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1. Straps
2. Capscrews

3. Propeller Shaft
4. Lubrication Fitting

5. Spider Assemblies
6. Retaining Rings

7. Propeller Shaft Yoke
8. Kit

Figure 5-84. Rear Propeller Shaft Group

- (1) Wash the spider assemblies (5) in solvent (9, table 5-1,) and wipe dry with a clean shop cloth.
- (2) Remove all rust, corrosion and dirt from rear propeller shaft assembly (3).
- (3) Inspect spider assemblies (5) for excessive wear, flat spots, scoring or cracks.
- d. Repair and replacement. Replace all worn or damaged parts, including all parts found defective during inspection procedures.
- e. Assembly. Assemble rear propeller shaft group as follows:
 - (1) Lubricate surfaces of spider assemblies (5) with chassis grease.
 - (2) Install yoke (7) and seal kit (8).
 - (3) Position arm of spider assembly (5) in yoke (7). Use arm without bearing cap.
 - (4) Install loose bearing cap in yoke (7).
 - (5) Support yoke (7) on vise jaws and seat bearing cap and spider assembly (5) with a hammer. Install lubrication fitting (4).
 - (6) Install retaining rings (6) on spider assembly (5). Tap ends of spider assembly (5) arms with hammer, if necessary.

- (7) Repeat steps (3) through (6) for remaining spider assembly (5).
- f. Installation. Install rear propeller shaft group as follows:

WARNING

Do not work under raised vehicle without first supporting vehicle with safety jack stands or injury to personnel may result.

- (1) Raise vehicle and support with jack stand.

WARNING

Support rear propeller shaft assembly with safety jack stands before installing straps or injury to personnel may result.

- (2) Align reference marks on propeller shaft yoke (7), propeller shaft and transfer case.
- (3) Install rear propeller shaft assembly (13) with straps (1) and capscrews (2).
- (4) Tighten capscrews (2) to torque specified in table 6-2.
- (5) Lower vehicle.

5-5.3.2 Transfer Case Assembly and Transfer Case Housing Group. Refer to figure 5-85, and perform the following steps to overhaul the transfer case assembly and transfer case housing group.

- a. Removal. Remove transfer case assembly and transfer case housing group as follows:

WARNING

Do not work under raised vehicle without first supporting vehicle with safety jack stands or injury to personnel may result.

- (1) Raise vehicle and support with jack stands.
- (2) Position drain pan under transfer case and remove plug and gasket assemblies (16) to drain transmission fluid.
- (3) Refer to paragraph 5-5.10.11 and disconnect speedometer cable and indicator switch wires; disconnect transfer case shift lever link at operating lever.

WARNING

Do not remove rear crossmember without adequate support under the transmission or injury to personnel may result.

- (4) Support transmission and transfer case assembly (1) with suitable bracing; refer to paragraph 5-5.8.1 and remove rear crossmember.
- (5) Mark transfer case front and rear output shaft yokes and rear propeller shaft for assembly alignment reference.
- (6) Refer to paragraph 5-5.3.1 and disconnect rear propeller shaft at transfer case yokes. Secure propeller shaft to frame rails with wire.
- (7) Disconnect parking brake cable guide from pivot located on right frame rail, if necessary.
- (8) Remove bolts attaching exhaust pipe support bracket to transfer case, if necessary.
- (9) Remove clamps (3) and hose (2).
- (10) Remove clips (6) and vent line (5).
- (11) Remove transfer case-to-transmission bolts.
- (12) Move transfer case assembly (1) rearward until free of transmission output shaft and remove transfer case assembly (1) from vehicle.
- (13) Place transfer case assembly (1) on suitable work table for disassembly using suitable lifting device.

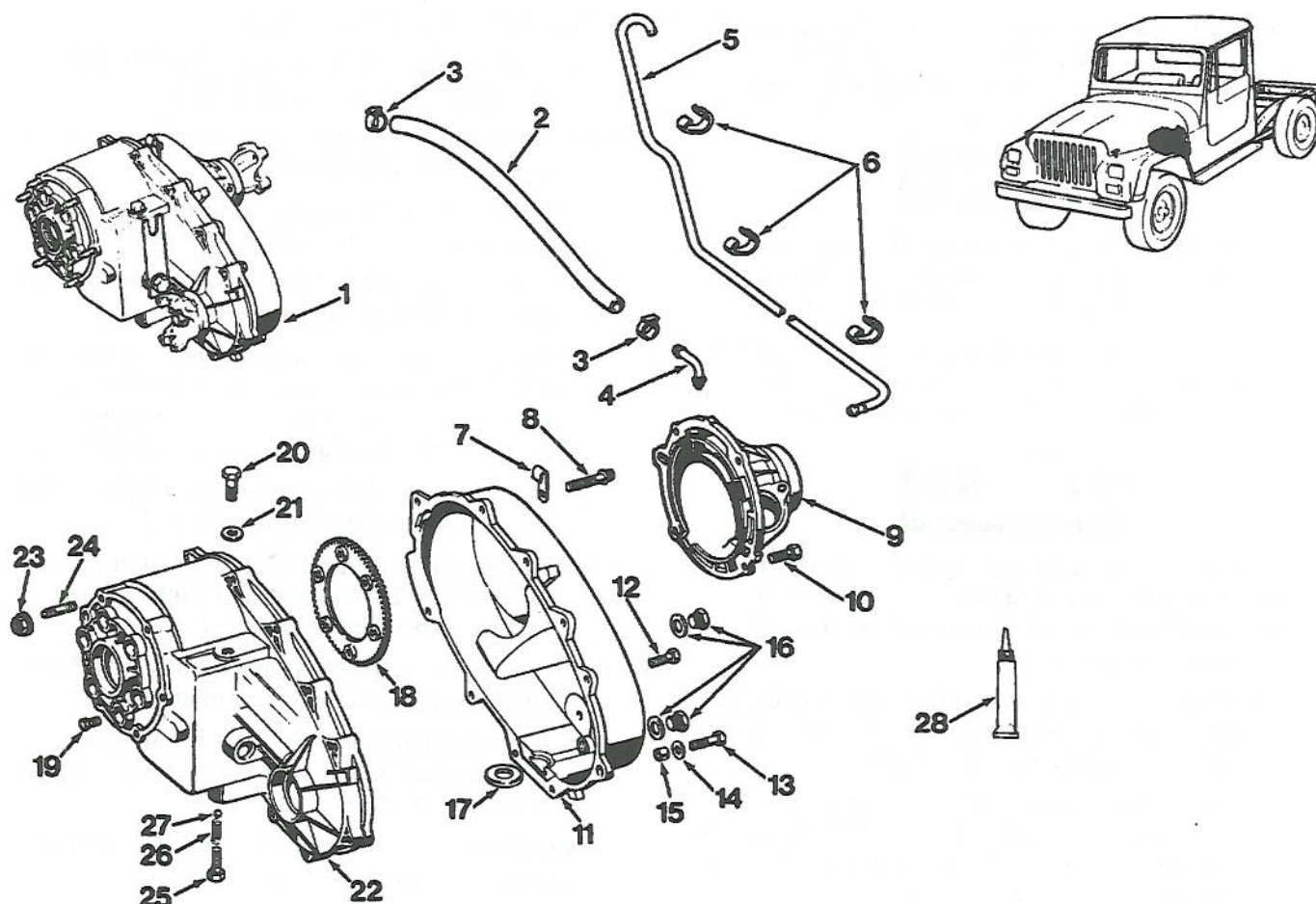
- b. Disassembly. Disassemble the transfer case assembly and transfer case housing group as follows:

- (1) Refer to paragraph 5-5.3.3 and remove rear output yoke and yoke and slinger assembly.
- (2) Turn case assembly (1) on end and position front case on wood blocks. Cut "V" case notches in wood blocks to clear mounting studs in front case (22), if necessary.
- (3) Remove plug (20), gasket (21) and tube (4).
- (4) Remove bolt (25), spring (26) and plunger (27).

CAUTION

Use a rawhide or plastic mallet when tapping the retainer. Do not attempt to use a pry bar to remove retainer or damage to retainer or case may result.

- (5) Mark retainer (9) for assembly alignment and remove bolts (10) and rear bearing retainer (9). Tap retainer with mallet to loosen.
- (6) Refer to paragraph 5-5.3.3 for disassembly of parts in retainer (9).
- (7) Remove bolt (8) and clip (7).
- (8) Remove bolts (13), washers (14) and dowels (15).
- (9) Remove bolts (12).



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|---------------------------|--------------------------------|----------------------|
| 1. Transfer Case Assembly | 10. Bolt | 20. Plug |
| 2. Hose | 11. Case | 21. Gasket |
| 3. Clamp | 12. Bolt | 22. Front Case |
| 4. Tube | 13. Bolt | 23. Nuts and Washers |
| 5. Vent Line | 14. Washer | 24. Studs |
| 6. Clip | 15. Dowel | 25. Bolt |
| 7. Clip | 16. Plug and Gasket Assemblies | 26. Spring |
| 8. Bolt | 17. Magnet | 27. Plunger |
| 9. Retainer | 18. Gear | 28. Sealant |
| | 19. Bolt | |

Figure 5-85. Transfer Case Assembly and Transfer Case Housing Group

CAUTION

Do not attempt to wedge case halves apart at any point on mating surfaces or damage to surface may result.

- (10) Remove case (11) by inserting suitable tool in slots cast in ends of case (11) and gently prying upward.

- (11) Refer to paragraph 5-5.3.3 for removal and disassembly of transfer case gears and shaft.
- (12) Remove bolts (19) and gear (18).
- (13) Remove nuts and washers (23) and studs (24).
- (14) Remove magnet (17).

- c. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for cleaning and inspection procedures. In addition, perform the following steps:

WARNING

P-D-680 Type II is toxic to the skin, eyes and respiratory tract. Avoid skin and eye contact. Good general ventilation is normally adequate.

- (1) Wash all parts thoroughly in P-D-680 Type II (7, table 5-1), removing all old lubricant, metallic particles, dirt or foreign materials.

WARNING

Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi and wearing of goggles is required.

- (2) Apply compressed air to oil feed ports and channels in each case half to remove any obstructions or cleaning solvent residue.
 - (3) Inspect case halves for cracks, porosity, damaged mating surfaces, stripped bolt threads or distortion. If any of these conditions exist, replacement of case half is required.
 - (4) Inspect bearing bores and rear bearing retainer (91) for excessive wear or damage.
- d. Repair and replacement. Replace all worn or damaged parts, including all parts found defective in inspection procedures above.
- e. Assembly. Assemble transfer case assembly and transfer case housing group as follows:

- (1) Install magnet (17).
- (2) Install studs (24) and nuts and washers (23).
- (3) Coat case (22) and surfaces of plate (18) around bolt holes with sealant (28).
- (4) Align gear (18) with bolt holes and position gear (18) in case (22).
- (5) Coat bolts (19) with sealant and install gear (18); tighten bolts (19) to torque specified in table 6-2.
- (6) Refer to paragraph 5-5.3.3 and install transfer case gears and shaft.

