

TRANSFER CASE

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MODEL 20 TRANSFER CASE

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GENERAL

The Model 20 Transfer Case is a four-position type unit providing two gear ratios in 4-wheel drive, one ratio in 2-wheel drive, and a neutral position. Four-wheel drive low provides a reduction ratio of 2.03:1 for off-road use and applications that require increased pulling power. Four-wheel drive high and 2-wheel drive high both provide 1:1 ratio in the transfer case. Neutral position is used for stationary power takeoff applications such as winching. In neutral, power is not transmitted to the wheels.

IDENTIFICATION

An identification tag which displays the vendor and Jeep part number is attached to the intermediate shaft lockplate bolt. This information is necessary to obtain the correct service replacement parts.

POWER FLOW

Power flow through the transfer case in the four positions is shown in figures 8-1 through 8-4. The darkened areas of the illustrations show which gears are engaged and the positions of the gears in the various drive ranges.

TRANSFER CASE SHIFT SEQUENCE

Transfer case shifting is controlled by a lever located forward and just to the right of the transmission shift lever. The lever is connected through linkage to the shift rods on the transfer case and must be moved only through the sequence indicated on the top of the knob (fig. 8-5).

Lubricant circulates between the transfer case and the transmission on the manual 3-speed transmission only.

TOWING

If the vehicle is disabled and must be towed with the front wheels off the ground, towing speed and distance must be limited. Towing speed must not exceed 30 mph for a distance no greater than 15 miles.

Ignition Key Available: Shift transmission and transfer case into Neutral. Vehicle can now be towed with all four wheels on the ground or with front or rear wheels raised. If vehicle is equipped with selective drive hubs, set them in the LOCK position.

Ignition Key Not Available and Vehicle is Unlocked: Shift transmission and transfer case into Neutral and tow vehicle with front wheels raised. Turn ignition key to OFF position to unlock steering wheel.

Ignition Key Not Available and Vehicle is Locked: Place dolly under rear wheels and tow vehicle with front end raised; or, disconnect rear propeller shaft at rear axle yoke (be sure to index mark propeller shaft and yoke for proper alignment at assembly), secure shaft to underside of vehicle, and tow with front end raised.

Recreational Towing

Jeep vehicles can be towed behind a recreational vehicle such as a motor home, but be sure you comply with the following instructions to avoid damage to drivetrain components. Be sure to check federal, state, and local laws.

Manual Transmission

- Turn ignition key to off position to unlock steering wheel.
- Shift transmission and transfer case into Neutral position.
- Turn selective drive hubs to **LOCK** position (if equipped).

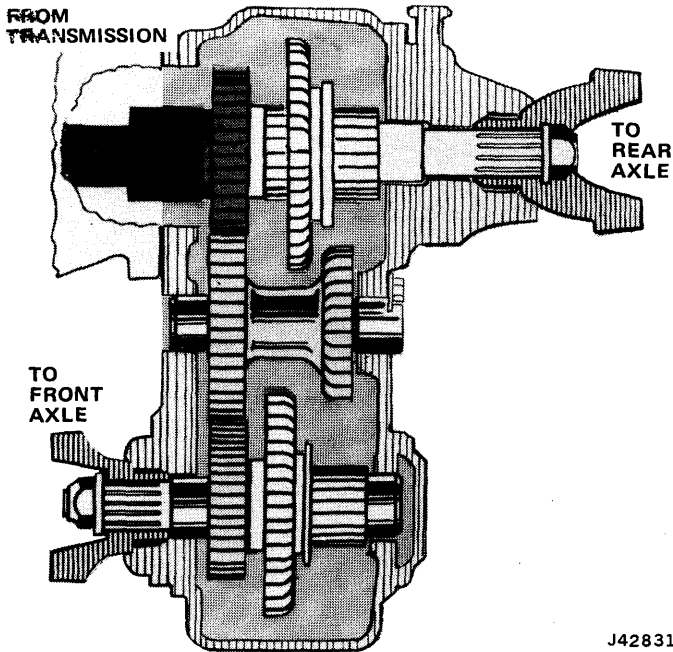


Fig. 8-1 Neutral

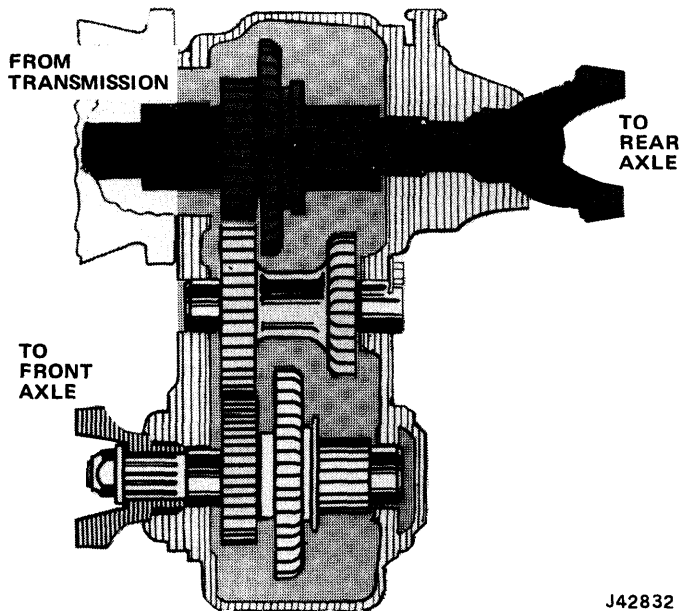


Fig. 8-2 2-Wheel Drive High

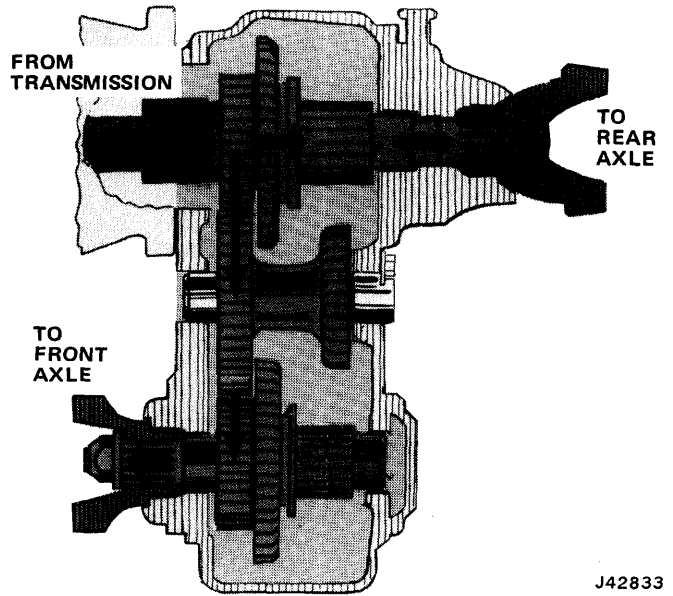


Fig. 8-3 4-Wheel Drive High

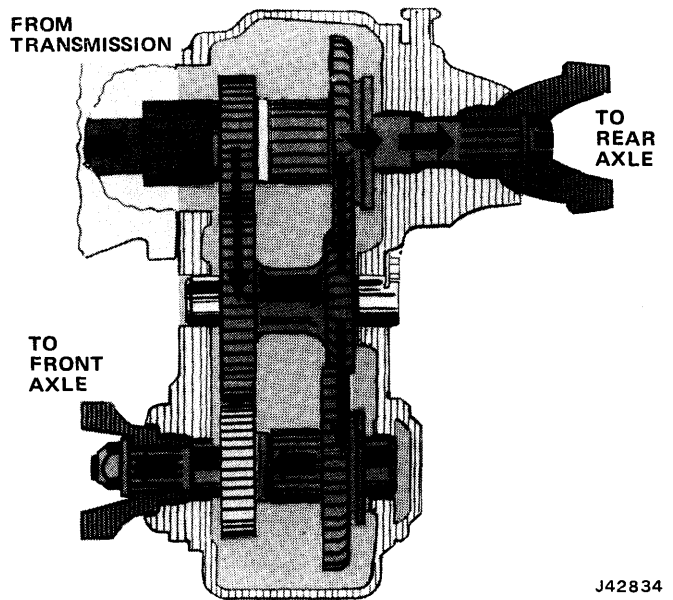
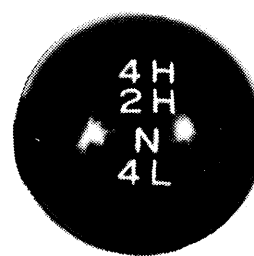
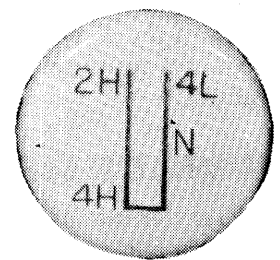


Fig. 8-4 4-Wheel Drive Low



CJ MODELS



CHEROKEE AND TRUCK

J42352

Fig. 8-5 Transfer Case Shift Knob

Trailer Towing and Campers

In order to maintain the coverage of the Jeep Corporation New Vehicle Warranty, including its conditions and limitation, on vehicles used in trailer towing or camper applications (including the mounting of slide-in campers on Jeep Pickup Trucks), the requirements and recommendations in this manual and other factory literature must be followed.

In addition to requirements for proper vehicle maintenance, inspection, and servicing as prescribed in this manual, GVW and GAW ratings are of special significance. When the vehicle is to be used for trailer towing or, in the case of a Jeep Truck, for mounting a camper, it is very important that neither GVW or GAW ratings be exceeded by the addition of:

- The tongue weight of a trailer
- The weight transferred to the truck by the mounting of a fifth-wheel trailer.
- The weight of a slide-in camper or any other type of truck camper.
- The weight of any other type of vehicle put in or on the vehicle.

Remember that everything put in or on the trailer or the mounted camper adds to the load.

CAUTION: *Jeep Corporation will not be responsible for brake performance if the Jeep vehicle and trailer hydraulic brake systems are in any way connected. A separate brake system for all trailers weighing over 1,000 pounds gross is recommended (as many states require).*

SERVICE PROCEDURES—IN VEHICLE

Shift Rod Oil Seal Replacement

Cherokee and Truck Models

(1) On models with 3-speed transmission, position transfer case shift lever in 2H position and remove knob and boot from shift lever. Remove bolts attaching transfer case shift housing to support tube and pull shift lever straight back to 4H position.

(2) Raise vehicle.

Service Diagnosis

Condition	Possible Cause	Correction
JUMPS OUT OF 2 WD	(1) Mainshaft gear disengaged from rear output shaft sliding gear.	(1) Check torque on mainshaft gear nut.
	(2) Shift lever torsion spring not holding.	(2) Replace spring.
JUMPS OUT OF 4 WD HIGH	(1) Front output shaft sliding gear disengaged from front output shaft gear.	(1) Excessive end play, worn or bent shift fork.
	(2) Mainshaft gear disengaged from rear output shaft sliding gear.	(2) Check torque on mainshaft gear nut.
	(3) Shift lever torsion spring not holding.	(3) Replace torsion spring.
	(4) Rear shift rod poppet spring not holding.	(4) Replace poppet spring.

(3) On models with eight-cylinder engine, place support stand under transmission and remove rear crossmember.

(4) Disconnect front propeller shaft at transfer case yoke. Mark shaft and yoke for assembly alignment reference.

(5) Remove clevis pins connecting control links to transfer case shift rods.

(6) On models with 3-speed transmission, remove transfer case shift housing from support tube using brass drift and hammer.

(7) Remove shift rod seal using Tool J-25175 (fig. 8-6).

(8) Install replacement seal using Thimble and Driver Tool J-25167 (fig. 8-7).

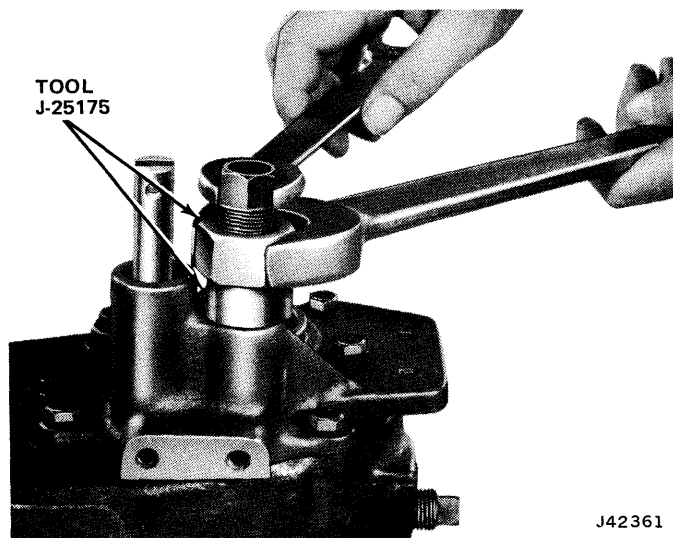


Fig. 8-6 Shift Rod Oil Seal Removal

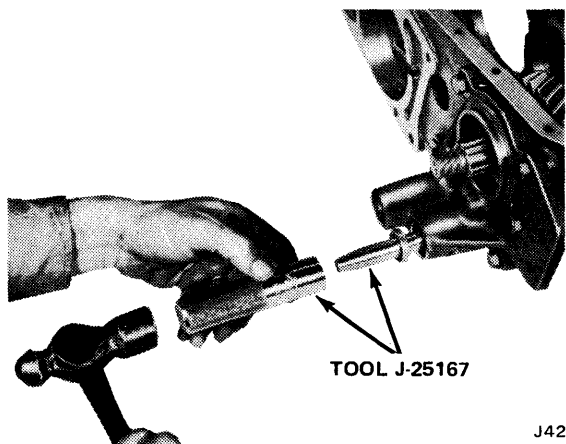


Fig. 8-7 Shift Rod Oil Seal Installation

(9) On models with 3-speed transmission, install transfer case shift housing on support tube.

(10) Install clevis pins connecting control links to transfer case shift rods. Use replacement cotter pins to secure clevis pins.

(11) Connect propeller shaft to transfer case yoke. Align shaft and yoke using alignment marks made during disassembly.

(12) On models with eight-cylinder engine, install rear crossmember and remove transmission support stand.

(13) Lower vehicle.

(14) On models with 3-speed transmission, install shift housing-to-support tube attaching bolts and install shift lever boot and knob.

CJ Models

(1) Shift transfer case into 4L position if left-side shift rod seal is to be replaced.

(2) Raise vehicle.

(3) Remove clevis pins connecting control links to transfer case shift rods.

(4) Remove shift rod oil seal using Tool J-25175 (fig. 8-6).

(5) Install replacement seal using Thimble and Driver Tool J-25167 (fig. 8-7).

(6) Install clevis pins connecting control links to transfer case shift rods. Use replacement cotter pins to secure clevis pins.

(7) Lower vehicle.

Front Yoke Oil Seal Replacement

(1) Raise vehicle.

(2) Place support stand under transmission and remove rear crossmember.

(3) Disconnect front propeller shaft of transfer case yoke mark shaft and yoke for assembly reference.

(4) Remove transfer case yoke nut and washer using Tool J-8614-01 (fig. 8-8).

(5) Remove transfer case yoke using Tools J-8614-01,02,03 (fig. 8-9).

(6) Remove oil seal using Tool J-25180 (fig. 8-10).

(7) Install replacement seal using Tool J-25160.

(8) Install yoke, washer, and nut. Tighten nut to 240 foot-pounds torque. Use Tool J-8614-01 to hold yoke while tightening nut.

REAR BEARING CAP

Removal

(1) Disconnect rear propeller shaft at transfer case yoke. Use wire to tie propeller shaft to frame.

(2) Disconnect speedometer cable.

(3) Remove bearing cap-to-transfer case bolts and remove bearing cap.

Disassembly

(1) Remove speedometer driven gear sleeve and driven gear from bearing cap.

(2) Mount bearing cap assembly in vise.

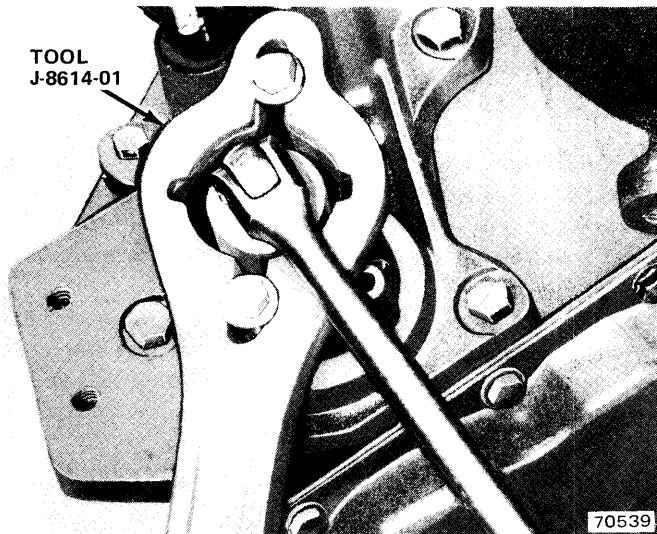


Fig. 8-8 Removing Front Output Shaft Nut

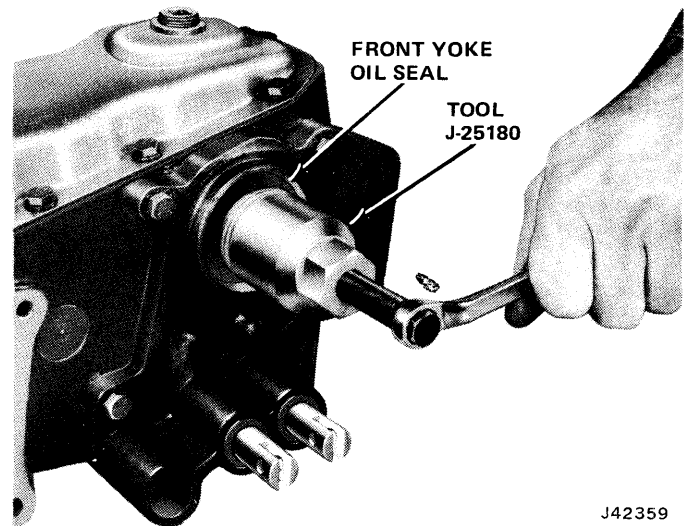


Fig. 8-10 Front Yoke Oil Seal Removal

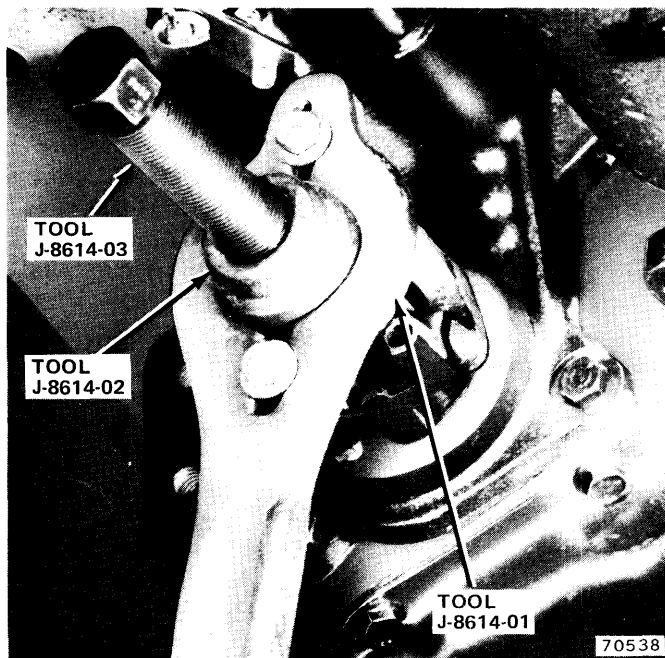


Fig. 8-9 Removing Yoke

(3) Using Yoke Holding Wrench J-8614-01, remove yoke nut (fig. 8-8).

