2008 Driveline/Axle

Front Drive Axle - Ascender, Envoy & Trailblazer

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Actuator Mounting Bolts	6 N.m	53 lb in
Brake Hose Retaining Bolt	25N.m	18 lb ft
Differential Carrier Assembly Case Bolts	48 N.m	35 lb ft
Differential Carrier Assembly Mounting Bolts	85 N.m	63 lb ft
Intermediate Shaft Bearing Assembly Case Bolts	48 N.m	35 lb ft
Intermediate Shaft Bearing Assembly Mounting Bolts	48 N.m	35 lb ft
Pinion Shaft Lock Screw	35 N.m	26 lb ft
Plug, Drain and Fill	32 N.m	24 lb ft
Ring Gear Bolts	83 N.m	61 lb ft
Upper Shock Module Mounting Bolt	40 N.m	30 lb ft

AXLE PRELOAD & 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

SEALERS, ADHESIVES & LUBRICANTS

Application	Type of Material	GM Part Number
Intermediate Shaft Bearing Housing Cavity	Lubricant	12377985 or equivalent or lubricant meeting requirements of NLGI #2, Category LB or GC-LB
Intermediate Shaft Bearing Housing Mating Surfaces	Sealant	US PN 1052942, Canadian PN 10953466 or equivalent

Differential Carrier Assembly Case Mating Surfaces	Sealant	US PN 88861422 or equivalent
Front Drive Axle	Lubricant	US PN 89021677, Canadian PN 89021678 or equivalent meeting GM Specification 9986115
Pinion Yoke Splines	Sealant	US PN 12346004, Canadian PN 10953480 or equivalent

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS

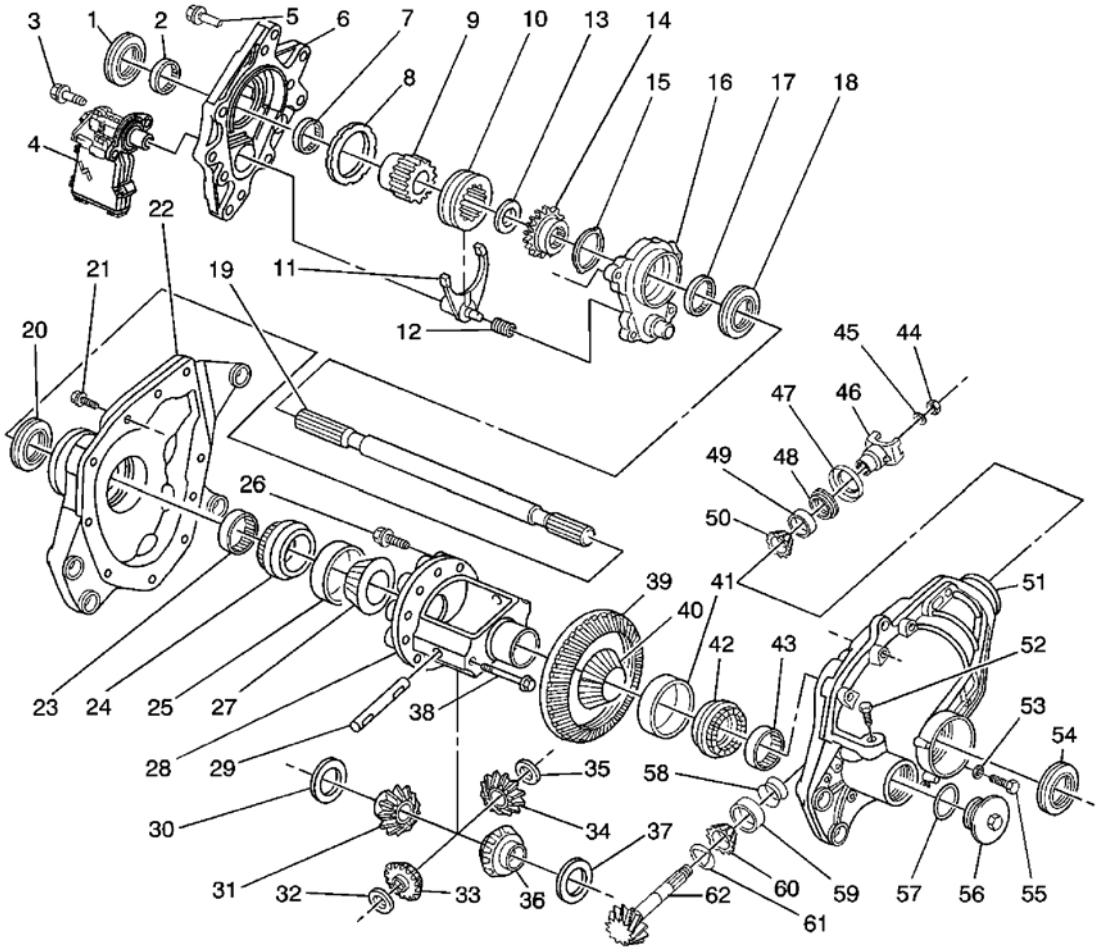


Fig. 1: Front Drive Axle Components (7.25 in Axle) (S4WD)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

1	Front Drive Axle Inner Shaft Seal
2	Front Drive Axle Inner Shaft Bearing
3	Bolt
4	Front Drive Axle Actuator
5	Bolt
6	Front Wheel Drive Intermediate Shaft Housing
7	Front Drive Axle Inner Shaft Bearing
8	Front Wheel Drive Shaft Thrust Washer
9	Front Drive Axle Clutch Gear
10	Front Drive Axle Clutch Sleeve
11	Front Drive Axle Clutch Fork
12	Front Drive Axle Clutch Fork Spring
13	Front Wheel Drive Shaft Washer
14	Front Drive Axle Clutch Gear
15	Front Wheel Drive Shaft Thrust Washer
16	Front Wheel Drive Intermediate Shaft Housing
17	Front Drive Axle Inner Shaft Bearing
18	Front Drive Axle Inner Shaft Seal
19	Front Drive Axle Intermediate Shaft
20	Front Drive Axle Inner Shaft Seal
21	Bolt
22	Front Differential Carrier Case Half
23	Front Differential Case Bearing
24	Front Differential Bearing Adjuster Nut
25	Front Differential Bearing Cup
26	Differential Ring Gear Bolt
27	Front Differential Bearing
28	Front Differential Case
29	Front Differential Pinion Gear Shaft
30	Front Differential Side Gear Thrust Washer
31	Front Differential Side Gear
32	Front Differential Pinion Gear Thrust Washer
33	Front Differential Pinion Gear
34	Front Differential Pinion Gear
35	Front Differential Pinion Gear Thrust Washer
36	Front Differential Side Gear
37	Front Differential Side Gear Thrust Washer
38	Front Drive Axle Differential Pinion Gear Shaft Lock Bolt
39	Front Differential Ring Gear
40	Front Differential Bearing
41	Front Differential Bearing Cup

	Front Differential Bearing Adjuster Nut
43	Front Differential Carrier Bearing
44	Front Differential Drive Pinion Gear Nut
45	Front Differential Drive Pinion Gear Shaft Washer
46	Front Differential Carrier Flange
47	Front Differential Drive Pinion Gear Bearing Dirt Deflector
48	Front Differential Drive Pinion Gear Seal
49	Front Differential Drive Pinion Gear Outer Bearing Cup
50	Front Differential Drive Pinion Gear Outer Bearing
51	Front Differential Carrier Case
52	Front Differential Carrier Vent Connector
53	Front Differential Carrier Oil Drain Plug Washer
54	Front Drive Axle Inner Shaft Seal
55	Front Differential Carrier Oil Drain Plug
56	Front Differential Carrier Oil Fill Plug
57	Front Differential Carrier Oil Fill Plug Washer
58	Front Differential Drive Pinion Gear Bearing Spacer
59	Front Differential Drive Pinion Gear Inner Bearing Cup
60	Front Differential Drive Pinion Gear Inner Bearing
61	Differential Drive Pinion Gear Bearing Spacer
62	Front Differential Drive Pinion Gear

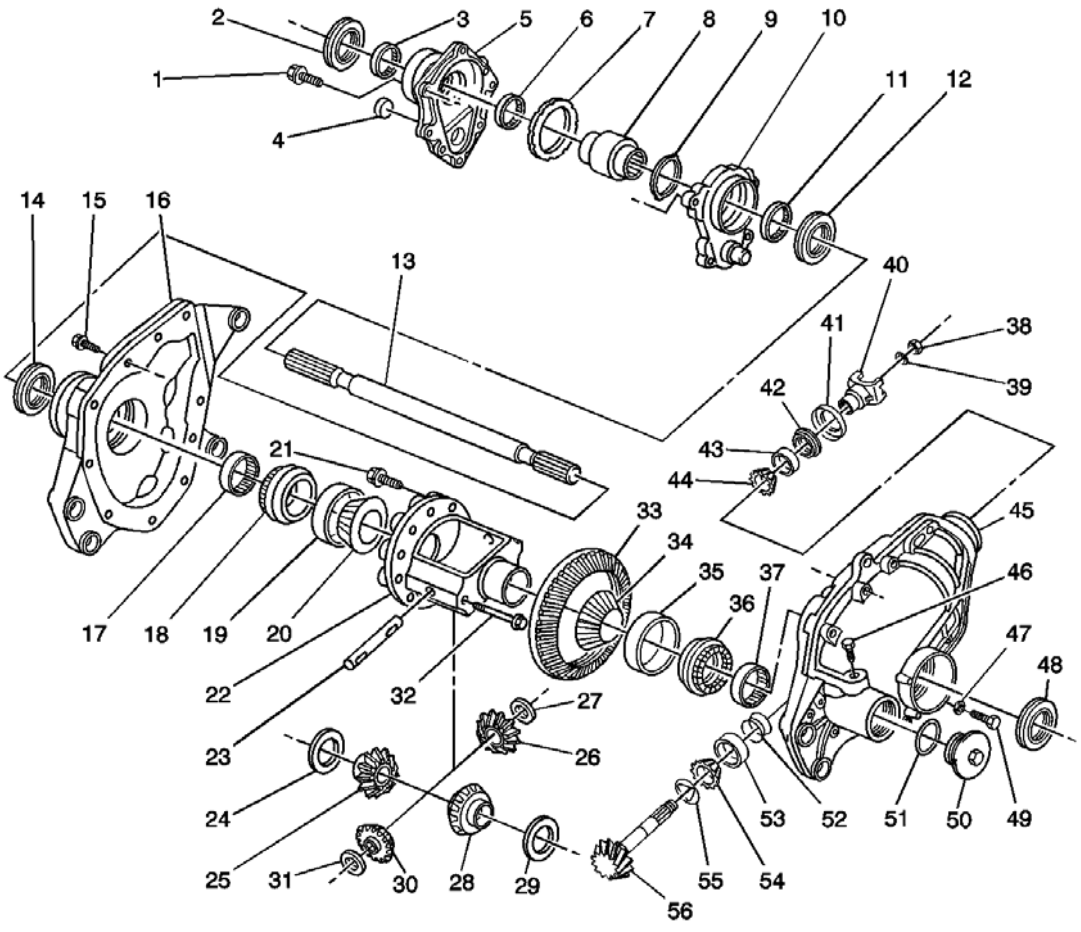


Fig. 2: Front Drive Axle Components (7.25 in Axle) (A4WD)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Bolt
2	Front Drive Axle Inner Shaft Seal
3	Front Drive Axle Inner Shaft Bearing
4	Front Wheel Drive Intermediate Shaft Housing Plug
5	Front Wheel Drive Intermediate Shaft Housing
6	Front Drive Axle Inner Shaft Bearing
7	Front Wheel Drive Shaft Thrust Washer
8	Front Drive Axle Clutch Sleeve
9	Front Wheel Drive Shaft Thrust Washer
10	Front Wheel Drive Intermediate Shaft Housing
11	Front Drive Axle Inner Shaft Bearing
12	Front Drive Axle Inner Shaft Seal

13	Front Drive Axle Inner Shaft
14	Front Drive Axle Inner Shaft Seal
15	Bolt
16	Front Differential Carrier Case
17	Front Differential Carrier Bearing
18	Front Differential Bearing Adjuster Nut
19	Front Differential Bearing Cup
20	Front Differential Bearing
21	Differential Ring Gear Bolt
22	Front Differential Case
23	Front Differential Pinion Gear Shaft
24	Front Differential Side Gear Thrust Washer
25	Front Differential Side Gear
26	Front Differential Pinion Gear
27	Front Differential Pinion Gear Thrust Washer
28	Front Differential Side Gear
29	Front Differential Side Gear Thrust Washer
30	Front Differential Pinion Gear
31	Front Differential Pinion Gear Thrust Washer
32	Front Drive Axle Differential Pinion Gear Shaft Lock Bolt
33	Front Differential Ring Gear
34	Front Differential Bearing
35	Front Differential Bearing Cup
36	Front Differential Bearing Adjuster Nut
37	Front Differential Carrier Bearing
38	Front Differential Drive Pinion Gear Nut
39	Front Differential Drive Pinion Gear Shaft Washer
40	Front Differential Carrier Flange
41	Front Differential Drive Pinion Gear Bearing Dirt Deflector
42	Front Differential Drive Pinion Gear Seal
43	Front Differential Drive Pinion Gear Outer Bearing Cup
44	Front Differential Drive Pinion Gear Outer Bearing
45	Front Differential Carrier Case
46	Front Differential Carrier Vent Connector
47	Front Differential Carrier Oil Drain Plug Washer
48	Front Drive Axle Inner Shaft Seal
49	Front Differential Carrier Oil Drain Plug
50	Front Differential Carrier Oil Fill Plug
51	Front Differential Carrier Oil Fill Plug Washer
52	Front Differential Drive Pinion Gear Bearing Spacer
53	Front Differential Drive Pinion Gear Inner Bearing Cup

	Front Differential Drive Pinion Gear Inner Bearing
55	Differential Drive Pinion Gear Bearing Spacer
56	Front Differential Drive Pinion Gear

DIAGNOSTIC INFORMATION & PROCEDURES

DIAGNOSTIC STARTING POINT - FRONT DRIVE AXLE

Begin the system diagnosis by reviewing the system Description and Operation. Refer to **Front Drive Axle 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**.

Noise Diagnosis

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

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

Classifying the Symptom

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

- Leaks
- Noises
- Vibrations

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

Bearing Noise

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

Front Wheel Bearing Noise

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

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

Knock at Low Speeds

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

Backlash Clunk

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

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

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Inspection and Adjustment**.
Worn pinion and ring gear	Replace the pinion and the ring gear. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Differential Case Assembly Disassemble** • **Differential Case Assembly Assemble** • **Front Differential Drive Pinion Gear Bearing Cup Installation** • **Differential Carrier Assembly Assemble**
Worn pinion bearings	Replace the pinion bearings. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Front Differential Drive Pinion Gear Bearing Cup Installation** • **Differential Carrier Assembly Assemble**
Loose pinion bearings	Adjust the pinion bearings preload. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Differential Carrier Assembly Assemble** • **Backlash Inspection and Adjustment**
Excessive pinion end play	Adjust the pinion end play. Refer to **Differential Carrier Assembly**

	Assemble.
Worn differential bearings	Replace the differential bearings. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Differential Case Assembly Disassemble** • **Differential Case Assembly Assemble** • **Differential Carrier Assembly Assemble**
Loose differential bearings	Adjust the differential bearing preload. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Differential Carrier Assembly Assemble**
Excessive ring gear runout	Replace the ring gear. Perform the following procedures: • **Differential Carrier Assembly Disassemble** • **Differential Carrier Assembly Assemble**
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Front Axle Lubricant Level Inspection**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Front Axle Lubricant Replacement**.

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 **Differential Carrier Assembly Disassemble**.
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

INTERMITTENT NOISE

Checks	Action
Warped ring gear	Replace the ring gear. Refer to **Differential Carrier Assembly Disassemble**.
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to **Differential Carrier Assembly Assemble** and **Backlash Inspection and Adjustment**.

CONSTANT NOISE

Checks	Action
Flat spot on the pinion or the	Replace the pinion and the ring gear. Refer to **Differential Carrier**

ring gear teeth	**Assembly Disassemble**.
Flat spot on the pinion bearing	Replace the bearing. Refer to **Differential Carrier Assembly Disassemble**.
Worn pinion splines	Replace the pinion. Refer to **Differential Carrier Assembly Disassemble**.

NOISY ON TURNS

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

FRONT DRIVE AXLE BEARING WEAR (STRAIGHT)

Straight 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.

Wear (Minor)

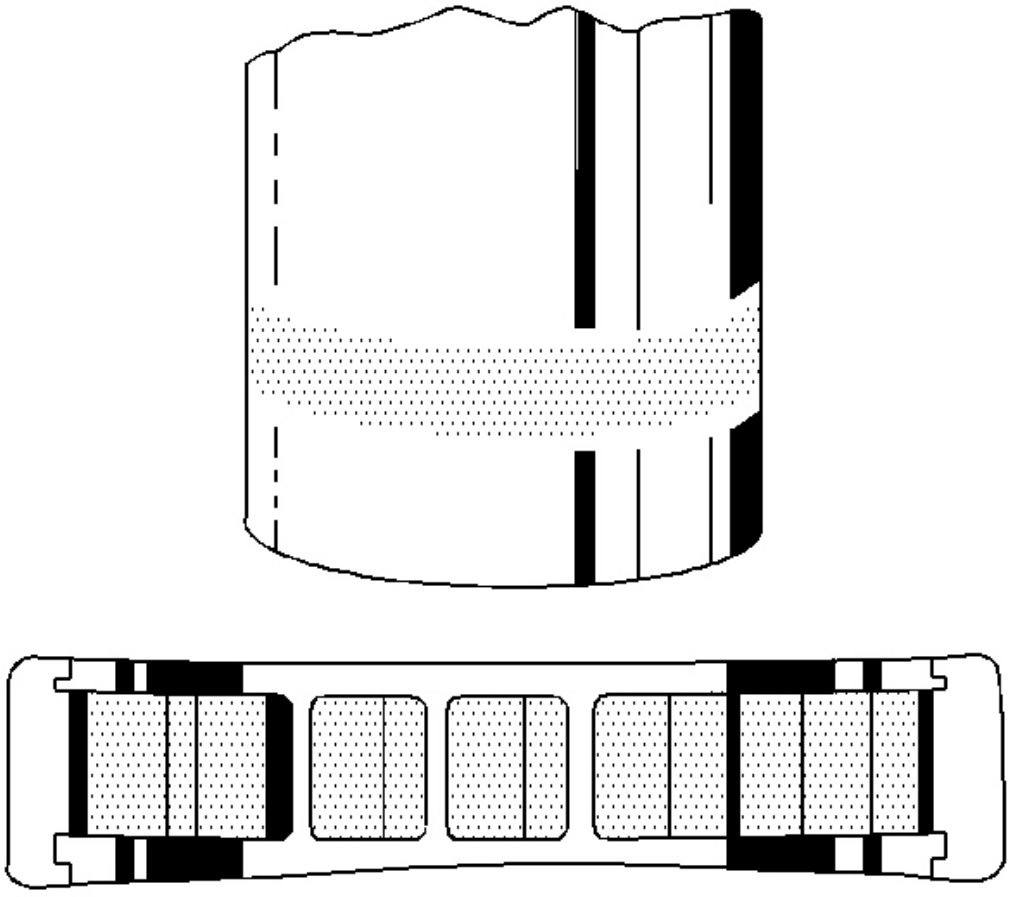


Fig. 3: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

Light pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housings. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Wear (Major)

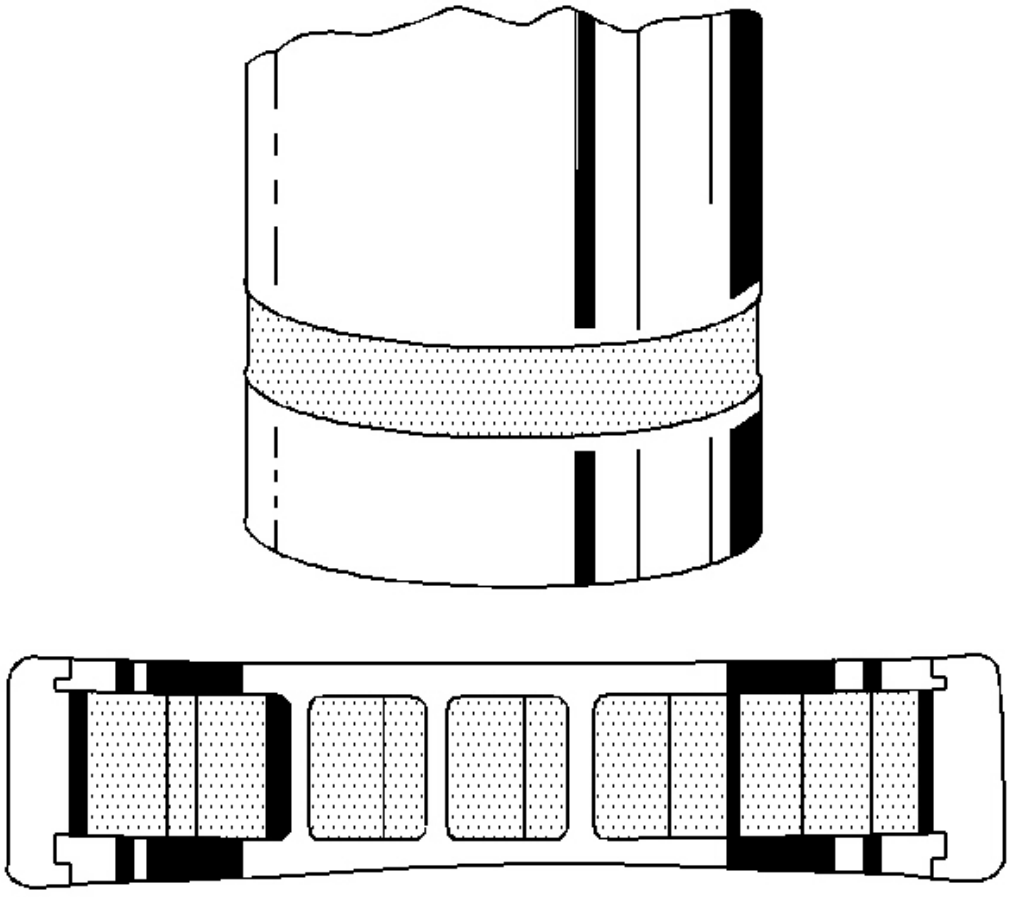


Fig. 4: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

Heavy pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Brinelling

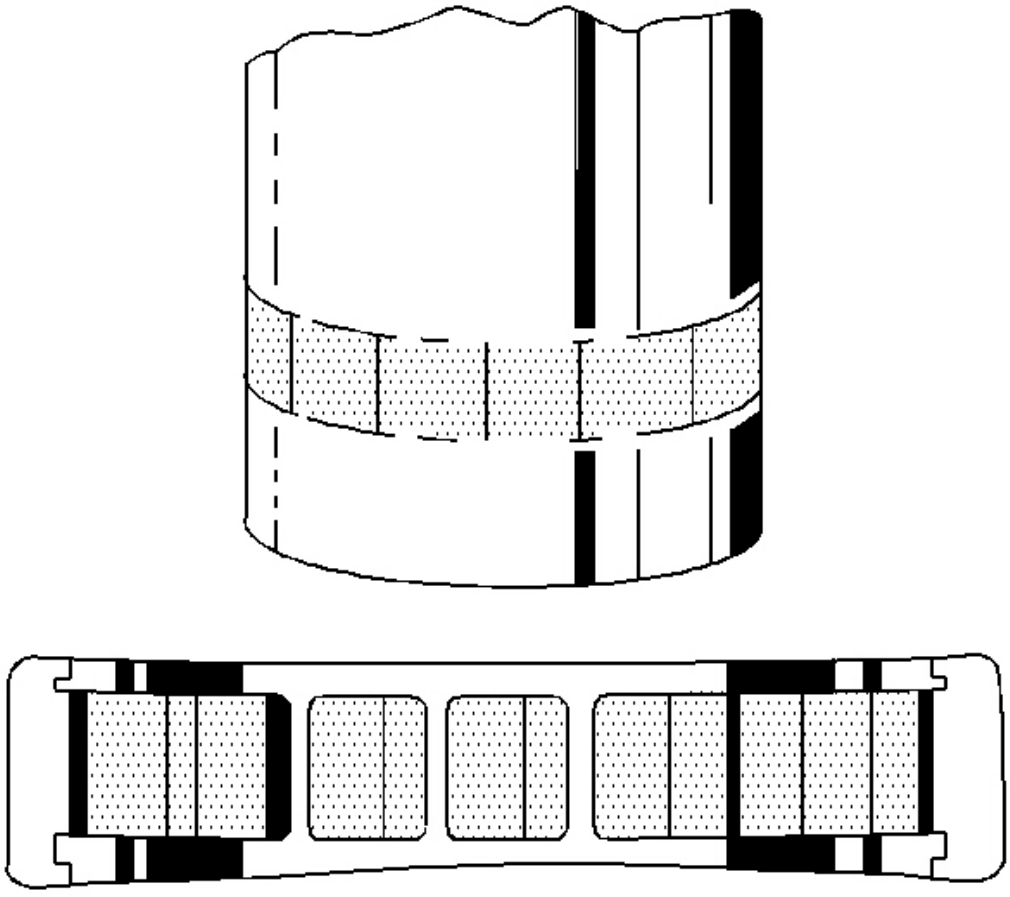


Fig. 5: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the raceway can be caused by roll either under impact loading or vibration while the bearing is not rotating. Replace the bearing if rough or noisy. Replace the shaft if damaged.

Indentations

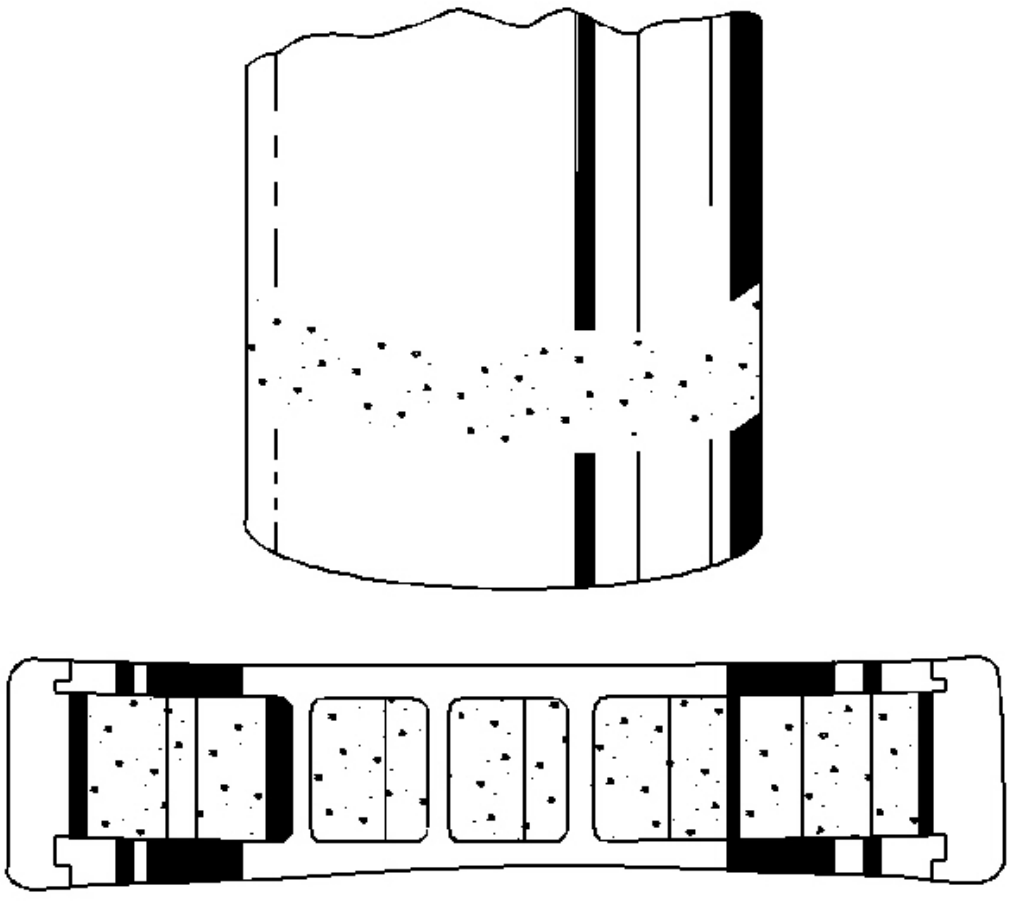


Fig. 6: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

Surface depressions on race and rollers can be caused by hard particles of foreign material. Clean all of the parts, including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Single Edge Pitting

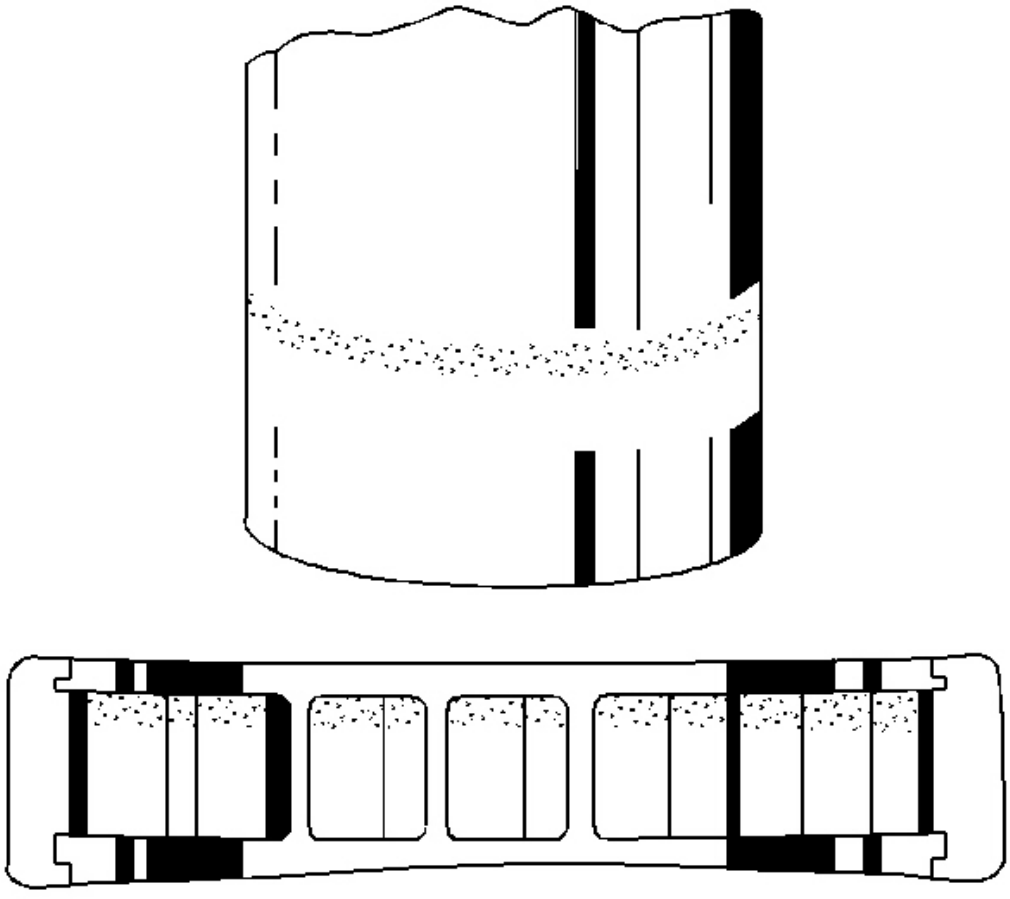


Fig. 7: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at one edge of race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Double Edge Pitting

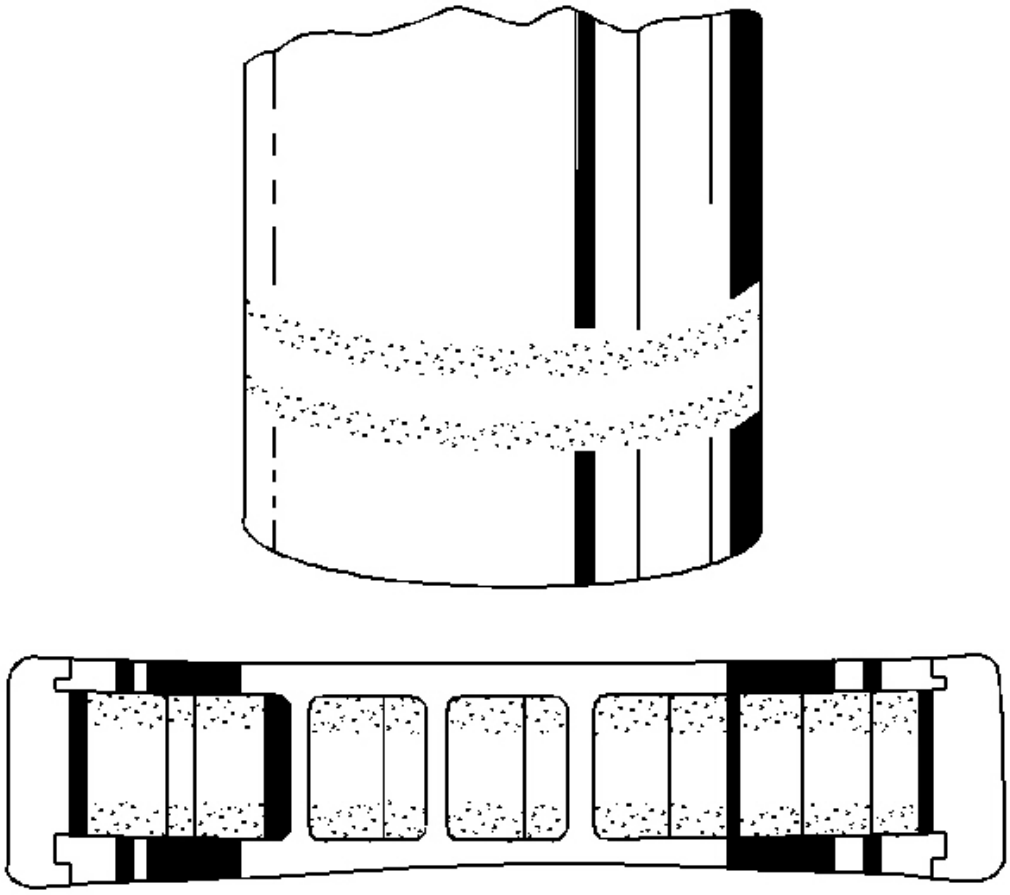


Fig. 8: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at both edges of the race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Misalignment

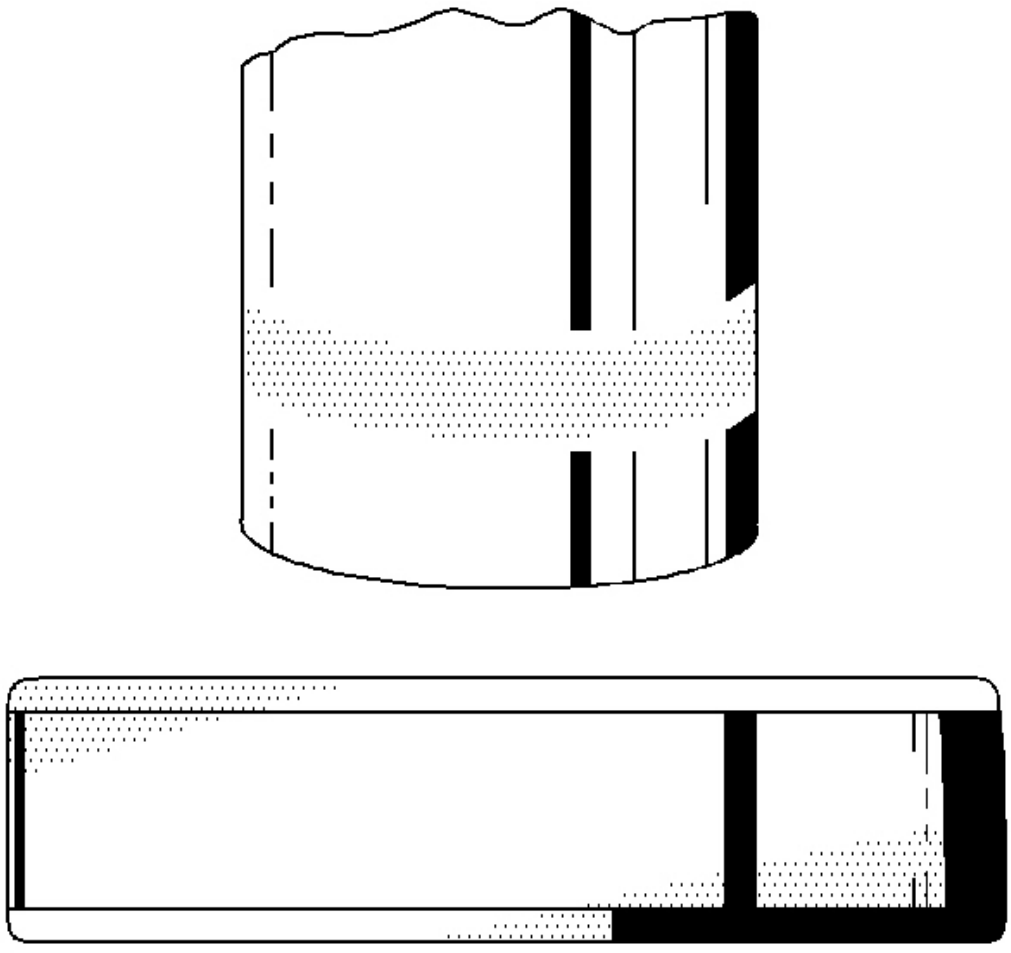


Fig. 9: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

Outer misalignment due to a foreign object. Replace the bearing. Ensure races are properly seated. Replace the shaft if the bearing operating surface is damaged.

