

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

2007 Driveline/Axle

Front Drive Axle - H3

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Differential Carrier Assembly Bearing Cap Bolts	63 N.m	46 lb ft
Differential Carrier Assembly Mounting Bracket to Carrier Bolts	155 N.m	114 lb ft
Differential Carrier Assembly Mounting Bracket to Frame Bolts	155 N.m	114 lb ft
Differential Housing Cover Bolts	30 N.m	22 lb ft
Intermediate Shaft Housing Assembly to Axle Housing Bolts	67 N.m	49 lb ft
Intermediate Shaft Housing to Outer Housing Bolts	48 N.m	35 lb ft
Pinion Shaft Lock Screw/Bolt	25 N.m	18 lb ft
Plug, Drain and Fill	32 N.m	24 lb ft
Ring Gear Bolts	120 N.m	89 lb ft
Third Point Mount Bolt	110 N.m	81 lb ft

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Axle Preload and Backlash Specifications

Application	Specification	
	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010 in
Backlash (Preferred)	0.13-0.18 mm	0.005-0.007 in
Pinion Bearing Preload, New Bearings	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, Used Bearings	1.1-2.3 N.m	10-20 lb in
Pinion and Differential Case Bearing Preload, New Bearings	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	2.8-5.1 N.m	25-45 lb in

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SEALERS, ADHESIVES AND LUBRICANTS

Sealers, Adhesives and Lubricants

Application	Type of Material	GM Part Number
Front Drive Axle	Lubricant	SAE 75W90 Synthetic Axle Lubricant GM P/N 89021677 (Canadian P/N 89021678) or equivalent meeting GM Specification 9986115
Pinion Yoke Splines	Sealant	GM P/N 12346004 (Canadian P/N 10953480) or equivalent

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS

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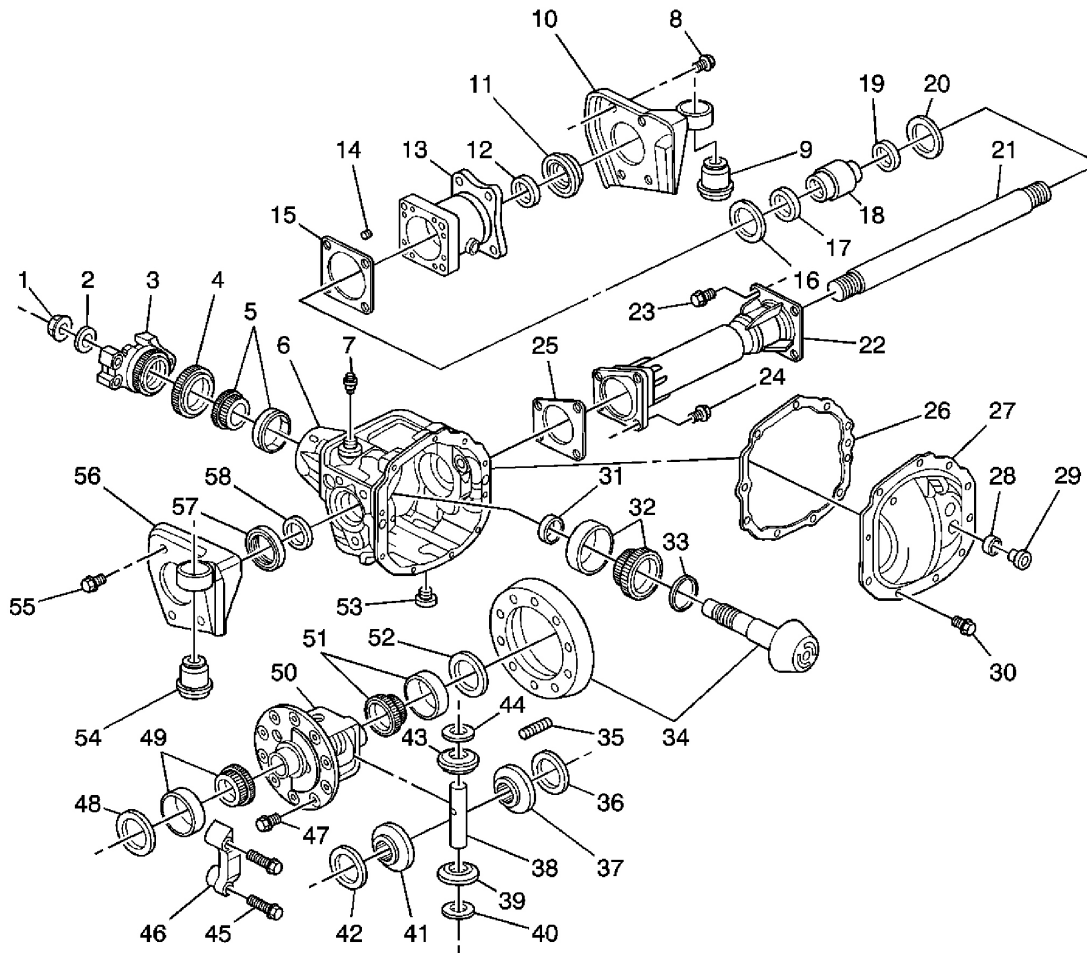


Fig. 1: Front Drive Axle Disassembled Views
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Nut - Pinion
2	Washer - Pinion
3	Flange Assembly - Pinion
4	Seal Assembly - Pinion
5	Bearing Assembly - Pinion Tail
6	Carrier Assembly
7	Connector - Vent
8	Bolt - Bracket to Support
9	Bushing - Mounting

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10	Bracket - Mounting
11	Seal Assembly - Shaft
12	Bearing Assembly - Shaft
13	Housing - Support
14	Pin - Locating
15	Gasket - Tube to Support
16	Washer - Thrust
17	Bearing Assembly - Shaft
18	Connector - Shaft
19	Bearing Assembly - Shaft
20	Washer - Thrust
21	Shaft - Output
22	Tube
23	Bolt - Tube to Support
24	Bolt - Tube to Carrier Assembly
25	Gasket - Tube to Carrier Assembly
26	Gasket - Cover Pan
27	Cover Assembly - Pan
28	Washer - Fill Plug
29	Plug - Fill
30	Bolt - Cover Pan
31	Spacer - Pinion Bearing
32	Bearing Assembly - Pinion Head
33	Shim - Pinion Bearing
34	Ring and Pinion Gear
35	Screw - Differential Case Cross Pin
36	Washer - Differential Side Gear Thrust
37	Gear - Differential Case
38	Pin - Differential Cross
39	Gear - Differential Pinion
40	Washer - Differential Pinion Gear Thrust
41	Gear - Differential Side
42	Washer - Differential Side Gear Thrust
43	Gear - Differential Pinion
44	Washer - Differential Pinion Gear Thrust

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	Bolt - Differential Carrier Bearing Cap
46	Cap - Differential Carrier Bearing
47	Bolt - Ring Gear
48	Shim - Differential Bearing
49	Bearing Assembly - Differential Case
50	Case - Differential
51	Bearing Assembly - Differential Case
52	Shim - Differential Bearing
53	Plug Assembly - Drain
54	Bushing - Mounting
55	Bolt - Mounting Bracket
56	Bracket - Mounting
57	Seal Assembly - Shaft
58	Bearing Assembly - Shaft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - FRONT DRIVE AXLE

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exist. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Front Drive Axle** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

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**.

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 **Diagnostic Starting Point - Vibration Diagnosis 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.

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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 car 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

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to <u>Backlash Inspection and Adjustment</u> .

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Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to the following: <ul style="list-style-type: none"> • <u>Differential Case Assembly Disassemble</u> • <u>Differential Case Assembly Assemble</u> • <u>Drive Pinion Bearings Replacement</u>
Worn pinion bearings	Replace the pinion bearings. Refer to <u>Drive Pinion Bearings Replacement</u> .
Loose pinion bearings	Adjust the pinion bearings preload. Refer to <u>Drive Pinion Bearings Replacement</u> and to <u>Backlash Inspection and Adjustment</u> .
Excessive pinion end play	Adjust the pinion end play. Refer to <u>Pinion Depth Adjustment</u> .
Worn differential bearings	Replace the differential bearings. Refer to <u>Differential Case Assembly Disassemble</u> and to <u>Differential Case Assembly Assemble</u> .
Loose differential bearings	Adjust the differential bearing preload. Refer to <u>Backlash Inspection and Adjustment</u> .
Excessive ring gear runout	Replace the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to <u>Front Axle Lubricant Level Inspection</u> .
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to <u>Front Axle Lubricant Replacement</u> .

NOISY WHEN COASTING

Noisy When Coasting

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to <u>Backlash Inspection and Adjustment</u> .

INTERMITTENT NOISE

Intermittent Noise

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Checks	Action
Warped ring gear	Replace the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to <u>Backlash Inspection and Adjustment</u> .

CONSTANT NOISE

Constant Noise

Checks	Action
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u>
Flat spot on the pinion bearing	Replace the bearing. Refer to <u>Drive Pinion Bearings Replacement</u> .
Worn pinion splines	Replace the pinion. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .

NOISY ON TURNS

Noisy on Turns

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to <u>Differential Case Assembly Disassemble</u> .
Worn differential spider	Replace the spine gears. Refer to <u>Differential Case Assembly Disassemble</u> .
Worn axle shaft splines	Replace the axle shaft. Refer to <u>Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement</u> .

FRONT DRIVE AXLE BEARING WEAR (DIFFERENTIAL CASE/PINION BEARINGS)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing a bearing condition:

- Note the general condition of all parts during disassembly and inspection.
- Classify the failure with the aid of the illustrations.
- Determine the cause.
- Make all repairs following recommended procedures.

Abrasive Roller Wear

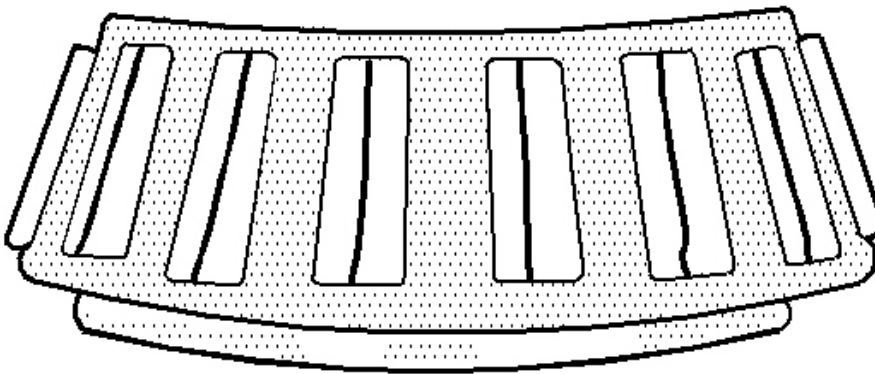
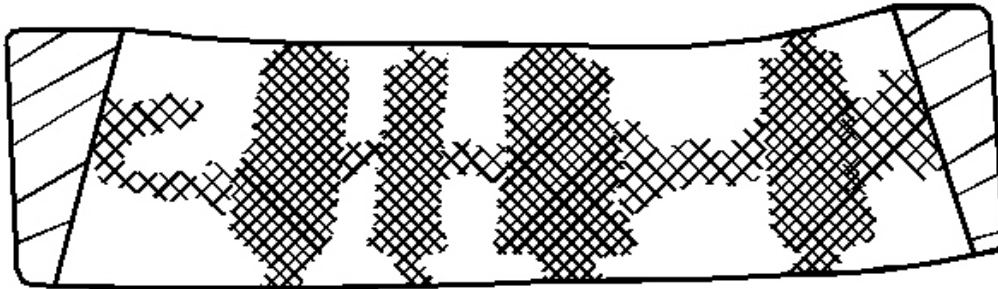


Fig. 2: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the races and the rollers can be caused by fine abrasives. Clean all of the parts and the housings. Inspect the seals and the bearings. Replace any leaky, rough or noisy bearings.

Abrasive Step Wear

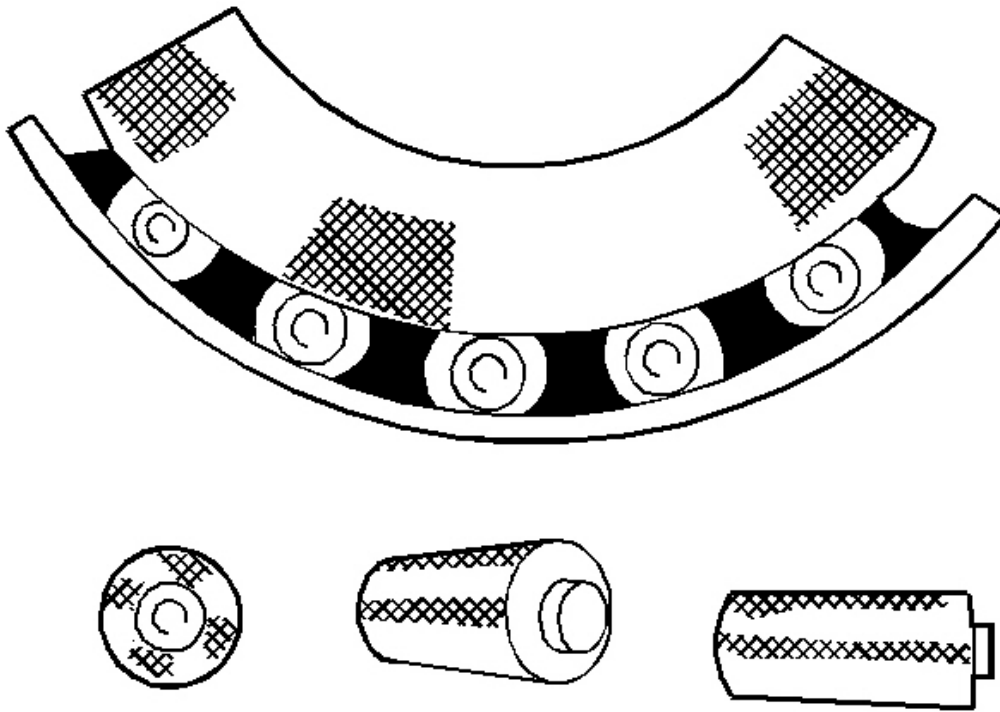


Fig. 3: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the roller ends can be caused by fine abrasives. Clean all of the parts and the housings. Inspect the seals and the bearings. Replace any leaky, rough or noisy bearings.

Galling

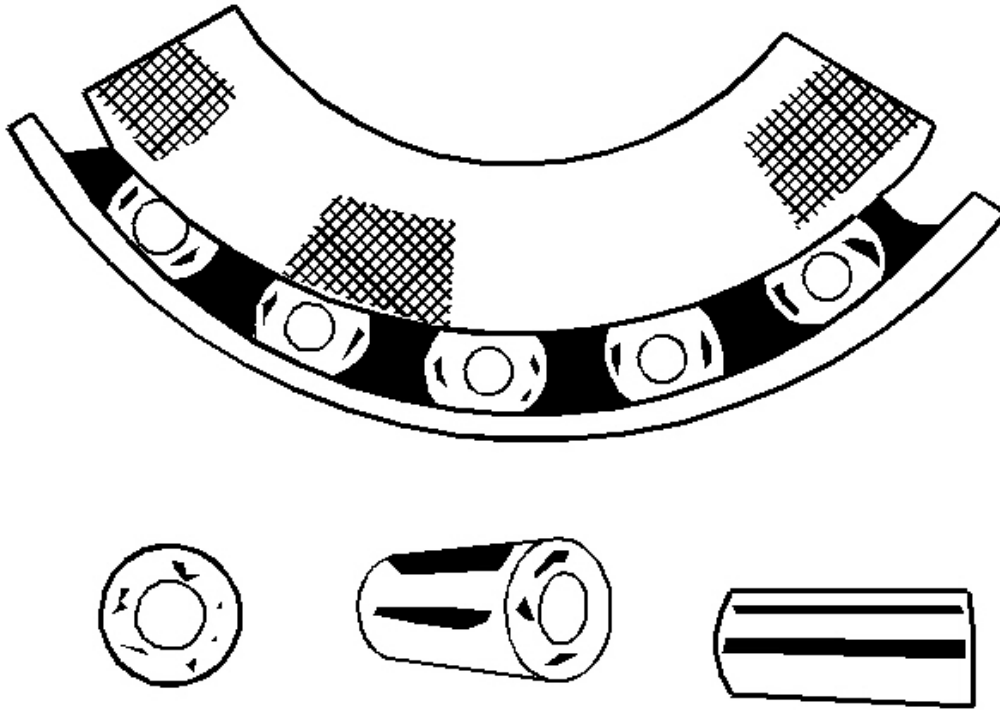


Fig. 4: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

Metal smears on the roller ends can be due to overheating, lubricant failure or lubricant overload. Replace the bearing. Inspect the seals. Inspect for proper lubrication.

Etching

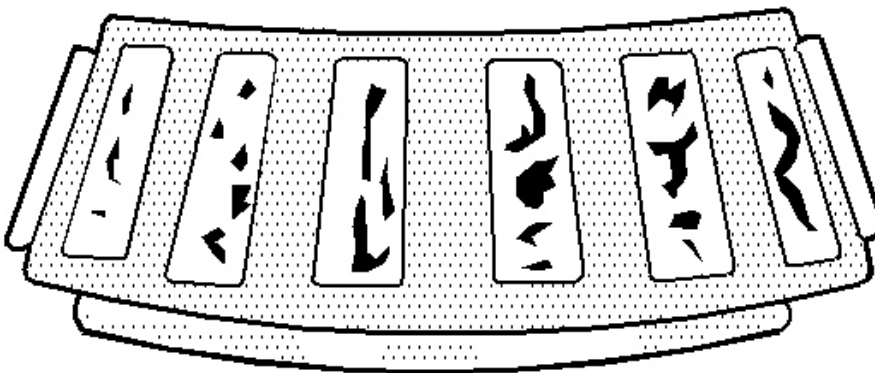
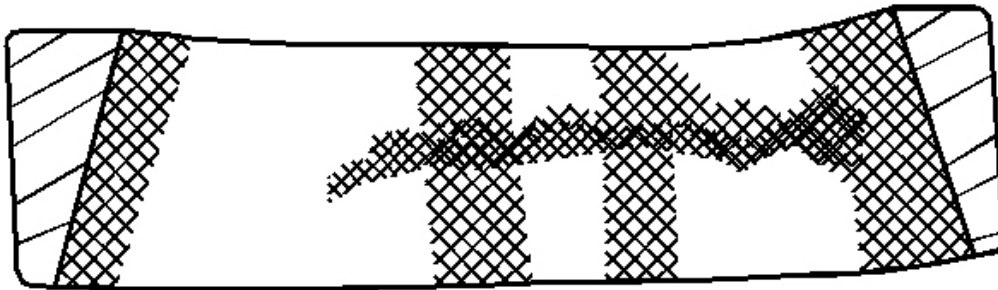


Fig. 5: Identifying Etching

Courtesy of GENERAL MOTORS CORP.

Bearing surfaces appear gray or grayish black in color, with related etching away of material usually at roller spacing. Replace the bearings. Inspect the seals. Inspect for proper lubrication.

Bent Cage

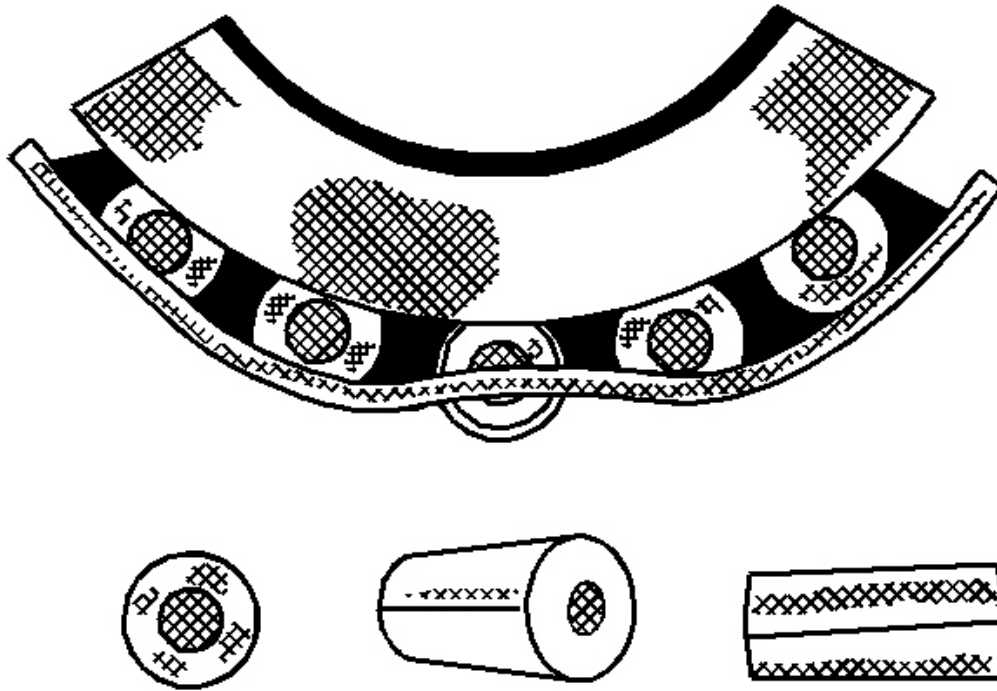


Fig. 6: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

A damaged cage can be due to improper handling or improper tool usage. Replace the bearing.

Cage Wear

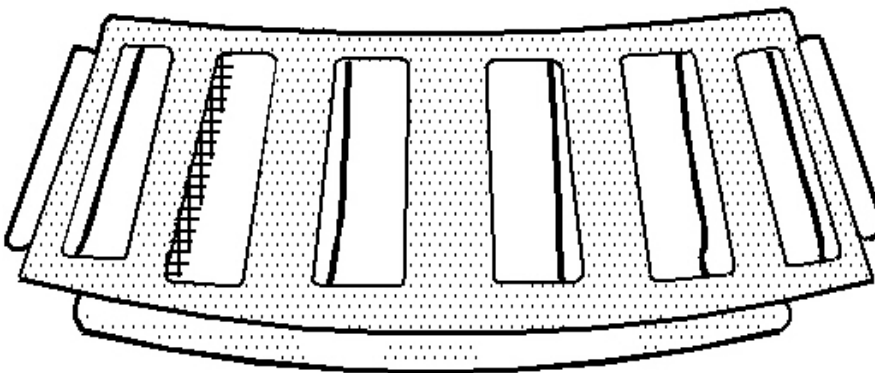
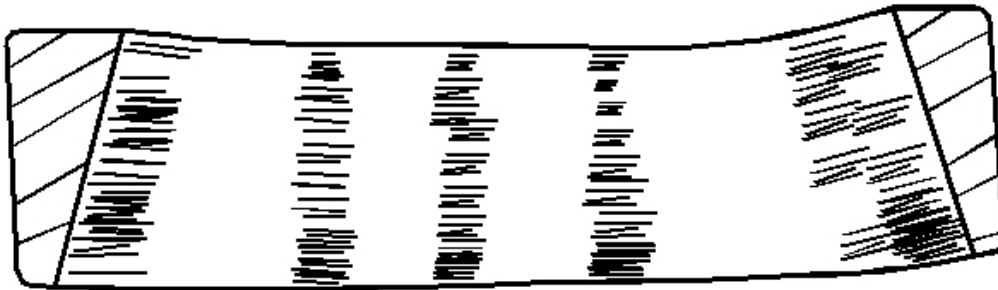


Fig. 7: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

Wear around the outside diameter of the cage and the roller pockets can be caused by abrasive material. Wear can be caused from inefficient lubrication. Clean the related parts and the housings. Inspect the seals. Replace the bearings.

Indentations

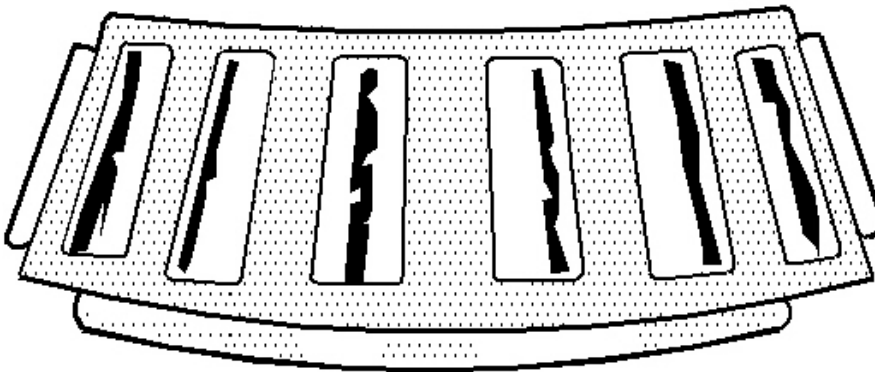
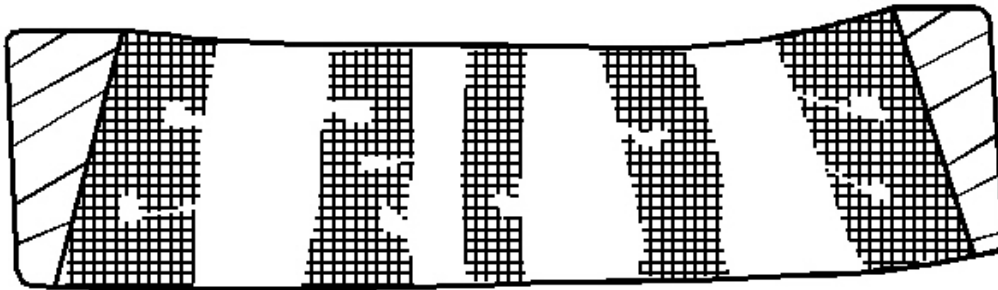


Fig. 8: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

Surface depressions on the race and the rollers can be caused by hard particles of foreign matter. Clean all the parts and the housings. Inspect the seals. Replace rough or noisy bearings.

Fretting

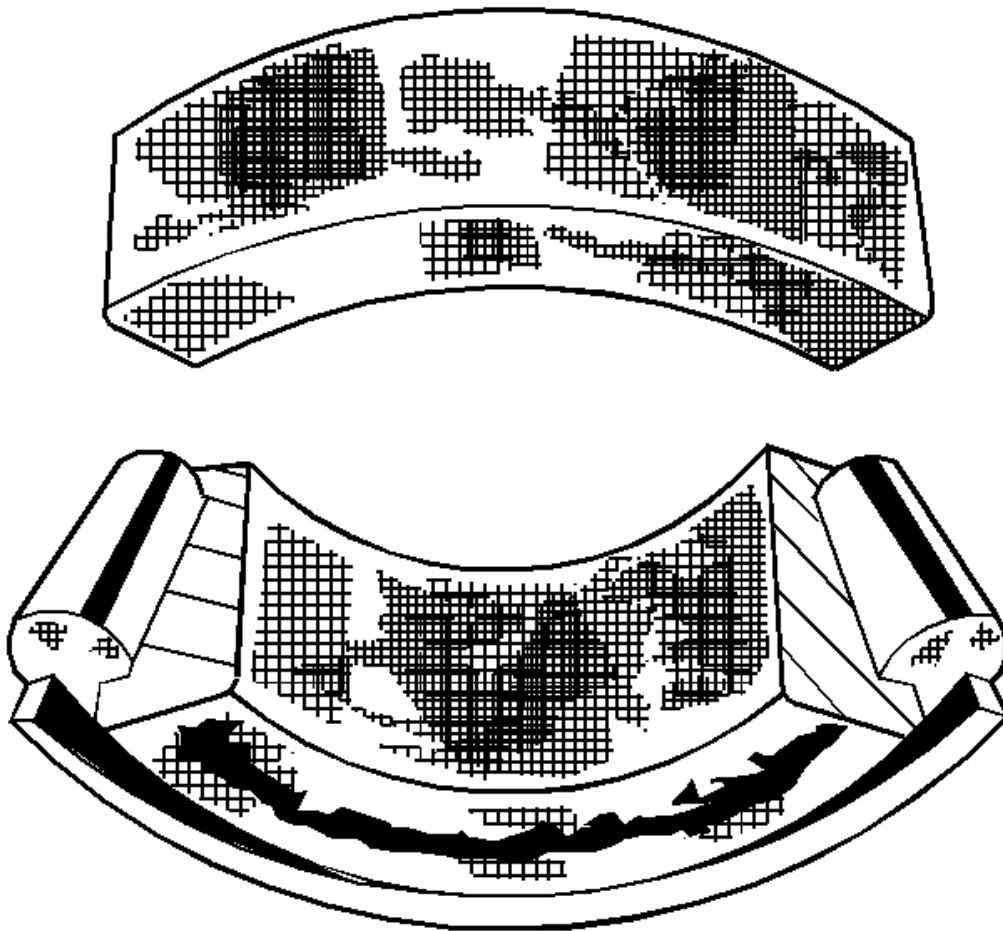


Fig. 9: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

Corrosion can be caused by small relative movement of parts with no lubrication. Replace the bearing. Clean the related parts. Inspect the seals. Inspect for proper lubrication.

Smears

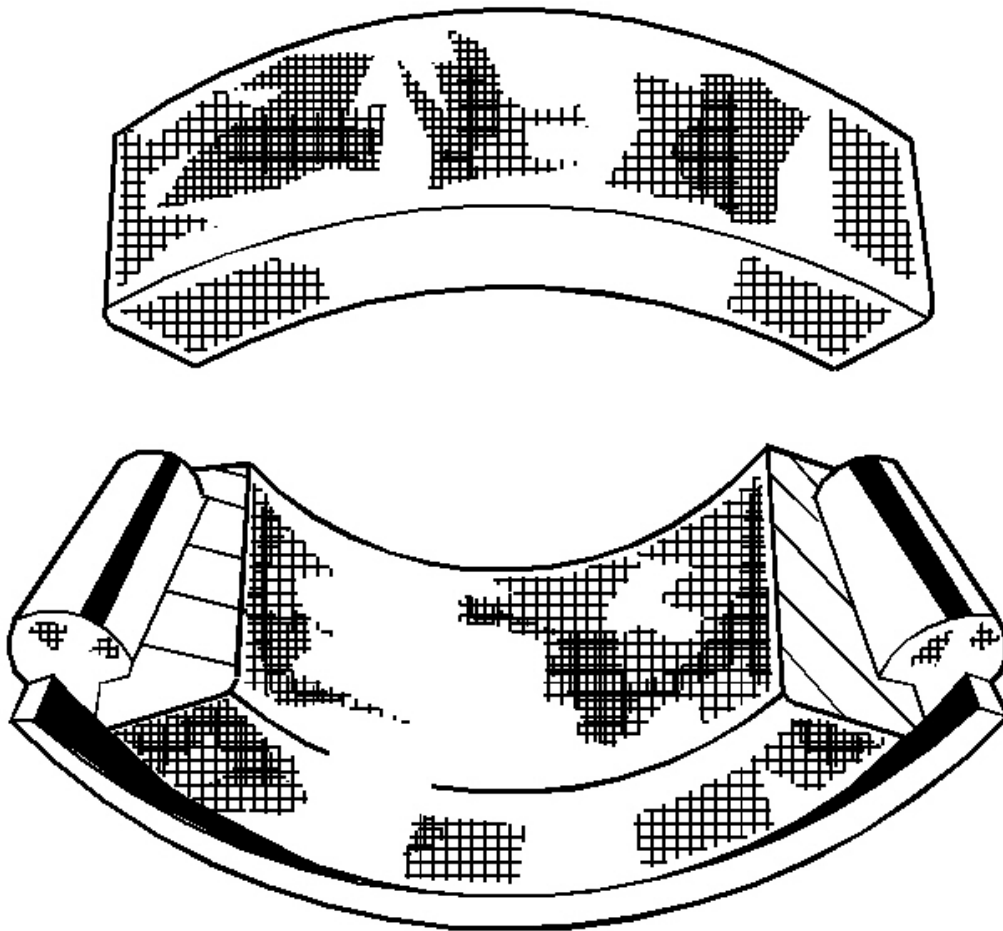


Fig. 10: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of the metal can be due to slippage. Slippage can be caused by the following factors:

- Poor fits
- Lubrication
- Overheating
- Overloads
- Handling damage

Replace the bearings. Clean the related parts. Inspect for proper fit and lubrication.

Stain Discoloration

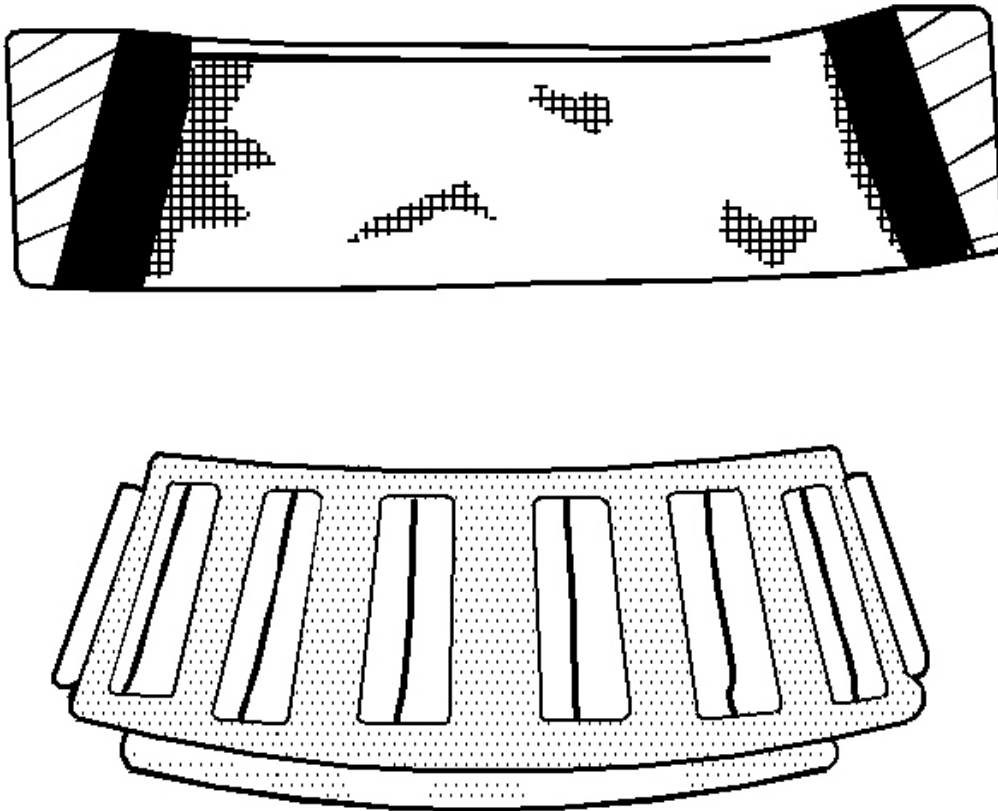


Fig. 11: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

Discoloration ranges from light brown to black. This discoloration is caused from incorrect lubrication or moisture. Reuse the bearing if you can remove the stains with light polishing. Reuse the bearing if there is no evidence of overheating. Inspect the seals and the related parts for damage.

Heat Discoloration

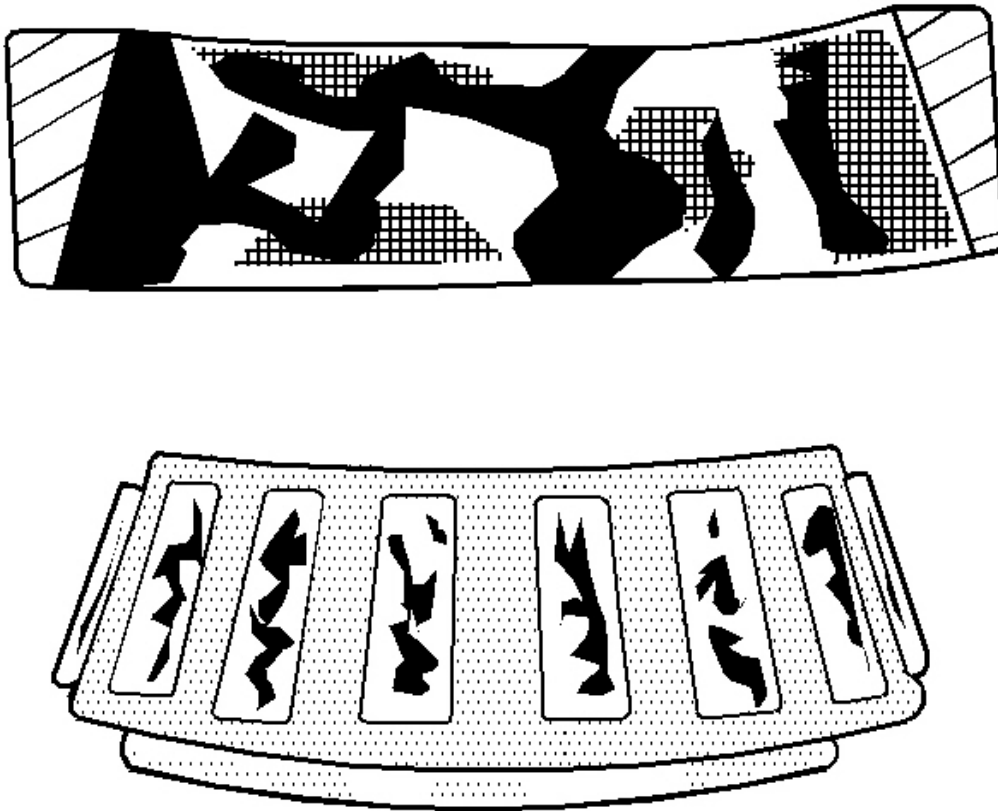


Fig. 12: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

Heat discoloration ranges from faint yellow to dark blue. This discoloration results from overload or an incorrect lubricant. Excessive heat causes softening of the races or the rollers. In order to inspect for loss of temper on the races and the rollers, perform a file test. A file drawn over a tempered part will grab and cut the metal. A file drawn over a hard part will glide readily with no metal cutting. Replace the bearings if overheating damage is indicated. The tempered part will fail the file test. Inspect the seals and the other related parts.

Misalignment

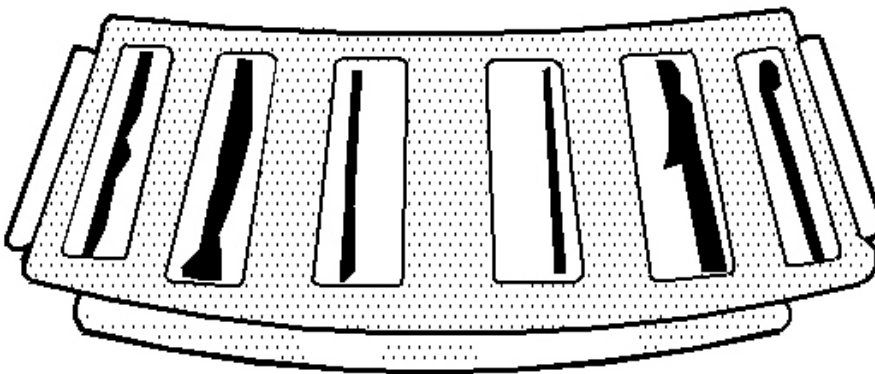
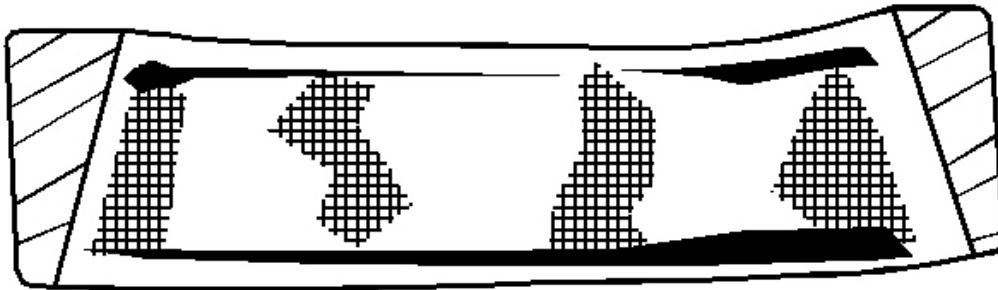


Fig. 13: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

A misaligned outer race can be due to a foreign object. Clean the related parts. Replace the bearing. Ensure the races are properly sealed.