CAUTION

Be sure front output shaft rear thrust bearing assembly is seated in the rear case before connecting case halves or damage to thrust bear-

ings, gears and shaft may result.

- (7) Apply sealant (28) to mating surface of case (22) and install case (11) on case (22).
 - (8) Align case bolt holes and install bolts (13), washers (14) and dowels (15).
 - (9) Install bolts (12). Tighten bolts (12) alternately and evenly to torque specified in table 6-2.
 - (10) Refer to paragraph 5-5.3.3 and assemble parts that go in rear bearing retainer (9).
 - (11) Apply sealant (28) to mating surface of retainer (9), align retainer (9) and case (11) index marks, and install retainer (9) with four bolts (10). Tighten bolts to torque specified in table 6-2.
 - (12) Install gasket (21) and plug (20). Tighten plug (20) to torque specified in table 6-2.
 - (13) Apply sealant to bolt (25) and install plunger (27), spring (26) and bolt (25). Tighten bolt (25) to torque specified in table 6-2.
 - (14) Install plug and gaskets assemblies (16). Tighten plugs to torque specified in table 6-2.
 - (15) Refer to paragraph 5-5.3.3 for installation of all oil seals, rear output yoke, and yoke and slinger assembly on transfer case shafts.
- f. Installation. Install transfer case assembly and transfer case housing group as follows:

WARNING

Do not work under raised vehicle without first supporting vehicle with safety jack stands or injury to personnel may result.

- (1) Raise vehicle and support with safety jack stands.
- (2) Align and install transfer case assembly (1) on transmission, using suitable lifting device. Align transfer case input gear splines with transmission output shaft. Rotate transfer case rear output shaft, if necessary, to align splines.

CAUTION

Be sure the transfer case is flush against the transmission before tightening attaching bolts. Severe damage to transfer case will result if the attaching bolts are tightened while transfer case is cocked or in a bind.

- (3) Align and install transfer case-to-transmission bolts. Tighten bolts to torque specified in table 6-2.

- (4) Install tube (4).
- (5) Install tube (2) with clamps (3).
- (6) Install line (5) with clip (6).
- (7) Attach exhaust pipe support bracket to transfer case assembly.
- (8) Refer to paragraph 5-5.3.1 and connect rear propeller shafts at transfer case yokes.
- (9) Connect parking brake cable guide to pivot bracket on frame rail.
- (10) Refer to paragraph 5-5.10.11 and install speedometer cable and indicator switch wires. Connect transfer case shift lever link to operating lever.
- (11) Refer to paragraph 5-5.8.1 and install rear cross-member. Remove transmission support bracing.
- (12) Fill transfer case assembly with transmission fluid, Dexron II.
- (13) Lower vehicle with suitable lifting device.

5-5.3.3 Transfer Case Gears and Shafts. Refer to figure 5-86 and perform the following steps to overhaul the transfer case gears and shafts.

- a. Removal and disassembly. Disassembly is accomplished during removal. Refer to paragraph 5-5.3.2, and remove transfer case assembly from vehicle. Disassemble transfer case assembly only as far as removing the rear case half from the front case half so that the transfer case assembly is situated with the rear side facing up and the gears and shafts still in the front case half. Removal procedures for the rear output yoke (33) and yoke and slinger assembly are listed below, although they must be accomplished prior to removal of front and rear case halves. Remove transfer case gears and shafts as follows:

- (1) Remove nut (35) and lockwasher (34), using tool #J-8614-01 to hold yoke while removing nut (35).
- (2) Remove yoke (33), using tools #J-8614-01, -02 and -03, if necessary.

NOTE

Rear bearing retainer should already be removed in accordance with procedures in paragraph 5-5.3.2.

- (3) Remove gear (6) from rear bearing retainer.

- (4) Remove pump housing (29) from rear bearing retainer and remove packing assembly (28) and housing (29).
- (5) Remove retaining ring (30), bearing (31) and seal (32) from rear bearing retainer.

NOTE

When removing oil pump, note position of pump for assembly reference.

- (6) Remove gear set (5).

NOTE

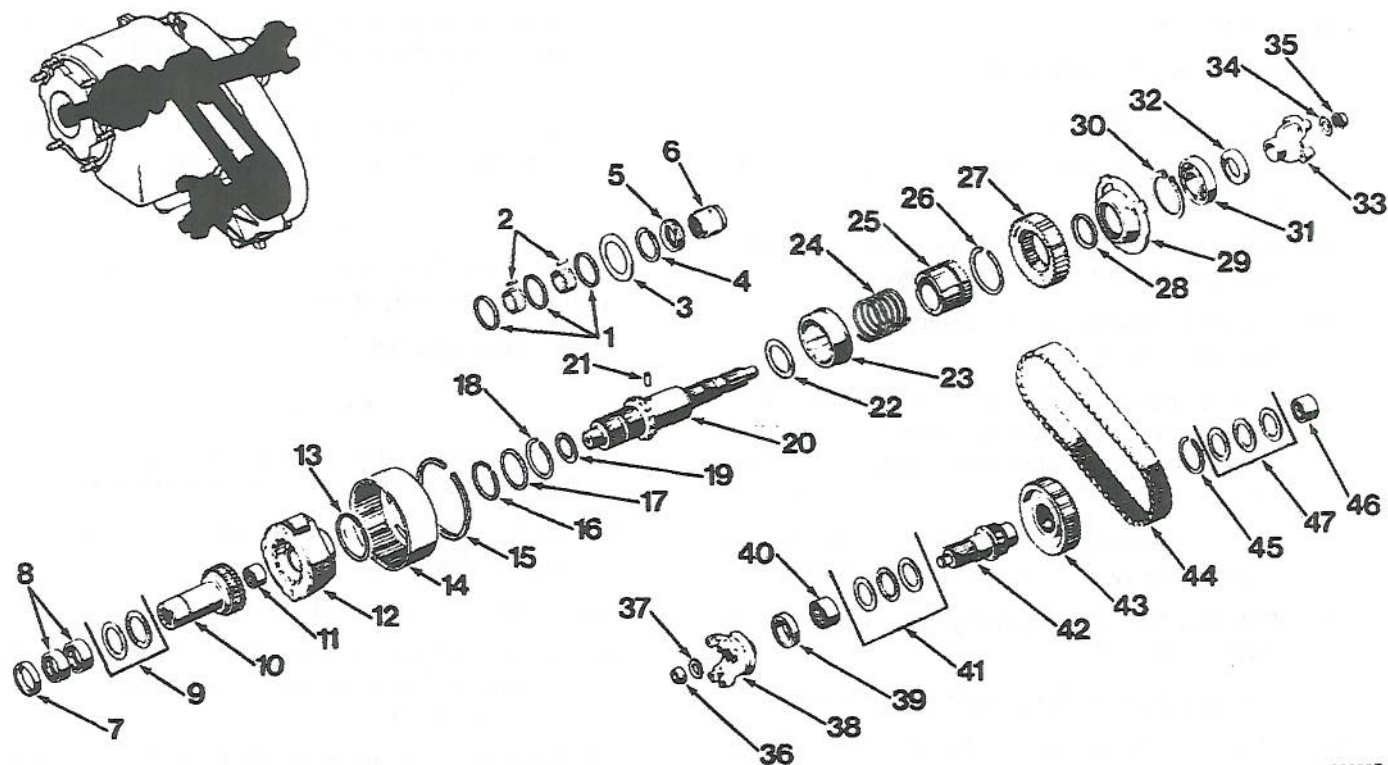
When removing thrust bearing, note position of bearing and races for assembly reference.

- (7) Remove rear thrust bearings (47) from front output shaft (42).
- (8) Remove retaining ring (45).
- (9) Remove chain (44) and sprockets (43) and (27) by lifting evenly on chain (44) and sprockets (43) and (271).
- (10) Remove front output shaft (42) and front thrust bearings (41).
- (11) Remove sprocket stop ring (26) and mode shift spring (24).

NOTE

Sliding clutch should be removed with mode fork, rail spring and bracket.

- (12) Refer to paragraph 5-5.3.4 and remove sliding clutch (23), mode fork, rail spring and bracket as an assembly. Remove shift rail.
- (13) Remove sprocket carrier (25), retaining ring (4), thrust washer (3), rollers (2) and roller spacers (1) all together.
- (14) Remove retaining ring (16), thrust washer (17), retaining ring (18) and roller and retainer (19).
- (15) Remove mainshaft assembly (20) by lifting mainshaft assembly straight up and out of case.
- (16) Remove pin (21) and thrust washer (22).
- (17) Remove retaining ring (15) and hub assembly (14).
- (18) Remove retaining ring (13) and gear assembly (12).
- (19) Remove roller and retainer (9) and input gear assembly (10).



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|-------------------------|---------------------------------|--------------------------|
| 1. Roller Spacer | 17. Thrust Washer | 33. Yoke |
| 2. Roller | 18. Retaining Ring | 34. Lockwasher |
| 3. Thrust Washer | 19. Retainer and Roller Bearing | 35. Nut |
| 4. Retaining Ring | 20. Mainshaft Assembly | 36. Nut |
| 5. Gear Set | 21. Pin | 37. Washer |
| 6. Gear | 22. Thrust Washer | 38. Yoke and Slinger |
| 7. Oil Seal | 23. Sliding Clutch | 39. Seal |
| 8. Bearing | 24. Mode Shift Spring | 40. Bearing |
| 9. Retainer and Roller | 25. Sprocket Carrier | 41. Front Thrust Bearing |
| 10. Input Gear Assembly | 26. Sprocket Stop Ring | 42. Front Output Shaft |
| 11. Roller Bearing | 27. Sprocket | 43. Sprocket |
| 12. Gear Assembly | 28. Packing Assembly | 44. Chain |
| 13. Retaining Ring | 29. Housing | 45. Retaining Ring |
| 14. Hub Assembly | 30. Retaining Ring | 46. Bearing |
| 15. Retaining Ring | 31. Bearing | 47. Rear Thrust Bearings |
| 16. Retaining Ring | 32. Seal | |

Figure 5-86. Transfer Case Gears and Shafts

- (20) Remove roller bearing (11), using slide hammer #J2619-01 and remover #J-29369-1, if necessary, as shown in figure 5-87.
- (21) Remove oil seal (7, figure 5-86).
- (22) Remove nut (36) and washer (37) using tool #J-8614-01 to hold yoke while removing nut (36).
- (23) Remove yoke and slinger assembly (38), using tools #J-8614-01, -02 -03, as necessary.
- (24) Remove seal (39).
- (25) Remove bearing (40), using tools #J-8092 and #J-29168, as shown in figure 5-88.