Frettage

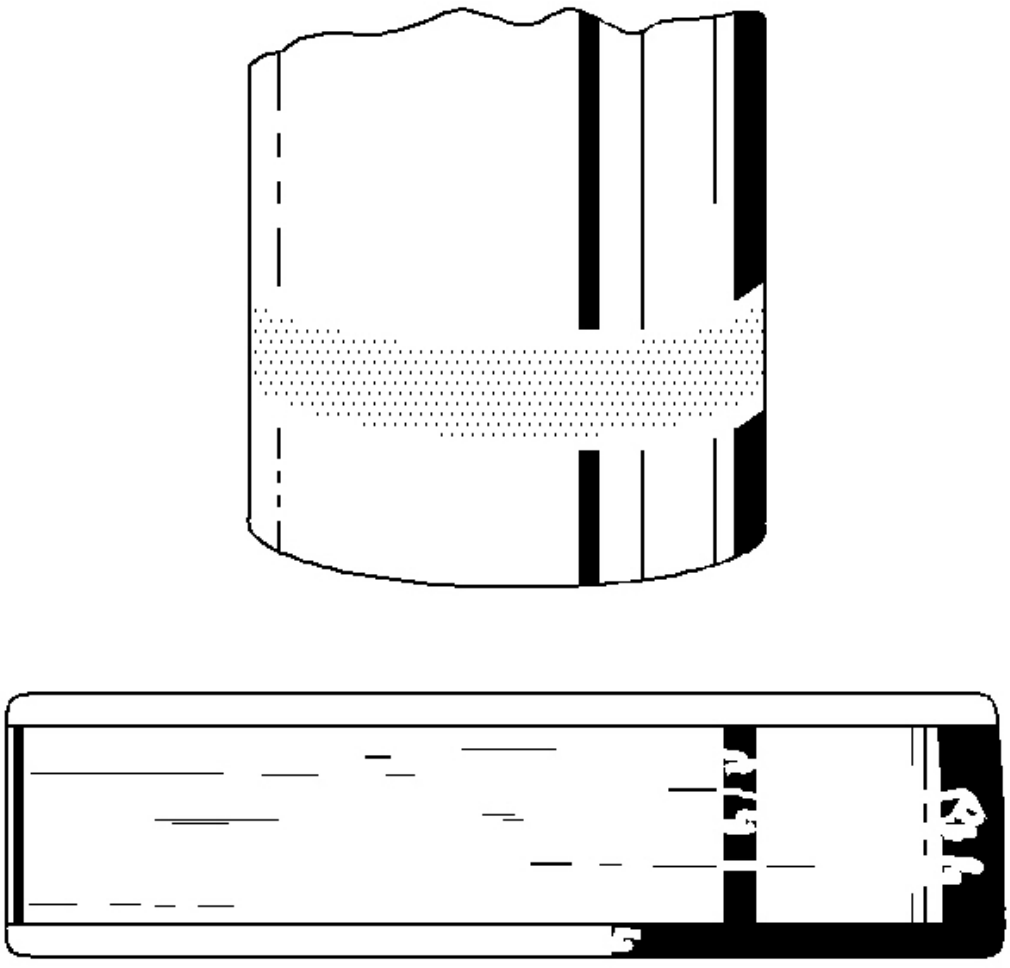


Fig. 10: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

Corrosion set up by a small relative movement of parts with no lubrication. Replace the bearing. Clean all the relative parts. Check the seals. Check for proper fit and lubrication. Replace the shaft if damaged.

Smears

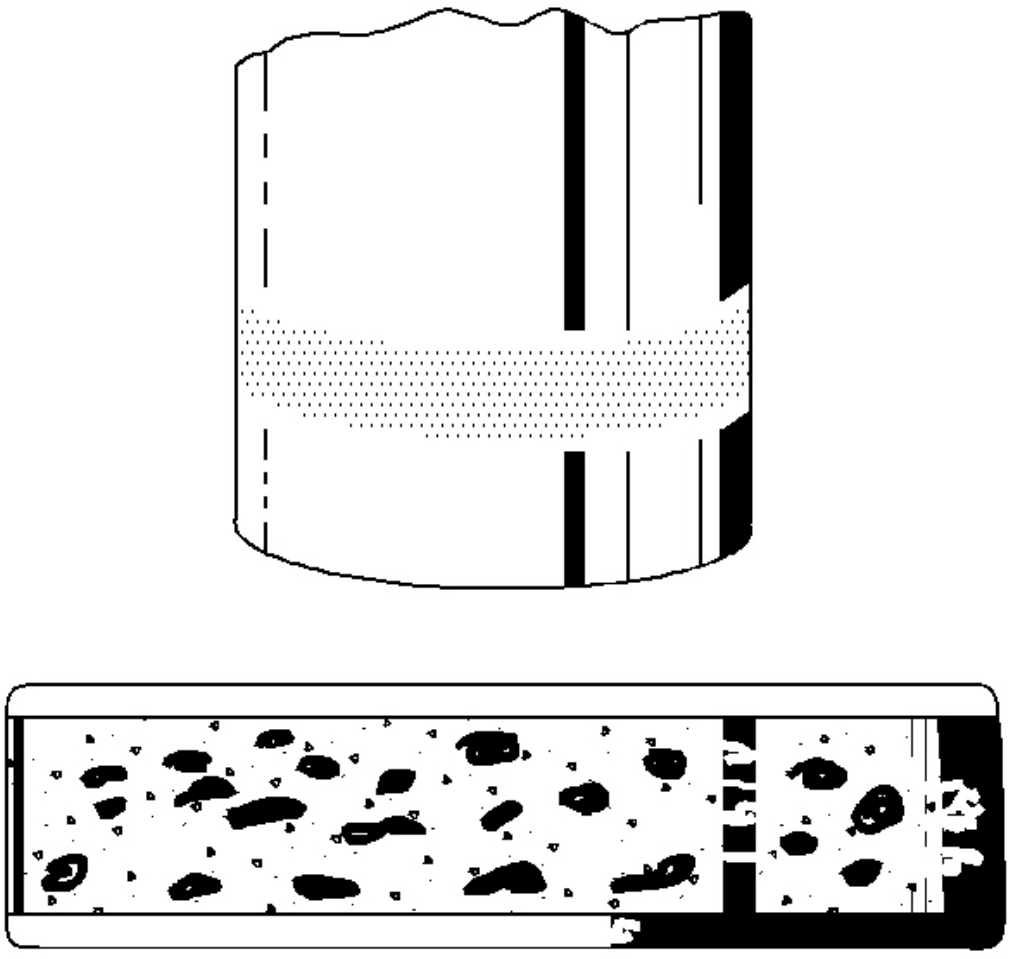


Fig. 11: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of metal due to slippage. Slippage can be caused by poor fits, lack of lubrication, overheating, overloads or handling damage. Replace the bearing. Clean all the related parts. Check for proper fit and lubrication.

FRONT DRIVE AXLE BEARING WEAR (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

- 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

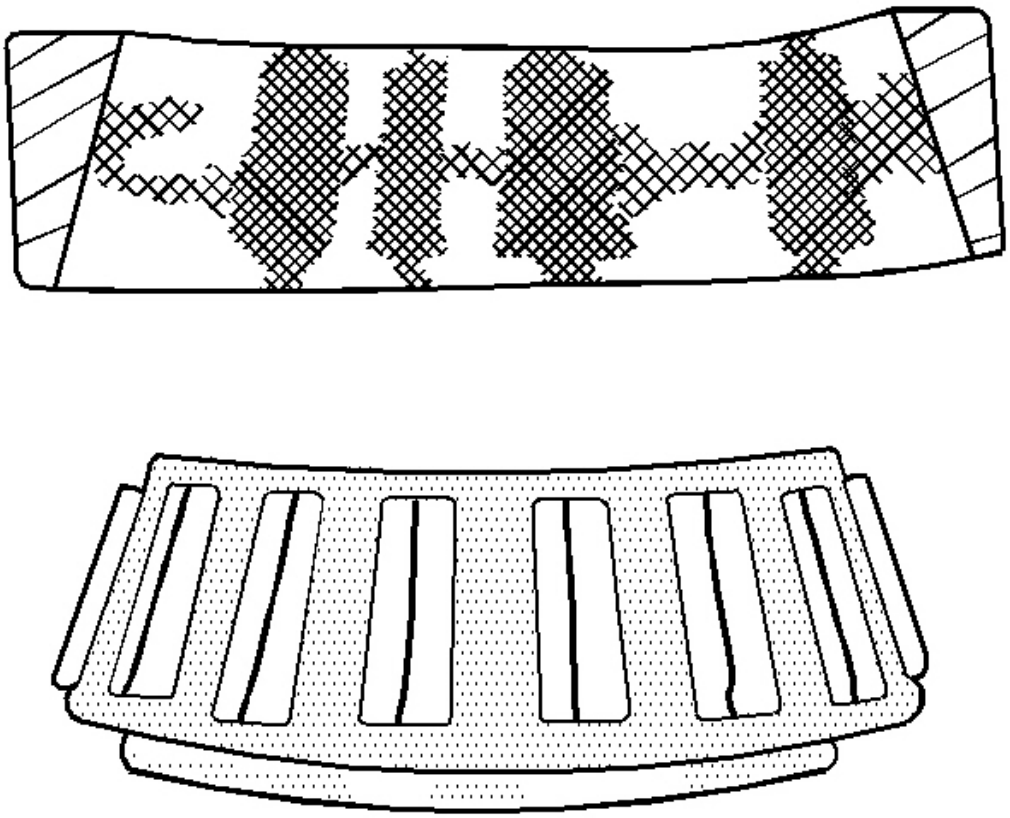


Fig. 12: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

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

Abrasive Step Wear

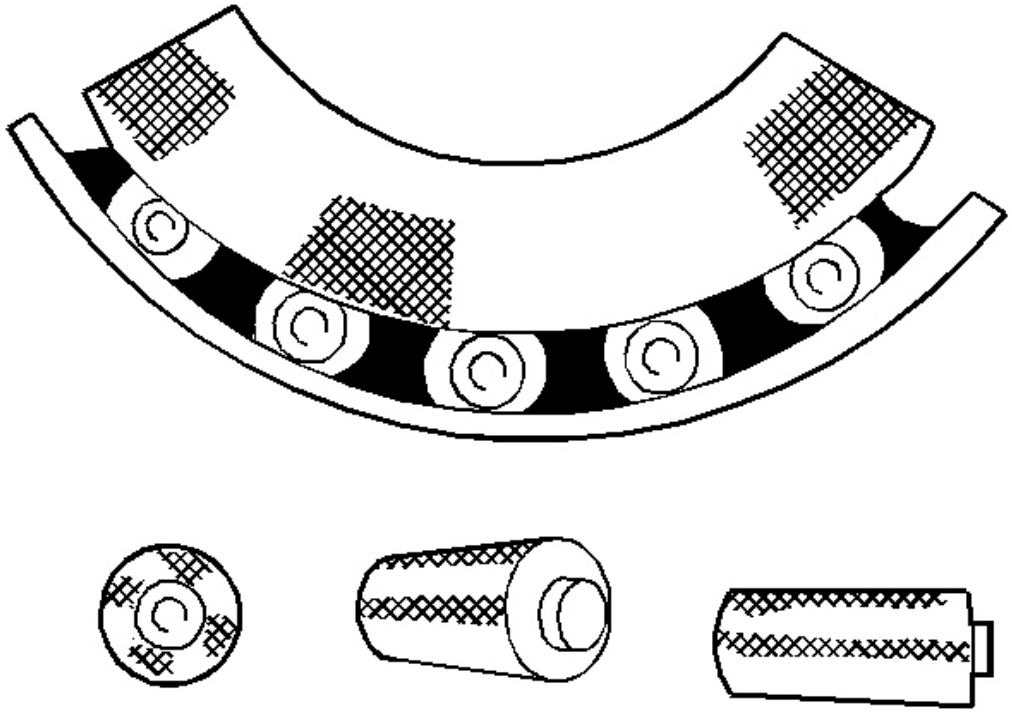


Fig. 13: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

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

Galling

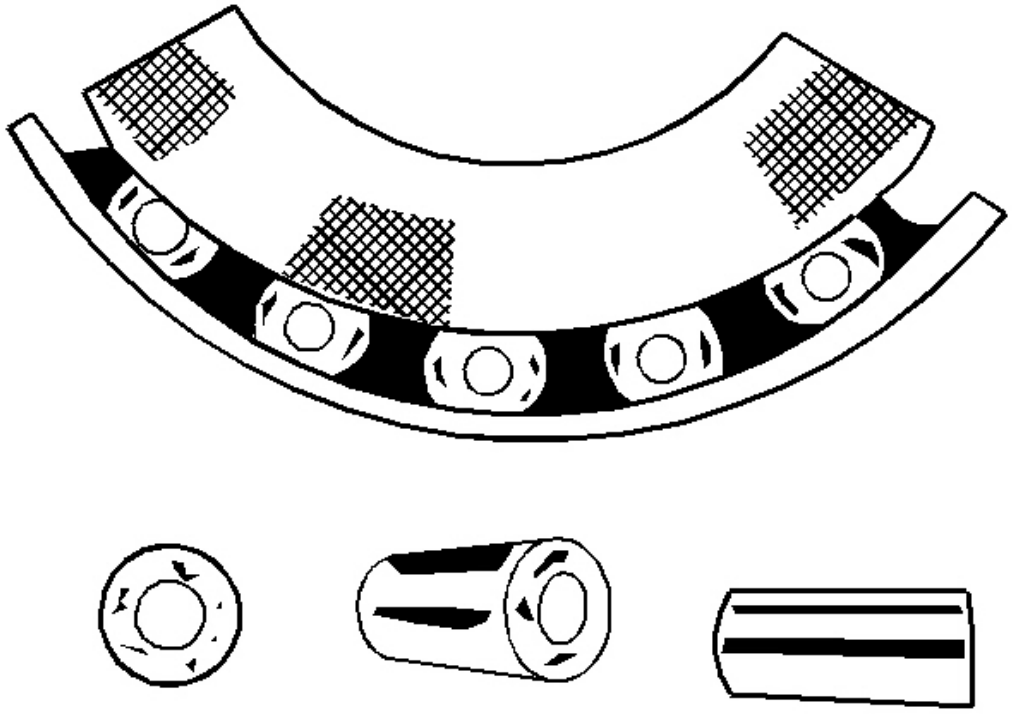


Fig. 14: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

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

Etching

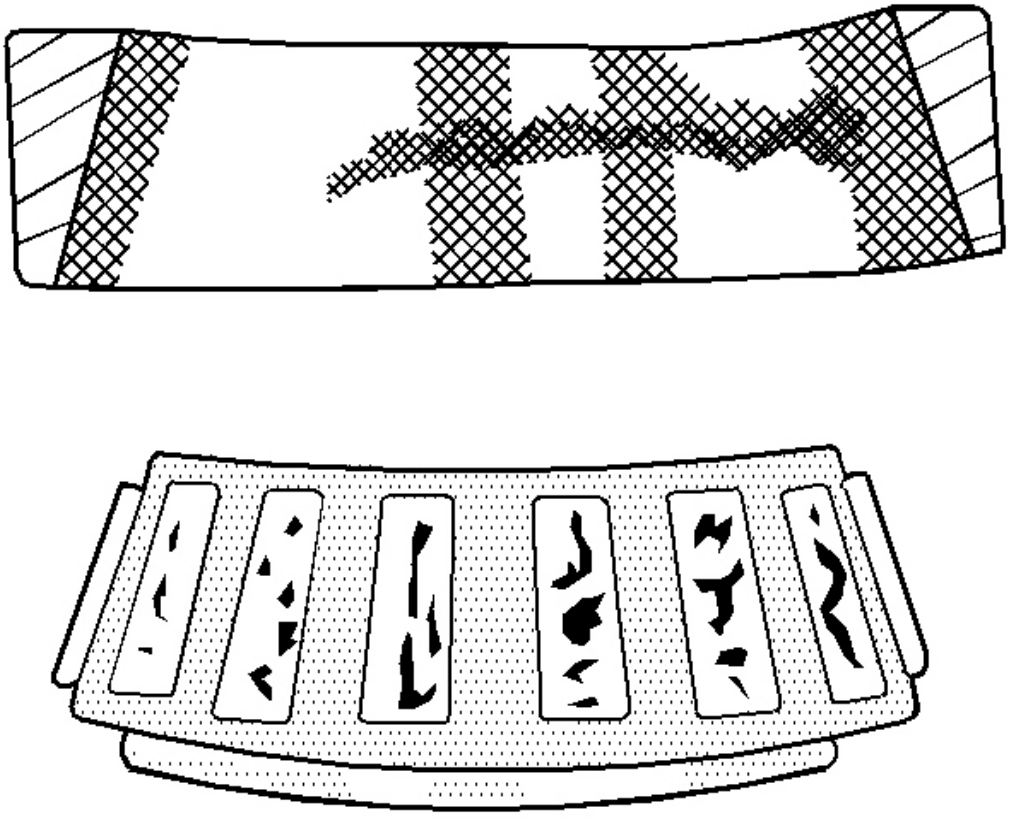


Fig. 15: Identifying Etching
Courtesy of GENERAL MOTORS CORP.

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

Bent Cage

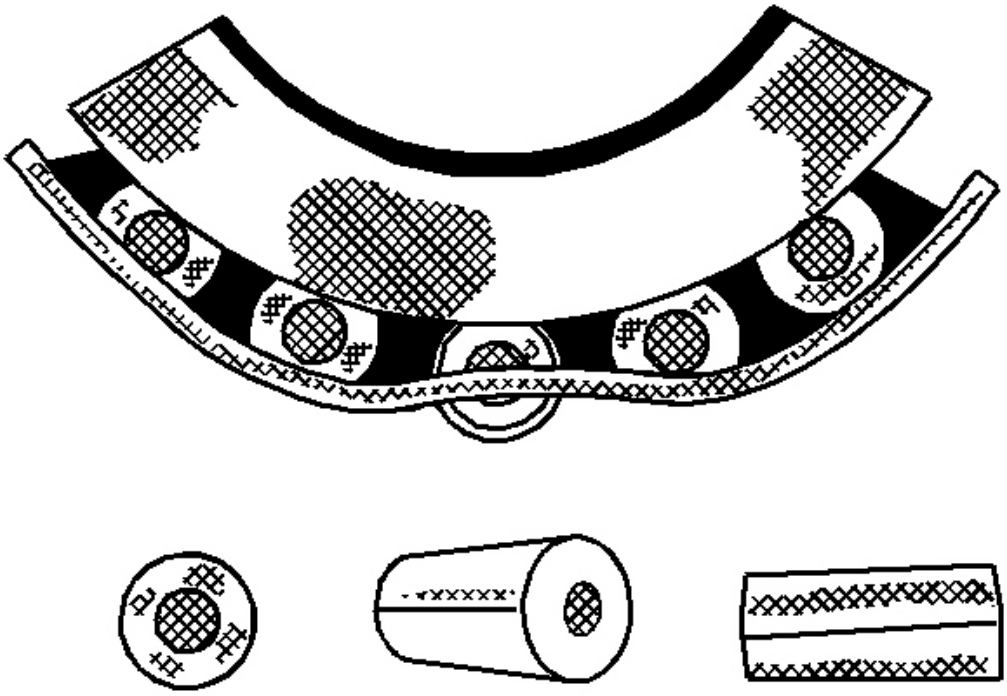


Fig. 16: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

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

Cage Wear

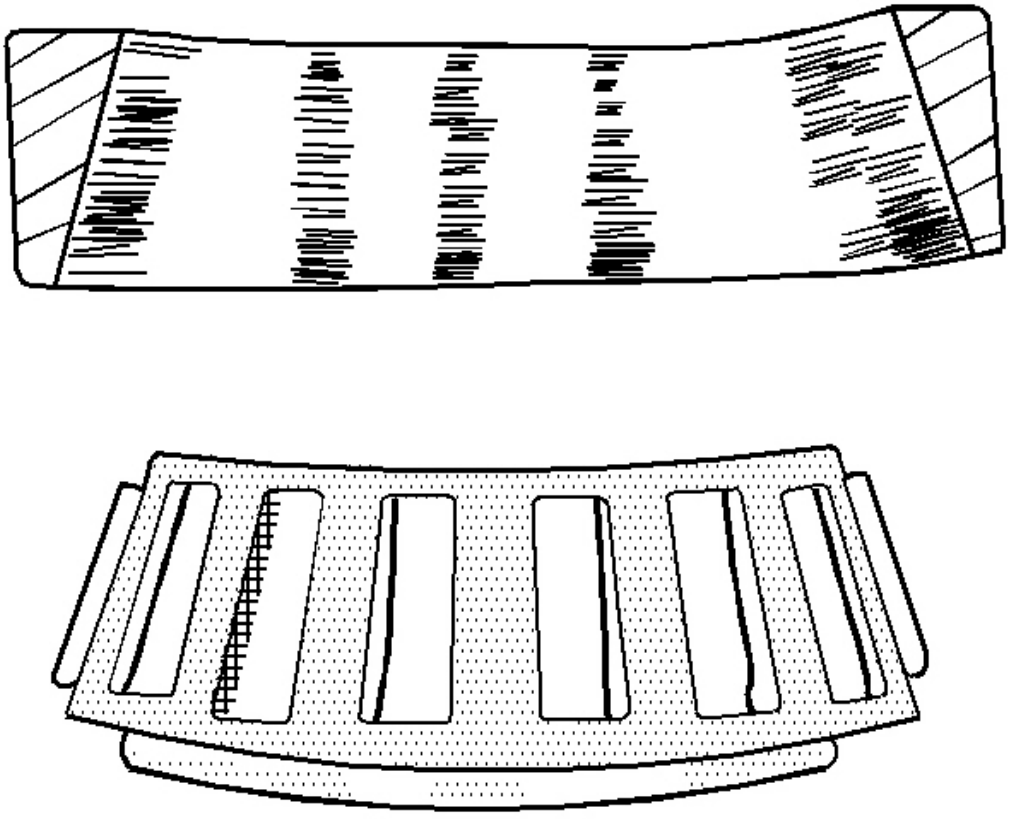


Fig. 17: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

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

Indentations

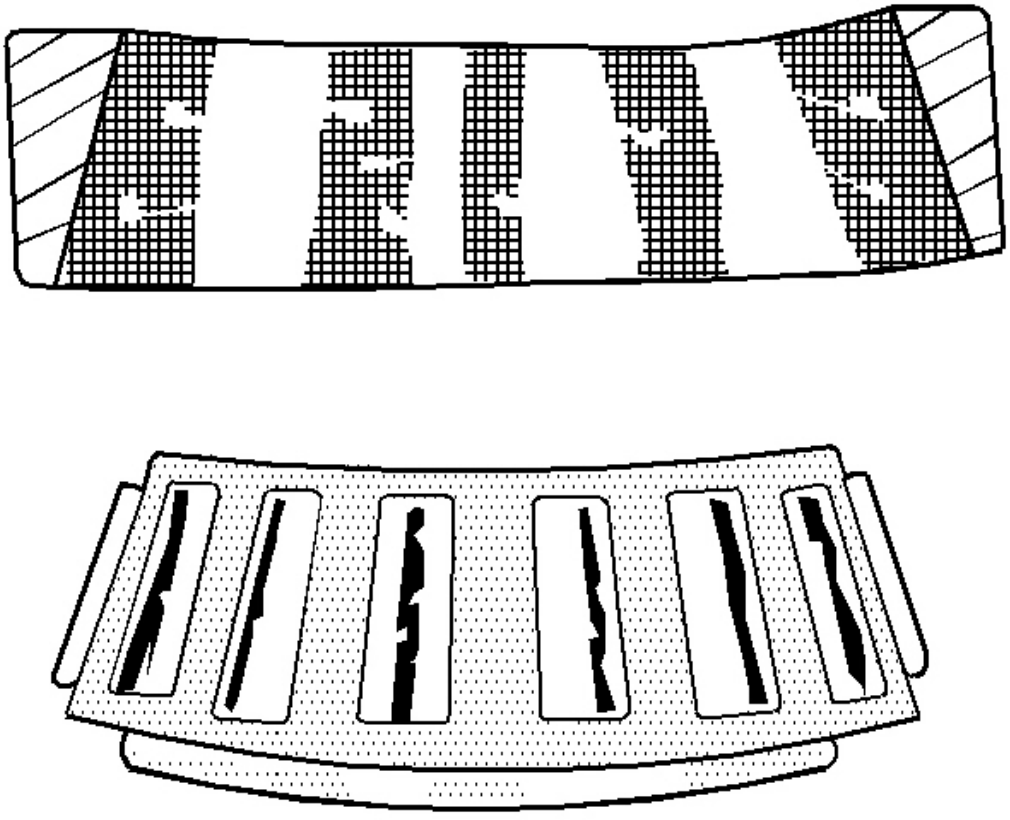


Fig. 18: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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

Frettage

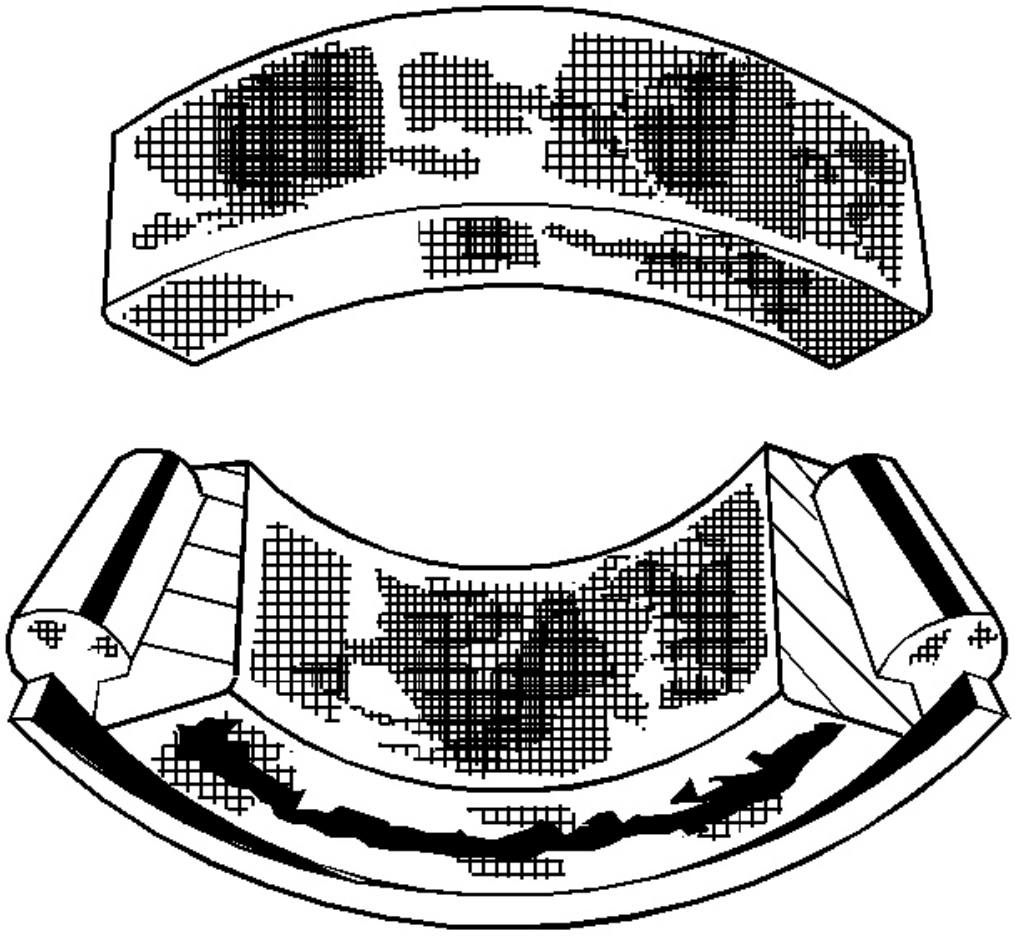


Fig. 19: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

Smears

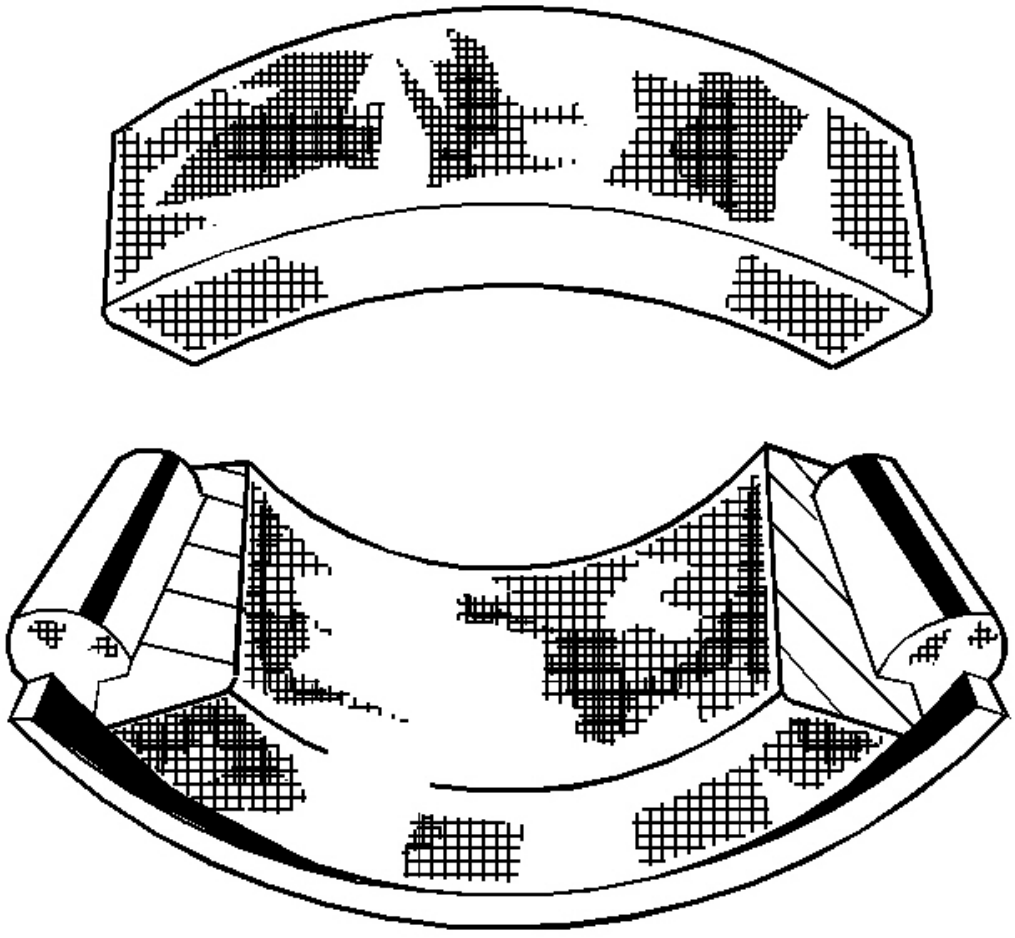


Fig. 20: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of the metal 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. Check for proper fit and lubrication.

Stain Discoloration

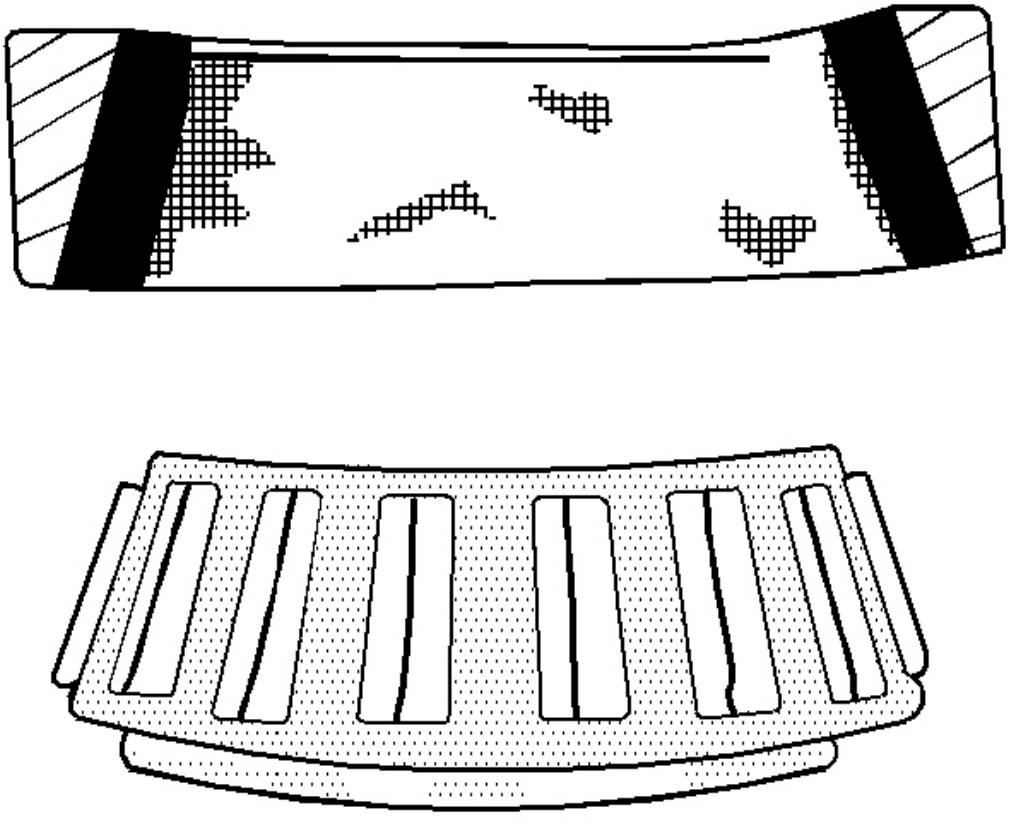


Fig. 21: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

Discoloration ranging 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. Check the seals and the related parts for damage.

