

31. **NOTICE:** Do not spread the differential housing more than specified or damage to the housing can occur.

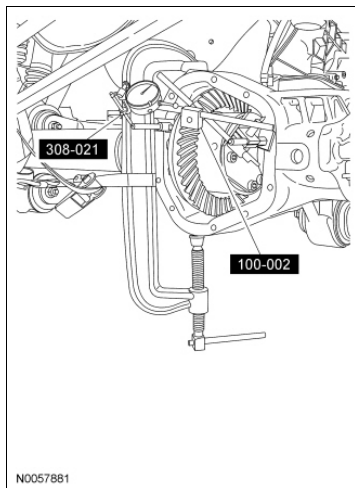
NOTE: Install the C-clamp at the 12 o'clock and 6 o'clock positions to allow the horizontal spread of the housing.

NOTE: Use a safety strap to keep the C-clamp from rotating.

NOTE: Use a C-clamp with a minimum 15-in opening and a 16,250 pound load limit.

Using a C-clamp with the Dial Indicator Gauge with Holding Fixture and Clutch Housing Gauge, spread the differential housing 0.38 mm (0.015 in) and install the differential carrier in the following sequence.

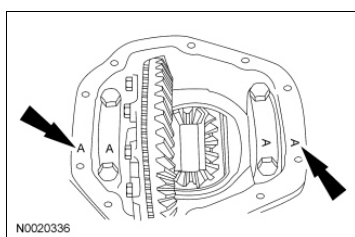
1. Remove the Dial Indicator Gauge and Clutch Housing Gauge after measuring the housing spread.
2. Using a soft-faced hammer, seat the differential into the differential housing.
 - ◆ Remove the C-clamp after seating the differential in the differential housing.



32. **NOTE:** Match the positioning of the mating letters on the bearing caps and the differential housing.

Install the 2 bearing caps and 4 bolts.

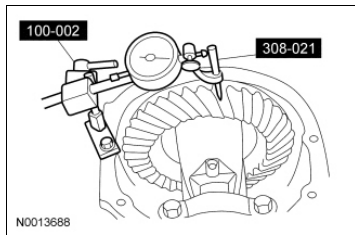
- Tighten to 108 Nm (80 lb-ft).



33. Using the Dial Indicator Gauge with Holding Fixture and Clutch Housing Gauge, measure backlash at 3 equally spaced points.

- The backlash must be within the specifications and cannot vary more than 0.05 mm (0.002 in) between points checked. A backlash variation or more than 0.05 mm (0.002 in) indicates gear/case runout.
- Make the necessary corrections by moving shims from one side of the differential case to the other, until the correct backlash adjustment is achieved.

- Correct for high backlash by moving the ring gear toward the pinion.
- Correct for low backlash by moving the ring gear away from the pinion.

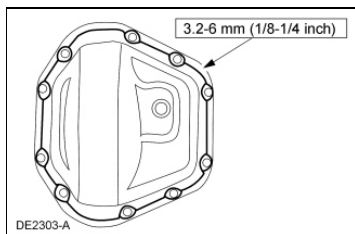


34. Check the gear tooth contact pattern. For additional information, refer to [Section 205-00](#).

35. **NOTE:** Clean the differential housing cover mounting surfaces with a suitable solvent to remove all traces of oil film or foreign material.

NOTE: Install the differential housing cover within 15 minutes of applying the silicone material.

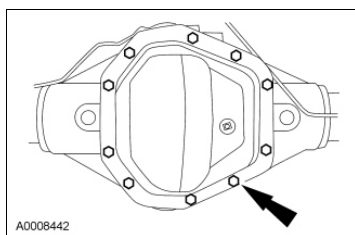
Apply the specified bead of silicone rubber sealer as shown.



36. **NOTE:** Place 2 cover bolts into the differential housing cover at the 2 o'clock and 8 o'clock positions. This will help to position the differential housing cover onto the differential housing.

