REAR SUSPENSION AND AXLES

CONTENTS

GENERAL INFORMATION

SUSPENSION COMPONENTS

The Jeep rear suspension is comprised of;

- Drive axle
- Leaf springs
- Dual-action shock absorbers
- Track bar (YJ vehicles)
- Stabilizer bar (XJ vehicles)
- Jounce bumpers

The rear suspension design uses semi-elliptic multi-leaf springs and a solid drive axle. The forward end of the springs are mounted to the frame rail hangers through rubber bushings. The bushings isolate road noise as the springs move. The rearward end of the springs are attached to the frame by the use of shackles. Again the spring and shackles use rubber bushings to isolate road noise. The shackles allow the springs to change their length as the vehicle moves over various road conditions. The spring and axle travel is limited through the use of bumpers mounted on frame.

All suspension components that use bushings should be tightened with the vehicle at normal ride height. If the springs are not at normal ride position, vehicle ride comfort could be affected. Rubber bushings must never be lubricated.

The springs are attached to the axle pads with U-bolts and plates. The springs use a center bolt that holds the spring leafs in position. The bolt is also used to locate the spring assembly to the axle pad.

Ride control is accomplished through the use of dual-action shock absorbers. The shocks dampen the jounce and rebound as the vehicle travels over various road conditions. The top of shock absorbers are bolted to the frame bracket. The bottom of the shocks are bolted to the axle bracket.

The stabilizer bar on the XJ is used to minimize vehicle rear sway during turns. The bar helps the vehicle maintain a flat attitude to the road surface. The bar extends across the underside of the chassis and connects to the frame rails. The links are connected to the axle brackets. All mounting points of the stabilizer bar are isolated by bushings.

The track bar on the YJ is used to minimize rear axle side-to-side movement. The track bar is attached to the frame rail bracket and axle bracket and is isolated with bushings.

The jounce bumpers are used to limit the jounce and rebound travel of the suspension.

AXLES

The Model 35 axle is standard for XJ and YJ vehicles. The 8 1/4 axle is available in XJ vehicles without ABS brakes.

The Model 35 and 8 1/4 axle housings has a cast iron center section. Two steel axle shaft tubes are pressed into the differential housing and welded.

It is not necessary to remove the axle from the vehicle for service. A removable differential cover is provided for routine vehicle service. If the differential housing is damaged, the complete axle assembly can be removed.

For complete drive axle assembly removal and installation refer to Drive Axle Assembly Replacement in this Group.

IDENTIFICATION

Model 35 axle has the assembly part number and gear ratio listed on a tag. The tag is attached to the left side of the housing cover (Fig. 1). Build date identification codes on axles are stamped on the axle shaft tube cover side. The Model 35 axle has a flat housing cover gasket flange at the outer edge (Fig. 1).

The 8 1/4 axle has the build date code and gear ratio tags attached to the housing cover (Fig. 2). The housing cover gasket has a rolled gasket flange at the outer edge (Fig. 2).

- The Model 35 axle has shaft tubes that are 2.625 inch (66.67 mm) in diameter.
- The 8 1/4 axle has axle shaft tubes that are 3.0-inch (76.2 mm) in diameter.

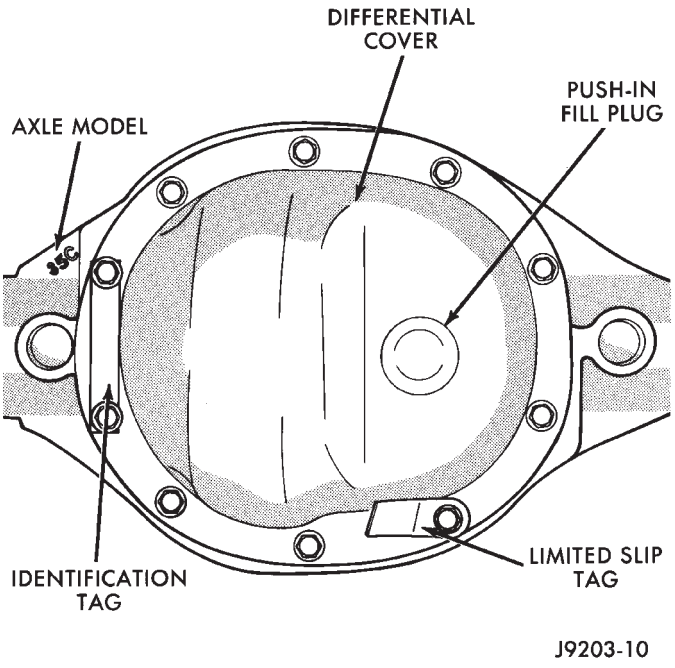

Fig. 1 Model 35 Differential Cover

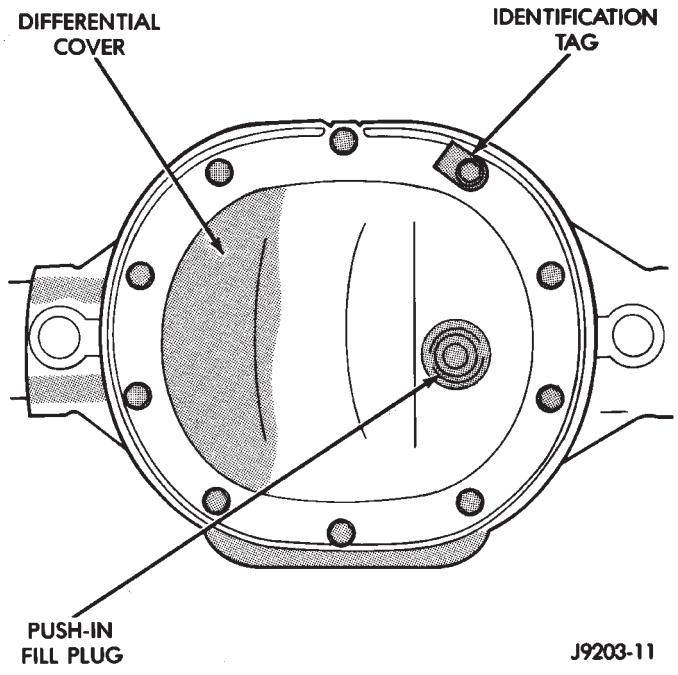

Fig. 2 8 1/4 Differential Cover

STANDARD DIFFERENTIAL OPERATION

The differential gear system divides the torque between the axle shafts. It allows the axle shafts to rotate at different speeds when turning corners.

Each differential side gear is splined to an axle shaft. The pinion gears are mounted on a pinion mate shaft and are free to rotate on the shaft. The pinion gear is fitted in a bore in the differential case and is positioned at a right angle to the axle shafts.

In operation, power flow occurs as follows:

- The pinion gear rotates the ring gear
- The ring gear (bolted to the differential case) rotates the case
- The differential pinion gears (mounted on the pinion mate shaft in the case) rotate the side gears
- The side gears (splined to the axle shafts) rotate the shafts

During straight-ahead driving, the differential pinion gears do not rotate on the pinion mate shaft. This occurs because input torque applied to the gears is divided and distributed equally between the two side gears. As a result, the pinion gears revolve with the pinion mate shaft but do not rotate around it (Fig. 3).

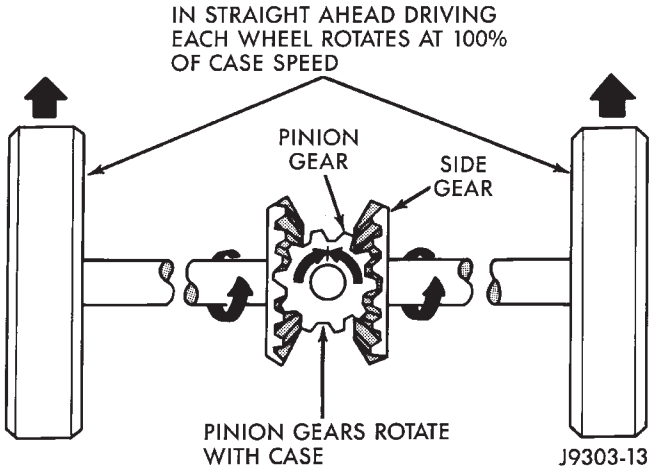

Fig. 3 Differential Operation—Straight-Ahead Driving

When turning corners, the outside wheel must travel a greater distance than the inside wheel in order to complete a turn. The difference must be compensated for, to prevent the tires from scuffing and skidding through turns. To accomplish this, the differential allows the axle shafts to turn at unequal speeds (Fig. 4). In this instance, the input torque applied to the pinion gears is not divided equally. The pinion gears now rotate around the pinion mate shaft in opposite directions. This allows the side gear and axle shaft attached to the outside wheel to rotate at a faster speed.

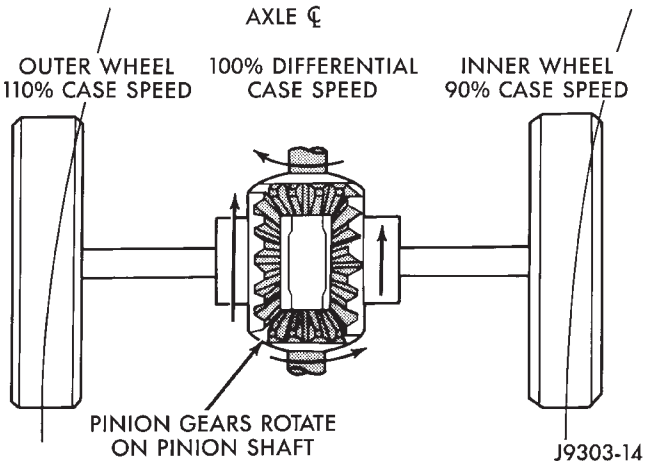

Fig. 4 Differential Operation—On Turns

XJ SUSPENSION

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SPRING AND SHOCK DIAGNOSIS

A noise from the shock absorber or spring bushings can be produced if movement between the rubber bushings and the metal occurs. This noise can usually be stopped by tightening the nuts. If the noise persists, inspect for damaged and worn bushings. Repair as necessary.

The shock absorbers are not refillable or adjustable. If a malfunction occurs, the shock absorber must be replaced. To test a shock absorber, hold it in an upright position and force the piston into and out of the cylinder four or five times. The action throughout each stroke should be smooth and even.

The spring eye and shock absorber bushings do not require any type of lubrication. **Do not attempt to stop spring bushing noise by lubricating them. Grease and mineral oil-base lubricants will deteriorate the bushing rubber.**

If the vehicle is used for severe, off-road operation, the springs should be examined regularly. Check for broken and shifted components.

CAUTION: Suspension components with rubber bushings should be tightened with the vehicle at normal height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

SPRING AND SHOCK ABSORBER DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
SPRING SAGS	1. Broken leaves	1. Replace broken leaves
	2. Spring fatigue	2. Replace spring
SPRING NOISE	1. Loose U-bolts	1. Tighten U-bolts to specified torque
	2. Worn bushings	2. Replace bushings
	3. Worn or missing leaf liners	3. Replace leaf liners
SHOCK ABSORBERS NOISY	1. Loose mounting bolt or nut	1. Tighten bolt or nut to specified torque
	2. Worn bushings	2. Replace shock absorber
	3. Leaking shock	3. Replace shock

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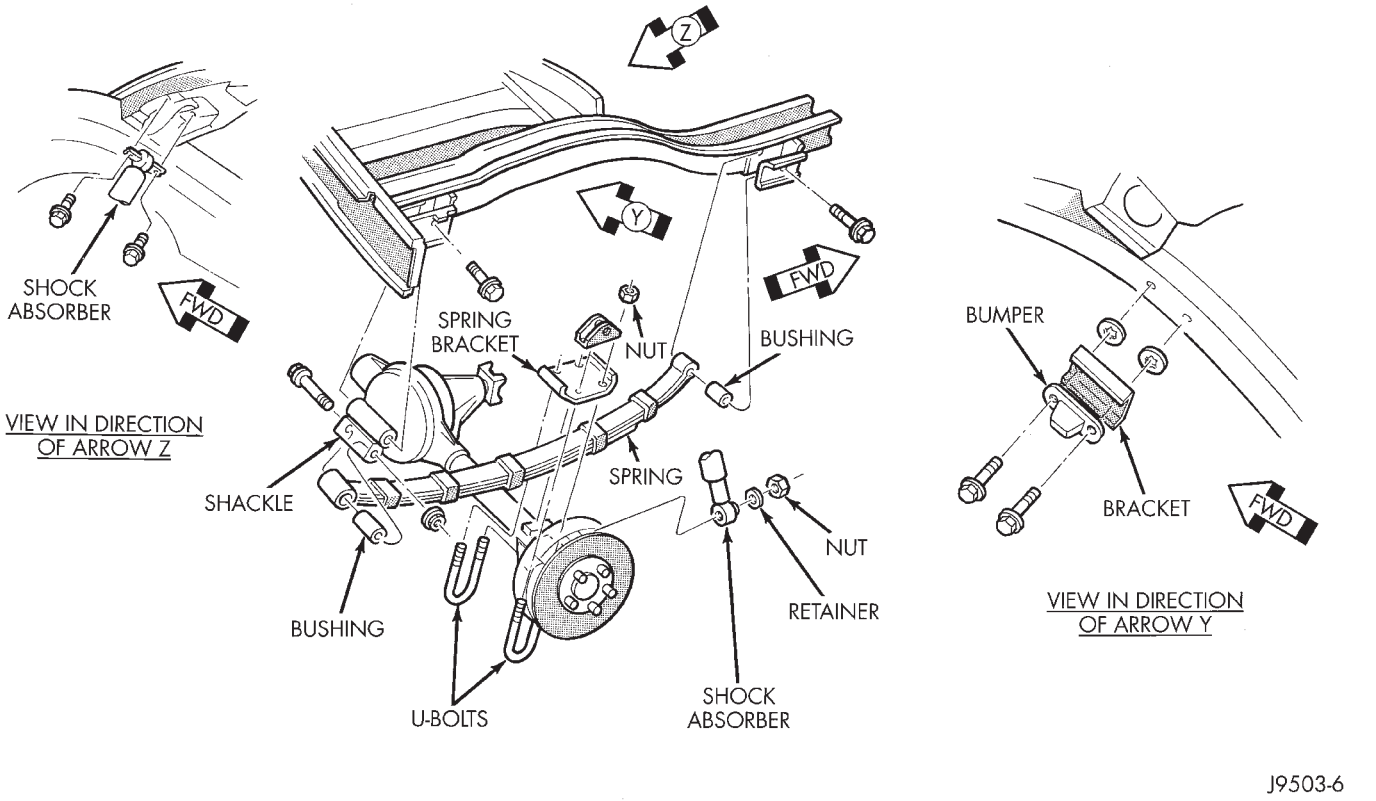

Fig. 1 Spring & Shock Absorber—XJ Vehicles

SHOCK ABSORBER

REMOVAL

(1) Remove the shock absorber upper bolts from the frame bracket (Fig. 1).

(2) Remove the lower attaching nut and washer from the bracket stud. Remove the shock absorber.

INSTALLATION

(1) Install the shock absorber lower eye on the spring bracket stud. Install the shock absorber and upper bolts on the frame bracket (Fig. 1).

(2) Tighten the lower nut to 62 N·m (46 ft. lbs.) torque.

(3) Tighten the upper bolts to 23 N·m (17 ft. lbs.) torque.

LEAF SPRING

REMOVAL

(1) Raise vehicle at frame.

(2) Remove the wheel and tire assemblies.

(3) Support axle with hydraulic jack to relieve axle weight.

(4) Disconnect the shock absorber from the axle bracket or the spring bracket (Fig. 1).

(5) Disconnect the stabilizer bar link from the spring bracket stud.

(6) Remove nuts, U-bolts and spring bracket from axle (Fig. 1).

(7) Remove nut and bolt attaching spring front eye to shackle (Fig. 1).

(8) Remove nut and bolt from spring rear eye (Fig. 1).

(9) Remove spring from vehicle.

INSTALLATION

(1) Position the spring front eye in the bracket. Loosely install the attaching bolt and nut (Fig. 1). Do not tighten at this time.

(2) Position the rear eye in the shackle bracket. Loosely install the attaching bolt and nut (Fig. 1). Do not tighten at this time.

(3) Position the axle. Install the spring bracket, U-bolts and nuts (Fig. 1). Tighten the nuts to 70 N·m (52 ft. lbs.) torque.

(4) Connect the stabilizer bar link to the spring bracket.

(5) Connect the shock absorber to the axle bracket or spring bracket.

(6) Remove the hydraulic jack.

(7) Lower the vehicle.

(8) Tighten the spring front eye attaching bolts to 148 N·m (109 ft. lbs.) torque.

(9) Tighten the spring rear eye attaching bolts to 108 N·m (80 ft. lbs.) torque.

LEAF SPRING EYE BUSHING REPLACEMENT

(1) Assemble tools shown (Fig. 2). Tighten the nut located at the socket wrench end of the threaded rod until the bushing is forced out.

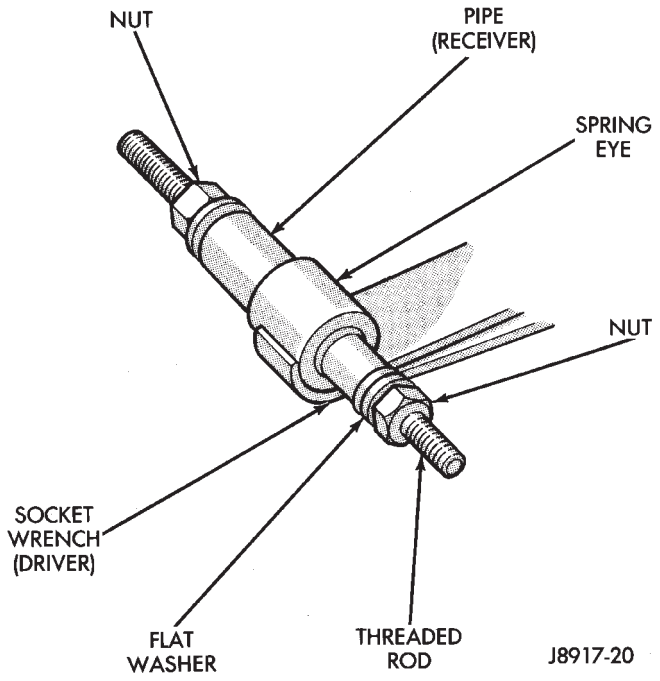

Fig. 2 Spring Eye Bushing Removal

(2) Assemble and align the bushing installation tools.

(3) Align the bushing with the spring eye. Tighten the nut located at the socket wrench end of the threaded rod. Tighten until the bushing is forced into the spring eye.

The bushing must be centered in the spring eye. The ends of the bushing must be flush or slightly recessed within the end surfaces of the spring eye.

STABILIZER BAR

REMOVAL

(1) Raise and support the vehicle.

(2) Disconnect stabilizer bar links from spring brackets (Fig. 3).

(3) Disconnect the stabilizer bar brackets from the frame rails. Remove the stabilizer bar and links.

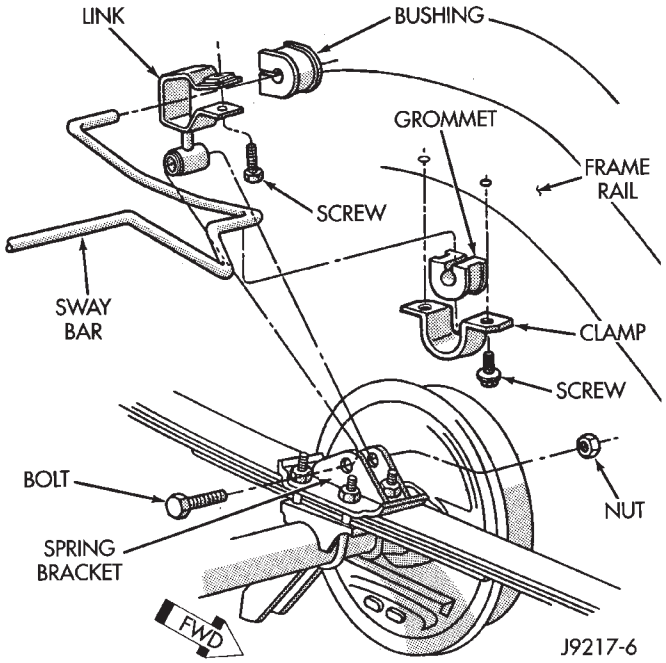

Fig. 3 Stabilizer Bar—XJ Vehicles

INSTALLATION

(1) Position the stabilizer bar links at the spring brackets (Fig. 3). Install the attaching bolts and nuts and tighten to 74 N·m (55 ft. lbs.) torque.

(2) Attach the stabilizer bar to the frame rail brackets with the bolts. Tighten to 54 N·m (40 ft. lbs.).

(3) Remove the supports and lower the vehicle.

YJ SUSPENSION

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SPRING AND SHOCK DIAGNOSIS

A noise from the shock absorber or spring bushings can be produced if movement between the rubber bushings and the metal occurs. This noise can usually be stopped by tightening the nuts. If the noise persists, inspect for damaged and worn bushings. Repair as necessary.

The shock absorbers are not refillable or adjustable. If a malfunction occurs, the shock absorber must be replaced. To test a shock absorber, hold it in an upright position and force the piston into and out of the cylinder four or five times. The action throughout each stroke should be smooth and even.

The spring eye and shock absorber bushings do not require any type of lubrication. **Do not attempt to stop spring bushing noise by lubricating them. Grease and mineral oil-base lubricants will deteriorate the bushing rubber.**

If the vehicle is used for severe, off-road operation, the springs should be examined regularly. Check for broken and shifted components.

CAUTION: Suspension components with rubber bushings should be tightened with the vehicle at normal height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

SPRING AND SHOCK ABSORBER DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
SPRING SAGS	1. Broken leaves	1. Replace broken leaves
	2. Spring fatigue	2. Replace spring
SPRING NOISE	1. Loose U-bolts	1. Tighten U-bolts to specified torque
	2. Worn bushings	2. Replace bushings
	3. Worn or missing leaf liners	3. Replace leaf liners
SHOCK ABSORBERS NOISY	1. Loose mounting bolt or nut	1. Tighten bolt or nut to specified torque
	2. Worn bushings	2. Replace shock absorber
	3. Leaking shock	3. Replace shock

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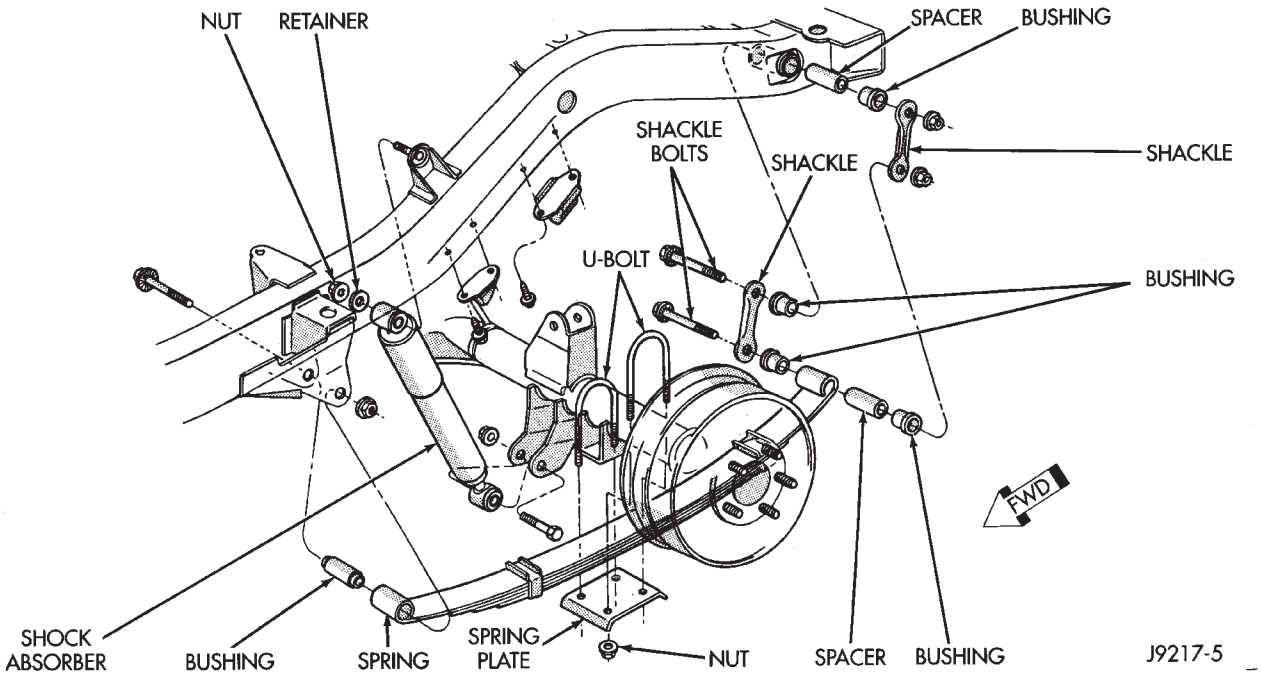

Fig. 1 Spring & Shock Absorber—YJ Vehicles

SHOCK ABSORBER

REMOVAL

(1) Remove the upper attaching nut and washer from the frame bracket stud (Fig. 1).

(2) Remove the lower attaching nut, washers and bolt from the axle bracket. Remove the shock absorber (Fig. 1).

INSTALLATION

(1) Position the shock upper eye on the frame bracket stud. Install the washer and nut (Fig. 1).

(2) Position the shock lower eye in the axle shaft tube bracket. Install the lower attaching bolt, washers and nut (Fig. 1).

(3) Tighten the upper and lower shock bolts to 61 N·m (45 ft. lbs.) torque.

LEAF SPRING

REMOVAL

(1) Raise the vehicle at the frame.

(2) Use a hydraulic jack to relieve the axle weight.

(3) Remove the wheel and tire.

(4) Remove the nuts, the U-bolts and spring bracket from the axle (Fig. 1).

(5) Remove the nut and bolt that attaches the spring rear eye to the shackle (Fig. 1).

(6) Remove the nut and bolt from the spring front eye (Fig. 1).

(7) Remove the spring from the vehicle.

INSTALLATION

(1) Position the spring front eye in the bracket. Loosely install the attaching bolt and nut (Fig. 1). Do not tighten at this time.

(2) Position the rear eye in the shackle bracket. Loosely install the attaching bolt and nut (Fig. 1). Do not tighten at this time.

(3) Align the rear spring center bolt with the locating hole in the rear axle spring pad.

(4) Lower the rear axle until it is completely supported by the spring.

Ensure that the spring center bolt is seated in the axle spring pad locating hole. Realign the center bolt with the locating hole, if necessary.

(5) Position the axle. Install the spring bracket, U-bolts and nuts (Fig. 1). Tighten the U-bolt nuts to 122 N·m (90 ft. lbs.) torque.

(6) Remove the hydraulic jack.

(7) Remove the support stands and lower the vehicle.

(8) Tighten the spring shackle plate bolts and front spring eye bolt to 135 N·m (100 ft. lbs.) torque.

LEAF SPRING EYE BUSHING REPLACEMENT

(1) Assemble tools shown (Fig. 2). Tighten the nut located at the socket wrench end of the threaded rod until the bushing is forced out.

(2) Assemble and align the bushing installation tools.

(3) Align the bushing with the spring eye and tighten the nut located at the socket wrench end of the threaded rod. Tighten until the bushing is forced into the spring eye.

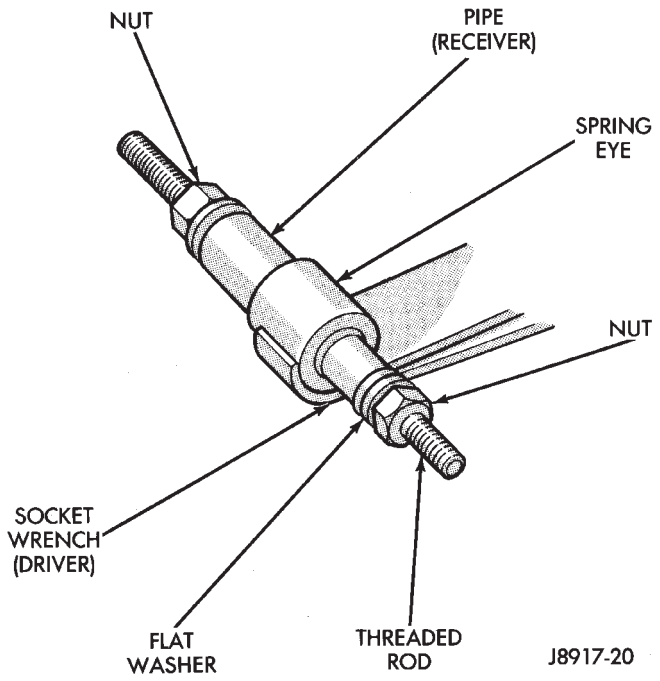

Fig. 2 Spring Eye Bushing Removal

The bushing must be centered in the spring eye. The ends of the bushing must be flush or slightly recessed within the end surfaces of the spring eye.

TRACK BAR

REMOVAL

(1) Raise the vehicle. Position a hydraulic jack under the axle and raise the axle to relieve the springs of axle weight.

(2) Remove the fasteners that attach the track bar to the frame bracket and axle bracket (Fig. 3).

