DISASSEMBLY AND ASSEMBLY

STANDARD DIFFERENTIAL

DISASSEMBLE

(1) Remove pinion gear mate shaft.

(2) Rotate the differential side gears and remove the pinion mate gears and thrust washers (Fig. 40).

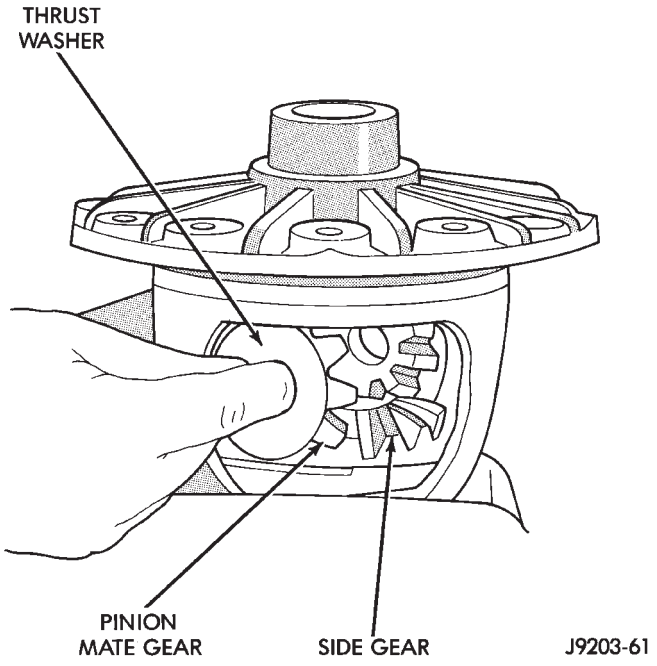

Fig. 40 Pinion Mate Gear Removal

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

DIFFERENTIAL ASSEMBLE

(1) Differential side gears and thrust washers

(2) Pinion gears and thrust washers

(3) Pinion gear mate shaft (align holes in shaft and case)

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

(5) Install differential case in axle housing. Refer to Differential removal and installation procedure.

TRAC-LOK DIFFERENTIAL

The **Trac–Lok** (limited–slip) differential components are illustrated in (Fig. 41). Refer to this illustration during repair service.

DISASSEMBLY

Service to the Trac–Lok differential requires the use of Tool Set 6960. Refer to Model 35 Axle section in this Group for Differential Removal and Installation.

(1) Clamp Side Gear Holding Tool 6965 in a vise.

(2) Position the differential case on the holding tool (Fig. 42). Place shop towels under the differential to avoid damage if removal of the ring gear is required (Fig. 42).

(3) If ring gear replacement is required, remove **and discard** the bolts holding the ring gear to the case. Tap the ring gear with a rawhide or plastic mallet and separate ring gear from case (Fig. 43).

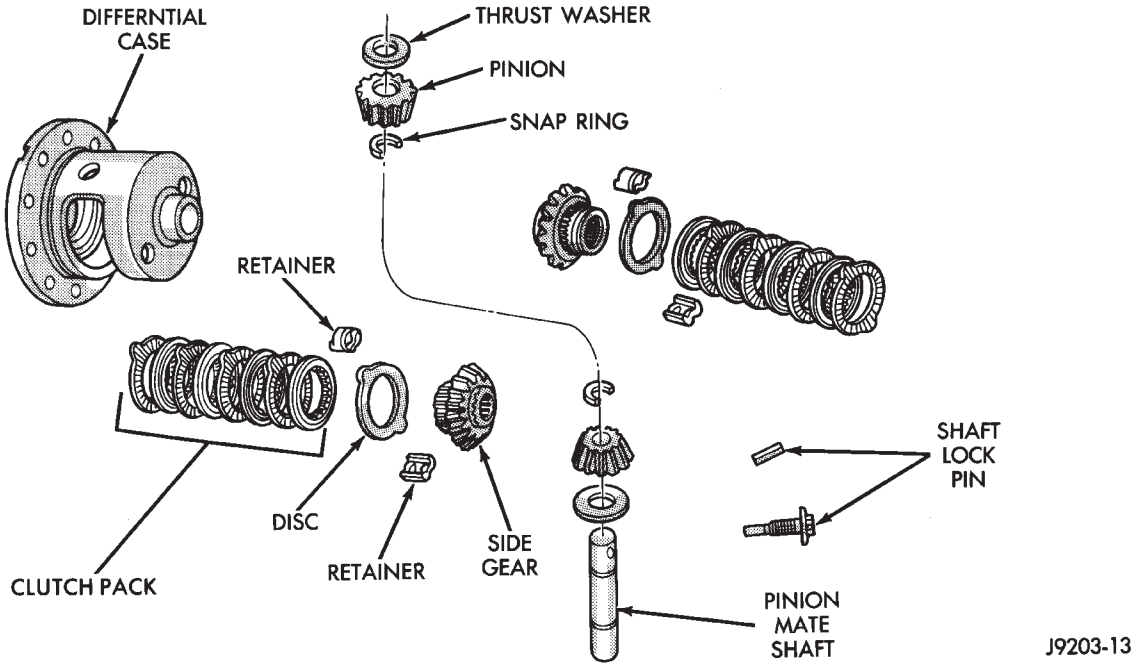

Fig. 41 Trac–Lok Differential Components

DISASSEMBLY AND ASSEMBLY (Continued)

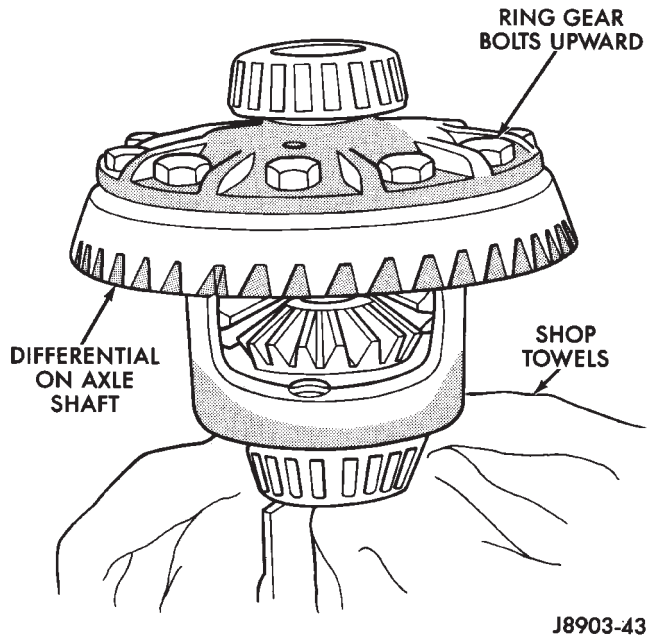

Fig. 42 Differential Case Holding Tool

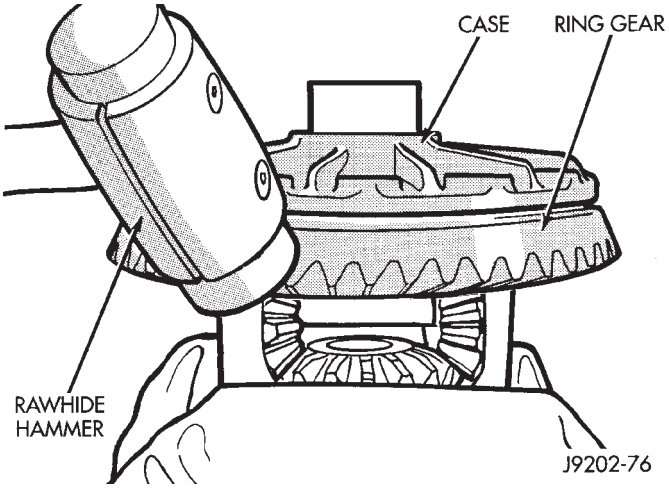

Fig. 43 Ring Gear Removal

(4) Remove the pinion gear mate shaft lock screw (Fig. 44).

(5) Remove the pinion gear mate shaft. If necessary, use a drift and hammer (Fig. 45).

(6) Install and lubricate Step Plate 6960–3 (Fig. 46).

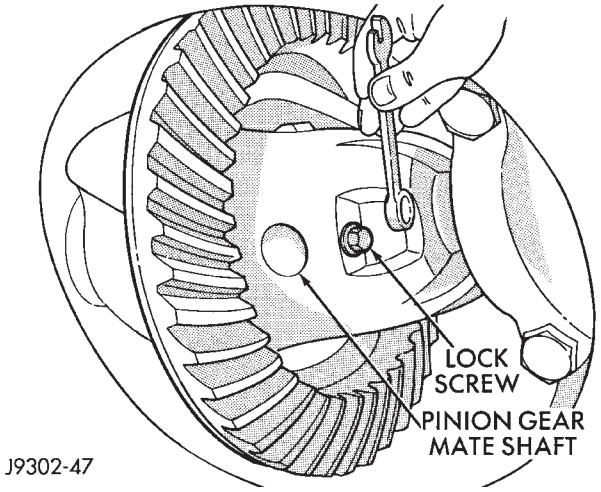

Fig. 44 Mate Shaft Lock Screw

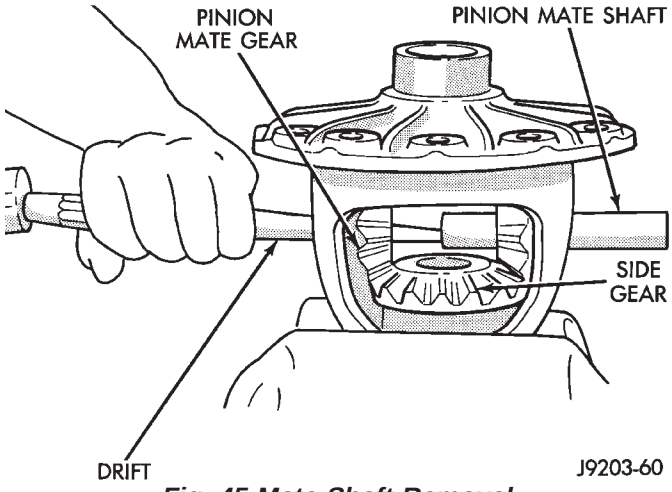

Fig. 45 Mate Shaft Removal

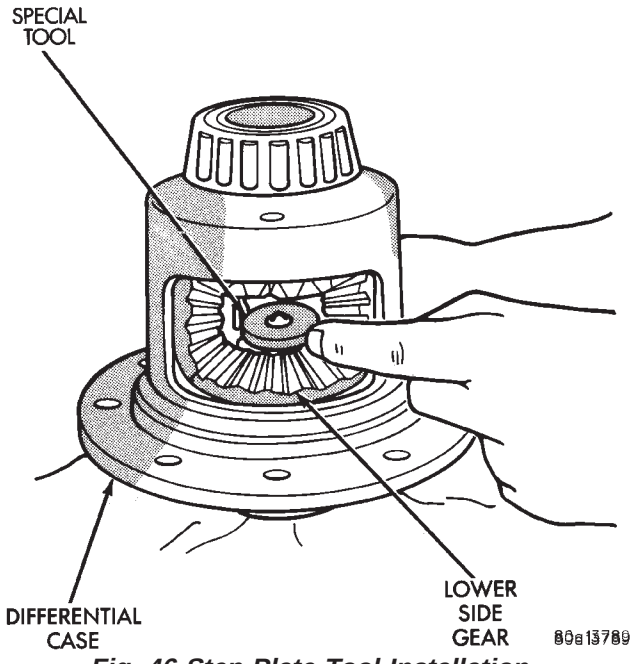

Fig. 46 Step Plate Tool Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Assemble Threaded Adapter 6960–1 into top side gear. Thread forcing Screw 6960–4 into adapter until it becomes centered in adapter plate.

(8) Position a small screw driver in slot of Threaded Adapter 6960–1 (Fig. 47) to prevent adapter from turning.

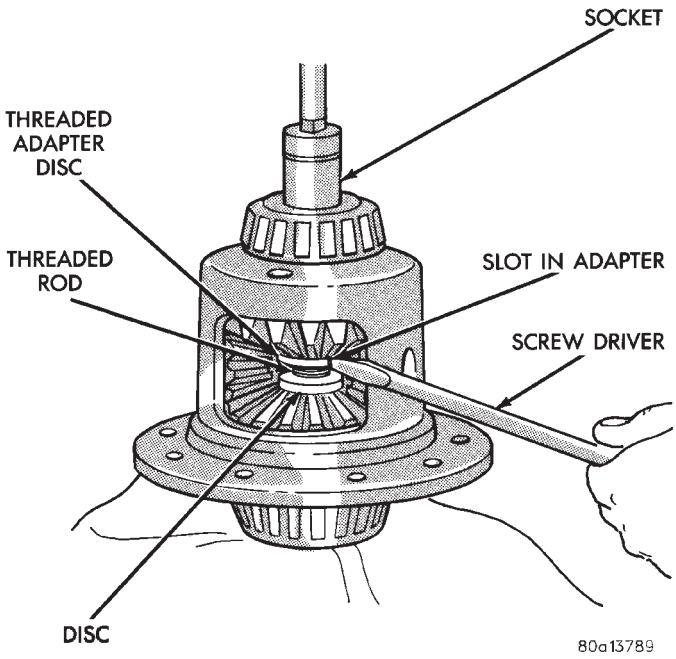

Fig. 47 Threaded Adapter Installation

(9) Tighten forcing screw tool 122 N·m (90 ft. lbs.) (maximum) to compress Belleville springs in clutch packs (Fig. 48).

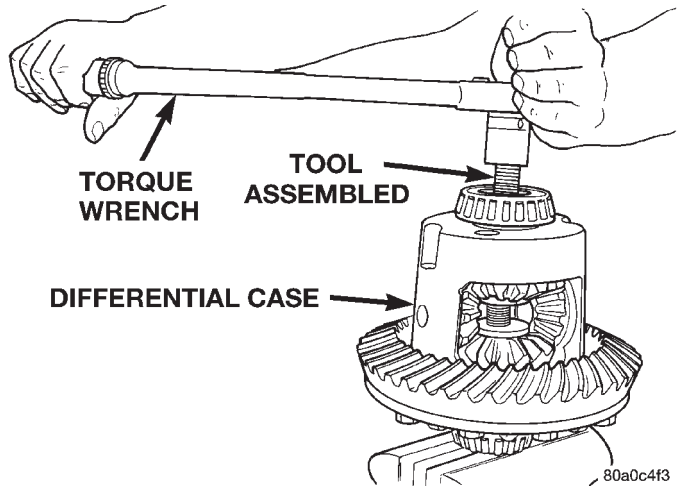

Fig. 48 Tighten Belleville Spring Compressor Tool

(10) Using a 0.020 in. feeler gauge and mallet, remove thrust washers from behind the pinion gears (Fig. 49).

(11) Loosen the forcing screw tool until the clutch pack tension is relieved and the pinion gears can be slightly rattled between the case and side gears.

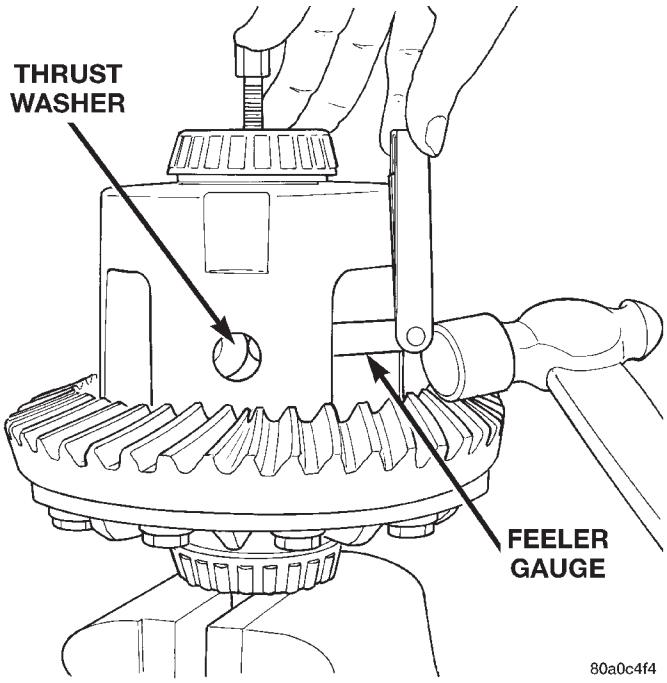

Fig. 49 Remove Pinion Thrust Washer

(12) Insert Turning Bar 6960–2 in case. Rotate case with tool until pinion gears can be removed (Fig. 50).

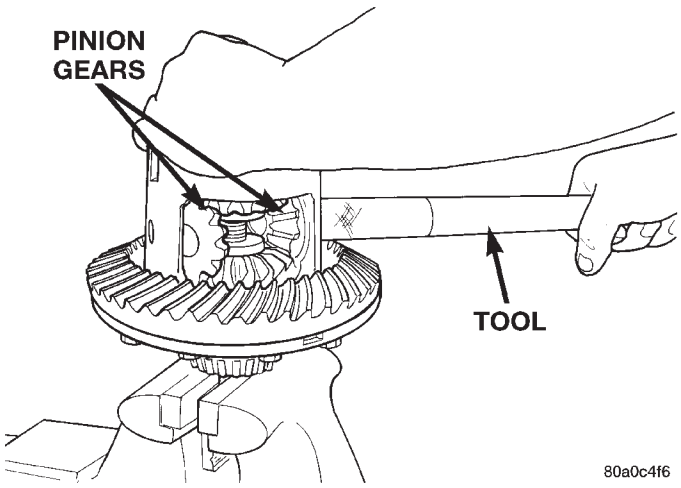

Fig. 50 Pinion Gear Removal

(13) Remove top side gear and clutch pack. Keep plates in correct order during removal (Fig. 51).

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

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

ASSEMBLY

The clutch discs are replaceable as complete sets only. **If one clutch disc pack is damaged, both packs must be replaced.**

DISASSEMBLY AND ASSEMBLY (Continued)

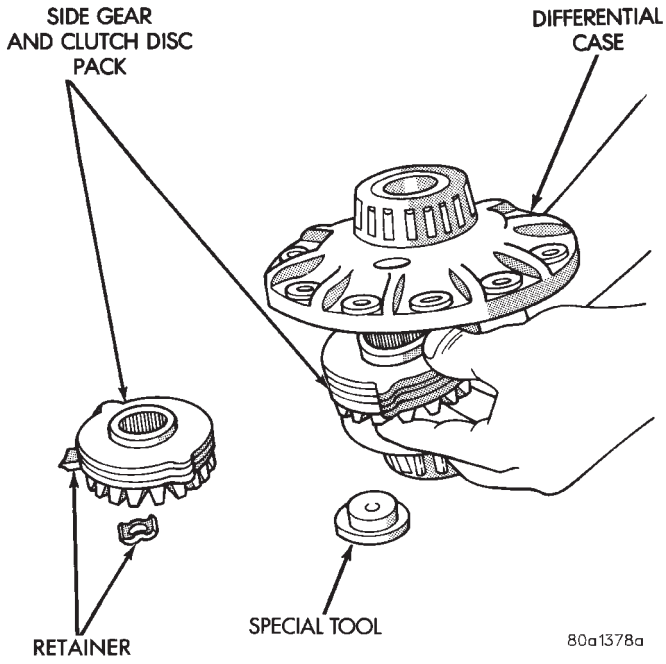

Fig. 51 Side Gear & Clutch Disc Removal

Lubricate each component with gear lubricant before assembly.

(1) Assemble the clutch discs into packs secure disc packs with retaining clips (Fig. 52).

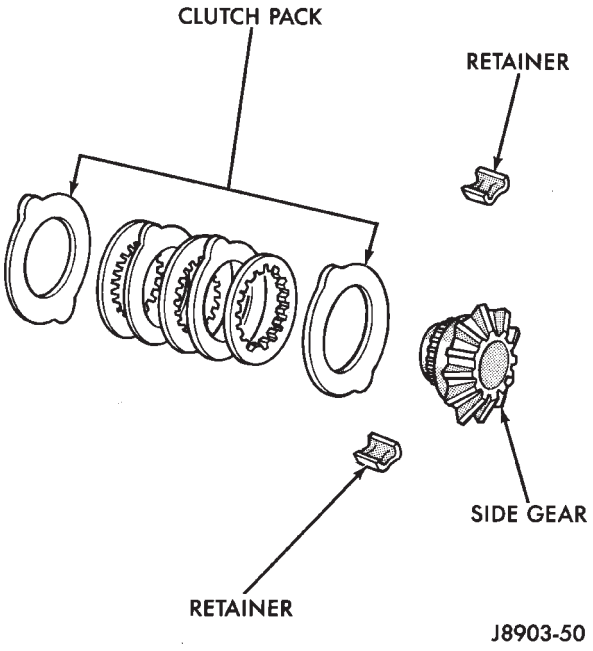

Fig. 52 Clutch Disc Pack

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

(3) Position case on axle fixture.

(4) Install clutch pack and side gear in lower bore (Fig. 53). **Be sure clutch pack retaining clips remain in position and are seated in the case pockets.**

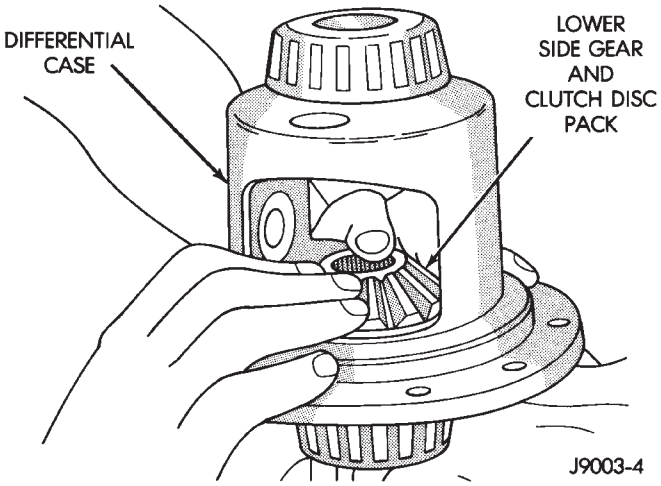

Fig. 53 Clutch Discs & Lower Side Gear Installation

(5) Install lubricated Step Plate 6960–3 on first clutch pack (Fig. 54).

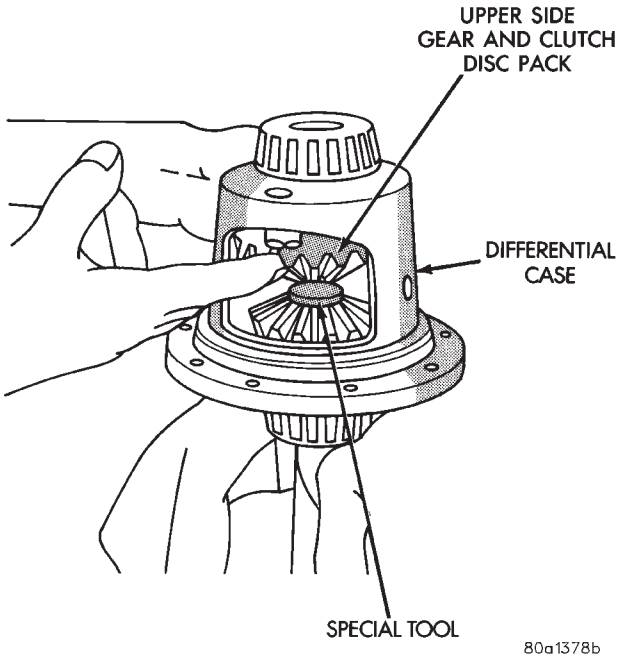

Fig. 54 Upper Side Gear & Clutch Disc Pack Installation

(6) Install the upper side gear and clutch disc pack (Fig. 54).

(7) Hold assembly in position. Insert Threaded Adapter 6960–1 into top side gear, insert forcing Screw 6960–4.

(8) Tighten forcing screw tool to slightly compress clutch discs.

(9) Place pinion gears in position in side gears and verify that mate shaft hole line up.

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Rotate case with Turning Bar 6960–2 until mate shaft holes in pinion gears align with holes in case.

(11) Tighten forcing screw to 122 N·m (90 ft. lbs.) to compress the Belleville springs. Lubricate and install thrust washers behind pinion gears and align washers with a small screw driver. Insert mate shaft into each pinion gear to verify alignment.

(12) Remove forcing screw, threaded adapter and step plate. Install pinion gear mate shaft, align holes in shaft and case.

(13) Install the pinion mate shaft lock screw finger tight to hold shaft during installation.

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) Lubricate all differential components with hypoid gear lubricant.

CLEANING AND INSPECTION

AXLE COMPONENTS

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 matched sets only.**

Clean axle shaft tubes and oil channels in housing.

Inspect for;

- 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.

TRAC-LOK

(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 discs with fiber coating (no grooves 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.

ADJUSTMENTS

PINION GEAR DEPTH

GENERAL 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. 55). 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 center line of the ring gear to the back face of the pinion is 96.8 mm (3.813 inches) for Model 44 axles. The standard depth provides the best teeth contact pattern. Refer to Backlash and Contact Pattern Analysis Paragraph in this section for additional information.

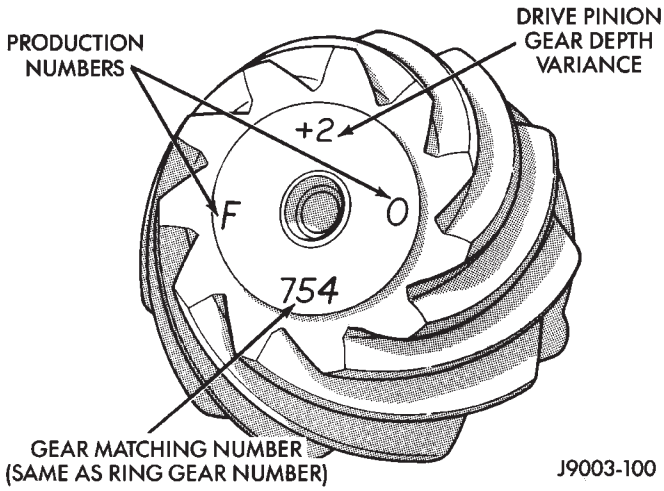

Fig. 55 Pinion Gear ID Numbers

NOTE: The button end on the pinion gear head is no longer a machined–to–specifications surface. Do not use this surface for pinion depth setup or checking (Fig. 56).

ADJUSTMENTS (Continued)

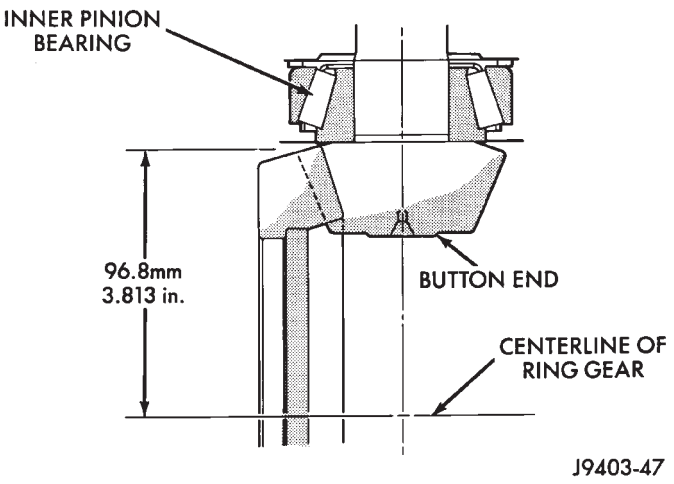

Fig. 56 Pinion Gear Head

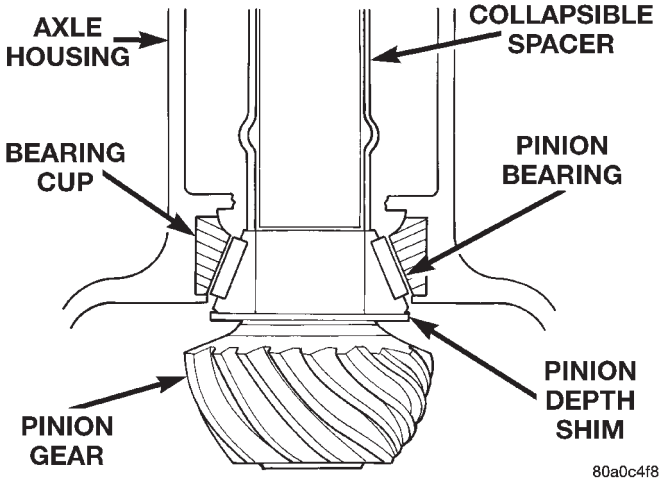

Fig. 57 Shim Locations

Compensation for pinion depth variance is achieved with select shims. The shims are placed under the inner pinion bearing cone (Fig. 57).