(4) Remove yoke from shaft using Tools J-8614-01,02,03 (fig. 8-9).

(5) Remove seal from bearing cap bore using Tool J-25180 (fig. 8-10).

(6) Remove bearing cap assembly from vise, and using rear face of cap as support, drive output shaft from bearing cap using brass drift and hammer.

(7) Lift tapered bearing and drive bearing cup out of bearing cap rear bore.

(8) Drive front bearing cup from bearing cap front bore.

(9) Remove speedometer drive gear and shims from shaft.

NOTE: Keep the shims together for use in assembly.

(10) Remove front bearing from shaft.

(11) If necessary, remove speedometer driven gear bushing from bearing cap.

Assembly

(1) If removed, install speedometer driven gear bushing using Bushing Installer Tool J-25169.

(2) Install front bearing cup in bore.

(3) Install front bearing on shaft.

(4) Install rear bearing cup in bore.

(5) Install speedometer drive gear and shims on shaft.

(6) Place output shaft in bearing cap and place end of output shaft on firm surface.

(7) Place rear cone and roller on output shaft and drive bearing onto shaft and seat it against shims.

(8) Install yoke seal with Tool J-25132.

(9) Install yoke, flat washer, and nut. Tighten nut to 240 foot-pounds torque. Use Tool J-8614-01 to hold yoke while tightening nut.

(10) Clamp dial indicator onto bearing cap and position indicator against output shaft as shown in figure 8-11.

(11) Pry output shaft back and forth to check end play. End play should be 0.001 to 0.003 inch.

(12) If end play is excessive, it can be corrected by installing shims between speedometer drive gear and output shaft front bearing.

(13) Place speedometer driven gear in bearing cap and install driven gear sleeve.

Installation

(1) Install bearing cap and install bearing cap-to-transfer case bolts. Tighten bolts to 30 foot-pounds torque.

(2) Connect speedometer cable.

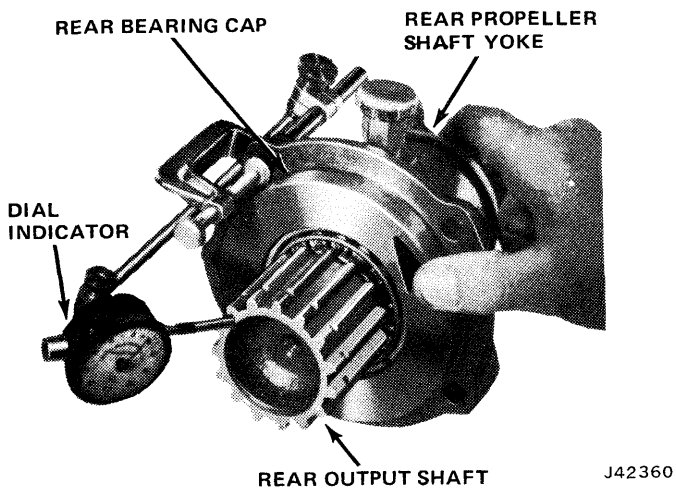


Fig. 8-11 Checking Rear Bearing Cap End Play

(3) Connect propeller shaft to yoke and tighten U-bolts to 15 foot-pounds torque. If equipped with ball and trunnion-type propeller shaft, tighten flange bolts to 30 foot-pounds torque.

SERVICE PROCEDURES—OUT OF VEHICLE

Transfer Case Removal—All Models

- (1) Remove shift lever knob, trim ring, and boot from transmission and transfer case shift levers.
- (2) Remove floor covering (if equipped) and remove transmission access cover from floorpan.
- (3) Raise vehicle and drain lubricant from transfer case. On CJ models, drain transmission lubricant also.
- (4) Disconnect torque reaction bracket from crossmember (if equipped).
- (5) On CJ models, position support stand under clutch housing to support engine and transmission and remove rear crossmember.
- (6) Disconnect front and rear propeller shafts at transfer case. Mark propeller shaft yokes for assembly reference.
- (7) Disconnect speedometer cable at transfer case.
- (8) On Cherokee and Truck models, disconnect parking brake cable at equalizer and disconnect exhaust pipe support bracket at transfer case.
- (9) Remove bolts attaching transfer case to transmission and remove transfer case. Remove transfer case gasket.

NOTE: One transfer case attaching bolt must be removed from the front end of the case. This bolt is located at the bottom right corner of the transmission.

Transfer Case Installation

- (1) Install transmission-to-transfer case gasket on transmission.
- (2) Shift transfer case to 4L position.

(3) Install one 3/8-16 x 4-inch dowel pin on each side of transmission to assist in guiding transfer case into place during installation.

(4) Install and position transfer case on dowel pins.

(5) Rotate transfer case output shaft (by turning yoke) until main shaft gear on transmission engages rear output shaft gear in transfer case. Slide transfer case forward until case seats against transmission.

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

(6) Install two transfer case attaching bolts but do not tighten completely.

(7) Remove dowel pins and install remaining transfer case attaching bolts. Tighten all bolts to 30 foot-pounds torque.

(8) Fill transmission (on CJ models) and transfer case with SAE 80W-90 gear lubricant, API GL-4 quality. On Cherokee and Truck models, check and correct transmission fluid level if necessary.

(9) Connect speedometer gear to transfer case.

(10) Connect front and rear propeller shafts to transfer case. Align reference marks made during removal. Tighten U-bolt clamp nuts to 15 foot-pounds torque. If equipped with ball and trunnion-type propeller shaft, tighten flange bolts to 30 foot-pounds torque.

(11) On CJ models, install rear support crossmember and remove support stand from under clutch housing.

(12) On Cherokee and Truck models, connect parking brake cable to equalizer and connect exhaust pipe support bracket to transfer case.

(13) Connect torque reaction bracket (if equipped).

(14) Lower vehicle.

(15) Install transmission access cover plate on floorpan. Install floor covering if equipped.

(16) Install boots, trim rings, and shift knobs.

Disassembly

- (1) Remove shift lever assembly.
- (2) Remove bottom cover and gaskets.
- (3) Remove bolts attaching rear bearing cap assembly to transfer case and remove assembly.

NOTE: Refer to Rear Bearing Cap in Service Procedures—In Vehicle for service procedures.

(4) Remove intermediate shaft lock plate.

(5) Using Arbor Tool J-25142 and plastic mallet, drive intermediate shaft out rear of case (fig. 8-12).

(6) Align Arbor Tool J-25142 in intermediate gear assembly and remove gear assembly and thrust washers.

(7) Remove front output shaft nut and washer.

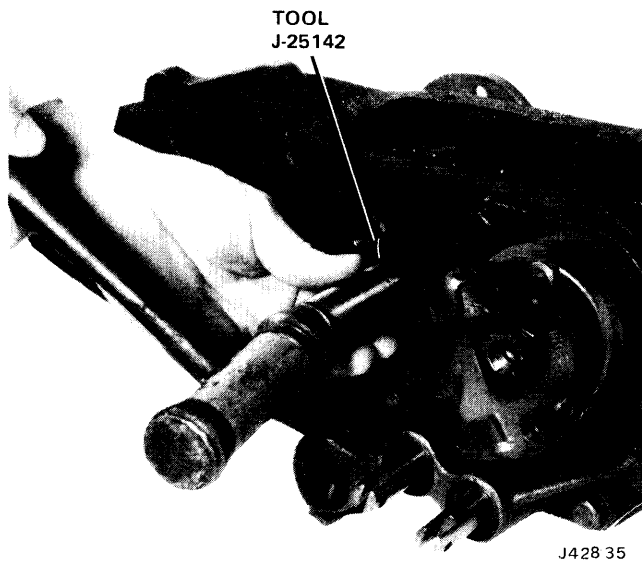


Fig. 8-12 Intermediate Shaft Removal

(8) Remove front output shaft yoke using Tools J-8614-01, 02, 03 (fig. 8-9).

(9) Remove front oil seal using Tool J-25180 (fig. 8-10).

(10) Remove cover plate attaching screws and remove cover. Remove front output shaft rear bearing.

CAUTION: *When removing the cover plate, do not damage the gaskets and shims (fig. 8-13).*

(11) Move rear output shaft shift rail to rear.

(12) Remove rear output shaft shift fork setscrew.

(13) Remove poppet ball and spring plugs.

(14) Insert punch through pin hole in rod and rotate rear output shaft rod 1/4-turn counterclockwise and pull rod out of case.

NOTE: *When the shift fork is free of the rod, do not lose the poppet ball and spring under the shift rod.*

(15) Remove front bearing cap attaching screws and slide housing off remaining shift rail.

(16) Remove rear output shaft sliding gear and shift fork (fig. 8-13).

(17) Using hammer and brass drift, drive front output shaft out rear of case. Support transfer case on wood blocks when removing shaft.

(18) Remove gears, spacer, and bearing from case and rotate shift rod to expose setscrew.

(19) Remove setscrew and pull out shift rod.

(20) Remove shift rail thimbles using 3/8-drive, 7/16-inch socket and extension to drive thimbles from case.

(21) Remove arbor tool, thrust washers, spacers, and roller bearings from intermediate gear.

(22) Remove front output shaft front bearing cup using brass drift and hammer.

(23) Remove shift rod seals from housing using Tool J-25175.

(24) Remove front output shaft rear bearing. Use sliding gear as support. Mount gear in vise with shaft lever groove facing downward. Insert front output shift through gear splines and drive shaft out of bearing using brass drift and hammer.

Cleaning and Inspection

Wash the case and components in clean solvent. Remove all gasket material from gasket surfaces and dry all components with compressed air.

Inspect all bearings, thrust washers, shafts and gears for excessive wear, pitting, and scoring. Replace any part that is damaged or worn.

Assembly

(1) Install front output shaft front bearing cup in case. Seat cup flush with exterior surface of case.

(2) Install shift rail thimbles.

(3) Install front bearing cap. Tighten attaching bolts to 30 foot-pounds torque.

(4) Support front output shaft rear bearing on 1-1/4-inch socket and install shaft into bearing using brass drift and hammer.

(5) Install front output shaft shift rail poppet ball and spring.

(6) Compress ball and spring and install front output shaft rail part way in case.

(7) Install front output shaft shift fork with setscrew offset facing front of case and slide shift rail through shift fork.

(8) Align setscrew holes in fork and rail and install setscrew. Tighten setscrew to 14 foot-pounds torque.

(9) Install front output shaft front bearing, bearing spacer, front output shaft sliding gear, and front output shaft gear. Be sure shift fork groove in sliding gear faces rear of case.

(10) Install front output shaft through gears, spacer, and bearing.

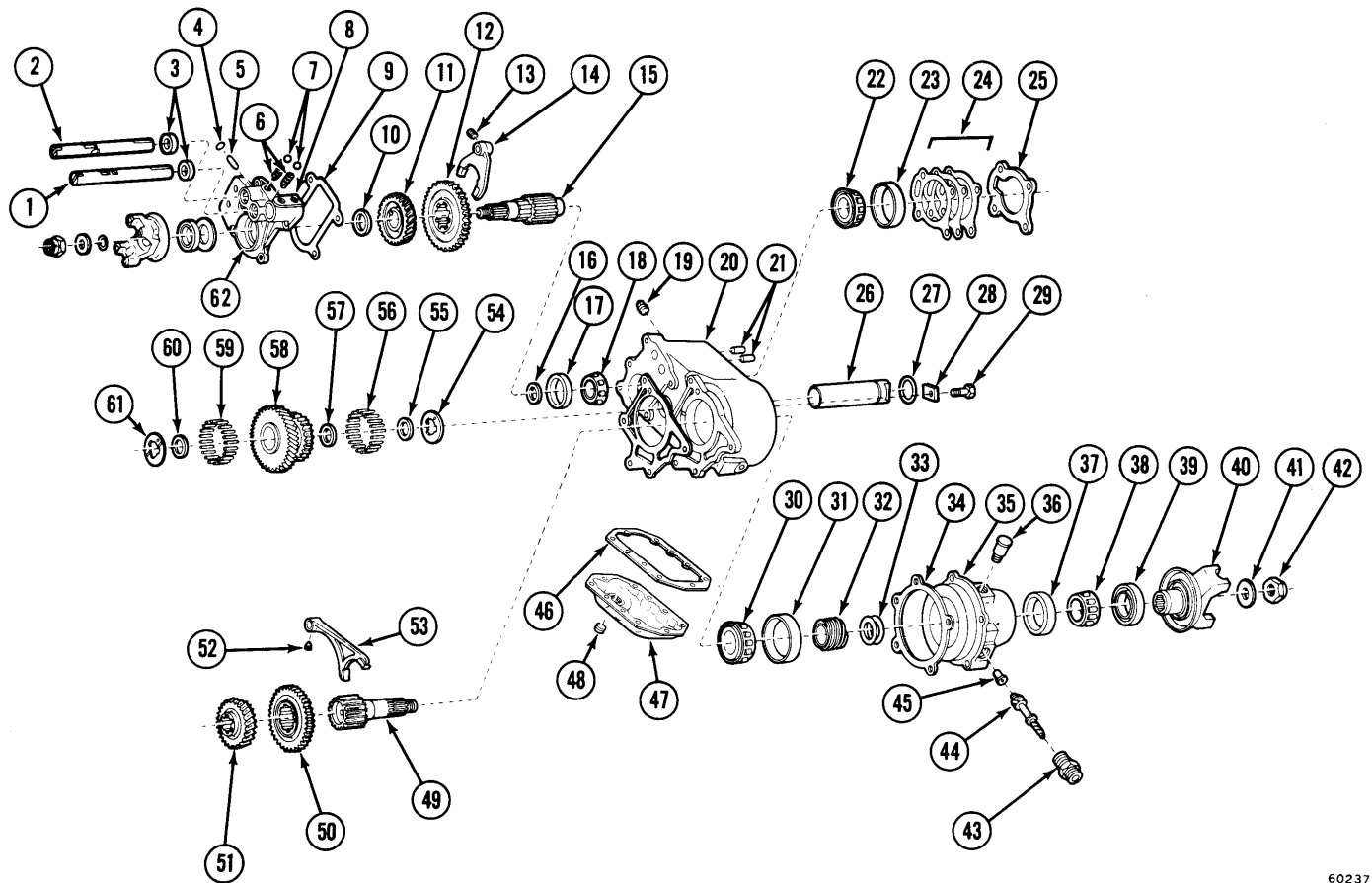
(11) Support case on wood blocks and drive front output shaft into front housing using brass drift and hammer. Be sure bearing is seated against shoulder on front output shaft.

(12) Install front output shaft rear bearing cup using wood block and hammer.

(13) Install rear bearing, cover plate, and shims. Tighten cover plate bolts to 30 foot-pounds torque.

(14) Check front output shaft end play as follows (fig. 8-14):

(a) seat rear bearing cup against cover plate by striking end of front output shaft with lead hammer.



1. SHIFT ROD - REAR OUTPUT SHAFT SHIFT FORK
2. SHIFT ROD - FRONT OUTPUT SHAFT SHIFT FORK
3. SHIFT ROD OIL SEAL
4. INTERLOCK PLUG
5. INTERLOCK
6. POPPET BALL SPRING
7. POPPET BALL
8. FRONT BEARING CAP
9. FRONT BEARING CAP GASKET
10. FRONT OUTPUT SHAFT THRUST WASHER
11. FRONT OUTPUT SHAFT GEAR
12. FRONT OUTPUT SHAFT SLIDING GEAR
13. SETSCREW
14. FRONT OUTPUT SHAFT SHIFT FORK
15. FRONT OUTPUT SHAFT
16. FRONT OUTPUT SHAFT SPACER
17. FRONT OUTPUT SHAFT FRONT BEARING CUP
18. FRONT OUTPUT SHAFT FRONT BEARING
19. FILLER PLUG
20. TRANSFER CASE
21. THIMBLE COVER
22. FRONT OUTPUT SHAFT REAR BEARING
23. FRONT OUTPUT SHAFT REAR BEARING CUP
24. FRONT OUTPUT SHAFT REAR BEARING CUP SHIMS
25. COVER PLATE
26. INTERMEDIATE SHAFT
27. INTERMEDIATE SHAFT O-RING
28. LOCK PLATE
29. LOCK PLATE BOLT
30. REAR OUTPUT SHAFT FRONT BEARING
31. REAR OUTPUT SHAFT FRONT BEARING CUP
32. SPEEDOMETER DRIVE GEAR
33. REAR OUTPUT SHAFT BEARING SHIM
34. REAR BEARING CAP GASKET
35. REAR BEARING CAP
36. BREATHER
37. REAR BEARING CAP CUP
38. REAR BEARING CAP BEARING
39. REAR BEARING CAP OIL SEAL
40. REAR YOKE
41. REAR YOKE WASHER
42. REAR YOKE NUT
43. SPEEDOMETER SLEEVE
44. SPEEDOMETER DRIVEN GEAR
45. SPEEDOMETER BUSHING
46. BOTTOM COVER GASKET
47. BOTTOM COVER
48. DRAIN PLUG
49. REAR OUTPUT SHAFT
50. REAR OUTPUT SHAFT SLIDING GEAR
51. MAINSHAFT GEAR
52. SETSCREW
53. REAR OUTPUT SHAFT SHIFT FORK
54. INTERMEDIATE GEAR THRUST WASHER
55. INTERMEDIATE GEAR BEARING SPACER
56. INTERMEDIATE GEAR SHAFT NEEDLE BEARINGS
57. INTERMEDIATE GEAR BEARING SPACER
58. INTERMEDIATE GEAR
59. INTERMEDIATE GEAR SHAFT NEEDLE BEARINGS
60. INTERMEDIATE GEAR BEARING SPACER
61. INTERMEDIATE GEAR THRUST WASHER
62. FRONT BEARING CAP

22. FRONT OUTPUT SHAFT REAR BEARING
23. FRONT OUTPUT SHAFT REAR BEARING CUP
24. FRONT OUTPUT SHAFT REAR BEARING CUP SHIMS
25. COVER PLATE
26. INTERMEDIATE SHAFT
27. INTERMEDIATE SHAFT O-RING
28. LOCK PLATE
29. LOCK PLATE BOLT
30. REAR OUTPUT SHAFT FRONT BEARING
31. REAR OUTPUT SHAFT FRONT BEARING CUP
32. SPEEDOMETER DRIVE GEAR
33. REAR OUTPUT SHAFT BEARING SHIM
34. REAR BEARING CAP GASKET
35. REAR BEARING CAP
36. BREATHER
37. REAR BEARING CAP CUP
38. REAR BEARING CAP BEARING
39. REAR BEARING CAP OIL SEAL
40. REAR YOKE
41. REAR YOKE WASHER
42. REAR YOKE NUT
43. SPEEDOMETER SLEEVE
44. SPEEDOMETER DRIVEN GEAR
45. SPEEDOMETER BUSHING
46. BOTTOM COVER GASKET
47. BOTTOM COVER
48. DRAIN PLUG
49. REAR OUTPUT SHAFT
50. REAR OUTPUT SHAFT SLIDING GEAR
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60. INTERMEDIATE GEAR BEARING SPACER
61. INTERMEDIATE GEAR THRUST WASHER
62. FRONT BEARING CAP

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Fig. 8-13 Model 20 Transfer Case Components

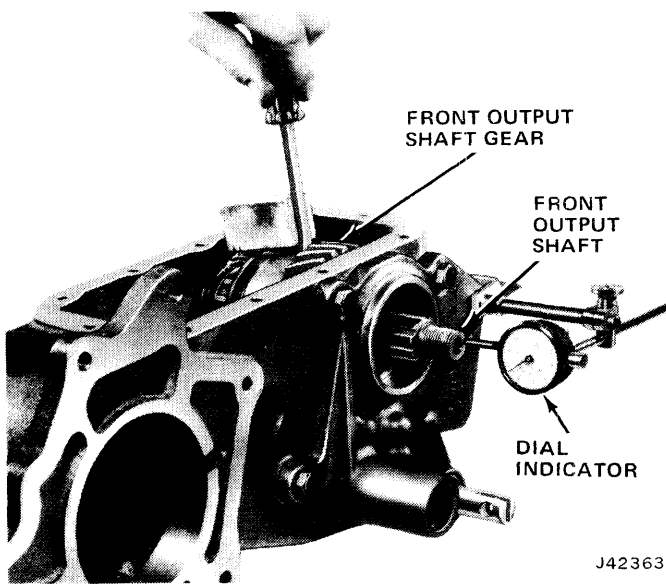


Fig. 8-14 Checking Front Output Shaft End Play

(b) mount dial indicator on front bearing cap and position indicator stylus against end of output shaft.

