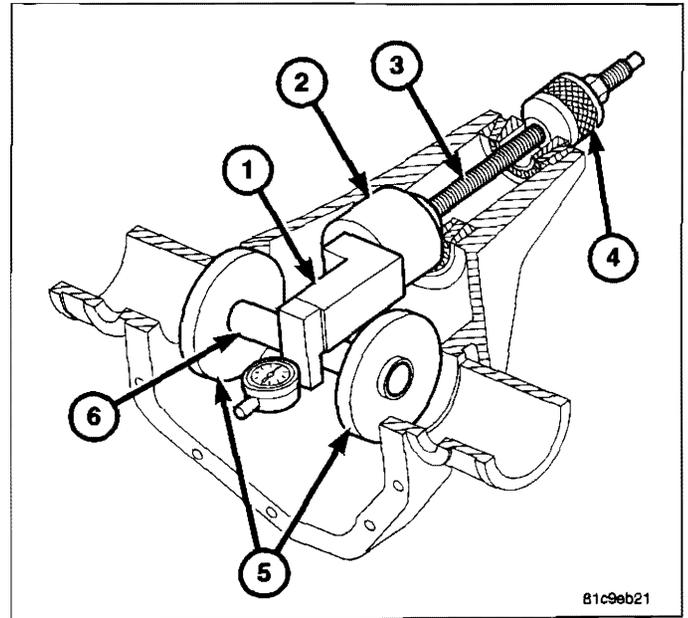
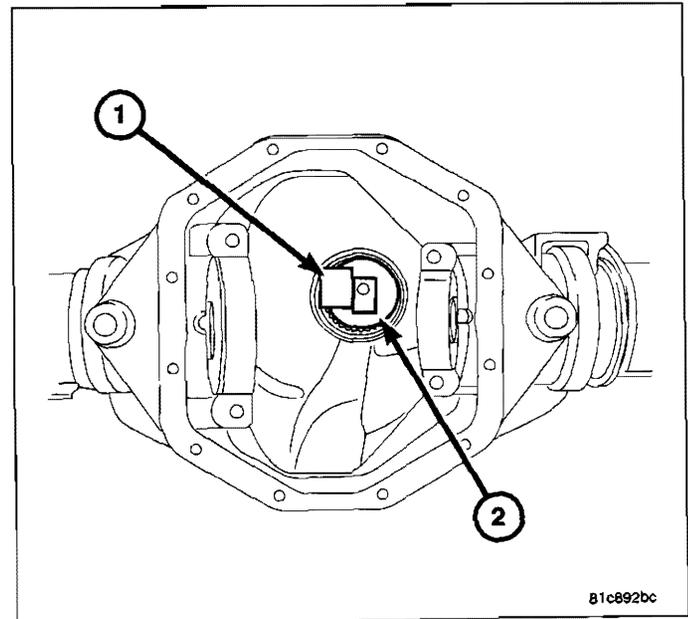


PINION GEAR DEPTH

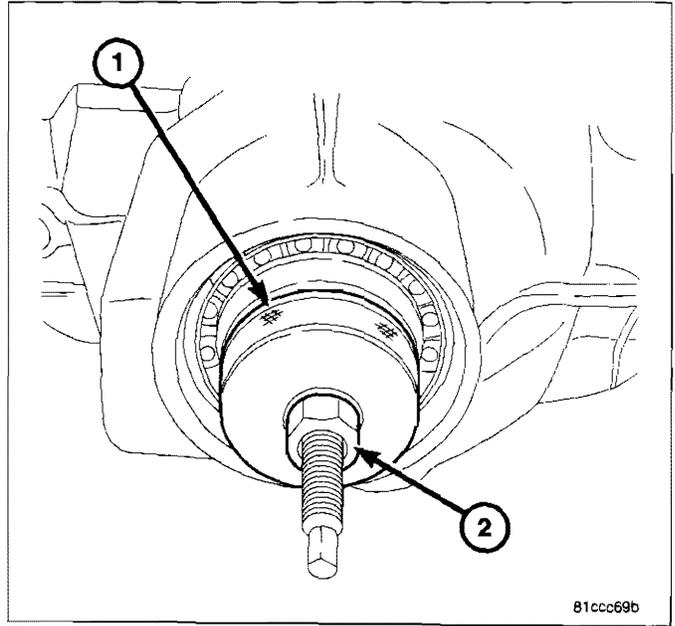
Measurement is taken with Height Block 6739 (1), Pinion Block 10091 (2), Screw 6741 (3), Nut 10121 (4), Arbor Discs 10094 (5) and Arbor D-115-3 (6). With pinion bearing cups and pinion bearings installed in the housing, take measurements with Dial Indicator C-3339A and Scooter Block D-115-2.



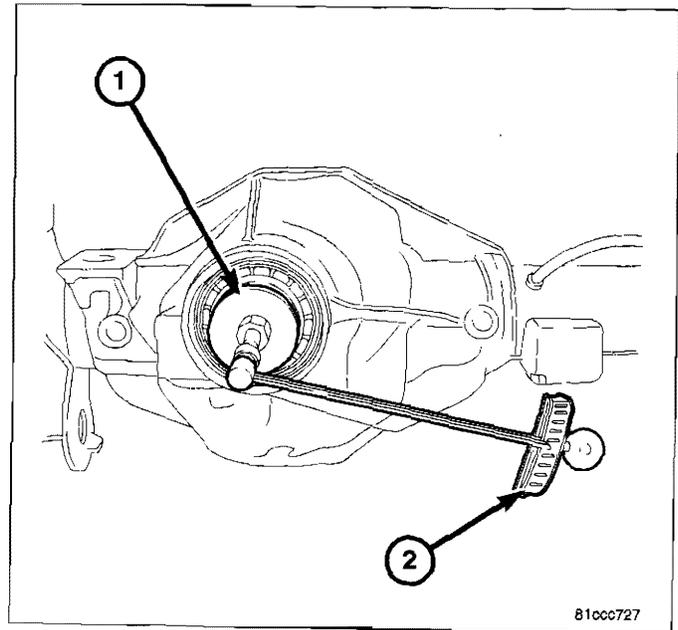
1. Assemble Pinion Height Block 6739 (1), Pinion Block 10091 (2) and rear pinion bearing onto Screw 6741.
2. Insert assembled pinion height block, pinion block, rear bearing and screw into the housing through pinion bearing cups.