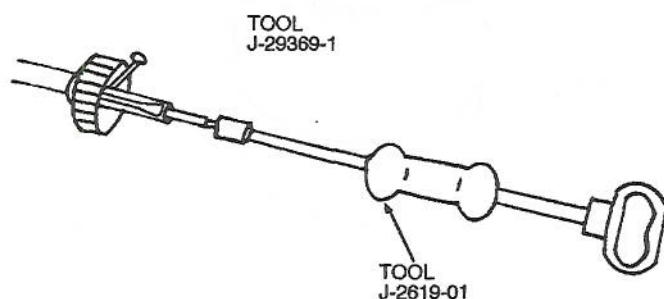


Figure 5-87. Mainshaft Pilot Bearing Removal

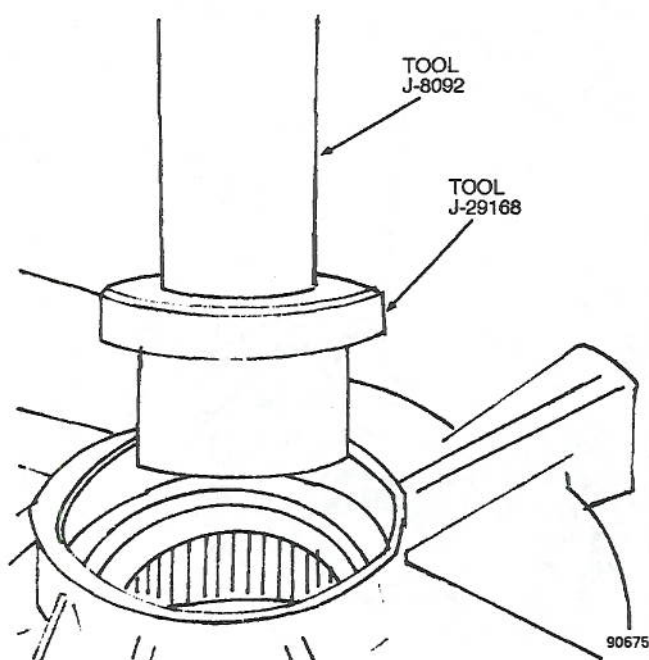


Figure 5-88. Front Output Shaft Front Bearing Removal

- (26) Remove bearing (46, figure 5-86), using remover tool #J-26941 and slide hammer #J2619-01, as shown in figure 5-89.
- (27) Remove two bearings (8, figure 5-86) at the same time, using drive handle #J-8092 and remover #J-29170, as shown in figure 5-90.
- b. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures.
- c. Repair and replacement. Replace all worn or damaged parts.
- d. Assembly and installation. Installation of the transfer case gears and shafts is accomplished during assembly. Assemble the transfer case gears and shafts as follows:

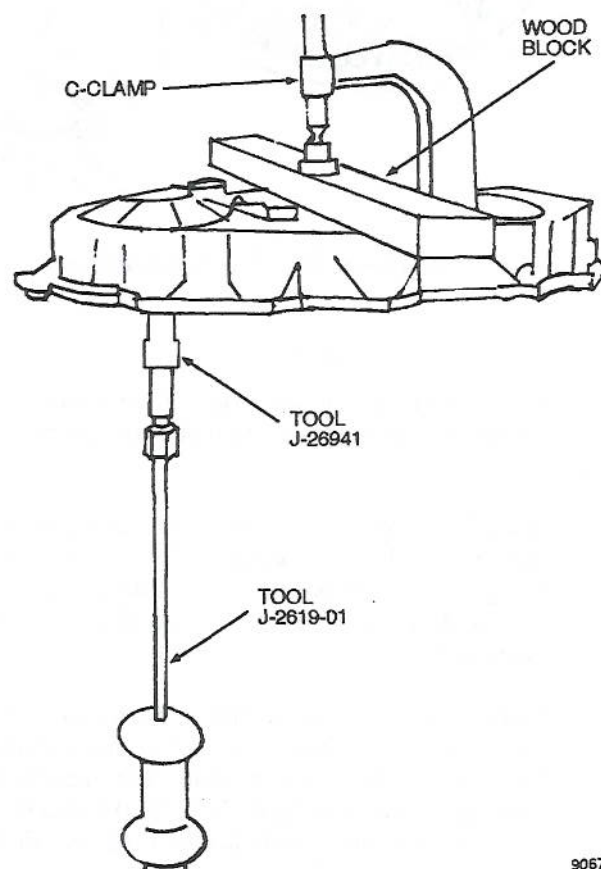


Figure 5-89. Front Output Shaft Rear Bearing Removal

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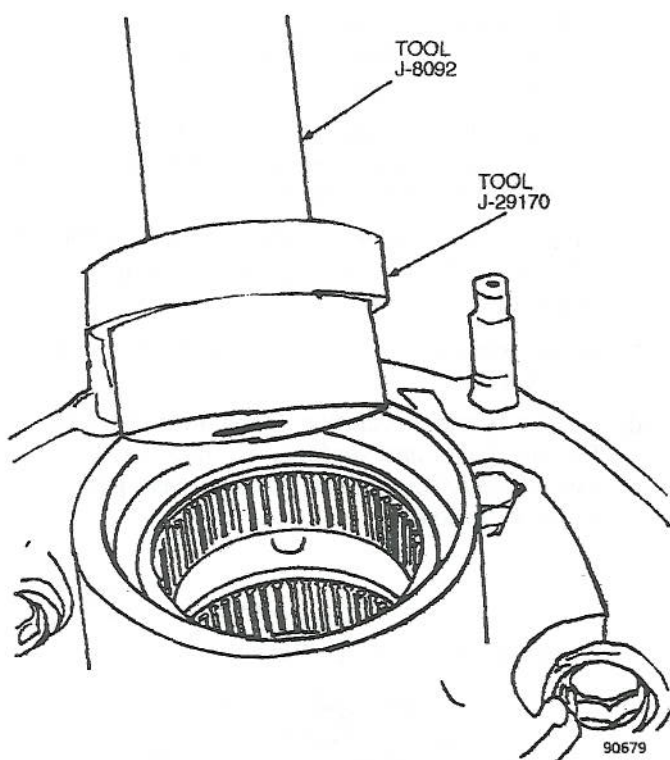


Figure 5-90. Input Gear Bearing Removal

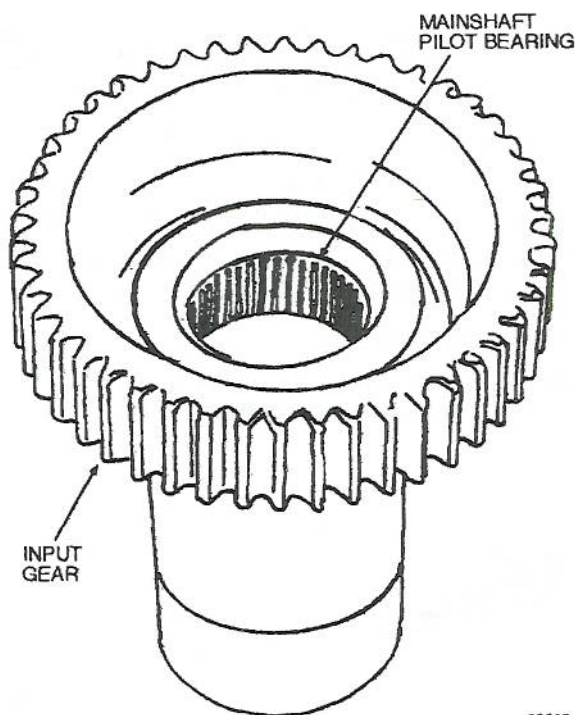


Figure 5-91. Mainshaft Pilot Bearing Installation

NOTE

Throughout this procedure, rotate the transfer case assembly as necessary to install the gears and shafts.

- (1) Install bearing (11, figure 5-86), using driver handle #J-8092 and installer #J-29174, as shown in figure 5-91. Make sure feed hole is not covered and that bearing (11) is seated flush with bearing bore.
- (2) Install two bearings (8, figure 5-86), one at a time. Use driver handle #J-8092 and installer #J-29169 to install rear bearing first, then front bearing as shown in figure 5-92. Make sure feed holes are not covered and that bearings are flush with case bore surfaces.
- (3) Install bearing (46, figure 5-86), using driver handle #J-8092 and installer #J-29163, as shown in figure 5-93. Make sure oil feed hole is not covered and that bearing is seated flush with edge of case bore.
- (4) Install bearing (40, figure 5-86), using tools #J-8092 and #J-29167, as shown in figure 5-94. Make sure oil feed hole is not covered.

