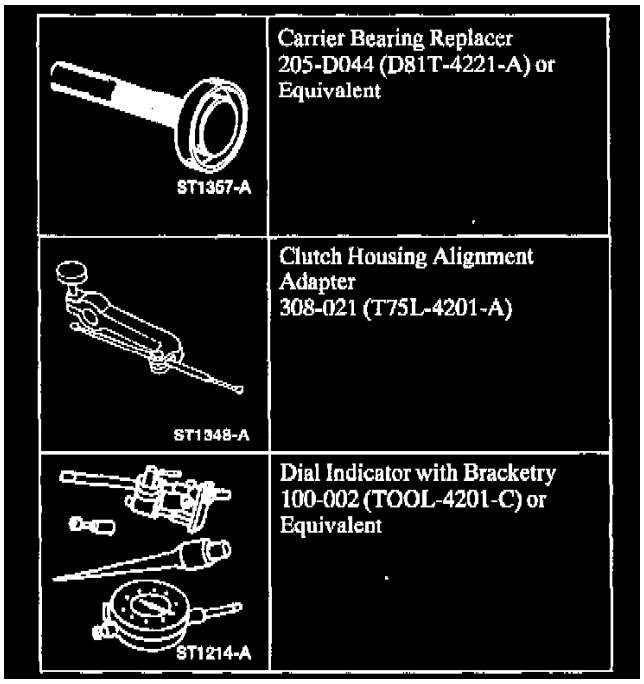
Differential Assembly: Service and Repair
Rear Drive Axle Differential - Dana 80

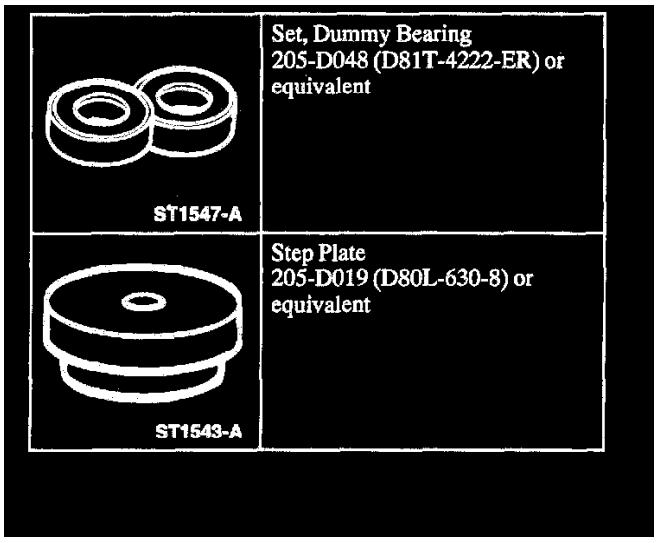
Differential Case End Play Check

Differential Case End Play Check



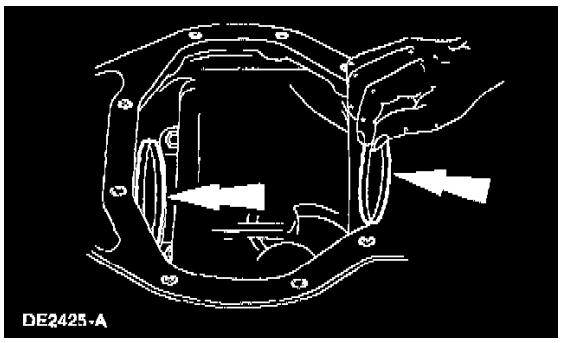
Special Tools

Part 1 - 2

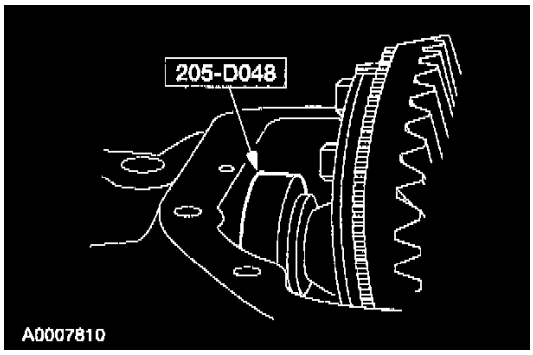


Part 2 - 2

Special Tool(s)

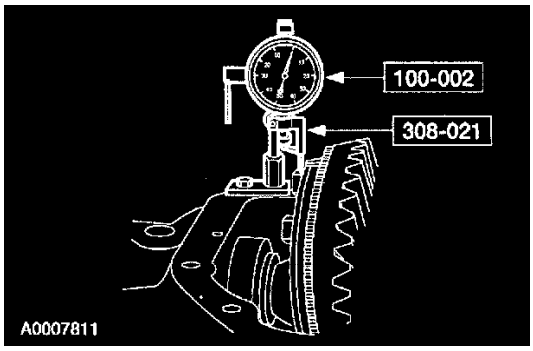


1. Install the outboard spacers in the side from which they were removed.



2. **NOTE:** Remove all nicks, burrs, dirt, etc. from the differential case hubs, to allow the bearings to rotate freely.

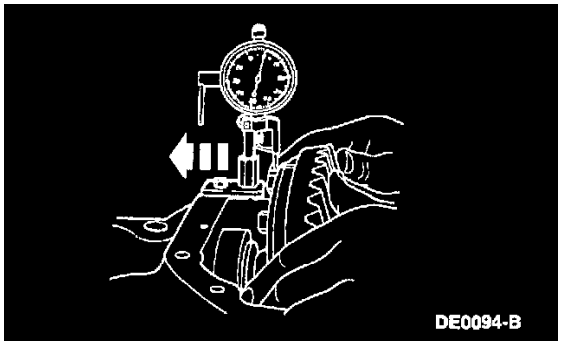
   Place the special tool on the differential case hubs, and position the assembly into the differential housing.



3. **NOTE:** Use a dial indicator with a minimum travel capability of **5.08 mm (0.200 inch)**.

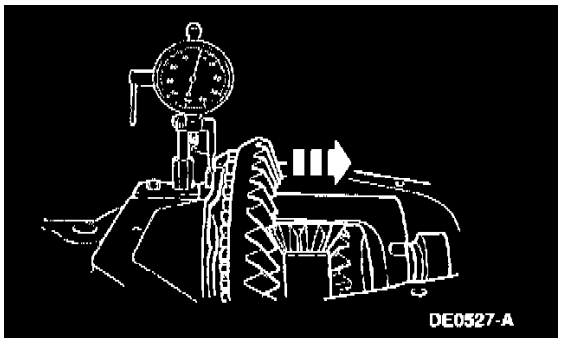
   NOTE: The rear axle uses a combination of differential bearing shims and selective outboard spacers to control differential case end play. The old outboard spacers provide a good starting point when setting end play. However, if additional shimming is necessary, beyond what the hardened differential bearing shims can provide, select and install different thickness outboard spacers.

   Mount the special tools as shown. Locate the tip of the Clutch Housing Gauge on a flat surface of one of the bolts.

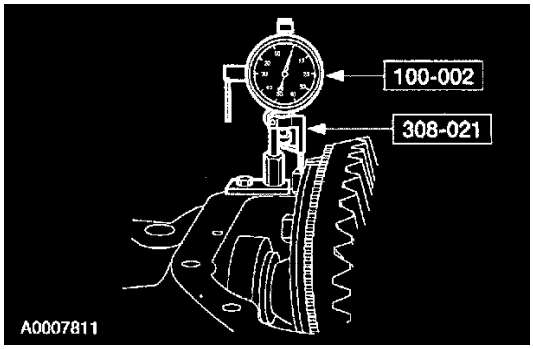


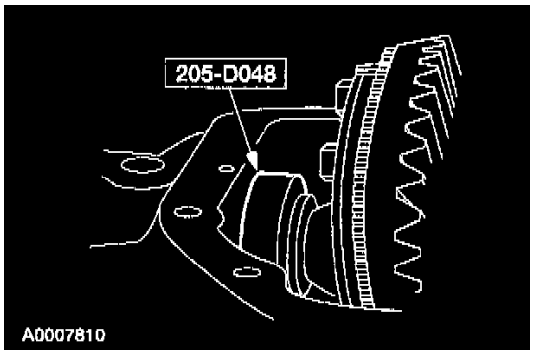
4. **NOTE:** Repeat this step and the following step until the same reading appears on the indicator each time. Record the reading. This is the total differential bearing shim thickness necessary, less preload. The final calculation occurs later during assembly.

Force the differential case as far as possible toward the indicator. With force still applied, set the indicator at 0.



5. Force the differential case as far as it will go in the opposite direction. Record the total differential case end play reading.





6. After making sure the reading is correct, remove the special tools and the differential from the differential housing. Do not remove the Master Bearings from the differential case at this time.

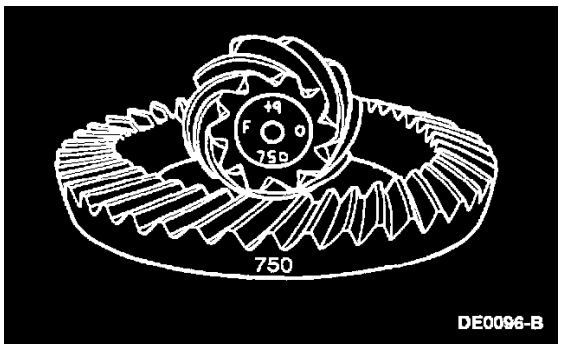
Pinion Ring Gear Variation Number

Pinion Ring Gear Variation Number

NOTE: If so equipped, install a new pinion shaft oil slinger if bent or mutilated.

NOTE: The differential ring gear and pinion is only available in a matched set. Matching numbers etched on both the differential ring gear and pinion are for verification. If installing a new differential ring gear and pinion, verify these numbers match before proceeding with assembly. The end of the pinion with the etched figures is the "button" end.

NOTE: Use the gear contact pattern method to verify the final pinion position is valid.



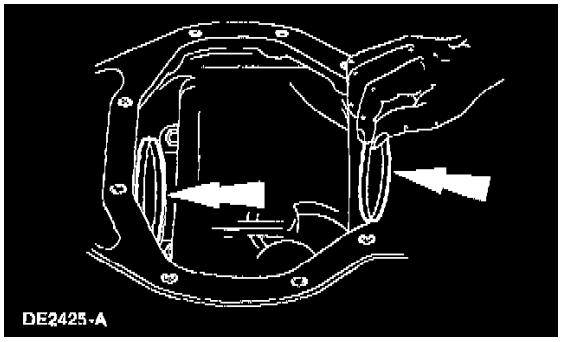
1. Shim the pinion as follows:
   - Etched on the button end of each pinion is a zero (0), or a plus (+) or minus (-) with a number. This number indicates the best running position for each particular differential ring gear. Shimming behind the inner pinion bearing controls this dimension.
2. If reusing the old differential ring gear and pinion, measure and record the old drive pinion position shim thickness and select a new shim of the same dimension.
   - To change the pinion adjustment, shims are available in the thickness of **0.69 - 1.68 mm (0.027 - 0.066 inch)**. Measure each shim separately with a micrometer.
3. If installing a new differential ring gear and pinion, notice the (+) or (-) etching on both the old and new pinion, and adjust the new shim thickness to compensate for the difference of these two figures. If so equipped, include the oil slinger thickness in the total measurement to correctly set pinion depth.
   - For example, a pinion etched with m+8 (+3) requires **0.08 mm (0.003 inch)** less shimming than a pinion etched "0". This means to increase the mounting distance by the amount etched in the pinion, subtract 0.08 mm (0.003 inch) from the drive pinion position shim selected for installation. A pinion etched m-8 (-3), requires **0.08 mm (0.003 inch)** more shimming than a pinion etched "O". In this instance, add **0.08 mm (0.003 inch)** to the drive pinion position shim selected for installation to decrease the pinion mounting distance by the amount etched in the pinion.

