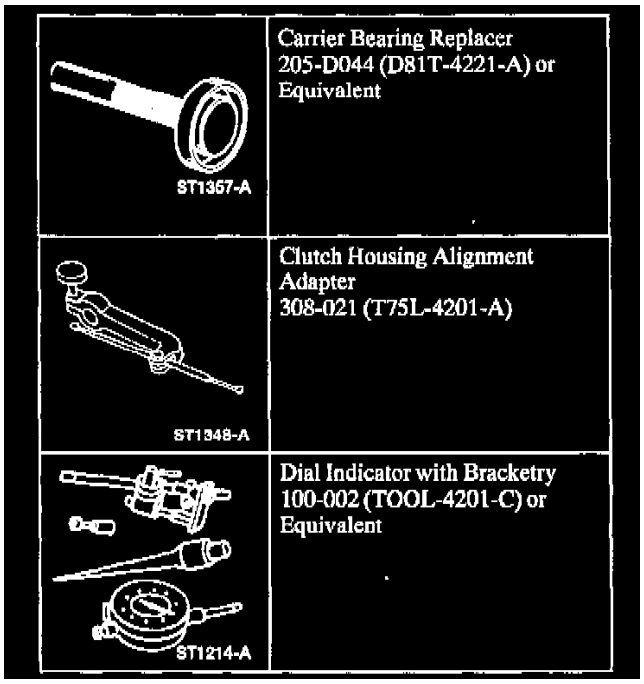
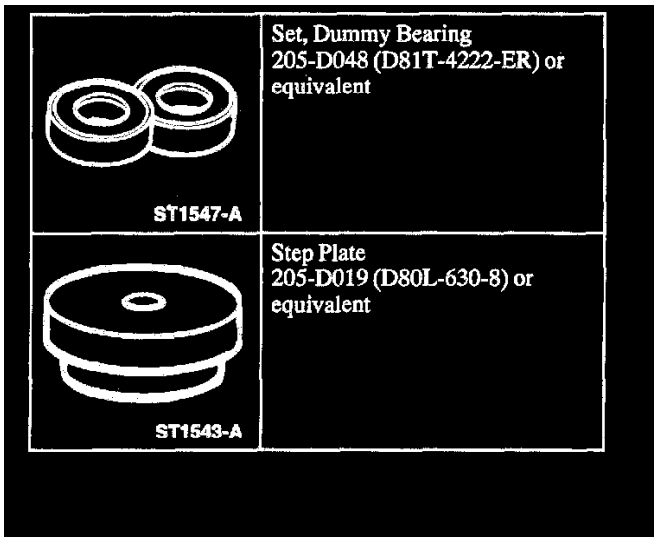
Differential Assembly: Service and Repair
Rear

Differential Case End Play Check
Differential Case End Play Check



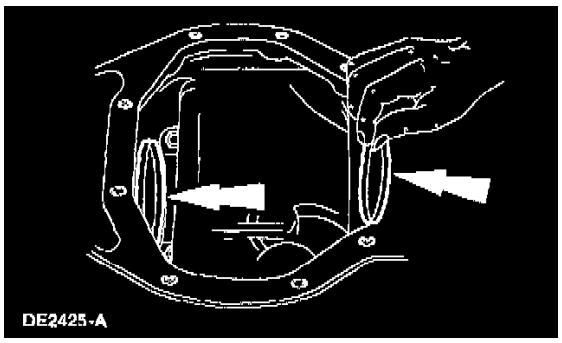
Special Tools

Part 1 - 2

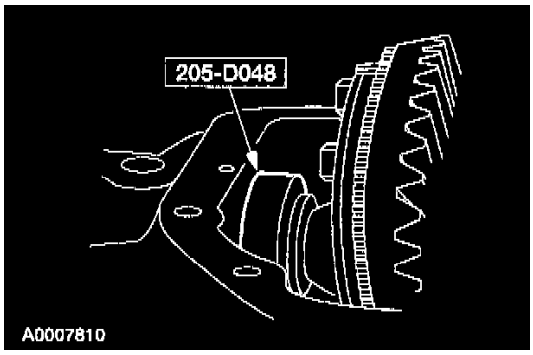


Part 2 - 2

Special Tool(s)

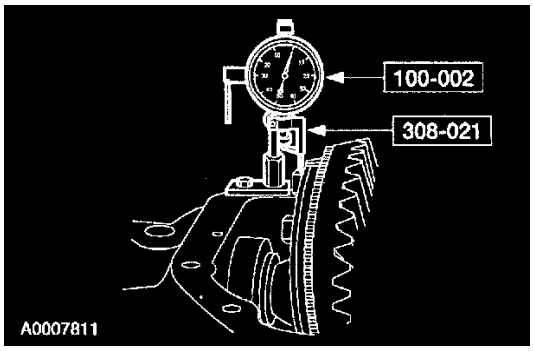


1. Install the outboard spacers in the side from which they were removed.



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

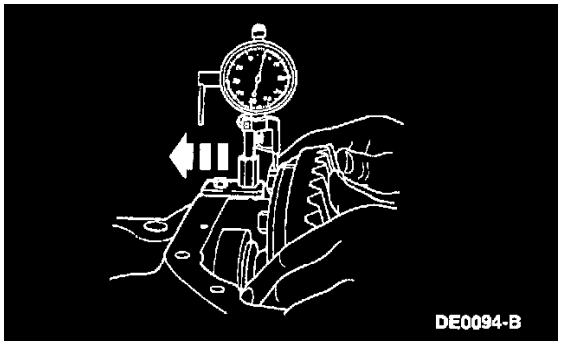
   Place the special tool on the differential case hubs, and position the assembly into the differential housing.



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

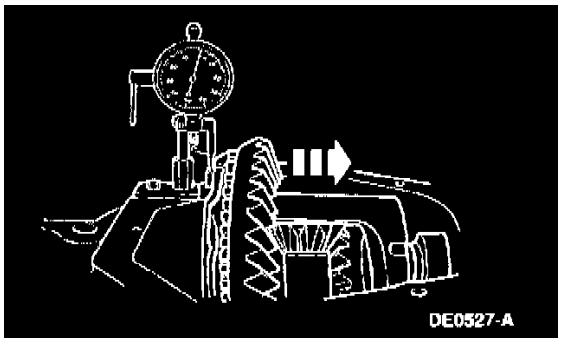
   NOTE: The rear axle uses a combination of differential bearing shims and selective outboard spacers to control differential case end play. The old outboard spacers provide a good starting point when setting end play. However, if additional shimming is necessary, beyond what the hardened differential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

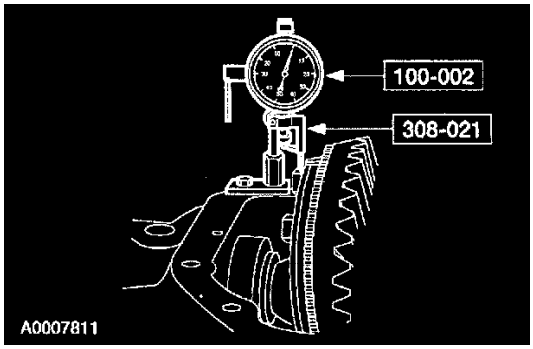


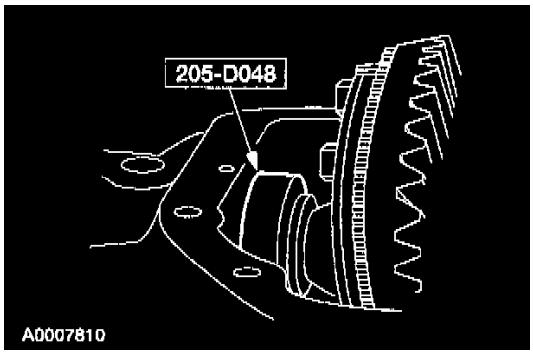
4. **NOTE:** Repeat this step and the following step until the same reading appears on the indicator each time. Record the reading. This is the total differential bearing shim thickness necessary, less preload. The final calculation occurs later during assembly.

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.

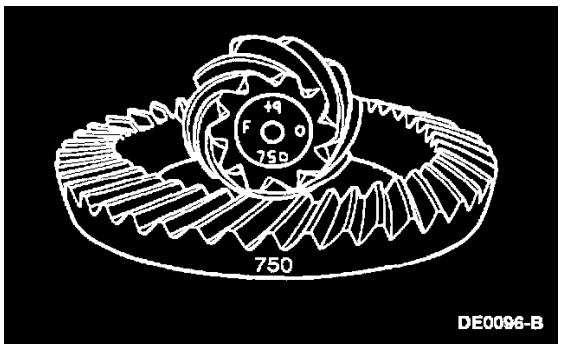
Pinion Ring Gear Variation Number

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.



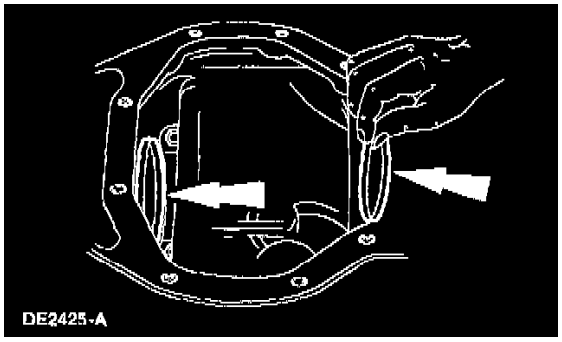
1. Shim the pinion as follows:
   - Etched on the button end of each pinion is a zero (0), or a plus (+) or minus (-) with a number. This number indicates the best running position for each particular differential ring gear. Shimming behind the inner pinion bearing controls this dimension.
2. If reusing 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

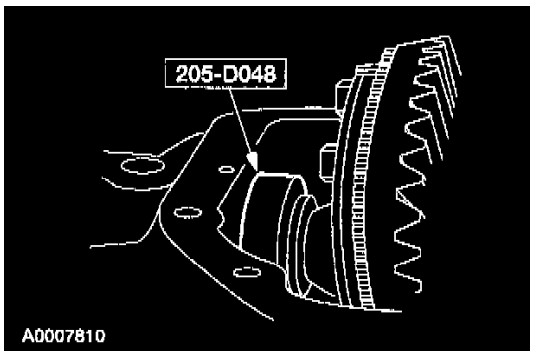
New Pinion Conversion Chart (Metric)

Ring Gear and Pinion Backlash

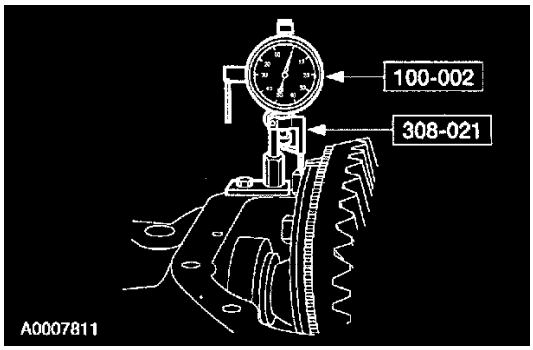
Ring Gear and Pinion Backlash



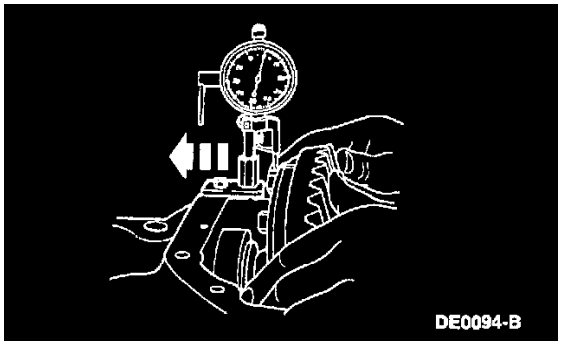
1. Install the outboard spacers in the side from which they were removed.



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

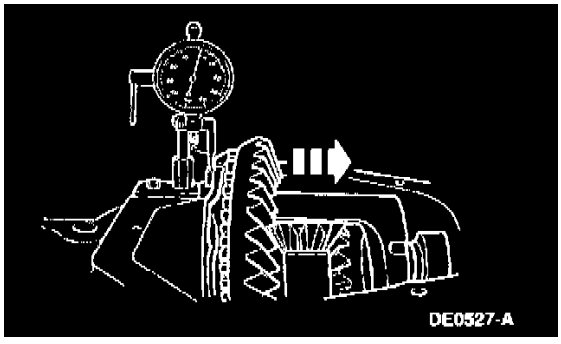


3. Install the special tools. Locate the tip of the Clutch Housing Gauge on a flat surface of one of the bolts.

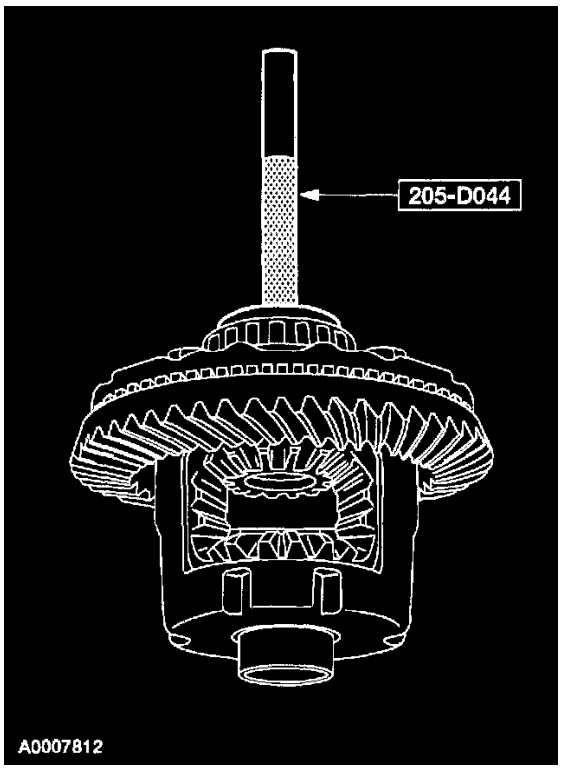


4. **NOTE:** Repeat this step and the following step until the same reading appears on the indicator each time. This is the differential bearing shim thickness necessary between the differential case and the differential bearing on the differential ring gear side of the differential case.

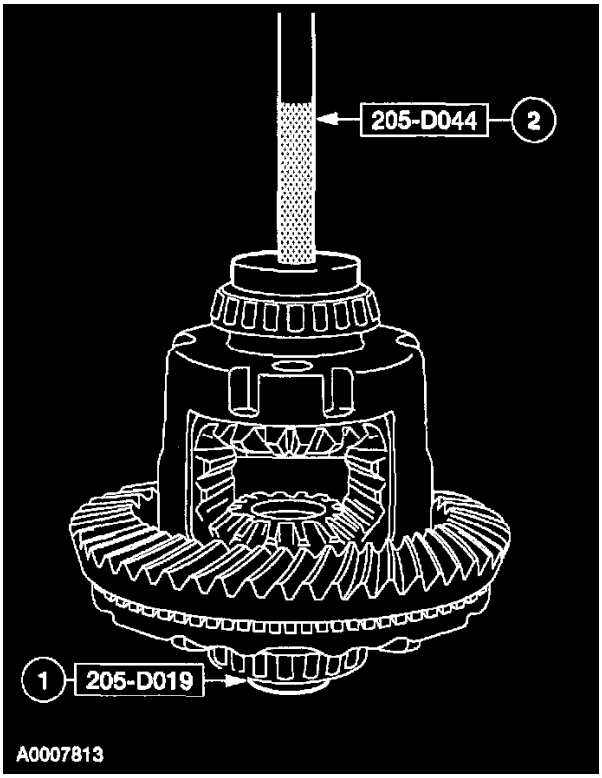
   Force the differential case (differential ring gear) away from the drive pinion. With force still applied, set the indicator at 0.



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.

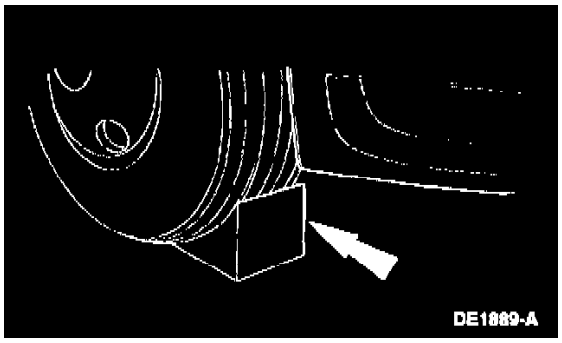


11. Using the special tools, install the differential bearing.
    1 Place the special tool on the differential bearing to protect it during the installation of the opposite bearing.
    2 Using the special tool, drive the differential bearing onto the hub.

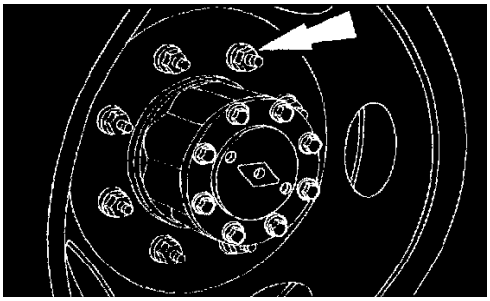
Removal and Installation

Axle Assembly

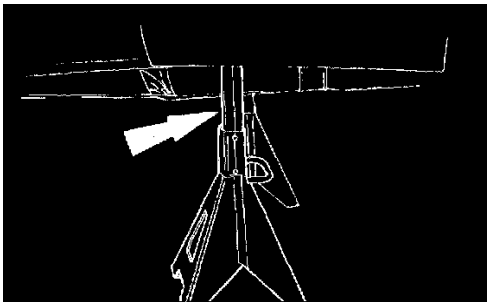
Removal



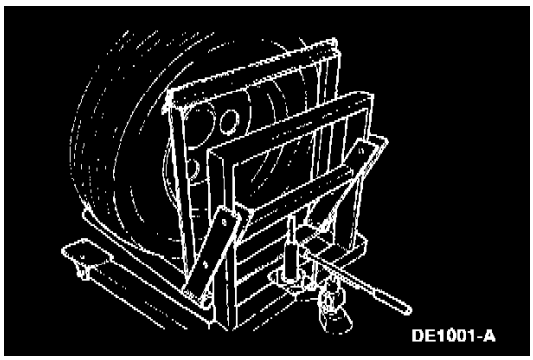
1. Chock the front wheels.



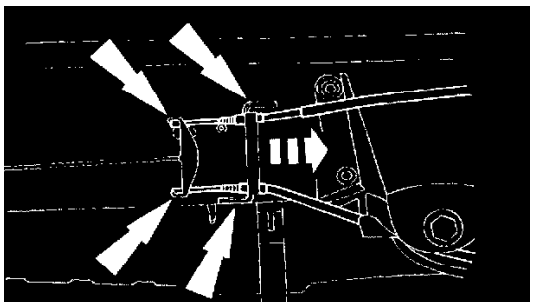
2. Loosen, but do not remove, the rear wheel lug nuts.



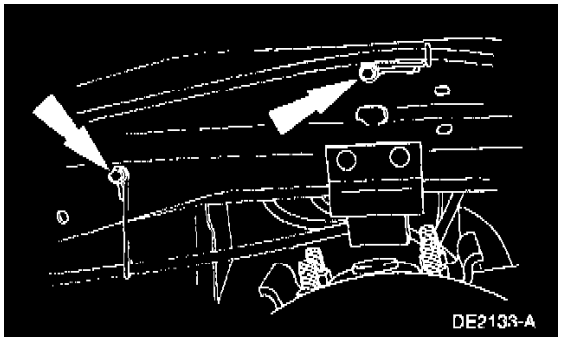
3. Raise and support the rear of the vehicle high enough so that it will clear the axle assembly when removing it.



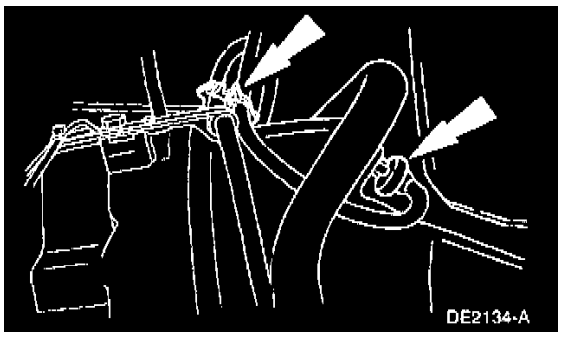
4. Remove the rear wheels using a wheel dolly.



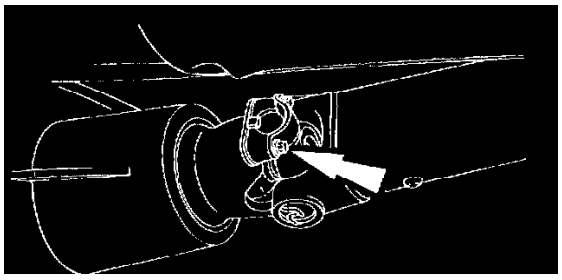
5. Release the parking brake cable tension, and disconnect the cables at the equalizer and the anchor plate.



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

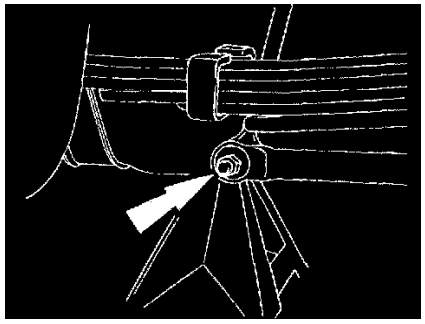


7. Disconnect the rear anti-lock brake sensor electrical connector. Release the harness clips and position the harness aside.

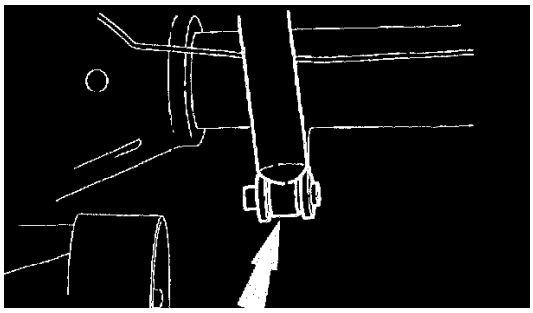


8. **NOTE:** To maintain driveline balance, mark the driveshaft components so they can be reinstalled in their original positions.

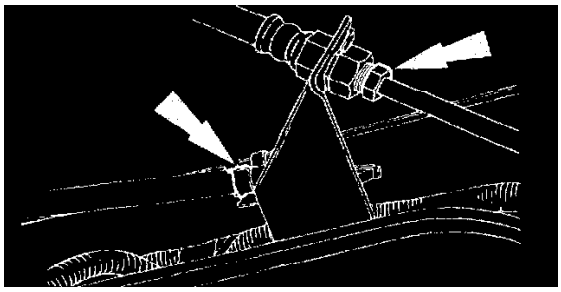
   Disconnect the driveshaft, and position it aside.



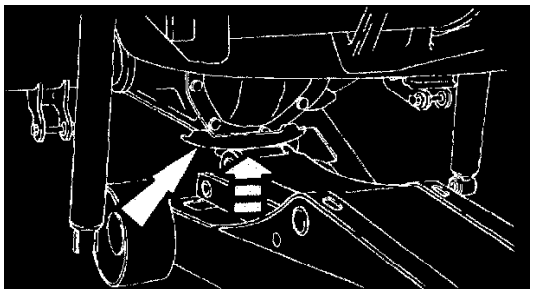
9. If so equipped, disconnect the sway bar at the sway links.



10. Disconnect the shock absorbers at the axle.

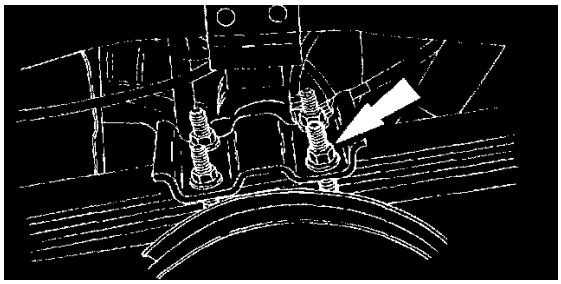


11. Disconnect the hydraulic brake hose and axle vent hose at the crossmember. Plug the brake hose and brake line, and position the hoses aside.

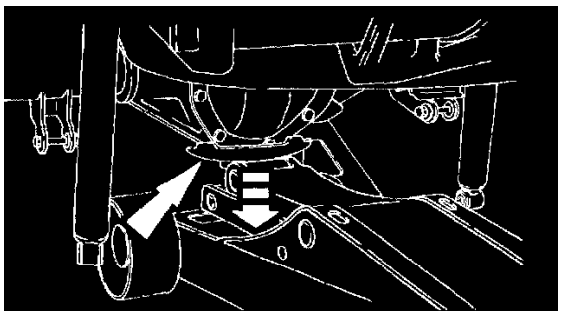


12. **CAUTION:** The nose of the axle will drop downward when loosening the U-bolts. Make sure to support the axle nose as well as the rear of the housing with the jack

    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.**

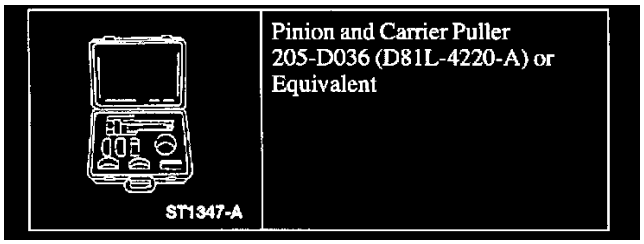
    Carefully lower the axle and remove it.

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

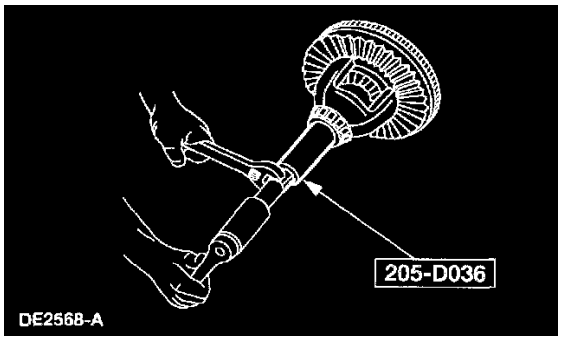


Special Tools

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).

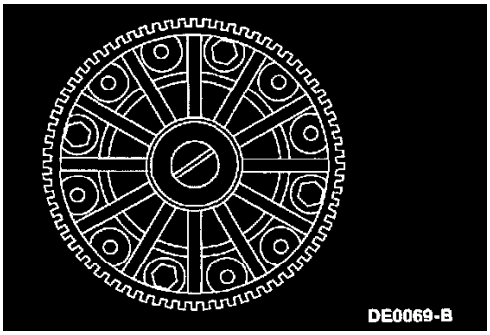
   NOTE: If damaged, install new differential bearing shims.

   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.

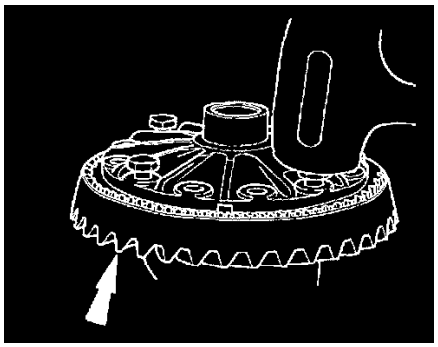
   Place the differential case in a vise.



