

DIFFERENTIAL & DRIVELINE

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PROPELLER SHAFT

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PROPELLER SHAFT

DIAGNOSIS AND TESTING - PROPELLER SHAFT

VIBRATION

Tires that are out-of-round or wheels that are unbalanced will cause a low frequency vibration. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

Brake drums that are unbalanced will cause a harsh, low frequency vibration. (Refer to 5 - BRAKES - DIAGNOSIS AND TESTING)

Driveline vibration can also result from loose or damaged engine mounts.

Propeller shaft vibration increases as the vehicle speed is increased. A vibration that occurs within a specific speed range is not usually caused by a propeller shaft being unbalanced. Defective universal joints or an incorrect propeller shaft angle, are usually the cause of such a vibration.

PROPELLER SHAFT (Continued)

DRIVELINE VIBRATION

Drive Condition	Possible Cause	Correction
Propeller Shaft Noise	1) Undercoating or other foreign material on shaft. 2) Loose U-joint clamp screws. 3) Loose or bent U-joint yoke or excessive runout. 4) Incorrect driveline angularity. 5) Rear spring center bolt not in seat. 6) Worn U-joint bearings. 7) Propeller shaft damaged or out of balance. 8) Broken rear spring. 9) Excessive runout or unbalanced condition. 10) Excessive drive pinion gear shaft runout. 11) Excessive axle yoke deflection. 12) Excessive transfer case runout.	1) Clean exterior of shaft and wash with solvent. 2) Install new clamps and screws and tighten to proper torque. 3) Install new yoke. 4) Measure and correct driveline angles. 5) Loosen spring u-bolts and seat center bolt. 6) Install new U-joint. 7) Install new propeller shaft. 8) Install new rear spring. 9) Re-index propeller shaft, test, and evaluate. 10) Re-index propeller shaft and evaluate. 11) Inspect and replace yoke if necessary. 12) Inspect and repair as necessary.
Universal Joint Noise	1) Loose U-joint clamp screws. 2) Lack of lubrication.	1) Install new clamps and screws and tighten to proper torque. 2) Replace as U-joints as necessary.

BALANCE

NOTE: Removing and re-indexing the propeller shaft 180° relative to the yoke may eliminate some vibrations.

If propeller shaft is suspected of being unbalanced, it can be verified with the following procedure:

- (1) Raise the vehicle.
- (2) Clean all the foreign material from the propeller shaft and the universal joints.
- (3) Inspect the propeller shaft for missing balance weights, broken welds and bent areas. **If the propeller shaft is bent, it must be replaced.**
- (4) Inspect the universal joints to ensure that they are not worn, properly installed and correctly aligned with the shaft.
- (5) Check the universal joint clamp screws torque.
- (6) Remove the wheels and tires. Install the wheel lug nuts to retain the brake drums or rotors.
- (7) Mark and number the shaft six inches from the yoke end at four positions 90° apart.

(8) Run and accelerate the vehicle until vibration occurs. Note the intensity and speed the vibration occurred. Stop the engine.

(9) Install a screw clamp at position 1 (Fig. 1).

(10) Start the engine and re-check for vibration. If there is little or no change in vibration, move the clamp to one of the other three positions. Repeat the vibration test.

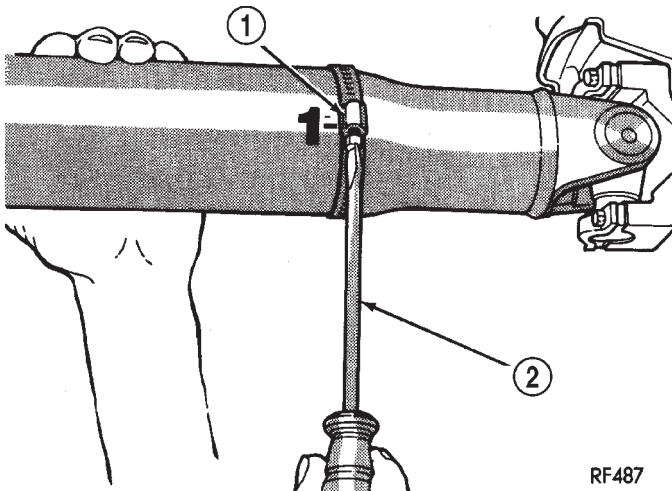
(11) If there is no difference in vibration at the other positions, the source of the vibration may not be propeller shaft.

(12) If the vibration decreased, install a second clamp (Fig. 2) and repeat the test.

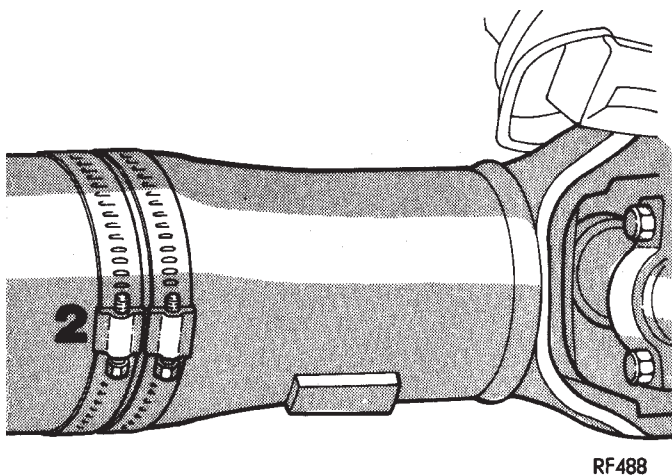
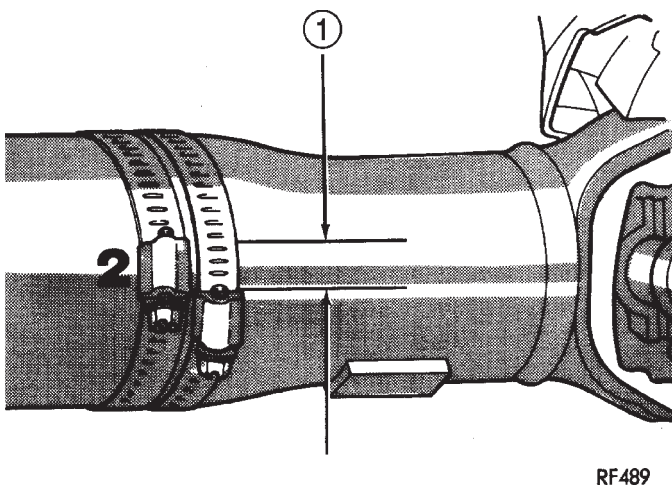
(13) If the additional clamp causes an additional vibration, separate the clamps (1/2 inch above and below the mark). Repeat the vibration test (Fig. 3).

(14) Increase distance between the clamp screws and repeat the test until the amount of vibration is at the lowest level. Bend the slack end of the clamps so the screws will not loosen.

PROPELLER SHAFT (Continued)

**Fig. 1 Clamp Screw At Position 1**

- 1 - CLAMP
2 - SCREWDRIVER

**Fig. 2 Two Clamp Screws At The Same Position****Fig. 3 Clamp Screws Separated**

- 1 - 1/2 INCH

- (15) If the vibration remains unacceptable, apply the same steps to the front end of the propeller shaft.
(16) Install the wheel and tires. Lower the vehicle.

RUNOUT

- (1) Remove dirt, rust, paint and undercoating from the propeller shaft surface where the dial indicator will contact the shaft.
(2) The dial indicator must be installed perpendicular to the shaft surface.
(3) Measure runout at the center and ends of the shaft sufficiently far away from weld areas to ensure that the effects of the weld process will not enter into the measurements.
(4) Refer to Runout Specifications chart.
(5) If propeller shaft runout is out of specification, remove the propeller shaft, index the shaft 180° and re-install the propeller shaft. Measure shaft runout again.
(6) If propeller shaft runout is now within specifications, mark the shaft and yokes for proper orientation.
(7) If the propeller shaft runout is not within specifications, verify that the runout of the transmission/transfer case and axle are within specifications. Correct as necessary and re-measure propeller shaft runout.
(8) Replace the propeller shaft if the runout still exceeds the limits.

RUNOUT SPECIFICATIONS

Front of Shaft	0.020 in. (0.50 mm)
Center of Shaft	0.025 in. (0.63 mm)
Rear of Shaft	0.020 in. (0.50 mm)
note: Measure front/rear runout approximately 3 inches (76 mm) from the weld seam at each end of the shaft tube for tube lengths over 30 inches. For tube lengths under 30 inches, the maximum allowed runout is 0.020 in. (0.50 mm) for the full length of the tube.	

STANDARD PROCEDURES

To accurately check driveline alignment, raise and support the vehicle at the axles as level as possible. Allow the wheels and propeller shaft to turn.

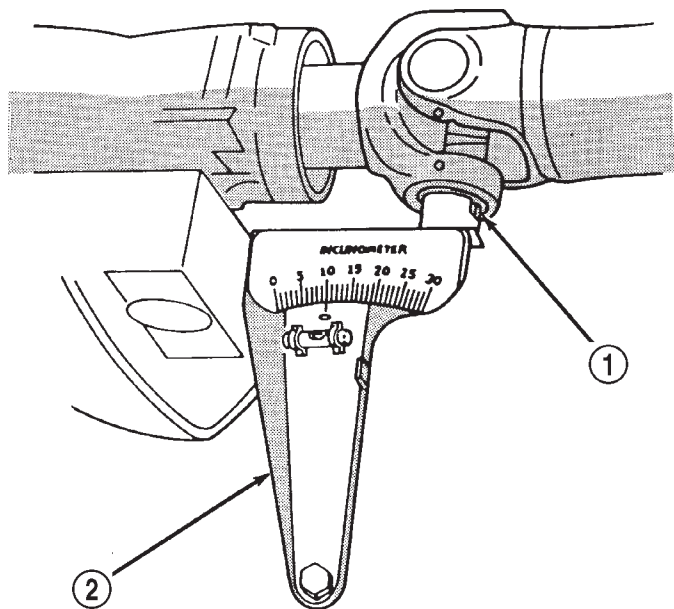
- (1) Remove any external bearing snap rings, if equipped from universal joint so protractor base sits flat.
(2) Rotate the shaft until transmission/transfer case output yoke bearing is facing downward.

NOTE: Always make measurements from front to rear and from the same side of the vehicle.

PROPELLER SHAFT (Continued)

(3) Place Inclinator 7663 on yoke bearing (A) parallel to the shaft (Fig. 4). Center bubble in sight glass and record measurement.

This measurement will give you the transmission or Output Yoke Angle (A).



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Fig. 4 Front (Output) Angle Measurement (A)

- 1 - SLIP YOE BEARING CAP
2 - INCLINOMETER

(4) Rotate propeller shaft 90 degrees and place Inclinator on yoke bearing parallel to the shaft (Fig. 5). Center bubble in sight glass and record measurement. This measurement can also be taken at the rear end of the shaft.

This measurement will give you the Propeller Shaft Angle (C).

(5) Subtract smaller figure from larger (C minus A) to obtain Transmission Output Operating Angle.

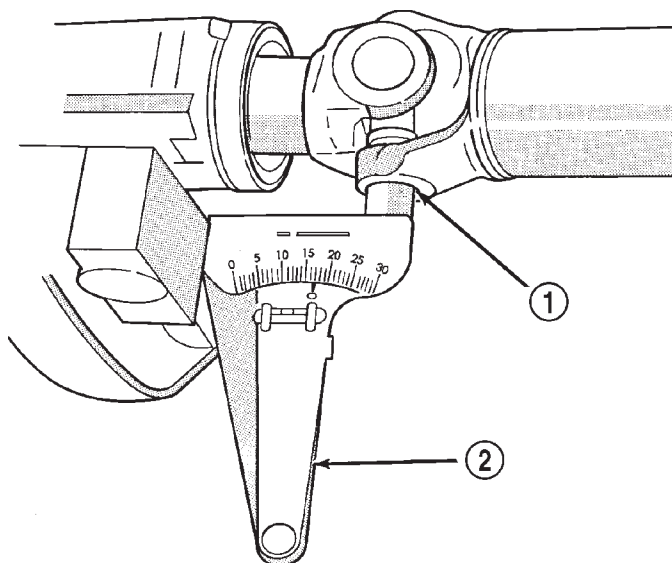
(6) Rotate propeller shaft 90 degrees and place Inclinator on pinion yoke bearing parallel to the shaft (Fig. 6). Center bubble in sight glass and record measurement.

This measurement will give you the pinion shaft or Input Yoke Angle (B).

(7) Subtract smaller figure from larger (C minus B) to obtain axle Input Operating Angle.

Refer to rules given below and the example in (Fig. 7) for additional information.

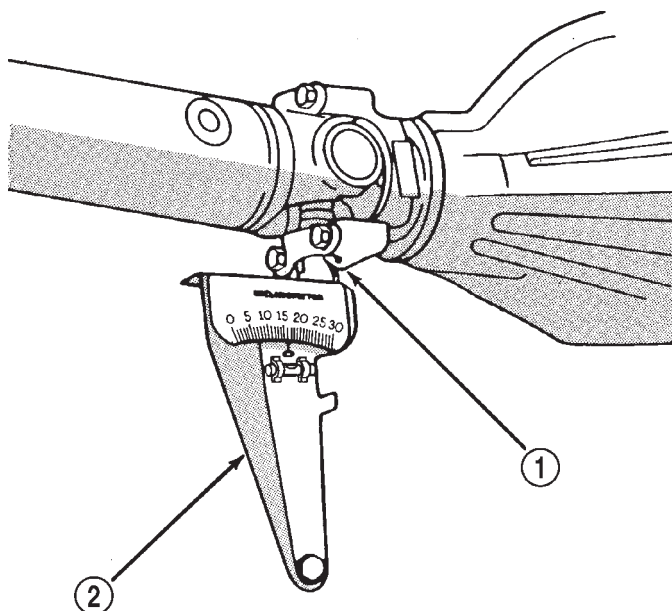
- Good cancellation of U-joint operating angles (within 1°).
- Operating angles less than 3°.
- At least 1/2 of one degree continuous operating (propeller shaft) angle.



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Fig. 5 Propeller Shaft Angle Measurement (C)

- 1 - SHAFT YOE BEARING CAP
2 - INCLINOMETER



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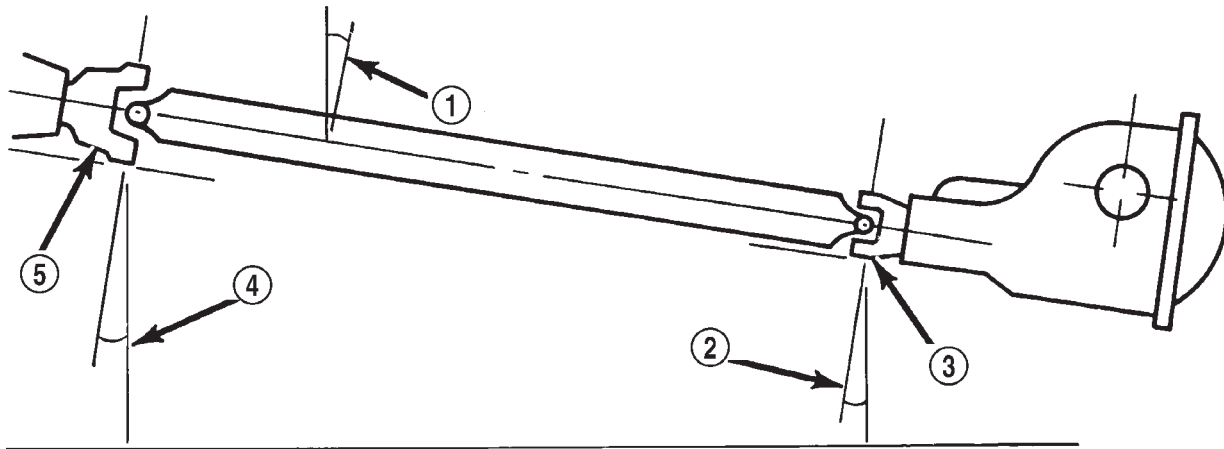
Fig. 6 Rear (Input) Angle Measurement (B)

- 1 - PINION YOE BEARING CAP
2 - INCLINOMETER

TWO-PIECE PROPELLER SHAFT

The procedure to measure the propeller shaft angles involved with a two-piece (Fig. 8) propeller shaft is the same as those for a one-piece propeller shaft.

PROPELLER SHAFT (Continued)



Horizontal Level

(A) Output Yoke = 3.0° or 4.9°

(C) Prop. Shaft = 4.9° or -3.0°

Transmission Output	1.9°
Operating Angle	

(B) Axle Input Yoke = 3.2° or 4.9°

(C) Prop. Shaft = 4.9° or -3.2°

Axle Input	1.7°
Operating Angle	

Trans. Output Operating Angle	1.9°
Axle Input Operating Angle	-1.7°

Amount of U-Joint Cancellation 0.2°

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Fig. 7 Universal Joint Angle Example

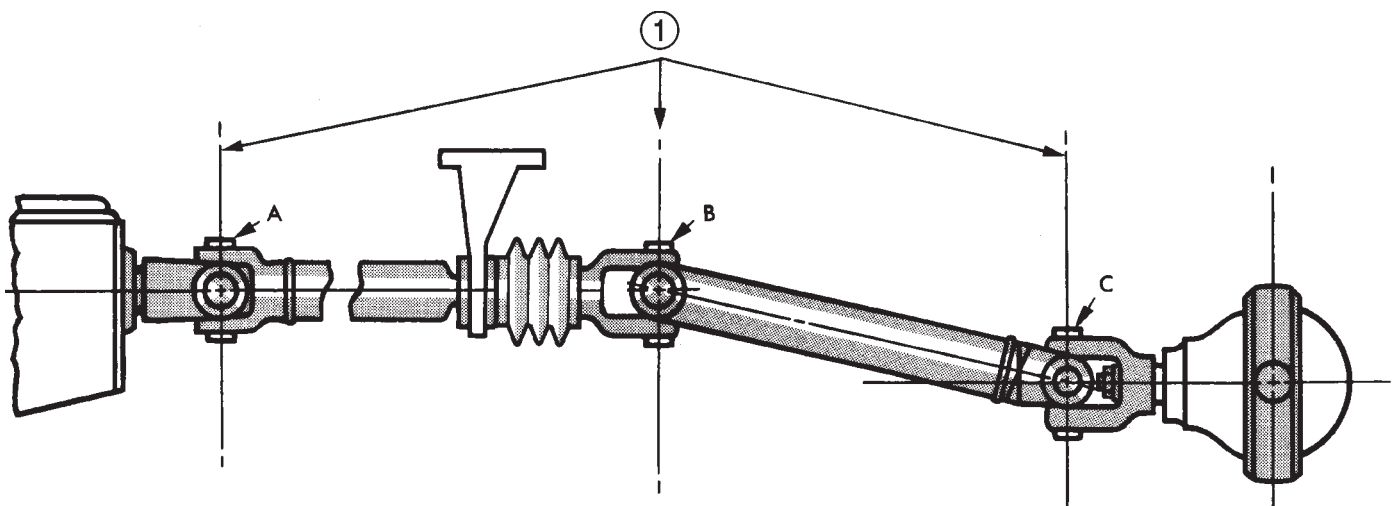
1 - 4.9° Angle (C)

2 - 3.2° Angle (B)

3 - Input Yoke

4 - 3.0° Angle (A)

5 - Output Yoke



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Fig. 8 Universal Joint Angle Two-Piece Shaft

1 - YOKES MUST BE IN SAME PLANE

PROPELLER SHAFT (Continued)

SPECIFICATIONS

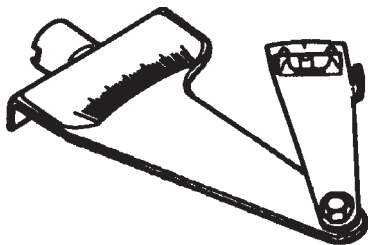
PROPELLER SHAFT

TORQUE SPECIFICATIONS

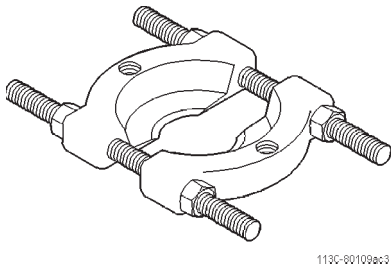
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Center Bearing Bolts	68	50	-
Front Shaft Flange Yoke	88	65	-
Front Shaft Axle Yoke	19	14	-
Rear Shaft Axle Yoke	29	22	-

SPECIAL TOOLS

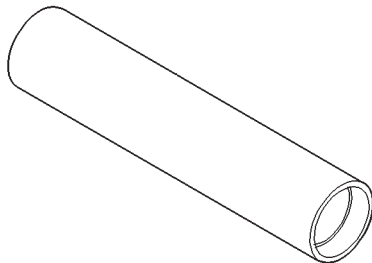
PROPELLER SHAFT



Inclinometer - 7663



Bearing Splitter - 1130



Installer, Bearing - 6052

PROPELLER SHAFT - FRONT

REMOVAL

(1) Shift the transmission and transfer case to their neutral positions.

(2) Raise and support vehicle and remove skid plate, if equipped.

(3) Mark a line across the companion flange at the transfer case and propeller shaft flange yoke for installation reference.

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

(5) Remove the universal joint strap bolts at the pinion shaft yoke (Fig. 9).

(6) Remove the bolts holding the propeller shaft to the transfer case companion flange.

(7) Remove the propeller shaft.

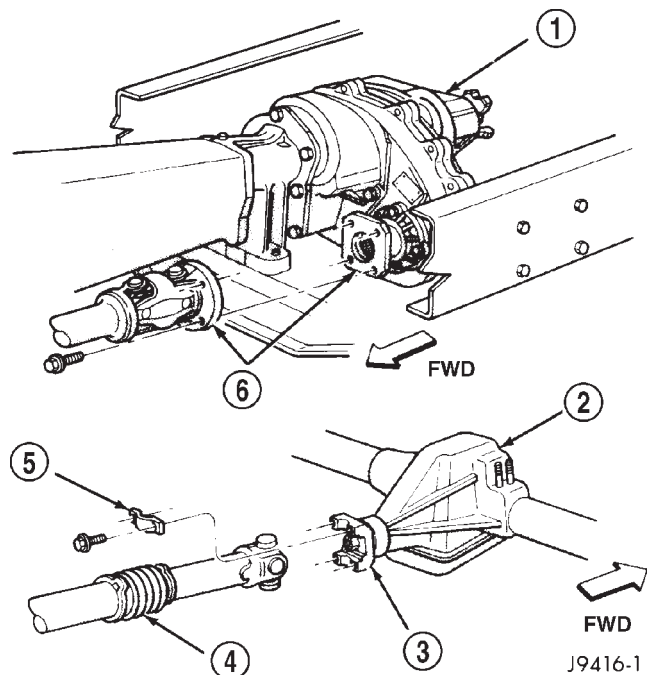


Fig. 9 Front Propeller Shaft

- 1 - TRANSFER CASE
- 2 - FRONT AXLE
- 3 - AXLE YOKE
- 4 - SLIP YOKE BOOT
- 5 - STRAP
- 6 - FLANGE YOKE/COMPANION FLANGE

PROPELLER SHAFT - FRONT (Continued)

INSTALLATION

(1) Position front propeller shaft under vehicle with rear universal joint over the transfer case companion flange.

(2) Place front universal joint into the axle pinion yoke.

(3) Align the mark on the flange yoke to the mark on the transfer case companion flange.

(4) Loosely install bolts to hold universal joint to transfer case companion flange.

(5) Align mark on front universal joint to the mark on the axle pinion yoke.

(6) Install bolts to hold front universal joint to axle pinion yoke. Tighten bolts to 19 N·m (14 ft. lbs.).

(7) Tighten bolts to hold universal joint to transfer case companion flange to 88 N·m (65 ft. lbs.).

(8) Install skid plate, if equipped.

(9) Lower vehicle and road test to verify repair.

PROPELLER SHAFT - REAR

REMOVAL

(1) Shift transmission into Neutral.

(2) Raise and support vehicle on safety stands.

(3) Mark a line across the axle pinion yoke or companion flange and propeller shaft or flange yoke for installation reference.

(4) Mark the outline of the center bearing on the frame crossmember for installation reference, if equipped.

(5) Remove bolts that attach the center bearing to the support bracket (Fig. 10), if equipped.

(6) Remove the bolts holding the universal joint clamps to the pinion yoke (Fig. 11).

(7) Slide the slip yoke off of the transmission, or transfer case, output shaft and remove the propeller shaft (Fig. 11).

INSTALLATION

(1) Slide the slip yoke onto the transmission or transfer case output shaft.

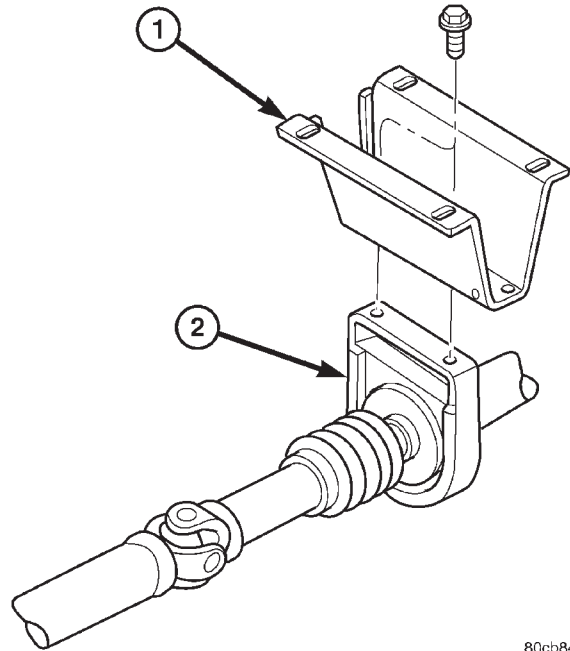
(2) Align the reference marks on the propeller shaft yoke/flange yoke and pinion yoke/companion flange.

(3) Align and install the center bearing to the support bracket, if necessary.

(4) Install the bolts and tighten to 68 N·m (50 ft. lbs.).

(5) Position universal joint into pinion yoke and tighten strap bolts to 29 N·m (22 ft. lbs.).

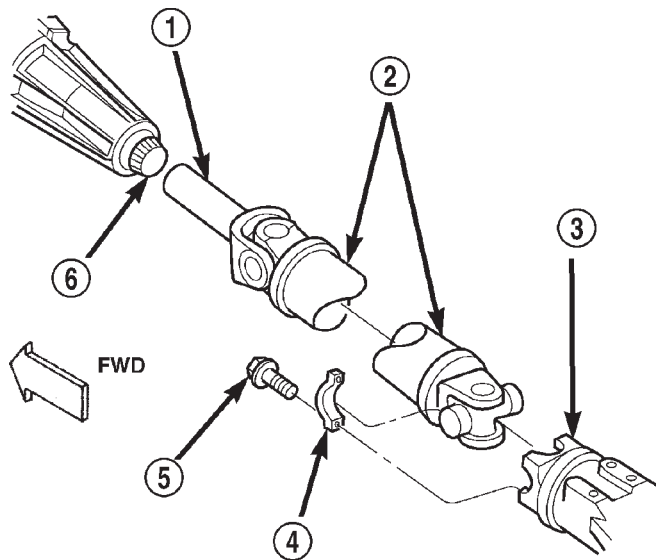
(6) Lower the vehicle.



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Fig. 10 CENTER BEARING

- 1 - SUPPORT BRACKET
2 - CENTER BEARING



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Fig. 11 REAR PROPELLER SHAFT

- 1 - SLIDING YOKE
2 - PROPELLER SHAFT
3 - PINION YOKE
4 - CLAMP
5 - SCREW
6 - OUTPUT SHAFT

CENTER BEARING

REMOVAL

- (1) Remove rear propeller shaft.
- (2) Remove slip joint boot clamp and separate the two half-shafts.
- (3) Use hammer and punch to tap slinger away from shaft to provide room for bearing splitter.
- (4) Position Bearing Splitter Tool 1130 between slinger and shaft.

CAUTION: Do not damage shaft spline during removal of center bearing.

- (5) Set shaft in press and press bearing off the shaft.

INSTALLATION

NOTE: Two types of center bearings are used and are not interchangeable. Install the same type as the vehicle was built with.

- (1) Install new slinger on shaft and drive into position with appropriate installer tool.
- (2) Install new center bearing on shaft with Bearing Installer Tool 6052. Drive on shaft with hammer until bearing is seated.
- (3) Clean shaft splines and apply a coat of multi-purpose grease.
- (4) Align master splines and slide front and rear half-shafts together. Reposition slip yoke boot and install new clamp.
- (5) Install propeller shaft in vehicle.

ADJUSTMENTS

ADJUSTMENT - CENTER BEARING

Launch shudder is a vibration that occurs at first acceleration from a stop. Shudder vibration usually peaks at the engines highest torque output. Shudder is a symptom associated with vehicles using a two-piece propeller shaft. To decrease shudder, lower the center bearing in 1/8 inch increments. Use shim stock or fabricated plates. Plate stock must be used to maintain compression of the rubber insulator around the bearing. Do not use washers. Replace the original bolts with the appropriate increased length bolts.

SINGLE CARDAN UNIVERSAL JOINTS

DISASSEMBLY

Individual components of cardan universal joints are not serviceable. If worn or leaking, they must be replaced as an assembly.

- (1) Remove the propeller shaft.
- (2) With a soft drift, tap the outside of the bearing cap assembly to loosen snap ring.
- (3) Remove snap rings from both sides of yoke (Fig. 12).

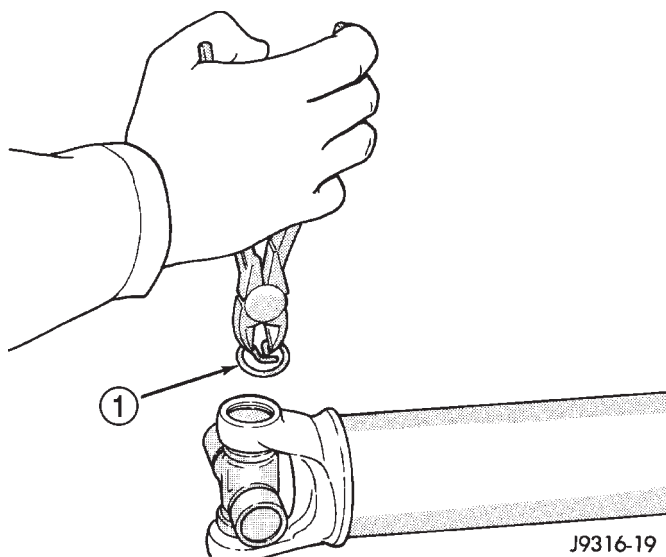


Fig. 12 Remove Snap Ring

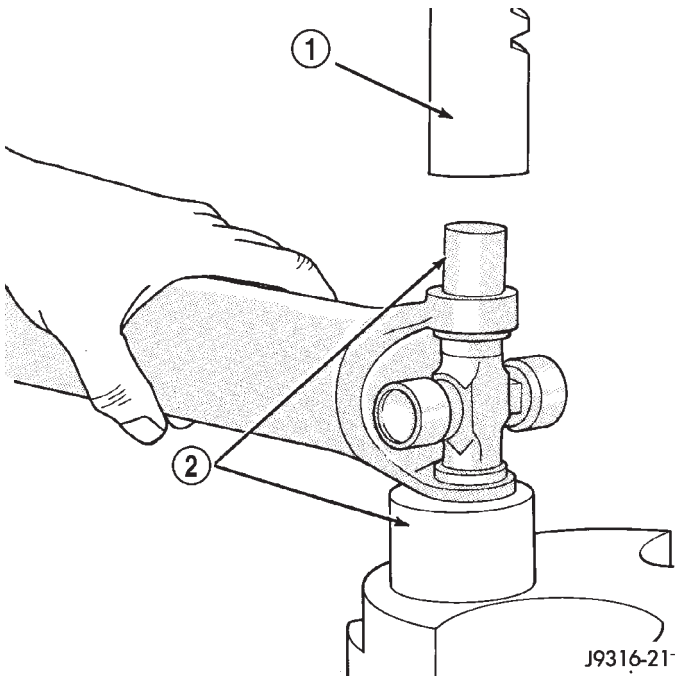
1 - SNAP RING

- (4) Set the yoke in an arbor press or vise with a socket whose inside diameter is large enough to receive the bearing cap positioned beneath the yoke.

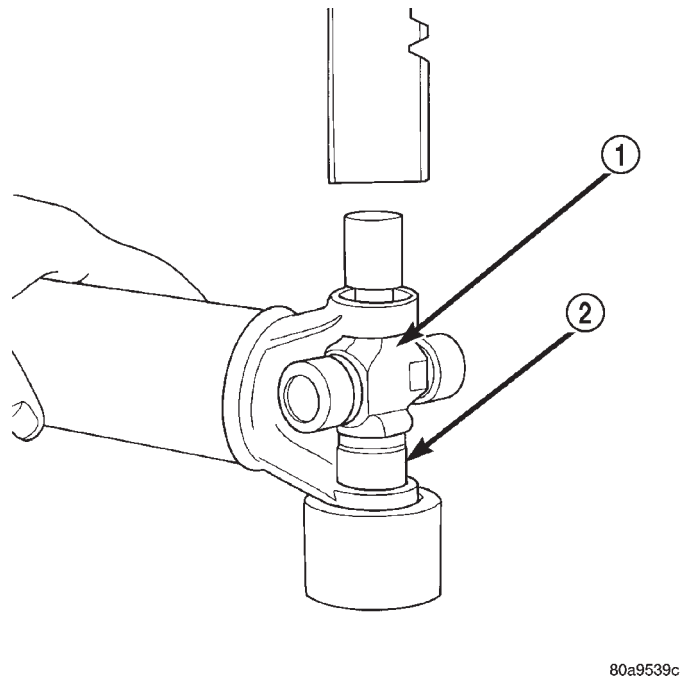
- (5) Position the yoke with the grease fitting, if equipped, pointing up.

- (6) Place a socket with an outside diameter smaller than the upper bearing cap on the upper bearing cap and press the cap through the yoke to release the lower bearing cap (Fig. 13).

SINGLE CARDAN UNIVERSAL JOINTS (Continued)

**Fig. 13 Press Out Bearing**

- 1 - PRESS
2 - SOCKET

**Fig. 14 Press Out Remaining Bearing**

- 1 - CROSS
2 - BEARING CAP

(7) If the bearing cap will not pull out of the yoke by hand after pressing, tap the yoke ear near the bearing cap to dislodge the cap.

(8) Turn the yoke over and straighten the cross in the open hole. Carefully press the end of the cross until the remaining bearing cap can be removed (Fig. 14).

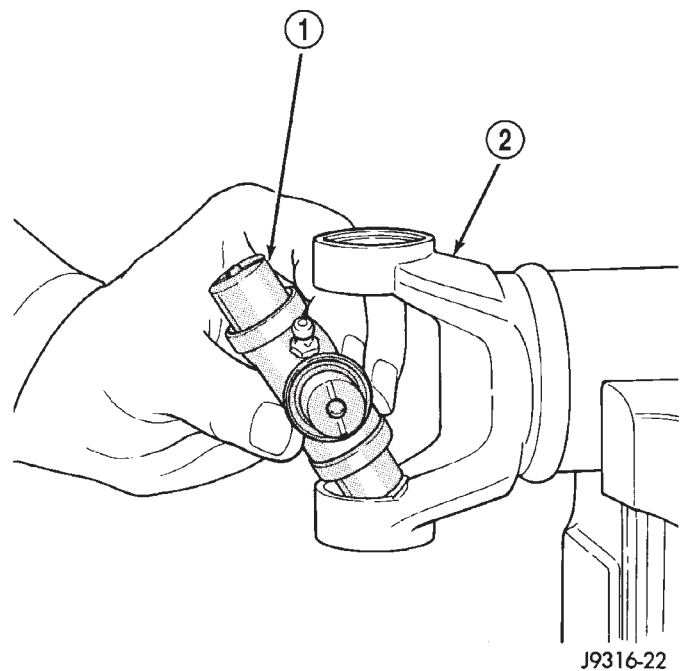
CAUTION: If cross or bearing cap are not straight during installation, the bearing cap will score the walls of the yoke bore and damage can occur.

ASSEMBLY

CAUTION: If the cross or bearing cap are not straight during installation, the bearing cap will score the walls of the yoke bore and damage can occur.

(1) Apply extreme pressure (EP) N.L.G.I. Grade 1 or 2 grease to inside of yoke bores to aid in installation.

(2) Position the cross in the yoke with its lube fitting equipped, pointing up (Fig. 15).

**Fig. 15 Install Cross In Yoke**

- 1 - CROSS
2 - YOKE

SINGLE CARDAN UNIVERSAL JOINTS (Continued)

(3) Place a bearing cap over the trunnion and align the cap with the yoke bore (Fig. 16). Keep the needle bearings upright in the bearing assembly.

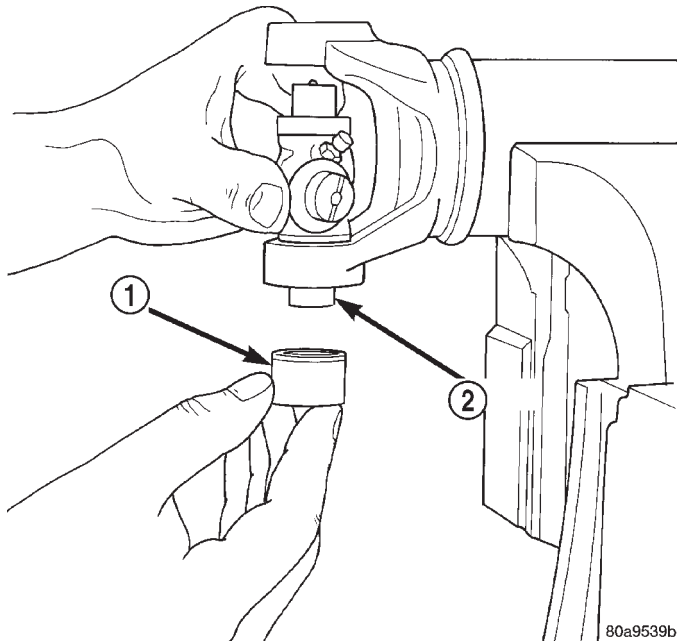


Fig. 16 Install Bearing On Trunnion

- 1 - BEARING CAP
2 - TRUNNION

(4) Press the bearing cap into the yoke bore enough to install a snap ring.

(5) Install a snap ring.

(6) Repeat Step 3 and Step 4 to install the opposite bearing cap. If the joint is stiff or binding, strike the yoke with a soft hammer to seat the needle bearings.

(7) Add grease to lube fitting, if equipped.

(8) Install the propeller shaft.

DOUBLE CARDAN UNIVERSAL JOINTS

DISASSEMBLY

NOTE: Individual components of cardan universal joints are not serviceable they must be replaced as an assembly.

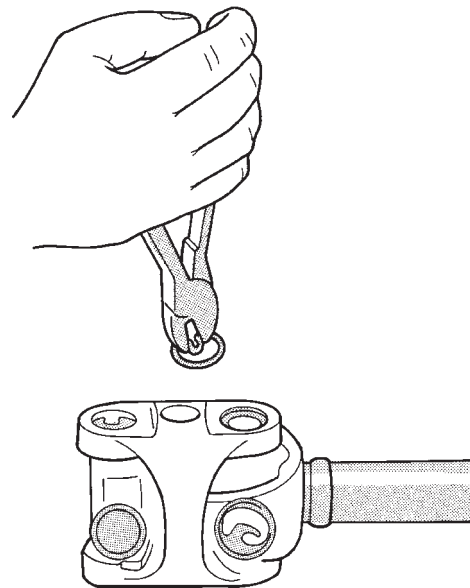
(1) Remove the propeller shaft.

(2) Mark the propeller shaft, link yoke and flange yoke for assembly reference.

(3) Tap the outside of the bearing cap assembly with drift to loosen snap rings.

(4) Remove all the bearing cap snap rings (Fig. 17).

(5) Remove any grease fittings if equipped.



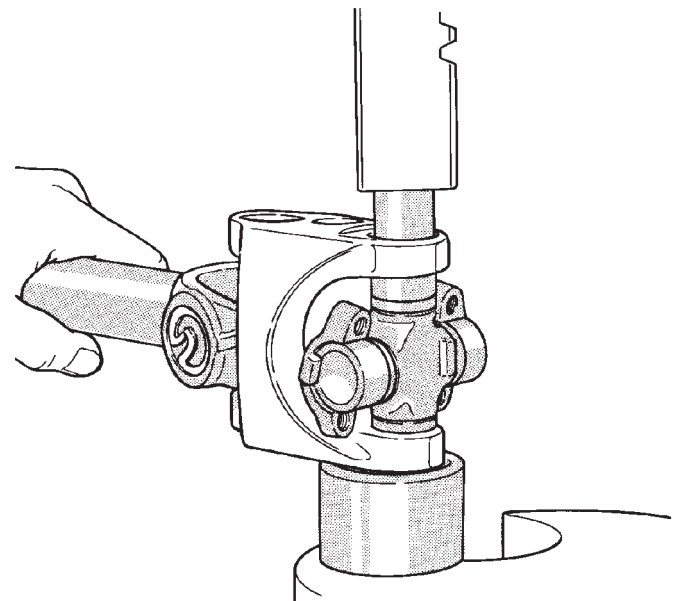
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Fig. 17 SNAP RINGS

(6) Position a socket on the press with an inside diameter large enough to receive the bearing cap under the link yoke.

(7) Place another socket with an outside diameter smaller than the bearing cap on the upper bearing cap.

(8) Press one bearing cap from the outboard side of the link yoke enough to grasp the cap with vise jaws (Fig. 18).

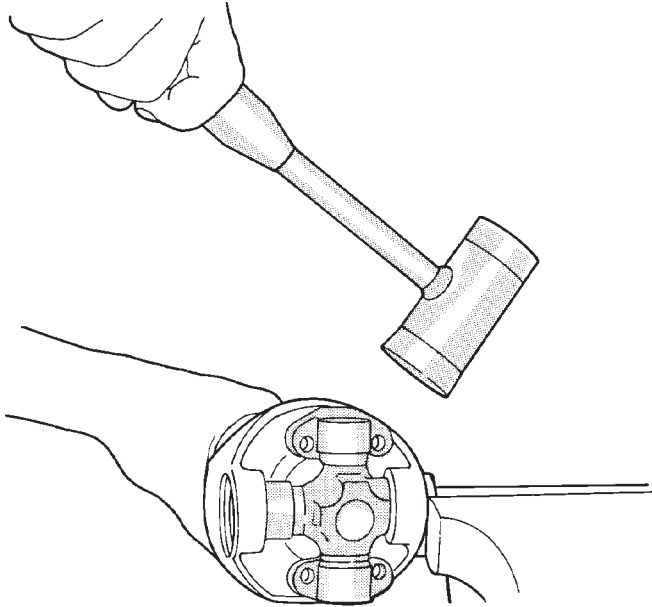


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Fig. 18 PRESS OUT BEARING

DOUBLE CARDAN UNIVERSAL JOINTS (Continued)

(9) Grasp protruding bearing cap with vise jaws and tap link yoke with a mallet and drift to remove bearing cap (Fig. 19).

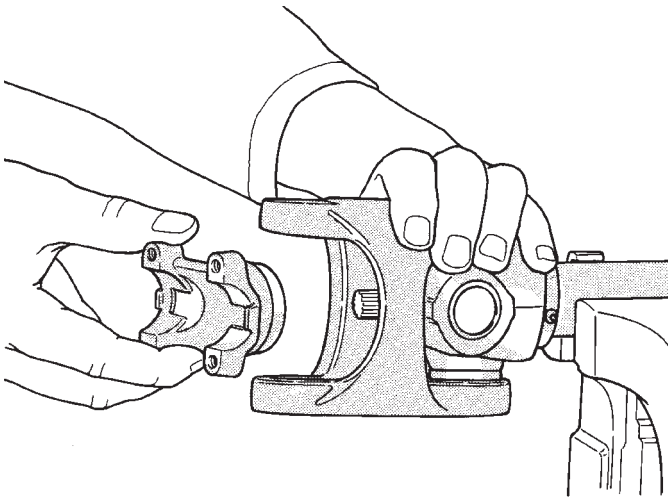


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Fig. 19 REMOVE BEARING FROM YOKE

(10) Flip assembly and repeat Step 6, Step 7, Step 8 and Step 9 to remove the opposite bearing cap.

(11) Remove the cross centering kit assembly and spring (Fig. 20).



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Fig. 20 REMOVE CENTERING KIT

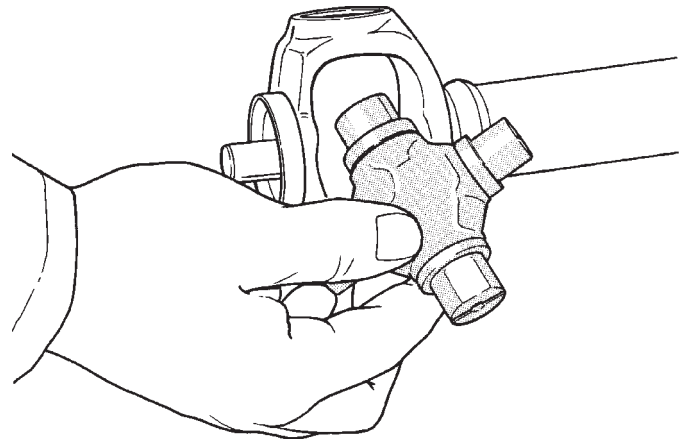
(12) Press the remaining bearing caps out the other end of the link yoke as described above to complete the disassembly.

ASSEMBLY

CAUTION: All alignment marks on the link yoke and propeller shaft yoke must be aligned during assembly.

(1) Apply extreme pressure (EP) N.L.G.I. Grade 1 or 2 grease to inside of yoke bores.

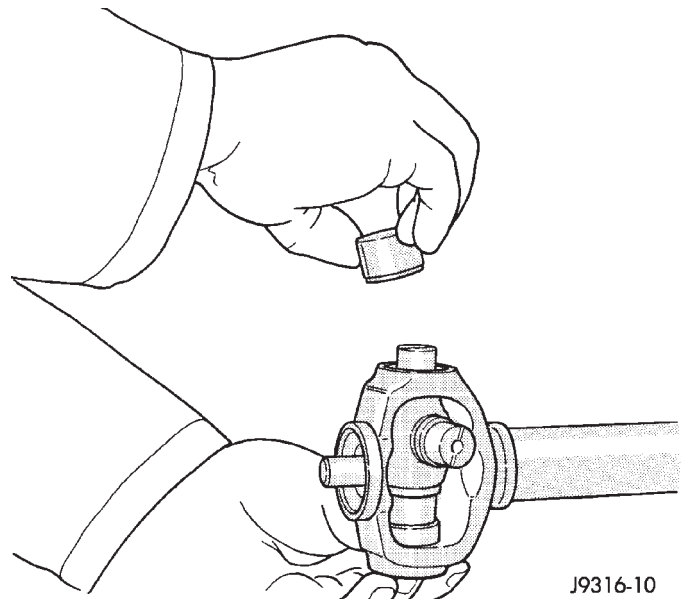
(2) Fit a cross into the propeller shaft yoke (Fig. 21).



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Fig. 21 INSTALL CROSS IN YOKE

(3) Place a bearing cap over the trunnion and align the cap with the yoke bore (Fig. 22). Keep needle bearings upright in the bearing cap.



J9316-10

Fig. 22 INSTALL BEARING CAP

DOUBLE CARDAN UNIVERSAL JOINTS (Continued)

(4) Press bearing cap into the yoke bore enough to clear snap ring groove (Fig. 23).

(5) Install a snap ring.

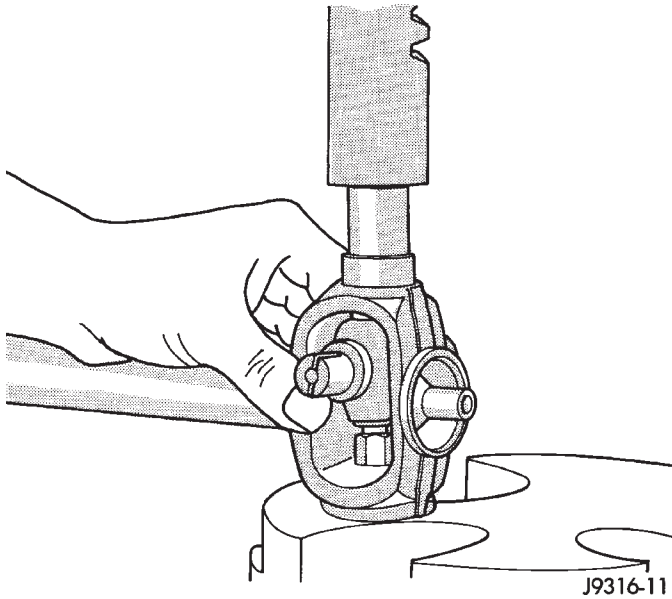


Fig. 23 PRESS BEARING CAP

(6) Flip propeller shaft yoke and install other bearing cap onto the opposite trunnion and install a snap ring (Fig. 24).

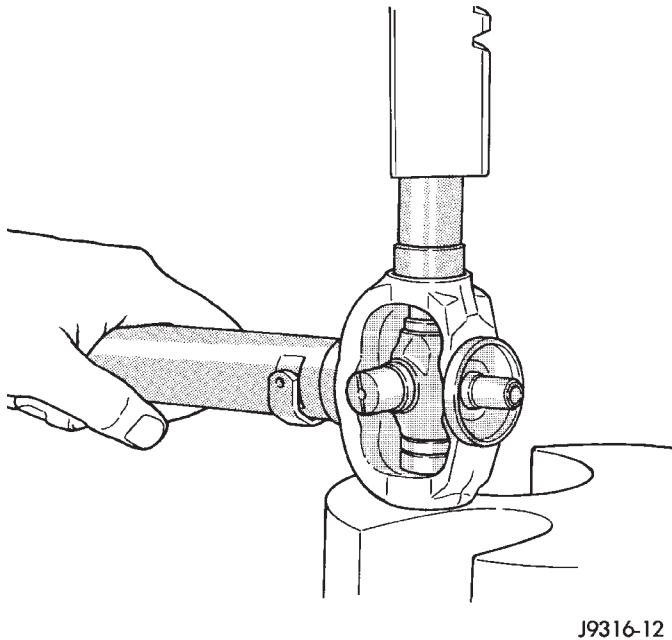


Fig. 24 PRESS BEARING CAP

(7) Fit the link yoke onto the remaining trunnions and press both bearing caps into place and install snap rings (Fig. 25).

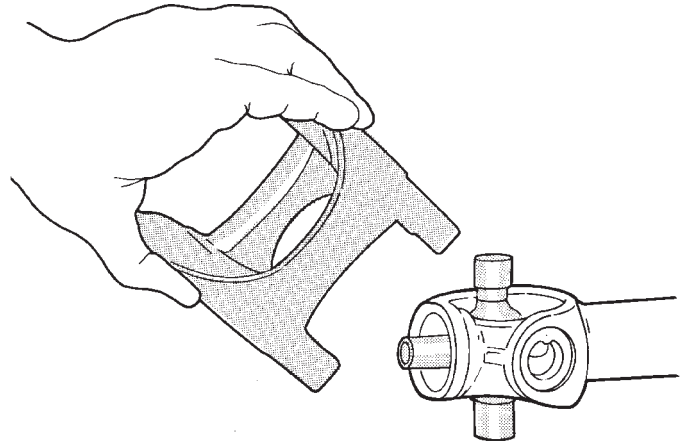


Fig. 25 INSTALL LINK YOKE

(8) Install centering kit assembly inside the link yoke (Fig. 26).

NOTE: Making sure the spring is properly positioned.

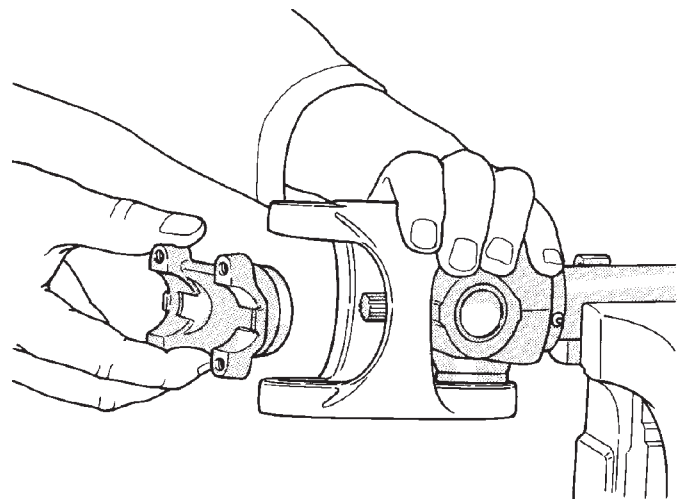
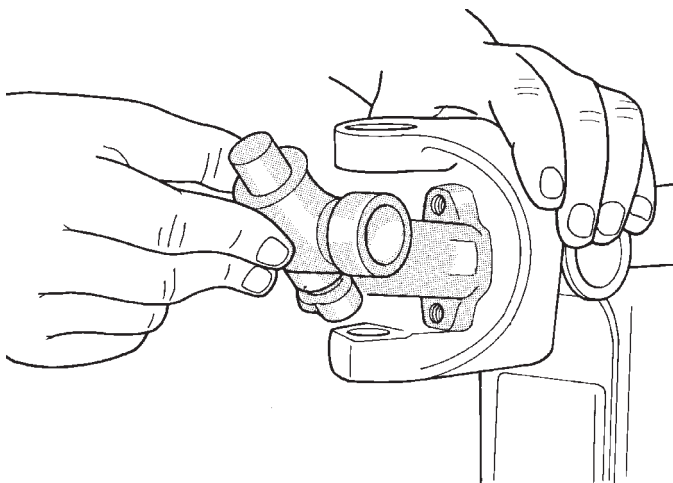


Fig. 26 CENTERING KIT

DOUBLE CARDAN UNIVERSAL JOINTS (Continued)

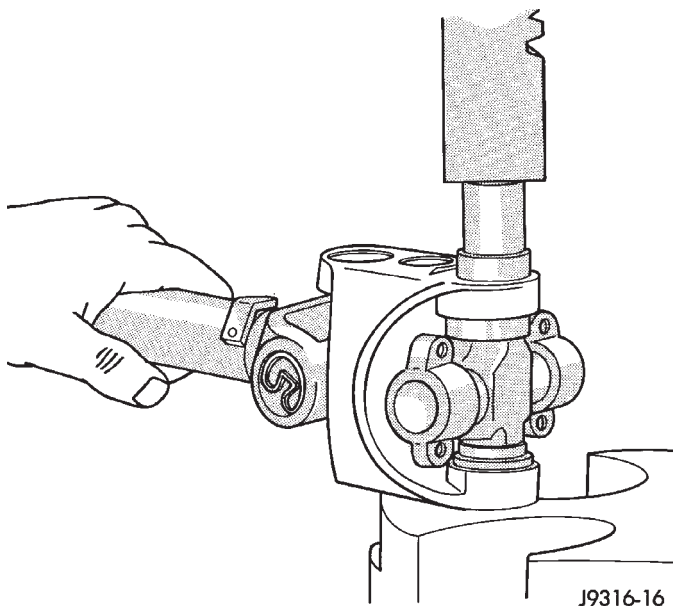
(9) Place two bearing caps on opposite trunnions of the remaining cross. Fit the open trunnions into the link yoke bores and the bearing caps into the centering kit (Fig. 27).



J9316-15

Fig. 27 REMAINING CROSS

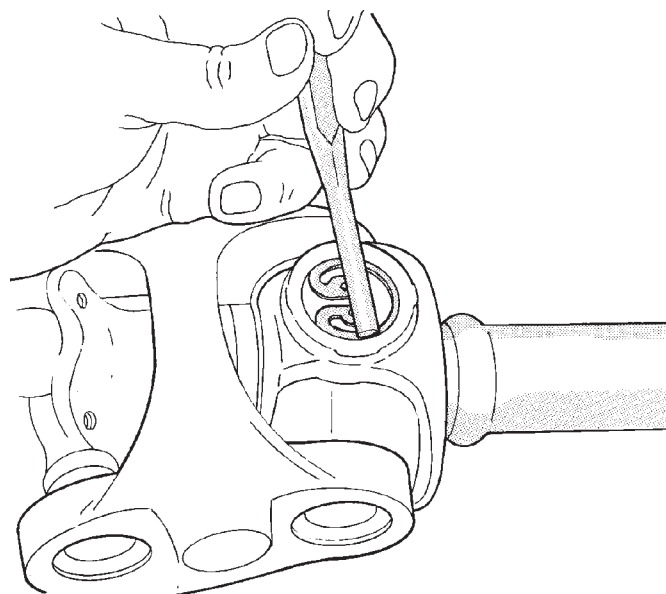
(10) Press the remaining two bearing caps into place and install snap rings (Fig. 28).



J9316-16

Fig. 28 PRESS BEARING CAP

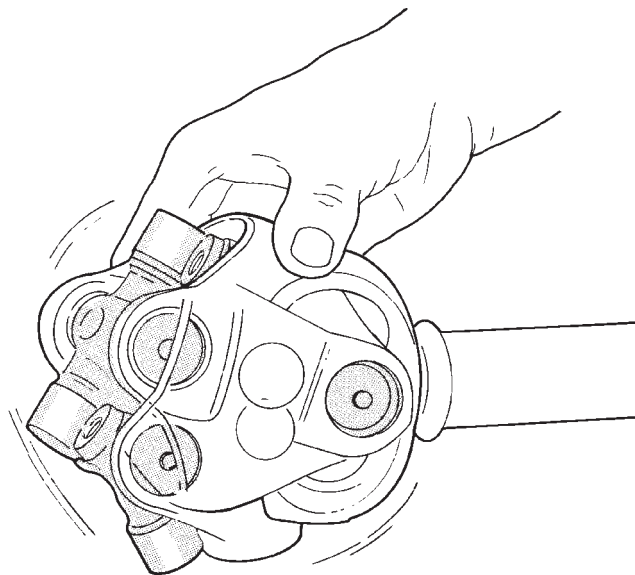
(11) Tap the snap rings to seat them into the grooves (Fig. 29).



J9316-17

Fig. 29 SEAT SNAP RINGS

(12) Verify for proper assembly. Flexing the joint beyond center, the joint should snap over-center in both directions if correctly assembled (Fig. 30).



J9316-18

Fig. 30 VERIFY ASSEMBLY

(13) Install the propeller shaft.

FRONT AXLE - 248FBI

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FRONT AXLE - 248FBI

DESCRIPTION

The Front Beam-design Iron (FBI) axle consists of a cast iron center casting differential housing with axle shaft tubes extending from each side. The tubes are pressed into the differential housing and welded. The axles is equipped with semi-floating axle shafts, meaning that loads are supported by the hub bearings.

The differential case is a one-piece design. Differential bearing preload and ring gear backlash is adjusted by the use of shims located between the differential bearing cones and case. Pinion bearing pre-

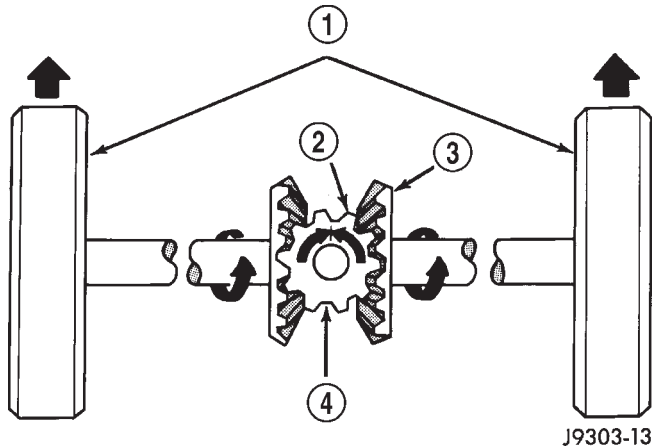
load is set and maintained by the use of a collapsible spacer. The stamped steel cover provides a means for inspection and servicing the differential.

OPERATION

The axle receives power from the transfer case through the front propeller shaft. The front propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are splined to the axle shafts.

FRONT AXLE - 248FBI (Continued)

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).



J9303-13

Fig. 1 DIFFERENTIAL-STRAIGHT AHEAD DRIVING

- 1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
 2 - PINION GEAR
 3 - SIDE GEAR
 4 - PINION GEARS ROTATE WITH CASE

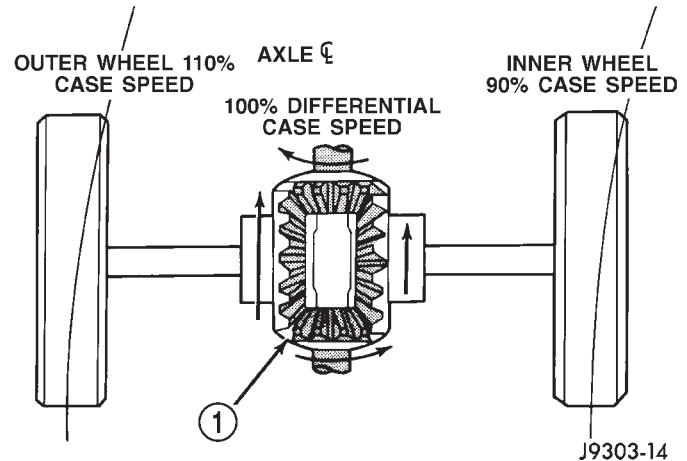
When turning corners, the outside wheel must travel a greater distance than the inside wheel to complete a turn. The difference must be compensated for to prevent the tires from scuffing and skidding through turns. To accomplish this, the differential allows the axle shafts to turn at unequal speeds (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.

DIAGNOSIS AND TESTING - AXLE**GEAR NOISE**

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, tooth contact, worn/damaged gears or the carrier housing not having the proper offset and squareness.

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

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the



J9303-14

Fig. 2 DIFFERENTIAL-ON TURNS

- 1 - PINION GEARS ROTATE ON PINION SHAFT

peak-noise range. If the noise stops or changes greatly:

- Check for insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

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

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched 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.

FRONT AXLE - 248FBI (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 shaft bore will also cause low speed knock.

VIBRATION

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

- 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 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

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.
- Transmission shift operation.
- 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 to case clearance.

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

DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose. 2. Faulty, brinelled wheel bearing.	1. Tighten loose nuts. 2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube. 2. Bent or sprung axle shaft. 3. End-play in pinion bearings. 4. Excessive gear backlash between the ring gear and pinion. 5. Improper adjustment of pinion gear bearings. 6. Loose pinion yoke nut. 7. Scuffed gear tooth contact surfaces.	1. Inspect axle tube alignment. Correct as necessary. 2. Inspect and correct as necessary. 3. Refer to pinion pre-load information and correct as necessary. 4. Check adjustment of the ring gear and pinion backlash. Correct as necessary. 5. Adjust the pinion bearings pre-load. 6. Tighten the pinion yoke nut. 7. Inspect and replace as necessary.

FRONT AXLE - 248FBI (Continued)

Condition	Possible Causes	Correction
Axle Shaft Broke	1. Misaligned axle tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch.	1. Replace the broken shaft after correcting tube mis-alignment. 2. Replace broken shaft and avoid excessive weight on vehicle. 3. Replace broken shaft and avoid or correct erratic clutch operation. 4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly. 2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly. 3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight. 4. Replace case and inspect gears and bearings for further 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. Fill differential with the correct fluid type and quantity. 2. Replace scored gears. Fill differential with the correct fluid type and quantity. 3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high. 2. Worn axle shaft seals. 3. Cracked differential housing. 4. Worn pinion seal. 5. Worn/scored yoke. 6. Axle cover not properly sealed.	1. Drain lubricant to the correct level. 2. Replace seals. 3. Repair as necessary. 4. Replace seal. 5. Replace yoke and seal. 6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low. 2. Improper grade of lubricant. 3. Bearing pre-loads too high. 4. Insufficient ring gear backlash.	1. Fill differential to correct level. 2. Fill differential with the correct fluid type and quantity. 3. Re-adjust bearing pre-loads. 4. Re-adjust ring gear backlash.

FRONT AXLE - 248FBI (Continued)

Condition	Possible Causes	Correction
Gear Teeth Broke	1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavement. 4. Improper adjustments.	1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation. 3. Replace gears and examine remaining parts for damage. 4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant. 2. Improper ring gear and pinion adjustment. 3. Unmatched ring gear and pinion. 4. Worn teeth on ring gear and/or pinion. 5. Loose pinion bearings. 6. Loose differential bearings. 7. Mis-aligned or sprung ring gear. 8. Loose differential bearing cap bolts. 9. Housing not machined properly.	1. Fill differential with the correct fluid type and quantity. 2. Check ring gear and pinion contact pattern. 3. Replace gears with a matched ring gear and pinion. 4. Replace ring gear and pinion. 5. Adjust pinion bearing pre-load. 6. Adjust differential bearing pre-load. 7. Measure ring gear run-out. Replace components as necessary. 8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification. 9. Replace housing.

REMOVAL

- (1) Raise and support the vehicle.
- (2) Remove wheels and tires.
- (3) Remove brake calipers and rotors. Refer to 5 Brakes for procedures.
- (4) Remove ABS wheel speed sensors, if equipped. Refer to 5 Brakes for procedures.
- (5) Disconnect axle vent hose.
- (6) Disconnect vacuum hose and electrical connector at disconnect housing.
- (7) Remove front propeller shaft.
- (8) Disconnect stabilizer bar links at the axle brackets.
- (9) Disconnect shock absorbers from axle brackets.
- (10) Disconnect track bar from the axle bracket.
- (11) Disconnect tie rod and drag link from the steering knuckles.
- (12) Position suitable lifting device under the axle assembly.

- (13) Secure axle to lifting device.
- (14) Mark suspension alignment cams for installation reference.
- (15) Disconnect upper and lower suspension arms from the axle bracket.
- (16) Lower the axle. The coil springs will drop with the axle.
- (17) Remove the coil springs from the axle bracket.

INSTALLATION

CAUTION: Suspension components with rubber bushings should be tightened with the weight of the vehicle on the suspension, at normal height. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur. Rubber bushings must never be lubricated.

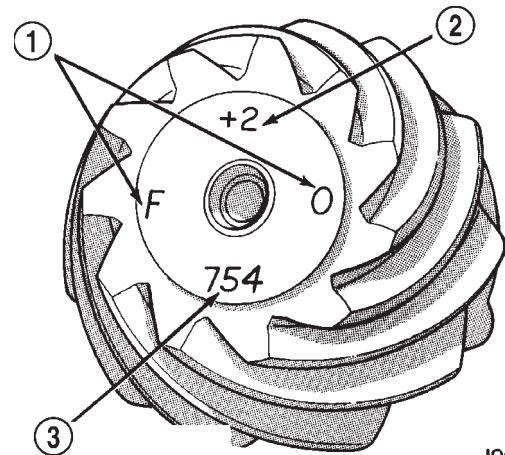
- (1) Support the axle on a suitable lifting device.