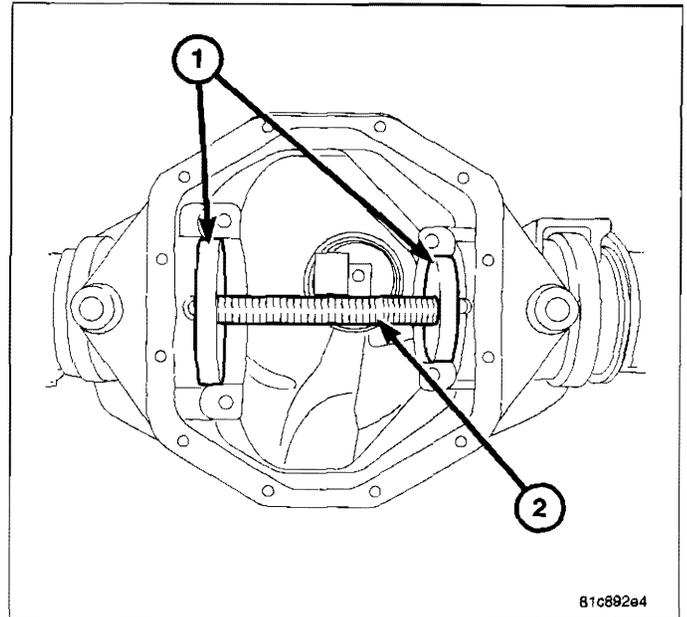
3. Install front pinion bearing and Cone-Nut 10121 (1) onto Screw 6741 (2).



4. Tighten cone-nut (1) until Torque To Rotate (2) the screw is 1.7 - 2.26 N·m (15 - 20 in. lbs.).

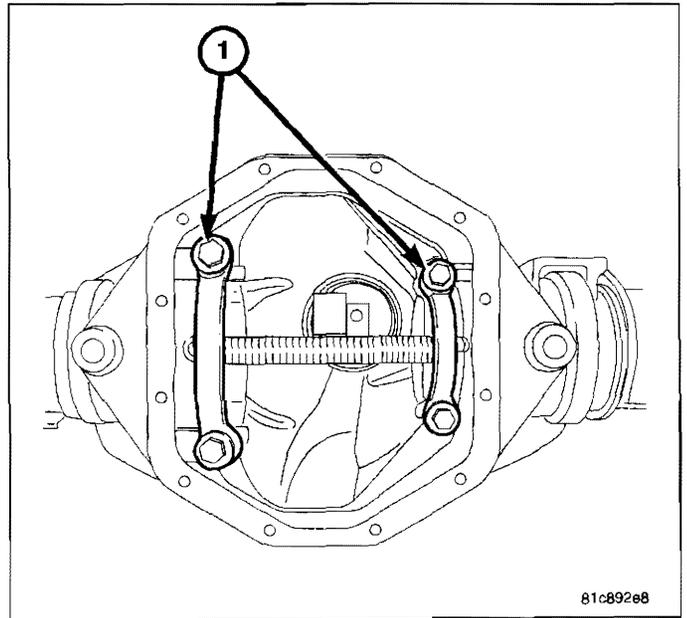


5. Place Arbor Disc 10094 (1) on Arbor D-115-3 (2), then position disc (1) in differential bearing cradles.

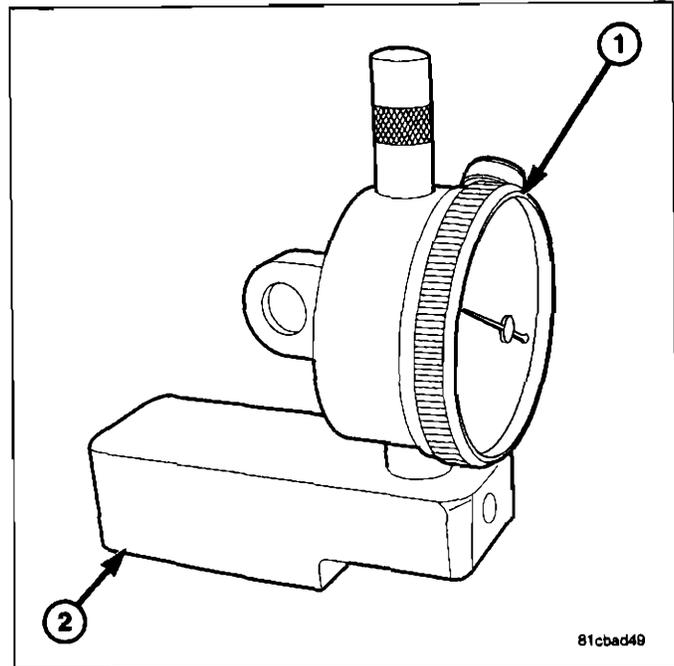


6. Install differential bearing caps (1) on arbor discs. Tighten larger bearing cap to 160 N·m (118 ft. lbs.) and small bearing to 100 N·m (74 ft. lbs.).

NOTE: Arbor should rotate freely in the arbor disc.

