REAR SUSPENSION AND AXLES

CONTENTS

GENERAL INFORMATION

REAR SUSPENSION

The Grand Cherokee rear suspension is link/coil design comprised of (Fig. 1);

- Drive axle
- Coil springs
- Upper and lower suspension arms
- Dual-action shock absorbers
- Track bar
- Stabilizer bar
- Jounce bumpers (used to limit the travel of the suspension)

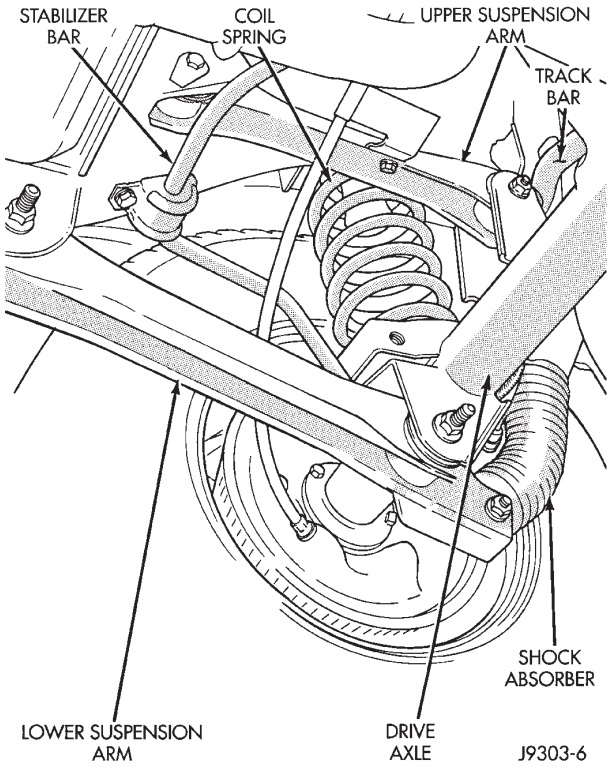

Fig. 1 Rear Suspension

The upper and lower suspension arms use bushings to isolate road noise. The suspension arms are bolted to the frame and axle through the rubber bushings. The upper suspension arm uses cam bolts at the axle to allow for pinion angle adjustment. The cams are available as a service kit and are not installed at the factory. The suspension arm travel (jounce or rebound) is limited through the use rubber bumpers.

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

The vehicles use coil springs mounted up in the fender shield that is part of the unitized body bracket. There is a rubber doughnut isolator between the top of the spring and bracket to isolate road noise. The bottom of the spring seats on the axle pad and is retained with a clip.

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

The stabilizer bar is used to minimize vehicle rear sway during turns. The spring steel bar helps to equalize the vehicle body in relationship to the suspension. 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 rubber bushings.

The track bar is used to minimize rear axle side-to-side movement. The track bar is attached to the frame rail bracket with a ball stud and isolated with a bushing at the axle bracket.

REAR AXLE

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

The axles are equipped with A.B.S. brake systems. The A.B.S. tone rings are pressed onto the axle shaft

near the hub flange. For additional information on the A.B.S. system refer to Group 5, Brakes.

The Model 35 axle has the assembly part number and gear ratio listed on a tag. The tag is attached to the housing cover (Fig. 2). Build date identification codes are stamped on the axle shaft tube cover side.

The Model 35 axle is available with Trac-lok (limited slip) differential as an option.

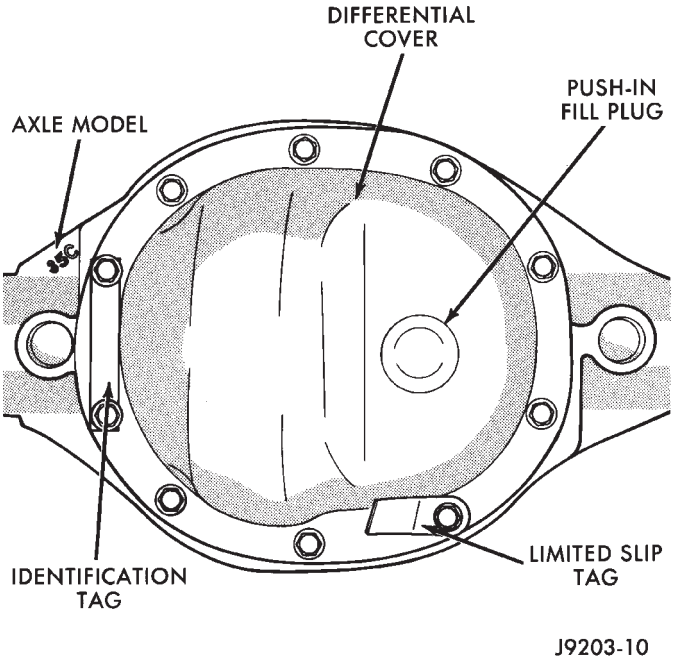

Fig. 2 Model 35 Differential Cover

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:

- Pinion gear rotates the ring gear
- Ring gear (bolted to the differential case) rotates the case
- Differential pinion gears (mounted on the pinion mate shaft in the case) rotate the side gears
- 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

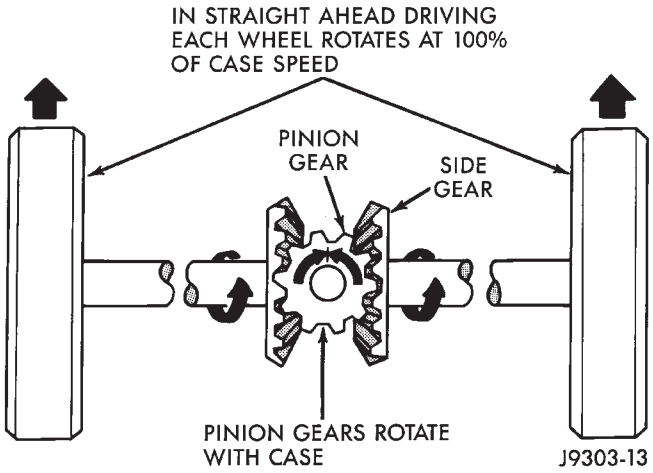

Fig. 3 Differential Operation—Straight-Ahead Driving

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).

When turning corners, the outside wheel must travel a greater distance than the inside wheel in order to complete a turn. This difference must be compensated for in order to prevent the wheels from scuffing and skidding through the turn. To accomplish this, the differential becomes effective allowing 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.

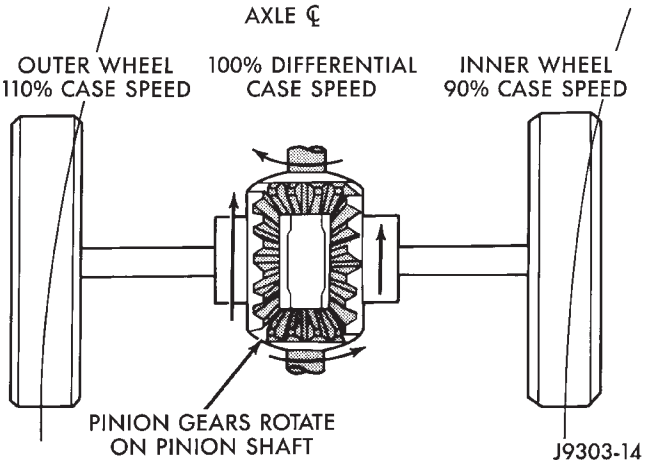

Fig. 4 Differential Operation—On Turns

REAR SUSPENSION

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SERVICE INFORMATION

CAUTION: All suspension components that use rubber bushings should be tightened with the vehicle at the normal height. Have the springs supporting the weight of vehicle when fasteners are torqued. If the springs are not at their normal ride position, vehicle ride comfort could be affected. Rubber bushings must never be lubricated.

TRACK BAR

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the bolt and nut from the frame rail bracket (Fig. 1).

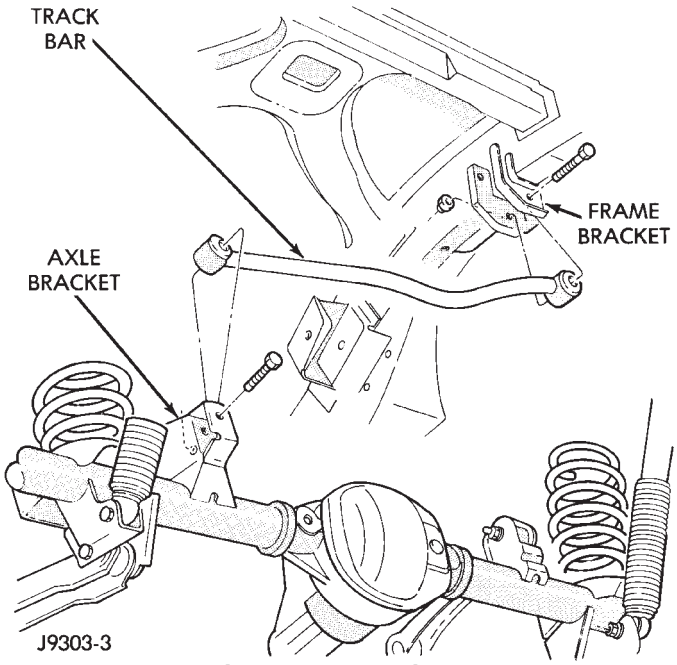

Fig. 1 Rear Track Bar

(3) Remove the bolt from the axle tube bracket (Fig. 1). Remove the track bar.

INSTALLATION

(1) Install the track bar to the axle bracket and install the bolt (Fig. 1).

(2) It may be necessary to pry the axle assembly over to install the track bar. Install the track bar to the frame rail bracket. Loosely install the bolt and flag nut (Fig. 1).

(3) Remove the supports and lower the vehicle.

(4) Tighten the bolt at the axle shaft tube bracket to 100 N●m (74 ft. lbs.) torque.

(5) Tighten the nut at the frame rail to 100 N●m (74 ft. lbs.) torque.

STABILIZER BAR

REMOVAL

(1) Raise and support the vehicle. Remove one wheel and tire.

(2) Disconnect the stabilizer bar links from the axle brackets (Fig. 2).

(3) Lower the exhaust by disconnecting the muffler and tail pipe hangers.

(4) Disconnect the stabilizer bar from the links.

(5) Disconnect the stabilizer bar clamps from the frame rails. Remove the stabilizer bar.

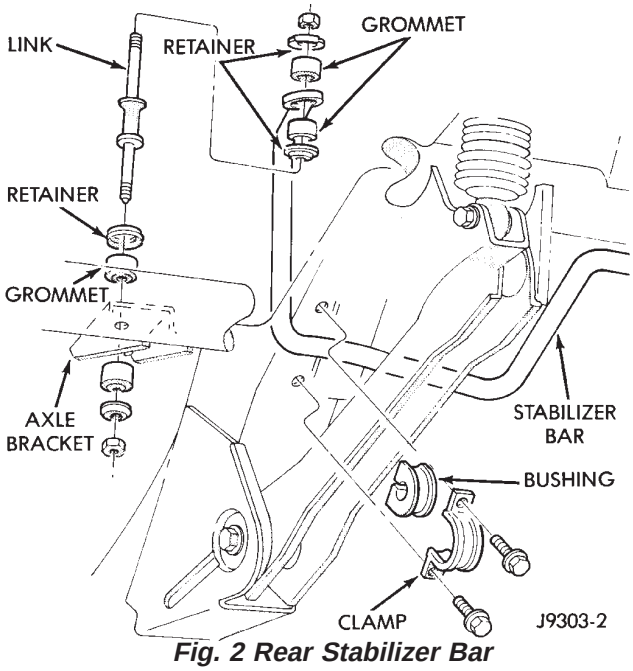

Fig. 2 Rear Stabilizer Bar

INSTALLATION

(1) Position the stabilizer bar on the frame rail and install the clamps and bolts. Ensure the bar is centered with equal spacing on both sides. Tighten the bolts to 54 N●m (40 ft. lbs.).

(2) Install the links and grommets onto the stabilizer bar and axle brackets (Fig. 2). Install the nuts and tighten to 36 N●m (27 ft. lbs.) torque.

(3) Connect the muffler and tail pipe to their hangers.

(4) Install the wheel and tire.

UPPER SUSPENSION ARM

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the upper suspension arm nut and bolt at the axle bracket (Fig. 3). Remove the ABS wire bracket from the arm.

(3) Remove the nut and bolt (Fig. 3) at the frame rail and remove the upper suspension arm.

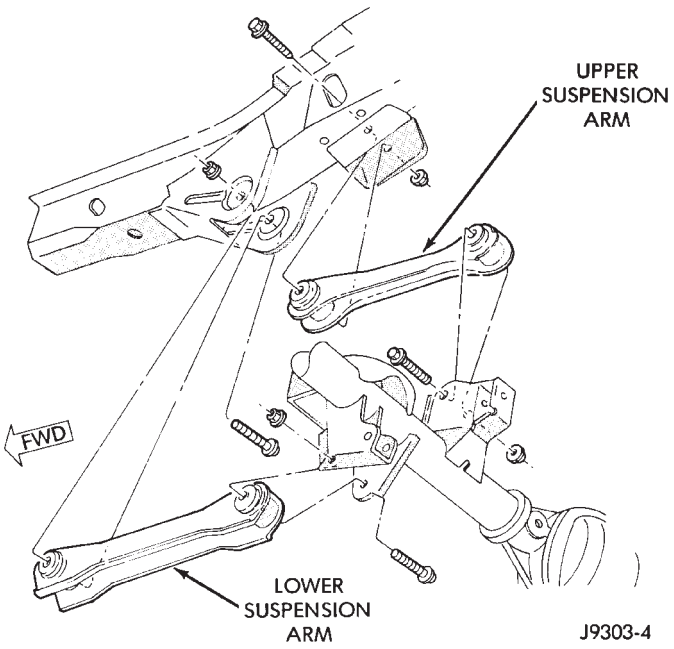

Fig. 3 Upper and Lower Suspension Arms

INSTALLATION

(1) Position the upper suspension arm at the axle and frame rail (Fig. 3).

(2) Install the bolts and finger tighten the nuts (Fig. 3). Install the ABS wire bracket onto the arm.

(3) Remove the supports and lower the vehicle.

(4) Tighten the nut at the axle bracket to 75 N●m (55 ft. lbs.) torque.

(5) Tighten the nut at the frame rail to 75 N●m (55 ft. lbs.) torque.

LOWER SUSPENSION ARM

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the lower suspension arm nut and bolt at the axle bracket (Fig. 3).

(3) Remove the nut and bolt (Fig. 3) at the frame rail and remove the lower suspension arm.

INSTALLATION

(1) Position the lower suspension arm at the axle bracket and frame rail bracket (Fig. 3).