Old Pinion Marking	New Pinion Marking (Metric)								
	-10	-8	-5	-3	0	+3	+5	+8	+10
+10	+.20	+.18	+.15	+.13	+.10	+.08	+.05	+.03	0
+8	+.18	+.15	+.13	+.10	+.08	+.05	+.03	0	-0.3
+5	+.15	+.13	+.10	+.08	+.05	+.03	0	-.03	-.05
+3	+.13	+.10	+.08	+.05	+.03	0	-.03	-.05	-.08
0	+.10	+.08	+.05	+.03	0	-.03	-.05	-.08	-.10
-3	+.08	+.05	+.03	0	-.03	-.05	-.08	-.10	-.13
-5	+.05	+.03	0	-.03	-.05	-.08	-.10	-.13	-.15
-8	+.03	0	-.03	-.05	-.08	-.10	-.13	-.15	-.18
-10	0	-.03	-.05	-.08	-.10	-.13	-.15	-.18	-0.20

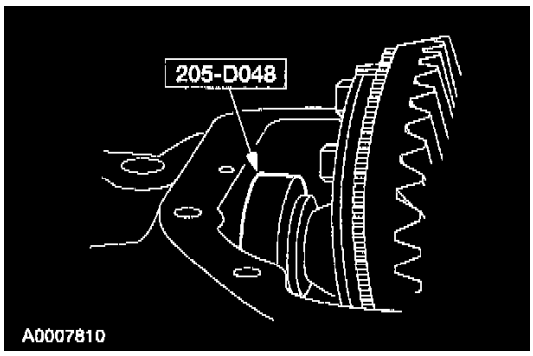
New Pinion Conversion Chart (Metric)

Ring Gear and Pinion Backlash

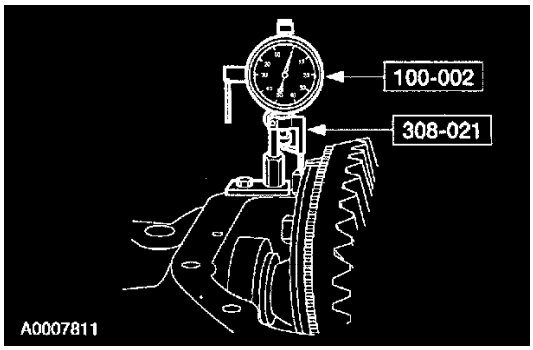
Ring Gear and Pinion Backlash



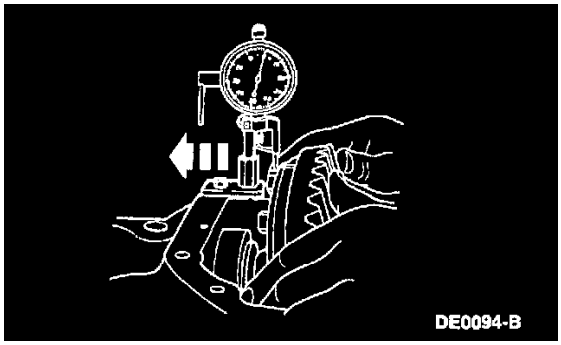
1. Install the outboard spacers in the side from which they were removed.



2. Place the differential assembly with the special tool in the differential housing.

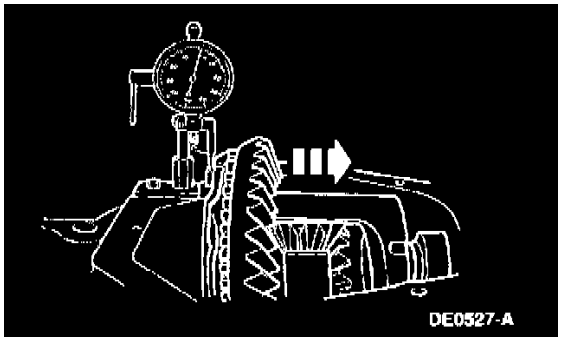


3. Install the special tools. Locate the tip of the Clutch Housing Gauge on a flat surface of one of the bolts.

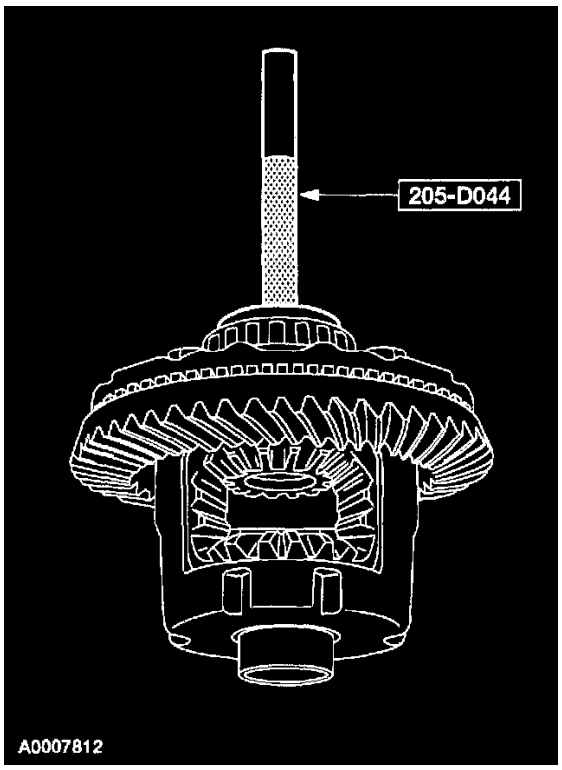


4. **NOTE:** Repeat this step and the following step until the same reading appears on the indicator each time. This is the differential bearing shim thickness necessary between the differential case and the differential bearing on the differential ring gear side of the differential case.

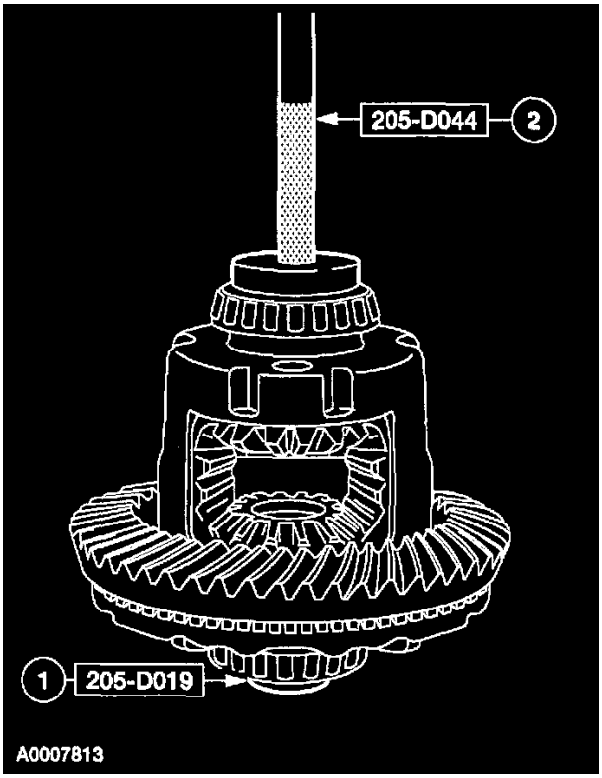
   Force the differential case (differential ring gear) away from the drive pinion. With force still applied, set the indicator at 0.



5. Force the differential ring gear into mesh with the pinion, to obtain an indicator reading. Record the reading.
6. Remove the special tools and the differential case from the differential housing.
7. Remove the Master Bearings from the differential case.
8. Place one shim, of the necessary thickness as determined from the previous measurement, on the differential ring gear side of the differential case. If additional shimming is necessary, beyond what the hardened differential bearing shim can provide, select and install a different thickness outboard spacer.



9. Using the special tool, install the differential bearing on the differential ring gear side of the differential case.
10. Determine the correct shim thickness, and place the shim on differential case hub on the drive pinion side.
    - To determine the correct shim thickness, first subtract the reading of the previous measurement from the total differential case end play reading obtained under Differential Case End Play Check. Then, add **0.25 mm (0.010 inch)** to this amount. This is the correct thickness shim to place on the hub. If additional shimming is necessary, beyond what the hardened differential bearing shim can provide, select and install a different thickness outboard spacer.

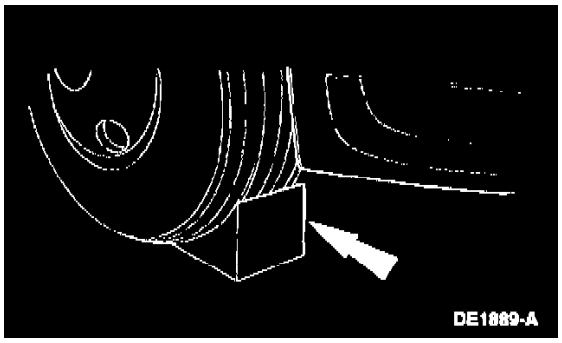


11. Using the special tools, install the differential bearing.
    1 Place the special tool on the differential bearing to protect it during the installation of the opposite bearing.
    2 Using the special tool, drive the differential bearing onto the hub.

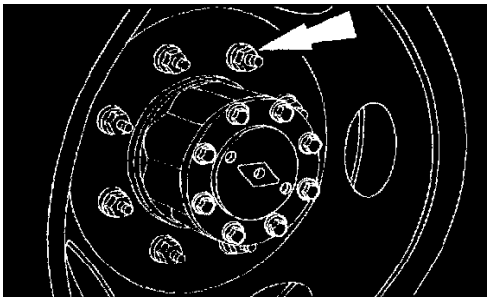
Removal and Installation

Axle Assembly

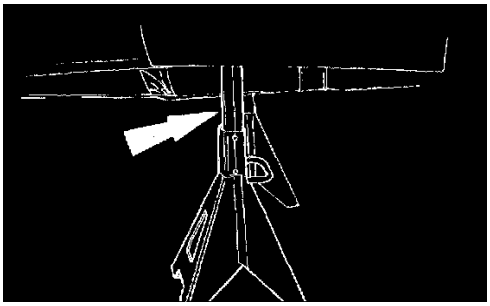
Removal



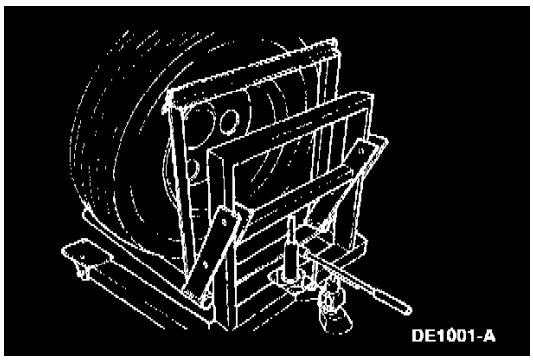
1. Chock the front wheels.



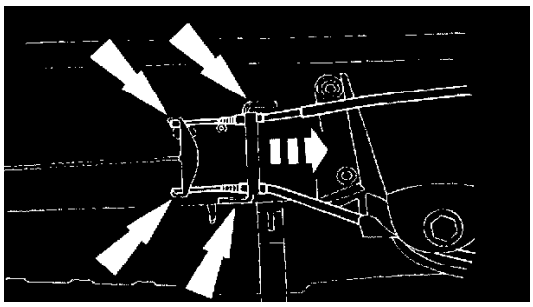
2. Loosen, but do not remove, the rear wheel lug nuts.



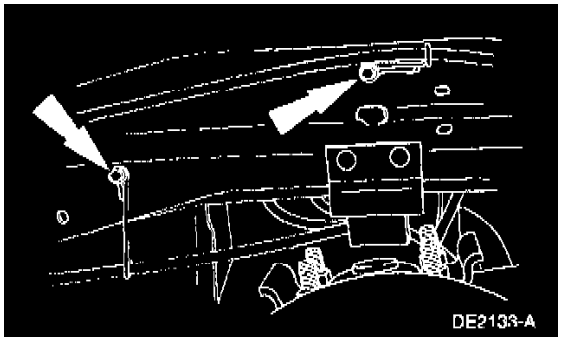
3. Raise and support the rear of the vehicle high enough so that it will clear the axle assembly when removing it.



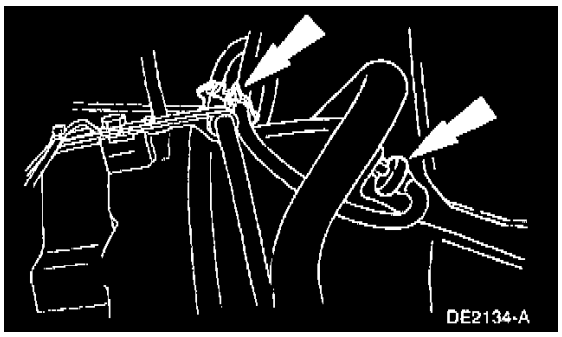
4. Remove the rear wheels using a wheel dolly.



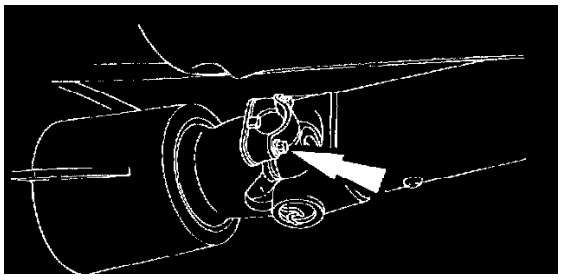
5. Release the parking brake cable tension, and disconnect the cables at the equalizer and the anchor plate.



6. Remove the frame anchors, and position the parking brake cables aside.

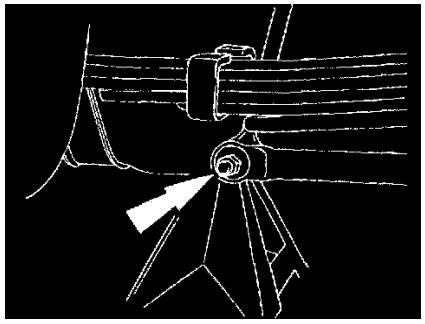


7. Disconnect the rear anti-lock brake sensor electrical connector. Release the harness clips and position the harness aside.

