or wire may enlarge the hole or passage, changing the calibration of the carburetor.

Check the choke shaft for grooves, wear, and excessive looseness or binding. Inspect the choke plate for nicked edges and ease of operation and free it if necessary.

Check the throttle shaft in its bore for excessive looseness or binding and check the throttle plate for burrs which prevent proper closure. If the throttle shaft and plate are not serviceable, it will be necessary to replace the carburetor.

Inspect the upper and lower carburetor body for cracks and stripped threads. Repair or replace the castings if damage is found.

Check the power valve for free movement of the piston and rod assembly. Also, check the power valve ball check for proper seating by immersing the upper body assembly in mineral spirits or hydraulic valve lifter checking fluid, and holding a finger over the main jet hole (jet removed). Hold the power valve rod upward. Turn the upper body assembly right side up and remove it from the liquid container. Check for a leak from the bottom of the power valve and seat.

Check the needle tip for damage or looseness. Replace the float if the arm needle contact surface is grooved or damaged. If the float is serviceable, polish the needle contact surface of the arm. Replace the float shaft if it is worn or damaged.

Replace all screws and nuts that have stripped threads.

Replace all distorted or broken springs.

Inspect all gasket mating surfaces for nicks and burrs. Repair or replace any parts that have a damaged gasket surface.

**Carburetor Assembly.** A disassembled view of the carburetor is shown in Fig. 20.

UPPER BODY

**1.** If the choke plate and the shaft were removed, insert the choke shaft assembly into the air horn, with the lever pointing toward the accelerating pump side of the carburetor.

Refer to the line previously scribed on the choke plate and insert the choke plate into its original position with the plate indentation facing upward and toward the accelerating pump side of the carburetor. Install the choke plate retaining screws snug, but not tight.

Check for proper plate fit, binding in the air horn and free rotation of the shaft by moving the plate from the closed position to the open position. If it moves freely, tighten the 2 choke plate screws while holding the plate in the fully closed position. Stake the screws. **When staking the screws, support the shaft and plate on a block of wood or a metal bar to prevent bending of the shaft.**

**2.** Install the fuel inlet screen and adapter in the fuel inlet of the body.

**3.** Install the main jet in the main fuel well.

**4.** Install the needle valve seat gasket and the seat within the tapped seat hole. Tighten the needle valve seat firmly. Insert the needle valve into the needle valve seat, with the viton tip toward the seat. **Use care to prevent damage to the tip.**

**5.** Position the float assembly in the body, with the tab on the arm located over the needle valve and the hinge of the arm lined up between the hinge bracket holes in the upper body casting. Insert the float hinge pin through the holes in the upper body and the float assembly.

**6.** Check the float setting. Refer to "Carburetor In-Chassis Adjustments" in this group of the manual.

**7.** Insert the air cleaner bracket in the channels of the air horn and install the bracket retaining pins.

LOWER BODY

**1.** If the throttle plate and shaft were removed, slide the throttle shaft into the lower body, with the lever on the throttle shaft located opposite the fuel bowl.

Refer to the line previously scribed on the throttle plate and insert the plate through the slot in the throttle shaft. The plate indentation must face the bottom of the body and point toward the accelerator pump side. Install the throttle plate screws snug, but not tight.

Rotate the throttle shaft while lightly slapping the throttle plate within the throttle bore. Check for free rotation of the throttle shaft. Hold the lower body up to the light. **Little, or no light should show between the throttle plate and throttle bore.** When the plate is properly located, hold the throttle plate closed; then, tighten and stake the retaining screws. **When staking the screws, support the shaft and plate on a block of wood or a metal bar to prevent bending of the shaft.**

**2.** Install the distributor vacuum outlet fitting.

**3.** If the lever and rod were removed from the accelerating pump cover, position the top hole of the lever between the top bracket holes in the cover; then, install the retaining roll pin.

Install the roll pin in the "HI" (lower) lever stop hole.

Position the small diameter end of the diaphragm return spring into the boss in the accelerating pump chamber. Position the diaphragm assembly into the accelerating pump cover and line up the holes. Position the cover and diaphragm over the return spring and onto the body. Install the cover retaining screws finger-tight. Push the diaphragm assembly inward and tighten the screws.

**4.** Position the accelerating pump actuating rod retaining clip over the hole in the accelerating lever, with the tab side of the clip toward the carburetor barrel. Depress the tab and insert the shorter end of the rod through the lever and clip. Release the tab when the rod is inserted. Perform the "Accelerating Pump Adjustments" after the carburetor is assembled. Refer to the "Carburetor In-Chassis Adjustments" in this group of the manual for the proper procedure.

**5.** Position the overtravel spring on the accelerating pump lever and hook the tang of the spring on the lever. Position the overtravel lever and spring onto the throttle shaft and insert the accelerating pump actuating rod into the closest hole in the lever. Install the washer and retaining ring.

Install the overtravel tension retaining pin in the throttle shaft. Pull the arm of the overtravel spring over the retaining pin to apply spring tension to the overtravel lever.

**6.** Position the spark valve gasket over the spark valve and install them into the lower body. Tighten the valve securely. A loose valve will cause poor engine operation.

**7.** Install the idle mixture adjusting screw in the lower body. Turn the screw inward until it bottoms on the lower body; then, back it off the specified amount of turns.

UPPER TO LOWER BODY ASSEMBLY

**1.** Place the ball check and the accelerating pump weight into the

lower body accelerating pump outlet passage. Insert a ball check into the accelerating pump inlet passage.

2. Install the upper to lower body gasket onto the lower body. **Make certain the word "TOP"** (inscribed on the gasket) is facing upward. Position the upper body onto the lower body and gasket. Install the body retaining screws.

3. Insert the fuel vent tube into the fuel vent passage in the upper body and tighten the retaining clip screw.

MANUAL CHOKE

1. Position the choke cable bracket assembly onto the lower body assembly and install the stud.

2. Insert the threaded end of the choke shaft to cam lever rod through the cam lever swivel. Install the spring and adjusting nut onto the rod.

3. Position the rod end into the keyhole in the choke shaft lever; then, insert the rod and turn it counterclockwise.

4. Position the cam lever assembly over the stud and install the retainer. Perform a "Manual Choke Adjustment" prior to installation of the carburetor. Refer to "Carburetor In-Chassis Adjustments" in this group of the manual for the proper procedure.

**Carburetor Bench Adjustments.** All carburetor adjustments, with the exception of the Final (Hot) Engine Idle and Idle Fuel Mixture adjustments can be performed prior to installing the carburetor.

**HOLLEY SINGLE-BARREL — 1962**

**Carburetor Disassembly.** Use a separate container for the component parts of the various assemblies to facilitate cleaning, inspection, and assembly. The carburetor is shown in Fig. 21.

MAIN BODY

1. Remove the cotter pin from the accelerating pump connecting link and remove the link.

2. Remove the two throttle body screws and lock washers. Separate the throttle body and main body, and remove the gasket. Discard the gasket.

3. Remove the fuel bowl (and identification tag) and gasket.

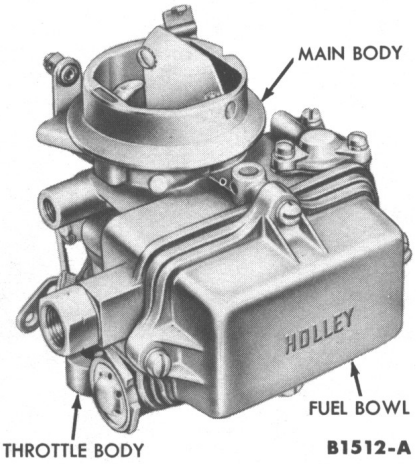



**FIG. 21—Holley Single-Barrel Carburetor**

4. Remove the fuel inlet fitting with a box wrench, and remove the gasket. Remove the fuel inlet seat screw and gasket located in the fuel inlet opening.

5. Remove the fuel inlet needle seat and bracket assembly, and the gasket from inside the main body.

6. Remove the float shaft, releasing the float. Slide the fuel inlet needle assembly off the float lever tab.

7. Remove the power valve cover and gasket. Lift the power valve diaphragm and stem assembly out of the main body.

8. Using a jet wrench, remove the main jet (Fig. 22). Remove the main well.

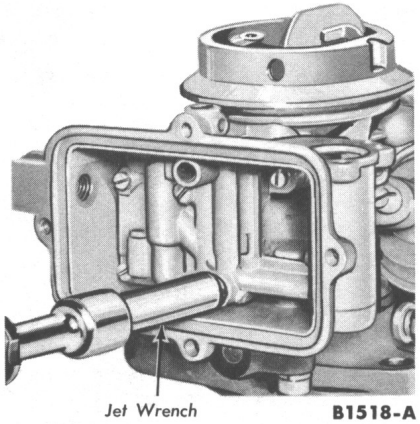



**FIG. 22—Jet Removal or Installation**

9. Remove the accelerating pump diaphragm return spring from the metal disc on the accelerating pump piston.

10. Pull the accelerating pump diaphragm out of the main body. Remove the accelerating pump operating lever retainer, then slide the lever off the stud.

11. Remove the choke pick-up lever retainer and lever spring. Slide the choke lever off the shaft. Remove the choke bracket.

12. Remove the two choke plate screws, and slide the choke shaft out of the main body. Remove the choke plate assembly. Remove the choke shaft and lever assembly retainer and remove the assembly from the choke plate.

13. Press the accelerating pump rod sleeve toward the diaphragm until the sleeve retainer ball drops out. Remove the sleeve and spring.

THROTTLE BODY

1. Remove the idle adjusting needle and spring.

2. Remove the spark control valve and gasket, using a socket wrench.

3. At times, it may be necessary to remove the throttle plate and shaft to accomplish a thorough cleaning job. If this is done, lightly scribe the plate along the throttle shaft before removal so it can be installed in exactly the same position. **The throttle plate and shaft cannot be interchanged between carburetors, nor are they serviced as separate parts.**

**Assembly.** A disassembled view of the carburetor is shown in Fig. 23.

THROTTLE BODY

1. If the throttle plate was removed, slide the throttle shaft into the throttle body. Referring to the line scribed on the throttle plate, install the plate in its original position with the screws snug, but not tight. Hold the throttle body up to the light. Little or no light should show between the throttle plate and the throttle bore. Tap the plate lightly with a screw driver handle to seat it. Tighten and stake the screws.

2. Install the accelerating pump link in the throttle lever. Secure it with a cotter pin. Install the link in the hole closest to the throttle shaft for warm weather and the hole farthest from the throttle shaft for cold weather.