Cracked Inner Race

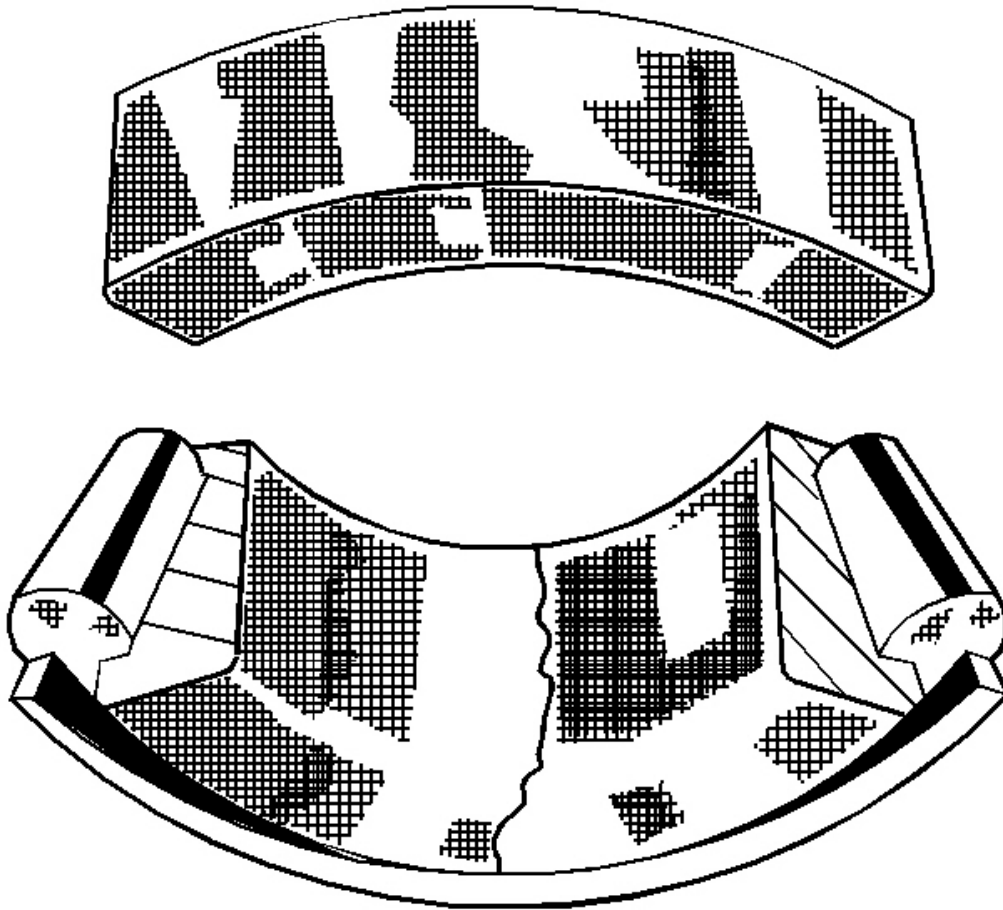


Fig. 14: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

Cracked race can be due to improper fit, cocking or poor bearing seats. Replace the bearing. Correct the bearing seats.

Fatigue Spalling

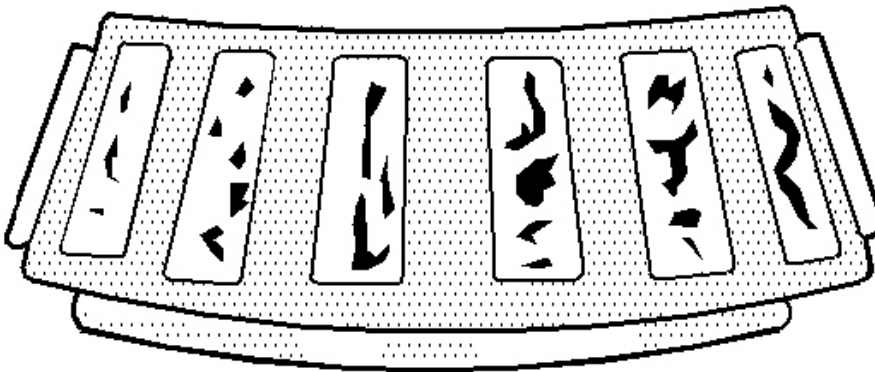


Fig. 15: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear

Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue. Replace the bearing. Clean all related parts.

Brinelling

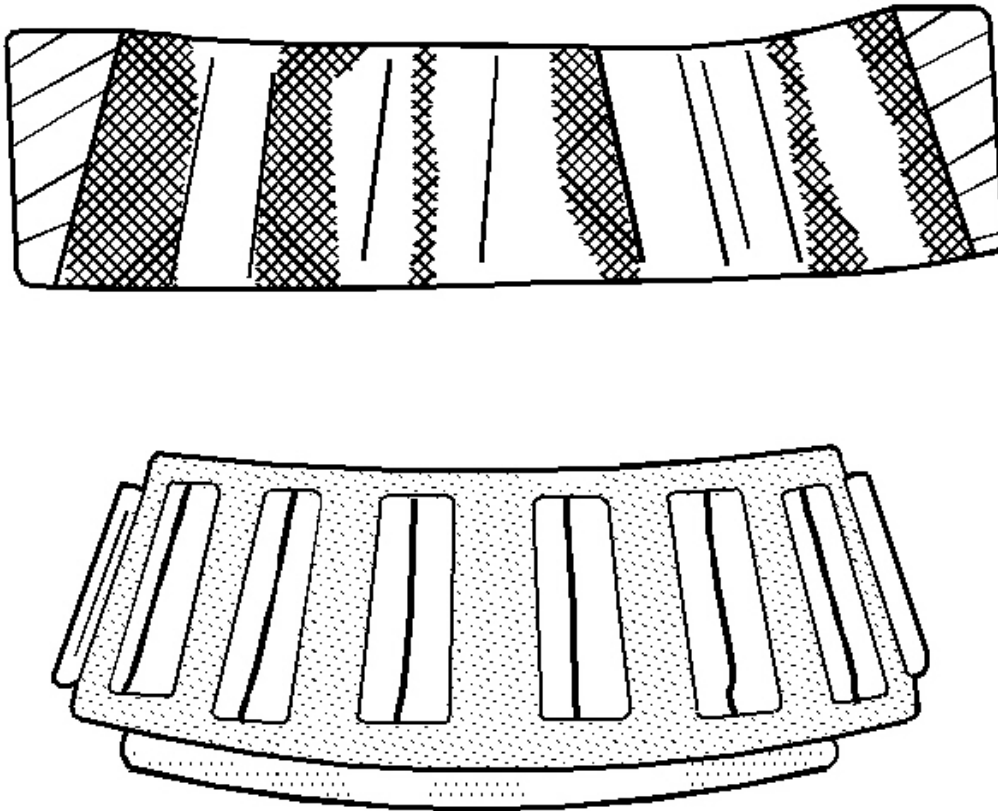


Fig. 16: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the race way can be caused by the rollers under impact loading or can be caused from vibration while the bearing is not rotating. Replace a rough or noisy bearing.

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

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- Inner axle tube assembly to differential carrier assembly mating surface
- Pinion yoke oil seal
- Vent tube

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 the 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 components 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

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Ensure that the vehicle is level.
3. Remove the Engine Protection Shield (EPS), if equipped. Refer to **Engine Shield Replacement** .
4. Remove the drain plug.
5. Drain axle fluid into a suitable container.

NOTE: Refer to **Fastener Notice** .

6. Install the drain plug.

Tighten: Tighten the drain plug to 32 N.m (24 lb ft).

7. Remove the fill plug.
8. Fill the drive axle with the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
9. Inspect the fluid level. Refer to **Front Axle Lubricant Level Inspection**.
10. Install the fill plug.

Tighten: Tighten the fill plug to 32 N.m (24 lb ft).

11. Install the EPS, if equipped. Refer to **Engine Shield Replacement** .
12. Lower the vehicle.

VENT HOSE REPLACEMENT

Removal Procedure

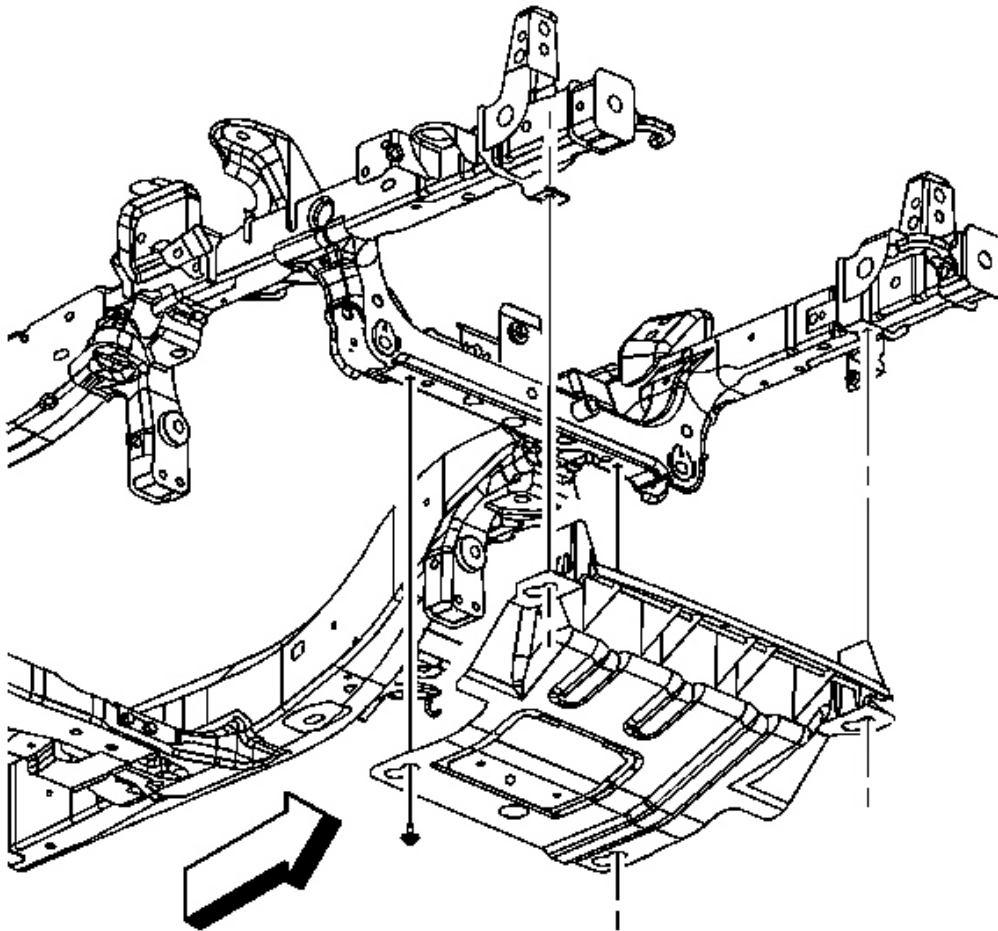


Fig. 17: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield (EPS), if equipped. Refer to **Engine Shield Replacement** .

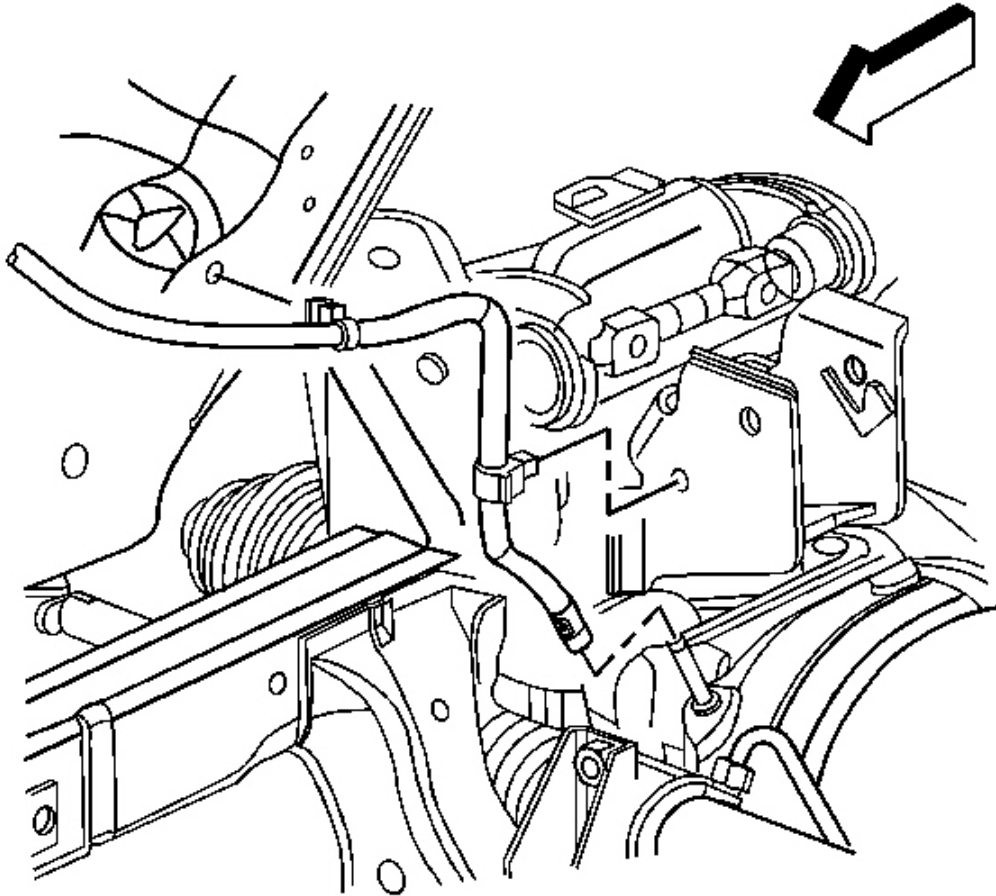


Fig. 18: View Of Vent Hose At Front Differential Housing
Courtesy of GENERAL MOTORS CORP.

3. Remove the vent hose from the vent tube on the front differential housing.
4. Lower the vehicle.

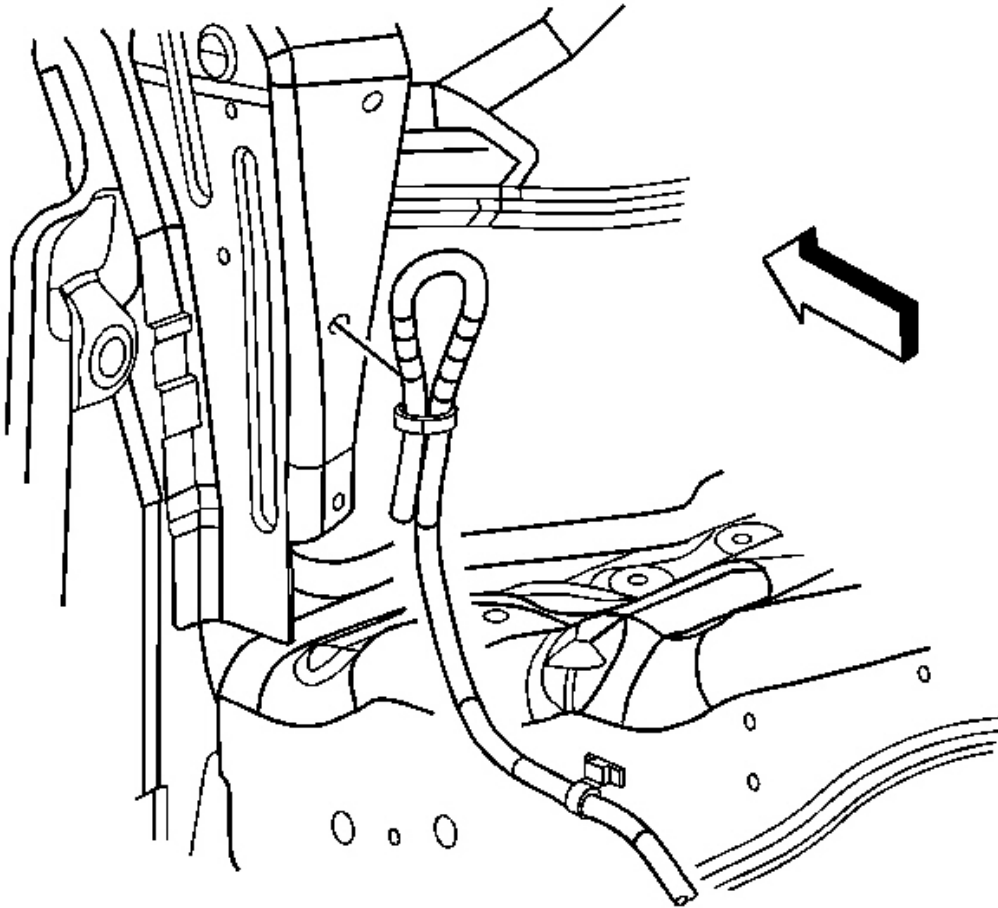


Fig. 19: View Of Vent Hose At Radiator Core Support
Courtesy of GENERAL MOTORS CORP.

5. Remove the vent hose from the retainers on the radiator core support.

Installation Procedure

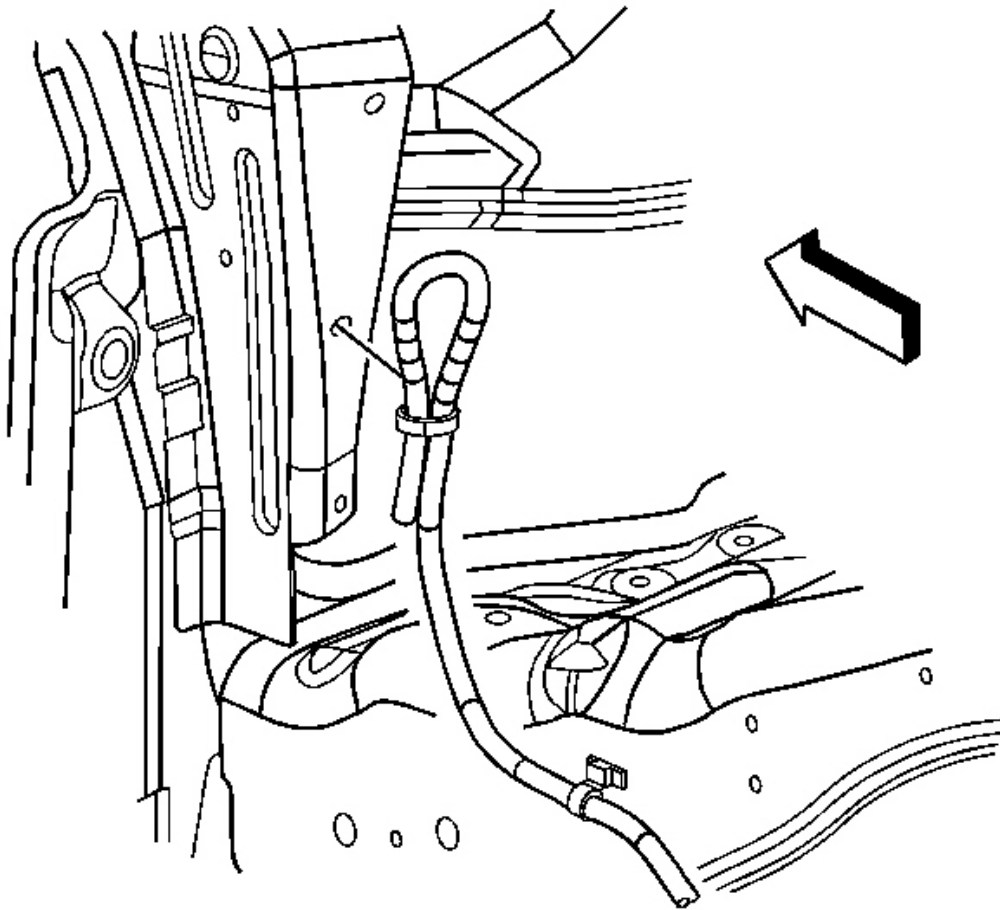


Fig. 20: View Of Vent Hose At Radiator Core Support
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose to the retainers on the radiator core support.
2. Raise the vehicle.

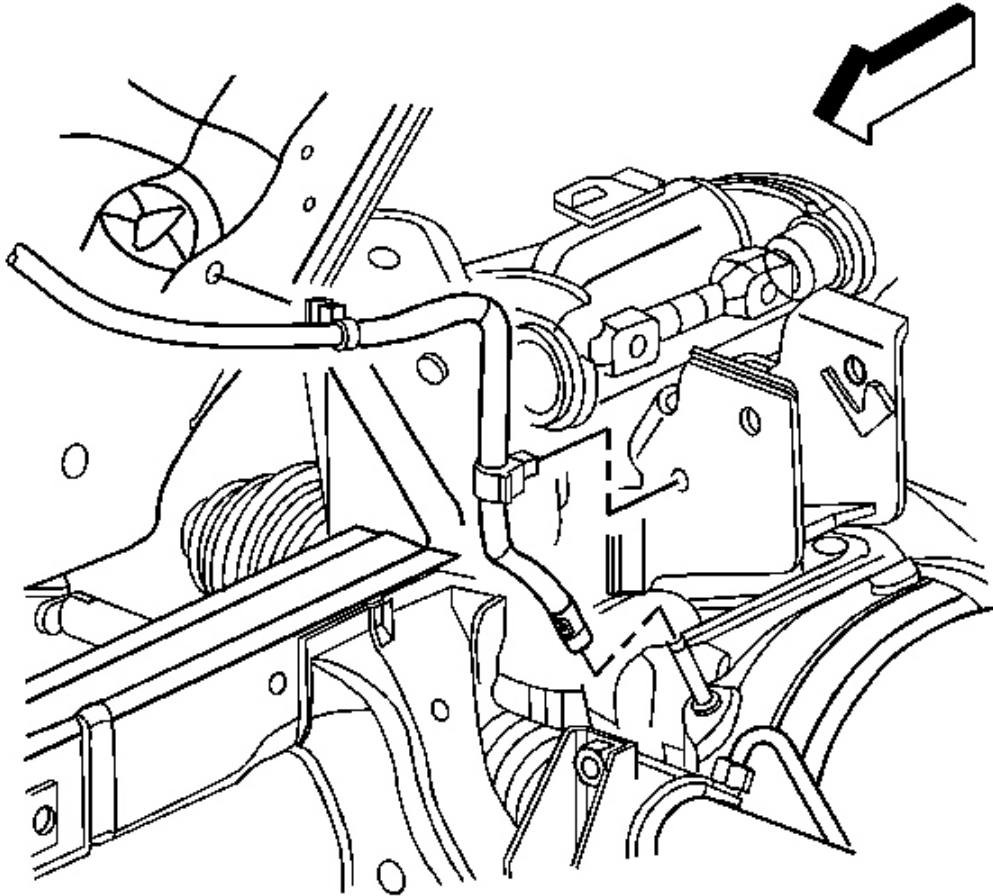


Fig. 21: View Of Vent Hose At Front Differential Housing
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose to the vent tube on the front differential housing.

IMPORTANT: When installing the vent hose for the front differential, loop the vent hose so that foreign objects and debris are restricted from falling into the vent hose and blocking it.

4. Loop the vent hose about 3 inches and install in the upper retainer.

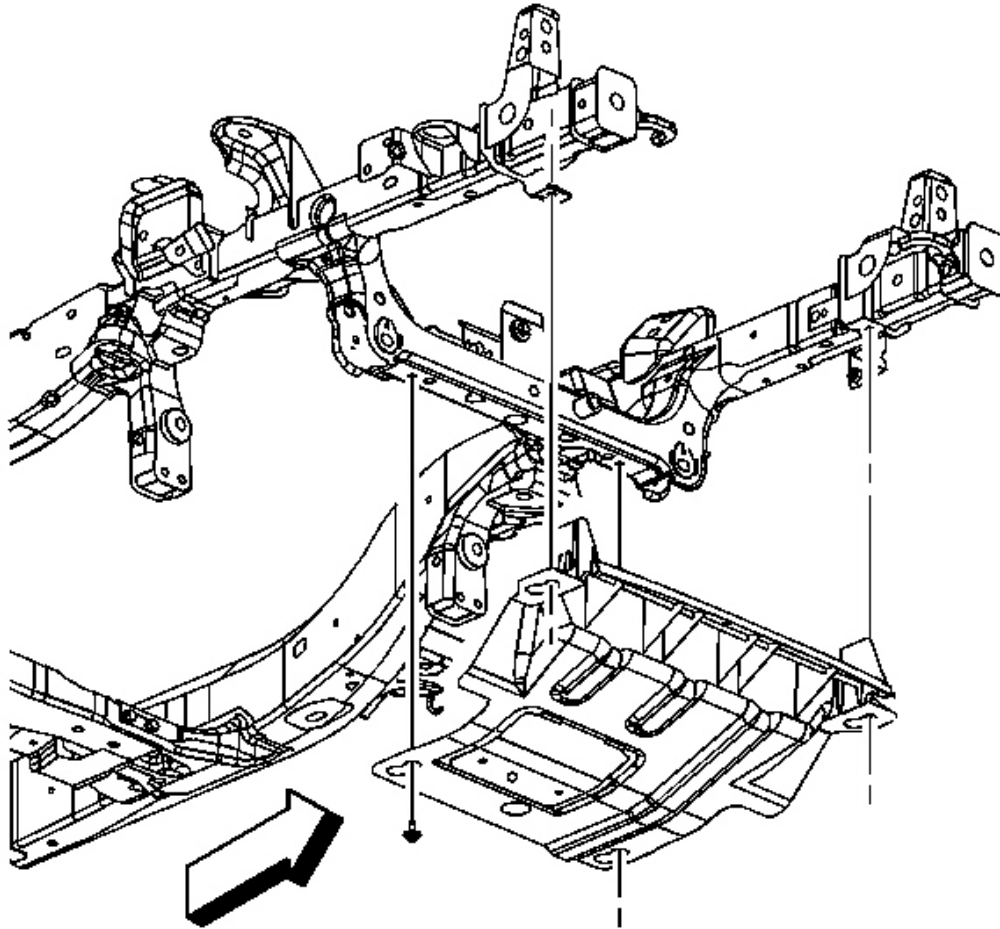


Fig. 22: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

5. Install the EPS, if equipped. Refer to **Engine Shield Replacement** .
6. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT AND INNER SHAFT HOUSING REPLACEMENT

Tools Required

- **J 8092** Universal Driver Handle 3/4 Inch - 10. See **Special Tools**.
- **J 2619-01** Slide Hammer. See **Special Tools**.

- **J 29369-1** Bearing Remover. See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Installer - RH. See **Special Tools**.

Removal Procedure

IMPORTANT: When servicing the inner drive shaft housing, the inner drive shaft bearing must be replaced. The bearing IS NOT serviced with the inner drive shaft housing.

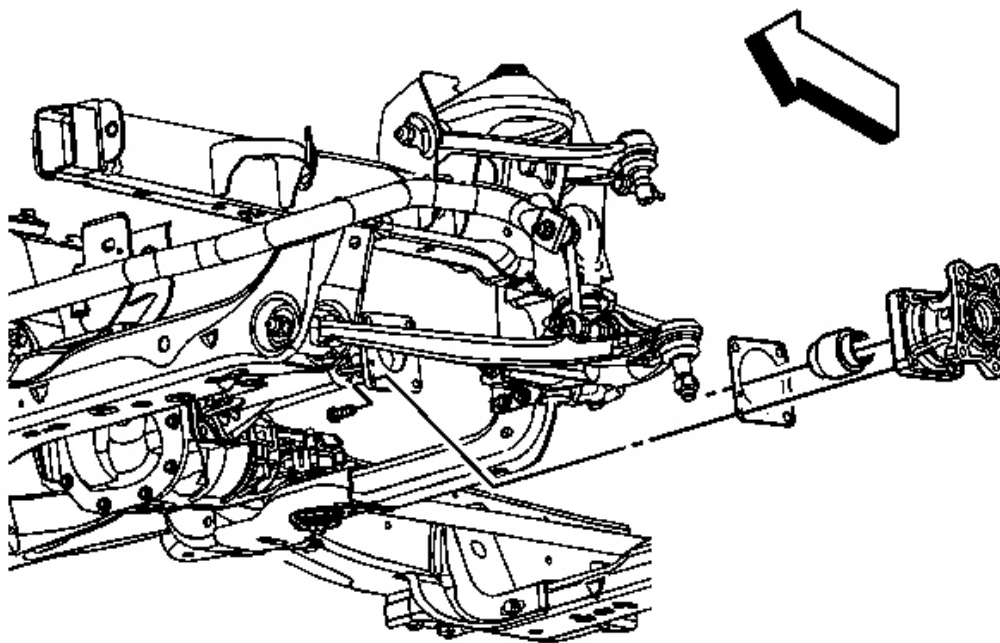


Fig. 23: Identifying Differential Carrier Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Remove the left differential carrier mounting bracket. Refer to **Differential Carrier Assembly Bushing and Bracket Replacement**.
2. Remove the retaining bolts (1) from the disconnect housing.
3. Remove the coupling housing (2).
4. Remove the coupler (3).

5. Remove the gasket (4).

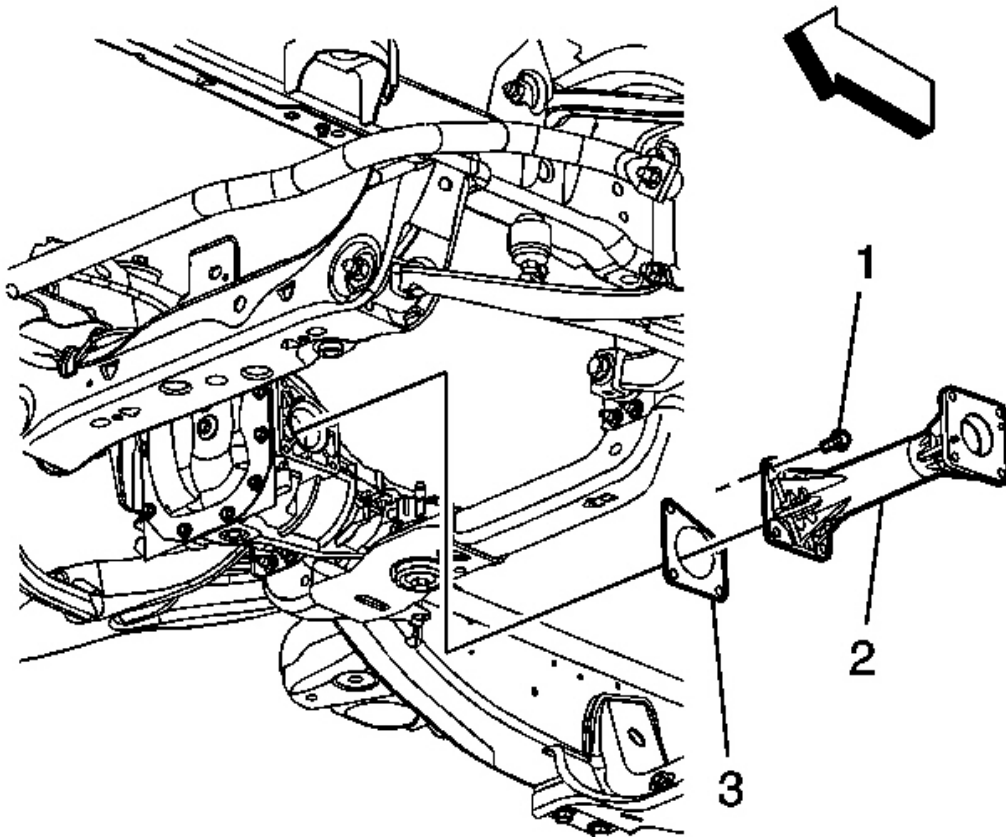


Fig. 24: View Of Coupling Housing
Courtesy of GENERAL MOTORS CORP.

6. Remove the intermediate housing retaining bolts (1).
7. Remove the intermediate housing (2).
8. Remove the intermediate housing gasket (3).
9. Install the intermediate shaft housing in a suitable clamping device.

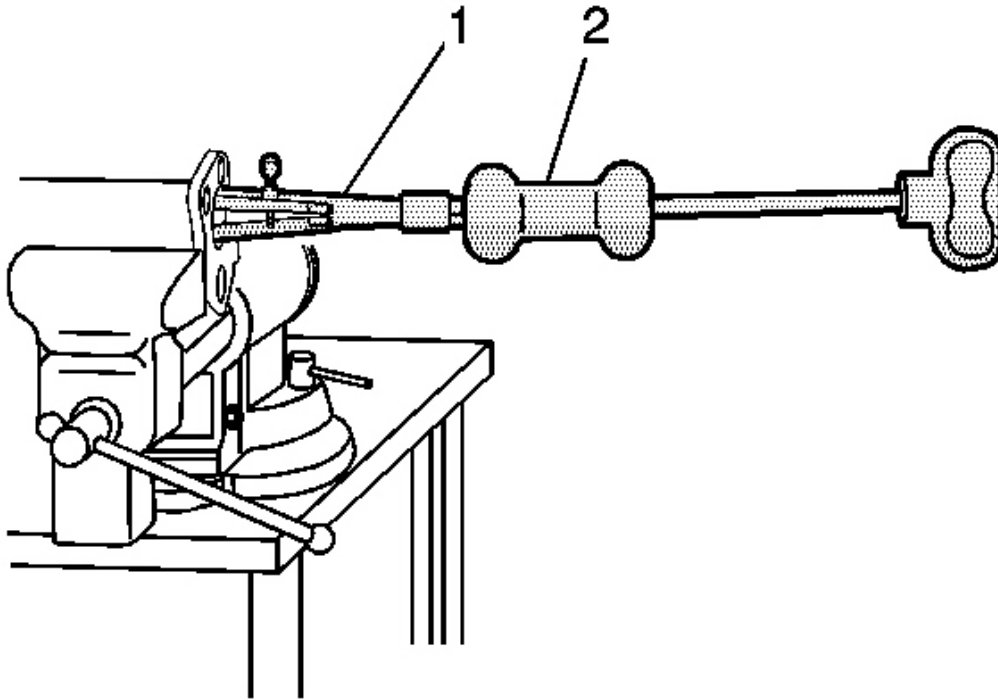


Fig. 25: Identifying J 29369-1 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

10. Using the **J 29369-1** (1) and the **J 2619-01** (2), remove the inner drive shaft bearing. See **Special Tools**.

Installation Procedure

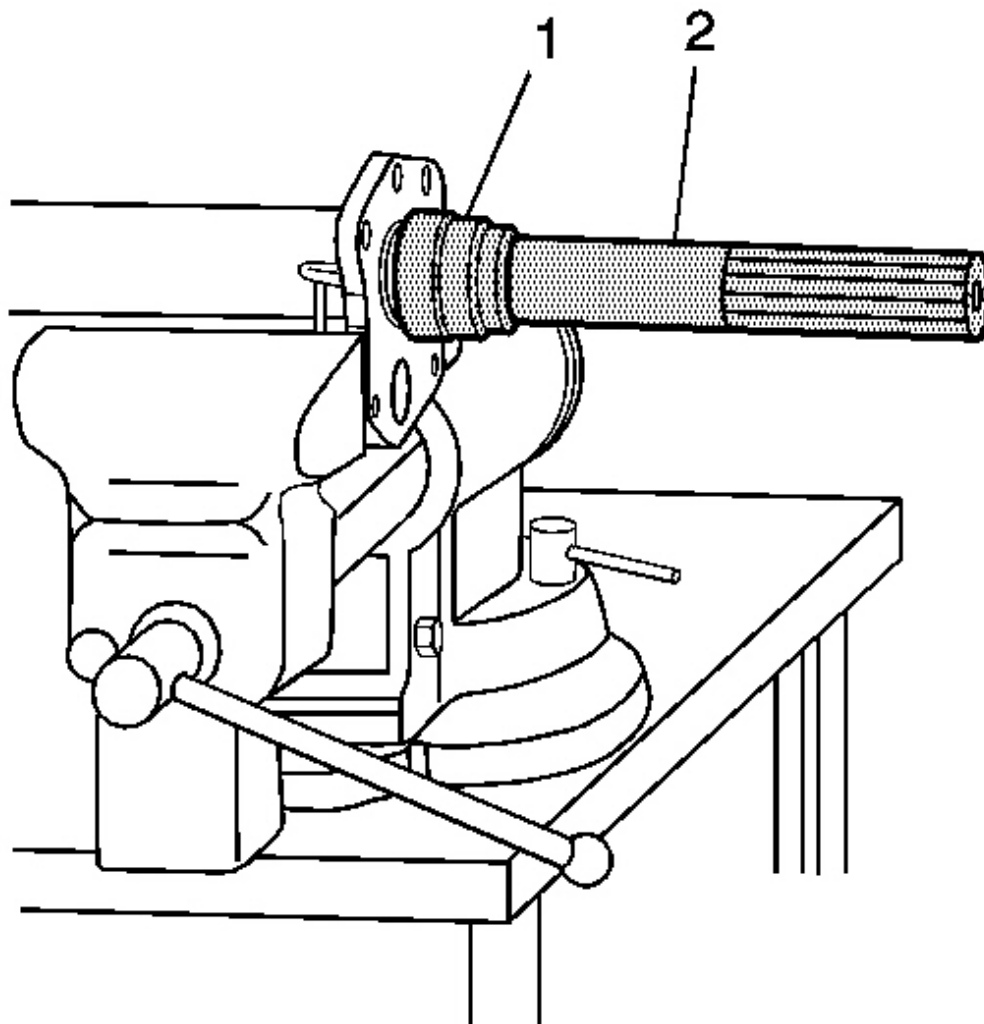


Fig. 26: Identifying J 45233 & J 8092
Courtesy of GENERAL MOTORS CORP.

1. Using the **J 45232** (1) and the **J 8092** (2), install the inner drive shaft bearing. See **Special Tools**.

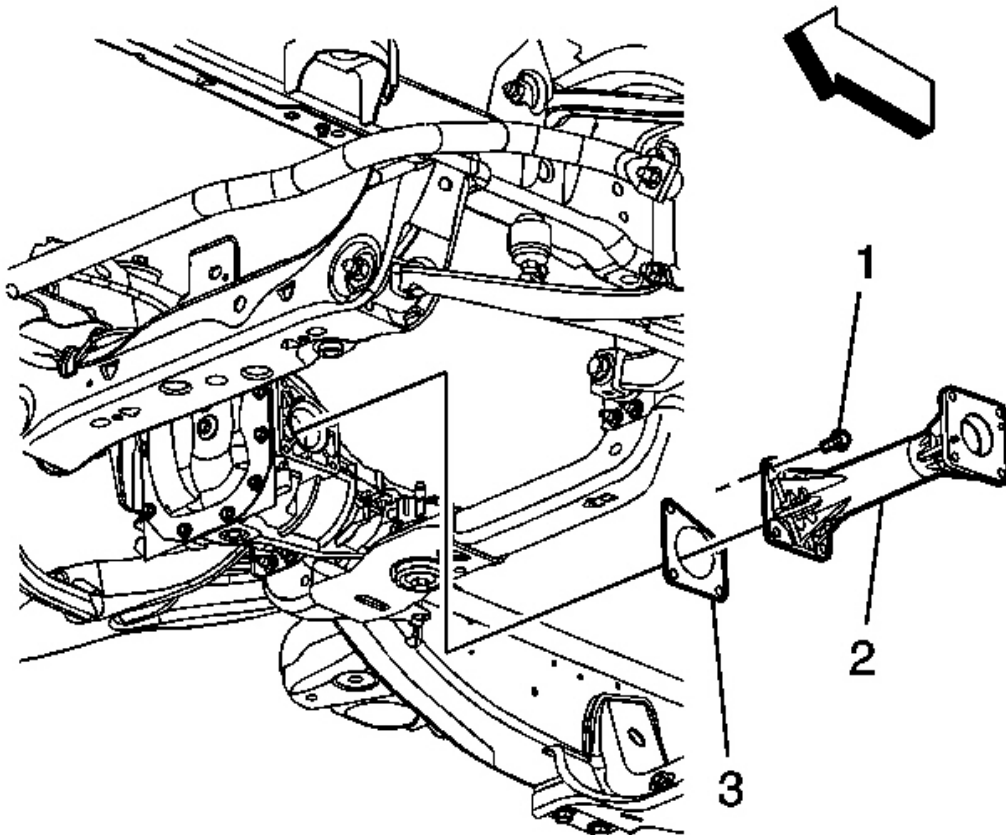


Fig. 27: View Of Coupling Housing
Courtesy of GENERAL MOTORS CORP.

2. Apply a small amount of clean grease on the housing gasket to hold it in place (3).
3. Install the intermediate housing (2).

NOTE: Refer to Fastener Notice .

IMPORTANT: Perform the following:

- Clean the thread locking material from the bolts.
- Apply new thread locking material to the bolts (DRI-LOC 204 Red, GM P/N 12345493).

4. Install the retaining bolts.

Tighten: Tighten the retaining bolts to 68 N.m (50 lb ft).