Install the differential housing cover and the 10 differential cover bolts.

- Tighten to 61 Nm (45 lb-ft).



37. Position the driveshaft in the front axle flange. Install the 4 new flange bolts.

- Tighten to 35 Nm (26 lb-ft).

38. Install the axle shafts and seals. For additional information, refer to [Axle Shaft Seal](#) in this section.

39. **NOTE:** If possible, allow one hour curing time before filling the axle with lubricant.

Fill the axle with the specified type and quantity of lubricant.

40. **NOTICE:** Make sure that the nut retainer cap is correctly positioned to allow for cotter pin installation. Do not tighten or loosen the nut to align the retainer cap with the cotter pin hole. Overtightening of the fasteners may result in premature failure of steering linkage components.

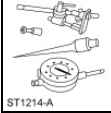





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Position the RH tie-rod and drag link. Install the tie-rod nut, retainer cap and new cotter pin.

- Tighten to 115 Nm (85 lb-ft).
-

Differential Case

Special Tool(s)

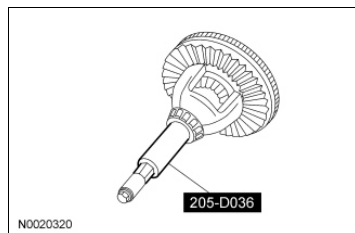
 ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C) or equivalent
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A)
 ST1357-A	Installer, Differential Carrier Bearing 205-D044 (D81T-4221-A) or equivalent
 ST1347-A	Puller, Drive Pinion/Differential Carrier 205-D036 (D81L-4220-A) or equivalent
 ST1548-A	Set, Dummy Bearing 205-D047 (D81T-4222-DR) or equivalent
 ST1655-A	Step Plate 205-D012 (D80L-630-7) or equivalent

Material

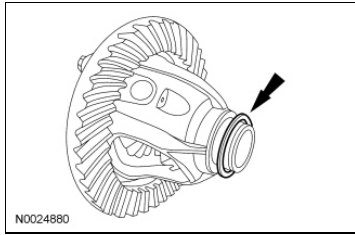
Item	Specification
Motorcraft® SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL (US); CXY-80W90-1L (Canada)	WSP-M2C197-A

Disassembly

1. Remove the differential carrier. For additional information, refer to Differential Carrier -- Dana 60 in this section.
2. Using the Drive Pinion/Differential Carrier Puller, remove the differential bearings.



3. Remove the differential bearing shims.

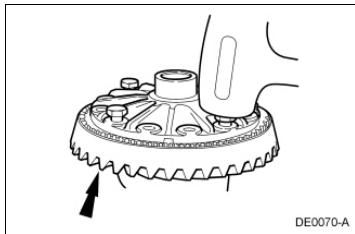


4. **NOTICE:** Place shop towels under the ring gear to prevent ring gear damage.

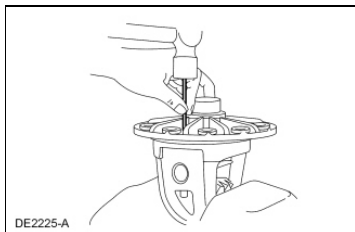
NOTE: Discard the bolts after removing them from the differential case.

Remove the ring gear.

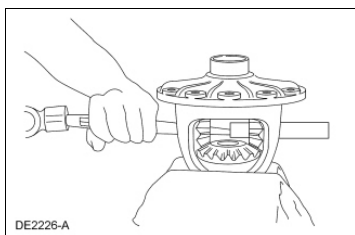
- Remove and discard 8 of the 12 ring gear bolts. Leave 4 loosely assembled bolts spaced equally apart from each other.
- Tap each of the 4 bolt heads alternately with a soft-faced hammer to loosen the ring gear. Remove the bolts and the ring gear. Discard the bolts.