(2) Install the bolts and finger tighten the nuts (Fig. 3).

(3) Remove the supports and lower the vehicle.

(4) Tighten the nut at the axle bracket to 177 N●m (130 ft. lbs.) torque.

(5) Tighten the bolt at the frame rail to 177 N●m (130 ft. lbs.) torque.

SPRING AND SHOCK DIAGNOSIS

A squeak noise from the shock absorber can be produced if movement between the rubber bushings and the metal occurs. This noise can usually be stopped by tightening the attaching nuts. If the squeak noise persists, inspect for damaged and worn bushings, and attaching components. Repair as necessary if any of these conditions exist.

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.

SHOCK ABSORBER

REMOVAL

(1) Remove the upper nut and retainer from the frame rail stud (Fig. 4).

(2) Remove the lower nuts and bolts from the axle bracket. Remove the shock absorber.

INSTALLATION

(1) Install the shock absorber on the upper frame rail stud. Install the shock absorber on the axle bracket (Fig. 4).

(2) Install the retainer and nut on the stud. Tighten the upper nut to 70 N●m (52 ft. lbs.) torque.

(3) Tighten the lower nut to 92 N●m (68 ft. lbs.) torque.

COIL SPRING

REMOVAL

(1) Raise and support the vehicle. Position a hydraulic jack under the axle to support it.

(2) Disconnect the stabilizer bar link and shock absorber from the axle bracket.

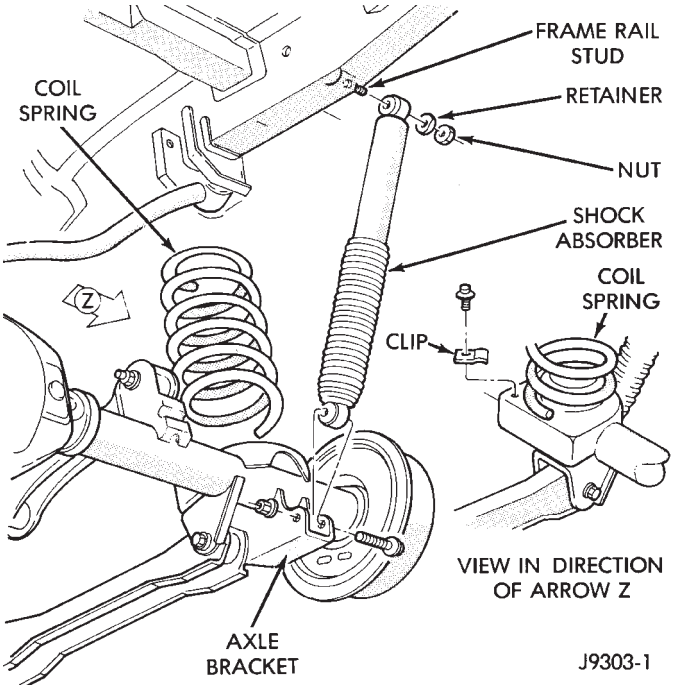

Fig. 4 Rear Coil Spring & Shock Absorber

(3) Disconnect the track bar from the frame rail bracket.

(4) Lower the axle until the spring is free from the upper mount seat. Remove the coil spring clip screw (Fig. 4) and remove the spring.

INSTALLATION

(1) Position the coil spring on the axle pad. Install the spring clip and screw (Fig. 4). Tighten the screw to 22 N●m (16 ft. lbs.) torque.

(2) Raise the axle into position until the spring seats in the upper mount.

(3) Connect the stabilizer bar links and shock absorbers to the axle bracket. Connect the track bar to the frame rail bracket.

(4) 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

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)
- 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

Common causes of overloading is from full-throttle acceleration. Overloading happens when towing heavier-than-recommended loads. Component breakage can occur when the wheels are spun excessively. Insufficient or incorrect lubricants contribute to breakage through overheating. 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.

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 differential side gear-to-case 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 problem condition, 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.
- With **Sure-Grip** differentials add a container of MOPAR® Hypoid Gear Additive.

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 Cause	Correction
WHEEL NOISE	(a) Wheel loose.	(a) Tighten loose nuts.
	(b) Faulty, brinelled wheel bearing.	(b) Faulty or brinelled bearings must be replaced.
AXLE SHAFT NOISE	(a) Misaligned axle shaft tube.	(a) Inspect axle shaft tube alignment. Correct as necessary.
	(b) Bent or sprung axle shaft.	(b) Replace bent or sprung axle shaft.
	(c) End play in drive pinion bearings.	(c) Refer to Drive Pinion Bearing Pre-Load Adjustment.
	(d) Excessive gear backlash between ring gear and pinion gear.	(d) Check adjustment of ring gear backlash and pinion gear. Correct as necessary.
	(e) Improper adjustment of drive pinion gear shaft bearings.	(e) Adjust drive pinion shaft bearings.
	(f) Loose drive pinion gearshaft yoke nut.	(f) Tighten drive pinion gearshaft yoke nut with specified torque.
	(g) Improper wheel bearing adjustment.	(g) Readjust as necessary.
	(h) Scuffed gear tooth contact surfaces.	(h) If necessary, replace scuffed gears.
AXLE SHAFT BROKE	(a) Misaligned axle shaft tube.	(a) Replace broken axle shaft after correcting axle shaft tube alignment.
	(b) Vehicle overloaded.	(b) Replace broken axle shaft. Avoid excessive weight on vehicle.
	(c) Erratic clutch operation	(c) Replace broken axle shaft after inspecting for other possible causes. Avoid erratic use of clutch.
	(d) Grabbing clutch.	(d) Replace broken axle shaft. Inspect clutch and make necessary repairs or adjustments.
DIFFERENTIAL CASE CRACKED	(a) Improper adjustment of differential bearings.	(a) Replace cracked case; examine gears and bearings for possible damage. At reassembly, adjust differential bearings properly.
	(b) Excessive ring gear backlash.	(b) Replace cracked case; examine gears and bearings for possible damage. At reassembly, adjust ring gear backlash properly.
	(c) Vehicle overloaded.	(c) Replace cracked case; examine gears and bearings for possible damage. Avoid excessive weight on vehicle.
	(d) Erratic clutch operation.	(d) Replace cracked case. After inspecting for other possible causes, examine gears and bearings for possible damage. Avoid erratic use of clutch.
DIFFERENTIAL GEARS SCORED	(a) Insufficient lubrication.	(a) 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.
	(b) Improper grade of lubricant.	(b) Replace scored gears. Inspect all gears and bearings for possible damage. Clean and refill differential housing to required capacity with proper lubricant.
	(c) Excessive spinning of one wheel/tire.	(c) Replace scored gears. Inspect all gears, pinion bores and shaft for damage. Service as necessary.
LOSS OF LUBRICANT	(a) Lubricant level too high.	(a) Drain excess lubricant by removing fill plug and allow lubricant to level at lower edge of fill plug hole.

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SERVICE DIAGNOSIS (CONT'D)

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

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MODEL 35 AXLE

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GENERAL INFORMATION

The housing for Model 35 rear axles consists of an iron center casting with 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 fitting for a vent hose used 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 axles are equipped with ABS brake sensors. The sensors are attached to the brake backing plate assemblies and tone rings are pressed on the axle shaft. Use care when removing axle shafts as NOT to damage the tone wheel or the sensor.

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

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. The shims are located between the differential bearing cups. Pinion bearing preload is set and maintained by the use of a collapsible spacer.

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.

- The lubricant for the standard Model 35 axle is SAE 90W gear lubricant.
- Lubricant for Model 35 axle with Trailer Tow and Trac-Lok: SAE 75W-140 SYNTHETIC gear lubricant with friction modifier.
- The lubricant quantity is 40±1 fluid oz..

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

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

DRIVE AXLE ASSEMBLY REPLACEMENT

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the wheels and tires. Remove the brake components from the axle, refer to Group 5, Brakes.

(3) Disconnect the vent hose from the axle shaft tube.

(4) Mark the front propeller shaft and pinion yokes for installation alignment reference. Disconnect the propeller shaft from the axle.

(5) Disconnect the following components from the axle:

- Stabilizer bar link
- Rear propeller shaft
- Shock absorbers
- ABS brake sensor
- Track bar at the axle bracket

(6) Position a floor jack under the axle.

(7) Remove the upper and lower suspension arm from the axle bracket.

(8) Lower the axle with the jack.

INSTALLATION

Have the springs supporting the weight of the vehicle when the arms and track bar fasteners

are being torqued. If the springs are not at their normal ride position, vehicle ride comfort could be affected.

(1) Raise the axle with a floor jack and align it with the coil springs.

(2) Position the lower suspension arm at the axle bracket.

(3) Install the upper and lower suspension arms.

(4) Install the bolts and tighten the nuts on the suspension arms;

- Lower: 177 N•m (130 ft. lbs.) torque.
- Upper: 75 N•m (55 ft. lbs.) torque.

(5) Install the following components to the axle:

- Track bar bolt — 100 N•m (74 ft. lbs.) torque
- Shock absorber nut — 60 N•m (44 ft. lbs.) torque
- Stabilizer bar link nut — 36 N•m (27 ft. lbs.) torque
- ABS brake sensor
- Axle vent hose
- Propeller shaft — 19 N•m (14 ft. lbs.) torque

(6) Install the brake components, refer to Group 5, Brakes.

(7) Install the wheels and tires.

(8) Check and add gear lubricant if needed.

(9) 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. 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 in a criss-cross pattern to 47 N•m (35 ft. lbs.) torque.

(8) Refill the differential with MOPAR® Hypoid Gear Lubricant within 13 mm (1/2 in.) below the fill plug hole.

Trac-Lok (limited slip) 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.

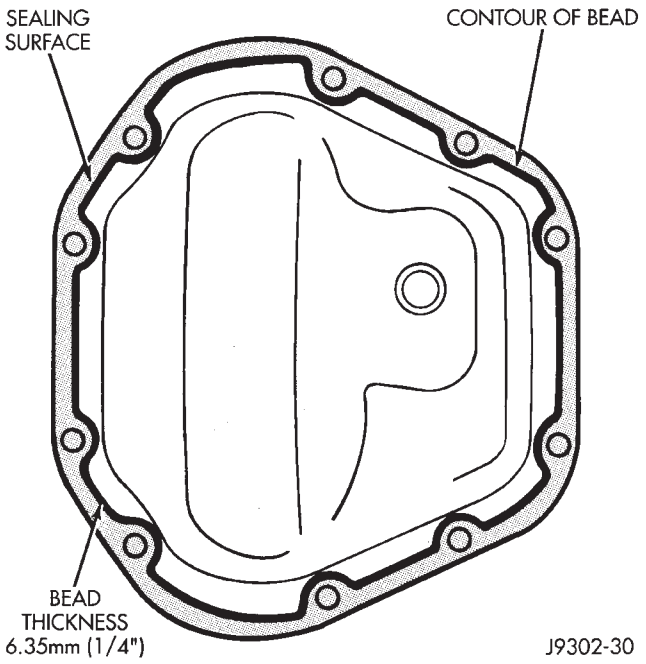

Fig. 1 Typical Housing Cover With Sealant

PINION SHAFT SEAL REPLACEMENT

REMOVAL

(1) Raise and support the vehicle.

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

(3) Remove the drive shaft from the yoke.

(4) Rotate the pinion gear three or four times.

(5) 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.**

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

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

(8) Use Remover W-251 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 W-147-E 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.**

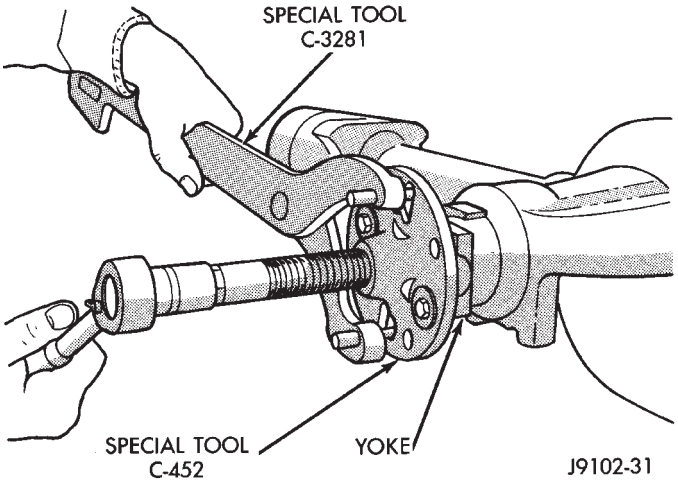

Fig. 2 Pinion Yoke Removal

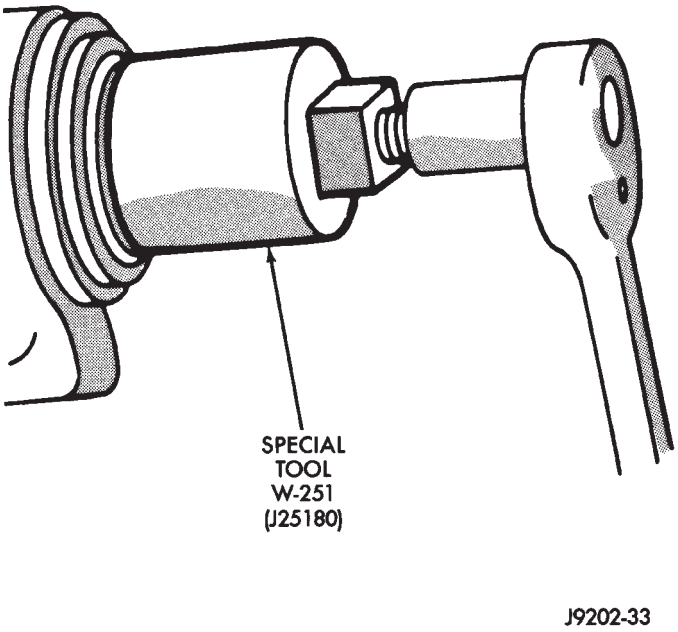

Fig. 3 Seal Removal

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 pinion 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 is equal to the amount at removal plus 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.