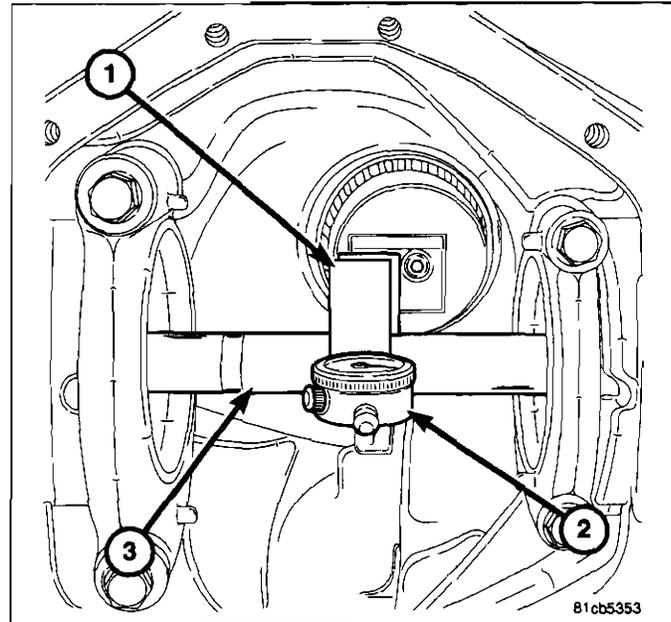


7. Assemble Dial Indicator C-3339A (1) into Scooter Block D-115-2 (2) and secure set screw.

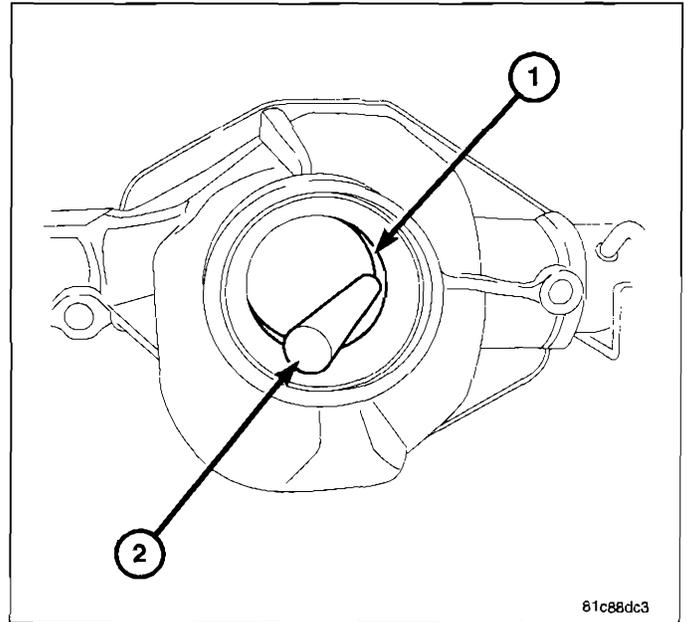


8. Position Scooter Block (1) flush on the pinion height block. Hold scooter block and zero the dial indicator (2).
9. Slowly slide the scooter block (1) across the pinion height block over to the arbor (3). Move scooter block till dial indicator (2) crests the arbor (3), then record the highest reading.
10. Select a pinion depth shim equal to the dial indicator reading plus or minus the pinion depth variance number on the pinion gear.

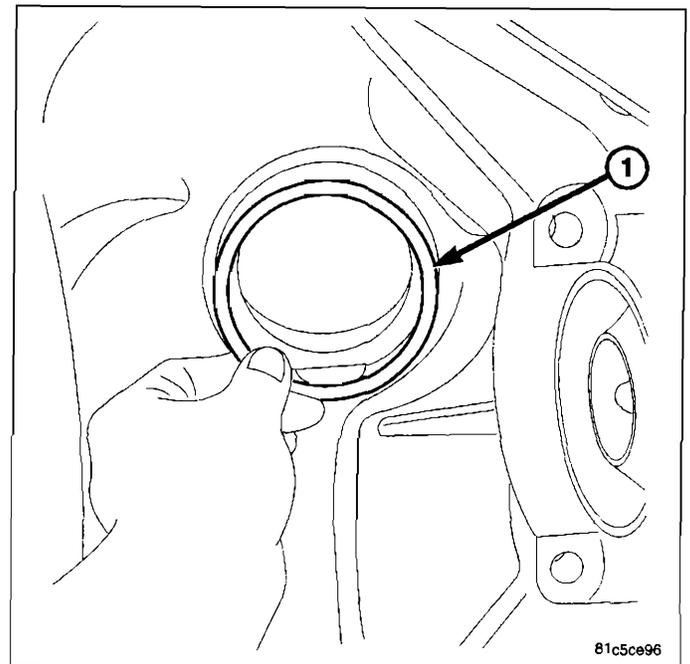
NOTE: If depth variance is -2, add 0.002 in. to the dial indicator reading. If the depth variance is +2, subtract 0.002 in. from the dial indicator reading.



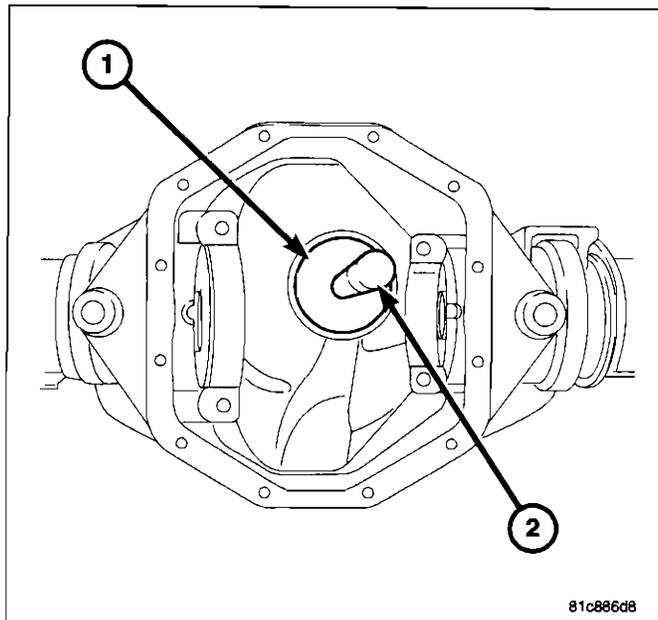
11. Remove rear pinion bearing cup (1) with a hammer and brass drift (2).



12. Install pinion depth shim (1) in rear pinion bearing cup bore.



13. Install rear pinion bearing cup with Installer 10093 (1) and handle C-4171 (2).

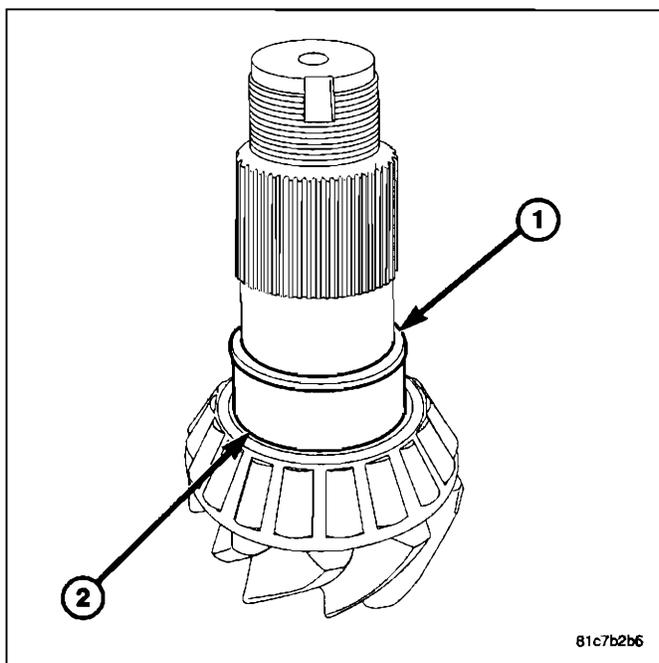


PINION TORQUE TO ROTATE

Pinion torque to rotate/pinion bearing preload is achieved using a select shim (1). The shim is located on the pinion shaft on top of the spacer (2). Pinion preload shims thickness will change with pinion depth shim change.