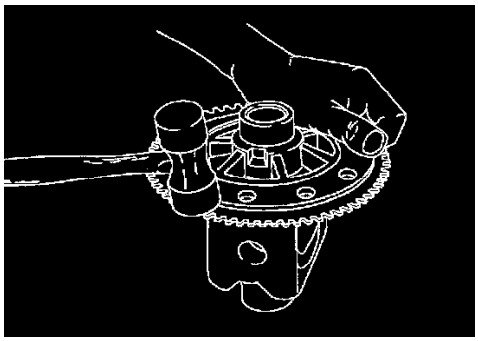
3. **CAUTION:** Do not damage the anti-lock speed sensor ring when removing the differential ring gear. If removing the anti-lock speed sensor ring, discard it and install a new one.

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

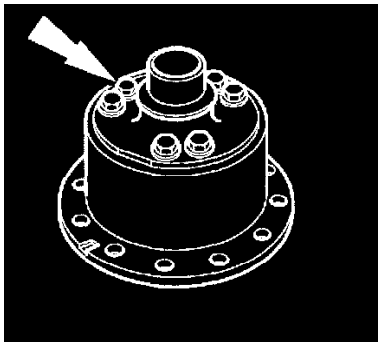
   Remove the bolts. Leave four bolts loosely assembled, 90 degrees apart.

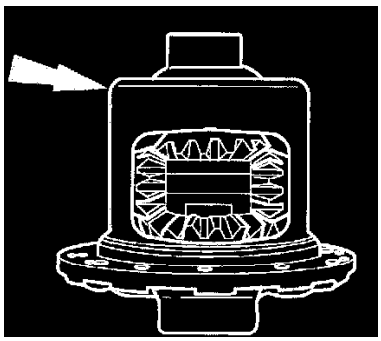


4. Tap each bolt head alternately with a rawhide or plastic hammer to loosen the differential ring gear. Remove the bolts and the differential ring gear.



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



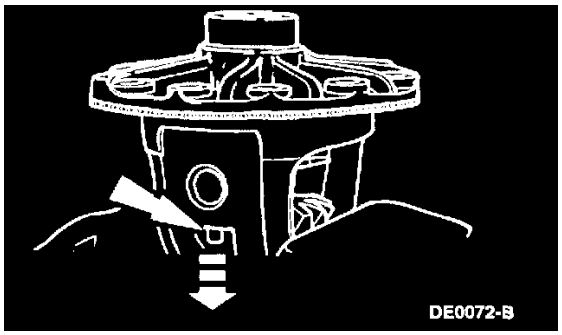


6. The Truetrac and Trac-Lok differential assemblies are non-repairable. Discard the entire assembly if it is worn/damaged. For conventional differential assemblies, proceed as follows.

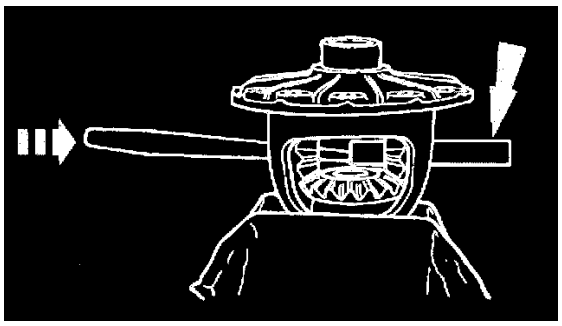
Conventional differential

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

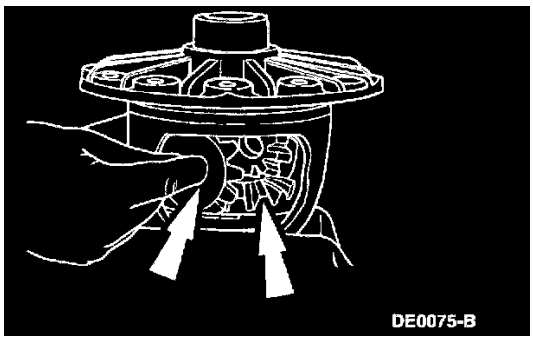
   Place the differential case in a vise.



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.

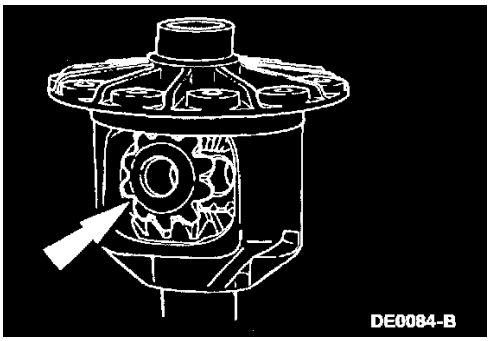
Assembly

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.

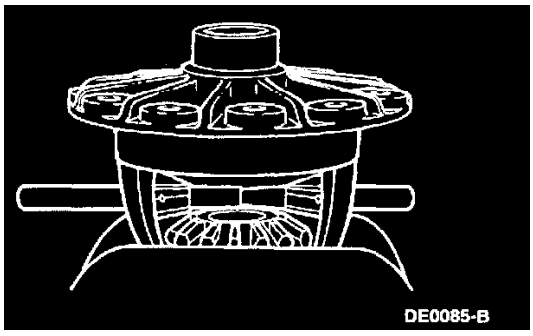


3. **NOTE:** The best way to assemble the differential side gears and the differential pinion gears is to lubricate all parts with the specified rear axle lubricant.

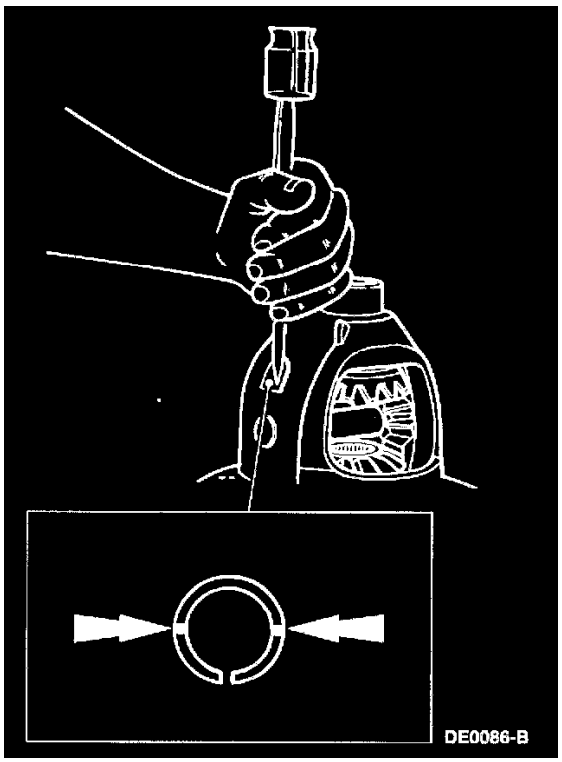
   Lubricate and assemble both differential side gears and differential side gear thrust washers. Hold them in place. Then, lubricate and assemble the differential pinion gears and the differential pinion gear thrust washers to hold the differential side gears in place.

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.

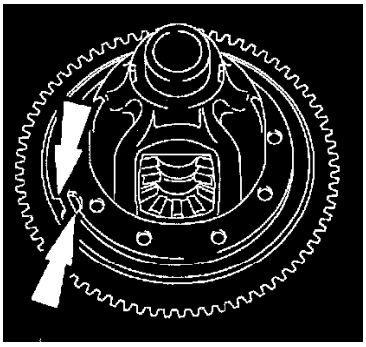


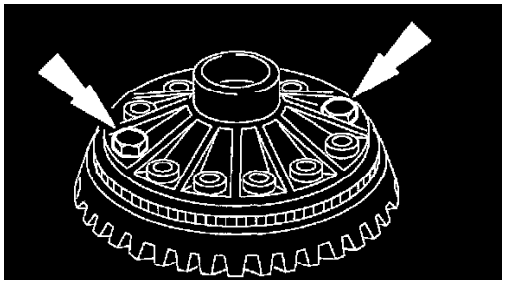
5. Assemble the differential pinion shaft and drive on the differential pinion shaft to remove the drift. Align the lock pin hole in the differential pinion shaft with the lock pin hole in the differential case.



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

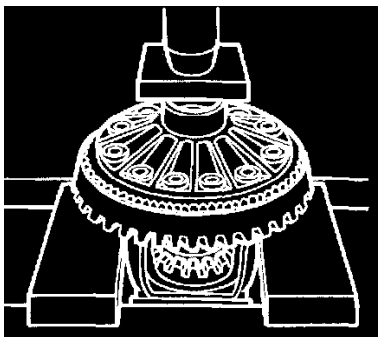




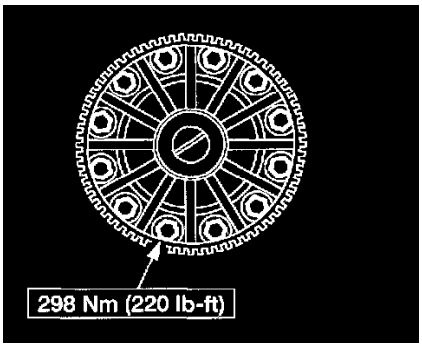
7. **NOTE:** Align the tab on the anti-lock speed sensor ring with the slot in the differential case.

   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.

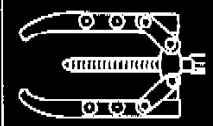
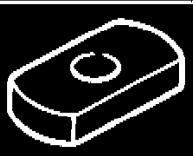


9. **NOTE:** Apply Threadlock and Sealer to the new bolt threads.

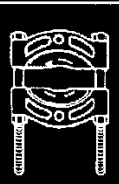
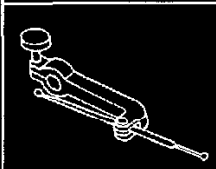
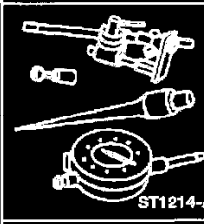
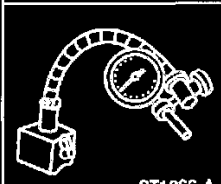
   Draw up the Grade 9 bolts alternately and evenly.
10. Install the differential bearings.

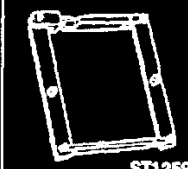
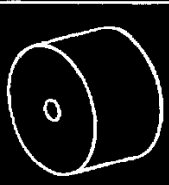
Drive Pinion

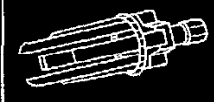
Drive Pinion

 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

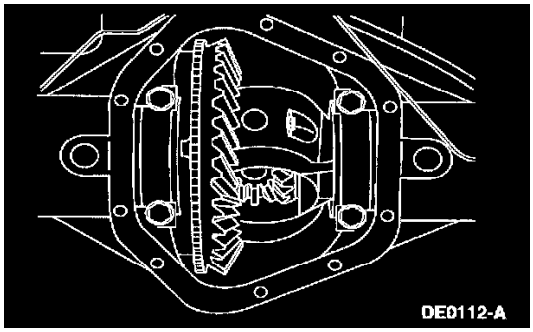
 ST1368-A	Puller, Bearing 205-D064 (D84L-1123-A)
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A)
 ST1544-A	Depth Gauge, Drive Pinion 205-S156 (T80T-4020-A)
 ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
 ST1266-A	Dial Indicator Gauge with Holding Fixture 100-D002 (D78P-4201-B)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

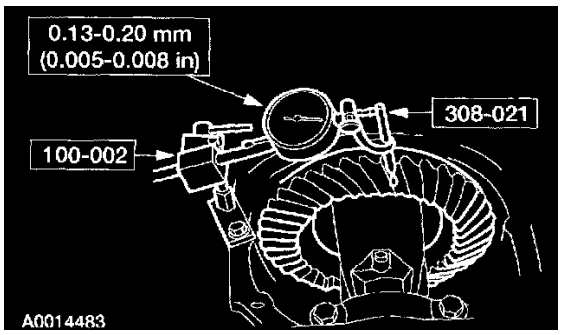
Special Tool(s)

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.

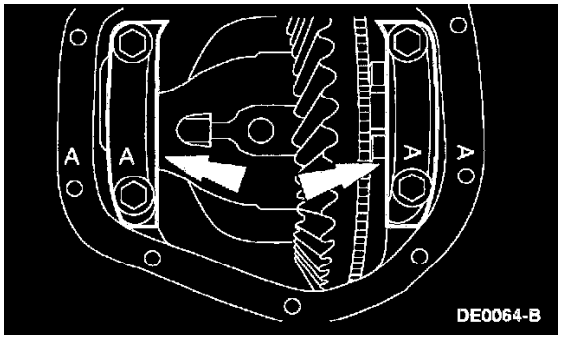
   Carry out the following before disassembly.
   - Remove all the lubricant from the internal parts of the conventional differential assembly or Trac-Lok differential assembly. Visually inspect the parts for wear and damage.
   - Rotate the differential assembly to check for any roughness, indicating damaged 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.

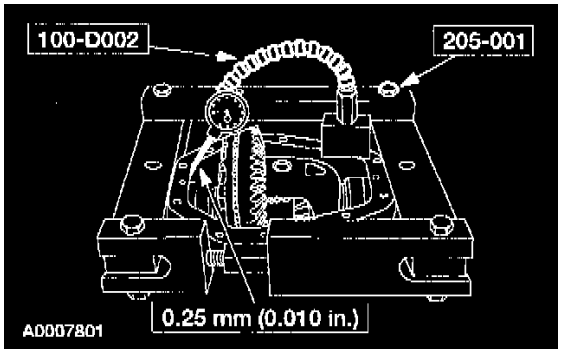
   NOTE: Measure the differential ring gear and pinion backlash at three equally spaced points around the ring gear.

   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.



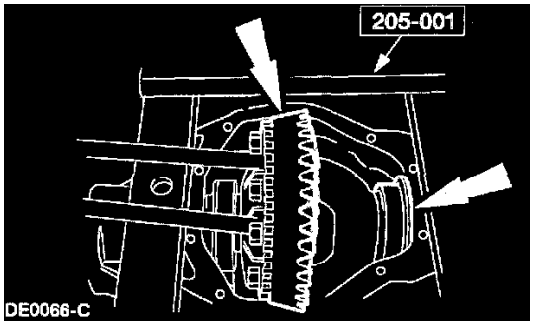
6. **CAUTION:** Note the position of the mating letters stamped vertically and horizontally on the bearing caps and the differential housing before removing the bearing caps.

   Remove the bolts and the bearing caps.



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

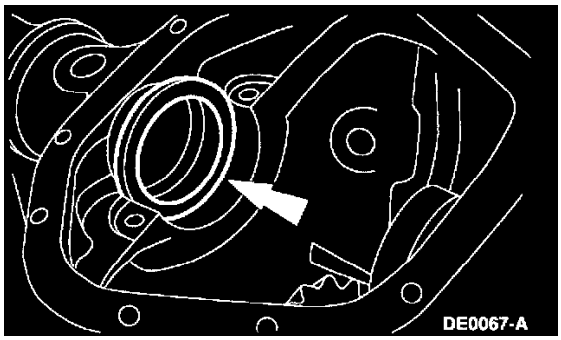
   Using the special tools, spread the differential housing to specifications, then remove the Dial Indicator Gauge with Holding Fixture.



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.

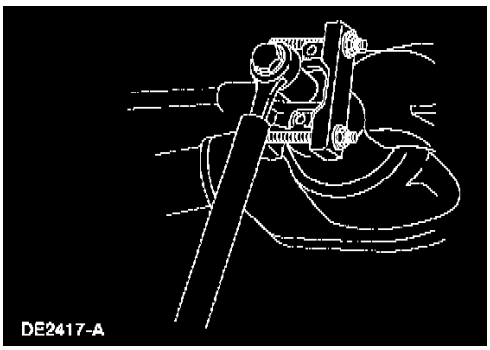
   CAUTION: Mark or tag the differential bearing cups, indicating from which side they were removed.

   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.



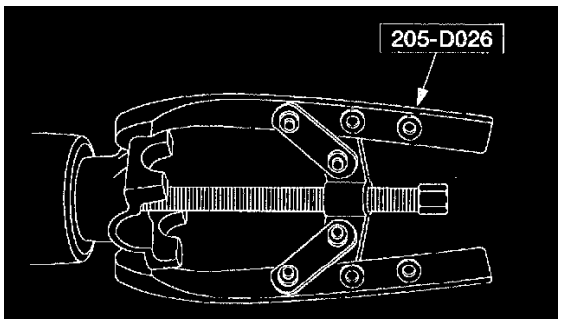
9. **CAUTION:** Mark or tag the outboard spacers indicating from which side they were removed.

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

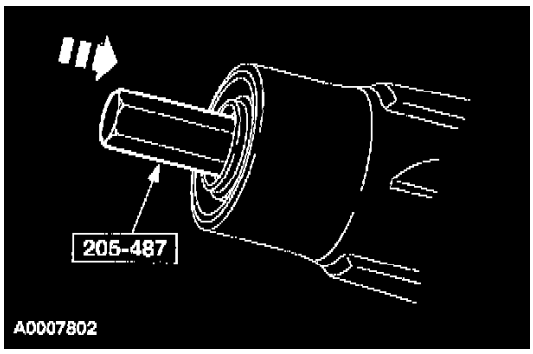


10. **CAUTION:** Index-mark the pinion Range to the pinion shaft prier to removal.

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

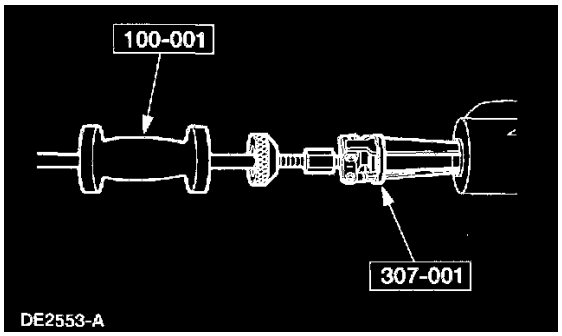


11. Using the special tool, remove the pinion flange.

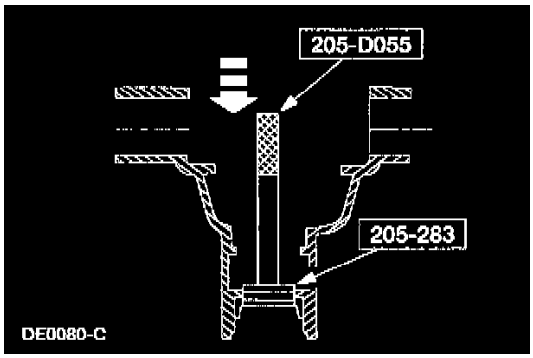


12. **NOTE:** There are drive pinion preload shims on the spline end of the pinion. These shims can stick to the pinion, the pinion bearing or they can fall out of the differential housing. Collect and keep the shims for reassembly.

    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.

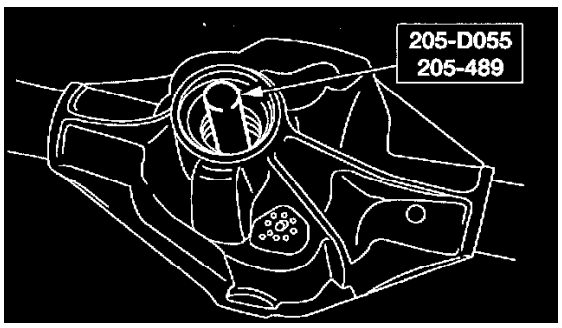


13. Using the special tools, remove and discard the pinion seal.

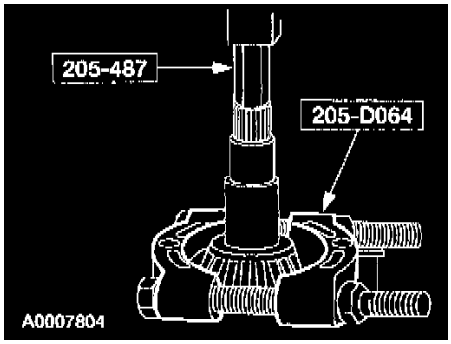


14. **CAUTION:** Do not nick the differential housing bore.

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



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



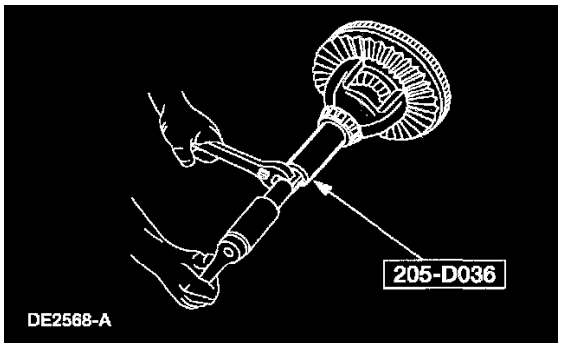
16. Using the special tools, remove the inner pinion bearing.

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).

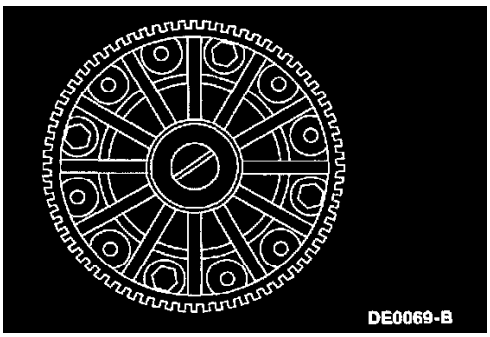
    NOTE: If damaged, install new differential bearing shims.

    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.

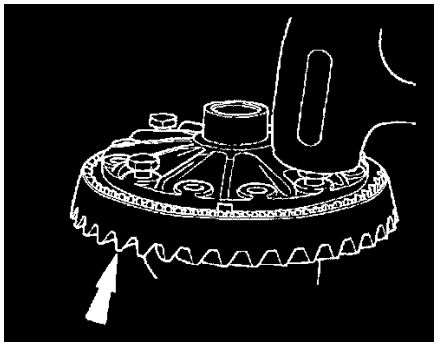
    Place the differential case in a vise.



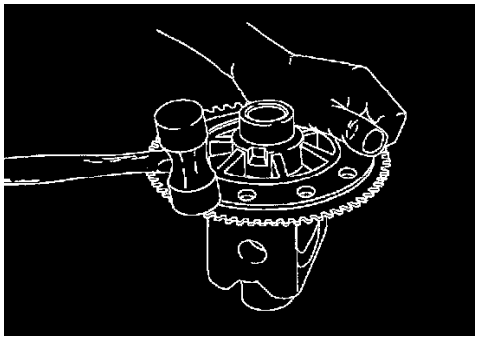
21. **CAUTION:** Do not damage the anti-lock speed sensor ring when removing the differential ring gear. If removing the anti-lock speed sensor ring, discard it and install a new one.

    NOTE: Always use new bolts upon reassembly.

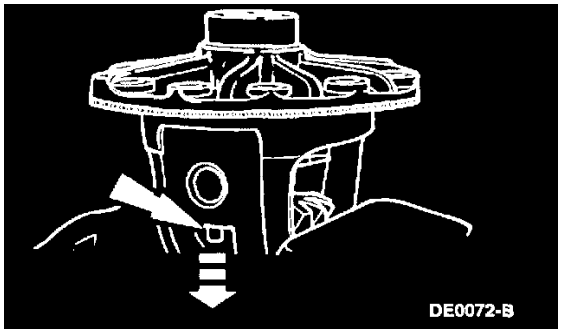
    Remove the ring gear bolts. Leave four bolts loosely assembled, 90 degrees apart.



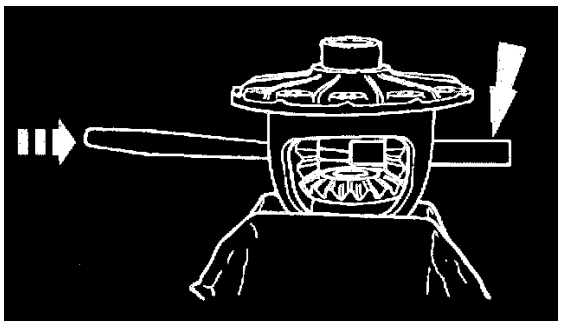
22. Tap each bolt head alternately with a rawhide or plastic hammer to loosen the differential ring gear. Remove and discard the bolts. Remove the differential ring gear.



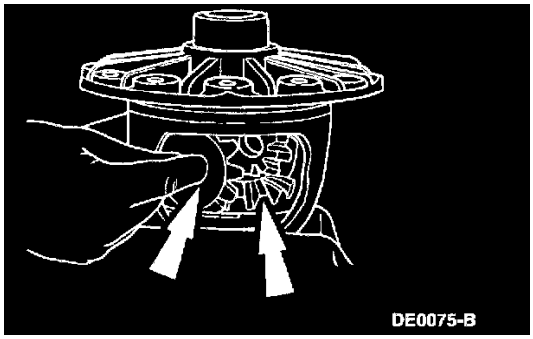
23. If necessary, remove the anti-lock speed sensor ring with a soft-faced hammer. Discard the anti-lock sensor ring.



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



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



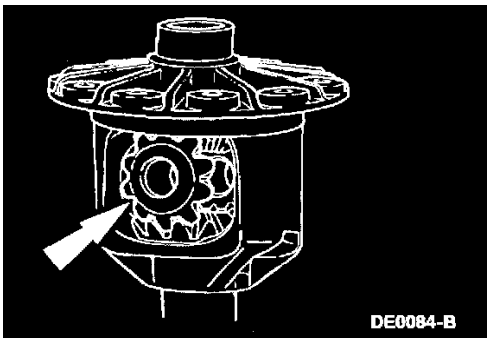
26. To remove the differential side gears and the differential pinion gears, rotate the differential side gears. The differential pinion gears will turn to the opening in the differential case.
27. Remove the differential pinion gears and the differential pinion thrust washers behind the differential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

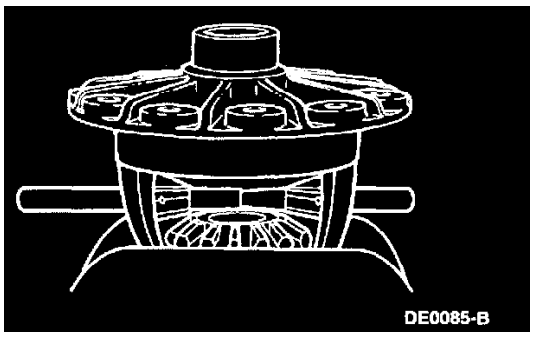
   Place the differential in a vise.
2. Lubricate and assembly both differential side gears and differential side gear thrust washers. Lubricate and assemble the differential pinion gears and the differential pinion gear thrust washers.



