

Differential Carrier Assembly Description

The Conventional Rear Differential Carrier for this vehicle consists of the following components:

- Differential Case
- Differential Carrier
- Differential Pinion gear shaft
- Differential Pinion gear shaft lock pin
- Differential Pinion gears
- Differential Pinion gear thrust washers
- Differential Pinion side gears

A open differential has a set of four gears. Two are side gears and two are pinion gears. Some differentials have more than two pinion gears. Each side gear is splined to an axle shaft so each axle shaft ; so each axle shaft turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear being bolted to the differential case, rotates the case, The differential pinion, as it rotates the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears rotate the axle shafts. If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could be solidly attached to the ring gear and both driving wheels would turn at equal speed. However, if it became necessary to turn a corner, the tires would scuff and slide because the differential allows the axle shafts to rotate at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the out wheel and slows it's rear axle side gear (as the shaft is splined to the side gear). the rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear wheel faster.

Limited Slip Differential Description and Operation

Limited Slip Differential

The locking differential consists of the following components:

- Differential case
- Pinion gear shaft
- Differential pinion gear shaft lock pin
- Limited Slip Differential Clutch Disc Splined (Friction material on disc and splines on the inside of disc)
- Limited Slip Differential Clutch Disc Eared (Disc without friction material and ears to the outside of the disc)
- Differential side gears
- Differential clutch disc thrust washer
- Differential pinion gears
- Differential pinion gear thrust washers

In a conventional differential, if one wheel spins, the opposite wheel will generate only as much torque as the wheel with the least amount of traction. In a limited slip differential, part of the ring gear torque is transmitted through clutch packs which contain multiple discs. In operation, two forces engage the limited slip differential's clutches. The first is the pre-load force within the clutch packs. The second is the separating forces generated by the side gears as torque is applied through the ring gear. The limited slip design provides the action needed for turning corners and for driving in a straight line when traction is uneven. When one wheel loses traction, the clutch packs transfer additional torque to the wheel having the most traction. Limited slip differential resist wheel spin on bumpy roads and provides greater pulling power when one wheel loses traction. If both wheels slip due to unequal traction, limited slip operation is normal. Also in extreme case of unequal traction, the wheel with the least amount of traction may spin.

Differential Cooler (250 mm Axle)

The 250 mm axle differential cooler is designed to reduce the temperature of the rear differential fluid. This is achieved by the transmission pumping transmission fluid through the differential cooler located in the rear of the differential housing.

The transmission oil cooling system includes an integrated rear differential cooler. There are two transmission oil coolers in series in the ZL1 transmission oil cooler system. The initial transmission oil cooler is a heat exchanger located in the lower end tank of the radiator. The transmission oil temperature is partially regulated by the temperature of the coolant leaving the radiator and passing over the heat exchanger.

Pipes and hoses from the transmission bring oil pumped at a high pressure through the rear differential cooler and back to the radiator end tank cooler. The oil out of the radiator end tank cooler is plumbed into an air-to-oil cooler in front of the air conditioning condenser and radiator. This cooler helps provide additional cooling for performance driving conditions for the ZL1 transmission and rear differential. The transmission oil is then directed back to the transmission.

Symptoms - Rear Drive Axle

Review the system and operation in order to familiarize yourself with the system functions. Refer to [Differential Carrier Assembly Description](#) or [Limited Slip Differential Description and Operation](#).

Rear Axle Noise

The proper diagnosis is an important part of rear axle repair. In axle work, one of the most difficult conditions to diagnose is noise. Locating a broken axle shaft or broken differential gear presents little or no problems, but locating and isolating axle noise can be an entirely different matter.

Any gear driven unit, especially an automotive drive axle where the engine torque multiplication occurs at a 90 degree turn in the driveline, produces a certain amount of noise. Therefore, an interpretation must be made for each vehicle in order to determine where the noise is normal or if a problem actually exists. A certain amount of noise must be expected and cannot be eliminated by conventional repairs or adjustment.

Normal axle noise can be described as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, the noise tends to reach a peak at speeds from 60 –100 km/h (40–60 mph) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way indicative of trouble in the axle assembly.

Driveline noises may confuse even the best technician. Vehicle noises coming from tires, transmission, propeller shaft, universal joints, and front or rear wheel bearings are often mistaken for axle noise.

Visual/Physical Inspection

- Inspect the system for loose or missing fasteners.
- Inspect the system for leaking components.
- Inspect the system for obvious damage or conditions which may cause the symptom.

Symptom List

Refer to a system diagnostic procedure from the following list in order to diagnose the symptom:

- Rear Drive Axle Noises
- Noisy in Drive
- Noisy When Coasting
- Intermittent Noise
- Constant Noise
- Noisy on Turns

Noisy in Drive

Noisy in Drive

Cause	Correction
DEFINITION: A noise heard during acceleration load. Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Level Inspection.	
Worn clutch disc and/or pressure plate assembly, if equipped	Repair or replace as required. Refer to Clutch Noisy.
Transmission noise	Repair or replace as required.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Wrong or poor grade oil	Drain and fill the system with the proper lubricant. Refer to Differential Oil Replacement.
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to Fastener Tightening Specifications.
Worn propeller shaft constant velocity joint or coupler, if applicable.	Replace the propeller shaft assembly. Refer to Propeller Shaft Replacement. A worn propeller shaft constant velocity joint or coupler may create a clicking, grinding, or snapping type noise.
Worn or loose center bearing assembly, if applicable	Replace the center bearing assembly as required. A worn center bearing may cause vehicle vibration or a grinding, squealing type of noise. Refer to Propeller Shaft Replacement .
Worn pinion bearings	Replace the pinion bearings. Refer to Differential Drive Pinion Gear Bearing Replacement.
Loose pinion bearings	Adjust the pinion bearings preload. Refer to Pinion Depth Adjustment.
Excessive pinion end play	Adjust the pinion end play. Refer to Pinion Depth Adjustment.
Worn differential bearings	Replace the differential bearings. Refer to Differential Bearing Replacement.
Loose differential bearings	Adjust the differential bearing preload. Refer to Differential Carrier Bearing Preload Adjustment.
Excessive ring gear runout	Replace the pinion and the ring gear set. Refer to Drive Pinion and Ring Gear Replacement.

Noisy When Coasting

Noisy When Coasting

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving. Inspect for proper gear oil levels prior to performing system diagnosis.	
Loose propeller shaft mounting bolts	Tighten the bolts as required.
Worn Propeller shaft constant velocity joint, if applicable	Replace the propeller shaft assembly. A worn propeller shaft constant velocity joint may create a clicking, grinding, or snapping type of noise.
Worn or loose center bearing assembly, if applicable	Replace as required. A worn center bearing assembly may cause vehicle vibration or a grinding or squealing type of noise.
Worn universal joints, if applicable	Replace as required. A worn universal joint may create a clicking or a snapping type of noise.
Worn axle shaft constant velocity joints, if applicable	Replace or repair the constant velocity joints as required. A worn axle shaft constant velocity joint may create a clicking, grinding, or snapping type of noise.
Transfer Case or PTU noise	Refer to Transfer Case or PTU Diagnosis.
Worn or damaged axle mounting bushings, if applicable	Check the bushing position and replace the bushings as required. A worn bushing may create a clunk type of noise during acceleration or deceleration or wrong orientation.
Loose mounting bracket, if applicable	Tighten the bracket bolts as required.
Loose or damaged shield, if applicable	Repair or replace as required. A loose shield may contact the propeller shaft assembly and create a scraping or grinding type of noise.
Bearing noise within axle assembly	Repair or replace as required. A grinding or roar type of noise will increase or decrease relative to vehicle speed.
Gear set whine noise within axle assembly created by incorrect gear backlash	Adjust the backlash, if applicable. Repair or replace as required. A whine type of noise will increase or decrease relative to vehicle speed.

[2014 Holden VF Sedan](#) | [VF/WN - Sedan, Ute, Sportwagon, Caprice, Lumina, HSV Service Manual 5617662](#) | [Driveline/Axle](#) | [Rear Drive Axle](#) | [Diagnostic Information and Procedures](#) | **Document ID: 791944**

Intermittent Noise

Intermittent Noise

Cause	Correction
Important: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Level Inspection .	
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Incorrect gear oil	Replace with the correct gear oil and friction modifier additive. Refer to Adhesives, Fluids, Lubricants, and Sealers .

Constant Noise

Constant Noise

Checks	Action
DEFINITION: A noise heard in the rear axle assembly during all driving conditions. This noise may increase or decrease in volume based on different driving maneuvers and speeds.	
Low gear oil levels	Note: Inspect for the proper gear oil levels prior to performing the rest of the system diagnosis. Refer to Rear Axle Lubricant Level Inspection. Faulty oil seal or other type external leaks may contribute to lower than required fluid levels. Refer to Rear Axle Lubricant Leak Diagnosis.
Worn, loose, or damaged differential mounts or brackets, if applicable.	Repair or replace the differential mounts or brackets, as required.
Flat spot on the pinion or the ring gear teeth	Replace the pinion and ring gear set or differential assembly, as required.
Worn pinion splines, if applicable	Replace the pinion or differential assembly, as required.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to Rear Axle Lubricant Replacement.
Bearing noise within the differential assembly	Repair or replace the differential assembly as required. A grinding or roar type noise will increase or decrease relative to the vehicle speed.
Gear set whine noise within the differential assembly	Repair or replace the differential assembly as required. A whine type noise will increase or decrease relative to the vehicle speed, approximately 80–96 km/h (50–60 mph). Typical causes of a gear set whine type noise may include incorrect backlash and/or pinion depth adjustment or worn or scored gear set teeth.
Excessive or incorrect pinion to ring gear backlash	Adjust the pinion to ring gear backlash, if applicable, otherwise repair or replace the differential assembly as required.
Loose pinion bearings	Adjust the pinion bearings preload, if applicable, otherwise repair or replace the differential assembly as required.
Excessive pinion end play	Adjust the pinion end play, if applicable, otherwise repair or replace the differential assembly as required.
Incorrect differential bearing preload	Adjust the differential bearing preload, if applicable, otherwise repair or replace the differential assembly as required.
Worn pinion bearings	© 2014 General Motors. All rights reserved.

Checks	Action
	Replace the pinion bearings or differential assembly, as required.
Worn differential bearings	Replace the differential bearings or differential assembly, as required.
Worn pinion and ring gear	Replace the pinion and ring gear set or differential assembly, as required.
Excessive ring gear runout	Replace the pinion and ring gear set or differential assembly, as required.
Worn propeller shaft constant velocity or universal joints	Replace the universal joints or propeller shaft assembly, as required.
Bent axle housing, if applicable	Replace the axle housing. Refer to Rear Axle Housing Replacement.
Worn axle shaft dowel holes, if applicable	Replace the axle shaft.
Worn wheel hub studs	Replace the wheel studs, as required. Refer to Wheel Stud Replacement.
Bent axle shaft, if applicable	Replace the axle shaft, as required.
Worn bearing in the torque tube assembly, if applicable	Replace the torque tube assembly.

Noisy on Turns

Noisy on Turns

Checks	Action
DEFINITION: A noise is present only when the vehicle turns. Note: - Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Level Inspection. - Operate the vehicle turning in tight circles in both left and right directions. A moan, groan, chatter, or a pulsing type concern may indicate an incorrect type gear oil, lack of the friction modifier additive, pump problems, or worn friction discs and/or plates within the axle assembly.	
Worn, damaged, or loose axle mount, bushing, or bracket, if applicable	Repair or replace, as required.
Worn, damaged, or loose torque tube bracket or bushing, if applicable	Repair or replace, as required.
Worn axle shaft constant velocity joints, if applicable	Replace the constant velocity joints, as required.
Worn wheel bearings	Replace the wheel bearings, as required.
Worn axle shaft splines	Replace the axle shaft or wheel drive shaft, as required. Refer to Rear Axle Shaft Replacement or Rear Wheel Drive Shaft Replacement.
Worn clutch plates, if applicable	Replace the friction discs/plates and drum, as required.
Worn differential side gears, pinion gears, thrust washers and/or pinion shaft, if applicable	Replace gears, washers, and/or shaft, as required.
Incorrect gear oil. Installation of the incorrect type gear oil may create a "moan" type noise within 7 770–25 900 km (3–10,000 miles). Fluid that is "black" in color is to be considered normal and is darkened by the carbon material in the clutch plates, if applicable.	Replace with correct gear oil, and friction modifier additive, if applicable. Adding friction modifier to the existing fluid without draining will not correct this condition. Refer to Sealers, Adhesives, and Lubricants and Rear Axle Lubricant Replacement . Fluid replacement may not correct a "moan" condition caused by the use of incorrect oil. Refer to Differential Overhaul or Differential Replacement .

Differential Oil Leak Diagnosis

Rear axle lubricant leaks can occur at the following locations:

- Axle tube to differential carrier housing joint
- Axle shaft oil seal
- Axle housing porosity
- Differential housing cover gasket
- Drain plug
- Fill plug
- Pinion yoke oil seal
- Vent tube

Determining the Cause

While most rear axle leaks may be easy to find, determining the cause may not be. A thorough inspection of the area around the leak may assist in determining the cause of the leak.

Oil Seals

Lubricant leaks from a oil seal may be caused by any of the following:

- An improperly installed seal
- A distorted seal
- A worn seal
- A worn shaft
- A brittle seal lip
- A hardened seal lip

To determine the actual cause of the leak, clean the area around the leak. Observe the area of the leak and determine if the seal or another component is causing the leak. A worn seal surface will cause a leak at the sealing lip while a misaligned seal or a seal installed into a housing with an excessive bore will cause the seal to leak at the outside surface of the seal. Hardened or cracked seal lips usually indicate the axle is operating beyond the normal temperature limits for the axle. A seal whose sealing surface has been nicked or cut may indicate that the shaft has a rough, burred, or gouged surface and will need to be inspected before the seal can be replaced.

Gaskets

A leak at a gasket is usually caused by a poor fit of the components on each side of the gasket surface. Inspect each component for distortion and for nicks or gouges that may prohibit the gasket from sealing properly.

Rear Axle Housing

Rear axle housing lubricant leaks usually occur at the following locations:

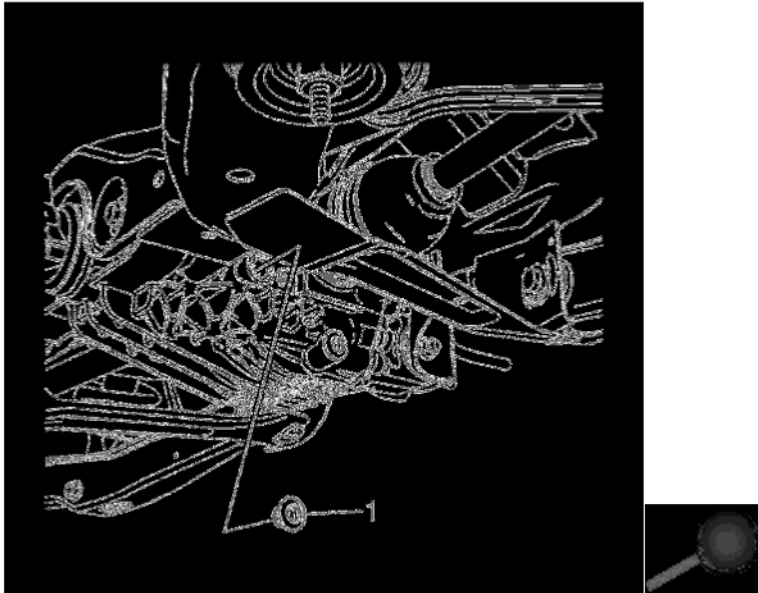
- Drain Plug
- Fill Plug

Drain and fill plug leaks are usually caused by a loose plug. These leaks can be repaired by either tightening the plug or by using an approved sealer on the threads on the plug.

Other leaks such as axle tube to differential carrier housing or porosity leaks require the replacement of the rear axle housing.

Rear Axle Lubricant Level Inspection

Inspection Procedure

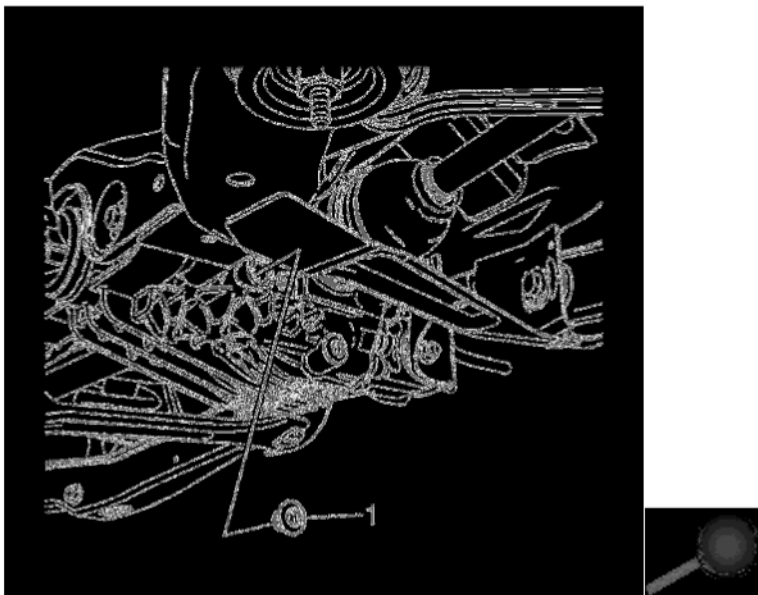


1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
 2. Clean any dirt from around the differential fill plug (1).
 3. Remove the fill plug (1) from the differential.
 4. Check the differential fluid level, it should be even with the bottom of the fill plug hole to no lower than **6 mm (0.25 in)** below the opening.
 5. Add new fluid if necessary. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
- Caution:** Refer to [Fastener Caution](#).
6. Install the differential fill plug (1) to the differential and tighten to **33 N•m (24 lb ft)**.
 7. Remove the support and lower the vehicle.

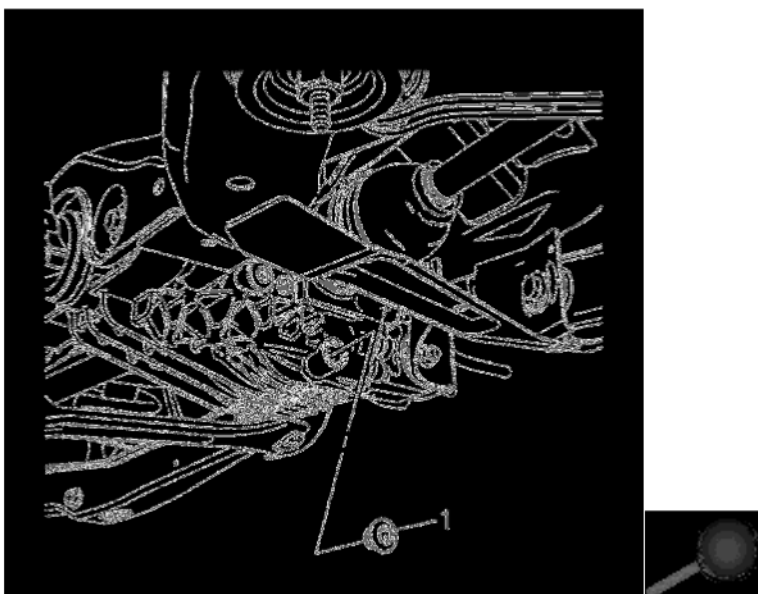
Rear Axle Lubricant Replacement

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#).



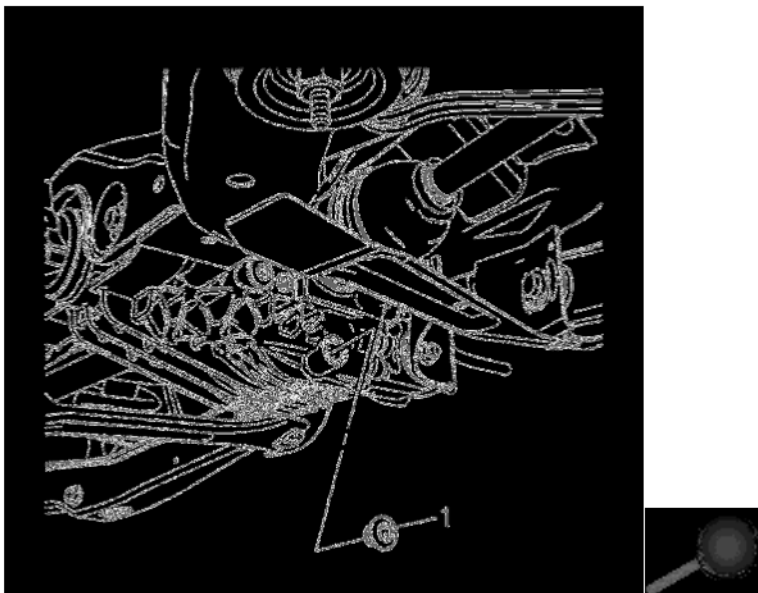
2. Remove the fill plug (1).



Note: Drain into a suitable container.

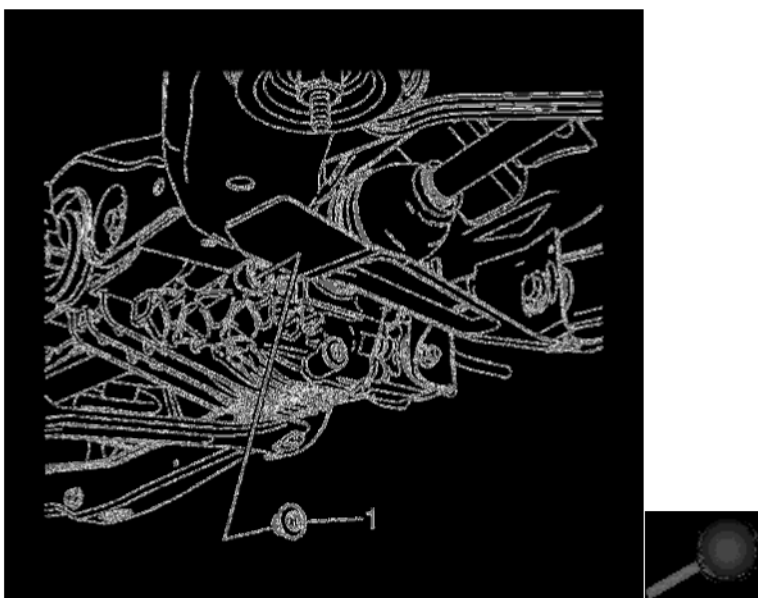
3. Remove the drain plug (1).

Installation Procedure



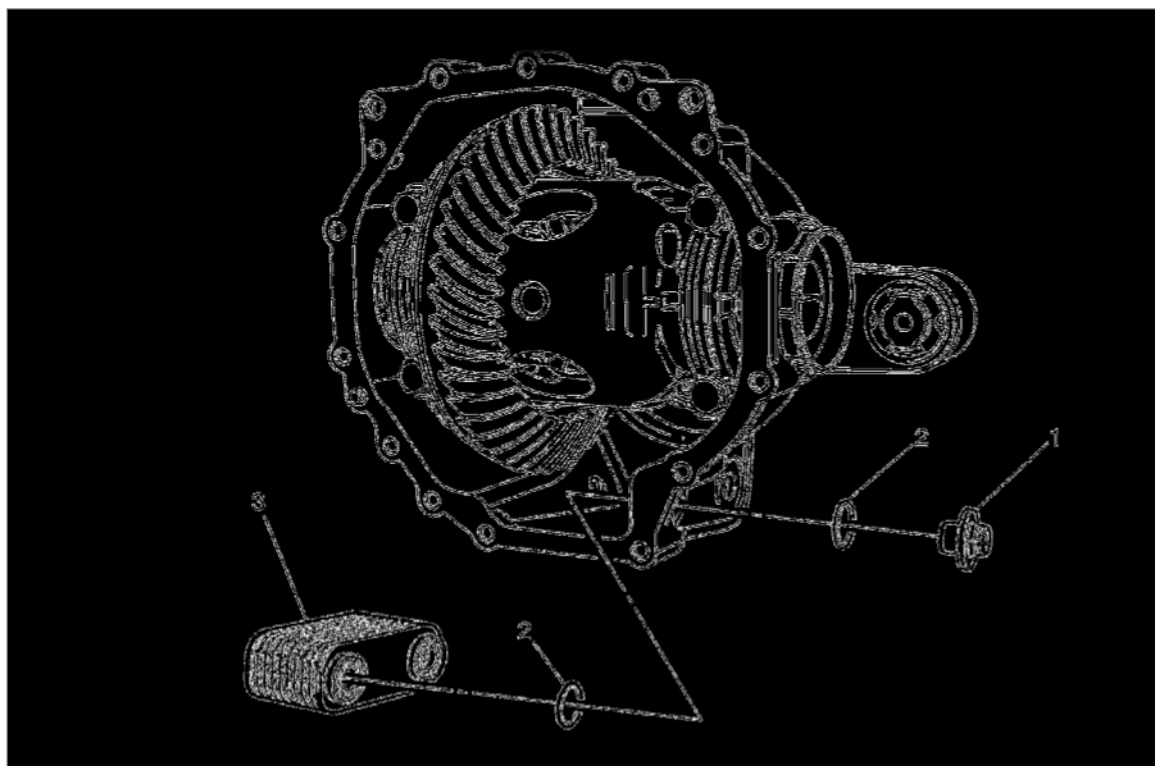
Caution: Refer to [Fastener Caution](#).

1. Install the drain plug (1) and tighten to **33 N•m (24 lb ft)**.
2. Fill the rear differential with the proper fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) and [Lubrication Specifications](#).



3. Install the rear differential fill plug (1) and tighten to **33 N•m (24 lb ft)**.
4. Remove the support and lower the vehicle.

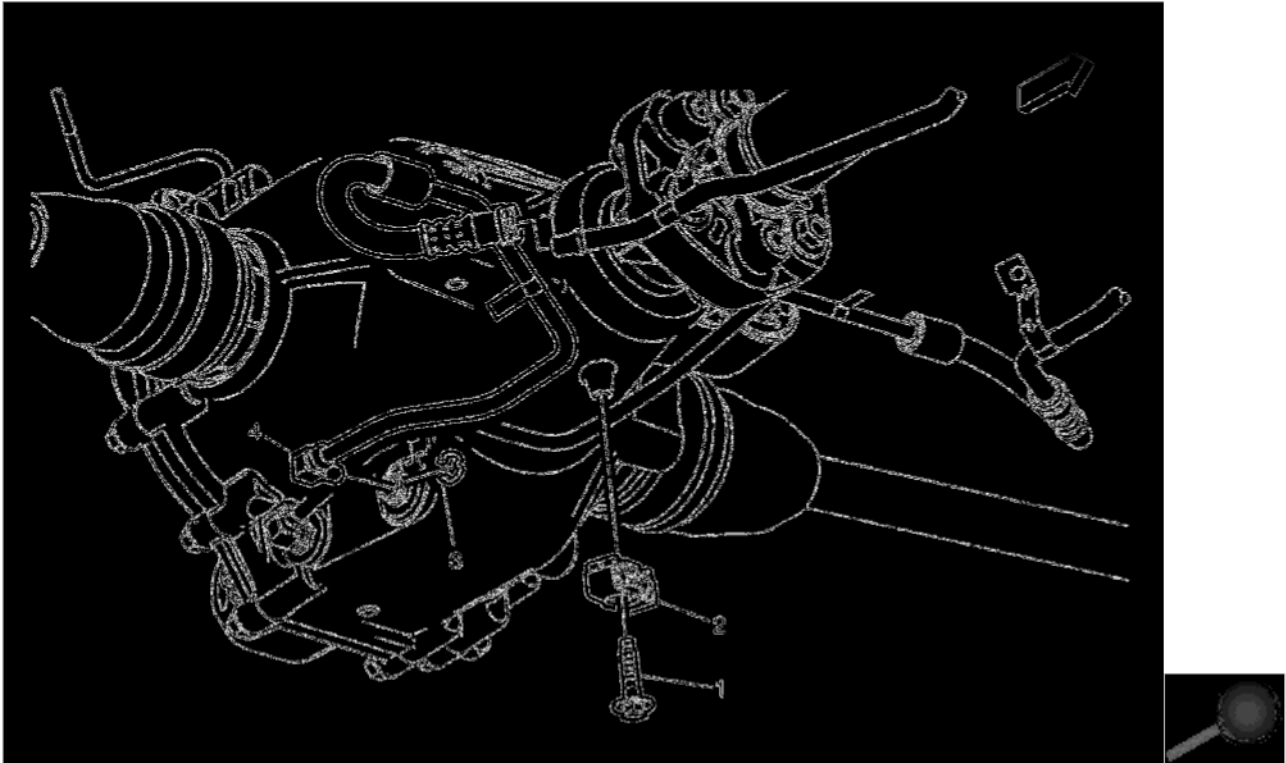
Differential Oil Cooler Replacement



Differential Oil Cooler Replacement

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the rear axle housing cover. Refer to Rear Axle Housing Cover Seal Replacement. 3. Disconnect the differential oil cooler lines. Refer to Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection.	
1	Differential Cooler Line Fittings (2) Caution: Refer to Fastener Caution . Tighten 22 N•m (16 lb ft).
2	Differential Oil Cooler Grommet (4)
3	Differential Oil Cooler Procedure 1. If reinstalling the same cooler, replace all 4 of the differential oil cooler grommet seals.

Differential Oil Cooler Inlet Hose Replacement (LSA)

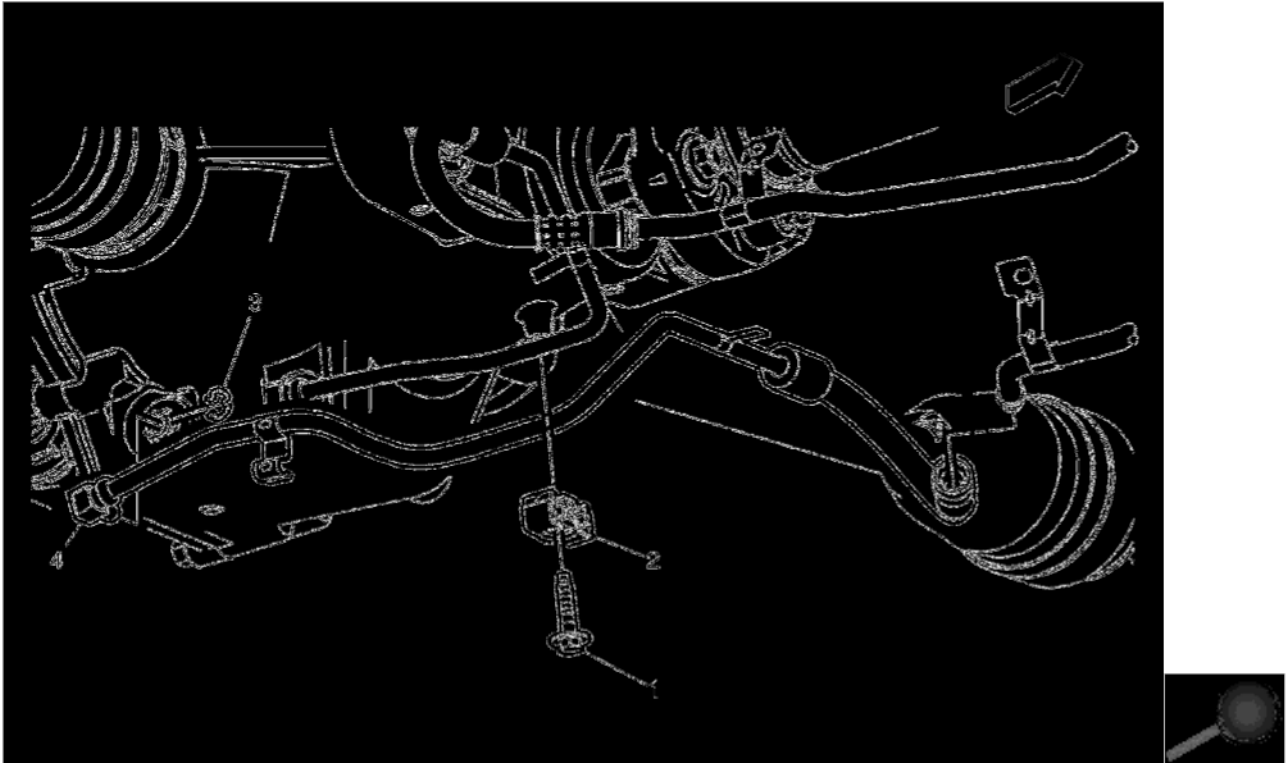


Differential Oil Cooler Inlet Hose Replacement

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Place a drain pan under the differential oil cooler inlet hose. 3. Cap the fittings and plug the holes when removing the differential oil cooler inlet hose.	
1	Differential Oil Cooler Inlet Hose Clip Fastener Caution: Refer to Fastener Caution . Tighten 9 N•m (80 lb in)
2	Differential Oil Cooler Inlet Hose Clip
3	Quick Disconnect Connect Retainer Procedure Disconnect the quick connect fittings from the differential oil cooler inlet hose. Refer to Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection .
4	Differential Oil Cooler Inlet Hose Procedure 1. Check the transmission fluid level and fill the transmission to the proper level. 2. Check transmission hoses and pipes for leaks.

Callout	Component Name
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Differential Oil Cooler Outlet Hose Replacement (LSA)

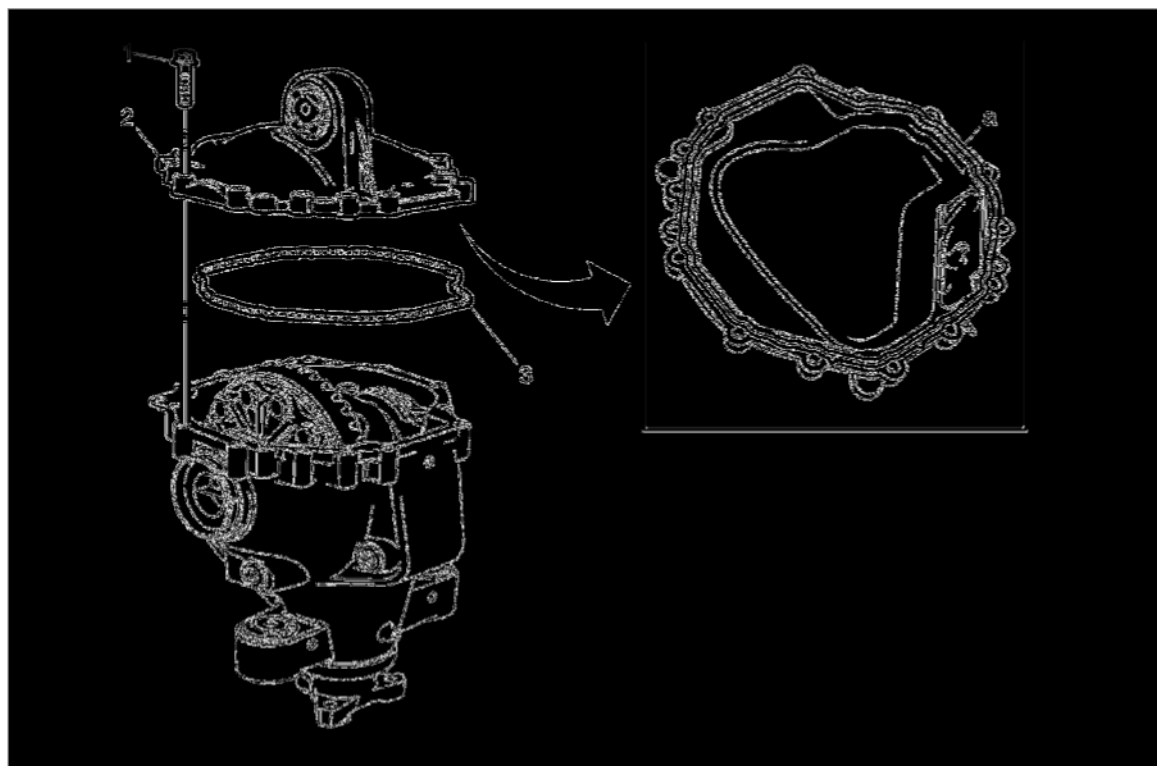


Differential Oil Cooler Outlet Hose Replacement

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Place a drain pan under the differential oil cooler outlet hose. 3. Cap the fittings and plug the holes when removing the differential oil cooler outlet hose.	
1	Differential Oil Cooler Outlet Hose Clip Fastener Caution: Refer to Fastener Caution . Tighten 9 N•m (80 lb in)
2	Differential Oil Cooler Outlet Hose Clip
3	Quick Disconnect Connect Retainer Procedure Disconnect the quick connect fittings from the differential oil cooler outlet hose. Refer to Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection .
4	Differential Oil Cooler Outlet Hose Procedure 1. Check the transmission fluid level and fill the transmission to the proper level. 2. Check transmission hoses and pipes for leaks.

Callout	Component Name
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Rear Axle Housing Cover Seal Replacement (250 mm)



Rear Axle Housing Cover Seal Replacement

Callout	Component Name
Preliminary Procedure Remove the rear differential assembly. Refer to Differential Replacement .	
1	Rear Differential Cover Bolt (Qty: 14) Caution: Refer to Fastener Caution . Tighten 55 N•m (41 lb ft)
2	Rear Differential Cover
3	Rear Differential Gasket Procedure 1. Ensure that the gasket is properly seated in the groove (a) for the proper sealing of the rear axle cover. 2. Fill the rear differential with the proper quantity of fluid. Refer to Lubrication Specifications. 3. Fill the rear differential with the proper fluid. Refer to Adhesives, Fluids, Lubricants, and Sealers.