(c) pry shaft rearward and zero dial indicator. Pry shaft forward and observe dial indicator reading. End play should be 0.001 to 0.003 inch. If necessary, adjust end play by adding or subtracting shims between cover plate and case. If shims are added, seat rear bearing cup as outlined in step (a) before checking end play.

(15) Install rear output shaft shift rail poppet ball and spring in shift rod housing.

(16) Compress ball and spring and install rear output shaft shift rail part way in case.

NOTE: Before installing shift rail, be sure front output shaft shift rail is in Neutral and that interlock is seated in housing bore.

(17) Install rear output shaft shift fork and sliding gear. Be sure shift fork groove in gear faces rear of case.

(18) Align setscrew holes in fork and rail and install setscrew. Tighten setscrew to 14 foot-pounds torque.

(19) Assemble intermediate gear rollers and spacers using Arbor Tool J-25142.

(20) Install intermediate gear thrust washers in case tangs aligned with grooves in case.

NOTE: Rear washer can be held in place by starting the intermediate shaft into the case. Hold the front washer in position with petroleum jelly.

(21) Install O-ring on intermediate shaft and install intermediate gear in case. Using rawhide mallet or lead hammer, drive intermediate shaft into intermediate gear, forcing Arbor Tool J-25142 out front of case.

(22) Install intermediate shaft lock plate, identification tag, lockwasher, and bolt. Tighten bolt to 14 foot-pounds torque.

(23) Install rear bearing cap assembly using a new gasket, and slide rear output shaft through gear. Tighten bearing cap bolts to 30 foot-pounds torque.

(24) Install front yoke seal using Tool J-25132.

(25) Install front propeller shaft yoke and tighten locknut to 240 foot-pounds torque. Use Tool J-8614-01 to hold yoke while tightening nut.

(26) Install bottom cover and gasket. Tighten bolts to 14 foot-pounds torque.

(27) Install shift rod oil seals using Tool Set J-25167.

SHIFT CONTROL CASE—CHEROKEE AND TRUCK

Shifter rods from the shift control case connect to the shift rods of the transfer case either directly or through nonadjustable links (fig. 8-15). The lever assembly is mounted on a support tube attached to the transfer case. The support tube has locating holes drilled to ensure alignment of the transfer case, support tube, and lever assembly.

Figure 8-16 shows the position of the shift lever and rails in relation to the gears in the transfer case in 2 High, 4 High, and 4 Low positions.

- 2 High—Inner rail is fully forward, pawl on outer rail is to rear of slot in inner rail, and legs of torsion spring are in notches in inner rail.
- 4 High—Inner rail is fully forward, pawl on outer rail is to rear of slot in inner rail, and legs of torsion spring are in notches in inner rail. Shift lever ball is forward and pin on shift lever is engaged in slot in pawl. The outside rail is in the forward position.
- 4 Low—Both rails are fully to the rear, the pawl is to the front of the slot, the shift lever ball is in (and to the rear of) the slot, and the spring legs are out of the notches. The pin on the shift lever is disengaged from the slot in the pawl.

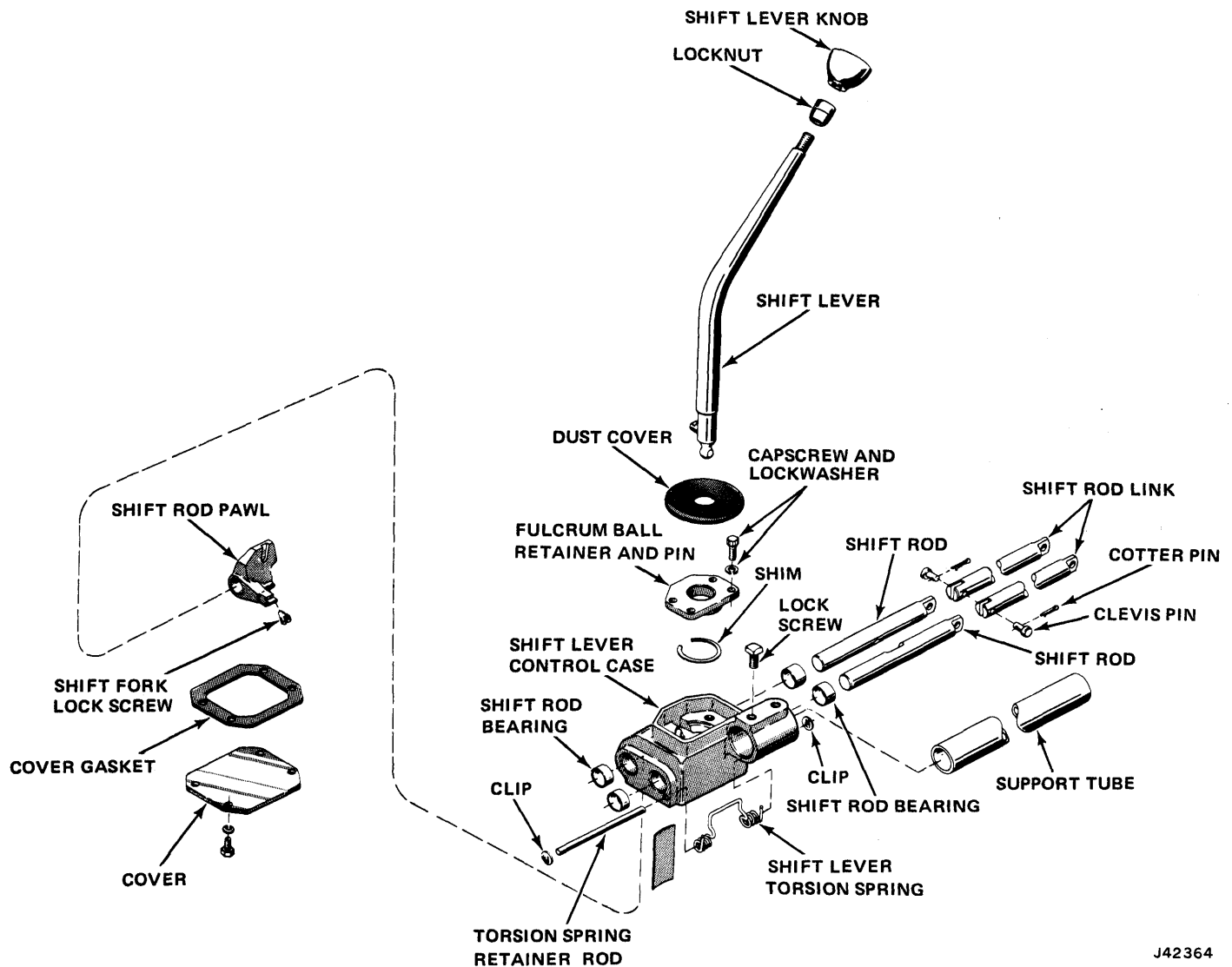
Removal

- (1) Remove shift lever, knob, trim ring, and boot.
- (2) Remove clevis pins attaching control case shift rods to shift rod links.
- (3) Remove control-case-to-support-tube attaching screws and remove control case.

NOTE: On vehicles with eight-cylinder engine and 4-speed transmission, the transfer case must be removed in order to remove the control case.

Disassembly

- (1) Remove retainer capscrews, retainer, shift lever and shims.
- (2) Remove cover. Remove lock screw from pawl and remove 4 WD and neutral shift rod and pawl.
- (3) Pry tension spring from notches in direct and low range shift rod and remove rod.
- (4) Remove clips from torsion spring retainer and remove rod and spring.



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Fig. 8-15 Shift Control Case—Cherokee and Truck

Assembly

- (1) Insert torsion spring, retaining rod, and clips.
- (2) Install direct and low range shift rod and set torsion spring in notches in rod.
- (3) Position shift rod pawl in case. Insert 4 WD and neutral shift rod through case and pawl and install and tighten setscrew.

NOTE: Be sure the holes are aligned to permit the setscrew to bottom in the rod.

- (4) Install gasket, cover, and attaching screws.
- (5) Install shift lever, retainer, and retainer-to-control case attaching screws.

Installation

- (1) Place shift lever in 4H (4 WD High).

- (2) Position control case on support tube (do not install bolts).
- (3) Attach control case shift rods to shift rod links with clevis pins.
- (4) Install shift control case-to-support tube lock-screws and tighten.
- (5) Install boot, trim ring, and shift lever knob.

SHIFT LINKAGE—CJ Models

The shift lever is connected to the transfer case shift rails through rods and nonadjustable links (fig. 8-17). The support tube connects to the transfer case and is retained by cap screws. Locating holes are drilled in the support tube at the transfer case end to ensure proper alignment.

On CJ models with 3-speed transmission, the transfer case must be removed in order to service the linkage.

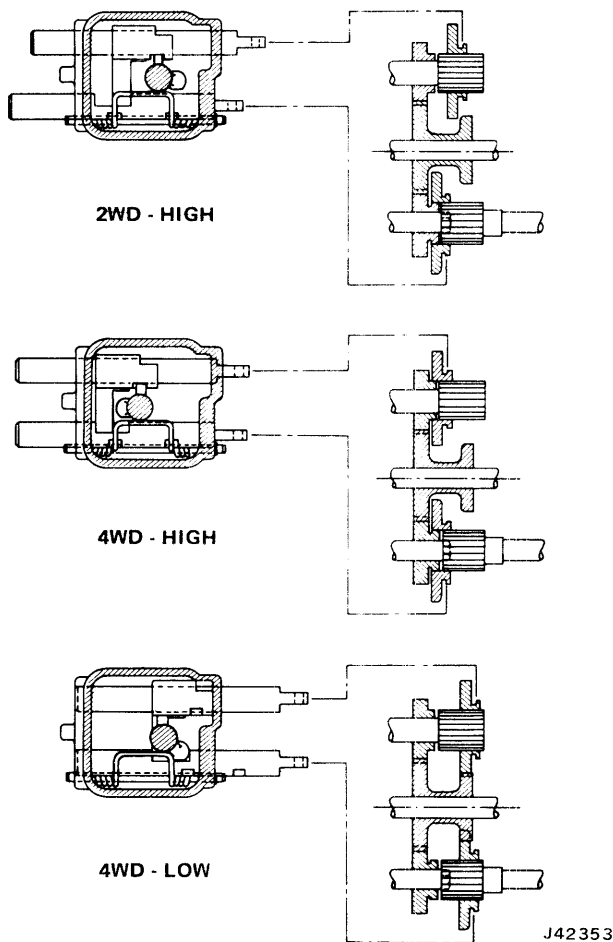


Fig. 8-16 Shift Positions

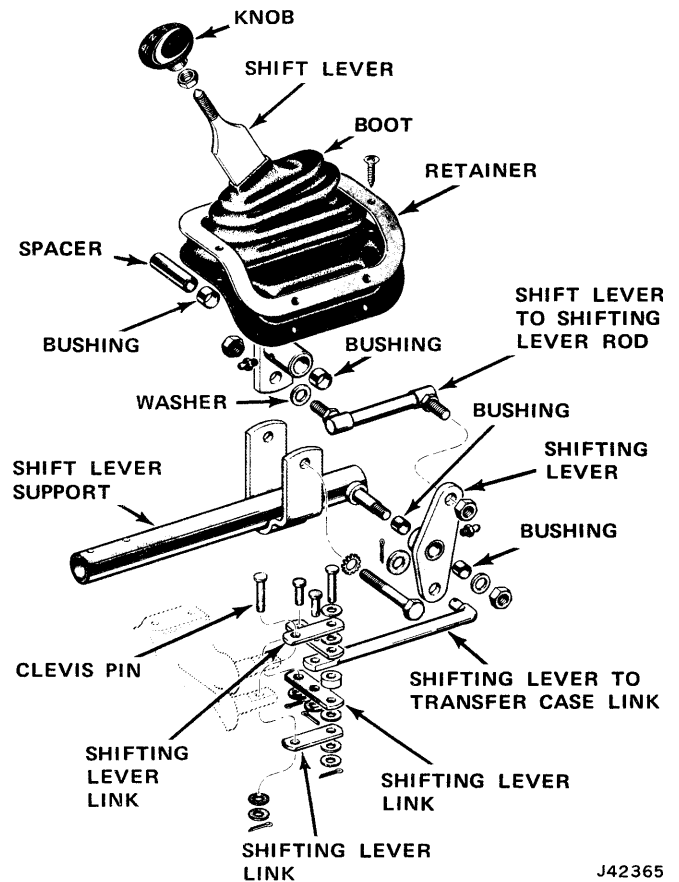


Fig. 8-17 Shift Linkage—CJ Models

QUADRA-TRAC TRANSFER CASE

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GENERAL

The Quadra-Trac transfer case provides full-time, four-wheel drive in all driving conditions. The transfer case contains a limited slip differential which is operated by a chain drive unit. In operation, engine torque is

transmitted to both the front and rear axles through the chain-driven limited slip differential.

A low range reduction unit, which provides maximum engine braking and torque at low speeds, is available as an option with Quadra-Trac.

EMERGENCY DRIVE

Emergency Drive is a control device, which locks the front and rear wheel drives together, resulting in undifferentiated 4-wheel drive, and is provided for use under extreme situations such as encountered in rough terrain.

CAUTION: When attempting to move the vehicle out of a particular position, do not spin the wheels excessively unless emergency drive is engaged.

Excessive wheel spin could damage the Quadra-Trac limited-slip differential. Do not drive the vehicle on dry pavement with emergency drive engaged. This will result in harsh operation and possibly damage driveline components.

Should loss of a front or rear propeller shaft assembly or front axle shaft failure occur, activating the emergency drive will permit 2-wheel drive operation until repair or replacement can be made. To engage emergency drive, slow the vehicle to under 5 mph and turn the control knob inside the glove box counterclockwise.

A reminder signal light in the instrument panel cluster lights immediately after emergency drive engagement occurs, and glows continuously until disengaged.

NOTE: A slight delay may occur until front and rear axles become synchronized.

To disengage emergency drive, turn the control knob clockwise. If the lockout light does not go off, back the vehicle in an "S" pattern for approximately 15 feet.

Because emergency drive is infrequently used, it is recommended that the system be activated and deactivated at least once each month.

REDUCTION UNIT SHIFT LEVER

The reduction unit is engaged and disengaged by the reduction unit shift lever. On CJ-7 models, the lever is located on the driver's side of the floorpan transmission tunnel. On Cherokee, Wagoneer, and Truck models, the lever is located on the floorpan just below the driver's seat (fig. 8-18).

There are three shift lever positions: High range, Low Range, and Neutral. The High range position is used for normal driving. The Low range position engages the reduction unit when maximum engine braking and torque is required. The Neutral position is for towing use only. This position allows the vehicle to be towed without removing or disconnecting the propeller shafts.

LOW RANGE—REDUCTION UNIT OPERATION

For operation under unusually severe on-road or off-road conditions, the low-range reduction unit provides maximum engine braking and maximum torque at low speed.

To engage Low Range drive:

- Take foot off accelerator.

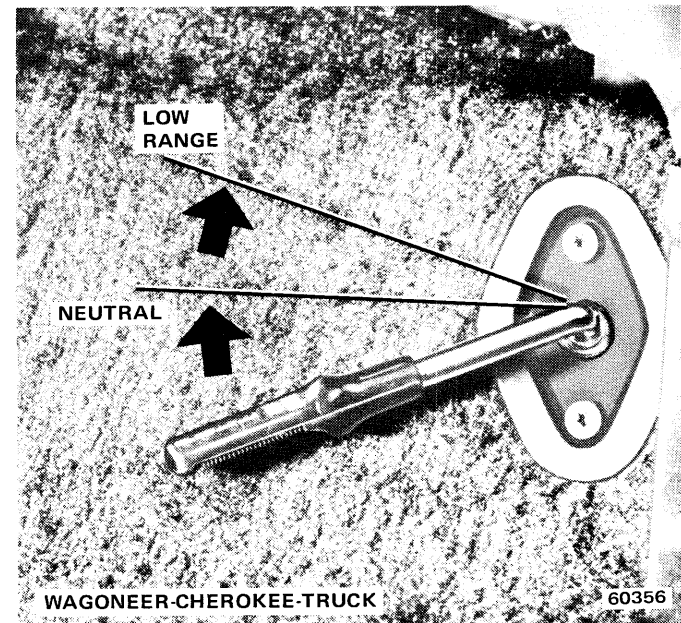
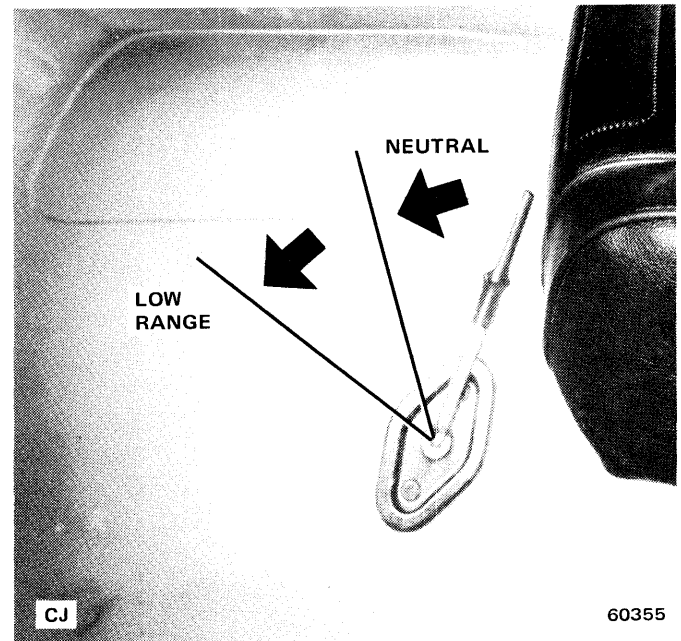


Fig. 8-18 Reduction Unit Shift Lever

- Shift automatic transmission into Neutral (with vehicle moving).
- When vehicle speed drops below 5 mph, engage reduction unit by moving lever fully forward (CJ-7 models) or up (Cherokee, Wagoneer, and Truck models). Do not stop at Neutral position, which is for towing use only.

To disengage Low Range drive:

- Take foot off accelerator.
- When vehicle speed drops to 5 to 10 mph, shift automatic transmission into Neutral.
- On CJ-7 models, pull lever fully rearward. On Cherokee, Wagoneer, or Truck models, push lever fully downward. Do not stop at Neutral position (on any model) when disengaging low range reduction unit.

TOWING

Automatic Transmission with Quadra-Trac Less Low Range Reduction Unit

Ignition Key Available: Turn ignition key to OFF position to unlock steering column and gearshift selector linkage. Place transmission gearshift lever in N (Neutral). If vehicle is to be towed with all four wheels on the ground, disconnect **both** propeller shafts from axle yokes (be sure to index mark propeller shafts and yokes for proper alignment at assembly), secure shafts to underside of vehicle, and proceed with towing. If vehicle is to be towed with front end raised, disconnect rear propeller shaft only (index mark for proper assembly later) and secure shaft to underside of vehicle.