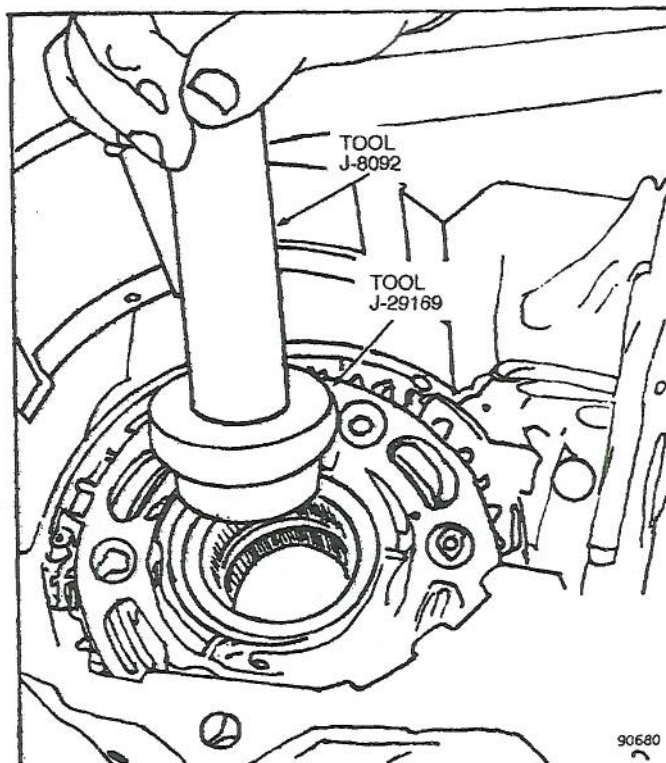


Figure 5-92. Input Gear Bearing Installation

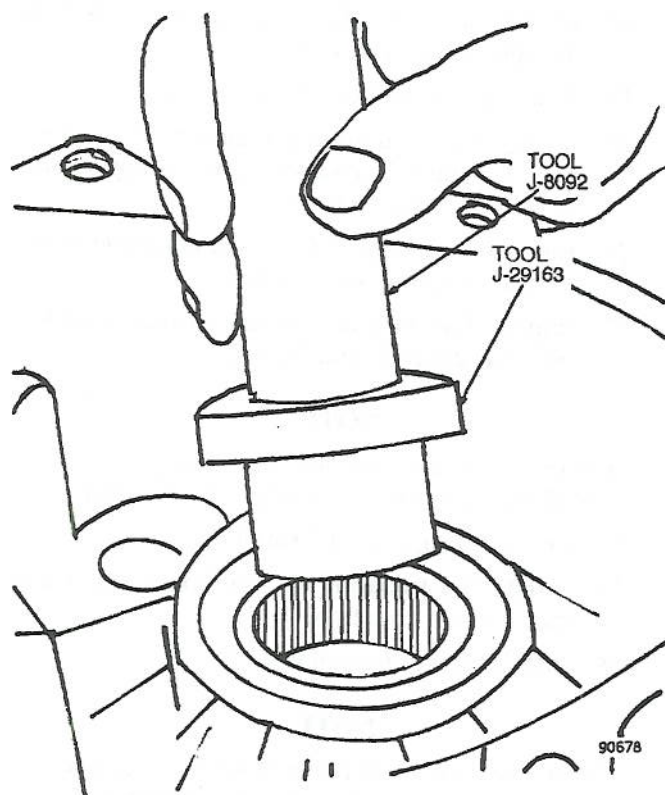


Figure 5-93. Front Output Shaft Rear Bearing Installation

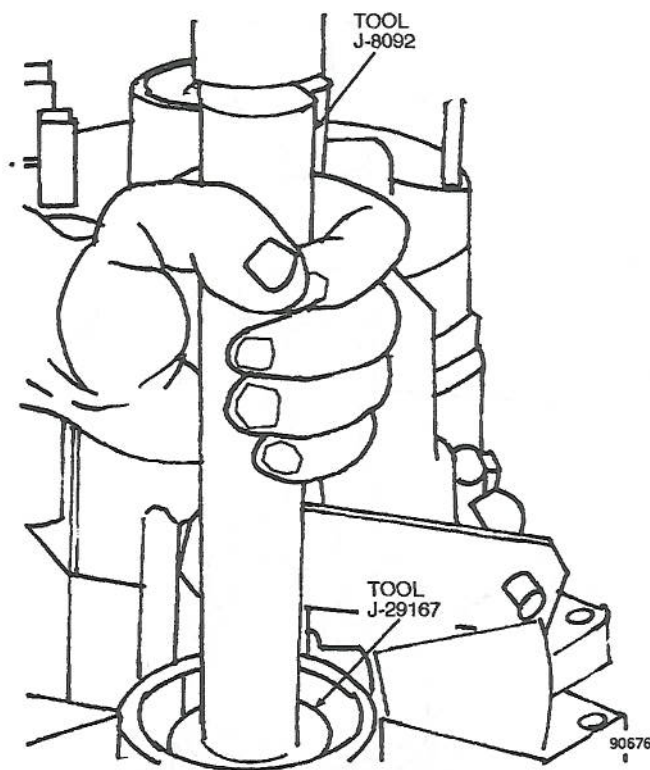


Figure 5-94. Front Output Shaft Front Bearing Installation

- (5) Install bearing (31, figure 5-86), using tool #J-7818, as shown in figure 5-95, so that shielded side of bearing (31) faces interior of case,
- (6) Install retaining ring (30, figure 5-86).
- (7) Install seal (32), using tools #J-8092 and #J-29162, as shown in figure 5-96.

NOTE

Lubricate all remaining components with Dexron II transmission fluid or petroleum jelly, as necessary, during assembly.

- (8) Install roller and retainer (9, figure 5-86) in front case half.
- (9) Install input gear assembly (10).
- (10) Install roller and retainer (19) in input gear assembly (10).
- (11) Install planetary gear assembly (12) over input gear assembly (10). Make sure planetary gear assembly (12) is fully seated and meshed with input gear assembly (10).

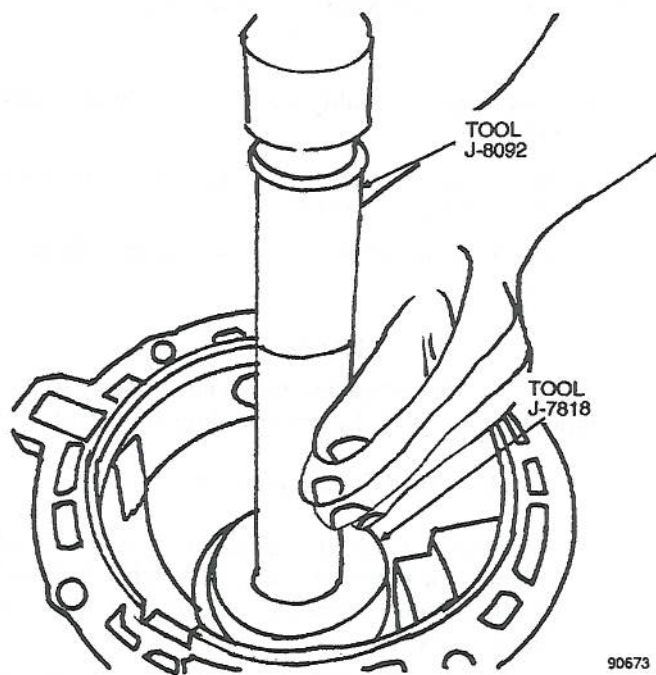


Figure 5-95. Rear Output Bearing Installation

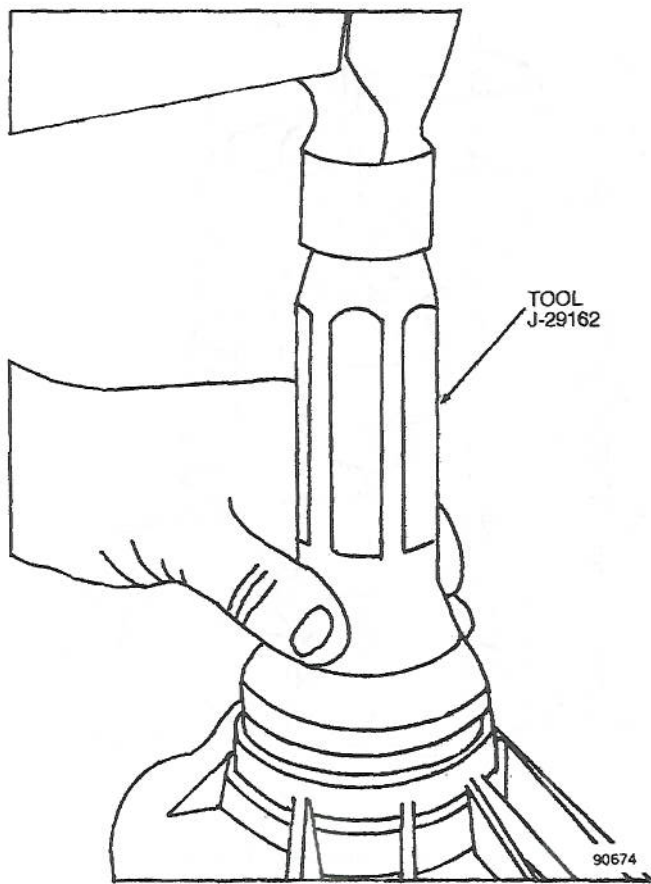


Figure 5-96. Rear Seal Installation

- (12) Install hub assembly (14) and retaining rings (15) and (18).
- (13) Install thrust washer (17), retaining ring (16) and retaining ring (13).
- (14) Refer to paragraph 5-5.3.4 and install shift rail.

NOTE

Make sure thrust bearing is seated properly in input gear assembly before installing mainshaft.

- (15) Install mainshaft assembly (20).
- (16) Coat bore of sprocket carrier (25) with liberal quantity of petroleum jelly (23, table 51), and position one spacer (1) at center of bore of sprocket carrier (25).
- (17) Coat rollers (2) with petroleum jelly and install 60 rollers (2) in each end of bore of sprocket carrier (25).

- (18) Install one spacer (1) in each end of the bore of the sprocket carrier (25).
- (19) Install thrust washer (22) and pin (21).
- (20) Align assembled sprocket carrier (25) and install a mainshaft assembly (20), being careful to avoid displacing rollers (2).
- (21) Refer to paragraph 5-5.3.4 and assemble mode fork, fork spring and bracket.
- (22) Engage fork in gear (23) and install assembly on shift rail and mainshaft (20).

NOTE

If the sprocket carrier has two ring grooves, install the stop ring in the upper groove only.

- (23) Install spring (24) and ring (26).
- (24) Install thrust bearing (41) in front case. Thick race goes in case first.
- (25) Install front output shaft (42).

NOTE

When installing the drive sprocket, the recessed side of the sprocket should face the interior of the case.

- (26) Position sprockets (43) and (27) in chain (44), align sprockets (43) and (27) with shafts (20) and (42) and install sprockets (43) and (27) and chain (44).
- (27) Install thrust washer (3) and retaining ring (4) on sprocket (25).
- (28) Install retaining ring (45).
- (29) Install thrust bearing (47) on front output shaft. Thin race goes on first.
- (30) Install gear set (5) on mainshaft assembly (20). Recessed side of gear set (5) faces downward, toward interior of case.
- (31) Install speedometer gear (6) on mainshaft assembly (20).
- (32) Refer to paragraph 5-5.3.2 and assemble case halves.
- (33) Install packing assembly (28) in pump housing. Apply petroleum jelly (23, table 5-1) to pump housing (29) tabs and install housing (29) in rear retainer (paragraph 55.3.3a).
- (34) Refer to paragraph 5-5.3.3a and install rear retainer.
- (35) Install seal (39).

- (36) Install yoke and slinger assembly (38), washer (37) and nut (36). Tighten nut (36) to torque specified in table 6-2.
- (37) Install yoke (33) with lockwasher (34) and nut (35). Tighten nut (35) to torque specified by table 6-2.
- (38) Refer to paragraph 5-5.3.2 to assemble and install transfer case assembly and transfer case housing group.

5-5.3.4 Transfer Case Shift Forks Group. Refer to figure 5-97, and perform the following steps to overhaul the transfer case shift forks group.

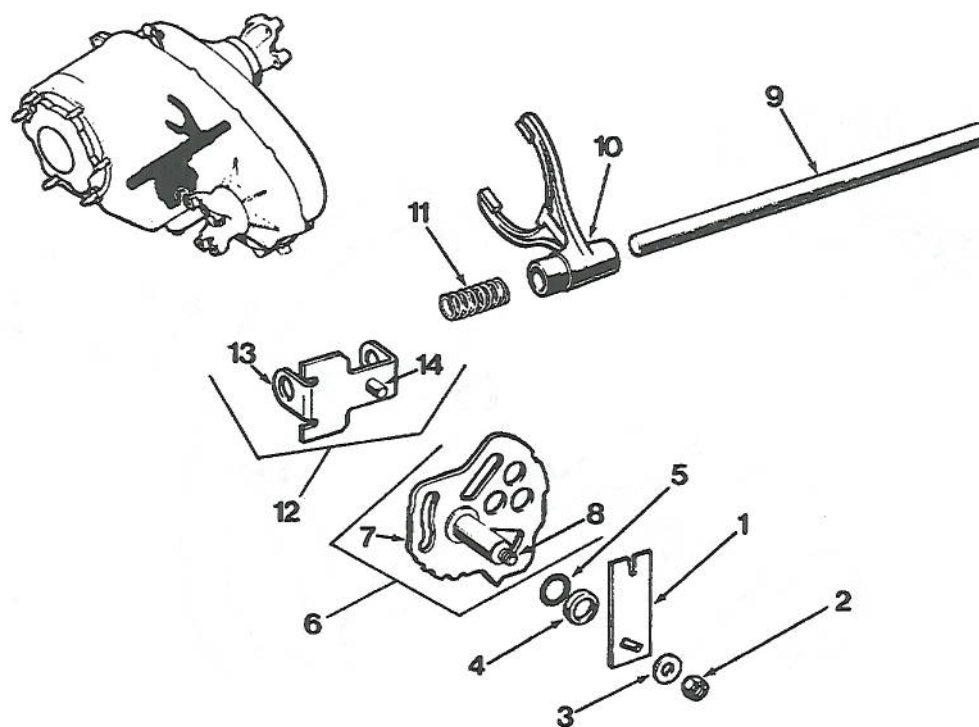
- a. Removal and disassembly. Disassembly is accomplished during removal. Remove the transfer case shift forks group as follows:

- (1) Refer to paragraph 5-5.3.3 and disassemble transfer case gears and shafts up through step (11) of paragraph 5-5.3.3a, removing the sprocket stop ring and mode shift spring.