Rear Axle Housing Cover Seal Replacement (195 and 210 mm)

Special Tools

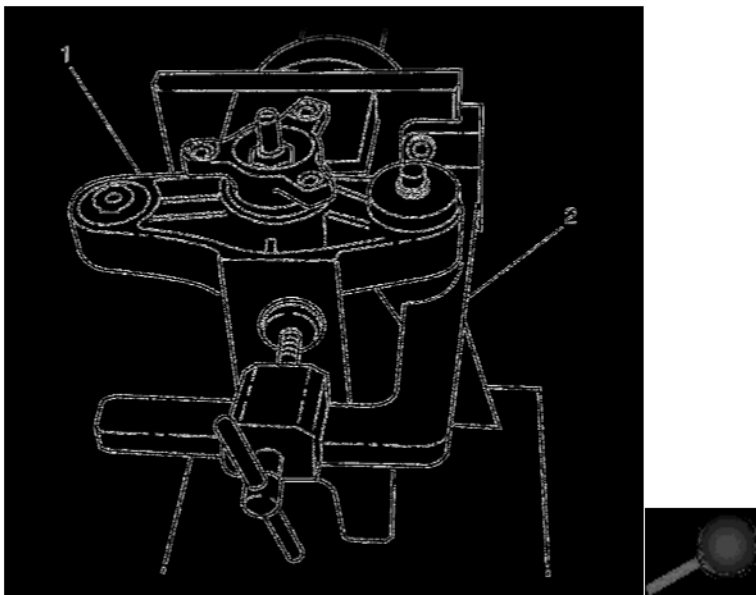
- DT-48722 Seal installer
- DT-48721 Seal installer

Disassemble

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

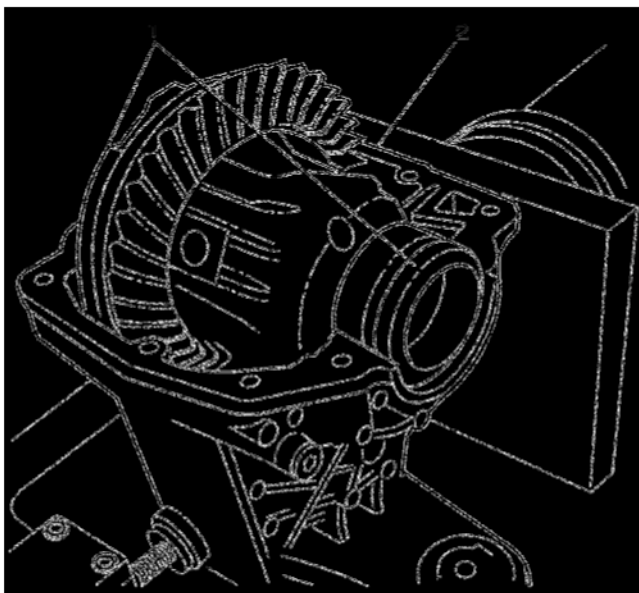
Warning: Refer to [Safety Glasses Warning](#).

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the differential fluid. Refer to the draining procedure in [Rear Axle Lubricant Replacement](#).
3. Remove the differential from the vehicle. Refer to [Differential Replacement](#).

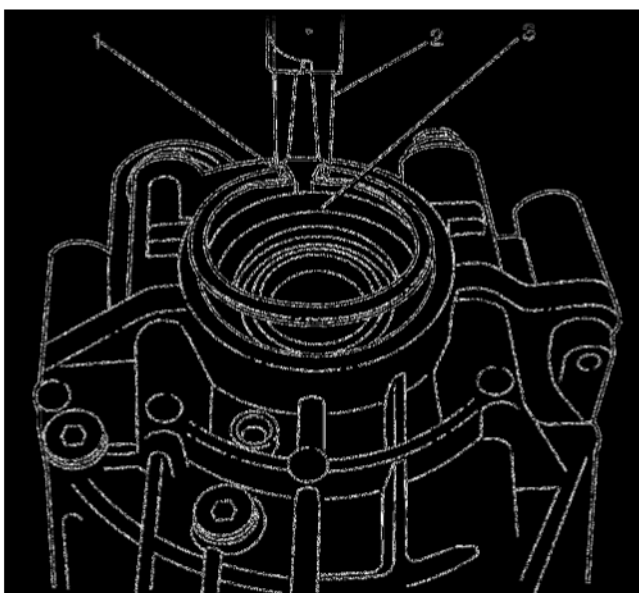


Note: The holding device must be able to rotate.

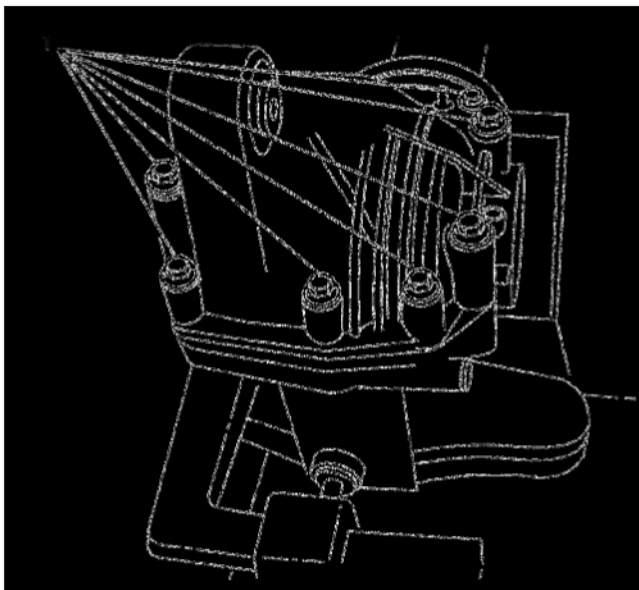
4. Mount the differential assembly (1) to a suitable holding device (2).



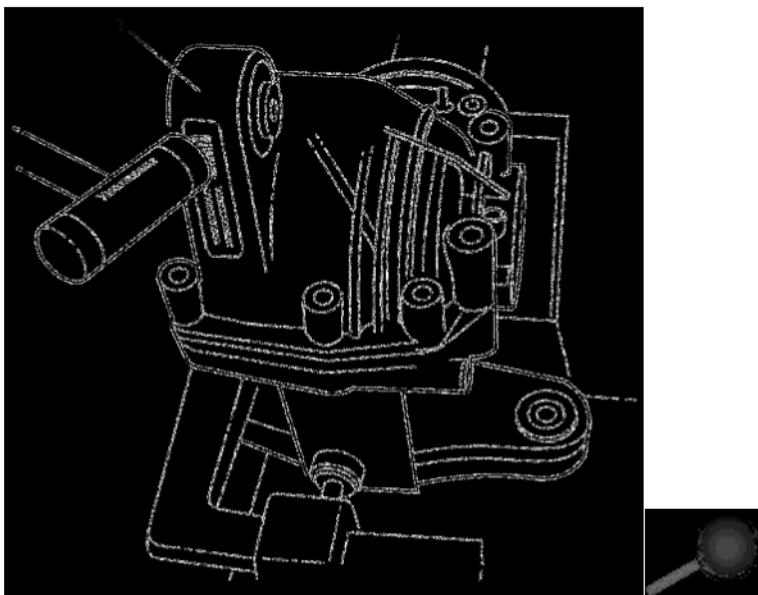
5. Remove the left and right axle shaft seals (1) from the differential (2).
Discard the axle shaft seals.



6. Remove the circlip (1) from the differential (3) with circlip pliers (2).

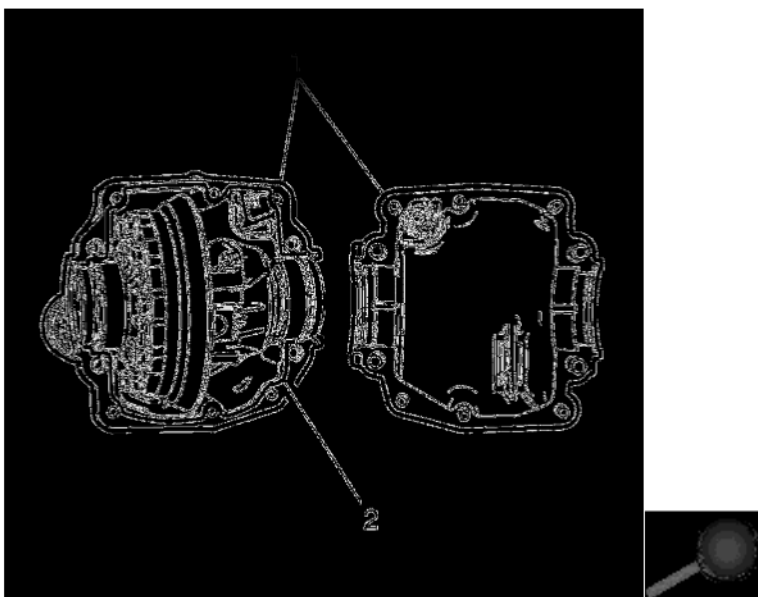


7. Remove the differential housing cover to differential housing retaining bolts (1).



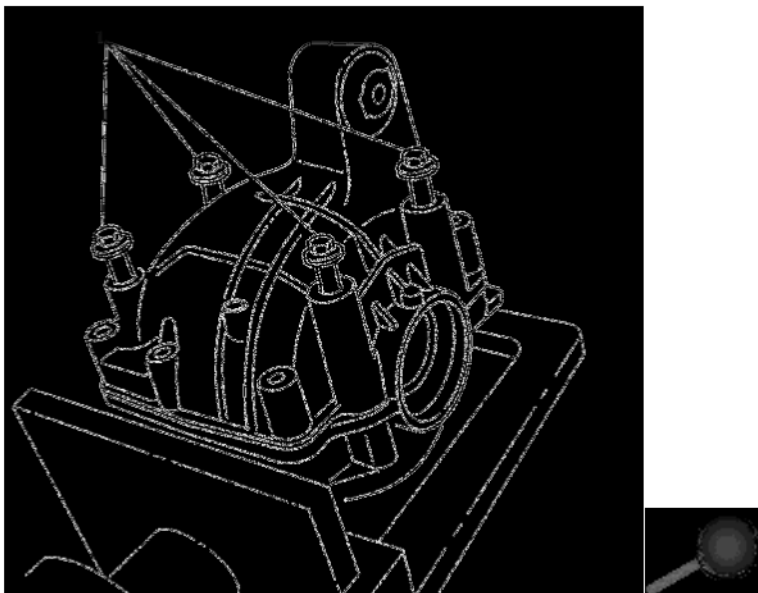
Note: Use a soft-faced hammer to aid in separating the differential housing cover from the rear differential housing (1).

8. Remove the rear differential housing cover (1).



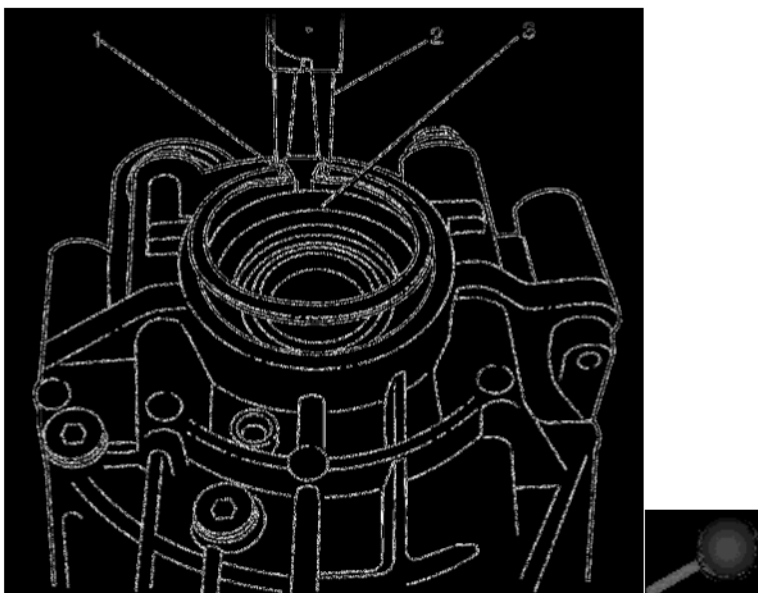
9. Clean mating surfaces of the differential housing and differential housing cover (1) and apply a 1mm bead of sealer (2) as shown.

Reassemble



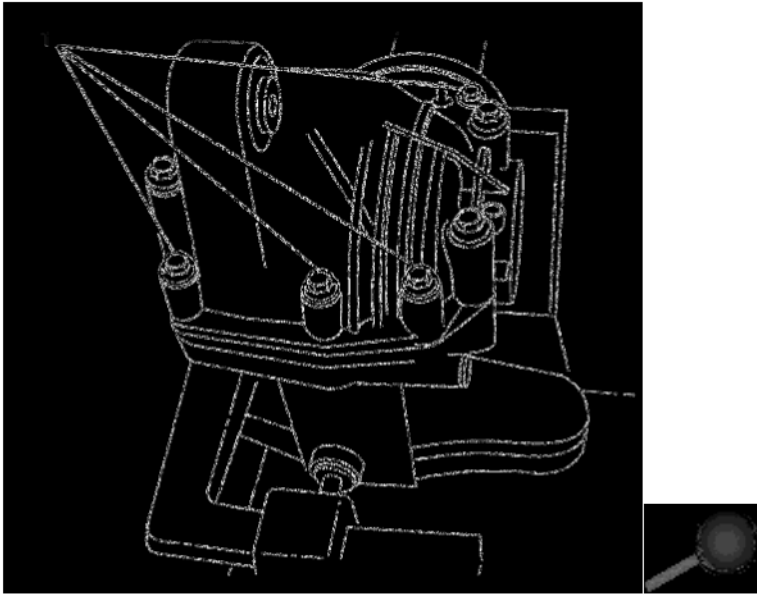
Note: Do not fully tighten the bearing bolts (1) at this stage. The differential has to be able to move freely within the differential housing to allow fitment of the circlip.

1. Position the differential housing cover to the differential housing and retain with the 4 bearing bolts (1).



Note: Align the opening of the circlip (1) with the opening on the differential housing.

2. Install the circlip (1) to the differential (3) with circlip pliers (2).
3. Make sure the circlip (1) is fitted correctly.

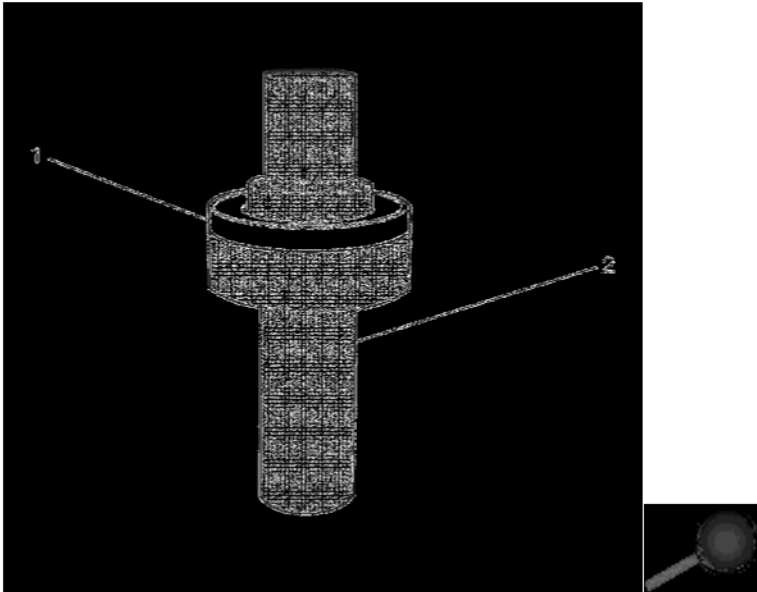


Note: Tighten the differential housing cover to differential housing retaining bolts (1) working diagonally.

4. Install the remaining differential housing cover to differential housing retaining bolts (1).

Tighten

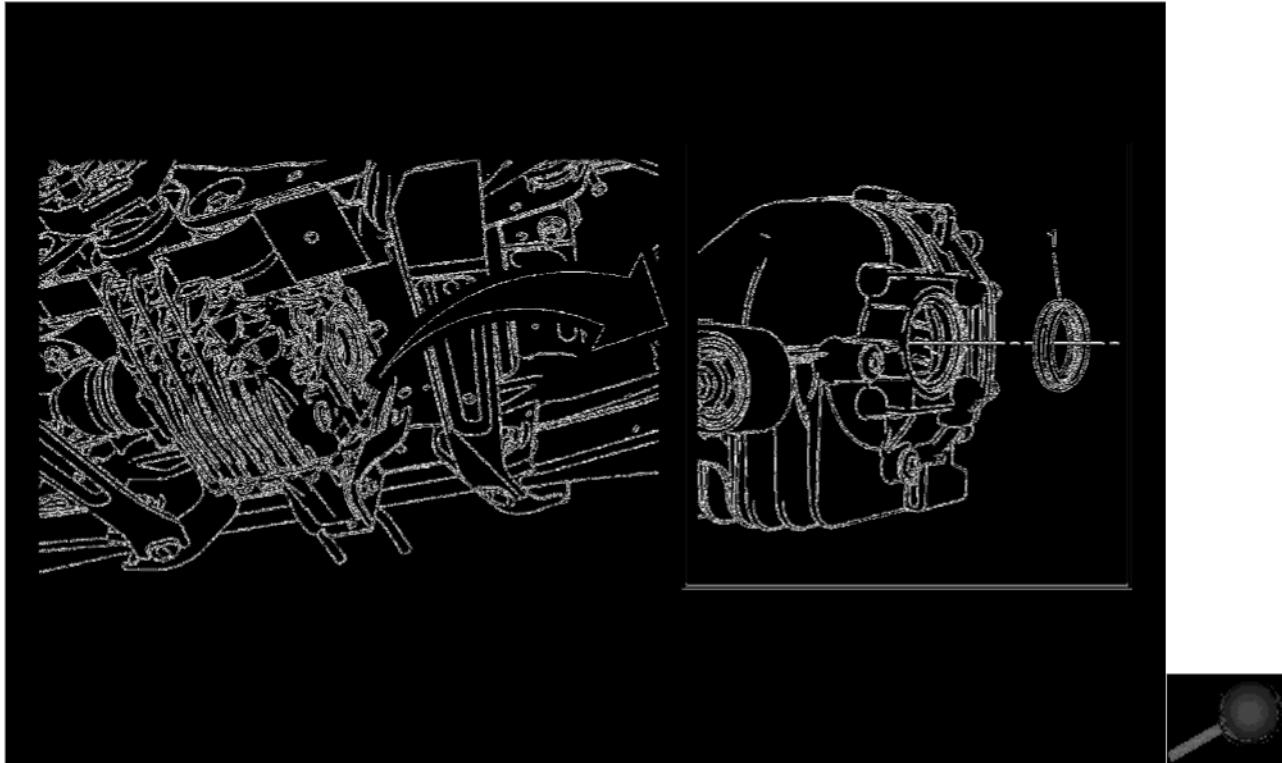
- Tighten the housing bolts to 53 N•m (39 lb ft).
- Tighten the bearing bolts to 153 N•m (112 lb ft).



Note: The left and right axle shaft seals are different sizes for the 195 mm axle.

5. Install New axle seals using DT-51273 (195 mm) left axle seal installer (1) DT-51274 right axle seal installer (195 mm) (2) and J-22388 (210 mm) seal Installer .
6. Install the differential into the vehicle. Refer to [Differential Replacement](#).
7. Fill the differential fluid. Refer to the draining procedure in [Rear Axle Lubricant Replacement](#).
8. Lower the vehicle.

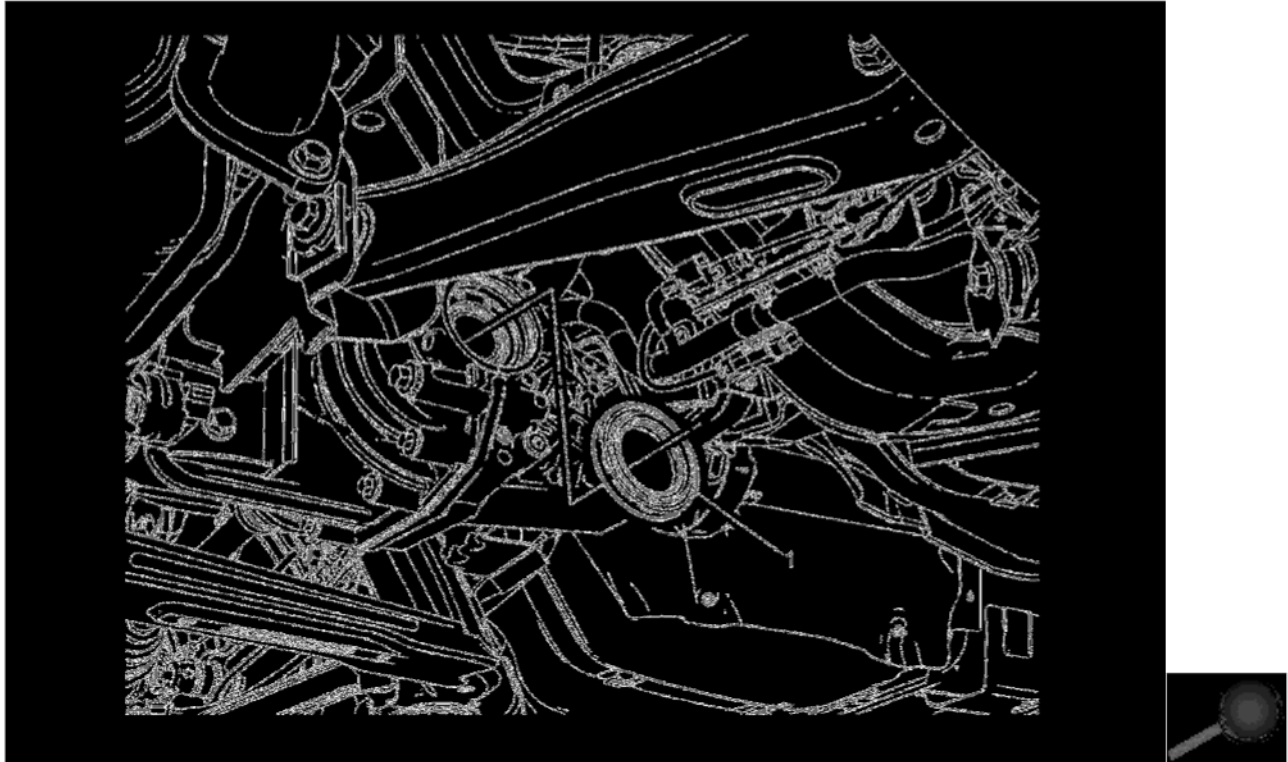
Rear Axle Shaft Seal Replacement (250 mm Axle)



Rear Axle Shaft Seal Replacement - Inner

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the rear wheel drive shaft. Refer to Rear Wheel Drive Shaft Replacement.	
1	Rear Axle Shaft Seal Procedure • Using the appropriate tool, remove the axle shaft seal. • Using the J-38869-A installer, install the rear axle shaft seal. • Check the rear axle fluid level. Refer to Rear Axle Lubricant Level Inspection. Special Tool J-38869-A Seal Installer

Rear Axle Shaft Seal Replacement (195 and 210mm Axle)



Rear Axle Shaft Seal Replacement

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the rear wheel drive shaft. Refer to Rear Wheel Drive Shaft Replacement.	
1	Rear Axle Shaft Seal Procedure 1. Using the appropriate tool, remove the axle shaft seal. 2. Using the <i>DT-51273</i> left axle seal installer or <i>DT-51274</i> right axle seal installer or <i>J-22388</i> axle seal installer, install the rear axle shaft seal. 3. Check the rear axle fluid level. Refer to Rear Axle Lubricant Level Inspection. Special Tools • <i>DT-51273</i> Seal Installer (195 mm) • <i>DT-51274</i> Seal Installer (195 mm) • <i>J-22388</i> Seal Installer (210 mm)

Rear Wheel Drive Shaft Flange Replacement (195mm)

Special Tools

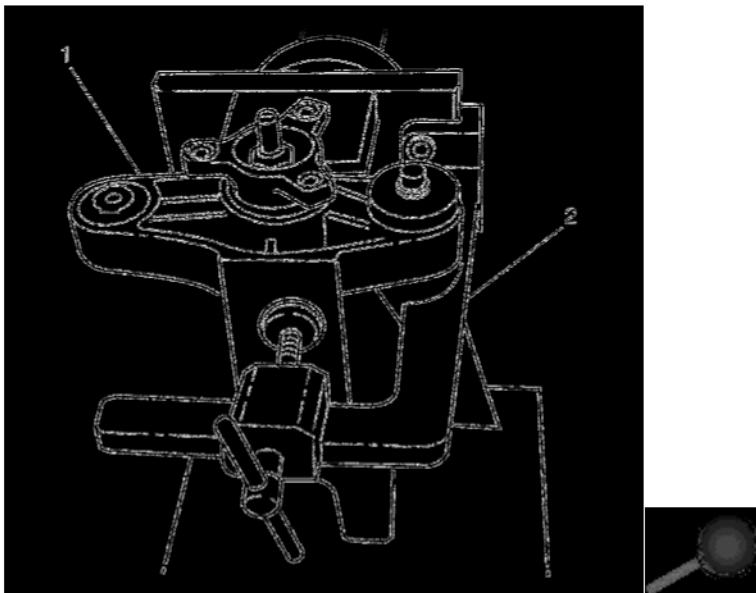
E-308 Seal Remover

Removal Procedure

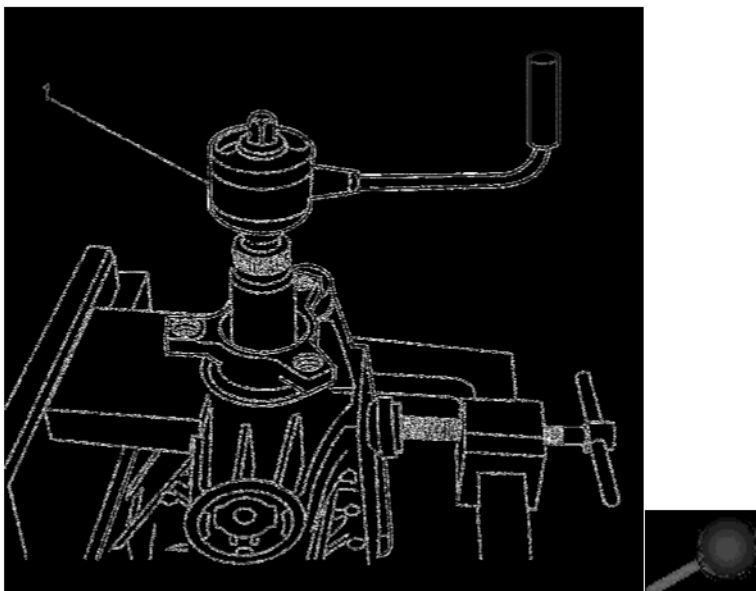
Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the differential fluid. Refer to the draining procedure in [Rear Axle Lubricant Replacement](#).
3. Remove the differential from the vehicle. Refer to [Differential Replacement](#).

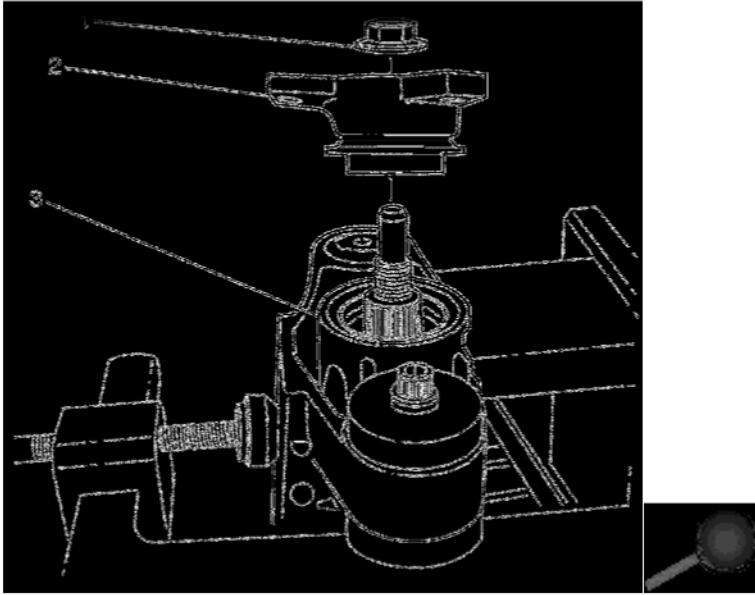


4. Mount the differential assembly (1) to a suitable holding device (2).



Note: It is important the next step is followed. The drag torque readings are required to correctly set the pinion preload on reassembly. Ensure the measuring equipment used has a tight tolerance, i.e. the equipment must be able to maintain an accuracy of 0.1 N•m.

5. Measure and record the pinion drag torque. The measurement must be taken while ensuring a constant rotational speed in a clockwise direction. It is critical that the breakaway torque is not the value used and the average value while the pinion is rotating is used, recorded to 0.1 N•m.
6. Mark the pinion flange nut to the flange. This mark is required for reassembly.



7. Remove the pinion flange nut (1).
8. Mark the flange to the pinion. This is also required for reassembly.
9. Reinstall the pinion flange nut only finger tight.

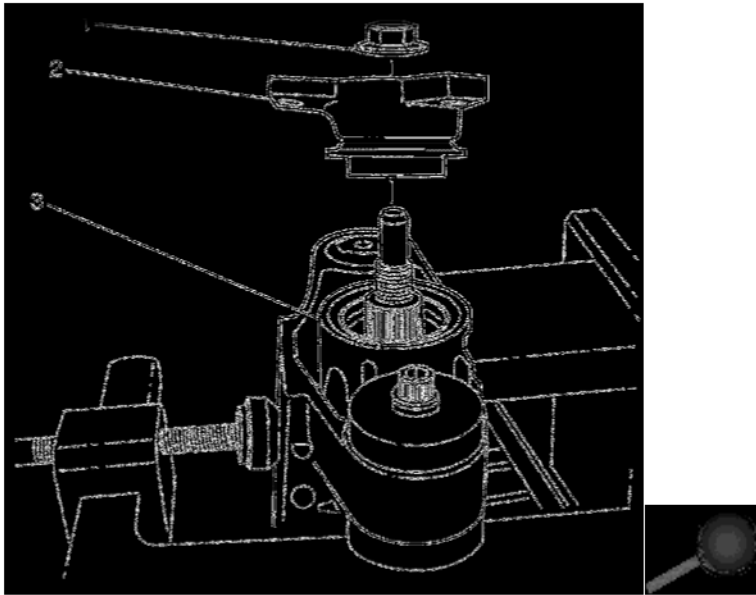
Note: The measurement must be taken while ensuring a CONSTANT rotational speed in a clockwise direction. It is critical that the breakaway torque is NOT the value used and the average value while the pinion IS used, recorded to 0.1 N•m. The equipment used must be able to maintain an accuracy of 0.1 N•m.

10. Measure and record the pinion flange seal drag torque.
11. Remove the pinion flange nut (1).

Note: Be careful not to damage any sealing surfaces when removing the pinion flange. Scores or abrasions will damage the assembly and result in lubricant leakage from this area.

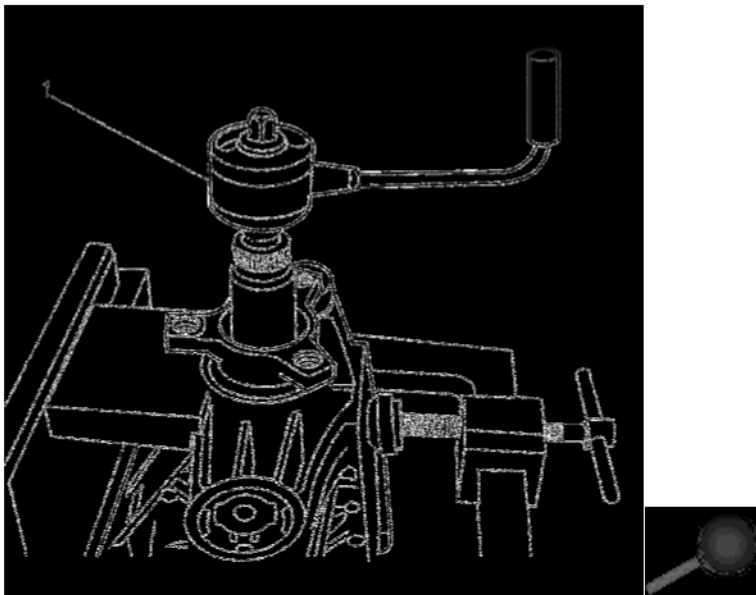
12. Remove the pinion flange (2).

Installation Procedure



Note: Ensure the sealing surface of the pinion flange is free of debris, scoring abrasions or damage.

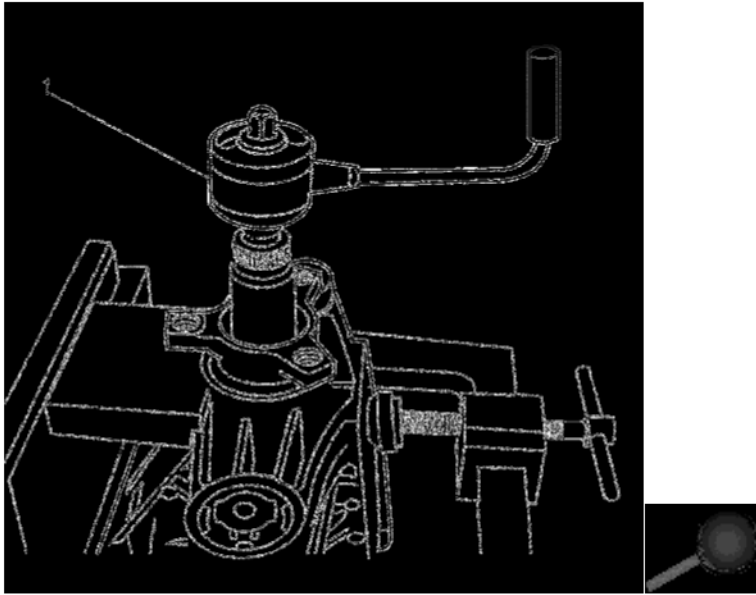
1. Reinstall the pinion flange (2). Ensure that the mark on pinion flange is realigned with the mark on the pinion.
2. Install the pinion flange nut finger tight.



3. Measure and record the new pinion flange seal drag torque. The measurement must be taken while ensuring a CONSTANT rotational speed in a clockwise direction it is critical that the breakaway torque is NOT the value used and the average value while the pinion is rotating is used, recorded to 0.1 N•m. The tool used must be able to maintain an accuracy of 0.1 N•m.

Note: Ensure the pinion flange nut is undamaged, clean and free from any debris including loctite residue.

4. Remove the pinion flange nut (1).
5. Lightly lubricate the contact surface of the pinion flange nut (1). Apply (loctite 2701) to three threads of the pinion flange nut.
6. Install the pinion flange nut to the unit. Tighten the pinion flange nut carefully until the pinion flange has no play. Align the mark on the nut with the mark on the flange.



Note: It's important that the following steps are performed carefully when installing the pinion flange nut. If the new pinion drag torque exceeds the calculated value by greater than 0.2 N·m, a new differential unit will be required, due to damage of the non-serviceable collapsible spacer.

Note: The new pinion drag torque must be calculated using the values recorded during the removal procedure. The new pinion drag torque should equal, X (the original pinion drag torque) $- Y$ (the old pinion flange seal drag torque) $+ Z$ (new pinion flange seal drag torque). The new pinion drag torque = $X - Y + Z$. If the pinion drag torque is below the value recorded during the removal procedure, tighten the pinion flange nut in small steps rechecking the pinion drag torque until the newly calculated pinion drag torque is achieved.

7. Measure the pinion drag torque. The measurement be taken while ensuring a constant rotational speed clockwise direction. It's critical that the breakaway torque is NOT the value used and the average value while the pinion is rotating is used, recorded to 0.1 N·m.

Note: If the new pinion drag torque exceeds the calculated value by 0.2 N·m, a new differential unit must be installed, due to damage to the collapsible spacer.

8. If the pinion drag torque is below the value recorded in step 5 of removal procedure, tighten the pinion flange nut in small steps rechecking the pinion drag torque until the newly calculated pinion drag torque is achieved.
9. Reinstall the differential to the vehicle. Refer to [Differential Replacement](#).
10. Fill the differential fluid. Refer to [Rear Axle Lubricant Replacement](#).
11. Lower the vehicle.

Rear Wheel Drive Shaft Flange Replacement (210 mm and 250 mm)

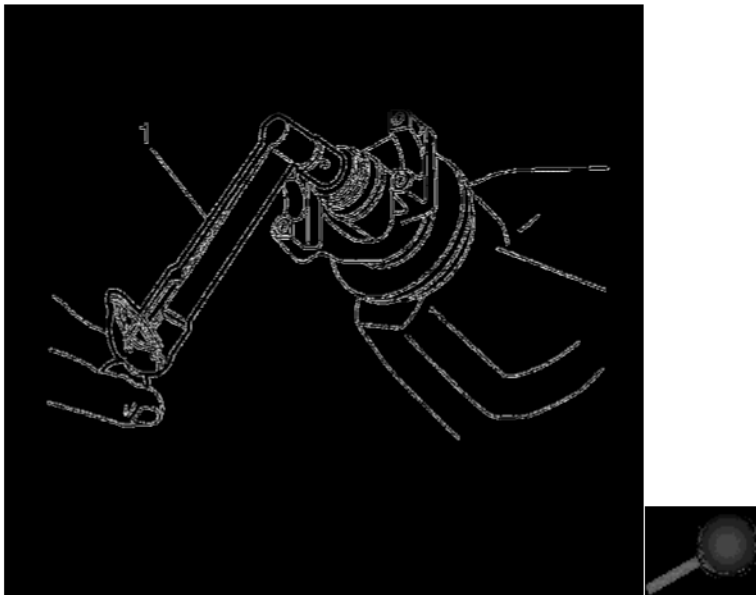
Special Tools

- DT-34826 Axle Pinion Nut Socket
- J-44412 Pinion Bearing Installer
- J-45012 Holding Fixture
- J-45019 Flange and Pinion Cage Remover

For equivalent regional tools, refer to [Special Tools](#).

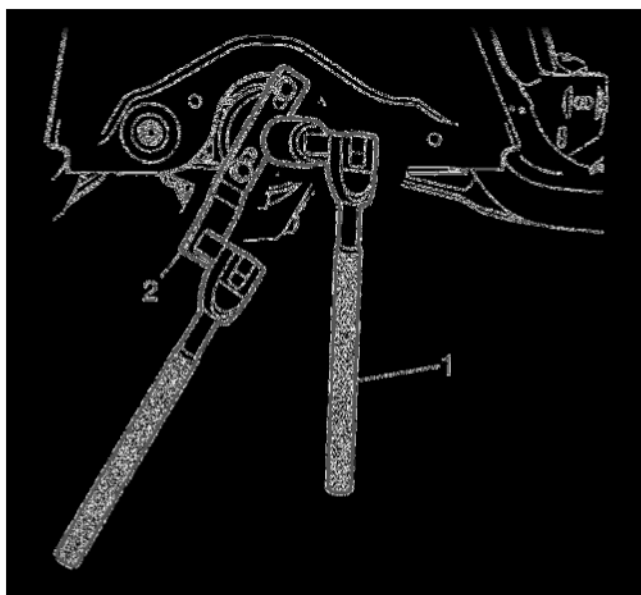
Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the propeller shaft assembly. Refer to [Propeller Shaft Replacement](#).