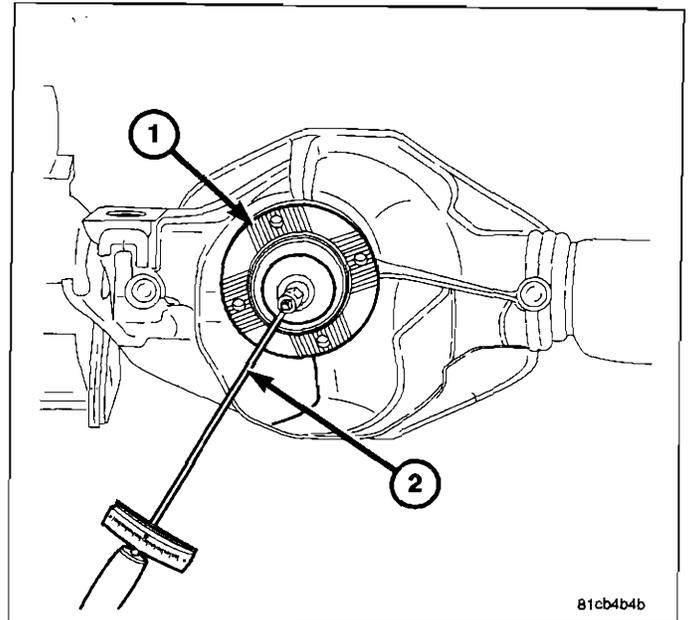
NOTE: Pinion torque to rotate (PTTR) is measured without the pinion seal.

1. Install pinion into the housing with the original shims plus/minus the pinion depth shim change. If pinion depth shim thickness was increased by 0.002 in. from the original shim thickness, increase preload shim thickness by 0.002 in. If pinion depth shim thickness was decreased by 0.002 in. from the original shim thickness, decrease preload shim thickness by 0.002 in.
2. Install pinion front bearing.
3. Install pinion flange and tighten the nut to 500 N·m (369 ft. lbs.)



4. Measure pinion torque to rotate (1) with and inch pound torque wrench (2). Pinion torque to rotate is: 5 - 8 N-m (44 - 70 in. lbs.).

NOTE: To increase PTTR install a thinner shim. To decrease PTTR install thicker shim. A shim thickness change of 0.025 mm (0.001 in.) will change PTTR approximately 0.9 N-m (8 in. lbs.).



DIFFERENTIAL BEARING PRELOAD AND GEAR BACKLASH

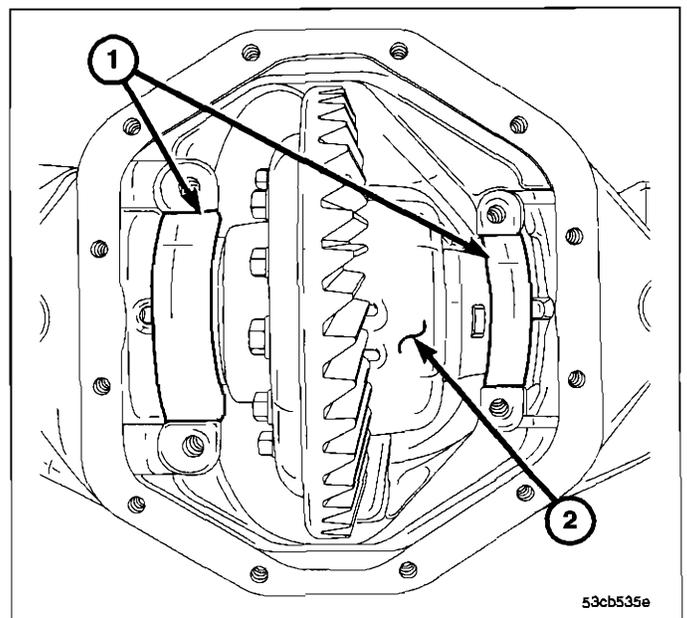
Before measuring differential bearing preload and gear backlash, pinion gear depth must be established and the pinion gear ready for installation. Pinion gear depth is essential to establishing gear backlash and tooth contact patterns.

Differential bearing preload and gear backlash is achieved with selective shims located between the differential bearing cups and differential housing. Shim thickness is determined using Dummy Bearings 10120 in place of the differential side bearings and preload shims.

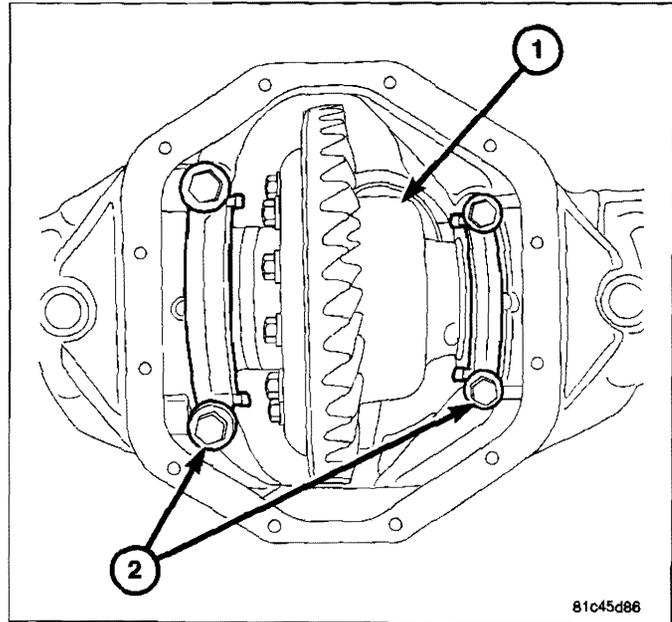
NOTE: The large dummy bearings has 7 mm (0.275 in.) added to the thickness. This was done to eliminate the use of a dummy shim and differential spacer. The small dummy bearing has 3 mm (0.118) added to the thickness. This was done to eliminate the use of a dummy shim.

DIFFERENTIAL BEARING PRELOAD SHIM SELECTION

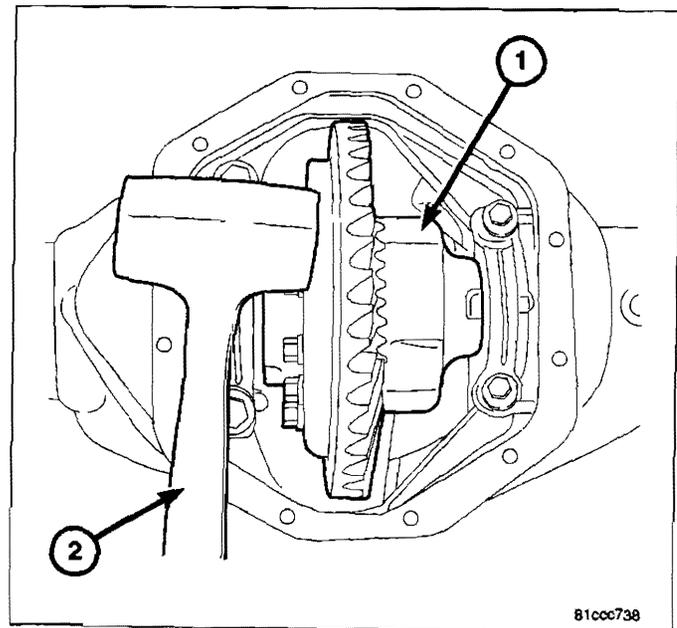
1. Remove bearings from differential case.
2. Install Dummy Bearings 10120 (1) on differential case (2).
3. Install differential case in the housing.



