

Driveline/Axle

Front Drive Axle - CTS Sedan

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Differential Carrier Cover Bolts	54 N.m	40 lb ft
Front Differential Carrier Mounting Bolts - Front	30 N.m plus 180 degrees	22 lb ft plus 180 degrees
Front Differential Carrier Mounting Bolts - Rear	30 N.m plus 90 degrees	22 lb ft plus 90 degrees
Drain Plug	33 N.m	24 lb ft
Fill Plug	33 N.m	24 lb ft
Intermediate Shaft Housing Bolts	58 N.m	43 lb ft
Pinion Nut	120 N.m plus staked in two places	89 lb ft plus staked in two places

LUBRICATION SPECIFICATIONS

Lubrication Specifications

Application	Quantity	
	Metric	English
Synthetic Differential Lubricant GL-5	0.4 L	0.85 pt

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		US	Canada
Front Axle Shaft Seals	Synthetic Gear Oil	12378261	10953455
Front Differential Carrier Side Cover O-ring	Synthetic Gear Oil	12378261	10953455
Intermediate Wheel Drive Shaft Splines	Grease	01051344	993037
Pinion Seal	Synthetic Gear Oil	12378261	10953455

VISUAL IDENTIFICATION

FRONT AXLE IDENTIFICATION

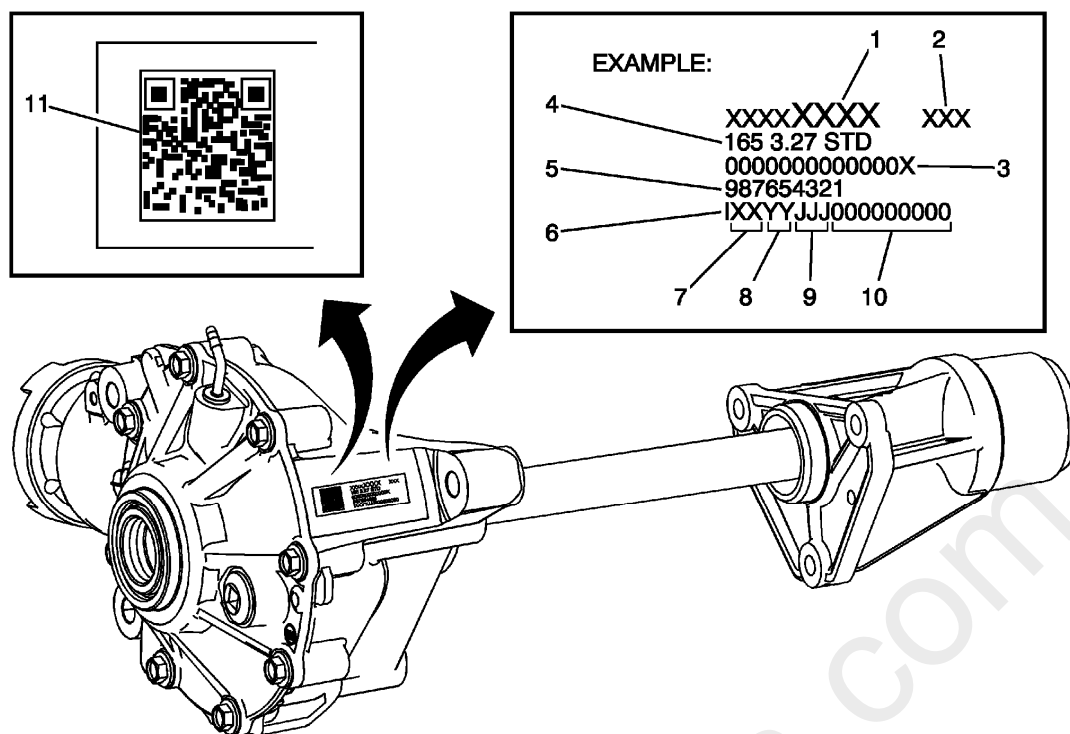


Fig. 1: Front Axle Identification
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	8-Digit Part Number
2	Revision Level
3	Vehicle Partitioning Product Structure (VPPS) Code
4	Gear Ratio and Differential Type
5	DUNS Number
6	Trace Code
7	Plant Code
8	Manufactured Year
9	Julian Date
10	Serial Number
11	2D Bar Code

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - FRONT DRIVE AXLE

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system functions. Refer to **Front Drive Axle Description and Operation**.

Noise Diagnosis

Any gear-driven unit produces a certain amount of noise that is normal and that conventional repairs or adjustment cannot eliminate. Slight noise that is heard only at a certain speed or under unusual or remote conditions is acceptable. For example, this noise tends to reach a peak at speeds from 60-100 km/h (40-60 mph) depending upon road and load conditions, or upon gear ratio and tire size. Noise of this kind does not indicate trouble in the axle assembly.

When an axle is suspected of being noisy, make a thorough test in order to determine whether the noise originates in the tires, road surface, wheel bearings, engine, transmission, propeller shaft, or axle assembly.

Classifying the Symptom

Front Drive Axle symptoms can usually be classified into the following categories:

- Leaks
- Noises
- Vibrations

Leak and noise related symptoms are diagnosed within the Front Drive Axle section. For vibration related symptoms, refer to **Vibration Diagnosis, Starting Point, and Correction** .

Visual/Physical Inspection

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

Symptoms List

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

- **Front Drive Axle Noises**
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Noisy on Turns**
- **Front Axle Lubricant Leak Diagnosis**

FRONT DRIVE AXLE NOISES

Gear Noise

Gear noise or whine is audible from 32-89 km/h (20-55 mph) under 4 driving conditions:

- Drive-Acceleration or heavy pull

- Road Load-Vehicle driving load or constant speed
- Float-Using enough throttle to keep the vehicle from driving the engine, the vehicle slows down gradually but the engine still pulls slightly.
- Coast-Throttle is closed and the vehicle is in gear.

Gear noise most frequently has periods where the noise is more prominent, usually between 48-64 km/h (30-40 mph) and 80-85 km/h (50-53 mph). Gear whine is corrected by ring and pinion gear replacement or adjustment, depending on the mileage of the gear set.

Bearing Noise

Faulty bearings produce a rough growl or grating sound, rather than the whine typical of gear noise. Bearing noise (hum) will pulsate at a constant vehicle speed. This indicates a bad pinion or a bad front axle side bearing. This noise can be confused with front wheel bearing noise. Inspect and replace the bearings and the affected components as required.

Front Wheel Bearing Noise

A rough front wheel bearing produces a noise which continues with the vehicle coasting at low speed and the transmission in neutral. The noise may diminish some when the brakes are gently applied. The noise may also change when performing side-to-side maneuvers with the vehicle.

A rough and/or noisy wheel bearing can be heard by spinning the wheels by hand and listening at the hubs for the noise. Inspect and replace the bearings and the affected components as needed.

Knock at Low Speeds

A low speed knock can be caused by a differential case side gear bore that has worn oversize. Inspect the side gears and the differential case assembly and replace the components as necessary.

Backlash Clunk

Excessive backlash clunk under acceleration or de-acceleration can be caused by any of the following:

- Worn differential pinion shaft
- Worn differential pinion and/or side gear teeth
- Worn thrust washers
- Excessive clearance between the side gears and the axle shafts
- Excessive clearance between differential side gears and the bore in the case
- Excessive drive pinion and ring gear backlash

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Noisy in Drive

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Front Axle Lubricant Level Inspection</u> .	
Transmission noise	Repair or replace as required. Refer to <u>Noise and Vibration Analysis</u> for the 6L50/6L80/6L90 transmission
Driveline assembly noise	Repair or replace as required. Refer to <u>Symptoms - Propeller Shaft</u> .
Worn wheel drive shaft constant velocity joints	Replace the wheel drive shafts as required. Refer to <u>Front Wheel Drive Shaft Replacement - Right Side</u> , or <u>Front Wheel Drive Shaft Replacement - Left Side</u> .
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed. 1. Inspect for the proper fluid level. Fill as required. 2. If the noise continues, replace the carrier unit. Refer to <u>Front Differential Carrier Assembly Replacement</u>.
Gear set whine noise within the differential assembly	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. 1. Inspect for the proper fluid level. Fill as required. 2. Replace the carrier unit. Refer to <u>Front Differential Carrier Assembly Replacement</u>.

NOISY WHEN COASTING

Noisy When Coasting

Cause	Correction
NOTE: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Front Axle Lubricant Level Inspection</u>	
Worn wheel drive shaft constant velocity joints	Replace the wheel drive shafts as required. Refer to <u>Front Wheel Drive Shaft Replacement - Left Side</u> , or <u>Front Wheel Drive Shaft Replacement - Right Side</u> .
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed.

	1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the carrier unit. Refer to <u>Front Differential Carrier Assembly Replacement</u>.
Gear set whine noise within the differential assembly	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. 1. Check for the proper fluid level. Fill as required. 2. Replace the carrier unit. Refer to <u>Front Differential Carrier Assembly Replacement</u>.

INTERMITTENT NOISE

Intermittent Noise

Cause	Correction
IMPORTANT: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Front Axle Lubricant Level Inspection</u>.	
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. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> .

CONSTANT NOISE

Constant Noise

Cause	Correction
NOTE: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Front Axle Lubricant Level Inspection</u>	
Low gear oil levels	Faulty oil seals or other type leaks may contribute to lower than required fluid levels. Refer to <u>Front Axle Lubricant Leak Diagnosis</u>. Fill to the proper level with the correct gear oil. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u>, and <u>Front Axle Lubricant Level Inspection</u>.
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed. 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the carrier unit.

	Refer to <u>Front Differential Carrier Assembly Replacement</u> .
Gear set whine noise within the differential assembly	A whine type noise will increase or decrease relative to the vehicle speed, approximately 31-37 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. 1. Check for the proper fluid level. Fill as required. 2. Replace the carrier unit. Refer to <u>Front Differential Carrier Assembly Replacement</u>.

NOISY ON TURNS

Noisy on Turns

Cause	Correction
IMPORTANT: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Front Axle Lubricant Level Inspection</u>.	
Worn or loose rear axle mount and/or bracket	Repair or replace as required.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn wheel bearings	Replace the wheel bearings as required.
Incorrect gear oil	Fill to the proper level with the correct gear oil. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> , and <u>Front Axle Lubricant Level Inspection</u> .

FRONT AXLE LUBRICANT LEAK DIAGNOSIS

Front axle lubricant leaks can occur at the following locations:

- Axle shaft oil seals
- Differential carrier assembly mating surface
- Drain plug
- Fill plug
- Inner axle tube assembly to differential carrier assembly mating surface
- Pinion yoke oil seal
- Vent tube and/or connector

Determining the Cause

While most front 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.

Sealing Surfaces

Front axles are assembled using specific sealers. A leak at a surface sealed with sealant is usually caused by a poor fit of the components but can also be caused by the use of the wrong sealant. When correcting a sealant leak, inspect each component for distortion and for nicks or gouges that may prohibit the sealant from sealing properly and when re-assembling the component, use the proper sealant.

Differential Carrier Assembly

Lubricant leaks at the differential carrier assembly can occur at the following locations:

- Drain plug
- Fill plug
- Vent tube

Drain and fill plug leaks are usually caused by a loose plug. A vent tube leak can be caused by a loose fitting vent hose or by a vent tube assembly whose interior shield is stuck in the upside down position. Inspect the vent plug's interior shield for unrestricted movement, repair or replace the plug as necessary. Drain or fill plug leaks can be repaired by either tightening the plug or by using an approved sealer on the threads on the plug.

REPAIR INSTRUCTIONS

FRONT AXLE LUBRICANT REPLACEMENT

Draining Procedure

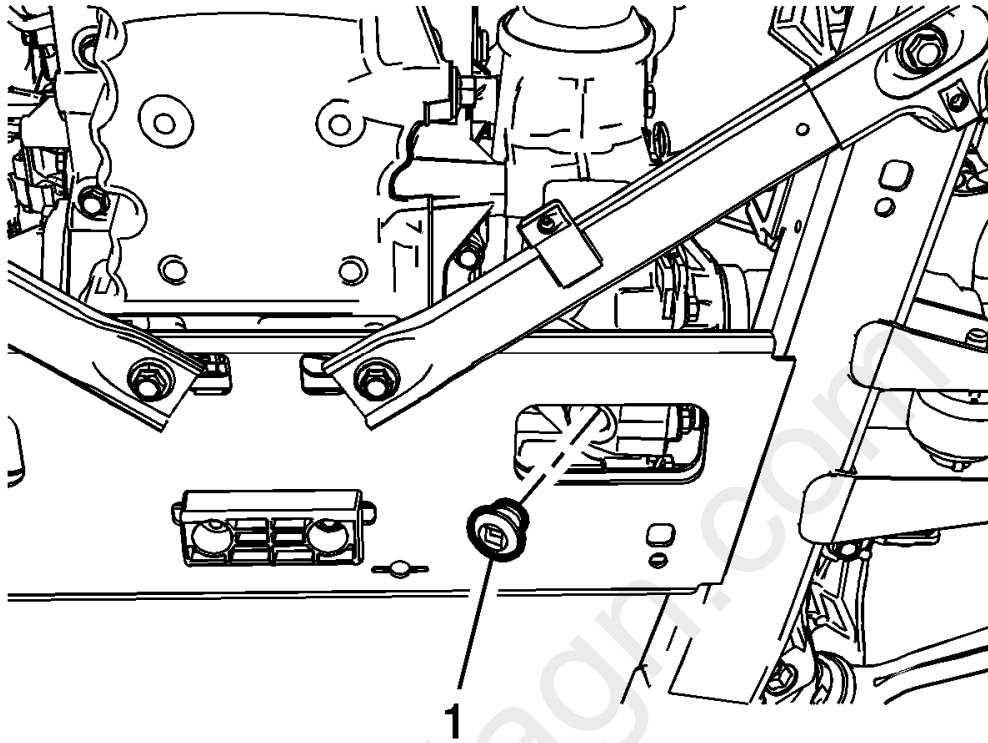


Fig. 2: Front Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine compartment lower noise shield. Refer to **Front Compartment Lower Noise Shield Replacement (AWD)** .
3. Clean any dirt from around the differential drain plug (1).
4. Position a drain pan under drain plug.
5. Remove the drain plug (1) from the differential and drain the fluid.

Filling Procedure

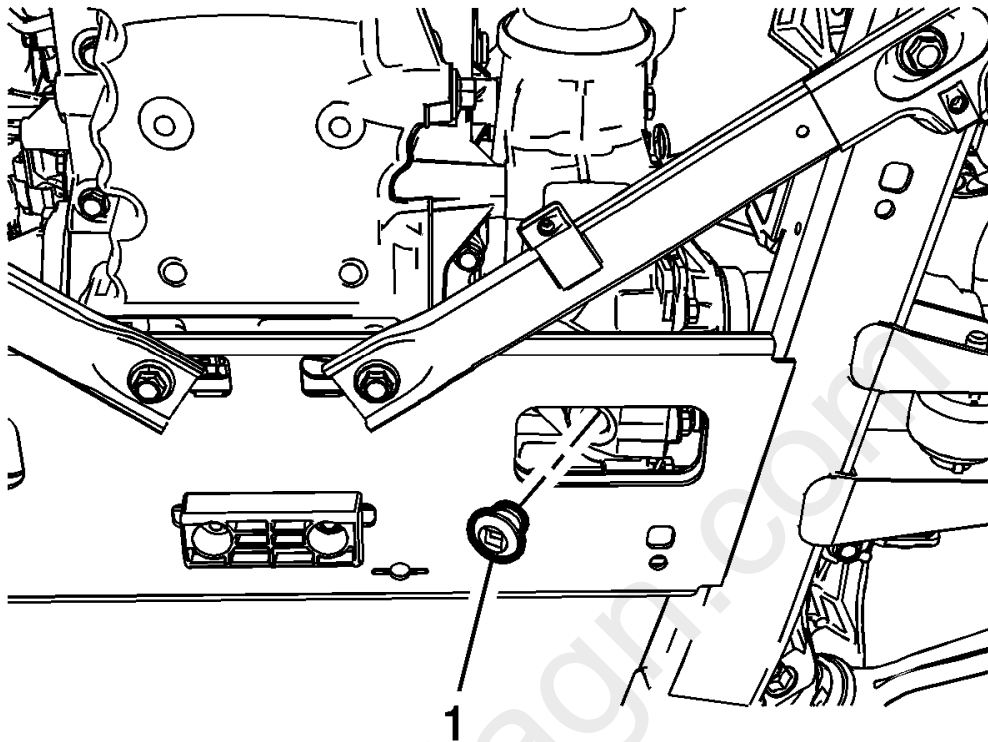


Fig. 3: Front Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Component Fastener Tightening Caution .