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

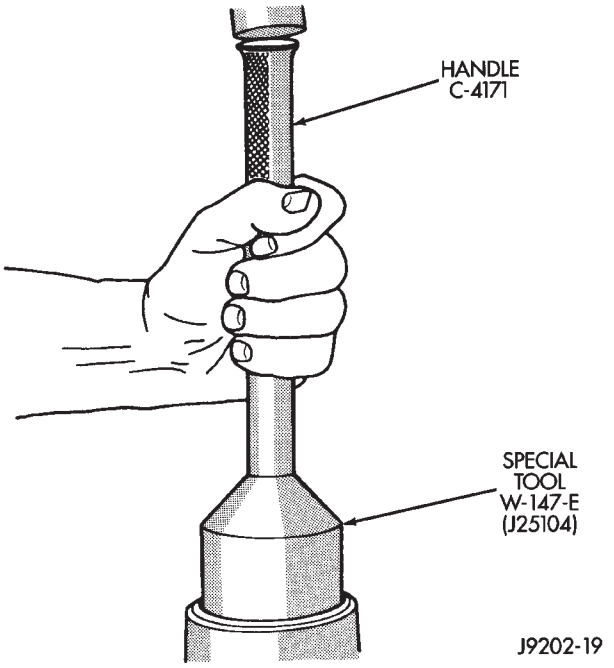

Fig. 4 Pinion Seal Installation

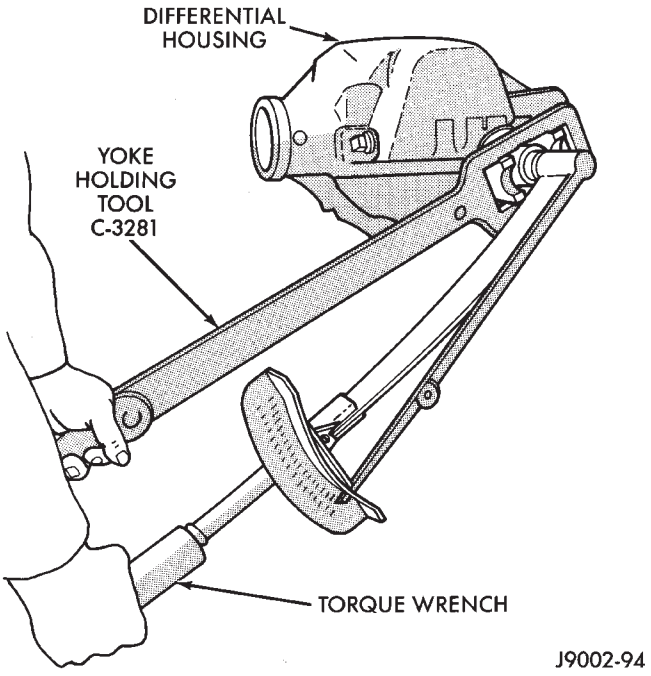

Fig. 5 Tightening Pinion Shaft Nut

(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) Lower the vehicle.

AXLE SHAFT

REMOVAL

(1) Raise and support the vehicle.
(2) Remove the wheels and tires.
(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).

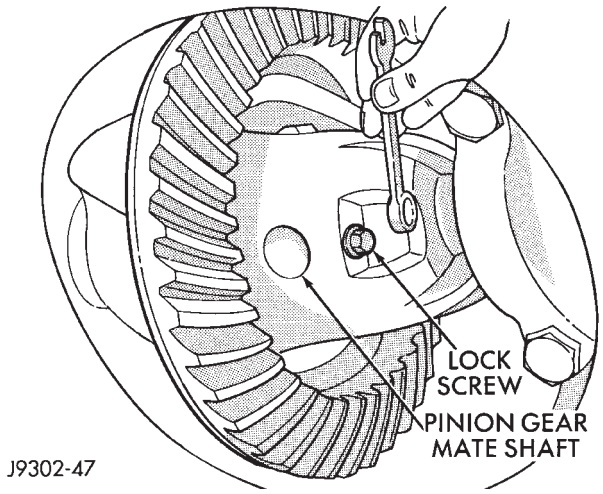

Fig. 6 Mate Shaft Lock Screw

(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).

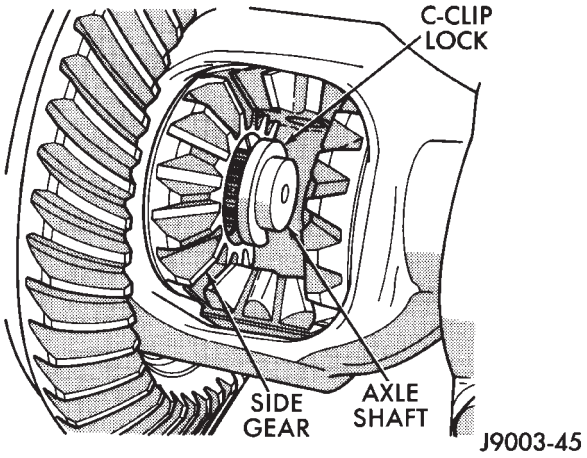

Fig. 7 Axle Shaft C-Clip Lock

(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 roller bearing contact surface on the axle shaft for signs of brinelling, spalling and pitting.
(10) If any of these conditions exist, the axle shaft and bearing 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 Section.
(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).
(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.

DIFFERENTIAL REMOVAL

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

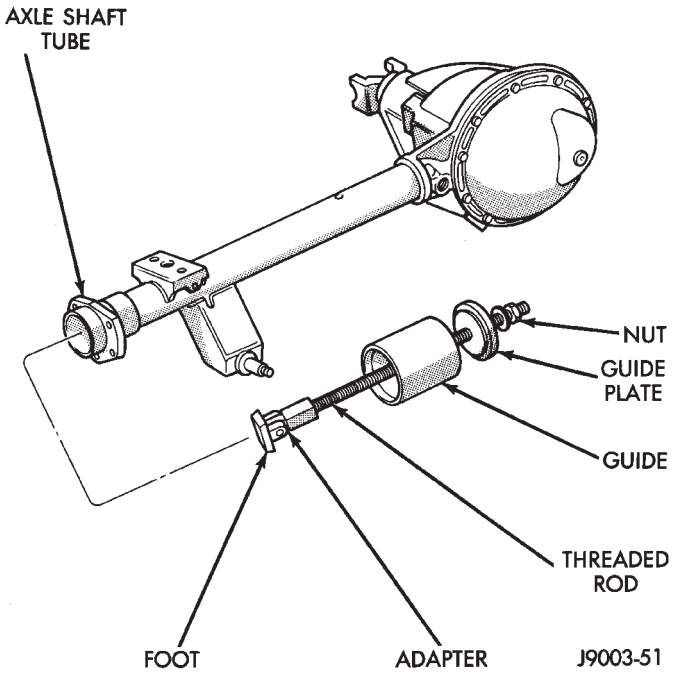

Fig. 8 Axle Shaft Bearing Removal Tool

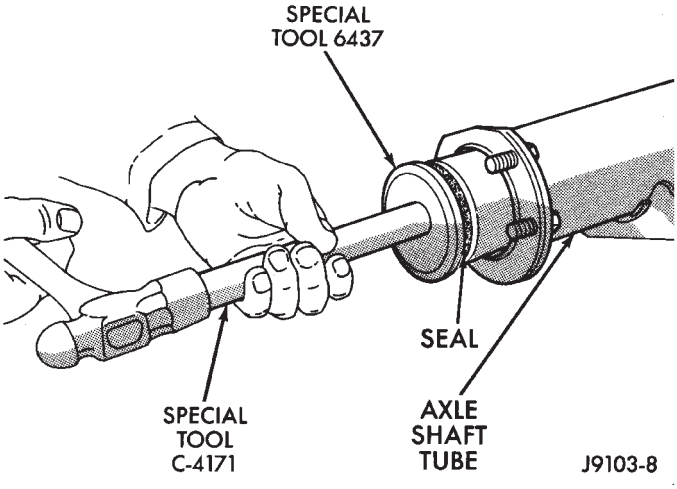

Fig. 9 Axle Shaft Seal Installation

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

(2) Remove the differential bearing caps.

(3) Position Spreader W-129-A 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.

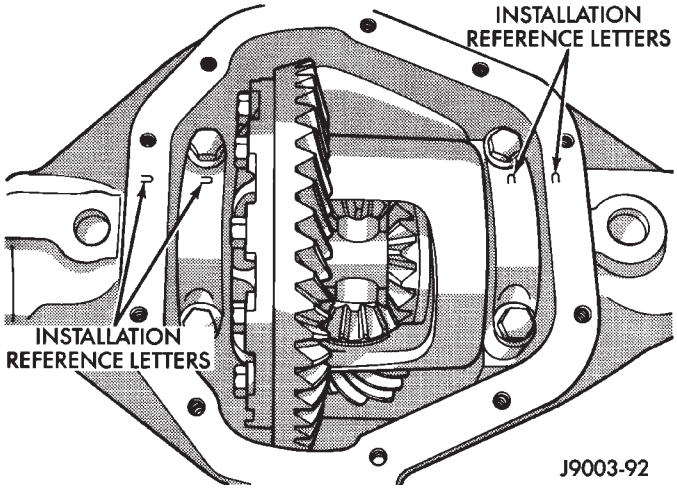

Fig. 10 Bearing Cap Identification

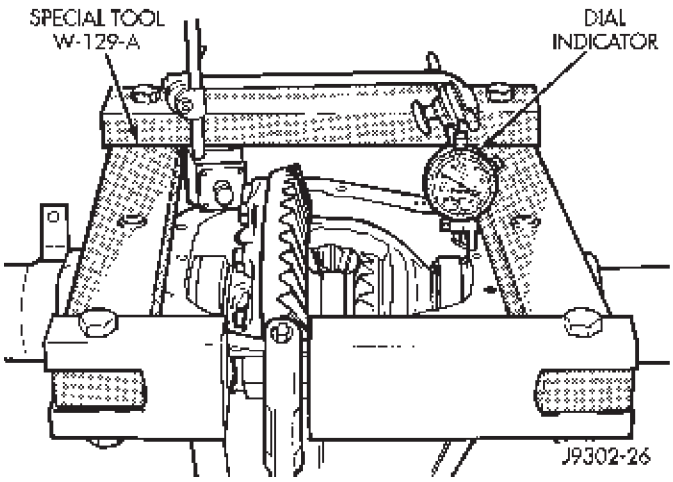

Fig. 11 Spread Differential Housing

(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).

(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.

(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 mallet and remove (Fig. 14).

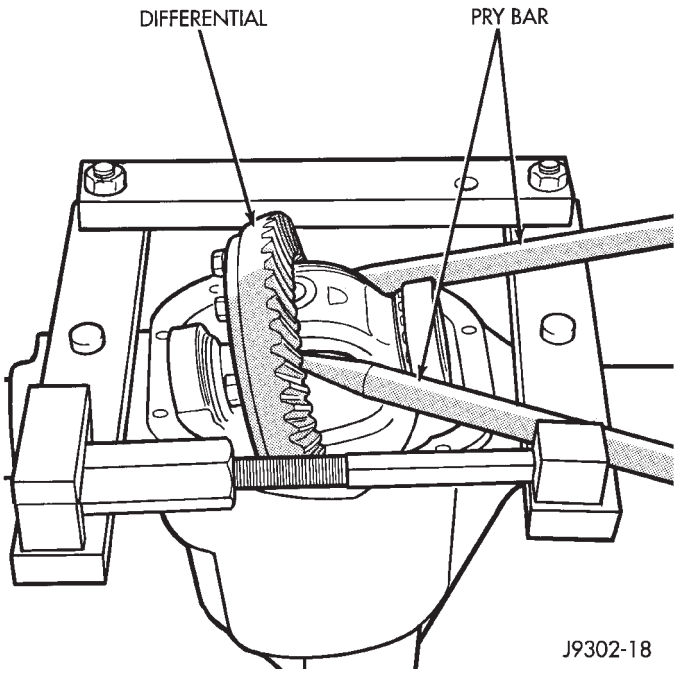

Fig. 12 Differential Removal

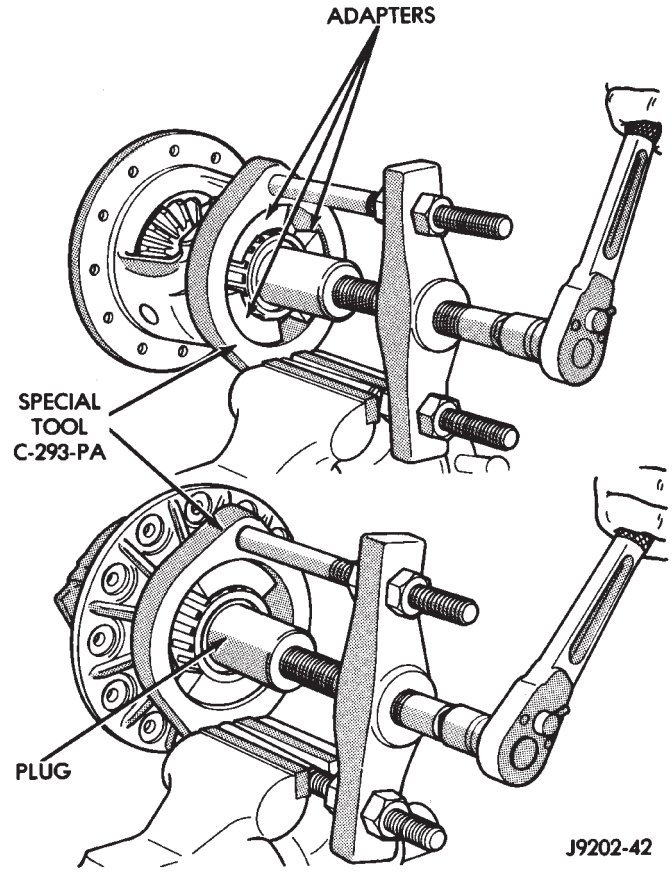

Fig. 13 Differential Bearing Removal

(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.

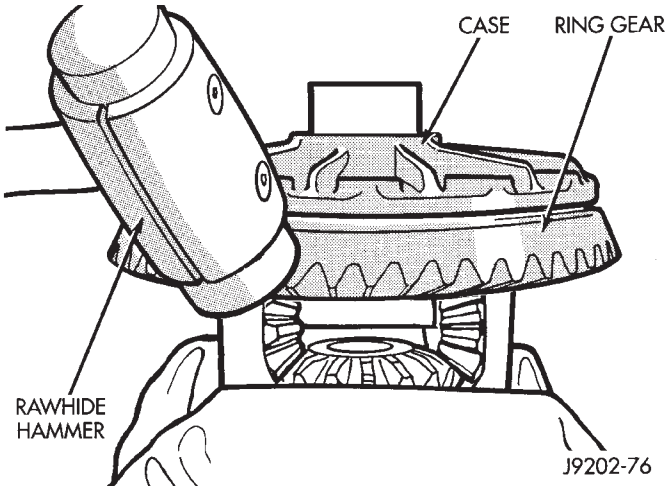

Fig. 14 Ring Gear Removal

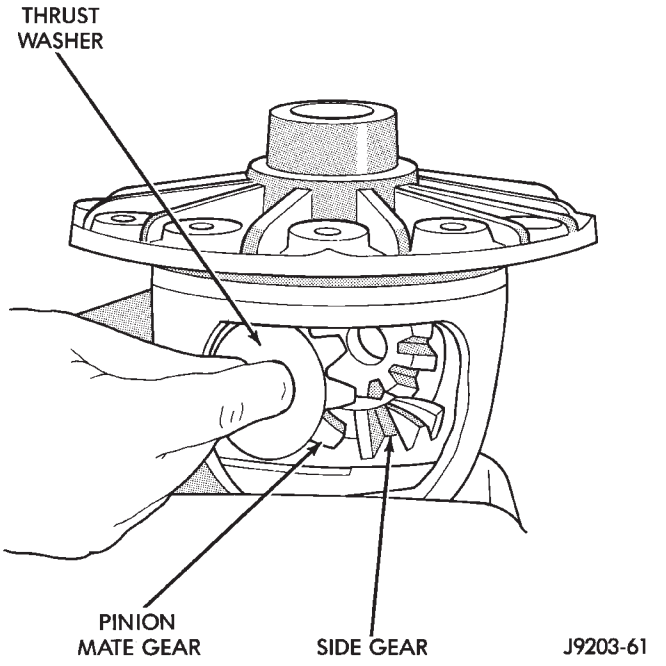

Fig. 15 Pinion Mate Gear Removal

(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).