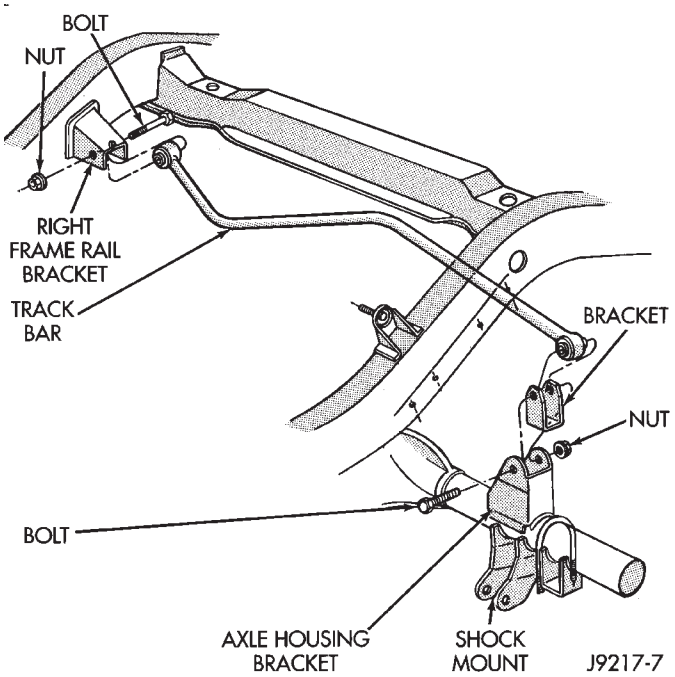

Fig. 3 Track Bar—YJ Vehicles

(3) Remove the track bar from the vehicle.

INSTALLATION

(1) Position the ends of the track bar in the frame and axle brackets (Fig. 3).

(2) Install and tighten the track bar attaching nuts to 168 N·m (125 ft. lbs.) torque.

(3) Remove the supports and lower the vehicle.

AXLE NOISE/VIBRATION DIAGNOSIS

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GENERAL INFORMATION

Axle bearing problem conditions are usually caused by:

- Insufficient or incorrect lubricant
- Foreign matter/water contamination
- Incorrect bearing preload torque adjustment
- Incorrect backlash (to tight)

When serviced, the bearings must be cleaned thoroughly. They should be dried with lint-free shop towels. **Never dry bearings with compressed air. This will overheat them and brinell the bearing surfaces. This will result in noisy operation after repair.**

Axle gear problem conditions are usually the result of:

- Insufficient lubrication
- Incorrect or contaminated lubricant
- Overloading (excessive engine torque) or exceeding vehicle weight capacity
- Incorrect clearance or backlash adjustment

Insufficient lubrication is usually the result of a housing cover leak. It can also be from worn axle shaft or pinion gear seals. Check for cracks or porous areas in the housing or tubes.

Using the wrong lubricant will cause overheating and gear failure. Gear tooth cracking and bearing spalling are indicators of this.

Axle component breakage is most often the result of:

- Severe overloading
- Insufficient lubricant
- Incorrect lubricant
- Improperly tightened components

Overloading occurs when towing heavier than recommended loads. Component breakage can occur when the wheels are spun excessively. Incorrect lubricant quantity contributes to breakage. Loose differential components can also cause breakage.

Incorrect bearing preload or gear backlash will not result in component breakage. Mis-adjustment will produce enough noise to cause service repair before a failure occurs. If a mis-adjustment condition is not corrected, component failure can result.

Excessive bearing preload may not be noisy. This condition will cause high temperature which can result in bearing failure.

GEAR AND BEARING NOISE

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant. Incorrect backlash, tooth contact, or worn/damaged gears can cause noise.

Gear noise usually happens at a specific speed range. The range is 30 to 40 mph, or above 50 mph. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly, check for insufficient lubricant. Incorrect ring gear backlash, or gear damage can cause noise changes.

Differential side and pinion gears can be checked by turning the vehicle. They usually do not cause noise in straight-ahead driving. These gears are loaded during vehicle turns. If noise does occur during vehicle turns, the side or pinion gears could be worn or damaged. A worn pinion gear mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

The axle shaft, differential and pinion gear bearings can all produce noise when worn or damaged. Bearing noise can be either a whining, or a growling sound.

Pinion gear bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher because it rotates at a faster rate. Drive the vehicle and load the differential. If bearing noise occurs the pinion rear bearing is the source of the noise. If the bearing noise is heard during a coast, front bearing is the source.

Worn, damaged differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing. The pitch of differential bearing noise is also constant and varies only with vehicle speed.

Axle shaft bearings produce noise and vibration when worn or damaged. The noise generally changes when the bearings are loaded. Road test the vehicle. Turn the vehicle sharply to the left and to the right.

This will load the bearings and change the noise level. Where axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 mph.

LOW SPEED KNOCK

Low speed knock is generally caused by a worn U-joint or by worn side-gear thrust washers. A worn pinion gear shaft bore will also cause low speed knock.

VIBRATION

Vibration at the rear of the vehicle is usually caused by a:

- Damaged drive shaft
- Missing drive shaft balance weight
- Worn, out-of-balance wheels
- Loose wheel lug nuts
- Worn U-joint
- Loose spring U-bolts
- Loose/broken springs
- Damaged axle shaft bearings
- Loose pinion gear nut
- Excessive pinion yoke run out
- Bent axle shaft

Check for loose or damaged front-end components or engine/transmission mounts. These components can contribute to what appears to be a rear-end vibration. Do not overlook engine accessories, brackets and drive belts.

All driveline components should be examined before starting any repair.

Refer to Group 22, Wheels and Tires for additional information.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear (or the clutch engaged), can be caused by:

- High engine idle speed
- Loose engine/transmission/transfer case mounts
- Worn U-joints
- Loose spring mounts
- Loose pinion gear nut and yoke
- Excessive ring gear backlash
- Excessive side gear\ase clearance

The source of a snap or a clunk noise can be determined with the assistance of a helper. Raise the vehicle on a hoist with the wheels free to rotate. Instruct the helper to shift the transmission into gear. Listen for the noise, a mechanics stethoscope is helpful in isolating the source of a noise.

REAR AXLE ALIGNMENT

MEASUREMENT

The following procedure can be used to determine if abnormal rear tire tread wear is the result of a bent or deformed rear axle shaft.

(1) Raise both rear wheels off the surface with a frame contact hoist.

(2) Attach a one-inch long piece of masking tape at the center of each tire tread for use as reference marks.

(3) Rotate the rear wheels until both reference marks face the front of the vehicle. Measure the distance between the outside edges of the two pieces of tape. Record this measurement as the front of tire (FTR) measurement.

(4) Rotate the rear wheels until both reference marks face the rear of the vehicle. Measure the distance between the outside edges of the two pieces of tape. Record this measurement as the rear of tire (RTR) measurement.

(5) Subtract the (RTR) measurement from the (FTR) measurement to obtain the amount of wheel toe. The acceptable rear wheel toe-in position is 1/16 inch (1.6 mm) to 3/16 inch (4.8 mm) toe-out.

(6) Rotate the rear wheels until the reference marks are facing downward. Measure the distance between the outside edges of the two pieces of tape. Record this measurement as the bottom of tire (BTR) measurement.

(7) Average the (FTR) and the (RTR) distance measurements. Subtract the (BTR) measurement from this average distance to obtain the camber. The acceptable amount of camber is 1/16 inch to 3/32 inch (1.6 to 2.4 mm).

(FTR + RTR) DIVIDED BY 2 (TWO) MINUS BTR EQUALS CAMBER

If the (BTR) distance measurement is less than the average FTR and RTR distance measurement, the camber will be positive (+). If the (BTR) distance measurement is greater than the average FTR and RTR distance, the camber will be negative (-).

If the toe position or camber is not acceptable, a bent or deformed rear axle shaft is most likely the cause.

LIMITED SLIP DIFFERENTIAL

Under normal traction conditions, engine torque is divided evenly. With low-traction surfaces, engine torque is transferred to the wheel with the most tire traction. When diagnosing a limited-slip differential the wheel with the least traction can continue spinning.

The most common problem is a chatter noise when turning corners. Check for incorrect or contaminated lubricant. Replace the gear lubricant if necessary.

- With Trac-Lok™ differentials add a container of MOPAR Trac-Lok Lubricant.

This will correct the condition in most instances. If the chatter persists, clutch damage could have occurred.

After changing the lubricant, drive the vehicle and make 10 to 12 slow, figure-eight turns. This maneuver will pump lubricant through the clutches.

SERVICE DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
WHEEL NOISE	1. Wheel loose. 2. Faulty, brinelled wheel bearing.	1. Tighten loose nuts. 2. Faulty or brinelled bearings must be replaced.
AXLE SHAFT NOISE	1. Misaligned axle shaft tube. 2. Bent or sprung axle shaft. 3. End play in drive pinion bearings. 4. Excessive gear backlash between ring gear and pinion gear. 5. Improper adjustment of drive pinion gear shaft bearings. 6. Loose drive pinion gearshaft yoke nut. 7. Improper wheel bearing adjustment. 8. Scuffed gear tooth contact surfaces.	1. Inspect axle shaft tube alignment. Correct as necessary. 2. Replace bent or sprung axle shaft. 3. Refer to Drive Pinion Bearing Pre-Load Adjustment. 4. Check adjustment of ring gear backlash and pinion gear. Correct as necessary. 5. Adjust drive pinion shaft bearings. 6. Tighten drive pinion gearshaft yoke nut with specified torque. 7. Readjust as necessary. 8. If necessary, replace scuffed gears.
AXLE SHAFT BROKE	1. Misaligned axle shaft tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch.	1. Replace broken axle shaft after correcting axle shaft tube alignment. 2. Replace broken axle shaft. Avoid excessive weight on vehicle. 3. Replace broken axle shaft after inspecting for other possible causes. Avoid erratic use of clutch. 4. Replace broken axle shaft. Inspect clutch and make necessary repairs or adjustments.
DIFFERENTIAL CASE CRACKED	1. Improper adjustment of differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation.	1. Replace cracked case; examine gears and bearings for possible damage. At reassembly, adjust differential bearings properly. 2. Replace cracked case; examine gears and bearings for possible damage. At reassembly, adjust ring gear backlash properly. 3. Replace cracked case; examine gears and bearings for possible damage. Avoid excessive weight on vehicle. 4. Replace cracked case. After inspecting for other possible causes, examine gears and bearings for possible damage. Avoid erratic use of clutch.
DIFFERENTIAL GEARS SCORED	1. Insufficient lubrication. 2. Improper grade of lubricant. 3. Excessive spinning of one wheel/tire.	1. Replace scored gears. Scoring marks on the drive face of gear teeth or in the bore are caused by instantaneous fusing of the mating surfaces. Scored gears should be replaced. Fill rear differential housing to required capacity with proper lubricant. Refer to Specifications. 2. Replace scored gears. Inspect all gears and bearings for possible damage. Clean and refill differential housing to required capacity with proper lubricant. 3. Replace scored gears. Inspect all gears, pinion bores and shaft for damage. Service as necessary.
LOSS OF LUBRICANT	1. Lubricant level too high.	1. Drain excess lubricant by removing fill plug and allow lubricant to level at lower edge of fill plug hole.

SERVICE DIAGNOSIS (CONT'D)

CONDITION	POSSIBLE CAUSES	CORRECTION
LOSS OF LUBRICANT	2. Worn axle shaft seals. 3. Cracked differential housing. 4. Worn drive pinion gear shaft seal. 5. Scored and worn yoke. 6. Axle cover not properly sealed.	2. Replace worn seals. 3. Repair or replace housing as necessary. 4. Replace worn drive pinion gear shaft seal. 5. Replace worn or scored yoke and seal. 6. Remove cover and clean flange and reseal.
AXLE OVERHEATING	1. Lubricant level too low. 2. Incorrect grade of lubricant. 3. Bearings adjusted too tight. 4. Excessive gear wear. 5. Insufficient ring gear backlash.	1. Refill differential housing. 2. Drain, flush and refill with correct amount of the correct lubricant. 3. Readjust bearings. 4. Inspect gears for excessive wear or scoring. Replace as necessary. 5. Readjust ring gear backlash and inspect gears for possible scoring.
GEAR TEETH BROKE (RING GEAR AND PINION)	1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavements. 4. Improper adjustments.	1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for possible damage. Avoid erratic clutch operation. 3. Replace gears. Examine the remaining parts for possible damage. Replace parts as required. 4. Replace gears. Examine other parts for possible damage. Ensure ring gear backlash is correct.
AXLE NOISE	1. Insufficient lubricant. 2. Improper ring gear and drive pinion gear adjustment. 3. Unmatched ring gear and drive pinion gear. 4. Worn teeth on ring gear or drive pinion gear. 5. Loose drive pinion gear shaft bearings. 6. Loose differential bearings. 7. Misaligned or sprung ring gear. 8. Loose differential bearing cap bolts	1. Refill axle with correct amount of the proper lubricant. Also inspect for leaks and correct as necessary. 2. Check ring gear and pinion gear teeth contact pattern. 3. Remove unmatched ring gear and drive pinion gear. Replace with matched gear and drive pinion gear set. 4. Check teeth on ring gear and drive pinion gear for correct contact. If necessary, replace with new matched set. 5. Adjust drive pinion gearshaft bearing preload torque. 6. Adjust differential bearing preload torque. 7. Measure ring gear runout. 8. Tighten with specified torque

MODEL 35 AXLE

INDEX

GENERAL INFORMATION

The Model 35 housing has an iron center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into and welded to the differential housing to form a one-piece axle housing.

The integral type housing, hypoid gear design has the centerline of the pinion set below the centerline of the ring gear.

The axle has a vent hose to relieve internal pressure caused by lubricant vaporization and internal expansion.

The axles are equipped with semi-floating axle shafts, meaning that loads are supported by the axle shaft and bearings. The axle shafts are retained by C-clips in the differential side gears.

The cover provides a means for servicing the differential without removing the axle.

Axles may be equipped with drum or disc brakes. The axles that are equipped with ABS brake have a tone ring pressed on the axle shaft. Use care when removing axle shafts as NOT to damage the tone wheel or the sensor.

The Model 35 axle has the assembly part number and gear ratio listed on a tag. The tag is attached to the housing cover. Build date identification codes are stamped on the axle shaft tube cover side.

The differential case is a one-piece design. The differential pinion mate shaft is retained with a threaded roll pin. Differential bearing preload and ring gear backlash is adjusted by the use of spacer shims. Pinion bearing preload is set and maintained by the use of a collapsible spacer.

For complete drive axle assembly removal and installation refer to Drive Axle Assembly Replacement in this Group.

LUBRICANT SPECIFICATIONS

Multi-purpose, hypoid gear lubricant should be used for Model 35 axle. The lubricant should have MIL-L-2105C and API GL 5 quality specifications. MOPAR Hypoid Gear Lubricant conforms to both of these specifications.

- Lubricant for Model 35 axle is a thermally stable SAE 80W-90 gear lubricant.
- Lubricant for Model 35 axle with Trailer Tow is SAE 75W-140 SYNTHETIC gear lubricant.
- Trac-Lok differentials add 4 oz. of friction modifier.
- Lubricant quantity is 1.66 L (3.50 pts.).

Refer to Group 0, Lubrication and Maintenance for additional information.

CAUTION: If axle is submerged in water, lubricant must be replaced immediately to avoid possible premature axle failure.

LUBRICANT CHANGE

The gear lubricant will drain quicker if the vehicle has been recently driven.

(1) Raise and support the vehicle.

(2) Remove the lubricant fill hole plug from the differential housing cover.

(3) Remove the differential housing cover and drain the lubricant from the housing.

(4) Clean the housing cavity with a flushing oil, light engine oil or lint free cloth. **Do not use water, steam, kerosene or gasoline for cleaning.**

(5) Remove the sealant from the housing and cover surfaces.

(6) Apply a bead of MOPAR® Silicone Rubber Sealant to the housing cover (Fig. 1). **Allow the sealant to cure for a few minutes.**

Install the housing cover within 5 minutes after applying the sealant. If not installed the sealant must be removed and another bead applied.

(7) Install the cover and any identification tag. Tighten the cover bolts to 41 N·m (30 ft. lbs.) torque.

(8) Refill differential with Mopar Hypoid Gear Lubricant to bottom of the fill plug hole.

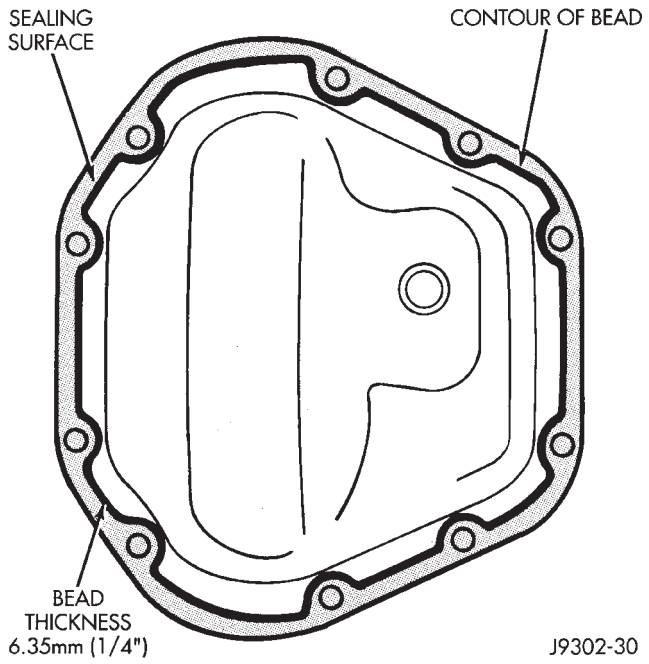

Fig. 1 Typical Housing Cover With Sealant

CAUTION: Overfilling the differential can result in lubricant foaming and overheating.

Trac-Lok Differentials; A container of Trac-Lok lubricant (friction modifier) should be added after repair service or a lubricant change.

(9) Install the fill hole plug and lower the vehicle.

LIMITED SLIP DIFFERENTIAL vehicles should be road tested by making 10 to 12 slow figure-eight turns. This maneuver will pump the lubricant through the clutch discs to eliminate a possible chatter noise complaint.

DRIVE AXLE ASSEMBLY REPLACEMENT—XJ VEHICLES

REMOVAL

(1) Raise the vehicle and position support stands under the frame rails slightly in front the springs.

(2) Remove the rear wheels.

(3) Mark the drive shaft yoke and axle pinion yoke for alignment reference. Disconnect the drive shaft from the axle.

(4) Disconnect the axle vent hose.

(5) Disconnect the parking brake cables at the equalizer or backing plate.

(6) Disconnect the shock absorbers from the axle brackets.

(7) Disconnect the brake hose at the axle junction block. **Do not disconnect the wheel cylinder tubing fittings.**

(8) If equipped, disconnect ABS wiring connections at the axle.

(9) Support the axle with a hydraulic jack under the differential.

(10) Remove the spring U-bolts from the plate brackets.

(11) Lower the jack enough to remove the axle.

INSTALLATION

CAUTION: Suspension components with rubber bushings should be tightened with the vehicle at normal height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

(1) Support the axle on a hydraulic jack under the differential. Position the axle under the vehicle.

(2) Raise the axle and align the spring center bolts with the locating holes in the axle pads and plate brackets.

(3) Install the spring U-bolts through the plate brackets and tighten to 70 N·m (52 ft. lbs.) torque.

(4) Install ABS wiring connections (if equipped) at the axle.

(5) Connect the brake hose at the axle junction block.

(6) Install the shock absorbers to the axle brackets and tighten to 62 N·m (46 ft. lbs.) torque.

(7) Connect the parking brake cables at the equalizer or backing plate.

(8) Connect the vent hose to the tube fitting.

(9) Align the reference marks and connect the drive shaft to the axle yoke. Tighten the U-joint clamp bolts to 19 N·m (14 ft. lbs.) torque.

(10) Check differential lubricant and add if necessary.

(11) Install the wheel and tire.

(12) Bleed the brakes.

(13) Remove the supports and lower the vehicle.

DRIVE AXLE ASSEMBLY REPLACEMENT—YJ VEHICLES

REMOVAL

(1) Raise the vehicle and position support stands under the frame rails slightly in front the springs.

(2) Remove the rear wheels.

(3) Mark the drive shaft yoke and axle pinion yoke for alignment reference. Disconnect the drive shaft from the axle.

(4) Disconnect the axle vent hose.

(5) Disconnect the parking brake cables at the equalizer or backing plate.

(6) Disconnect the shock absorbers from the plate brackets.

(7) Disconnect the brake hose at the axle junction block. **Do not disconnect the wheel cylinder tubing fittings.**

(8) Disconnect the track bar at the axle bracket.

(9) Support the axle with a hydraulic jack under the differential. Raise the axle just enough to relieve the axle weight from the springs.

(10) Remove the spring U-bolts from the plate brackets.

(11) Loosen BUT DO NOT REMOVE the bolts that attach the spring front pivot at the frame rail brackets. This will allow the springs to pivot without binding on the bushings.

(12) Disconnect shackle from the springs and lower the springs to the surface.

(13) Lower the jack enough to remove the axle.

INSTALLATION

CAUTION: Suspension components with rubber bushings should be tightened with the vehicle at normal height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

(1) Support the axle on a hydraulic jack under the differential. Position the axle under the vehicle.

(2) Raise the springs and install the spring shackle bolts. **Do not tighten at this time.**

(3) Lower the axle and align the spring center bolts with the locating holes in the axle pads and plate brackets.

(4) Install the spring U-bolts through the plate brackets and tighten to 122 N·m (90 ft. lbs.) torque.

(5) Connect the track bar to the axle bracket and install the bolt. Do not tighten at this time.

It is important that the springs support the weight of the vehicle when the track bar is connected. If the springs are not at their usual position, vehicle ride comfort could be affected.

(6) Connect the brake hose at the axle junction block.

(7) Install the shock absorbers to the axle brackets and tighten to 61 N·m (45 ft. lbs.) torque.

(8) Connect the parking brake cables at the equalizer or backing plate.

(9) Connect the vent hose to the tube fitting.

(10) Align the reference marks and connect the drive shaft to the axle yoke. Tighten the U-joint clamp bolts to 19 N·m (14 ft. lbs.) torque.

(11) Check differential lubricant and add if necessary.

(12) Install the wheel and tire.

(13) Bleed the brakes.

(14) Remove the supports and lower the vehicle.

(15) Tighten the spring front pivot bolt/nut to 142 N·m (105 ft. lbs.) torque. Tighten the spring shackle bolt/nut to 135 N·m (100 ft. lbs.) torque.

(16) Tighten the track bar bolt at the axle bracket to 142 N·m (105 ft. lbs.) torque.

PINION SHAFT SEAL REPLACEMENT

REMOVAL

(1) Raise and support the vehicle.

(2) Remove wheel and tire assemblies.

(3) Mark the drive shaft yoke and pinion yoke for installation alignment reference.

(4) Remove the drive shaft from the yoke.

(5) Rotate the pinion gear three or four times. **Make sure brakes are not dragging during this procedure.**

(6) Measure the amount of torque (in Newton-meters or inch-pounds) necessary to rotate the pinion gear with a torque wrench. Note the torque for installation reference. **It must be known to properly adjust the pinion gear bearing preload torque after seal installation.**

(7) Remove the pinion yoke nut and washer. Use Remover C-452 and Wrench C-3281 to remove the pinion yoke (Fig. 2).

(8) Mark the positions of the yoke and pinion gear for installation alignment reference.

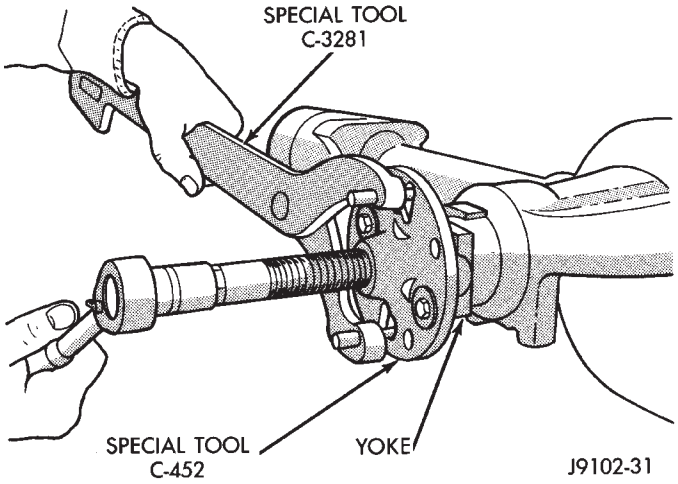

Fig. 2 Pinion Yoke Removal

(9) Use Remover 7794A and slide hammer to remove the pinion gear seal (Fig. 3).

INSTALLATION

(1) Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer D-163 and Handle C-4171 (Fig. 4).

(2) Align the installation reference marks and install yoke on the pinion gear with Installer W-162-D.

(3) Install a new nut on the pinion gear. **Tighten the nut only enough to remove the shaft end play.**

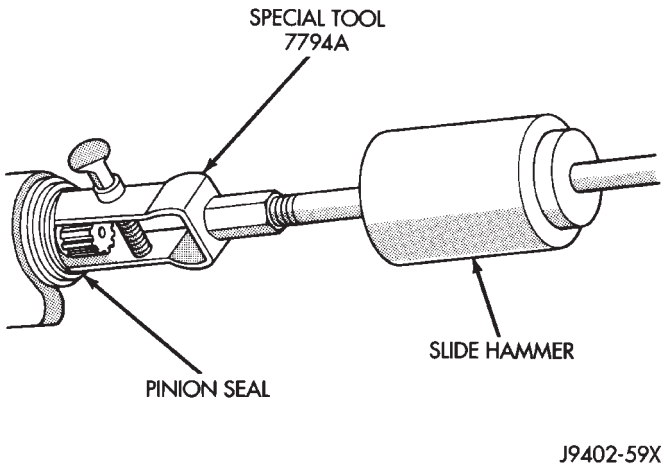

Fig. 3 Seal Removal

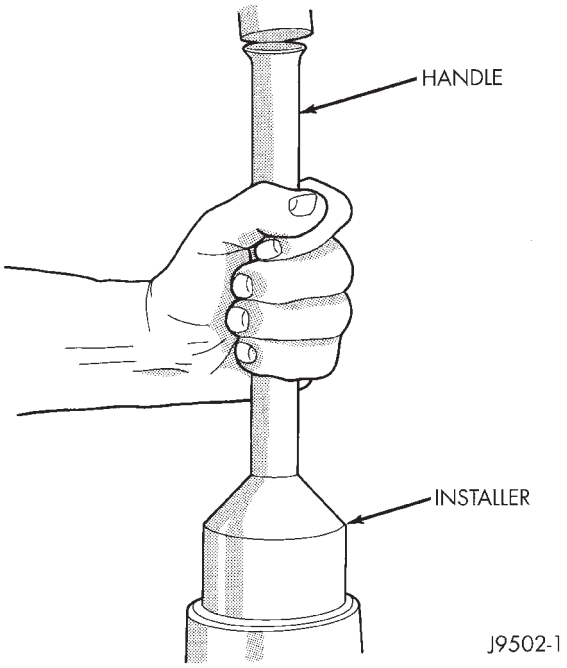

Fig. 4 Pinion Seal Installation

CAUTION: Exercise care during the bearing preload torque adjustment. Do not over-tighten, or loosen and then re-tighten the nut. Do not exceed the bearing preload torque. The collapsible preload spacer on the shaft will have to be replaced. The bearing preload torque will be re-adjusted afterward.

(4) Install a socket and inch-pound torque wrench on the pinion nut.

(5) Rotate the shaft with the torque wrench and note the torque.

The required preload torque is equal to the amount recorded during removal plus an additional 0.56 N·m (5 in. lbs.).

(6) Use Flange Wrench C-3281 to retain the yoke and shaft (Fig. 5). Tighten the shaft nut in very small increments.

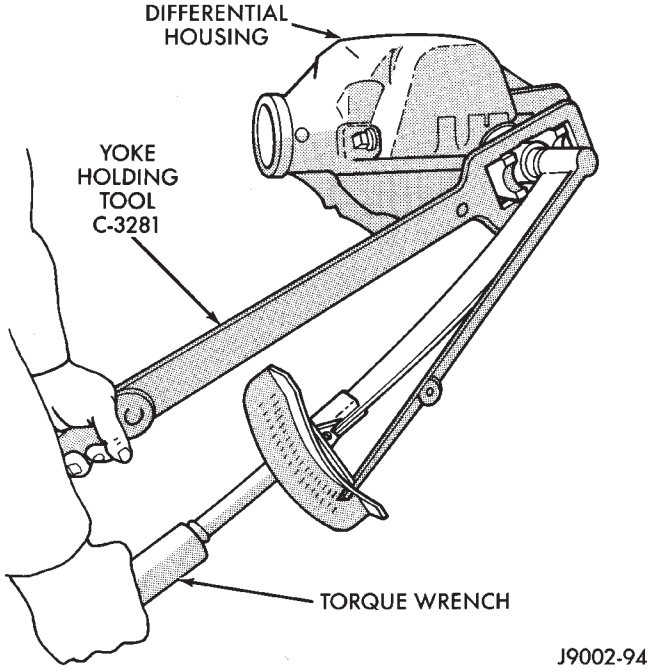

Fig. 5 Tightening Pinion Shaft Nut

(7) Continue tightening the shaft nut in small increments until the correct bearing preload torque is attained.

(8) Align the installation reference marks and attach the drive shaft to the yoke.

(9) Add API grade GL 5 hypoid gear lubricant to the differential housing, if necessary.

(10) Install wheel and tire assemblies.

(10) Lower the vehicle.

AXLE SHAFT

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the wheel and tire.

(3) Remove the brake drum.

(4) Clean all the foreign material from housing cover area.

(5) Loosen the housing cover bolts. Drain the lubricant from the housing and the axle shaft tubes. Remove the housing cover.

(6) Rotate the differential case so that the pinion mate gear shaft lock screw is accessible. Remove the lock screw and the pinion mate gear shaft from the case (Fig. 6).

(7) Force the axle shaft in toward the center of the vehicle. Remove the axle shaft C-clip lock from the axle shaft (Fig. 7).

(8) Remove the axle shaft. Use care to prevent damage to the axle shaft bearing and seal, which will remain in the axle shaft tube.

(9) Inspect axle shaft seal for leakage or damage.

