator and associated power supply components.

LOW SENSITIVITY

In cases of low sensitivity that is not traceable to weak tubes or defective parts, check the setting of the antenna trimmer. If the set has been aligned using any dummy antenna other than the 90 mnt. condenser, re-adjust the setting of this condenser will be off considerably.

In all cases, the trimmer should be adjusted to the regular car aerial. Install the set in the automobile and connect it to the antenna. Do not mount the control unit, but place it in some accessible place. Tune in a weak station, near 1400 KC, remove the plug button covering the antenna trimmer from the case, and adjust this trimmer for maximum volume.

Another possible cause of low sensitivity is mis-alignment of the I.F. transformers caused by the upper and lower units being aligned at different times, since two I.F. transformers are on the control unit and the balance are in the lower unit. To correct this, realign both units as described under "Alignment Procedure" on Page 8 of this manual.

REPLACING TUBES IN CONTROL HEAD

1. Remove the two Phillips screws at the bottom of the instrument panel grill. Lift out the grill.
2. Remove the four machine screws holding the speaker plate.
3. Insert a screwdriver blade in the slot in the front of the control head and pry off the lower cover. This will give access to the 6A8 and 6SK7 tubes.

HUM

A possible source of hum difficult to trace is, caused when the lower end of the volume control accidentally becomes grounded in the control unit, in addition to the ground which is made in the lower radio unit. Removing the accidental ground in the control head will clear up this difficulty.

IGNITION NOISE

If ignition noise is excessive, first make sure the installation man has performed all the operations descibed in paragraphs 20 and 21 on page 3 of this manual. These are very important.

Additional bonnet grounding strips (Stewart-Warner Part No. 118718, Hudson Part No. BO-161417) may be helpful in further reducing ignition interference. The best location for these can be determined by grounding the head to the body at various points with a knife. If the grounding strip is located at a point 10 inches from the center of the car, install an additional strip at a point 36 inches from the center as shown in Fig. B, on Page 2 of this manual.

A change has been incorporated in the radios now being built to reduce ignition noise. This change can be made in the field by a radio service man if excessive noise is still encountered after following all previous instructions.

One antenna motor noise choke (Hudson Part No. BC-151563; Stewart-Warner Part No. 118726) is required and full instructions to make this change are given here.

INSTALLATION OF ANTENNA CHoke

The antenna noise choke (Stewart-Warner Part No. 118726, Hudson Part No. BO-161580) is a single layer choke coil wound on a ceramic body which looks like an insulated resistor. It is to be installed inside the control unit in place of the resistor connected in series with the antenna lead on early sets. Later sets already have the choke.

Remove the top cover of the control unit. Check whether a resistor or small choke connected to the blue antenna lead. (See Fig. 1.) If it is a choke wound on a resistor body, the change has already been made. If you find a plain, insulated resistor connected to a terminal lug in which the blue wire from the antenna socket is connected, proceed with the change. This resistor has a value of 68 ohms and can be identified by its blue body, grey end and black dot.

Remove the resistor.

Remove the two screws holding the antenna socket to the case.

The antenna trimmer must now be connected to a different terminal on the antenna coil. This trimmer is the one which can be adjusted through the side of the case. A bare wire runs from the antenna coil terminal A, through the top trimmer lug to the control grid of the 6SK7 tube.
Disconnect this wire from the antenna coil terminal and from the trimmer terminal. Slip a piece of spaghetti tubing over this wire and re-connect it to the same lug on the antenna coil (Marked A in Figure 1.)

Connect the trimmer condenser to the antenna coil terminal nearest the corner. (Marked B in Figure 1.) This is the terminal to which the antenna series mica condenser connects.

Replace the antenna socket using the two mounting screws.

Solder the choke to the terminals from which you removed the resistor (see Fig. 1).

Check to see that the wiring of the unit has not been pushed over so as to interfere with the dial drive gear.

After this change is made, it is absolutely essential to re-align the antenna trimmer. This must be done with a signal generator and an 80 mmfd. condenser in series with the antenna lead and the signal generator. If any other capacity is used, adjustment will be incorrect.

The antenna trimmer cap should be aligned to the regular car aerial. To do this we suggest connecting the radio to the car so it will operate but without mounting the control unit in place on the instrument panel. Arrange it so you can get at the antenna trimmer easily. Tune in a weak station near 1400 kc. on the dial and adjust the antenna trimmer for maximum volume.