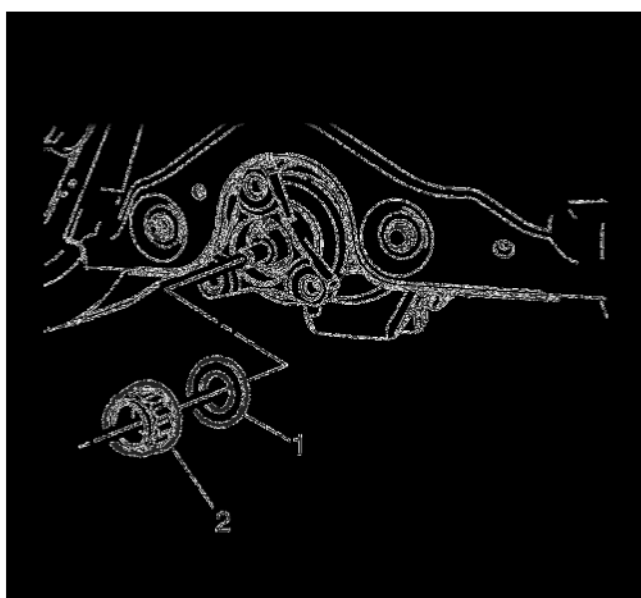


Note: Record this measurement for reassembly.

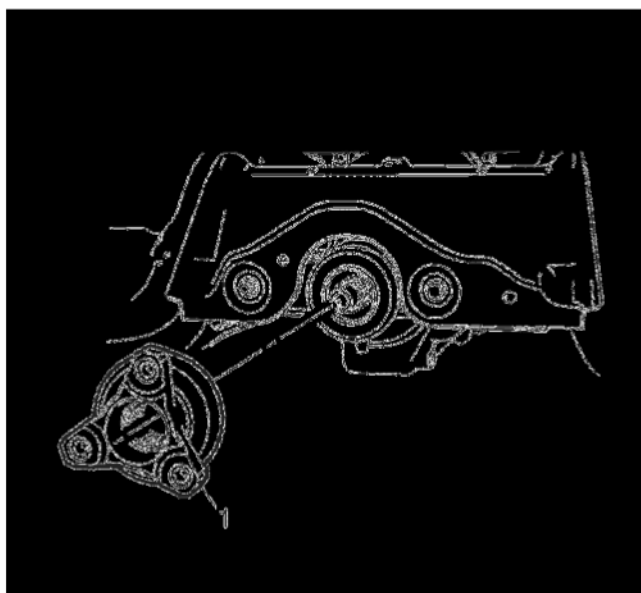
3. Using an inch-pound torque wrench (1) , measure the rotational torque of the differential ring and pinion gear and related components.
4. Using the appropriate tools, remove the stake in the rear wheel drive shaft flange nut.



5. Using the J-45012 fixture with a breaker bar (2), hold the pinion flange.
6. Using the DT-34826 socket and the breaker bar (1), loosen the flange nut.



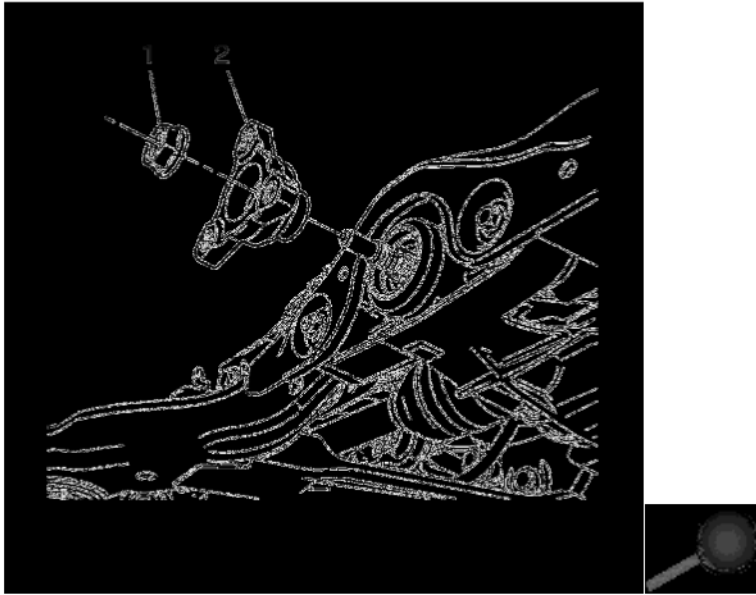
- Note:** DO NOT reuse the pinion nut. Replace with NEW only.
7. Remove and discard the flange nut (2) and the washer (1).



8. Using the J45019 remover, remove the rear wheel drive shaft flange (1).

Installation Procedure

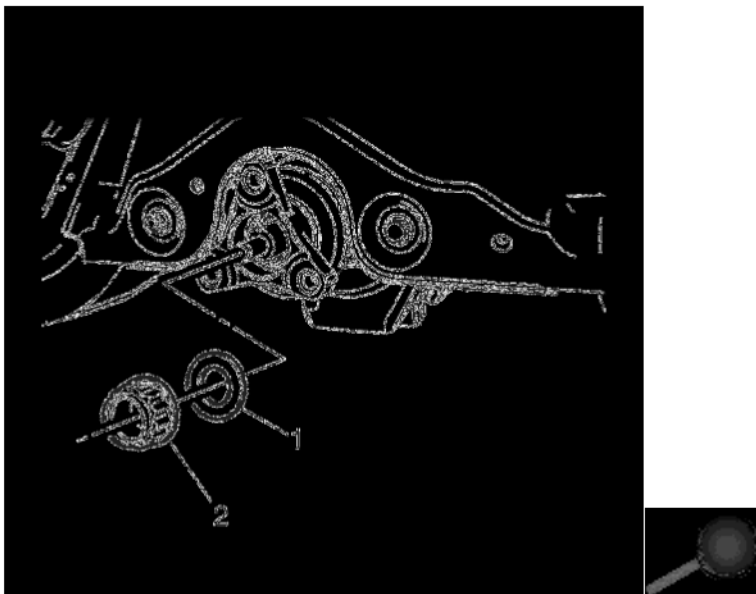
1. Apply a small amount silicone sealant to the splines of the rear wheel drive shaft flange.
Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).



2. Position the drive pinion flange (2) on the drive pinion shaft.

Note: Install the drive pinion flange on the drive pinion shaft so that there 3 to 4 threads showing.

3. Using a brass hammer, tap the drive flange (2) on the drive pinion shaft.
4. Using the J-44412 installer, install the rear wheel drive shaft flange.



Note: Hand start the pinion nut until there are 4 to 5 threads showing.

5. Install the washer (1) and the NEW pinion nut (1).

Note: Rotate the pinion while tightening the pinion nut to seat the bearings.

6. Using the J45012 fixture and DT34826 socket, tighten the drive pinion flange nut until the pinion end play is just taken up.
7. Using an inch-pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading is the same as the rotational torque noted at removal. If the rotational torque during removal could not be recorded, tighten the pinion nut in small increments until a rotating torque of **2.25-3.38 N·m (20-30 lb in)** is achieved .
8. Using a hammer and a punch, stake two sides of the drive pinion nut to the grooves in the drive pinion gear.

9. Check the fluid level of the rear drive axle. Refer to [Rear Axle Lubricant Level Inspection](#).
10. Install the propeller shaft assembly. Refer to [Propeller Shaft Replacement](#).
11. Remove the support and lower the vehicle.

Differential Carrier Insulator Replacement - Right Side Front

Special Tools

EN-592-AU Bushing Remover/Installer

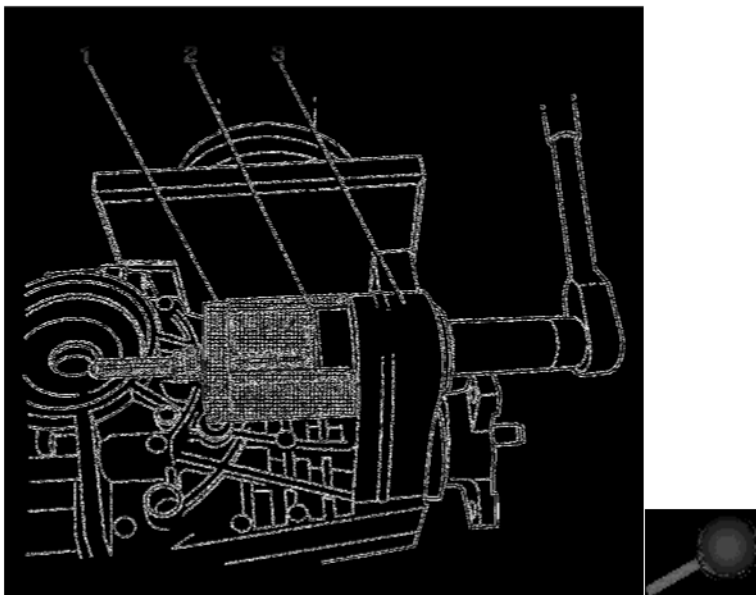
Removal Procedure

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

Note: All three bushings of the differential are different although they appear the same. Make sure that the correct part number is used. Mount orientation is critical for noise and vibration performance.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove both rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
3. Disconnect the propeller shaft and rubber coupling from the differential flange. Refer to [Propeller Shaft Replacement](#).
4. Remove the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
5. Remove both wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
6. Remove the differential assembly. Refer to [Differential Replacement](#).

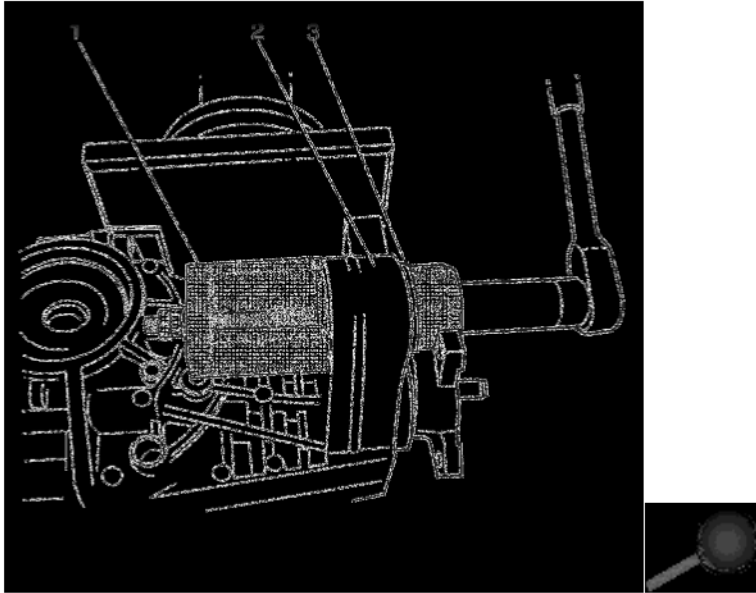


Note: Observe and mark the orientation of the bushing with reference to the original position. This will minimise the potential of incorrect bushing installation.

Note: The right front bushing (2) is a single use part and must be discarded after use.

7. Remove the right front bushing (2) from the differential (3) using EN-592-AU bushing remover/installer (1).
Discard the bushing.

Installation Procedure



Note: Before installing, the right front bushing (3) must be correctly aligned and oriented. Mount orientation is critical for noise and vibration performance.

1. Pull the right front bushing (3) to the differential (2) using *EN-592-AU* bushing remover/installer (1).
2. Pull the right front bushing (3) until it is flush fitted.
3. Install the differential assembly. Refer to [Differential Replacement](#).
4. Connect the propeller shaft and rubber coupling to the differential flange. Refer to [Propeller Shaft Replacement](#).
5. Install the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
6. Install the wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
7. Install the rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
8. Remove the safety stands.
9. Lower the vehicle to the ground.

Differential Carrier Insulator Replacement - Left Side Front

Special Tools

EN-592-AU Bushing Remover/Installer

Removal Procedure

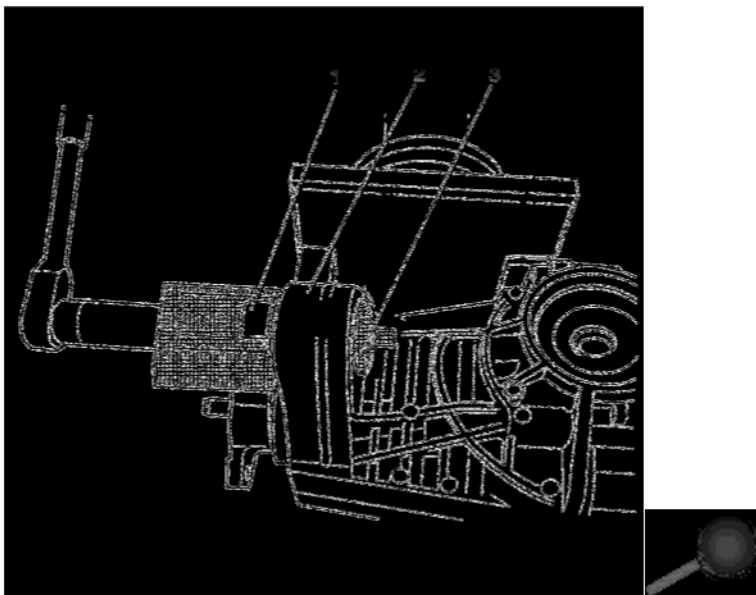
Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

Note: All three bushings of the differential are different although they appear the same. Make sure that the correct part number is used. Mount orientation is critical for noise and vibration performance.

Note: The left differential carrier bushing has to be pressed in the opposite direction to the right due to clearance.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
3. Disconnect the propeller shaft and rubber coupling from the differential flange. Refer to [Propeller Shaft Replacement](#).
4. Remove the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
5. Remove the wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
6. Remove the differential assembly. Refer to [Differential Replacement](#).

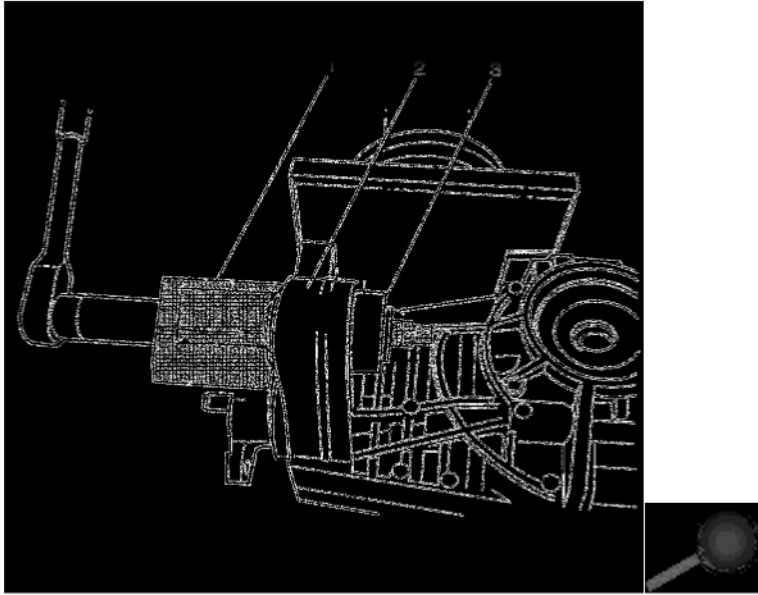


Note: Observe and mark the orientation of the bushing with reference to the original position. This will minimise the potential of incorrect bushing installation.

Note: The left front bushing (1) is a single use part and must be discarded after use.

7. Remove the left front bushing (1) from the differential (2) using EN-592-AU bushing remover/installer (3).
Discard the bushing.

Installation Procedure



Note: Before installing, the bushing must be correctly aligned and oriented. Mount orientation is critical for noise and vibration performance.

1. Pull the left front bushing (3) to the differential (2) using *EN-592-AU* bushing remover/installer (1).
2. Pull the left front bushing (3) until it is flush fitted.
3. Install the differential assembly. Refer to [Differential Replacement](#).
4. Connect the propeller shaft and rubber coupling to the differential flange. Refer to [Propeller Shaft Replacement](#).
5. Install the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
6. Install the wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
7. Install the rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
8. Remove the safety stands.
9. Lower the vehicle to the ground.

Differential Carrier Insulator Replacement - Rear

Special Tools

EN-592-AU Bushing Remover/Installer

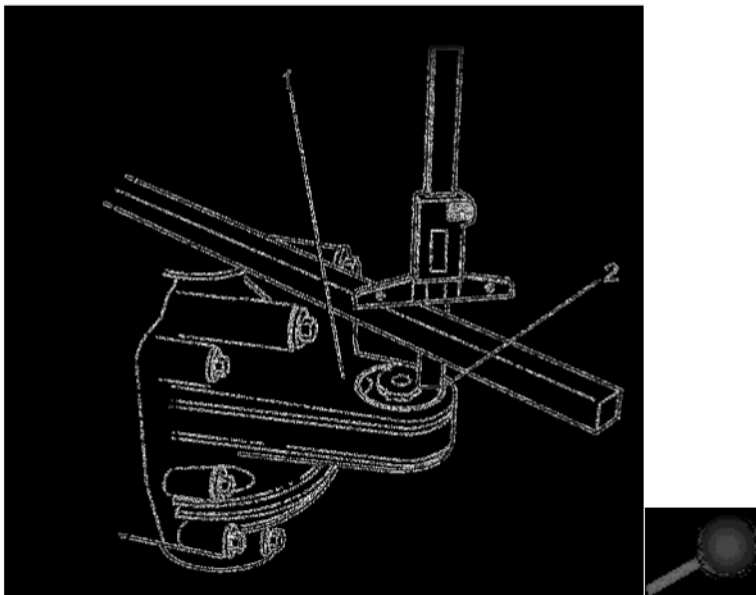
Removal Procedure

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

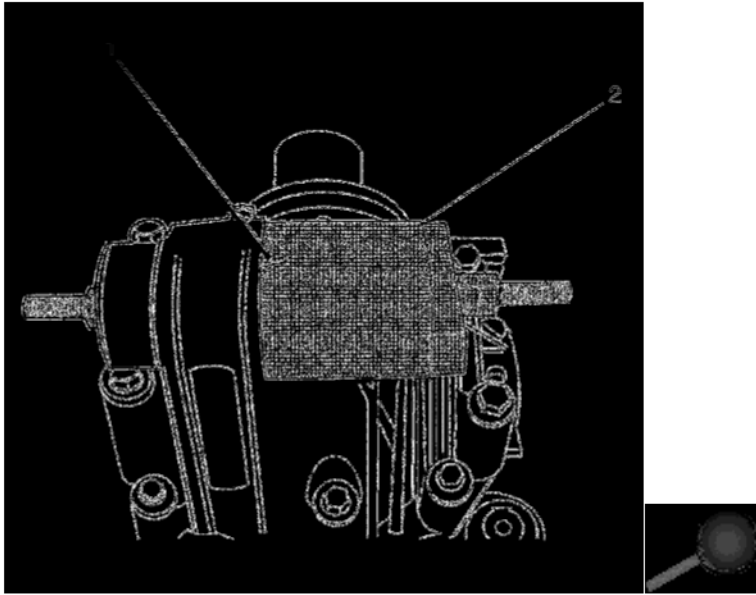
Note: All three bushings of the differential are different although they appear the same. Make sure that the correct part number is used. Mount orientation is critical for noise and vibration performance.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove both rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
3. Disconnect the propeller shaft and rubber coupling from the differential flange. Refer to [Propeller Shaft Replacement](#).
4. Remove the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
5. Remove both wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
6. Remove the differential assembly. Refer to [Differential Replacement](#).



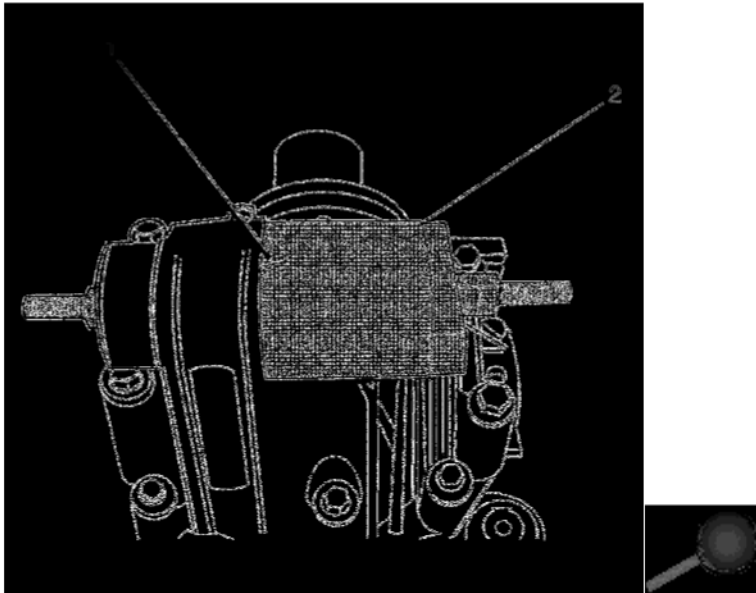
Note: Observe and mark the orientation of the rear bushing with reference to the original position. This recommendation will minimise the potential of incorrect rear bushing installation.

7. Measure the installation depth of the rear bushing (2) in relation to the differential (1).

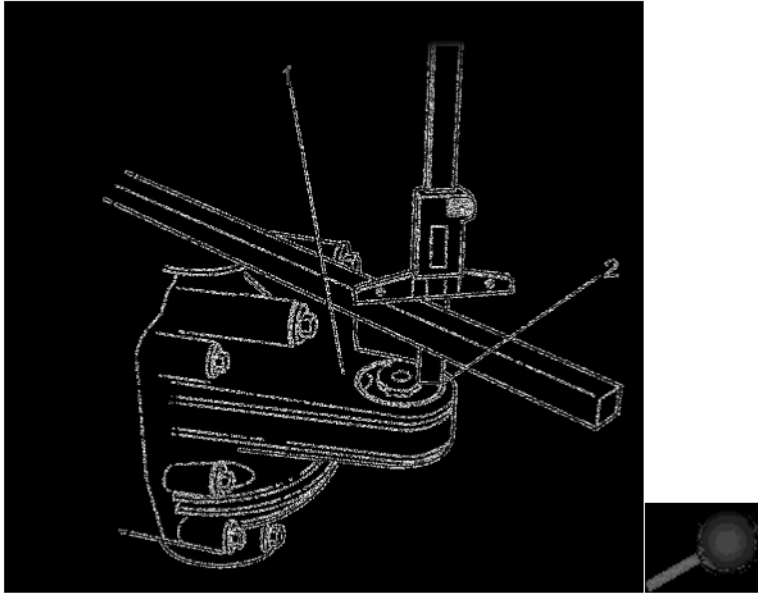


- Note:** The rear bushing (1) is a single use part and must be discarded after use.
8. Remove the rear bushing (1) from the differential using *EN-592-AU* bushing remover/installer (2).
Discard the rear bushing.

Installation Procedure



- Note:** Before installing, the rear bushing (1) must be correctly aligned and oriented. Mount orientation is critical for noise and vibration performance. The depth to which the bushing is going to travel must also be maintained.
1. Pull the rear bushing (1) into the differential using the *EN-592-AU* bushing remover/installer (2).

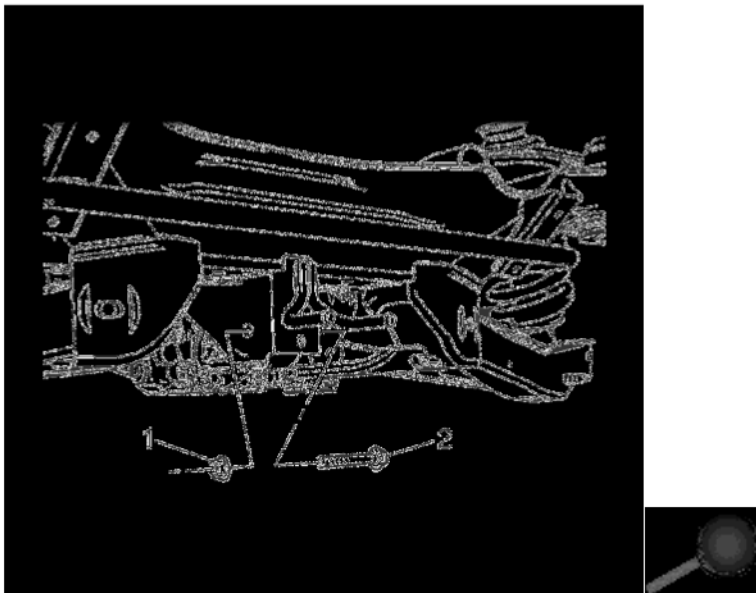


2. Pull the rear bushing (2) into the differential (1) until the measured installation depth is reached.
3. Install the differential assembly. Refer to [Differential Replacement](#).
4. Connect the propeller shaft and rubber coupling to the differential flange. Refer to [Propeller Shaft Replacement](#).
5. Install the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
6. Install both wheel drive shaft assemblies. Refer to [Rear Wheel Drive Shaft Replacement](#).
7. Install both rear wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
8. Remove the safety stands.
9. Lower the vehicle to the ground.

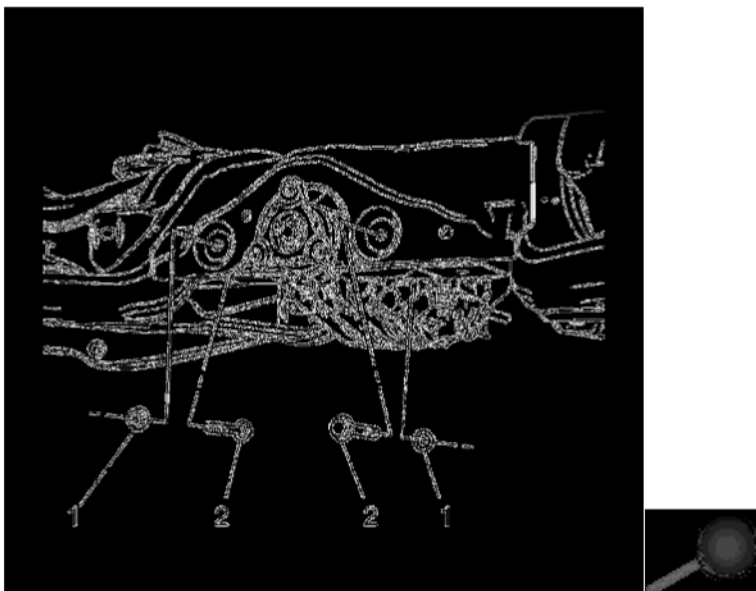
Differential Replacement (195 mm)

Removal Procedure

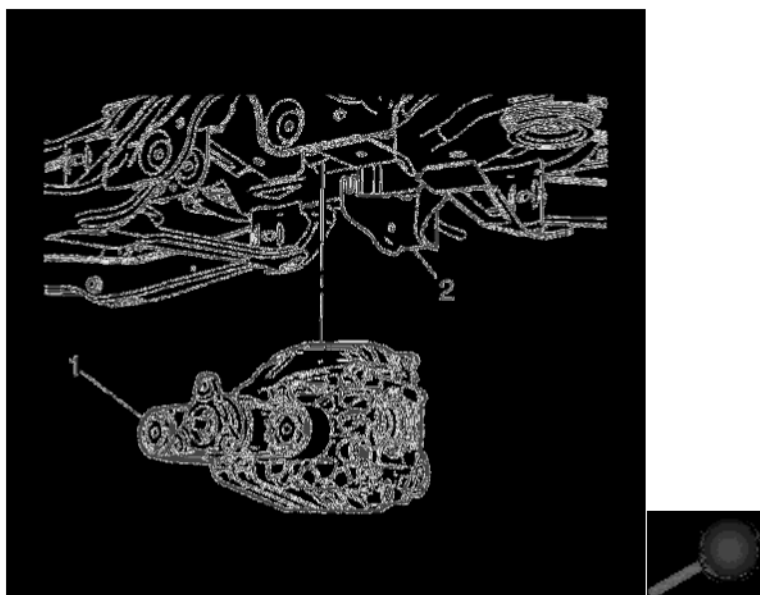
1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear differential assembly. Refer to [Rear Axle Lubricant Replacement](#).
3. Remove the propeller shaft from the vehicle. Refer to [Propeller Shaft Replacement](#).
4. Remove the wheel drive shafts from the vehicle. Refer to [Rear Wheel Drive Shaft Replacement](#).
5. Support the rear drive axle assembly with a hydraulic jack stand.
6. Remove the vent tube from the rear axle housing.



7. Remove the rear differential mount nut (1) and bolt (2).

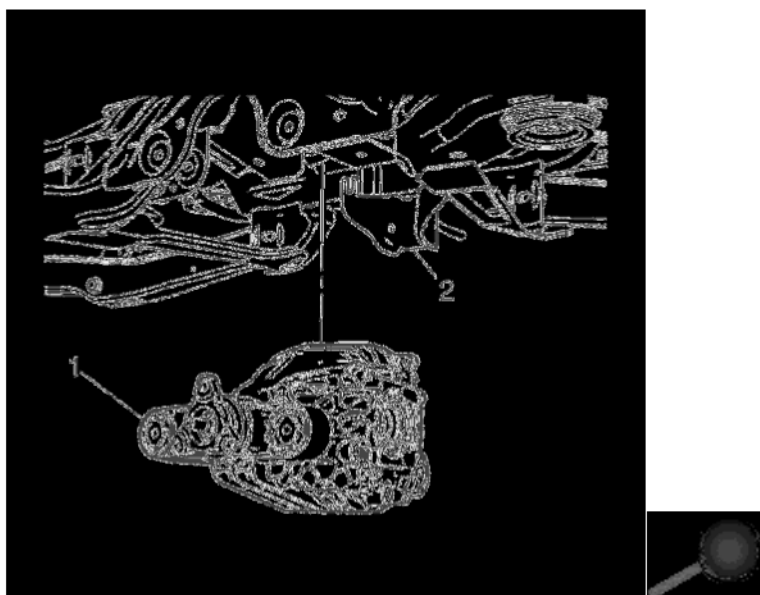


8. Remove the front differential mounting nuts (1) and bolts (2).

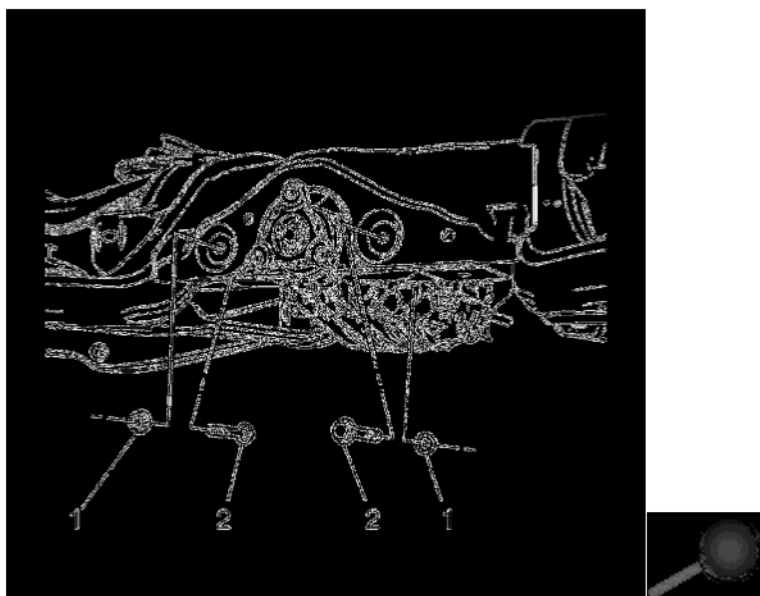


9. Remove the rear differential assembly (1) from the vehicle

Installation Procedure



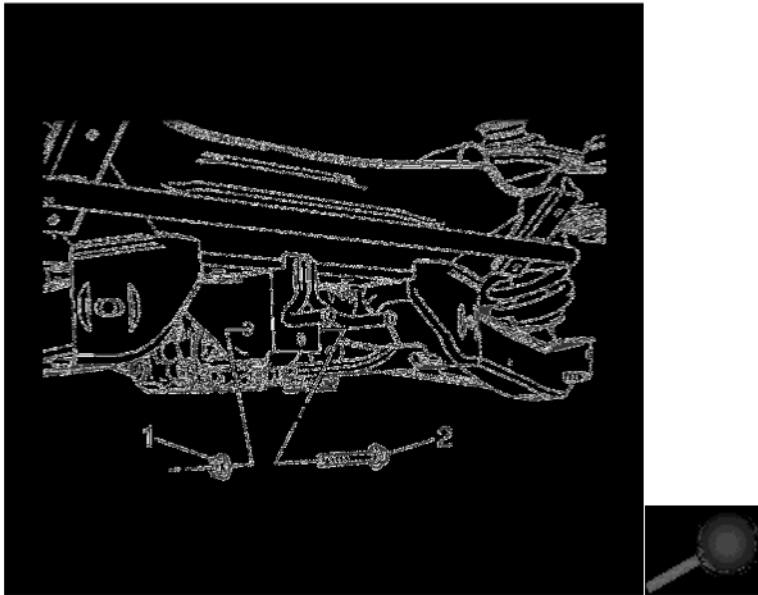
1. Position the rear differential assembly (1) in the rear suspension carrier (2).



Caution: Refer to [Fastener Caution](#).

2. Install the front differential mounting bolts (2) and (1) nuts.

3. Tighten the nuts (1) to **80 N•m (59 lb ft)**.



4. Install the rear differential mounting nut (1) and bolt (2).
5. Tighten the nuts (1) to **80 N•m (59 lb ft)**.
6. Install the wheel drive shafts from the vehicle. Refer to [Rear Wheel Drive Shaft Replacement](#).
7. Install the propeller shaft from the vehicle. Refer to [Propeller Shaft Replacement](#).
8. Install the vent tube from the rear axle housing.
9. Fill the rear differential with fluid. Refer to [Rear Axle Lubricant Replacement](#).
10. Remove the support and lower the vehicle.

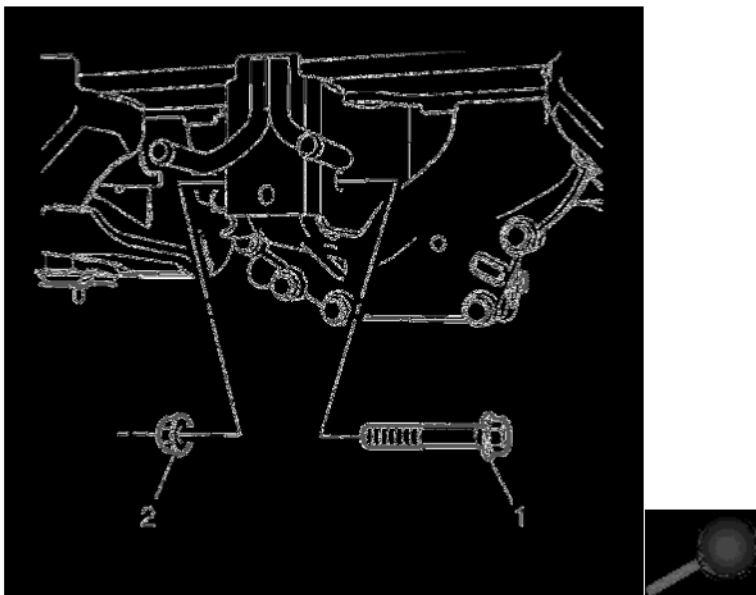
Differential Replacement (210 mm and 250 mm)

Removal Procedure

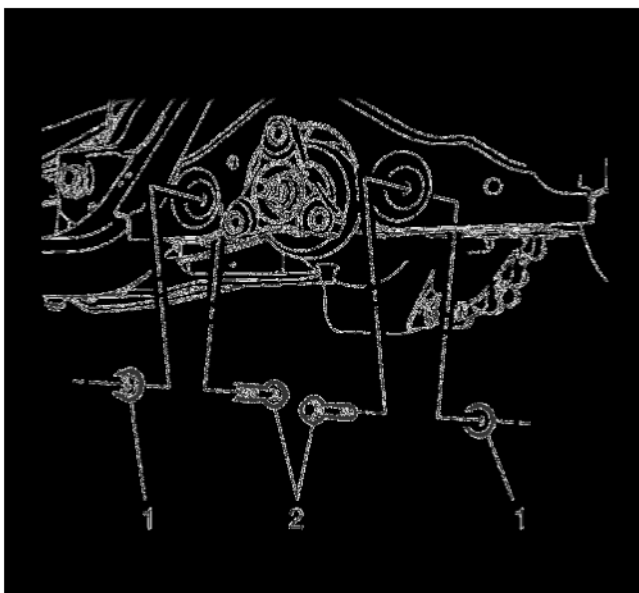
1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear differential assembly. Refer to [Rear Axle Lubricant Replacement](#).
3. Remove the propeller shaft from the vehicle. Refer to [Propeller Shaft Replacement](#).
4. Remove the wheel drive shafts from the vehicle. Refer to [Rear Wheel Drive Shaft Replacement](#).

Note: Insert plugs or cover to coolant lines and fittings to ensure that the fluid does not become contaminated.

5. Remove the rear differential cooler lines.
 - For the differential oil cooler inlet hose/pipe to rear transmission cooler pipe, refer to [Differential Oil Cooler Inlet Hose Replacement](#).
 - For the differential oil cooler outlet hose/pipe to rear transmission cooler pipe, refer to [Differential Oil Cooler Outlet Hose Replacement](#).
6. Support the rear drive axle assembly with a hydraulic jack stand.

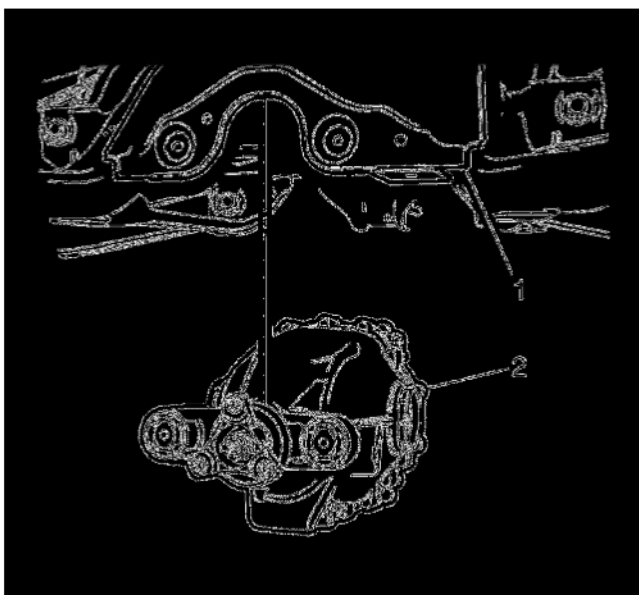


7. Remove the rear differential mount nut (2) and bolt (1).
8. Loosen and reposition the exhaust heat shield to allow the removal of differential mounting bolts. Refer to [Exhaust Heat Shield Replacement](#).