Heat Discoloration

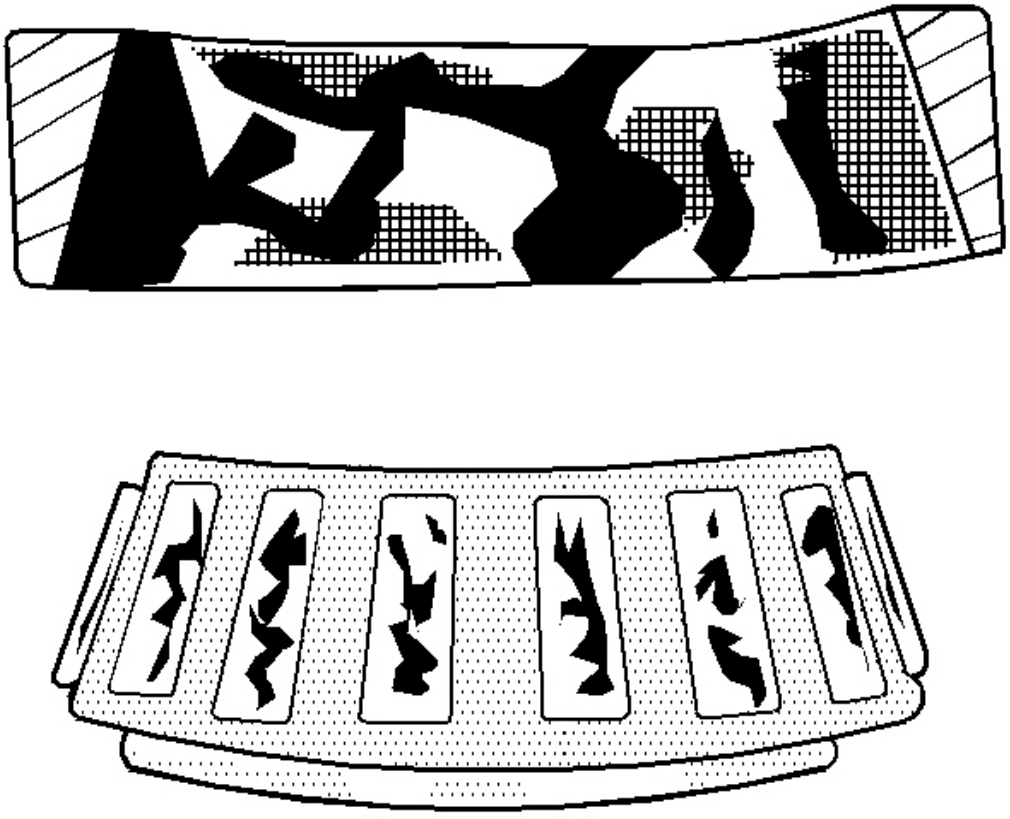


Fig. 22: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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 check 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. Check the seals and the other related parts.

Misalignment

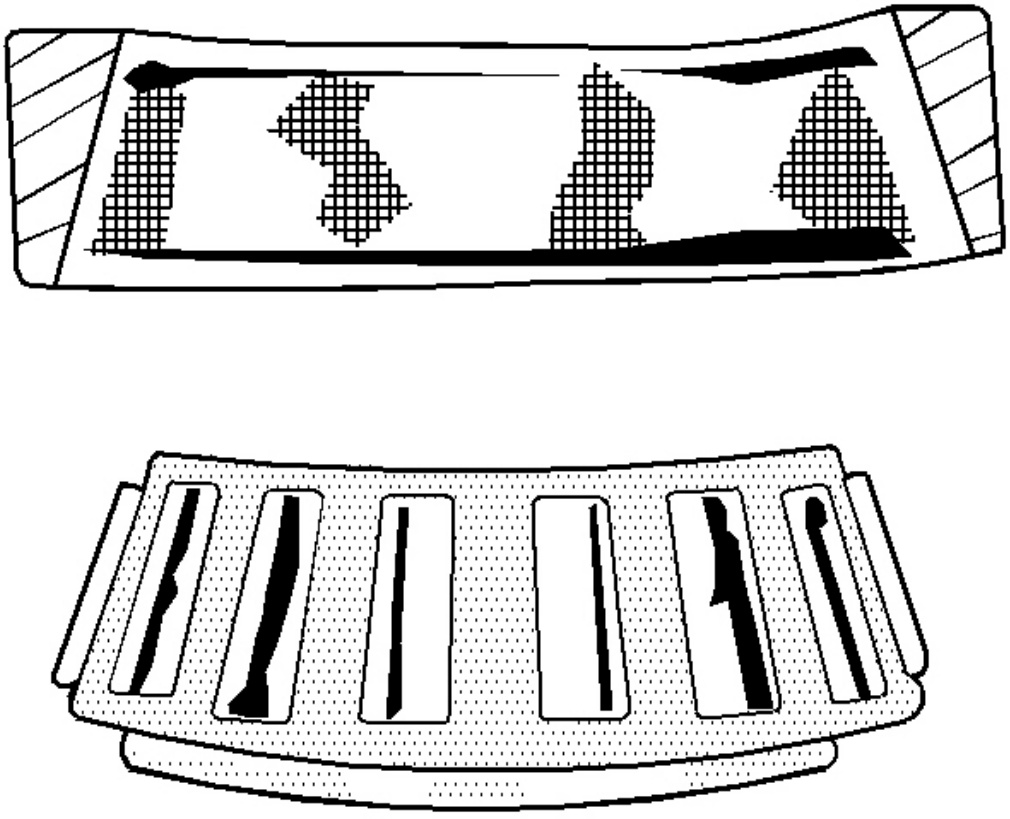


Fig. 23: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

Cracked Inner Race

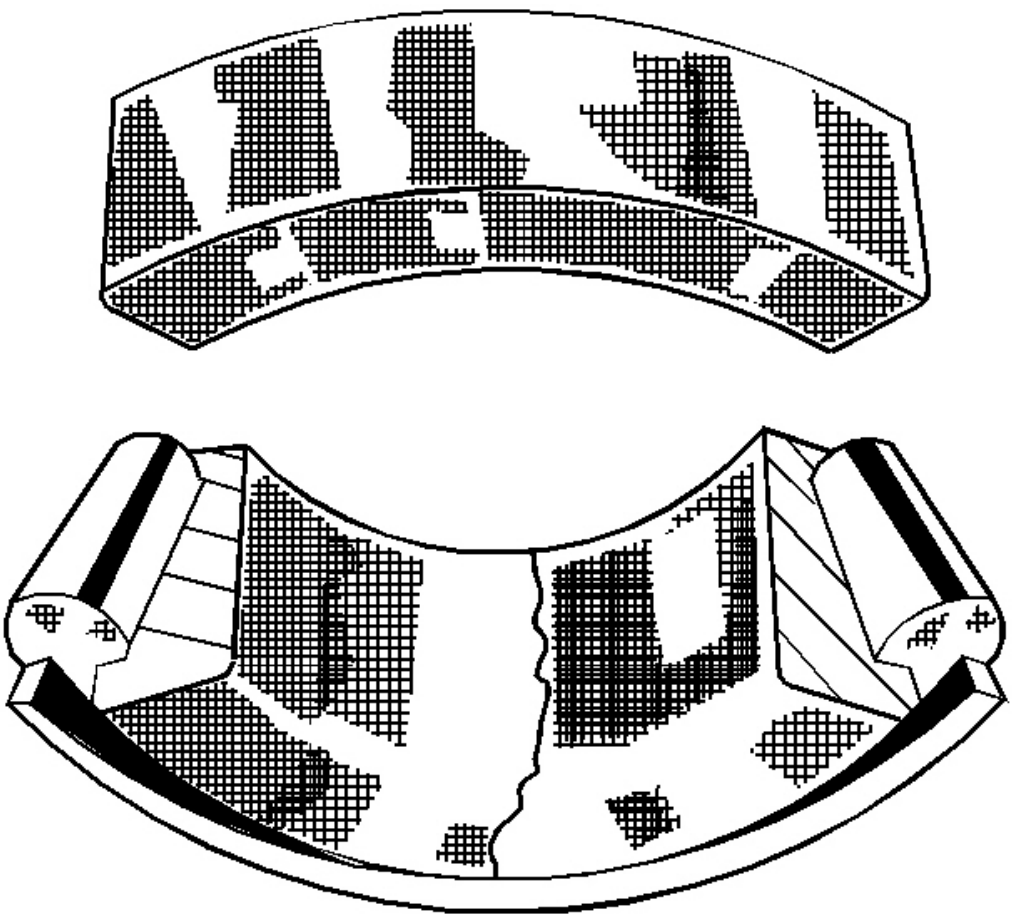


Fig. 24: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

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

Fatigue Spalling

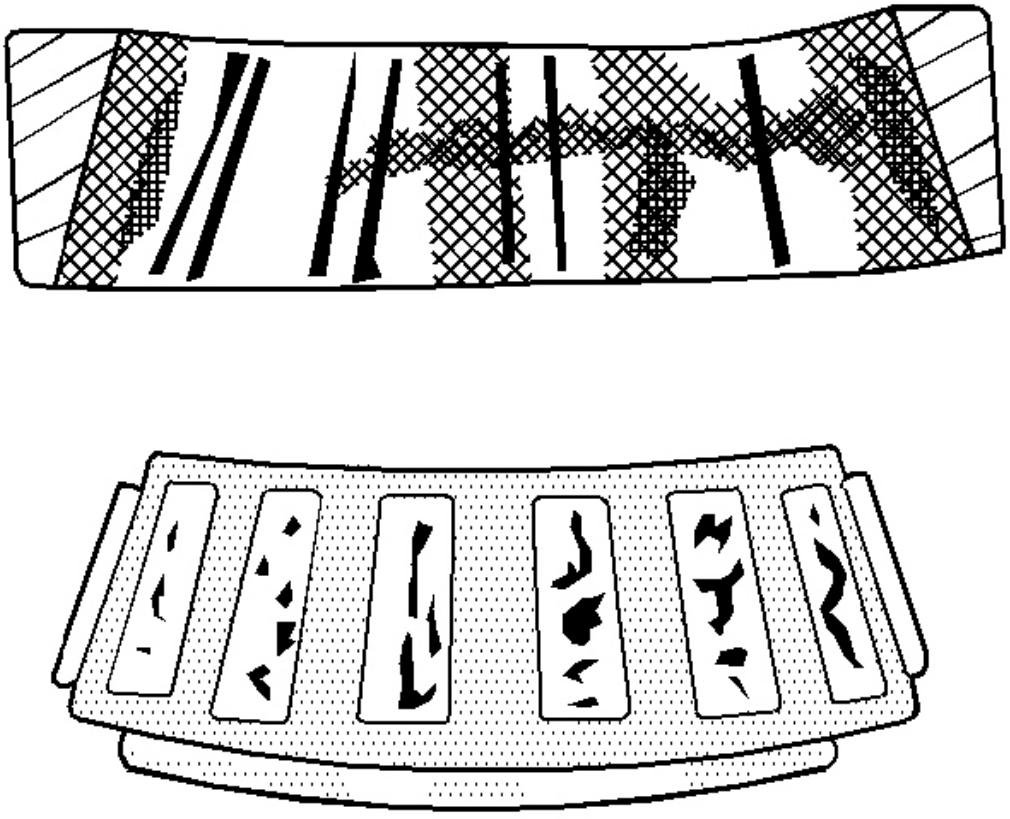


Fig. 25: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear
Courtesy of GENERAL MOTORS CORP.

Flaked surface metal that results from fatigue. Replace the bearing. Clean all related parts.

Brinelling

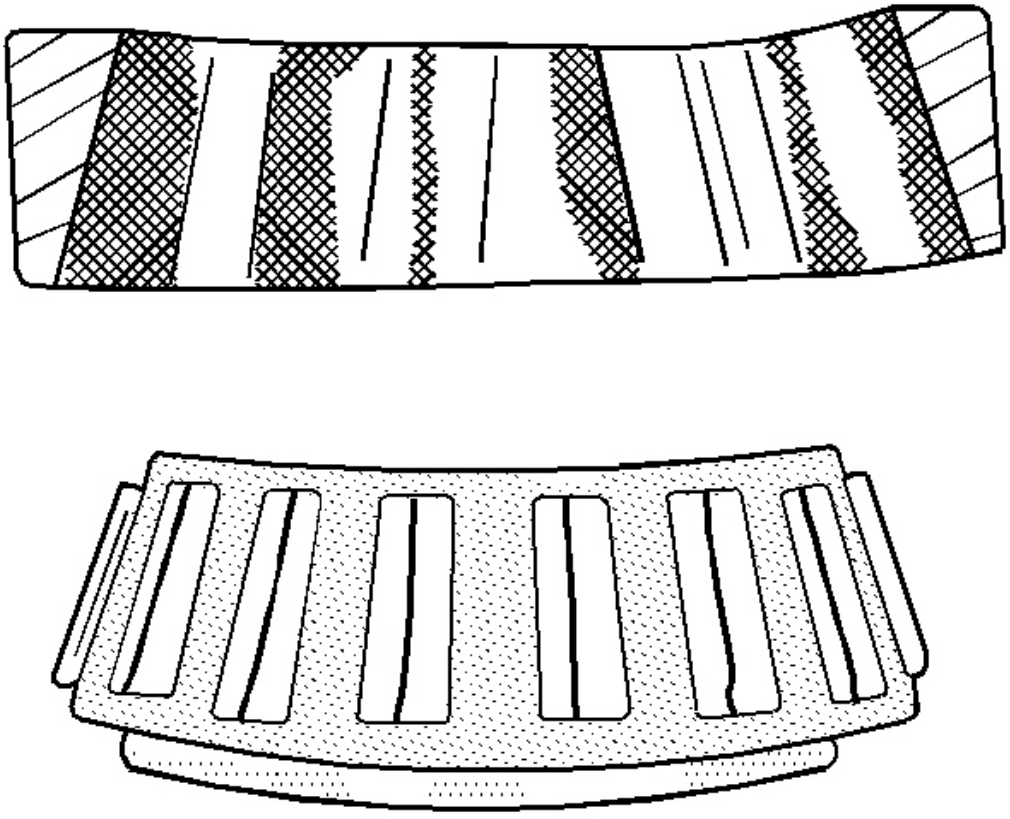


Fig. 26: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the race way caused by the rollers under impact loading or 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
- Inner axle tube assembly to differential carrier assembly mating surface
- Pinion yoke oil seal

- Vent tube and/or connector

Determining the Cause

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

Oil Seals

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

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

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

Sealing Surfaces

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

Differential Carrier Assembly

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

- Drain plug
- Fill plug
- Vent tube

Drain and fill plug leaks are usually caused by a loose plug. A vent tube leak can be cause 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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** .

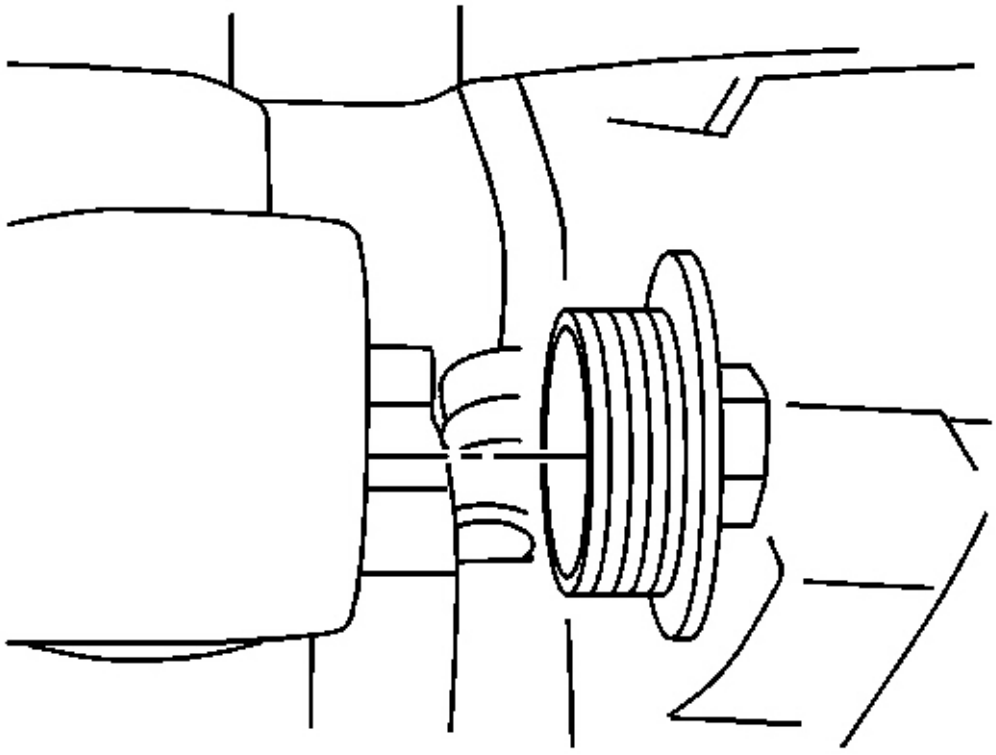


Fig. 27: View Of Front Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the fill plug.

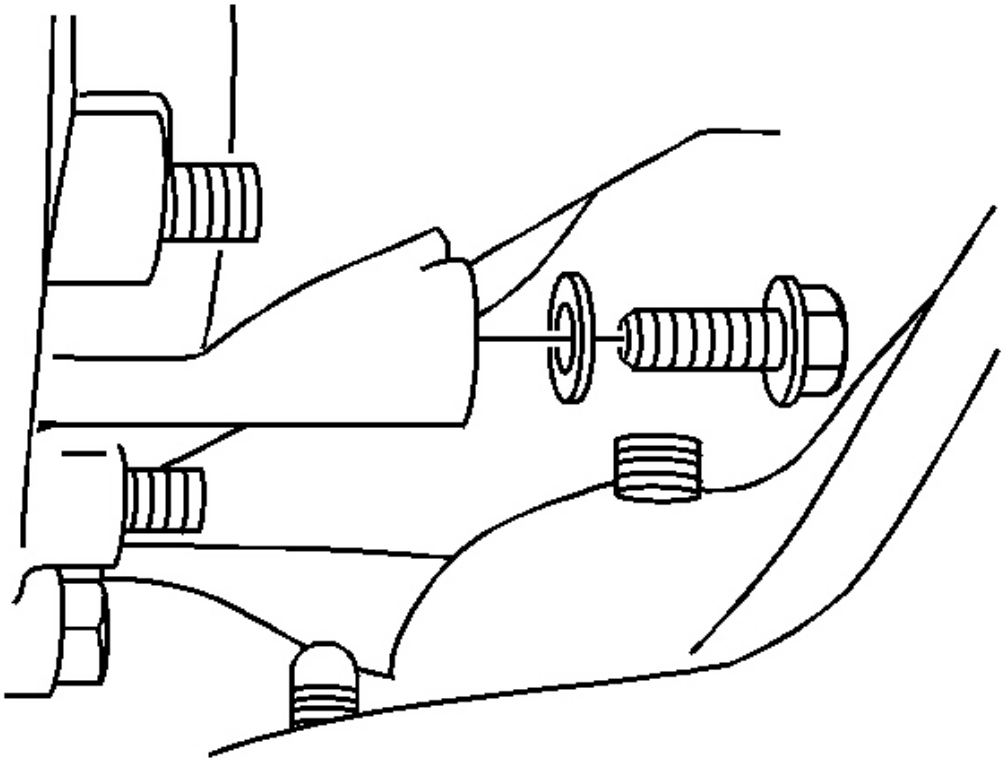


Fig. 28: View Of Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

4. Remove the drain plug and the washer.
5. Drain the fluid from the differential carrier assembly.

Installation Procedure

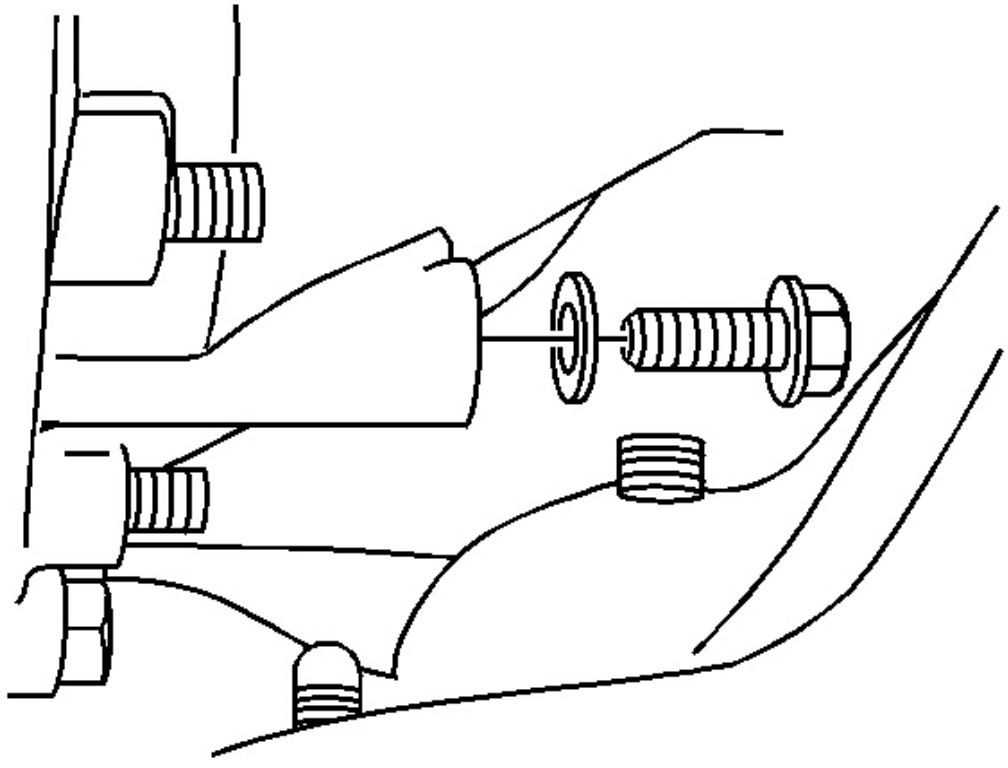


Fig. 29: View Of Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Install the drain plug and the washer.

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

2. Fill the differential carrier assembly with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .

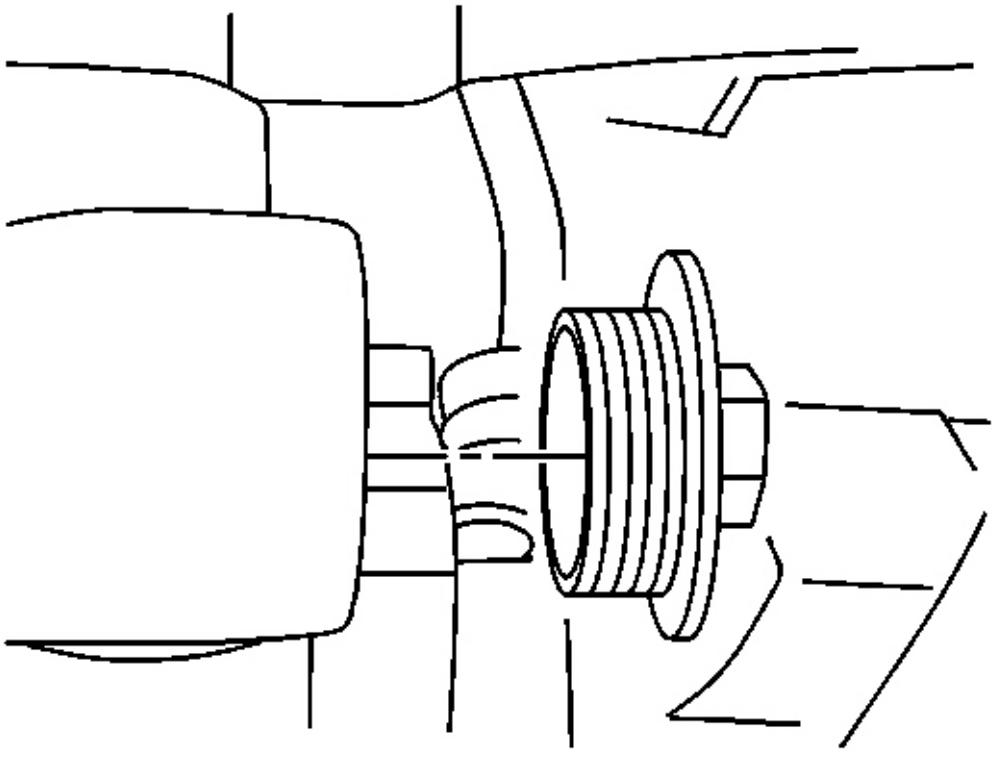


Fig. 30: View Of Front Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Install the fill plug.

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

4. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** .
5. Lower the vehicle.

VENT HOSE REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .

IMPORTANT: Make note of the routing in order to aid in reassembly.

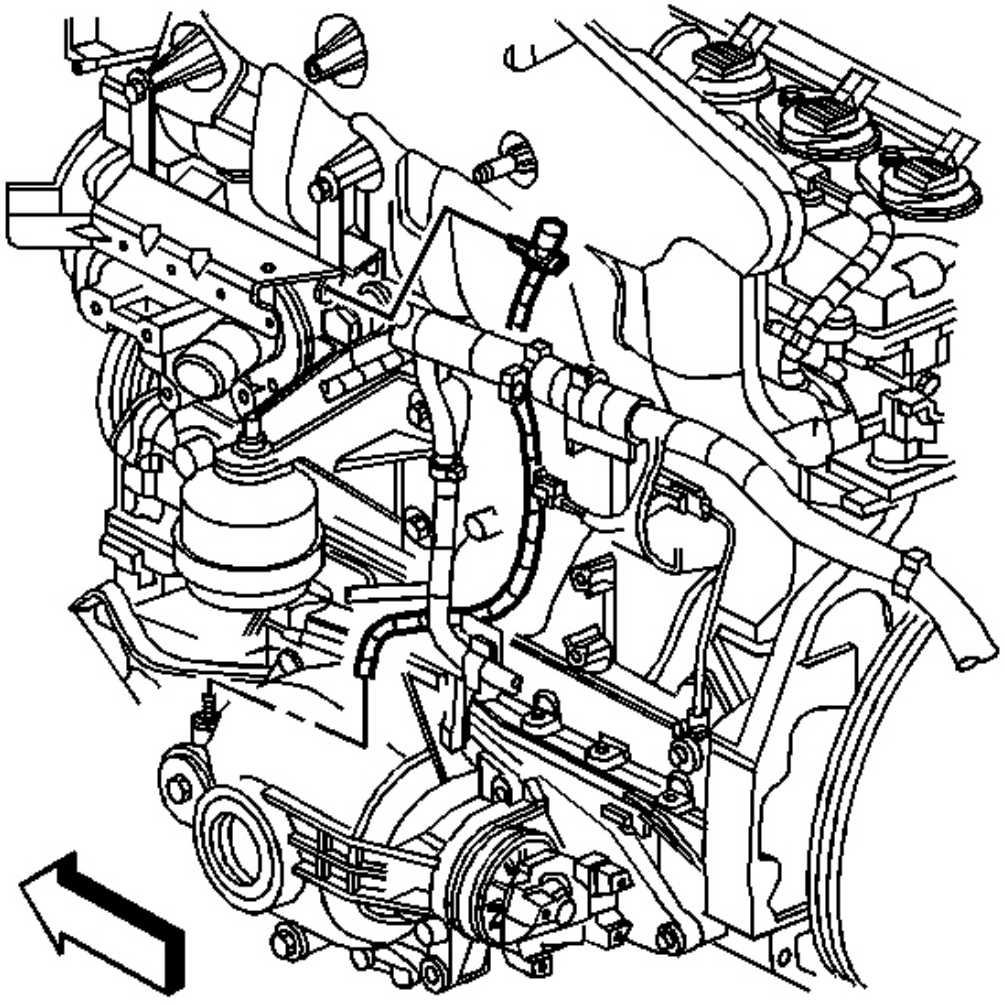


Fig. 31: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

2. Remove the vent hose from the top of the differential carrier assembly.
3. Remove the vent hose from the clip on the engine wiring harness bracket.
4. Remove the vent hose.

Installation Procedure

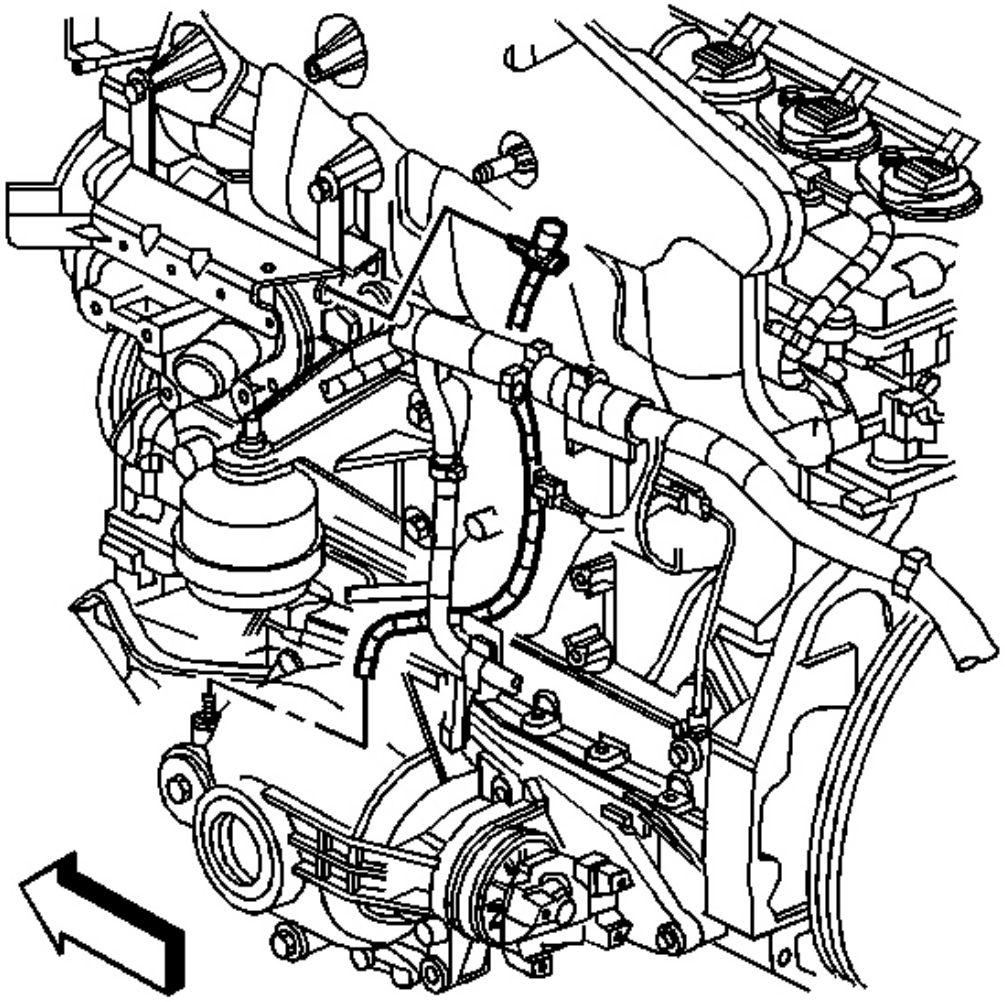


Fig. 32: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose to the differential carrier assembly.
    - Route the same way as when removed.
    - Ensure that the hose is free of kinks and is routed clear of sharp objects.
    - Ensure that the vent is not plugged.
2. Install the vent hose in the clip on the engine wiring harness bracket.
3. Lower the vehicle.

FRONT DRIVE AXLE INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT (S4WD)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .
3. Disconnect the electrical connector from the actuator.
4. Remove the wire harness clip from the intermediate shaft bearing assembly.

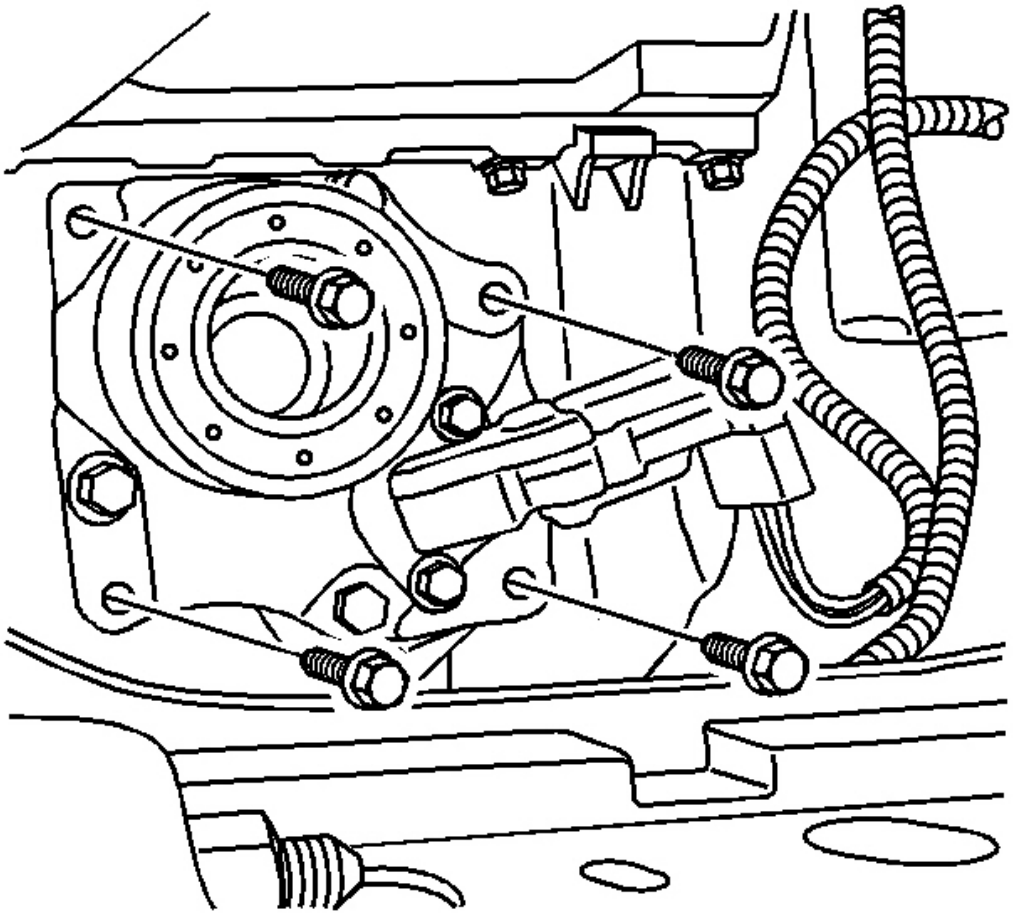


Fig. 33: View Of Intermediate Shaft Bearing Assembly Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the intermediate shaft bearing assembly mounting bolts.