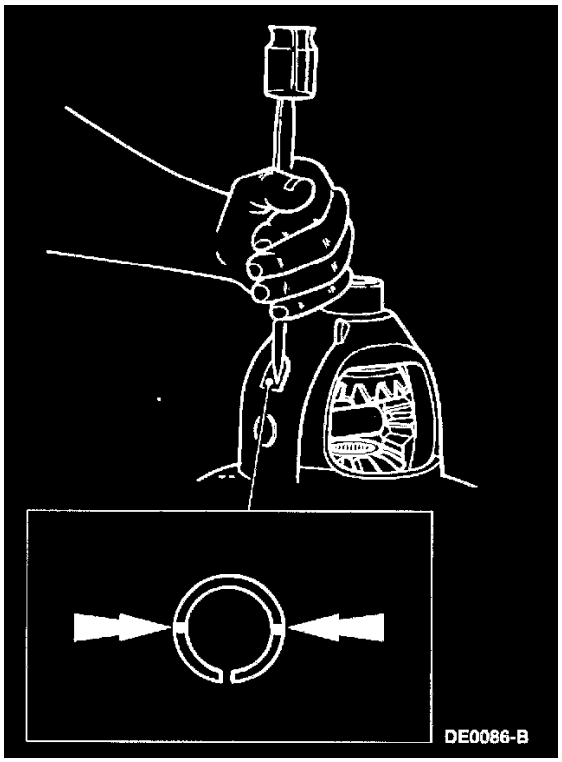
3. Install the differential side gears and washers in the differential case. Hold the side gears in place while installing the differential pinion gears in the differential case.

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

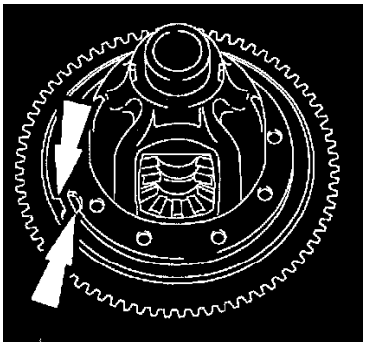
   Rotate the differential side gears to align the differential pinion gears with the holes in the differential case for the differential pinion shaft.

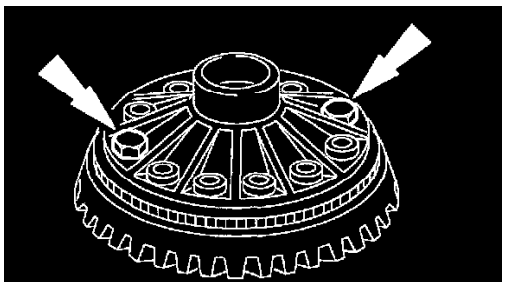


5. Assemble the differential pinion shaft. Use a soft faced hammer to tap on the differential pinion shaft to remove the drift.



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.

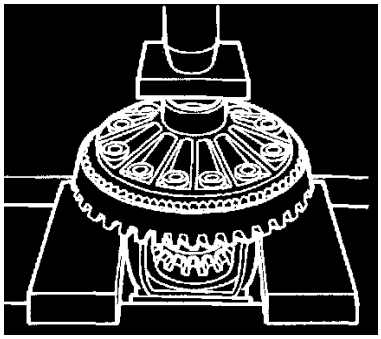




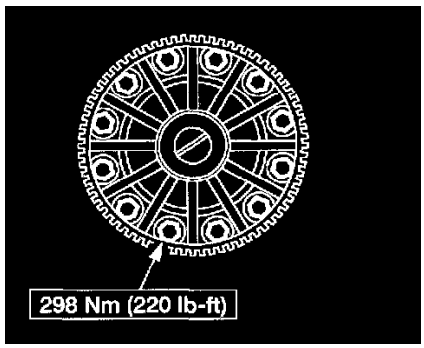
7. **NOTE:** Align the tab on the anti-lock speed sensor ring with the slot in the differential case.

   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.

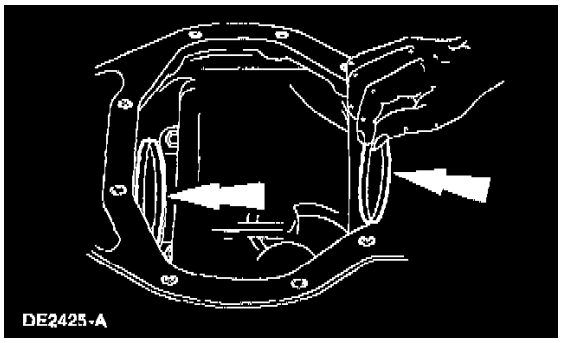


8. Press the anti-lock speed sensor on the differential case. The differential case flange acts as a pilot for the anti-lock speed sensor ring.

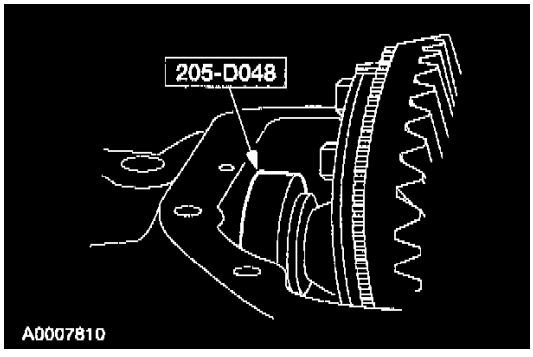


9. **NOTE:** Apply Threadlock and Sealer to the new bolt threads.

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

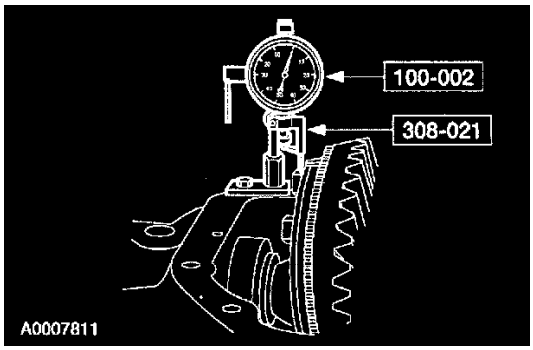


10. Install the outboard spacers in the side from which they were removed.



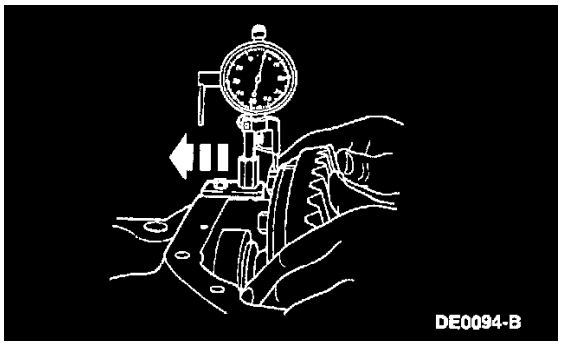
11. **NOTE:** Remove all nicks, burrs, dirt, etc. from the differential case hubs, to allow the special tools to rotate freely.

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



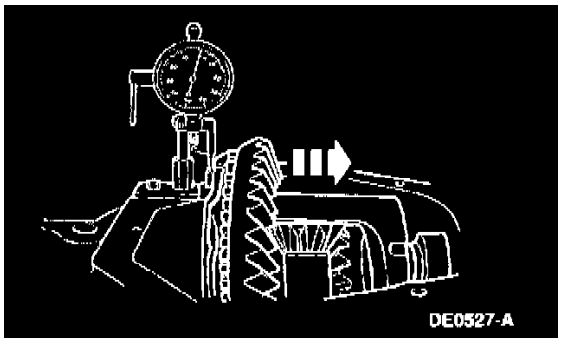
12. **NOTE:** The rear axle uses a combination of differential bearing shims and selective outboard spacers to control differential case end play. The old outboard spacers provide a good starting point when setting end play. However, if additional shimming is necessary, beyond what the hardened differential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

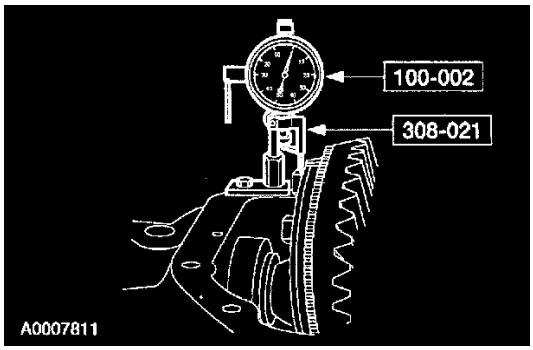


13. **NOTE:** Repeat this and the following step until the same readings appear on the indicator each time. This is the total differential bearing shim thickness necessary, less preload. The final calculation occurs later during assembly.

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

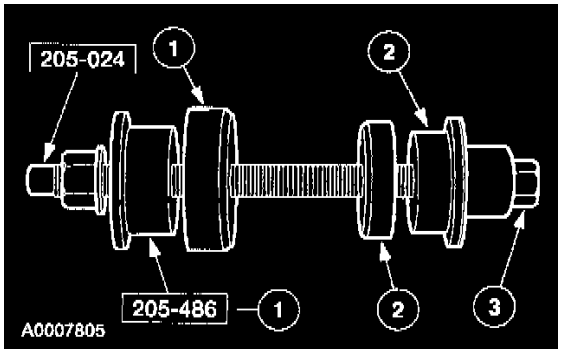


14. Force the differential case as far as it will go in the opposite direction. Record the total differential case end play reading.

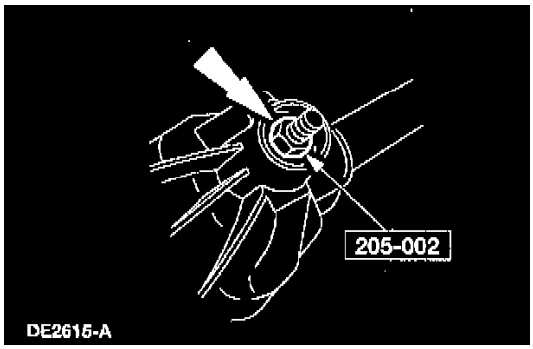


15. After making sure the reading is repeatable, remove the special tools and the differential from the differential housing. Do not remove the Master

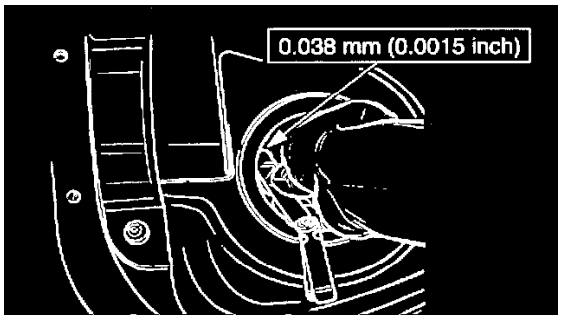
Bearings from the differential case at this time.



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.



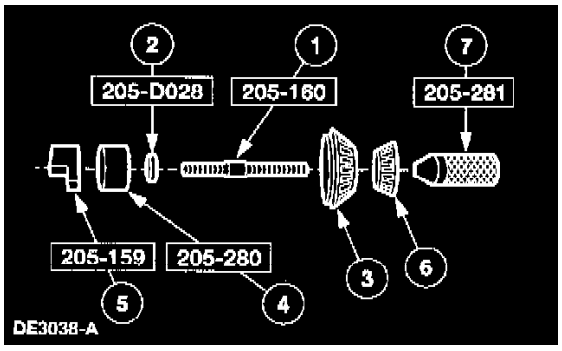
17. Tighten the special tool to seat the pinion bearing cups into their bores.



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.

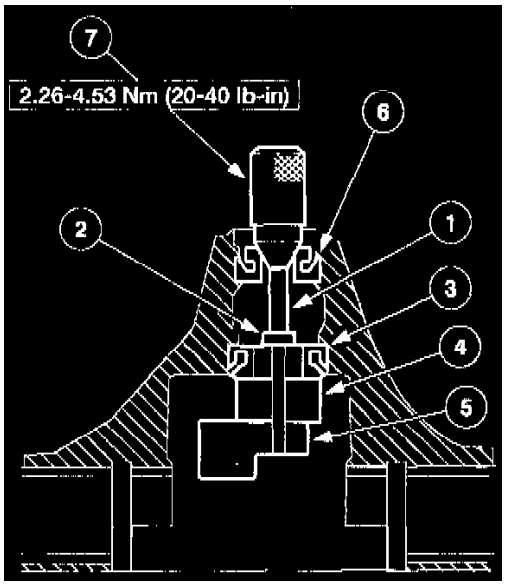
    Check that the cups have seated correctly in their bores.



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.

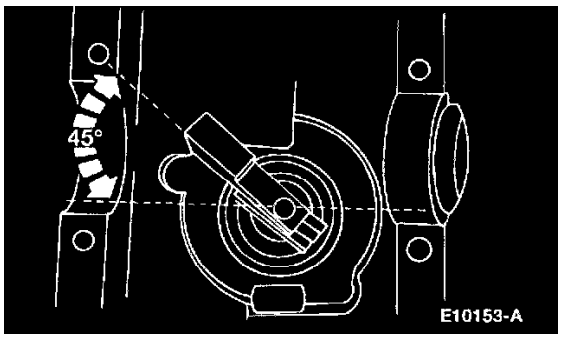
NOTE: Apply a light oil film on the pinion bearings before assembling the tools.

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.



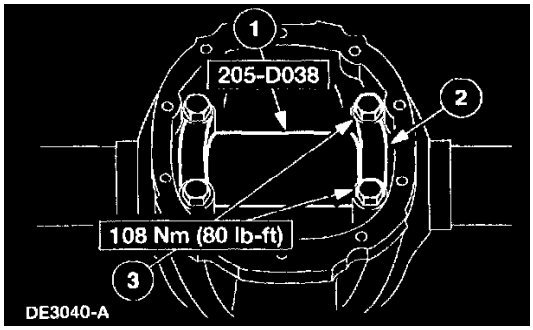
Item	Description
1	Screw
2	Alignment Adapter
3	Inner Pinion Bearing
4	Drive Pinion Depth Gauge/Aligner
5	Gauge Block
6	Outer Pinion Bearing
7	Drive Pinion Depth Gauge/Aligner Handle

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

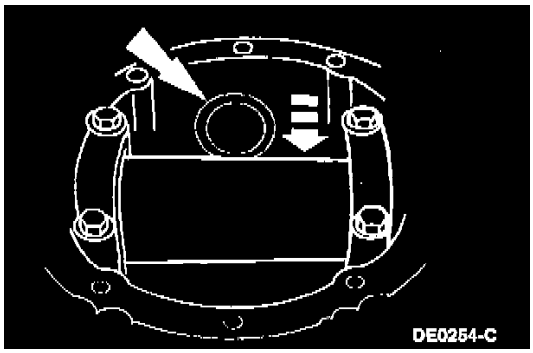


21. **NOTE:** Offset the Gauge Block to obtain an accurate reading.

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.

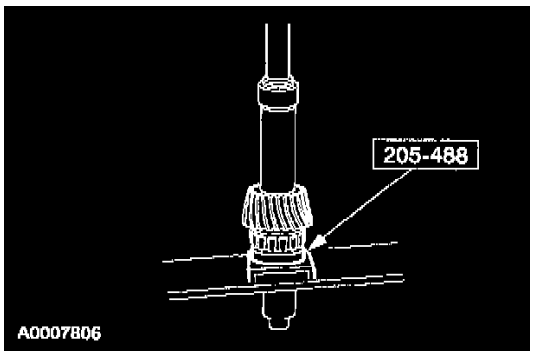
    NOTE: Use a feeler gauge or clean, flat drive position shims as a measuring device.

    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.

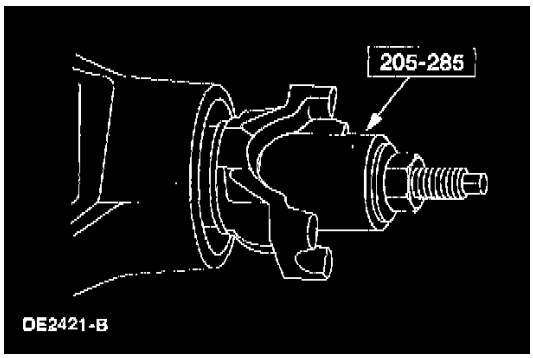


25. **NOTE:** Always use the same new inner pinion bearing installed when taking the measurement for drive pinion position shim selection.

    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.



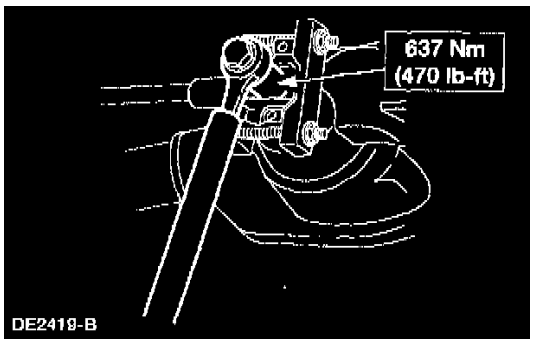
Available Drive Pinion Bearing Preload Shims

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

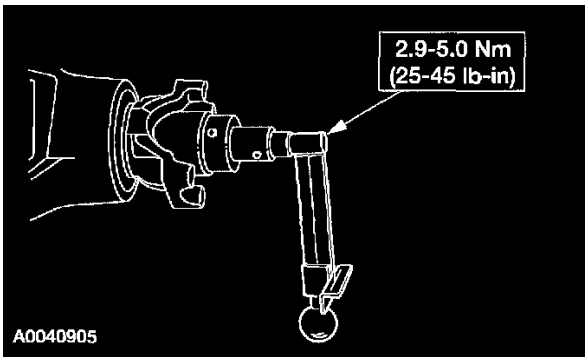
mm	Inches
0.51	0.020
0.53	0.021
0.56	0.022
0.58	0.023
0.76	0.030

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

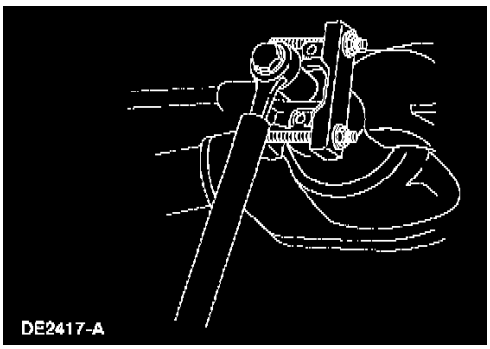
    Using the special tool, install the pinion flange.



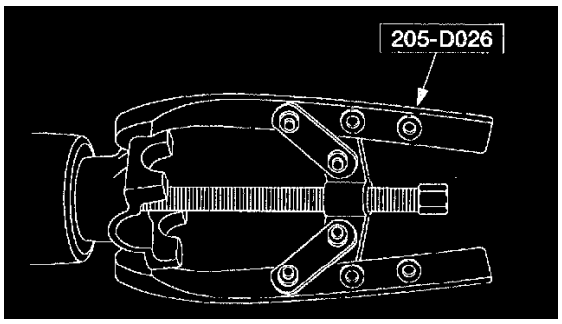
29. Install the old washer and pinion locknut.



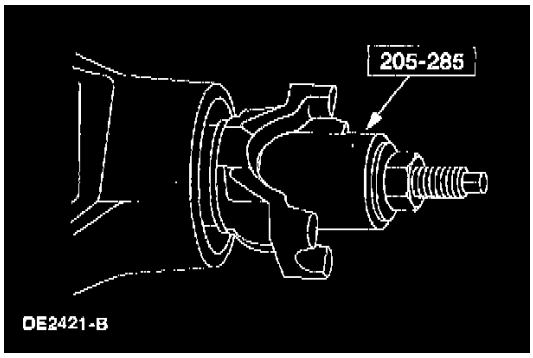
30. Using a Nm (inch-pound) torque wrench, rotate the pinion. The torque must read as specified.
    - To increase the bearing preload, remove drive pinion bearing preload shims. To decrease the preload, add pinion bearing preload shims.



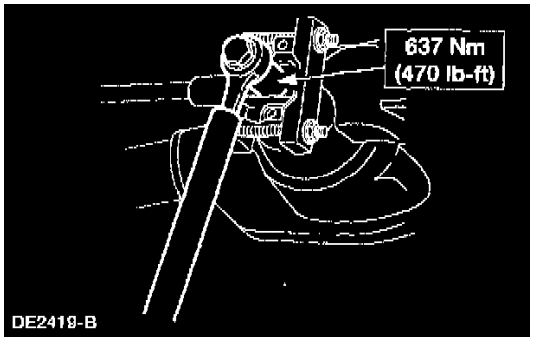
31. With the drive pinion bearings at the correct preload as determined in this procedure, remove and discard the pinion locknut and washer.



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.

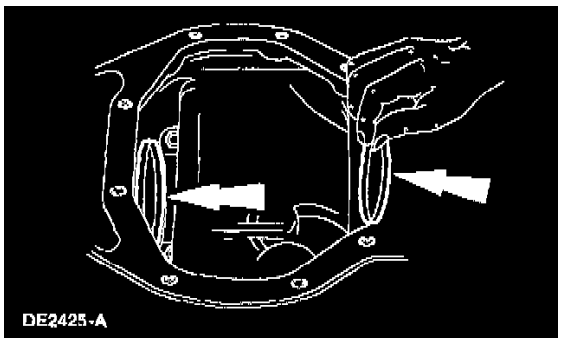


36. Using the special tool, install the pinion flange.

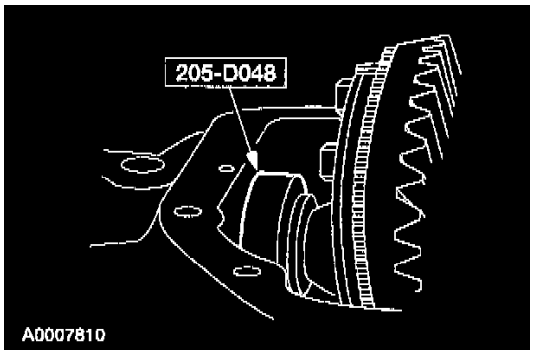


37. **CAUTION:** Always use a new washer and locknut.

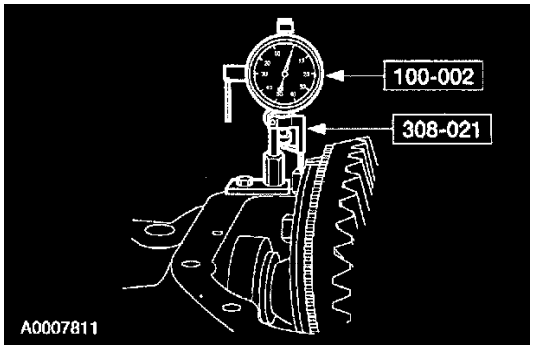
    Install the new washer and locknut. Torque to specification.



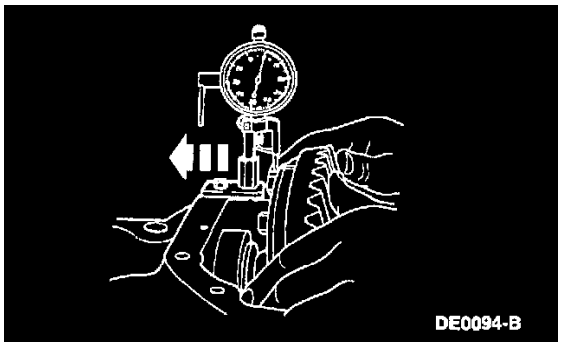
38. Install the outboard spacers in the side from which they were removed.



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

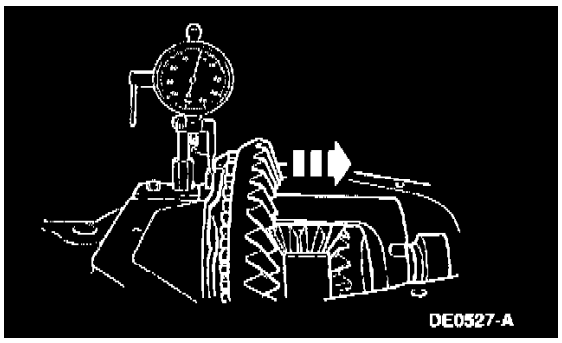


40. Install the special tools. Locate the tip of the Clutch Housing Gauge on the flat surface of one of the bolts.

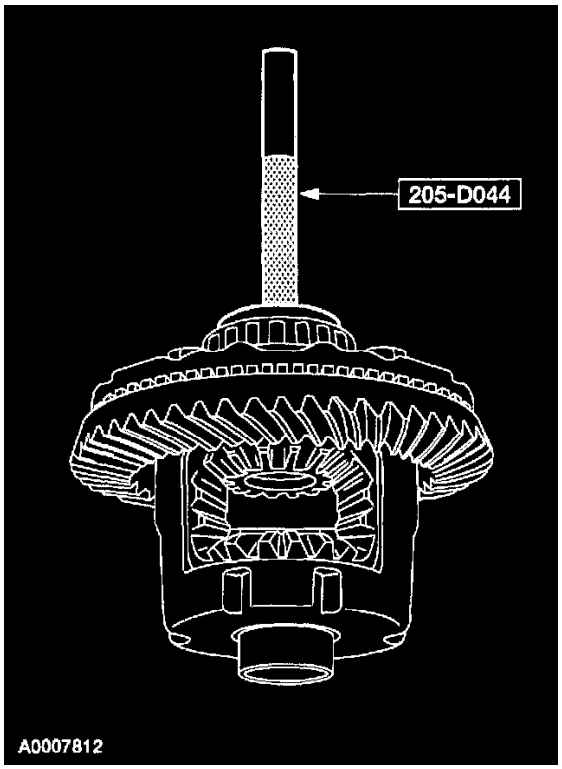


41. **NOTE:** Repeat this and the following step until the same readings appear on the indicator each time. This is the differential bearing shim thickness necessary between the differential case and the differential bearing on the differential ring gear side of the differential case.

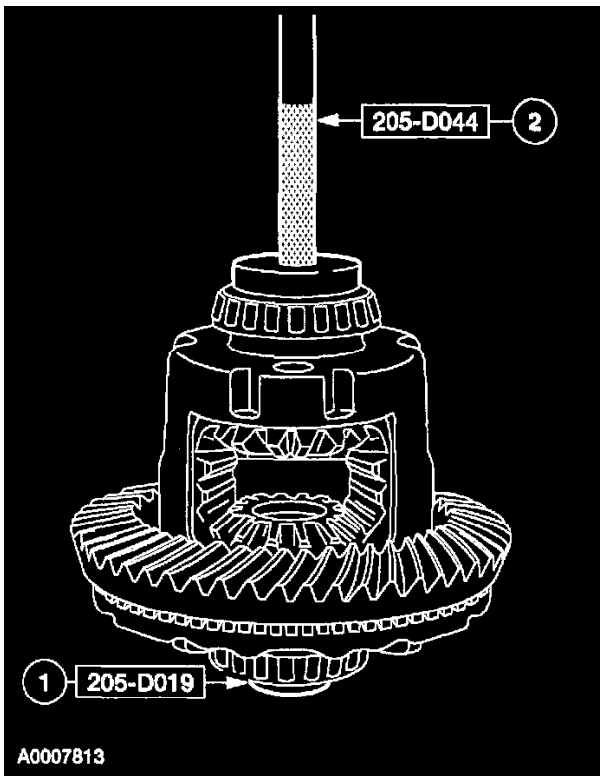
    Force the differential case and ring gear away from the drive pinion. With force applied, set the indicator to 0.



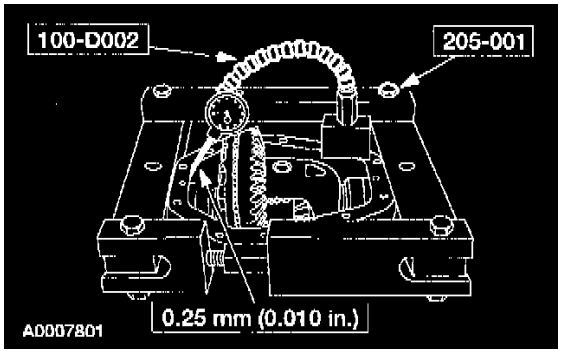
42. Force the differential ring gear into mesh with the pinion to obtain an indicator reading. Record this measurement.
43. Remove the differential case and the special tools from the differential housing.
44. Remove the Master Bearings from the differential case.
45. Place a shim of the thickness determined 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.