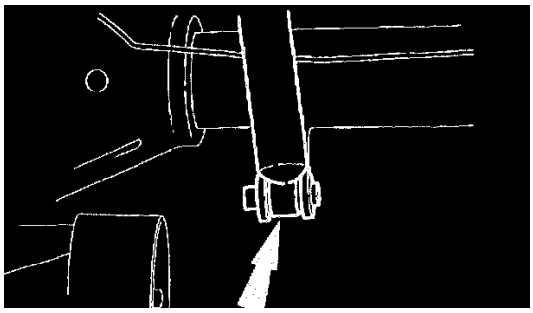


8. **NOTE:** To maintain driveline balance, mark the driveshaft components so they can be reinstalled in their original positions.

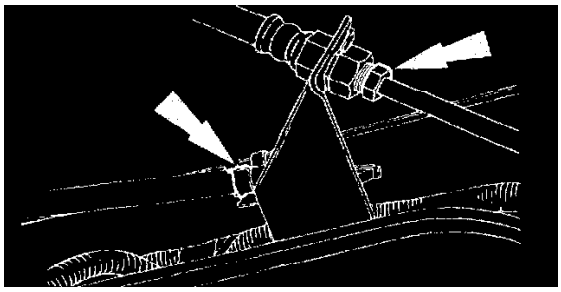
   Disconnect the driveshaft, and position it aside.



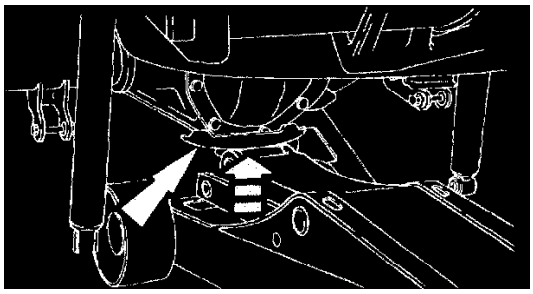
9. If so equipped, disconnect the sway bar at the sway links.



10. Disconnect the shock absorbers at the axle.

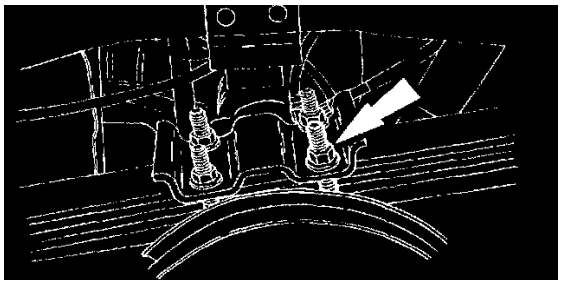


11. Disconnect the hydraulic brake hose and axle vent hose at the crossmember. Plug the brake hose and brake line, and position the hoses aside.

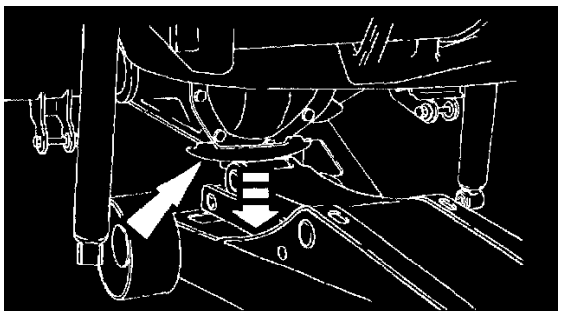


12. **CAUTION:** The nose of the axle will drop downward when loosening the U-bolts. Make sure to support the axle nose as well as the rear of the housing with the jack

    Support the axle with a suitable floor jack.



13. Remove the U-bolt nuts, the spring seat caps and the U-bolts.



14. **WARNING: Watch for obstructions while lowering and removing the axle.**

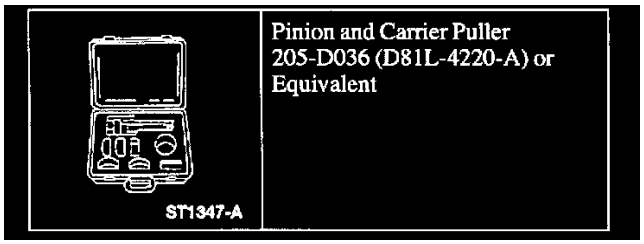
    Carefully lower the axle and remove it.

Installation

1. Follow the removal procedure in reverse order.
2. Bleed the brakes.
3. Make sure the axle lubricant level is correct.

Differential Case and Ring Gear

Differential Case and Ring Gear

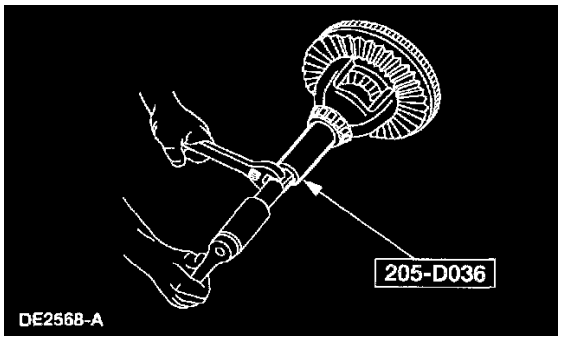


Special Tools

Special Tool(s)

Disassembly

All differentials



1. **NOTE:** Differential bearing shims are available in thicknesses of 0.762,0.787, 0.813,0.838, 0.864, 0.889 and 0.914 mm (0.030,0.031,0.032,0.033, 0.034,0.035 and 0.036 inch).

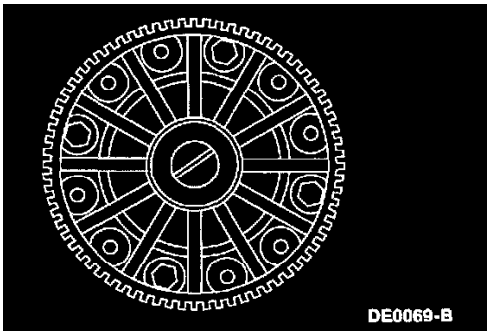
   NOTE: If damaged, install new differential bearing shims.

   NOTE: Install new differential bearings if removing them from the differential case.

   Using the special tool, remove the differential bearings.
   - Wire the differential bearing shims, differential bearing cup, differential bearing, and selective outboard spacer(s) together. Note from which side they were removed (differential ring gear side or the opposite side).

2. **NOTE:** Use a vise with brass jaws or wood blocks.

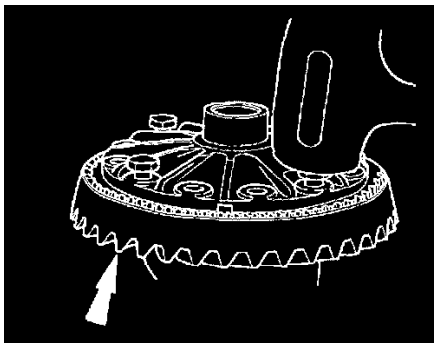
   Place the differential case in a vise.



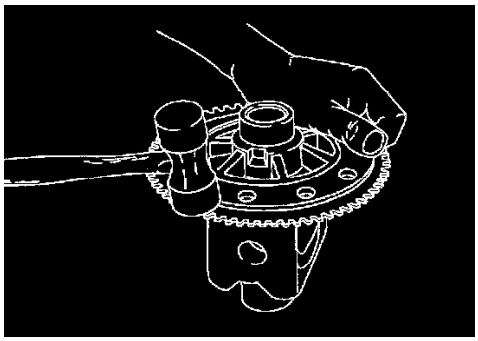
3. **CAUTION:** Do not damage the anti-lock speed sensor ring when removing the differential ring gear. If removing the anti-lock speed sensor ring, discard it and install a new one.

   NOTE: Always install new bolts upon assembly. Use Grade 9 bolts for all Dana rear axles.

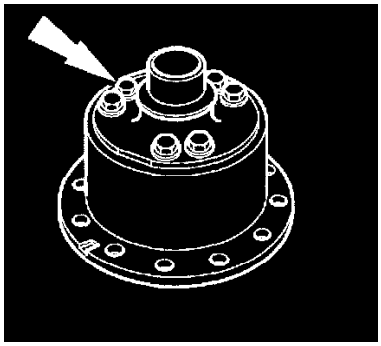
   Remove the bolts. Leave four bolts loosely assembled, 90 degrees apart.

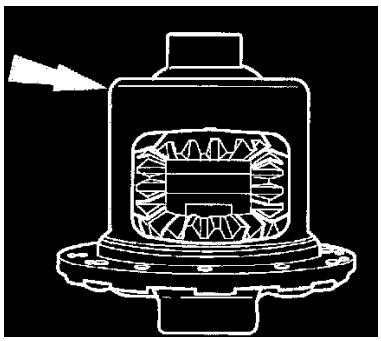


4. Tap each bolt head alternately with a rawhide or plastic hammer to loosen the differential ring gear. Remove the bolts and the differential ring gear.



5. If necessary, remove the anti-lock speed sensor ring with a soft-faced hammer. Discard the anti-lock speed sensor ring.



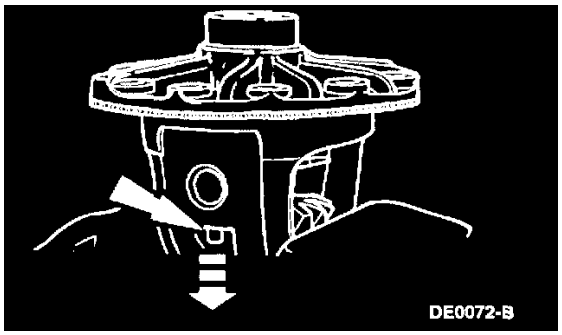


6. The Truetrac and Trac-Lok differential assemblies are non-repairable. Discard the entire assembly if it is worn/damaged. For conventional differential assemblies, proceed as follows.

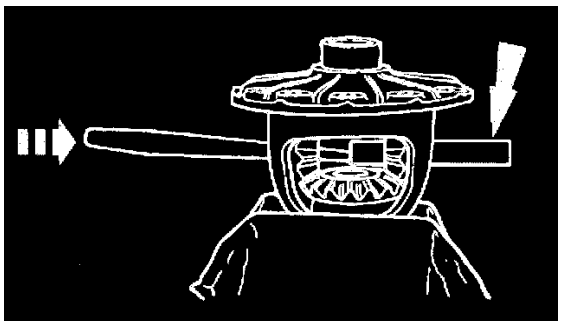
Conventional differential

7. **NOTE:** Use a vise with brass jaws or wood blocks.

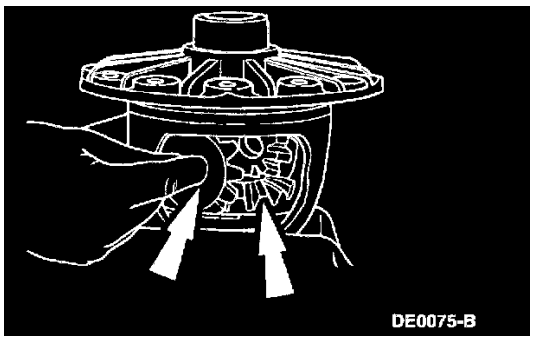
   Place the differential case in a vise.



8. Using a small drift, drive out the differential pinion shaft lock pin.



9. Using a drift, remove the differential pinion shaft.



10. To remove the differential side gears and the differential pinion gears, rotate the differential side gears. The differential pinion gears will turn to the opening in the differential case.
11. Remove the differential pinion gears and the differential pinion thrust washers behind the differential pinion gears.
12. Lift out the differential side gears and the differential side gear thrust washers.

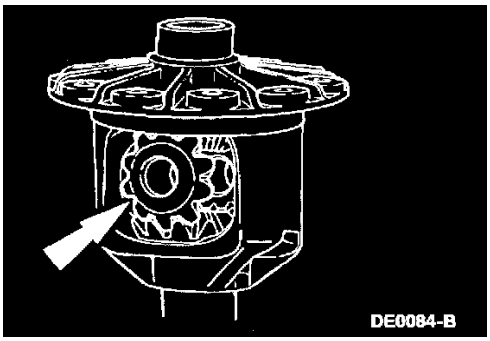
Assembly

Conventional differential

1. **NOTE:** For Truetrac and Trac-Lok differential assemblies proceed to All differentials in this procedure.

   NOTE: Use a vise with brass jaws or wood blocks.

   Place the differential case in a vise.
2. Lubricate the new differential side gear thrust washers, the thrust face of the new differential side gears, the new differential pinion thrust washers, and the new differential pinion gears with grease.