IMPORTANT: Do not nick or cut the inboard (oil pan) side inner shaft seal.

6. Remove the intermediate shaft bearing assembly.

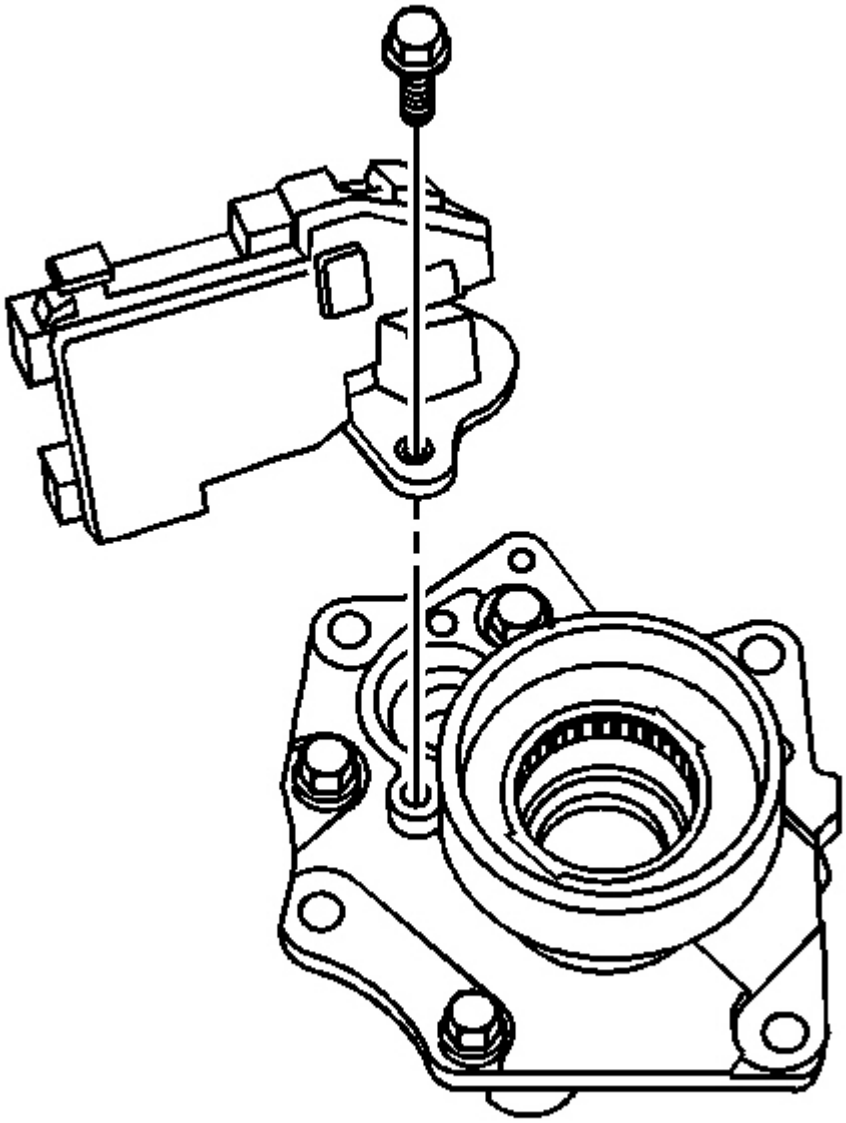


Fig. 34: View Of Actuator & Actuator Bolts
Courtesy of GENERAL MOTORS CORP.

7. Remove the actuator from the intermediate shaft bearing assembly.

Installation Procedure

1. Install the actuator to the intermediate shaft bearing assembly.

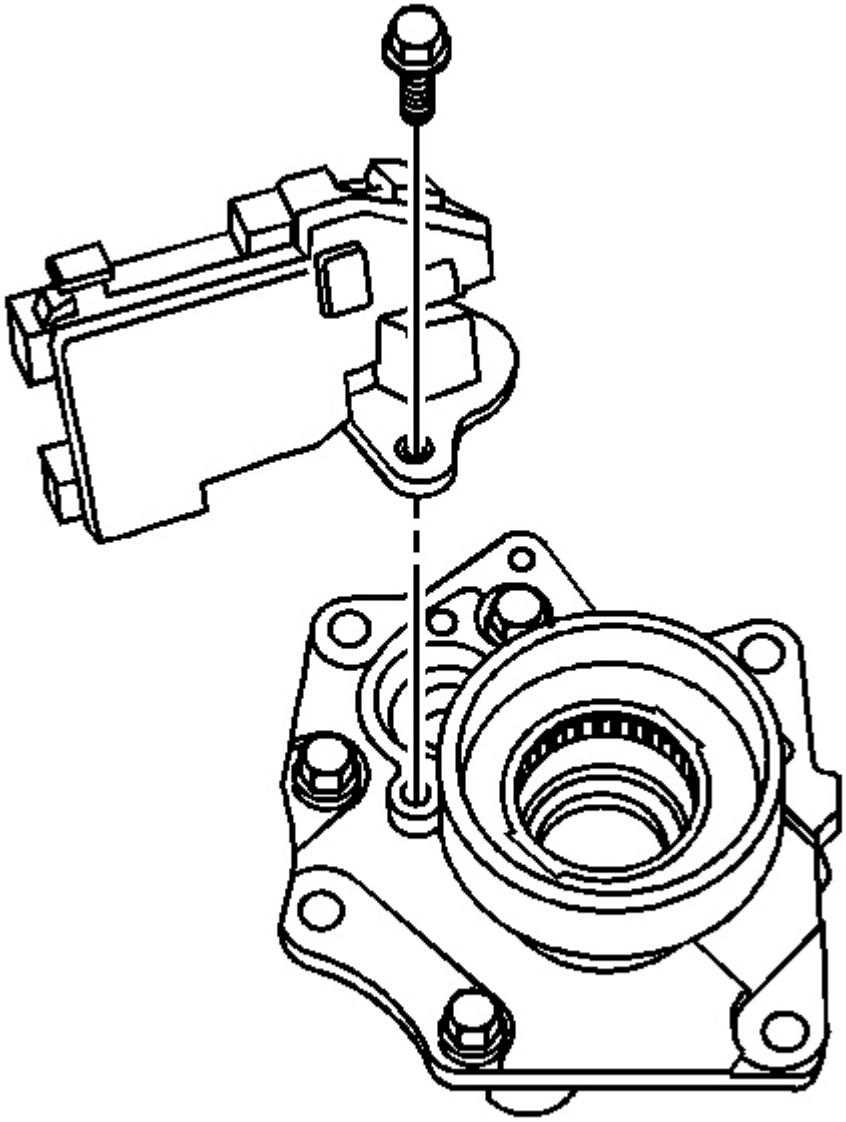


Fig. 35: View Of Actuator & Actuator Bolts

Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the actuator assembly to intermediate shaft bearing assembly mounting bolts.

   Tighten: Tighten the actuator assembly mounting bolts to 6 N.m (53 lb in).

IMPORTANT: Do not nick or cut the inboard (oil pan) inner shaft seal.

3. Install the intermediate shaft bearing assembly to the oil pan.

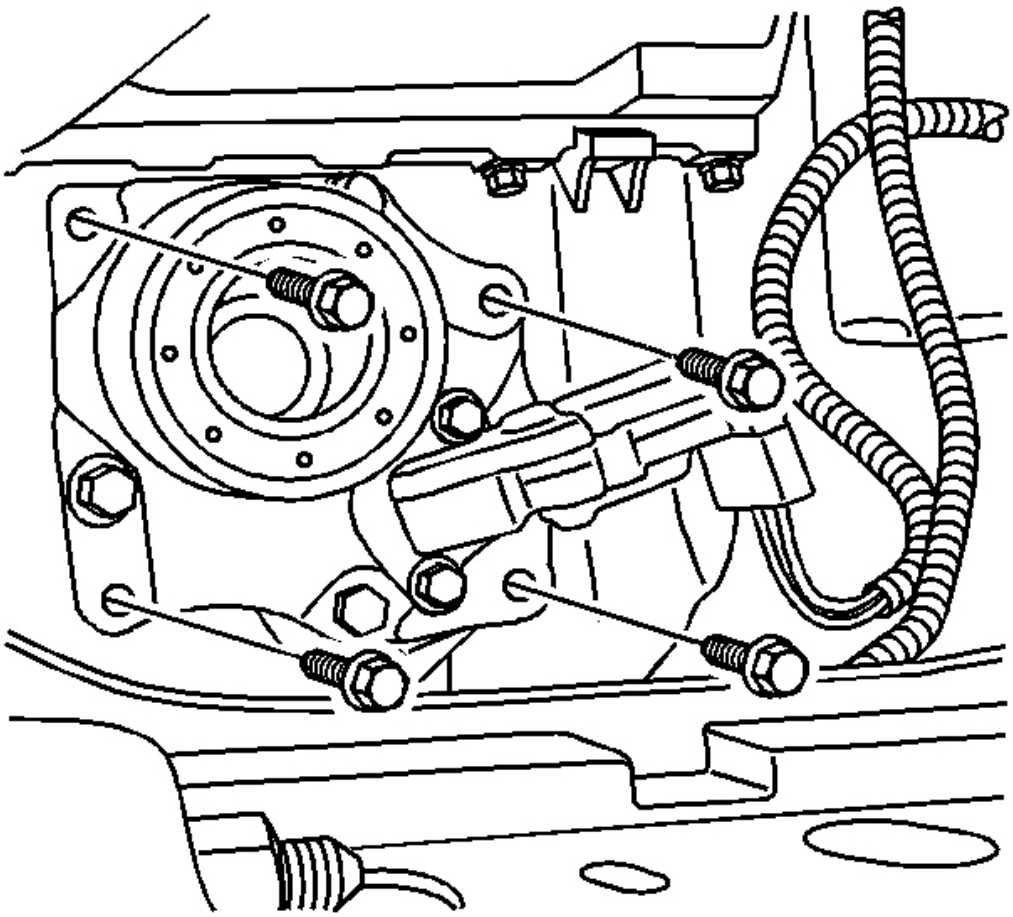


Fig. 36: View Of Intermediate Shaft Bearing Assembly Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

4. Install the intermediate shaft bearing assembly mounting bolts.

   Tighten: Tighten the intermediate shaft bearing assembly mounting bolts to 48 N.m (35 lb ft).

5. Install the wire harness clip.
6. Connect the electrical connector.
7. Install the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .
8. Lower the vehicle.

FRONT DRIVE AXLE INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT (A4WD)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .

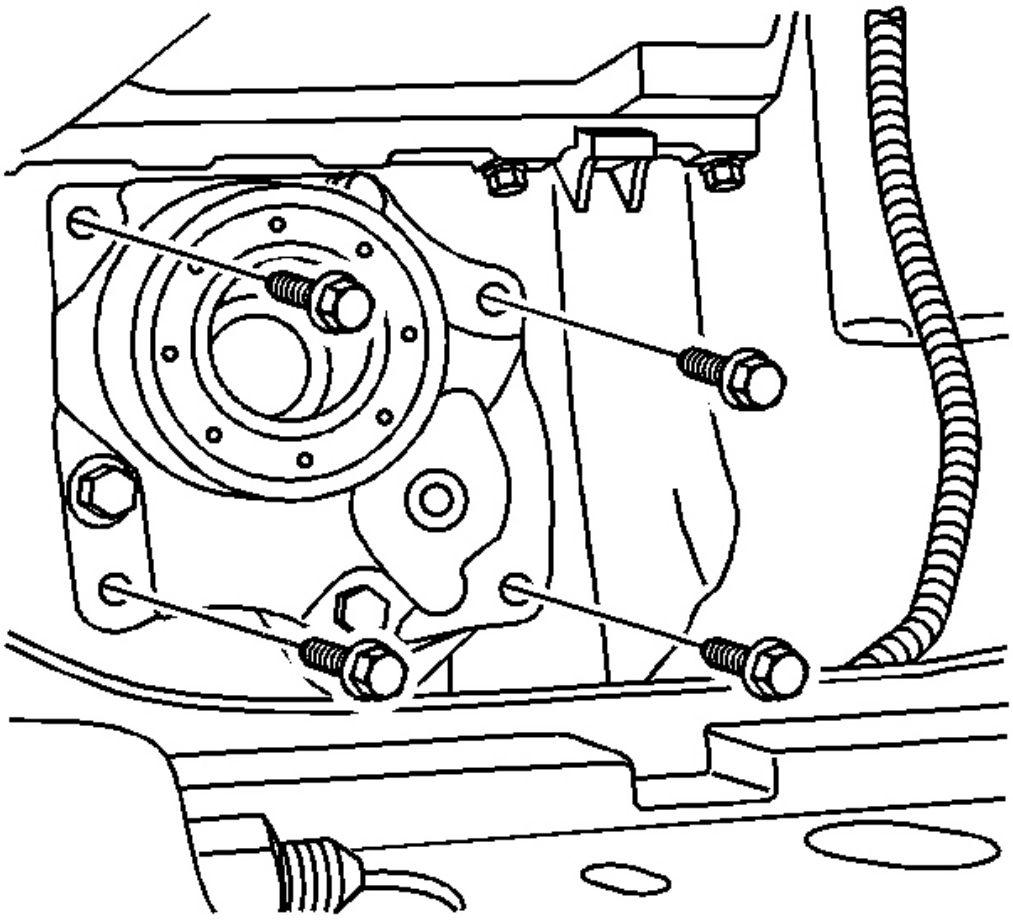


Fig. 37: View Of Intermediate Shaft Bearing Assembly Mounting Bolts - Front Drive Axle (A4WD)
Courtesy of GENERAL MOTORS CORP.

3. Remove the intermediate shaft bearing assembly mounting bolts.
4. Remove the wire harness clip from the intermediate shaft bearing assembly.

IMPORTANT: Do not nick or cut the inboard (oil pan) inner shaft seal.

5. Remove the intermediate shaft bearing assembly.

Installation Procedure

IMPORTANT:

- **Do not nick or cut the inboard (oil pan) inner shaft seal.**

- **The intermediate shaft bearing assembly must fit flush against the oil pan in order for the inner axle shaft and the intermediate shaft bearing assembly to be properly installed.**

1. Install the intermediate shaft bearing assembly to the oil pan.

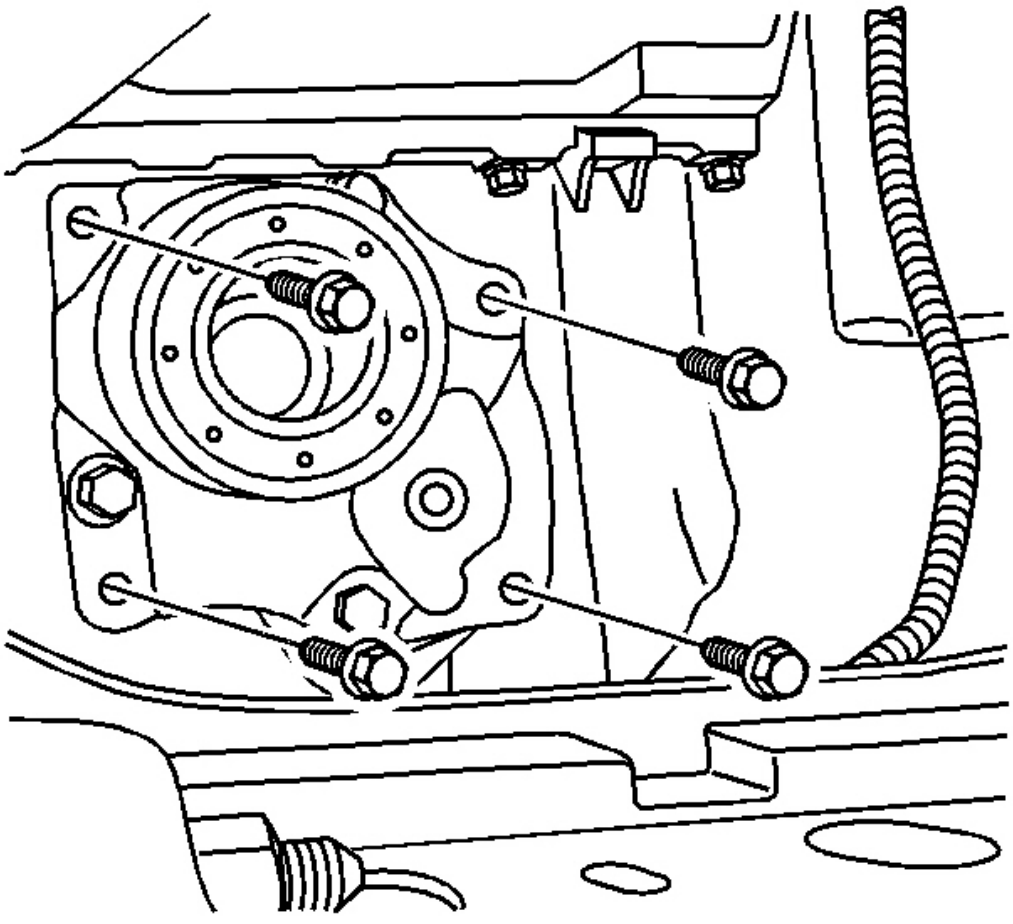


Fig. 38: View Of Intermediate Shaft Bearing Assembly Mounting Bolts - Front Drive Axle (A4WD)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the intermediate shaft bearing assembly mounting bolts.

Tighten: Tighten the intermediate shaft bearing assembly bolts to 48 N.m (35 lb ft).

3. Install the wire harness clip.
4. Install the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .
5. Lower the vehicle.

INTERMEDIATE SHAFT BEARING ASSEMBLY OIL SEAL REPLACEMENT

Tools Required

- **J 2619-01** Slide Hammer with Adapter
- **J 29369-2** Bushing and Bearing Remover (2-3 in). See **Special Tools**.
- **J 45225** Axle Seal Installer. See **Special Tools**.
- **J 45359** Axle Seal Installer
- **J 6125-B** Slide Hammer. See **Special Tools**.
- **J 8092** Universal Driver Handle 3/4 in - 10

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .

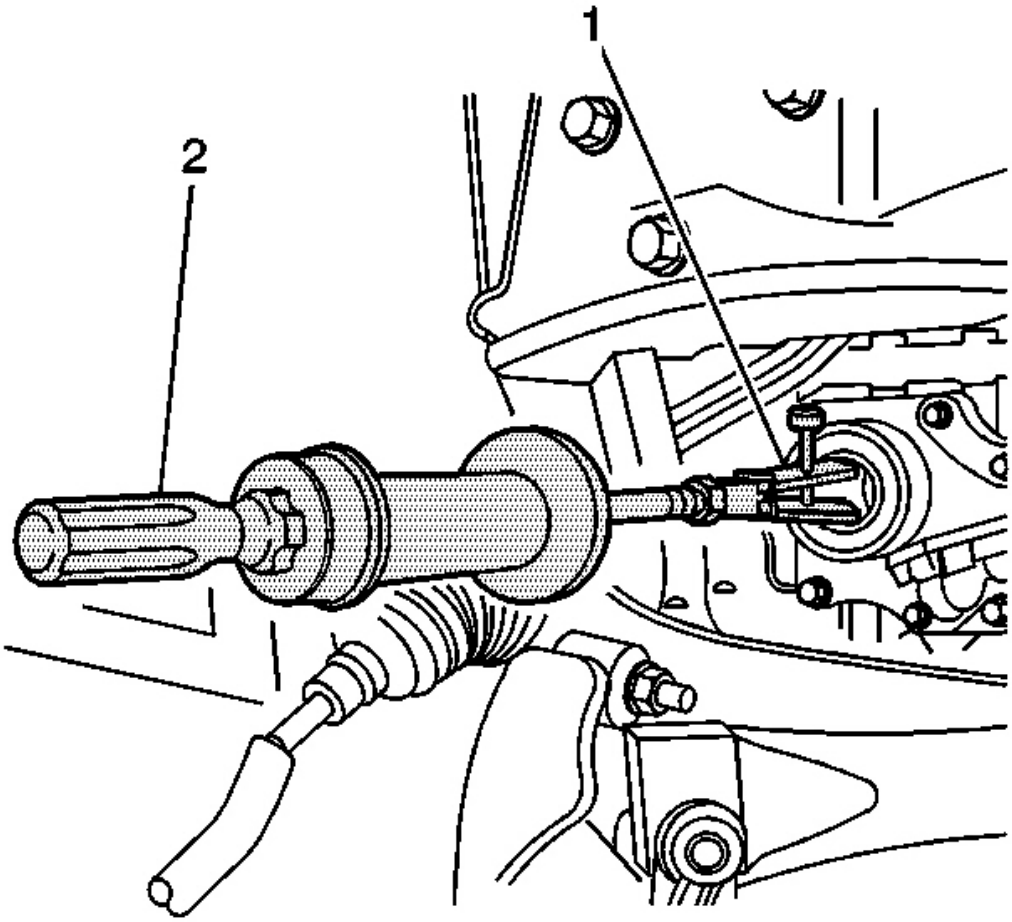


Fig. 39: Identifying Special Tools J 29369--2 & J 6125--B
Courtesy of GENERAL MOTORS CORP.

3. Install the **J 29369-2** (1) and the **J 6125-B** (2) into the outboard, wheel drive shaft side, oil seal as shown. See **Special Tools**.
4. Remove the outboard, wheel drive shaft side, inner shaft seal by pulling on the **J 6125-B** (2). See **Special Tools**.
5. To replace the inboard, oil pan side side, inner shaft seal, remove the intermediate shaft bearing assembly. Refer to **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (S4WD)** or **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (A4WD)**.
6. Install the intermediate shaft bearing assembly into a vise.

   Place shop towels in the vise in order to protect the intermediate shaft bearing assembly.

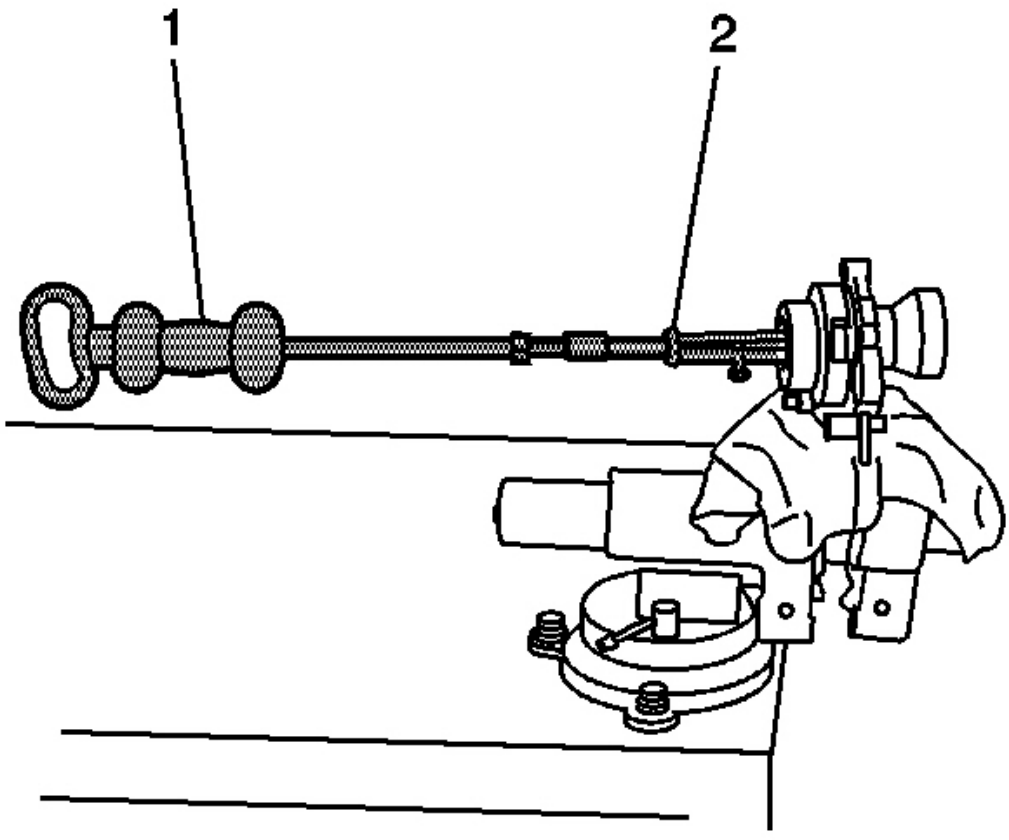


Fig. 40: Identifying Special Tools J 29369-2 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

7. Install the **J 29369-2** (2) and the **J 2619-01** (1) into the inboard, oil pan side, oil seal as shown.
8. Remove the inboard, oil pan side, seal by pulling on the **J 2619-01** (1).

Installation Procedure

1. Install the new inboard, oil pan side, inner shaft seal on top of the seal bore.

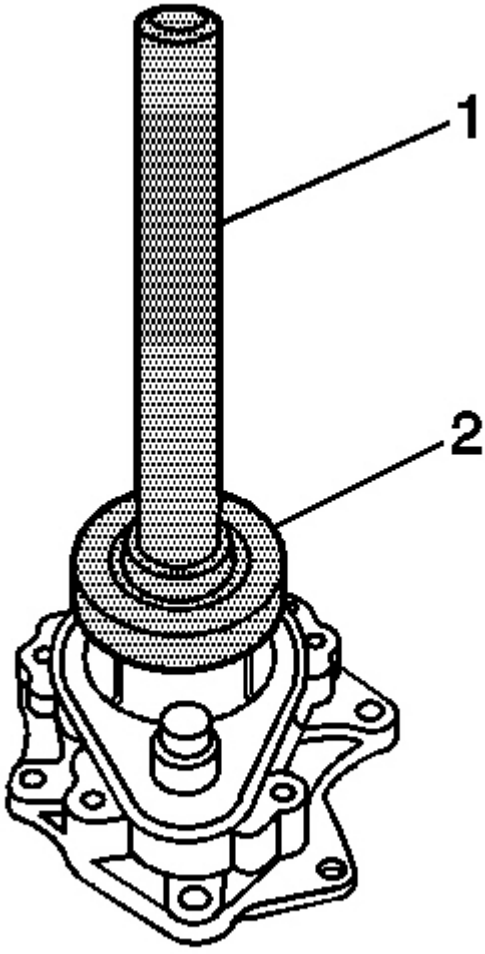


Fig. 41: Identifying Axle Seal Installer & Universal Driver Handle
Courtesy of GENERAL MOTORS CORP.

2. Install the new seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.
3. Install the intermediate shaft bearing assembly. Refer to **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (S4WD)** or **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (A4WD)**.

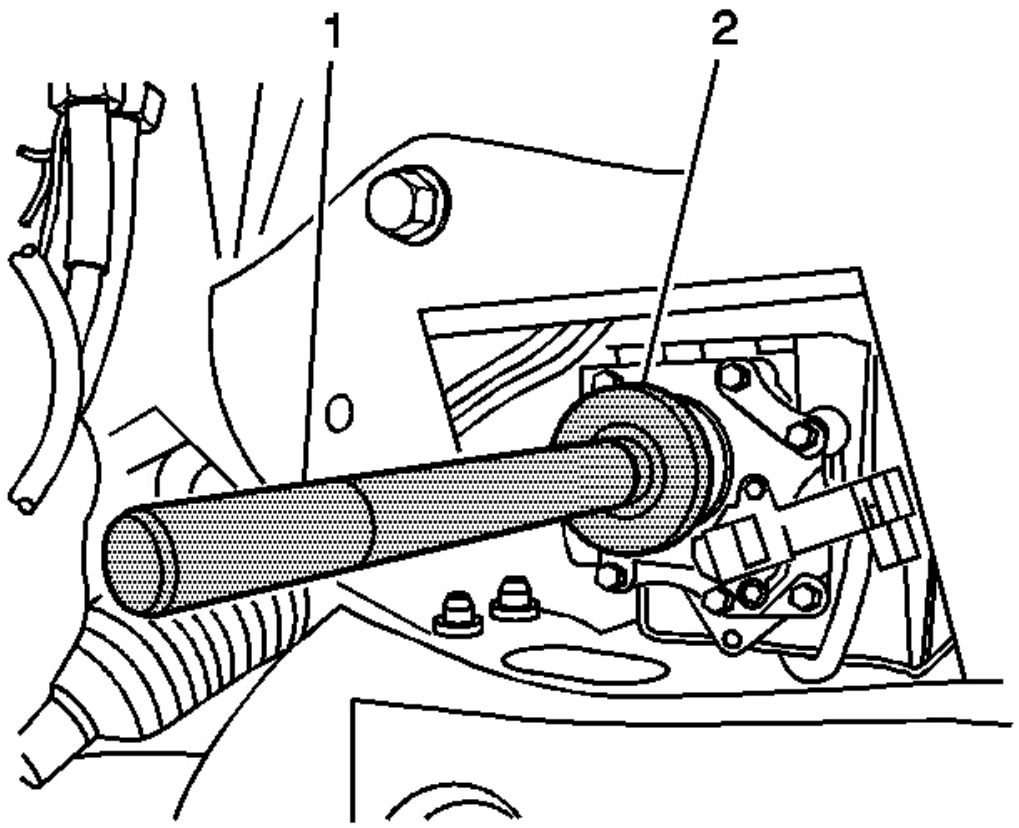


Fig. 42: Identifying Special Tools J 45359 & J 8092
Courtesy of GENERAL MOTORS CORP.

NOTE: The outboard intermediate shaft bearing assembly seal must be installed 0.9-1.1 mm (0.035-0.043 in) below the surface of the intermediate shaft bearing assembly housing bore. If the seal is not installed properly, damage to the seal may occur.

4. Install the new oil seal using the **J 45359** (2) and the **J 8092** (1).
5. Install the right wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .
6. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT

Tools Required

- **J 6125-B** Slide Hammer. See **Special Tools**.
- **J 45104** Axle Remover Adapter. See **Special Tools**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the lubricant from the differential carrier assembly. Refer to **Front Axle Lubricant Replacement**.
3. Remove the intermediate shaft bearing assembly. Refer to **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (S4WD)** or **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (A4WD)**.
4. Install the **J 45104** to the **J 6125-B** . See **Special Tools**.
5. Install the **J 45104** and the **J 6125-B** into the threaded hole on the inner axle shaft. See **Special Tools**.

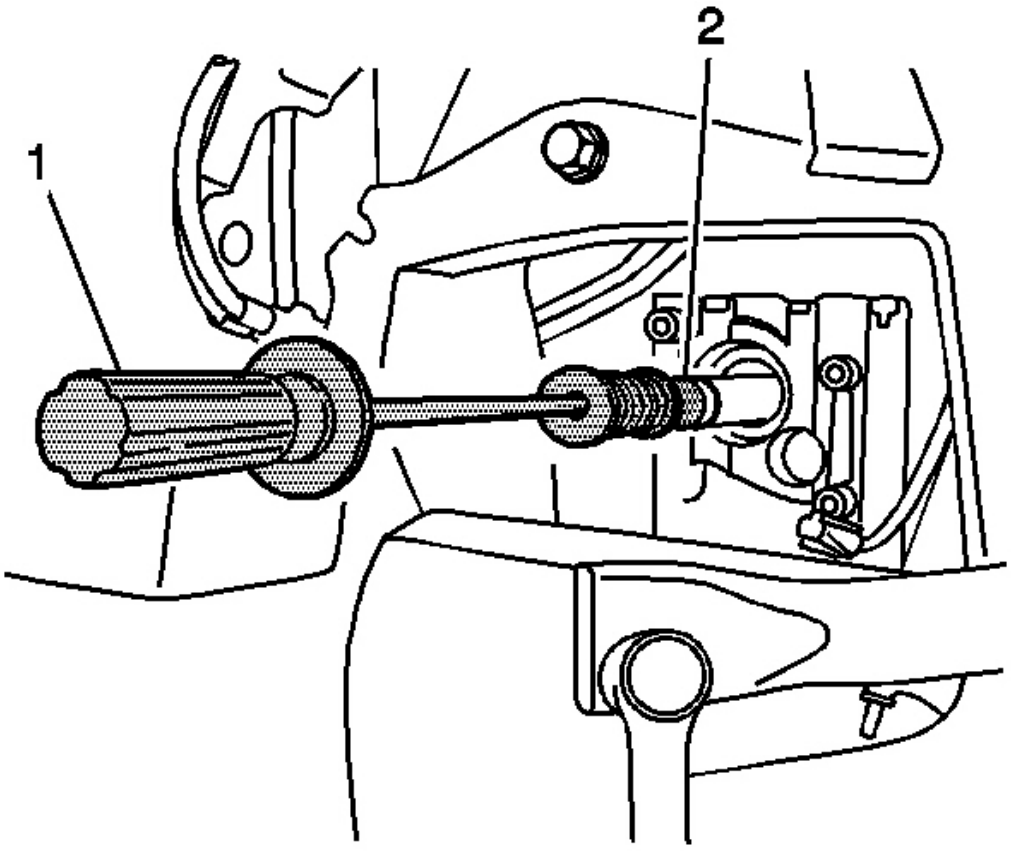


Fig. 43: Identifying Slide Hammer & Axle Remover Adapter
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not nick or cut the inboard (oil pan) side differential carrier assembly oil seal.

6. Remove the inner axle shaft using the **J 6125-B** (1) and the **J 45104** (2). See **Special Tools**.

   Support the inner axle shaft as necessary to in order to pull the inner axle shaft from the differential carrier assembly and evenly through the oil pan.

Installation Procedure

1. Install the **J 45104** and the **J 6125-B** to the inner axle shaft. See **Special Tools**.
2. While supporting the **J 6125-B** and the **J 45104** with the inner axle shaft, place the inner axle shaft into the inner axle shaft opening in the oil pan. See **Special Tools**.

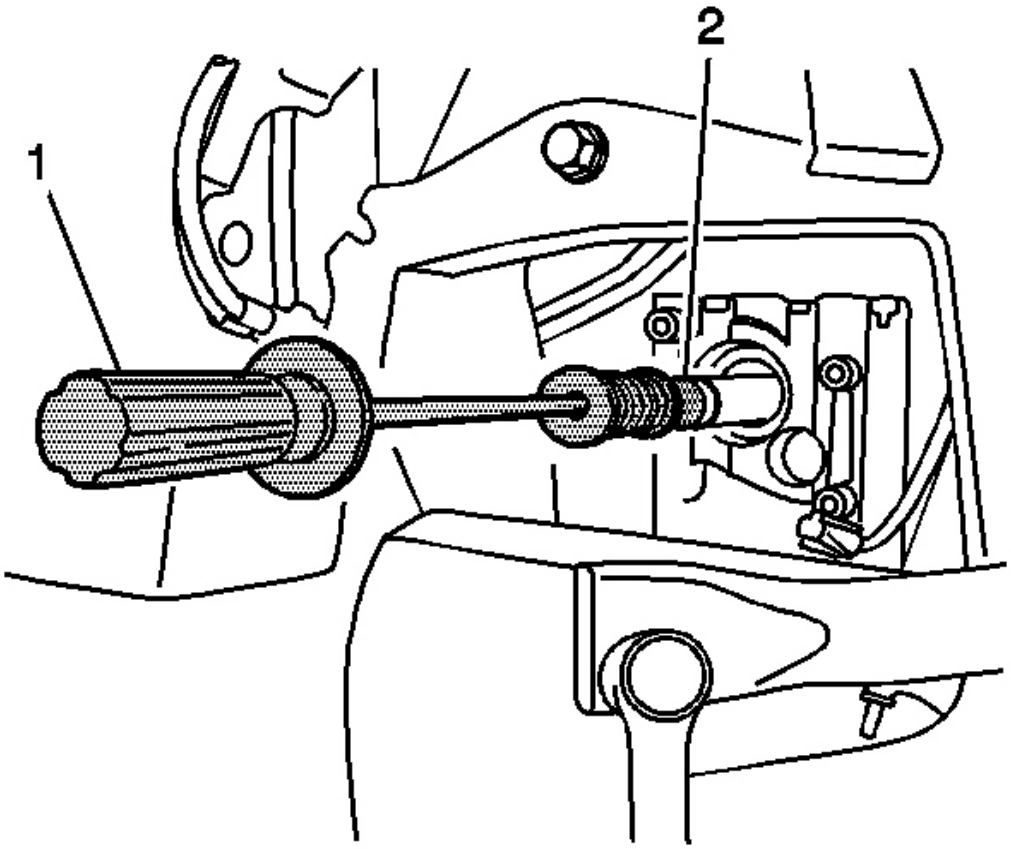


Fig. 44: Identifying Slide Hammer & Axle Remover Adapter
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not nick or cut the differential carrier assembly oil seal.