Ignition Key Not Available: Place dolly under rear wheels and tow vehicle with front end raised; or, disconnect rear propeller shaft at rear axle yoke (index mark for correct assembly later), secure shaft to underside of vehicle, and tow with front wheels raised.

Automatic Transmission with Quadra-Trac and Low Range Reduction Unit

Ignition Key Available: Vehicle can be towed with all four wheels on the ground without disconnecting propeller shafts. Place transmission gearshift lever in P (Park) and shift low-range reduction unit gearshift lever to N (Neutral) position. If Emergency Drive control (in glove box) was in EMERGENCY DRIVE when the engine was shut down, restart engine and turn the control knob to the NORMAL position. Never tow the vehicle with the Emergency Drive control activated or with reduction unit in Low Range position.

Ignition Key Not Available and Vehicle is Locked or Unlocked: Place dolly under rear wheels and tow vehicle with front wheels raised; or, disconnect rear propeller shaft at rear axle (index mark for proper assembly), secure shaft to underside of vehicle, and tow with front wheels raised.

STICK-SLIP CONDITION

When the brake cones in the Quadra-Trac limited slip differential stick and release, it is under a torque windup condition as in a conventional transfer case. Sudden release of the cones under this condition results in a constant, pulsating, grunt-like or rasping noise. This is a low-frequency noise that is most noticeable to the driver at slow speeds, such as when slowly turning a corner, or when maneuvering to park the vehicle.

Stick-slip noise will not occur when the vehicle is driven in a straight-ahead position. If a noise similar to stick-slip, but much louder, occurs in the straight-ahead position, the chain should be inspected for excessive looseness.

Proper lubricant is important in preventing stick-slip noise. Use Quadra-Trac lubricant or equivalent only.

Multi-grade, detergent-type oils must not be used. A stick-slip condition caused by improper lubricants may be corrected by completely draining the Quadra-Trac and low range unit (if equipped) and refilling with the specified lubricant.

NOTE: *If a vehicle is not driven for a week or more, the stick-slip condition may occur when the vehicle is first driven. This is considered normal and should be of no concern, as the noise will usually disappear with continued driving.*

Uneven tire inflation pressures and mismatched tire types and sizes will also cause stick-slip noise. All tires must be inflated equally and must be of the same size and type.

LUBRICATION AND STICK SLIP CORRECTION

The Quadra-Trac transfer case does not require periodic or scheduled lubrication. However, should a stick-slip condition occur, drain and refill the transfer case and reduction unit (if equipped) as follows. Use Quadra-Trac lubricant, Jeep part number 8997156 or equivalent only.

- (1) Check for mismatched tires or uneven tire pressure and correct as required.
- (2) Completely drain and refill transfer case and reduction unit (if equipped) as follows:

With Reduction Unit:

(a) Remove fill plugs from transfer case and reduction unit and remove drain plug from transfer case. Allow transfer case to drain completely.

(b) Install transfer case drain plug and tighten to 20 foot-pounds torque.

(c) Loosen reduction unit housing attaching bolts and pull housing back far enough to drain all lubricant. After lubricant has drained completely, push housing into position and tighten 3/8-16 bolts to 20 foot-pounds torque, and 5/16-18 bolts to 9 foot-pounds torque.

(d) Fill transfer case to fill hole level (2 quarts, 1.7 quarts Imperial) with Quadra-Trac lubricant, 8997156 or equivalent and install fill plug.

(e) Add one pint of Quadra-Trac lubricant to the reduction unit and install fill plug.

(f) Tighten transfer case and reduction unit fill plugs to 20 foot-pounds torque.

Without Reduction Unit:

(a) Remove fill and drain plugs from transfer case. Allow transfer case to drain completely.

(b) Install transfer case drain plug and tighten to 20 foot-pounds torque.

(c) Fill transfer case to fill hole level (2 quarts, 1.7 quarts Imperial) with Quadra-Trac lubricant, 8997156 or equivalent.

(d) Install transfer case fill plug and tighten to 20 foot pounds torque.

(3) Drive vehicle in circles, both clockwise and counterclockwise for approximately 15 minutes to allow lubricant to circulate throughout differential.

NOTE: When driving the vehicle in circles do not turn the wheel to the stop position.

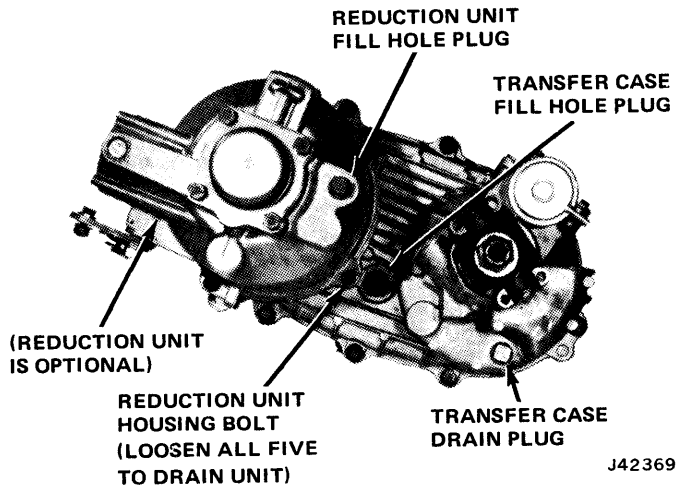


Fig. 8-19 Quadra-Trac Drain and Fill Plug Locations

TORQUE BIAS CHECK

(1) Be sure Emergency Drive is not engaged. The differential must be free to operate and not locked.

(2) Place transmission in N (Neutral).

(3) Disconnect rear propeller shaft front universal joint from transfer case rear yoke.

(4) Have helper apply brakes firmly to lock front wheels and use a socket and torque wrench to apply torque in tightening direction (clockwise) to transfer case rear yoke retaining nut. Brake cones in limited slip differential should release when 80 to 170 foot-pounds of torque is applied.

NOTE: If the brake cones release at a torque value of 80 foot-pounds or less, the differential unit may require replacement. If the cones will not release when 170 foot-pounds torque or more is applied, improper lubricant may be the cause. Refer to *Stick-Slip Condition and Lubrication* in this section.

DRIVE CHAIN TENSION INSPECTION

(1) Remove transfer case drain plug and drain lubricant. Install drain plug.

(2) Remove chain inspection plug.

(3) Thread Chain Tension Gauge, J-25162, into inspection hole just finger-tight until tool shoulders against case.

(4) The tool plunger should protrude past the outer end of the checking tool (fig. 8-20). If tool plunger is

flush or below the end of the tool, the chain should be replaced.

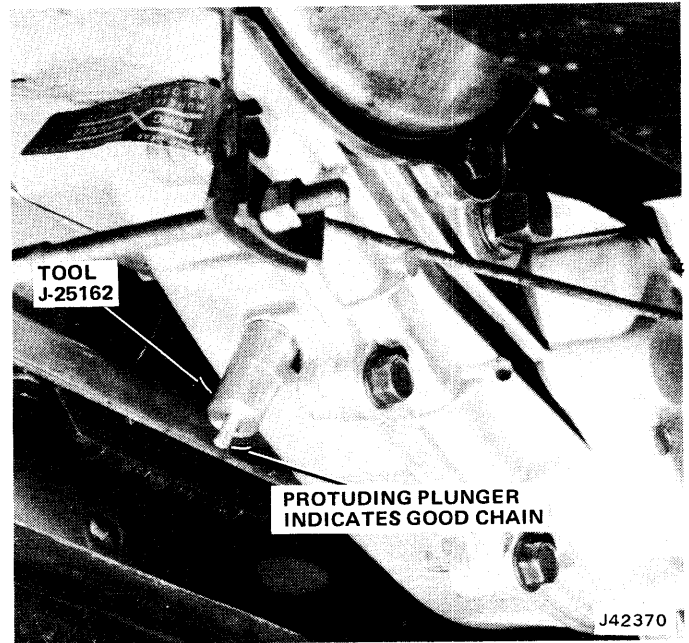


Fig. 8-20 Chain Tension Gauge Installed

OUTPUT SHAFT SEAL REPLACEMENT

(1) Raise vehicle

(2) Place support stand under transmission and remove rear crossmember if front output shaft seal is to be replaced.

(3) Disconnect propeller shaft at transfer case yoke. Mark shaft and yoke for assembly reference. Use wire to tie shaft to frame.

(4) Remove transfer case yoke nut using Tool J-8614-01 (fig. 8-8).

(5) Remove transfer case yoke using Tools J-8614-01, 02, 03 (fig. 8-9).

(6) Remove output shaft seal using Tool J-25180.

(7) Install replacement seal using Tool J-25160.

(8) Install yoke, washer, and yoke retaining nut on output shaft. Tighten yoke nut to 120 foot-pounds torque. Use Tool J-8614-01 to hold yoke while tightening nut.

(9) Connect propeller shaft to yoke. Align shaft and yoke using alignment marks made at disassembly.

(10) Install crossmember (if removed) and remove transmission support stand.

(11) Lower vehicle.

REDUCTION UNIT REMOVAL

(1) Raise vehicle.

(2) Loosen bolts attaching reduction unit to transfer case cover (fig. 8-21).

(3) Move reduction unit rearward just far enough to allow oil to drain from unit.

(4) Disconnect shift linkage at reduction unit control lever.

(5) When oil has drained, remove bolts attaching reduction unit to transfer case cover.

(6) Move reduction unit rearward to clear transmission output shaft and pinion cage which is attached to transfer case drive sprocket.

NOTE: *The pinion cage should not be removed if the transfer case cover assembly is to be removed. However, the cage may be removed for inspection or replacement if the transfer case cover assembly is to remain in the vehicle. Pinion cage removal involves removing the snap ring which secures the cage to the sprocket and sliding the cage rearward.*

REDUCTION UNIT INSTALLATION

(1) If removed, install pinion cage on transfer case drive sprocket splines.

(2) Install retaining snap ring. Be sure snap ring is seated completely in groove (fig. 8-22).

(3) Clean sealing ring groove in transfer case cover and install sealing ring.

(4) Lift reduction unit and mesh caged pinions with sun gear and ring gear, and align sun gear inner splines with transmission output shaft splines.

(5) Move reduction unit forward until it contacts sealing ring.

(6) Install reduction unit attaching screws. Alternately tighten screws to 15 foot-pounds torque.

(7) Connect shift lever linkage at reduction unit control lever.

(8) Fill reduction unit and transfer case assembly with proper quantities and types of lubricants. Refer to Lubrication and Stick Slip Correction for quantity, type, and procedure.

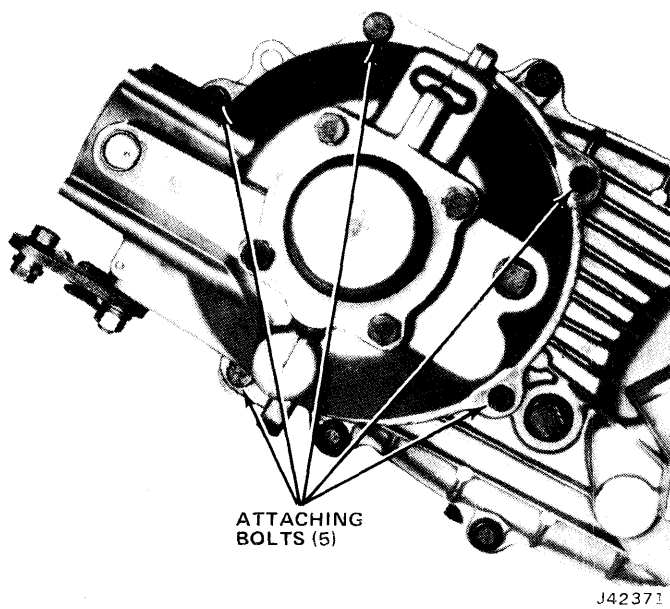


Fig. 8-21 Reduction Unit Attaching Bolts

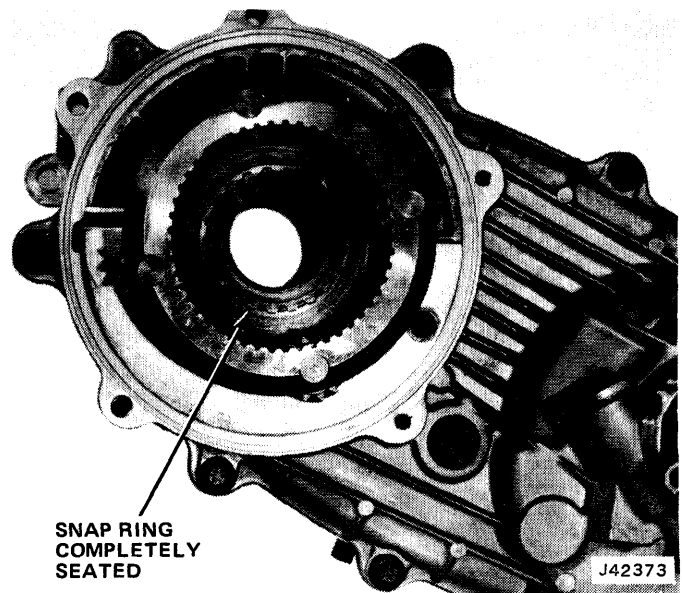


Fig. 8-22 Reduction Pinion Cage—Installed Position

REDUCTION UNIT DISASSEMBLY

(1) Remove power takeoff cover (fig. 8-23).

(2) Position 11/16-inch, 1/2-inch drive deep well socket in vise and clamp securely. Allow two inches of socket to extend beyond top of vise.

(3) Mount reduction unit on socket. Be sure socket enters bore of sun gear (fig. 8-24). Reduction unit should be supported by socket.

(4) Move reduction unit control lever rearward to high range position.

(5) Remove snap ring and spacer from main shaft (fig. 8-25).

(6) Lift reduction unit housing off gear train (fig. 8-26).

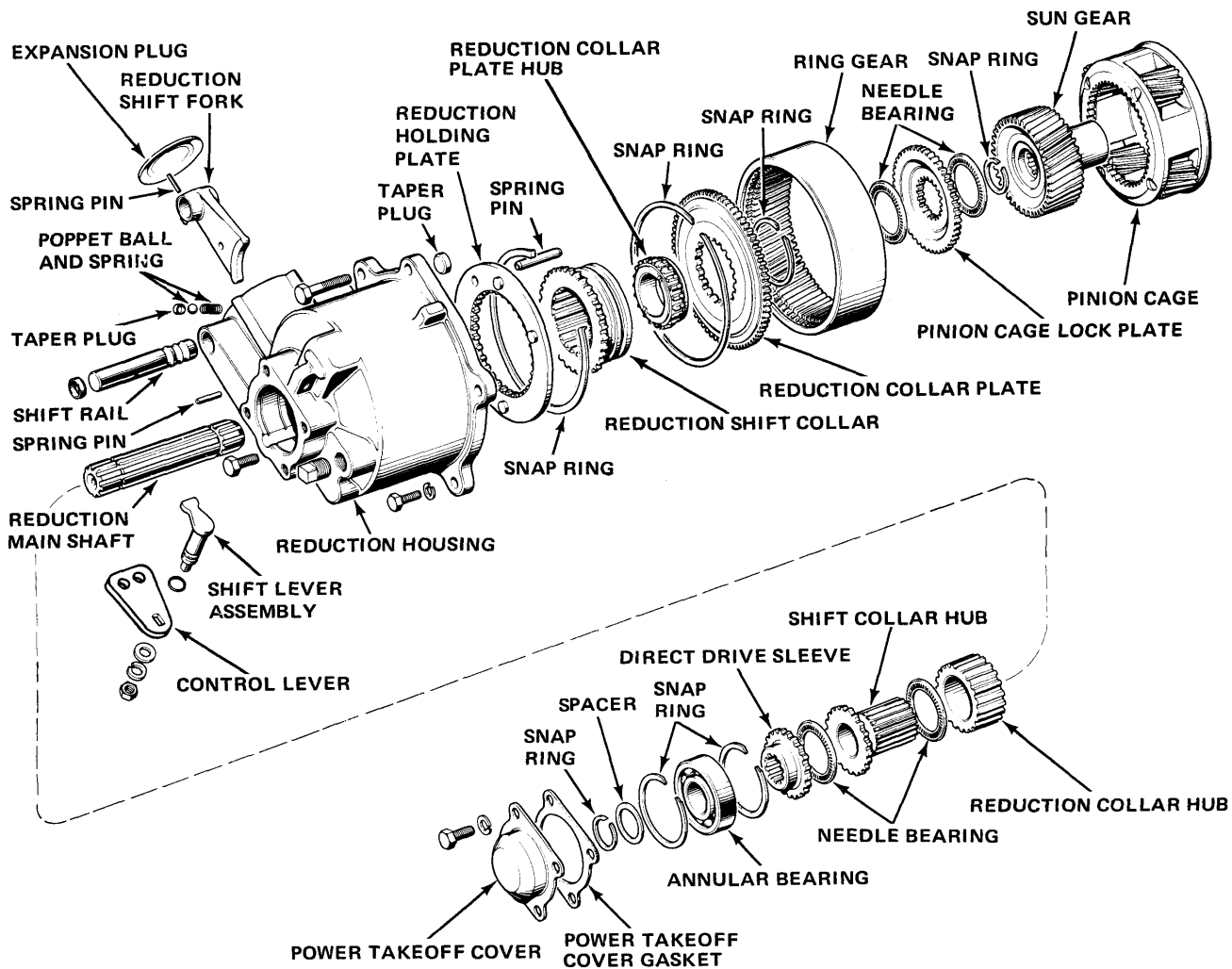
NOTE: *If only the shift collar, annular bearing, or reduction housing are to be serviced, do not remove and disassemble the gear train. Leave the gear train in place on the socket to simplify assembly.*

(7) Remove direct drive sleeve and needle bearing, shift collar hub and needle bearing, reduction collar hub, and ring gear and needle bearings as an assembly (fig. 8-27).

NOTE: *If necessary, reduction collar plate hub and reduction collar plate can be separated from ring gear by removing retaining snap rings.*

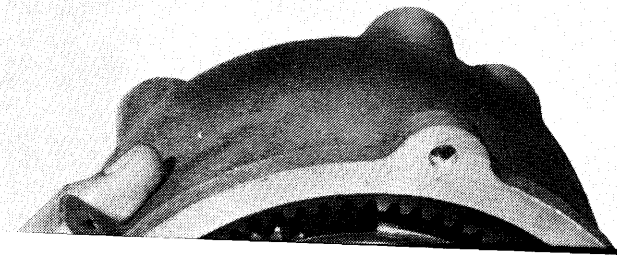
(8) Remove pinion cage lock plate and needle bearings.

(9) Remove sun gear and main shaft from pinion cage (fig. 8-28). Do not attempt to disassemble sun gear and main shaft.