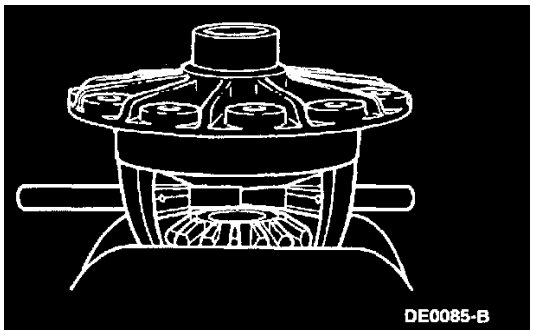


3. **NOTE:** The best way to assemble the differential side gears and the differential pinion gears is to lubricate all parts with the specified rear axle lubricant.

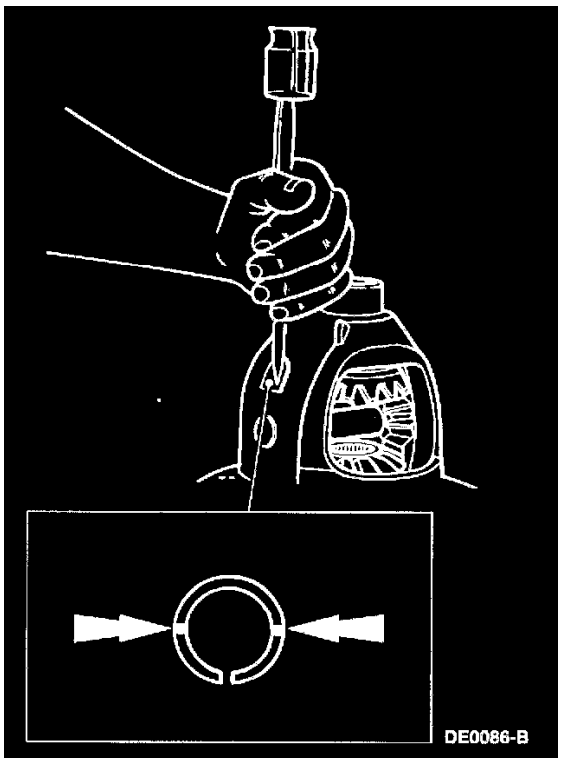
   Lubricate and assemble both differential side gears and differential side gear thrust washers. Hold them in place. Then, lubricate and assemble the differential pinion gears and the differential pinion gear thrust washers to hold the differential side gears in place.

4. **NOTE:** Rotate the differential side gears until the holes of the differential pinion gear thrust washers and the differential pinion gears line up with the holes of the differential case. If the differential pinion gears will not rotate by hand, install one of the axle shafts into the spline of the differential side gear and use a pipe wrench to turn the axle shaft.

   Using a drift, line up the holes with those of the differential case.

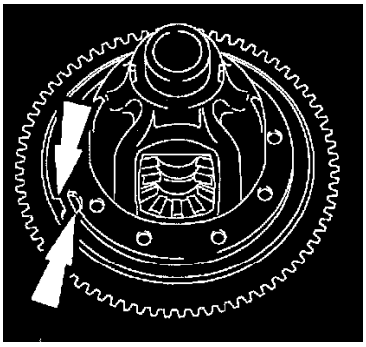


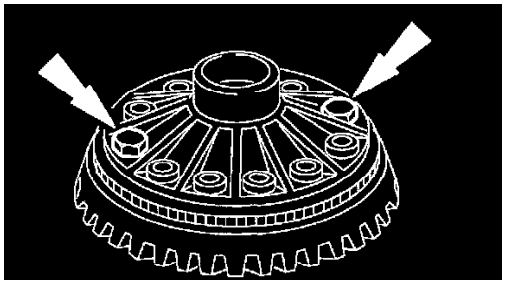
5. Assemble the differential pinion shaft and drive on the differential pinion shaft to remove the drift. Align the lock pin hole in the differential pinion shaft with the lock pin hole in the differential case.



6. Assemble the differential pinion shaft lock pin. Peen the metal of the differential case over the differential pinion shaft lock pin in two places, 180 degrees apart, to lock it in place. Note the location of the slot in the differential pinion shaft lock pin and peen it 90 degrees apart.

All differentials

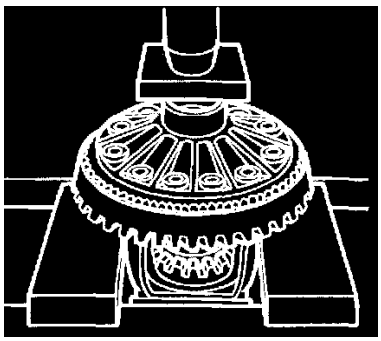




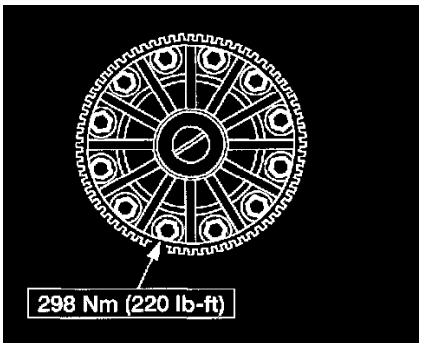
7. **NOTE:** Align the tab on the anti-lock speed sensor ring with the slot in the differential case.

   NOTE: Apply Threadlock and Sealer to the new bolts.

   Align the tab in the anti-lock speed sensor ring with the slot in the differential case. Start the two bolts through the differential case flange and into the differential ring gear to make sure the differential case and the differential ring gear bolt hole align.



8. Press the anti-lock speed sensor ring on the differential case. The differential case flange acts as a pilot for the anti-lock speed sensor ring.

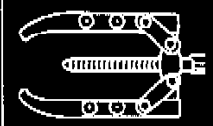
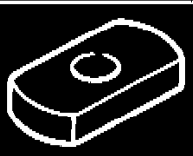


9. **NOTE:** Apply Threadlock and Sealer to the new bolt threads.

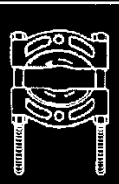
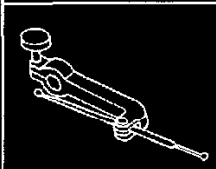
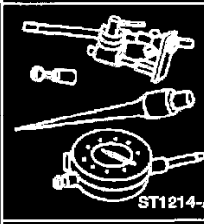
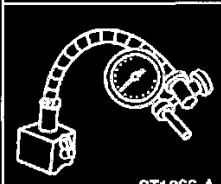
   Draw up the Grade 9 bolts alternately and evenly.
10. Install the differential bearings.

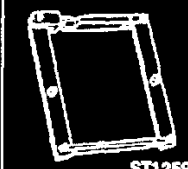
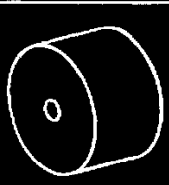
Drive Pinion

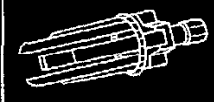
Drive Pinion

 ST1260-A	2-Jaw Puller 205-D026 (D80L-1002-L) or Equivalent
 ST1743-A	Aligning Adapter 205-D028 (D80T-4020-R60)
 ST1550-A	Bearing Cup Driver (inner) 205-489
 ST1881-A	Bearing Cup Remover 205-283 (T88T-4628-A)
 ST1783-A	Bearing Cup Replacer (inner) 205-486

Special Tools

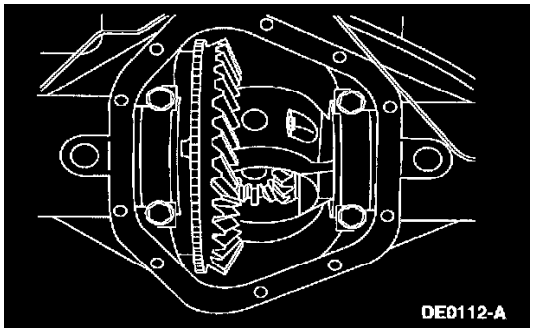
 ST1368-A	Puller, Bearing 205-D064 (D84L-1123-A)
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A)
 ST1544-A	Depth Gauge, Drive Pinion 205-S156 (T80T-4020-A)
 ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
 ST1266-A	Dial Indicator Gauge with Holding Fixture 100-D002 (D78P-4201-B) or equivalent

 ST1259-A	Spreader, Differential Carrier 205-001 (TOOL-4000-E)
 ST1542-A	Installer, Drive Pinion Flange 205-285 (T88T-4851-A)
 ST1890-A	Depth Gauge/Aligner, Drive Pinion 205-280 (T88T-4020-A)
 ST1434-A	Gauge Tube 205-D038 (D81T-4020-FS1) or equivalent
 ST1653-A	Handle 205-D055 (D81L-4000-A) or equivalent
 ST1891-A	Depth Gauge/Aligner, Drive Pinion Handle 205-281 (T88T-4020-B)
 ST1351-A	Slide Hammer 100-001 (T50T-100-A)

 ST1361-A	Installer, Drive Pinion Bearing Cup 205-024 (T67P-4616-A)
 ST1308-A	Installer, Drive Pinion Bearing 205-488
 ST1882-A	Protector, Drive Pinion Thread 205-487
 ST1213-A	Remover, Bushing 307-001 (TOOL-1175-AC) or equivalent
 ST1869-A	Drawbar, Rear Axle 205-098 (T75T-1176-A)

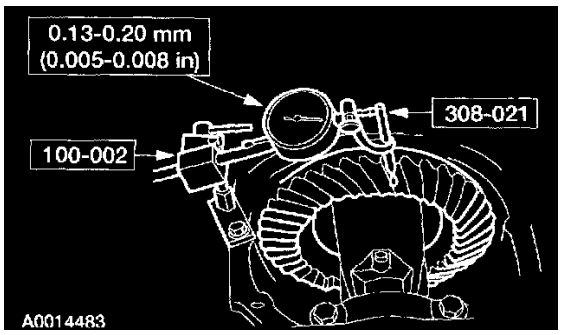
Special Tool(s)

1. Remove the axle assembly.
2. Remove the differential housing cover and drain the lubricant from the rear axle.
   - Clean the gasket material from the differential housing cover and the differential housing.


DE0112-A

3. **NOTE:** An inspection can find the cause of the concern and determine the resolution.

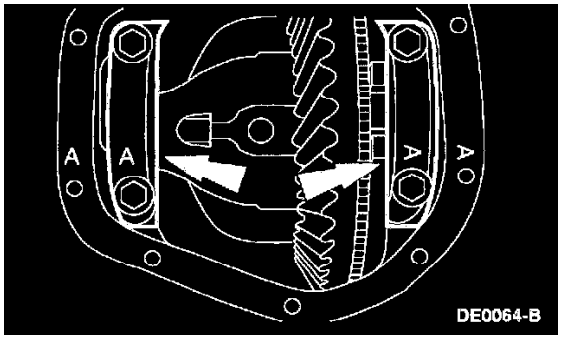
   Carry out the following before disassembly.
   - Remove all the lubricant from the internal parts of the conventional differential assembly or Trac-Lok differential assembly. Visually inspect the parts for wear and damage.
   - Rotate the differential assembly to check for any roughness, indicating damaged bearings or gears.
   - Check the differential ring gear and pinion teeth for signs of scoring, abnormal wear, nicks or chips.
   - Use a magnet to search for hidden heavy metal particles indicating component damage.



4. **CAUTION:** The differential ring gear and pinion must be clean and dry to obtain an accurate reading.

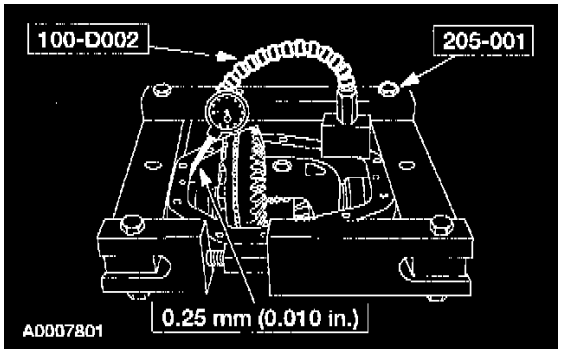
   NOTE: Measure the differential ring gear and pinion backlash at three equally spaced points around the ring gear.

   Using the special tools, measure the differential ring gear and pinion backlash.
   - The backlash specification cannot vary more than **0.05 mm (0.002 inch)** between points checked. A larger variation of backlash indicates gear or case runout concerns.
5. Remove the axle shafts.



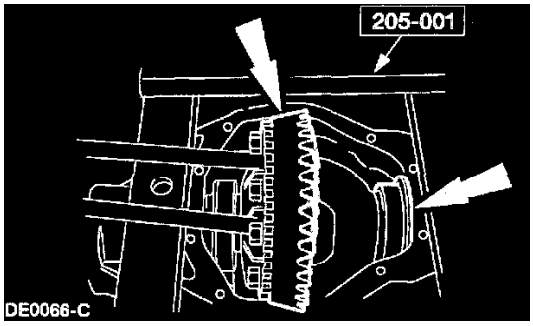
6. **CAUTION:** Note the position of the mating letters stamped vertically and horizontally on the bearing caps and the differential housing before removing the bearing caps.

   Remove the bolts and the bearing caps.