3. Install the idle adjusting needle and spring. Turn the needle in gently with the fingers until it seats, then back it off 1-1½ turns for a prelimi-

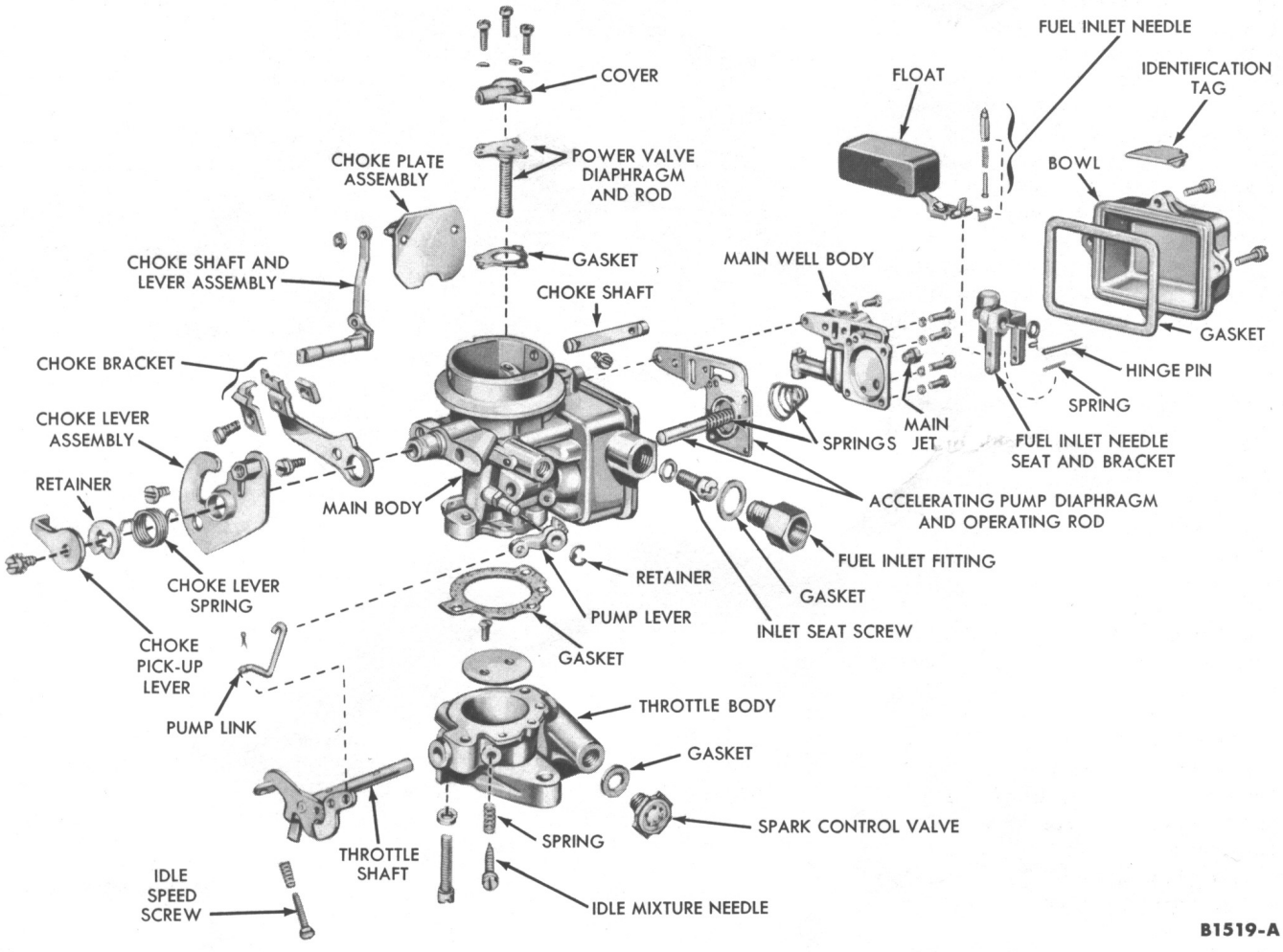



**FIG. 23—Carburetor Assembly**

nary idle adjustment. **Do not force the needle against the seat. If the needle is damaged, it must be replaced before a proper idle mixture adjustment can be made.**

4. Install the spark control valve and gasket, using a socket wrench.

MAIN BODY

1. Position the choke shaft and lever assembly on the choke plate and install the retainer. Position the choke plate assembly in the main body. Slide the choke shaft in the main body. Install the choke plate screws.

2. Install the choke bracket. Position the choke lever on the main body with the number on the lever facing out. Position the spring on the lever (Fig. 24). Install the retainer and the choke pick-up lever (Fig. 25).

3. Place the spring on the accelerating pump diaphragm rod, and press the rod sleeve onto the rod to compress the spring.

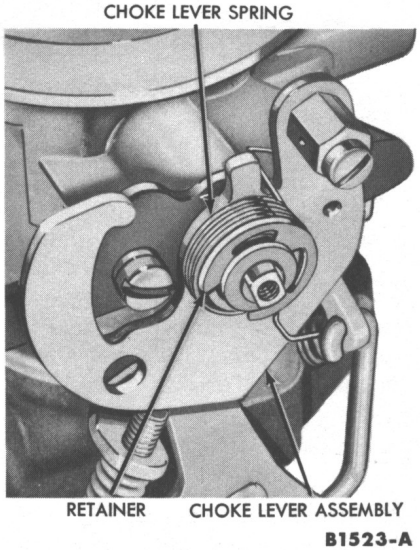



**FIG. 24—Choke Lever Spring Installation**

4. Drop the rod sleeve retainer ball into the hole in the sleeve.

5. Position the accelerating pump assembly in the main body.

6. Position the large end of the

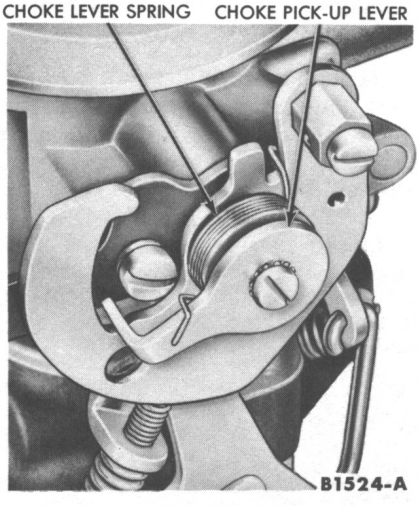



**FIG. 25—Choke Pick-Up Lever Installation**

accelerating pump return spring in the metal disc on the diaphragm.

7. Position the screws and lock washers in the main well. The two long screws are placed in the center top and center bottom holes. The short screws are used in the three remaining holes.

8. Insert the power valve end of the main well body into position against the spacer gasket as follows:

Apply pressure with the index finger against the protruding end of the accelerating pump rod sleeve to fully compress the accelerating pump return spring as the thumb presses the main well body into position (Fig. 26). This will prevent the return spring pressure from disturbing the alignment of the holes in the diaphragm and main body. Before releasing the accelerating pump rod sleeve, tighten the screws. Install the main jet.

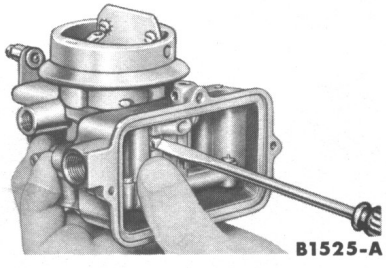



**FIG. 26—Main Well Body Installation**

9. Position the power valve gasket and power valve diaphragm stem assembly on the cover. Position the screws in the cover and install the assembly on the main body. Do not over-tighten the retaining screws.

10. Clip the fuel inlet needle on the float lever tab.

11. Guide the fuel inlet needle into the seat, and position the float lever between the two float hinge bracket arms with the float tang spring to the right of the float tang. Install the float lever shaft. **Do not attempt to interchange the fuel inlet needle or seat. They are matched assemblies.**

12. Place the fuel inlet needle seat screw bracket on the screw and insert the screw through the fuel inlet fitting boss.

13. Place the seat gasket on the threaded end of the inlet seat screw which protrudes into the fuel bowl.

14. Place the fuel inlet needle seat and bracket, float, and fuel inlet needle assembly into position. Place the fuel level gauge under the float hinge bracket to prevent the assembly from tilting when the seat screw is tightened (Fig. 27).

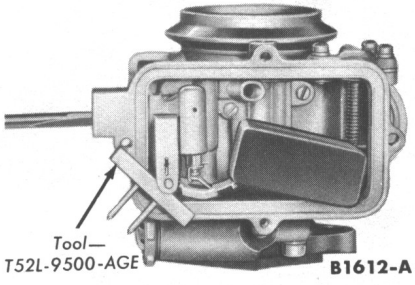



**FIG. 27—Fuel Inlet Needle and Seat Installation**

15. Tighten the screw securely, then remove the gauge. Install the fuel inlet fitting and gasket.

16. Invert the main body assembly, and check the setting of the float (Fig. 28). With the main body in the upright position, check the float drop (Fig. 29). Make sure the clearance between the bottom of the float chamber to the lowest point of the float is to specifications. Bend the upright tang on the float lever to achieve the correct clearance.

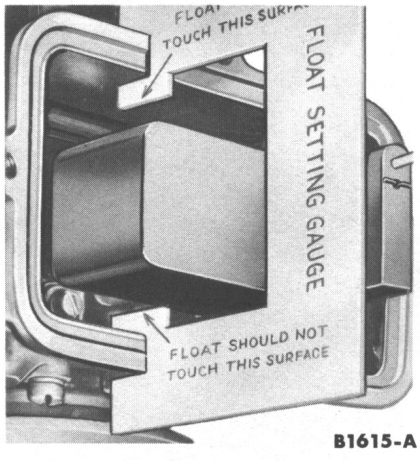



**FIG. 28—Bench Float Setting**

17. If necessary, bend the tab on the float arm to bring the float setting within limits. This should provide the proper fuel level.

18. Install a new fuel bowl gasket in the recess in the main body.

19. Place the fuel bowl into position. Install the retaining screws and lock washers and identification tag. Tighten the two center screws, then the two end screws, alternately, to evenly compress the gasket.

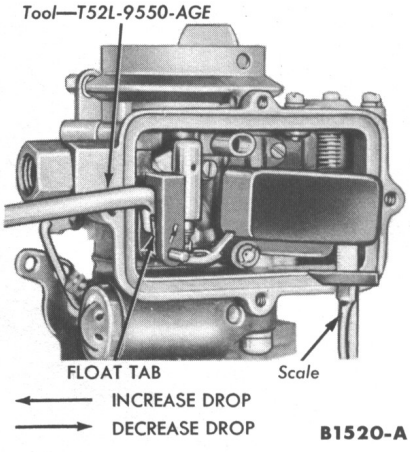



**FIG. 29—Float Drop**

20. Place a new throttle body to main body gasket on the throttle body, and check the alignment of all holes in the gasket with the corresponding holes in the throttle body.

21. Insert the two throttle body screws and lock washers through the throttle body and gasket to maintain gasket alignment, then position the main body on the throttle body.