NOTE

Mode clutch gear should be removed with mode fork spring and bracket.

- (2) Remove mode clutch gear, mode fork (10), rail spring (11) and bracket and pin assembly (12).
- (3) Remove shift rail (9).
- (4) Remove pin (14) from bracket (13).
- (5) Remove self-locking nut (2), washer (3) and plate (1).
- (6) Remove sector and shaft assembly (6) and remove retainer (4) and preformed packing (5).
- (7) Remove shifter (7) from shaft (8).
- b. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures.
- c. Repair and replacement. Replace all worn or damaged parts.



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| 1. Plate | 6. Sector and Shaft Assembly | 11. Rail Spring |
| 2. Self-Locking Nut | 7. Shifter | 12. Bracket and Pin Assembly |
| 3. Washer | 8. Shouldered Shaft | 13. Bracket |
| 4. Retainer | 9. Shift Rail | 14. Pin |
| 5. Preformed Packing | 10. Mode Fork | |

Figure 5-97. Transfer Case Shift Forks Group

d. Assembly and installation. Assembly and installation is accomplished during the transfer case shift forks group as follows:

- (1) Refer to paragraph 5-5.3.3 and install input oil seal, input bearing, thrust bearing and input gear assembly.
- (2) Install shifter (7) on shaft (8).
- (3) Install preformed packing (5), retainer (4) and sector and shaft assembly (6).
- (4) Install plate (1) with washer (3) and self-locking nut (2). Tighten self-locking nut to torque specified in table 6-2.
- (5) Install pin (14) in bracket (13).
- (6) Refer to paragraph 5-5.3.3 and install planetary gear assembly, hub assembly, retaining rings and planetary thrust washer.

NOTE

The shift rail bore, in the transfer case, must be completely dry and contain no oil or rail may not seat completely.

(7) Install shift rail (9).

(8) Refer to paragraph 5-5.3.3 and install mainshaft assembly, sprocket carrier with needle bearings and spacers, thrust washer and pin.

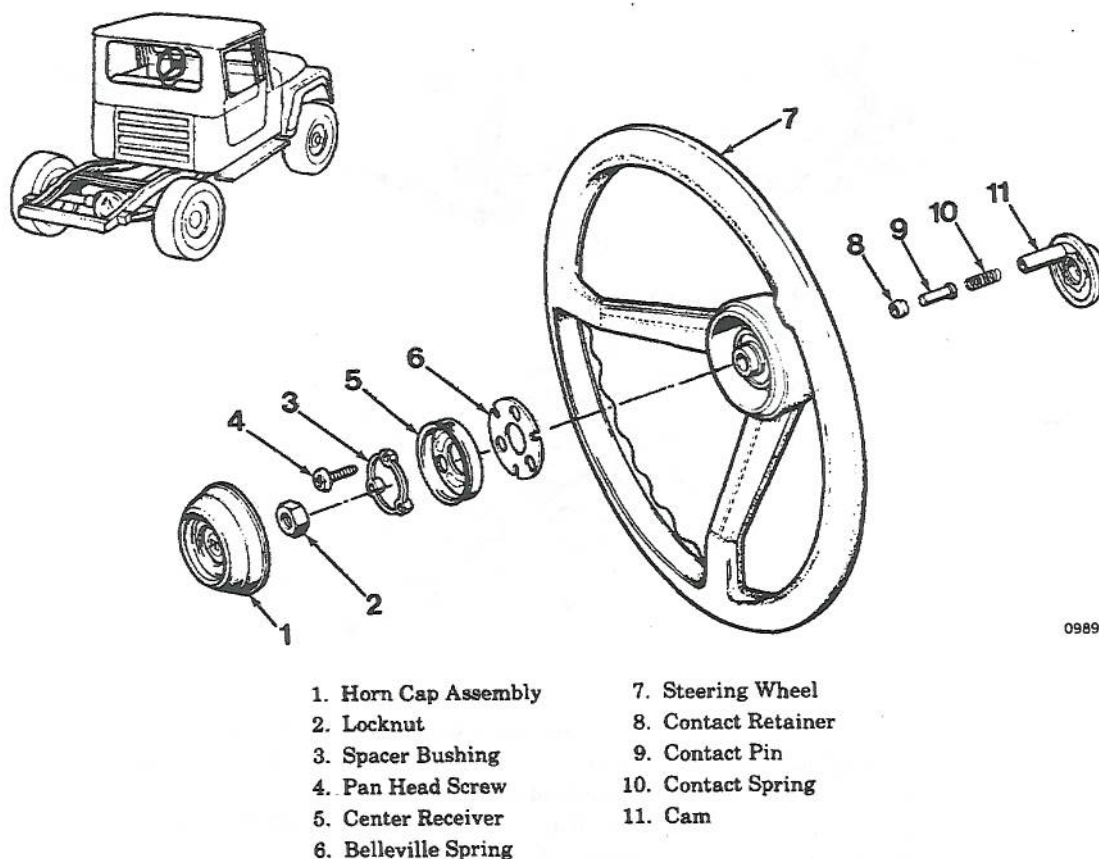
(9) Fit mode fork (10) over mode clutch gear and install mode fork (10), rail spring (11) and bracket and pin assembly (12) on shift rail (9) as mode clutch gear goes on main shaft.

5-5.3.5 Air Compression System. Data for this paragraph will be provided in a subsequent change to this manual.

Figures 5-98, 5-99 and 5-100 will be provided in a subsequent change to this manual.

5-5.4 Steering.

5-5.4.1 Steering Wheel Group. Refer to figure 5-101, and perform the following steps to overhaul the steering wheel group.



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Figure 5-101. Steering Wheel Group

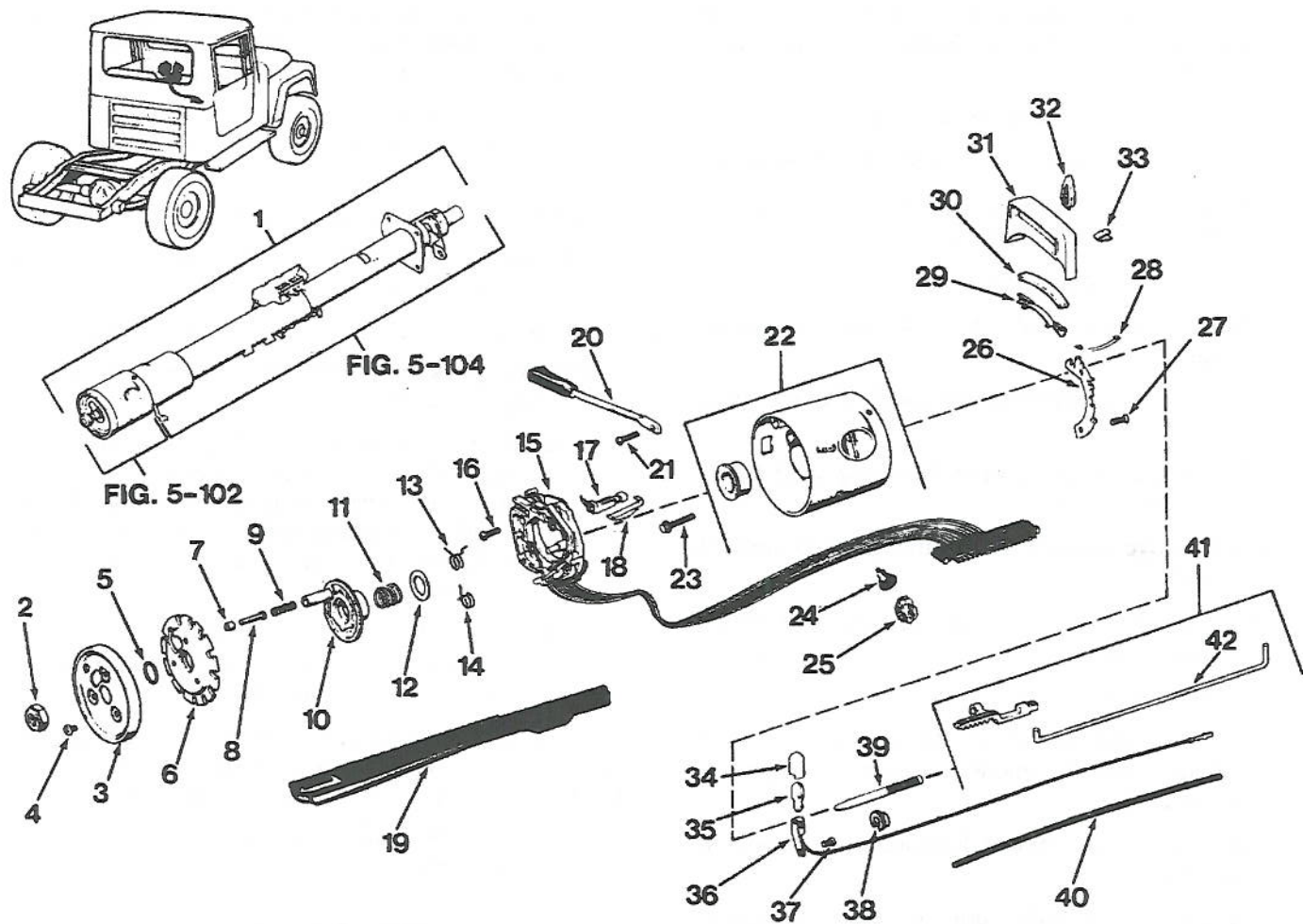
- a. Removal and disassembly. Disassembly is accomplished during removal. Remove steering wheel as follows:
 - (1) Disconnect battery negative cable.
 - (2) Place front wheels in straight ahead position.
 - (3) Remove horn cap assembly (1). Pull cap assembly (1) straight up to remove.
 - (4) Remove locknut (2).
 - (5) Remove pan head screws (4) and spacer bushing (3).
 - (6) Remove center receiver (5) and belleville spring (6).
 - (7) Mark steering wheel and steering shaft for assembly reference.
 - (8) Remove steering wheel using puller tool #J-21232.
 - (9) Remove contact retainer (8), contact pin (9) and contact spring (10).
 - (10) Remove cam (11).
 - b. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures.
 - c. Repair and replacement. Replace all worn or damaged parts.
 - d. Assembly and installation. Assembly is accomplished during installation. Install steering wheel group as follows:
 - (1) Install cam (11).
 - (2) Install contact spring (10), contact pin (9) and contact retainer (8).
 - (3) Align reference marks on steering wheel (7) and steering shaft and install steering wheel (7).
 - (4) Install belleville spring (6) and center receiver (5).
 - (5) Install spacer bushing (3) using pan head screws (4).
 - (6) Install locknut (2) and tighten to torque specified by table 6-2.
 - (7) Install horn cap assembly (1).
- 5-5.4.2 Steering Column Assembly and Upper Housing Group.** Refer to figure 5-102, and perform the following steps to overhaul the steering column assembly and upper housing group.