7. **CAUTION:** Do not spread the differential housing more than specified.

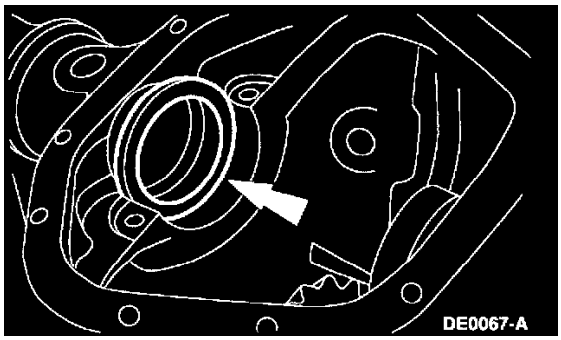
   Using the special tools, spread the differential housing to specifications, then remove the Dial Indicator Gauge with Holding Fixture.



8. **CAUTION:** It will be necessary to use large pry bars to remove the differential assembly from the differential housing. Do not damage the differential ring gear when carrying out this step.

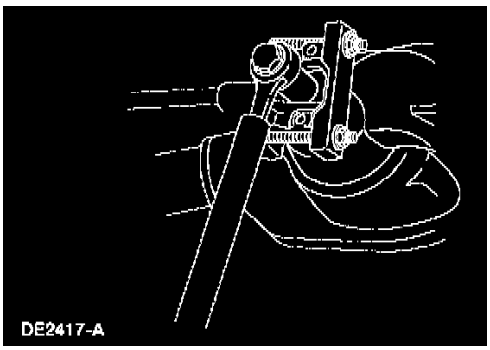
   CAUTION: Mark or tag the differential bearing cups, indicating from which side they were removed.

   Remove the differential assembly with the bearing cups.
   - Remove the special tool after removing the differential assembly.
   - Inspect the differential bearing cups for deep scores, galling, and spelling.



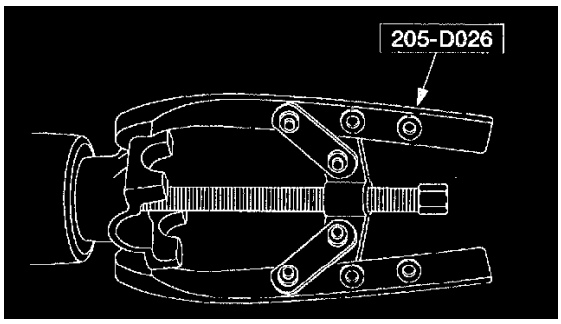
9. **CAUTION:** Mark or tag the outboard spacers indicating from which side they were removed.

   Remove the outboard spacers.
   - Inspect the spacers for nicks, bending, or grooved conditions.

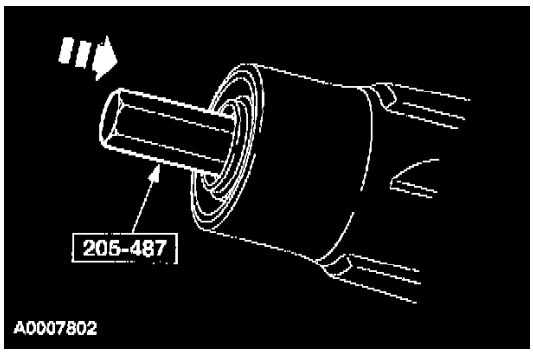


10. **CAUTION:** Index-mark the pinion Range to the pinion shaft prier to removal.

    Using a suitable tool to prevent the flange from turning, remove the pinion lock nut and washer.

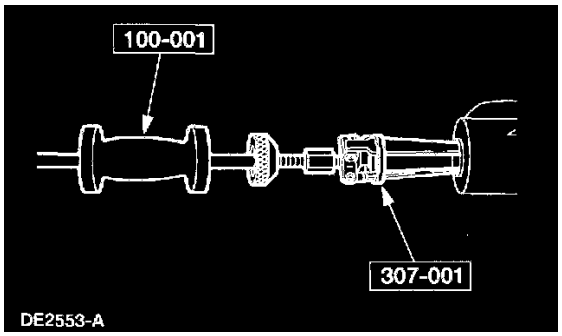


11. Using the special tool, remove the pinion flange.

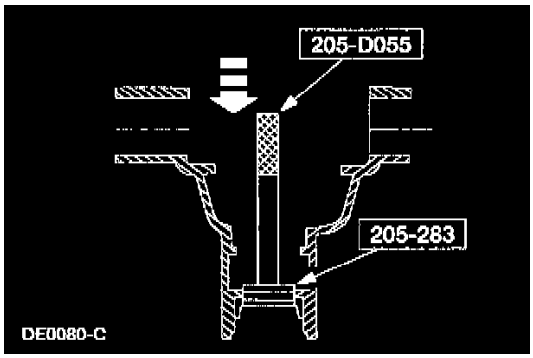


12. **NOTE:** There are drive pinion preload shims on the spline end of the pinion. These shims can stick to the pinion, the pinion bearing or they can fall out of the differential housing. Collect and keep the shims for reassembly.

    Using a soft faced hammer and the special tool, tap the pinion out of the pinion bearing cup and remove it through the rear of the differential housing.

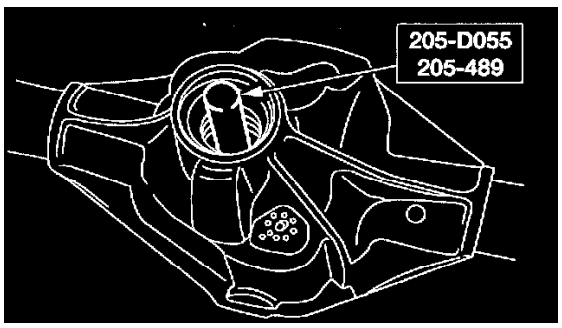


13. Using the special tools, remove and discard the pinion seal.

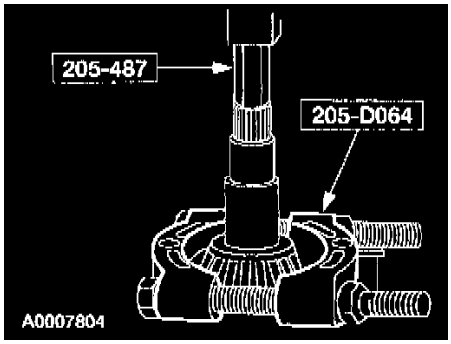


14. **CAUTION:** Do not nick the differential housing bore.

    Using the special tools, remove the outer pinion bearing cup.



15. Using the special tools, remove the inner pinion bearing cup.



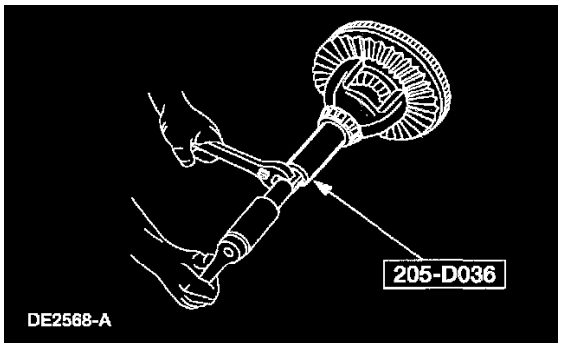
16. Using the special tools, remove the inner pinion bearing.

17. **NOTE:** Discard the drive pinion position shim if bent or nicked. If discarding the shim, measure and record the shim thickness.

    Remove the oil slinger, if equipped, and the drive pinion position shim.

18. **CAUTION:** Do not disassemble the Trac-Lok differential assembly or the Truetrac differential assembly. Discard the entire assembly if worn or damaged.

    Carry out the following after disassembling the axle:
    - Thoroughly clean all parts.
    - Inspect all parts for damage and wear.
    - Clean the inside of the differential case before assembly. For Truetrac differentials, submerge the entire differential assembly in a suitable solvent to wash away contaminates from within the housing.



19. **NOTE:** Differential bearings shims are available in thicknesses of 0.762, 0.787,0.813,0.838, 0.864,0.889, and 0.914 mm (0.030,0.031,0.032, 0.033,0.034,0.035, and 0.036 inch).

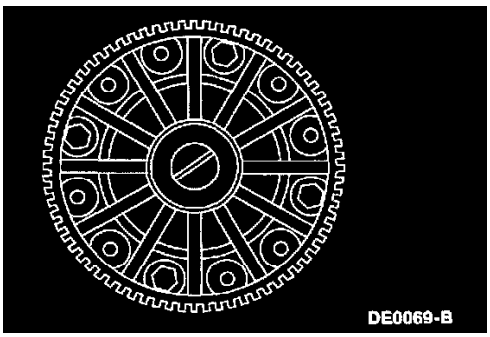
    NOTE: If damaged, install new differential bearing shims.

    NOTE: Install new differential bearings and cups if removing the bearings from the differential case.

    Using the special tools, remove the differential bearings.
    - Tag the selective outboard spacers to identify the side from which they were removed. If the differential bearings are removed, add the bearing shims to the spacers for the appropriate side.

20. **NOTE:** Use a vise with brass jaws or wood blocks.

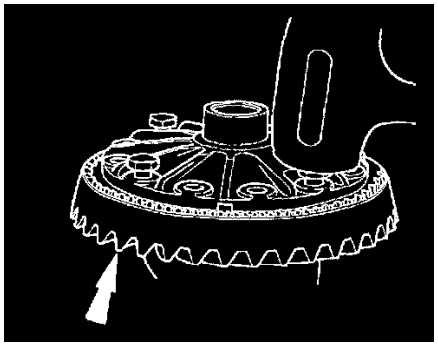
    Place the differential case in a vise.



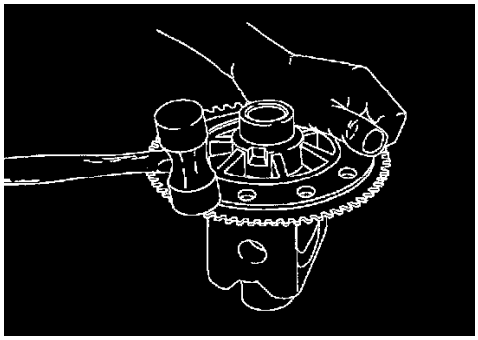
21. **CAUTION:** Do not damage the anti-lock speed sensor ring when removing the differential ring gear. If removing the anti-lock speed sensor ring, discard it and install a new one.

    NOTE: Always use new bolts upon reassembly.

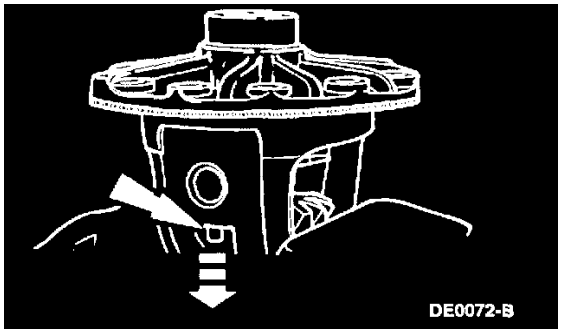
    Remove the ring gear bolts. Leave four bolts loosely assembled, 90 degrees apart.



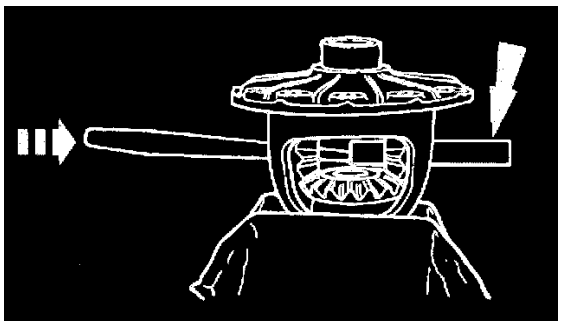
22. Tap each bolt head alternately with a rawhide or plastic hammer to loosen the differential ring gear. Remove and discard the bolts. Remove the differential ring gear.



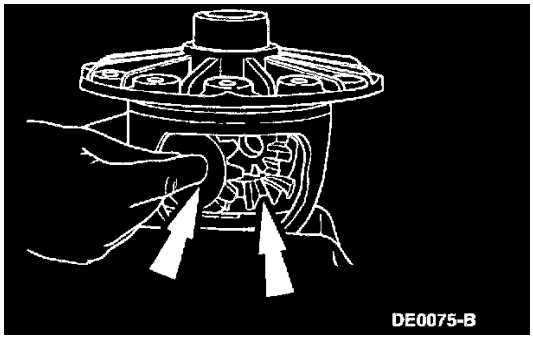
23. If necessary, remove the anti-lock speed sensor ring with a soft-faced hammer. Discard the anti-lock sensor ring.



