

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 that provides two gear ratios in 4-wheel drive, one ratio in 2-wheel drive, and a neutral position. The 4-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.

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

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).

TOWING

Manual Transmission

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 FREE position.

Ignition Key Not Available and Vehicle is Unlocked: Shift transmission and transfer case into Neutral and tow vehicle with front wheels raised.

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.

SERVICE PROCEDURES—IN VEHICLE

Shift Rod Oil Seal Replacement

- (1) Disconnect transfer case shift rod control links.
- (2) Install Puller Tool J-25175 and remove seal (fig. 8-6).
- (3) Using thimble and Driver J-25167, install seal (fig. 8-7).
- (4) Connect transfer case shift rod control links.

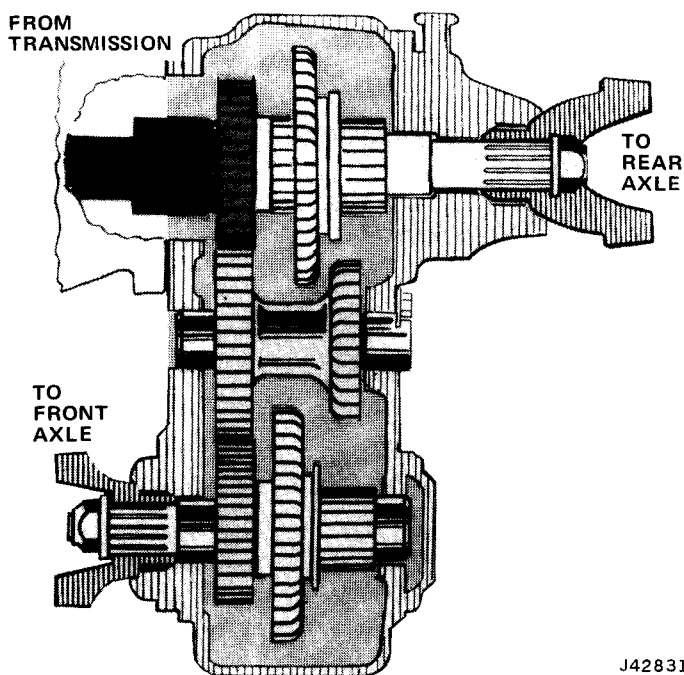


Fig. 8-1 Neutral

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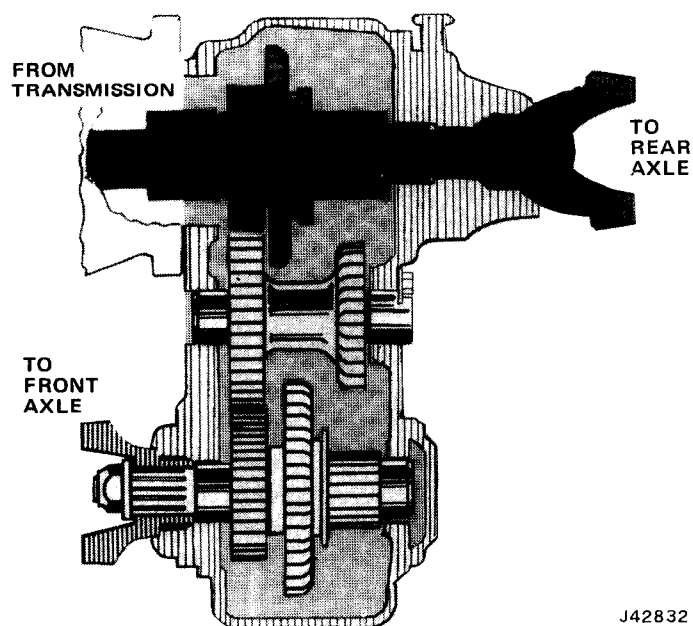
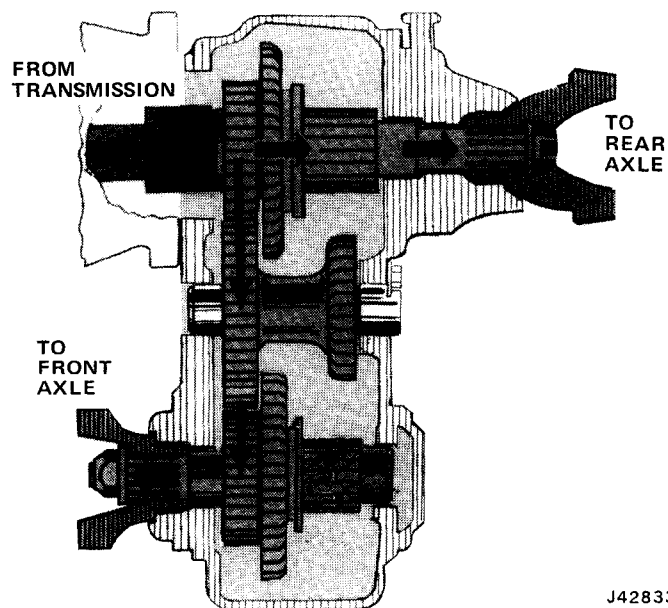


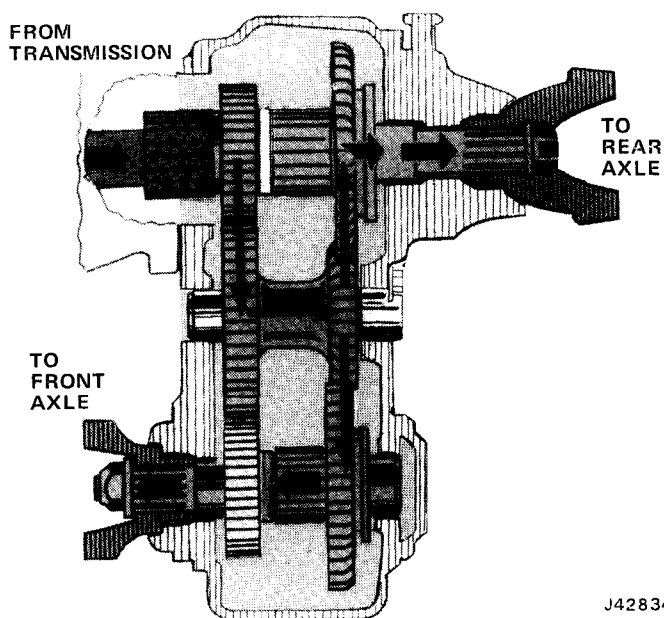
Fig. 8-2 2-Wheel Drive High

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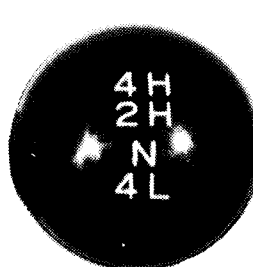
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Fig. 8-3 4-Wheel Drive High



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Fig. 8-4 4-Wheel Drive Low



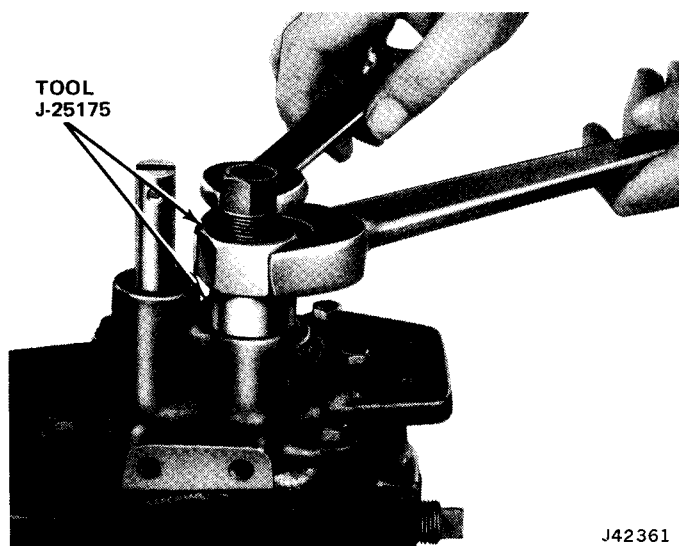
CJ MODELS



CHEROKEE AND TRUCK

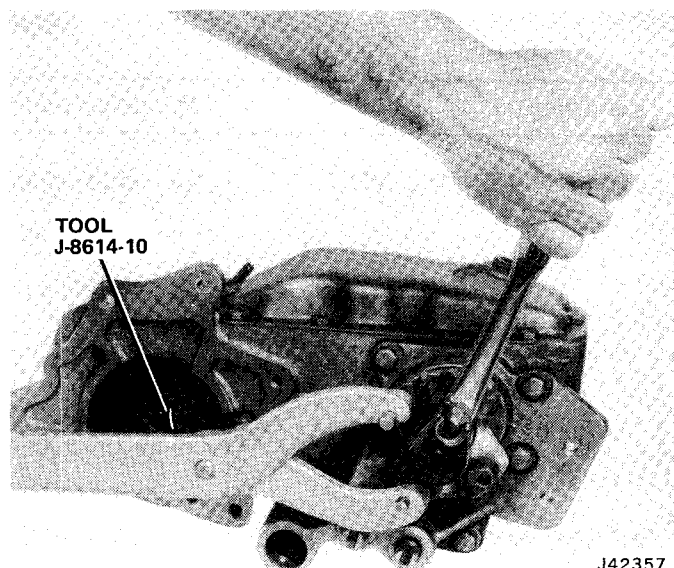
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Fig. 8-5 Transfer Case Shift Knob



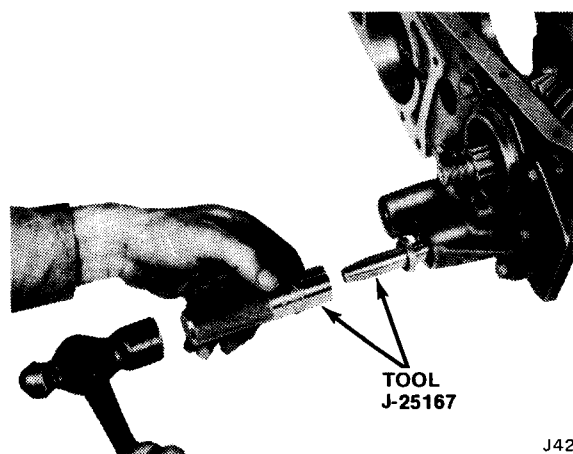
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Fig. 8-6 Shift Rod Oil Seal Removal



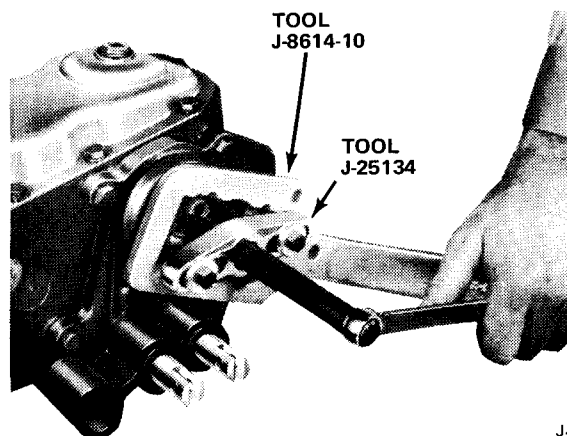
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Fig. 8-8 Removing Front Output Shaft Nut



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Fig. 8-7 Shift Rod Oil Seal Installation



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Fig. 8-9 Universal Joint Yoke Puller

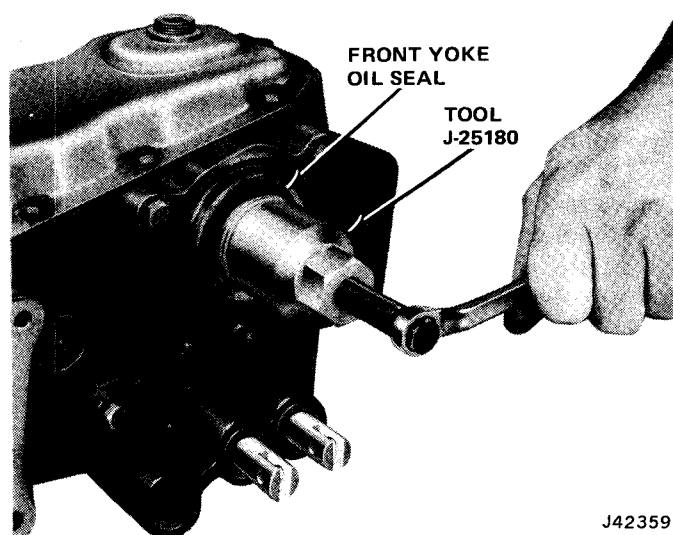
Front Yoke Oil Seal Replacement

- (1) Disconnect front propeller shaft from yoke.
- (2) Remove front propeller shaft nut and washer using Tool J-8614-10 (fig. 8-8).
- (3) Remove front propeller shaft yoke with Puller J-25134 (fig. 8-9).
- (4) Remove oil seal with Puller J-25180 (fig. 8-10).
- (5) Install new seal with Driver J-25132.
- (6) Install yoke, washer, and nut. Tighten nut to 240 foot-pounds torque.

REAR BEARING CAP

Removal

- (1) Disconnect rear propeller shaft at transfer case yoke. Use wire to tie disconnected end of propeller shaft to frame.
- (2) Disconnect speedometer cable.
- (3) Remove bearing-cap-to-transfer case bolts and remove bearing cap.