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

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

(4) Remove the collapsible preload spacer (Fig. 18).

(5) Remove oil slinger, front bearing.

(6) Remove the front pinion bearing cup with Remover D-147 and Handle C-4171 (Fig. 19).

(7) Remove the rear bearing cup from housing (Fig. 20). Use Remover D-148 and Handle C-4171.

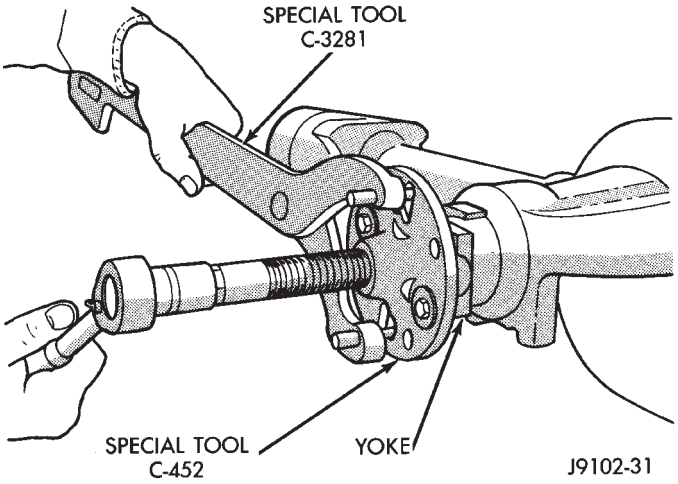

Fig. 16 Pinion Yoke Removal

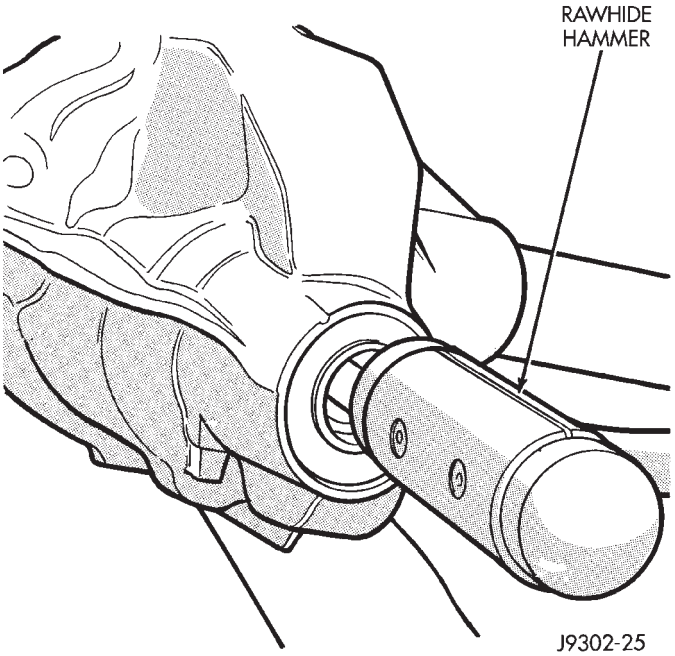

Fig. 17 Remove Pinion Gear

(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.

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, do not dry with compressed air. **Cup and bearing must be replaced as a matched sets only.**

Clean the axle shaft tubes with a stiff wire or a clean cloth.

Inspect for;

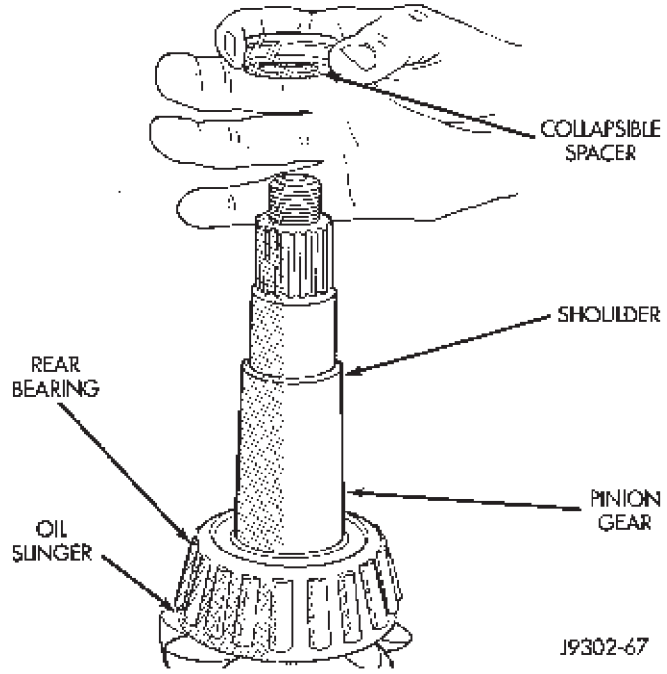

Fig. 18 Collapsible Spacer

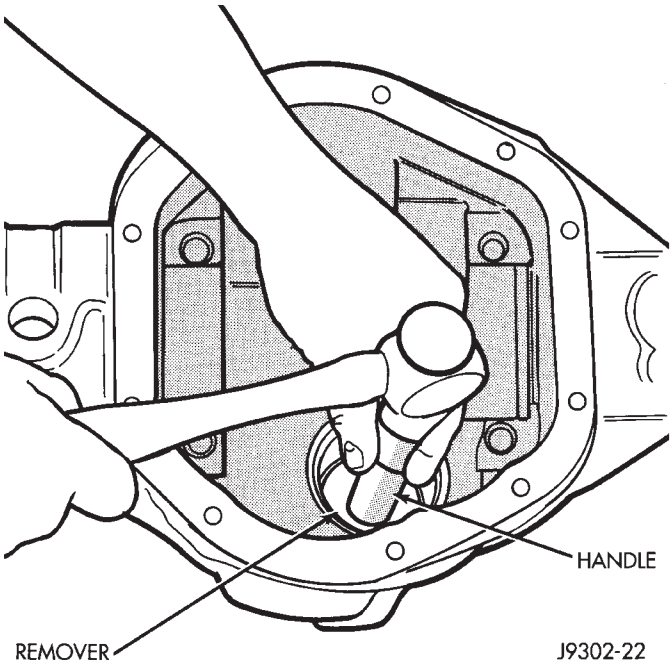

Fig. 19 Front Bearing Cup Removal

- 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.

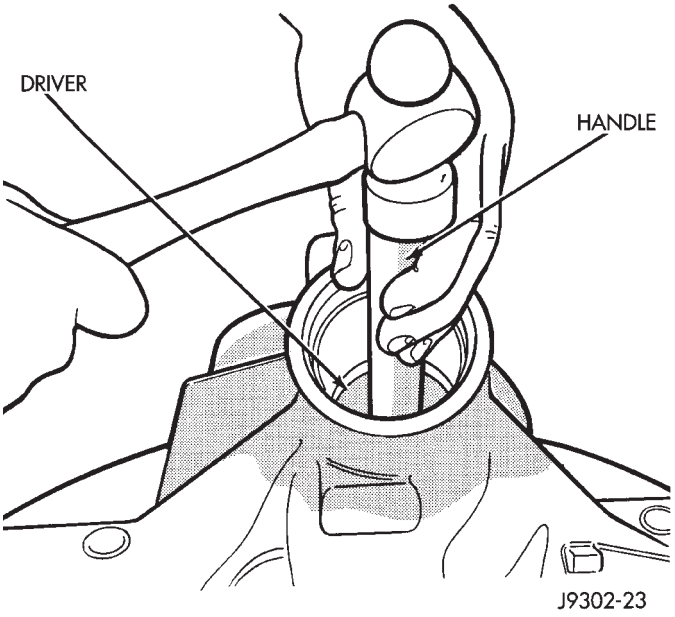

Fig. 20 Rear Bearing Cup Removal

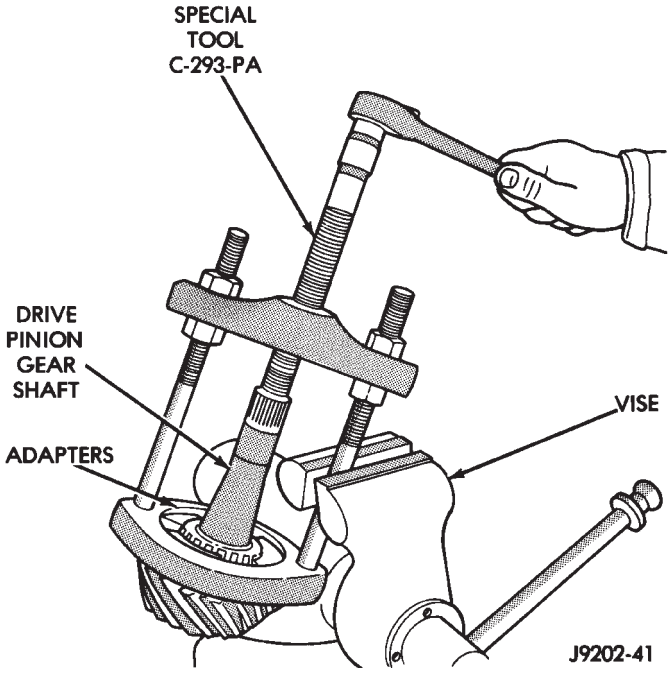

Fig. 21 Inner Bearing Removal

- 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

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 2.095 inches (53.21 mm) for Model 35 axles. The standard depth provides the best teeth contact pattern.

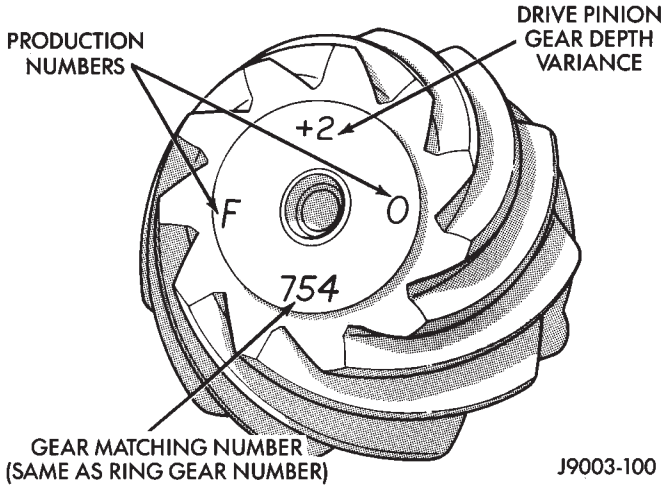

Fig. 22 Pinion Gear ID Numbers

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).

Compensation for depth variance is achieved by shims placed adjacent to the pinion gear rear bearing cup (Fig. 24).

If a new gear set is being installed, note the depth variance etched into both pinion gears. 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.

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.

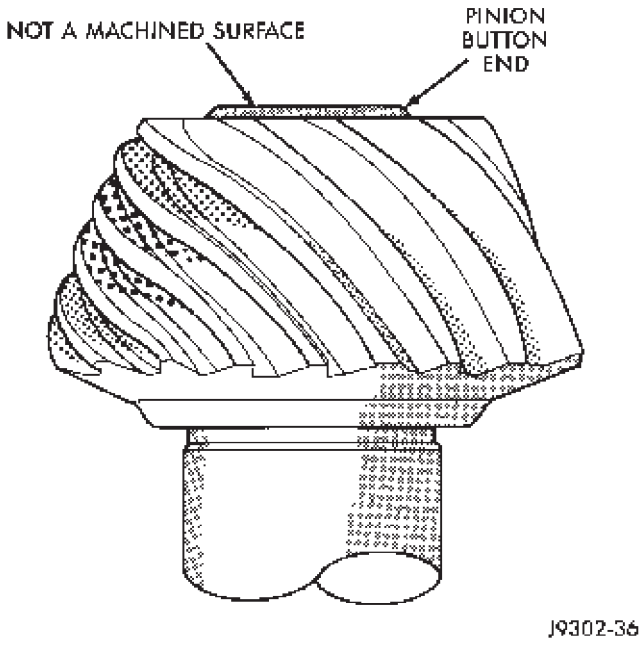

Fig. 23 Pinion Gear Head

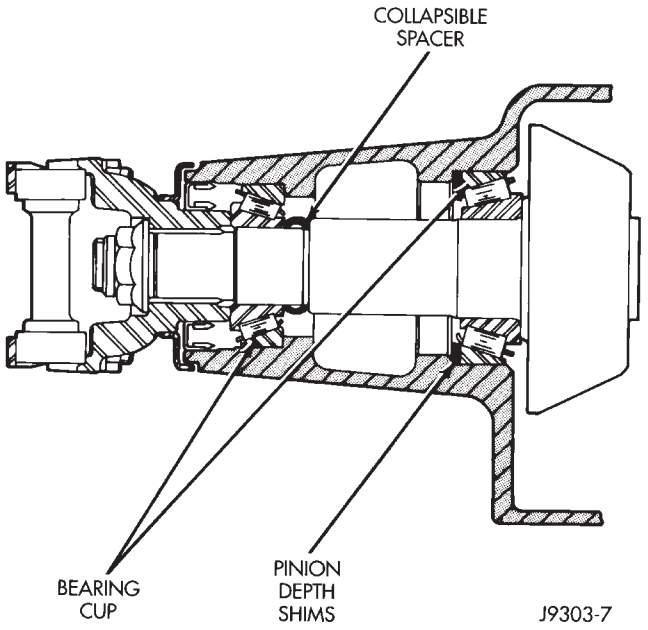

Fig. 24 Shim Locations

PINION GEAR ASSEMBLY/INSTALLATION

(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. 25). Ensure cup is correctly seated.

(2) Install the pinion front bearing cup with Installer D-130 and Handle C-4171 (Fig. 26).