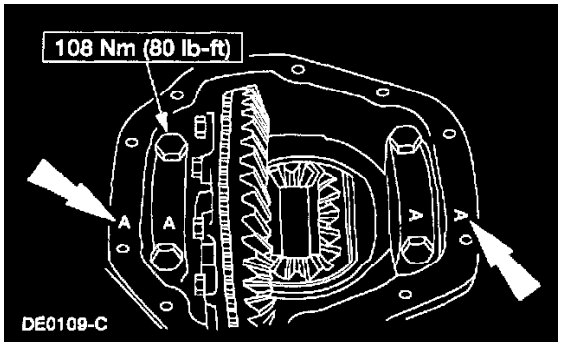
48. Using the special tools, install the differential bearing.
    1 Place the special tool on the differential bearing to protect it during the installation of the opposite bearing.
    2 Using the special tool, drive the differential bearing onto the hub.
49. Assemble the differential bearing cups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



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

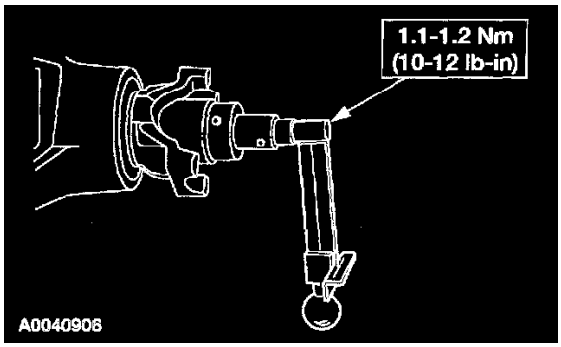
    CAUTION: Avoid nicking the ring gear teeth and the anti-lock speed sensor ring during assembly.

    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.

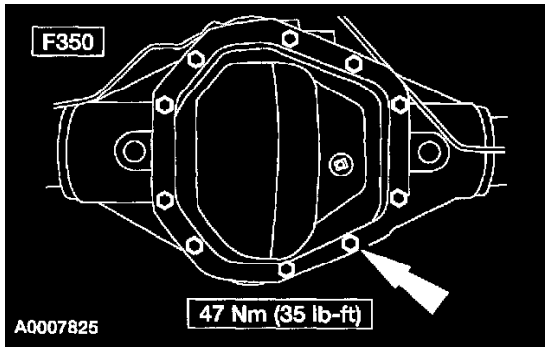


52. Confirm the total preload.
    - Using a Nm (inch-pound) torque wrench, check the torque to rotate the pinion. The reading must be higher than the initial reading taken without the differential case installed by the amount shown.
53. Carry out the Tooth Contact Pattern Check to verify the final pinion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

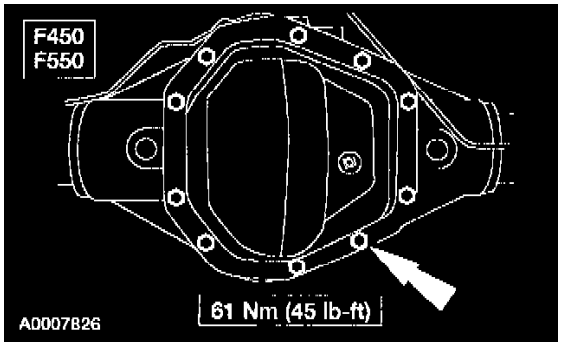
55. **CAUTION:** Clean both flat surfaces (differential housing and differential cover) with a suitable solvent to remove all traces of oil film.

    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.



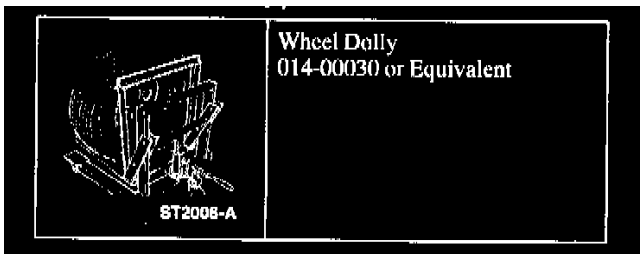
57. Install the remaining bolts. Tighten the bolts alternately and evenly.
    - Allow a one hour cure time before filling the axle with the correct amount of specified lubricant.



58. Install the axle assembly.

Removal and Installation

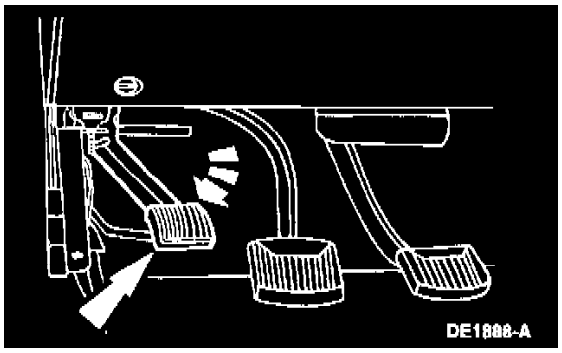
Axle Assembly



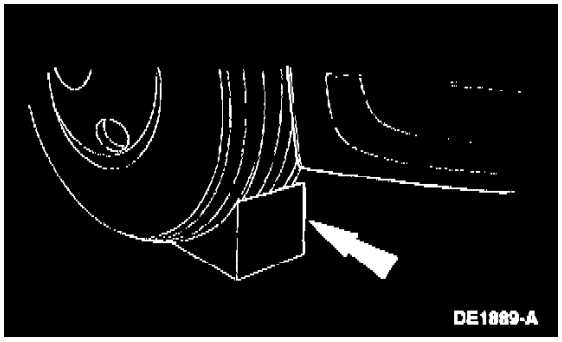
Special Tools

Special Tool(s)

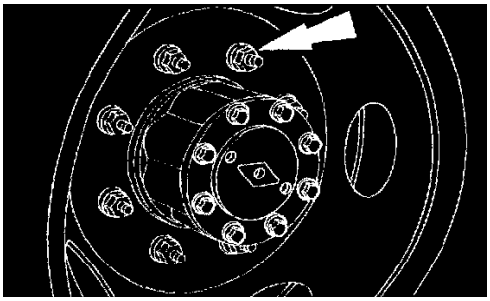
Removal



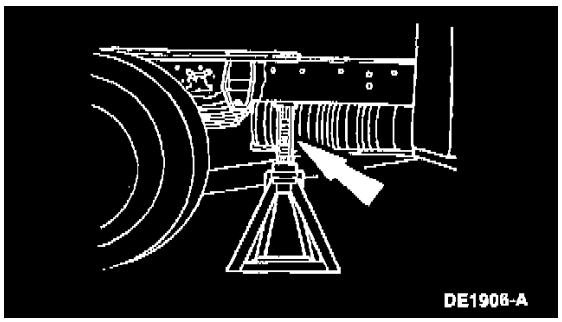
1. Set the parking brake.



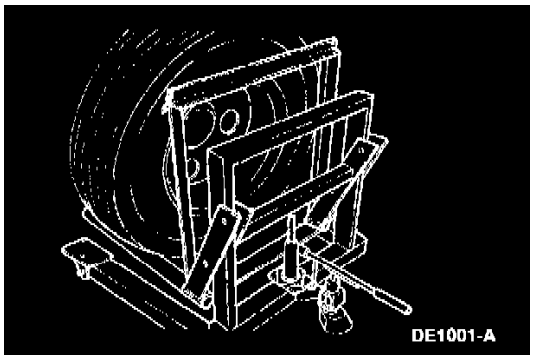
2. Chock the front wheels.



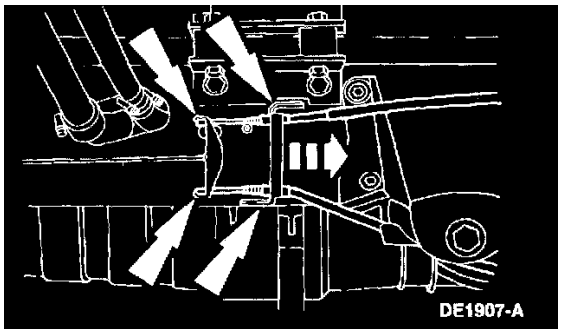
3. Loosen, but do not remove, the rear wheel lug nuts.



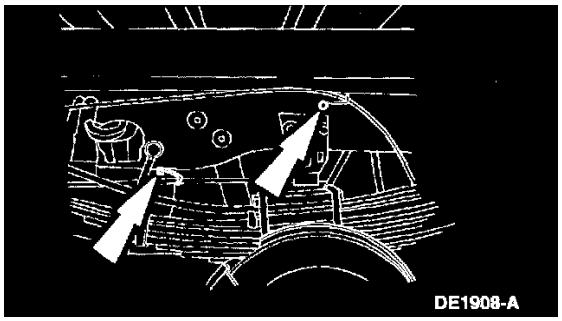
4. Raise and support the rear of the vehicle high enough so that it will clear the axle assembly when removing it.



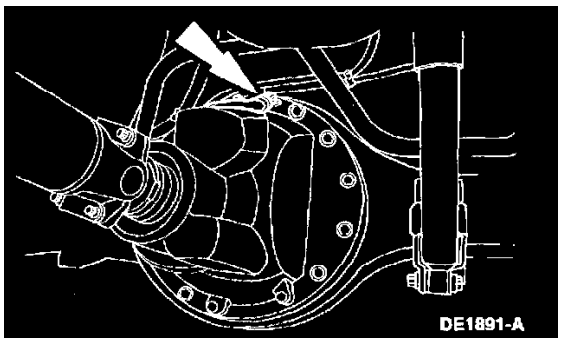
5. Remove the rear wheels using the Wheel Dolly.



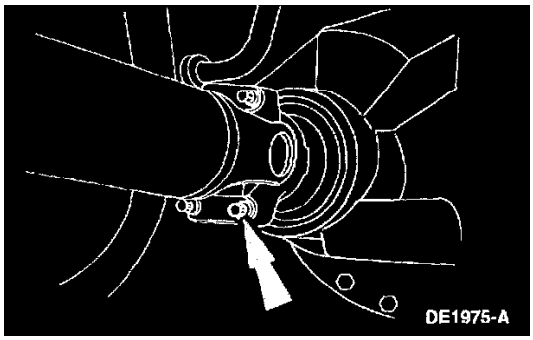
6. Release the parking brake cable tension, and disconnect the cables at the equalizer and the anchor plate.



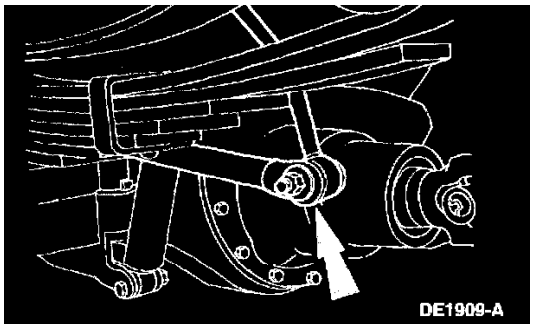
7. Remove the frame anchors, and position the parking brake cables aside.



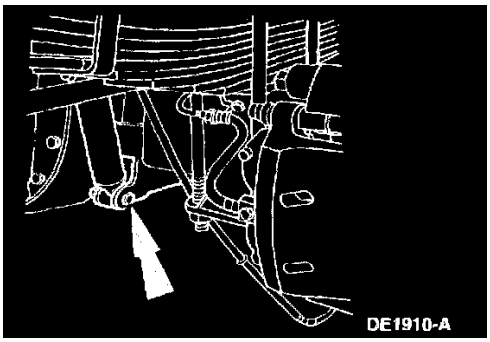
8. Disconnect the rear anti-lock brake sensor electrical connector. Release the harness clips and position the harness aside.



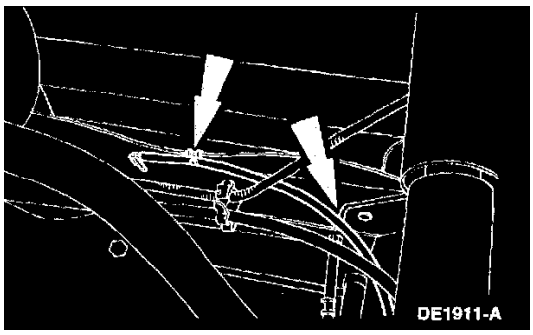
9. Index and disconnect the driveshaft, and position it aside.



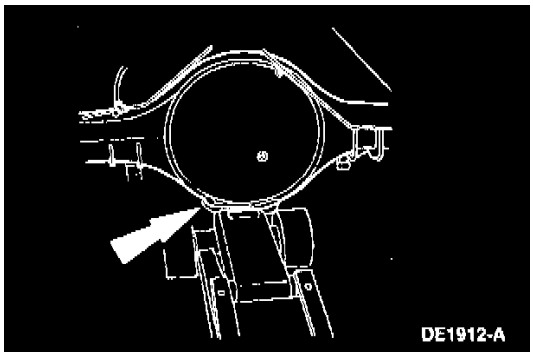
10. Disconnect the sway bar at the sway links.



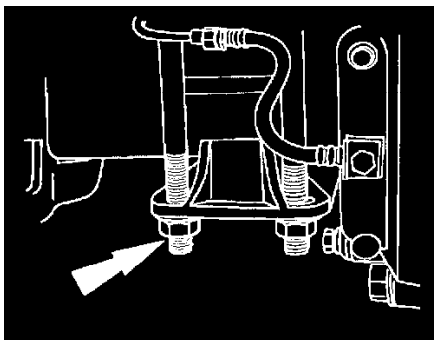
11. Disconnect the shock absorbers at the axle.



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

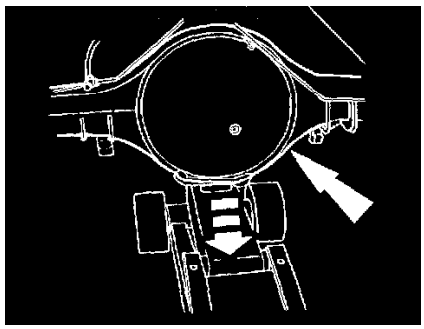


13. Support the axle with a suitable floor jack.



14. **NOTE:** Mark the front of each spring seat cap for proper orientation during installation.

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



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

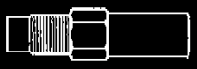
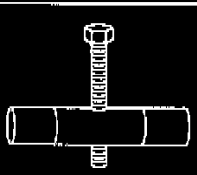
    Carefully lower the axle and remove it.

Installation

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

Drive Pinion

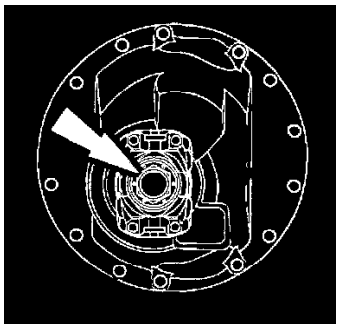
Drive Pinion

 ST2225-A	Pinion Seal Installer Set 205-S438 (Pinion Seal Driver Tube 205-440, Pinion Seal Driver 205-439)
 ST2226-A	Yoke Installer 205-S434 (Yoke Installer Thread Sleeve 205-436, Yoke Installer Tube 205-435, Yoke Installer Drive Nut 205-437)
 ST2224-A	Yoke Remover 205-433

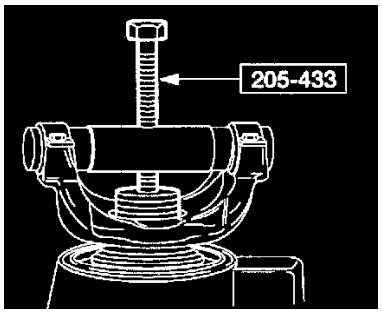
Special Tools

Special Tool(s)

Disassembly

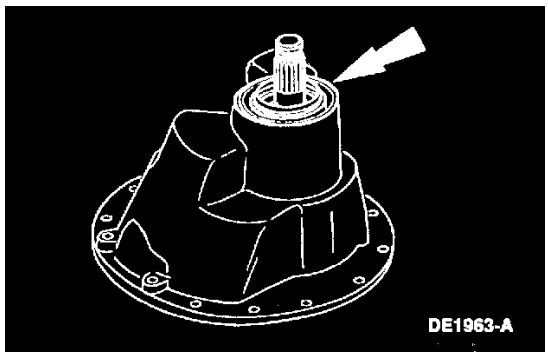


1. Remove the hex nut.

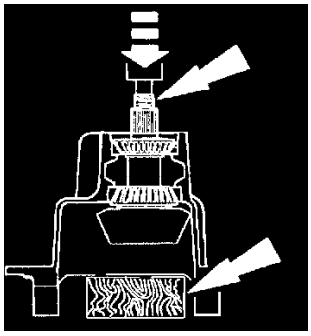


2. **CAUTION:** Hammering on the pinion flange will close in the bearing bores and misalign the flange lugs. This will result in premature failure of the journal needle bearings/other driveline components. Serious damage will also occur internally to the differential ring gear and pinion set/pinion bearings by hammering on external parts.

   Using the special tool, remove the pinion flange.



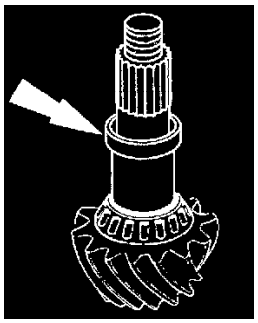
3. Remove the pinion seal.



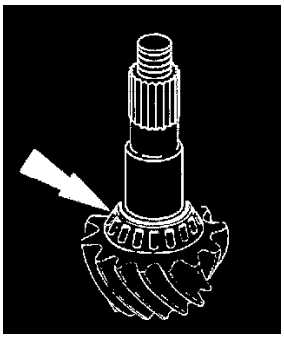
4. **CAUTION:** Position a block of wood under the pinion to avoid damage to the gear teeth.

   NOTE: The outer bearing is press fit.

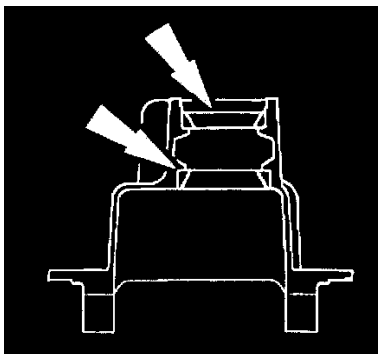
   Press the pinion through the outer pinion bearing, and remove the pinion.



5. Remove the pinion preload spacer.
   - Measure and record the spacer thickness. Set the spacer aside for use in assembly.



6. If reusing the gear set, remove the inner pinion bearing with a suitable puller.



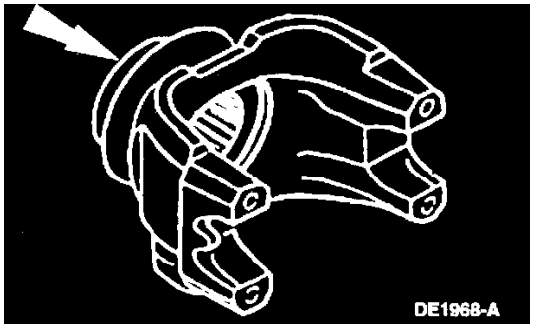
7. If discarding the pinion bearings, remove the outer and inner pinion bearing cups.
8. **CAUTION:** Alkaline cleaning solutions will damage machine surfaces. Use only emulsion cleaners or petroleum based cleaning solvent.

   CAUTION: Use soft, clean, listless towels to dry the components.

   CAUTION: Never spin-dry bearings with compressed air. This will damage the mating surfaces due to a lack of lubrication.

   CAUTION: After drying, lightly coat the parts with rust inhibitor or clean lubricant to prevent damage from corrosion. Wrap all parts that are going to be in storage for a prolonged period in wax paper.

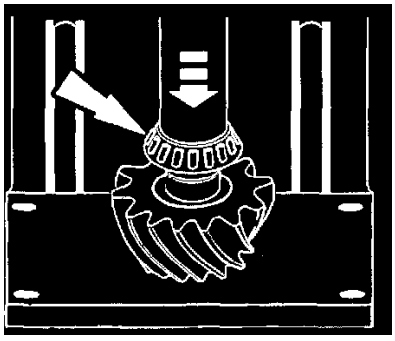
   Clean and dry the components as necessary.



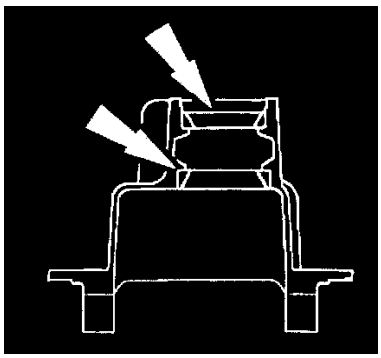
9. Inspect the pinion flange for grooves in the sealing surface caused by contamination.
   - If grooves are detectable with a fingernail, repair the flange with a CR approved sleeve or install a new flange.

Assembly

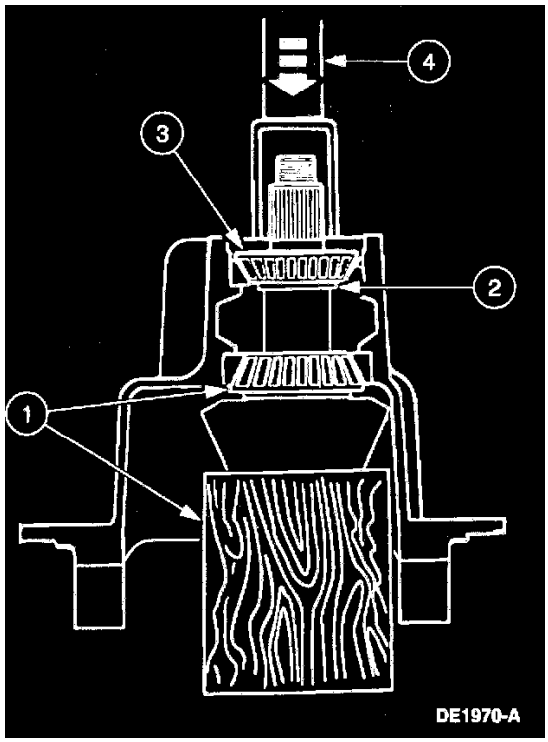
Initial Assembly



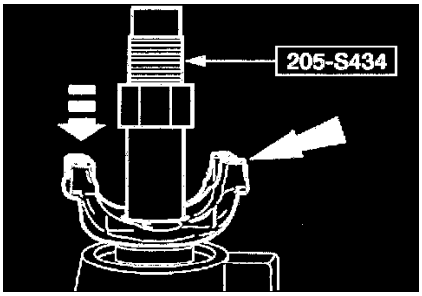
1. Press the inner pinion bearing onto the pinion.



2. Press the inner and outer pinion bearing cups into the carrier until seated.
   - Use a **0.0381 mm (0.0015 inch)** feeler gauge to verify the bearing cups have completely seated in the bearing bores.
   - Lubricate the bearing cups and cone.

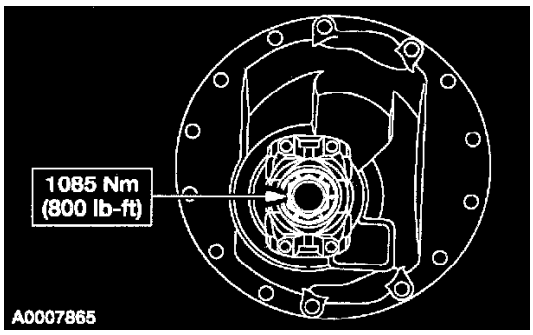


3. Seat the outer pinion bearing on the pinion.
   1 Seat the inner pinion bearing into the cup by positioning a **152.4 x 152.4 x 152.4 mm (6 x 6 x 6 inch)** block of-wood under the pinion.
   2 Place the original pinion preload spacer onto the pinion.
   3 Place the outer pinion bearing onto the pinion.
   4 Using a suitable press, seat the outer bearing on the pinion.

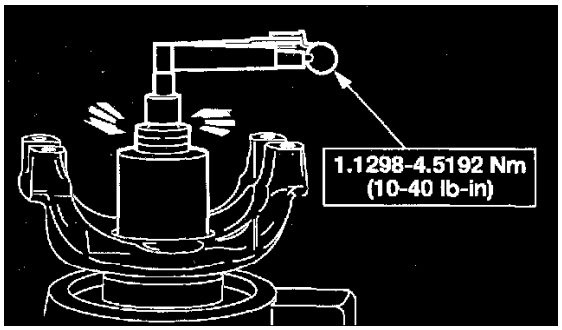


4. **NOTE:** Do not install the pinion seal at this time.

   Using the special tool, install the pinion flange.

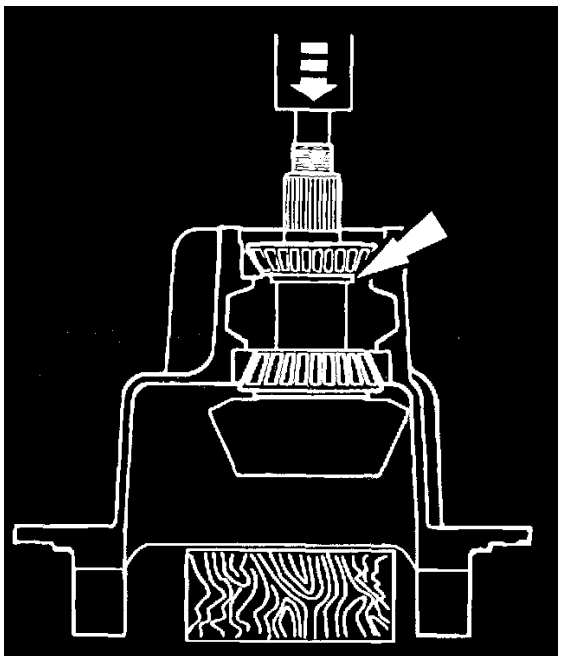


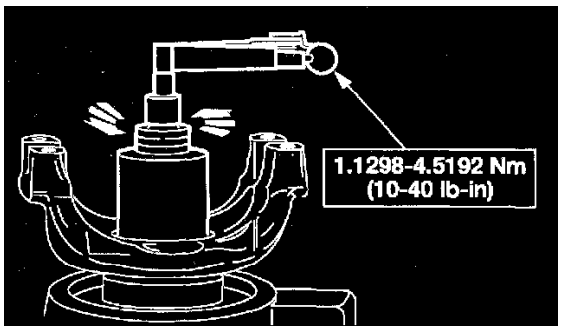
5. Install the hex nut.
   - Using a suitable torque multiplier, tighten the hex nut.



Measuring pinion bearing preload torque

6. Measure the torque to rotate.
   - Take torque measurements every fourth revolution.
   - Proceed to Pinion bearing preload adjustment in this procedure if the bearing preload torque is not within the specifications. Proceed to Final assembly in this procedure if the bearing preload torque is within the specifications.