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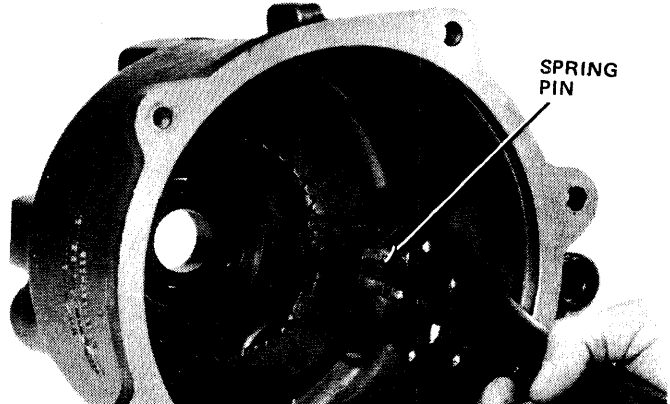
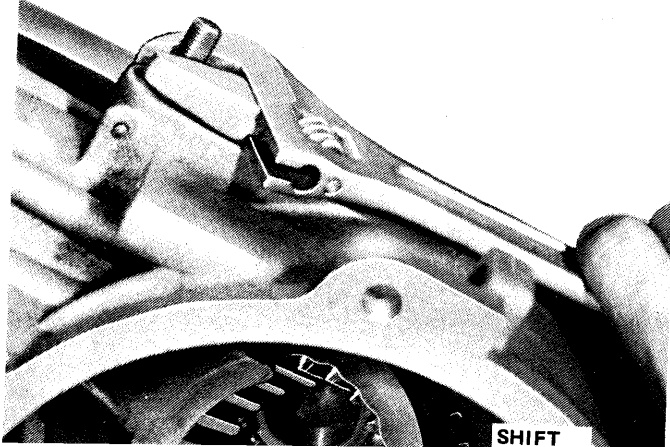
Fig. 8-23 Reduction Unit Components



Shift Collar Removal

- (1) Move control lever to Neutral position and disengage shift collar from shift fork.
- (2) Move control lever rearward to high range position and align outer teeth on shift collar with inner teeth on holding plate.

... shift fork and shift



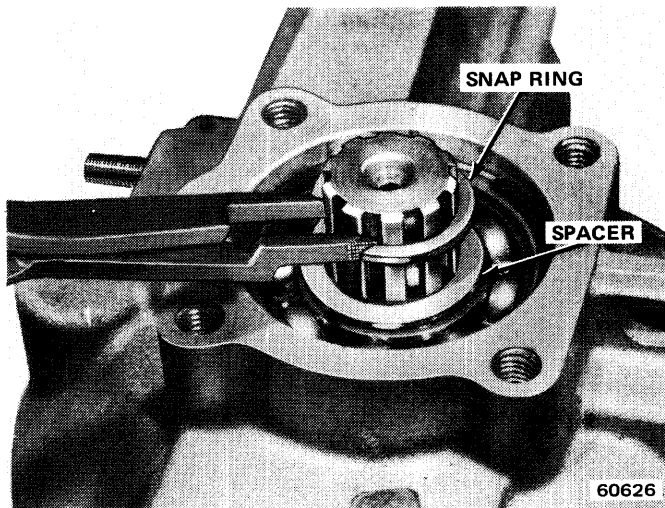


Fig. 8-25 Removing-Installing Main Shaft Snap Ring

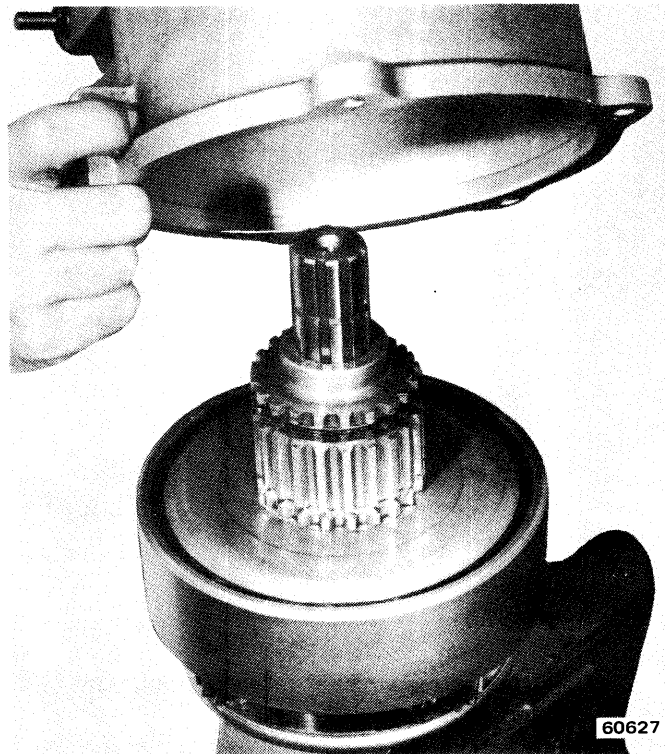


Fig. 8-26 Removing-Installing Housing

Reduction Housing Disassembly

- (1) Remove shift fork locating spring pin by pulling and rotating with pliers (fig. 8-31)
- (2) Remove large expansion plug.
- (3) Remove shift rail taper plugs.
- (4) Remove control lever from shift lever assembly.
- (5) Use 3/16-pin punch and drive spring pin from shift fork and shift rail (fig. 8-32).
- (6) Slide shift rail forward out of shift fork. Remove shift fork.
- (7) Remove shift rail poppet ball.

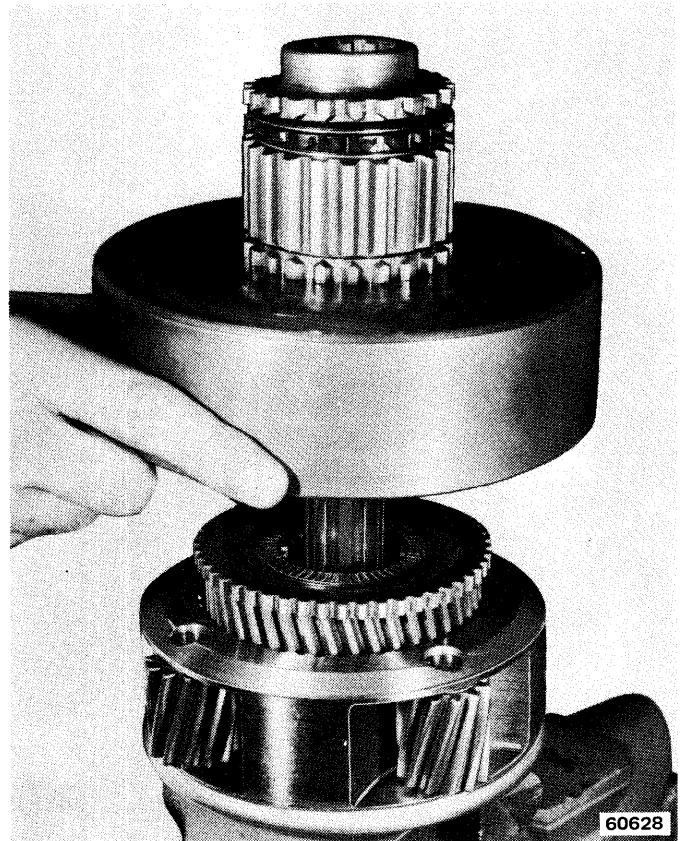


Fig. 8-27 Removing Sleeve, Hubs, and Ring Gear Assembly

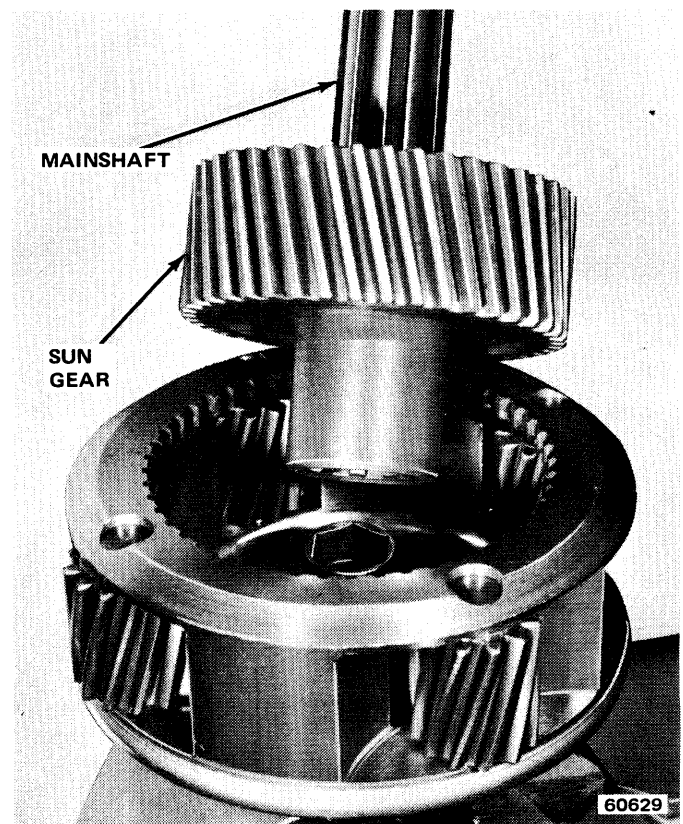


Fig. 8-28 Removing Sun Gear and Main Shaft

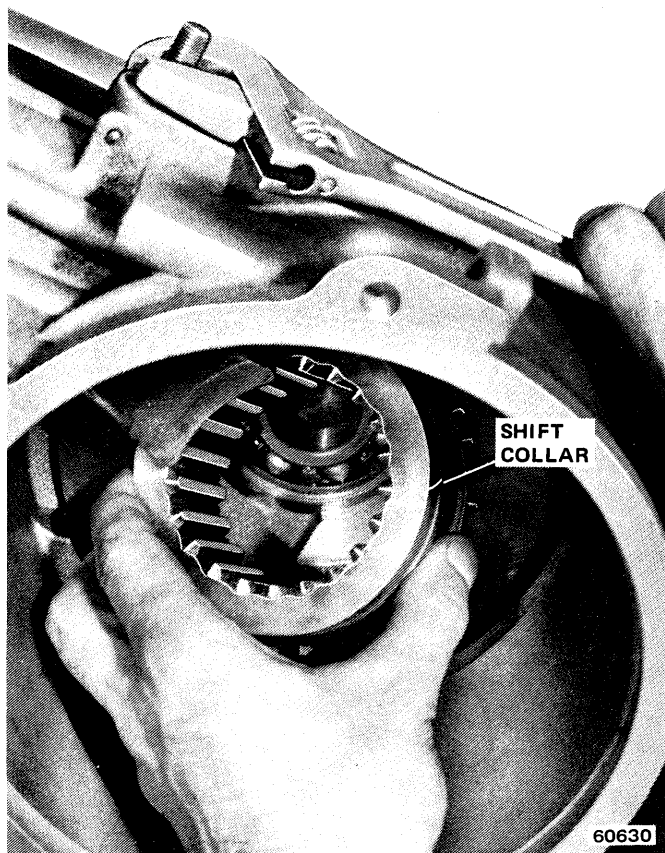


Fig. 8-29 Removing-Installing Shift Collar

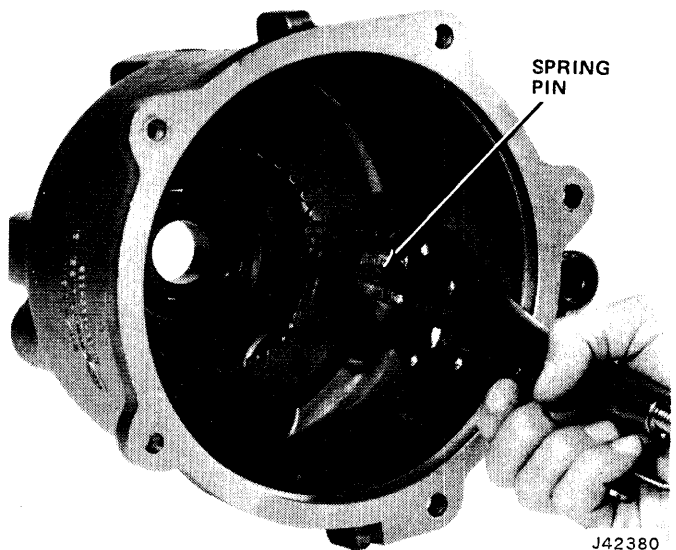


Fig. 8-31 Removing Shift Fork Locating Spring Pin

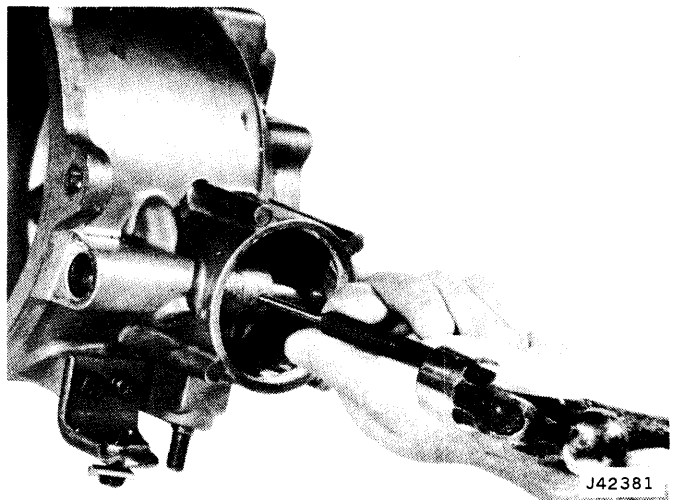


Fig. 8-32 Removing Spring Pin

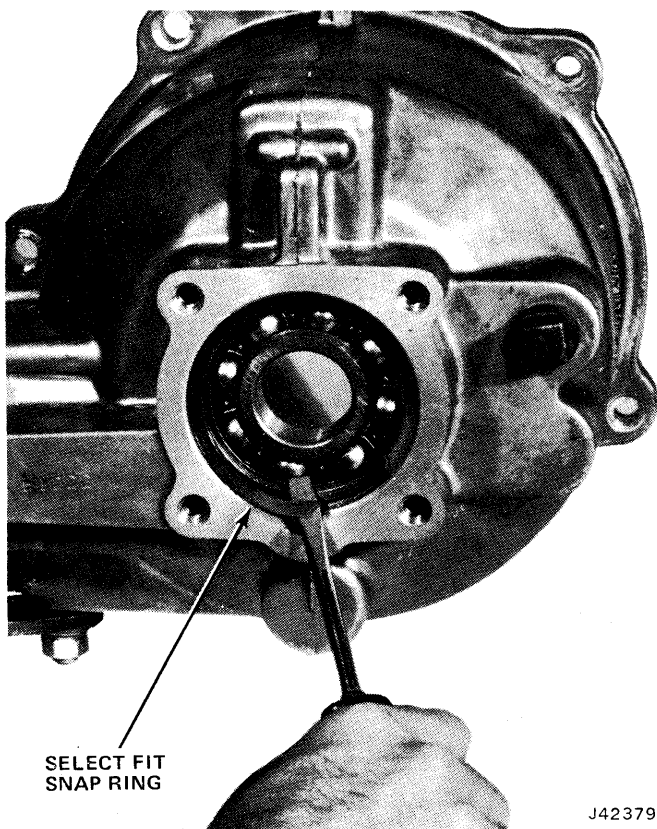


Fig. 8-30 Removing Rear Annular Bearing Snap Ring

(8) Drive poppet taper plug into shift rail bore and remove plug and poppet spring.

(9) Remove shift lever retaining pin and shift lever assembly.

(10) Remove reduction holding plate retaining snap ring and reduction holding plate.

REDUCTION UNIT ASSEMBLY

(1) Install reduction holding plate in case.

NOTE: The locating pins should index in the case, and the shift fork locating spring pin holes in the holding plate and housing must align (fig. 8-33).

(2) Install reduction holding plate retaining snap ring. Snap ring tabs must face forward. Be sure snap ring seats completely in groove and clears shift fork.

(3) Install shift fork locating spring pin.

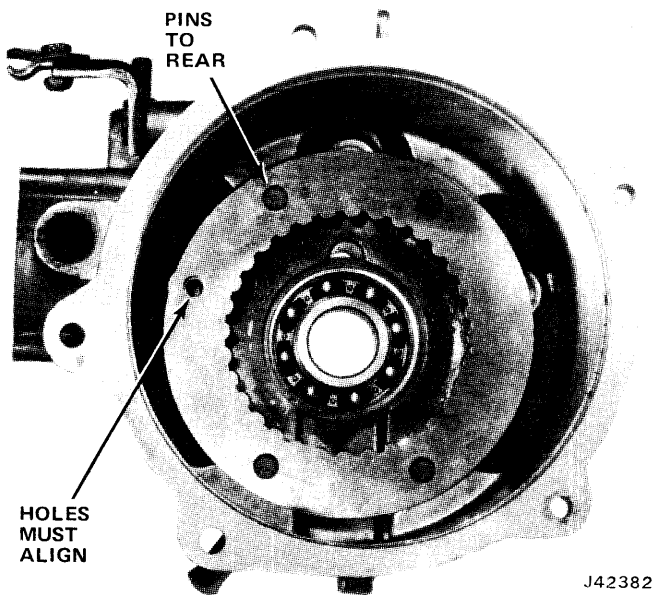


Fig. 8-33 Indexing Reduction Holding Plate

- (6) Move shift lever assembly inward just far enough to allow installation of shaft locating taper pin.
- (7) Install taper pin.
- (8) Insert shift rail, grooved end first, into shift rail rear bore in case.
- (9) Rotate rail so flat side will be adjacent to poppet spring.
- (10) Slide rail inward far enough to allow shift fork to mesh with shift lever assembly and shift rail.
- (11) Push rail through shift fork until end of rail is even with edge of poppet bore.
- (12) Place poppet ball on end of spring.
- (13) Use spring pin as tool and compress poppet ball (fig. 8-35).

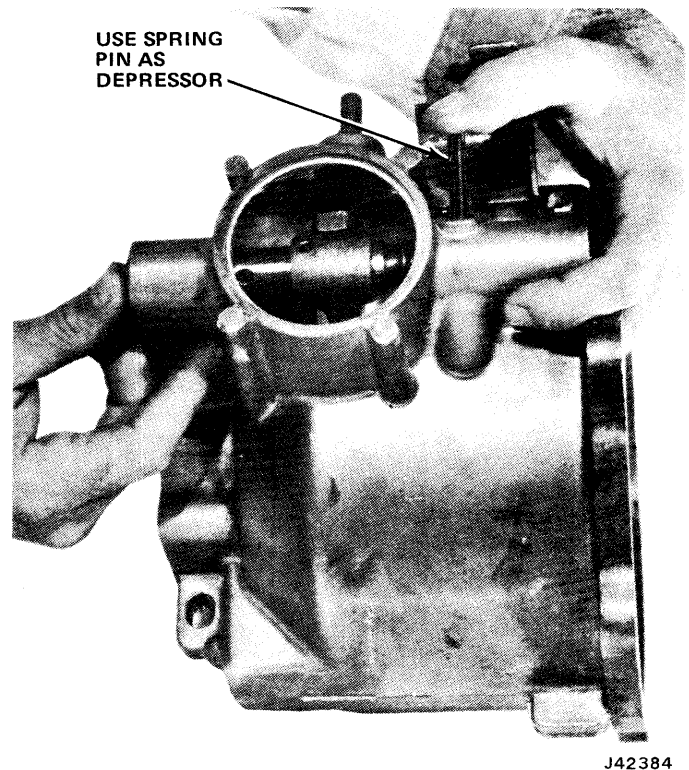


Fig. 8-35 Installing Shift Rail and Poppet Ball

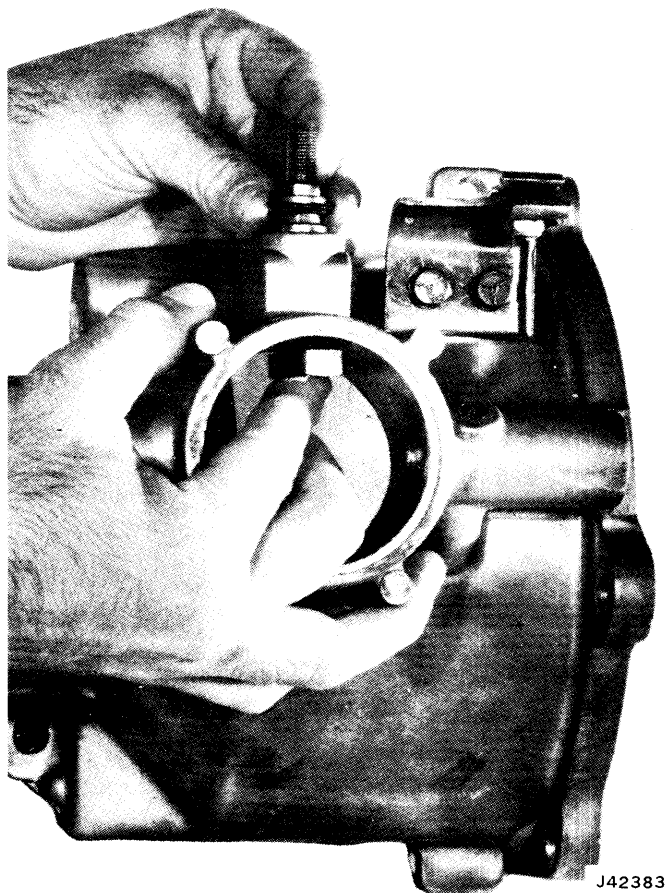


Fig. 8-34 Shift Lever O-Ring Installation

(4) Insert shift lever assembly, without O-ring, fully into housing with lever end facing rearward.