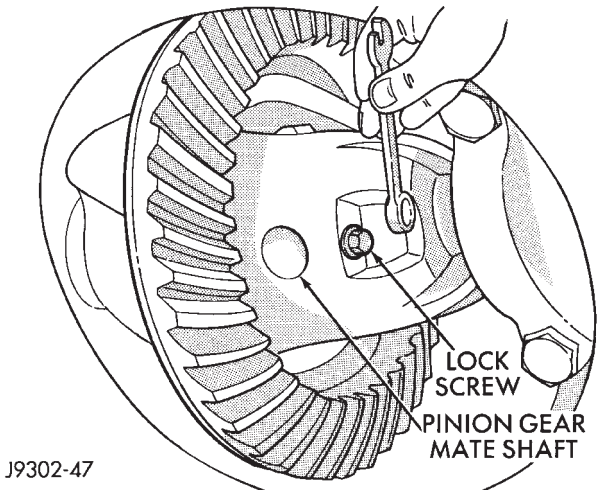

Fig. 6 Mate Shaft Lock Screw

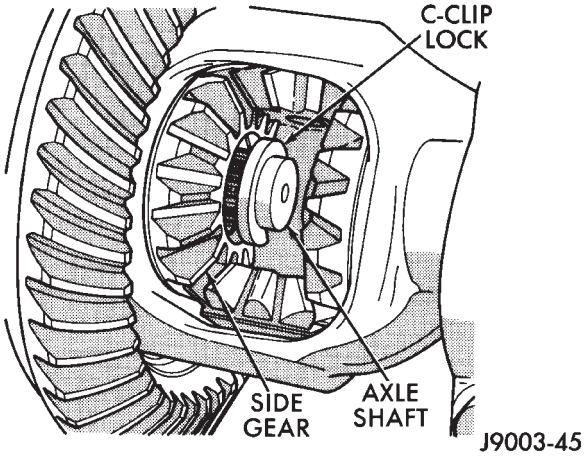

Fig. 7 Axle Shaft C-Clip Lock

(10) Inspect the roller bearing contact surface on the axle shaft for signs of brinelling, spalling and pitting.

(11) If any of these conditions exist, the axle shaft and bearing or seal must be replaced.

INSTALLATION

(1) Lubricate the bearing bore and seal lip with gear lubricant. Insert the axle shaft through the seal, bearing, and engage it with the side gear splines. **Use care to prevent the shaft splines from damaging the axle shaft seal lip.**

(2) Insert the C-clip lock in the end of the axle shaft. Push the axle shaft outward to seat the C-clip lock in the side gear.

(3) Insert the mate shaft into the case and through the thrust washers and pinion gears. Align the hole in shaft with the hole in the differential case and install the lock screw with Loctite® on the threads. Tighten the screw to 19 N·m (14 ft. lbs.) torque.

(4) Install the cover and add fluid. Refer to the Drain and Refill in this section.

AXLE SHAFT SEAL AND BEARING

REMOVAL

(1) Remove the axle shaft. Refer to the Removal procedures in this Group.

(2) Remove the axle shaft seal from the end of the axle shaft tube with a small pry bar.

(3) Remove the bearing if it appears damaged.

The seal and bearing can be removed at the same time with the bearing removal tool.

(4) Remove the axle shaft bearing from the tube (Fig. 8) with Bearing Removal Tool Set 6310 (T.Ar 960-02).

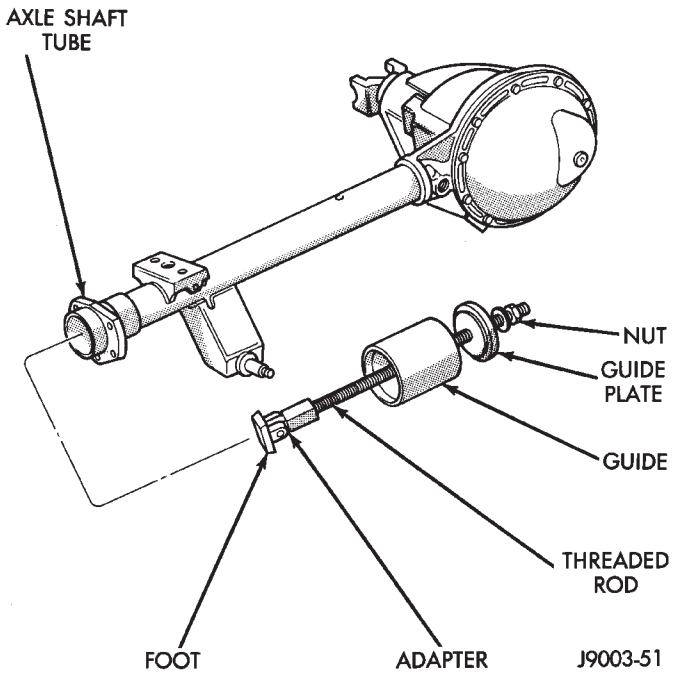

Fig. 8 Axle Shaft Bearing Removal Tool

(5) Inspect the axle shaft tube bore for roughness and burrs. Remove as necessary.

CAUTION: Inspect the housing bore for burrs. Remove them if they exist.

INSTALLATION

Do not install the original axle shaft seal. Always install a new seal.

(1) Wipe the bore in the axle shaft tube clean.

(2) Install axle shaft bearing with Installer 6436 and Handle C-4171. Ensure part number on the bearing must go against the Installer.

(3) Install the new axle shaft seal (Fig. 9) with Installer 6437 and Handle C-4171.

(4) Install the Axle Shaft. Refer to the installation procedure.

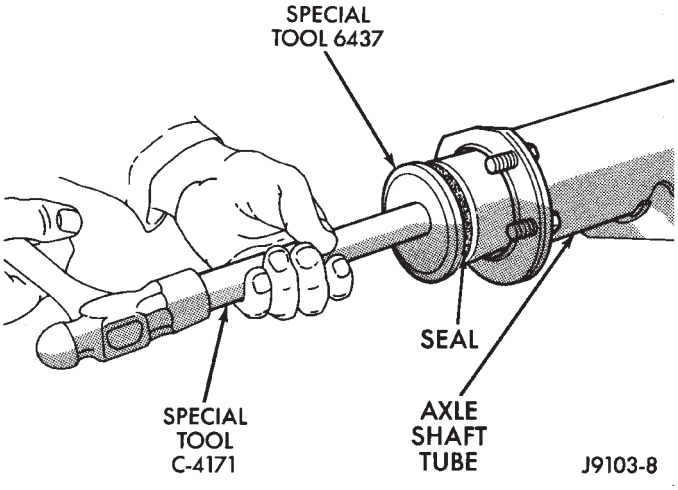

Fig. 9 Axle Shaft Seal Installation

DIFFERENTIAL REMOVAL

To service the differential the axle shafts must be removed. Refer to the removal procedures in this Group.

(1) Note the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 10).

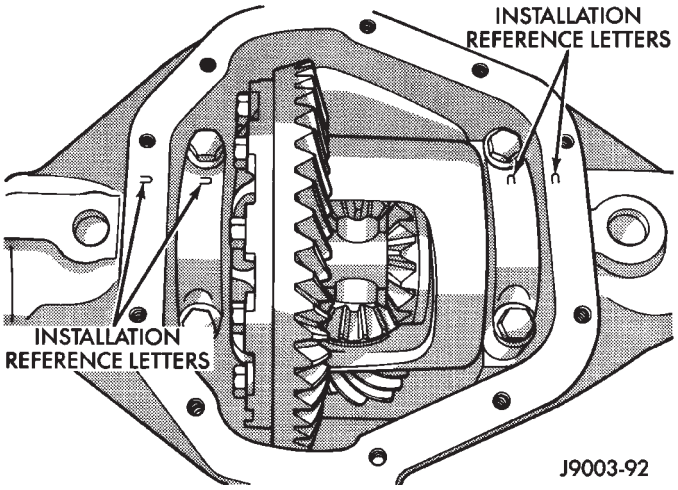

Fig. 10 Bearing Cap Identification

(2) Remove the differential bearing caps.

(3) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 11). Install the holddown clamps and tighten the tool turnbuckle finger-tight.

(4) Install a pilot stud at the left side of the differential housing. Attach Dial Indicator to housing pilot stud. Load the indicator plunger against the opposite side of the housing (Fig. 11) and zero the indicator.

CAUTION: Do not spread over 0.38 mm (0.015 in). If the housing is over-separated, it could be distorted or damaged.

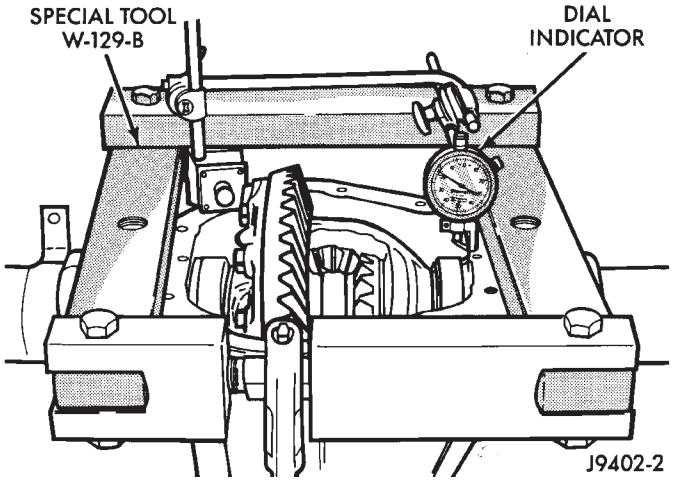

Fig. 11 Spread Differential Housing

(5) Separate the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 11).

(6) Remove the dial indicator.

(7) Pry the differential case loose from the housing. To prevent damage, pivot on housing with the end of the pry bar against spreader (Fig. 12).

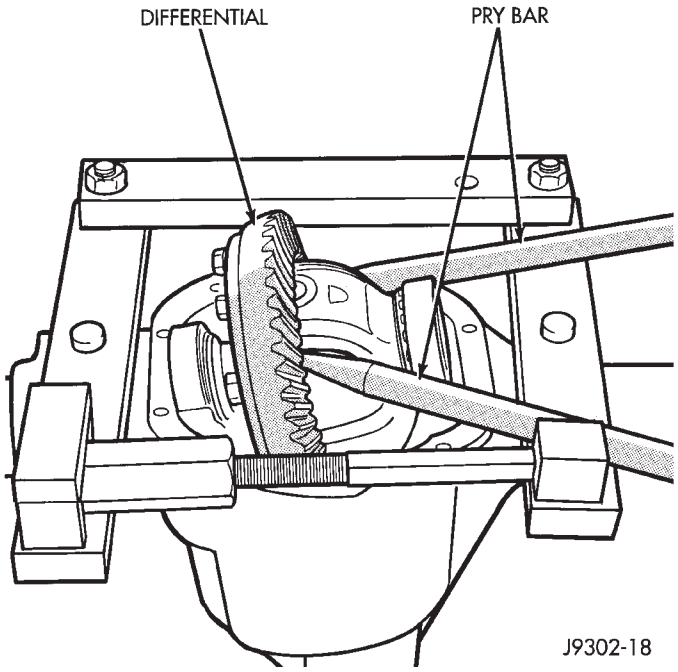

Fig. 12 Differential Removal

(8) Remove the case from housing. Mark or tag bearing cups and outboard shim/spacer (selected thickness) indicating which side they were removed. Remove spreader from housing.

DIFFERENTIAL DISASSEMBLY

(1) Remove the bearings from the differential case with Press C-293-PA, Plug SP3289, Adapter C-293-18 (Fig. 13).

Place adapter rings so they do not damage the bearing cage.

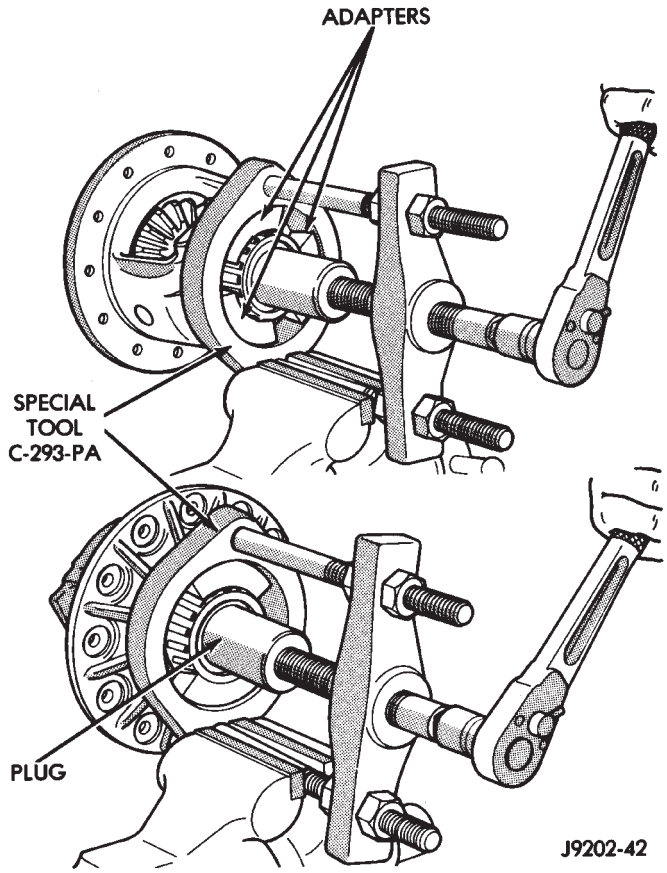

Fig. 13 Differential Bearing Removal

(2) Clamp the differential case in a vise equipped with soft jaws. Remove and discard the ring gear bolts. Tap the ring gear with a rawhide or plastic mallet and remove (Fig. 14).

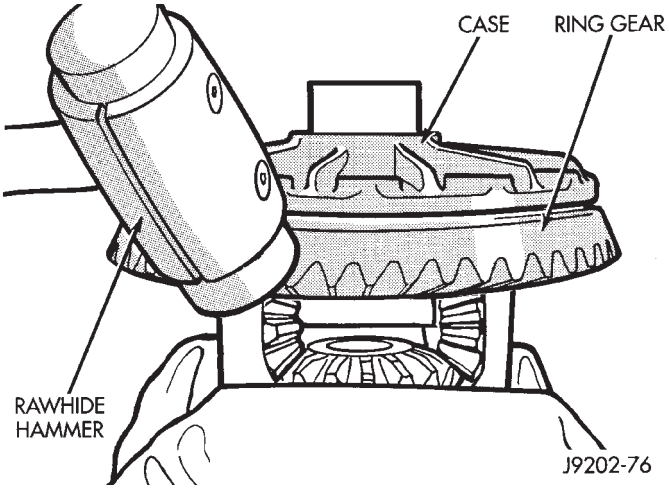

Fig. 14 Ring Gear Removal

(3) Rotate the differential side gears and remove the pinion mate gears and thrust washers (Fig. 15).

(4) Remove the differential side gears and thrust washers.

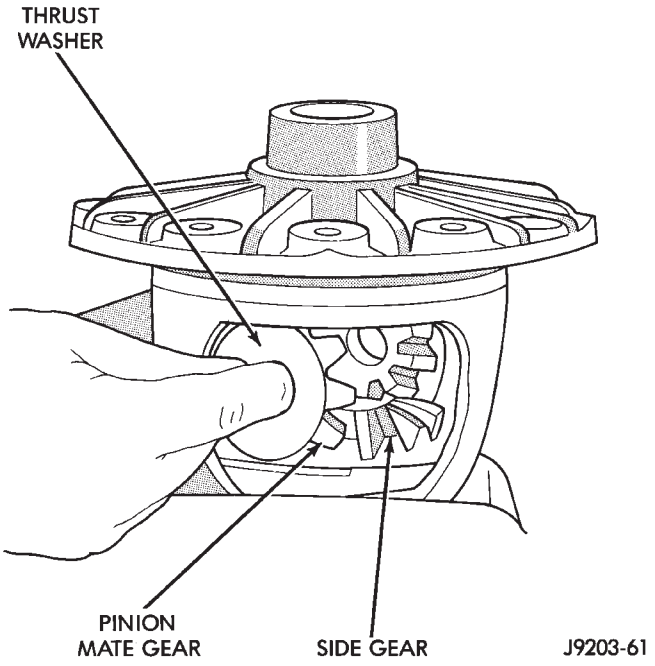

Fig. 15 Pinion Mate Gear Removal

(5) Remove the case from the vise.

PINION REMOVAL/DISASSEMBLY

(1) Remove the pinion yoke nut and washer. Use Remover C-452 and Wrench C-3281 to remove the pinion yoke (Fig. 16).

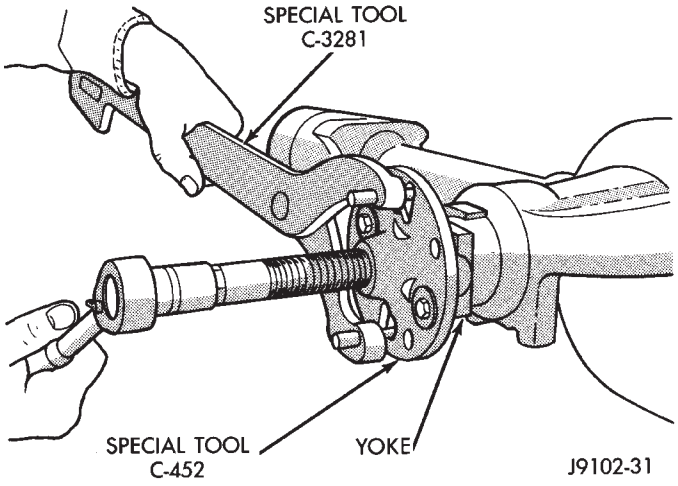

Fig. 16 Pinion Yoke Removal

(2) Remove the pinion gear from housing (Fig. 17). Catch the pinion with your hand to prevent it from falling and being damaged.

(3) Remove the pinion gear seal with a slide hammer or pry out with bar.

(4) Remove oil slinger, front bearing.

(5) Remove the front pinion bearing cup and seal with Remover D-147 and Handle C-4171 (Fig. 18).

(6) Remove the rear bearing cup from housing (Fig. 19). Use Remover D-148 and Handle C-4171.

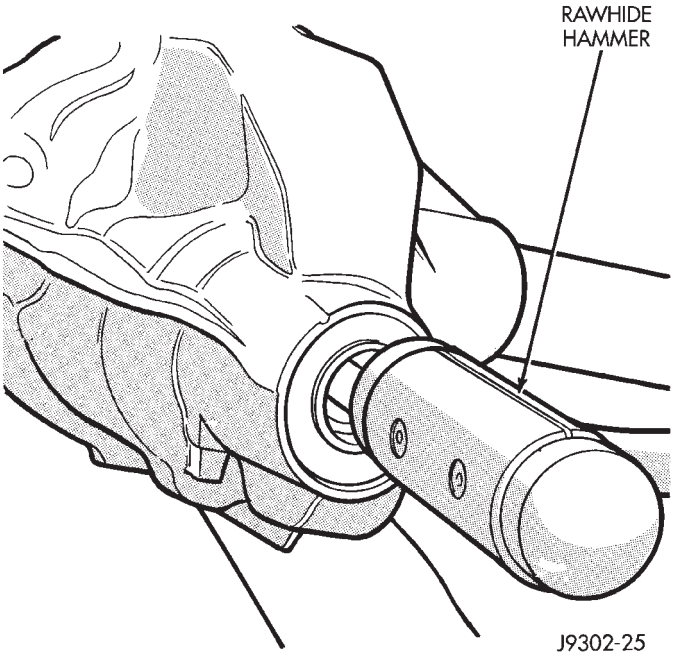

Fig. 17 Remove Pinion Gear

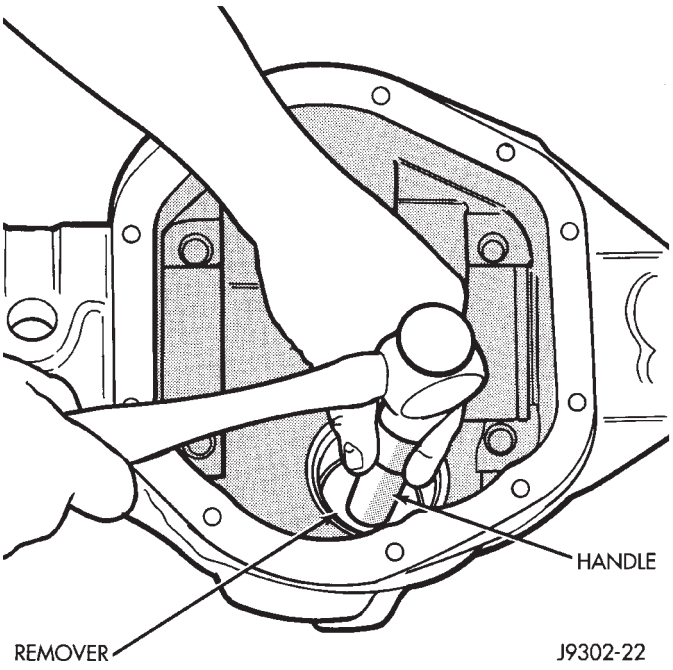

Fig. 18 Front Bearing Cup Removal

(7) Remove the collapsible preload spacer (Fig. 20).

(8) Remove the inner bearing from the pinion with Puller C-293-PA and Adapter C-293-39 (Fig. 21).

Place adapter rings so they do not damage the bearing cage.

(9) Remove the depth shims from the pinion gear shaft. Record the thickness of the depth shims.

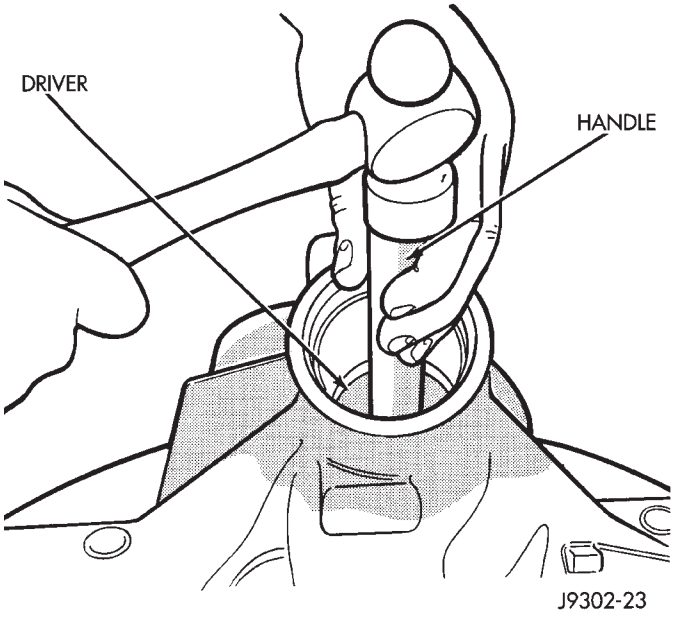

Fig. 19 Rear Bearing Cup Removal

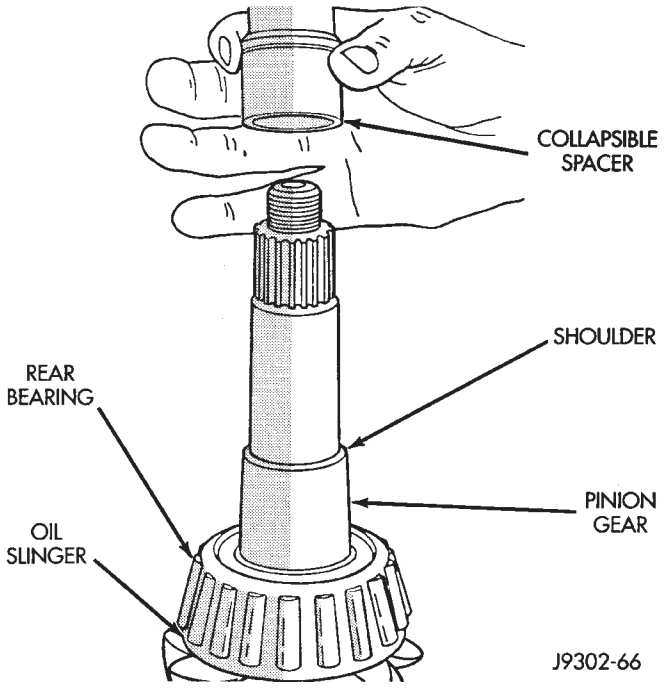

Fig. 20 Collapsible Spacer

CLEANING/INSPECTION

Wash differential components with cleaning solvent and dry with compressed air. **Do not steam clean the differential components.**

Wash bearings with solvent and towel dry, or dry with compressed air. DO NOT spin bearings with compressed air **Cup and bearing must be replaced as a matched sets only.**

Clean axle shaft tubes and oil channels in housing.

Inspect for;

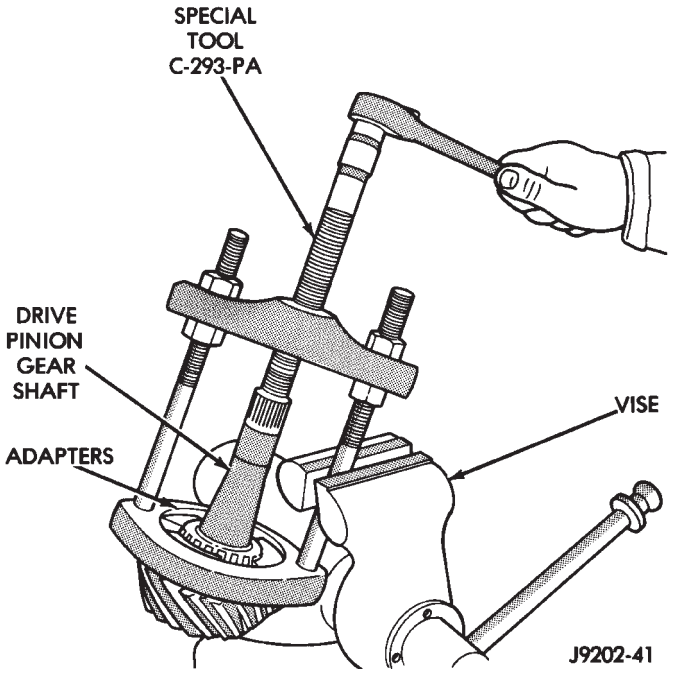

Fig. 21 Inner Bearing Removal

- Smooth appearance with no broken/dented surfaces on the bearing rollers or the roller contact surfaces
- Bearing cups must not be distorted or cracked
- Machined surfaces should be smooth and without any raised edges
- Raised metal on shoulders of cup bores should be removed with a hand stone
- Wear and damage to pinion gear mate shaft, pinion gears, side gears and thrust washers. Replace as a matched set only.
- Ring and pinion gear for worn and chipped teeth
- Ring gear for damaged bolt threads. Replaced as a matched set only.
- Pinion yoke for cracks, worn splines, pitted areas, and a rough/corroded seal contact surface. Repair or replace as necessary.
- Preload shims for damage and distortion. Install new shims if necessary.

DIFFERENTIAL ASSEMBLY

(1) Install the following components in the differential case.
- Differential side gears and thrust washers
- Pinion gears and thrust washers
- Pinion gear mate shaft (align holes in shaft and case)

(2) Lubricate all differential components with hypoid gear lubricant.

PINION GEAR DEPTH INFORMATION

Ring and pinion gears are supplied as matched sets only. The identifying numbers for the ring and pinion gear are etched into the face of each gear (Fig. 22). A plus (+) number, minus (-) number or zero (0) is etched into the face of the pinion gear. This number is the amount (in thousandths of an inch) the depth varies from the standard depth setting of a pinion etched with a (0). The standard setting from the centerline of the ring gear to the back face of the pinion is 96.8 mm (3.813 inches) for Model 35 axles (Fig. 23). The standard depth provides the best teeth contact pattern.

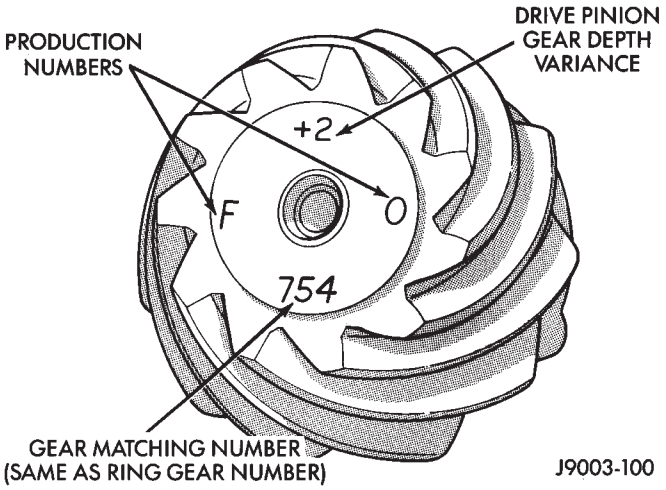

Fig. 22 Pinion Gear ID Numbers

THE BUTTON END ON THE PINION GEAR HEAD IS NO LONGER A MACHINED-TO-SPECIFICATIONS SURFACE. DO NOT USE THIS SURFACE FOR PINION DEPTH SET-UP OR CHECKING (Fig. 23).

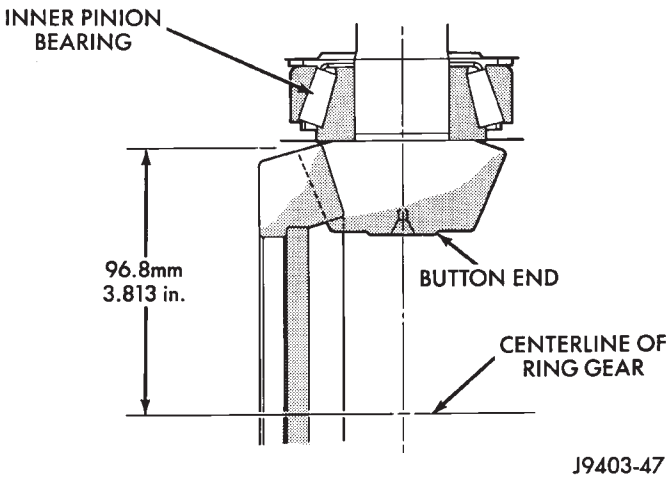

Fig. 23 Pinion Gear Head

Compensation for pinion depth variance is achieved with select shims. In production the shims are placed between the pinion gear and the inner pinion bearing cone. For service the shims are placed under the inner pinion bearing cup (Fig. 24).