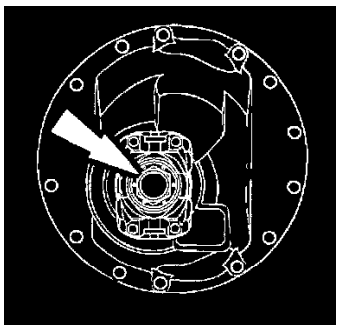




Pinion bearing preload adjustment

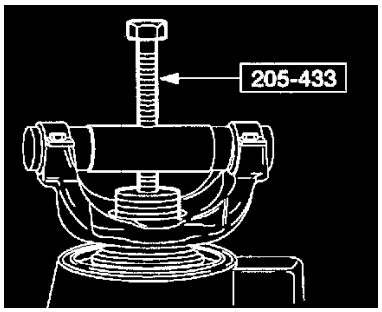
7. **NOTE:** Also refer to the following illustration.

   Adjust the pinion bearing preload by installing a new pinion bearing preload spacer.
   - To increase the preload, install a thinner spacer. To decrease the preload, install a thicker spacer.
   - The pinion bearing preload spacers are available in sizes from **7.26 to 8.00 mm (0.286 to 0.315 inch)**.
   - Always measure the new spacer before installing it.
   - On a flat surface, sand the next thicker size spacer with emery cloth to the required thickness to obtain a closer adjustment. Thoroughly wash the spacer to remove the emery cuttings before installation.
   - A **0.0254 mm (0.001 inch)** change in the spacer thickness will change the torque rate approximately **3.3894 Nm (30 inch lbs.).**
   - Repeat Measuring pinion bearing preload torque and Pinion bearing preload adjustment in this procedure until the rotational torque is within specifications.



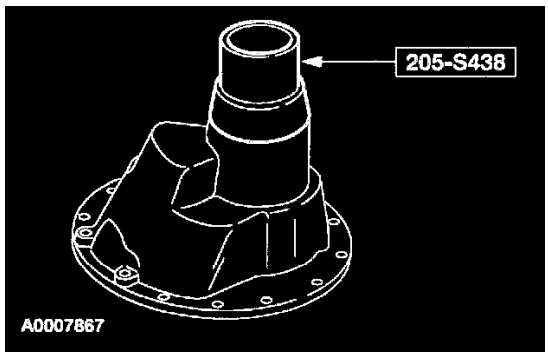
Final assembly

8. Using a suitable torque multiplier, remove the hex nut.

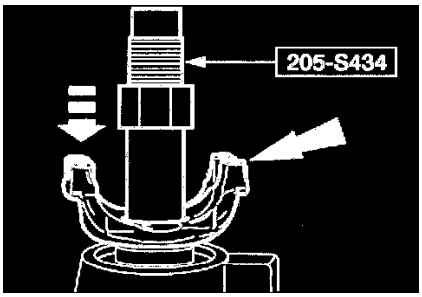


9. **CAUTION:** Hammering on the pinion Range will close in the bearing bores and misalign the flange lugs. This will result in premature failure of the journal needle bearings/other driveline components. Serious damage will also occur internally to the differential ring gear and pinion set/pinion bearings by hammering on external parts.

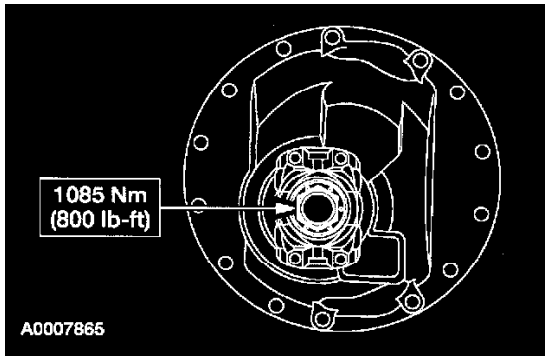
   Using the special tool, remove the pinion flange.



10. Using the special tool, install the pinion seal.
    - A rotational torque of **1.6947 - 5.0841 Nm (15 - 45 inch lbs.)** is acceptable with the pinion seal installed.



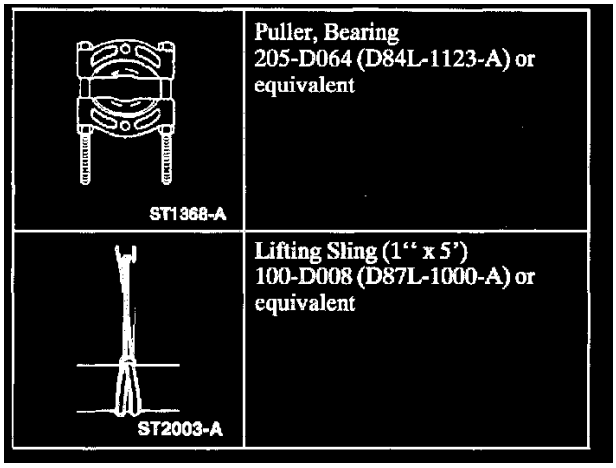
11. Using the special tool, install the pinion flange.



12. Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the pinion threads, and install a new hex nut.
    - Using a suitable torque multiplier, tighten the nut.
13. Assemble the carrier.

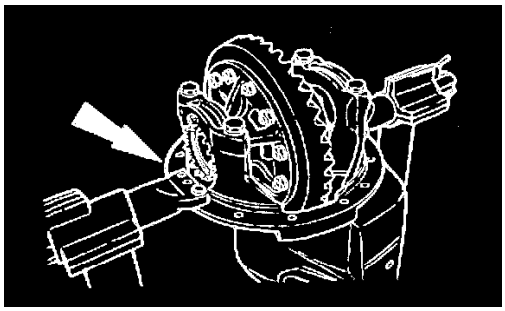
Differential Case and Ring Gear

Differential Case and Ring Gear

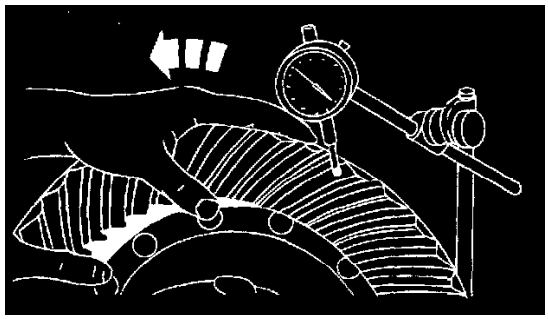


Special Tool(s)

Disassembly

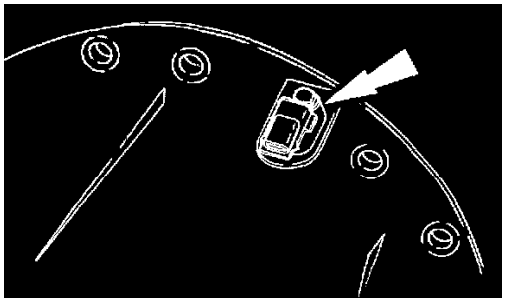


1. Mount the carrier housing in a suitable repair stand.

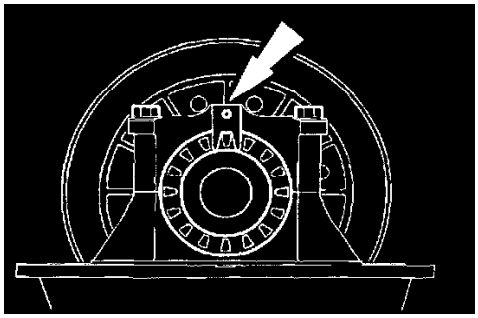


2. **CAUTION:** If reusing the differential ring gear and pinion measure and record the backlash before disassembly. Re-assembling the differential ring gear and pinion to the recorded backlash will match the established wear patterns. Hand rolled patterns will cover less area than the established patterns.

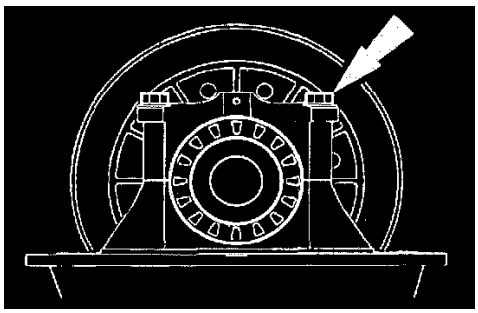
   Measure and record the differential ring gear and pinion backlash.
   - Check the backlash in four equally spaced positions around the differential ring gear.
     The acceptable backlash tolerance is **+ 0.0508 mm (0.002 inch)** from the backlash etched in the differential ring gear.
   - The tooth contact pattern can move only by adjusting backlash. The tooth contact pattern can move only in the direction of heel-to-toe, and toe-to-heel. Depth of the tooth contact pattern is not adjustable. Contact Spicer Service at 1-800-666-8688 for assistance if you are unable to establish an acceptable tooth contact pattern within the limits of backlash.



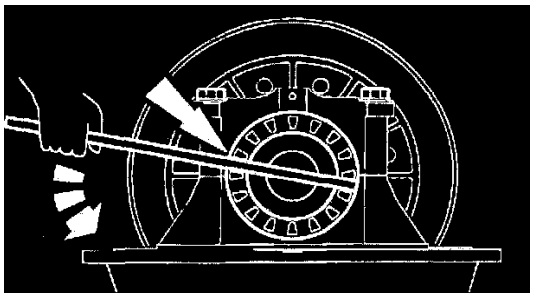
3. Remove the rear anti-lock brake sensor.



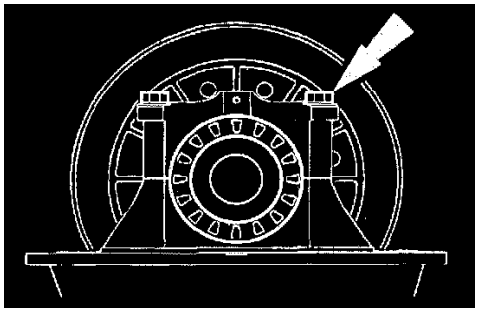
4. Remove the adjusting ring locks (4143).



5. Loosen, but do not remove, the four bolts.

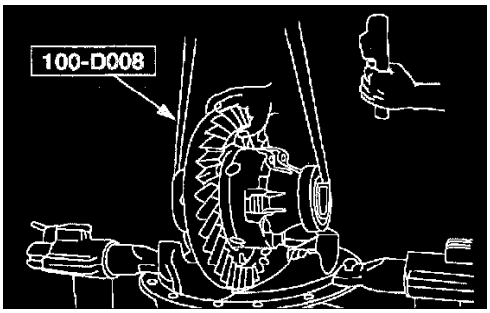


6. Relieve the bearing preload.
   - Loosen each differential bearing adjusting ring.



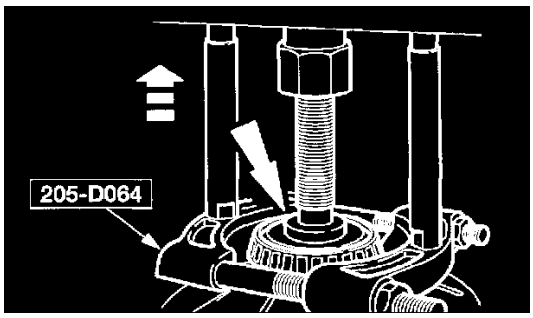
7. **NOTE:** The differential bearing caps are match marked at the factory.

   Remove the bolts, bearing caps and adjusting rings.

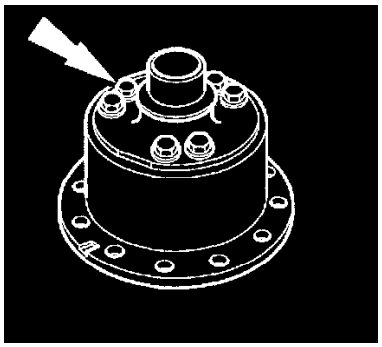


8. **CAUTION:** Do not damage the differential ring gear and pinion.

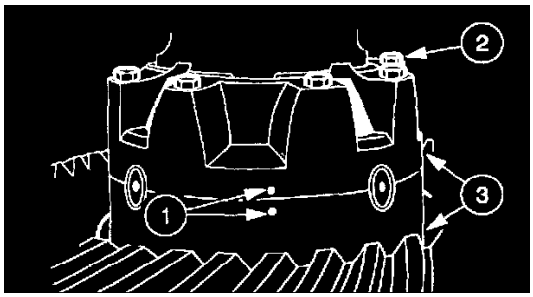
   Using the special tool, carefully lift the differential subassembly out of the carrier.



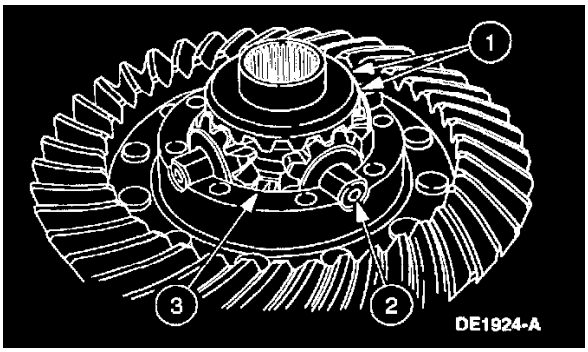
9. Using the special tool, and a suitable puller, remove the differential side bearings if worn/damaged.



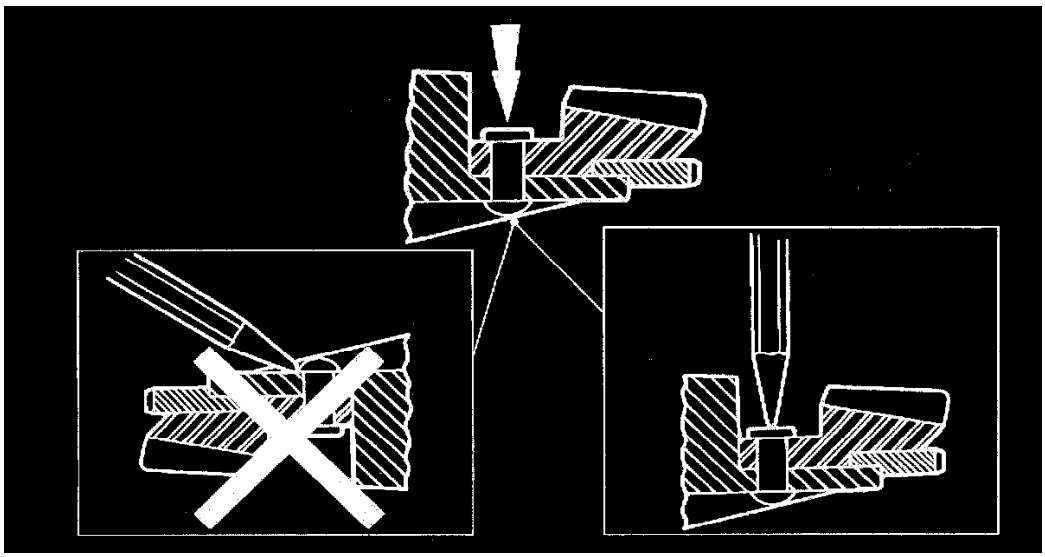
10. The Truetrac differential assembly is non-repairable. Discard the entire assembly if it is worn/damaged.



11. On the conventional differential assembly separate the differential case halves.
    1 Match mark the case halves.
    2 Remove the bolts.
    3 Separate the case halves.



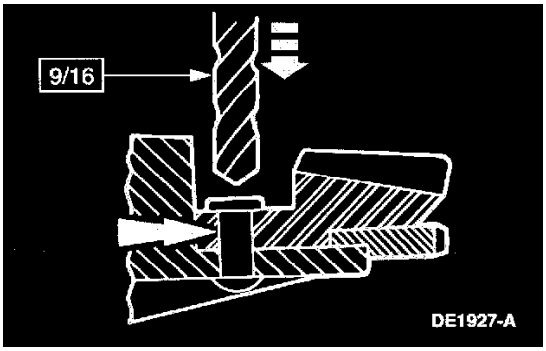
12. On the conventional differential assembly, remove the gear assembly.
    1 Remove the thrust washer and differential side gear.
    2 Remove the differential cross shaft with the pinion mates and the thrust washers.
    3 Remove the differential side gear and thrust washer.



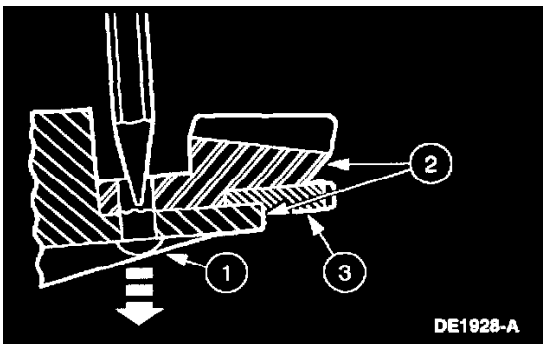
13. **CAUTION:** Do not use a chisel to remove the rivet heads. This will damage the differential case.

    CAUTION: Use a soft hammer to strike the punch.

    If discarding the pinion/differential ring gear, carefully center punch each differential ring gear rivet.



14. Drill the rivet heads to the depth shown using the specified size drill bit.



15. Separate the differential ring gear from the case.

    1 **CAUTION:** Use a soft hammer to strike the punch.

    Drive out the remaining rivet portions with a rounded type punch.
    2 Separate the differential ring gear from the case.

    3 **CAUTION:** Discard the anti-lock speed sensor ring (4B409) if separating it from the case half.

    If necessary, remove the anti-lock speed sensor ring and discard it.

16. **CAUTION:** Alkaline cleaning solutions will damage machine surfaces. Use only emulsion cleaners or petroleum based cleaning solvent.

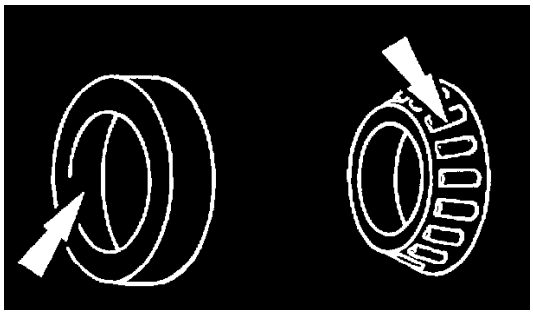
    CAUTION: Use soft, clean, lintless towels to dry the components.

CAUTION: Never spin-dry bearings with compressed air. This will damage the mating surfaces due to a lack of lubrication.

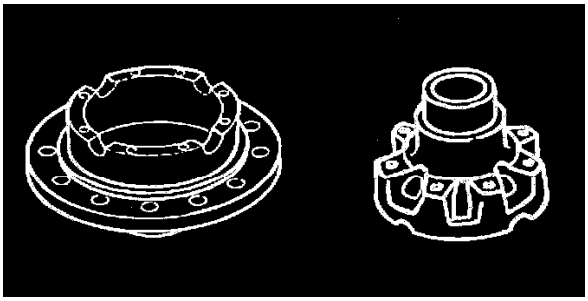
CAUTION: After drying, lightly coat the parts with rust inhibitor or clean lubricant to prevent damage from corrosion. Wrap all parts that are going to be in storage for a prolonged period in wax paper.

NOTE: For Truetrac differentials, submerge the entire differential assembly in a suitable solvent to wash away contaminants from within the housing.

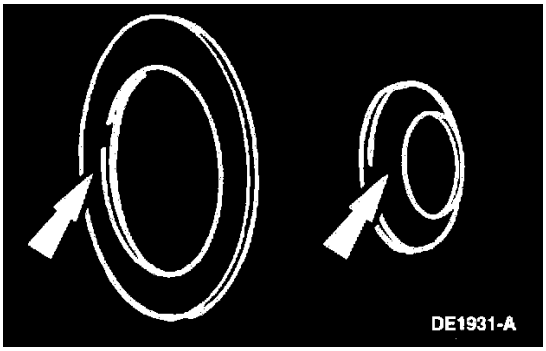
Clean and dry the components.



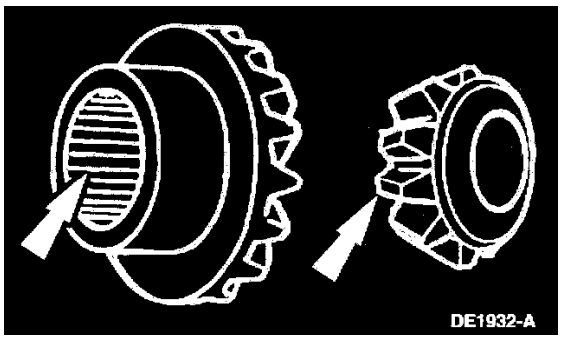
17. Inspect the bearing surfaces for pitting, wear and overheating.



18. Inspect the following:
    - the differential case machine surfaces.
    - the differential ring gear mounting holes for deformities, such as egg shaping.
    - all surfaces for nicks and cracks.

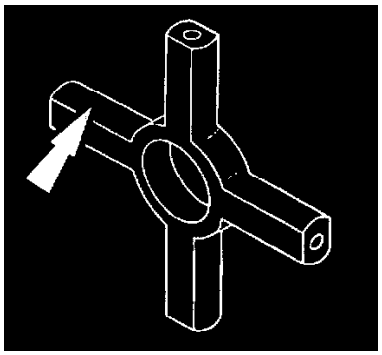


19. Inspect the thrust washers for scoring and cracking.



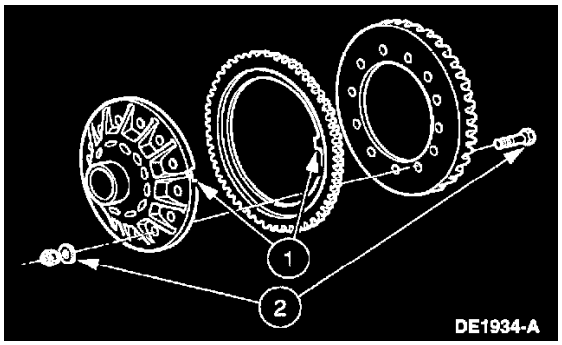
20. **CAUTION:** Discard all gears in sets if one or more sustains wear/damage.

    Inspect the gears for pitting, scoring, wear and damage.

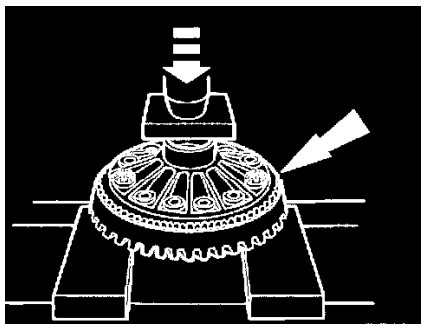


21. Inspect the shafts for nicks and scores.
22. Refer to Drive Pinion if disassembly is necessary.

Assembly

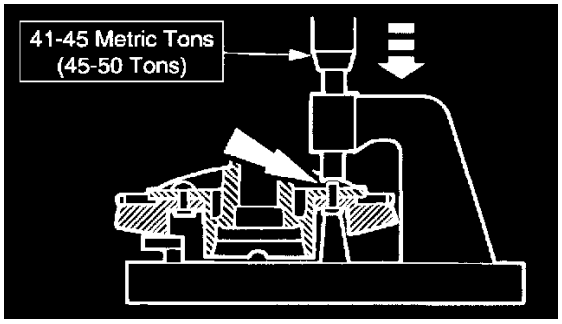


1. Assemble the differential ring gear and, if removed, a new anti-lock speed sensor ring to the differential case.
   1 Align the tab on the sensor ring with the notch in the case flange.
   2 Bolt the differential ring gear to the case in three places, 120 degrees apart.



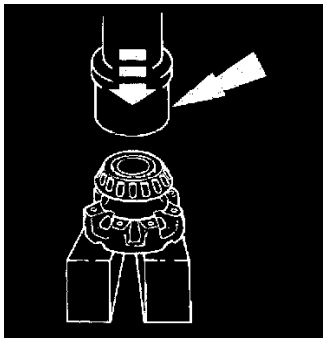
2. **NOTE:** Proceed to the next step of this procedure if not installing a new anti-lock speed sensor ring.

   Press the anti-lock speed sensor ring on the case flange.



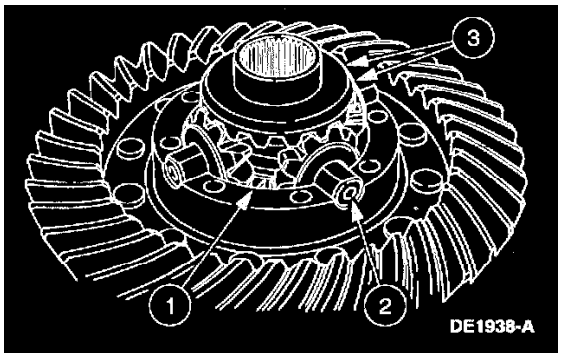
3. **CAUTION:** Compress the rivet before removing the bolts from the differential ring gear and case to prevent differential ring gear runout.

   Install each rivet, using a suitable hydraulic or mechanical press and riveting fixture and applying the force specified.



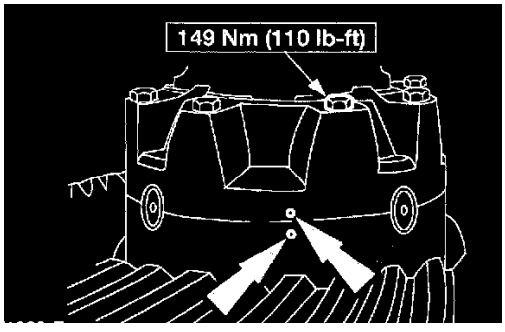
4. **CAUTION:** Place the differential side bearing cups on the differential side bearings after pressing the bearings on the case. This will prevent bearing damage during the remaining assembly process.

   Press the differential side bearings on the differential case halves, and place the bearing cups on the bearings.



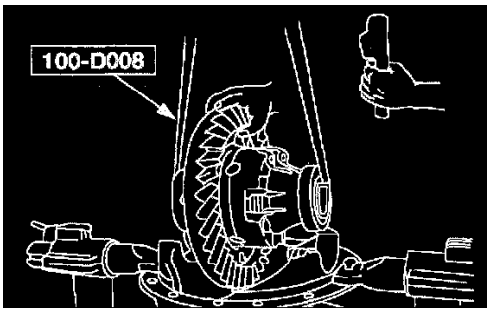
5. **NOTE:** Lightly lubricate all of the mating surfaces with clean axle lubricant. This will aid in assembly and provide initial lubrication.

   On the conventional differential, install the gear assembly.
   1 Position the thrust washer and the differential side gear into the case half.
   2 Position the differential cross shaft with the pinion mates and the thrust washers into the case half.
   3 Position the differential side gear and thrust washer on the differential pinion mates.



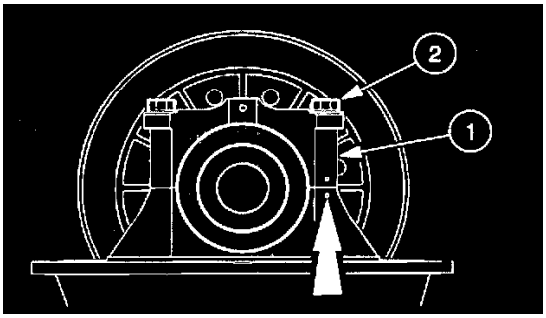
6. **CAUTION:** Align the match marks.

On the conventional differential, assemble the differential case halves.



7. **CAUTION:** Do not damage the differential ring gear and pinion.

   Using the special tool, carefully position the differential subassembly into the carrier.