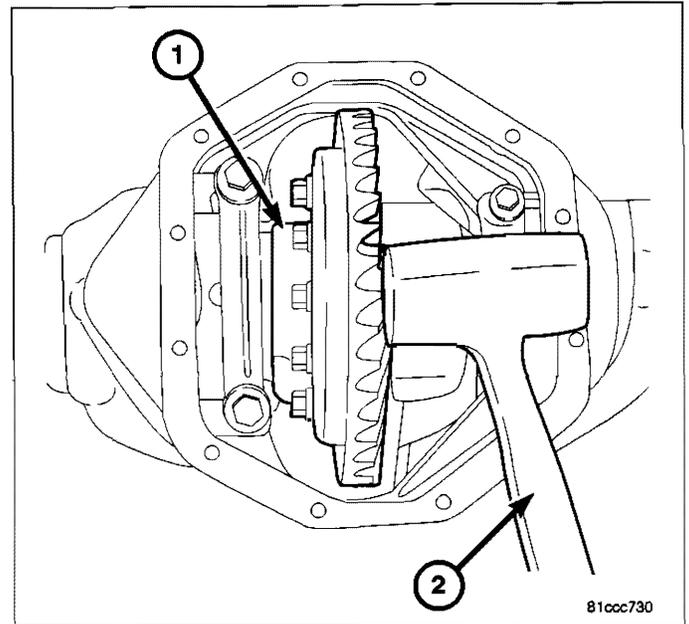
4. Install differential (1) bearing caps and tighten bearing cap bolts (2) finger tight.



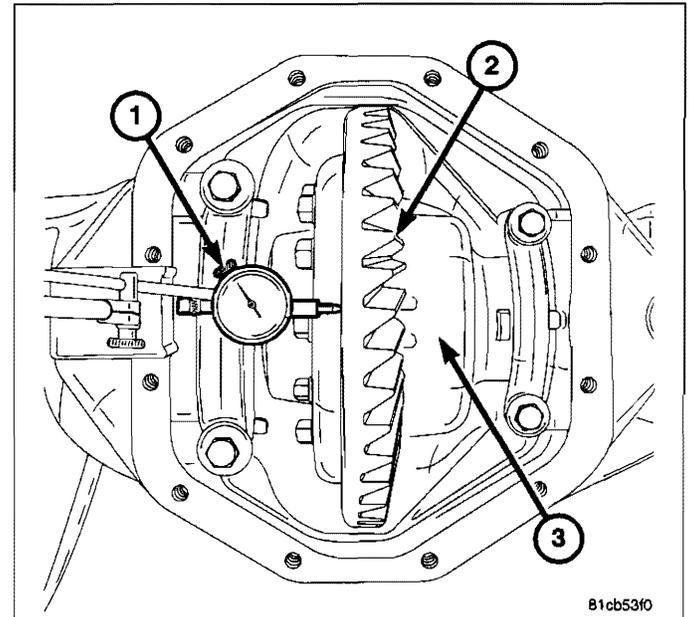
5. Seat pinion gear side (1) dummy bearing with a dead-blow hammer (2).



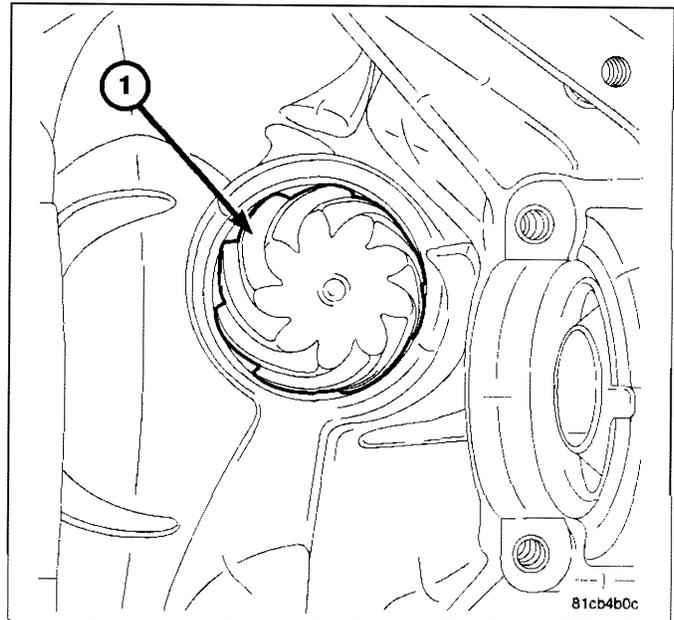
6. Seat ring gear side (1) dummy bearing with a dead-blow hammer (2).
7. Tighten larger bearing cap to 160 N·m (118 ft. lbs.) and small bearing to 100 N·m (74 ft. lbs.).



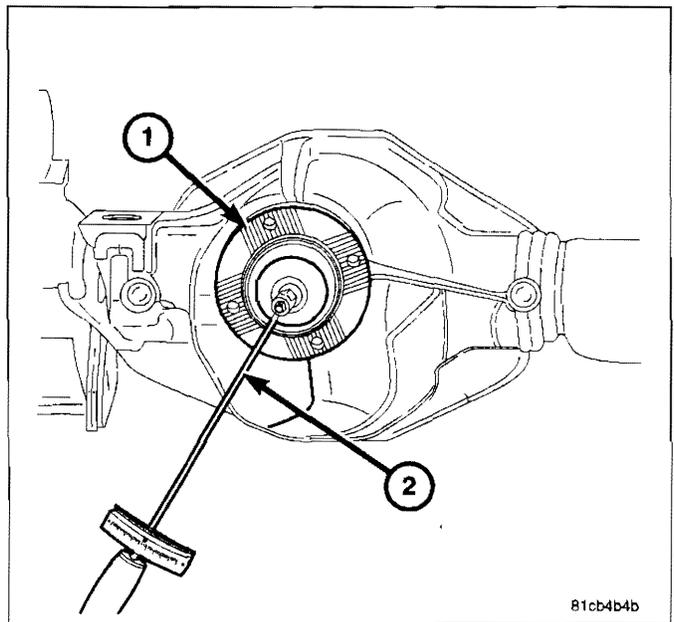
8. Attach Dial Indicator C-3339A (1) to the housing and position dial indicator plunger on a flat surface on the ring gear (2).
9. Push and hold differential case (3) to pinion gear side of the housing and zero dial indicator.
10. Push and hold differential case (3) to the ring gear (2) side and record differential dial indicator (1) reading. Add 6 mm (0.236 in.) to the dial indicator reading for dummy bearings thickness. Then add 0.2 mm (0.008 in) for bearing preload. This is the total shim thickness needed to preload the differential bearings.
Example: Differential Dial Indicator Reading + Dummy Bearings 6 mm (0.236 in.) + Differential Bearing Preload 0.2 mm (0.008 in) = Total Differential Shim
11. Rotate dial indicator out of the way.
12. Remove differential case with dummy bearings from the housing.