1. Install the drain plug (1) to the differential and tighten to 33 N.m (24 lb ft).

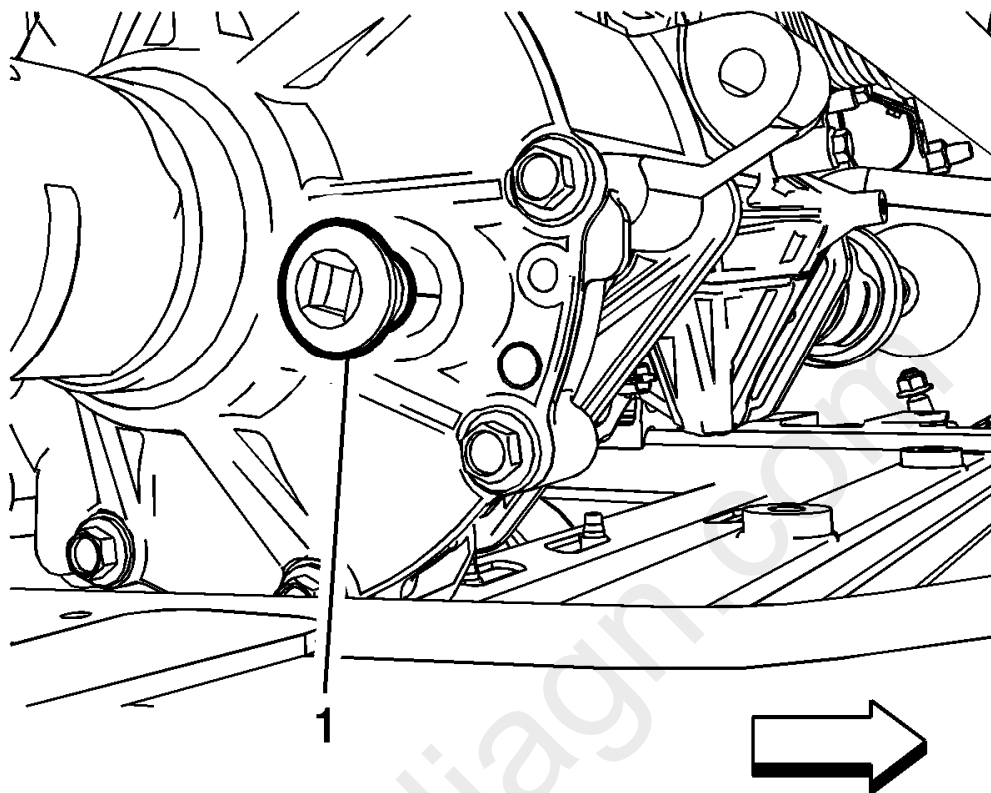


Fig. 4: Front Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

2. Clean any dirt from around the differential fill plug (1).
3. Remove the fill plug from the differential.
4. Fill the differential with axle lubricant. Refer to Adhesives, Fluids, Lubricants, and Sealers , and Lubrication Specifications.

NOTE: Do NOT overfill the front differential. Overfilling the front differential can cause leakage out the differential housing vent.

5. Inspect the gear lubricant level to ensure it is 4 mm (0.16 in) below the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening.
6. Install the fill plug (1) to the differential and tighten to 33 N.m (24 lb ft).
7. Install the engine compartment lower noise shield. Refer to Front Compartment Lower Noise Shield Replacement (AWD) .
8. Lower the vehicle.

FRONT WHEEL DRIVE INTERMEDIATE SHAFT HOUSING REPLACEMENT

Special Tools

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 left front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .

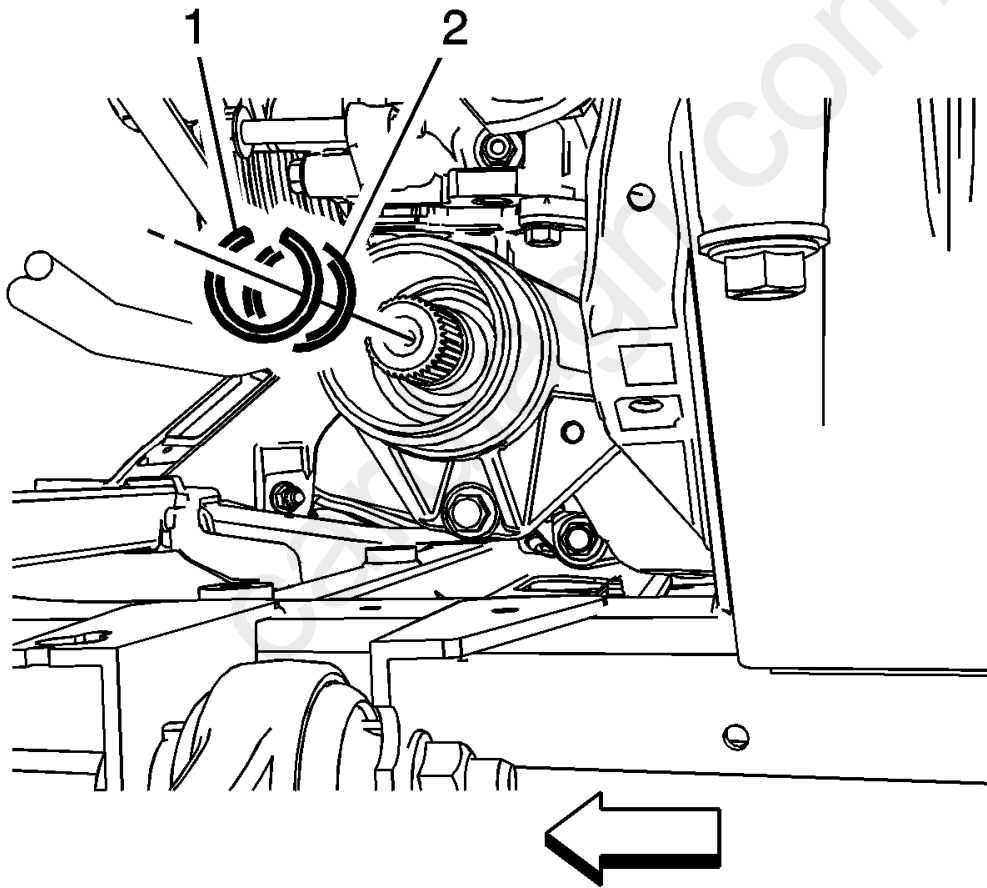


Fig. 5: Wheel Drive Shaft Retaining Ring & O-ring
Courtesy of GENERAL MOTORS COMPANY

3. Remove and discard the intermediate wheel drive shaft retaining ring (1) and the O-ring (2).

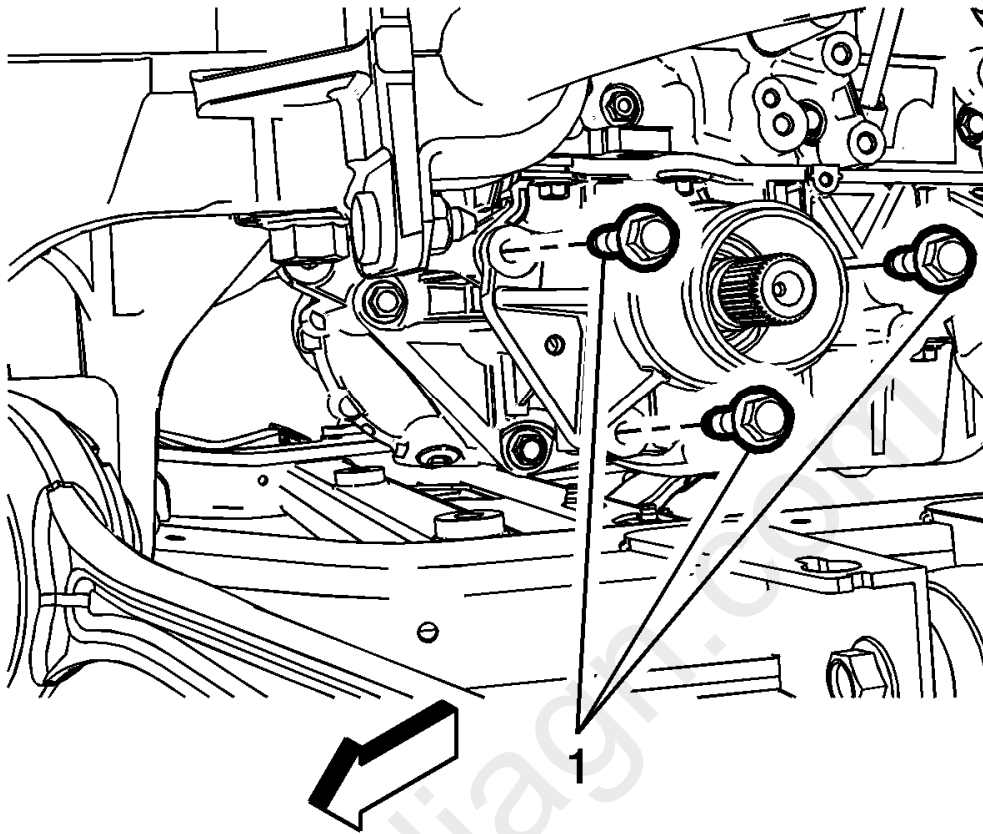


Fig. 6: Front Wheel Drive Intermediate Shaft Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove the intermediate shaft housing assembly mounting bolts (1).

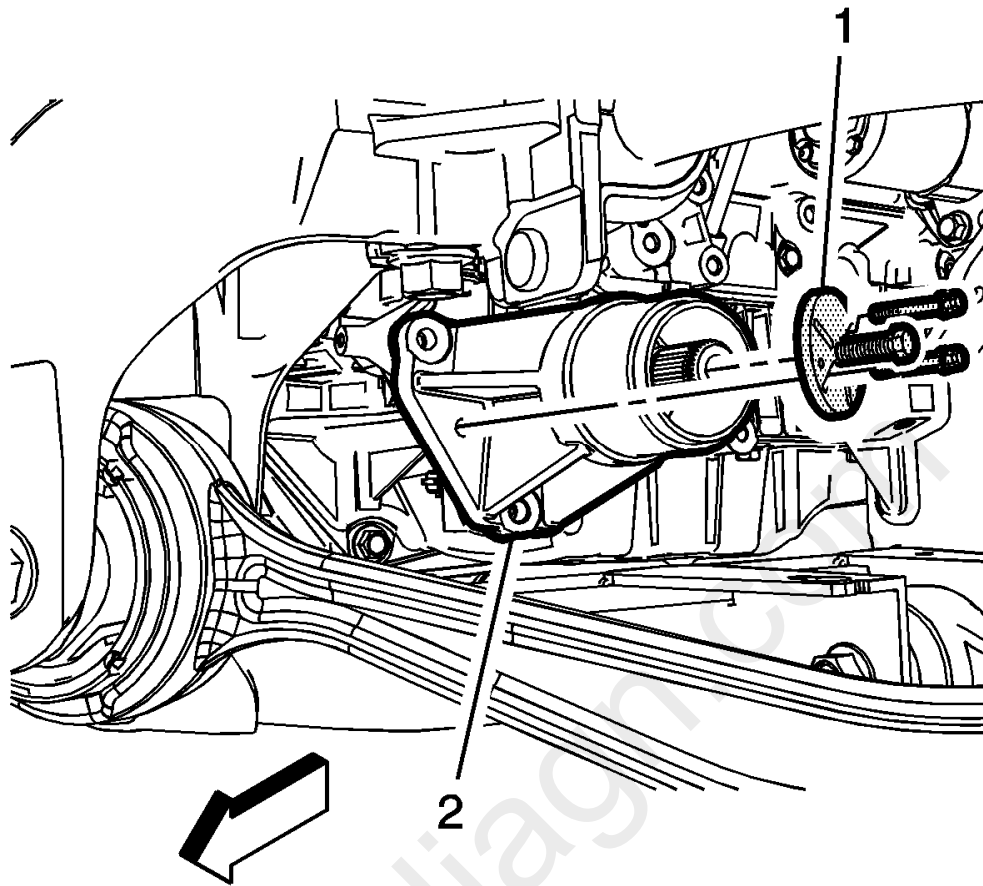


Fig. 7: Using Special Tool To Remove Intermediate Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

5. Install **J 45019** remover (1) into the threaded holes in the intermediate shaft housing assembly (2).
6. Using the **J 45019** remover , remove the intermediate shaft housing assembly.
7. Remove **J 45019** remover from the intermediate shaft housing.

NOTE: **The intermediate shaft bearing is not serviced separately. If the bearing is worn or damaged, replace the housing assembly.**

8. Thoroughly clean and inspect the intermediate shaft housing for damage, if damaged replace the intermediate shaft housing.

Installation Procedure

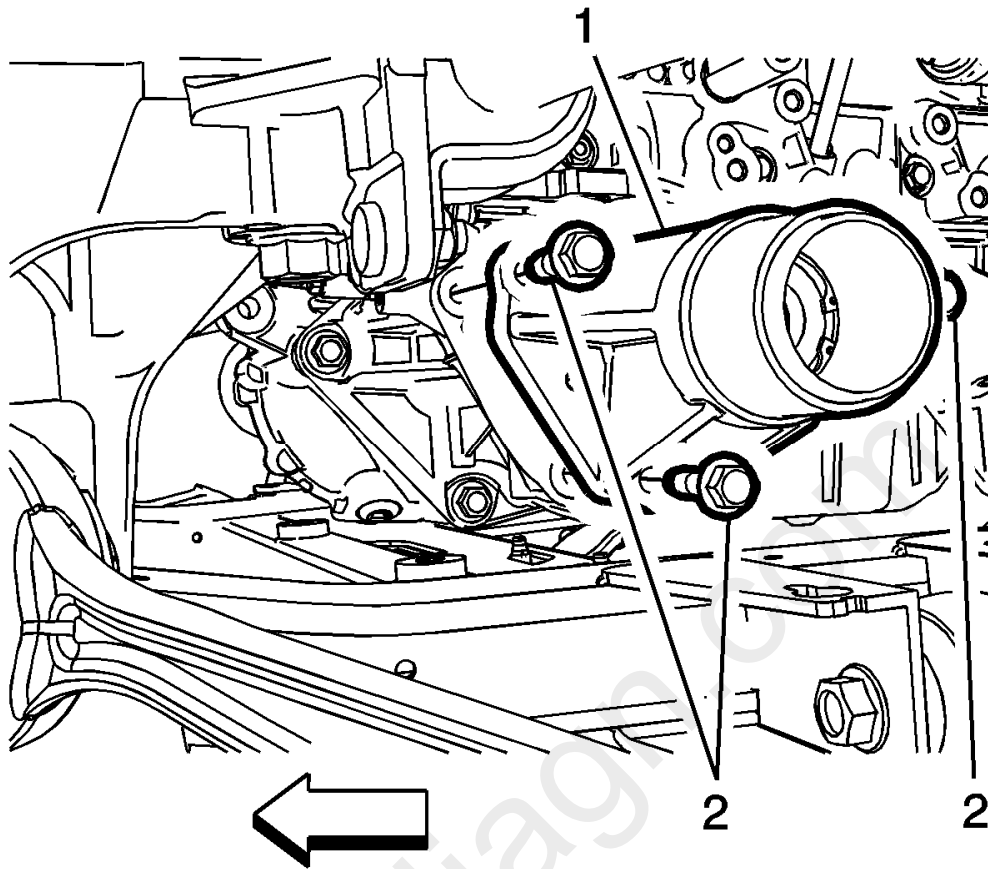


Fig. 8: Intermediate Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Install the intermediate shaft housing assembly (1) to the intermediate wheel drive shaft.

CAUTION: Refer to Fastener Caution .

2. Install the intermediate shaft housing mounting bolts (2) to the oil pan. Tighten the intermediate shaft housing assembly mounting bolts to 58 (43 lb ft).

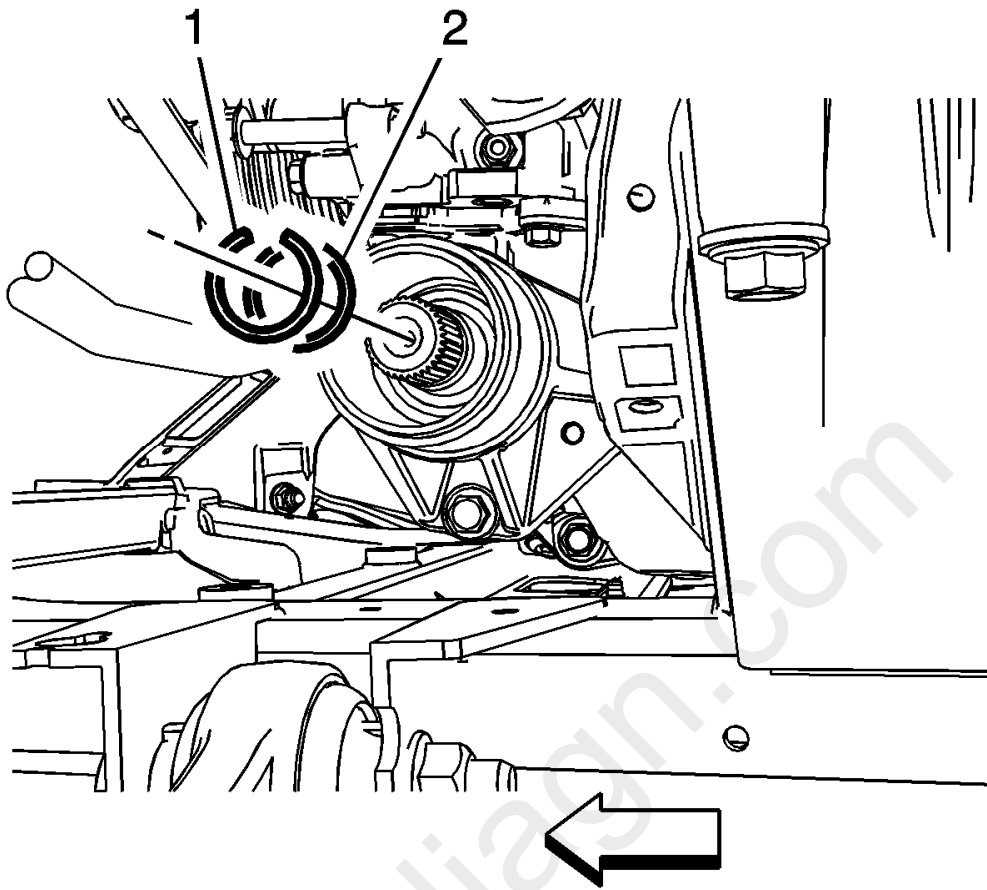


Fig. 9: Wheel Drive Shaft Retaining Ring & O-ring
Courtesy of GENERAL MOTORS COMPANY

3. Apply a small amount of lubricant to the intermediate wheel drive shaft splines. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
4. Install a new O-ring (2) and the new wheel drive shaft retaining ring (1).
5. Install the left front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side**.
6. Lower the vehicle.