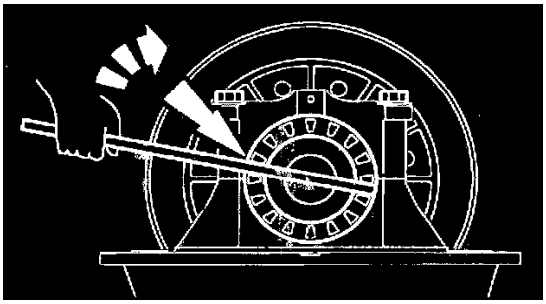
8. **CAUTION:** The bearing cups must seat on the differential side bearings.

   CAUTION: Align the match marks.

   Install the differential bearing caps.
   1 Position the bearing cap onto the leg.

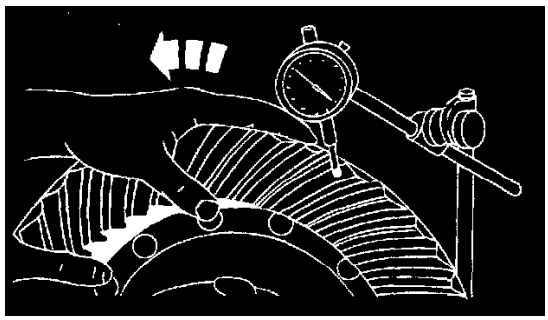
   2 **CAUTION:** The bolt threads must be clean.

   Apply Threadlock 262 E2FZ-19554-B or equivalent meeting Ford specification WSK-M2G351-A6 to the bolt threads, and install the bolts. Tighten the bolts enough to eliminate visible space between the bearing cap and leg. Do not tighten the bolts to the appropriate torque at this time.



9. **CAUTION:** Align the differential assembly within the bearing bores before applying preload or damage to the bearings will result.

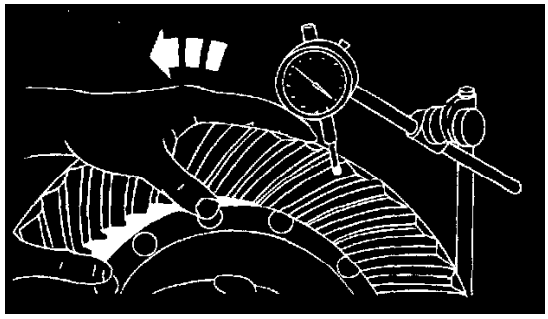
   Install the differential bearing adjusting rings.
   - Tighten both adjusting rings until there is zero end play, and some backlash between the differential ring gear and pinion. Make sure the adjusting ring tooth aligns so that installation of the adjusting ring lock is possible.



10. Set the backlash at zero.

    NOTE: The adjusting ring tooth must always align so that installation of the adjusting ring lock is possible.

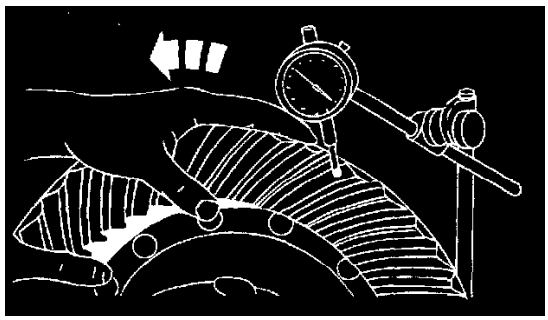
    Loosen the adjusting ring on the tooth side of the differential ring gear one tooth and tighten the opposite adjusting ring one tooth. Repeat this process until backlash is at zero.



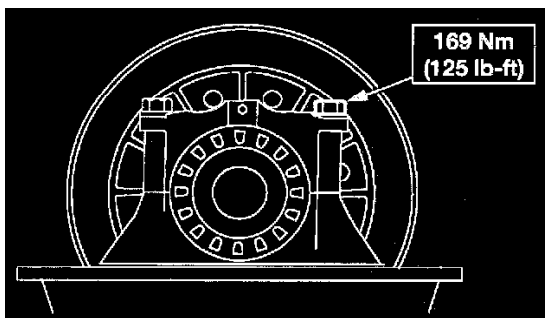
11. Set the backlash and the bearing preload to specifications.
    - With a new matched set installed, set the backlash to the specification etched in the differential ring gear.
    - With the original matched set installed, set the backlash to the specification recorded prior to disassembly.

    NOTE: The adjusting ring tooth must always align so that installation of the adjusting ring lock is possible.

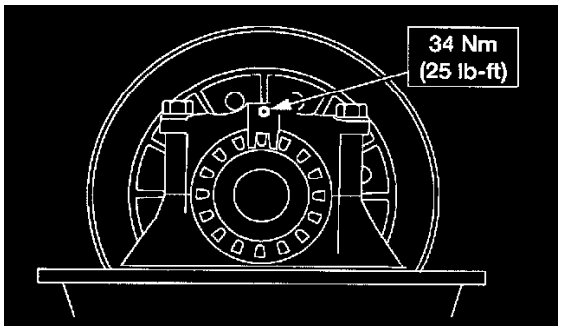
    Tighten the adjusting ring on the tooth side of the differential ring gear until backlash is within specifications.



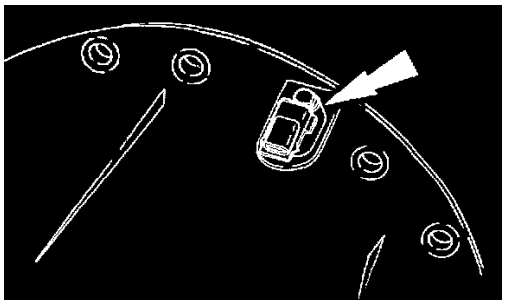
12. Check the differential ring gear and pinion backlash in four equally spaced positions around the differential ring gear.
    - The acceptable backlash tolerance is **0.0508 mm (0.002 inch)** from the backlash etched in the differential ring gear.
    - If the backlash tolerance varies more than **0.080 mm (0.003 inch)** between the four positions, remove the differential and determine the cause.



13. Tighten the bolts.
    - Check the differential ring gear and pinion backlash, as described in the previous step, after tightening the bolts.



14. Install the adjusting ring locks.



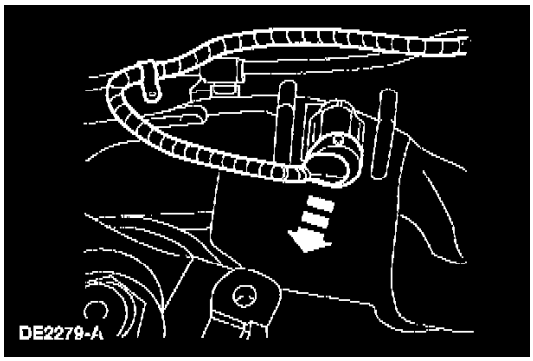
15. Install the rear anti-lock brake sensor.
16. Install the carrier.

Removal and Installation

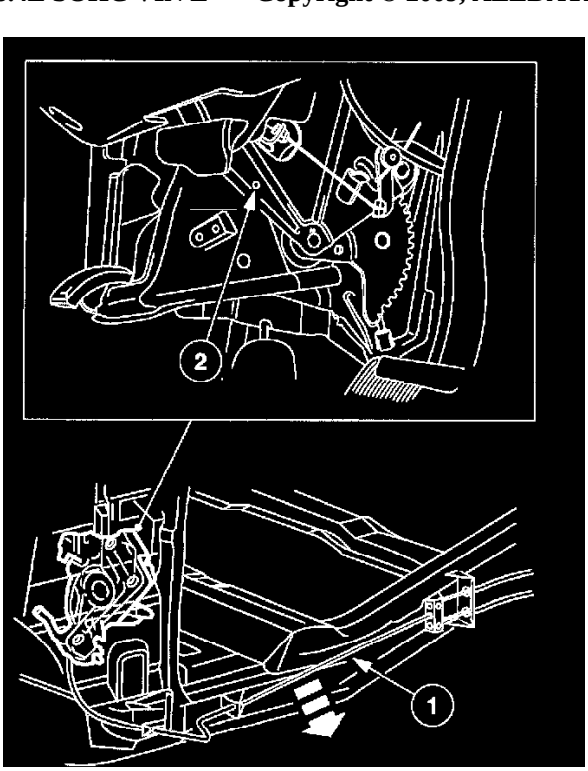
Axle Assembly

Removal

1. Raise the vehicle on a hoist.
2. Remove the wheels and tires.
3. Remove the driveshaft.

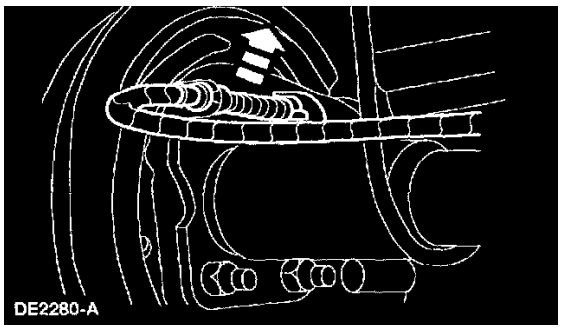


4. Disconnect the rear anti-lock brake sensor.

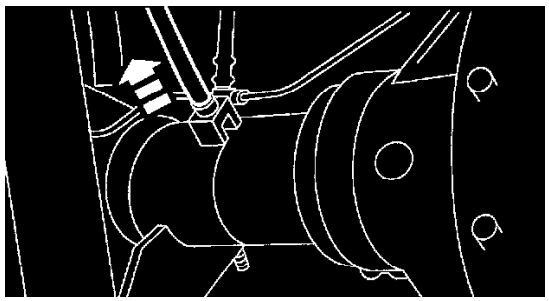


5. **NOTE:** Make sure the parking brake control is fully released.

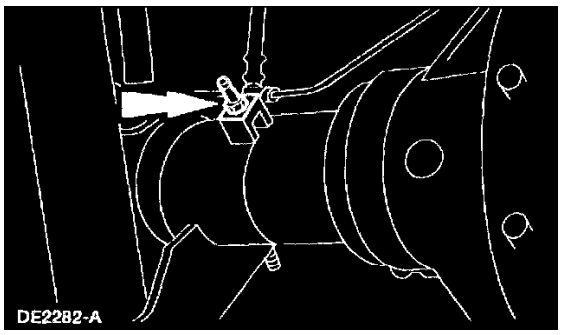
   Release the tension on the parking brake system.
   1 Have an assistant pull the front parking brake cable and conduit to its full range.
   2 Insert a suitable retainer.



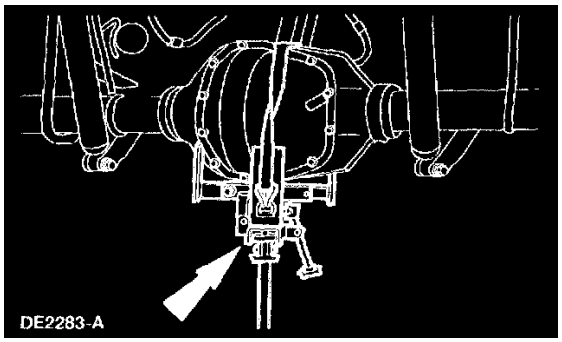
6. Disconnect the parking brake cable at the parking brake lever.



7. Remove the vent hose at the brake hose junction block.

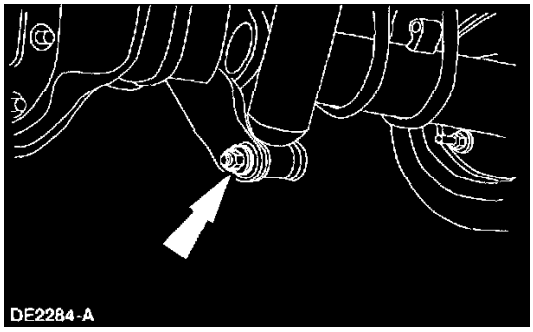


8. Remove the brake hose junction block from the rear axle housing and let it hang.
9. Remove the brake lines from the rear axle housing but not from the disc bake calipers and let the tubing hang.
10. Remove the disc brake calipers from the rear disc brake rotors and wire them aside.

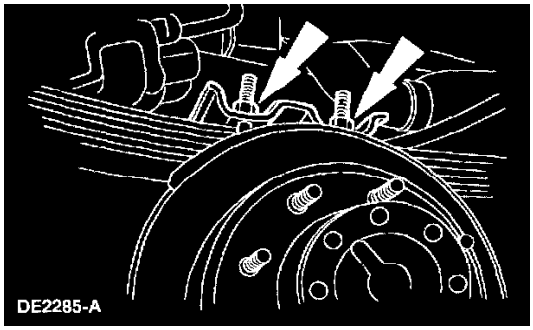


11. **WARNING: Strap the axle securely to the jack.**

    Use a suitable transmission jack to support the axle.



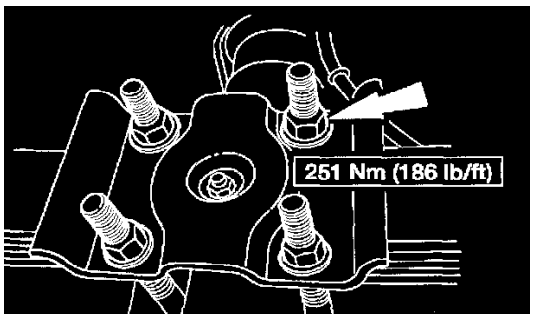
12. Remove the lower shock absorber nuts and bolts.

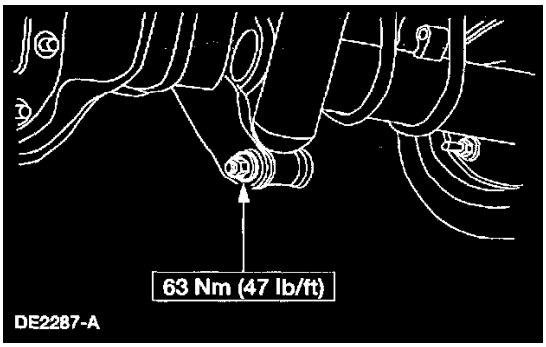


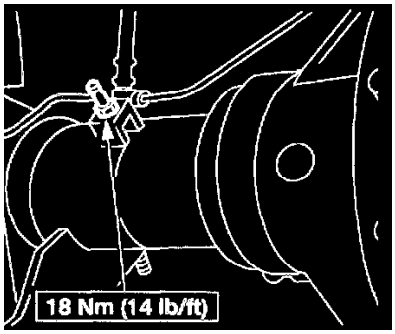
13. **NOTE:** Once the rear spring plate nuts and bolts are removed, they must be replaced.

    Remove the rear spring plate U-bolts and nuts.
14. Lower the axle from the vehicle.

Installation



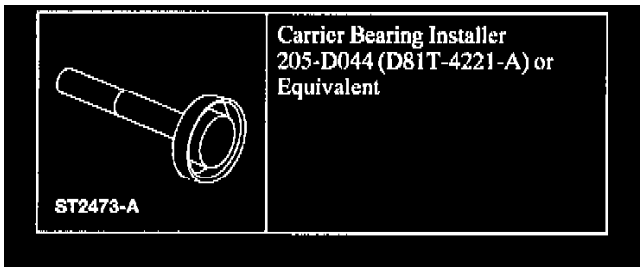




1. Follow the removal procedure in reverse order.
   - Install the brake calipers.

Differential Case and Ring Gear-One Piece, Conventional

Differential Case and Ring Gear-One Piece, Conventional

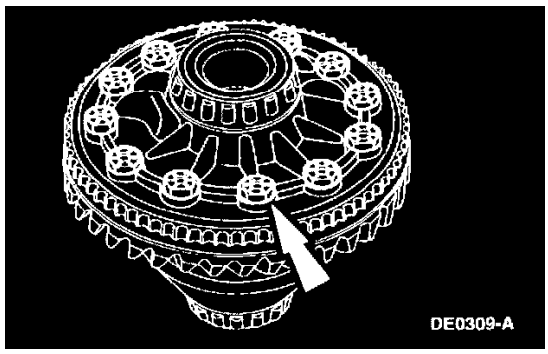


Special Tools

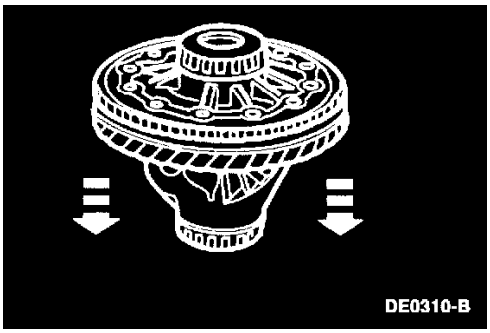
Special Tool(s)

Disassembly

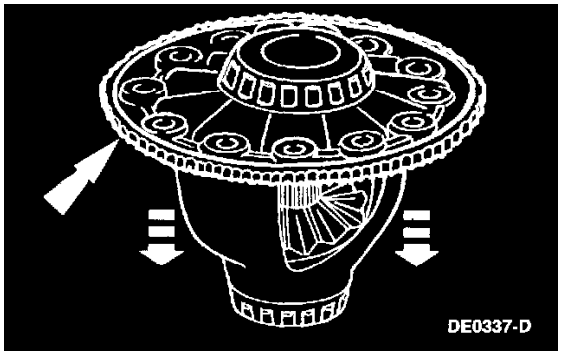
1. Remove the differential case.



2. Remove the ring gear bolts.

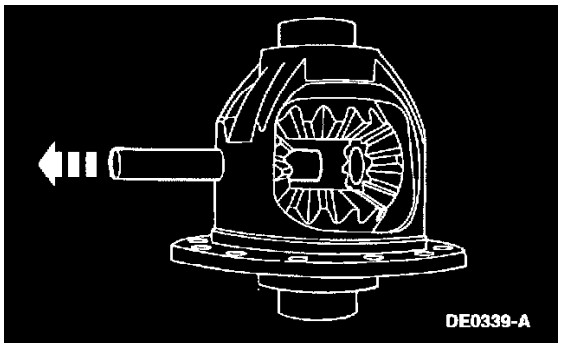


3. Insert a punch in the bolt holes and drive the ring gear off.

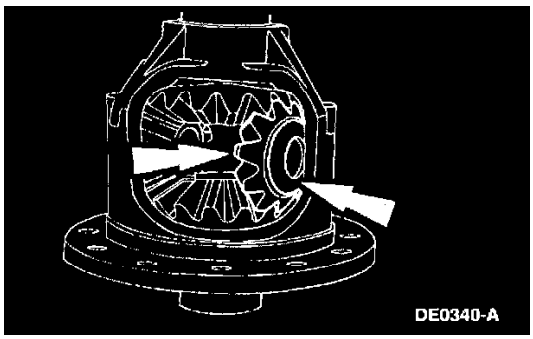


4. **NOTE:** The anti-lock speed sensor ring cannot be reused once removed.

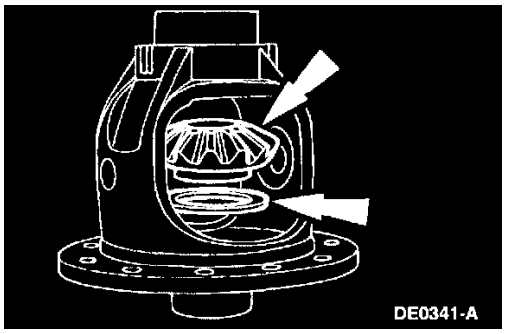
   Remove the anti-lock speed sensor ring.
5. If required, remove the differential bearings.



6. Remove the differential pinion shaft lock bolt and the differential pinion shaft.

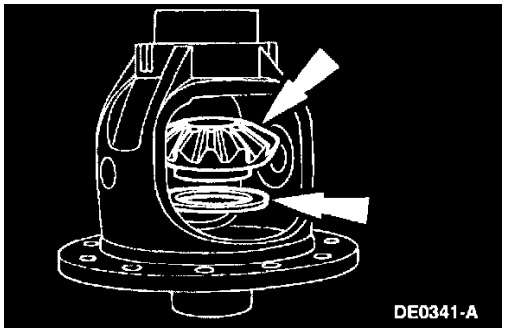


7. Rotate and remove the differential pinion gears and differential pinion thrust washers.

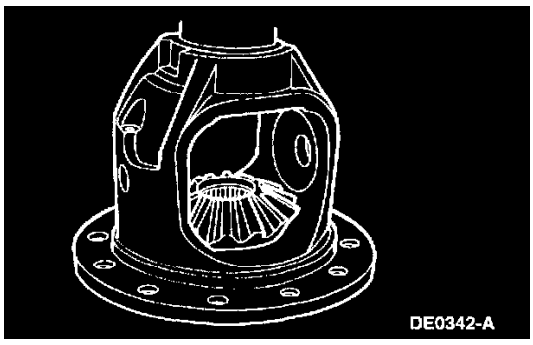


8. Remove the differential side gears and the differential side gear thrust washers.

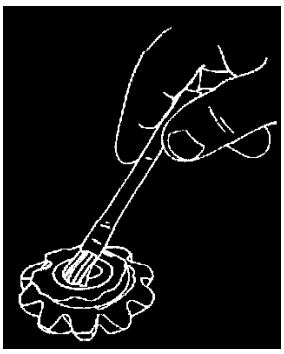
Assembly



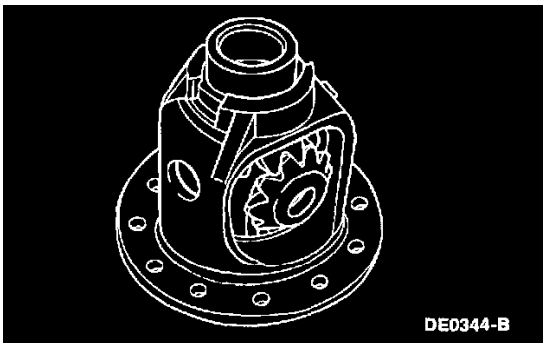
1. Position the differential side gear thrust washers on the differential side gears.
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B to lubricate the differential side gear thrust washers and the differential side gear journals.



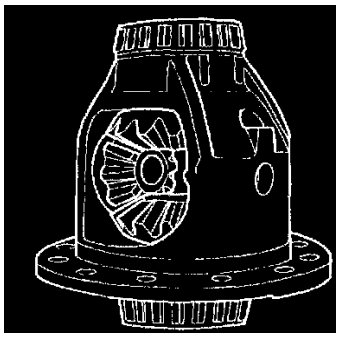
2. Position the differential side gears.



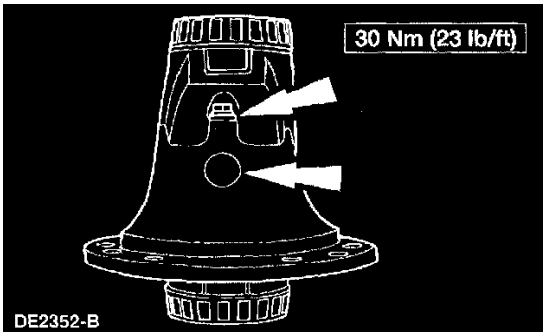
3. Assemble the differential pinion thrust washers and the differential pinion gears.
   - Lubricate with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.



4. Engage the differential pinion gears opposite the differential side gears.

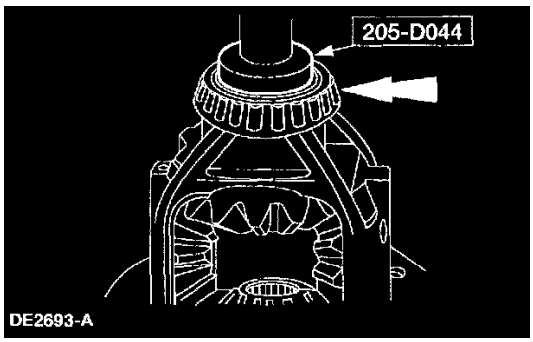


5. Rotate the differential pinion gears to align the differential pinion shaft bore.

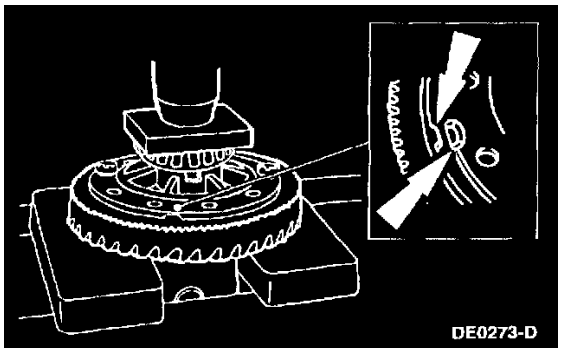


6. **CAUTION:** If a new pinion shaft lock bolt is not available, use Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 and tighten to specification.

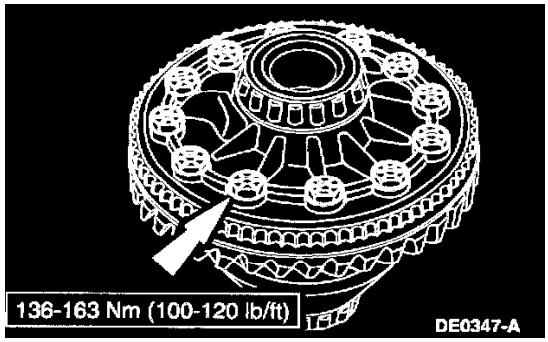
   Insert the differential pinion shaft, and install a new differential pinion shaft lock bolt.



7. Using the special tool, install the differential bearings.



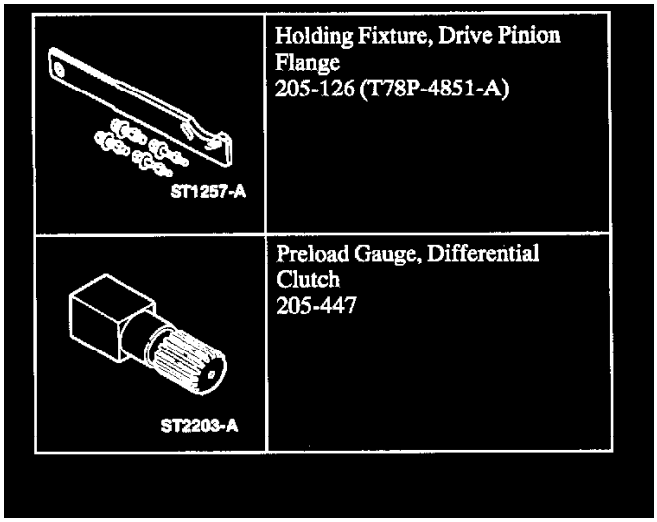
8. Press the new anti-lock speed sensor ring and the ring gear on the differential case.



9. Install the ring gear bolts and tighten.
   - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the ring gear bolts.
10. Install the differential case.

