

TRANSFER CASE

	Page		Page
Model 20 Transfer Case	8-1	Quadra-Trac System	8-10

MODEL 20 TRANSFER CASE

	Page		Page
Cherokee and Truck	8-2	Rear Bearing Cap Inspection	8-6
CJ Models	8-2	Removal	8-3
Diagnosis	8-2	Shift Control Case	8-8
Disassembly	8-3	Shift Linkage	8-9
Front Yoke Oil Seal Replacement	8-7	Shift Rod Housing Seal Replacement	8-7
General Information	8-1	Specifications	8-10
Installation	8-3	Torque Specifications	8-10

GENERAL

The Model 20 transfer case provides two gear ratios in 4-wheel drive (high and low), a 2-wheel drive, and a neutral position.

When the vehicle is driven in 2-wheel drive, the gear that drives the front propeller shaft is freewheeling on the output shaft. Power flow in 2-wheel drive is shown in figure 8-1, and power flow in 4-wheel drive high range is shown in figure 8-2.

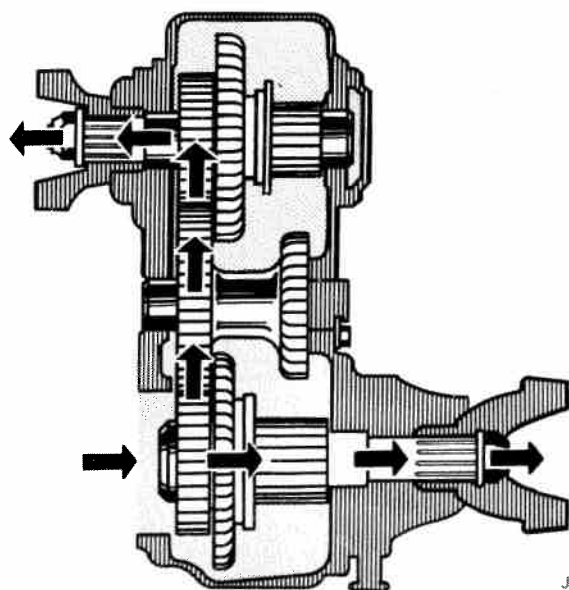


Fig. 8-1 Silent Transfer Case in 2-Wheel Drive

Transfer case gears and drives are controlled by a single lever located forward and just to the right of the transmission shift lever. This lever is connected through linkage to the shift rods on the transfer case.

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

All vehicles have a transfer case shift diagram located on the top face of the shift lever knob (fig. 8-3).

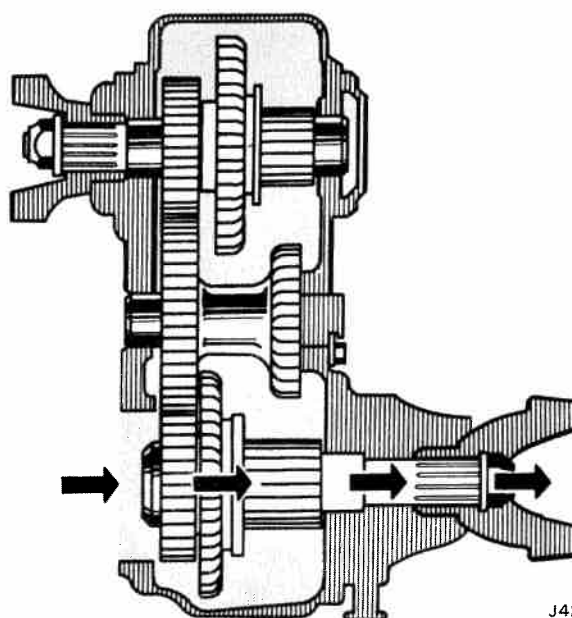


Fig. 8-2 Silent Transfer Case in 4-Wheel Drive



CJ MODELS



CHEROKEE AND TRUCK

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Fig. 8-3 Transfer Case Shift Knobs

CJ MODELS

The transfer case shift lever has four positions: 4H (4-wheel drive high), 2H (2-wheel drive high), N (neutral), and 4L (4-wheel drive low).

The forward position of the lever (4H) provides high range 4-wheel drive. The first rear position (2H) disengages the 4-wheel drive and allows rear wheel drive only for regular highway and road travel. The second rear position (N) disengages all power to the wheels and is used for stationary power takeoff applications. The last rear position (4L) provides low range 4-wheel drive for the extreme adverse conditions.

CHEROKEE AND TRUCK

The transfer case shift lever has four positions: 2WD, 4WD-HIGH, NEUTRAL and 4WD-LOW. The left-hand forward position of the lever 2H (2WD) allows the rear wheel drive only for regular highway and city road travel. The left-hand rear position 4H (4WD-HIGH) provides high range 4-wheel drive. The right-hand center position (NEUTRAL) disengages all power to the wheels and is used for stationary power takeoff operations, or when towing the vehicle. The right-hand forward position 4L (4WD-LOW) provides low range 4-wheel drive for the toughest going (fig. 8-3).

DIAGNOSIS

Cherokee and Truck

Outlined below is information on the operation of the transfer case and the shift lever control case to aid in diagnosis of service problems with these assemblies.

Figure 8-4 shows the position of the shift lever and rails in the shift lever control case in the 2WD HIGH, 4WD High and 4WD Low positions.

2WD High - In this position, the inner rail of the control case is all the way forward, the pawl on the outer rail is to the rear of the slot in the inner rail, and the legs of the torsion spring are in the two notches in the inner rail. The ball on the end of the shift lever is to the rear. The pin on the shift lever is engaged in the slot of the pawl. The outside rail is in the midposition.

4WD High - In this position, the inner rail is all the way forward. The pawl is to the front of the slot in the inner rail. The spring legs are in the notches. The shift lever ball is forward. The pin on the shift lever is still engaged in the slot in the pawl. The outside rail is in the forward position.

4WD Low - In this position, both rails are all the way 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.

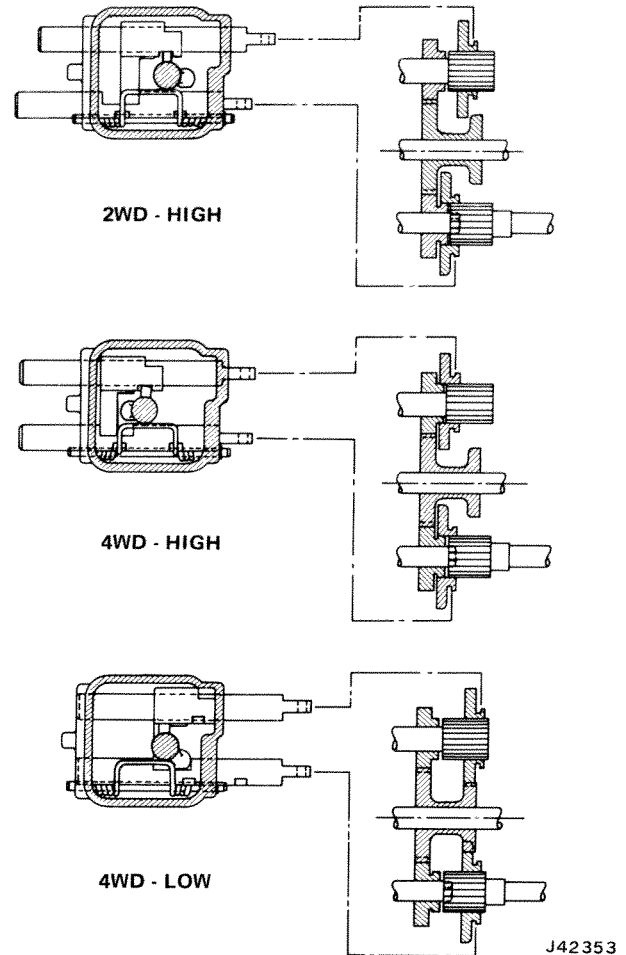


Fig. 8-4 Shift Positions

Spring Operation - In the 2WD High and 4WD High positions, the spring legs are in the notches in the inner rail, and the shank of the shift lever (between the pivot ball and the end ball) just touches the horizontal section of the spring (fig. 8-5). When the shift lever is in the normal 4WD High position and the crossover is made moving the manually operated end of the shift lever to the right to the 4WD High - Neutral - 4 WD Low range, the shank of the shift lever pushes the spring out of the notches, allowing the inner rails, as well as the outer rail, to be moved to the rear.

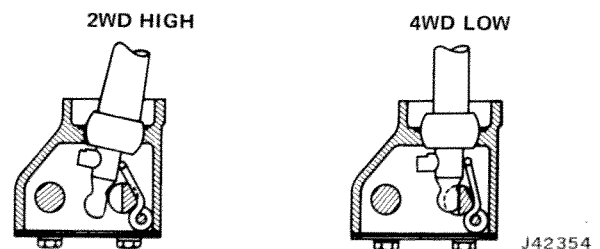


Fig. 8-5 Lever and Spring Positions

Service Problems

If the transfer case walks out of the 2WD High, the shift lever does not move. The mainshaft sliding gear has disengaged from the transmission mainshaft gear and there is no driving connection to either front or rear wheels (fig. 8-6).

If the transfer case walks out of 4WD High, the shift lever will move. Either the front output shaft sliding gear will disengage from the front output shaft gear, leaving the vehicle in the 2WD High, or the mainshaft sliding gear will disengage from the mainshaft gear and cause the front output shaft sliding gear to disengage at the same time. In this case, there is no driving connection to either front or rear wheels (fig. 8-6).

Correction - Walking Out of 2WD High

Remove the shift lever control case.

Move the shift lever into the 2WD High position of the control case. Tap the front end of the inner rail with a hammer four or five blows. The legs of the torsion spring in the slots should keep the rail from moving. If the rail moves, install a new shift lever torsion spring. Repeat the above tests.

Correction - Walking Out of 4WD High

Follow the procedure outlined above for walking out of 2WD High.

Road test the vehicle. If the transfer case still walks out of 4WD High, replace the outer rail poppet spring in shift rod housing of the transfer case.

Check the transmission mainshaft gear and front output shaft gear for damage to the clutching teeth. Check the front output shaft sliding gear and mainshaft sliding gear for damage to the splines. Replace if damaged. Check the transmission mainshaft nut for proper torque (refer to Torque Specifications).

TRANSFER CASE REMOVAL

(1) Remove the transfer case shift lever knob and trim boot.

(2) Remove transfer case shift lever.

(3) Lift and support vehicle.

(4) Drain transfer case lubricant.

(5) Disconnect front propeller shaft from transfer case. Disconnect rear propeller shaft from transfer case.

(6) Install transfer case drain plug.

(7) Disconnect parking brake cable at equalizer and mounting bracket.

(8) Disconnect speedometer cable.

(9) Remove screws which attach transfer case to transmission. Install two 3/8-16 x 4 inch dowel pins, one on each side of case.

(10) Remove transfer case.

(11) Remove gasket between transmission and transfer case.

TRANSFER CASE INSTALLATION

(1) Place a new gasket on dowel pins in transmission case

(2) Shift transfer case to 4WD low position.

(3) Position transfer case on dowel pins.

(4) Rotate transfer case output shaft until gears engage with output gear on transmission. Slide transfer case forward to transmission.

CAUTION: *Be sure the transfer case fits flush against the transmission. Severe damage will result if the transfer case balls are tightened while the transfer case is binding.*

(5) Install one attaching screw. Remove dowel pins and install all remaining attaching screws.

(6) Connect speedometer cable and parking brake cable.

(7) Install proper amount of lubricant into transfer case.

(8) Lower vehicle.

(9) Install transfer case lever, trim boot and lever knob.

TRANSFER CASE DISASSEMBLY

NOTE: *Refer to figure 8-6 for parts relationship.*

(1) Remove bolts which attach rear bearing cap assembly to transfer case and remove bearing cap assembly.

NOTE: *The rear bearing cap assembly may be serviced without further disassembly of the transfer case. Refer to Rear Bearing Cap Inspection.*

(2) Remove case bottom cover.

(3) Remove intermediate shaft lock plate bolt, lockwasher, and lock plate.

(4) Drive intermediate shaft out of rear of case using Arbor Tool W-280 (fig. 8-7).

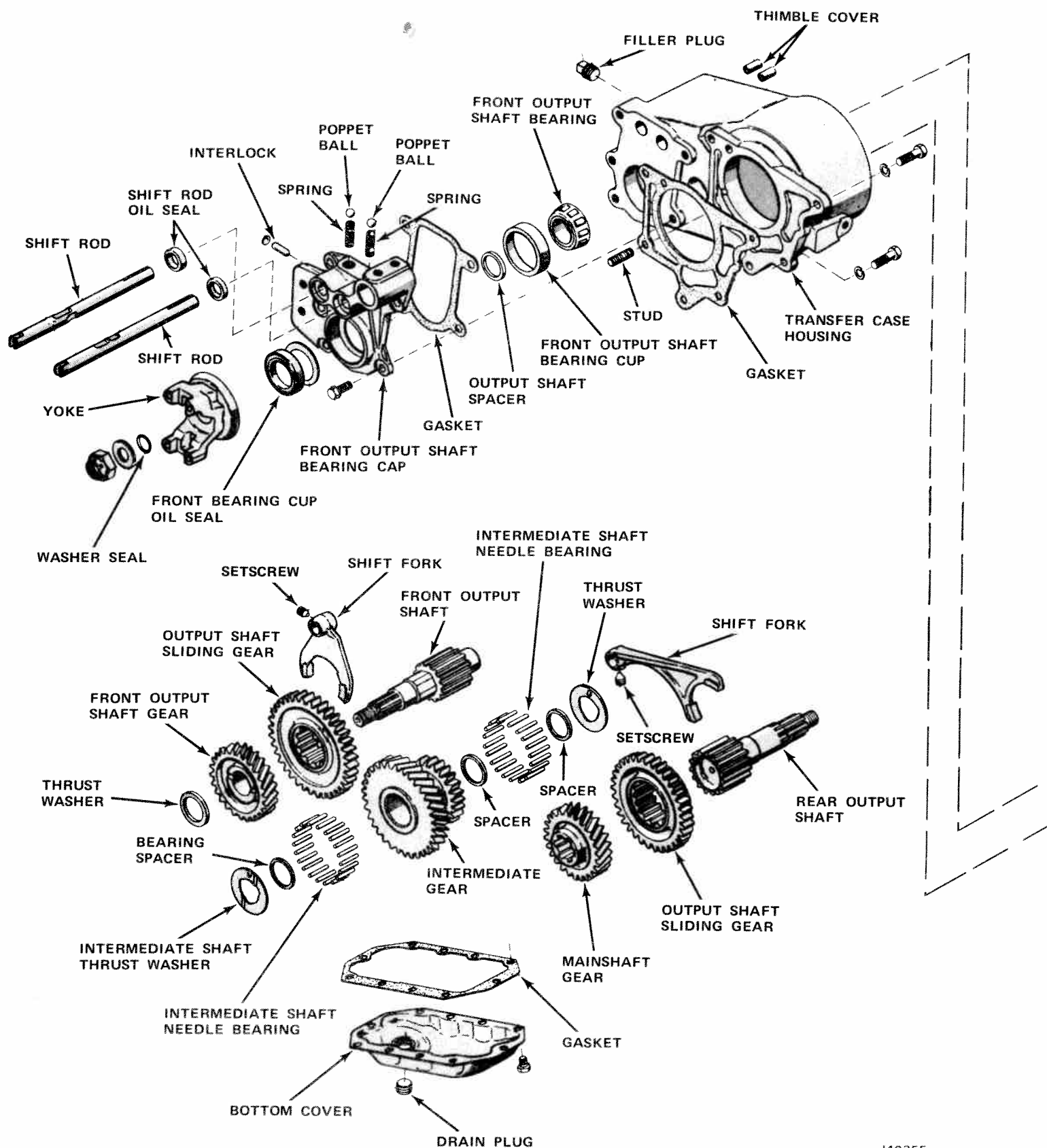
NOTE: *This tool allows the two sets of needle bearings and three spacers to remain in position as the shaft is removed. Align the tool in the center of the intermediate gear assembly for removal.*

(5) Remove intermediate gear assembly through bottom of case.