(3) Install the rear bearing (and slinger if used) on the pinion gear with Installer W-262 (Fig. 27).

(4) Install a new collapsible preload spacer on pinion shaft and install pinion gear in housing (Fig. 28).

(5) Install pinion front bearing, oil slinger. Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer W-147-E and Handle C-4171 (Fig. 29).

(6) Install yoke with Installer W-162-D and Wrench C-3281 (Fig. 30).

(7) Install the yoke washer and a new nut on the pinion gear. **Tighten the nut only enough to remove the end play. Do not over-tighten it.**

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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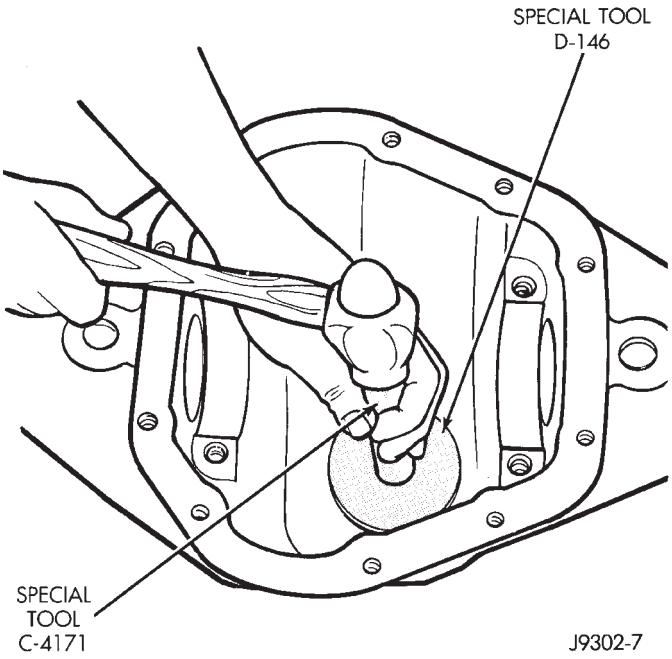


Fig. 25 Pinion Rear Bearing Cup Installation

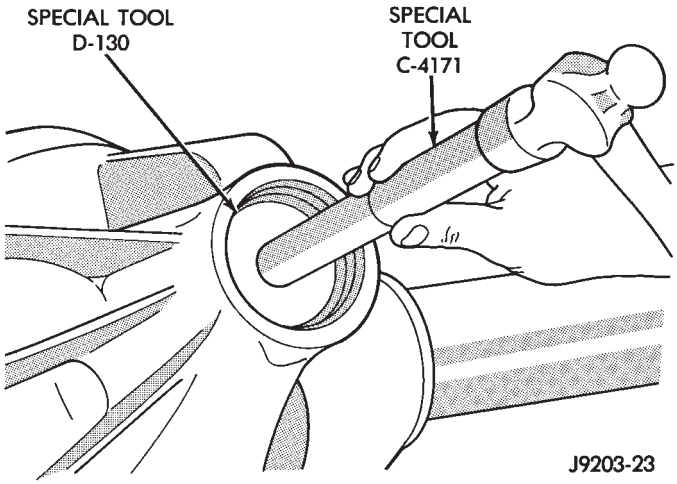


Fig. 26 Pinion Front Bearing Cup Installation

CAUTION: Never loosen the pinion gear nut to decrease the pinion gear bearing preload torque. If the specified 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. 31). Slowly tighten the nut in small increments until the rotating torque is achieved. **Measure the preload torque frequently to avoid overtightening the nut.**

(9) Check bearing preload torque with an inch pound torque wrench (Fig. 32). 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 (20 to 40 in. lbs.)

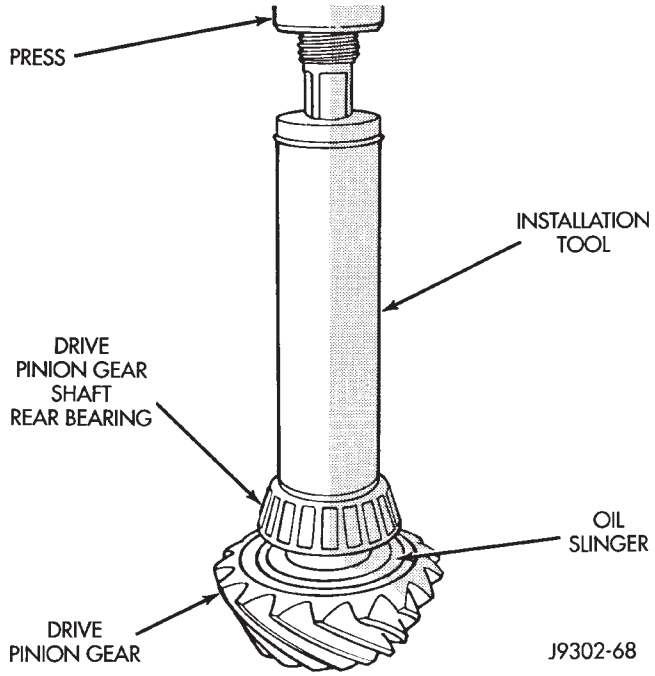


Fig. 27 Shaft Rear Bearing Installation

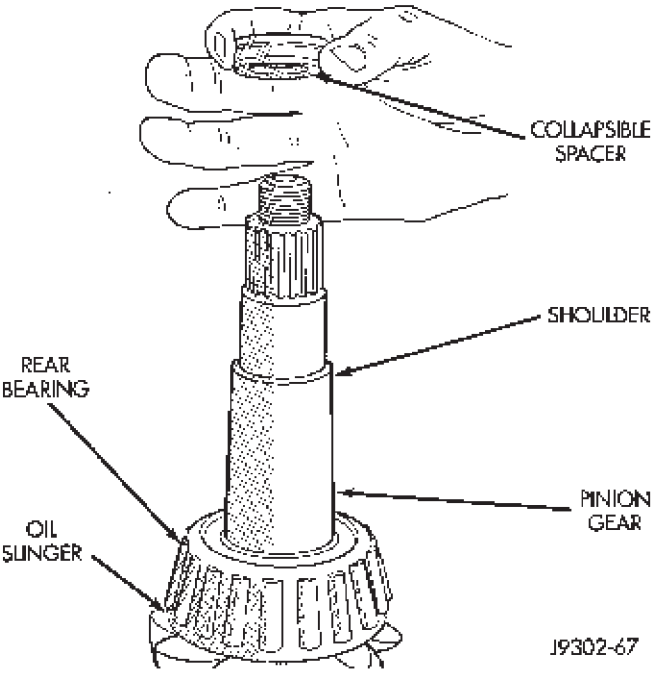


Fig. 28 Collapsible Preload Spacer

DIFFERENTIAL SHIM PACK MEASUREMENT AND ADJUSTMENT

(1) Install the bearings on the hub with Installer 7618 (J-21784) and Driver Handle 8015 (J-8092) (Fig. 33).

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

(3) Install the differential case in the housing.

(4) Install the outboard shim/spacer (selected thickness) on each side between bearing cup and

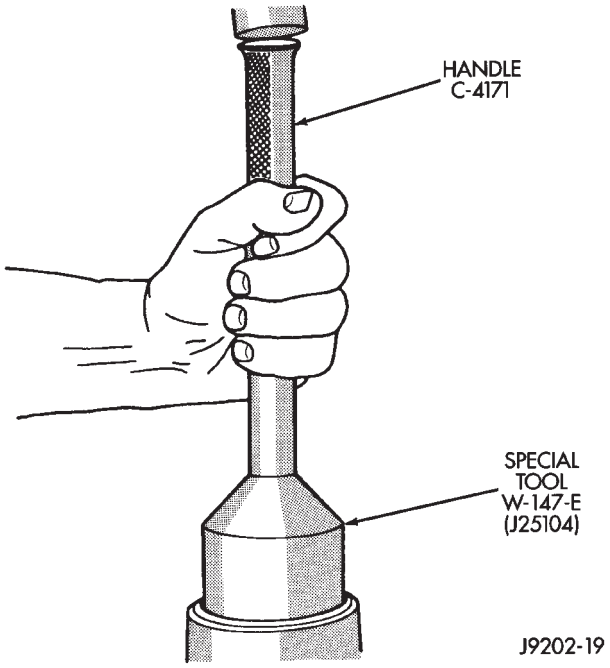


Fig. 29 Pinion Seal Installation

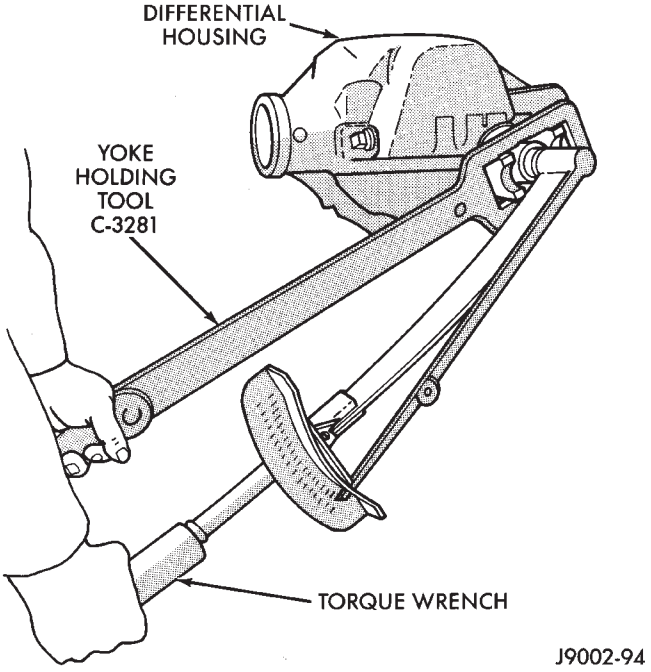


Fig. 31 Tightening Pinion Nut

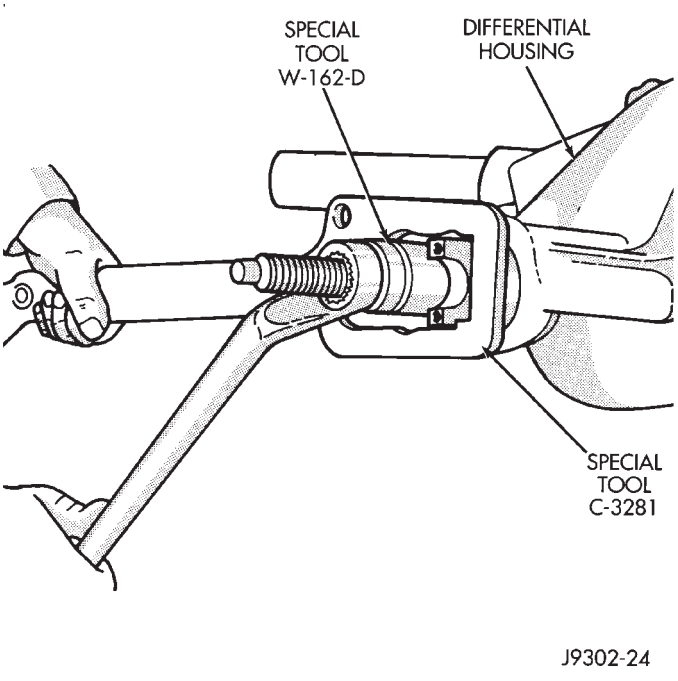


Fig. 30 Pinion Yoke Installation

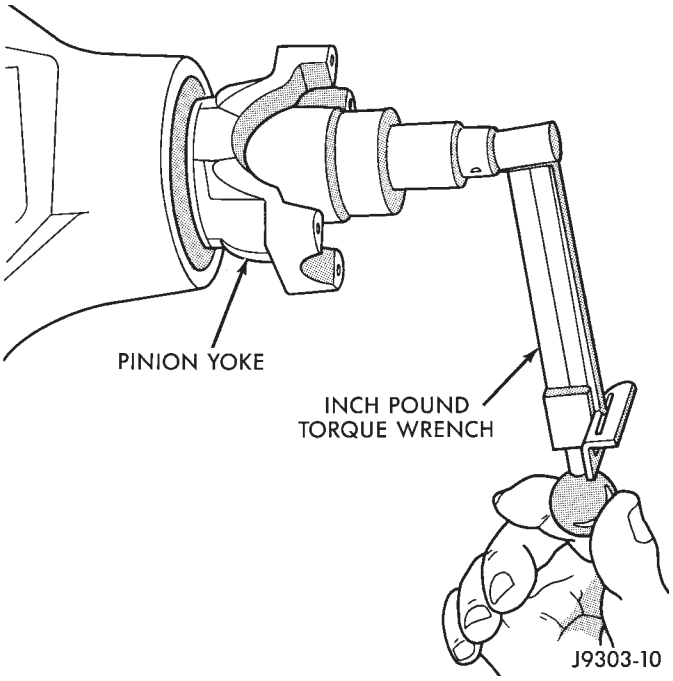


Fig. 32 Check Pinion Gear Torque

housing (Fig. 34). Use 0.142 in. (3.6 mm) as a starting point, shim/spacers are available in various thicknesses.

(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. 35).

(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.

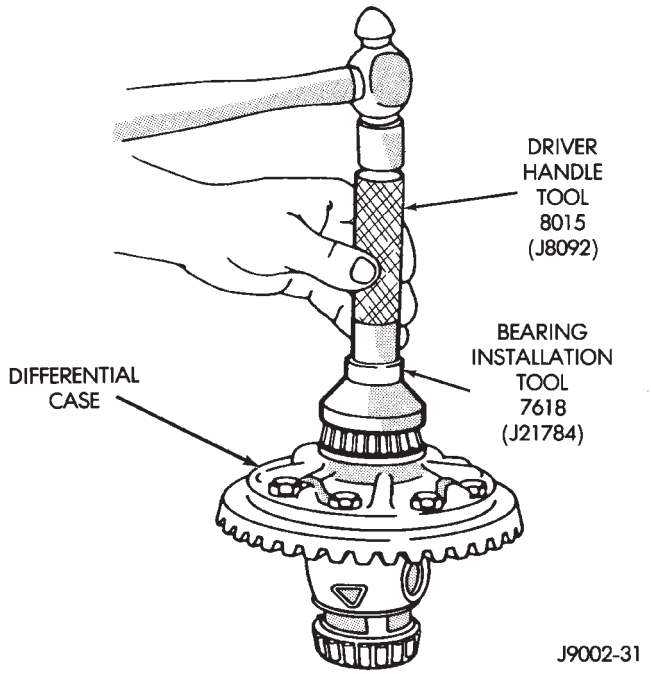


Fig. 33 Differential Bearing Installation

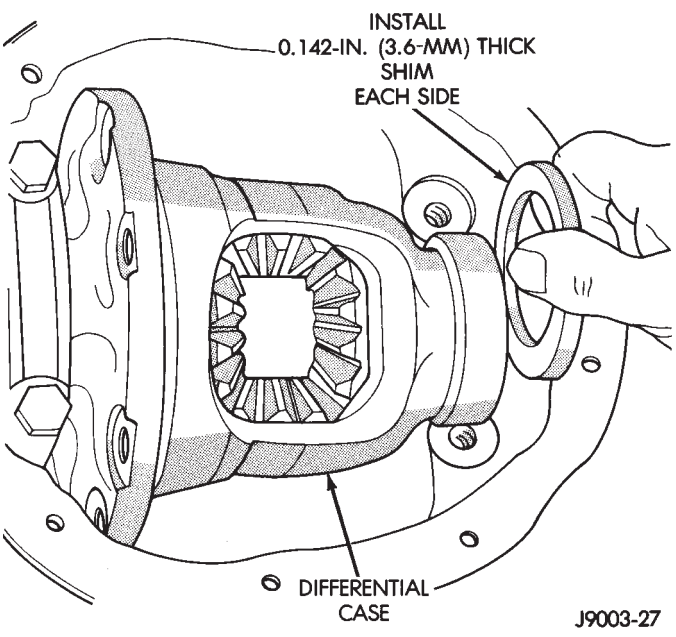


Fig. 34 Differential Bearing Shim Installation

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 61-81 N●m (45-60 ft. lbs.) torque (Fig. 36).