FRONT AXLE SHAFT SEAL REPLACEMENT - LEFT SIDE

Removal Procedure

1. Remove the front differential carrier from the vehicle. Refer to **Front Differential Carrier Assembly Replacement**.

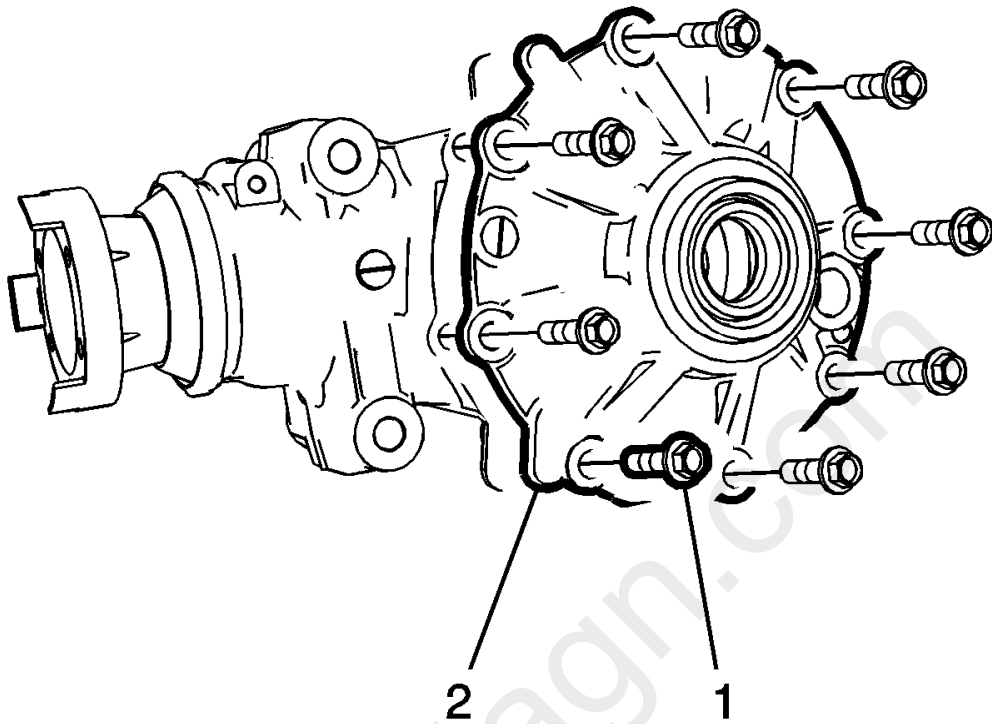


Fig. 10: Carrier Side Cover Bolts
Courtesy of GENERAL MOTORS COMPANY

2. Remove the carrier side cover bolts (1).
3. Using the appropriate tool in the pry tabs, remove the carrier side cover (2).

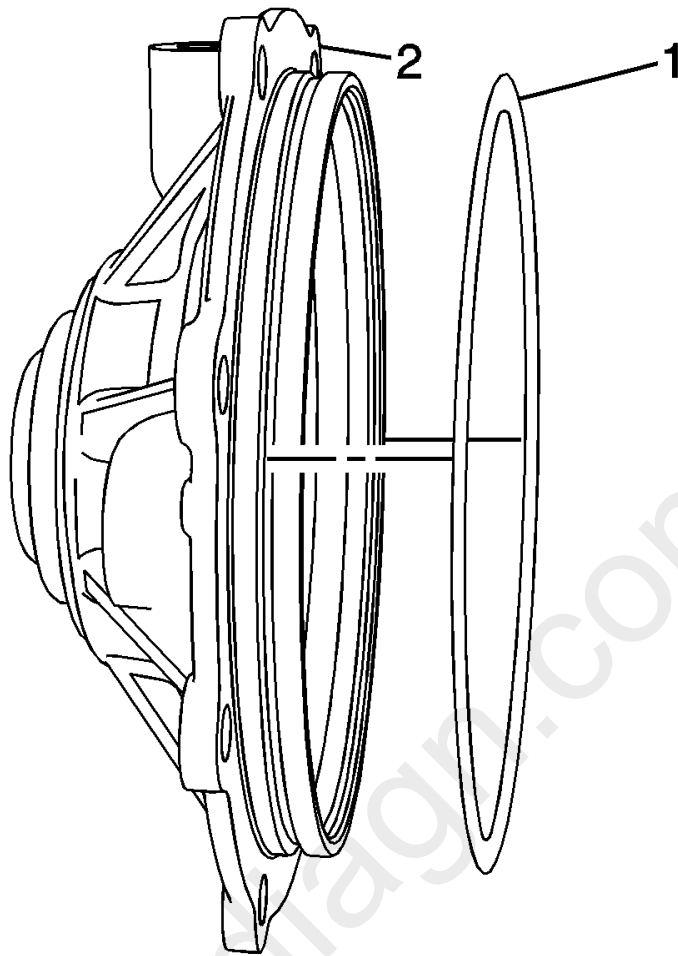


Fig. 11: Carrier Side Cover & O-ring
Courtesy of GENERAL MOTORS COMPANY

4. Remove and discard the O-ring (1) from the side cover (2).

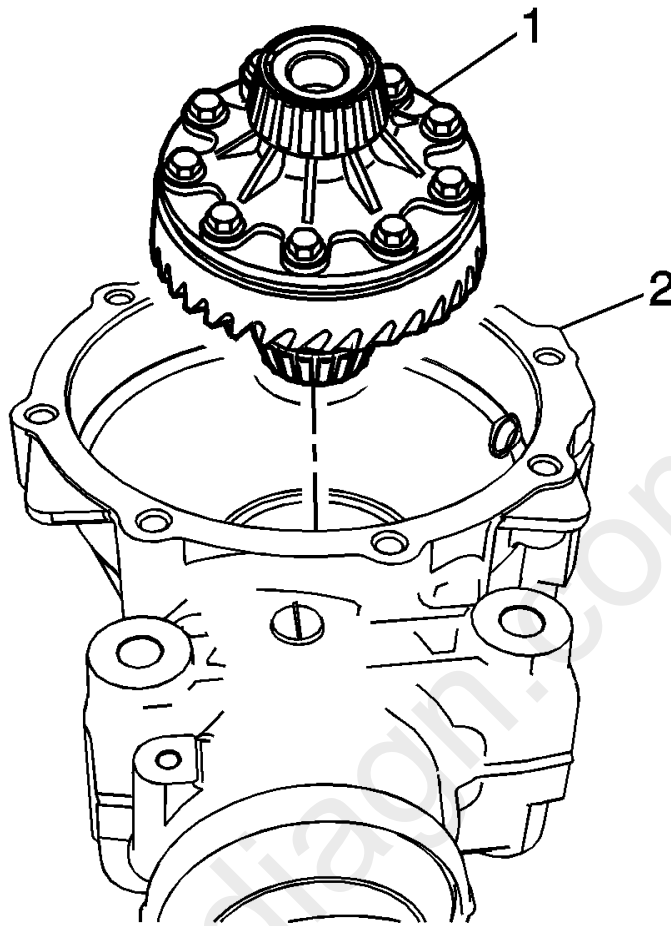


Fig. 12: Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

5. Remove the differential assembly (1), including the intermediate shaft from the carrier (2).

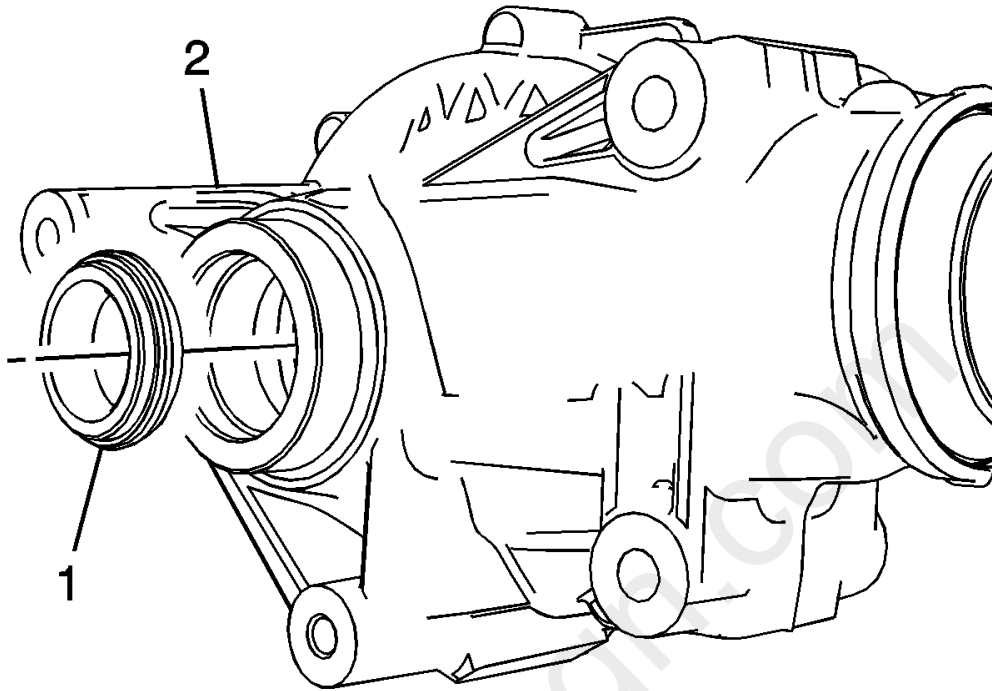


Fig. 13: Left Output Shaft Oil Seal
Courtesy of GENERAL MOTORS COMPANY

6. Using a suitable tool, remove the left output shaft oil seal (1) from the carrier (2).

Installation Procedure

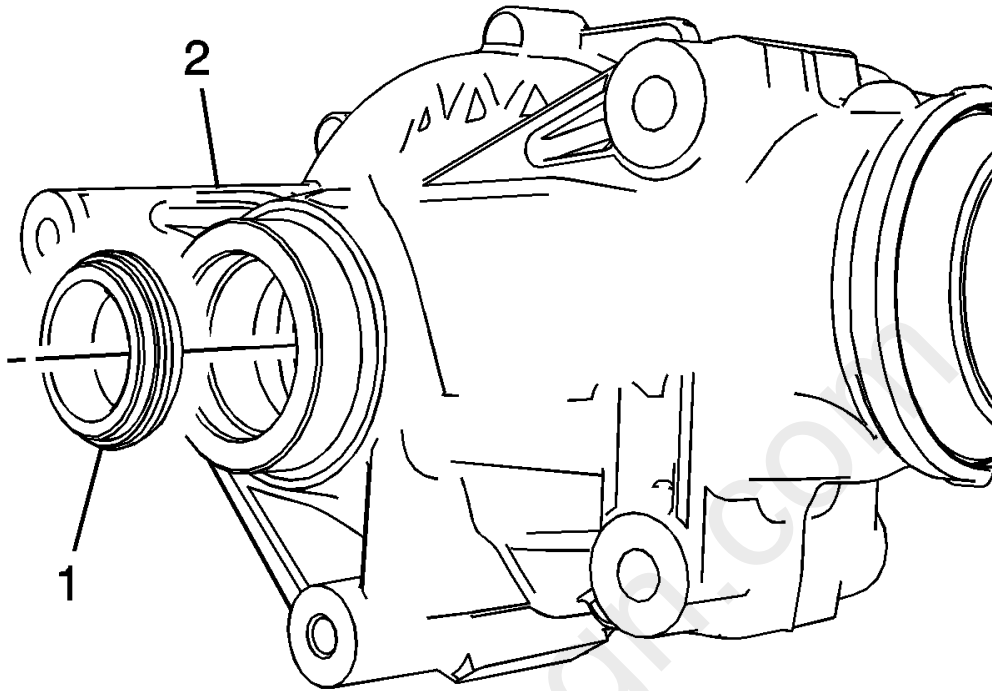


Fig. 14: Left Output Shaft Oil Seal
Courtesy of GENERAL MOTORS COMPANY

1. Using a suitable seal driver, install the left output shaft seal (1) into the carrier (2).

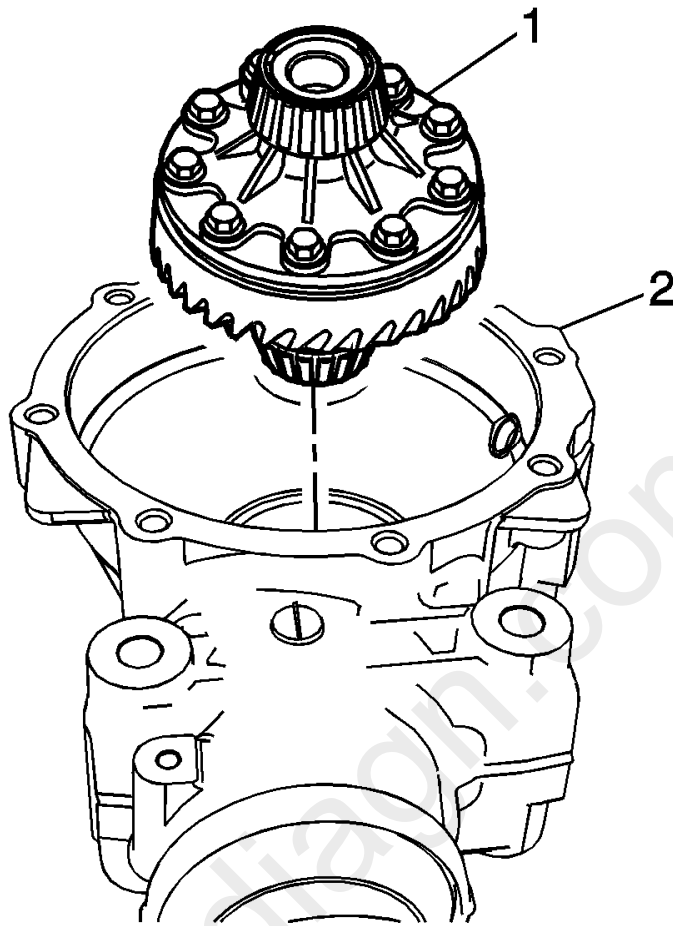


Fig. 15: Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the differential assembly (1) including the intermediate shaft into the differential carrier (2).

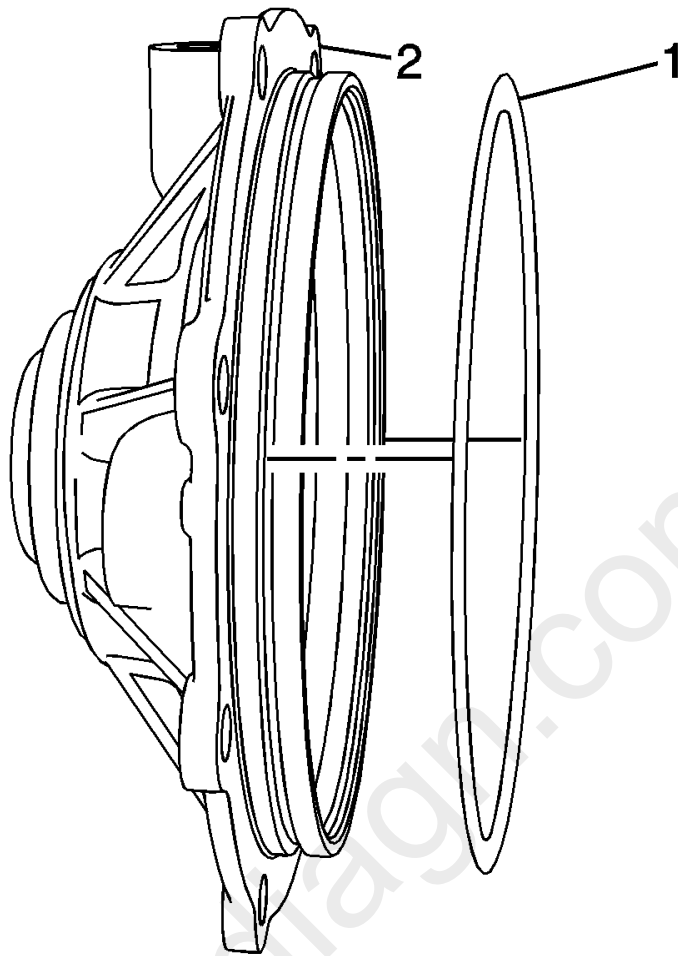


Fig. 16: Carrier Side Cover & O-ring
Courtesy of GENERAL MOTORS COMPANY

3. Install a NEW carrier cover O-ring (1) into the groove on the side cover (2).
4. Apply a light coat of gear lube to the O-ring.