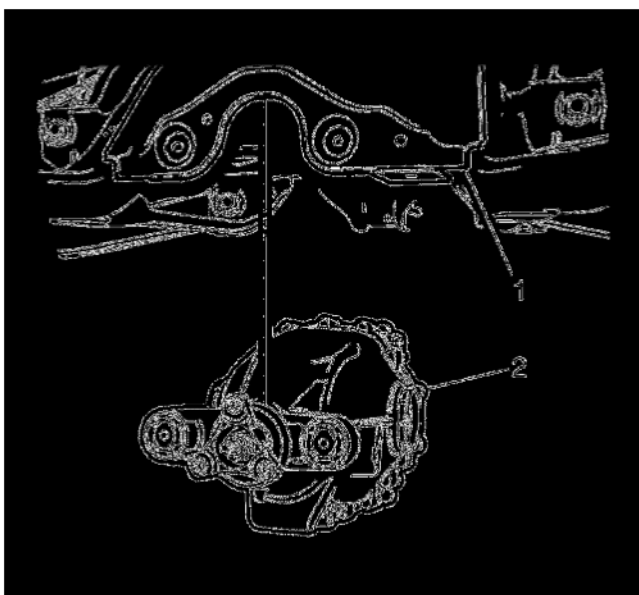
9. Remove the front differential mounting nuts (1) and the bolts (2).

10. Lower the differential enough to disconnect the vent hose from the rear axle housing.



11. Remove the rear differential assembly (2) from the rear suspension support (1).

Installation Procedure

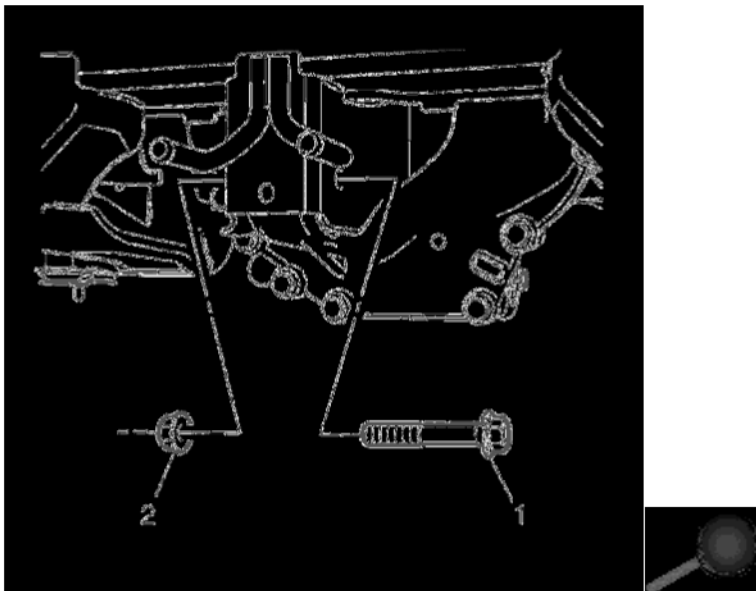


1. Position the rear differential assembly (2) in the rear suspension support (2).
2. Raise the differential enough to connect the vent hose to the rear axle housing.



Caution: Refer to [Fastener Caution](#).

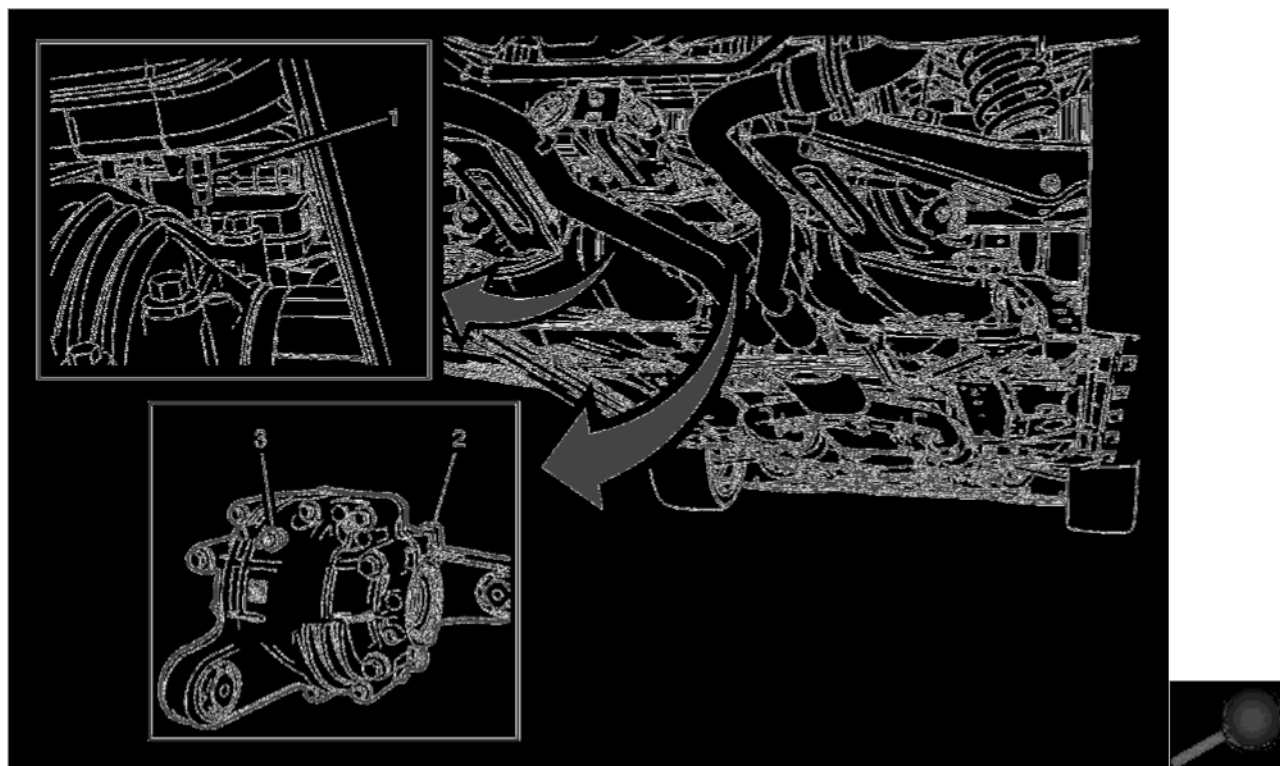
3. Install the front differential mounting bolts (2) and (1) nuts.
4. Tighten the nuts (1) to **80 N•m (59 lb ft)**.



5. Install the rear differential mounting nut (2) and bolt (1).
6. Tighten the nut (1) to **80 N•m (59 lb ft)**.
7. Reposition the exhaust heat shield and tighten the nuts until secure. Refer to [Exhaust Heat Shield Replacement](#).
8. Install the wheel drive shafts into the vehicle. Refer to [Rear Wheel Drive Shaft Replacement](#).
9. Install the rear differential cooler lines.
 - For the differential oil cooler inlet hose/pipe to rear transmission cooler pipe, refer to [Differential Oil Cooler Inlet Hose Replacement](#).
 - For the differential oil cooler outlet hose/pipe to rear transmission cooler pipe, refer to [Differential Oil Cooler Outlet Hose Replacement](#).
10. Install the propeller shaft into the vehicle. Refer to [Propeller Shaft Replacement](#).
11. Install the vent tube to the rear axle housing.
12. Fill the rear differential with fluid. Refer to [Rear Axle Lubricant Replacement](#).

13. Remove the support and lower the vehicle.

Rear Axle Housing Breather Replacement



Rear Axle Housing Breather Replacement

Callout	Component Name
Preliminary Procedure Raise and Support vehicle. Refer to Lifting and Jacking the Vehicle .	
1	Rear Axle Housing breather hose Procedure Disconnect the differential breather vent hose. Note: After disconnecting the rear axle housing breather hose check for any obstructions this will help prevent fluid leaks.
2	Differential Procedure Clean the residue thread sealer to allow proper sealing during reassembly.
3	Rear Axle Housing Breather Procedure Remove the rear axle housing breather. Note: Apply a small amount of thread sealer to the threads of the breather. Tighten 15 N•m (11 lb ft)

Differential Drive Pinion Gear Seal Replacement (210 and 250 mm Axle)

Special Tools

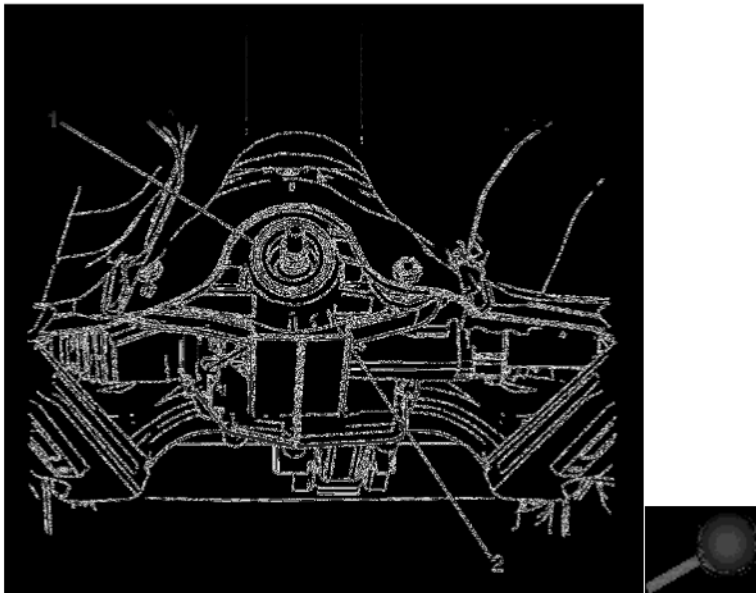
- 6613 Universal Pulley Holder OTC
- DT-48727 Seal Installer
- E-308 Seal Remover

Removal Procedure

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

1. Raise and support vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
3. Disconnect the propeller shaft and rubber coupling from the differential flange. Refer to [Propeller Shaft Replacement](#).
4. Remove the differential pinion flange. Refer to [Rear Axle Disassemble](#).

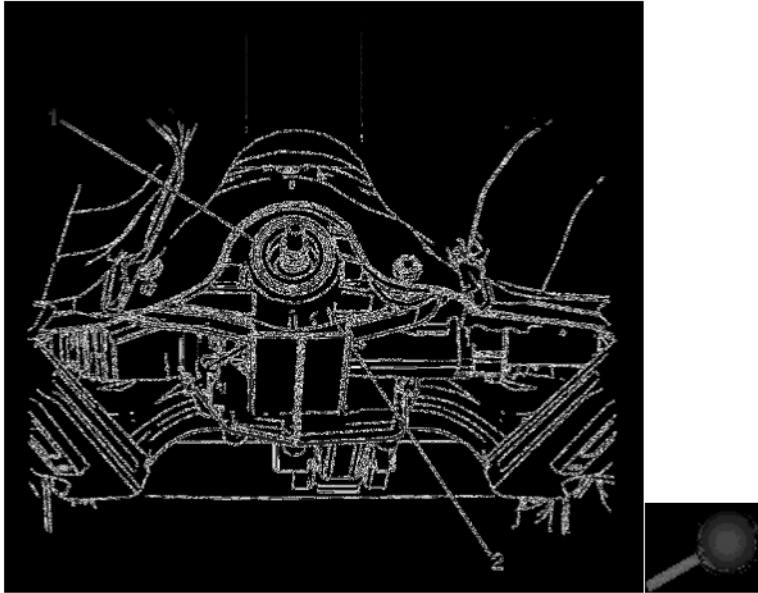


Note: Be careful with the sealing surfaces when removing the pinion flange oil seal (1). Prevent lubricant leakage from the assembly.

Note: The pinion flange oil seal (1) is a single use part and must be discarded after use.

5. Use E-308 seal remover to remove the pinion flange oil seal (1) from the differential (2). Discard the pinion flange oil seal.

Installation Procedure



1. Lubricate the NEW pinion flange oil seal (1) with the correct grease. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

Note: Be careful with any sealing surfaces when fitting the pinion flange oil seal. Prevent lubricant leakage from the assembly.

Note: Use *DT-48727* seal installer to obtain correct seal depth.

2. Install the NEW pinion flange oil seal (1) to the differential (2) with *DT-48727* seal installer.
3. Install the pinion flange. Refer to [Rear Axle Assemble](#).
4. Connect the propeller shaft and rubber coupling to the differential flange. Refer to [Propeller Shaft Replacement](#).
5. Install the intermediate exhaust assembly. Refer to [Exhaust Crossover Pipe Replacement](#).
6. Check differential fluid. Refer to [Rear Axle Lubricant Level Inspection](#).
7. Remove safety stands.
8. Lower the vehicle to the ground.

Differential Drive Pinion Gear Seal Replacement (195 mm)

Special Tools

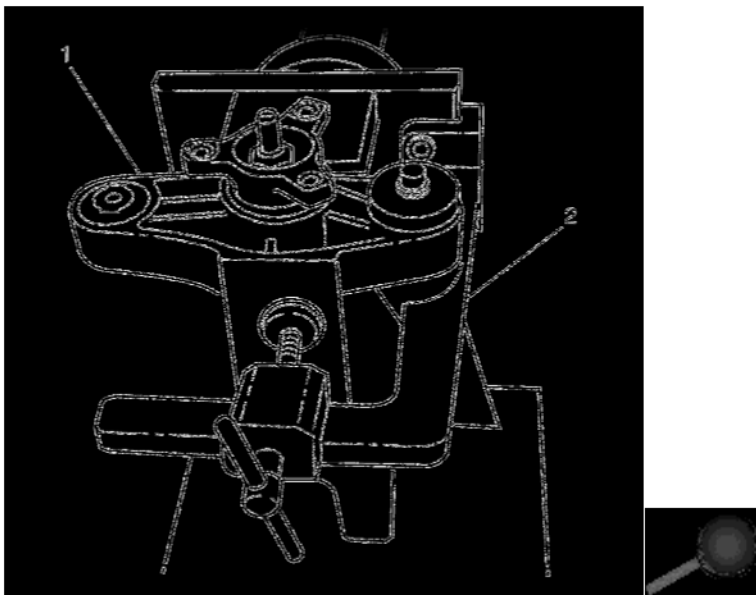
- E-308 Seal Remover
- DT-48727 Pinion Seal Installer

Removal Procedure

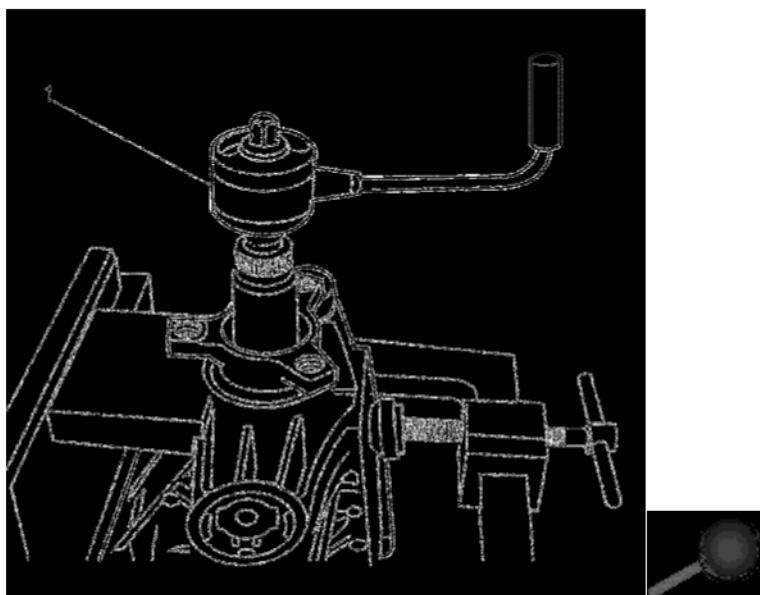
Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

Warning: Refer to [Safety Glasses Warning](#).

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the differential fluid. Refer to the draining procedure in [Rear Axle Lubricant Replacement](#).
3. Remove the differential from the vehicle. Refer to [Differential Replacement](#).

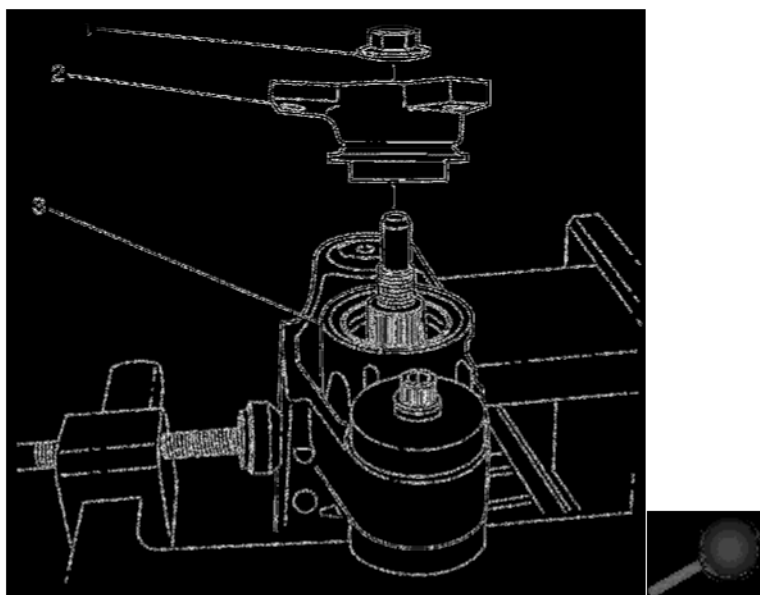


4. Mount the differential assembly (1) to a suitable holding device (2).



Note: It is important the next step is followed. The drag torque readings are required to correctly set the pinion preload on reassembly. Ensure the measuring equipment used has a tight tolerance, i.e. the equipment must be able to maintain an accuracy of 0.1 N•m.

5. Measure and record the pinion drag torque. The measurement must be taken while ensuring a constant rotational speed in a clockwise direction. It is critical that the breakaway torque is not the value used and the average value while the pinion is rotating is used, recorded to 0.1 N•m.
6. Mark the pinion flange nut to the flange. This mark is required for reassembly.



7. Remove the pinion flange nut (1).
8. Mark the flange to the pinion. This is also required for reassembly.
9. Reinstall the pinion flange nut only finger tight.

Note: The measurement must be taken while ensuring a CONSTANT rotational speed in a clockwise direction. It is critical that the breakaway torque is NOT the value used and the average value while the pinion IS used, recorded to 0.1 N•m. The equipment used must be able to maintain an accuracy of 0.1 N•m.

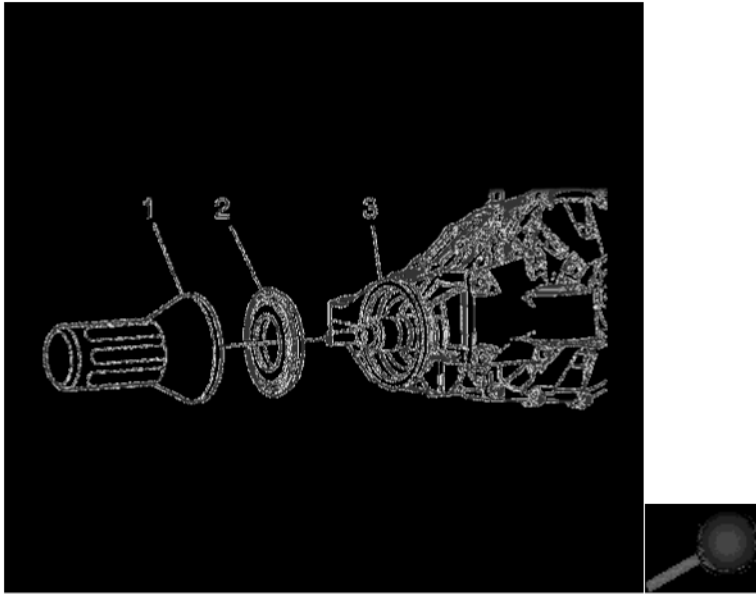
10. Measure and record the pinion flange seal drag torque.
11. Remove the pinion flange nut (1).

Note: Be careful not to damage any sealing surfaces when removing the pinion flange. Scores or abrasions will damage the assembly and result in lubricant leakage from this area.

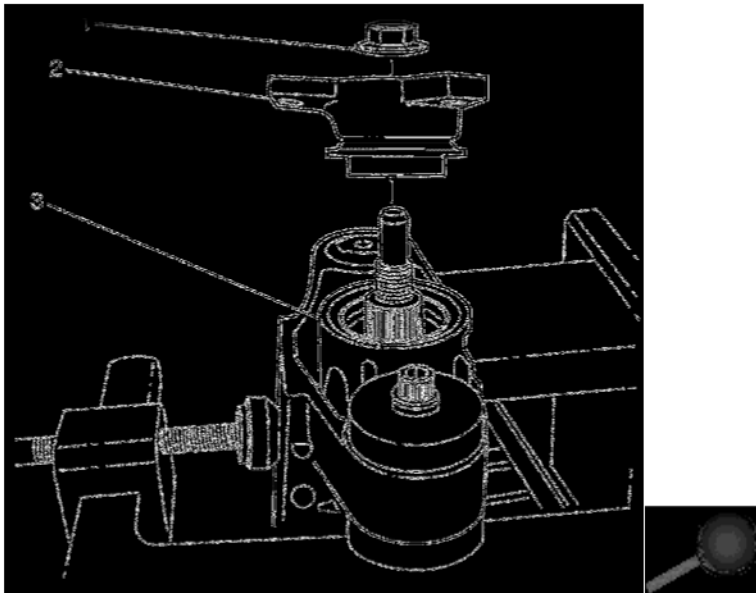
12. Remove the pinion flange (2).

- Note:** The pinion flange seal is a single use part and must be discarded after use.
13. Remove the old pinion flange seal (3) carefully and discard.

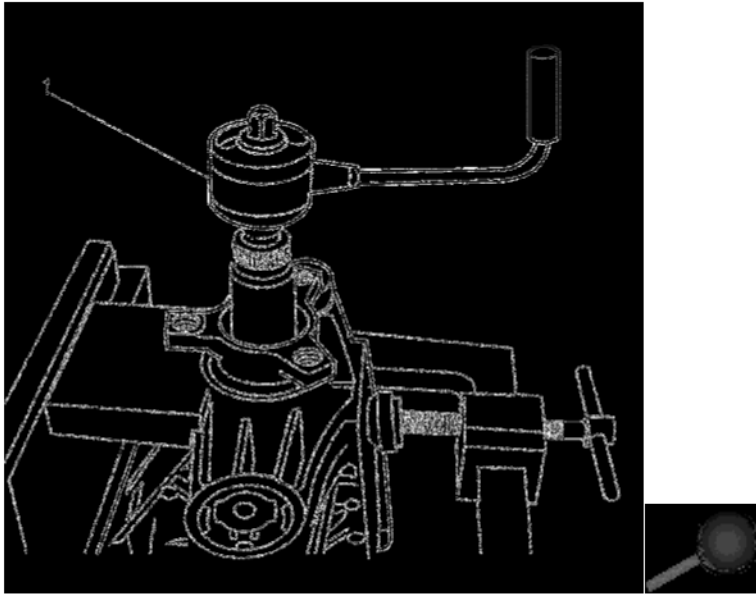
Installation Procedure



- Note:** Lubricate the new pinion flange seal with the correct grease.
1. Install the new pinion flange seal (2) using DT-48727 pinion seal installer (1) into the differential (3).



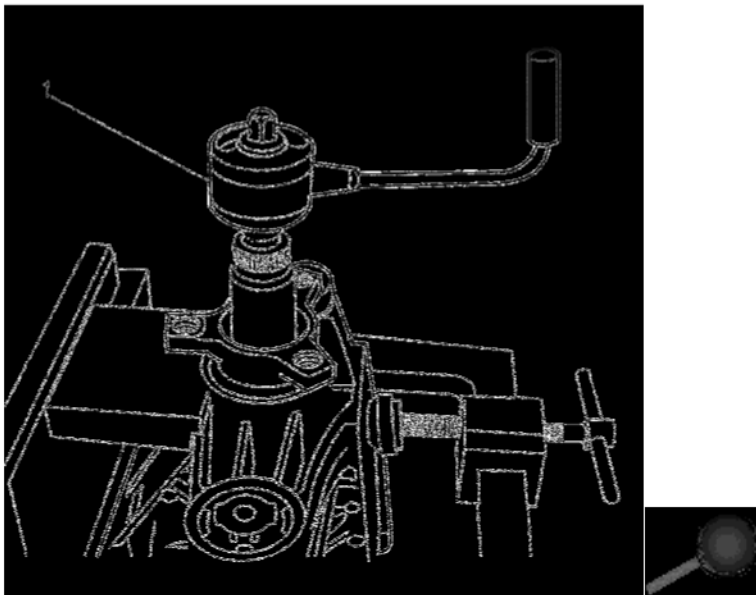
- Note:** Ensure the sealing surface of the pinion flange is free of debris, scoring abrasions or damage.
2. Reinstall the pinion flange (2) . Ensure that the mark on pinion flange is realigned with the mark on the pinion.
 3. Install the pinion flange nut finger tight.



4. Measure and record the new pinion flange seal drag torque. The measurement must be taken while ensuring a CONSTANT rotational speed in a clockwise direction it is critical that the breakaway torque is NOT the value used and the average value while the pinion is rotating is used, recorded to 0.1 N•m. The tool used must be able to maintain an accuracy of 0.1 N•m.

Note: Ensure the pinion flange nut is undamaged, clean and free from any debris including loctite residue.

5. Remove the pinion flange nut (1).
6. Lightly lubricate the contact surface of the pinion flange nut (1). Apply (loctite 2701) to three threads of the pinion flange nut.
7. Install the pinion flange nut to the unit. Tighten the pinion flange nut carefully until the pinion flange has no play. Align the mark on the nut with the mark on the flange.



Note: Its important that the following steps are performed carefully when installing the pinion flange nut. If the new pinion drag torque exceeds the calculated value by greater than 0.2 N•m, a new differential unit will be required, due to damage of the non-serviceable collapsible spacer.

Note: The new pinion drag torque must be calculated using the values recorded during the removal procedure. The new pinion drag torque should equal, X (the original pinion drag torque) $- Y$ (the old pinion flange seal drag torque) $+ Z$ (new pinion flange seal drag torque). The new pinion drag torque = $X - Y + Z$. If the pinion drag torque is below the value recorded during the removal procedure, tighten the pinion flange nut in small steps rechecking the pinion drag torque until the newly calculated pinion drag torque is achieved.

8. Measure the pinion drag torque. The measurement be taken while ensuring a constant rotational speed clockwise direction. Its critical that the breakaway torque is NOT the value used and the average value while the pinion is rotating is used, recorded to 0.1 N•m.

Note: If the new pinion drag torque exceeds the calculated value by 0.2 N•m, a new differential unit must be installed, due to damage to the collapsible spacer.

9. If the pinion drag torque is below the value recorded in step 5 of removal procedure, tighten the pinion flange nut in small steps rechecking the pinion drag torque until the newly calculated pinion drag torque is achieved.
10. Reinstall the differential to the vehicle. Refer to [Differential Replacement](#).
11. Fill the differential fluid. Refer to [Rear Axle Lubricant Replacement](#).
12. Lower the vehicle.

Rear Axle Disassemble (250 mm)

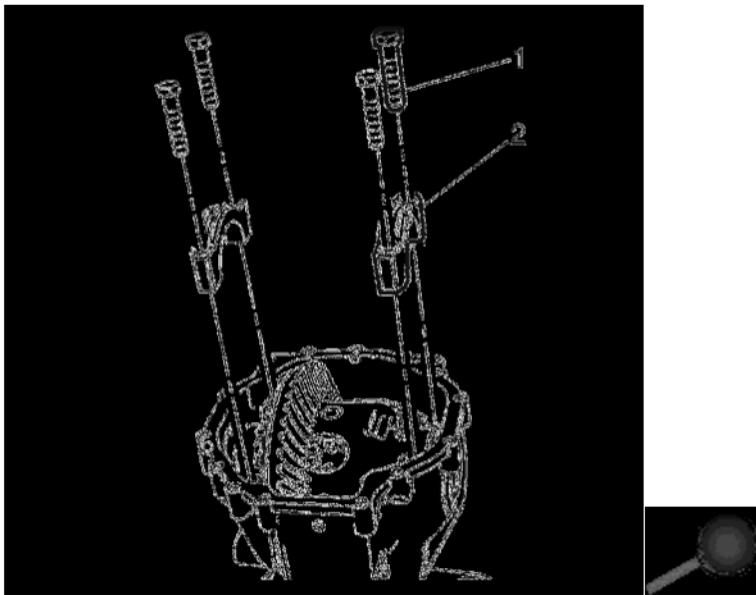
Special Tools

- *J-8001* Dial Indicator Set
- *J-36842* Holding Fixture
- *DT47561* Bearing Remover
- *J-22912-B* Split Plate Bearing Puller
- *J8107-4* Side Bearing Remover Plug
- *J22888-D* Side Bearing Remover Kit

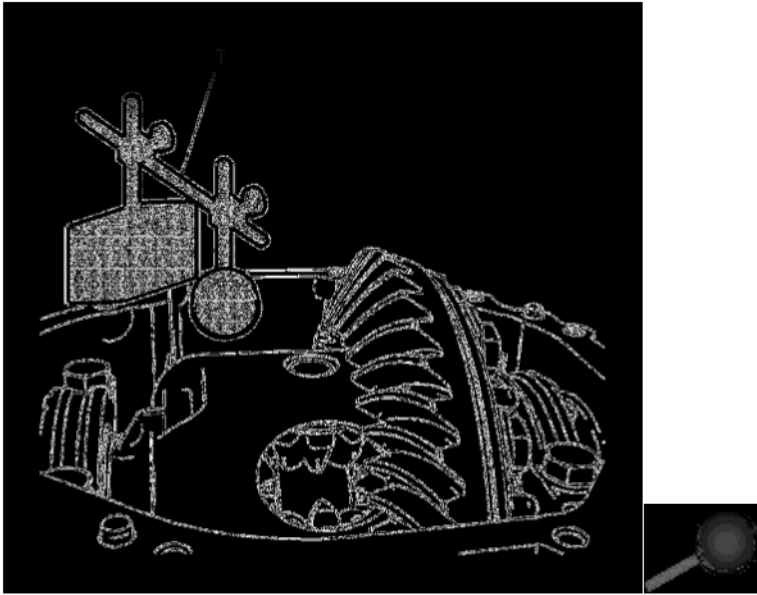
For regional equivalent tools, refer to [Special Tools](#).

Disassemble Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the rear differential case assembly from the vehicle. Refer to [Differential Replacement](#).
3. Using the *J-36842* fixture, install the rear differential carrier in the vise.
4. Remove the Rear Axle Housing Cover. Refer to [Rear Axle Housing Cover Seal Replacement](#).



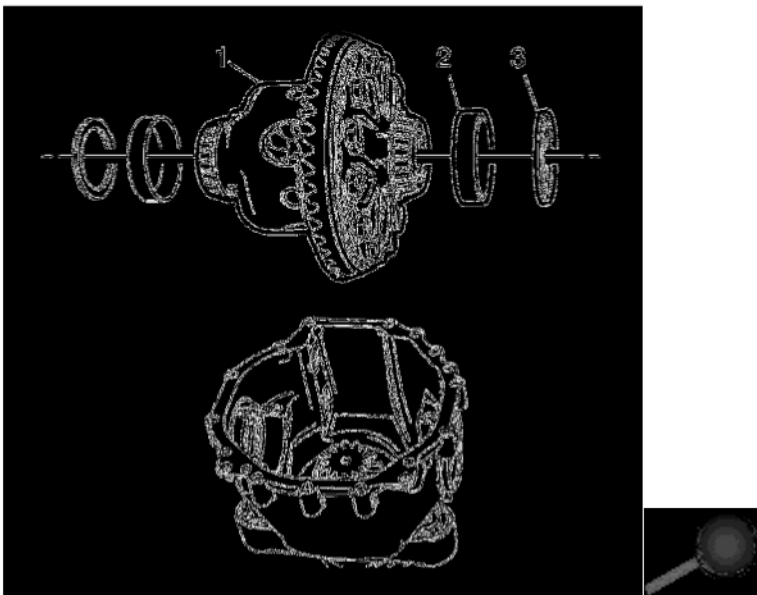
- Note:** Mark the left and right bearing caps before removing them.
5. Remove the differential bearing caps (2) and the bolts (1)
 6. Position the 14 inch C clamp so that it is parallel with the ring gear.



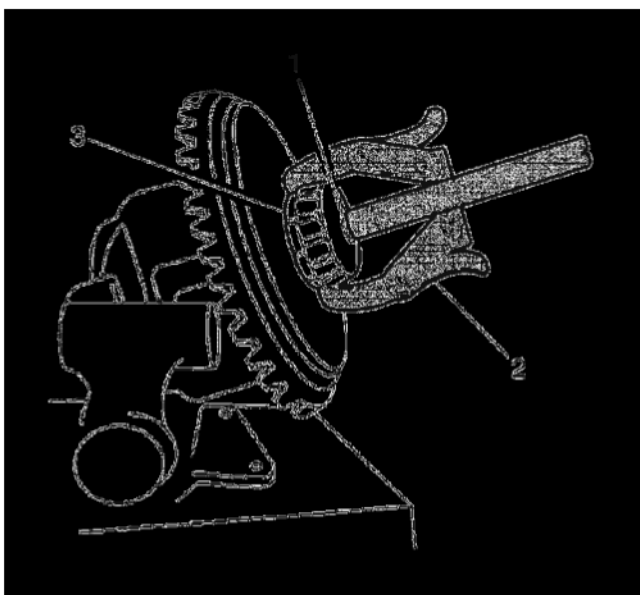
7. Position the J-8001 set (1) on the differential carrier.

Note: In the next step you will need to compress the differential housing just enough to remove the differential case assembly. DO NOT compress the housing more than **0.254mm (0.01 inch)**.

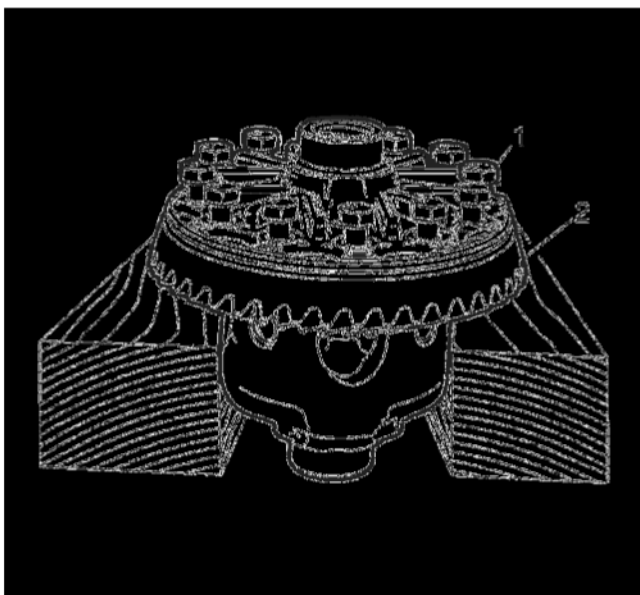
8. Using a 14 inch C clamp, compress the rear axle housing just enough to remove the differential case assembly.



9. Remove the differential case assembly (1) from the rear axle housing.
10. Install the differential case in a soft jawed vise.

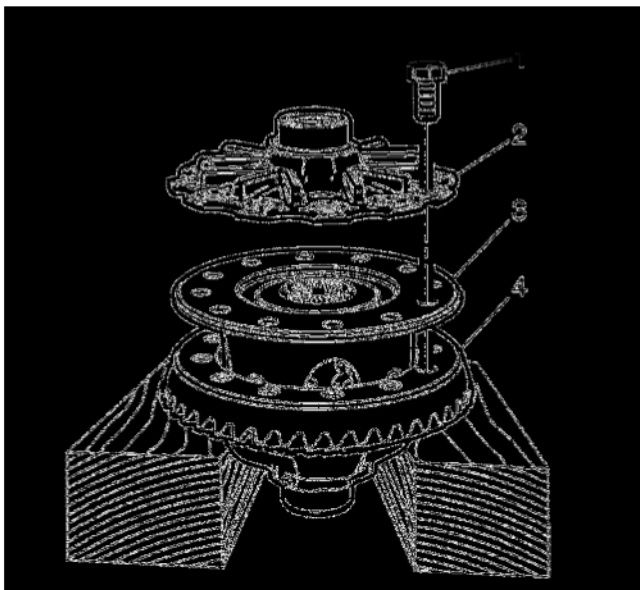


11. Using the *J22888-D* kit (2) and the *J8107-4* plug (1), remove the side bearings.
12. Remove the differential case from the vise.

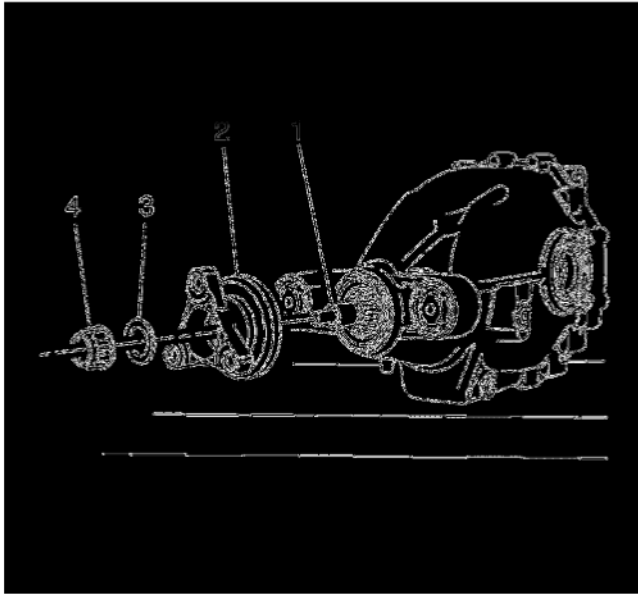


Note: The ring gear bolts are left handed threads.