(5) Install O-ring seal in shift lever shaft groove (fig. 8-34).

(14) Slide shift rail over poppet ball as far as spring pin will allow.

(15) Remove spring pin and slide shift rail to first detent position.

(16) Rotate shift rail until flat side is facing shift lever assembly and spring pin bore is aligned with spring pin bore in shift fork.

(17) Slide shift fork on shift rail to align spring pin holes.

(18) Install spring pin flush with outside surface of shift fork (fig. 8-36).

(19) Install shift rail taper plugs, poppet bore taper plug and shift rail cover expansion plug.

(20) Install shift fork locating spring pin.

(21) Install control lever.

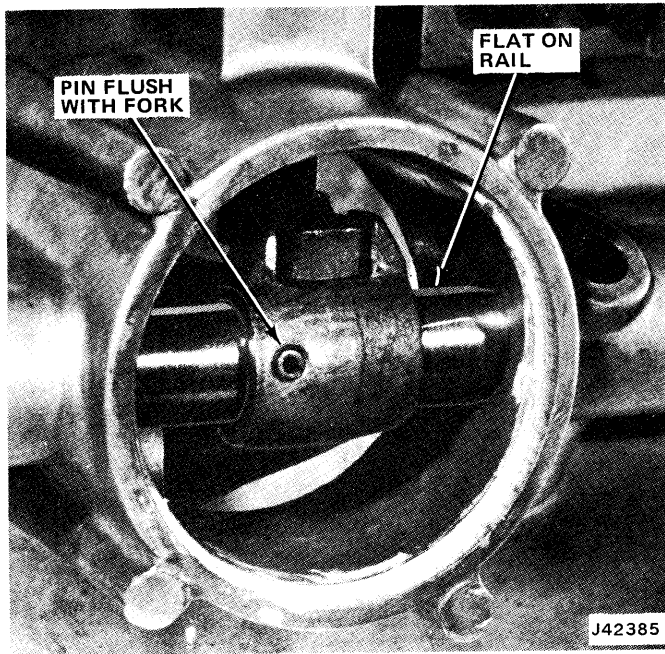


Fig. 8-36 Shift Rail Installed

(22) Install reduction shift collar as follows:

- (a) Position shift fork in center (neutral) detent.
- (b) Place reduction shift collar outer teeth in mesh with reduction holding plate inner teeth. Shift collar fork groove should be just forward of shift fork.
- (c) Move shift fork to rear detent.
- (d) Move shift collar rearward away from fork until groove in collar aligns with fork.
- (e) Move collar toward fork to engage collar groove with shift fork.

(23) Install needle bearing and reduction collar hub on shift collar hub (fig. 8-37).

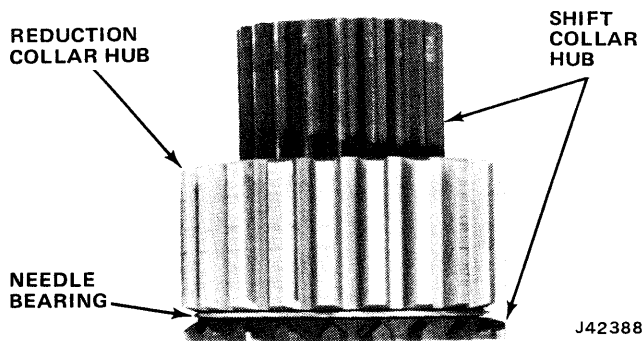


Fig. 8-37 Needle Bearing and Reduction Collar Hub Assembled with Shift Collar Hub

(24) If ring gear was disassembled, install reduction collar and reduction collar plate hub and install retaining snap rings (fig. 8-38).

(25) Install ring gear assembly on top of reduction collar hub with open end of ring gear facing upward (fig. 8-39).

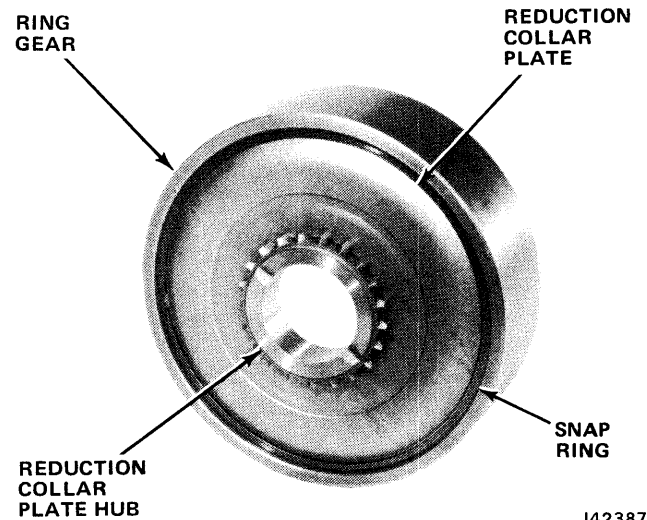


Fig. 8-38 Ring Gear Assembly

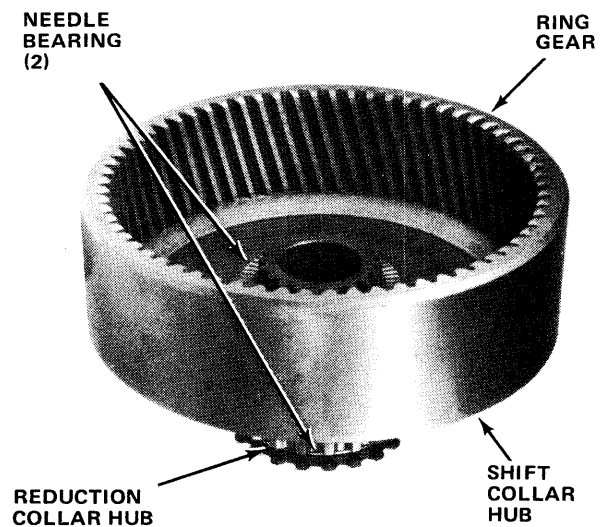


Fig. 8-39 Ring Gear Installed on Reduction Collar Hub

(26) Install needle bearing, pinion cage lock plate, and another needle bearing on that part of shift collar hub that extends through ring gear.

(27) Slide assembled parts toward edge of workbench just far enough to expose bore in shift collar hub. Support assembly with one hand and insert main shaft in bore of shift collar hub with other hand. Be sure main shaft and sun gear are fully seated. Install main shaft and sun gear from open end of ring gear.

(28) Hold assembled parts firmly together, lift assembly and mount assembly on socket (in vise) used to support reduction unit during disassembly.

(29) Install needle bearing and direct drive sleeve on main shaft.

(30) Align splines on assembled parts and install reduction housing (fig. 8-26). Be sure housing is seated

firmly against direct drive sleeve.

(31) Install rear spacer and snap ring. The snap ring is select-fit and is available in thickness ranges of 0.089 to 0.091 inch, 0.092 to 0.094 inch, 0.095 to 0.097 inch, 0.099 to 0.101 inch, and 0.103 to 0.105 inch. Install thickest ring possible to provide 0.004-to-0.009 inch spacer clearance. Be sure snap ring fits securely in groove.

(32) Install power takeoff cover and gasket. Tighten cover attaching screws to 20 foot-pounds torque.

(33) Remove unit from support socket and install pinion cage.

(34) Remove socket from vise.

TRANSFER CASE COVER REMOVAL—IN VEHICLE

Removal

(1) Raise vehicle.

(2) Remove reduction unit if equipped. Refer to Reduction Unit Removal.

NOTE: *The pinion cage will remain with the transfer case assembly.*

(3) Remove transfer case drain plug and drain unit.

(4) Mark rear output shaft yoke and universal joint for alignment reference at assembly.

(5) Disconnect rear propeller shaft at transfer case yoke.

(6) Mark Emergency Drive control diaphragm vacuum hoses for assembly reference and disconnect hoses, switch wire, and speedometer cable.

(7) Remove Emergency Drive indicator switch.

(8) Disconnect park brake cable guide from pivot at right side frame rail.

(9) On CJ-7 models, place support stand under transmission and remove rear crossmember.

(10) Remove bolts attaching case cover assembly to case.

(11) Slide cover assembly backward and off front output shaft and transmission output shaft.

TRANSFER CASE COVER—DISASSEMBLY

(1) Remove rear output shaft yoke using Tool J-8614-01 (fig. 8-8).

(2) If not equipped with reduction unit, remove power takeoff cover from rear of transfer case cover. Remove sealing ring from transfer case cover (fig. 8-40).

(3) Using wooden block 2 by 4 by 6 inches long, position cover and drive sprocket on wooden block (fig. 8-41).

(4) If not equipped with reduction unit, remove drive hub and sleeve from drive sprocket rear splines by expanding internal snap ring. Snap ring expanding tabs are accessible through a slot in the outside edge of the drive sleeve.

(5) If equipped with reduction unit, remove pinion cage snap ring and carrier.

(6) Remove case cover from drive sprocket and differential. Cover, rear output shaft, bearings, and seal, drive sprocket rear needle bearing, and lockup hub may be serviced without disassembling other units.

(7) Slide drive sprocket toward differential unit and remove chain.

NOTE: *The differential unit may be serviced without disassembling other units.*

TRANSFER CASE COVER—ASSEMBLY

(1) Position drive sprocket on wooden block.

(2) Position differential assembly about 2 inches from drive sprocket and with front end of differential on bench (fig. 8-42).

(3) Install drive chain on drive sprocket and differential assembly as shown (fig. 8-43).

NOTE: *Be sure chain is engaged with teeth in sprocket and differential and that slack is removed from chain.*

(4) Insert rear output shaft into differential.

(5) Move lockup hub rearward in case cover. Lubricate drive sprocket thrust washer with petroleum jelly and position on case cover (fig. 8-44).

(6) Align and position case cover on drive sprocket and differential. Output shaft may require slight rotation to align with lockup hub. Be sure drive sprocket thrust washer is not displaced.

(7) If equipped with reduction unit, install pinion cage on drive sprocket rear splines. Be sure snap ring seats completely in groove.

(8) If not equipped with reduction unit, assemble drive hub, drive sleeve, and snap ring, and install on drive sprocket rear splines. Be sure snap ring seats completely in groove.

(9) Rotate drive sleeve or pinion cage to be sure drive sprocket thrust washer did not become mispositioned. Unit must turn easily without binding.

(10) If not equipped with reduction unit, install power takeoff sealing ring and cover. Tighten attaching screws to 20 foot-pounds torque.

(11) Install speedometer gear on rear output shaft (fig. 8-45).

(12) Using Seal Driver J-25160, install rear output shaft oil seal (fig. 8-46).

(13) Install rear yoke and nut. Tighten nut to 120 foot-pounds torque.

TRANSFER CASE COVER INSTALLATION—IN VEHICLE

(1) Clean oil seal groove and install seal ring.

(2) Install two 3/8-16 x 2-inch-long pilot studs in transfer case (front housing).

(3) Move cover assembly forward to mesh with front output shaft and transmission output shaft.

NOTE: *It may be necessary to rotate the rear output shaft to allow the two sets of splines to engage.*

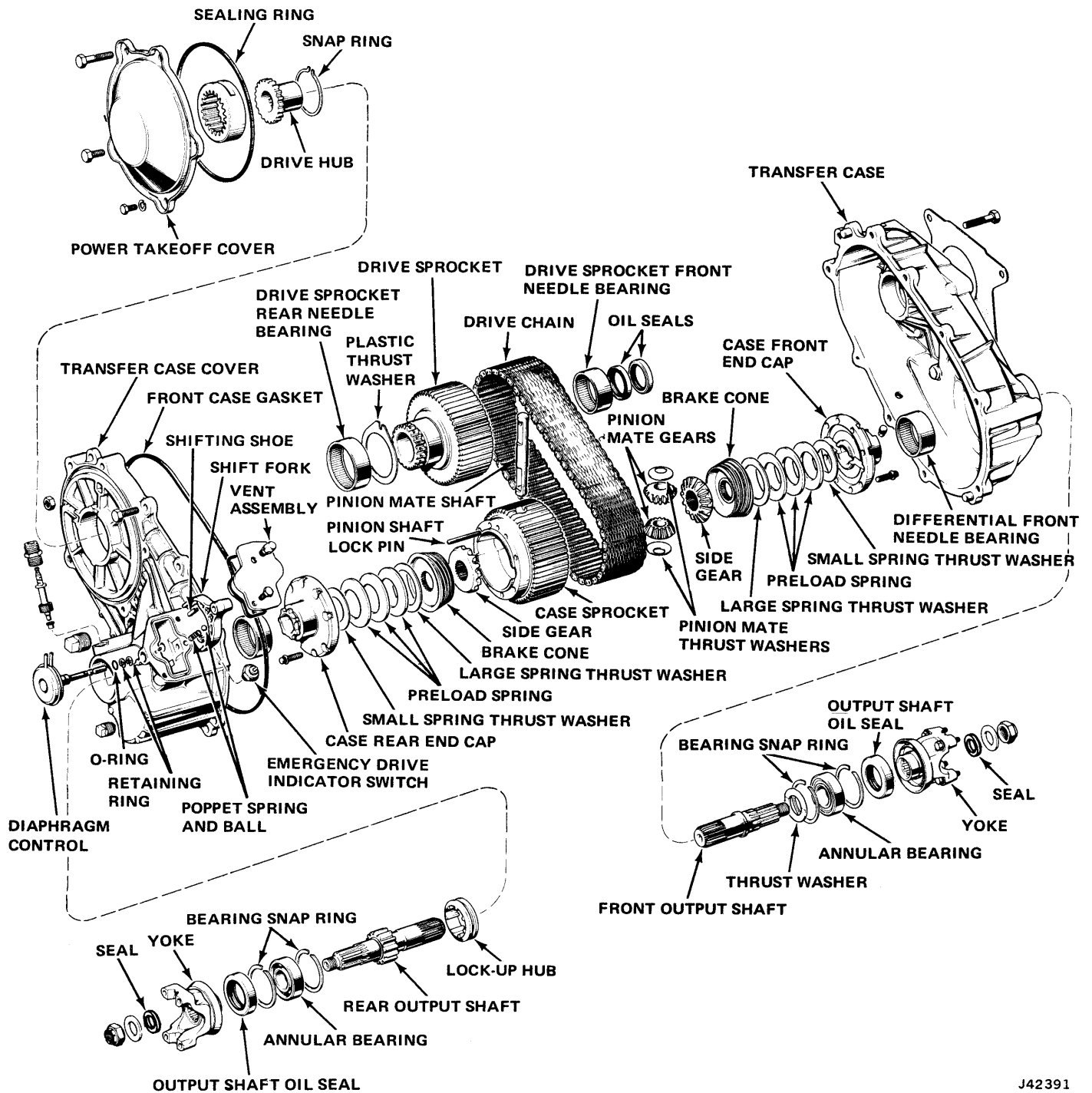


Fig. 8-40 Quadra-Trac Transfer Case Components

(4) Move cover assembly forward until it seats on case. Remove pilot studs and install cover-to-case attaching bolts. Tighten bolts to 15 to 25 foot-pounds torque.

(5) Install emergency drive signal switch and connect signal wire, diaphragm control vacuum hoses and speedometer cable.

(6) Connect rear propeller shaft to transfer case yoke. If necessary, raise rear wheels to align shaft and

yoke.

(7) Connect parking brake cable guide to pivot.

(8) If equipped with reduction unit, install reduction unit and connect shift lever linkage.

(9) On CJ-7 models, install rear crossmember and remove support stand.

(10) Install proper amount of specified lubricant. Refer to Lubrication and Stick Slip Correction.

(11) Lower vehicle.

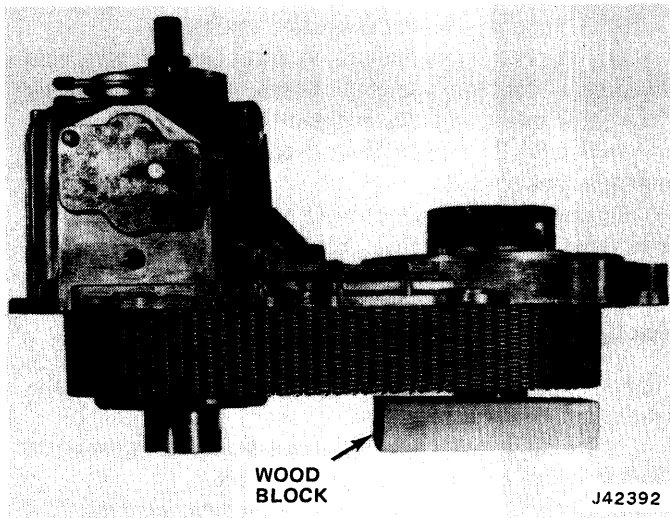


Fig. 8-41 Transfer Case Cover Positioned for Disassembly

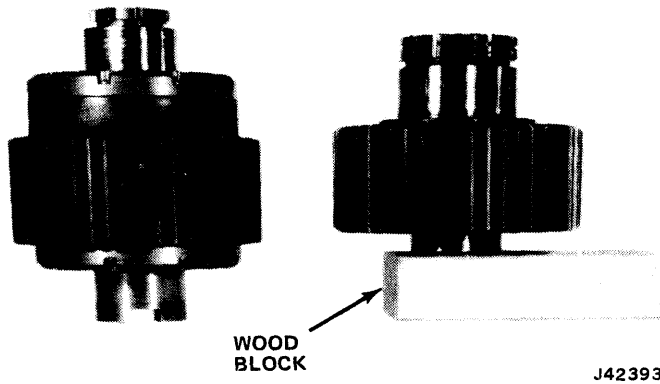


Fig. 8-42 Differential and Drive Sprocket Positioned for Chain Installation

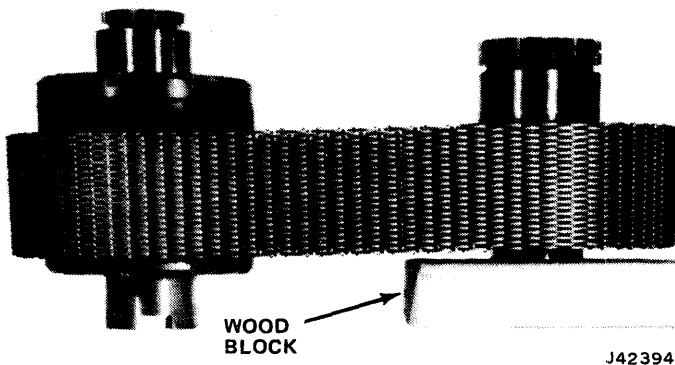


Fig. 8-43 Drive Chain Positioned Around Differential and Drive Sprocket

TRANSFER CASE—REMOVAL

Transfer case removal is not required except when the front output shaft, front annular bearing, transmission output shaft seals or the transfer case (front housing) require service. The drive chain, drive sprocket, differential unit, diaphragm control system, needle bearing,