- a. Removal and disassembly. Disassembly is accomplished during removal. Remove steering column assembly and upper housing group as follows:
 - (1) Disconnect battery negative cable. Refer to paragraph 5-5.4.3 and remove steering column assembly (1).
 - (2) Cover painted areas of column (1).
 - (3) Refer to paragraph 5-5.4.1 and remove locknut (2) and steering wheel.
 - (4) Remove machine screws (4) and cover (3).
 - (5) Compress shaft lock (6) and unseat retaining ring (5) as follows:
 - (a) Inspect and identify steering shaft nut thread type. Metric shafts have identifying groove in steering wheel locating splines. See figure 5-103 in subparagraph d, Assembly and Installation. American thread shafts do not have this groove.
 - (b) If shaft has American threads, use tool #J-23653 as is to compress shaft lock (6, figure 5-102) and unseat retaining ring (5).
 - (e) If shaft has metric threads, replace compressor tool forcing screw with metric forcing screw #J-23653-4 before installing tool #J-23653 on steering shaft.
 - (6) Remove tool and retaining ring (5). Discard retaining ring (5).

CAUTION

The shaft is free in the column after retainer ring is removed. Do not allow the shaft to fall out of the column.

- (7) Remove shaft lock (6), control cam (10), spring (11) and flat washer (12).
- (8) Remove retainer (7), pin (8) and spring (9).
- (9) Remove hazard warning knob (24) by pressing inward and unthreading knob (24) from column.
- (10) Remove pan head screw (21) and manual control lever (20).
- (11) Unhook turn signal switch assembly (15) wire harness connector from bracket at lower end of steering column.
- (12) Disconnect instrument panel harness connector from turn signal switch harness connector by lifting plastic lock tab on connector and separating connectors.



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|---------------------------------|----------------------------------|------------------------------|
| 1. Steering Column Assy. | 16. Pan Head Screw | 30. Seal |
| 2. Locknut | 17. Switch Assembly | 31. Bezel and Dial |
| 3. Cover | 18. Retaining Clip | 32. Pointer Indicator |
| 4. Machine Screw | 19. Wiring Protector | 33. Gear and Selector Spring |
| 5. Retaining Ring | 20. Manual Control Lever | 34. Lamp Hood |
| 6. Shaft Lock | 21. Pan Head Screw | 35. Lamp |
| 7. Retainer | 22. Service Housing Assembly Kit | 36. Socket Assembly |
| 8. Pin | 23. Tapping Screw | 37. Machine Screw |
| 9. Spring | 24. Hazard Warning Knob | 38. Thrust Washer Bearing |
| 10. Control Cam | 25. Ignition Actuator | 39. Spring Bolt Assembly |
| 11. Spring | 26. Shift Lever Gate | 40. Dial Lamp Protector |
| 12. Flat Washer | 27. Machine Screw | 41. Rack Assembly |
| 13. Cancel Spring | 28. Flat Spring | 42. Actuator Rod |
| 14. Cancel Spring | 29. Bezel Bracket | |
| 15. Turn Signal Switch Assembly | | |

Figure 5-102. Steering Column and Upper Housing Group

- (13) Wrap tape around turn signal switch harness connector to prevent its becoming snagged during removal.
- (14) Remove pan head screws (16) and turn signal switch assembly (15). Pull switch (15) and harness straight up and out of housing. Remove wiring protector (19).
- (15) Remove cancel springs (13) and (14) from turn signal switch assembly (15).
- (16) Remove retaining clip (18) and switch assembly (17).
- (17) Refer to paragraph 5-5.10.25 and remove ignition switch, lock cylinder and ignition switch.
- (18) Remove tapping screws (23).
- (19) Remove service housing assembly kit (22).
- (20) Disengage rod (42) from lock rack portion of rack assembly (41).
- (21) Remove screws attaching shroud to housing (22) and remove housing (22) from shroud.
- (22) Remove wave washer from key release lever pivot and remove key release lever and spring.
- (23) Remove lock rack portion of rack assembly (41) and spring bolt assembly (39).
- (24) Remove flat spring (28).
- (25) Remove ignition actuator (25) through lock cylinder hole in housing (22). Push on block tooth of sector kit (25) with blunt punch to remove.
- (26) Remove steering shaft from column (1).
- (27) Remove spring clip from lower bearing retainer and remove retainer, bearing and adapter.
- (28) Remove machine screw (27) and shift lever gate (26).
- (29) Remove bezel bracket (29), seal (30) and bezel and dial (31).
- (30) Remove pointer indicator (32) and gear and selector spring (33) from bezel and dial (31).
- (31) Remove thrust washer bearing (38).
- (32) Remove machine screw (37) and socket assembly (36).
- (33) Remove lamp hood (34) and lamp (35).
- (34) Remove dial lamp protector (40).

- b. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures.
- c. Repair and replacement. Replace all worn or damaged parts.
- d. Assembly and installation. Assembly is accomplished during installation. Install steering column assembly and upper housing group as follows:



Use only the specified screws, bolts and nuts when servicing the column, and tighten all fasteners to recommended torque values only to maintain the energy-absorbing (compressing) action of the column. Incorrect length screws or bolts can prevent the column from compressing under impact. The bolts and nuts that attach the column mounting bracket to the column and instrument panel must also be tightened to the proper torque so that the bracket will break away under impact.

- (1) Coat all friction and bearing surfaces with chassis grease (22, table 5-1) before assembly.
- (2) Install dial lamp protector (40) on socket assembly (36) cable.
- (3) Install lamp (35) and lamp hood (34) on socket assembly (36).
- (4) Install socket assembly (36) using machine screw (37).
- (5) Install thrust washer bearing (38).
- (6) Install gear and selector spring (33) and pointer indicator (32) in bezel and dial (31).
- (7) Install bezel bracket (29), seal (30) and bezel and dial (31).
- (8) Install shift lever gate (26) using machine screw (27).
- (9) Install ignition actuator (25) through lock cylinder hole in housing. Use blunt tool to press ignition actuator (25) into shaft.
- (10) Install flat spring (28). Bowed side of spring must bear against lock rack portion of rack assembly (41) when rack assembly (41) is installed.
- (11) Assemble spring bolt assembly (39) and lock rack portion of rack assembly (41).
- (12) Install assembled spring bolt (39) and lock rack (41).

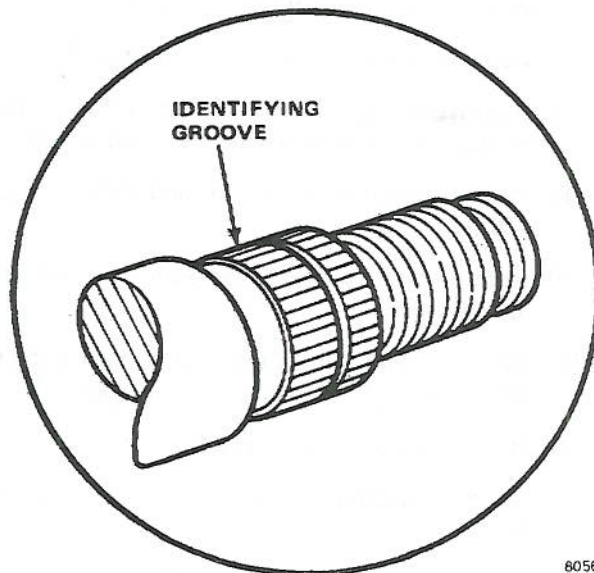
- (13) Install key-release lever return spring over post in housing (22). Insert release lever fingers in slot in lock rack (41) and position hole in lever over threaded hole in housing (22) port. Be sure inner end of spring contacts release lever.
- (14) Raise key-release lever slightly and install end of release lever spring between lever and housing base.
- (15) Coat wave washer with chassis grease and install washer on post and over release lever.
- (16) Position shroud on housing (22) and install attaching screws. Tighten screws to torque specified by table 6-2. Do not displace release lever wave washer when assembling shroud and housing (22).
- (17) Install actuator rod (42) in lock rack portion of rack assembly (41). Insert short hooked end of rod (42) in lock rack.
- (18) Install assembled shroud and housing (22) on column (1) and install attaching screws (23). Tighten screws to torque specified by table 6-2.
- (19) Refer to paragraph 5-5.10.25 and install ignition switch cylinder and ignition switch.
- (20) Install lower bearing, bearing adapter, retainer, and retaining ring in lower end of column.
- (21) Install steering shaft through lower end of column and into upper bearing in housing (22).
- (22) Install switch assembly (17) and retaining clip (18).
- (23) Install cancel springs (13) and (14) in turn signal switch assembly (15).
- (24) Install turn signal switch assembly (15).
- (25) Fold turn signal wiring against connector and feed connector through housing (22). Connect wiring connector.
- (26) Align turn signal switch assembly (15) in housing (22) and secure switch assembly (15) using pan head screws (16). Tighten screws to torque specified by table 6-2.
- (27) Install wiring protector (19).
- (28) Install manual control lever (20) using pan head screws (21). Tighten screw to torque specified by table 6-2.
- (29) Install flat washer (12), spring (11) and control cam (10) on steering shaft.

- (30) Place manual control lever (20) in neutral position and install hazard warning knob (24).
- (31) Install spring (9) and pin (8) in control cam (10).
- (32) Position shaft lock (6) on steering shaft.
- (33) Install replacement retaining ring (5) on sleeve of compressor tool #J-23653 and install tool on steering shaft.

CAUTION

Identify the steering shaft nut thread type before using the compressor tool. If the shaft has American threads, use the compressor tool as is. However, if the shaft has metric threads (figure 5-103), replace the compressor tool forcing screw with metric forcing screw #J-23653-4 before using the tool.

- (34) Compress shaft lock (6, figure 5-102) and install retaining ring (5) in steering shaft groove.
- (35) Remove compressor tool.
- (36) Install retainer (7) on end pin (8) protruding from shaft lock (6).
- (37) Install lock plate cover (3) using machine screws (4).



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Figure 5-103. Metric Steering Shaft Identification

CAUTION

Some steering shafts have metric size steering wheel nut threads. If a replacement locknut is being installed, identify the shaft thread type before installation. Metric shafts have an identifying groove in the steering wheel locating splines (figure 5-103). American thread shafts do not have this groove.

- (38) Refer to paragraph 5-5.4.1 and install steering wheel and locknut (2, figure 5-102). Tighten locknut to torque specified by table 6-2.
- (39) Refer to paragraph 5-5.4.3 and install steering column assembly (1).
- (40) Connect battery negative cable.

5-5.4.3 Steering Column Lower Housing and Shafts Group. Refer to figure 5-104, and perform the following steps to overhaul the steering column housing and shafts group.