FRONT AXLE - 248FBI (Continued)

- (2) Secure axle to lifting device.
- (3) Position the axle under the vehicle.
- (4) Install springs, retainer clip and bolts.
- (5) Raise axle and align it with the spring pads.
- (6) Position upper and lower suspension arms in the axle brackets. Install bolts, nuts and align the suspension alignment cams to the reference marks. Do not tighten at this time.
- (7) Connect track bar to the axle bracket and install the bolt. Do not tighten at this time.
- (8) Install shock absorber and tighten bolts to 121 N·m (89 ft. lbs.).
- (9) Install stabilizer bar link to the axle bracket. Tighten the nut to 37 N·m (27 ft. lbs.).
- (10) Install drag link and tie rod to the steering knuckles and tighten the nuts to 88 N·m (65 ft. lbs.).
- (11) Install ABS wheel speed sensors, if equipped. Refer to 5 Brakes for procedures.
- (12) Install rotors and brake calipers, refer to 5 Brakes for procedures.
- (13) Connect the vent hose to the tube fitting.
- (14) Connect vacuum hose and electrical connector to disconnect housing.
- (15) Install front propeller shaft.
- (16) Check and add differential lubricant, if necessary. Refer to Lubricant Specifications for lubricant requirements.
- (17) Install wheel and tire assemblies.
- (18) Remove supports and lower the vehicle.
- (19) Tighten upper suspension arm nuts at axle to 121 N·m (89 ft. lbs.). Tighten upper suspension arm nuts at frame to 84 N·m (62 ft. lbs.).
- (20) Tighten lower suspension arm nuts at axle to 84 N·m (62 ft. lbs.). Tighten the lower suspension arm nuts at frame to 119 N·m (88 ft. lbs.).
- (21) Tighten track bar bolt at the axle bracket to 176 N·m (130 ft. lbs.).
- (22) Check front wheel alignment.

ADJUSTMENTS

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. 3). 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 127 mm (5.00 in.). The standard depth provides the best gear tooth contact pattern. Refer to Backlash and Contact Pattern in this section for additional information.

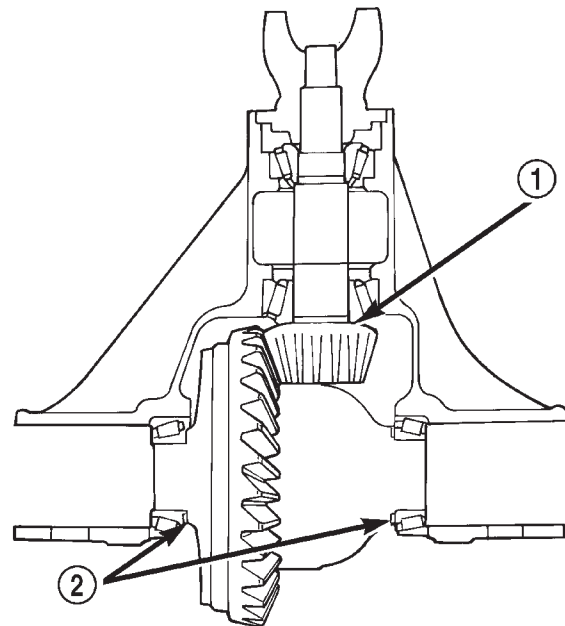


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Fig. 3 PINION GEAR ID NUMBERS

- 1 - PRODUCTION NUMBERS
- 2 - PINION GEAR DEPTH VARIANCE
- 3 - GEAR MATCHING NUMBER

Compensation for pinion depth variance is achieved with a select shim/slinger. The shims are placed between the rear pinion bearing and the pinion gear head (Fig. 4).



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Fig. 4 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM/SLINGER
- 2 - DIFFERENTIAL BEARING SHIM

FRONT AXLE - 248FBI (Continued)

If a new gear set is being installed, note the depth variance etched into both the original and replacement pinion. Add or subtract this number from the thickness of the original depth shim/oil slinger to compensate for the difference in the depth variances. Refer to the Depth Variance chart.

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

Note the etched number on the face of the pinion gear head (–1, –2, 0, +1, +2, etc.). The numbers represent thousands of an inch deviation from the standard. If the number is negative, add that value to the required thickness of the depth shims. If the number is positive, subtract that value from the thickness of the depth shim. If the number is 0 no change is necessary.

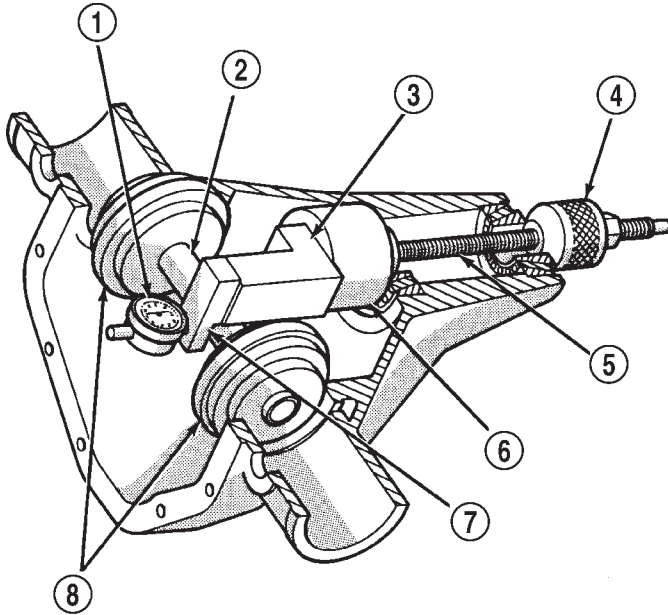
PINION GEAR DEPTH VARIANCE

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

FRONT AXLE - 248FBI (Continued)

PINION DEPTH MEASUREMENT AND ADJUSTMENT

Measurements are taken with pinion bearing cups and pinion bearings installed in the housing. Take measurements with Pinion Gauge Set and Dial Indicator C-3339 (Fig. 5).



J9403-45

Fig. 5 PINION GEAR DEPTH GAUGE TOOLS

- 1 - DIAL INDICATOR
- 2 - ARBOR
- 3 - PINION HEIGHT BLOCK
- 4 - CONE
- 5 - SCREW
- 6 - PINION BLOCK
- 7 - SCOOTER BLOCK
- 8 - ARBOR DISC

(1) Assemble Pinion Height Block 6739, Pinion Block 6736 and rear pinion bearing onto Screw 6741 (Fig. 5).

(2) Insert assembled height gauge components, rear bearing and screw into the housing through pinion bearing cups (Fig. 6).

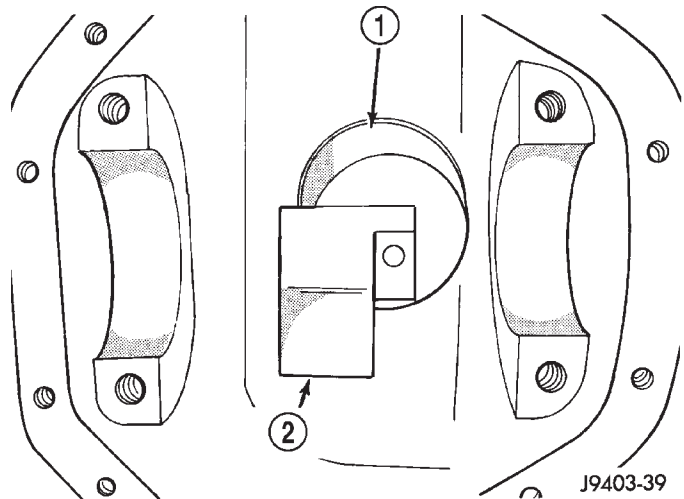
(3) Install front pinion bearing and Cone-nut 6740 hand tight (Fig. 5).

(4) Place Arbor Disc 6732 on Arbor D-115-3 in position in the housing side bearing cradles (Fig. 7).

NOTE: Arbor Discs 6732 has different step diameters to fit other axles. Choose proper step for axle being serviced.

(5) Install differential bearing caps on arbor discs and snug the bearing cap bolts. Then cross tighten cap bolts to 108 N·m (80 ft. lbs.).

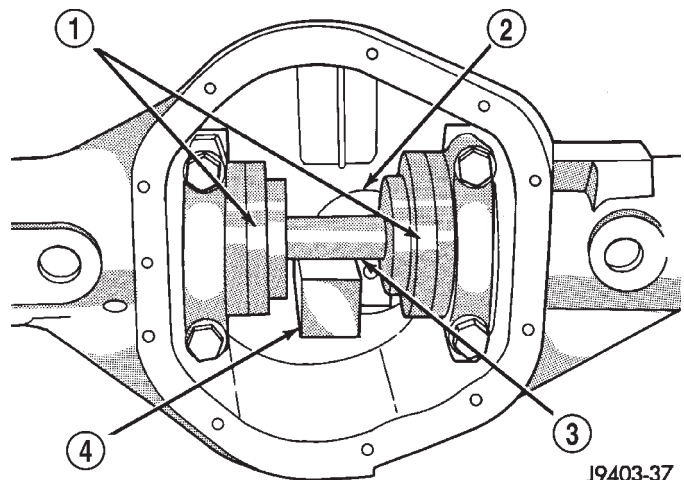
(6) Assemble Dial Indicator C-3339 into Scooter Block D-115-2 and secure set screw.



J9403-39

Fig. 6 PINION HEIGHT BLOCK

- 1 - PINION BLOCK
- 2 - PINION HEIGHT BLOCK



J9403-37

Fig. 7 GAUGE TOOLS IN HOUSING

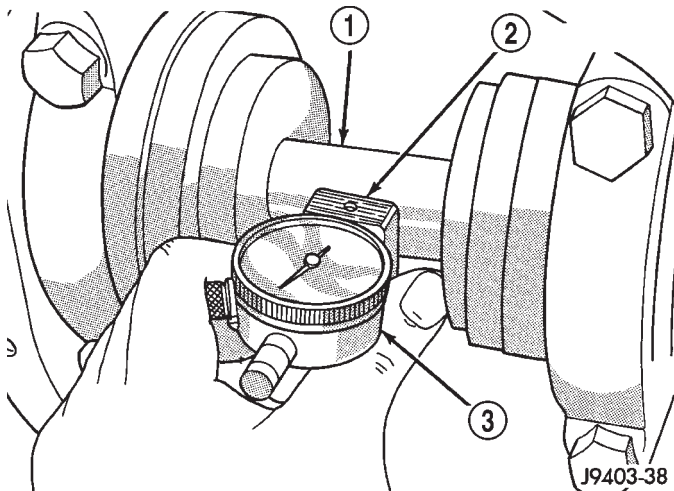
- 1 - ARBOR DISC
- 2 - PINION BLOCK
- 3 - ARBOR
- 4 - PINION HEIGHT BLOCK

(7) Position Scooter Block/Dial Indicator flush on the pinion height block. Hold scooter block and zero the dial indicator.

(8) Slowly slide the scooter block across the pinion height block over to the arbor (Fig. 8). Move the scooter block till dial indicator crests the arbor, then record the highest reading.

(9) Select a shim/slinger equal to the dial indicator reading plus the pinion depth variance number etched in the face of the pinion (Fig. 3). For example, if the depth variance is -2, add +0.002 in. to the dial indicator reading.

FRONT AXLE - 248FBI (Continued)

**Fig. 8 PINION GEAR DEPTH MEASUREMENT**

- 1 - ARBOR
- 2 - SCOOTER BLOCK
- 3 - DIAL INDICATOR

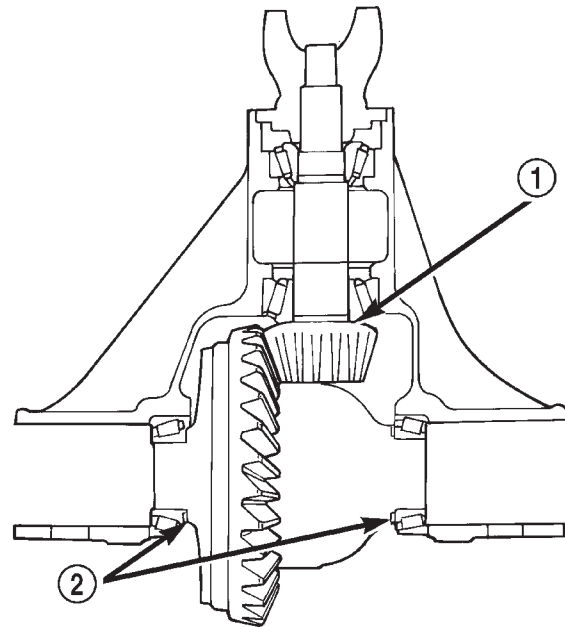
DIFFERENTIAL SIDE BEARING PRELOAD AND GEAR BACKLASH

Differential side bearing preload and gear backlash is achieved by selective shims positioned behind the differential side bearing cones. The proper shim thickness can be determined using slip-fit Dummy Bearings D-343 in place of the differential side bearings and a Dial Indicator C-3339. Before proceeding with the differential bearing preload and gear backlash measurements, measure the pinion gear depth and prepare the pinion for installation. Establishing proper pinion gear depth is essential to establishing gear backlash and tooth contact patterns. After the overall shim thickness to take up differential side play is measured, the pinion is installed, and the gear backlash shim thickness is measured. The overall shim thickness is the total of the dial indicator reading and the preload specification added together. The gear backlash measurement determines the thickness of the shim used on the ring gear side of the differential case. Subtract the gear backlash shim thickness from the total overall shim thickness and select that amount for the pinion gear side of the differential (Fig. 9). Differential shim measurements are performed with spreader W-129-B removed.

SHIM SELECTION

NOTE: It is difficult to salvage the differential side bearings during the removal procedure. Install replacement bearings if necessary.

- (1) Remove differential side bearings from differential case.

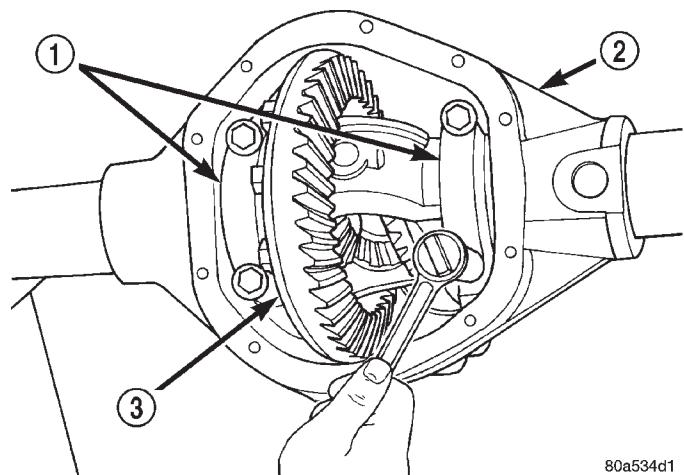


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Fig. 9 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM/SLINGER
- 2 - DIFFERENTIAL BEARING SHIM

- (2) Remove factory installed shims from differential case.
- (3) Install ring gear on differential case and tighten bolts to specification.
- (4) Install dummy side bearings D-343 on differential case.
- (5) Install differential case in the housing.
- (6) Install the marked bearing caps in their correct positions and snug the bolts (Fig. 10).



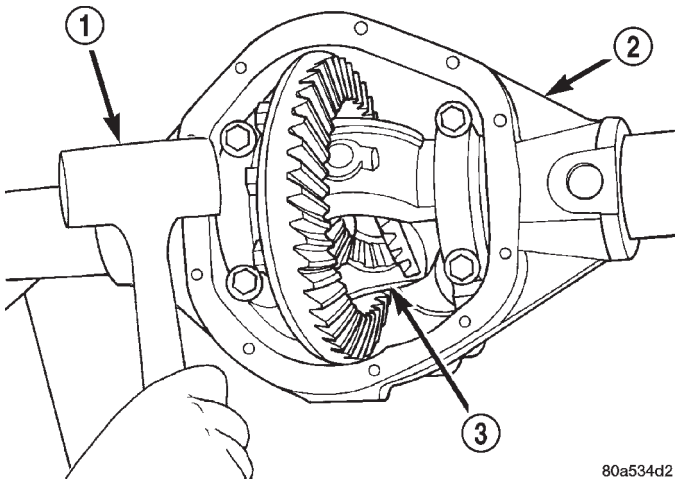
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Fig. 10 BEARING CAP BOLTS

- 1 - BEARING CAP
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE

FRONT AXLE - 248FBI (Continued)

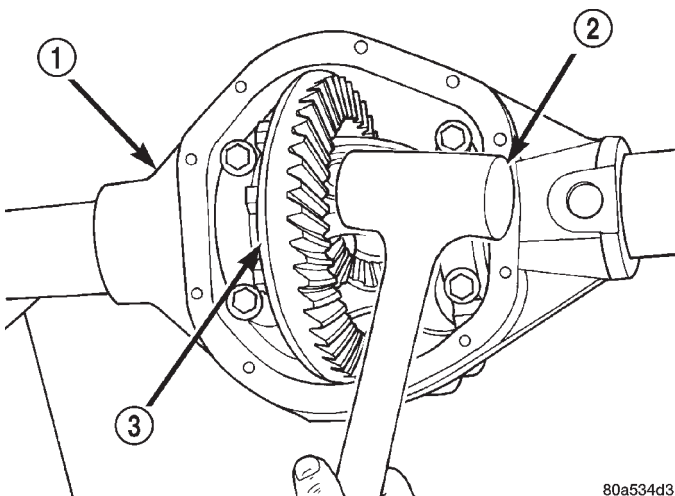
(7) Using a dead-blow hammer, seat the differential dummy bearings to each side of the housing (Fig. 11) and (Fig. 12).



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Fig. 11 SEAT PINION GEAR SIDE DUMMY BEARING

- 1 - DEAD-BLOW HAMMER
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE



80a534d3

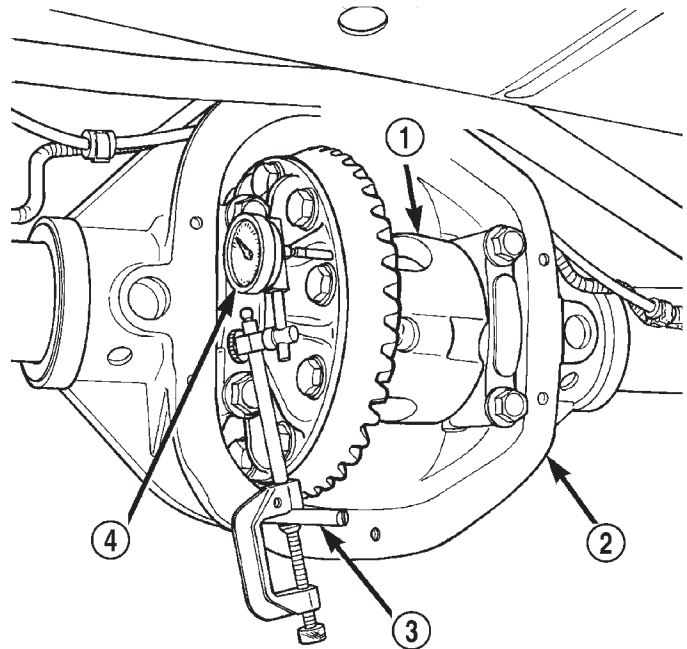
Fig. 12 SEAT RING GEAR SIDE DUMMY BEARING

- 1 - DIFFERENTIAL HOUSING
- 2 - DEAD-BLOW HAMMER
- 3 - DIFFERENTIAL CASE

(8) Thread Pilot Stud C-3288-B into rear cover bolt hole below ring gear (Fig. 13).

(9) Attach the Dial Indicator C-3339 to pilot stud. Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 13).

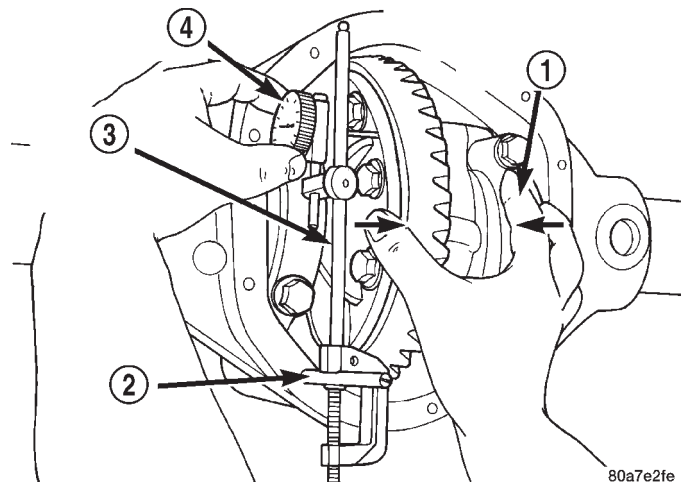
(10) Push and hold differential case to pinion gear side of the housing and zero dial indicator (Fig. 14).



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Fig. 13 DIFFERENTIAL SIDE PLAY

- 1 - DIFFERENTIAL CASE
- 2 - DIFFERENTIAL HOUSING
- 3 - PILOT STUD
- 4 - DIAL INDICATOR



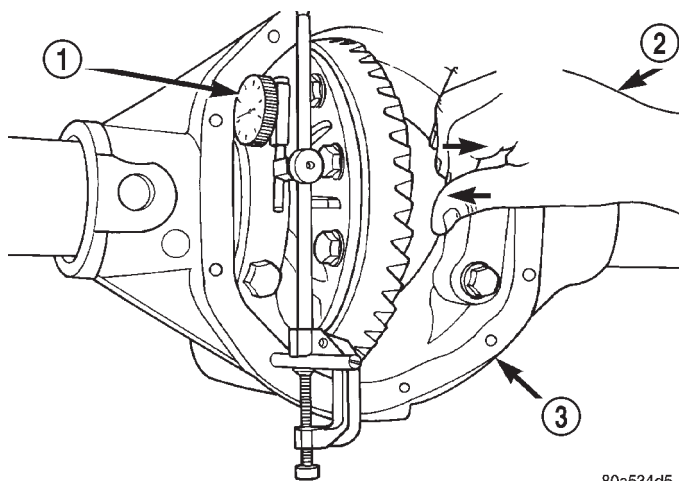
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Fig. 14 DIAL INDICATOR LOCATION

- 1 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 2 - PILOT STUD
- 3 - DIAL INDICATOR ARM
- 4 - DIAL INDICATOR FACE

FRONT AXLE - 248FBI (Continued)

(11) Push and hold differential case to ring gear side of the housing and record the dial indicator reading (Fig. 15).



80a534d5

Fig. 15 DIFFERENTIAL CASE RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - DIFFERENTIAL HOUSING

(12) Add 0.38 mm (0.015 in.) to the zero end play total. This total represents the thickness of shims needed to preload the new bearings when the differential is installed.

(13) Rotate dial indicator out of the way on the pilot stud.

(14) Remove differential case and dummy bearings from the housing.

(15) Install the pinion gear in the housing. Install the pinion yoke and establish the correct pinion rotating torque.

(16) Install differential case and dummy bearings D-343 in the housing (without shims), install bearing caps and tighten bolts snug.

(17) Seat ring gear side dummy bearing (Fig. 12).

(18) Position dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 13).

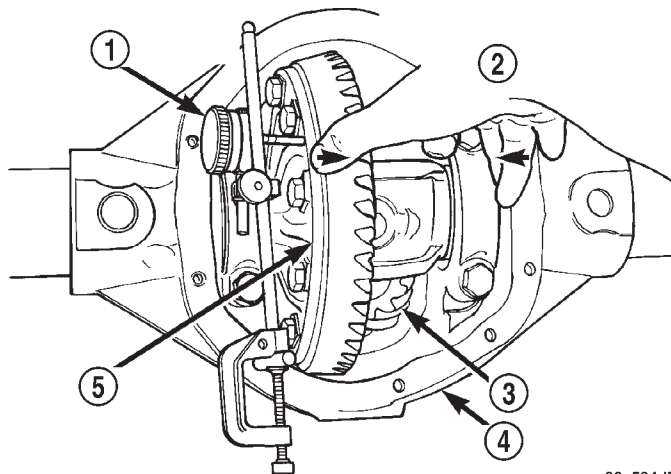
(19) Push and hold differential case toward pinion gear and zero the dial indicator (Fig. 16).

(20) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 17). This is the shim thickness needed on the ring gear side of the differential case for proper backlash.

(21) Subtract the backlash shim thickness from the total preload shim thickness. The remainder is the shim thickness required on the pinion side of the housing.

(22) Rotate dial indicator out of the way on pilot stud.

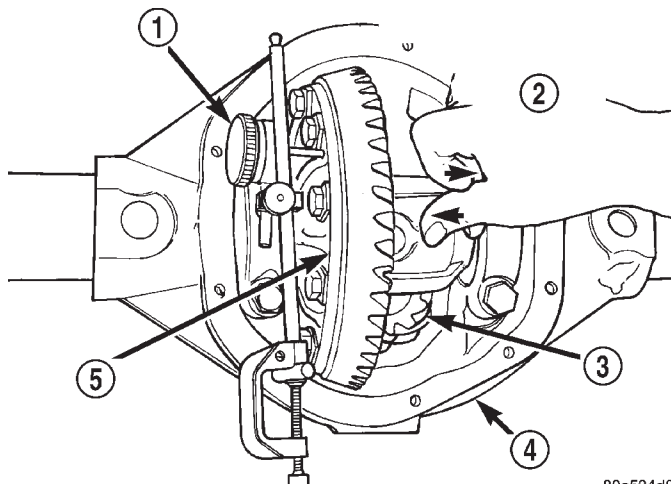
(23) Remove differential case and dummy bearings from the housing.



80a534d7

Fig. 16 DIFFERENTIAL CASE PINION GEAR SIDE

- 1 - DIAL INDICATOR FACE
- 2 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE



80a534d8

Fig. 17 DIFFERENTIAL CASE RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

(24) Install selected side bearing shims onto the differential case hubs.

(25) Install side bearings on differential case hubs with Install C-4487-1 and Handle C-4171.

(26) Install bearing cups on differential.

(27) Install Spreader W-129-B and some items from Adapter Set 6987 on the housing and spread open enough to receive differential case.

FRONT AXLE - 248FBI (Continued)

CAUTION: Never spread housing over 0.50 mm (0.020 in.). The housing can be damaged if over-spread.

- (28) Install differential case into the housing.
- (29) Remove spreader from the housing.
- (30) Rotate differential case several times to seat the side bearings.
- (31) Position indicator plunger against a ring gear tooth (Fig. 18).
- (32) Push and hold ring gear upward while not allowing the pinion gear to rotate.
- (33) Zero dial indicator face to pointer.
- (34) Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.12 mm (0.005 in.) and 0.20 mm (0.008 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the housing to the other (Fig. 19).

(35) Verify differential case and ring gear runout by measuring ring to pinion gear backlash at eight locations around the ring gear. Readings should not vary more than 0.05 mm (0.002 in.). If readings vary more than specified, the ring gear or the differential case is defective.

After the proper backlash is achieved, perform Gear Contact Pattern Analysis procedure.

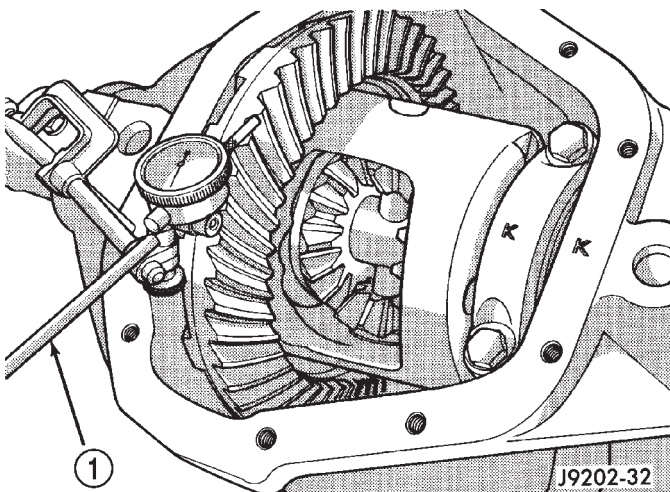


Fig. 18 RING GEAR BACKLASH

1 - DIAL INDICATOR

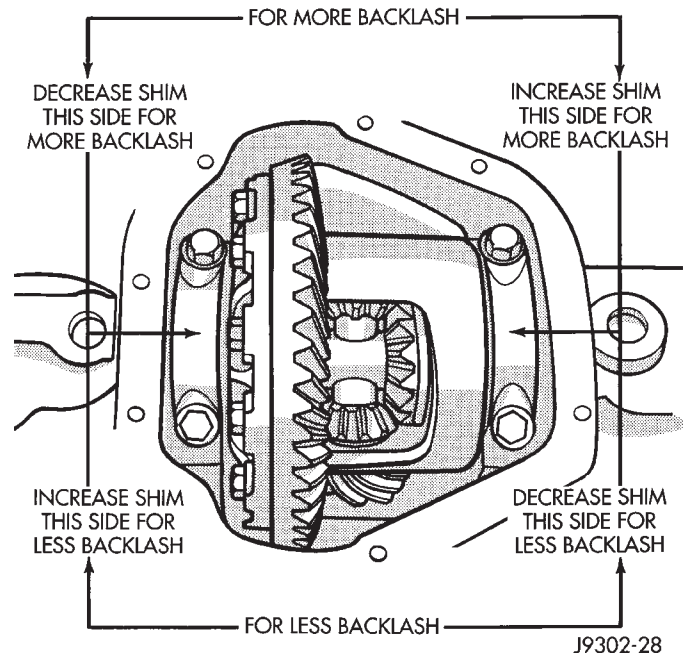


Fig. 19 BACKLASH SHIM

GEAR CONTACT PATTERN

The ring and pinion gear contact patterns will show if the pinion depth is correct. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

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

(2) Wrap, twist and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.

(3) With a boxed end wrench on the ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeeze the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart (Fig. 20) and adjust pinion depth and gear backlash as necessary.

FRONT AXLE - 248FBI (Continued)

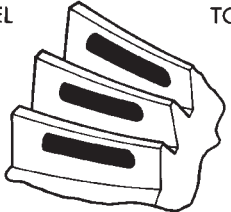
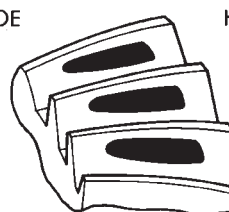
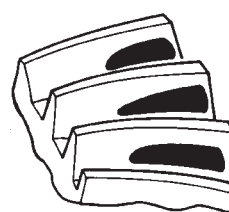
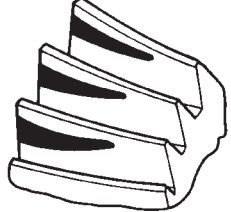
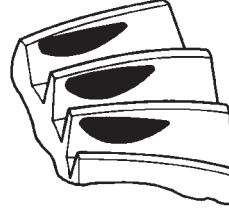
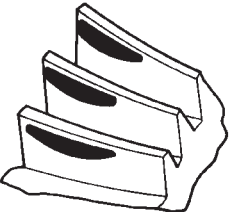
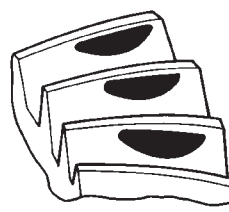
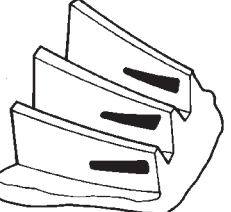
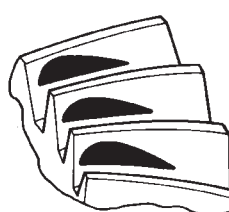
DRIVE SIDE OF RING GEAR TEETH HEEL TOE 	COAST SIDE OF RING GEAR TEETH TOE HEEL 	DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT 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.

Fig. 20 GEAR TOOTH CONTACT PATTERNS

FRONT AXLE - 248FBI (Continued)

SPECIFICATIONS

FRONT AXLE - 248FBI

AXLE SPECIFICATIONS

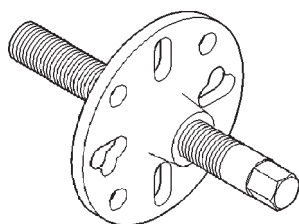
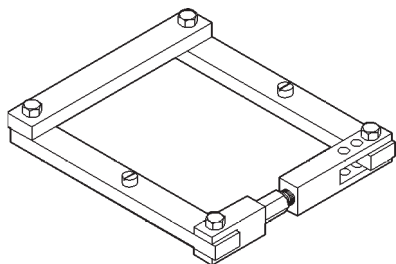
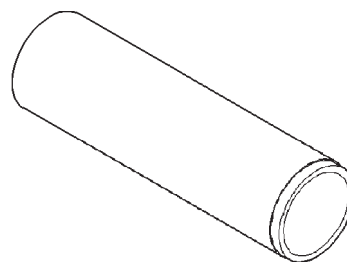
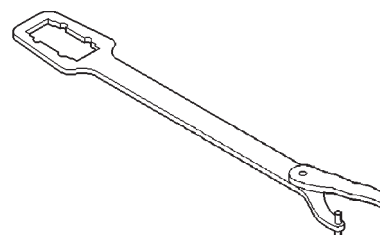
DESCRIPTION	SPECIFICATION
Axle Ratio	3.54, 4.10
Ring Gear Diameter	248 mm (9.75 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Pinion Gear Standard Depth	127 mm (5.000 in.)
Pinion Bearing Preload - Original Bearing	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearing	2.26-4.52 N·m (20-40 in. lbs.)

TORQUE SPECIFICATIONS

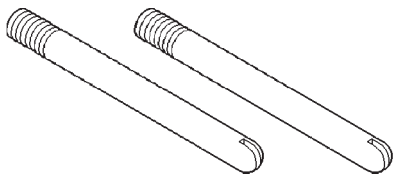
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fill Hole Plug	34	25	-
Differential Cover Bolts	41	30	-
Bearing Cap Bolts	108	80	-
Ring Gear Bolts	176	130	-
Pinion Nut	292-678	215-496	-
Axle Nut	237	175	-
Shift Motor Bolts	11	8	96

SPECIAL TOOLS

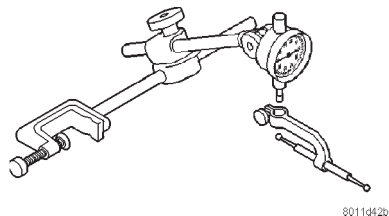
FRONT AXLE

**REMOVER - C-452****SPREADER - W-129-B****INSTALLER, BEARING - C-3095-A****WRENCH, FLANGE - C-3281**

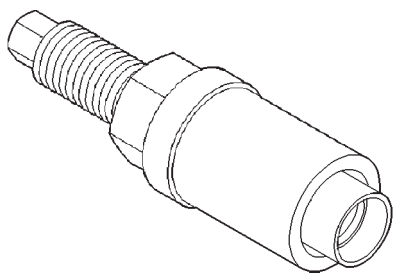
FRONT AXLE - 248FBI (Continued)



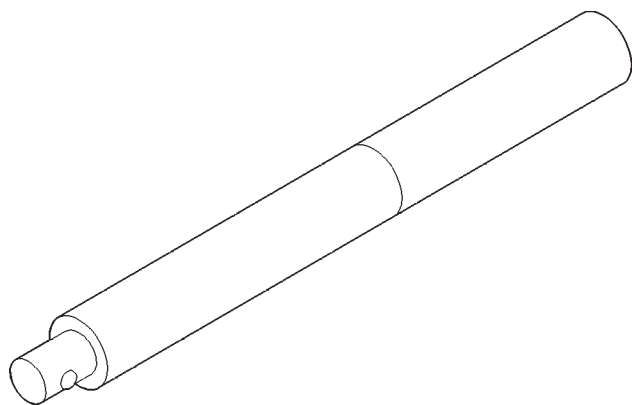
PILOTS, STUDS - C-3288-B



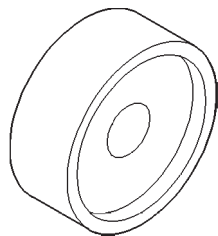
DIAL INDICATOR, SET - C-3339



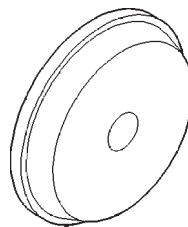
INSTALLER, FLANGE - C-3718



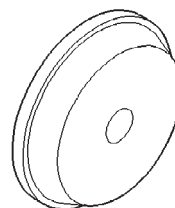
HANDLE, DRIVE - C-4171



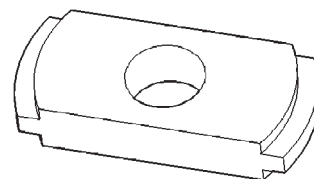
INSTALLER, BEARING - C-4190



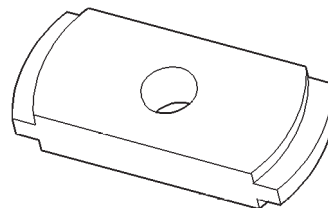
INSTALLER, CUP - C-111



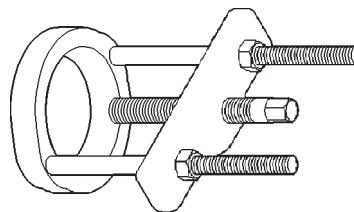
INSTALLER, CUP - C-146



REMOVER, CUP - D-158

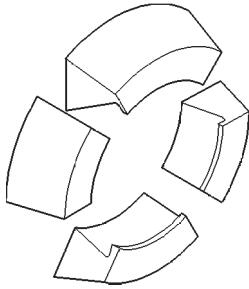
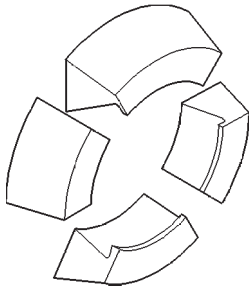
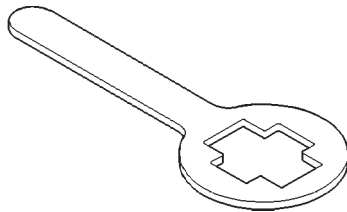
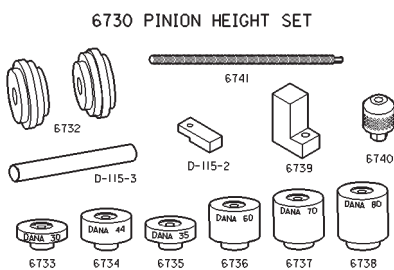


REMOVER, CUP - D-162

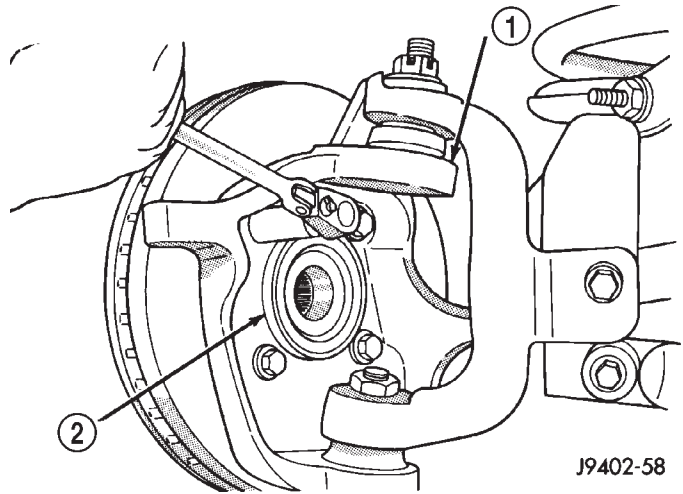


PULLER/PRESS - C-293-PA

FRONT AXLE - 248FBI (Continued)

**BLOCK, ADAPTER - C-239-37****BLOCK, ADAPTER - C-239-62****HOLDER, YOKE - 6719A****PINION DEPTH, SET - 6730****AXLE SHAFTS****REMOVAL**

- (1) Raise and support the vehicle.
- (2) Remove wheel and tire assembly.
- (3) Remove brake caliper, rotor and ABS wheel speed sensor if equipped. Refer to 5 Brakes for procedures.
- (4) Remove the cotter pin and axle hub nut.
- (5) Remove hub bearing bolts (Fig. 21) and remove hub bearing from the steering knuckle.



J9402-58

Fig. 21 HUB AND KNUCKLE

- 1 - KNUCKLE
- 2 - HUB BEARING

- (6) Remove brake dust shield from knuckle.
- (7) Remove axle shaft from the housing. Avoid damaging the axle shaft oil seal.

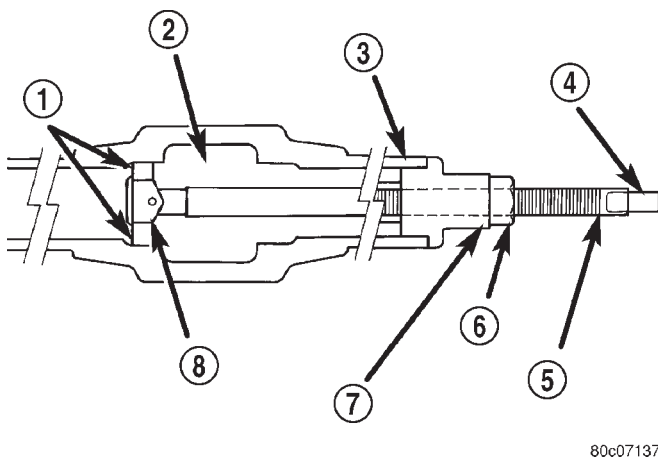
INSTALLATION

- (1) Clean axle shaft and apply a thin film of Mopar Wheel Bearing Grease to the shaft splines, seal contact surface, hub bore.
- (2) Install axle shaft into the housing and differential side gears. Avoid damaging axle shaft oil seals in the differential.
- (3) Install dust shield and hub bearing on knuckle.
- (4) Install hub bearing bolts and tighten to 170 N·m (125 ft. lbs.).
- (5) Install axle washer and nut, tighten nut to 237 N·m (175 ft. lbs.). Align nut to next cotter pin hole and install new cotter pin.
- (6) Install ABS wheel speed sensor, brake rotor and caliper. Refer to Brakes for proper procedures.
- (7) Install wheel and tire assembly.
- (8) Remove support and lower the vehicle.

AXLE SHAFTS - INTERMEDIATE

REMOVAL

- (1) Remove vacuum shift motor housing.
- (2) Remove outer axle shaft.
- (3) Remove inner axle shaft seal from the shift motor housing with a long drift or punch. Be careful not to damage housing.
- (4) Remove intermediate axle shaft and shift collar.
- (5) Assemble intermediate axle shaft bushing tools (Fig. 22).
- (6) Remove intermediate axle shaft bushing.



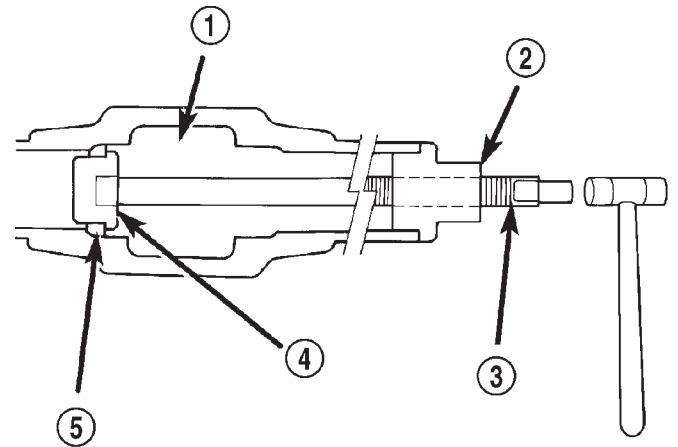
80c07137

Fig. 22 INTERMEDIATE SHAFT BUSHING

- 1 - BUSHING
- 2 - SHIFT MOTOR HOUSING OPENING
- 3 - AXLE TUBE
- 4 - LOCATION FOR OPEN-END WRENCH
- 5 - SPECIAL TOOL 5041-2
- 6 - NUT
- 7 - SPECIAL TOOL 8417
- 8 - SPECIAL TOOL 8415

INSTALLATION - INTERMEDIATE AXLE

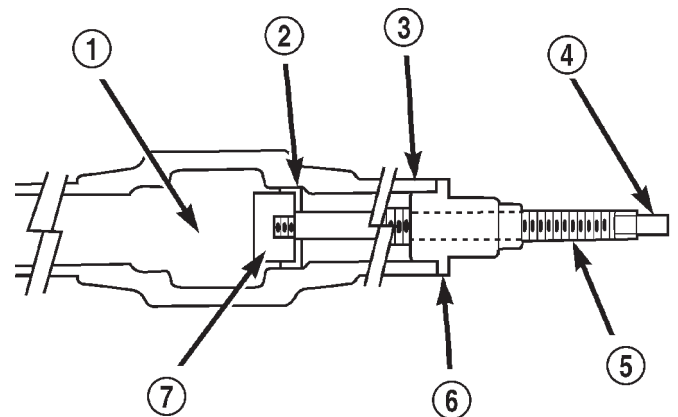
- (1) Position the bushing on installation tool and seat the bushing (Fig. 23) in the housing bore.
- (2) Clean the inside perimeter of the axle shaft tube with fine crocus cloth.
- (3) Apply a light film of oil to the inside lip of the new axle shaft seal.
- (4) Install the inner axle seal (Fig. 24).
- (5) Install the shift collar in the axle housing.
- (6) Lubricate splined end of the intermediate axle shaft with multi-purpose lubricant.
- (7) Insert the intermediate axle shaft into the differential side gear.



80c07136

Fig. 23 BUSHING INSTALLATION

- 1 - SHIFT MOTOR HOUSING OPENING
- 2 - SPECIAL TOOL 5417
- 3 - SPECIAL TOOL 5041-2
- 4 - SPECIAL TOOL 8416
- 5 - BUSHING



80c0712c

Fig. 24 SEAL INSTALLATION

- 1 - SHIFT MOTOR HOUSING OPENING
- 2 - SEAL
- 3 - AXLE TUBE
- 4 - LOCATION FOR OPEN-END WRENCH
- 5 - SPECIAL TOOL 5041-2
- 6 - SPECIAL TOOL 8417
- 7 - SPECIAL TOOL 8411

CAUTION: Apply all-purpose lubricant to the axle shaft splines to prevent damage to the seal during axle shaft installation.

- (8) Insert axle shaft into the tube and engage the splined end of the shaft with the shift collar.
- (9) Install the vacuum shift motor housing.

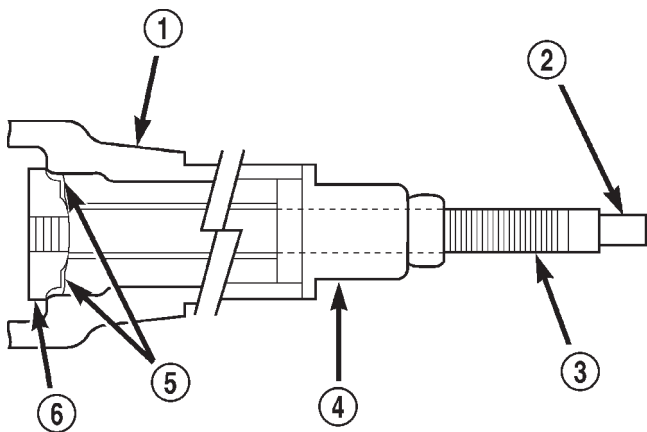
AXLE SHAFT SEALS

REMOVAL

- (1) Remove hub bearings and axle shafts.
- (2) Remove axle shaft seal from the differential housing with a long drift or punch. **Be careful not to damage housing.**
- (3) Clean the inside perimeter of the differential housing with fine crocus cloth.

INSTALLATION

- (1) Apply a light film of oil to the inside lip of the new axle shaft seal.
- (2) Install the inner axle seal (Fig. 25).



80c0712a

Fig. 25 SEAL INSTALLATION

- 1 - DIFFERENTIAL HOUSING
- 2 - POSITION FOR OPEN-END WRENCH
- 3 - SPECIAL TOOL 5041-2
- 4 - SPECIAL TOOL 8417
- 5 - SEAL
- 6 - SPECIAL TOOL 8411

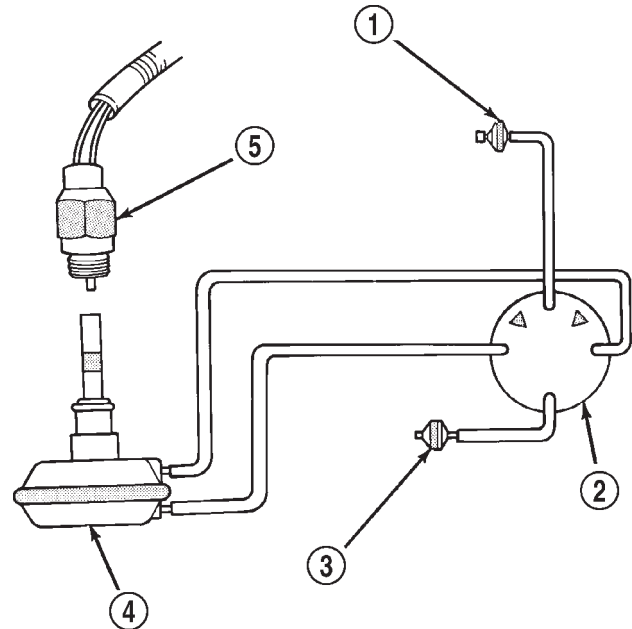
- (3) Install axles and hub bearings.

AXLE VACUUM MOTOR

DESCRIPTION

The disconnect axle control system consists of:

- Shift motor.
- Indicator switch.
- Vacuum switch.
- Vacuum harness (Fig. 26).



J9202-55

Fig. 26 VACUUM CONTROL SYSTEM

- 1 - CHECK VALVE
- 2 - CONTROL SWITCH ON TRANSFER CASE
- 3 - AIR VENT FILTER
- 4 - AXLE SHIFT MOTOR
- 5 - INDICATOR SWITCH

OPERATION

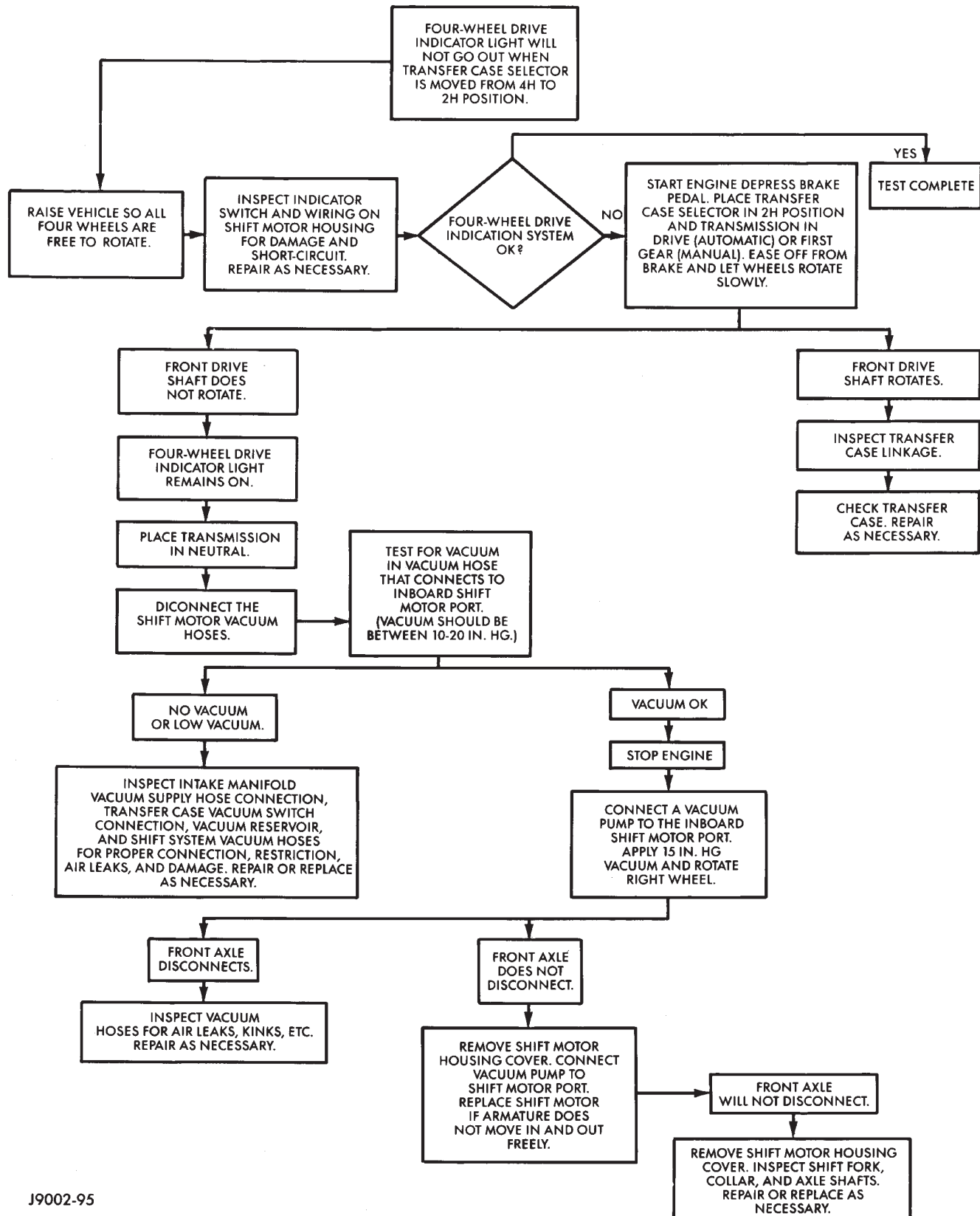
The shift motor receives a vacuum signal from the switch mounted on the transfer case when the vehicle operator wants to switch from two wheel drive mode to four wheel drive mode, or vice versa. When this signal is received, the shift motor begins to move the shift fork and collar within the axle housing. In the four wheel drive mode, the shift collar connects the axle intermediate shaft to the axle shaft to supply engine power to both front wheels. In two wheel drive mode, the shift collar is disengaged from the intermediate shaft and the intermediate shaft is allowed to free-spin. When the two shafts are disengaged, the load on the engine is reduced, thereby providing better fuel economy and road handling.

AXLE VACUUM MOTOR (Continued)

DIAGNOSIS AND TESTING - VACUUM MOTOR

AXLE VACUUM SHIFT MOTOR

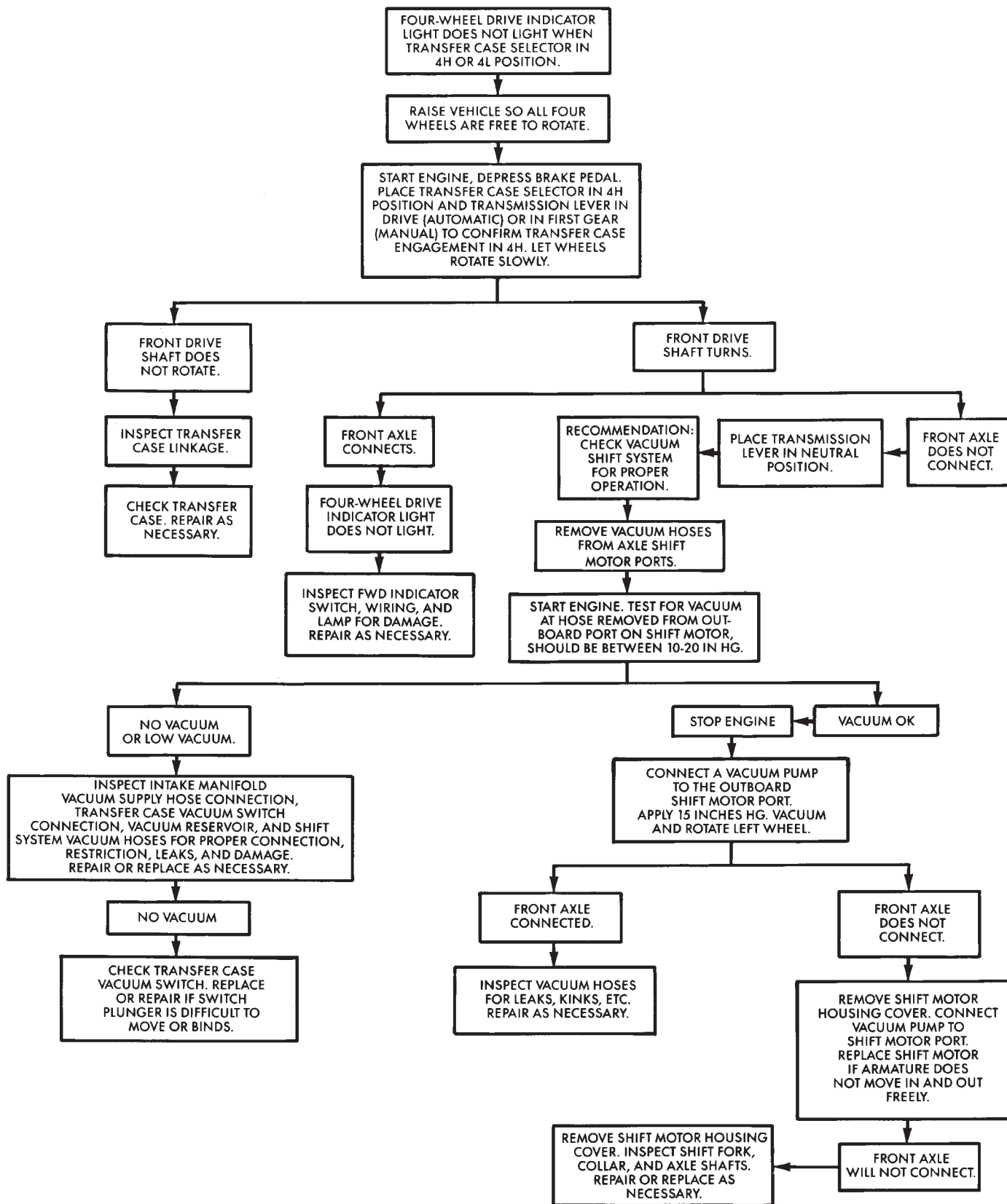
TWO-WHEEL DRIVE OPERATION DIAGNOSIS



AXLE VACUUM MOTOR (Continued)

AXLE VACUUM SHIFT MOTOR (CONT'D)

FOUR-WHEEL DRIVE OPERATION DIAGNOSIS



AXLE VACUUM MOTOR (Continued)

REMOVAL

- (1) Disconnect the vacuum and wiring connector from the shift housing.
- (2) Remove indicator switch.
- (3) Remove shift motor housing cover, gasket and shield from the housing (Fig. 27).

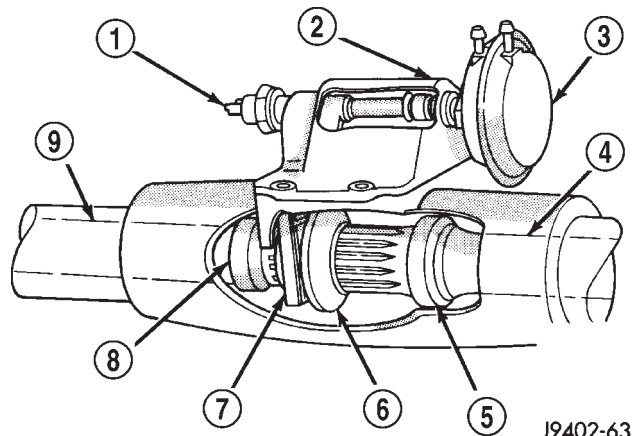


Fig. 27 SHIFT MOTOR HOUSING

- 1 - INDICATOR LAMP SWITCH
- 2 - DISCONNECT HOUSING
- 3 - VACUUM SHIFT MOTOR
- 4 - AXLE SHAFT
- 5 - SEAL
- 6 - SHIFT COLLAR
- 7 - SHIFT FORK
- 8 - BEARING
- 9 - INTERMEDIATE AXLE SHAFT

DISASSEMBLY

- (1) Remove E-clips from the shift motor housing and shaft. Remove shift motor and shift fork from the housing (Fig. 28).
- (2) Remove O-ring seal from the shift motor shaft.
- (3) Clean and inspect all components. Replace any component that is excessively worn or damaged.

ASSEMBLY

- (1) Install a new O-ring seal on the shift motor shaft.
- (2) Insert shift motor shaft through the hole in the housing and shift fork. The shift fork offset should be toward the differential.
- (3) Install E-clips on the shift motor shaft and housing.

INSTALLATION

- (1) Install shift motor housing gasket.
- (2) Guide the shift fork onto the shift collar groove, while install the shift motor housing cover.
- (3) Install shift motor housing shield and tighten the bolts to 11 N·m (96 in. lbs.).

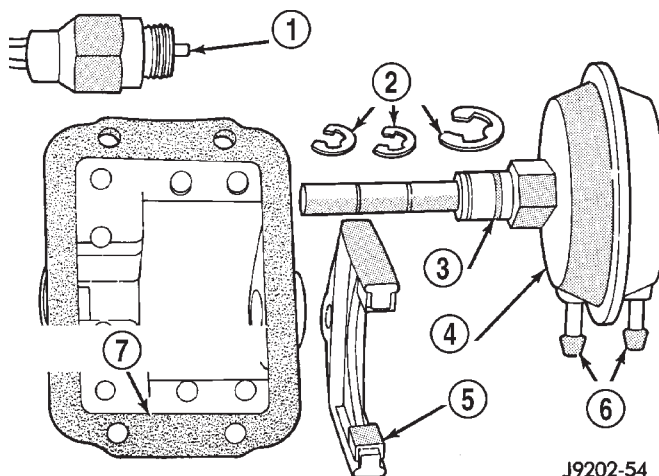


Fig. 28 SHIFT MOTOR COMPONENTS

- 1 - INDICATOR SWITCH
- 2 - E-CLIP
- 3 - O-RING
- 4 - SHIFT MOTOR
- 5 - SHIFT FORK
- 6 - VACUUM PORTS
- 7 - DISCONNECT HOUSING AND GASKET

(4) Add 148 ml (5 ounces) of API grade GL 5 hypoid gear lubricant to the shift motor housing. Add lubricant through indicator switch mounting hole.

(5) Install indicator switch, electrical connector and vacuum harness.

SINGLE CARDAN UNIVERSAL JOINTS

REMOVAL

Single cardan U-joint components are not serviceable. If defective they must be replaced as a unit.

CAUTION: Clamp only the narrow forged portion of the yoke in the vise. To avoid distorting the yoke, do not over tighten the vise jaws.

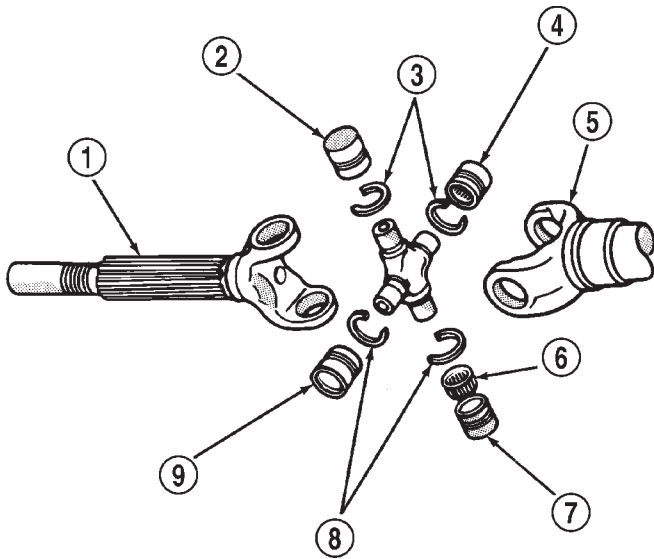
- (1) Remove axle shaft.
- (2) Remove the bearing cap retaining snap rings (Fig. 29).

NOTE: Saturate the bearing caps with penetrating oil prior to removal.

(3) Locate a socket with an inside diameter is larger than the bearing cap. Place the socket (receiver) against the yoke and around the perimeter of the bearing cap to be removed.

(4) Locate a socket with an outside diameter is smaller than the bearing cap. Place the socket (driver) against the opposite bearing cap.

SINGLE CARDAN UNIVERSAL JOINTS (Continued)



J8902-15

Fig. 29 AXLE SHAFT OUTER U-JOINT

- 1 - SHAFT YOKE
- 2 - BEARING CAP
- 3 - SNAP RINGS
- 4 - BEARING CAP
- 5 - SPINDLE YOKE
- 6 - BEARING
- 7 - BEARING CAP
- 8 - SNAP RINGS
- 9 - BEARING CAP

(5) Position the yoke with the sockets in a vise (Fig. 30).

(6) Tighten the vise jaws to force the bearing cap into the larger socket (receiver).

(7) Release the vise jaws. Remove the sockets and bearing cap that was partially forced out of the yoke.

(8) Repeat the above procedure for the remaining bearing cap and remove spider from the propeller shaft yoke.

INSTALLATION

(1) Pack the bearing caps 1/3 full of wheel bearing lubricant. Apply extreme pressure (EP), lithium-base lubricant to aid in installation.

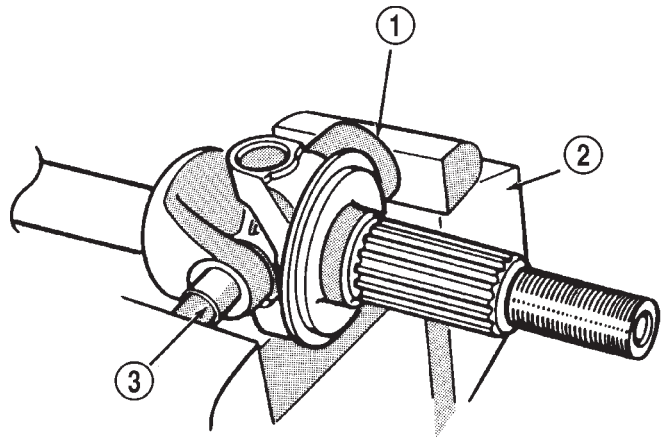
(2) Position the spider in the yoke. Insert the seals and bearings. Tap the bearing caps into the yoke bores far enough to hold the spider in position.

(3) Place the socket (driver) against one bearing cap. Position the yoke with the socket in a vise.

(4) Tighten the vise to force the bearing caps into the yoke. Force the caps enough to install the retaining clips.

(5) Install the bearing cap retaining clips.

(6) Install axle shaft.



J8902-16

Fig. 30 YOKE BEARING CAP

- 1 - LARGE-DIAMETER SOCKET WRENCH
- 2 - VISE
- 3 - SMALL-DIAMETER SOCKET WRENCH

PINION SEAL**REMOVAL**

(1) Raise and support the vehicle.

(2) Remove wheel and tire assemblies.

(3) Remove brake calipers and rotors

(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 a (in. lbs.) dial-type torque wrench. Record the torque reading for installation reference.

(8) Remove the pinion yoke nut and washer. Use Remover C-452 and Wrench C-3281 to remove the pinion yoke (Fig. 31) .

(9) Use suitable pry tool or slide hammer mounted screw to remove the pinion shaft seal.

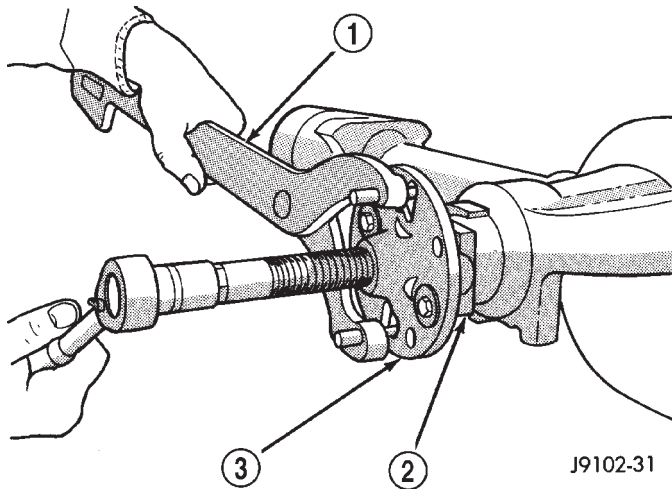
INSTALLATION

(1) Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with an appropriate installer (Fig. 32).