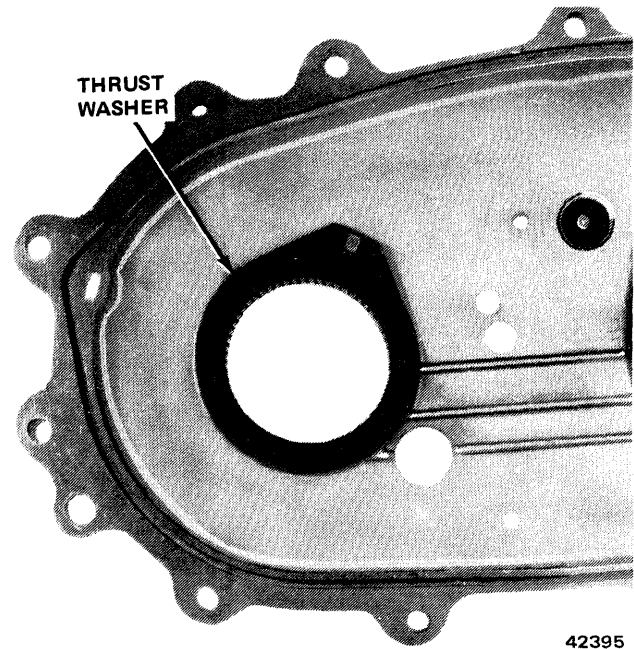


Fig. 8-44 Drive Sprocket Thrust Washer in Position on Case Cover

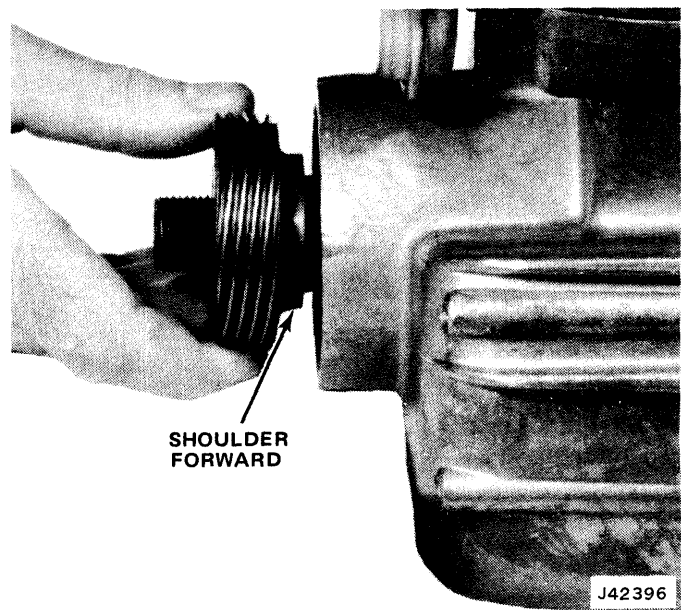


Fig. 8-45 Installing Speedometer Drive Gear

thrust washer, or rear output shaft are serviced in the vehicle by removing the transfer case cover. Refer to Transfer Case Cover—Removal.

- (1) Raise vehicle.
- (2) Mark front and rear output shaft yokes and propeller shafts for assembly reference.
- (3) Disconnect front propeller shaft at transfer case front yoke.
- (4) Disconnect rear propeller shaft at transfer case yoke.
- (5) Remove bolts attaching exhaust pipe support bracket to transfer case.

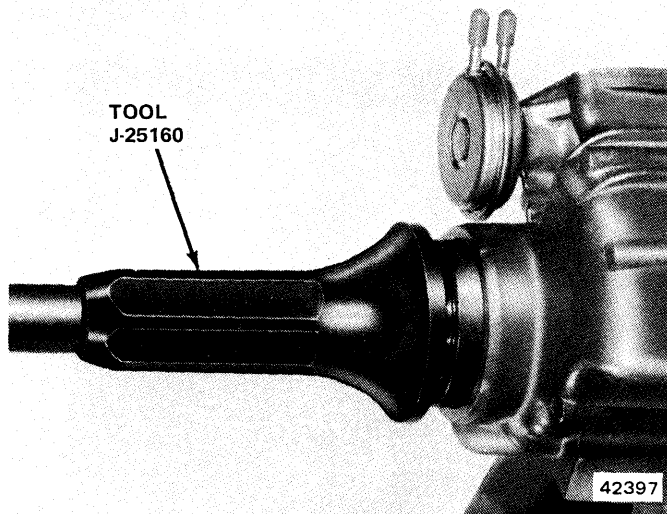


Fig. 8-46 Installing Rear Output Shaft Oil Seal

(6) Mark diaphragm control vacuum hoses for assembly reference, and disconnect diaphragm control vacuum hoses, emergency drive signal switch wire, and speedometer cable.

(7) Disconnect park brake cable guide from pivot on right frame rail.

(8) On CJ-7 models, place support stand under clutch housing and remove rear crossmember.

(9) Remove two transfer case-to-transmission bolts which enter from front side and install 7/16-14 x 5 inch guide pin in upper hole.

(10) Remove two transfer case-to-transmission bolts which enter from rear and install 7/16-14 x 5-inch guide pin in upper hole.

(11) Move transfer case assembly rearward until free of transmission output shaft and guide pins and remove assembly.

(12) Remove all gasket material from rear of transmission.

TRANSFER CASE—INSTALLATION

(1) Position gasket on rear of transmission.

(2) Install 7/16-14 x 5-inch guide pins in upper threaded holes in transmission adapter and transfer case.

(3) Align and install transfer case assembly on transmission. Drive hub splines must align with transmission output shaft. Slight rotation of transfer case rear output shaft yoke may be necessary.

NOTE: Do not install any transfer case attaching bolts until the transfer case is seated against the transmission.

(4) Install front and rear transfer case-to-transmission attaching bolts. Tighten bolts to 40 foot-pounds torque.

(5) Attach exhaust pipe support bracket to transfer case.

(6) Align and connect propeller shafts.

(7) Connect emergency drive signal switch wire and diaphragm control vacuum hoses. Connect parking brake cable guide to pivot bracket on right frame side.

(8) On CJ-7 models, install rear crossmember and remove support stand.

(9) Install proper amount of specified lubricant. Refer to Lubrication and Stick Slip Correction

(10) Lower vehicle.

Drive Sprocket Oil Seal Replacement

Drive sprocket oil seals may be replaced without disassembling the transfer case.

(1) Remove seals using J-type puller or a smooth-ended pry bar. Do not damage case bore.

(2) Install rear seal (lip facing rearward) using Tool J-25213 and Sleeve J-25213-1 as driver. Install seal until sleeve shoulder touches case front surface.

(3) Remove Sleeve J-25213-1. Install front seal (lip facing forward) until driver shoulder touches case front surface (fig. 8-47).

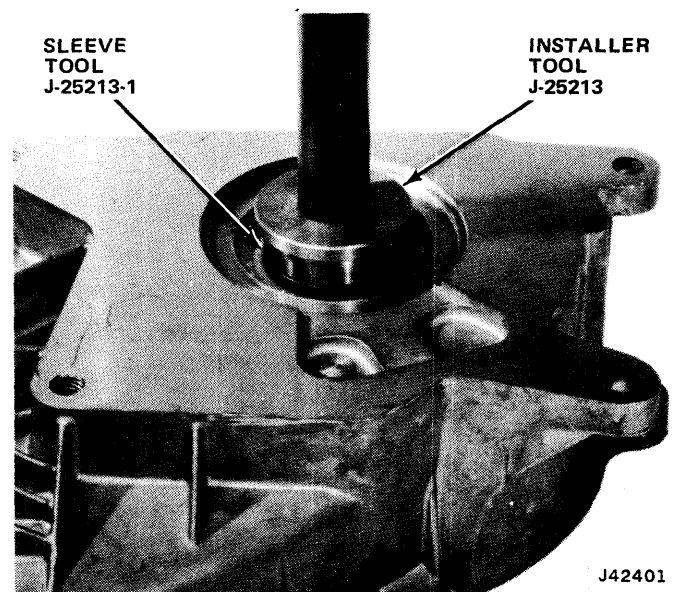


Fig. 8-47 Installing Drive Sprocket Front and Rear Oil Seals

TRANSFER CASE DISASSEMBLY

(1) Remove front and rear output shaft yokes using Tools J-8641-01, -02, -03 (fig. 8-8).

(2) If not equipped with reduction unit, remove power takeoff cover from rear of transfer case cover.

(3) Remove sealing ring from transfer case cover.

(4) Remove transfer case cover to transfer case attaching bolts, and remove cover. Drive chain, drive sprocket, differential unit, and output shaft will remain in cover.

NOTE: The case, front output shaft, bearings, and seals may be serviced at this time without removing the chain, sprocket, differential, etc.

(5) Position cover and drive sprocket on wooden block 2 by 4 by 6 inches long (fig. 8-41).

(6) If not equipped with reduction unit, remove drive hub and sleeve from drive sprocket rear splines by expanding internal snap ring.

NOTE: Ring expanding tabs are accessible through a slot in the outside edge of the drive sleeve.

(7) If equipped with reduction unit, remove pinion cage from drive sprocket rear splines.

(8) Remove case cover from drive sprocket and differential. Case cover, rear output shaft, bearings and seal, drive sprocket, rear needle bearings, and lockup hub may be serviced without further disassembly.

(9) Slide drive sprocket toward differential unit and remove chain.

Subassembly Service

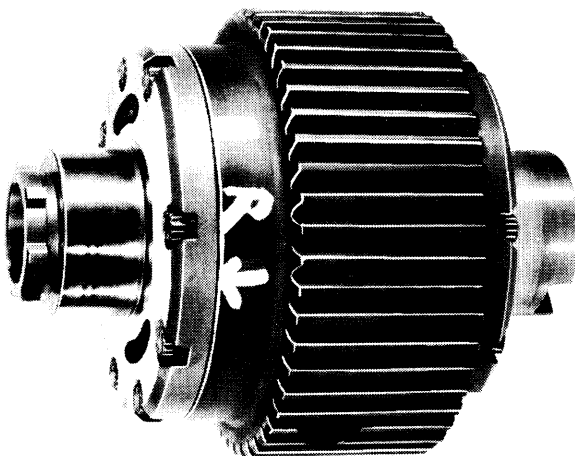
Differential

The differential unit is an unloading cone, limited-slip unit. Belleville springs are used to preload the brake cones. The unit is serviced as an assembly only. However, it may be disassembled for component inspection and cleaning.

During disassembly be sure that the side gears, brake cones, preload springs, and thrust washers are identified and kept together as matched sets. The side gears, brake cones, preload springs, and thrust washers must be installed in their original order in the case sprocket during assembly.

Disassembly

(1) Place paint marks on case sprocket and both end caps for assembly alignment reference (fig. 8-48).



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Fig. 8-48 Case Sprocket and End Caps Marked for Assembly Reference

(2) Remove screws attaching front end cap to case sprocket and remove end cap.

NOTE: It may be necessary to tap the cap with a plastic hammer to remove it.

(3) Remove thrust washers, preload springs, brake cone, and side gear from case sprocket.

NOTE: Keep these parts together and identify them as a matched set.

(4) Invert case sprocket. Remove screws attaching rear end cap and remove cap from case sprocket.

NOTE: It may be necessary to tap the end cap with a plastic hammer to remove it.

(5) Remove thrust washers, preload springs, brake cone and side gear from case sprocket.

NOTE: Keep these pieces together and identify them as a matched set.

(6) Lift case sprocket from bench. Pinion shaft lock-pin should fall free. If necessary, remove pin using 1/4-inch pin punch.

(7) Remove pinion mate shaft from case sprocket using brass shift and hammer.

CAUTION: Do not damage the pinion mate thrust washers.

Cleaning

Wash all parts thoroughly in clean solvent. Be sure all lubricant and metal particles are removed from all surface of every component. Maintain the side gears, brake cones, preload springs, and thrust washers as matched sets.

Inspection

Case Sprocket

The tapered clutch surfaces and pinion gear thrust surfaces will be highly polished. Very small but smooth score marks and original machining marks are permissible; rough score marks or severe wear are not, and replacement is required.

The pinion mate shaft bores may be polished. The shaft should fit tightly in the bores.

The sprocket teeth will show a polished wear pattern. However, deep ridges and valleys on the teeth indicate excessive wear and replacement is required.

Pinion Mate Gears, Washers, and Shaft

The teeth should be free of chip marks; however, a rough machined look is normal. The thrust surfaces and shaft bores may be highly polished with some slightly tarnished spots—this is normal. Galling or excessive wear is not acceptable.

The thrust washers should be smooth and should conform to their mating surfaces. Washer distortion or galling is not acceptable.

The shaft should be straight and fit tightly in the case sprocket. A polished wear pattern is normal. Galling, grooves, or wear on the shaft is not acceptable.

Side Gears

The teeth should be free of chip marks. However, a rough machined look is normal. The thrust surfaces and shaft splines may be highly polished with some slightly tarnished spots—this is normal. Galling or measurable wear is not acceptable.

Brake Cones

The spiral tapered braking surfaces will be highly polished. Very small but smooth score marks and original machining marks are permissible; rough score marks or severe wear are not, and replacement is required.

Preload Springs and Thrust Washers

The thrust washers should be flat and smooth. Light scratches and circular wear pattern are acceptable; severe wear, warping and galling are not, and replacement is required.

The preload springs should be dished approximately 1/4 inch and should be smooth. Light scratches and circular wear pattern are normal. Severe wear, warping, galling, and flatness indicate that replacement is required.

End Caps

The bearing and end thrust surfaces must be polished and smooth. Deep pitting, galling, and scoring indicate that replacement is required.

Differential Unit Assembly

NOTE: During assembly, all bearing and thrust surfaces must be prelubricated with Quadra-Trac Lubricant 8997156 or equivalent.

(1) Slide pinion mate shaft into case sprocket to depth of three inches.

(2) Install pinion mate thrust washers and gears on shaft in proper order (fig. 8-40).

(3) Align pinion mate shaft lockpin hole with lockpin hole in case sprocket. Drive pinion mate shaft into case sprocket until lockpin holes are aligned.

NOTE: Alignment can be checked by looking through the lockpin hole in the case sprocket.

(4) Slide pinion mate gears apart until side gears press washers against case sprocket (fig. 8-49).

(5) Mesh appropriate (front or rear) side gear with pinion mate gears.

(6) Position appropriate brake cone over side gear and into case sprocket.

(7) Place large thrust washer on brake cone.

(8) Place preload springs against thrust washer with concave side of springs facing brake cone.

(9) Lubricate small thrust washer and position it on appropriate end cap.

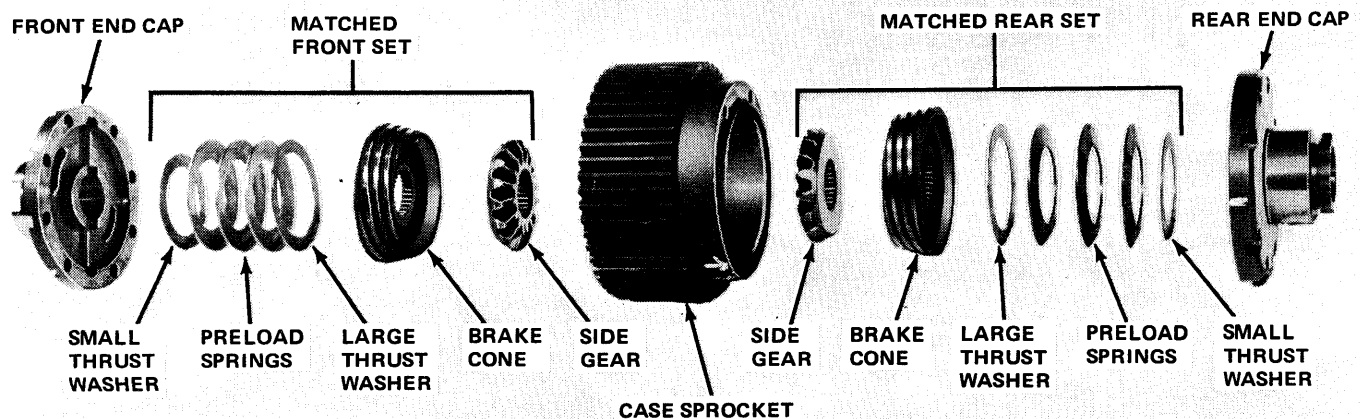
(10) Place end cap and thrust washer on end of case sprocket.

NOTE: Be sure the cap is centered in the preload springs and that the cap is rotated to its original alignment on the case sprocket.

(11) Install end cap attaching screws. Tighten screws alternately and evenly to 27 foot-pounds torque.

(12) Invert case sprocket.

(13) Install pinion shaft lockpin in case sprocket and through pinion mate shaft.



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Fig. 8-49 Differential Unit Assembly Sequence

(14) Engage remaining side gear in pinion mate gears.

(15) Install remaining brake cone over side gear and in case sprocket.

(16) Place large thrust washer on brake cone.

(17) Place preload springs against thrust washer with concave side of springs facing brake cone.

(18) Lubricate remaining small thrust washer and install on remaining end cap.

(19) Place end cap and thrust washer on case sprocket. Be sure cap is centered in preload springs and that cap is rotated to its original alignment on case sprocket.

(20) Install end cap attaching screws hand-tight only.

(21) Using front and rear output shafts as assembly tools, insert shafts into differential and rotate shafts until both are aligned and have entered brake cone splines and side gear splines.

(22) Tighten end cap attaching screws alternately and evenly to 27 inch-pounds torque.

Bearing Replacement

Needle Bearings

To remove the differential front and rear needle bearings and drive sprocket front needle bearing, use Bearing Remover Tool J-25159 (fig. 8-50).

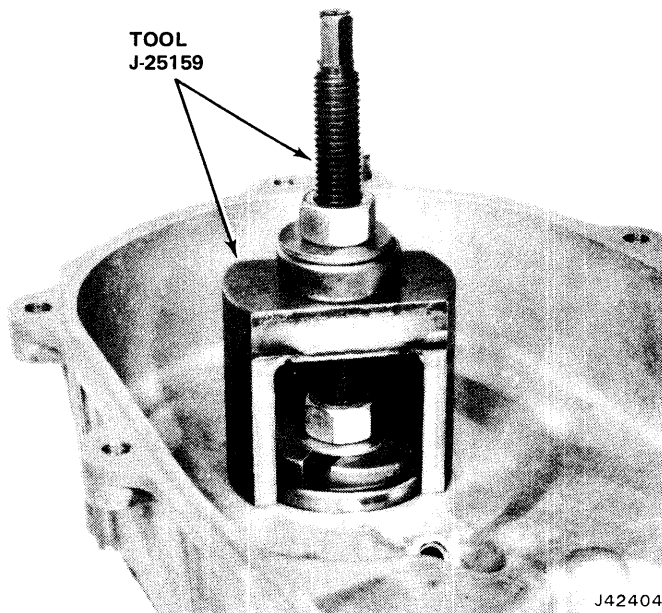


Fig. 8-50 Removing Differential Front or Rear Needle Bearing

Use Bearing Installer Tool J-25212 (less Pilot Adapter J-25212-1) to install the differential front and rear needle bearings (fig. 8-51).

Use Bearing Installer Tool J-25212 with Pilot Adapter J-25212-1 inserted into the case bore to install the drive

sprocket front needle bearing. The drive sprocket oil seals must be removed to allow the pilot adapter to enter the case bore (fig. 8-52).