DIFFERENTIAL INSTALLATION

(1) Position Spreader W-129-A with the tool dowel pins seated in the locating holes (Fig. 37). Install the holddown clamps and tighten the tool turnbuckle finger-tight.

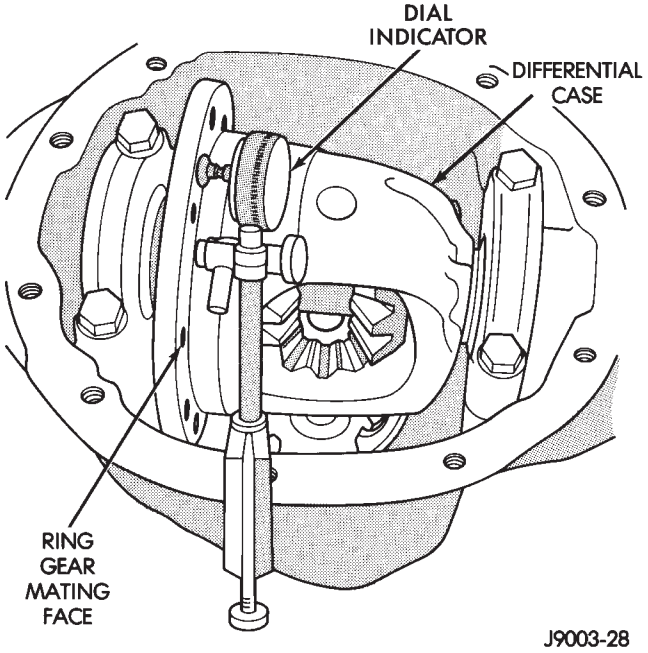


Fig. 35 Shim Measurement

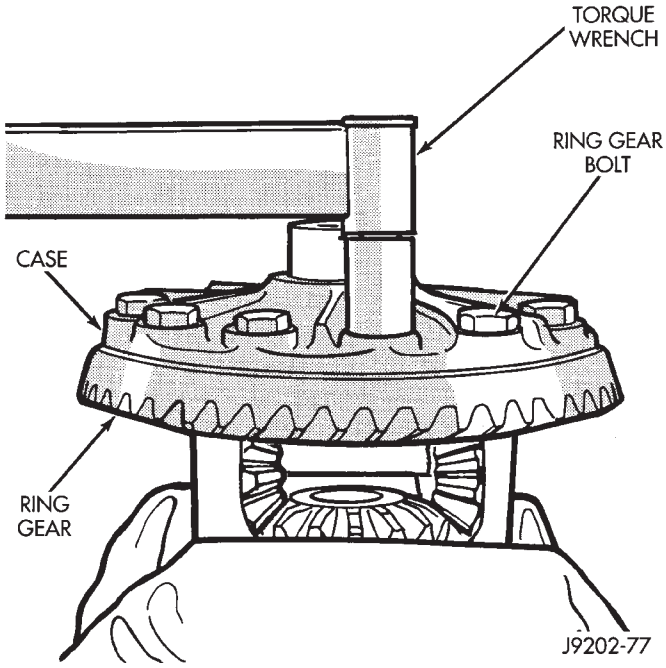


Fig. 36 Ring Gear Bolt Installation

(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. 37) 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.

(3) Separate the housing enough to install the case in the housing. Measure the distance with the dial indicator (Fig. 37).

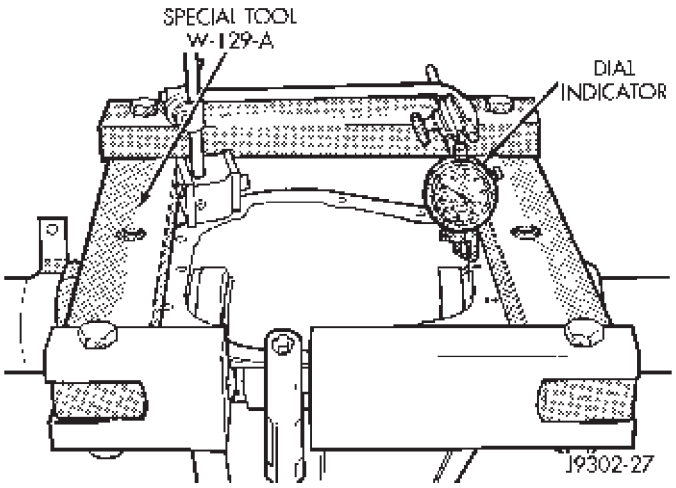


Fig. 37 Spread Differential Housing

(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. 38). Remove the spreader.

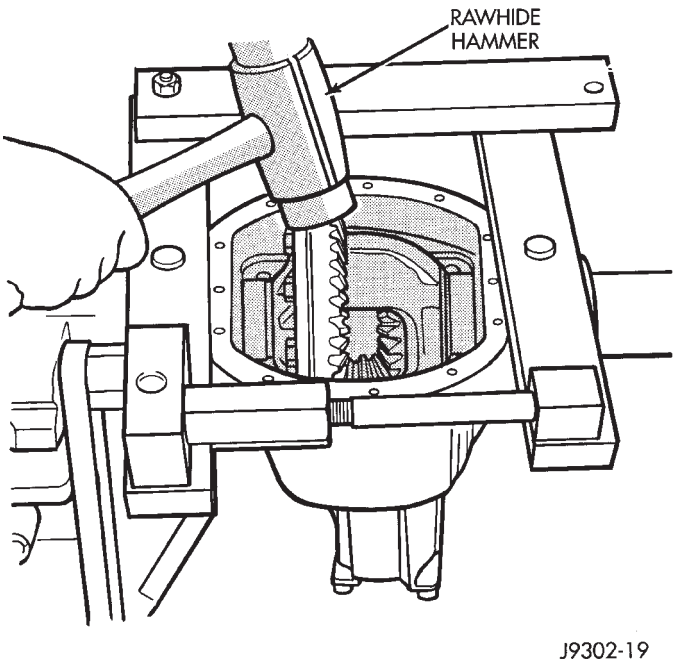


Fig. 38 Differential Installation

(7) Install the bearing caps at their original locations (Fig. 39). Tighten the bearing cap bolts to 77 N●m (57 ft. lbs.) torque.

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. 40).

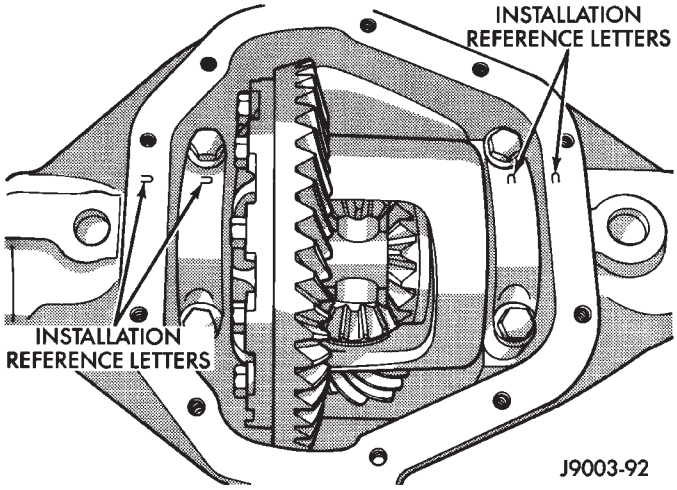


Fig. 39 Differential Bearing Cap Reference Letters

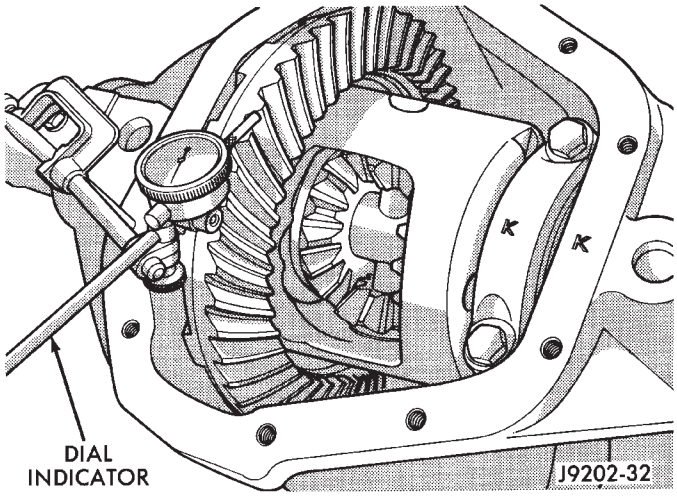


Fig. 40 Ring Gear Backlash Measurement

The ring gear backlash must be within 0.005 - 0.009 inch (0.12 - 0.23 mm). It cannot vary more than 0.002 inch (0.05 mm) between the points checked.

If backlash must be adjusted, spacers are available in various thicknesses. Adjust the backlash accordingly (Fig. 41). **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.

(2) Apply a thin coat of **hydrated ferric oxide**, to 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

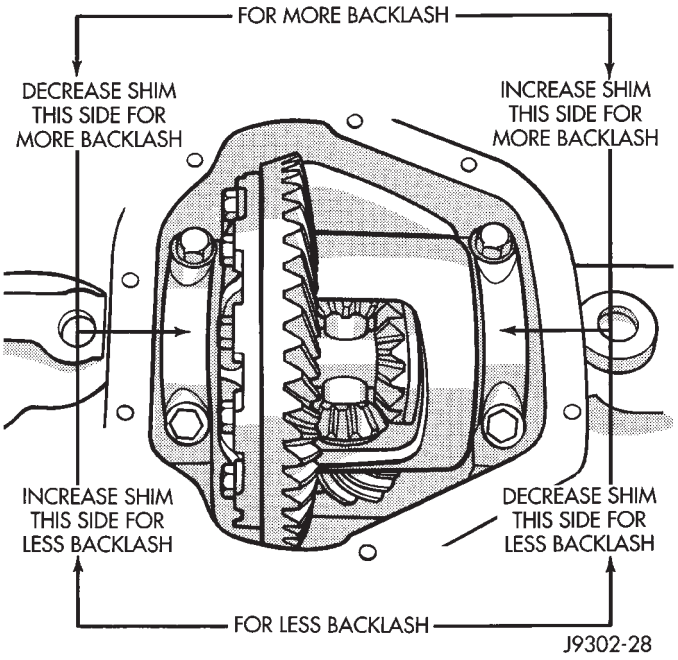
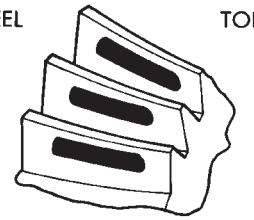
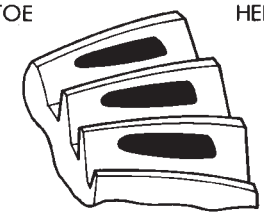
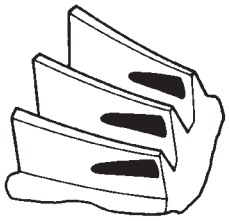
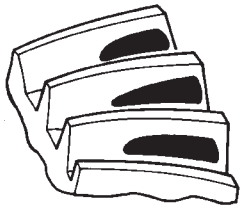
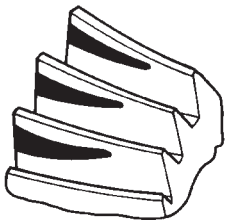
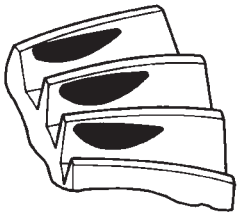
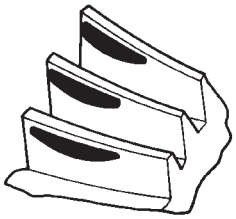
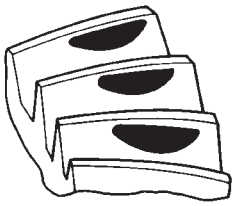
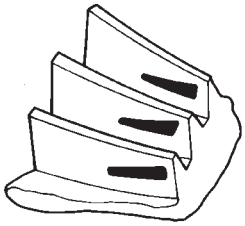
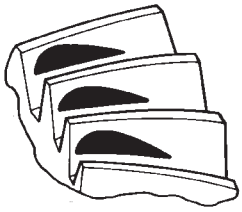


Fig. 41 Backlash Shim Adjustment

flange. This action 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. 42) 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. 42 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. 43). **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 47 N●m (35 ft. lbs.) torque.

CAUTION: Overfilling the differential can result in the 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.