22. Invert the carburetor, and evenly tighten the two throttle body screws.

23. Insert the accelerating pump link through the hole in the pump operating lever.

24. Slide the accelerating pump operating lever on the lever stud and install the retainer.

## FUEL PUMP, FUEL TANK AND FUEL LINES (Part 3-2)

### FUEL PUMP—1962

The fuel pump is shown disassembled in Fig. 30.

### DISASSEMBLY

1. Scribe a line on the fuel pump body, valve housing, and pulsator cover, so that on assembly, the inlet and outlet openings will be in the correct position.

2. Remove the pulsator cover retaining screw with a clutch-type screw driver, then remove the cover and pulsator.

3. Hold the valve housing against the pump body and remove the housing retaining screws, then remove the valve housing.

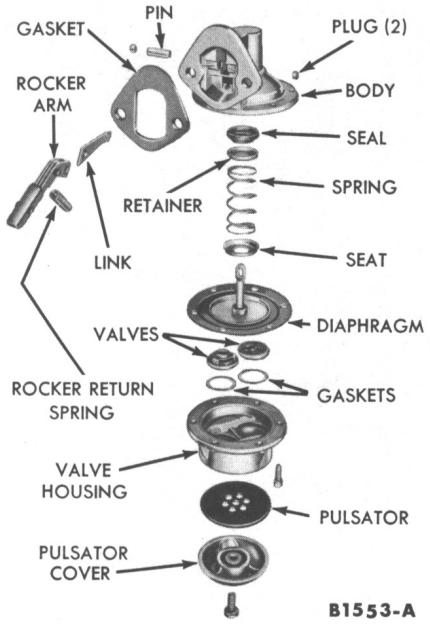



**FIG. 30—Fuel Pump Assembly**

4. Scrape away the staking marks at the rocker arm plugs and remove one plug. Drive out the other plug and pin with tool T56L-9350-A, Detail 3 (Fig. 31). Remove the rocker arm and spring.

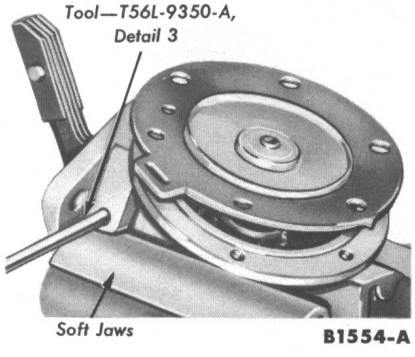



**FIG. 31—Rocker Arm Pin Removal**

5. Press the diaphragm into the fuel pump body and unhook the rocker arm link from the slot in the diaphragm rod (Fig. 32). Remove the rocker arm link, diaphragm, and spring.

6. Scrape away the staking marks and flip the valves out of the valve housing with a screw driver. **Note the position of the inlet and outlet valves so that the new valves can be installed in the same manner.**

## CLEANING AND INSPECTION

Clean the fuel pump body, valve housing, pulsator cover, and outlet fitting screen in solvent. Blow out all passages with compressed air.

Inspect the body, valve housing, and cover for cracks or damage and replace them if necessary. Inspect the staked areas around the valve and seal counterbores for high spots which may cause distortion of the new parts upon installation. Remove all high spots. Inspect the mounting flange for distortion. Replace the pump body or lap the distorted flange, if necessary.

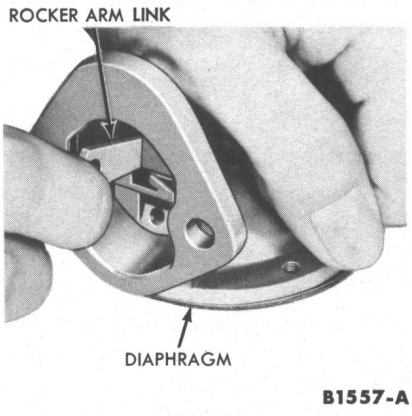



**FIG. 32—Diaphragm and Link Removal or Installation**

## ASSEMBLY

Install all the parts included in the overhaul kit.

1. Install a new diaphragm rod oil seal and retainer using Tool T56L-9350-A, Detail 1 (Fig. 33). Stake the retainer at four points.

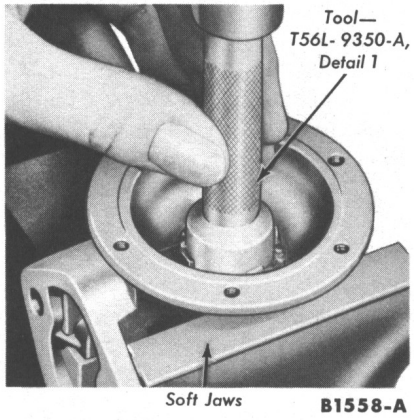



**FIG. 33—Diaphragm Rod Oil Seal and Retainer Installation**

2. Lubricate the fuel pump diaphragm rod with grease. Assemble the spring seat (cup side toward the spring) and spring on the diaphragm rod. Insert the diaphragm rod through the pump oil seal.

3. Lubricate the rocker arm and link with engine oil. Apply pressure on the diaphragm spring and insert the link in the diaphragm rod slot (Fig. 32). Position the rocker arm over the link.

4. Install the rocker arm pin. Coat the plugs with sealer. Install the plugs (Fig. 30) and stake them in place. Install the rocker arm return spring in the rocker arm.

5. Install the valve gaskets, then press the valves in place using Tool T56L-9350-A, Detail 1 (Fig. 34). Stake each valve at four points.

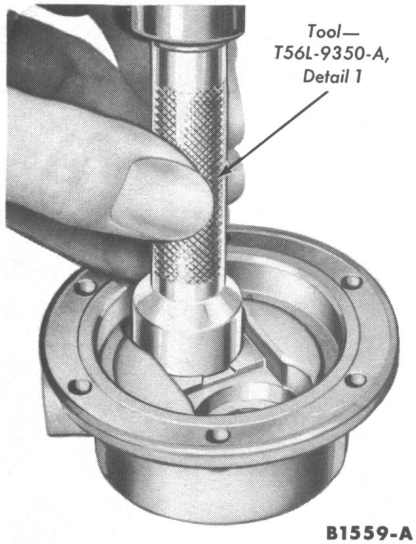



**FIG. 34—Pump Valve and Gasket Installation**

6. Position the valve housing on the pump body, aligning the scribed marks. Hold the housing tight against the diaphragm and pump body, and install the housing retaining screws. Make sure the diaphragm extends evenly around the edge of the housing. Tighten the screws evenly.

7. Using the scribed lines as guides, install the pulsator and the pulsator cover.

## FUEL PUMP – 1963

The fuel pump for the 1963 EEV-144 and EEW-170 engine installations is a new design, single action type, manufactured by Carter. The pump incorporates pressure leak-down bleed holes in the valve assemblies to prevent excessive pressure build-up in the fuel line during hot soak periods. Specifications are identical to those for the 1962 pump. The fuel pump is shown in Fig. 35.

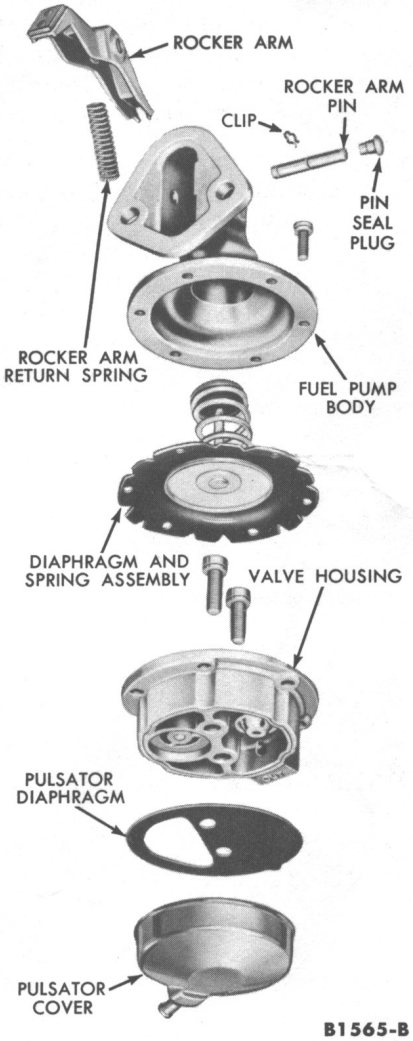



**FIG. 35—Fuel Pump Assembly**

### TROUBLE DIAGNOSIS AND TESTS

Trouble diagnosis and tests are covered in Part 3-1 of the 1961 Shop Manual.

### REMOVAL

1. Disconnect the fuel lines at the pump.

2. Remove the pump retaining screws, then remove the pump and gasket. Discard the gasket.

### INSTALLATION

1. Remove all the gasket material from the mounting pad and pump flange. Apply oil resistant sealer to both sides of a new gasket.

2. Position the new gasket on the pump flange, and hold the pump in position against the mounting pad. Make sure the rocker arm is riding on the camshaft eccentric.

3. Press the pump tight against the pad, install the retaining screws, and alternately torque them to specifications. Connect the fuel lines.

4. Operate the engine and check for leaks.

### DISASSEMBLY

1. Scribe marks on the fuel pump body, valve housing, and pulsator cover so that these parts can be assembled in their original position.

2. Remove the valve housing assembly. Separate the valve housing from the pulsator cover and note the position of the pulsator diaphragm so that it can be assembled in its proper position. **Do not remove the fuel valves from the housing. The valve housing is replaced as an assembly.**

3. Remove the rocker arm return spring, then remove the clip from the rocker arm pin (Fig. 35).

4. Remove the rocker arm pin seal plug (Fig. 36).

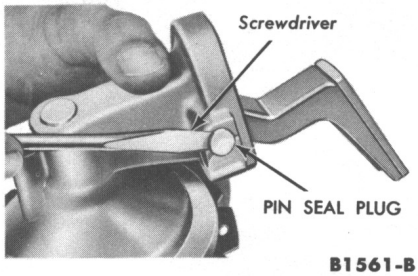



**FIG. 36—Rocker Arm Pin Seal Plug Removal or Installation**

5. Press the fuel pump diaphragm into the fuel pump body to release the tension on the rocker arm and allow the rocker arm pin to fall out. If the pin does not come out freely, use needle nose pliers (Fig. 37). Pull the rocker arm out to unhook it from the diaphragm stem.