3. Using the **J 6125-B** (1) and the **J 45104** (2), carefully guide the inner axle shaft through the oil pan and differential carrier assembly oil seal into the differential side gear turning as necessary in order to align the inner axle shaft splines with the differential side gear splines. See **Special Tools**.
4. Using the **J 6125-B** , push the inner axle shaft into the differential side gear until the retaining ring snaps the inner axle shaft into place. See **Special Tools**.

   Pull on the inner axle shaft to ensure that it is locked into position.

5. Remove the **J 45104** and the **J 6125-B** . See **Special Tools**.
6. Install the intermediate shaft bearing assembly. Refer to **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (S4WD)** or **Front Drive Axle Intermediate Shaft Bearing Assembly Replacement (A4WD)**.
7. Add lubricant to the differential carrier assembly. Use the proper fluid. Refer to **Front Axle Lubricant Replacement**.
8. Lower the vehicle.

FRONT DRIVE AXLE ACTUATOR REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** .
3. Disconnect the electrical connector from the actuator assembly.

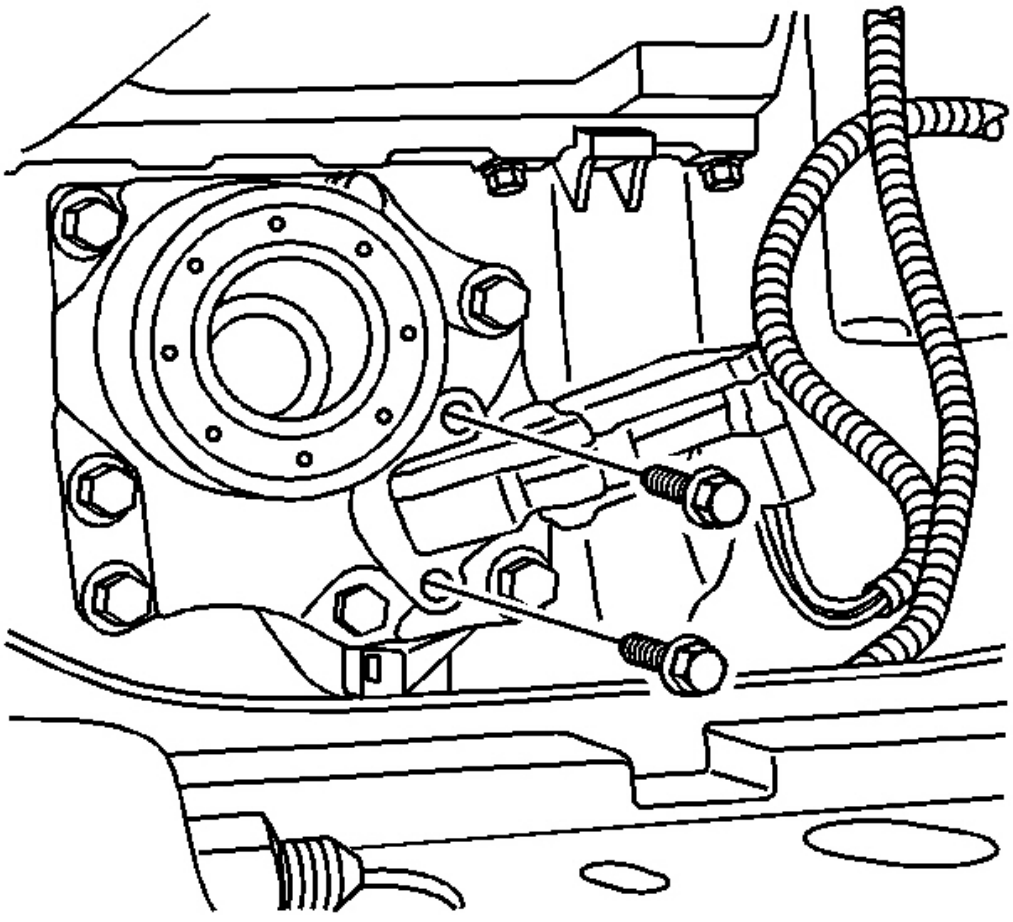


Fig. 45: Actuator Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the actuator assembly bolts.
5. Remove the actuator assembly.

Installation Procedure

1. Install the actuator assembly.

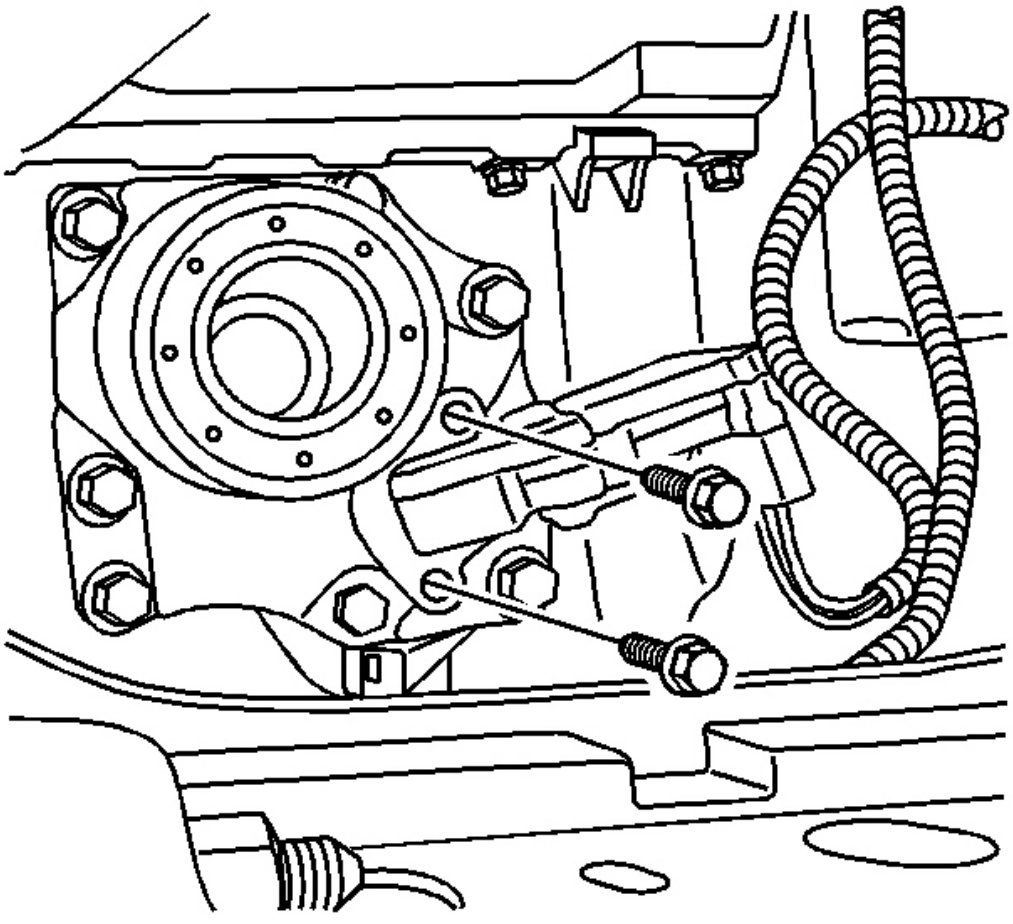


Fig. 46: Actuator Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

2. Install the actuator assembly bolts.

   Tighten: Tighten the bolts to 6 N.m (53 lb in).

3. Connect the electrical connector to the actuator assembly.
4. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** .
5. Lower the vehicle.

FRONT DIFFERENTIAL DRIVE PINION FLANGE/YOKE, SEAL & DUST DEFLECTOR

REPLACEMENT

Tools Required

- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 33782** Pinion Oil Seal Installer. See **Special Tools**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine protection shield. Refer to **Engine Protection 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 rear steering gear crossmember. Refer to **Rear Steering Gear Crossmember Replacement** .

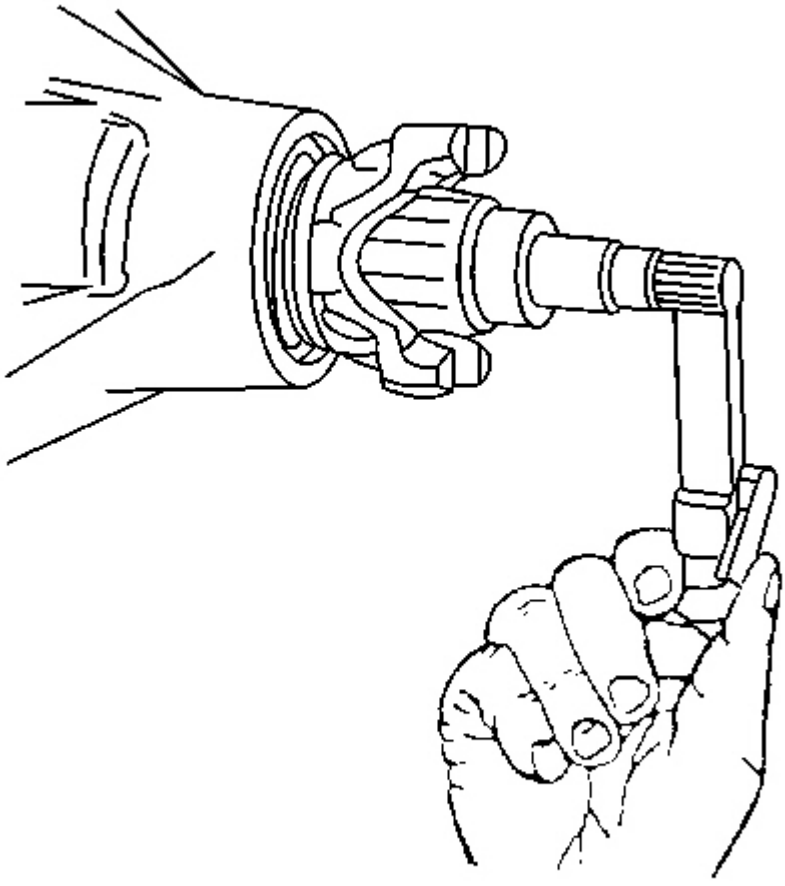


Fig. 47: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS CORP.

6. Measure the torque required in order to rotate the pinion. Use 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

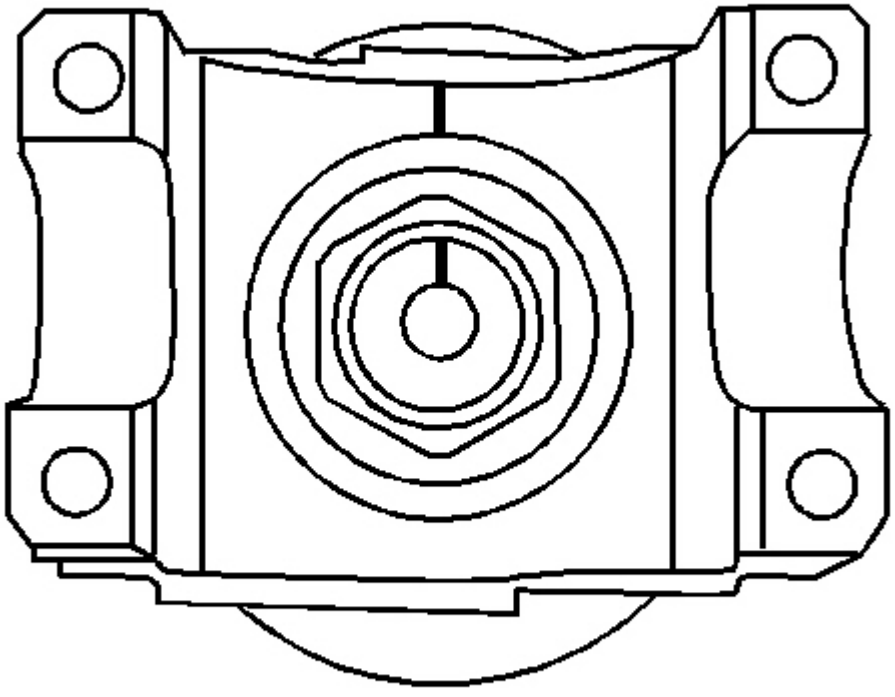


Fig. 48: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

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

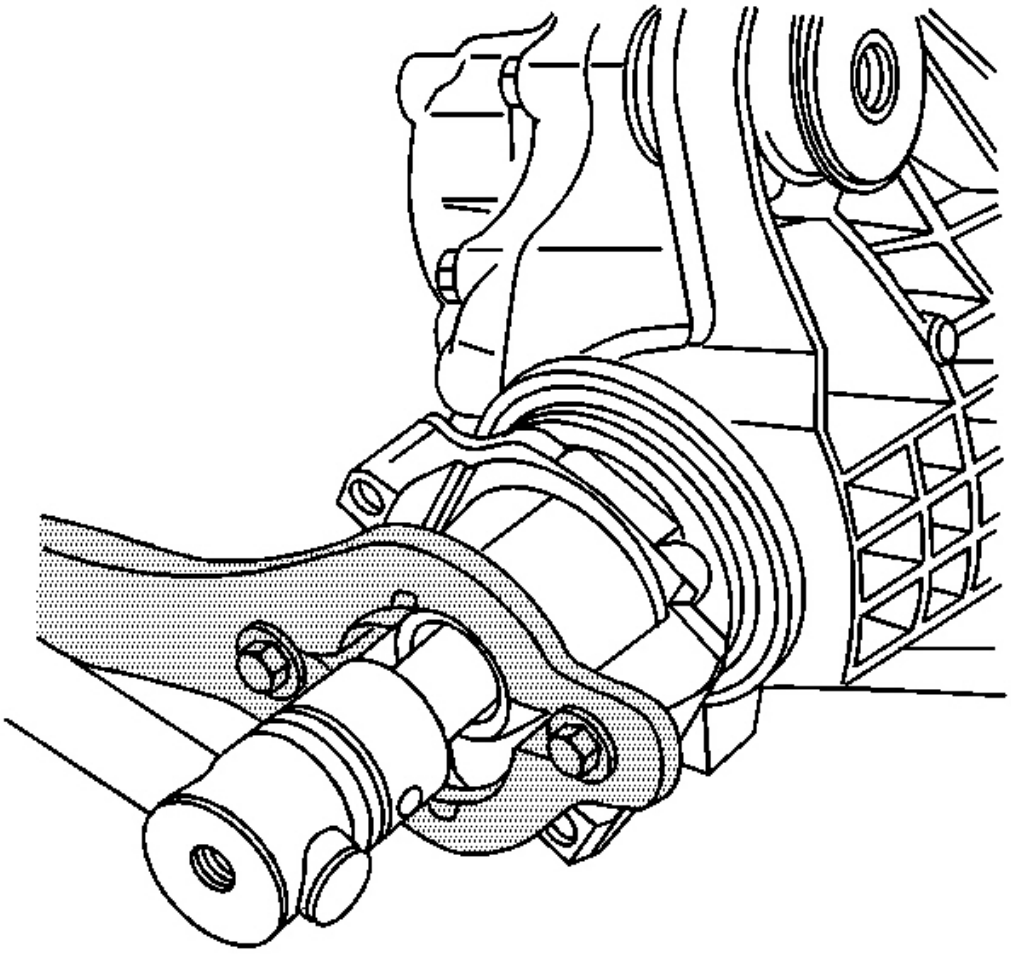


Fig. 49: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

8. Install the **J 8614-01** onto the pinion as shown. See **Special Tools**.
9. Remove the pinion nut while holding the **J 8614-01** . See **Special Tools**.

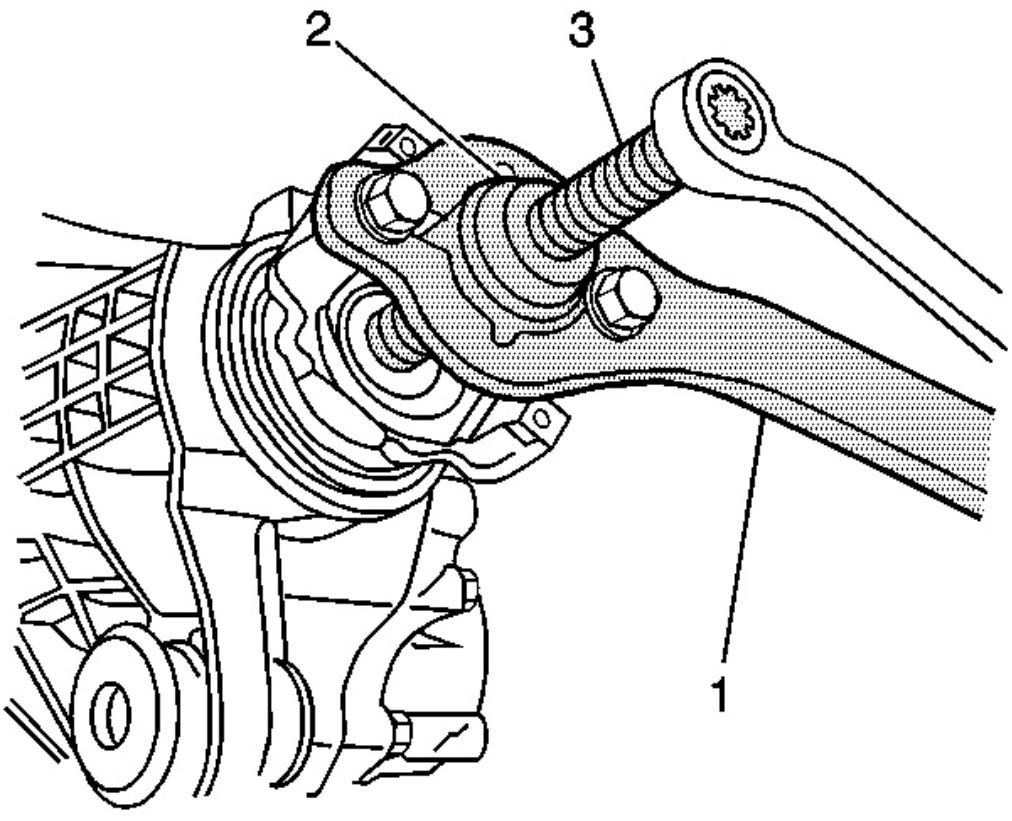


Fig. 50: Removing Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

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 pinon 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.

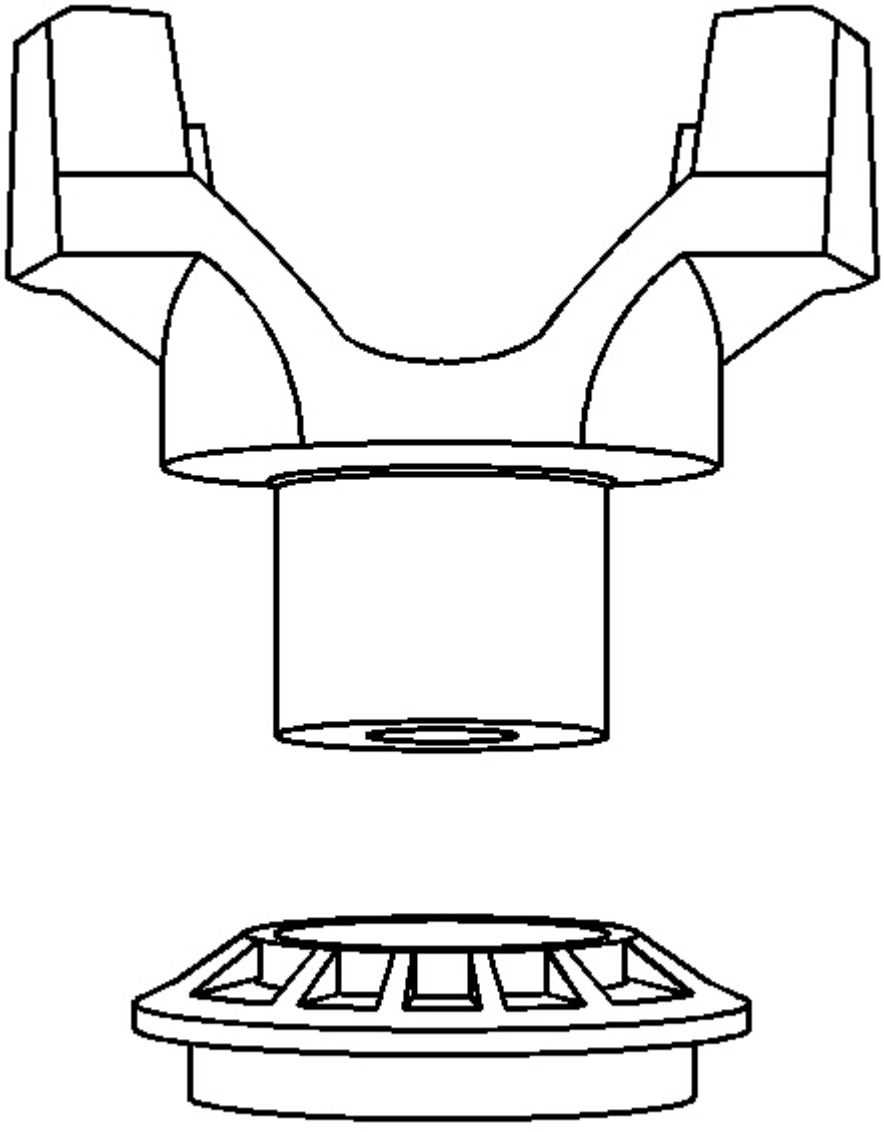


Fig. 51: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

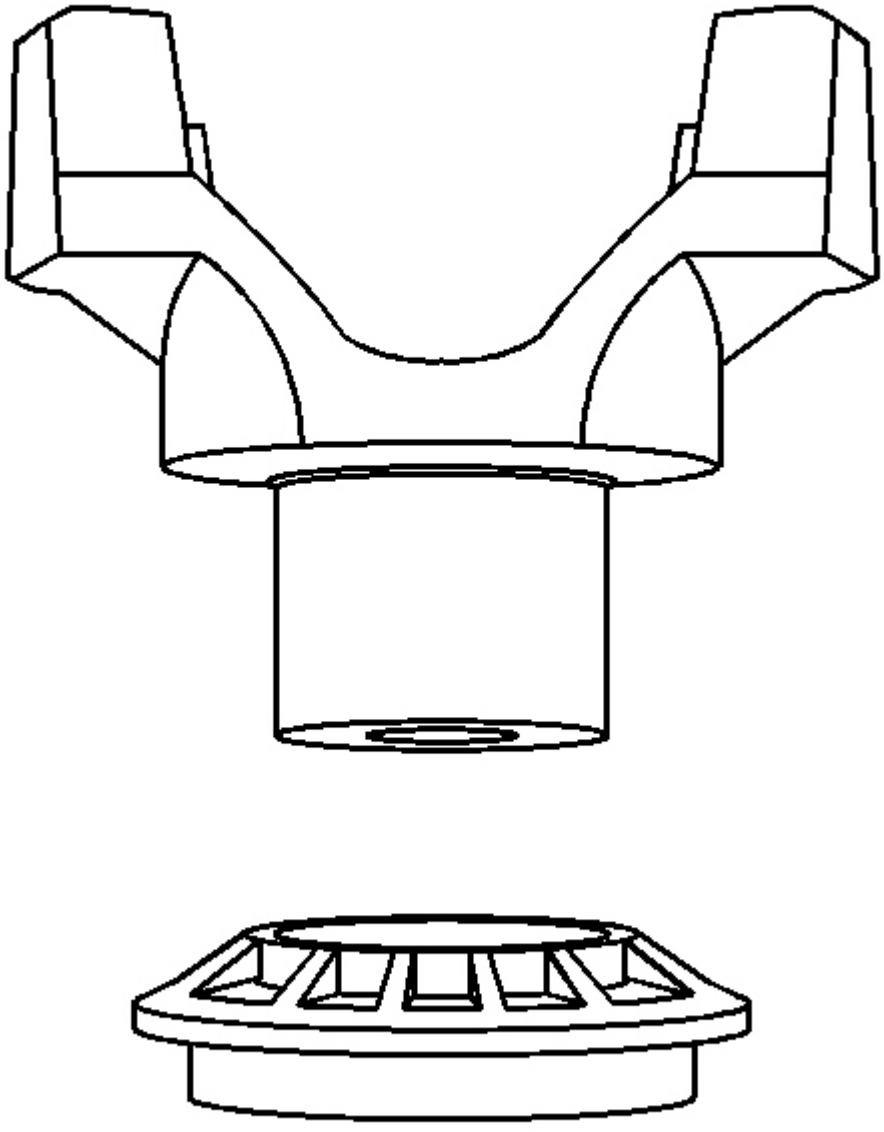


Fig. 52: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

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

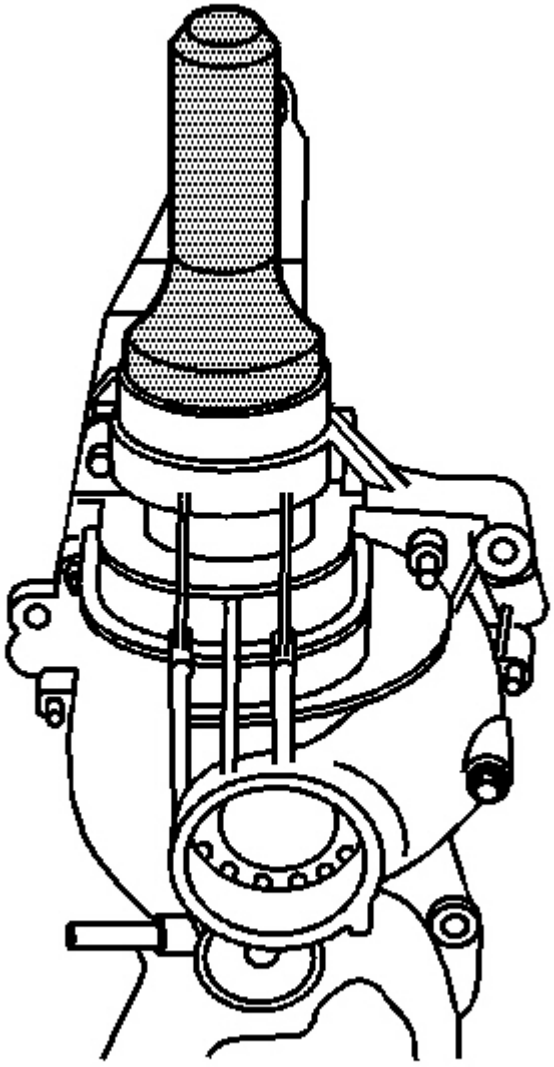


Fig. 53: View Of Pinion Oil Seal Installer
Courtesy of GENERAL MOTORS CORP.

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 33782** over the oil seal. See **Special Tools**.
3. Strike the **J 33782** 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.

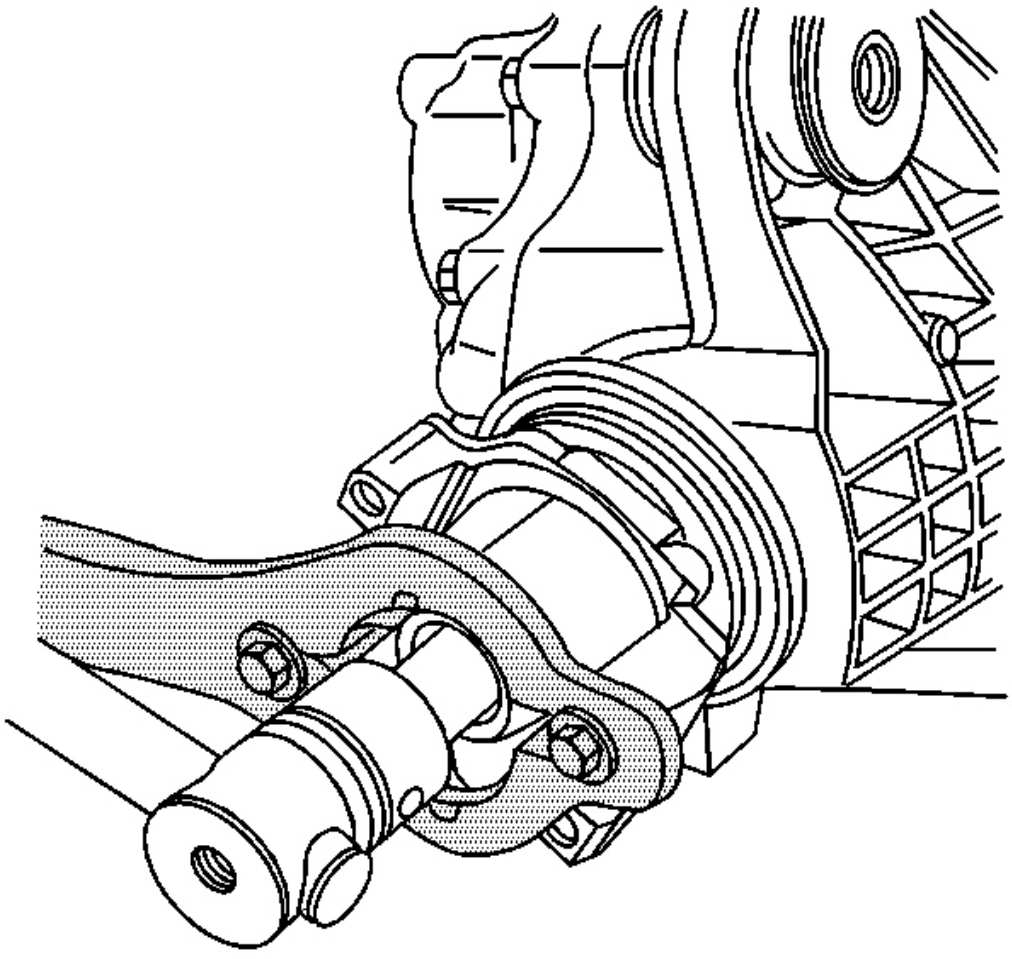


Fig. 54: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

7. 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.

8. 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.

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 rear steering gear crossmember. Refer to **Rear Steering Gear Crossmember Replacement** .
13. Install the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
14. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** .
15. Fill the drive axle. Refer to **Front Axle Lubricant Replacement**.
16. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT (4.2L IN-LINE SIX CYLINDER)

Removal Procedure

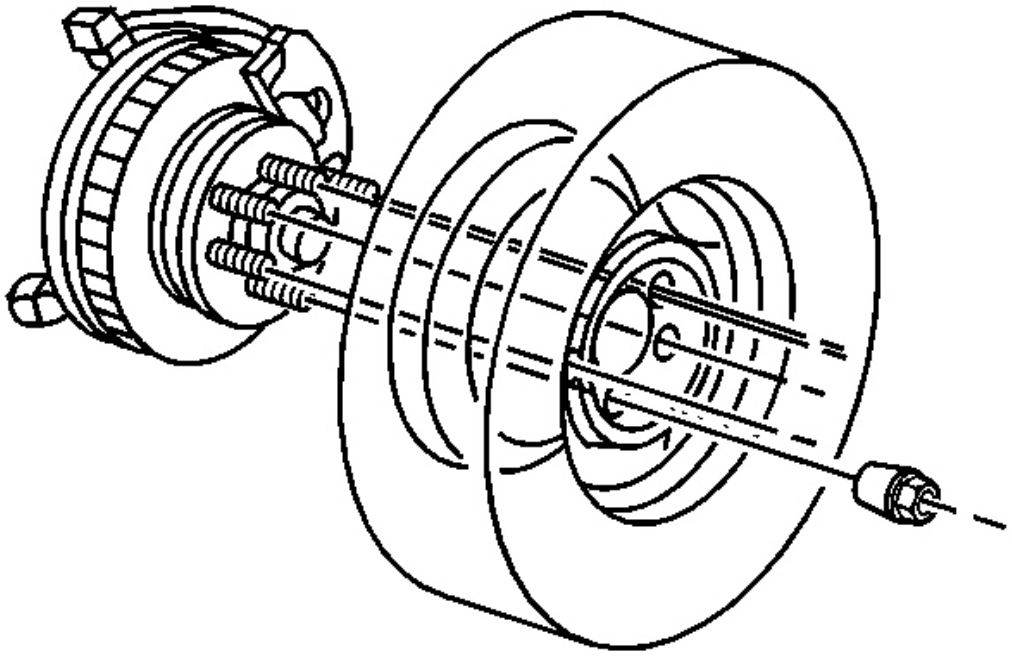


Fig. 55: View Of Tire/Wheel Assembly, Hub Assembly & Wheel Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the front tires and wheels. Refer to **Tire and Wheel Removal and Installation** .

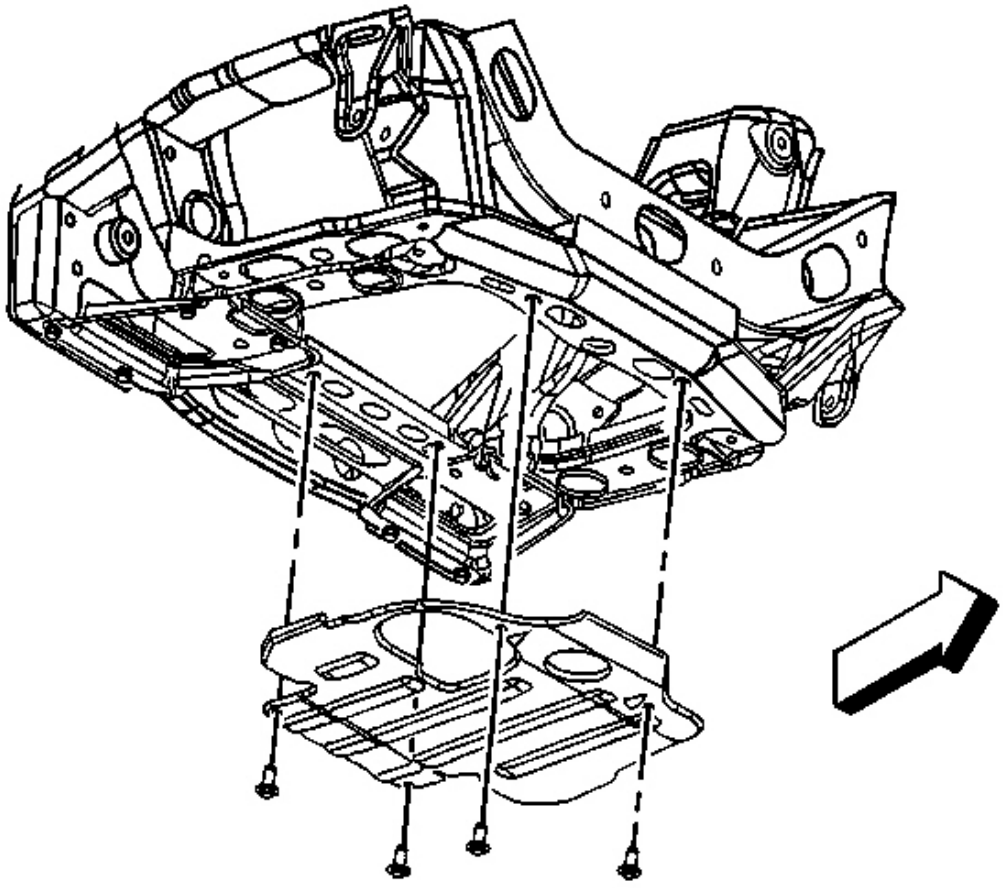


Fig. 56: Identifying Engine Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** .
3. Drain the engine of oil.
4. Drain the front drive axle. Refer to **Front Axle Lubricant Replacement**.
5. Remove the front propeller shaft from the front axle. Refer to **Front Propeller Shaft Replacement** .
6. Wrap the bearing caps with tape in order to prevent the loss of the roller bearings.