(6) Remove front output shaft yoke and washer (fig. 8-8) using Yoke Holding Wrench Tool C-3281.

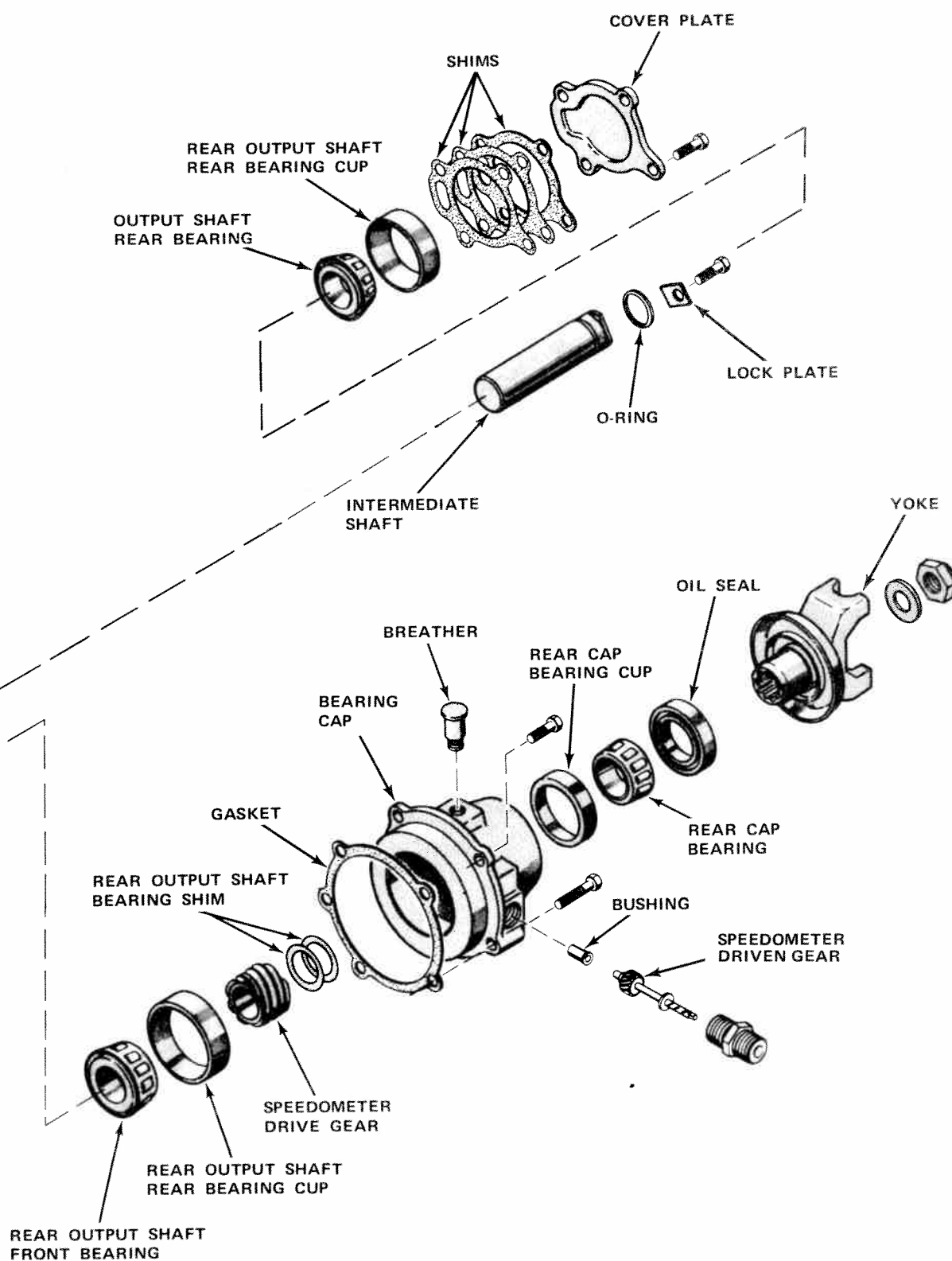
(7) Remove front output shaft yoke using Puller Tool W-172 (fig. 8-9).

(8) Remove felt oil seal and oil seal gasket.



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Fig. 8-6 Model 20 Transfer Case Components (Sheet 1 of 2)



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Fig. 8-6 Model 20 Transfer Case Components (Sheet 2 of 2)

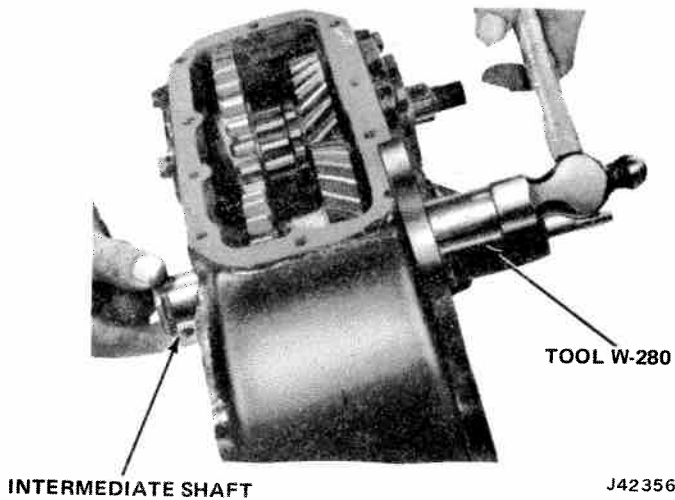


Fig. 8-7 Intermediate Shaft Needle Bearing Aligner

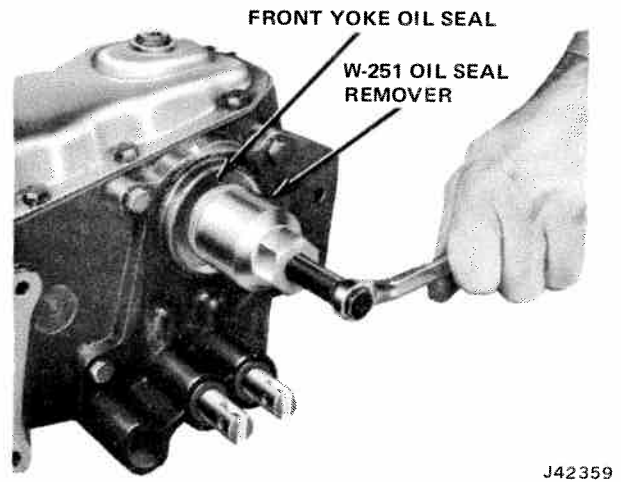


Fig. 8-10 Front Yoke Oil Seal Removal

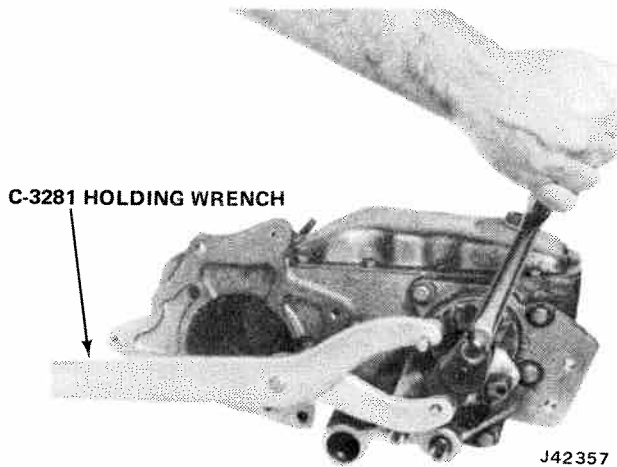


Fig. 8-8 Removing Front Output Shaft Nut

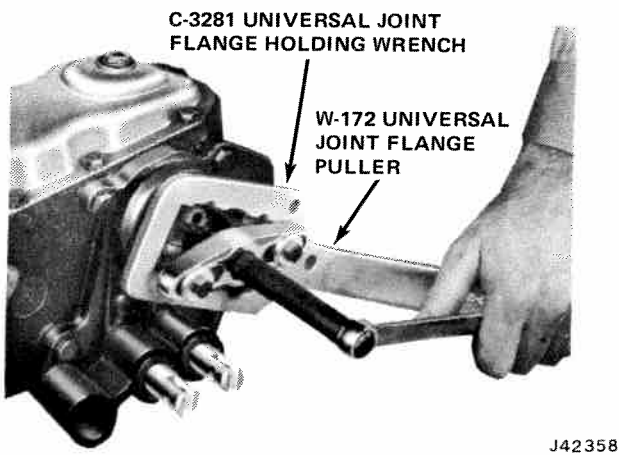


Fig. 8-9 Universal Joint Flange Puller

(9) Remove front yoke oil seal using Puller Tool W-251 (fig. 8-10).

(10) Remove screws attaching the rear bearing cover and remove cover

CAUTION: When removing rear bearing cover, take care to avoid damage to the gaskets and shims between the cover and case.

(11) Position both shift rails in neutral.

(12) Remove left fork setscrew.

(13) Rotate left shift rail 1/4-turn counterclockwise. Hold shift fork and use a punch through rail pin hole as a handle to pull shift rail from case.

NOTE: When the shift fork is free of rail, use hand to catch poppet ball and spring under shift rail.

(14) Remove screws attaching front shift rod housing. Slide housing from remaining shift rail.

REAR BEARING CAP INSPECTION

Disassembly

NOTE: The rear bearing cap assembly may be removed without disassembly of the transfer case.

(1) Remove rear output shaft nut and washer by using Yoke Holding Wrench C-3281. Remove rear output shaft yoke by using Puller Tool W-172 (fig. 8-9).

(2) Remove rear output shaft seal with Puller Tool W-251 (fig. 8-10).

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

(4) Remove output shaft by tapping it with a soft mallet.

(5) Remove bearing cone and roller assembly from shaft by lightly tapping rear face of roller assembly.

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

(7) If necessary, remove speedometer driven pinion bushing.

Assembly

- (1) If removed, install a new speedometer driven pinion bushing using Bushing Installer Tool W-133.
- (2) Tap front cone and roller assembly onto output shaft. Slide speedometer gear and original spacers onto output shaft.
- (3) Insert output shaft through housing. Place front end of output shaft on a firm surface.
- (4) Place rear cone and roller assembly on output shaft.
- (5) Tap bearing onto shaft to seat against inner spacers.
- (6) Use Driver Tool W-143 to install yoke seal. Install felt seal, propeller shaft yoke, flat washer, and retaining nut. Tighten nut (refer to Torque Specifications).
- (7) Measure rear bearing cap assembly end play (fig. 8-11). End play should be 0.001 inch to 0.003 inch. If end play is incorrect, it can be corrected by installing or removing shims adjacent to speedometer drive gear.

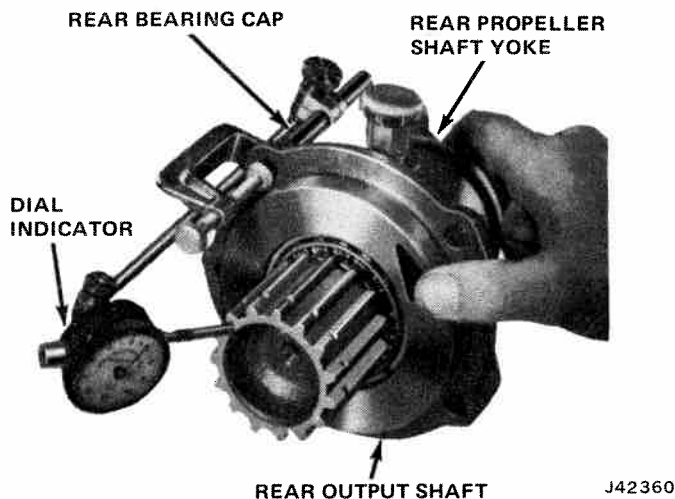


Fig. 8-11 Checking Rear Output Shaft Bearing Adjustment

SHIFT ROD HOUSING SEAL REPLACEMENT

- (1) Remove seals using Puller Tool W-176 (fig. 8-12).
- (2) Use Thimble and Driver Tool W-130 to replace seals (fig. 8-13).

FRONT YOKE OIL SEAL REPLACEMENT

- (1) Remove front propeller shaft nut and washer using Yoke Holding Wrench Tool C-3281.
- (2) Remove front propeller shaft yoke with Puller Tool W-172 (fig. 8-9).
- (3) Remove felt seal, oil seal gasket, and oil seal. Use Puller Tool W-251 to remove oil seal (fig. 8-10).
- (4) Use Driver Tool W-143 to install seal. Install oil seal gasket and felt seal.

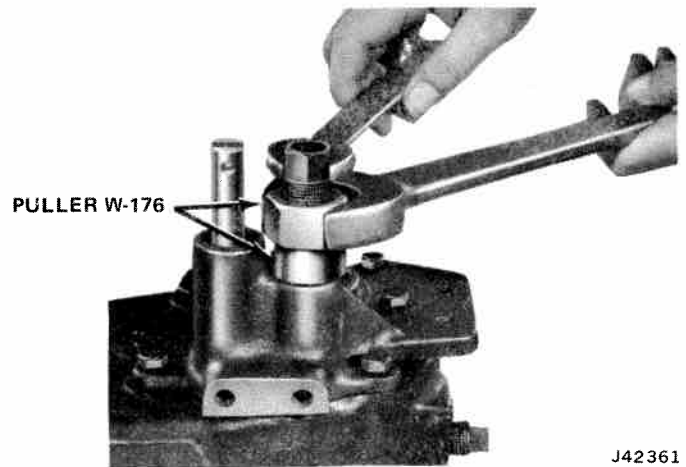


Fig. 8-12 Shift Rail Oil Seal Removal

- (5) Install yoke, washers, and nut. Tighten nut (refer to Torque Specifications).
- (6) Use a rawhide or lead mallet to drive front of output shaft through gears and out of case.
- (7) With shaft removed, output shaft sliding gear can be lifted from front wheel drive fork. Fork can then be turned and shift rod fork bolt removed.

CLEANING AND INSPECTION

Wash the transfer case and all the components in solvent. Dry with compressed air. Clean all of the old gasket material and dirt from all gasket surfaces.

Inspect all thrust washers for scoring and excessive wear. Inspect all bearings and cups for pitting or scoring. Inspect the intermediate shaft for wear or other damage. Remove Arbor Tool W-280 from the intermediate gear. Remove and inspect bearing spacers and needle bearings. If the needle bearings are faulty, inspect the intermediate gear bore. Inspect all gears for chipped or broken teeth. If any of the above conditions are experienced, replace the parts involved.

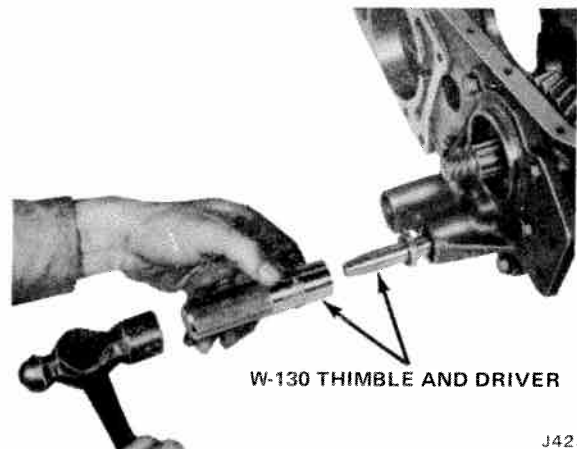


Fig. 8-13 Shift Rail Oil Seal Replacement

TRANSFER CASE ASSEMBLY

NOTE: Refer to figure 8-6 for parts relationship.