6. Remove the fuel pump diaphragm. **Do not disassemble.** The diaphragm and spring are serviced as an assembly.

### CLEANING AND INSPECTION

Clean the fuel pump body, valve housing, and pulsator cover in solvent. Blow out all body, housing and cover passages. Inspect the pump body, valve housing and pulsator

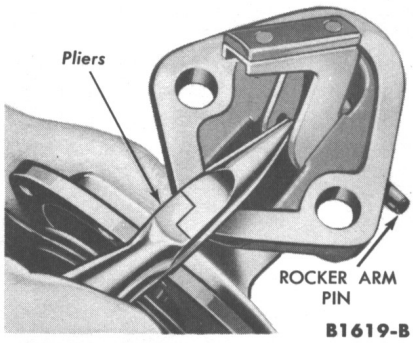



**FIG. 37—Rocker Arm Pin Removal or Installation**

cover for cracks or damage and replace them if necessary. **The fuel valves are not serviceable, so if replacement is necessary, replace the valve housing and valves as an assembly.** Inspect the mounting flange for distortion. Replace pump body or lap distorted flange if necessary.

### ASSEMBLY

1. Position the fuel pump diaphragm assembly into the pump body. Apply pressure on the diaphragm spring so that the rocker arm can be installed on the stem as shown in Fig. 38.

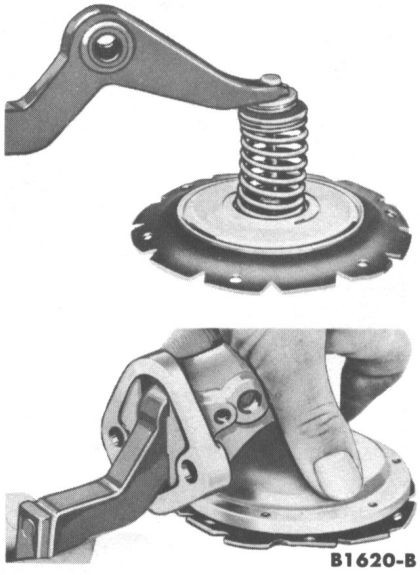



**FIG. 38—Rocker Arm Installation**

2. Align the rocker arm pin holes by applying slight pressure on the diaphragm spring, then install the rocker arm pin (Fig. 36).

3. Install a new rocker arm pin seal plug, then install the clip over

the groove in the center of the rocker arm pin (Fig. 35).

**4.** Position the rocker arm return spring on the boss in the pump body. Compress the spring and slip it over the tang in the rocker arm.

**5.** Place a new pulsator diaphragm on the valve housing in the position previously noted on disassembly (opening in the diaphragm over the fuel inlet valve(s) as shown in Fig. 39). Position the cover on the valve housing, aligning the scribed lines on the cover with the line on the valve housing. Be sure the pulsator diaphragm extends evenly around the edge of the cover. Install and tighten to specifications the two retaining screws and lockwashers inside the valve housing.

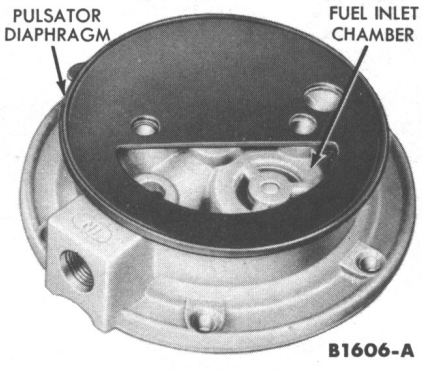



**FIG. 39—Pulsator Diaphragm Installation**

**6.** Align the scribe lines. Hold the valve housing assembly tight against the fuel pump body and install the six screws and lockwashers. Be sure the fuel pump diaphragm extends evenly around the edge of the valve housing before tightening the retaining screws to specifications.

# GROUP 4—COOLING SYSTEM

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 4 of the 1961 Shop Manual remain the same for 1962 and 1963.

# GROUP 5—CLUTCH AND TRANSMISSION

### SYNCHRO-SMOOTH DRIVE TRANSMISSION

The 1962-1963 maintenance recommendations are in Group 14 and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures outlined in Group 5 of the 1961 Shop Manual are the same for 1962 and 1963, with the following exceptions:

## TROUBLE SHOOTING

### TROUBLE SYMPTOMS AND POSSIBLE CAUSES

| | | |
|---|---|---|
| **JUMPING OUT OF HIGH GEAR** | Shift linkage out of adjustment, worn or loose.<br>Insufficient spring tension of rail detent springs.<br>Misalignment or loose transmission case and/or clutch housing.<br>Worn input shaft pilot bearing.<br>Bent output shaft.<br>Worn or broken high gear synchronizer.<br>Worn clutch teeth on input shaft | and/or worn clutch teeth on synchronizer sleeve.<br>Bent or worn shift fork, lever and/or shaft.<br>End play in input shaft (bearing retainer loose or broken, loose or worn bearings on input and output shafts).<br>Clutch teeth not engaging completely.<br>Not enough over-shift travel in column. |
| **STICKING IN HIGH GEAR** | Clutch not releasing fully.<br>Burred or battered teeth on synchronizer sleeve and/or input shaft.<br>Frozen synchronizing blocking ring on input shaft gear cone.<br>Stuck shifter plunger. | Lack of lubrication.<br>Improper lubrication.<br>Corroded transmission levers (shaft).<br>Defective (tight) input shaft pilot bearing. |

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**TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)**

| | | |
|---|---|---|
| **JUMPING OUT OF SECOND GEAR** | Shift linkage out of adjustment, worn or loose.<br>Insufficient spring tension of rail detent springs.<br>Worn input shaft pilot bearing.<br>Bent output shaft.<br>Worn clutch teeth on second gear and/or worn clutch teeth on synchronizer sleeve.<br>Bent or worn shifter fork, lever and/or shaft. | End play in output shaft (extension loose or broken, and loose or worn bearings on input and output shafts).<br>Clutch teeth not engaging completely.<br>Excessive end play in cluster gear (worn thrust washers).<br>Not enough over-shift travel in column. |
| **STICKING IN SECOND GEAR** | Clutch not releasing fully.<br>Burred or battered teeth on synchronizer sleeve and/or intermediate gear.<br>Frozen synchronizing blocking ring on intermediate gear cone.<br>Stuck shifter plunger. | Lack of lubrication.<br>Improper lubrication.<br>Corroded transmission levers (shaft).<br>Second speed gear seizure on shaft will give same effect as gears stuck in second gear. |
| **JUMPING OUT OF LOW GEAR** | Shift linkage out of adjustment, worn or loose.<br>Insufficient spring tension of rail detent spring.<br>Misalignment or loose transmission case and/or clutch housing.<br>Bent output shaft.<br>Worn or broken clutch teeth on low gear.<br>Worn or broken clutch teeth on reverse sliding gear. | Bent or worn shift fork, lever and/or shaft.<br>End play in output shaft (extension loose or broken, loose or worn output shaft bearing).<br>End play of low gear.<br>Clutch teeth not engaging completely.<br>Not enough over-shift travel in column. |
| **STICKING IN LOW GEAR** | Clutch not releasing fully.<br>Burred or battered teeth on synchronizer sleeve and/or low gear.<br>Frozen synchronizing blocking ring on low gear cone.<br>Stuck shifter plunger.<br>Lack of lubrication. | Improper lubrication.<br>Corroded transmission levers (shaft).<br>Low gear seizure on shaft will give same effect as gears stuck in first gear. |
| **GEARS SPINNING WHEN SHIFTING INTO GEAR FROM NEUTRAL** | Clutch not releasing fully.<br>Binding input shaft pilot bearing.<br>Synchronizers not functioning. | |
| **LOW, SECOND AND HIGH GEAR CLASH** | Worn blocking rings and/or cone surfaces.<br>Broken blocking rings.<br>Excessive output shaft end play. | Weak or broken detent springs in the synchronizer assembly.<br>Dragging clutch plate.<br>Excessive rock of synchronizer assembly on output shaft. |
| **REVERSE GEAR CLASH** | Transmission gears can be made to clash by shifting into reverse gear too quickly after the clutch pedal is depressed, even though the clutch is in perfect working order. Sufficient time MUST be allowed before shifting into reverse gear. If gear clash continues after allowing proper time | for the clutch driven plate parts to stop, check the clutch adjustments to specified limits. Also, make sure that the engine idle speed is to specification. Gear clash also may be caused by a dragging clutch plate (plate distorted, or input shaft pilot bearing tight). |

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**TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)**

| | | |
|---|---|---|
| **GEAR NOISE** | Some gear noise is to be expected in all except high speed gears. Comparison with another vehicle is the only means of determining whether or not gear noise is excessive. Before removing the transmission for correction of gear noise, determine by test which gears are noisy under load, so that these parts can be thoroughly inspected when removed. | |
| **GEAR RATTLE DURING ACCELERATION** | An improperly calibrated clutch driven plate and a faulty crankshaft balancer may cause rattle in the transmission in third speed gear on acceleration. Rattles occurring on wide open throttle between 40 and 60 mph are usually caused by improper clutch driven plate dampening. | |
| **NOISE WHEN SHIFTING OUT OF REVERSE GEAR** | Shifting out of reverse very slowly will usually result in some noise just as the gears disengage. This is normal because of the gear pointing necessary for easy engagement. Noise when disengaging reverse indicates that the reverse idler gear is at fault. All tests must be made by disengaging reverse gear while the vehicle is still in motion. | |
| **SCORED OR BROKEN GEAR TEETH** | Gears and gear clutch teeth will be seriously damaged and possibly broken by failure of the vehicle's operator to fully engage the gears on every shift before engaging the clutch and applying engine power. | |
| **NOISY IN ALL GEARS** | Low lubricant level.<br>Incorrect lubricant.<br>Cluster gear bearings worn or damaged.<br>Input shaft bearing or gear worn or damaged. | Output shaft bearing worn or damaged.<br>Transmission misalignment or loose. |
| **NOISY IN FIRST THROUGH THIRD GEARS** | Working gears worn or damaged.<br>Cluster gear worn or damaged.<br>Synchronizers worn or broken. | |
| **NOISY IN REVERSE** | Reverse idler shaft worn or damaged.<br>Reverse gear and sleeve worn or broken. | Shift linkage improperly adjusted.<br>Bent, damaged or loose shift linkage. |
| **HARD SHIFTING** | Clutch improperly adjusted.<br>Clutch parts worn or damaged.<br>Shift linkage out of adjustment, damaged or loose parts. | Synchronizers worn or damaged.<br>Shift levers or forks worn.<br>Shift rail components not functioning properly. |

## OPERATION

The three-speed transmission (Fig. 40) is of the fully synchronized type, with all gears except the reverse gear and sleeve in constant mesh. All forward-speed changes are accomplished with synchronizer sleeves (Fig. 41) instead of sliding gears. The synchronizers will enable quicker shifts, eliminate gear clash and permit down-shifting, high to intermediate between 40-20 mph and from intermediate to low below 20 mph.

The forward-speed gears are helical-cut and are in constant mesh (Fig. 41). Gears used in the reverse train are spur-cut and are not synchronized.