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Fig. 8-10 Front Yoke Oil Seal Removal

Service Diagnosis

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

Disassembly

- (1) Remove speedometer driven gear sleeve and driven gear from bearing cap.
- (2) Mount bearing cap assembly in vise.
- (3) Using Yoke Holding Wrench J-8614-10, remove yoke nut (fig. 8-8).
- (4) With Universal Joint Yoke Puller J-25134, remove yoke from shaft (fig. 8-9).
- (5) Remove seal from bearing cap bore with Puller 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 out tapered bearing and drive bearing cup from 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 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) Drive front bearing cup into bore.
- (3) Install front bearing on shaft.
- (4) Drive rear bearing cup into bore.
- (5) Install speedometer drive gear and shims on shaft.
- (6) Place output shaft in bearing cap and rest 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 Driver J-25132.
- (9) Install yoke, flat washer, and nut. Tighten nut to 240 foot-pounds torque.

(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.

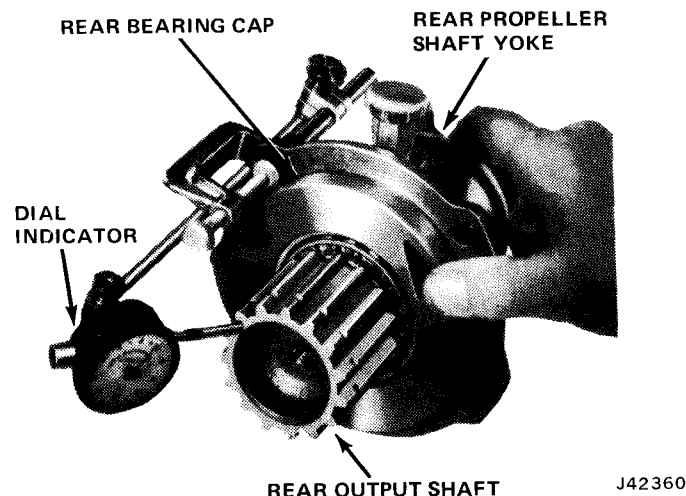


Fig. 8-11 Checking Rear Bearing Cap End Play

Installation

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

(2) Connect speedometer cable.

(3) Install 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 transmission (CJ models only) and transfer case.

(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 front end of case. Bolt is located at bottom right corner of transmission.

Transfer Case Installation

(1) Install transmission-to-transfer case gasket on transmission.

(2) Shift transfer case to 4 WD low 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 transfer case is flush against transmission. Severe damage to transfer case will result if attaching bolts are tightened while transfer case is in bind or 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 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 transmission fluid level and add 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 floor-pan. Install floor covering if equipped.
- (16) Install boots, trim rings, and shift knobs.

Disassembly

NOTE: Refer to figure 8-12 for parts nomenclature.

- (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).

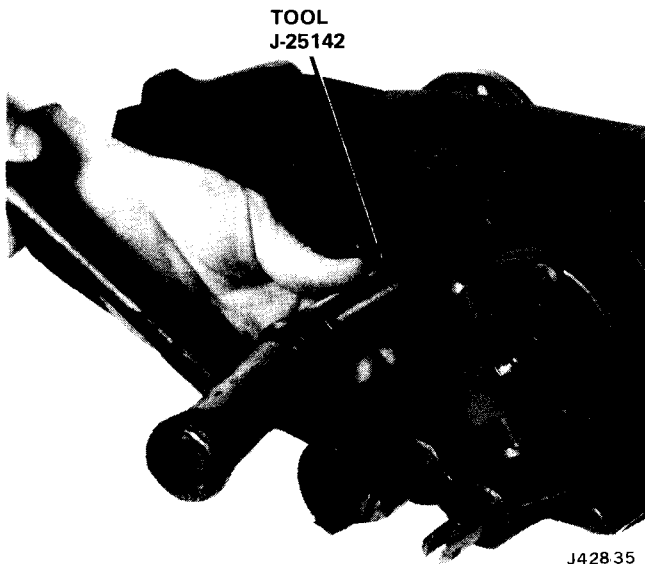


Fig. 8-12 Intermediate Shaft Removal

- (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.
- (8) Remove front output shaft yoke using Yoke Holding Wrench J-8614-10 and Yoke Puller J-25134 (fig. 8-9).
- (9) Remove front oil seal using Puller J-25180 (fig. 8-10).
- (10) Remove cover plate attaching screws and remove cover. Remove front output shaft rear bearing.

CAUTION: When removing cover plate, do not damage the gaskets and shims.

- (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 shift fork is free of rod, use hand to catch poppet ball and spring under shift rod.

- (15) Remove front shift rod housing attaching screws and slide housing off remaining shift rail.
- (16) Remove rear output shaft sliding gear and shift fork.
- (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 shaft through gear splines and drive shaft out of bearing using brass drift and hammer.

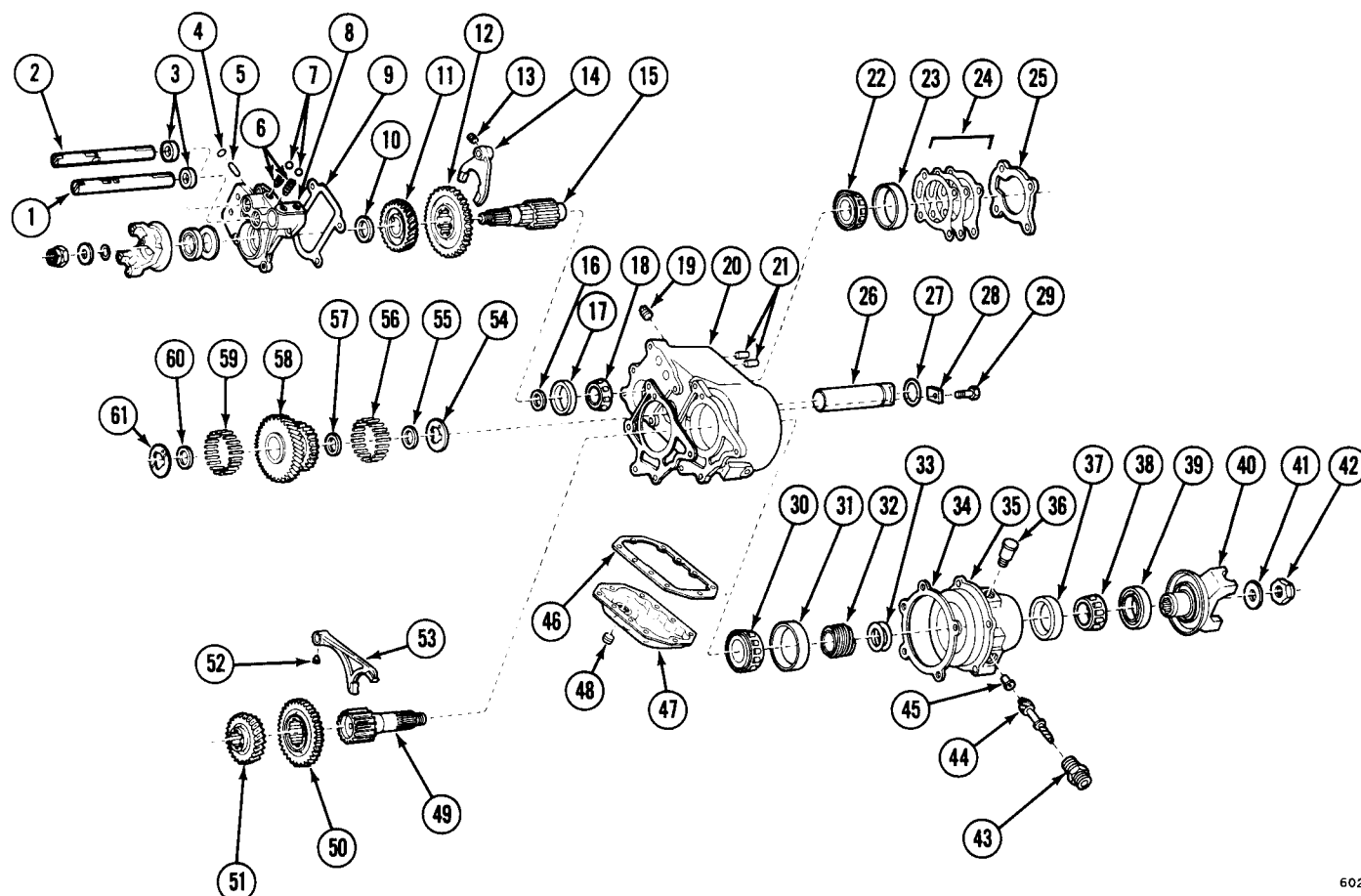
Cleaning and Inspection

Wash all transfer case components and transfer case housing in solvent. Clean gasket material from all 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 shift rod housing. 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.



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

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Fig. 8-13 Model 20 Transfer Case Components

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

(7) Install front output shaft shift fork with setscrew off at 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.

(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.

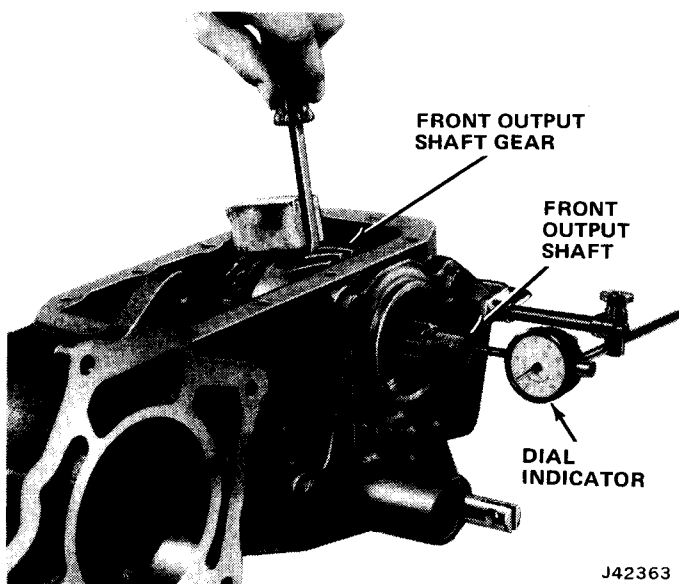


Fig. 8-14. Checking Front Output Shaft End Play

(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 intermediate shaft into case. Hold 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 with Driver J-25132.

(25) Install front propeller shaft yoke and tighten locknut to 240 foot-pounds torque.

(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 mounts to a support tube which is attached to the transfer case. The tube is secured to the transfer case and to the lever assembly by capscrews. 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.

