

1969



CHEVROLET TRUCK
CHASSIS
OVERHAUL MANUAL

CHEVROLET

SERIES
10-60

ST 134-69

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7. Install new nuts to the threaded shell studs and tighten to 19-25 ft. lbs. torque.
8. Leak test the compressor as outlined under "Leak Testing the Compressor" in this section.
9. Install compressor in the vehicle.

Major Internal Mechanism

The clutch hub and drive plate assembly, drive key, pulley and coil housing should be removed before proceeding with the following compressor disassembly.

Removal from Shell

1. Remove the rear head, discharge plate and suction reed valve from the compressor as outlined under "Rear Head and Reed Valve Assemblies".
2. Remove the oil inlet tube and "O" ring with Tool J-5139 as shown in Figure 16.
3. Carefully lay the compressor shell on its side and slide out interior mechanism and front head assembly. Do not hammer or use undue force to remove the mechanism; however, gentle taps on the head casting may aid in removing the assembly.

CAUTION: Do not hammer or tap on the compressor shaft

4. Remove front head casting, front discharge valve plate and suction reed valve from the mechanism. Examine parts for damage and replace if necessary. Check particularly for damage to the sealing surfaces on the front head casting webs.
5. Examine the mechanism for any obvious damage.
6. Remove the suction crossover cover (fig. 17).
7. If desired, the mechanism may be assembled in Checking Cage J-9397 and operated on a motor test stand, or by some other suitable means, to observe sound level and general operation. Tighten cage nuts evenly to 14-16 ft. lbs. torque.
8. Remove mechanism from the cage.

Disassembly

If the mechanism has sustained major damage, due possi-

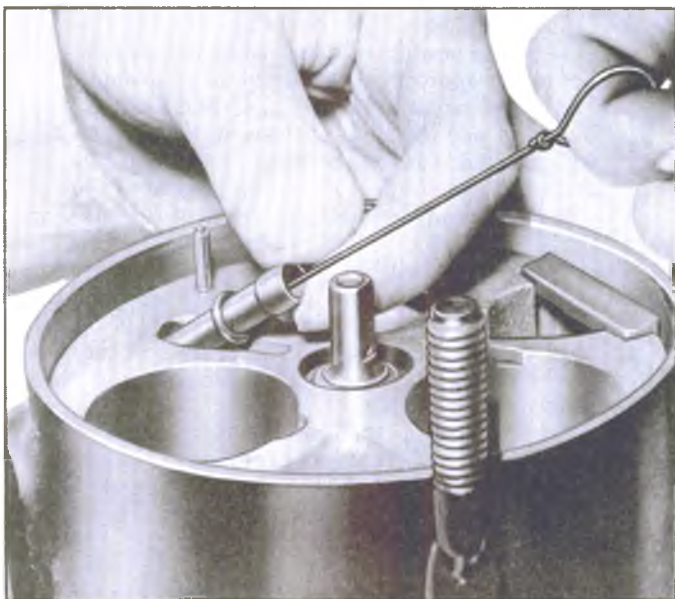


Fig. 16—Removing Oil Inlet Tube and "O" Ring

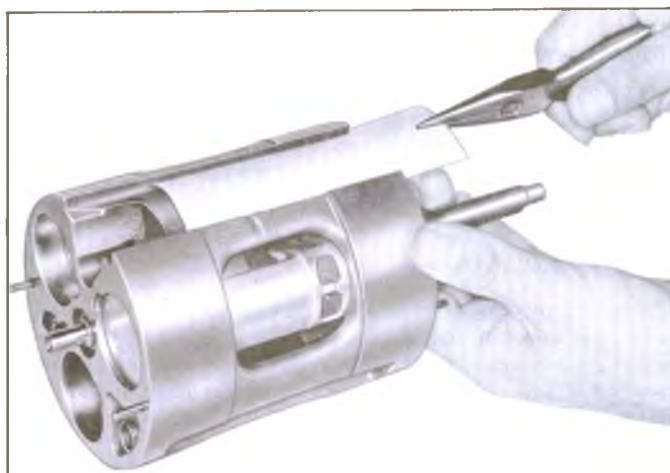


Fig. 17—Removing Suction Crossover Cover

bly to loss of refrigerant and/or oil, it may be necessary to replace it with a complete service interior mechanism assembly rather than to replace individual parts. If further disassembly is considered worthwhile, proceed as follows:

1. Before disassembling the cylinder and mechanism, number the pistons and cylinder locations so that all parts may be replaced in their original location. Pistons and cylinder bores may be identified by numbering them 1, 2 and 3 with a pencil.
2. Use an old discharge tube to drive discharge tube out of cylinder (fig. 18). (Drive from REAR of cylinder.)
3. Drive the cylinder halves apart and free from the dowel pins and discharge crossover tube using a fiber block and mallet (fig. 19). Discard the discharge crossover tube.



Fig. 18—Unseating Discharge Crossover Tube

suitable socket, check pinion bearing preload. The rotating torque of the pinion shaft should be 10 to 20 inch pounds. Add or remove shims behind the outer bearing cone to bring preload within limits.

9. When pinion depth and bearing preload are within limits, install differential in carrier, adjust differential bearing preload and ring gear backlash and complete the axle assembly as outlined under "Differential-Installation."
10. Remove flange and install slinger, oil, seal, flange and propeller shaft.
11. Fill unit with recommended lubricant and road test vehicle.

AXLE SHAFT GUIDE AND OIL SEAL REPLACEMENT

The axle shaft guides and oil seals, located just outboard of the differential bearings, can be replaced only after removal of the differential.

1. Remove differential as outlined previously.
2. Drive the guides and seals inboard out of carrier.
3. Install new guides in tube.
4. Lubricate new oil seals and install in tube, with lip of seal inboard.

SPECIAL TOOLS

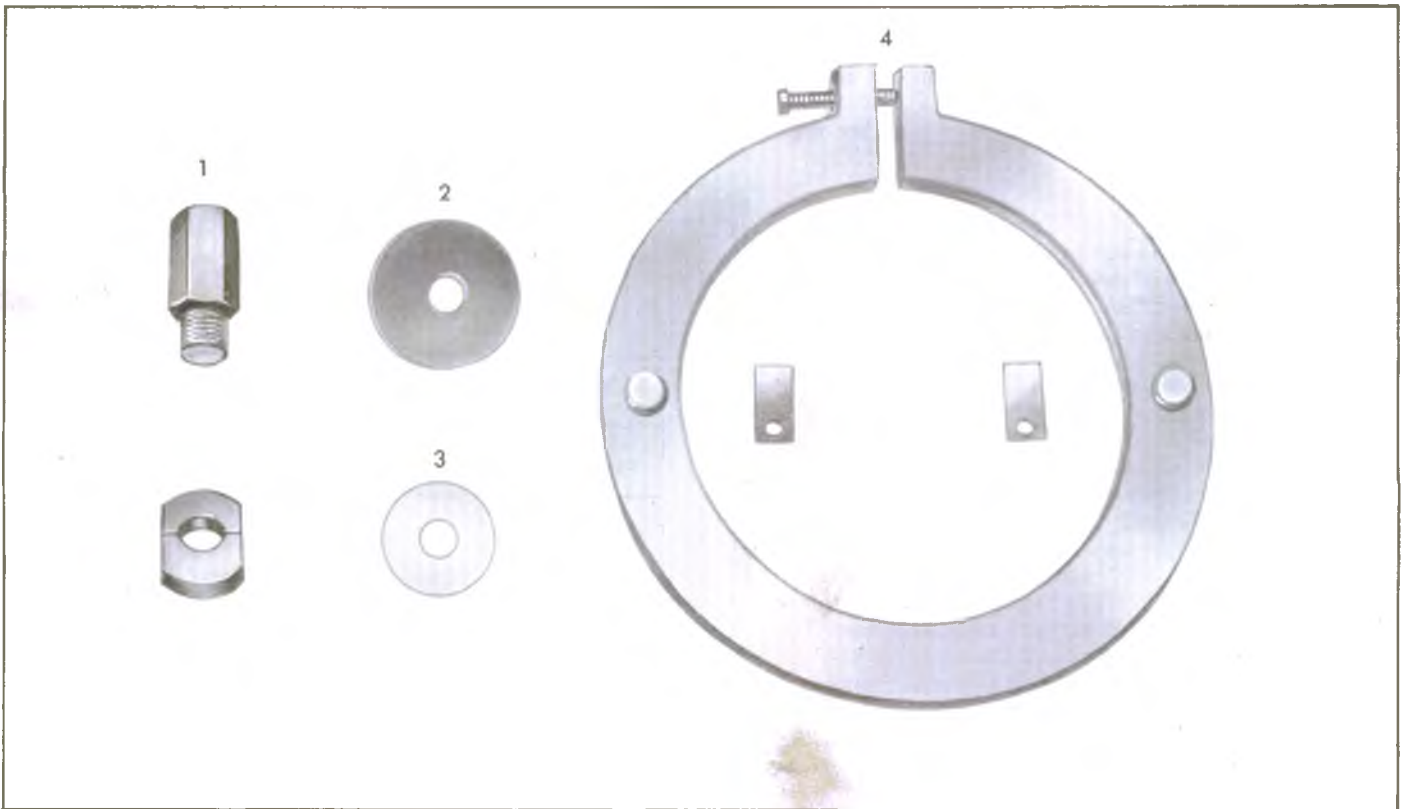


Fig. 2—Four-Wheel Drive Special Tools

1. J-6368—Bearing Cup Installer Handle
2. J-3234—Bearing Cup Installer

3. J-6367—Bearing Cup Remover
4. J-5231—Spreader

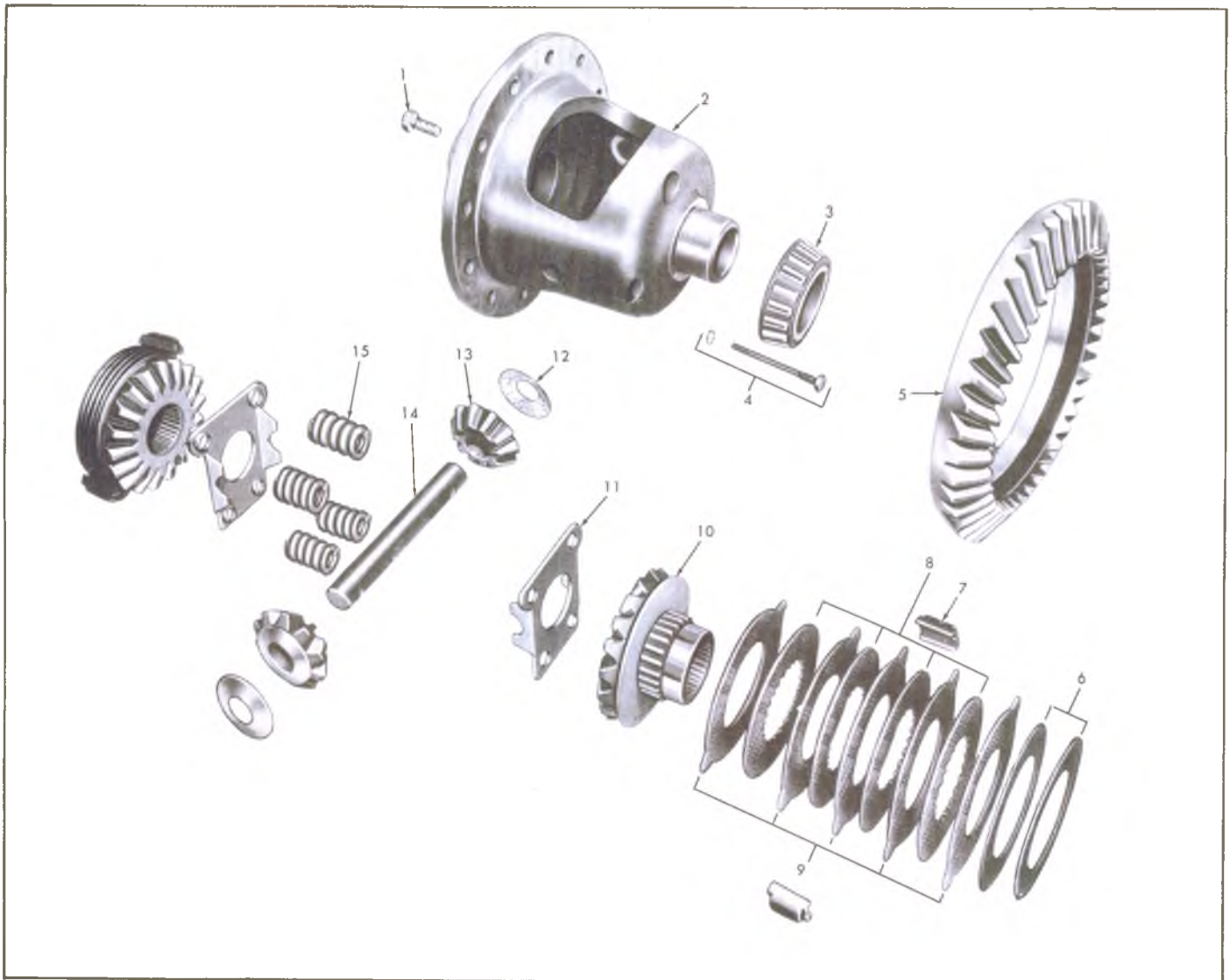


Fig. 26—Positraction Exploded View (Eaton)

- | | | |
|---------------------------------|----------------------|--------------------------|
| 1. Ring Gear-to-Case Bolt | 5. Ring Gear | 10. Side Gear |
| 2. Differential Case | 6. Shim | 11. Spring Retainer |
| 3. Side Bearing | 7. Clutch Pack Guide | 12. Pinion Thrust Washer |
| 4. Pinion Lock Screw and Washer | 8. Clutch Disc | 13. Pinion Gear |
| | 9. Clutch Plates | 14. Pinion Shaft |
| | | 15. Preload Spring |

14. Install pinion gears and thrust washers. Installation of pinion gears can be performed by reversing the pinion gear removal procedure.
15. Assemble springs in spring retainer and clamp assembly in vise. Install "C" clamp and bar stock on spring retainer then install a 1/4 inch bolt and nut in each front spring (fig. 34).
16. Position spring pack between side gears and remove bar stock and "C" clamp.
17. Drive spring pack into side gears sufficiently to retain front springs, then remove 1/4 inch bolts from springs. Drive spring pack into position (fig. 35).
18. Install the pinion shaft and lock screw to retain side gears until axle shaft installation.
19. Check alignment of spring retainer with side gears. Slight movement of the spring pack can be made if necessary.
20. Install side bearings and ring gear to case using procedure outlined for the conventional differential.
21. Place differential in carrier and adjust bearings and backlash as outlined for the conventional differential.
22. Check operation of unit as follows:
 - a. Raise gear of vehicle until rear wheels are off the ground, and remove one wheel and tire assembly.
 - b. Attach Adapter J-5748 to axle shaft flange and install a 1/2-13 bolt into adapter (fig. 36).
 - c. With wheel and tire assembly still on vehicle held firmly to prevent turning, measure torque required to rotate opposite axle shaft with a 0-150 lb. torque wrench attached to J-5748. Torque required to rotate axle shaft should be no less than 40 ft. lbs.

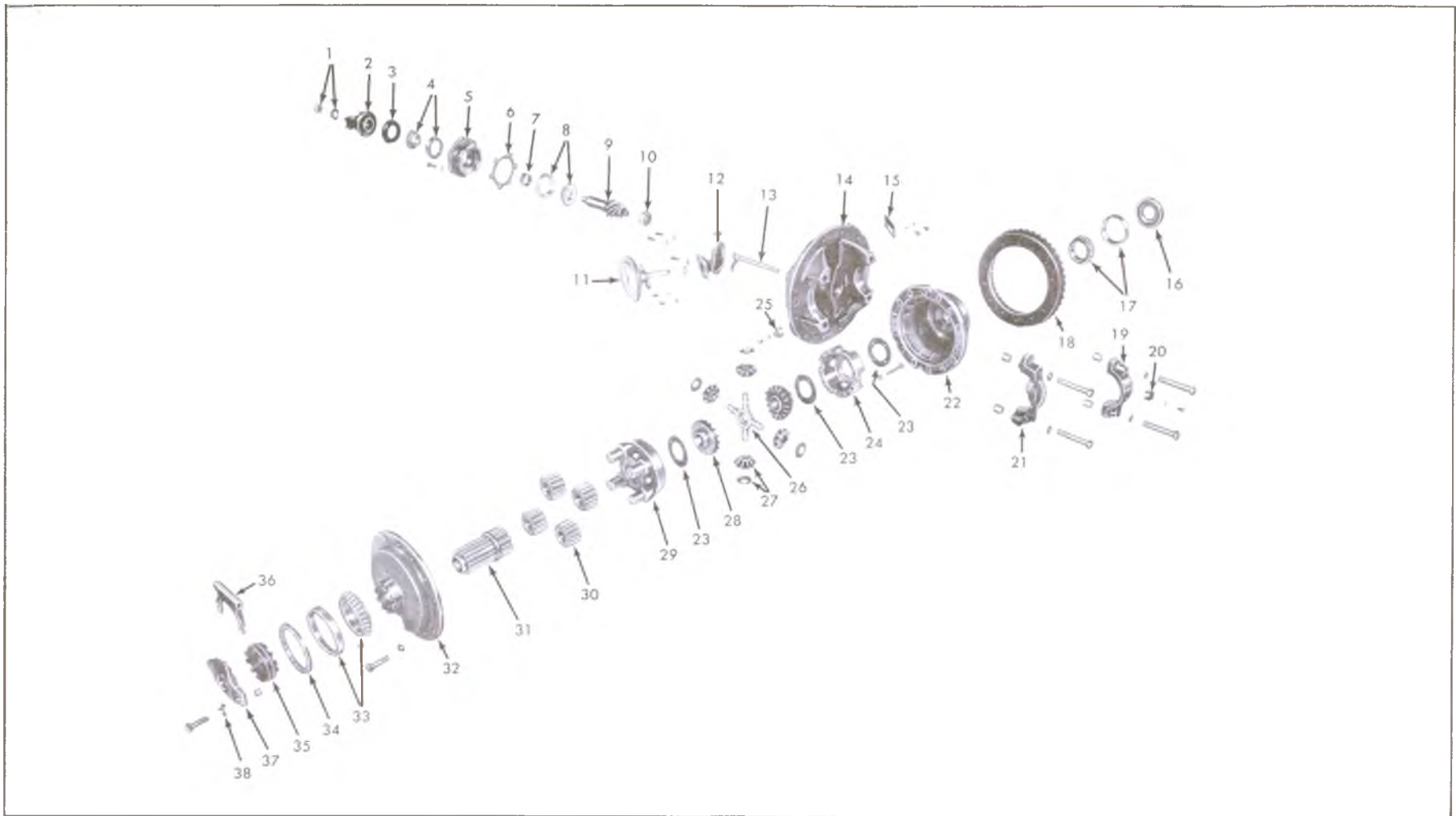


Fig. 58—Exploded View of Carrier

- | | | | |
|-------------------------------------|---|--|---|
| 1. Pinion Retaining Nut and Washer | 11. Shift Unit (Vacuum) | 20. Adjusting Nut Lock (Right) | 28. Differential Side Gear (2) |
| 2. Pinion Flange and Dust Deflector | 12. Shift Unit Mounting Bracket | 21. Differential Bearing Cap (Left) | 29. Differential and Planet Support |
| 3. Pinion Oil Seal | 13. Shifter Yoke Lever | 22. Differential and Planet Support Case Cover | 30. Planet Gears (4) |
| 4. Pinion Front Bearing | 14. Differential Carrier | 23. Thrust Washer | 31. Sun Gear |
| 5. Pinion and Bearing Retainer | 15. Oil Trough | 24. Differential and Planet Support Cover | 32. Differential and Planet Support Case |
| 6. Pinion Adjusting Shim | 16. Differential Bearing Adjusting Nut and Oil Baffle | 25. Adjusting Nut Lock (Left) | 33. Differential Bearing (Left) |
| 7. Pinion Bearing Preload Spacer | 17. Differential Bearing (Right) | 26. Differential Pinion Shaft | 34. Differential Bearing Adjusting Nut (Left) |
| 8. Pinion Intermediate Bearing | 18. Ring Gear | 27. Differential Pinion and Thrust Washer (4) | 35. Shift Sleeve |
| 9. Pinion | 19. Differential Bearing Cap (Right) | | 36. Shift Yoke |
| 10. Pinion Rear Bearing | | | 37. Shift Anchor |
| | | | 38. Anchor Bolt Lock |

Repairs

PINION DISASSEMBLY

1. Place companion flange in vise, remove cotter pin, nut and flange washer (fig. 96).
2. Place assembly in arbor press with cage on bed of arbor. Press drive pinion (21) downward and out of cage.
3. Remove pinion flange, and retainer and oil seal assembly (42). Remove pinion bearing spacer (30), from pinion.
4. Lift outer bearing cone and roller assembly (38) from cage.
5. When inspection indicates necessity, cups (32 and 37) can be removed from cage with Tool J-3940 as shown in Figure 86.
6. Remove stake points holding straight roller bearing (28) to pinion, then press pinion from bearing with bearing supported by Tool J-3493 as shown in Figure 87.
7. Remove inner pinion cone (29). Position Tool J-3493 over head of pinion so that it contacts inner race and press pinion from bearing (fig. 87).

PINION INSPECTION

1. Wash all parts thoroughly in cleaning solvent.
2. Inspect splines of pinion shaft for excessive wear.
3. Inspect pinion for scored, cracked, chipped or worn teeth.
4. Examine pinion bearings and cups for roughness, defects or excessive wear.
5. Check condition of oil seal and oil seal contacting surface on pinion flange.

NOTE: If a pinion and ring gear set requires replacement and wear pattern on the gears was normal for length of service, record the shim pack thickness used with the pinion being removed, as well as the "individual variation distance" (etched on shaft spline) of that pinion. This information will be used in determining the approximate thickness of shim pack to be used with the new pinion.

PINION ASSEMBLY

If inspection indicates that drive pinion should be replaced, replacement of ring gear is also necessary as these parts are serviced as matched sets.

1. Press inner pinion bearing onto pinion shaft until wide side of bearing cone seats against pinion shoulder. Use J-3493 and space bearing from split ring with a discarded pinion bearing spacer.
2. Press the straight roller pilot bearing onto the shaft and stake end of shaft at six points using a round nose punch.
3. If new bearing cups are to be installed press cups firmly against shoulder of pinion cage using Tool J-22377 for the 18,500 lb. axle and J-21106 for the 23,000 lb. axle.
4. Lubricate pinion bearings with recommended axle lubricant, then insert pinion and bearing assembly into cage. Place original bearing spacer over pinion shaft.
5. Press outer pinion bearing onto pinion.
6. Adjust pinion bearing pre-load as instructed under "Rear Axle Adjustments, Eaton Axles."
7. Install oil seal assembly (41) into retainer (42).
8. Install strip sealer (40) into seal retainer.
9. Press seal retainer into pinion bearing cage (34).
10. Install pinion flange on pinion shaft. Install washer and pinion flange nut (45), then tighten to torque recommended in "Rear Axle Specifications." Insert cotter pin. Do not back off pinion flange nut to align cotter pin hole.

PINION INSTALLATION

1. Install original shim pack on carrier unless a new pinion is being installed. If a new pinion is being installed, an es-

timate of the shim pack thickness required can be obtained by increasing or decreasing thickness of shim pack removed by the amount that the old and new pinions differ in "Individual Variation Distance" (etched on pinion splines).

2. Position pinion and cage assembly on carrier over housing bolt holes. Align oil passages in shims, cage and carrier.
3. Install bolts and lock washers. Tighten bolts to torque shown in "Rear Axle Specifications."

DIFFERENTIAL DISASSEMBLY

1. Place differential assembly on bench. If original identification marks on case halves are not clear, punch mark both halves to assist in properly matching at reassembly.
2. Cut lock wires, then remove cap screws holding together the two-piece case, and separate case (fig. 88).
3. Remove four pinions (16) and thrust washers (15) from spider (17). Remove differential side gears (14 and 18) and thrust washers (13 and 19) from case.
4. If differential bearings require replacement, use Tool J-3493 in manner shown in Figure 89 to remove bearings.

DIFFERENTIAL INSPECTION

1. Wash all parts thoroughly in cleaning solvent.
2. Inspect ring gear for chipped or worn teeth and loosened bolts.
3. Check radial clearance between differential side gears and differential case, also fit of differential pinions on spider.
4. Inspect spider arms for wear and distortion.
5. Inspect splines and teeth of differential side gears and pinions for chipping or excessive wear.
6. Check thrust washers for wear and replace if even slight wear is indicated.
7. Check differential bearings and cups for broken races, discoloration or roughness.
8. Inspect differential case for cracks or distortion.

RING GEAR REPLACEMENT

Whenever inspection reveals that the ring gear must be replaced, it is also necessary to install a new pinion as these parts are serviced in matched sets.

1. Remove locknuts and bolts, ring gear and differential case.
2. After cleaning differential case thoroughly, position ring gear on case and install bolts and locknuts. Tighten bolt nuts to specifications.

DIFFERENTIAL REASSEMBLY

1. Lubricate differential case inner walls and all the component parts with recommended axle lubricant.
2. Press differential side bearings (8 and 24) onto differential case.
3. Position new thrust washer (13 and 19) and side gear (14 and 18) in ring gear half of case. Install spider (17) with pinions (16) in position, using all new thrust washers (15). Install remaining side gear and new thrust washer.
4. Install other half of case over assembly. Align mating marks on differential case halves (fig. 88). Install four bolts holding two halves of case together. Draw the two halves together firmly. Check assembly for free rotation of gears; then install remaining bolts. Tighten bolts to correct torque; then install lock wire.

Reassembly

1. Lubricate side bearings and cups with recommended axle lubricant. Place cups over bearings and position differential assembly in carrier housing.

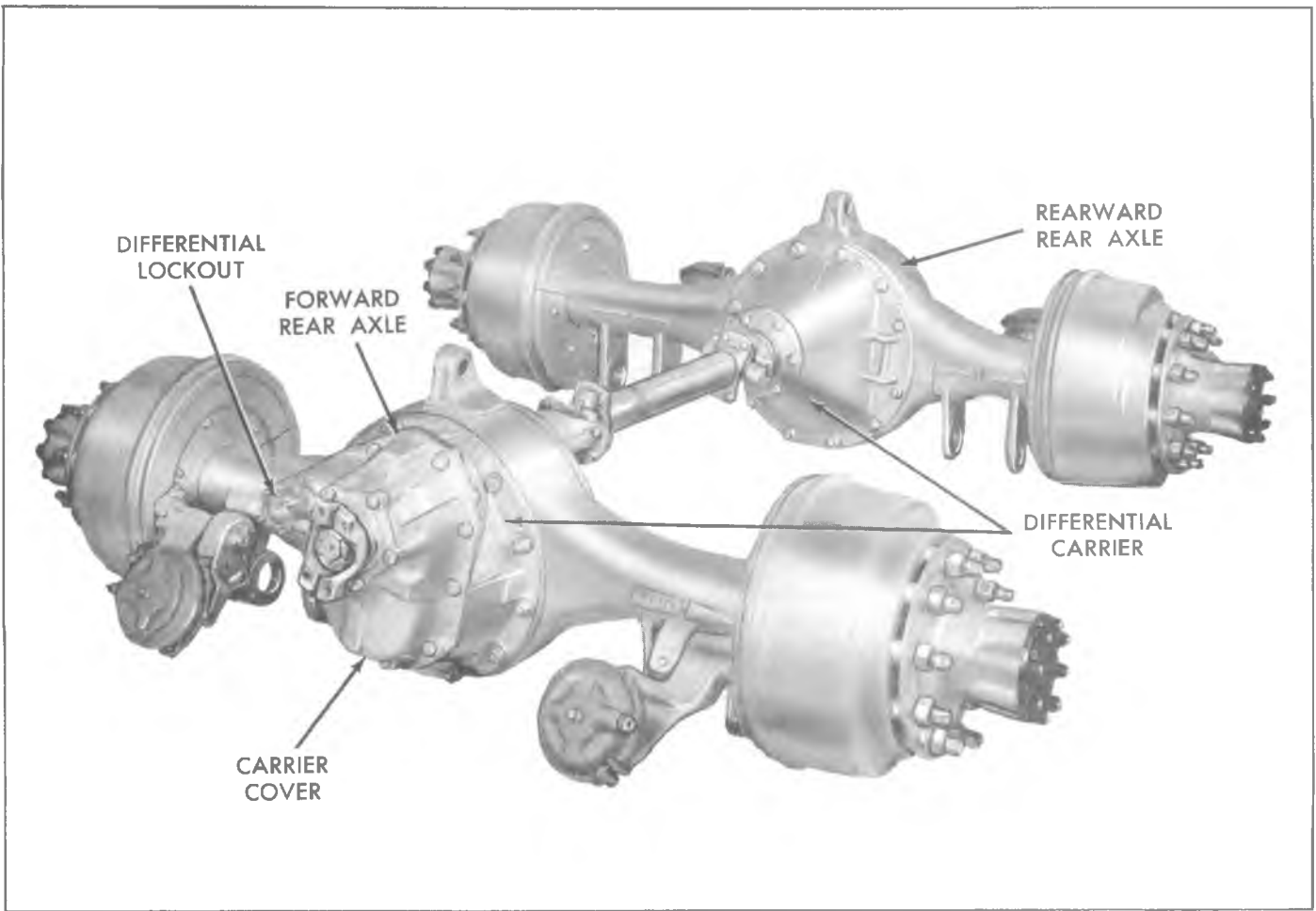


Fig. 100—Tandem Rear Axles and Power Divider

6. Start companion flange and slinger on output shaft splines, hold flange from turning and install nut. Tighten nut to 500-700 ft. lbs. torque and install cotter pin.
7. Install "D" washer on rear of input shaft so flat in I.D. of washer rests on flat of shaft (fig. 103).
8. Install bronze washer in clutch end of helical and differential side gear, install gear on rear of shaft making sure "D" washer remains in position, and install wire snap ring (fig. 103).