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.

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 in. (0.10 mm). 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 in. (0.025 mm). Subtract this amount from original shim. Refer to the Pinion Gear Depth Variance Chart.

PINION DEPTH MEASUREMENT AND ADJUSTMENT

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 6955, Pinion Block 6734 and Dial Indicator C–3339 (Fig. 58).

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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ADJUSTMENTS (Continued)

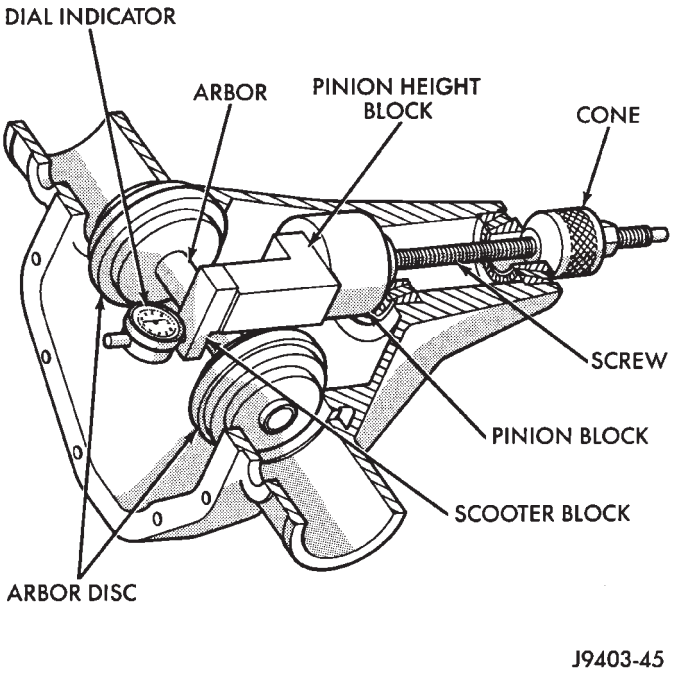


Fig. 58 Pinion Gear Depth Gauge Tools—Typical

(1) Assemble Pinion Gauge Set, Pinion Block and pinion bearings. Install assembly into differential pinion gear bore and hand tighten cone (Fig. 59).

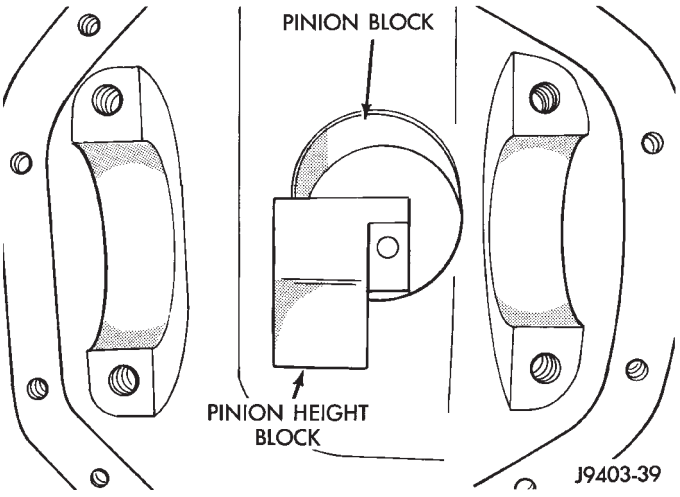


Fig. 59 Pinion Height Block—Typical

(2) Place Arbor Disc 6928 on Arbor D–115–3 and position in the bearing cradles (Fig. 60). 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.

(3) Firmly place Scooter Block D-115–2 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. 61). Record the longest

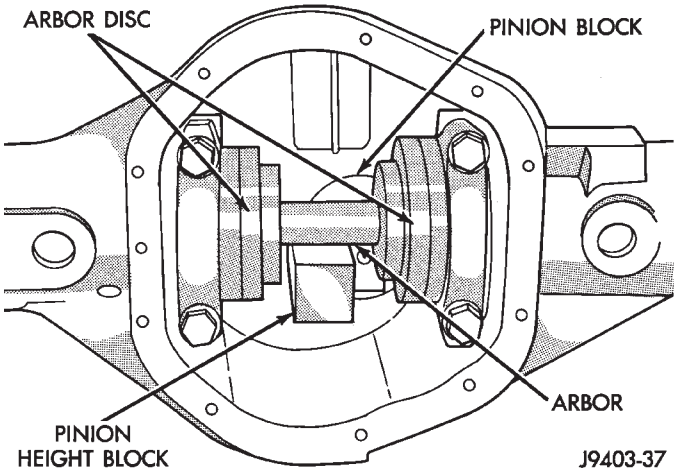


Fig. 60 Gauge Tools In Housing—Typical

travel distance, whether inward (–) or outward (+), indicated by the pointer.

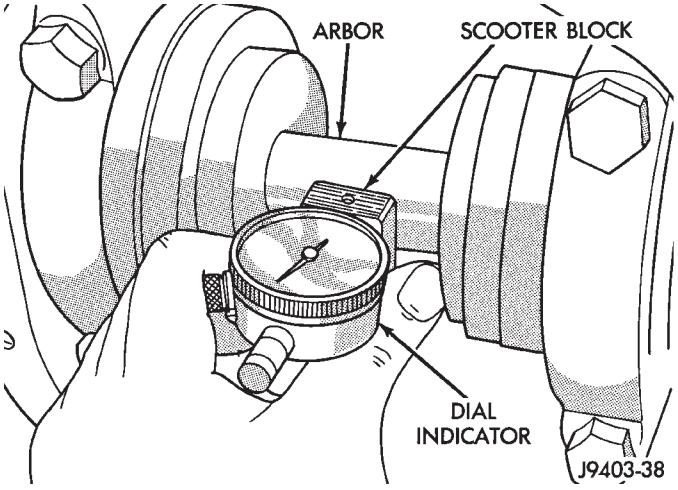


Fig. 61 Pinion Gear Depth Measurement—Typical

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.**

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

DIFFERENTIAL BEARING PRELOAD AND GEAR LASH

DIFFERENTIAL SHIM PACK MEASUREMENT

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

ADJUSTMENTS (Continued)

(1) Install dummy side bearings 6927 on differential.

(2) Install the differential case in the axle housing.

(3) Install the outboard shim/spacer (selected thickness) on each side between bearing cup and housing (Fig. 62). Use 0.142 in. (3.6 mm) as a starting point, shim/spacers are available in various thicknesses.

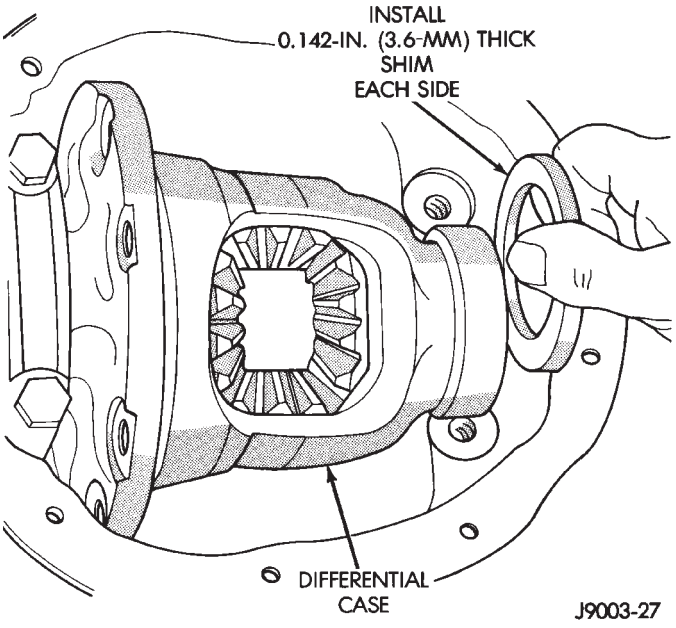


Fig. 62 Differential Bearing Shim Installation

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

(5) Attach a dial indicator to the housing. Position the indicator plunger so that it contacts the ring gear mating surface (Fig. 63).

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

(7) 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 in. (0.20 mm), an additional 0.004–in. (0.10 mm) thick shim will be needed at each side zero end play.

(8) Install zero end–play shims on each side of case.

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

(9) Add an additional 0.004–in. (0.1 mm) to each outboard shim/spacer for bearing preload.

(10) Remove differential from axle housing.

(11) Remove dummy bearings.

(12) Install new side bearing cones and cups.

(13) Install ring gear.

(14) Install differential and verify gear lash and contact pattern.

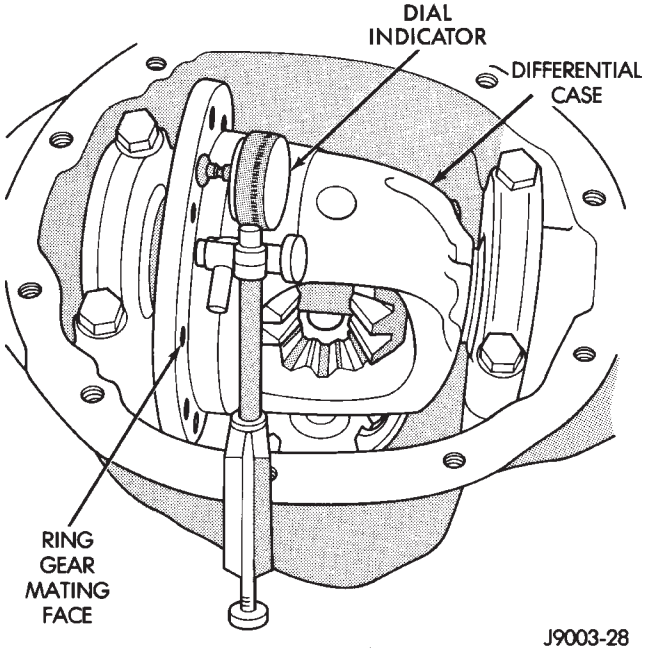


Fig. 63 Shim Measurement

(15) Proceed to Final Assembly paragraph in this section.

GEAR BACKLASH AND CONTACT PATTERN ANALYSIS

After installing new side bearings or ring and pinion set adjusting the bearing perload and gear mash backlash will be necessary.

(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. 64).

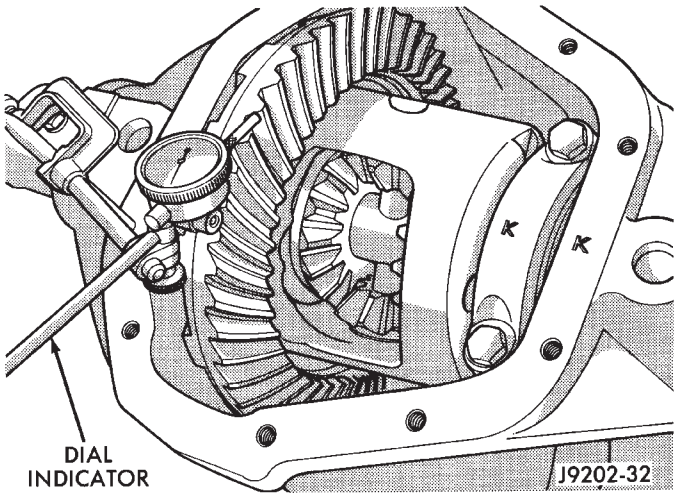


Fig. 64 Ring Gear Backlash Measurement

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

ADJUSTMENTS (Continued)

If backlash must be adjusted, spacers are available in various thicknesses. Adjust the backlash accordingly (Fig. 65). **Do not increase the total shim pack thickness, excessive bearing preload and damage will occur.**

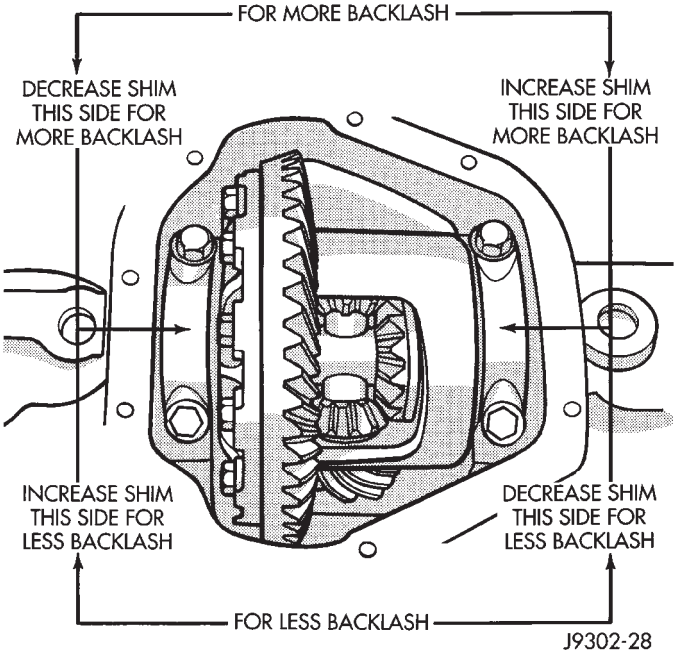


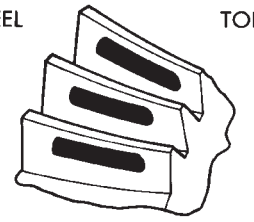
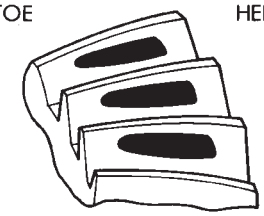
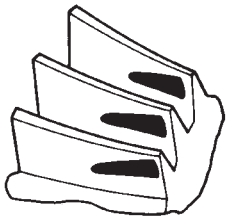
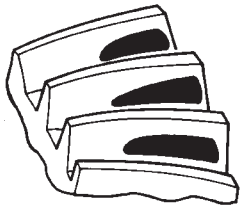
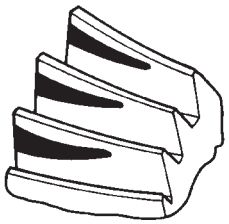
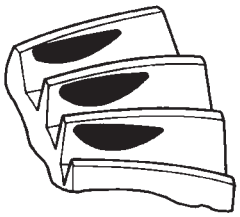
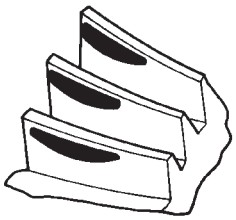
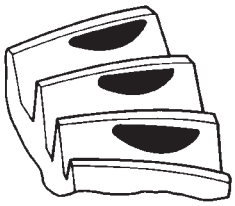
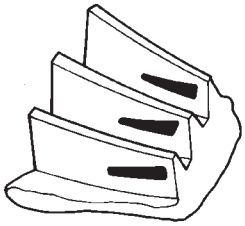
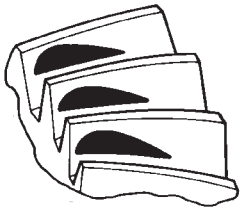
Fig. 65 Backlash Shim Adjustment

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, 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. 66) 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. 66 Gear Tooth Contact Patterns

SPECIFICATIONS

MODEL 35 AXLE

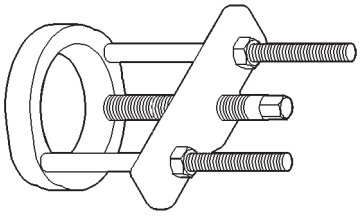
Axle Type. . . . . .Semi–Floating Hypoid
Lubricant . . . . . .SAE Thermally Stable 80W–90
Lubricant Trailer Tow . . . . . .Synthetic 75W–140
Lube Capacity. . . . . .1.66 L (3.50 pts.)
Axle Ratio 3.07, 3.55, 3.73, 4.10
Differential . . . . . .
Bearing Preload. . . . . .0.1 mm (0.004 in.)
Side Gear Clearance. . . . . .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.)

MODEL 35 AXLE

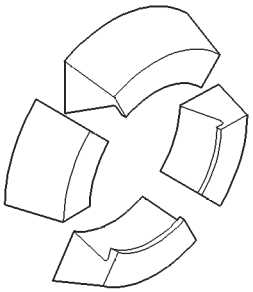
DESCRIPTION	TORQUE
Fill Hole Plug	.34 N·m (25 ft. lbs.)
Diff. Cover Bolt	.41 N·m (30 ft. lbs.)
Bearing Cap Bolt	.77 N·m (57 ft. lbs.)
Pinion Nut	.292–427 N·m (215–315 ft. lbs.)
Ring Gear Bolt	.95–122 N·m (70–90 ft. lbs.)
RWAL/ABS Sensor Bolt	.24 N·m (18. ft. lbs.)

SPECIAL TOOLS

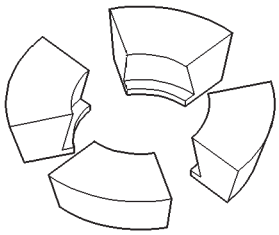
FRONT AXLE—MODEL 35



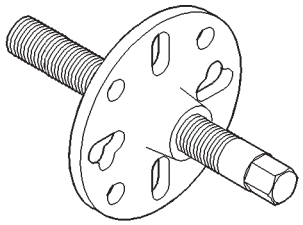
Puller—C-293-PA



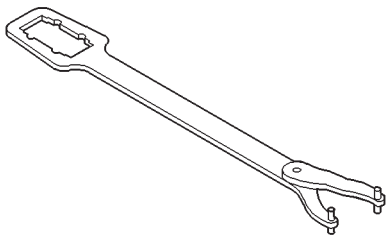
Adapter—C-293-18



Adapter—C-293-39

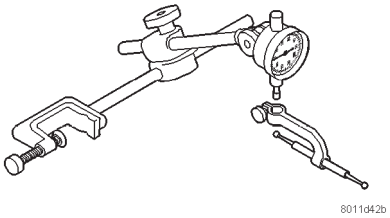


Puller—C-452

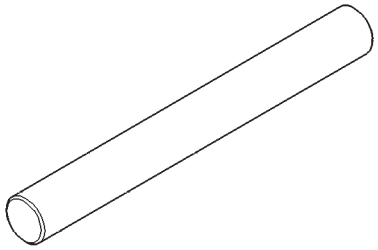


Wrench—C-3281

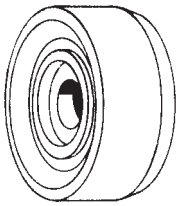
SPECIAL TOOLS (Continued)



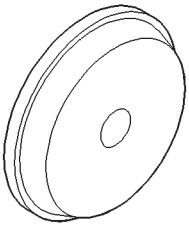
Dial Indicator—C-3339



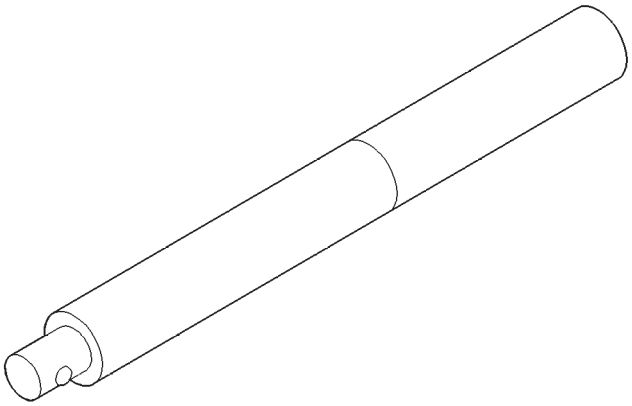
Arbor, Pinion—W-115-3



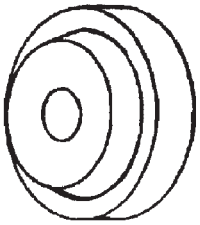
Driver—C-3716-A



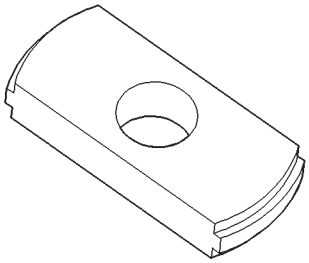
Installer—D-130



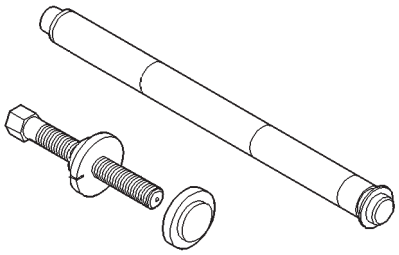
Handle—C-4171



Installer—D-146

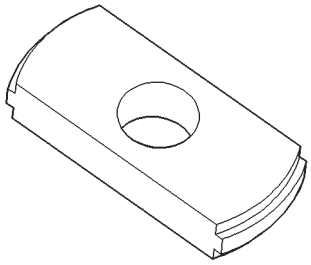


Remover—D-147

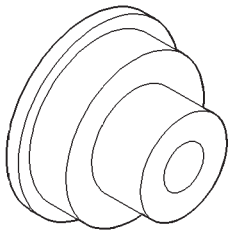


Trac-lok Tool—C-4487

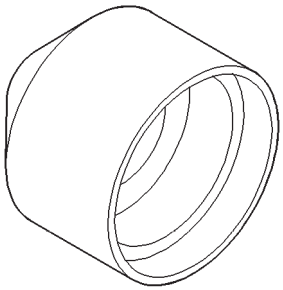
SPECIAL TOOLS (Continued)



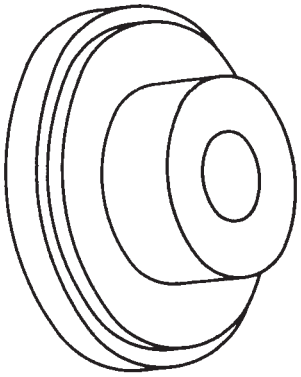
Remover—D-148



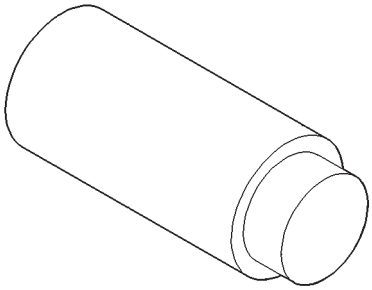
Installer—6436



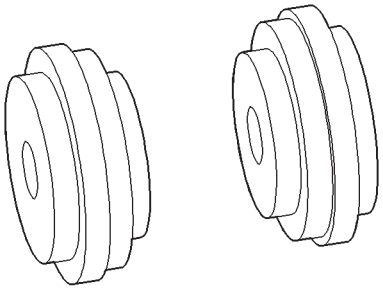
Installer—D163



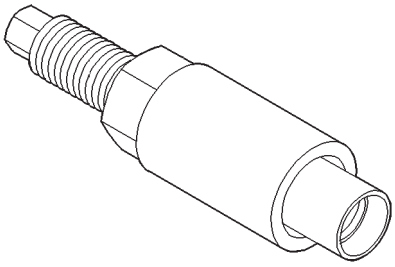
Installer—6437



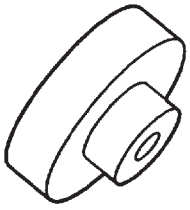
Plug—SP-3289



Disc, Axle Arbor—6732

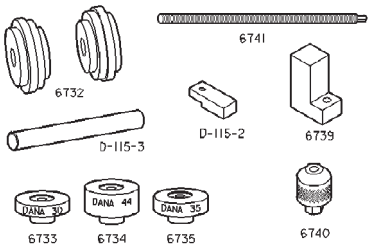


Installer—W-162-D

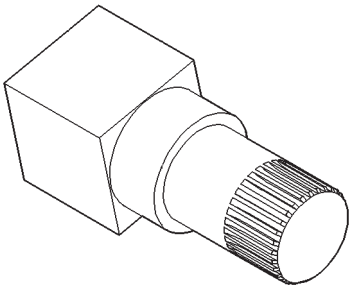


Gauge Block—6735

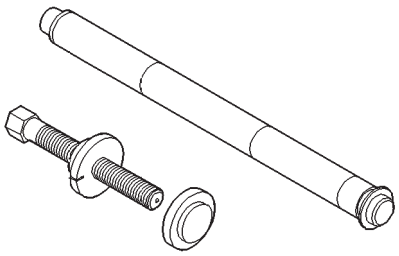
SPECIAL TOOLS (Continued)



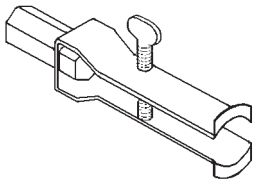
Tool Set, Pinion Depth—6774



Holder—6965



Trac-lok Tool Set—6960



Puller—7794-A

MODEL 44 AXLE

INDEX

GENERAL INFORMATION

GENERAL INFORMATION

The Model 44 housing has an aluminum center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing to form a one–piece axle housing.

The integral type housing, hypoid gear design has the center line of the pinion set below the center line 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.

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

LUBRICANT SPECIFICATIONS

Multi–purpose, hypoid gear lubricant should be used. The lubricant should have MIL–L–2105C and API GL 5 quality specifications. Mopar Hypoid Gear Lubricant conforms to both of these specifications.

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

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

DESCRIPTION AND OPERATION

AXLES

ZJ vehicles are equipped with a Model 44 rear axle.

The Model 44 axle housing has a cast aluminum center section. Two steel axle shaft tubes are pressed into the center section.

DESCRIPTION AND OPERATION (Continued)

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 44 axle has the assembly part number and gear ratio listed on a tag. The tag is attached to the right side of the housing cover. Build date identification codes on axles are stamped on the axle shaft tube cover side. The Model 44 axle has a flat housing cover gasket flange at the outer edge.

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. 1).

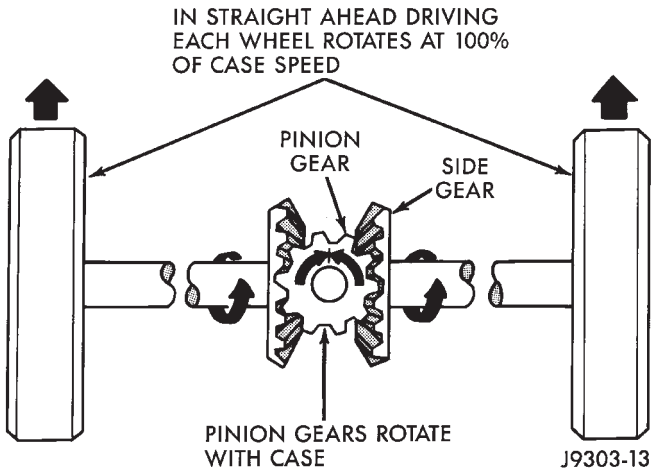


Fig. 1 Differential Operation—Straight Ahead Driving

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. 2). 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.

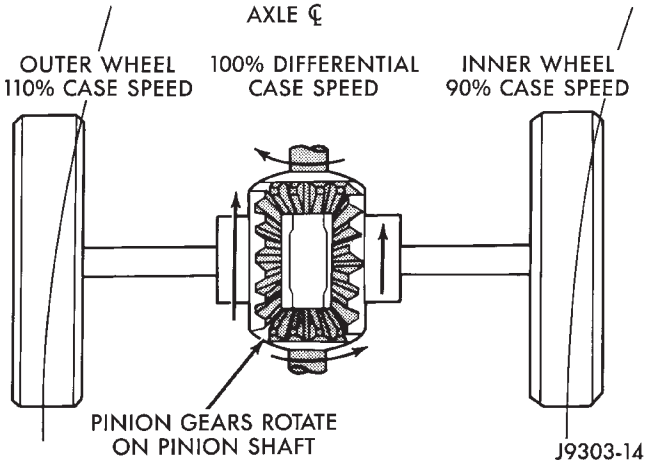


Fig. 2 Differential Operation—On Turns

TRAC-LOK 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 that is smooth appearance.

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 from separating forces generated by the side gears as torque is applied through the ring gear (Fig. 3).