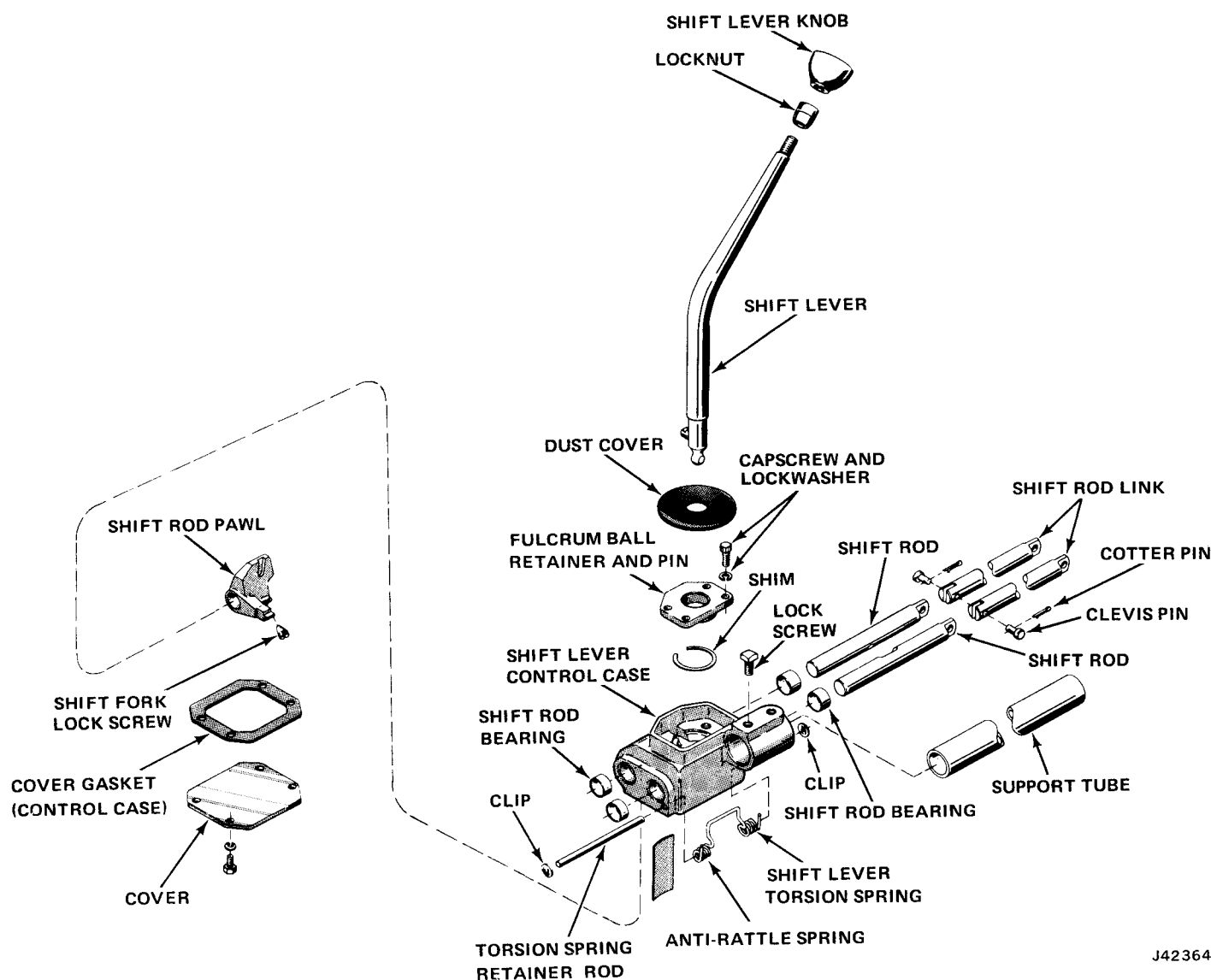


Fig. 8-15 Shift Control Case—Cherokee and Truck

- **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 V-8 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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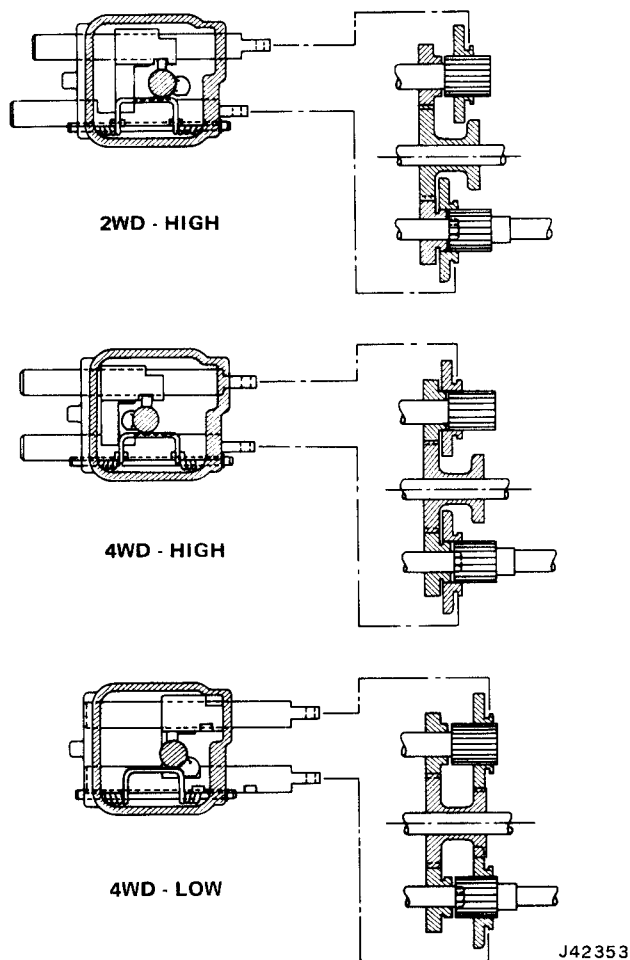


Fig. 8-16 Shift Positions

Assembly

- (1) Install 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 setscrew and tighten.

NOTE: Be sure holes are aligned to permit setscrew to bottom in 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 capscrews. Locating holes are drilled in the support tube at the transfer case end to ensure proper alignment.

- (1) Remove shift lever knobs, trim ring, and boot.
- (2) Remove clevis pins that attach shifting lever links to transfer case shift rods.
- (3) Remove capscrews that secure support tube to transfer case.
- (4) Slide lever assembly from transfer case.

Installation

- (1) Shift lever to 4H (4 WD High) position.
- (2) Position support tube on transfer case (do not install capscrews).
- (3) Using clevis pins, attach shifting lever links to transfer case shift rods.
- (4) Install transfer-case-to-support-tube capscrews and tighten.
- (5) Install boot, trim ring, and shift lever knob.

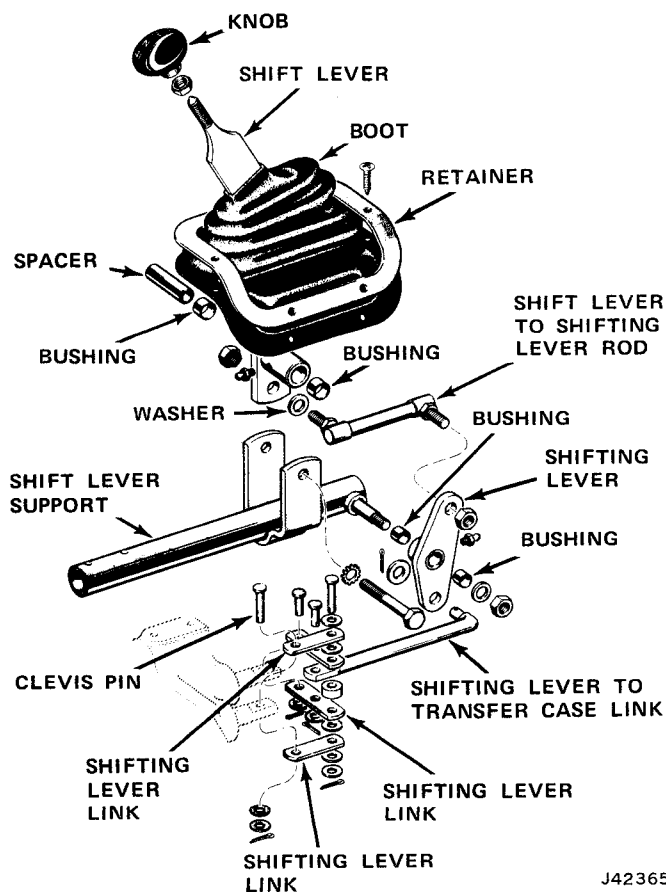


Fig. 8-17 Shift Linkage—CJ Models

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QUADRA-TRAC TRANSFER CASE

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GENERAL

The Quadra-Trac transfer case system 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 drive-line 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 will come on immediately after emergency drive engagement occurs, and will glow 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- or off-road conditions, the low-range reduction unit provides maximum engine braking and maximum torque at low speed.

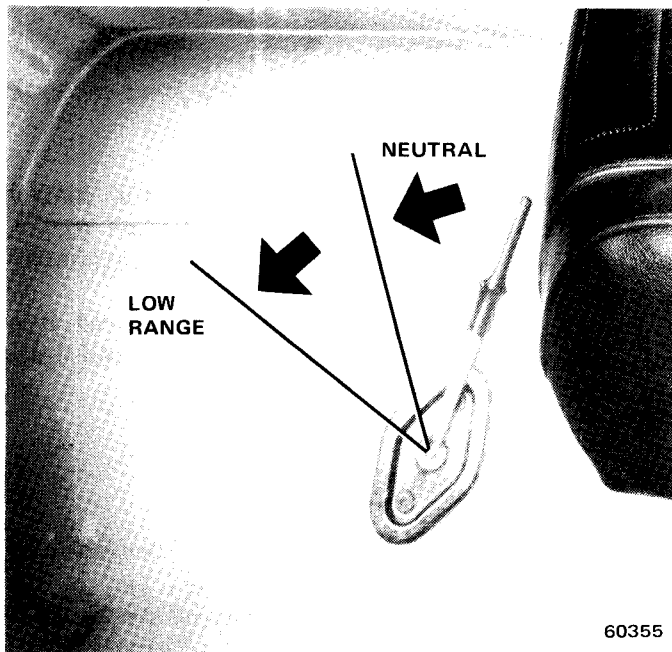
To engage Low Range drive:

- Take foot off accelerator.
- Shift automatic transmission into Neutral (with vehicle moving).

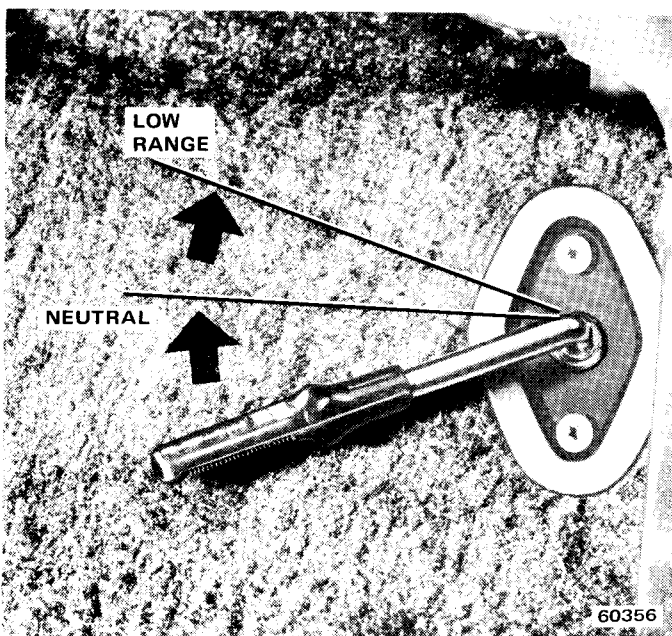
- When vehicle speed drops below 5 mph, engage reduction unit by moving lever fully forward (CJ-7 models) or up (Cherokee, Wagoneer, and Truck models). Do not stop at Neutral position, which is for towing use only.

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.



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Fig. 8-18 Reduction Unit Shift Lever

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 clutch elements of the Quadra-Trac drive system stick, it is under a torque windup condition as in a conventional transfer case. Sudden release of the clutch under this condition results in a constant, pulsating, grunt-like or rasping noise. This is a low-frequency stick-slip noise that, if it occurs, is evident to the driver at slow speeds, such as when slowly turning a corner, or when maneuvering to park.

The 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 a 30W nondetergent oil only, such as Valvoline, Union Custom, or equivalent. Multi-grade, detergent-type oils must not be used. Vehicles experiencing stick-slip caused by improper lubricants may be corrected by completely draining the units and refilling with the specified lubricants.

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 disappear with continued driving.*

Uneven tire inflation pressures and mismatched tire types and sizes will also cause stick-slip noise. Be sure all tires are inflated equally and are of the same size and type.

LUBRICATION

The Quadra-Trac transfer case does not require periodic or scheduled lubrication. However, should a stick-slip condition occur, a full eight fluid ounces of Jeep Lubricant Concentrate, Part Number 8123004, or Lubrizol 5901 or equivalent, should be added. This applies to the Quadra-Trac transfer case with or without reduction unit. It may be necessary to drain a small amount of lubricant from the transfer case to permit addition of the full eight ounces of lubricant.

If the addition of the lubricant does not correct the stick-slip condition, the unit should be drained and refilled.

After adding lubricant, drive the vehicle slowly in left- and right-hand circles for approximately 15 minutes in each direction with the steering wheel one-half turn off full lock. This must be done to circulate the lubricant through the differential assembly in the Quadra-Trac unit.

Lube Change—Without Reduction Unit

Lubricant Blend:

- Jeep Lubricant Concentrate, Part No. 8123004 (or equivalent brand). Use eight ounces.
- SAE 30W good quality nondetergent motor oil (Ashland Valvoline, or equivalent brand). Requirement is 3.5 pints (2.9 Imperial pints or 1.7 liters).

Remove fill plug and drain plug and allow the transfer case to drain completely. Replace drain plug. Install concentrate, then fill to fill-hole level with lubricant blend, as specified above. Replace fill plug (fig. 8-19).

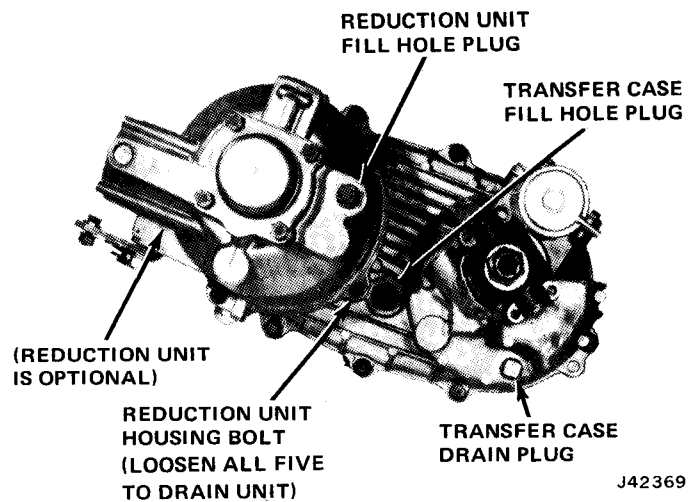


Fig. 8-19 Quadra-Trac Drain and Fill Plug Locations

Lube Change—With Reduction Unit

Use Lubricant Blend:

- Jeep Lubricant Concentrate, Jeep Part No. 8123004 (or equivalent). Use eight ounces.
- SAE 30 (good quality) nondetergent motor oil (Ashland Valvoline, or equivalent). Requirement is 4.5 pints (3.7 Imperial pints or 2.1 liters).

(1) Remove fill plugs from transfer case and reduction unit.

(2) Remove transfer case drain plug. After it has drained completely, replace drain plug.

(3) Loosen five bolts on reduction unit housing (no drain plug), so that the unit can be pulled back far enough to permit the unit to drain. After it has drained completely, move the housing back into position and tighten bolts to 15 foot-pounds torque.

First fill the reduction unit to fill-hole level with lubricant blend, as specified previously. Replace the fill plug. Next, fill the transfer case to fill-hole level with the specified lubricant blend. Replace fill plug (fig. 8-19).

CAUTION: Fill plugs, drain plugs, and reduction housing bolts should not be overtightened. Torque values are 20 foot-pounds for the plugs and the 3/8-16 bolts. Torque for the 5/16-18 bolts is 15 foot-pounds.

CAUTION: Overtightening may result in thread stripping or breakage of the aluminum unit(s).

TORQUE BIAS CHECK

(1) Be sure Quadra-Trac lockout 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. Differential cone clutches should slip when 80 to 170 foot-pounds of torque is applied.

NOTE: Slippage with torques below 80 foot-pounds indicates the need for differential unit replacement. If the unit will not slip by applying 170 foot-pounds torque or less, improper lubricant may be the cause. Refer to Stick-Slip Condition and Lubrication paragraphs 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, Tool Number 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.