DIFFERENTIAL CARRIER

Disassembly

1. Remove unit from vehicle and remove differential carrier cover assembly as outlined previously.



Fig. 101—Removing Input Shaft Flange Nut

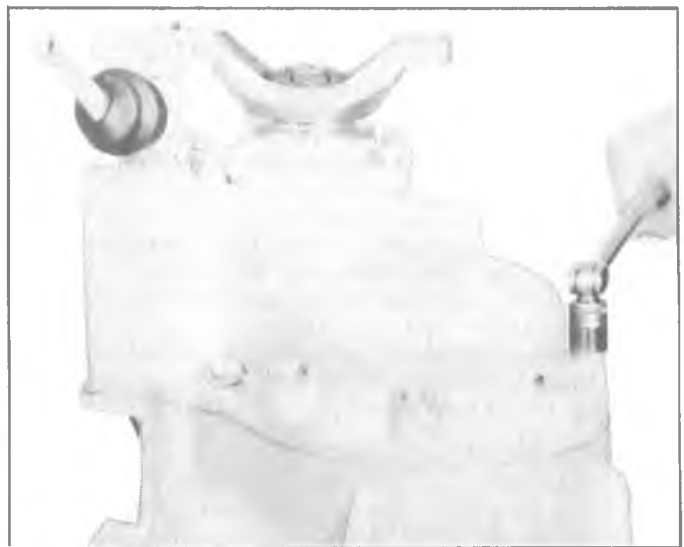


Fig. 102—Removing Differential Carrier Cover Bolts

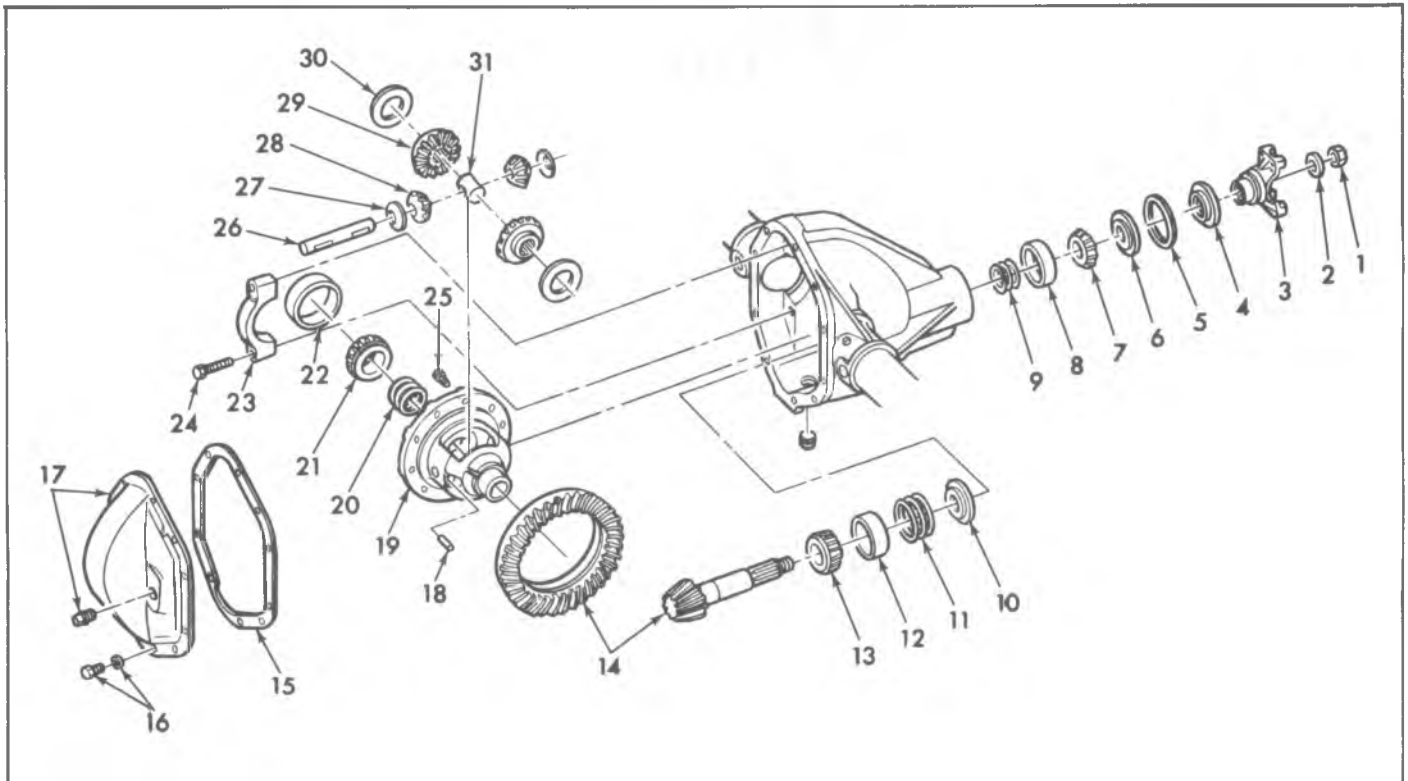


Fig. 133—Dana Rear Axle Assembly

- | | | |
|---|--|--|
| 1. Nut | 12. Cup (Inner Pinion Bearing) | 22. Cup (Differential Bearing) |
| 2. Washer | 13. Cone and Roller (Inner Pinion) | 23. Cap (Differential Bearing) |
| 3. Companion Flange | 14. Ring and Pinion | 24. Bolt (Differential Bearing Cap) |
| 4. Seal Pinion Oil | 15. Gasket (Housing Cover) | 25. Bolt (Ring Gear) |
| 5. Gasket | 16. Screw and Washer (Cover) | 26. Pinion Shaft |
| 6. Slinger | 17. Cover and Plug | 27. Thrust Washer (Pinion) |
| 7. Cone and Roller (Outer Pinion Bearing) | 18. Lock Pin (Pinion Shaft) | 28. Pinion |
| 8. Cup (Outer Pinion Bearing) | 19. Differential Case | 29. Side Gear |
| 9. Shims (Outer Pinion Bearing) | 20. Shims (Differential Adjusting) | 30. Thrust Washer (Side Gear) |
| 10. Oil Slinger | 21. Cone and Roller (Differential Bearing) | 31. Spacer (Axle Shaft) (10 Series only) |
| 11. Shims (Inner Pinion Bearing) | | |

6. Remove inner pinion cone and roller using Tool J-3493, installed as shown in Figure 137, and press pinion from bearing.

INSPECTION OF COMPONENTS

1. Clean all gears and bearings in an approved cleaning solvent and inspect all bearing cups, races and rollers for scoring, chipping or evidence of excessive wear. On pinion bearing rollers, inspect large end of rollers for wear. This is where wear is most evident on tapered roller bearings.

NOTE: The pinion bearings are of the tapered type, and the natural wear pattern is a frosted condition with occasional slight scratches on races or rollers. This does not indicate a defective bearing.

2. Inspect pinion splines and flange splines for evidence of excessive wear.

3. Inspect ring gear and pinion teeth for possible scoring, cracking or chipping.
4. Inspect differential case for cracks or scores or side gears, thrust washers, and pinion thrust faces.
5. Check fit of differential side gears in case.
6. Check fit of side gears and axle shaft splines.
7. Inspect differential pinion shaft and spacer for scoring or evidence of excessive wear.

DIFFERENTIAL CASE

Reassembly

1. Position differential side gears and new thrust washers in differential case.
2. Position differential pinions and new thrust washers in differential case. Align pinions with holes in differential case.

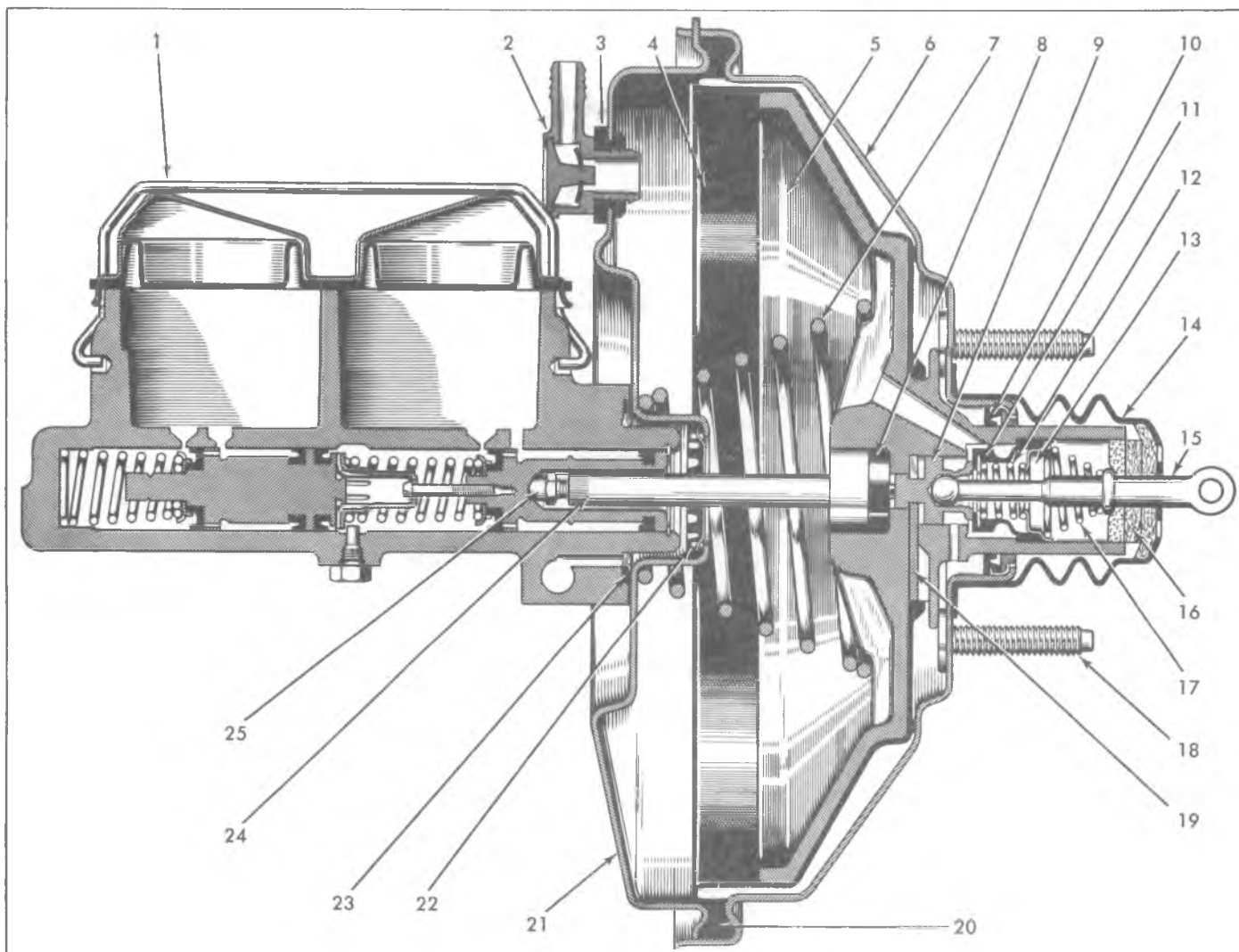


Fig. 1—Bendix Single Diaphragm Unit

- | | | |
|-----------------------|--------------------------|----------------------------|
| 1. Main Cylinder | 10. Bearing Seal | 19. Air Valve Lock Plate |
| 2. Vacuum Check Valve | 11. Poppet Valve | 20. Diaphragm Lip |
| 3. Grommet | 12. Poppet Valve Spring | 21. Front Shell |
| 4. Diaphragm | 13. Poppet Retainer | 22. Push Rod Seal |
| 5. Diaphragm Plate | 14. Dust Boot | 23. Cylinder-to-Shell Seal |
| 6. Rear Shell | 15. Valve Push Rod | 24. Hydraulic Push Rod |
| 7. Diaphragm Spring | 16. Filter and Silencers | 25. Adjusting Screw |
| 8. Reaction Disc | 17. Valve Return Spring | |
| 9. Plunger | 18. Mounting Stud | |

NOTE: Perform Step 12 only if seal is defective and a new seal is available. Do not reuse seal once it has been removed from the unit.

12. Support outer surface of rear shell on blocks of wood or other suitable material (stud side up) and drive out seal with a punch or a thin blade screw driver. Discard seal.
13. Remove check valve from grommet; then remove grommet from front shell.
14. Remove front shell and holding fixture from vise; then remove holding fixture from front shell.

Cleaning

Use an approved nontoxic cleaning solvent to clean all metal parts. Use alcohol or an approved commercial cleaning solvent for cleaning rubber and plastic parts. Immerse parts in cleaning solvent and use a hair brush to remove foreign matter. Blow out all passages, orifices and valve holes. Air dry by placing cleaned parts on clean paper or lint-free cloth. If slight rust is found on inside surface of power cylinder housing, polish clean with crocus cloth or fine emery cloth, then follow with a thorough cleaning.

The use of gasoline, kerosene, antifreeze alcohol or any

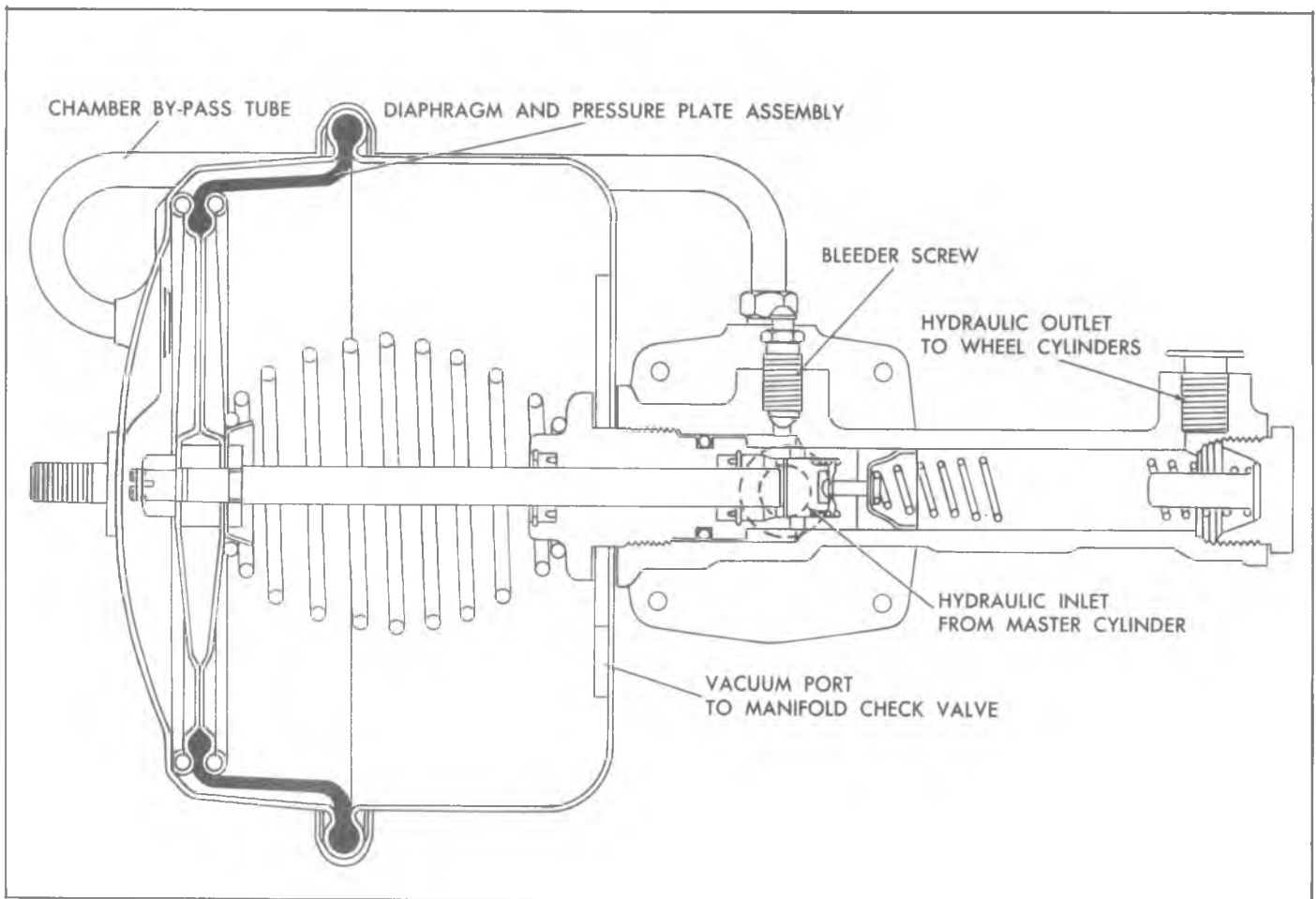


Fig. 18—Typical Hy-Power Unit—Bleeder Position

either recommended brake fluid or Di-Acetone alcohol. Discard fluid after flushing.

CAUTION: Use care when filling hydraulic system to prevent dirt from entering through top of master cylinder.

A manifold check valve is installed in the vacuum line run-

ning from the engine intake manifold to the front chamber of the Hy-Power unit.

Disassembly (Fig. 20)

1. Remove the slave cylinder end plug, copper gasket, spring and retainer.
2. Scratch mark both sections of chamber. Mark adjacent to each other so they can be reassembled in original position.
3. Punch mark the flanges of control valve body and slave cylinder casting. (Mark adjacent to each other so they can be reassembled in original position.)
4. Remove the control valve to vacuum chamber bypass tube and grommet.
5. Remove clamp band, the rear section of chamber, diaphragm and pressure plate assembly, and return spring.
6. Unscrew push rod bushing which fastens front chamber to slave cylinder. Remove gasket and seals.
7. Remove control valve cover plate "O" ring, plate, and cleaner felts, dismantle valve disc and spring.
8. Remove diaphragm return spring, the control valve plunger and diaphragm assembly from slave cylinder body.
9. Using diaphragm push rod or other suitable rod, push

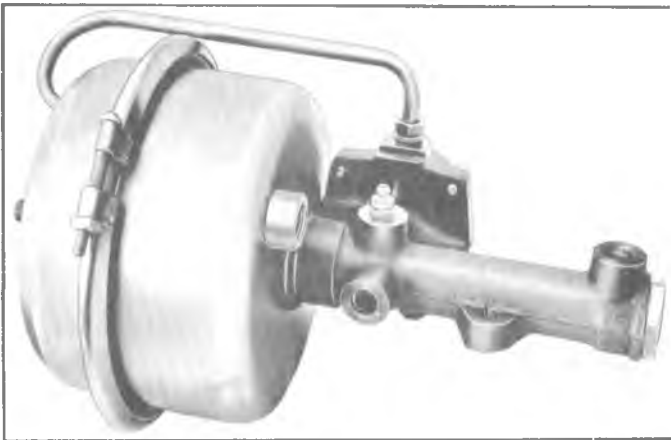


Fig. 19—Hy-Power Vacuum Booster

pliers install snap ring (2) securely in groove in cylinder bore.

WARNING: MAKE SURE SNAP RING IS SEATED ALL THE WAY AROUND IN ITS GROOVE BEFORE RELEASING PRESSURE AGAINST RETURN SPRING. FAILURE TO SEAT SNAP RING SECURELY CAN RESULT IN PARTS DAMAGE AND PERSONAL INJURY.

Remove hose tee or wooden block from end of push rod.

Shells, Diaphragms, Clamp Bands (Fig. 30)

5. With hydraulic cylinder (1) held in vise with bleed screws up, guide Center shells and diaphragms assembly (6) onto end of push rod, seating push rod in seat in end of rear shaft. Do NOT lubricate shaft with any lubricant besides alcohol or brake fluid. Align scribe marks on center shells and front shell and press shells together to seat bead of front diaphragm in flanges of shells. Diaphragm and flanges should be dusted with talcum powder to sim-

plify future disassembly. Assemble clamp band (2) over shell flanges while holding center shells and diaphragm assembly in position. Position opening in band 45° from vertical center line of Hydrovac on side away from mounting bracket. Squeeze ends of band together and assemble bolt (4) and nut (3). Tap band lightly with soft hammer while tightening bolt to 30-40 in. lbs. to seat band securely on shells. Assemble rear shell (17) to scribe marks and seat bead of rear diaphragm in shell flanges. Assemble clamp band (9) over shell flanges while holding rear shell in position. Position opening in band directly in line with front clamp band opening and squeeze ends of band together and assemble bolt (11) and nut (10). Tap band lightly as above and tighten to 30-40 in. bls. Place new seal on control tube (12), as shown, and assemble hose tee (16) with hose clamps (13, 14 and 15) to tube on rear shell (17), tube on center shells (6) and to control tube (12). Attach control tube and nut to control valve body port. Securely tighten tube nut. Secure hose tee to tubes with clamps. If removed, install pipe plug (8) in port in rear shell. Tighten securely.

AIR COMPRESSOR AND GOVERNOR (BENDIX-WESTINGHOUSE)

Air Compressor and Governor General information and overhaul procedures for Bendix-Westinghouse Air Compressors are listed in the index below:

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Troubleshooting Chart	5-22	Air Compressor Governor	5-34
Disassembly of Compressor	5-25	Compressor Tests After Overhaul	5-37
Cleaning, Inspection, and Repair	5-27		

DESCRIPTION AND OPERATION OF COMPRESSOR

The compressors covered in this manual are single-acting, two cylinder reciprocating type (fig. 33). The rated capacity

of compressor is its piston displacement in cubic feet per minute when operating at 1250 rpm. Compressors can be readily

TROUBLESHOOTING CHART

This Troubleshooting Chart is to serve as a guide to facilitate an accurate diagnosis of a malfunctioning air compressor and governor.

COMPRESSOR FAILS TO MAINTAIN SUFFICIENT PRESSURE

- Dirty intake strainer.
- Restriction in compressor cylinder head intake or discharge cavities or in discharge line.
- Leaking or broken discharge valves.
- Excessive wear.
- Drive belt slipping.
- Inlet valves stuck open.
- Worn inlet valves.
- Excessive system leakage or usage.

NOISY OPERATION

- Loose drive pulley.
- Restrictions in cylinder head or discharge line.
- Worn or burned out bearings.
- Compressor not getting proper lubrication.
- Excessive wear.

COMPRESSOR PASSES EXCESSIVE OIL

- Excessive wear.
- Dirty air strainer. (Improper air strainer maintenance.)
- High inlet vacuum.
- Small oil return line.
- Excessive oil pressure.
- Oil supply or return lines to compressor flooded.
- Defective or worn oil seal rings in end cover.
- Piston rings not properly installed.
- Back pressure from engine crankcase.

COMPRESSOR NOT UNLOADING

- Defective unloader pistons or bores.
- Intake cavity restrictions.
- Defective governor.
- Unloader line or cavity to governor restricted.
- Unloader mechanism binding or stuck.

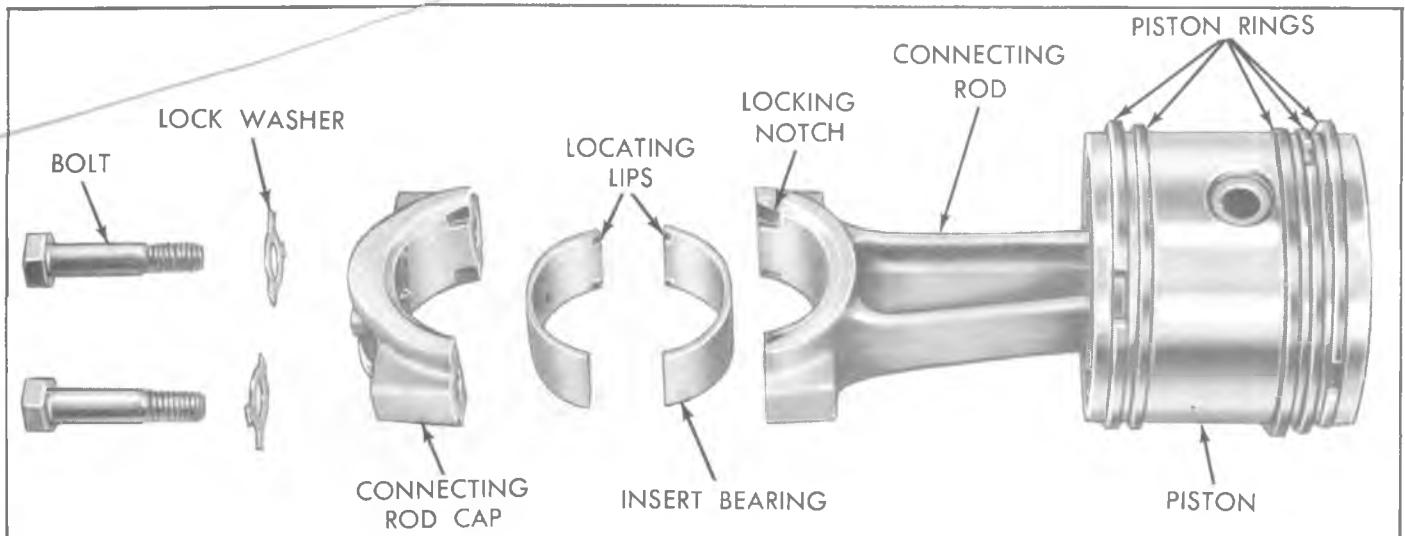


Fig. 51—Piston and Connecting Rod Assembly

6. Install cap screws and washers attaching rear end cover to crankcase. Tighten cap screws.
7. Install key in keyway in front end of crankshaft, install drive hub on shaft, and secure with nut and cotter pin.

NOTE: Crankshaft should rotate freely.

CYLINDER BLOCK INSTALLATION

Place new cylinder block gasket on crankcase. Position cylinder block on crankcase, aligning marks made before disassembly. Install cap screws and washers. Tighten firmly.

PISTON AND CONNECTING ROD ASSEMBLY AND INSTALLATION

1. Position connecting rod in piston and press piston pin into piston with lock wire holes in pin aligned with lock wire holes in piston (refer to fig. 49). The piston pin can be rotated by inserting a screwdriver into the piston pin slot (fig. 50) to align piston pin lock wire hole with the lock wire hole in the piston boss.
2. Install new piston pin lock wires in piston pin so that

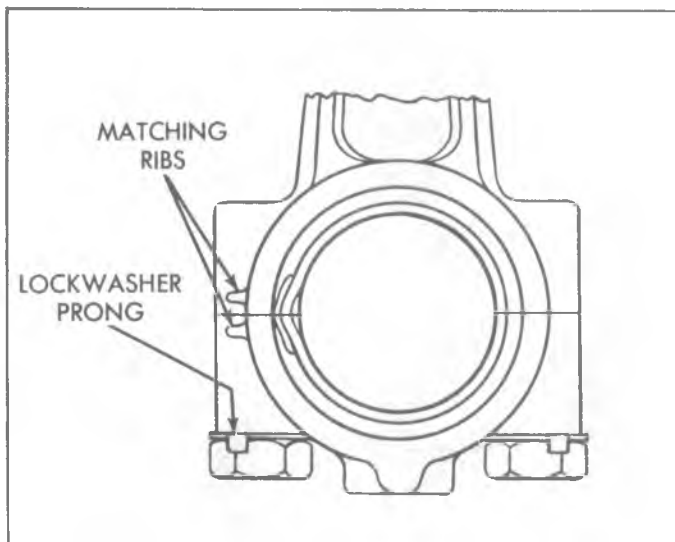


Fig. 52—Matching Ribs on Connecting Rods and Caps

3. long end extends through piston and pin. Snap short end into lock wire hole at bottom of piston skirt.
3. Install piston rings in grooves of pistons. Rings must be installed in proper location and with pip marks (may be numbered 1 to 5) upward. Refer to figures 44 and 45 for proper clearance dimensions and location of rings on pistons.
4. Press bearing inserts into rod and cap by hand, with locating lips in proper alignment.

NOTE: All locating lips are on the same side as cap bolt (fig. 51).