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,

DESCRIPTION AND OPERATION (Continued)

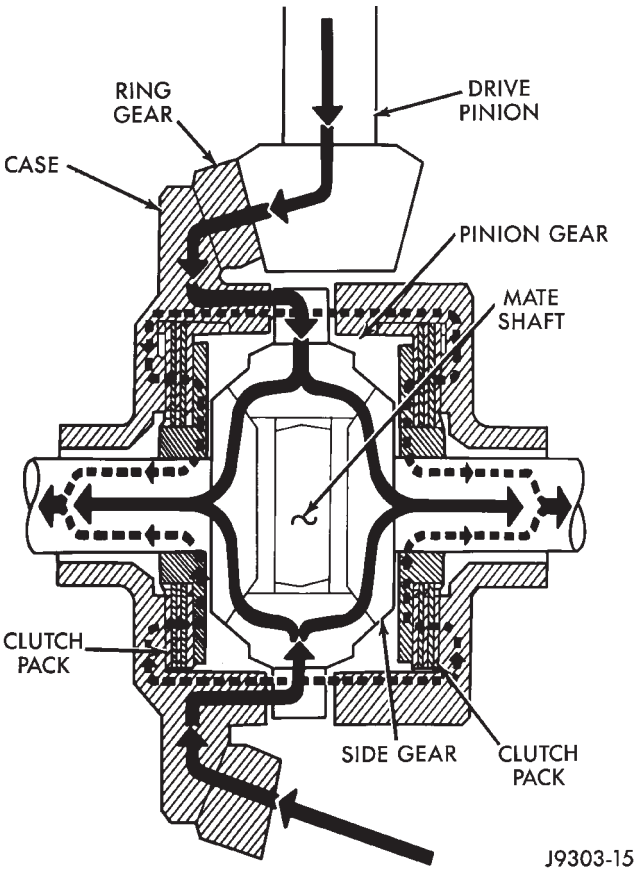


Fig. 3 Trac-lok Limited Slip Differential Operation

Trac-lok operation is normal. In extreme cases of differences of traction, the wheel with the least traction may spin.

DIAGNOSIS AND TESTING

GENERAL INFORMATION

The Model 44 housing has an aluminum center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing to form a one–piece axle housing.

The integral type housing, hypoid gear design has the center line of the pinion set below the center line 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.

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

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. The side 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.

DIAGNOSIS AND TESTING (Continued)

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/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 in. (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.

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS

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.

DIAGNOSIS AND TESTING (Continued)

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

DIAGNOSIS AND TESTING (Continued)

TRAC-LOK 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 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) Raise one rear wheel until it is completely off the ground.

(4) Remove wheel and bolt Special Tool 6790 to studs.

(5) Use torque wrench on special tool to rotate wheel and read rotating torque (Fig. 4).

(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.

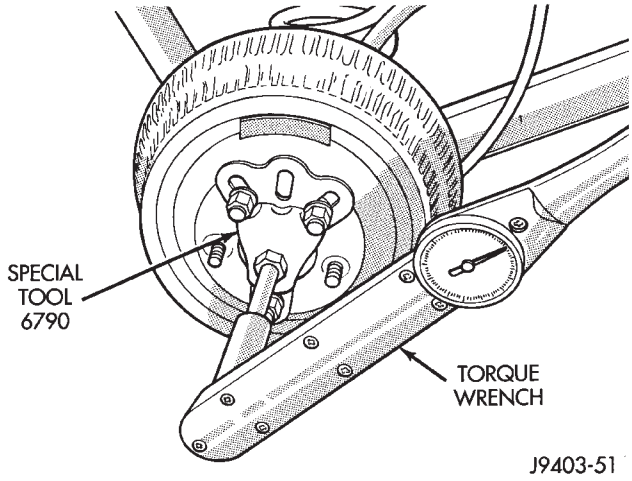


Fig. 4 Trac-loc Test

(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. 5). **Allow the sealant to cure for a few minutes.**

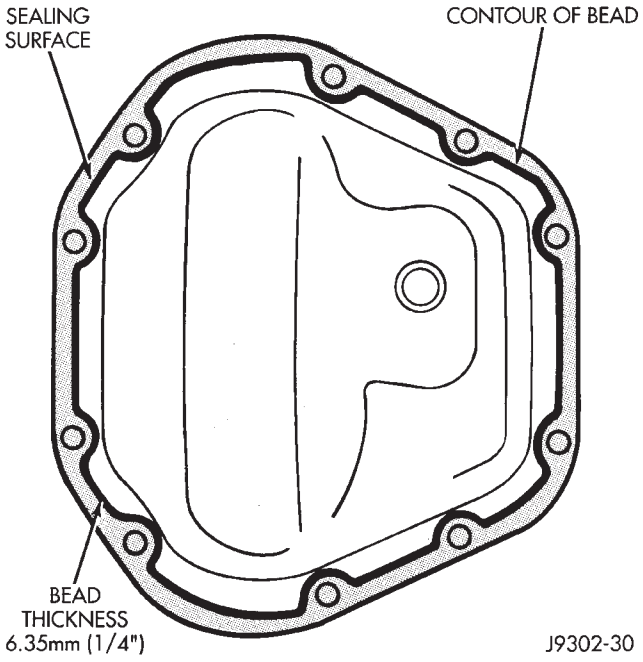


Fig. 5 Typical Housing Cover With Sealant

Install the housing cover within 5 minutes after applying the sealant.

(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.

SERVICE PROCEDURES

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.

SERVICE PROCEDURES (Continued)

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.

REMOVAL AND INSTALLATION

REAR AXLE

REMOVAL

(1) Raise and support the vehicle.

(2) Position a suitable lifting device under the axle.

(3) Secure axle to device.

(4) Remove the wheels and tires.

(5) Remove the brake components from the axle, refer to Group 5, Brakes.

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

(7) Mark the propeller shaft and yokes for installation alignment reference.

(8) Remove propeller shaft.

(9) Disconnect stabilizer bar links.

(10) Disconnect shock absorbers from axle.

(11) Disconnect track bar.

(12) Disconnect upper and lower suspension arms from the axle brackets.

(13) Separate the axle from the vehicle.

INSTALLATION

NOTE: The weight of the vehicle must be supported by the springs before suspension arms and track bar fasteners can be tightened. If the springs are not at their normal ride position, vehicle ride height and handling could be affected.

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

(2) Position the upper and lower suspension arms on the axle brackets. Install nuts and bolts, do not tighten bolts at this time.

(3) Install track bar and attachment bolts, do not tighten bolts at this time.

(4) Install shock absorber and tighten nuts to 60 N·m (44 ft. lbs.) torque

(5) Install stabilizer bar link and tighten nuts to 36 N·m (27 ft. lbs.) torque

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

(7) Install axle vent hose

(8) Align propeller shaft and pinion yoke reference marks. Install U-joint straps and bolts tighten to 19 N·m (14 ft. lbs.) torque

(9) Install the wheels and tires.

(10) Check and add gear lubricant if needed.

(11) Remove support and lower the vehicle.

(12) Tighten lower suspension arms bolts to 177 N·m (130 ft. lbs.) torque.

(13) Tighten upper suspension arms bolts to 75 N·m (55 ft. lbs.) torque.

(14) Tighten track bar bolts to 100 N·m (74 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. 6).

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

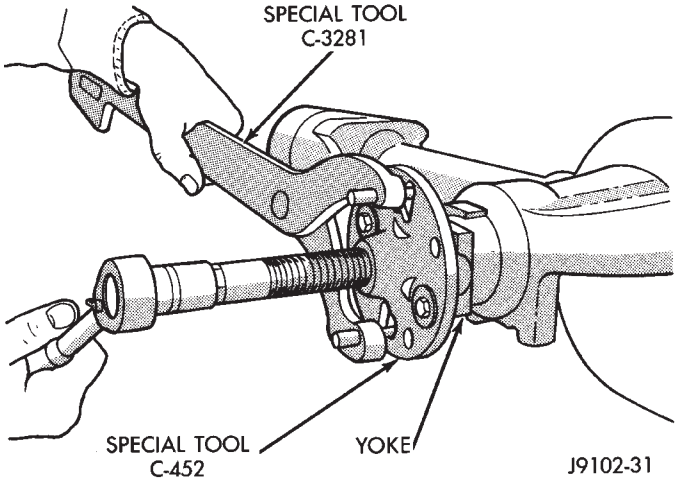


Fig. 6 Pinion Yoke Removal

REMOVAL AND INSTALLATION (Continued)

(9) Use Remover 7794A and slide hammer to remove the pinion gear seal (Fig. 7).

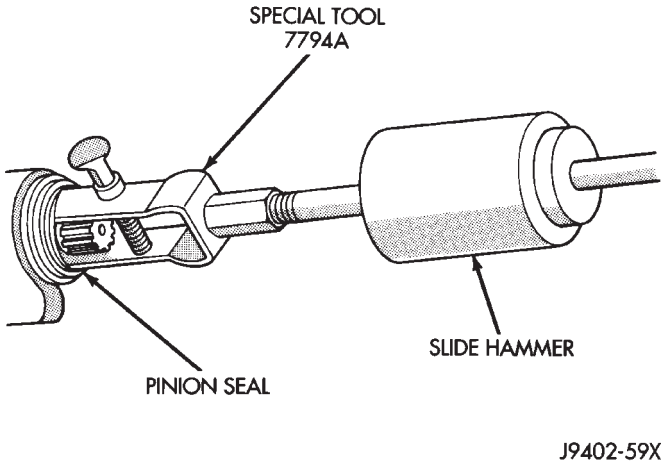


Fig. 7 Seal Removal

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. 8).

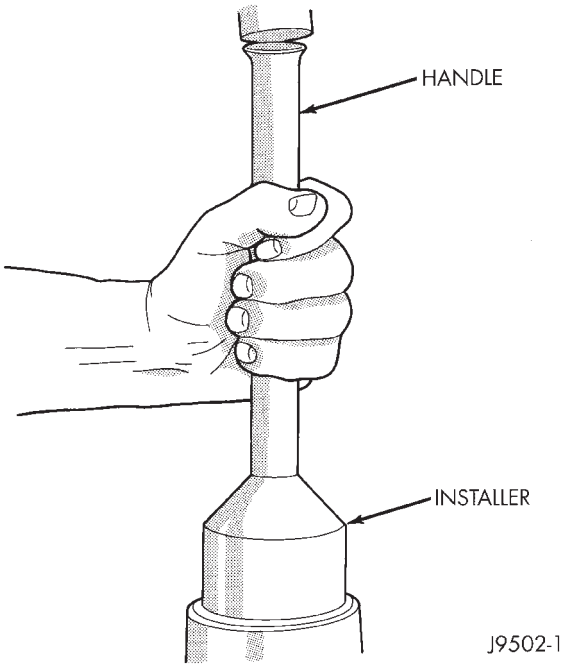


Fig. 8 Pinion Seal Installation

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

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

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 (Fig. 9).

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

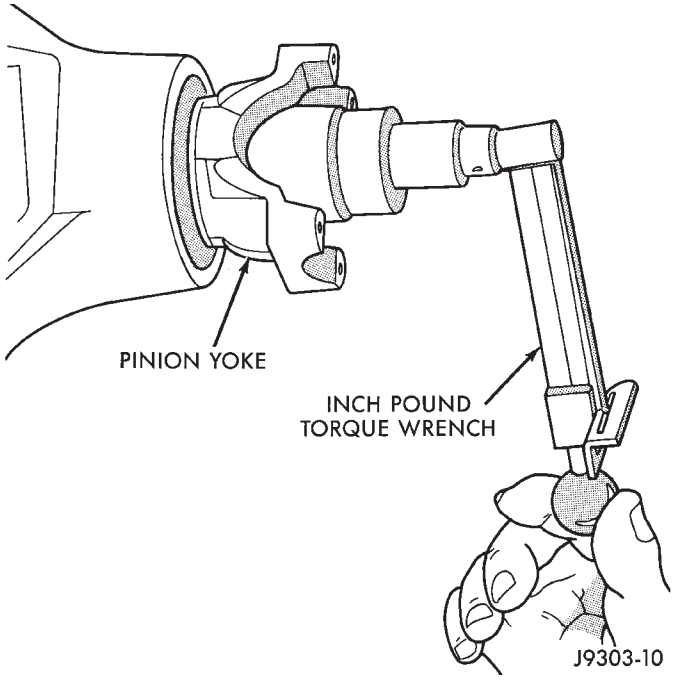


Fig. 9 Check Pinion Rotation Torque

(6) Use Flange Wrench 6719 to retain the yoke and shaft (Fig. 10). Tighten the shaft nut in very small increments.

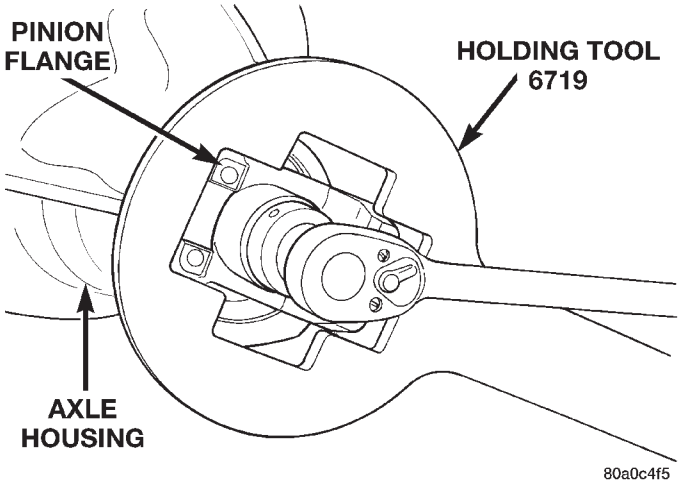


Fig. 10 Tightening Pinion Shaft Nut

REMOVAL AND INSTALLATION (Continued)

(7) Continue tightening the shaft nut in small increments until the correct bearing rotation 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.

(11) 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. 11).

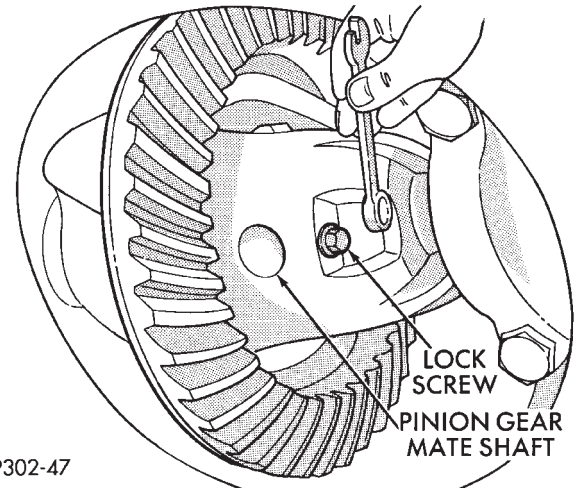


Fig. 11 Mate Shaft Lock Screw

(7) Force the axle shaft in toward the center of the vehicle. Remove the axle shaft C–clip lock from the axle shaft (Fig. 12).

(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.

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

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

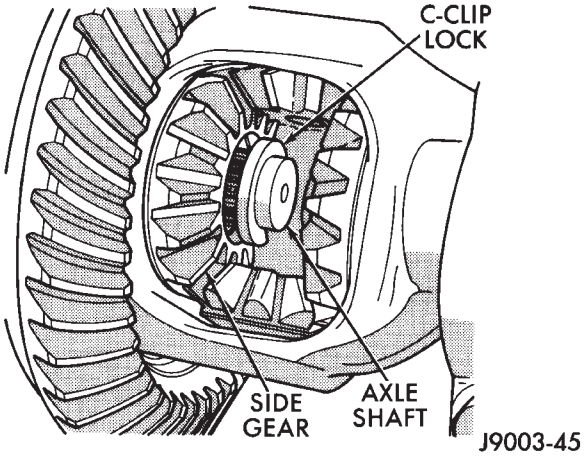


Fig. 12 Axle Shaft C–Clip Lock

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. 13) with Bearing Removal Tool Set 6310.

(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.

REMOVAL AND INSTALLATION (Continued)

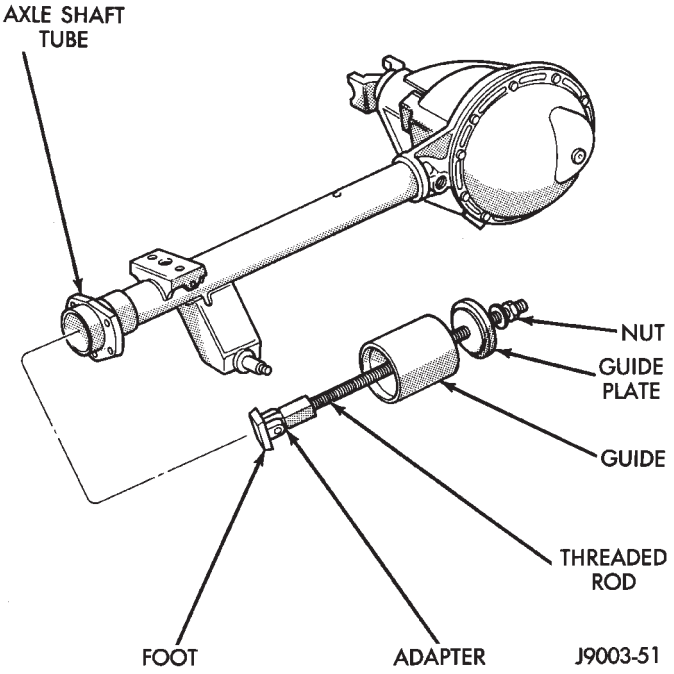


Fig. 13 Axle Shaft Bearing Removal Tool

(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. 14) with Installer 6437 and Handle C–4171.

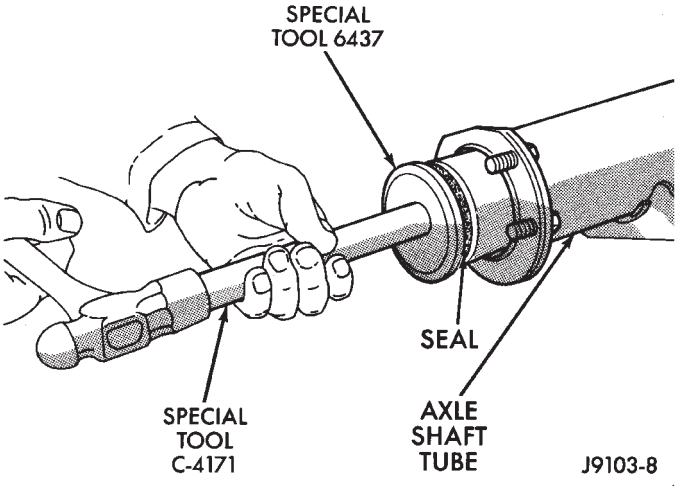


Fig. 14 Axle Shaft Seal Installation

(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.

(1) Note the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 15).

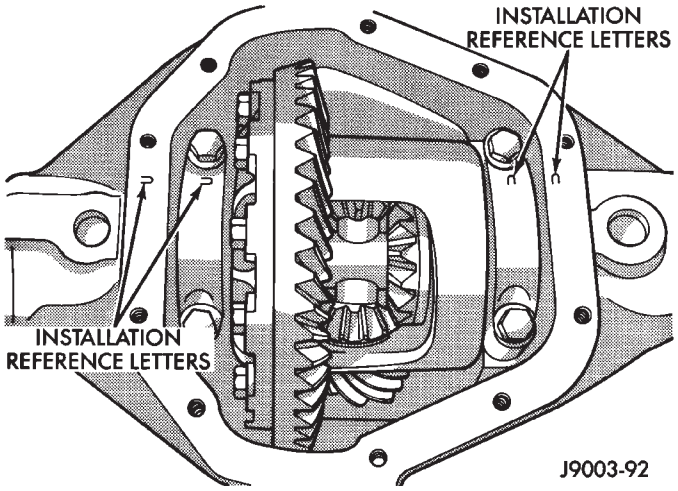


Fig. 15 Bearing Cap Identification

(2) Remove the differential bearing caps.

(3) Position Spreader W–129–B with the tool dowel pins seated in the locating holes (Fig. 16). Install the hold down clamps and tighten the tool turnbuckle finger–tight.

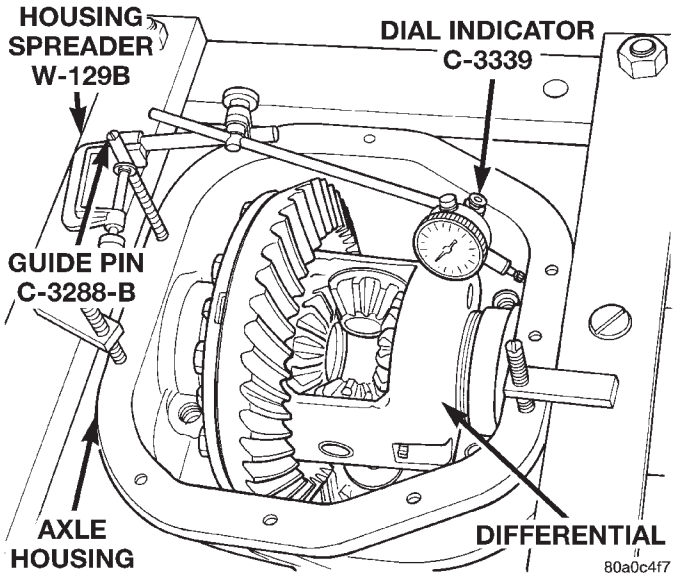


Fig. 16 Spread Differential Housing

(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. 16) 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.

REMOVAL AND INSTALLATION (Continued)

(5) Separate the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 16).

(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. 17).

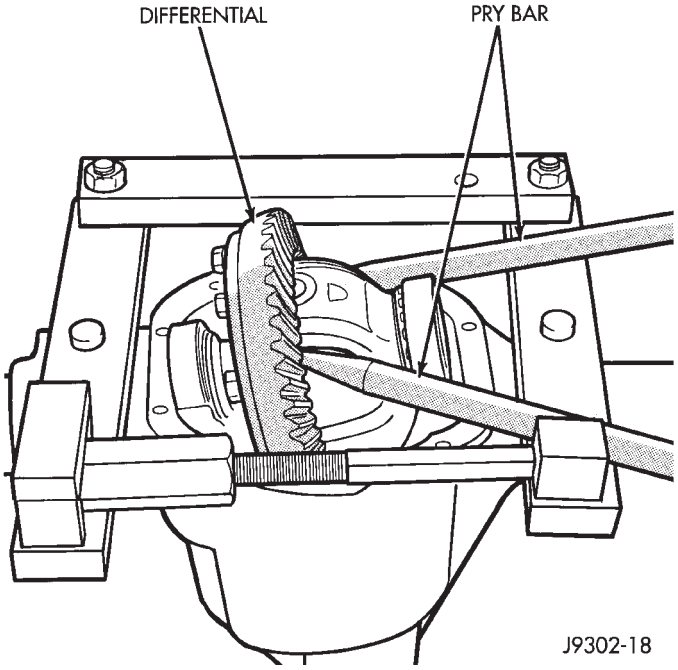


Fig. 17 Differential Removal

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

DIFFERENTIAL INSTALLATION

(1) Position Spreader W–129–B with the tool dowel pins seated in the locating holes (Fig. 16). Install the hold down 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. 16) 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. 16).

(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. 18). Remove the spreader.

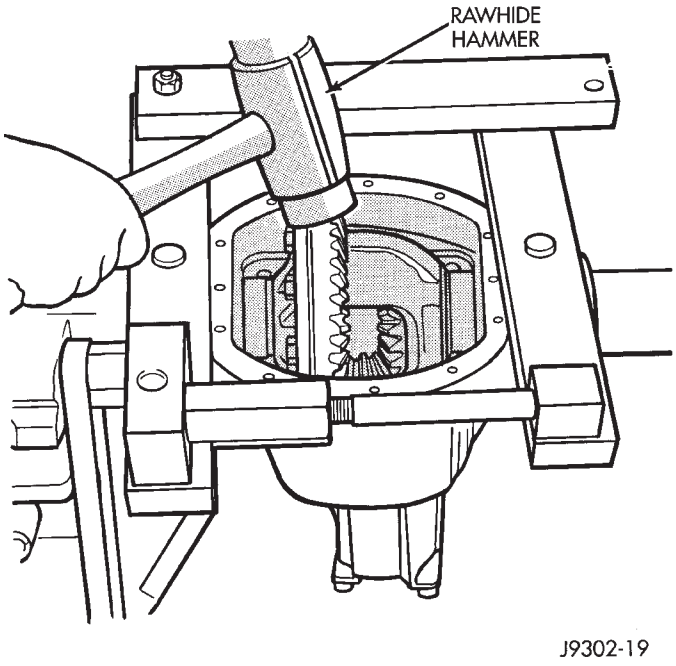


Fig. 18 Differential Installation

(7) Install the bearing caps at their original locations (Fig. 19). Tighten the bearing cap bolts to 77 N·m (57 ft. lbs.) torque.

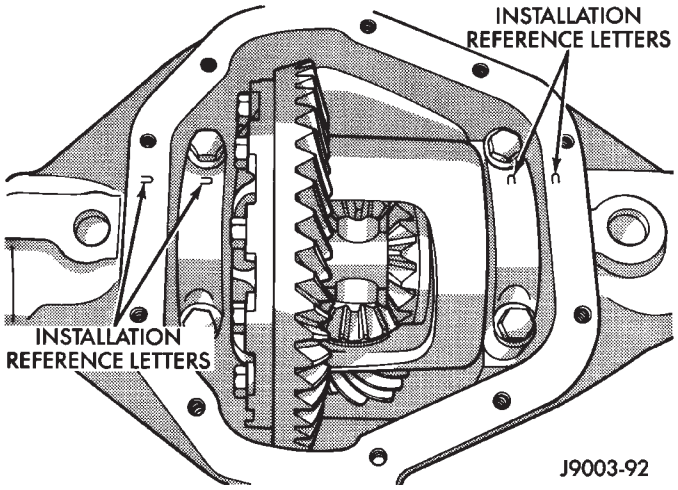


Fig. 19 Differential Bearing Cap Reference Letters

REMOVAL AND INSTALLATION (Continued)

DIFFERENTIAL SIDE BEARINGS

REMOVAL

(1) Remove Differential case from axle housing.

(2) Remove the bearings from the differential case with Press 938, and Adapter 1130 (Fig. 20).

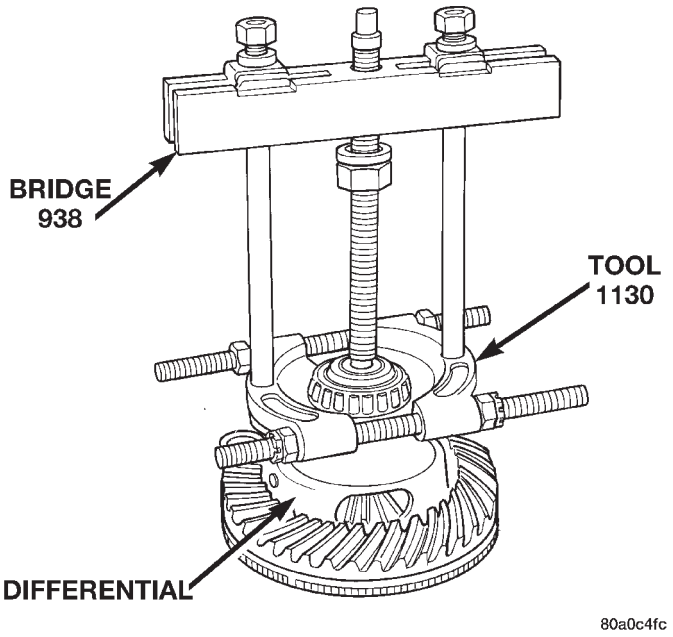


Fig. 20 Differential Bearing Removal

DIFFERENTIAL SIDE BEARING INSTALLATION

If ring and pinion gears have been replaced, verify differential side bearing preload and gear mesh backlash.

(1) Using tool C-4340 with handle C-4171, install differential side bearings (Fig. 21).

(2) Install differential in axle housing.

RING GEAR

The ring and pinion gears are service in a matched set. Do not replace the ring gear with replacing the pinion gear. Refer to Pinion Gear removal and installation paragraph in this section for proper procedure.