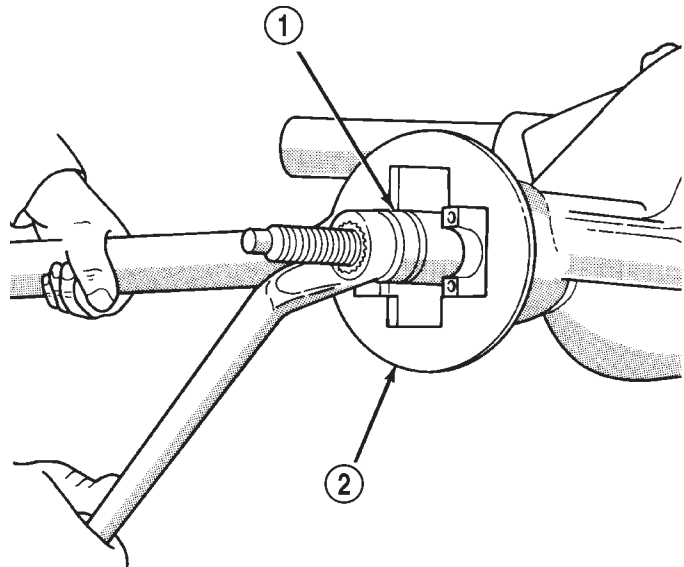
(2) Install yoke on the pinion gear with Installer C-3718 and Holder 6719 (Fig. 33).

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

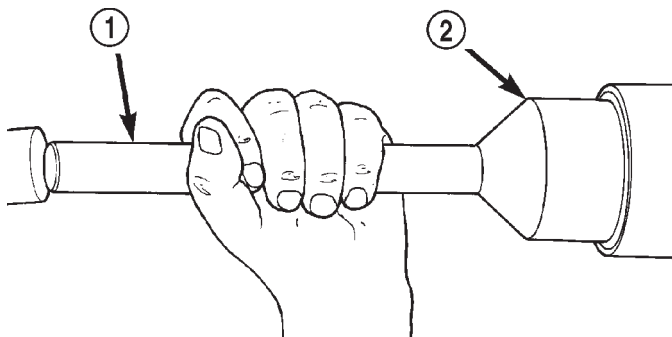
PINION SEAL (Continued)

**Fig. 31 Pinion**

- 1 - YOKE HOLDER
2 - YOKE
3 - YOKE PULLER

**Fig. 33 PINION YOKE**

- 1 - INSTALLER
2 - YOKE HOLDER

**Fig. 32 Pinion Seal Installation**

- 1 - HANDLE
2 - INSTALLER

(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 inch pound torque wrench. Rotating torque should be equal to the reading recorded during removal, plus an additional 0.56 N·m (5 in. lbs.) (Fig. 34).

(5) If the rotating torque is too low, use Holder 6719 to hold the pinion yoke (Fig. 35), and tighten the pinion shaft nut in 6.8 N·m (5 ft. lbs.) until proper rotating torque is achieved.

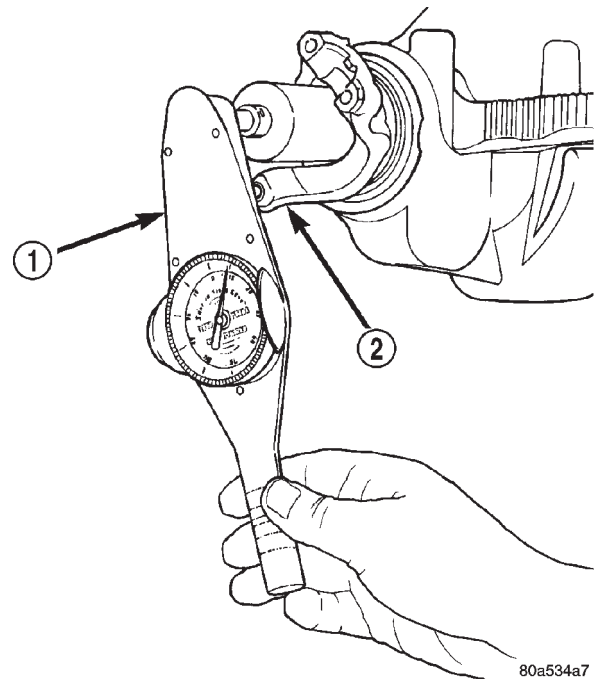
(6) Align the installation reference marks and attach the propeller shaft to the yoke.

(7) Check and add lubricant to axle, if necessary. Refer to Lubricant Specifications in this section for lubricant requirements.

(8) Install brake rotors and calipers.

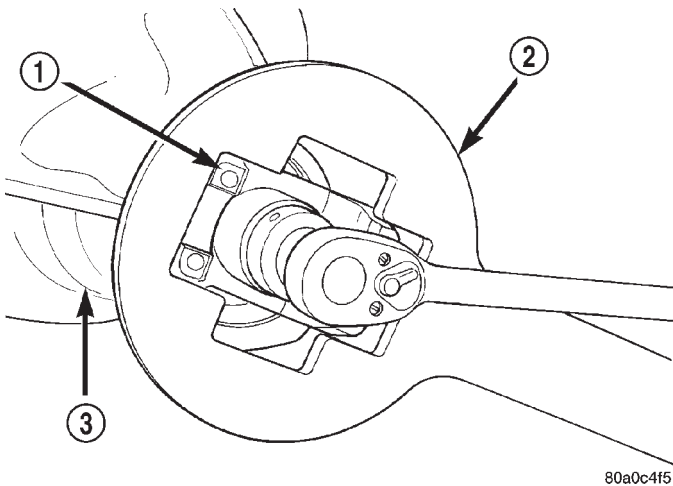
(9) Install wheel and tire assemblies.

(10) Lower the vehicle.

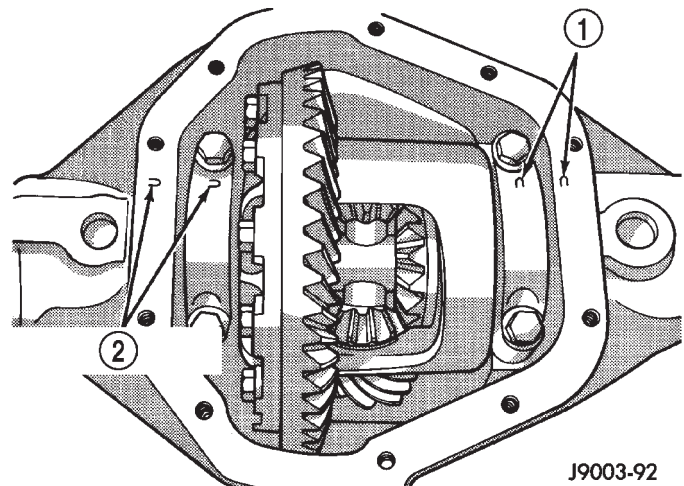
**Fig. 34 PINION ROTATING TORQUE**

- 1 - TORQUE WRENCH
2 - PINION YOKE

PINION SEAL (Continued)

**Fig. 35 PINION SHAFT NUT**

- 1 - PINION FLANGE
- 2 - YOKE HOLDER
- 3 - DIFFERENTIAL HOUSING

**Fig. 36 Bearing Cap Reference**

- 1 - REFERENCE LETTERS
- 2 - REFERENCE LETTERS

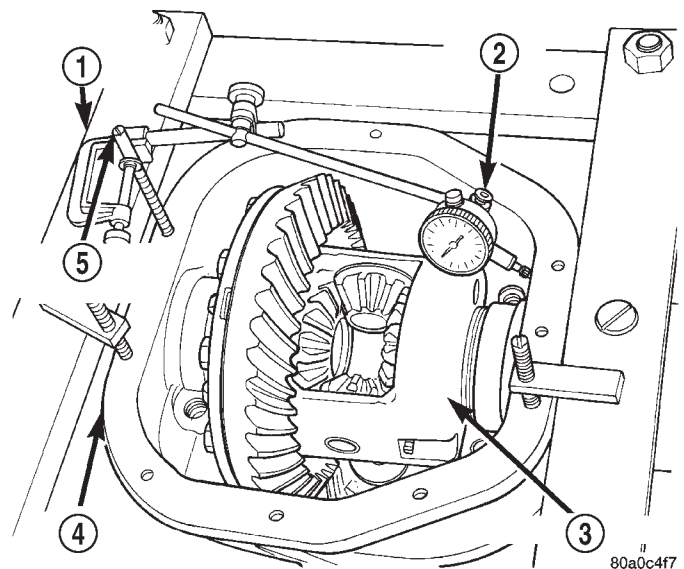
DIFFERENTIAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove lubricant fill hole plug from the differential housing cover.
- (3) Remove 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 hub bearings and axle shafts.
- (6) Note the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 36).
- (7) Remove the differential bearing caps.
- (8) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 37).
- (9) Install the hold down clamps and tighten the spreader turnbuckle finger-tight.
- (10) Install Pilot Stud C-3288-B to the left side of the differential housing and attach dial indicator to the pilot stud. Load the indicator plunger against the opposite side of the housing (Fig. 37) and zero the dial indicator.
- (11) Spread the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 37).

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If the housing is over-spread it could be distorted or damaged.

- (12) Remove the dial indicator.

**Fig. 37 SPREAD DIFFERENTIAL HOUSING**

- 1 - SPREADER
- 2 - DIAL INDICATOR
- 3 - DIFFERENTIAL
- 4 - DIFFERENTIAL HOUSING
- 5 - PILOT STUD

DIFFERENTIAL (Continued)

(13) Pry the differential case loose from the housing. To prevent damage, pivot on housing with the end of the pry bar against spreader (Fig. 38).

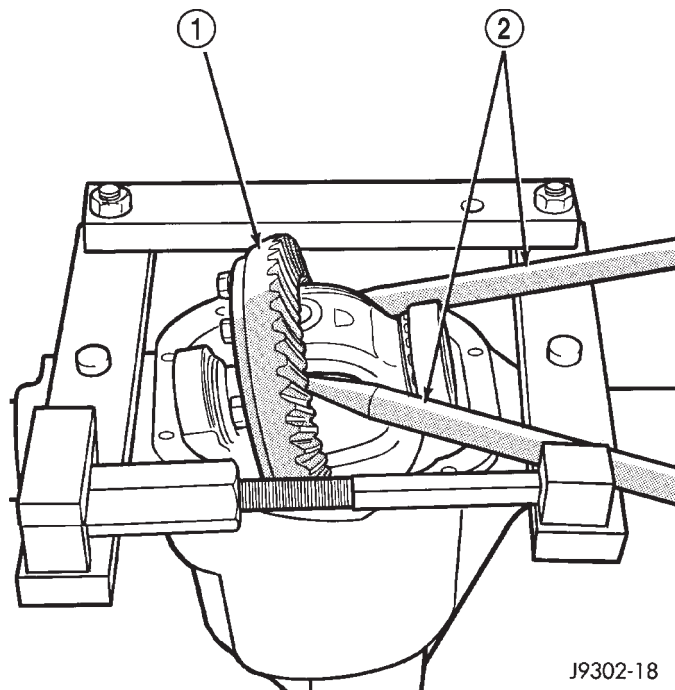


Fig. 38 DIFFERENTIAL REMOVAL

- 1 - DIFFERENTIAL
- 2 - PRY BAR

(14) Remove the case from housing.

(15) Remove and tag bearing cups to indicate their location.

DISASSEMBLY

- (1) Remove roll-pin holding mate shaft in housing.
- (2) Remove pinion gear mate shaft (Fig. 39).
- (3) Rotate differential side gears and remove pinion mate gears and thrust washers (Fig. 40).
- (4) Remove differential side gears and thrust washers.

ASSEMBLY

- (1) Install differential side gears and thrust washers.
- (2) Install pinion mate gears and thrust washers.
- (3) Install pinion gear mate shaft.
- (4) Align hole in the pinion gear mate shaft with hole in the differential case.
- (5) Install and seat pinion mate shaft roll-pin in the differential case and mate shaft with a punch and hammer (Fig. 41). Peen the edge of the roll-pin hole in the differential case slightly in two places 180° apart.
- (6) Lubricate all differential components with hypoid gear lubricant.

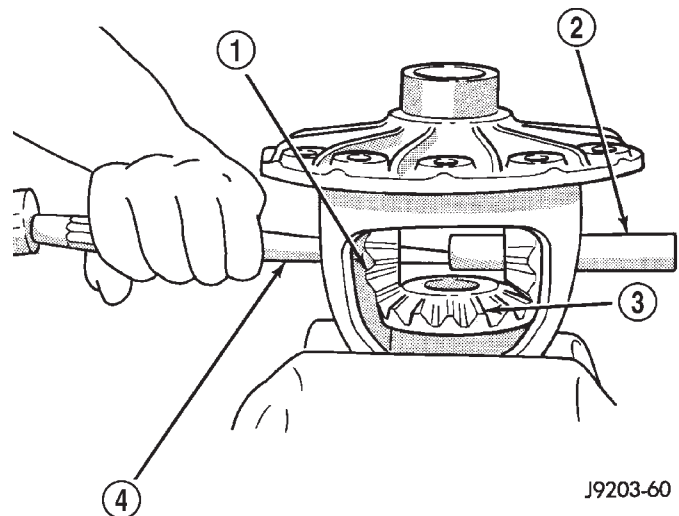


Fig. 39 PINION MATE SHAFT

- 1 - PINION MATE GEAR
- 2 - PINION MATE SHAFT
- 3 - SIDE GEAR
- 4 - DRIFT

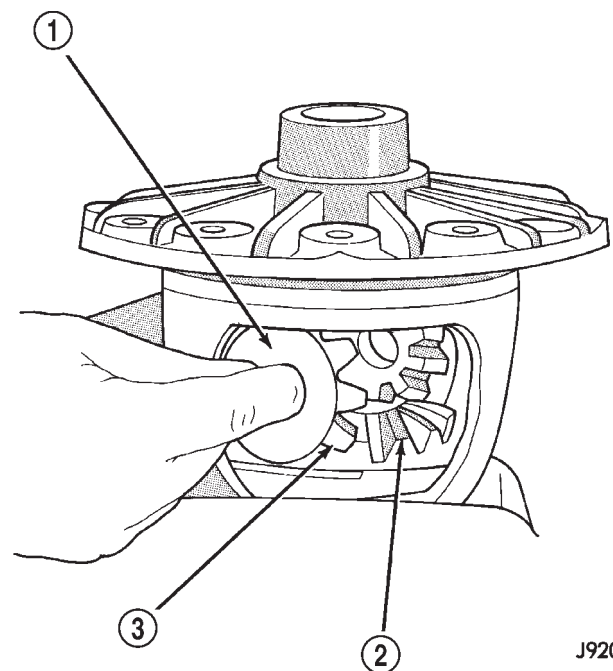
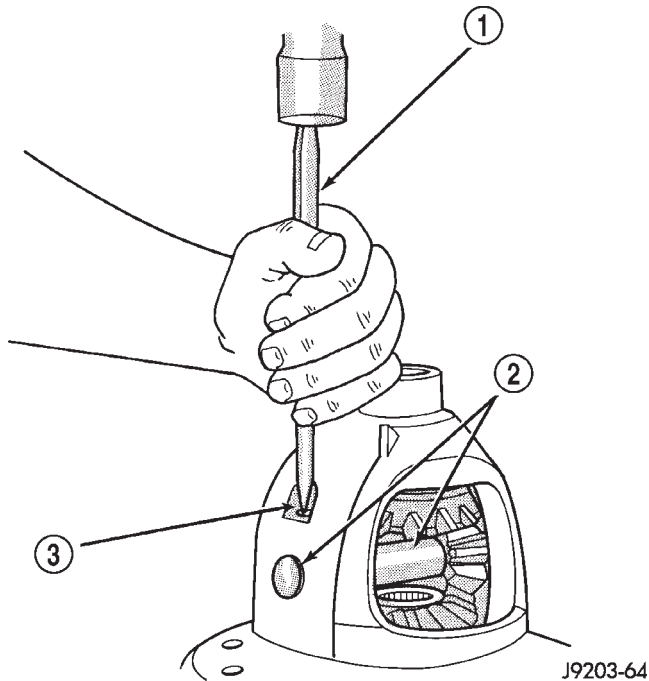


Fig. 40 Pinion Mate/Side Gear

- 1 - THRUST WASHER
- 2 - SIDE GEAR
- 3 - PINION MATE GEAR

DIFFERENTIAL (Continued)

**Fig. 41 Pinion Mate Shaft Roll-Pin**

- 1 - PUNCH
- 2 - PINION MATE SHAFT
- 3 - MATE SHAFT LOCKPIN

INSTALLATION

NOTE: If replacement differential bearings or differential case are being installed, differential side bearing shim requirements may change. Refer to **Adjustments (Differential Bearing Preload and Gear Backlash)** procedures to determine proper shim selection.

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

(2) Install a Pilot Stud C-3288-B at the left side of the differential housing and attach dial indicator to the pilot stud. Load the indicator plunger against the opposite side of the housing and zero the dial indicator.

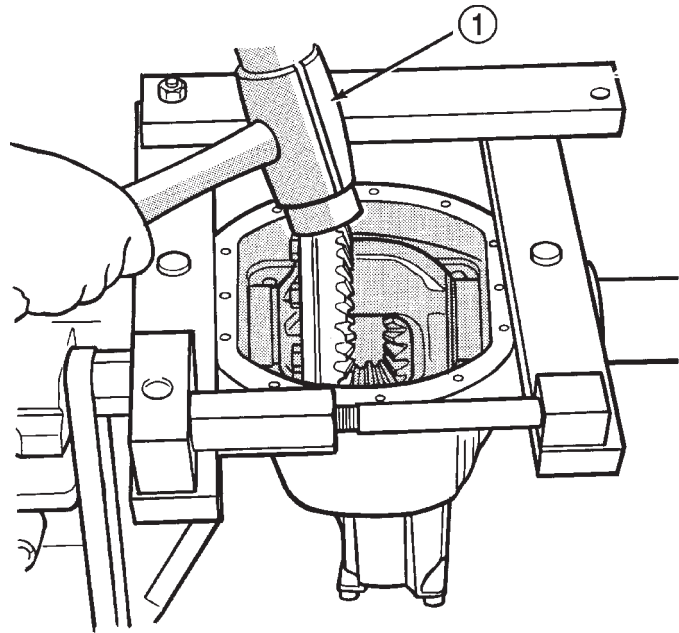
(3) Spread the housing enough to install the case in the housing. Measure the distance with the dial indicator.

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

(4) Remove the dial indicator.

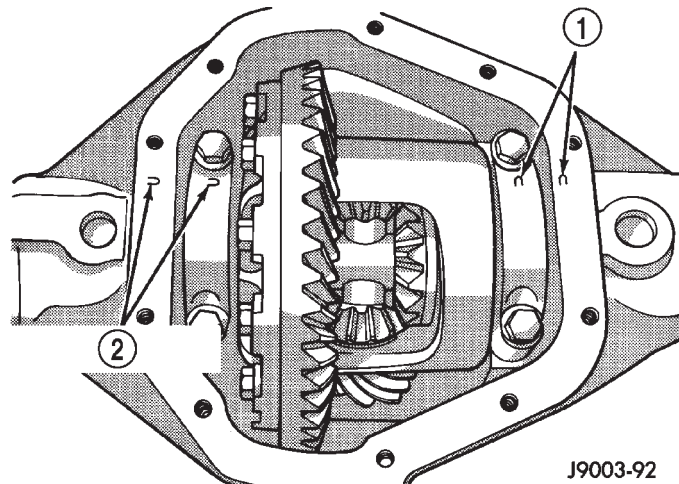
(5) Install differential into the housing. Tap the differential case with a rawhide/rubber hammer to ensure the bearings are seated in housing (Fig. 42).

(6) Remove the spreader.

**Fig. 42 DIFFERENTIAL CASE**

- 1 - RAWHIDE HAMMER

(7) Install bearing caps in their original locations (Fig. 43) and tighten bearing cap bolts in a criss-cross pattern to 109 N·m (80 ft. lbs.).

**Fig. 43 Bearing Cap Reference**

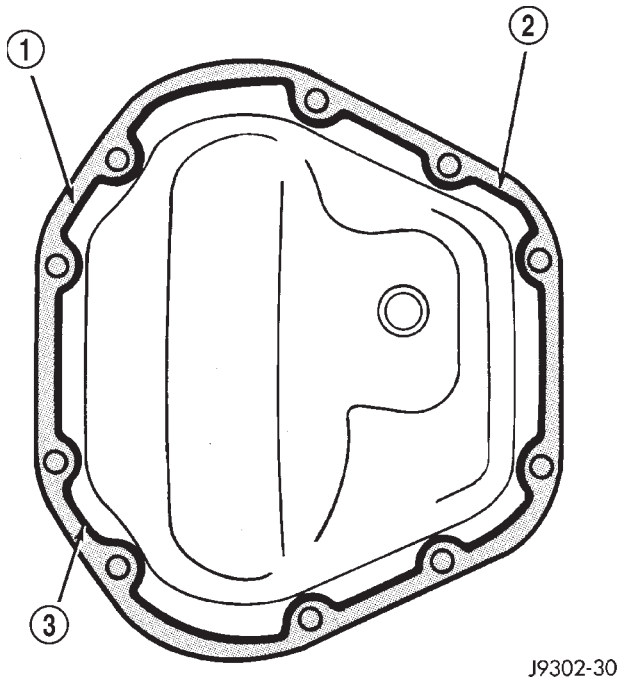
- 1 - REFERENCE LETTERS
- 2 - REFERENCE LETTERS

(8) Install axle shafts.

(9) Install the hub bearings.

DIFFERENTIAL (Continued)

(10) Apply a bead of red Mopar Silicone Rubber Sealant or equivalent to the housing cover (Fig. 44).



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Fig. 44 DIFFERENTIAL COVER - TYPICAL

- 1 - SEALANT SURFACE
- 2 - SEALANT
- 3 - SEALANT THICKNESS

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied or adhesion quality will be compromised.

(11) Install the cover and tighten bolts in a criss-cross pattern to 47 N·m (35 ft. lbs.).

(12) Fill the differential with Mopar Hypoid Gear Lubricant or equivalent to bottom of the fill plug hole.

(13) Install fill hole plug and tighten to 34 N·m (25 ft. lbs.).

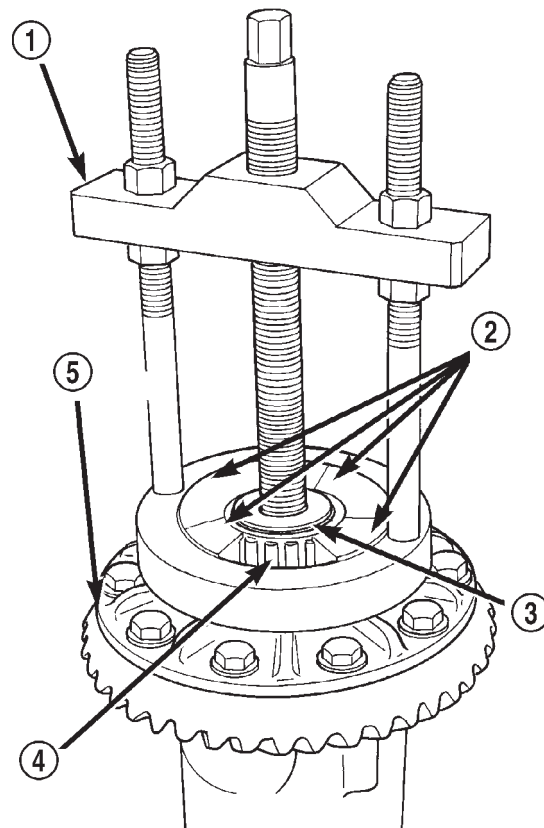
(14) Remove support and lower vehicle.

DIFFERENTIAL CASE BEARINGS

REMOVAL

(1) Remove differential case from axle housing.

(2) Remove bearings from the differential case with Puller/Press C-293-PA, Adapters C-293-62 and Step Plate C-4487-1 (Fig. 45).



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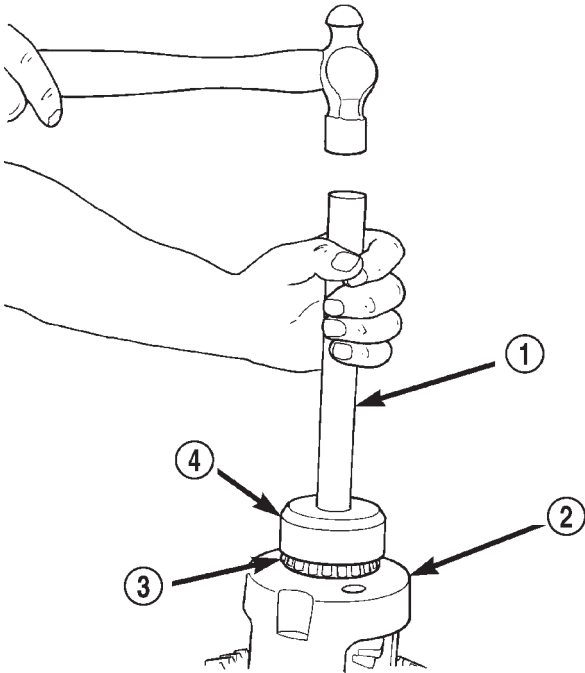
Fig. 45 Differential Bearing Removal

- 1 - PULLER
- 2 - ADAPTERS
- 3 - STEP PLATE
- 4 - BEARING
- 5 - DIFFERENTIAL CASE

DIFFERENTIAL CASE BEARINGS (Continued)

INSTALLATION

(1) Install differential side bearings with Installer C-4190 and Handle C-4171 (Fig. 46).



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Fig. 46 Install Differential Side Bearings

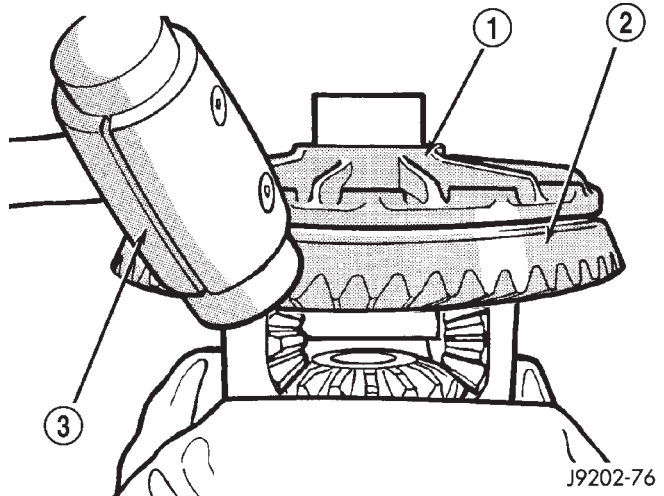
- 1 - HANDLE
- 2 - DIFFERENTIAL CASE
- 3 - BEARING
- 4 - INSTALLER

(2) Install differential case in axle housing.

PINION GEAR/RING GEAR**REMOVAL**

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

- (1) Remove differential from housing.
- (2) Place differential case in a vise with soft metal jaw.
- (3) Remove ring gear bolts from differential case.
- (4) Drive ring gear from differential case with a soft hammer (Fig. 47).
- (5) Mark pinion yoke and propeller shaft for installation alignment.



J9202-76

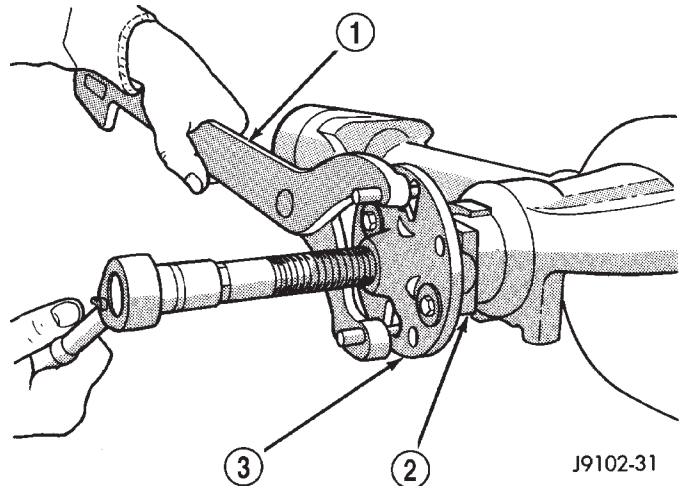
Fig. 47 RING GEAR

- 1 - CASE
- 2 - RING GEAR
- 3 - HAMMER

(6) Remove propeller shaft from pinion yoke and tie propeller shaft to underbody.

(7) Hold pinion yoke with Holder 6719A and remove pinion yoke nut and washer.

(8) Remove pinion yoke with Puller C-452 and Flange Wrench C-3281 (Fig. 48).



J9102-31

Fig. 48 PINION YOKE

- 1 - FLANGE WRENCH
- 2 - YOKE
- 3 - PULLER

PINION GEAR/RING GEAR (Continued)

(9) Remove pinion gear from housing (Fig. 49).

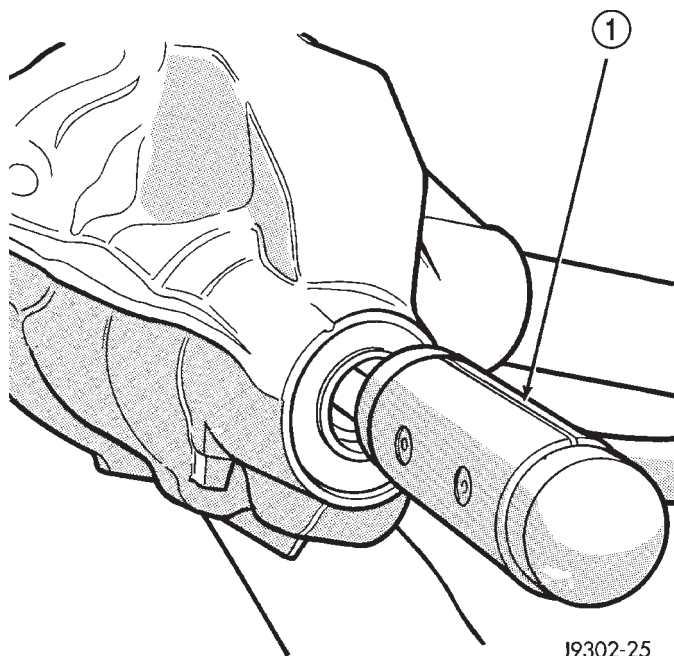


Fig. 49 PINION GEAR REMOVAL

1 - RAWHIDE HAMMER

(10) Remove pinion seal with a pry bar or screw mounted slide hammer.

(11) Remove oil slinger and front pinion bearing.

(12) Remove front pinion bearing cup with Driver D-158 and Handle C-4171 (Fig. 50).

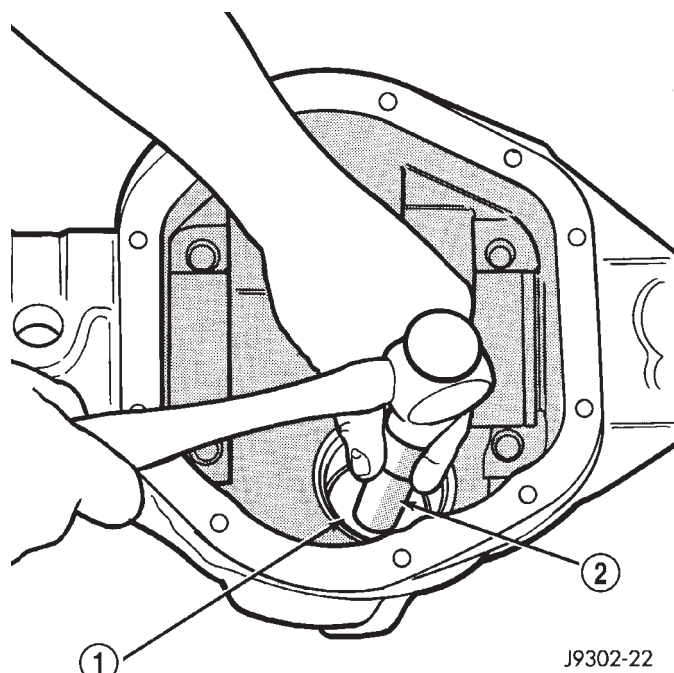


Fig. 50 FRONT PINION BEARING CUP

1 - REMOVER
2 - HANDLE

(13) Remove rear bearing cup with remover D-162 and Handle C-4171 (Fig. 51).

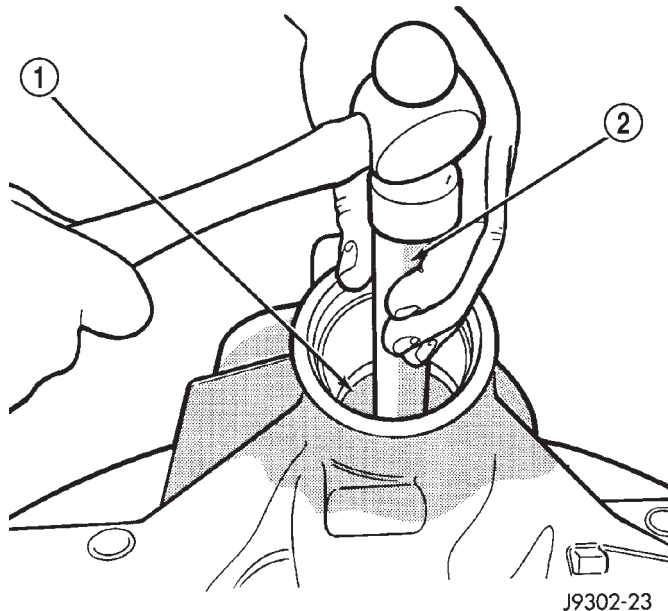


Fig. 51 REAR PINION BEARING CUP

1 - DRIVER
2 - HANDLE

(14) Remove collapsible preload spacer (Fig. 52).

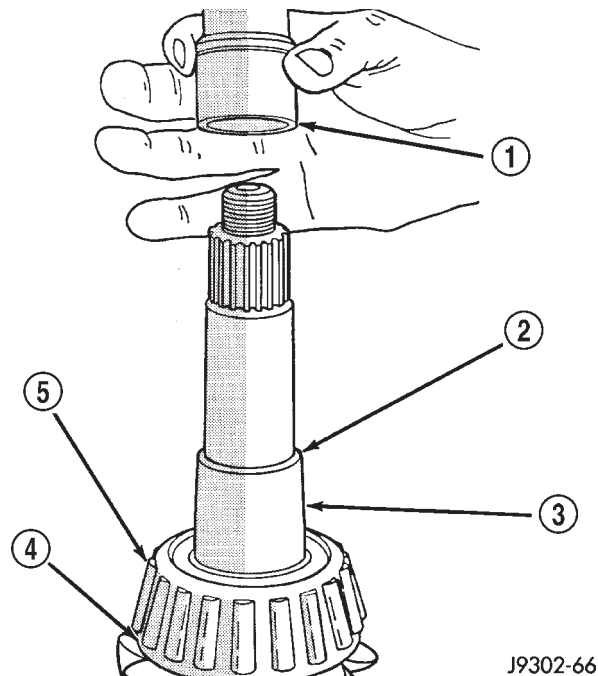


Fig. 52 COLLAPSIBLE SPACER

1 - COLLAPSIBLE SPACER
2 - SHOULDER
3 - PINION GEAR
4 - OIL SLINGER
5 - REAR BEARING

PINION GEAR/RING GEAR (Continued)

(15) Remove rear pinion bearing from pinion with Puller C-293-PA and Adapters C-293-37 (Fig. 53).

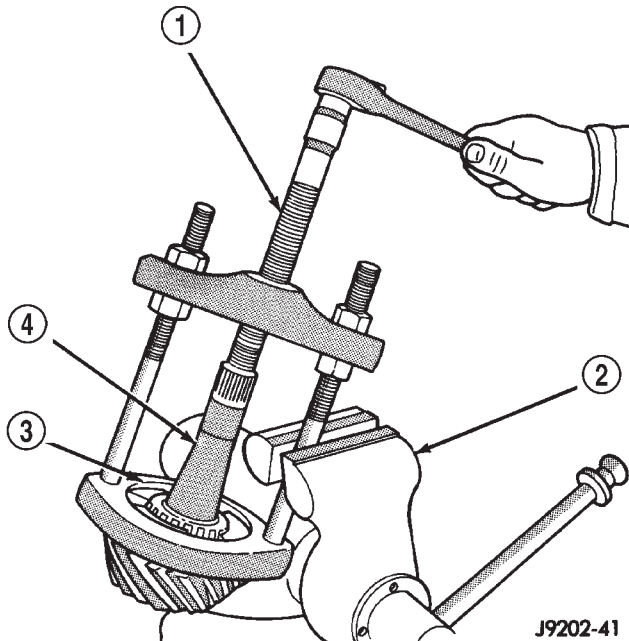


Fig. 53 REAR PINION BEARING

- 1 - PULLER
- 2 - VISE
- 3 - ADAPTERS
- 4 - PINION SHAFT

(16) Remove pinion depth shims from the pinion shaft and record thickness.

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 ring and pinion gears are reused, the original pinion depth shim can be used. Refer to Adjustments (Pinion Gear Depth) to select the proper shim thickness if ring and pinion gears are replaced.

(1) Apply Mopar Door Ease stick lubricant or equivalent to outside surface of bearing cups.

(2) Install rear pinion bearing cup with Installer D-111 and Handle C-4171 (Fig. 54) and verify cup is seated.

(3) Install front pinion bearing cup with Installer D-146 and Handle C-4171 (Fig. 55) and verify cup is seated.

(4) Install pinion front bearing, oil slinger. Apply a light coating of gear lubricant on the lip of pinion seal.

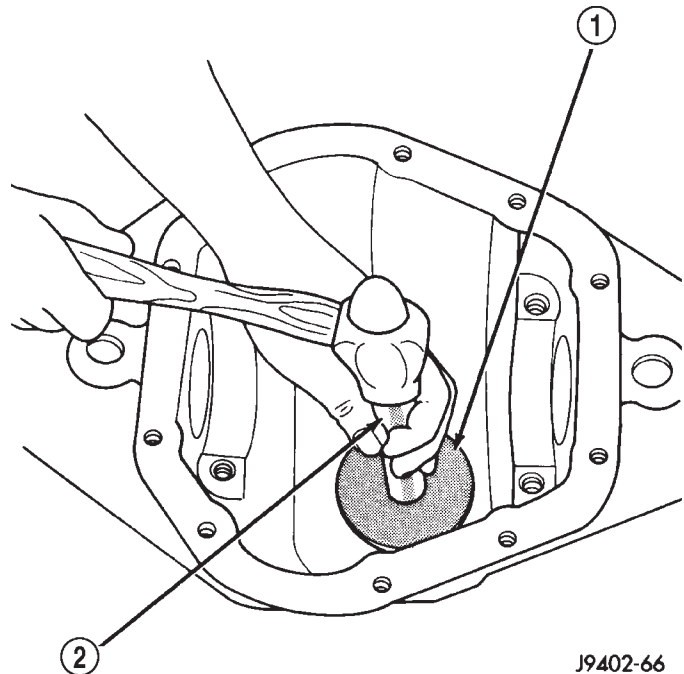


Fig. 54 REAR PINION BEARING CUP

- 1 - INSTALLER
- 2 - HANDLE

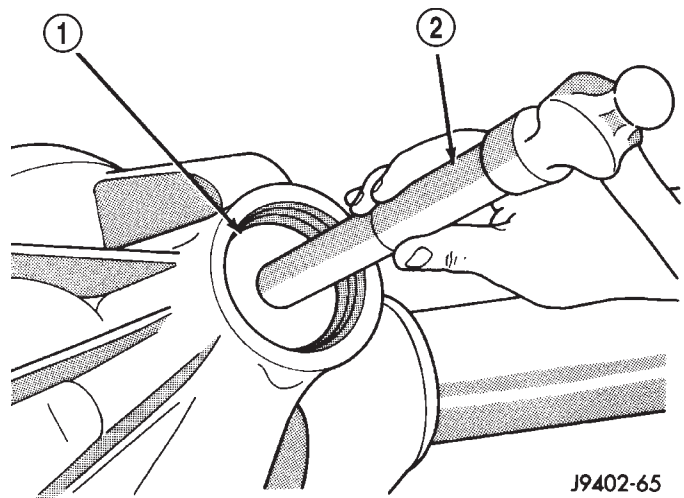
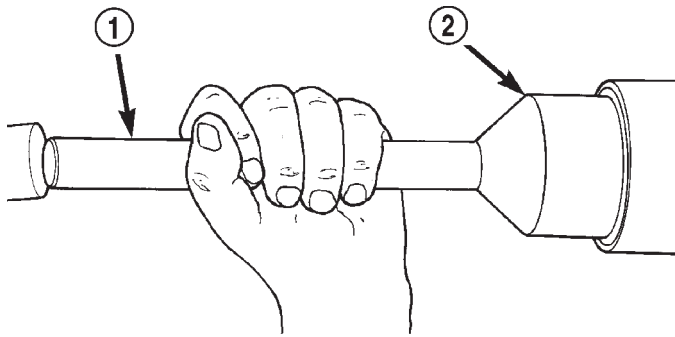


Fig. 55 FRONT PINION BEARING CUP

- 1 - INSTALLER
- 2 - HANDLE

PINION GEAR/RING GEAR (Continued)

(5) Install pinion seal with an appropriate installer (Fig. 56).



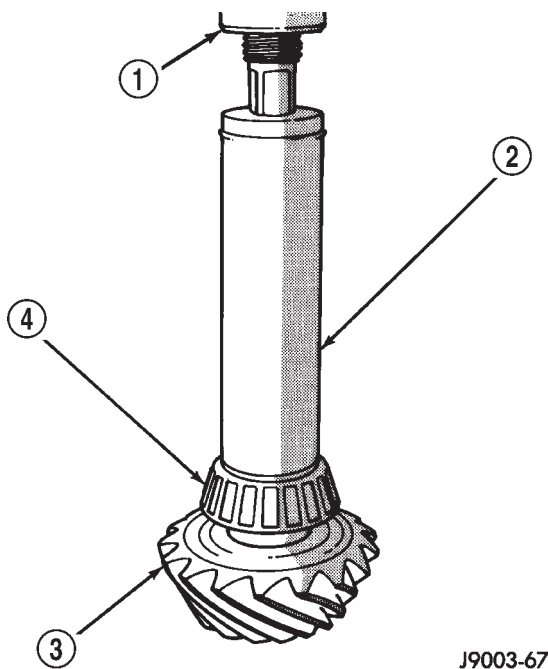
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Fig. 56 PINION SEAL INSTALLER

- 1 - HANDLE
- 2 - INSTALLER

(6) Install proper thickness depth shim on the pinion gear.

(7) Install rear bearing and oil slinger on pinion gear with Installer C-3095-A (Fig. 57).



J9003-67

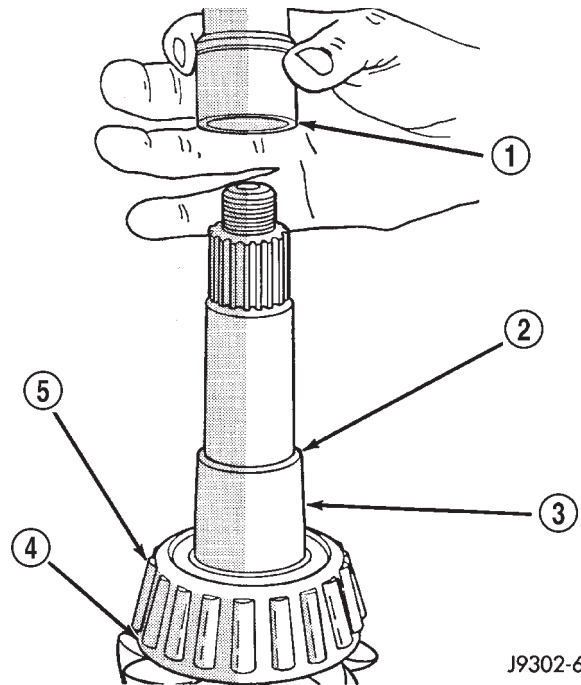
Fig. 57 REAR PINION BEARING

- 1 - PRESS
- 2 - INSTALLER
- 3 - PINION GEAR
- 4 - PINION REAR BEARING

(8) Install a **new** collapsible preload spacer on pinion shaft (Fig. 58).

(9) Install pinion gear in housing.

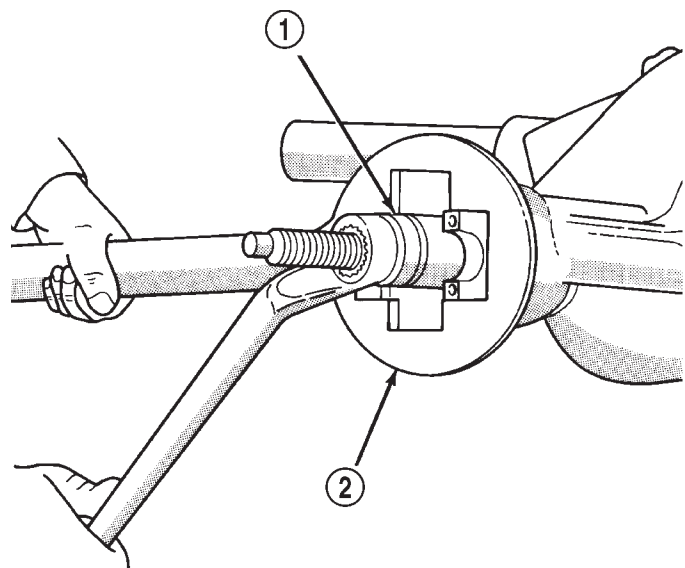
(10) Install yoke with Installer C-3718 and Yoke Holder 6719A (Fig. 59).



J9302-66

Fig. 58 COLLAPSIBLE SPACER

- 1 - COLLAPSIBLE SPACER
- 2 - SHOULDER
- 3 - PINION GEAR
- 4 - OIL SLINGER
- 5 - REAR PINION BEARING



J9402-61

Fig. 59 PINION YOKE INSTALLER

- 1 - INSTALLER
- 2 - YOKE HOLDER

PINION GEAR/RING GEAR (Continued)

(11) Install yoke washer and a **new** nut on the pinion gear. Tighten the nut to 291 N·m (215 ft. lbs.) minimum. **Do not over-tighten.** Maximum torque is 678 N·m (500 ft. lbs.).

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

(12) Use Yoke Holder 6719A to hold the yoke (Fig. 60) and tighten the nut in 6.8 N·m (5 ft. lbs.) until the rotating torque is achieved. Measure the preload torque frequently to avoid over-tightening the nut.

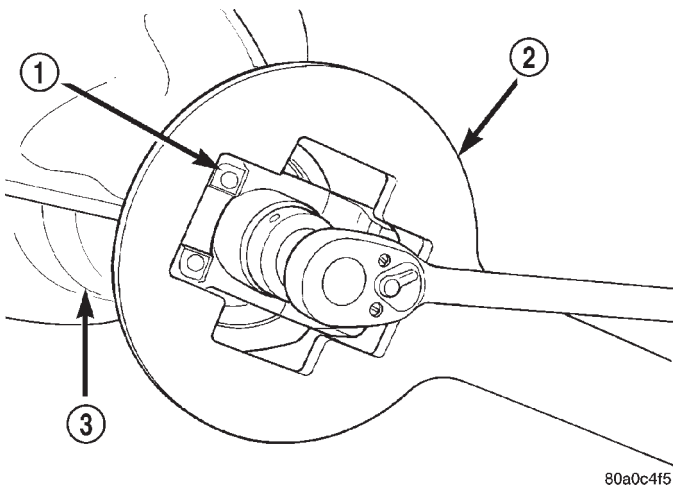


Fig. 60 PINION NUT

- 1 - PINION FLANGE
- 2 - YOKE HOLDING
- 3 - DIFFERENTIAL HOUSING

(13) Check bearing preload torque with an inch pound torque wrench (Fig. 61). The torque to rotate the pinion gear should be:

- Original Bearings: 1 to 2 N·m (10 to 20 in. lbs.).
- New Bearings: 2.26 to 4.52 N·m (20 to 40 in. lbs.).

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

(15) Install **new** ring gear bolts and alternately tighten to 176 N·m (130 ft. lbs.). (Fig. 62).

CAUTION: Never reuse the ring gear bolts. The bolts can fracture causing extensive damage.

(16) Install differential in axle housing and verify gear mesh and contact pattern. Refer to Adjustments (Gear Contact Pattern).

(17) Install differential cover and fill with lubricant.

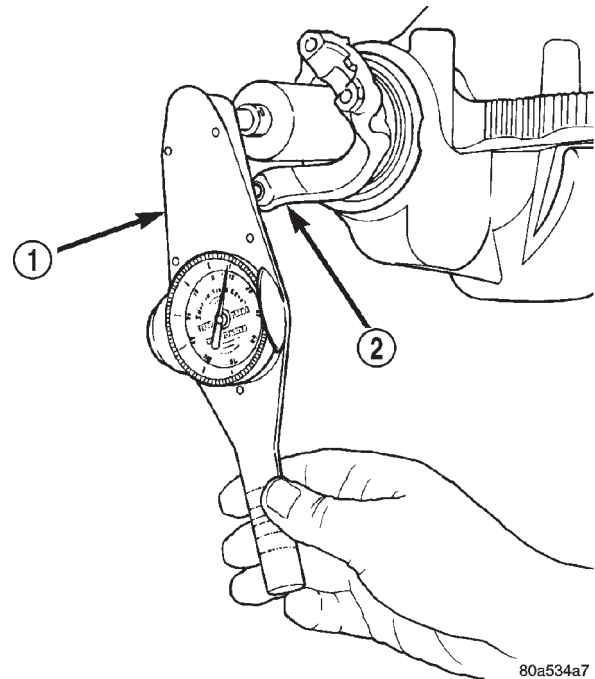


Fig. 61 Pinion Rotating Torque

- 1 - TORQUE WRENCH
- 2 - PINION YOKE

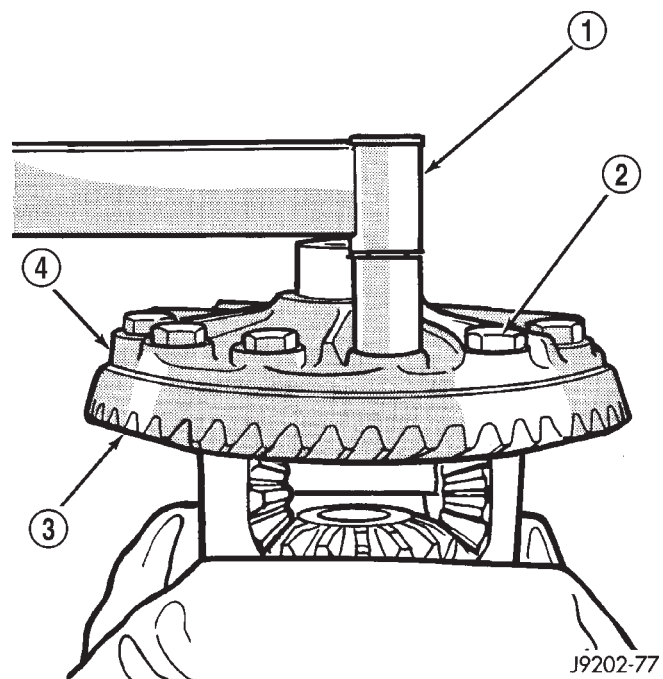


Fig. 62 RING GEAR BOLT

- 1 - TORQUE WRENCH
- 2 - RING GEAR BOLT
- 3 - RING GEAR
- 4 - CASE

REAR AXLE - 248RBI

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REAR AXLE - 248RBI

DESCRIPTION

The Rear Beam-design Iron (RBI) axle housings consist of an iron center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing and welded. The axles are equipped with full-floating axle shafts, meaning that loads are supported by the axle housing tubes.

The differential case for the standard differentials and the Trac-lok® differential are a one-piece design. Differential bearing preload and ring gear backlash are adjusted by the use of shims located between the differential bearing cones and case. Pinion bearing preload is set and maintained by the use of a collapsible spacer. The removable, stamped steel cover provides a means for inspection and service.

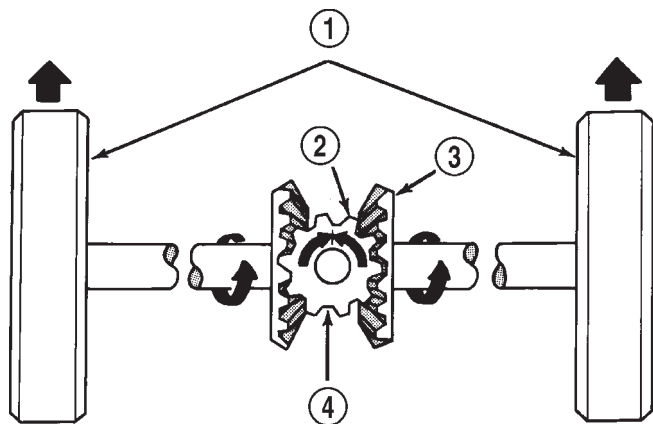
OPERATION

STANDARD DIFFERENTIAL

The axle receives power from the transmission/transfer case through the rear propeller shaft. The rear propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts

through the pinion mate and side gears. The side gears are splined to the axle 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).



J9303-13

Fig. 1 STRAIGHT AHEAD DRIVING

- 1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
- 2 - PINION GEAR
- 3 - SIDE GEAR
- 4 - PINION GEARS ROTATE WITH CASE

REAR AXLE - 248RBI (Continued)

When turning corners, the outside wheel must travel a greater distance than the inside wheel 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.

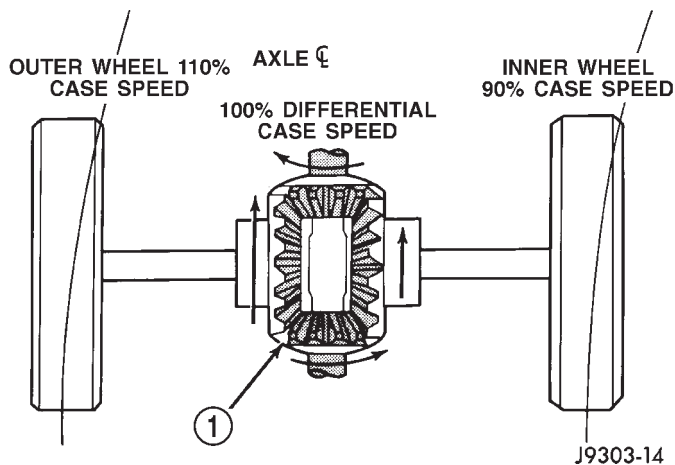


Fig. 2 DIFFERENTIAL ON TURNS

1 - PINION GEARS ROTATE ON PINION SHAFT

TRAC-LOK® DIFFERENTIAL

The differential 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. 3).

This design provides the differential action needed for turning corners and for driving straight ahead during periods of unequal traction. When one wheel loses traction, the clutch packs transfer additional torque to the wheel having the most traction. The differential resists wheel spin on bumpy roads and provide more pulling power when one wheel loses traction. Pulling power is provided continuously until both wheels lose traction. If both wheels slip due to unequal traction, Trac-lok® operation is normal. In extreme cases of differences of traction, the wheel with the least traction may spin.

DIAGNOSIS AND TESTING - AXLE**GEAR NOISE**

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth

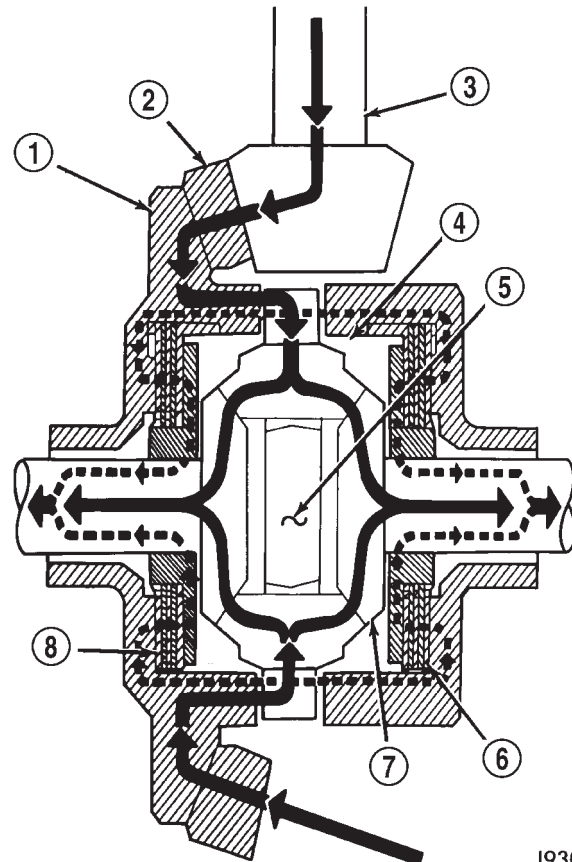


Fig. 3 TRAC-LOK LIMITED SLIP DIFFERENTIAL

- 1 - CASE
- 2 - RING GEAR
- 3 - DRIVE PINION
- 4 - PINION GEAR
- 5 - MATE SHAFT
- 6 - CLUTCH PACK
- 7 - SIDE GEAR
- 8 - CLUTCH PACK

contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

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

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then 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 gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehi-

REAR AXLE - 248RBI (Continued)

cle turns. A worn pinion shaft can also cause a snapping or a knocking noise.

BEARING NOISE

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

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched 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 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(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 rearend vibration. Do not overlook engine accessories, brackets and drive belts.

NOTE: All driveline components should be examined before starting any repair.

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.
- Transmission shift operation.
- 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 to case clearance.

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

REAR AXLE - 248RBI (Continued)

DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose. 2. Faulty, brinelled wheel bearing.	1. Tighten loose nuts. 2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube. 2. Bent or sprung axle shaft.	1. Inspect axle tube alignment. Correct as necessary. 2. Inspect and correct as necessary.
Axle Shaft Broke	1. Misaligned axle tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch.	1. Replace the broken shaft after correcting tube mis-alignment. 2. Replace broken shaft and avoid excessive weight on vehicle. 3. Replace broken shaft and avoid or correct erratic clutch operation. 4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly. 2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly. 3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight. 4. Replace case and inspect gears and bearings for further 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. Fill differential with the correct fluid type and quantity. 2. Replace scored gears. Fill differential with the correct fluid type and quantity. 3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.

REAR AXLE - 248RBI (Continued)

Condition	Possible Causes	Correction
Loss Of Lubricant	1. Lubricant level too high. 2. Worn axle shaft seals. 3. Cracked differential housing. 4. Worn pinion seal. 5. Worn/scored yoke. 6. Axle cover not properly sealed.	1. Drain lubricant to the correct level. 2. Replace seals. 3. Repair as necessary. 4. Replace seal. 5. Replace yoke and seal. 6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low. 2. Improper grade of lubricant. 3. Bearing pre-loads too high. 4. Insufficient ring gear backlash.	1. Fill differential to correct level. 2. Fill differential with the correct fluid type and quantity. 3. Re-adjust bearing pre-loads. 4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavement. 4. Improper adjustments.	1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation. 3. Replace gears and examine remaining parts for damage. 4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant. 2. Improper ring gear and pinion adjustment. 3. Unmatched ring gear and pinion. 4. Worn teeth on ring gear and/or pinion. 5. Loose pinion bearings. 6. Loose differential bearings. 7. Mis-aligned or sprung ring gear. 8. Loose differential bearing cap bolts. 9. Housing not machined properly.	1. Fill differential with the correct fluid type and quantity. 2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth. 3. Replace gears with a matched ring gear and pinion. 4. Replace ring gear and pinion. 5. Adjust pinion bearing pre-load. 6. Adjust differential bearing pre-load. 7. Measure ring gear run-out. Replace components as necessary. 8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification. 9. Replace housing.

REAR AXLE - 248RBI (Continued)

REMOVAL

- (1) Raise and support the vehicle.
- (2) Position an axle lift under the axle and secure it to the axle.
- (3) Remove the wheels and tires.
- (4) Remove RWAL sensor from the differential housing, if necessary.
- (5) Remove brake hose from the axle junction block.
- (6) Disconnect parking brake cables and cable brackets.
- (7) Remove vent hose from the axle shaft tube.
- (8) Mark propeller shaft and yoke for installation alignment reference.
- (9) Remove propeller shaft.
- (10) Remove shock absorbers from the axle brackets.
- (11) Remove spring clamps and spring brackets.
- (12) Remove axle from the vehicle.

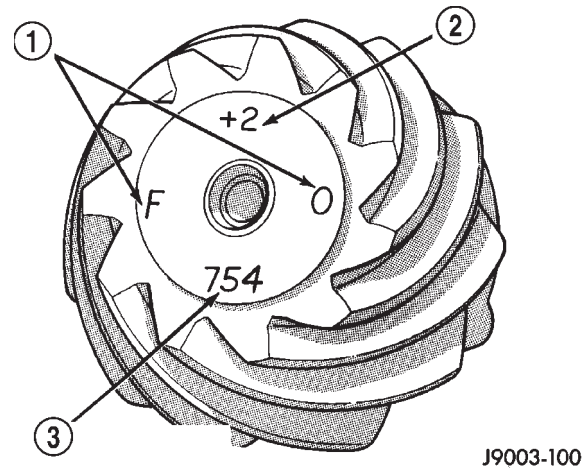
INSTALLATION

- (1) Raise axle with lift and align to the leaf spring centering bolts.
- (2) Install spring clamps and spring brackets.
- (3) Install shock absorbers and tighten to specifications.
- (4) Install RWAL sensor to the differential housing, if necessary.
- (5) Install parking brake cables and cable brackets.
- (6) Install brake hose to the axle junction block.
- (7) Install axle vent hose.
- (8) Install propeller shaft with reference marks aligned.
- (9) Install wheels and tires assemblies.
- (10) Add gear lubricant, if necessary.
- (11) Remove lift from the axle and lower the vehicle.

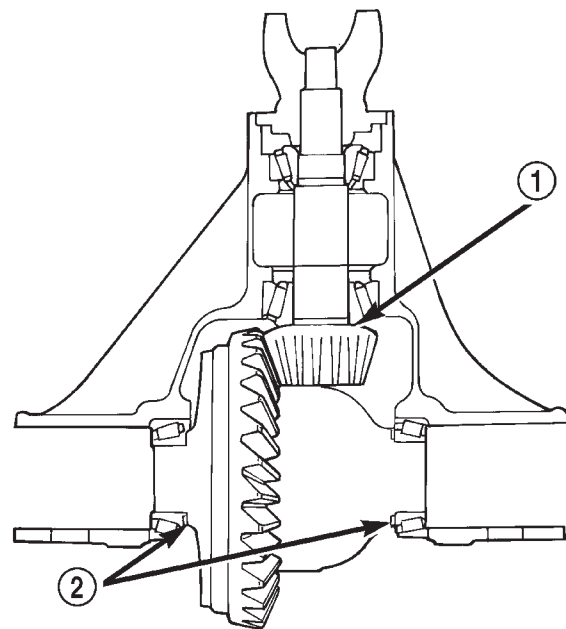
ADJUSTMENTS

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. 4). 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 127 mm (5.00 in.). The standard depth provides the best gear tooth contact pattern. Refer to Backlash and Contact Pattern in this section for additional information.

Compensation for pinion depth variance is achieved with a select shim. The shims are placed between the rear pinion bearing and the pinion gear head (Fig. 5).

**Fig. 4 PINION GEAR ID NUMBERS**

- 1 - PRODUCTION NUMBERS
- 2 - PINION GEAR DEPTH VARIANCE
- 3 - GEAR MATCHING NUMBER



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Fig. 5 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM
- 2 - DIFFERENTIAL BEARING SHIM

If a new gear set is being installed, note the depth variance etched into both the original and replacement pinion. Add or subtract this number from the thickness of the original depth shim/oil slinger to compensate for the difference in the depth variances. Refer to the Depth Variance chart.

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

REAR AXLE - 248RBI (Continued)

Note the etched number on the face of the pinion gear head (-1, -2, 0, +1, +2, etc.). The numbers represent thousands of an inch deviation from the standard. If the number is negative, add that value to the

required thickness of the depth shims. If the number is positive, subtract that value from the thickness of the depth shim. If the number is 0 no change is necessary.

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

PINION DEPTH MEASUREMENT AND ADJUSTMENT

Measurements are taken with pinion bearing cups and pinion bearings installed in the housing. Take measurements with Pinion Gauge Set and Dial Indicator C-3339 (Fig. 6).

(1) Assemble Pinion Height Block 6739, Pinion Block 6736 and rear pinion bearing onto Screw 6741 (Fig. 6).

(2) Insert assembled height gauge components, rear bearing and screw into the housing through pinion bearing cups (Fig. 7).

(3) Install front pinion bearing and Cone-nut 6740 hand tight (Fig. 6).

(4) Place Arbor Disc 6732 on Arbor D-115-3 in position in the housing side bearing cradles (Fig. 8).

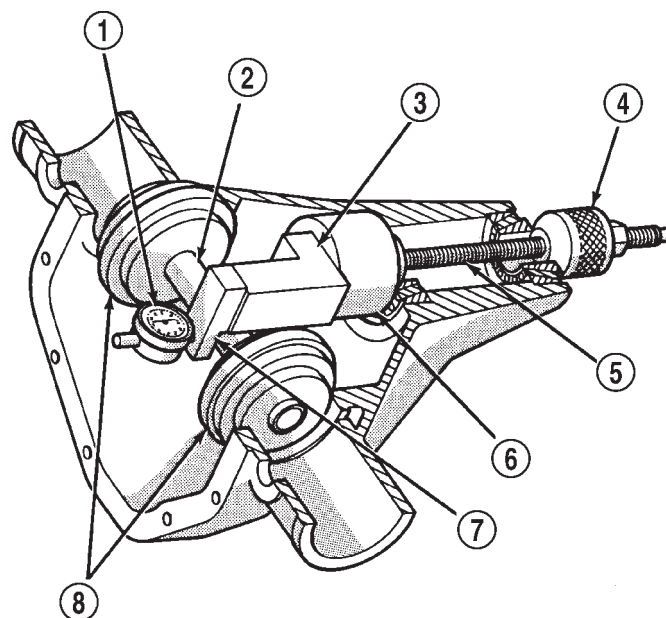
NOTE: Arbor Discs 6732 has different step diameters to fit other axles. Choose proper step for axle being serviced.

(5) Install differential bearing caps on arbor discs and snug the bearing cap bolts. Then cross tighten cap bolts to 108 N·m (80 ft. lbs.).

(6) Assemble Dial Indicator C-3339 into Scooter Block D-115-2 and secure set screw.

(7) Position Scooter Block/Dial Indicator flush on the pinion height block. Hold scooter block and zero the dial indicator.