If a new gear set is being installed, note the depth variance etched into both the original and replacement pinion gear. Add or subtract the thickness of the original depth shims to compensate for the difference in the depth variances. Refer to the Depth Variance charts.

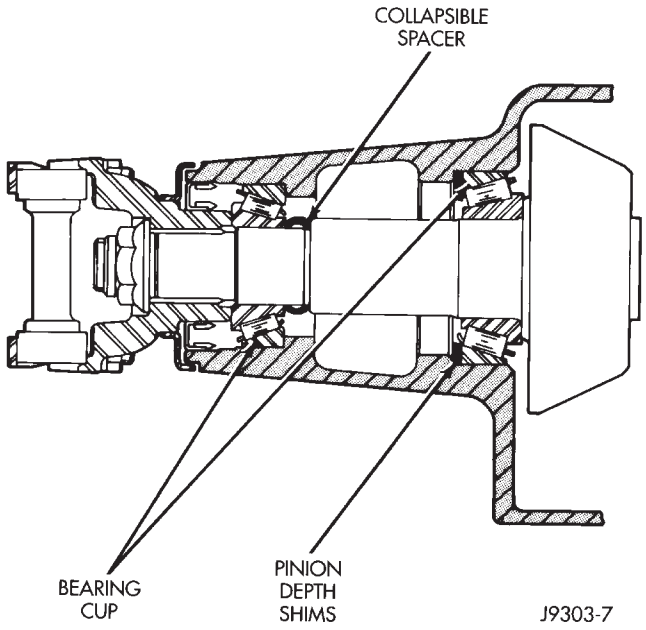

Fig. 24 Shim Locations

Note where Old and New Pinion Marking columns intersect. Intersecting figure represents plus or minus amount needed.

For example, if old pinion is plus (+) 1 and the new pinion is minus (-) 3, intersecting figure is (+)0.004 inch (0.10mm). Add this amount to the original shim. Or if the old pinion is (-) 3 and the new pinion is (-) 2, intersecting figure is (-)0.001 inch (0.025mm). Subtract this amount from original shim. Refer to the Pinion Gear Depth Variance Chart.

PINION MEASUREMENT AND ASSEMBLY

PINION GEAR DEPTH MEASUREMENT

Pinion gear depth measurement is necessary when;

- Axle housing or differential case is replaced
- Pinion select shim pack is unknown
- Ring and pinion gears are replaced

Measurements are taken with pinion cups and pinion bearings installed in housing. Take measurements with Pinion Gauge Set 6774, Pinion Block 6735 and Dial Indicator C-3339 (Fig. 25).

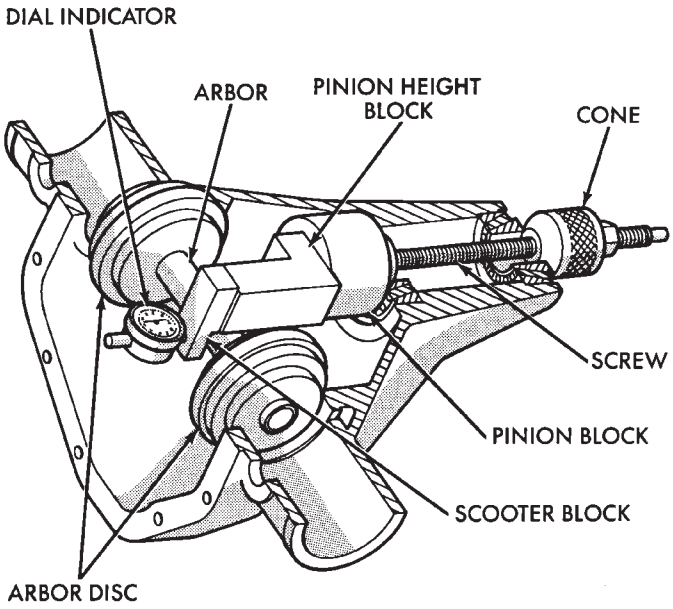

Fig. 25 Pinion Gear Depth Gauge Tools

PINION GEAR DEPTH VARIANCE

Original Pinion Gear Depth Variance	Replacement Pinion Gear Depth Variance								
	−4	**−3**	**−2**	**−1**	**0**	**+1**	**+2**	**+3**	**+4**
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

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(1) Assemble Pinion Gauge Set, Pinion Block and pinion bearings. Install assembly into differential pinion gear bore and hand tighten cone (Fig. 26).

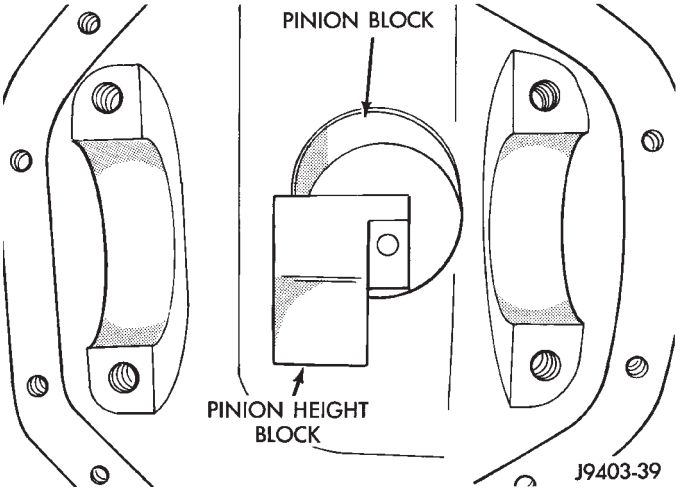


Fig. 26 Pinion Height Block

(2) Place Arbor Disc 6732 on Arbor D-115-3 and position in the bearing cradles (Fig. 27). Install differential bearing caps on Arbor Discs and tighten caps snug only.

Arbor Discs have different steps to fit other axle sizes. Pick correct size step for axle being serviced.

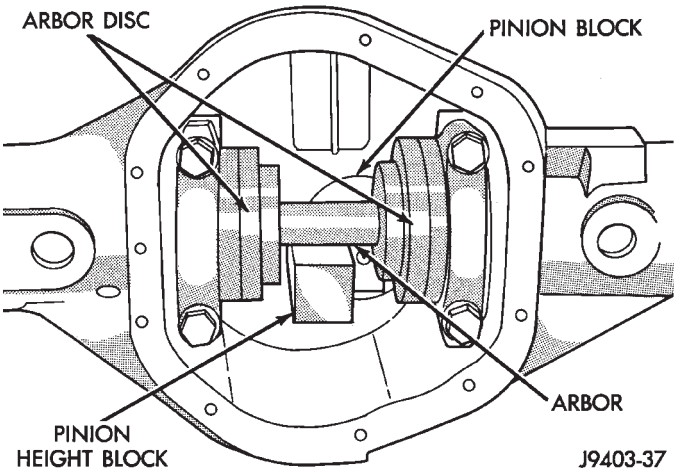


Fig. 27 Gauge Tools In Housing

(3) Firmly place Scooter Block and Dial Indicator on pinion height block tool and zero the dial indicator pointer.

(4) Slide the Scooter Block across the arbor while observing indicator (Fig. 28). Record the longest travel distance, whether inward (-) or outward (+), indicated by the pointer.

The plunger travel distance indicated, plus or minus the variance etched in the gear is the required thickness for the depth shims.

(5) Measure the thickness of each depth shim with a micrometer and combine the shims necessary for total required shim pack thickness. **Include oil slinger or baffle thickness with the total shim pack thickness.**

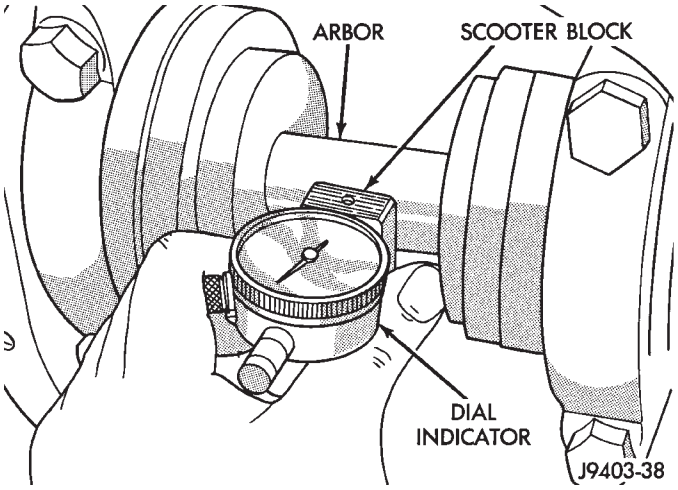


Fig. 28 Pinion Gear Depth Measurement

(6) Remove the measurement tools from the differential housing.

PINION GEAR ASSEMBLY/INSTALLATION

In production depth select shims are placed between the inner pinion bearing cone and pinion gear. For service the select shims are placed under the inner bearing cup.

(1) Place the depth shims (and baffle if equipped) in the pinion gear rear bearing bore. Install the bearing cup with Installer D-146 and Driver Handle C-4171 (Fig. 29). Ensure cup is correctly seated.

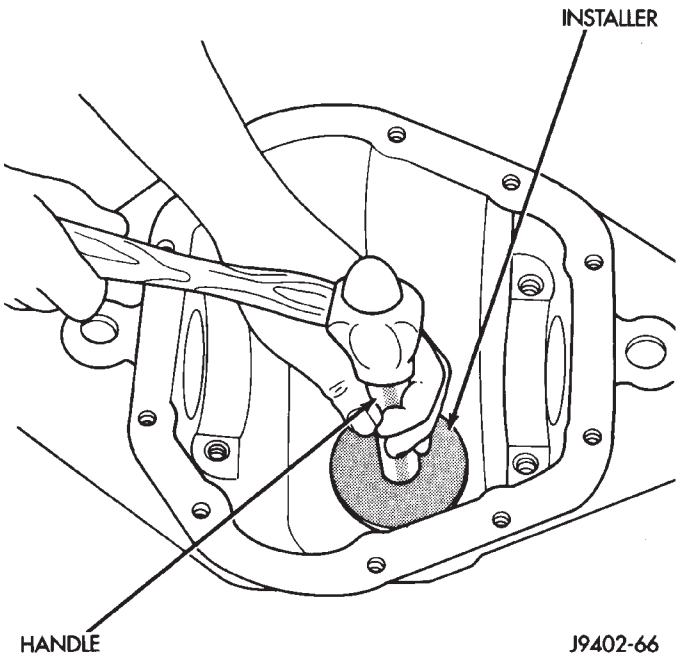


Fig. 29 Pinion Rear Bearing Cup Installation

(2) Install the pinion front bearing cup with Installer D-130 and Handle C-4171 (Fig. 30).

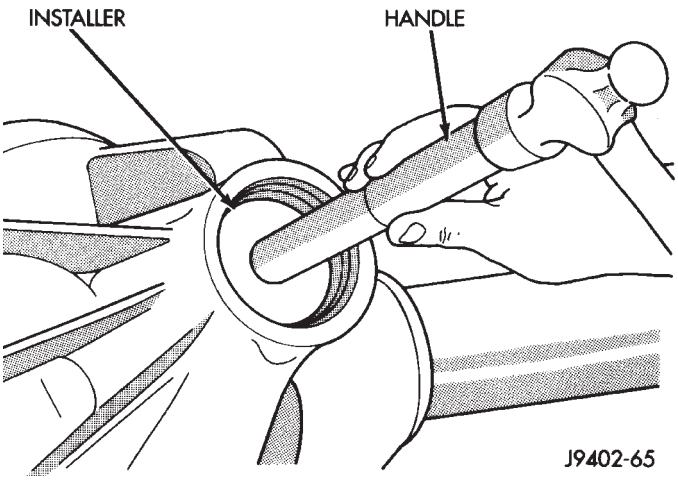


Fig. 30 Pinion Front Bearing Cup Installation

(3) Install pinion front bearing, oil slinger. Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer D-163 and Handle C-4171 (Fig. 31).

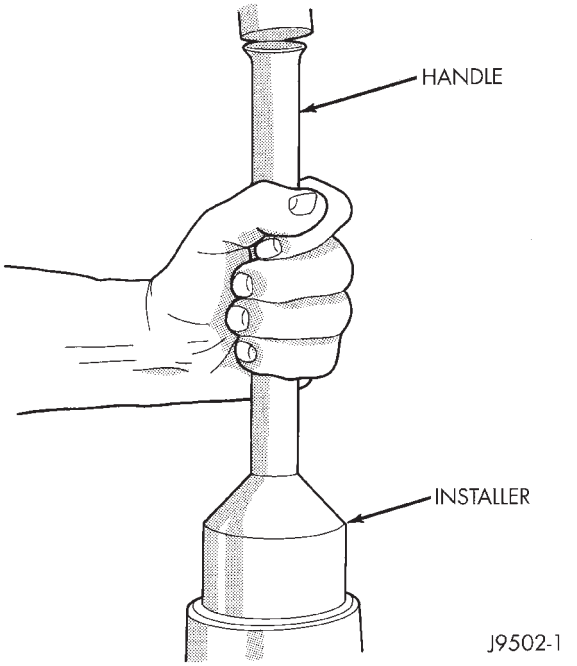


Fig. 31 Pinion Seal Installation

(4) Install the rear bearing (and slinger if used) on the pinion gear with Installer W-262 (Fig. 32).

(5) Install a new collapsible preload spacer on pinion shaft and install pinion gear in housing (Fig. 33).

(6) Install yoke with Installer W-162-D and Wrench C-3281 (Fig. 34).

(7) Install the yoke washer and a new nut on the pinion gear. Tighten the nut to 271 N·m (200 ft.lbs.) minimum. **Do not over-tighten.** Maximum torque is 475 N·m (350 ft. lbs.).

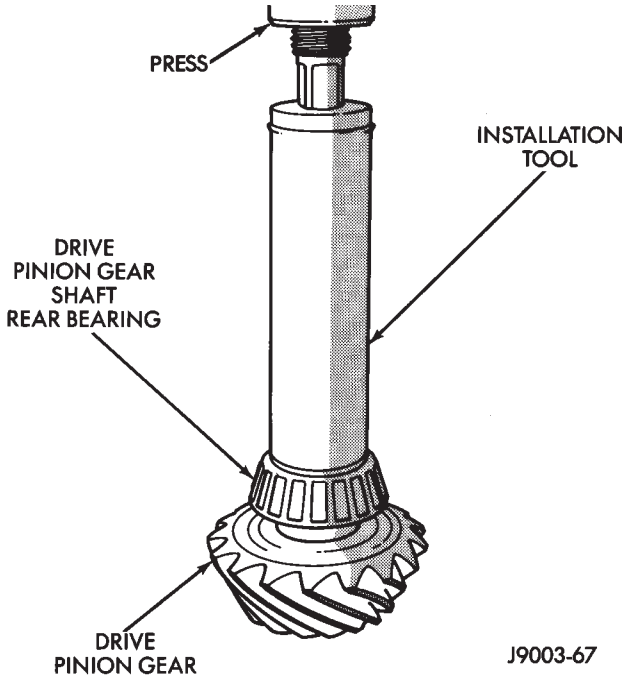


Fig. 32 Shaft Rear Bearing Installation

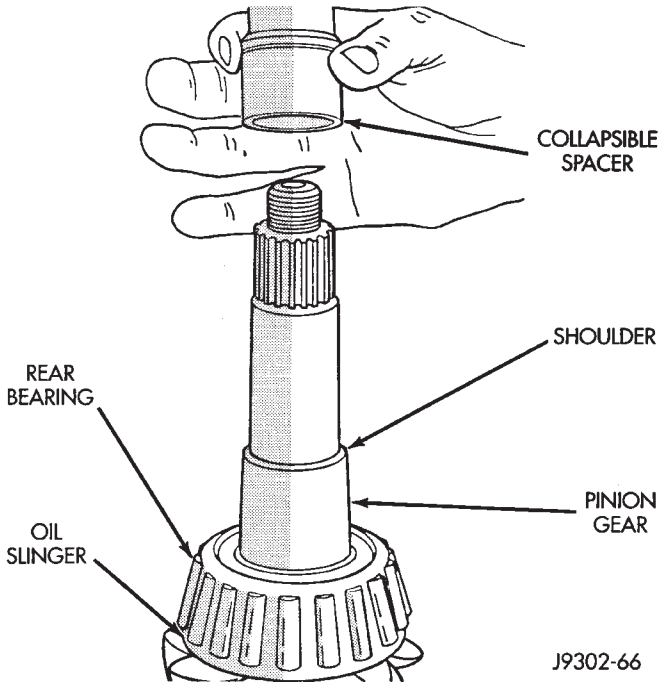


Fig. 33 Collapsible Preload Spacer

CAUTION: Never loosen pinion gear nut to decrease pinion gear bearing preload torque and never exceed specified preload torque. If preload torque is exceeded a new collapsible spacer must be installed. The torque sequence will have to be repeated.

(8) Use Flange Wrench C-3281 to retain the yoke (Fig. 35). Slowly tighten the nut in small increments until the rotating torque is achieved. Measure the preload torque frequently to avoid over-tightening the nut.

(9) Check bearing preload torque with an inch

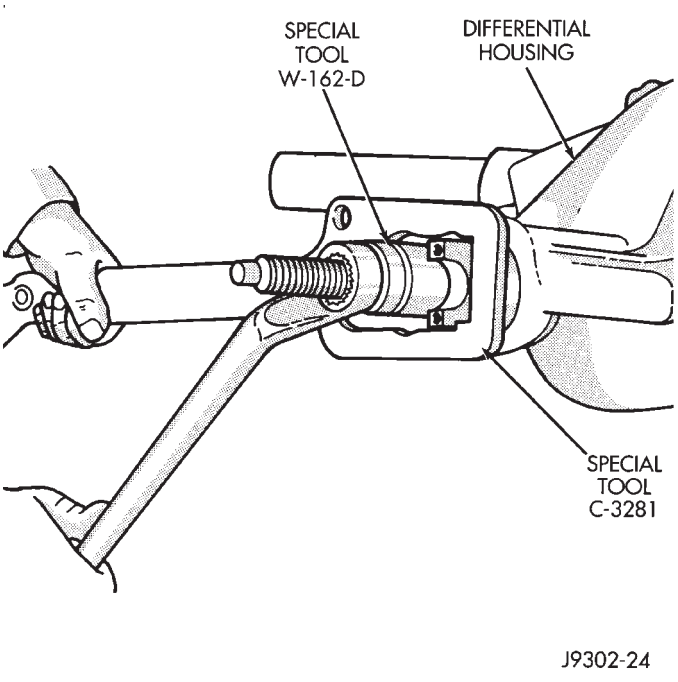


Fig. 34 Pinion Yoke Installation

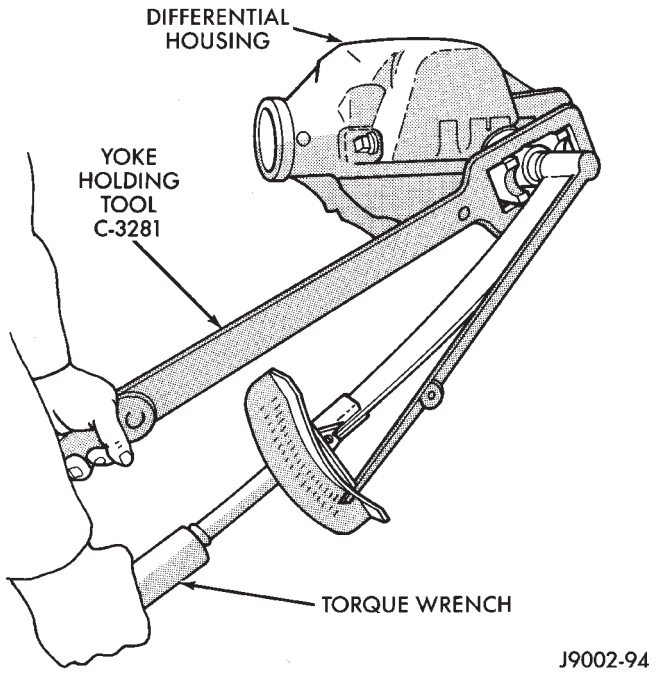


Fig. 35 Tightening Pinion Nut

pound torque wrench (Fig. 36). The torque necessary to rotate the pinion gear should be;

- Original Bearings — 1 to 3 N·m (10 to 20 in. lbs.).
- New Bearings — 2 to 5 N·m (15 to 35 in. lbs.).

DIFFERENTIAL MEASUREMENT AND INSTALLATION

DIFFERENTIAL SHIM PACK MEASUREMENT

(1) Install the bearings on the hub with Installer C-3716A and Driver Handle C-4171.

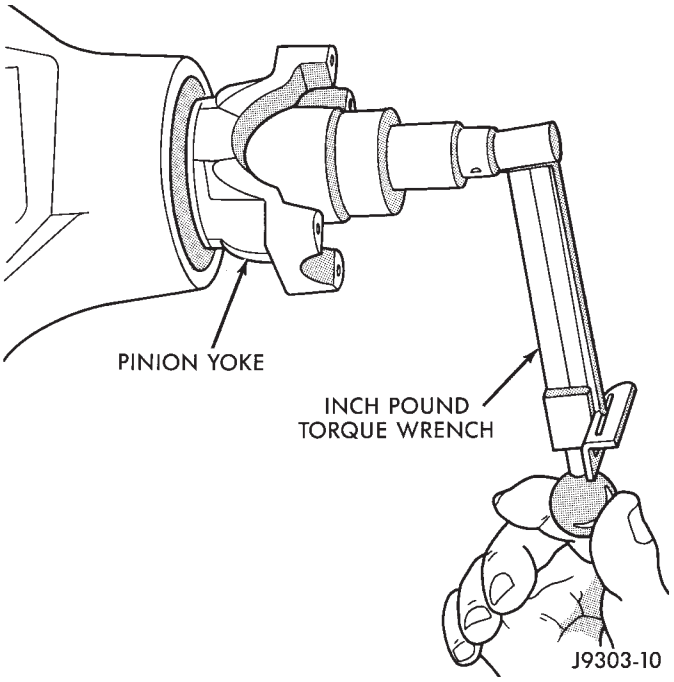


Fig. 36 Check Pinion Gear Torque

(2) Match each bearing cup with bearing (original). Install the cups on the bearings.

Note: It is recommended whenever bearings are removed that they be replaced.

(3) Install the differential case in the housing.

(4) Install the outboard shim/spacer (selected thickness) on each side between bearing cup and housing (Fig. 37). Use 0.142 in. (3.6 mm) as a starting point, shim/spacers are available in various thicknesses.

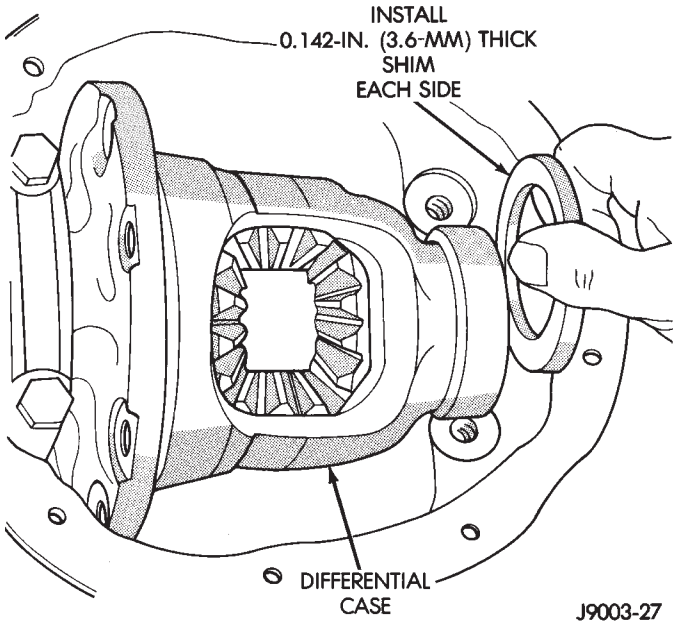


Fig. 37 Differential Bearing Shim Installation

(5) Install the marked bearing caps in their correct positions. Install and snug the bolts.

(6) Attach a dial indicator to the housing. Position the indicator plunger so that it contacts the ring gear mating surface (Fig. 38).

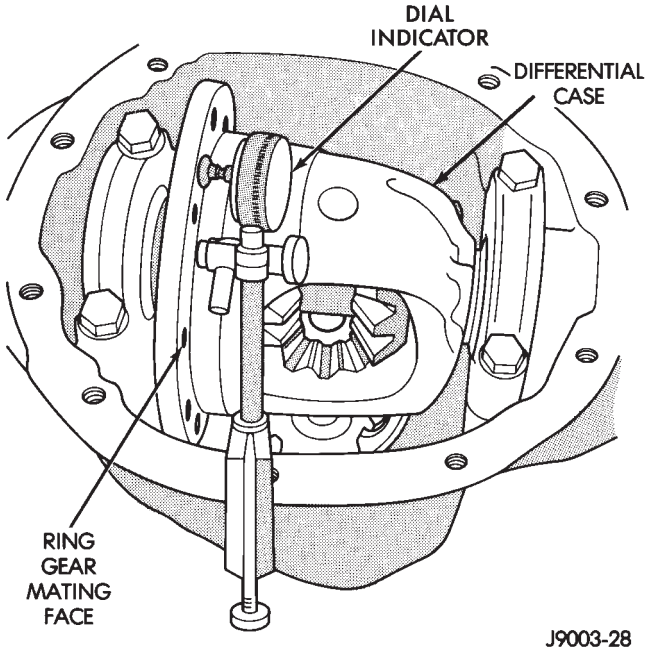


Fig. 38 Shim Measurement

(7) Pry the differential case to one side and zero the dial indicator pointer.

(8) Pry the differential case to the opposite side and record indicator reading. Reading is additional shim thickness needed for zero end play. For example, if reading was 0.008 inch (0.20 mm), an additional 0.004-inch (0.10-mm) thick shim will be needed at each side zero end play.

(9) Install zero end-play shims on each side of case.

The differential bearings must be preloaded to compensate for heat and load during operation.

(10) Add an additional 0.004-inch (0.1-mm) to each outboard shim/spacer for bearing preload.

RING GEAR INSTALLATION

(1) Invert the differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.

(2) Install new ring gear bolts and alternately tighten to 95-122 N·m (70-90 ft. lbs.) torque (Fig. 39).

DIFFERENTIAL INSTALLATION

(1) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 40). Install the holddown clamps and tighten the tool turnbuckle finger-tight.

(2) Install a pilot stud at the left side of the differential housing. Attach Dial Indicator to housing pilot stud. Load the indicator plunger against the opposite side of the housing (Fig. 40) and zero the indicator.

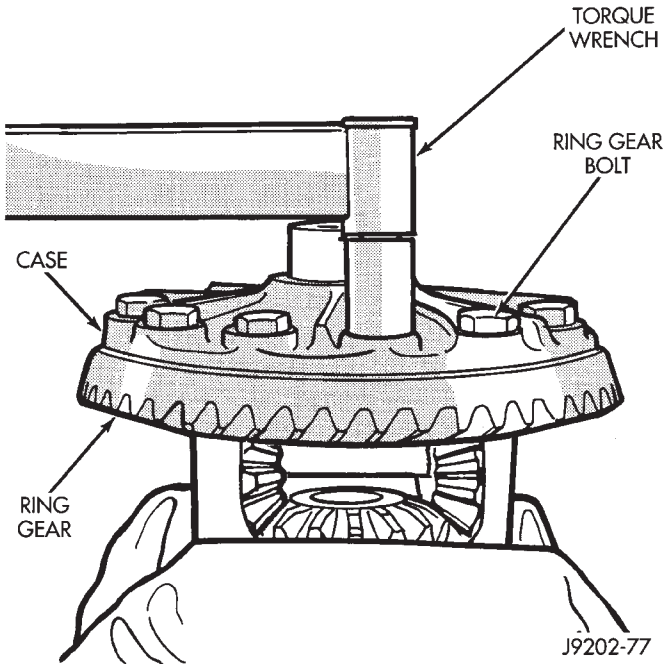


Fig. 39 Ring Gear Bolt Installation

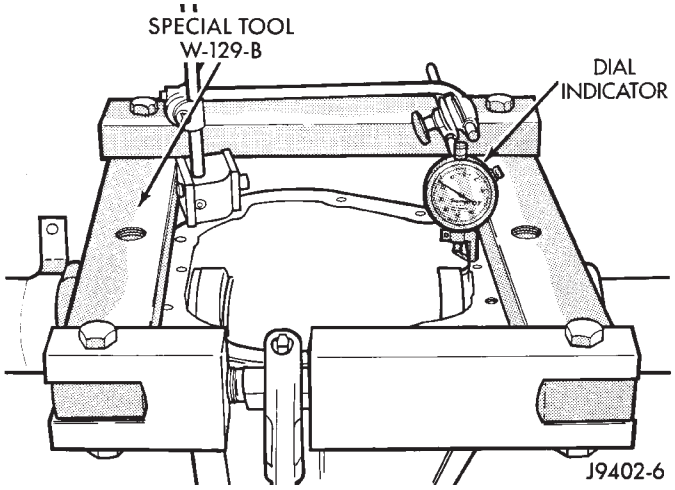


Fig. 40 Spread Differential Housing

CAUTION: Do not spread over 0.38 mm (0.015 in). If the housing is over-separated, it could be distorted or damaged.

(3) Separate the housing enough to install the case in the housing. Measure the distance with the dial indicator (Fig. 40).

(4) Remove the dial indicator.

(5) Install differential and outboard shim/spacer (selected thickness) in housing.

(6) Install case in the housing. Tap the differential case to ensure the bearings are fully seated (Fig. 41). Remove the spreader.