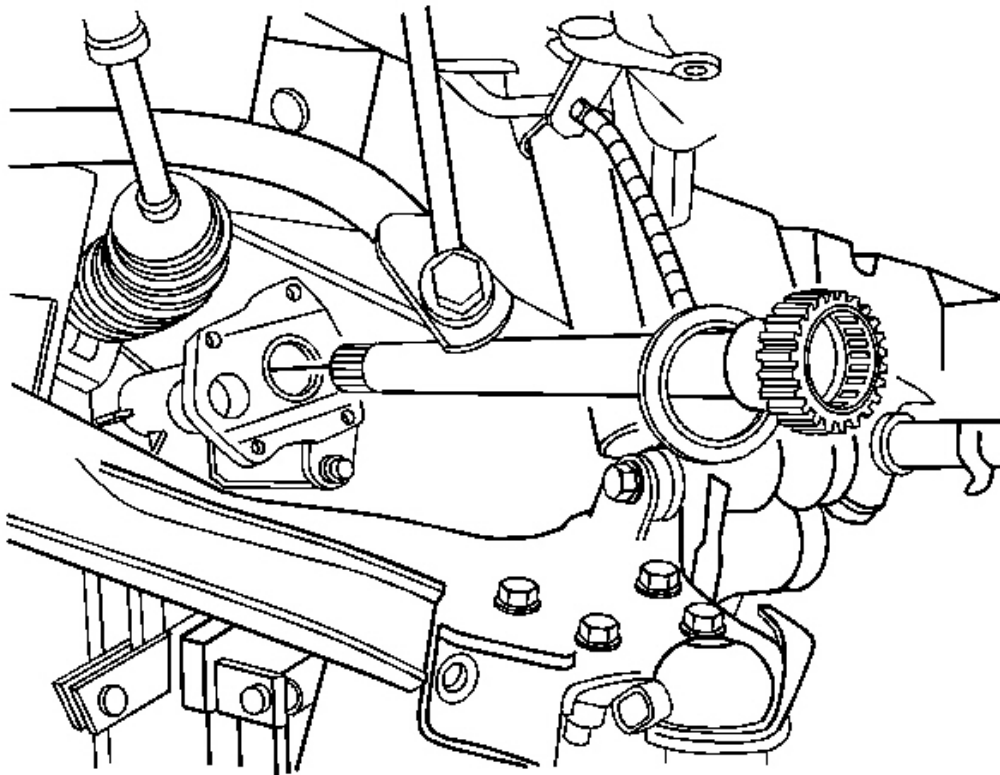


Fig. 28: View Of Inner Drive Shaft
Courtesy of GENERAL MOTORS CORP.

5. Install the intermediate shaft.
6. Apply a small amount of grease to the housing gasket (4) to hold it in place.
7. Install the coupler (3).
8. Position the coupler housing on the intermediate housing (2).
9. Install the retaining bolts (1).

Tighten: Tighten the retaining bolts to 60 N.m (44 lb ft).

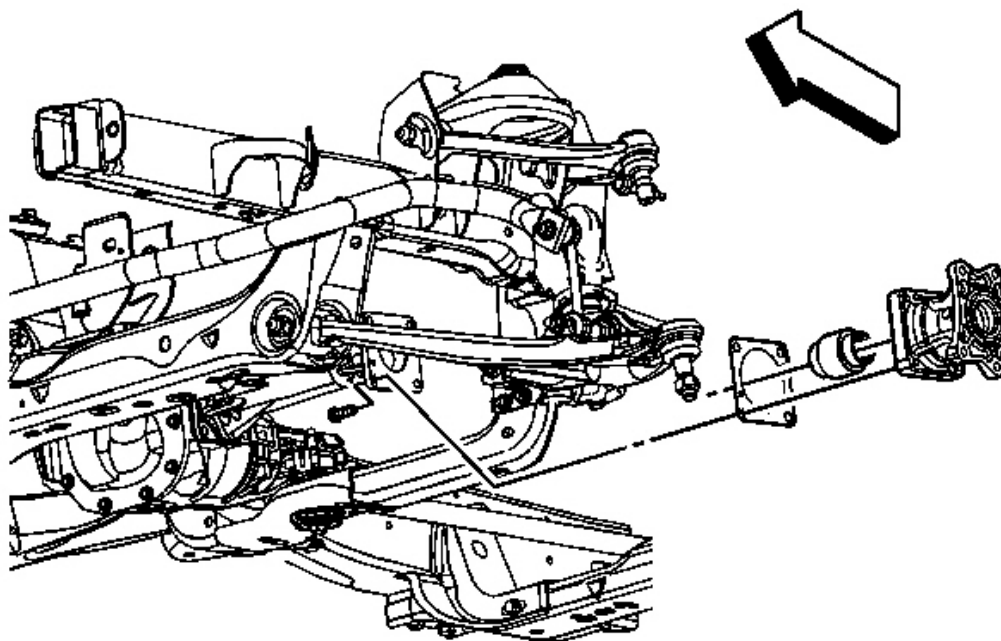


Fig. 29: Identifying Differential Carrier Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

10. Install the left differential carrier mounting bracket. Refer to Differential Carrier Assembly Bushing and Bracket Replacement.
11. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH SHAFT BEARING REPLACEMENT

Tools Required

- **J 29369-1** Bushing and Bearing Remover. See Special Tools.
- **J 2619-01** Slide Hammer and Adapter. See Special Tools.
- **J 45233** Differential Bearing Adjuster Needle Bearing Replacer - RH. See Special Tools.
- **J 8092** Universal Driver Handle - 3/4 in - 10. See Special Tools.

Removal Procedure

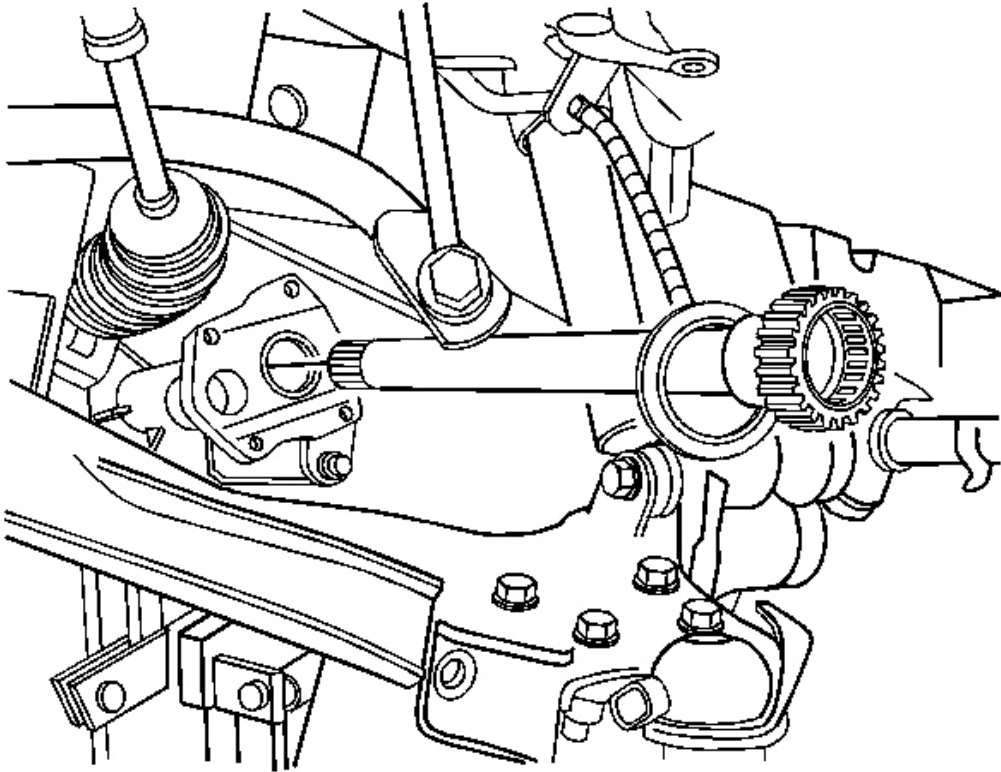


Fig. 30: View Of Inner Drive Shaft
Courtesy of GENERAL MOTORS CORP.

1. Remove the inner drive shaft. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement.**

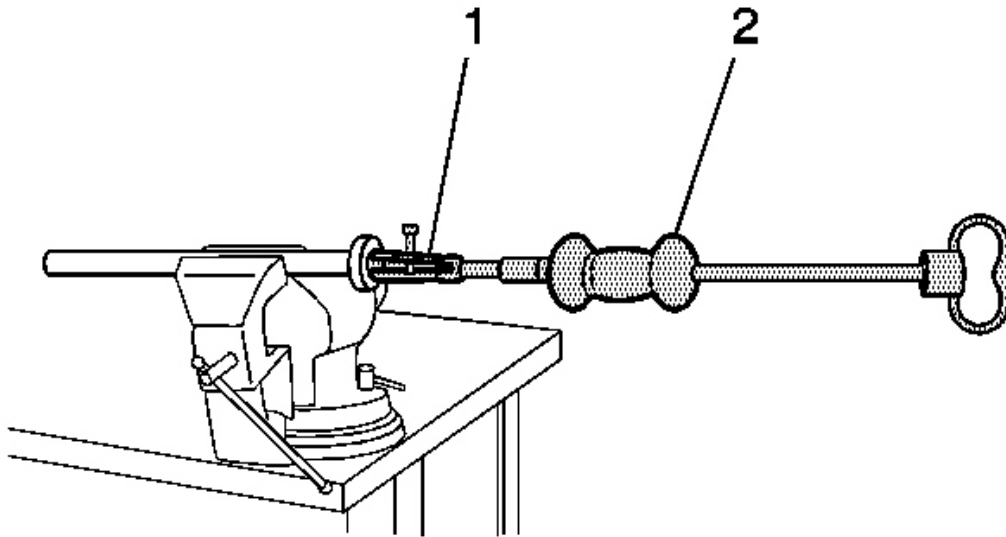


Fig. 31: Removing Clutch Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the inner shaft in a clamping device.
3. Install the **J 29369-1** to the **J 2619-01** . See **Special Tools**.
4. Using the **J 29369-1** (1) and the **J 2619-01** (2), remove the clutch bearing. See **Special Tools**.

Installation Procedure

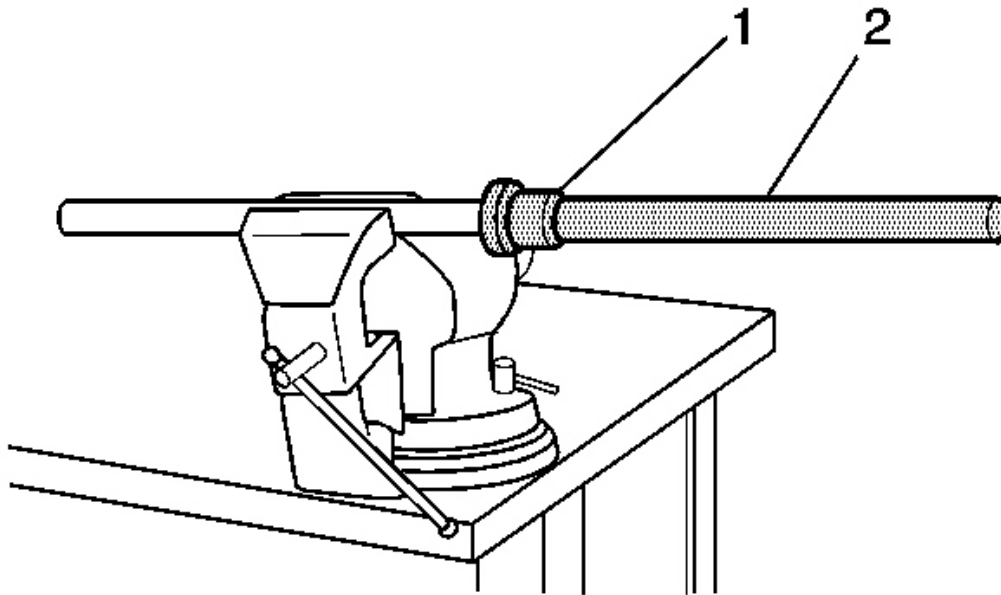


Fig. 32: Installing Clutch Bearing
Courtesy of GENERAL MOTORS CORP.

1. Install the **J 45233** to the **J 8092** . See **Special Tools**.
2. Using the **J 45233** (1) and the **J 8092** (2), install the clutch bearing. See **Special Tools**.
3. Remove the inner shaft from the clamping devise.

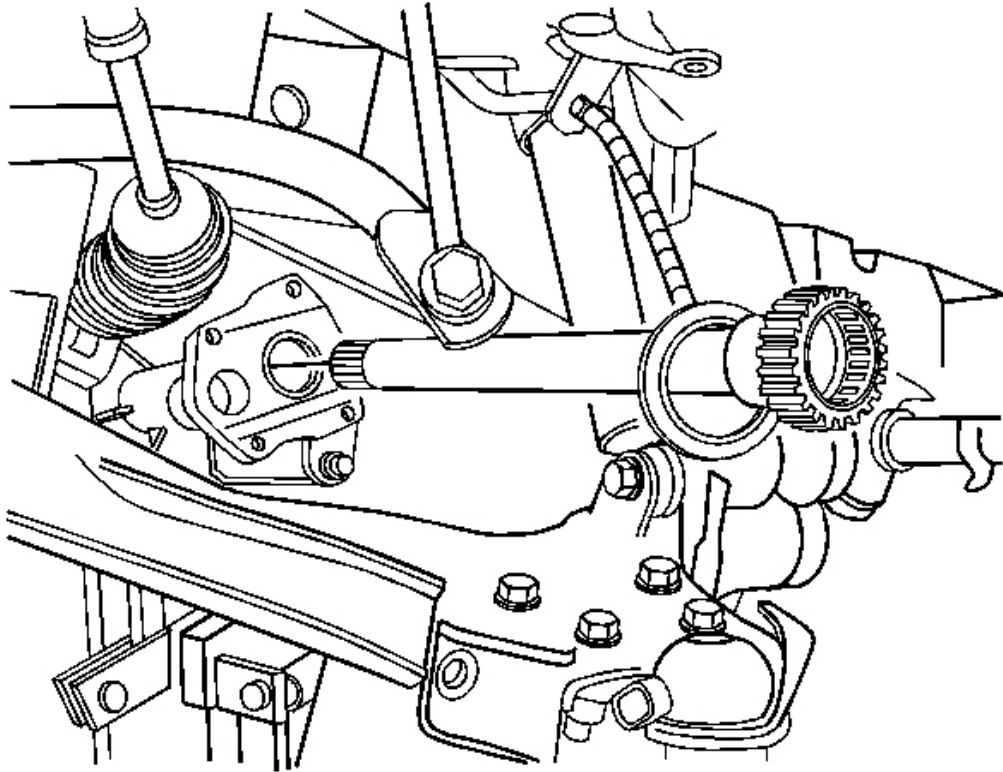


Fig. 33: View Of Inner Drive Shaft
Courtesy of GENERAL MOTORS CORP.

4. Install the inner shaft. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement**.

FRONT DRIVE AXLE SEAL AND BEARING REPLACEMENT

Tools Required

- **J 2619-01** Slide Hammer. See **Special Tools**.
- **J 8092** Universal Drive Handle 3/4 Inch - 10. See **Special Tools**.
- **J 21426** Extension Housing Seal Installer
- **J 29369-2** Bushing and Bearing Remover 2-3 inch. See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Installer - Left. See **Special Tools**.

Removal Procedure

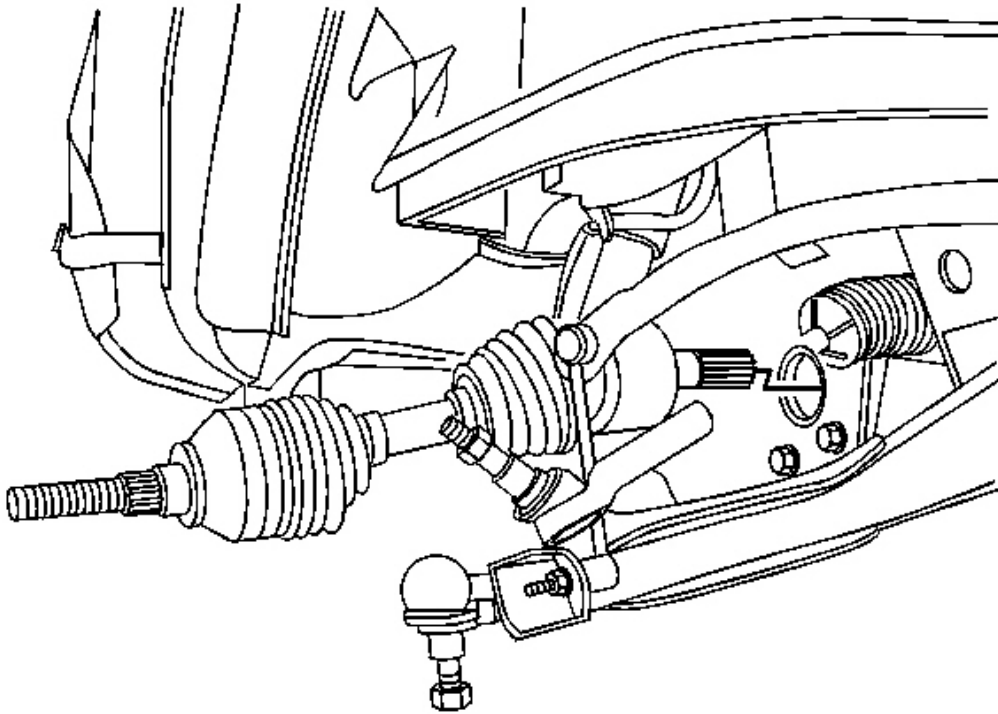


Fig. 34: View Of Front Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

1. Remove the wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .

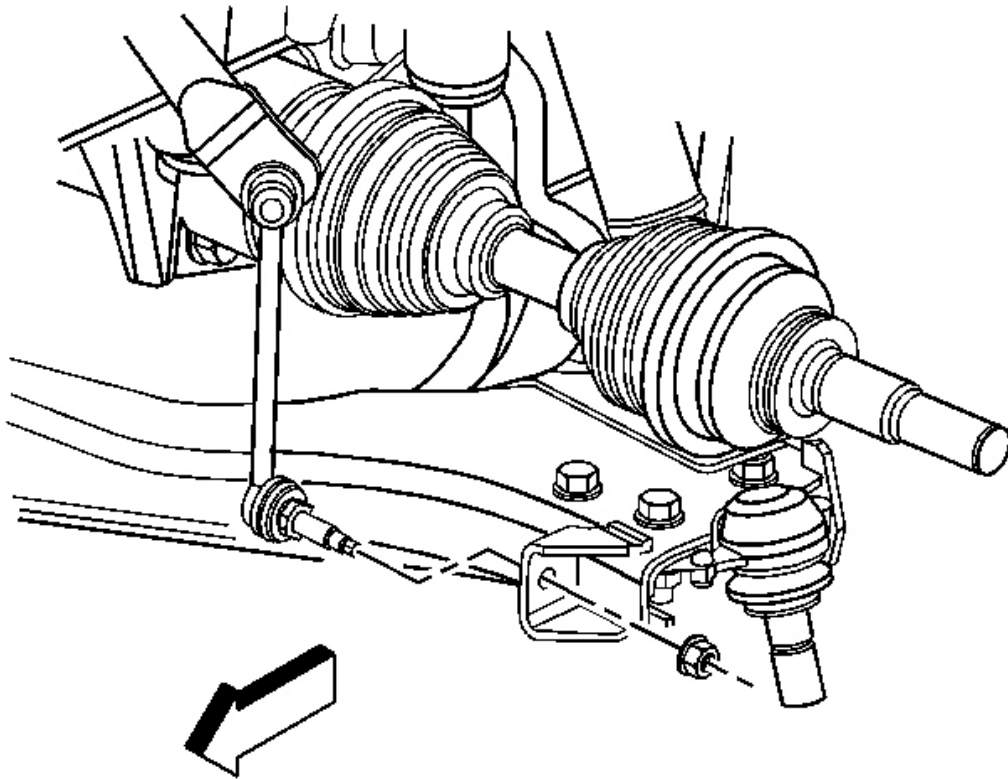


Fig. 35: View Of Lower Control Arm Swaybar Link
Courtesy of GENERAL MOTORS CORP.

2. Remove the swaybar link from the lower control arm. Refer to **Stabilizer Shaft Link Replacement** .

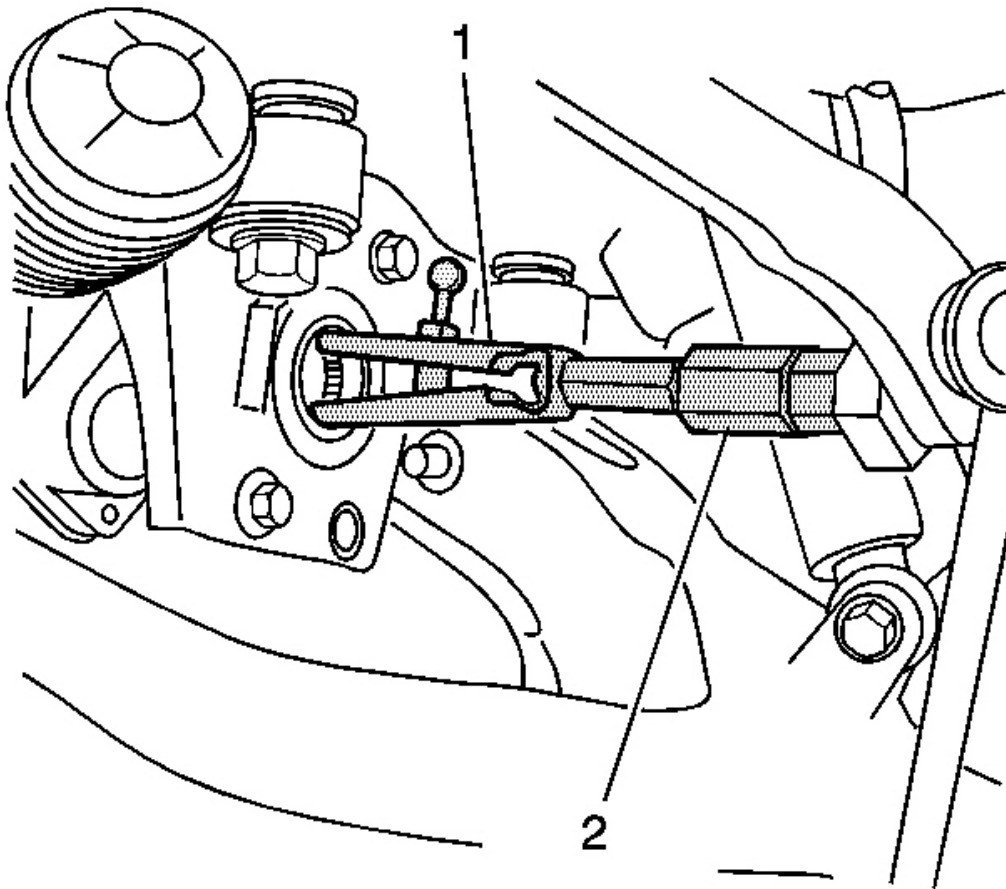


Fig. 36: Removing Axle Seal
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 29369-2** (2) and the **J 2619-01** (1), remove the axle seal. See **Special Tools**.

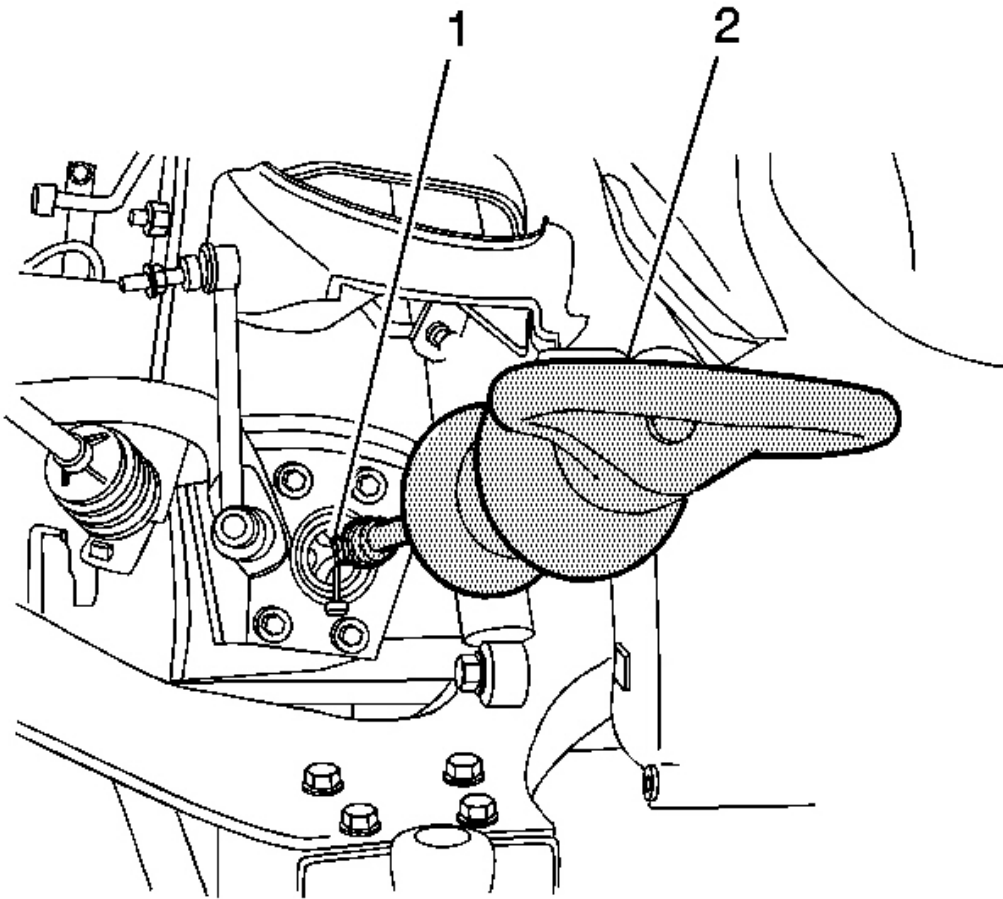


Fig. 37: Removing Axle Bearing
Courtesy of GENERAL MOTORS CORP.

4. Using the **J 29369-2** (1) and the **J 2619-01** (2), remove the axle bearing. See **Special Tools**.

Installation Procedure

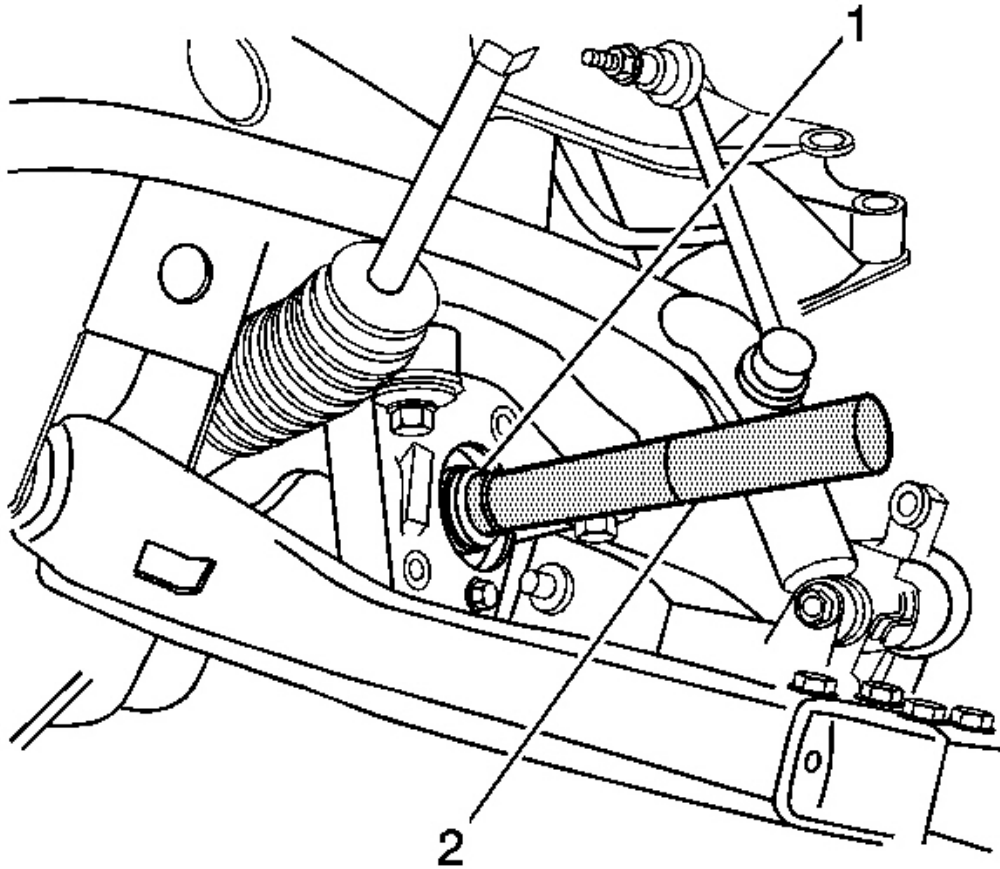


Fig. 38: Installing Axle Bearing
Courtesy of GENERAL MOTORS CORP.

1. Position the axle bearing in the intermediate housing.
2. Using the **J 45232** (1) and the **J 8092** (2), install the axle bearing. See **Special Tools**.

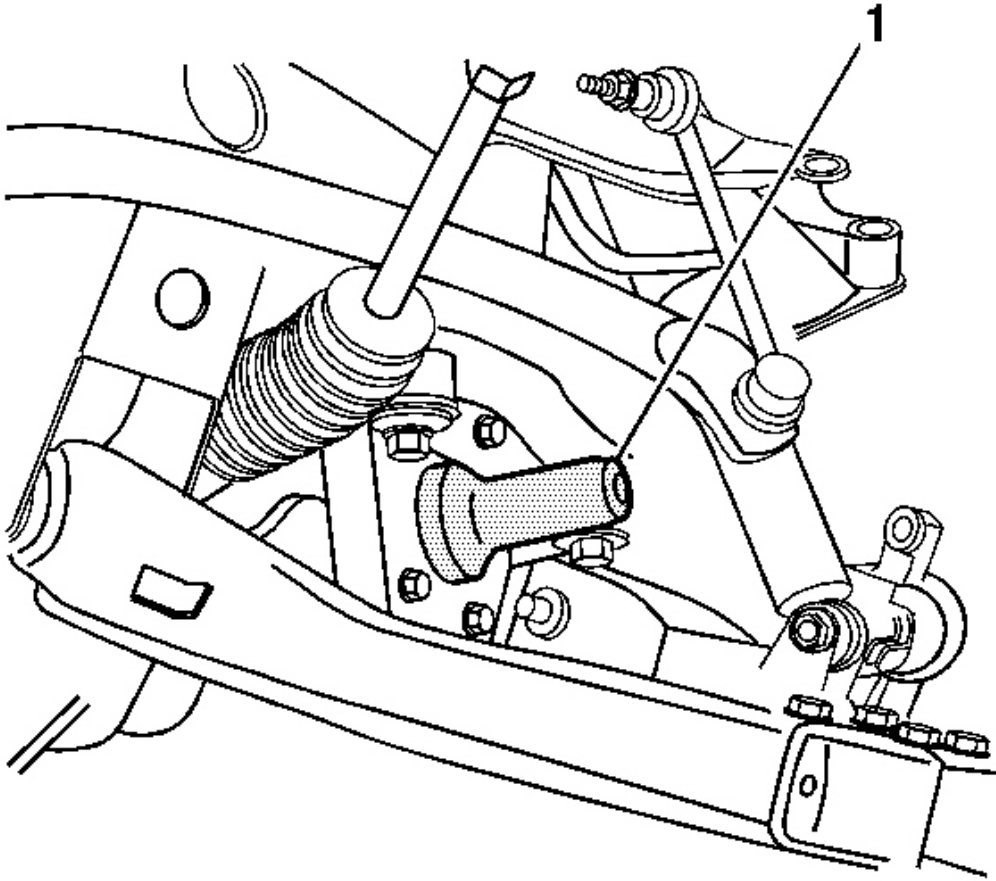


Fig. 39: Installing Axle Seal
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 21426** (1), install the axle seal.

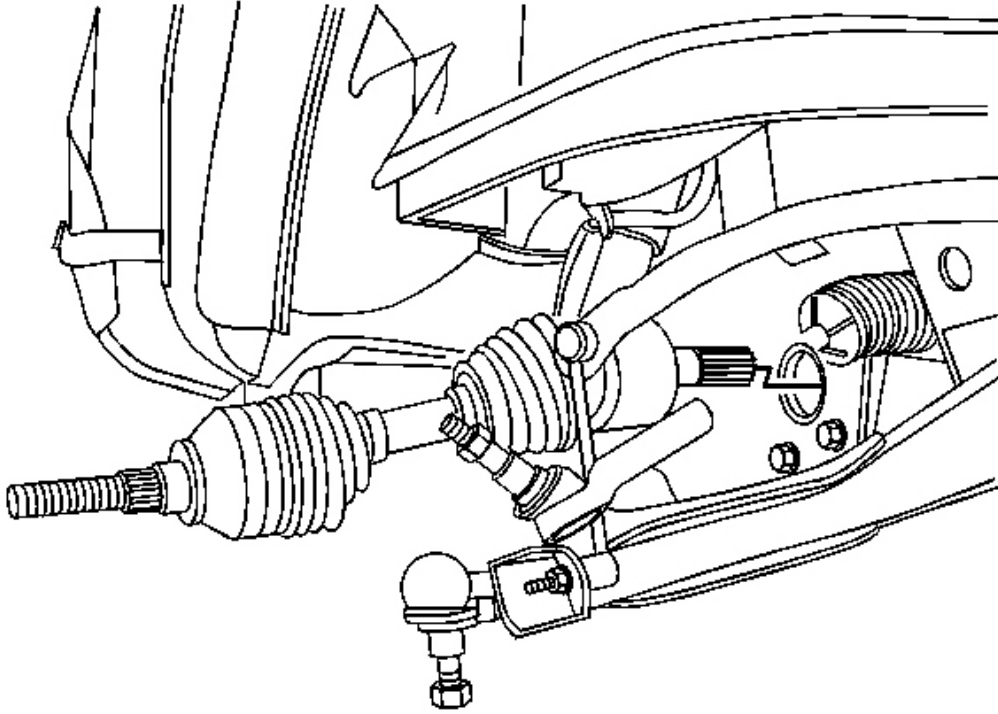


Fig. 40: View Of Front Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

4. Install the wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .

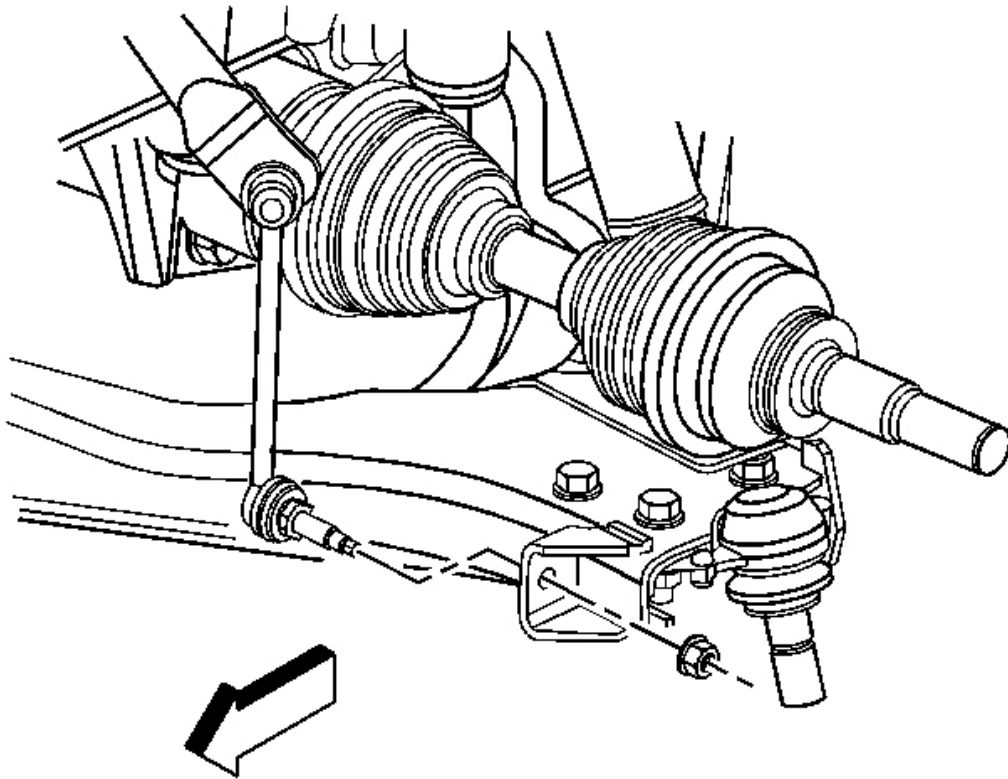


Fig. 41: View Of Lower Control Arm Swaybar Link
Courtesy of GENERAL MOTORS CORP.

5. Install the swaybar link to the lower control arm. Refer to **Stabilizer Shaft Link Replacement** .
6. Check in fluid level. Refer to **Front Axle Lubricant Level Inspection.**
7. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY COVER AND/OR GASKET REPLACEMENT

Removal Procedure

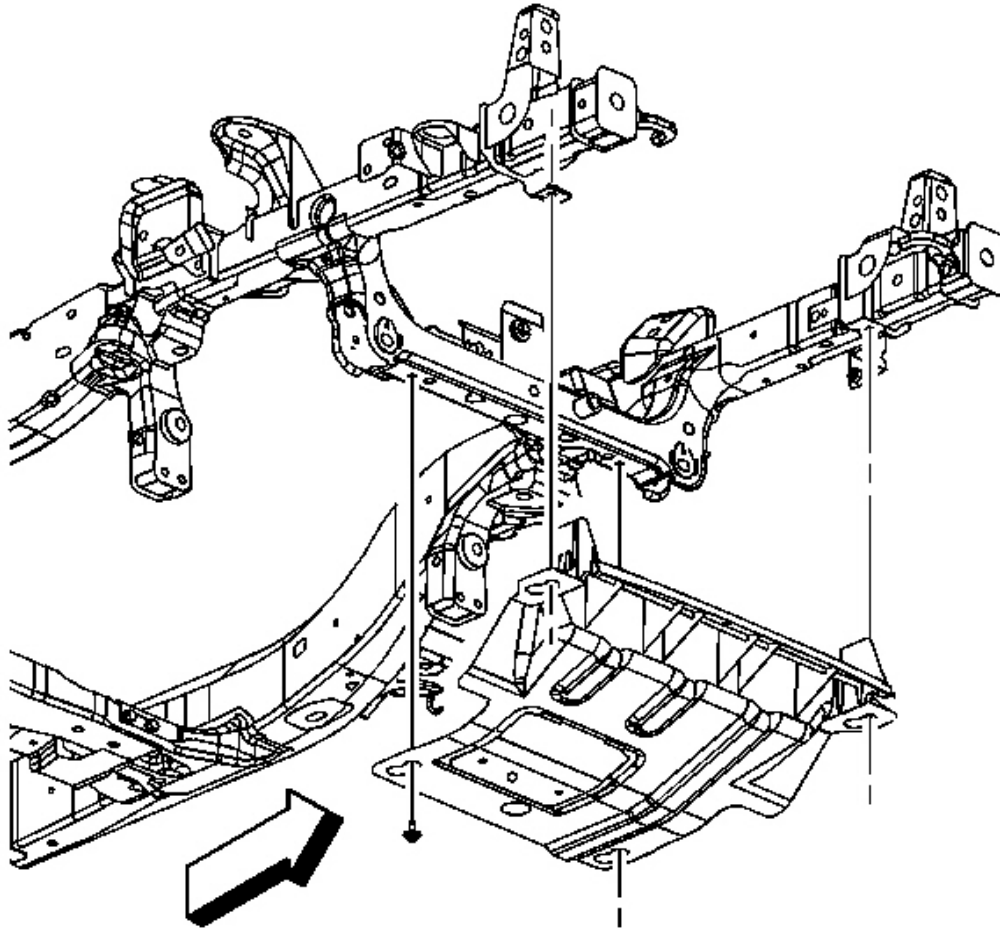


Fig. 42: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield (EPS), if equipped. Refer to **Engine Shield Replacement** .
3. Drain the front differential assembly.

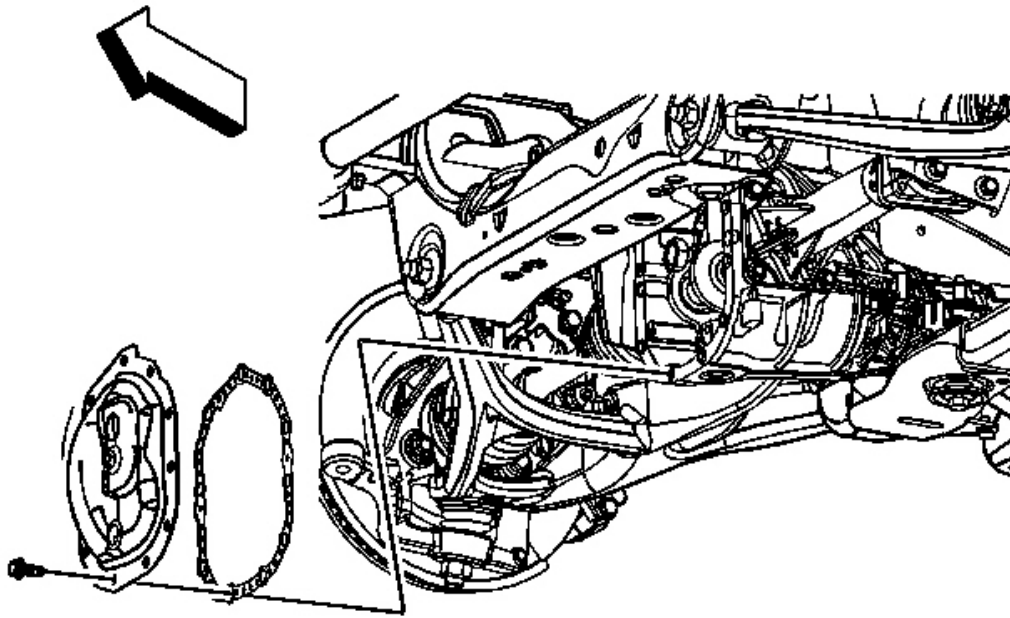


Fig. 43: Identifying Differential Cover, Gasket & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential cover bolts.