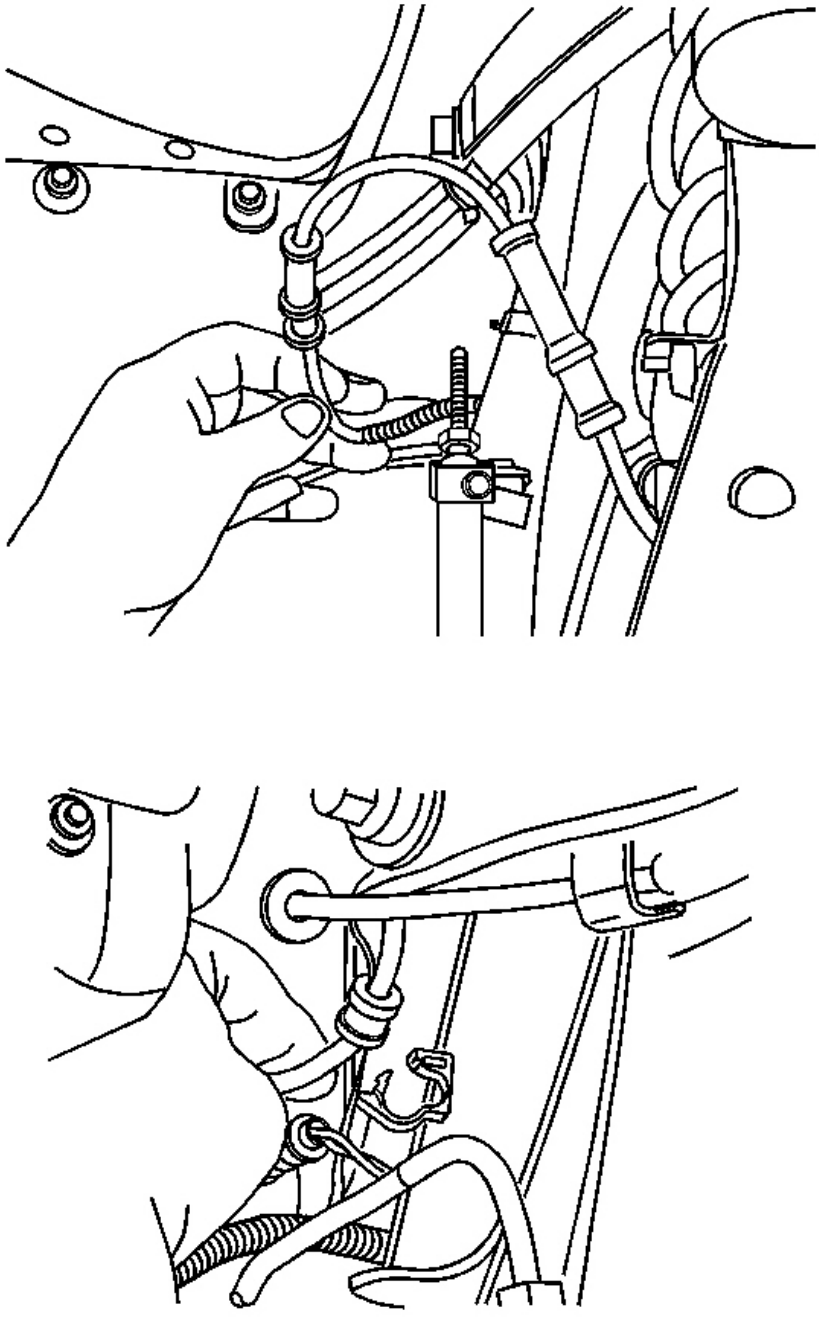


Fig. 57: Identifying Wheel Speed Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

7. Remove the antilock brake system (ABS) wiring harness from the retainers.

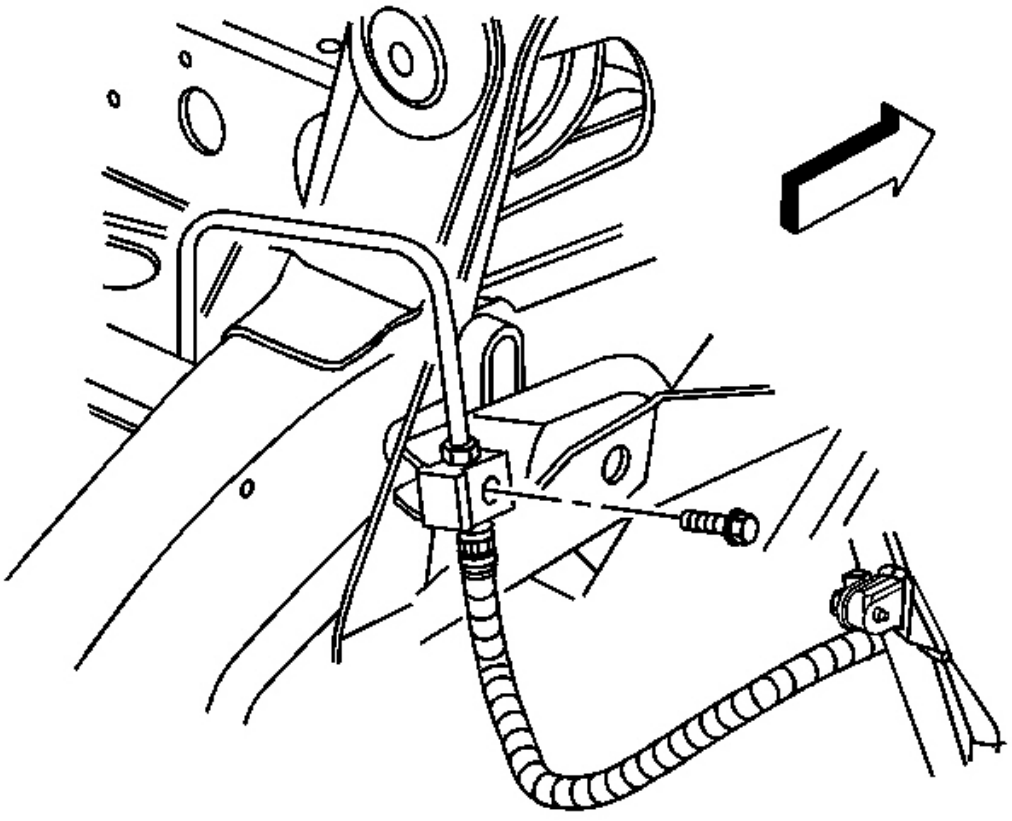


Fig. 58: Identifying Front Brake Hose Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake hose retaining bolts.
9. Remove the front drive axle vent hose.

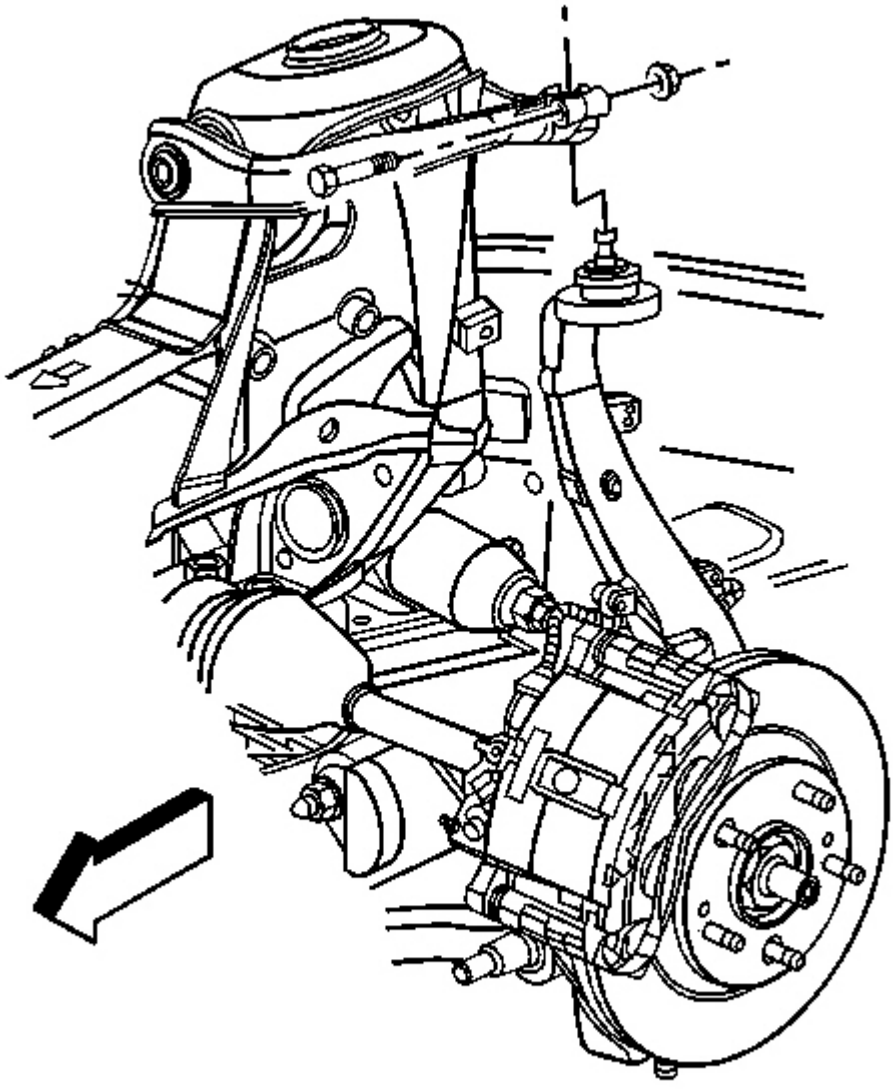


Fig. 59: View Of Upper Control Arm To Steering Knuckle Pinch Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

10. Remove the left and right upper ball pinch bolt and nut.

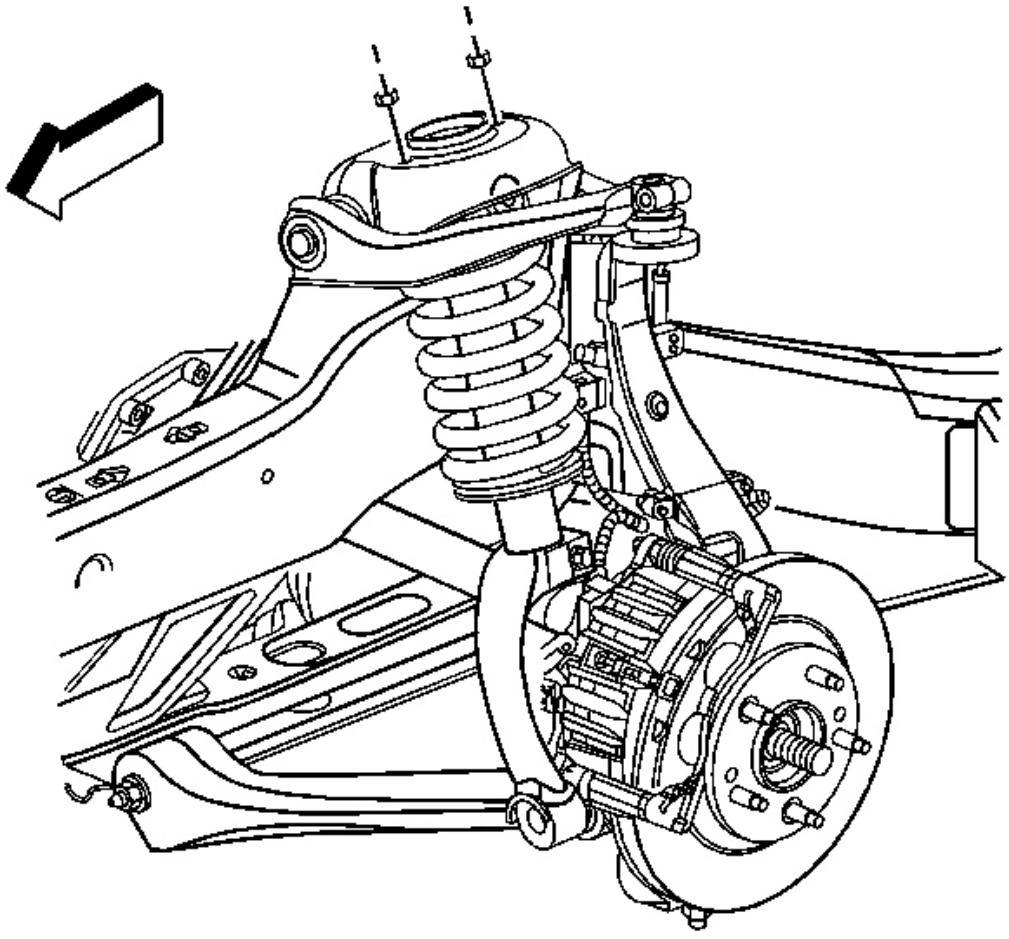


Fig. 60: View Of Upper Shock Module Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

11. Remove the left and right upper shock module retaining nuts.

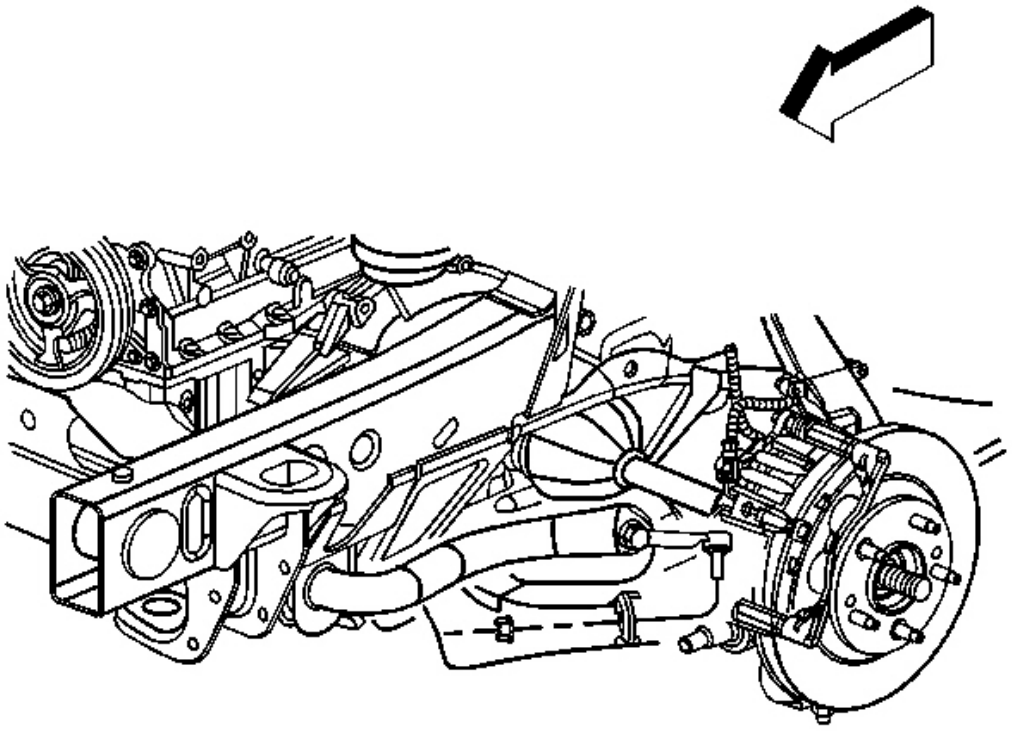


Fig. 61: View Of Stabilizer Shaft Link Lower Retaining Nut
Courtesy of GENERAL MOTORS CORP.

12. Remove the front stabilizer bar links from the frame. Refer to **Stabilizer Shaft Link Replacement** .
13. Remove the shock module from the frame.
14. Remove the steering knuckle from the upper control arm.
15. Remove the left and right front wheel drive shafts from the front drive axle.

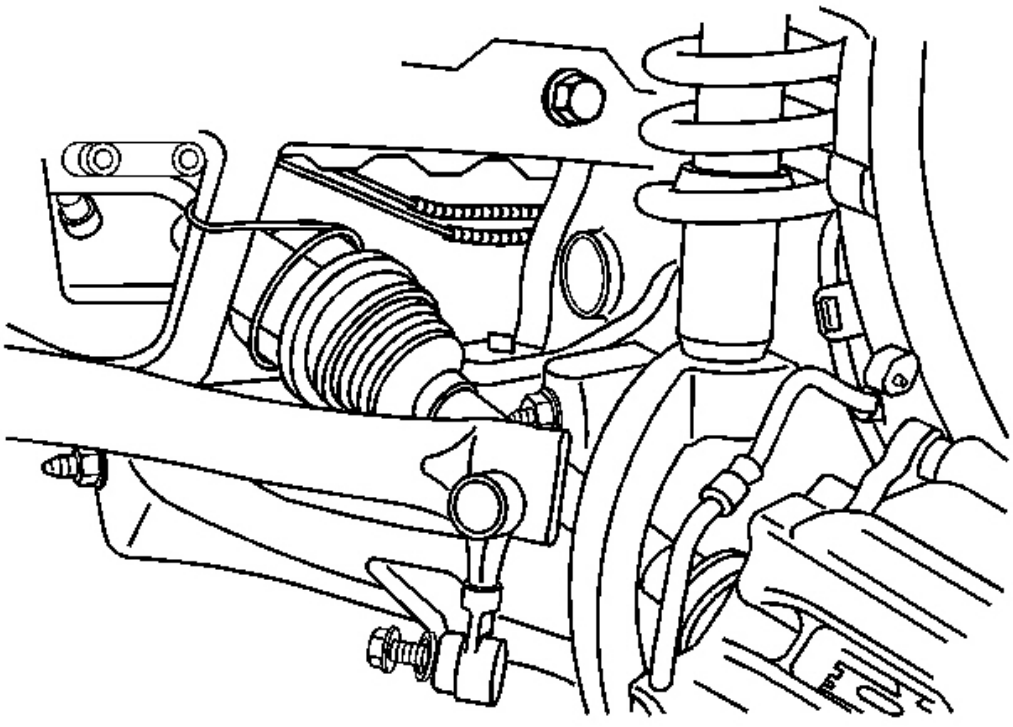


Fig. 62: View Of Lower Control Arm
Courtesy of GENERAL MOTORS CORP.

16. Relocate and secure the left and right front wheel drive shafts to the frame.

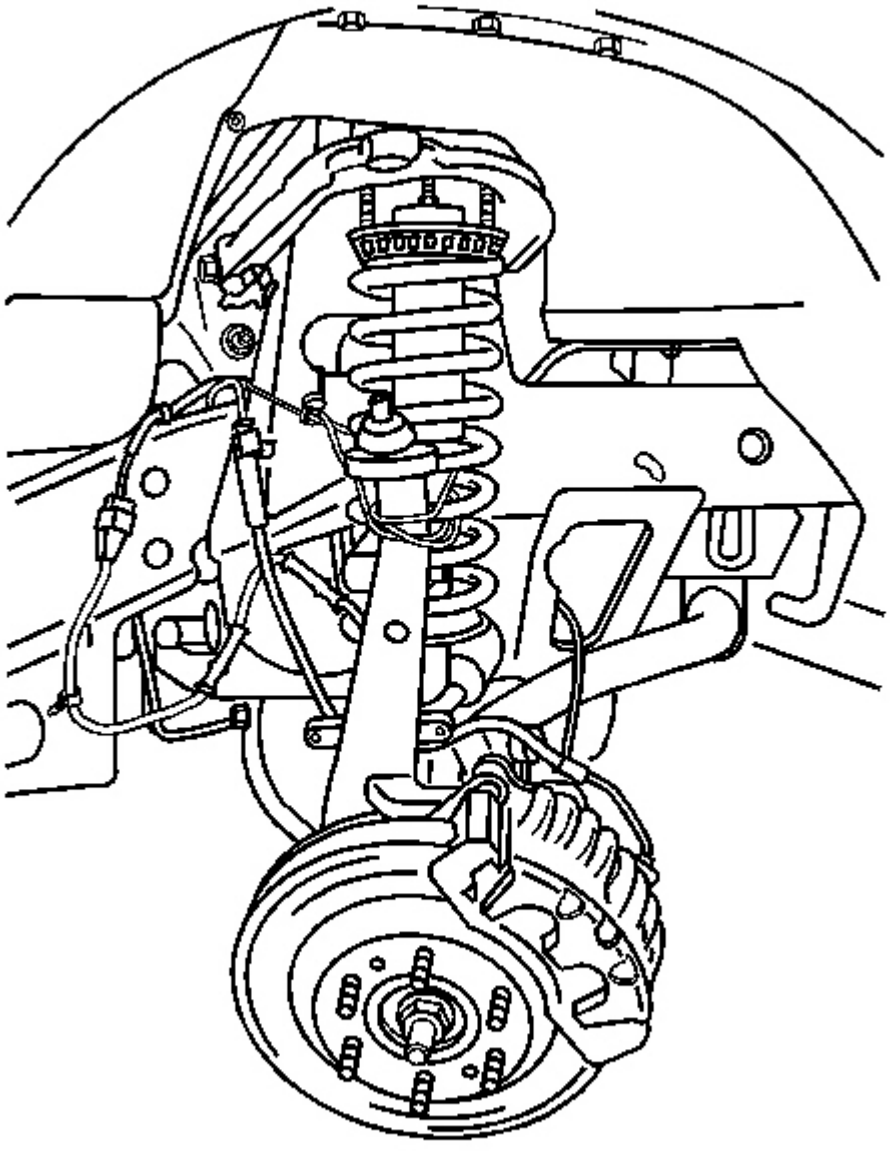


Fig. 63: View Of Shock Module/Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

17. Using mechanics wire or hook, support the front shock modules and steering knuckle.

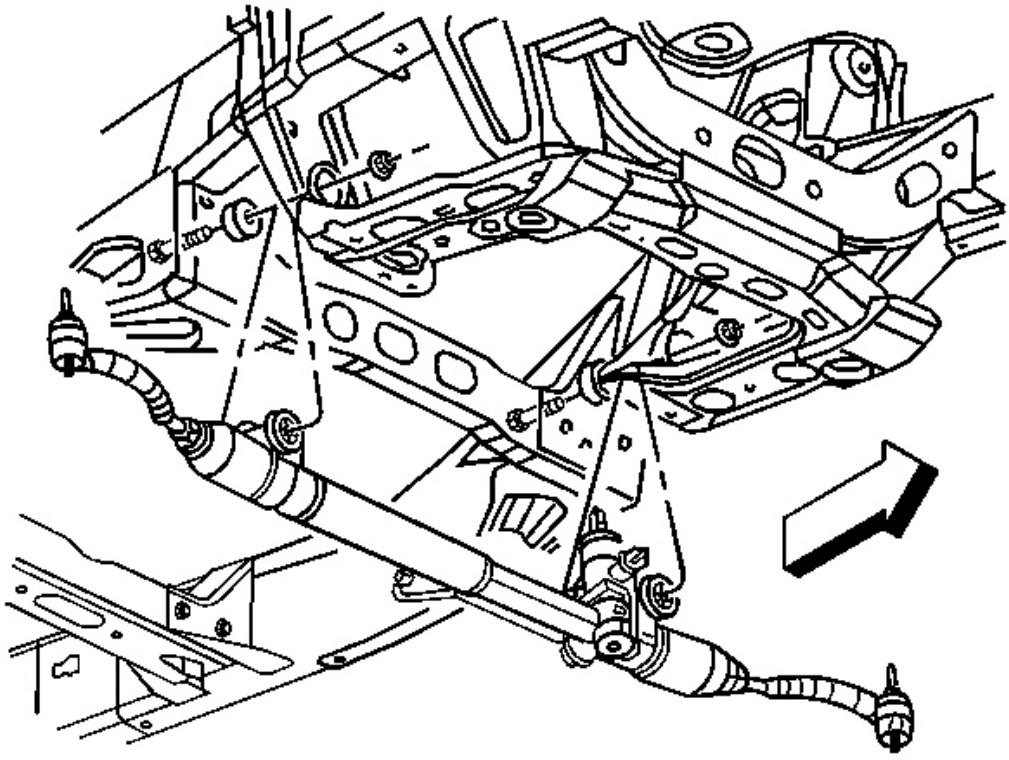


Fig. 64: View Of Power Steering Gear & Bolts
Courtesy of GENERAL MOTORS CORP.

18. Remove the power steering gear assembly. Refer to **Steering Gear Replacement** .

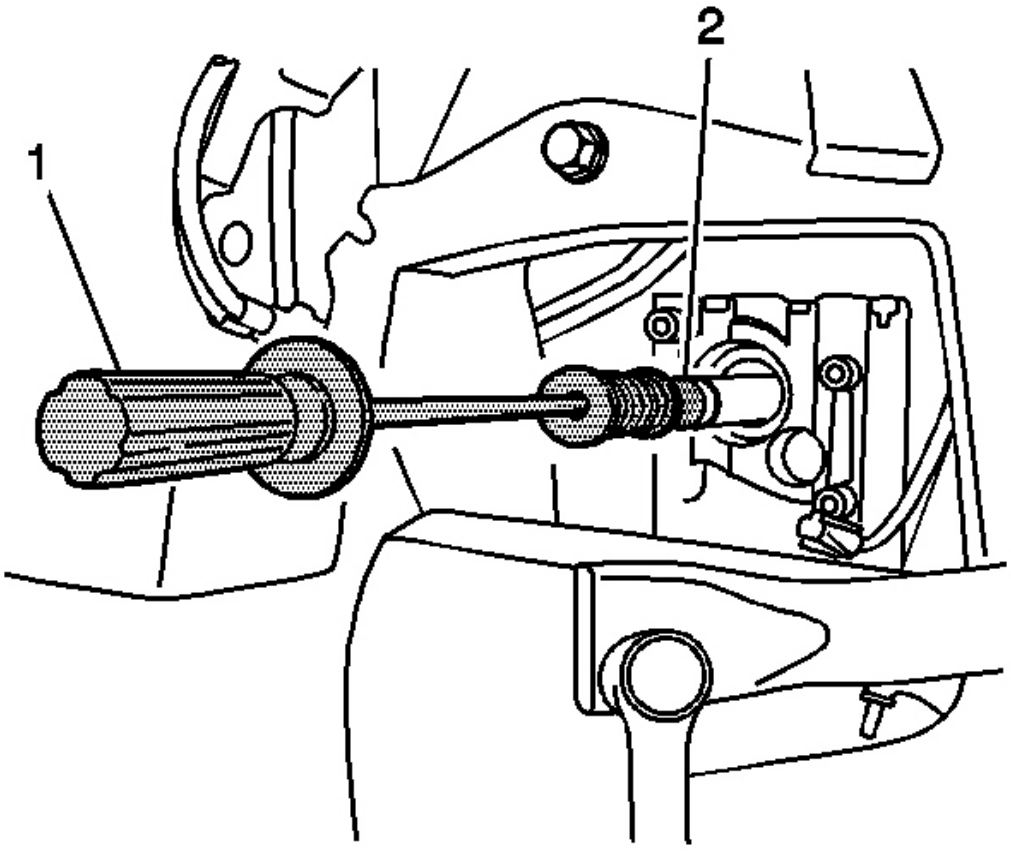


Fig. 65: Identifying Slide Hammer & Axle Remover Adapter
Courtesy of GENERAL MOTORS CORP.

19. Remove the inner shaft (2) from the front drive axle. Refer to **Front Drive Axle Inner Shaft Replacement**.

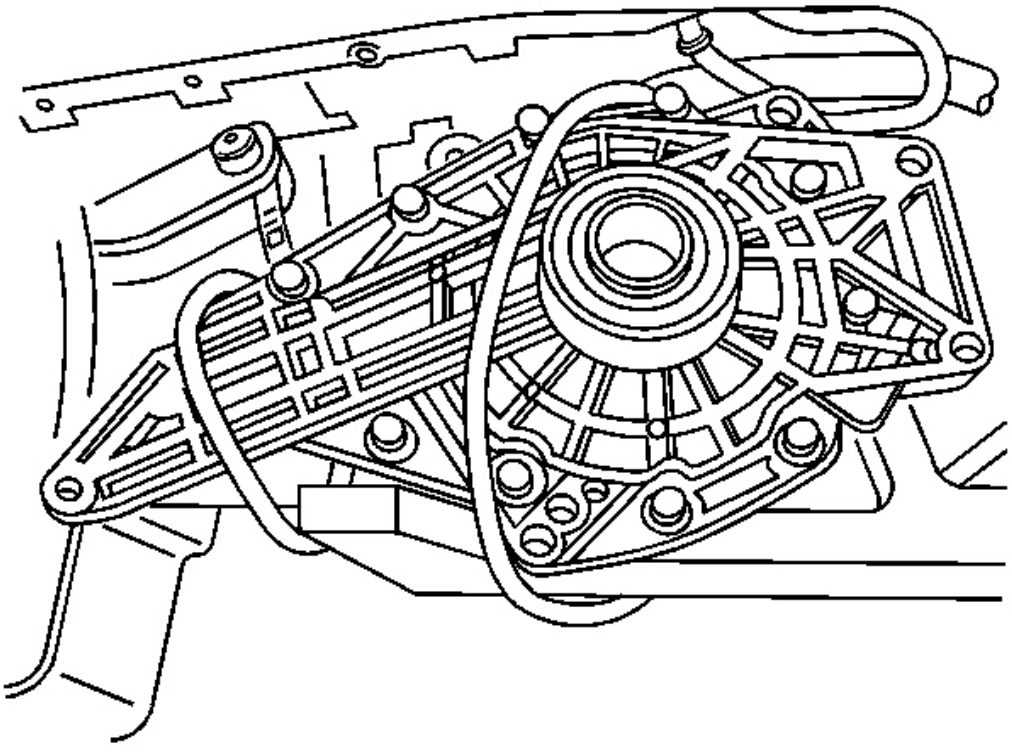


Fig. 66: Securing Front Differential To Frame
Courtesy of GENERAL MOTORS CORP.

20. Remove the front drive axle from the oil pan.
21. Secure the front drive axle to the frame.
22. Remove the oil pan. Refer to **Oil Pan Replacement** .

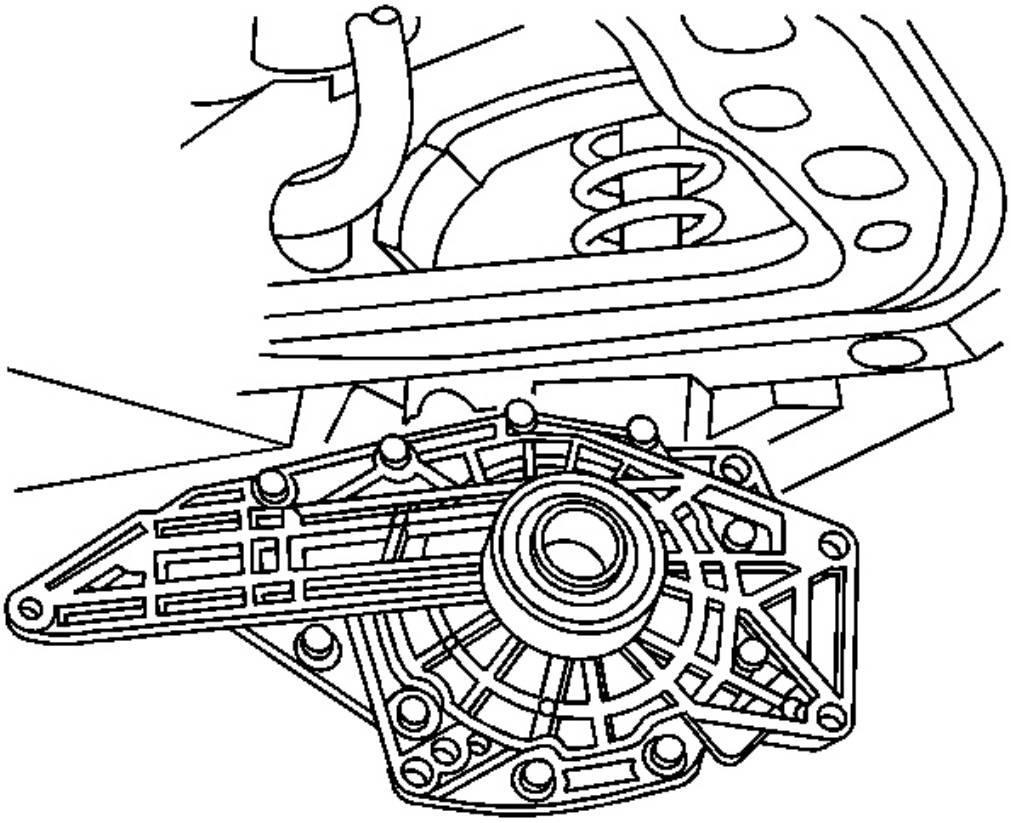


Fig. 67: Front Differential
Courtesy of GENERAL MOTORS CORP.