REMOVAL

(1) Remove differential from axle housing.

(2) Place differential case in a suitable vise with soft metal jaw protectors. (Fig. 22)

(3) Remove bolts holding ring gear to differential case.

(4) Using a soft hammer, drive ring gear from differential case (Fig. 22).

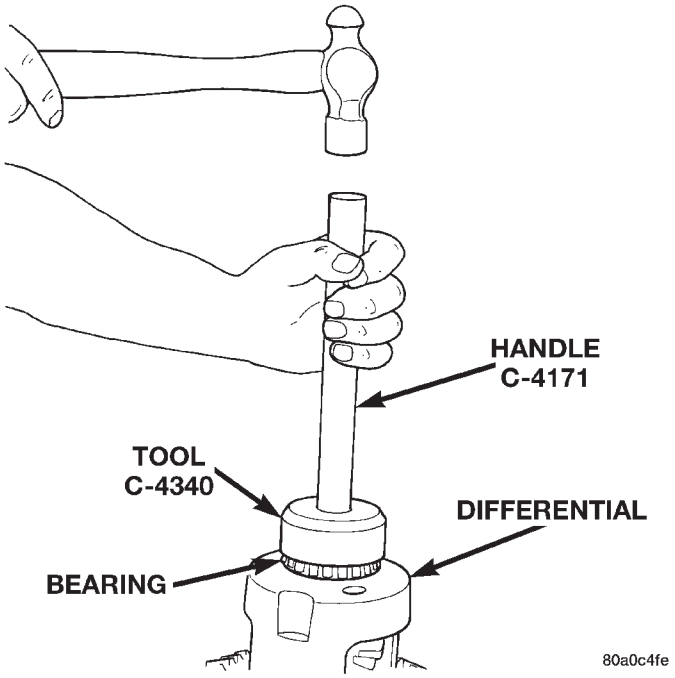


Fig. 21 Install Differential Side Bearings

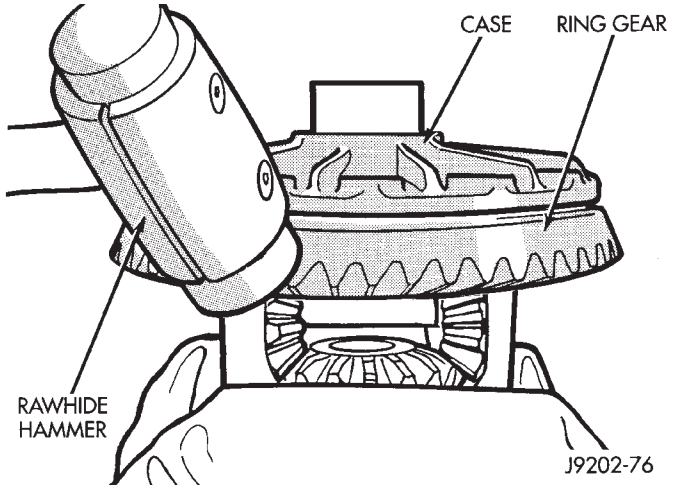


Fig. 22 Ring Gear Removal

RING GEAR INSTALLATION

CAUTION: Do not reuse the bolts that held the ring gear to the differential case. The bolts can fracture causing extensive damage.

(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. 23).

(3) Install differential in axle housing and verify gear mesh and contact pattern.

REMOVAL AND INSTALLATION (Continued)

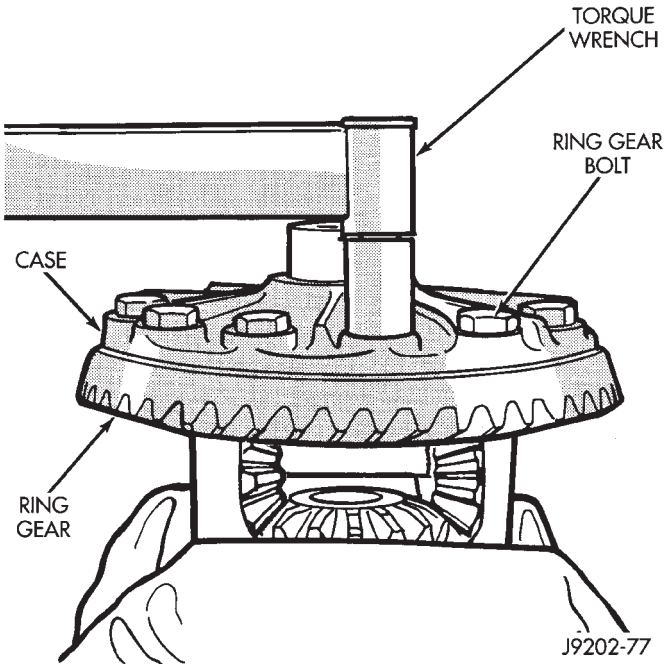


Fig. 23 Ring Gear Bolt Installation

PINION GEAR

REMOVAL

(1) Remove differential assembly from axle housing.

(2) Remove the pinion yoke nut and washer. Use Remover C–452 and Wrench C–3281 to remove the pinion yoke (Fig. 24).

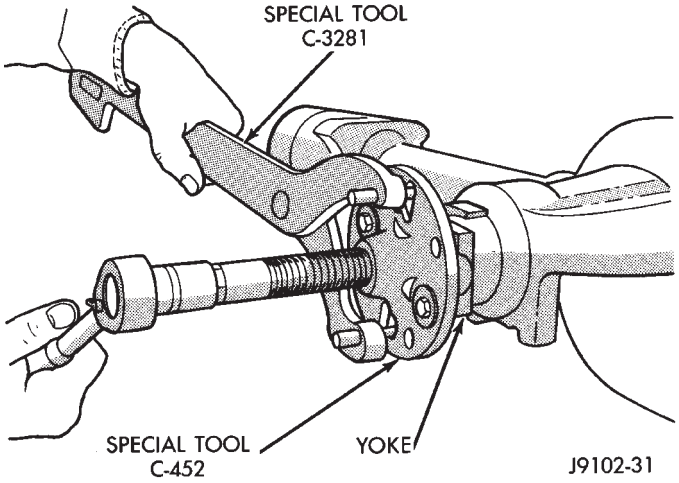


Fig. 24 Pinion Yoke Removal

(3) Remove the pinion gear from housing (Fig. 25). Catch the pinion with your hand to prevent it from falling and being damaged.

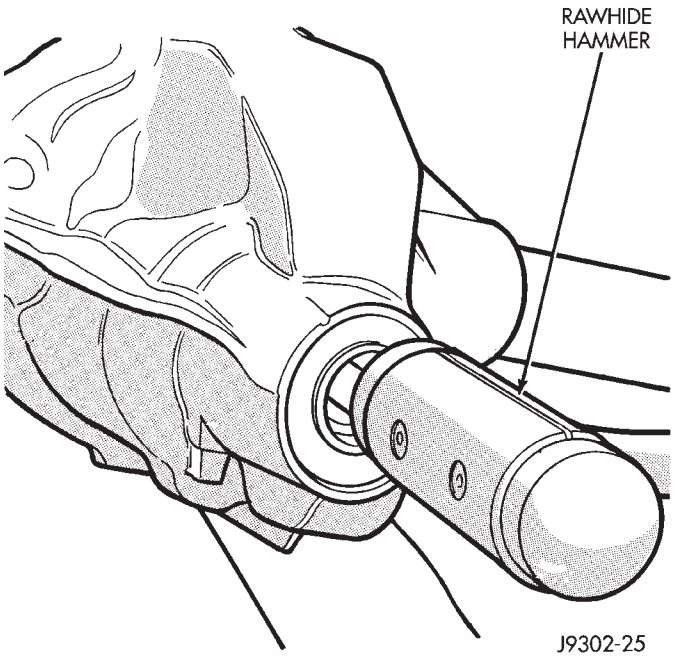


Fig. 25 Remove Pinion Gear

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

(5) Remove oil slinger, front bearing.

(6) Remove the front pinion bearing cup and seal with Remover D-103 and Handle C–4171 (Fig. 26).

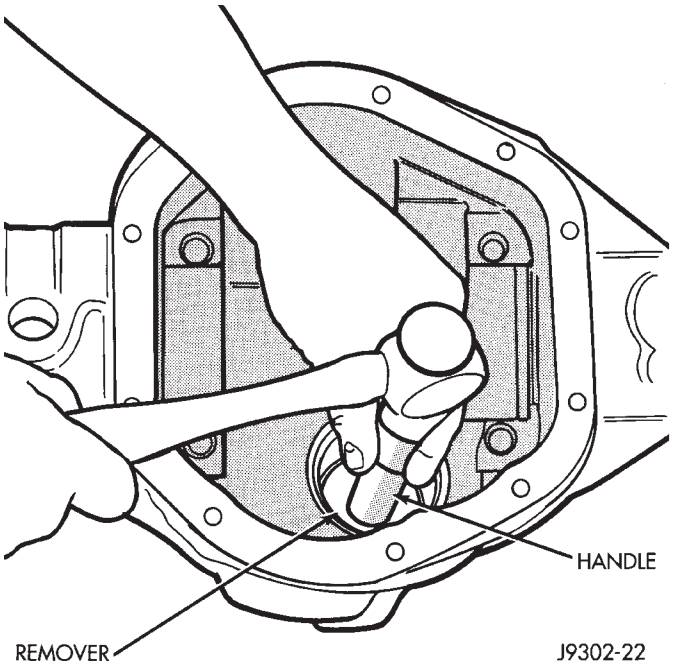


Fig. 26 Front Bearing Cup Removal

REMOVAL AND INSTALLATION (Continued)

(7) Remove the rear bearing cup from housing (Fig. 27). Use Remover C-4307 and Handle C–4171.

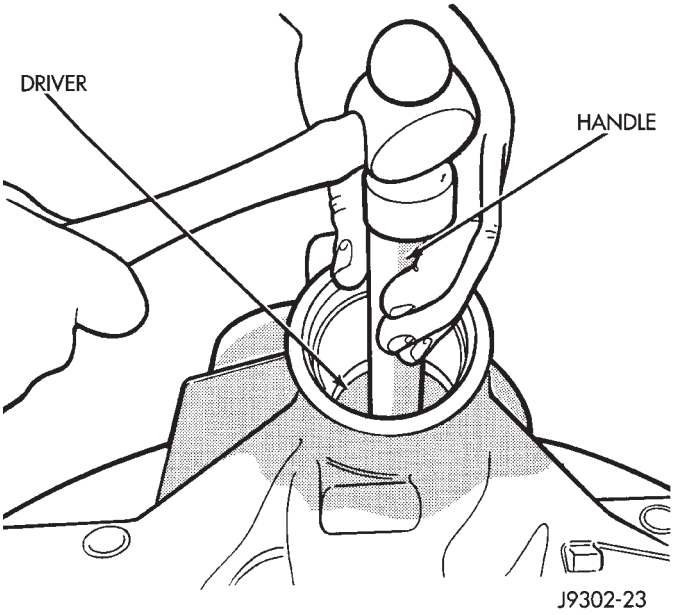


Fig. 27 Rear Bearing Cup Removal

(8) Remove the collapsible preload spacer (Fig. 28).

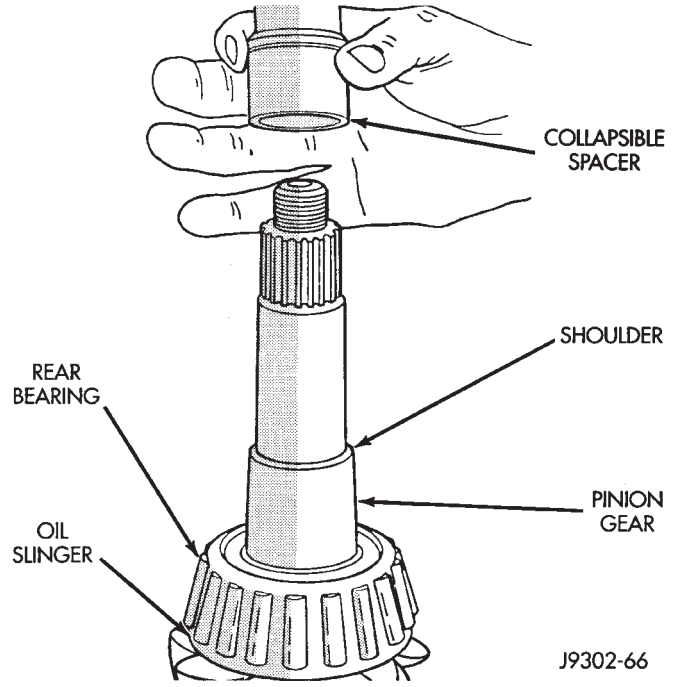


Fig. 28 Collapsible Spacer

(9) Remove the inner bearing from the pinion with Puller C–293PA and Adapter C–293–39 (Fig. 29).

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

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

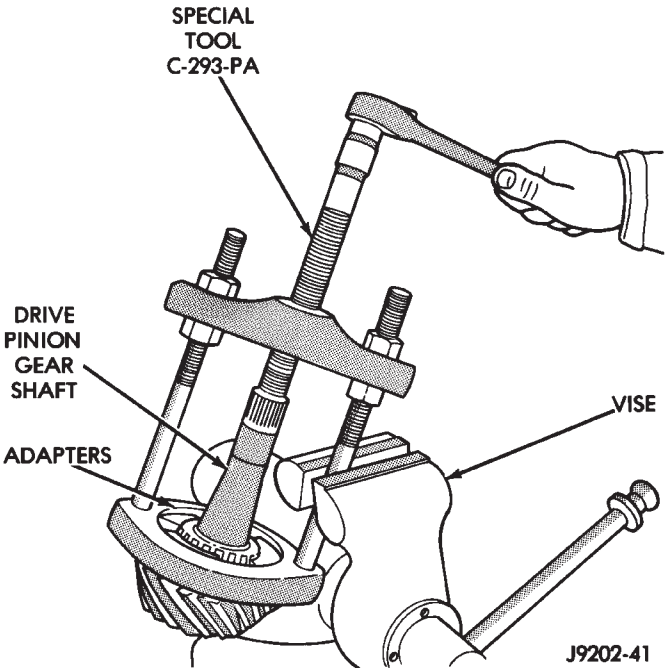


Fig. 29 Inner Bearing Removal

PINION GEAR INSTALLATION

(1) Install the pinion rear bearing cup with Installer C—4308 and Driver Handle C–4171 (Fig. 30). Ensure cup is correctly seated.

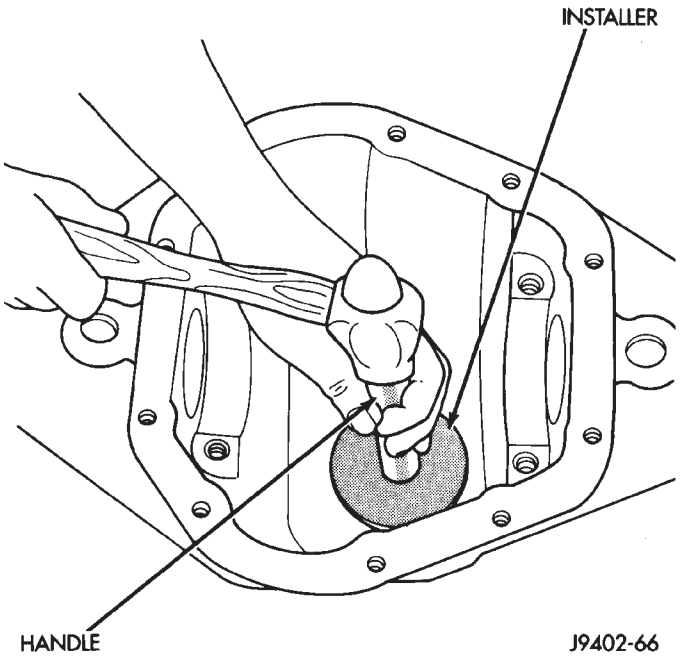


Fig. 30 Pinion Rear Bearing Cup Installation

REMOVAL AND INSTALLATION (Continued)

(2) Install the pinion front bearing cup with Installer D–129 and Handle C–4171 (Fig. 31).

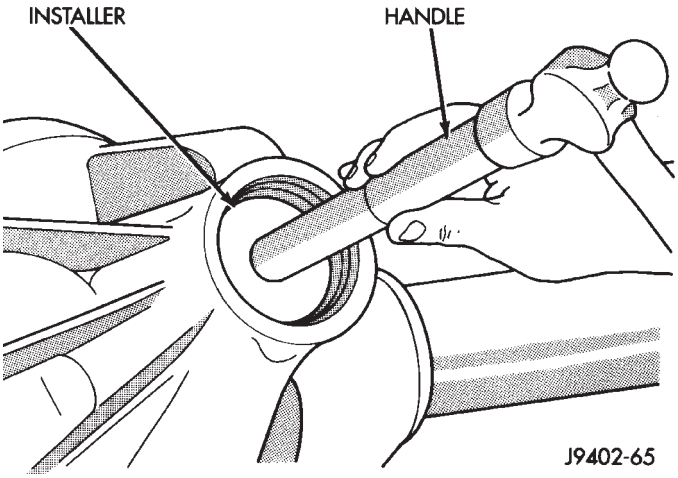


Fig. 31 Pinion Front Bearing Cup Installation

(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. 32).

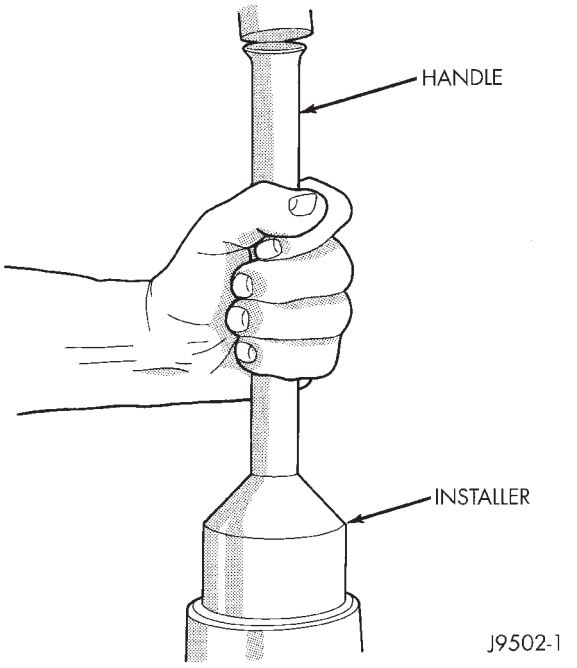


Fig. 32 Pinion Seal Installation

NOTE: Pinion depth shims are placed between the rear pinion bearing cone and pinion gear to achieve proper ring and pinion gear mesh. If the factory installed ring and pinion gears are reused, the pinion depth shim should not require replacement. Refer to Pinion Gear Deptht paragraph in this section to select the proper thickness shim before installing rear pinion bearing cone.

(4) Place the proper thickness depth shim on the pinion gear and install the rear bearing.

(5) Install the rear bearing (and slinger if used) on the pinion gear with Installer 6448 (Fig. 33).

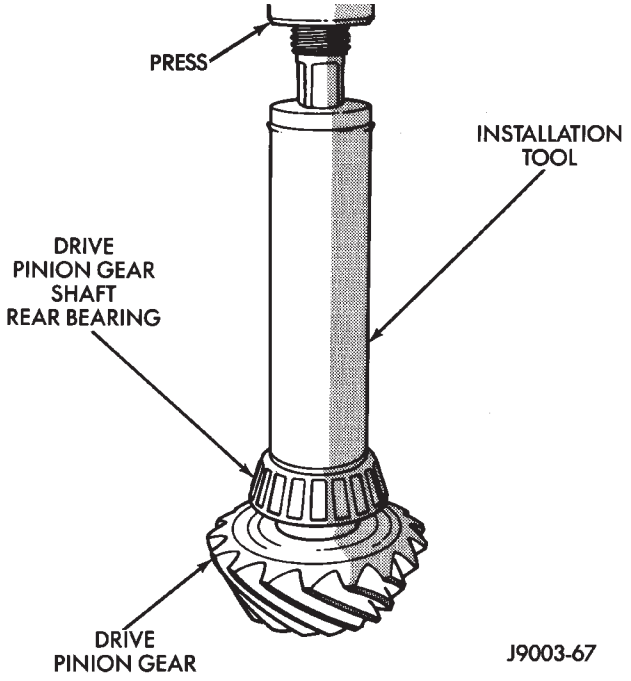


Fig. 33 Shaft Rear Bearing Installation

(6) Install a new collapsible preload spacer on pinion shaft and install pinion gear in housing (Fig. 34).

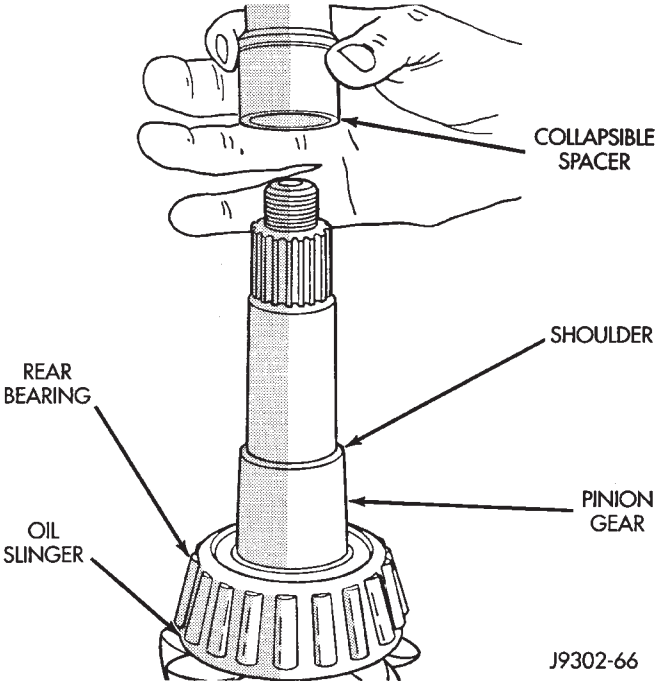


Fig. 34 Collapsible Preload Spacer

REMOVAL AND INSTALLATION (Continued)

(7) Install yoke with Installer W–162D and Wrench 6719 (Fig. 35).

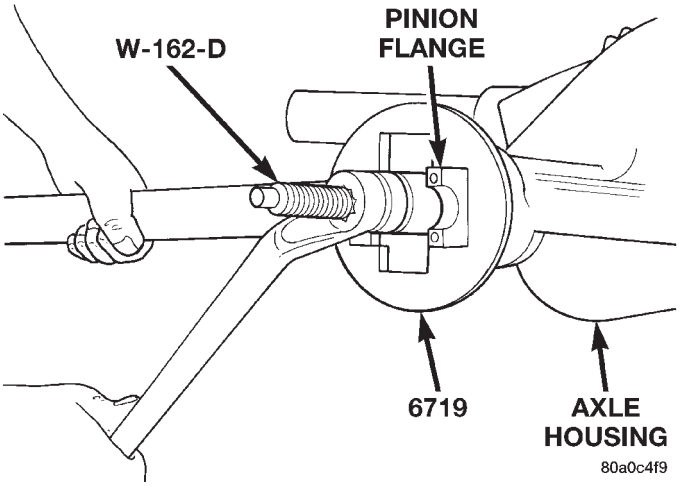


Fig. 35 Pinion Yoke Installation—Typical

(8) Install the yoke washer and a new nut on the pinion gear. Tighten the nut to 298 N·m (220 ft. lbs.) minimum. **Do not over–tighten.** Maximum torque is 380 N·m (280 ft. lbs.).

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) Use Flange Wrench 6719 to retain the yoke (Fig. 36). Slowly tighten the nut in small increments until the rotating torque is achieved. Measure the preload torque frequently to avoid over–tightening the nut.

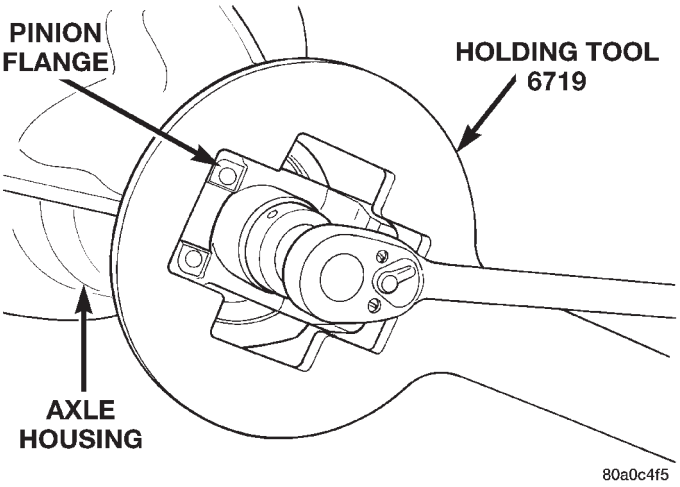


Fig. 36 Tightening Pinion Nut

(10) Check bearing preload torque with an inch pound torque wrench (Fig. 37). 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.).

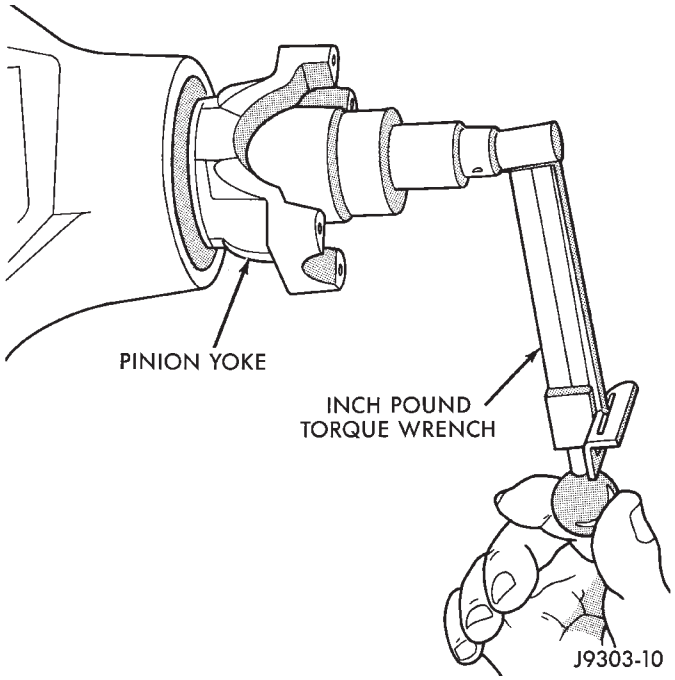


Fig. 37 Check Pinion Gear Rotation Torque

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. 38). Allow the sealant to cure for a few minutes.

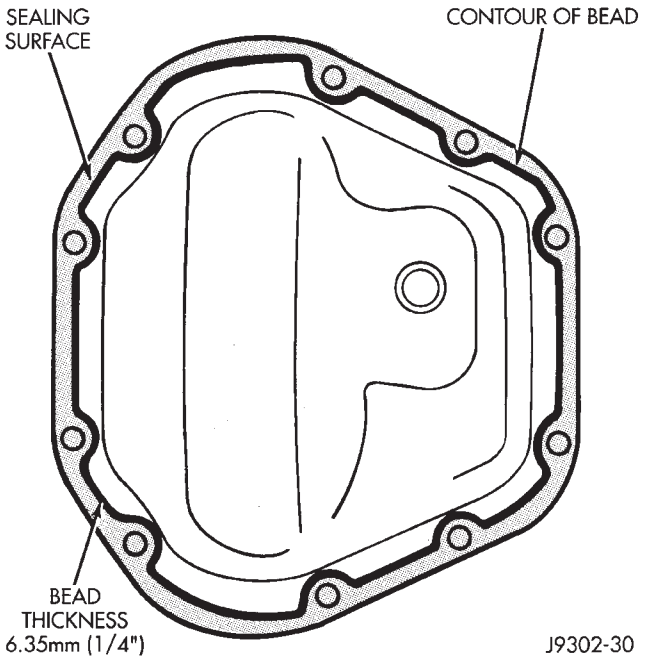


Fig. 38 Typical Housing Cover With Sealant

REMOVAL AND INSTALLATION (Continued)

Install the housing cover within 5 minutes after applying the sealant.