IMPORTANT: The front differential housing cover gasket is reusable. DO NOT replace unless gasket is damaged.

5. Remove the differential cover and gasket.

Installation Procedure

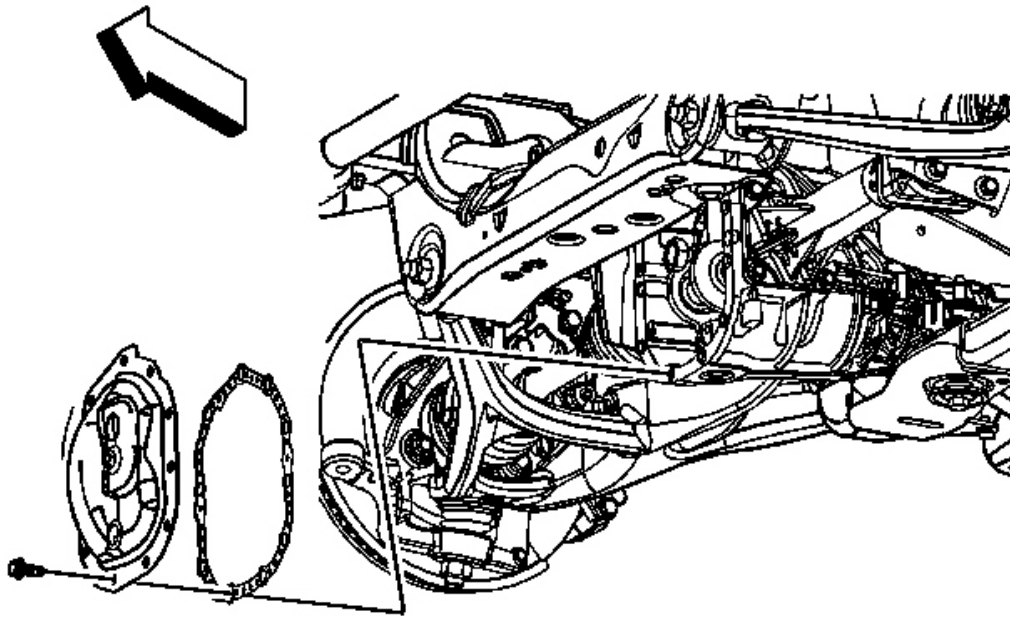


Fig. 44: Identifying Differential Cover, Gasket & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the differential cover and gasket.

NOTE: Refer to Fastener Notice .

2. Install the differential cover bolts.

Tighten: Tighten the differential cover bolts to 30 N.m (22 lb ft).

3. Fill the front differential with fluid. Refer to Front Axle Lubricant Replacement.

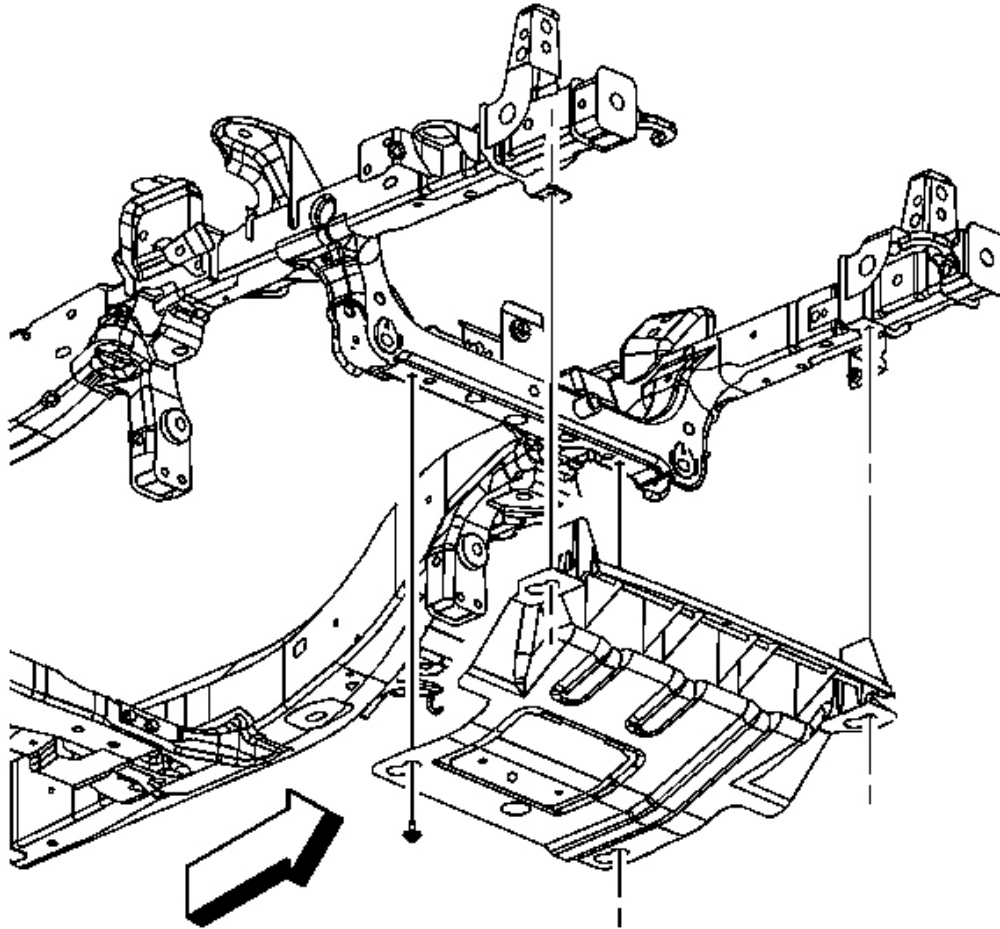


Fig. 45: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

4. Install the EPS, if equipped. Refer to Engine Shield Replacement .
5. Lower the vehicle.

FRONT DIFFERENTIAL DRIVE PINION FLANGE/YOKE, SEAL AND DUST DEFLECTOR REPLACEMENT

Tools Required

- **J 8614-01** Flange and Pulley Holding Tool. See Special Tools.

- **J 21128** Axle Pinion Oil Seal Installer. See **Special Tools**.

Removal Procedure

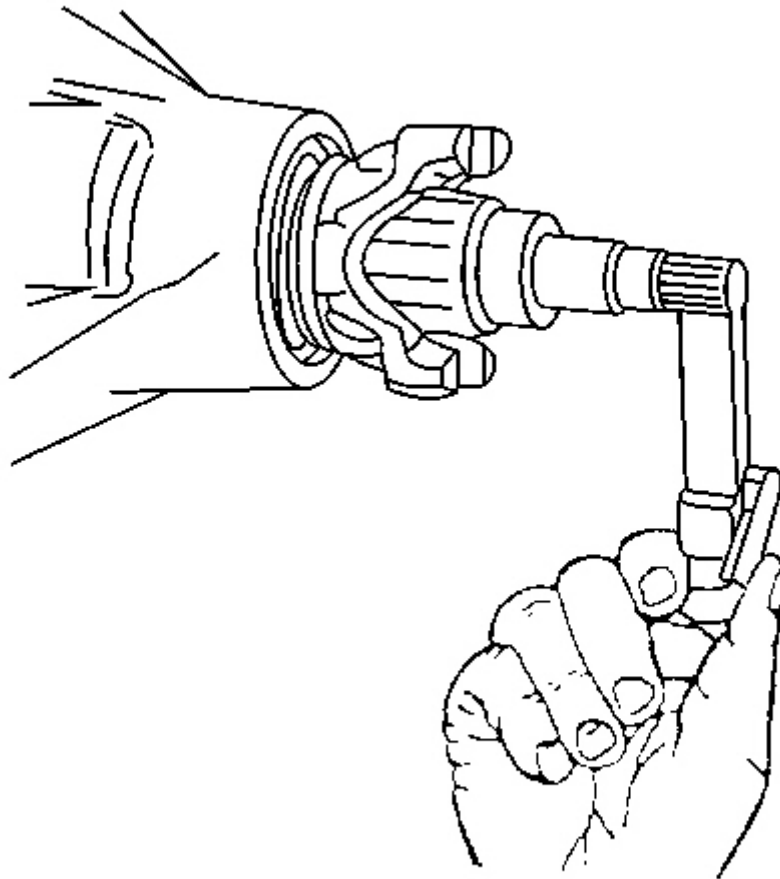


Fig. 46: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield (EPS). Refer to **Engine Shield Replacement** .
3. Drain the drive axle. Refer to **Front Axle Lubricant Replacement**.
4. Remove the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .

5. Remove the brake calipers. Refer to **Front Brake Caliper Replacement** .
6. Measure the torque required in order to rotate the pinion. Using an inch-pound torque wrench, record the torque value for reassembly. This will give the combined preload for the following components:
 - The pinion bearings
 - The pinion seal
 - The carrier bearings
 - The axle bearings
 - The axle seals

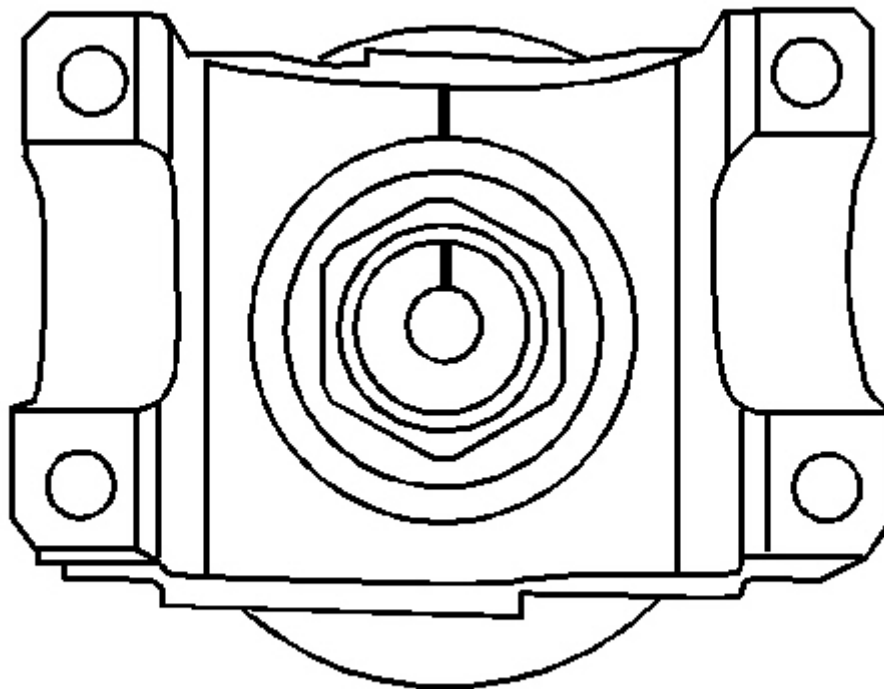


Fig. 47: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

7. Scribe an alignment line between the pinion shaft and the pinion yoke.

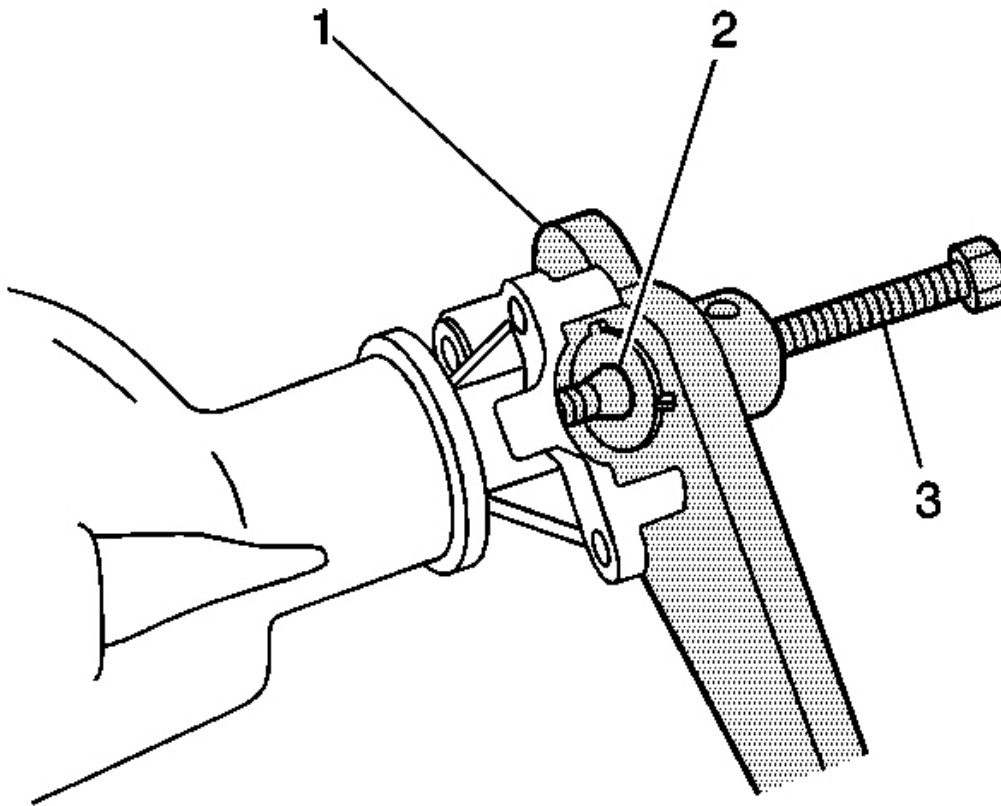


Fig. 48: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

8. Install the **J 8614-01** (1) onto the pinion, as shown. See **Special Tools**.
9. Remove the pinion nut while holding the **J 8614-01** (1). See **Special Tools**.
10. Install the **J 8614-2** (2) and the **J 8614-3** (3) into the **J 8614-01** (1), as shown. See **Special Tools**.
11. Remove the pinion yoke by turning the **J 8614-3** (3) clockwise, while holding the **J 8614-01** (1). See **Special Tools**.

IMPORTANT: Carefully remove the seal from the bore. Do not distort or scratch the aluminum case.

12. Remove the oil seal using a suitable seal removal tool.

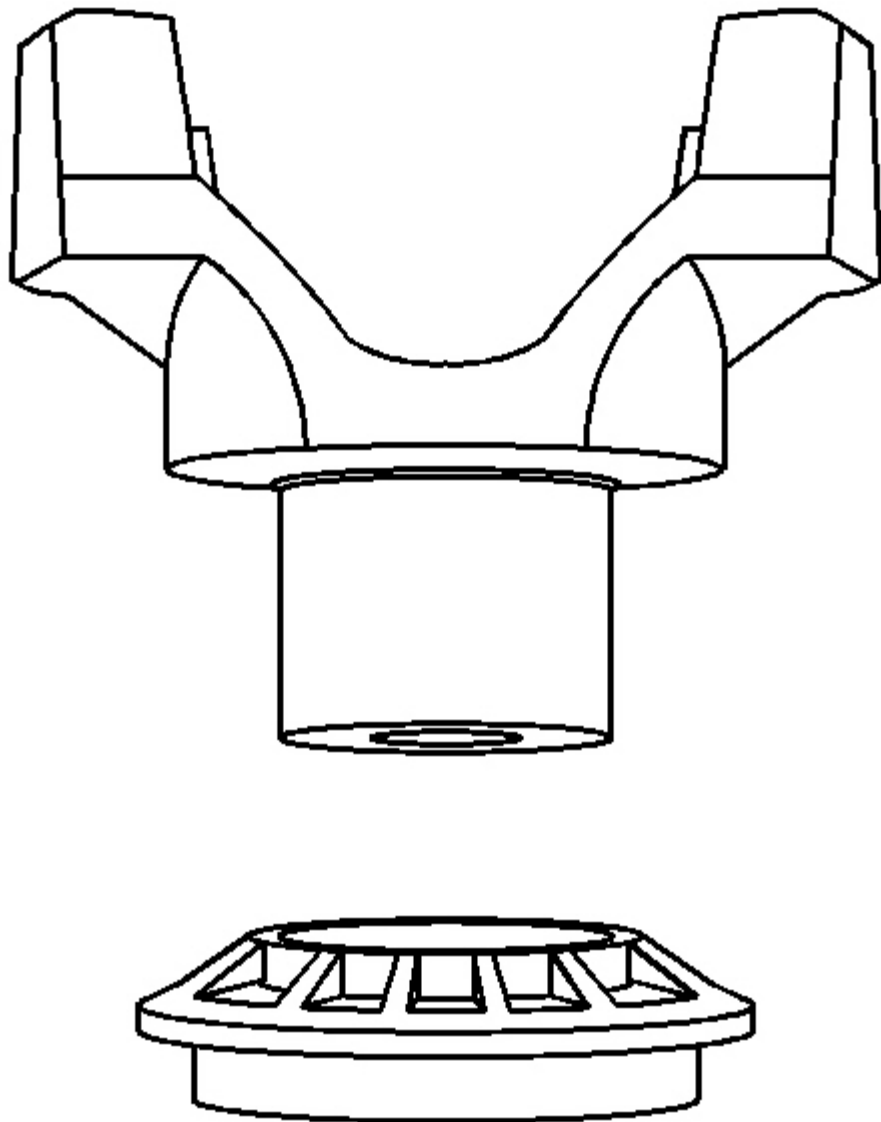


Fig. 49: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

13. Remove the dust deflector from the pinion yoke using a soft-faced hammer.

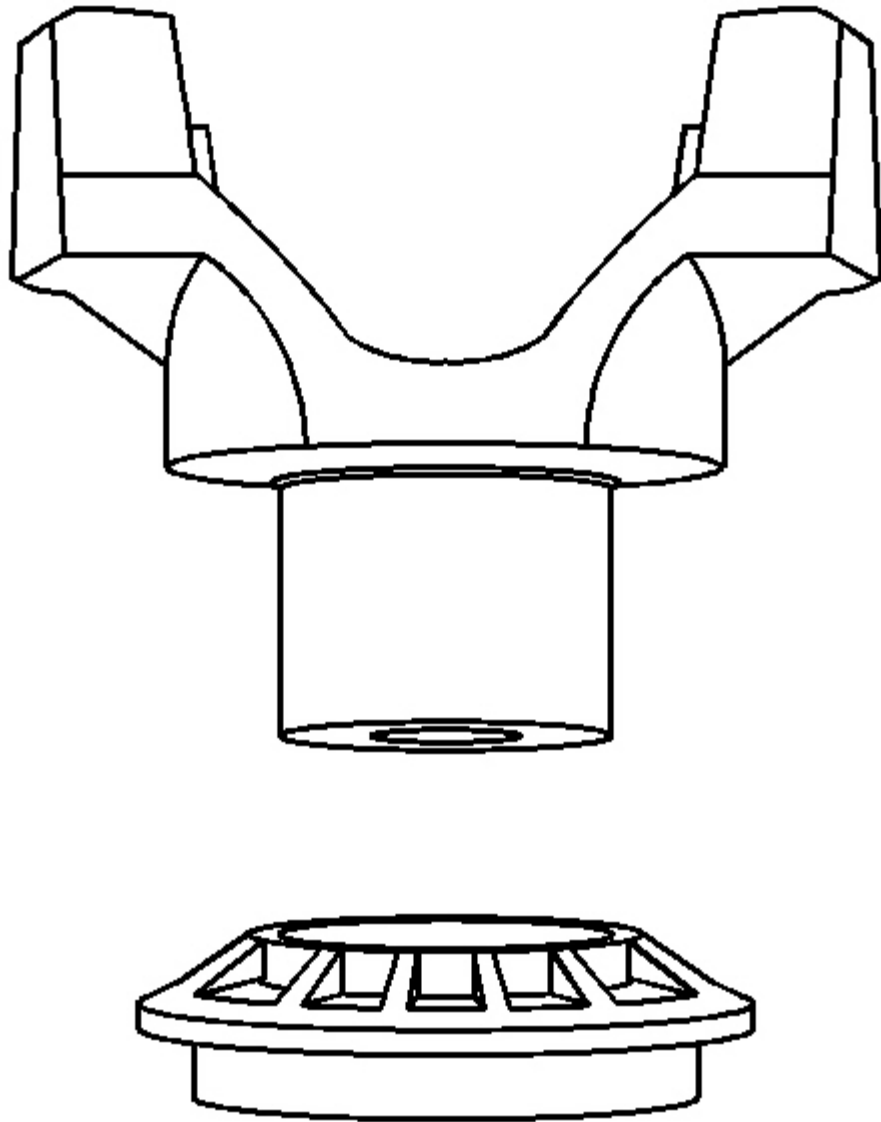


Fig. 50: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

1. Install the new deflector onto the pinion yoke, using a soft-faced hammer.

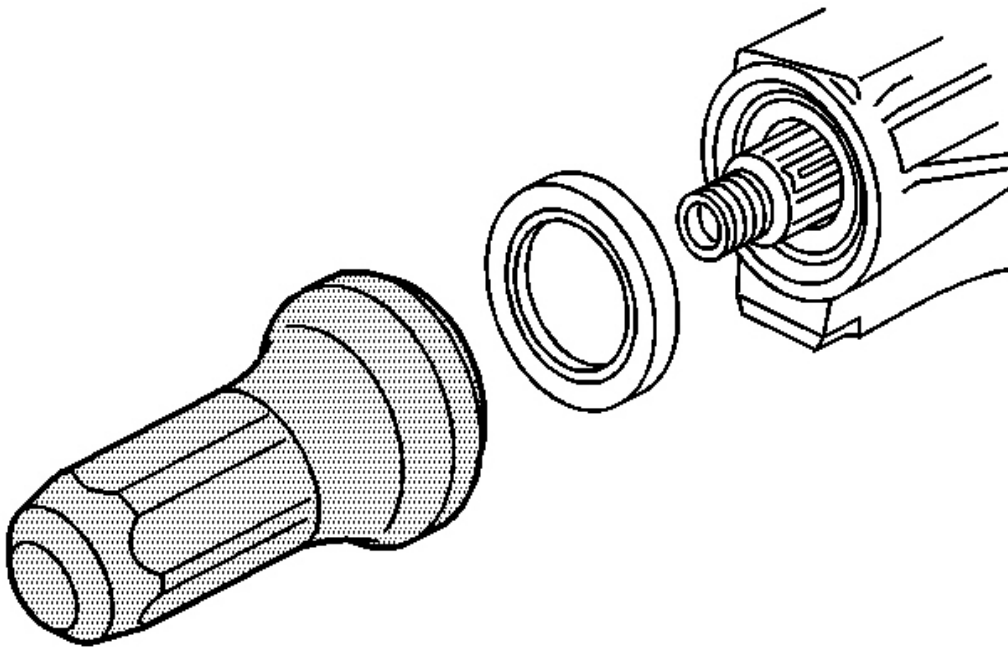


Fig. 51: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Drive the seal in straight, not at an angle, as this will damage the aluminum housing.

2. Install the new oil seal by doing the following:
 1. Position the oil seal in the bore.
 2. Install the **J 21128** over the oil seal. See **Special Tools**.
 3. Strike the **J 21128** with a hammer, until the seal flange seats on the axle housing surface. See **Special Tools**.
3. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the drive pinion yoke.
4. Install the pinion yoke.

Align the reference marks made during removal.

NOTE: Do not hammer the pinion flange/yoke onto the pinion shaft. Pinion components may be damaged if the pinion flange/yoke is hammered onto the pinion shaft.

5. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer, until a few pinion shaft threads show through the yoke.
6. Install the washer and a new pinion nut.

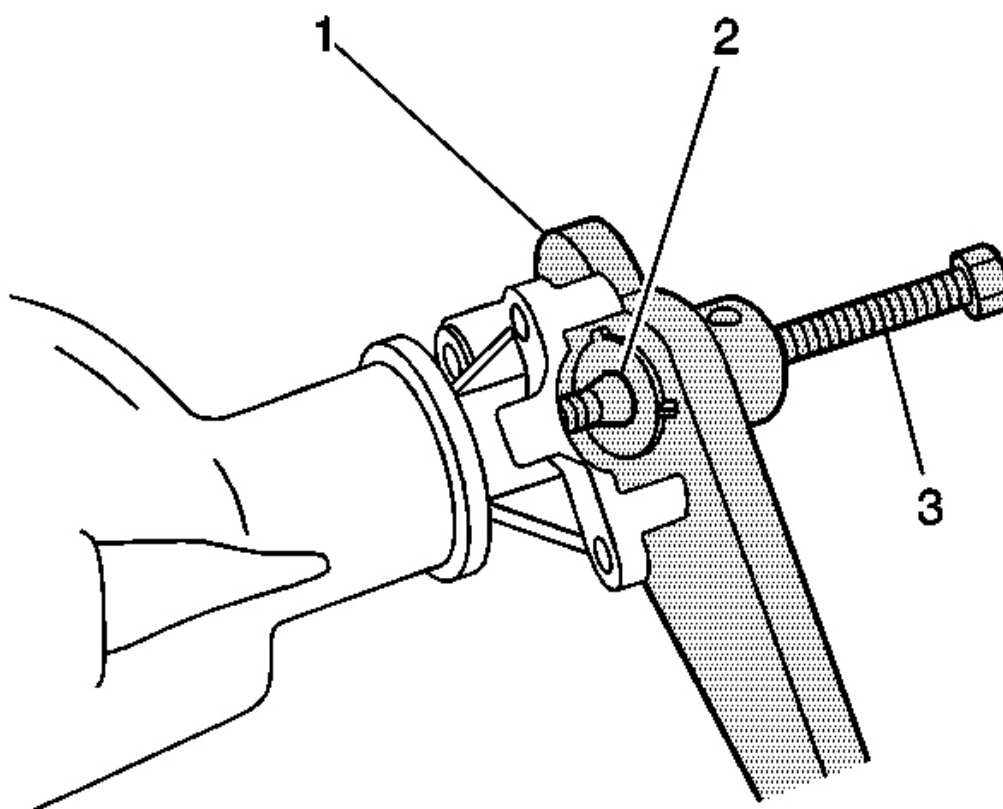


Fig. 52: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

7. Install the **J 8614-01** (1) onto the pinion yoke, as shown. See **Special Tools**.

NOTE: Refer to **Fastener Notice** .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

8. Tighten the pinion nut while holding the **J 8614-01** (1). See **Special Tools**.

Tighten: Tighten the pinion nut, until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

9. Measure the rotating torque of the pinion using an inch-pound torque wrench.

Compare the measurement of the rotating torque to the measurement recorded earlier.

Specification: The rotating torque of the pinion nut should be 0.40-0.57 N.m (3-5 lb in) greater than the torque recorded during removal.

10. If the rotating torque is not within specifications, continue to tighten the pinion nut.

Tighten: Tighten the pinion nut in small increments, as needed, until the torque required in order to rotate the pinion is 0.40-0.57 N.m (3-5 lb in) greater than the torque recorded during removal.

11. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust, if necessary.
12. Install the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
13. Install the EPS. Refer to **Engine Shield Replacement** .
14. Install the brake calipers. Refer to **Front Brake Caliper Replacement** .
15. Fill the drive axle. Refer to **Front Axle Lubricant Replacement**.
16. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY BUSHING AND BRACKET REPLACEMENT

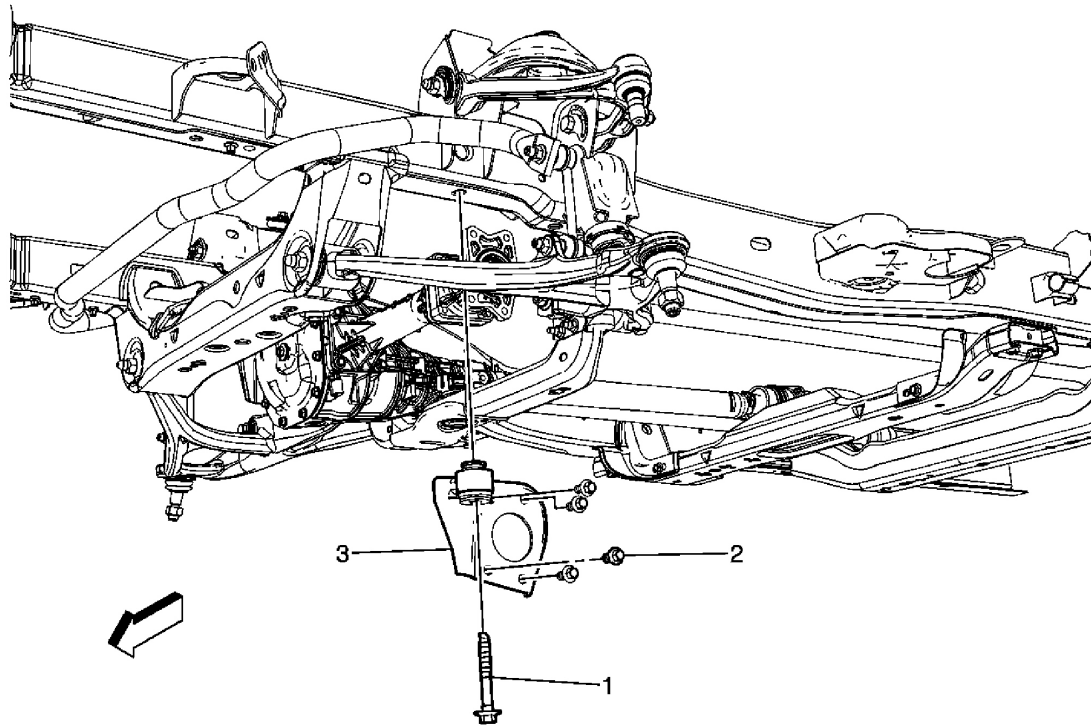


Fig. 53: Differential Carrier Assembly Bushing and Bracket Replacement
 Courtesy of GENERAL MOTORS CORP.

Differential Carrier Assembly Bushing and Bracket Replacement

Callout	Component Name
Preliminary Procedures	
<ol style="list-style-type: none"> 1. Remove the engine protection shield front. Refer to <u>Fastener Tightening Specifications</u>. 2. Remove the engine protection shield rear. Refer to <u>Fastener Tightening Specifications</u>. 3. Remove the front drive axle. Refer to <u>Wheel Drive Shaft Replacement</u> . 	
1	Front Drive Axle Mounting Bolt (Qty: 1) NOTE: Refer to <u>Fastener Notice</u> . Tip:

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

- The bushings for the mounting bracket is not serviced separately. They are serviced with the mounting bracket.
- DO NOT completely tighten the bolts from the mounting bracket to the frame. Leave the bolts loose to allow the bracket alignment to the intermediate shaft housing.

Tighten: 152 N.m (112 lb ft)

2

Mounting Bracket to the Front Drive Axle Bolt (Qty: 4)

Tighten: 152 N.m (112 lb ft)

3

Mounting Front Drive Axle Bracket

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT

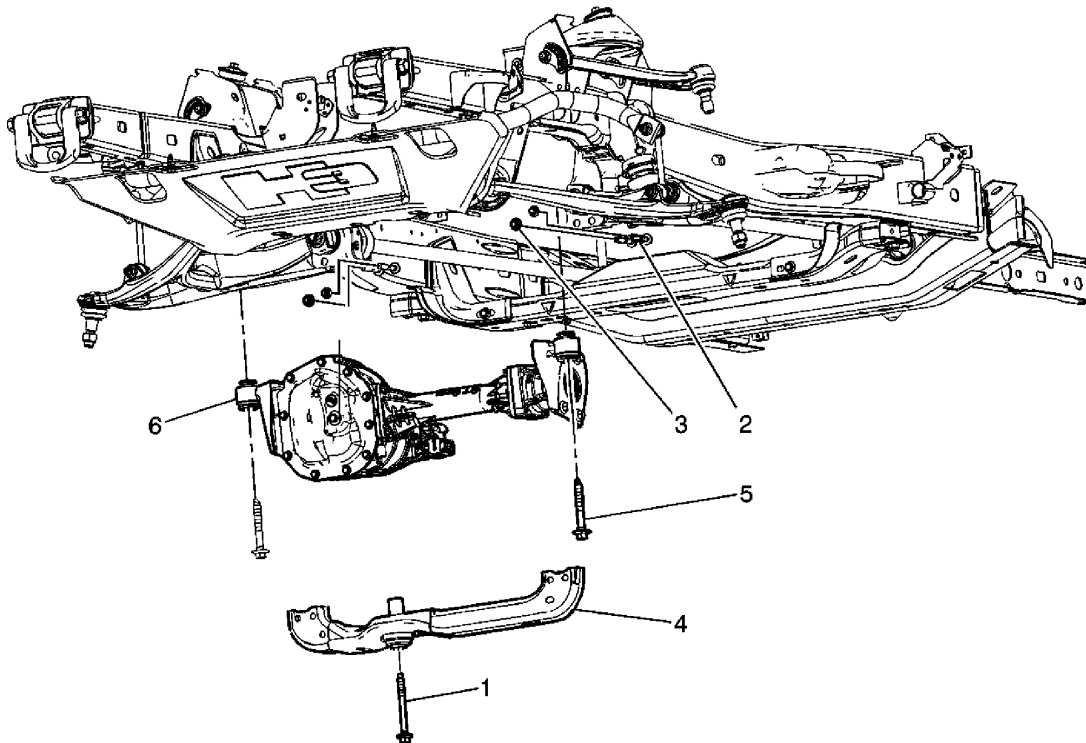


Fig. 54: Differential Carrier Assembly Replacement
Courtesy of GENERAL MOTORS CORP.

Differential Carrier Assembly Replacement

Callout	Component Name
---------	----------------

NOTE:

Refer to Fastener Notice .

Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.

Preliminary Procedures

1. Remove the engine protection shield front Refer to Fastener Tightening Specifications.
2. Remove the engine protection shield rear. Refer in Fastener Tightening Specifications.
3. Drain the front drive axle. Refer to Front Axle Lubricant Replacement.
4. Remove the wheel drive shafts. Refer to Wheel Drive Shaft Replacement .

1	Crossmember to Front Drive Axle Mounting Bolt (Qty: 1) Tighten: 100 N.m (74 lb ft).
2	Crossmember to Frame Mounting Bolt (Qty: 4) Tighten: 160 N.m (118 lb ft).
3	Crossmember to Frame Nut (Qty: 4)
4	Transfer Case Crossmember
5	Mounting Bracket Bolt (Qty: 2) Tip: Support the front drive axle with a transmission jack stand. Tighten: 152 N.m (112 lb ft).
6	Front Drive Axle

FRONT AXLE LUBRICANT LEVEL INSPECTION

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Ensure the vehicle is level.
3. Inspect the front axle for leaks. Repair as necessary.
4. Remove the engine protection shield (EPS), if equipped. Refer to Engine Shield Replacement .
5. Clean the area around the front axle fill plug.
6. Remove the front axle fill plug and the washer.
7. Fabricate a dipstick from a pipe cleaner or similar item. Form the pipe cleaner into an "L".

IMPORTANT: Ensure that the pipe cleaner is resting on the bottom threads of the fill hole.

8. Insert the pipe cleaner into the fill plug opening with the stem "L" is facing down.
9. Remove the pipe cleaner and measure the distance from the bend in the pipe cleaner to the lubricant level.

Specification: The oil level should be between 0-8 mm (0-0.4 in) below the fill plug opening.

10. If the level is low, add fluid until the level is within the proper fluid level specification. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

NOTE: Refer to Fastener Notice .

11. Install the fill plug and the washer.

Tighten: Tighten the plug to 32 N.m (24 lb ft).

12. Install the EPS, if equipped. Refer to **Engine Shield Replacement** .
13. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT

Tools Required

- **J 8001** Dial Indicator Set. See **Special Tools**.
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 21128** Axle Pinion Oil Seal Installer. See **Special Tools**.
- **J 22536** Pinion Driver. See **Special Tools**.
- **J 22779** Side Bearing Backlash Gage. See **Special Tools**.
- **J 25025** Guide Pins. See **Special Tools**.
- **J 25588** Side Bearing Shim Installer. See **Special Tools**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement**.

3. Remove the drive pinion yoke and the oil seal. Refer to **Front Differential Drive Pinion Flange/Yoke, Seal and Dust Deflector Replacement**.

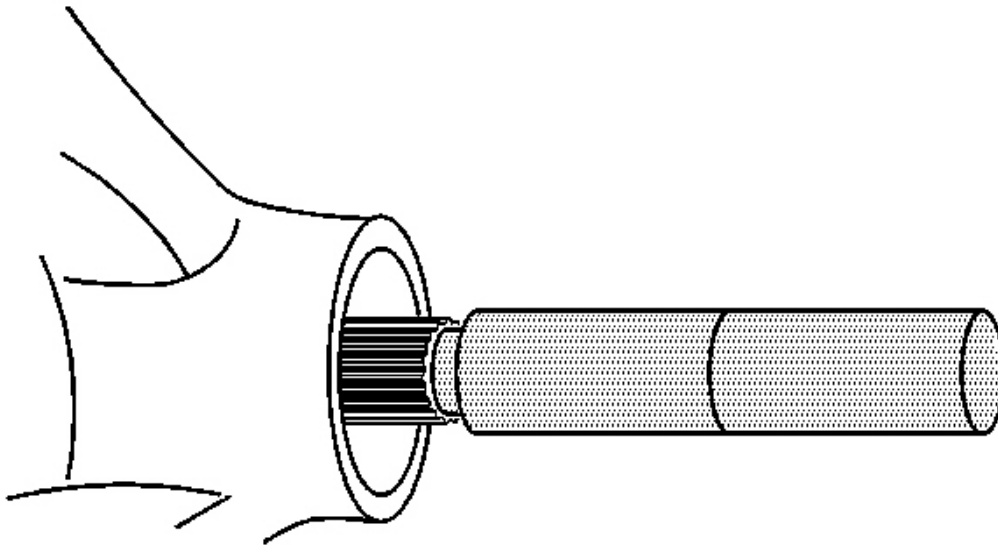


Fig. 55: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 22536** as shown. See **Special Tools**.

Ensure that the **J 22536** is firmly seated on the pinion. See **Special Tools**.

5. Drive the pinion out using the **J 22536** and a hammer. See **Special Tools**.

Strike the **J 22536** slowly. See **Special Tools**. Do not let the pinion fall out of the rear axle housing.

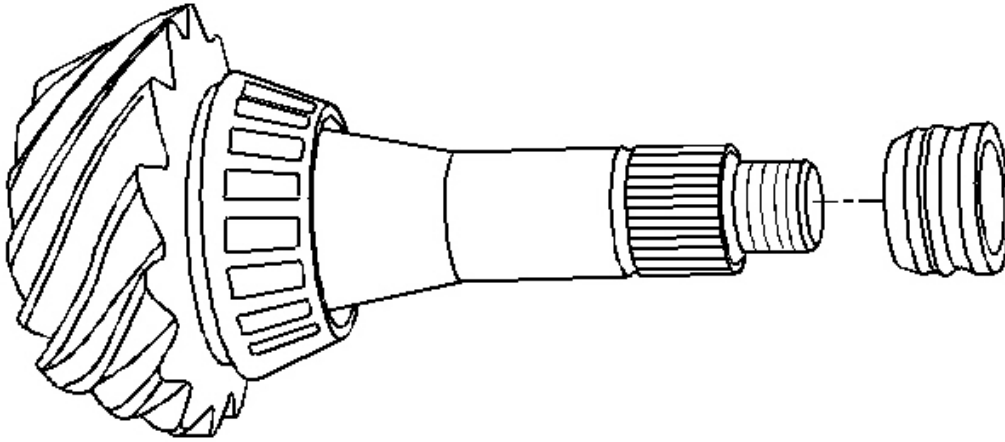


Fig. 56: View Of Collapsible Spacer & Pinion
Courtesy of GENERAL MOTORS CORP.

6. Remove the collapsible spacer from the pinion. Discard the spacer.
7. Remove the pinion bearings and the cups. Refer to **Drive Pinion Bearings Replacement**.
8. Remove the ring gear. Refer to **Differential Case Assembly Disassemble**.