(7) Install the bearing caps at their original locations (Fig. 42). Tighten the bearing cap bolts to 77 N·m (57 ft. lbs.) torque.

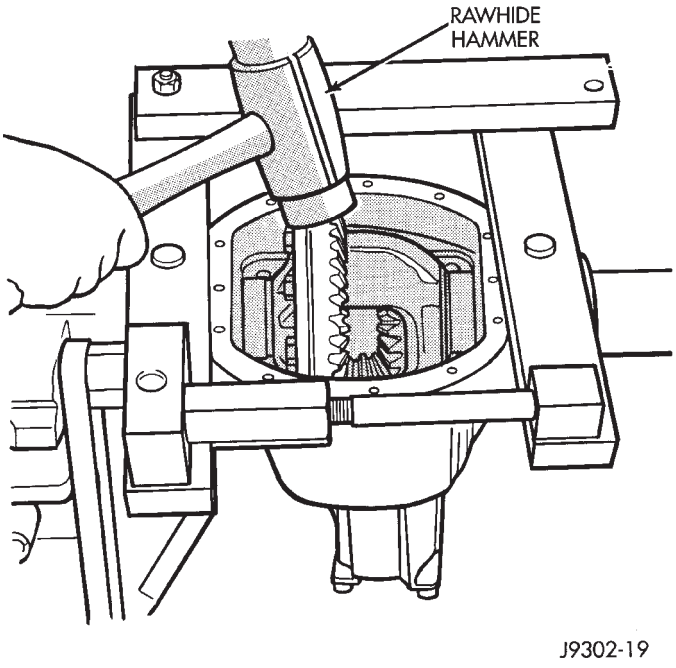


Fig. 41 Differential Installation

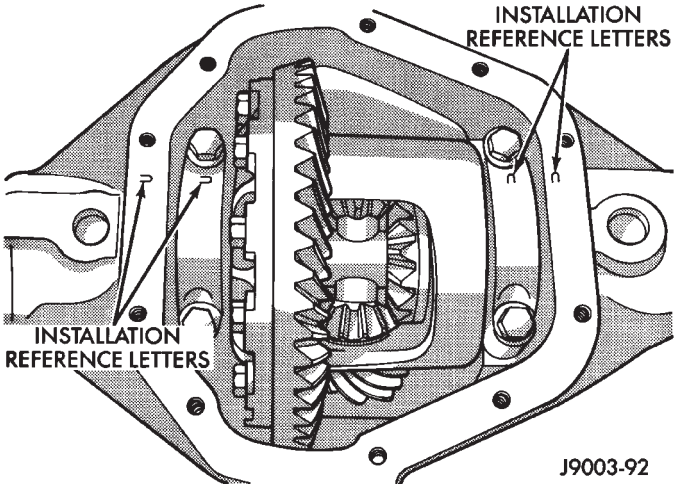


Fig. 42 Differential Bearing Cap Reference Letters

BACKLASH AND CONTACT PATTERN ANALYSIS

(1) Rotate assembly several revolutions to seat bearings. Measure backlash at three equally spaced locations around the perimeter of the ring gear with a dial indicator (Fig. 43).

The ring gear backlash must be within 0.12 - 0.20 mm (0.005 - 0.008 inch). It cannot vary more than 0.05 mm (0.002 inch) between the points checked.

If backlash must be adjusted, spacers are available in various thicknesses. Adjust the backlash accordingly (Fig. 44). **DO NOT INCREASE THE TOTAL SHIM PACK THICKNESS, EXCESSIVE BEARING PRELOAD AND DAMAGE WILL OCCUR.**

The ring gear teeth contact patterns will show if the pinion gear depth shim(s) have the correct thickness. It will also show if the ring gear backlash has been adjusted correctly. The backlash must be maintained within the specified limits until the correct tooth contact patterns are obtained.

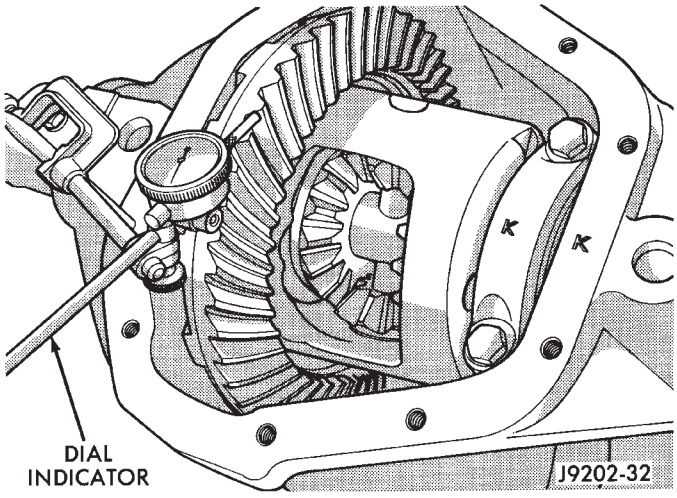


Fig. 43 Ring Gear Backlash Measurement

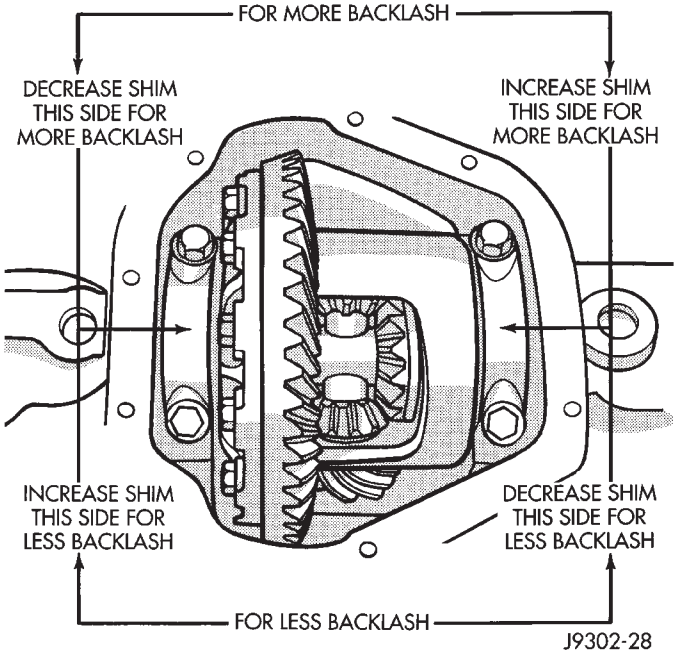
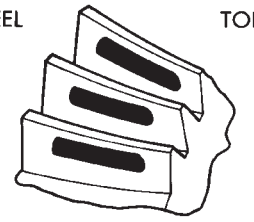
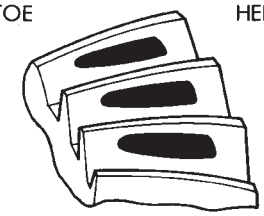
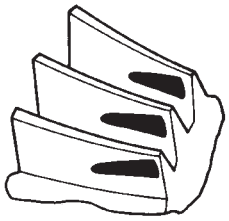
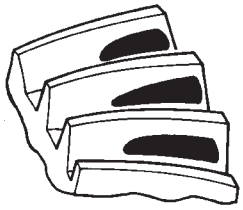
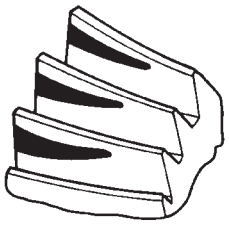
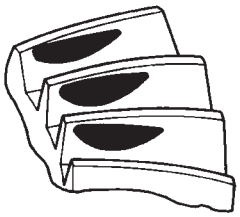
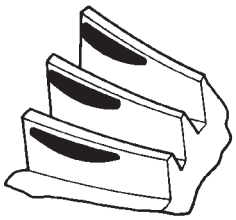
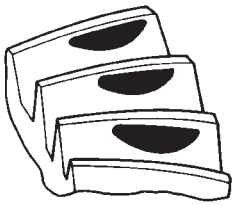
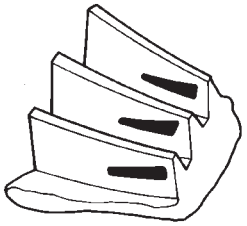
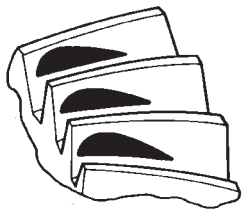


Fig. 44 Backlash Shim Adjustment

(2) Apply a thin coat of hydrated ferric oxide, or equivalent, to the drive and coast side of the ring gear teeth.

(3) Rotate the ring gear one complete revolution in both directions while a load is being applied. Insert a pry bar between the differential housing and the case flange. This will produce distinct contact patterns on both the drive side and coast side of the ring gear teeth.

(4) Note patterns in compound. Refer to (Fig. 45) for interpretation of contact patterns and adjust accordingly.

DRIVE SIDE OF RING GEAR TEETH	COAST SIDE OF RING GEAR TEETH	
HEEL TOE 	TOE HEEL 	DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT PATTERN AND TOP OF THE TOOTH.
		RING GEAR BACKLASH CORRECT. **THINNER** PINION GEAR DEPTH SHIM REQUIRED.
		RING GEAR BACKLASH CORRECT. **THICKER** PINION GEAR DEPTH SHIM REQUIRED.
		PINION GEAR DEPTH SHIM CORRECT. **DECREASE** RING GEAR BACKLASH.
		PINION GEAR DEPTH SHIM CORRECT. **INCREASE** RING GEAR BACKLASH.

J9003-24

Fig. 45 Gear Tooth Contact Patterns

FINAL ASSEMBLY

(1) Install the axle shafts. Refer to Axle Shaft Installation within this group.

(2) Scrape the residual sealant from the housing and cover mating surfaces. Clean the mating surfaces with mineral spirits. Apply a bead of MOPAR® Silicone Rubber Sealant on the housing cover (Fig. 46). Allow the sealant to cure for a few minutes.

Install the housing cover within 5 minutes after applying the sealant. If not installed the sealant must be removed and another bead applied.

(3) Install the cover on the differential with the attaching bolts. Install the identification tag. Tighten the cover bolts to 41 N·m (30 ft. lbs.) torque.

CAUTION: Overfilling the differential can result in lubricant foaming and overheating.

(4) Refill the differential housing with the specified quantity of MOPAR® Hypoid Gear Lubricant.

(5) Install the fill hole plug and tighten to 34 N·m (25 ft. lbs.) torque. Axles equipped with rubber fill plug install plug into cover.

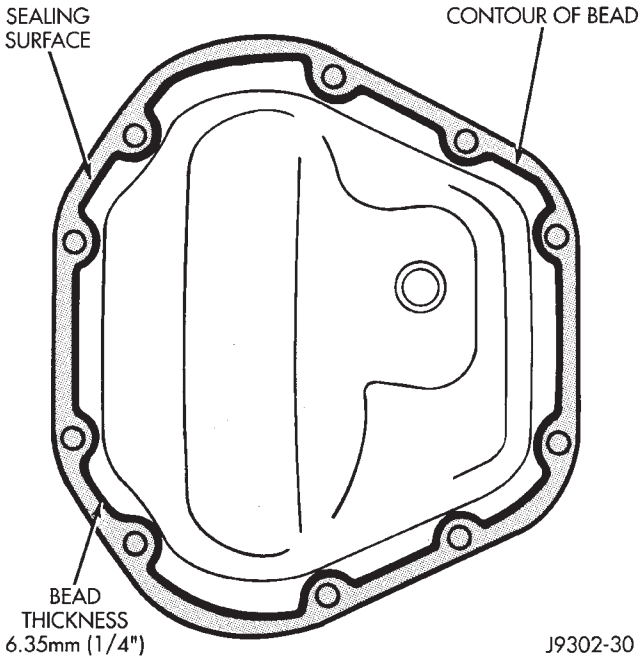


Fig. 46 Typical Housing Cover With Sealant

8 1/4 AXLE

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INFORMATION

The housing consists of an iron differential housing with axle shaft tubes extending from either side. The tubes are welded to the housing to form a one-piece axle.

The integral type housing, hypoid gear design has the centerline of the pinion set below the centerline of the ring gear.

The axle has a vent used to relieve internal pressure caused by lubricant vaporization and internal expansion.

The axle shafts are retained by C-clips in the differential side gears.

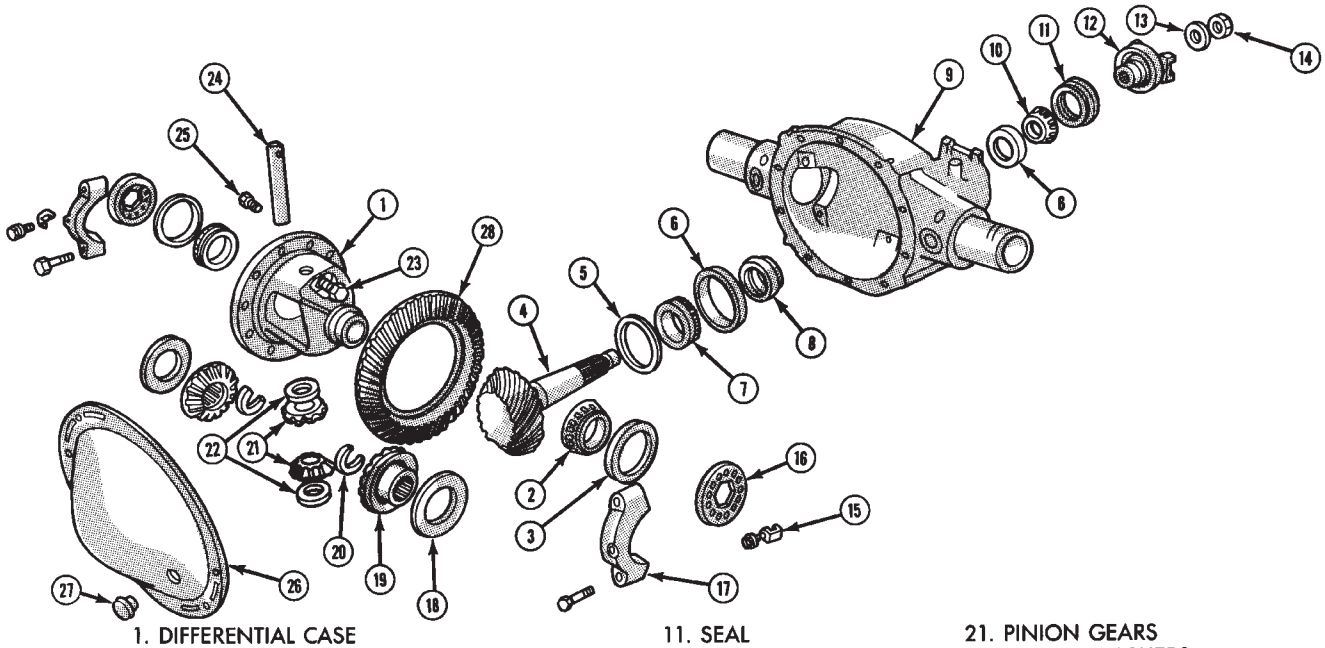
The removable cover provides a means for servicing the differential without removing the axle.

The axles have the gear ratio listed on a tag. The tag is attached to the housing cover.

The differential case is a one-piece design. The differential pinion mate shaft is retained with a threaded roll pin. Preload and backlash is adjusted by the use of threaded adjusters. Pinion bearing preload is set and maintained by the use of a collapsible spacer.

PINION GEAR DEPTH MEASUREMENT WITH GAUGE SET 6575 is used when;

- The axle/differential housing is being replaced
- The original pinion depth shim pack is lost or misplaced
- Replacing the differential case
- Replacing pinion and differential bearings



1. DIFFERENTIAL CASE
2. DIFFERENTIAL BEARING
3. BEARING CUP
4. PINION GEAR SHAFT
5. PINION GEAR DEPTH SHIMS
6. BEARING CUP
7. PINION GEAR SHAFT REAR BEARING
8. BEARING PRELOAD COLLAPSIBLE SPACER
9. DIFFERENTIAL HOUSING
10. PINION GEAR SHAFT FRONT BEARING
11. SEAL
12. YOKE
13. WASHER
14. NUT
15. LOCK
16. ADJUSTER
17. BEARING CAP
18. THRUST WASHER
19. SIDE GEAR
20. C-LOCK
21. PINION GEARS
22. THRUST WASHERS
23. SHAFT LOCK BOLT
24. MATE SHAFT
25. RING GEAR BOLT
26. COVER
27. PLUG
28. RING GEAR

J9203-14

Fig. 1 Axle Differential—8 1/4

LUBRICANT SPECIFICATIONS

Multi-purpose, hypoid gear lubricant should be used in the 8 1/4 inch axle. The lubricant should have MIL-L-2105C and API GL 5 quality specifications. MOPAR® Hypoid Gear Lubricant conforms to both of these specifications.

- The factory installed lubricant for the 8 1/4 inch rear axle is SAE 80W 90 gear lubricant.
- The factory installed lubricant quantity is 67±2 fluid oz.

CAUTION: Overfilling the differential can result in lubricant foaming and overheating.

Refer to Group 0, Lubrication and Maintenance for additional information.

CAUTION: If axle is submerged in water, lubricant must be replaced immediately to avoid possible premature axle failure.

DRIVE AXLE ASSEMBLY REPLACEMENT—XJ VEHICLES

REMOVAL

(1) Raise the vehicle. Position support stands under the frame rails slightly in front the springs.
(2) Remove the rear wheels.
(3) Mark the drive shaft yoke and axle pinion yoke for alignment reference. Disconnect the drive shaft from the axle.
(4) Disconnect the axle vent hose.
(5) Disconnect the parking brake cables at the equalizer or backing plate.
(6) Disconnect the shock absorbers from the axle brackets.
(7) Disconnect the brake hose at the axle junction block. **Do not disconnect the wheel cylinder tubing fittings.**
(8) If equipped, disconnect ABS wiring connections at the axle.
(9) Support the axle with a hydraulic jack under the differential.
(10) Remove the spring U-bolts from the plate brackets.
(11) Lower the jack enough to remove the axle.

INSTALLATION

CAUTION: Suspension components with rubber bushings should be tightened with the vehicle at normal height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

(1) Support the axle on a hydraulic jack under the differential. Position the axle under the vehicle.
(2) Raise the axle and align the spring center bolts with the locating holes in the axle pads and plate brackets.
(3) Install the spring U-bolts through the plate brackets and tighten to 70 N·m (52 ft. lbs.) torque.
(4) Install ABS wiring connections (if equipped) at the axle.
(5) Connect the brake hose at the axle junction block.
(6) Install the shock absorbers to the axle brackets and tighten to 62 N·m (46 ft. lbs.) torque.
(7) Connect the parking brake cables at the equalizer or backing plate.
(8) Connect the vent hose to the tube fitting.
(9) Align the reference marks and connect the drive shaft to the axle yoke. Tighten the U-joint clamp bolts to 19 N·m (14 ft. lbs.) torque.
(10) Check differential lubricant and add if necessary.
(11) Install the wheel and tire.
(12) Bleed the brakes.
(13) Remove the supports and lower the vehicle.

LUBRICANT CHANGE

The gear lubricant will drain quicker if the vehicle has been recently driven.
(1) Raise and support the vehicle.
(2) Remove the lubricant fill hole plug from the differential housing cover.
(3) Remove the differential housing cover and drain the lubricant from the housing.
(4) Clean the housing cavity with a flushing oil, light engine oil or lint free cloth. **Do not use water, steam, kerosene or gasoline for cleaning.**
(5) Remove the sealant from the housing and cover surfaces. Use solvent to clean the mating surfaces.
(6) Apply a bead of MOPAR® Silicone Rubber Sealant to the housing cover (Fig. 2). Allow the sealant to cure for a few minutes.

Install the housing cover within 5 minutes after applying the sealant. If not installed the sealant must be removed and another bead applied.

(7) Install the cover and any identification tag. Tighten the cover bolts in a criss-cross pattern to 47 N·m (35 ft. lbs.) torque.
(8) Refill the differential with Mopar Hypoid Gear Lubricant 13 mm (1/2 in.) below the fill plug hole. With Trac-Lok differentials, add a container of Mopar Hypoid Gear Lubricant Additive.

CAUTION: Overfilling the differential can result in lubricant foaming and overheating.

(9) Install the fill hole plug and lower the vehicle.

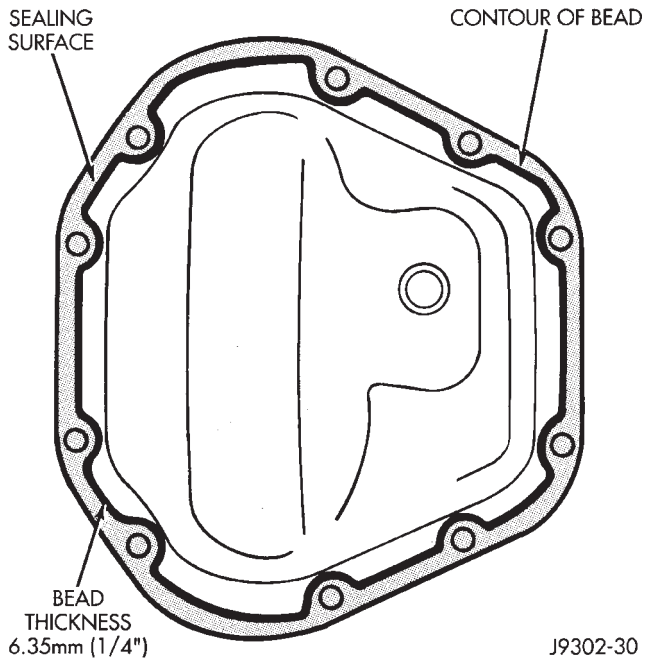


Fig. 2 Typical Housing Cover With Sealant

AXLE SHAFT, SEAL AND BEARING SERVICE

CAUTION: When rear axle service is necessary, both rear wheels must be raised off the surface so that they are free to rotate. Be cautious when the tires are being rotated by the engine or by other means.

AXLE SHAFT REMOVAL

(1) Raise and support the vehicle.
(2) Remove the wheel and tire.
(3) Remove the brake drum.
(4) Clean all the foreign material from housing cover area.
(5) Loosen the housing cover bolts and drain the lubricant from the housing. Remove the housing cover.
(6) Rotate the differential case so that the pinion mate gear shaft lock screw is accessible. Remove the lock screw and the pinion mate gear shaft from the case (Fig. 3).
(7) Push the axle shaft in toward the center of the vehicle. Remove the axle shaft C-clip lock from the axle shaft (Fig. 4).
(8) Remove the axle shaft. Use care to prevent damage to the axle shaft bearing, which will remain in the axle shaft tube.
(9) Inspect the axle shaft bearing contact surface area for indications of brinelling, spalling, and pitting.

If any of these conditions exist, the axle shaft and bearing should be replaced. Normal bearing contact on the shaft will be a dull gray and it could appear to be lightly dented.

(10) If any of these conditions exist, the axle shaft and bearing must be replaced.

The normal appearance (from roller bearing contact) will be a dull gray surface area that could appear slightly dented.

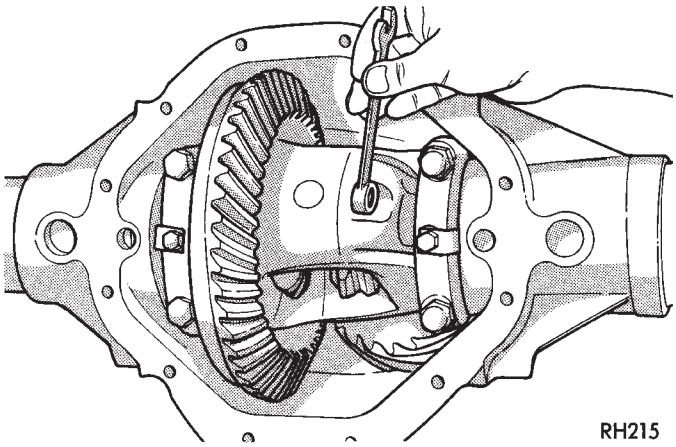


Fig. 3 Pinion Mate Shaft Lock Screw

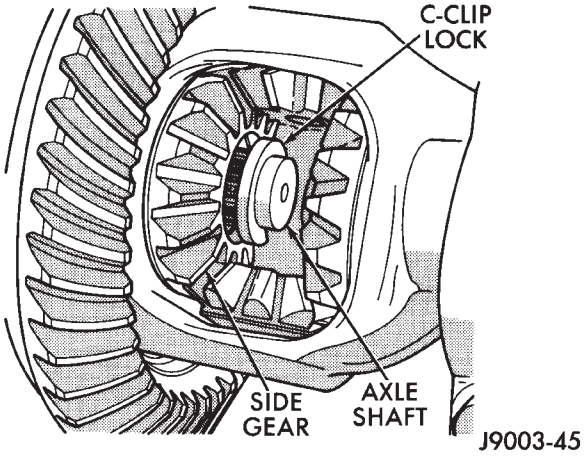


Fig. 4 Axle Shaft C-Clip Lock

AXLE SHAFT SEAL AND BEARING REMOVAL

(1) Remove the axle shaft seal with a small pry bar.
(2) Remove the bearing if it appears damaged or the axle shaft shows any of the conditions described above.
(3) Remove the bearing with Remover C-4167 (Fig. 5). Attach Slide Hammer 7420 and Adapter 7420-8 to the end of the removal tool.
(4) Inspect the axle shaft seal surface and tube bore for roughness and burrs. **Polish each axle shaft with No. 600 crocus cloth. This can remove slight surface damage. Do not reduce the diameter of the axle shaft seal contact surface. When polishing, the crocus cloth should be moved around the circumference of the shaft (not in-line with the shaft).**

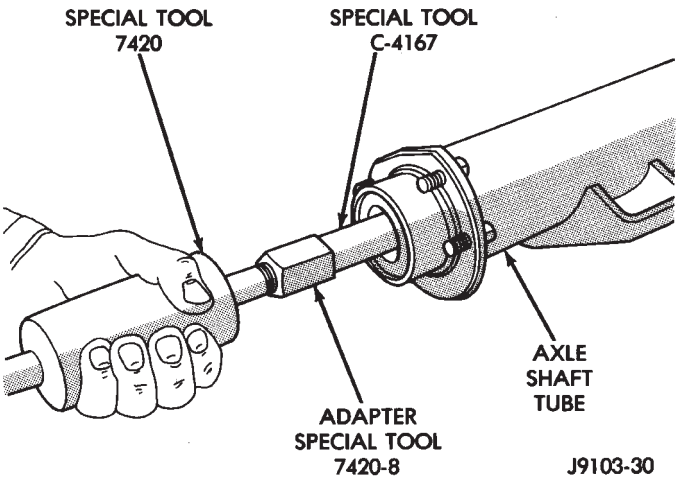


Fig. 5 Axle Shaft Bearing Removal

BEARING AND SEAL INSTALLATION

Do not install the original axle shaft seal. Always install a new seal.

(1) Wipe the bore in the axle shaft tube clean.

(2) If the original bearing is not reusable, install a new bearing. Place the axle shaft bearing on the pilot of Bearing Installer C-4198 and Handle C-4171.

CAUTION: DO NOT use the new axle shaft seal to position or seat the bearing in the axle shaft bore.

(3) Insert the bearing into the tube. Ensure that the bearing is not cocked and is seated firmly against the tube shoulder.

(4) Install the new axle shaft seal (Fig. 6) with Installer C-4198 and Handle C-4171. The flat side of the installation tool must face the seal.

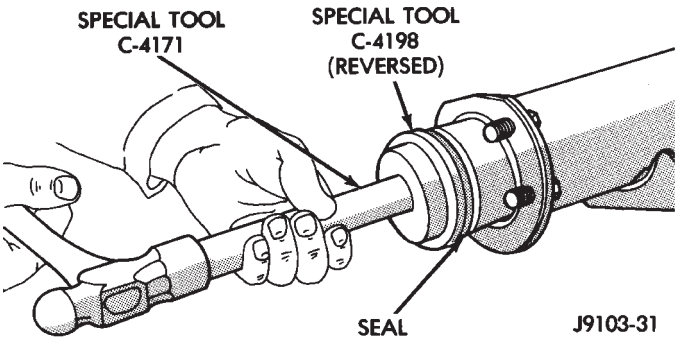


Fig. 6 Axle Shaft Seal Installation

(5) When the tool contacts the end of the tube (face), the seal will be at the correct position and depth.

AXLE SHAFT INSTALLATION

(1) Lubricate the bearing bore and seal lip. Insert the axle shaft and engage the splines with the side gear. Use care to prevent the shaft splines from damaging the axle shaft seal lip.

(2) Insert the C-clip lock in the recessed groove (Fig. 4). Push the axle shaft outward to seat the C-clip lock.

(3) Insert the pinion gear mate shaft in the case. Install through the thrust washers and pinion gears. Align the hole in the shaft with the lock screw hole. Install the lock screw with Loctite® on the threads. Tighten the screw to 11 N·m (8 ft. lbs.) torque (Fig. 3).

(4) Clean the cover and apply a bead of sealant. Refer to the Drain and Refill in this section.

(5) Install the brake drum and wheel and tire.

(6) Raise or lower the hoist until the vehicle is level.

(7) Remove the fill hole plug. Fill the differential housing with lubricant. Refer to the Specifications chart for the type and the quantity. Install the fill hole plug.

(8) Lower the vehicle and test the brakes and axle for correct operation.

PINION SEAL REPLACEMENT

CAUTION: The following procedures must be used so the correct pinion bearing preload torque is retained. If this procedure is not followed completely, it may result in premature failure of the rear axle.

REMOVAL

(1) Raise and support the vehicle.

(2) Mark the U-joint, pinion yoke, and pinion shaft for reference.

(3) Disconnect the drive shaft from the pinion yoke. Secure the drive shaft in an upright position to prevent damage to the rear U-joint.

(4) Remove the rear wheels and brake drums to prevent any drag. The drag can cause a possible false bearing preload torque measurement.

(5) Use a Newton-meter or an inch-pound torque wrench to measure the pinion bearing preload. Rotate the pinion shaft several times with the torque wrench. Note the indicated torque as the wrench is moved through several revolutions.