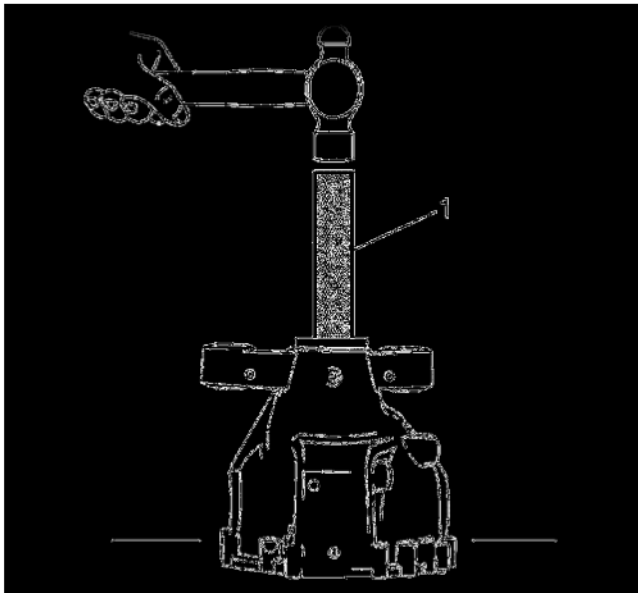
13. Loosen the ring gear bolts (1).
14. Using the appropriate tool, tap on the gear bolts (1) until the ring gear (2) is loose.



15. Remove and discard the ring gear bolts (1). DO NOT reuse the ring gear bolts, replace with NEW only.
16. Remove the differential case flange (2).
17. Remove the ring gear (4) from the differential case (3).

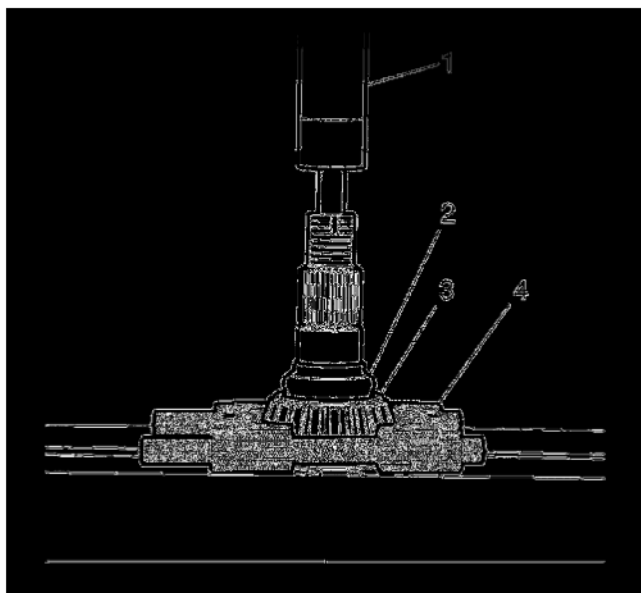


18. Remove the pinion nut (4) pinion washer (3) pinion yoke (2) from the pinion shaft (1).
19. Remove the pinion shaft seal.

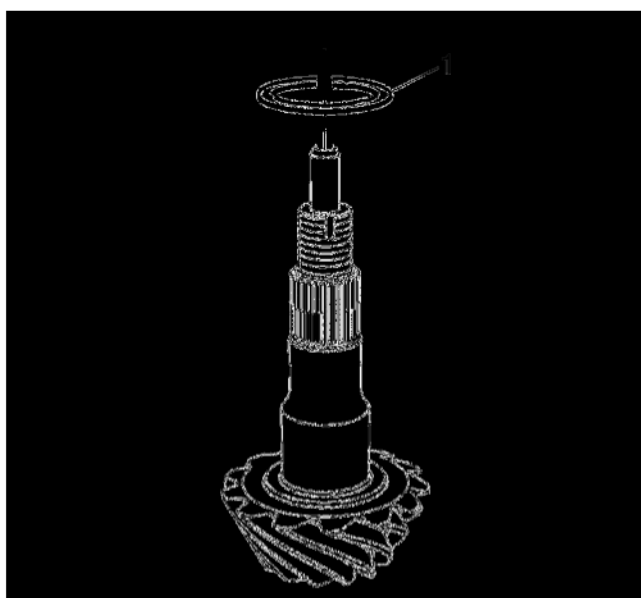


Note: Position a block of wood under the differential housing to protect the pinion gear when removed.

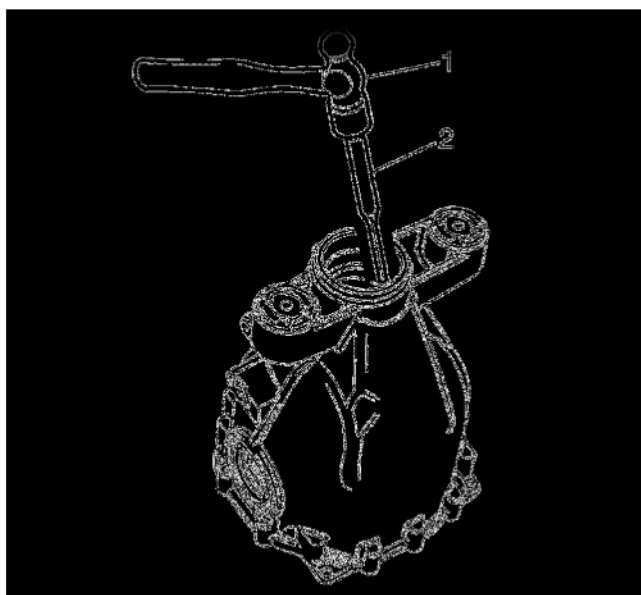
20. Using the DT-47561 remover (1) and the hammer, remove the pinion gear.



21. Using the *J-22912-B* puller (4) and the hydraulic press (1), remove the outer pinion bearing (3) and the collapsible spacer (2).

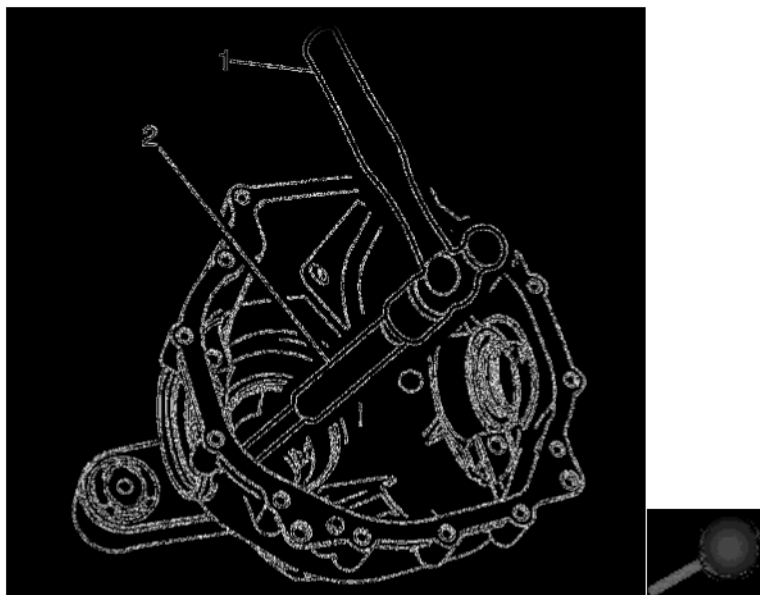


22. Remove the select washer (1).



Note: Use the slot on each side of the pinion bearing to position the brass drift to remove the bearing cup. Also, alternate from side to side when removing the bearing cup.

23. Using the hammer (1) and the brass drift (2), remove the inner pinon bearing cup from the differential housing.



Note: Use the slot on each side of the pinion bearing to position the brass drift to remove the bearing cup. Also, alternate from side to side when removing the bearing cup.

24. Using the hammer (1) and the brass drift (2), remove the outer pinon bearing cup from the differential housing.

Rear Axle Disassemble (210 mm)

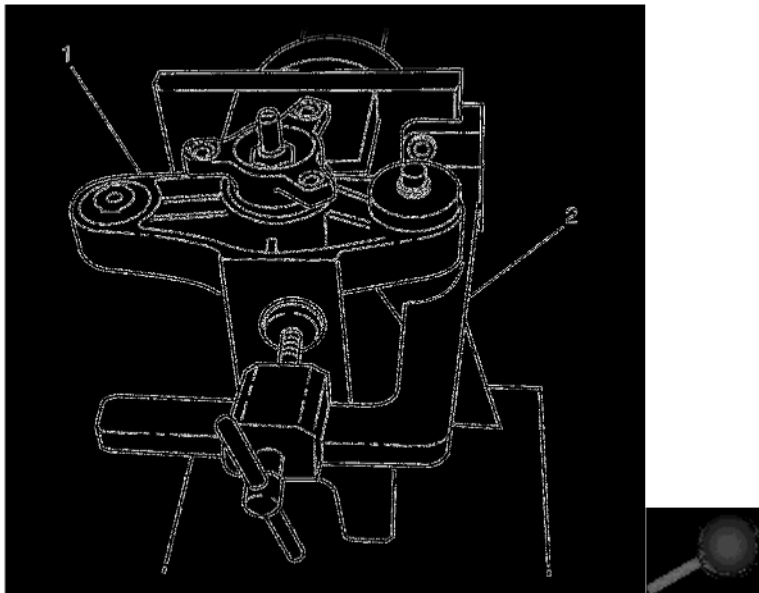
Special Tools

- 205-116 Carrier Bearing Puller Including Plug
- J-36842 Holding Fixture
- DT-48725 Pinion Head Bearing Cup Removal Kit
- DT-48726 Pinion Head Bearing Cup Remover
- DT-48805 Pinion Tail Bearing Cup Remover
- E-308 Seal Remover

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

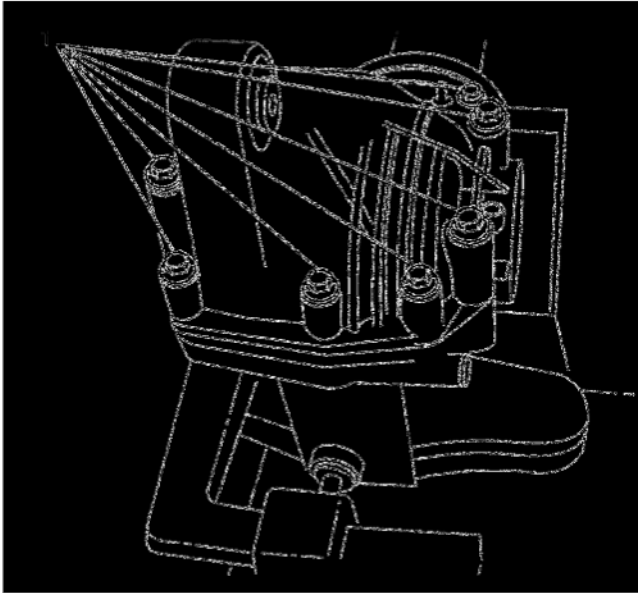
Warning: Refer to [Safety Glasses Warning](#).

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the differential fluid. Refer to the draining procedure in [Rear Axle Lubricant Replacement](#).
3. Remove the differential from the vehicle. Refer to [Differential Replacement](#).

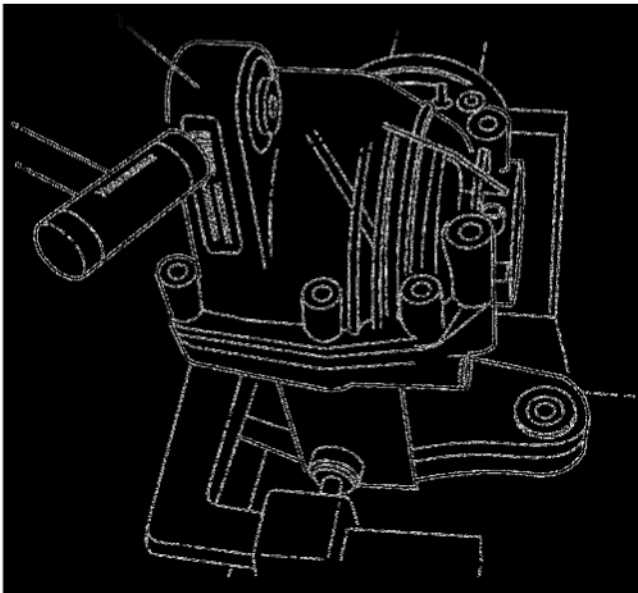


Note: The holding device must be able to rotate.

4. Mount the differential assembly (1) to J-36842 Holding Fixture (2).

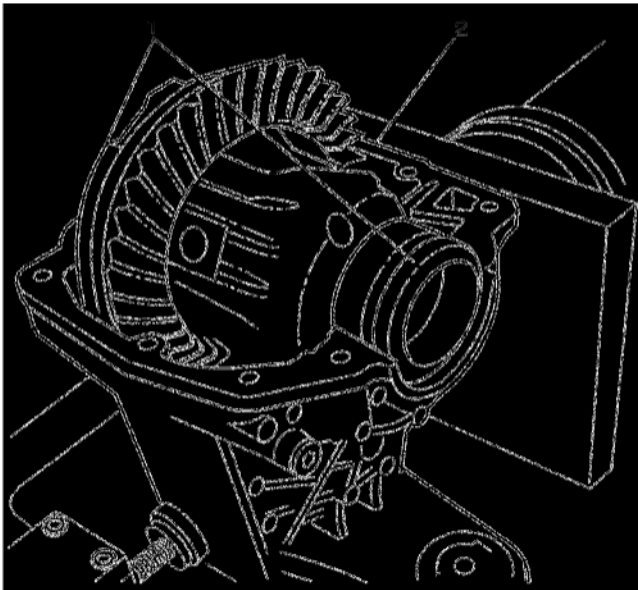


5. Remove the differential housing cover to differential housing retaining bolts (1).

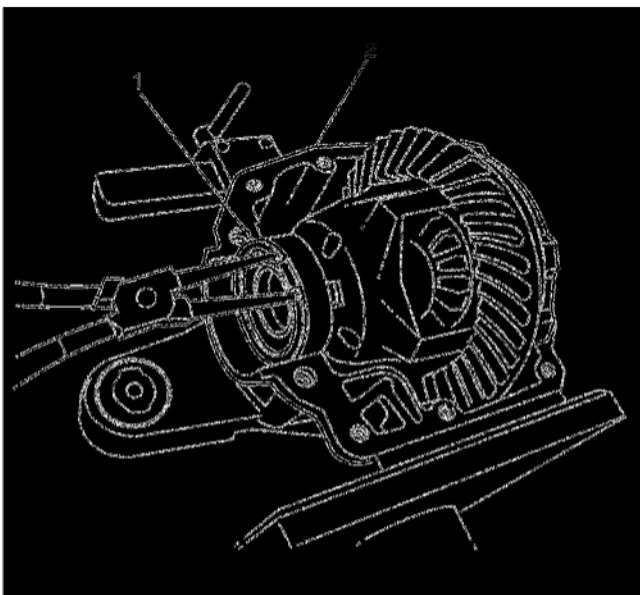


Note: Use a soft-faced hammer to aid in separating the differential housing cover from the rear differential housing (1).

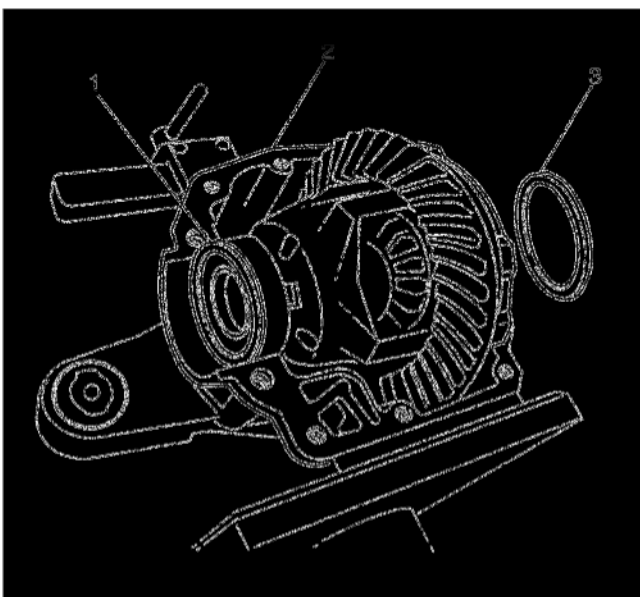
6. Remove the rear differential housing cover (1).



7. Remove the left and right axle shaft seals (1) from the differential (2).
Discard the axle shaft seals.

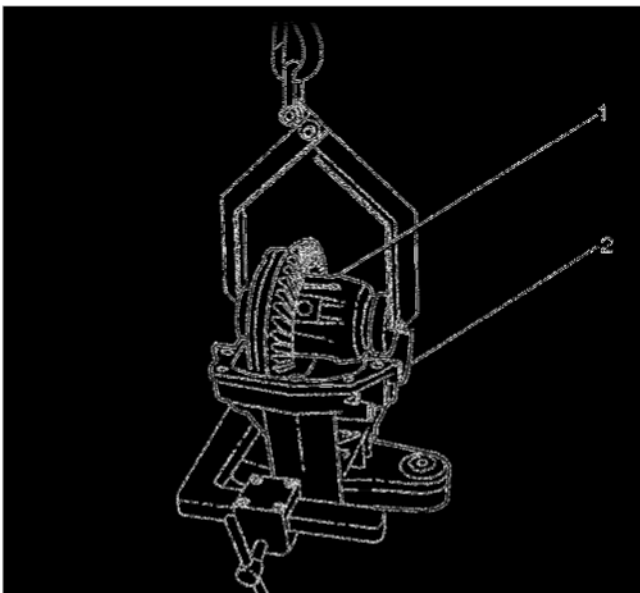


8. Remove the circlip (1) from the differential (2).



Note: Mark the left shim (3) and right shim (1) before removing for correct refitting.

9. Remove the left shim (3) and right shim (1) from the differential (2).

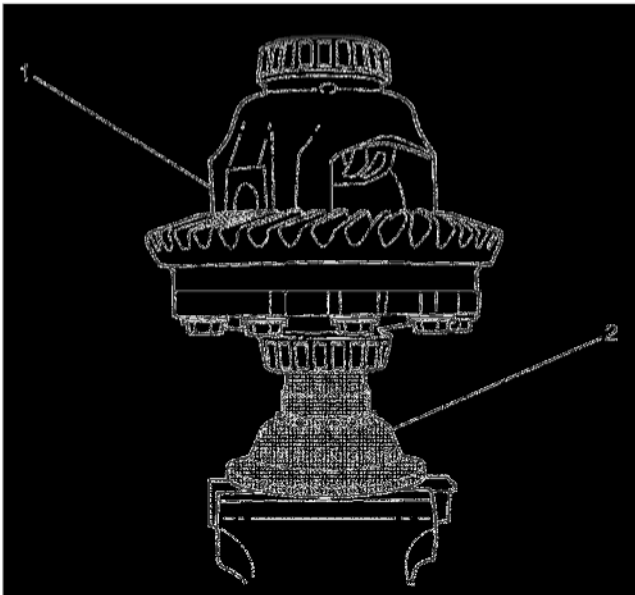


Note: Remove the differential (1) using a suitable tool or with the aid of an assistant.

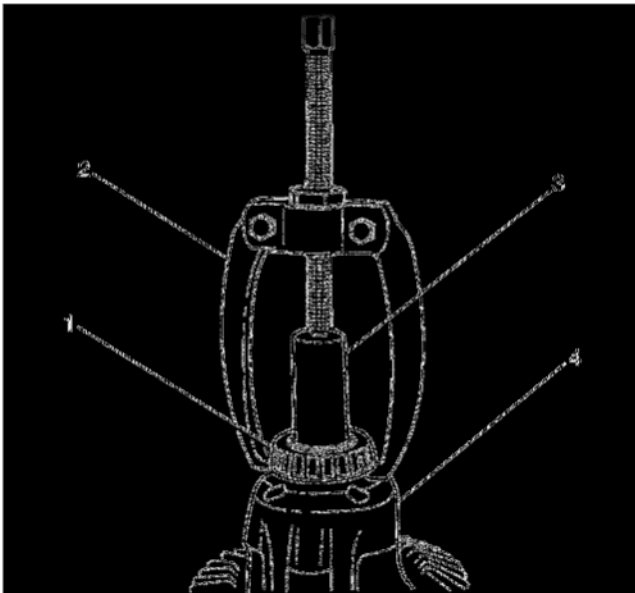
10. Remove the differential (1) from the differential housing (2).

Note: Place a suitable container to catch remaining differential fluid.

11. Allow remaining differential fluid to drain.



12. Position the differential (1) onto a suitable holding device (2).



Note: Use a suitable puller (2) and 205-116 carrier bearing puller including plug (3) to remove the right bearing (1).

13. Remove the right bearing (1) from the differential (4).

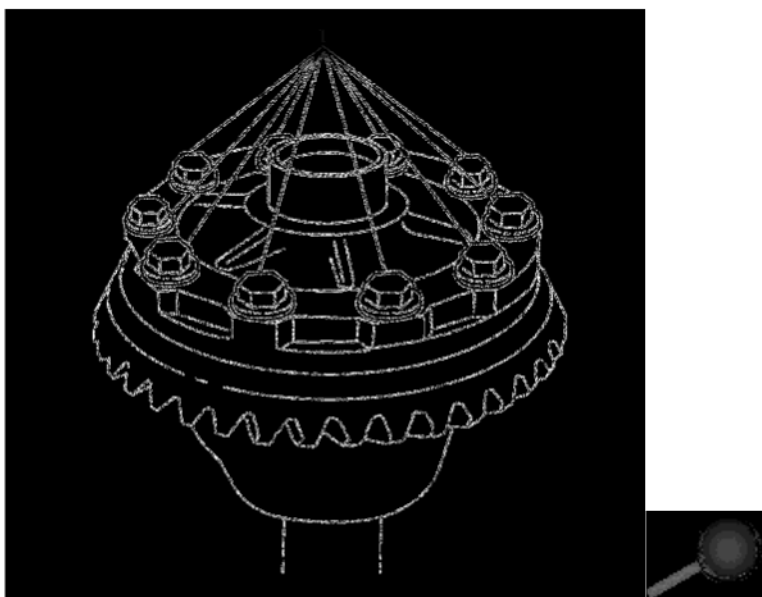
Discard the right bearing.

14. Turn the differential (4) over on the holding tool with the aid of an assistant.

Note: Use a suitable puller (2) and 205-116 carrier bearing puller including plug (3) to remove the left bearing.

15. Remove the left bearing from the differential (4).

Discard the left bearing.



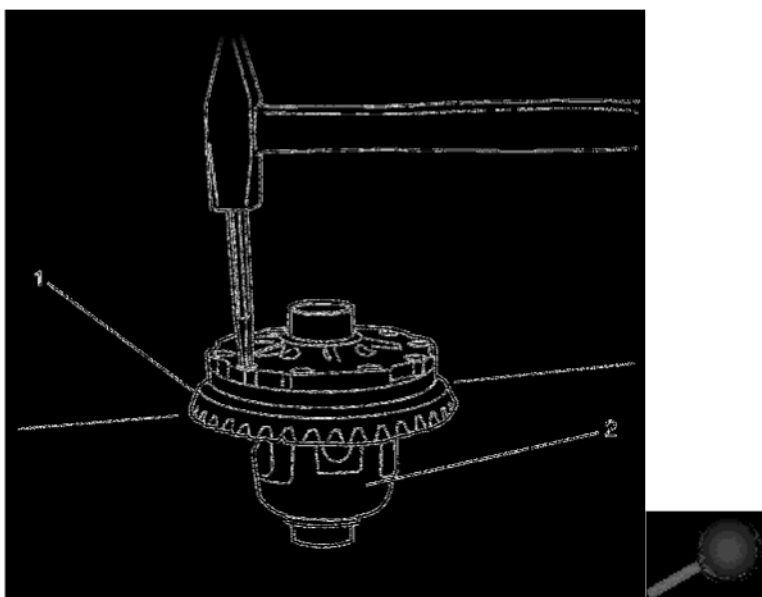
16. Remove the ring gear to differential retaining bolts (1).

Discard ring gear to differential retaining bolts.

17. Remove the differential from the holding device.

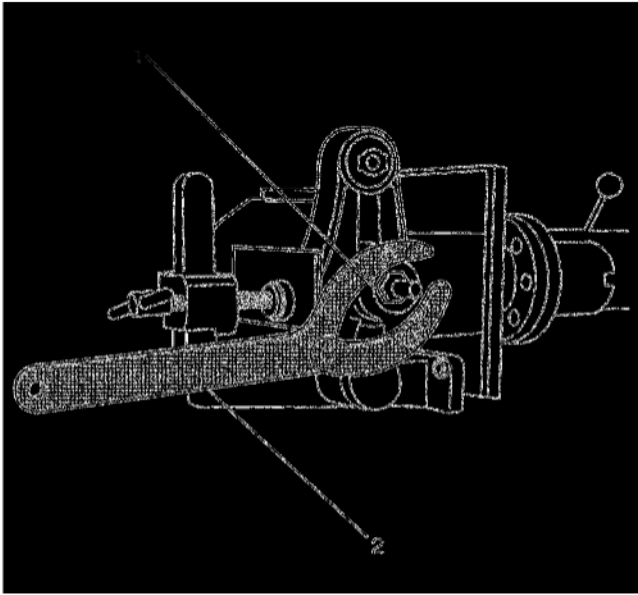
Note: Make sure there is soft material between the differential and the bench top.

18. Place the differential onto a bench top.



Note: Use suitable tools or a suitable press to remove the ring gear (1) from the differential (2).
Take care not to damage the ring gear retaining bolt hole threads.

19. Remove the ring gear (1) from the differential (2).

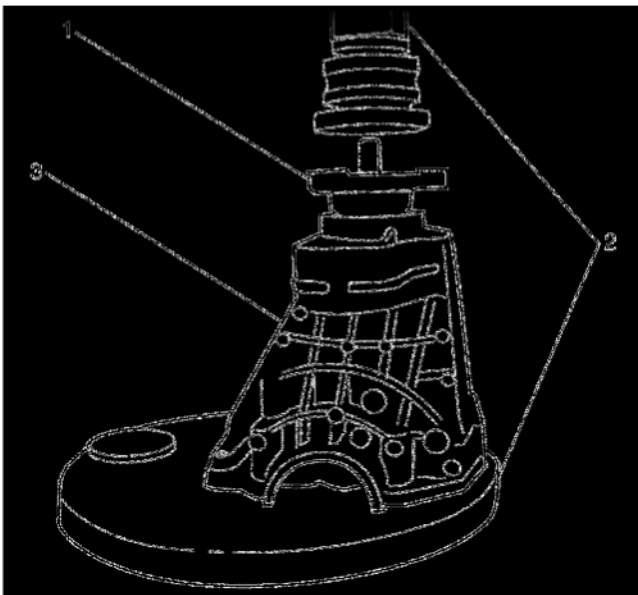


20. Install the universal holding tool (2) to the pinion flange (1).

Note: Hold the pinion flange with universal holding tool (2).

21. Remove the pinion flange to prevailing torque pinion flange retaining nut (1).
Discard the prevailing torque pinion flange retaining nut.

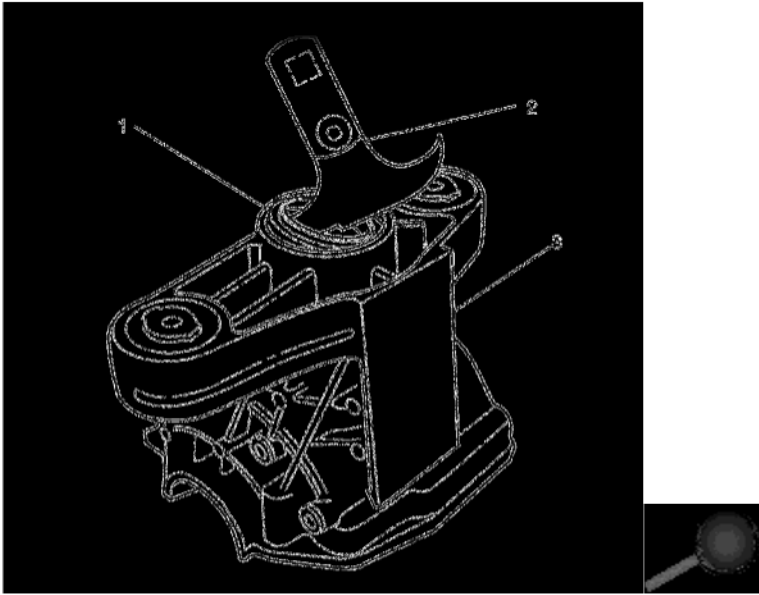
22. Remove the universal holding tool (2) from the pinion flange (1).



Note: The pinion flange (1) can be removed with a suitable puller or with a press (2). Support the pinion or place a soft cloth under the pinion to prevent damage when removing.

23. Remove the pinion flange (1) from the differential housing (3).

24. Remove the pinion from the differential housing (3).



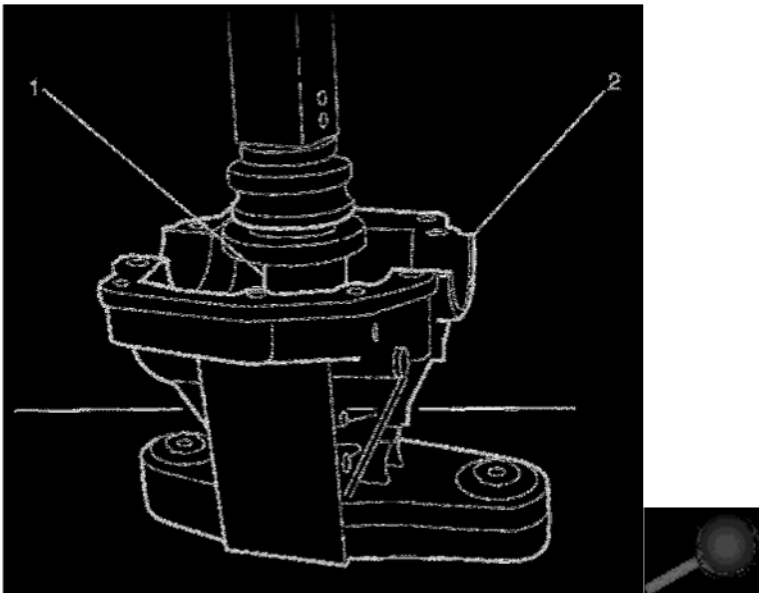
Note: Do not damage any sealing surfaces when removing the axle shaft oil seal (1). Cuts or abrasions will damage the assembly and result in lubricant leakage from this area.

25. Using a *E-308* seal remover (2), remove the pinion flange oil seal (1) from the differential housing (3).

Discard the pinion flange oil seal.

26. Remove the tail bearing from the differential housing (3).

Discard the tail bearing.

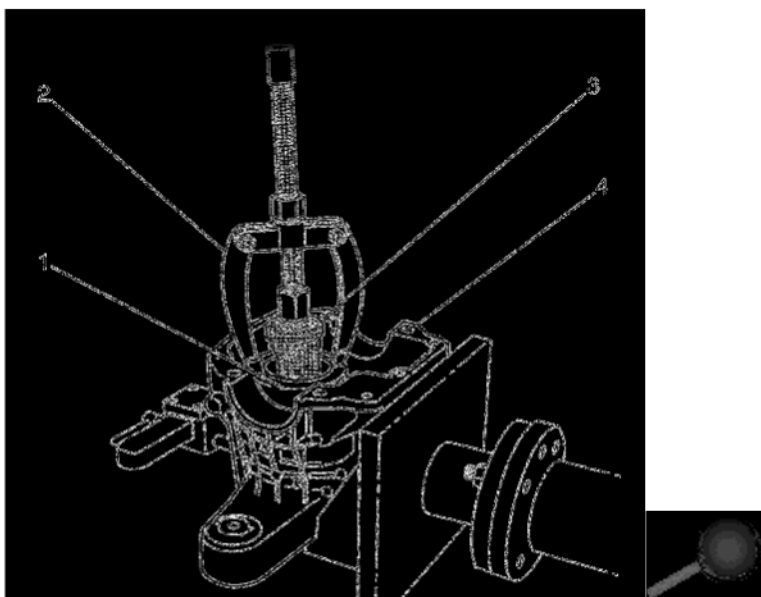


Note: Use a suitable press and *DT-48805* pinion tail bearing cup remover to remove the tail bearing cup.

27. Position the *DT-48805* pinion tail bearing cup remover (1) to the differential housing (2) and press out the tail bearing cup.

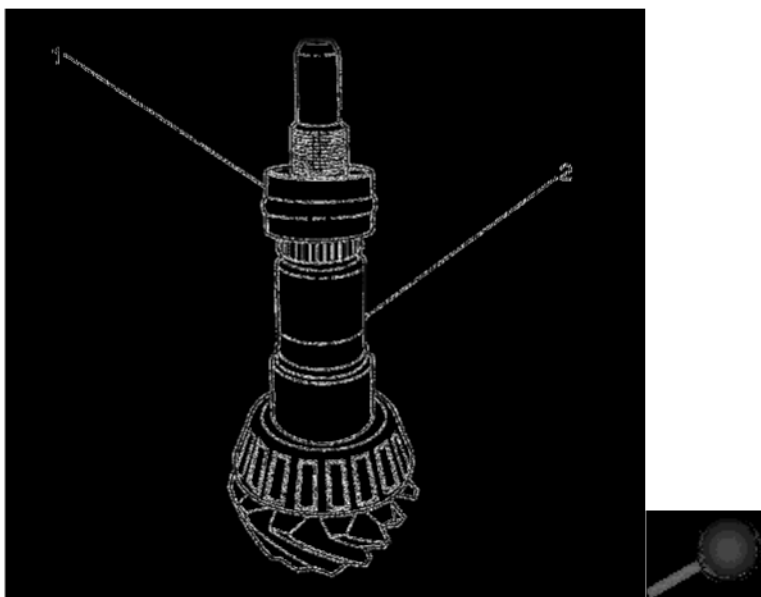
28. Remove the tail bearing cup from the differential housing (2).

Discard the tail bearing cup.



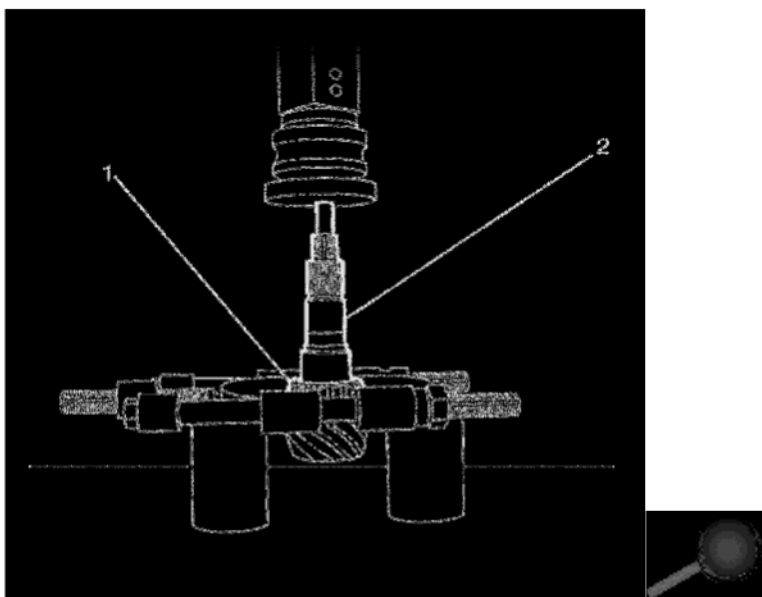
Note: Use *DT-48725* pinion head bearing cup removal kit (1, 2) and *DT-48726* pinion head bearing cup remover (3) to remove the head bearing cup.

29. Position *DT-48726* pinion head bearing cup remover (3) to the differential housing (4) and pull out the head bearing cup.
30. Remove the head bearing cup from the differential housing (4).
Discard the head bearing cup.



Note: Do not reuse the collapsible spacer (1).

31. Remove the collapsible spacer (1) from the pinion gear (2).
Discard the collapsible spacer.



Note: Use a suitable press and press plates to remove the pinion head bearing (1).

32. Remove the pinion head bearing (1) from the pinion gear (2).

Discard the pinion head bearing.

33. Remove the pinion shim from the pinion gear (2).

34. Clean loctite from the pinion gear thread.

Differential Carrier Bearing Preload Adjustment (250 mm)

Special Tools

J-22779 Side Bearing Backlash Gauge

For equivalent regional tools, refer to [Special Tools](#).

[Wedge Method](#)

Note:

- The differential side bearing preload adjustment must be completed before the backlash adjustment can be started.
- In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
- Measure the service shims and the spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
- Do not use or reuse the original cast iron production shims. Use service shims and spacers instead.

1. Install the drive pinion, if necessary. Refer to [Rear Axle Disassemble](#).

Note: Record the measurement.

2. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion which should be:
 - For New bearings: **2.7–3.4 N·m (24–30 lb in)**
 - For USED bearings: **1.6–2.9 N·m (14–26 lb in)**

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to [Rear Axle Disassemble](#).

Note: Ensure that the differential side bearing surfaces in the axle housing are clean and free of burrs. If the original differential side bearings are to be reused, the original differential side bearing cups must also be used.

4. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.
5. Insert one **4.572 mm (0.180 in)** thick service spacer into the left side of the axle housing.
6. Side the differential assembly towards the service spacer in order to hold the spacer in place.
7. Install the J-22779 gauge into the right side of the axle housing.
The J-22779 gauge must be installed between the service spacer and the differential side bearing cup.

Note: Over-tightening of the J-22779 gauge may spread the housing and result in incorrect shim selection.

8. Tighten the knob on the J-22779 gauge until there is moderate drag when the J-22779 gauge is moved.
9. Remove the J-22779 gauge.
10. Remove the service spacer.
11. Using a micrometer, measure the thickness of the service spacer. Record the measurement.
12. Using a micrometer, measure the thickness of the J-22779 gauge in 3 locations. Calculate the average of the 3 measurements. Record the measurement.