Installation Procedure

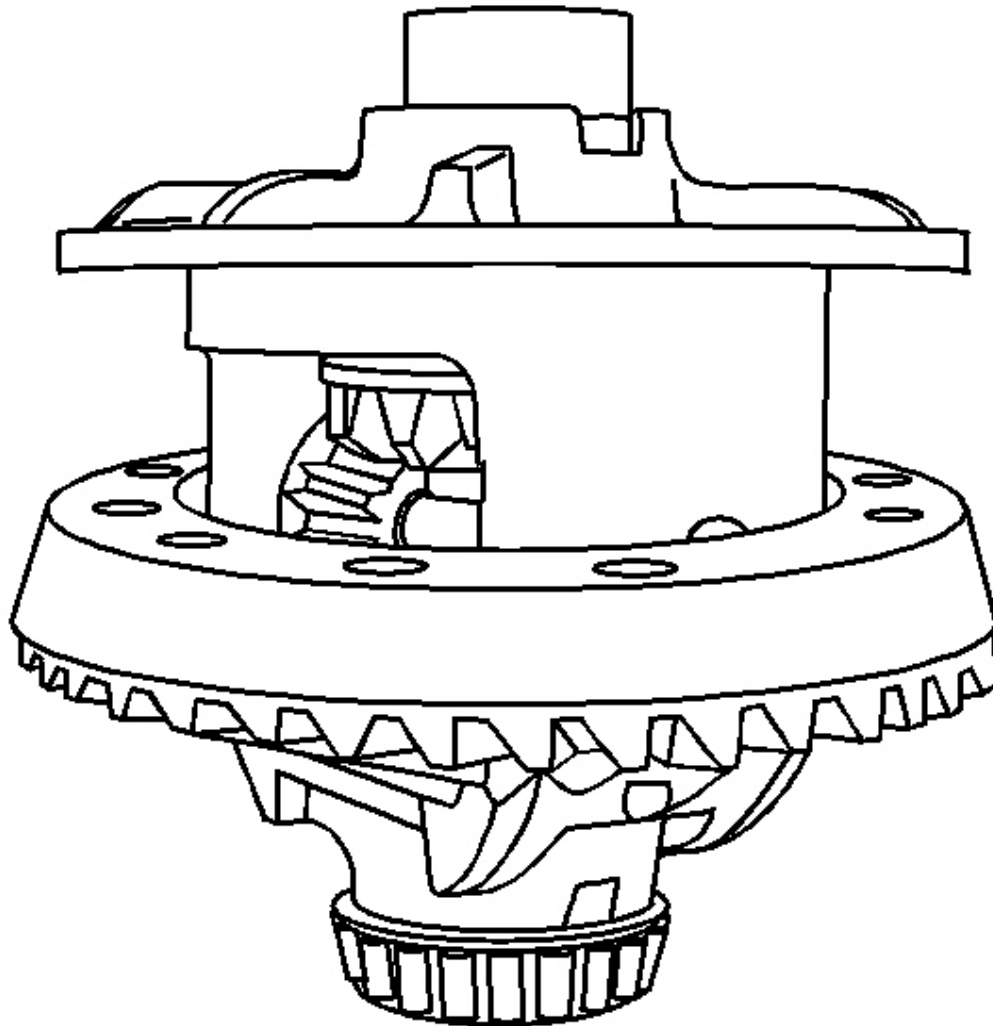


Fig. 57: Installing Ring Gear Onto Differential Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

1. Install the ring gear to the differential case. Refer to **Differential Case Assembly Disassemble**.

2. Install the new ring gear bolts.

Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

NOTE: Refer to Fastener Notice .

3. Tighten the new ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

Tighten: Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

4. Install the drive pinion bearing cups. Refer to Drive Pinion Bearings Replacement.
5. Determine the selective shim thickness for the pinion gear. See Differential Side Bearing Preload Adjustment Procedure.
6. Install the selective shim onto the pinion.
7. Install the inner pinion bearing onto the pinion. Refer to Drive Pinion Bearings Replacement.

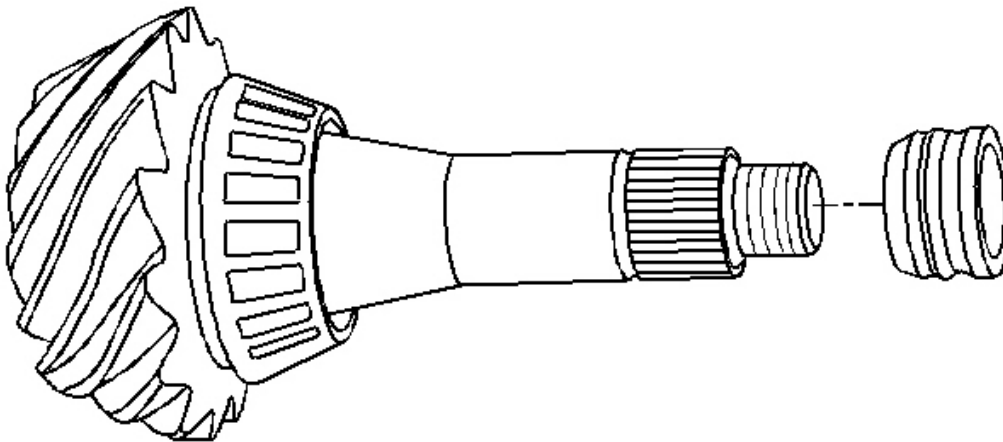


Fig. 58: View Of Collapsible Spacer & Pinion
Courtesy of GENERAL MOTORS CORP.

8. Install a new collapsible spacer.
9. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant**

Recommendations .

10. Install the pinion to the axle housing.
11. Install the outer pinion bearing.

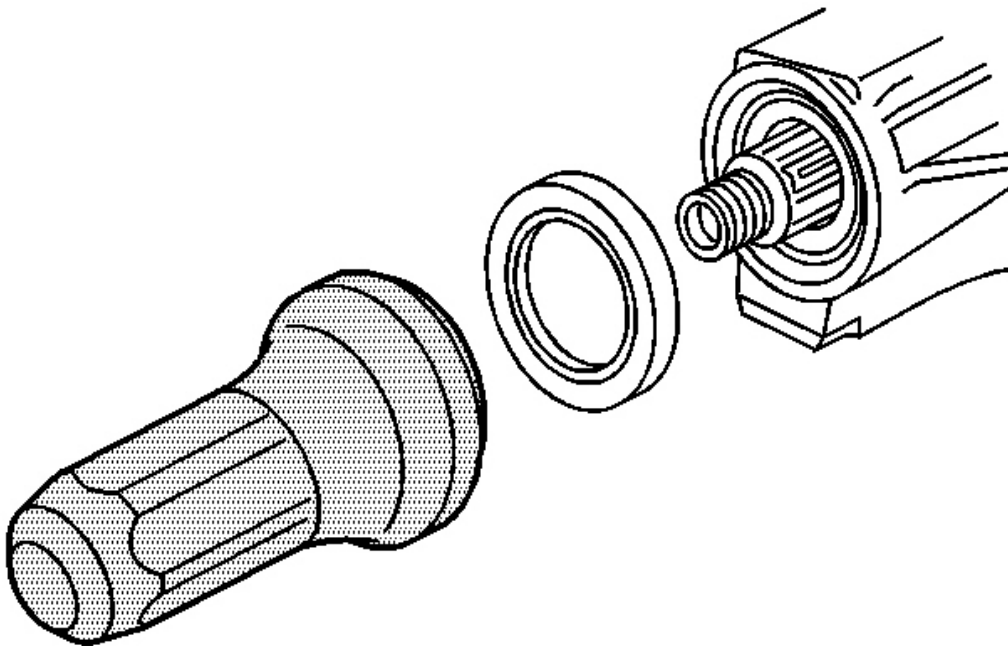


Fig. 59: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

12. Install a new pinion oil seal using the **J 21128** . See **Special Tools**.
13. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the pinion yoke.

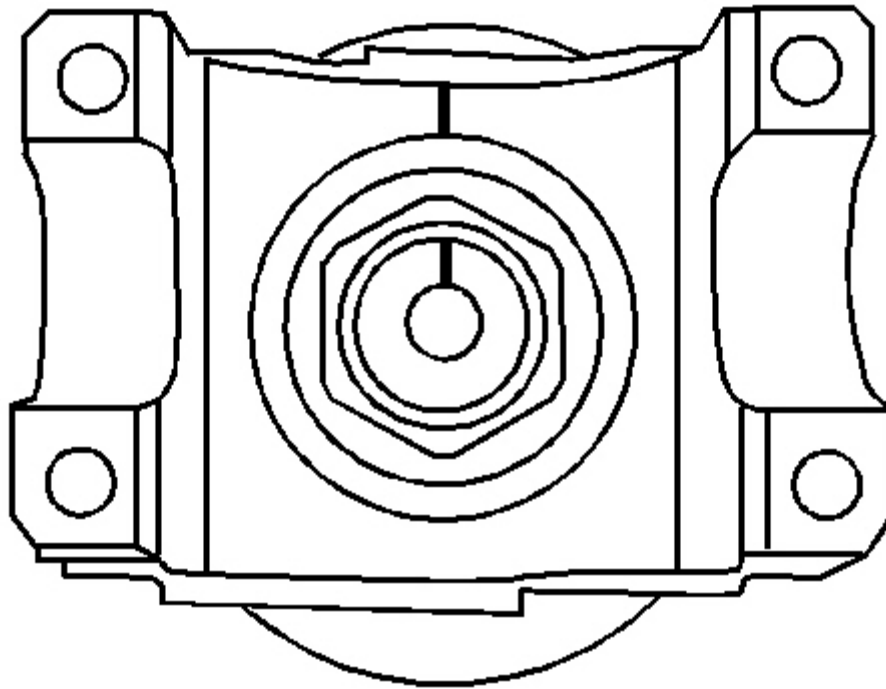


Fig. 60: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

14. Install the pinion yoke.

Align the marks made during removal.

15. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.

16. Install the washer and a new pinion nut.

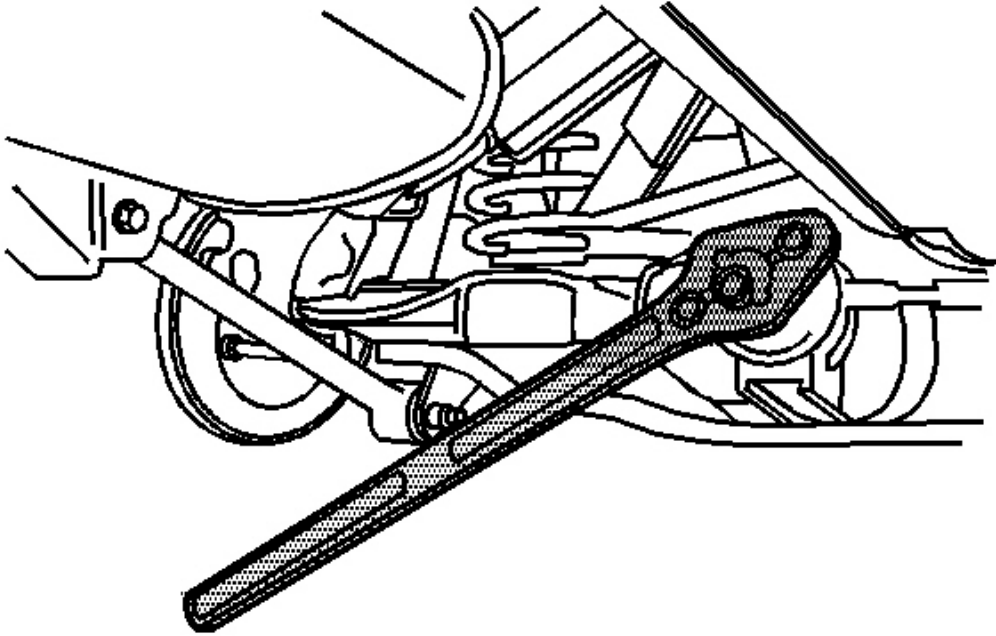


Fig. 61: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

17. Install the **J 8614-01** onto the pinion yoke as shown. See **Special Tools**.

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

18. Tighten the pinion nut while holding the **J 8614-01** . See **Special Tools**.

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

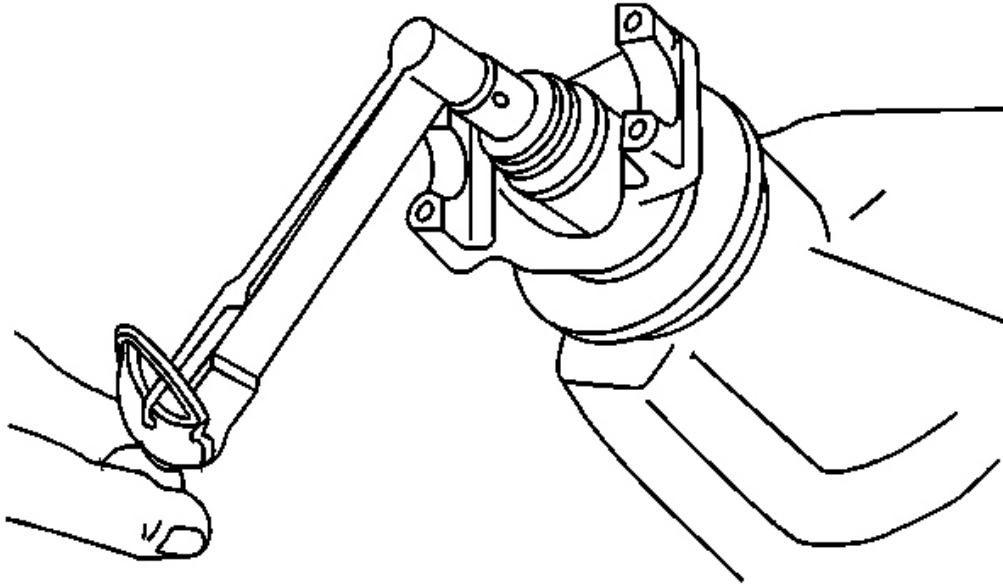


Fig. 62: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

19. Measure the rotating torque of the pinion using an inch-pound torque wrench.

Specification: The rotating torque of the pinion should be 1.0-2.3 N.m (10-20 lb in) for used bearings or 1.7-3.4 N.m (15-30 lb in) for new bearings.

20. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings or 1.7 N.m (15 lb in) for new bearings, continue to tighten the pinion nut.

Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is 1.0-2.3 N.m (10-20 lb in) for used bearings or 1.7-3.4 N.m (15-30 lb in) for new bearings.

21. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.

Recheck the rotating torque and adjust if necessary.

22. Install the differential carrier assembly. Refer to **Differential Carrier Assembly**

Replacement.

23. Perform a gear tooth contact pattern check on the pinion and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection.**
24. Lower the vehicle.

Differential Side Bearing Preload Adjustment Procedure**IMPORTANT:**

- **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 **Drive Pinion and Ring Gear Replacement** .
2. Measure the rotating torque of the drive pinion using an inch-pound torque wrench.

Specification: The rotating torque of the drive pinion should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m(10-20 lb in) for used bearings.

3. Record the measurement.

IMPORTANT: Before installation of the differential 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 side bearings and bearing cups into the axle housing.
5. Insert one 4.318 mm (0.170 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** between the right side differential side bearing cup and the axle housing. See **Special Tools**.

IMPORTANT: Over-tightening may spread the housing and result in incorrect shim selection.

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

Record the measurement.

13. Using a micrometer, measure the thickness of the service spacer.

Record the measurement.

14. Add the thickness of the service spacer to the average thickness of the **J 22779** . See **Special Tools**.

The resulting value is the total service shim thickness without preload for the axle.

15. Insert one 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing.
16. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the service shim.
17. Install the **J 22779** on the left side of the differential assembly. See **Special Tools**.
18. While rotating the ring gear back and forth, tighten the knob on the **J 22779** until there is approximately 0. See **Special Tools**.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.
19. Once the amount of backlash is obtained, remove the **J 22779** . See **Special Tools**.
20. Remove the differential case with the differential side bearings and the bearing cups.
21. Remove the service shims.
22. Using a micrometer, measure the thickness of the **J 22779** in 3 locations. See **Special Tools**.
23. Calculate the average of the 3 measurements.

This value is the left side service shim thickness without preload.

24. Subtract the service shim thickness for the left side of the axle, calculated in step 23, from

the total service shim thickness, calculated in step 14.

This value is the service shim thickness for the right side of the axle without preload.

25. In order to initially set the preload of the differential side bearings and the backlash to approximately 0.013-0.023 mm (0.005-0.009 in), take the value determined in step 24 and add 0.0203 mm (0.008 in) service shim thickness to this amount.
26. Assemble the left side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of selective service shims equaling the thickness determined in step 23.

Measure the service spacer and the service shims separately.

Add the measurements together in order to determine the total shim pack thickness.

27. Assemble the right side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of selective service shims equaling the thickness determined in step 25.

Measure the service spacer and the service shims separately.

Add the measurements together in order to determine the total shim pack thickness.

28. Install the differential assembly with the differential side bearings and the differential side bearing cups.
29. Install the left side service spacer between the axle housing and the differential assembly.
30. Install the left side selective service shim or shims.

The service shim or shims must be installed between the service spacer and the differential side bearing cup.

31. Install the right side service spacer between the axle housing and the differential assembly.
32. Install the right side selective service shim or shims using the **J 25588** , if necessary. See **Special Tools**.

The service shim or shims must be installed between the service spacer and the differential side bearing cup.

33. Install the differential bearing caps and the bolts.

Tighten: Tighten the differential bearing cap bolts to 63 N.m (46 lb ft).

34. Measure the drive pinion and differential side bearing preload using an inch-pound torque

wrench.

Rotate the pinion several times to ensure the differential side bearings have seated.

Specification: The rotating torque of the drive pinion and differential side bearings should be 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.1 N.m (25-45 lb in) for used bearings.

Record the measurement.

35. 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.

Specification: The differential case side bearing preload should be 1.7-4.0 N.m (15-35 lb in).

36. 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.
37. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
38. 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**.

DRIVE PINION BEARINGS REPLACEMENT

Tools Required

- **J 5590** Pinion Bearing Race Installer - Rear. See **Special Tools**.
- **J 7817** Outer Bearing Race Installer. See **Special Tools**.
- **J 8092** Universal Driver Handle- 3/4 in - 10. See **Special Tools**.
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 21128** Axle Pinion Oil Seal Installer. See **Special Tools**.
- **J 22912-B** Split-Plate Bearing Puller. See **Special Tools**.
- **J 29609** Rear Pinion Bearing Cup Installer. See **Special Tools**.

2007 Hummer H3

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Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement**.
3. Remove the drive pinion from the axle. Refer to **Drive Pinion and Ring Gear Replacement**.

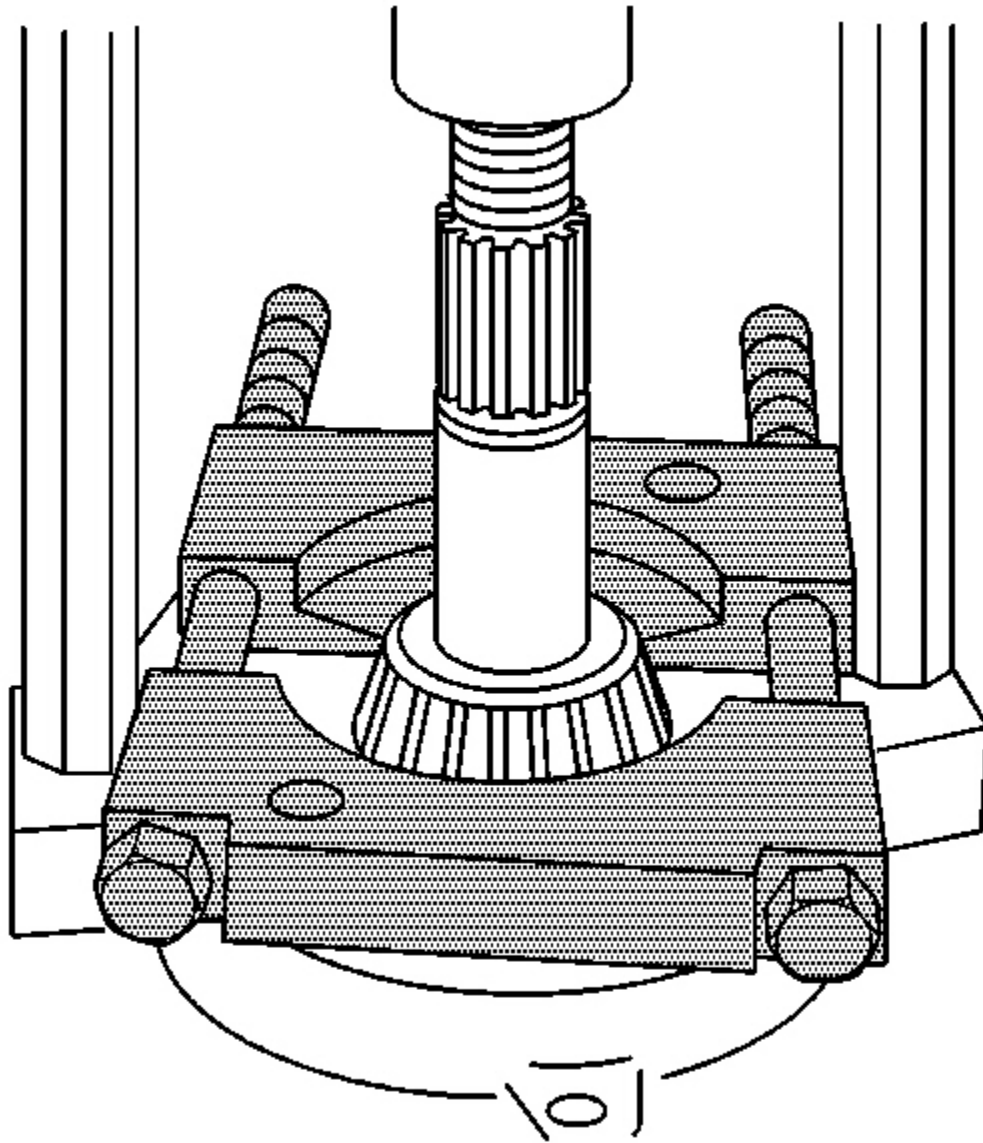


Fig. 63: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

4. Press the bearing off of the pinion using the J 22912-B . See **Special Tools**.
5. Remove the shim.

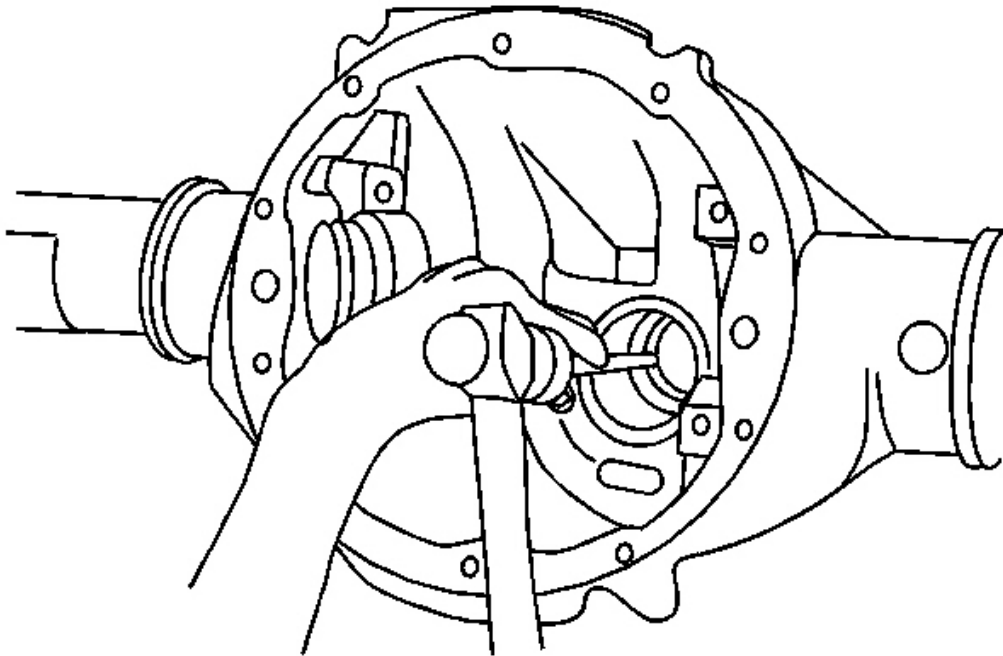


Fig. 64: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

6. Remove the outer pinion bearing cup from the axle housing using a hammer and a brass drift in the slots provided. Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

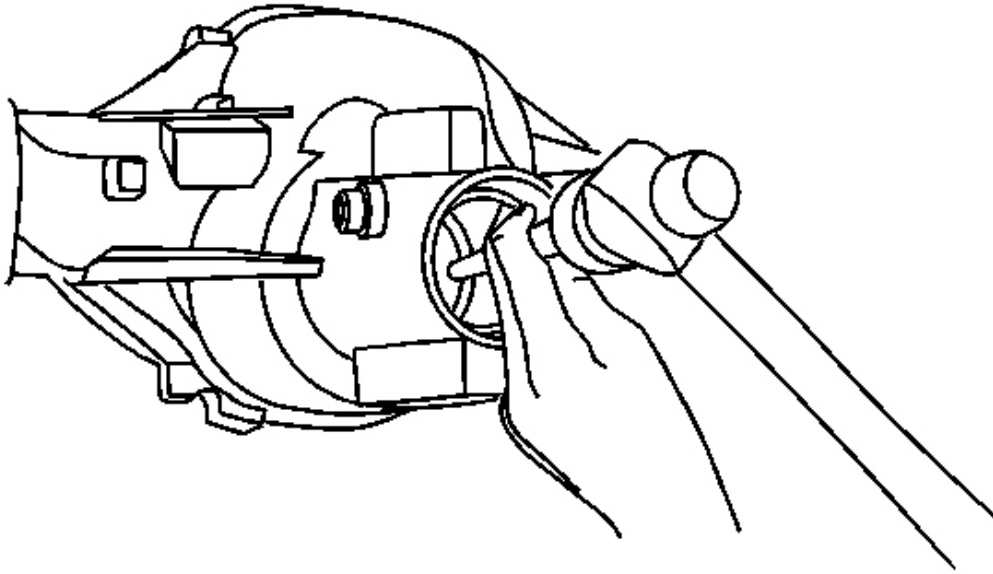


Fig. 65: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner pinion bearing cup from the axle housing using a hammer and a brass drift in the slots provided. Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

Installation Procedure

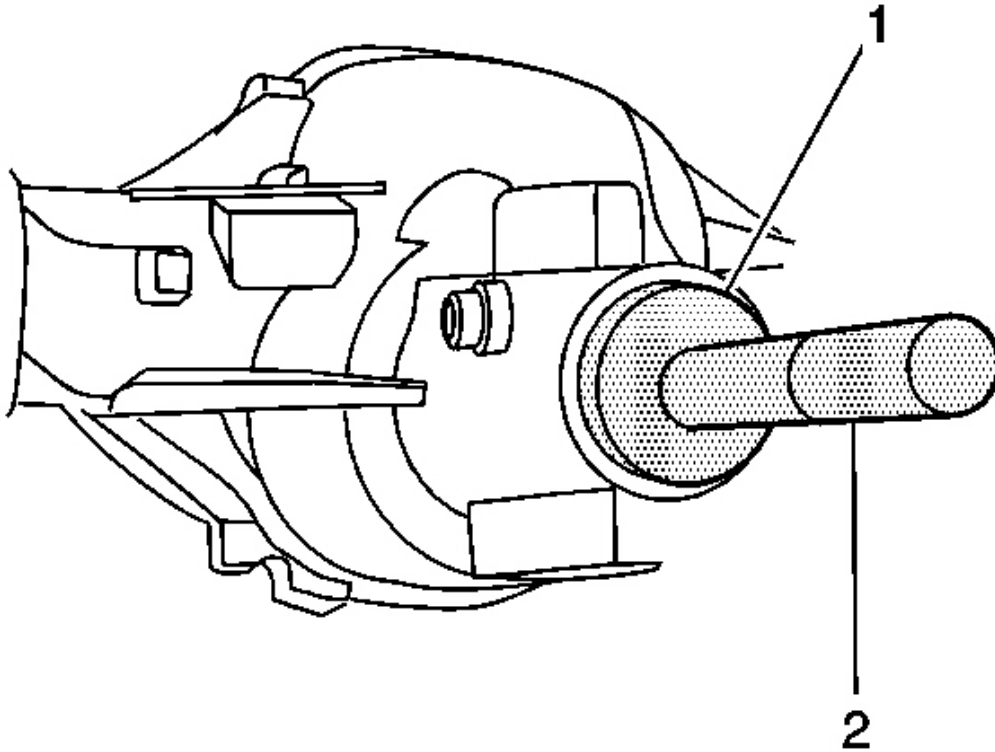


Fig. 66: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

1. Install the outer pinion bearing cup using the **J 7817** (1) and the **J 8092** (2). See **Special Tools**.

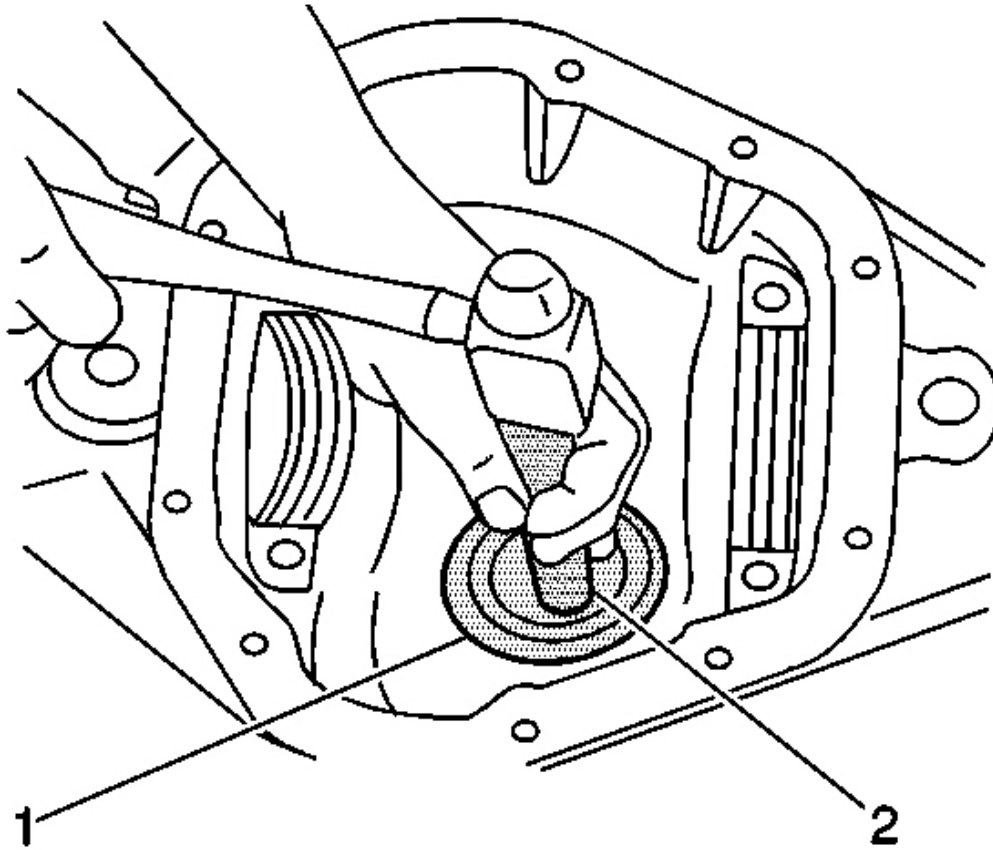


Fig. 67: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing cup using the **J 29609** (2) and the **J 8092** (1). See **Special Tools**.
3. Determine the selective shim thickness for the pinion. Refer to **Pinion Depth Adjustment**.

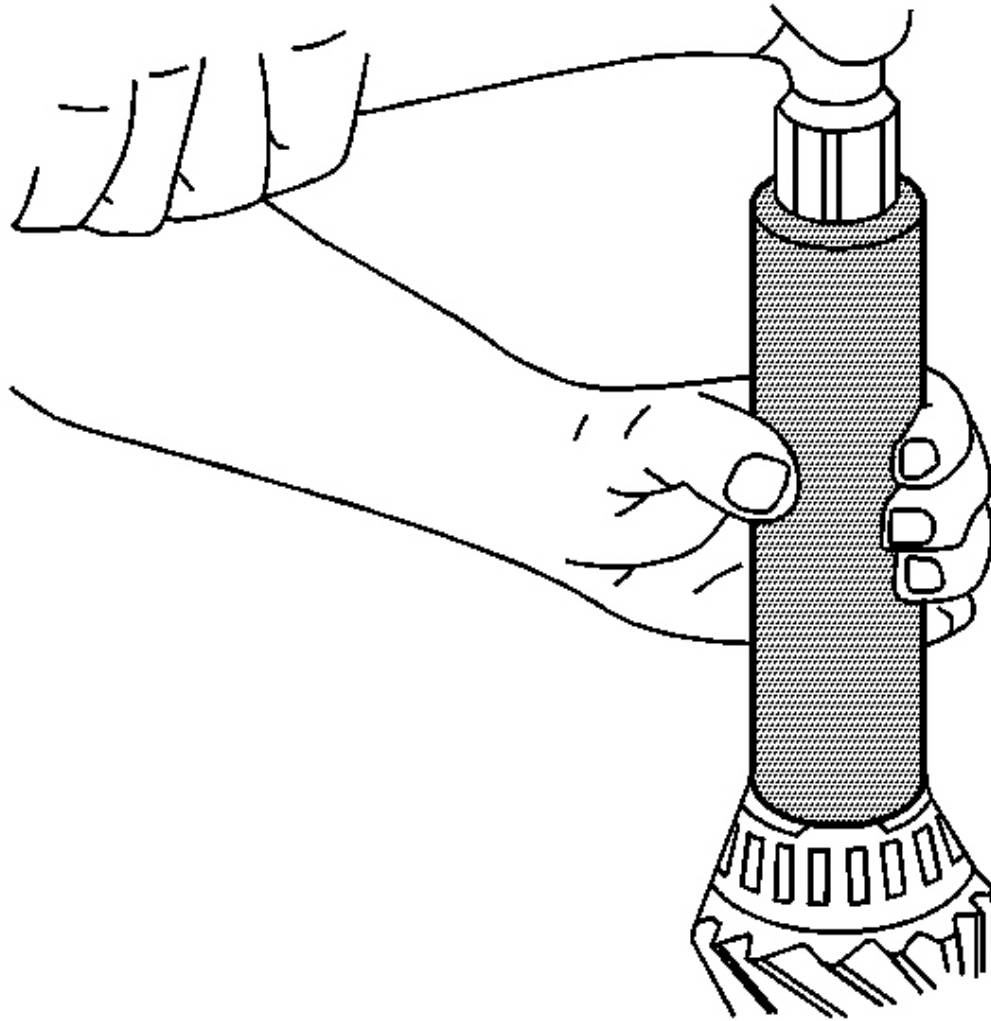


Fig. 68: Installing Inner Pinion Bearing
Courtesy of GENERAL MOTORS CORP.

4. Install the selective shim between the inner pinion bearing and the shoulder on the gear.
5. Install the inner pinion bearing using the **J 5590** . See **Special Tools**.

Press the bearing on until the cone seats on the pinion shim.

6. Install a new collapsible spacer.

7. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
8. Install the pinion into the axle housing.
9. Install the outer pinion bearing onto the pinion.

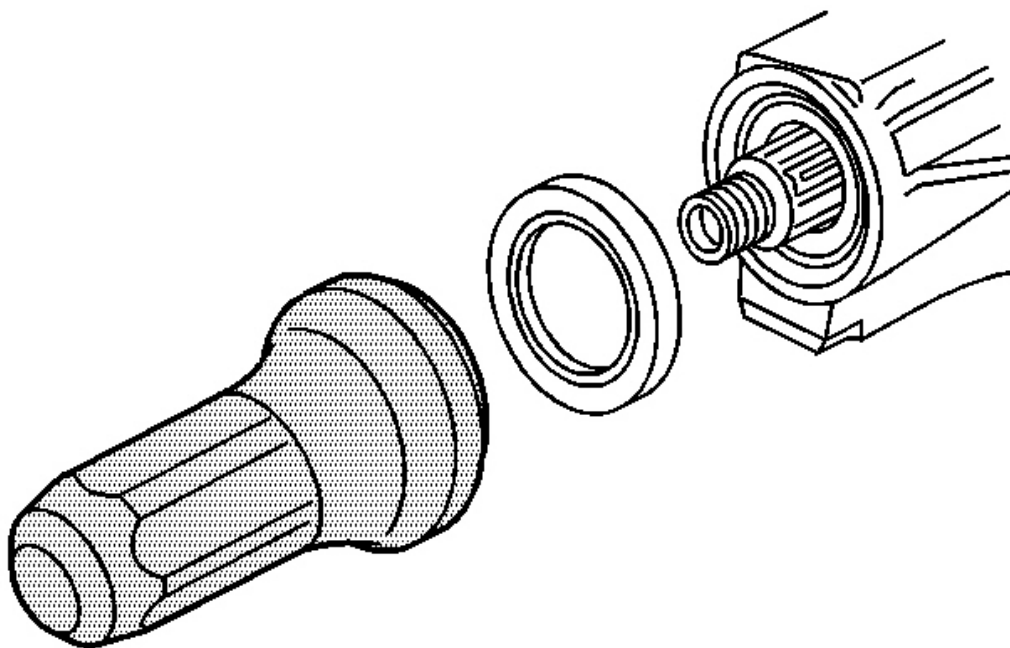


Fig. 69: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

10. Install a new pinion oil seal using the **J 21128** . See **Special Tools**.
11. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the pinion yoke.

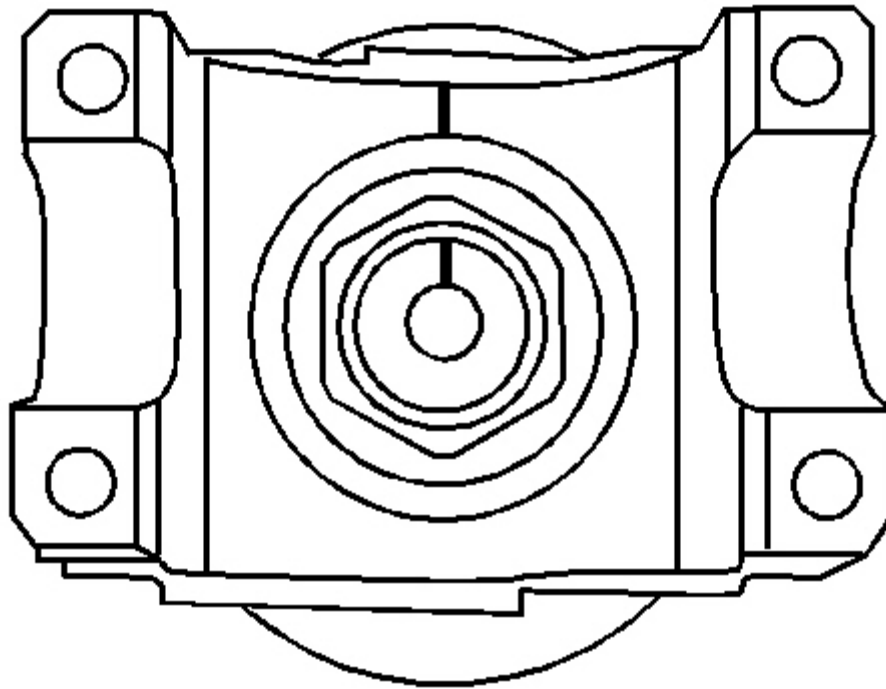


Fig. 70: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

12. Install the pinion yoke.

Align the marks made during removal.

13. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
14. Install the washer and a new pinion nut.