(8) Slowly slide the scooter block across the pinion height block over to the arbor (Fig. 9). Move the

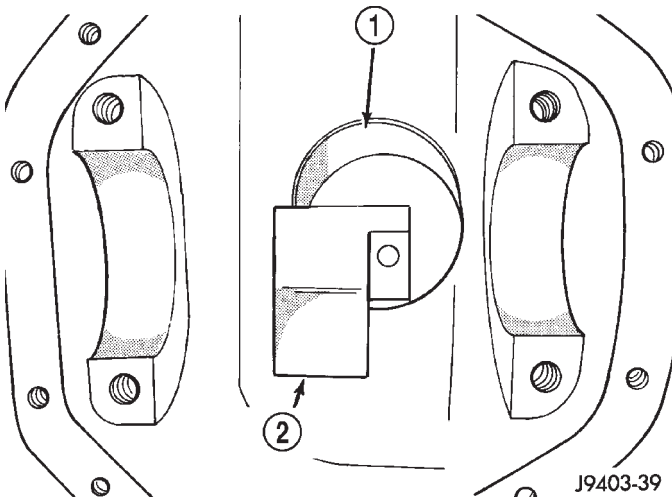


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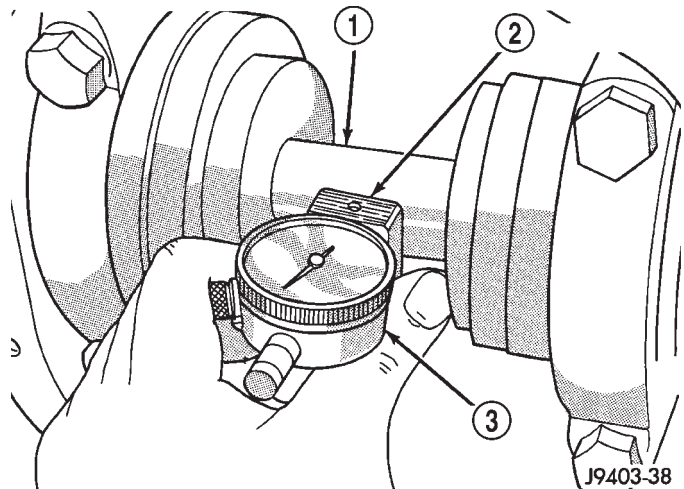
Fig. 6 PINION DEPTH GAUGE TOOLS

- 1 - DIAL INDICATOR
- 2 - ARBOR
- 3 - PINION HEIGHT BLOCK
- 4 - CONE
- 5 - SCREW
- 6 - PINION BLOCK
- 7 - SCOOTER BLOCK
- 8 - ARBOR DISC

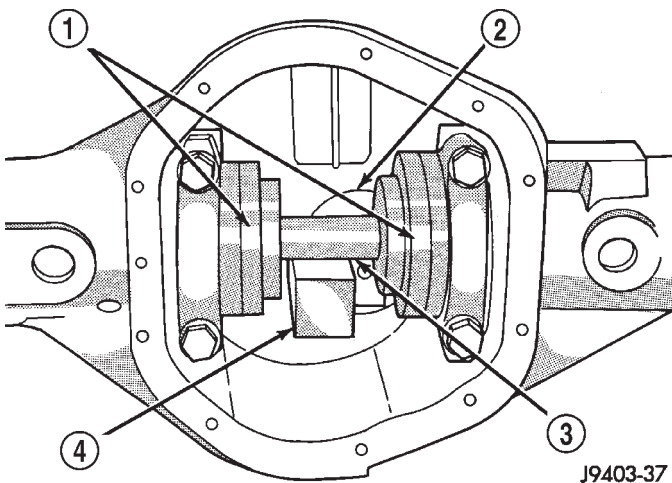
REAR AXLE - 248RBI (Continued)

**Fig. 7 PINION HEIGHT BLOCK**

- 1 - PINION BLOCK
- 2 - PINION HEIGHT BLOCK

**Fig. 9 PINION DEPTH MEASUREMENT**

- 1 - ARBOR
- 2 - SCOOTER BLOCK
- 3 - DIAL INDICATOR

**Fig. 8 GAUGE TOOLS IN HOUSING**

- 1 - ARBOR DISC
- 2 - PINION BLOCK
- 3 - ARBOR
- 4 - PINION HEIGHT BLOCK

scooter block till dial indicator crests the arbor, then record the highest reading.

(9) Select a shim equal to the dial indicator reading plus the pinion depth variance number etched in the face of the pinion (Fig. 4). For example, if the depth variance is -2, add +0.002 in. to the dial indicator reading.

DIFFERENTIAL SIDE BEARING PRELOAD AND GEAR BACKLASH

Differential side bearing preload and gear backlash is achieved by selective shims positioned behind the differential side bearing cones. The proper shim

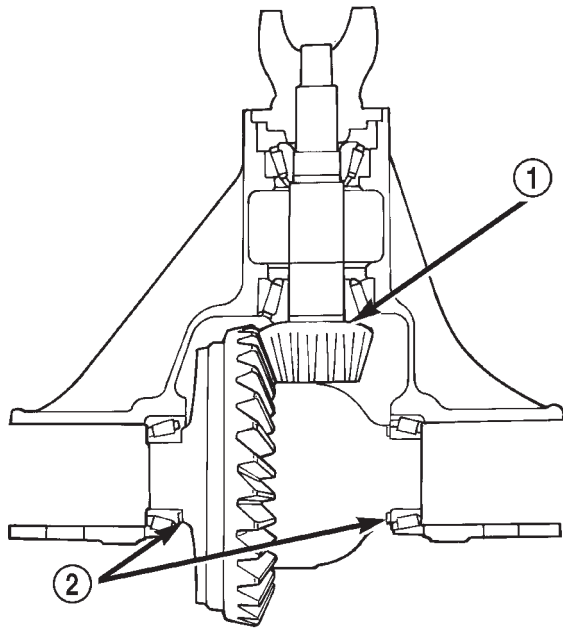
thickness can be determined using slip-fit Dummy Bearings D-343 in place of the differential side bearings and a Dial Indicator C-3339. Before proceeding with the differential bearing preload and gear backlash measurements, measure the pinion gear depth and prepare the pinion for installation. Establishing proper pinion gear depth is essential to establishing gear backlash and tooth contact patterns. After the overall shim thickness to take up differential side play is measured, the pinion is installed, and the gear backlash shim thickness is measured. The overall shim thickness is the total of the dial indicator reading and the preload specification added together. The gear backlash measurement determines the thickness of the shim used on the ring gear side of the differential case. Subtract the gear backlash shim thickness from the total overall shim thickness and select that amount for the pinion gear side of the differential (Fig. 10). Differential shim measurements are performed with spreader W-129-B removed.

SHIM SELECTION

NOTE: It is difficult to salvage the differential side bearings during the removal procedure. Install replacement bearings if necessary.

- (1) Remove differential side bearings from differential case.
- (2) Remove factory installed shims from differential case.
- (3) Install ring gear on differential case and tighten bolts to specification.
- (4) Install dummy side bearings D-343 on differential case.

REAR AXLE - 248RBI (Continued)

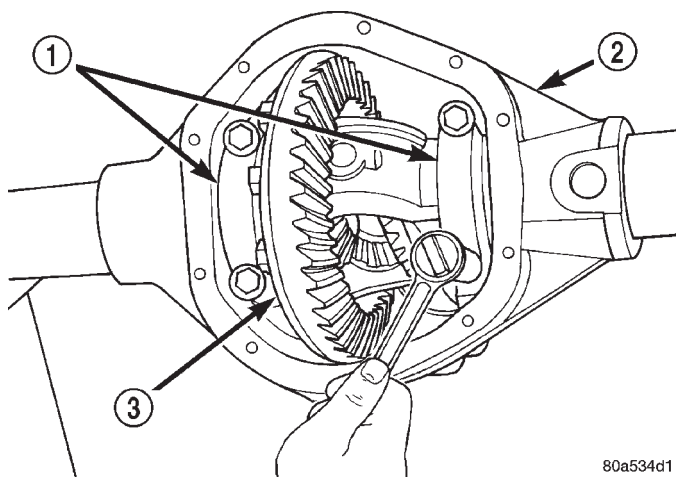


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Fig. 10 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM
- 2 - DIFFERENTIAL BEARING SHIM

- (5) Install differential case in the housing.
- (6) Install the marked bearing caps in their correct positions and snug the bolts (Fig. 11).



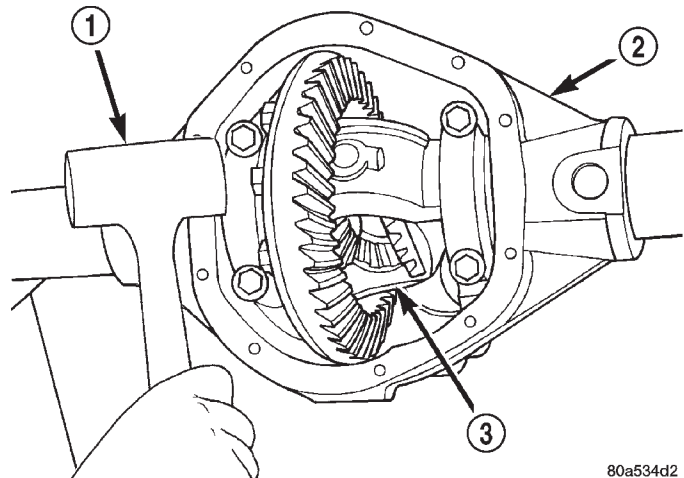
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Fig. 11 BEARING CAP BOLTS

- 1 - BEARING CAP
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE

- (7) Using a dead-blow hammer, seat the differential dummy bearings to each side of the housing (Fig. 12) and (Fig. 13).

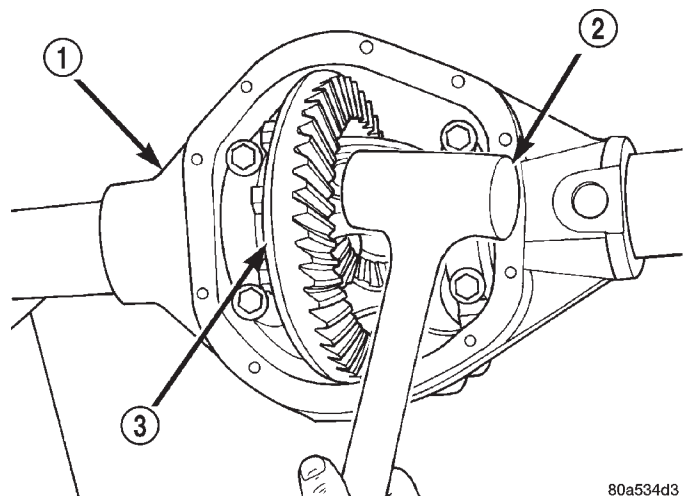
- (8) Thread Pilot Stud C-3288-B into rear cover bolt hole below ring gear (Fig. 14).



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Fig. 12 SEAT PINION GEAR SIDE DUMMY BEARING

- 1 - DEAD-BLOW HAMMER
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE



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Fig. 13 SEAT RING GEAR SIDE DIFFERENTIAL DUMMY BEARING

- 1 - DIFFERENTIAL HOUSING
- 2 - DEAD-BLOW HAMMER
- 3 - DIFFERENTIAL CASE

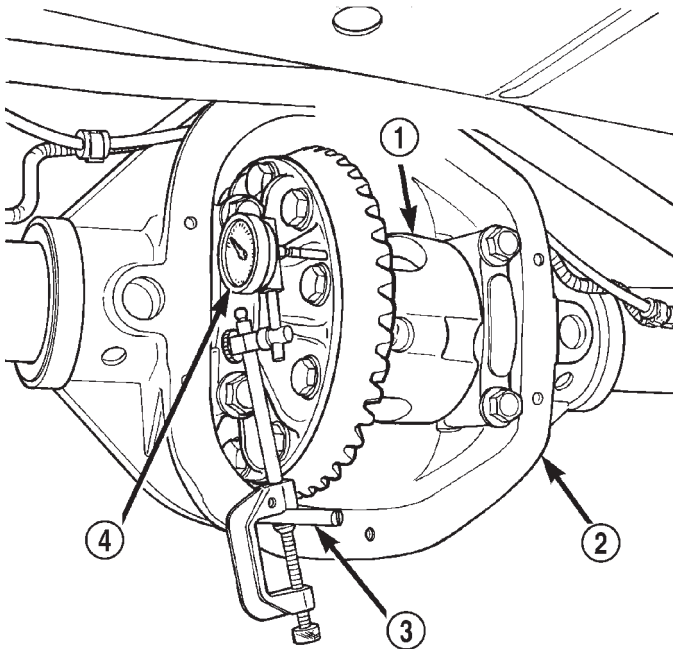
- (9) Attach the Dial Indicator C-3339 to pilot stud. Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 14).

- (10) Push and hold differential case to pinion gear side of the housing and zero dial indicator (Fig. 15).

- (11) Push and hold differential case to ring gear side of the housing and record the dial indicator reading (Fig. 16).

- (12) Add 0.38 mm (0.015 in.) to the zero end play total. This total represents the thickness of shims needed to preload the new bearings when the differential is installed.

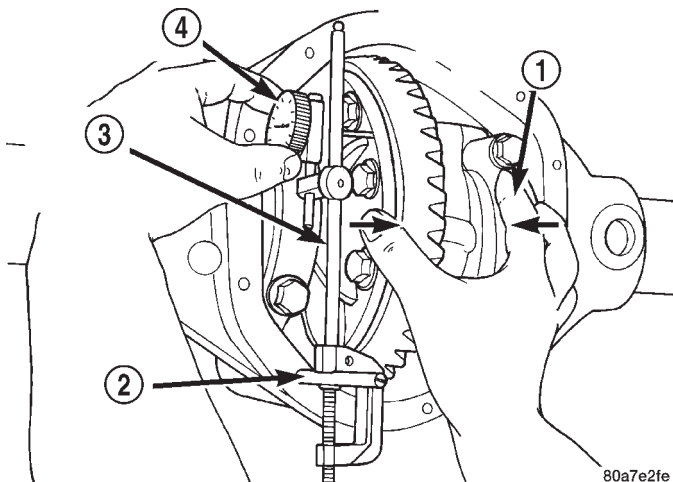
REAR AXLE - 248RBI (Continued)



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Fig. 14 DIFFERENTIAL SIDE PLAY MEASUREMENT

- 1 - DIFFERENTIAL CASE
- 2 - DIFFERENTIAL HOUSING
- 3 - PILOT STUD
- 4 - DIAL INDICATOR



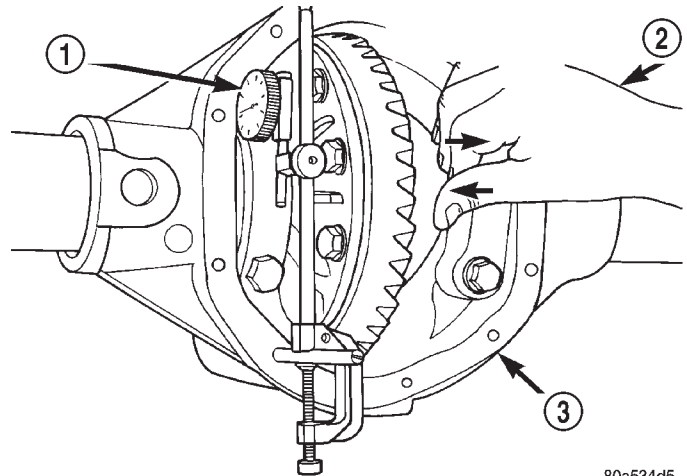
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Fig. 15 DIAL INDICATOR LOCATION

- 1 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 2 - PILOT STUD
- 3 - DIAL INDICATOR ARM
- 4 - DIAL INDICATOR FACE

(13) Rotate dial indicator out of the way on the pilot stud.

(14) Remove differential case and dummy bearings from the housing.



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Fig. 16 DIFFERENTIAL CASE TO RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - DIFFERENTIAL HOUSING

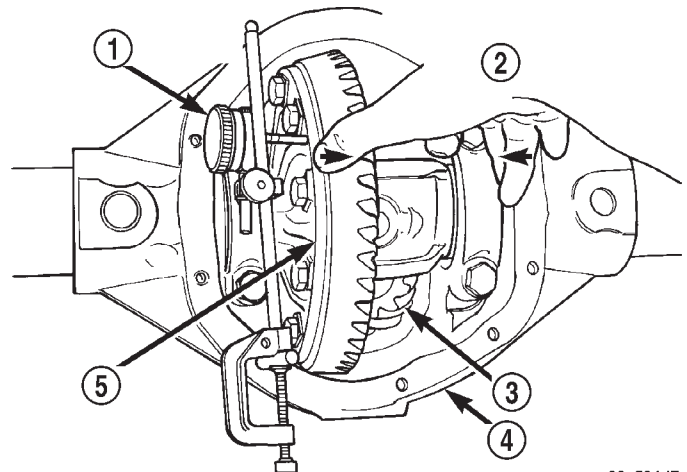
(15) Install the pinion gear in the housing. Install the pinion yoke and establish the correct pinion rotating torque.

(16) Install differential case and dummy bearings D-343 in the housing (without shims), install bearing caps and tighten bolts snug.

(17) Seat ring gear side dummy bearing (Fig. 13).

(18) Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 14).

(19) Push and hold differential case toward pinion gear and zero the dial indicator (Fig. 17).



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Fig. 17 DIFFERENTIAL CASE TO PINION GEAR SIDE

- 1 - DIAL INDICATOR FACE
- 2 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

REAR AXLE - 248RBI (Continued)

(20) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 18).

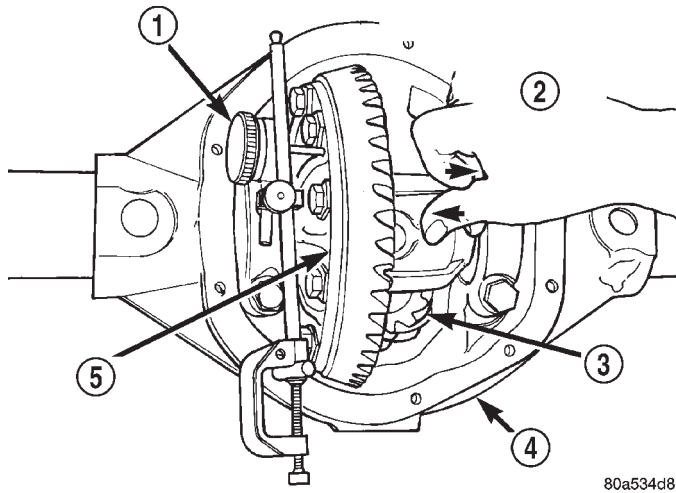


Fig. 18 DIFFERENTIAL CASE TO RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

(21) This is the shim thickness needed on the ring gear side of the differential case for proper backlash.

(22) Subtract the backlash shim thickness from the total preload shim thickness. The remainder is the shim thickness required on the pinion side of the housing.

(23) Rotate dial indicator out of the way on pilot stud.

(24) Remove differential case and dummy bearings from the housing.

(25) Install the selected side bearing shims onto the differential case hubs.

(26) Install side bearings on differential case hubs with Install C-4487-1 and Handle C-4171.

(27) Install bearing cups on differential.

(28) Install Spreader W-129-B and some items from Adapter Set 6987 on the housing and spread open enough to receive differential case.

CAUTION: Never spread housing over 0.50 mm (0.020 in.). The housing can be damaged if over-spread.

(29) Install differential case into the housing.

(30) Remove spreader from the housing.

(31) Rotate the differential case several times to seat the side bearings.

(32) Position the indicator plunger against a ring gear tooth (Fig. 19).

(33) Push and hold ring gear upward while not allowing the pinion gear to rotate.

(34) Zero dial indicator face to pointer.

(35) Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.12 mm (0.005 in.) and 0.20 mm (0.008 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the housing to the other (Fig. 20).

(36) Verify differential case and ring gear runout by measuring ring to pinion gear backlash at eight locations around the ring gear. Readings should not vary more than 0.05 mm (0.002 in.). If readings vary more than specified, the ring gear or the differential case is defective.

After the proper backlash is achieved, perform Gear Contact Pattern Analysis procedure.

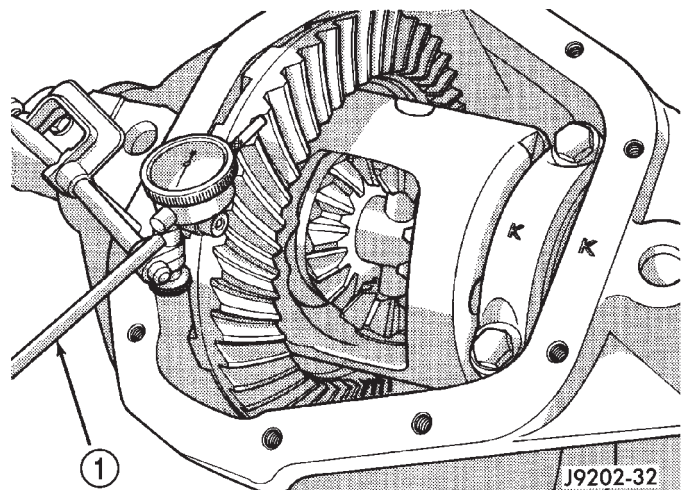
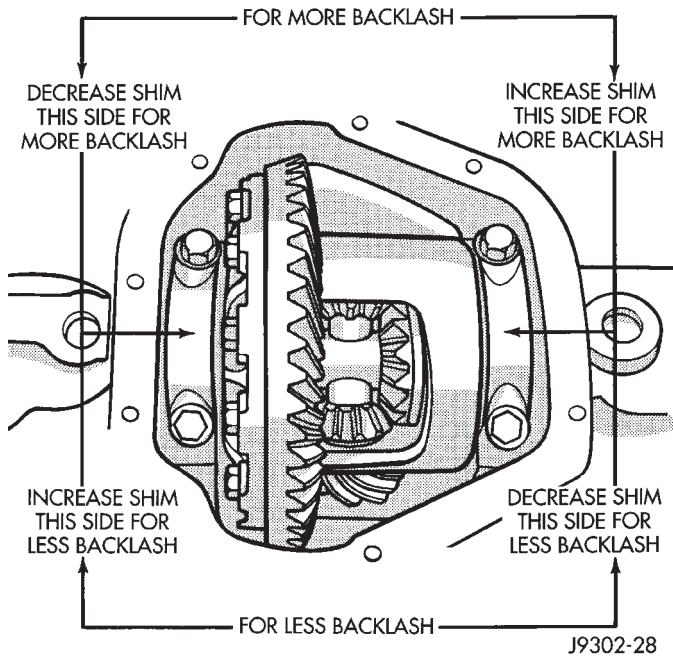


Fig. 19 RING GEAR BACKLASH MEASUREMENT

- 1 - DIAL INDICATOR

REAR AXLE - 248RBI (Continued)

**Fig. 20 BACKLASH SHIM****GEAR CONTACT PATTERN**

The ring and pinion gear contact patterns will show if the pinion depth is correct. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

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

(2) Wrap, twist and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.

(3) With a boxed end wrench on the ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeeze the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart (Fig. 21) and adjust pinion depth and gear backlash as necessary.

REAR AXLE - 248RBI (Continued)

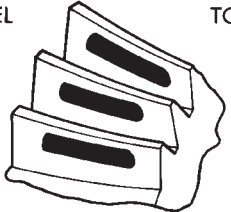
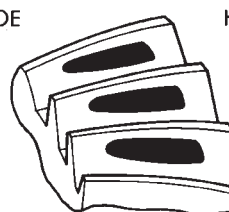
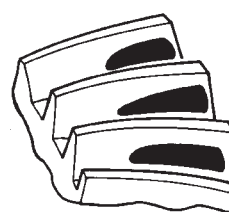
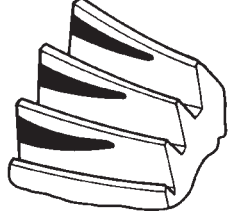
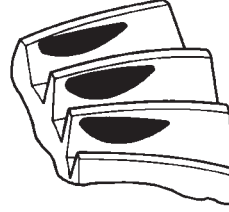
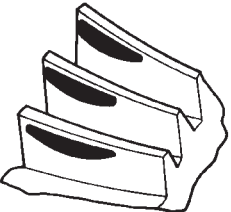
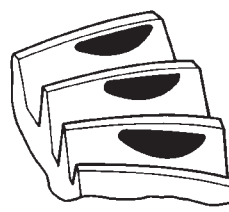
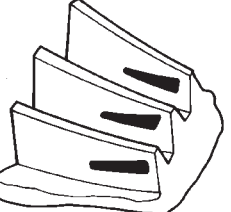
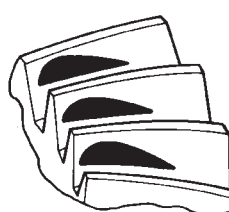
DRIVE SIDE OF RING GEAR TEETH HEEL TOE 	COAST SIDE OF RING GEAR TEETH TOE HEEL 	DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT 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.

Fig. 21 GEAR TOOTH CONTACT PATTERNS

REAR AXLE - 248RBI (Continued)

SPECIFICATIONS

REAR AXLE - 248RBI

AXLE SPECIFICATIONS

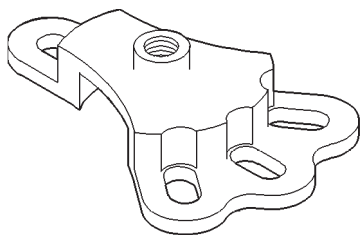
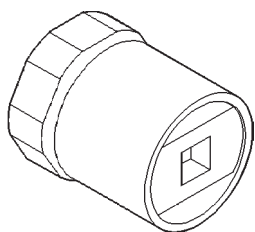
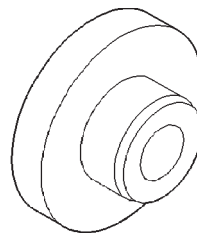
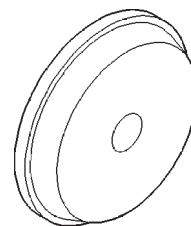
DESCRIPTION	SPECIFICATION
Axle Ratio	3.55, 4.10
Ring Gear Diameter	248 mm (9.75 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Pinion Gear Standard Depth	127.0 mm (5.000 in.)
Pinion Bearing Preload - Original Bearings	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearings	2.3-5.1 N·m (20-45 in. lbs.)

TORQUE SPECIFICATIONS

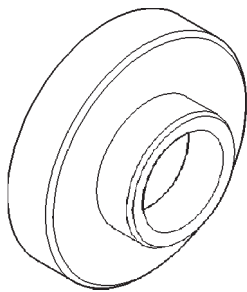
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fill Hole Plug	34	25	-
Differential Cover Bolts	41	30	-
Bearing Cap Bolts	108	80	-
Ring Gear Bolt	176	130	-
Pinion Nut	292-447	215-330	-
Axle Shaft Bolts	122-136	90-100	-
Hub Bearing Nut	163-190	120-140	-

SPECIAL TOOLS

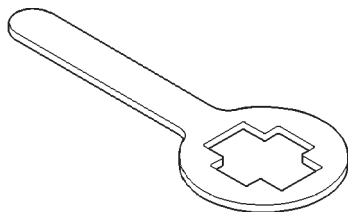
REAR AXLE - 248RBI

**Puller 6790****Wrench DD-1241-JD****Installer 5064****Installer D-111**

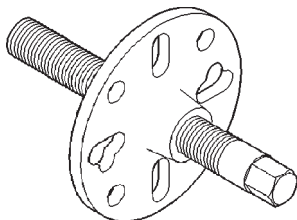
REAR AXLE - 248RBI (Continued)



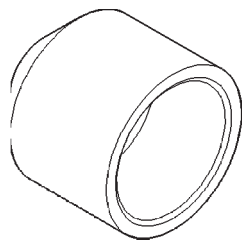
Installer 8149



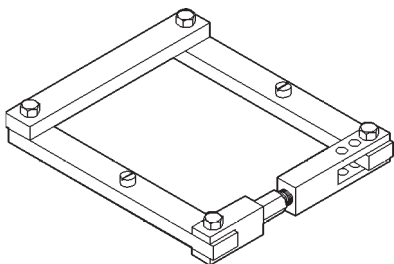
Holder 6719A



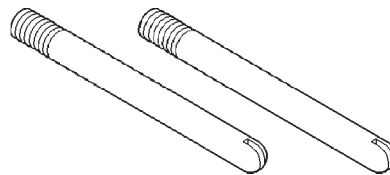
Puller C-452



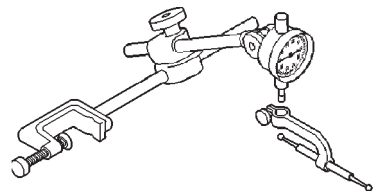
Installer 8108



Spreader W-129-B

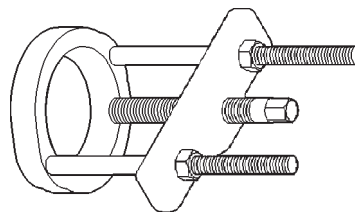


Pilot Studs C-3288-B

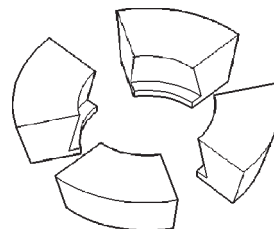


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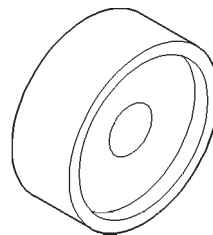
Dial Indicator C-3339



Puller/Press C-293-PA

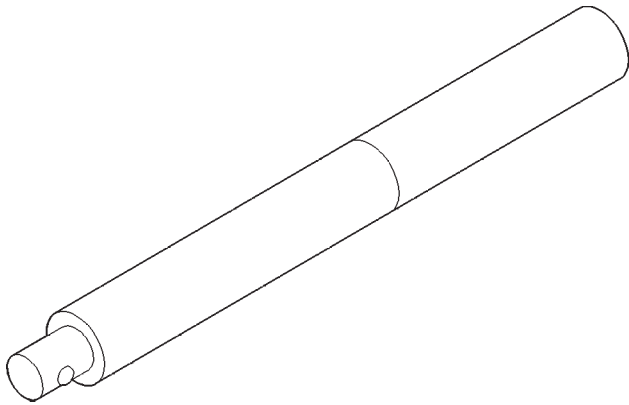


Adapters C-293-37

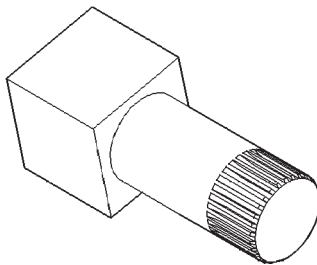


Installer C-4190

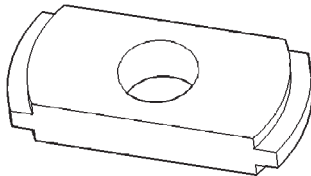
REAR AXLE - 248RBI (Continued)



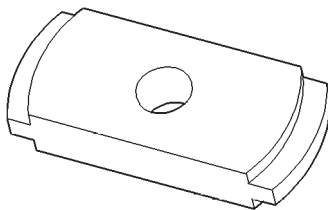
Handle C-4171



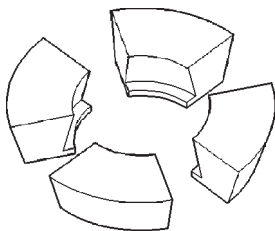
Fixture 6963-A



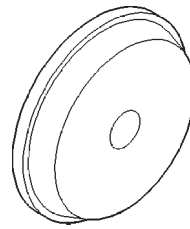
Remover D-158



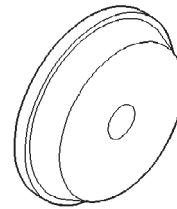
Remover D-162



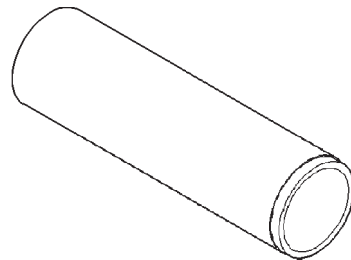
Adapters C-293-37



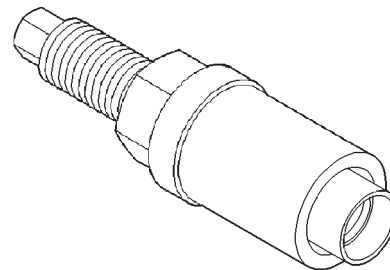
Installer D-111



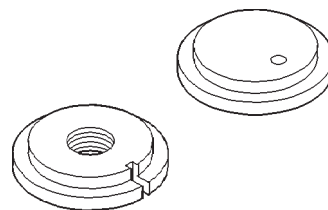
Installer D-146



Installer C-3095-A

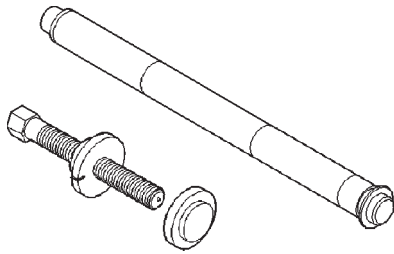
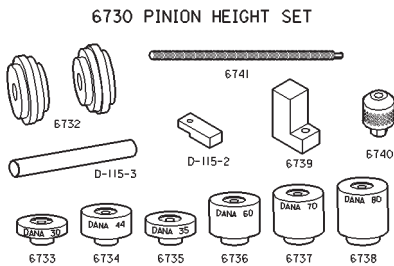
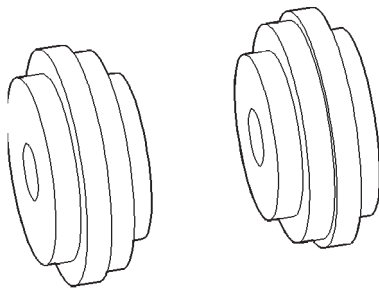


Installer C-3718



Trac-lok Tools 8139

REAR AXLE - 248RBI (Continued)

**Trac-lok Tools C-4487****Gauge Set 6730****Arbor Discs 6732**

AXLE SHAFTS

REMOVAL

- (1) Remove the axle shaft flange bolts.
- (2) Slide the axle shaft out from the axle tube.

INSTALLATION

- (1) Clean the gasket contact surface area on the flange with an appropriate solvent. Install a new flange gasket and slide the axle shaft into the tube.
- (2) Install the bolts and tighten to 129 N·m (95 ft. lbs.).

AXLE BEARINGS

REMOVAL

- (1) Remove wheel and tire assembly.
- (2) Remove brake drum.
- (3) Remove the axle shaft.
- (4) Remove the lock wedge and adjustment nut. Use Socket DD-1241-JD to remove the adjustment nut.
- (5) Remove the hub assembly. The outer axle bearing will slide out as the hub is being removed.
- (6) Remove inner grease seal and discard. Use Installer 5064 and Handle C-4171 to drive grease seal and inner axle bearing from the hub.
- (7) Remove the bearing cups from the hub bore. Use a brass drift, or an appropriate removal tool, to tap out the cups.

INSTALLATION

- (1) Thoroughly clean both axle bearings and interior of the hub with an appropriate cleaning solvent.
- (2) Install bearing cups with Installer 8151 and Handle C-4171.
- (3) **Pack inner and outer bearings with Mopar wheel bearing grease or equivalent.**
- (4) Apply grease to inner and outer bearing cup surfaces.
- (5) Install inner axle bearing in the hub.
- (6) Install **new** grease seal in hub with Installer 8149 and Handle C-4171.
- (7) Inspect bearing and seal contact surfaces on the axle tube for burrs/roughness. Remove all the rough contact surfaces from the axle tube.
- (8) Carefully slide the hub onto the axle.

CAUTION: Do not let grease seal contact axle tube threads during installtion.

- (9) Install outer axle bearing.
- (10) Install hub bearing adjustment nut with Socket DD-1241-JD.
- (11) Tighten adjustment nut to 163-190 N·m (120-140 ft. lbs.) while rotating the wheel. Then loosen adjustment nut 1/8 to 1/3 of-a-turn to provide 0.025-0.250mm (0.001-0.009 in.) wheel bearing end play.
- (12) Tap locking wedge into the spindle keyway and adjustment nut.

NOTE: Located locking wedge in a new position in the adjustment nut.

- (13) Install axle shaft and brake drum.
- (14) Install the wheel and tire assembly.

PINION SEAL

REMOVAL

- (1) Raise and support the vehicle.
- (2) Mark universal joint, pinion yoke and shaft for installation reference.
- (3) Disconnect the propeller shaft from the pinion yoke.
- (4) Remove the wheel and tire assemblies.
- (5) Remove brake calipers to prevent any drag that may cause a false bearing preload torque measurement.
- (6) Rotate pinion yoke three or four times.
- (7) Record pinion gear rotating torque with an inch pound torque wrench (Fig. 22).

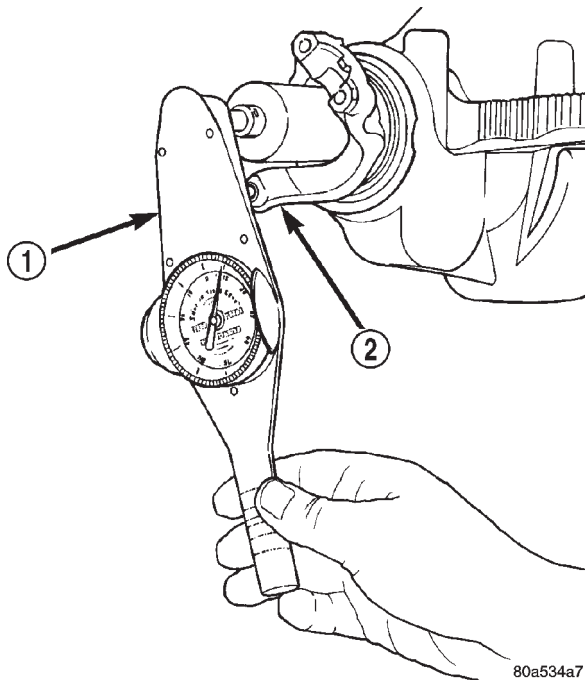


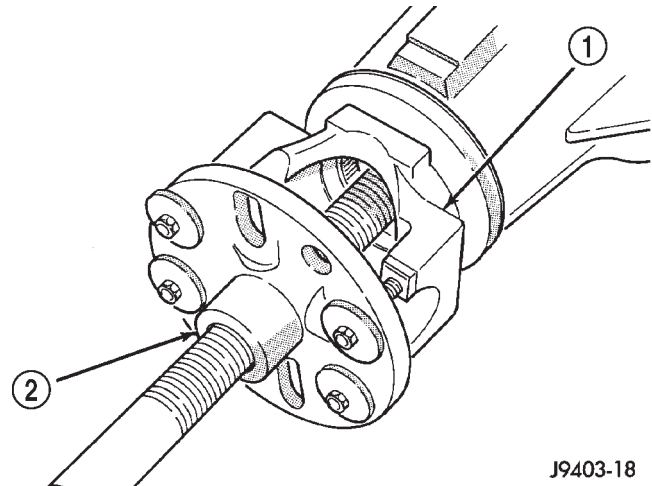
Fig. 22 PINION ROTATING TORQUE

- 1 - TORQUE WRENCH
2 - PINION YOKE

- (8) Hold yoke with Yoke Holder 6719A and remove the pinion shaft nut and washer.
- (9) Remove yoke with Remover C-452 (Fig. 23).
- (10) Remove pinion seal with pry tool or slide-hammer mounted screw.

INSTALLATION

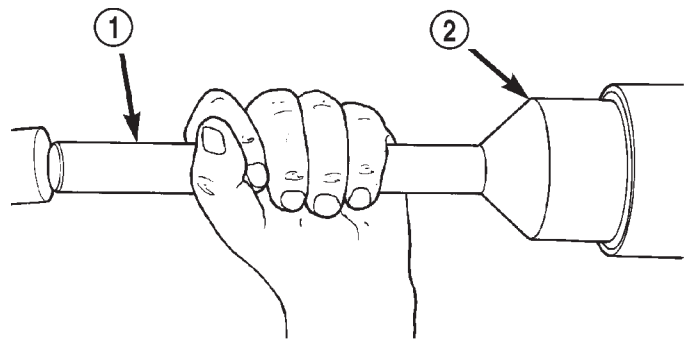
- (1) Apply a light coating of gear lubricant on the lip of pinion seal.
- (2) Install **new** pinion seal with an appropriate installer (Fig. 24).
- (3) Install yoke on pinion shaft with Installer C-3718 and Yoke Holder 6719.



J9403-18

Fig. 23 PINION YOKE REMOVER

- 1 - PINION YOKE
2 - REMOVER



80a98349

Fig. 24 PINION SEAL INSTALLER

- 1 - HANDLE
2 - INSTALLER

(4) Install pinion yoke washer with the **concave surface** against the yoke end.

(5) Install **new** pinion nut.

CAUTION: Never exceed the minimum tightening torque when installing the pinion yoke retaining nut at this point. Damage to collapsible spacer, if equipped, or bearings may result.

(6) Hold pinion yoke with Yoke Holder 6719 and tighten shaft nut to 291.5 N·m (215 ft. lbs.) (Fig. 25). Rotate pinion shaft several revolutions to ensure the bearing rollers are seated.

(7) Rotate pinion shaft with a inch pound torque wrench. Rotating torque should be equal to the reading recorded during removal, plus an additional 0.56 N·m (5 in. lbs.) (Fig. 26).

PINION SEAL (Continued)

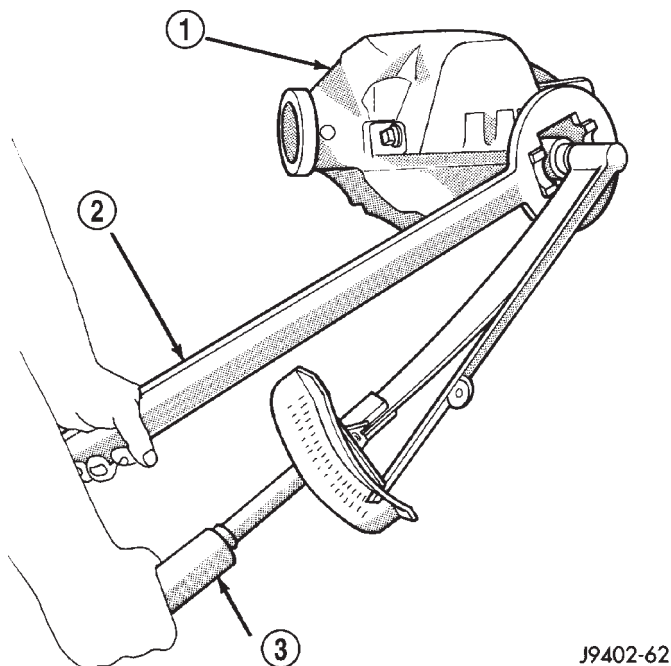


Fig. 25 TIGHTEN PINION NUT

- 1 - DIFFERENTIAL HOUSING
2 - YOKE HOLDER
3 - TORQUE WRENCH

J9402-62

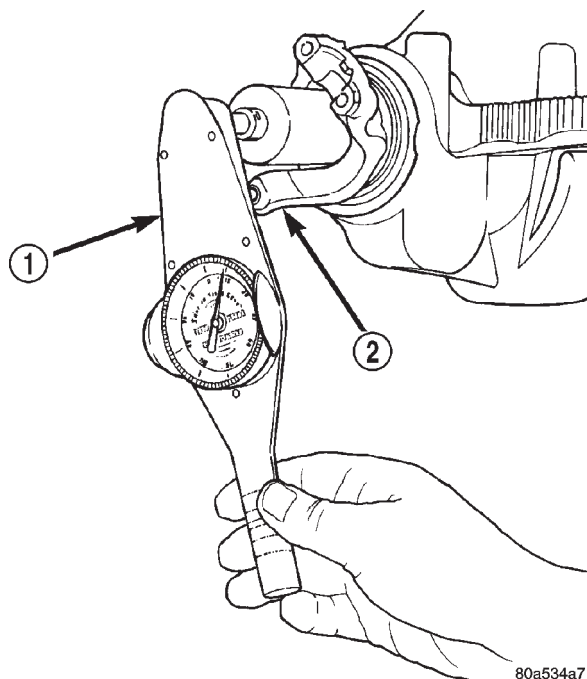


Fig. 26 PINION ROTATING TORQUE

- 1 - TORQUE WRENCH
2 - PINION YOKE

80a534a7

CAUTION: Never loosen pinion gear nut to decrease pinion rotating torque and never exceed specified preload torque. If preload torque is exceeded a new pin-

ion nut and collapsible spacer, if equipped, must be installed.

(8) If rotating torque is low, use Yoke Holder 6719 to hold the pinion yoke (Fig. 25) and tighten the pinion shaft nut in 6.8 N·m (5 ft. lbs.) increments until proper rotating torque is achieved.

NOTE: The bearing rotating torque should be constant during a complete revolution of the pinion. If the rotating torque varies, this indicates a binding condition.

(9) Install propeller shaft with reference marks aligned.

(10) Add gear lubricant to the differential housing, if necessary.

(11) Install wheel and tire assemblies and lower the vehicle.

(12) Pump the brake pedal before moving the vehicle.

DIFFERENTIAL

REMOVAL

(1) Raise and support the vehicle.

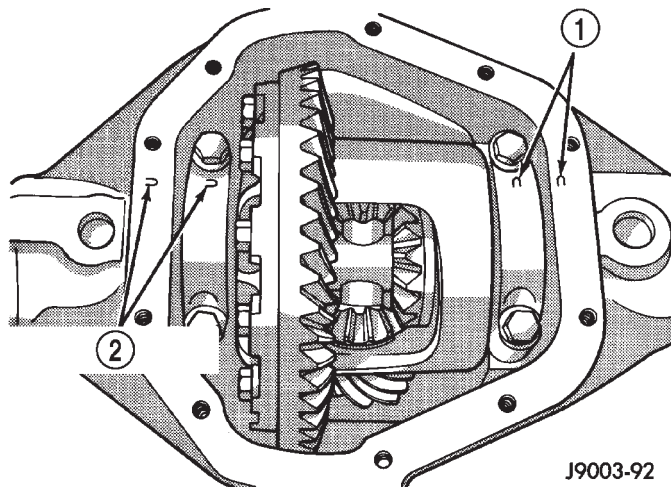
(2) Remove fill hole plug from the differential housing cover.

(3) Remove differential housing cover and drain 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 axle shafts.

(6) Note the orientation of the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 27).



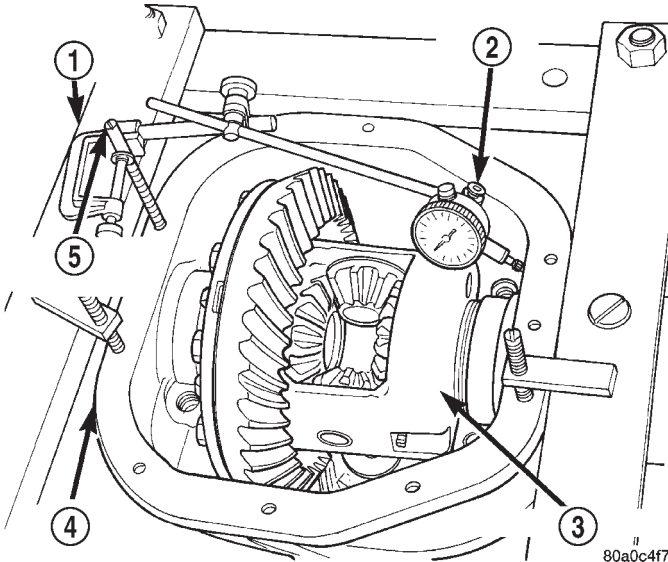
J9003-92

Fig. 27 BEARING CAP IDENTIFICATION

- 1 - REFERENCE LETTERS
2 - REFERENCE LETTERS

DIFFERENTIAL (Continued)

- (7) Remove the differential bearing caps.
- (8) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 28).
- (9) Install the hold down clamps and tighten the tool turnbuckle finger-tight.

**Fig. 28 SPREAD DIFFERENTIAL HOUSING**

- 1 - SPREADER
- 2 - DIAL INDICATOR
- 3 - DIFFERENTIAL
- 4 - DIFFERENTIAL HOUSING
- 5 - PILOT STUD

(10) Install a Pilot Stud C-3288-B 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. 28) and zero the indicator.

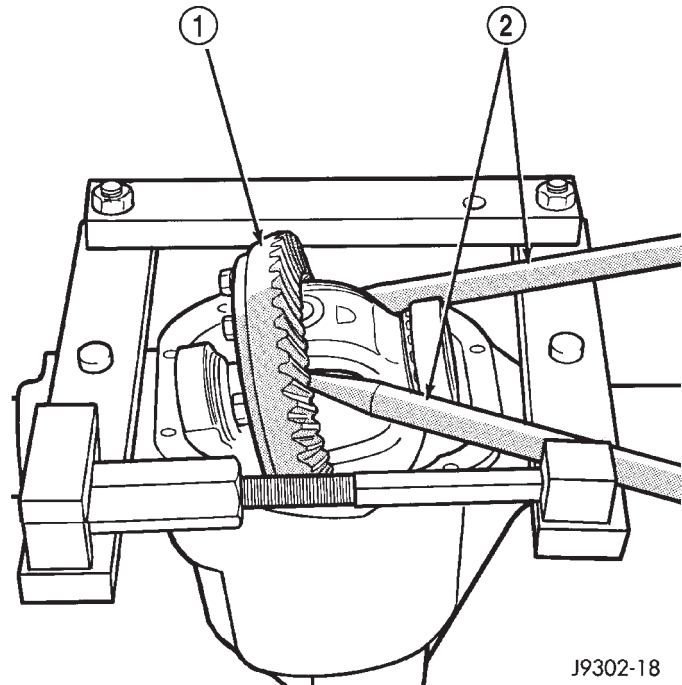
(11) Spread the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 28).

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

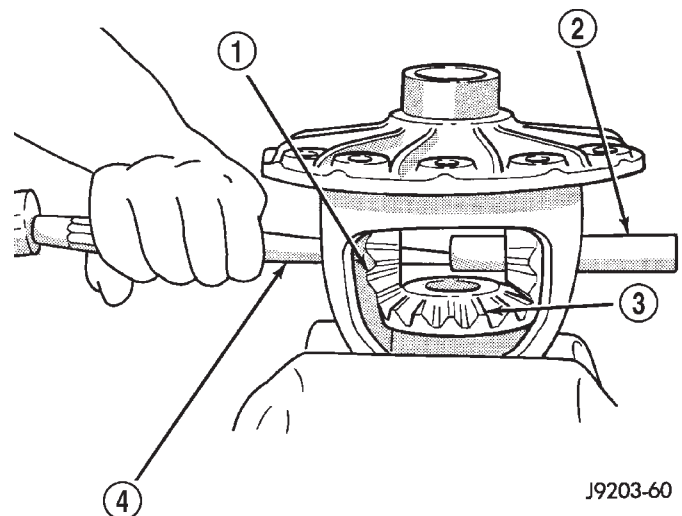
- (12) Remove the dial indicator.
- (13) Pry the differential case loose from the housing. To prevent damage, pivot on housing with the end of the pry bar against spreader (Fig. 29).
- (14) Remove the case from housing. Tag bearing cups to indicate their location.

DISASSEMBLY

- (1) Remove roll-pin holding mate shaft in housing.
- (2) Remove pinion gear mate shaft (Fig. 30).
- (3) Rotate the differential side gears and remove the pinion mate gears and thrust washers (Fig. 31).

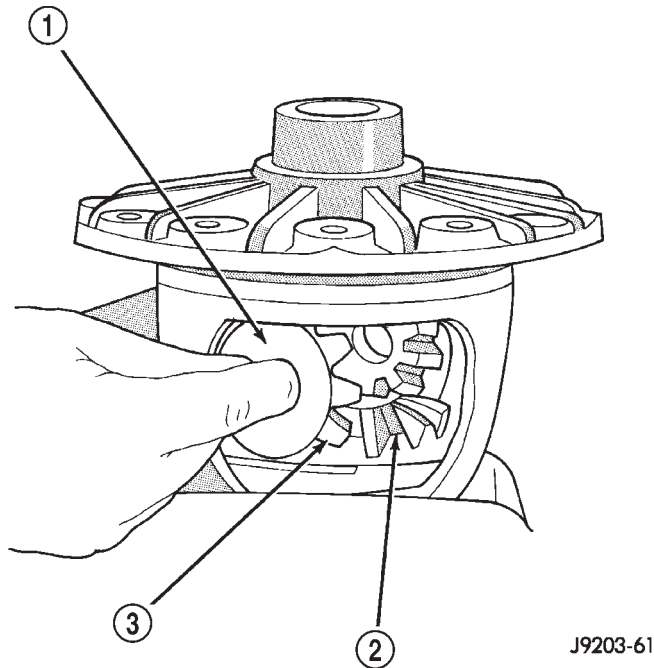
**Fig. 29 DIFFERENTIAL REMOVAL**

- 1 - DIFFERENTIAL
- 2 - PRY BAR

**Fig. 30 PINION MATE SHAFT**

- 1 - PINION MATE GEAR
- 2 - PINION MATE SHAFT
- 3 - SIDE GEAR
- 4 - DRIFT

DIFFERENTIAL (Continued)

**Fig. 31 PINION MATE/SIDE GEAR**

- 1 - THRUST WASHER
- 2 - SIDE GEAR
- 3 - PINION MATE GEAR

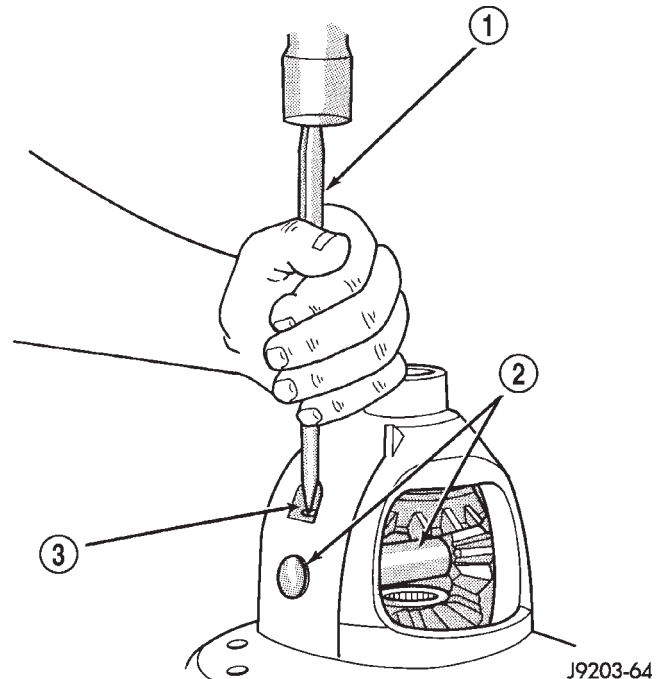
(4) Remove the differential side gears and thrust washers.

ASSEMBLY

- (1) Install the differential side gears and thrust washers.
- (2) Install the pinion mate gears and thrust washers.
- (3) Install the pinion gear mate shaft.
- (4) Align the hole in the pinion gear mate shaft with the hole in the differential case.
- (5) Install and seat the pinion mate shaft roll-pin in the differential case and mate shaft with a punch and hammer (Fig. 32). Peen the edge of the roll-pin hole in the differential case slightly in two places, 180° apart.
- (6) Lubricate all differential components with hypoid gear lubricant.

INSTALLATION

NOTE: If replacement differential bearings or differential case are being installed, differential side bearing shim requirements may change. Refer to **Adjustments (Differential Bearing Preload and Gear Backlash)** procedures to determine proper shim selection.

**Fig. 32 PINION MATE SHAFT ROLL-PIN**

- 1 - PUNCH
- 2 - PINION MATE SHAFT
- 3 - MATE SHAFT LOCKPIN

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

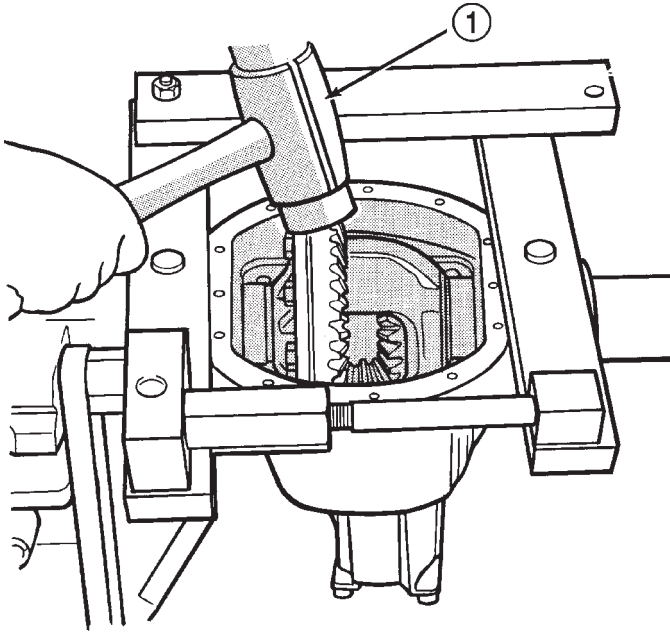
(2) Install a Pilot Stud C-3288-B at the left side of the differential housing and attach dial indicator to the pilot stud. Load the indicator plunger against the opposite side of the housing and zero the dial indicator.

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

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

- (4) Remove the dial indicator.
- (5) Install differential into the housing. Tap the differential case with a rawhide/rubber hammer to ensure the bearings are seated in housing (Fig. 33).
- (6) Remove the spreader.
- (7) Install bearing caps in their original locations (Fig. 34) and tighten bearing cap bolts in a criss-cross pattern to 109 N·m (80 ft. lbs.).
- (8) Install axle shafts.
- (9) Install the hub bearings.
- (10) Apply a bead of red Mopar Silicone Rubber Sealant or equivalent to the housing cover (Fig. 35).

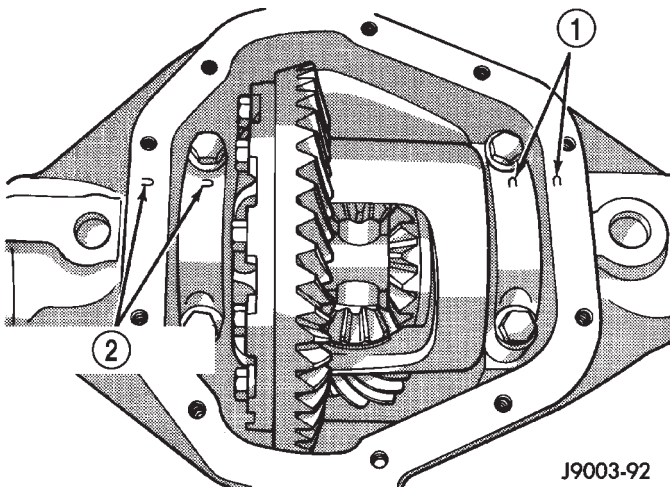
DIFFERENTIAL (Continued)



J9302-19

Fig. 33 DIFFERENTIAL CASE

1 - RAWHIDE HAMMER



J9003-92

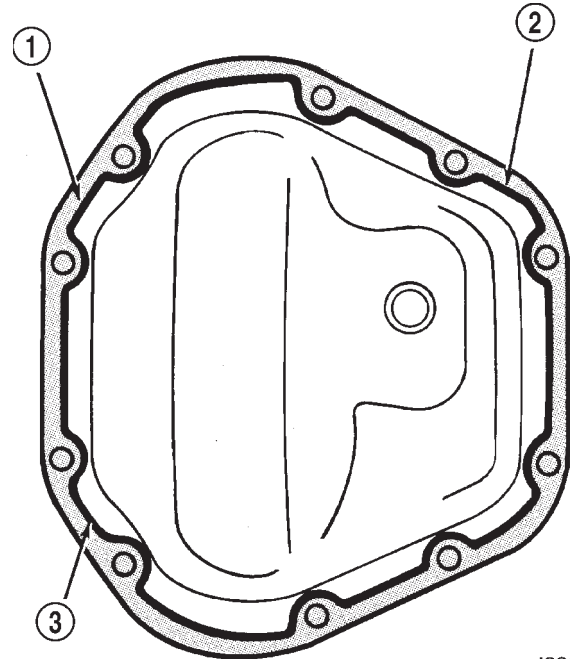
Fig. 34 Bearing Cap Reference

1 - REFERENCE LETTERS
2 - REFERENCE LETTERS

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied or adhesion quality will be compromised.

(11) Install the cover and tighten bolts in a criss-cross pattern to 47 N·m (35 ft. lbs.).

(12) Fill the differential with Mopar Hypoid Gear Lubricant or equivalent to bottom of the fill plug hole.



J9302-30

Fig. 35 DIFFERENTIAL COVER - TYPICAL

1 - SEALANT SURFACE
2 - SEALANT
3 - SEALANT THICKNESS

(13) Install fill hole plug and tighten to 34 N·m (25 ft. lbs.).

(14) Remove support and lower vehicle.

DIFFERENTIAL - TRAC-LOK**DIAGNOSIS AND TESTING - TRAC-LOK®**

The most common problem is a chatter noise when turning corners. Before removing the unit for repair, drain, flush and refill the axle with the specified lubricant. A container of Mopar Trac-lok® Lubricant (friction modifier) should be added after repair service or during 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.

DIFFERENTIAL TEST

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.

DIFFERENTIAL - TRAC-LOK (Continued)

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

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

(5) Use torque wrench on special tool to rotate wheel and read rotating torque (Fig. 36).

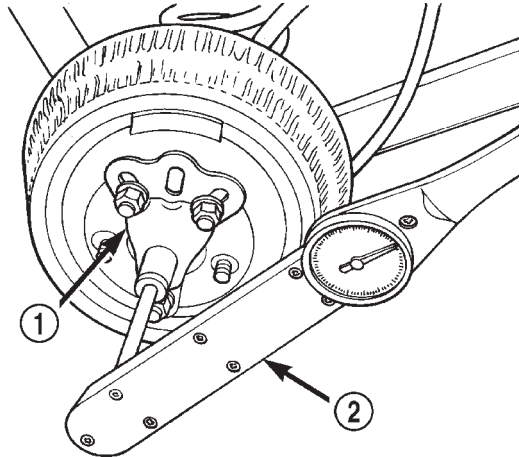


Fig. 36 ROTATING TORQUE TEST

- 1 - SPECIAL TOOL WITH BOLT IN CENTER HOLE
2 - TORQUE WRENCH

(6) If rotating torque is less than 41 N·m (56 ft. lbs.) or more than 271 N·m (200 ft. lbs.) on either wheel the unit should be serviced.

DISASSEMBLY

(1) Clamp side gear Holding Fixture 6965 in a vise and position the differential case on the Holding Fixture (Fig. 37).

(2) Remove ring gear if the ring gear is to be replaced. The Trac-lok® differential can be serviced with the ring gear installed.

(3) Remove pinion gear mate shaft roll pin.

(4) Remove pinion gear mate shaft with a drift and hammer.

(5) Install and lubricate Step Plate C-6960-3 (Fig. 38).

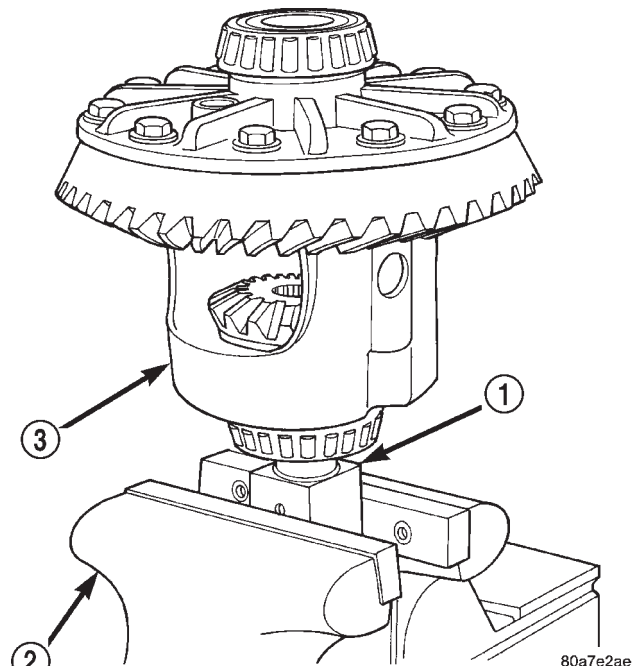


Fig. 37 DIFFERENTIAL CASE FIXTURE

- 1 - HOLDING FIXTURE
2 - VISE
3 - DIFFERENTIAL

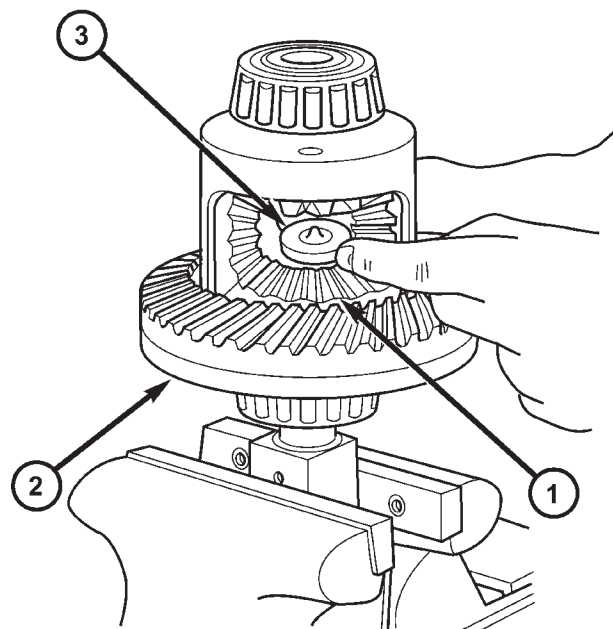


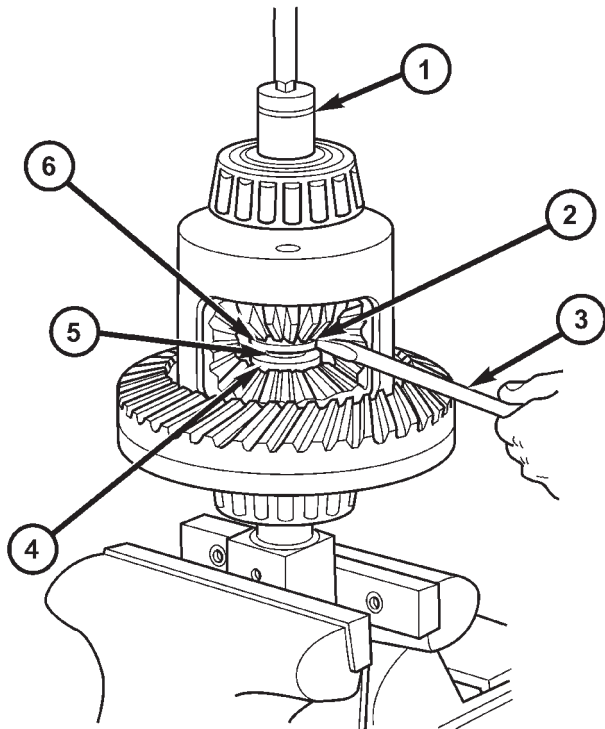
Fig. 38 Step Plate

- 1 - LOWER SIDE GEAR
2 - DIFFERENTIAL CASE
3 - STEP PLATE

DIFFERENTIAL - TRAC-LOK (Continued)

(6) Assemble Threaded Adapter C-6960-1 into top side gear. Thread Forcing Screw C-6960-4 into adapter until it becomes centered in adapter plate.

(7) Position a small screw driver in slot of Threaded Adapter Disc C-6960-3 (Fig. 39) to prevent adapter from turning.