---

**SETTING UP STATIONS**

**TO UNLOCK:** Turn Manual Tuning Control **DOWN** about 70 to 100 strokes after word UNLOCK appears. Turn until control turns hard after turning easily. NEVER FORCE CONTROL AFTER THIS POINT IS REACHED.

**TO LOCK:** Turn Manual Tuning Control **UP** about 70 to 100 strokes after word LOCK appears. Turn until control turns hard after turning easily. NEVER FORCE CONTROL AFTER THIS POINT IS REACHED.

---

**FIG. 2. Locking and Unlocking Mechanisms**

(a) Operate set for about ten minutes before setting up buttons.

(b) TO UNLOCK TUNING MECHANISM: Rotate right (tuning) control downwards until word UNLOCK shows at the left side of dial. Continue to turn until wheel tightens. (70 to 100 strokes will be required). A more complete description of this procedure is given below under the heading "Unlocking Tuning Mechanism."

(c) Tune in desired station with (tuning) control.

(d) Hold down the button selected and move tuning control up and down leaving it in position where tone is deepest. Release button.

(e) Follow same procedure for other buttons. IMPORTANT: After setting any button, it must not be touched until after mechanism has been locked in (f). Otherwise it is necessary to reset it as in (c) and (d).

(f) LOCK TUNING MECHANISM: Rotate tuning control upwards until word LOCK appears at right side of dial. Continue to turn until wheel tightens (70 to 100 strokes will be required). A complete description of the locking operation is also given below.
(g) Insert station call letter tab in front of each button. The tabs are inserted by flexing them and allowing them to snap into place in the buttons.

**SETTING UP EARLY RADIOS**

Some of the earliest radios produced required a slightly different set-up procedure than given above. This same procedure can be used on later sets though it is not necessary.

After unlocking the tuning mechanism, proceed as follows for each button:
1. Tune station in manually.
2. Now hold the manual tuning control and push the button to be set up several times.
3. Alter pushing and releasing button several times, hold button down and again tune station carefully by turning manual tuning control back and forth slightly.
4. Repeat for other buttons.

The essential difference between this procedure and the one given above is that the button is pushed and released several times in quick succession after desired station is tuned in but before final tuning adjustment is made.

**UNLOCKING TUNING MECHANISM**

In setting up this mechanism, you must understand the action of the control during locking and unlocking.

---

**HOW THE “FEATHER TOUCH TUNER” OPERATES**

![Diagram of how the Feather Touch Tuner operates.](image)

**FIG. 3. Magnet Plunger in “OUT” Position**

Refer to Fig. 3 and Fig. 4. When a push button is depressed, it makes mechanical contact with the cam operating bar located under it, and depresses the bar so that the gathering bar can make contact with it. At the same time, the key forces the contact plate downward, making electrical contact through the contact screw. When the contact screw makes contact, it energizes the winding of the magnet assembly causing the plunger to be drawn completely into the magnet as shown in Fig. 4. The plunger is mechanically coupled to the gathering bar and gathering bar shaft so that when the plunger is drawn into the magnet, it causes the gathering bar to be forced ahead. The gathering bar engages the cam operating bar which is depressed by the push button key and drives it forward as shown in Fig. 4. This position of the cam operating bar is indicated by the ends of the cam operating bar extending from the mechanism frame (see Fig. 6). When the cam operating bar moves forward, the cam stops attached to the bar engage the cam, rotating it until it is in the position indicated in Fig. 4. The rotation of the cam causes the cam shaft and gear segment to rotate likewise, rotating the gang condenser to a position corresponding to the station to which this particular key is set.

**FIG. 4. Magnet Plunger in “IN” Position**

**HOW THE “LOCKING-UP” MECHANISM WORKS**

The cam shaft assembly consists primarily of a shaft on which five cams are alternately spaced between friction collars. On the clutch end of this bar is a short threaded section upon which screws the collar which is part of the clutch and clutch spring assembly. When the cams are locked, this threaded collar is turned upon the threaded section of this cam shaft, exerting pressure upon the cams and friction collars, thus locking them securely in position. When the cams are unlocked, this threaded collar is turned so as to unscrew it and exert a minimum of pressure on the cams and friction collars. The only pressure then exerted upon the cams to hold them in position is that exerted by a spring washer near the threaded end of the shaft. Thus the cams are held so they cannot move of their own accord, but are still loose enough to permit them to be set to correspond to the desired station.