(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.

DISASSEMBLY AND ASSEMBLY

STANDARD DIFFERENTIAL

DISASSEMBLE

(1) Remove pinion gear mate shaft.

(2) Rotate the differential side gears and remove the pinion mate gears and thrust washers (Fig. 39).

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

DIFFERENTIAL ASSEMBLE

(1) Differential side gears and thrust washers

(2) Pinion gears and thrust washers

(3) Pinion gear mate shaft (align holes in shaft and case)

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

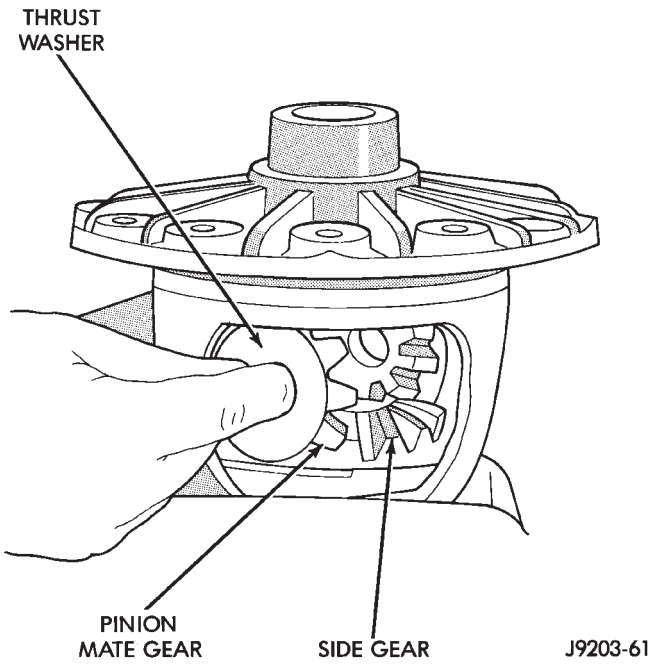


Fig. 39 Pinion Mate Gear Removal

(5) Install differential case in axle housing. Refer to Differential removal and installation procedure.

TRAC-LOK DIFFERENTIAL

The **Trac–Lok** (limited–slip) differential components are illustrated in (Fig. 40). Refer to this illustration during repair service.

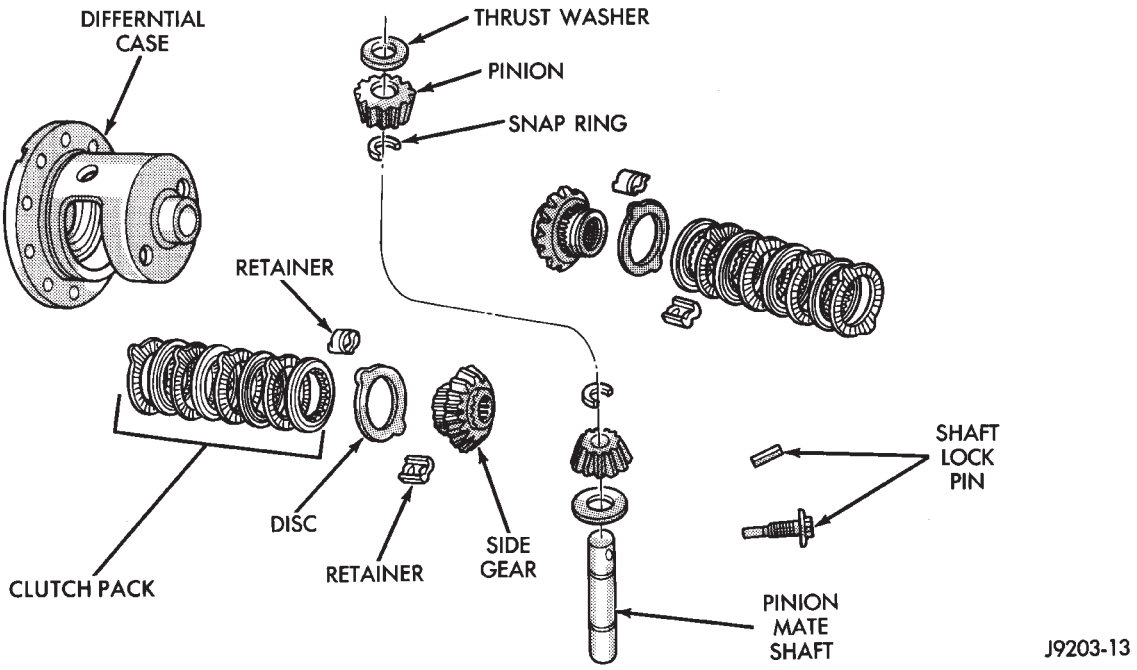


Fig. 40 Trac–Lok Differential Components

DISASSEMBLY AND ASSEMBLY (Continued)

DISASSEMBLY

Service to the Trac–Lok differential requires the use of Tool Set C–4487 (J–23781). Refer to Model 44 Axle section in this Group for Differential Removal and Installation.

(1) Clamp Side Gear Holding Tool 6963 in a vise.

(2) Position the differential case on the holding tool (Fig. 41). Place shop towels under the differential to avoid damage if removal of the ring gear is required (Fig. 41).

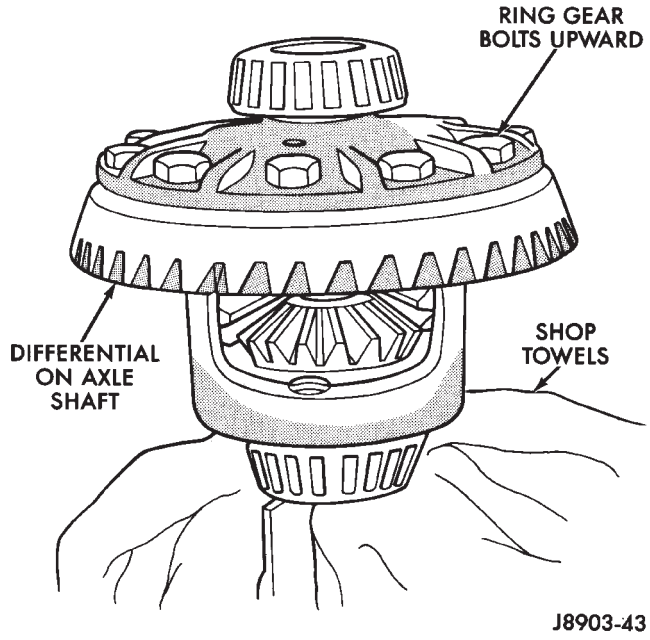


Fig. 41 Differential Case Holding Tool

(3) If ring gear replacement is required, remove **and discard** the bolts holding the ring gear to the case. Tap the ring gear with a rawhide or plastic mallet and separate ring gear from case (Fig. 42).

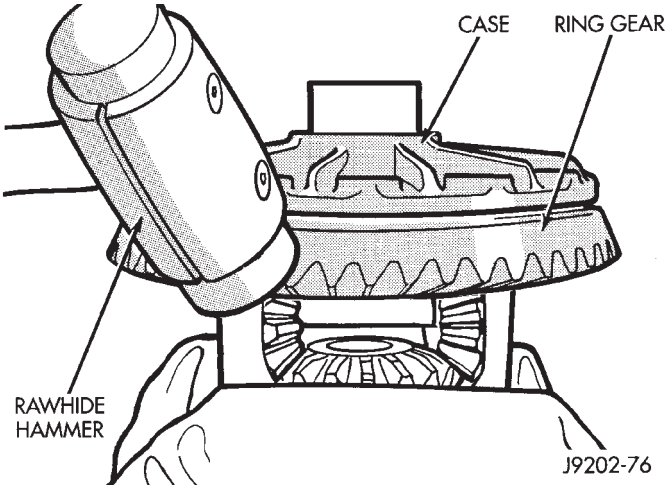


Fig. 42 Ring Gear Removal

(4) Remove the pinion gear mate shaft lock screw (Fig. 43).

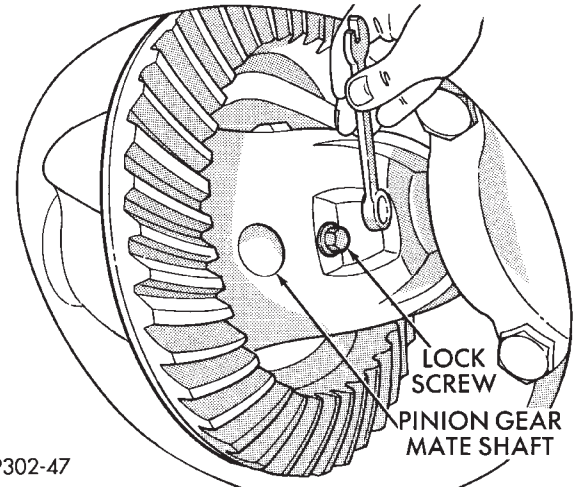


Fig. 43 Mate Shaft Lock Screw

(5) Remove the pinion gear mate shaft. If necessary, use a drift and hammer (Fig. 44).

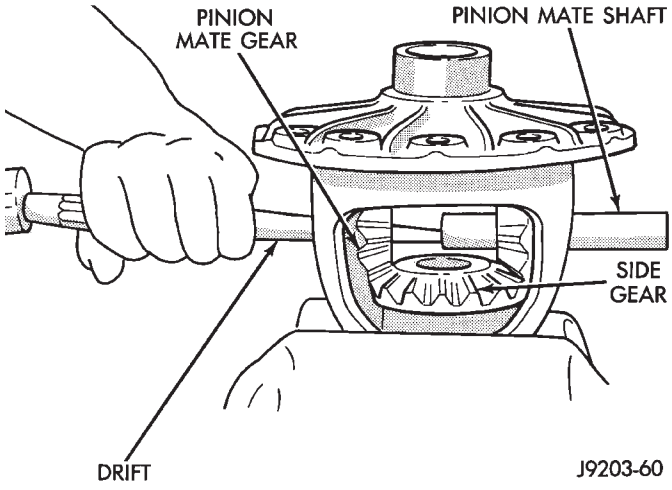


Fig. 44 Mate Shaft Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(6) Install and lubricate Step Plate C–4487–1 (Fig. 45).

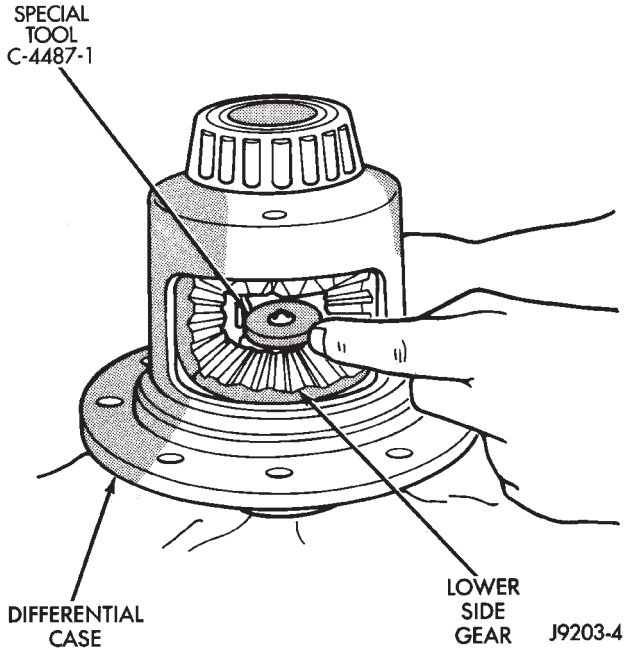


Fig. 45 Step Plate Tool Installation

(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. 46) to prevent adapter from turning.

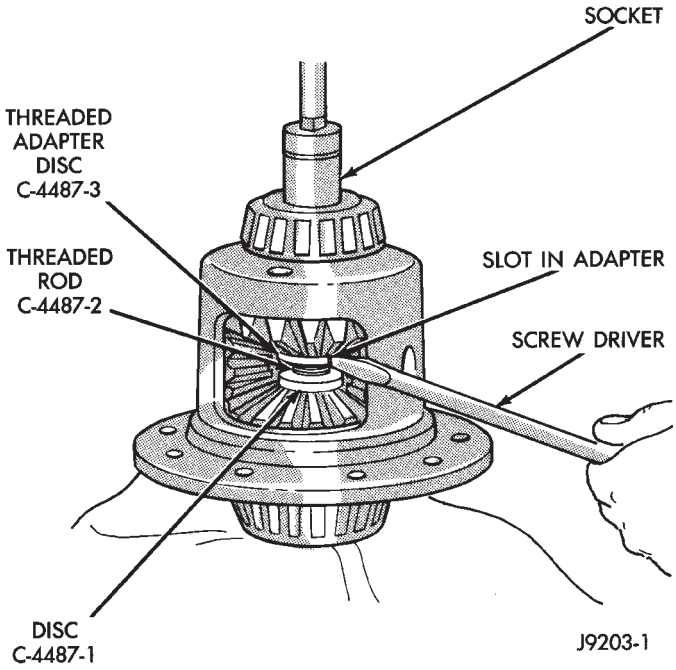


Fig. 46 Threaded Adapter Installation

(9) Tighten forcing screw tool 122 N·m (90 ft. lbs.) (maximum) to compress Belleville springs in clutch packs (Fig. 47).

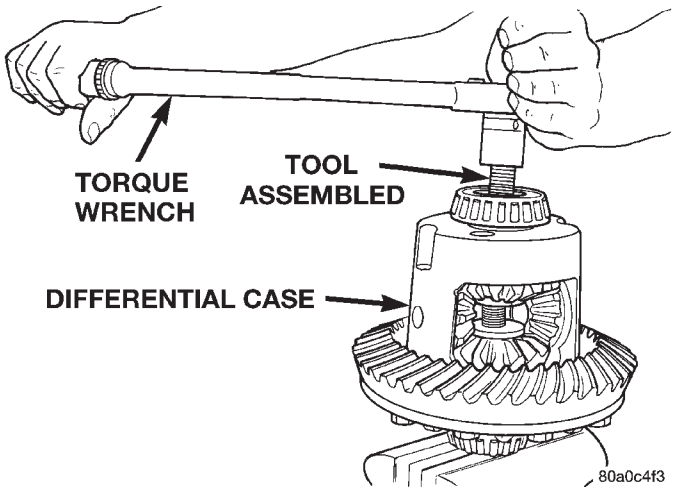


Fig. 47 Tighten Belleville Spring Compressor Tool

(10) Using a 0.020 in. feeler gauge and mallet, remove thrust washers from behind the pinion gears (Fig. 48).

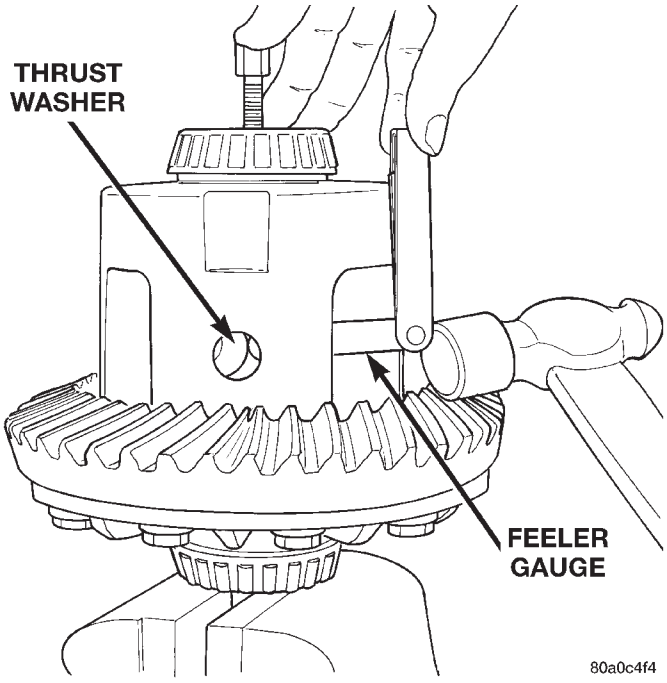


Fig. 48 Remove Pinion Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

(11) Loosen the forcing screw tool until the clutch pack tension is relieved and the pinion gears can be slightly rattled between the case and side gears.

(12) Insert Turning Bar C–4487–4 in case. Rotate case with tool until pinion gears can be removed (Fig. 49).

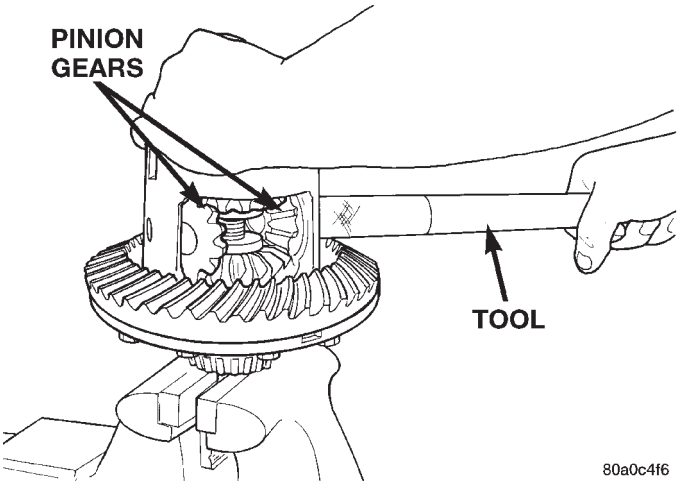


Fig. 49 Pinion Gear Removal

(13) Remove top side gear and clutch pack. Keep plates in correct order during removal (Fig. 50).

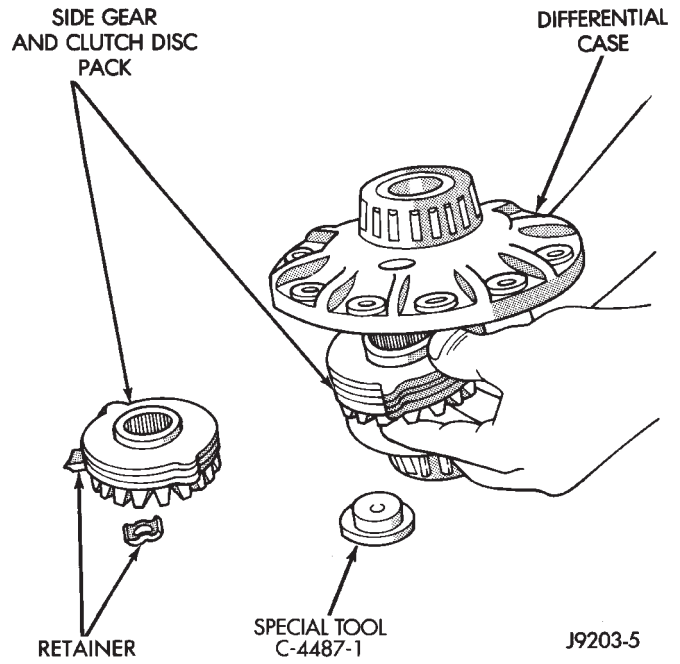


Fig. 50 Side Gear & Clutch Disc Removal

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

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

ASSEMBLY

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.

(1) Assemble the clutch discs into packs secure disc packs with retaining clips (Fig. 51).

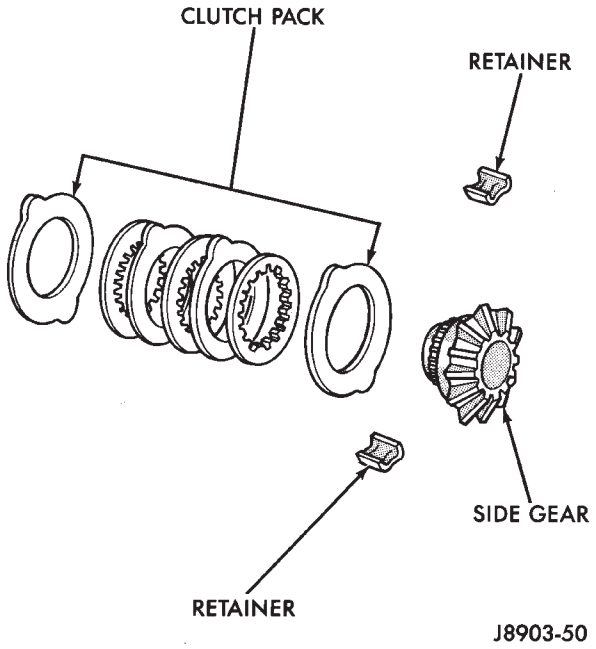


Fig. 51 Clutch Disc Pack

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

(3) Position case on axle fixture.

(4) Install clutch pack and side gear in lower bore (Fig. 52). **Be sure clutch pack retaining clips remain in position and are seated in the case pockets.**

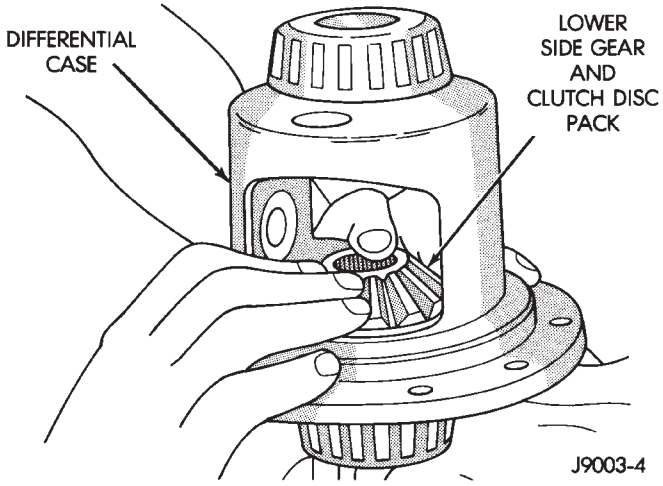


Fig. 52 Clutch Discs & Lower Side Gear Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Install lubricated Step Plate C–4487–1 on first clutch pack (Fig. 53).

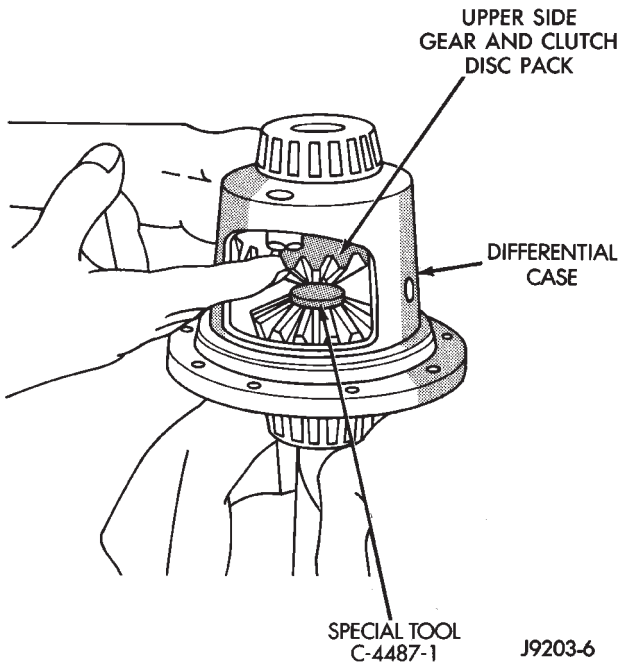


Fig. 53 Upper Side Gear & Clutch Disc Pack Installation

(6) Install the upper side gear and clutch disc pack (Fig. 53).

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

(8) Tighten forcing screw tool to slightly compress clutch discs.

(9) Place pinion gears in position in side gears and verify that mate shaft hole line up.

(10) Rotate case with Turning Bar C–4487–4 until mate shaft holes in pinion gears align with holes in case.

(11) Tighten forcing screw to 122 N·m (90 ft. lbs.) to compress the Belleville springs. Lubricate and install thrust washers behind pinion gears and align washers with a small screw driver. Insert mate shaft into each pinion gear to verify alignment.

(12) Remove forcing screw, threaded adapter and step plate. Install pinion gear mate shaft, align holes in shaft and case.

(13) Install the pinion mate shaft lock screw finger tight to hold shaft during installation.

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) Lubricate all differential components with hypoid gear lubricant.

CLEANING AND INSPECTION

AXLE COMPONENTS

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 matched sets only.**

Clean axle shaft tubes and oil channels in housing.

Inspect for;

- 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.

TRAC-LOK

(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 discs with fiber coating (no grooves 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.

ADJUSTMENTS

PINION GEAR DEPTH

GENERAL 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. 54). 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 center line of the ring gear to the back face of the pinion is 96.8 mm (3.813 inches) for Model 44 axles. The standard depth provides the best teeth contact pattern. Refer to Backlash and Contact Pattern Analysis Paragraph in this section for additional information.

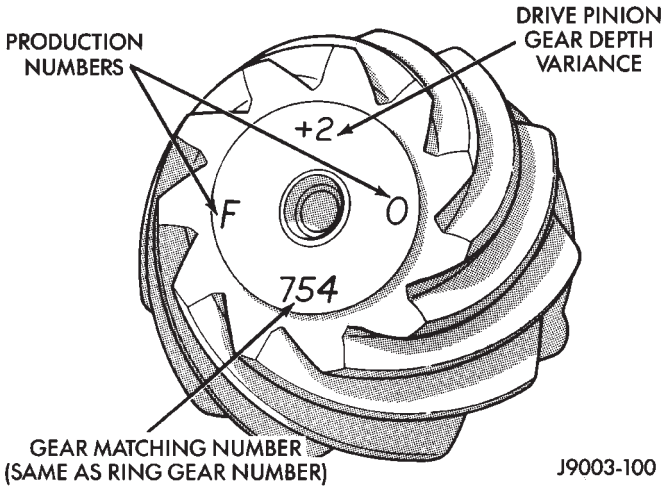


Fig. 54 Pinion Gear ID Numbers

NOTE: The button end on the pinion gear head is no longer a machined–to–specifications surface. Do not use this surface for pinion depth setup or checking (Fig. 55).

Compensation for pinion depth variance is achieved with select shims. The shims are placed under the inner pinion bearing cone (Fig. 56).

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.

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 in. (0.10 mm). Add this amount to the original shim.

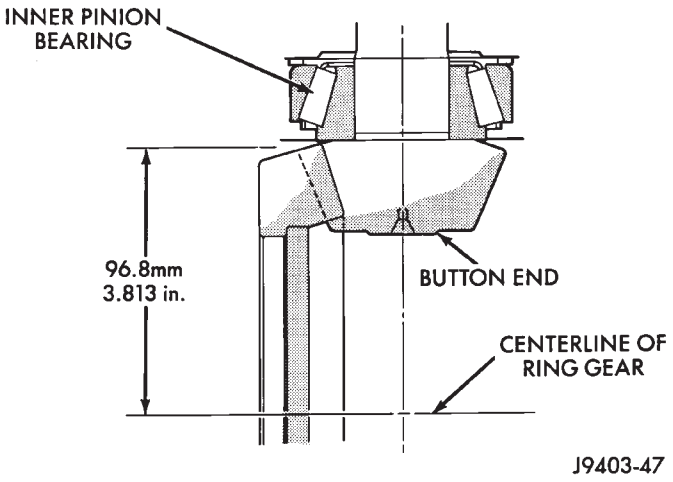


Fig. 55 Pinion Gear Head

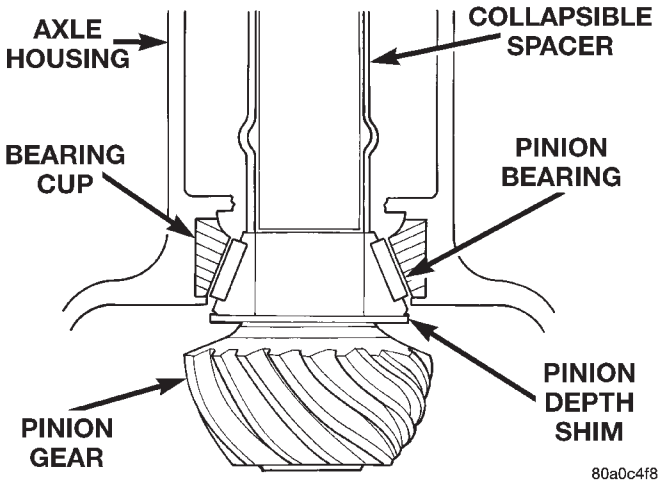


Fig. 56 Shim Locations

Or if the old pinion is (–) 3 and the new pinion is (–) 2, intersecting figure is (–) 0.001 in. (0.025 mm). Subtract this amount from original shim. Refer to the Pinion Gear Depth Variance Chart.