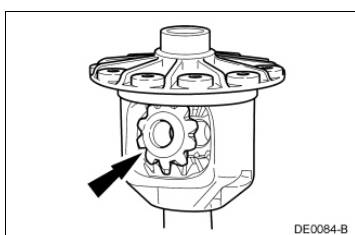
5. Using a hammer and a small drift, drive out the differential pinion shaft lockpin.



6. Using a suitable tool, remove the differential pinion shaft.



7. Remove the differential pinion gears, pinion gear thrust washers, differential side gears and differential side gear thrust washers.



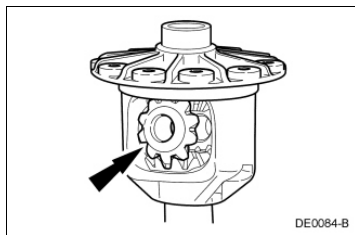
8. **NOTE:** If upon inspection, any component has score marks/chips, thoroughly clean the differential housing.

Carry out the following inspection.

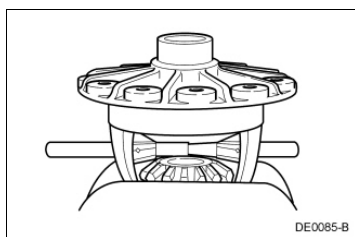
- Thoroughly clean all parts.
- Inspect all parts for damage or discoloration from overheating.
 - ◆ Discard the complete differential if excessive wear is visible on all parts.
 - ◆ Discard both differential pinion gears and both differential side gears if any one of these gears are worn/damaged.
- Verify that the differential bearing bores are smooth. Remove any nicks/burrs from the mounting surfaces of the differential housing.

Assembly

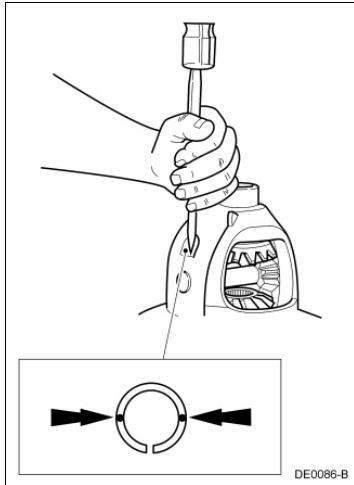
1. Place the differential case into a vise with soft jaws.
2. Lubricate all components with axle lubricant.
 - The differential side gear thrust washers.
 - The differential side gear hubs and thrust faces.
 - The differential pinion thrust washers.
 - The differential pinion gears.
 - ◆ Assemble the gears and their respective washers.
3. Lubricate the gears with axle lubricant, then install them into the differential case.
 - Install and hold the differential side gears and thrust washers in the differential case. Then, install the differential pinion gears and thrust washers and rotate them until the pinion shaft bore in the case and gears align.
 - ◆ If hand rotation of the gears is not possible, install an axle shaft into the differential side gear and turn the shaft with a pipe wrench.
 - ◆ If necessary, use a drift to align the pinion shaft bores.



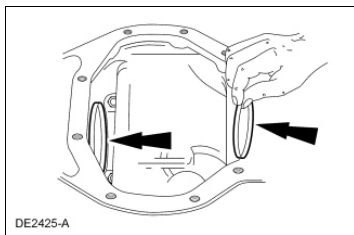
4. Install the differential pinion shaft, aligning the lockpin bore in the differential case and the pinion shaft.



5. Install the differential pinion shaft lockpin.
 - Peen the differential case metal over the lockpin, in 2 places, 90 degrees from the slot in the lockpin.