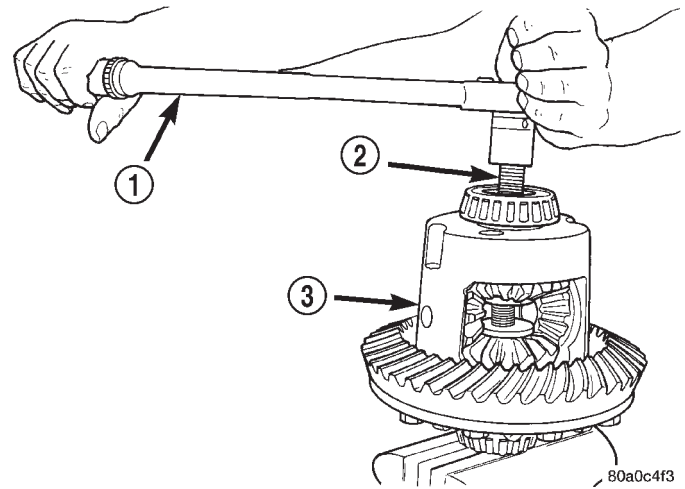


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Fig. 39 Threaded Adapter Disc

- 1 - SOCKET
- 2 - SLOT IN ADAPTER
- 3 - SCREWDRIVER
- 4 - DISC
- 5 - FORCING SCREW
- 6 - THREADED ADAPTER DISC

(8) Install Forcing Screw C-6960-4 and tighten screw to 122 N·m (90 ft. lbs.) maximum to compress Belleville springs in clutch packs (Fig. 40).

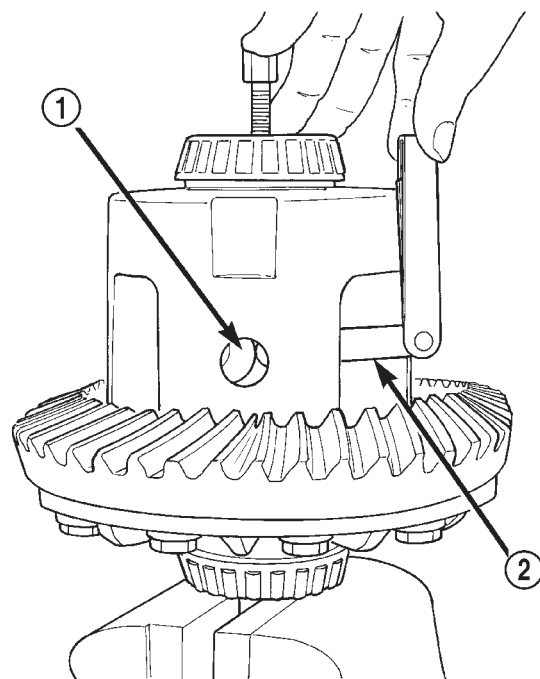


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Fig. 40 COMPRESS BELLEVILLE SPRING

- 1 - TORQUE WRENCH
- 2 - TOOL ASSEMBLED
- 3 - DIFFERENTIAL CASE

(9) With a feeler gauge remove thrust washers from behind the pinion gears (Fig. 41).



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Fig. 41 PINION GEAR THRUST WASHER

- 1 - THRUST WASHER
- 2 - FEELER GAUGE

DIFFERENTIAL - TRAC-LOK (Continued)

(10) Insert Turning Bar C-6960-2 into the pinion mate shaft hole in the case (Fig. 42).

(11) Loosen the Forcing Screw in small increments until the clutch pack tension is relieved and the differential case can be turned using Turning Bar.

(12) Rotate differential case until the pinion gears can be removed.

(13) Remove pinion gears from differential case.

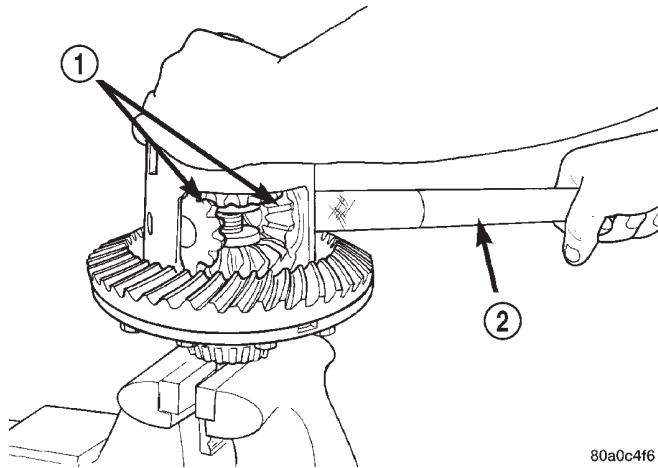


Fig. 42 PINION GEAR

- 1 - PINION GEARS
- 2 - TURNING BAR

(14) Remove Forcing Screw, Step Plate and Threaded Adapter.

(15) Remove top side gear, clutch pack retainer and clutch pack. Keep plates in correct order during removal (Fig. 43).

(16) Remove differential case from the Holding Fixture. Remove side gear, clutch pack retainer and clutch pack. Keep plates in correct order during removal.

ASSEMBLY

Clean all components in cleaning solvent and dry components with compressed air. Inspect clutch pack plates for wear, scoring or damage. Replace both clutch packs if any one component in either pack is damaged. Inspect side gears and pinions. Replace any gear that is worn, cracked, chipped or damaged. Inspect differential case and pinion shaft. Replace if worn or damaged.

(1) Lubricate each component with gear lubricant before assembly.

(2) Assemble the clutch discs into packs and secure disc packs with retaining clips (Fig. 44).

NOTE: New 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.

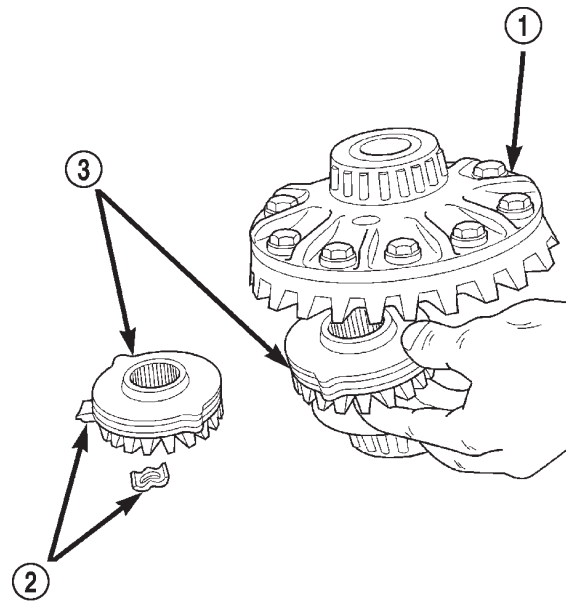


Fig. 43 SIDE GEAR & CLUTCH PACK

- 1 - DIFFERENTIAL CASE
- 2 - RETAINER
- 3 - SIDE GEAR AND CLUTCH DISC PACK

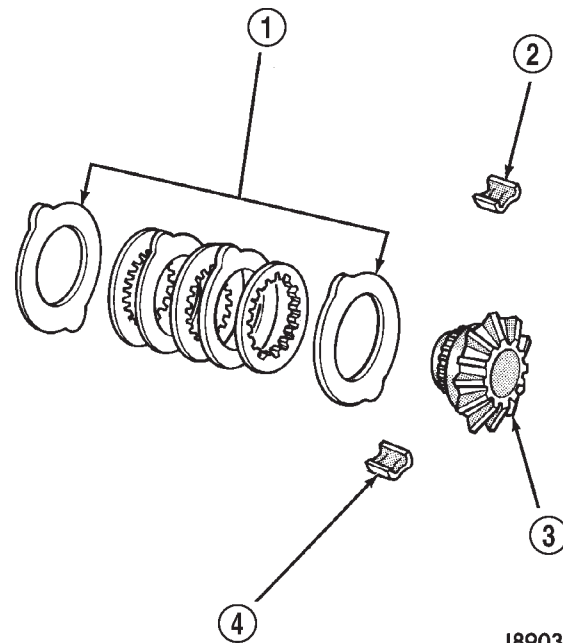


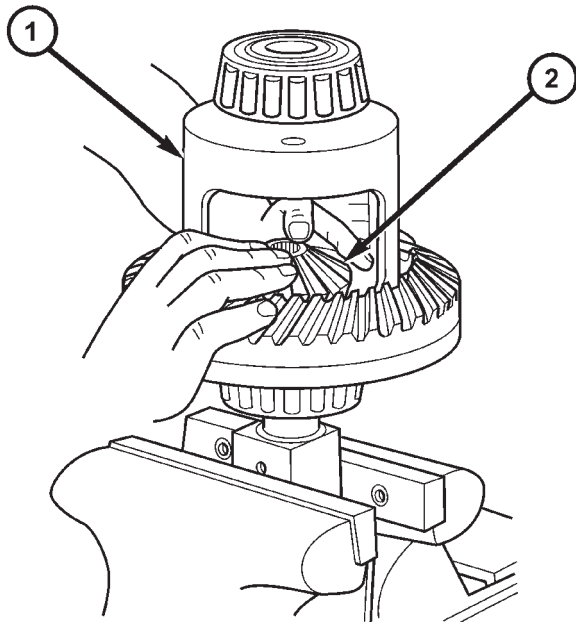
Fig. 44 CLUTCH DISC PACK

- 1 - CLUTCH PACK
- 2 - RETAINER
- 3 - SIDE GEAR
- 4 - RETAINER

DIFFERENTIAL - TRAC-LOK (Continued)

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

(4) Install clutch pack and side gear in the ring gear side of the differential case (Fig. 45). **Be sure clutch pack retaining clips remain in position and are seated in the case pockets.**



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Fig. 45 Clutch Pack and Lower Side Gear

- 1 - DIFFERENTIAL CASE
2 - LOWER SIDE GEAR AND CLUTCH PACK

(5) Position the differential case on the Holding Fixture 6965.

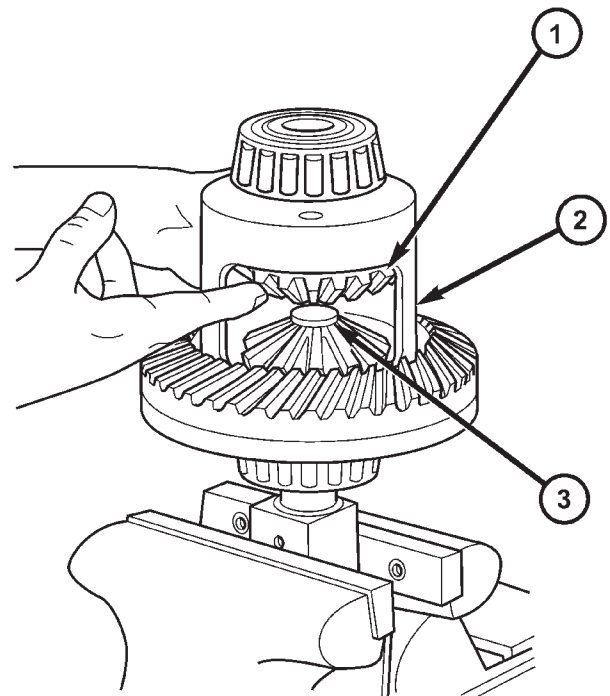
(6) Install lubricated Step Plate C-6960-3 in lower side gear (Fig. 46).

(7) Install the upper side gear and clutch disc pack (Fig. 46).

(8) Hold assembly in position. Insert Threaded Adapter C-6960-1 into top side gear.

(9) Install Forcing Screw C-6960-4 and tighten screw to slightly compress clutch disc.

(10) Place pinion gears in position in side gears and verify that the pinion mate shaft hole is aligned.



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Fig. 46 Clutch Pack and Upper Side Gear

- 1 - SIDE GEAR AND CLUTCH PACK
2 - DIFFERENTIAL CASE
3 - STEP PLATE - C-6960-3

(11) Rotate case with Turning Bar C-6960-2 until the pinion mate shaft holes in pinion gears align with holes in case. It may be necessary to slightly tighten the forcing screw in order to install the pinion gears.

(12) Tighten forcing screw to 122 N·m (90 ft. lbs.) maximum to compress the Belleville springs.

(13) 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.

(14) Remove Forcing Screw, Step Plate and Threaded Adapter.

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

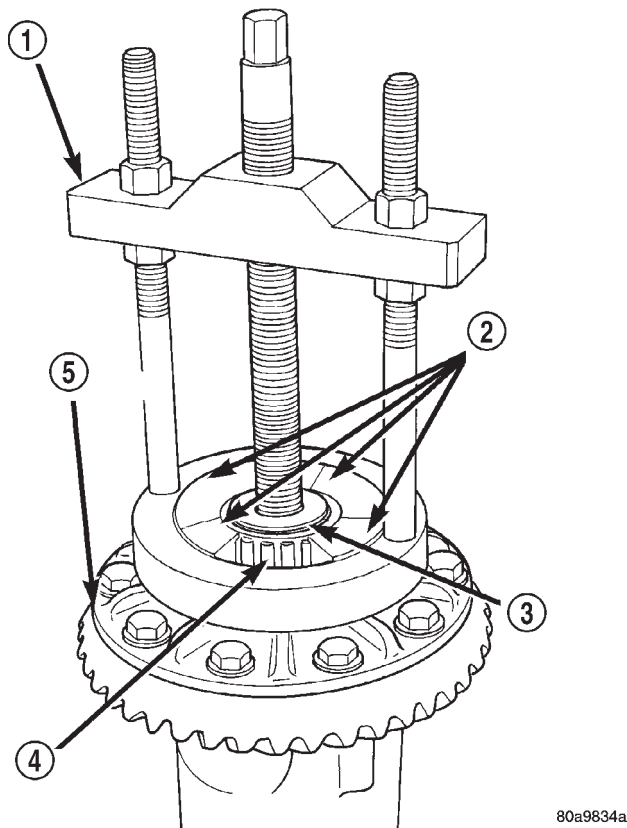
(16) Install pinion mate shaft roll pin. Peen the edge of the roll pin hole in the case slightly in two places 180° apart.

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

DIFFERENTIAL CASE BEARINGS

REMOVAL

- (1) Remove differential case from the housing.
- (2) Remove bearings from the differential case with Puller/Press C-293-PA, Adapters C-293-62 and Step Plate 8139-2 (Fig. 47).



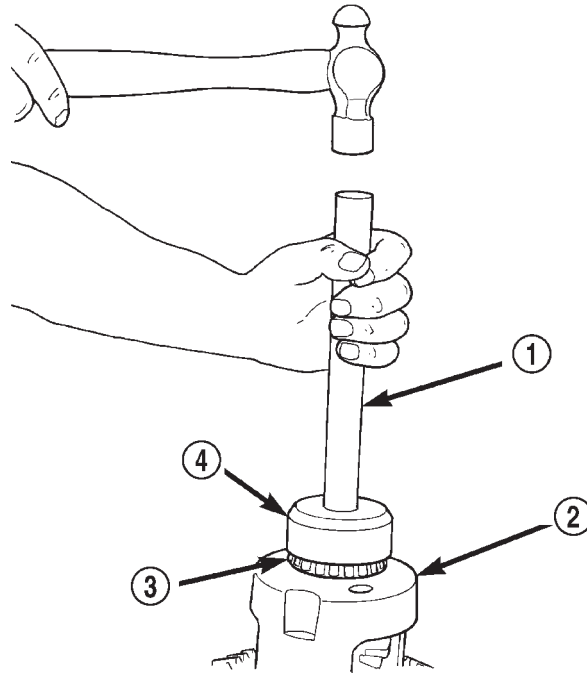
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Fig. 47 DIFFERENTIAL CASE BEARING

- 1 - PULLER
- 2 - ADAPTERS
- 3 - STEP PLATE
- 4 - BEARING
- 5 - DIFFERENTIAL CASE

INSTALLATION

- (1) Install differential side bearings with installer C-4190 and Handle C-4171 (Fig. 48).



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Fig. 48 CASE BEARING INSTALLER

- 1 - HANDLE
- 2 - DIFFERENTIAL CASE
- 3 - BEARING
- 4 - INSTALLER

- (2) Install differential case into the housing.

PINION GEAR/RING GEAR/ TONE RING

REMOVAL

NOTE: The ring and pinion gears are service as a matched set. Never replace ring gear without replacing the matched pinion gear.

- (1) Remove differential from housing.
- (2) Place differential case in a suitable vise with soft metal jaw protectors. (Fig. 49)
- (3) Remove bolts holding ring gear to differential case.
- (4) Drive ring gear from the differential case with a soft hammer (Fig. 49).

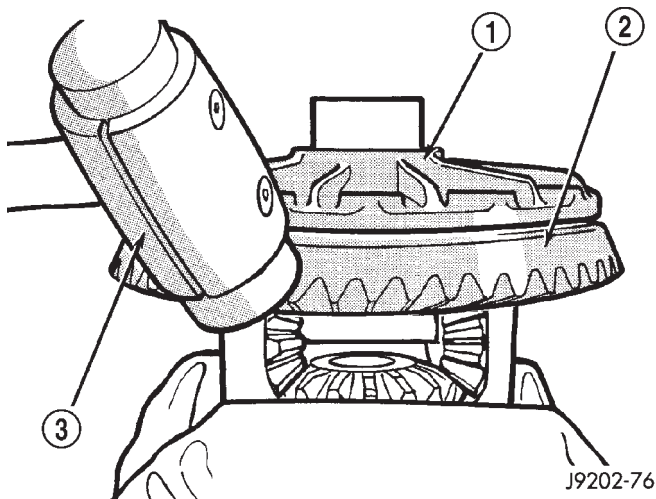


Fig. 49 RING GEAR

- 1 - DIFFERENTIAL CASE
- 2 - RING GEAR
- 3 - RAWHIDE HAMMER

- (5) Remove exciter ring from the differential case by slowly tapping the ring with a brass drift.

- (6) Mark pinion yoke and propeller shaft for installation alignment.

- (7) Disconnect propeller shaft from pinion yoke and tie propeller shaft to underbody.

- (8) Hold yoke with Yoke Holder 6719A and remove pinion yoke nut and washer.

- (9) Remove pinion yoke with Remover C-452 and Flange Wrench C-3281 (Fig. 50).

- (10) Remove pinion gear from housing (Fig. 51).

- (11) Remove pinion seal with a slide hammer or suitable pry bar.

- (12) Remove oil slinger, if equipped, and front pinion bearing.

- (13) Remove front pinion bearing cup with Remover D-158 and Handle C-4171 (Fig. 52).

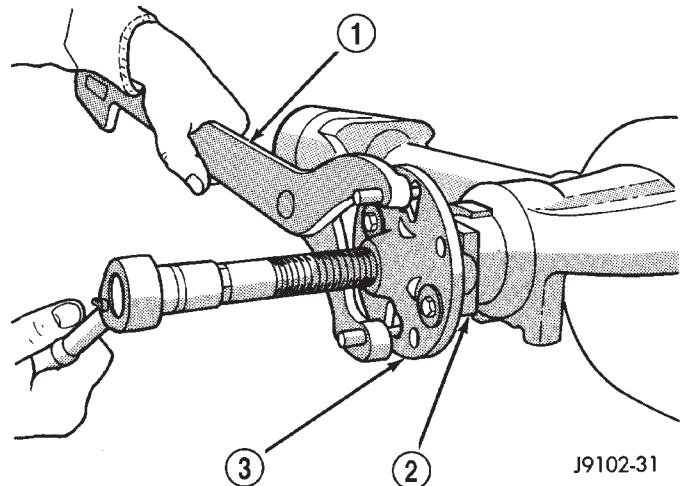


Fig. 50 PINION YOKE REMOVER

- 1 - FLANGE WRENCH
- 2 - PINION YOKE
- 3 - REMOVER

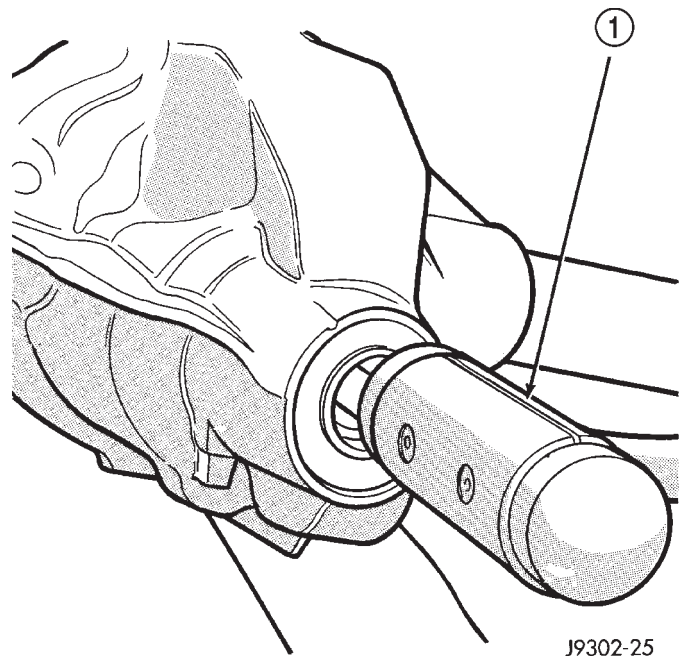


Fig. 51 PINION GEAR REMOVAL

- 1 - RAWHIDE HAMMER

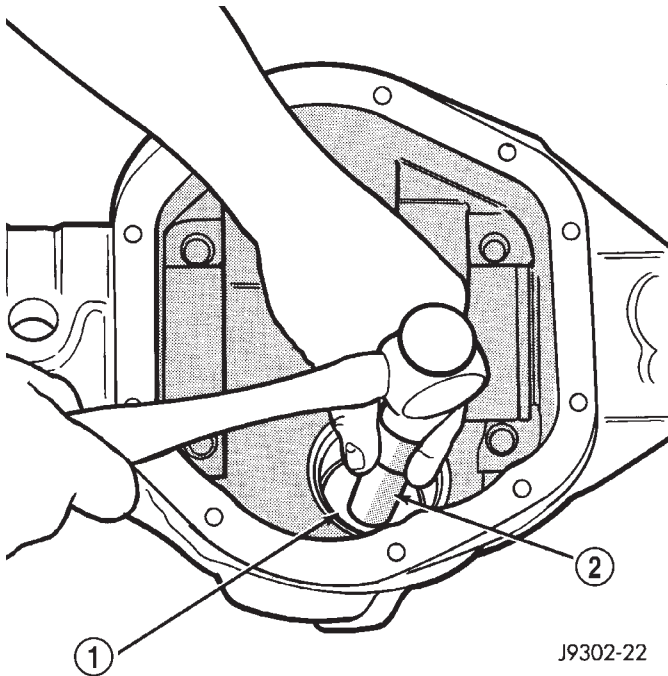
- (14) Remove rear bearing cup with Remover D-162 and Handle C-4171 (Fig. 53).

- (15) Remove collapsible preload spacer (Fig. 54) from pinion gears.

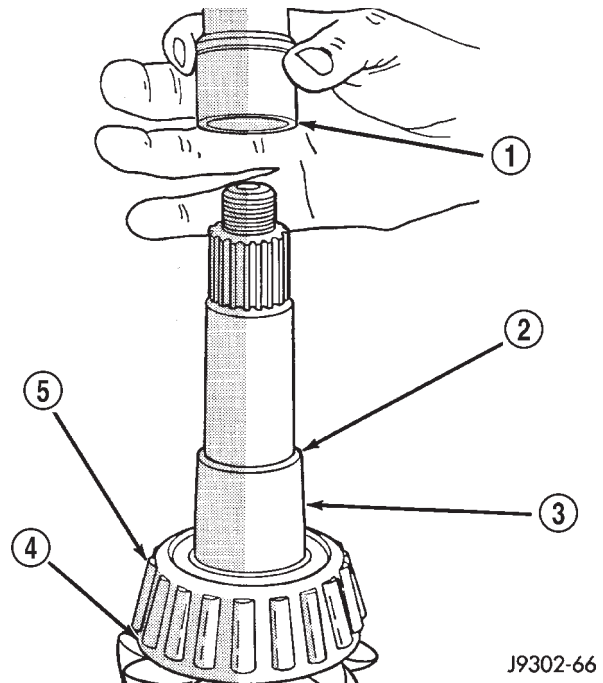
- (16) Remove rear pinion bearing with Puller/Press C-293-PA and Adapters C-293-37 (Fig. 55).

- (17) Remove pinion depth shims from the pinion shaft and record thickness of the depth shims.

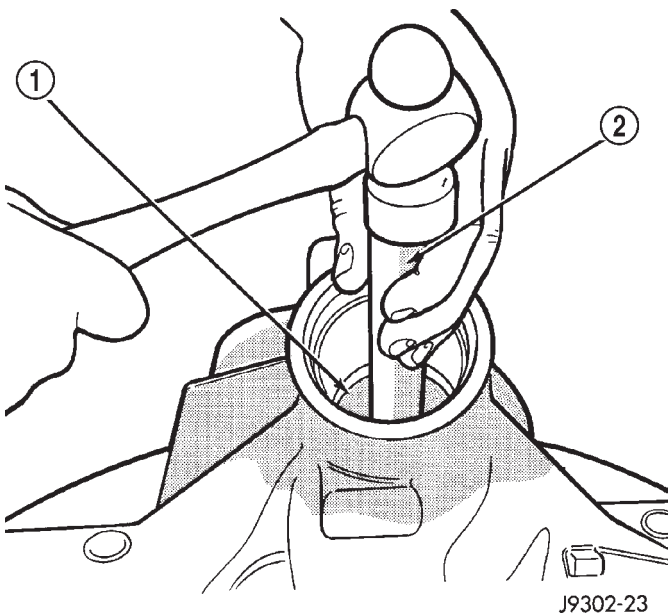
PINION GEAR/RING GEAR/TONE RING (Continued)

**Fig. 52 FRONT PINION BEARING CUP**

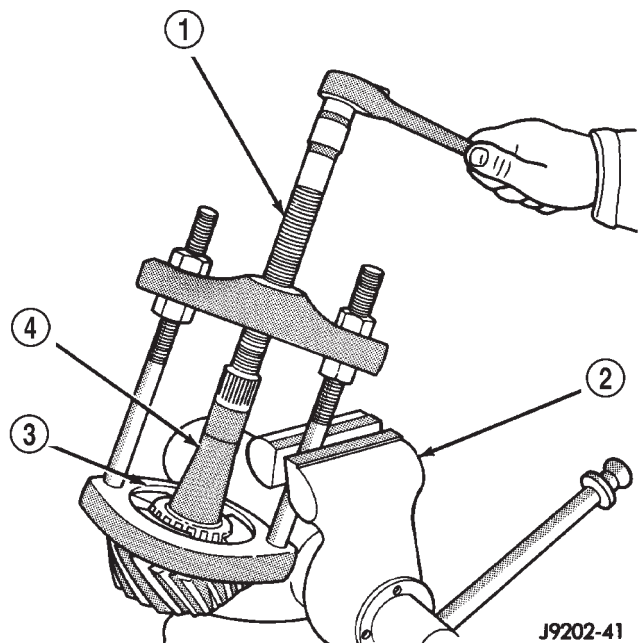
- 1 - REMOVER
2 - HANDLE

**Fig. 54 COLLAPSIBLE SPACER**

- 1 - COLLAPSIBLE SPACER
2 - SHOULDER
3 - PINION GEAR
4 - PINION DEPTH SHIM
5 - REAR BEARING

**Fig. 53 REAR PINION BEARING CUP**

- 1 - DRIVER
2 - HANDLE

**Fig. 55 REAR PINION BEARING**

- 1 - PULLER
2 - VISE
3 - ADAPTERS
4 - PINION GEAR SHAFT

PINION GEAR/RING GEAR/TONE RING (Continued)

INSTALLATION

(1) Apply Mopar Door Ease stick or equivalent lubricant to outside surface of bearing cups.

(2) Install rear pinion bearing cup with Installer D-111 and Handle C-4171 (Fig. 56) and verify cup is seated.

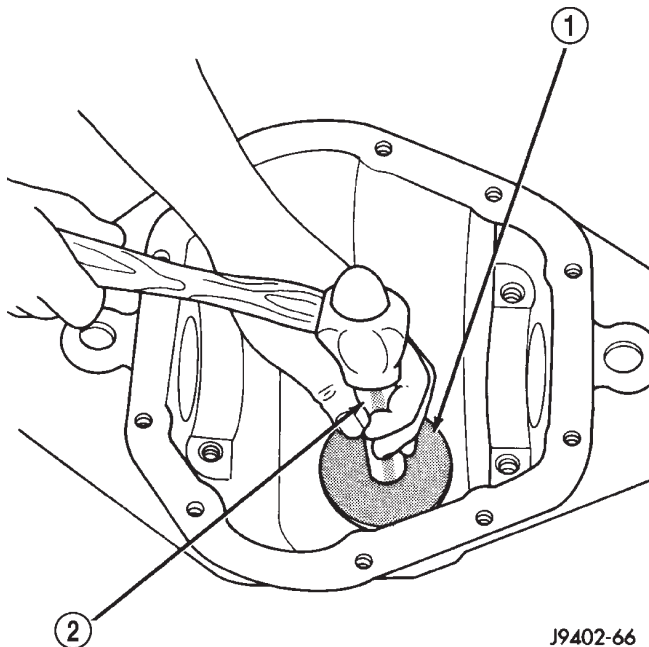


Fig. 56 REAR PINION BEARING CUP

- 1 - INSTALLER
2 - HANDLE

(3) Install front pinion bearing cup with Installer D-146 and Handle C-4171 (Fig. 57) and verify cup is seated.

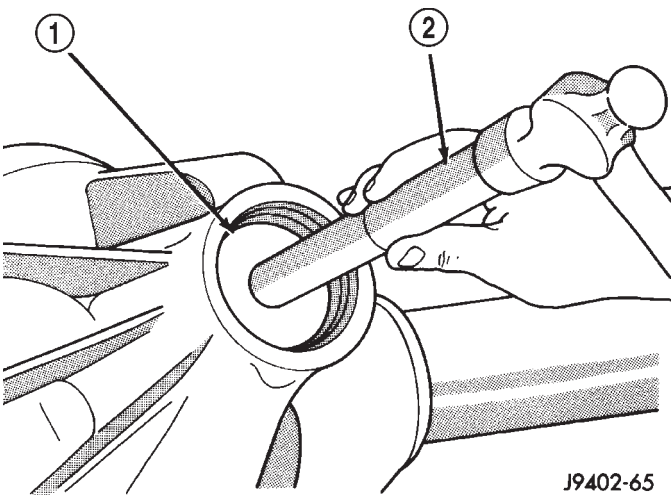


Fig. 57 FRONT PINION BEARING CUP

- 1 - INSTALLER
2 - HANDLE

(4) Install front pinion bearing and oil slinger, if equipped.

(5) Apply a light coating of gear lubricant on the lip of pinion seal. Install **new** pinion seal with an appropriate installer (Fig. 58).

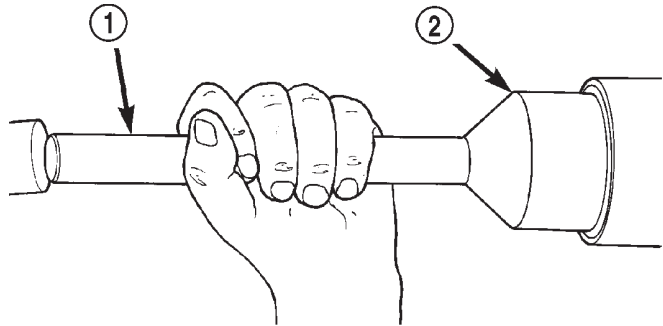


Fig. 58 PINION SEAL INSTALLER

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- 1 - HANDLE
2 - INSTALLER

NOTE: Pinion depth shims are placed between the rear pinion bearing cone and pinion gear to achieve proper ring and pinion gear mesh. If ring and pinion gears are reused, the pinion depth shim should not require replacement. Refer to Adjustments (Pinion Gear Depth) to select the proper thickness shim before installing rear pinion bearing cone.

(6) Place the proper thickness pinion depth shim on the pinion gear.

(7) Install rear pinion bearing on the pinion gear with Installer C-3095-A (Fig. 59).

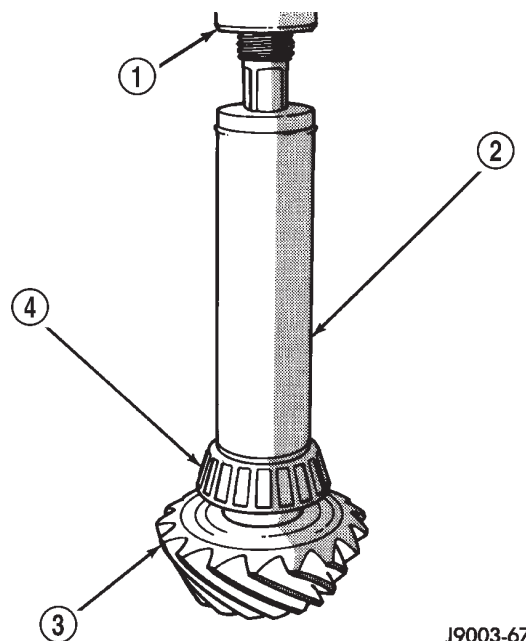


Fig. 59 REAR PINION BEARING

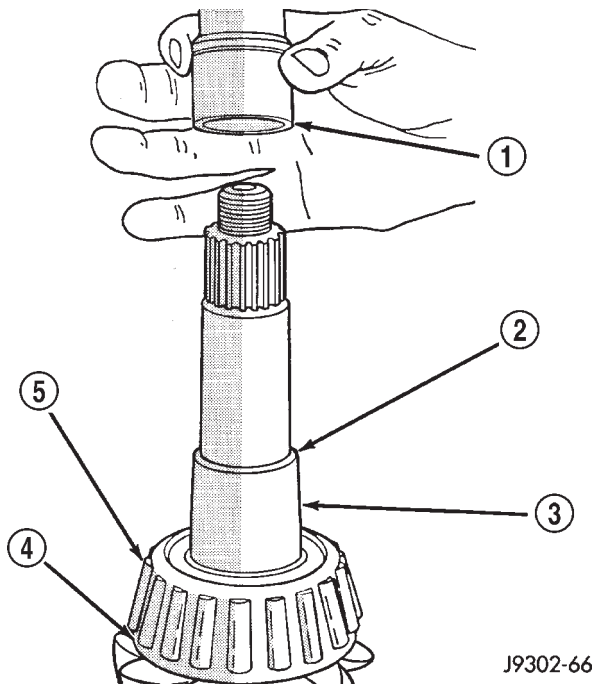
J9003-67

- 1 - PRESS
2 - INSTALLER
3 - PINION GEAR
4 - REAR PINION BEARING

PINION GEAR/RING GEAR/TONE RING (Continued)

(8) Install a **new** collapsible preload spacer on pinion shaft (Fig. 60).

(9) Install pinion gear into the housing.



J9302-66

Fig. 60 COLLASIBLE SPACER

- 1 - COLLAPSIBLE SPACER
- 2 - SHOULDER
- 3 - PINION GEAR
- 4 - OIL SLINGER
- 5 - REAR PINION BEARING

(10) Install yoke with Installer C-3718 and Yoke Holder 6719A (Fig. 61).

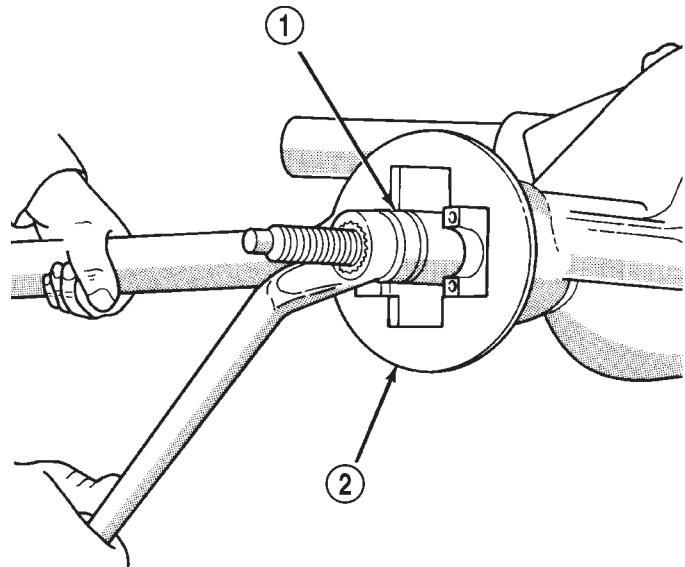
(11) Install pinion yoke washer with **concave surface** against the yoke end.

(12) Install a **new** nut on the pinion gear. Tighten the nut to 292 N·m (215 ft. lbs.) minimum. **Do not over-tighten.** Maximum torque is 447 N·m (330 ft. lbs.).

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

(13) Tighten pinion nut with Yoke Holder 6719A, and a torque wrench set at 447 N·m (330 ft. lbs.). Crush collapsible spacer until bearing end play is taken up. Slowly tighten the nut in 6.8 N·m (5 ft. lbs.) increments until the rotating torque is achieved. Measure the rotating torque frequently to avoid over crushing the collapsible spacer (Fig. 62).

(14) Check bearing rotating torque with an inch pound torque wrench (Fig. 62). Pinion rotating torque should be:

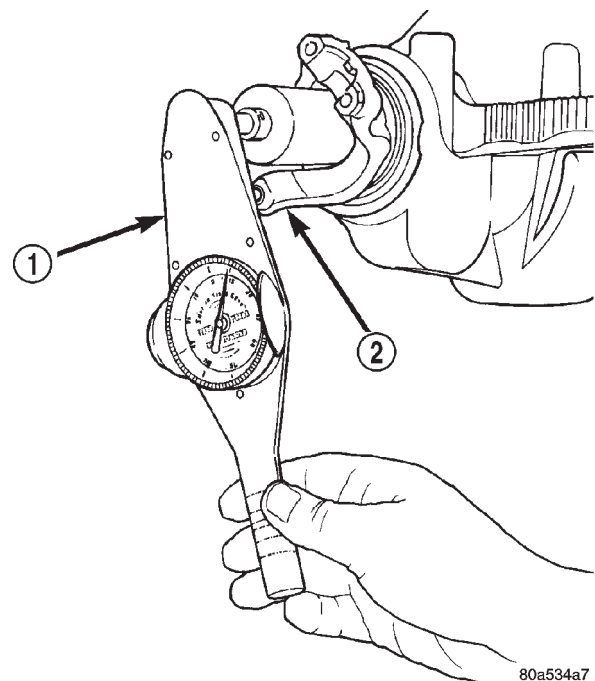


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Fig. 61 PIONION YOKE INSTALLER

- 1 - INSTALLER
- 2 - YOKE HOLDER

- Original Bearings - 1 to 3 N·m (10 to 20 in. lbs.).
 - New Bearings - 2.3 to 5.1 N·m (20 to 45 in. lbs.).
- (15) Invert the differential case in the vise.



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Fig. 62 PINION ROTATING TORQUE

- 1 -TORQUE WRENCH
- 2 - PINION YOKE

PINION GEAR/RING GEAR/TONE RING (Continued)

(16) Position exciter ring on differential case slowly and evenly tap the exciter ring into position with a brass drift.

(17) Install ring gear and start two ring gear bolts to provide case-to-ring gear bolt hole alignment.

(18) Invert differential case in the vise.

(19) Install **new** ring gear bolts and alternately tighten to 176 N·m (130 ft. lbs.) (Fig. 63).

CAUTION: Never reuse ring gear bolts, the bolts can fracture causing extensive damage.

(20) Install differential into the housing and verify gear mesh and contact pattern.

(21) Install axle shafts.

(22) Install differential cover and fill differential with gear lubricant.

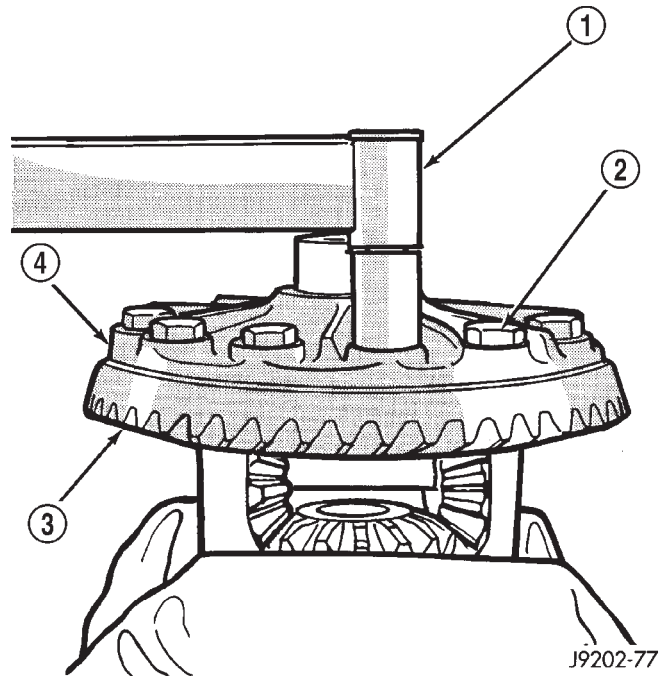


Fig. 63 RING GEAR BOLT

- 1 - TORQUE WRENCH
- 2 - RING GEAR BOLT
- 3 - RING GEAR
- 4 - CASE

REAR AXLE - 267RBI

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REAR AXLE - 267RBI

DESCRIPTION

The Rear Beam-design Iron (RBI) axle housings consist of an iron center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing and welded. The axles are full-floating axle shafts, supported by the axle housing tubes. The full-float shafts are retained by bolts attached to the hub.

The differential case for the standard differential is a one-piece design. Differential bearing preload and ring gear backlash are adjusted by the use of shims located between the differential bearing cones and case. Pinion bearing preload is set and maintained by the use of a solid shims. The differential cover provides a means for inspection and service.

Axles equipped with a Powr-lok® differential are optional. The differential has a two-piece differential

case. The differential contains four pinion gears and a two-piece pinion mate cross shaft to provide increased torque to the non-slipping wheel through a ramping motion in addition to the standard Trac-lok® components.

OPERATION

STANDARD DIFFERENTIAL

The axle receives power from the transmission/transfer case through the rear propeller shaft. The rear propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are splined to the axle shafts.

REAR AXLE - 267RBI (Continued)

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).

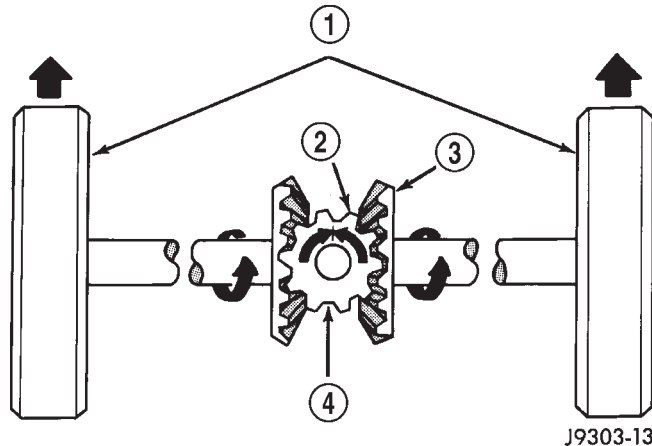


Fig. 1 Differential Operation - Straight Ahead Driving

- 1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
- 2 - PINION GEAR
- 3 - SIDE GEAR
- 4 - PINION GEARS ROTATE WITH CASE

When turning corners, the outside wheel must travel a greater distance than the inside wheel 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.

POWR-LOK® DIFFERENTIAL

The differential 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. 3).

This design provide the differential action needed for turning corners and for driving straight ahead during periods of unequal traction. When one wheel loses traction, the clutch packs transfer additional torque to the wheel having the most traction. The Powr-lok® differential additionally utilizes a ramping action supplied by the cross shafts to increase the force applied to the clutch packs to increase the

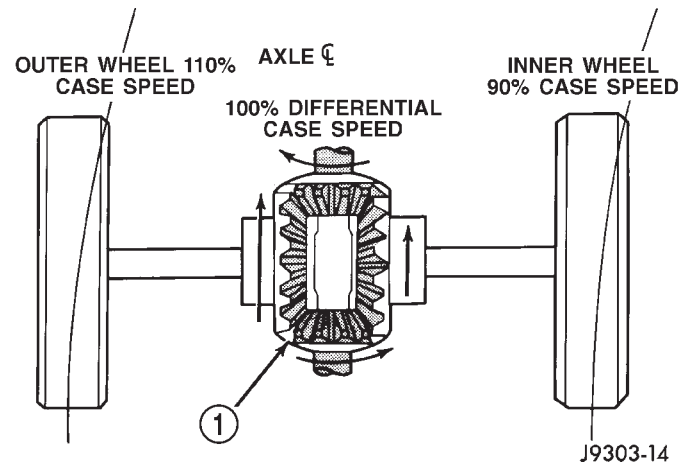


Fig. 2 Differential Operation - On Turns

- 1 - PINION GEARS ROTATE ON PINION SHAFT

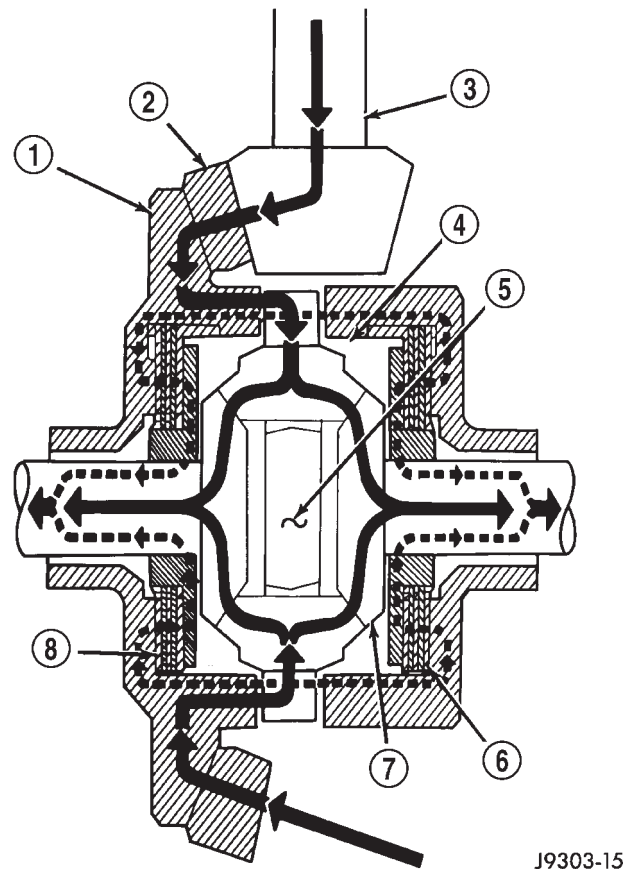


Fig. 3 Powr-Lok® Limited Slip Differential

- 1 - CASE
- 2 - RING GEAR
- 3 - DRIVE PINION
- 4 - PINION GEAR
- 5 - MATE SHAFT
- 6 - CLUTCH PACK
- 7 - SIDE GEAR
- 8 - CLUTCH PACK

REAR AXLE - 267RBI (Continued)

torque supplied to the non-slipping wheel. The differential resist wheel spin on bumpy roads and provide more pulling power when one wheel loses traction. Pulling power is provided continuously until both wheels lose traction. If both wheels slip due to unequal traction, operation is normal. In extreme cases of differences of traction, the wheel with the least traction may spin.

DIAGNOSIS AND TESTING - AXLE**GEAR NOISE**

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

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

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then 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 gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion shaft can also cause a snapping or a knocking noise.

BEARING NOISE

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

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched 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 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(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.

NOTE: All driveline components should be examined before starting any repair.

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.
- Transmission shift operation.
- 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 to case clearance.

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

REAR AXLE - 267RBI (Continued)

DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose. 2. Faulty, brinelled wheel bearing.	1. Tighten loose nuts. 2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube. 2. Bent or sprung axle shaft.	1. Inspect axle tube alignment. Correct as necessary. 2. Inspect and correct as necessary.
Axle Shaft Broke	1. Misaligned axle tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch.	1. Replace the broken shaft after correcting tube mis-alignment. 2. Replace broken shaft and avoid excessive weight on vehicle. 3. Replace broken shaft and avoid or correct erratic clutch operation. 4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly. 2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly. 3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight. 4. Replace case and inspect gears and bearings for further 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. Fill differential with the correct fluid type and quantity. 2. Replace scored gears. Fill differential with the correct fluid type and quantity. 3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high. 2. Worn axle shaft seals. 3. Cracked differential housing. 4. Worn pinion seal. 5. Worn/scored yoke. 6. Axle cover not properly sealed.	1. Drain lubricant to the correct level. 2. Replace seals. 3. Repair as necessary. 4. Replace seal. 5. Replace yoke and seal. 6. Remove, clean, and re-seal cover.

REAR AXLE - 267RBI (Continued)

Condition	Possible Causes	Correction
Axle Overheating	1. Lubricant level low. 2. Improper grade of lubricant. 3. Bearing pre-loads too high. 4. Insufficient ring gear backlash.	1. Fill differential to correct level. 2. Fill differential with the correct fluid type and quantity. 3. Re-adjust bearing pre-loads. 4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavement. 4. Improper adjustments.	1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation. 3. Replace gears and examine remaining parts for damage. 4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant. 2. Improper ring gear and pinion adjustment. 3. Unmatched ring gear and pinion. 4. Worn teeth on ring gear and/or pinion. 5. Loose pinion bearings. 6. Loose differential bearings. 7. Mis-aligned or sprung ring gear. 8. Loose differential bearing cap bolts. 9. Housing not machined properly.	1. Fill differential with the correct fluid type and quantity. 2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth. 3. Replace gears with a matched ring gear and pinion. 4. Replace ring gear and pinion. 5. Adjust pinion bearing pre-load. 6. Adjust differential bearing pre-load. 7. Measure ring gear run-out. Replace components as necessary. 8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification. 9. Replace housing.

REMOVAL

- (1) Raise and support the vehicle.
- (2) Position an axle lift under the axle and secure it to the axle.
- (3) Remove the wheels and tires.
- (4) Remove RWAL sensor from the differential housing, if necessary.
- (5) Remove brake hose from the axle junction block.
- (6) Disconnect parking brake cables and cable brackets.
- (7) Remove vent hose from the axle shaft tube.

- (8) Mark propeller shaft and yoke for installation alignment reference.

- (9) Remove propeller shaft.
- (10) Remove shock absorbers from the axle brackets.
- (11) Remove spring clamps and spring brackets.
- (12) Remove axle from the vehicle.

INSTALLATION

- (1) Raise axle with lift and align to the leaf spring centering bolts.
- (2) Install spring clamps and spring brackets.

REAR AXLE - 267RBI (Continued)

- (3) Install shock absorbers and tighten to specifications.
- (4) Install RWAL sensor to the differential housing, if necessary.
- (5) Install parking brake cables and cable brackets
- (6) Install brake hose to the axle junction block.
- (7) Install axle vent hose.
- (8) Install propeller shaft with reference marks aligned.
- (9) Install wheels and tires assemblies.
- (10) Add gear lubricant, if necessary.
- (11) Remove lift from the axle and lower the vehicle.

ADJUSTMENTS

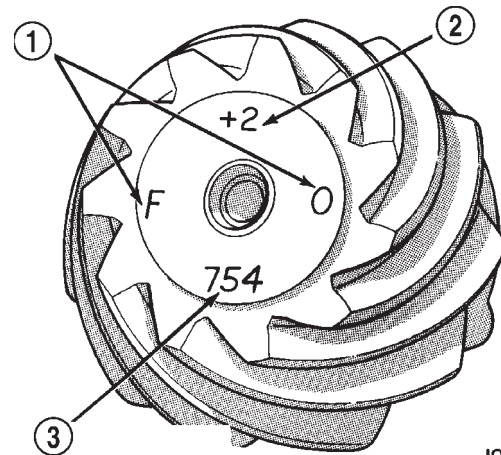
Ring and pinion gears are supplied as matched sets only. The identifying numbers for the ring and pinion gear are etched onto each gear (Fig. 4). A plus (+) number, minus (-) number or zero (0) is etched onto the pinion gear. This number is the amount (in thousandths of an inch) the depth varies from 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 136.53 mm (5.375 in.). The standard depth provides the best gear tooth contact pattern. Refer to Backlash and Contact Pattern in this section for additional information.

Compensation for pinion depth variance is achieved with a select shim/oil baffle. The shims are placed between the rear pinion bearing and the pinion gear head (Fig. 5).

If a new gear set is being installed, note the depth variance etched into both the original and replacement pinion. Add or subtract this number from the thickness of the original depth shim/oil slinger to compensate for the difference in the depth variances. Refer to the Depth Variance chart.

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

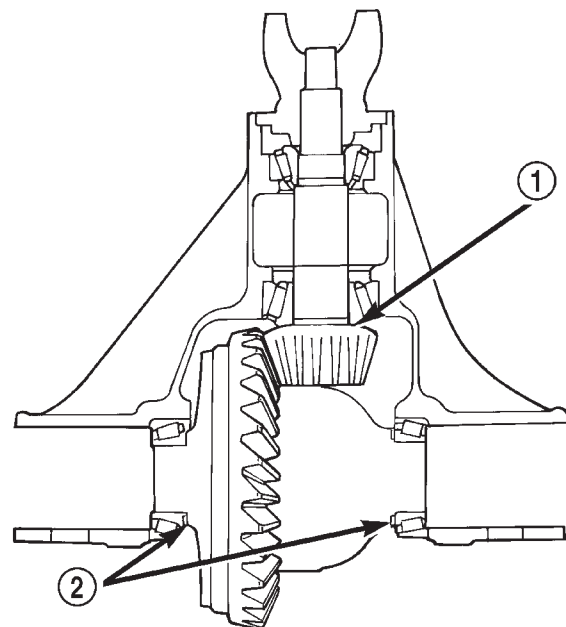
Note the etched number on the face of the pinion gear head (-1, -2, 0, +1, +2, etc.). The numbers represent thousands of an inch deviation from the standard. If the number is negative, add that value to the required thickness of the depth shims. If the number is positive, subtract that value from the thickness of the depth shim. If the number is 0 no change is necessary.



J9003-100

Fig. 4 PINION GEAR ID NUMBERS

- 1 - PRODUCTION NUMBERS
- 2 - PINION GEAR DEPTH VARIANCE
- 3 - GEAR MATCHING NUMBER



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Fig. 5 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM/OIL BAFFLE
- 2 - DIFFERENTIAL BEARING SHIM

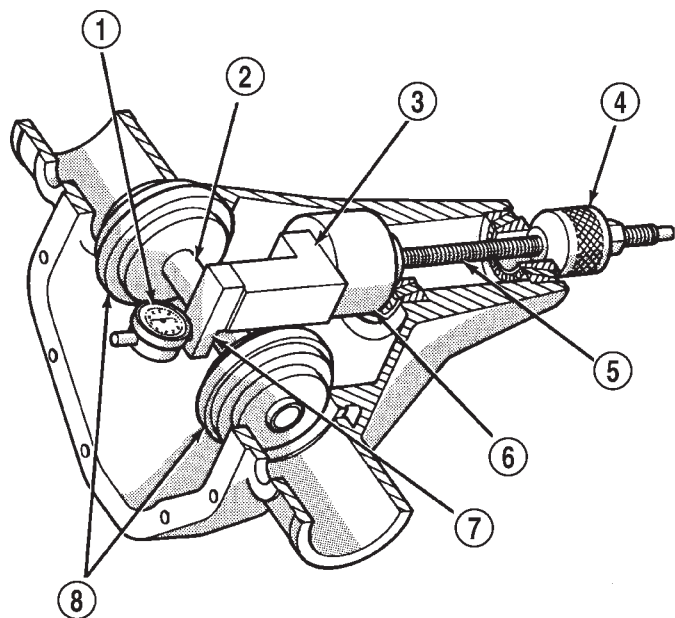
REAR AXLE - 267RBI (Continued)

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

PINION DEPTH MEASUREMENT AND ADJUSTMENT

Measurements are taken with pinion bearing cups and pinion bearings installed in the housing. Take measurements with Pinion Gauge Set and Dial Indicator C-3339 (Fig. 6).



J9403-45

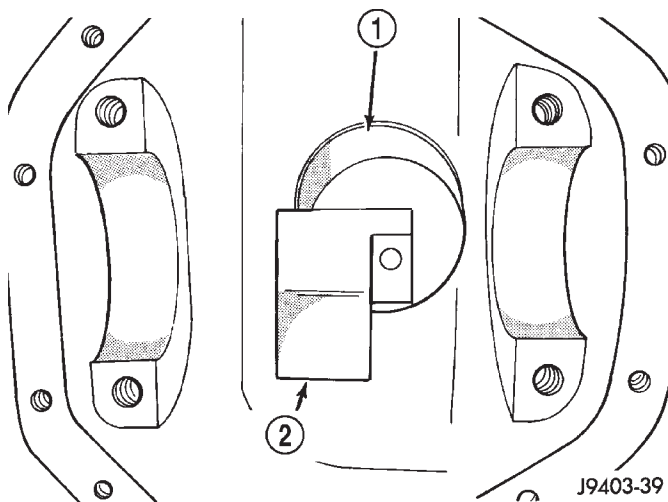
Fig. 6 PINION GEAR DEPTH GAUGE TOOLS

- 1 - DIAL INDICATOR
- 2 - ARBOR
- 3 - PINION HEIGHT BLOCK
- 4 - CONE
- 5 - SCREW
- 6 - PINION BLOCK
- 7 - SCOOTER BLOCK
- 8 - ARBOR DISC

(1) Assemble Pinion Height Block 6739, Pinion Block 6737 and rear pinion bearing onto Screw 6741 (Fig. 6).

(2) Insert assembled height gauge components, rear bearing and screw into the housing through pinion bearing cups (Fig. 7).

(3) Install front pinion bearing and Cone-nut 6740 hand tight (Fig. 6).

**Fig. 7 PINION HEIGHT BLOCK**

- 1 - PINION BLOCK
- 2 - PINION HEIGHT BLOCK

(4) Place Arbor Disc 6732 on Arbor D-115-3 in position in the housing side bearing cradles (Fig. 8).

NOTE: Arbor Discs 6732 has different step diameters to fit other axles. Choose proper step for axle being serviced.

REAR AXLE - 267RBI (Continued)

(5) Install differential bearing caps on arbor discs and snug the bearing cap bolts. Then cross tighten cap bolts to 108 N·m (80 ft. lbs.).

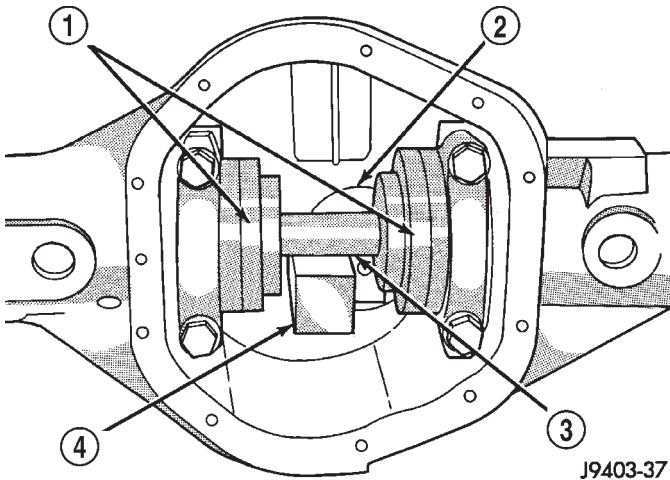


Fig. 8 GAUGE TOOLS IN HOUSING

- 1 - ARBOR DISC
- 2 - PINION BLOCK
- 3 - ARBOR
- 4 - PINION HEIGHT BLOCK

(6) Assemble Dial Indicator C-3339 into Scooter Block D-115-2 and secure set screw.

(7) Position Scooter Block/Dial Indicator flush on the pinion height block. Hold scooter block and zero the dial indicator.

(8) Slowly slide the scooter block across the pinion height block over to the arbor (Fig. 9). Move the scooter block till dial indicator crests the arbor, then record the highest reading.

(9) Select a shim/oil baffle equal to the dial indicator reading plus the pinion depth variance number etched in the face of the pinion (Fig. 4). For example, if the depth variance is -2, add +0.002 in. to the dial indicator reading.

DIFFERENTIAL SIDE BEARING PRELOAD AND GEAR BACKLASH

Differential side bearing preload and gear backlash is achieved by selective shims positioned behind the differential side bearing cones. The proper shim thickness can be determined using slip-fit Dummy Bearings D-343 in place of the differential side bearings and a Dial Indicator C-3339. Before proceeding with the differential bearing preload and gear backlash measurements, measure the pinion gear depth and prepare the pinion for installation. Establishing proper pinion gear depth is essential to establishing gear backlash and tooth contact patterns. After the overall shim thickness to take up differential side play is measured, the pinion is installed, and the gear backlash shim thickness is measured. The overall shim thickness is the total of the dial indicator reading and the preload specification added

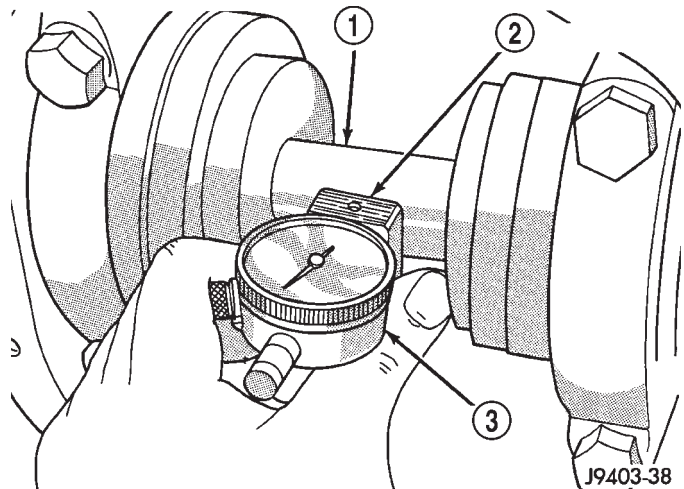


Fig. 9 PINION GEAR DEPTH MEASUREMENT

- 1 - ARBOR
- 2 - SCOOTER BLOCK
- 3 - DIAL INDICATOR

together. The gear backlash measurement determines the thickness of the shim used on the ring gear side of the differential case. Subtract the gear backlash shim thickness from the total overall shim thickness and select that amount for the pinion gear side of the differential (Fig. 10). Differential shim measurements are performed with spreader W-129-B removed.

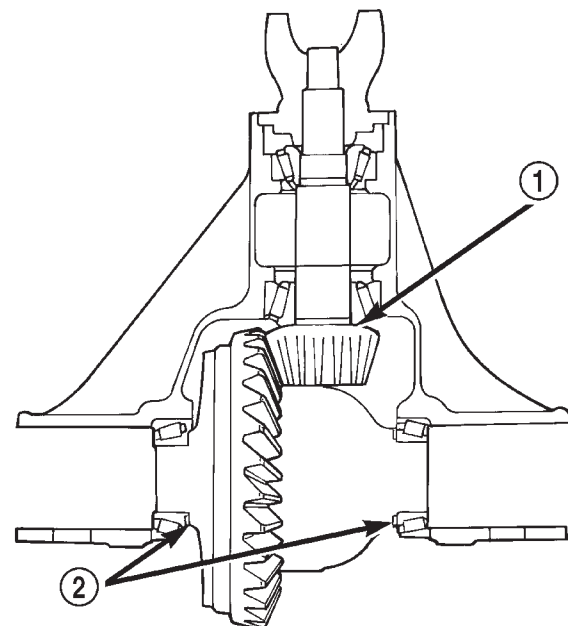


Fig. 10 SHIM LOCATIONS

- 1 - PINION GEAR DEPTH SHIM/OIL BAFFLE
- 2 - DIFFERENTIAL BEARING SHIM

REAR AXLE - 267RBI (Continued)

SHIM SELECTION

NOTE: It is difficult to salvage the differential side bearings during the removal procedure. Install replacement bearings if necessary.

- (1) Remove differential side bearings from differential case.
- (2) Remove factory installed shims from differential case.
- (3) Install ring gear on differential case and tighten bolts to specification.
- (4) Install dummy side bearings D-343 on differential case.
- (5) Install differential case in the housing.
- (6) Install the marked bearing caps in their correct positions and snug the bolts (Fig. 11).

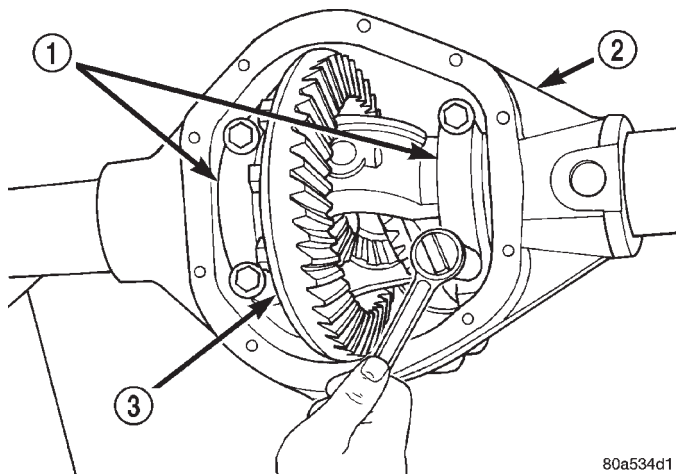


Fig. 11 BEARING CAP BOLTS

- 1 - BEARING CAP
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE

- (7) Using a dead-blow hammer, seat the differential dummy bearings to each side of the housing (Fig. 12) and (Fig. 13).

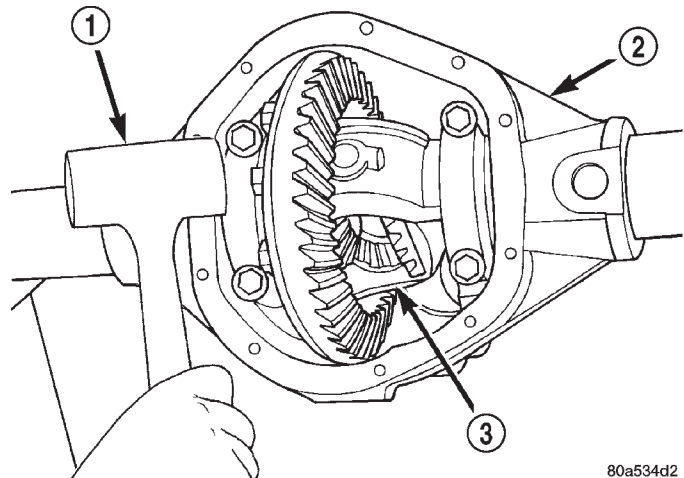
- (8) Thread Pilot Stud C-3288-B into rear cover bolt hole below ring gear (Fig. 14).

- (9) Attach the Dial Indicator C-3339 to pilot stud. Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 14).

- (10) Push and hold differential case to pinion gear side of the housing and zero dial indicator (Fig. 15).

- (11) Push and hold differential case to ring gear side of the housing and record the dial indicator reading (Fig. 16).

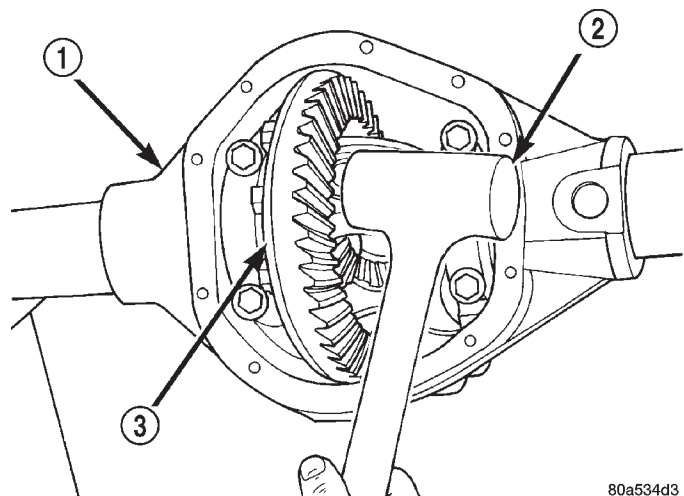
- (12) Add 0.38 mm (0.015 in.) to the zero end play total. This total represents the thickness of shims needed to preload the new bearings when the differential is installed.