5. Lubricate pistons, rings, piston pin bushings, and bearing inserts with clean engine oil.
6. Turn crankshaft to position bearing journal nearest drive

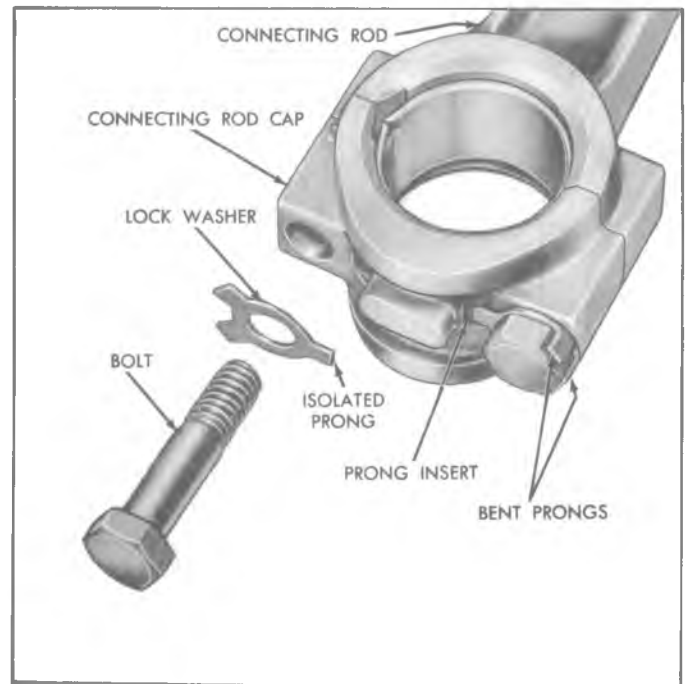


Fig. 53—Installation of Lockwasher and Bolt on Connecting Rod and Cap

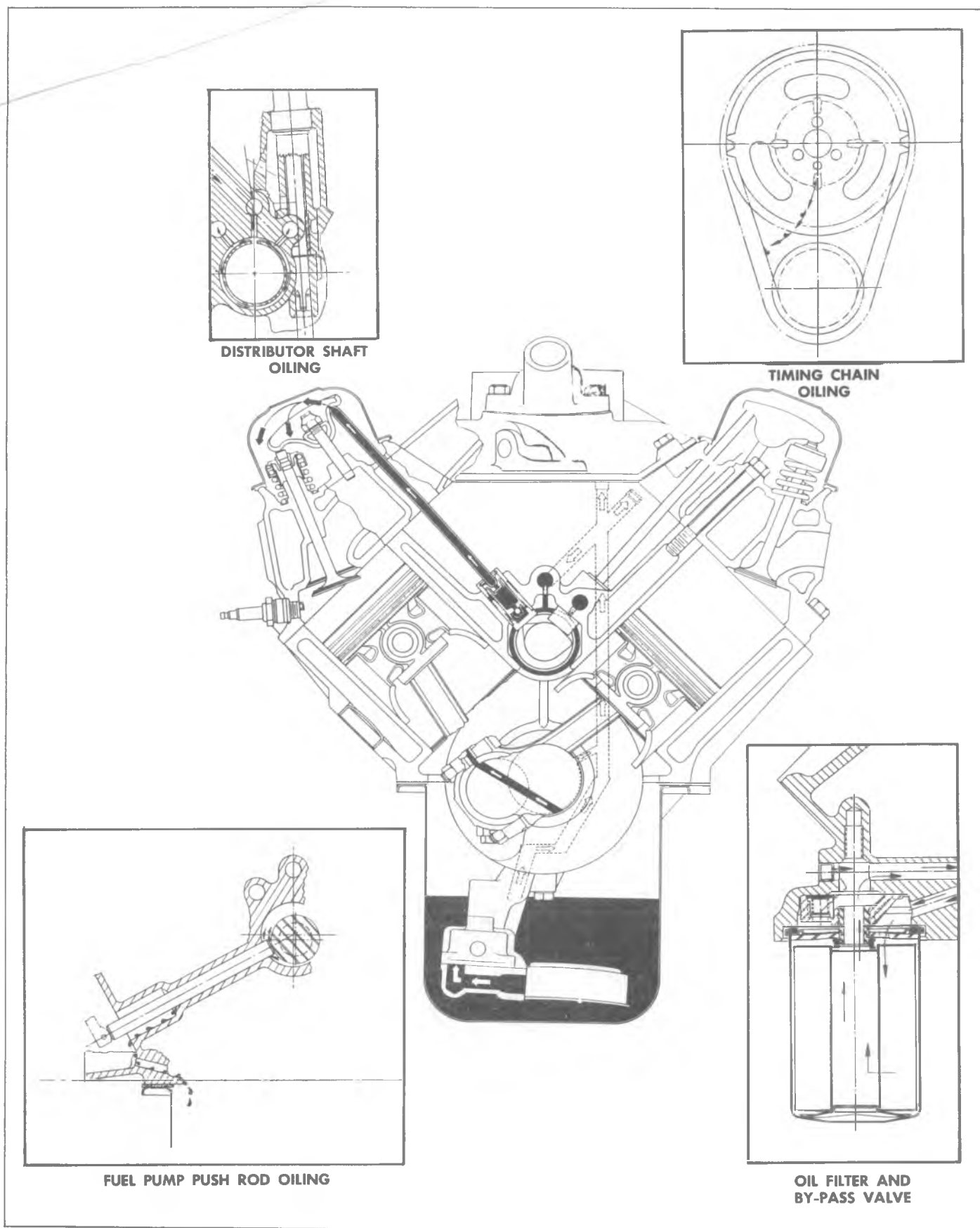


Fig 2—V8 Engine Lubrication (307 and 350)

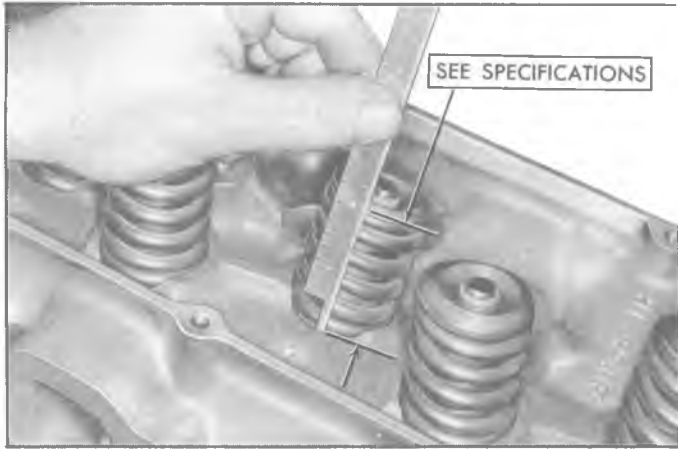


Fig. 29—Measuring Valve Spring Installed Height

3. Remove the plunger, ball check valve assembly and the plunger spring.
4. Remove the ball check valve and spring by prying the ball retainer loose from the plunger with the blade of a small screw driver (fig. 31).

Cleaning and Inspection

Thoroughly clean all parts in cleaning solvent, and inspect them carefully. If any parts are damaged or worn the entire lifter assembly should be replaced. If the lifter body wall is scuffed or worn, inspect the cylinder block lifter bore, if the bottom of the lifter is scuffed or worn inspect the camshaft lobe, if the push rod seat is scuffed or worn inspect the push rod.

NOTE: Inertia valve and retainer (lifter "B") (fig. 30) should not be removed from the push rod seat. To check the valve, shake the push rod seat and inertia valve assembly and the valve should move.

Assembly

1. Place the check ball on small hole in bottom of the plunger.
2. Insert check ball spring on seat in ball retainer and place retainer over ball so spring rests on the ball. Carefully press the retainer into position in plunger with the blade of a small screw driver (fig. 32).
3. Place the plunger spring over the ball retainer and slide the lifter body over the spring and plunger, being careful to line up the oil feed holes in the lifter body and plunger.
4. Fill the assembly with SAE 10 oil, then insert the end of a 1/8" drift pin into the plunger and press down solid. At this point oil holes in the lifter body and plunger assembly will be aligned (fig. 33).

CAUTION: Do not attempt to force or pump the plunger.

5. Insert a 1/16" drift pin through both oil holes to hold the plunger down against the lifter spring tension (fig. 33).

NOTE: On lifter "B" (fig. 30) the drift pin must not extend inside the plunger.

6. Remove the 1/8" drift pin, refill assembly with SAE 10 oil.
7. Install the metering valve and push rod seat (lifter "A") or the push rod seat and inertia valve assembly (lifter "B") (fig. 30).
8. Install the push rod seat retainer, press down on the push

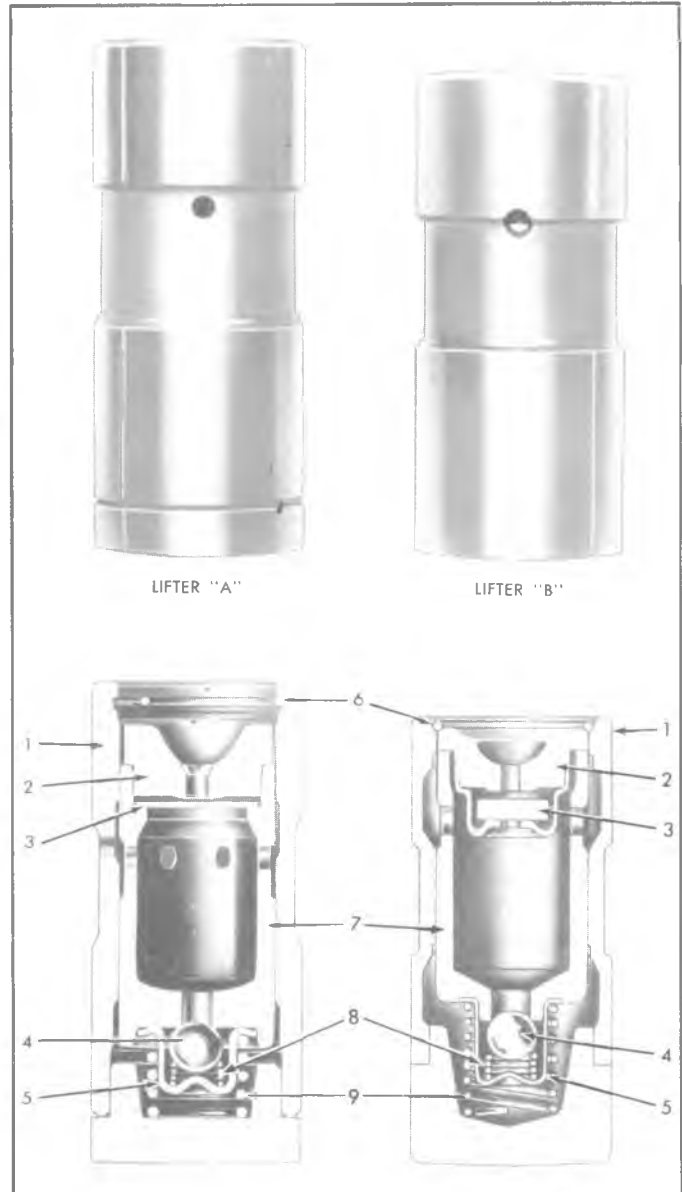


Fig. 30—Hydraulic Valve Lifters

- | | |
|--|---------------------------|
| 1. Lifter Body | 5. Check Ball Retainer |
| 2. Push Rod Seat | 6. Push Rod Seat Retainer |
| 3. Metering Valve (Lifter A)
Inertia Valve (Lifter B) | 7. Plunger |
| 4. Check Ball | 8. Check Ball Spring |
| | 9. Plunger Spring |

rod seat and remove the 1/16" drift pin from the oil holes. The lifter is now completely assembled, filled with oil and ready for installation.

NOTE: Before installing any new lifters, coat the bottom of the lifter with Molykote or its equivalent.

OIL PUMP

The oil pump consists of two gears and a pressure regulator valve enclosed in a two-piece housing. The oil pump is driven by the distributor shaft which is driven by a helical gear on the camshaft.

A baffle is incorporated on the pickup screen to eliminate pressure loss due to sudden or surging stops.



Fig. 55—Measuring Ring Gap



Fig. 56—Checking Ring in Groove

3. With bearing caps removed, install Tool J-5239 (3/8") or J-6305 (11/32") on connecting rod bolts.

CAUTION: Be sure ring gaps are properly positioned as previously outlined.

4. Install each connecting rod and piston assembly in its respective bore. Install with connecting rod bearing tangs on side opposite camshaft on V8 engines (fig. 59). In Line engine pistons must have piston notch facing front of

2. Lightly coat pistons, rings and cylinder walls with light engine oil.

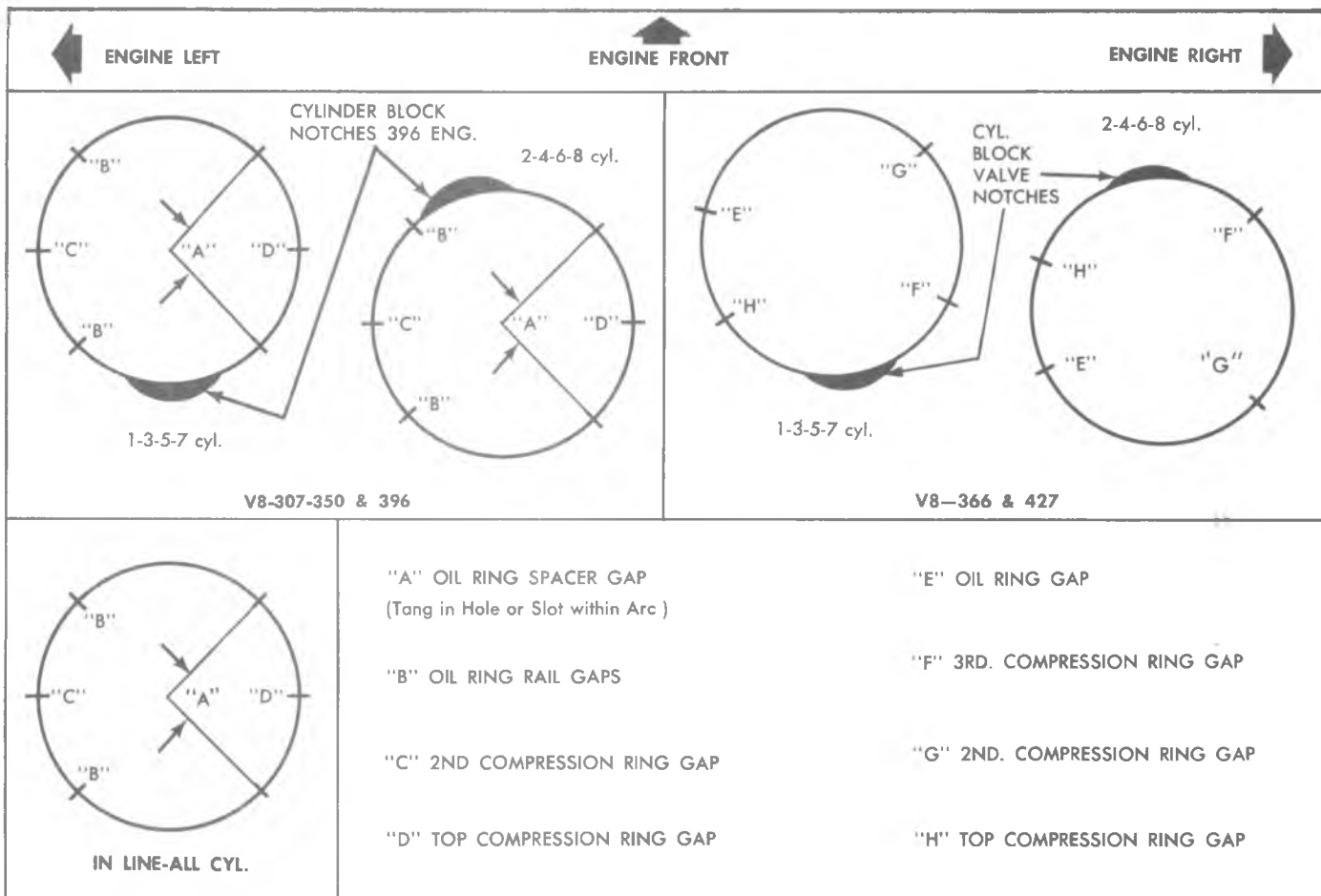


Fig. 57—Ring Gap Location

SECTION 6K

WATER PUMP

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GENERAL DESCRIPTION

The water pumps (fig. 1 and 2) used on Chevrolet truck engines are of the centrifugal vane impeller type. The bearings used in these pumps are permanently lubricated during manufacture and are sealed to prevent the loss of lubricant and

the entry of dirt or water. Because of the similarity of design only typical illustrations and procedures are used in this section unless specific illustrations or procedures are necessary to clarify the operation.

REPAIR PROCEDURES

Disassembly

1. Remove bolts and fan and pulley.
2. On V8 models, remove back plate screws, plate and gasket.
3. Support fan hub in an arbor press and press pump shaft out of hub. A 1/2" dia. x 2" rod will allow the shaft to be pushed through the hub (fig. 3).
4. Support pump in an arbor press as shown (fig. 4). Press shaft and impeller assembly out of pump, applying pressure on the outer race of the shaft bearing only.

CAUTION: Shaft and bearing assembly must not be pushed out of housing by applying force on shaft, or bearings will be damaged. Use a 7/8" deep socket or piece of

tubing 1-1/8" O.D. on all 16, 307 and 350 cu. in. engines and a 1-1/16" deep socket or piece of tubing 1-7/16" O.D. on 366, 396 and 427 cu. in. engines.

5. Support impeller on seal surface, using Tool J-7028 in an arbor press, and using a 1/2" x 1" pin, press shaft out of impeller (fig. 5). Discard seal.

Inspection

1. Wash all parts except pump shaft bearing in cleaning solvent. Figures 6 and 7 show the water pumps disassembled.

NOTE: Pump shaft bearing is a permanently sealed and lubricated bearing and should not be washed in cleaning solvent.

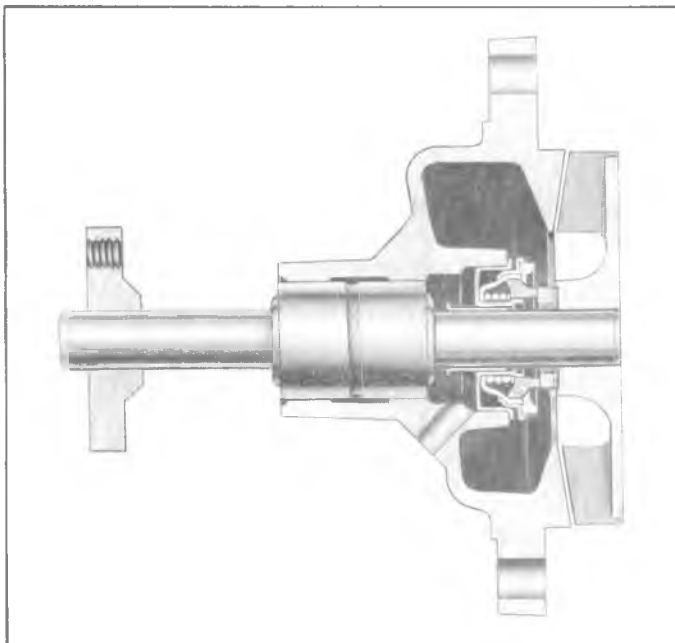


Fig. 1—Water Pump—Typical In Line

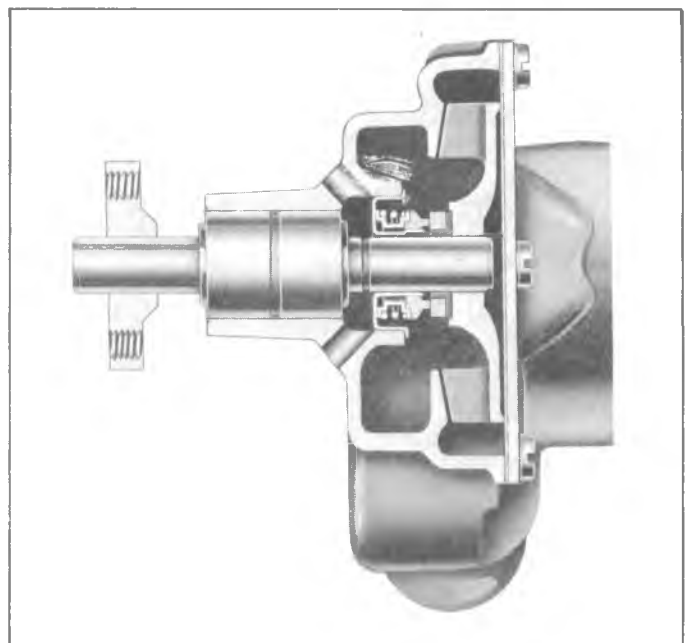


Fig. 2—Water Pump—Typical V8



Fig. 5R—Metering Rod Adjustment

6. Install air horn gasket on float bowl by carefully sliding slit portion of gasket over metering rod holder. Then align gasket with dowels provided on top of bowl casting and press gasket firmly in place.

AIR HORN ASSEMBLY AND INSTALLATION

1. Install idle vent valve assembly, if removed.
2. Install choke shaft, choke valve and vacuum break lever, if removed. Align choke valve, tighten two retaining screws and stake securely.
3. Install vacuum break diaphragm and plunger into cavity at side of air horn. With choke valve in the open position,

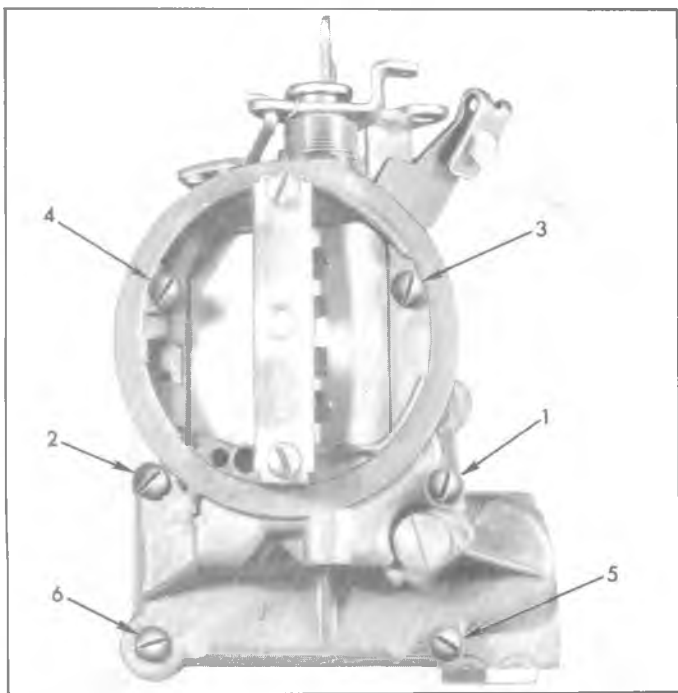


Fig. 6R—Tightening Sequence

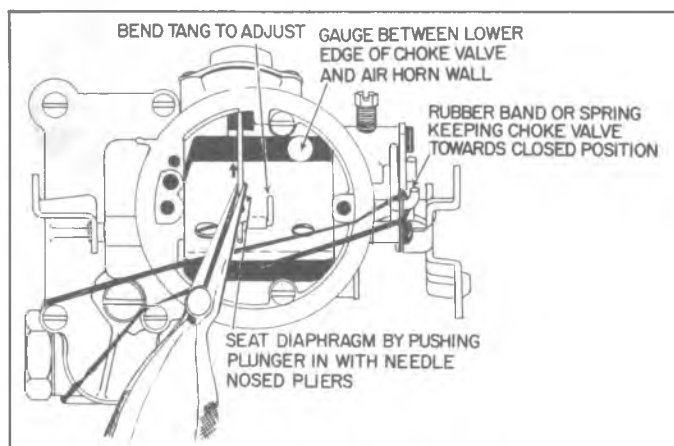


Fig. 7R—Vacuum Break Adjustment

slide eyelet of plunger rod over end of vacuum break lever on choke valve.

4. Seat vacuum break diaphragm over sealing bead on air horn casting. With diaphragm held in place, carefully install diaphragm cover and two retaining screws. Tighten screws securely.
5. Install air horn to float bowl by lowering gently on to float bowl until seated. Install (3) long and (3) short air horn to float bowl attaching screws. Torque screws tightly using correct tightening sequence. (Fig. 7R)
6. Assemble choke rod to the choke shaft lever. End of rod points away from air horn casting when installed properly. (Lower end of rod has 45 degree bend.)
7. Install lower end of choke rod into curved slot in fast idle cam. Steps on fast idle cam should face fast idle tang on throttle lever.
8. Install upper choke lever to choke shaft. End of lever faces towards vacuum break diaphragm at 2 o'clock position with choke valve closed. (See Figure 8R). Install choke lever screw. Tighten securely.

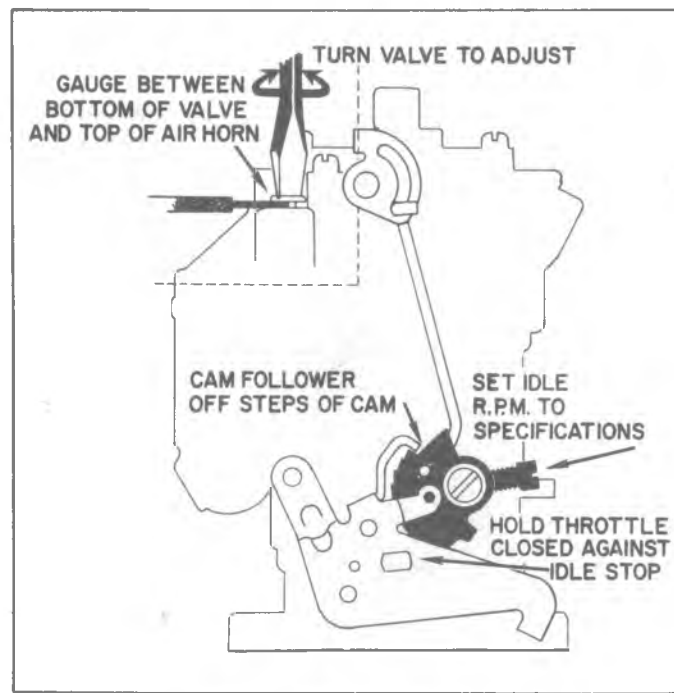


Fig. 8R—Idle Vent Adjustment

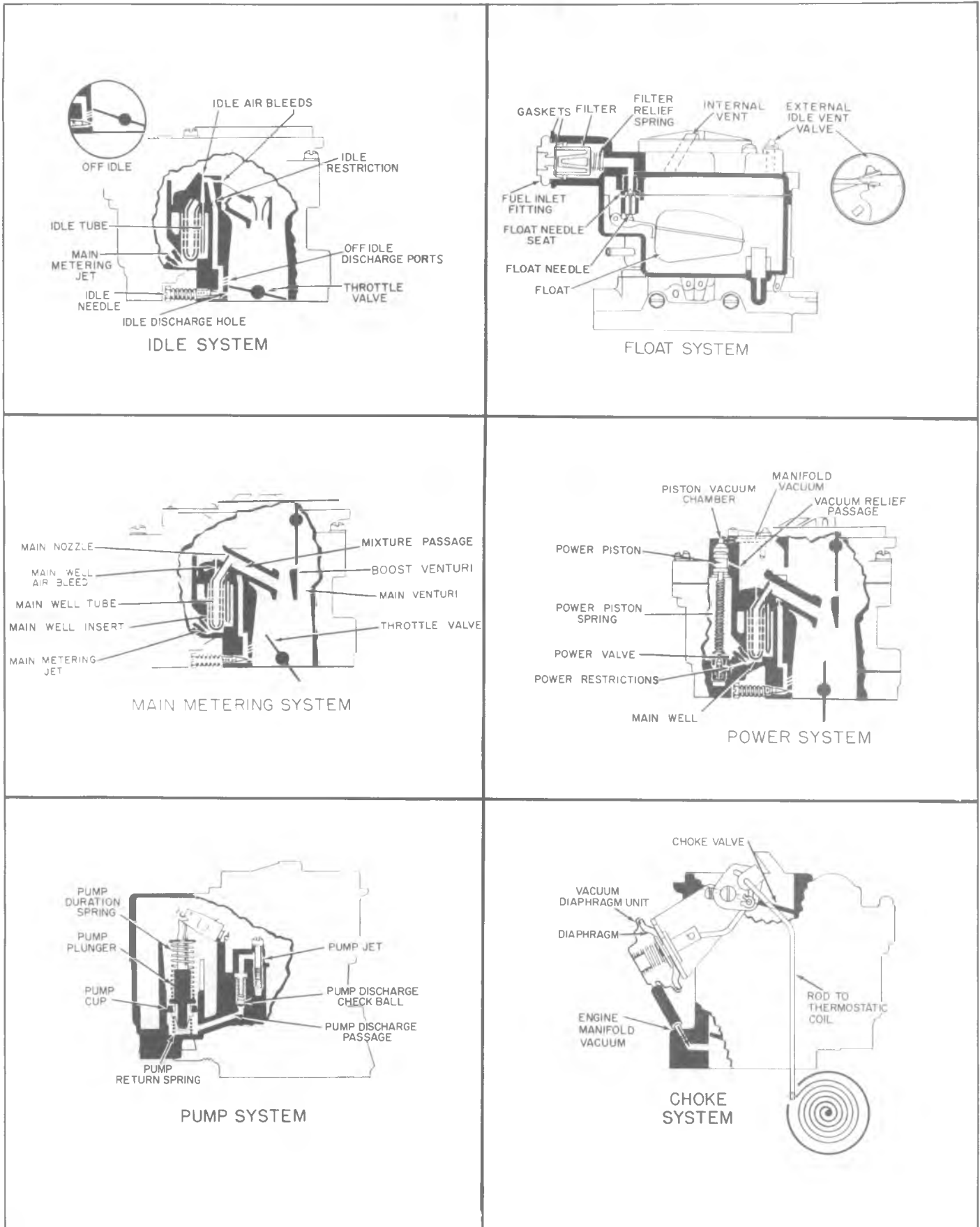


Fig. 25R—Rochester 2GV (1 1/4) Systems

ROCHESTER 4MV

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GENERAL DESCRIPTION

The Rochester 4MV Carburetor (fig. 46R), used in conjunction with a temperature sensing choke coil (mounted on the intake manifold over the exhaust cross-over passage), is used with 350 and 396 cu. in. engines.