Differential Case and Ring Gear-Two-Piece, Conventional

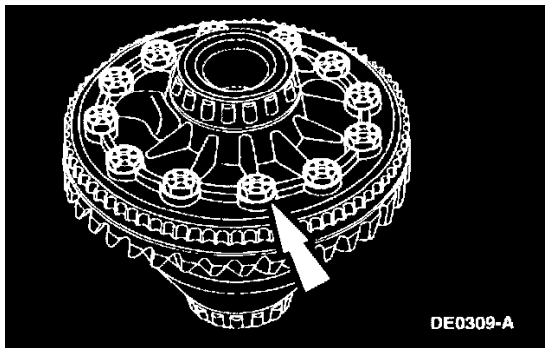
Differential Case and Ring Gear-Two-Piece, Conventional



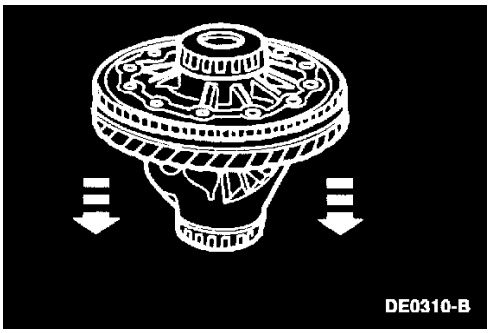
Special Tool(s)

Disassembly

1. Remove the differential case.



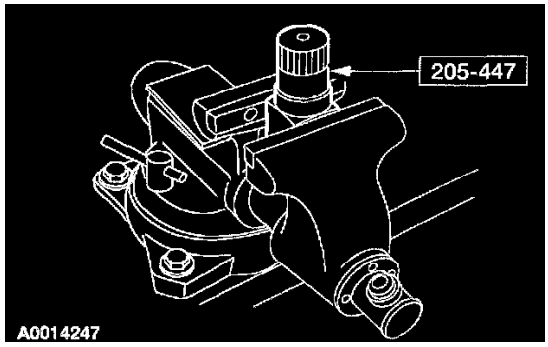
2. Remove the ring gear bolts.



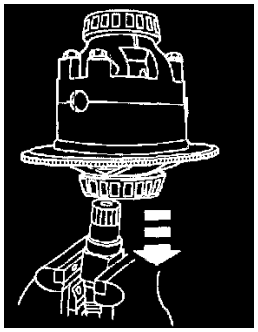
3. Insert a punch in the bolt holes and drive off the ring gear.
4. **CAUTION:** The anti-lock speed sensor ring cannot be reused once removed.

   NOTE: Remove the anti-lock speed sensor ring only if required.

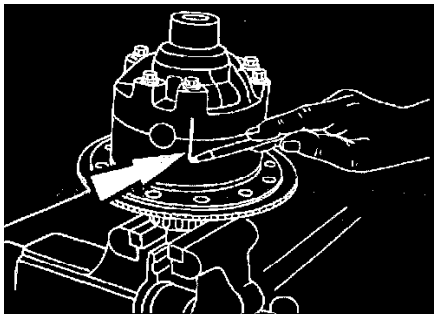
   Remove the anti-lock speed sensor ring.



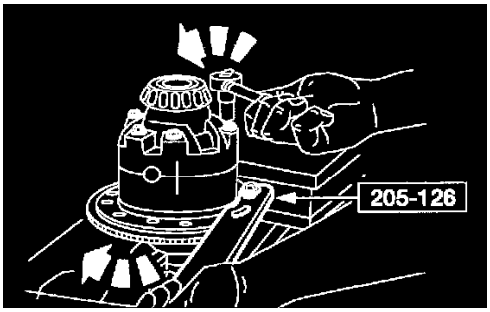
5. Position the special tool in a vise.



6. Position the differential case on the special tool.

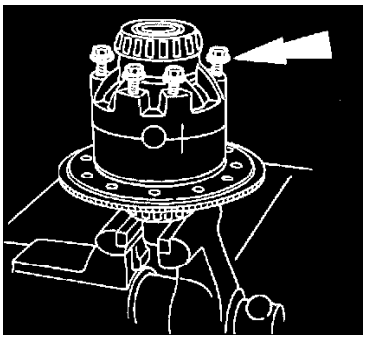


7. Index mark the differential case halves.

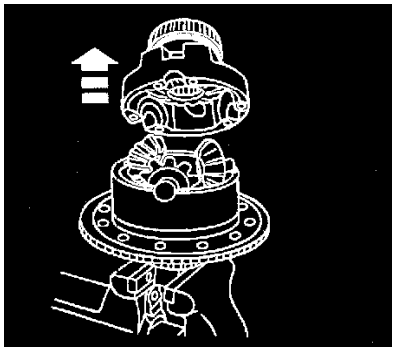


8. **NOTE:** Attach the special tool with a bolt and nut.

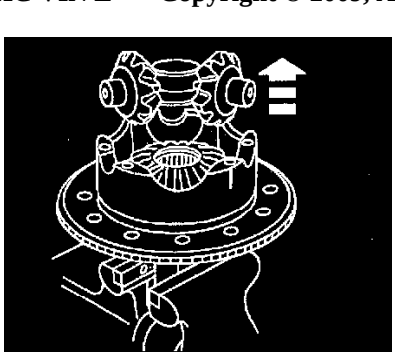
   Install the special tool on the differential case as shown and loosen the differential case bolts.



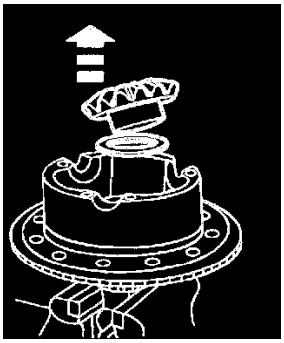
9. Remove the differential case bolts.



10. Remove the right differential case half and differential side gear.

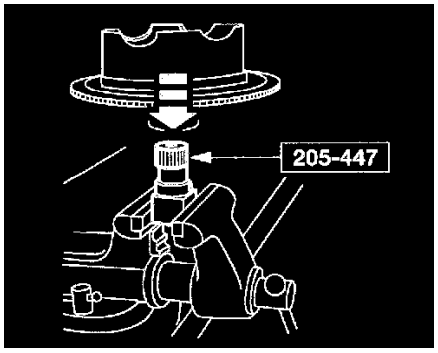


11. Remove the differential pinion shaft and differential pinion gears.

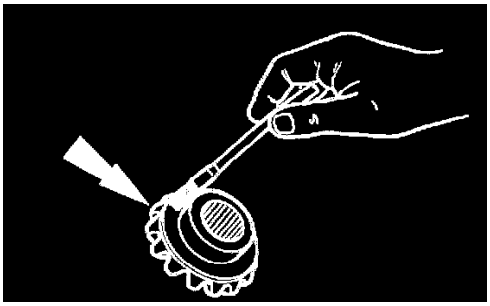


12. Remove the left differential side gear and the differential side gear thrust washers.

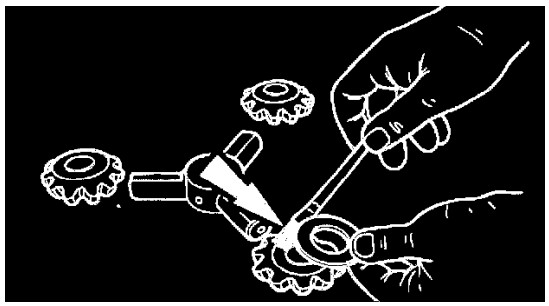
Assembly



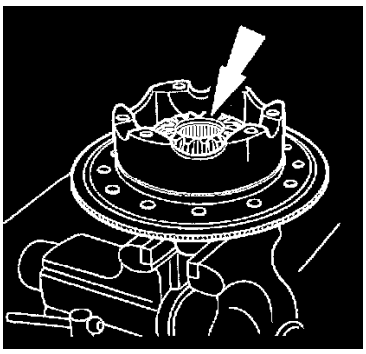
1. Position left differential case half (ring gear side) on the special tool.



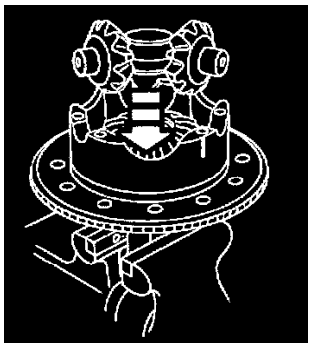
2. Lubricate the differential side gears and the differential side gear thrust washers with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.



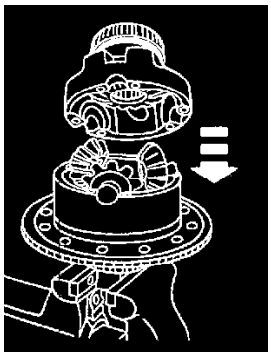
3. Lubricate the differential pinion gears, pinion gear thrust washers and the differential pinion shaft with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.



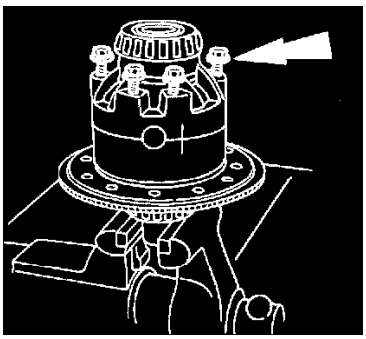
4. Install the left differential side gear.



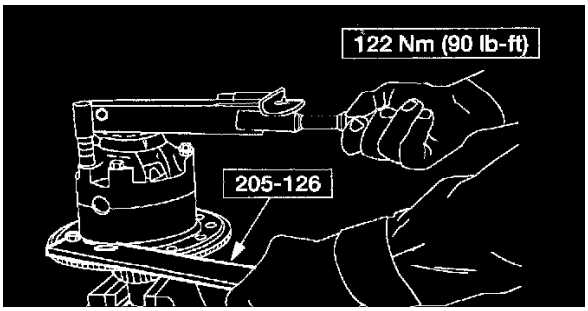
5. Install the differential pinion shaft and the differential pinion gears.



6. Position the right differential case half with the index marks aligned.

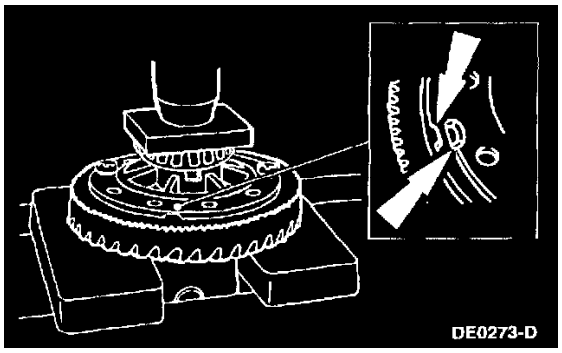


7. Position the differential case retaining bolts.

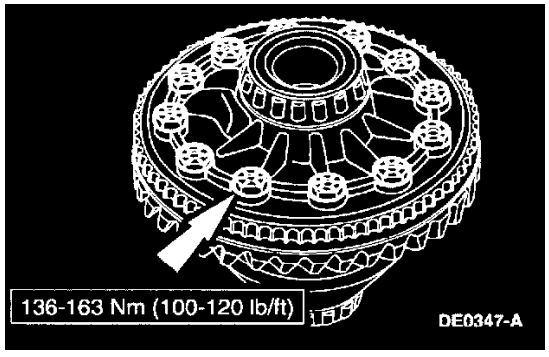


8. **NOTE:** Use the special tool as shown to keep the differential case from turning.

   Tighten the retaining bolts.



9. Press the new anti-lock speed sensor ring, if removed, and the ring gear on the differential case.

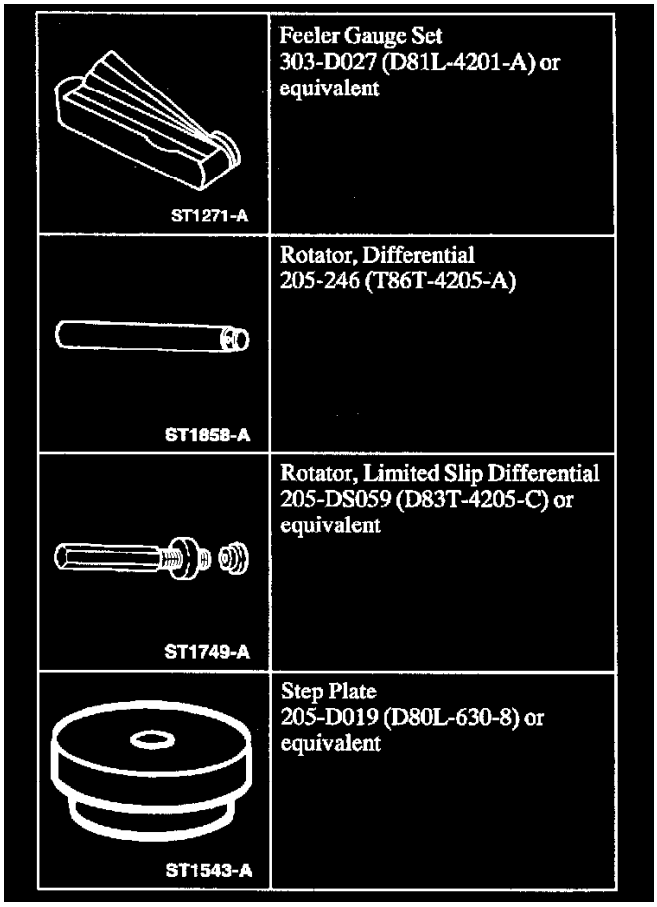


10. **NOTE:** Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the ring gear bolts.

    Install the ring gear bolt and tighten.
11. Install the differential case.

Differential Case and Ring Gear-One-Piece, Traction-LOK

Differential Case and Ring Gear-One-Piece, Traction-Lok

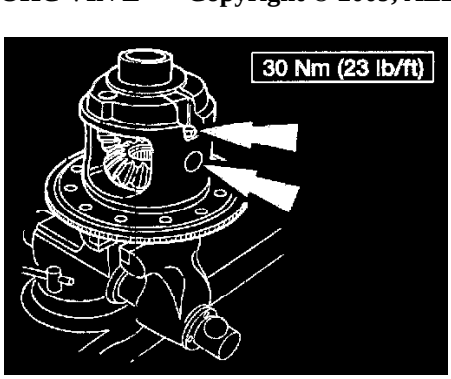


Special Tools

Special Tool(s)

Disassembly

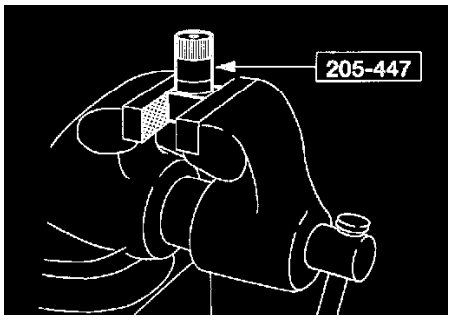
1. Remove the differential case.



2. **NOTE:** The differential bearings need not be removed to overhaul the Ford limited slip differential.

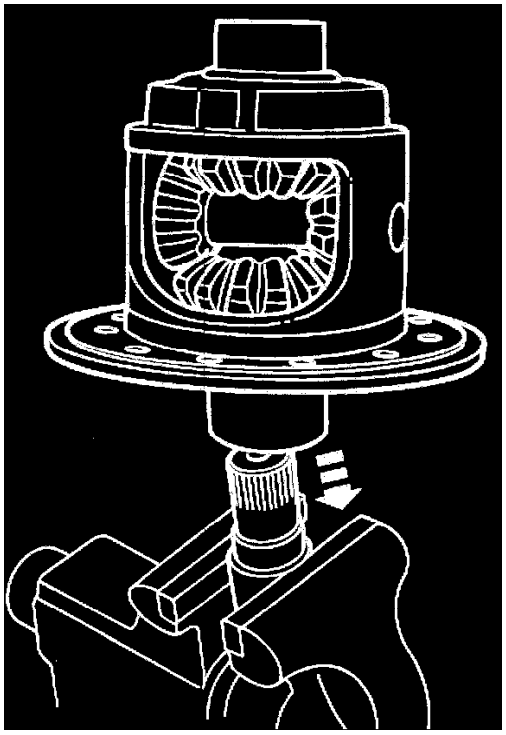
   NOTE: The anti-lock speed sensor ring cannot be reused once removed.

   Remove the differential pinion shaft lock bolt, and remove the differential pinion shaft.
   - If required, remove the ring gear and anti-lock speed sensor ring.

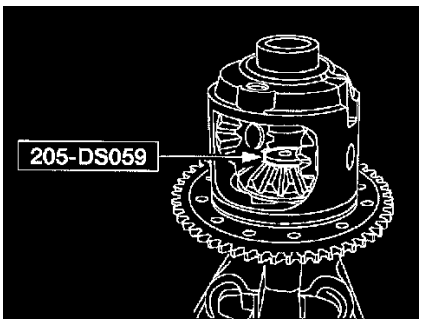


3. **NOTE:** This tool does not have the 1/2-inch drive hole.

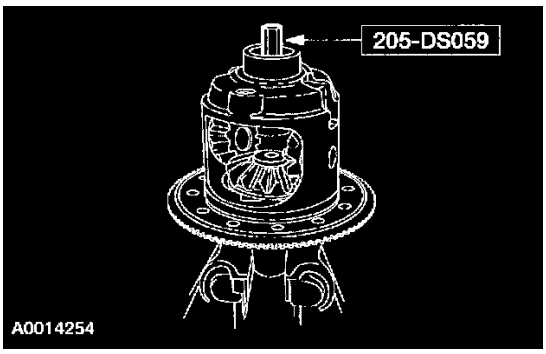
   Install the special tool in a suitable vise.



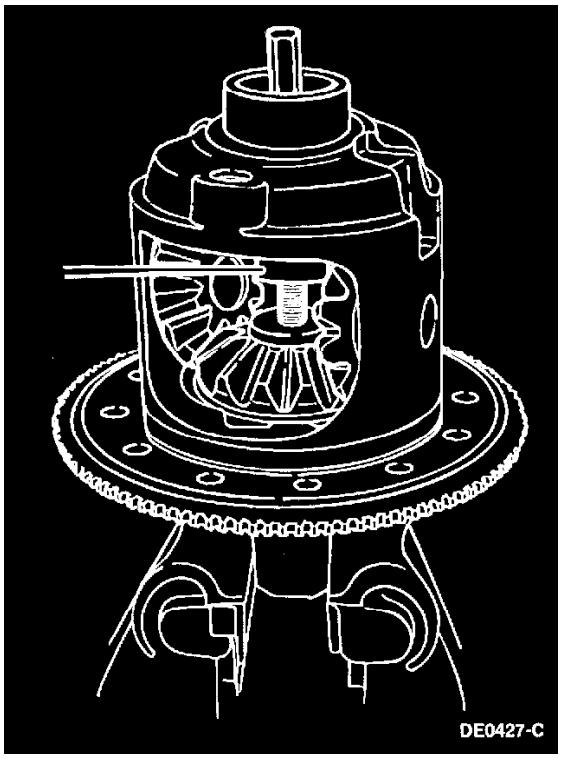
4. Install the differential case on the tool.



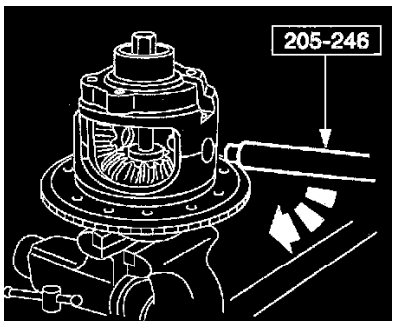
5. Install the special tool in the bottom side gear bore.
   - Apply a small amount of grease to the centering hole of the special tool.



6. Install the nut in the upper differential side gear. Hold the nut in position while installing the hex screw. Tighten the hex-head screw until contact is made with the Step Plate.



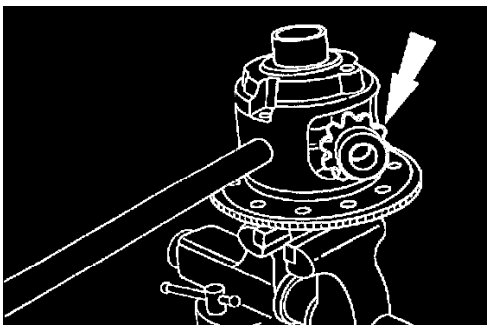
7. Insert a suitable dowel bar in the hole of the nut.
   Tighten the forcing screw to force the differential side gear away from the differential pinion gears. The dowel bar is used to keep the nut from turning when the forcing screw is tightened.



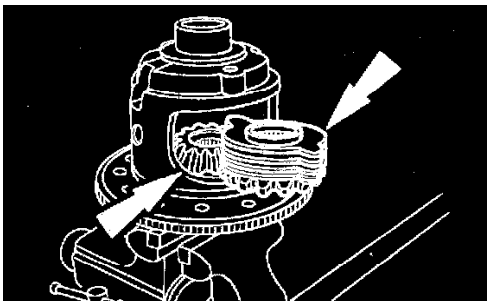
8. **WARNING: Keep fingers/hands away from pinion gears when rotating the differential case with the differential rotating tool.**

   NOTE: Differential pinion thrust washers cannot be removed independently of the differential pinion gears and so must be removed simultaneously with the differential pinion gears.

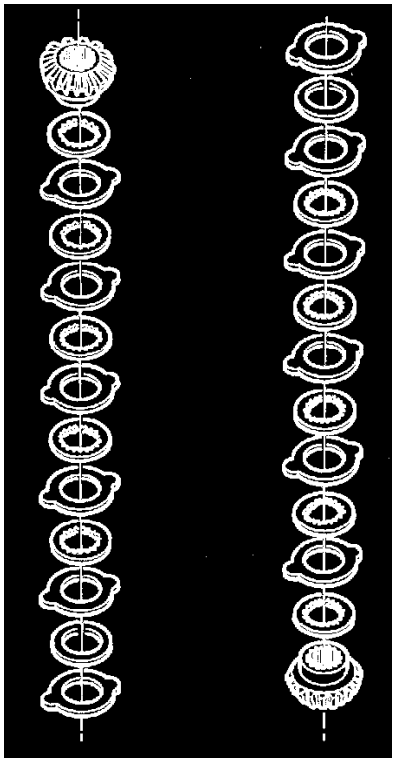
   Insert the special tool in the pinion shaft bore, and turn the differential case to "walk" the differential pinion gears and differential pinion thrust washers out to the differential case windows.



9. Remove the differential pinion gears and differential pinion thrust washers.



10. Remove the differential side gears and differential clutch packs, and tag them RIGHT and LEFT with the shim.

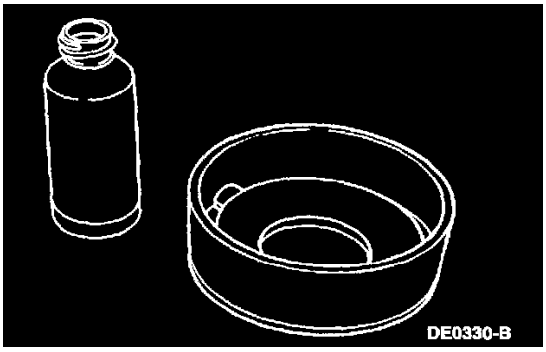


11. **CAUTION:** When separating the clutch plates and clutch discs, note the sequence in which they are disassembled. They must be reassembled in the same sequence.

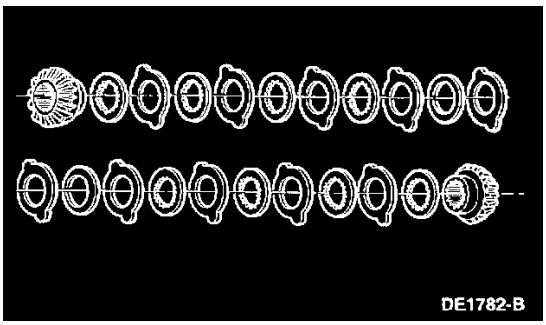
    CAUTION: Do not use acids or solvents when cleaning the differential clutch pack. Wipe components with a clean, lint-free cloth only.

    Separate the differential clutch discs and clutch plates for cleaning and inspection.

Assembly



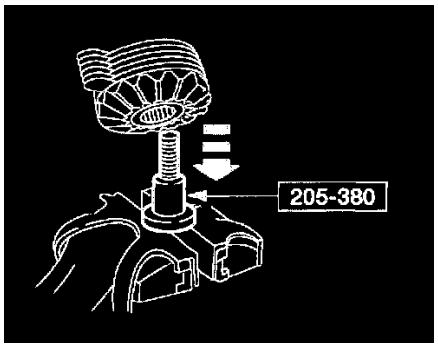
1. Prelubricate each steel clutch plate and soak all friction plates in Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A for at least 15 minutes.



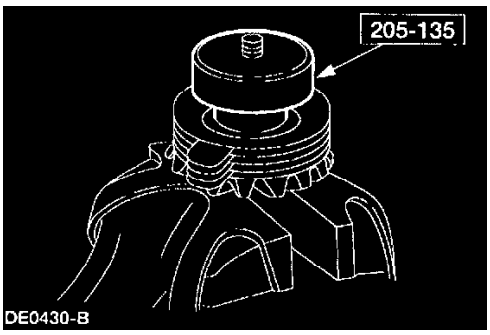
2. **NOTE:** Do not mix the differential clutch packs or shims from one side with the other.

    NOTE: The Belleville spring is a dished plate.

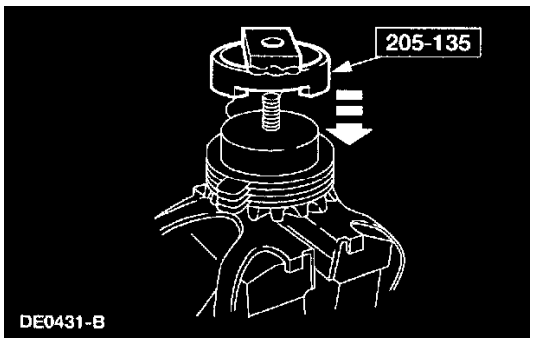
Assemble the differential clutch packs (without the shims and Belleville springs) on the respective differential side gears.



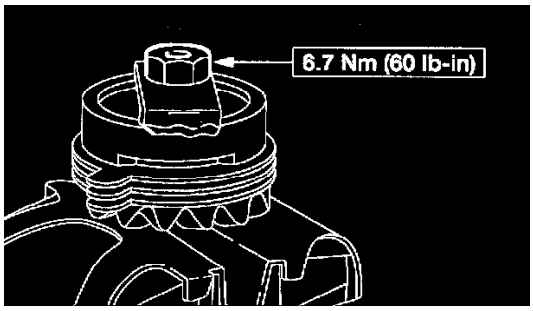
3. Clamp the bolt head of the special tool in a vise. Install the differential clutch pack and the differential side gear (without the shim or the Belleville spring) on the gauge.



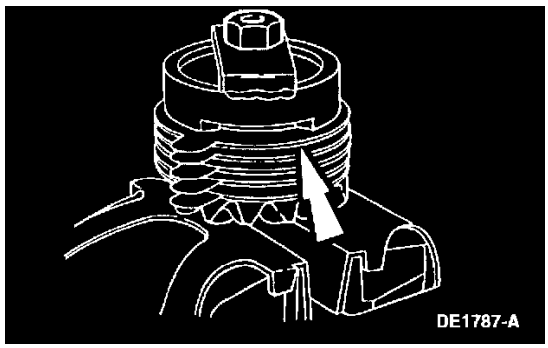
4. Position the special tool on top of the differential clutch pack.