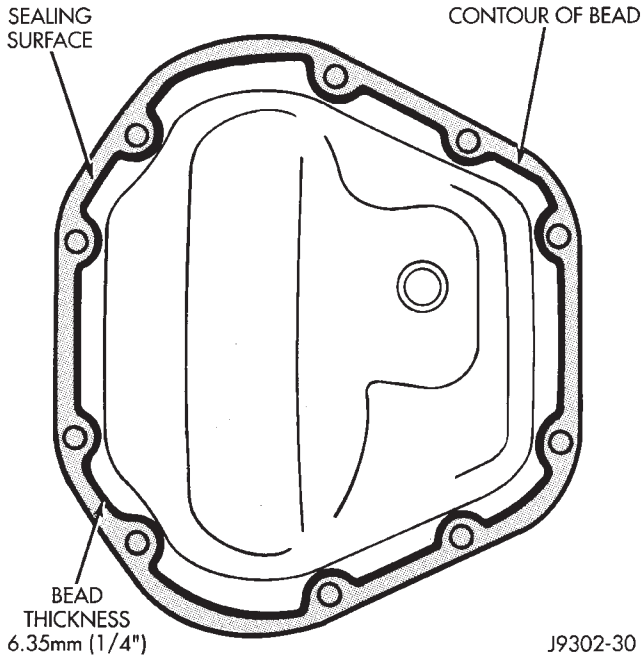


Fig. 43 Typical Housing Cover With Sealant

AXLE SPECIFICATIONS

MODEL 35 REAR AXLE

Axle Type	Semi-Floating, Hypoid
Application	ZJ
Ring Gear Diameter	7.562 in. (19.2 cm)
Lubricants*	MOPAR Gear Lubricant or Equivalent SAE 75W-90, API Grade GL-5, MIL-L-2105C
*Trailer Tow	Synthetic 80W-140
Lubricant Capacity	40 oz. (1.1L)
Axle Model	Dana M35C
Axle Ratio	3.55, 3.73
Track	58.5 in.
GAWR	2950 lbs.

Differential Bearing Preload Shim	0.004 in.	0.1 mm
Differential Side Gear-to-Case Clearance	0.000-0.006 in.	0.00-0.15 mm
Ring Gear Backlash	0.005-0.008 in.	0.12-0.20 mm
Drive Pinion Gearshaft Bearing Break-Away Preload Torque	Collapsible Spacer	
Original Bearings	10-20 in. lbs.	1-2 N·m
Replacement Bearings	15-35 in. lbs.	1.5-4 N·m
Drive Pinion Gear Depth	Select Shims	
Standard Setting	2.095 in.	53.2 mm
Side Gear Clearance (max.)	0.006 in.	0.15 mm
Case Runout (max.)	0.002 in.	0.5 mm

J9303-29

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 clutches which have radial grooves on the plates and concentric grooves on the discs.

In operation, the Trac-lok clutches are engaged by two concurrent forces. The first being preload force exerted through Belleville spring washers contained in the clutch packs. The second is from separating forces generated by the side gears as torque is applied through the ring gear (Fig. 1).

The Trac-lok design provides differential action needed for turning corners and for driving straight ahead. However, when one wheel looses traction, the clutch packs transfer additional torque to the wheel having the most traction. Trac-lok differentials resist wheel spin on bumpy roads and provide more pulling power when one wheel looses traction. Pulling power is provided continuously until both wheels loose 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.

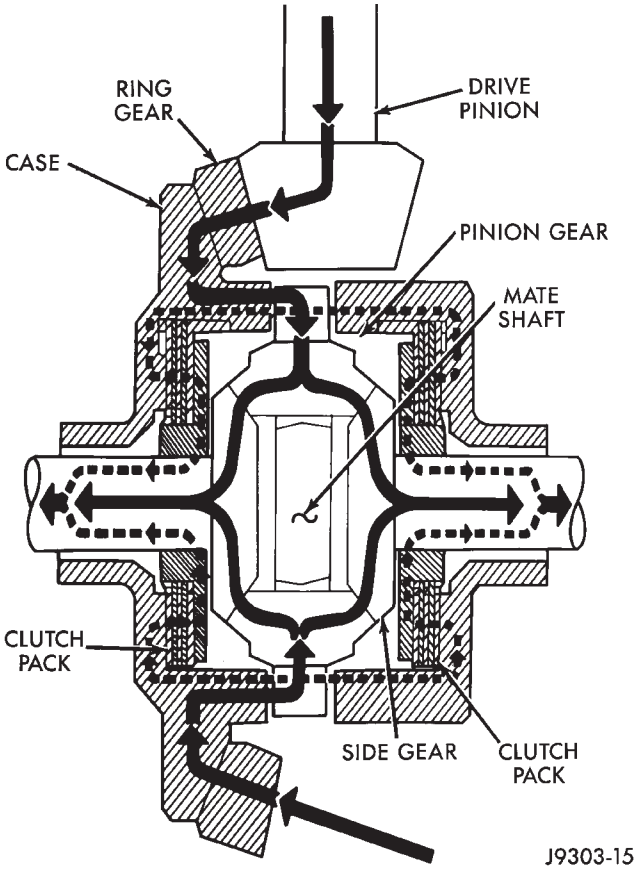


Fig. 1 Limited Slip Differential Operation—Both Wheels Driving

NOISE DIAGNOSIS

If a noise 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 repair service or a lubricant change.

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 to eliminate a possible **chatter or pop** noise complaint.

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

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 from the housing.

(1) Raise the vehicle on a hoist with the ignition OFF, vehicle in park.

(2) Attempt to turn each rear wheel by hand.

- If extremely difficult (or impossible) to turn either wheel, the differential IS functioning normally.
- If relatively easy to turn the wheel, the differential is NOT functioning normally and should be serviced.

DIFFERENTIAL OVERHAUL

The **Trac-Lok** (limited-slip) differential components are illustrated in (Fig. 2). 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.

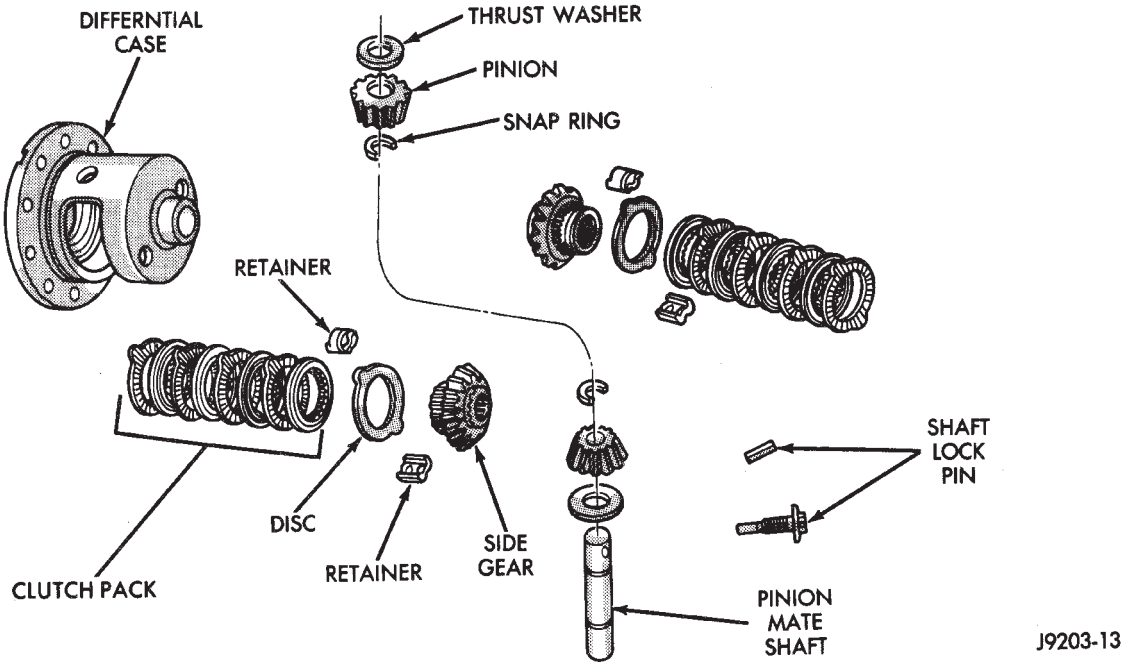


Fig. 2 Trac-Lok Differential Components

(1) Clamp one axle shaft in a vise equipped with soft jaws (Fig. 3).

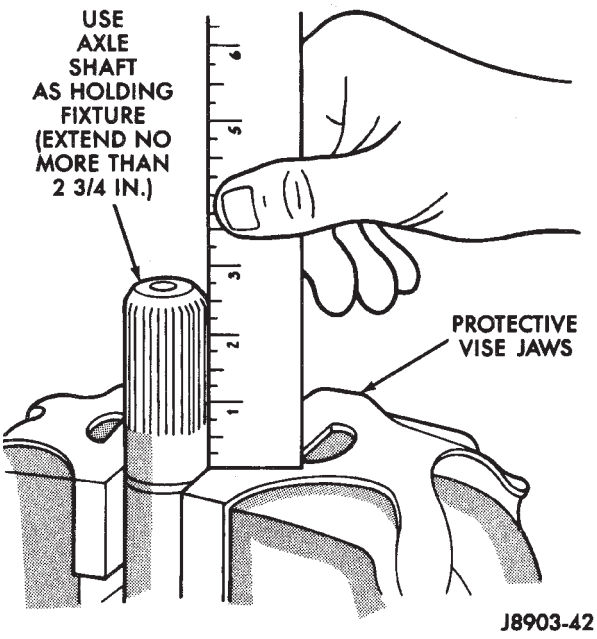


Fig. 3 Axle Shaft As Holding Fixture

(2) Position the differential case on the axle shaft (Fig. 4). Place shop towels under the differential to avoid damage during removal of the ring gear (Fig. 4).

(3) Remove **and discard** the ring gear bolts. Tap the ring gear with a rawhide mallet and remove (Fig. 5).

(4) Remove the pinion gear mate shaft lock screw (Fig. 6).

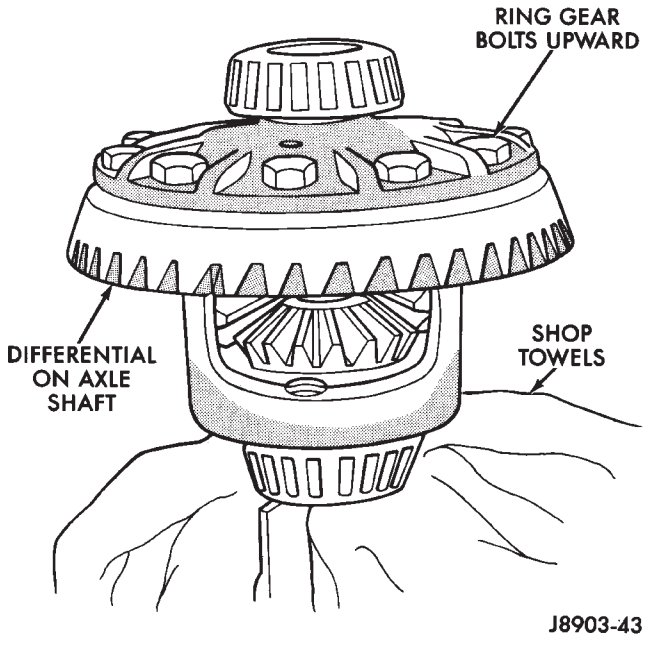


Fig. 4 Differential Case On Shaft

(5) Remove the mate shaft with a drift and hammer (Fig. 7).

(6) Install and lubricate Step Plate C-4487-1 (Fig. 8).

(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.

(8) Position a small screw driver in slot of Threaded Adapter C-4487-3 (Fig. 9) to prevent adapter from turning.

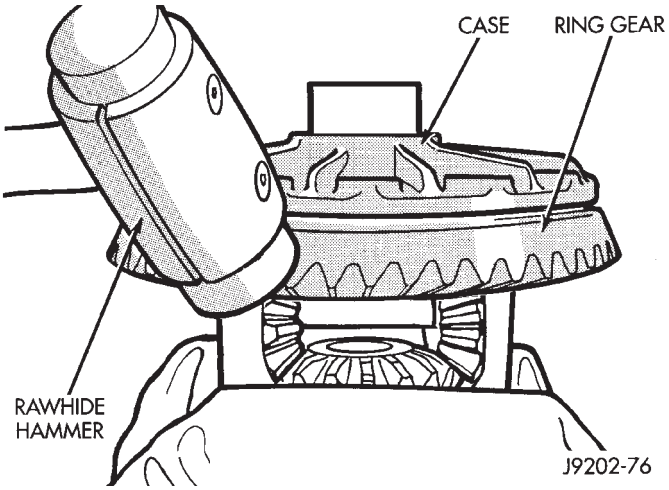


Fig. 5 Ring Gear Removal

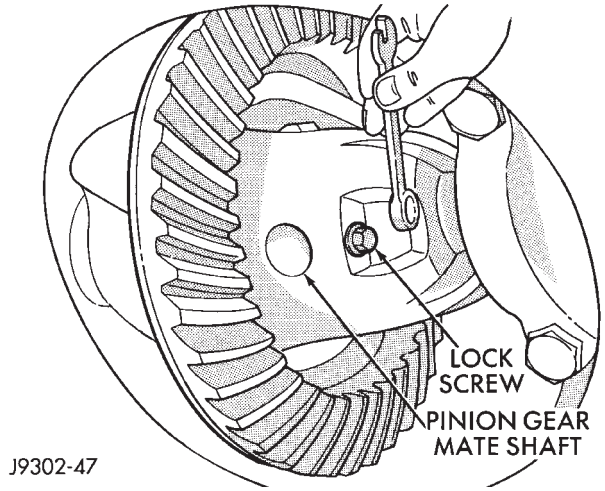


Fig. 6 Mate Shaft Lock Screw

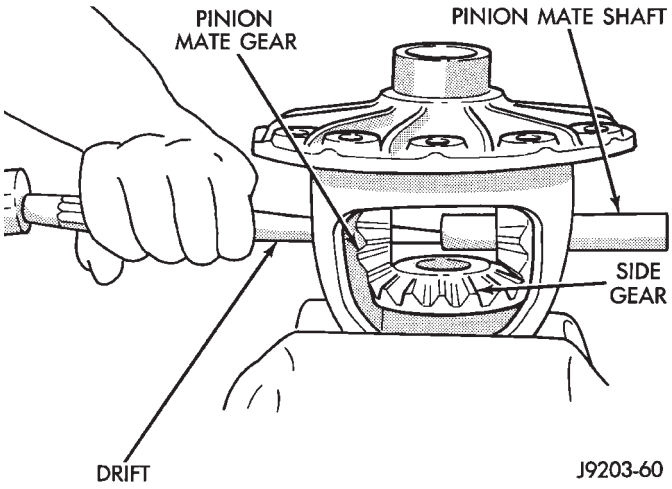


Fig. 7 Mate Shaft Removal

(9) Tighten forcing screw tool enough to relieve clutch pack tension. Remove both pinion thrust washers (Fig. 10).