24. Using a small drift, drive out the differential pinion shaft lock pin.



25. Using a drift, remove the differential pinion shaft.



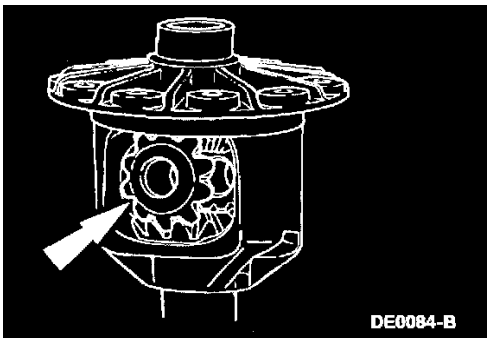
26. To remove the differential side gears and the differential pinion gears, rotate the differential side gears. The differential pinion gears will turn to the opening in the differential case.
27. Remove the differential pinion gears and the differential pinion thrust washers behind the differential pinion gears.
28. Lift out the differential side gears and the differential side gear thrust washers.

Assembly

1. **NOTE:** For Truetrac and Trac-Lok differential assemblies, proceed to Step 7.

   NOTE: Use a vice with brass jaws or wood blocks.

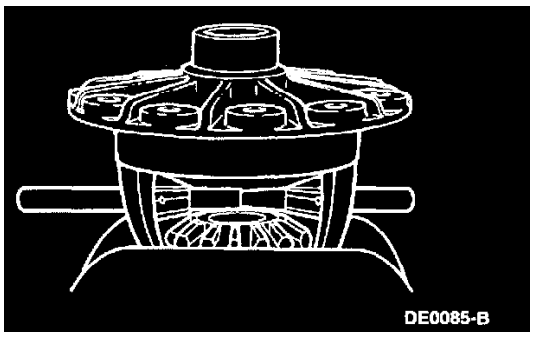
   Place the differential in a vise.
2. Lubricate and assembly both differential side gears and differential side gear thrust washers. Lubricate and assemble the differential pinion gears and the differential pinion gear thrust washers.



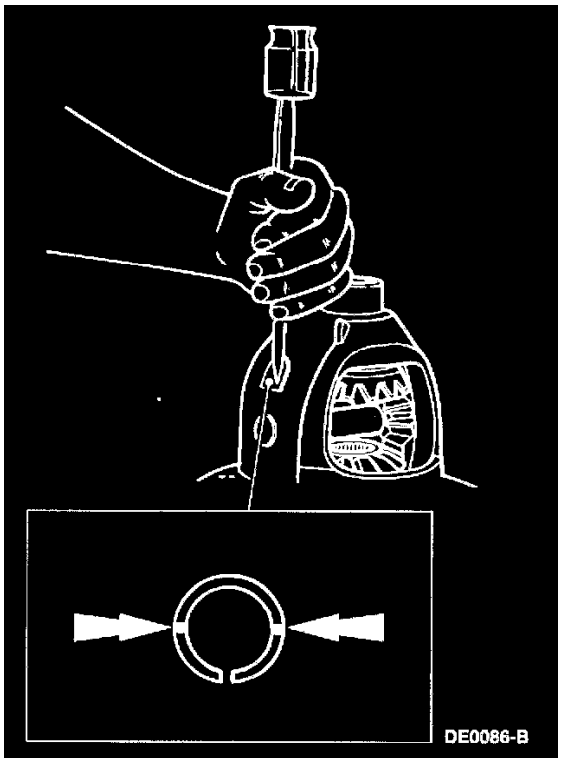
3. Install the differential side gears and washers in the differential case. Hold the side gears in place while installing the differential pinion gears in the differential case.

4. **NOTE:** Use a drift to align the pinion gear holes with the pinion shaft holes.

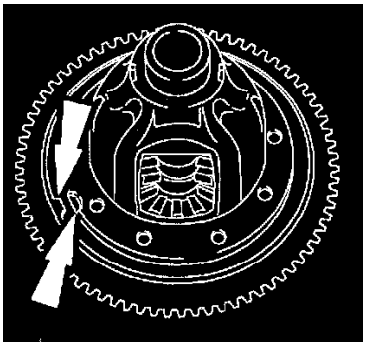
   Rotate the differential side gears to align the differential pinion gears with the holes in the differential case for the differential pinion shaft.

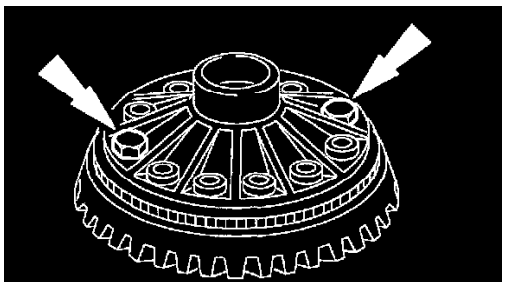


5. Assemble the differential pinion shaft. Use a soft faced hammer to tap on the differential pinion shaft to remove the drift.



6. Align the lock pin hole in the differential case with the differential pinion shaft lock pin hole. Insert the lock pin and peen the metal of the differential case over the differential pinion shaft lock pin in two places, 180 degrees apart to lock it in place.

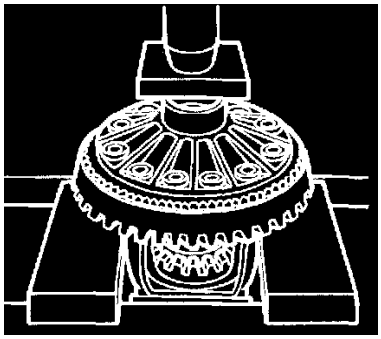




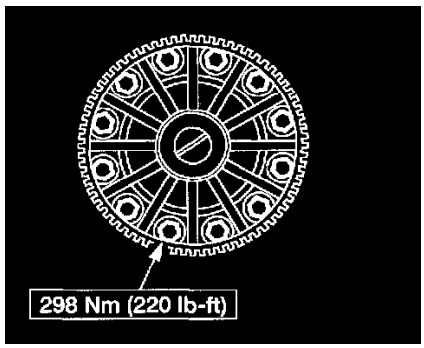
7. **NOTE:** Align the tab on the anti-lock speed sensor ring with the slot in the differential case.

   NOTE: Apply Thread lock and Sealer to the new bolts.

   Start two bolts through the differential case flange, the anti-lock sensor ring, and into the differential ring gear to make sure the differential ring gear and differential case align.

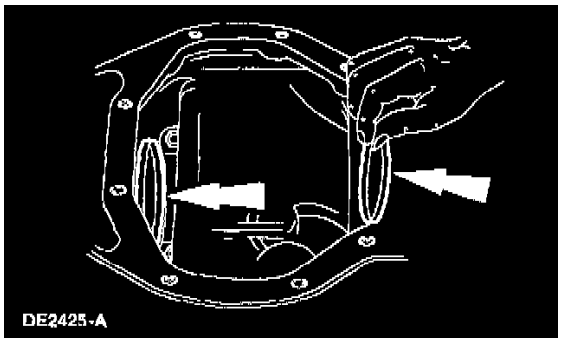


8. Press the anti-lock speed sensor on the differential case. The differential case flange acts as a pilot for the anti-lock speed sensor ring.

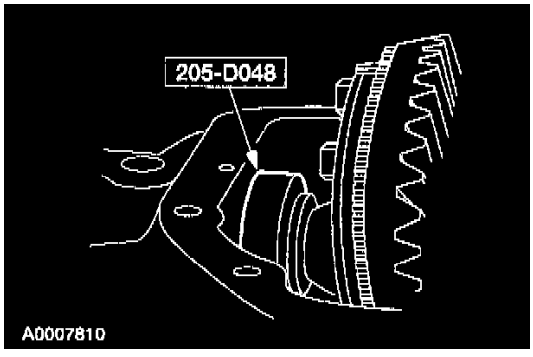


9. **NOTE:** Apply Threadlock and Sealer to the new bolt threads.

   Draw up the new ring gear bolts alternately and evenly to specifications.

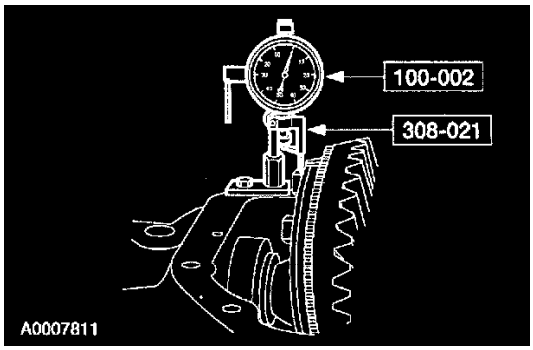


10. Install the outboard spacers in the side from which they were removed.



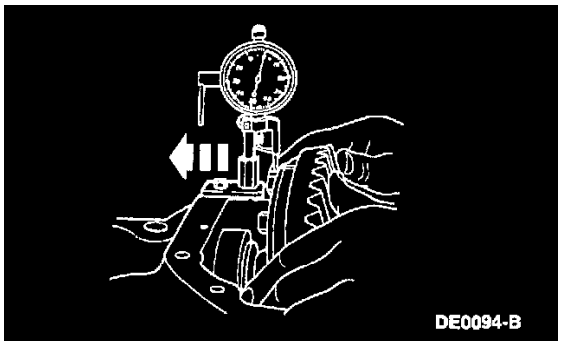
11. **NOTE:** Remove all nicks, burrs, dirt, etc. from the differential case hubs, to allow the special tools to rotate freely.

Place the special tools of the differential case hubs and position the assembly into the differential housing.



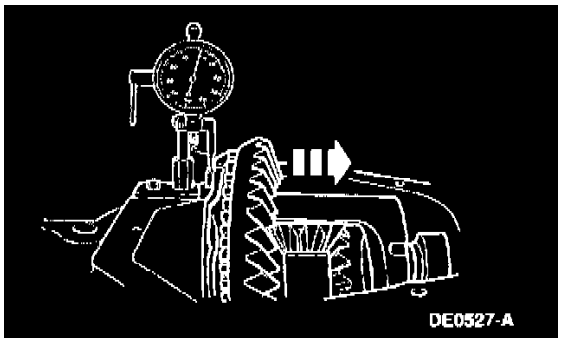
12. **NOTE:** The rear axle uses a combination of differential bearing shims and selective outboard spacers to control differential case end play. The old outboard spacers provide a good starting point when setting end play. However, if additional shimming is necessary, beyond what the hardened differential bearing shims can provide, select and install different thickness outboard spacers.

    Mount the special tools as shown. Locate the tip of the Clutch Housing Gauge on a flat surface of one of the bolts.

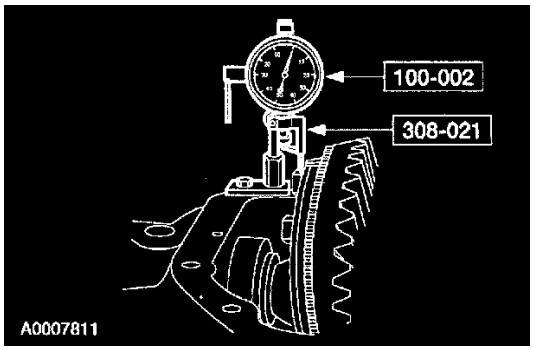


13. **NOTE:** Repeat this and the following step until the same readings appear on the indicator each time. This is the total differential bearing shim thickness necessary, less preload. The final calculation occurs later during assembly.

    Force the differential case as far as possible toward the indicator. With force applied, set the indicator at 0.

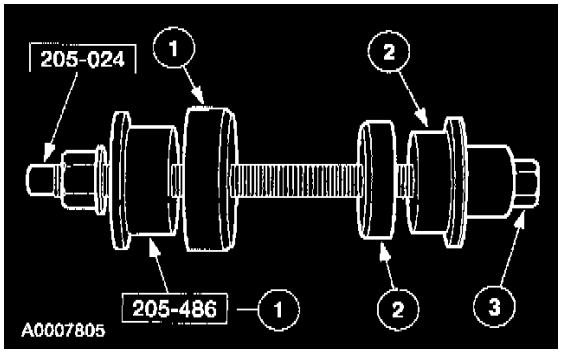


14. Force the differential case as far as it will go in the opposite direction. Record the total differential case end play reading.

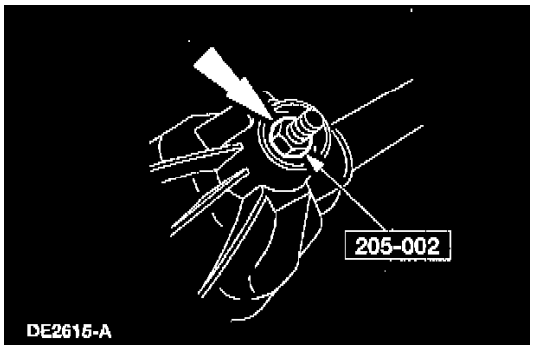


15. After making sure the reading is repeatable, remove the special tools and the differential from the differential housing. Do not remove the Master

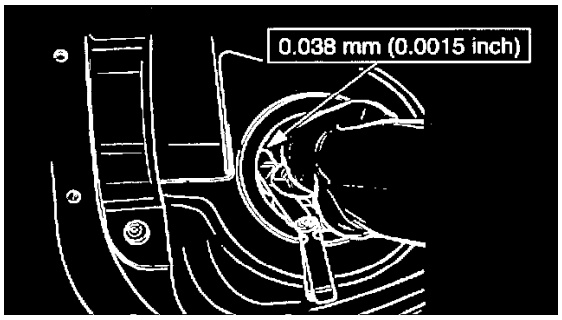
Bearings from the differential case at this time.