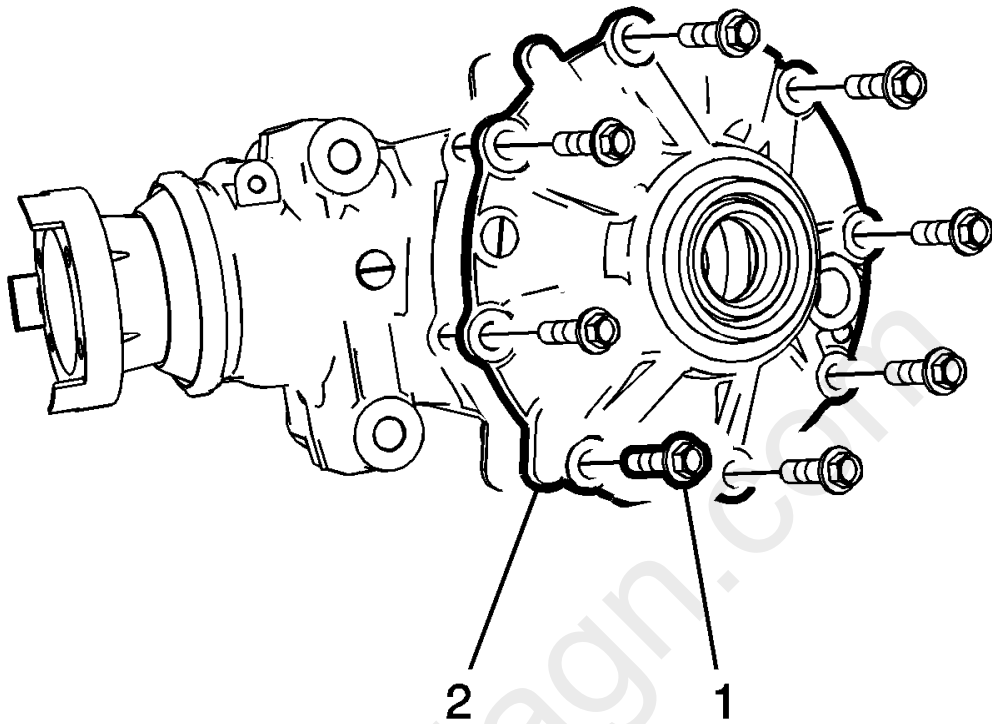


Fig. 17: Carrier Side Cover Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Align the bolt holes and push cover (2) onto the differential carrier evenly.
6. Start the cover bolts (1) and hand tighten.

CAUTION: Refer to Fastener Caution .

7. Tighten the side cover retaining bolts (1) to 54 (40 lb ft) in a criss-cross pattern.
8. Install the front differential carrier into the vehicle. Refer to **Front Differential Carrier Assembly Replacement**.
9. Fill the differential with fluid. Refer to **Front Axle Lubricant Level Inspection**.

FRONT AXLE SHAFT SEAL REPLACEMENT - RIGHT SIDE

Removal Procedure

1. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the right front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Right Side .

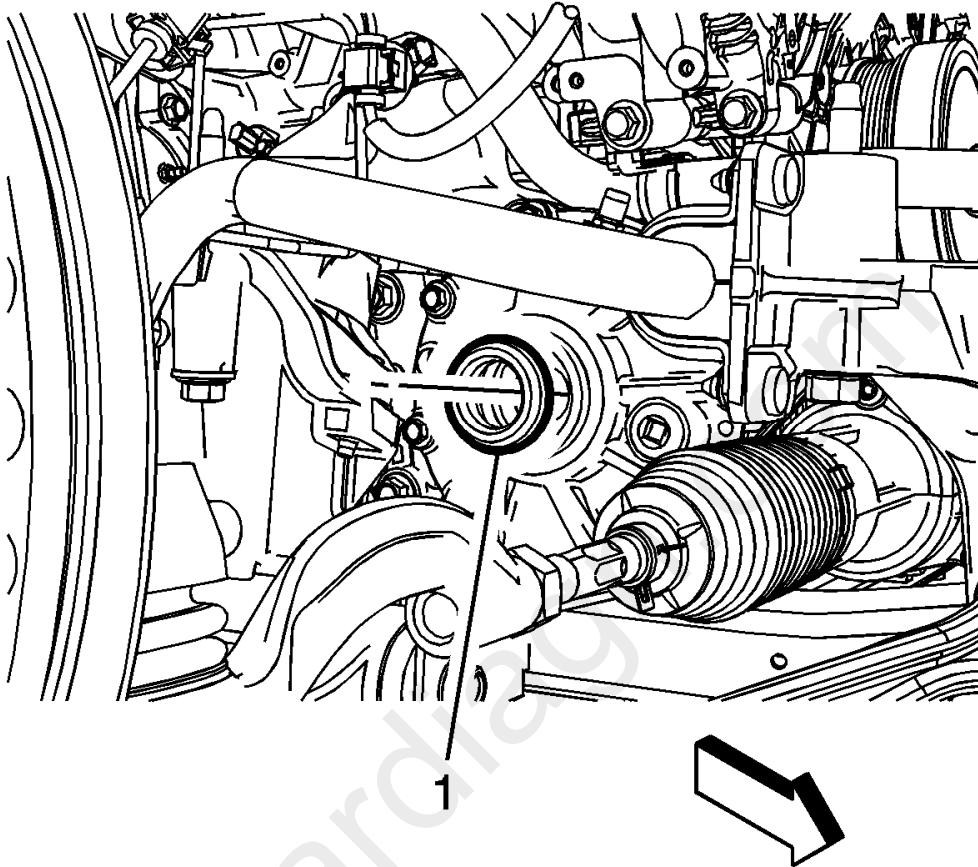


Fig. 18: Front Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

3. Using a flat-bladed tool, remove the right differential output shaft seal (1).

Installation Procedure

1. Lubricate the wheel drive shaft sealing surface of the oil seal with axle lubricant. Refer to Adhesives, Fluids, Lubricants, and Sealers.

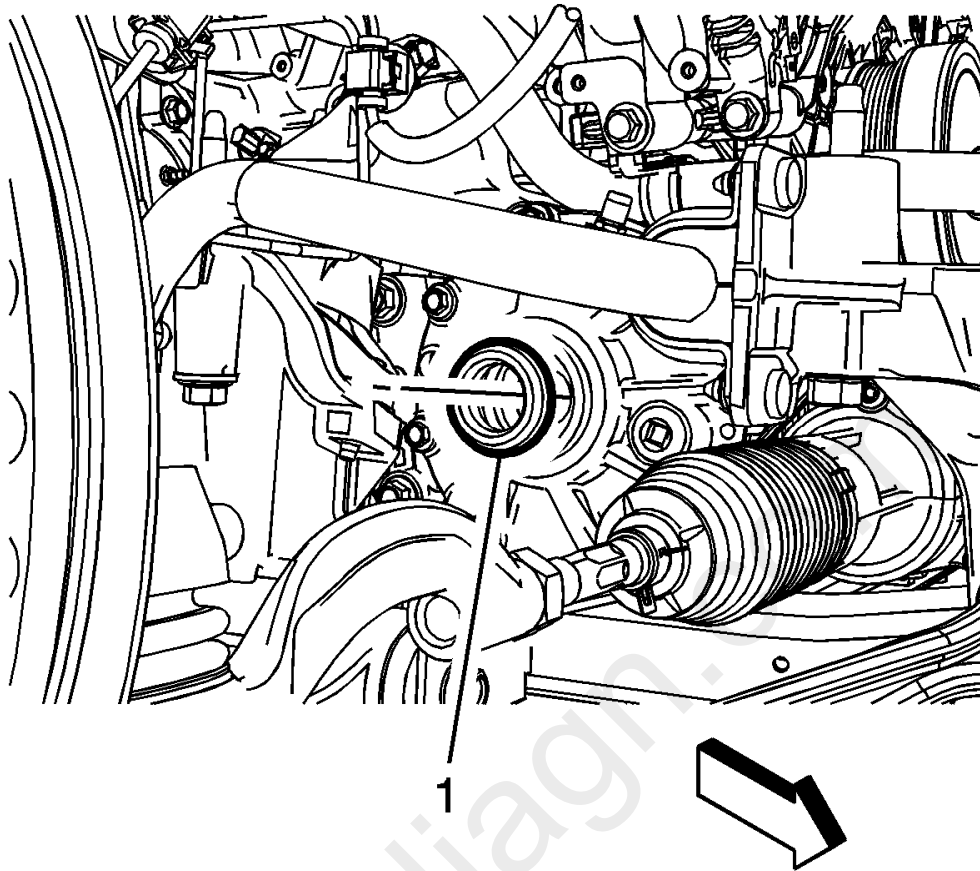


Fig. 19: Front Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

2. Install the right differential output shaft seal (1) using a suitable seal driver.
3. Install the right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side**.
4. Inspect the fluid level. Refer to **Front Axle Lubricant Level Inspection**.
5. Lower the vehicle.

FRONT DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT

Special Tools

EN-45059 Torque Angle Sensor Kit

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

NOTE: The intermediate wheel drive shaft and the front differential carrier are to be removed as an assembly.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Drain the differential assembly. Refer to Front Axle Lubricant Replacement.
3. Lower the drivetrain and front suspension frame assembly. Refer to Drivetrain and Front Suspension Frame Removal and Installation .
4. Remove the front propeller shaft from the differential and position out of the way. Refer to Front Axle Propeller Shaft Replacement .
5. Remove the left front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Left Side .
6. Remove the right front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Right Side .
7. Remove the front wheel drive intermediate shaft housing. Refer to Front Wheel Drive Intermediate Shaft Housing Replacement.
8. Using the engine support fixture, carefully lower the engine assembly enough to allow the front differential carrier assembly to be removed through the right wheel opening.

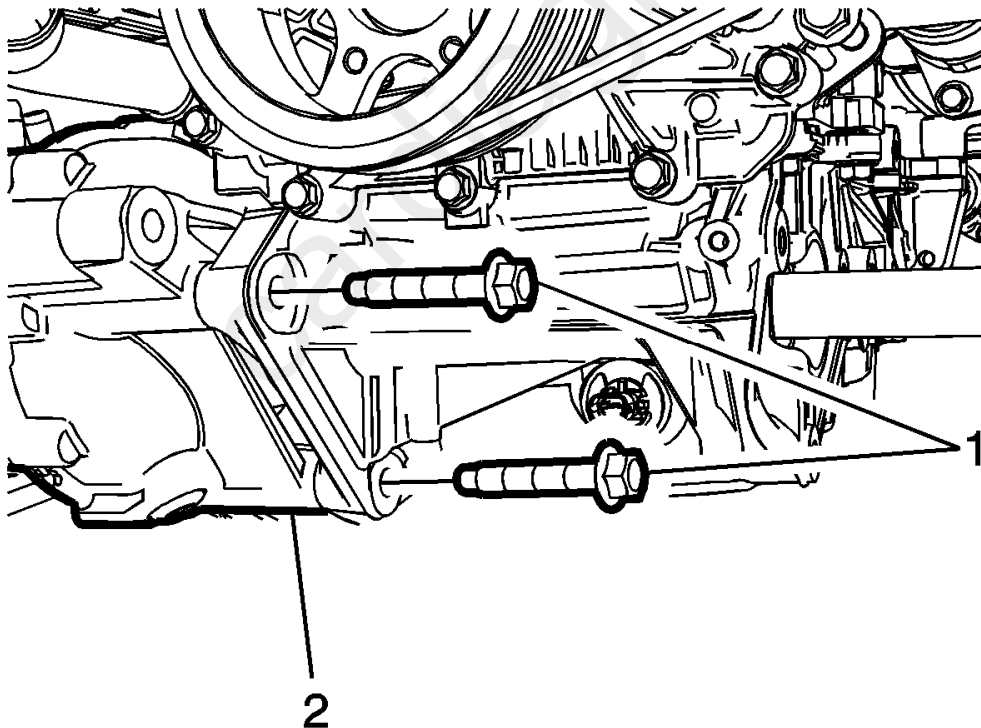


Fig. 20: Front Differential Carrier

Courtesy of GENERAL MOTORS COMPANY

9. Position a transmission jack beneath the front differential carrier (2).
10. Firmly secure the front differential carrier to the transmission jack.
11. Remove the front differential carrier (2) to front oil pan mounting bolts (1).

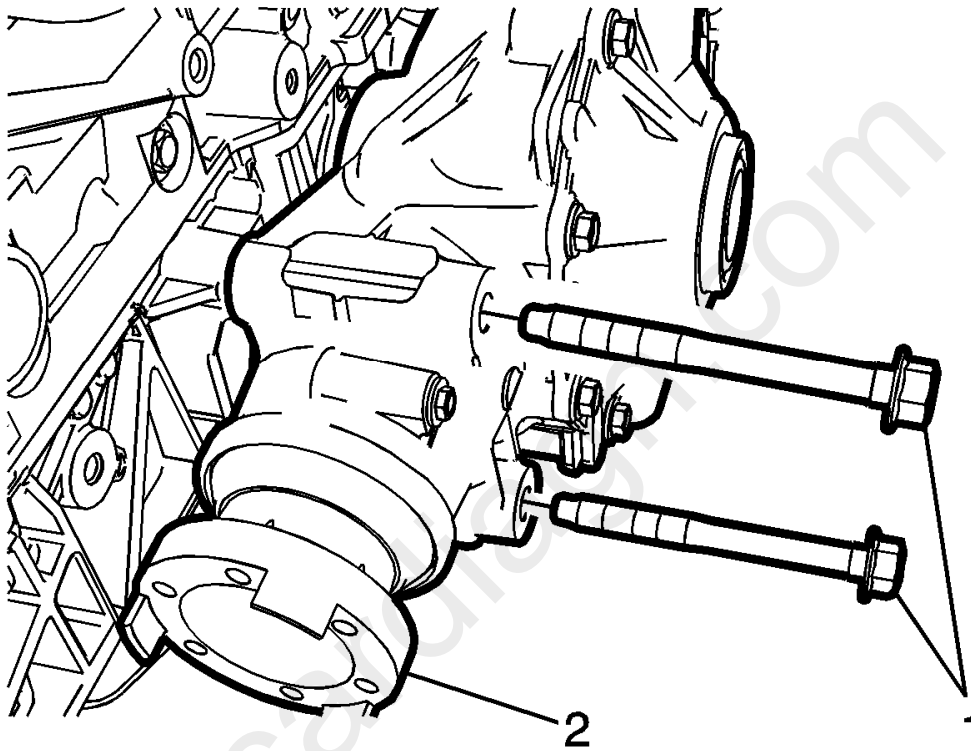


Fig. 21: Front Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

12. Remove the front differential carrier (2) to rear oil pan mounting bolts (1).

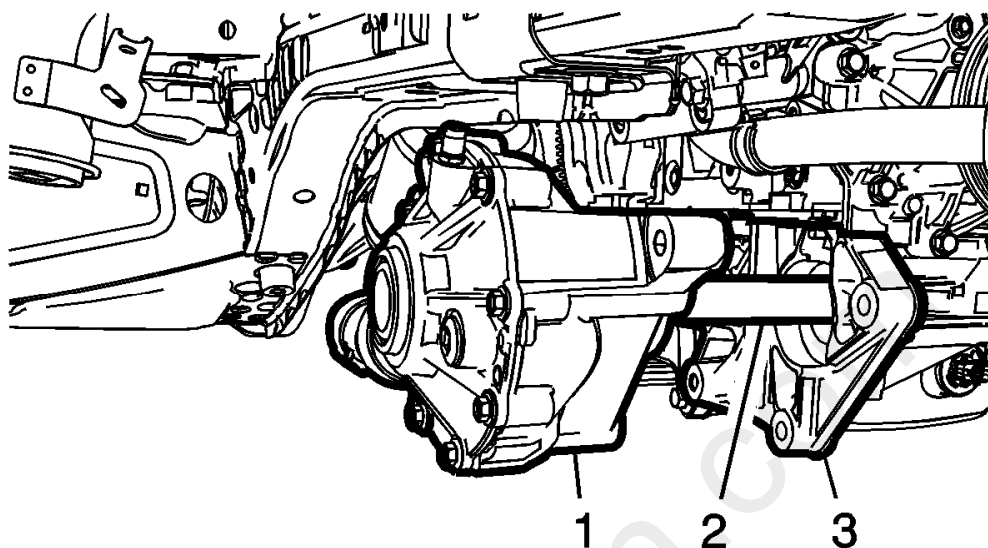


Fig. 22: Intermediate Wheel Drive Shaft And Front Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

13. Remove the intermediate wheel drive shaft (2) and the front differential carrier assembly (1) from the oil pan (3).
14. Remove the front differential carrier assembly from the vehicle.

Installation Procedure

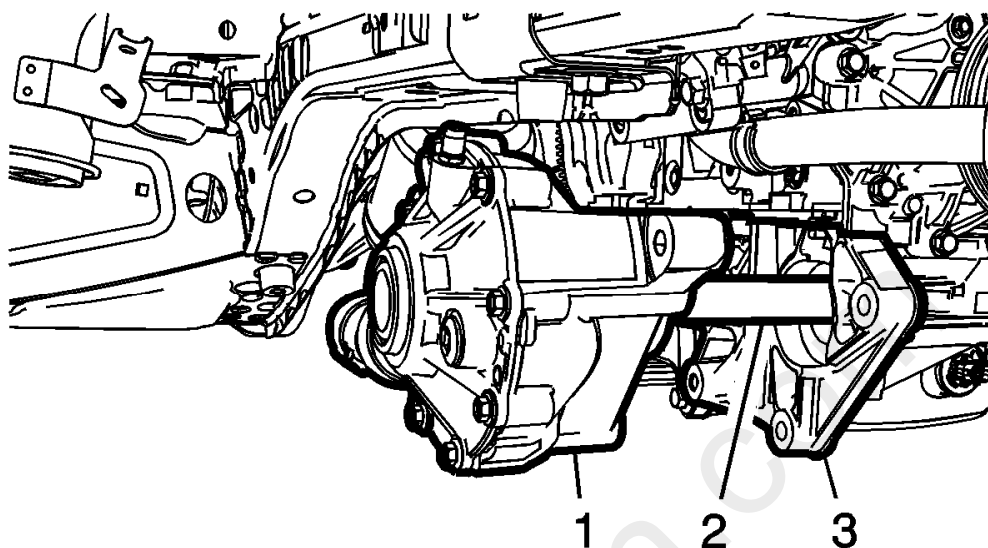


Fig. 23: Intermediate Wheel Drive Shaft And Front Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

NOTE: The intermediate wheel drive shaft and front differential carrier are to be installed as a assembly.