Ball bearings support the input gear and the center of the output shaft (Figs. 50 and 51). Needle bearings, in the input gear bore, support the front of the output shaft. The countershaft gear (cluster gear) also runs on 2 rows of needle bearings. A bronze bushing is used in the reverse idler gear (Fig. 47). The output shaft in this transmission is short enough to enable the rear bearing to support the front of the driveshaft.

Synchronizers and blocking rings are the conventional tapered ring and straight-clutch gear type (Fig. 50).

The shift forks, shift rails, detent mechanism and related parts are provided in the transmission case (Fig. 46).

When first gear is selected, the shift lever moves the reverse gear and sleeve forward and forces the synchronizer blocking ring conical surface against the matching cone on the constant mesh first gear located on the output shaft. If the vehicle is moving, the internal teeth of the reverse gear and sleeve and blocking ring will not index until the constant mesh first gear is brought up or down

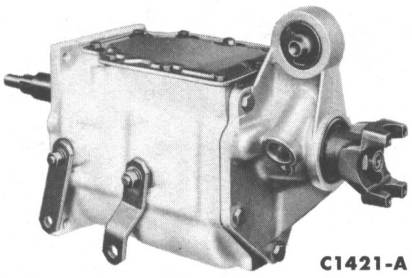



**FIG. 40—Three-Speed Transmission**

to the speed of the reverse gear and sleeve which is rotating at output shaft speed.

The reverse gear and sleeve has internal splines that, with further movement, will slide over the blocking ring and engage external clutch teeth on the constant mesh first gear. Since first gear is now locked to the output shaft and is always meshed with the countershaft (cluster) gear, the power flow is from the input gear, through the countershaft gear, to the constant mesh first gear, through the reverse gear and sleeve to the output shaft and out the rear of the transmission.

Engagement of second and third gears is the same as first except for ratio. In third gear, the input gear and shaft is locked directly to the output shaft by the second and third speed synchronizer to provide a ratio of 1:1.

Spur teeth are cut on the outside of the reverse gear and sleeve. The reverse gear and sleeve like the hub are always locked to the output shaft. Reverse gear is engaged by sliding the reverse gear and sleeve into mesh with the spur gear at the rear of the idler gear. The drive is then from the input gear, through the countershaft gear, to and through the reverse idler gear to the output shaft reverse gear and sleeve. The gears in this position, will rotate the output shaft in a reverse direction.

A system of interlocks and detents in the transmission case makes it possible for the selection of one gear speed at a time and helps to hold any gear in the selected position.

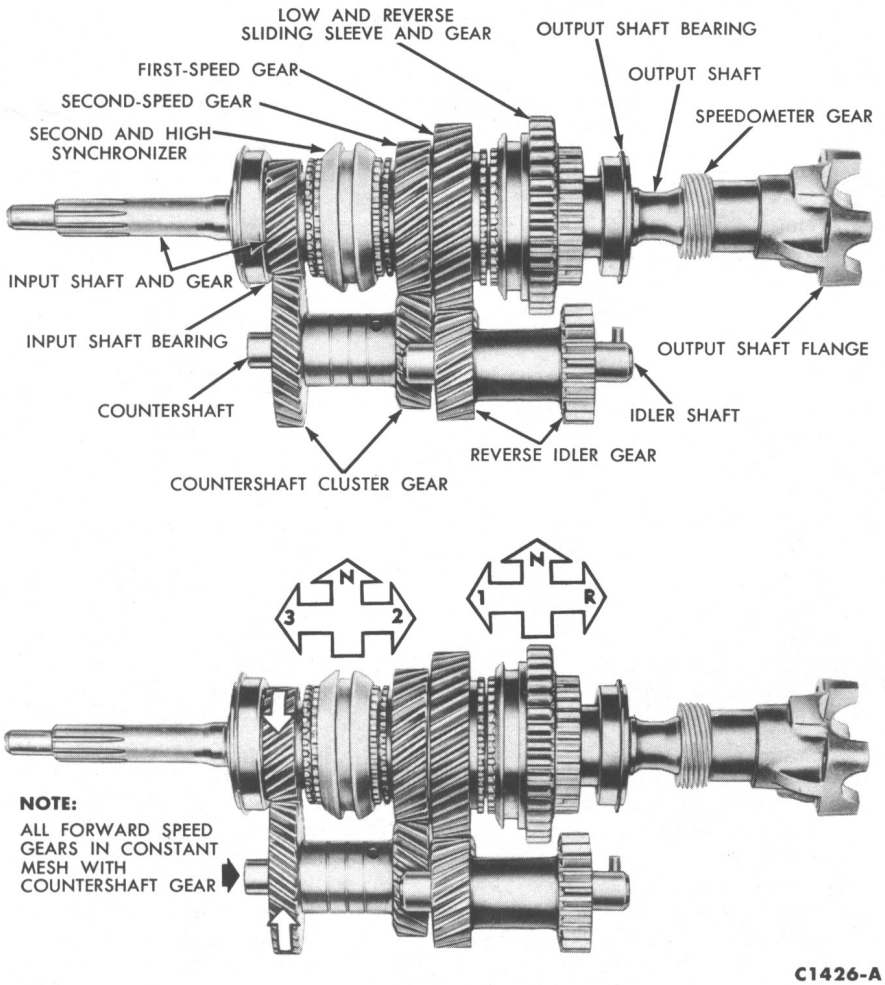



**FIG. 41—Power Flow—Three-Speed Transmission**

## TRANSMISSION OVERHAUL

### Disassembly

**1.** Remove the drain plug from the bottom of the transmission case and drain the lubricant.

**2.** Remove the 9 cap screws that attach the cover to the case. Remove the cover and the gasket (Fig. 42) from the case.

**3.** Remove the nut and flat washer that secures the companion flange to the output shaft. Remove the flange from the output shaft.

**4.** Remove the 5 cap screws and lock washers that attach the extension housing to the case. Remove the extension housing and gasket from the case.

**5.** Remove the 4 cap screws and lock washers that attach the front bearing retainer to the case. Remove the retainer and gasket from the case and input shaft.

**6.** Remove the lubricant filler plug from the right side of the case. Working through the plug opening, drive the roll pin out of the case and countershaft with a small punch (Fig. 43).

**7.** Hold the countershaft gear with a hook and with Tool T63P-7111-B (Fig. 44), push the countershaft out the rear of the case until the countershaft gear (cluster) can be lowered to the bottom of the case. Remove the countershaft from the rear of the case.

**8.** Lift the input gear and shaft from the front of the case. Be careful not to drop the needle bearings from the bore of the input shaft.

**9.** Slide the speedometer drive gear off the output shaft. Remove the speedometer drive gear lock ball from the shaft.

**10.** Remove the snap ring that retains the output shaft bearing on the shaft. Remove the bearing from the case and shaft as shown in Fig. 45 with tool T63P-7025-A.

**11.** Place both shift levers in the neutral (center) position.

**12.** Remove the set screw (Fig. 46) that retains the detent springs and plugs in the case. Remove a detent spring and plug from the case.

**13.** Remove the set screw that secures the first and reverse shift fork to the shift rail. Slide the first and reverse shift rail out through the rear of the case.

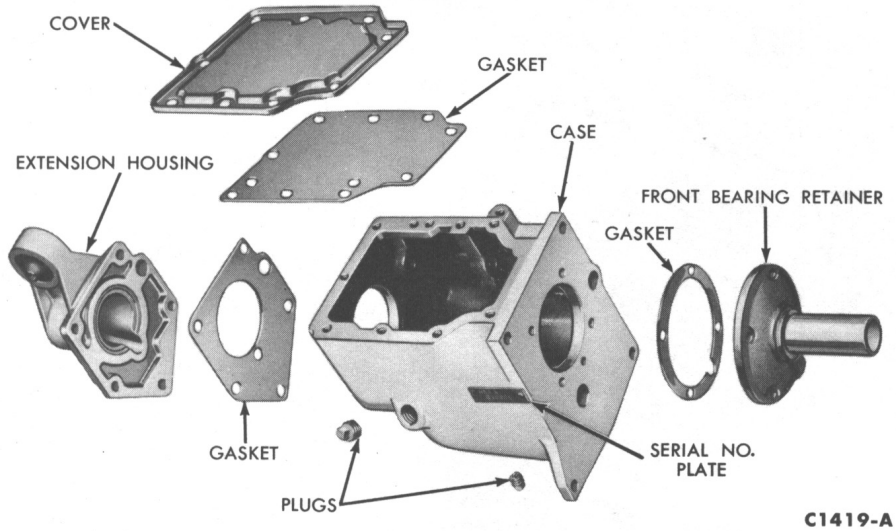



**FIG. 42—Transmission Case and Related Parts**

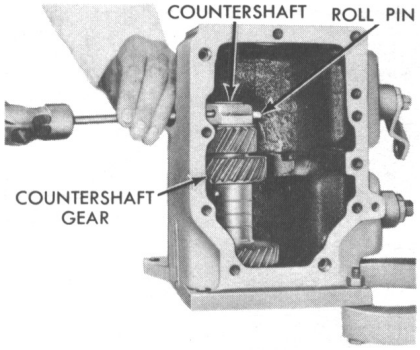



**FIG. 43—Removing Countershaft Roll Pin**

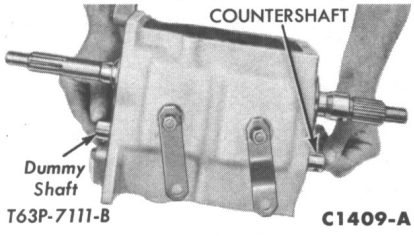



**FIG. 44—Removing Countershaft**

**14.** Rotate the first and reverse shift fork upward, then lift it from the case.

**15.** Remove the set screw that secures the second and third shift fork to the shift rail. Rotate the shift rail 90° with a pair of pliers. Be careful not to damage the rail surface with the pliers.

**16.** Lift the interlock plug (Fig. 46) from the case with a magnet.

**17.** Tap on the inner end of the second and third shift rail to remove the expansion plug (Fig. 46) from the front of the case.

**18.** Remove the second and third detent plug and spring from the detent bore.

**19.** Rotate the second and third shift fork upward, then lift it from the case.

**20.** Carefully lift the output shaft assembly out through the top of the case.

**21.** Working through the front bearing opening, drive the reverse idler gear shaft (Fig. 47) out through the rear of the case with a drift.

**22.** Lift the reverse idler gear and two thrust washers from the case.

**23.** Lift the countershaft and thrust washers from the case. Be careful not to allow the dummy shaft and needle bearings (Fig. 48) to fall out of the gear.