This is a four barrel, two stage carburetor with versatility and principles of operation that make it adaptable for small to large engines without design changes.

The fuel bowl is centrally located to avoid problems

of fuel slosh, causing engine turn cut-out, and delayed fuel flow to the carburetor bores. The float needle valve is pressure balanced to permit use of a small single float pontoon.

The primary side has small bores and a triple venturi for fine fuel control in the idle and economy ranges. The secondary side has large bores and an air valve for high air capacity (fig. 47R).

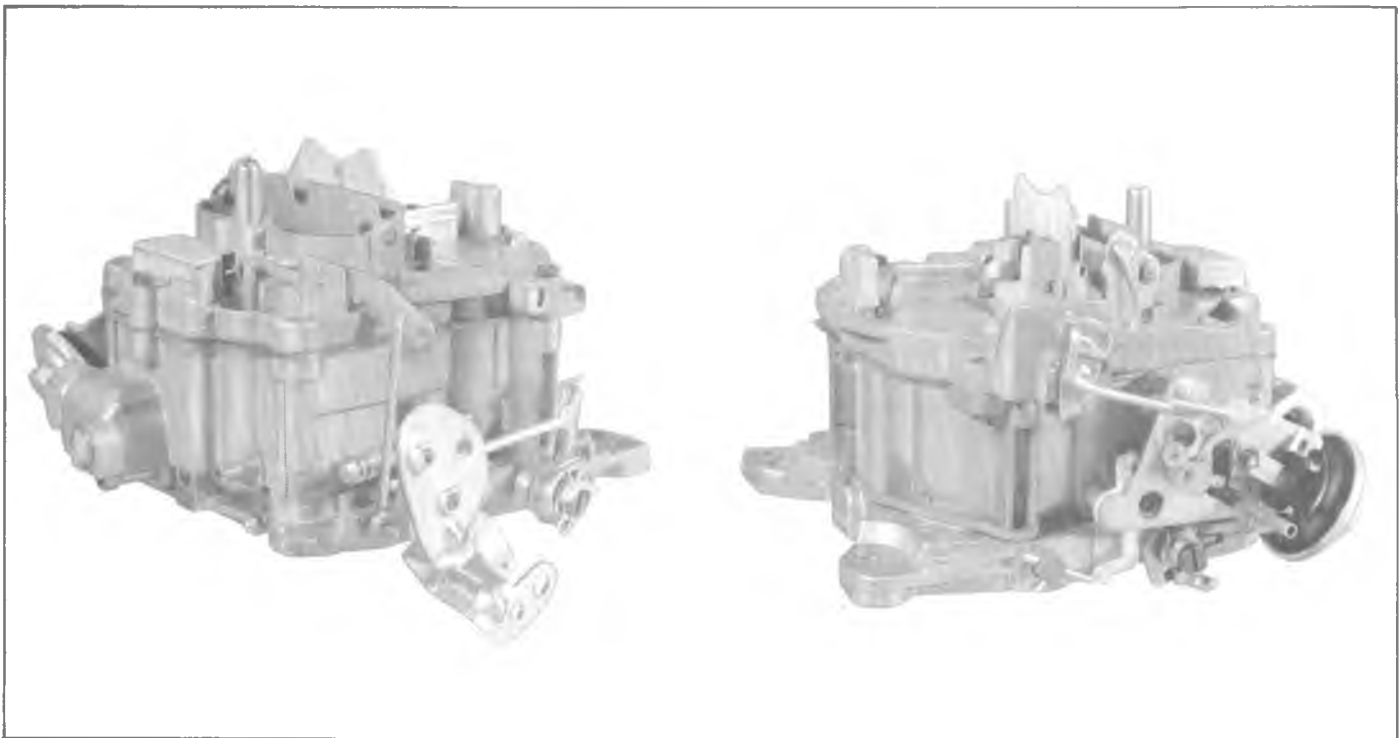


Fig. 46R—Rochester "MV" Carburetor

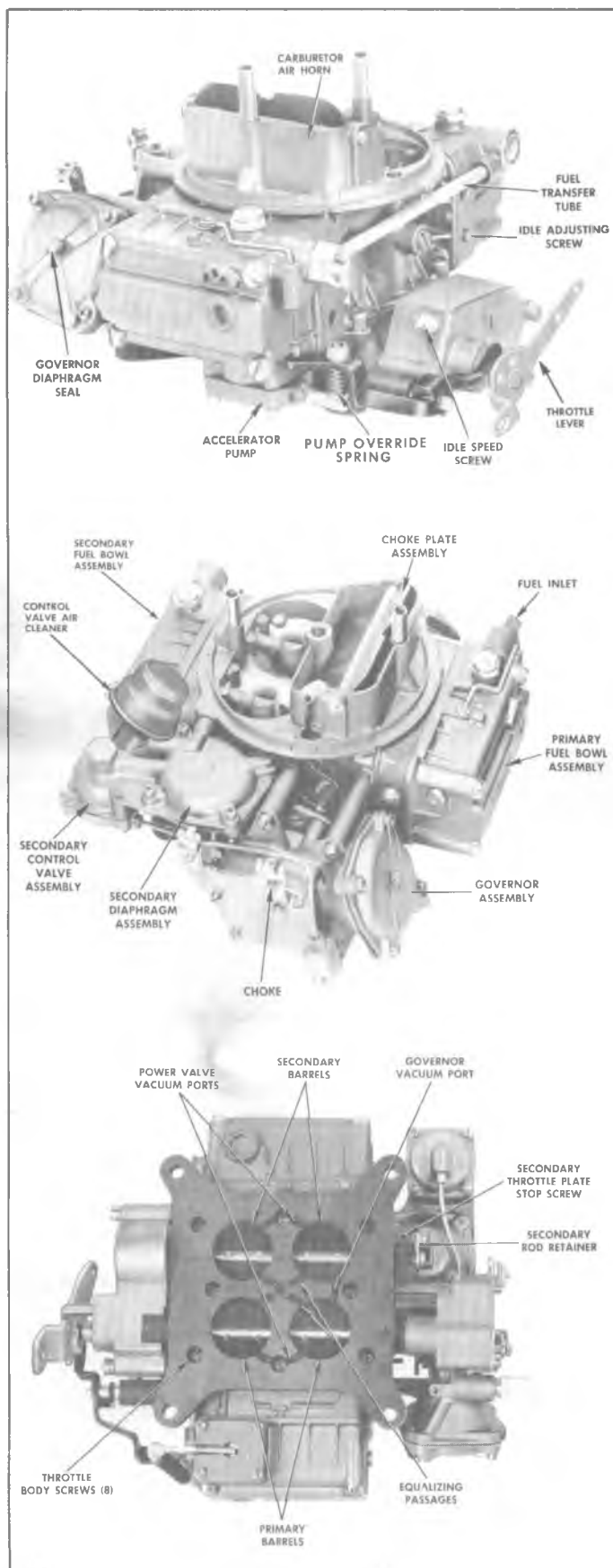


Fig. 1H—Holley 4150G Carburetor

NOTE: Do not disturb control valve seat.

3. Remove clean air filter.

DISASSEMBLE MAIN BODY

1. Remove choke lever retaining clip and choke rod clip then remove choke lever spring.
2. Remove pump discharge nozzle screw, nozzle and gasket, then up-end the body assembly to remove pump discharge check valve.

NOTE: The choke rod seal will withstand normal cleaning in carburetor cleaner, therefore, further disassembly of the main body is not required for cleaning purposes. If part replacement is required, proceed as follows:

- File off the staked ends of shaft screws then remove screws.
- Remove valve from shaft slot and slide shaft from main body.
- Remove choke rod (upward through seal) and remove seal from main body.

DISASSEMBLE THROTTLE BODY (FIG. 10H)

1. Remove throttle operating housing cover screws and cover.

NOTE: Ordinarily the throttle body need not be disassembled for cleaning and inspection purposes. If necessary, disassemble for part replacement as outlined below.

2. Remove pump operating lever assembly. Disassemble spring, bolt and nut, if needed.
3. Remove idle speed screw from housing.
4. Remove screw retaining throttle operating lever to shaft. Remove lever from shaft and withdraw shaft from housing.
5. Remove accelerator pump operating cam screw and remove cam.
6. Remove cotter keys from throttle connecting rod and remove rod.
7. Remove secondary throttle shaft lever screw and remove lever.
8. File off staked ends of the throttle shaft. Drive out primary throttle shaft pin.
9. Scribe primary and secondary throttle plates along shafts and number plates for assembly purposes (fig. 10H). Plates must be installed in some bores they were removed from.
10. Remove plate screws and slide shafts and bushings out of throttle body.

Cleaning and Inspection

NOTE: The most frequent causes of carburetor malfunction are gum, carbon, and water. Carefully clean and inspect all parts and castings as the carburetor is being serviced as follows:

1. Clean throttle flange (if not disassembled), vacuum break and all non-metallic parts, in alcohol or gasoline.

NOTE: Secondary throttle shaft bushings and accelerator pump cam are plastic.

2. Wash all other parts in cleaning solvent.
3. Inspect holes in all operating levers and castings for excessive wear.



Fig. 17H—Air Vent Valve Adjustment

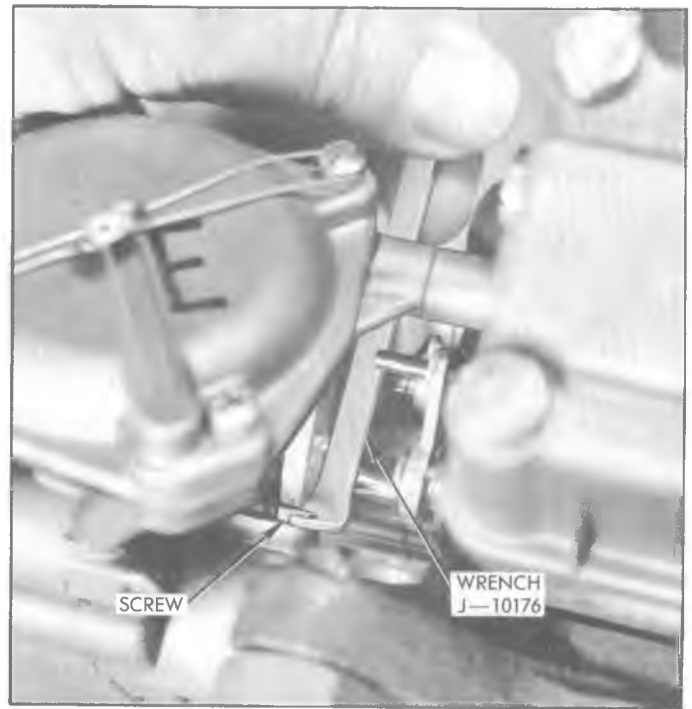


Fig. 18H—Fast Idle Adjustment

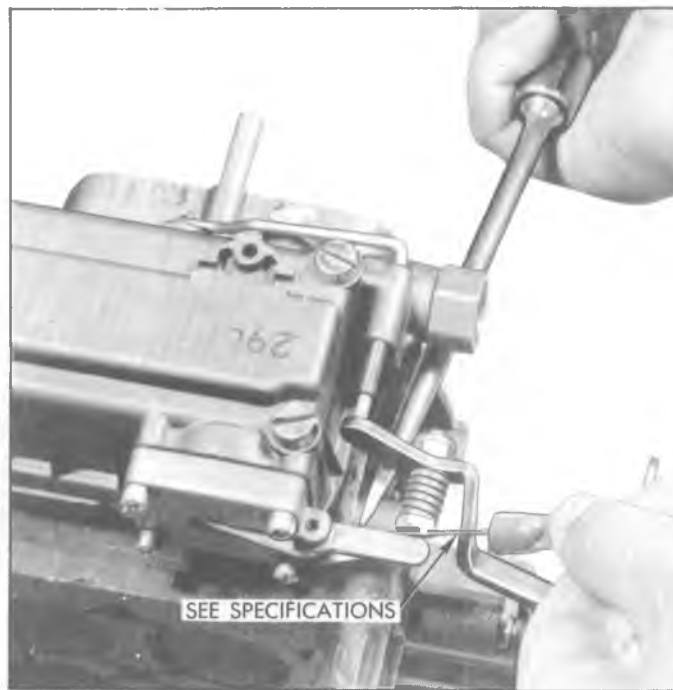


Fig. 19H—Accelerator Pump Adjustment

CHARGING SYSTEMS

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STANDARD NON-INTEGRAL TYPE DELCOTRONS

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5.5" SERIES 1D DELCOTRON

DISASSEMBLY (Fig. 1C)

1. Hold generator in a vise, clamping the mounting flange lengthwise.
2. Remove 4 thru bolts then break loose the end frames by prying at bolt locations.
3. Remove the slip-ring end frame and stator (as an assembly) from drive end and rotor assembly.
4. Place a piece of tape over the slip ring end frame bearing to prevent entry of dirt or other foreign matter.

CAUTION: Brushes may drop onto rotor shaft and become contaminated with bearing lubricant. Clean brushes prior to installing with a non toxic cleaner such as trichloroethylene.

5. Remove the three stator lead attaching nuts and separate stator from end frame.

6. Remove screws, brushes and holder assembly.
7. Remove heat sink from end frame by removing "batt" and "grd" terminals and one attaching screw (fig. 7c).
8. Remove slip ring end frame bearing (if necessary). Refer to bearing replacement included in this section.
9. Remove pulley retaining nut and slide washer, pulley and fan from shaft.
 - a. Single Groove Pulley—Place 15/16" box wrench on retaining nut and insert a 5/16" allen wrench into shaft to hold shaft while removing nut (fig. 2c).
 - b. Double Groove Pulley—Place a 15/16" socket (with wrench flats on the drive end or use Adapter J-21501 and a box wrench) on retaining nut, insert a 5/16" allen wrench through socket and adapter into hex on shaft to hold the shaft while removing the nut.
10. Remove rotor and spacers from end frame assembly.
11. Remove drive end frame bearing retainer plate and bearing assembly from frame.

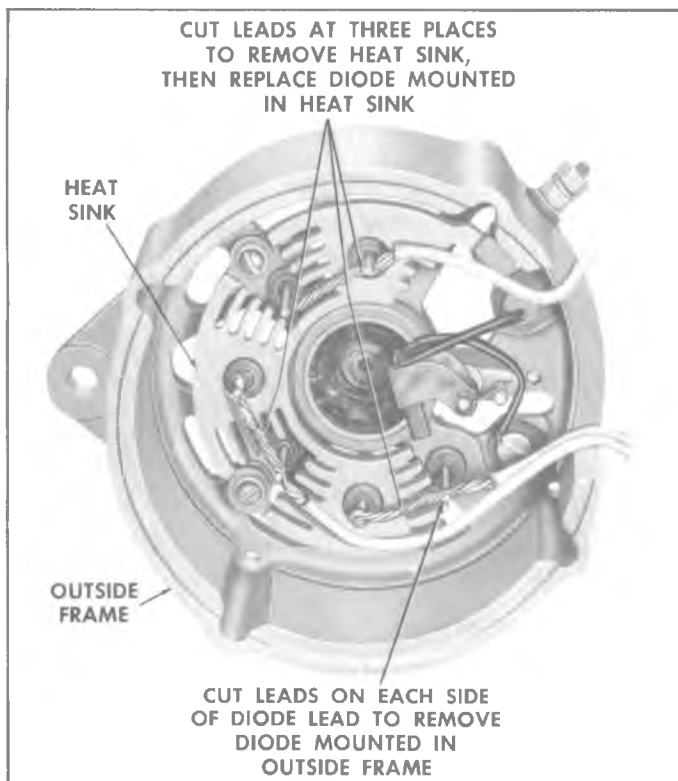


Fig. 21c—Replacing Defective Diodes

OHMMETER METHOD

Use an ohmmeter with a 1-1/2 volt cell and use the lowest range scale.

Connect the ohmmeter leads at each diode as previously described using a test lamp first in one direction and then the other (fig. 20c). Note the readings. If both readings are identical (very high or very low), the diode is defective. A good diode will give one high and one low reading.

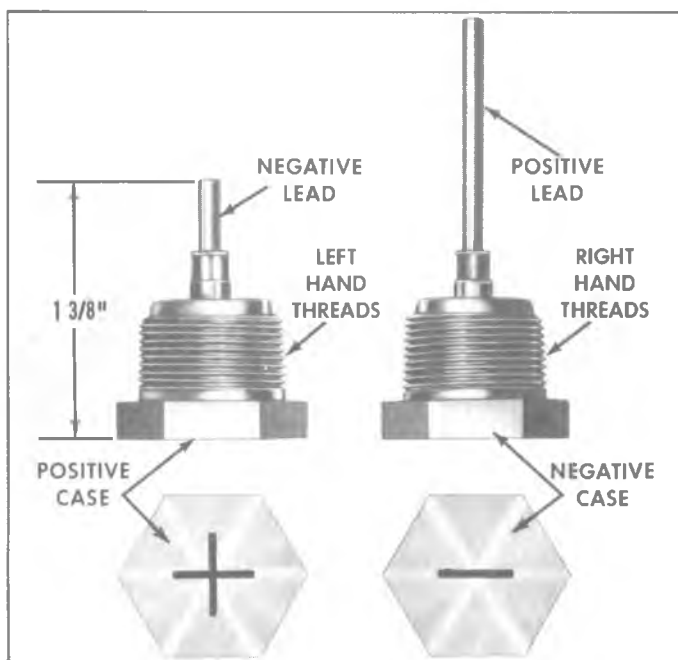


Fig. 22c—Diodes Showing Polarity Marking on Case

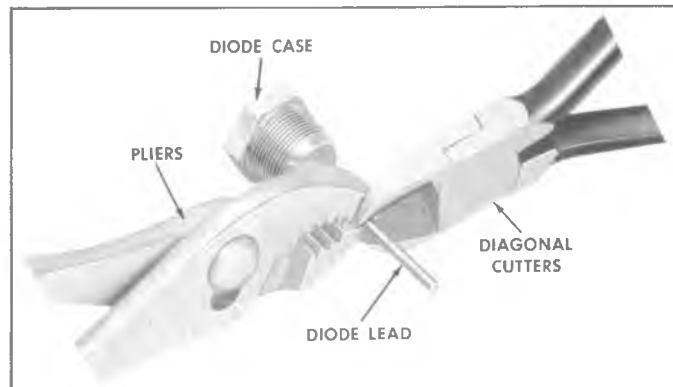


Fig. 23c—Cutting Diode Lead

REPAIRS

Diode Replacement

1. Cut the flexible lead (s) as close as possible to the defective diode lead (fig. 21c).
2. Remove the diode from the end frame or heat sink as required.
3. Select diode with proper polarity marking (fig. 22c).

NOTE: If diode is to be assembled into the heat sink to an overall length of 1-3/8" (fig. 23c), do not grip the diode case when cutting the lead as this will damage the diode internally.

4. Lightly coat threads of new diode with silicone grease or light engine oil and install diode into sink or frame. Torque diode to 160-190 in. lbs.
5. Connect flexible lead (s) to diode as follows:
 - a. Place the clip over the diode lead and tightly crimp the flexible leads into the clip.
 - b. Solder the leads to the clip and the clip to the diode lead.

CAUTION: Use only 60% tin, 40% lead rosin core solder or equivalent with 360° F. melting point. Do not hold soldering iron on diode lead any longer than necessary, as excessive heat may damage the diode.

Heat Sink Replacement

1. Detach heat sink from end frame by removing the attaching screws. Note carefully the proper stack up of parts so the "BAT" and "GRD" terminal bolts can be reassembled in the same manner. Cut all leads on each side of the three diode stems as close to the stem as possible.
2. Replace diodes, if necessary, as outlined in Diode Replacement.
3. Assemble heat sink to the end frame, following carefully the proper stack up of parts as noted in Step 1. Reconnect leads as described under Diode Replacement.

Brush Replacement

1. Remove retaining clip and slide brush holder assembly from the pivot pin.
2. Remove terminal nuts and stud assembly from end frame.
3. Install new holder, brush and lead assembly onto pivot pin (fig. 21c). Attach retaining clip to pivot pin.
4. Install terminal assembly to end frame.

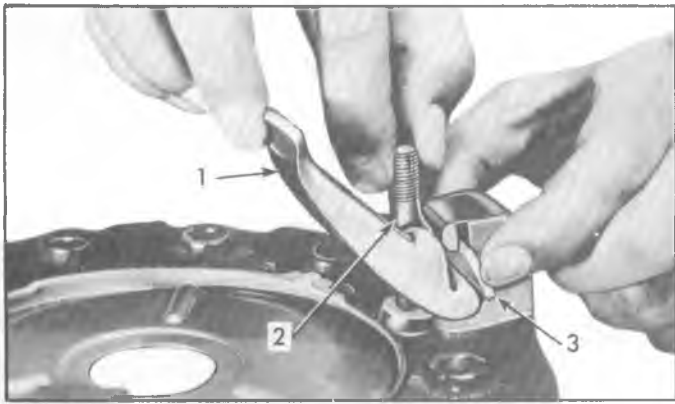


Fig. 4E—Removing Levers (Step 1)

1. Release Lever 2. Eyebolt 3. Strut

position and also that the punch marks made before dismantling are matched to insure retaining the original balance.

9. Place a bar across the cover and slowly compress, guiding the holes in the cover over the pressure plate lugs and all springs into their spring seats in the cover.
10. Assemble adjusting nuts on the eyebolts and screw them down until their tops are flush with the tops of the eyebolts. Slowly release pressure of spindle and remove cover assembly from press.

Adjusting Levers

While no wear adjustment is needed because of the coil spring design, it is imperative that the clutch release levers are each set to exactly the same height at the time of manufacture or rebuild to insure uniform clutch application. To obtain exactly the same adjustment at each release lever, use gauge plate J-1048 and release lever height gauge J-6456 as follows:

1. Place gauge plate J-1048 (fig. 11E) on the flywheel in position normally occupied by driven plate.

NOTE: It is recommended that a spare flywheel be obtained so that this operation may be performed at the bench.

2. Bolt cover on flywheel with gauge plate centered.

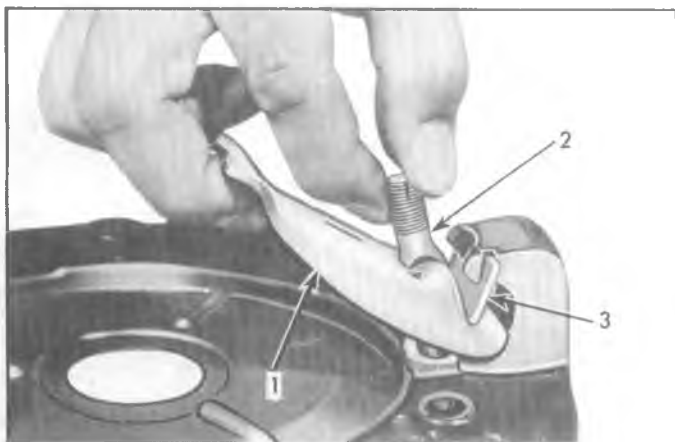


Fig. 5E—Removing Levers (Step 2)

1. Release Lever 2. Eyebolt 3. Strut



Fig. 6E—Greasing Lug

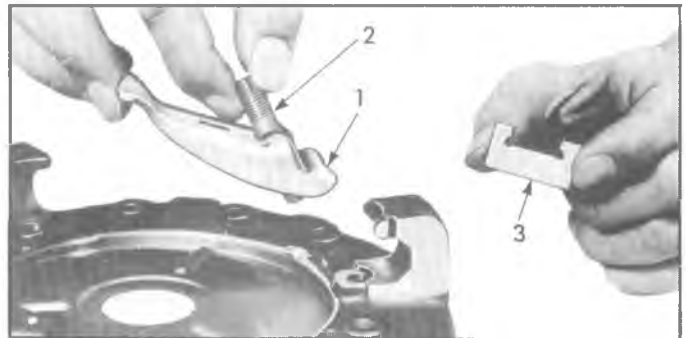


Fig. 7E—Installing Lever

1. Release Lever 2. Eyebolt 3. Strut

NOTE: On assemblies with three levers, the three flat machined lands of the gauge plate must be located directly under the levers. On the larger 13" clutch with four levers, any position is satisfactory.

3. Depress each lever several times with a hammer handle to settle all parts into working position.
4. Position height gauge J-6456 on the hub of the gauge plate and the bearing surface of one lever (fig. 13E). Turn adjusting nut until lever is flush with proper step of height gauge. Adjust remaining levers in same manner. The height gauge (insert) has three steps for use with the five basic coil spring clutches currently available. One step is used for the passenger car 10" clutch, one step for the 13" clutch, while the third step is used for 10-1/2",

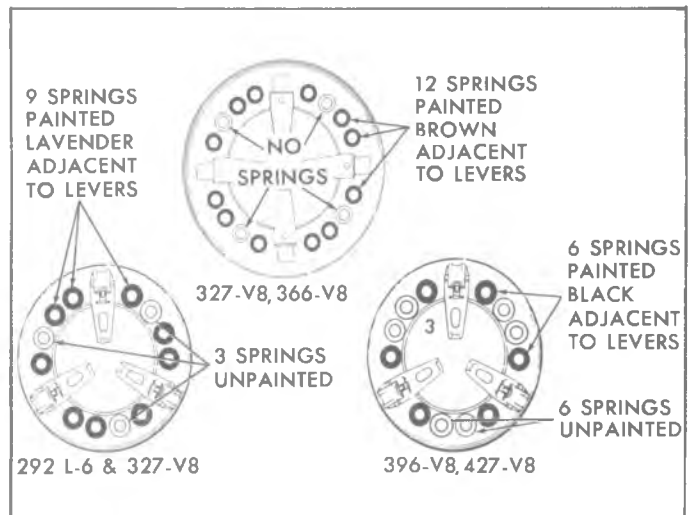


Fig. 8E—Spring Arrangement Diagram

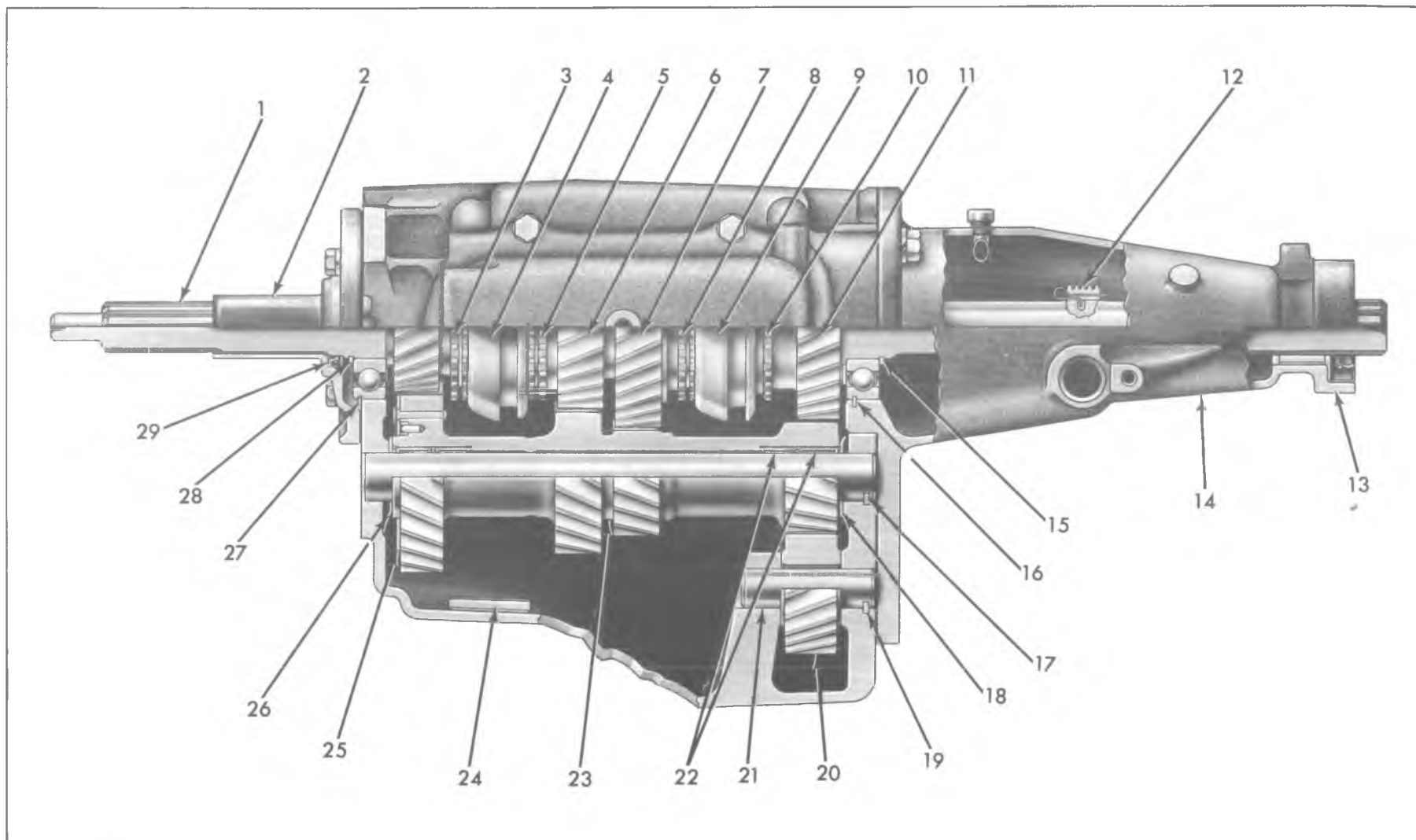


Fig. 1G—Transmission Cross Section

- | | | | | |
|---------------------------------|--------------------------------|---|--|-----------------------------------|
| 1. Clutch Gear | 6. 2nd Speed Gear | 13. Rear Extension Seal | 19. Reverse Idler Shaft | 26. Thrust Washer |
| 2. Clutch Gear Bearing Retainer | 7. 1st Speed Gear | 14. Rear Extension | 20. Reverse Idler Gear | 27. Clutch Gear Bearing |
| 3. 3rd Speed Synchronizer Ring | 8. 1st Speed Synchronizer Ring | 15. Rear Bearing-to-Shaft Snap Ring | 21. Reverse Idler Shaft | 28. Snap Ring |
| 4. 2nd-3rd Speed Clutch Assy. | 9. 1st Reverse Clutch Assy. | 16. Rear Bearing-to-extension Snap Ring | 22. Countergear Bearings | 29. Clutch Gear Retainer Lip Seal |
| 5. 2nd Speed Synchronizer Ring | 10. Reverse Synchronizer Ring | 17. Countergear Woodruff Key | 23. Countergear | |
| | 11. Reverse Gear | 18. Thrust Washer | 24. Case Magnet | |
| | 12. Speedometer Gear and Clip | | 25. Anti-Lash Plate Assy. (Pass. only) | |