16. Position the special tools and the inner and outer pinion bearing cups in their respective housing bores.
    1 After placing the inner outer bearing cups in their bores, place the special tool (inner) on the inner pinion bearing cup.
    2 Place the special tool (outer) on the outer pinion bearing cup.
    3 Install the special tool.



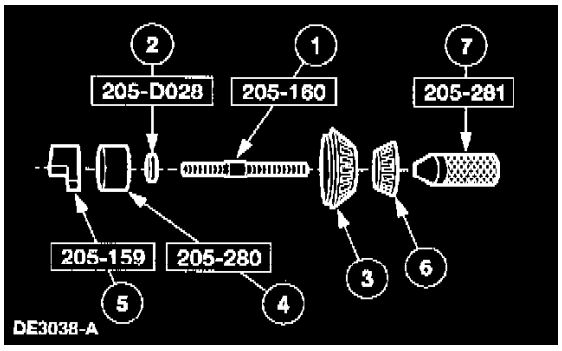
17. Tighten the special tool to seat the pinion bearing cups into their bores.



18. **CAUTION:** Always install new pinion bearings when installing new bearing cups.

    NOTE: If the feeler gauge can fit between a cup and the bottom of its bore at any point around the cup, remove and reseat the cup.

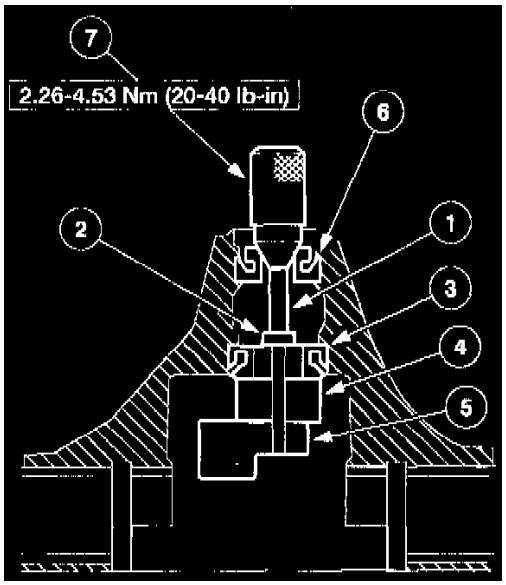
    Check that the cups have seated correctly in their bores.



19. **CAUTION:** If any of the gauge surfaces have nicks in them, remove the high spots with a medium India oilstone to prevent erroneous readings.

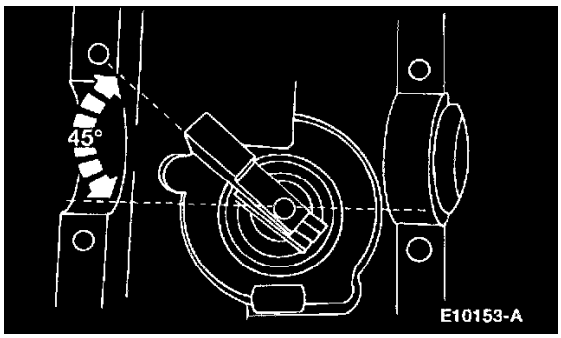
NOTE: Apply a light oil film on the pinion bearings before assembling the tools.

Assemble and position the following in the differential housing.
1 Position the special tool.
2 Position the special tool.
3 Position the inner pinion bearing.
4 Position the special tool.
5 Position the special tool.
6 Position the outer pinion bearing.
7 Thread on the special tool.



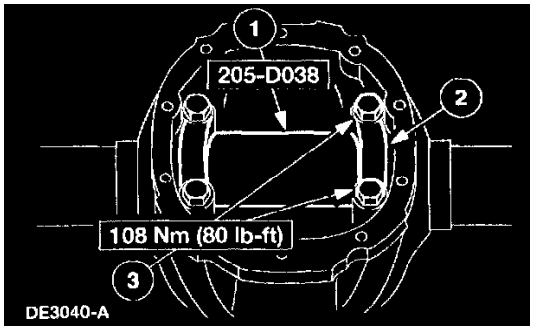
Item	Description
1	Screw
2	Alignment Adapter
3	Inner Pinion Bearing
4	Drive Pinion Depth Gauge/Aligner
5	Gauge Block
6	Outer Pinion Bearing
7	Drive Pinion Depth Gauge/Aligner Handle

20. **NOTE:** This step simulates pinion bearing preload. Using a Nm (inch-pound) torque wrench, tighten the Handle to specification.

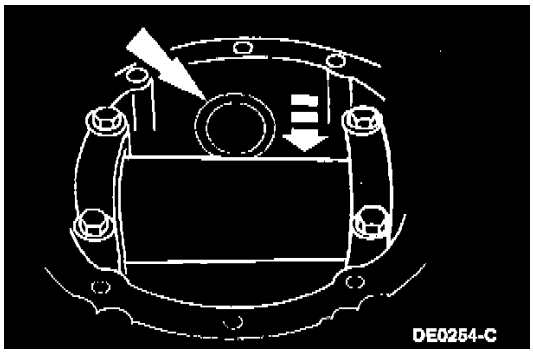


21. **NOTE:** Offset the Gauge Block to obtain an accurate reading.

Rotate the Gauge Block several half turns to make sure the pinion bearings are correctly seated and position the Gauge Block.



22. Install the special tool.
    1 Position the special tool.
    2 Install the bearing caps.
    3 Install the four bolts.



23. **NOTE:** The service tools designed for a nominal pinion with 0 etch.

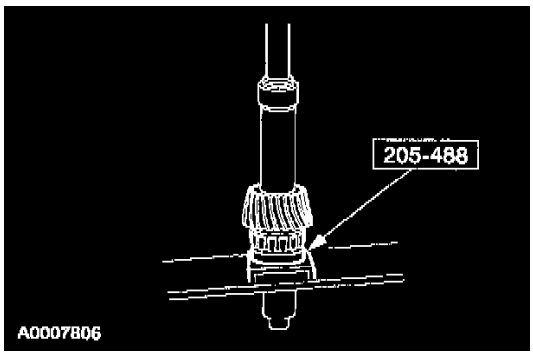
    NOTE: Use a feeler gauge or clean, flat drive position shims as a measuring device.

    NOTE: Do not attempt to force the feeler gauge or shims between the Gauge Block and the Gauge Tube. A slight drag indicates a correct selection.

    Measure between the Gauge Block and the Gauge Tube. Record the measurement.

24. **CAUTION:** Follow the drive pinion bearing preload shim and drive pinion position shim assembly as directed or unit failure can result.

    Install the correct thickness drive pinion position shim, and the oil slinger, if so equipped, on the peon.

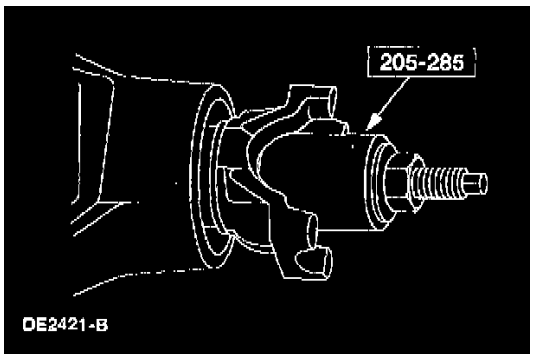


25. **NOTE:** Always use the same new inner pinion bearing installed when taking the measurement for drive pinion position shim selection.

    Using the special tools and a suitable press, install the inner pinion bearing.

26. **NOTE:** Use the thickness of the old drive pinion bearing preload shims as a starting point for setting pinion bearing preload.

    Inspect the drive pinion bearing preload shims for damage. Discard them if necessary. New shims are available in the thickness shown in the following chart.



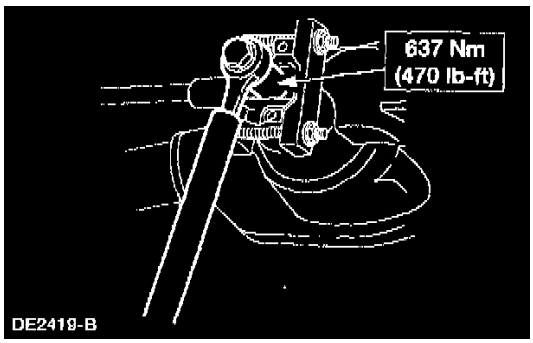
Available Drive Pinion Bearing Preload Shims

27. Assemble the drive pinion preload shims onto the pinion and install the pinion into the differential housing.

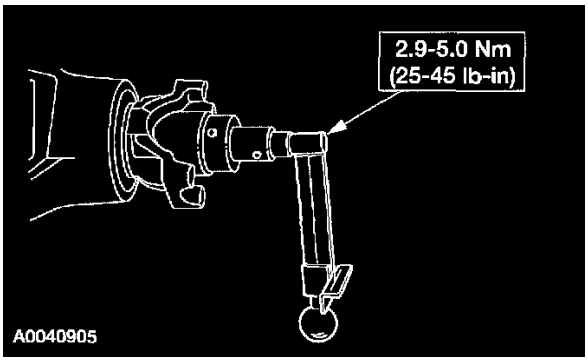
mm	Inches
0.51	0.020
0.53	0.021
0.56	0.022
0.58	0.023
0.76	0.030

28. **NOTE:** Do not install the pinion oil seal at this time.

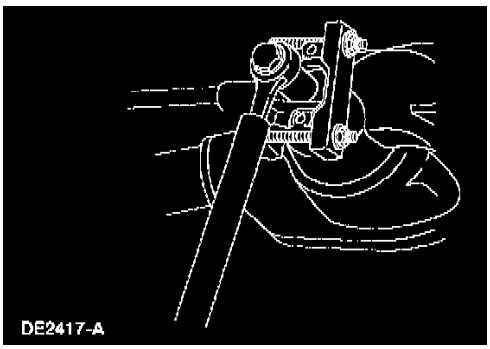
    Using the special tool, install the pinion flange.



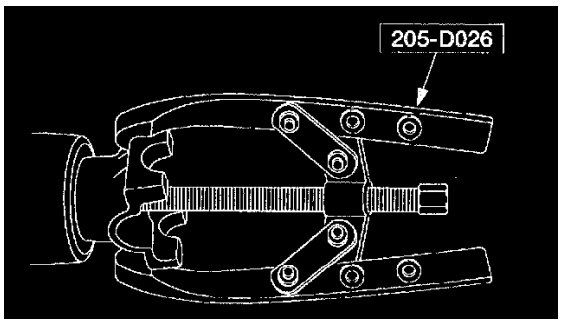
29. Install the old washer and pinion locknut.



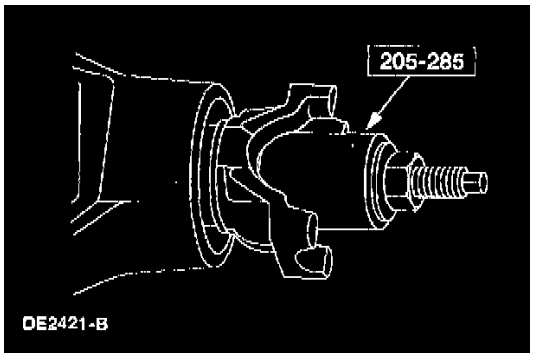
30. Using a Nm (inch-pound) torque wrench, rotate the pinion. The torque must read as specified.
    - To increase the bearing preload, remove drive pinion bearing preload shims. To decrease the preload, add pinion bearing preload shims.



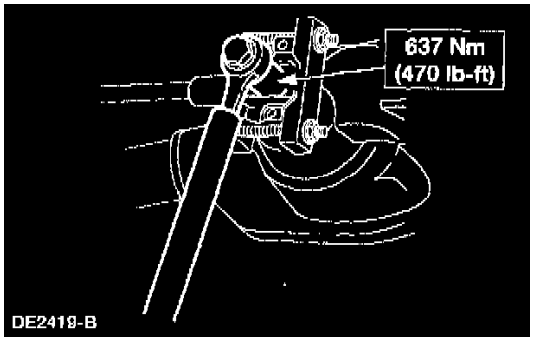
31. With the drive pinion bearings at the correct preload as determined in this procedure, remove and discard the pinion locknut and washer.



32. Using the special tool, remove the pinion flange.
33. Coat the pinion seal rubber lips with the specified fill lubricant.
34. Using a suitable driver, install the differential pinion oil seal.
35. Coat the inner splines of the pinion flange with lubricant.