PINION DEPTH MEASUREMENT AND ADJUSTMENT

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 6955, Pinion Block 6734 and Dial Indicator C–3339 (Fig. 57).

(1) Assemble Pinion Gauge Set, Pinion Block and pinion bearings. Install assembly into differential pinion gear bore and hand tighten cone (Fig. 58).

(2) Place Arbor Disc 6928 on Arbor D–115–3 and position in the bearing cradles (Fig. 59). Install dif-

ADJUSTMENTS (Continued)

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

J8902-46

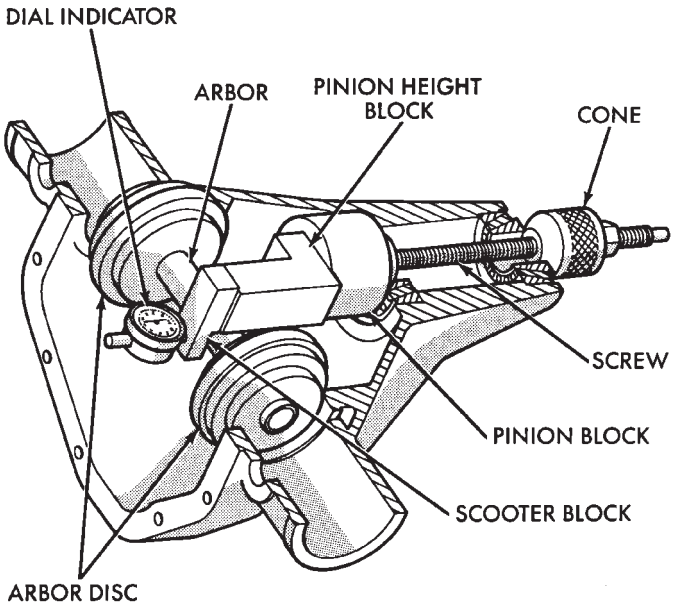


Fig. 57 Pinion Gear Depth Gauge Tools—Typical

ferential 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.

(3) Firmly place Scooter Block D-115–2 and Dial Indicator on pinion height block tool and zero the dial indicator pointer.

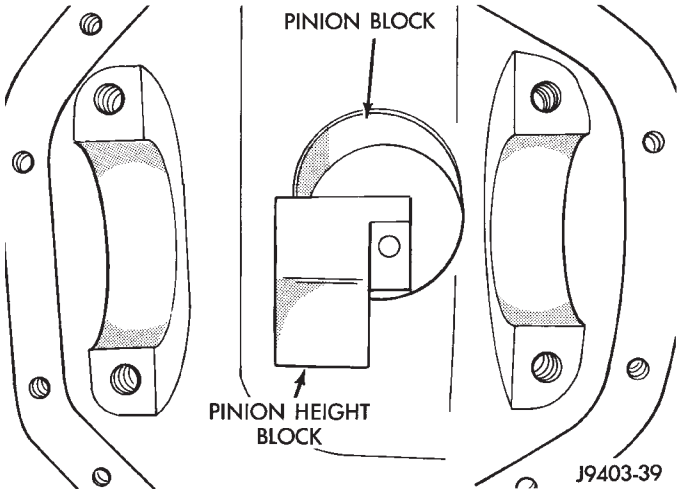


Fig. 58 Pinion Height Block—Typical

(4) Slide the Scooter Block across the arbor while observing indicator (Fig. 60). 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.**

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

ADJUSTMENTS (Continued)

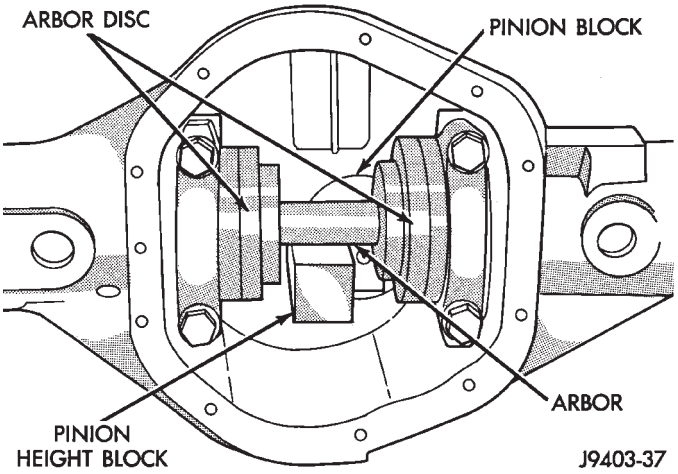


Fig. 59 Gauge Tools In Housing—Typical

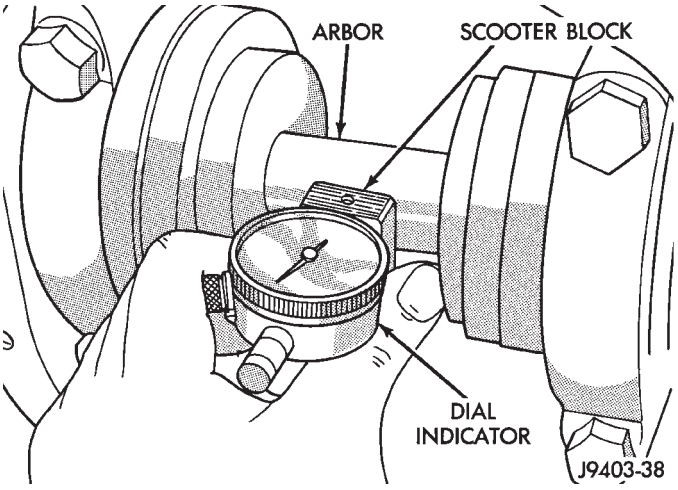


Fig. 60 Pinion Gear Depth Measurement—Typical

DIFFERENTIAL BEARING PRELOAD AND GEAR LASH

DIFFERENTIAL SHIM PACK MEASUREMENT

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

(1) Install dummy side bearings 6929 on differential.

(2) Install the differential case in the axle housing.

(3) Install the outboard shim/spacer (selected thickness) on each side between bearing cup and housing (Fig. 61). Use 0.142 in. (3.6 mm) as a starting point, shim/spacers are available in various thicknesses.

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

(5) Attach a dial indicator to the housing. Position the indicator plunger so that it contacts the ring gear mating surface (Fig. 62).

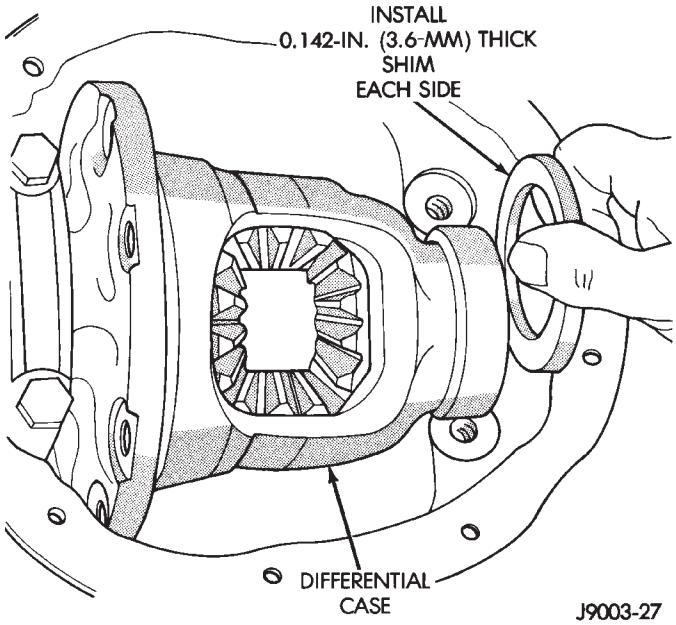


Fig. 61 Differential Bearing Shim Installation

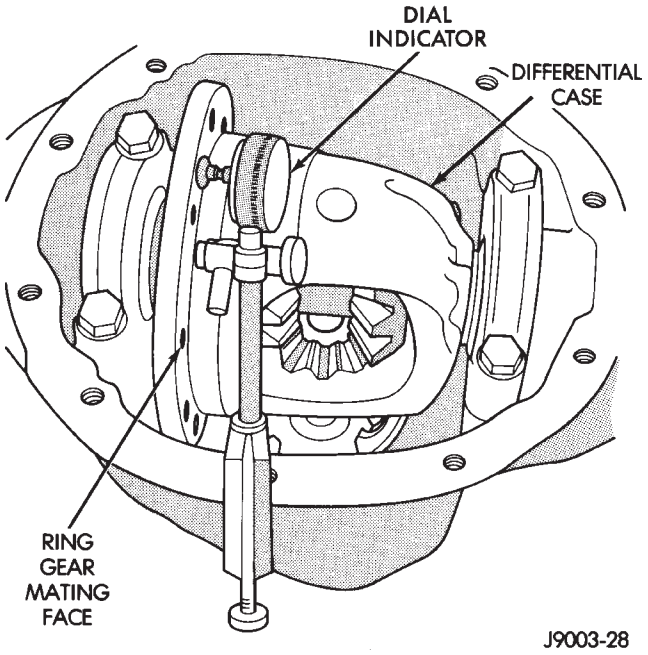


Fig. 62 Shim Measurement

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

(7) 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 in. (0.20 mm), an additional 0.004–in. (0.10 mm) thick shim will be needed at each side zero end play.

(8) Install zero end–play shims on each side of case.

ADJUSTMENTS (Continued)

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

(9) Add an additional 0.004–in. (0.1 mm) to each outboard shim/spacer for bearing preload.

(10) Remove differential from axle housing.

(11) Remove dummy bearings.

(12) Install new side bearing cones and cups.

(13) Install ring gear.

(14) Install differential and verify gear lash and contact pattern.

(15) Proceed to Final Assembly paragraph in this section.

GEAR BACKLASH AND CONTACT PATTERN ANALYSIS

After installing new side bearings or ring and pinion set adjusting the bearing perload and gear mash backlash will be necessary.

(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. 63).

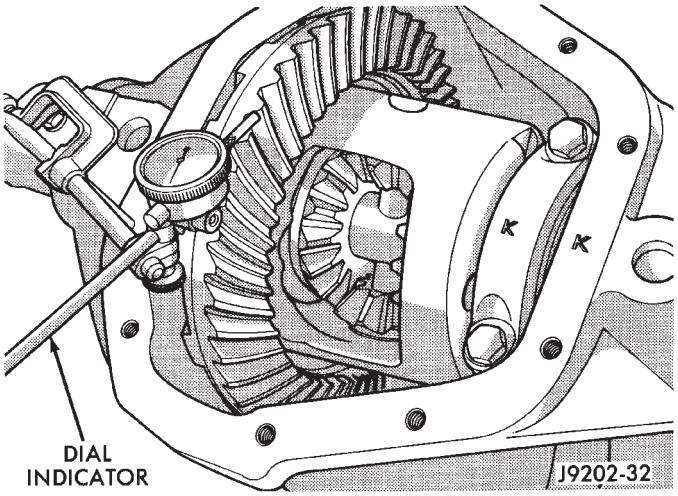


Fig. 63 Ring Gear Backlash Measurement

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

If backlash must be adjusted, spacers are available in various thicknesses. Adjust the backlash accordingly (Fig. 64). **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.

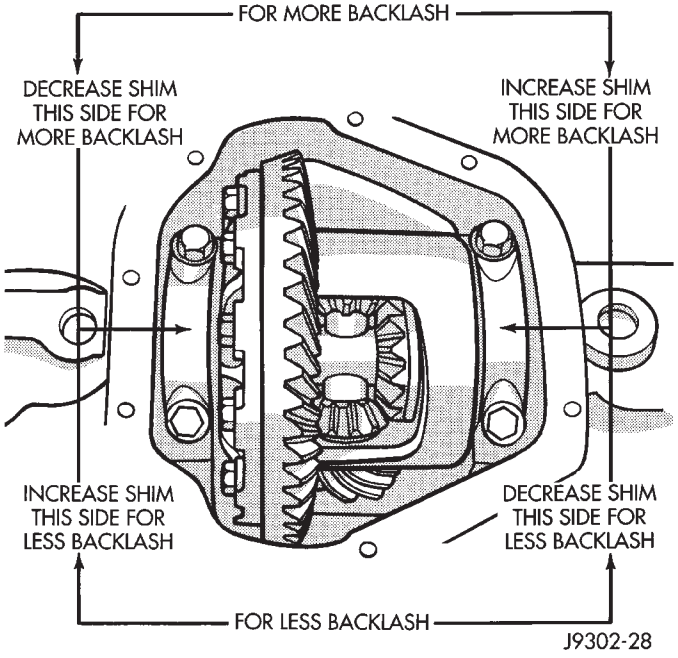


Fig. 64 Backlash Shim Adjustment

(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.

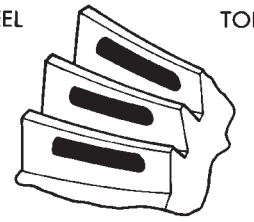
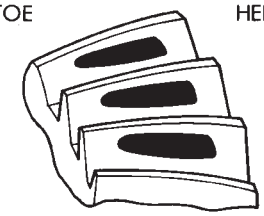
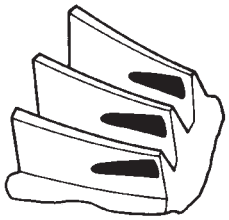
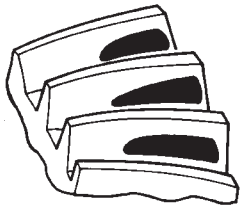
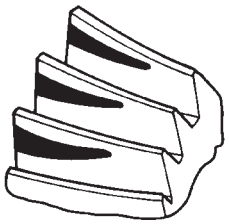
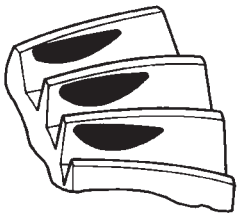
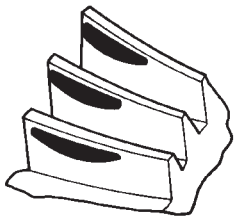
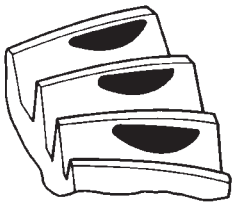
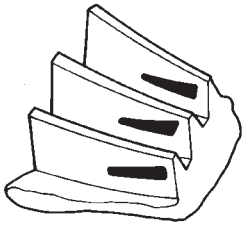
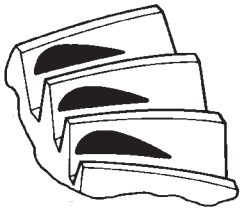
(4) Note patterns in compound. Refer to (Fig. 65) for interpretation of contact patterns and adjust accordingly.

SPECIFICATIONS

MODEL 44 AXLE

DESCRIPTION	SPEC.
Type	Semi-floating Hypoid
Axle Ratios	3.55/3.73
Ring Gear Diameter	216 mm (8.5 in.)
Gear Backlash	0.13–0.20 mm (0.005–0.008 in.)
Pinion Depth	109.52 mm (4.312 in.)
Brg. Perload, Pinion (New)	2.26–4.52 N·m (20–40 in. lbs.)
Maximum Carrier Spread	0.51 mm (0.020 in.

SPECIFICATIONS (Continued)

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. 65 Gear Tooth Contact Patterns

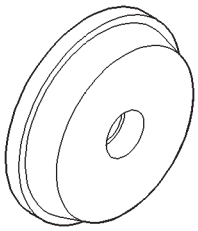
SPECIFICATIONS (Continued)

TORQUE

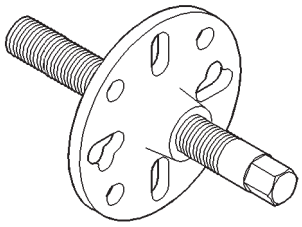
DESCRIPTION	TORQUE
Bolts, Diff. Cover	41 N·m (30 ft. lbs.)
Bolts, Diff. Bearing Cap	85 N·m (63 ft. lbs.)
Bolts, Ring Gear	108 N·m (80 ft. lbs.)
Screw, ABS Sensor	8 N·m (70 in. lbs.)
Nuts, Brake Backing Plate	61 N·m (45 ft. lbs.)
Nut, Pinion Gear Minimum	298 N·m (220 ft. lbs.)

SPECIAL TOOLS

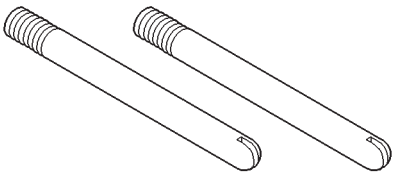
MODEL 44 AXLE



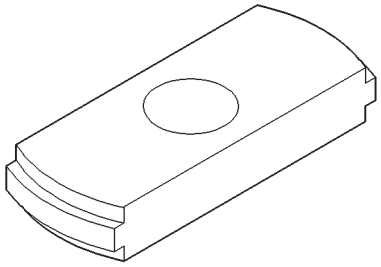
Installer—C-4308



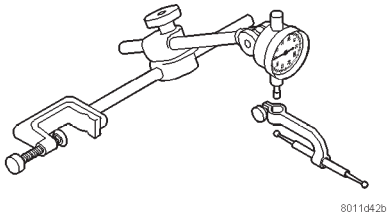
Remover—C-452



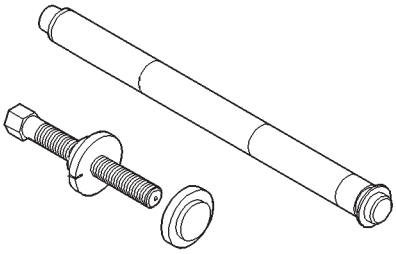
Pilot—C-3288



Remover—C-4307

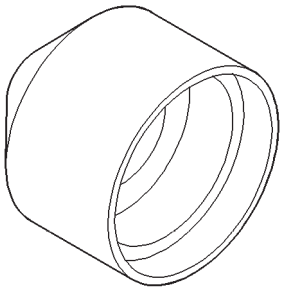


Dial Indicator—C-3339

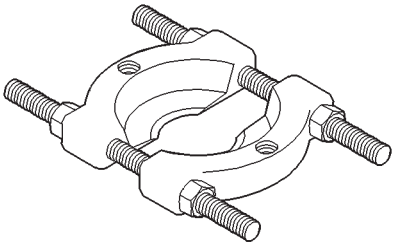


Trac-lok Tool Set—C-4487

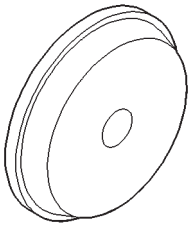
SPECIAL TOOLS (Continued)



Installer—D-163



Splitter—1130



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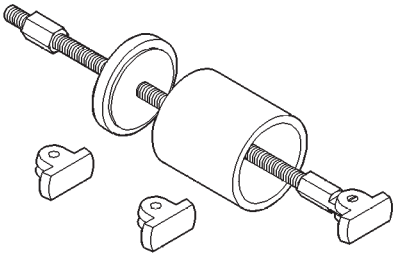

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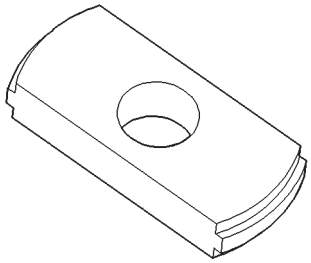

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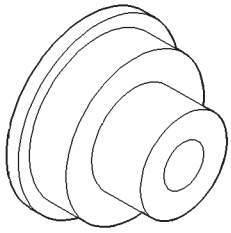

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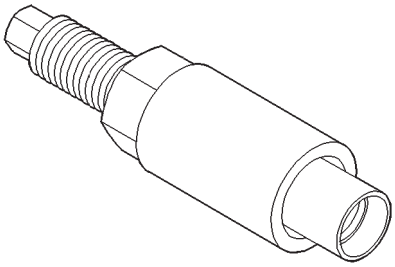
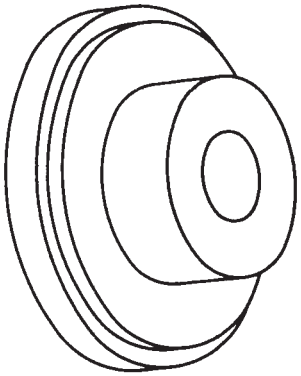
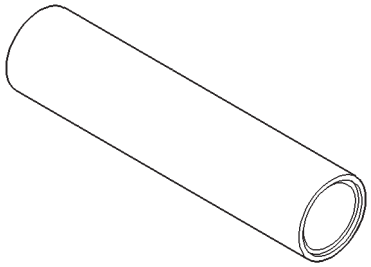


Installer—W-162–D

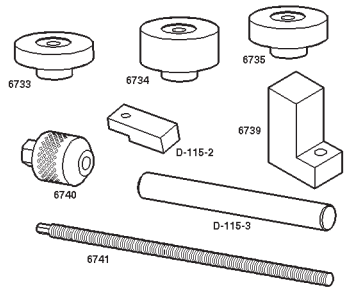


Installer—6437

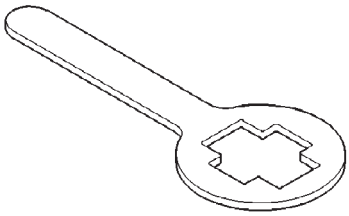
SPECIAL TOOLS (Continued)



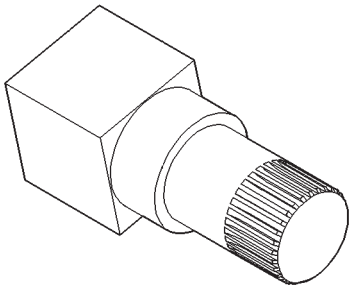
Installer—6448



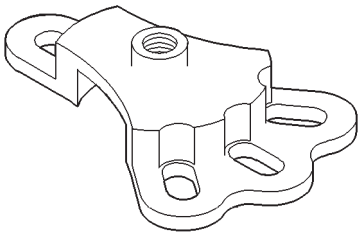
Adapter Set—6956



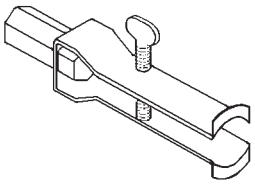
Holder—6719



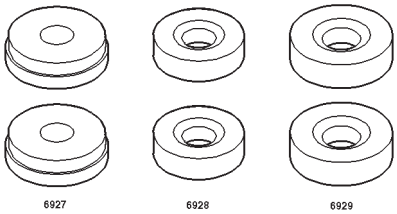
Holder—6963



Adapter—6790



Remover—7794-A



Pinion Depth Set—6955

DIFFERENTIAL AND DRIVELINE

MODEL 44 AXLE

CONTENTS

GENERAL INFORMATION

MODEL 44 ALUMINUM AXLE

The Model 44 housing has an aluminum center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing to form a one–piece axle housing.

The integral type housing, hypoid gear design has the center line of the pinion set below the center line 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. Model 44 axles have the assembly part number and gear ratio listed on a tag attached to the differential housing by a housing cover bolt. Build date identification codes are stamped on an axle shaft tube.

The differential case is a one–piece design. The differential pinion mate shaft is retained with a threaded pin. Differential bearing preload and ring gear backlash is adjusted by shims positioned between the side bearing race and the housing. Pinion gear depth is adjusted by shims positioned between the pinion gear and the inner bearing cone. Pinion gear bearing preload is set and maintained by the use of a collapsible spacer (Fig. 1).

LUBRICANT SPECIFICATIONS

A multi–purpose, hypoid gear lubricant which conforms to the following specifications should be used.

GENERAL INFORMATION (Continued)

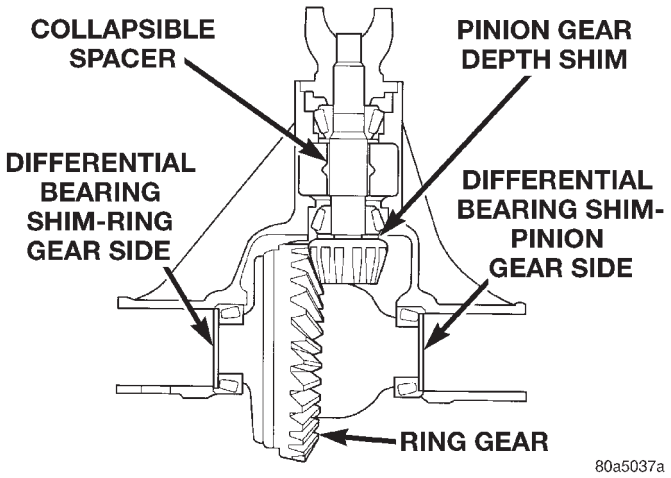


Fig. 1 Axle Adjustment Shims and Spacer

Mopar® Hypoid Gear Lubricant conforms to all of these specifications.

- The lubricant should have MIL–L–2105C and API GL 5 quality specifications.
- Lubricant is a thermally stable SAE 80W–90 gear lubricant.
- Lubricant for axles intended for heavy-duty or trailer tow use is SAE 75W–140 SYNTHETIC gear lubricant.

Trac-lok differentials require the addition of 4 oz. of friction modifier to the axle lubricant. The Dana 44 rear axle lubricant capacity is 2.25 L (4.75 pts.) total, including the friction modifier if necessary.

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

DESCRIPTION AND OPERATION

STANDARD DIFFERENTIAL

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. 2).

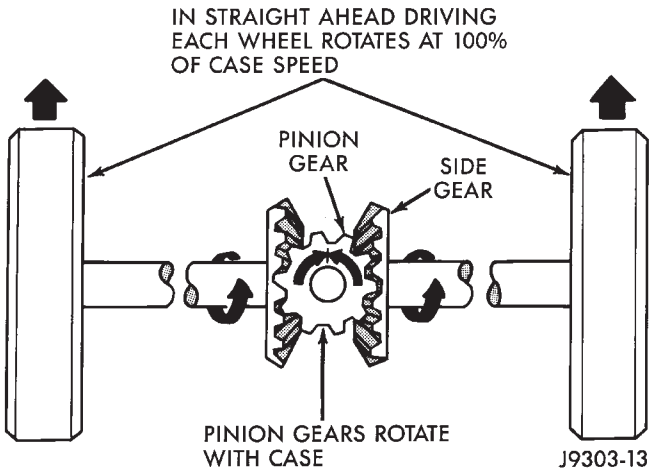


Fig. 2 Differential Operation—Straight Ahead Driving

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 in order 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. 3). 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.

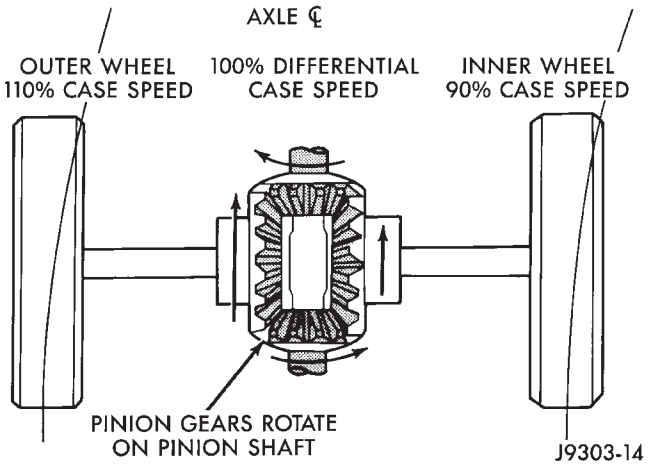


Fig. 3 Differential Operation—On Turns

DESCRIPTION AND OPERATION (Continued)

TRAC-LOK OPERATION

In a conventional differential, 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 which contain multiple discs. The clutches will have radial grooves on the plates, and concentric grooves on the discs or bonded fiber material that is smooth in appearance.

In operation, the Trac-lok clutches are engaged by two concurrent forces. The first being the preload force exerted through Belleville spring washers within the clutch packs. The second is the separating forces generated by the side gears as torque is applied through the ring gear (Fig. 4).