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

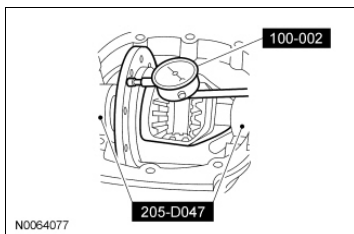


7. **NOTE:** The rear axle uses a combination of differential bearing shims and selective outboard spacers to control differential case end play. The old outboard spacers provide a good starting point when setting end play. However, if additional shimming is necessary, beyond what the hardened differential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

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

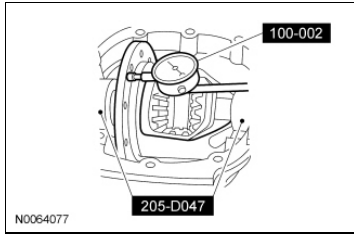
Place the Dummy Bearing Set on the differential case hubs and position the assembly into the differential housing.

- Position the remaining Dial Indicator Gauge with Holding Fixture.

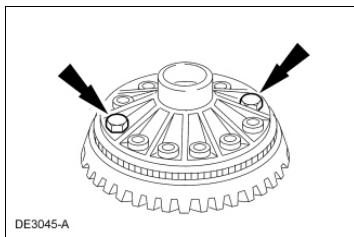


8. **NOTE:** Repeat this and the following step until the same readings appear on the Dial Indicator Gauge each time. This is the total differential bearing shim thickness necessary, less preload. The final calculation occurs later during assembly.

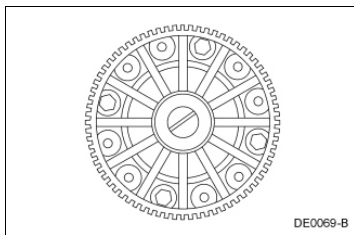
Force the differential case as far as possible toward the Dial Indicator Gauge. With force applied, set the Dial Indicator Gauge at 0. Force the differential case as far as it will go in the opposite direction. Record the total differential case end play reading.



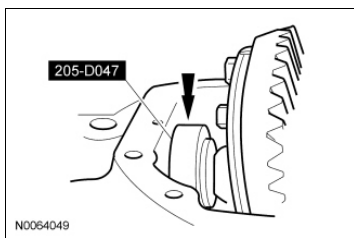
9. After making sure the reading is repeatable, remove the differential case from the differential housing. Do not remove the Dummy Bearing Set from the differential case at this time.
10. Start 2 new bolts through the differential case flange and into the differential ring gear to make sure the differential ring gear and the differential case align.



11. Install the remaining 10 new ring gear bolts and draw up the new ring gear bolts alternately and evenly.
 - Tighten to 215 Nm (158 lb-ft).



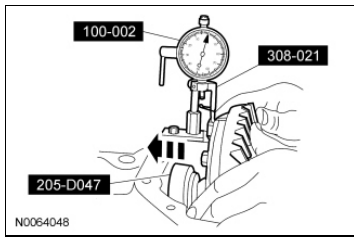
12. Position the differential case with the Dummy Bearing Set into the differential housing.



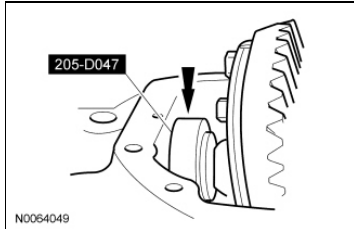
13. **NOTE:** Repeat this step until there is a consistent reading.

Using the Dummy Bearing Set, Dial Indicator Gauge with Holding Fixture and Clutch Housing Gauge, determine the total thickness of differential bearing shims to install under the differential bearing on the ring gear side of the differential case. Record this measurement, as the shim thickness required for the ring gear side of the differential case.

- Force the ring gear away from the pinion and zero the Dial Indicator Gauge.
- Force the ring gear into mesh with the pinion.
 - ◆ Rock the ring gear to allow the teeth of the gears to mesh.
- Record the reading.