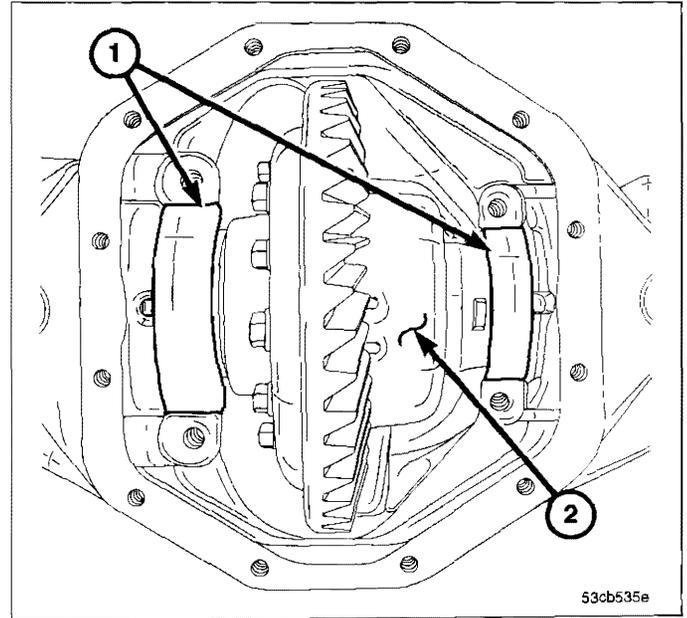
13. Install pinion gear (1) into the housing.



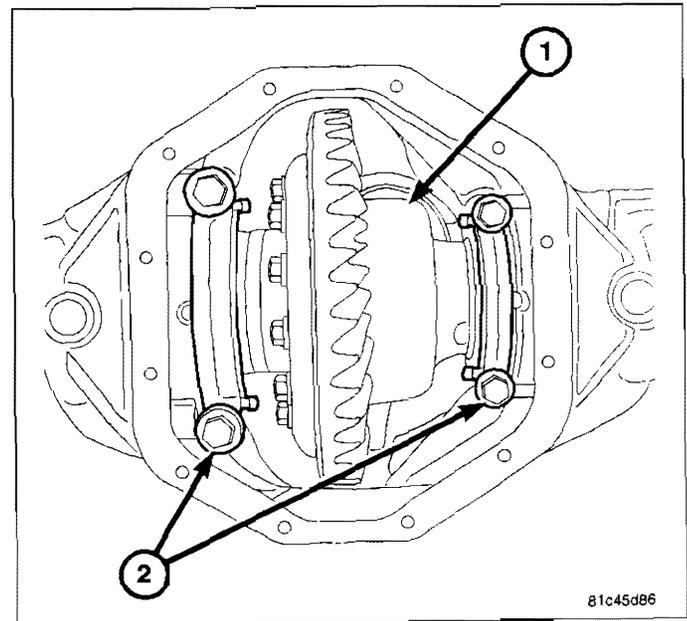
14. Establish pinion (1) torque to rotating with torque wrench (2).



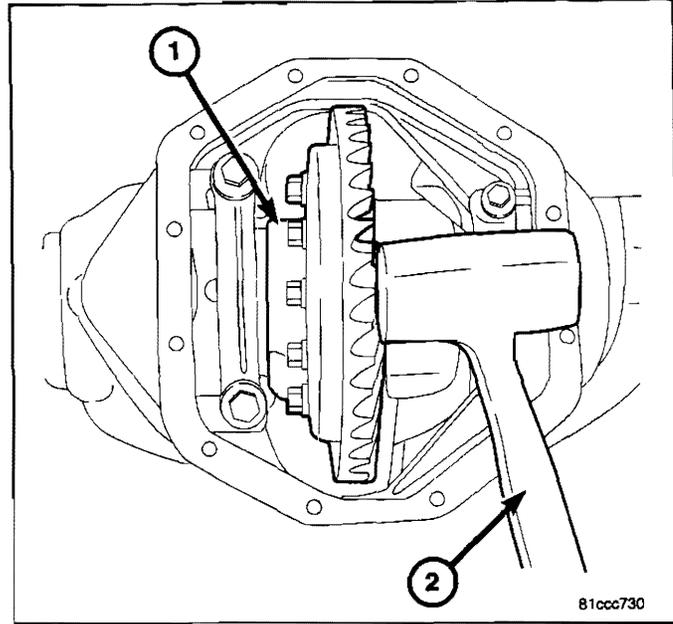
15. Install differential (2) with Dummy Bearings 10120 (1) into the housing.



16. Install differential (1) bearing caps and bearing cap bolts (2).



17. Seat differential dummy bearing to the ring gear side (1) of the housing with a dead-blow hammer (2).
18. Tighten larger bearing cap to 160 N·m (118 ft. lbs.) and small bearing to 100 N·m (74 ft. lbs.).

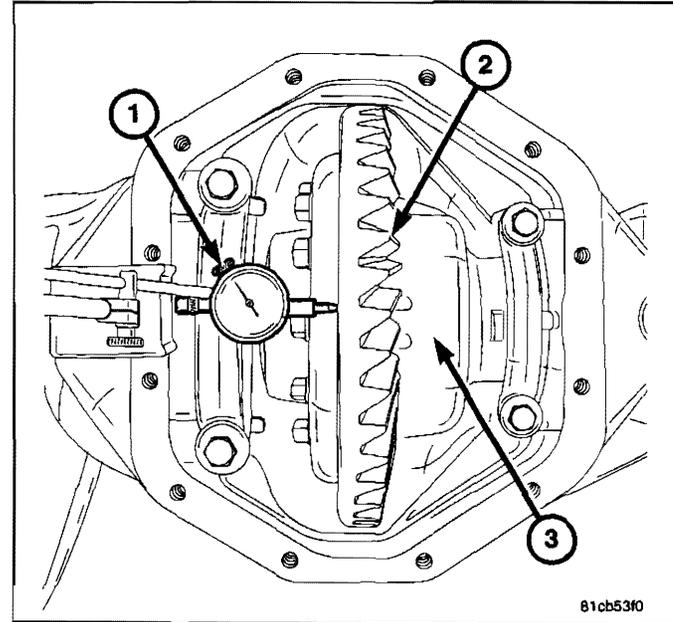


19. Attach Dial Indicator C-3339A (1) to the housing and position dial indicator plunger on a flat surface on the ring gear (2).
20. Push and hold differential case (3) to pinion gear side of the housing and zero dial indicator.
21. Push and hold differential case (3) to the ring gear (2) side and record ring gear side dial indicator (1) reading. Add 3 mm (0.118 in.) to the record dial indicator reading to compensate for dummy bearing thickness. Then subtract 0.15 mm (0.006 in.) to compensate for ring gear backlash. The remainder is the total shim thickness needed on the ring gear side of the differential.