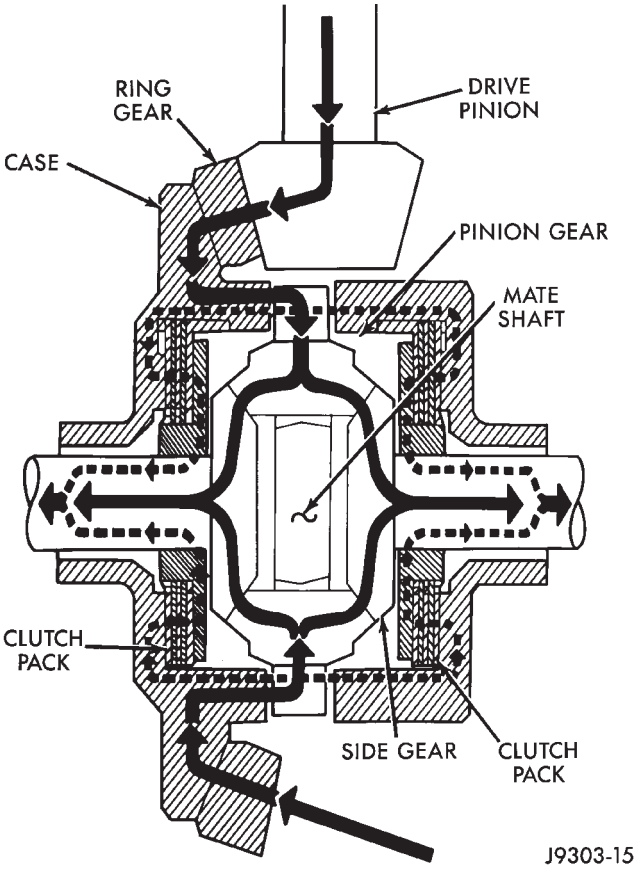


Fig. 4 Trac-lok Limited Slip Differential Operation

The Trac-lok design provides the differential action needed for turning corners and for driving straight ahead during periods of unequal traction. 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.

DIAGNOSIS AND TESTING

GEAR NOISE

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

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.
- Gear damage.

Differential side and pinion gears can be checked by turning the vehicle. They usually do not cause noise in straight–ahead driving. The side 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 rear pinion bearing is the source of the noise. If the bearing noise is heard during a coast, the front pinion bearing is the source.

Worn or damaged differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing noise. 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.

DIAGNOSIS AND TESTING (Continued)

VIBRATION

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

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out–of–balance wheels.
- Loose wheel lug nuts.
- Worn U–joint(s).
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

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/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.

TRAC–LOK DIFFERENTIAL NOISE

The most common problem is a chatter noise when turning corners. Before removing a 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 Mopar® Trac-lok Lubricant (friction modifier) should be added after repair service or a lubricant change.

After changing the lubricant, drive the vehicle and make 10 to 12 slow, figure–eight turns. This maneuver will pump lubricant through the clutches. This will correct the condition in most instances. If the chatter persists, clutch damage could have occurred.

DIAGNOSIS AND TESTING (Continued)

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.

DIAGNOSIS AND TESTING (Continued)

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

DIAGNOSIS AND TESTING (Continued)

TRAC–LOK TEST

WARNING: WHEN SERVICING VEHICLES WITH A TRAC–LOK DIFFERENTIAL DO NOT USE THE ENGINE TO TURN THE AXLE AND WHEELS. BOTH REAR WHEELS MUST BE RAISED AND THE VEHICLE SUPPORTED. A TRAC–LOK AXLE CAN EXERT ENOUGH FORCE IF ONE WHEEL IS IN CONTACT WITH A 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) Place blocks in front and rear of both front wheels.

(2) Raise one rear wheel until it is completely off the ground.

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

(4) Remove wheel and bolt Special Tool 6790 to studs.

(5) Use torque wrench on special tool to rotate wheel and read rotating torque (Fig. 5).

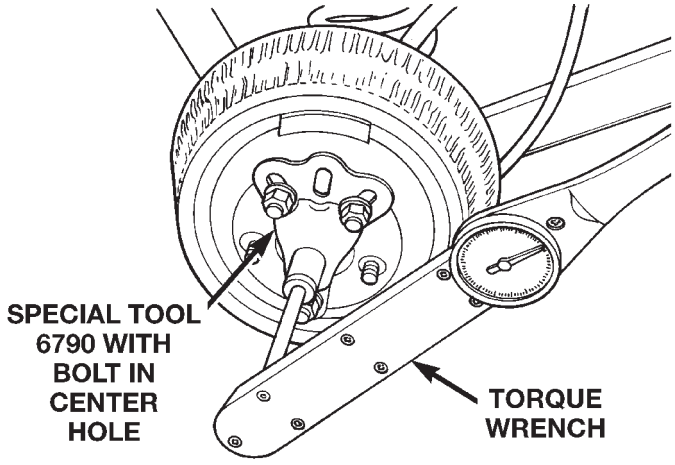


Fig. 5 Trac-loc Test

(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 serviced.

SERVICE PROCEDURES

LUBRICANT CHANGE

(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 original sealant from the housing and cover surfaces.

(6) Apply a bead of Mopar® Silicone Rubber Sealant, or equivalent, to the housing cover (Fig. 6).

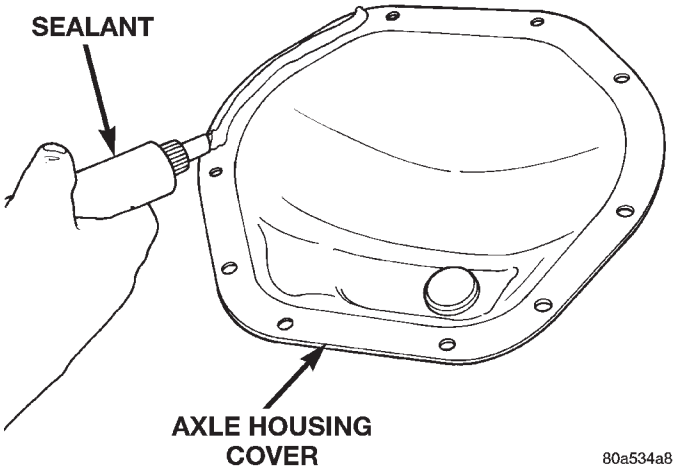


Fig. 6 Apply Sealant

Install the housing cover within 5 minutes after applying the sealant.

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

(8) For Trac–Lok differentials, a quantity of Mopar® Trac–Lok lubricant (friction modifier), or equivalent, must be added after repair service or a lubricant change. Refer to the General Information section of this group for the quantity necessary.

(9) Fill differential with Mopar® Hypoid Gear Lubricant, or equivalent, to bottom of the fill plug hole. Refer to the Lubricant Specifications in this group for the quantity necessary.

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

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

(11) Trac–Lok differential equipped 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.

REMOVAL AND INSTALLATION

REAR AXLE

REMOVAL

(1) Raise and support the vehicle.

REMOVAL AND INSTALLATION (Continued)

(2) Position a suitable lifting device under the axle.
(3) Secure axle to device.
(4) Remove the wheels and tires.
(5) Remove the brake rotors and calipers from the axle. Refer to Group 5, Brakes, for proper procedures.
(6) Disconnect the vent hose from the axle shaft tube.
(7) Mark the propeller shaft and yokes for installation alignment reference.
(8) Remove propeller shaft.
(9) Disconnect stabilizer bar links.
(10) Disconnect shock absorbers from axle.
(11) Disconnect track bar.
(12) Disconnect upper and lower suspension arms from the axle brackets.
(13) Separate the axle from the vehicle.

INSTALLATION

NOTE: The weight of the vehicle must be supported by the springs before suspension arms and track bar fasteners can be tightened. If the springs are not at their normal ride position, vehicle ride height and handling could be affected.

(1) Raise the axle with lifting device and align coil springs.
(2) Position the upper and lower suspension arms on the axle brackets. Install nuts and bolts, do not tighten bolts at this time.
(3) Install track bar and attachment bolts, do not tighten bolts at this time.
(4) Install shock absorber and tighten nuts to 60 N·m (44 ft. lbs.) torque
(5) Install stabilizer bar link and tighten nuts to 36 N·m (27 ft. lbs.) torque
(6) Install the brake rotors and calipers. Refer to Group 5, Brakes, for proper procedures.
(7) Install axle vent hose
(8) Align propeller shaft and pinion yoke reference marks. Install U-joint straps and bolts tighten to 19 N·m (14 ft. lbs.) torque
(9) Install the wheels and tires.
(10) Check and add gear lubricant.
(11) Remove lifting device from axle and lower the vehicle.
(12) Tighten lower suspension arms bolts to 177 N·m (130 ft. lbs.) torque.
(13) Tighten upper suspension arms bolts to 75 N·m (55 ft. lbs.) torque.
(14) Tighten track bar bolts to 100 N·m (74 ft. lbs.) torque.

PINION SHAFT SEAL REPLACEMENT

REMOVAL

(1) Raise and support the vehicle.
(2) Remove wheel and tire assemblies.
(3) Remove rear brake rotors and calipers. Refer to Group 5, Brakes, for proper procedures.
(4) Mark the propeller shaft and pinion yoke for installation reference.
(5) Remove the propeller shaft from the yoke.
(6) Rotate the pinion gear three or four times.
(7) Measure the amount of torque necessary to rotate the pinion gear with an (in. lbs.) dial-type torque wrench. Record the torque reading for installation reference.
(8) Using a short piece of pipe and Holder 6958 to hold the pinion yoke, remove the pinion nut and washer (Fig. 7).
(9) Use Remover C-452 and Wrench C-3281 to remove the pinion yoke (Fig. 8).

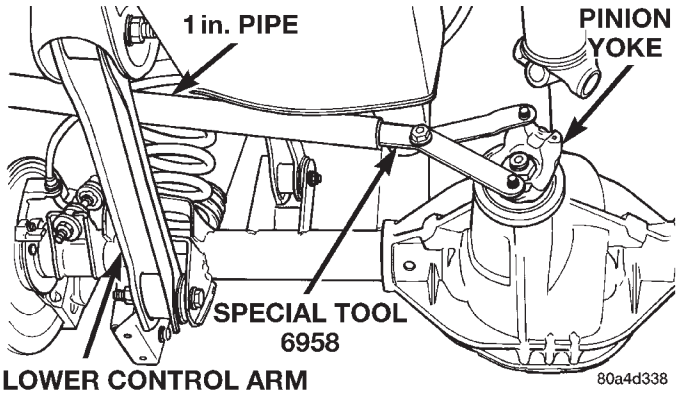


Fig. 7 Pinion Yoke Holder

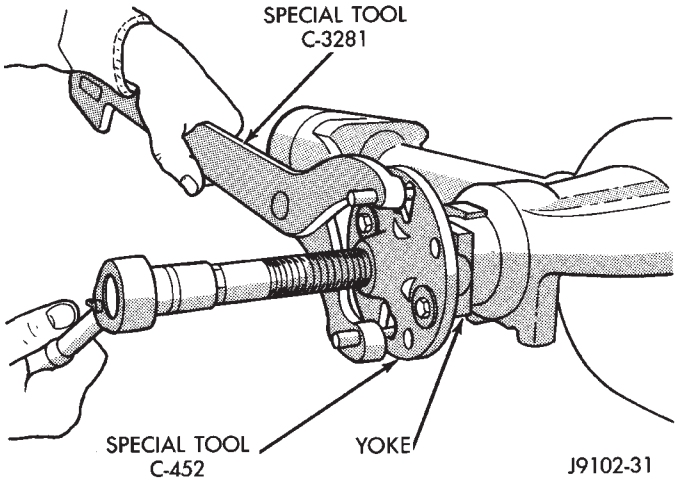


Fig. 8 Pinion Yoke Removal

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

REMOVAL AND INSTALLATION (Continued)

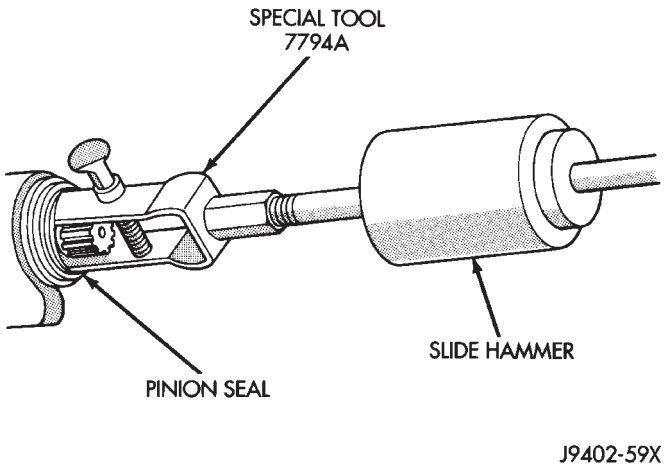


Fig. 9 Seal Removal

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. 10).

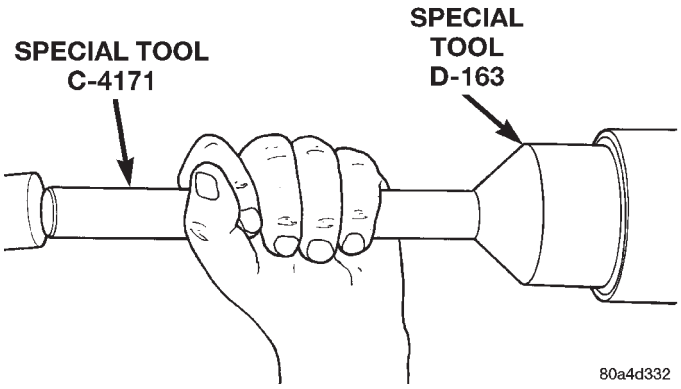


Fig. 10 Pinion Seal Installation

(2) Install yoke on the pinion gear with Installer C-3718.

CAUTION: Do not exceed the minimum tightening torque when installing the pinion yoke retaining nut at this point. Damage to collapsible spacer or bearings may result.

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

(4) Rotate the pinion shaft using an (in. lbs.) torque wrench. Rotating resistance torque should be equal to the reading recorded during removal, plus an additional 0.56 N·m (5 in. lbs.) (Fig. 11).

(5) If the rotating torque is low, use Holder 6958 to hold the pinion yoke (Fig. 12), and tighten the pinion shaft nut in 6.8 N·m (5 ft. lbs.) increments until proper rotating torque is achieved.

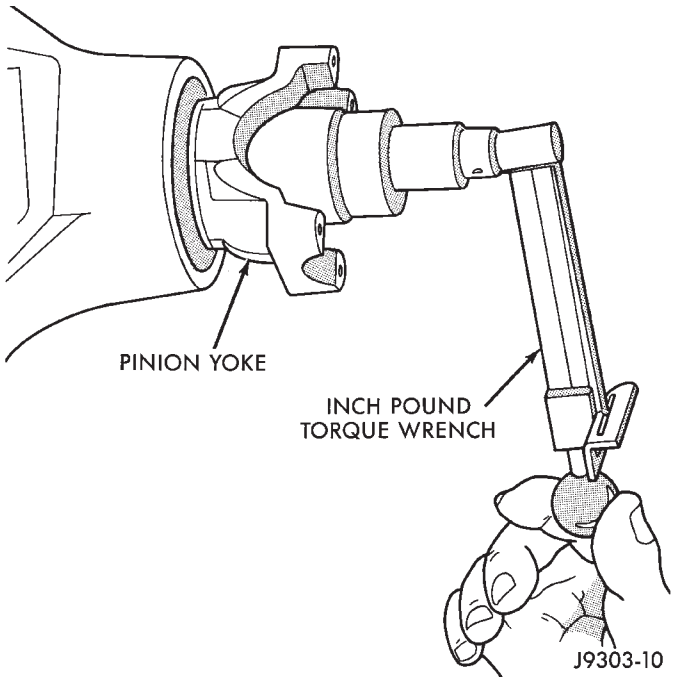


Fig. 11 Check Pinion Rotation Torque

CAUTION: If the maximum tightening torque is reached prior to reaching the required rotating torque, the collapsible spacer may have been damaged. Replace the collapsible spacer.

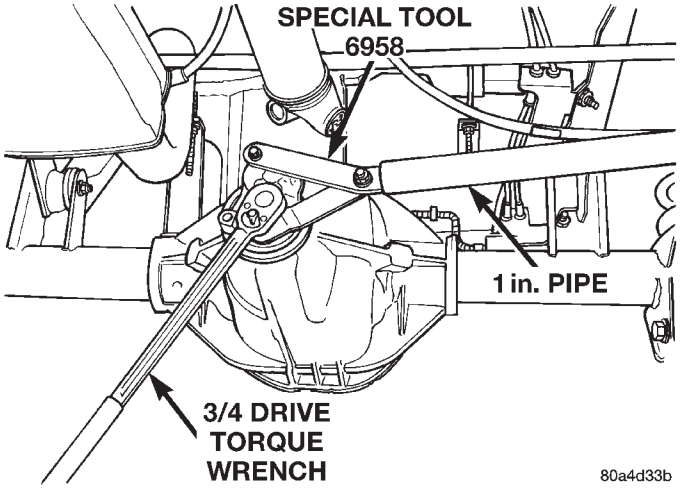


Fig. 12 Tightening Pinion Shaft Nut

(6) Align the installation reference marks and install the propeller shaft.

(7) Add gear lubricant to the differential housing, if necessary. Refer to the Lubricant Specifications for gear lubricant requirements.

(8) Install brake rotors and calipers. Refer to Group 5, Brakes, for proper procedures.

(9) Install wheel and tire assemblies.

(10) Lower the vehicle.

REMOVAL AND INSTALLATION (Continued)

COLLAPSIBLE SPACER

REMOVAL W/PINION INSTALLED

(1) Raise and support the vehicle.

(2) Remove wheel and tire assemblies.

(3) Remove rear brake rotors and calipers. Refer to Group 5, Brakes, for proper procedures.

(4) Mark the propeller shaft and pinion yoke for installation reference.

(5) Remove the propeller shaft from the yoke.

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

(7) Measure the amount of torque necessary to rotate the pinion gear with an in. lbs. dial-type torque wrench. Record the torque reading for installation reference.

(8) Using a short piece of pipe and Holder 6958 to hold the pinion yoke, remove the pinion nut and washer (Fig. 13).

(9) Use Remover C-452 and Wrench C-3281 to remove the pinion yoke (Fig. 14).

(10) Use Remover 7794-A and slide hammer to remove the pinion shaft seal (Fig. 15).

(11) Remove the front pinion bearing using a pair of suitable pick tools to pull the bearing straight off the pinion gear shaft. It may be necessary to lightly tap the end of the pinion gear with a rawhide or rubber mallet if the bearing becomes bound on the pinion shaft.

(12) Remove the collapsible spacer.

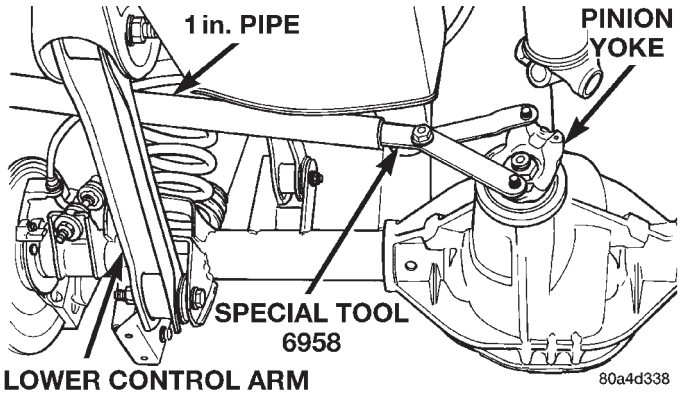


Fig. 13 Pinion Yoke Holder

REMOVAL W/PINION REMOVAL

(1) Raise and support the vehicle.

(2) Remove wheel and tire assemblies.

(3) Remove rear brake rotors and calipers. Refer to Group 5, Brakes, for proper procedures.

(4) Mark the propeller shaft and pinion yoke for installation reference.

(5) Remove the propeller shaft from the yoke.

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

(7) Measure the amount of torque necessary to rotate the pinion gear with an in. lbs. dial-type torque wrench. Record the torque reading for installation reference.

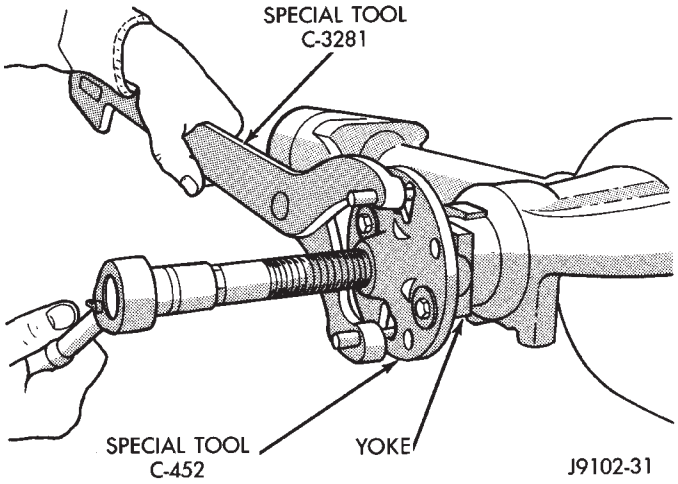


Fig. 14 Pinion Yoke Removal

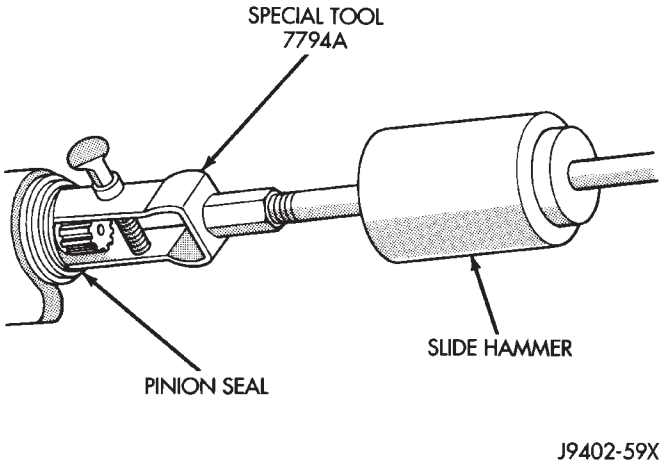


Fig. 15 Seal Removal

(8) Remove differential assembly from axle housing.

(9) Using Holder 6958 to hold yoke and a short length of 1 in. pipe, remove the pinion yoke nut and washer (Fig. 13).

(10) Using Remover C–452 and Wrench C–3281, remove the pinion yoke from pinion shaft (Fig. 14).

(11) Remove the pinion gear from housing (Fig. 16). Catch the pinion with your hand to prevent it from falling and being damaged.

(12) Remove collapsible spacer from pinion shaft.

INSTALLATION

(1) Install a new collapsible preload spacer on pinion shaft (Fig. 17).

(2) If pinion gear was removed, install pinion gear in housing.

(3) Install pinion front bearing. Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer D–163 and Handle C–4171 (Fig. 18).

REMOVAL AND INSTALLATION (Continued)

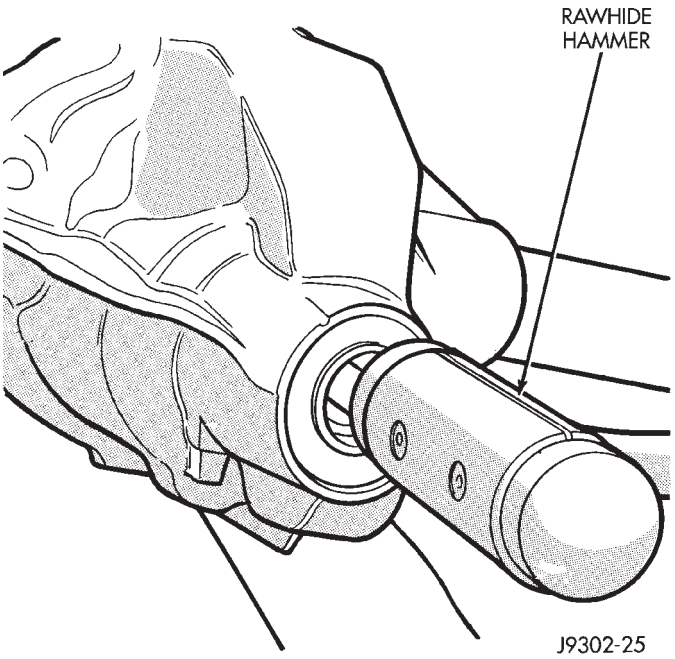


Fig. 16 Remove Pinion Gear

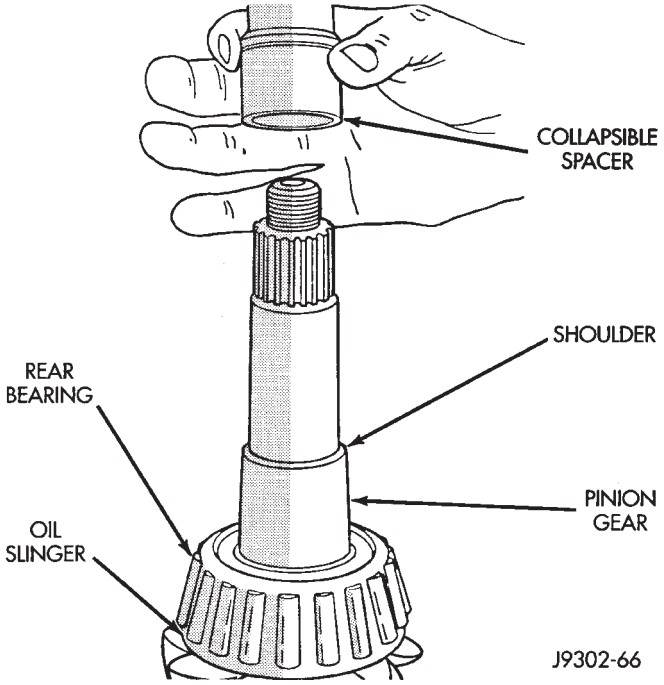


Fig. 17 Collapsible Preload Spacer

(4) Install yoke with Installer C–3718 and holder 6958 (Fig. 19).

(5) If the original pinion bearings are being used, install differential assembly and axle shafts, if necessary.

NOTE: If new pinion bearings were installed, do not install the differential assembly and axle shafts until after the pinion bearing preload and rotating torque are set.

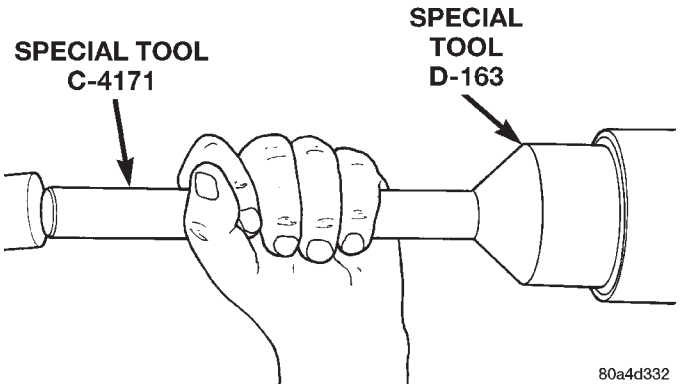


Fig. 18 Pinion Seal Installation

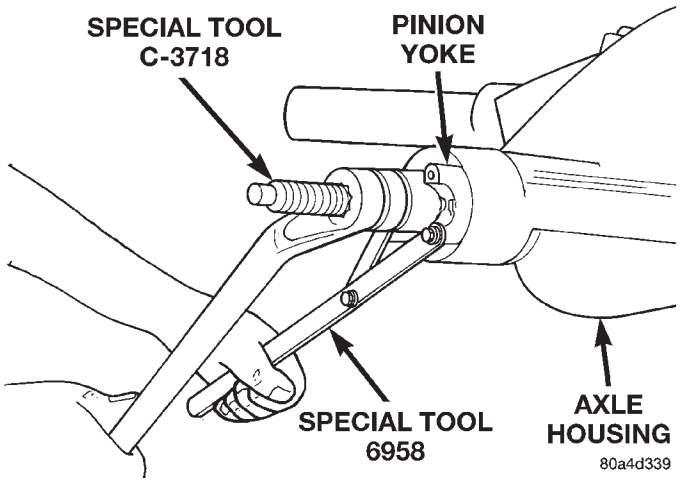


Fig. 19 Pinion Yoke Installation

(6) Install the yoke washer and a new nut on the pinion gear. Tighten the nut to 298 N·m (220 ft. lbs.) minimum. **Do not over–tighten.** Maximum torque is 380 N·m (280 ft. lbs.).