13. Add the thickness of the service spacer, measured in Step 11 to the average thickness of the J-22779 gauge, measured in Step 12. The resulting value is the total service shim thickness without preload for the axle.
14. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
15. Install the J-22779 gauge into the left side of the axle housing. The J-22779 gauge must be installed between the service spacer and the differential side bearing cup.
16. While rotating the ring gear back and forth, tighten the knob on the J-22779 gauge until there is approximately 0.025–0.051 mm (0.001–0.002 in) of backlash between the ring gear and the drive pinion.
17. Once the correct amount of backlash is obtained, remove the J-22779 gauge.
18. Remove the differential assembly with the differential side bearings and the differential side bearing cups.
19. Remove the BENT service shim.
20. Using a micrometer, measure the thickness of the J-22779 gauge in 3 locations. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.
21. In order to determine the right side service shim thickness, subtract the service shim thickness for the left side of the axle, calculated in step 20, from the total service shim thickness, calculated in step 13. This value is the service shim thickness for the right side of the axle without preload.
22. In order to preload of the differential side bearings and set the backlash to approximately 0.127–0.223 mm (0.005–0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.
23. Assemble the left side shim pack using one 4.572 mm (0.180 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 20. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
24. Assemble the right side shim pack using one 4.572 mm (0.180 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 22. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
25. Install the differential assembly with the differential side bearings and the differential side bearing cups.
26. Install the left side service spacer and service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
27. Install the right side service spacer between the axle housing and the differential side bearing cup.

Note: The service shim must be installed between the service spacer and the differential side bearing cup.
28. Using a brass drift and a hammer, install the right side service shim into the axle housing, if necessary.

Caution: Refer to [Fastener Caution](#).
29. Install the differential bearing caps and the bolts, and tighten the bolts to **166 N·m (122 lb ft)**.
30. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.

Note: Record the measurement.
31. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential side bearings should be approximately **0.57– 1.13 N·m (5–10 lb in)** greater than the rotating torque of the drive pinion measured earlier.
32. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and differential case bearing preload, measured

in Step 33. Multiply the value obtained by the axle ratio and the preload should be **1.7–4.0 N·m (15–35 lb in)**.

33. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
34. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to [Backlash Adjustment](#).
35. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

Shim Method

Note:

- The differential side bearings must have preload before the backlash adjustment can be started.
- In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
- Measure the service shims and the service spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
- Do not use or reuse the original cast iron production shims. Use service shims and service spacers instead.

1. Install the drive pinion, if necessary. Refer to [Drive Pinion and Ring Gear Replacement](#).

Note: Record the measurement.

2. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion which should be:
 - For NEW bearings: **2.7–3.41 N·m (24–30 lb in)**
 - For used bearings: **1.6–2.9 N·m (14–26 lb in)**

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to [Drive Pinion and Ring Gear Replacement](#).

Note: Before installation of the case assembly, ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

4. Install the differential assembly with the differential side bearings and bearing cups into the axle housing.
5. Insert one BENT 1.016 mm (0.040 in) thick service shim into the right side axle housing. Side the differential assembly towards the bent service shim in order to hold the shim in place.
6. While holding the differential assembly against the bent service shim, install one 4.318 mm (0.170 in) thick service spacer into the left side axle housing.
7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.
8. While holding the ring gear against the drive pinion, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
11. Remove the BENT shim from the right side of the axle housing.

12. Insert one 4.318 mm (0.170 in) thick service spacer into the right side axle housing.
13. Move the differential assembly towards the left side of the axle housing. While holding the differential assembly against the left side shim pack, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
14. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
15. In order to preload the differential side bearing and set the initial backlash to approximately 0.127 mm (0.005 in), adjust the thickness of left and right side shims by doing the following:
 - 15.1. Subtract 0.152 mm (0.006 in) from the measurement recorded for the left side shim in step 9. Record the measurement.
 - 15.2. Add 0.356 mm (0.014 in) to the measurement recorded for the right side shim in step 14.
16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.
17. Install the left side service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
18. Move the differential assembly towards the left side of the axle housing.

Note: The service shim must be installed between the service spacer and the differential side bearing cup.
19. Using a brass drift and a hammer, install the right side service shim into the axle housing, if necessary.
20. Install the differential bearing caps and bolts.
21. Tighten the differential bearing cap bolts to **166 N·m (122 lb ft)**.
22. Rotate the pinion several times to ensure the bearings have seated.

Note: Record the measurement.
23. Using an inch-pound torque wrench, measure the rotating torque of drive pinion and differential case side bearings should be approximately **0.57– 1.13 N·m (5–10 lb in)** greater than the rotating torque of the drive pinion measured earlier.

Note: If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
24. Determine the preload for the differential side bearings by performing the following calculation:
 - 24.1. Subtract the drive pinion rotating torque, measured in step 2, from the drive pinion and differential case side bearing rotating torque, measured in step 22.
 - 24.2. Multiply the value obtained by the axle ratio. This value equals the preload for the differential side bearings should be **1.7–4.0 N·m (15–35 lb in)**.
25. Once the differential side bearing preload is within specifications, measure the backlash between the ring gear and the drive pinion and adjust, if necessary. Refer to [Backlash Adjustment](#).
26. Once backlash and differential side bearing preload is within specifications, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

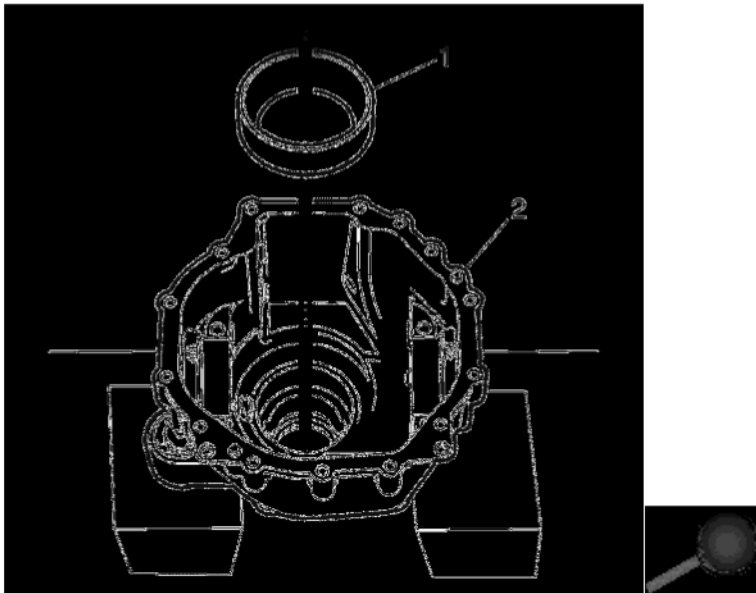
Rear Axle Assemble (250 mm)

Special Tools

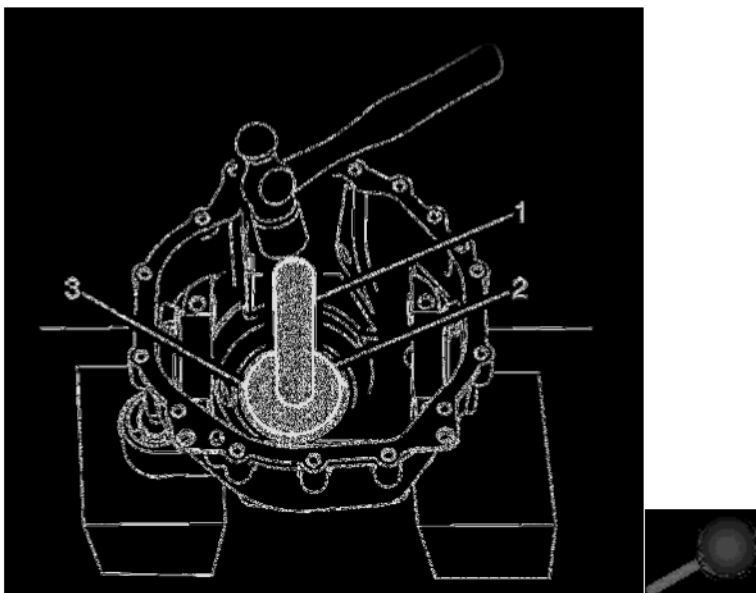
- J-8592 Driver Handle 3/4 in-12
- J-44412 Inner Pinion Bearing Installer
- J-44417 Outer Pinion Race Installer
- J-45012 Holding Fixture
- J-8001 Dial Indicator Set
- J-22779 Side Bearing Backlash Gauge

For equivalent regional tools, refer to [Special Tools](#).

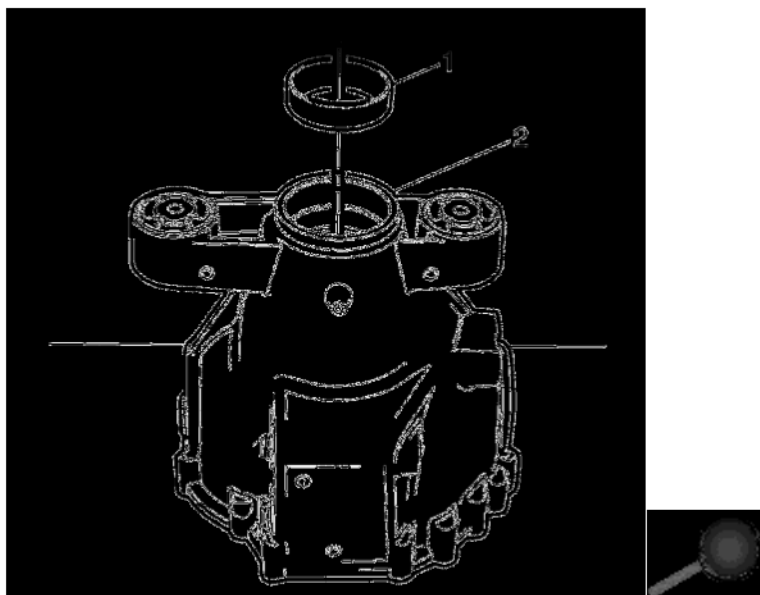
[Assemble Procedure](#)



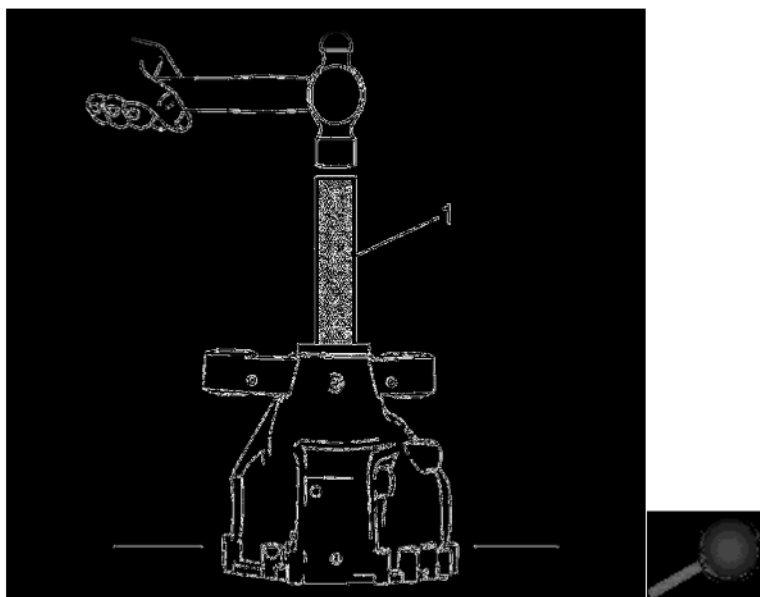
- Note:** Ensure that the inner pinion bearing cup is seated evenly in the differential carrier.
1. Position the inner pinion bearing cup (1) in the differential carrier (2).



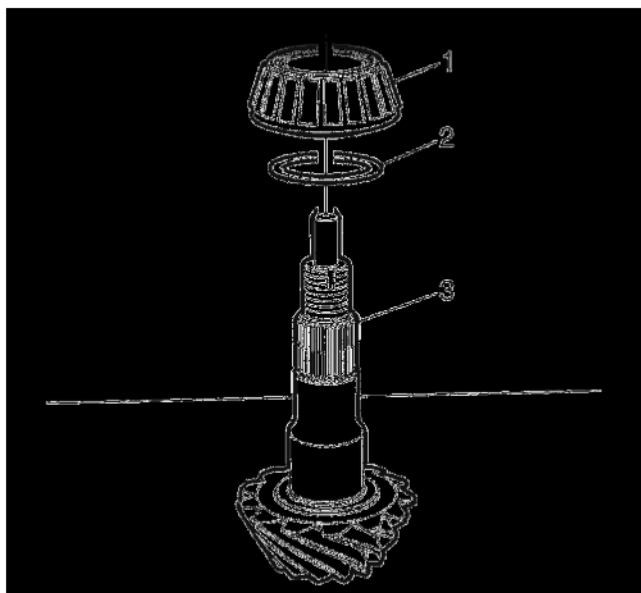
2. Using the J-44417 installer (2), J-8592 handle (1) and the hammer, install the inner pinion bearing (3).



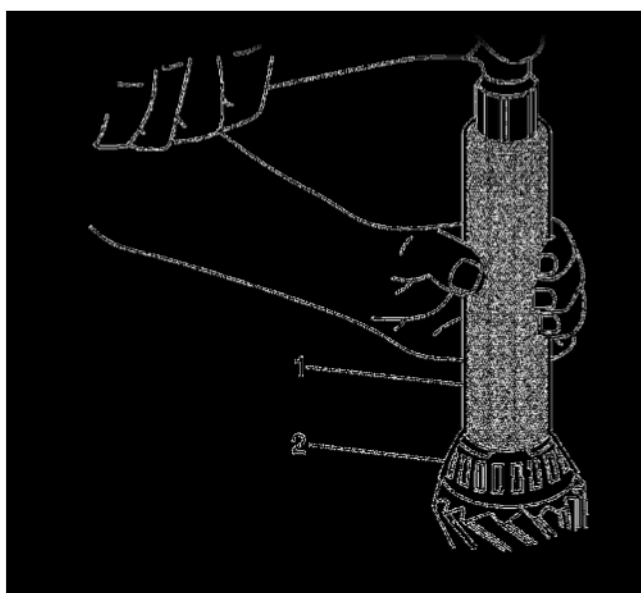
- Note:** Ensure that the outer pinion bearing cup is seated evenly in the differential carrier.
3. Position the outer pinion bearing cup (1) in the differential carrier (2).



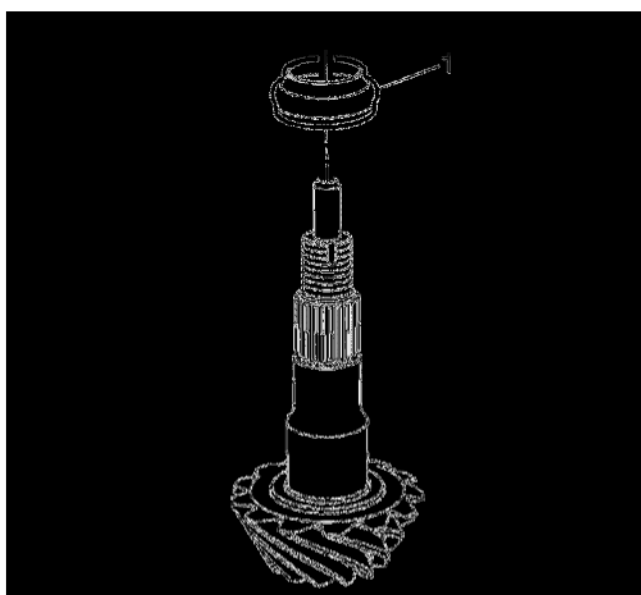
4. Using the J-8592 handle (1), J-8608 installer (2) and the hammer, install the outer bearing cup.
5. Determine the selective shim thickness for the pinion bearing. Refer to [Pinion Depth Adjustment](#)



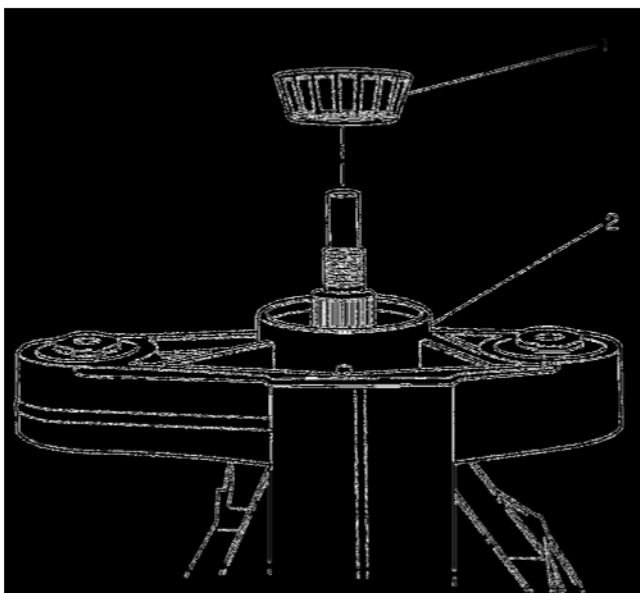
6. Install the selective shim (2) and the inner pinion bearing (1) and the pinion drive gear (3).



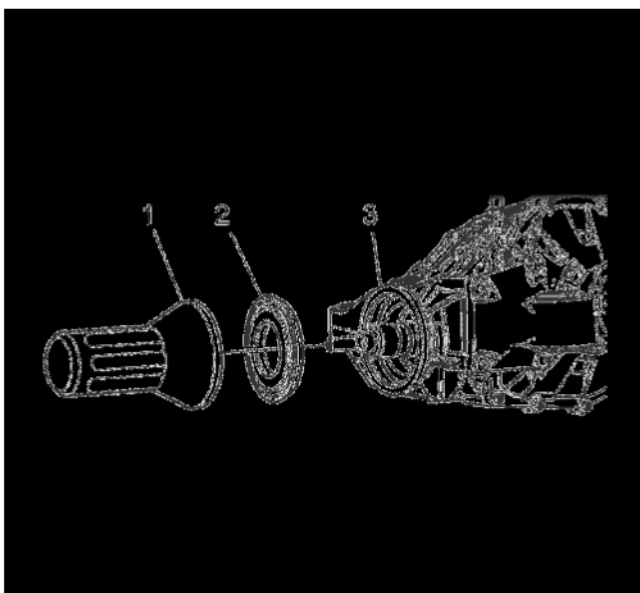
7. Using the J-44412 installer (1), install the inner pinion bearing race (2).



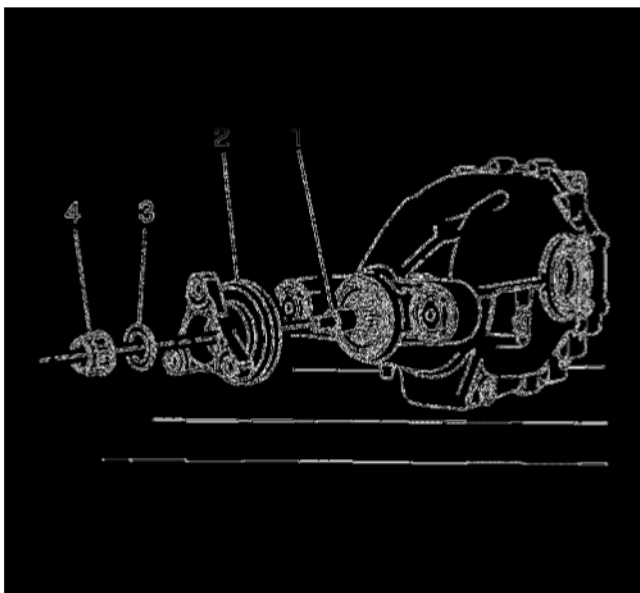
8. Install the NEW collapsible spacer (1).
9. Use the proper axle lubricant on the pinion bearings, refer to [Adhesives, Fluids, Lubricants, and Sealers](#).



10. Install the pinion tail bearing (1) to the differential housing (2).

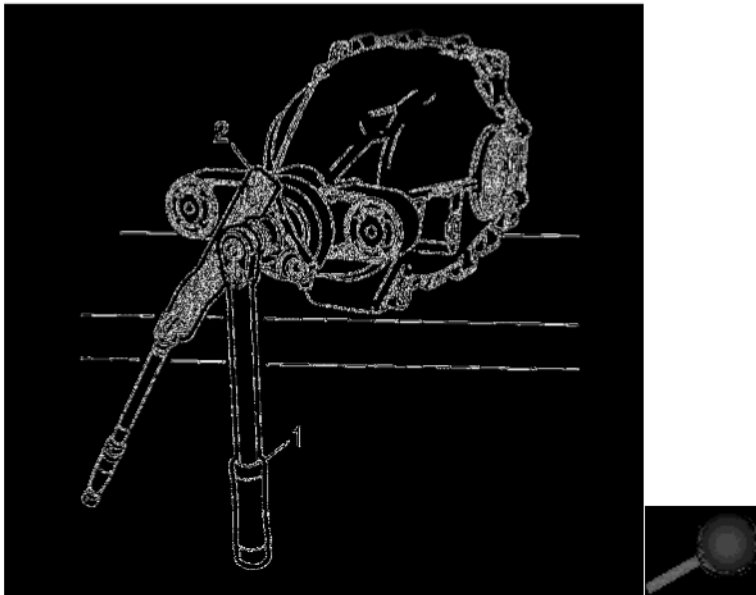


11. Using the appropriate tool (1), install the NEW pinion seal (2) in the differential carrier (3).

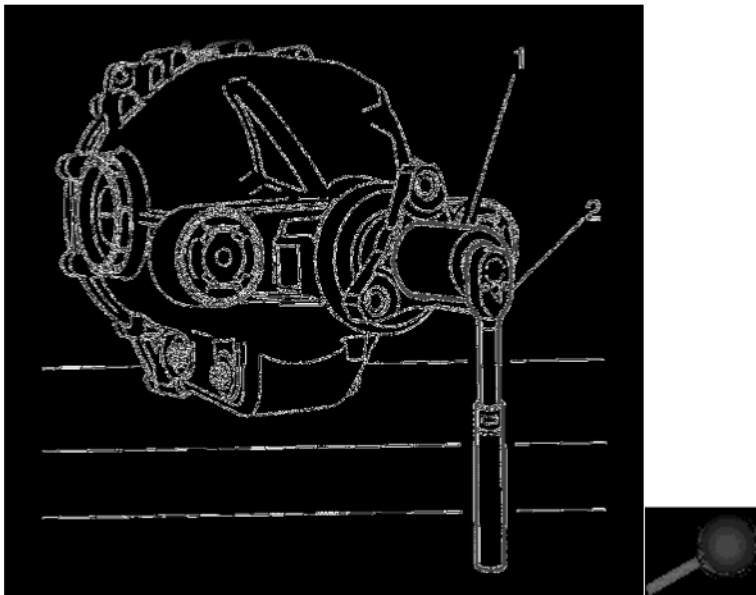


12. Using a soft face hammer, seat the pinion flange (2) on the pinion shaft (1) until a few pinion shaft threads show through the flange.
13. Install the pinion washer (3).

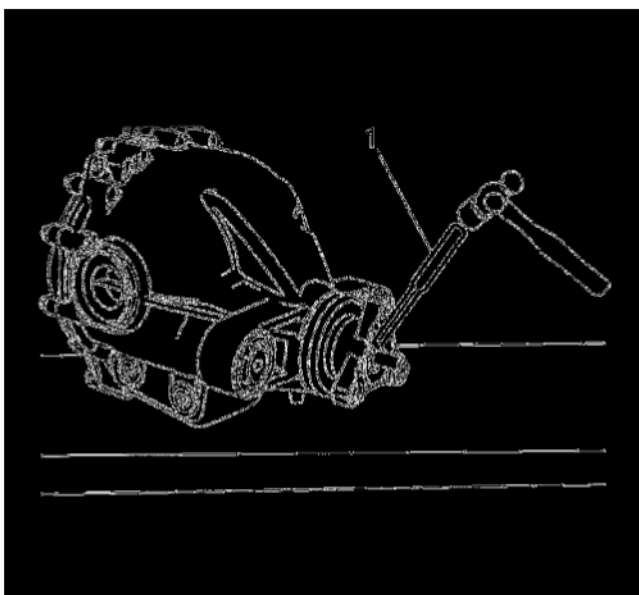
14. Finger start the NEW pinion nut (4) pinion shaft (1).



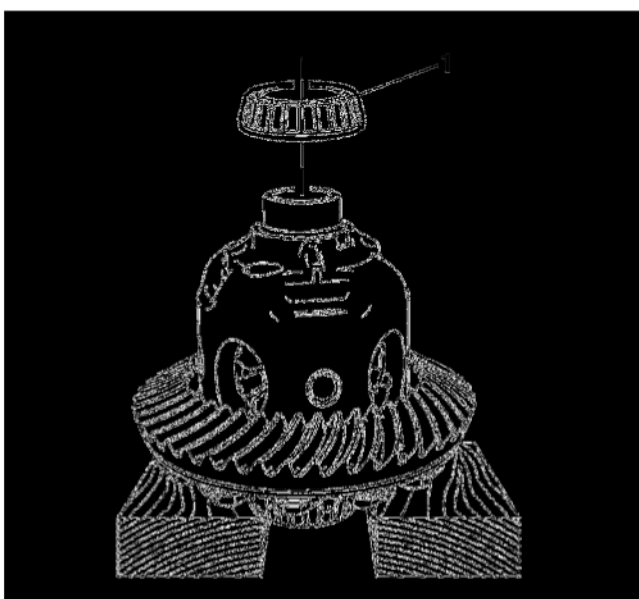
15. Using the J-45012 fixture (2), a breaker bar and a torque wrench with the proper size socket (1), tighten the pinion until all the end play is removed.
16. Remove the J-45012 fixture with the breaker bar (2).



17. Using a inch pound torque wrench (2) the proper size socket (1), measure the rotating torque which should be:
- For NEW bearings **2.7-3.4 N·m (24-30 lb in)**
 - For used bearings **1.6-2.9 N·m (14-26 lb in)**
18. If the rotating torque measurement is below the minimum torque value, continue to tighten the pinion nut in small increments until the torque is within the specifications.
19. If the rotating torque exceeds the specified values, the pinion gear will have to be removed and a NEW collapsible spacer installed.

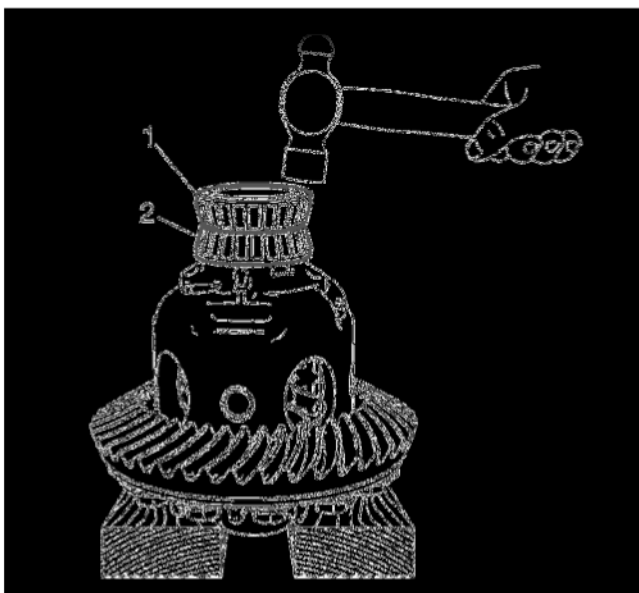


20. Using a punch and a hammer (1), stake the pinion nut in both the slots in the pinion shaft.



Note: Ensure that the bearing is positioned evenly on the differential case.

21. Position the new bearing (1) on the differential case.

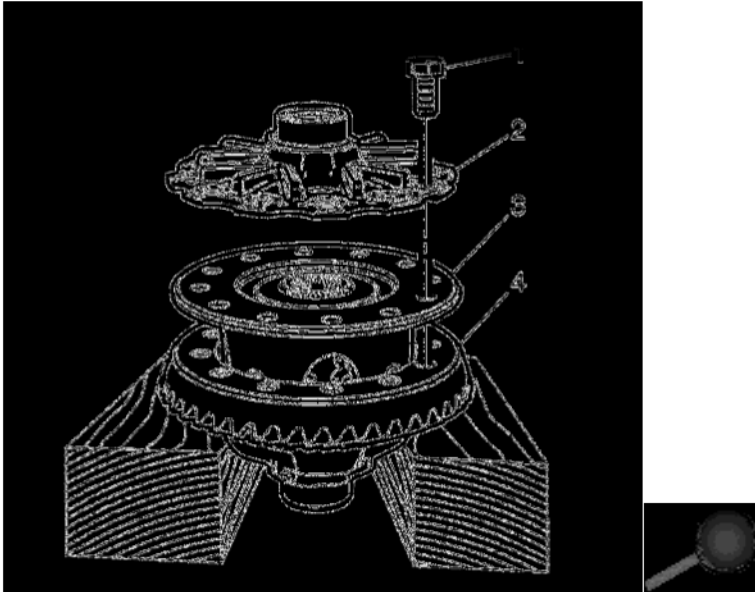


Note:

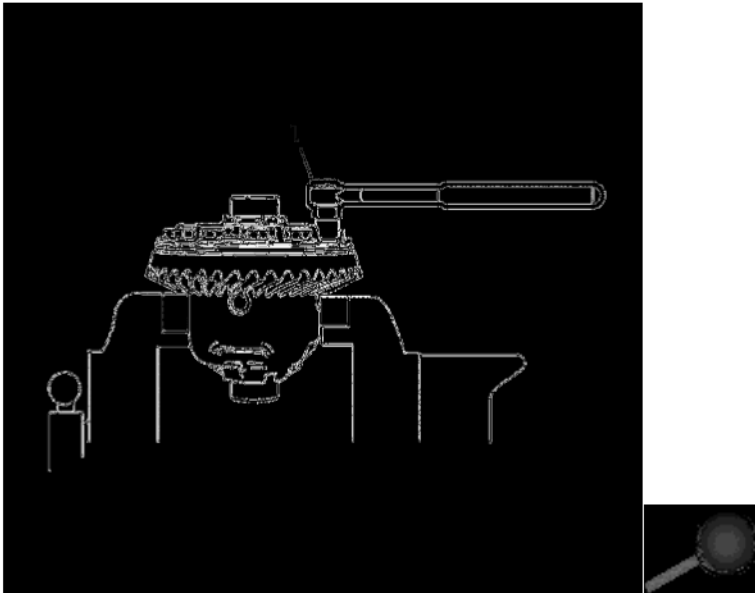
- Use 2 blocks of wood to protect the differential case while performing the following procedure.

- Ensure that the new bearing (2) is fully seated.

22. Using the old bearing (1) and a hammer, install the new differential case bearing (2).



23. Install the ring gear (4) on to the differential case (3).
 24. Position the differential flange (2) on the differential case (3).
 25. Install the New ring gear bolts (1) and tighten by hand.
 26. Install the differential case in a soft jawed vise.



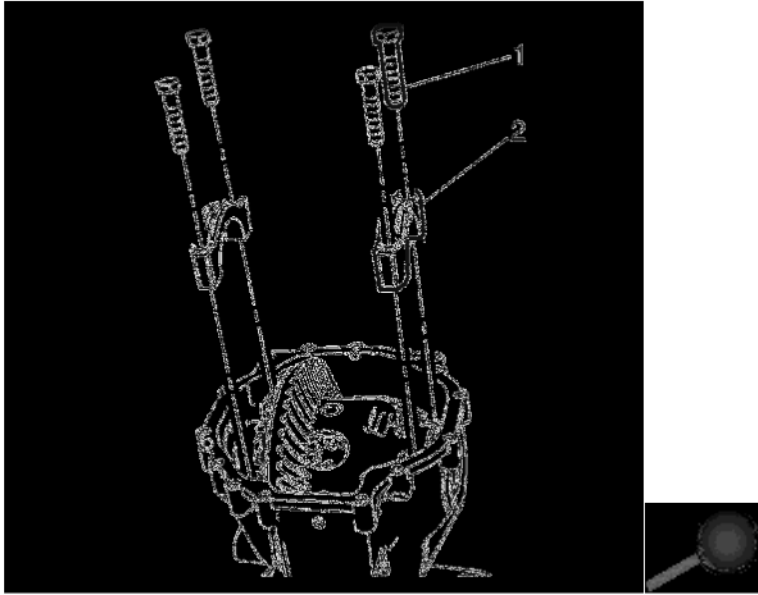
Caution: Refer to [Fastener Caution](#).

Note: When tightening the ring gear bolts, tighten the bolts in a criss-cross pattern.

27. Using the proper sized socket and torque wrench (1), tighten the New ring bolts to 295 N•m (218 lb ft).

Note: Compress the housing just enough to install the differential case assembly. DO NOT compress the housing more than **0.254mm (0.01 inch)**.

28. Using a 14 inch C clamp, compress the rear axle housing just enough to install the differential case assembly.
 29. Install the differential case assembly in the differential housing.
 30. Use the proper axle lubricant on the bearings, refer to [Adhesives, Fluids, Lubricants, and Sealers](#).



Note: When installing the bearing caps make note of the marks on the bearing caps indicating left and right.

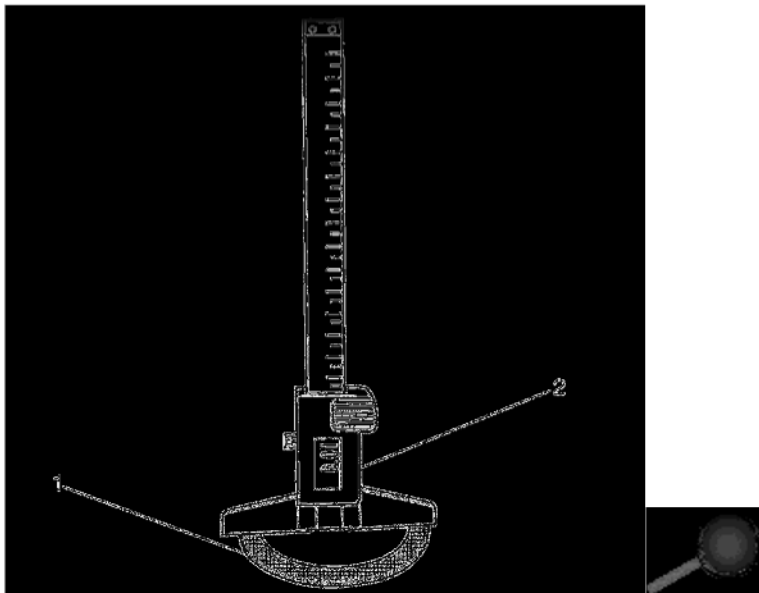
Note: Do not torque the bearing cap bolts at this time. Hand tighten the bearing cap bolts.

31. Install the bearing caps (2) and bearing cap bolts (1) on the differential case.
32. Adjust the differential side bearing preload. Refer to [Differential Carrier Bearing Preload Adjustment](#).
33. Check the gear tooth contact pattern. Refer to [Gear Tooth Contact Pattern Inspection](#).
34. Torque the bearing cap bolts (1), tighten bolts to 70N•m (52 lb ft).
35. Install the differential housing cover. Refer to [Rear Axle Housing Cover Seal Replacement](#).
36. Install the differential assembly into the vehicle. Refer to [Differential Replacement](#).
37. Refill the differential assembly. Refer to [Rear Axle Lubricant Replacement](#).
38. Lower vehicle.

Rear Axle Assemble (210 mm)

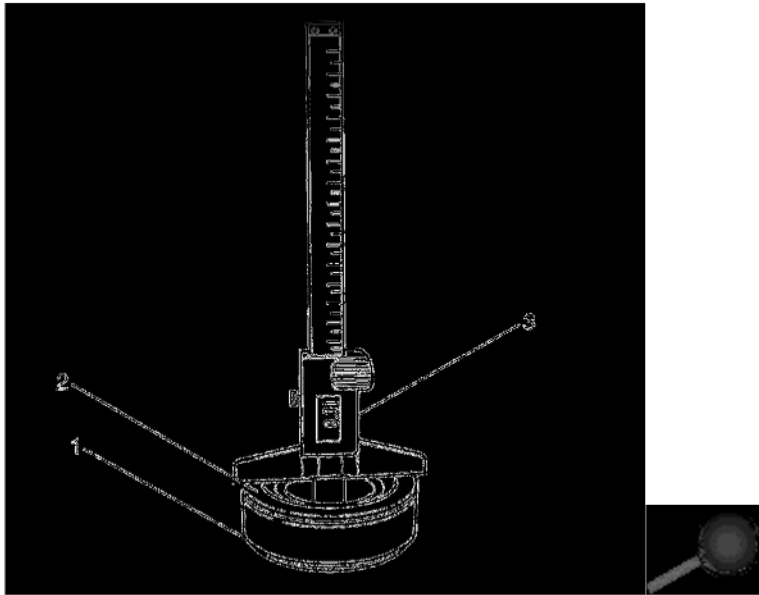
Special Tools

- DT-48721 Right Axle Seal Installer
- DT-48722 Left Axle Seal Installer
- DT-48723 Pinion Head Bearing Cup Installer
- DT-48725 Pinion Tail Bearing Cup Installer
- DT-48727 Pinion Seal Installer
- DT-48728 Differential Bearing Installer
- DT-48806 Pinion Bearing Measurement Spacer
- DT-48807 Pinion Head Bearing Installer



Note: Use DT-48806 pinion bearing measurement spacer otherwise bearing height cannot be measured correctly.

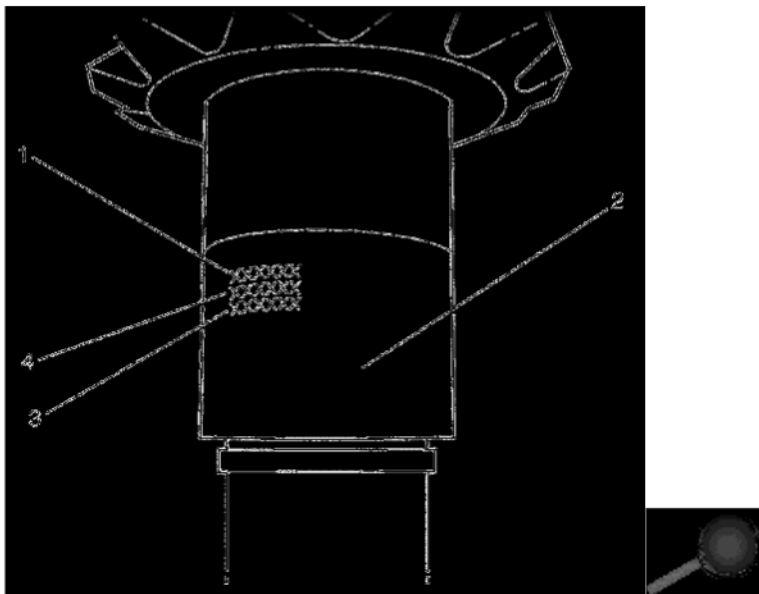
1. Measure the thickness of DT-48806 pinion bearing measurement spacer (1) using a depth gauge (2) (e.g. – 3.67 mm).
2. Record the thickness of the DT-48806 pinion bearing measurement spacer (1).