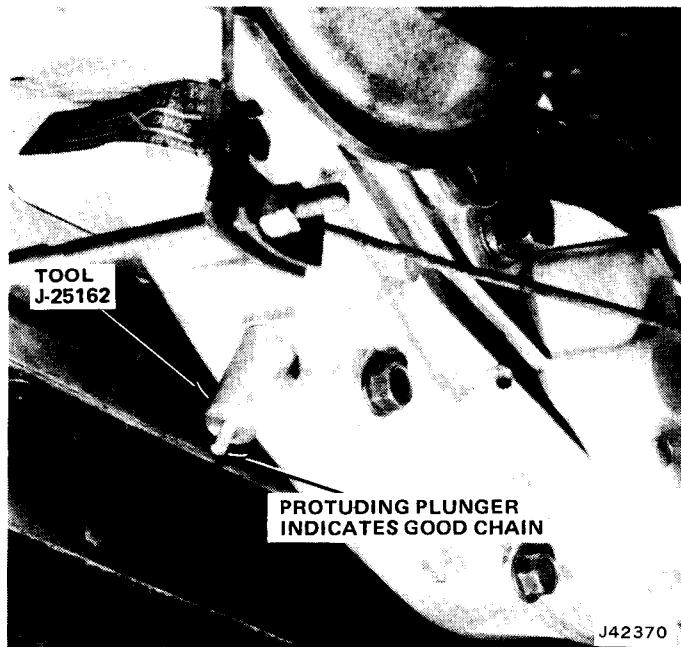


Fig. 8-20 Chain Tension Gauge Installed

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, but 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.

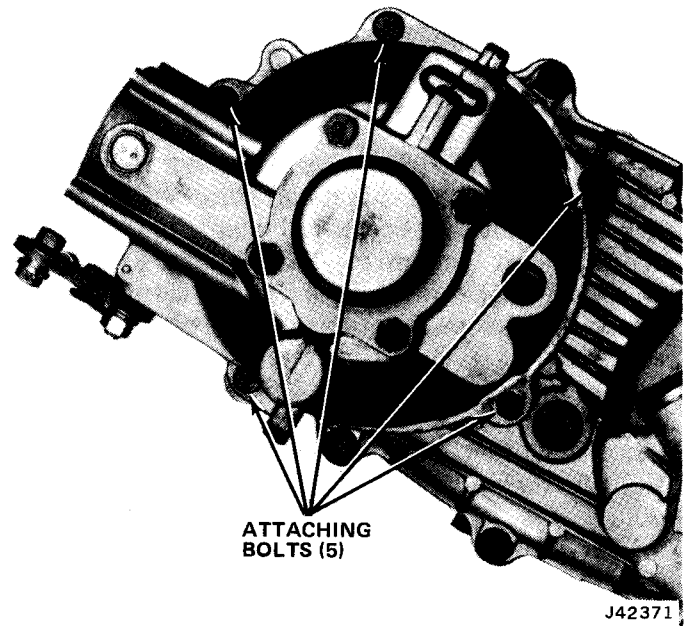


Fig. 8-21 Reduction Unit Attaching Bolts

REDUCTION UNIT INSTALLATION

- (1) If removed, install pinion cage onto 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 attaching screws. Alternately tighten screws to 15 foot-pounds torque.
- (7) Connect shift lever linkage at reduction unit control lever.

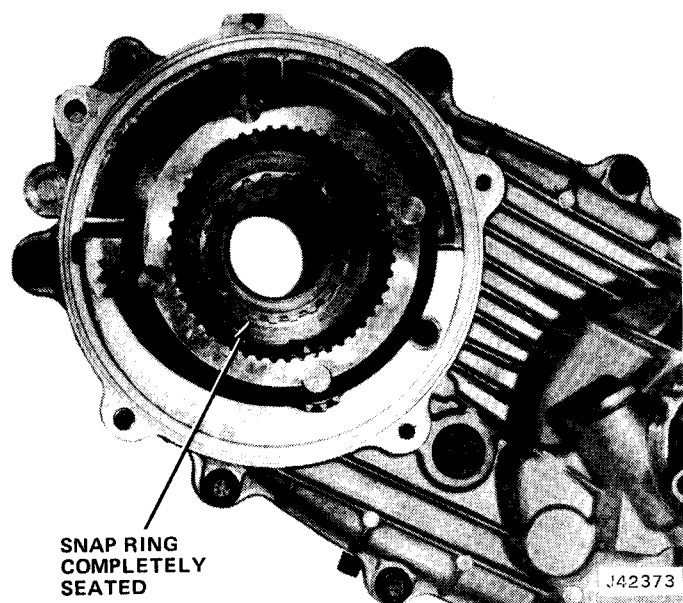


Fig. 8-22 Reduction Pinion Cage Installed

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

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) Place reduction onto 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).

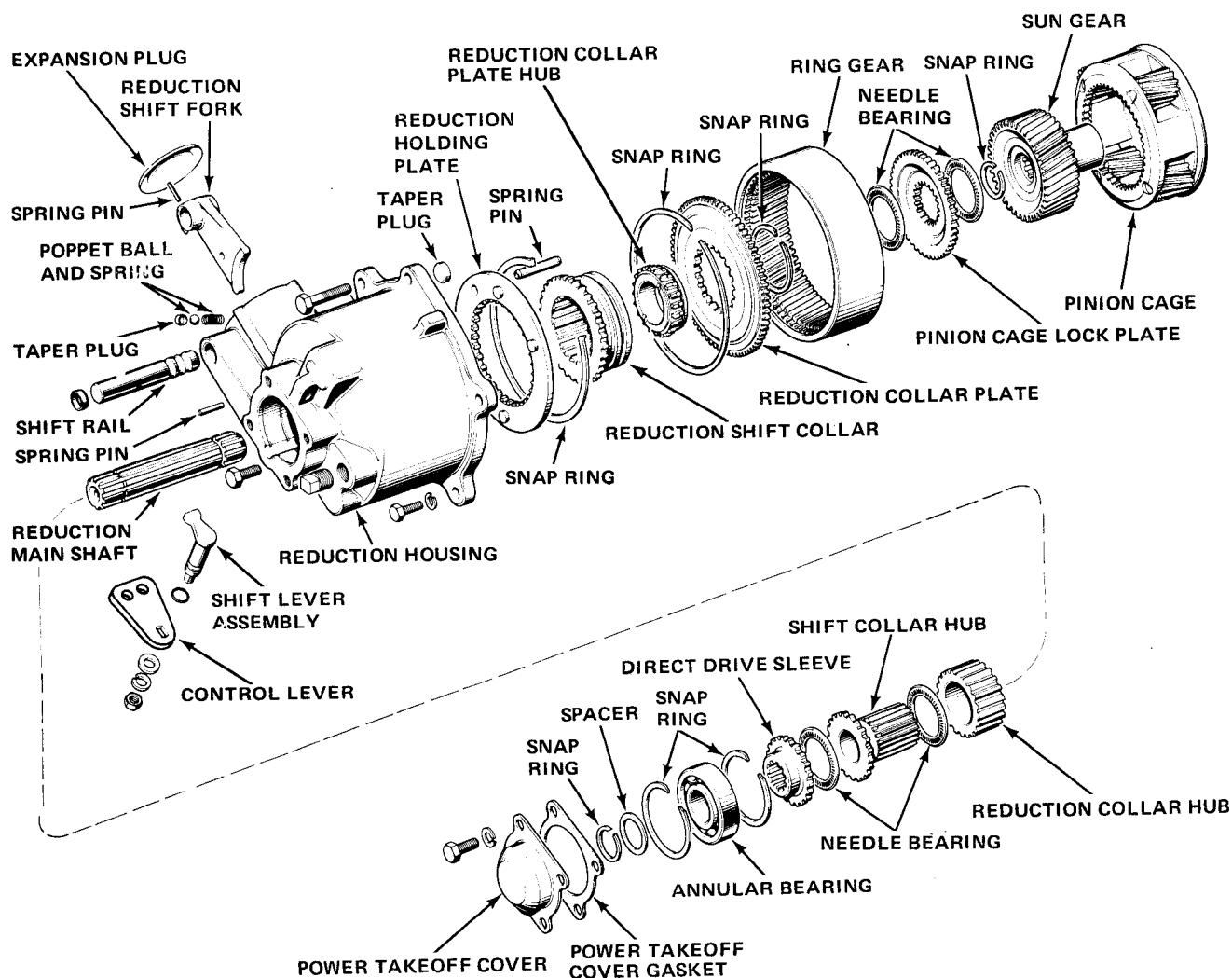


Fig. 8-23 Reduction Unit Components

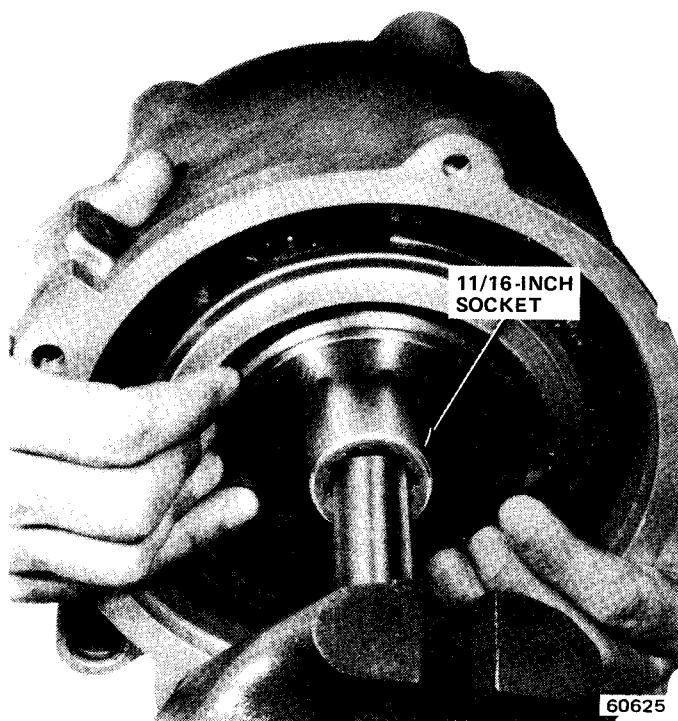


Fig. 8-24 Mounting Reduction Unit on Socket

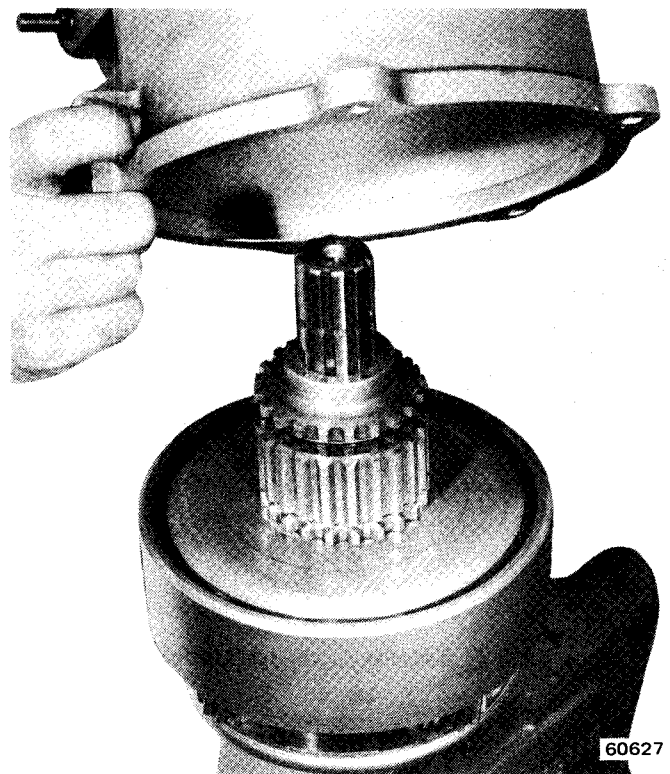


Fig. 8-26 Removing-Installing Housing

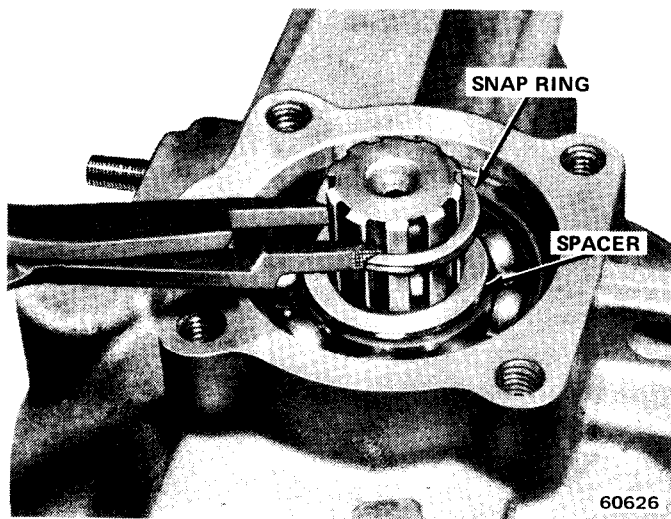


Fig. 8-25 Removing-Installing Main Shaft Snap Ring

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

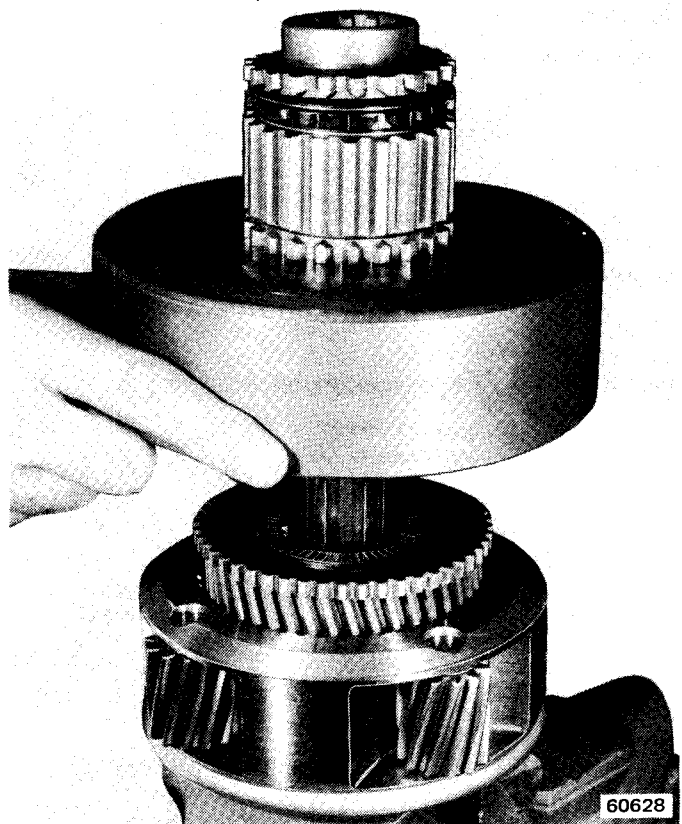


Fig. 8-27 Removing Sleeve, Hubs, and Ring Gear Assembly

(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.