CAUTION: Never loosen pinion gear nut to decrease pinion gear bearing rotating 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.

NOTE: A new collapsible spacer will start to crush at around 265 ft. lbs. torque. If the spacer requires more than 280 ft. lbs. torque to crush, the collapsible spacer is defective.

(7) Using yoke holder 6958, a short length of 1 in. pipe, and a torque wrench set at 380 N·m (280 ft. lbs.), crush collapsible spacer until bearing end play is taken up (Fig. 20).

(8) Slowly tighten the nut in 6.8 N·m (5 ft. lbs.) increments until the rotating torque is achieved.

REMOVAL AND INSTALLATION (Continued)

Measure the rotating torque frequently to avoid over crushing the collapsible spacer (Fig. 21).

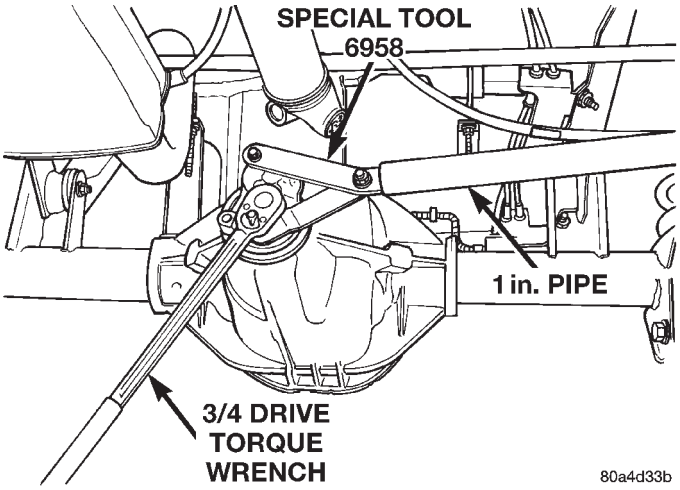


Fig. 20 Tightening Pinion Nut

(9) Check rotating torque with an inch pound torque wrench (Fig. 21). The torque necessary to rotate the pinion gear should be:

- Original Bearings — The reading recorded during removal, plus an additional 0.56 N·m (5 in. lbs.).
- New Bearings — 2 to 5 N·m (15 to 35 in. lbs.).

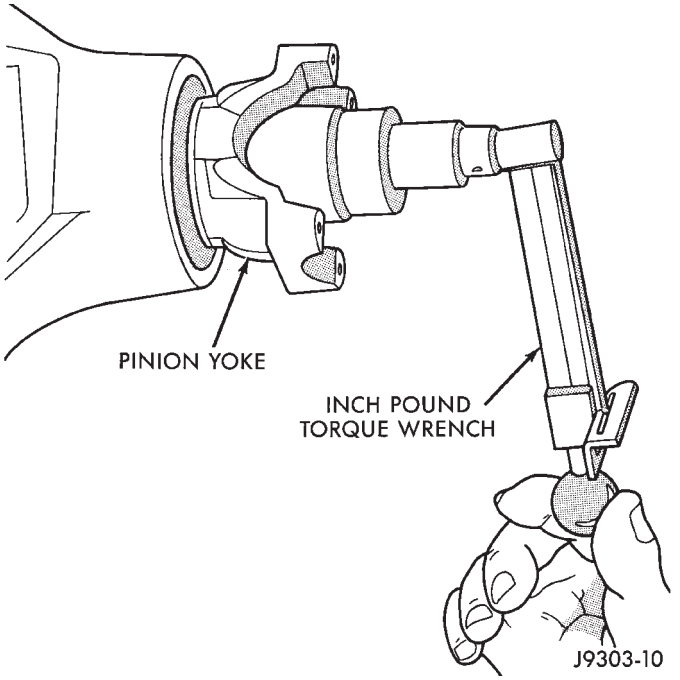


Fig. 21 Check Pinion Gear Rotation Torque

(10) Install differential assembly and axle shafts, if necessary.

(11) Align marks made previously on yoke and propeller shaft and install propeller shaft.

(12) Install rear brake rotors and calipers. Refer to Group 5 Brakes, for proper procedures.

(13) Add gear lubricant, if necessary. Refer to Lubricant Specifications of this section for lubricant requirements.

(14) Install wheel and tire assemblies.

(15) Lower vehicle.

AXLE SHAFT

REMOVAL

(1) Raise and support vehicle. Ensure that the transmission is in neutral.

(2) Remove rear wheel and tire.

(3) Remove brake caliper and rotor. Refer to Group 5, Brakes, for proper procedure.

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

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

(6) Rotate differential case so that pinion mate gear shaft lock screw is accessible. Remove lock screw and pinion mate gear shaft from differential case (Fig. 22).

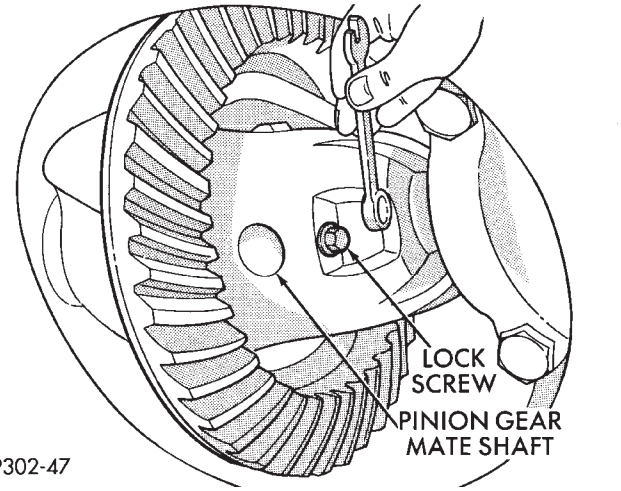


Fig. 22 Mate Shaft Lock Screw

(7) Push axle shaft inward and remove axle shaft C–clip lock from the axle shaft (Fig. 23).

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

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

(10) Inspect roller bearing contact surface on axle shaft for signs of brinelling, galling and pitting. If any of these conditions exist, the axle shaft and/or bearing and seal must be replaced.

INSTALLATION

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

REMOVAL AND INSTALLATION (Continued)

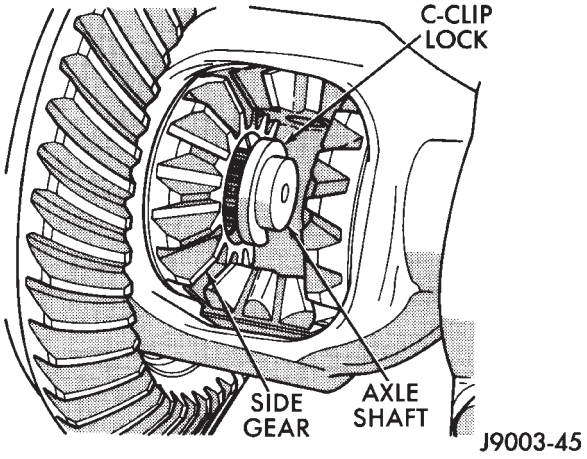


Fig. 23 Axle Shaft C–Clip Lock

prevent shaft splines from damaging axle shaft seal lip.

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

(3) Insert pinion mate shaft into differential case and through thrust washers and pinion gears.

(4) Align hole in shaft with hole in the differential case and install lock screw with Loctite® on the threads. Tighten lock screw to 19 N·m (14 ft. lbs.) torque.

(5) Install cover and add fluid. Refer to Lubricant Change procedure in this section for procedure and lubricant requirements.

(6) Install brake caliper and rotor. Refer to Group 5, Brakes, for proper procedures.

(7) Install wheel and tire.

(8) Lower vehicle.

AXLE SHAFT SEAL AND BEARING

REMOVAL

(1) Remove the axle shaft.

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

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

(3) Remove the axle shaft bearing from the tube (Fig. 24) with Bearing Removal Tool Set 6310.

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

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 is against the installer.

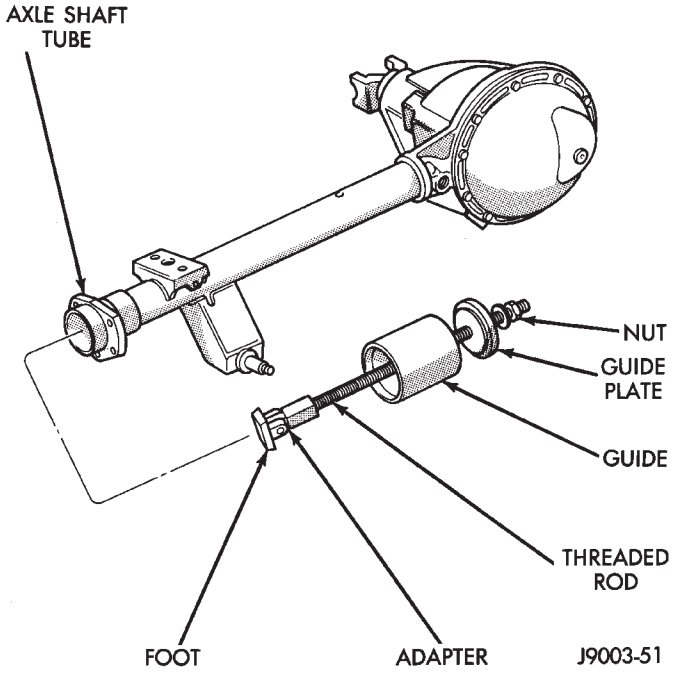


Fig. 24 Axle Shaft Bearing Removal Tool

(3) Install the new axle shaft seal (Fig. 25) with Installer 6437 and Handle C–4171.

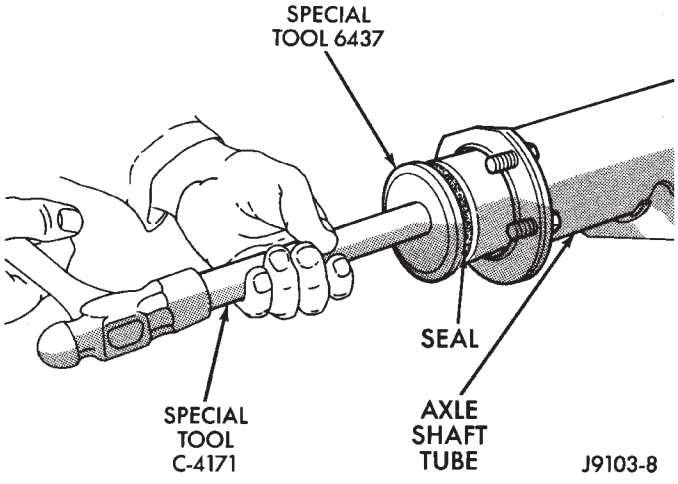


Fig. 25 Axle Shaft Seal Installation

(4) Install the axle shaft.

DIFFERENTIAL

REMOVAL

(1) Remove axle shafts.

(2) Note the orientation of the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 26).

(3) Remove the differential bearing caps.

(4) Position Spreader W–129–B with the tool dowel pins seated in the locating holes (Fig. 27).

REMOVAL AND INSTALLATION (Continued)

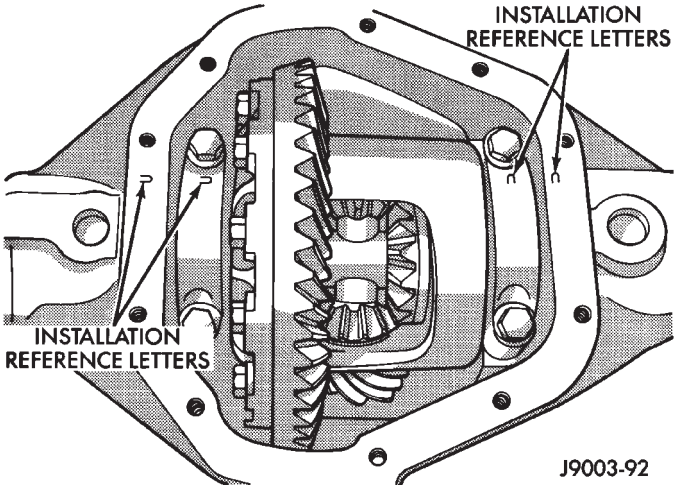


Fig. 26 Bearing Cap Identification

(5) Install the hold down clamps and tighten the tool turnbuckle finger–tight.

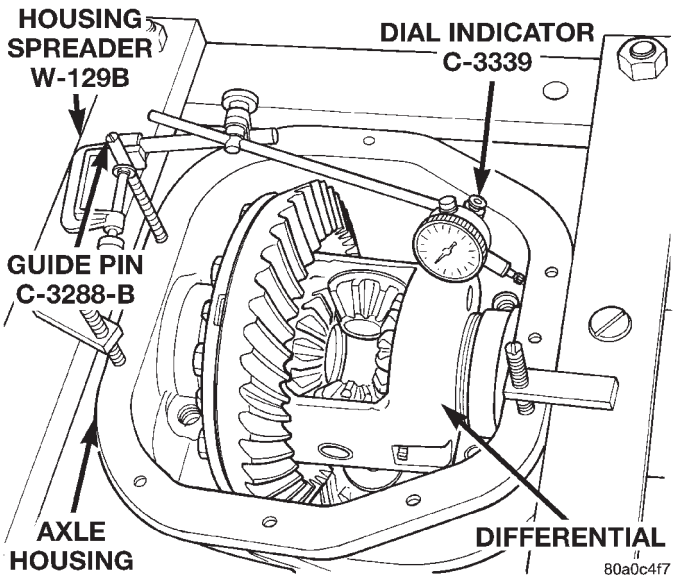


Fig. 27 Spread Differential Housing

(6) 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. 27) and zero the indicator.

(7) Separate the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 27).

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

(8) Remove the dial indicator.

(9) Pry the differential case loose from the housing. To prevent damage, pivot on housing with the end of the pry bar against spreader (Fig. 28).

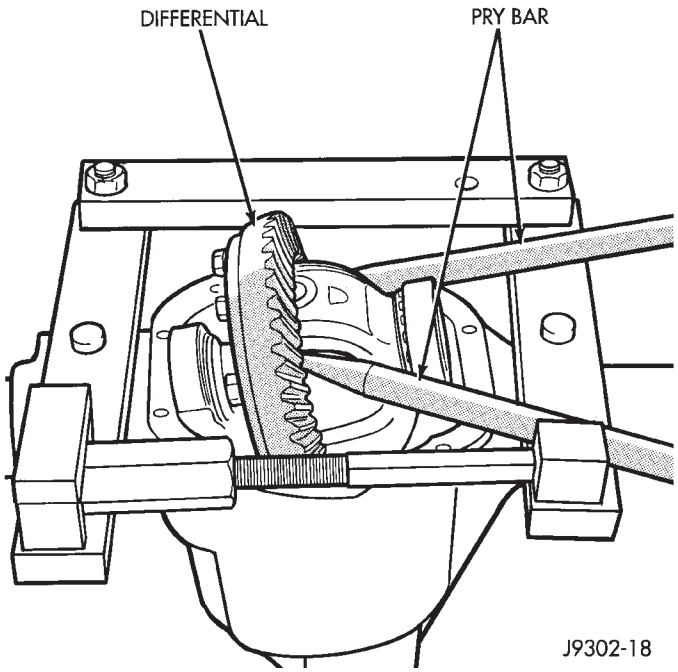


Fig. 28 Differential Removal

(10) Remove the case from housing. Mark or tag bearing cups and outboard shim(s)/spacer(s) (selected thickness) to indicate which side they were removed from.

DIFFERENTIAL INSTALLATION

(1) Position Spreader W–129–B with the tool dowel pins seated in the locating holes (Fig. 27). Install the hold down 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. 27) and zero the indicator.

(3) Separate the housing enough to install the case in the housing. Measure the distance with the dial indicator (Fig. 27).

CAUTION: Do not spread over 0.51 mm (0.020 in). If the housing is over–separated, it could be distorted or damaged.

(4) Remove the dial indicator.

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

(6) Install case in the housing. Tap the differential case with a rawhide or rubber mallet to ensure the bearings are fully seated in the differential housing (Fig. 29).

(7) Remove the spreader.

(8) Install the bearing caps at their original locations (Fig. 30). Tighten the bearing cap bolts to 77 N·m (57 ft. lbs.) torque.

(9) Install axle shafts.

REMOVAL AND INSTALLATION (Continued)

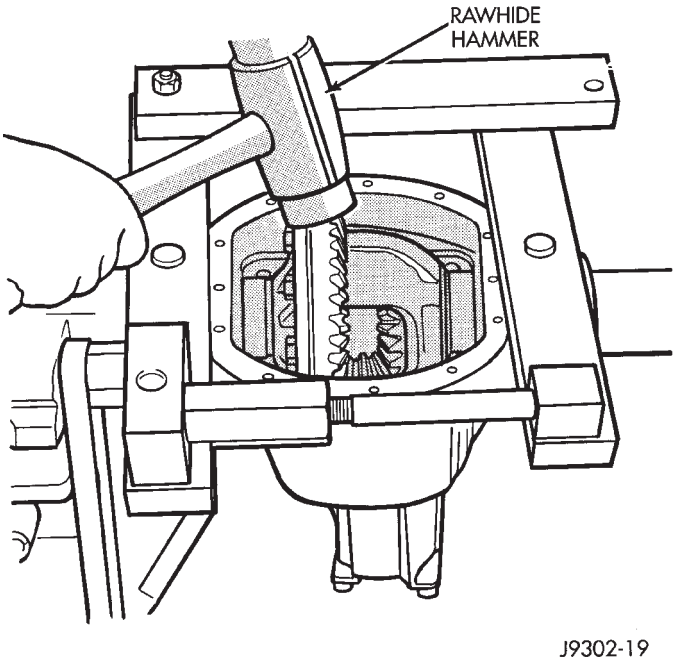


Fig. 29 Differential Installation

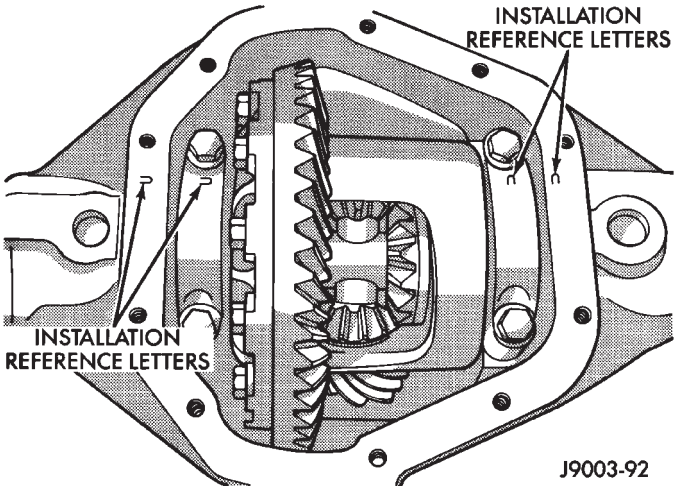


Fig. 30 Differential Bearing Cap Reference Letters

DIFFERENTIAL SIDE BEARINGS

REMOVAL

(1) Remove differential case from axle housing.

(2) Remove the bearings from the differential case with Puller/Press C-293-PA, C-293-42 Adapters and Plug C-293-3 (Fig. 31).

DIFFERENTIAL SIDE BEARING INSTALLATION

(1) Using tool C-4340 with handle C-4171, install differential side bearings (Fig. 32).

(2) Install differential case in axle housing.

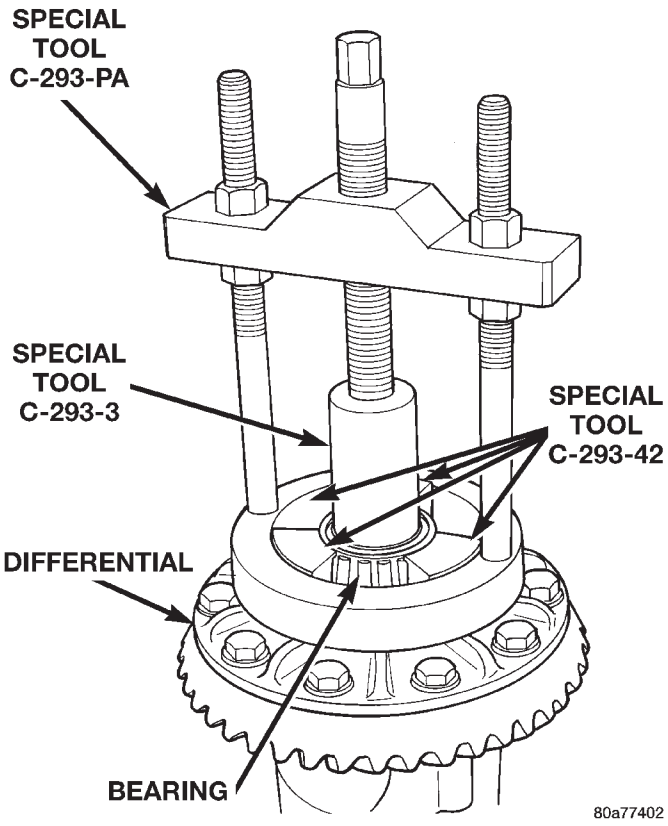


Fig. 31 Differential Bearing Removal

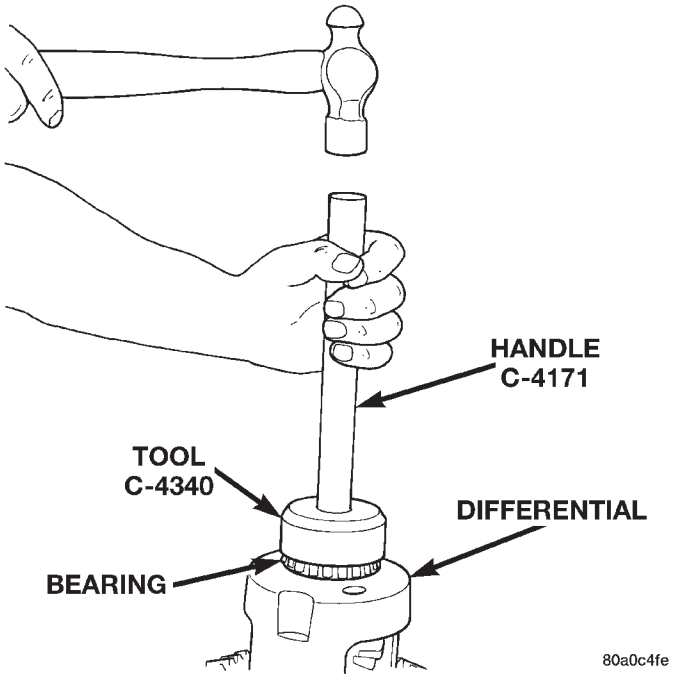


Fig. 32 Install Differential Side Bearings

REMOVAL AND INSTALLATION (Continued)

RING GEAR

NOTE: The ring and pinion gears are service in a matched set. Do not replace the ring gear without replacing the pinion gear.

REMOVAL

(1) Remove differential case from axle housing.
(2) Clamp Side Gear Holding Tool 6963-A in a vise.
(3) Position deferential case on the holding tool (Fig. 33).
(4) Place shop towels around differential to cover vise in order to prevent damage to ring gear when removed.
(5) Remove and discard the bolts holding the ring gear to differential case.
(6) Using a soft hammer, drive ring gear from differential case.

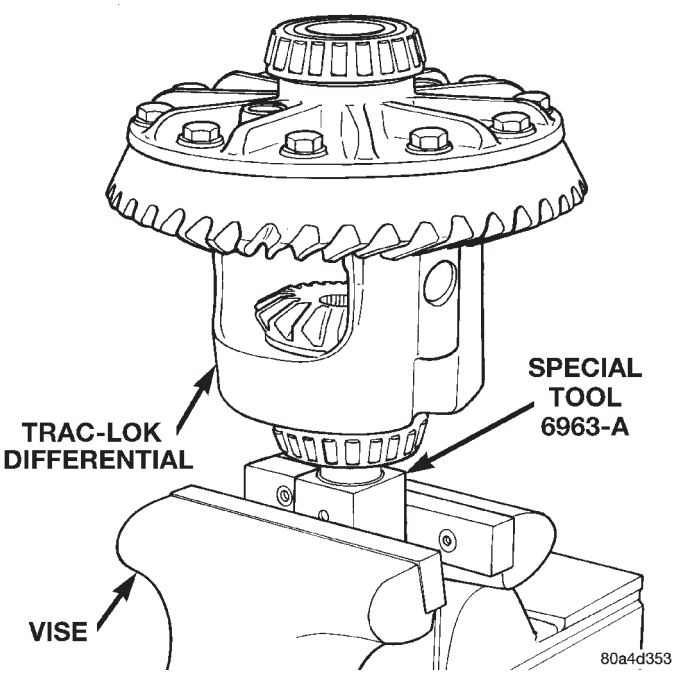


Fig. 33 Side Gear Holding Tool 6963-A

RING GEAR INSTALLATION

CAUTION: Do not reuse the bolts that held the ring gear to the differential case. The bolts can fracture causing extensive damage.

(1) Invert the differential case on Side Gear Holding Tool 6963-A.
(2) Position ring gear on the differential case and start two new ring gear bolts. This will provide case–to–ring gear bolt hole alignment.
(3) Invert the differential case on Side Gear Holding Tool 6963-A.
(4) Install new ring gear bolts and alternately tighten to 95–122 N·m (70–90 ft. lbs.) torque (Fig. 34).
(5) Install differential in axle housing and verify differential side bearing preload, gear mesh, and contact pattern.

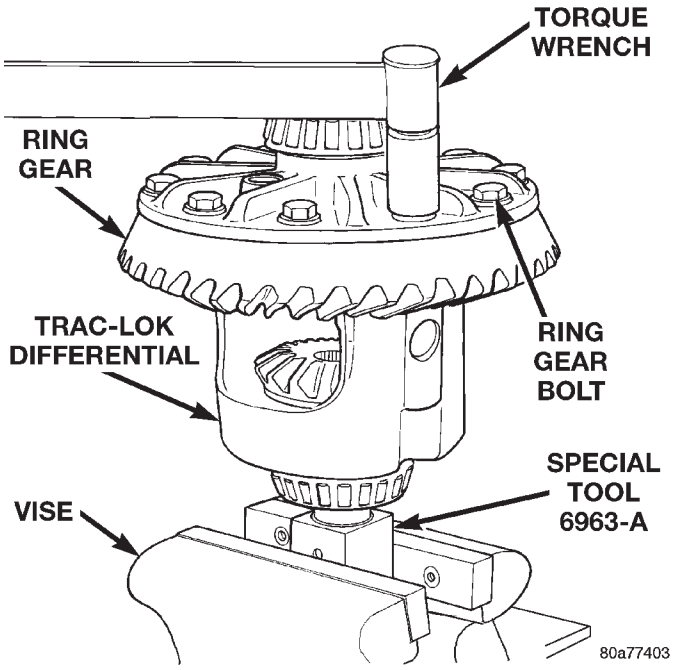


Fig. 34 Ring Gear Bolt Installation

PINION GEAR

REMOVAL

(1) Remove differential assembly from axle housing.
(2) Mark pinion yoke and propeller shaft for installation alignment.
(3) Disconnect propeller shaft from pinion yoke. Using suitable wire, tie propeller shaft to underbody.
(4) Using Holder 6958 to hold yoke and a short length of 1 in. pipe, remove the pinion yoke nut and washer (Fig. 35).
(5) Using Remover C–452 and Wrench C–3281, remove the pinion yoke from pinion shaft (Fig. 36).
(6) Remove the pinion gear from housing (Fig. 37). Catch the pinion with your hand to prevent it from falling and being damaged.
(7) Remove the pinion seal with a slide hammer or pry out with bar.
(8) Remove oil slinger, if equipped, and the front pinion bearing.
(9) Remove the front pinion bearing cup with Remover D-103 and Handle C–4171 (Fig. 38).
(10) Remove the rear bearing cup from housing (Fig. 39). Use Remover C-4307 and Handle C–4171.