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

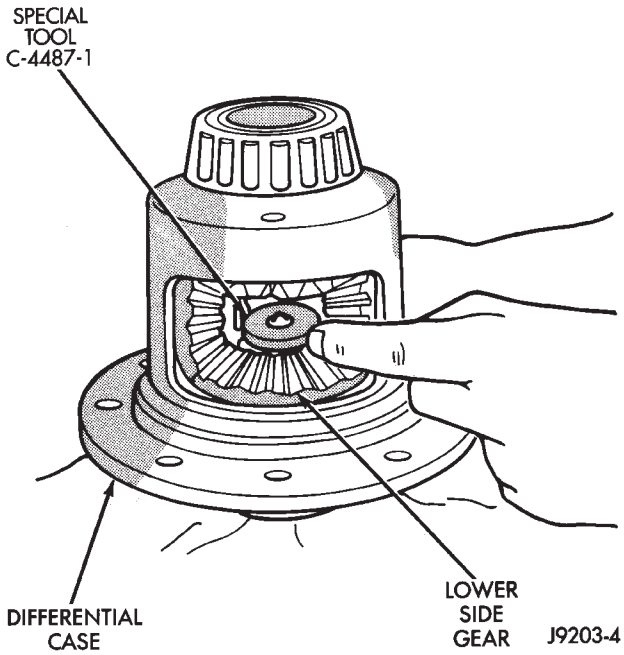


Fig. 8 Step Plate Tool Installation

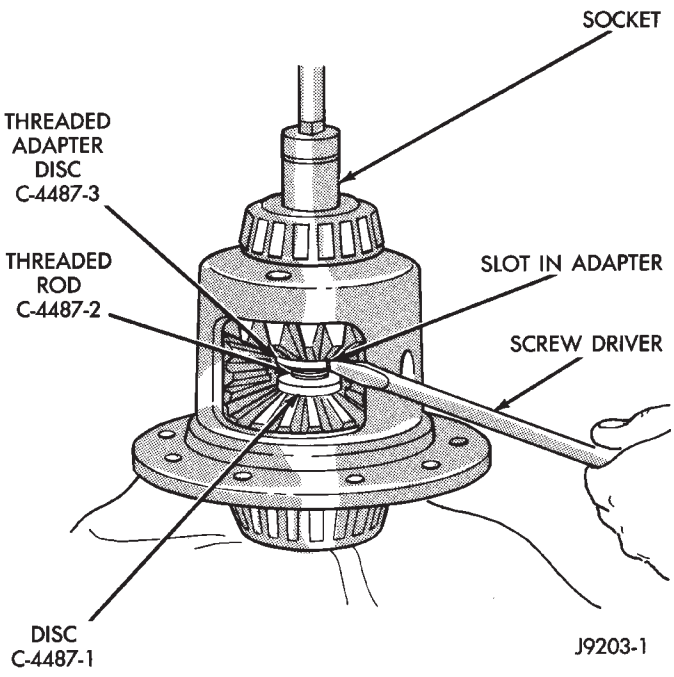


Fig. 9 Threaded Adapter Installation

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

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

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

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

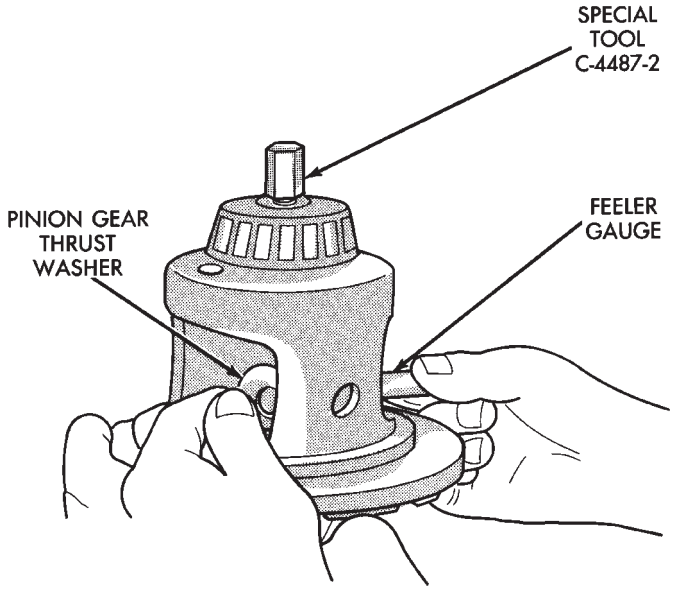


Fig. 10 Remove Pinion Thrust Washer

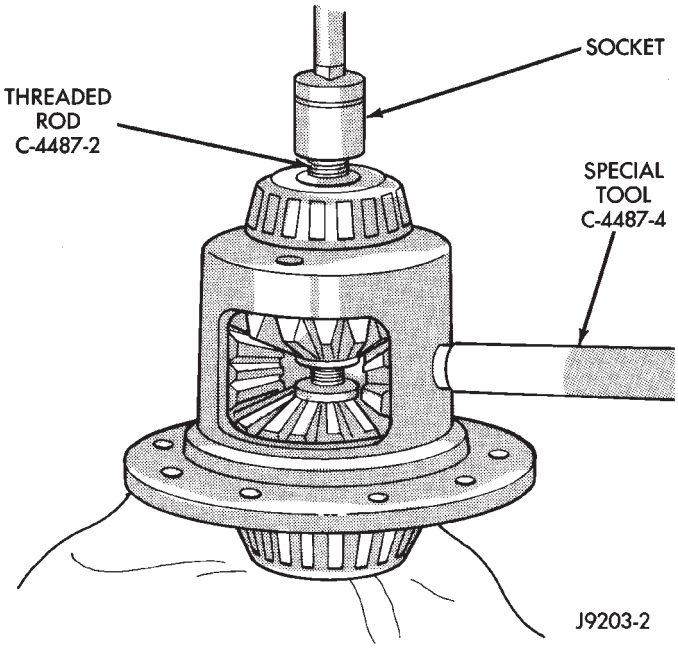


Fig. 11 Pinion Gear Removal

CLEANING AND INSPECTION

(1) Clean all components (Fig. 2) 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.

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.

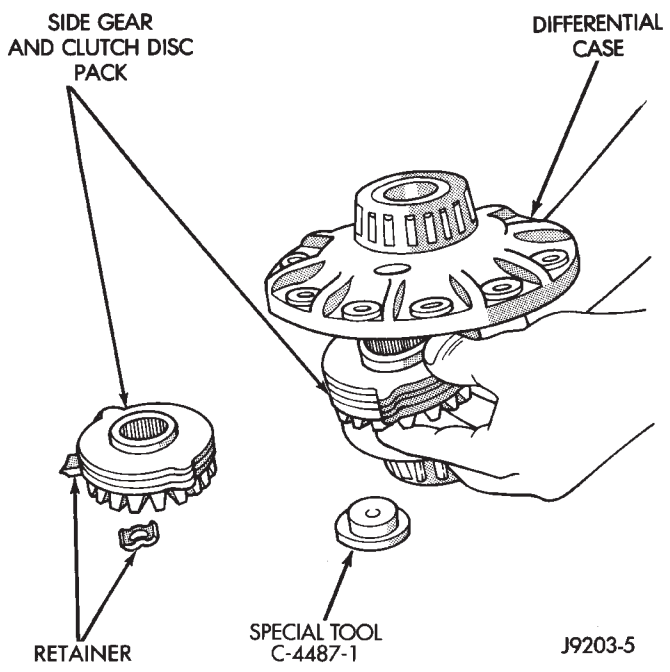


Fig. 12 Side Gear & Clutch Disc Removal

(2) Assemble the clutch discs into packs (Fig. 13).

(3) Secure disc packs with retaining clips (Fig. 13).

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

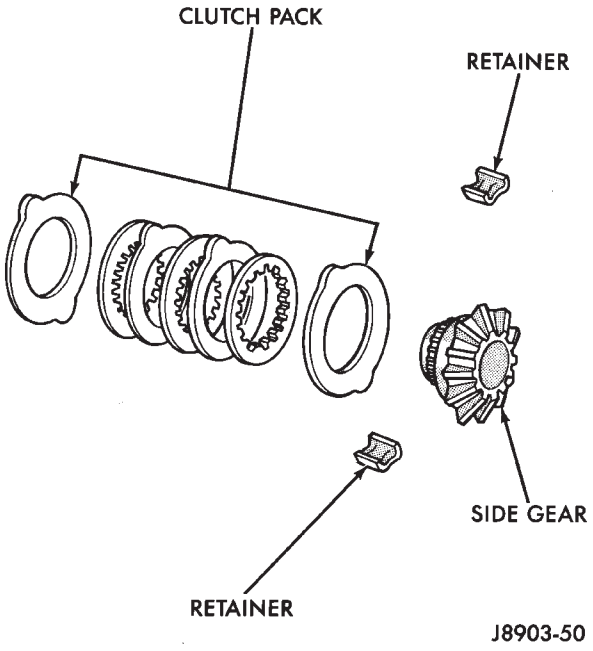


Fig. 13 Clutch Disc Pack

(5) Position case on axle fixture.

(6) Install clutch pack and side gear in lower bore (Fig. 14). **Be sure clutch pack retaining clips remain in position and are seated in the case pockets.**

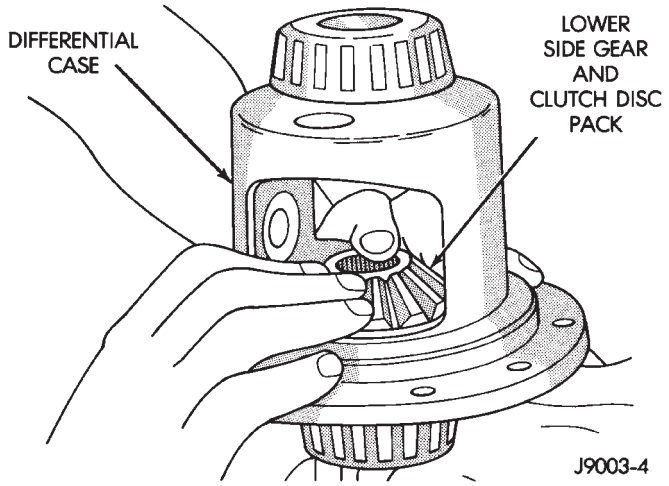


Fig. 14 Clutch Discs & Lower Side Gear Installation

(7) Install lubricated Step Plate C-4487-1 on first clutch pack (Fig. 15).

(8) Install the upper side gear and clutch disc pack (Fig. 15).

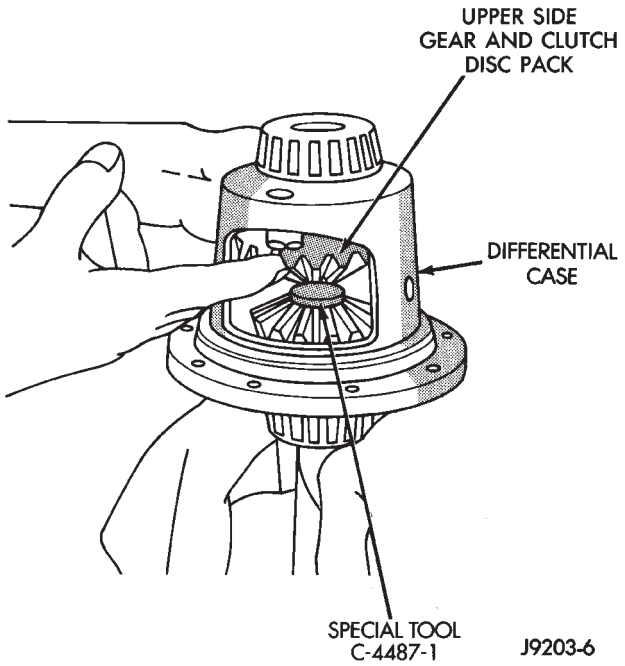


Fig. 15 Upper Side Gear & Clutch Disc Pack Installation

(9) Hold assembly in position. Insert Threaded Adapter C-4487-3 into top side gear, insert forcing Screw C-4487-4.

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

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

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

(13) Install the following components in the differential case.

- Pinion gears and thrust washers
- Pinion gear mate shaft (align holes in shaft and case)

(14) Install the pinion mate shaft lock screw with Loctite® on the threads. Tighten the screw to 19 N●m (14 ft. lbs.) torque.

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.

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

(16) Install new ring gear bolts and alternately tighten to 61-81 N●m (45-60 ft. lbs.) torque (Fig. 16).

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

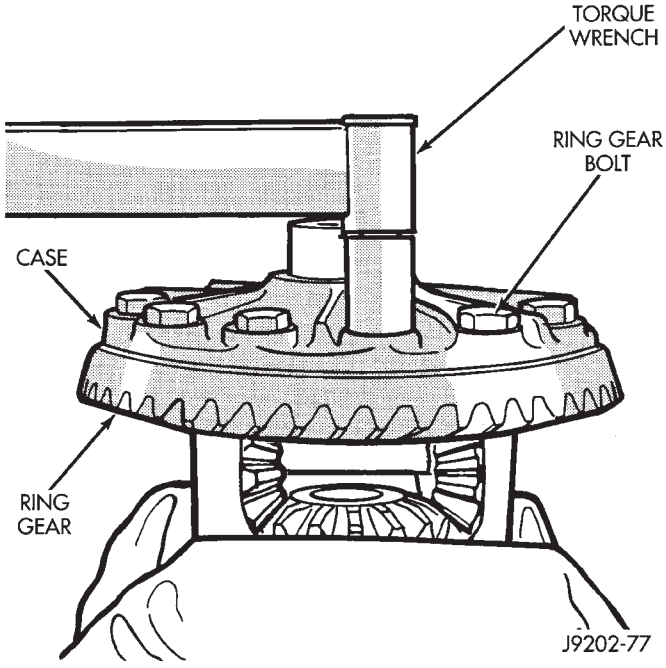


Fig. 16 Ring Gear Bolt Installation

TORQUE SPECIFICATIONS

REAR SUSPENSION COMPONENTS

DESCRIPTION	TORQUE
Jounce Bumper to Frame	20 N·m (15 ft. lbs.)
Lower Suspension Arm Bolt/Nut	177 N·m (130 ft. lbs.)
Shock Lower Bolt/Nut	92 N·m (68 ft. lbs.)
Shock Upper Nut	70 N·m (52 ft. lbs.)
Stabilizer Bar Link Nuts	36 N·m (27 ft. lbs.)
Stabilizer Bar Clamp Bolts	75 N·m (40 ft. lbs.)
Track Bar to Frame Rail Bracket Nut	100 N·m (74 ft. lbs.)
Track Bar Axle Bracket Bolt	100 N·m (74 ft. lbs.)
Upper Suspension Arm Nut	74 N·m (55 ft. lbs.)
Wheel Lug Nut 1/2 x 20 with 60° Cone	109 to 150 N·m (80 to 110 ft. lbs.)

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REAR AXLE MODEL 35

DESCRIPTION	TORQUE
Bearing Cap Bolts	77 N·m (57 ft. lbs.)
Differential Cover Bolts	47 N·m (35 ft. lbs.)
Fill Hole Plug	34 N·m (25 ft. lbs.)
Ring Gear Bolts	61 to 81 N·m (45 to 60 ft. lbs.)

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