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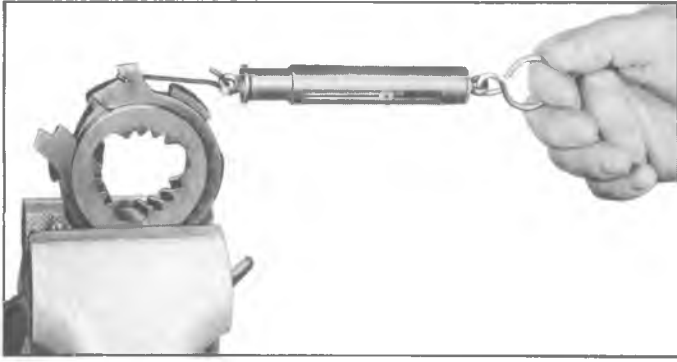


Fig. 15B—Measuring Blocker Ring Tension

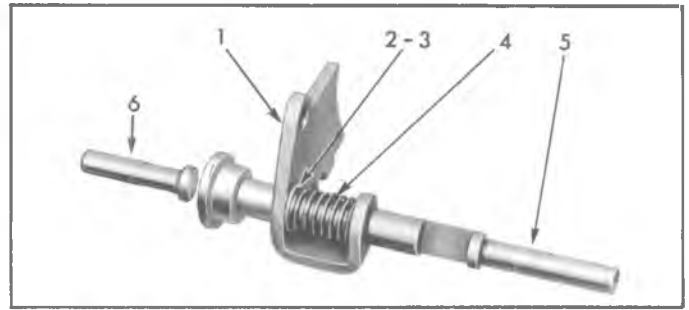


Fig. 17B—Shift Rail, Plunger, Fork and Spring Assembly

- | | |
|--------------|---------------|
| 1. Fork | 4. Spring |
| 2. Snap Ring | 5. Shift Rail |
| 3. Washer | 6. Plunger |

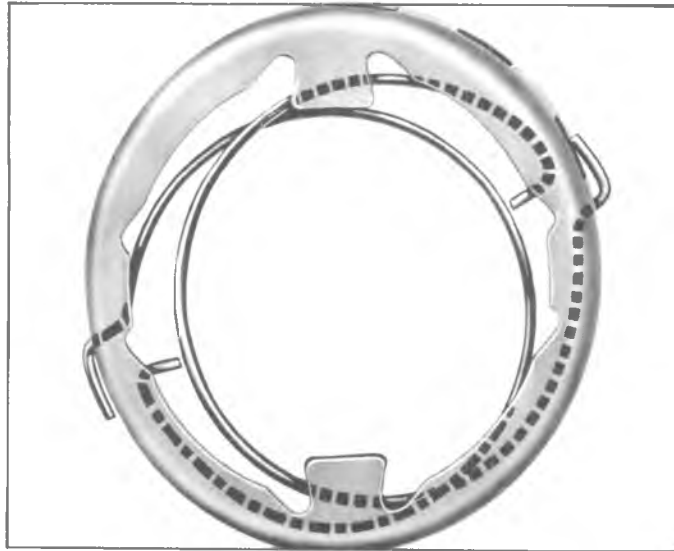


Fig 16B—Installing Cam Roller Retaining Springs

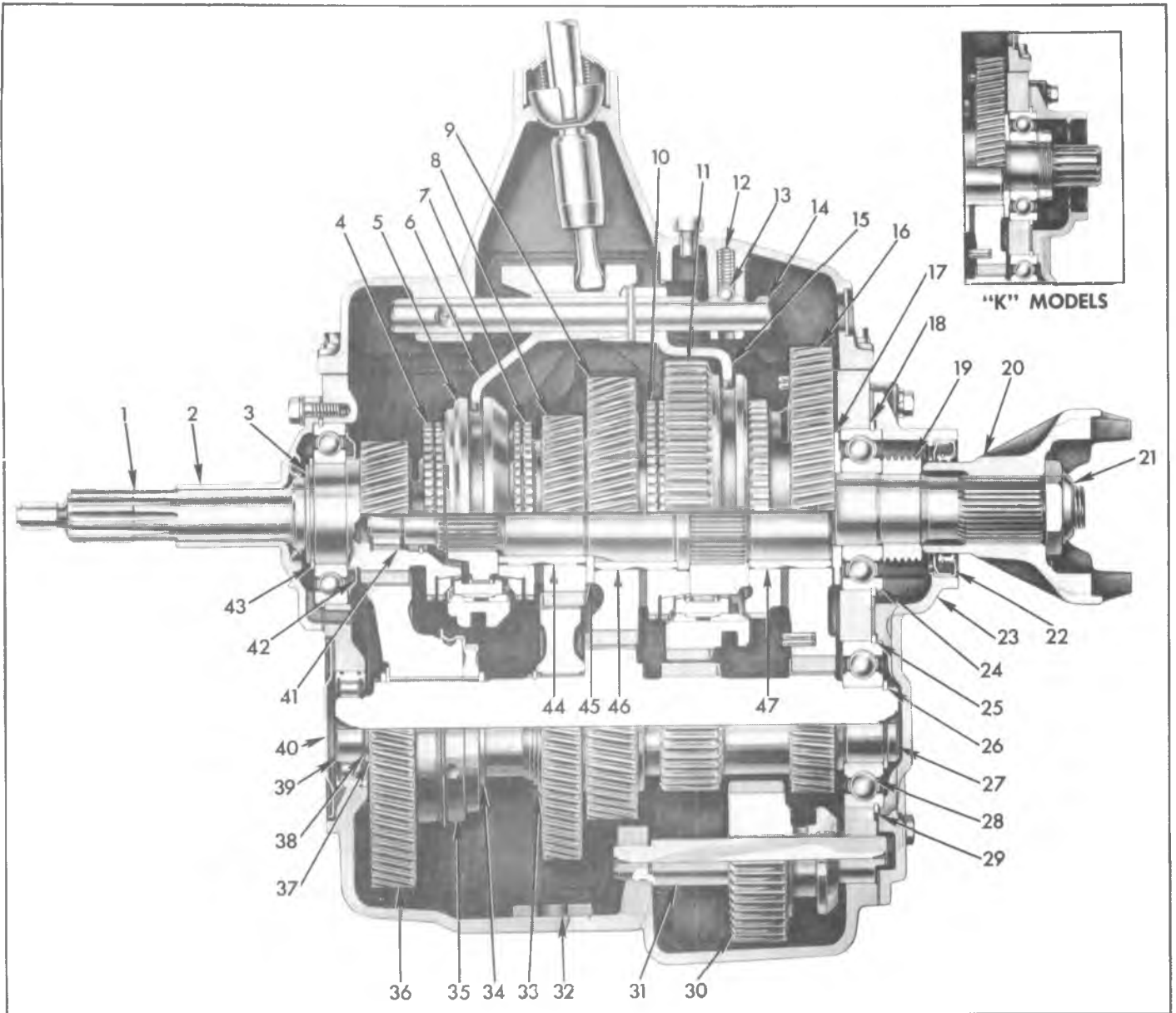


Fig. 1M—Transmission Assembly—Cross Section

- | | | | |
|---|---------------------------------------|----------------------------------|-----------------------------------|
| 1. Main Drive Clutch Gear | 11. Reverse Driven Gear | 25. Rear Bearing Snap Ring | 39. Front Countershaft
Bearing |
| 2. Drive Gear Bearing
Retainer | 12. Poppet Spring | 26. Snap Ring | 40. Countergear Front
Cover |
| 3. Snap Ring--Outer | 13. Poppet Ball | 27. Countershaft | 41. Pilot Bearing Rollers |
| 4. 3rd and 4th Synchronizer
Ring | 14. Shift Rail | 28. Countershaft Rear
Bearing | 42. Clutch Gear Oil Slinger |
| 5. 3rd and 4th Synchronizer
Collar | 15. 1st and 2nd Shift Fork | 29. Bearing Snap Ring | 43. Snap Ring |
| 6. 3rd and 4th Shift Fork | 16. 1st Speed Gear | 30. Reverse Idler Gear | 44. 3rd Speed Gear
Bushing |
| 7. 3rd and 4th Speed
Synchronizer Ring | 17. Thrust Washer | 31. Reverse Idler Shaft | 45. Thrust Washer |
| 8. 3rd Speed Gear | 18. Bearing Snap Ring | 32. Case Magnet | 46. 2nd Speed Gear
Bushing |
| 9. 2nd Speed Gear | 19. Speedometer Drive Gear | 33. Snap Ring | 47. 1st Speed Gear
Bushing |
| 10. 1st and 2nd Synchronizer
Assembly | 20. Output Yoke | 34. Snap Ring | |
| | 21. Flange Nut | 35. Damper Assembly | |
| | 22. Rear Bearing Retainer Oil
Seal | 36. Countergear | |
| | 23. Rear Bearing Retainer | 37. Thrust Washer | |
| | 24. Mainshaft Rear Bearing | 38. Snap Ring | |

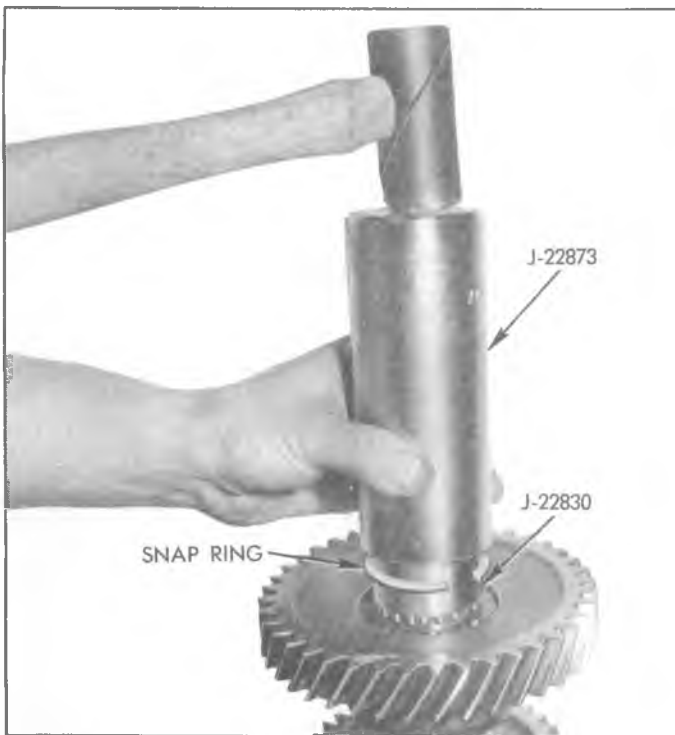


Fig. 21M—Installing Counter Gear Snap Ring

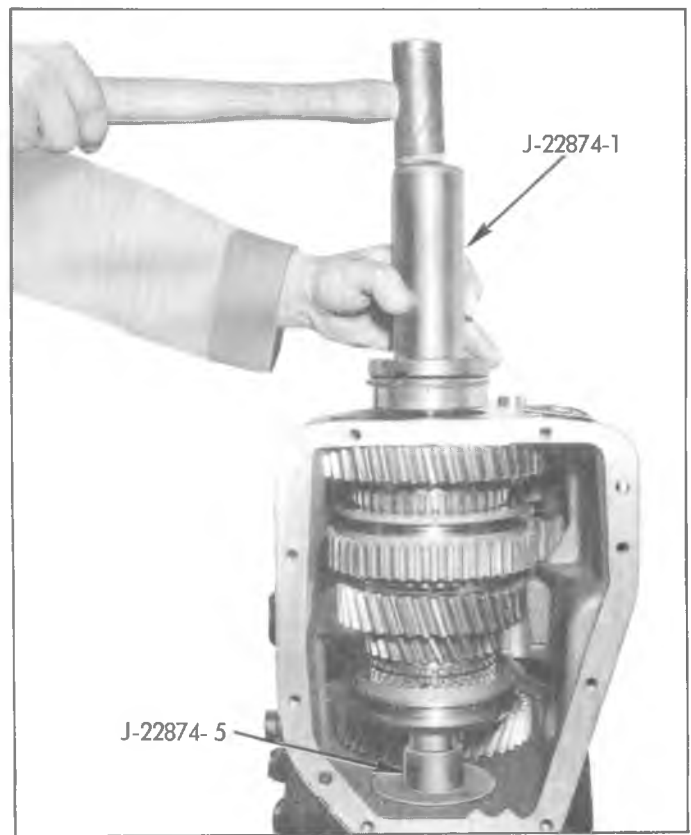


Fig. 23M—Installing Mainshaft Rear Bearing

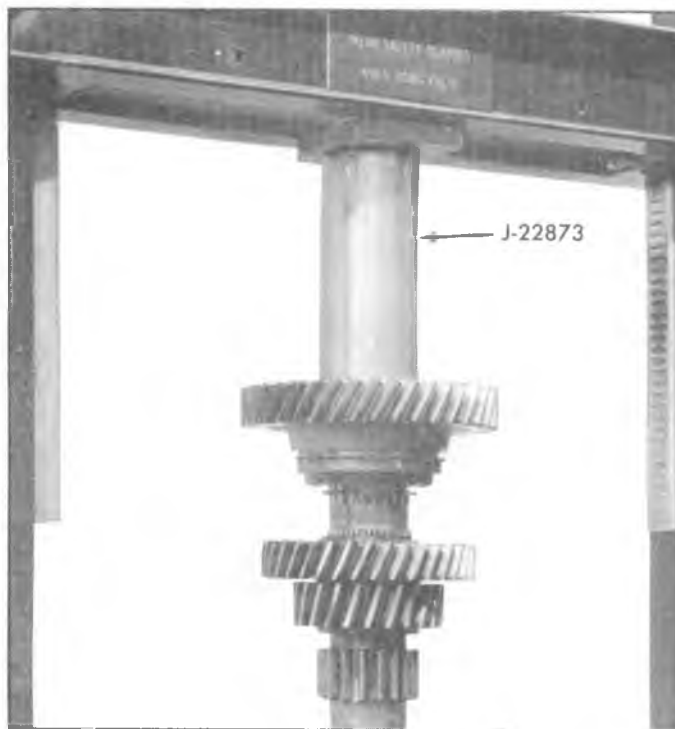


Fig. 22M—Installing Clutch Countergear

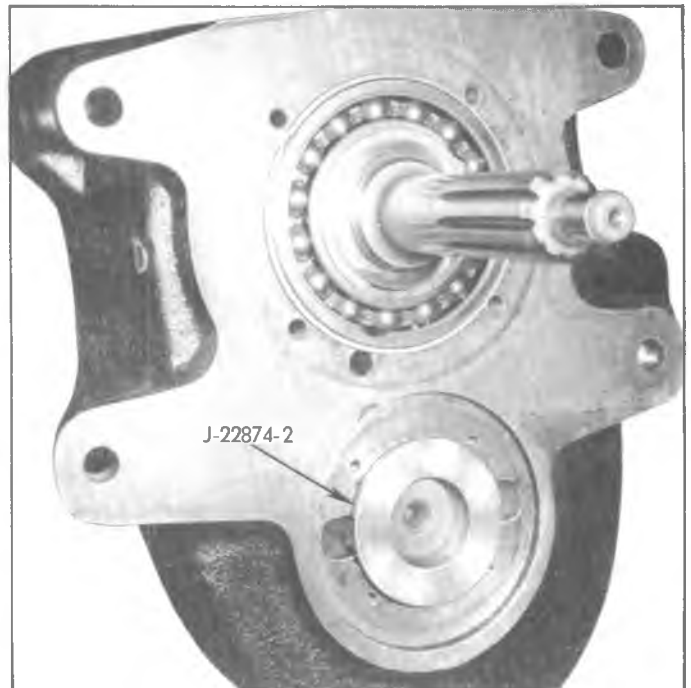


Fig. 24M—Countergear Front Support Tool

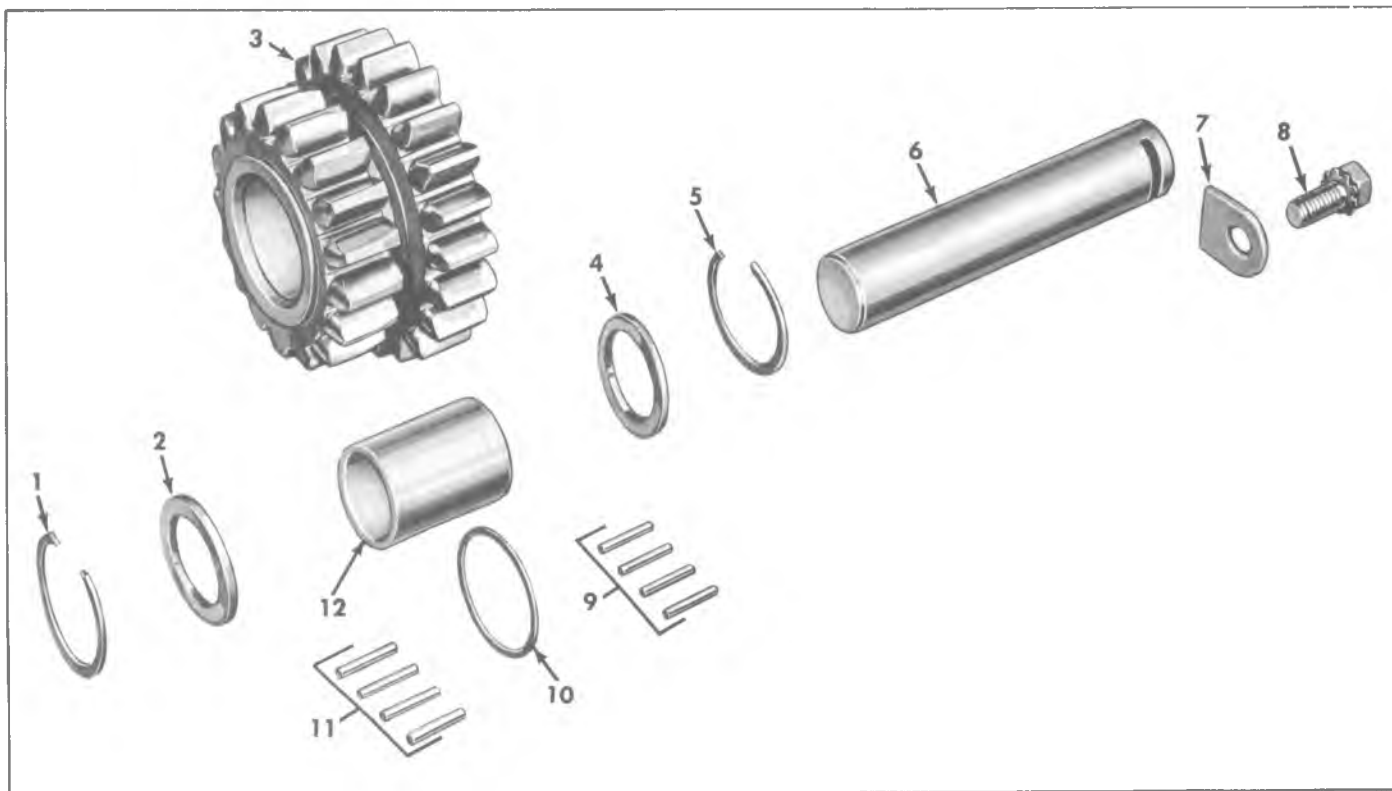


Fig. 11K—Reverse Idler Gear Components

- | | | | |
|-----------------------|-----------------------------------|---|--|
| 1. Snap Ring | 6. Idler Gear Shaft | 9. One Row of 34 Needle Bearing Rollers | 11. One Row of 34 Needle Bearing Rollers |
| 2. Retaining Washer | 7. Lock Plate | 10. Needle Bearing Roller Separator | 12. Needle Bearing Roller Inner Race |
| 3. Reverse Idler Gear | 8. Screw and Lock Washer Assembly | | |
| 4. Retaining Washer | | | |
| 5. Snap Ring | | | |

2. Position needle bearing roller thrust washer against the snap ring.
3. Insert one row of 34 needle bearing rollers, holding in place with light grease, and bearing race in bore of idler gear (fig. 12).
4. Position needle bearing roller separator over bearing race and install second row of 34 needle bearing rollers.
5. Place second thrust washer over bearing rollers; then install second retaining snap ring.

Check by feel for some slight end play of the countershaft.

REVERSE IDLER GEAR AND SHAFT

Installation

1. Position reverse idler gear assembly in transmission case (15) with large gear toward rear of case.

ASSEMBLY OF TRANSMISSION (Fig. 2K) COUNTERSHAFT AND GEAR CLUSTER

Installation

1. Position transmission case on work bench with front of case down.
2. Coat front thrust washer with grease and position it in case over countershaft front bearing.
3. Position countershaft and gear cluster in transmission case making sure the front thrust washer is not disturbed.
4. Install countershaft cluster gear rear thrust bearing and bearing race on pilot diameter at rear of countershaft (fig. 10K).
5. Using a new gasket, install gasket and countershaft rear bearing and retainer assembly.

NOTE: Use sealing cement on the four screw and lock washer assemblies. Tighten screws securely.

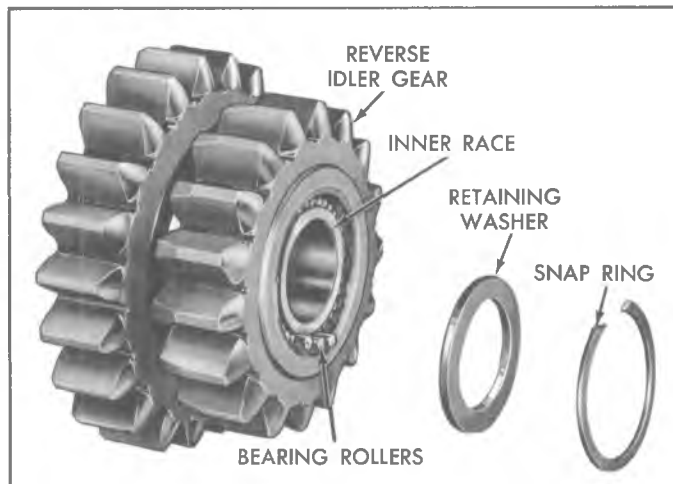


Fig. 12K—Assembling Reverse Idler Gear Bearing Rollers

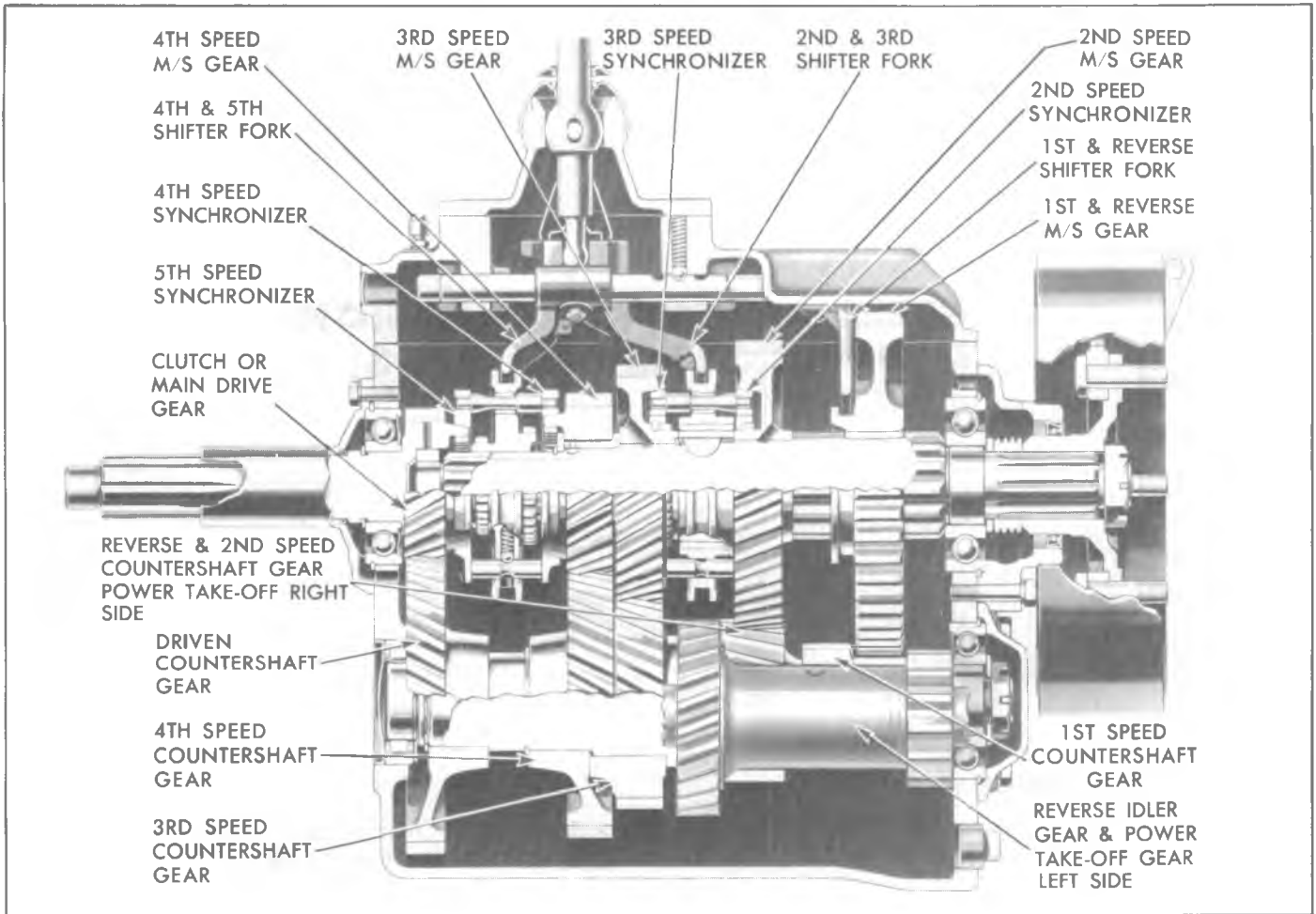


Fig. 1S—Spicer 5-Speed Transmission Cross Section

brush bearings with a soft bristled brush until all foreign material has been removed.

2. Rinse bearings in clean solvent; then blow bearings dry with air pressure. **DO NOT SPIN BEARINGS WHILE DRYING.**
3. Rotate each bearing slowly while examining balls or rollers for roughness, damage, or excessive wear. Replace all bearings which are in questionable condition.
4. Pack all bearings with bearing lubricant (such as, NLGI

No. 0 Light Weight Ball and Roller Bearing Grease).

5. Wrap each bearing in clean lint-free paper until ready to install in transmission.

Gears and Shafts

1. Check operating gear teeth for pitting on tooth faces. Gears with pitted teeth should be replaced.
2. Check all engaging gear teeth. Gears with teeth worn, tapered or reduced in length from clashing in shifting should be replaced.