(1) If removed, slide right shift rod partially into case. Place right shift fork on rod with bolt hole aligned with countersunk hole in rod. Install shift rod fork bolt. Tighten bolt (refer to Torque Specifications).

(2) Place right shift fork in proper position in case. Set front output shaft sliding gear in shift fork with slot in gear facing rear of case.

(3) Install rear cone and roller on front output shaft.

(4) Insert front output shaft gear and thrust washer in place and slide output shaft through both gears.

(5) Install front thrust washer.

(6) Install front cone and roller assembly on output shaft.

(7) Install front and rear bearing cups.

(8) Install shift rod housing gasket, housing, lockwashers, and bolts. Tighten bolts (refer to Torque Specifications).

(9) Install rear bearing cover shim set, cover plate, lockwashers, and bolts. Tighten bolts (refer to Torque specifications).

(10) Use a dial indicator to check output shaft bearing adjustment (fig. 8-14).

(a) Pry shaft to the extreme rear position.

(b) Set indicator to zero.

(c) Pry shaft forward and read indicator.

(d) Shaft end play should be 0.001 inch to 0.003 inch.

(e) End play can be adjusted by changing rear bearing cover shims. Shims are available in various thicknesses.

(11) Position right shift rod in neutral position to allow shift rod interlocks to enter detents in rod. Move interlocks into right shift rod.

(12) Remove left shift rod detent cap plug.

(13) Insert detent spring and ball. Compress detent and start rod into case just far enough to retain ball. Position left rod so countersunk hole in rod is up, then rotate it 1/4 turn counterclockwise.

(14) Position and hold shift fork in case. Push shift rod through fork. Rotate shift rod 1/4 turn clockwise and align countersunk hole in rod with hole in shift fork. Install setscrew and tighten (refer to Torque Specifications).

(15) Assemble intermediate gear, rollers and spacers using Arbor Tool W-280.

(16) Place intermediate gear thrust washers in case with tangs aligned with grooves in case. The rear washer can be held in place by starting intermediate shaft into case. Hold front washer in position with heavy grease.

(17) Position intermediate gear in case. Using a soft-faced hammer, drive intermediate shaft into intermediate gear, forcing Arbor Tool W-280 out of front of case. Install intermediate shaft lock plate, lockwasher, and bolt. Tighten bolts (refer to Torque Specifications).

(18) Install rear bearing cap assembly using a new gasket. Tighten bolts (refer to Torque Specifications).

(19) Using new gasket, install lower cover. Tighten bolts (refer to Torque Specifications).

(20) Use Driver Tool W-143 to install front and rear yoke seals. Install oil seal gasket and felt oil seal.

(21) Install front and rear propeller shaft yokes. Tighten nuts (refer to Torque Specifications).

SHIFT CONTROL CASE

Disassembly (Cherokee and Truck)

(1) Remove control case from support tube.

(2) Remove retainer screws, retainer, and shift lever.

(3) Remove lower cover. Remove lock screw from pawl and remove 2WD-4WD High shift rod and pawl (fig. 8-15).

(4) Pry tension spring from notches in 4WD High and Low shift rod and remove rod.

(5) Remove two clips from torsion spring retainer rod and remove rod and spring.

Assembly

(1) Insert torsion spring, retaining rod and retainer clips.

(2) Install 4WD High and Low shift rod. Set tension spring in notches in rod.

(3) Position 2WD-4WD High shift pawl in case. Insert shift rod through pawl and install setscrew. Be sure holes are aligned to permit setscrew to bottom in rod.

(4) Install lower cover.

(5) Install case onto support tube and connect shift rods to transfer case rods.

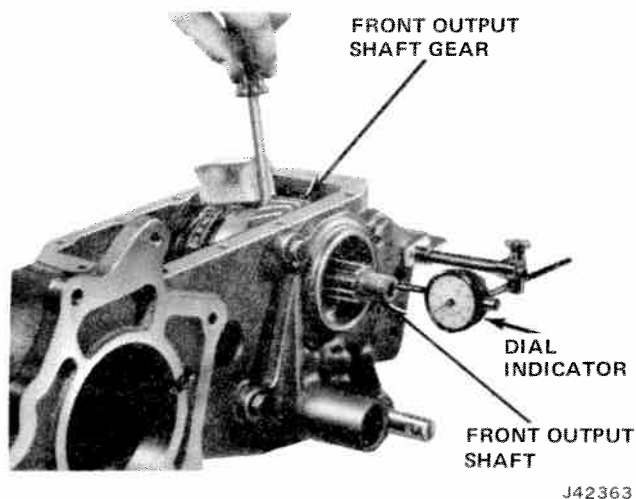
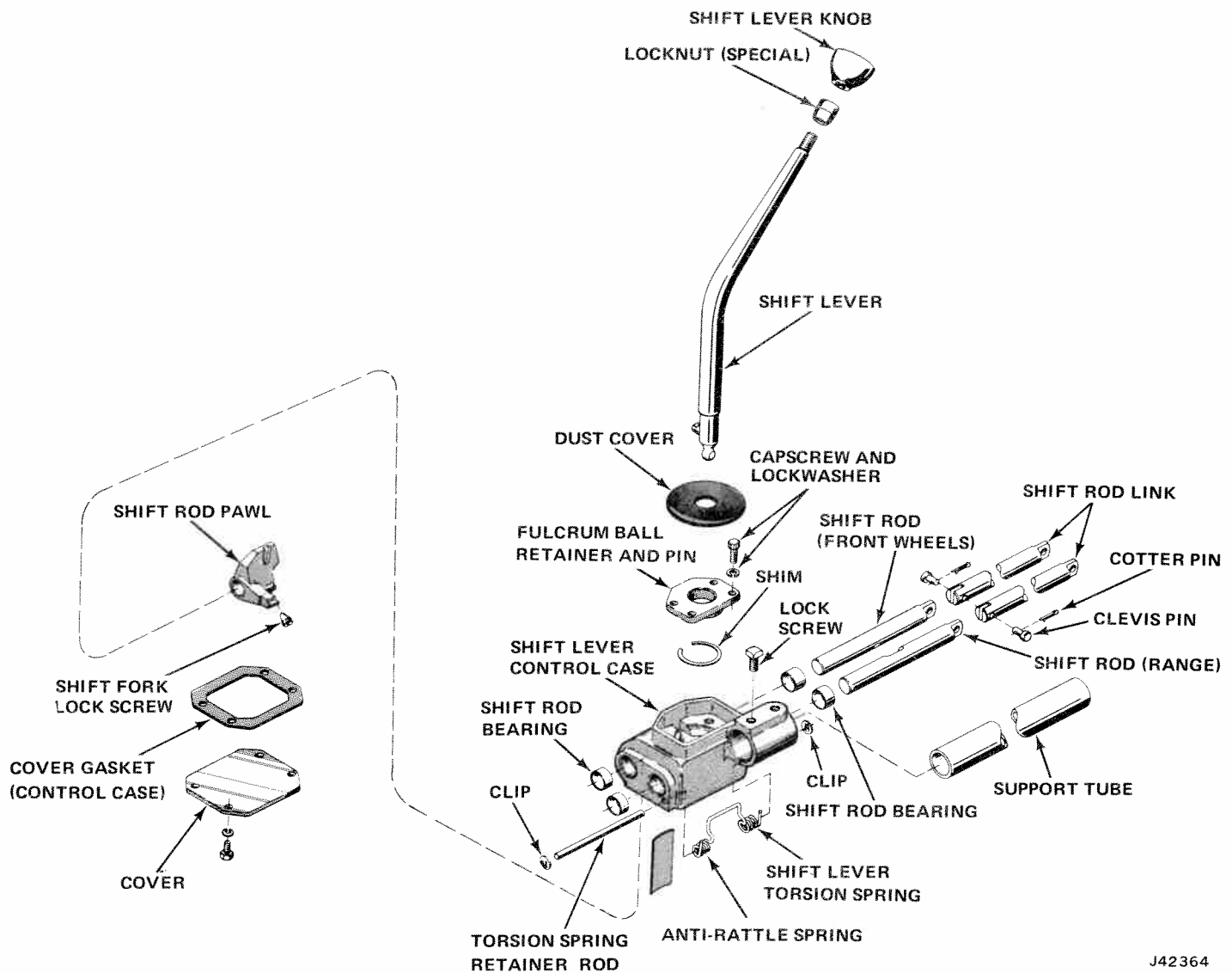


Fig. 8-14 Checking Output Shaft Bearing Adjustment



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Fig. 8-15 Transfer Case Shift Control Lever - Cherokee and Truck

TRANSFER CASE SHIFT LINKAGE

Shifter rods from the shift control case or lever connect to the shifter rods of the transfer case either directly or through nonadjustable links. The lever assembly mounts in a support tube on the transfer case.

Two square head capscres secure the support tube to the transfer case, and another two square-head capscres secure the lever assembly to the support tube. Holes are drilled in the support tube for the four capscres so that mounting positions cannot be altered.

Removal

(1) Remove cotter pins and clevis pins or nuts that connect shifter rods of lever assembly to shifter rods of transmission or to links.

(2) Remove the square-head capscres that secure shift lever assembly to support tube. Slide lever assembly from support tube.

Installation

(1) To install lever assembly, position both shifter rods in extreme forward detent position.

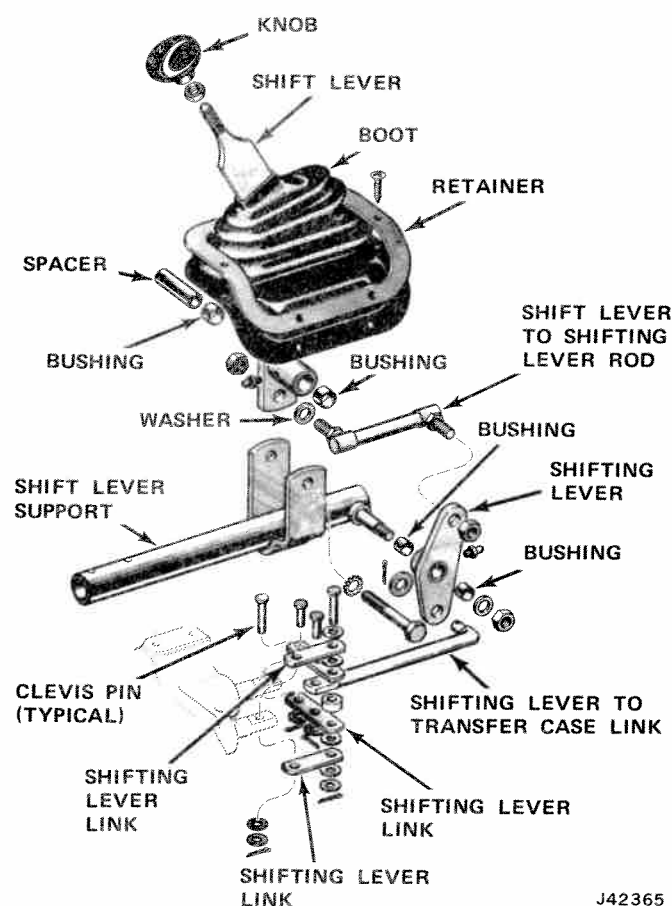
(2) Shift shift lever assembly to 4H (4WD HIgh) position.

(3) Position shifter lever assembly on support tube, but do not install square-head capscres.

(4) Connect shifter rods of shift lever assembly to shifter rods of transfer case, using clevis pins and cotter pins.

(5) Install square-head capscres that secure shift lever assembly to support tube.

NOTE: The transfer case shift linkage should be lubricated periodically.



J42365

Fig. 8-16 Transfer Case Shift Control Lever CJ Models

TRANSFER CASE SPECIFICATIONS

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

J42366

TORQUE SPECIFICATIONS

Torque Specifications	Foot-Pounds
Front and Rear Output Shaft Yoke Nuts	225-250
Right and Left Shift Fork Setscrews	12-15
Shift Rod Housing to Case Bolts	28-30
Front Output Shaft Rear Bearing Cover to Case Bolts	28-32
Intermediate Shaft Lock Plate to Case Bolts	12-15
Rear Bearing Cap Assembly to Case Bolts	28-32
Lower Cover to Case Bolts	12-15
Transfer Case to Transmission Bolts	28-32

J42367

QUADRA-TRAC

	Page
General Information	8-10
Lockout Device	8-10
Low-Range Reduction Unit Operation	8-11
Lubrication	8-11
Reduction Unit	8-13

	Page
Reduction Unit Shift Cable Adjustment	8-11
Specifications	8-28
Stick-Slip Condition	8-11
Transfer Case Assembly	8-21
Transfer Case Cover	8-18

GENERAL

The Quadra-Trac system provides full-time 4-wheel drive operation in all driving conditions. It is ideally suited for 4-wheel drive operation in normal, dry road conditions or in situations with mixed dry and slippery surface conditions. The big safety plus is that it provides 4-wheel drive tractive response at all times resulting in optimum handling under all highway conditions and under all off-road conditions. A controlled-type differential allows the front and rear axles to operate at their own speed, and smoothly delivers continuous power to all four wheels in the proper proportion to match the vehicle to the road surface in forward or reverse.

LOCKOUT DEVICE

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

CAUTION: In situations where you are attempting to move the vehicle out of a particular position, do not spin the wheels excessively unless Lockout device is engaged.

Should loss of a front or rear propeller shaft assembly or front axle shaft failure occur, activation of the

lockout device will permit 2-wheel drive operation until repair or replacement can be made. To engage the lockout device, slow the vehicle to under 5 mph and turn the control knob inside the glove box counter-clockwise.

The Lockout reminder light in the instrument panel cluster will come on immediately after Lockout occurs, and will glow continuously until disengaged.

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

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

As the lockout device is infrequently used, it is recommended that the system be activated and deactivated at least once a month.

LOW RANGE - REDUCTION UNIT OPERATION

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

To engage LOW RANGE drive:

- Take foot off accelerator.
- Come to a rolling stop - under 5 mph.
- Shift automatic transmission into neutral with vehicle moving.
- Pull firmly out on the LOW RANGE lever (located just below the instrument panel to the right of the steering column).

To disengage LOW RANGE Drive:

- Shift automatic transmission into neutral at low speed - under 5 mph.
- Push LOW RANGE lever in firmly.

If low Range Drive is infrequently used, it is recommended that it be engaged and exercised for at least five minutes each month.

REDUCTION UNIT SHIFT CABLE ADJUSTMENT

Clamp-Type Attachment

- (1) Loosen nut which clamps cable to shift lever pivot. Be sure cable can move freely in pivot.

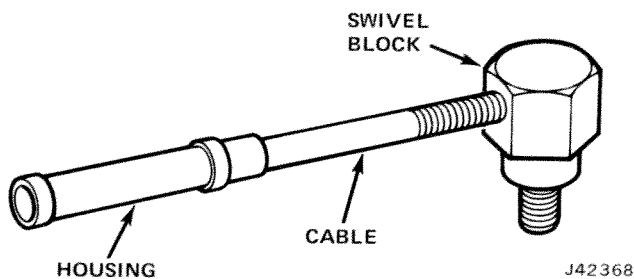


Fig. 8-17 Low Range Swivel Block

- (2) Move reduction shift lever to most rearward detent position (Hi-Range position).

- (3) Push LOW RANGE lever inward until lever stops.