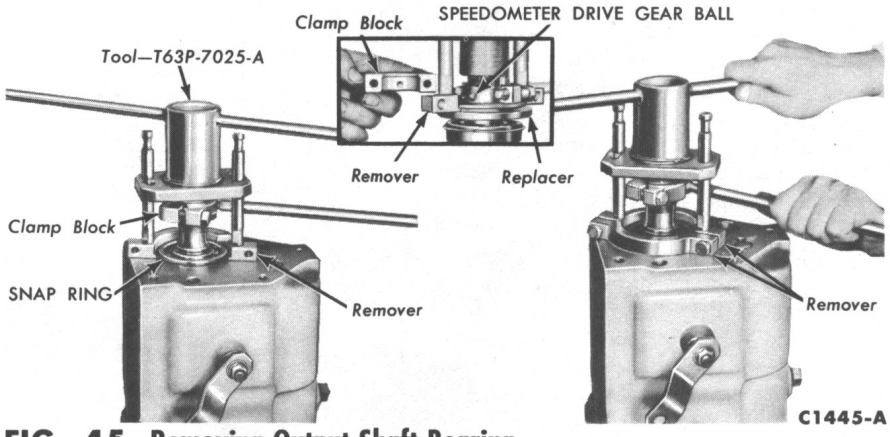



**FIG. 45—Removing Output Shaft Bearing**

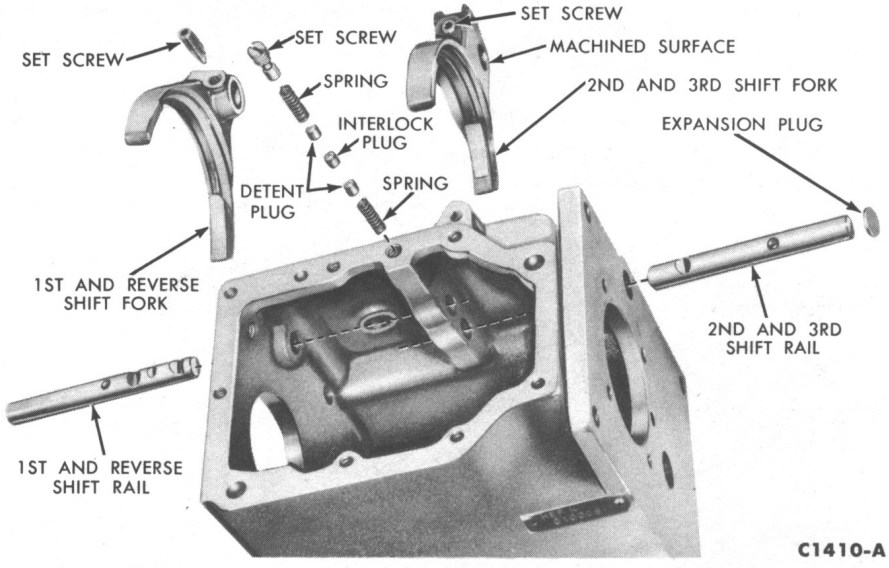



**FIG. 46—Shift Rails and Forks Disassembled**

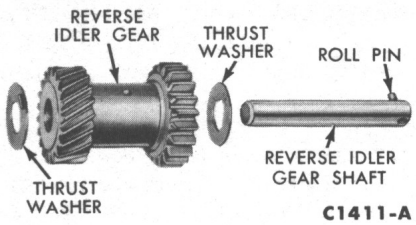



**FIG. 47—Reverse Idler Shaft Disassembled**

24. Remove the countershaft to case retaining pin and any needle bearings which may have fallen into the case.

25. Remove the nut, lock washer and the flat washer that secures each shift lever (Fig. 49) to the lever and shaft. Lift the shift levers off the shafts. Slide each lever and shaft out of the case. Discard the O-ring from each shaft.

26. Remove the snap ring from the front of the output shaft, then slide the synchronizer and the second speed gear (Fig. 50) off the shaft.

27. Remove the next snap ring and thrust washer from the output shaft, then slide the first gear and blocking ring off the shaft.

28. Remove the next snap ring from the output shaft, then slide the reverse gear and sleeve off the shaft.

29. Remove the dummy shaft, 50 roller bearings and the 2 retainer washers (Fig. 48) from the countershaft gear.

30. If the input shaft and gear bearing (Fig. 51) is to be replaced, remove and install it with the tools shown in Fig. 52.

31. Disassemble the synchronizers as shown in Figs. 53 and 54.

### Cleaning and Inspection

CLEANING

1. Clean all parts except the ball bearings in cleaning solvent and dry them with compressed air.

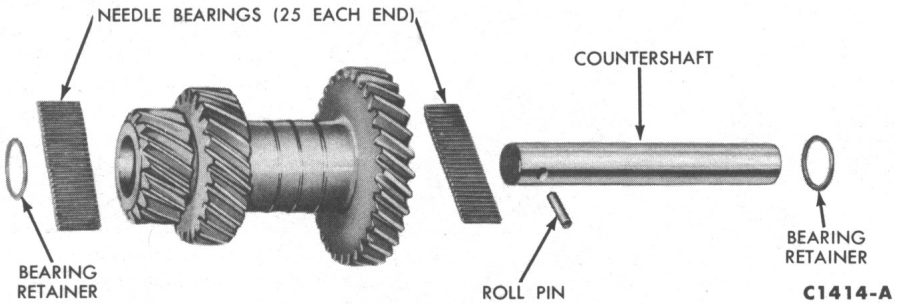



**FIG. 48—Countershaft Gear Disassembled**

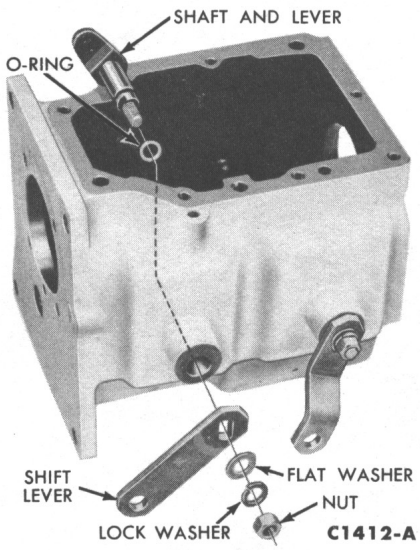



**FIG. 49—Shift Levers and Lever and Shaft Disassembled**

2. To clean the bearings, rotate them in clean solvent until all traces of lubricant and dirt have been removed.

3. Dry the bearings with compressed air, but do not allow them to spin.

4. After the bearings are dry, dip them in transmission lubricant, then wrap them in a clean lint-free cloth until ready for use.

INSPECTION

1. Inspect the transmission case for being cracked, worn or damaged bearing bores, damaged threads, thrust washer wear or any other damage which could affect the operation of the transmission.

2. Inspect the front face of the case for small nicks or burrs that could cause misalignment of the transmission with the flywheel housing. Remove all small nicks or burrs.

3. Replace a cover that is bent or distorted. Make sure that the vent hole in the cover is open.

4. Check the condition of the shift levers, forks, shift rails and the lever and shafts.

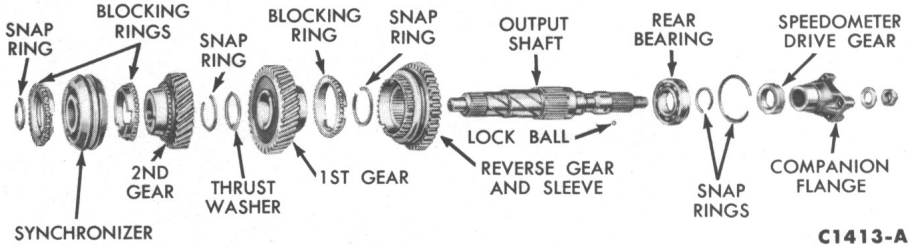



**FIG. 50—Output Shaft Disassembled**

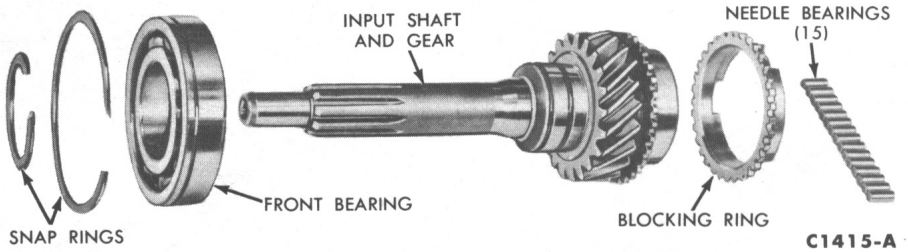



**FIG. 51—Input Shaft Gear Disassembled**

5. Examine the ball bearing races for being cracked, worn or rough. Inspect the balls for looseness, wear, end play or other damage. Check the bearing assemblies for looseness in the bores. If any of these conditions exist, replace the bearings.

6. Replace needle bearings that are broken, worn or rough.

7. Replace the countershaft gear (cluster) if the teeth are chipped, broken or worn. Replace the counter-

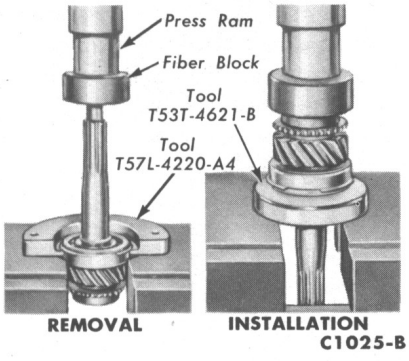



**FIG. 52—Replacing Input Shaft Gear Bearing**

shaft (Fig. 48) if it is bent, scored or worn.

8. Coat the bore in each end of the countershaft gear with grease. Hold the tool T63P-7111-B in the gear and install 25 needle bearings and a retainer washer in each end of the gear. Install the countershaft gear, thrust washers and the countershaft in the case. Place the transmission case in a vertical position. Check the end play with a feeler gauge as shown in Fig. 55. If the end play exceeds 0.018 inch, replace the thrust washers as required to obtain an

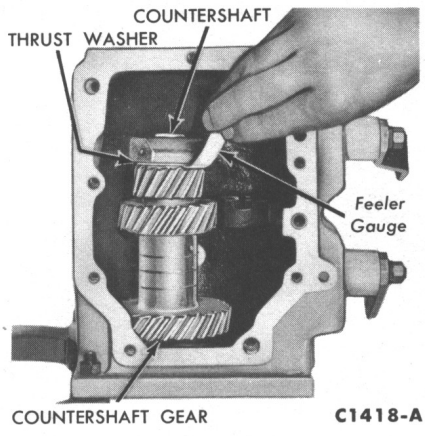



**FIG. 55—Checking Countershaft Gear End Play**

end play of 0.004-0.018 inch. Once the end play has been established, remove the countershaft with the dummy shaft. Allow the countershaft gear to remain in the case.

9. Replace the reverse idler gear if the teeth are chipped, worn or broken. If the bushings are worn or damaged, replace the gear assembly. Replace the idler gear shaft if worn or scored. Install the idler gear, thrust washers and shaft in the case. Make sure that the thrust washer with the flat side is at the web end, and that the spur gear is toward the rear of the case. Check the reverse idler gear end play as detailed in step 8. If the end play is within specifications (0.004-0.018 inch), leave the gear installed in the case.