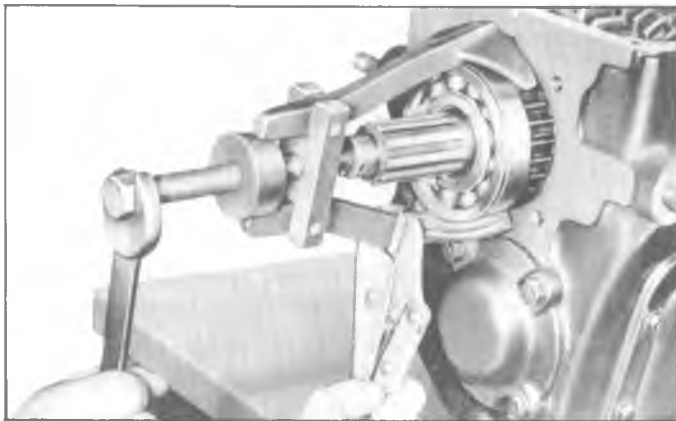


Fig. 2S—Removing Mainshaft Rear Bearing



Fig. 3S—Removing Idler Gear Shaft

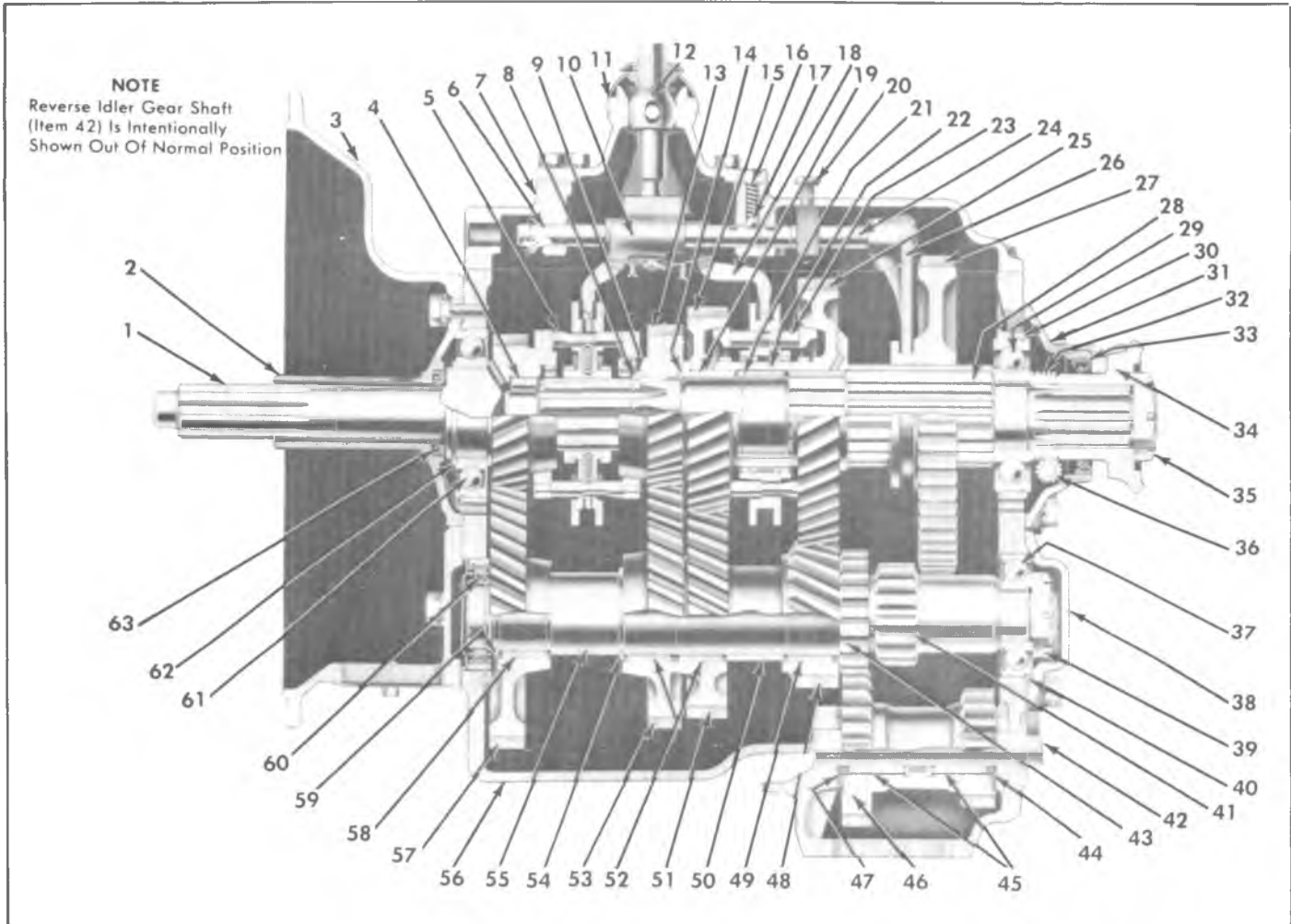


Fig. 1R—Spicer 5-Speed Transmission

- | | | | |
|------------------------------------|---|---------------------------------------|--|
| 1. Main Drive Gear | 19. Mainshaft 3rd Speed Gear Sleeve | 34. Companion Flange | 49. Countershaft Gear Key |
| 2. Main Drive Gear Bearing Cap | 20. Breather | 35. Companion Flange Nut | 50. Countershaft 2nd and 3rd Gear Spacer |
| 3. Clutch Housing | 21. Mainshaft Gear Key | 36. Speedometer Driven Gear | 51. Countershaft 3rd Speed Gear |
| 4. Mainshaft Pilot Bearing Rollers | 22. Mainshaft 2nd and 3rd Speed Clutch Gear | 37. Countershaft Rear Bearing | 52. Countershaft Gear Keys |
| 5. 4th and 5th Synchronizer | 23. 2nd and 3rd Synchronizer | 38. Countershaft Rear Bearing Cap | 53. Countershaft 4th Speed Gear |
| 6. 4th and 5th Shift Rod | 24. 1st and Reverse Shift Rod | 39. Countershaft Rear Bearing Nut | 54. Snap Ring |
| 7. Shifter Housing | 25. Mainshaft 2nd Speed Gear | 40. Snap Ring | 55. Countershaft |
| 8. Snap Ring | 26. 1st and Reverse Shift Fork | 41. Countershaft 1st Speed Gear Teeth | 56. Transmission Case |
| 9. Thrust Washer | 27. 1st and Reverse Sliding Gear | 42. Reverse Idler Gear Shaft | 57. Countershaft Drive Gear |
| 10. 4th and 5th Shift Fork | 28. Mainshaft | 43. Countershaft Reverse Gear Teeth | 58. Countershaft Gear Key |
| 11. Control Tower | 29. Mainshaft Rear Bearing | 44. Thrust Washer | 59. Snap Ring |
| 12. Gearshift Lever | 30. Snap Ring | 45. Reverse Idler Gear Bearings | 60. Countershaft Front Bearing |
| 13. Mainshaft 4th Speed Gear | 31. Mainshaft Rear Bearing Cap | 46. Reverse Idler Gear | 61. Main Drive Gear Bearing |
| 14. Snap Ring | 32. Speedometer Drive Gear | 47. Thrust Washer | 62. Snap Ring |
| 15. Mainshaft 3rd Speed Gear | 33. Mainshaft Rear Bearing Cap Oil Seal | 48. Countershaft 2nd Speed Gear | 63. Main Drive Gear Bearing Cap Oil Seal |
| 16. Poppet Ball Spring | | | |
| 17. Poppet Ball | | | |
| 18. 2nd and 3rd Shift Fork | | | |

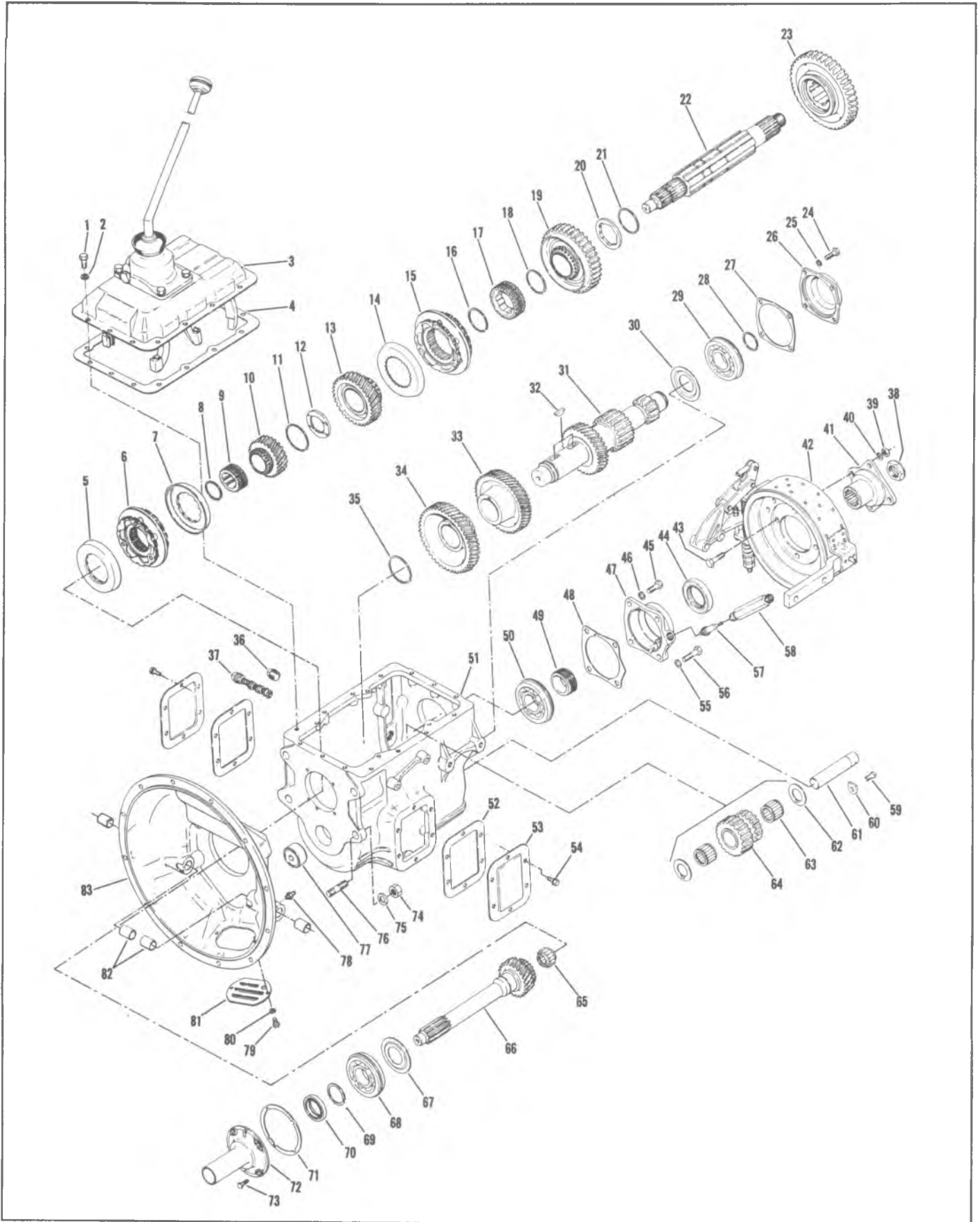


Fig. 3N—Transmission Assembly—Exploded View

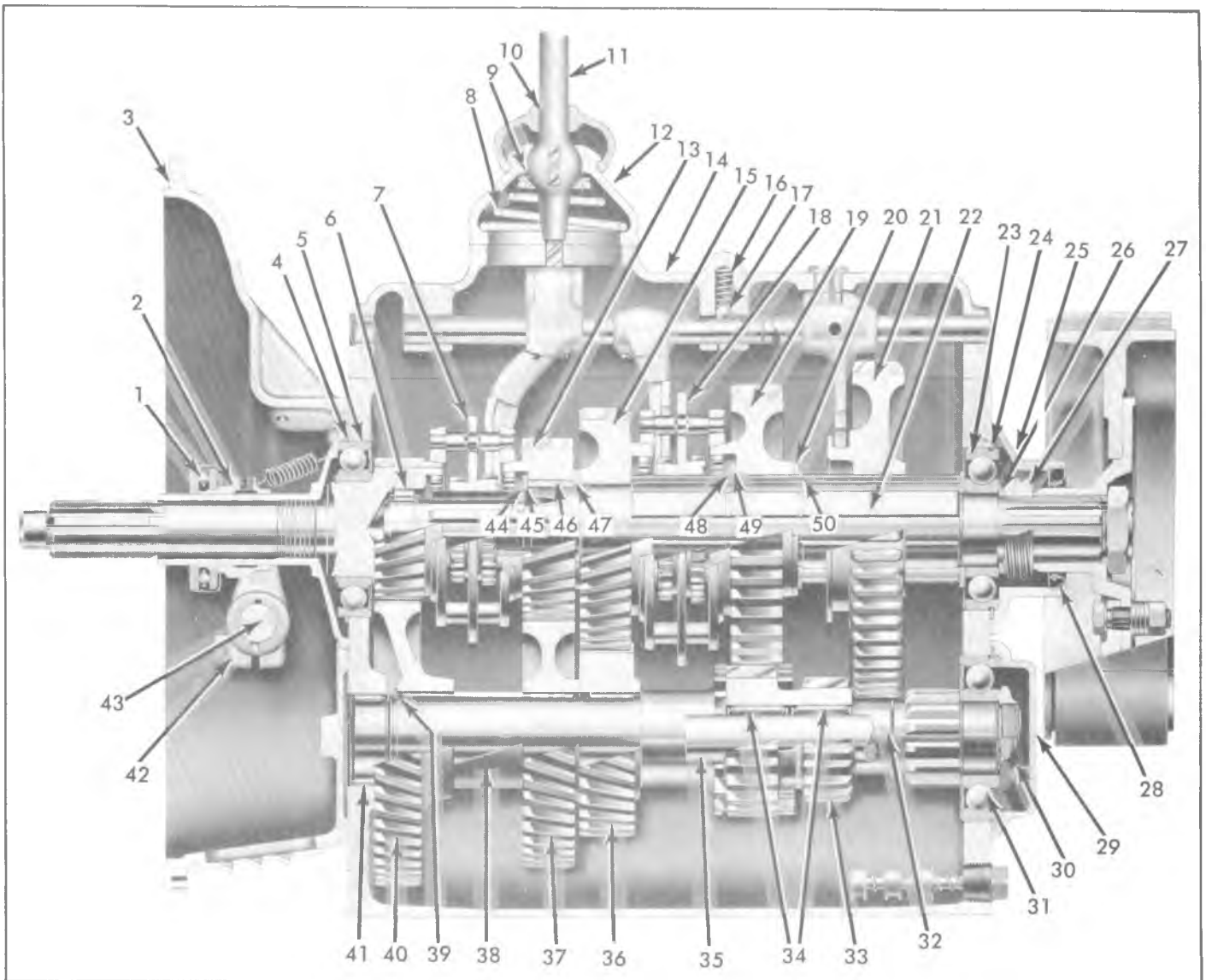


Fig. 1P—Transmission Cross-Section

- | | | |
|-------------------------------------|--|------------------------------------|
| 1. Clutch Release Bearing | 18. 2nd and 3rd Synchronizer Assy. | 35. Reverse Idler Shaft |
| 2. Release Bearing Support | 19. Mainshaft 2nd Speed Gear | 36. Countershaft 3rd Speed Gear |
| 3. Clutch Housing | 20. 2nd Gear Locating Washer | 37. Countershaft 4th Speed Gear |
| 4. Drive Gear Bearing Retainer Ring | 21. Mainshaft 1st and Reverse Gear | 38. Countershaft Drive Gear Spacer |
| 5. Drive Gear Bearing | 22. Mainshaft | 39. Snap Ring |
| 6. Mainshaft Pilot Bearing | 23. Mainshaft Rear Bearing | 40. Countershaft Drive Gear |
| 7. 4th and 5th Synchronizer Assy. | 24. Mainshaft Rear Bearing Snap Ring | 41. Countershaft Front Bearing |
| 8. Gearshift Lever Spring | 25. Mainshaft Rear Bearing Cap | 42. Clutch Release Yoke |
| 9. Spring Seat Washer | 26. Speedometer Drive Gear Spacer | 43. Release Yoke Cross Shaft |
| 10. Dust Cover | 27. Speedometer Drive Gear | 44. Snap Ring |
| 11. Gearshift Lever | 28. Rear Bearing Cap Oil Seal | 45. 4th Speed Gear Retainer Washer |
| 12. Control Tower | 29. Countershaft Rear Bearing Cap | 46. 4th Speed Gear Bushing Sleeve |
| 13. Mainshaft 4th Speed Gear | 30. Countershaft Rear Bearing Retainer Nut | 47. 4th Speed Gear Locating Washer |
| 14. Shift Bar Housing | 31. Countershaft Rear Bearing | 48. Snap Ring |
| 15. Mainshaft 3rd Speed Gear | 32. Countershaft | 49. 2nd Speed Gear Retainer Washer |
| 16. Poppet Spring | 33. Reverse Idler Gear | 50. 2nd Speed Gear Snap Ring |
| 17. Poppet Ball | 34. Reverse Idler Gear Bearings | |

4. Install parking brake parts (if used) as directed in BRAKES (SEC. 5) of this manual.

CONTROL TOWER INSTALLATION

NOTE: On transmissions having a conventional gearshift lever, accomplish the following:

1. With transmission in "Neutral," position a new gasket on shift bar housing.
2. Place shift control lever in shifter shaft collar; then install shift lever pivot bolt, nut, and lock washer attaching control lever to anchor bracket. Tighten nut to 25-31 foot-pounds torque.

**AUXILIARY 4-SPEED TRANSMISSION
(SPICER MODEL 6041)**

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DISASSEMBLY OF TRANSMISSION

NOTE: Refer to Figure 1.

1. Remove drain plug and drain fluid from transmission. Remove cover to case bolts and lift cover from transmission case.
2. Lock transmission by locking both shift collars into engagement with mating gears at same time. Remove mainshaft nut; then remove rear flange.
3. If front support has not been removed, then remove front support from main drive gear bearing cap.
4. Remove countershaft rear bearing cap, noting number of shims under cap.
5. Remove mainshaft rear bearing cap and gasket with oil seal and speedometer driven gear in cap, then remove oil seal and speedometer driven gear from cap and sleeve.
6. Remove main drive gear bearing cap with bearings, main drive gear, seal and seal cap.
7. Remove speedometer drive gear. Then using puller (J-4558) as shown in figure 5, press mainshaft with front pilot bearing, mainshaft overdrive gear snap ring, overdrive and direct clutch gear, collar, and overdrive gear out through front of case, leaving 1st speed gear, 1st and 2nd speed clutch gear and collar and mainshaft 2nd speed gear and sleeves in case. Remove these items from case after removing mainshaft.
8. Remove mainshaft rear bearing assembly from transmission case.
9. Drive countershaft toward rear far enough to force rear bearing cup out of case. Using snap ring pliers, remove countershaft 2nd speed gear front snap ring from groove, slide 2nd speed gear forward, then lift countershaft assembly out of case.
10. Remove countershaft front bearing cup from case.
11. Remove power take-off covers, and filler plug from case.

DISASSEMBLY OF SUBASSEMBLIES

MAIN DRIVE GEAR AND BEARINGS

1. Remove oil seal and oil seal cap with gasket from main drive gear bearing cap. Seal can then be removed from cap.
2. Support cap at flange; then press main drive gear out of cap.
3. Remove spacer and bearing cone from main drive gear shaft. Washer and bearing cone may be lifted from bearing cap.
4. If inspection reveals damage or wear at bearing cups, they may be driven out of cap and replaced with new parts.
5. If bearing has remained in pocket of drive gear, remove with suitable puller.

MAINSHAFT AND GEARS

1. Remove shift collar from clutch gear. If bearing has remained on mainshaft, it will first be necessary to remove this part.
2. Remove snap ring. Pull clutch gear off splines at front of mainshaft; then remove overdrive gear.

COUNTERSHAFT GEARS AND BEARINGS

Countershaft gears should be marked so that correct position will be known when installing.

1. Using suitable puller, remove bearing cones from countershaft.
2. Remove countershaft 2nd speed gear rear snap ring from end of countershaft, then remove 2nd speed gear from countershaft.
3. Remove countershaft drive gear snap ring from front of countershaft.
4. Using arbor press, press drive gear and countershaft overdrive gear from countershaft.

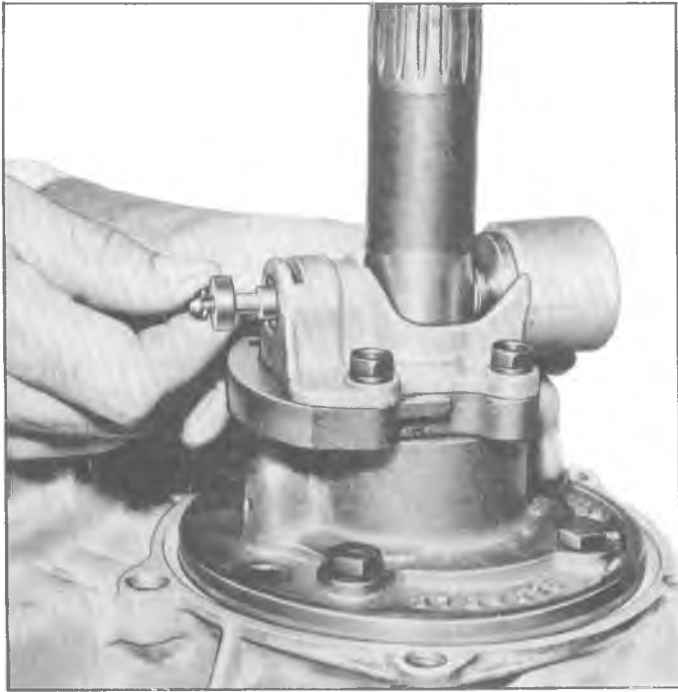


Fig. 4PG—Removing Governor Valve and Shaft

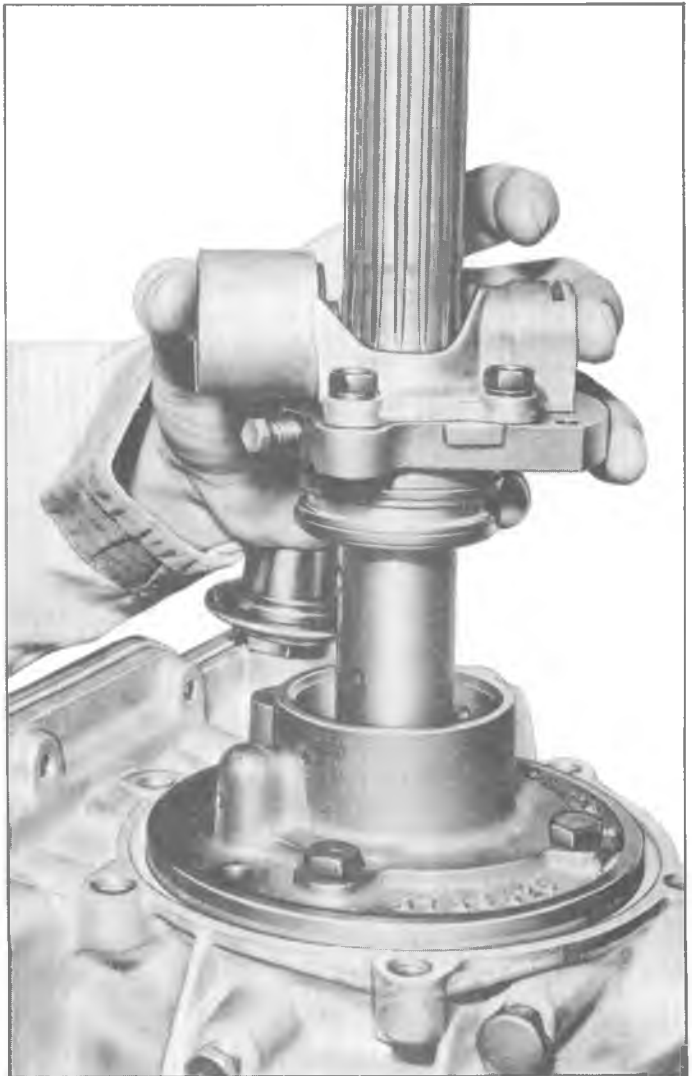


Fig. 5PG—Removing Governor Assembly

OIL PAN AND VALVE BODY

NOTE: The oil pan and valve body may be serviced without the necessity of removing the extension and internal components covered in the preceding steps.

20. Rotate the holding fixture until the transmission is upside down and the oil pan is at the top. Remove the oil pan attaching bolts, oil pan and gasket. Remove screen; replace at assembly using new transmission case screen.
21. Remove the vacuum modulator and gasket, and the vacuum modulator plunger, dampening spring and valve (fig. 10PG).
22. Remove the two bolts attaching the detent guide plate to the valve body and the transmission case. Remove the guide plate and the range selector detent roller spring.
23. Remove the remaining valve body-to-transmission case attaching bolts (indicated by arrows in Figure 11PG) and carefully lift out the valve body and gasket, disengaging the servo apply tube from the transmission case as the valve body is removed.
24. If necessary, the TV, shift and parking actuator assembly levers, and the parking pawl and bracket (fig. 12PG) may be removed.

This completes the entire transmission disassembly procedure. Component parts disassembly and repair procedures will be found in succeeding pages of this manual.

OVERHAULING UNIT ASSEMBLIES

CONVERTOR AND STATOR

The converter is a welded assembly and no internal repairs are possible. Check the seams for stress or breaks and replace converter if necessary.

OIL PUMP

Seal Replacement

If the pump seal requires replacement, remove the pump

from the transmission, pry out and replace the seal. (Drive new seal into place, fully seated in counterbore, using J-6839.) Then, if no further work is required on the pump, reinstall it in the case.

NOTE: Outer diameter of the seal should be coated with non-hardening sealer prior to installation.

Disassembly

1. Remove bolts attaching pump cover to body and remove the cover.
2. Remove pump gears from body.

CAUTION: Do not drop or nick gears. These gears are not heat treated.

3. Remove the rubber seal ring from the pump body.

NOTE: See Figure 14PG for a layout of pump parts.

Inspection

1. Wash all parts in cleaning solvent and blow out all oil passages. **DO NOT USE RAGS TO DRY PARTS.**

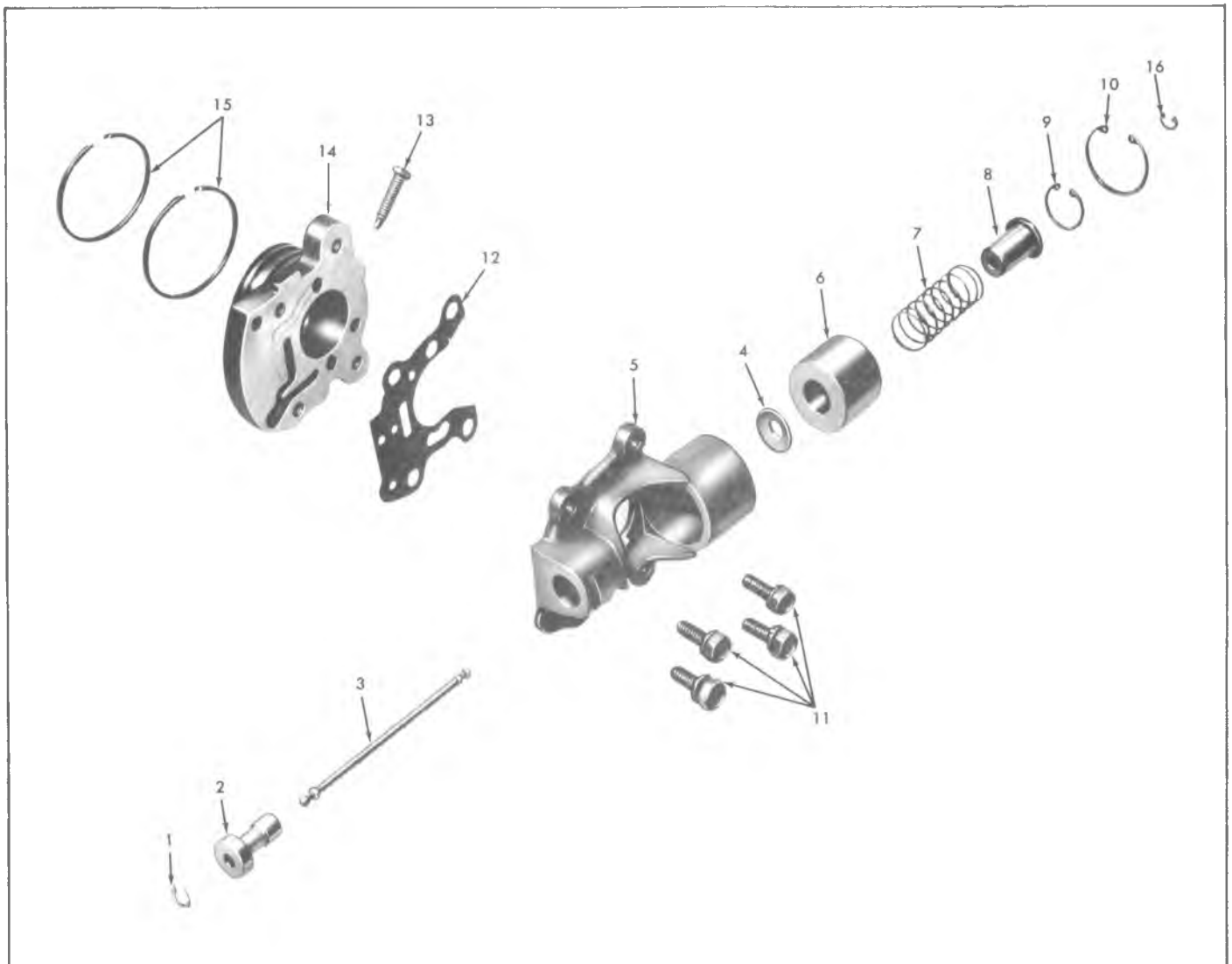


Fig. 26PG—Governor—Exploded View

- | | | | |
|---------------------------------------|---|--|---|
| 1. Valve to Shaft Retaining Snap Ring | 6. Outer Weight | 10. Outer Weight to Body Retaining Snap Ring | 13. Hub Drive Screw |
| 2. Valve | 7. Spring | 11. Body to Hub Screws and Lock Washers | 14. Hub |
| 3. Shaft | 8. Inner Weight | 12. Gasket | 15. Hub Oil Seal Rings |
| 4. Urethane Washer | 9. Inner Weight to Outer Weight Retaining Snap Ring | | 16. Inner Weight to Shaft Retaining Snap Ring |
| 5. Body | | | |

Disassembly

1. Remove the manual valve, suction screen and gasket.
2. Remove valve body bolts and carefully remove lower valve body and transfer plate from upper valve body. Discard gaskets.
3. From the upper valve body, remove the TV and detent valves and the downshift timing valve as follows:
 - a. TV and Detent Valve - Remove the retaining pin by wedging a thin screw driver between its head and the valve body, then remove the detent valve assembly and throttle valve spring. Tilt the valve body to allow the throttle valve to fall out. If necessary, remove the "C" clip and disassemble the detent valve assembly.