- (4) Push LOW RANGE lever inward until lever stops. Pull LOW RANGE lever out slightly; no more than 1/16 inch.

- (5) Tighten cable clamp nut.

- (6) Check operation of reduction unit.

Swivel-Type Attachment

- (1) Remove swivel block from control lever.

- (2) Move reduction unit control lever to most forward position.

- (3) Thread swivel block in or out on cable end to obtain free fit in reduction unit control lever (fig. 8-17).

- (4) Secure swivel block to control lever.

- (5) Check operation of reduction unit.

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.

Lubricant plays a major role in preventing stick-slip noise; therefore, detergent and heavy-duty (10W-30) type motor oils are not recommended. Vehicles experiencing stick-slip due to the usage of 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.*

LUBRICATION

The Quadra-Trac transfer case does not require periodic or scheduled lubrication. However, should a stick-slip condition occur in the transfer case, a full eight fluid ounces of concentrate, Jeep Part Number 8123004, should be added (this applies to the Quadra-Trac transfer case with or without the reduction unit). It may be necessary to drain a slight amount (minimum) of lubricant at the transfer case drain plug to

permit addition of the full amount of concentrate through the transfer case fill plug.

If the addition of the concentrate does not correct the stick-slip condition, the unit(s) should be drained and refilled.

After adding the lubricant or concentrate, the vehicle must be driven in a figure eight for 8 to 10 minutes with the steering one-half turn off the stops. This must be done to circulate the lubricant through the differential assembly in the Quadra-Trac unit.

Lube Change - Without Reduction Unit

Lubricant Blend:

- Concentrate, Jeep Part No. 8123004. Use eight ounces.
- SAE 30 (good quality) nondetergent motor oil (Ashland Valvoline preferred). 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. 8-18).

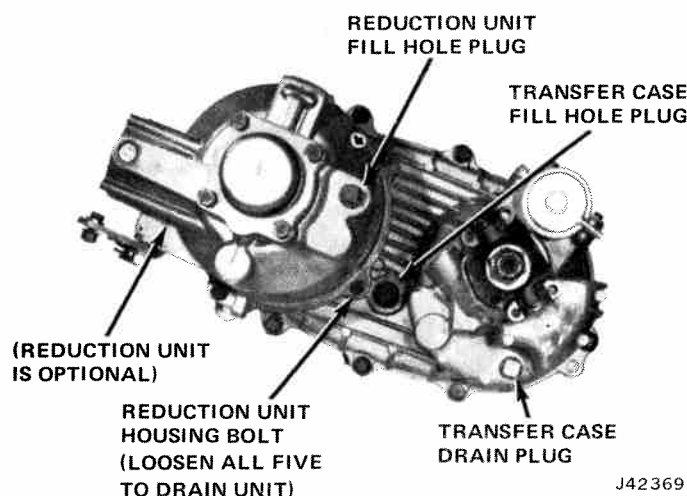


Fig. 8-18 Quadra-Trac Drain and Fill Plug Locations

Lube Change - With Reduction Unit

Use Lubricant Blend:

- Concentrate, Jeep Part No. 8123004. Use eight ounces.
- SAE 30 (good quality) nondetergent motor oil (Ashland Valvoline preferred). 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 (refer to Torque Specifications).

First fill the reduction unit to fill-hole level with motor oil, 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. 8-18).

CAUTION: Fill plugs, drain plugs, and reduction housing bolts should not be overtightened. Torque values are 15 to 25 foot-pounds for the plugs and the 3/8-16 bolts. Torque for the 5/16-18 bolts is 10 to 20 foot-pounds.

NOTE: 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 P (Park).

(3) Lift and support vehicle in a manner which will allow front wheels to turn freely.

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

(5) 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 110 to 270 foot-pounds of torque is applied.

NOTE: Slippage with torques below 110 foot-pounds indicates the need for differential unit replacement. If the unit will not slip by applying 270 foot-pounds torque or less, improper lubricant may be the cause. Refer to Stick-Slip Condition and to Lubrication Change - With Reducton Unit in this Section. If addition of concentrate or changing lubricant does not correct the condition after reasonable mileage, the differential unit should be replaced.

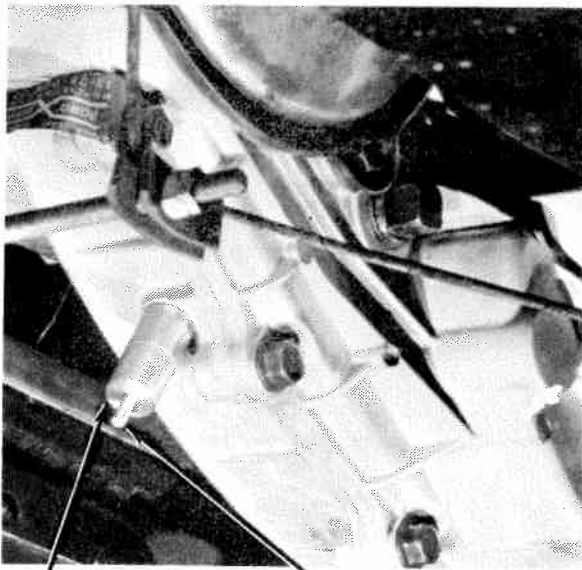
Drive Chain Tension Inspection

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

(2) Remove chain inspection plug.

(3) Thread Chain Tension Gauge, Tool Number W-363, into inspection hole until tool shoulders against case just finger-tight.

(4) The tool plunger should protrude past the outer end of the checking tool (fig. 8-19). If tool plunger is flush or below the end of the tool, the chain should be replaced.



CHAIN TENSION GAUGE W-363 PROTRUDING PLUNGER INDICATES GOOD CHAIN J42370

Fig. 8-19 Chain Tension Gauge Installed

REDUCTION UNIT

Removal

- (1) Lift and support vehicle.
- (2) Loosen all bolts attaching reduction unit to transfer case cover (fig. 8-20).
- (3) Move reduction unit rearward just far enough to allow oil to drain from unit.
- (4) Loosen low range cable retaining bolt at shift control lever and remove the control cable.
- (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 only involves removing the snap ring which secures the cage to the sprocket and sliding the cage rearward.

An oil baffle, used only with reduction units, can be seen on the back of the transfer case cover. This baffle need not be removed except for replacement.

Installation

- (1) If removed, place reduction oil baffle and tube assembly on rear of transfer case cover (fig. 8-21).
- (2) If removed, install pinion cage onto transfer case drive sprocket splines.
- (3) Install retaining snap ring. Be sure snap ring is seated completely in groove (fig. 8-22).

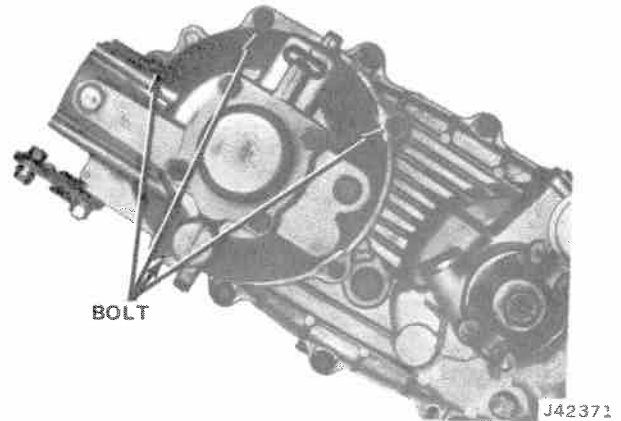


Fig. 8-20 Reduction Unit Attaching Bolts

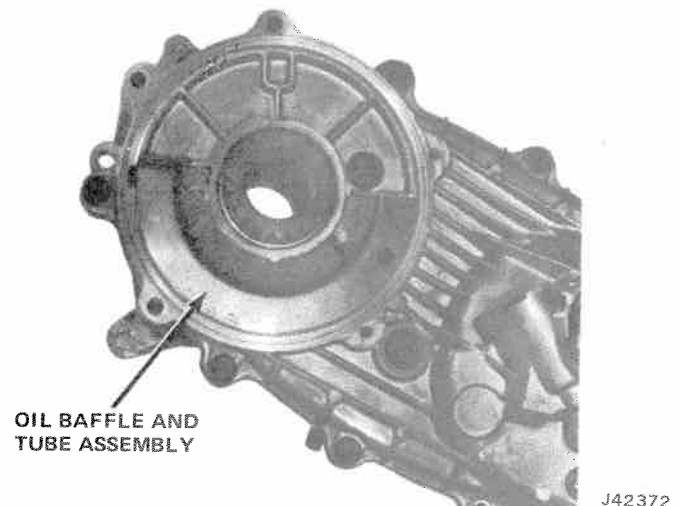


Fig 8-21 Reduction Oil Baffle and Tube Assembly Installed

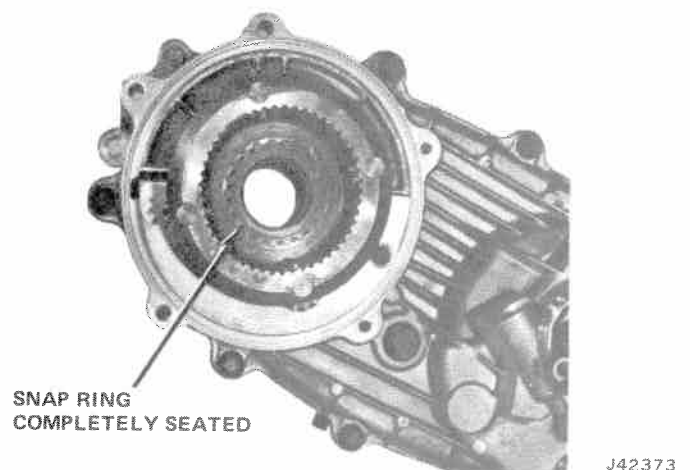


Fig 8-22 Reduction Pinion Case Installed

- (4) Clean sealing ring groove in transfer case cover and install sealing ring.
- (5) Lift reduction unit and mesh caged pinions with sun gear and ring gear, and align sun gear inner splines with transmission output shaft splines.

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

(7) Loosely install attaching screws. Alternately tighten screws to specified torque (refer to Torque Specifications).

(8) Connect and adjust shift control cable (refer to Control Cable Adjustment for procedure).

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

Disassembly

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

(2) Remove snap ring and spacer from rear end of reduction mainshaft (fig. 8-24).

(3) Remove reduction mainshaft and sun gear assembly by sliding it forward.

(4) Remove needle bearing (fig. 8-25).

(5) Grasp ring gear and remove ring gear, reduction collar plate, pinion cage lock plate, shift collar hub and reduction collar hub as an assembly (fig. 8-26).

(6) With a plastic hammer or soft mallet, tap shift collar hub from pinion cage lock plate (fig. 8-27).

(7) Remove pinion cage lock plate and needle bearing, ring gear, reduction collar plate, and shift collar hub, reduction collar hub, and needle bearing from shift collar hub.

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

(8) Remove needle bearing and direct drive sleeve from reduction shift collar.

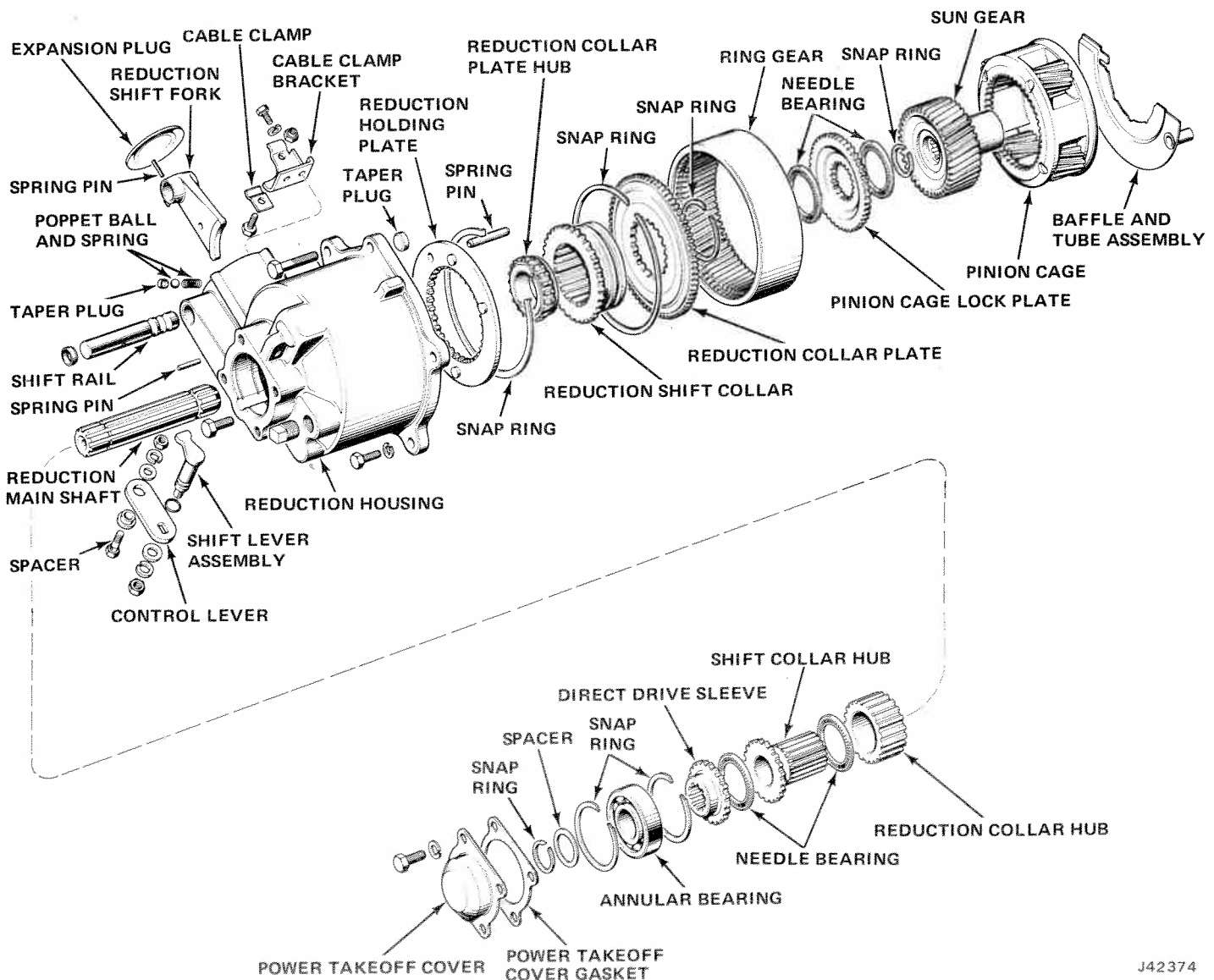
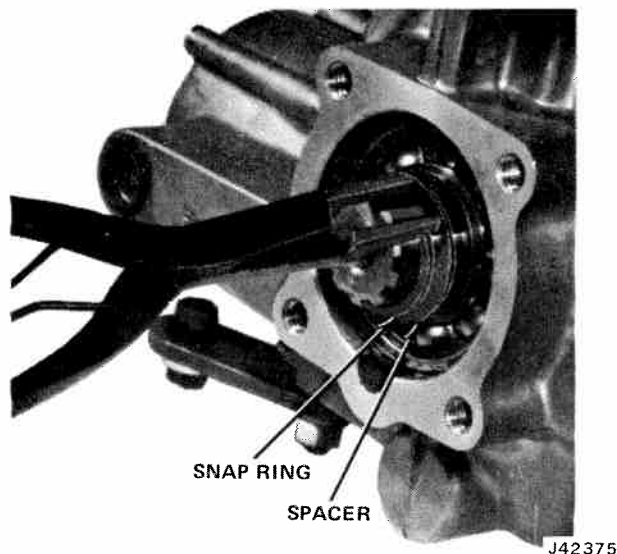
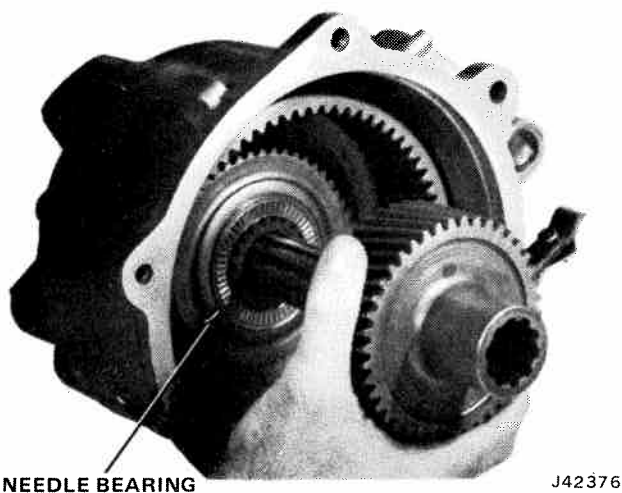
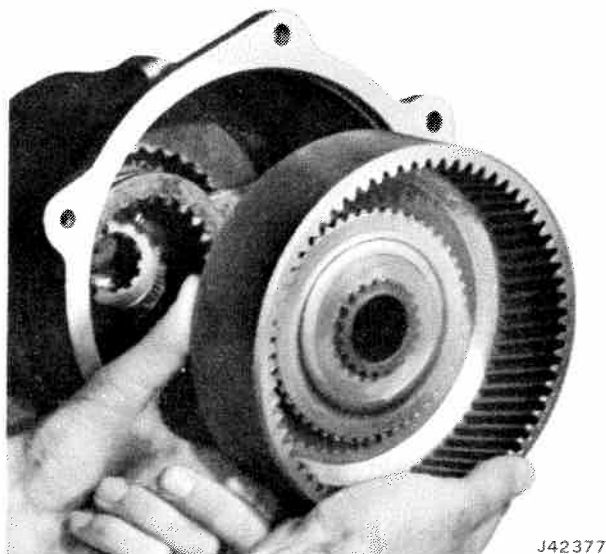
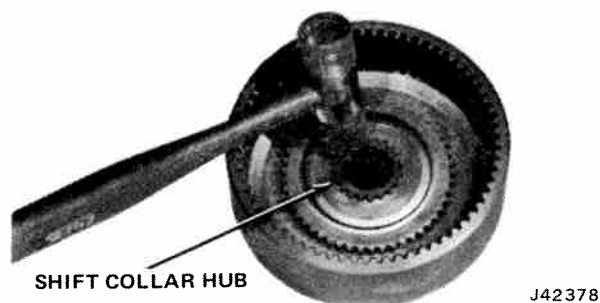