1. Position the front differential carrier (1) on a transmission jack.
2. Firmly secure the differential to the transmission jack.
3. With the front differential carrier firmly attached to the jack, install the intermediate wheel drive shaft (2) and the front differential carrier (1) to the oil pan (3).

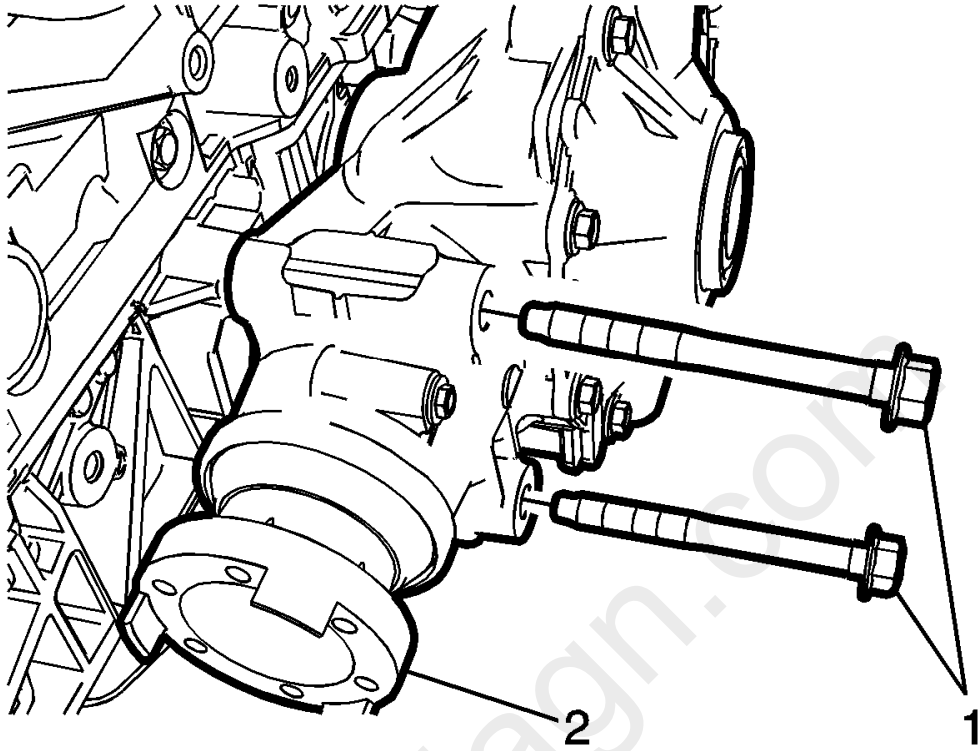


Fig. 24: Front Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

4. Install the front differential carrier (2) to the rear oil pan mounting bolts (1) hand tight.

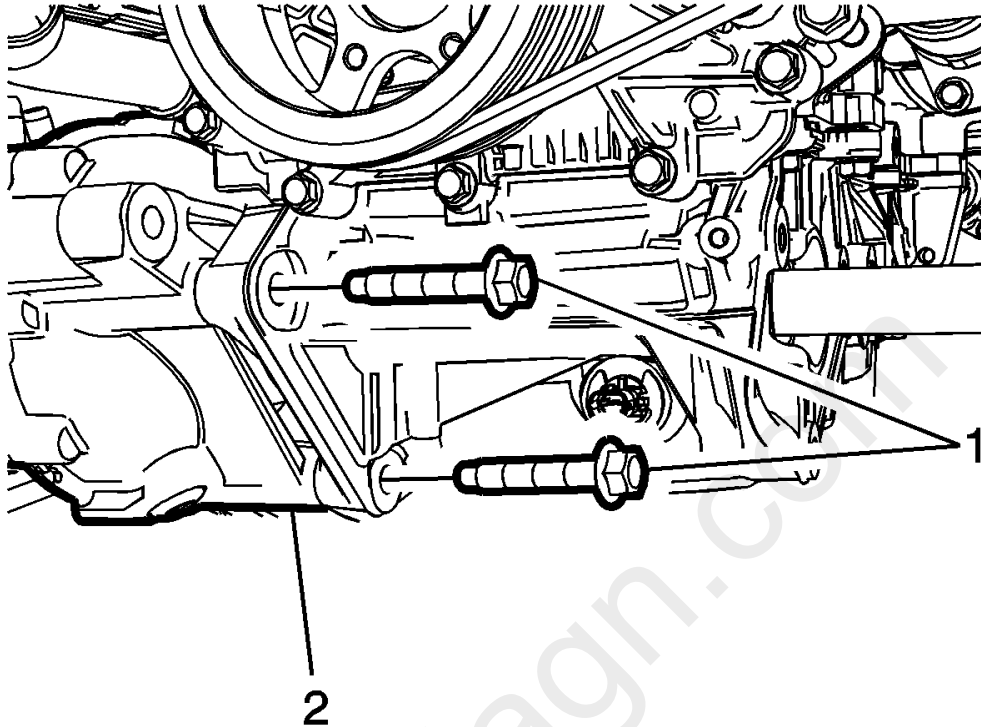


Fig. 25: Front Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

5. Install the front differential carrier (2) to the front oil pan mounting bolts (1) hand tight.

CAUTION: Refer to Fastener Caution .

6. Tighten the front differential carrier front and rear bolts as follows:
 1. Tighten the front differential carrier bolts first pass evenly to 30 N.m (22 lb ft).
 2. Tighten the front differential carrier bolts a second pass an additional 180 degrees using the **EN-45059** sensor.
 3. Tighten the rear differential carrier bolts first pass evenly to 30 N.m (22 lb ft).
 4. Tighten the front differential carrier bolts a second pass an additional 90 degrees using the **EN-45059** sensor.
7. Remove the transmission jack from the front differential carrier.
8. Using the engine support fixture, carefully raise the engine assembly to it's original position.

9. Install the front wheel drive intermediate shaft housing. Refer to **Front Wheel Drive Intermediate Shaft Housing Replacement**.
10. Install the left front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side**.
11. Install the right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side**.
12. Install the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement**.
13. Install the drivetrain and front suspension frame assembly. Refer to **Drivetrain and Front Suspension Frame Removal and Installation**.
14. Fill the front differential. Refer to **Front Axle Lubricant Level Inspection**.
15. Lower the vehicle.

FRONT DIFFERENTIAL CARRIER COVER AND GASKET REPLACEMENT

Removal Procedure

1. Drain the front differential carrier. Refer to **Front Axle Lubricant Replacement**.
2. Remove the right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side**.
3. Lower the drivetrain and front suspension frame enough to access the carrier side cover bolts. Refer to **Drivetrain and Front Suspension Frame Removal and Installation**.

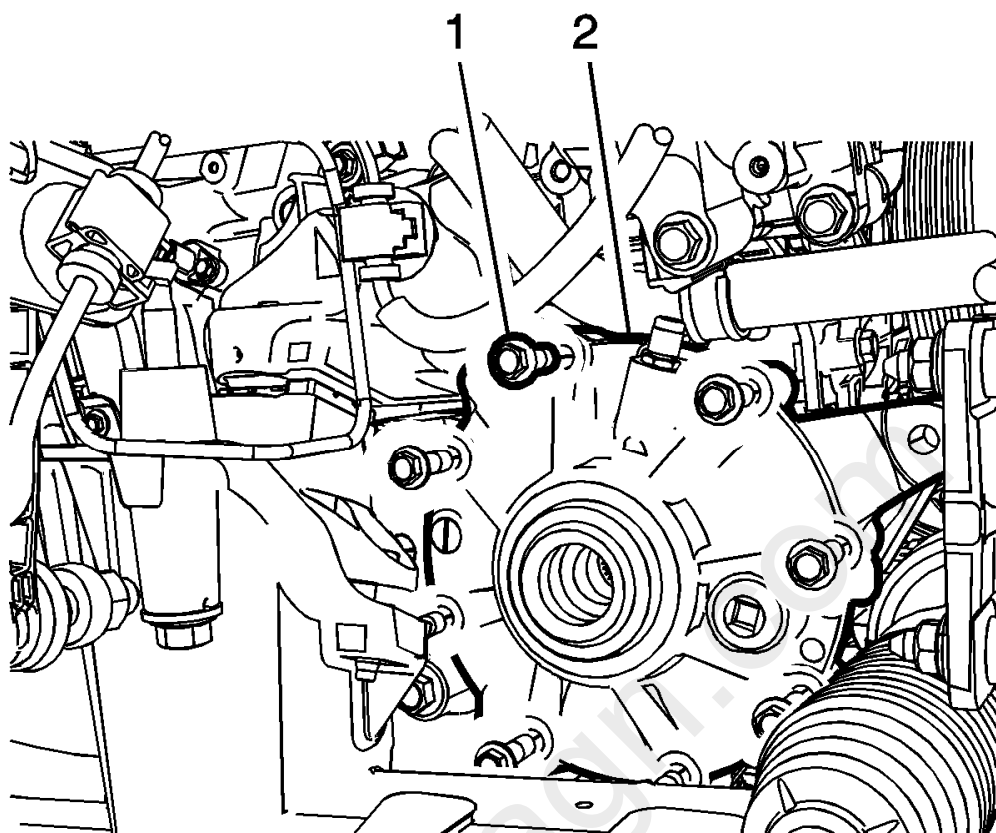


Fig. 26: Carrier Side Cover
Courtesy of GENERAL MOTORS COMPANY

4. Remove the carrier side cover bolts (1).
5. Using the appropriate tool in the pry tabs, remove the carrier side cover (2).

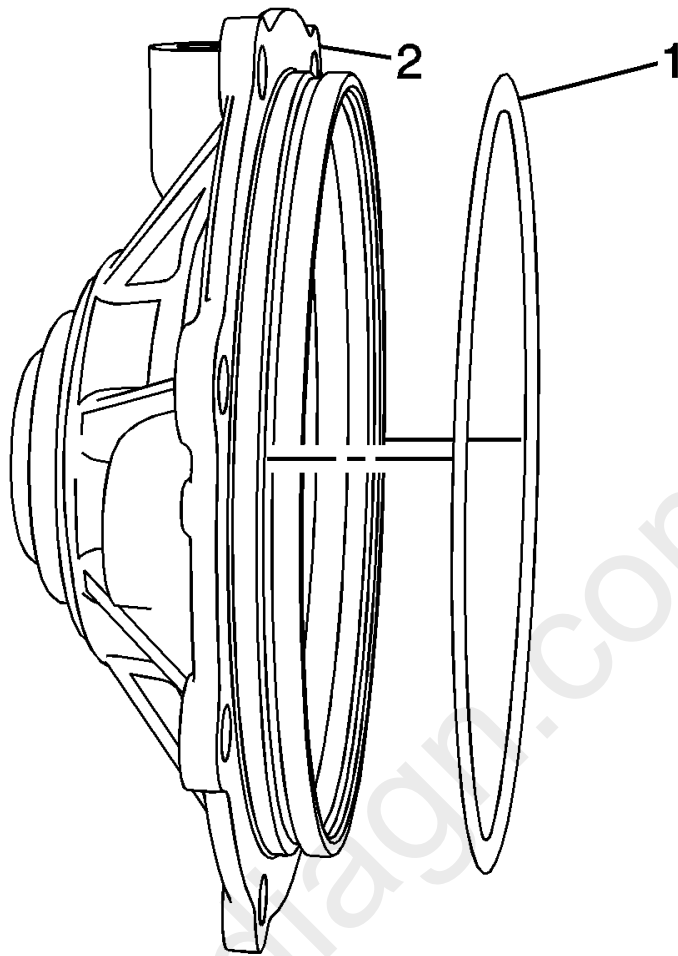


Fig. 27: Carrier Side Cover & O-ring
Courtesy of GENERAL MOTORS COMPANY

6. Remove the O-ring (1) from the carrier side cover (2).

Installation Procedure

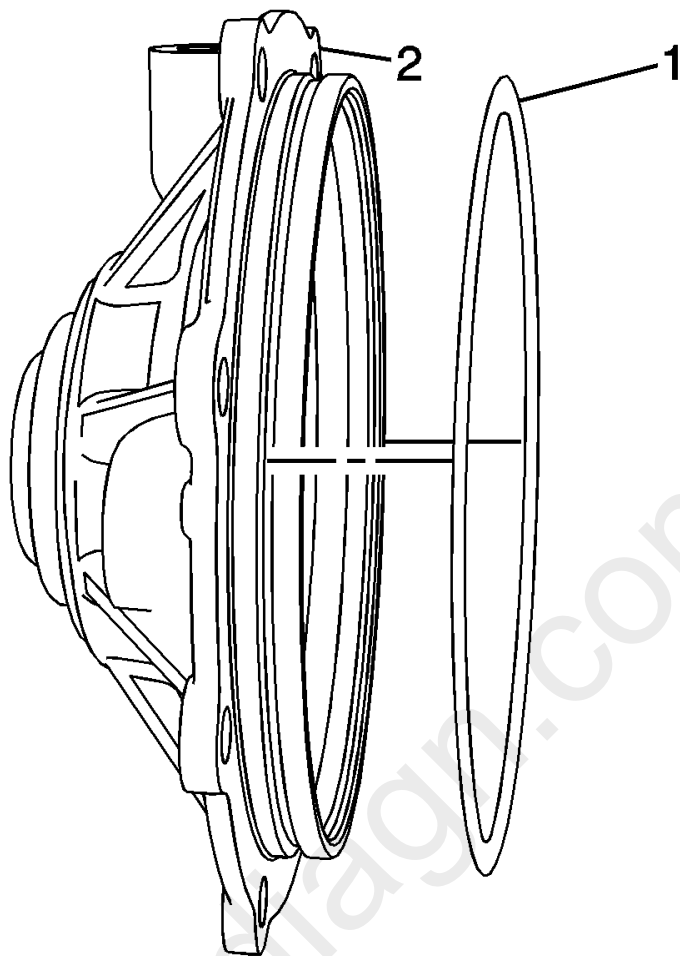


Fig. 28: Carrier Side Cover & O-ring
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW O-ring (1) into the groove of the carrier side cover (2).
2. Apply a light coat of gear lube to the O-ring area.

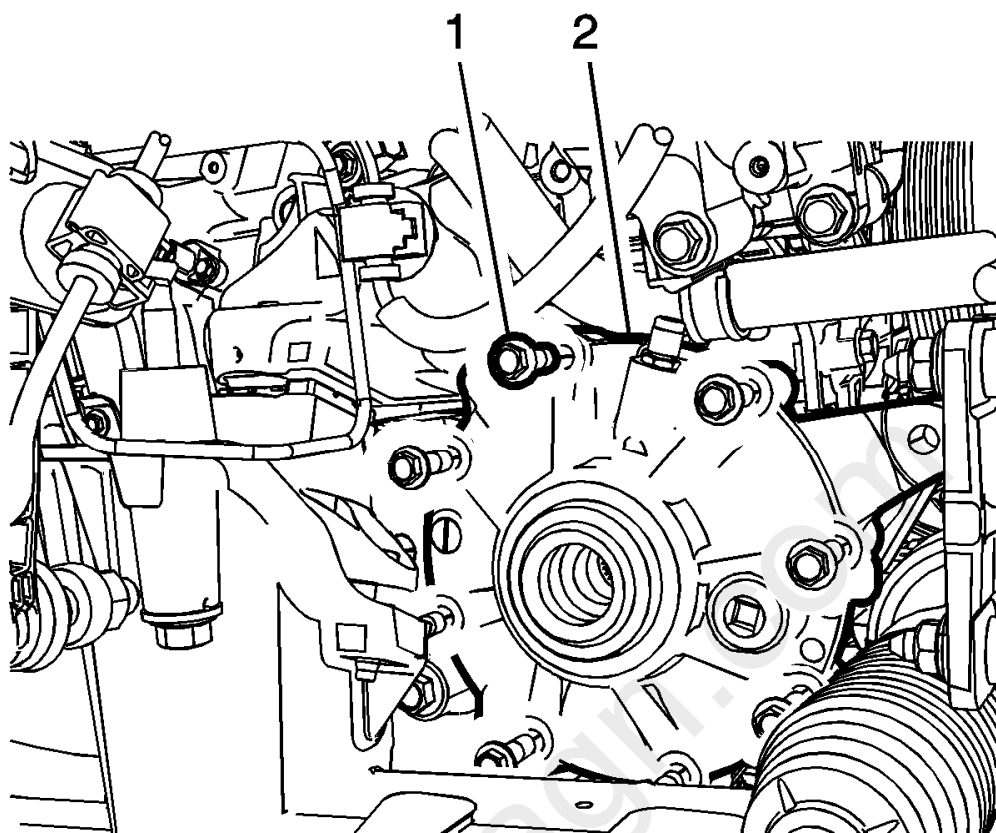


Fig. 29: Carrier Side Cover

Courtesy of GENERAL MOTORS COMPANY

3. Align the bolt holes and push the carrier side cover (2) onto the differential carrier evenly.
4. Start the cover bolts (1) and hand tighten.