10. Replace the input shaft and gear (Fig. 51) if the splines are damaged or if the teeth are chipped, worn or broken. If the needle bearing surface in the bore of the gear is worn or rough, or if the cone surface is damaged, replace the gear and rollers.

11. Replace all other gears that are chipped, broken or worn.

12. Check the synchronizer sleeves for free movement on their hubs. Make sure that the alignment marks (etched marks) are properly indexed as shown in Figs. 53 and 54.

13. Check the blocking rings for the grooves being worn smooth or for the teeth being damaged.

14. Replace the speedometer drive gear if the teeth are stripped or damaged. Make certain to install the correct size replacement gear.

15. Replace the output shaft if there is any evidence of wear or if any of the splines are damaged.

16. Inspect the seal in the extension housing and replace it if worn or damaged. **A bushing is not used in the extension of the Econoline transmission.**

17. Replace the seal in the input shaft bearing retainer if it is damaged.

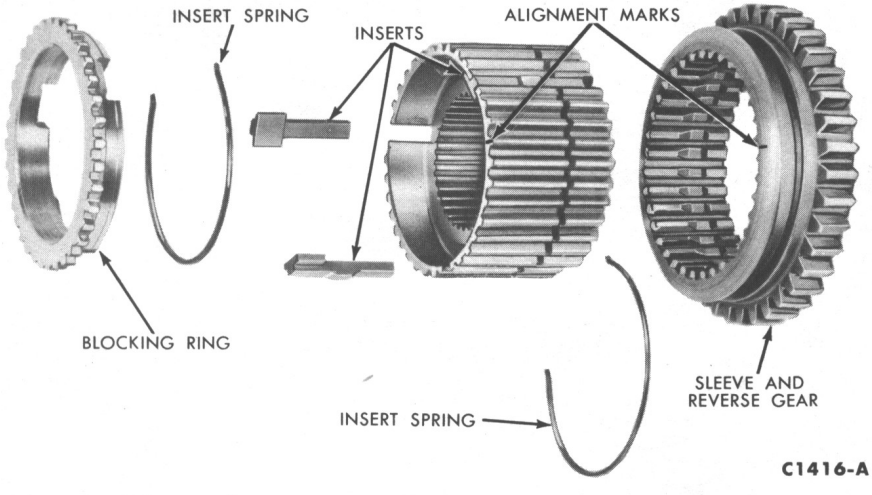



**FIG. 53—First and Reverse Gear Synchronizer Disassembled**

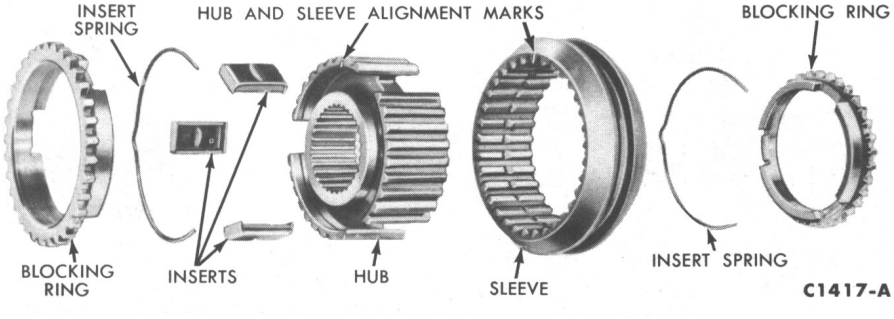



**FIG. 54—Second and Third Gear Synchronizer Disassembled**

### Assembly

1. The countershaft gear and the reverse idler gear should be in the transmission case as detailed in steps 8 and 9 under "Inspection."

2. Install an insert spring (Fig. 53) in the groove of the 1st and reverse synchronizer hub. Make sure that the spring,covers all insert grooves. Start the hub in the sleeve making sure that the alignment marks are properly indexed. Position the three inserts in the hub making sure that the small end is over the spring and that the shoulder is on the inside of the hub. Slide the sleeve and reverse gear onto the hub until the detent is engaged. Install the other insert spring in the front of the hub to hold the inserts against the hub.

3. Install one insert spring (Fig. 54) in to a groove of the synchronizer

hub, making sure that all three insert slots are fully covered. With the alignment marks on the hub and sleeve aligned, start the hub into the sleeve. Place the three inserts on top of the retaining spring and push the assembly together. Install the remaining insert spring, so that the spring ends cover the same slots as do the other spring. **Do not stagger the springs.** Place a synchronizer blocking ring in each end of the synchronizer sleeve.

**4.** Lubricate the output shaft splines and machined surfaces with transmission lubricant.

**5.** Slide the first and reverse synchronizer (Fig. 50) onto the output shaft with the teeth end of gear facing toward the rear of shaft. Secure it in place with the snap ring.

**6.** Coat the tapered machined surface on the first gear with grease. Place the blocking ring on the greased surface.

**7.** Slide the first gear onto the output shaft with the blocking ring toward the rear of the shaft. Rotate the gear as necessary to engage the three notches in the blocking ring with the synchronizer inserts. Secure the first gear with the thrust washer and snap ring.

**8.** Coat the tapered machined surface of the second gear with grease and slide the blocking ring onto it. Slide the second gear with blocking ring and the third and fourth gear synchronizer onto the mainshaft. The tapered machined surface of the second gear must be toward the front of shaft. Make sure that the notches in the blocking ring engage the synchronizer inserts. Secure the synchronizer with a snap ring.

**9.** Install a new O-ring on each of the two shift lever shafts (Fig. 49). Lubricate the shafts with transmission lubricant and install them in the case. Secure each shift lever to its respective shaft with a flat washer, lock washer and nut.

**10.** Coat the bore of the input shaft and gear with a thick coat of grease. Install the 15 needle bearings (Fig. 51) in the bore.

**11.** Position the output shaft assembly in the case.

**12.** Place a detent plug spring and a plug in the case (Fig. 46). Place the second and third speed shift fork in the synchronizer groove. Rotate the fork into position and install the second and third speed shift rail. It will be necessary to depress the detent plug to enter the rail in the bore. Move the rail inward until the detent plug engages the center notch (neutral). Secure the fork to the shaft with the set screw.

**13.** Install the interlock plug in the case. If the second and third shift rail is in the neutral position, the top of the interlock will be slightly lower than the surface of the first and reverse shift rail bore.

**14.** Place the first and reverse shift fork in the groove of the first and reverse synchronizer. Rotate the fork into position and install the first and reverse shift rail. Move the rail inward until the center notch (neutral) is aligned with the detent bore. Secure the fork to the shaft with the set screw. Install the remaining detent plug and spring. Secure the detent spring with the slotted head set screw. Turn the set screw in until the head is flush with the case.

**15.** Install a new expansion plug in the case.

**16.** Carefully install the input shaft and gear in the front of the case. Make sure that the needle bearings do not fall out of place.

**17.** Position a new front bearing retainer gasket on the case.

**18.** Place the bearing retainer on the case making sure that the oil return groove is at the bottom. Install and tighten the four attaching screws to 19-25 ft-lbs.

**19.** Install the large snap ring on the rear bearing. Place the bearing on the output shaft with the snap ring end toward the rear of the shaft. Press the bearing into place with tool T63P-7025-A (Fig. 56). Secure the bearing to the shaft with a snap ring.

**20.** Hold the speedometer drive gear lock ball in the detent and slide the spedometer drive gear into place.

**21.** Place the transmission in the vertical position. Working through the drain hole in the bottom of the case, align the bore of the countershaft gear and the thrust washers with the bore of the case using a screwdriver.

**22.** Working from the rear of the case, push the dummy shaft out of the countershaft gear with the countershaft. Before the countershaft is completely inserted in the bore, make sure that the hole that accommodates the roll pin is in alignment with the hole in the case.

**23.** Working through the lubricant filler hole, install a roll pin (Fig. 43) in the case and countershaft.

**24.** Install the filler and drain plugs in the case. Make sure that the magnetic plug is installed in the bottom of the case.

**25.** Coat a new extension housing gasket with sealer and position it on the case.

**26.** Install external thread lock washers on the five attaching screws. Dip the threads of the cap screws in sealer. Secure the housing to the case and tighten the cap screws to 42-50 ft -lbs.

**27.** Secure the companion flange to the output shaft with a flat washer and nut. Tighten the nut to 60-80 ft-lbs.

**28.** Place the transmission in gear. Pour lubricant over the entire gear train while rotating the input or output shaft.

**29.** Coat a new cover gasket with

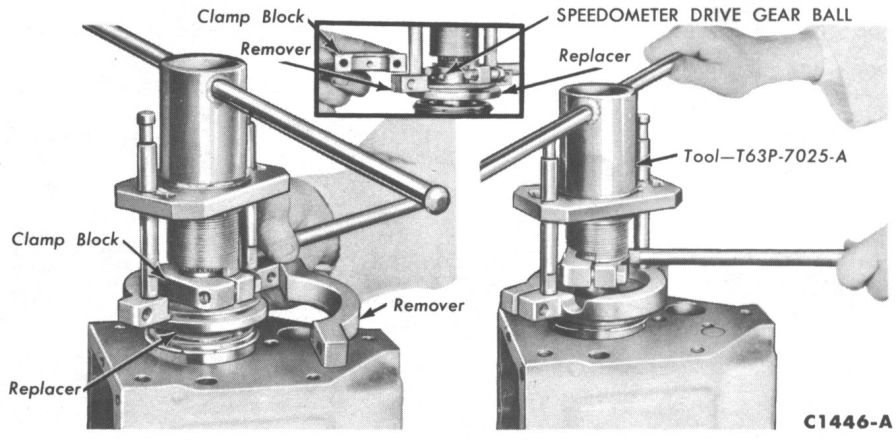



**FIG. 56—Installing Output Shaft Rear Bearing**

sealer. Secure the cover with 9 cap screws. Tighten the screws to 14-19 ft-lbs.

**30.** If the extension housing seal is to be replaced, remove it with the tools T50T-100-A and T50T-101-A or 1175-AE.

**31.** Install the new extension housing seal with tool T57L-7657-A.

**32.** Check the operation of the transmission in all of the gear positions.

# GROUP 6—REAR AXLE AND DRIVE LINE

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All the basic service procedures in Group 6 of the 1961 Shop Manual remain the same for 1962 and 1963 with the following exceptions:

### REAR AXLE TROUBLE SHOOTING AND MINOR REPAIRS

### REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

Soak the new rear axle seal in SAE 10 engine oil for ½ hour before it is installed.