Fig. 8-23 Reduction Unit Components

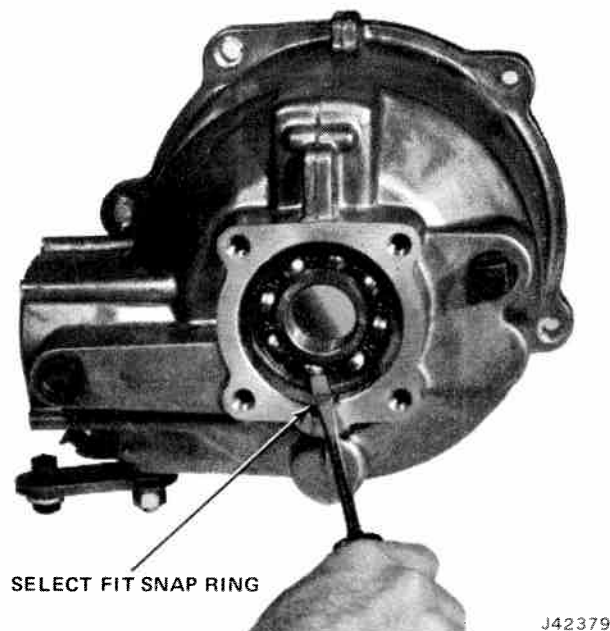

Fig. 8-24 Removing Snap Ring and Spacer

Fig. 8-25 Removing Mainshaft and Sun Gear Assembly

Fig. 8-26 Removing Ring Gear Assembly

Fig. 8-27 Removing Shift Collar Hub

Shift Collar Removal

- (1) Using control lever, shift collar to center or neutral detent.
- (2) Move collar away from shift fork to disengage fork.
- (3) Shift fork rearward to direct drive detent.
- (4) Move collar toward fork to align outer teeth on collar with inner teeth in reduction holding plate.
- (5) Shift fork and collar forward to reduction detent.
- (6) Remove reduction shift collar.

Annular Bearing Replacement

- (1) Remove rear snap ring and annular bearing (fig. 8-28). 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. 8-28 Removing Rear Annular Bearing Snap Ring

Reduction Housing Disassembly

- (1) Remove shift fork locating spring pin by pulling and rotating with pliers (fig. 8-29).
- (2) Remove large expansion plug.
- (3) Remove shift rail taper plugs.
- (4) Remove control lever from shift lever assembly.
- (5) Use a 3/16-pin punch and drive spring pin from shift fork and shift rail (fig. 8-30)
- (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.

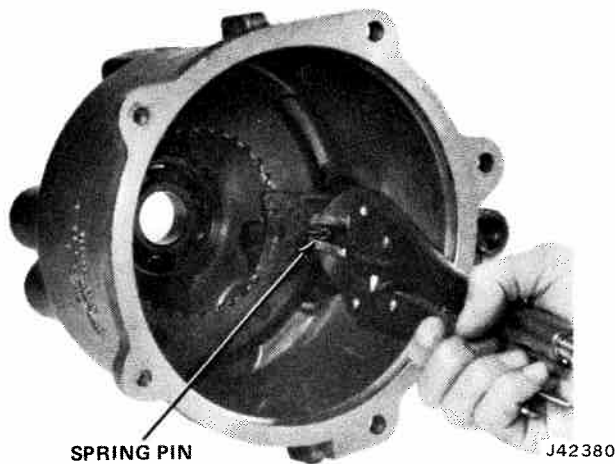


Fig. 8-29 Removing Shift Fork Locating Spring Pin

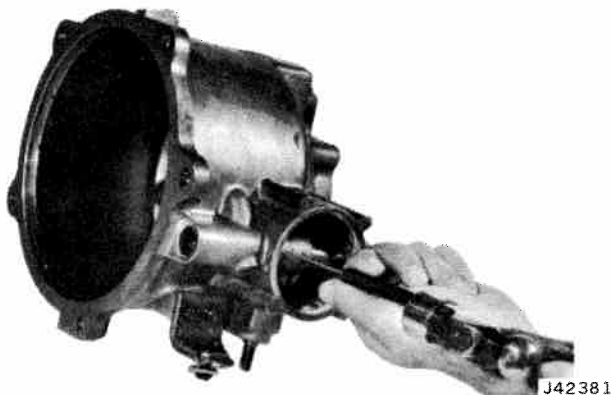


Fig. 8-30 Removing Spring Pin

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).

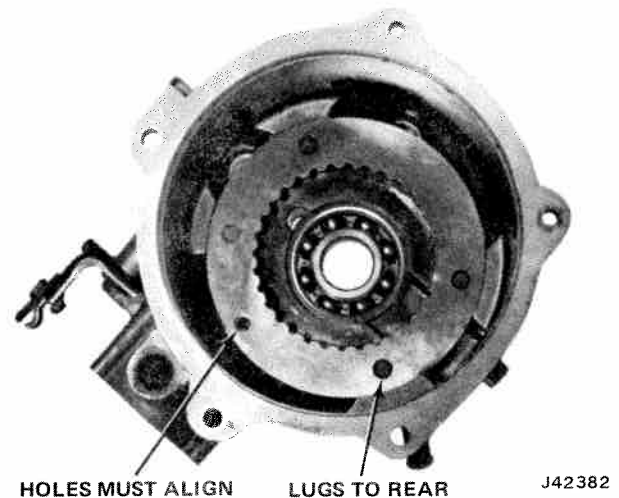


Fig. 8-31 Reduction Holding Plate Indexed Properly in Case



Fig. 8-32 Shift Lever O-Ring Installation

- (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) Without an O-ring, insert shift lever assembly fully into housing with lever end facing rearward.
- (4) Place O-ring seal in exposed groove in shift lever shaft (fig. 8-32).
- (5) Move shift lever assembly inward just far enough to allow installation of shaft locating taper pin.
- (6) Install taper pin.
- (7) Insert shift rail, grooved end first, into shift rail rear bore in case.
- (8) Rotate rail so flat side will be adjacent to poppet spring.

(9) Slide rail far enough to allow shift fork to be meshed with shift lever assembly and on rail.

(10) Move rail through shift fork until end of rail is even with edge of poppet bore.

(11) Place poppet ball on end of spring.

(12) Use a spring pin as a tool to depress poppet ball (fig. 8-33).

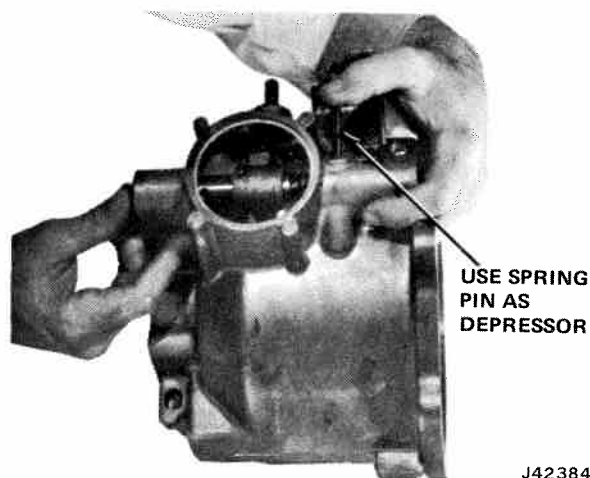


Fig. 8-33 Installing Shift Rail and Poppet

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

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

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

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

(17) Install spring pin flush with outside surface of shift fork (fig. 8-34).

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

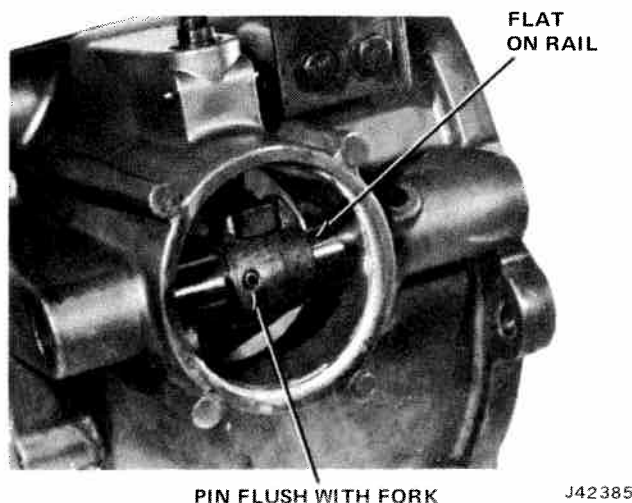


Fig. 8-34 Shift Rail

(19) Install shift fork locating spring pin.

(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. The shift collar fork groove should be just forward of the shift fork.

(c) Shift fork to rear (direct drive) detent.

(d) Move shift collar away from fork and rearward until groove in collar aligns with fork.

(e) Move collar toward fork to engage collar groove with shift fork.

(22) Install direct drive sleeve into reduction shift collar.

(23) Needle bearing surface and pointed ends of outer teeth should be forward.

(24) Lubricate and install needle bearing against direct drive sleeve (fig. 8-35).

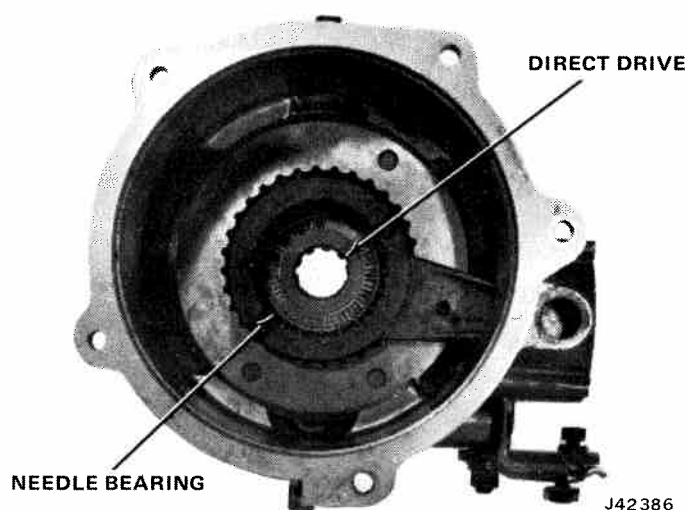


Fig. 8-35 Direct Drive Sleeve and Needle Bearing Installed

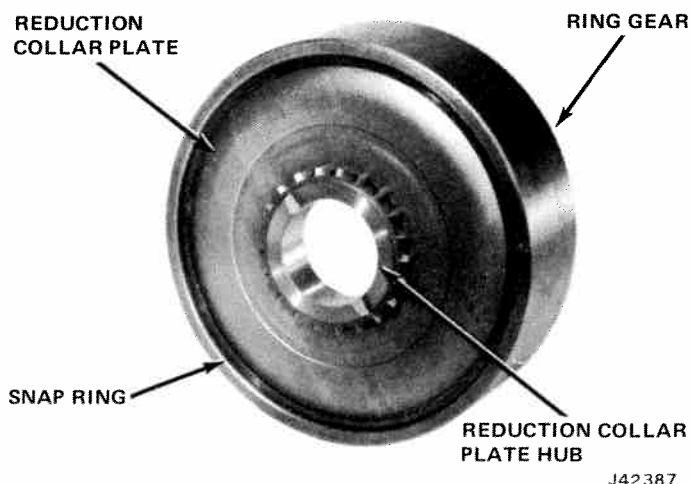


Fig. 8-36 Reduction Collar Plate

(25) If separated, assemble reduction collar plate hub and ring gear to reduction collar plate as shown. Be sure snap rings seat completely in their grooves (fig. 8-36).

(26) Place needle bearing and reduction collar hub on shift collar hub (fig. 8-37).

(27) Place ring gear, reduction collar plate and hub assembly onto shift collar hub (fig. 8-38). No needle bearing is used between reduction collar plate hub and reduction collar hub.