CAUTION: Do not disturb the setting of the adjustment hex nut on the detent valve assembly. This is a factory adjust-

ment and should not normally be changed. However, some adjustment is possible if desired. See "Throttle Valve Adjustment."

- b. Downshift Timing Valve - Drive out the roll pin. Remove the valve spring and the downshift timing valve
4. From the lower valve body, remove the low-drive shift valve and the pressure regulator valve as follows.
 - a. Low-Drive Shift Valve - Remove the snap ring and tilt the valve body to remove the low-drive regulator valve sleeve and valve assembly, valve springs and the shifter valve.
 - b. Pressure Regulator Valve - Remove the snap ring, then tilt valve body to remove the hydraulic modulator valve sleeve and valve, pressure regulator valve

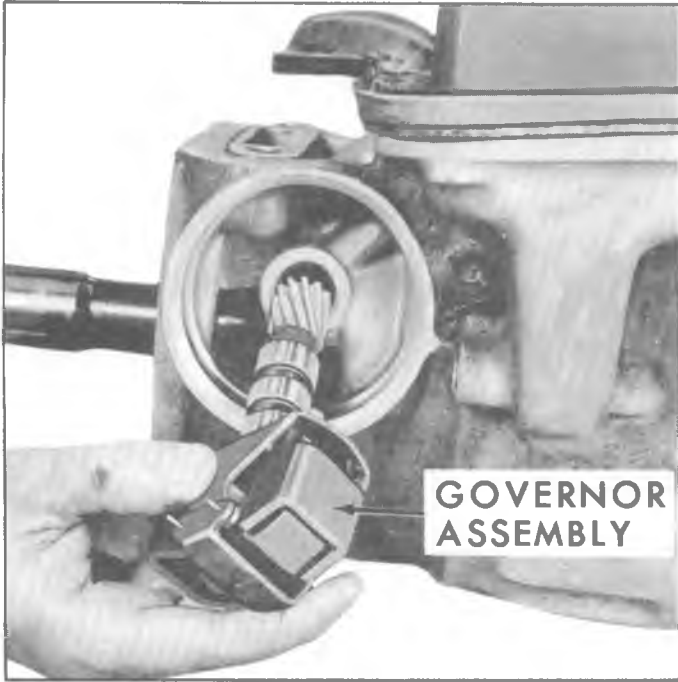


Fig. 10M—Removing Governor From Case

NOTE: The parking pawl shaft retaining plug may be removed by tapping in an awl between the transmission case and plug, then removing plug from case with a long nosed pliers.

16. Remove intermediate servo piston and seal ring. Remove washer, spring seat and apply pin (fig. 28M).

Removal of Oil Pump and Internal Case Components

1. Remove eight (8) pump attaching bolts with washer type seals (fig. 29M).



Fig. 11M—Removing Transmission Oil Pan



Fig. 12M—Removing Oil Pump Strainer From Valve Body

2. Install two (2) threaded Slide Hammers J-9539 (Weights J-6585) into threaded holes in pump body and remove pump assembly from case (fig. 30M). Discard pump gasket.

Refer to pages 7-140 thru 7-144 for disassembly and reassembly of the oil pump.

3. Remove intermediate clutch cushion spring (fig. 31M).
4. Remove intermediate clutch faced plates and steel reaction plates (fig. 32M).
5. Remove intermediate clutch pressure plate (fig. 33M).
6. Remove intermediate overrun brake band (fig. 34M).

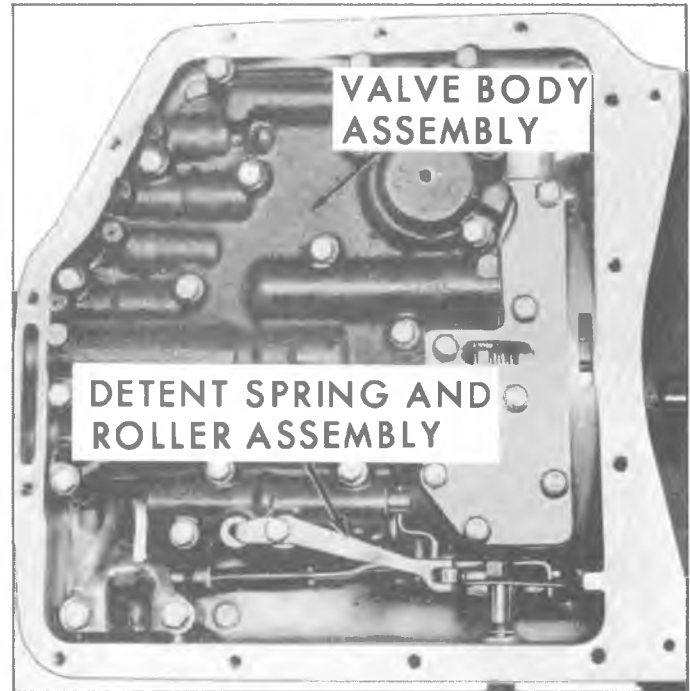


Fig. 13M—Detent Spring and Roller Assembly



Fig. 50M—Removing Low and Reverse Clutch Piston

NOTE: To facilitate assembly locate pump priming valve in pump body to priming valve cavity in pump cover (figs. 68M and 69M).

11. Install pump outside diameter to case (square cut) "O" ring seal.
12. Install pump to converter hub lip seal using Seal Installer J-21359 (fig. 65M).
13. Tighten attaching bolts. Torque to 18 ft. lbs.

Direct Clutch Disassembly, Inspection and Overhaul (Fig. 70M)

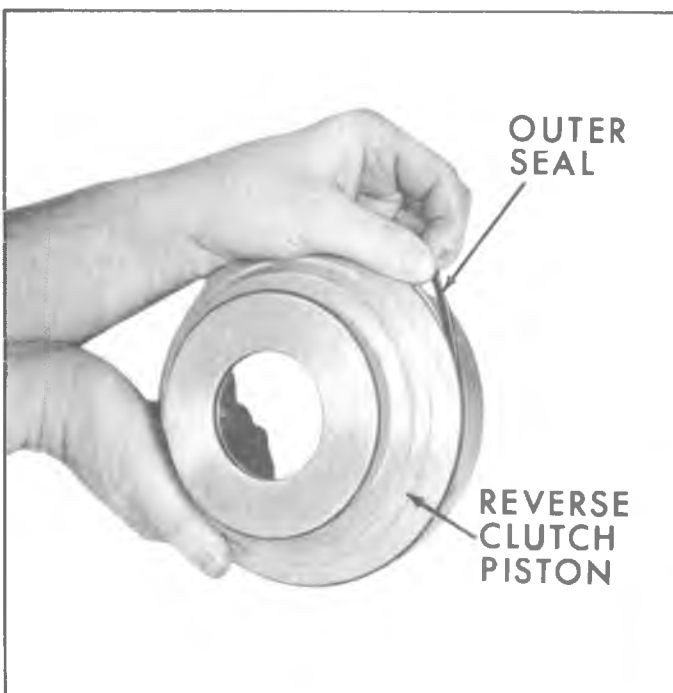


Fig. 51M—Removing Low and Reverse Clutch Piston Oil Seals



Fig. 52M—Removing Low and Reverse Clutch Piston Center and Inner Seal

Disassembly

1. Remove intermediate overrun clutch drum front retaining ring and retainer (fig. 71M).
2. Remove intermediate clutch overrun outer race.
3. Remove intermediate overrun roller clutch assembly (fig. 72M).
4. Remove intermediate overrun roller clutch cam if necessary.
5. Remove direct clutch drum to forward clutch housing special thrust washer.
6. Remove direct clutch pressure plate to clutch drum retaining ring and pressure plate (fig. 74M).
7. Remove face plates, steel reaction plates, and cushion spring (3 tangs) (fig. 75M).
8. Using Compressing Tool J-23327, remove direct clutch piston return spring seal retaining ring, spring seat and seventeen (17) clutch return coil springs (fig. 76M).



Fig. 53M—Removing 1-2 Accumulator Piston Cover

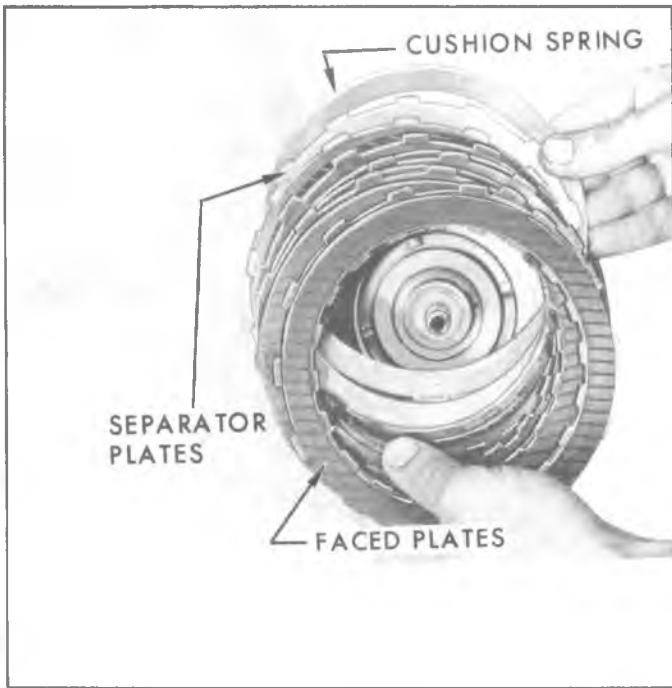


Fig. 83M—Removing Forward Clutch Retaining Ring and Pressure Plate

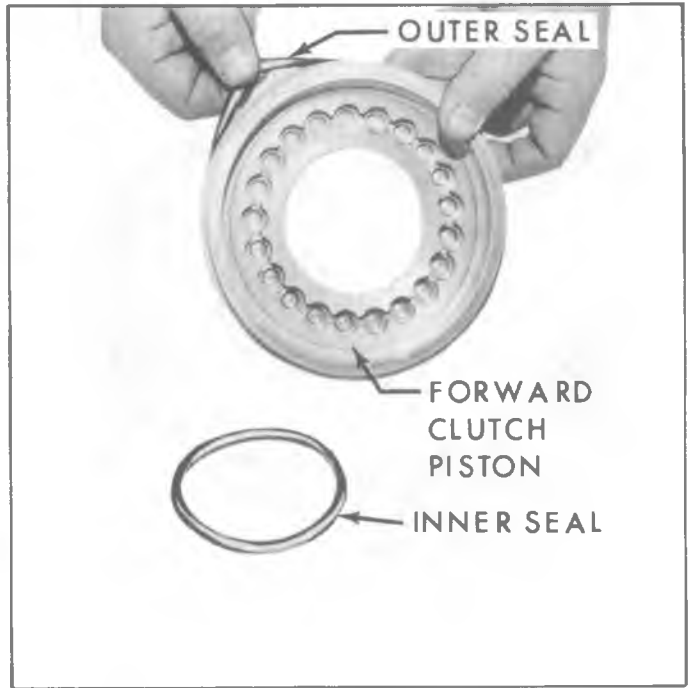


Fig. 85M—Removing Forward Clutch Piston Inner and Outer Seals

Inspection

1. Wash all parts in cleaning solvent, air dry and blow out all passages.
2. Inspect governor sleeve for nicks, burrs, scoring or galling.
3. Check governor sleeve for free operation in bore of transmission case.
4. Inspect governor valve for nicks, burrs, scoring or galling.

5. Check governor valve for free operation in bore of governor sleeve.
6. Inspect governor driven gear for nicks, burrs, or damage.
7. Check governor driven gear for looseness on governor sleeve.
8. Inspect governor weight springs for distortion or damage.
9. Check governor weights for free operation their retainers.
10. Check valve opening at entry and exhaust (.020 inch minimum).

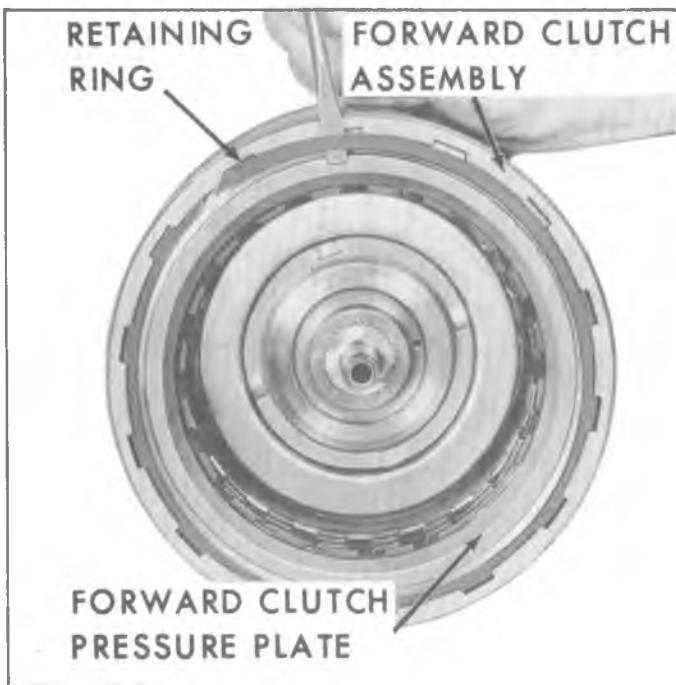


Fig. 84M—Removing Forward Clutch, Clutch Pack

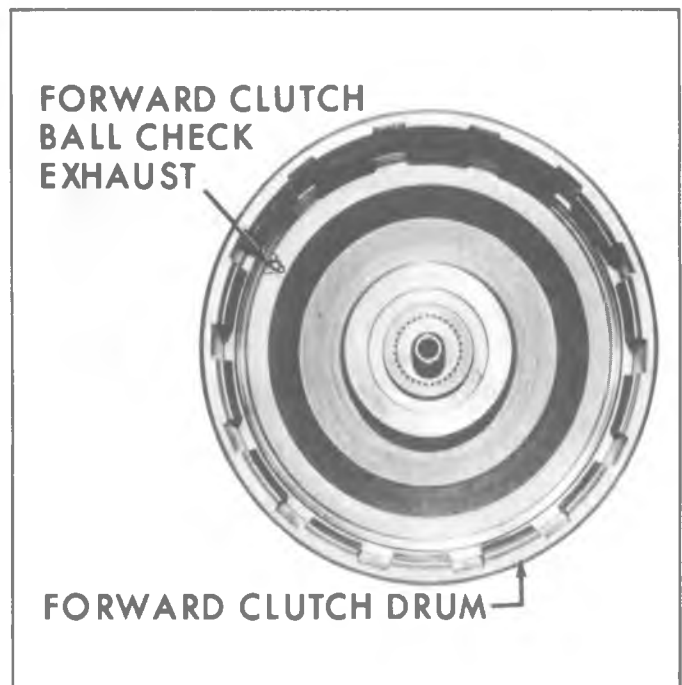


Fig. 86M—Forward Clutch Ball Check Exhaust

TURBO HYDRA-MATIC 400 TRANSMISSION

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TRANSMISSION DISASSEMBLY AND REASSEMBLY

DISASSEMBLY OF MAJOR UNITS

1. With transmission in cradle on portable jack, remove converter assembly by pulling straight out.

NOTE: Converter contains a large amount of oil.

2. Install holding Fixture J-8763-01 on transmission so that modulator assembly will be located on side of holding fixture nearest bench.

NOTE: Do not over-torque holding screw. This will bind center support.

3. Install fixture and transmission into holding Tool Base J-3289-14 with bottom pan facing up (fig. 2T).
4. Remove modulator assembly attaching screw and retainer (fig. 3T).
5. Remove modulator assembly and "O" ring seal from case (fig. 4T). Discard "O" ring.
6. Remove modulator valve from transmission case.

Removal of Governor, Speedometer Driven Gear, Pan, Strainer and Intake Pipe

1. Remove attaching screws, governor cover and gasket (fig. 5T). Discard gasket.
2. Withdraw governor assembly from case.
3. Remove speedometer driven gear attaching screw and retainer (fig. 6T).
4. Withdraw speedometer driven gear assembly from case.
5. Remove bottom pan attaching screws, bottom pan, and bottom pan gasket.

6. Remove strainer retainer bolt (fig. 7T).
7. Remove intake pipe and strainer assembly from case (fig. 8T).
8. Remove intake pipe "O" ring from pipe or case and discard.

Removal of Control Valve Assembly, Solenoid Connector, Governor Pipes and Detent Spring Assembly

1. Remove control valve body attaching screws and detent roller and spring assembly (fig. 9T).

NOTE: Do not remove solenoid attaching screws.

2. Disconnect solenoid lead from connector terminal.
3. Remove control valve body assembly and governor pipes (fig. 10T).

CAUTION: Do not drop manual valve.

4. Remove governor pipes from control valve assembly.
5. Remove control valve assembly to spacer gasket.

Removal of Rear Servo, Valve Body Spacer, Gasket and Front Servo

1. Remove rear servo cover attaching screws, servo cover and gasket. Discard gasket (fig. 11T).
2. Remove rear servo assembly from case (fig. 12T).
3. Remove rear servo accumulator spring.
4. Make band apply pin selection check to determine possible cause of malfunction (fig. 13T).



Fig. 33T—Center Support Locating Bolt

5. Check governor valve for free movement in governor sleeve.

FRONT SERVO PARTS INSPECTION

1. Inspect servo pin for damage.
2. Inspect piston for damaged oil ring groove, check freedom of ring in groove (fig. 16T).
3. Inspect piston for cracks or porosity.
4. Check fit of servo pin in piston and case bore.

DISASSEMBLY OF REAR SERVO ASSEMBLY

1. Remove rear accumulator piston from rear servo piston (fig. 50T).
2. Remove "E" ring retaining rear servo piston to band apply servo pin (fig. 51T).
3. Remove rear servo piston and seal from band apply pin (fig. 52T) (exploded view).
4. Remove washer, spring, and retainer.

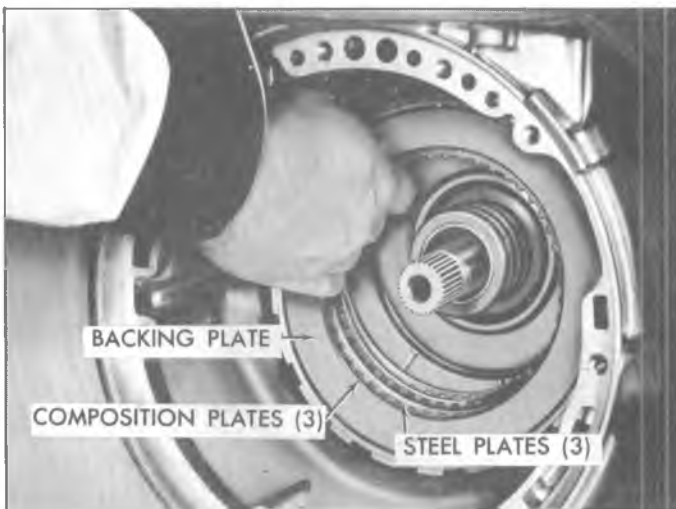


Fig. 34T—Removing Intermediate Backing Plate and Clutch Plates

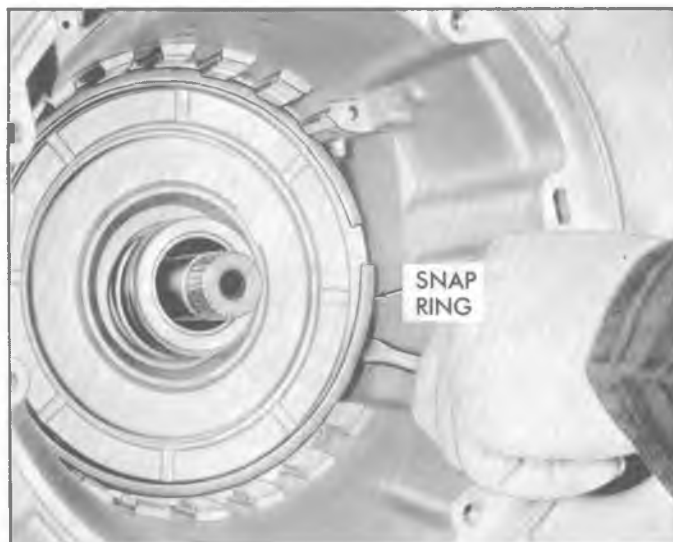


Fig. 35T—Removing Center Support to Case Snap Ring

Inspection

1. Inspect freedom of accumulator rings in piston and case bore.
2. Inspect fit of band apply servo pin in servo piston.
3. Inspect band apply pin for scores or cracks.
4. Inspect accumulator and servo pistons for scoring, cracks, or porosity.

Reassembly

1. Install spring retainer cup side down, spring and washer on band apply servo pin.
2. Install band apply pin, retainer, spring and washer, into bore of servo piston and secure with "E" ring.
3. Install oil seal ring on servo piston, if removed.



Fig. 36T—Removing Case Center Support and Gear Unit from Case

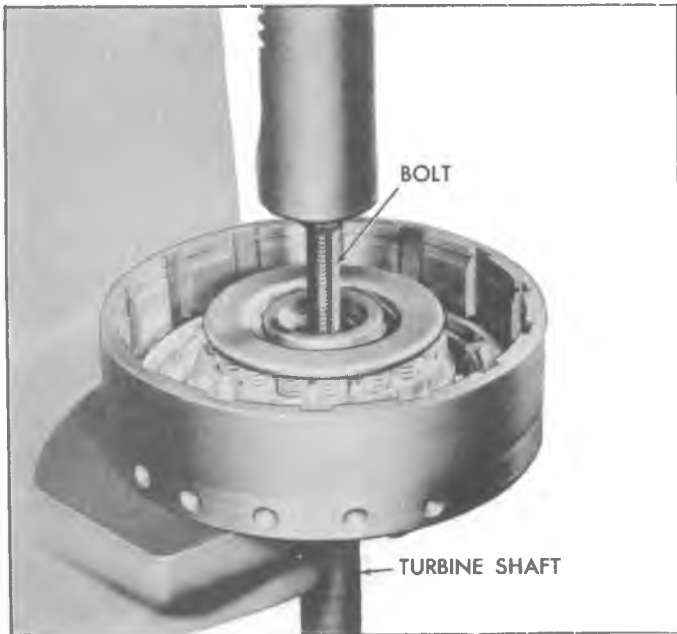


Fig. 69T—Removing Turbine Shaft from Forward Clutch Housing

5. Place spring retainer and snap ring on springs.
6. Compress springs in arbor press, using clutch compressor Tools J-4670 and J-21664, install snap ring.
7. If removed, install turbine shaft in forward clutch housing, using arbor press.
8. Install forward clutch hub washers on forward clutch hub. Retain with petrolatum.
9. Place forward clutch hub into forward clutch housing.
10. Oil and install five (5) radial grooved composition and four (4) flat steel and one (1) waved steel clutch plate (plate with "U" notches), starting with waved steel and alternating composition and steel clutch plates (fig. 75T).



Fig. 71T—Removing Forward Clutch Piston Outer Seal

CAUTION: Do not confuse the flat steel clutch plate (plate with "V" notch) with the waved steel clutch plate (plate with "U" notch). (See Fig. 76T).

NOTE: Radially grooved composition clutch plates are installed at the factory only. All service composition plates have the smooth surface configuration.

11. Install direct clutch hub and retaining snap ring (fig. 77T).
12. Place forward clutch housing on pump delivery sleeve and air check clutch operation (fig. 78T).

DIRECT CLUTCH AND INTERMEDIATE SPRAG DISASSEMBLY, INSPECTION AND REASSEMBLY

Disassembly

1. Remove intermediate sprag retainer snap ring and retainer (fig. 79T).
2. Remove sprag outer race, bushings and sprag assembly.



Fig. 70T—Removing Forward Clutch Spring Retaining Snap Ring



Fig. 72T—Removing Forward Clutch Center Seal



Fig. 109T—Installing Planet Pinion Pin

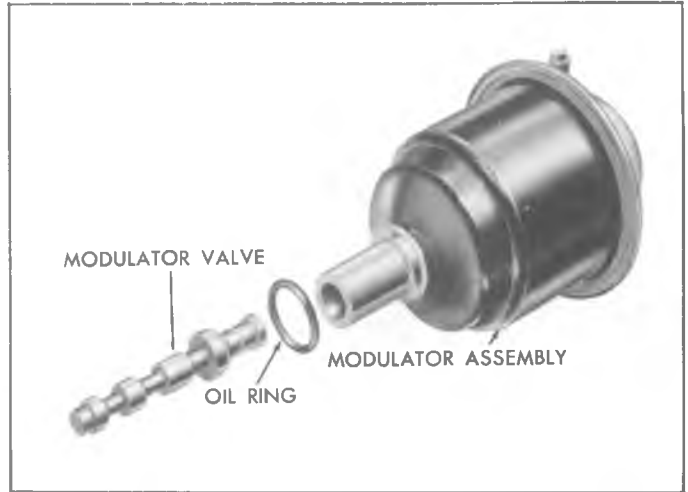


Fig. 110T—Modulator Assembly and Valve

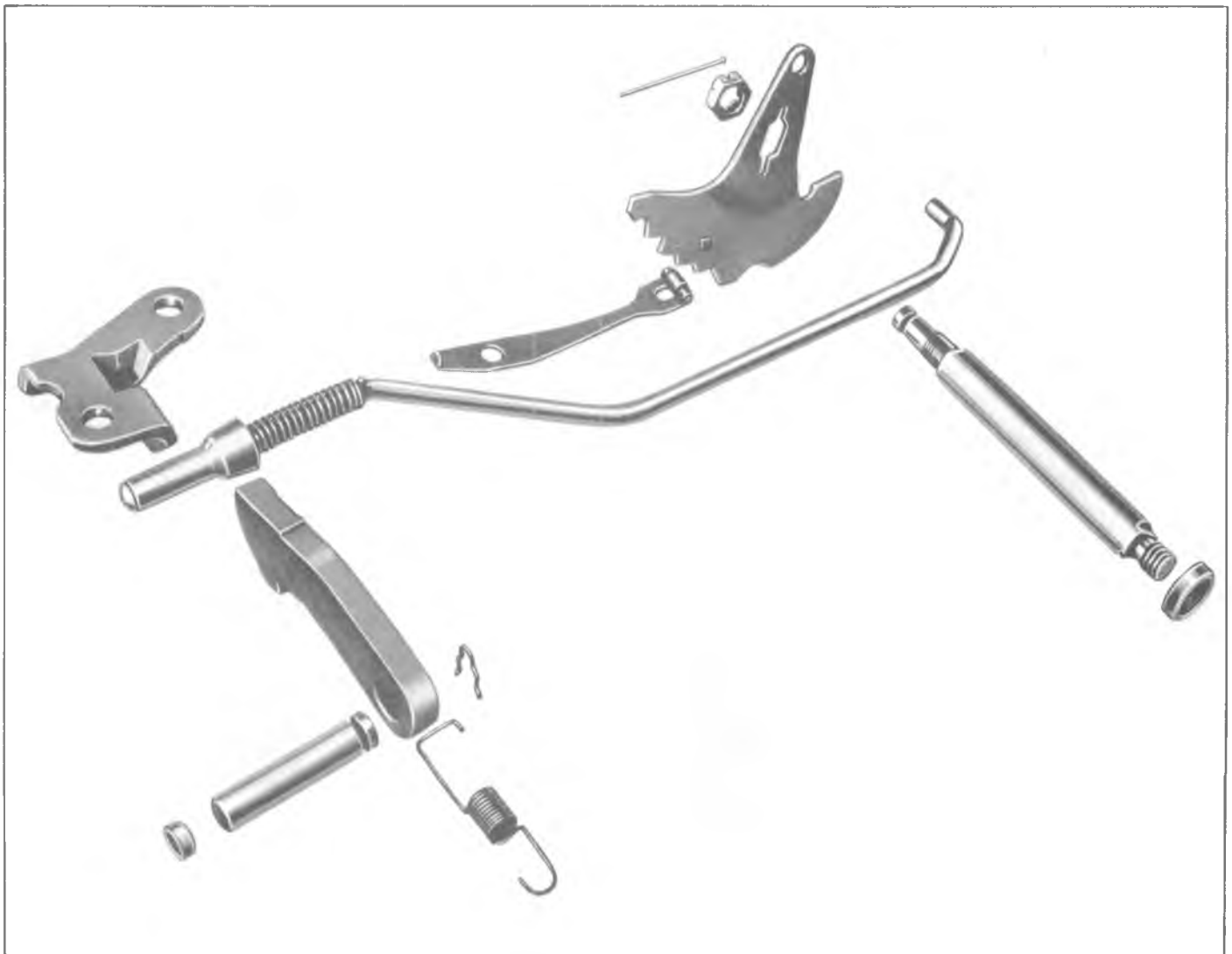


Fig. 111T—Manual and Parking Linkage—Exploded View

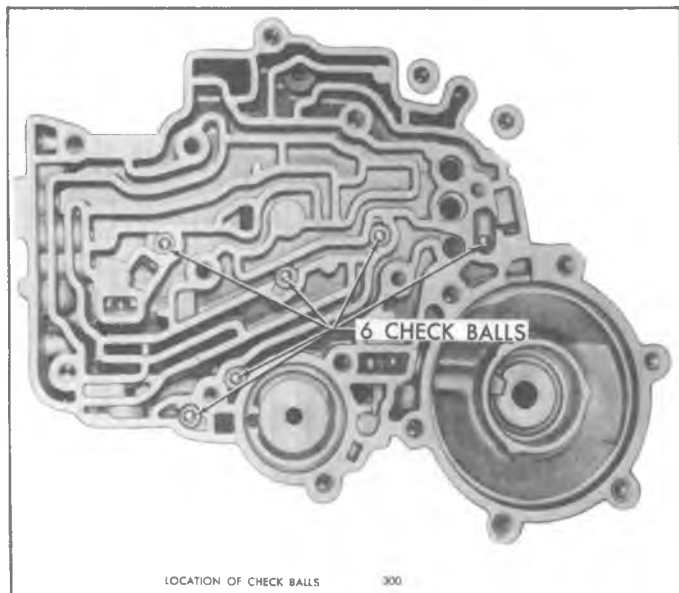


Fig. 142T—Location of Check Balls



Fig. 144T—Installing Detent Solenoid and Gasket

9. Install detent solenoid assembly and gasket with connector facing outer edge of case (fig. 144T).

NOTE: Do not tighten bolts at this time.