### REAR AXLE OVERHAUL

### DIFFERENTIAL CASE AND DRIVE PINION OVERHAUL—HOUSING IN TRUCK

**Assembly and Installation.** Soak the new drive pinion seal in SAE 10 engine oil for ½ hour before it is installed.

**Differential Case Assembly and Installation.** Set the preload of the right differential bearing nut 2 or 3 notches tight after it contacts the bearing cup.

# GROUP 7—WHEELS, TIRES, CHASSIS SUSPENSION AND UNDERBODY

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All basic service procedures in Group 7 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

### WHEELS AND TIRES (Part 7-2)

### HUBS, BEARINGS, AND OIL SEALS OR GREASE RETAINERS

**Front Wheel Bearing Adjustment.** The front wheel bearings should be adjusted if the wheel is loose on the spindle or if the wheel does not rotate freely. The following procedure will bring the end play to specification.

**1.** Raise the vehicle until the wheel and tire clear the floor.

**2.** Pry off the wheel cover and remove the grease cap from the hub (Fig. 57).

**3.** Wipe the excess grease from the end of the spindle, and remove the adjusting nut cotter pin and nut lock.

**4.** While rotating the wheel, hub, and drum assembly, tighten the adjusting nut snug (12-15 ft-lbs) to seat the bearings (Fig. 58).

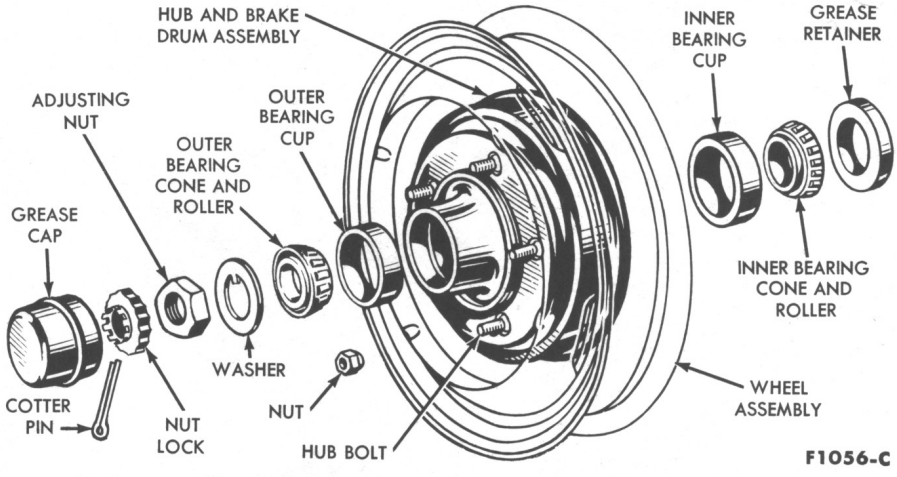



**FIG. 57—Front Hub, Bearings and Grease Retainer**




**FIG. 58—Front Wheel Bearing Adjustment**

5. Locate the nut lock on the adjusting nut so that the castellations on the lock are aligned with the cotter pin hole in the spindle.

6. Using a 1⅛-inch box wrench, back off both the adjusting nut and nut lock 2 castellations.

7. Install a new cotter pin, and bend the ends of the cotter pin around the castellated flange of the nut lock.

8. Check the front wheel rotation. If the wheel rotates properly, install the grease cap and the hub cap or wheel cover. If the wheel still rotates roughly or noisily, clean or replace the bearings and cups.

9. Lower the vehicle.

# GROUP 8—STEERING

The 1962-1963 maintenance recommendations are in Group 14 and the 1962-1963 specifications are in Group 15 of this manual.

All the basic service procedures in Group 8 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

### STEERING GEAR (Part 8-1)

### STEERING GEAR REPAIR—1963

For 1963, the worm shaft upper bearing cup is no longer a press fit in the bearing adjuster. The lower bearing cup is no longer a press fit in the housing. During disassembly or assembly, the cup will slide in or out of the adjuster and housing without use of special tools.

The worm shaft bearing adjuster lock nut is marked on its outer side with the letter "S". Install the lock nut with the flat side against the bearing adjuster and the identifying letter "S" outward.

When removing or installing the sector shaft bushing, use Tool T60K-3576-A.

### STEERING GEAR INSTALLATION

1. Slide the steering column and shift tube assembly over the worm shaft so that the boss in the column and shift tube bracket pilots into the hole in the steering column (Fig. 3 of the 1961 Shop Manual).

2. Position the clamp to the steering column and bracket and install the two clamp retaining bolts. Do not tighten the clamp bolts at this time.

3. Install the steering column and steering gear assembly through the passenger compartment, and pilot the sector shaft into the sector shaft (Pitman) arm.

4. Position the column-to-instrument panel clamp, and start the retaining bolts and nuts.

5. Install the gear housing mounting bolts and torque to specifications.

6. Move the Pitman arm firmly onto the sector shaft and install the bolt and nut that clamp the arm to the shaft.

7. The steering shaft must center in the steering column upper bearing. For **right or left adjustment,** move the column as required. With the shaft centered in the bearing, torque the screws at the instrument panel to specifications.

8. For **fore-and-aft adjustment,** loosen the housing bolts, center the shaft, and torque the housing bolts to specifications.

9. Position the upper bearing sleeve and spring.

10. Position the steering wheel and horn contact, install the retaining nut, and torque to specifications. Stake the nut.

11. Adjust the clearance between the steering wheel and the column, and finally tighten the upper and lower clamp bolts.

12. Tighten the steering column and shift tube bracket clamp bolts.

13. Connect the transmission shift rods to the shift tube levers, install the steering column floor pan (six retaining screws), and install the rubber seal.

14. Connect the horn and turn signal wires, and secure them in the retaining clip.

# GROUP 9—BRAKES

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 9 of the 1961 Shop Manual are the same for 1962 and 1963.

# GROUP 10—GENERATING AND STARTING SYSTEMS

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

The service procedures in Group 10 of the 1961 Shop Manual are the same for 1962 and 1963.

# GROUP 11—LIGHTS, INSTRUMENTS AND ACCESSORIES

The 1962-1963 maintenance recommendations are in Group 14, and the 1962-1963 specifications are in Group 15 of this manual.

All basic service procedures in Group 11 of the 1961 Shop Manual remain the same for 1962 and 1963, with the following exceptions:

## WINDSHIELD WIPER

### TWO-SPEED ELECTRIC MOTOR DISASSEMBLY

The two-speed electric motor may be disassembled for service of the drive mechanism parts.

1. Remove the gear housing cover plate and gasket (Fig. 59).

2. Remove the output shaft retainer and spacer washer.

3. Remove the crankpin bearing retainer and remove the spacer washer and cam return spring assembly.

4. Remove the arm and link assembly.

5. Remove the crankpin bearing cam.

6. Remove the input gear retainer and outer spacer shim, and remove the input gear and inner spacer shim.

7. Remove the wiper arm lever nut and lock washer.

8. Remove the wiper arm lever and spacer, and remove the output shaft and gear assembly from the housing.

9. The output gear may be removed from its shaft by tapping with a fiber hammer. Be careful not to damage the end of the shaft.

The worm drive gear and armature assembly is not serviced.

### TWO-SPEED ELECTRIC MOTOR ASSEMBLY AND ADJUSTMENT

1. Tighten the motor cover. Adjust the motor shaft end play to 0.005-0.007 inch by turning the shaft stop screw. Measure with a feeler gauge between the stop screw and the motor shaft.

2. Install the input gear shim or the input gear shaft and install the gear in the housing. Adjust the end play to 0.005 to 0.010 inch by adding or removing shims under the input gear retainer. Install the retainer.

3. Install the output gear on the output shaft. Make sure that the gear is bottomed on the shaft.

4. Install the output shaft and gear assembly into the housing with the gear teeth facing the motor. Install one spacer washer to the outside end of the output shaft and assemble the wiper arm lever to the output shaft, with the linkage studs facing away from and above the shaft. Secure the lever with a lock washer and nut.

5. Place the bearing cam on the crankpin with the small diameter portion of the cam facing outward.

6. Install the arm and link assembly to the bearing cam. As the arm is placed on the shaft, the gears must be meshed and the link which is riveted to the arm must be installed to the output shaft at the same time. Proper gear indexing is obtained when the bottom tooth of the arm and gear segment will be in mesh with the bottom valley of the output shaft gear.

7. Install the output shaft spacer washer and retainer. Check the end play of the output shaft (0.005-0.010 inch). Remove or install spacer washers under the shaft retainer to adjust the end play.

8. Install the cam return spring assembly.

9. Install the bearing spacer and retainer. If the retainer cannot be installed, one or more coils of the spring clutch are probably out of place. If the bearing has excessive end play on the crankpin, the projection of the bearing may ride out of the semi-circle slot in the end plate. Add spacer washers under the retainer if necessary.

10. Apply generous amounts of Sun Prestige No. 41 grease to all moving parts. Install the gear housing cover plate.

**When operating the unit on the bench, do not place hands or fingers between the wiper lever and the case, or inside the gear housing, as considerable power is developed by the gear reduction.**

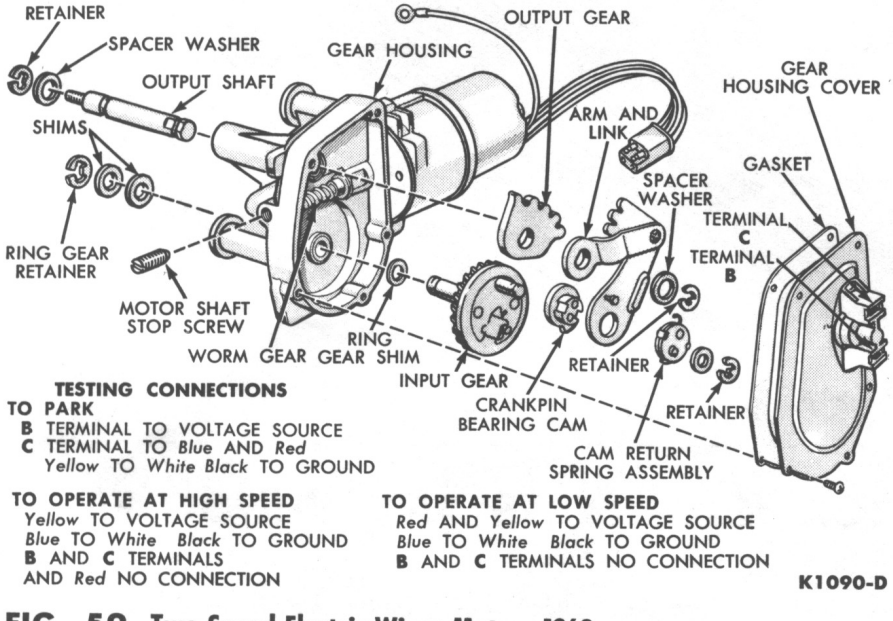



**FIG. 59—Two-Speed Electric Wiper Motor—1963**