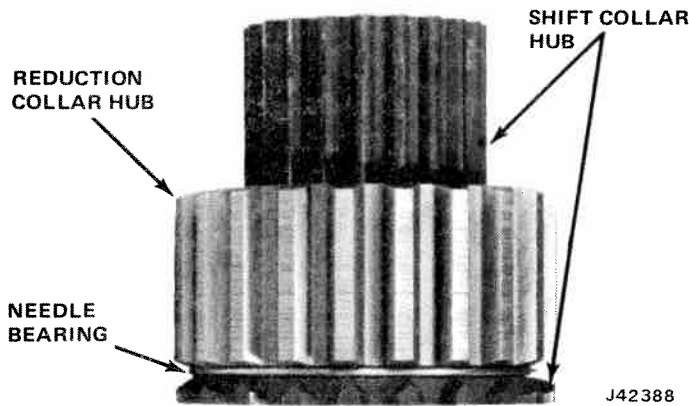


Fig. 8-37 Needle Bearing and Reduction Collar Hub Assembled with Shift Collar Hub

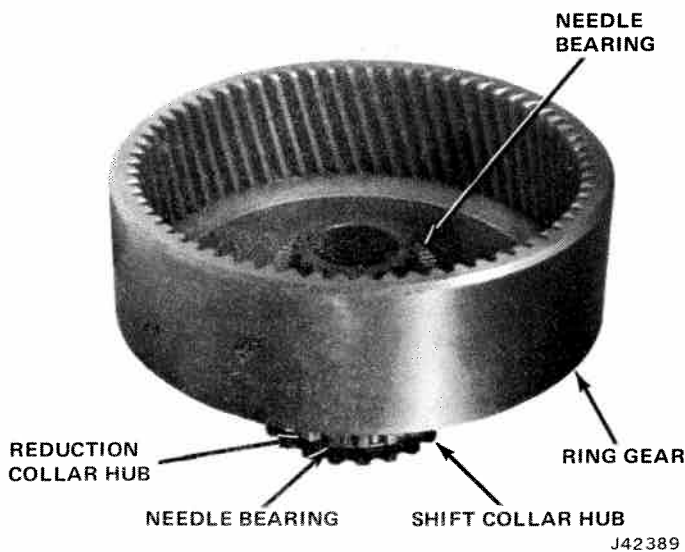


Fig. 8-38 Ring Gear

(28) Install a needle bearing onto shift collar hub and reduction collar plate hub.

(29) Install pinion cage lock plate onto shift collar hub.

NOTE: The pinion cage lock plate should be tapped gently with a plastic hammer or soft mallet until the lock plate is snug against the needle bearing.

(30) Place assembly into the housing.

NOTE: It may be necessary to rotate ring gear or pinion cage lock plate to align various sets of splines.

(31) Install needle bearing onto shift collar hub and pinion cage lock plate.

(32) Insert reduction mainshaft and sun gear assembly into shift collar hub and through direct drive sleeve and annular bearing (fig. 8-39).

NOTE: Rotation of the sun gear may be necessary to align mainshaft splines with direct drive sleeve and annular bearing.

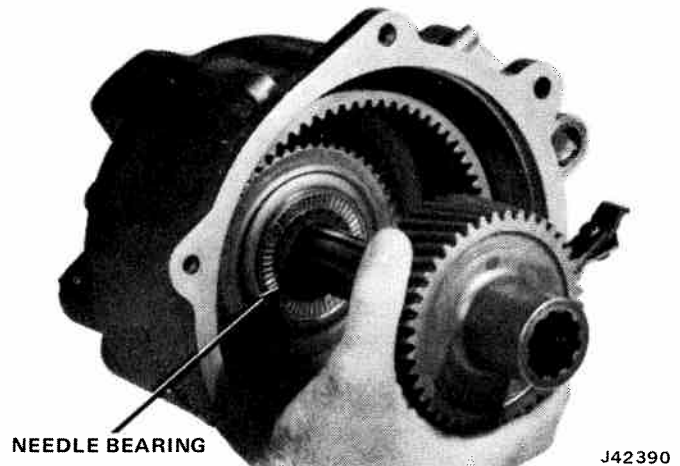


Fig. 8-39 Installing Mainshaft and Sun Gear Assembly

(33) Using only a brass drift, gently tap the reduction mainshaft rearward as far as possible.

(34) 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 the thickest ring possible to provide 0.004 to 0.099 inch spacer clearance. Be sure snap ring fits securely in groove.

(35) Install power takeoff cover and gasket. Tighten cover attaching screws to specified torque.

TRANSFER CASE COVER

Removal

(1) Lift and support vehicle.

(2) If equipped with reduction unit, 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 allow unit to drain.

(4) Mark rear output shaft yoke and universal joint to provide alignment reference to be used during

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

(5) Mark diaphragm control vacuum hoses for identification during assembly, then disconnect diaphragm control vacuum hoses, lockup indicator switch wire and speedometer cable. Remove indicator switch.

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

(7) Remove bolts which attach case cover assembly

to case (front housing).

(8) Carefully slide cover assembly backward off front output shaft and transmission output shaft.

Disassembly

(1) Remove rear output shaft yoke.

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

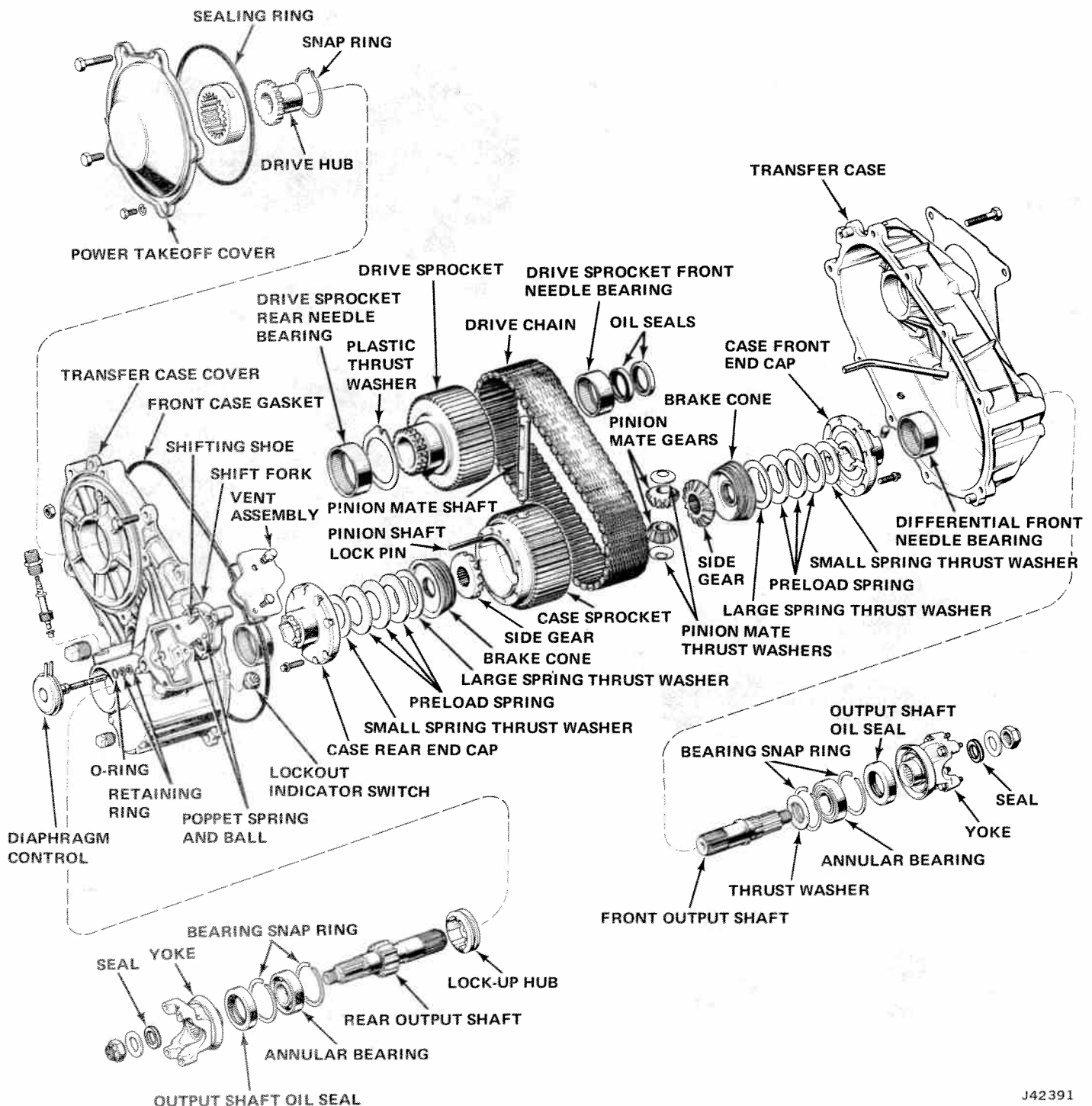


Fig. 8-40 Quadra-Trac Transfer Case Components

(3) Using a piece of wood 2 by 4 by 6 inches long, position cover and sprocket (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) Lift case cover from drive sprocket and differential. The cover, rear output shaft, bearings and seal, drive sprocket rear needle bearing, and lockup hub may be serviced without disassembly of other units. Refer to appropriate headings in Subassembly Service for detailed procedures.

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

NOTE: The differential unit may be serviced without disassembly of other units. Refer to Differential Inspection for detailed procedures.

Assembly

(1) Position drive sprocket on a piece of wood 2 by 4 by 6 inches long.

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

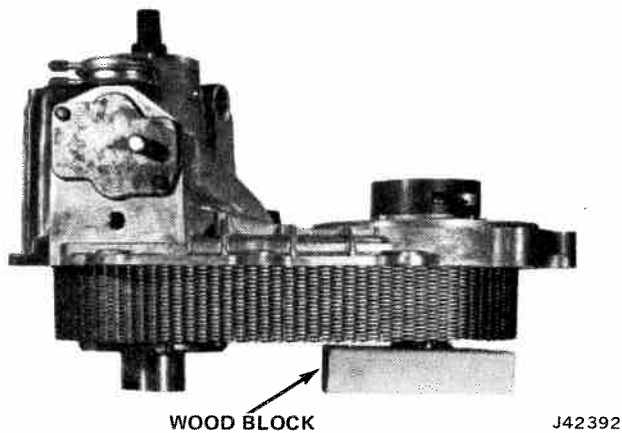


Fig. 8-41 Transfer Case Cover Positioned for Disassembly

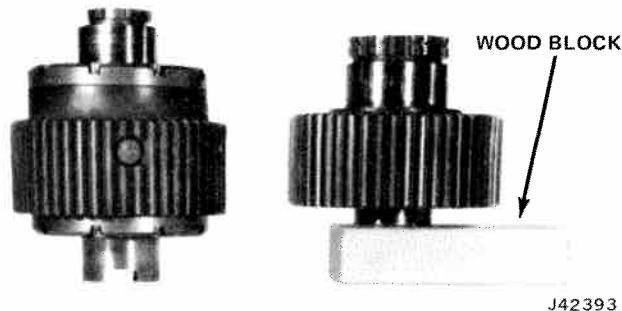


Fig. 8-42 Differential and Drive Sprocket Positioned for Chain Installation

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

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

(4) Insert rear output shaft into differential.

(5) Shift lockup hub rearward in case cover. Lubricate drive sprocket thrust washer and stick it in position on case cover (fig. 8-44).

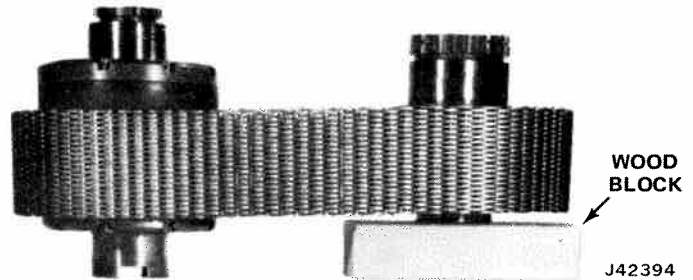


Fig. 8-43 Drive Chain Positioned Around Differential and Drive Sprocket

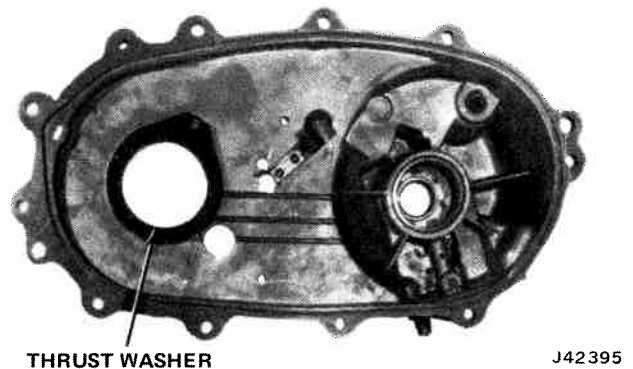


Fig. 8-44 Drive Sprocket Thrust Washer in Position on Case Cover

(6) Carefully align and position case cover onto drive sprocket and differential. Output shaft may require slight rotation to align with lockup hub. Be sure drive sprocket thrust washer does not become mispositioned.

(7) If equipped with reduction, install pinion cage onto 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; then install onto 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. The unit should turn easily with no binding.

(10) If not equipped with reduction, install power takeoff sealing ring and cover. Tighten attaching screws (refer to Torque Specifications).

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

(12) Use Seal Drive W-360 to install rear output shaft oil seal (fig. 8-46).

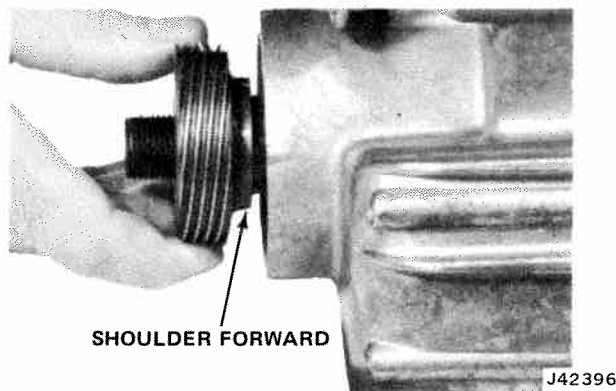


Fig. 8-45 Installing Speedometer Drive Gear

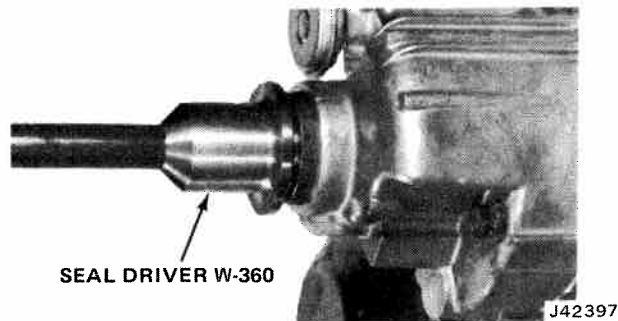


Fig. 8-46 Installing Rear Output Shaft Oil Seal

(13) Install rear yoke and nut. Tighten nut (refer to Torque Specifications).

Installation

- (1) Clean oil seal groove and install seal ring.
- (2) Install two 3/8-16 x 2 inch long pilot studs into transfer case (front housing).
- (3) Insert oil tube into case bore at front output shaft bearing boss. Insert a 6-inch length of 5/16 inch drill rod into tube. Rod will be used as a pilot to align tube with case cover (fig. 8-47).
- (4) Lift cover assembly and align tube pilot with hole in cover. Move assembly forward over pilot studs.
- (5) Move cover assembly forward to mesh with front output shaft and transmission output shaft.

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

(6) After cover assembly has been moved forward and evenly touches the case, remove pilot studs and install cover to case attaching bolts. Alternately and evenly tighten bolts (refer to Torque Specifications).

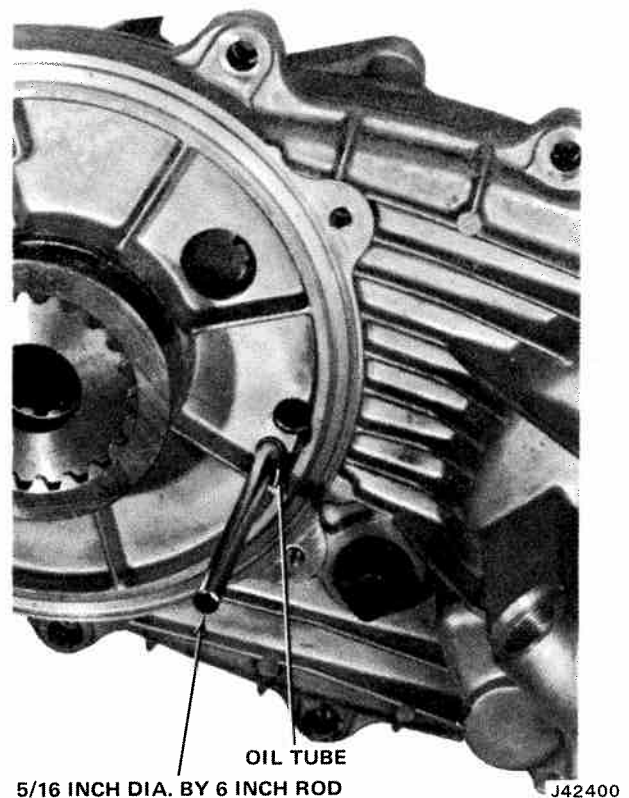


Fig. 8-47 Aligning Oil Tube for Cover Assembly Installation

(7) Install lockout indicator switch. Connect Lockout switch wire, diaphragm control vacuum hoses and speedometer cable.