Note: Rotate the pinion head bearing (2) to settle for correct measurement.

3. Measure the thickness of the *DT-48806* pinion bearing measurement spacer (1) and the pinion head bearing (2) with the depth gauge (3) (e.g. – 33.925 mm).
4. Record the thickness of the *DT-48806* pinion bearing measurement spacer (1) and pinion head bearing (2).
5. Subtract the thickness of *DT-48806* pinion bearing measurement spacer (1) 3.67 mm from the total thickness of the pinion bearing measurement spacer (1) and the pinion bearing (2) 33.925 mm to determine the pinion head bearing (2) thickness.

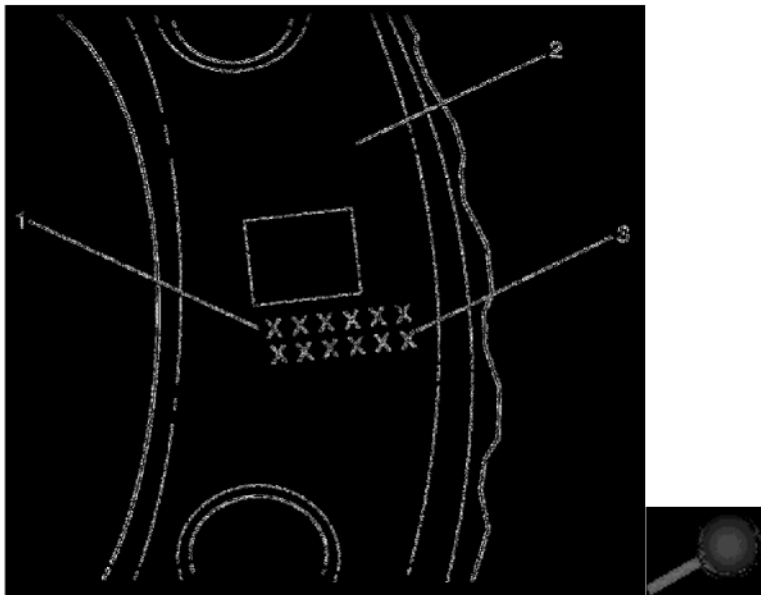
Example – The pinion head bearing (2) thickness is 33.925 mm – 3.67 mm = 30.255 mm.



6. Record the serial number (1), set number (3) and size (4) which are stamped into the pinion gear (2).

Example:

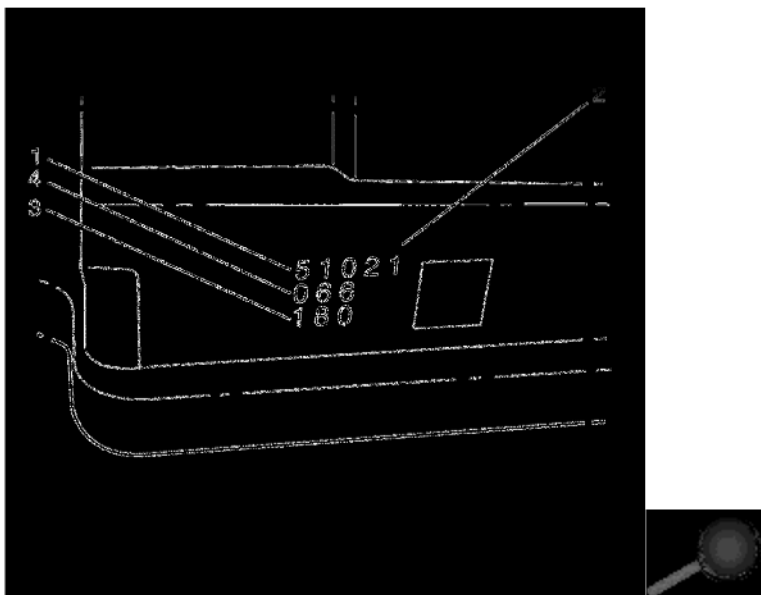
- Serial Number A0200008 (1)
- Pinion Size 106.475 mm (4)
- Set Number 260125 (3)



7. Check that the serial number (1) and set number (3) which are stamped into the ring gear (2) match those of the pinion set in step 6.

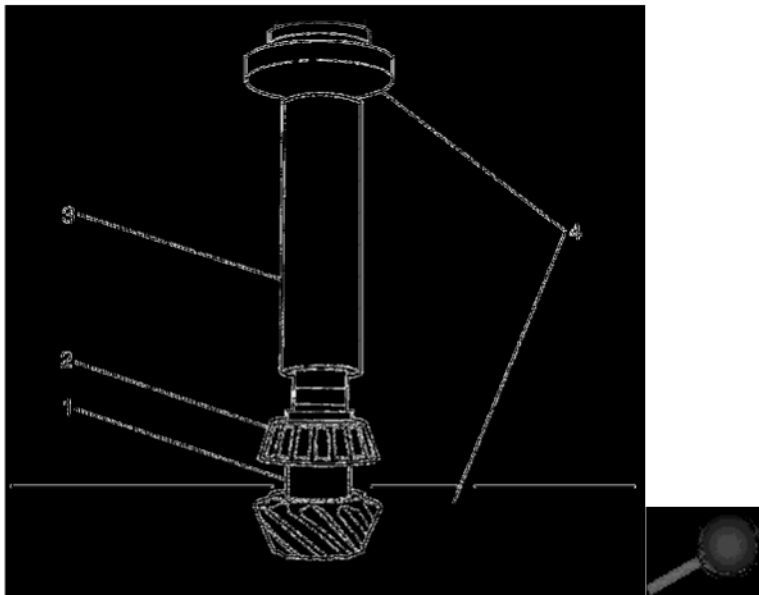
Example:

- Serial Number A0200008 (1)
- Set Number 260125 (3)



Note: The identification number (1, 3, and 4) is stamped into the differential housing (2).

8. Identify the differential housing.
- Manufacturing date (1)
 - Item number (4)
 - Size equals 138 plus the number on the housing. Example – 138.180 mm (3)
9. Record the differential housing size. Example – 138.180 mm.
10. Determine the thickness of the pinion shim.
- Add the pinion plus the bearing Example – $106.475 \text{ mm} + 30.255 \text{ mm} = 136.730 \text{ mm}$.
 - Subtract the pinion plus the head bearing from the housing size, also subtract the correction factor. The correction factor is .05 mm. Example $138.180 - 136.730 - 0.05 = 1.40 \text{ mm}$ thickness shim required.
11. Position the correct shim onto the pinion head.

**Note:**

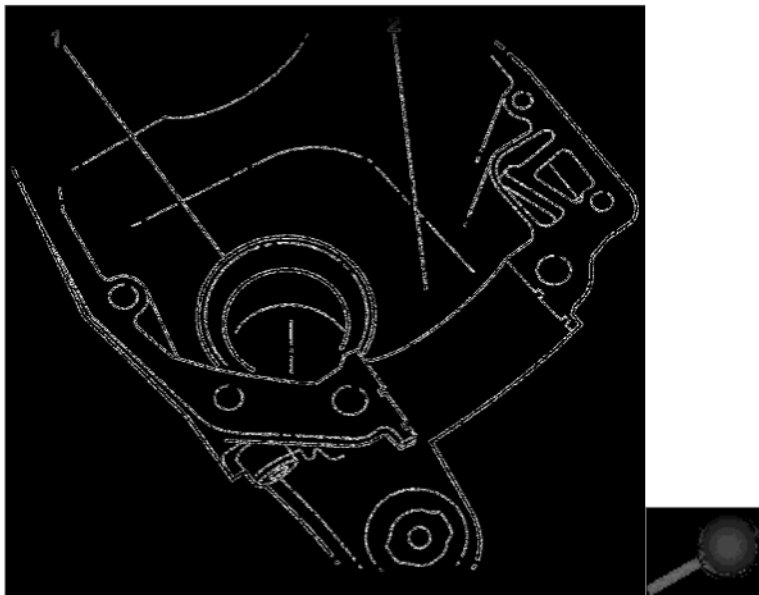
- Use *DT-48807* pinion head bearing installer (3) to aid in pinion bearing (2) installation.
- Position the pinion gear (1) onto an aluminum plate in suitable press (4) before pressing the pinion head bearing (2) to prevent damage to the pinion (1).

12. Position the NEW pinion head bearing (2) onto the pinion gear (1).

Note: Use a suitable press (4) to install the NEW differential pinion head bearing (2).

13. Press the NEW pinion head bearing (2) onto the pinion gear using *DT-48807* pinion head bearing installer (3).

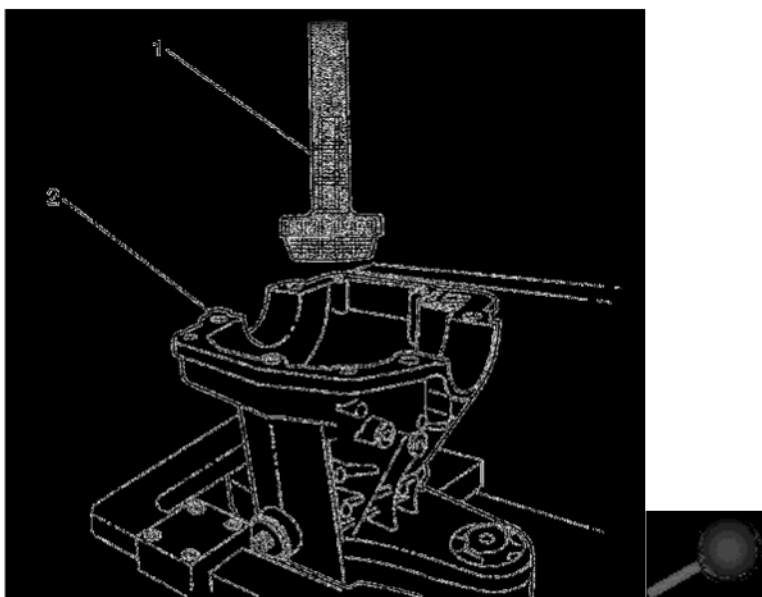
14. Clean the ring gear and the contact area of the differential.



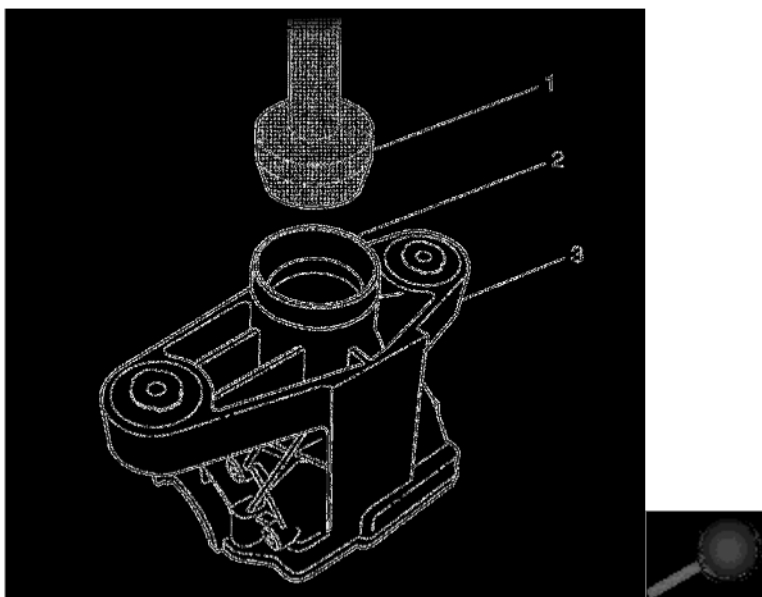
Warning: Refer to [Safety Glasses Warning](#).

Note: To make fitting easier cool the bearing cups (2).

15. Position the NEW head bearing cup (1) into the differential housing (2).

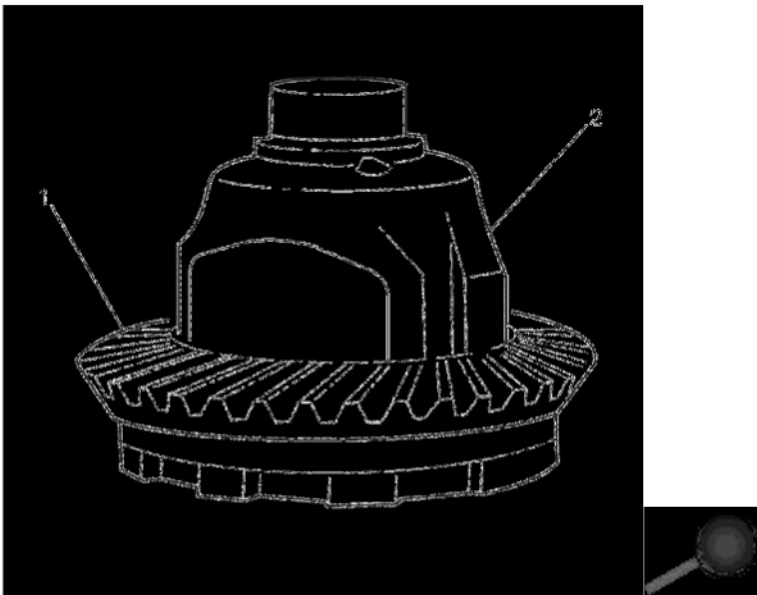


16. Press the NEW head bearing cup in with *DT-48723* pinion head bearing cup installer (1) and rotate until it fits tightly in the front differential housing (2).
17. Use a feeler gauge to make sure the NEW head bearing cup is seated correctly.



Note: To make fitting easier cool the bearing cup (2).

18. Position the NEW tail bearing cup (2) to the differential housing (3).
19. Press the NEW tail bearing cup in with *DT-48725* pinion tail bearing cup installer (1) and rotate until it fits tightly in the front differential housing (3).
20. Use a feeler gauge to make sure the NEW tail bearing cup is seated correctly.



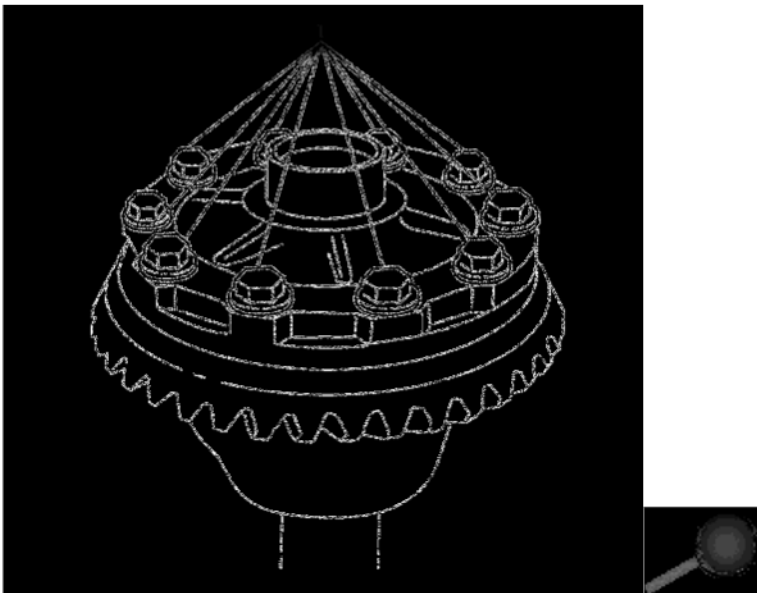
Note: Warm the ring gear (1) evenly using a hotplate until it fits over the differential (2).

21. Position the ring gear (1) to the differential (2).

Note:

- Do not fully tighten the NEW ring gear to differential retaining bolts at this stage.
- The ring gear has to cool before the ring gear to differential retaining bolts can be tightened.

22. Install two NEW ring gear to differential retaining bolts.



Caution: Refer to [Fastener Caution](#).

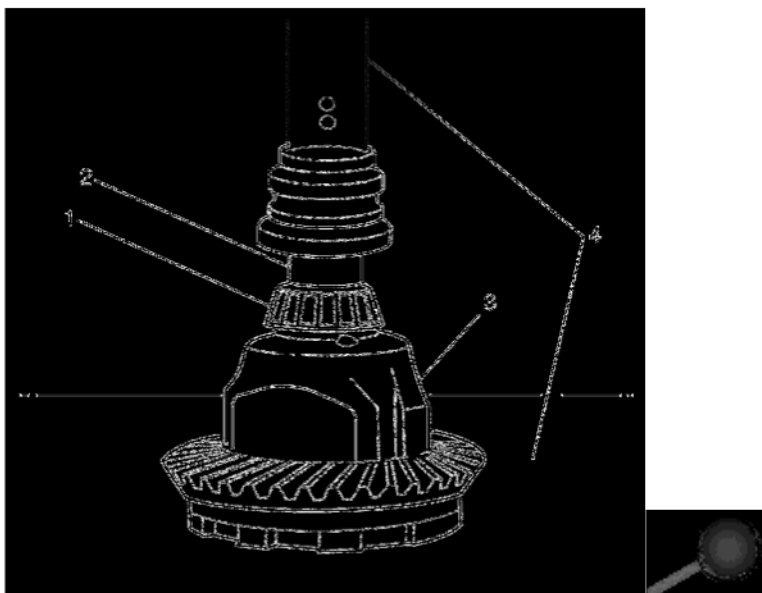
Note:

- The ring gear has to cool before the ring gear to differential retaining bolts (1) can be tightened.
- Tighten the ring gear to differential retaining bolts (1) working diagonally.

23. Install the remaining NEW ring gear to differential retaining bolts (1).

Tighten

Tighten the bolts to 125 N•m (96 lb ft).

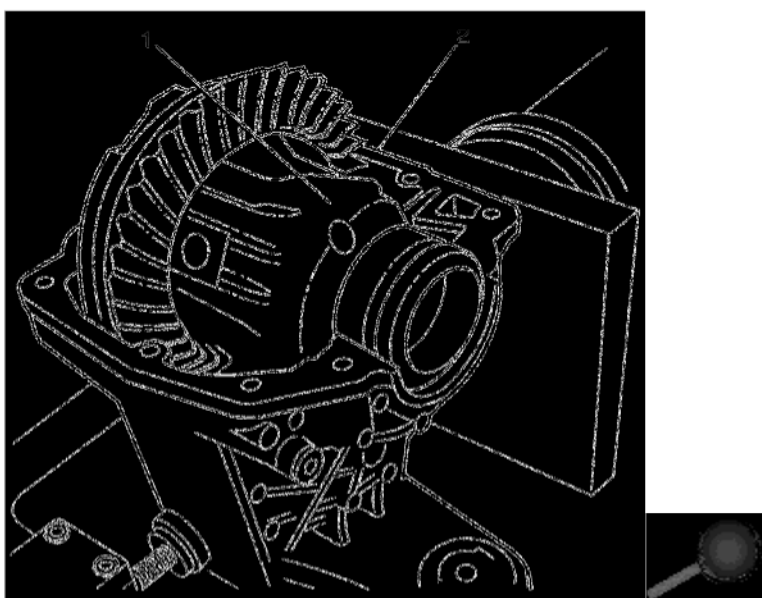


Note: Use a suitable press (4) to install the right differential bearing (1).

24. Press the right differential bearing (1) to the differential (3) with *DT-48728* differential bearing installer (2).

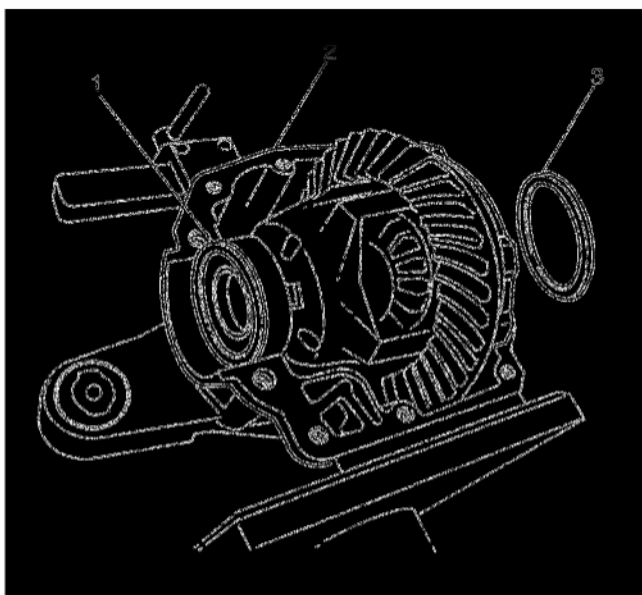
Note: Use a suitable press (4) to install the left differential bearing.

25. Rotate and press the left bearing to the differential with *DT-48728* differential bearing installer (2).

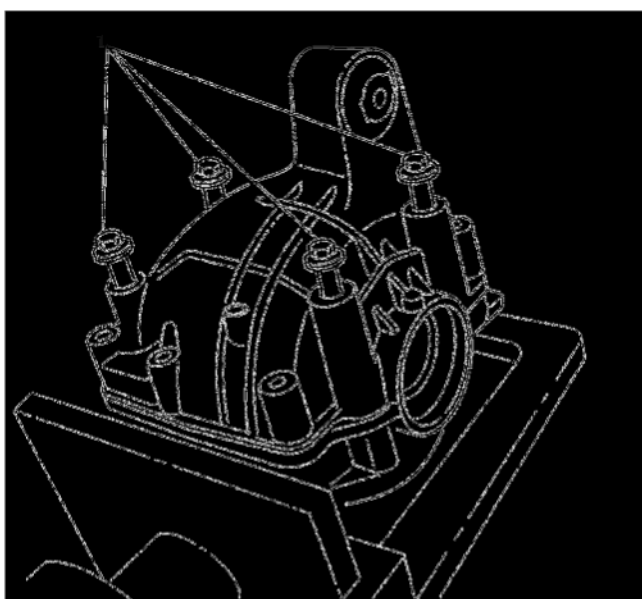


Note: Position the differential (1) to the differential housing (2) using a suitable tool or with the aid of an assistant.

26. Position the differential (1) to the differential housing (2).



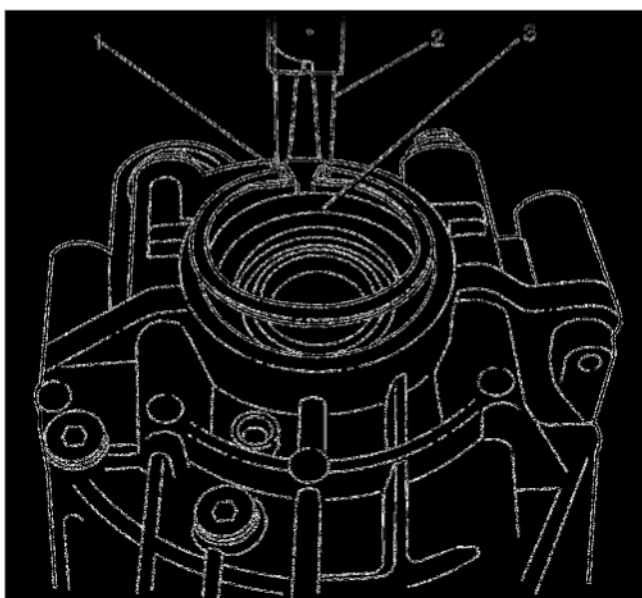
27. Position the left shim (3) and right shim (1) to the original position in the differential housing (2).



Note: Do not fully tighten the bearing bolts (1) at this stage. The differential has to be able to move freely within the differential housing to allow fitment of the circlip.

28. Position the differential housing cover to the differential housing and retain with the 4 bearing bolts (1).

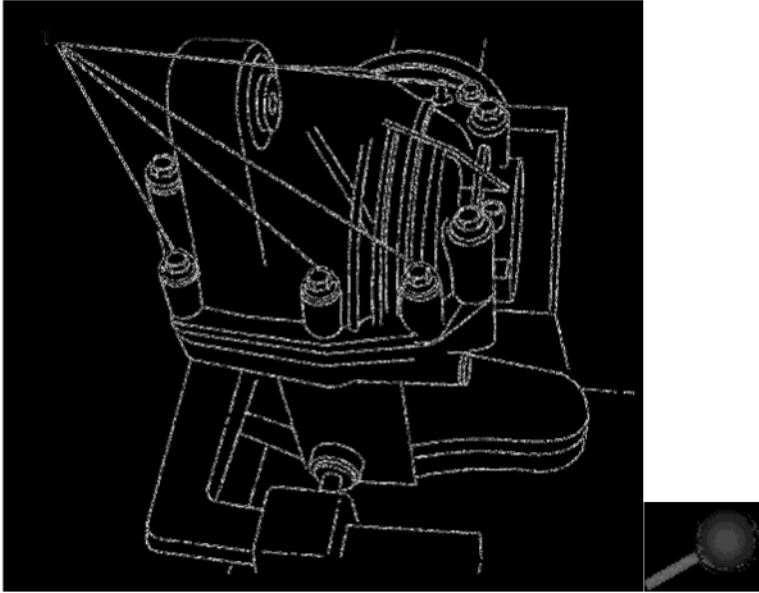
29. Turn the differential assembly left through 90° for the differential to slide down in the housing.



Note: Align the opening of the circlip (1) with the opening on the differential housing.

30. Install the circlip (1) to the differential (3) with circlip pliers (2).

31. Make sure the circlip (1) is fitted correctly.

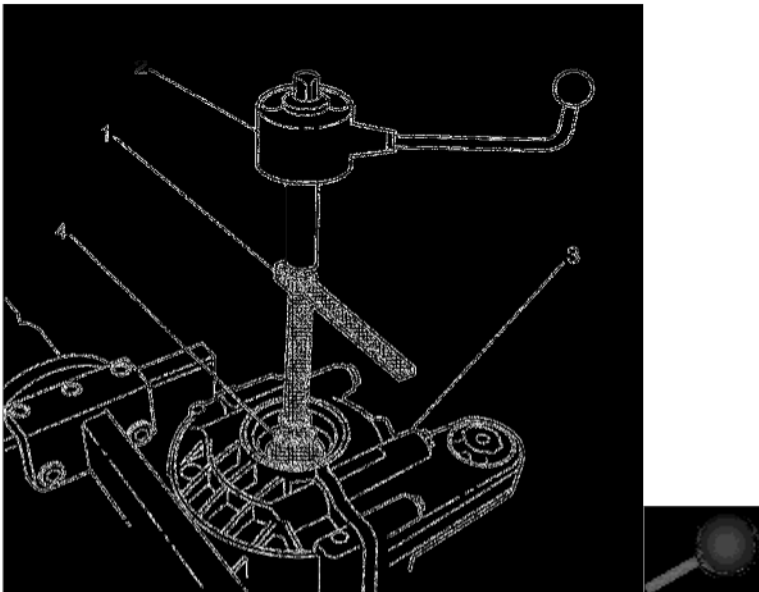


Note: Tighten the differential housing cover to differential housing retaining bolts (1) working diagonally.

32. Install the remaining differential housing cover to differential housing retaining bolts (1).

Tighten

- Tighten the housing bolts to 53N•m (39 lb ft).
- Tighten the bearing bolts to 153N•m (112 lb ft).



33. Position the backlash tool (1) to the differential assembly (3).

34. Secure the backlash tool (1) to the differential assembly (3) by adjusting the spreading nut (4).

35. Mount the turning torque gauge (2) to the backlash tool (1).

36. Rotate the turning torque gauge (2) clockwise and record reading.

Note: This figure is for NEW bearings only.

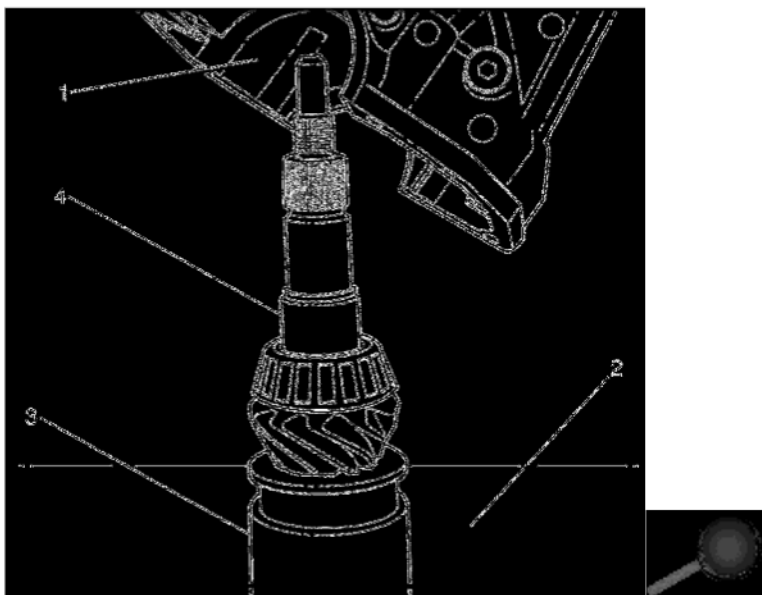
37. Turning torque should be between 2.0 to 3.3N•m (27 lb in).

38. If the measured turning torque is outside the tolerance:

- Remove the rear differential housing.
- If turning torque is too high or too low, fit a thinner or thicker shim respectively.
- Repeat from steps 5-11 from the disassembly procedure then from step 24 onwards in the assembly procedure.

- Check turning torque. Repeat until the turning torque is correct.

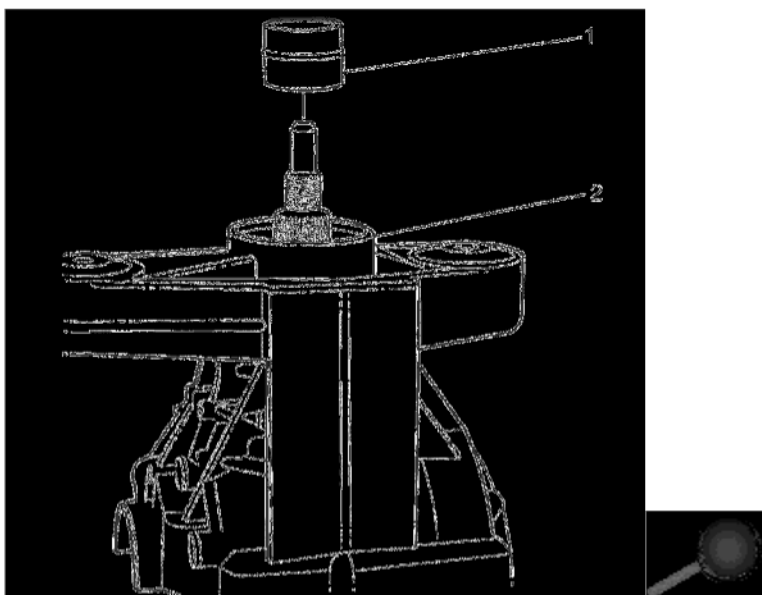
39. Remove differential assembly. Repeat steps 5 through 11 from the disassembly procedure.



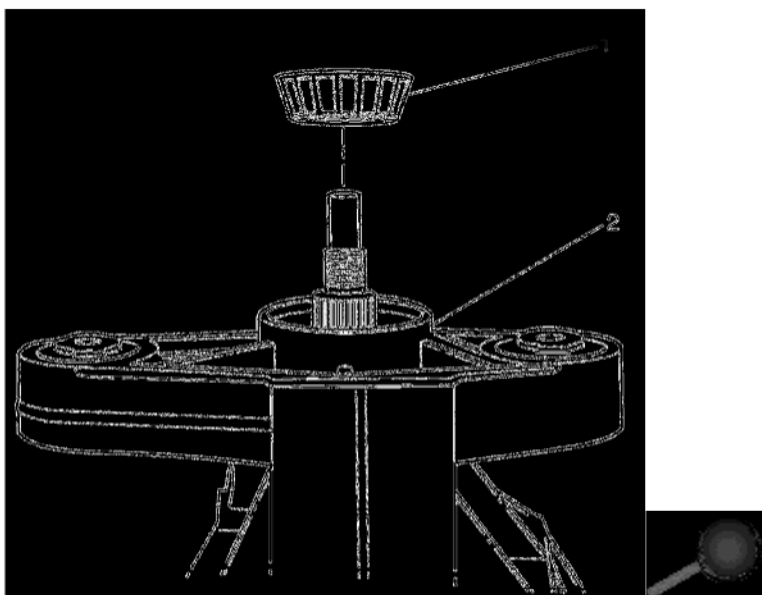
40. Position the pinion (4) on DT-48728 differential bearing installer (3) in a suitable press (2).

Note: The differential housing (1) must not rest on the press (2). Use a suitable supporting tool (3) to elevate pinion (4).

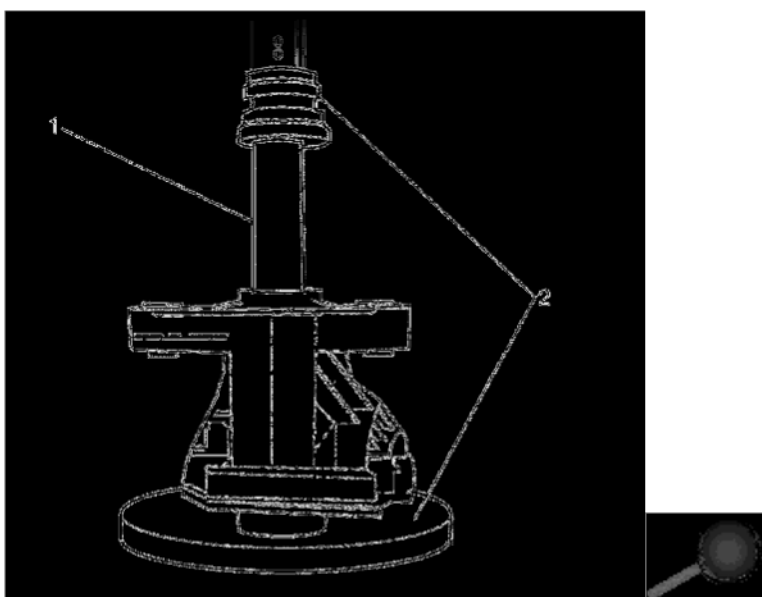
41. Position the differential housing (1) over the pinion gear (4).



42. Position a NEW collapsible spacer (1) to the differential (2).



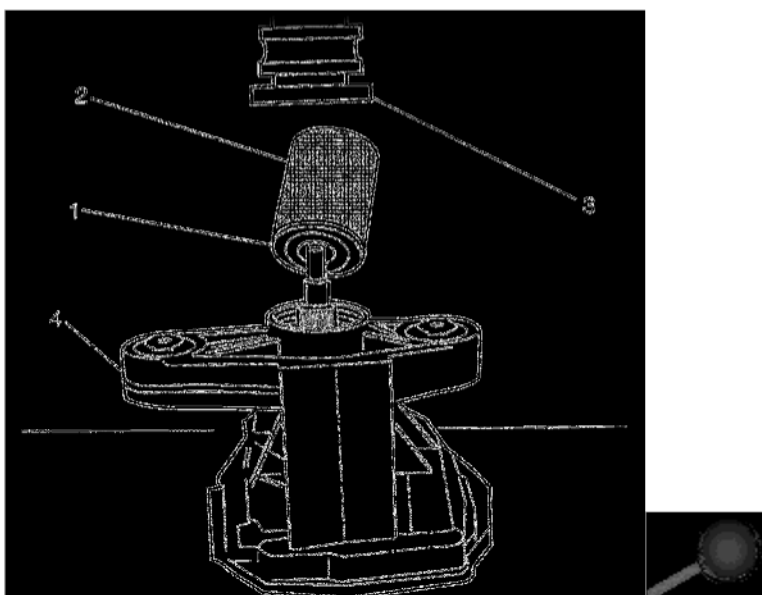
43. Position the pinion tail bearing (1) to the differential housing (2).



Note: Take care to only press the tail bearing until it rests on the collapsible spacer so that it is not damaged.

44. Use a suitable press (2) and DT-48723 pinion head bearing cup installer (1) to press the tail bearing until it rests against the collapsible spacer.

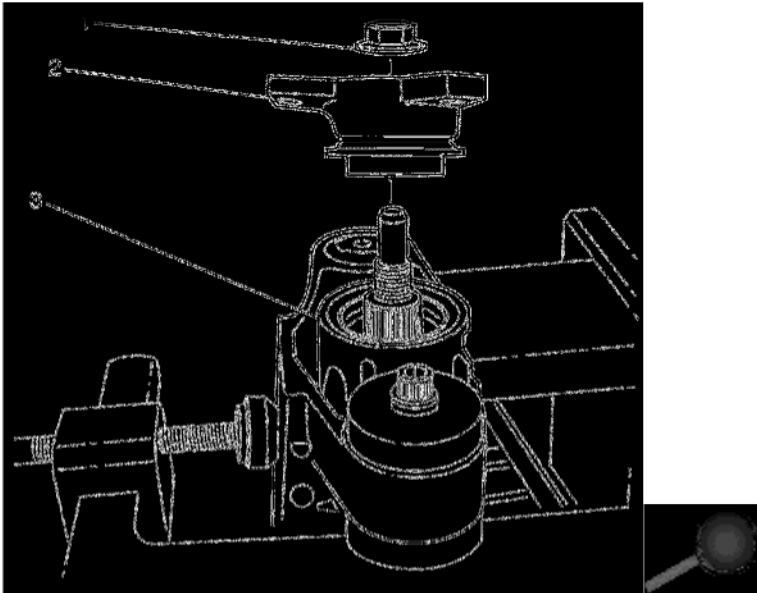
45. Remove the supporting tool so that the differential housing rests on the table.