This measurement is very important because the bearing preload torque must be carefully re-adjusted after the new seal is installed.

(6) Retain the yoke with Wrench C-3281. Remove the pinion shaft nut and Belleville washer.

(7) Make reference marks and remove the yoke with a puller.

(8) Lower the rear of the vehicle to prevent lubricant leakage.

(9) Remove the pinion shaft seal with Puller C-748. Clean the seal contact surface in the housing bore.

INSTALLATION

(1) Examine the splines on the pinion shaft for burrs or wear.

(2) Remove any burrs and clean the shaft.

(3) Inspect the pinion yoke for cracks, worn splines and a worn seal contact surface. Repair or replace the yoke as necessary.

The outer perimeter of the seal is pre-coated with a special sealant. An additional application of sealant is not required.

(4) Install the replacement pinion shaft seal (Fig. 7) with Seal Installer C-4076-A and Handle C-4735-1.

The seal is correctly installed when the seal flange contacts the face of the differential housing flange.

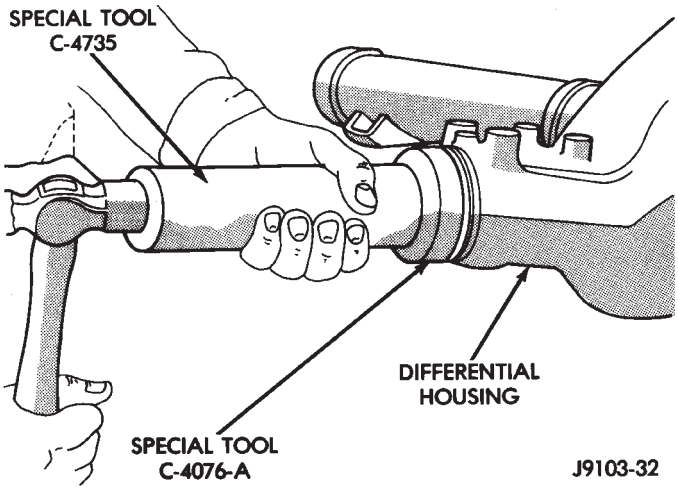


Fig. 7 Pinion Shaft Seal Installation

(5) Position the pinion yoke on the end of the shaft with the reference marks aligned.

(6) Seat the yoke on the pinion shaft with Installer C-3718 and Wrench C-3281.

(7) Remove the tools. Install the Belleville washer. The convex side of the washer must face outward.

(8) Retain the pinion yoke with Wrench C-3281. Tighten the shaft nut to 285 N·m (210 ft. lbs.) torque (Fig. 8). Rotate the pinion shaft several complete revolutions to ensure that the bearing rollers are seated.

Use a Newton-meter or an inch-pound torque wrench to measure the pinion gear bearing preload torque.

CAUTION: Never loosen pinion gear nut to decrease pinion gear bearing preload torque and never exceed specified preload torque. If preload torque is exceeded a new collapsible spacer must be installed. The torque sequence will have to be repeated.

(9) Continue tightening and measuring the bearing preload torque until it is the same as the original.

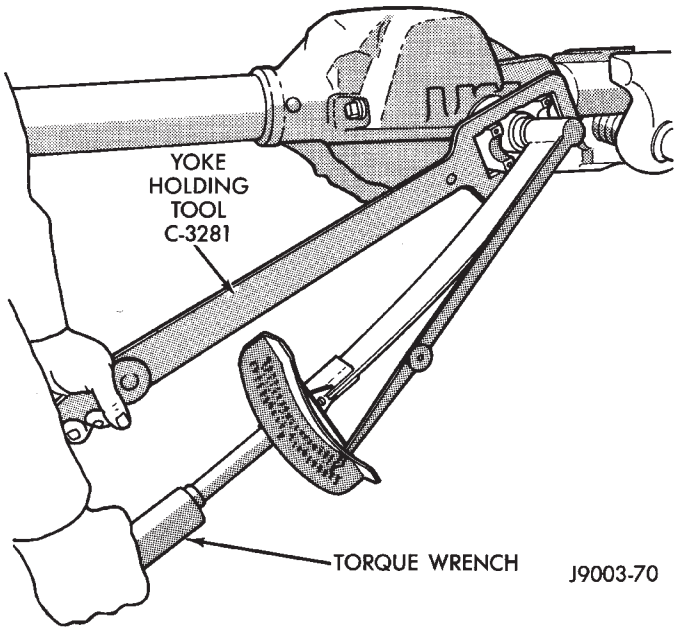


Fig. 8 Tightening Pinion Shaft Nut

The bearing preload torque should never be greater than 1 N·m (10 in. lbs.) more than the recorded value.

The bearing preload torque should be constant during a complete revolution of the pinion gear. If the preload torque varies, this indicates a binding condition. This condition must be corrected before the installation of the drive shaft.

(10) If the specified torque is not obtained, tighten the nut in small increments until the preload torque is obtained.

(11) Seal replacement is unacceptable if final nut torque is less than 285 N·m (210 ft. lbs.) torque.

(12) Install the drive shaft with the installation reference marks aligned. Tighten the U-joint yoke clamp screws to 19 N·m (14 ft. lbs. or 170 in. lbs.) torque.

(13) Install the brake drums, wheels and tires.

(14) Adjust the hoist so that the vehicle is in a level position. Check the differential housing lubricant level. If necessary, add MOPAR® Hypoid Gear Lubricant.

DIFFERENTIAL SERVICE

SERVICE INFORMATION

It is not necessary to remove the complete axle to service the differential.

CAUTION: When differential service is necessary, both rear wheels must be raised off the surface. They must be free to rotate.

CAUTION: Do not subject the bearings, cups, bores or journals to heat from a torch or other abuse. Permanent damage could result. Special tools are available and recommended when servicing axle.

DIFFERENTIAL CASE REMOVAL

(1) Remove the axle shafts, refer to Axle Shaft Removal.

Side play and runout checks taken during disassembly will be very useful in reassembly.

(2) Check differential side play. Position a screwdriver or pinch bar between left side of axle housing and case flange (Fig. 9). Use a prying motion to determine if any side play exists. There should be no side play.

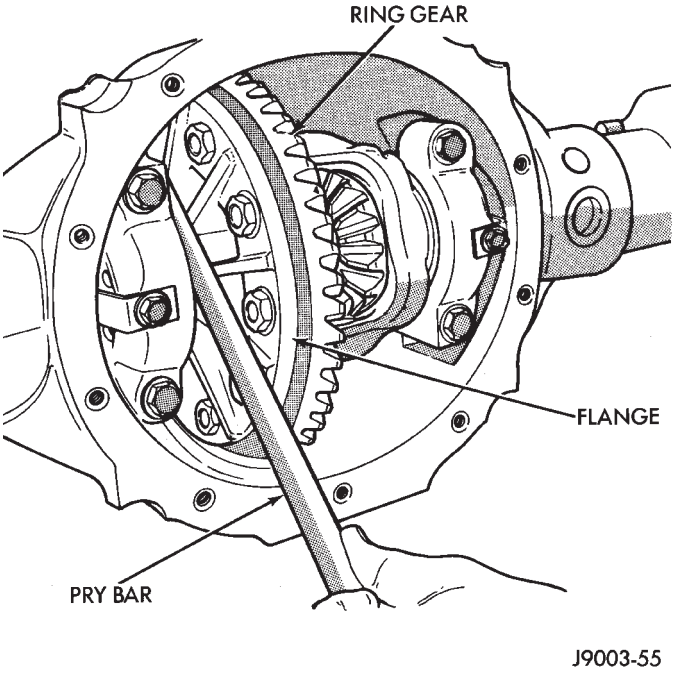


Fig. 9 Differential Case Side Play Test

Side play resulting from bearing races being loose on case hubs require replacement of the differential case. Otherwise, use threaded adjuster to remove the side play before measuring the ring gear runout.

(3) Eliminate any side play in the differential case. Attach Dial Indicator to Pilot stud C-3288-B. Place the indicator plunger at a right angle (90°) to the ring gear (Fig. 10). The plunger should exert a slight force against the gear face.

(4) Measure runout by turning the ring gear several complete revolutions. Observe the dial indicator pointer. Mark the ring gear and the differential case at the areas of maximum runout. The ring gear runout should not exceed 0.13 mm (0.005 inch). If the runout exceeds 0.13 mm (0.005 inch), a damaged differential case could be the cause.

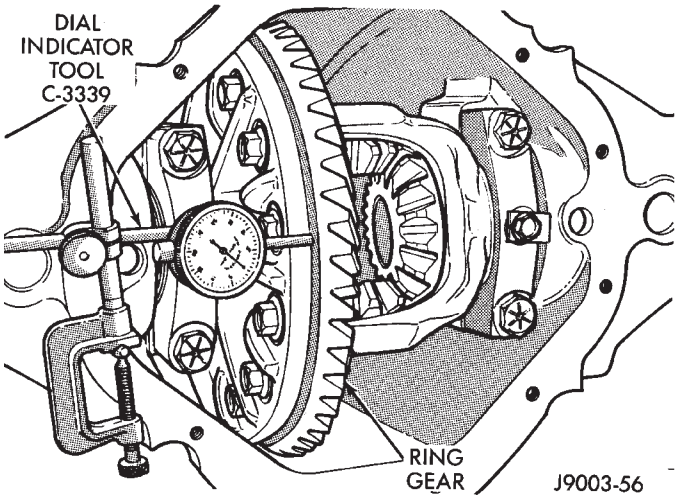


Fig. 10 Ring Gear Runout Measurement

Marking the differential case will be very useful later during differential case runout measurement.

(5) Mark the differential housing and differential bearing caps for installation reference (Fig. 11).

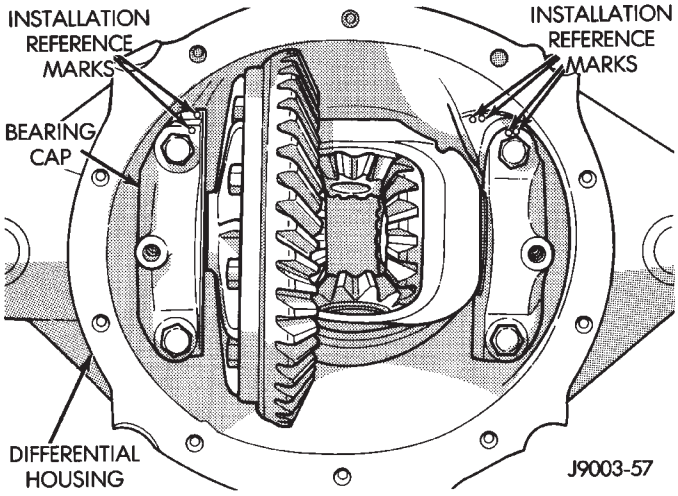


Fig. 11 Housing & Caps Marked For Installation Reference

(6) Remove the bearing threaded adjuster lock from each bearing cap. Loosen the bolts, but do not remove the bearing caps.

(7) Loosen the threaded adjusters with Wrench C-4164 (Fig. 12).

(8) Hold the differential case in place. Remove the bearing caps, adjusters and differential case (Fig. 13).

Each differential bearing cup and threaded adjuster must be kept with their respective bearing.

PINION GEAR SHAFT REMOVAL

(1) Remove the pinion gear nut and washer. Use Puller C-452 and Wrench C-3281 to remove the pinion gear yoke.

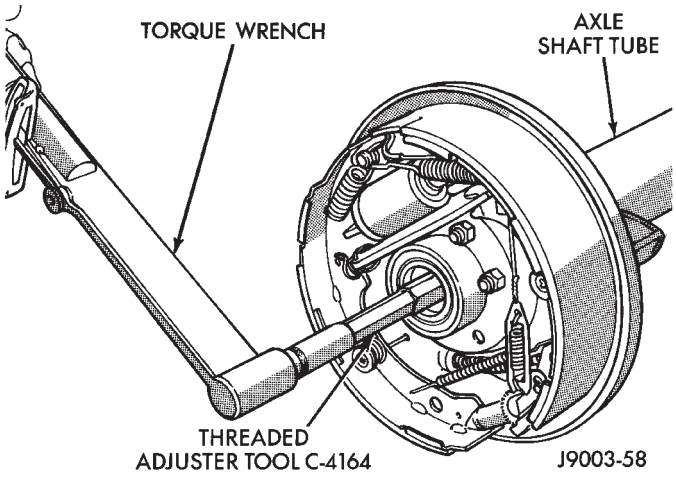


Fig. 12 Threaded Adjuster Tool

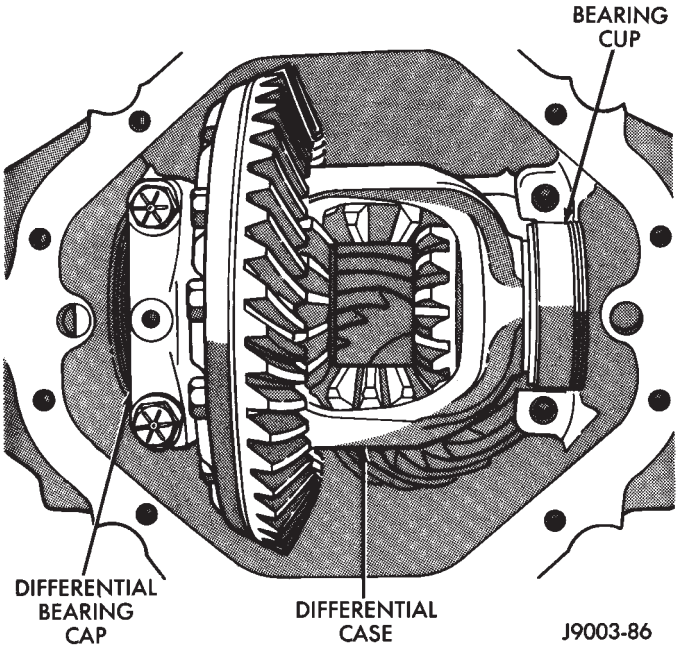


Fig. 13 Differential Bearing Cap Removed

(2) Use Puller C-748 to remove pinion seal and discard seal.

(3) Force pinion gear shaft out the front bearing and remove bearing. **This will damage the front bearing rollers and bearing cup. The front bearing and cup must be replaced.** Discard collapsible spacer.

(4) Remove the front and rear bearing cups.

- Front bearing cup use Remover C-4345 and Handle C-4171
- Rear bearing cup use Remover C-4307 and Handle C-4171

(5) Remove the rear bearing from the pinion shaft with Puller C-293-PA (J-29721) and Adapter C-293-42 (Fig. 14). Remove and record the pinion depth shims.

RING GEAR

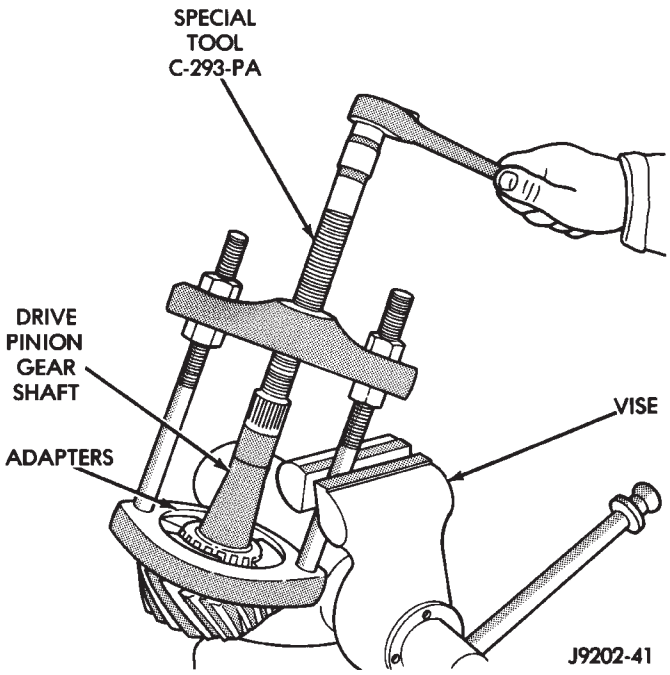


Fig. 14 Inner Bearing Removal

Do not remove the ring gear from case unless the runout must be measured.

(1) Clamp the case with the ring gear bolts facing upward. Use a vise equipped with soft jaws (brass).

(2) Remove and discard **left-hand** threaded ring gear bolts. Use a hammer and a brass drift to force ring gear loose from the case pilots. Remove the ring gear.

CASE FLANGE RUNOUT MEASUREMENT

(1) If the ring gear runout exceeded 0.13 mm (0.005 inch), case flange runout should be measured. Install the case with bearing cups and threaded adjusters close to their original position.

(2) Install the bearing caps and bolts. Tighten the bolts lightly. Use Wrench C-4164 (Fig. 12) to thread both adjusters inward. Remove all side play.

(3) Attach Dial Indicator to measure the flange runout. The plunger should contact the ring squarely between the outer edge and gear attaching bolt holes (Fig. 15).

(4) Rotate the differential case several times. Observe the dial indicator pointer. Mark the area of maximum flange runout. The differential case flange runout must not exceed 0.08 mm (0.003 inch). If runout exceeds this amount replace differential case.

To reduce excessive ring gear runout, position gear runout mark 180 degrees opposite flange runout mark.

(5) Remove differential bearing cap bolts. Remove differential case from differential housing.

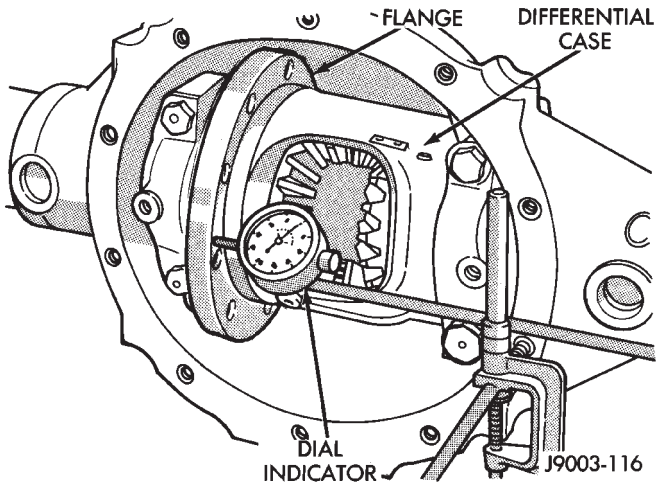


Fig. 15 Case Flange Runout Measurement

DIFFERENTIAL CASE DISASSEMBLY

(1) Rotate side gears until pinion gears are located at the differential case opening. Remove gears.

(2) Remove side gears and thrust washers.

(3) Remove differential bearings from the case hubs with Puller C-293-PA, Adapter C-293-48 and Plug SP-3289 (Fig. 16).

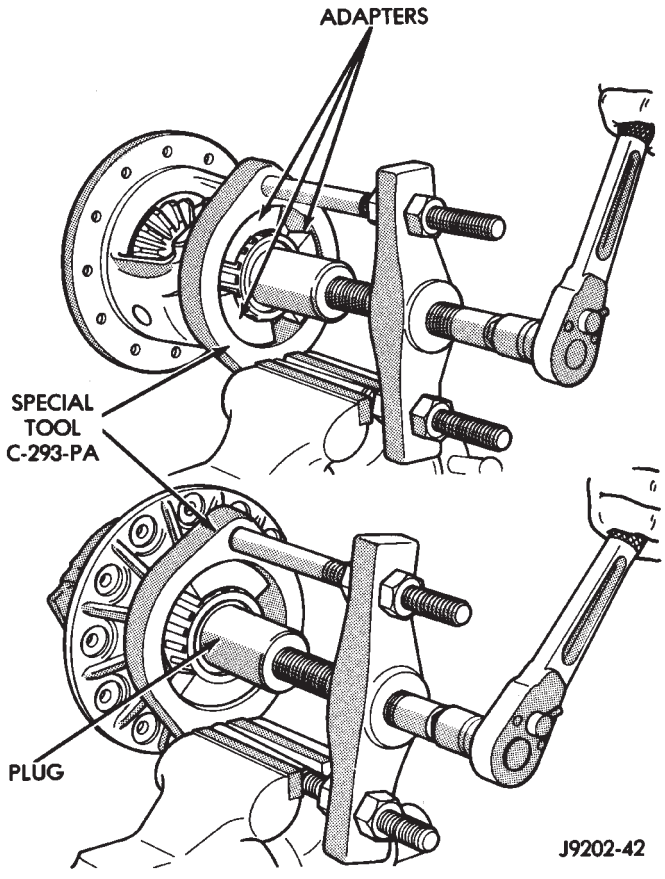


Fig. 16 Differential Bearing Removal

CLEANING/INSPECTION

(1) Clean all differential components in cleaning solvent. Allow the bearings to either air dry or dry them with a lint-free cloth. Dry the other components with compressed air.

(2) Examine each component for wear or damage.

(3) Replace shims, bearings and cups as a set only. Replace bearings and cups if either is galled, worn, cracked, or damaged.

(4) Inspect the differential side and pinion gears. Replace any gear that is worn, cracked or chipped.

(5) Inspect differential case and replace case if cracked or damaged.

Polish each axle shaft sealing surface with No. 600 crocus cloth. This can remove slight surface damage. Do not reduce the diameter of the axle shaft seal contact surface. When polishing, the crocus cloth should be moved around the circumference of the shaft (not in-line with the shaft).

When replacing a drive pinion gear bearing, always replace the bearing and cup as a matched set.

(6) Inspect the axle shaft C-clip locks for cracks or excessive wear. Replace them if necessary.

(7) Test each threaded adjuster to determine if it rotates freely.

(8) If an adjuster binds, repair the damaged threads or replace the adjuster.

DIFFERENTIAL CASE ASSEMBLY

(1) Lubricate all the differential case components with gear lubricant.

(2) Place the thrust washers on the differential side gears. Position the gears in the differential case counterbores.

If replacement side gears or thrust washers are used, refer to Differential Side Gear Clearance Measurement And Adjustment (Fig. 17).

SIDE GEAR CLEARANCE	0.007
THRUST WASHER THICKNESS	+ 0.033
TOTAL	0.040
	0.040
REPLACEMENT WASHER THICKNESS	− 0.037
NEW SIDE GEAR CLEARANCE	0.003

J9203-31

Fig. 17 Side Gear Calculations

(3) Position the thrust washers on the differential pinion gears. Mesh the pinion gears with the side gears.**Ensure that the pinion gears are exactly 180 degrees opposite each other.**

(4) Rotate the side gears to align the pinion gears and thrust washers. Align these components with the mate shaft bores in the case.

(5) If ring gear was removed, clean all contact surfaces. Use an Arkansas stone or fine file to remove any sharp areas from the chamfered inside diameter.

(6) If removed, heat ring gear with a heat lamp or by immersing in a hot fluid. The temperature should not exceed 149°C (300°F). **Do not use a torch to heat the ring gear.**

(7) Position heated rear gear on case. Use two equally spaced Pilot Studs C-3288-B to align the gear with the flange holes (Fig. 18).

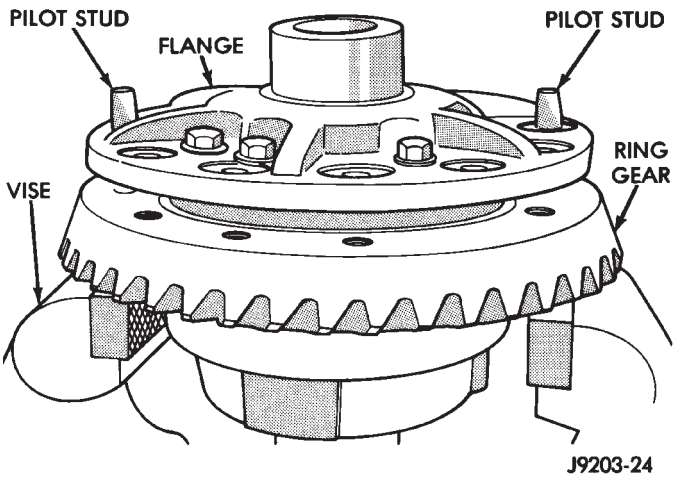


Fig. 18 Case-To-Ring Gear Alignment

(8) Install replacement ring gear bolts (with left hand threads). Alternately and evenly tighten each bolt to 95 N·m (70 ft. lbs.) torque.

CAUTION: When installing a differential bearing, never apply force to the bearing cage because bearing damage will result.

(9) Install a differential bearing on each hub with Installer C-4340 and Handle C-4171 (Fig. 19).

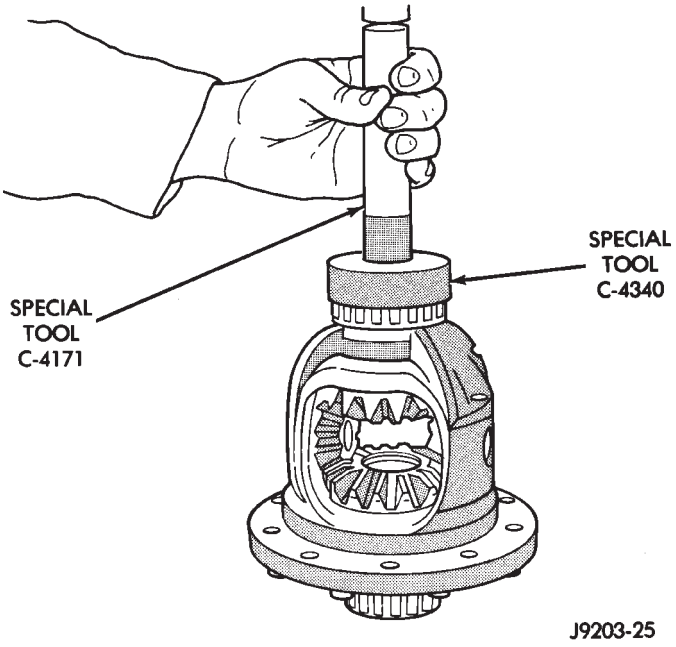


Fig. 19 Differential Bearing Installation

PINION DEPTH MEASUREMENT AND ADJUSTMENT WITH GAUGE SET 6575

(1) Use pinion gear adjustment gauge set 6575 (Fig. 20) and continue the assembly:

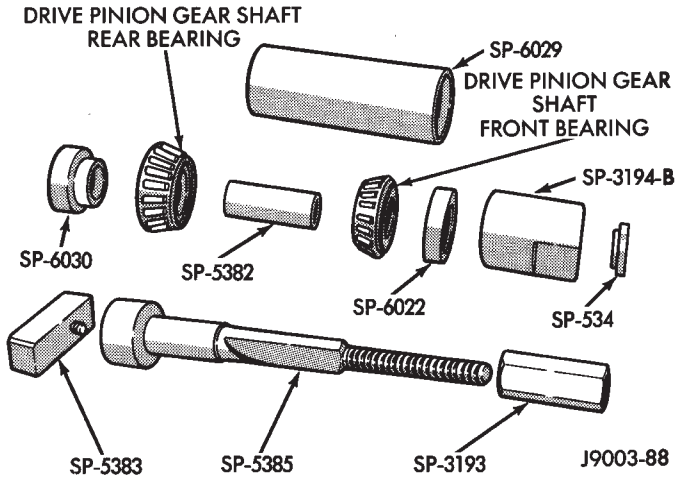


Fig. 20 Axle Adjustment Tools—8 1/4

(2) Install front (outer) bearing cup use Installer D-130 and Handle C-4171.

(3) Install rear (inner) bearing cup use Installer C-4308 and Handle C-4171.

Assemble tools as described;

- Position Spacer (SP-6030) over Shaft (SP-5385)
- Position pinion rear bearing on shaft
- Position tools (with bearing) in the housing
- Install Sleeve (SP-5382)
- Install pinion front bearing
- Install Spacer (SP-6022)
- Install Sleeve (SP-3194-B), Washer (SP-534) and Nut (SP-3193)

(4) Prevent compression sleeve tool from turning with Wrench C-3281.

Tighten the nut to seat the pinion bearings in the housing (Fig. 21). Allow the sleeve to turn several times during the tightening to prevent brinelling the bearing cups or bearings.

Depth shim(s) are positioned between the pinion gear rear bearing and pinion gear. The required thickness of the depth shim(s) is determined according to the following information.

(5) Loosen the compression nut tool. Lubricate the pinion gear front and rear bearings with gear lubricant. Re-tighten the compression nut tool to 1 to 3 N·m (15 to 25 in. lbs.) torque. Rotate the pinion gear several complete revolutions to align the bearing rollers.

(6) Install Gauge Block SP-5383 at the end of SP-5385. Install Cap Screw (SP-536) and tighten.

(7) Position Arbor (SP-6029) in the differential housing (Fig. 22).

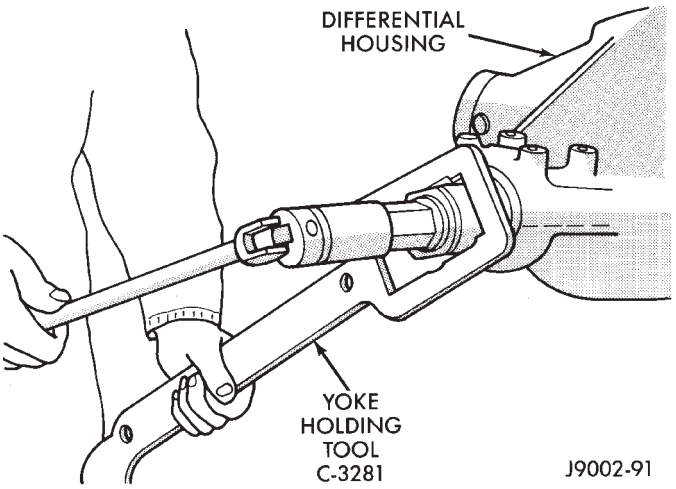


Fig. 21 Seating Pinion Bearings

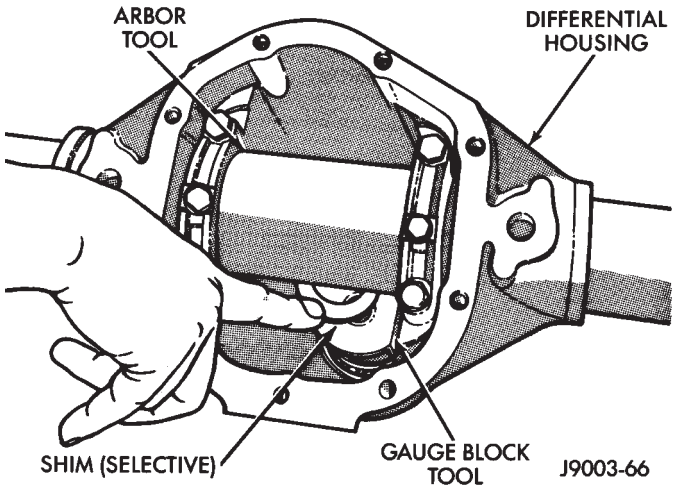


Fig. 22 Depth Shim(s) Selection

(8) Center the tool. Place a piece of 0.002 inch shim stock at each end of the arbor tool. Install the bearing caps on the arbor tool. Tighten the cap bolts to 14 N·m (10 ft. lbs.) torque.