- a. Removal and disassembly. Disassembly is accomplished during removal. Remove steering column lower housing and shafts group as follows:

- (1) Disconnect battery negative cable.

CAUTION

Do not attempt to separate the lower shaft and steering column at this time. If separated, the plastic connector injected into the lower shaft could be damaged.

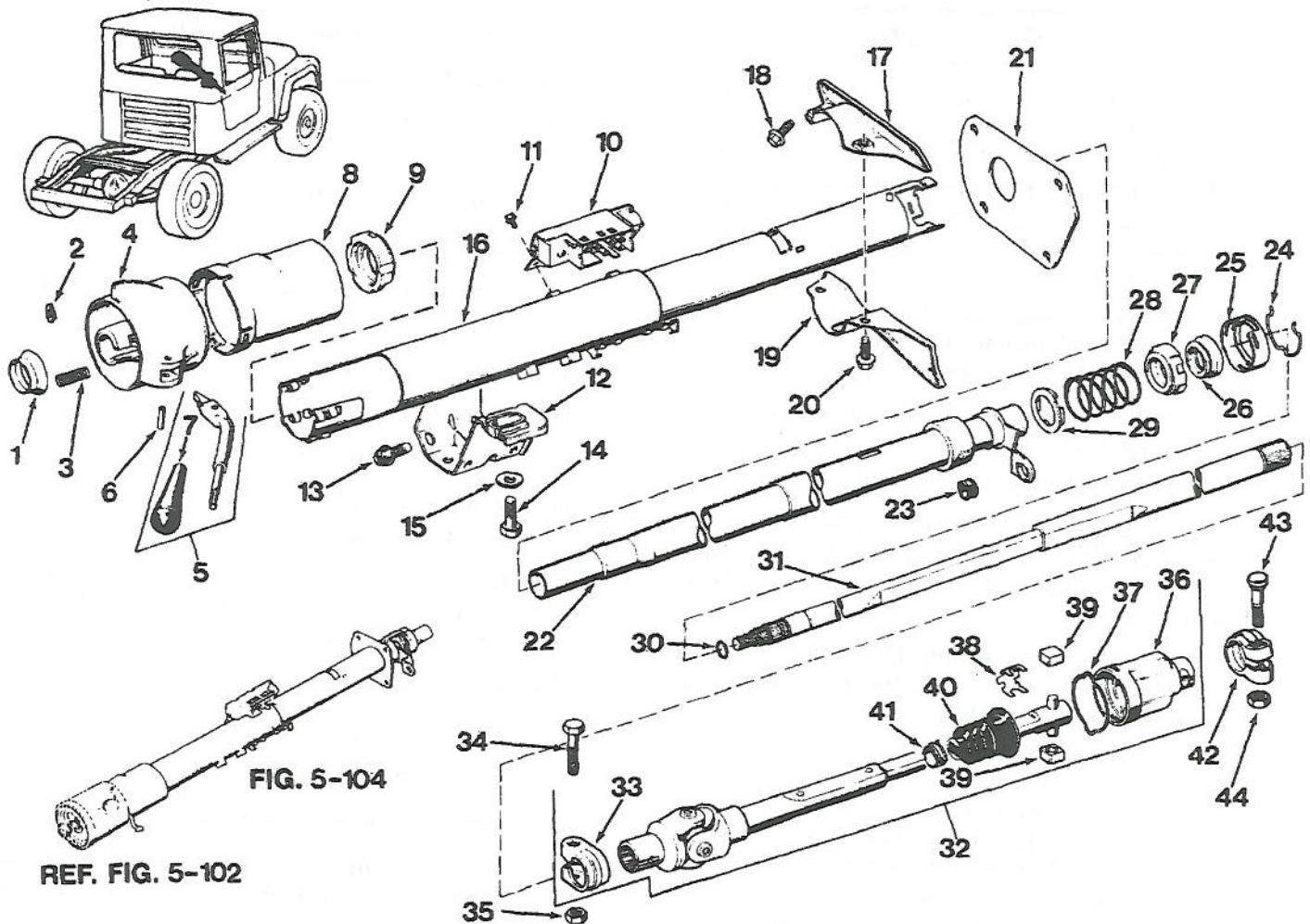
- (2) Remove steering column jacket assembly (16) from instrument panel bezel.
- (3) Remove capscrews (14) and flat washers (15) attaching jacket assembly (16) to instrument panel.
- (4) Remove capscrews (13) attaching bracket assembly (12) to jacket assembly (16), and remove bracket assembly (12).

CAUTION

To avoid damaging the mounting bracket break-away capsules, store the bracket in a safe place until service operations are completed.

- (5) Remove capscrews (18) and (20) and plates (17) and (19).
- (6) Disconnect wiring harness at ignition switch (10).

- (7) Refer to paragraph 5-5.4.2 and remove upper housing and retaining ring (30).
- (8) Remove housing cup (1).
- (9) Remove pointer indicator (2) from bezel and dial.
- (10) Remove spring (3).
- (11) Remove lever bowl (4).
- (12) Remove hinge pin (6) and manual control lever (5).
- (13) Remove lever knob (7).
- (14) Remove shroud (8).
- (15) Remove bearing (9).
- (16) Remove screw and washers (11) and ignition switch assembly (10).
- (17) Remove clip (24) and retainer (25); remove bearing assembly (26), shift adapter (27), spring (28) and thrust washer bearing (29).
- (18) Remove jacket assembly (16).
- (19) Remove seal (21).
- (20) Remove tube assembly (22).
- (21) Remove grommet (23) from tube assembly (22).
- (22) Loosen hex nut (35) and capscrew (34) and remove steering shaft assembly (31) from clamp (33).
- (23) Remove clamp (33) from lower shaft and remove hex nut (35) and capscrew (34) from clamp (33).
- (24) Remove hex nut (44), capscrew (43), clamp (42) and lower shaft (32).
- (25) Remove retaining ring (37) and coupling (36).
- (26) Remove bearings (39) and spring (38).
- (27) Loosen retaining clamp (41) and remove seal (40).
- (28) Remove retaining clamp (41).
- b. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures.
- c. Repair and replacement. Replace all worn or damaged parts.
- d. Assembly and installation. Assembly is accomplished during installation. Install steering column lower housing and shafts group as follows:



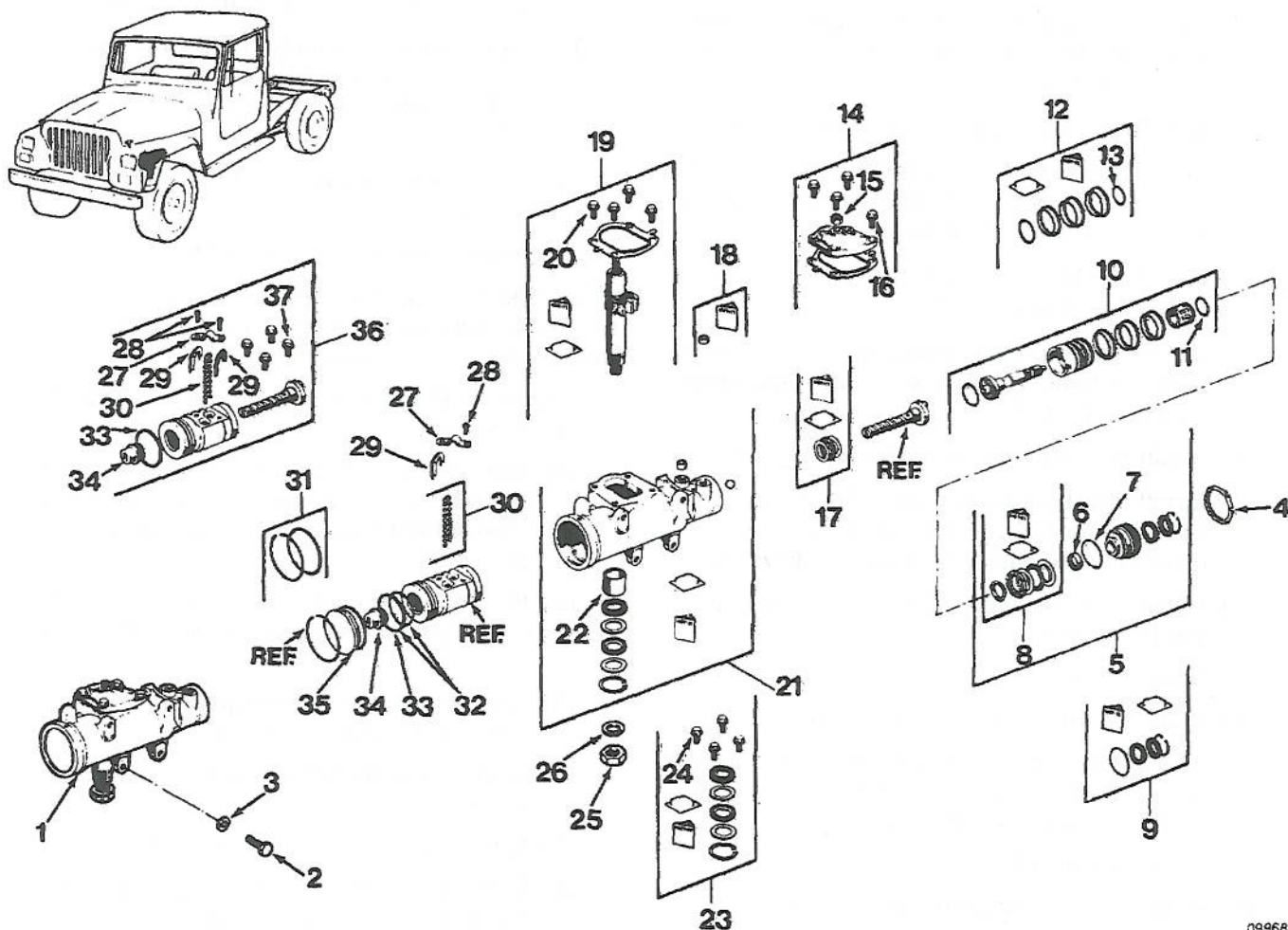
1. Housing Cup
2. Pointer Indicator
3. Spring
4. Lever Bowl
5. Manual Control Lever
6. Hinge Pin
7. Lever Knob
8. Shroud
9. Bearing
10. Ignition Switch Assembly
11. Screw and Washer
12. Bracket Assembly
13. Hex Screw
14. Capscrew
15. Flat Washer

16. Steering Column Jacket Assembly
17. Plate
18. Capscrew
19. Plate
20. Capscrew
21. Seal
22. Tube Assembly
23. Grommet
24. Clip
25. Retainer
26. Bearing Assembly
27. Shift Adapter
28. Spring
29. Thrust Washer Bearing
30. Retaining Ring

31. Steering Shaft Assembly
32. Lower Shaft
33. Clamp
34. Capscrew
35. Hex Nut
36. Coupling
37. Retaining Ring
38. Spring
39. Bearing
40. Seal
41. Retaining Clamp
42. Clamp
43. Capscrew
44. Lock Hex Nut