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Fig. 12 SEAT PINION GEAR SIDE BEARING

- 1 - DEAD-BLOW HAMMER
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE



80a534d3

Fig. 13 SEAT RING GEAR SIDE BEARING

- 1 - DIFFERENTIAL HOUSING
- 2 - DEAD-BLOW HAMMER
- 3 - DIFFERENTIAL CASE

- (13) Rotate dial indicator out of the way on the pilot stud.

- (14) Remove differential case and dummy bearings from the housing.

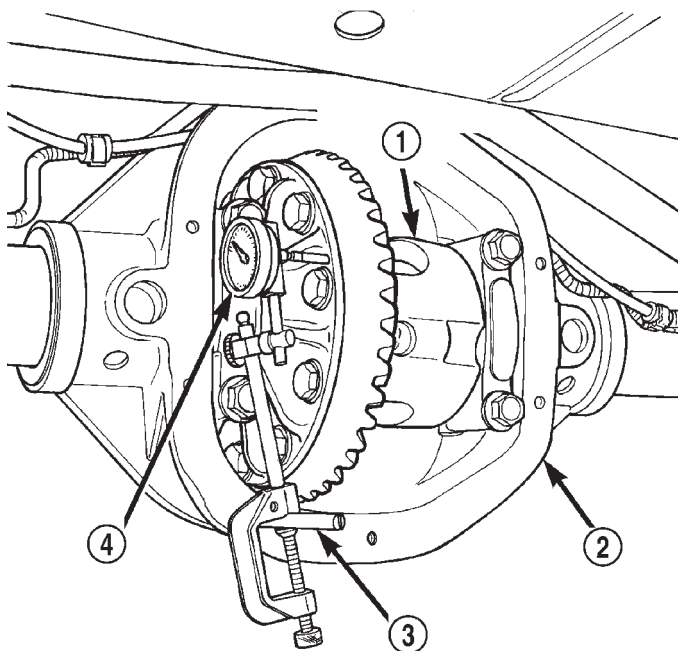
- (15) Install the pinion gear in the housing. Install the pinion yoke and establish the correct pinion rotating torque.

- (16) Install differential case and dummy bearings D-343 in the housing (without shims), install bearing caps and tighten bolts snug.

- (17) Seat ring gear side dummy bearing (Fig. 13).

- (18) Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 14).

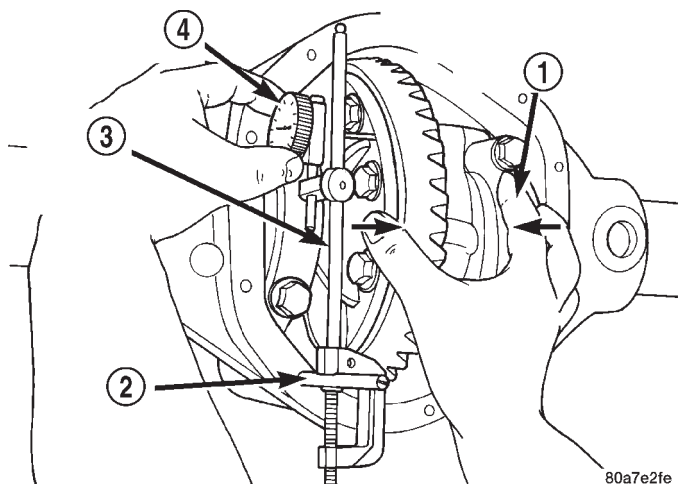
REAR AXLE - 267RBI (Continued)



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Fig. 14 DIFFERENTIAL SIDE PLAY

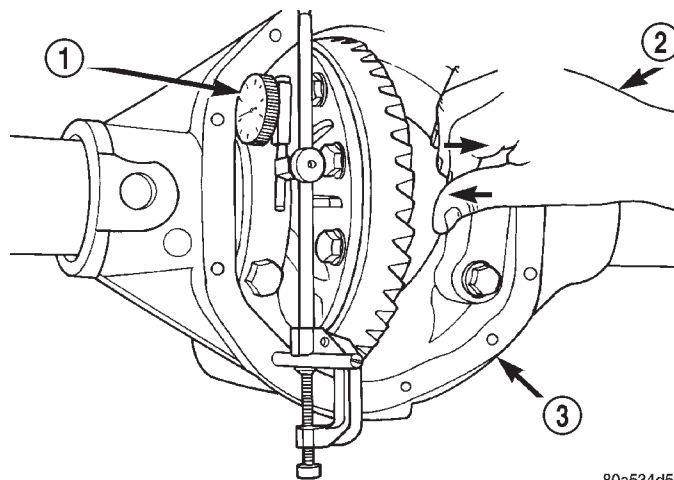
- 1 - DIFFERENTIAL CASE
- 2 - DIFFERENTIAL HOUSING
- 3 - PILOT STUD
- 4 - DIAL INDICATOR



80a7e2fe

Fig. 15 DIAL INDICATOR LOCATION

- 1 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 2 - PILOT STUD
- 3 - DIAL INDICATOR ARM
- 4 - DIAL INDICATOR FACE

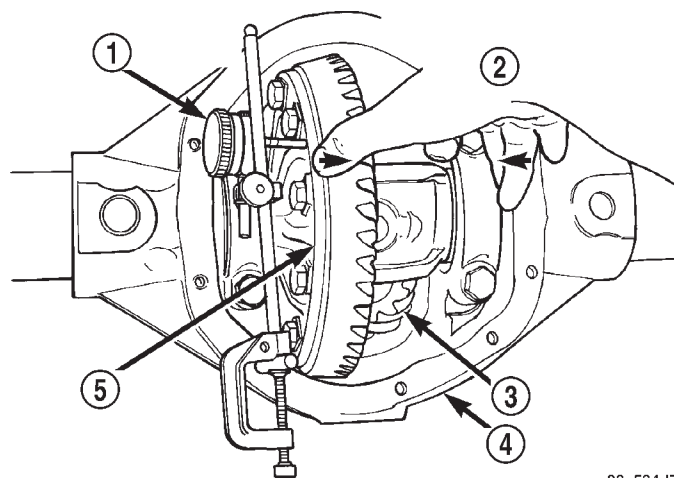


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Fig. 16 DIFFERENTIAL CASE RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - DIFFERENTIAL HOUSING

(19) Push and hold differential case toward pinion gear and zero the dial indicator (Fig. 17).



80a534d7

Fig. 17 DIFFERENTIAL CASE PINION GEAR SIDE

- 1 - DIAL INDICATOR FACE
- 2 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

REAR AXLE - 267RBI (Continued)

(20) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 18).

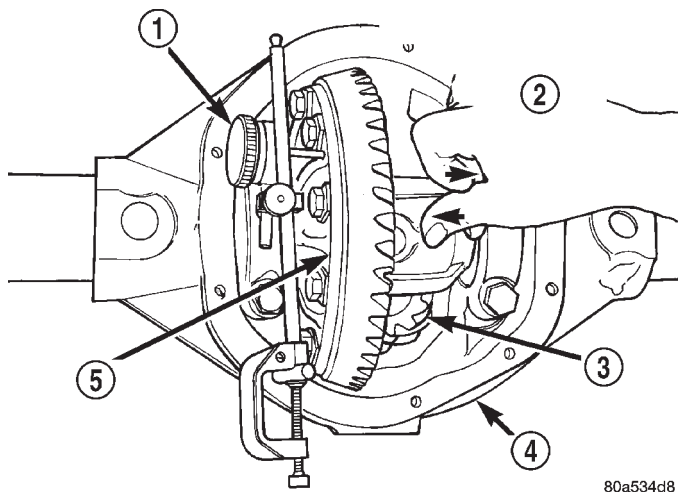


Fig. 18 DIFFERENTIAL CASE RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

(21) This is the shim thickness needed on the ring gear side of the differential case for proper backlash.

(22) Subtract the backlash shim thickness from the total preload shim thickness. The remainder is the shim thickness required on the pinion side of the housing.

(23) Rotate dial indicator out of the way on pilot stud.

(24) Remove differential case and dummy bearings from the housing.

(25) Install the selected side bearing shims onto the differential case hubs.

(26) Install side bearings on differential case hubs with Install C-4487-1 and Handle C-4171.

(27) Install bearing cups on differential.

(28) Install Spreader W-129-B and some items from Adapter Set 6987 on the housing and spread open enough to receive differential case.

CAUTION: Never spread housing over 0.50 mm (0.020 in.). The housing can be damaged if over-spread.

(29) Install differential case into the housing.

(30) Remove spreader from the housing.

(31) Rotate differential case several times to seat the side bearings.

(32) Position the indicator plunger against a ring gear tooth (Fig. 19).

(33) Push and hold ring gear upward while not allowing the pinion gear to rotate.

(34) Zero dial indicator face to pointer.

(35) Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.12 mm (0.005 in.) and 0.20 mm (0.008 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the housing to the other (Fig. 20).

(36) Verify differential case and ring gear runout by measuring ring to pinion gear backlash at eight locations around the ring gear. Readings should not vary more than 0.05 mm (0.002 in.). If readings vary more than specified, the ring gear or the differential case is defective.

After the proper backlash is achieved, perform Gear Contact Pattern Analysis procedure.

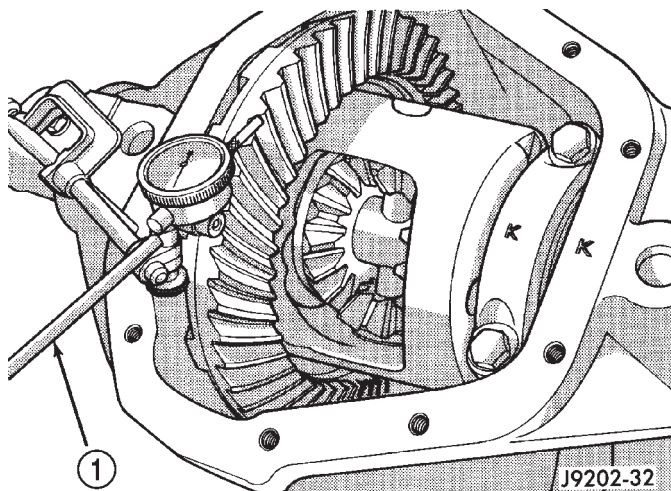


Fig. 19 RING GEAR BACKLASH

- 1 - DIAL INDICATOR

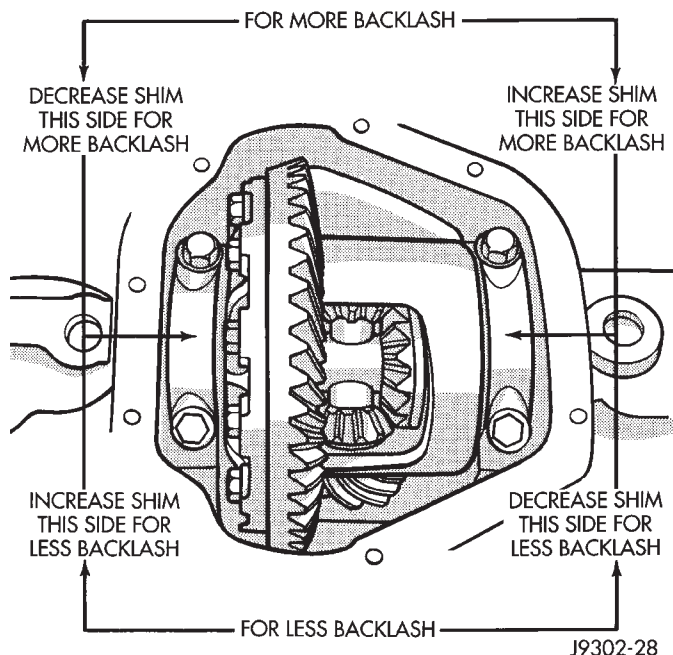


Fig. 20 BACKLASH SHIM

REAR AXLE - 267RBI (Continued)

GEAR CONTACT PATTERN

The ring and pinion gear contact patterns will show if the pinion depth is correct. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

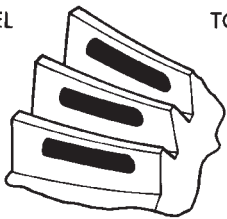
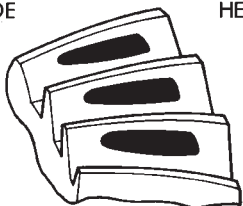
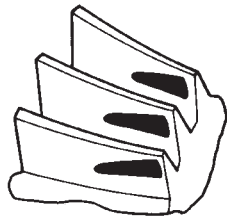
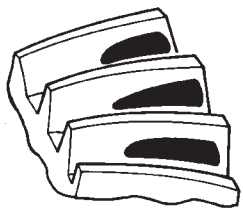
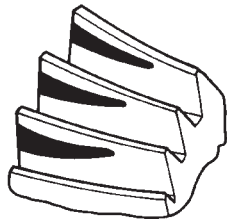
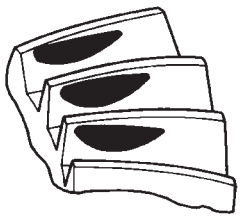
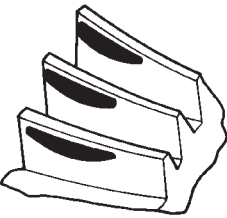
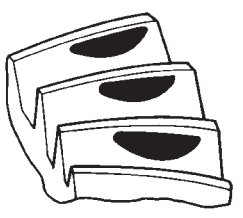
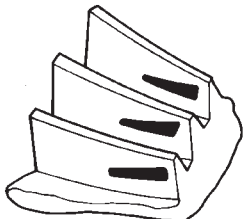
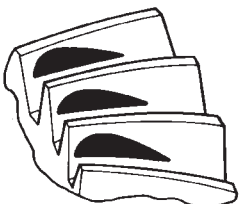
(1) Apply a thin coat of hydrated ferric oxide or equivalent to the drive and coast side of the ring gear teeth.

(2) Wrap, twist and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.

(3) With a boxed end wrench on the ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeeze the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart (Fig. 21) and adjust pinion depth and gear backlash as necessary.

REAR AXLE - 267RBI (Continued)

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

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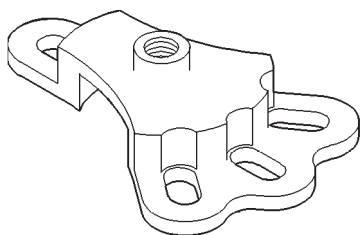
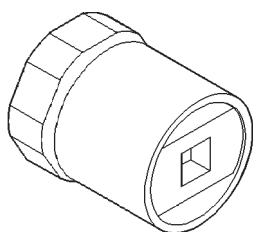
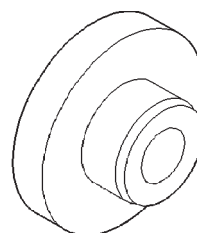
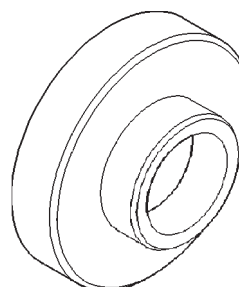
Fig. 21 GEAR TOOTH CONTACT PATTERNS

REAR AXLE - 267RBI (Continued)**SPECIFICATIONS****REAR AXLE - 267RBI***AXLE SPECIFICATIONS*

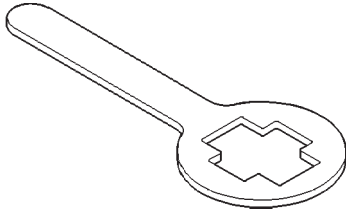
DESCRIPTION	SPECIFICATION
Axle Ratio	3.55, 4.10
Ring Gear Diameter	267 mm (10.50 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Pinion Gear Standard. Depth	136.53 mm (5.375 in.)
Pinion Bearing Preload - Original Bearings	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearings	2.3-5.1 N·m (20-45 in. lbs.)

TORQUE SPECIFICATIONS

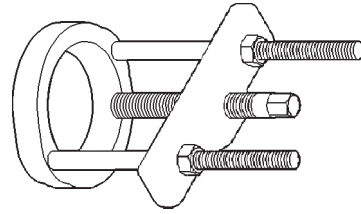
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fill Hole Plug	34	25	-
Differential Cover Bolts	47	35	-
Bearing Cap Bolts	108	80	-
Ring Gear Bolt	176	130	-
Pinion Nut	298-380	220-280	-
Axle Shaft Bolts	129	95	-
Hub Bearing Nut	163-190	120-140	-

SPECIAL TOOLS**REAR AXLE - 267RBI****Puller 6790****Wrench DD-1241-JD****Installer 5064****Installer 8149**

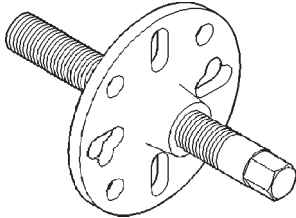
REAR AXLE - 267RBI (Continued)



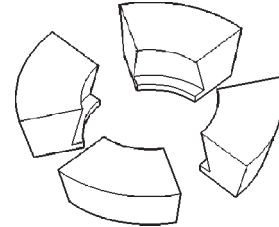
Holder 6719A



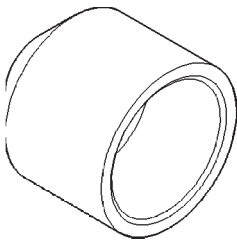
Puller/Press C-293-PA



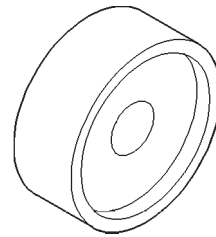
Puller C-452



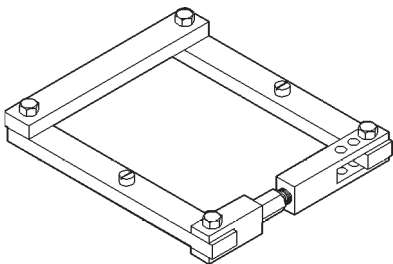
Adapters C-293-62



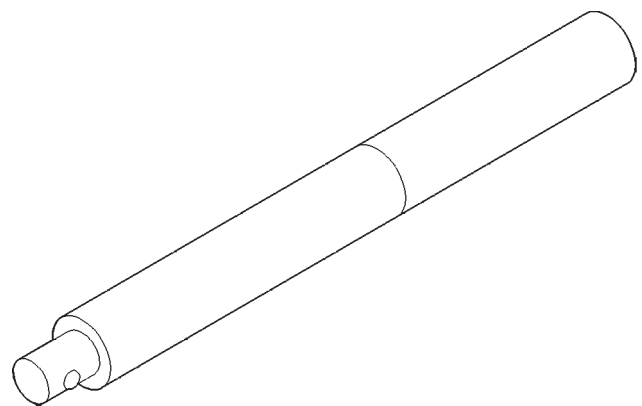
Installer 8108



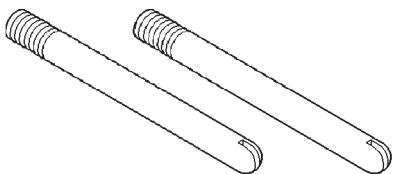
Installer C-4190



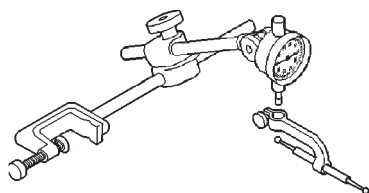
Spreader W-129-B



Handle C-4171

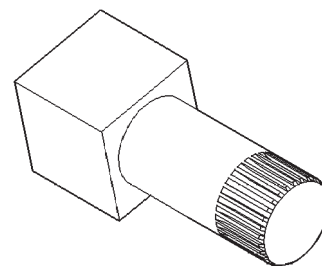


Pilot Studs C-3288-B



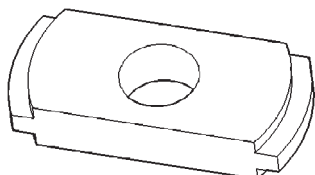
Dial Indicator C-3339

8011d42b

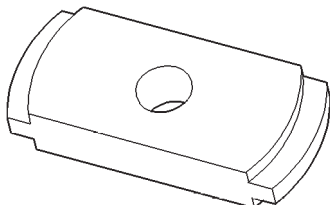


Fixture 6963-A

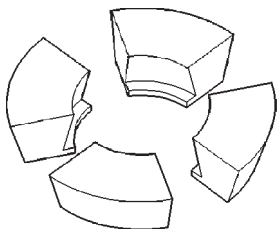
REAR AXLE - 267RBI (Continued)



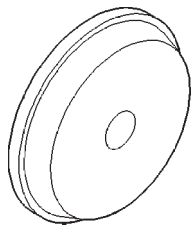
Remover D-158



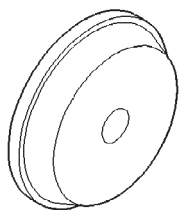
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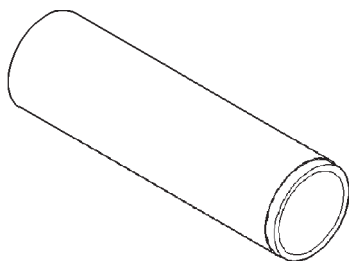
Adapters C-293-62



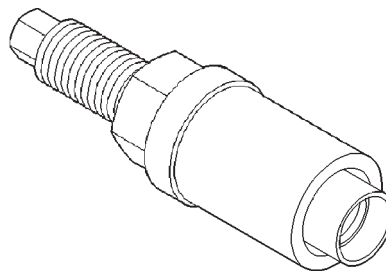
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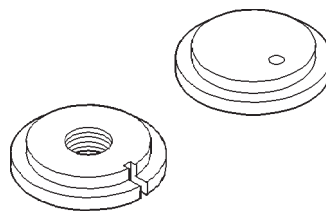
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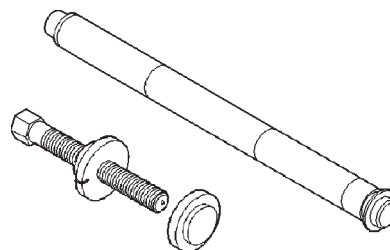
Installer C-3095-A



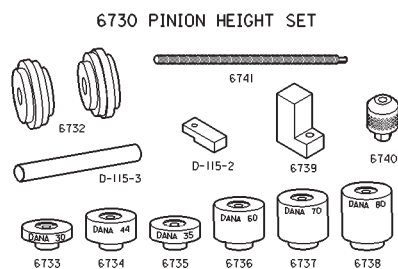
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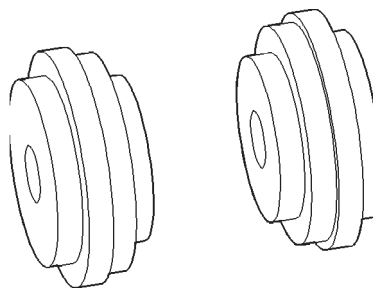
Trac-lok Tools 8139



Trac-lok Tools C-4487



Gauge Set 6730



Arbor Discs 6732

AXLE SHAFTS

REMOVAL

- (1) Remove the axle shaft flange bolts.
- (2) Slide the axle shaft out from the axle tube.

INSTALLATION

- (1) Clean the gasket contact surface area on the flange with an appropriate solvent. Install a new flange gasket and slide the axle shaft into the tube.
- (2) Install the bolts and tighten to 129 N·m (95 ft. lbs.).

AXLE BEARINGS

REMOVAL

- (1) Remove wheel and tire assembly.
- (2) Remove brake drum.
- (3) Remove the axle shaft.
- (4) Remove the lock wedge and adjustment nut. Use Socket DD-1241-JD to remove the adjustment nut.
- (5) Remove the hub assembly. The outer axle bearing will slide out as the hub is being removed.
- (6) Remove inner grease seal and discard. Use Installer 5064 and Handle C-4171 to drive grease seal and inner axle bearing from the hub.
- (7) Remove the bearing cups from the hub bore. Use a brass drift, or an appropriate removal tool, to tap out the cups.

INSTALLATION

- (1) Thoroughly clean both axle bearings and interior of the hub with an appropriate cleaning solvent.
- (2) Install bearing cups with Installer 8151 and Handle C-4171.
- (3) **Pack inner and outer bearings with Mopar wheel bearing grease or equivalent.**
- (4) Apply grease to inner and outer bearing cup surfaces.
- (5) Install inner axle bearing in the hub.
- (6) Install **new** grease seal in hub with Installer 8149 and Handle C-4171.
- (7) Inspect bearing and seal contact surfaces on the axle tube for burrs/roughness. Remove all the rough contact surfaces from the axle tube.
- (8) Carefully slide the hub onto the axle.

CAUTION: Do not let grease seal contact axle tube threads during installtion.

- (9) Install outer axle bearing.
- (10) Install hub bearing adjustment nut with Socket DD-1241-JD.

(11) Tighten adjustment nut to 163-190 N·m (120-140 ft. lbs.) while rotating the wheel. Then loosen adjustment nut 1/8 to 1/3 of-a-turn to provide 0.025-0.250mm (0.001-0.009 in.) wheel bearing end play.

(12) Tap locking wedge into the spindle keyway and adjustment nut.

NOTE: Located locking wedge in a new position in the adjustment nut.

- (13) Install axle shaft and brake drum.
- (14) Install the wheel and tire assembly.

PINION SEAL

REMOVAL

- (1) Raise and support the vehicle.
- (2) Mark universal joint, pinion yoke and shaft for installation reference.
- (3) Disconnect the propeller shaft from the pinion yoke.
- (4) Remove the wheel and tire assemblies.
- (5) Remove brake calipers to prevent any drag that may cause a false bearing preload torque measurement.
- (6) Rotate pinion yoke three or four times.
- (7) Record pinion gear rotating torque with an inch pound torque wrench (Fig. 22).

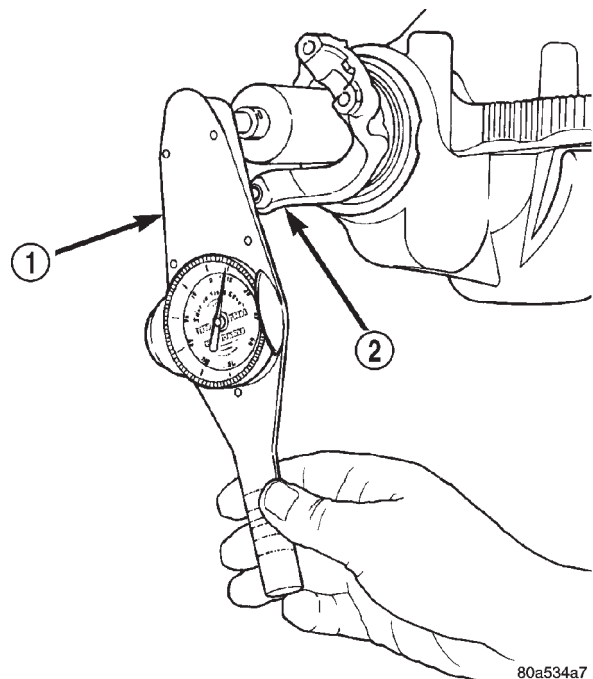


Fig. 22 PINION ROTATING TORQUE

- 1 - TORQUE WRENCH
- 2 - PINION YOKE

PINION SEAL (Continued)

(8) Hold yoke with Yoke Holder 6719A and remove the pinion shaft nut and washer.

(9) Remove yoke with Remover C-452 (Fig. 23).

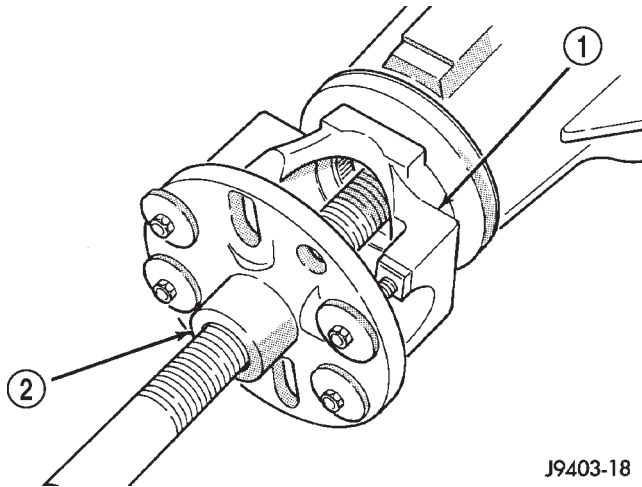


Fig. 23 PINION YOKE REMOVER

- 1 - PINION YOKE
2 - REMOVER

(10) Remove pinion seal with pry tool or slide-hammer mounted screw.

INSTALLATION

(1) Apply a light coating of gear lubricant on the lip of pinion seal.

(2) Install **new** pinion seal with an appropriate installer.

(3) Install yoke with Installer D-191 and Yoke Holder 6719A (Fig. 24).

(4) Install pinion yoke washer and nut.

(5) Hold pinion yoke with Yoke Holder 6719A and tighten shaft nut to 289-380 N·m (220-280 ft. lbs.) (Fig. 25). Rotate pinion shaft several revolutions to ensure the bearing rollers are seated.

(6) Rotate the pinion shaft using an inch pound torque wrench. Rotating resistance torque should be equal to the reading recorded, plus a small amount for the drag the new seal will have (Fig. 26).

NOTE: The bearing rotating torque should be constant during a complete revolution of the pinion. If the rotating torque varies, this indicates a binding condition.

(7) Install propeller shaft with the installation reference marks aligned.

(8) Install the brake drums.

(9) Add gear lubricant to the differential housing, if necessary.

(10) Install wheel and tire assemblies and lower the vehicle.

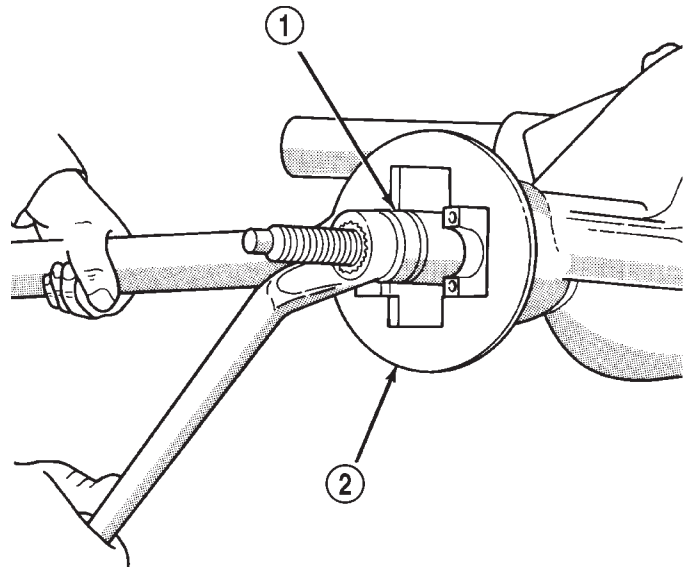


Fig. 24 PINION YOKE INSTALLER

- 1 - INSTALLER
2 - YOKE HOLDER

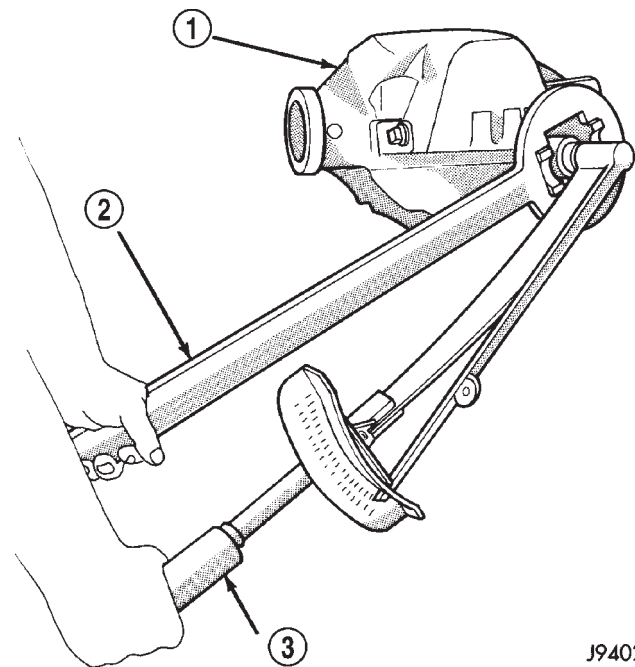
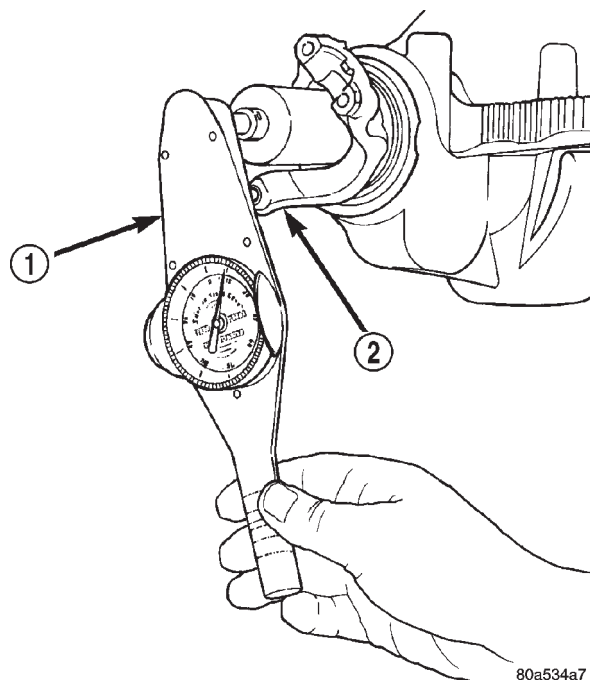


Fig. 25 TIGHTEN PINION NUT

- 1 - DIFFERENTIAL HOUSING
2 - YOKE HOLDER
3 - TORQUE WRENCH

DIFFERENTIAL (Continued)

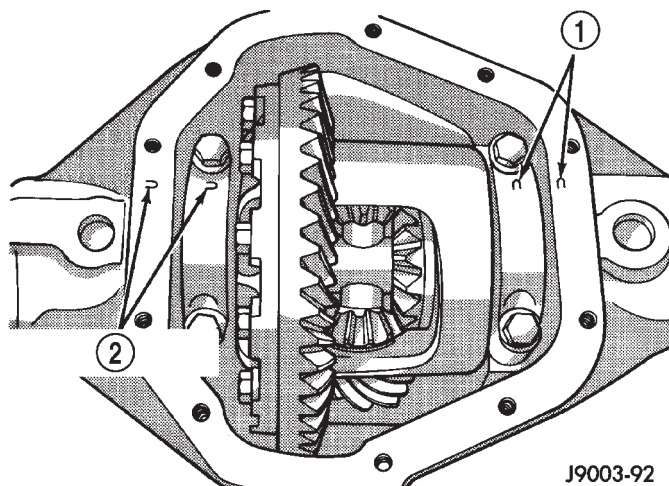
**Fig. 26 Pinon Rotating Torque**

- 1 - TORQUE WRENCH
2 - PINION YOKE

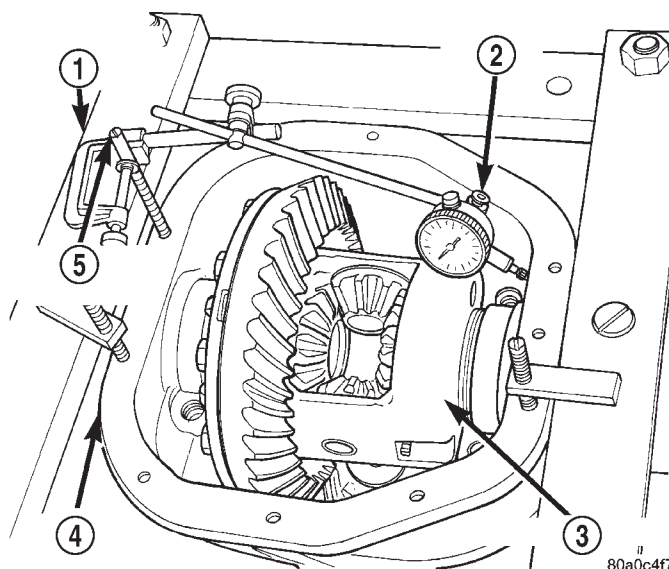
DIFFERENTIAL

REMOVAL

- (1) Raise and support the vehicle.
- (2) Remove fill hole plug from the differential housing cover.
- (3) Remove differential housing cover and drain 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 axle shafts.
- (6) Note the orientation of the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 27).
- (7) Remove the differential bearing caps.
- (8) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 28).
- (9) Install the hold down clamps and tighten the tool turnbuckle finger-tight.
- (10) Install a Pilot Stud C-3288-B 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. 28) and zero the indicator.
- (11) Spread the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 28).

**Fig. 27 BEARING CAP IDENTIFICATION**

- 1 - REFERENCE LETTERS
2 - REFERENCE LETTERS

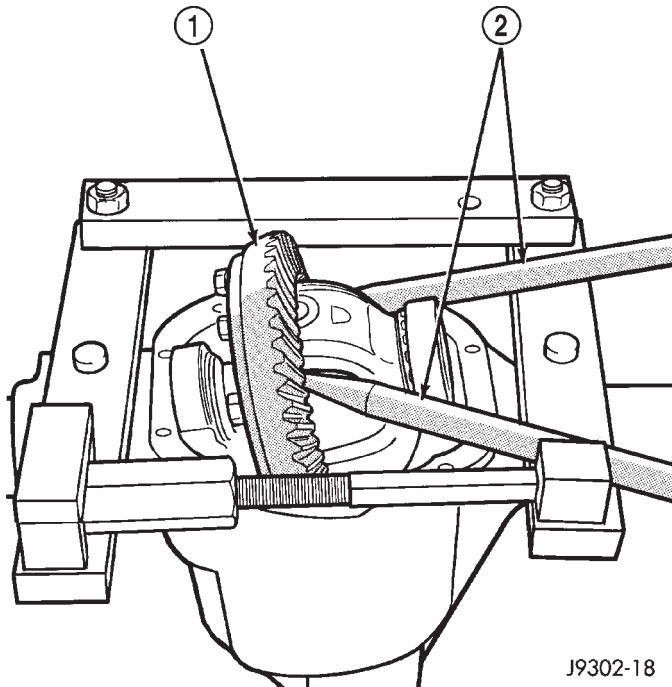
**Fig. 28 SPREAD DIFFERENTIAL HOUSING**

- 1 - SPREADER
2 - DIAL INDICATOR
3 - DIFFERENTIAL
4 - DIFFERENTIAL HOUSING
5 - PILOT STUD

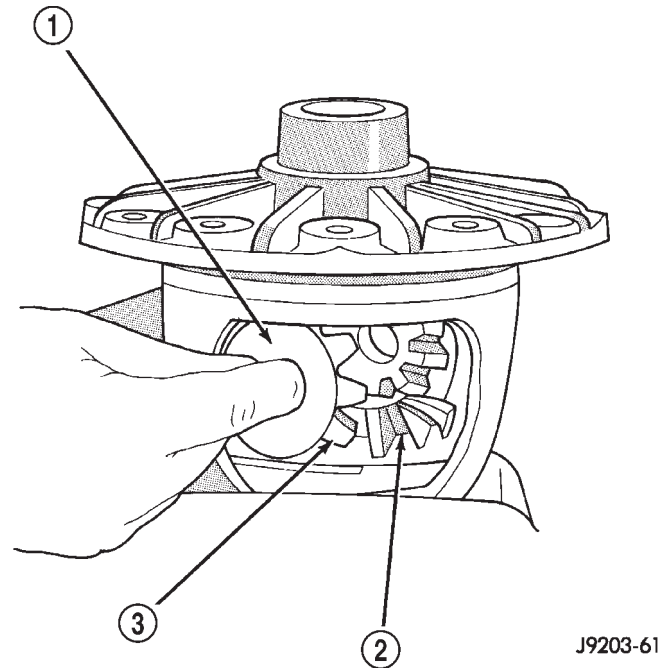
CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

- (12) Remove the dial indicator.
- (13) Pry the differential case loose from the housing. To prevent damage, pivot on housing with the end of the pry bar against spreader (Fig. 29).
- (14) Remove the case from housing. Tag bearing cups to indicate their location.

DIFFERENTIAL (Continued)

**Fig. 29 DIFFERENTIAL REMOVAL**

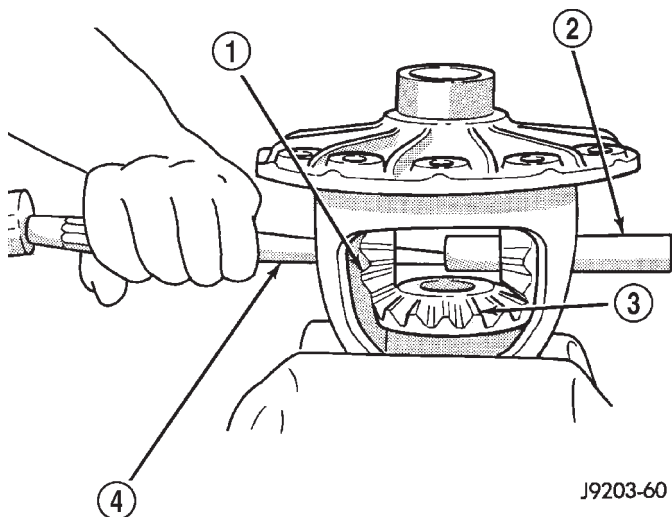
- 1 - DIFFERENTIAL
- 2 - PRY BAR

**Fig. 31 Pinion Mate/Side Gear**

- 1 - THRUST WASHER
- 2 - SIDE GEAR
- 3 - PINION MATE GEAR

DISASSEMBLY

- (1) Remove roll-pin holding mate shaft in housing.
- (2) Remove pinion gear mate shaft (Fig. 30).
- (3) Rotate differential side gears and remove pinion mate gears and thrust washers (Fig. 31).

**Fig. 30 PINION MATE SHAFT**

- 1 - PINION MATE GEAR
- 2 - PINION MATE SHAFT
- 3 - SIDE GEAR
- 4 - DRIFT

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

ASSEMBLY

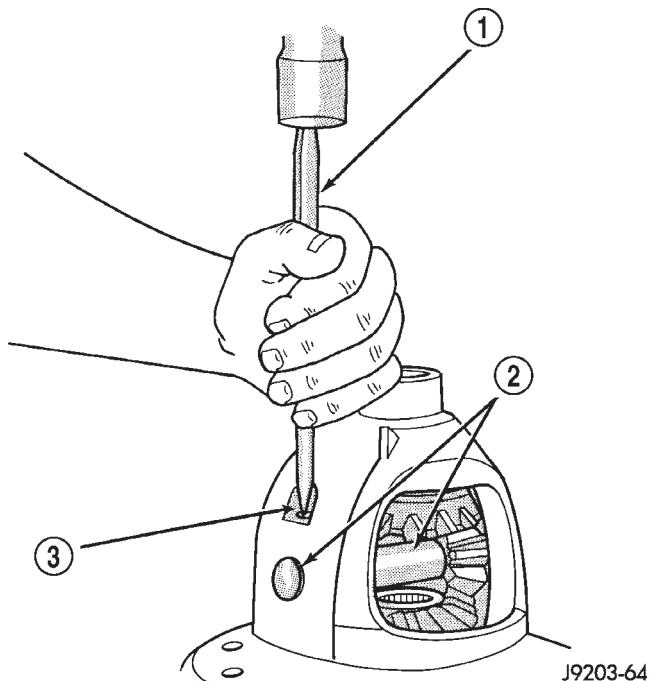
- (1) Install differential side gears and thrust washers.
- (2) Install pinion mate gears and thrust washers.
- (3) Install pinion gear mate shaft.
- (4) Align hole in the pinion gear mate shaft with hole in the differential case.
- (5) Install and seat pinion mate shaft roll-pin in the differential case and mate shaft with a punch and hammer (Fig. 32). Peen the edge of the roll-pin hole in the differential case slightly in two places 180° apart.
- (6) Lubricate all differential components with hypoid gear lubricant.

INSTALLATION

NOTE: If replacement differential bearings or differential case are being installed, differential side bearing shim requirements may change. Refer to Adjustments (Differential Bearing Preload and Gear Backlash) procedures to determine proper shim selection.

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

DIFFERENTIAL (Continued)

**Fig. 32 Pinion Mate Shaft Roll-Pin**

- 1 - PUNCH
- 2 - PINION MATE SHAFT
- 3 - MATE SHAFT LOCKPIN

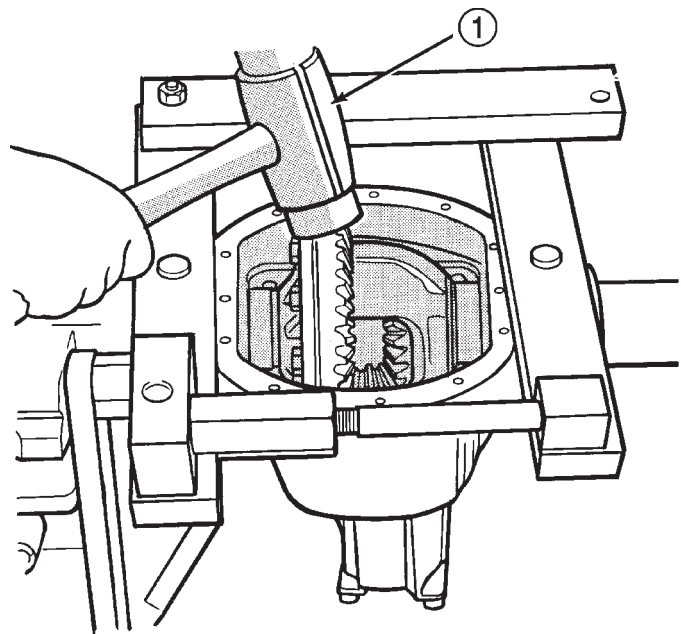
down clamps and tighten the tool turnbuckle finger-tight.

(2) Install a Pilot Stud C-3288-B at the left side of the differential housing and attach dial indicator to the pilot stud. Load the indicator plunger against the opposite side of the housing and zero the dial indicator.

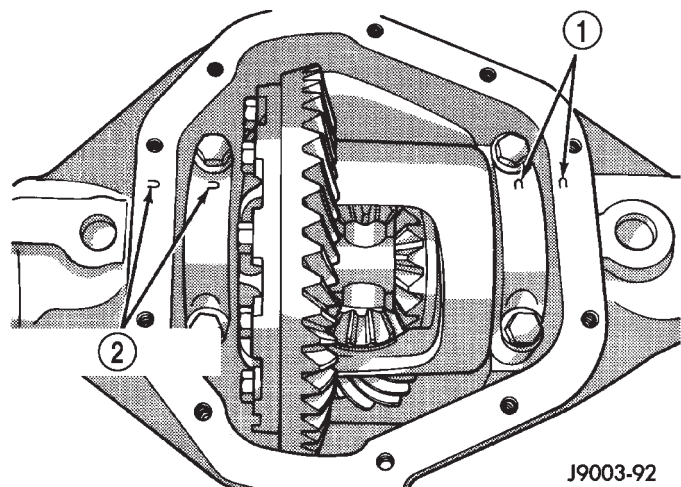
(3) Spread the housing enough to install the case in the housing. Measure the distance with the dial indicator.

CAUTION: Do not spread over 0.50 mm (0.020 in). If the housing is over-spread, it could be distorted or damaged.

- (4) Remove the dial indicator.
- (5) Install differential into the housing. Tap the differential case with a rawhide/rubber hammer to ensure the bearings are seated in housing (Fig. 33).
- (6) Remove the spreader.
- (7) Install bearing caps in their original locations (Fig. 34) and tighten bearing cap bolts in a criss-cross pattern to 109 N·m (80 ft. lbs.).
- (8) Install axle shafts.
- (9) Install the hub bearings.
- (10) Apply a bead of red Mopar Silicone Rubber Sealant or equivalent to the housing cover (Fig. 35).

**Fig. 33 DIFFERENTIAL CASE**

- 1 - RAWHIDE HAMMER

**Fig. 34 BEARING CAP IDENTIFICATION**

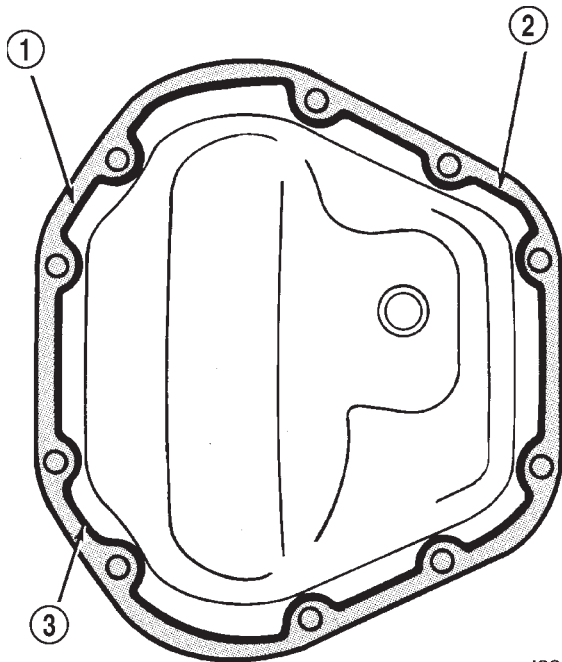
- 1 - REFERENCE LETTERS
- 2 - REFERENCE LETTERS

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied or adhesion quality will be compromised.

(11) Install the cover and any identification tag. Tighten the cover bolts in a criss-cross pattern to 47 N·m (35 ft. lbs.).

(12) Fill the differential with Mopar Hypoid Gear Lubricant or equivalent to bottom of the fill plug hole.

DIFFERENTIAL (Continued)



J9302-30

Fig. 35 DIFFERENTIAL COVER - TYPICAL

- 1 - SEALANT SURFACE
- 2 - SEALANT
- 3 - SEALANT THICKNESS

(13) Install the fill hole plug and tighten to 34 N·m (25 ft. lbs.).

(14) Remove support and lower vehicle.

DIFFERENTIAL - POWR-LOK

DIAGNOSIS AND TESTING - POWR-LOK®

WARNING: WHEN SERVICING VEHICLES WITH A POWR-LOK® DIFFERENTIAL DO NOT USE THE ENGINE TO TURN THE AXLE AND WHEELS. BOTH REAR WHEELS MUST BE RAISED AND THE VEHICLE SUPPORTED. THE 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.

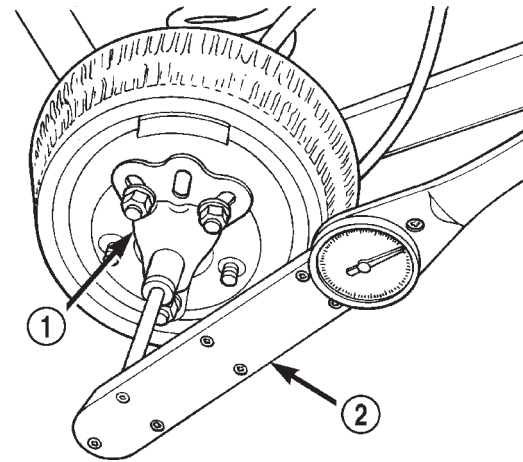
(1) Place blocks in front and rear of both front wheels.

(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 or equivalent to wheel studs.

(5) Use torque wrench on special tool to rotate wheel and read rotating torque (Fig. 36).



80a4d327

Fig. 36 POWR-LOK TEST -TYPICAL

- 1 - SPECIAL TOOL
- 2 - TORQUE WRENCH

(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.

DISASSEMBLY

The Powr-Lok® differential has a two-piece cross shaft and uses 2 disc and 3 plates for each clutch pack. One plate and one disc in each clutch pack is dished.

NOTE: Pay close attention to the clutch pack arrangement during this procedure. Note the direction of the concave and convex side of the plates and discs.

(1) Mark the ring gear half and cover half for installation reference (Fig. 37).

(2) Remove the case attaching bolts and remove the button cover half (Fig. 38).

(3) Remove top clutch pack (Fig. 39).

(4) Remove top side gear clutch ring.

(5) Remove top side gear.

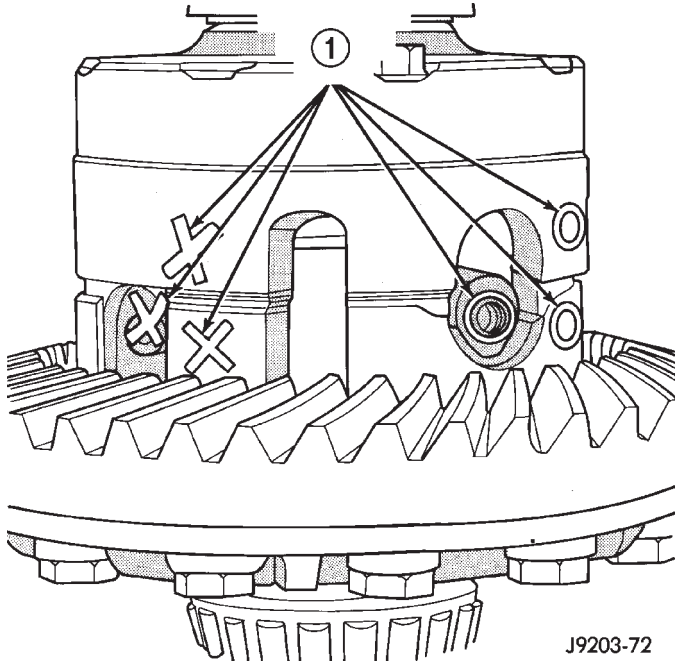
(6) Remove pinion mate gears and cross shafts.

(7) Remove the same parts listed above from the ring gear flange half of the case. Keep these parts with the flange cover half for correct installation in their original positions.

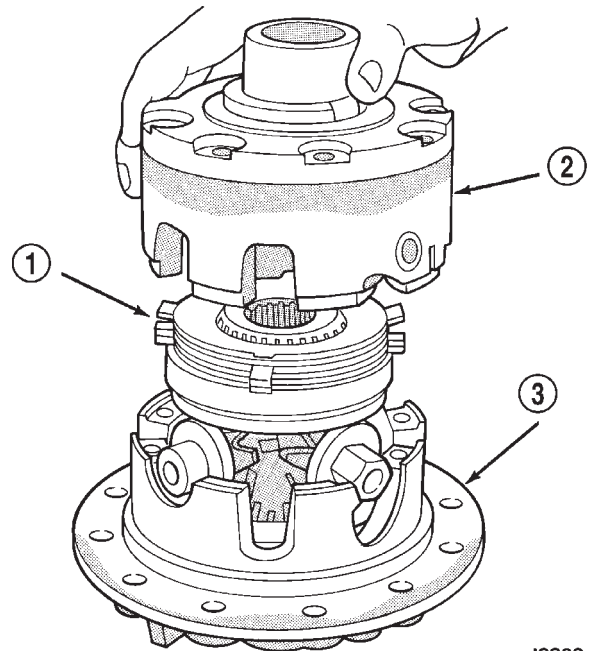
ASSEMBLY

The Powr-Lok® differential has a two-piece cross shaft and uses 2 disc and 3 plates for each clutch pack. One plate and one disc in each clutch pack is dished.

DIFFERENTIAL - POWR-LOK (Continued)

**Fig. 37 CASE MARKED**

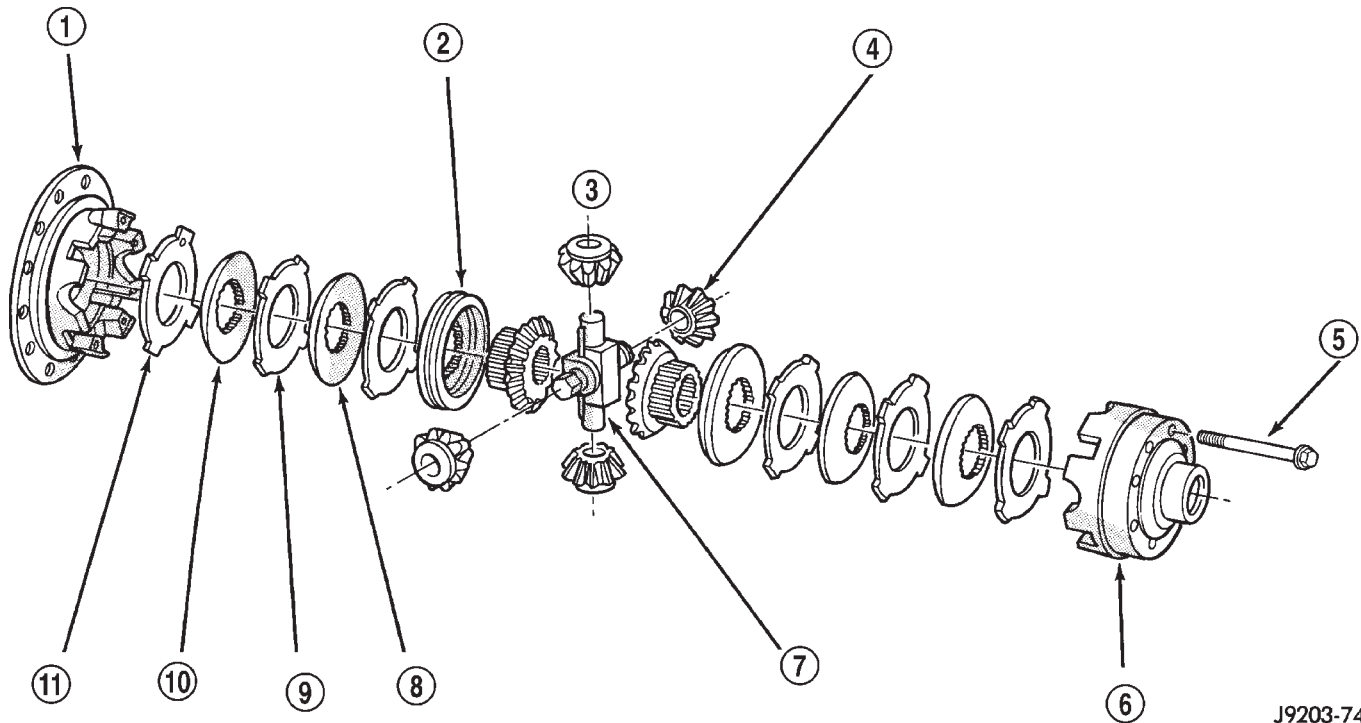
1 - REFERENCE MARKS

**Fig. 38 COVER HALF REMOVAL**

1 - CLUTCH PLATES

2 - BUTTON HALF

3 - FLANGE HALF

**Fig. 39 POWR-LOK COMPONENTS**

1 - FLANGE HALF

2 - CLUTCH RING

3 - SIDE GEAR

4 - PINION MATE GEAR

5 - SCREW

6 - BUTTON HALF

7 - PINION MATE CROSS SHAFT

8 - DISHED DISC

9 - PLATE

10 - DISHED DISC

11 - PLATE

DIFFERENTIAL - POWR-LOK (Continued)

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

(1) Saturate the clutch plates with Mopar® Hypoid Gear Lubricant or Additive (Fig. 40). Assemble clutch packs into the side gear plate in exactly the same position as removed (Fig. 39).

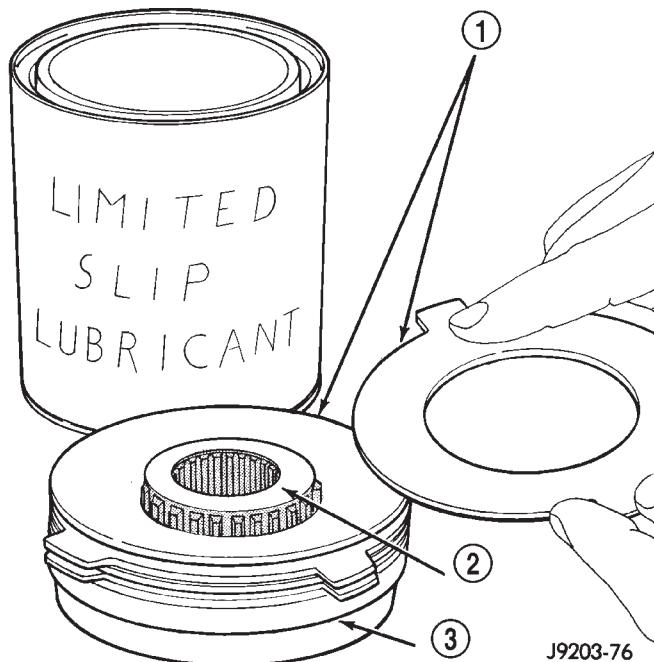


Fig. 40 CLUTCH PACK PRE-LUBRICATION

- 1 - CLUTCH PLATES
- 2 - SIDE GEAR
- 3 - CLUTCH RING

(2) Line up the plate ears and install the assembled pack into the flange half (Fig. 41). Ensure that the clutch plate lugs enter the slots in the case. Also ensure that the clutch pack bottoms out on the case.

(3) Install pinion mate shafts and pinion mate gears (Fig. 42). **Make sure shafts are correctly installed according to the alignment marks.**

(4) Lubricate and install the other side gear and clutch pack (Fig. 41).

(5) Correctly align and assemble button half to flange half. Install case body screws finger tight.

(6) Tighten body screws alternately and evenly. Tighten screws to 89-94 N·m (65-70 ft. lbs.) (Fig. 43).

If bolt heads have 7 radial lines or the number 180 stamped on the head, tighten these bolts to 122-136 N·m (90-100 ft. lbs.).

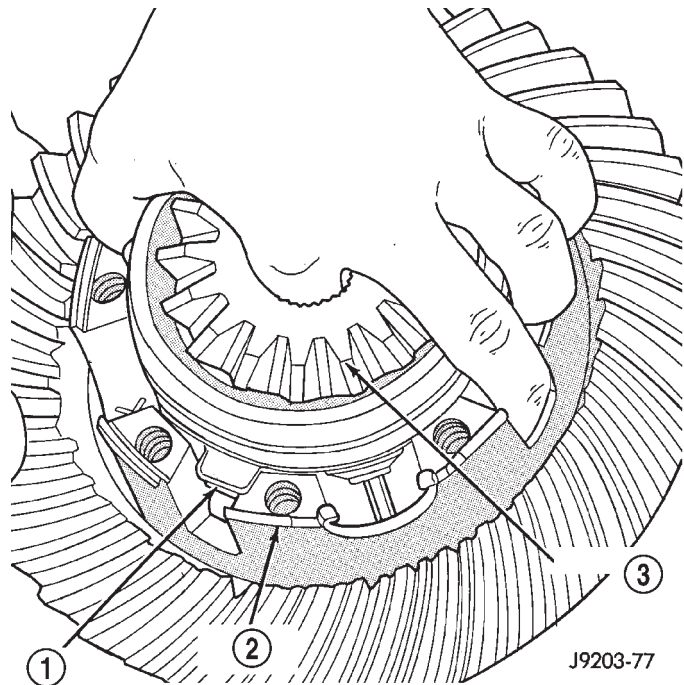


Fig. 41 CLUTCH PACK INSTALLATION

- 1 - LUGS
- 2 - FLANGE HALF
- 3 - SIDE GEAR

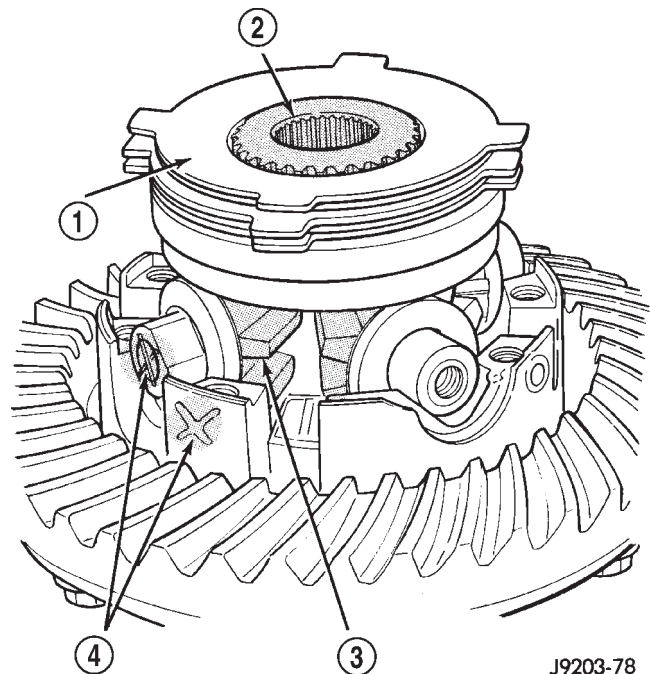
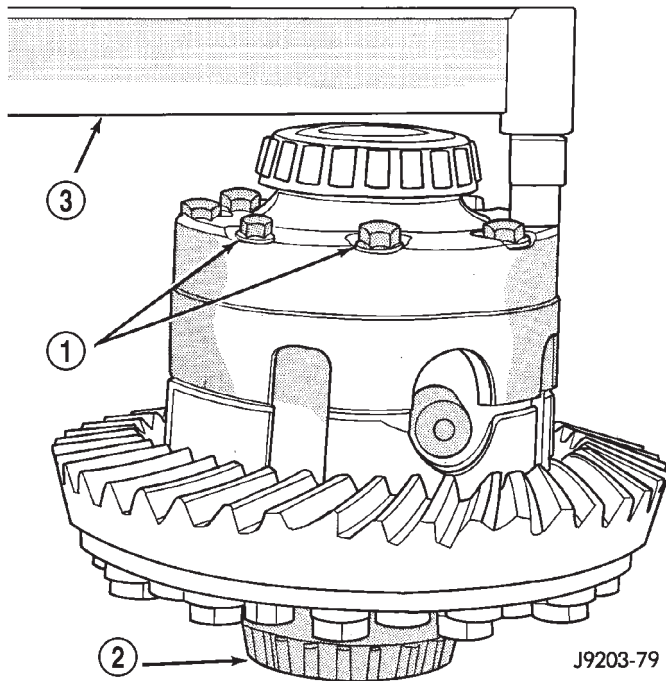


Fig. 42 CLUTCH PACK

- 1 - CLUTCH PACK
- 2 - SIDE GEAR
- 3 - PINION GEARS AND MATE SHAFT
- 4 - ALIGNMENT MARKS

DIFFERENTIAL - POWR-LOK (Continued)

**Fig. 43 CASE HALF INSTALLATION**

- 1 - FIXTURE
- 2 - CASE BOLTS
- 3 - TORQUE WRENCH

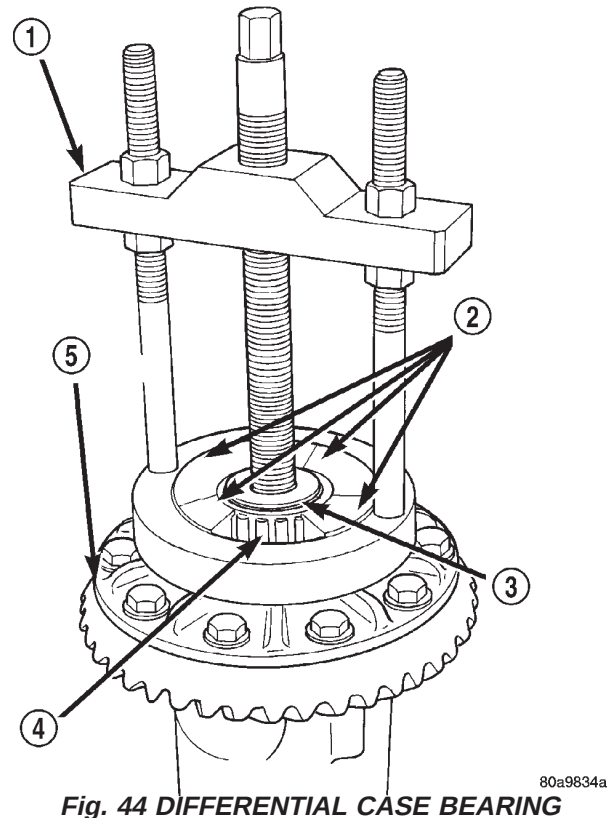
DIFFERENTIAL CASE BEARINGS

REMOVAL

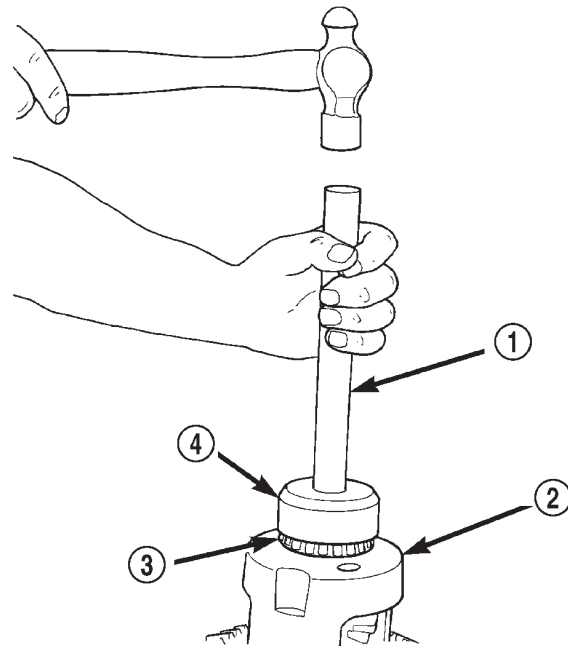
- (1) Remove differential case from the housing.
- (2) Remove bearings from the differential case with Puller/Press C-293-PA, Adapters C-293-62 and Step Plate 8139-2 (Fig. 44).