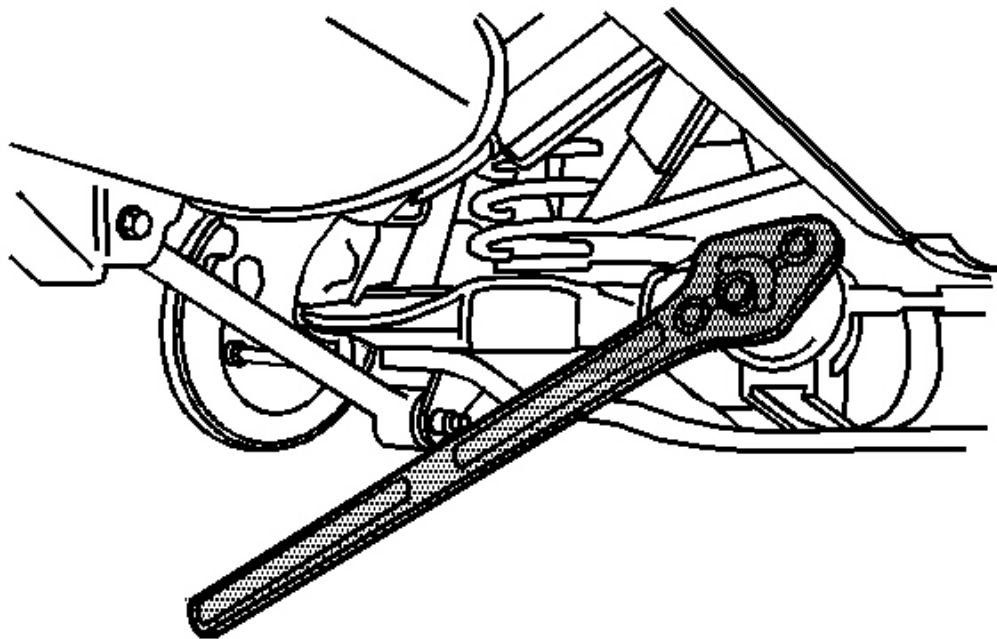


Fig. 71: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

15. Install the **J 8614-01** onto the pinion yoke as shown. See **Special Tools**.

NOTE: Refer to **Fastener Notice** .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

16. Tighten the pinion nut while holding the **J 8614-01** . See **Special Tools**.

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

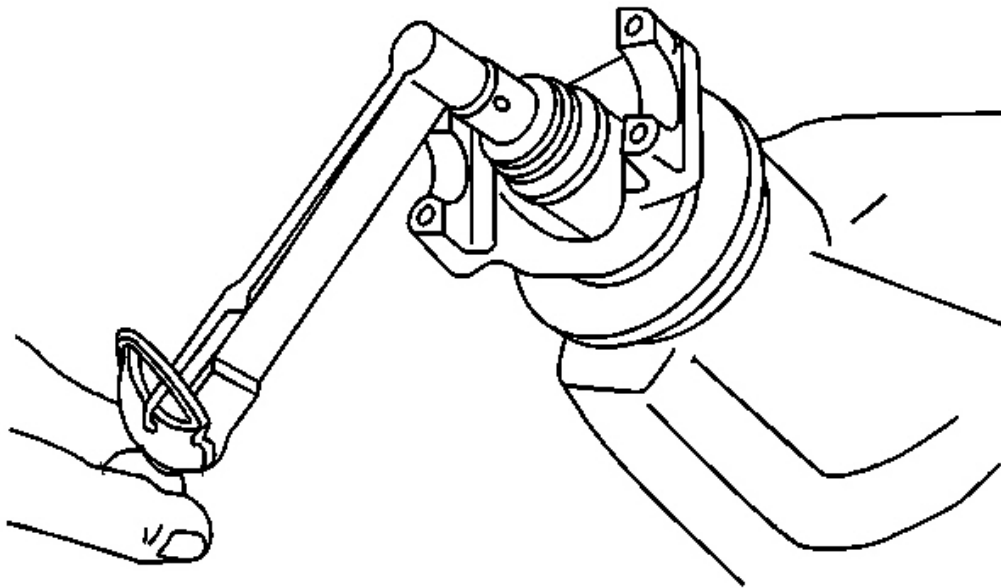


Fig. 72: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

17. Measure the rotating torque of the pinion using an inch-pound torque wrench.

Specification: The rotating torque of the pinion should be 1.0-2.3 N.m (10-20 lb in) for used bearings or 1.7-3.4 N.m (15-30 lb in) for new bearings.

18. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings or 1.7 N.m (15 lb in) for new bearings, continue to tighten the pinion nut.

Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is 1.0-2.3 N.m (10-20 lb in) for used bearings or 1.7-3.4 N.m (15-30 lb in) for new bearings.

19. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.

Recheck the rotating torque and adjust if necessary.

20. Install the differential carrier assembly. Refer to **Differential Carrier Assembly**

Replacement.

21. Lower the vehicle.

DIFFERENTIAL REPLACEMENT

Tools Required

- **J 8001** Dial Indicator Set. See **Special Tools**.
- **J 3289-20** Holding Fixture. See **Special Tools**.
- **J 34178** Spreader Gage Adapter. See **Special Tools**.
- **J 45222** Axle Housing Spreader. See **Special Tools**.
- **J-45222-10** Axle Housing Spreader Adapters. See **Special Tools**.
- **J-45935** Holding Fixture. See **Special Tools**.

Removal Procedure

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

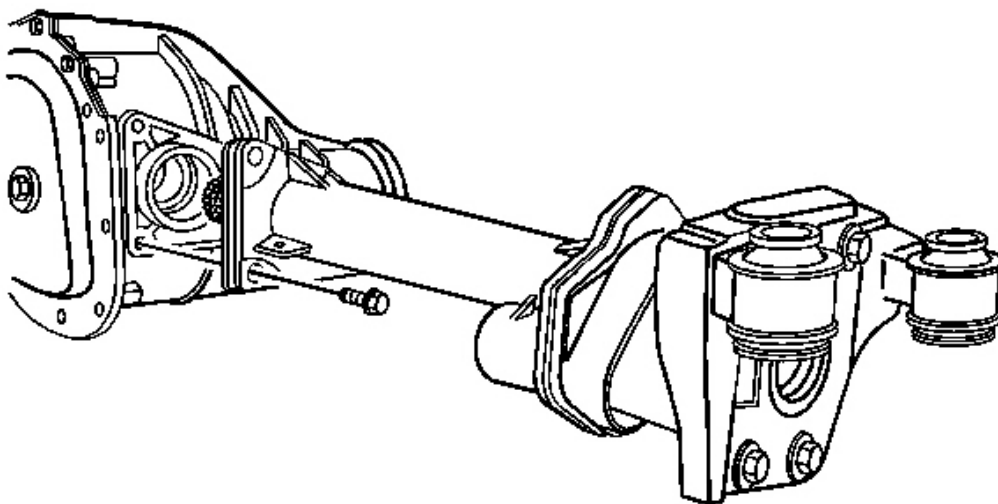


Fig. 73: View Of Front Axle Shaft Housing Tube
Courtesy of GENERAL MOTORS CORP.

2. Remove the bolts retaining the front axle shaft housing tube to the front drive axle housing.
3. Remove the front axle shaft housing tube assembly.

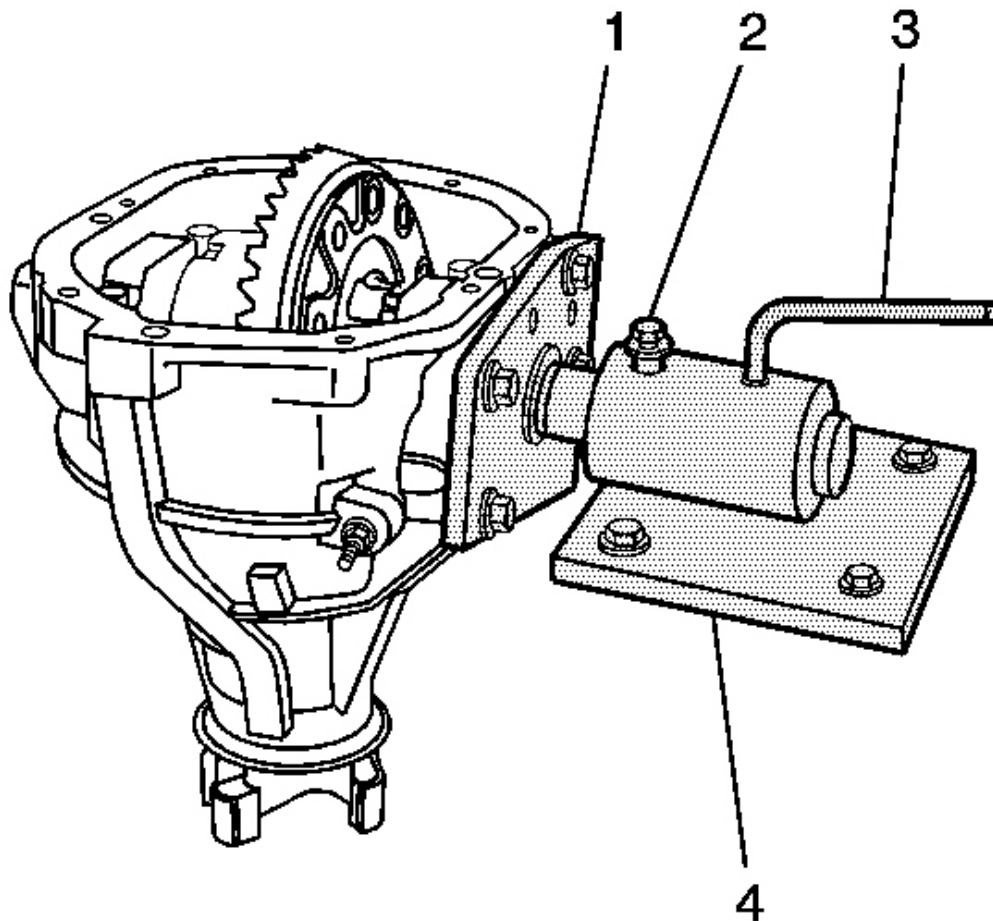


Fig. 74: View Of J-45935, J 3289-20, J 3289-22 & Set Screw
Courtesy of GENERAL MOTORS CORP.

4. Install the **J-45935** (1) to the front drive axle housing using axle mounting bolts. See **Special Tools**.
5. Insert the **J-45935** (1) into the bench mounting fixture **J 3289-20** (2). See **Special Tools**.
6. Install the locking pin J 3289-22 (3), then tighten the set screw (4).

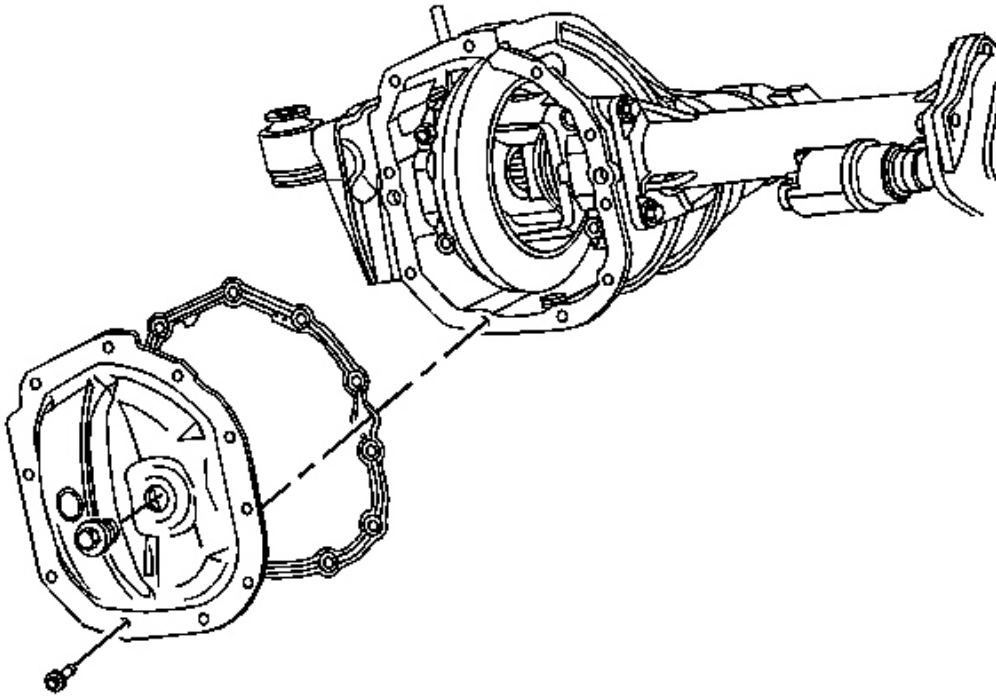


Fig. 75: View Of Differential Cover
Courtesy of GENERAL MOTORS CORP.

7. Remove the front axle housing cover bolts.
8. Remove the front axle housing cover and gasket.

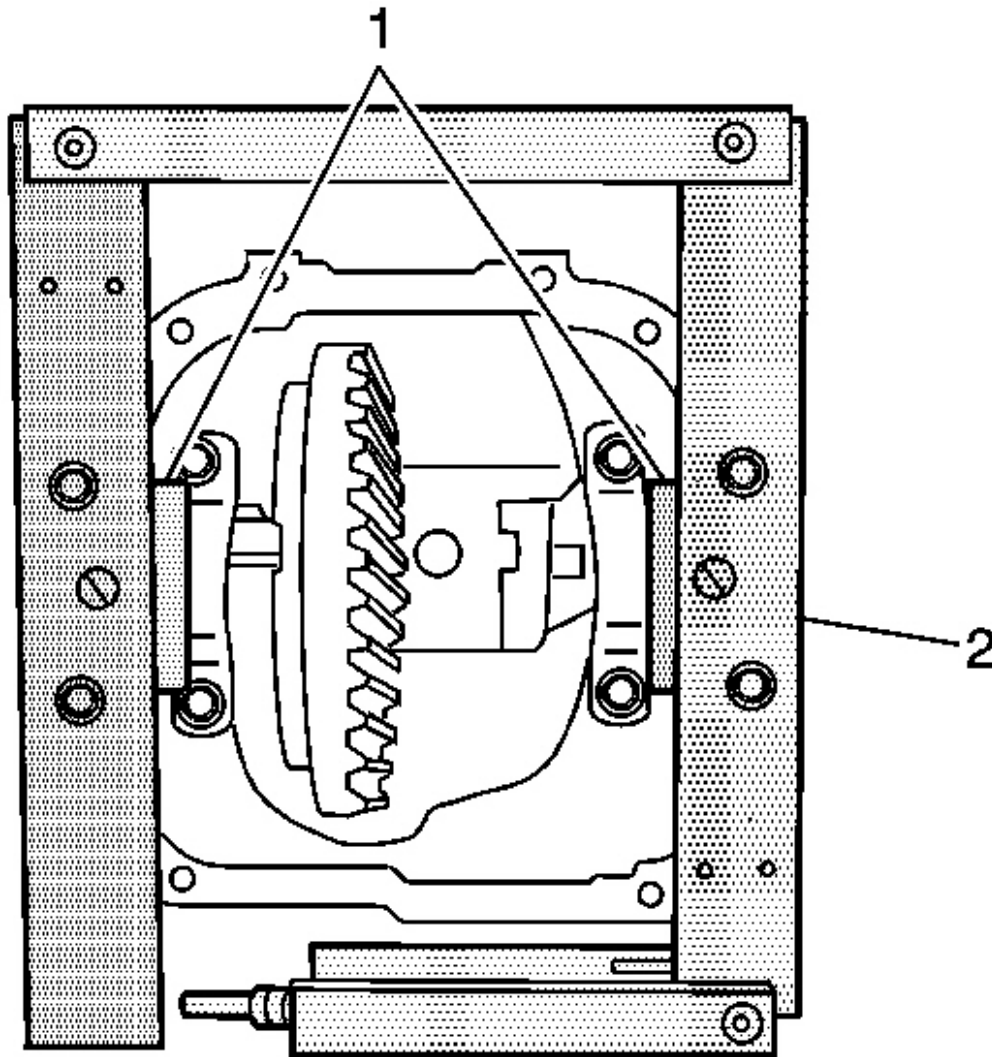


Fig. 76: View Of J-45222-10 & J 45222 Installed On Front Axle Housing
Courtesy of GENERAL MOTORS CORP.

9. Install the **J-45222-10** (1) to the front axle housing as shown. See **Special Tools**.
10. Install the **J 45222** (2) to the **J-45222-10** as shown. See **Special Tools**.

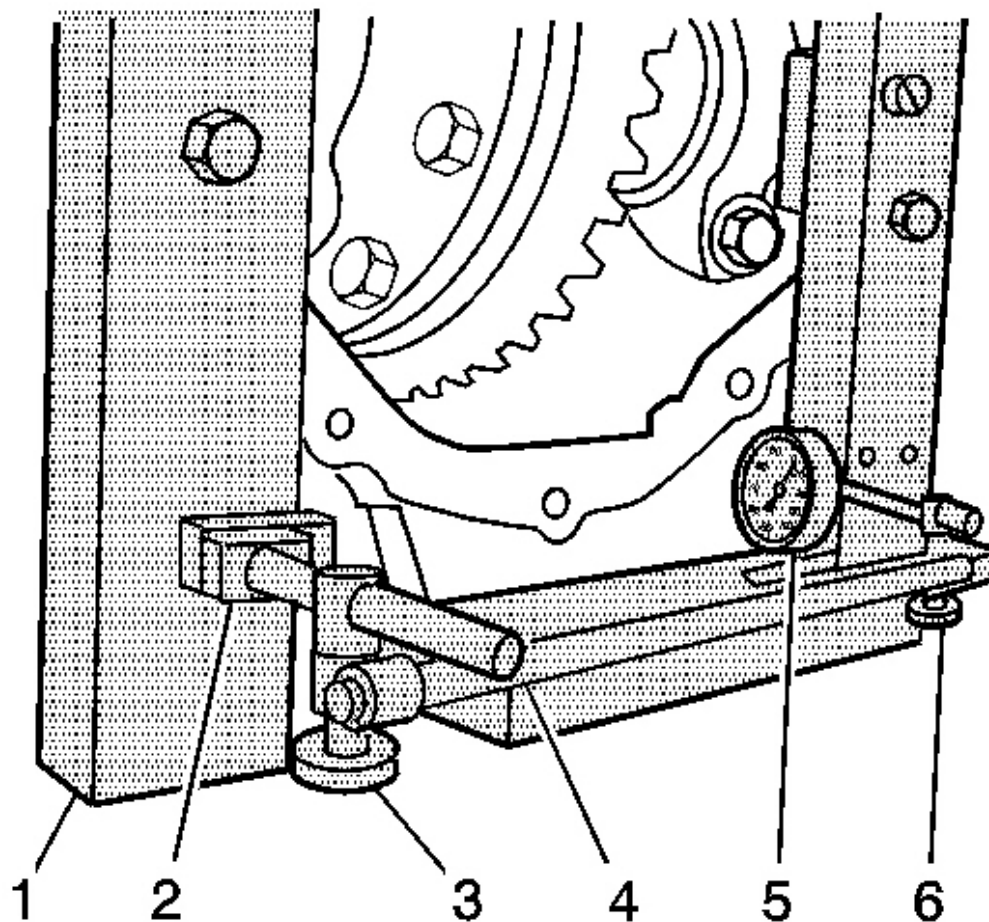


Fig. 77: View Of J 8001-1, J 8001-2, J 34178 & J 8001-3
Courtesy of GENERAL MOTORS CORP.

11. Install the **J 8001-1** (2), the **J 8001-2** (3), the **J 34178** (4, 6) and the **J 8001-3** (5) as shown. See **Special Tools**.
12. Preload the **J 8001-3** approximately 3/4 of a turn clockwise.
13. Rotate the indicator housing to align the indicator needle of the **J 8001-3** (5) and the dial indicator face to ZERO.
14. Spread the axle housing by turning the clevis screw of the **J 34178** while observing the **J 8001-3** . Spread the housing just enough to remove the differential assembly. DO NOT spread the housing more than 1.02 mm (0.040 in). See **Special Tools**.

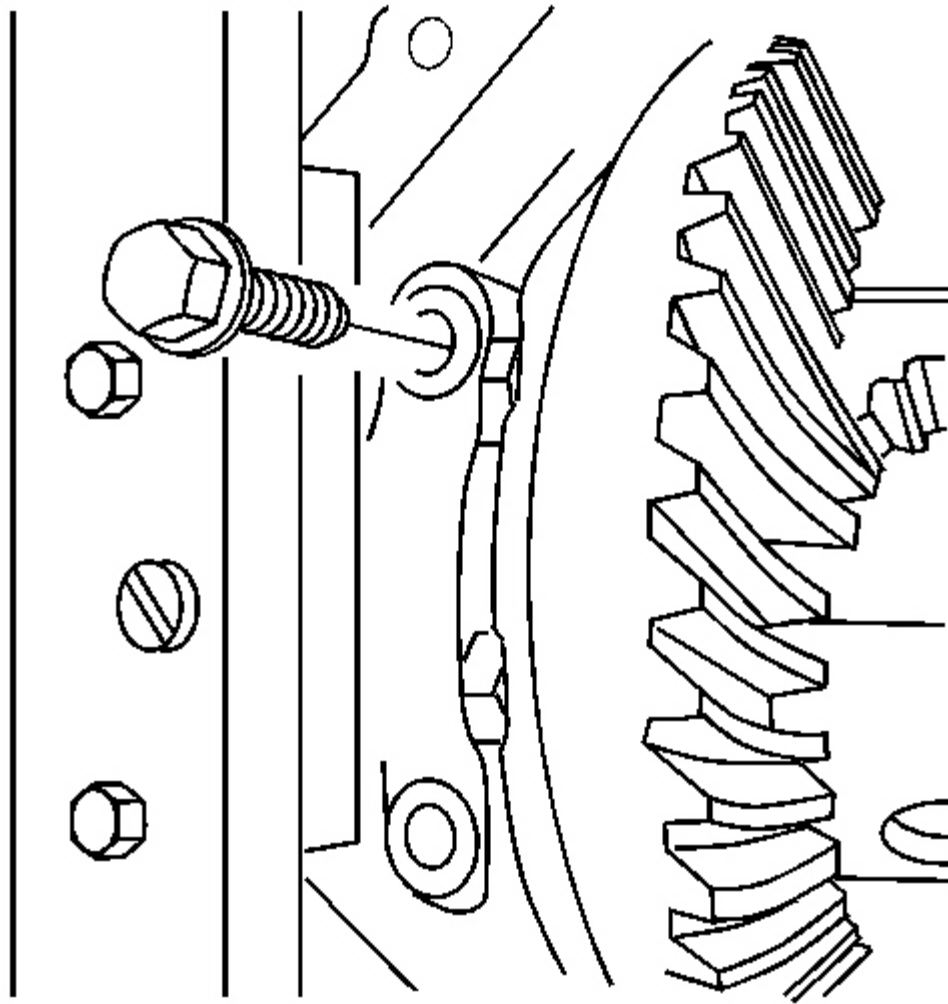


Fig. 78: View Of Bearing Cap Bolts
Courtesy of GENERAL MOTORS CORP.

15. Mark the bearing caps left and right then remove the bearing cap bolts and the bearing caps.

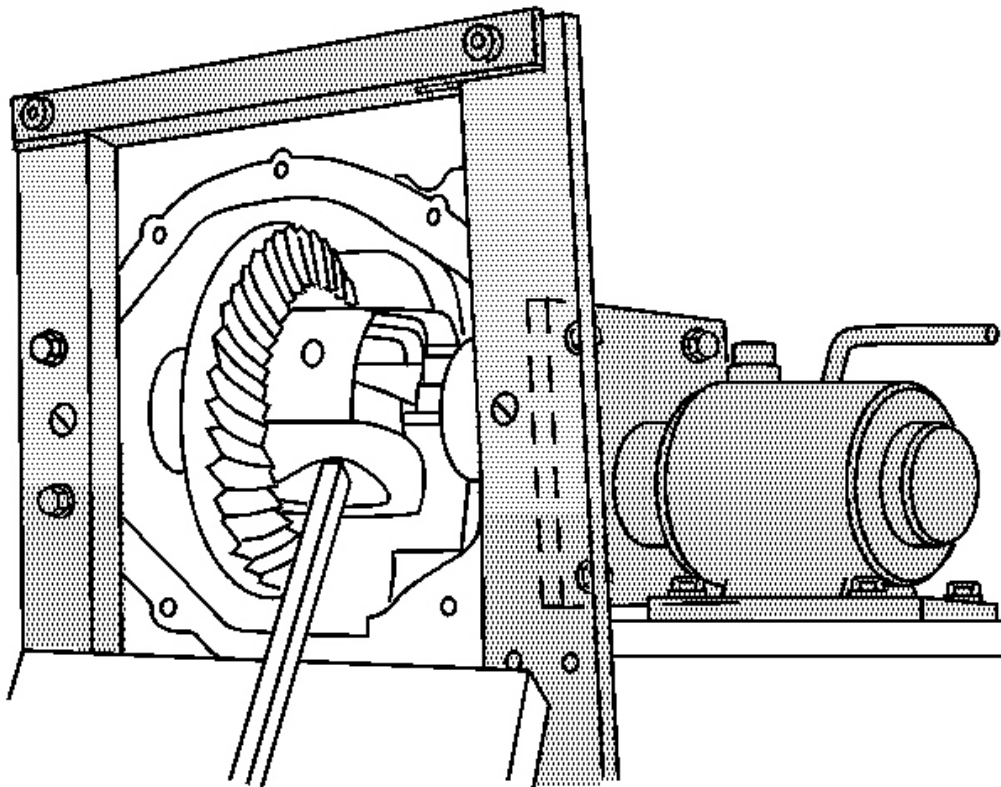


Fig. 79: Removing Differential Case From Axle Housing
Courtesy of GENERAL MOTORS CORP.

CAUTION: To prevent personal injury and/or component damage, support the differential case when removing the case from the axle housing. If the case is not supported, the differential case could fall and cause personal injury or damage to the differential case.

NOTE: When removing the differential case from the axle housing, do not damage the cover gasket surface. If the cover gasket surface is damaged, lubricant may leak from the axle and cause premature failure of the axle assembly.

16. Remove the differential case from the axle housing using a pry bar and a block of wood.

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

17. Remove the bearing cups, the shims and the spacers as necessary. Mark the cups and shims left and right and in order as necessary. Place the cups and the shims with the bearing caps.
18. Remove the **J 8001-1** , the **J 8001-2** , the **J 34178** and the **J 8001-3** . See **Special Tools**.
19. Remove the **J 45222** and the **J-45222-10** . See **Special Tools**.

Installation Procedure

1. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

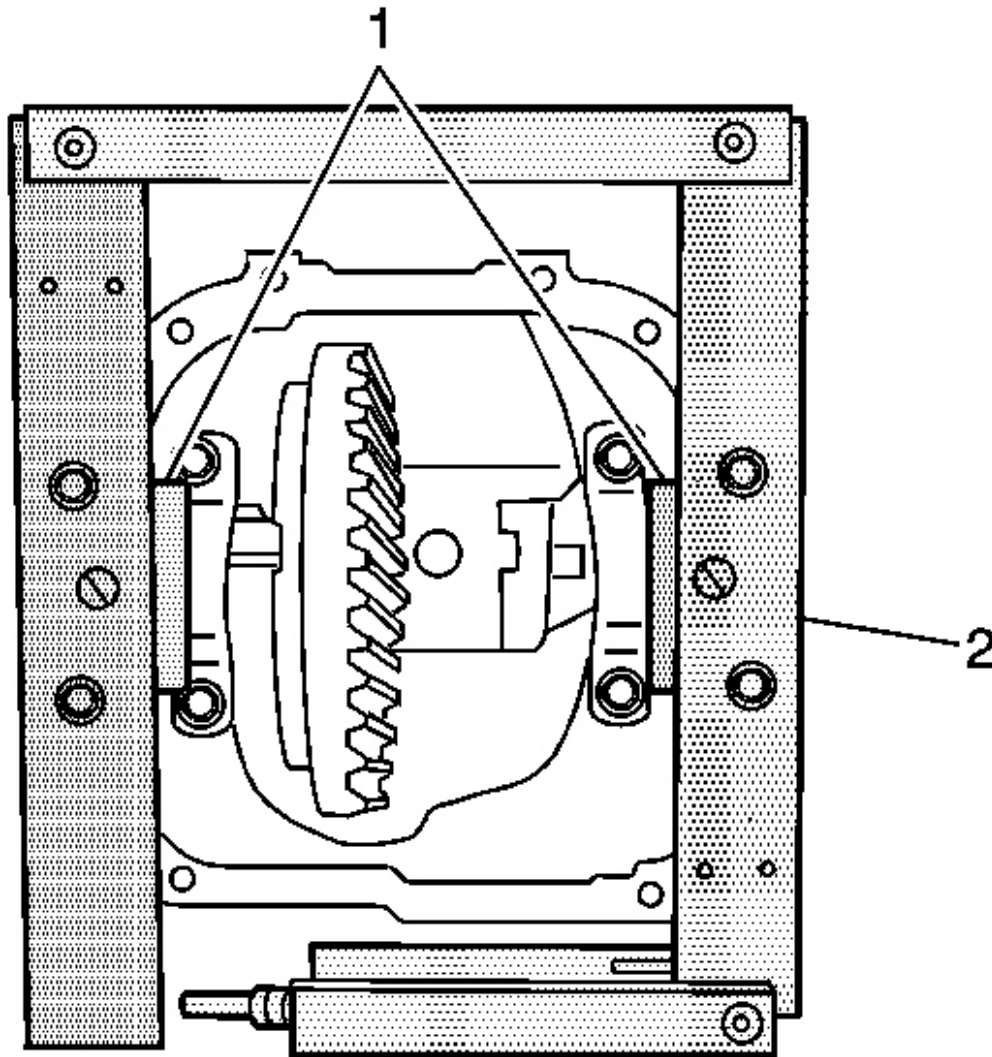


Fig. 80: View Of J-45222-10 & J 45222 Installed On Front Axle Housing
Courtesy of GENERAL MOTORS CORP.

2. Install the **J-45222-10** (1) and the **J 45222** (2) to the front axle housing as shown. See **Special Tools**.

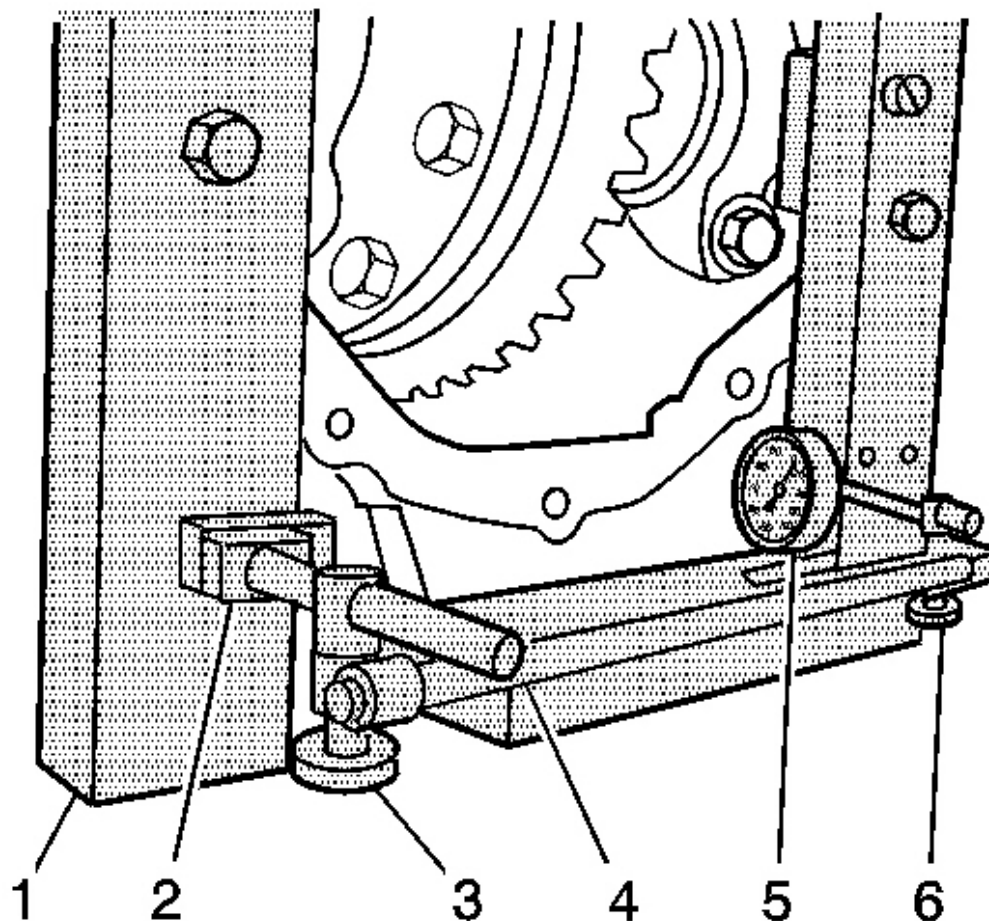


Fig. 81: View Of J 8001-1, J 8001-2, J 34178 & J 8001-3
 Courtesy of GENERAL MOTORS CORP.

3. Install the **J 8001-1** (2), the **J 8001-2** (3) the **J 34178** (4, 6) and the **J 8001-3** (5) as shown. See **Special Tools**.
4. Preload the **J 8001-3** (5) approximately 3/4 of a turn clockwise.
5. Rotate the indicator housing to align the indicator needle of the **J 8001-3** (5) and the dial indicator face to ZERO.
6. Spread the axle housing by turning the clevis screw of the **J 34178** while observing the **J 8001-3** . Spread the housing just enough to remove the differential assembly. DO NOT spread the housing more than 1.02 mm (0.040 in). See **Special Tools**.

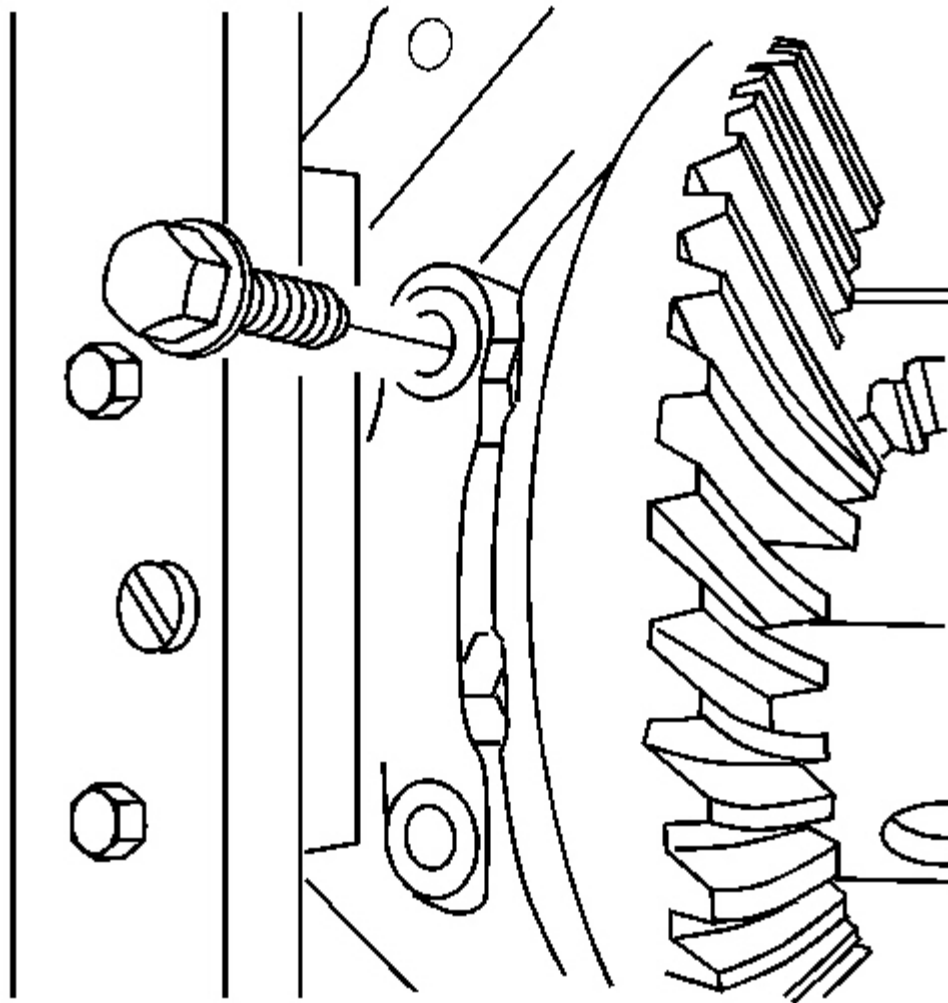


Fig. 82: View Of Bearing Cap Bolts
Courtesy of GENERAL MOTORS CORP.

7. Place the case with the bearing cups installed into the axle housing.
8. Install the bearing caps and bolts. Do not torque the bearing cap bolts at this time.
9. Adjust the differential side bearing preload. Refer to **Drive Pinion and Ring Gear Replacement**.
10. Adjust the backlash. Refer to **Backlash Inspection and Adjustment**.

11. Perform the gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

NOTE: Refer to **Fastener Notice** .

12. Tighten the bearing cap bolts.

Tighten: Tighten the bearing cap bolts to 63 N.m (46 lb ft).

13. Install the front axle housing cover gasket.
14. Install the front axle housing cover and bolts.

Tighten: Tighten the bolts to 30 N.m (22 lb ft).

15. Install the front axle shaft housing tube assembly to the front drive axle housing.
16. Install the bolts retaining the front axle shaft housing tube assembly to the front drive axle housing.

Tighten: Tighten the front axle shaft tube to axle bolts to 60 N.m (44 lb ft).

17. Remove the **J-45935** from the front drive axle housing. See **Special Tools**.
18. Install the differential carrier assembly to the vehicle. Refer to **Differential Carrier Assembly Replacement**.

DIFFERENTIAL CASE ASSEMBLY DISASSEMBLE

Tools Required

J 22888-D Side Bearing Remover Kit. See **Special Tools**.

Disassembly Procedure

1. Place the differential case in a vise.

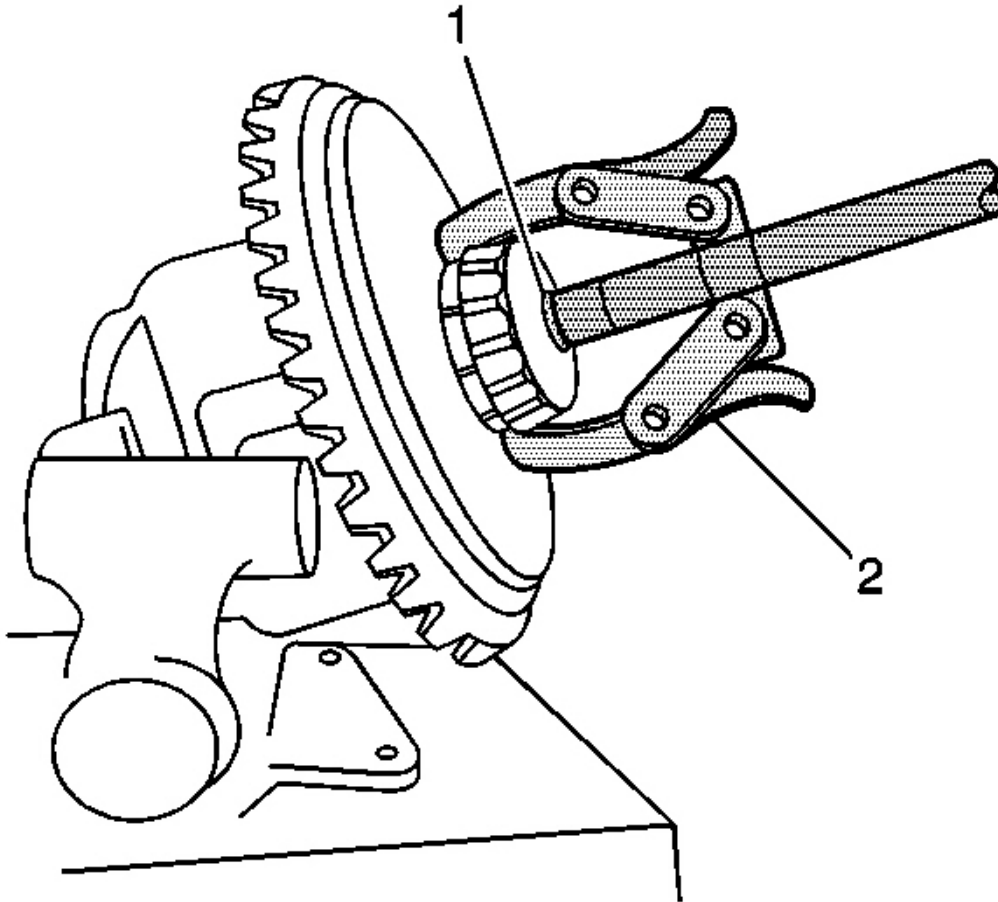


Fig. 83: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the **J 22888-20A** (2) and the **J 8107-2** (1) as shown.
3. Remove the differential side bearings using the **J 22888-20A** and the **J 8107-2** .