(9) Trial fit depth shim(s) between the arbor tool and gauge block tool (Fig. 22). **The depth shim(s) fit must be snug but not tight (drag friction of a feeler gauge blade).**

Depth shims are available in 0.001-inch increments from 0.020 inch to 0.038 inch.

(10) Note the etched number on the face of the pinion gear. The numbers represent thousands-of-an-inch deviation from the standard. If the number is - (negative), add that value to the required thickness of the depth shim(s). If the number is + (positive), subtract that value from the thickness of the depth shim(s). If the number is 0, no change is necessary.

(11) Remove tools from differential housing.

(12) Position depth shim(s) on the pinion gear. Install rear bearing with Installer C-4040 (Fig. 23). Be sure the contact surfaces are clean and without foreign particles.

(13) Lubricate pinion gear front and rear bearings with gear lubricant.

(14) Install pinion gear into the housing. Install new collapsible spacer at the end of the pinion gear. Install pinion gear front bearing.

(15) Install pinion yoke with Remover/Installer C-3718 and Wrench C-3281 (Fig. 24).

PINION GEAR DEPTH VARIANCE

Original Pinion Gear Depth Variance	Replacement Pinion Gear Depth Variance								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

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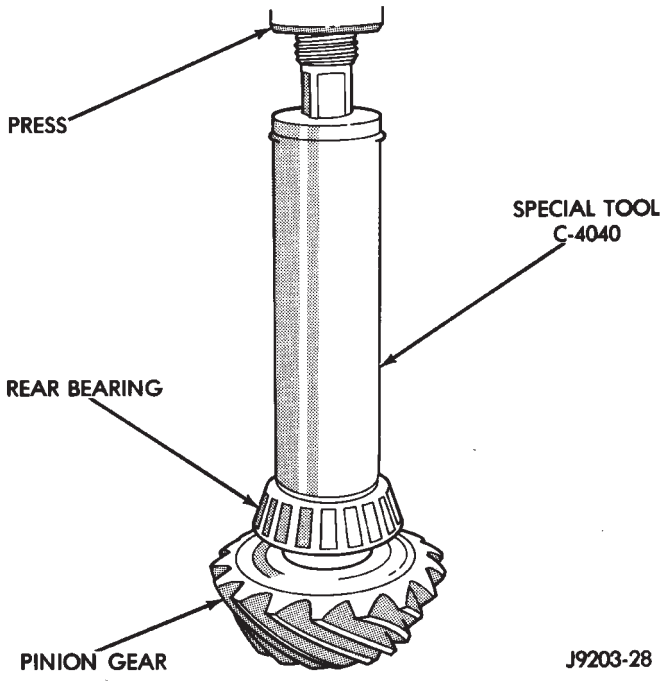


Fig. 23 Shaft Rear Bearing Installation

It is necessary to use the tools (above) to correctly seat the front bearing on the drive pinion gear shaft (Fig. 24).

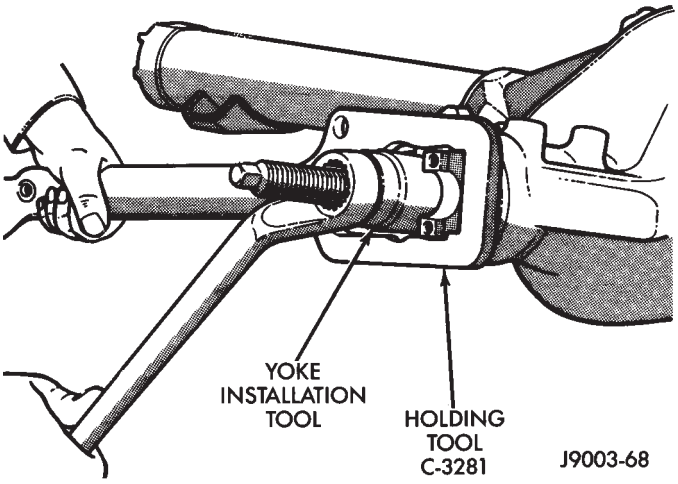


Fig. 24 Pinion Yoke Installation

CAUTION: Use care to prevent collapsing preload collapsible spacer during installation of the yoke and seating the front bearing.

(16) Remove yoke and tools from the pinion gear.

(17) Install the pinion seal with Seal Installer C-4076-A and Handle C-4735-1 (Fig. 25).

The outer perimeter of the seal is pre-coated with a special sealant. An additional application of sealant is not required.

(18) Install pinion yoke with Remover/Installer C-3718 and Wrench C-3281.

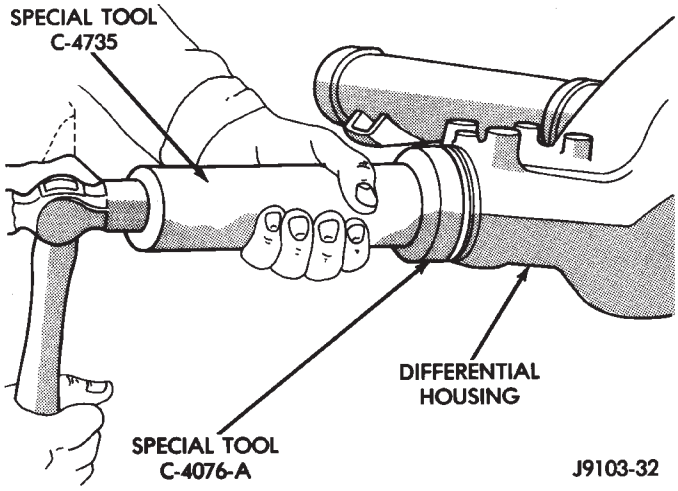


Fig. 25 Pinion Gear Seal Installation

(19) Remove the tools. Install the Belleville washer. The convex side of the washer must face outward. Install the pinion nut.

(20) Retain pinion yoke with Wrench C-3281. Initially tighten the pinion gear shaft nut enough to remove the bearing end play. While tightening, rotate the pinion shaft to ensure the bearing rollers are correctly seated.

(21) Tighten the pinion nut (Fig. 26) to 285 N·m (210 ft. lbs.) torque (minimum).

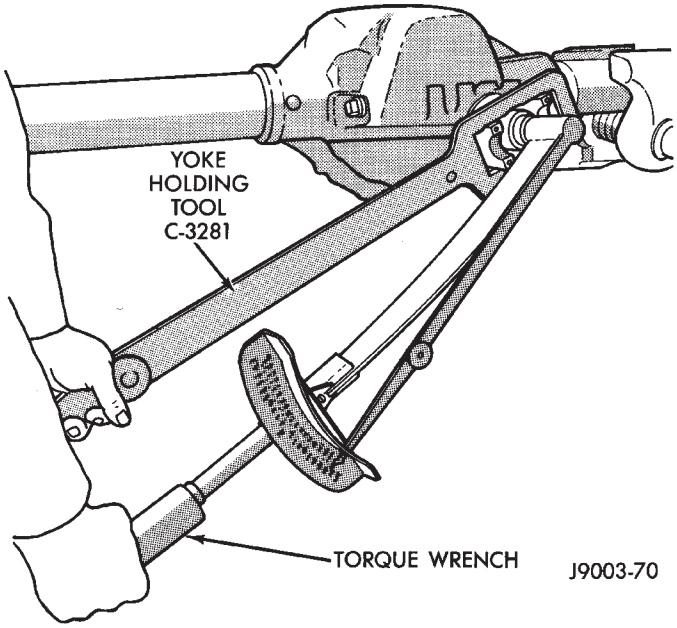


Fig. 26 Tightening Pinion Gear Nut

(22) Remove the tools from the shaft. Rotate the pinion several revolutions to seat the bearing rollers.

CAUTION: Never loosen pinion gear nut to decrease pinion gear bearing preload torque and never exceed specified preload torque. If preload torque is exceeded a new collapsible spacer must be installed. The torque sequence will have to be repeated.

(23) Measure pinion bearing preload torque by rotating pinion shaft with a Newton-meter or an inch-pound torque wrench. The correct bearing preload torque is 1 to 2 N·m (10 to 20 in. lbs.). This torque value is with replacement bearings and pinion nut tightened with a minimum of 285 N·m (210 ft. lbs.) torque (Fig. 27).

When using original pinion rear bearing and a replacement front bearing. The correct preload torque is 1 N·m (10 in. lbs.) in addition to the torque measured and recorded during disassembly.

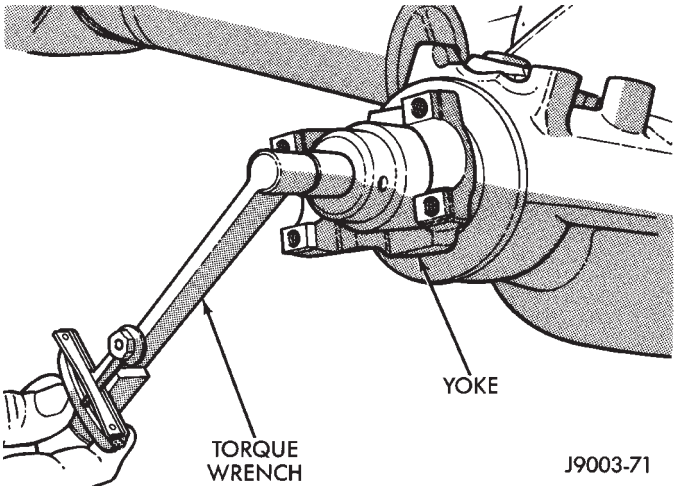


Fig. 27 Bearing Preload Torque Measurement

The bearing preload torque should be constant during a complete revolution of the pinion gear shaft. If preload torque varies during rotation of the shaft, there is an internal binding that must be corrected before final assembly.

(24) If the specified torque is not obtained, tighten the nut in small increments until the preload torque is obtained.

The differential will be unacceptable for use if the final nut torque is less than 285 N·m (210 ft. lbs.) torque. If the preload torque is not within the specified range this is also unacceptable.

DIFFERENTIAL CASE INSTALLATION

(1) Apply a coating of hypoid gear lubricant to the differential bearings, bearing cups and threaded adjusters. A dab of grease can be used to keep the adjusters in position. Carefully position the assembled differential case in the housing.

(2) Observe the reference marks and install the differential bearing caps at their original locations (Fig. 28).

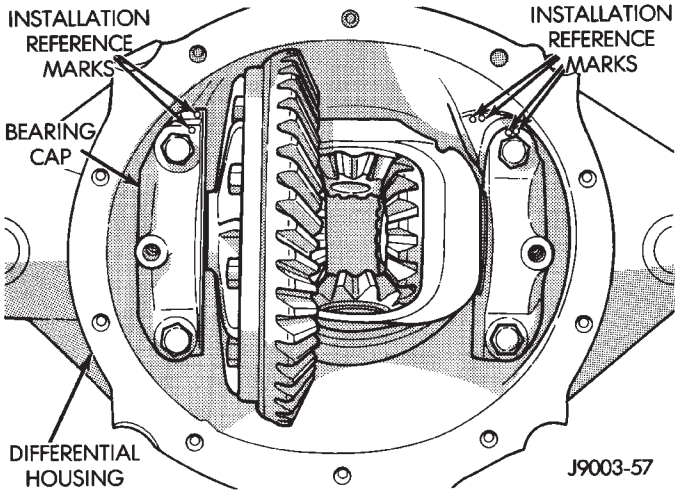


Fig. 28 Bearing Caps & Bolts

(3) Install the bearing cap bolts (Fig. 28). Tighten the upper bolts to 14 N·m (10 ft. lbs.) torque. Tighten the lower bolts finger-tight until the bolt head is lightly seated.

DIFFERENTIAL BEARING PRELOAD AND RING GEAR BACKLASH ADJUSTMENT

The following limitations must be considered when adjusting the differential:

- The maximum ring gear backlash variation is 0.003 inch (0.076 mm).
- Mark the gears so the same teeth are meshed during all backlash measurements.
- Maintain the specified threaded-adjuster torque while adjusting.
- Excessive adjuster torque will introduce a high bearing load and cause premature bearing failure. Insufficient adjuster torque can result in excessive differential case free-play and ring gear noise.
- Insufficient adjuster torque will not support the ring gear correctly and can cause excessive differential case free-play and ring gear noise.

The differential bearing cups will not always immediately follow the threaded adjusters as they are moved during adjustment. Ensure accurate bearing cup responses to the adjustments. Maintain the gear teeth engaged (meshed) as marked. The bearings must be seated by rapidly rotating the pinion gear a half turn back and forth. Do this five to ten times each time the threaded adjusters are adjusted.

(1) Use Wrench C-4164 to adjust each threaded adjuster inward (Fig. 29) until the differential bearing free-play is eliminated. Allow some ring gear backlash (approximately 0.01 inch/0.25 mm) between the

ring and pinion gear. Seat the bearing cups with the procedure described above.

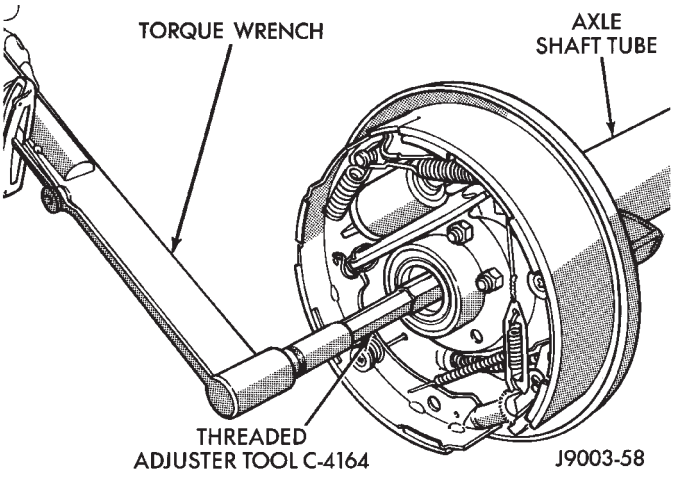


Fig. 29 Threaded Adjuster Tool

(2) Install Dial Indicator (Fig. 30). Position the plunger against the drive side of a ring gear tooth. Measure the backlash at 4 positions (90 degrees apart) around the ring gear. Locate and mark the area of minimum backlash.

(3) Rotate the ring gear to the position of the least backlash. Mark the gear so that all future backlash measurements will be taken with the same gear teeth meshed.

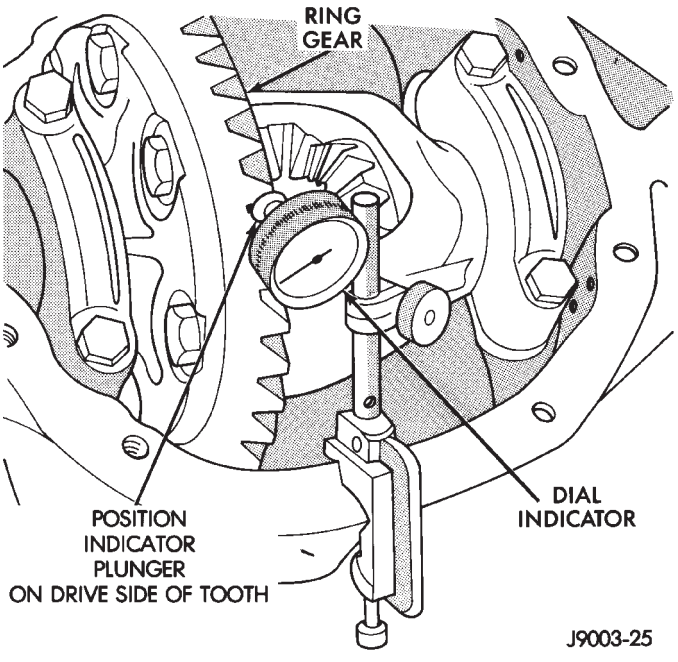


Fig. 30 Ring Gear Backlash Measurement

(4) Loosen the right-side, tighten the left-side threaded adjuster. Obtain backlash of 0.003 to 0.004 inch (0.076 to 0.102 mm) with each adjuster tightened to 14 N·m (10 ft. lbs.) torque. Seat the bearing cups with the procedure described above.

(5) Tighten the differential bearing cap bolts to 136 N·m (100 ft. lbs.) torque.

(6) Use Wrench C-4164 to tighten the right-side threaded adjuster to 95 N·m (70 ft. lbs.) torque. Seat the bearing cups with the procedure described above. Continue to tighten the right-side adjuster and seat bearing cups until the torque remains constant at 95 N·m (70 ft. lbs.)

(7) Measure the ring gear backlash. The range of backlash is 0.005 to 0.008 inch (0.127 to 0.203 mm).

Continue increasing the torque at the right-side threaded adjuster until the specified backlash is obtained.

The left-side threaded adjuster torque should have approximately 95 N·m (70 ft. lbs.) torque. If the torque is considerably less, the complete adjustment procedure must be repeated.

(8) Tighten the left-side threaded adjuster until 95 N·m (70 ft. lbs.) torque is indicated. Seat the bearing rollers with the procedure described above. Do this until the torque remains constant.

(9) Install the threaded adjuster locks . Ensure the lock finger is engaged with the adjuster hole. Tighten the lock screws to 10 N·m (90 in. lbs.) torque.

SIDE GEAR CLEARANCE MEASUREMENT AND ADJUSTMENT

When measuring side gear clearance, check each gear independently. If it necessary to replace a side gear, replace both gears as a matched set.

(1) Install the axle shafts and C-clip locks and pinion mate shaft. If necessary, refer to the installation located within this group.

(2) Measure each side gear clearance. Insert a matched pair of feeler gauge blades between the gear and differential housing on opposite sides of the hub (Fig. 31).

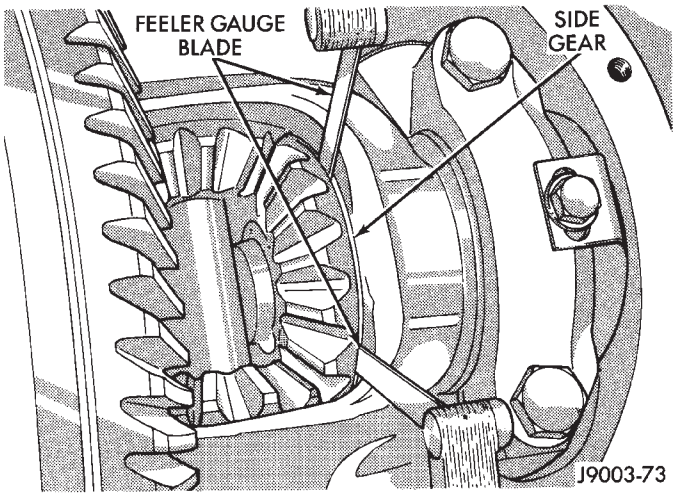


Fig. 31 Side Gear Clearance Measurement

(3) If side gear clearances is no more than 0.005 inch. Determine if the shaft is contacting the pinion

gear mate shaft. **Do not remove the feeler gauges, inspect the axle shaft with the feeler gauge inserted behind the side gear.** If the end of the axle shaft is not contacting the pinion gear mate shaft, the side gear clearance is acceptable.

(4) If clearance is more than 0.005 inch (axle shaft not contacting mate shaft), record the side gear clearance. Remove the thrust washer and measure its thickness with a micrometer. Add the washer thickness to the recorded side gear clearance. The sum of gear clearance and washer thickness will determine required thickness of replacement thrust washer (Fig. 32).

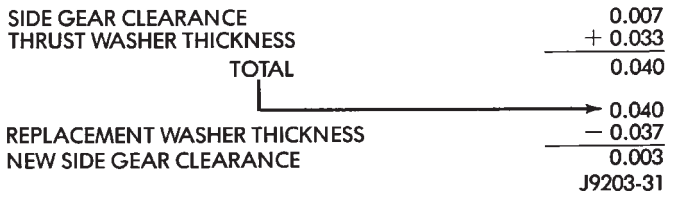


Fig. 32 Side Gear Calculations

In some cases, the end of the axle shaft will move and contact the mate shaft when the feeler gauge is inserted. The C-clip lock is preventing the side gear from sliding on the axle shaft.

(5) If there is no side gear clearance, remove the C-clip lock from the axle shaft. Use a micrometer to measure the thrust washer thickness. Record the thickness and re-install the thrust washer. Assemble the differential case without the C-clip lock installed and re-measure the side gear clearance.

(6) Compare both clearance measurements. If the difference is less than 0.012 inch (0.305 mm), add clearance recorded when the C-clip lock was installed to thrust washer thickness measured. The sum will determine the required thickness of the replacement thrust washer.

(7) If clearance is 0.012 inch (0.305 mm) or greater, both side gears must be replaced (matched set) and the clearance measurements repeated.

(8) If clearance (above) continues to be 0.012 inch (0.305 mm) or greater, the case must be replaced.

RING GEAR TEETH CONTACT PATTERN ANALYSIS

The ring gear teeth contact patterns will show if the pinion gear depth shim(s) have the correct thickness. It will also show if the ring gear backlash has been adjusted correctly. The backlash must be maintained within the specified limits until the correct teeth contact patterns are obtained.

- Excessive backlash is corrected by moving the ring gear teeth closer to the pinion gear teeth
- Insufficient backlash is corrected by moving the ring gear away from the pinion gear

(1) Apply yellow ferrous (iron) oxide compound to both sides of ring gear teeth.

(2) Rotate the ring gear one complete revolution in both directions.

(3) Note patterns in compound. Refer to (Fig. 33) for interpretation of contact patterns and adjust accordingly.

(4) Install the axle shafts. Refer to Axle Shaft Installation within this group.

(5) Install the housing cover. Refill the differential with lubricant. Refer to Axle Shaft Installation.

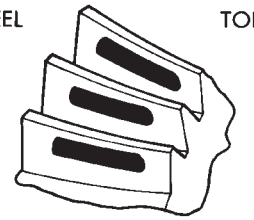
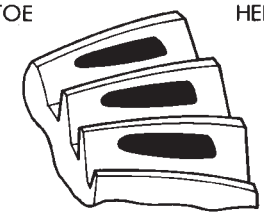
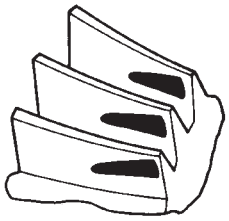
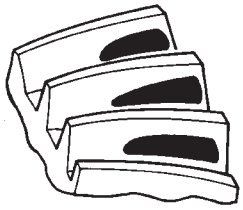
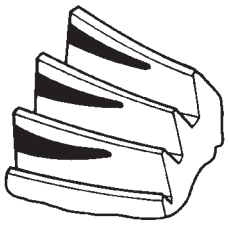
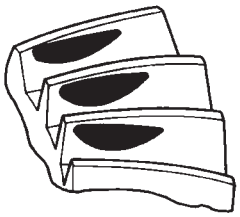
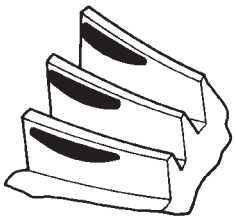
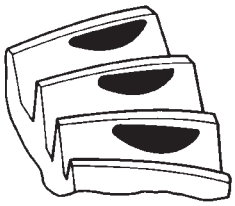
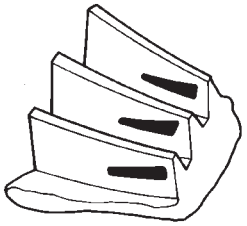
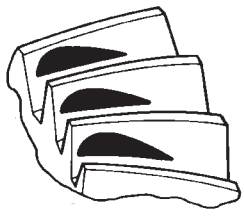
DRIVE SIDE OF RING GEAR TEETH	COAST SIDE OF RING GEAR TEETH	
HEEL TOE 	TOE HEEL 	DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT PATTERN AND TOP OF THE TOOTH.
		RING GEAR BACKLASH CORRECT. **THINNER** PINION GEAR DEPTH SHIM REQUIRED.
		RING GEAR BACKLASH CORRECT. **THICKER** PINION GEAR DEPTH SHIM REQUIRED.
		PINION GEAR DEPTH SHIM CORRECT. **DECREASE** RING GEAR BACKLASH.
		PINION GEAR DEPTH SHIM CORRECT. **INCREASE** RING GEAR BACKLASH.

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Fig. 33 Gear Teeth Contact Patterns

TRAC-LOK DIFFERENTIAL

OPERATION

In a conventional differential, the torque applied to the ring gear is transmitted to the axle shafts through the differential gears. During normal operation, the torque transmitted to each wheel is equal at all times. However, if one wheel spins, the opposite wheel will generate only as much torque as the spinning wheel.

In the Trac-Lok differential, part of the ring gear torque is transmitted through clutch packs. The clutch packs contain multiple disc. The clutch will have radial grooves on the plates, and concentric grooves on the discs or bonded fiber material which is smooth.

In operation, the Trac-Lok clutches are engaged by two concurrent forces. The first being preload force exerted through Belleville spring washers. The second is from separating forces generated by the side gears (Fig. 1).

The Trac-Lok design provides the normal differential action needed for turning corners. It also provides for the transmission of equal torque to both wheels when driving straight ahead. When one wheel loses traction, the clutch packs transfer torque to the wheel having the most traction. Trac-lok differentials resist wheel spin on bumpy roads. It also provides more pulling power when one wheel loses traction. Pulling power is continuous until both wheels lose traction. If both wheels slip due to unequal traction, Trac-Lok operation is normal. In extreme cases of differences of traction, the wheel with the least traction may spin. This occurs after the Trac-Lok has transferred as much torque as possible to the non-spinning wheel.

NOISE DIAGNOSIS

If chatter occurs when turning corners, the most probable cause is incorrect or contaminated lubricant. Before removing the Trac-Lok unit for repair, drain, flush and refill the axle with the specified lubricant. Refer to Lubricant change in this Group.

A container of Trac-Lok Lubricant (friction modifier) should be added after.

Vehicles with a limited slip differential should be road tested by making 10 to 12 slow figure-eight turns. This maneuver will pump the lubricant through the clutch discs.

Refer to Group 0, Lubrication and Maintenance for additional information.

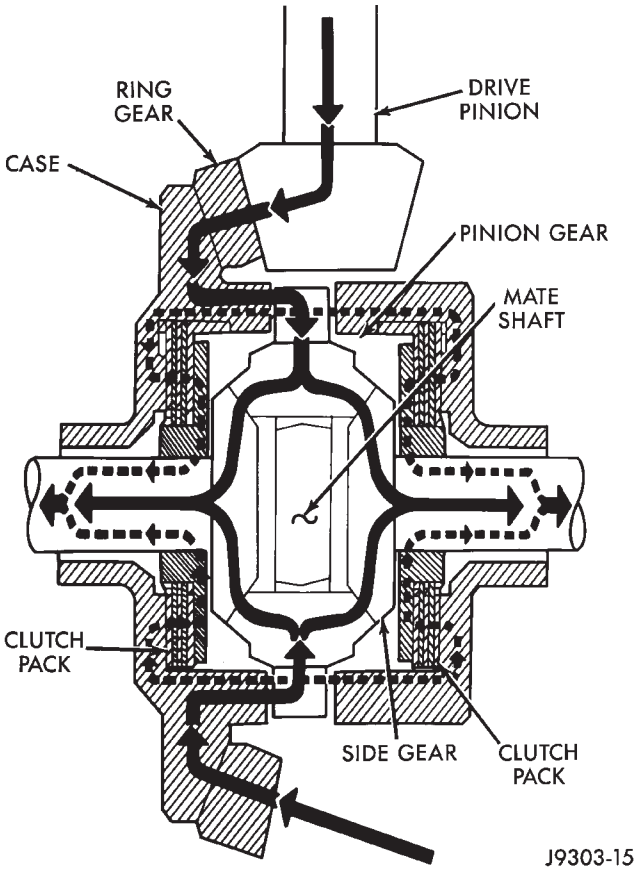

Fig. 1 Limited Slip Differential Operation—Both Wheels Driving

DIFFERENTIAL TEST

WARNING: WHEN SERVICING VEHICLES WITH A LIMITED SLIP DIFFERENTIAL DO NOT USE THE ENGINE TO TURN THE AXLE AND WHEELS. BOTH REAR WHEELS MUST BE RAISED AND THE VEHICLE SUPPORTED. A LIMITED SLIP AXLE CAN EXERT ENOUGH FORCE (IF ONE WHEEL IS IN CONTACT WITH THE SURFACE) TO CAUSE THE VEHICLE TO MOVE.

The differential can be tested without removing the differential case by measuring rotating torque. Make sure brakes are not dragging during this measurement.

(1) Engine off, transmission in neutral, and parking brake off.

(2) Place blocks in front and rear of both front wheels.

(3) Jack up one rear wheel until it is completely off the ground.

(4) Remove wheel and bolt special tool to studs.

(5) Use torque wrench on Special Tool 6790 to rotate wheel and read rotating torque (Fig. 2).