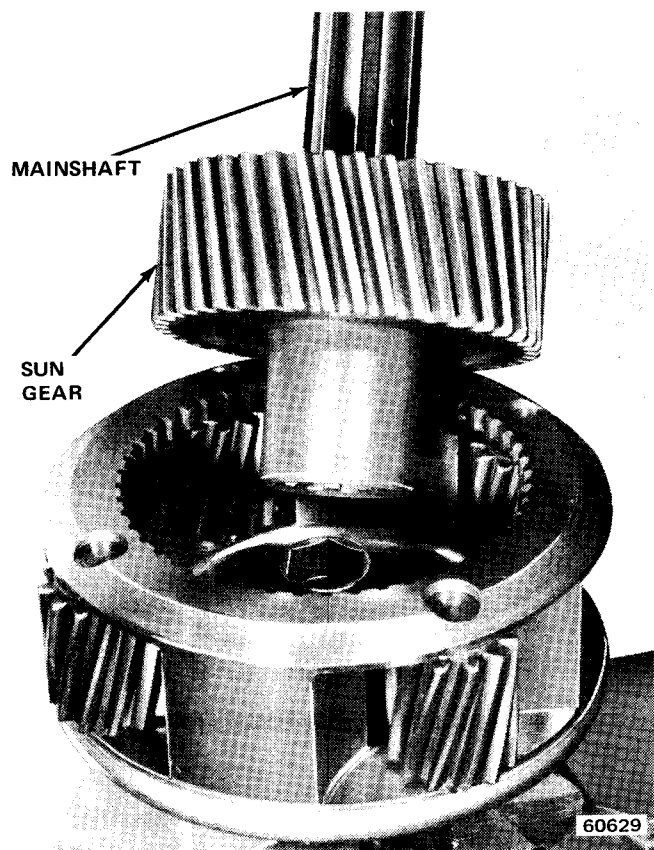


Fig. 8-28 Removing Sun Gear and Main Shaft

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.

(3) Using control lever, move shift fork and shift collar forward to low range position and remove shift collar (fig. 8-29).

Annular Bearing Replacement

(1) Remove rear snap ring and annular bearing (fig. 8-30). The rear snap ring is select-fit and available in thickness ranges of 0.086 to 0.088 inch, 0.089 to 0.091 inch, 0.092 to 0.094 inch, 0.095 to 0.097 inch, and 0.098 to 0.100 inch. The front snap ring should be 0.086 to 0.088 inch.

(2) Install front snap ring and bearing, then install thickest rear snap ring that will seat completely.

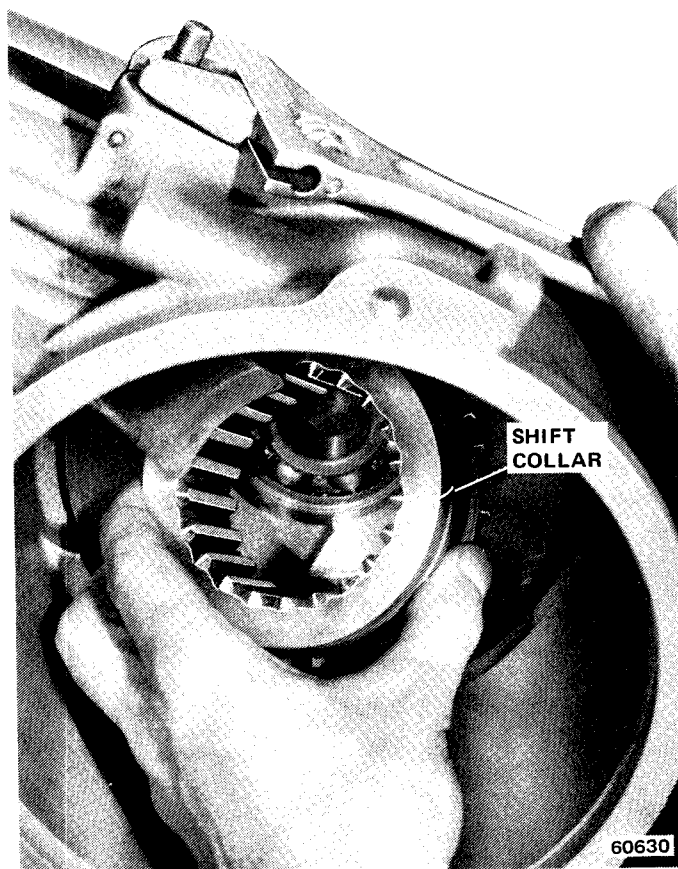


Fig. 8-29 Removing-Installing Shift Collar

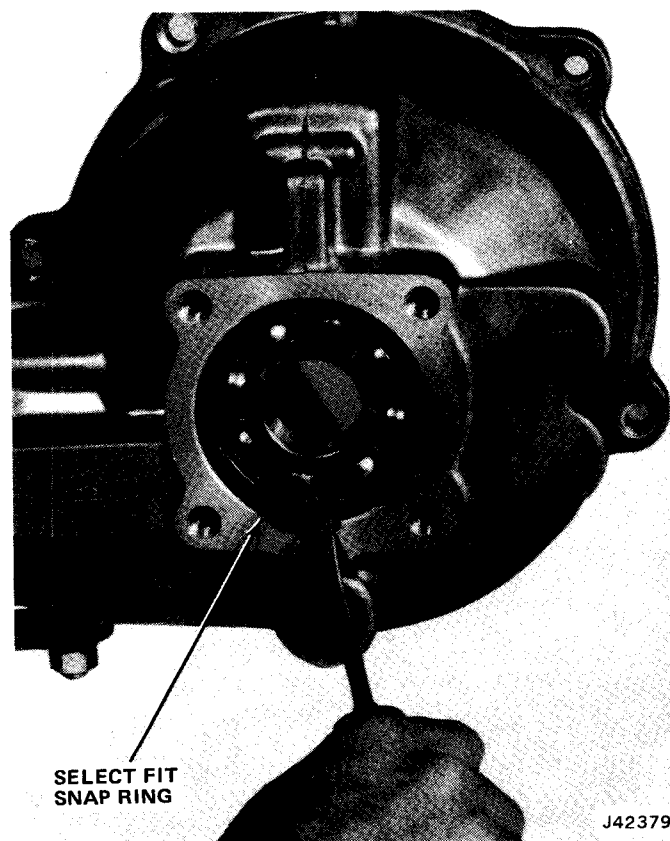


Fig. 8-30 Removing Rear Annular Bearing Snap Ring

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.
- (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.

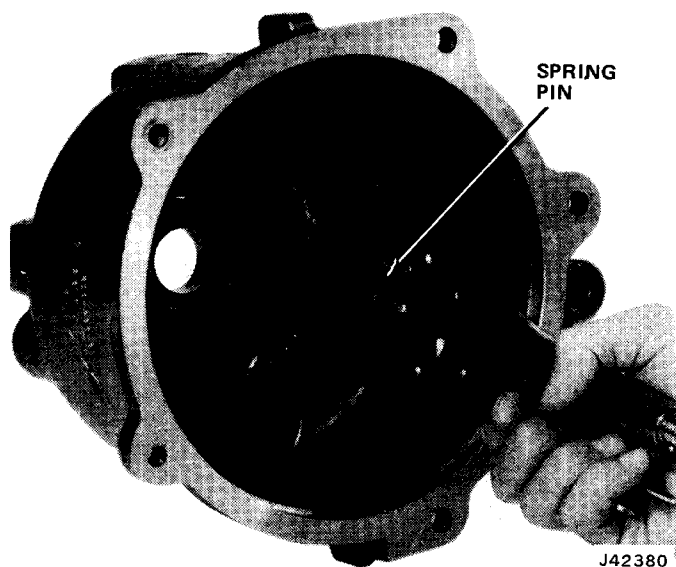


Fig. 8-31 Removing Shift Fork Locating Spring Pin

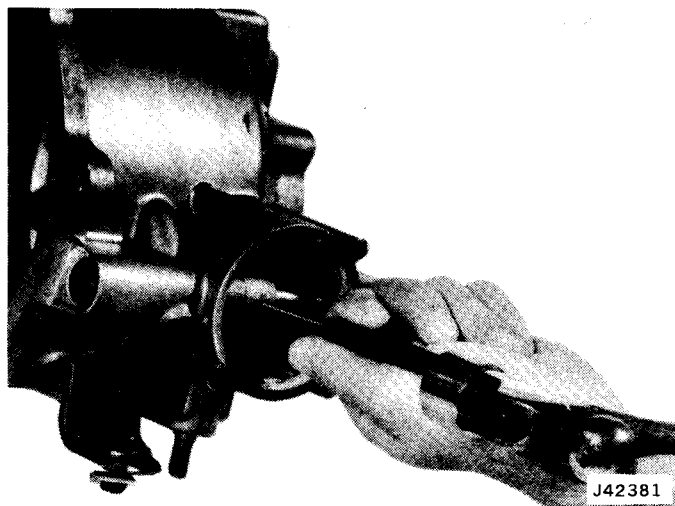


Fig. 8-32 Removing Spring Pin

Reduction Unit Assembly

- (1) Install reduction holding plate.

NOTE: The locating pins should index in case, and shift fork locating spring pin holes in holding plate and housing must align (fig. 8-31).

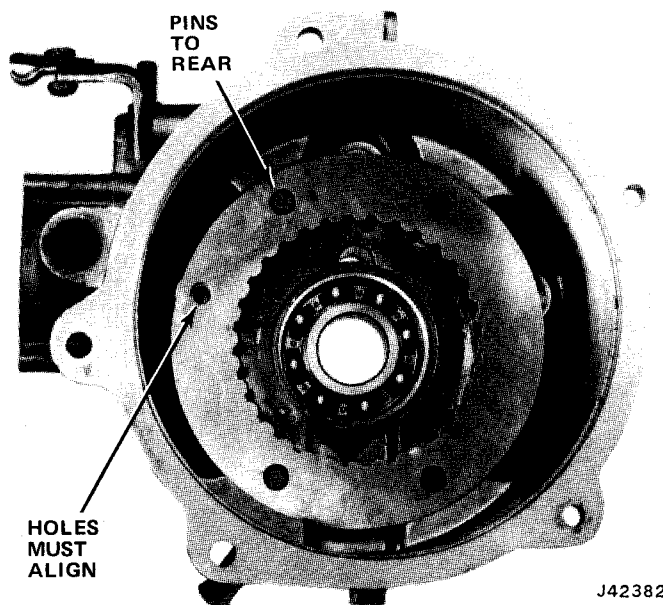


Fig. 8-33 Reduction Holding Plate Indexed Properly in Case

- (2) Install holding plate retaining snap ring. Snap ring tabs should face forward. Be sure snap ring seats completely in groove and clears shift fork.
- (3) Install shift fork locating spring pin.
- (4) Insert shift lever assembly, without O-ring, fully into housing with lever end facing rearward.
- (5) Install O-ring seal in groove in shift lever shaft (fig. 8-34).
- (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 far enough to allow shift fork to be meshed with shift lever assembly and on rail.
- (11) Move 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 to depress poppet ball (fig. 8-35).
- (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.



Fig. 8-34 Shift Lever O-Ring Installation

(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).

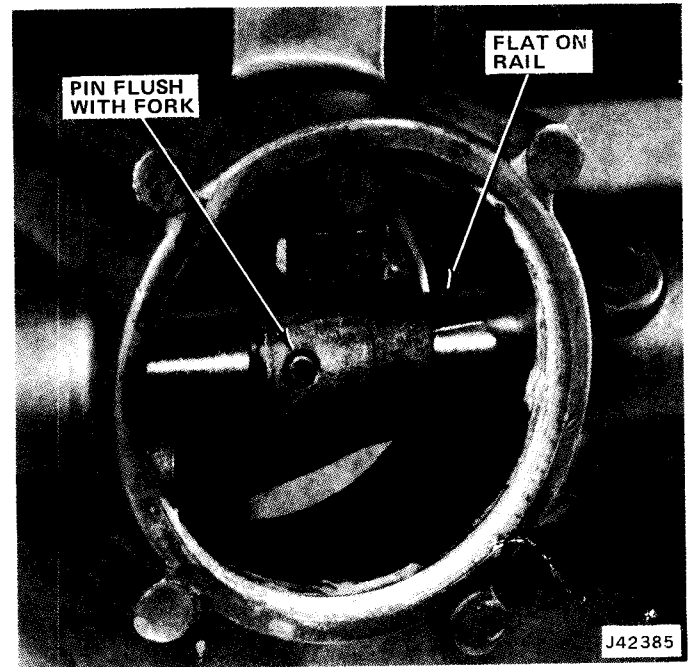


Fig. 8-36 Shift Rail

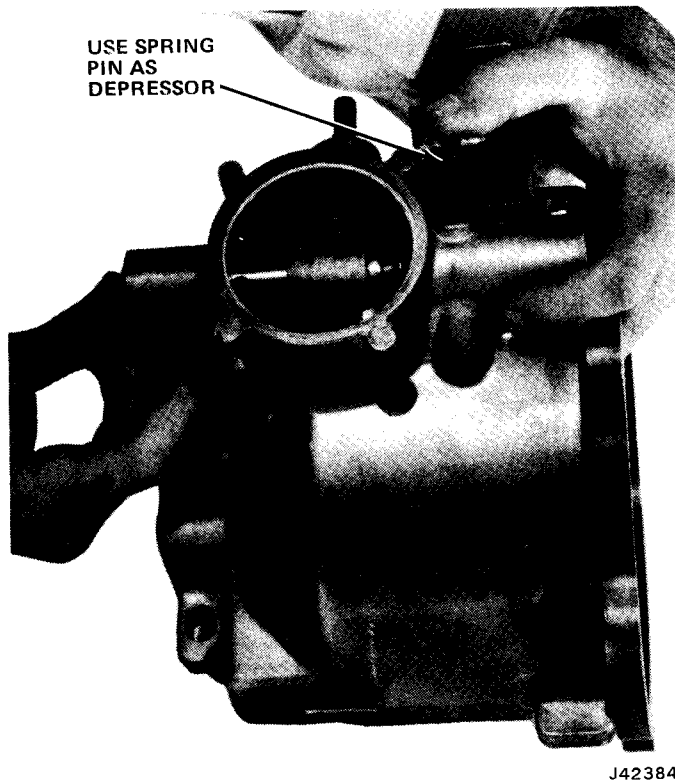


Fig. 8-35 Installing Shift Rail and Poppet

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

(20) Install control lever.