(8) Connect rear propeller shaft front universal joint to rear output shaft. It may be necessary to lift rear wheels free of hoist to allow proper alignment for installation.

(9) Connect parking brake cable guide to pivot on right frame side.

(10) If equipped with reduction unit, install reduction unit and adjust cable. Refer to Reduction Unit Installation for procedure.

(11) Install proper amount of specified lubricant. Refer to Lubrication for quantity, type, and procedure.

(12) Lower vehicle.

TRANSFER CASE ASSEMBLY

Removal

Complete assembly removal is normally not required except when the front output shaft, front annular bearing, transmission output shaft seals or the transfer case (front housing) require service. For chain, drive sprocket, differential unit, diaphragm control system, needle bearing, thrust washer, or rear output shaft service, refer to Transfer Case Cover - Removal.

- (1) Lift and support vehicle.
- (2) Mark front and rear output shaft yokes and universal joints to provide alignment references to be

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

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

(4) Remove bolts which attach exhaust pipe support bracket to transfer case.

(5) Mark diaphragm control vacuum hoses for identification during assembly, then disconnect diaphragm control vacuum hoses, lockout indicator switch wire, and speedometer cable.

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

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

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

(9) Move transfer case assembly backward until unit is free of transmission output shaft and guide pins. Lower assembly from the vehicle.

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

Installation

(1) Position a new gasket onto rear of transmission.

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

(3) Lift transfer case assembly and move it forward to 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 attaching bolts until transfer case assembly is positioned against transmission gasket.

(4) Install rear and front attaching bolts. Tighten bolts (refer to Torque Specifications).

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

(6) Align and attach front propeller shaft.

(7) Connect lockout indicator switch wire and diaphragm control vacuum hoses. Connect park brake cable guide to pivot bracket on right frame side.

(8) Install proper amount of specified lubricant. Refer to Lubrication for quantity, type, and procedure.

(9) Lower vehicle.

Drive Sprocket Oil Seal Replacement

(1) Drive sprocket oil seals may be replaced without disassembling transfer case.

(2) Use a standard J-type puller or a smooth-ended pry bar to remove seals. Do not damage case bore.

(3) Install rear seal (lip to rear) by using Seal Installer W-358 and Sleeve W-358-1 as driver. Install seal until driver shoulder touches case front surface.

(4) Remove Sleeve W-358-1. Install front seal (lip forward) by using Seal Installer W-358 less Sleeve W-358-1. Install seal until driver shoulder touches case front surface (fig. 8-48).

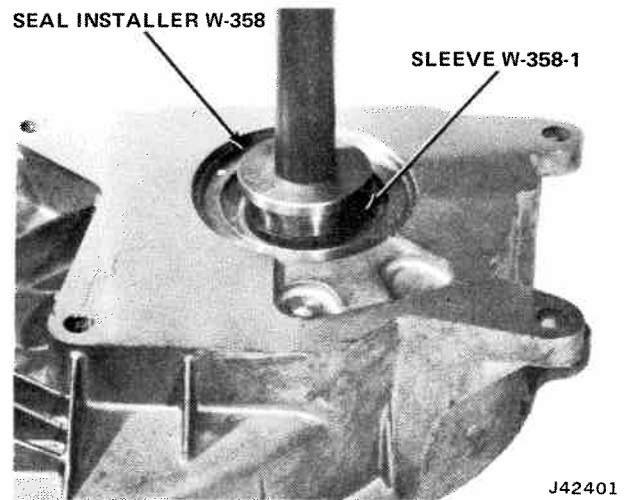


Fig. 8-48 Installing Drive Sprocket Front and Rear Oil Seals

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 screws retaining transfer case cover to transfer case. Slide case from the cover. This will leave chain, drive sprocket, differential unit and output shafts resting in case cover.

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

(5) Using a piece of wood 2 by 4 by 6 inches long, position cover and sprocket (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 bearing, and lockup hub may be serviced without disassembly of other units. Refer to Subassembly Service for detailed procedures.

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

NOTE: Differential unit may be serviced without disassembly of other units. Refer to Differential Inspection for detailed procedures.

Subassembly Service

Differential Inspection

The differential unit is a Belleville preloaded, unloading cone, limited-slip type. The unit is serviced only as an assembly; however, it may be disassembled for component inspection and cleaning purposes.

During disassembly, take care to ensure 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 placed in their original order in the case sprocket during assembly.

Disassembly

(1) Use small paint marks on case sprocket and both end caps to identify rear end cap, front end cap, and proper orientation of both caps on case sprocket (fig. 8-49).



Fig. 8-49 Case Sprocket and End Caps Identified for Orientation

(2) Remove screws which attach front end cap to case sprocket. Remove end cap.

NOTE: It may be necessary to gently tap the end cap with a plastic hammer or soft mallet.

(3) 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.

(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 gently tap the end cap with a plastic hammer or soft mallet.

(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 out; however, it may be necessary to push pin out with a 1/4-inch pin punch.

(8) Use a brass drift and hammer to drive pinion mate shaft from case sprocket.

CAUTION: Be careful not to damage pinion mate thrust washers.

Cleaning

Clean all parts in petroleum solvent. Be sure that all metal contaminated lubricant is removed from all surfaces of every component. The side gears, brake cones, preload springs, and thrust washers must be maintained as matched sets.

Component 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 snugly in the bores.

The sprocket teeth will show a polished wear pattern. Measurable ridges and valleys across the teeth indicate excessive wear.

Pinion Mate Gears, Washers, and Shaft

The teeth should be free of chip marks but a rough machined look is normal. The thrust surfaces and shaft bores may be highly polished with some slightly tarnished spots. Galling or measurable wear is unacceptable.

The thrust washers should be smooth and should conform to their mating surfaces. Washer distortion or galling is unacceptable.

The shaft should be straight and fit snugly into the case sprocket. A polished wear pattern will be noticed. Galling or shouldered-wear on the shaft is unacceptable.

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. Galling or measurable wear is unacceptable.

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 3/4 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.

Assembly

NOTE: During assembly, all bearing and thrust surfaces must be prelubricated with Concentrate, part number 8123004.

(1) Slide pinion mate shaft into case sprocket about three inches.

(2) Place pinion mate thrust washers and gears on shaft in proper order.

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

NOTE: This can be determined by looking through the lockpin hole in the case sprocket.

(4) Slide pinion mate gears apart until gears are pressing washers against case sprocket (fig. 8-50).

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

(6) Position appropriate brake cone over 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) Loosely install attaching screws. Alternately and evenly tighten all screws to 24 to 30 inch-pounds torque.

(12) Invert case sprocket and end cap.

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

(14) Mesh remaining side gear into pinion mate gears.

(15) Position remaining brake cone over side gear and into 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.

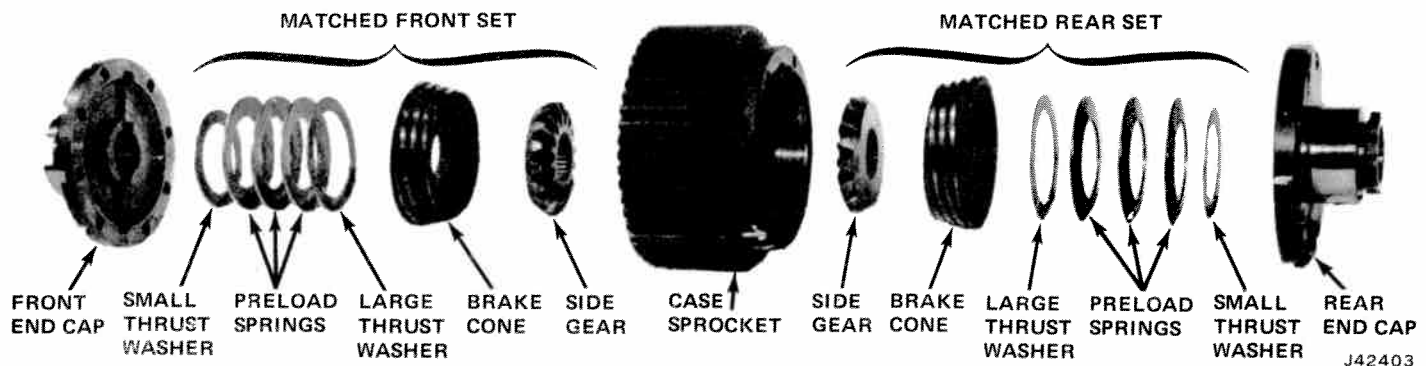


Fig. 8-50 Differential Unit Assembly Sequence

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

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

(20) Be sure cap is centered in preload springs and that cap is rotated to its original alignment on case sprocket. Loosely install attaching screws.

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

(22) Alternately and evenly tighten end cap attaching screws to 24 to 30 inch-pounds torque.

Bearing Replacement

Needle Bearings

On the differential front and rear needle bearings and drive sprocket front needle bearing, use Bearing Remover Tool W-356 for bearing removal (fig. 8-51).

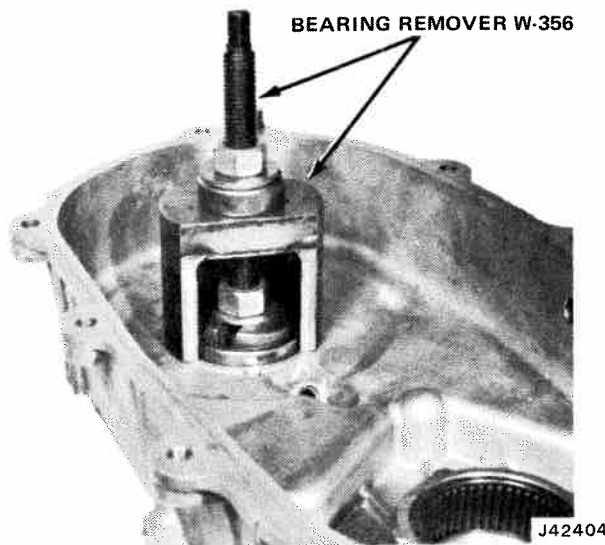


Fig. 8-51 Removing Differential Front or Rear Needle Bearing

Use Bearing Installer Tool W-357 less Pilot Adapter W-357-1 to install the differential front and rear needle bearings (fig. 8-52).

Use Bearing Installer Tool W-357 with Pilot Adapter W-357-1 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. 8-53).

The drive sprocket rear needle bearing may be removed using Bearing Remover and Installer Tool W-361 and Pilot W-361-1. The cover must be supported on the side opposite the driver when the bearing is being removed (fig. 8-54).

Use Bearing Driver Tool W-361 with Pilot W-361-1 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. 8-55).

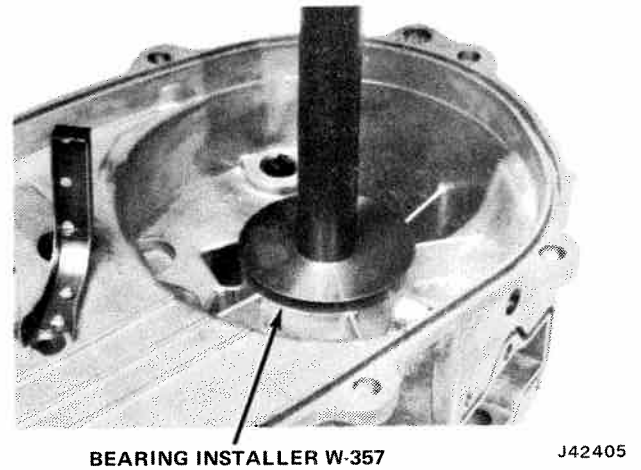


Fig. 8-52 Installing Differential Rear Needle Bearing

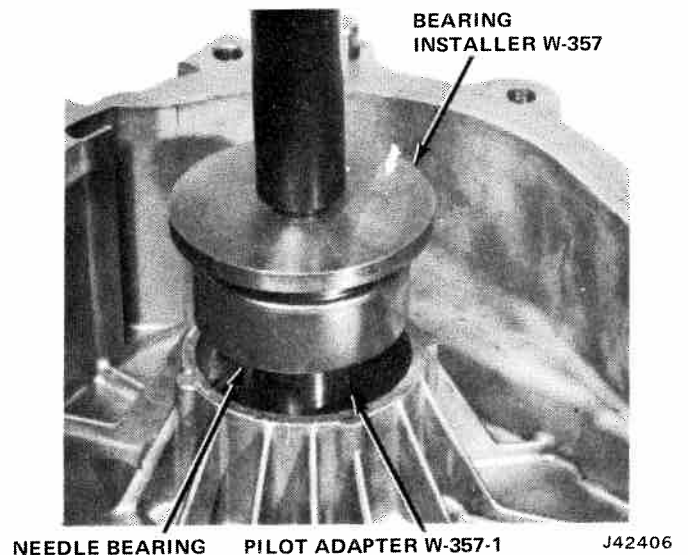


Fig. 8-53 Installing Drive Sprocket Front Needle Bearing

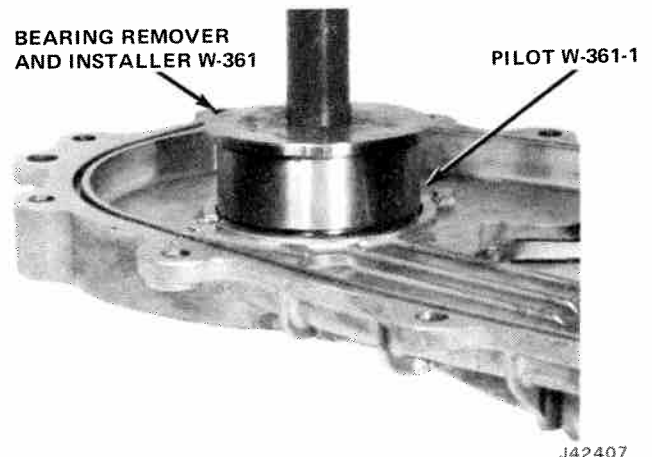


Fig. 8-54 Removing Drive Sprocket Rear Needle Bearing

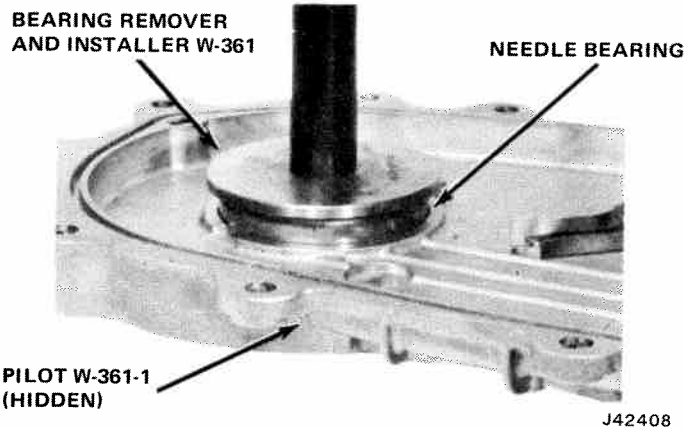


Fig. 8-55 Installing Drive Sprocket Rear Needle Bearing

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) Annular bearing fits just snugly in bore and may be removed by hand. If bearing is tight or if bore is scratched, use a brass drift and tap bearing from bore. It will seldom be necessary to remove inner snap ring.