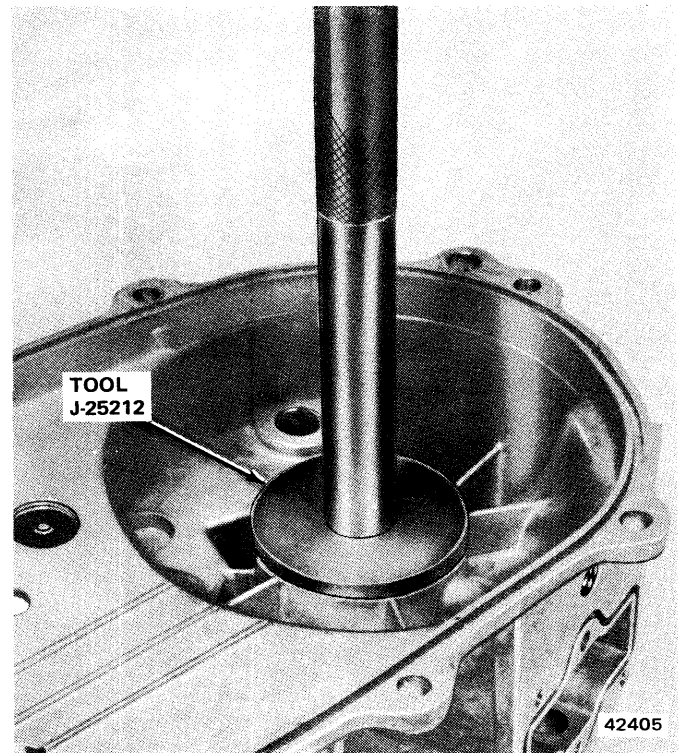


Fig. 8-51 Installing Differential Rear Needle Bearing

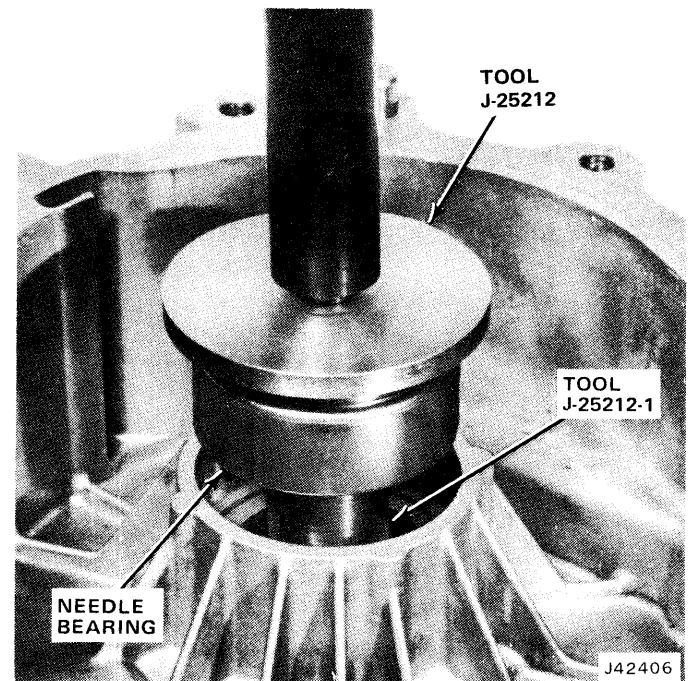


Fig. 8-52 Installing Drive Sprocket Front Needle Bearing

The drive sprocket rear needle bearing may be removed using Bearing Remover and Installer Tool J-25161 and Pilot J-25161-1. The cover must be supported

on the side opposite the driver when the bearing is being removed (fig. 8-53).

Use Bearing Driver Tool J-25161 with Pilot J-25161-1 inserted into the case bore to install the drive sprocket rear needle bearing. The cover must be supported on the side opposite the driver when the bearing is being installed (fig. 8-54).

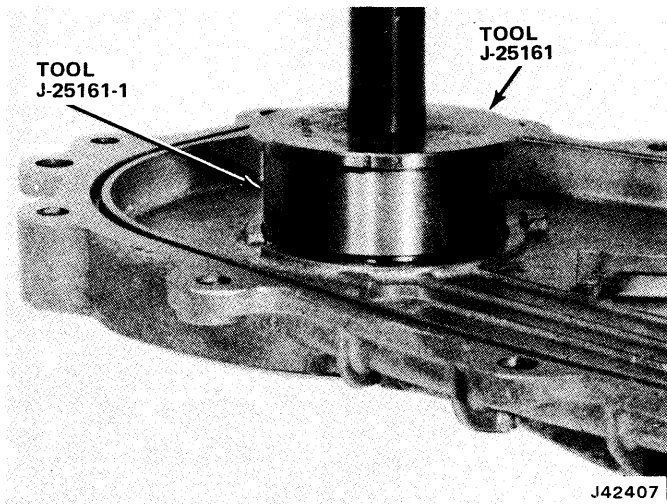


Fig. 8-53 Removing Drive Sprocket Rear Needle Bearing

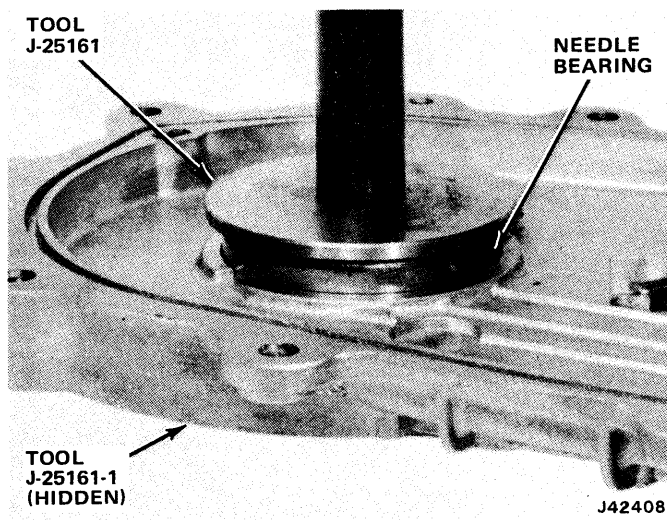


Fig. 8-54 Installing Drive Sprocket Rear Needle Bearing

Annular Bearings

The front and rear output shaft annular bearings are retained in the transfer case and case cover by snap rings. The outer snap ring for each bearing is select-fit and available in four thickness ranges: 0.060 to 0.063 inch, 0.064 to 0.066 inch, 0.067 to 0.069 inch, and 0.070 to 0.072 inch. The inner snap ring for the bearings should always be 0.060 to 0.063 inch thick.

- (1) Remove output shaft yoke seal.

NOTE: If the rear bearing is being replaced, also remove the speedometer gear.

- (2) Remove outer snap ring.

(3) Remove annular bearing. Bearing is snug-fit in bore and can be removed by hand. However, if bearing is tight or if bore is scratched, use brass drift to remove bearing.

(4) Install inner (0.060 to 0.063 inch) snap ring if removed. Insert bearing (shielded side to inside) in bore and tap bearing until it stops against inner snap ring. Use Snap Ring Groove Gauge Tool J-25163 to determine snap ring thickness needed. Install thickest snap ring possible to provide 0.001 to 0.003 inch bearing end play.

Diaphragm Control, Shift Fork, and Lockup Hub

- (1) Remove vent cover and sealing ring.

(2) Remove retaining rings which position shift fork on diaphragm control rod.

NOTE: The shift fork may be pried forward or rearward to gain access to the retaining rings.

- (3) Remove spring using magnet.

NOTE: The diaphragm control rod is held in position by a spring-loaded detent ball.

(4) Insert magnet into opening before removing diaphragm control (fig. 8-55).

- (5) Remove diaphragm from case cover.

- (6) Remove detent ball and spring.

- (7) Remove shift fork and plastic shifting shoes.

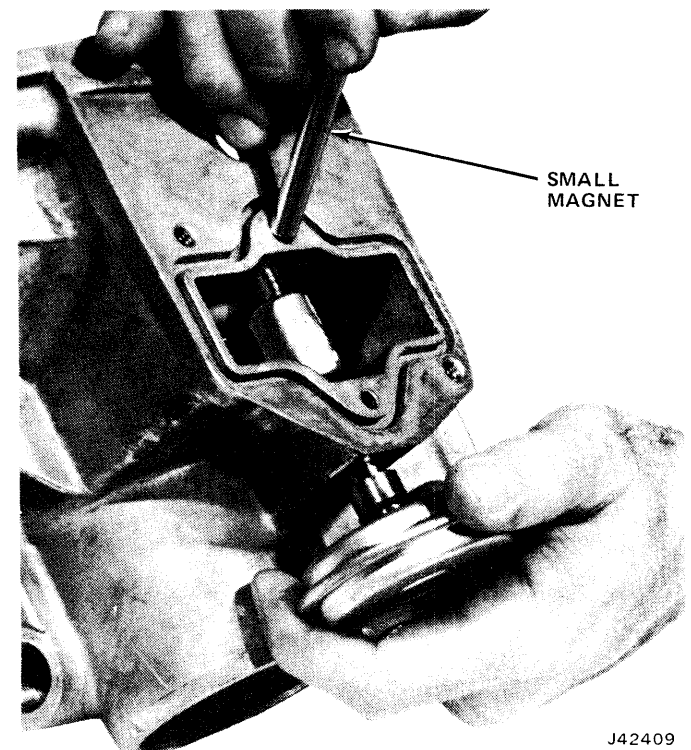


Fig. 8-55 Removing Diaphragm Control

- (8) Remove lockup hub.
 - (9) Lubricate and install shifting shoes in shift fork.
- Install lockup hub in shift fork (fig. 8-56).

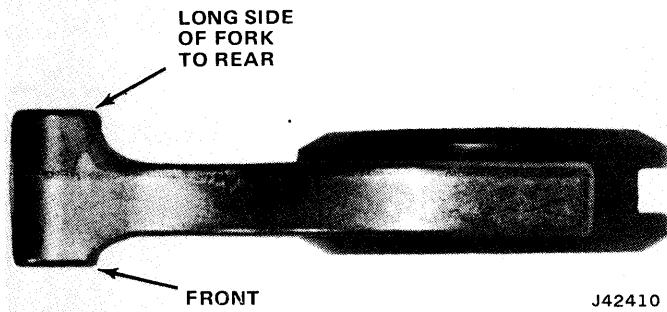


Fig. 8-56 Shift Fork and Lockup Hub Assembly

- (10) Insert fork, with long side of fork to rear, and hub assembly in case cover. Reach through differential needle bearing to keep lockup hub and shift fork from separating.
- (11) Slide diaphragm control rod in case cover and through shift fork but not past detent ball hole.
- (12) Install detent spring and ball in hole. Use 1/4-inch pin punch to depress detent ball and slide diaphragm control rod past ball.
- (13) Install shift fork retaining clips.
- (14) Install diaphragm control retaining spring. Spring should seat below edge of hole. Install vent cover sealing ring and vent cover.

TRANSFER CASE ASSEMBLY

- (1) Lubricate all bearing and thrust surfaces with Quadra-Trac Lubricant 8997156, or equivalent.
- (2) Position drive sprocket on wooden block (fig. 8-42).
- (3) Position differential assembly about 2 inches from drive sprocket and with front end of differential resting on bench.
- (4) Install drive chain around drive sprocket and differential assembly. Be sure chain is properly engaged with sprocket and differential teeth and that slack is removed from chain (fig. 8-43).
- (5) Insert rear output shaft in differential.
- (6) Move lockup hub rearward in case cover. Lubricate drive sprocket thrust washer and install on case cover (fig. 8-44).
- (7) Align and install case cover on drive sprocket and differential. Rotate output shaft and align with lockup hub if necessary. Be sure drive sprocket thrust washer is not displaced.
- (8) Assemble drive hub, drive sleeve, and snap ring if disassembled (fig. 8-57).

(9) If not equipped with reduction unit, install drive sleeve and hub on drive sprocket. Be sure snap ring seats completely.

(10) If equipped with reduction unit, be sure oil baffle is in position, and install pinion cage and snap ring.

(11) Install case assembly on cover assembly and install front output shaft, output shaft thrust washer and front case gasket.

(12) Align and install case on differential drive sprocket. Install case-to-cover attaching screws. Tighten screws alternately and evenly to 20 foot-pounds torque.

NOTE: Do not exceed the maximum specified torque.

(13) Rotate drive sleeve to be sure drive sprocket thrust washer did not become displaced. The sleeve should turn easily without binding.

(14) Install power takeoff sealing ring and cover.

(15) Install speedometer gear on rear output shaft (fig. 8-45).

(16) Install rear output shaft oil seal using Tool J-25160 (fig. 8-46).

(17) Install rear yoke and nut. Tighten nut to 120 foot-pounds torque. Use Tool J-8614-01 to hold yoke while nut is tightened.

(18) Install front output shaft oil seal using Tool J-25160.

(19) Install front yoke and nut. Tighten nut to 120 foot-pounds torque. Use Tool J-8614-01 to hold yoke while nut is tightened.

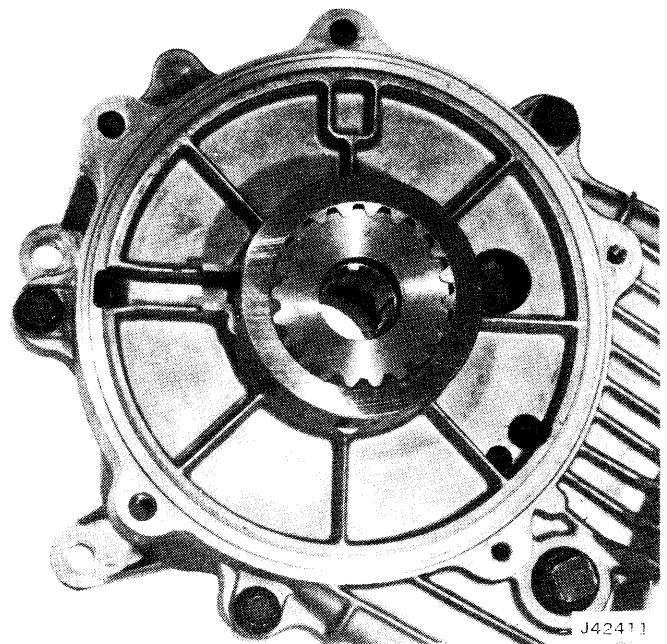


Fig. 8-57 Drive Hub and Sleeve Installed

SPECIFICATIONS

Quadra-Trac Transfer Case

Type . . . Automatically Differentiated Constant 4-Wheel Drive
 Make . . . Warner Gear
 Model . . . Quadra-Trac
 Gear Ratio:
 High . . . 1:1
 Low (With Reduction Unit) . . . 2.57:1

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Quadra-Trac Torque Specifications

Service Set-To Torques should be used when assembling components.

Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Service Set-To Torques	Service In-Use Recheck Torques
Transfer Case		
Breather	8	6-10
Chain Measuring Access Hole Plug	12	6-14
Differential End Bolts	27	24-30
Drain Plug	20	15-25
Fill Plug	20	15-25
Lock-Up Cover to Transfer Case	10	8-10
Emergency Drive Indicator Switch	12	10-15
Output Shaft Nut	120	90-150
Power Takeoff Cover to Transfer Case Bolt:		
3/8-16 Bolts	20	15-25
5/16-18 Bolts	15	10-20
Speedometer Adapter	25	20-30
Transfer Case Cover to Transfer Case	20	15-25
Transfer Case to Transmission Extension Bolt		
.	40	30-50
Reduction Unit		
Fill Plug	20	15-25
Reduction Power Takeoff Cover to Case	20	15-25
Reduction Unit to Transfer Case Bolt:		
3/8-16 Bolt/Nut	20	15-25
5/16-18 Bolt/Nut	10	8-10
Shift Lever to Shaft Nut	20	15-25

All torque values given in foot-pounds with dry fits unless otherwise specified.

Refer to the Standard Torque Specifications and Capscrew Markings Chart in Section A of this manual for any torque specifications not listed above.

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Lubricants

Model 20 Transfer Case SAE 80 or 90 Gear Lubricant
 Quadra-Trac Transfer Case Quadra-Trac Lubricant
 Part No. 8997156 or equivalent

60635

Model 20 Transfer Case

Type Four-Position
 Make Spicer
 Model 20
 Gear Ratio:
 High 1:1
 Low 2.03:1
 Two-Wheel Drive 1:1

60631

Model 20 Transfer Case Torque Specifications

Service Set-To Torques should be used when assembling components.

Service In-Use Recheck Torques should be used for checking a pre-torqued item.

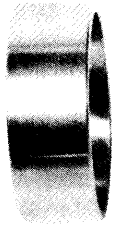
	Service Set-To Torques	Service In-Use Recheck Torques
Front and Rear Output Shaft Yoke Nuts		
.	240	225-250
Front Output Shaft Rear Bearing Cover to Case Bolts		
.	30	28-32
Intermediate Shaft Lock Plate to Case Bolts		
.	14	12-15
Lower Cover to Case Bolts		
.	14	12-15
Rear Bearing Cap Assembly to Case Bolts		
.	30	28-32
Right and Left Shift Fork Setscrews		
.	14	12-15
Shift Rod Housing to Case Bolts		
.	30	28-30
Transfer Case to Transmission Bolts		
.	30	28-32

All torque values given in foot-pounds with dry fits unless otherwise specified.

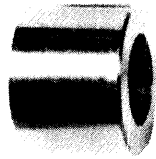
Refer to the Standard Torque Specifications and Capscrew Markings Chart in Section A of this manual for any torque specifications not listed above.

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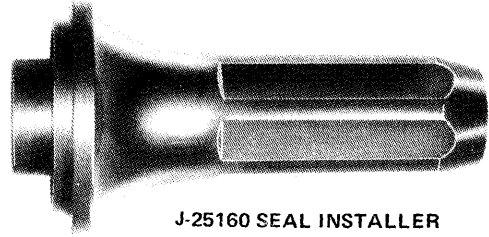
Special Tools (Sheet 1 of 2)



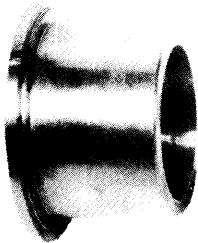
J-25161-1 PILOT



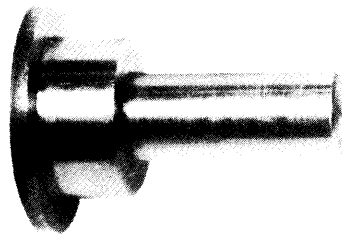
J-25212-1 PILOT ADAPTER



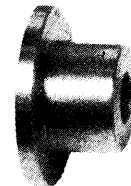
J-25160 SEAL INSTALLER



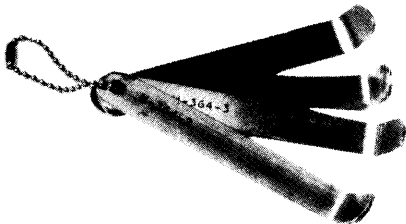
J-25161 BEARING REMOVER AND INSTALLER



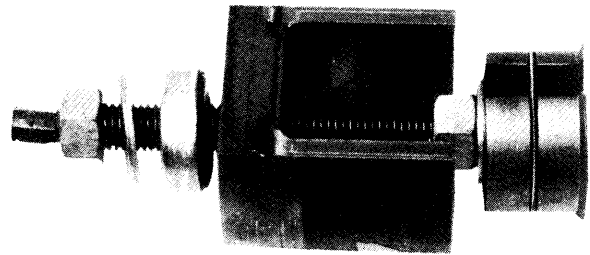
J25212 BEARING INSTALLER



J-25213 SEAL INSTALLER



J-25163 GAUGE SET



J-25159 BEARING PULLER



J-25213-1 SLEEVE



J-25162 CHAIN GAUGE



J-25122 HANDLE