(21) 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.

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

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

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

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

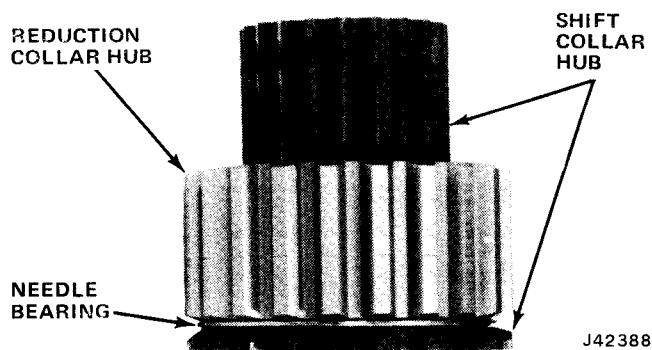


Fig. 8-37 Needle Bearing and Reduction Collar Hub Assembled with Shift Collar Hub

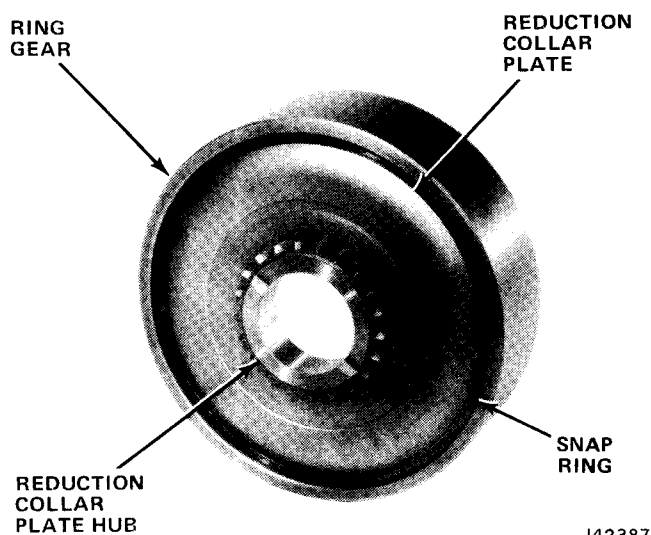


Fig. 3-38 Ring Gear Assembly

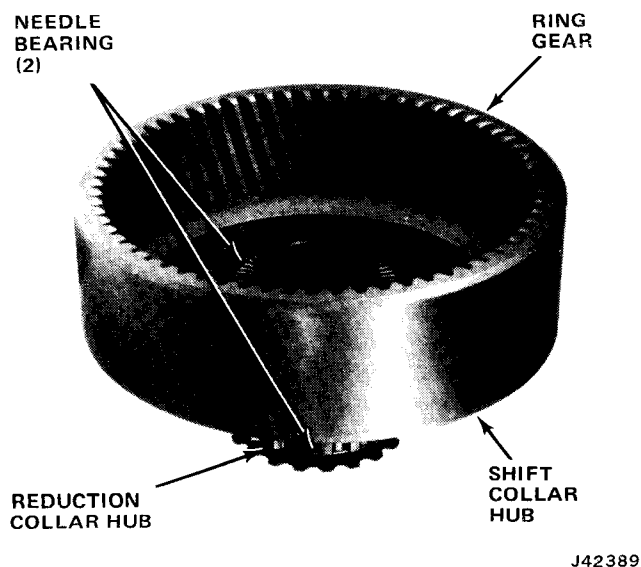


Fig. 3-39 Ring Gear Assembled on Reduction Collar Hub

(26) 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.

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

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

(29) Align splines on assembled parts and install reduction housing (fig. 8-26). Be sure housing is seated firmly against direct drive sleeve.

(30) 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.

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

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

(33) Remove socket from vise.

TRANSFER CASE COVER REMOVAL—IN VEHICLE

Removal

(1) Raise and support vehicle.

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

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

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

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

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

(8) Remove bolts which attach case cover assembly to case.

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

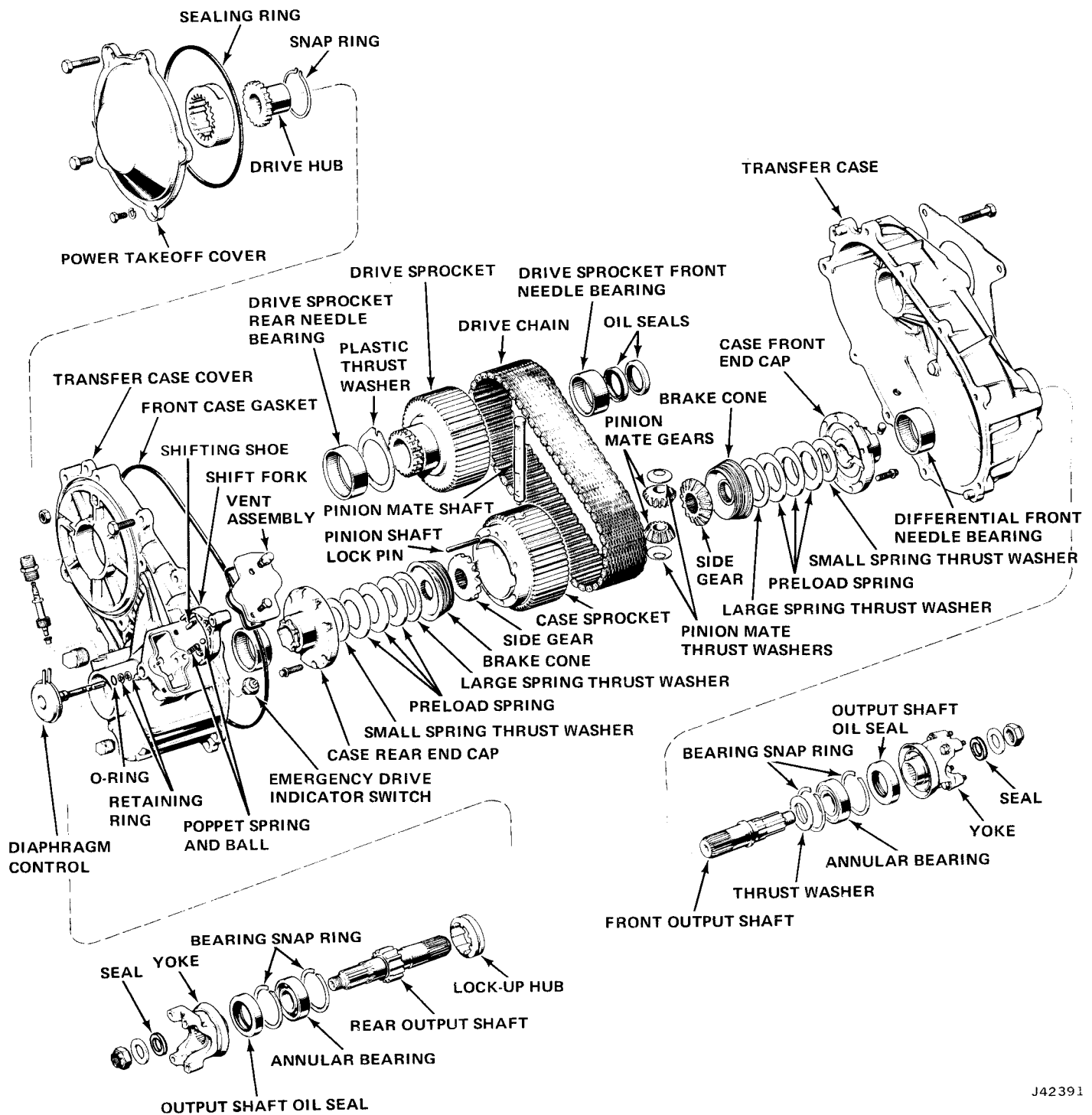


Fig. 8-40 Quadra-Trac Transfer Case Components

TRANSFER CASE COVER—DISASSEMBLY

- (1) Remove rear output shaft yoke.
- (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 (the 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.*

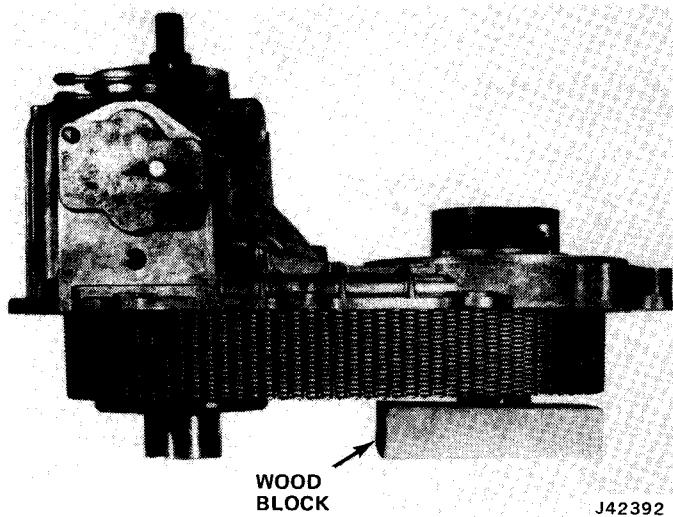


Fig. 8-41 Transfer Case Cover Positioned for Disassembly

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.*

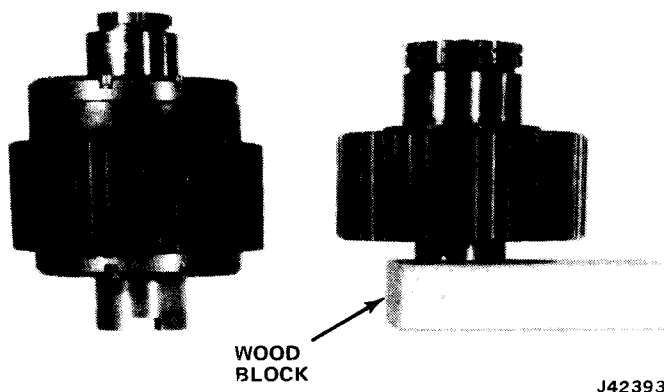


Fig. 8-42 Differential and Drive Sprocket Positioned for Chain Installation

(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.

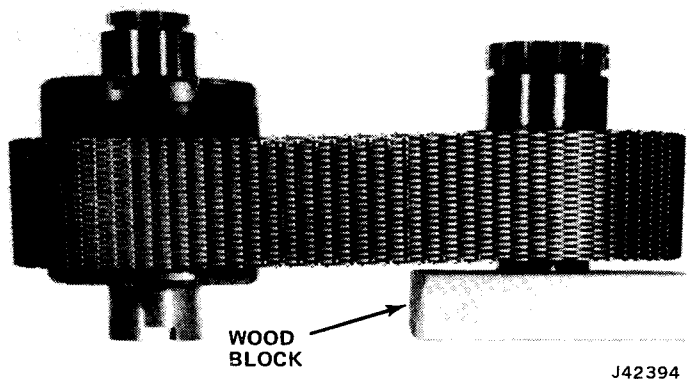


Fig. 8-43 Drive Chain Positioned Around Differential and Drive Sprocket

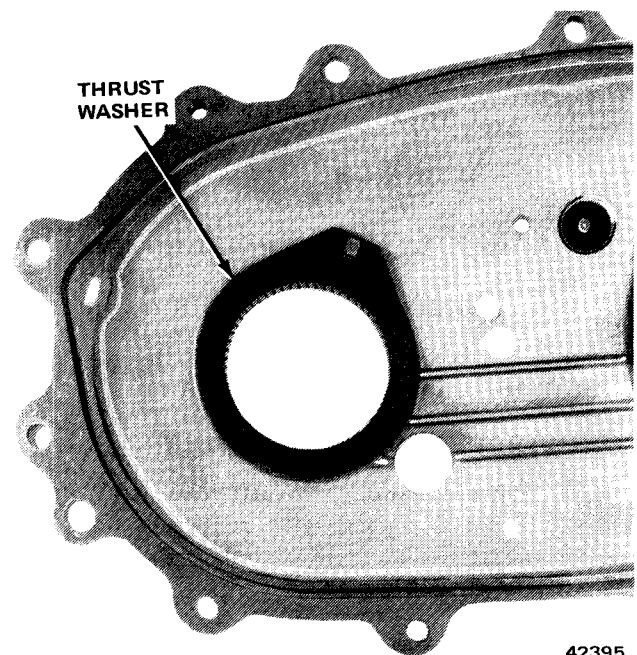


Fig. 8-44 Drive Sprocket Thrust Washer in Position on Case Cover

(9) Rotate drive sleeve or pinion cage to be sure drive sprocket thrust washer did not become displaced. Unit should turn easily with no 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.