INSTALLATION

- (1) Install differential side bearings with installer C-4190 and Handle C-4171 (Fig. 45).
- (2) Install differential case into the housing.

**Fig. 44 DIFFERENTIAL CASE BEARING**

- 1 - PULLER
- 2 - ADAPTERS
- 3 - STEP PLATE
- 4 - BEARING
- 5 - DIFFERENTIAL CASE

**Fig. 45 CASE BEARING INSTALLER**

- 1 - HANDLE
- 2 - DIFFERENTIAL CASE
- 3 - BEARING
- 4 - INSTALLER

PINION GEAR/RING GEAR/ TONE RING

REMOVAL

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

- (1) Remove differential from axle housing.
- (2) Place differential case in a vise with soft metal jaw protectors. (Fig. 46)
- (3) Remove bolts holding ring gear to differential case.
- (4) Drive ring gear from differential case with a soft hammer (Fig. 46).

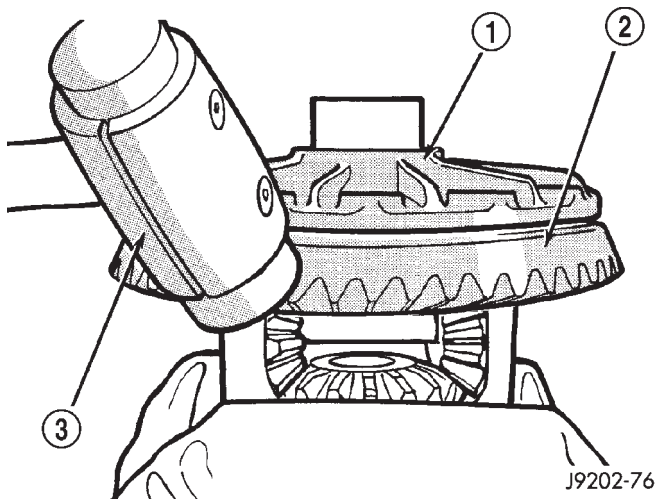


Fig. 46 RING GEAR

- 1 - DIFFERENTIAL CASE
- 2 - RING GEAR
- 3 - HAMMER

- (5) Remove exciter ring from the differential case with a brass drift and a hammer.

- (6) Mark pinion yoke and propeller shaft for installation alignment.

- (7) Disconnect propeller shaft from pinion yoke. Tie propeller shaft to underbody.

- (8) Hold pinion yoke with Yoke Holder 6719A and remove pinion yoke nut and washer.

- (9) Remove pinion yoke from pinion with Remover C-452 and Wrench C-3281 (Fig. 47).

- (10) Remove pinion gear from housing (Fig. 48).

- (11) Remove pinion seal with a slide hammer or pry bar.

- (12) Remove oil slinger, if equipped, and the front pinion bearing.

- (13) Remove front pinion bearing cup with Remover D-158 and Handle C-4171 (Fig. 49).

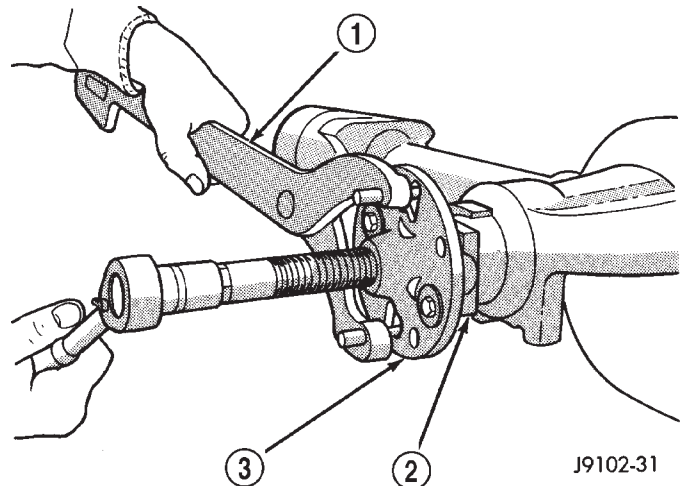


Fig. 47 PINION YOKE REMOVER

- 1 - WRENCH
- 2 - YOKE
- 3 - REMOVER

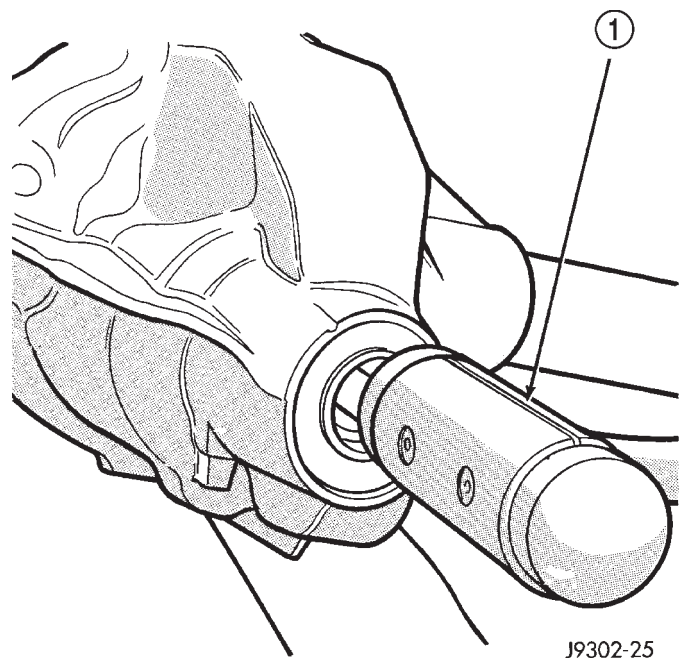


Fig. 48 PINION GEAR REMOVAL

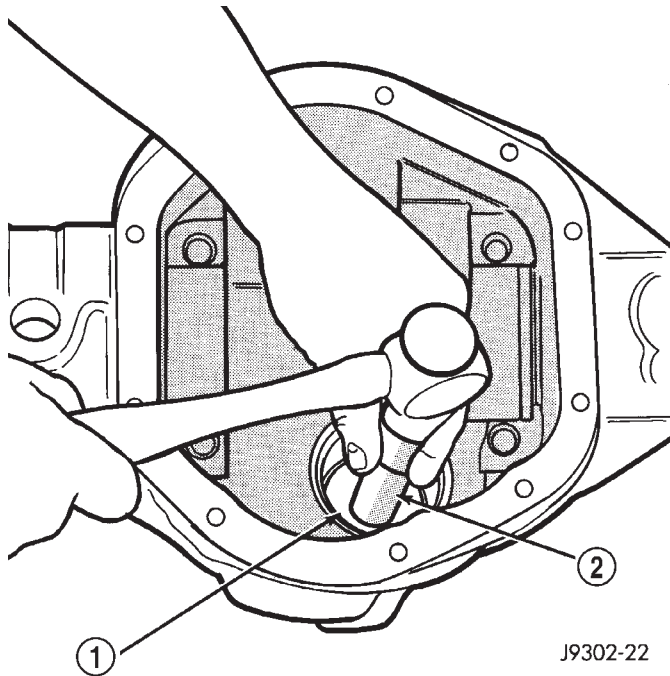
- 1 - RAWHIDE HAMMER

- (14) Remove rear bearing cup with Remover D-162 and Handle C-4171 (Fig. 50).

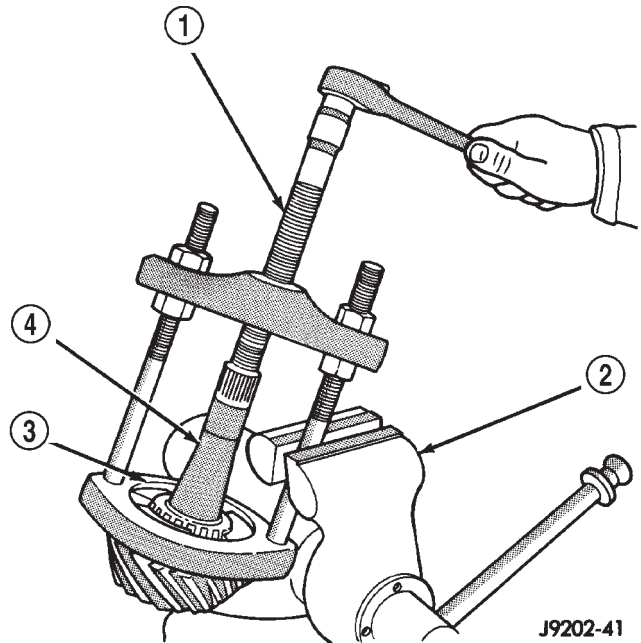
- (15) Remove rear bearing from the pinion with Puller/Press C-293-PA and Adapters C-293-37 (Fig. 51).

- (16) Remove pinion depth shims from the pinion gear shaft and record thickness of the shims.

PINION GEAR/RING GEAR/TONE RING (Continued)

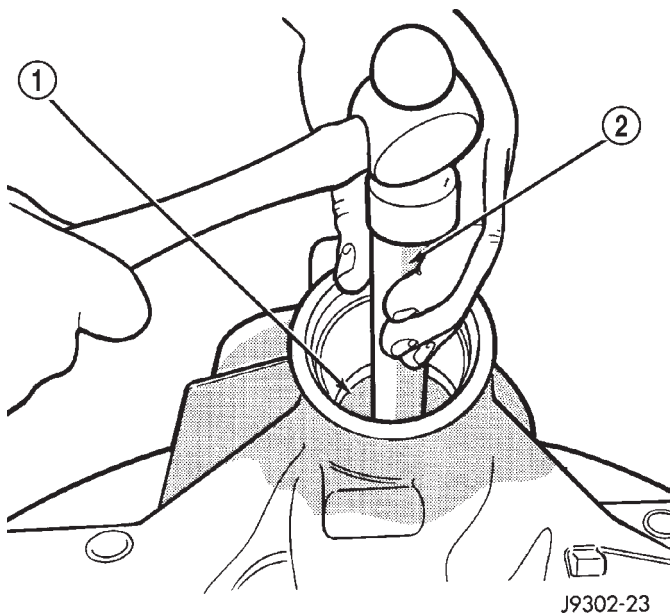
**Fig. 49 FRONT PINION BEARING CUP**

- 1 - REMOVER
2 - HANDLE

**Fig. 51 REAR PINION BEARING**

- 1 - PULLER
2 - VISE
3 - PINION SHAFT
4 - ADAPTER BLOCKS

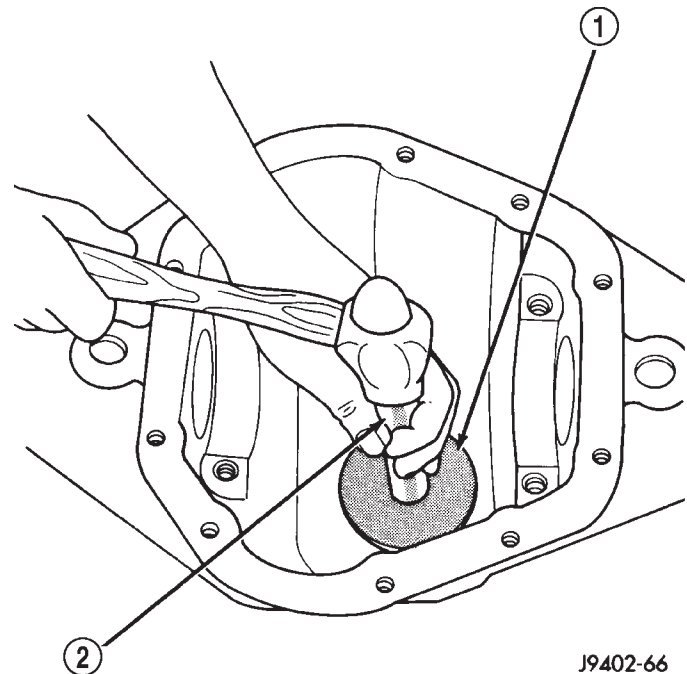
(2) Install rear pinion bearing cup with Installer C-111 and Handle C-4171 (Fig. 52) and verify cup is seated.

**Fig. 50 REAR BEARING CUP**

- 1 - REMOVER
2 - HANDLE

INSTALLATION

(1) Apply Mopar Door Ease stick lubricant or equivalent to the outside surface of bearing cups.

**Fig. 52 REAR PINION BEARING CUP**

- 1 - INSTALLER
2 - HANDLE

PINION GEAR/RING GEAR/TONE RING (Continued)

(3) Install front pinion bearing cup with Installer D-146 and Handle C-4171 (Fig. 53) and verify cup is seated.

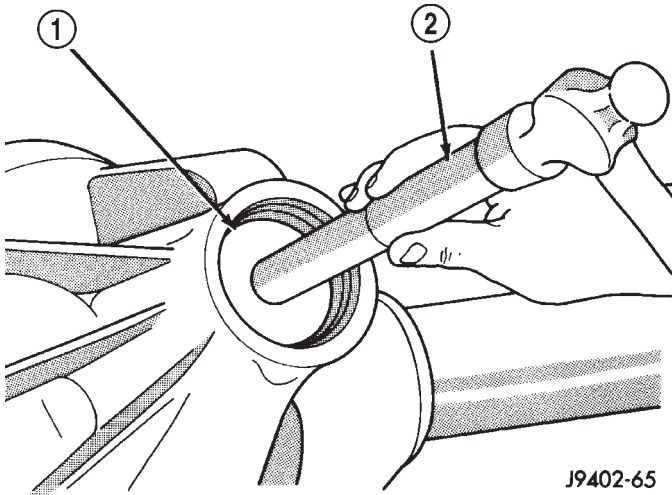


Fig. 53 FRONT PINION BEARING CUP

- 1 - INSTALLER
2 - HANDLE

(4) Install pinion front bearing and oil slinger, if equipped. Apply a light coating of gear lubricant on the lip of pinion seal.

(5) Install a **new** pinion seal with an appropriate installer (Fig. 54).

NOTE: Pinion depth shims are placed between the rear pinion bearing cone and pinion gear to achieve proper ring and pinion gear mesh. If ring and pinion gears are reused, the pinion depth shim should not require replacement. If the ring and pinion gears are replaced refer to Adjustments (Pinion Gear Depth) to select the proper thickness shim.

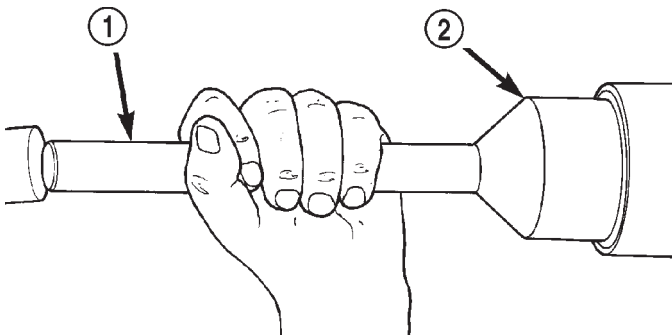


Fig. 54 PINION SEAL

- 1 - HANDLE
2 - INSTALLER

(6) Place the proper thickness pinion depth shim on the pinion gear.

(7) Install rear bearing and oil slinger, if equipped on the pinion gear with Installer C-3095-A and a press (Fig. 55).

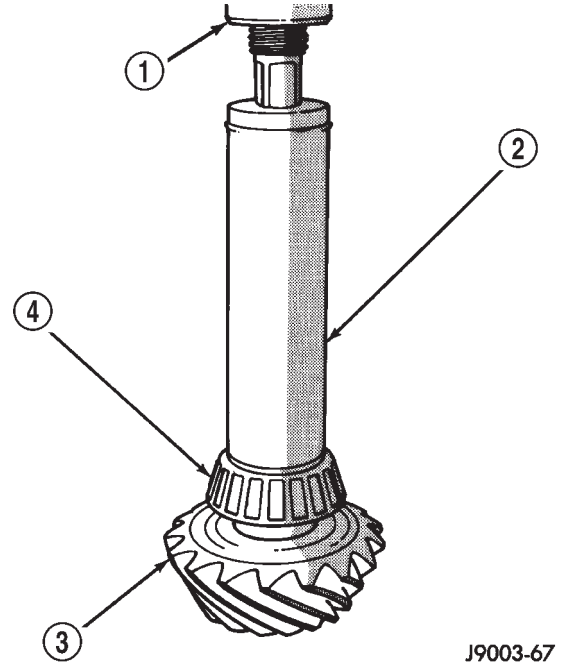


Fig. 55 REAR PINION BEARING

- 1 - PRESS
2 - INSTALLER
3 - PINION GEAR
4 - PINION BEARING

(8) Install original solid shims on pinion gears.

(9) Install yoke with Installer C-3718 and Yoke Holder 6719A (Fig. 56).

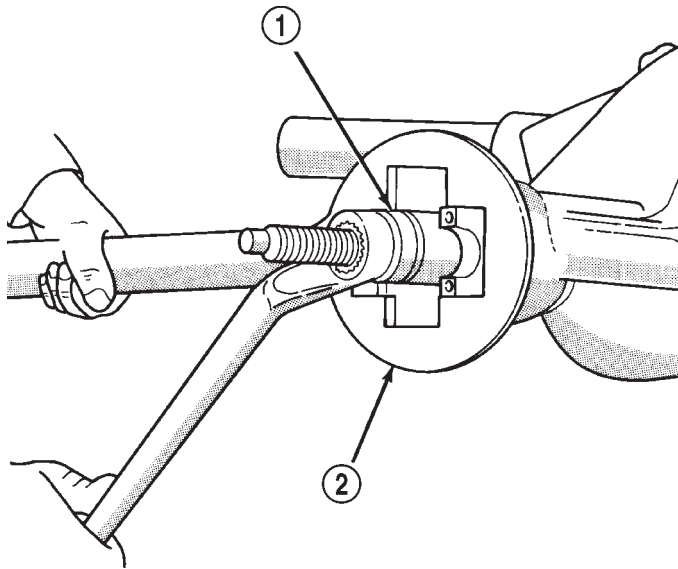
(10) Install the yoke washer and **new** nut on the pinion gear. Tighten the nut to 298-380 N·m (220-280 ft. lbs.).

(11) Check bearing rotating torque with an inch pound torque wrench (Fig. 57). Pinion rotating torque should be:

- Original Bearings: 1 to 3 N·m (10 to 20 in. lbs.).
- New Bearings: 2.3 to 5.1 N·m (20 to 45 in. lbs.).

(12) If rotating torque is less than the desired rotating torque, remove the pinion yoke and decrease the thickness of the solid shim pack if greater increase shim pack. Changing the shim pack thickness by 0.025 mm (0.001 in.) will change the rotating torque approximately 0.9 N·m (8 in. lbs.).

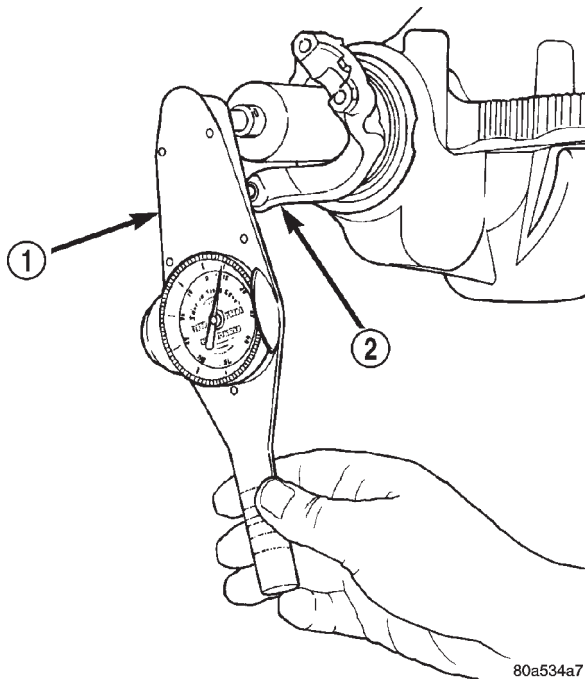
PINION GEAR/RING GEAR/TONE RING (Continued)



J9402-61

Fig. 56 PINION YOKE INSTALLER

- 1 - INSTALLER
2 - HOLDER



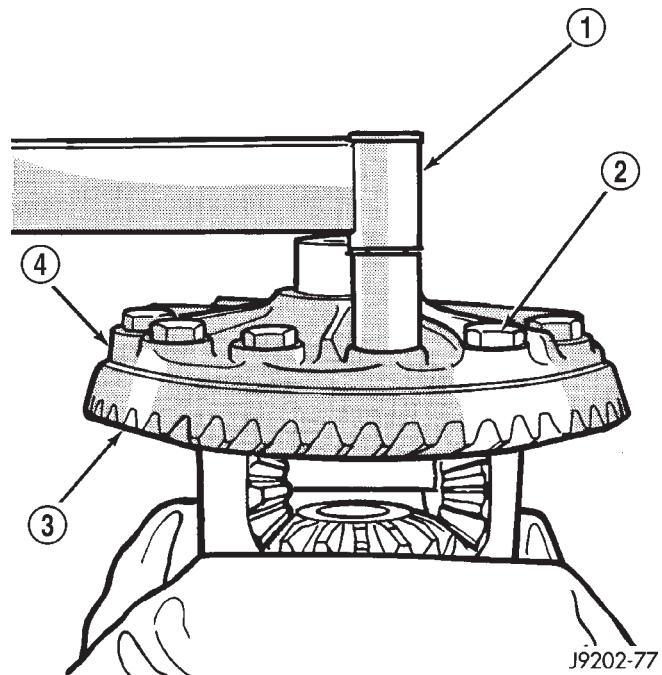
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Fig. 57 PINION ROTATING TORQUE

- 1 - TORQUE WRENCH
2 - PINION YOKE

- (13) Invert the differential case.
(14) Position exciter ring on differential case.
(15) Using a brass drift, slowly and evenly tap the exciter ring into position.
(16) Invert differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.
(17) Invert the differential case in the vise.
(18) Install **new** ring gear bolts and alternately tighten to 176 N·m (130 ft. lbs.) (Fig. 58).

CAUTION: Never reuse the ring gear bolts. The bolts can fracture causing extensive damage.



J9202-77

Fig. 58 RING GEAR BOLT

- 1 - TORQUE WRENCH
2 - RING GEAR BOLT
3 - RING GEAR
4 - CASE

- (19) Install differential in housing and verify gear mesh and contact pattern.
(20) Install differential cover and fill with gear lubricant.

REAR AXLE - 286RBI

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REAR AXLE - 286RBI

DESCRIPTION

The Rear Beam-design Iron (RBI) axle housings consist of an iron center casting (differential housing) with axle shaft tubes extending from either side. The tubes are pressed into the differential housing and welded. The axles are full-floating axle shafts, that are supported by the axle housing tubes. The full-float axle shafts are retained by bolts attached to the hub.

The differential case for the standard differential is a one-piece design. Differential bearing preload and ring gear backlash are adjusted by the use of shims located between the differential bearing cones and

case. Outboard protective spacers are located between the differential bearing cup and housing. Pinion bearing preload is set and maintained by the use of shims. Pinion height is controlled by a shim pack located under the inner pinion bearing cup. The differential cover provides a means for inspection and service.

Axles equipped with a Trac-Lok® differential are optional. The differential contains two clutch packs, four pinion gears, and a one-piece pinion mate cross shaft to provide increased torque to the non-slipping wheel in addition to the standard differential components. A Trac-lok® differential for the has a two-piece differential case.

REAR AXLE - 286RBI (Continued)

OPERATION

STANDARD DIFFERENTIAL

The axle receives power from the transmission/transfer case through the rear propeller shaft. The rear propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are splined to the axle 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).

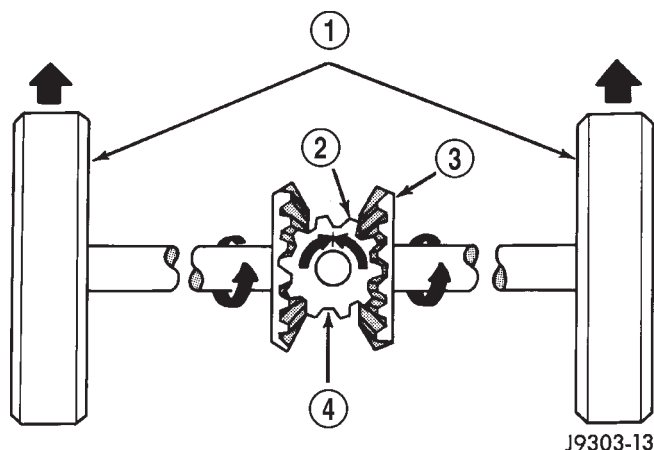


Fig. 1 STRAIGHT AHEAD DRIVING

- 1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
 2 - PINION GEAR
 3 - SIDE GEAR
 4 - PINION GEARS ROTATE WITH CASE

When turning corners, the outside wheel must travel a greater distance than the inside wheel 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.

TRAC-LOK™ DIFFERENTIAL

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

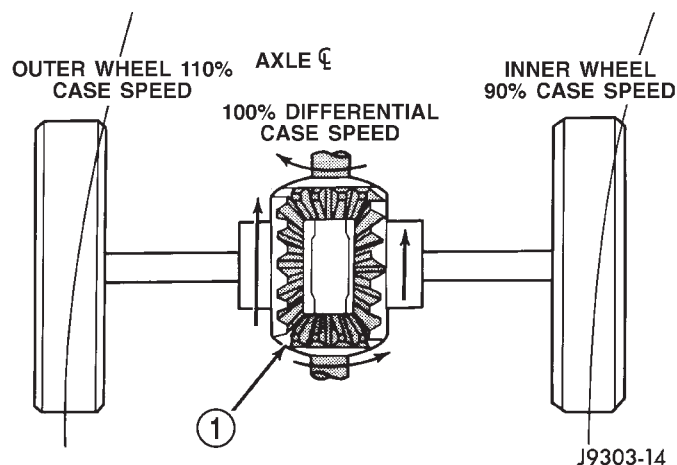


Fig. 2 ON TURNS

- 1 - PINION GEARS ROTATE ON PINION SHAFT

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

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 loses 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 loses traction. Pulling power is provided continuously until both wheels lose traction. If both wheels slip due to unequal traction, Trac-lok™ operation is normal. In extreme cases of differences of traction, the wheel with the least traction may spin.

DIAGNOSIS AND TESTING - AXLE

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

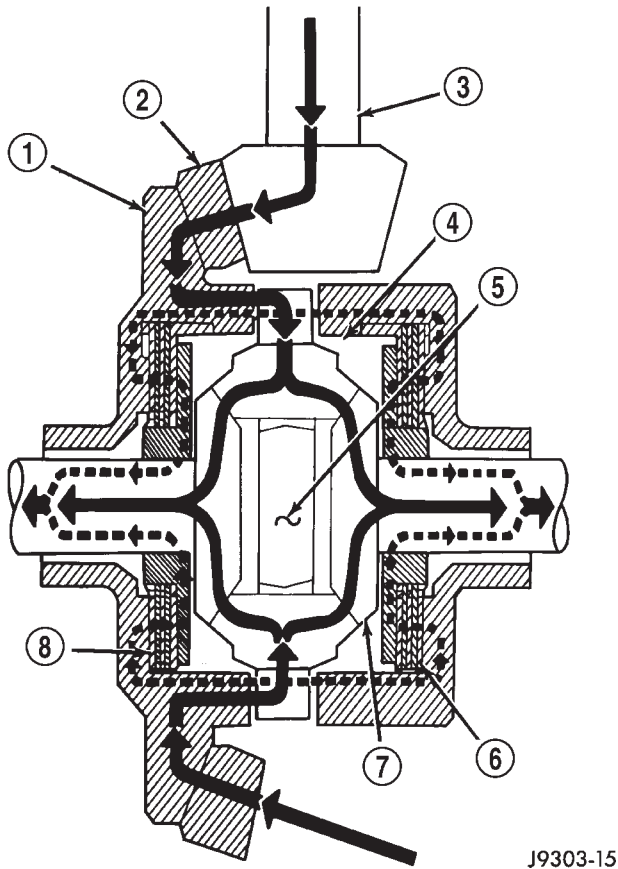
Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then 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 gears and pinions can be checked by turning the vehicle. They usually do not cause

REAR AXLE - 286RBI (Continued)



J9303-15

Fig. 3 TRAC-LOK LIMITED SLIP DIFFERENTIAL

- 1 - CASE
- 2 - RING GEAR
- 3 - DRIVE PINION
- 4 - PINION GEAR
- 5 - MATE SHAFT
- 6 - CLUTCH PACK
- 7 - SIDE GEAR
- 8 - CLUTCH PACK

noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion shaft can also cause a snapping or a knocking noise.

BEARING NOISE

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

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched 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 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(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 rearend vibration. Do not overlook engine accessories, brackets and drive belts.

NOTE: All driveline components should be examined before starting any repair.

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.
- Transmission shift operation.
- 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 to case clearance.

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

REAR AXLE - 286RBI (Continued)

DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose. 2. Faulty, brinelled wheel bearing.	1. Tighten loose nuts. 2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube. 2. Bent or sprung axle shaft.	1. Inspect axle tube alignment. Correct as necessary. 2. Inspect and correct as necessary.
Axle Shaft Broke	1. Misaligned axle tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch.	1. Replace the broken shaft after correcting tube mis-alignment. 2. Replace broken shaft and avoid excessive weight on vehicle. 3. Replace broken shaft and avoid or correct erratic clutch operation. 4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly. 2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly. 3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight. 4. Replace case and inspect gears and bearings for further 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. Fill differential with the correct fluid type and quantity. 2. Replace scored gears. Fill differential with the correct fluid type and quantity. 3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.

REAR AXLE - 286RBI (Continued)

Condition	Possible Causes	Correction
Loss Of Lubricant	1. Lubricant level too high. 2. Worn axle shaft seals. 3. Cracked differential housing. 4. Worn pinion seal. 5. Worn/scored yoke. 6. Axle cover not properly sealed.	1. Drain lubricant to the correct level. 2. Replace seals. 3. Repair as necessary. 4. Replace seal. 5. Replace yoke and seal. 6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low. 2. Improper grade of lubricant. 3. Bearing pre-loads too high. 4. Insufficient ring gear backlash.	1. Fill differential to correct level. 2. Fill differential with the correct fluid type and quantity. 3. Re-adjust bearing pre-loads. 4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavement. 4. Improper adjustments.	1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation. 3. Replace gears and examine remaining parts for damage. 4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant. 2. Improper ring gear and pinion adjustment. 3. Unmatched ring gear and pinion. 4. Worn teeth on ring gear and/or pinion. 5. Loose pinion bearings. 6. Loose differential bearings. 7. Mis-aligned or sprung ring gear. 8. Loose differential bearing cap bolts. 9. Housing not machined properly.	1. Fill differential with the correct fluid type and quantity. 2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth. 3. Replace gears with a matched ring gear and pinion. 4. Replace ring gear and pinion. 5. Adjust pinion bearing pre-load. 6. Adjust differential bearing pre-load. 7. Measure ring gear run-out. Replace components as necessary. 8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification. 9. Replace housing.

REAR AXLE - 286RBI (Continued)

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 RWAL sensor from the differential housing, if necessary.
- (6) Disconnect the brake hose at the axle junction block.
- (7) Disconnect the parking brake cables and cable brackets.
- (8) Disconnect the vent hose from the axle shaft tube.
- (9) Mark the propeller shaft and companion flange for installation alignment reference.
- (10) Remove propeller shaft.
- (11) Disconnect shock absorbers from axle.
- (12) Remove the spring clamps and spring brackets.
- (13) Separate the axle from the vehicle.

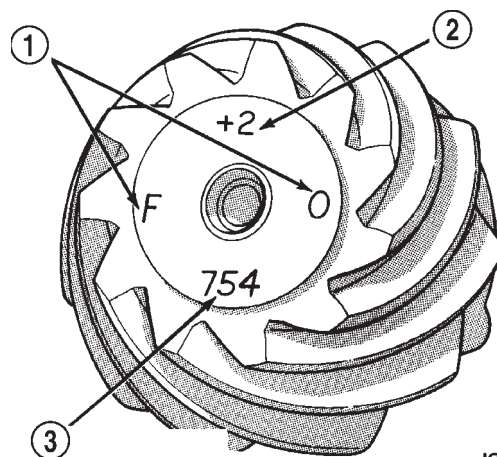
INSTALLATION

- (1) Raise the axle with lifting device and align to the leaf spring centering bolts.
- (2) Install the spring clamps and spring brackets.
- (3) Install the shock absorbers.
- (4) Install the RWAL sensor to the differential housing, if necessary.
- (5) Install the parking brake cables and cable brackets.
- (6) Install the brake hose to the axle junction block.
- (7) Install axle vent hose.
- (8) Install the propeller shaft with reference marks aligned.
- (9) Install the wheels and tires.
- (10) Add gear lubricant, if necessary. Refer to Specifications for lubricant requirements.
- (11) Remove lifting device from axle and lower the vehicle.

ADJUSTMENTS

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. 4). 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 147.625 mm (5.812 in.). The standard depth provides the best teeth contact pattern. Refer to Backlash and Contact Pattern Analysis Paragraph in this section for additional information.

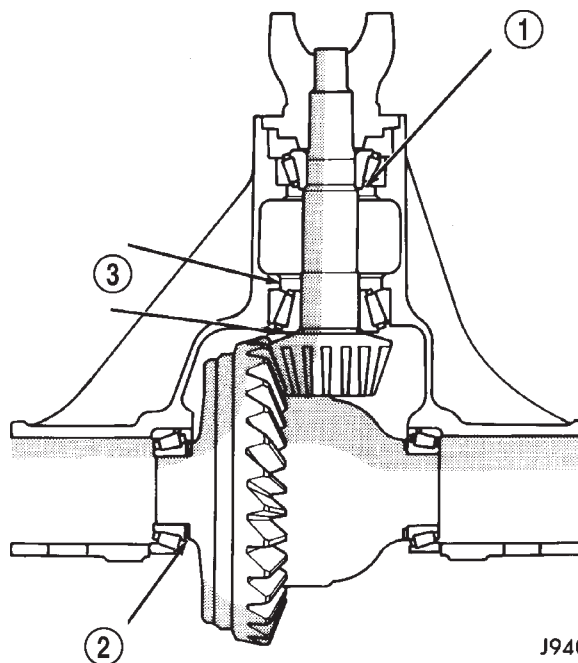
Compensation for pinion depth variance is achieved with select shims. The shims are placed under the inner pinion bearing cone (Fig. 5).



J9003-100

Fig. 4 PINION GEAR ID NUMBERS

- 1 - PRODUCTION NUMBERS
- 2 - PINION GEAR DEPTH VARIANCE
- 3 - GEAR MATCHING NUMBER



J9403-64

Fig. 5 SHIM LOCATIONS

- 1 - PINION BEARING PRELOAD SHIM
- 2 - DIFFERENTIAL BEARING SHIM
- 3 - PINION GEAR DEPTH SHIM

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.

Note the etched number on the face of the drive pinion gear (-1, -2, 0, +1, +2, etc.). The numbers represent

REAR AXLE - 286RBI (Continued)

thousands of an inch deviation from the standard. If the number is negative, add that value to the required thickness of the depth shim(s). If the number is posi-

tive, subtract that value from the thickness of the depth shim(s). If the number is 0 no change is necessary. Refer to the Pinion Gear Depth Variance Chart.

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

PINION DEPTH MEASUREMENT AND ADJUSTMENT

Measurements are taken with pinion cups and pinion bearings installed in housing. Take measurements with a Pinion Gauge Set 6730 and Dial Indicator C-3339 (Fig. 6).

(1) Assemble Pinion Height Block 6739, Pinion Block 6738 and rear pinion bearing onto Screw 6741 (Fig. 6).

(2) Insert assembled height gauge components, rear bearing and screw into the housing through pinion bearing cups (Fig. 7).

(3) Install front pinion bearing and Cone 6740 hand tight (Fig. 6).

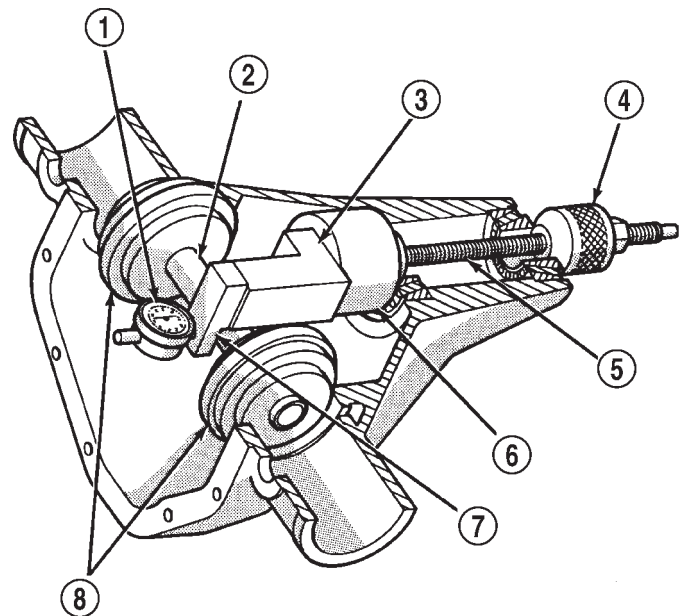
(4) Place Arbor Disc 6732 on Arbor D-115-3 in position in the housing side bearing cradles (Fig. 8). Install differential bearing caps on Arbor Discs and snug the bearing cap bolts. Then tighten cap bolts in a criss-cross pattern to 108 N·m (80 ft. lbs.).

NOTE: Arbor Discs 6732 have different step diameters to fit other axle sizes. Pick correct size step for axle being serviced.

(5) Assemble Dial Indicator C-3339 into Scooter Block D-115-2 and secure set screw.

(6) Position Scooter Block/Dial Indicator flush on the pinion height block. Hold scooter block and zero the dial indicator.

(7) Slowly slide the scooter block across the pinion height block over to the arbor (Fig. 9). Move the scooter block till dial indicator crests the arbor, then record the highest reading.

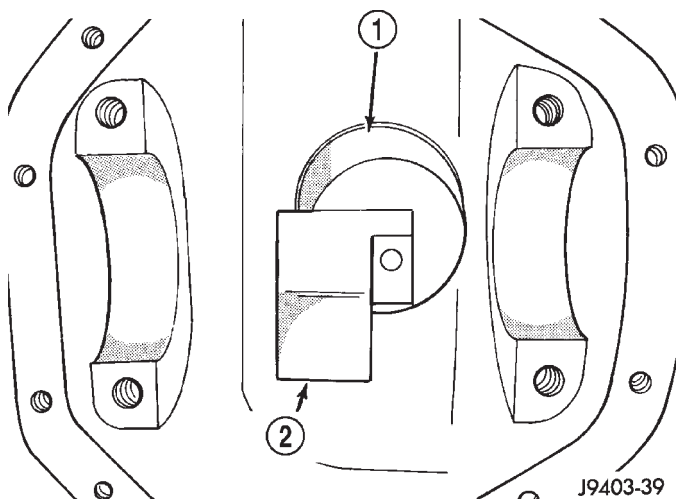


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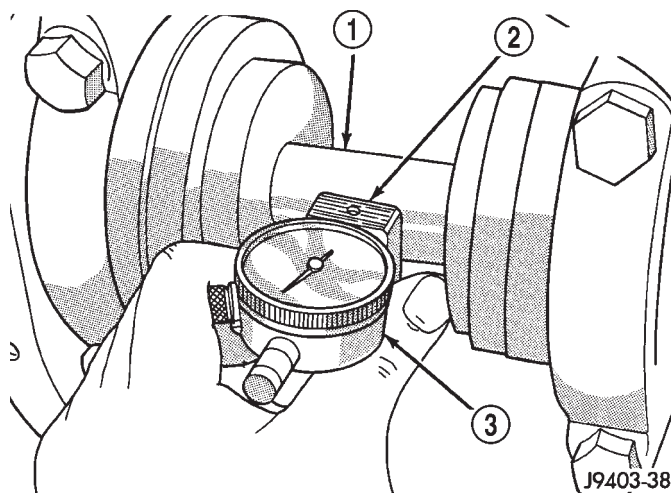
Fig. 6 PINION GEAR DEPTH GAUGE

- 1 - DIAL INDICATOR
- 2 - ARBOR
- 3 - PINION HEIGHT BLOCK
- 4 - CONE
- 5 - SCREW
- 6 - PINION BLOCK
- 7 - SCOOTER BLOCK
- 8 - ARBOR DISC

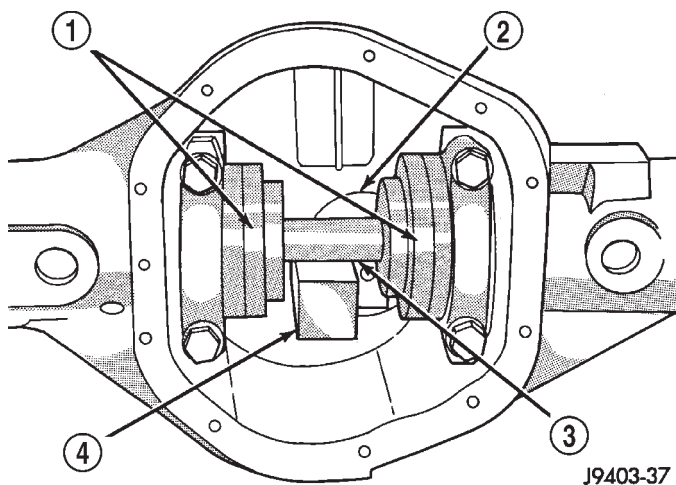
REAR AXLE - 286RBI (Continued)

**Fig. 7 PINION HEIGHT BLOCK**

- 1 - PINION BLOCK
- 2 - PINION HEIGHT BLOCK

**Fig. 9 PINION DEPTH MEASUREMENT**

- 1 - ARBOR
- 2 - SCOOTER BLOCK
- 3 - DIAL INDICATOR

**Fig. 8 GAUGE TOOLS IN HOUSING**

- 1 - ARBOR DISC
- 2 - PINION BLOCK
- 3 - ARBOR
- 4 - PINION HEIGHT BLOCK

(8) Select a shim equal to the dial indicator reading plus the drive pinion gear depth variance number etched in the face of the pinion gear (Fig. 4) using the opposite sign on the variance number. For example, if the depth variance is -2, add +0.002 in. to the dial indicator reading.

(9) Remove the pinion depth gauge components from the axle housing

DIFFERENTIAL BEARING PRELOAD AND GEAR BACKLASH

Differential side bearing preload and gear backlash is achieved by selective shims positioned behind the

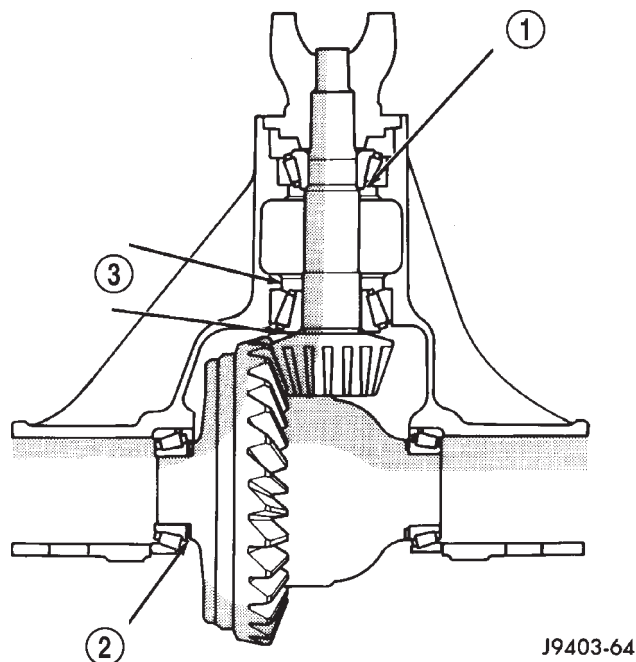
differential side bearing cones. The proper shim thickness can be determined using slip-fit dummy bearings D-346 in place of the differential side bearings and a dial indicator C-3339. Before proceeding with the differential bearing preload and gear backlash measurements, measure the pinion gear depth and prepare the pinion gear for installation. Establishing proper pinion gear depth is essential to establishing gear backlash and tooth contact patterns. After the overall shim thickness to take up differential side play is measured, the pinion gear is installed, and the gear backlash shim thickness is measured. The overall shim thickness is the total of the dial indicator reading and the preload specification added together. The gear backlash measurement determines the thickness of the shim used on the ring gear side of the differential case. Subtract the gear backlash shim thickness from the total overall shim thickness and select that amount for the pinion gear side of the differential (Fig. 10). Differential shim measurements are performed with axle spreader W-129-B removed.

SHIM SELECTION

NOTE: It is difficult to salvage the differential side bearings during the removal procedure. Install replacement bearings if necessary.

- (1) Remove differential side bearings from differential case.
- (2) Remove factory installed shims from differential case.
- (3) Install ring gear on differential case and tighten bolts to specification, if necessary.

REAR AXLE - 286RBI (Continued)

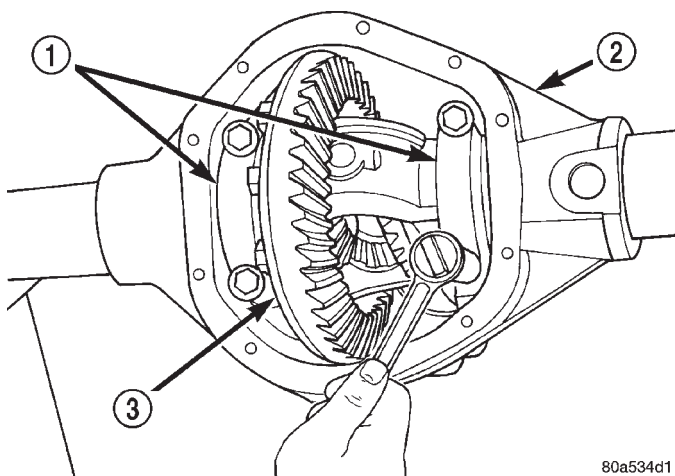
**Fig. 10 SHIM LOCATIONS**

- 1 - PINION BEARING PRELOAD SHIM
- 2 - DIFFERENTIAL BEARING SHIM
- 3 - PINION GEAR DEPTH SHIM

(4) Install dummy side bearings D-346 on differential case.

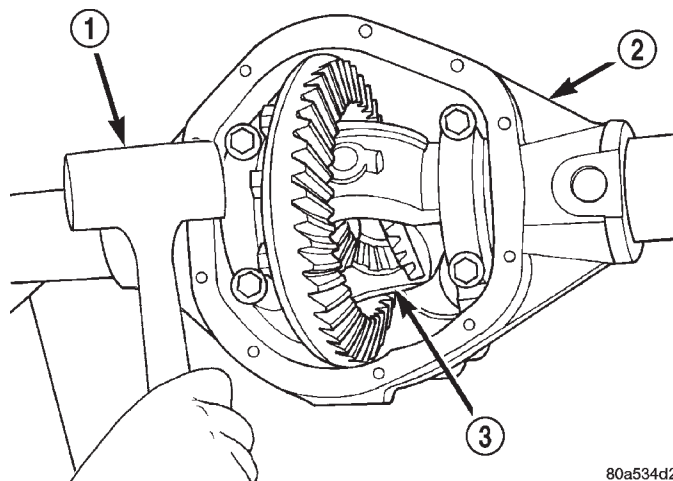
(5) Install differential case in the housing.

(6) Install the marked bearing caps in their correct positions. Install and snug the bolts (Fig. 11).

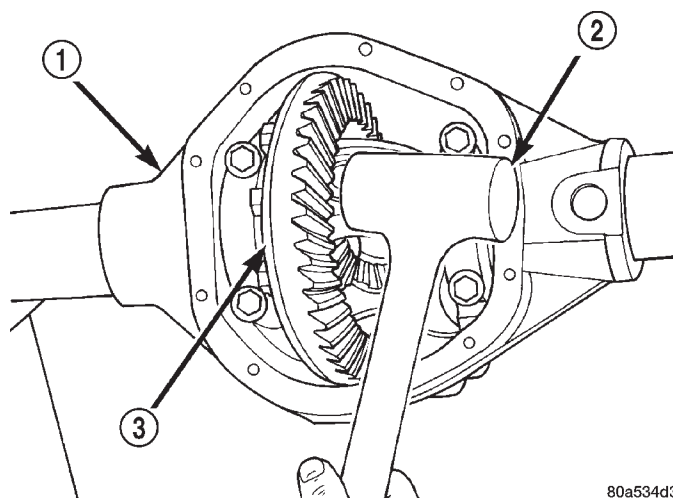
**Fig. 11 BEARING CAP BOLTS**

- 1 - BEARING CAP
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE

(7) Using a dead-blow hammer, seat the differential dummy bearings to each side of the housing (Fig. 12) and (Fig. 13).

**Fig. 12 SEAT PINION GEAR SIDE BEARING**

- 1 - DEAD-BLOW HAMMER
- 2 - DIFFERENTIAL HOUSING
- 3 - DIFFERENTIAL CASE

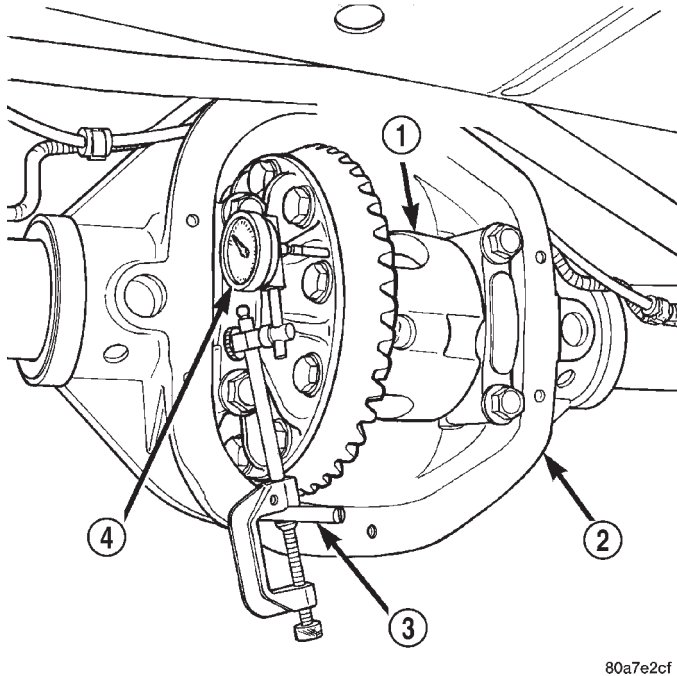
**Fig. 13 SEAT RING GEAR SIDE BEARING**

- 1 - DIFFERENTIAL HOUSING
- 2 - DEAD-BLOW HAMMER
- 3 - DIFFERENTIAL CASE

REAR AXLE - 286RBI (Continued)

(8) Thread Pilot Stud C-3288-B into rear cover bolt hole below ring gear (Fig. 14).

(9) Attach a dial indicator C-3339 to pilot stud. Position the dial indicator plunger on a flat surface between the ring gear bolt heads (Fig. 14).



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Fig. 14 DIFFERENTIAL SIDE PLAY MEASUREMENT

- 1 - DIFFERENTIAL CASE
- 2 - DIFFERENTIAL HOUSING
- 3 - PILOT STUD
- 4 - DIAL INDICATOR

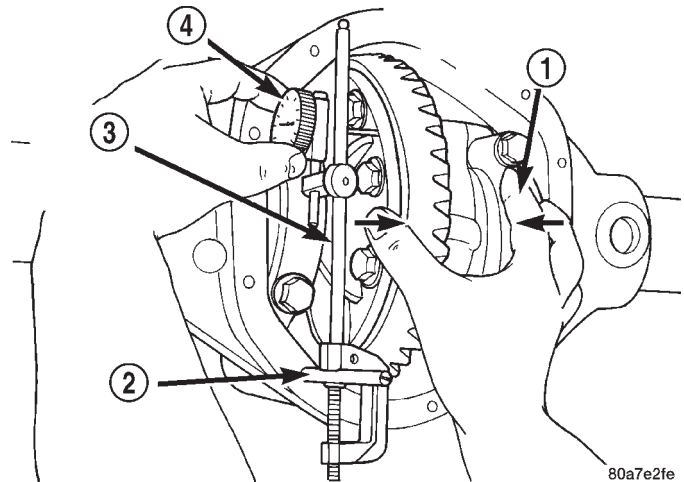
(10) Push and hold differential case to pinion gear side of the housing and zero dial indicator (Fig. 15).

(11) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 16).

(12) Add 0.254mm (0.010 in.) to the zero end play total. This total represents the thickness of shims to preload the new bearings when the differential is installed.

(13) Rotate dial indicator out of the way on the pilot stud.

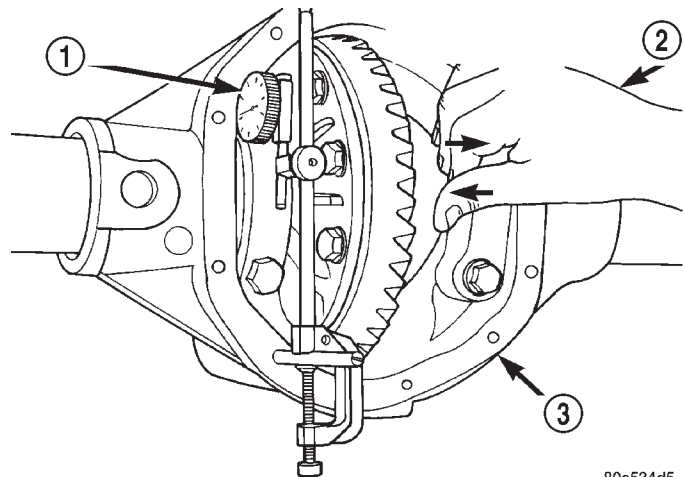
(14) Remove differential case and dummy bearings from the housing.



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Fig. 15 DIAL INDICATOR LOCATION

- 1 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 2 - PILOT STUD
- 3 - DIAL INDICATOR EXTENSION
- 4 - DIAL INDICATOR FACE



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Fig. 16 DIFFERENTIAL CASE AND DIAL INDICATOR

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - DIFFERENTIAL HOUSING

(15) Install the pinion gear in axle housing. Install the pinion yoke, or flange, and establish the correct pinion rotating torque.

(16) Install differential case and Dummy Bearings D-346 in the housing (without shims), install bearing caps and tighten bolts snug.

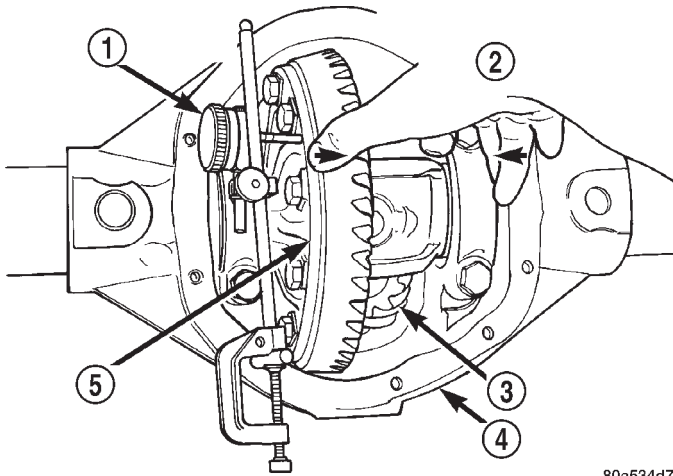
(17) Seat ring gear side dummy bearing (Fig. 12).

(18) Position the dial indicator plunger on a flat surface between the ring gear bolt heads. (Fig. 14).

REAR AXLE - 286RBI (Continued)

(19) Push and hold differential case toward pinion gear (Fig. 17).

(20) Zero dial indicator face to pointer (Fig. 17).

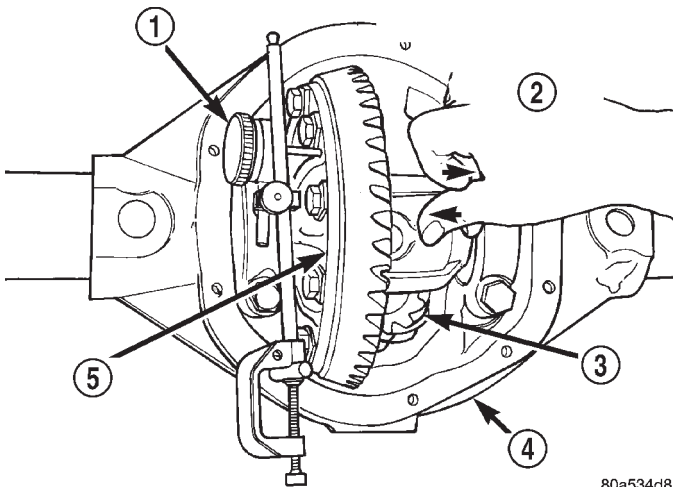


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Fig. 17 PINION GEAR SIDE

- 1 - DIAL INDICATOR FACE
- 2 - DIFFERENTIAL CASE TO PINION GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

(21) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 18).



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Fig. 18 RING GEAR SIDE

- 1 - DIAL INDICATOR
- 2 - DIFFERENTIAL CASE TO RING GEAR SIDE
- 3 - PINION GEAR
- 4 - DIFFERENTIAL HOUSING
- 5 - DIFFERENTIAL CASE

(22) This is the thickness shim required on the ring gear side of the differential case to achieve proper backlash.

(23) Subtract the backlash shim thickness from the total preload shim thickness. The remainder is the shim thickness required on the pinion side of the housing.

(24) Rotate dial indicator out of the way on pilot stud.

(25) Remove differential case and dummy bearings from the housing.

(26) Install side bearing shims on differential case hubs.

(27) Install side bearings and cups on differential case.

(28) Install spreader W-129-B on the housing and spread housing enough to install differential case.

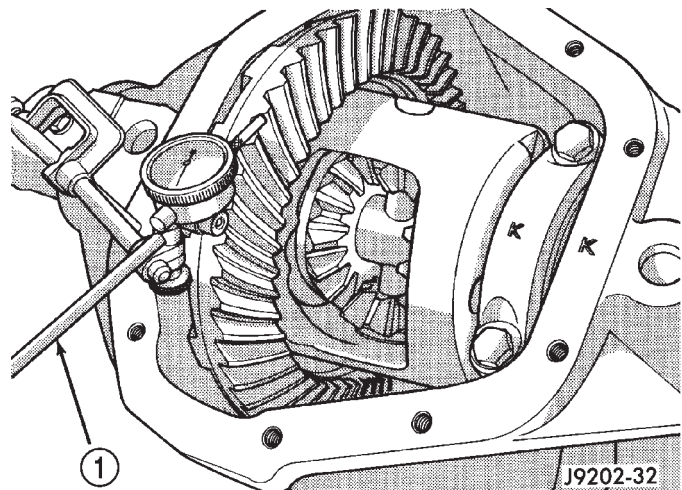
CAUTION: Do not spread over 0.50 mm (0.020 in). If the housing is over-spread, it could be distorted or damaged.

(29) Install differential case in the housing.

(30) Remove spreader from the housing.

(31) Rotate the differential case several times to seat the side bearings.

(32) Position the indicator plunger against a ring gear tooth (Fig. 19).



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Fig. 19 RING GEAR BACKLASH

- 1 - DIAL INDICATOR

REAR AXLE - 286RBI (Continued)

(33) Push and hold ring gear upward while not allowing the pinion gear to rotate.

(34) Zero dial indicator face to pointer.

(35) Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.12 mm (0.005 in.) and 0.20 mm (0.008 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the axle housing to the other (Fig. 20).

(36) Verify differential case and ring gear runout by measuring ring to pinion gear backlash at several locations around the ring gear. Readings should not vary more than 0.05 mm (0.002 in.). If readings vary more than specified, the ring gear or the differential case is defective.

After the proper backlash is achieved, perform Gear Contact Pattern Analysis procedure.

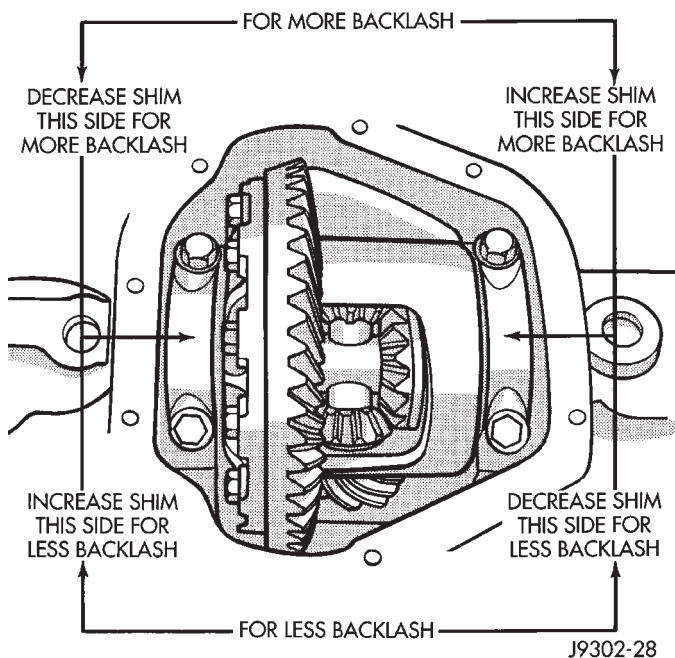


Fig. 20 BACKLASH SHIM ADJUSTMENT

GEAR CONTACT PATTERN ANALYSIS

The ring gear and pinion teeth contact patterns will show if the pinion depth is correct in the axle housing. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

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

(2) Wrap, twist, and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.

(3) Using a boxed end wrench on a ring gear bolt, Rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeeze the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart (Fig. 21) and adjust pinion depth and gear backlash as necessary.

REAR AXLE - 286RBI (Continued)

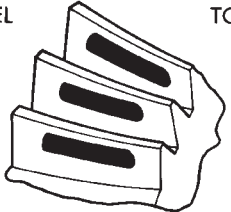
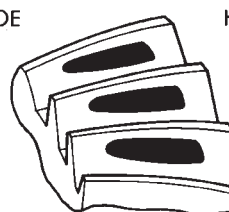
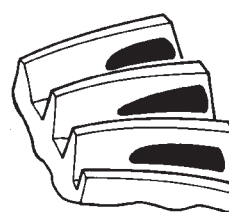
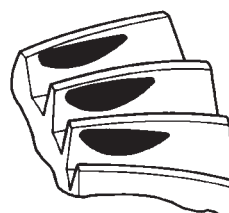
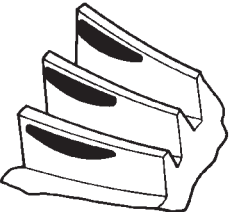
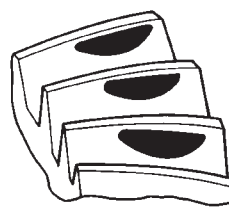
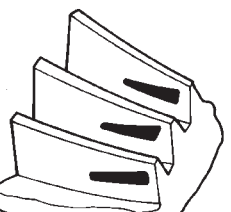
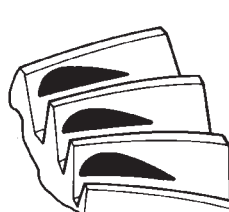
DRIVE SIDE OF RING GEAR TEETH HEEL TOE 	COAST SIDE OF RING GEAR TEETH TOE HEEL 	DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT 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.

Fig. 21 GEAR TOOTH CONTACT PATTERN

REAR AXLE - 286RBI (Continued)

SPECIFICATIONS

REAR AXLE - 286RBI

AXLE SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Axle Ratio	3.55, 4.10
Ring Gear Diameter	286 mm (11.25 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Pinion Gear Standard Depth	147.625 mm (5.812 in.)
Pinion Bearing Preload - Original Bearings	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearings	2.8-5.1 N·m (25-45 in. lbs.)

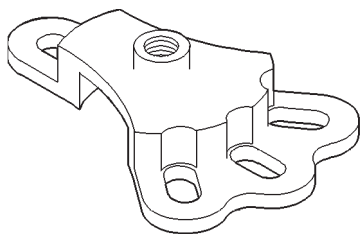
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fill Hole Plug	34	25	-
Differential Cover Bolts	47	35	-
Bearing Cap Bolts	108	80	-
Ring Gear Bolt	298	220	-
Pinion Nut	637-678	470-500	-
Axle Shaft Bolts	128	95	-
Trac-Loc® Case Bolts	122-136	90-100	-
* Hub Bearing Nut	163-190	120-140	-

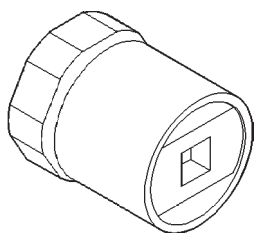
* Torque to spec. then back off nut 1/8 to 1/3 turn and install locking wedge.