23. Remove the front drive axle from the vehicle.

Installation Procedure

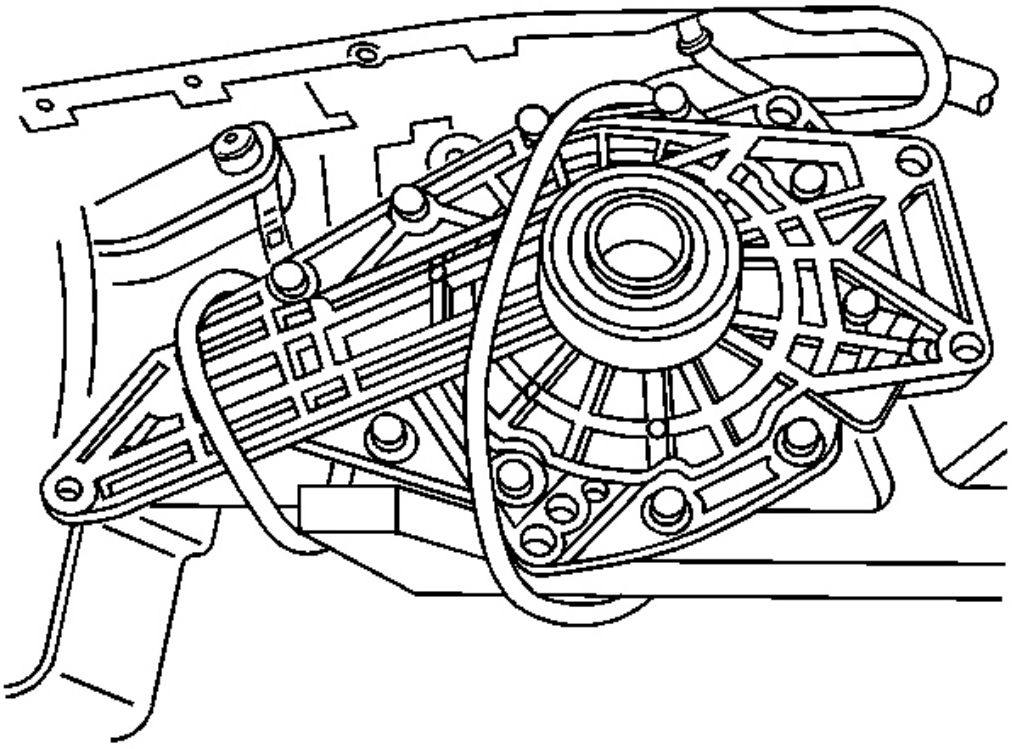


Fig. 68: Securing Front Differential To Frame
Courtesy of GENERAL MOTORS CORP.

1. Install the front drive axle to the frame.
2. Secure the front drive axle to the frame.
3. Install the oil pan. Refer to **Oil Pan Replacement** .
4. Remove the front drive axle from the frame.
5. Install the front drive axle to the oil pan.

NOTE: Refer to Fastener Notice .

6. Install the front drive axle mounting bolts.

Tighten: Tighten the front drive axle mounting bolts to 85 N.m (63 lb ft).

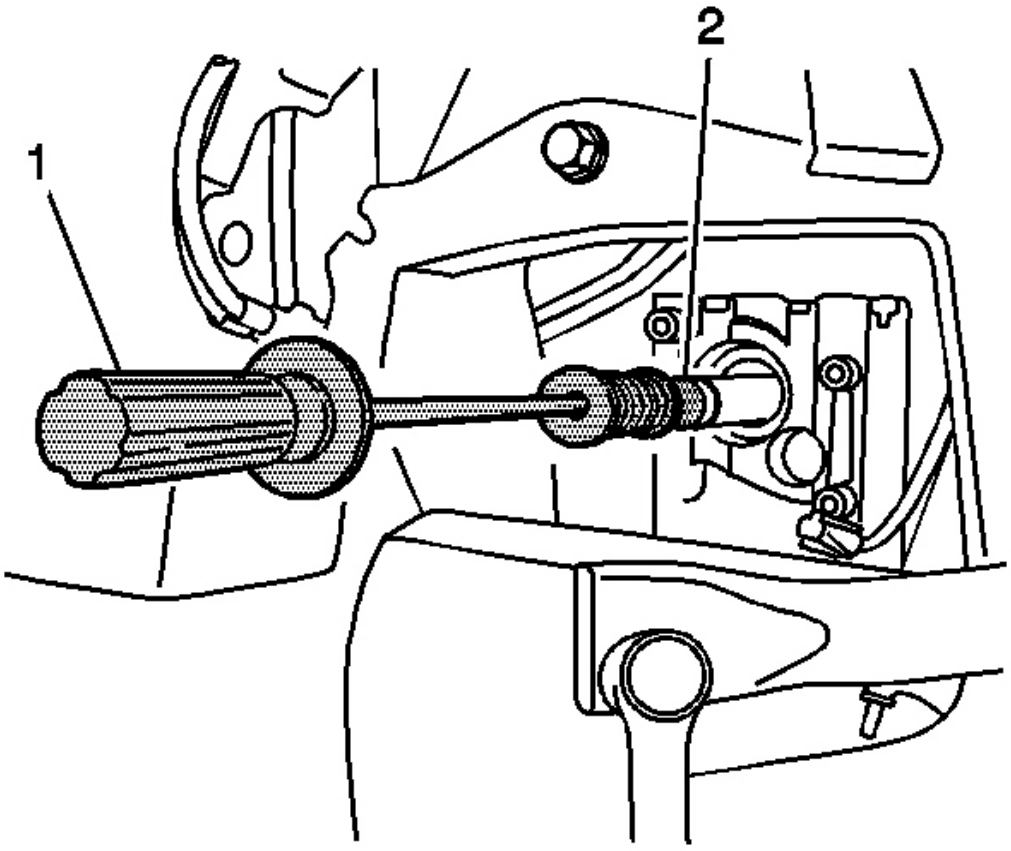


Fig. 69: Identifying Slide Hammer & Axle Remover Adapter
Courtesy of GENERAL MOTORS CORP.

7. Install the inner axle (2) to the front drive axle. Refer to **Front Drive Axle Inner Shaft Replacement**.

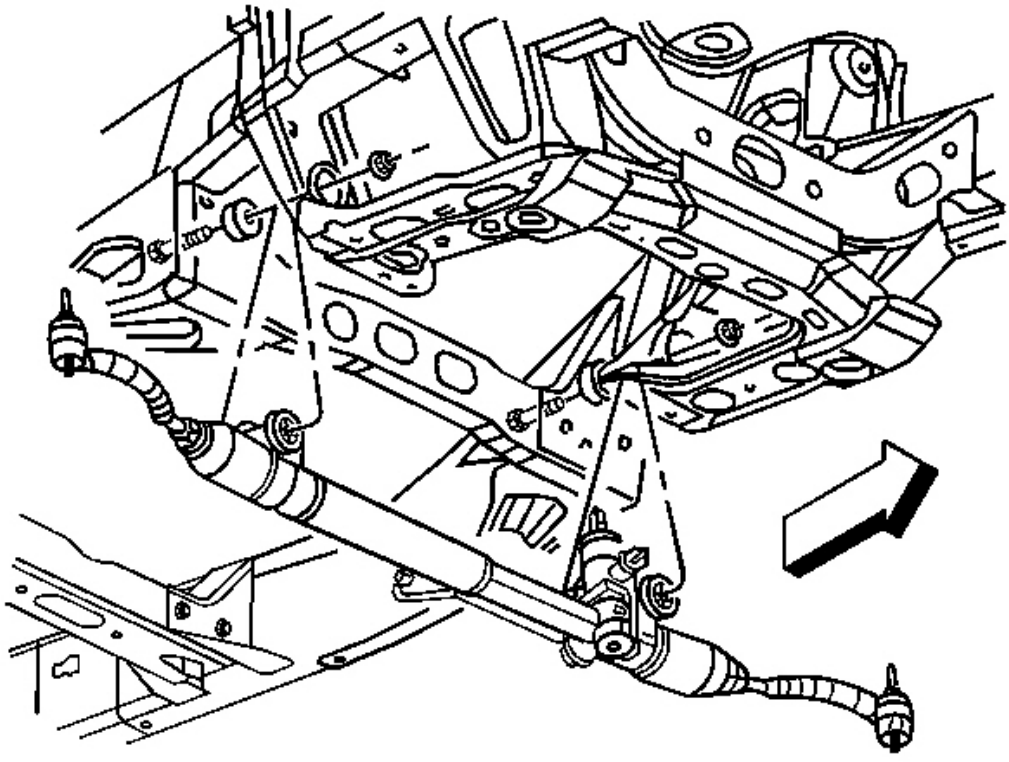


Fig. 70: View Of Power Steering Gear & Bolts
Courtesy of GENERAL MOTORS CORP.

8. Install the power steering gear. Refer to **Steering Gear Replacement** .
9. Remove the left and right front wheel drive shafts from the frame.
10. Remove the left and right shock module and steering knuckles from their supports.
11. Install the right and left front wheel drive shafts to the front drive axle.
12. Install the vent hose to the front drive axle.
13. Install the left and right shock modules to the frame.
14. Install the upper shock module retaining nuts.

    Tighten: Tighten the upper shock module mounting bolts to 100 N.m (74 lb ft).

15. Install the steering knuckle to the upper control arm.
16. Install the upper ball joint pinch bolt and nut.

    Tighten: Tighten the upper shock module mounting bolts to 40 N.m (30 lb ft).

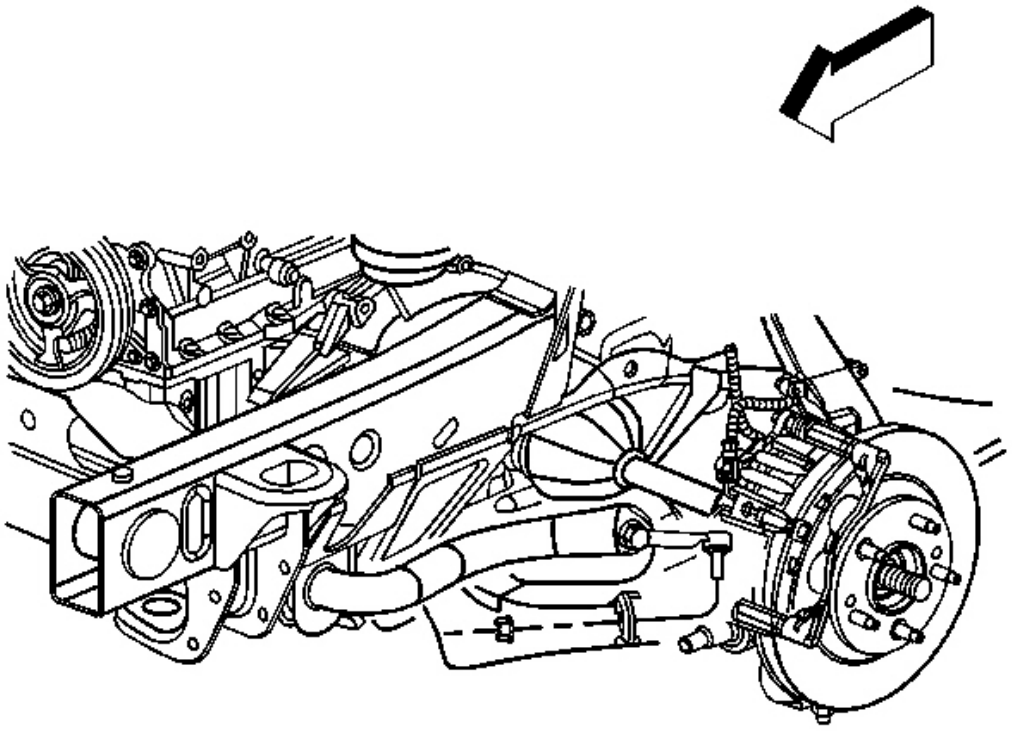


Fig. 71: View Of Stabilizer Shaft Link Lower Retaining Nut
Courtesy of GENERAL MOTORS CORP.

17. Install the front stabilizer bar links to the frame. Refer to **Stabilizer Shaft Link Replacement** .

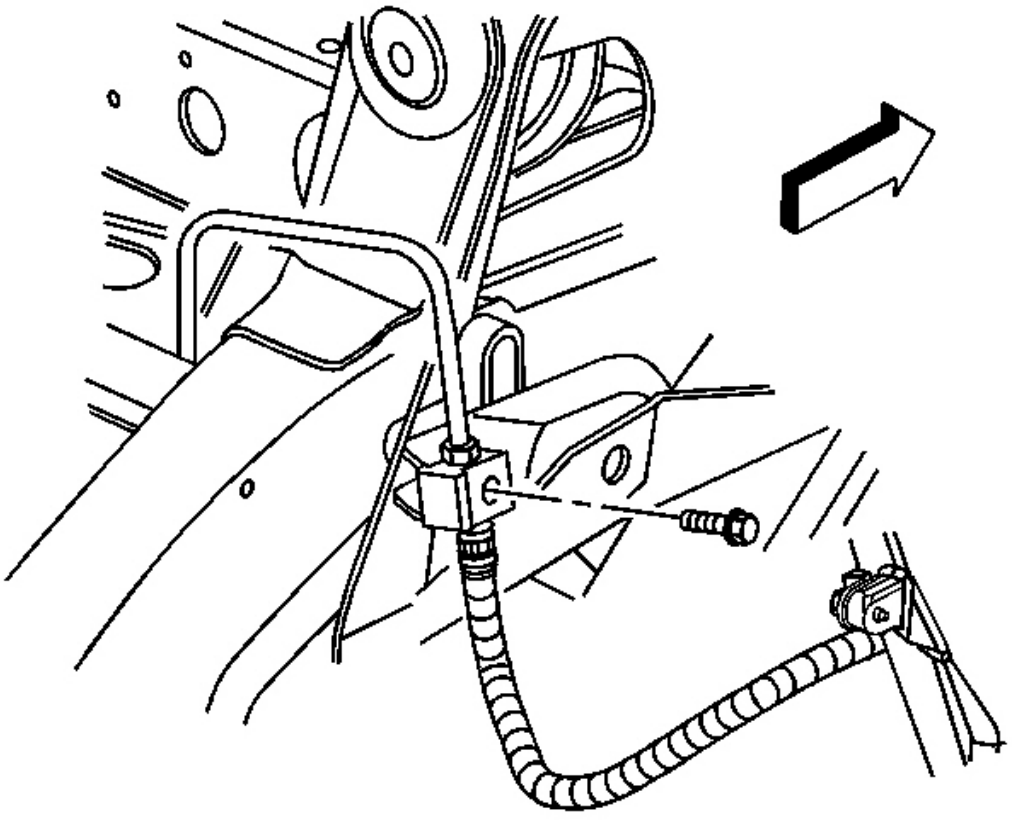


Fig. 72: Identifying Front Brake Hose Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

18. Install the brake hose retaining bolts.

    Tighten: Tighten the brake hose retaining bolt to 25 N.m (18 lb ft).

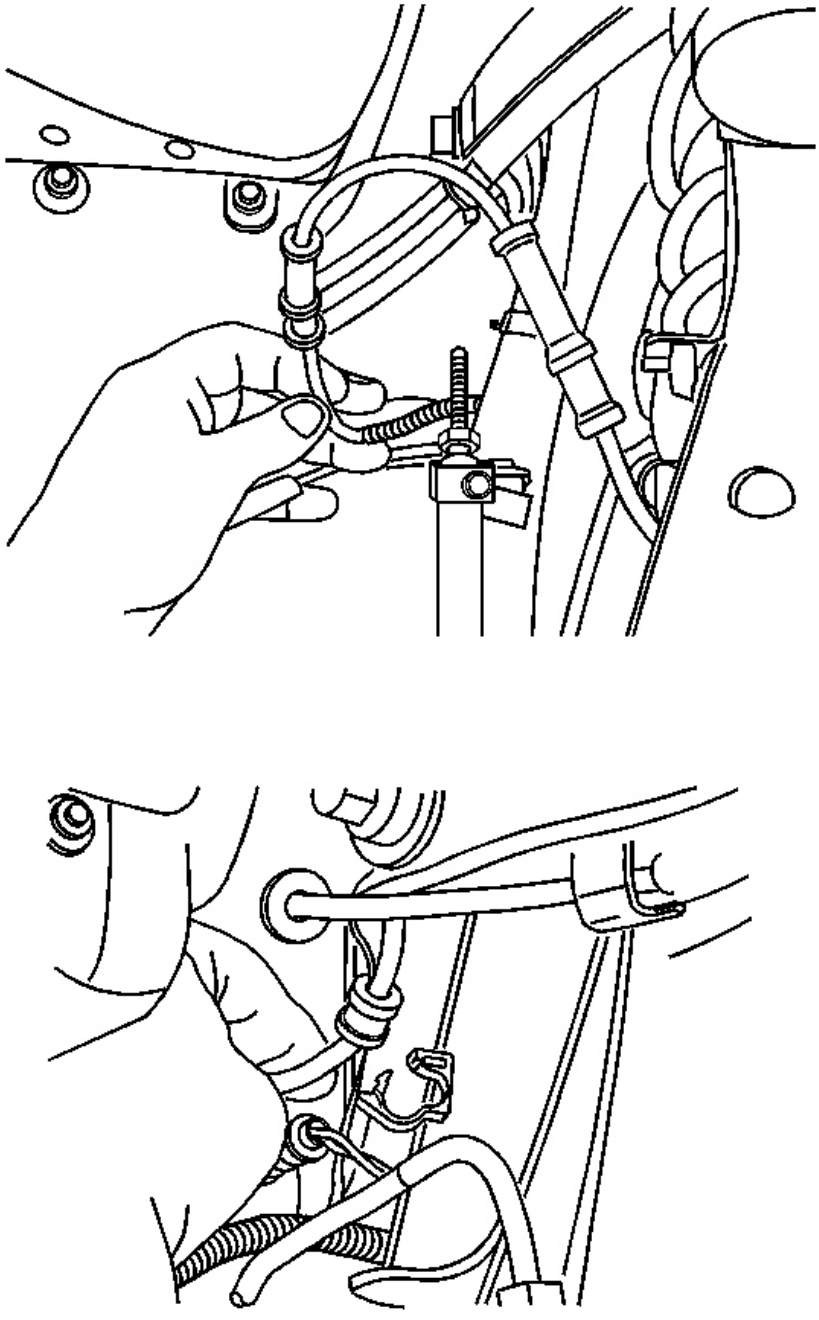


Fig. 73: Identifying Wheel Speed Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

19. Install the right and left ABS wiring harness in the retainers.

20. Install the front propeller shaft from the front axle. Refer to **Front Propeller Shaft Replacement** .
21. Fill the front drive axle with the proper fluid. Refer to **Front Axle Lubricant Replacement**.
22. Fill the engine with the proper amount motor oil. Refer to **Approximate Fluid Capacities** .

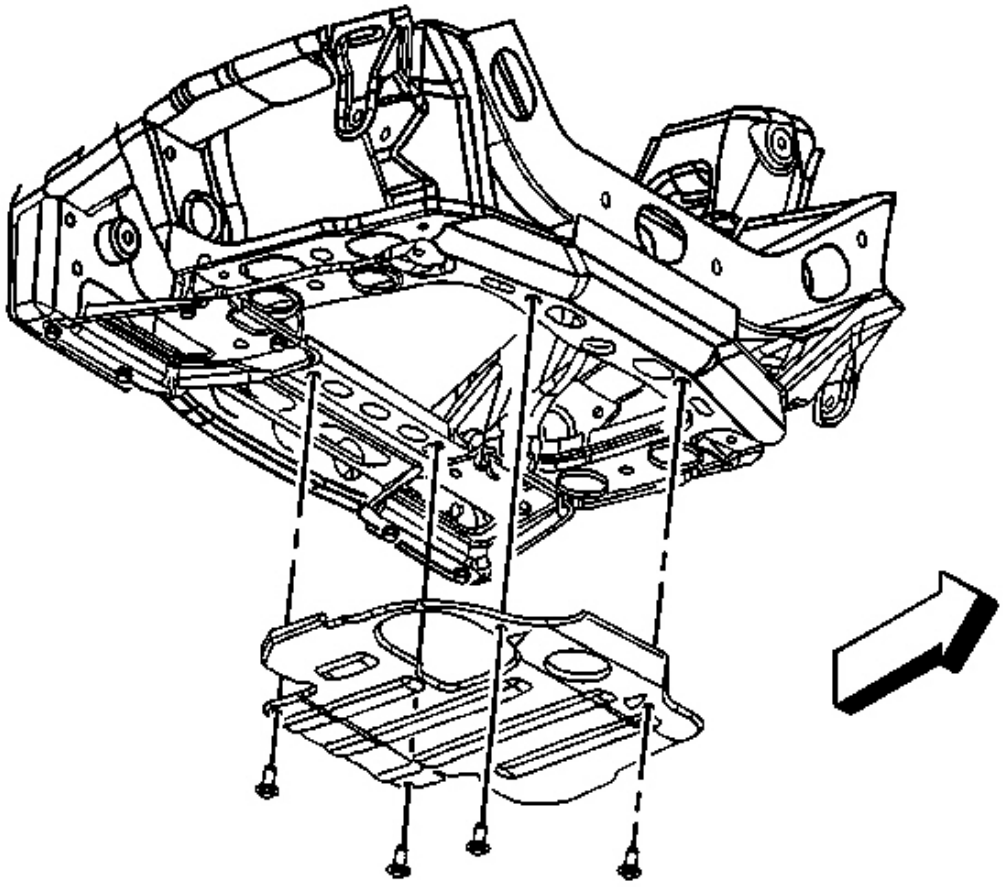


Fig. 74: Identifying Engine Shield
Courtesy of GENERAL MOTORS CORP.

23. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** .

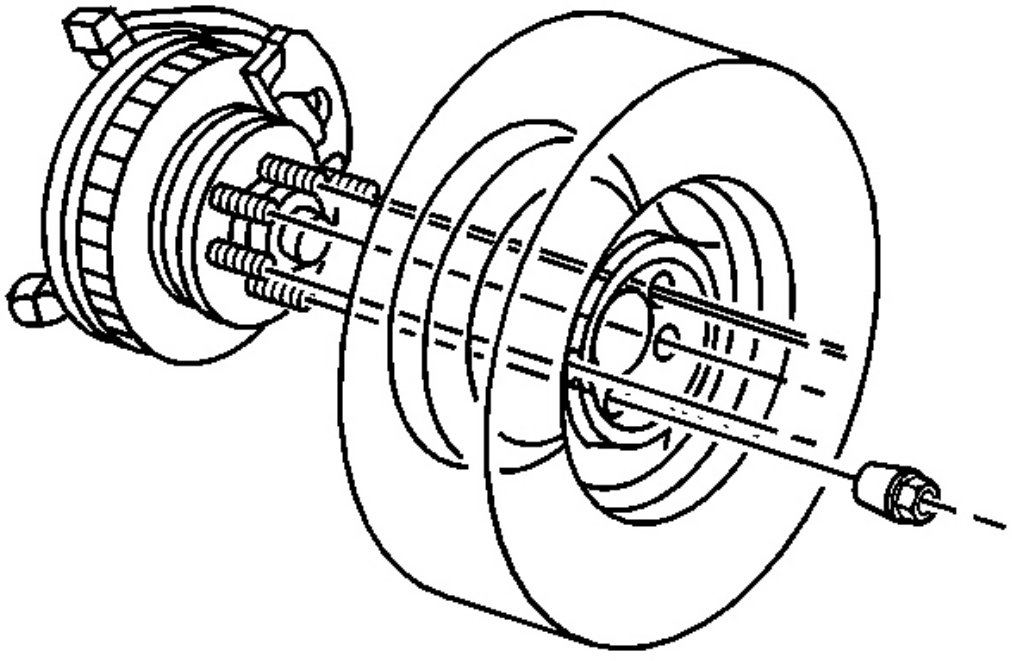


Fig. 75: View Of Tire/Wheel Assembly, Hub Assembly & Wheel Nuts
Courtesy of GENERAL MOTORS CORP.

24. Install the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT (5.3L V-8)

Removal Procedure

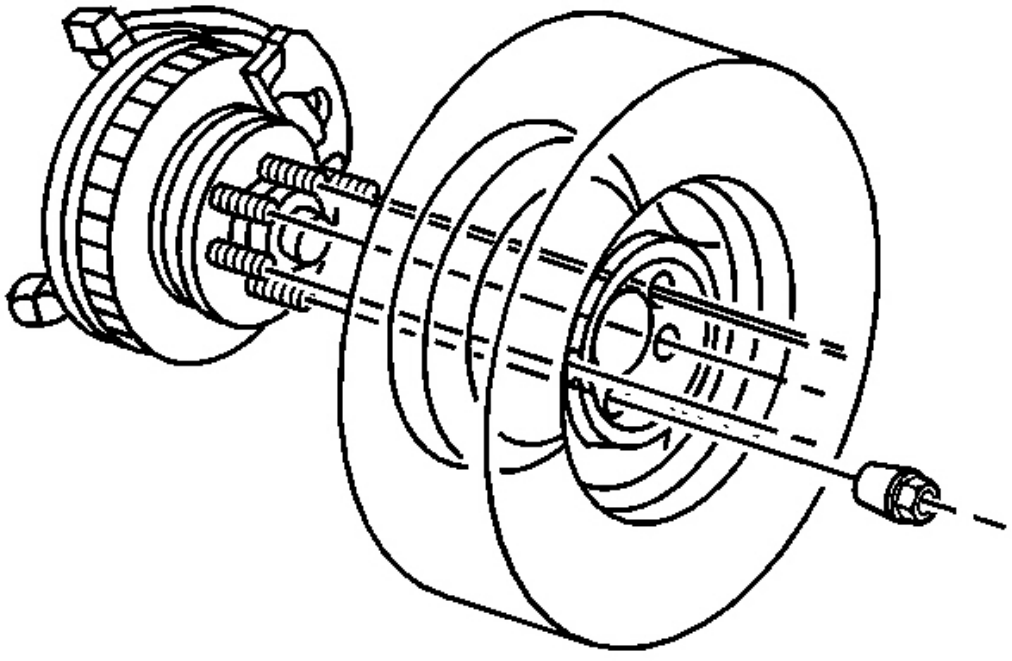


Fig. 76: View Of Tire/Wheel Assembly, Hub Assembly & Wheel Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

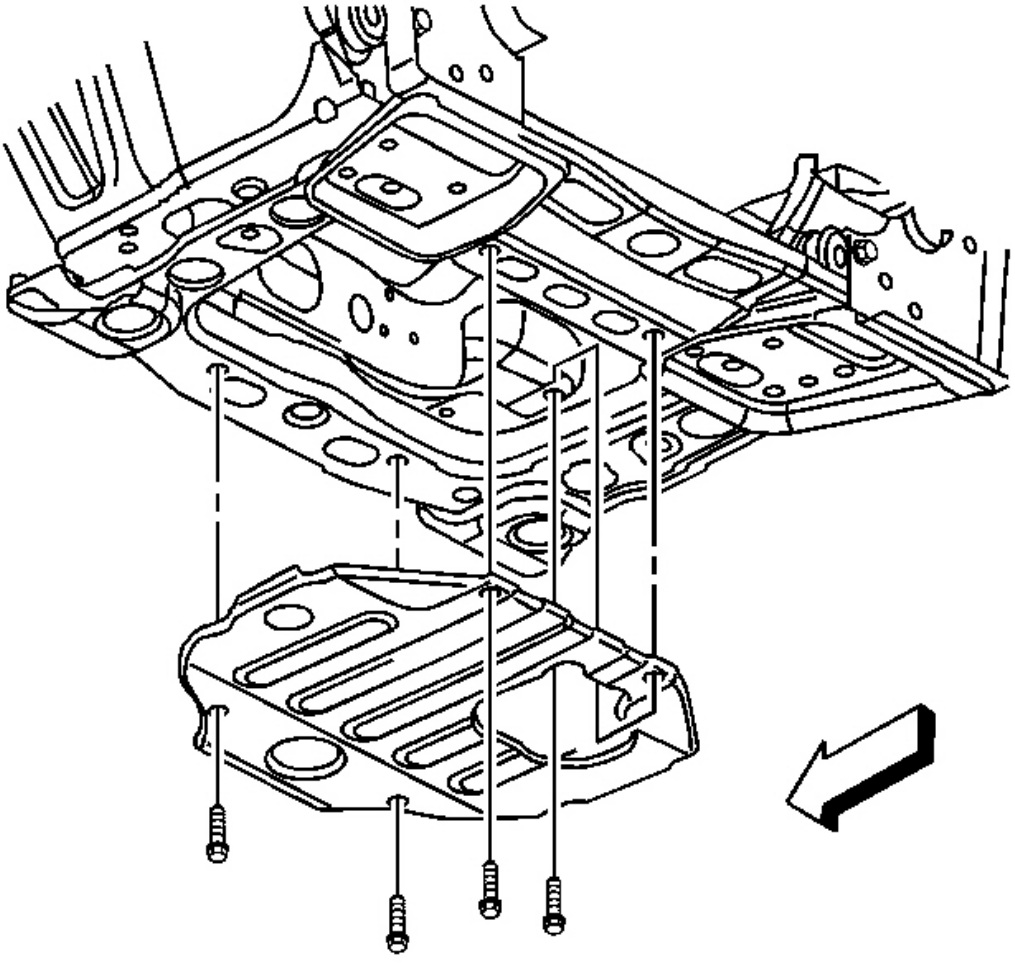


Fig. 77: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** .
3. Drain the front differential. Refer to **Front Axle Lubricant Replacement**.

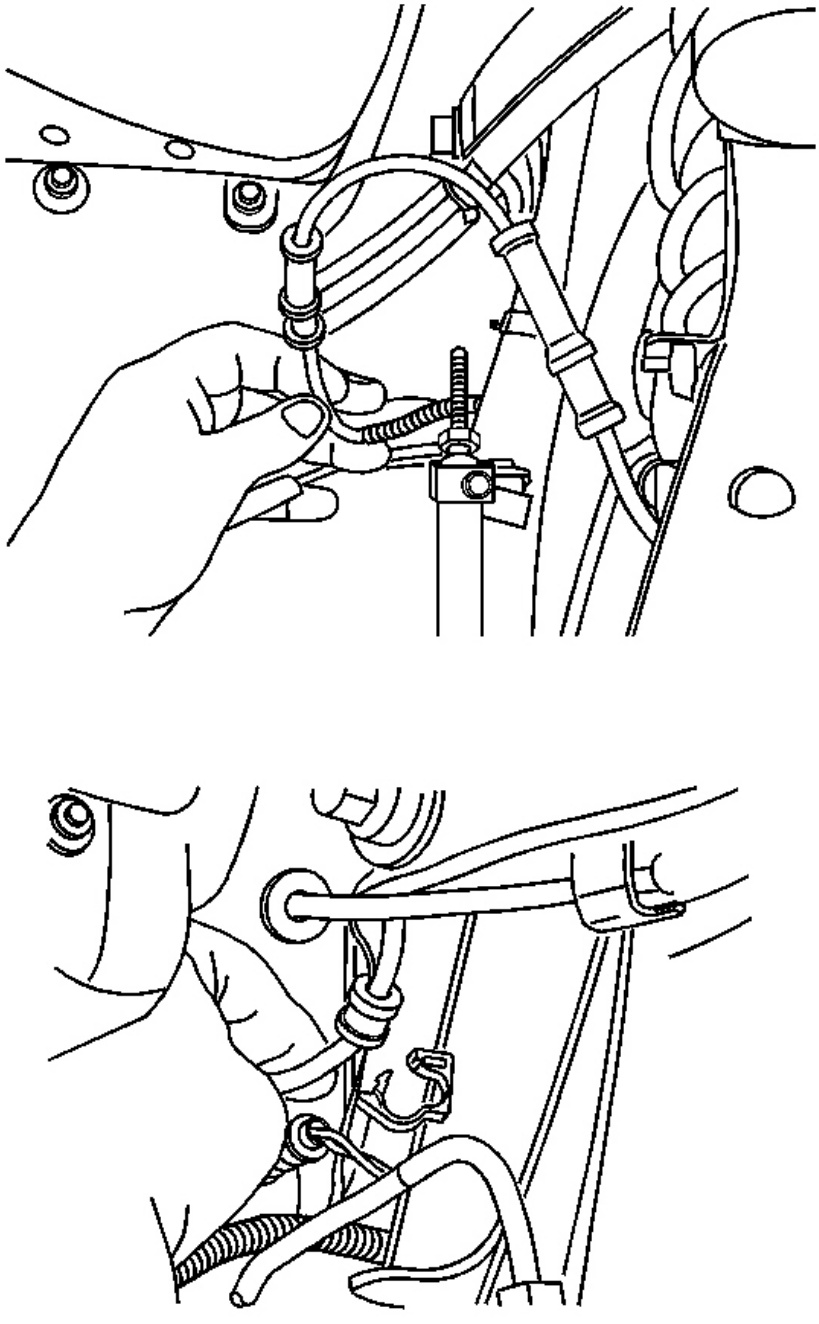


Fig. 78: Identifying Wheel Speed Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

4. Remove the left and right antilock brake system (ABS) wiring harnesses from the retainers.

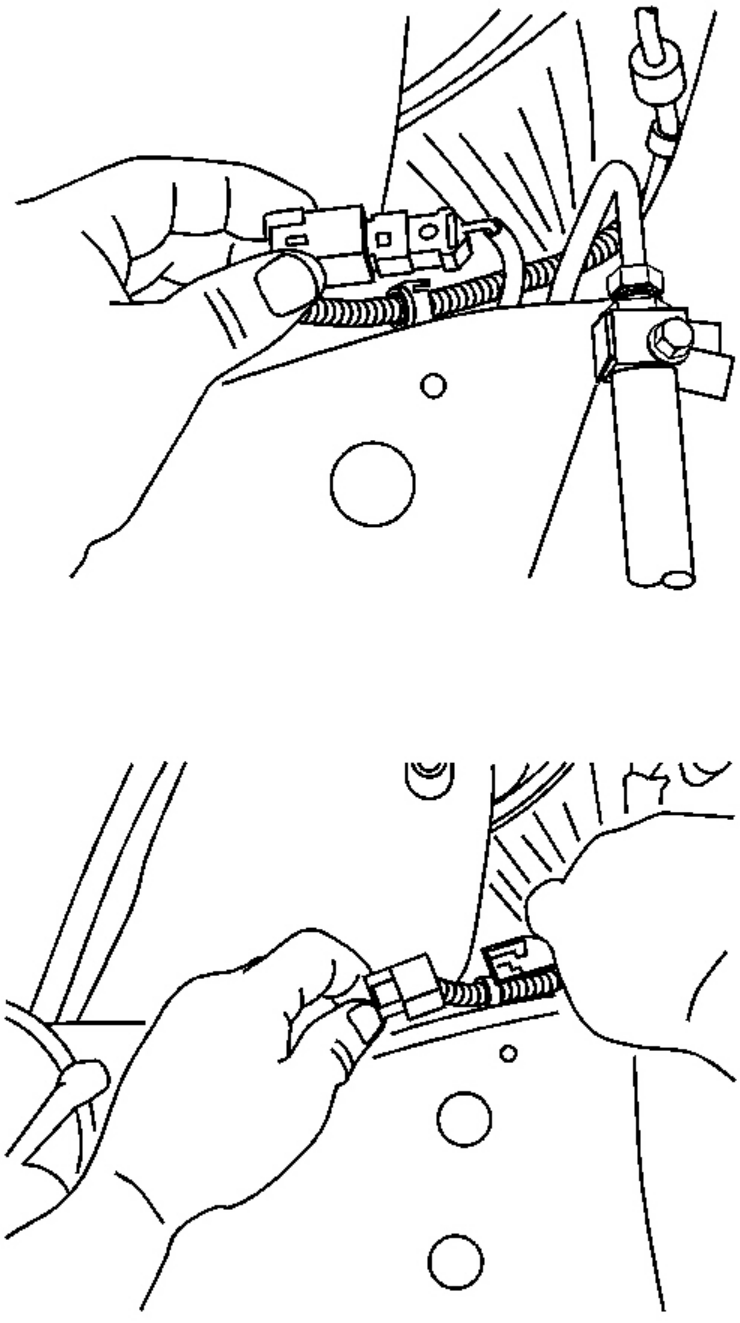


Fig. 79: Locating Connector
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the left and right wheel speed sensor electrical connectors.