10. Install "O" ring seal on solenoid connector.
11. Lubricate and install case connector with lock tabs facing into case, positioning locator tab on notch on side of case (fig. 145T).
12. Install detent connector into case sleeve connector.

Installation of Rear Servo Assembly

NOTE: Before installing rear servo assembly, check band apply pin using Tool J-21370-5 and 6 as follows (fig. 146T).

- a. Attach band apply pin selection Gauge J-21370-6 and

J-21370-5 to Transmission Case (lever pivot pin to rear) with attaching screws.

NOTE: Attach tool attaching screws finger tight and check freeness of selective pin. Torque attaching screws to 15 foot lbs. and recheck pin to make certain it does not bind.

- b. Apply 25 ft. lbs. torque and select proper servo pin to be used from scale on tool.

Selecting proper length pin is equivalent to adjusting band. The band lug end of each selective apply pin bears identification in the form of one, two or three rings.

There are three selective pins identified as follows:

- c. If both steps are below the gauge surface, the long pin, identified by 3 rings, should be used.
- d. If the gauge surface is between the steps, the medium pin, identified by 2 rings, should be used.

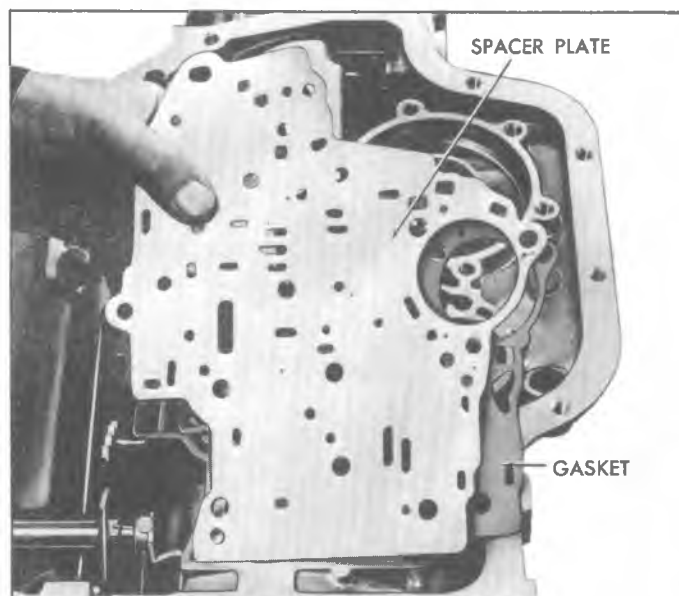


Fig. 143T—Installing Control Valve Assembly Spacer Plate and Gasket



Fig. 145T—Installing Case Connector Sleeve and "O" Ring

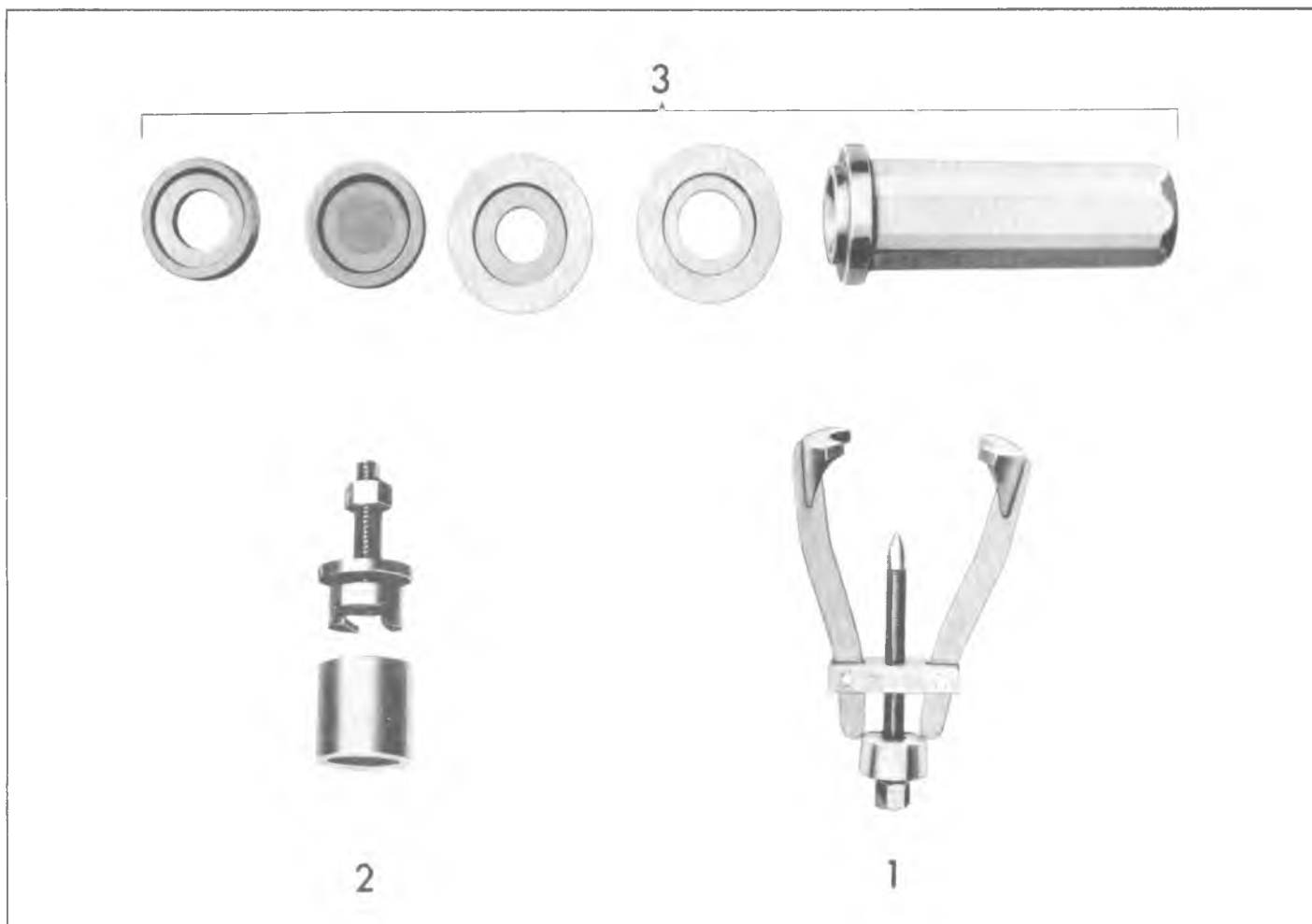


Fig. 75T—Five-Speed (Clark) Transmission Special Tools

- 1. J-1619 Mainshaft Bearing Remover
- 2. J-6382 Reverse Idler Gear Shaft Remover
- 3. J-6419 Bearing Installer Set

G10-20 SERIES (Fig. 12)

The overhaul and adjustment procedures for the G10 and 20 series are the same as those outlined for the C10 through 30 series with the following exception. The worm bearing adjusting nut is located over the wormshaft and ball nut assembly at the top of the housing assembly. The wormshaft is drawn through the top of the housing assembly.

40 THROUGH 60 SERIES EXCEPT TANDEM (See Figure 13)**Disassembly**

1. Loosen the sector shaft locknut.
2. Turn the lash adjuster a few turns counter-clockwise. This will remove the load from the worm bearing caused by the close meshing of the rack and sector teeth.
3. Loosen the worm bearing locknut and remove the adjusting nut.
4. Place a pan under the assembly to catch lubricant and remove the bolts attaching the side cover to the housing.
5. Pull the side cover with the sector and shaft from the housing.

NOTE: If the sector does not clear the opening in the housing easily, turn the wormshaft by hand until the sector will pass through the opening in the housing.

6. Place the steering housing in a bench vise and remove the adjuster nut (being careful not to harm the seal) and upper worm bearing.

NOTE: Do not clamp the housing too tightly in the vise as damage may result from excessive pressure.

7. Draw the wormshaft and nut assembly from the housing. Lay this assembly flat on the bench so that the ball nut will not thread down to either end. Damage will be done to the ends of the ball guides if the nut is allowed to rotate until stopped at the end of the worm.
8. Remove the locknut from the lash adjuster and unscrew the lash adjuster from the side cover. Slide the lash adjuster out of slot in the end of the sector shaft.

Inspection

With the steering gear completely disassembled (fig. 13) wash all parts in clean solvent. Dry them thoroughly with clean rags. With a magnifying glass inspect the roller bearings, cones, worm and nut grooves and the surfaces of the balls for signs of indentation. Also check for any signs of chipping or breakdown of the surface.

Any parts that show signs of damage should be replaced. Balls must be replaced with genuine Chevrolet approved parts made according to special specifications for this steering gear. No non-genuine balls should be used regardless of grade or quality.

Inspect the sector shaft for wear and check the fit of the shaft in the housing bushing. Inspect the fit of the pilot on the end of the sector shaft in its bushing in the side cover. If this bushing is worn, a new side cover and bushing assembly should be installed as it is impractical to replace this bushing in the service department.

Check the ball guides for any damage at the ends where they deflect or pick the balls from their helical path. Any damaged guides should be replaced.

Repairs**Sector Shaft Seal**

1. Pry the old seal out of the housing with a screw driver,



Fig. 14—Installing Sector Shaft Seal Using Installer Tool J-9225

2. Press the new seal into place using Tool J-9225 as shown in Figure 14.

Sector Shaft Bushings

1. Support the housing on a suitable arbor press; then using Tool J-9226 and Handle J-7079-2, press the old bushings out of the housing (fig. 15).
2. Support the housing on an arbor press and use Handle J-7079-2 with Tool J-9226 to press the new bushings into the housing. Press each bushing in turn, one into each end of the housing. The bushings will be properly located in the bore when the tool bottoms against the housing (fig. 16).

Side Cover Bushings

The side cover bushing is not replaced. If this bushing needs service the entire side cover should be replaced.

Ball Nut

As a rule, disassembly of the ball bearing nut will not be necessary, if it is perfectly free with no indication of binding or tightness when rotated on the worm. However, if there is

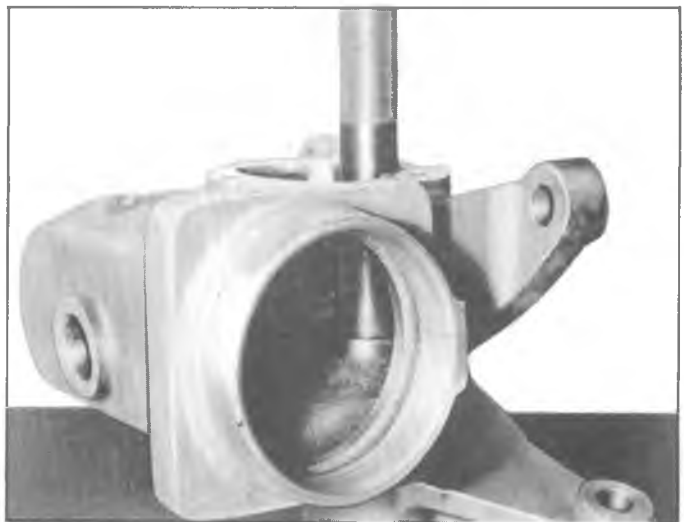


Fig. 15—Removing Sector Shaft Bushings Using Remove Tool J-9226 and Handle J-7079-2



Fig. 40—Removing Rack-Piston

5. Remove the rack-piston as follows:

- a. Insert Ball Retainer Tool J-7539 into the rack-piston bore with pilot of tool seated in the end of the worm (fig. 40). Turn coupling flange counter-clockwise while holding tool tightly against worm. The rack-piston will be forced onto the tool.
- b. Remove the rack-piston with Ball Retainer Tool J-7539 from gear housing.

6. Remove the adjuster plug as follows:

- a. Remove the coupling flange attaching bolt and flange.
 - b. Loosen the adjuster plug locknut and remove.
 - c. Remove adjuster plug assembly with Spanner Wrench J-7624 (fig. 41). Remove and discard the plug "O" ring.
7. Grasp the lower shaft and pull the valve and shaft assembly from the housing bore. Separate worm and shaft and remove the lower shaft cap "O" ring and discard.
8. If the worm or the lower thrust bearing and race remained in the gear housing, remove them at this time.

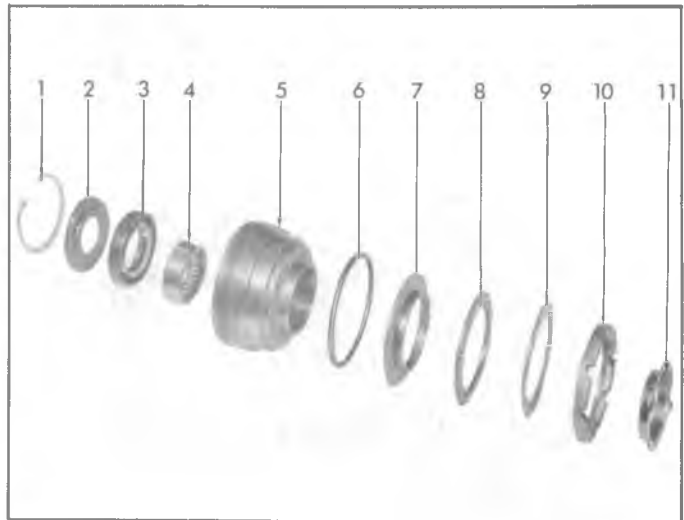


Fig. 42—Adjuster Plug - Exploded View

- | | |
|-------------------|--------------------------|
| 1. Retaining Ring | 7. Thrust Washer (Large) |
| 2. Dust Seal | 8. Thrust Bearing |
| 3. Oil Seal | 9. Thrust Washer (Small) |
| 4. Needle Bearing | 10. Spacer |
| 5. Adjuster Plug | 11. Retainer |
| 6. "O" Ring | |

OVERHAULING INDIVIDUAL UNITS

Adjuster Plug Assembly

Disassembly

1. If the oil seal ONLY is to be replaced, and not the bearing, install the adjuster plug loosely in the gear housing. Remove the retaining ring with Internal Pliers J-4245. With a screw driver, pry the dust seal and oil seal from the bore of the adjuster plug being careful not to score the needle bearing bore (fig. 42). Discard the oil seal.
2. If the thrust bearing ONLY is to be removed, pry the thrust bearing retainer at the two raised areas with a small screw driver (fig. 43). Remove the spacer, thrust bearing washer, thrust bearing and washer. Discard the retainer.

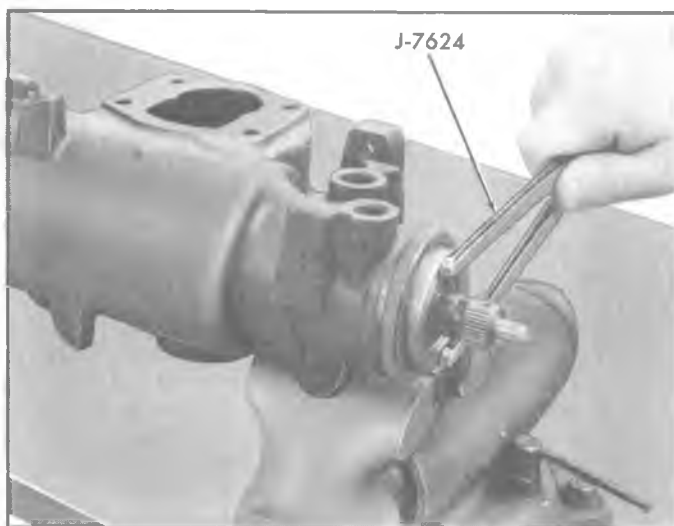


Fig. 41—Removing Adjuster Plug

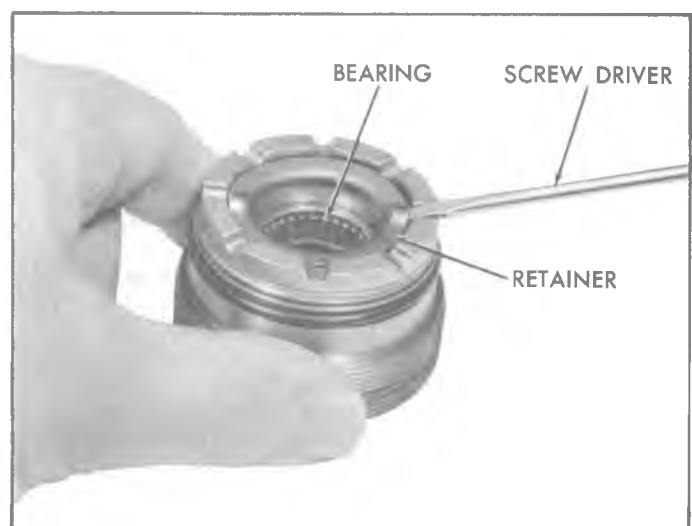


Fig. 43—Removing Retainer

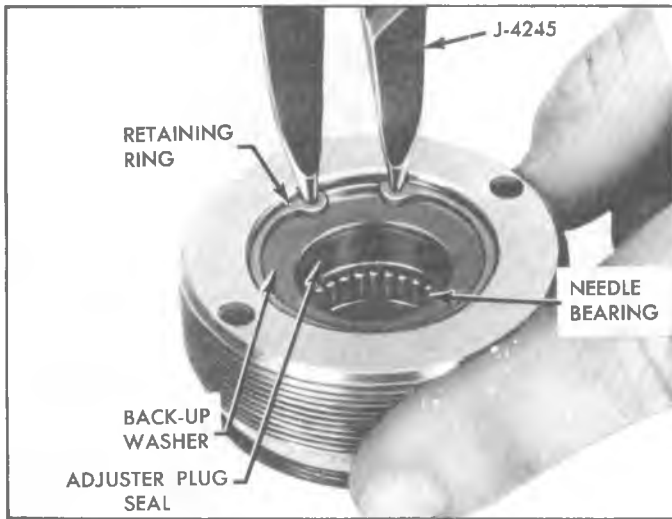


Fig. 70—Removing Adjuster Plug Seal Retaining Ring

Assembly

1. If the needle bearing was removed, place the new needle bearing over Tool J-8524-1 and J-7079-2, with the bearing manufacturer's identification away from the tool, and drive the bearing into the adjuster plug until the tool bottoms in the housing.

CAUTION: Place a block of wood under the adjuster plug to protect the thrust bearing surface.

2. Temporarily install the adjuster plug in the gear housing and place the seal back-up washer and a new oil seal on Tool J-8524-1 and J-7079-2 (lip of seal away from tool). Lubricate the seal with Transmission Fluid and drive or press the seal into the adjuster plug, just far enough to provide clearance for the retaining ring.
3. Install the retaining ring with Internal Pliers J-4245; then remove the adjuster plug from the housing.
4. Lubricate the thrust bearing assembly with Transmission Fluid. Place the large thrust bearing race on the adjuster plug hub; then install the upper thrust bearing, small bearing race and spacer (grooves of spacer away from the bearing race).

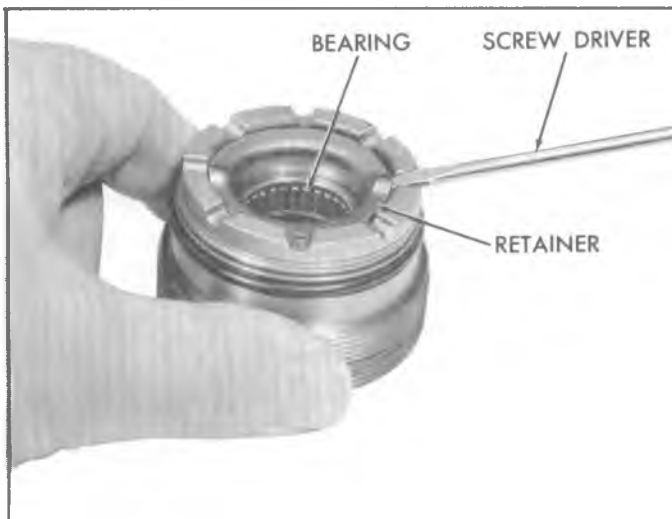


Fig. 71—Removing Thrust Bearing Retainer



Fig. 72—Removing Needle Bearing and Seal

5. Install a new bearing retainer on the adjuster plug by carefully tapping on the flat surface of the retainer.

NOTE: The projections must not extend beyond the spacer when the retainer is seated. The spacer must be free to rotate.

6. Lubricate a new "O" ring seal with Transmission Fluid and install onto the adjuster plug assembly.

Valve Assembly

The valve assembly is a precision unit with effectively fitted parts and is hydraulically balanced at the factory. If replacement of any valve part other than those called out in the following procedure, is necessary, the rotary valve assembly should be replaced complete. Cleanliness of the parts, tools, and work area is of the utmost importance during servicing of the valve assembly.

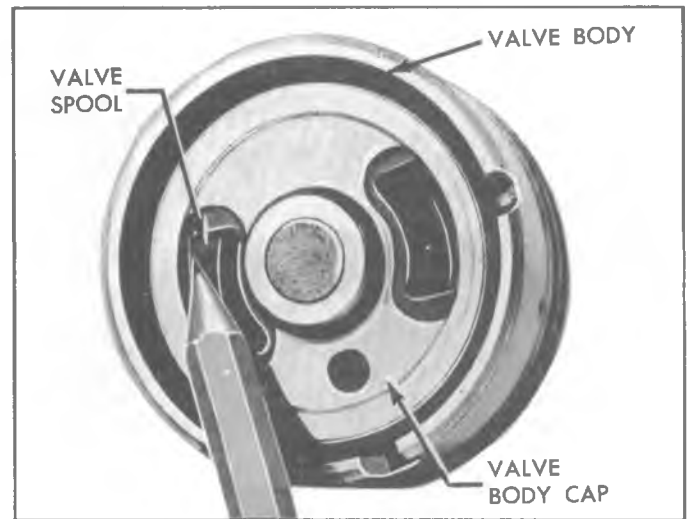


Fig. 73—Separating Valve Spool from Valve Body

FRONT SUSPENSION

SECTION 3

ALIGNMENT SPECIFICATIONS

Models	C-P 10	CP20, 30	G10, 20	K10, 20	P40	C-P 40	C-S 50 (Exc. S531)	M50 C-S 60	T50 T60 S531	C-M-T 60
Axle (Lbs.)	2500	C20 3000 C30 3500 P20-30	G10 2200 G20 3000	K10 3300 K20 3500	4000	5000	7000	7000	9,000—11,000	
King Pin Inclination	-		7 1/4°						L.H. 5 3/4° R.H. 6 1/4°	
Camber*	+1/4° +1/2°		1 +1/2°						L.H. +0 1/4° R.H. -0 1/4°	
Curb Caster*	0° ±1/2°		3 1/4°	3°	1 1/2° ±1/2°	2-1/2°±1/2°		1-3/4°	2 1/2°±1/2°*	
Toe In (Total)	1/8"-1/4"		3/32"-3/16"		1/8"-3/16" at 20" dia.	3/32"-3/16"		1/8"-7/32" at 20" dia.		

*See Chart Fig. 7 Sec. 3

WHEEL ANGLES ON TURNS

	Wheel Turn Angle	
	Inner Wheel	Outer Wheel
All 40-50-60 Models Except T-P and S		
5000# Axles	20°	17° 3/4°
7000# Axles	20°	17° 1/4°
9000# Axles	20°	17°
11000# Axles	20°	17° 1/2°
T 50 and 60 Models		
7000# Axles	20°	17° 1/2°
9000# Axles	20°	17°
11000# Axles	20°	17° 1/4°
S Models		
5000# Axles	20°	17° 1/4°
7000# Axles	20°	17° 1/4°
P 40 Models		
5000# Axles	20°	17° 3/4°

Displacement	230	250	292	307	350		366	396	427	
Horsepower	140	155	170	200	215	255	235	310	260	
CAMSHAFT:										
Lobe Lift ± .002" (Int. & Exh.)	.1896"	.2217"	.2315"	.2658"			.2343"	.2343"	.2343"- Intake .2530"- Exhaust	
Journal Diameter	1.8682"-1.8692"						1.9487" 1.9497"	1.9487"- 1.9497"	1.9487"- 1.9497"	
Camshaft Runout	.0015" (Max.)									
VALVE SYSTEM:										
Lifter	Hydraulic									
Rocker Arm Ratio	1.75:1			1.50:1			1.70:1			
Valve Lash (Int. & Exh.)	One turn Down from Zero Lash									
Face Angle	Intake	45°								
	Exhaust	45°	46°	45°	46°					
Seat Angle (Int. & Exh.)	46°									
Seat Runout (Int. & Exh.)	.002" (Max.)									
Seat Width	Intake	1/32"-1/16"								
	Exhaust	1/16"-3/32"					3/32"-1/8"	1/16"-3/32"	3/32"-1/8"	
Stem Clearance	Production	Int.	.0010"-.0027"				.0010"- .0025"			
		Exh.	.0015"-.0032"		.0010"-.0027"			.0012"- .0027"	.0012"- .0027"	.0012"- .0027"
	Service	Hi Limit Production (.001" Intake) (.002" Exhaust)								

TURBO HYDRA-MATIC 350

Pump Cover to Pump Body	17 ft. lb.
Pump Assembly to Case	18 ft. lb.
Valve Body and Support Plate	130 in. lb.
Parking Lock Bracket	29 ft. lb.
Oil Suction Screen	40 in. lb.
Oil Pan to Case	130 in. lb.
Extension to Case	25 ft. lb.
Modulator Retainer to Case	130 in. lb.
Inner Selector Lever to Shaft	25 ft. lb.
Detent Valve Actuating Bracket	52 in. lb.
Converter to Flywheel Bolts	35 ft. lb.
Under Pan to Transmission Case	110 in. lb.
Oil Pan Drain Plug	20 ft. lb.
Transmission Case to Engine	35 ft. lb.

TURBO HYDRA-MATIC 400

Pump Cover Bolts	18 lb. ft.
Parking Pawl Bracket Bolts	18 lb. ft.
Center Support Bolt	23 lb. ft.
Pump to Case Attaching Bolts	18 lb. ft.
Extension Housing to Case Attaching Bolts	23 lb. ft.
Rear Servo Cover Bolts	18 lb. ft.
Detent Solenoid Bolts	7 lb. ft.
Control Valve Body Bolts	8 lb. ft.
Bottom Pan Attaching Screws	12 lb. ft.
Modulator Retainer Bolt	18 lb. ft.
Governor Cover Bolts	18 lb. ft.
Manual Lever to Manual Shaft Nut	8 lb. ft.
Manual Shaft to Inside Detent Lever	18 lb. ft.
Linkage Swivel Clamp Nut	43 lb. in.
Converter Dust Shield Screws	93 lb. in.
Transmission to Engine Mounting Bolts	28 lb. ft.
Converter to Flywheel Bolts	33 lb. ft.
Rear Mount to Transmission Bolts	40 lb. ft.
Rear Mount to Crossmember Bolt	40 lb. ft.
Crossmember Mounting Bolts	25 lb. ft.
Oil Cooler Line	113 lb. in.
Line Pressure Take-Off Plug	13 lb. ft.
Strainer Retainer Bolt	10 lb. ft.

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