Example: Ring Gear Side Dial Indicator Reading + One Dummy Bearing 3 mm (0.118 in.) – Ring Gear Backlash 0.15 mm (0.006 in.) = Ring Gear Side Shim

22. Subtract ring gear side shim from total differential shim, the remainder is the shim thickness needed on the pinion side of the housing.

Example: Total Differential Shim – Ring Gear Side Shim = Pinion Gear Side Shim

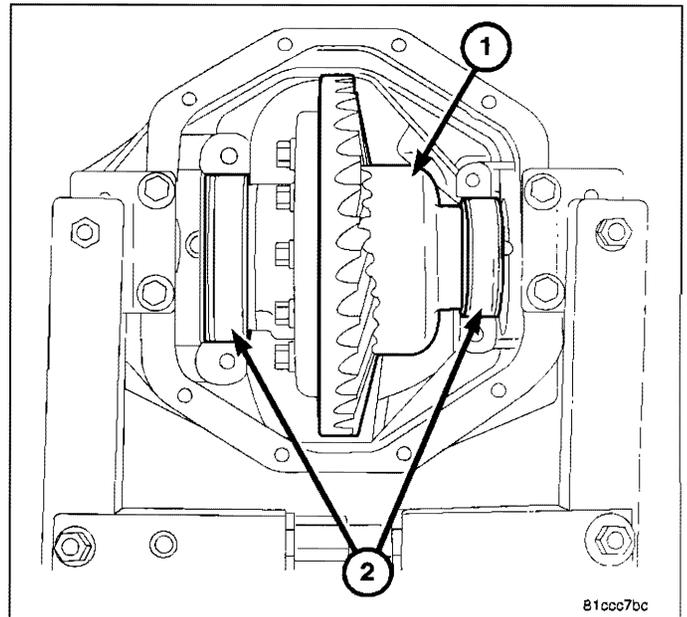
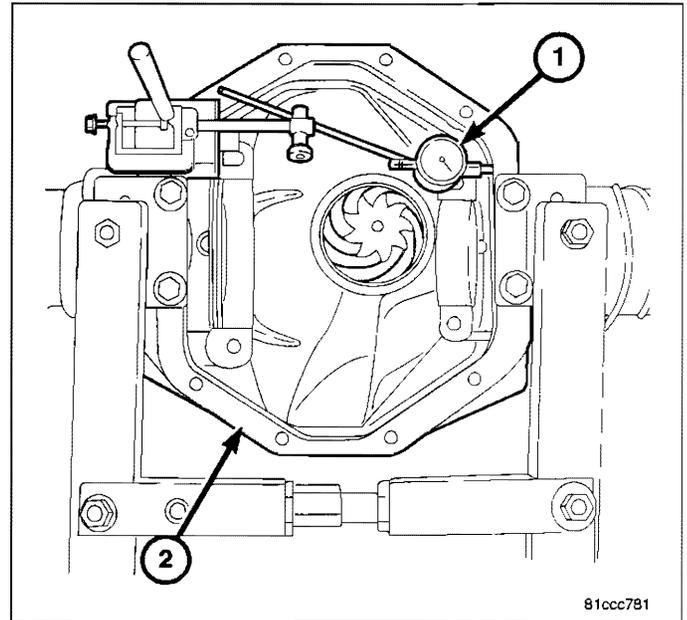


23. Remove differential case with dummy bearings from the housing.
24. Install new side bearing cones and cups on differential case.
25. Mount Dial Indicator C-3339A (1) to the housing (2) with indicator plunger against the opposite side of the housing. Zero the indicator.
26. Spread housing, while measuring the distance with the dial indicator.

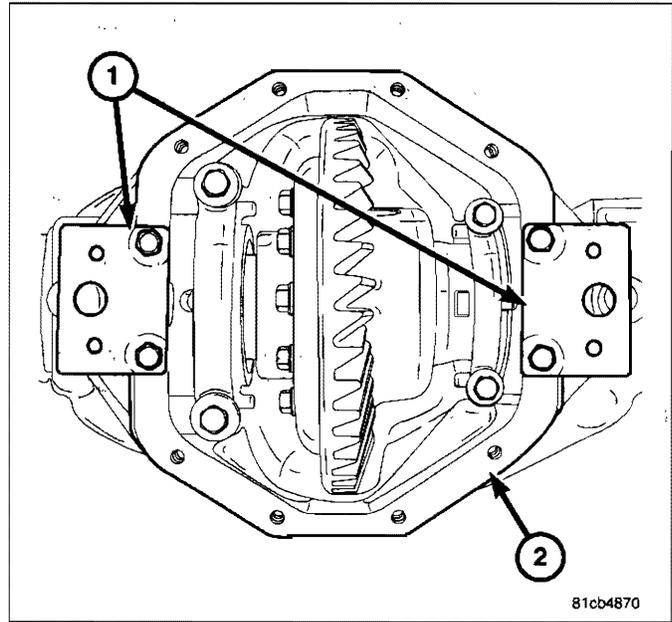
CAUTION: Never spread housing over 0.38 mm (0.015 in.). Failure to follow these instruction will damage the housing.

27. Remove dial indicator.

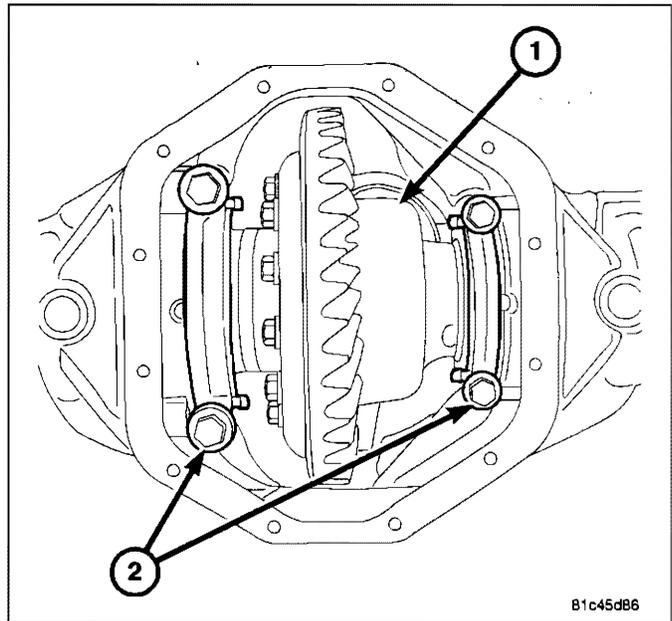
28. Install differential case (1) with bearing cups and shims (2) into the housing.
29. Rotate the differential case several times to seat the side bearings.