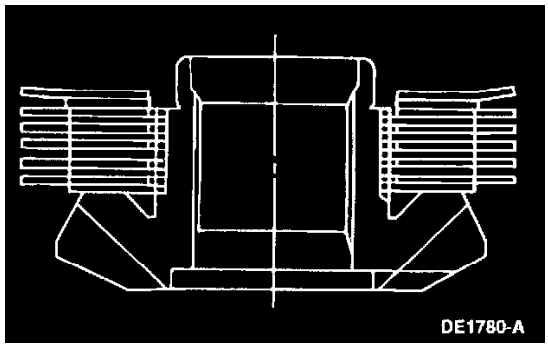


5. Install the special tool over the disc and differential clutch pack.



6. Install the nut of the gauge over the top and base stud.

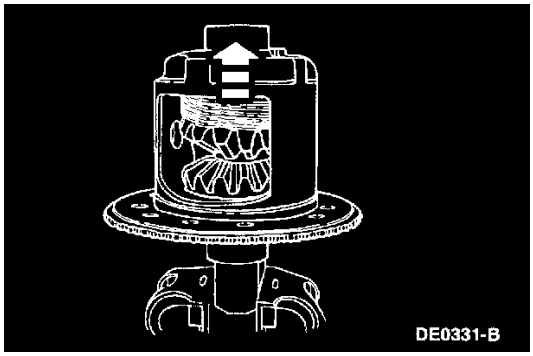




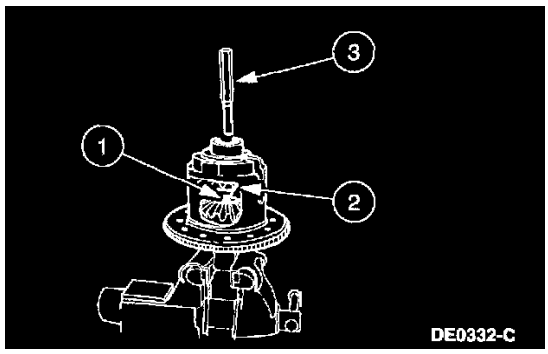
7. Use the Feeler Gauge Set and select the thickest blade that will enter between the tool and the differential clutch pack. The reading will be the thickness of the new clutch shim. Select the correct shim size, and remove the special tools.

Part Number	Description
F75Z-4A324-DA	0.030 Inch
F75Z-4A324-EA	0.035 Inch
F75Z-4A324-FA	0.040 Inch
F75Z-4A324-GA	0.045 Inch
F75Z-4A324-HA	0.050 Inch
F75Z-4A324-JA	0.055 Inch
F75Z-4A324-KA	0.060 Inch

8. Place the shim and Belleville spring on the differential clutch pack.
   - The dished or concave side of the Belleville spring must face up and against the thrust face of the differential case.



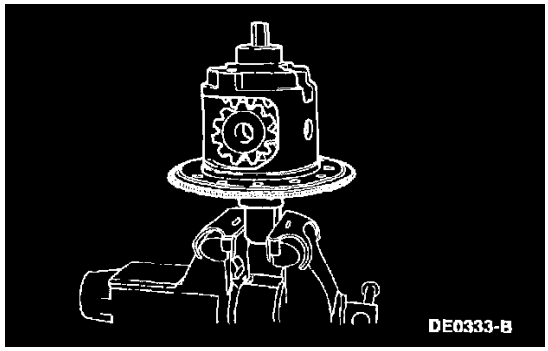
9. Insert the differential clutch packs with shims and Belleville springs and differential side gears into the differential case.
   - Hold the upper differential clutch pack and side gear assembly in place to prevent it from falling out of the differential case.



10. **NOTE:** Apply a small amount of grease to the Step Plate bore.

    NOTE: If necessary, insert the dowel bar in the nut bore to keep the nut from turning as the hex screw is tightened.

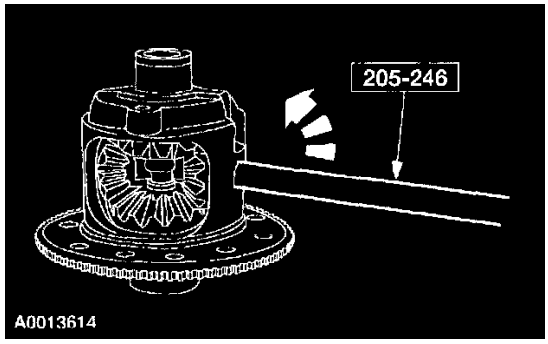
    Assemble the forcing screw, nut and Step Plate to the differential case.
    1 Position the Step Plate in the bottom side gear bore.
    2 Position the nut in the top side gear bore and hold it in place.
    3 Install the hex-head screw and tighten it two turns after it contacts the bottom Step Plate.



11. **NOTE:** Prelubricate both sides of the differential pinion thrust washers with SAE 75W-140 High Performance Rear Axle Lubricant FITZ-19589-B or equivalent meeting Ford specification WSL-M2C192-A.

    NOTE: Make sure the differential pinion gears are 180 degrees apart so they will align correctly with the pinion shaft bore.

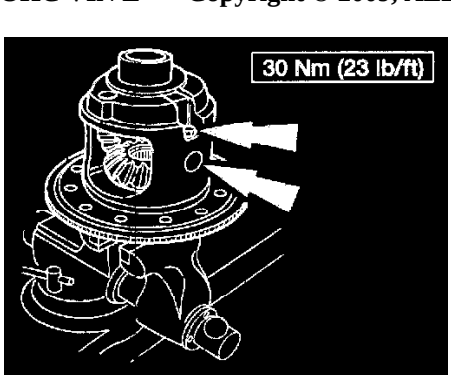
    Position the differential pinion gears and differential pinion thrust washers in the Window of the differential case so they mesh with the differential side gear teeth.



12. **WARNING: Keep fingers/hands away from pinion gears when rotating the differential case with the differential rotating tool.**

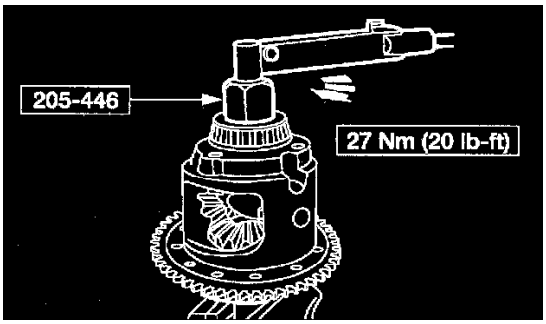
    NOTE: It will probably be necessary to loosen or tighten the forcing screw to allow the differential pinion gears and differential side gears to rotate. Insert the special tool into the pinion shaft bore, and turn the differential case. This will cause the differential pinion gears to engage the differential side gears and "walk" into the differential case.

    Rotate the differential case until the pinion mating shaft holes are lined up exactly with the holes in the differential pinion gears.

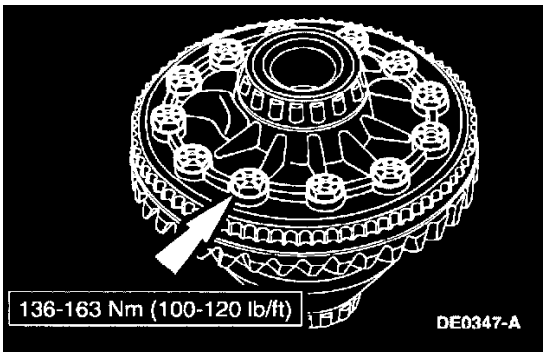


13. **CAUTION:** If a new pinion shaft lock bolt is not available, use Stud and Bearing Mount E0AZ-19554BA or equivalent meeting Ford specification WSK-M2G349-A1 and tighten to specification.

    Loosen the forcing screw, and remove the Step Plate and nut from the side gear bores. Install the differential pinion shaft in the differential case.
    - Install a new differential pinion shaft lock bolt.
14. Replace the differential bearings, if removed.



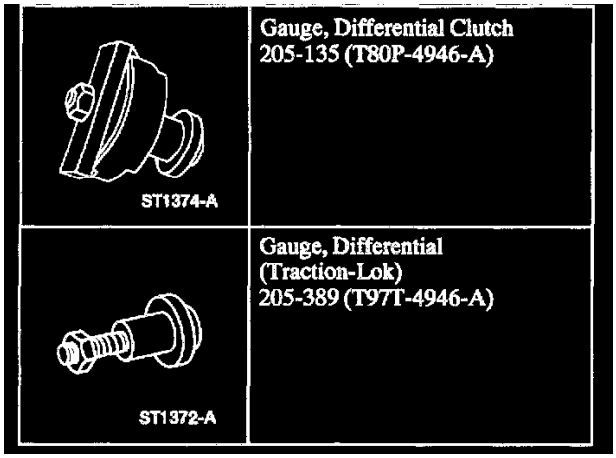
15. Check the torque required to rotate one differential side gear.
    - Install the special tool with the (1/2 inch drive hole) as shown.
    - The initial break-away torque, if original clutch plates are used, must be within specification. The rotating torque required to keep the differential side gear turning with new clutch plates may vary.

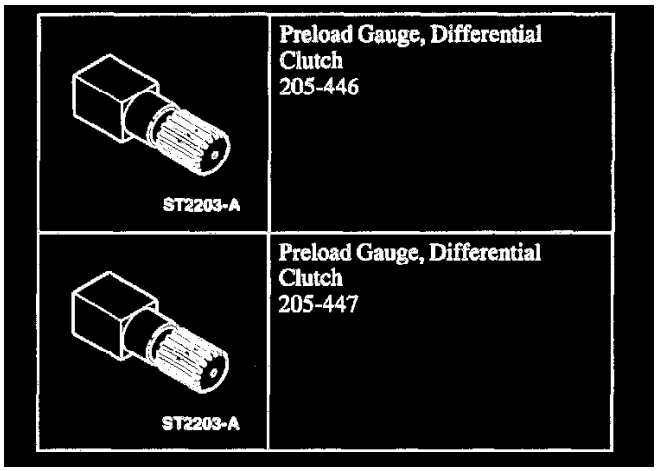


16. Install the ring gear and, if removed, a new anti-lock speed sensor ring on the differential case and tighten the retaining bolts.
17. Install the differential case.

Differential Case and Ring Gear-Two-Piece, Traction-LOK

Differential Case and Ring Gear-Two-Piece, Traction-Lok

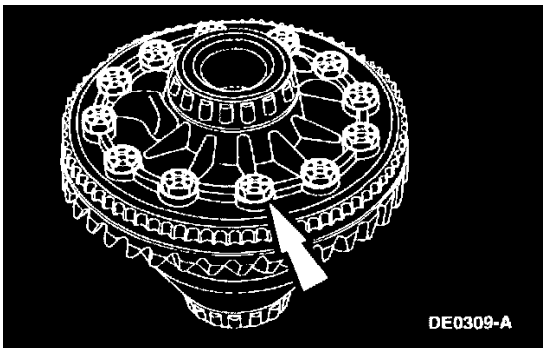




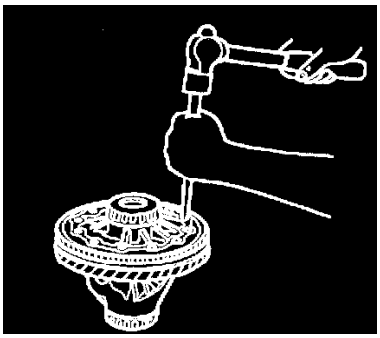
Special Tool(s)

Disassembly

1. Remove the differential case.



2. Remove the ring gear bolts.

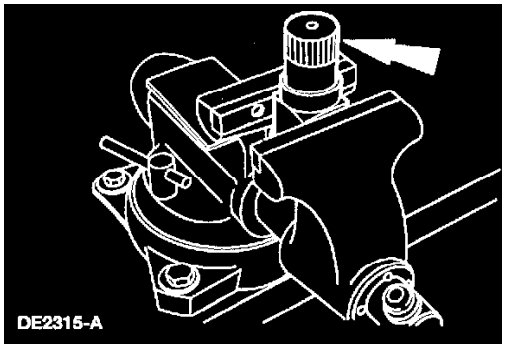


3. **NOTE:** The anti-lock speed sensor ring cannot be reused once removed.

Insert a punch in the bolt holes and drive the ring gear off.

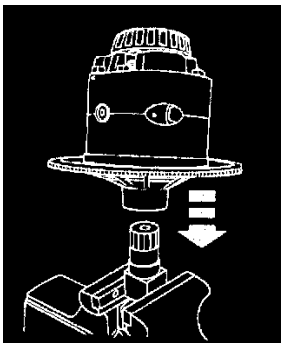
- If necessary, remove the anti-lock speed sensor ring and discard it.

4. If the differential bearings require removal, refer to Differential Case.

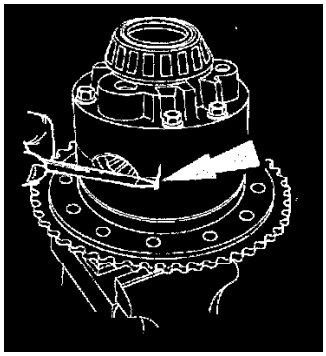


5. **NOTE:** This tool does not have the 1/2 inch drive hole.

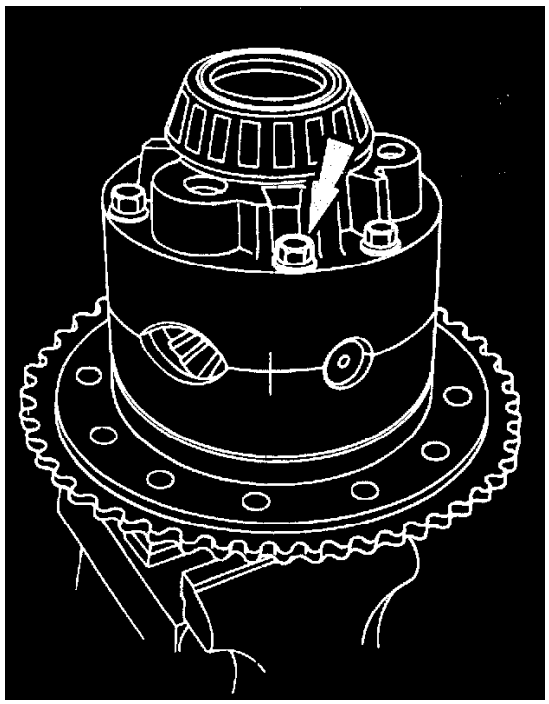
   Position the Traction-Lok Torque Tool Set in a vise.



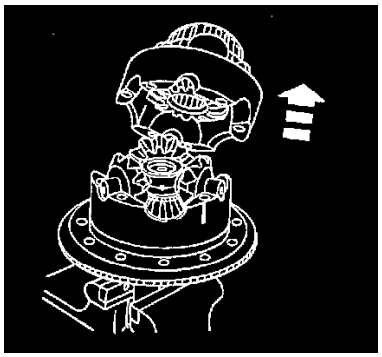
6. Position the differential case on the Traction-Lok Torque Tool Set.



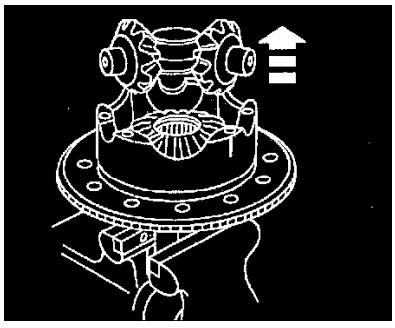
7. Index mark the differential case halves.



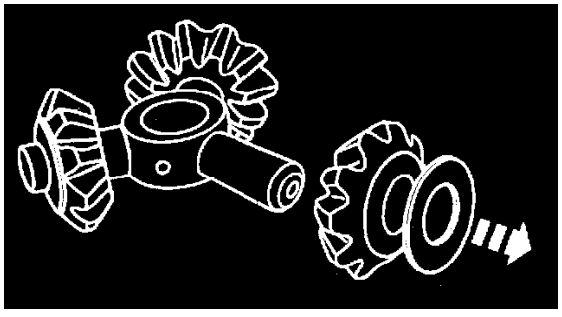
8. Remove the differential case bolts.



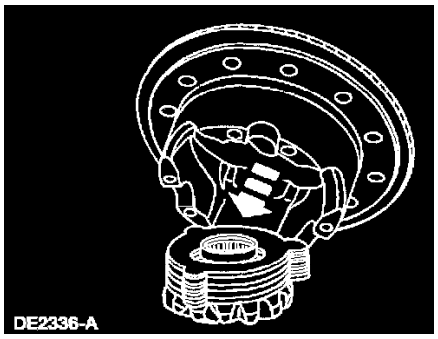
9. Remove the right differential case half and differential side gear.



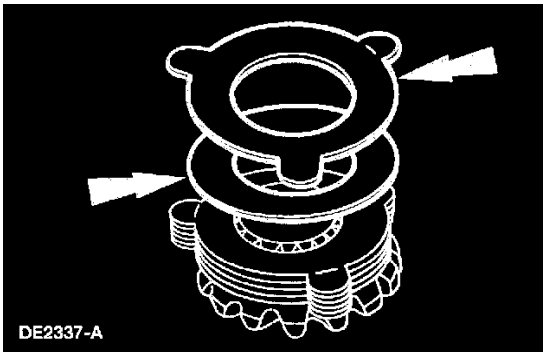
10. Remove the differential pinion shaft and differential pinion gears.



11. Remove the differential pinion gears from the differential pinion shaft.



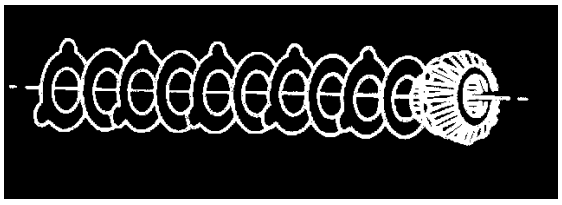
12. Remove both differential side gears and differential clutch packs from each differential case half.



13. Remove the Belleville spring and shim(s) from both differential clutch packs.

Assembly

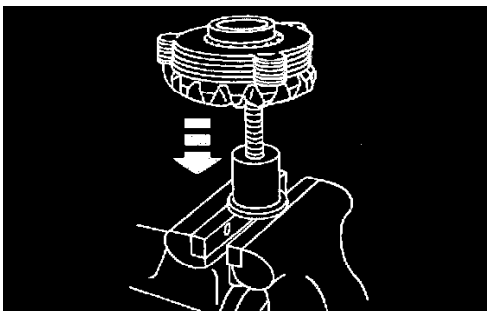
1. Prelubricate each clutch disc and soak the clutch friction plate for at least 15 minutes in Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A.



2. **CAUTION:** Do not mix the differential clutch packs or shims from one side with the other.

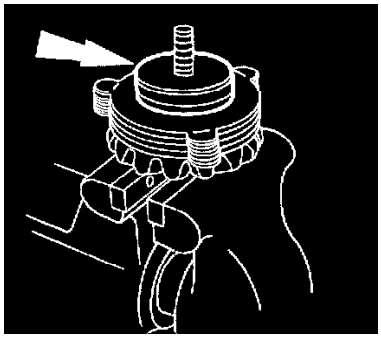
   NOTE: The Belleville spring is a dished plate.

   Assemble the differential clutch packs (without the shims and Belleville springs) on the respective differential side gears.

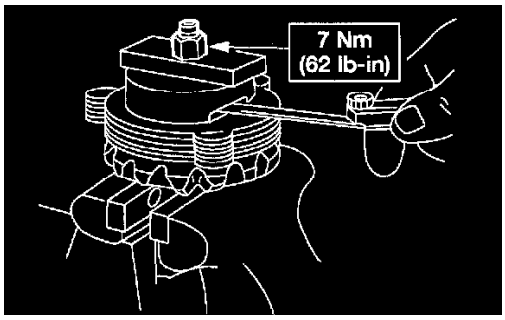


3. **NOTE:** Use the Traction-Lok Clutch Gauge Mandrel for the procedure. Refer to the Special Tool(s) Chart.

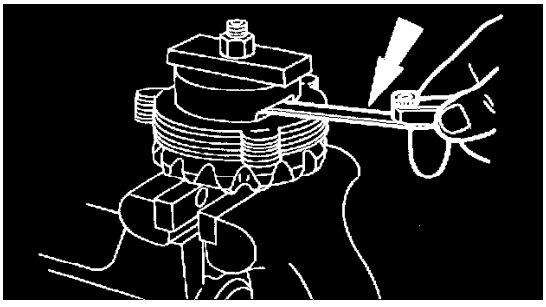
   Clamp the bolt head of the Traction-Lok Clutch Gauge in a vise.
   - Install the differential clutch pack and the differential side gear (without the shim or the Belleville spring) on the gauge.



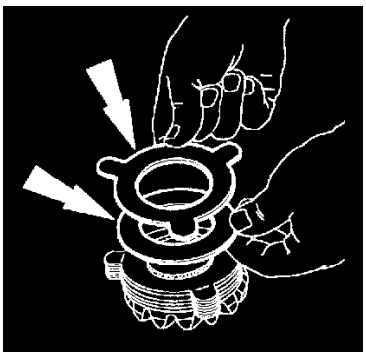
4. Position the Traction-Lok Clutch Gauge disc on top of the differential clutch pack.



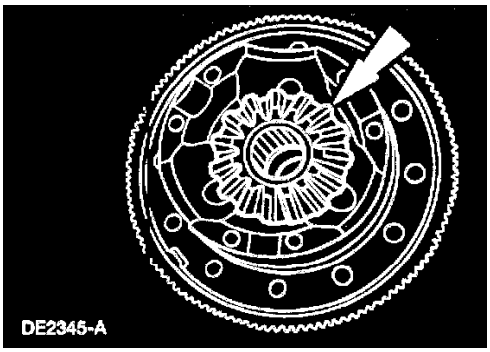
5. Install the Traction-Lok Clutch Gauge housing over the disc and tighten the nut.



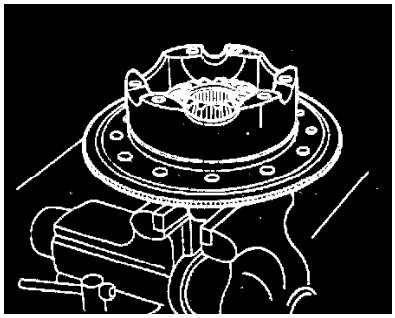
6. Use a feeler gauge and select the thickest blade that will enter between the tool and the differential clutch pack.
   - The reading will be the thickness of the new clutch shim.
   - Select the correct shim size, and remove the Traction-Lok Clutch Gauge.



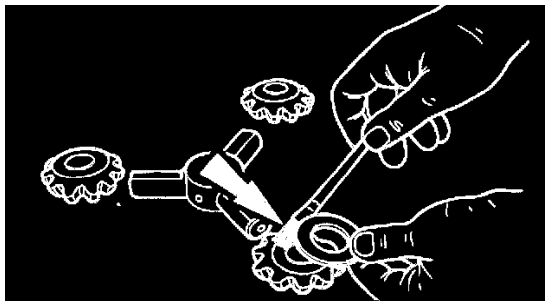
7. Place the selected shim and Belleville spring on the differential clutch pack.
   - The dished or concave side of the Belleville spring must be face up and against the thrust face of the differential case.



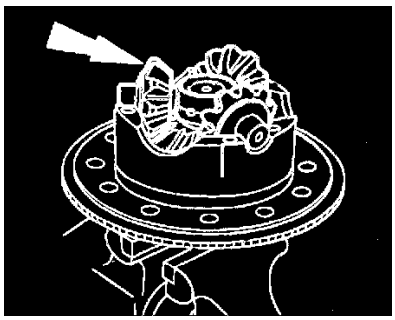
8. Install the differential side gear and differential clutch pack into the left case half (ring gear side).



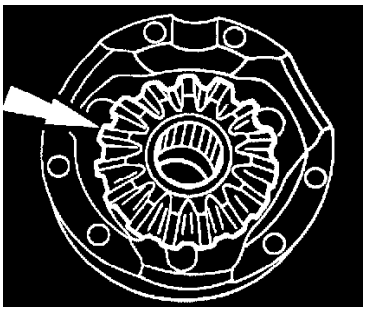
9. Position left differential case half on the Traction-Lok Torque Tool Set.



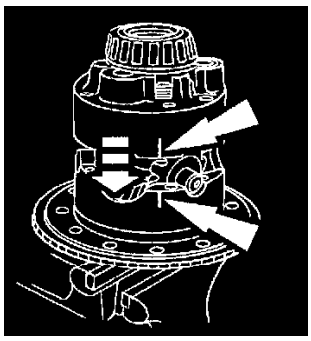
10. Lubricate the differential pinion gears, pinion gear thrust washers and the differential pinion shaft with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.
    - Install the differential pinion gears in the differential pinion shaft.



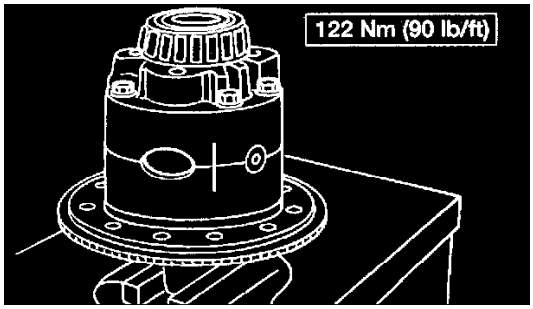
11. Install the differential pinion shaft and the differential pinion gears.



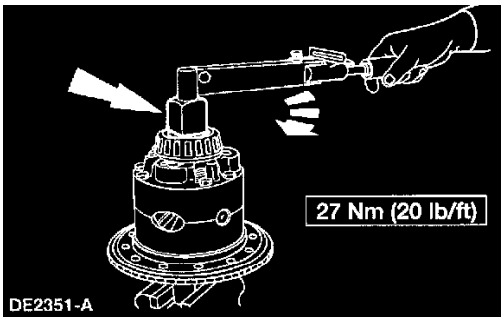
12. Install the right differential clutch pack and differential side gear into the right case half.



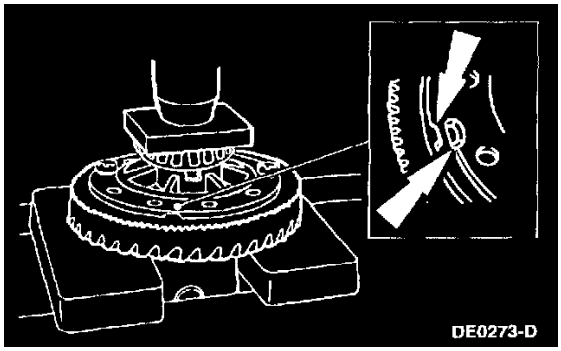
13. Position the right differential case half with the index marks aligned.

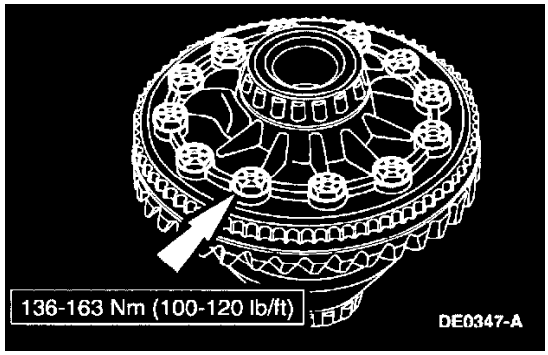


14. Install the retaining bolts and tighten.



15. Check the torque required to rotate one differential side gear.





16. Install the Traction-Lok Torque Tool Set with the 1/2-inch drive hole as shown.
    - The initial break-away torque, if the original clutch plates are used, must be within specification. The rotating torque required to keep the differential side gear turning with new clutch plates may vary.
16. Install the ring gear and, if removed, a new # anti-lock speed sensor ring on the differential case and tighten the retaining bolts.
17. Install the differential case.