(4) If removed, install inner (0.060 to 0.063-inch) snap ring. Insert bearing - shielded side to inside - into bore and tap in to stop against inner snap ring. Use Snap Ring Groove Gauge Tool W-364 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 gently pried forward or rearward to gain access to retaining rings.

- (3) Remove the spring. A magnet may be used.

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

(4) Insert magnet into opening prior to removing diaphragm control (fig. 8-56).

- (5) Pull diaphragm control from case cover.
- (6) Remove detent ball and spring.
- (7) Remove shift fork and plastic shifting shoes.
- (8) Remove lockup hub.
- (9) Lubricate and position shifting shoes in shift fork. Place lockup hub into shift fork (fig. 8-57).

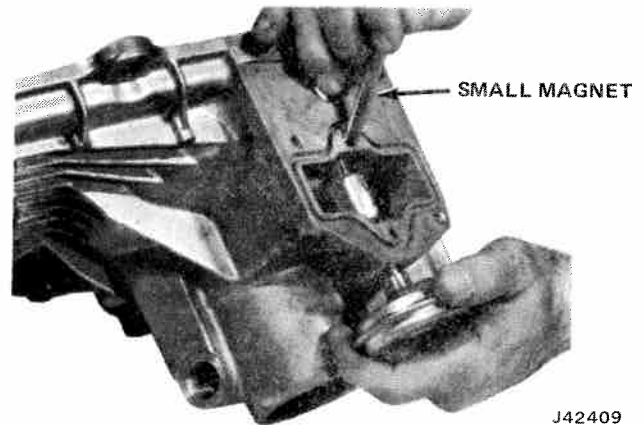


Fig. 8-56 Removing Diaphragm Control

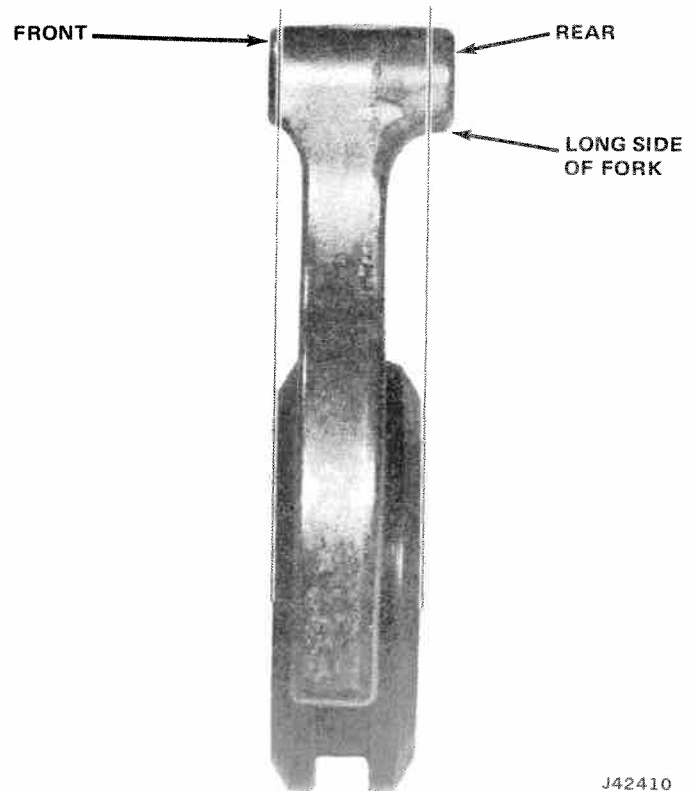


Fig. 8-57 Lockup Hub Assembly with Shift Fork

(10) With long side of fork to rear, insert fork and hub assembly into case cover.

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

(11) Slide diaphragm control rod into case cover, through shift fork but not past detent ball hole.

(12) Deposit detent spring and ball into hole. Use a 1/4-inch pin punch to depress detent ball and slide diaphragm control rod past ball.

(13) Install shift fork retaining clips.

(14) Install the diaphragm control retaining spring. The spring should go into hole deeper than flush. Install vent cover sealing ring and vent cover.

Assembly

NOTE: During assembly, all bearing and thrust surfaces must be prelubricated with Concentrate, part number 8123004.

(1) Position drive sprocket on a block of wood 2 by 4 by 6 inches long (fig. 8-42).

(2) Place differential assembly about 2 inches from drive sprocket and with front end of differential on bench.

(3) Position drive chain around drive sprocket and differential assembly as shown.

(4) 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 into differential.

(6) Shift lockup hub rearward in case cover. Lubricate drive sprocket thrust washer and place it in position on case cover (fig. 8-44).

(7) Carefully align and position case cover onto drive sprocket and differential. Output shaft may require slight rotation to align with lockup hub. Be sure drive sprocket thrust washer does not become mispositioned.

(8) If disassembled, assemble drive hub, drive sleeve, and snap ring (fig. 8-58).

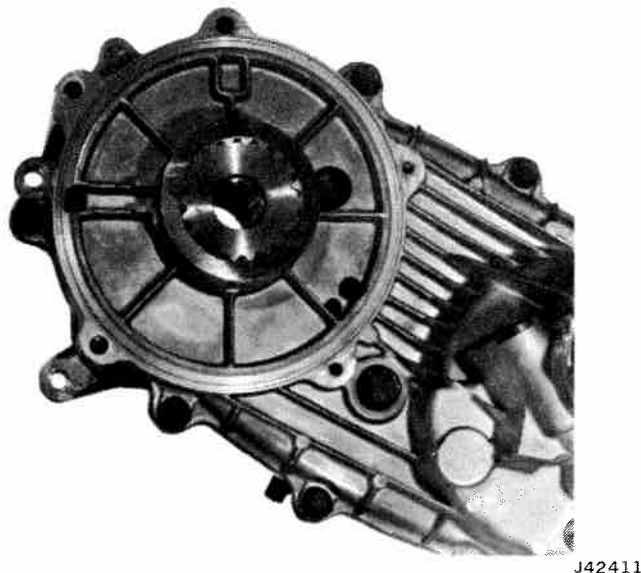


Fig. 8-58 Drive Hub and Sleeve Installed

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

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

(11) Tip case cover assembly to position as shown. Insert front output shaft, output shaft thrust washer and front case gasket.

(12) Insert oil tube into case bore at front output shaft bearing boss. Insert a 6-inch length of 5/16-inch drill rod into tube. Rod will be used as pilot to align tube with case cover (fig. 8-59).

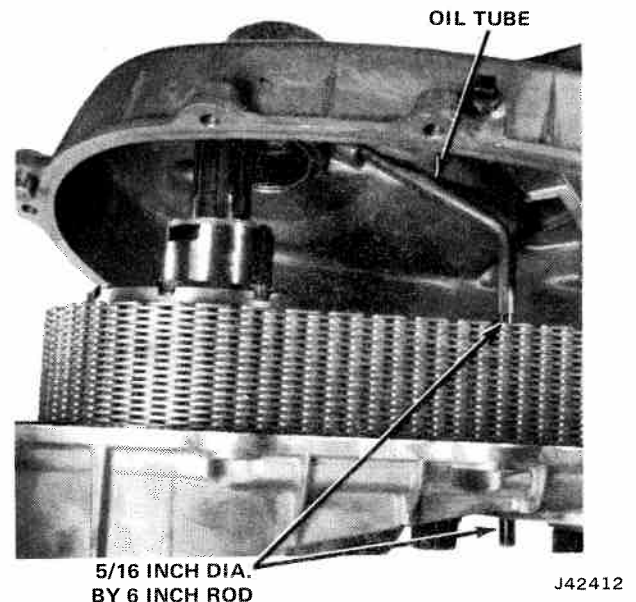


Fig. 8-59 Aligning Oil Tube for Case Installation to Cover Assembly

(13) Carefully align and install case onto differential and drive sprocket. Loosely install case-to-cover attaching screws. Alternately and evenly tighten screws (refer to Torque Specifications).

NOTE: Do not exceed the maximum specified torque.

(14) Rotate drive sleeve to be sure drive sprocket thrust washer did not become mispositioned. The sleeve should turn easily with no binding.

(15) Install power takeoff sealing ring and cover.

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

(17) Use Seal Driver W-360 to install rear output shaft oil seal (fig. 8-46).

(18) Install rear yoke and nut. Tighten nut (refer to Torque Specifications).

(19) Use Seal Driver W-360 to install front output shaft oil seal.

(20) Install front yoke and nut. Tighten nut (refer to Torque Specifications).

SPECIFICATIONS

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
	J42398

TORQUE SPECIFICATIONS

Transfer Case	Foot-Pounds
Breather	6-10
Chain Measuring Access Hole Plug	6-14
Drain Plug	15-25
Fill Plug	15-25
Lock-Out Cover to Transfer Case	8-10
Lock-Out Indicator Switch	10-15
Output Shaft Nut	90-150

Foot-Pounds

Power Takeoff Cover to Transfer Case Bolt:	
3/8 - 16	15-25
5/16 - 18	10-20
Speedometer Adapter	20-30
Transfer Case Cover to Transfer Case	15-25
Differential End Capscrews	24-30
Transfer Case to Transmission Extension Bolt	30-50
Reduction Unit	
Cable Housing Clamp Nut	7-12
Fill Plug	15-25
Shift Lever Cable Clamp Nut	10-20
Shift Lever to Shaft Nut	15-25
Reduction Power Takeoff Cover to Case	15-25
Reduction Unit to Transfer Case Bolt:	
3/8 - 16	15-25
5/16 - 18	8-10
	J42399

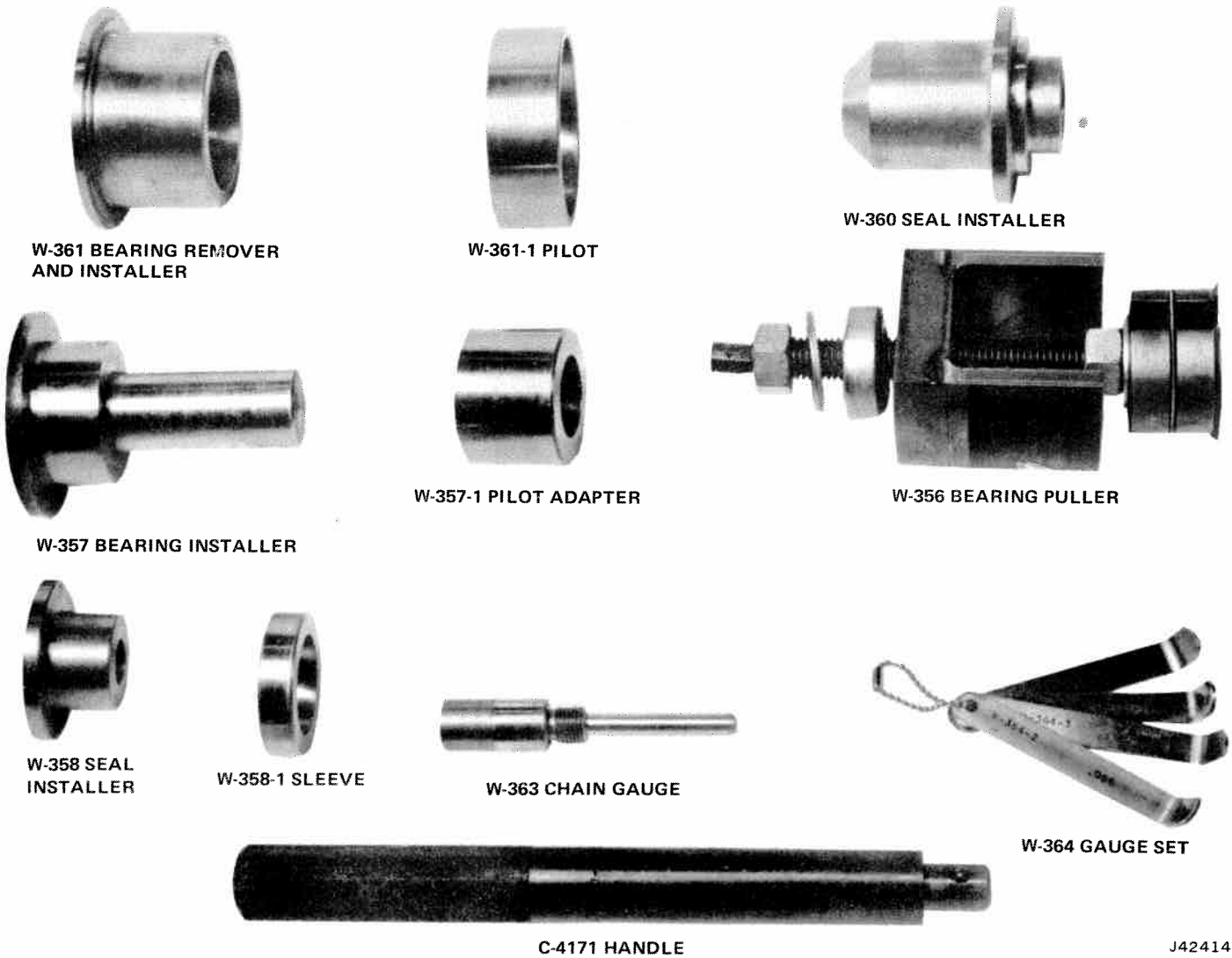


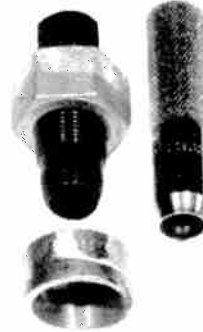
Fig. 8-60 Tools (Sheet 1 of 2)



C-3281 U-JOINT
FLANGE HOLDING WRENCH



W-321 ONE-INCH
TRAVEL INDICATOR



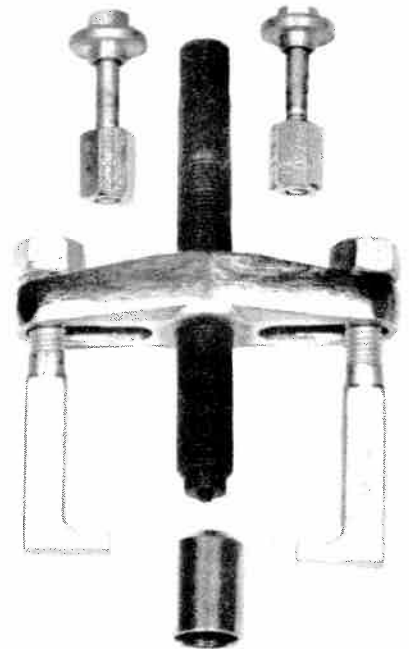
W-176 SHIFTER SHAFT
OIL SEAL PULLER



W-280 COUNTER
SHAFT NEEDLE BEARING
ALIGNING ARBOR



W-133 SPEEDOMETER DRIVE
PINION BUSHING DRIVER



W-172 U-JOINT FLANGE PULLER



W-251 OUTPUT SHAFT
OIL SEAL PULLER
(FRONT AND REAR)



W-130 SHIFTER SHAFT OIL
SEAL INSTALLER THIMBLE
AND DRIVER



W-143 OUTPUT SHAFT OIL
SEAL DRIVER (FRONT AND REAR)

J42413

Fig. 8-60 Tools (Sheet 2 of 2)

TECHNICAL SERVICE LETTER REFERENCE

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