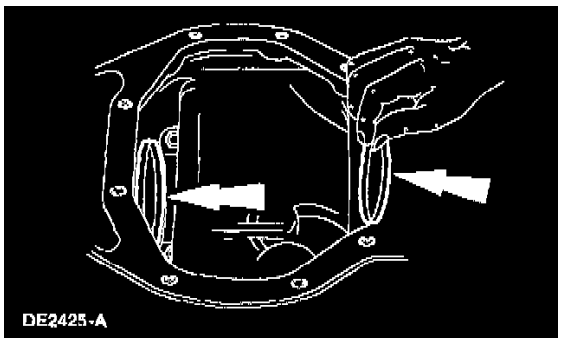


36. Using the special tool, install the pinion flange.

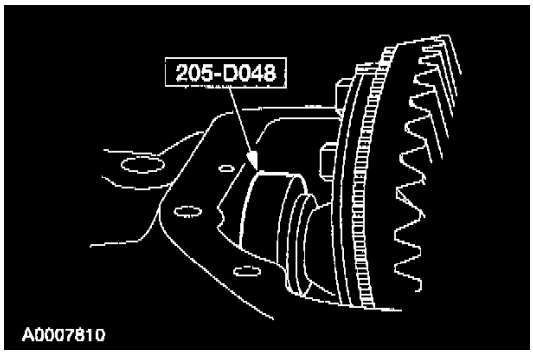


37. **CAUTION:** Always use a new washer and locknut.

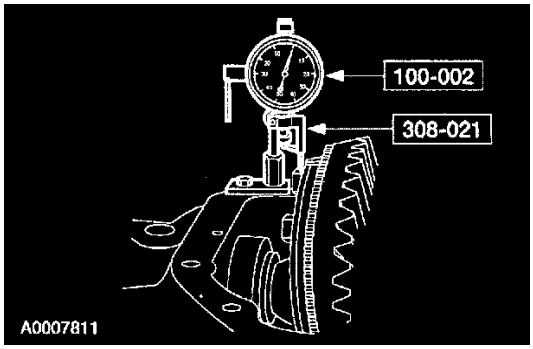
    Install the new washer and locknut. Torque to specification.



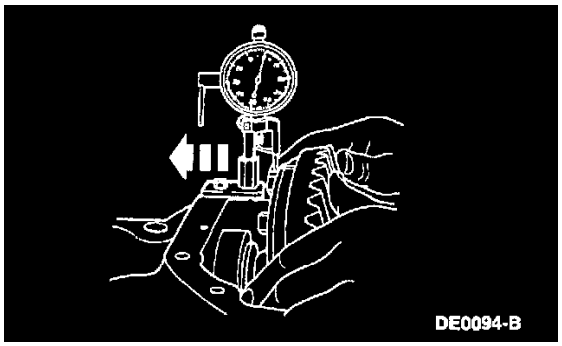
38. Install the outboard spacers in the side from which they were removed.



39. Place the differential assembly with the special tools in the differential housing.

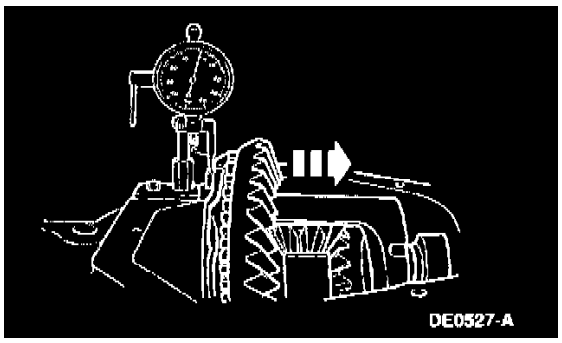


40. Install the special tools. Locate the tip of the Clutch Housing Gauge on the flat surface of one of the bolts.

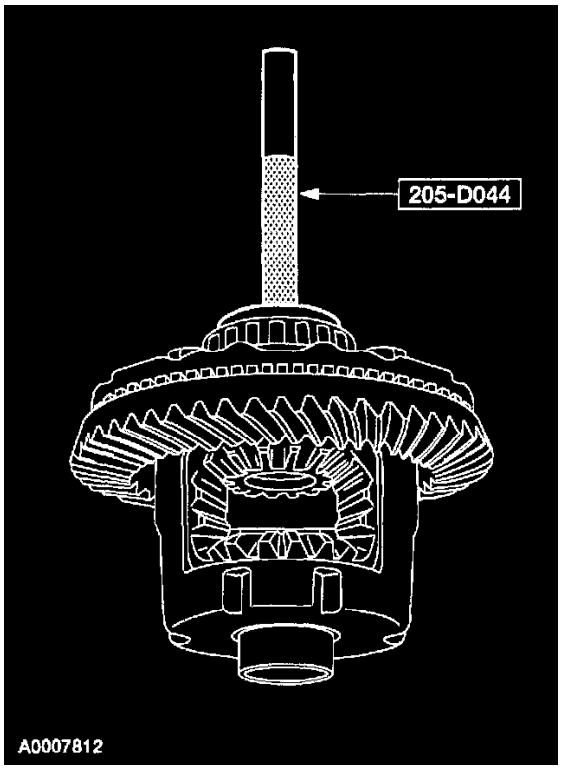


41. **NOTE:** Repeat this and the following step until the same readings appear on the indicator each time. This is the differential bearing shim thickness necessary between the differential case and the differential bearing on the differential ring gear side of the differential case.

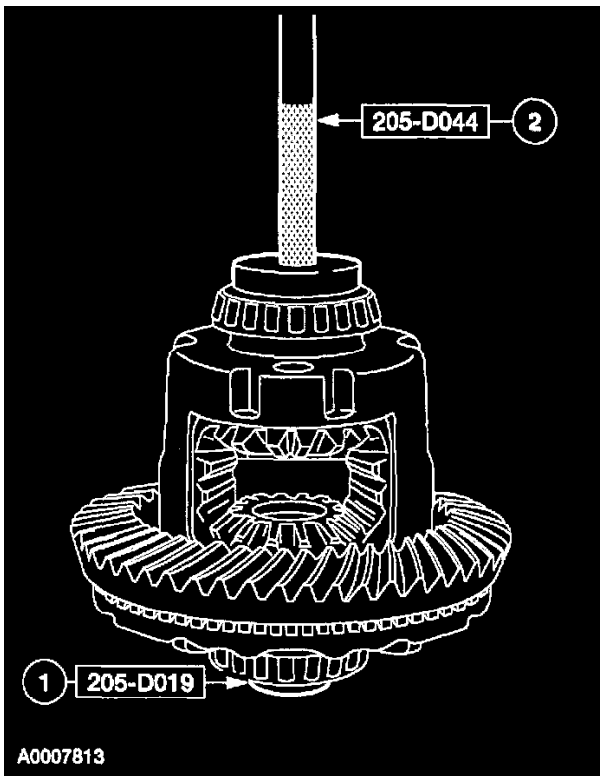
    Force the differential case and ring gear away from the drive pinion. With force applied, set the indicator to 0.



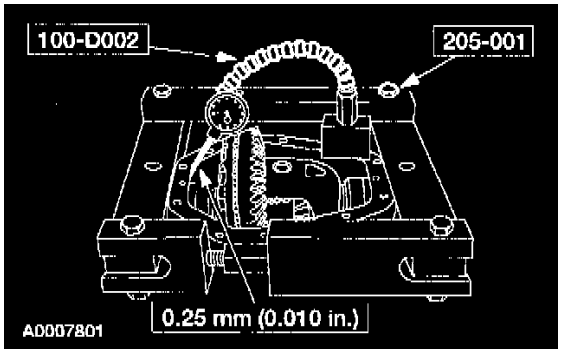
42. Force the differential ring gear into mesh with the pinion to obtain an indicator reading. Record this measurement.
43. Remove the differential case and the special tools from the differential housing.
44. Remove the Master Bearings from the differential case.
45. Place a shim of the thickness determined by the end play between the differential case and the ring gear/pinion on the ring gear side of the differential case. If additional shimming is necessary, beyond what the hardened differential bearing shim can provide, select and install a different thickness outboard spacer.



46. Using the special tool, install the differential bearing on the differential ring gear side of the differential case.
47. Determine the correct shim thickness and place the shim on the differential case hub on the drive pinion side.
    - To determine the correct shim thickness, first subtract the thickness of the ring gear side differential case hub shim from the total differential case end play reading recorded earlier. Then, add **0.25 mm (0.010 inch)** to this amount. This result is the correct thickness of shim to place on the pinion side differential hub. If additional shimming is necessary, beyond what the hardened differential bearing shim can provide, select and install a different thickness outboard spacer.



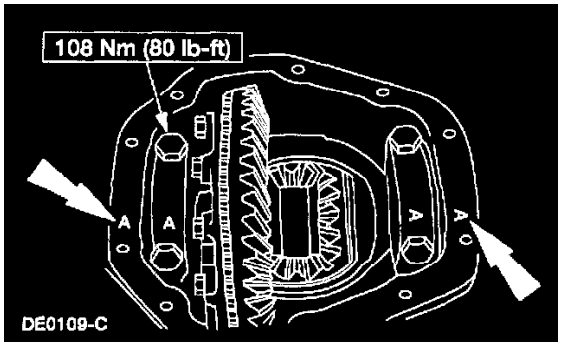
48. Using the special tools, install the differential bearing.
    1 Place the special tool on the differential bearing to protect it during the installation of the opposite bearing.
    2 Using the special tool, drive the differential bearing onto the hub.
49. Assemble the differential bearing cups to the differential bearings.



50. **CAUTION:** Do not spread the differential housing more than specified.

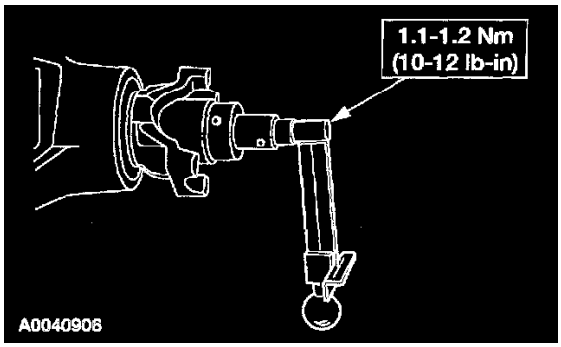
    CAUTION: Avoid nicking the ring gear teeth and the anti-lock speed sensor ring during assembly.

    Using the special tools, spread the differential housing to specifications.
    1 Use a rawhide hammer to seat the differential in the differential housing.
    2 Remove the special tools.



51. **CAUTION:** Match the mating letters as noted during disassembly.

Install the bearing caps, aligning the letters with those on the differential housing. Tighten the bolts to specifications.

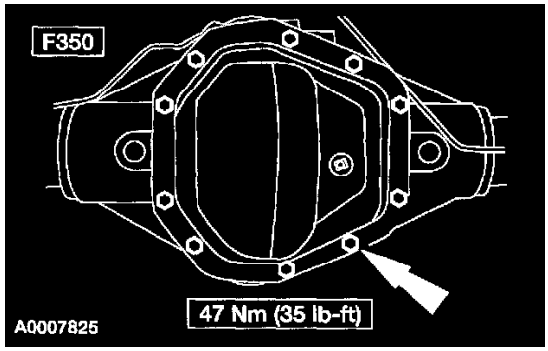


52. Confirm the total preload.
    - Using a Nm (inch-pound) torque wrench, check the torque to rotate the pinion. The reading must be higher than the initial reading taken without the differential case installed by the amount shown.
53. Carry out the Tooth Contact Pattern Check to verify the final pinion position is correct.
54. Install the axle shafts.

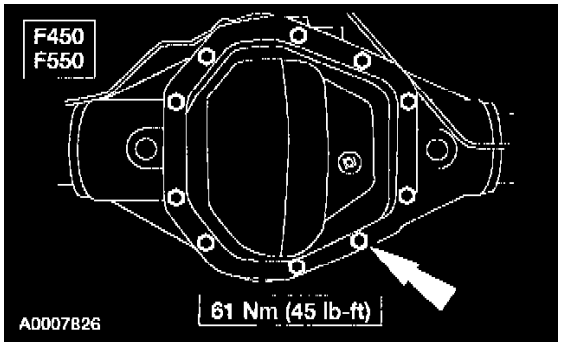
55. **CAUTION:** Clean both flat surfaces (differential housing and differential cover) with a suitable solvent to remove all traces of oil film.

    CAUTION: Install the differential cover within 15 minutes of applying the silicone or it will be necessary to remove and reapply new sealant.

    Apply a continuous bead of sealant of the specified thickness to the differential housing cover.
56. Place two bolts into the differential housing cover at the 8 o'clock and 2 o'clock positions. Install the differential housing cover on the differential housing.



57. Install the remaining bolts. Tighten the bolts alternately and evenly.
    - Allow a one hour cure time before filling the axle with the correct amount of specified lubricant.



58. Install the axle assembly.