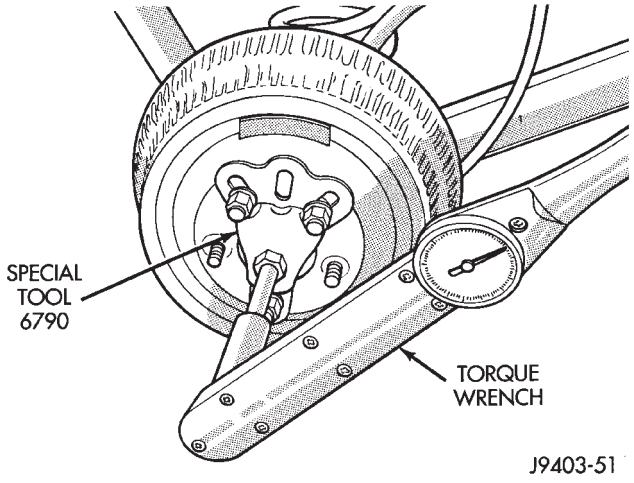

Fig. 2 Trac-Loc Test

(6) If rotating torque is less than 22 N·m (30 ft. lbs.) or more than 271 N·m (200 ft. lbs.) on either wheel the unit should be service.

DIFFERENTIAL OVERHAUL

The Trac-Lok differential components are illustrated in (Fig. 3). Refer to this illustration during repair service.

DISASSEMBLY

Service to the Trac-Lok differential requires the use of Tool Set C-4487 (J-23781). Refer to Model 35 Axle section in this Group for Differential Removal and Installation.

(1) Clamp one axle shaft in a vise equipped with soft jaws (Fig. 4).

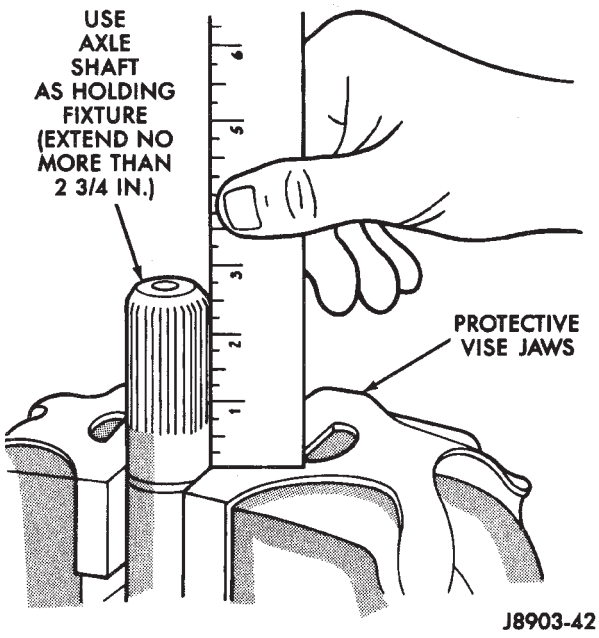

Fig. 4 Axle Shaft As Holding Fixture

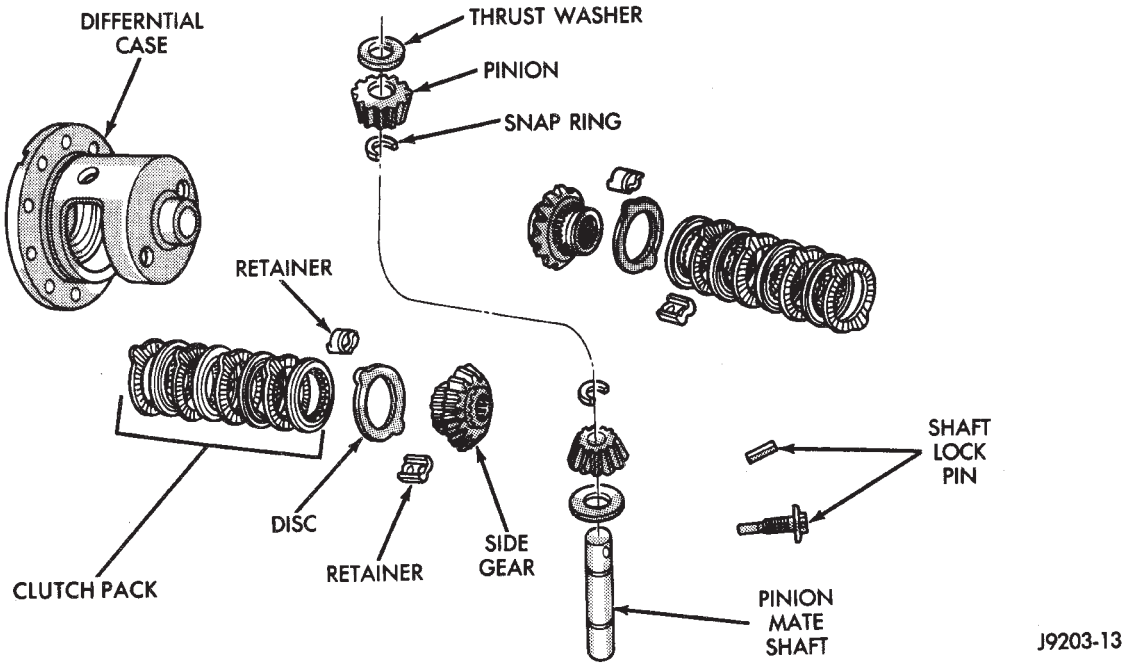

Fig. 3 Trac-Lok Differential Components

(2) Position the differential case on the axle shaft (Fig. 5). Place shop towels under the differential to avoid damage during removal of the ring gear (Fig. 5).

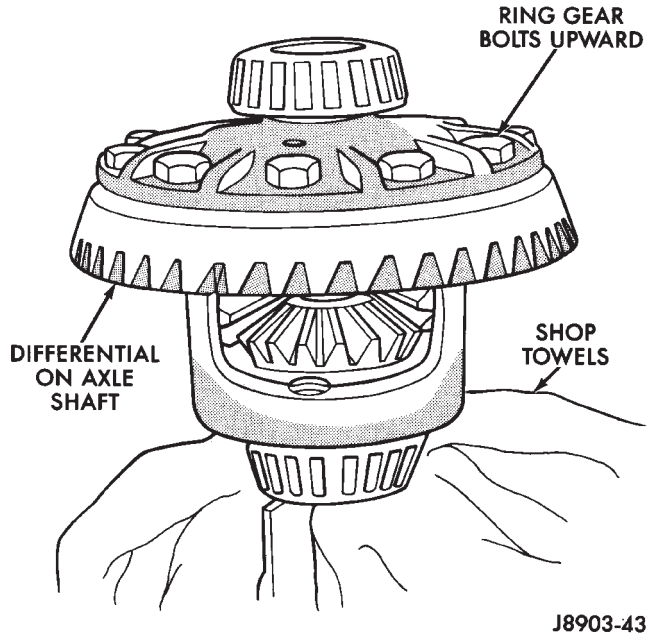

Fig. 5 Differential Case On Shaft

(3) Remove and discard the ring gear bolts. Tap the ring gear with a rawhide or plastic mallet and remove (Fig. 6).

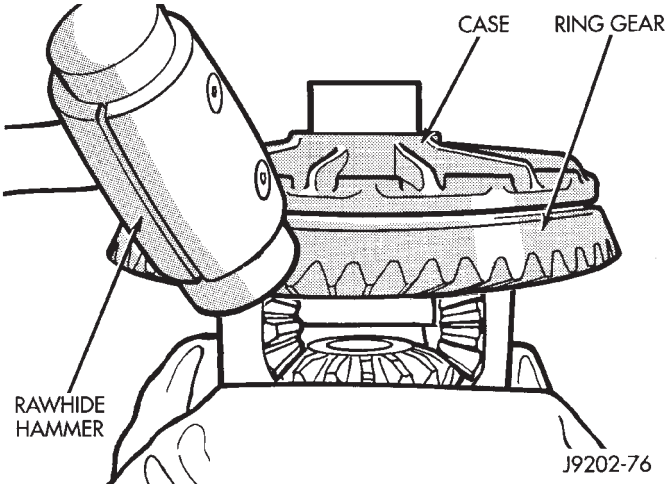

Fig. 6 Ring Gear Removal

(4) Remove the pinion gear mate shaft lock screw (Fig. 7).

(5) Remove the pinion gear mate shaft with a drift and hammer (Fig. 8).

(6) Install and lubricate Step Plate C-4487-1 (Fig. 9).

(7) Assemble Threaded Adapter C-4487-3 into top side gear. Thread forcing Screw C-4487-2 into adapter until it becomes centered in adapter plate.

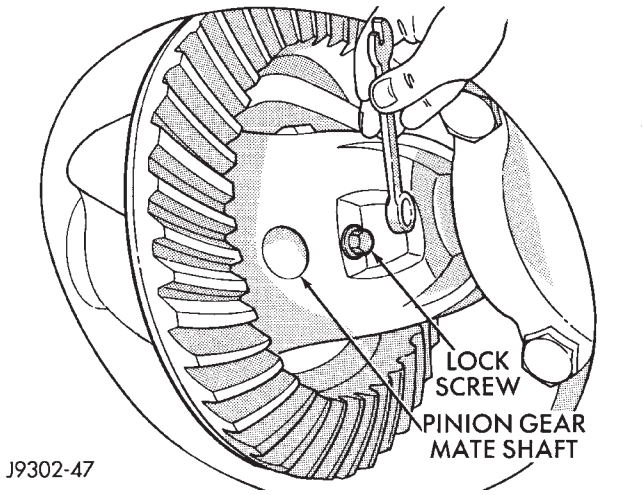

Fig. 7 Mate Shaft Lock Screw

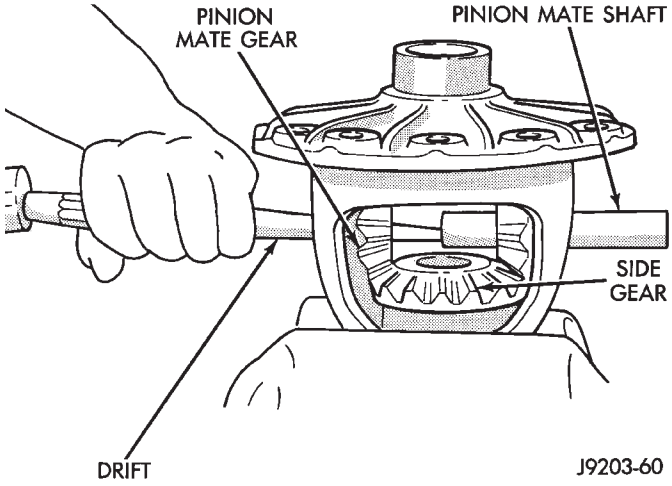

Fig. 8 Mate Shaft Removal

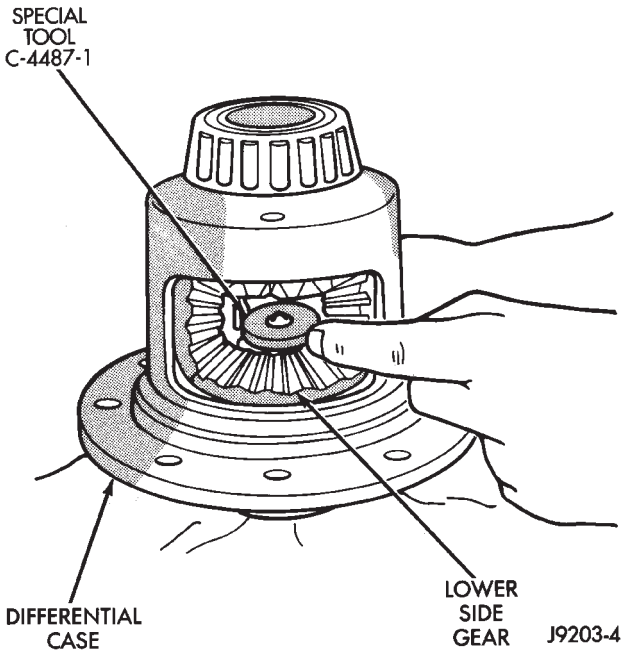

Fig. 9 Step Plate Tool Installation

(8) Position a small screw driver in slot of Threaded Adapter C-4487-3 (Fig. 10 to prevent adapter from turning.

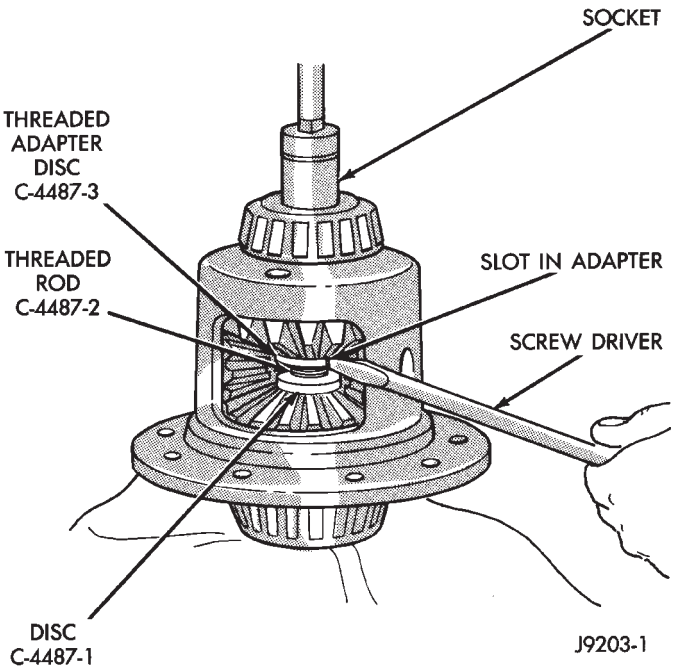

Fig. 10 Threaded Adapter Installation

(9) Tighten forcing screw tool enough to relieve clutch pack tension. Remove both pinion thrust washers (Fig. 11).

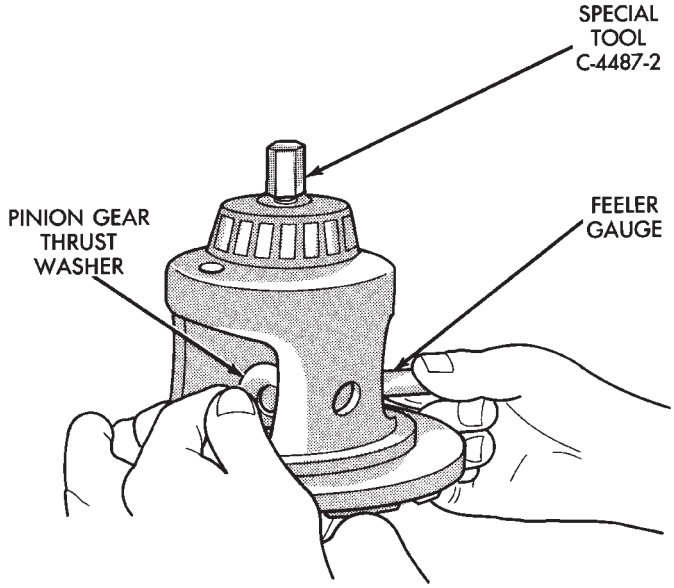

Fig. 11 Remove Pinion Thrust Washer

(10) Loosen the forcing screw tool until the clutch pack tension is relieved.

(11) Insert Turning Bar C-4487-4 in case. Rotate case with tool until pinion gears can be removed (Fig. 12).

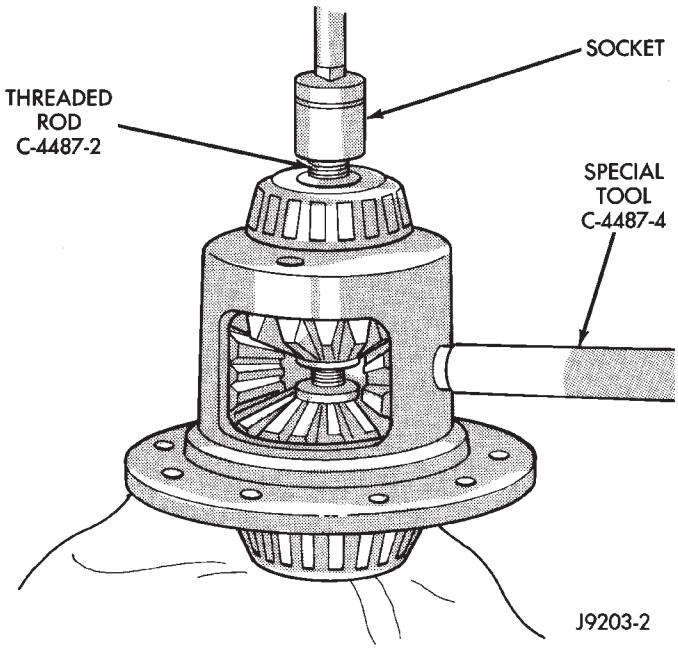

Fig. 12 Pinion Gear Removal

(12) Remove top side gear and clutch pack. Keep plates in correct order during removal (Fig. 13).

(13) Remove case from fixture. Remove remaining clutch pack.

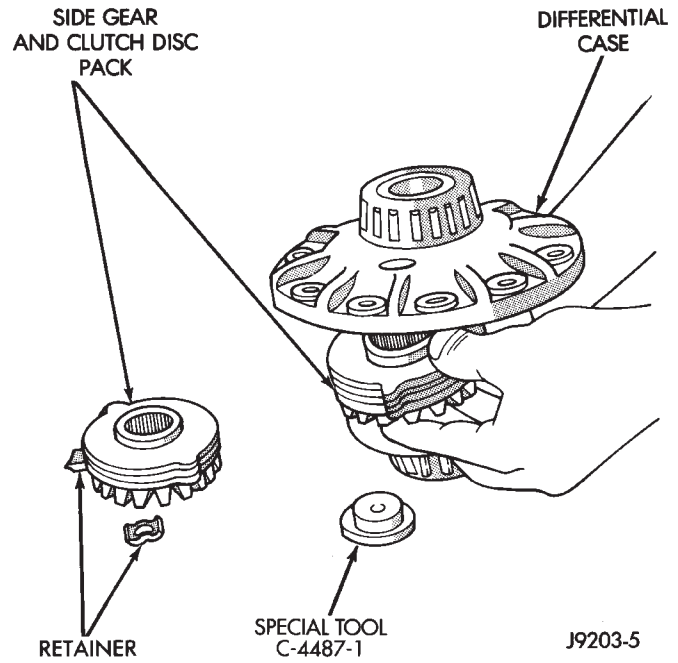

Fig. 13 Side Gear & Clutch Disc Removal

(14) Remove clutch pack retaining clips. Mark each clutch pack for installation reference.

CLEANING AND INSPECTION

(1) Clean all components in cleaning solvent. Dry components with compressed air.

(2) Inspect clutch pack plates for wear, scoring or damage. Replace both clutch packs if any one component in either pack is damaged.

(3) Inspect side and pinion gears. Replace any gear that is worn, cracked, chipped or damaged.

(4) Inspect differential case and pinion shaft. Replace if worn or damaged.

PRESOAK PLATES AND DISC

Plates and dics with fiber coating (no groves or lines) must be presoaked in Friction Modifier before assembly. Soak plates and discs for a minimum of 20 minutes. Add remaining Friction Modifier to differential after assembly.

ASSEMBLY

(1) The clutch discs are replaceable as complete sets only. If one clutch disc pack is damaged, both packs must be replaced. Lubricate each component with gear lubricant before assembly and installation.

(2) Assemble the clutch discs into packs and secure disc packs with retaining clips (Fig. 14).

(3) Position assembled clutch disc packs on the side gear hubs.

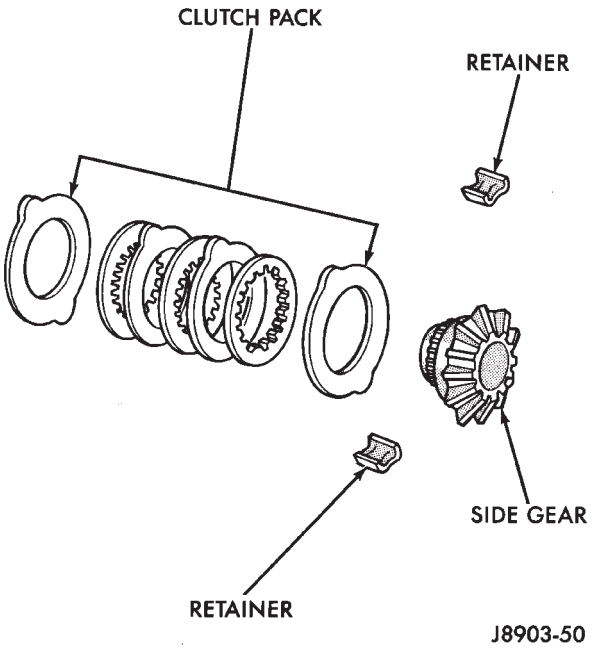

Fig. 14 Clutch Disc Pack

(4) Position case on axle fixture.

(5) Install clutch pack and side gear in lower bore (Fig. 15). Be sure clutch pack retaining clips remain in position and are seated in the case pockets.

(6) Install lubricated Step Plate C-4487-1 on first clutch pack (Fig. 16).

(7) Install the upper side gear and clutch disc pack (Fig. 16).

(8) Hold assembly in position. Insert Threaded Adapter C-4487-3 into top side gear, insert forcing Screw C-4487-2.

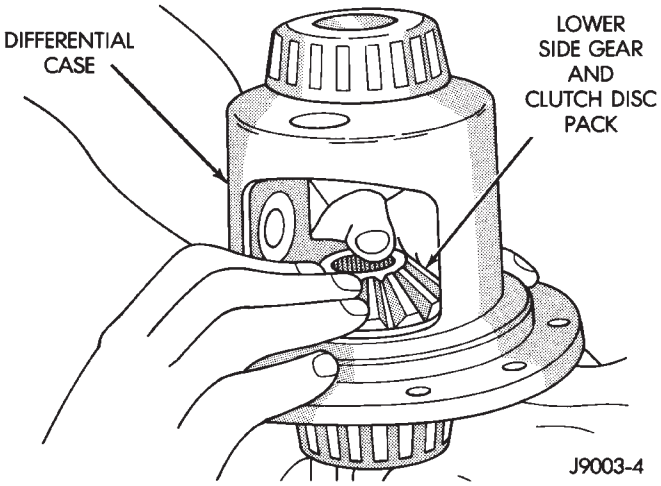

Fig. 15 Clutch Discs & Lower Side Gear Installation

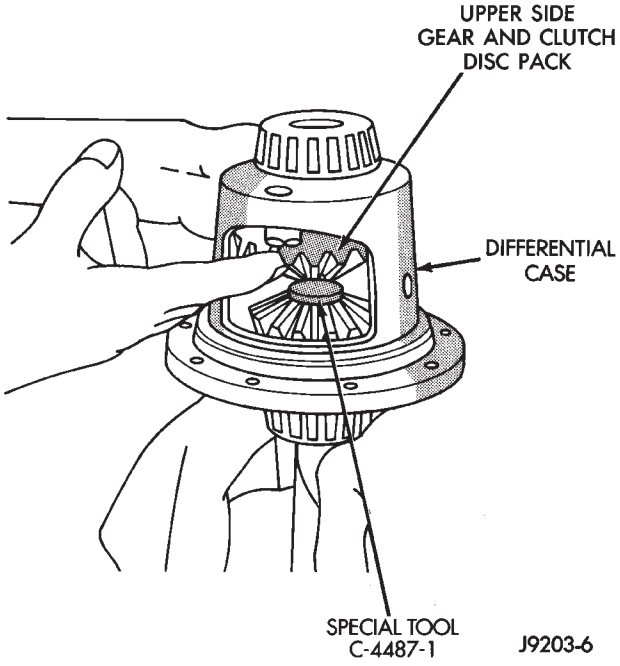

Fig. 16 Upper Side Gear & Clutch Disc Pack Installation

(9) Tighten forcing screw tool to compress clutch discs.

(10) Install pinion gears. Rotate case with Turning Bar C-4487-4. Make sure holes of pinion mate gears are aligned with case.

(11) Tighten forcing screw to compress the Belleville plates. Lubricate and install pinion gear thrust washers with a small screw driver.

(12) Install pinion gear mate shaft (align holes in shaft and case).

(13) Install the pinion mate shaft lock screw finger tight.

If replacement gears and thrust washers were installed, it is not necessary to measure the gear backlash. Correct fit is due to close machining tolerances during manufacture.

(14) Invert the differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.

(15) Install new ring gear bolts and alternately tighten to 95-122 N·m (70-90 ft. lbs.) torque (Fig. 17).

(17) Lubricate all differential components with hypoid gear lubricant.

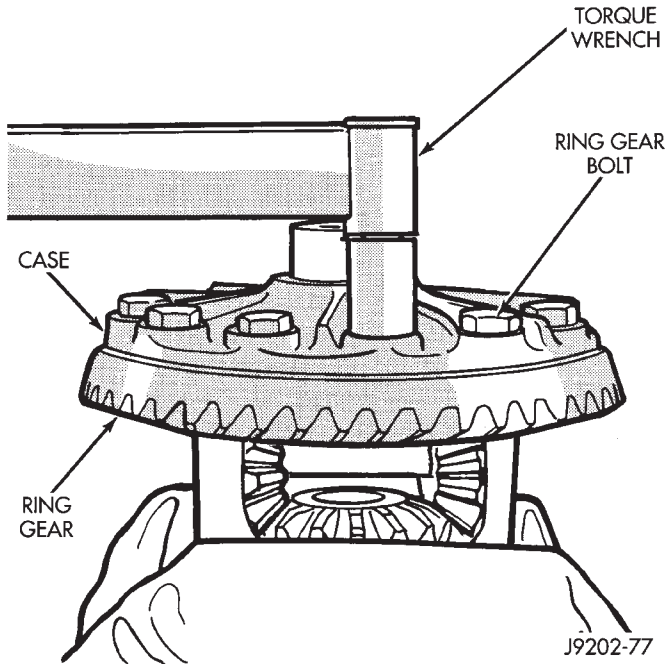

Fig. 17 Ring Gear Bolt Installation

AXLE SPECIFICATIONS

MODEL 35 AXLE

Axle Type.....Semi-Floating Hypoid
Lubricant.....SAE Thermally Stable 80W-90
Lubricant Trailer Tow.....Synthetic 75W-140
Lube Capacity.....1.66 L (3.50 pts.)
Axle Ratio.....3.07, 3.55, 3.73, 4.10
Differential
Bearing Preload.....0.1 mm (0.004 in.)
Side Gear Clearance.....0-0.15 mm (0-0.006 in.)
Ring Gear
Diameter.....19.2 cm (7.562 in.)
Backlash.....0-0.15 mm (0.005-0.008 in.)
Pinion Std. Depth.....96.8 mm (3.813 in.)
Pinion Bearing Preload
Original Bearing.....1-2N·m (10-20 in. lbs.)
New Bearing.....1.5-4N·m (15-35 in. lbs.)

8 1/4 AXLE

Axle Type.....Semi-floating, hypoid
Lubricant.....SAE 75W-90
Lube Capacity.....2.08 L (4.4 pts.)
Axle Ratios.....3.07 3.55 4.10
Differential
Side Gear Clearance.....0.12 mm (0.005 in.)
Case Flange Runout.....0.07 mm (0.003 in.)
Bearing Preload.....95 N·m (70 ft. lbs.)
Ring Gear
Diameter.....20.95 cm (8.25 in.)
Backlash.....0.12-0.20 mm (0.005-0.008 in.)
Runout.....0.127 mm (0.005 in.)
Pinion Bearing
Preload.....1-2 N·m (10-20 in.lbs.)

TORQUE SPECIFICATIONS

XJ REAR SUSPENSION COMPONENTS

DESCRIPTION.....TORQUE
Shock Absorber
Upper Bolt.....23 N·m (17 ft. lbs.)
Lower Nut.....62 N·m (46 ft. lbs.)
Stabilizer Bar
Clamp Bolt.....54 N·m (40 ft. lbs.)
Link Upper Bolt.....12 N·m (9 ft. lbs.)
Link Lower Nut.....74 N·m (55 ft. lbs.)
Spring
U-Bolt Nut.....70 N·m (52 ft. lbs.)
Front Pivot Bolt.....148 N·m (109 ft. lbs.)
Upper Shackle Bolt.....148 N·m (109 ft. lbs.)
Lower Shackle Bolt.....108 N·m (80 ft. lbs.)

YJ REAR SUSPENSION COMPONENTS

DESCRIPTION.....TORQUE
Shock Absorber
Upper Nut.....61 N·m (45 ft. lbs.)
Lower Nut.....61 N·m (45 ft. lbs.)
Track Bar
Frame Bracket Nut.....142 N·m (105 ft. lbs.)
Axle Bracket Nut.....142 N·m (105 ft. lbs.)
Spring
U-Bolt Nut.....122 N·m (90 ft. lbs.)
Rear Shackle Bolts.....136 N·m (100 ft. lbs.)
Front Pivot Bolt.....142 N·m (105 ft. lbs.)

MODEL 35 AXLE

DESCRIPTION.....TORQUE
Fill Hole Plug.....34 N·m (25 ft. lbs.)
Diff. Cover Bolt.....41 N·m (30 ft. lbs.)
Bearing Cap Bolt.....77 N·m (57 ft. lbs.)
Pinion Nut.....292-427 N·m (215-315 ft. lbs.)
Ring Gear Bolt.....95-122 N·m (70-90 ft. lbs.)
RWAL/ABS Sensor Bolt.....24 N·m (18. ft. lbs.)

8 1/4 AXLE

DESCRIPTION.....TORQUE
Diff. Cover Bolt.....47 N·m (35 ft. lbs.)
Bearing Cap Bolt.....95 N·m (70 ft. lbs.)
Pinion Nut.....285 N·m (210 ft. lbs.)
Ring Gear Bolt.....95 N·m (70 ft. lbs.)
RWAL/ABS Sensor Bolt.....24 N·m (18. ft. lbs.)