SPECIAL TOOLS

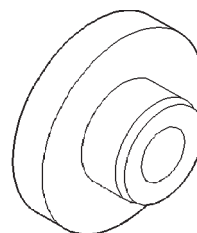
REAR AXLE - 286 RBI



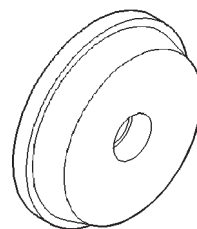
Puller, Hub 6790



Wrench DD-1241-JD

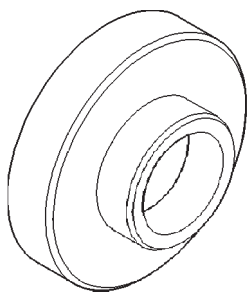


Installer 5064

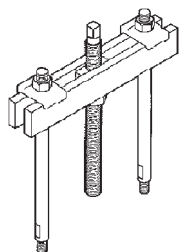


Installer C-4308

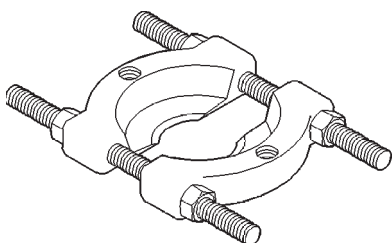
REAR AXLE - 286RBI (Continued)



Installer, Seal 8152

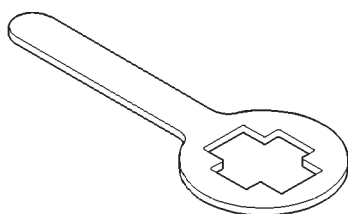


Bridge 938

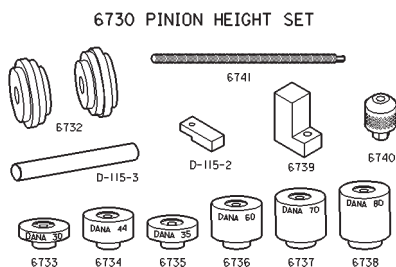


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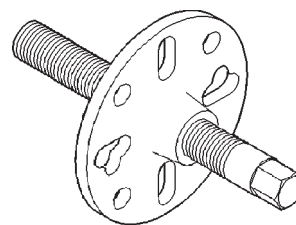
Splitter, Bearing 1130



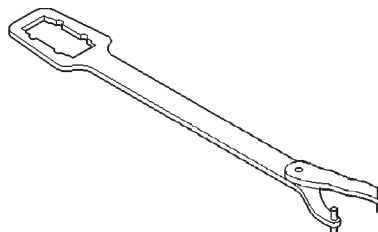
Holder, Yoke 6719



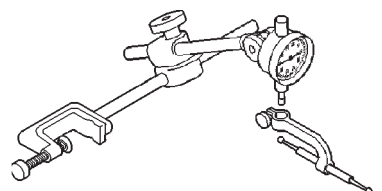
Gauge, Pinion Depth Setting 6730



Puller C-452

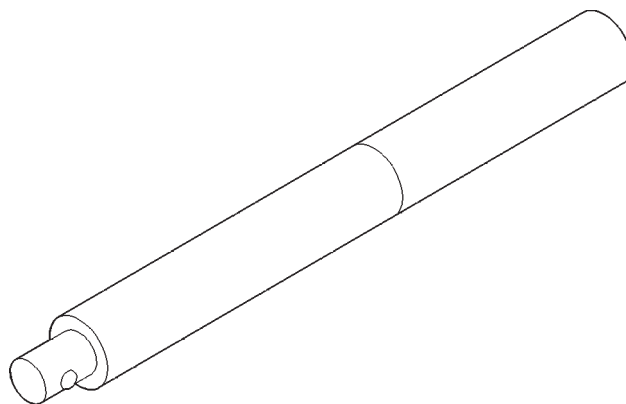


Wrench C-3281

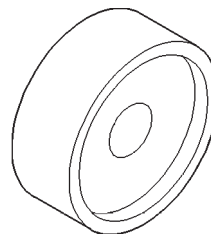


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Dial Indicator Set C-3339

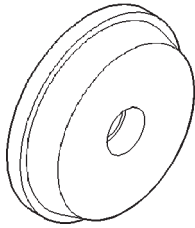


Handle C-4171

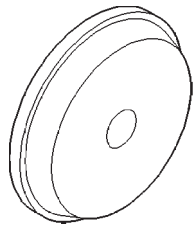


Installer C-4190

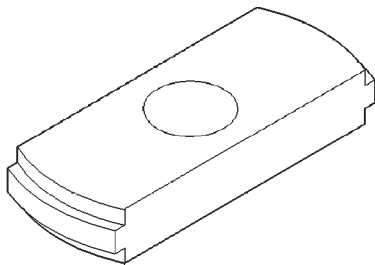
REAR AXLE - 286RBI (Continued)



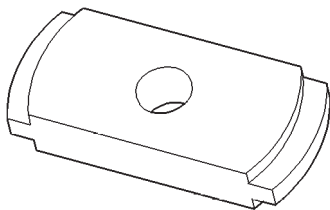
Installer C-4308



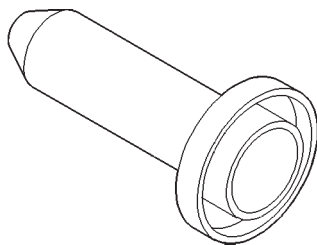
Installer C-4204



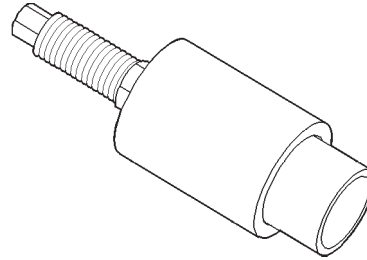
Remover C-4307



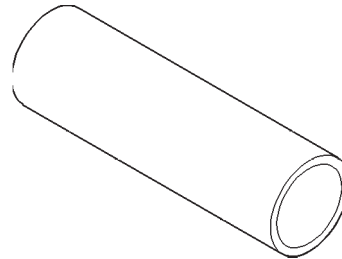
Remover D-159



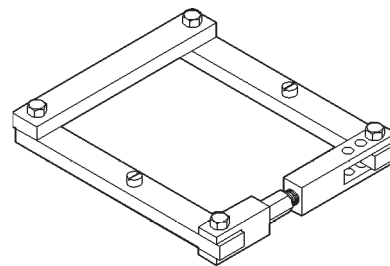
Installer D-187-B



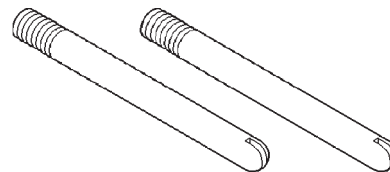
Installer D-191



Installer D-389



Spreader W-129-B



Pilot Studs C-3288-B

AXLE SHAFTS

REMOVAL

- (1) Remove the axle shaft flange bolts.
- (2) Slide the axle shaft out from the axle tube.

INSTALLATION

- (1) Clean the gasket contact surface area on the flange with an appropriate solvent. Install a new flange gasket and slide the axle shaft into the tube.
- (2) Install the bolts and tighten to 129 N·m (95 ft. lbs.).

AXLE BEARINGS

REMOVAL

- (1) Remove wheel and tire assembly.
- (2) Remove brake drum.
- (3) Remove the axle shaft.
- (4) Remove the lock wedge and adjustment nut. Remove adjustment nut with Socket DD-1241-JD.
- (5) Remove the hub assembly. The outer axle bearing will slide out as the hub is being removed.
- (6) Drive grease seal and inner bearing out of the hub with Installer 5064 and Handle C-4171.
- (7) Remove bearing cups from the hub with a brass drift and a hammer.

INSTALLATION

- (1) Thoroughly clean both axle bearings and interior of the hub with an appropriate cleaning solvent.
- (2) Install bearing cups with Installer 8153 and Handle C-4171.
- (3) Pack inner and outer bearings with Mopar wheel bearing grease or equivalent.
- (4) Apply lubricant to surface area of the bearing cup.
- (5) Install inner axle bearing in the hub.
- (6) Install a **new** bearing grease seal with Installer 8152 and Handle C-4171.
- (7) Inspect bearing and seal contact surfaces on the axle tube spindle for burrs and/or roughness. Remove all the rough contact surfaces from the axle spindle.

CAUTION: Do not let grease seal contact the axle tube threads during installation.

- (8) Carefully slide the hub onto the axle.
- (9) Install outer axle bearing.
- (10) Install hub bearing adjustment nut with Socket DD-1241-JD.
- (11) Tighten adjustment nut to 163-190 N·m (120-140 ft. lbs.) while rotating the wheel.

- (12) Loosen adjustment nut 1/8 of-a-turn to provide 0.001-inch to 0.010-inch wheel bearing end play.
- (13) Tap the locking wedge into the spindle keyway and adjustment nut.

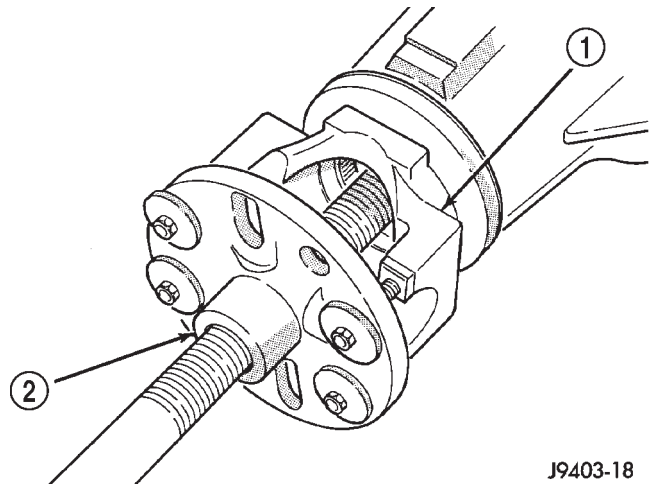
NOTE: Locate locking wedge in a new position in the adjustment nut.

- (14) Install axle shaft and brake drum.
- (15) Install wheel and tire assembly.

PINION SEAL

REMOVAL

- (1) Raise and support the vehicle.
- (2) Mark the universal joint, pinion yoke, and pinion shaft for installation reference.
- (3) Disconnect the propeller shaft from the pinion yoke. Secure the propeller shaft in an upright position to prevent damage to the rear universal joint.
- (4) Remove wheel and tire assemblies.
- (5) Remove brake calipers to prevent any drag. The drag may cause a false bearing preload torque measurement.
- (6) Rotate pinion yoke three or four times.
- (7) Record the amount of torque necessary to rotate the pinion gear with an inch pound dial-type torque wrench.
- (8) Hold the yoke with Holder 6719A and remove the pinion shaft nut and washer.
- (9) Remove yoke from the pinion with Remover C-452 (Fig. 22).



J9403-18

Fig. 22 Yoke Removal

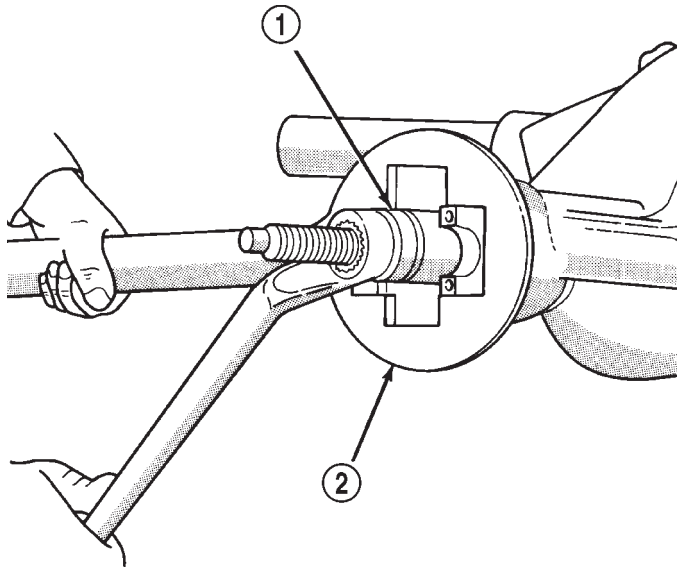
- 1 - PINION YOKE
2 - REMOVER

- (10) Remove pinion shaft seal with suitable pry tool or slide-hammer mounted screw.

PINION SEAL (Continued)

INSTALLATION

- (1) Clean the seal contact surface in the housing bore.
- (2) Apply a light coating of gear lubricant on the lip of pinion seal.
- (3) Install **new** pinion shaft seal with an appropriate Installer.
- (4) Position pinion yoke on the end of the shaft with the reference marks aligned.
- (5) Install the yoke with Installer D-191 and Yoke Holder 6719A (Fig. 23).



J9402-61

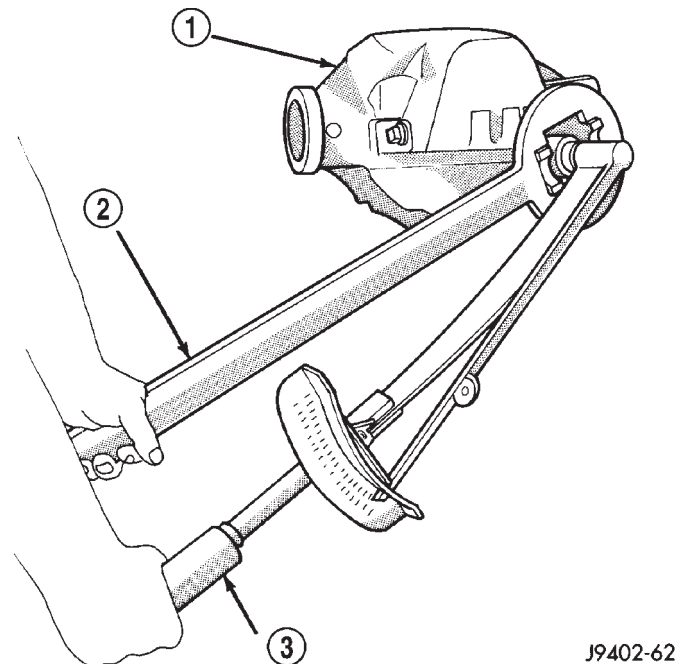
Fig. 23 Pinion Yoke Installation

- 1 - INSTALLER
- 2 - YOKE HOLDER

- (6) Install the pinion yoke washer and nut.
- (7) Hold pinion yoke with Yoke Holder 6719A and tighten shaft nut to 597 N·m (440 ft. lbs.) (Fig. 24). Rotate pinion shaft several revolutions to ensure the bearing rollers are seated.
- (8) Rotate pinion shaft using an inch pound torque wrench. Rotating resistance torque should be equal to the reading recorded, plus a small amount for the drag the new seal will have (Fig. 25).

NOTE: The bearing rotating torque should be constant during a complete revolution of the pinion. If the rotating torque varies, this indicates a binding condition.

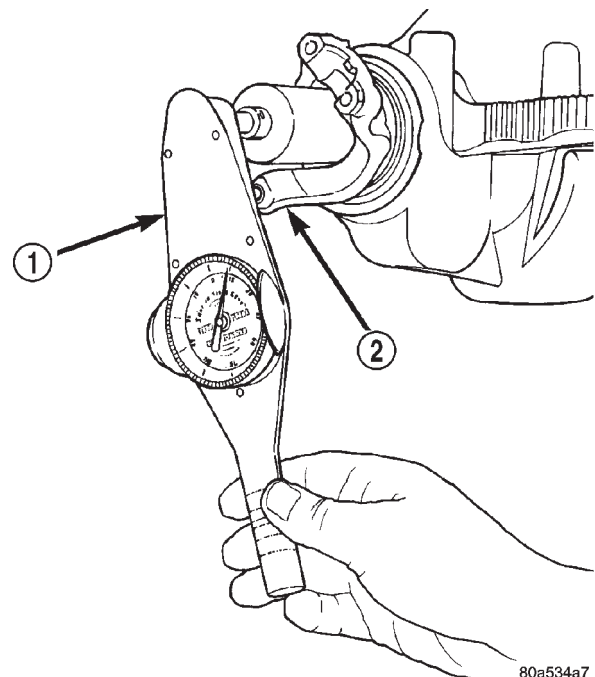
- (9) Install propeller shaft with the installation reference marks aligned.
- (10) Install the brake calipers.



J9402-62

Fig. 24 Tightening Pinion Shaft Nut

- 1 - DIFFERENTIAL HOUSING
- 2 - YOKE HOLDER
- 3 - TORQUE WRENCH



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Fig. 25 Pinion Rotating Torque

- 1 - TORQUE WRENCH
- 2 - PINION YOKE

- (11) Add gear lubricant to the differential housing, if necessary.

PINION SEAL (Continued)

(12) Install wheel and tire assemblies and lower the vehicle.

DIFFERENTIAL

REMOVAL

- (1) Raise and support the vehicle.
- (2) Remove fill hole plug from the differential housing cover.
- (3) Remove differential housing cover and drain 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 axle shafts.
- (6) Note the orientation of the installation reference letters stamped on the bearing caps and housing machined sealing surface (Fig. 26).

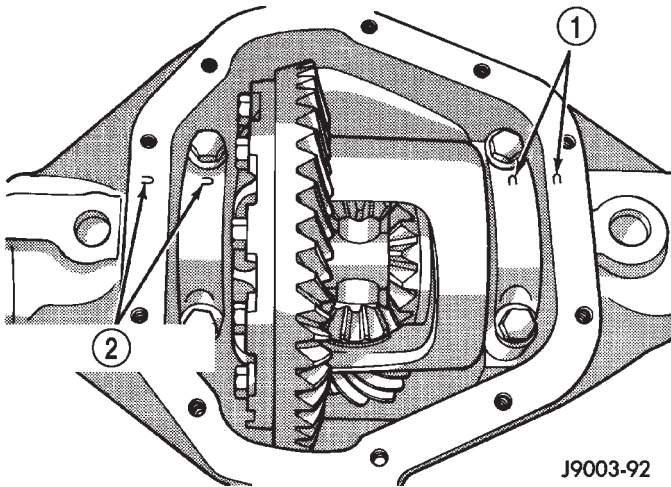


Fig. 26 BEARING CAP IDENTIFICATION

- 1 - REFERENCE LETTERS
- 2 - REFERENCE LETTERS

- (7) Remove the differential bearing caps.
- (8) Position Spreader W-129-B with the tool dowel pins seated in the locating holes (Fig. 27).
- (9) Install the hold down clamps and tighten the tool turnbuckle finger-tight.
- (10) Install a Pilot Stud C-3288-B 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.
- (11) Spread the housing enough to remove the case from the housing. Measure the distance with the dial indicator (Fig. 27).

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

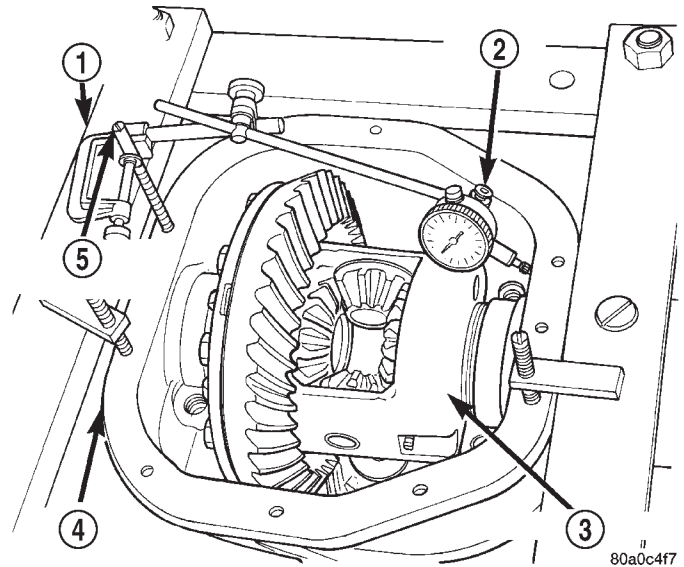


Fig. 27 SPREAD DIFFERENTIAL HOUSING

- 1 - SPREADER
- 2 - DIAL INDICATOR
- 3 - DIFFERENTIAL
- 4 - DIFFERENTIAL HOUSING
- 5 - PILOT STUD

- (12) Remove the dial indicator.
- (13) 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).

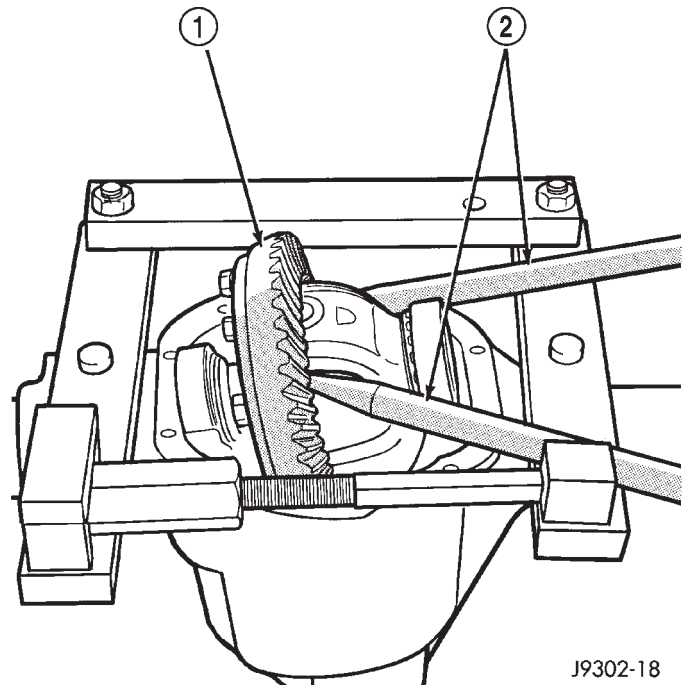


Fig. 28 DIFFERENTIAL REMOVAL

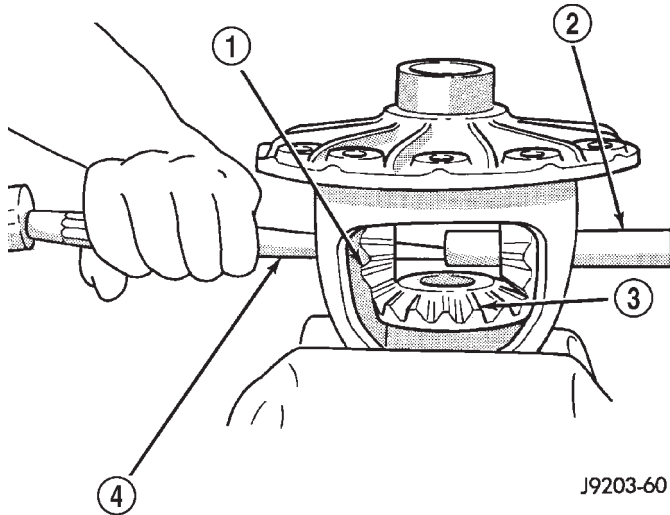
- 1 - DIFFERENTIAL
- 2 - PRY BAR

DIFFERENTIAL (Continued)

(14) Remove the case from housing. Tag bearing cups to indicate their location.

DISASSEMBLY

- (1) Remove roll-pin holding mate shaft in housing.
- (2) Remove pinion gear mate shaft (Fig. 29).
- (3) Rotate differential side gears and remove pinion mate gears and thrust washers (Fig. 30).



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Fig. 29 PINION MATE SHAFT

- 1 - PINION MATE GEAR
- 2 - PINION MATE SHAFT
- 3 - SIDE GEAR
- 4 - DRIFT

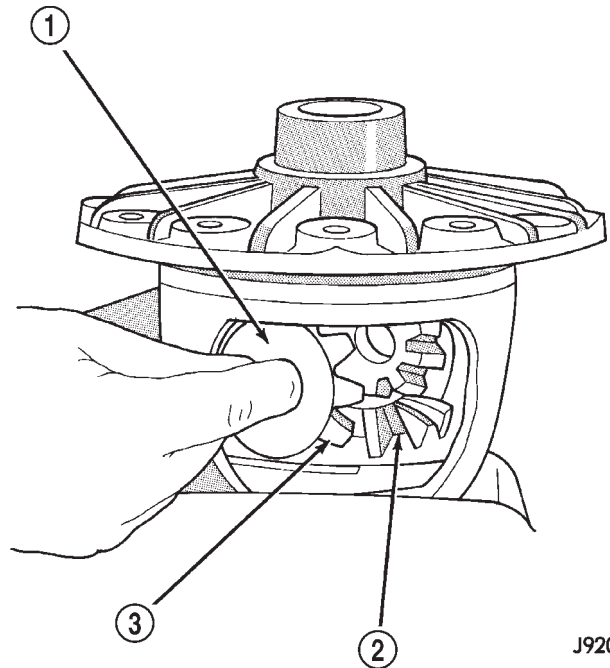
(4) Remove differential side gears and thrust washers.

ASSEMBLY

- (1) Install differential side gears and thrust washers.
- (2) Install pinion mate gears and thrust washers.
- (3) Install pinion gear mate shaft.
- (4) Align hole in the pinion gear mate shaft with hole in the differential case.
- (5) Install and seat pinion mate shaft roll-pin in the differential case and mate shaft with a punch and hammer (Fig. 31). Peen the edge of the roll-pin hole in the differential case slightly in two places 180° apart.
- (6) Lubricate all differential components with hypoid gear lubricant.

INSTALLATION

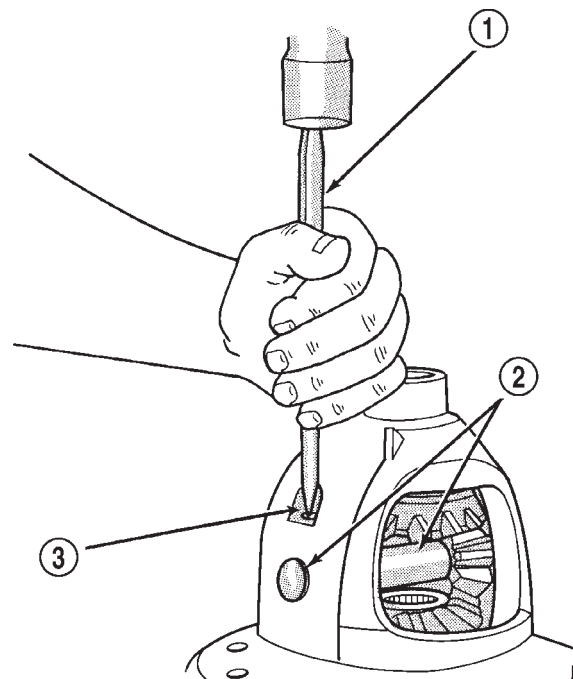
NOTE: If replacement differential bearings or differential case are being installed, differential side bearing shim requirements may change. Refer to Adjustments (Differential Bearing Preload and Gear



J9203-61

Fig. 30 Pinion Mate/Side Gear

- 1 - THRUST WASHER
- 2 - SIDE GEAR
- 3 - PINION MATE GEAR



J9203-64

Fig. 31 Pinion Mate Shaft Roll-Pin

- 1 - PUNCH
- 2 - PINION MATE SHAFT
- 3 - MATE SHAFT LOCKPIN

Backlash) procedures to determine proper shim selection.

DIFFERENTIAL (Continued)

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

(2) Install a Pilot Stud C-3288-B at the left side of the differential housing and attach dial indicator to the pilot stud. Load the indicator plunger against the opposite side of the housing and zero the dial indicator.

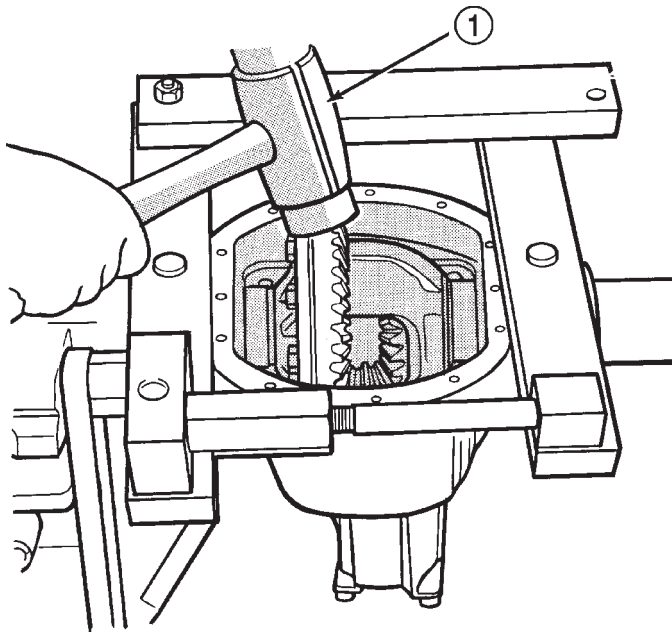
(3) Spread the housing enough to install the case in the housing. Measure the distance with the dial indicator.

CAUTION: Never spread the housing over 0.50 mm (0.020 in). If housing is over-spread, it could be distorted or damaged.

(4) Remove the dial indicator.

(5) Install differential into the housing. Tap the differential case with a rawhide/rubber hammer to ensure the bearings are seated in housing (Fig. 32).

(6) Remove the spreader.



J9302-19

Fig. 32 DIFFERENTIAL CASE

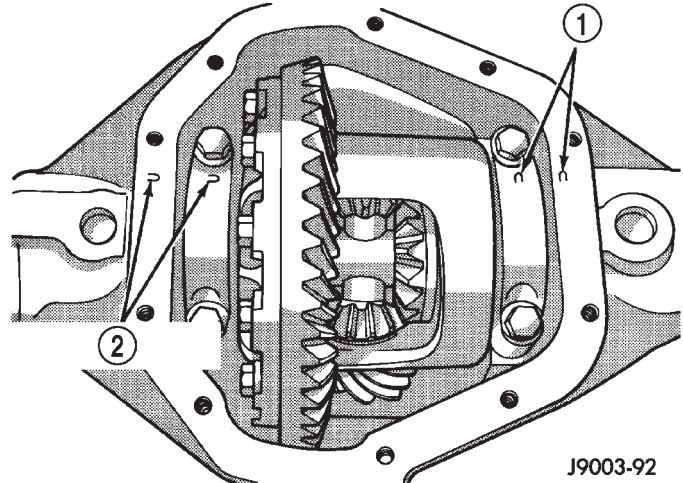
1 - RAWHIDE HAMMER

(7) Install bearing caps in their original locations (Fig. 33) and tighten bearing cap bolts in a criss-cross pattern to 109 N·m (80 ft. lbs.).

(8) Install axle shafts.

(9) Install the hub bearings.

(10) Apply a bead of red Mopar Silicone Rubber Sealant or equivalent to the housing cover (Fig. 34).

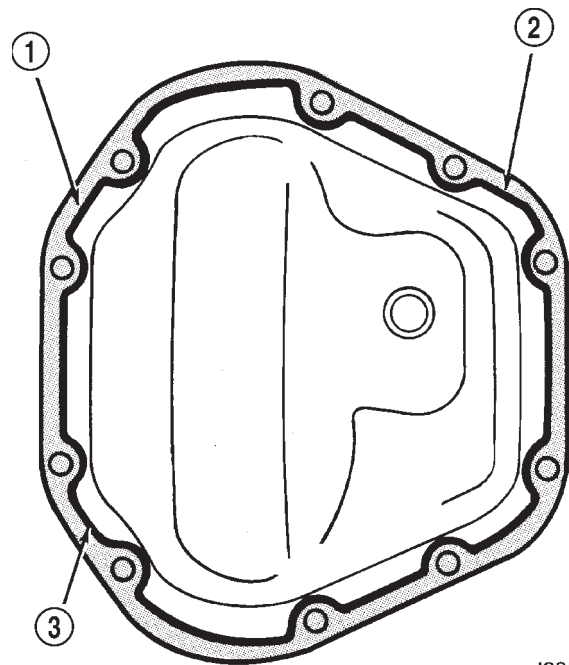


J9003-92

Fig. 33 Bearing Cap Reference

1 - REFERENCE LETTERS

2 - REFERENCE LETTERS



J9302-30

Fig. 34 DIFFERENTIAL COVER - TYPICAL

1 - SEALANT SURFACE

2 - SEALANT

3 - SEALANT THICKNESS

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied or adhesion quality will be compromised.

(11) Install the cover and tighten bolts in a criss-cross pattern to 47 N·m (35 ft. lbs.).

DIFFERENTIAL (Continued)

(12) Fill the differential with Mopar Hypoid Gear Lubricant or equivalent to bottom of the fill plug hole.

(13) Install fill hole plug and tighten to 34 N·m (25 ft. lbs.).

(14) Remove support and lower vehicle.

DIFFERENTIAL - TRAC-LOK

DIAGNOSIS AND TESTING - TRAC-LOK®

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. A container of Mopar Trac-lok™ Lubricant (friction modifier) should be added after repair service or during 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.

DIFFERENTIAL TEST

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 or equivalent tool to studs.

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

(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.

DISASSEMBLY

The Trac-Lok® differential on this axle has a one-piece cross shaft and uses one dished disc, regular 5 disc and 7 plates.

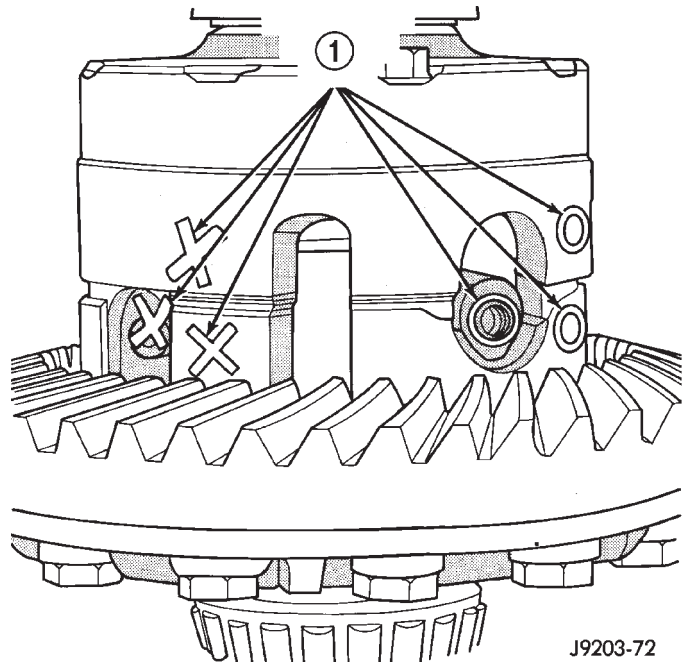
NOTE: Pay attention to the clutch pack arrangement during disassembly. Note the direction of the concave and convex side of the plates and discs.

(1) Mark the ring gear half and cover half for installation reference (Fig. 35).

(2) Remove case attaching bolts and remove the button cover half (Fig. 36).

(3) Remove top clutch pack.

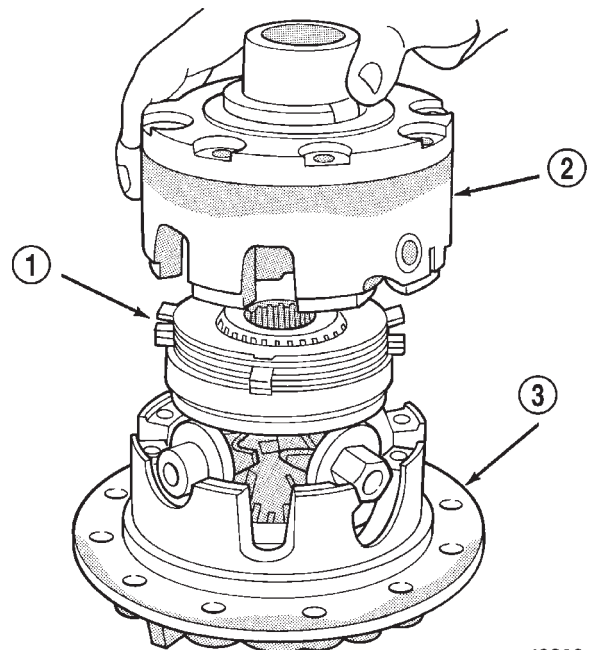
(4) Remove top side gear clutch ring.



J9203-72

Fig. 35 CASE MARKED

1 - REFERENCE MARKS



J9203-73

Fig. 36 COVER HALF REMOVAL

1 - CLUTCH PLATES

2 - BUTTON HALF

3 - FLANGE HALF

(5) Remove top side gear.

(6) Remove pinion mate gears and cross shaft.

(7) Remove the same parts listed above from the ring gear flange half of the case. Keep these parts

DIFFERENTIAL - TRAC-LOK (Continued)

with the flange cover half for installation in their original positions.

ASSEMBLY

The Trac-Lok® differential for this axle has a one-piece cross shaft and uses one dished disc, 5 regular disc and 7 plates for each clutch pack.

NOTE: 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 lube before assembly and installation.

(1) Saturate the clutch plates with Mopar Hypoid Gear Lubricant or Additive.

(2) Assemble the discs and plates on the side gear (Fig. 37) in the following order.

- (a) Install dished disc on side gear.
- (b) Install one disc on side gear.
- (c) Install one plate on side gear.
- (d) Install one disc on side gear.
- (e) Install one plate on side gear.
- (f) Install three discs on side gear.
- (g) Install five plates on side gear.

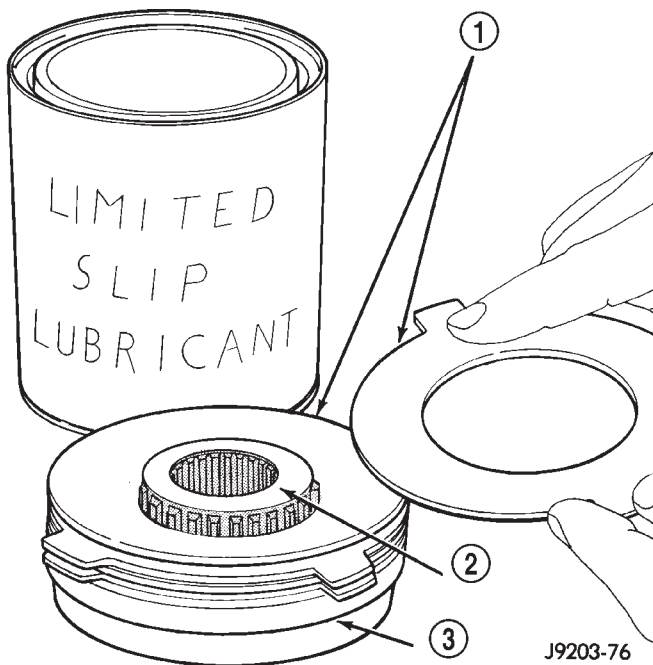


Fig. 37 CLUTCH PACK ASSEMBLY

- 1 - CLUTCH PLATES
- 2 - SIDE GEAR
- 3 - CLUTCH RING

(3) Line up the plate ears and install the assembled pack into the flange half (Fig. 38). Verify clutch plate lugs enter the slots in the case and clutch pack bottoms out in the case.

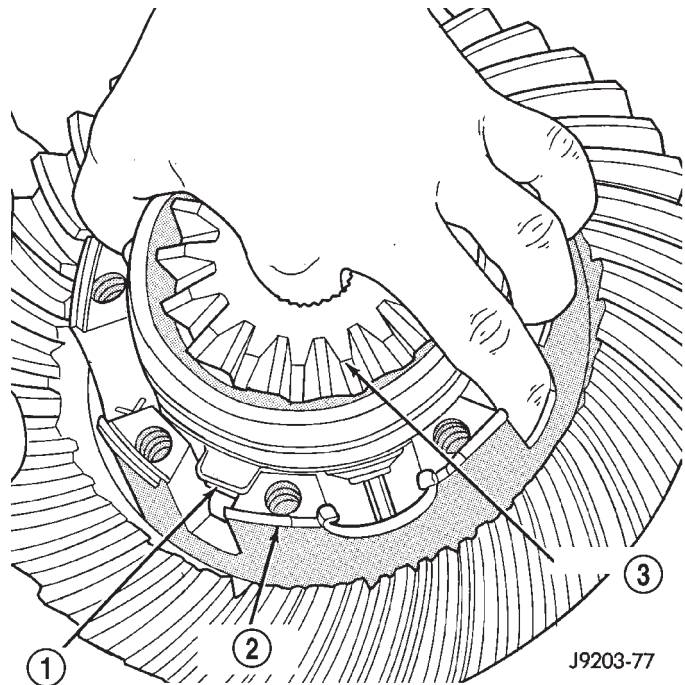


Fig. 38 CLUTCH PACK

- 1 - LUGS
- 2 - FLANGE HALF
- 3 - SIDE GEAR

(4) Install pinion mate shafts and pinion mate gears (Fig. 39). **Verify shafts are correctly installed according to the alignment marks.**

(5) Lubricate and install the other side gear and clutch pack (Fig. 38).

(6) Correctly align and assemble button half to flange half. Install case body screws finger tight.

(7) Tighten body screws alternately and evenly to 122-136 N·m (90-100 ft. lbs.) (Fig. 40).

DIFFERENTIAL CASE BEARINGS

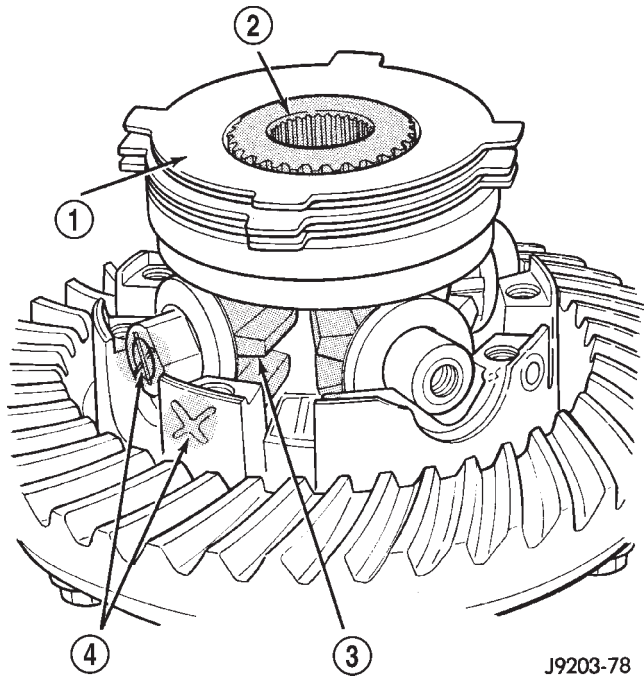
REMOVAL

- (1) Remove differential case from the housing.
- (2) Remove bearings from the differential case with bridge and bearing splitter (Fig. 41).

INSTALLATION

- (1) Install differential bearings with Installer C-4190 and Handle C-4171 (Fig. 42).
- (2) Install differential in the housing.

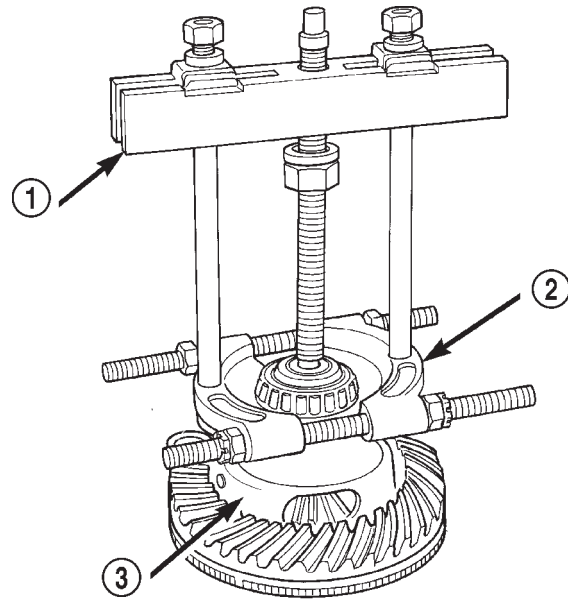
DIFFERENTIAL CASE BEARINGS (Continued)



J9203-78

Fig. 39 CLUTCH PACK

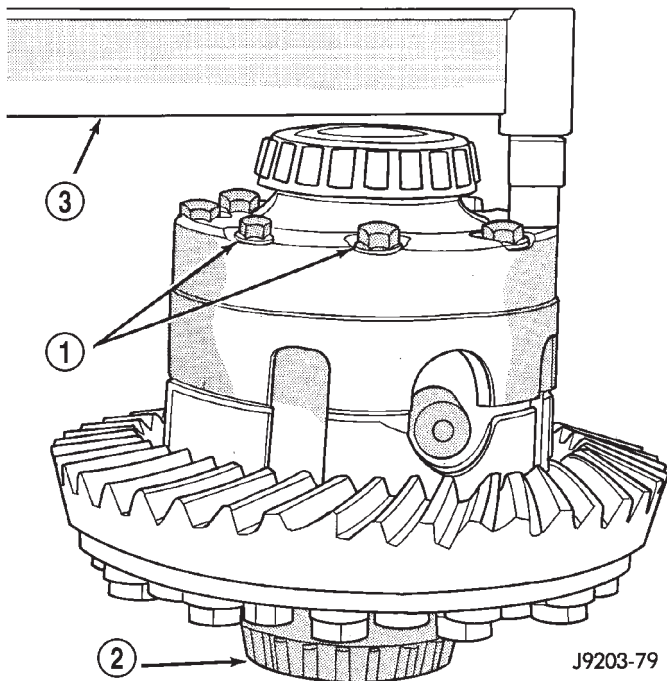
- 1 - CLUTCH PACK
- 2 - SIDE GEAR
- 3 - PINION GEARS AND MATE SHAFT
- 4 - ALIGNMENT MARKS



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Fig. 41 DIFFERENTIAL CASE BEARING

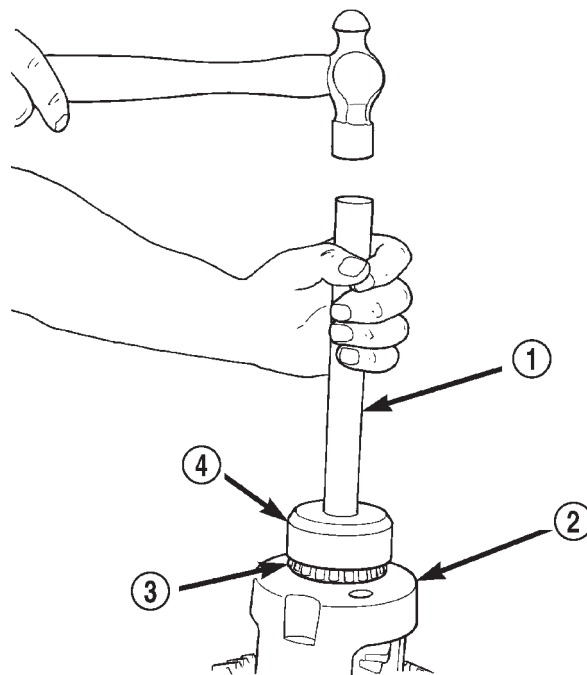
- 1 - BRIDGE
- 2 - SPLITTER
- 3 - DIFFERENTIAL



J9203-79

Fig. 40 CASE HALF BOLTS

- 1 - FIXTURE
- 2 - CASE BOLTS
- 3 - TORQUE WRENCH



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Fig. 42 CASE BEARING INSTALLER

- 1 - HANDLE
- 2 - DIFFERENTIAL CASE
- 3 - BEARING
- 4 - INSTALLER

PINION GEAR/RING GEAR/ TONE RING

REMOVAL

NOTE: The ring and pinion gears are service as a matched set. Never replace the ring gear without replacing the matched pinion gear.

- (1) Remove differential from the housing.
- (2) Place differential case in a vise with soft metal jaw protectors. (Fig. 43)
- (3) Remove the ring gear bolts.
- (4) Drive ring gear from differential case with a soft hammer (Fig. 43).

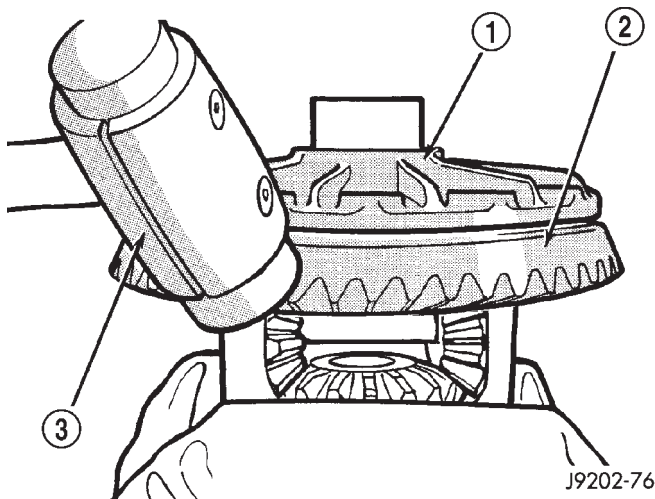


Fig. 43 RING GEAR

- 1 - DIFFERENTIAL CASE
- 2 - RING GEAR
- 3 - HAMMER

- (5) Remove the exciter ring from the differential case by tapping it off with a brass drift.

- (6) Hold the pinion yoke with Holder 6719A and remove pinion yoke nut and washer.

- (7) Remove pinion yoke with Remover C-452 and Wrench C-3281 (Fig. 44).

- (8) Remove pinion gear from housing (Fig. 45).

- (9) Remove pinion seal with a slide hammer or pry bar.

- (10) Remove oil slinger, if equipped, and the front pinion bearing.

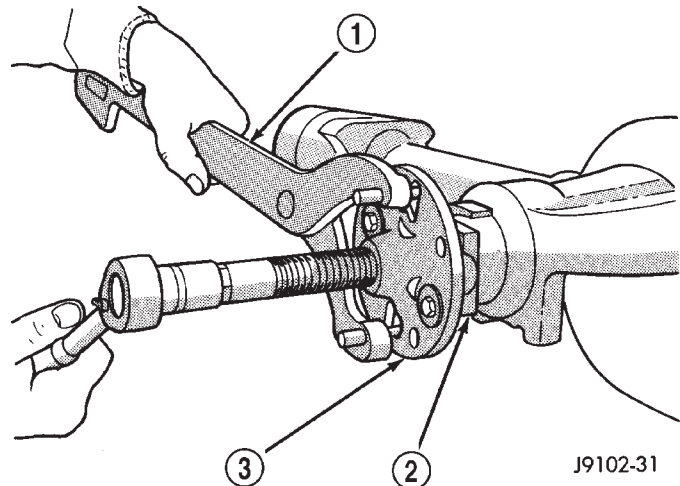


Fig. 44 PINION YOKE REMOVER

- 1 - WRENCH
- 2 - YOKE
- 3 - REMOVER

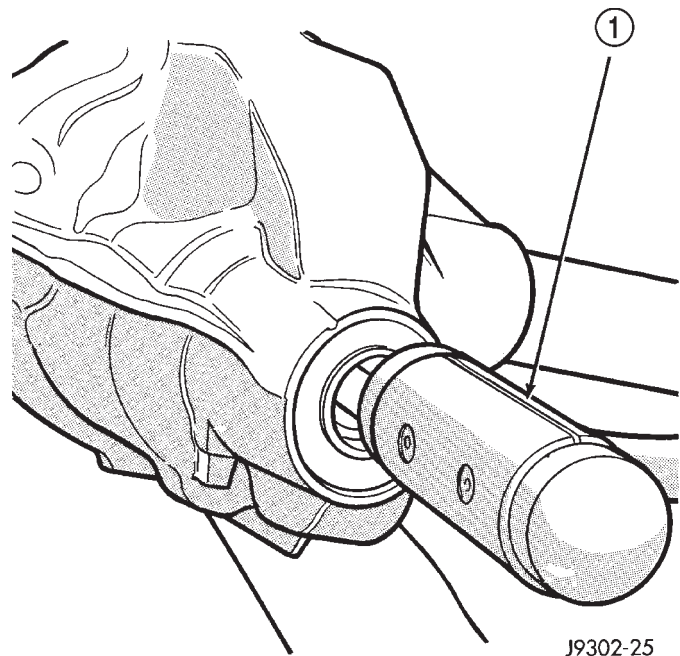


Fig. 45 PINION GEAR REMOVAL

- 1 - RAWHIDE HAMMER

PINION GEAR/RING GEAR/TONE RING (Continued)

(11) Remove front pinion bearing cup with Remover C-4307 and Handle C-4171 (Fig. 46).

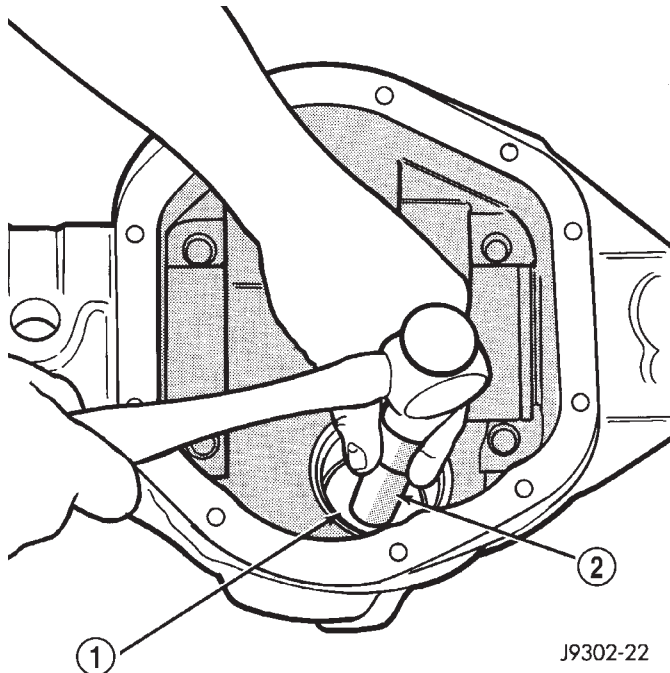


Fig. 46 FRONT PINION BEARING CUP

- 1 - REMOVER
2 - HANDLE

(12) Remove rear bearing cup with Remover D-159 and Handle C-4171 (Fig. 47).

(13) Remove pinion depth shims under rear bearing cup in the housing bore.

(14) Remove rear bearing from the pinion with Puller/Press C-293-PA and Adapters DD-914-95 (Fig. 48).

INSTALLATION

(1) Apply Mopar Door Ease stick lubricant or equivalent to outside surface of bearing cups.

(2) Install proper thickness pinion depth shims in the housing bore and install rear pinion bearing cup with Installer C-4204 and Handle C-4171 (Fig. 49) and verify cup is seated.

(3) Install pinion front bearing cup with Installer C-4308 and Handle C-4171 (Fig. 50) and verify cup is seated.

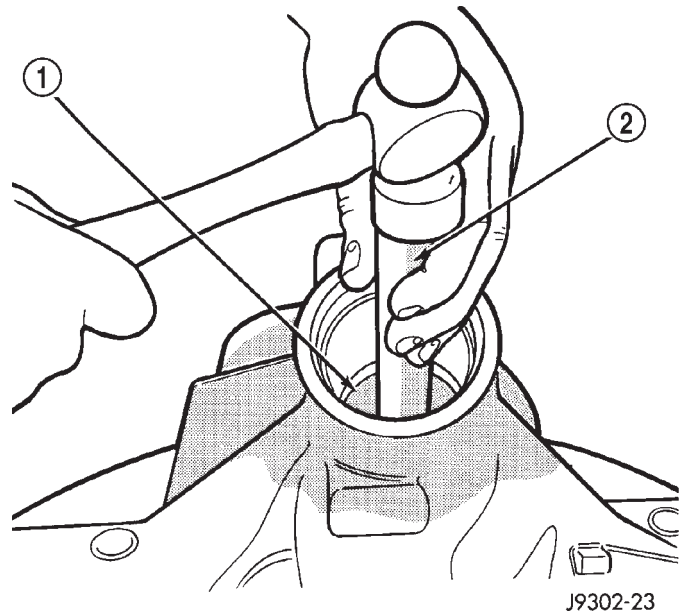


Fig. 47 REAR PINION BEARING CUP

- 1 - REMOVER
2 - HANDLE

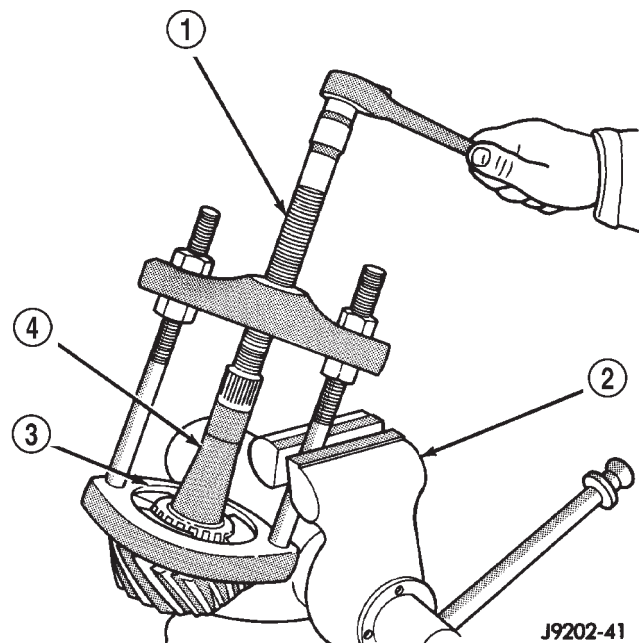
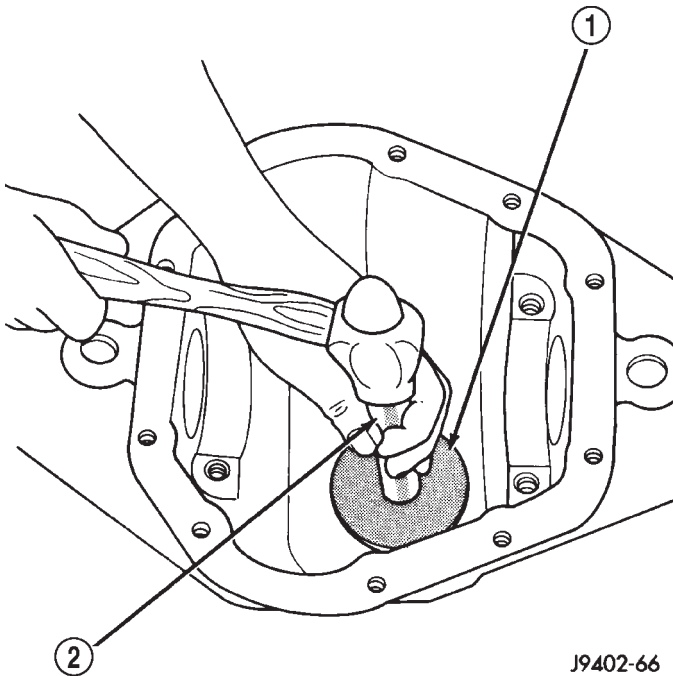


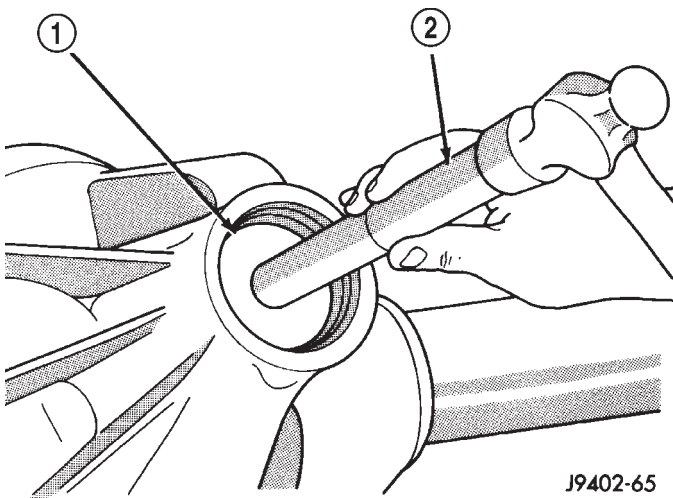
Fig. 48 REAR PINION BEARING

- 1 - PULLER
2 - VISE
3 - PINION SHAFT
4 - ADAPTER BLOCKS

PINION GEAR/RING GEAR/TONE RING (Continued)

**Fig. 49 REAR PINION BEARING CUP**

- 1 - INSTALLER
2 - HANDLE

**Fig. 50 FRONT PINION BEARING CUP**

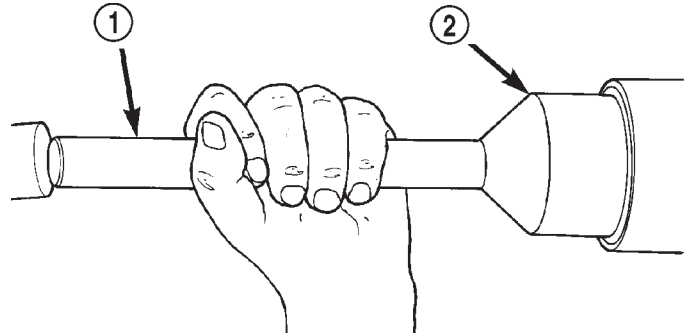
- 1 - INSTALLER
2 - HANDLE

(4) Install pinion front bearing and oil slinger, if equipped. Apply a light coating of gear lubricant on the lip of pinion seal.

(5) Install **new** pinion seal with an appropriate installer (Fig. 51).

NOTE: Pinion depth shims are placed between the rear pinion bearing cone and pinion gear to achieve proper ring and pinion gear mesh. If ring and pinion

gears are reused, the pinion depth shim should not require replacement or adjustment. If the ring and pinion gears are replaced refer to Adjustments to select the proper thickness shim.

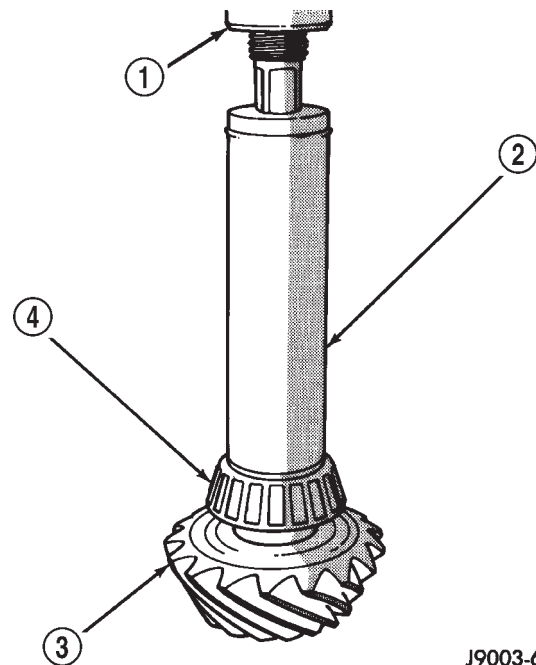


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Fig. 51 PINION SEAL

- 1 - HANDLE
2 - INSTALLER

(6) Install rear bearing on the pinion gear with Installer D-389 and a press (Fig. 52).



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Fig. 52 REAR PINION BEARING

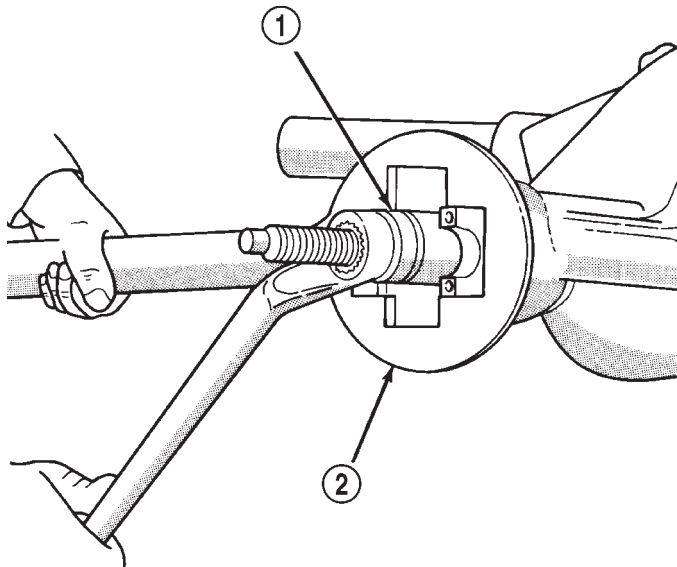
- 1 - PRESS
2 - INSTALLER
3 - PINION GEAR
4 - PINION BEARING

(7) Install original solid shims on pinion gears.

(8) Install yoke with Installer C-3718 and Yoke Holder 6719A (Fig. 53).

(9) Install yoke washer and **new** nut on the pinion gear. Tighten the nut to 637 N·m (470 ft. lbs.).

PINION GEAR/RING GEAR/TONE RING (Continued)



J9402-61

Fig. 53 PINION YOKE

- 1 - INSTALLER
2 - HOLDER

(10) Check bearing rotating torque with an inch pound torque wrench (Fig. 54). Pinion rotating torque should be:

- Original Bearings: 1 to 3 N·m (10 to 20 in. lbs.).
- New Bearings: 2.8 to 5.1 N·m (25 to 45 in. lbs.).

(11) If rotating torque is less than the desired rotating torque, remove the pinion yoke and decrease the thickness of the solid shim pack if greater increase shim pack. Changing the shim pack thickness by 0.025 mm (0.001 in.) will change the rotating torque approximately 0.9 N·m (8 in. lbs.).

(12) Invert the differential case.

(13) Position exciter ring on differential case and tap onto the case with a brass drift slowly and evenly.

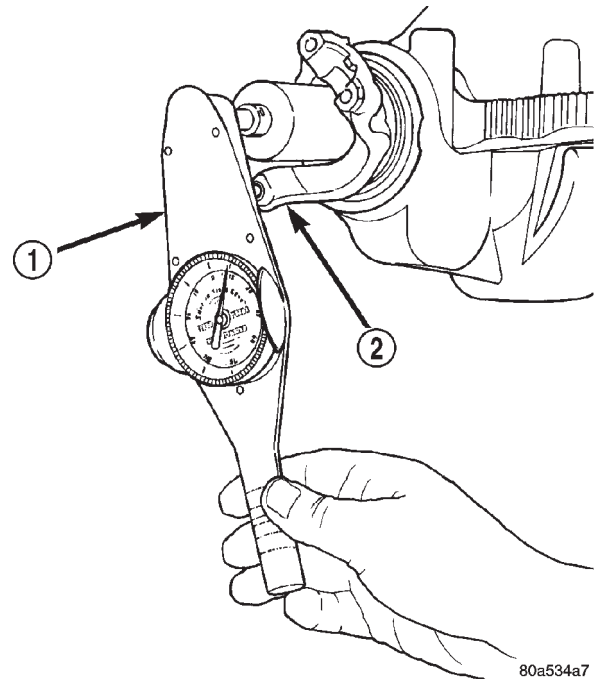
(14) Invert differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.

(15) Invert the differential case in the vise.

(16) Install **new** ring gear bolts and alternately tighten to 298 N·m (220 ft. lbs.) (Fig. 55).

CAUTION: Never reuse the ring gear bolts. The bolts can fracture causing extensive damage.

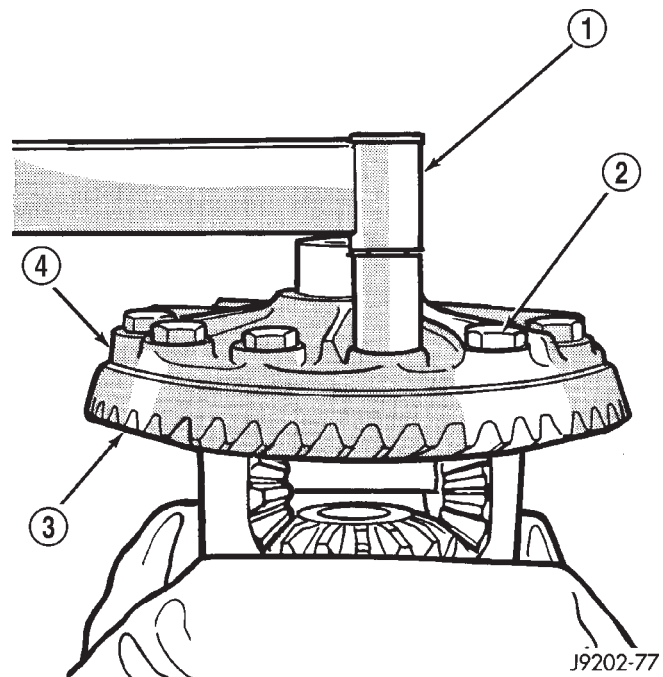
(17) Install differential in housing and verify gear mesh and contact pattern.



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Fig. 54 Pinion Rotating Torque

- 1 - TORQUE WRENCH
2 - PINION YOKE



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Fig. 55 RING GEAR BOLT

- 1 - TORQUE WRENCH
2 - RING GEAR BOLT
3 - RING GEAR
4 - CASE