The threaded collar is connected through the clutch to the manual tuning control, permitting adjustment of the cams from outside the tuning unit.
OPERATION OF CLUTCH AND DE-CLUTCH ARM

The clutch mechanism of this tuner (see Fig. 5) functions every time a push button is depressed. Its purpose is to disengage the manual tuning control and its associated gears from the automatic portion of the tuner when tuning electrically. The clutch is a dual unit, providing positive mechanical coupling between the manual tuning gears and the contact of the rheostat, which operates in conjunction with the positive coupling element to remove excessive backlash when tuning mechanically.

When the plunger is drawn into the magnet, turning the gathering bar shaft, the cam attached to the shaft (Fig. 6) moves downward on the riser of the de-clutch arm, releasing the pressure on the de-clutch arm, which bears against the inside section of the clutch. When this pressure is released, the clutch return spring contracts, separating the two halves of the clutch, thus disengaging the manual tuning gears.

When the push button is again released, allowing the plunger to be withdrawn from the magnet, the cam on the gathering bar shaft moves upward on the de-clutch arm riser, again exerting pressure on the de-clutch arm, and in turn on the clutch, thus engaging the two clutch sections, and making manual tuning possible.

TUNER TROUBLES AND REMEDIES

SET TUNES IMPROPERLY
If the set fails to tune in stations properly, first check the set-up of the various buttons. If the set-up is incorrect, the set will tune consistently to the same point, and this condition can be remedied by resetting the buttons.

If the set works through the plunger tends to move, make sure the Bristol headed set screws in the retaining collar are tight. This is the collar which is almost touched by the condenser drive gear sector when the condenser plates are unmoved. A loose set screw may strike the unit frame, causing the plunger to stick in either the IN or OUT position.

If the set fails to tune properly, and the dial stops at different points when approaching the station being sought, the ends of the dial the mechanism may not be properly locked up (see "Locking Tuning Mechanism"). The next step is to check for binding of the mechanism (see section on Binding). This trouble also may occur if the pulling force of the magnet is not great enough. This may occur when the battery voltage is low (below 5 volts). It may also be due to too large a gap between the plunger and the pole piece of the magnet assembly. On later sets the gap can be adjusted as described in paragraphs 3 and 6 of "Replacing Magnet Cut Assembly." The adjustable magnet assemblies are identified by the Gear Adjusting Screw and Locking Nut shown in Fig. 6.

In the early type of magnet assemblies, the gap is not adjustable. If one of these magnets is found to have insufficient pull, the remedy is installation of the new type magnet assembly. However, before replacing a magnet assembly, make sure that improper tuning is not due to low battery voltage or the other causes mentioned above.

MECHANISM WHERE TUNING CONTROL FAILS TO REACH STOP DURING UNLOCKING

This is probably due to the shearing off of the "C" washer on the clutch end of the cam shaft (See Fig. 6). On the earlier mechanisms, this "C" washer was held by the clutch gear assembly to the shaft and was made of a fairly soft steel. Occasionally these washers may shear off if the customer continues turning the tuning wheel after the mechanism has become completely unlocked. This continued turning forces the gear and clutch assembly against the "C" washer, shearing it off completely. You can replace this washer with the new hardened washer (Stewart-Warner Part No. 118676, Hudson Part No. B-161579). This can be done without removing the tuning unit from the case. First lock the mechanism, then remove the nuts holding the triangular plate on the clutch end of the shaft. Unhook the plunger return spring so that no pressure will be exerted by the clutch. The washer can now be removed and a new one installed.

On all early sets, replace this "C" washer even if the old one is still all right.

Shearing or partial shearing of this washer may cause slipping of the clutch or sticking of the plunger in the OUT position.

If a bronze washer is present between the "C" washer and the gear, remove it and discard it. If a steel washer is present, it must be left in place. On early mechanisms, a 3/4" steel washer was used in this position and it must be left in place.

BINDING

If the radio tunes improperly, check for binding in the dial and tuning mechanisms. Below are enumerated some of the troubles by blip.

RUBBING LIGHT DIFFUSION PLATE: Two types of light diffusion plates were used, the new type being riveted to the cover, while the old type is mounted on the unit itself. (See Fig. 5) If the new type light diffusion plate, which is mounted in the cover of the control head rubs against the dial scale due to warping of the celluloid, cut this plate as shown by the shading in Fig. 5. This can be done without removing the shield from the cover. In some early units, this diffusion plate was mounted on the unit itself. In this case, enlarge the notch fitting over the dial lamp wire as shown in Fig. 5. Exercise care not to break on the celluloid, which is quite brittle and may break. Then cement the diffusion plate to the front of the contact plate assembly so that the shield rests flat against this metal plate.