Figure 5-104. Steering Column Lower Housing and Shafts Group

- (1) Place retaining clamp (41) and seal (40) on lower shaft (32). Do not tighten clamp (41) yet.
 - (2) Install spring (38) and bearings (39) and position seal (40) over bearings (39). Tighten retainer clamp (41).
 - (3) Install retainer ring (37) and coupling (36).
 - (4) Install lower shaft (32) using clamp (42), cap-screw (43) and hex nut (44). Tighten cap screw (43) to torque specified by table 6-2.
 - (5) Install clamp (33), cap screw (34) and hex nut (35) on lower shaft (32).
 - (6) Install steering shaft assembly (31) in lower shaft and tighten cap screw (34) to torque specified by table 6-2.
 - (7) Install grommet (23) in tube assembly (22).
 - (8) Install thrust washer bearing (29), spring (28), shift adapter (27), bearing assembly (26), retainer (25) and clip (24) on tube assembly (22).
 - (9) Install tube assembly (22) over steering shaft assembly (31).
 - (10) Install seal (21).
 - (11) Install steering column jacket assembly (16).
 - (12) Install ignition switch assembly (10) using screws and washers (11). Tighten screws to torque specified in table 6-2.
 - (13) Install bearing (9).
 - (14) Install shroud over jacket assembly (16).
 - (15) Install lever knob (7) on manual control lever (5).
 - (16) Install manual control lever (5) on lever bowl (4) using hinge pin (6).
 - (17) Install lever bowl (4) on jacket assembly (16).
 - (18) Install spring (3).
 - (19) Install pointer indicator (2) in bezel and dial.
 - (20) Install housing cup (1).
 - (21) Refer to paragraph 5-5.4.2 and install upper housing and retaining ring (30).
 - (22) Connect wiring harness at ignition switch (10).
 - (23) Install plates (17) and (19) using cap screws (18) and (20). Tighten cap screws (18) and (20) to torque specified by table 6-2.
 - (24) Install bracket assembly (12) on jacket assembly (16) using cap screws (13). Tighten cap screws to torque prescribed by table 6-2.
 - (25) Install bracket assembly (12) on instrument panel using cap screws (14) and flat washers (15). Tighten cap screws to torque specified by table 6-2.
 - (26) Install jacket assembly (16) to instrument panel bezel.
 - (27) Connect battery negative cable.
- 5-5.4.4 Steering Gear Components Group.** Refer to figure 5-105, and perform the following steps to overhaul the steering gear components group.
- a. Removal. Remove steering gear components group as follows:
 - (1) Disconnect pressure and return hoses at gear assembly (1). Keep hoses raised to avoid excessive fluid loss and cap hoses to prevent dirt entry.
 - (2) Remove clamp bolt and nut attaching flexible coupling to steering gear stub shaft, part of valve assembly (10).
 - (3) Paint alignment marks on pitman shaft and pitman arm for assembly reference.
 - (4) Remove and discard hex nut (25) and lockwasher (26).
 - (5) Remove pitman arm using tool #J-6632.
 - (6) Remove special cap screws (2) and special washers (3) and remove gear assembly (1).
 - b. Disassembly. Disassemble steering gear components group as follows:
 - (1) Drain fluid from gear assembly (1).
 - (2) Cap all openings in exterior of gear assembly (1) and clean exterior thoroughly.
 - (3) Mount gear assembly (1) in vise so pitman shaft (19) points downward. Clamp unmachined housing base portion of gear assembly (1) in vise only.
 - (4) Rotate end plug retaining ring component of steering parts kit (31) until one end of ring is aligned with hole in side of gear assembly housing kit (21). Unseat ring using punch inserted through hole in gear assembly housing kit (21) and remove retaining ring using screwdriver.



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|------------------------|-------------------------------|-------------------------|
| 1. Gear Assembly | 13. Seal | 26. Lockwasher |
| 2. Special Capscrew | 14. Cover Parts Kit | 27. Retaining Strap |
| 3. Special Washer | 15. Self-Locking Nut | 28. Screw and Washer |
| 4. Locknut | 16. Machine Bolt | 29. Ball Return Guide |
| 5. Plug Assembly Kit | 17. Bearing Assembly | 30. Steering Parts Kit |
| 6. Bearing | 18. Check Valve Kit | 31. Steering Parts Kit |
| 7. Seal | 19. Steering Shaft Assembly | 32. Steering Parts Kit |
| 8. Steering Parts Kit | 20. Capscrew | 33. Piston Ring |
| 9. Seal Kit | 21. Gear Housing Assembly Kit | 34. End Plug |
| 10. Valve Assembly | 22. Roller Needle Bearing | 35. End Plug |
| 11. Seal | 23. Seal | 36. Rack-Piston-Nut Kit |
| 12. Steering Parts Kit | 24. Machine Bolt | 37. Machine Bolt |
| | 25. Hex Nut | |

Figure 5-105. Steering Gear Components Group

- (5) Remove end plug (35). Install 12-point deep socket and ratchet handle on stub shaft. Slowly rotate shaft counterclockwise until rack piston component of rack-piston-nut kit (36) forces end plug (35) out of gear assembly housing kit (21).

CAUTION

Do not rotate the stub shaft any farther than necessary or the ball bearings will drop out of the rack piston circuits. This causes the rack piston and pitman shaft sector teeth to disengage, preventing removal. If disengagement should occur, remove the side cover and pitman shaft and reengage the teeth.

- (6) Remove seal component of end plug seal kit (31).
- (7) Turn stub shaft 1/2 turn clockwise.
- (8) Unseat rack piston end plug (34) by tapping.

CAUTION

Do not attempt to remove the rack piston end plug until it has been unseated as the plug could break.

- (9) Remove rack piston end plug (34).
- (10) Remove and discard self-locking nut (15).

NOTE

Self-locking nut has left hand threads.

- (11) Remove machine bolt (16) and capscrew (20) and remove cover parts kit (14) from adjuster screw by turning screw clockwise.
- (12) Rotate stub shaft until steering shaft (19) sector teeth are centered in gear assembly housing (21).
- (13) Remove steering shaft (19) from gear assembly housing (21) by tapping threaded end of shaft.

NOTE

Do not remove or disassemble any of the pitman shaft component parts. The shaft and component parts are serviced as an assembly only.

- (14) Remove rack piston from gear assembly housing (21) as follows:
 - (a) Insert arbor tool #J-7539-01 or #J-21552 into rack piston (36) until tool contacts end of wormshaft.

- (b) Hold arbor tool tightly against wormshaft and turn stub shaft counterclockwise to force rack piston (36) onto arbor tool.
- (c) Remove rack piston (36) and arbor tool as assembly.
- (15) Remove adjuster plug locknut (4).
- (16) Remove adjuster plug assembly kit (5).
- (17) Remove steering parts kit (8).
- (18) Remove seal kit (9).
- (19) Remove bearing (6) using tool #J-6221. Discard bearings after removal.
- (20) Remove valve assembly (10) by grasping shaft and pulling outward.
- (21) Remove and discard stub shaft seal (11).
- (22) Hold valve body in both hands with stub shaft pointing downward. Tap end of stub shaft lightly against wood block until shaft cap is free of valve body.
- (23) Pull stub shaft outward until shaft clears valve body by approximately 1/4 inch.
- (24) Press spool valve locating pin inward and carefully remove stub shaft from valve body and spool valve.
- (25) Remove spool valve from valve body using a push and turn motion. If spool valve becomes cocked, carefully realign valve and try removal again. Do not force spool valve out.
- (26) Remove and discard seal (13).
- (27) Cut and remove steering parts kit (12).
- (28) Remove wormshaft and bearing assembly (17) from rack-piston-nut kit (36).
- (29) Remove and discard rack piston ring (33) and steering parts seal kit (32).
- (30) Remove screws and washers (28) and retaining strap (27).
- (31) Place rack piston on clean cloth and remove return guide (29) and steering parts kit (30).
- (32) Remove machine bolts (37).
- (33) Remove check valve kit (18).
- (34) Remove machine bolts (24).
- (35) Remove retaining ring component of seal (23) using snap ring pliers #J-4245.
- (36) Remove washer, backup washer, double lip seal, backup washer and single lip seal, all of which are contained in seal (23).

(37) Remove needle bearing (22) using tools #J-8092 and #J-21551.

(38) Discard all seals (23) and needle bearing (22).

c. Cleaning and inspection. Refer to paragraphs 5-4.3 and 5-4.4 for general cleaning and inspection procedures. In addition perform the following steps:

- (1) Inspect check valve (18) to see if it is scored, chipped, cracked or distorted.
- (2) Inspect housing ball plug for leaking.
- (3) Inspect adjuster plug (5) threads for damage.
- (4) Inspect spool valve-to-valve body (10) fit. If fit is loose, entire valve assembly (10) must be replaced.
- (5) Inspect torsion bar on spool valve (10) to see if it is loose or broken. If damaged, it must be replaced.
- (6) Inspect valve body-to-wormshaft notch in valve body (10) skirt for damage or excessive wear. Valve assembly (10) must be replaced if notch is worn or damaged.

d. Repair and replacement. Replace all worn or damaged parts. In addition, perform the following steps.

- (1) If housing ball plug leaks, reseal plug using blunt punch.

WARNING

Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi and goggles must be worn.

- (2) Spray ball area with Loctite Solvent 7559 and dry with compressed air.
- (3) Cover ball area with Loctite Sealant 290 and let stand for 2 hours before installing or assembling gear.

e. Assembly. Assemble steering gear components group as follows:

- (1) Lubricate gear housing and all replacement bearings and seals with power steering fluid.
- (2) Install roller needle bearing (22) using tools #J-8092 and #J-21553 to a depth of approximately 1/32 inch below shoulder in housing bore.

- (3) Install single lip seal and backup washer. Seat washer and seal components of seal (23) using tool #J-21553. Install seal and washer using tool #J-21553. Install seal and washer only far enough to provide clearance for next seal and washer, washer and retaining ring and to provide small clearance between seals.

CAUTION

Do not bottom seal against housing counter-bore.

- (4) Install double lip seal and backup washer, both of which are components of seal (23).
- (5) Install washer component of seal (23).
- (6) Install retaining ring component of seal (23) using snap ring pliers #J-4245.
- (7) Install machine bolts (24).
- (8) Install replacement check valve spring in pressure port of gear housing assembly (21). Be sure spring is seated in pressure port counterbore and large end of spring faces downward.
- (9) Install replacement check valve (18) over spring so valve tongs face downward. Be sure valve is centered on small end of spring.
- (10) Test check valve (18) operation by lightly pressing valve downward with pencil. Valve should reseal itself when pencil pressure is released.
- (11) Lubricate all rack-piston-nut kit components (36) with power steering fluid.
- (12) Install rack piston ring (33) and steering parts kit (32) in ring groove of rack piston.
- (13) Install wormshaft in rack piston.
- (14) Align ball return guide (29) holes with wormshaft grooves.
- (15) Alternately install 18 black and silver ball bearings from the steering parts kit (30) in rack piston bearing circuit hole adjacent to seal ring, a component of steering parts kit (32). Rotate wormshaft slowly in counterclockwise direction when installing bearings and press each bearing downward to make room for following bearing.