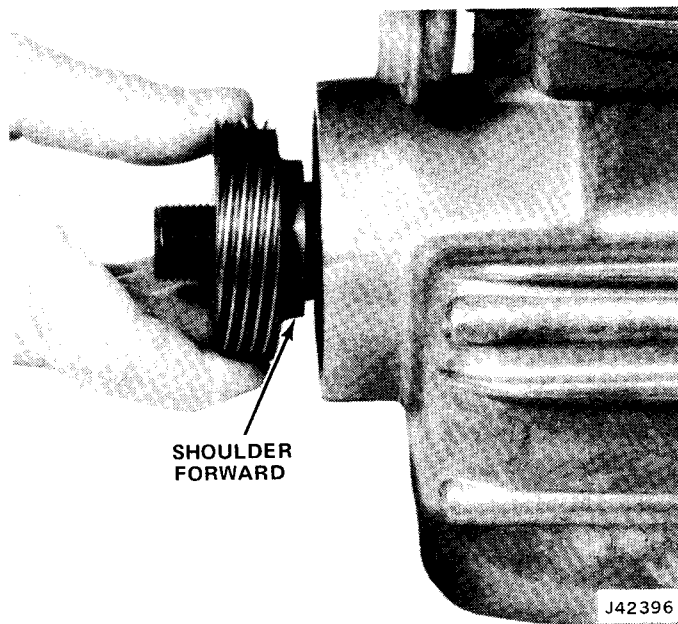


Fig. 8-45 Installing Speedometer Drive Gear

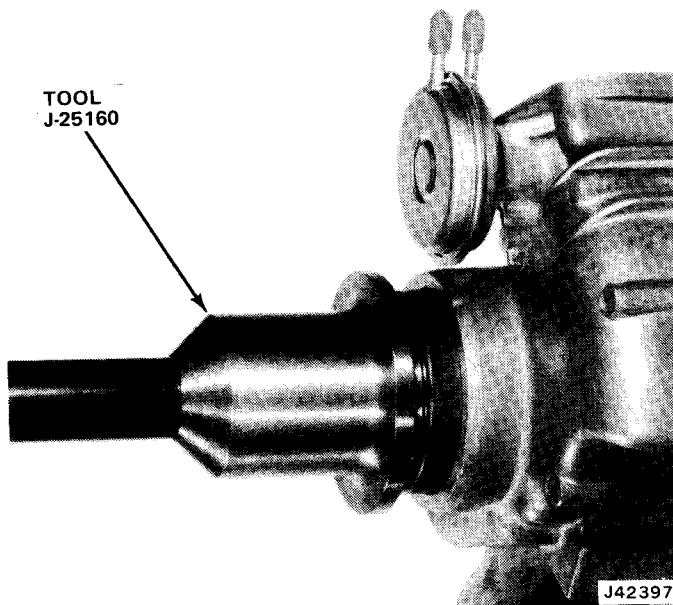


Fig. 8-46 Installing Rear Output Shaft Oil Seal

TRANSFER CASE COVER—INSTALLATION

- (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 two sets of splines to engage.*

(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. Connect signal switch 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 paragraph for quantity, type, and procedure.

(11) Lower vehicle.

TRANSFER CASE —REMOVAL

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

- (1) Raise vehicle.
- (2) Mark front and rear output shaft yokes and universal joints for assembly reference. Disconnect front propeller shaft at transfer case front yoke.
- (3) Disconnect rear propeller shaft at transfer case rear yoke.
- (4) Remove bolts attaching exhaust pipe support bracket to transfer case.
- (5) Mark diaphragm control vacuum hoses for assembly reference, and disconnect diaphragm control vacuum hoses, emergency drive signal switch wire, and speedometer cable.
- (6) Disconnect park brake cable guide from pivot on right frame side.
- (7) On CJ-7 models, place support stand under clutch housing and remove rear crossmember.

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

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

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

(11) 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) Raise transfer case assembly and install it 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 transfer case is seated against 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 front propeller shaft.

(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 paragraph for quantity, type, and procedure.

(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 to rear) using Seal Installer J-25213 and Sleeve J-25213-1 as driver. Install seal until driver shoulder touches case front surface.

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

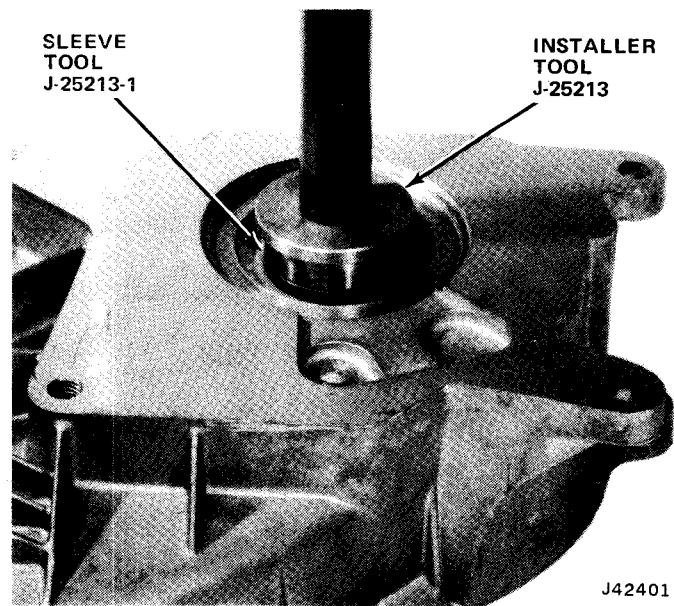


Fig. 8-47 Installing Drive Sprocket Front and Rear Oil Seals

TRANSFER CASE DISASSEMBLY

(1) Remove front and rear output shaft yokes.

(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) Using wooden block 2 by 4 by 6 inches long, position cover and drive sprocket on wooden block (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 outside edge of drive sleeve.

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

(8) Lift case cover from drive sprocket and differential. Cover rear output shaft, bearings and seal, drive sprocket rear needle bearings, and lockup hub may be serviced without disassembly of other units.

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

NOTE: Differential unit may be serviced without disassembly of other units.

Subassembly Service

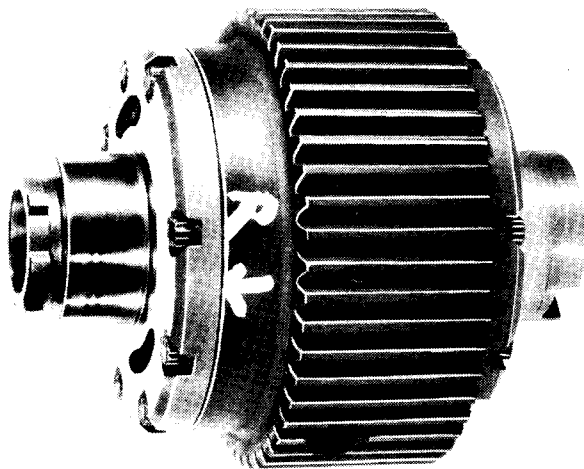
Differential Inspection

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

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 reference and orientation of both caps on case sprocket (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. Remove end cap.

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

(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 and remove screws which attach rear end cap. Remove rear end cap from case sprocket.

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

(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.

(7) Pinion shaft lockpin should fall free; however, it may be necessary to remove pin using 1/4-inch pin punch.

(8) Drive pinion mate shaft from case sprocket using brass shift and hammer.

CAUTION: *Do not damage pinion mate thrust washers.*

Cleaning

Clean all parts thoroughly in solvent. Be sure that lubricant and metal particles are removed from all surfaces of every component. The side gears, brake cones, preload springs, and thrust washers must be maintained 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 that 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 or shouldered-wear on the shaft is not acceptable.

Side Gears

The teeth should be free of chip marks but 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 Jeep Lubricant Concentrate, Part No. 8123004, or Lubrizol 5901, or equivalent.

(1) Slide pinion mate shaft into case sprocket about 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 are pressing washers against case sprocket (fig. 8-49).

(5) Mesh appropriate (front or rear) side gear into 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 all springs facing brake cone.

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

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

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

(11) Install attaching screws hand-tight, then tighten screws alternately and evenly to 27 foot-pounds torque.

(12) Invert case sprocket and end cap.

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

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

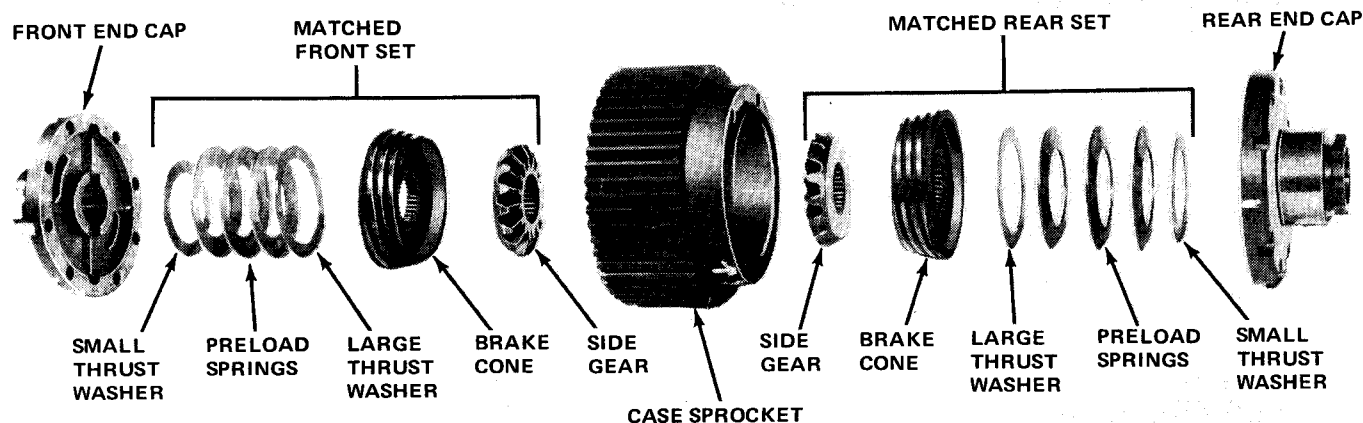


Fig. 8-49 Differential Unit Assembly Sequence

(15) Position 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 all washers facing brake cone.

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

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

(20) Install attaching screws hand-tight.

(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).

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).

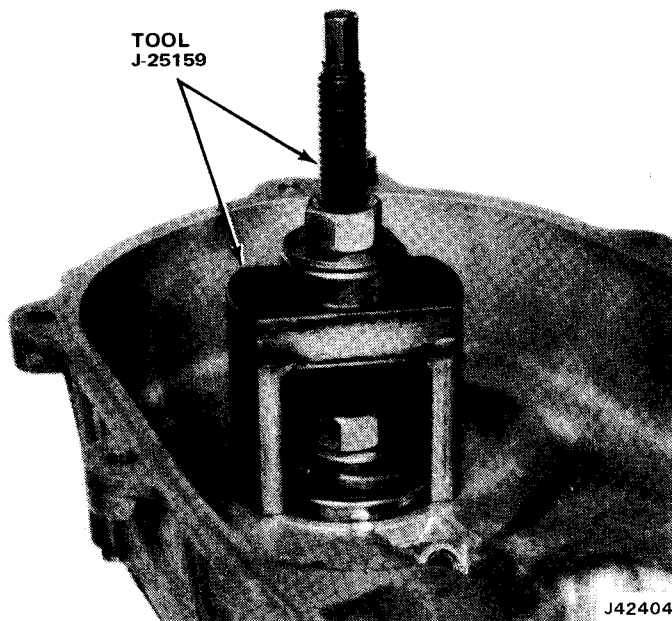


Fig. 8-50 Removing Differential Front or Rear Needle Bearing

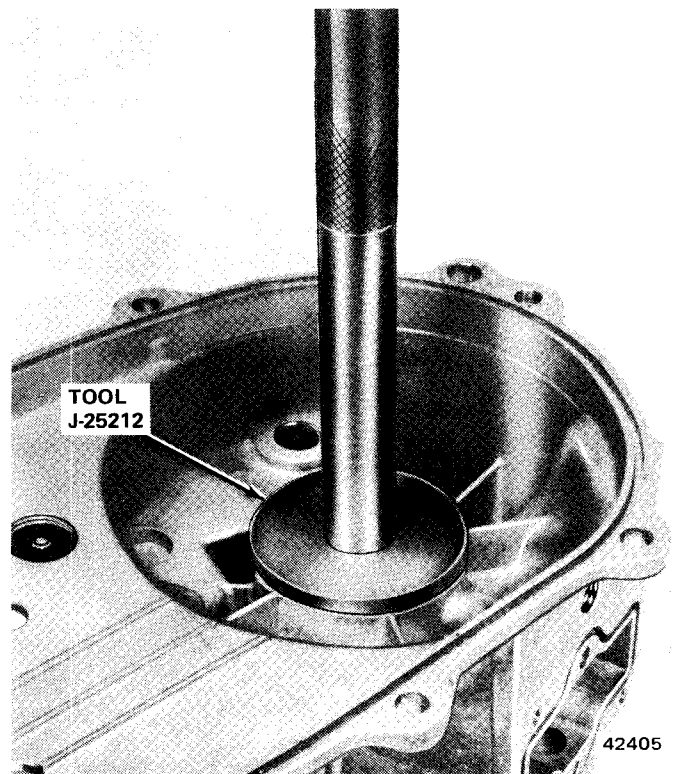


Fig. 8-51 Installing Differential Rear Needle Bearing

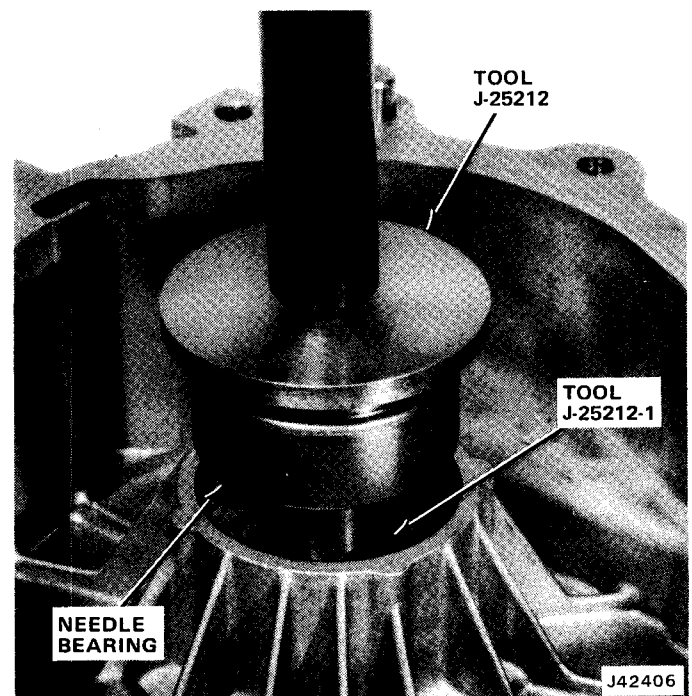


Fig. 8-52 Installing Drive Sprocket Front Needle Bearing

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).