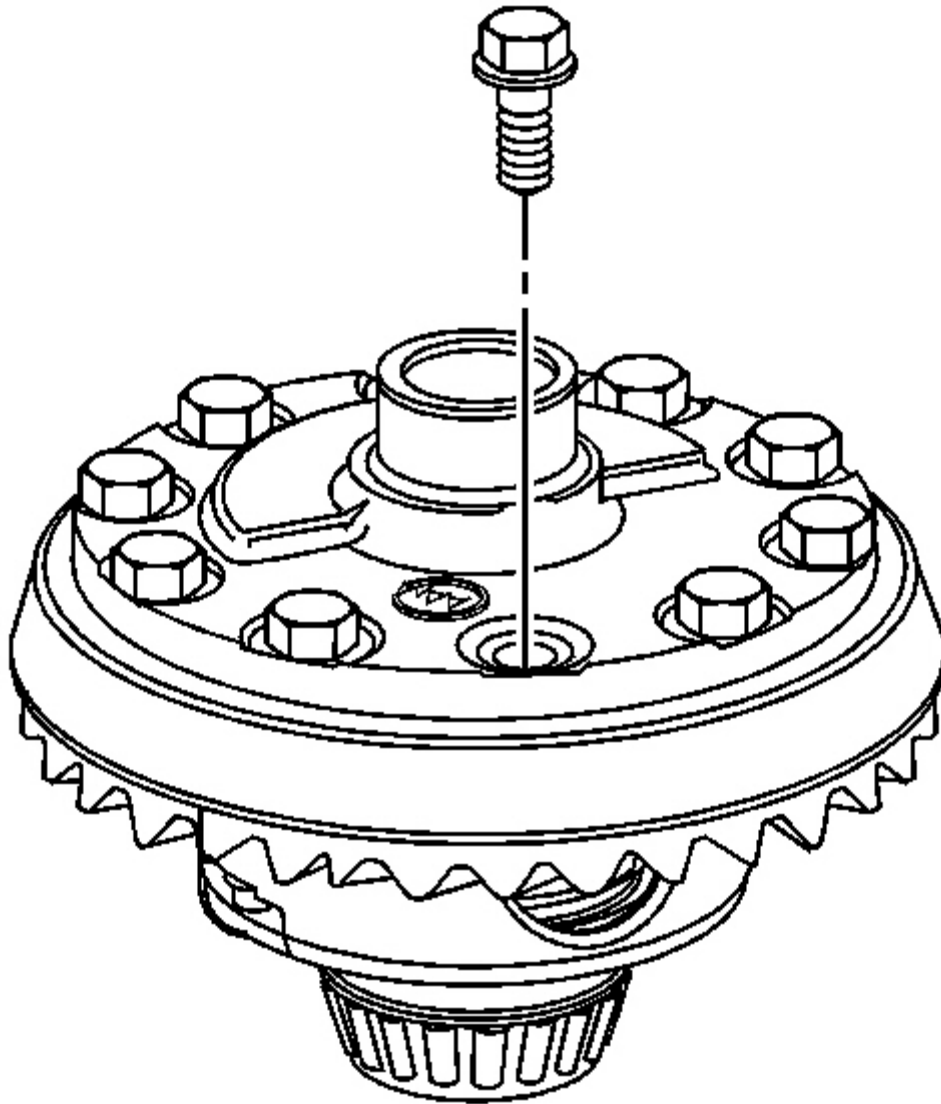


Fig. 84: View Of Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-handed threads.

4. Remove the ring gear bolts.

NOTE: Do not pry the ring gear from the differential case. Prying the ring gear from the differential case may cause damage to the ring gear and/or the differential case.

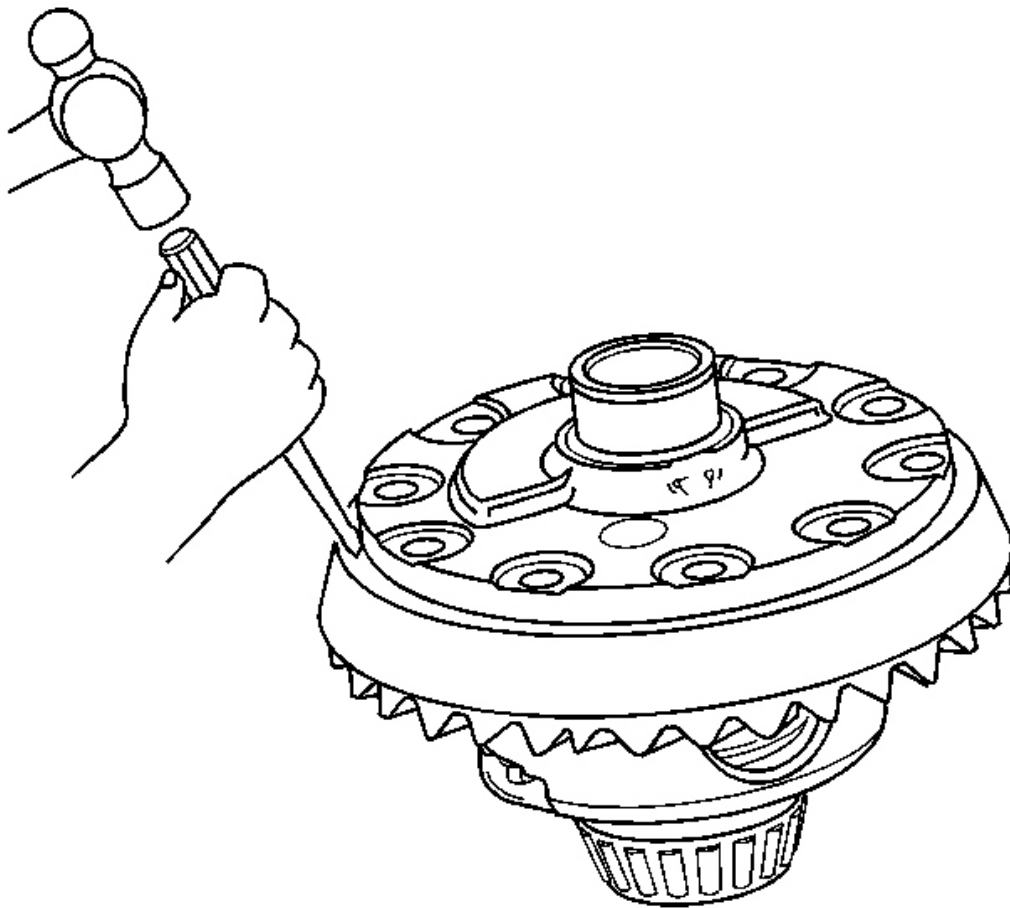


Fig. 85: Removing Ring Gear
Courtesy of GENERAL MOTORS CORP.

5. Remove the ring gear from the differential case.

Drive the ring gear off with a brass drift, if necessary.

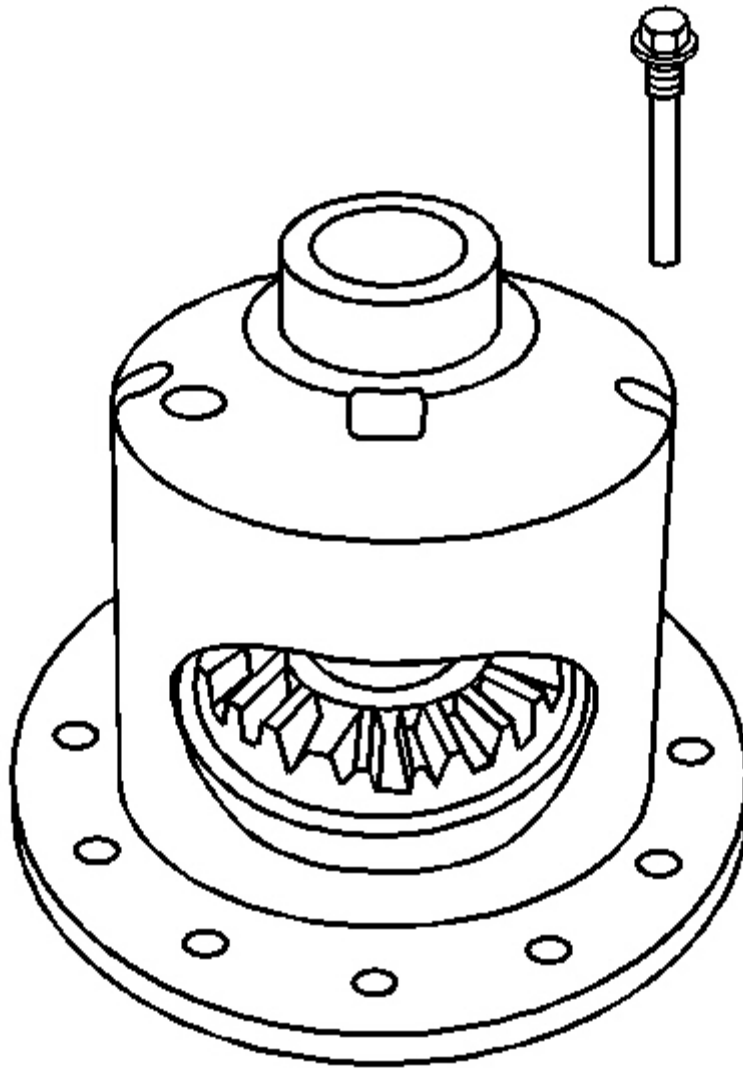


Fig. 86: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion shaft lock bolt.

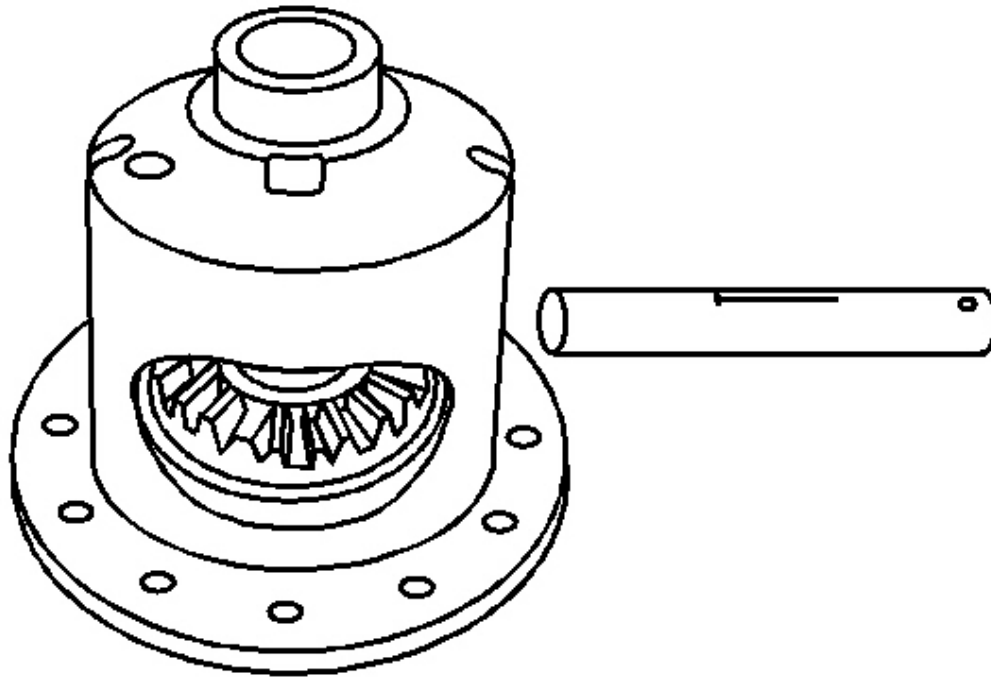


Fig. 87: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Remove the pinion shaft.

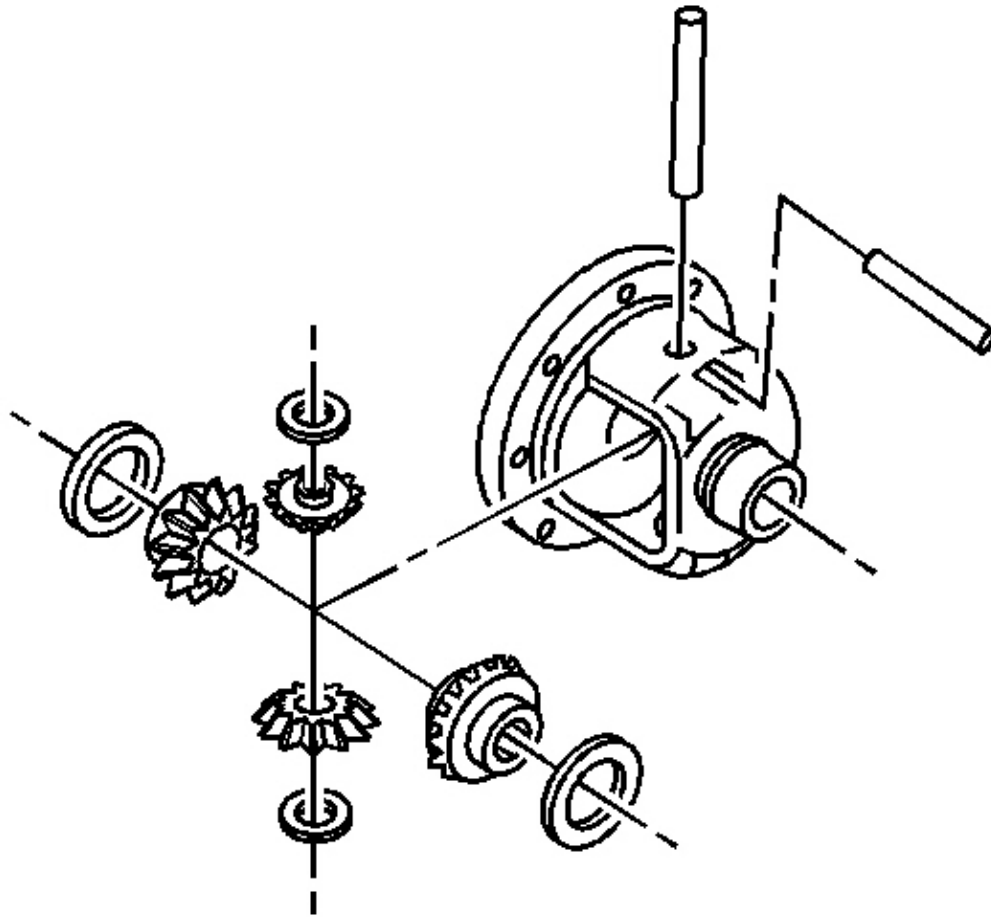


Fig. 88: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

8. Remove the differential pinion gears and the differential side gears.
 1. Mark the pinion gears top and bottom and the differential side gears left and right.
 2. Roll the differential pinion gears out of the case with the pinion thrust washers.
 3. Remove the differential side gears and the side gear thrust washers.

DIFFERENTIAL CASE BEARINGS INSPECTION

IMPORTANT: • When replacing the worn or cracked bearings and the

cups, replace the bearings in sets.

- **The low mileage bearings may have very small scratches and pits on the rollers and the bearing cups from the initial preload.**

Do not replace a bearing for this reason.

1. Inspect the bearings for smooth rotation after oiling.
2. Inspect the bearing rollers for wear.
3. Inspect the bearing cups for the following conditions:
 - Wear
 - Cracks
 - Brinelling
 - Scoring

DIFFERENTIAL CASE AND GEARS INSPECTION

1. Inspect the following components for excessive wear and/or fit:
 - The pinion gear shaft
 - The thrust washers
 - The differential case for wear, cracks and scoring
 - The fit of the pinion gear shaft in the differential case
 - The fit of the differential side gears in the differential case
 - The fit of the side gears on the axle shafts
2. Inspect the teeth of the pinion gears and the differential side gears for the following conditions:
 - Wear
 - Cracks
 - Scoring
 - Spalling
3. Replace any worn or poor fitting components as necessary.

PINION AND RING GEAR INSPECTION

1. The ring and pinion gears are matched sets and must be replaced any time a replacement of either is necessary.

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2. Inspect the pinion and the ring gear teeth for the following conditions:
 - Cracking
 - Chipping
 - Scoring
 - Excessive wear
3. Inspect the pinion gear splines for wear.
4. Inspect the pinion flange splines for wear.
5. Inspect the fit of the pinion flange on the pinion gear.
6. Inspect the sealing surface of the pinion flange for nicks, burrs or rough tool marks which will damage the inside diameter of the pinion seal and result in an oil leak.
7. Inspect all of the parts for wear and replace as necessary.

THRUST WASHERS, SHIMS AND ADJUSTER SLEEVES INSPECTION

1. Inspect the shims and the thrust washers for cracks and chips.

The damaged shims should be replaced with an equally sized service shim.

2. Inspect the adjuster sleeves for damaged threads. Replace if required.

DIFFERENTIAL CASE ASSEMBLY ASSEMBLE

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10. See **Special Tools**.
- **J 25299** Side Bearing Installer. See **Special Tools**.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

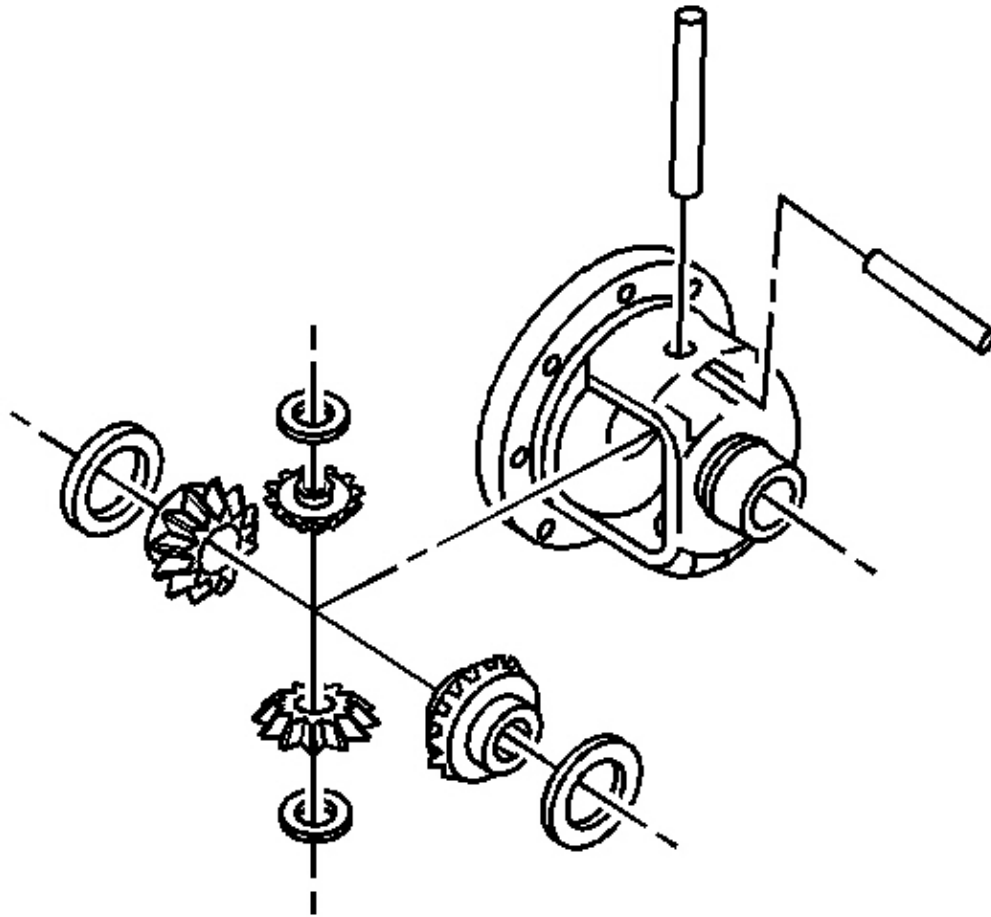


Fig. 89: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

2. Install the differential side gear thrust washers to the differential side gears.
3. Install the differential side gears and thrust washers into the differential case.

If the same differential side gears and the thrust washers are being used, install the side gears and the thrust washers to their original locations.

4. Install the differential pinion gears and thrust washers by performing the following steps:
 1. Position one pinion gear between the differential side gears.

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2. Position the second pinion gear between the differential side gear directly opposite of the first gear.
3. Rotate the differential side gears until the pinion gears are directly opposite the opening in the differential case.
4. Install the thrust washers.

Rotate the pinion gears toward the differential case opening in order to permit the sliding in of the thrust washers.

5. Install the pinion gear shaft.

NOTE: Refer to Fastener Notice .

6. Install the new pinion gear shaft lock bolt.

Tighten: Tighten the new pinion shaft lock bolt to 25 N.m (18 lb ft).

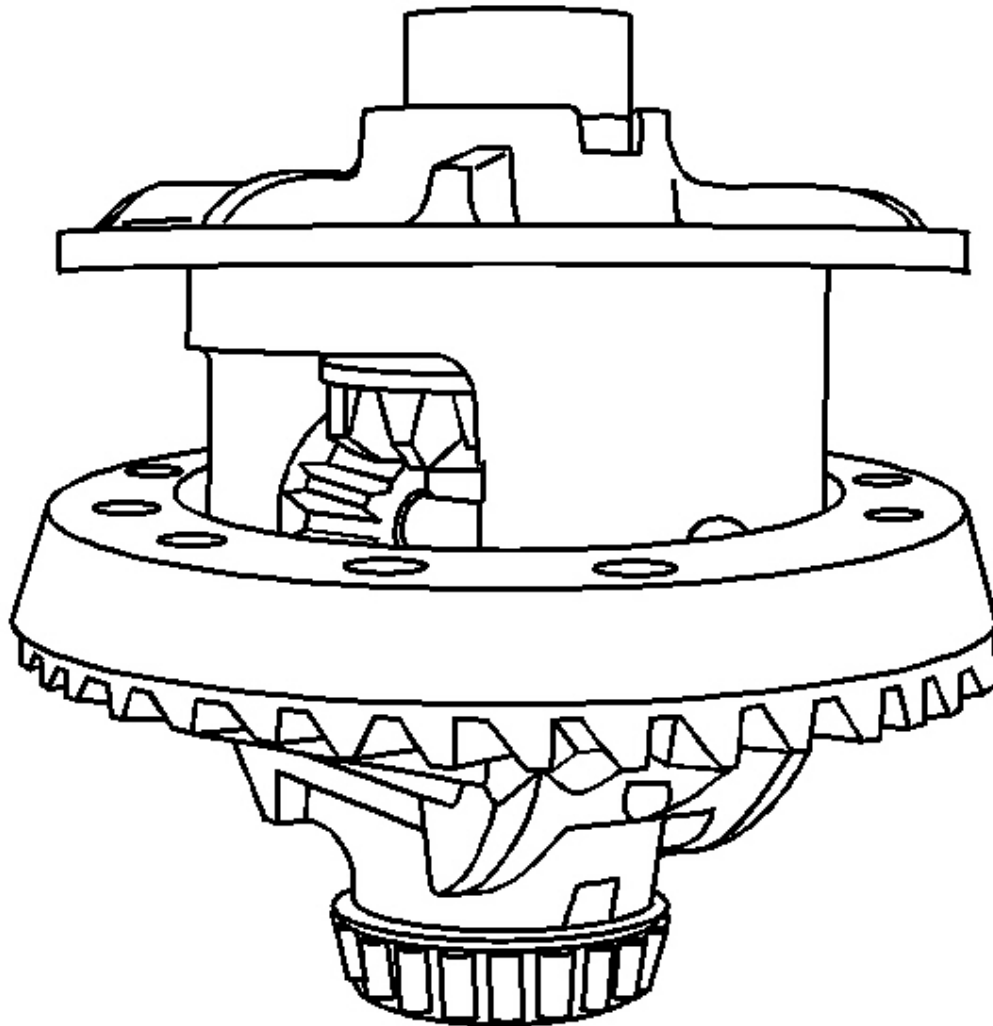


Fig. 90: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

7. Install the ring gear onto the differential case.

IMPORTANT: The ring gear bolts have left-hand threads.

8. Install the new ring gear bolts.

Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

9. Tighten the ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

Tighten: Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

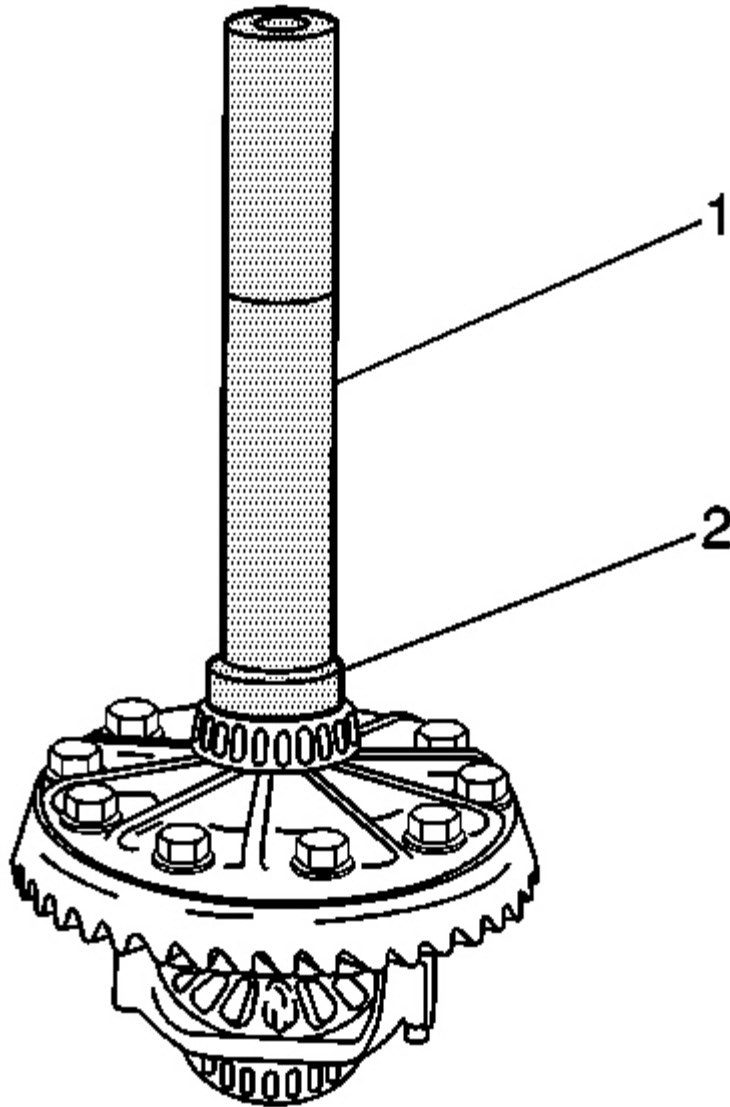


Fig. 91: Installing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

10. Install the differential side bearings by performing the following steps:
 1. In order to protect the differential case, install the **J 8107-2** in the case on the side opposite the bearing installation.

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2. Install the **J 25299** (2) and the **J 8092** (1) onto the differential case bearing as shown. See **Special Tools**.
3. Install the differential case bearings using the **J 33790** and the **J 8092** . See **Special Tools**.

PINION DEPTH ADJUSTMENT

Tools Required

- **J 8001** Dial Indicator Set. See **Special Tools**.
- **J 34925** Pinion Setting Gage and Components. See **Special Tools**.

Adjustment Procedure

IMPORTANT: Make sure all of the tools, the differential side bearing bores and the pinion bearing cups are clean before proceeding.

1. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** .
2. Install the pinion bearings into the axle housing.

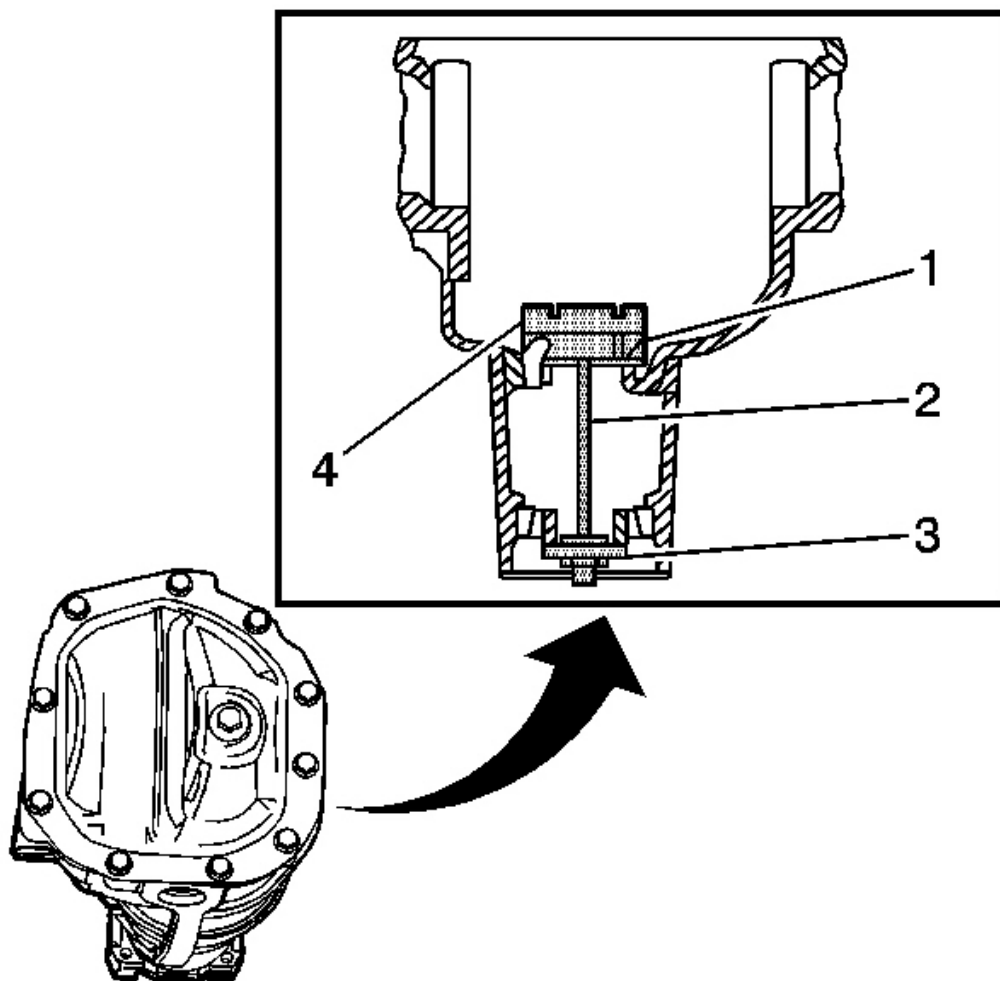


Fig. 92: Assembling J 21777-35, J 21777-43, J 21777-42 & J 23597-11
Courtesy of GENERAL MOTORS CORP.

3. Assemble the J 21777-40 (1), the J 21777-43 (2), the J 21777-42 (3) and the J 23597-11 (4) into the axle housing as shown.

NOTE: Refer to Fastener Notice .

4. While holding the J 21777-43 stationary, install an inch-pound torque wrench on the nut of the J 21777-43 .

Tighten: Tighten the nut on the **J 21777-43** until a rotating torque of 1.7-2.8 N.m (15-25 lb in) is obtained.

5. Rotate the assembly several times in both directions in order to seat the pinion bearings.
6. Check the rotating torque of the assembly. If the torque is less than 1.7 N.m (15 lb in), continue to tighten the nut on the **J 21777-43** until a rotating torque of 1.7-2.8 N.m (15-25 lb in) is obtained.

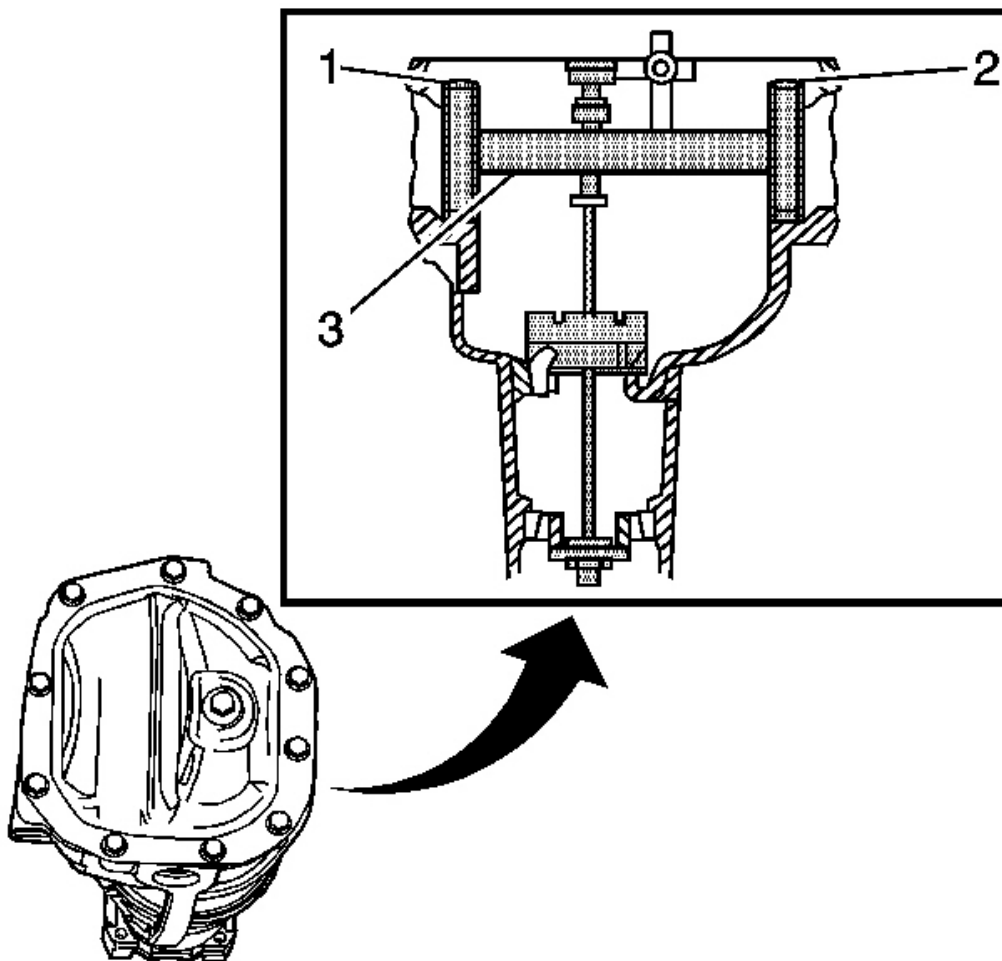


Fig. 93: Assembling J 21777-45 & J 21777-1
Courtesy of GENERAL MOTORS CORP.

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7. Assemble the **J 21777-45** (1, 2) to the J 23597-1 (3) as shown.
8. Rotate the J 23597-1 within the **J 21777-45** . The J 23597-1 must rotate back and forth freely within the discs. If the J 23597-1 does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

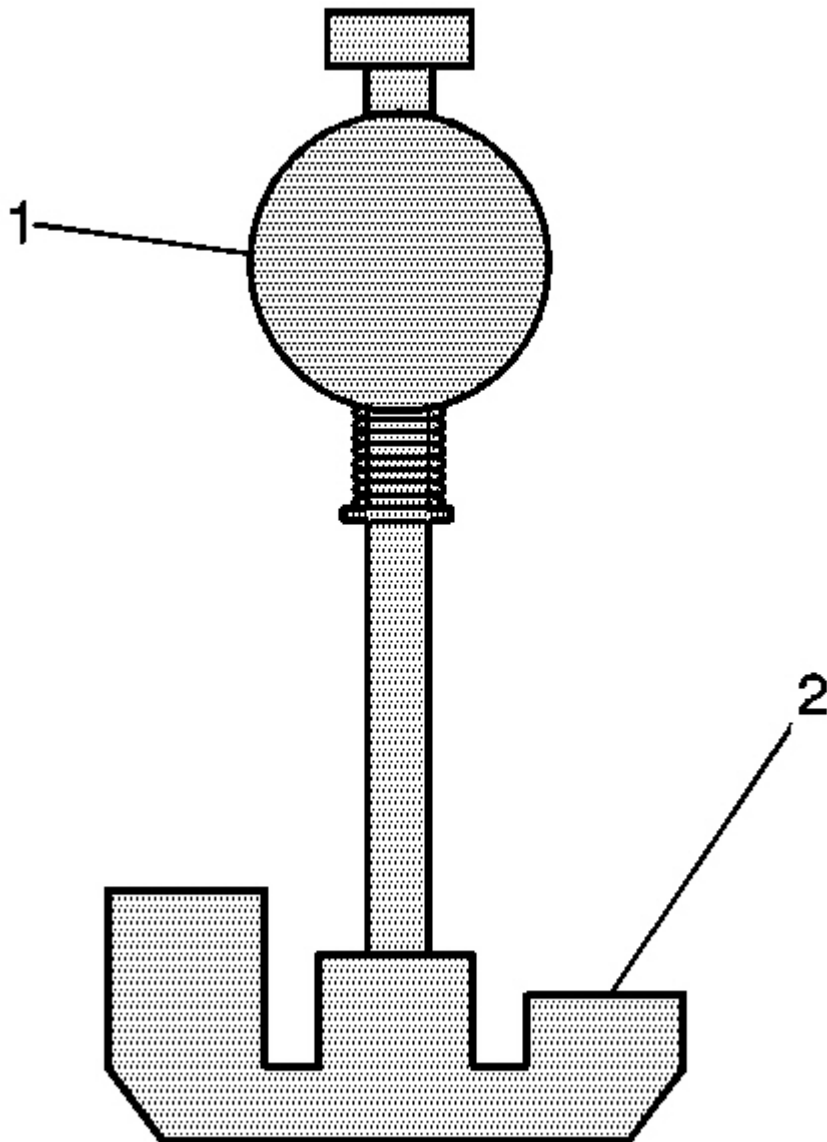


Fig. 94: Identifying J 21777-1 & J 44416-3
Courtesy of GENERAL MOTORS CORP.

9. Align the plunger of the J 23597-1 (1) to the J 23597-11 (2).
10. Install the **J 8001** to the J 23597-1 as follows:
 1. Loosely clamp the **J 8001** onto the stem on the J 23597-1. See **Special Tools**.
 2. Place the contact pad of the **J 8001** onto the mounting post of the J 23597-1. See **Special Tools**.
 3. With the contact pad of the **J 8001** touching the mounting post of the J 23597-1, loosen the lock nut on the **J 8001** and push down on the **J 8001** until the needle the **J 8001** has turned 3/4 of a turn clockwise. See **Special Tools**.
 4. Tighten the clamp on the **J 8001** finger tight. See **Special Tools**.
11. Move the plunger of the J 23597-1 back and forth until the needle of the **J 8001** indicates the greatest deflection. See **Special Tools**.

The deflection is the point where the needle changes direction.

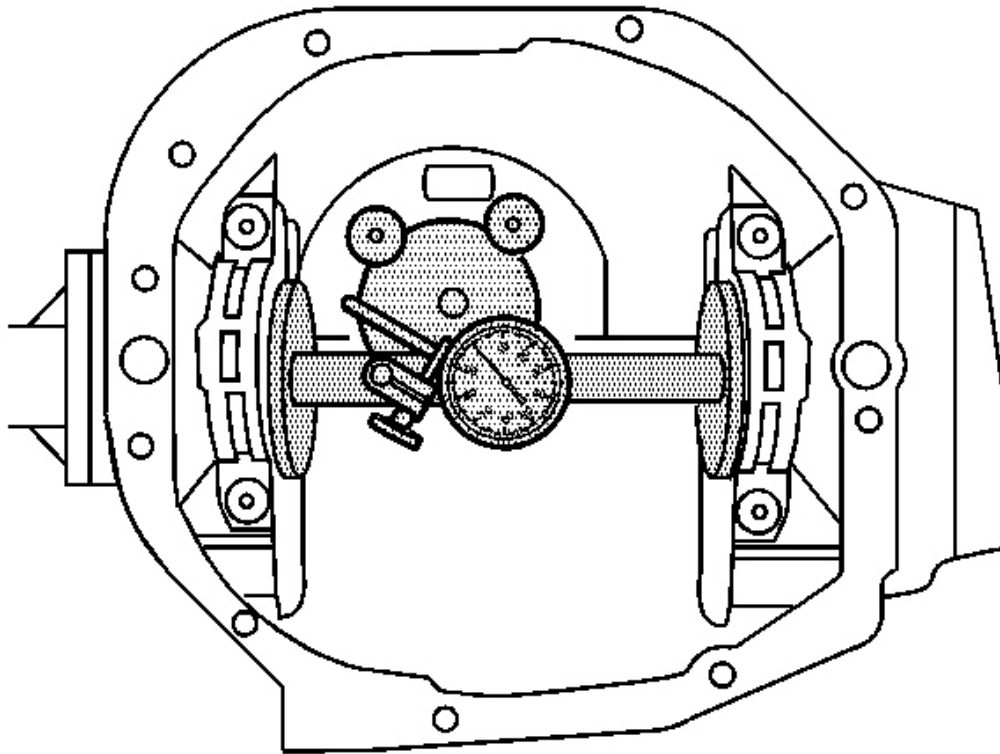


Fig. 95: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS CORP.

12. At the greatest point of deflection, move the housing of the **J 8001** until the needle indicates ZERO. See **Special Tools**.
13. Move the plunger of the J 23597-1 back and forth again to verify the zero setting. Adjust the housing of the **J 8001** as necessary to set the needle to zero. See **Special Tools**.
14. Rotate the plunger of the J 23597-1 away from the J 23597-11 until it no longer touches the J 23597-11 or the J 21777-29.
15. The value indicated on the **J 8001** is the thickness of the shim needed in order to set the depth of the pinion. See **Special Tools**.
16. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
17. Remove the pinion depth setting tools.

18. Remove the pinion bearings.
19. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Drive Pinion Bearings Replacement** .