ENDS OF DRUM RUBBER BRACKETS: The dial drum should have a slight amount of end play. If it doesn't, it may be binding. This may be due to improper placement of the volume control mounting bracket. To correct this difficulty, loosen the two screws holding this bracket and move this bracket slightly farther away from the drum.

Similar binding may also be due to a loose end cap on the dial drum. In this case, force the cap back on the drum and punch-mark the cap to hold it in place on the dial drum. In a few cases, it may be found that dial end bearing is out of line or slightly off center. The bearing can generally be bent slightly to restore it to its proper position. If this cannot be done, replace the dial scale assembly.

Binding of the drum on the mounting brackets may be due to the fact that the control units fitted too tightly in early cars. This causes the escutcheon to be forced sideways, thus pressing on the tuning controls, which may move the dial drum brackets. This binding can generally be eliminated by bending the brackets slightly outward.

Similar difficulties will be encountered if the control head is not properly installed. When mounting the head, tighten the wing nuts evenly, so the control head will not have a tendency to bind against the dash opening, which would work the escutcheon against the controls.

DRIVE PULLEY STRIKING ANTENNA COIL SHIELD: Check to see that the dial drive pulley is properly located on the condenser shaft. Its backing should touch the condenser pinion gear.

Also, the antenna coil shield may be moved slightly away from the drum by loosening the two nuts holding down the shield.

It may also be possible to move the entire tuning unit slightly away from the shield can. Loosen the four screws holding down the unit and slightly move it.

CHASSIS WIRING IMPROPERLY PLACED: If the leads from the small switch and other leads in the vicinity of the "A" filter assembly are not properly located, they may interfere with free motion of the dial cord or the condenser drive gear sector. Dress these leads so that they cannot touch these moving parts.
BINDING BETWEEN SECTOR AND PINION GEARS: Excessive friction between these gears can be reduced by changing the position of the pinion gear so that the set screw indicated in Fig. 6 points upward when the gang is completely closed. (See Fig. 6). This draws the pinion gear slightly farther away from the gear sector, reducing the pressure between them.

COUNTER-WEIGHT STRIKES CASE: Should the gang counter-weight strike the wrap-around case, loosen the four screws holding the tuning mechanism to the chassis and shift the tuning mechanism slightly on counter-weight clears case. Keep in mind that the case side may be pulled in slightly when the cover is put on. If the case is warped inward, bend it slightly outward until counter-weight does not strike it.

SLIPPING CLUTCH (BACKLASH)

A slipping clutch is indicated by excessive backlash during manual tuning. First check to see that the correct plunger return spring is used.

The correct type of spring may be determined from the following table giving the dimensions of the three types of springs which have been used.

<table>
<thead>
<tr>
<th>Type of Spring</th>
<th>Number of Turns</th>
<th>Length Overall Outside of Body</th>
<th>Length Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT SPRING</td>
<td>25</td>
<td>7/8&quot; 13/16&quot; 7/32&quot;</td>
<td></td>
</tr>
<tr>
<td>LIGHT SPRING</td>
<td>34 or more</td>
<td>7/8&quot; 13/16&quot; 7/32&quot;</td>
<td></td>
</tr>
<tr>
<td>HEAVY SPRING</td>
<td>24</td>
<td>11/32&quot; 19/32&quot; 7/32&quot;</td>
<td></td>
</tr>
</tbody>
</table>

If the unit has the light or heavy spring, replace it with a correct one (Stewart-Warner Part No. 118154, Hudson Part No. BO-161528). When changing springs, it is also desirable to replace the magnet assembly if it does not have the Locking Nut and Gap Adjusting Screw shown in Fig. 6. However, this is only necessary when there is insufficient pull of the solenoid to operate the mechanism.

Next check the position of the cam on the end of the gathering bar shaft (copper plated shaft) with relation to the riser of the de-clutch arm while the plunger is out. See Fig. 8 and Fig. 7. The cam should be halfway up the curved portion of the riser as shown in Fig. 7.

If the cam is not halfway up the riser while plunger is out, as shown in Fig. 7 loosen the two Bristol set screws in the retaining collar on the other end of the gathering bar shaft and move the retaining collar on the shaft until the cam is properly positioned on the riser. A special set screw wrench (Stewart-Warner Part No. 112484) is needed to fit the Bristol set screws.