14. Remove the differential case with the Dummy Bearing Set from the differential housing.



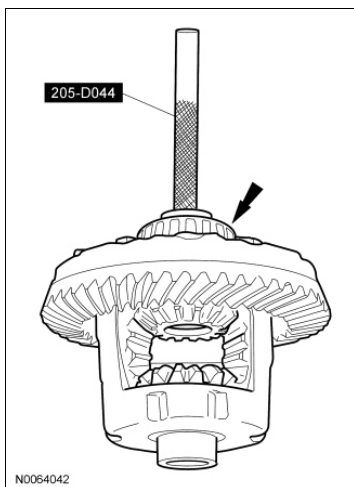
15. Place the required thickness of differential bearing shims on the ring gear side of the differential case. Refer to the measurement recorded, as the shim thickness required for the ring gear side of the differential case. Differential bearing shims are available in the thickness shown in the following chart.

- For example, a reading of 1.14 mm (0.045 in), requires that 1.14 mm (0.045 in) shims be placed on the ring gear side of the differential case.

Available Differential Bearing Shims

mm	Inch
0.076	0.003
0.127	0.005
0.254	0.010
0.762	0.030

16. Using the Differential Carrier Bearing Installer, install the selected differential bearing shim and the differential bearing.



17. Determine the total thickness of differential bearing shims to install under the differential bearing on

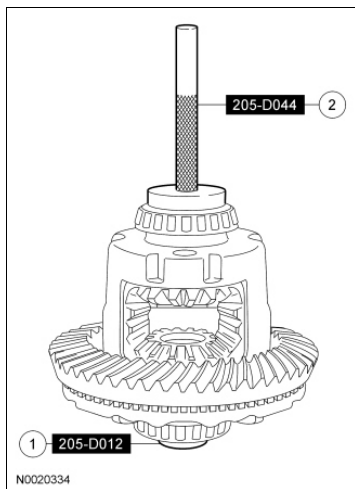
the drive pinion side of the differential case.

- Subtract the measurement recorded, as the shim thickness required for the ring gear side of the differential case, from the total case end play measurement taken at the beginning of the assembly procedure. Then, add 0.38 mm (0.015 in) to the total. This is the total amount of differential bearing shims to install under the differential bearing on the drive pinion side of the differential case.

18. Place the amount of differential bearing shims, as determined by the calculation made in the previous step, on the drive pinion side of the differential case.

19. Using the Step Plate and Differential Carrier Bearing Installer, install the selected differential bearing shim and the differential bearing on the drive pinion side of the case.

1. Place the Step Plate under the bearing to protect it during the bearing installation.
2. Using the Differential Carrier Bearing Installer, install the bearing.



20. Install the differential carrier. For additional information, refer to [Differential Carrier -- Dana 60](#) in this section.

Material

Item	Specification	Fill Capacity
High Performance DOT 3 Motor Vehicle Brake Fluid PM-1-C (US); CPM-1-C (Canada)	WSS-M6C62-A or WSS-M6C65-A1	1700-2025 ml (3.59-4.27 pt) ^a
Metal Brake Parts Cleaner PM-4-A or PM-4-B (US); CPM-4 (Canada)	--	--
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	--

^a Actual brake fluid capacity will vary depending on vehicle wheelbase and optional equipment.

General Specifications

Item	Specification
Brake Disc	
F-250 and F-350	
Front brake disc minimum thickness	36.4 mm (1.433 in)
Rear brake disc minimum thickness	32.4 mm (1.275 in)
F-450 and F-550	
Front brake disc minimum thickness	37.4 mm (1.472 in)
Rear brake disc minimum thickness	37.4 mm (1.472 in)
Brake Pads	
Brake pad maximum taper wear (in any direction)	3.0 mm (0.118 in)
Brake pad minimum thickness	3.0 mm (0.118 in)
Parking Brake	
Parking brake maximum brake diameter (F-350 and F-450)	243.2 mm (9.574 in)
Parking brake maximum drum diameter (F-250 and F-350)	207.2 mm (8.157 in)

Torque Specifications

Description	Nm	lb-ft	lb-in
Caliper bleeder screw	15	--	133