BACKLASH INSPECTION AND ADJUSTMENT

Tools Required

- **J 8001** Dial Indicator Set. See **Special Tools**.
- **J 25025** Guide Pins. See **Special Tools**.
- **J 25588** Side Bearing Shim Installer. See **Special Tools**.

Adjustment Procedure

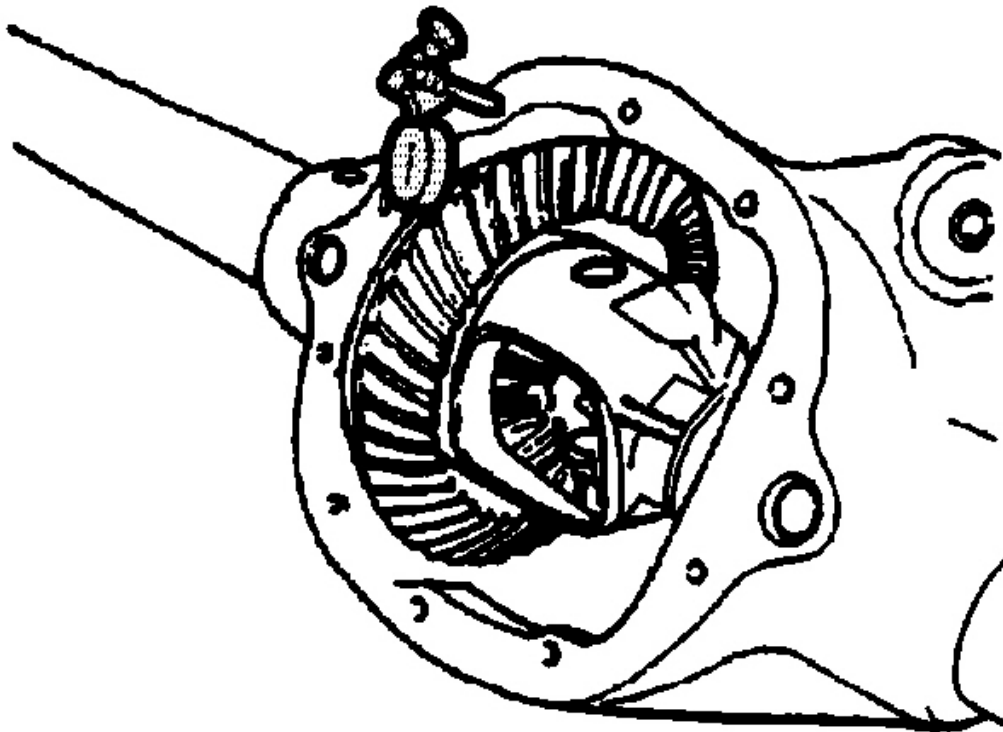


Fig. 96: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

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1. Install the **J 25025-1** and the **J 8001** to the axle housing as shown. See **Special Tools**.
2. Place the indicator stem of the **J 8001-3** at the heel end of a gear tooth.
3. Set the **J 8001-3** so that the stem is aligned with the gear rotation and perpendicular to the tooth angle.
4. Preload the dial of the **J 8001-3**.

Align the needle and the dial face of the **J 8001-3** to ZERO.

5. While holding the drive pinion stationary, move the ring gear back and forth.

Measure and record the backlash.

6. Repeat the measuring procedure at eight points around the ring gear.

Specification: The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).

7. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for the following conditions:
 - Burrs
 - A distorted case flange
 - Uneven bolting
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be:

Specification: The backlash between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

IMPORTANT:

- **Do not use the original cast iron production shims to adjust the backlash. Use service shims and spacers instead.**
- **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).**

9. If the backlash is too small, increase the backlash using the following procedure:

1. Remove the bearing cap bolts and the bearing caps.

Mark the bearing caps left or right.

2. Remove the differential case assembly with the bearing cups and the shims.

Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

Measure the production shim or the shim and service spacer in 3 locations.

Measure each shim separately.

4. Calculate the average of the 3 measurements for each shim.

Add the average of each of the shim measurements together.

Record the measurement. This is the thickness for the left side shim pack.

5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness from the left side shim pack.

6. Measure the thickness of right side shim pack.

Measure the shim or the shim and service spacer in 3 locations.

Measure each shim separately.

7. Calculate the average of the 3 measurements for each shim.

Add the average of each of the shim measurements together.

Record the measurement. This is the thickness for the right side shim pack.

8. Assemble a new right side shim pack by increasing the appropriate amount of thickness to 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 shims. For example, to

increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the right side shim pack.

10. If the backlash is too large, decrease the backlash using the following procedure:

1. Remove the bearing cap bolts and the bearing caps.

Mark the bearing caps left or right.

2. Remove the differential case assembly with the bearing cups and the shims.

Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

Measure the production shim or the shim and service spacer in 3 locations.

Measure each shim separately.

4. Calculate the average of the 3 measurements for each shim.

Add the average of each of the shim measurements together.

Record the measurement. This is the thickness for the left side shim pack.

5. Assemble a new left side shim pack by increasing the appropriate amount of thickness to the original left side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the left side shim pack.

6. Measure the thickness of right side shim pack.

Measure the shim or the shim and service spacer in 3 locations.

Measure each shim separately.

7. Calculate the average of the 3 measurements for each shim.

Add the average of each of the shim measurements together.

Record the measurement. This is the thickness for the right side shim pack.

8. Assemble a new right side shim pack by decreasing the appropriate amount of

thickness to 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 shims. For example, to decrease the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness to the right side shim pack.

11. Install the differential case assembly with the bearing cups.
12. Install the left side service spacer between the axle housing and the differential case.
13. Install the right side service spacer between the axle housing and the differential case.

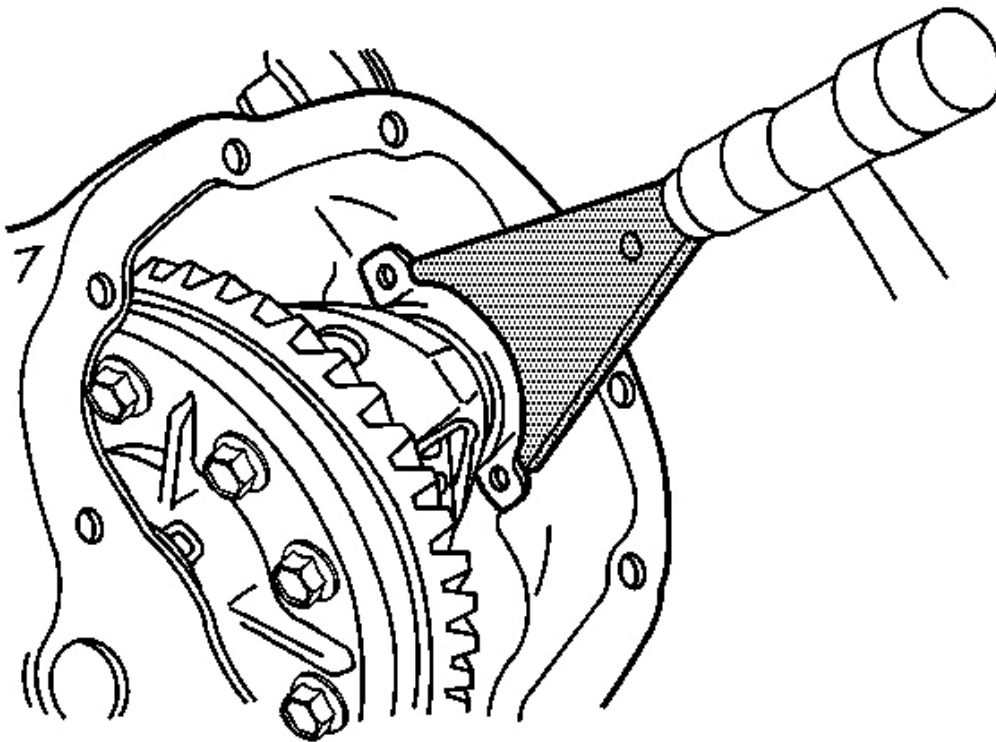


Fig. 97: Installing The Left Side Service Shim Using J 25588
Courtesy of GENERAL MOTORS CORP.

14. Install the left side service shim using the **J 25588** , if necessary. See **Special Tools**.

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

15. Install the right side service shim using the **J 25588** , if necessary. See **Special Tools**.

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

NOTE: Refer to **Fastener Notice** .

16. Install the bearing caps and bolts.

Tighten: Tighten the bolts to 63 N.m (46 lb ft).

17. Recheck the backlash and adjust, if necessary.

18. 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

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 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

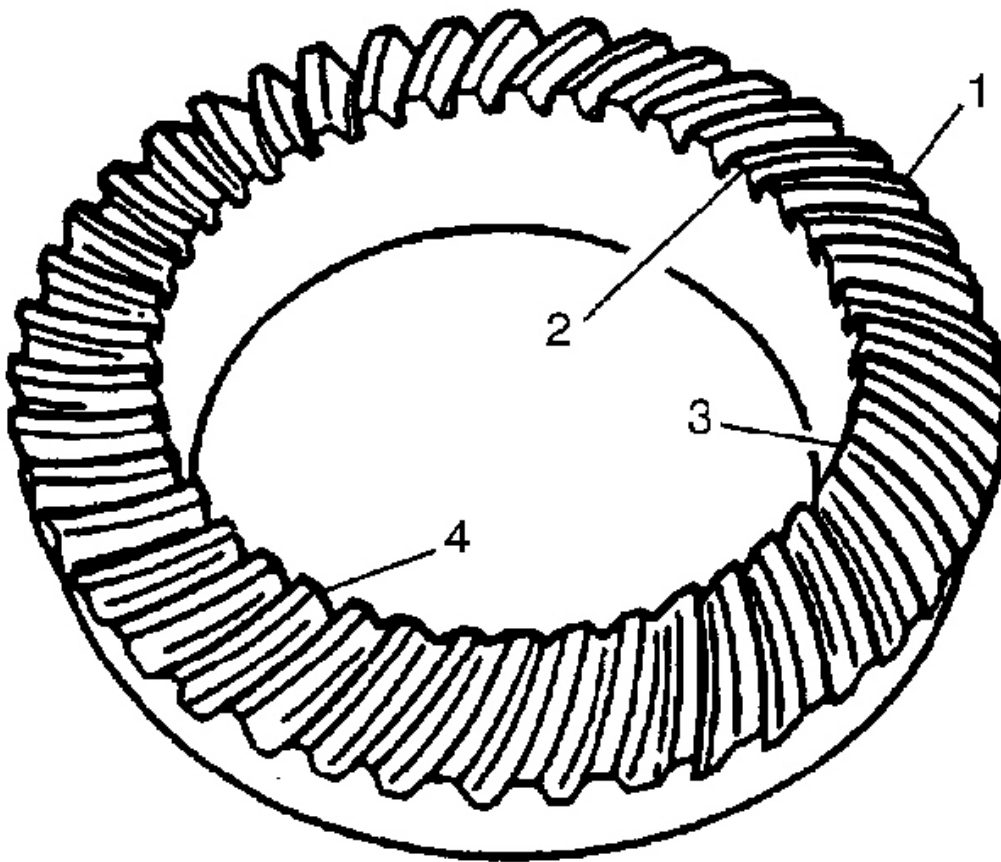


Fig. 98: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS CORP.

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

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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.

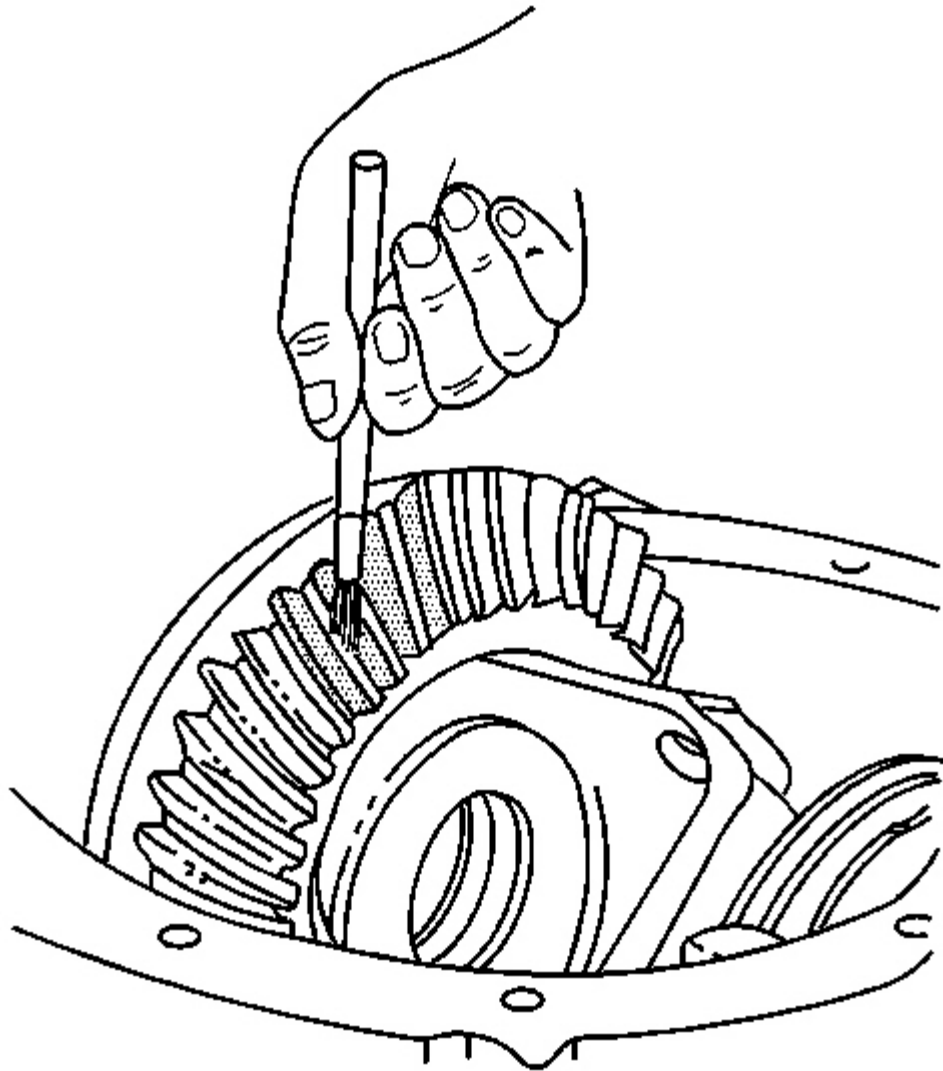


Fig. 99: Applying Gear Marking Compound To Ring Gear Teeth
Courtesy of GENERAL MOTORS CORP.

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: Avoid turning the ring gear excessively.

4. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates 3 full revolutions.
5. Turn the drive pinion flange/yoke in the opposite direction so that the ring gear rotates 3 full revolutions in the opposite direction.
6. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.

Correct Contact Pattern

Condition

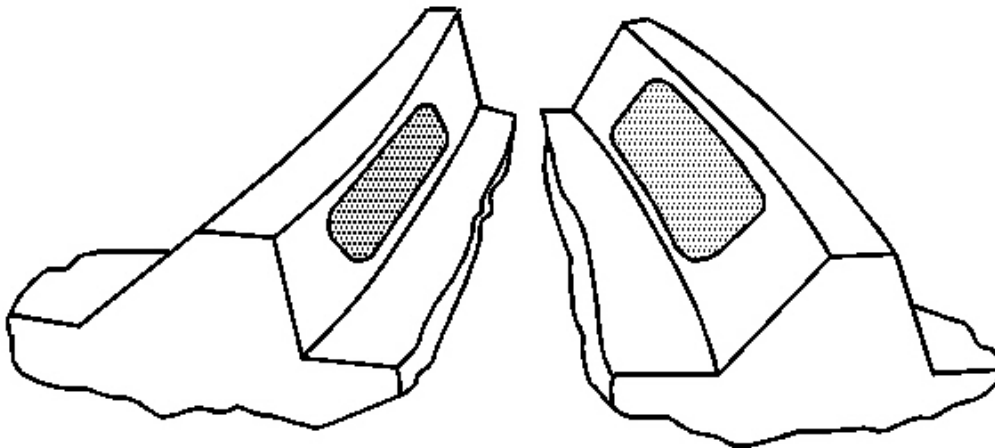


Fig. 100: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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

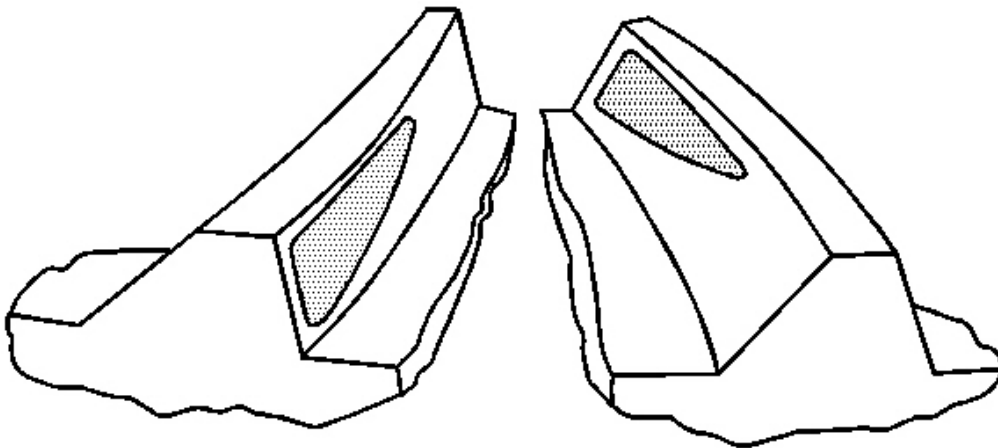


Fig. 101: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 Inspection and Adjustment**.

Drive Side Toe - Coast Side Heel Contact Pattern

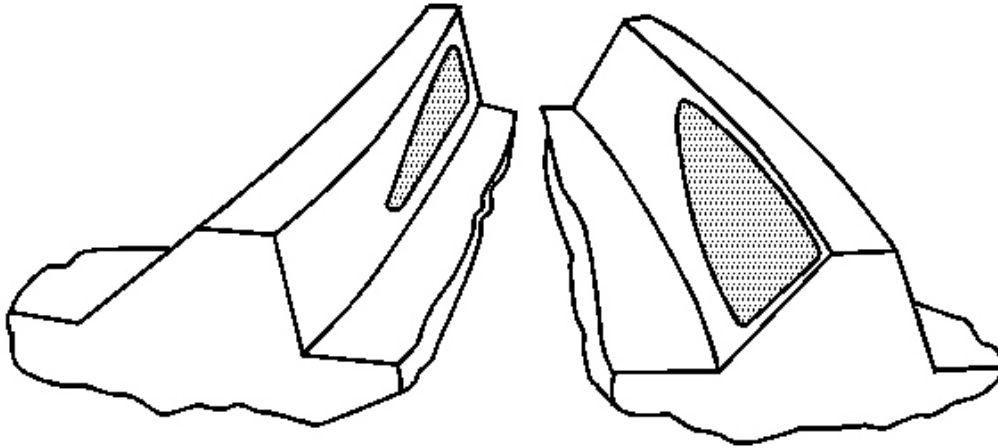


Fig. 102: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 Inspection and Adjustment**.

Drive Side Heel - Coast Side Heel Contact Pattern

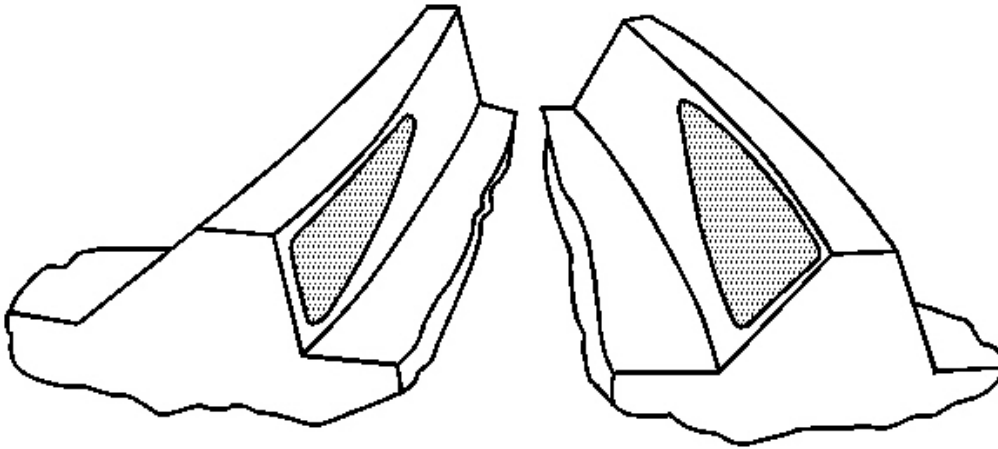


Fig. 103: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 Inspection and Adjustment**.

Drive Side Toe - Coast Side Toe Contact Pattern

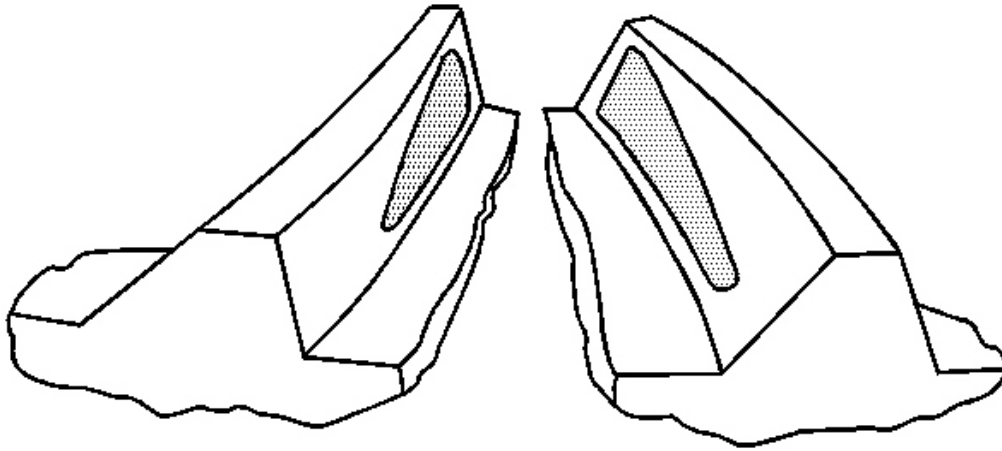


Fig. 104: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 Inspection and Adjustment**.

High Flank Contact Pattern

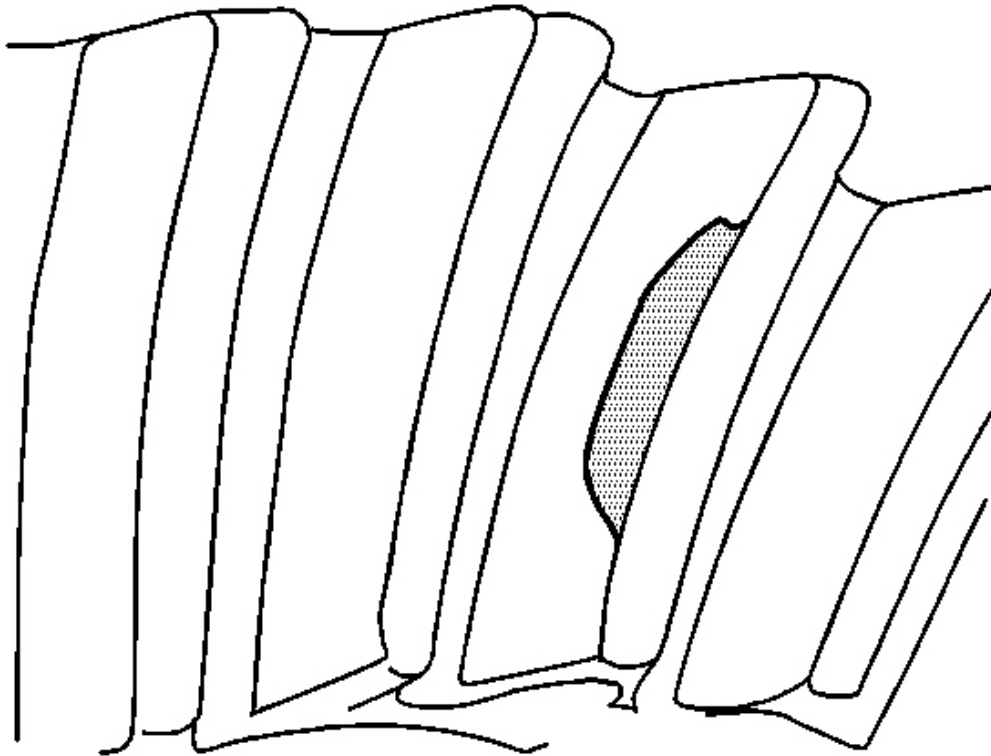


Fig. 105: Identifying High Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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

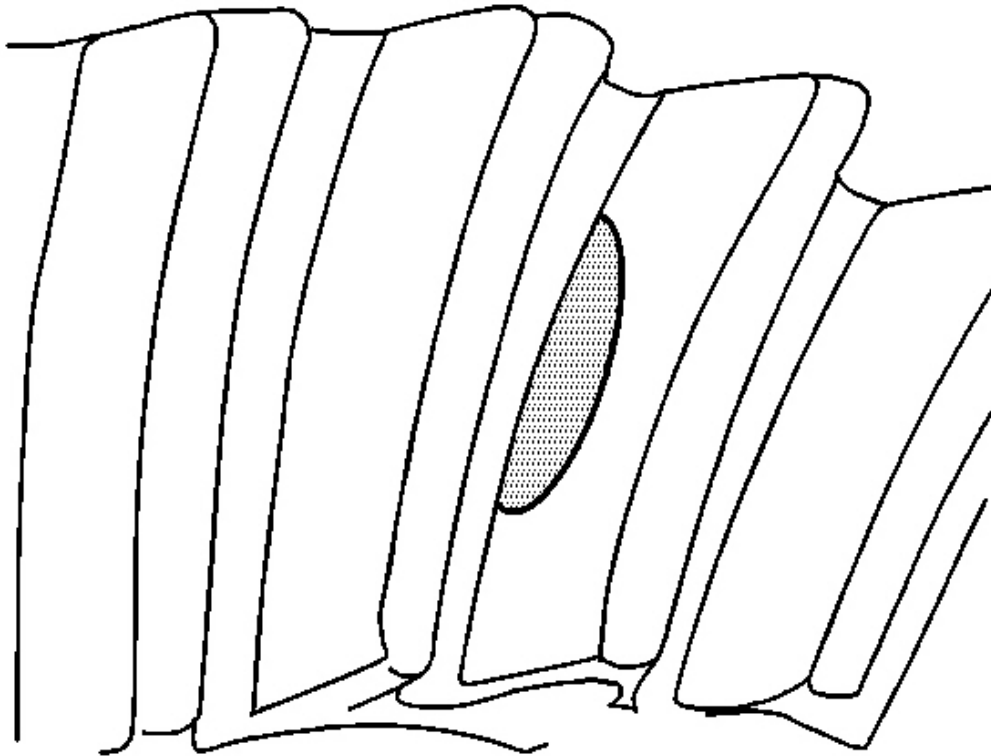


Fig. 106: Identifying Low Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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**.

DESCRIPTION AND OPERATION

FRONT DRIVE AXLE DESCRIPTION AND OPERATION

The Front Drive Axle consist of the following components:

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2007 Driveline/Axle Front Drive Axle - H3

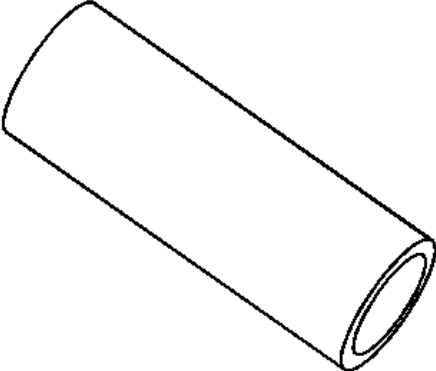
- Differential Carrier Housing
- Differential Assembly
- Intermediate Shaft
- Intermediate Shaft Housing
- Electric Motor Actuator
- Shift Fork/Clutch Assembly

The front axle on four wheel drive model vehicles has a central disconnect feature. The axle uses a conventional ring and pinion gear set in order to transmit the driving force of the engine to the wheels. The open differential allows the wheels to turn at different rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within the carrier. The axle identification number on top of the differential carrier assembly or on a label on the right half of differential carrier assembly. The drive axles are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

SPECIAL TOOLS AND EQUIPMENT

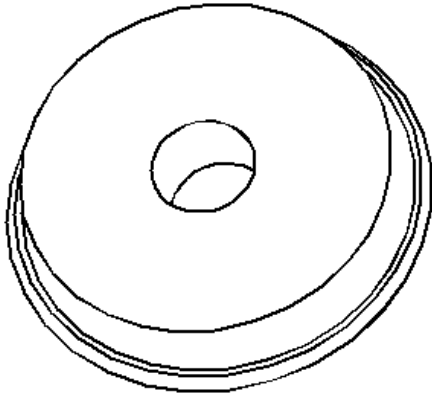
SPECIAL TOOLS

Special Tools

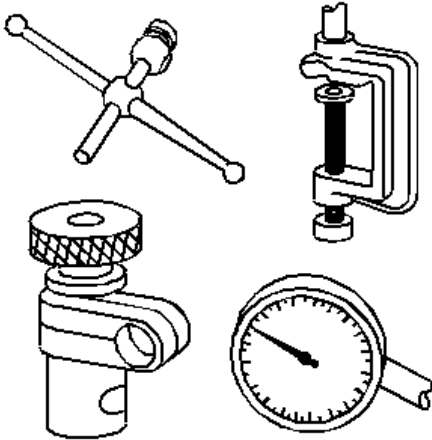
Illustration	Tool Number/Description
	J 5590 Pinion Bearing Race Installer - Rear

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



J 7817
Outer Bearing Race Installer

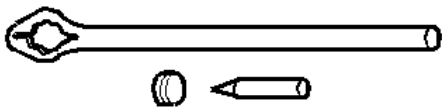
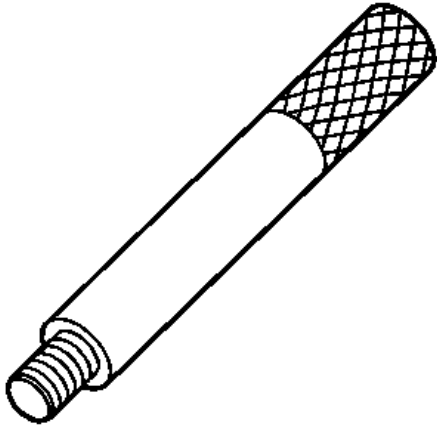


J 8001
Dial Indicator Set

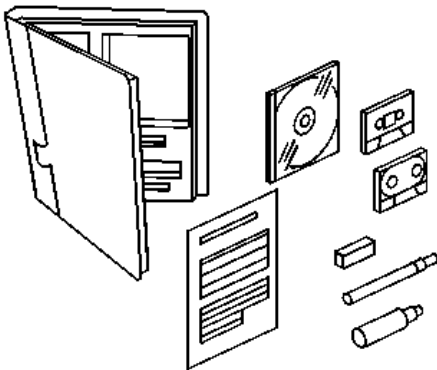
J 8092
Driver Handle

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



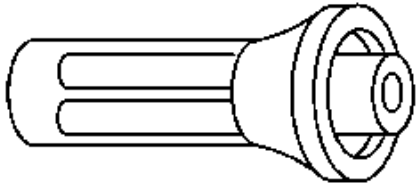
J 8614-01
Flange and Pulley Holding Tool



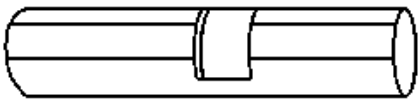
J 21128
Axle Pinion Oil Seal Installer

2007 Hummer H3

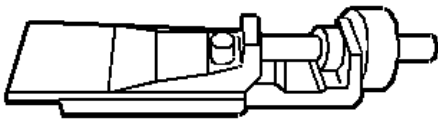
2007 Driveline/Axle Front Drive Axle - H3



J 21426
Extension Housing Seal Installer



J 22536
Pinion Driver

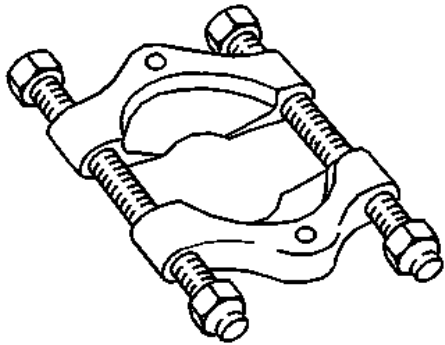
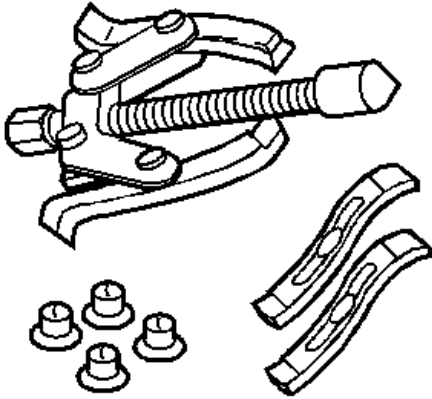


J 22779
Side Bearing Backlash Gage

J 22888-D
Side Bearing Remover Kit

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

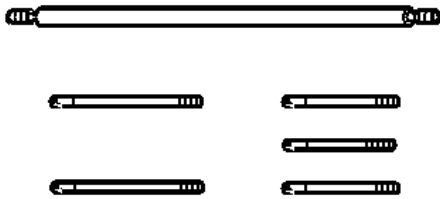
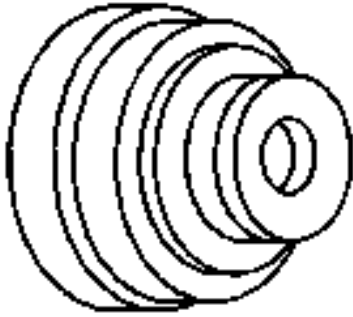


J 22912-01
Rear Pinion and Axle Bearing Remover

J 23690
Bearing Installer

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

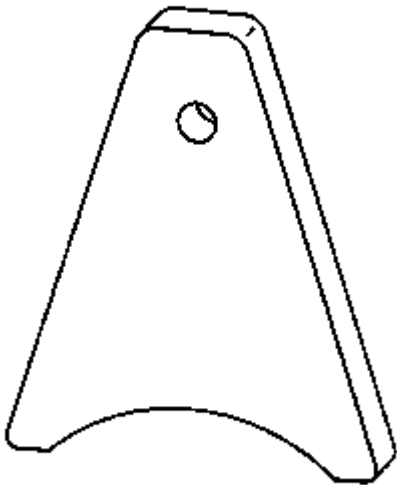
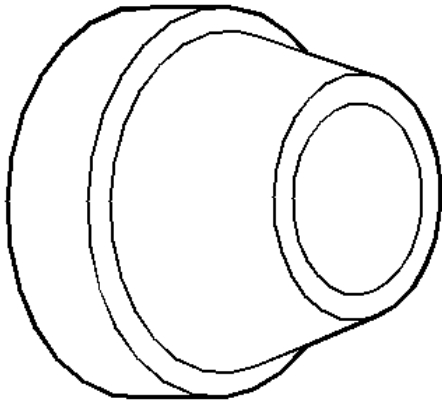


J 25025
Guide Pins

J 25299
Side Bearing Installer

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

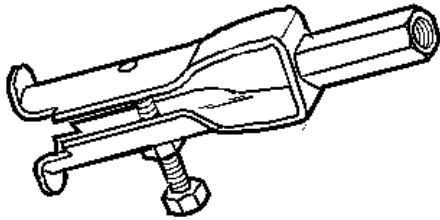


J 25588
Side Bearing Shim Installer

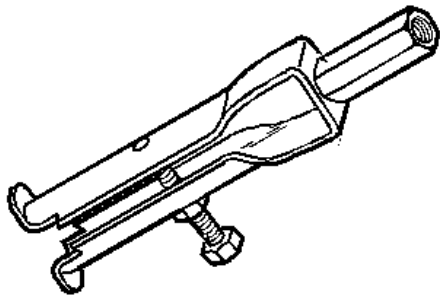
J 2619-01
Slide Hammer

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



J 29369-1
Bushings and Bearing Remover

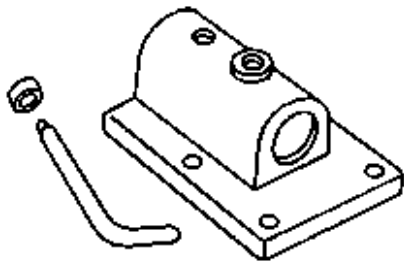
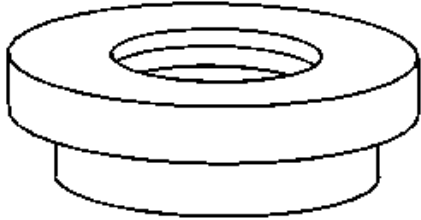


J 29369-2
Bushings and Bearing Remover - 2-3 inch

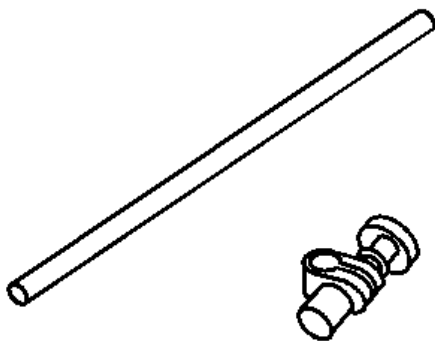
J 29609
Rear Pinion Bearing Cup Installer

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



J 3289-20
Holding Fixture



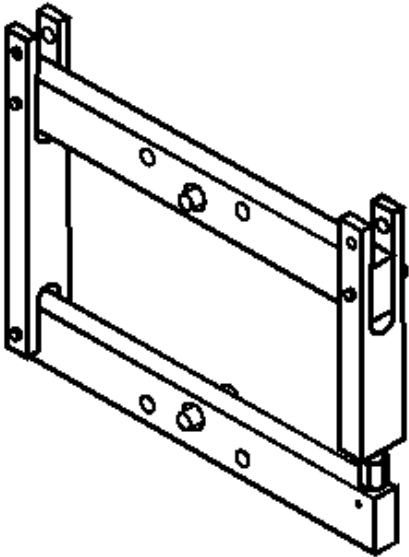
J 34178
Spread Gage Adapter

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



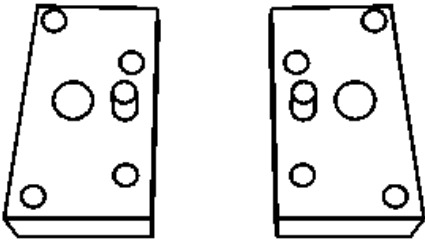
J 34925
Pinion Setting Gage and Components



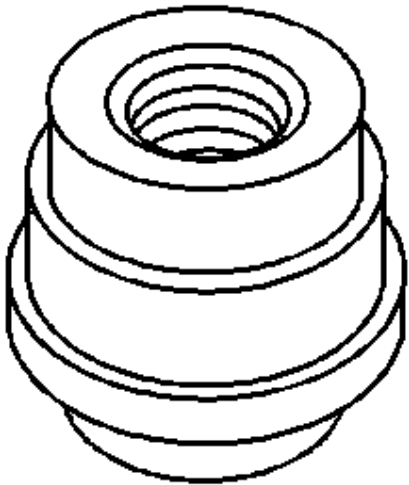
J 45222
Axle Housing Spreader

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3



J 45222-10
Axle Housing Spreader Adapters



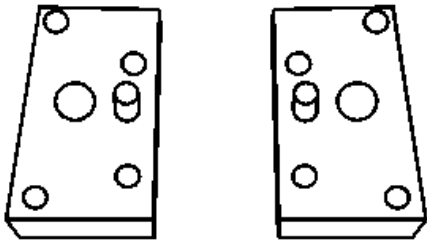
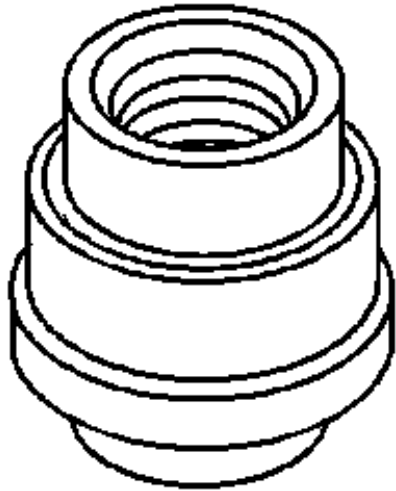
J 45232
Differential Bearing Adjuster Needle Bearing
Replacer - LH

J 45233
Differential Bearing Adjuster Needle Bearing

2007 Hummer H3

2007 Driveline/Axle Front Drive Axle - H3

Replacer - RH



J 45935
Holding Fixture