CAUTION: Refer to Fastener Caution .

5. Tighten the side cover retaining bolts (1) to 54 (40 lb ft) in a criss-cross pattern.
6. Install the drivetrain and front suspension frame. Refer to **Drivetrain and Front Suspension Frame Removal and Installation** .
7. Install the right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side** .
8. Fill the differential with fluid. Refer to **Front Axle Lubricant Replacement**.

FRONT DIFFERENTIAL CARRIER FLANGE REPLACEMENT

Special Tools

- **DT-44873-2** Shoulder Bolts
- **J 8614-01** Flange and Pulley Holding Tool
- **J-5590** Bearing and Seal Driver
- **DT-36366-A** Pinion Seal Installer

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

1. Raise and support vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .

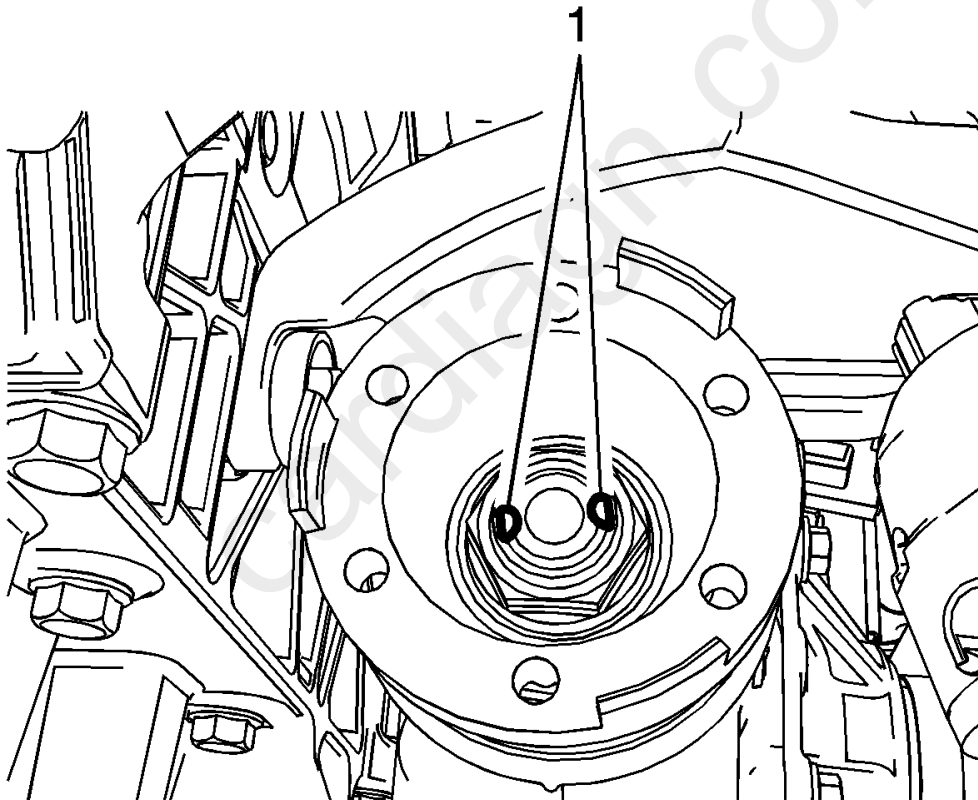


Fig. 30: Stake Points For Pinion Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: The pinion retaining nut is staked in two places and must be unstaked.

After the nut is removed, discard the nut.

3. Using a suitable punch, unstake the pinion retaining nut in both places (1).

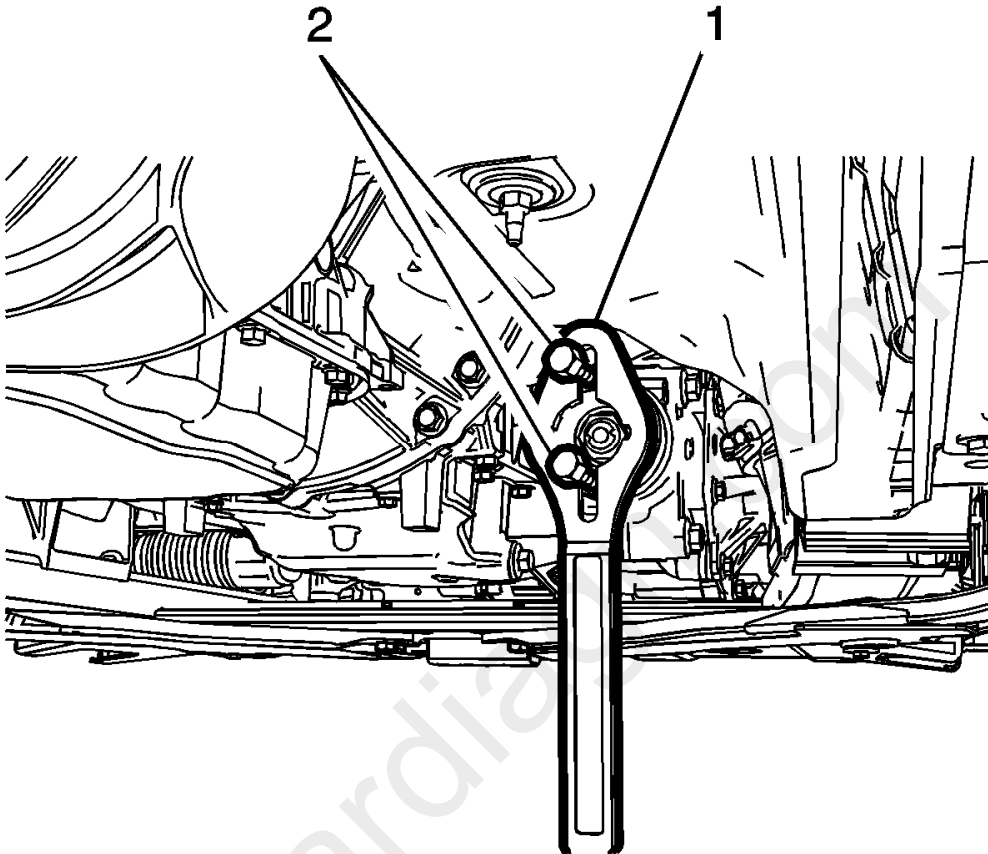


Fig. 31: Drive Pinion Flange Holder
Courtesy of GENERAL MOTORS COMPANY

4. Install the **J 8614-01** Holding Tool (1) to the drive pinion flange using **DT-44873-2** Shoulder Bolts (2).

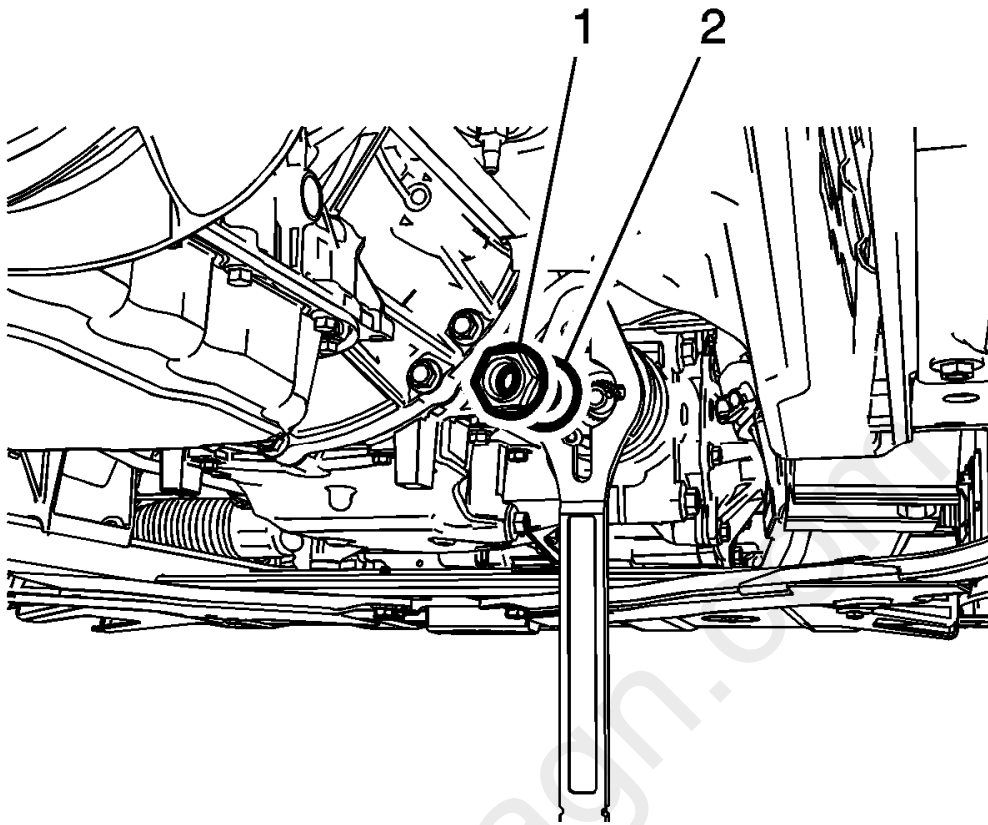


Fig. 32: Drive Pinion Flange Nut
Courtesy of GENERAL MOTORS COMPANY

5. Using the appropriate size socket and a breaker bar, remove the drive pinion flange nut (1) and washer (2).

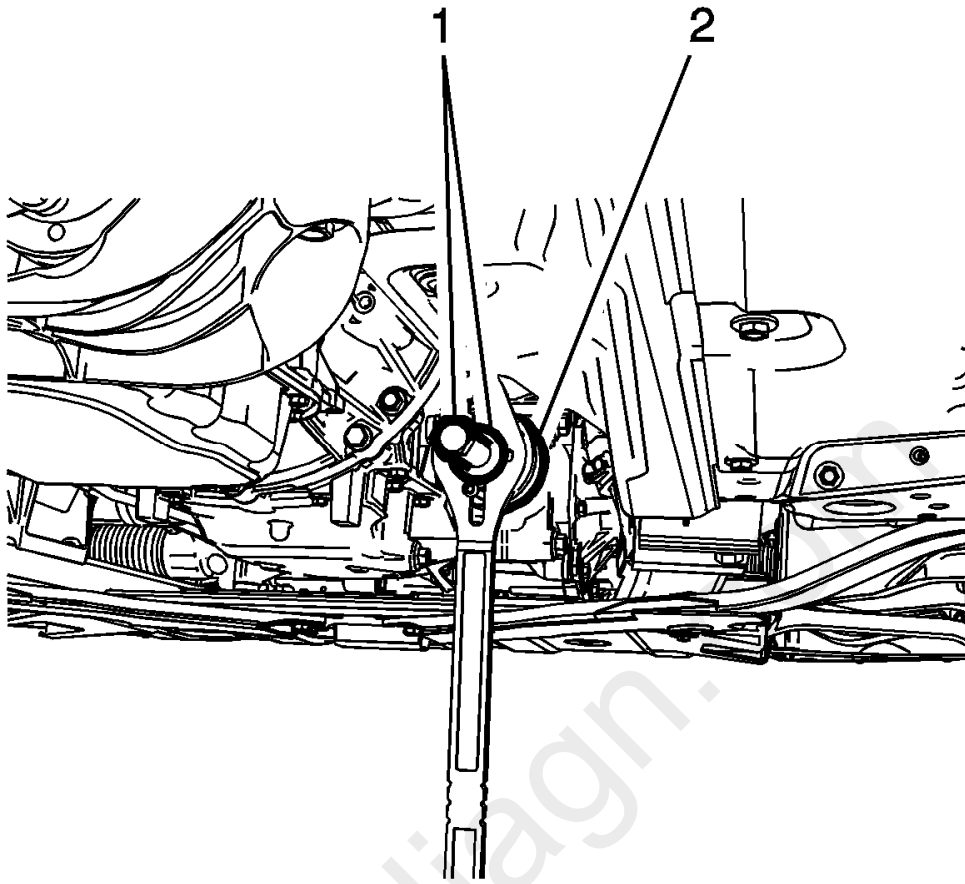


Fig. 33: Removing Drive Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

6. Install the forcing screw and adapter (1) of **J 8614-01** holding tool to the drive pinion flange (2).
7. Tighten the forcing screw of **J 8614-01** holding tool to remove the drive pinion flange.
8. Remove the **J 8614-01** holding tool from the drive pinion flange.

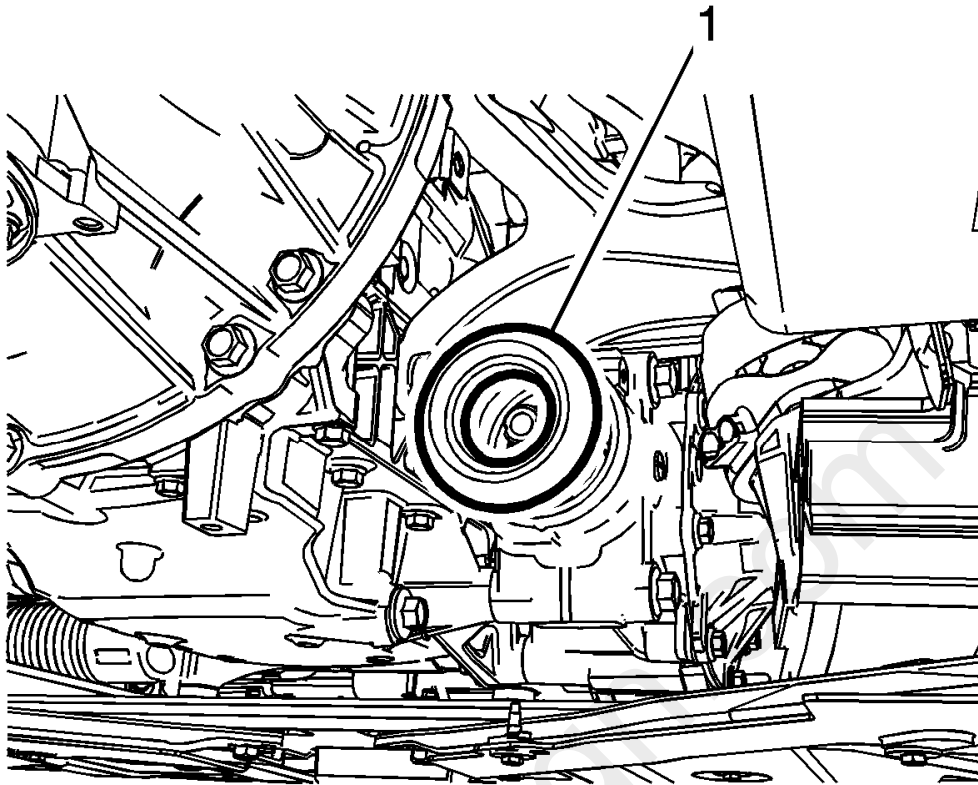


Fig. 34: Drive Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

9. If necessary, using a flat-bladed tool, remove the drive pinion seal (1). Take care not to damage any sealing surfaces.

Installation Procedure

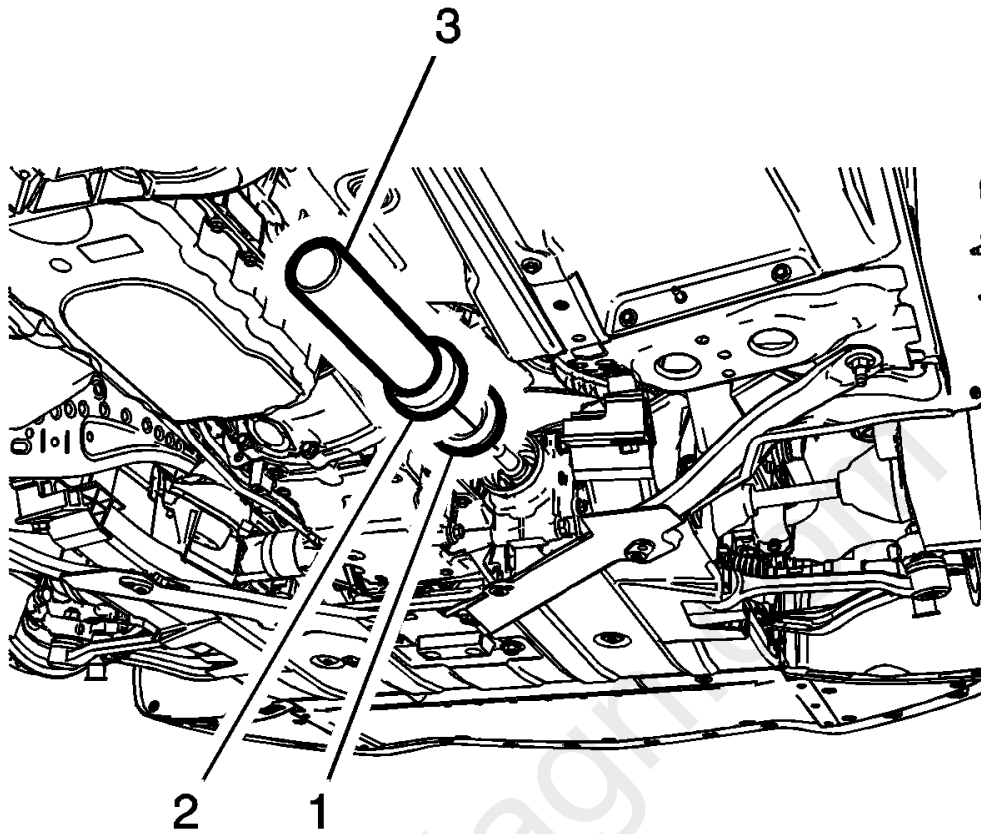


Fig. 35: Installing Drive Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

1. If removed, lubricate the drive pinion flange sealing surface of the drive pinion seal (1) with synthetic gear oil. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Using the **DT-36366-A** Seal Installer (2) and **J-5590** Driver (3), install the new pinion seal in the pinion housing.