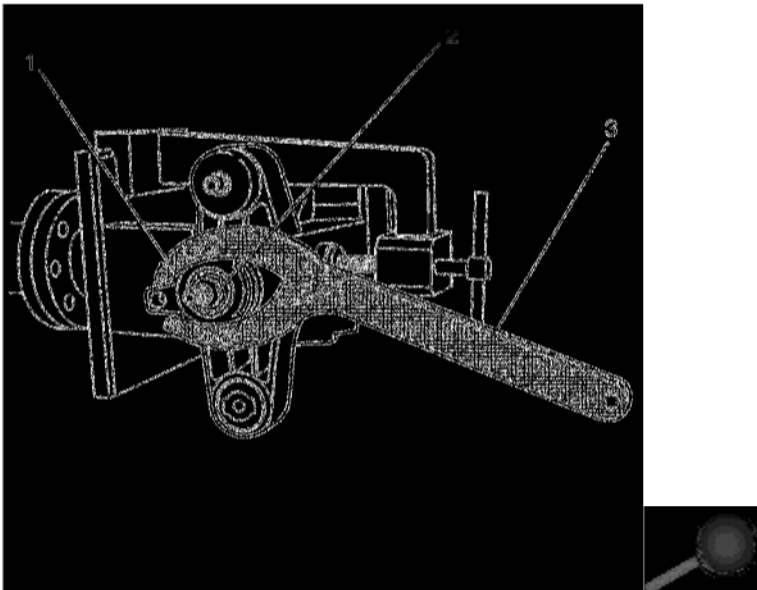
46. Lubricate the NEW pinion flange seal (1) with correct grease. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

Note: Use DT-48727 pinion seal installer to install the seals to correct depth.

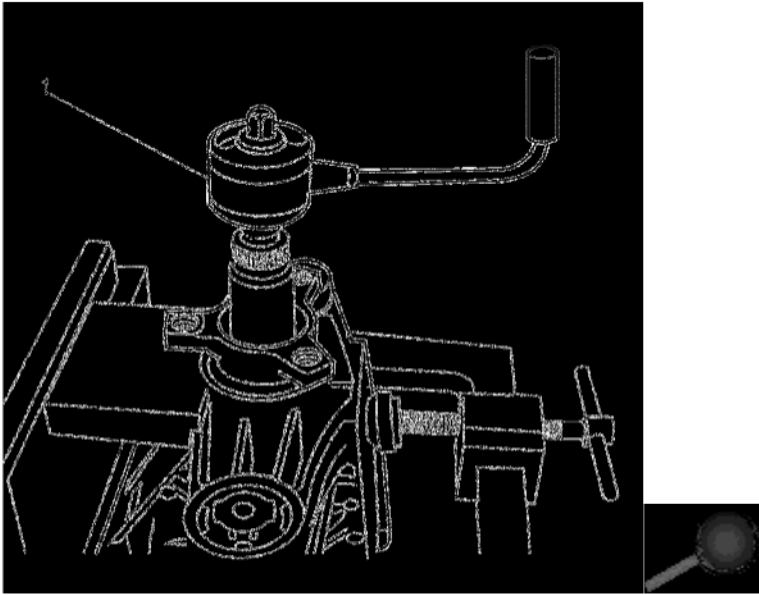
47. Install the pinion flange seal (1) to the differential housing (4) with DT-48727 pinion seal installer (2) in a suitable press (3).
48. Mount the differential housing (4) on a suitable holding device.



49. Position the pinion flange (2) to the differential (3).
50. Lubricate the contact surface of the prevailing torque pinion flange retaining nut (1) with correct grease. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
51. Apply correct LOCTITE to the thread of the NEW prevailing torque pinion flange retaining nut (1).
- Note:** Do not fully tighten the NEW prevailing torque pinion flange retaining nut at this stage. Overtightening will require disassembly and fitment of a new collapsible spacer and possibly bearings.
52. Install the NEW prevailing torque pinion flange retaining nut (1) to the differential (3).



53. Install the universal pulley holder (3) to the pinion flange (1).
54. Tighten the prevailing torque pinion flange retaining nut (2) carefully until it has no play.
55. Remove the universal pulley holder from the pinion flange (1).
56. Turn the differential assembly through 90 degrees.



57. Position the turning torque gauge (1) to the prevailing torque pinion flange nut.

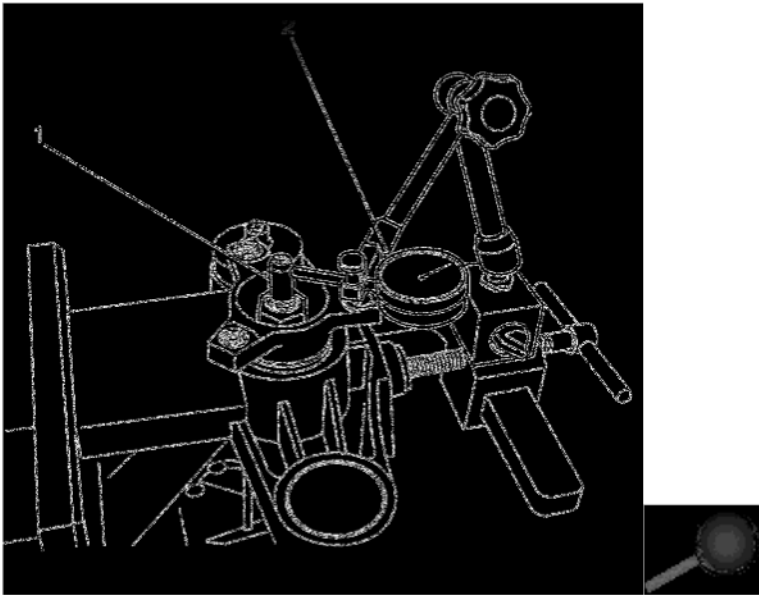
58. Turn the turning torque gauge (1) in a clockwise direction and record reading.

Note: This torque figure is for NEW bearings only.

59. Turning torque should be between 2.2 and 2.7 N•m (20–25 lb in).

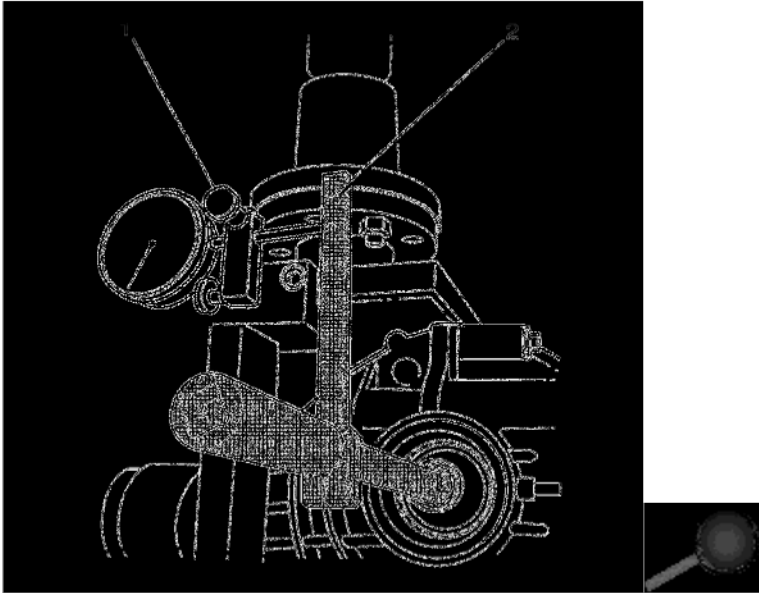
60. If the turning torque is below specified tolerance, tighten the prevailing torque pinion flange retaining nut in small steps and check turning torque until specified turning torque is reached.

61. If the turning torque is above specified tolerance disassemble, fit new collapsible spacer and repeat until correct specification is achieved.



62. Position a dial gauge (2) to measure the concentric running on centering while turning the pinion (1).

63. If the measured value is above 0.1 mm remove the pinion flange and re-install at a different angle. Repeat steps 49–63 in the assembly procedure. Make sure the turning torque is 0.1–0.2 N•m higher than recorded in step 60 but not higher than 2.7 N•m.



64. Position the backlash tool (2) to the differential assembly.

Note: The location of the dial gauge on the backlash tool (2) arm corresponds to the edge of the ring gear (210 mm).

65. Position the dial gauge (1) to the backlash tool (2).

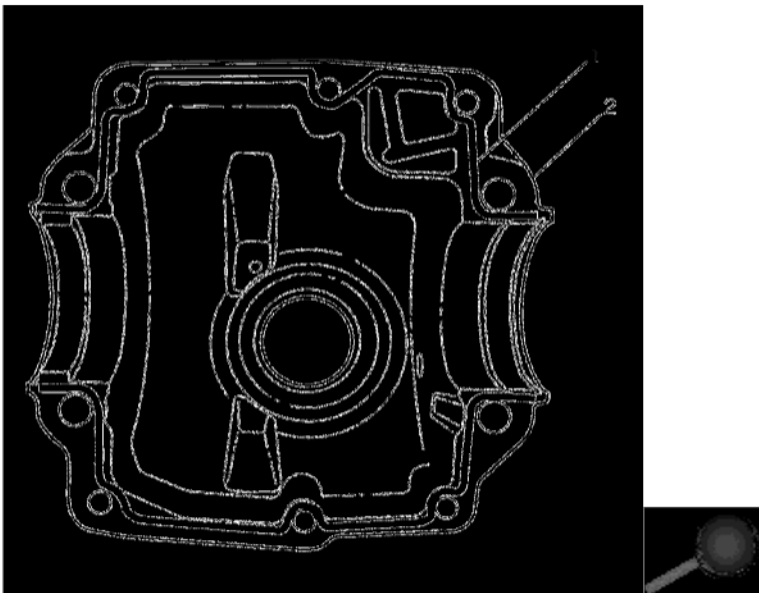
66. Use a suitable tool to move the backlash tool (2) within the backlash and record the reading.

67. Backlash must be between 0.07 and 0.18 mm.

68. If the backlash is not between the specified tolerance, it must be adjusted with differential shims otherwise turning torque set during steps 35–40 will be changed.

69. If a 0.05 mm thinner shim is used on the right a .05 mm thicker shim has to be added to the left.

70. Remove the rear differential housing. Refer to steps 5 and 6 in the disassembly procedure.

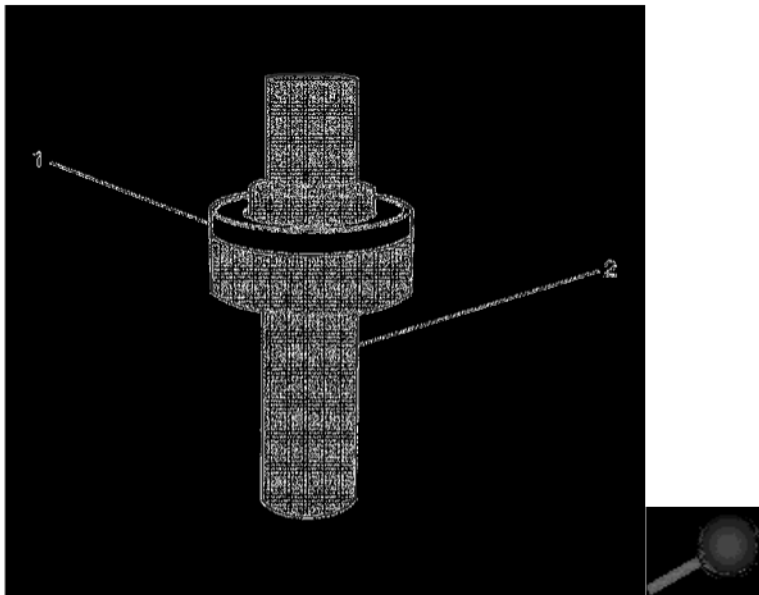


71. Clean the mating faces of the differential housings (2).

Note: Apply a 1 mm liquid seal bead (1) to the differential housing. Use the graphic as a template.

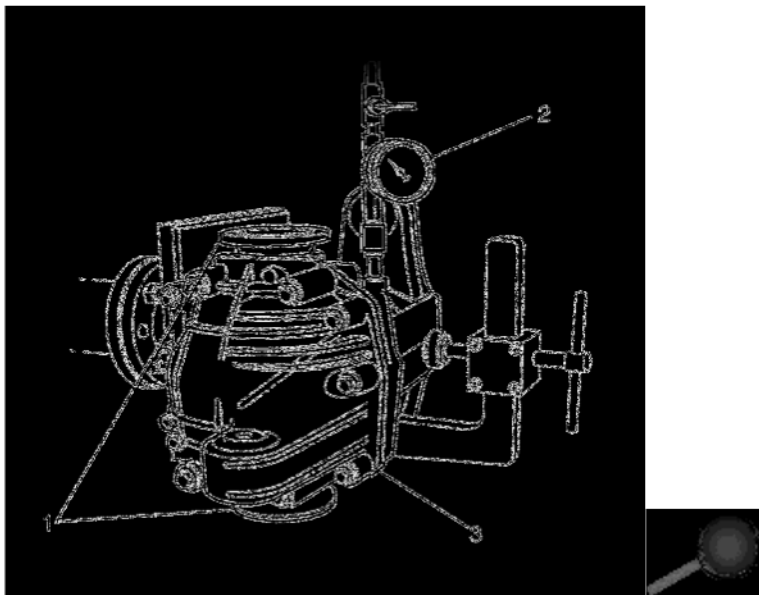
72. Apply a 1 mm liquid seal bead (LOCTITE 5910) (1) to the mating face of the differential housing. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

73. Install the differential housing cover to the differential housing. Refer to steps 23 through 30.

**Note:**

- The left and right rear axle shaft seals are different sizes so there are 2 different size installers. Make sure that the correct seal installer is used for the correct seal.
- Fill the space between the dust lip and the seal lip with the correct grease.

74. Install the left and right rear axle shaft seals (1) using *DT-48722* left axle seal installer and *DT-48721* right axle seal installer (2).



75. Install two rear axle flanges or two sealing plugs (1) to seal the differential (3).

Note: Set the air pressure regulator to 40 kPa before connecting.

76. Remove the oil drain plug and install the air pressure regulator (2).

77. Connect the air supply to the regulator (2) and pressurize the differential (3) to 40 kPa.

78. Disconnect the air supply from the regulator (2).

79. The pressure should not decrease from 40 kPa within 3 minutes. If the pressure decreases, locate and repair leakage.

80. Install the differential (3) to the vehicle. Refer to [Differential Replacement](#).

81. Fill the differential fluid. Refer to the filling procedure in [Rear Axle Lubricant Replacement](#).

Pinion Depth Adjustment (210 mm and 250 mm)

Note: Ensure that the differential side bearings bores, and the pinion bearing cups are clean before proceeding.

1. Start with the original pinion shim, install the pinion shim between the pinion gear and the inner pinion bearing.
2. Set the pinion bearing pre-load. Refer to [Rear Axle Assemble](#).
3. Install the Differential Case Assembly. Refer to [Rear Axle Assemble](#).
4. Set the carrier bearing pre-load. Refer to [Differential Carrier Bearing Preload Adjustment](#).
5. Set the back lash. Refer to [Backlash Adjustment](#).
6. Take a pattern and shim until the pinion depth is good. Refer to [Gear Tooth Contact Pattern Inspection](#).
7. Select the shim that is the proper thickness.
8. If the shim needs to be change, repeat steps 2 thru 6. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to [Rear Axle Assemble](#).

Backlash Adjustment (210 and 250 mm)

Special Tools

- J 8001 Dial Indicator Set
- J 25025 Guide Pins

For equivalent regional tools, refer to [Special Tools](#).

Note: The following adjustment procedure applies to both left and right differential side bearings.

1. Use the J 25025 pins and the J 8001 set to measure the axle backlash.
2. The difference between the backlash at all the measuring points should not vary by more than **0.005 (0.002 in)**.
3. If the difference between the backlash at all of the measuring points varies by more than **0.005 (0.002 in)**, inspect for the following conditions:
 - Burrs
 - A distorted case flange
 - Uneven bolting
4. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point should be **0.150–0.250 mm (0.006–0.010 in)**.
5. If the backlash is within specifications, proceed to step 15.
6. If the backlash is less than the specified value in step 5, proceed to step 14.

Note:

- Use production shims and spacers when necessary.
- Adjust the thickness of the shim pack on each side of the differential in equal amounts. This will maintain the correct axle side bearing preload.
- Moving **0.05 mm (0.002 in)** of shim thickness from one side of the differential to the other will change the backlash adjustment approximately **0.03 mm (0.001 in)**
- Mark the bearing caps left and right

7. Remove the bearing caps and the bolts.

Note: Mark the bearing cups and the shims top left or right.

8. Remove the differential case assembly with the bearing caps and the shims.

Note: Measure each shim separately.

9. Measure the thickness of the left and right the shim packs in 3 locations.

Note: The combined average shim measurement is the thickness for the shim pack.

10. Calculate the average of the 3 measurements for each shim.
11. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shim. For example, to increase the backlash by **0.05 mm (0.002 in)**, remove **0.10 mm (0.004 in)** of thickness to the left side shim pack.

Note: The service shim must be installed between the service spacer and the differential bearing cup.

12. Using the appropriate tool, install service shim if necessary.

Caution: Refer to [Fastener Caution](#).

13. Install the bearing caps and bolts and tighten the bolts to **166 N•m (122 lb ft)**.
14. Recheck the backlash and adjust, if necessary.
15. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

Gear Tooth Contact Pattern Inspection (210 and 250 mm)

The gear contact pattern check is not a substitute for adjusting the pinion depth and backlash. Use this method in order to verify the correct running position of the ring gear and the drive pinion. Gear sets which are not positioned properly may be noisy and/or have a short life span. A pattern check ensures that when best contact has been obtained between the ring gear and the drive pinion, the system will produce low noise and have a long life.

Drive Pinion and Ring Gear Identification

Production drive pinion and ring gears are manufactured by using a 2-cut or a 5-cut method. The 2-cut drive pinions and ring gears can be identified by having a groove cut into the outside edge of the ring gear and a ring on the stem of the drive pinion. The gear tooth contact patterns that are produced from each style of gear set differ slightly. A 2-cut gear will produce a pattern that is bias from the toe to the heel of the tooth (drive side), while a 5-cut gear set will produce a square pattern from the toe to the heel of the tooth (drive side). When diagnosing the gear tooth contact pattern, regardless of what type of gear set it is, a correct pattern will be centered within the area of the tooth, from toe to heel and from top to bottom.

Gear Tooth Nomenclature



The side of the ring gear tooth which curves outward, or is convex, is the drive side (4). The concave side is the coast side (3). The end of the tooth nearest the center of the ring gear is the toe end (2). The end of the tooth farthest away from the center is the heel end (1).

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

The effects of bearing preloads are not readily apparent on hand-loaded tooth contact pattern tests. However, bearing preloads should be within specifications before proceeding with backlash and pinion depth adjustments.

Backlash Adjustment

The backlash can be adjusted by either varying the thickness of the side bearing shims from side to side or by moving the adjuster sleeve(s) in or out, or both. By adjusting the shim thickness or moving the adjuster sleeve(s), the case and ring gear assembly will move closer to or further away from the pinion. In most cases, adjusting the backlash will correct an abnormal contact pattern. This adjustment will also be used to set the side bearing preload.

- If the thickness of the right shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the left shim or the adjuster sleeve is moved out (if applicable), the backlash will increase.
- If the thickness of the left shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the right shim or the adjuster sleeve is moved out (if applicable), the backlash will decrease.

Pinion Depth Adjustment

Adjust the position of the pinion by increasing or decreasing the distance between the pinion head and the centerline of the ring gear. Decreasing the distance moves the pinion closer to the centerline of the ring gear. Increasing the distance moves the pinion farther away from the centerline of the ring gear.

Testing Procedure

1. Wipe clean the differential case, the ring gear and the axle housing of lubricant. Carefully clean each tooth of the ring gear.



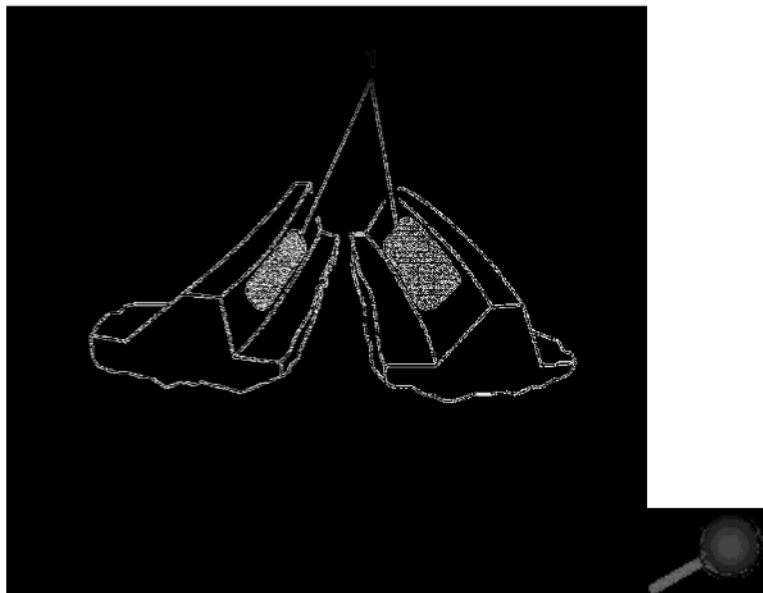
2. Use a medium stiff brush in order to sparingly apply gear marking compound, GM P/N 1052351 (Canadian P/N 10953497) or equivalent, to all of the ring gear teeth.
3. Torque the bearing caps bolts to specification.

Important: Performing a test without loading the gears will not produce a satisfactory pattern.
4. Apply the park brake or using the appropriate tool, hold the ring gear until a torque load of 14 N·m (10 lb ft) is achieved in order to turn the pinion.

Important: Avoid turning the ring gear excessively.
5. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates 3 full revolutions.
6. Turn the drive pinion flange/yoke in the opposite direction so that the ring gear rotates 3 full revolutions in the opposite direction.
7. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.
8. When correct contact pattern is achieved using a suitable solvent clean the differential case, the ring gear and the axle housing of gear marking compound. Carefully clean each tooth of the ring gear and air dry all the parts.

Correct Contact Pattern

Condition



The backlash and pinion depth is correct.

Correction

None required.

Service Hints

Loose bearings on the drive pinion or in the differential case may cause patterns that vary. If the contact pattern varies, inspect the following preload settings:

- Total assembly
- Differential case
- Pinion

If these settings are correct, inspect for damage or incorrectly assembled parts.

Drive Side Heel — Coast Side Toe Contact Pattern

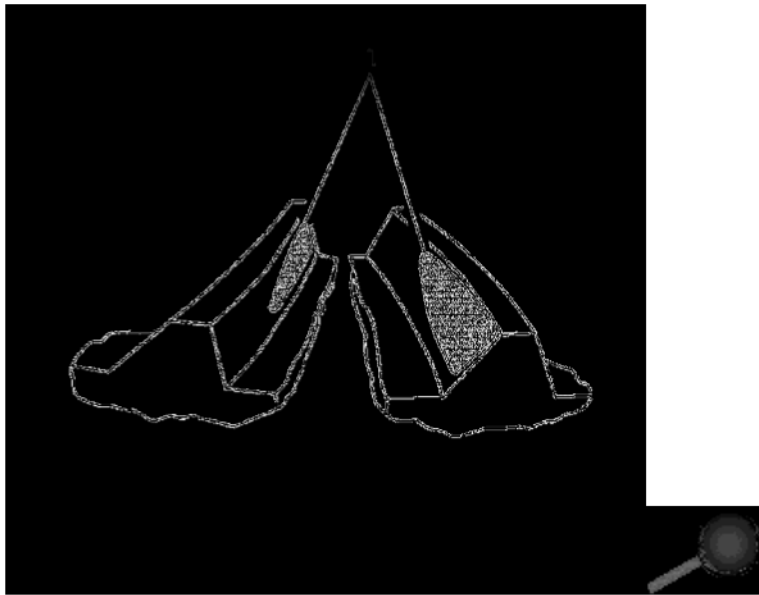


Condition

The backlash is incorrect. The ring gear is too far away from the pinion.

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to [Backlash Adjustment](#).

Drive Side Toe — Coast Side Heel Contact Pattern**Condition**

The backlash is incorrect. The ring gear is too close to the drive pinion.

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to [Backlash Adjustment](#).

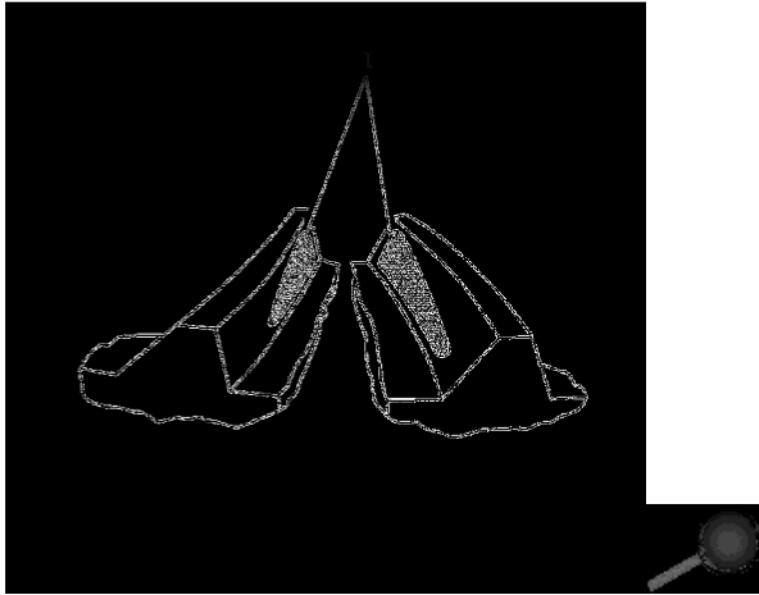
Drive Side Heel — Coast Side Heel Contact Pattern**Condition**

The backlash is incorrect. The ring gear is too far away from the pinion.

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to [Backlash Adjustment](#).

Drive Side Toe — Coast Side Toe Contact Pattern



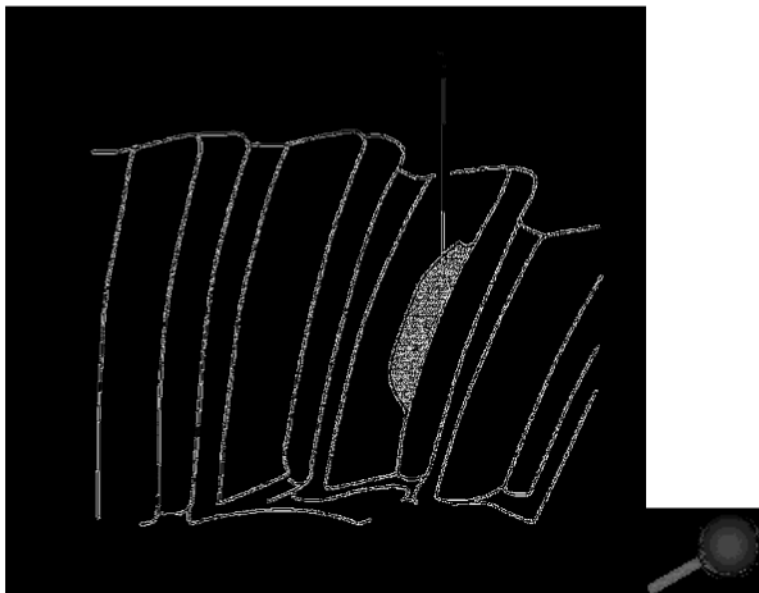
Condition

The backlash is incorrect. The ring gear is too close to the drive pinion.

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to [Backlash Adjustment](#).

High Flank Contact Pattern



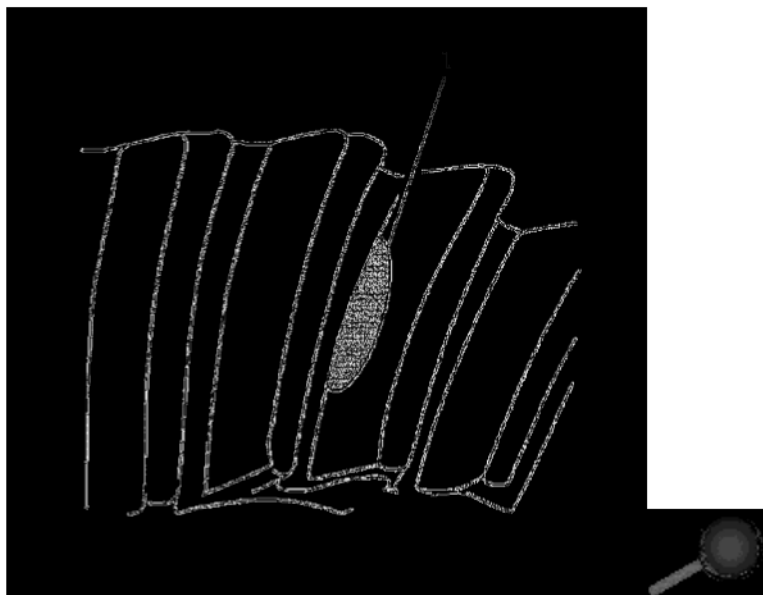
Condition

The pinion depth is incorrect. The pinion gear is too far away from the ring gear.

Correction

Increase the pinion depth. Move the pinion gear closer to the ring gear by increasing the pinion shim thickness. Refer to [Pinion Depth Adjustment](#).

Low Flank Contact Pattern



Condition

The pinion depth is incorrect. The pinion gear is too close to the ring gear.

Correction

Decrease the pinion depth. Move the pinion gear away from the ring gear by decreasing the pinion shim thickness. Refer to [Pinion Depth Adjustment](#).

Fastener Tightening Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Differential Housing Cover to Differential Housing Retaining Bolt M14x135 (2x)	153 N•m	112 lb ft
Differential Housing Cover to Differential Housing Retaining Bolt M14x100 (2x)	153 N•m	112 lb ft
Differential Housing Cover to Differential Housing Retaining Bolt M10x1.5x75 (6x)	53 N•m	39 lb ft
Ring Gear to Differential Assembly Retaining Bolt M12 (10x)	125 N•m	92 lb ft
Rear Wheel Drive Shaft Flange Nut (195 mm)	Record pinion drag torque before removal and torque to the same value on installation.	Record pinion drag torque before removal and torque to the same value on installation.
Rear Wheel Drive Shaft Flange Nut (210 mm and 250 mm)	2.5 N•m	23 lb in
Differential Fill Plug	35 N•m	26 lb ft
Differential Drain Plug	35 N•m	26 lb ft
Differential Breather Fitting	15 N•m	11 lb ft
Differential to Rear Frame Retaining Nut	80 N•m	59 lb ft
Differential to Rear Frame Retaining Bolt	100 N•m	74 lb ft

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Lubrication Specifications

Capacities

Application	Quantity	
	Metric	English
Fill Capacity (195 mm , 210 mm)	0.9 L	1.0 Qt
Fill Capacity (250 mm)	2.3 L	2.43 Qt

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Adhesives, Fluids, Lubricants, and Sealers

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number
Prevailing Torque Pinion Flange Nut	Thread Locker	Loctite 2701 (Alternative Loctite 648)
Input and Output Seals	Grease	Mobil Grease XHD 222
Differential Housing Cover (210 mm)	Sealant	Loctite 5910
Rear Differential (195 mm)	Lubricant Fuchs Titan EG 5010D 75w85	92269208
Rear Differential (210 mm)	Lubricant SAF Carbon MOD synthetic oil 75w85	92184900
Rear Differential (250 mm)	Lubricant Dexron LS Gear 75w90	88862624

[2014 Holden VF Sedan](#) | [VF/WN - Sedan, Ute, Sportwagon, Caprice, Lumina, HSV Service Manual 5617662](#) | [Driveline/Axle](#) | [Rear Drive Axle](#) | [Special Tools and Equipment](#) | **Document ID: 3287249**

Special Tools

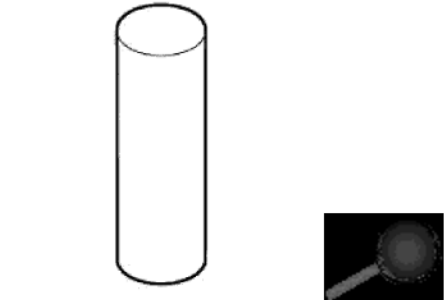
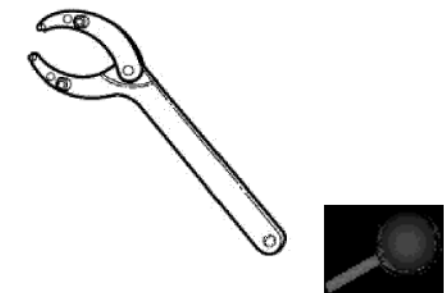
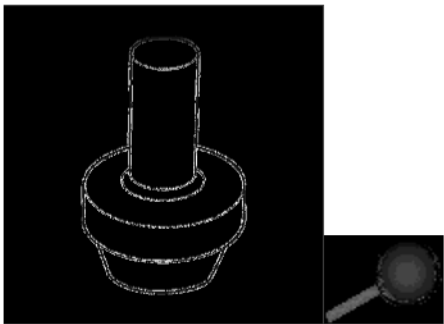
Illustration	Tool Number/ Description
	205-116 Bearing Remover
	6613 Universal Pulley Holder OTC
	J-22388 Output Seal Installation 210mm
	J-38869 Output Seal Installation 250mm
	DT-48723 Bearing Head Cup Installer

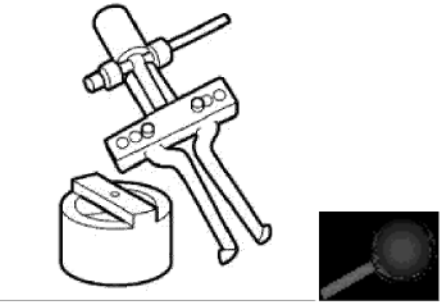
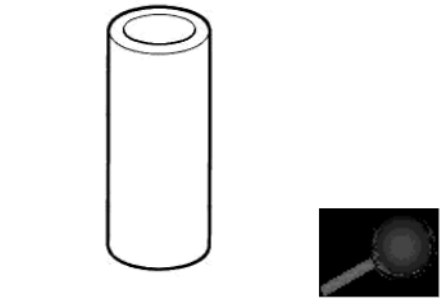
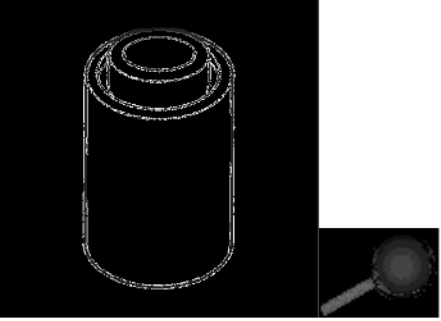
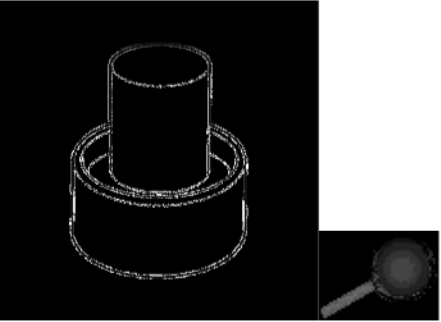
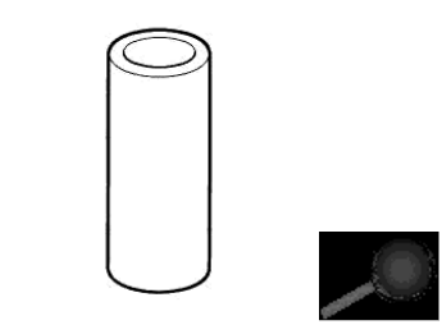
Illustration	Tool Number/ Description
	DT-48725 Tail Bearing Cup Installer
	DT-48726 Pinion Head Bearing Cup Remover
	DT-48727 Seal Installer
	DT-48728 Bearing Installer
	DT-48805 Pinion Head Bearing Cup Remover
	DT-48806 Pinion Bearing Measurement Spacer

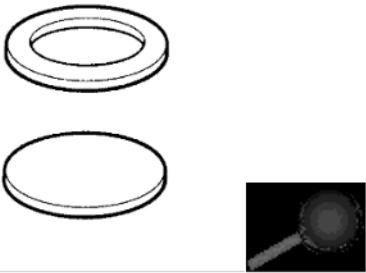
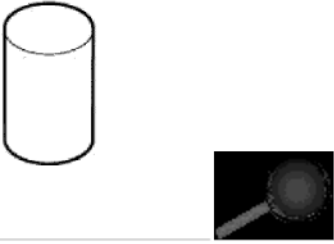
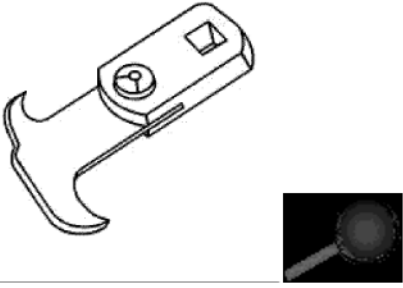
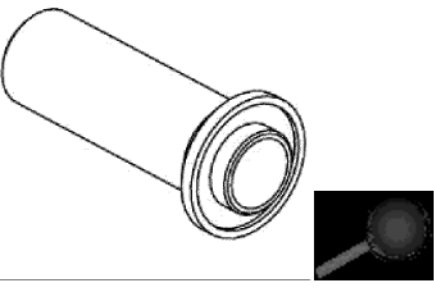
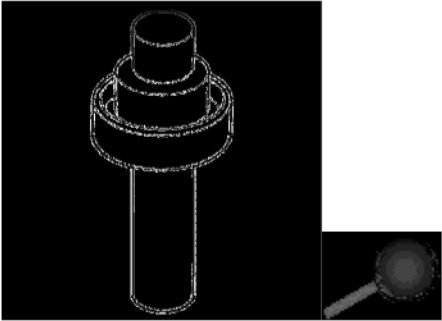
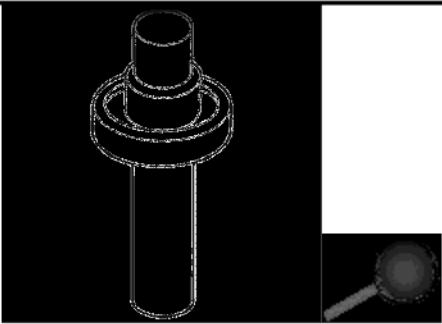
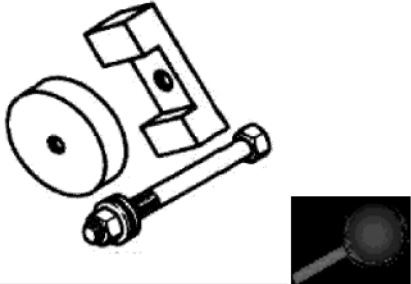
Illustration	Tool Number/ Description
	
	DT-48807 Pinion Head Bearing Installer
	E-308 Seal Remover
	DT-51275 Pinion Seal Installer 195mm
	DT-51273 Left Output Seal Installer 195mm
	DT-51274 Right Output Seal Installer 195mm

Illustration	Tool Number/ Description
	
	EN-592-AU Bush Remover/Installer