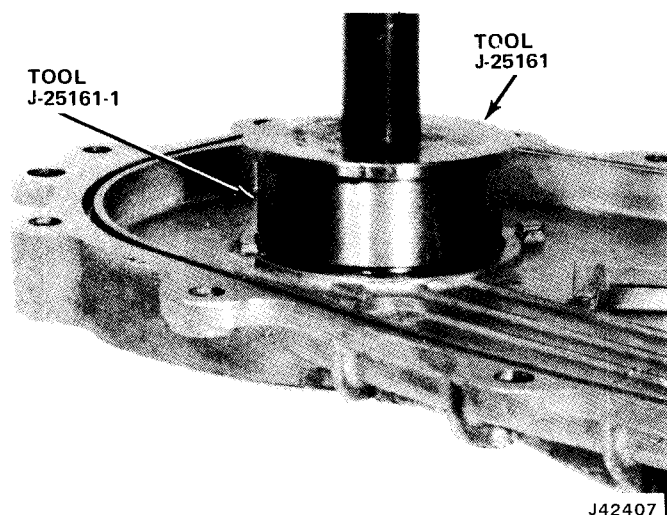


Fig. 8-53 Removing Drive Sprocket Rear Needle Bearing

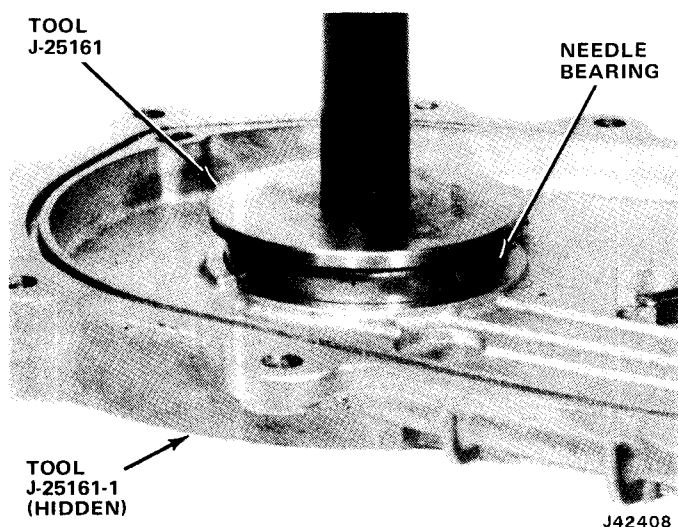


Fig. 8-54 Installing Drive Sprocket Rear Needle Bearing

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 rear bearing is being replaced, remove 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 into stop 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: Shift fork may be pried forward or rearward to gain access to retaining rings.

- (3) Remove spring using magnet.

CAUTION: 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).



Fig. 8-55 Removing Diaphragm Control

- (5) Remove diaphragm from case cover.
- (6) Remove detent ball and spring.
- (7) Remove shift fork and plastic shifting shoes.
- (8) Remove lockup hub.
- (9) Lubricate and install shifting shoes in shift fork. Install lockup hub in shift fork (fig. 8-56).
- (10) Insert fork, with long side of fork to rear, and hub assembly in case cover.

NOTE: Reach through differential needle bearing to keep lockup hub and shift fork from separating.

(11) Slide diaphragm control rod in case cover, 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.

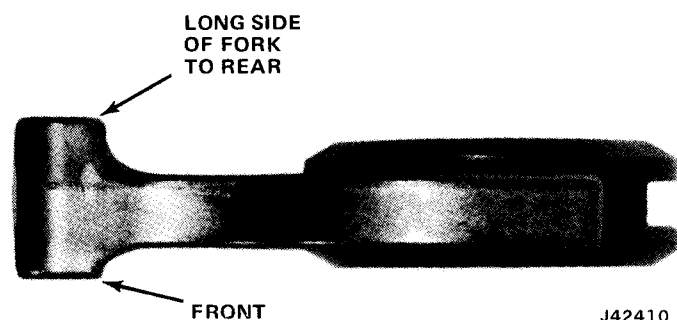


Fig. 8-56 Shift Fork and Lockup Hub Assembly

TRANSFER CASE ASSEMBLY

NOTE: During assembly, lubricate all bearing and thrust surfaces with Jeep Lubricant Concentrate, Part No. 8123004, or Lubrizol 5901, or equivalent.

- (1) Position drive sprocket on wooden block (fig. 8-42).
- (2) Place differential assembly about 2 inches from drive sprocket and with front end of differential on bench.
- (3) 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).
- (4) Insert rear output shaft in differential.
- (5) Move lockup hub rearward in case cover. Lubricate drive sprocket thrust washer and install on case cover (fig. 8-44).
- (6) 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

(7) Assemble drive hub, drive sleeve, and snap ring if disassembled (fig. 8-57).

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

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

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

(11) 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.

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

(13) Install power takeoff sealing ring and cover.

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

(15) Install rear output shaft oil seal using Seal Driver J-25160 (fig. 8-46).

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

(17) Install front output shaft oil seal using Seal Driver J-25160.

(18) Install front yoke and nut. Tighten nut to 120 foot-pounds torque.

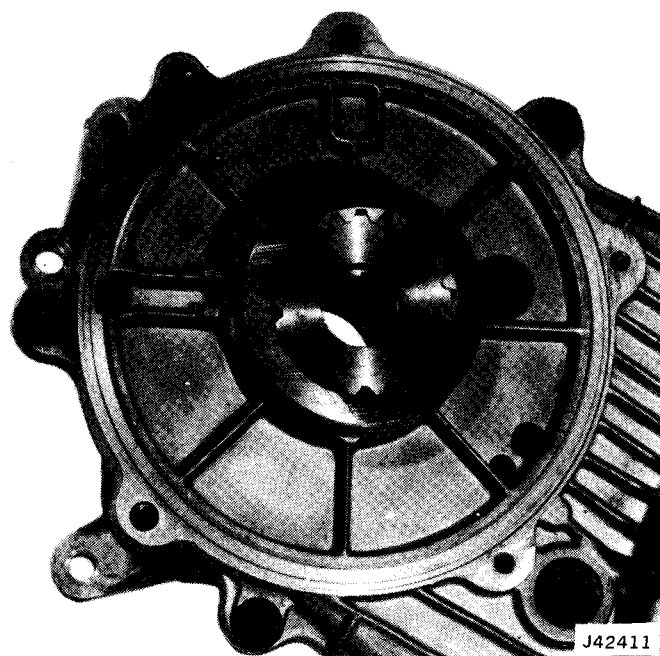


Fig. 8-57 Drive Hub and Sleeve Installed



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 SAE 30W Non-Detergent
 Engine Oil (Valveline or Equivalent) and 8 ounces
 Jeep Lubricant Concentrate or Lubrizol 5901.
 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 Torque Specifications

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

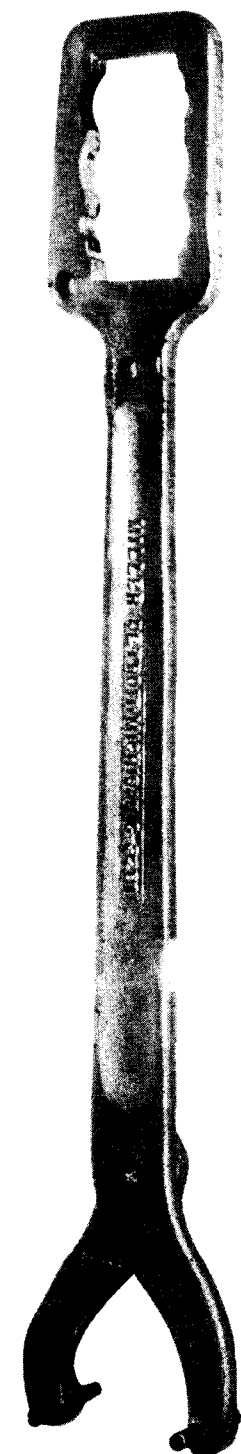
Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	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

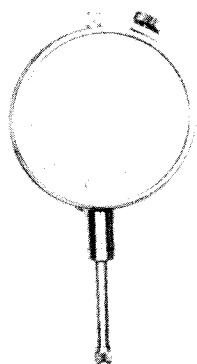
All torque values given in foot-pounds with dry fits unless otherwise specified.

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

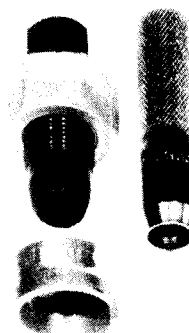
60632



J-8614-10 UNIVERSAL JOINT
FLANGE HOLDING WRENCH



J-25150 ONE-INCH
TRAVEL INDICATOR



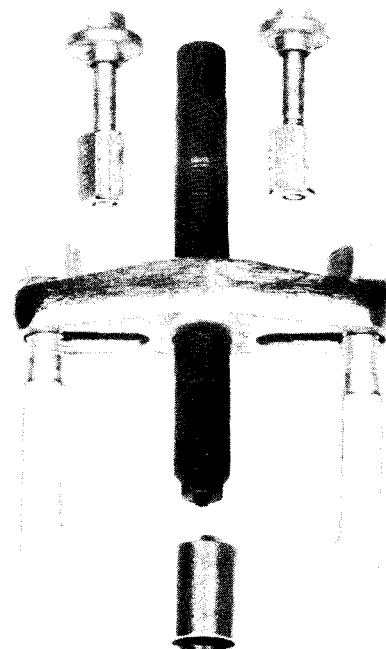
J-25175 SHIFTER SHAFT
OIL SEAL PULLER



J-25142 COUNTER SHAFT
NEEDLE BEARING
ALIGNING ARBOR



J-25169 SPEEDOMETER DRIVE
PINION BUSHING DRIVER



J-25134 UNIVERSAL JOINT
FLANGE PULLER



J-25180 OUTPUT SHAFT
OIL SEAL PULLER
(FRONT AND REAR)



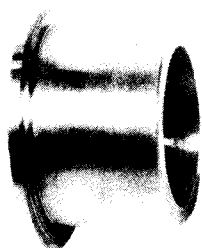
J-25167 SHIFTER SHAFT OIL
SEAL INSTALLER THIMBLE
AND DRIVER



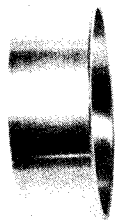
J-25132 OUTPUT SHAFT OIL
SEAL DRIVER (FRONT AND REAR)

J42413

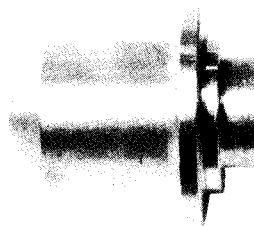
Fig. 8-58 Tools (Sheet 1 of 2)



J-25161 BEARING REMOVER
AND INSTALLER



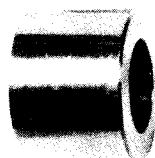
J-25161-1 PILOT



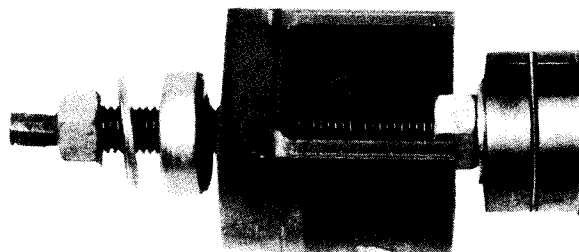
J-25160 SEAL INSTALLER



J-25212 BEARING INSTALLER



J-25212-1 PILOT ADAPTER



J-25159 BEARING PULLER



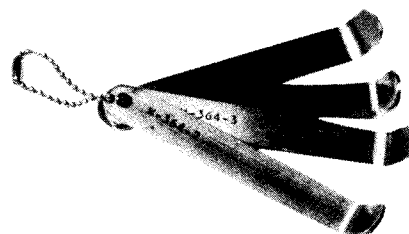
J-25213 SEAL
INSTALLER



J-25213-1 SLEEVE



J-25162 CHAIN GAUGE



J-25163 GAUGE SET



J-25122 HANDLE

J42414

Fig. 8-59 Tools (Sheet 2 of 2)