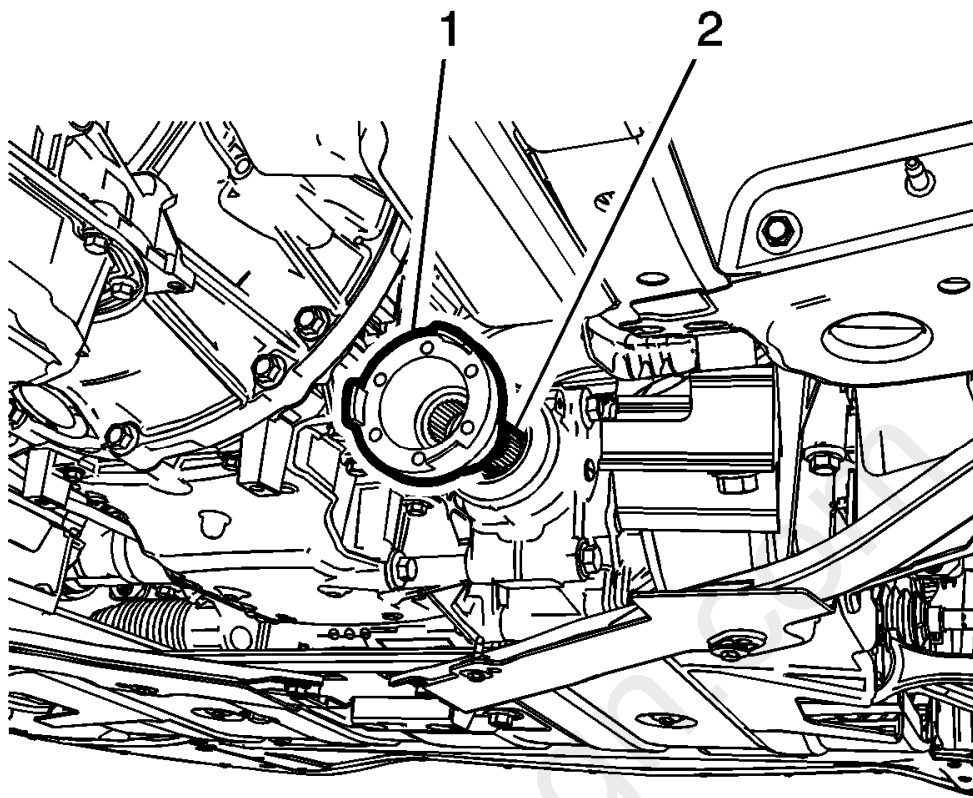


Fig. 36: Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

3. Install the pinion flange (1) to the drive pinion shaft (2).
4. Install the pinion nut washer and a NEW drive pinion flange nut to the pinion shaft.

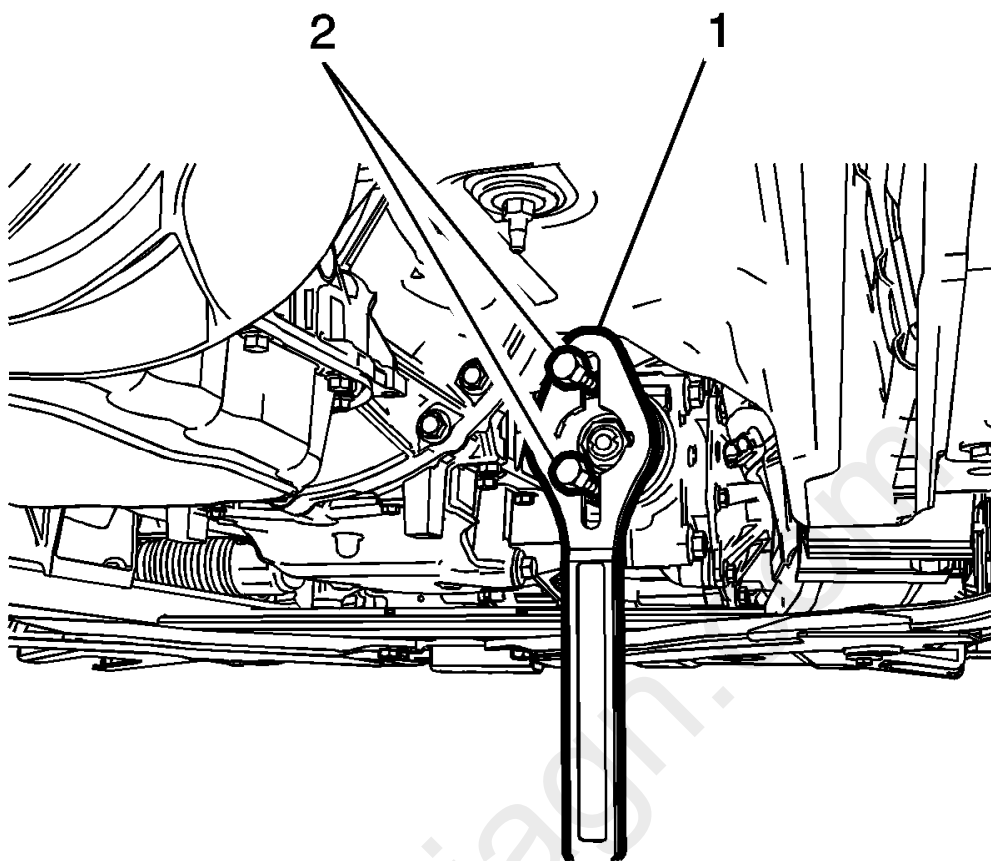


Fig. 37: Drive Pinion Flange Holder
Courtesy of GENERAL MOTORS COMPANY

5. Install the **J 8614-01** Holding Tool (1) to the drive pinion flange using **DT-44873-2** Shoulder Bolts (2).

CAUTION: Refer to Fastener Caution .

6. While holding the **J 8614-01** Holding Tool , tighten the drive pinion nut to 120 (89 lb ft).
7. Remove the **J 8614-01** Holding Tool (1) and **DT-44873-2** Shoulder Bolts (2) from the pinion flange.

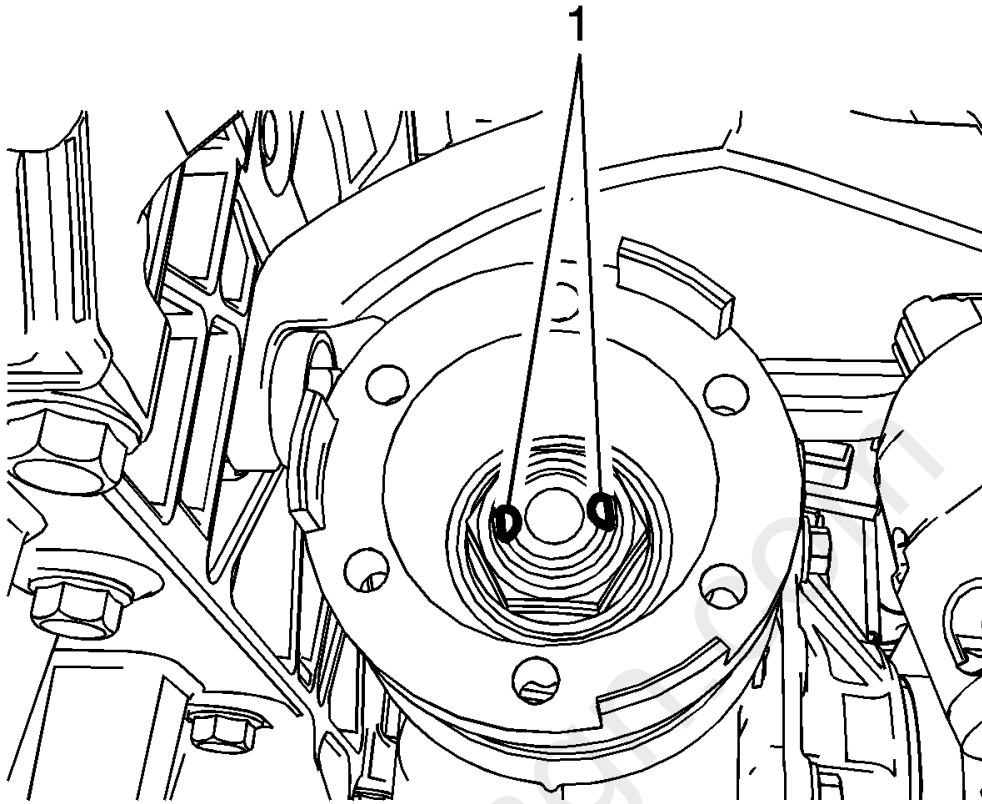


Fig. 38: Stake Points For Pinion Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: The pinion retaining nut must be staked in two places.

8. Using a suitable punch, stake the pinion nut in two places (1).
9. Install the propeller shaft. Refer to **Front Axle Propeller Shaft Replacement**.
10. Inspect the fluid level. Refer to **Front Axle Lubricant Level Inspection**.
11. Lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT

Special Tools

- **EN-49417** Installer
- **DT-36366-A** Pinion Seal Installer

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

1. Remove the front differential flange. Refer to Front Differential Carrier Flange Replacement.

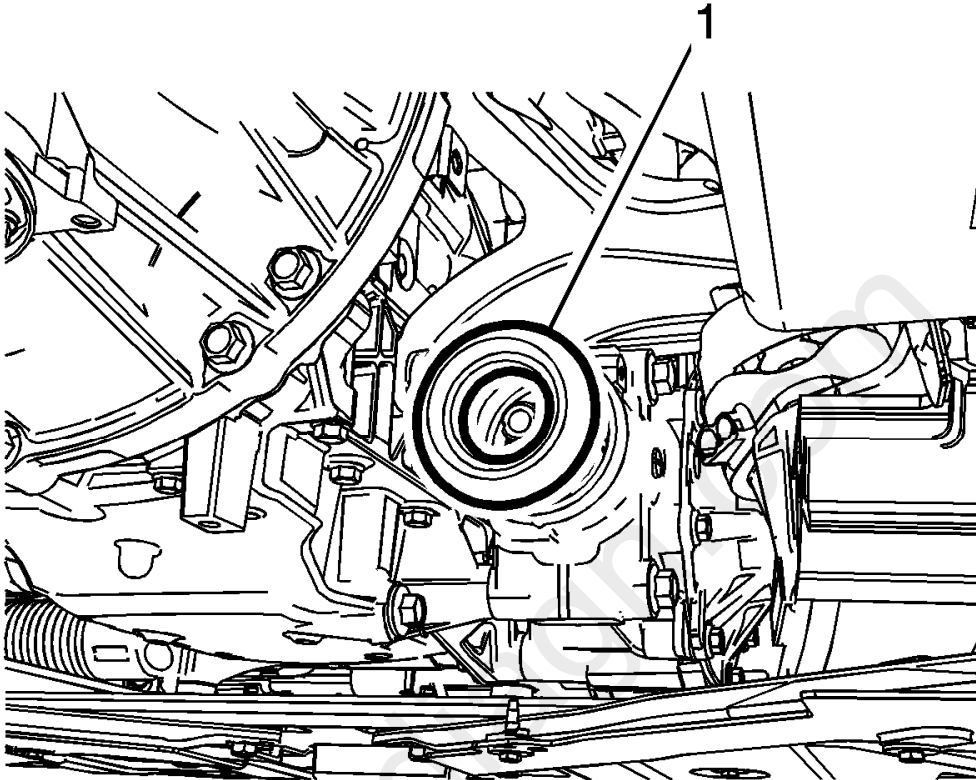


Fig. 39: Differential Drive Pinion Gear Seal
Courtesy of GENERAL MOTORS COMPANY

2. Using a flat-bladed tool, remove the drive pinion seal (1). Take care not to damage any sealing surfaces.

Installation Procedure

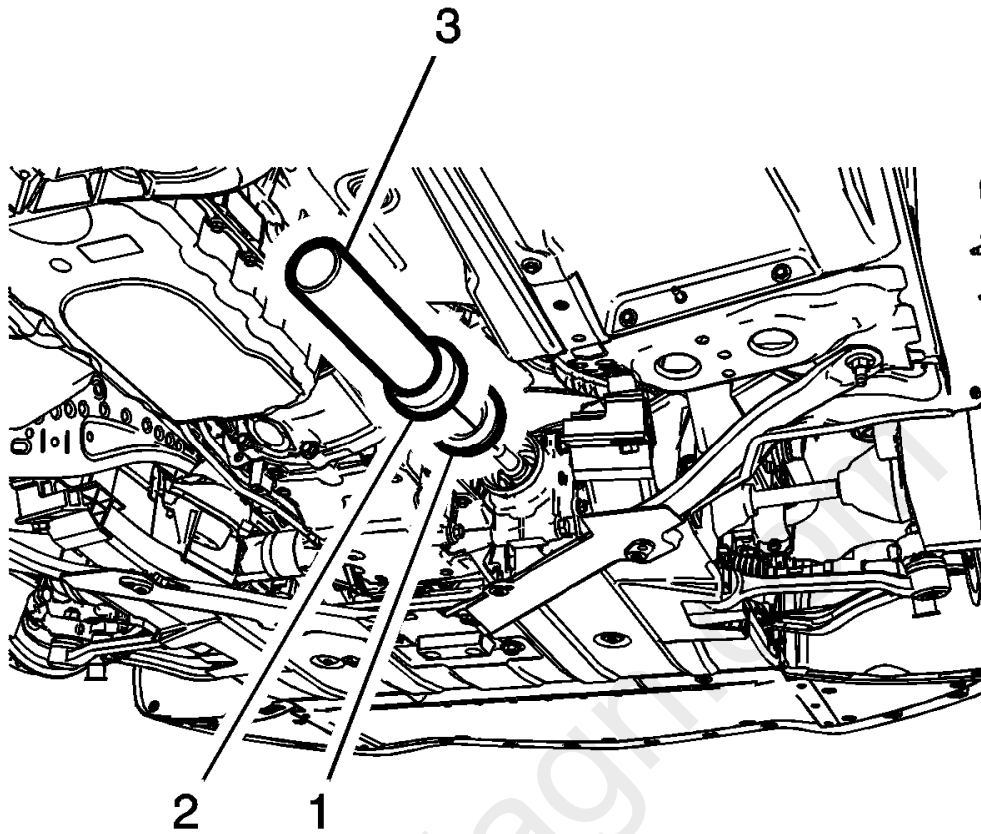


Fig. 40: Installing Differential Drive Pinion Gear Seal
Courtesy of GENERAL MOTORS COMPANY

1. Lubricate the drive pinion flange sealing surface of the drive pinion seal (1) with synthetic gear oil. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Using the **DT-36366-A** Seal Installer (2) and **EN-49417** Installer (3), install the new pinion seal in the pinion housing.
3. Install the front differential flange. Refer to **Front Differential Carrier Flange Replacement**.
4. Inspect the fluid level. Refer to **Front Axle Lubricant Level Inspection**.
5. Lower the vehicle.

FRONT AXLE LUBRICANT LEVEL INSPECTION

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine compartment lower noise shield. Refer to **Front Compartment Lower Noise Shield Replacement (AWD)** .

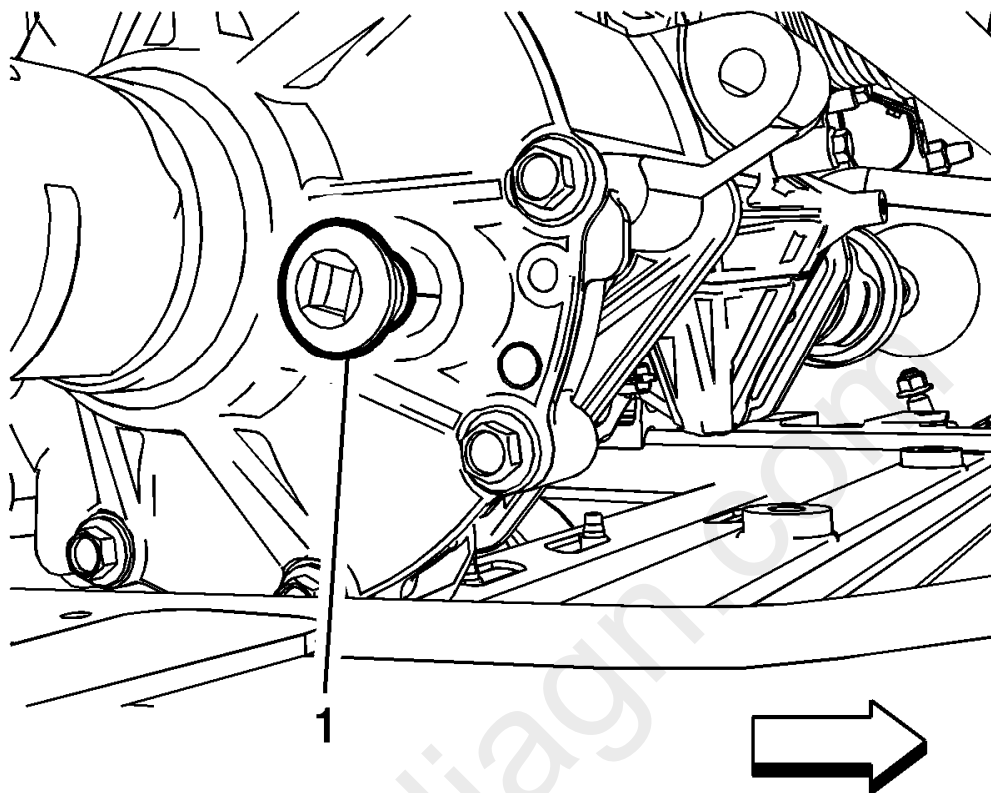


Fig. 41: Differential Fill Plug
Courtesy of GENERAL MOTORS COMPANY

3. Clean any dirt from around the differential fill plug.
4. Remove the fill plug (1) from the differential.

NOTE: Do NOT overfill the front differential. Overfilling the front differential can cause leakage out the differential housing vent.