In all cases where slipping clutches are reported, check to see that there is no excessive friction in the gang condenser, dial or gang condenser drive gears. See section on "Binding".
STICKING MAGNET PLUNGERS

If the automatic tuning mechanism does not operate but manual tuning is possible, the plunger may be stuck in the OUT position. (See Fig. 3). It manual tuning control turns easily but does not tune stations, the plunger may be stuck in the "IN" position (See Fig. 4). A loose set screw on the retaining collar on the gathering bar shaft, may strike the frame and cause the plunger to stick so check the set screw first.

If the plunger sticks when the plunger is all the way in, it is sticking against the musical pole piece of the magnet assembly.

On the other sets, the gap between the plunger and the pole piece is adjustable. Adjustable magnets are identified by the gap adjusting screw and locking nut on the end of the magnet assembly. (See Fig. 6.) In these sets, loosen the locking nut on the rear of the magnet and turn the gap adjusting screw inward (counter-clockwise) one-half turn and re-tighten the locking nut. If this sticking occurs in early units, replace the magnet with the newer type assembly. Read the paragraph "Replacing Magnet Coil Assembly" for instructions for replacing and adjusting the magnet assembly.

The plunger may stick in the OUT position, if the "C" washer on the bottom end of the cam shaft (Fig. 6) is totally or partially sheared off. Check this washer, and if found defective, replace with the hardened type of washer. (Stewart-Warner Part No. 118878, Hudson Part No. BO-161759, See Fig. 6 page 14. A faulty C washer allows the plunger to come too far out, and also allows the cam to reach a position too high on the de-clutch arm riser (See Fig. 9). After checking the "C" washer, check the adjustment of the cam on the riser, as explained under "SLIPPING CLUTCH": If the cam is too far up on the riser (See Fig. 9) it lets the plunger come out of the magnet too far and this may cause sticking. If the cam is not far enough up on the riser (See Fig. 8) the clutch may slip.

If the position of the cam is correct as shown in Fig. 7 but the plunger still sticks loosen the screws holding down the magnet and shift it slightly until the plunger moves freely, then re-tighten the screws. If this does not clear up the difficulty, replace the entire magnet assembly.

REPLACING MAGNET COIL ASSEMBLY

(Stewart-Warner Part No. 118878.
Hudson Part No. BO-161517)

To replace a magnet coil assembly, proceed as follows:
1. Remove top and bottom covers of tuning unit. Unsolder red and black magnet wires from points to which they connect.
2. Take out two round headed screws holding magnet to mounting plate.
3. Lift off old magnet assembly and install new assembly.
4. When replacing this magnet assembly, before tightening the screws holding down the unit, check to see that the plunger moves freely inside the magnet coil. If it has a tendency to bind, shift the position of the magnet slightly, until the plunger moves freely, then tighten down the holding screws.
5. It is necessary to set the large adjusting screw on the top of the new magnet. Loosen the nut and turn the screw out several turns. Now push down one of the push button shafts next to the drum dial. Then with a screwdriver, push the plunger into the magnet as far as it will go.
6. While holding the plunger in very tightly, you can now release the push button shaft and turn the magnet adjusting screw in, until you feel the screw striking the plunger.

When this happens, back the screw out one complete turn and re-tighten the locking nut. This adjustment must be made very carefully since if the threads are tight, it is difficult to notice the exact point where the screw strikes the plunger.

IMPORTANT: To get proper adjustment, a push button shaft must be depressed before pushing in the plunger so that the plunger operates the tuning mechanism as indicated by one of the cam operating bars extending from the frame (Fig. 5). If the above adjustment is done while the power is on the unit, the plunger will pull in by itself as soon as you depress one of the push button shafts. It is then merely necessary to hold the plunger in tightly with a screwdriver and release the push button shaft. The adjustment can then be made.

STOP ARM ADJUSTING SCREW

The function of this screw (Fig. 6) is to prevent damage to the gang condenser plates when the rotor plates are fully opened. This screw is adjusted so that the stop arm on the cam shaft will strike it just before the gang condenser plates open so far as to strike the stationary plates. Set this screw so the stop arm will strike it when the rotor plates are approximately 1/4 from the stationary plates. Then tighten the locking nut so as to hold the screw in this position.