- 30. Remove Spreader W-129-B and Adapter Plates 10068 (1) from housing (2).

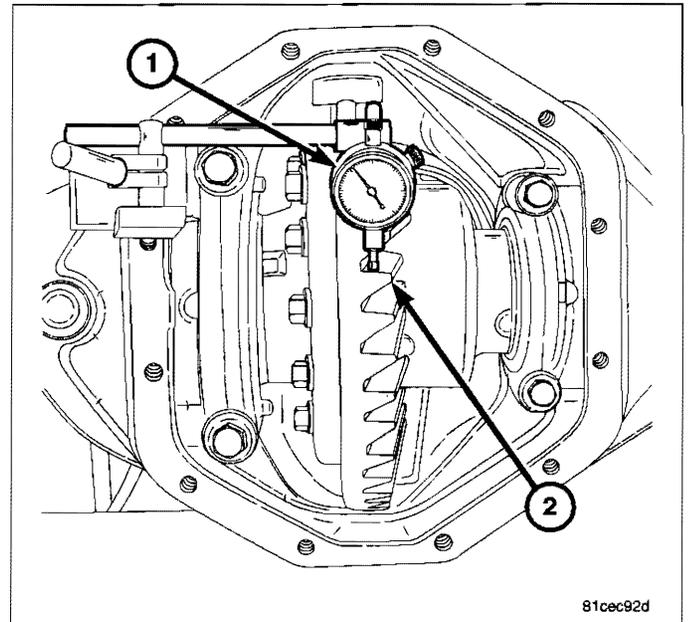


- 31. Install differential (1) bearing caps and bolts (2).
- 32. Tighten larger bearing cap to 160 N·m (118 ft. lbs.) and small bearing to 100 N·m (74 ft. lbs.).



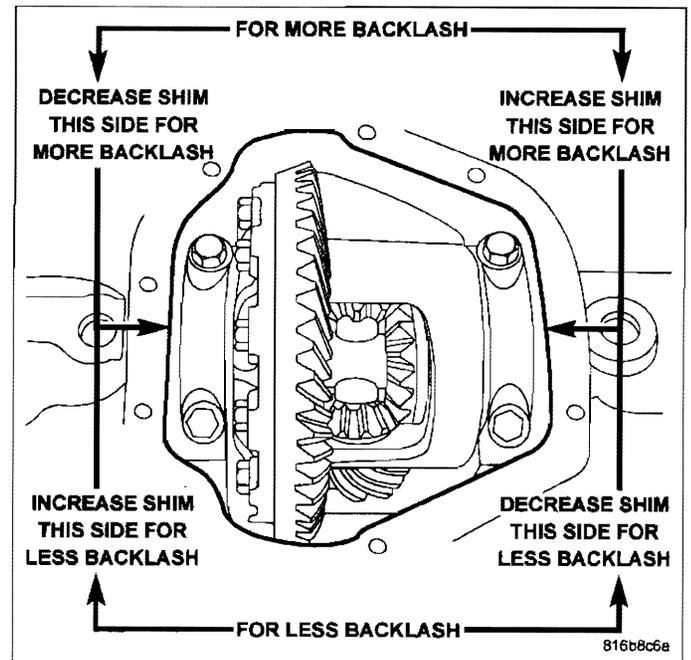
GEAR BACKLASH

1. Position the dial indicator (1) plunger against a ring gear tooth (2).
2. Push and hold ring gear upward while not allowing the pinion gear to rotate.
3. Zero dial indicator face to pointer.
4. Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.1 - 0.15 mm (0.004 - 0.006 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the differential housing to the other.
5. 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.



6. If backlash is not within specifications adjust shims equally on both sides to obtain backlash specification.

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



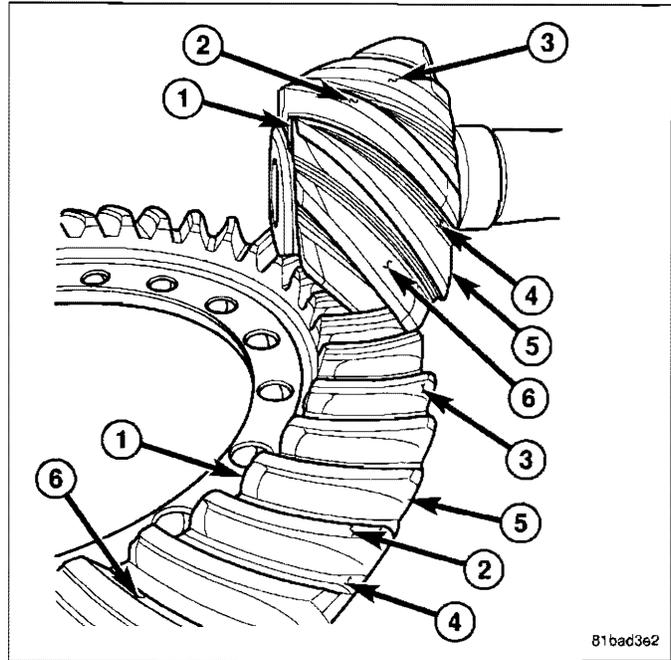
GEAR TOOTH CONTACT PATTERN

The gear and pinion gear tooth contact patterns will show if the ring gear backlash has been adjusted correctly.

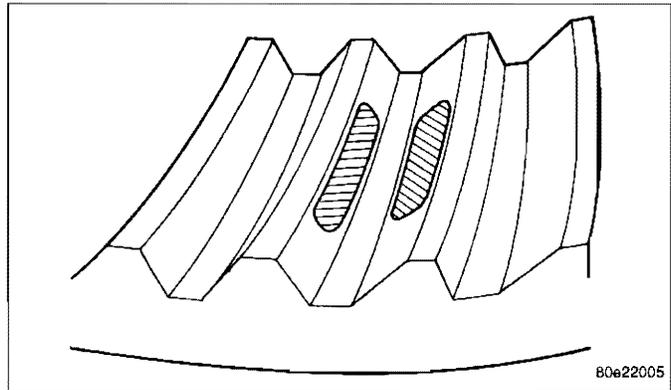
Ring and pinion gear tooth description:

- Toe - (1)
- Land - (2)
- Drive Side - (3)
- Root - (4)
- Heel - (5)
- Coast Side - (6)

Paint six ring gear teeth 180 degrees apart with marking compound. Rotate the pinion 4 full revolutions in each directions to obtain a contact pattern.



Gear contact pattern correct. Backlash and pinion depth is correct.



Ring gear too far away from pinion gear, coast side toe (1) and drive side heel (2). Decrease backlash, by moving the ring closer to the pinion gear.