5. Check the differential fluid level, it should be 4 mm (0.16 in) below the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening.
6. Add new fluid as necessary.
7. Fill the differential with the appropriate synthetic axle lubricant. Refer to **Lubrication Specifications**.

CAUTION: Refer to **Component Fastener Tightening Caution** .

8. Install the differential fill plug to the differential and tighten to 33 N.m (24 lb ft).
9. Install the engine compartment lower noise shield. Refer to **Front Compartment Lower Noise Shield Replacement (AWD)**.
10. Lower the vehicle.

DESCRIPTION AND OPERATION

FRONT DRIVE AXLE DESCRIPTION AND OPERATION

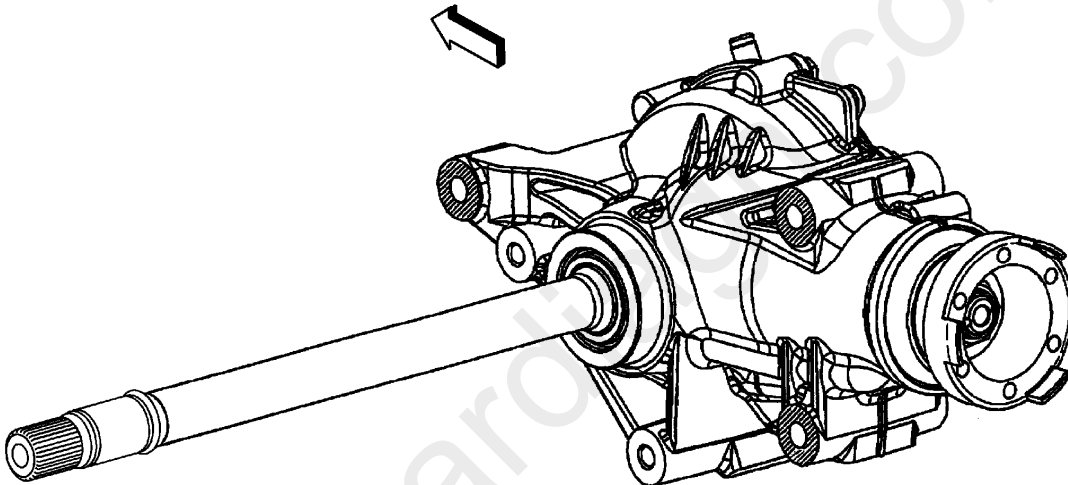


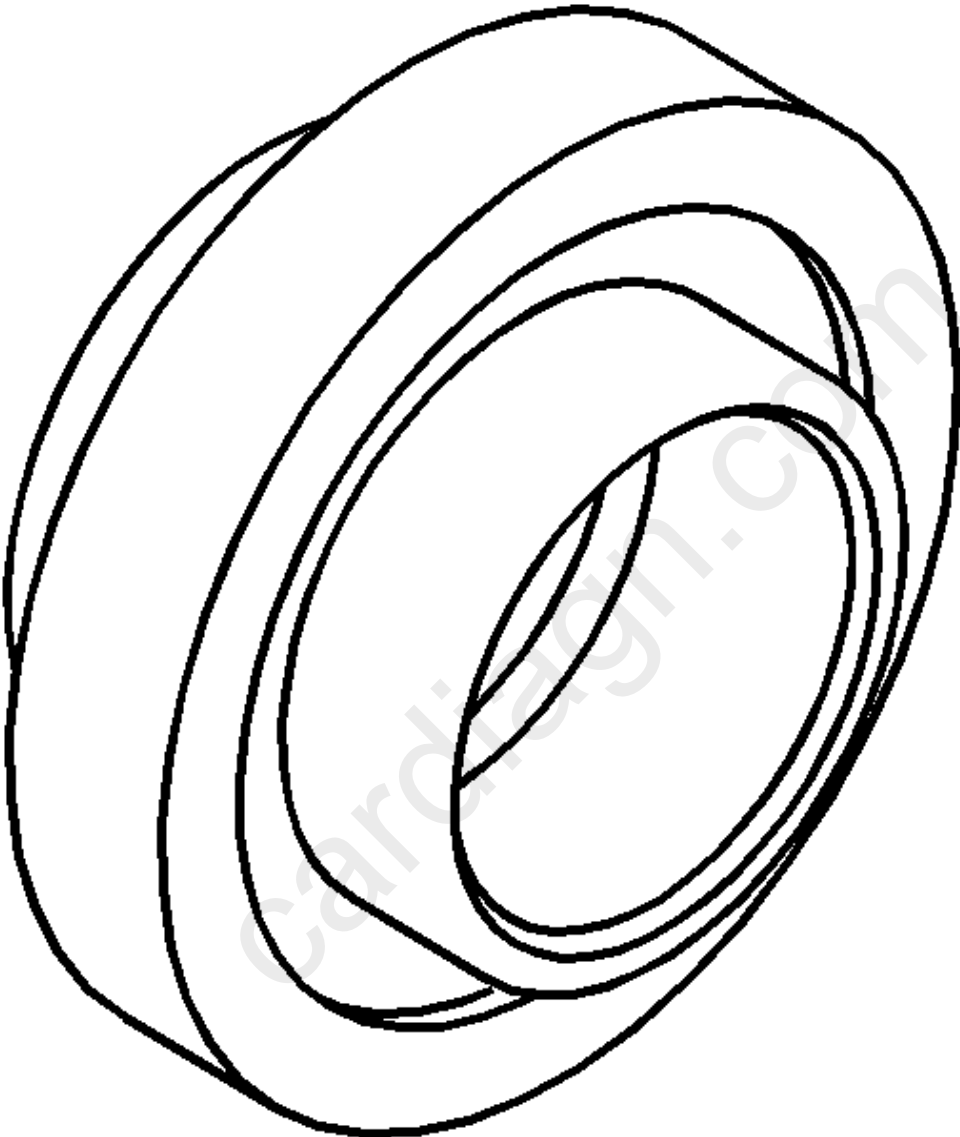
Fig. 42: Drive Axle

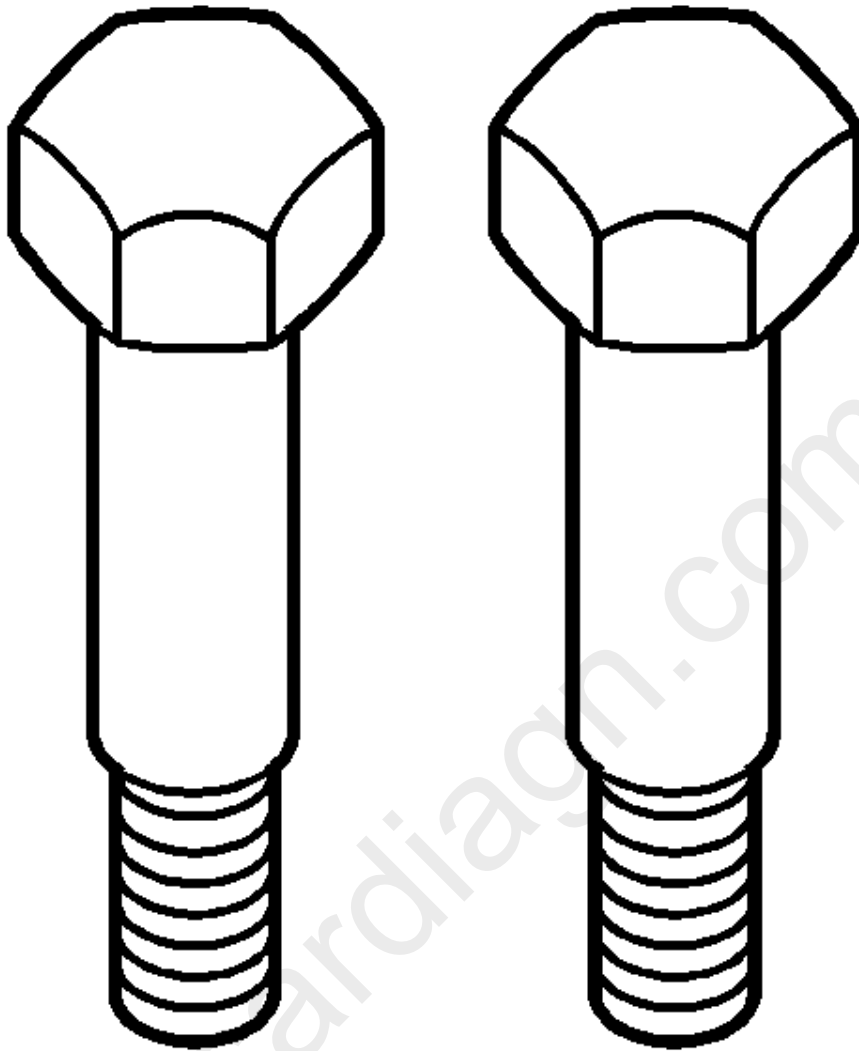
Courtesy of GENERAL MOTORS COMPANY

The differential housing, side cover and pinion housing are constructed of cast aluminum. The internal components incorporate a hypoid gear set, ring and pinion, carrier assembly and pinion housing assembly. The pinion is supported in a pinion housing by a tapered roller bearings. The pinion is positioned forward of the ring gear centerline. All models have a 7 5/8 inch ring gear.

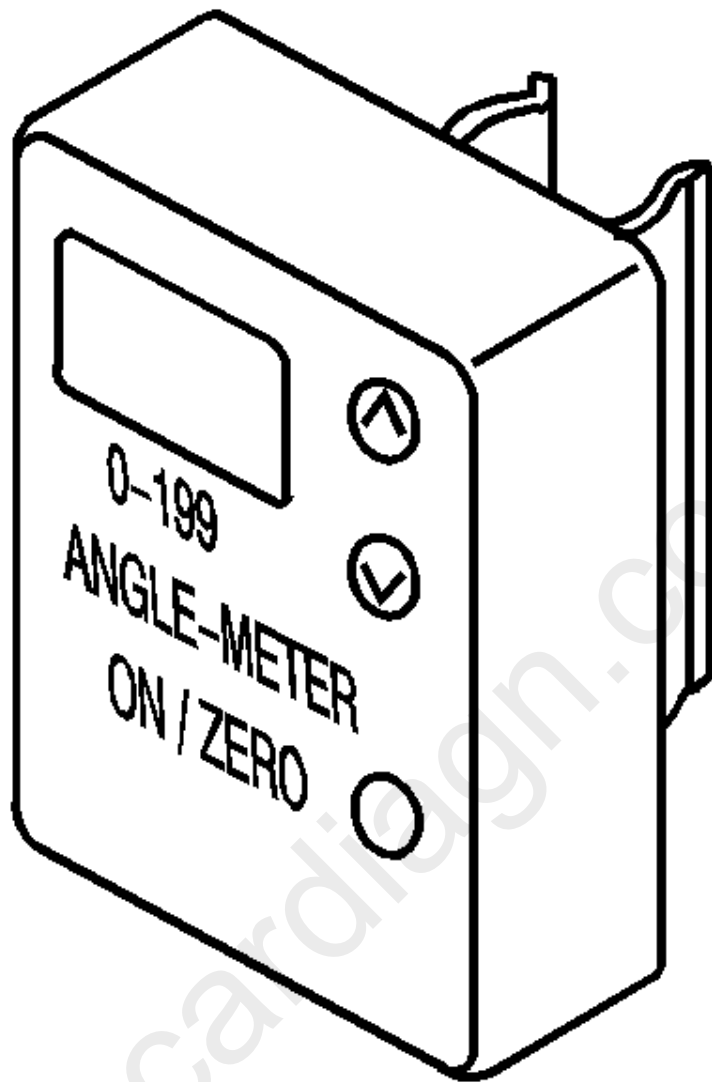
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

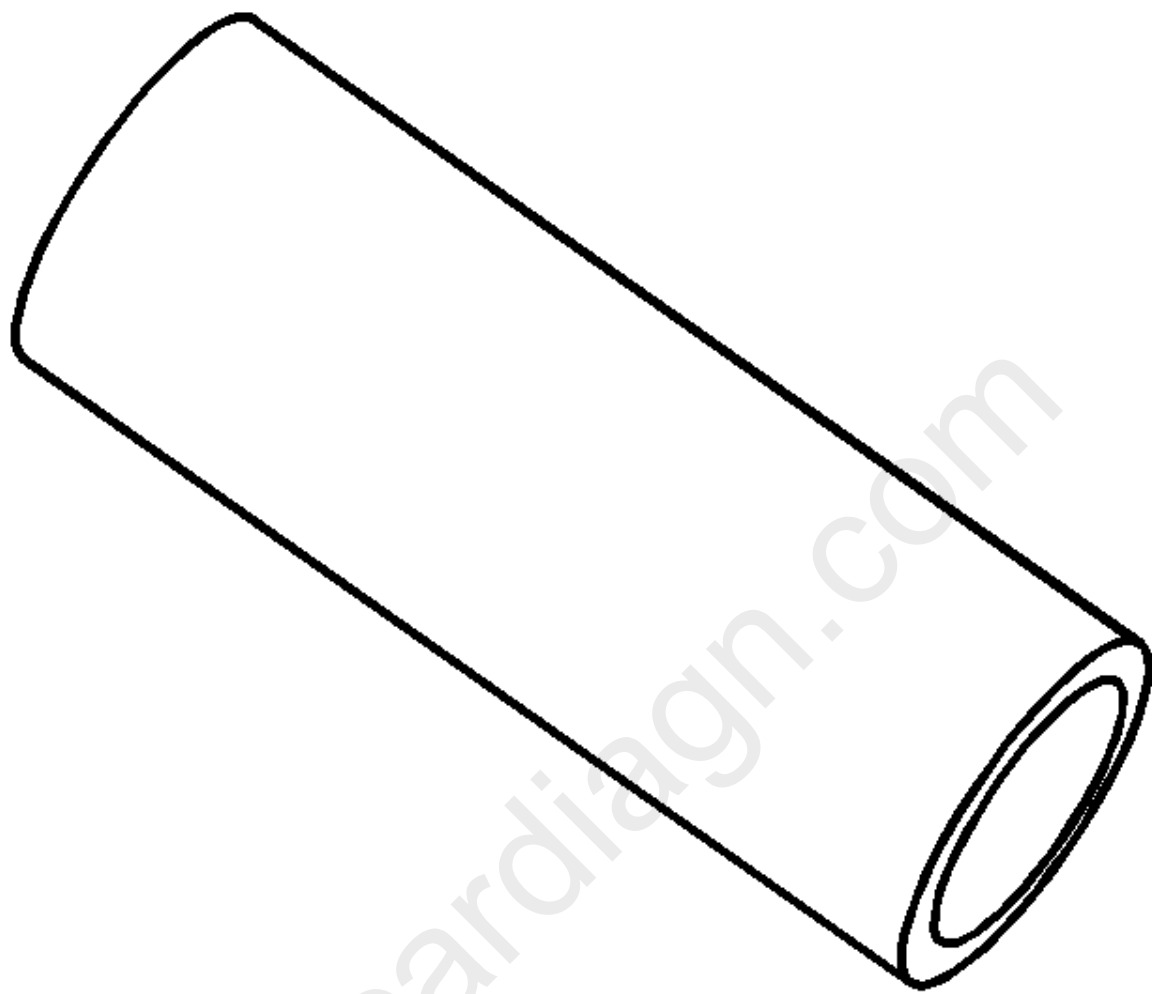
Illustration	Tool Number/ Description
	DT 36366 Pinion Seal Installer



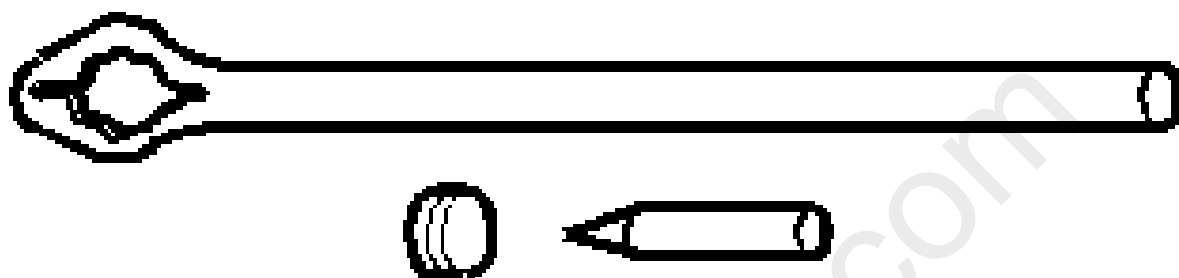
DT 44873-2
J 44873-2
Shoulder
Bolts



EN 45059
J 45059
Torque
Angle
Sensor Kit



J-5590
Bearing and
Seal Driver



J 8614-01
Flange and
Pulley
Holding
Tool