There is also a fixed stop whose purpose is to stop the condenser plates just before they strike the fixed plates when the plates are fully meshed. This fixed stop is part of the frame assembly. When the gang condenser or any of its associated parts are replaced or otherwise adjusted, before tightening the set screws holding the condenser drive pinion gear to the shaft, set the rotor plates so that their upper edges are flush with the top edges of the stationary plates. Then turn the condenser drive gear segment until the stop arm on the cam shaft strikes the fixed stop on the frame, then tighten the set screws. When this adjustment is properly made, and when the stop arm adjusting screw is correctly set, no strain is put on the rotor plates of the condenser in either the open or closed position of the gang condenser.

ADJUSTMENT OF CONTACT SCREW

The contact screw, once properly set, seldom requires realignment. Improper adjustment may be identified by the following symptoms:

CONTACT SCREW TOO FAR IN: When a push button key is depressed, the magnet will operate, but the cam operating bar may not be pushed through as shown in Fig. 10.

CONTACT SCREW TOO FAR OUT: This may permit the push button key to exert too much pressure on the cam operating bar and cause it to stick.

Chattering of the mechanism may be caused when the screw is either too far in or too far out. Adjust the screw until the unit operates properly when any one of the push buttons is depressed.

POSITION OF GANG CONDENSER COUNTER-WEIGHT

Refer to Fig. 14. The purpose of the counter-weight shown in this illustration is to counter balance the weight of the gang condenser. To function properly, the weight must be in the position illustrated in Fig. 14 when the gang condenser is closed. When the weight is in this correct position, the edge of the weight must be near the turn nut. When replacing the dial drive drum, always check to see that this weight is in the position described above, or the tuning unit may not operate satisfactorily.
**REMOVING TUNING UNIT CHASSIS FROM CASE**

1. Pry off bottom cover, utilizing screwdriver slot at front of case.
2. Remove four self-tapping screws holding down top cover and pry cover off.
3. Unsolder the blue wire extending from the on-off switch to the "A" choke assembly.
4. Remove two screws holding antenna receptacle to case. Also remove the screw holding down the cable grounding plate. Then remove four screws holding chassis assembly to case.
5. The entire tuning unit chassis can now be lifted from the case.

**REMOVING TUNING MECHANISM FROM CHASSIS**

1. Unsolder the green-white and the white wire from the gang condenser.
2. Unsolder brown cable wire from low end of volume control.
3. Unsolder gray rubber covered shielded wire (2 copper tracers) from center terminal of volume control.
4. Unsolder gray rubber covered shielded wire (1 copper tracer) from high end of volume control.
5. Unsolder blue wire from on-off switch on volume control. Also unsolder shielding from volume control bracket.
6. Unsolder 2 blue pilot light wires at G/A switch.
7. Unsolder ground of 03 md. condenser from frame of tuning mechanism. Mechanism can now be lifted out.

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**HOW TO REPLACE THE DIAL DRIVE CORD**

**FIG. 11. Proper Position of Dial Drum when Replacing Drive Cord.**

**FIG. 12. Early Type Dial Drive System**

**FIG. 13. Second Type Dial Drive System**

**FIG. 14. Details of Latest Type Dial Drive Systems**

Three dial drive systems are illustrated here. The method marked "Second Type" (Fig. 13) can be used in sets originally using the "Early Type" (Fig. 12). The second type is preferable to the early type.

The method marked "Latest Type" (Fig. 14) is the best but uses a different Dial Drive Pulley. Therefore early type or second type drives cannot be restrung as shown for latest type unless a new Dial Drive Pulley (Stewart-Warner Part No. 110178, Hudson Part No. BO-181529) is installed.

The dial cord in the latest type dial drive can be replaced as follows:

1. Remove chassis from case as described on this page.
2. Remove the antenna coil shield cut by removing the two nuts holding it to the chassis. This will give access to the dial drive drum.
3. Refer to Fig. 11. Rotate the dial so the word "UNLOCK" is directly in line with the reference notch on the right hand dial support bracket. Block the dial in this position, using a small block of rubber or other soft material which will not mar or damage the dial.
4. Rotate the gang condenser so its plate is fully meshed. (See Fig. 14.) Keep the gang in this position until the dial cord has been replaced.
5. About 26 inches of dial drive cord (Stewart-Warner Part No. 113178, Hudson Part No. BO-186321) are required. Tie a large knot in the center of this dial cord.

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Form No. 9988  
— PAGE 16 —  
Printed in United States of America