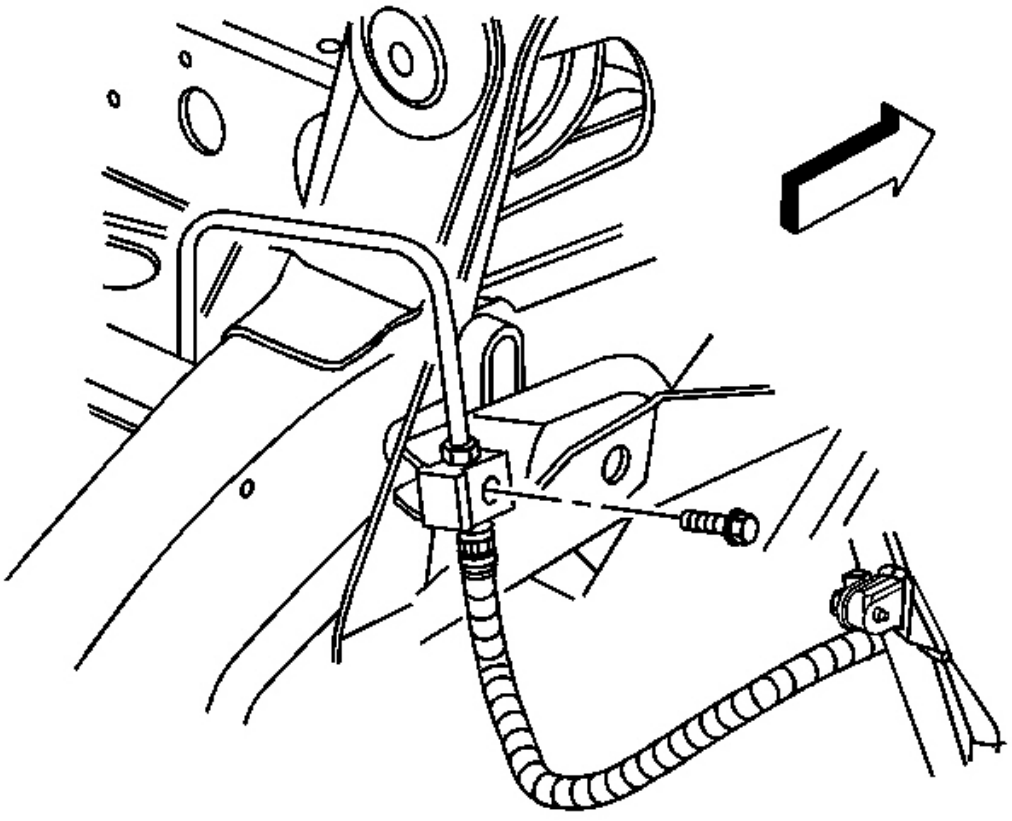


Fig. 80: Identifying Front Brake Hose Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the brake hose retaining bolt from the frame.

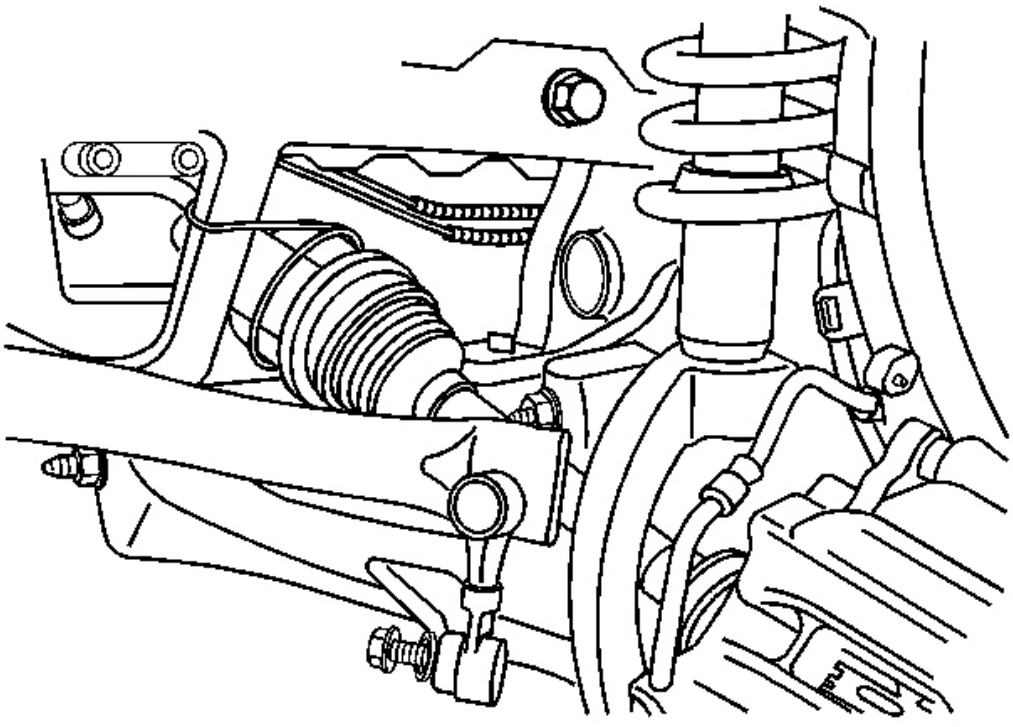


Fig. 81: View Of Lower Control Arm
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the sway bar link pins from the lower control arms.

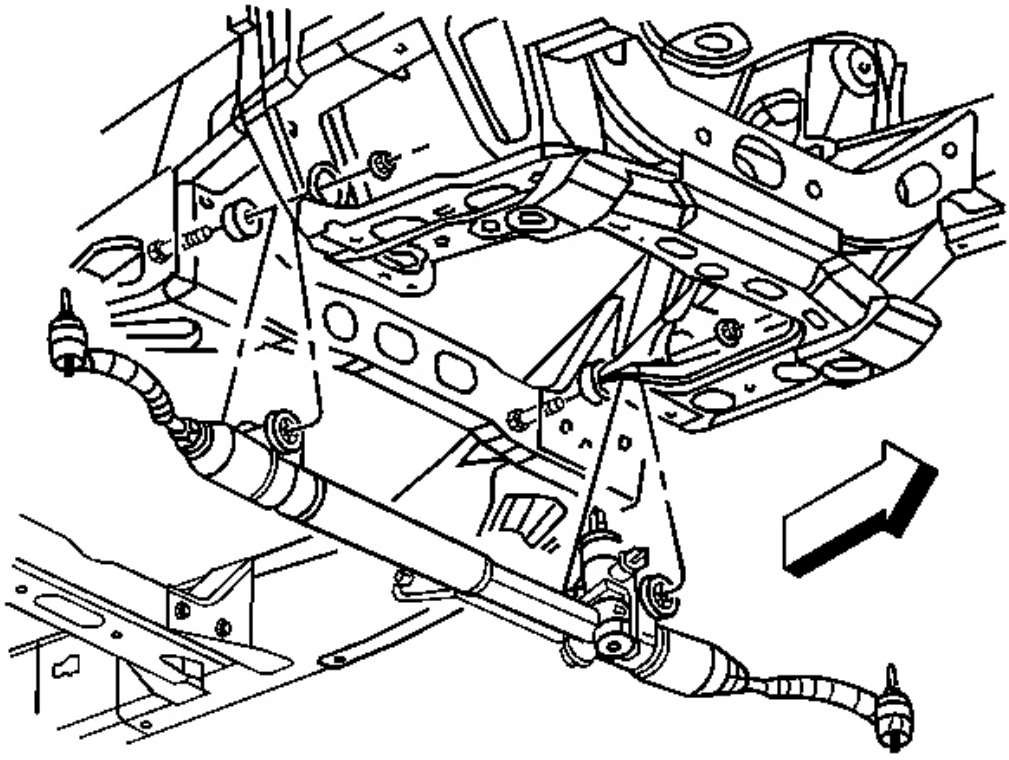


Fig. 82: View Of Power Steering Gear & Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the steering gear. Refer to **Steering Gear Replacement** .
9. Place an adjustable jack stand under the lower control arm.

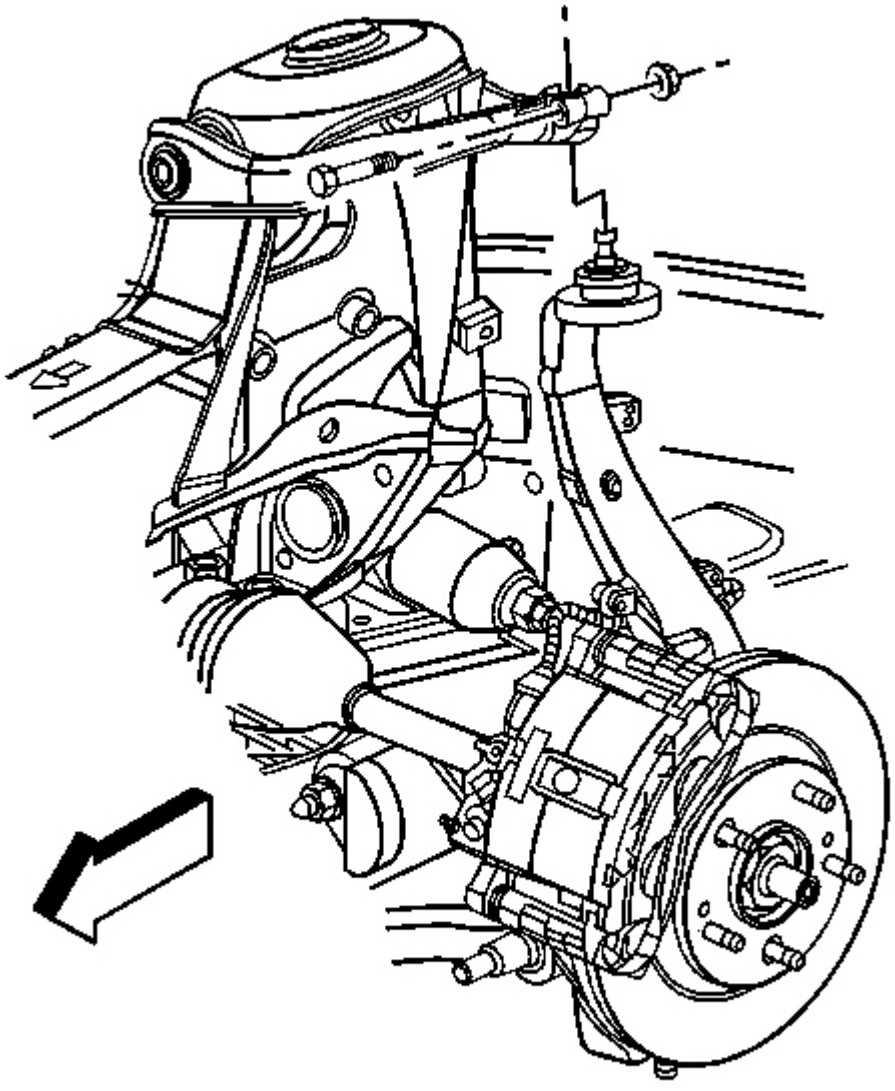


Fig. 83: View Of Upper Control Arm To Steering Knuckle Pinch Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

10. Remove the upper ball joint pinch bolt and nut.
11. Remove the steering knuckle from the upper control arm.

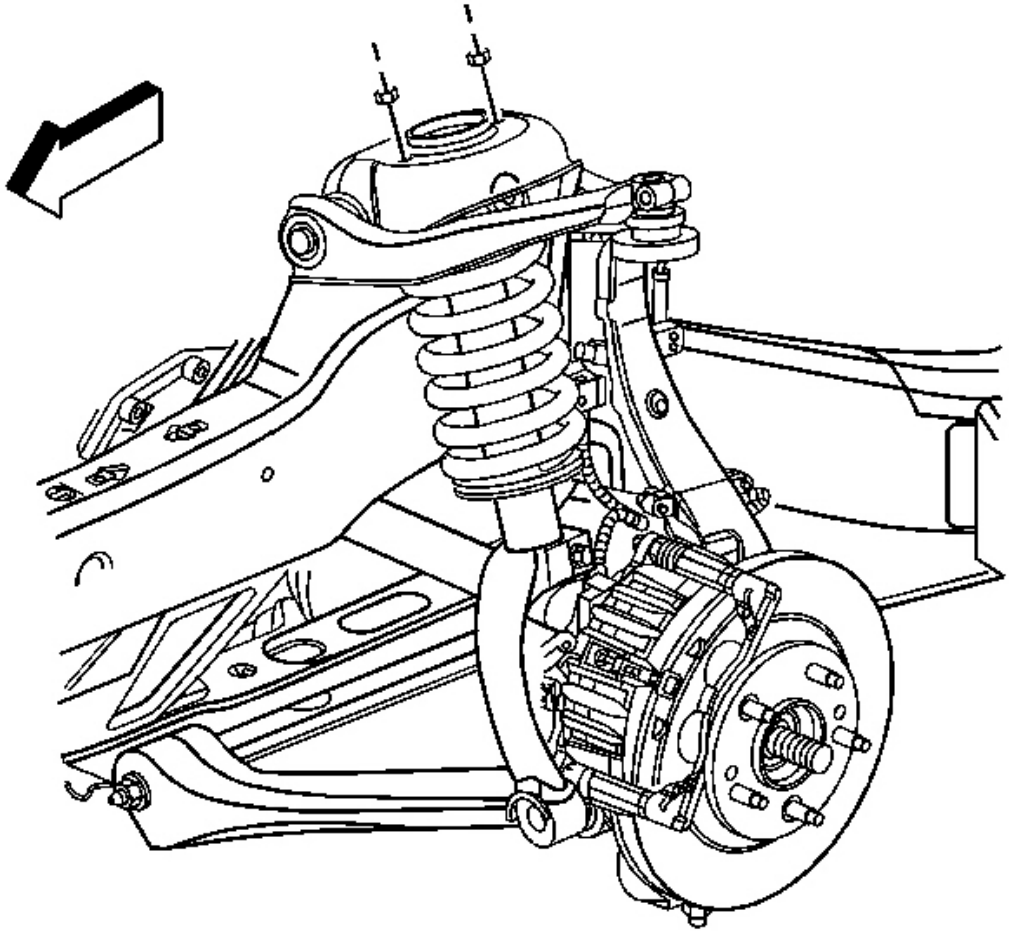


Fig. 84: View Of Upper Shock Module Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

12. Remove the upper shock module bolts from the frame.
13. Lower the jack stand to allow removal of the steering knuckle from the upper control arm.
14. Remove the steering knuckle from the upper control arm.

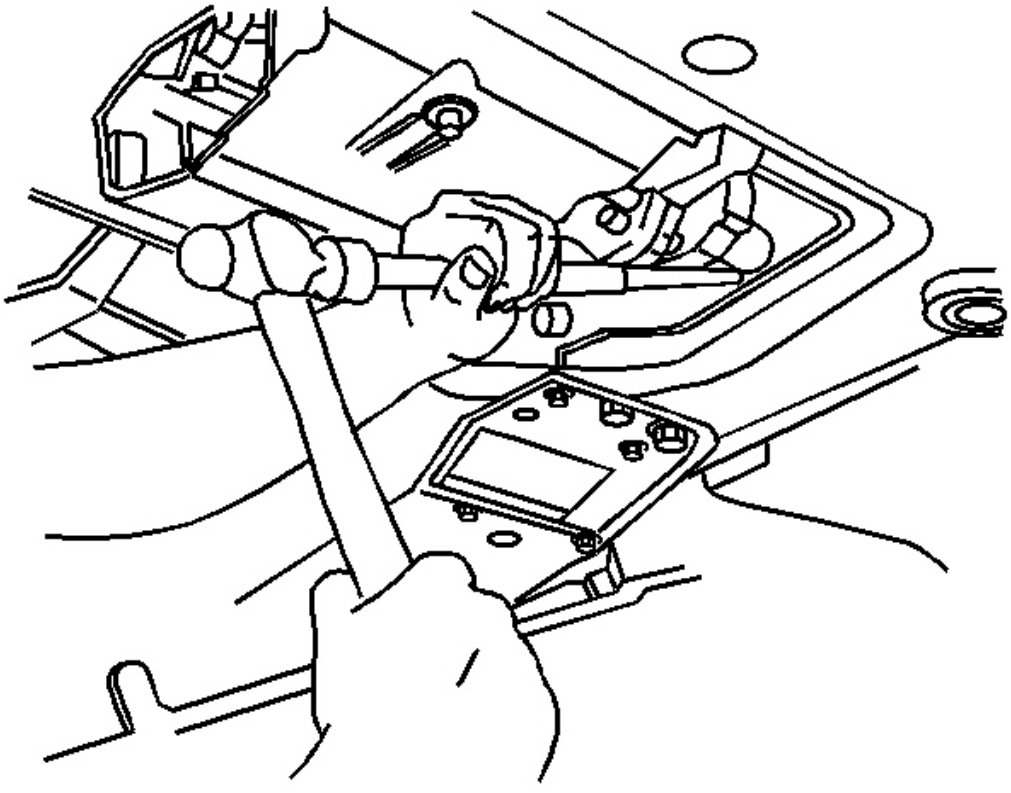


Fig. 85: Removing Left Wheel Drive Shaft From Front Differential
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: In the following service procedures, it is not necessary to remove the wheel drive shaft from the steering knuckles.

15. Using a brass drift or equivalent, remove the left wheel drive shaft from the front differential.

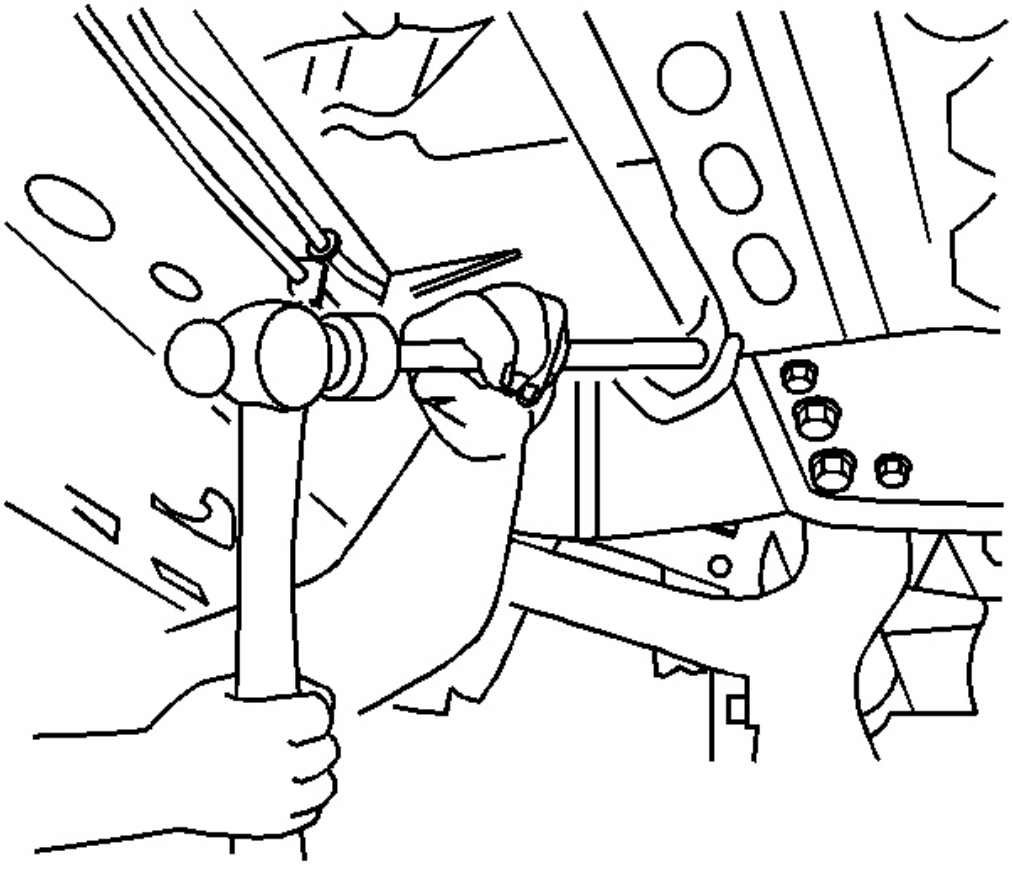


Fig. 86: Removing Right Wheel Drive Shaft From Front Differential
Courtesy of GENERAL MOTORS CORP.

16. Using a brass drift or equivalent, remove the right wheel drive shaft from the front differential.
17. Position the wheel drive shafts to the side.

IMPORTANT: DO NOT allow the shock modules and steering knuckle to hang without supporting them.

18. Using mechanics wire or metal hooks, secure the shock modules to the frame.
19. Remove the jack stand.

IMPORTANT: It is not necessary to completely remove the front propeller shaft from the vehicle.

20. Remove the front propeller shaft from the front pinion yoke. Refer to **Front Propeller Shaft Replacement** .
21. Relocate the propeller shaft to the side and secure.

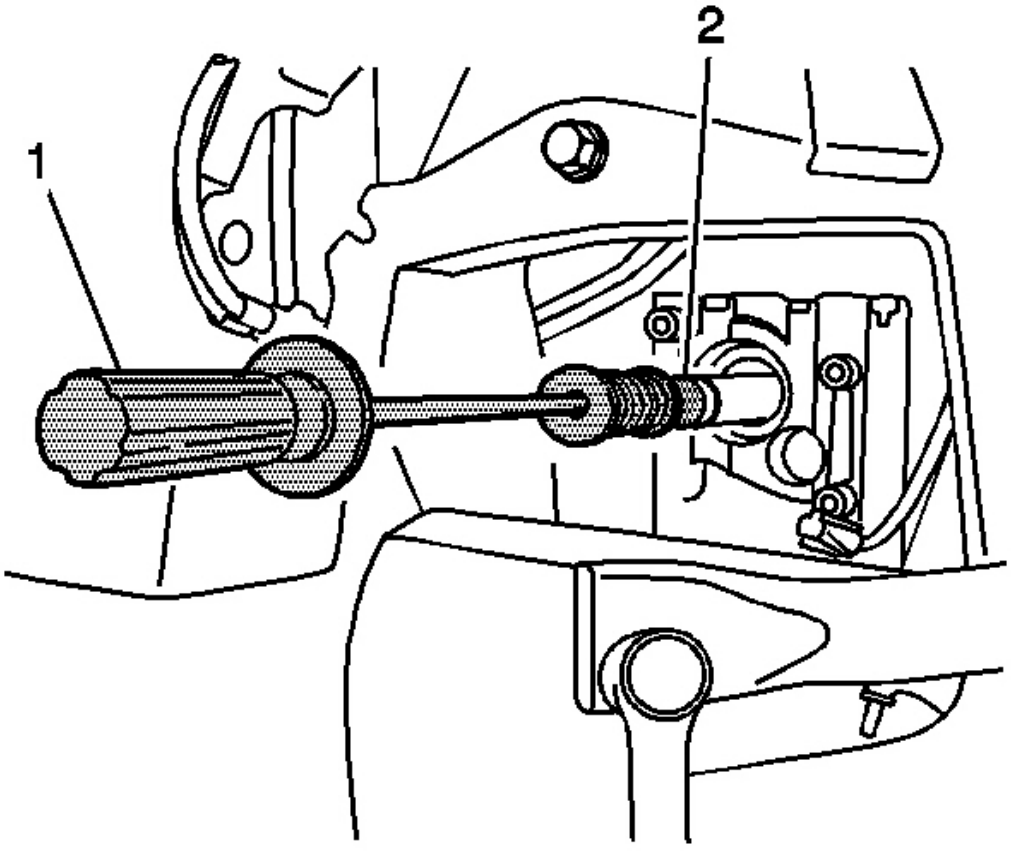


Fig. 87: Identifying Slide Hammer & Axle Remover Adapter
Courtesy of GENERAL MOTORS CORP.

22. Remove the inner axle shaft (2). Refer to **Front Drive Axle Inner Shaft Replacement**.
23. Remove the mounting bolts for the front differential assembly.
24. Remove the front differential assembly from the oil pan.

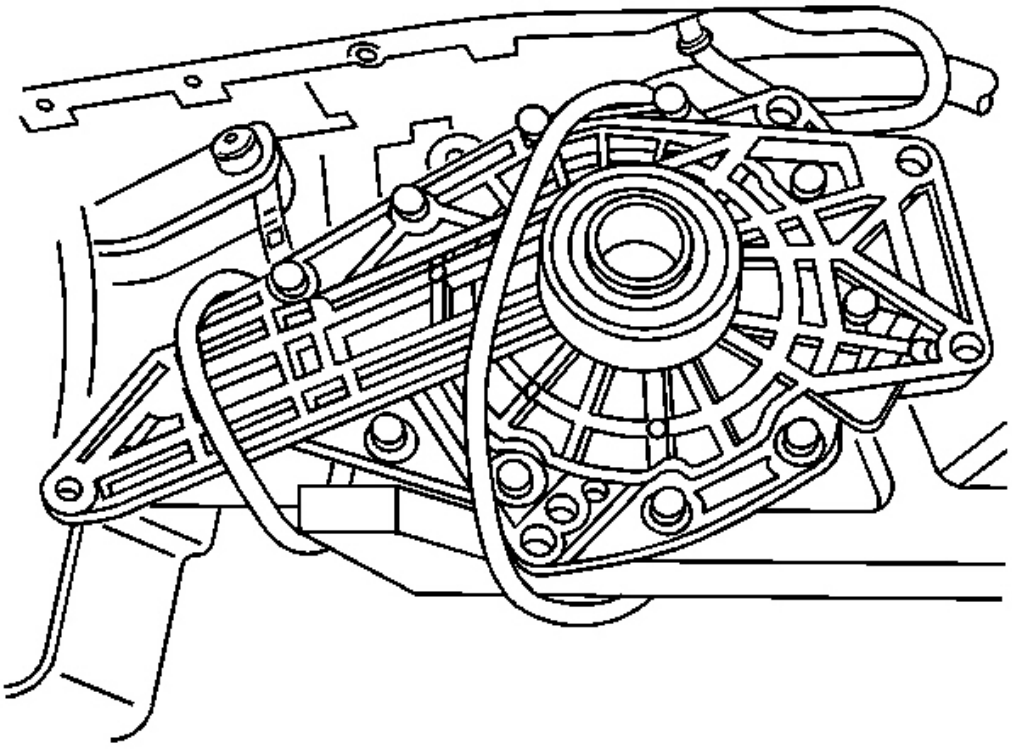


Fig. 88: Securing Front Differential To Frame
Courtesy of GENERAL MOTORS CORP.

25. Secure the front differential to the frame.

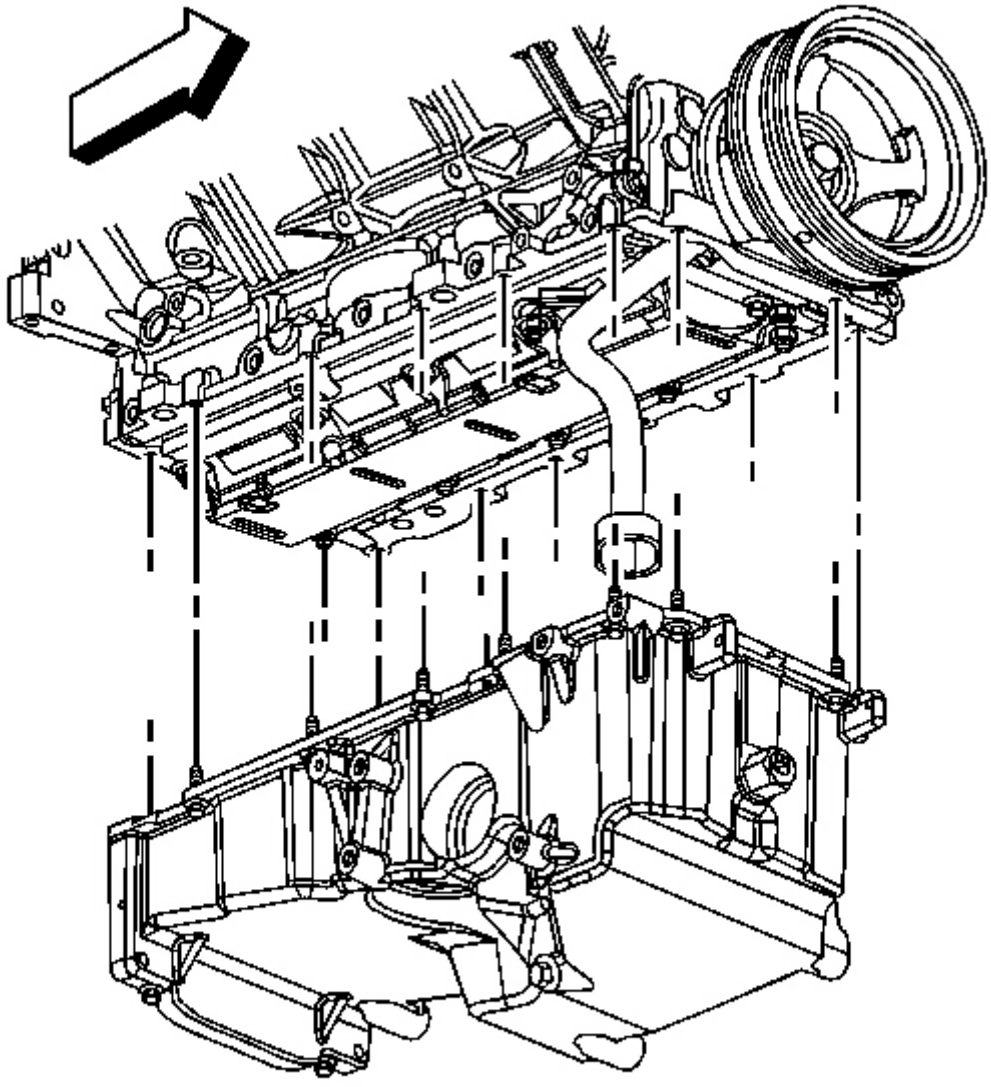


Fig. 89: View Of Oil Pan & Bolts
Courtesy of GENERAL MOTORS CORP.

26. Remove the oil pan assembly. Refer to Oil Pan Replacement .

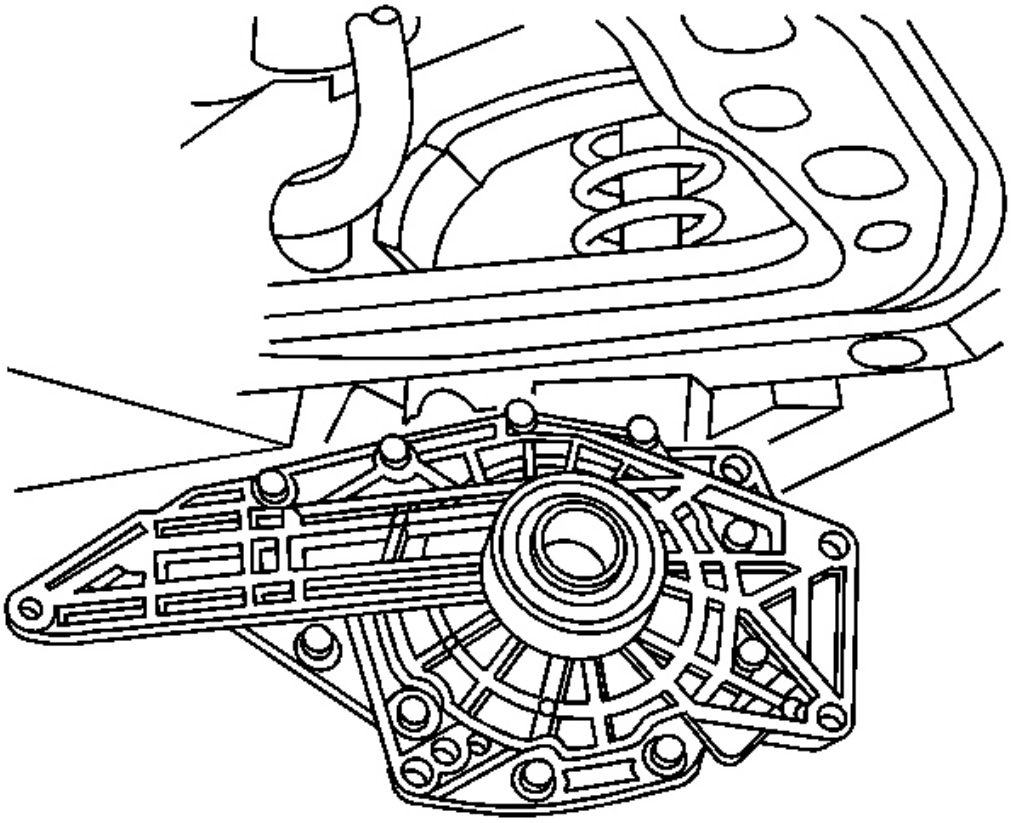


Fig. 90: Front Differential
Courtesy of GENERAL MOTORS CORP.

27. Remove the front differential from the vehicle.

Installation Procedure

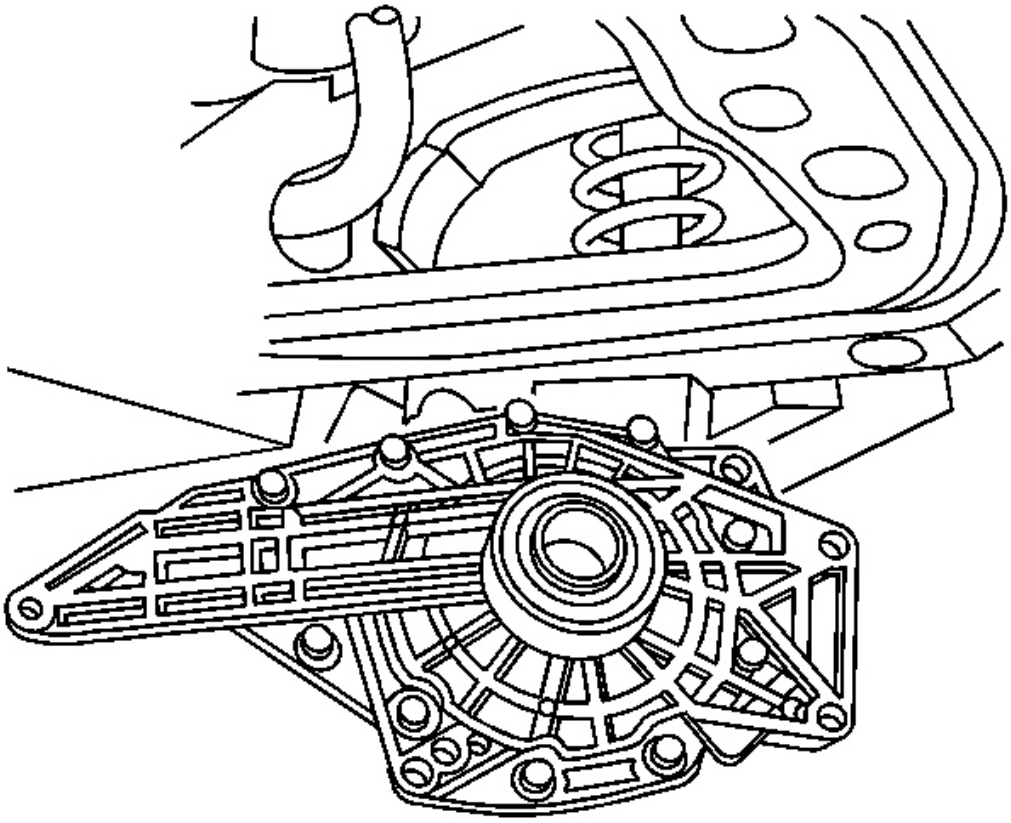


Fig. 91: Front Differential
Courtesy of GENERAL MOTORS CORP.

1. Position the front differential assembly on the frame.

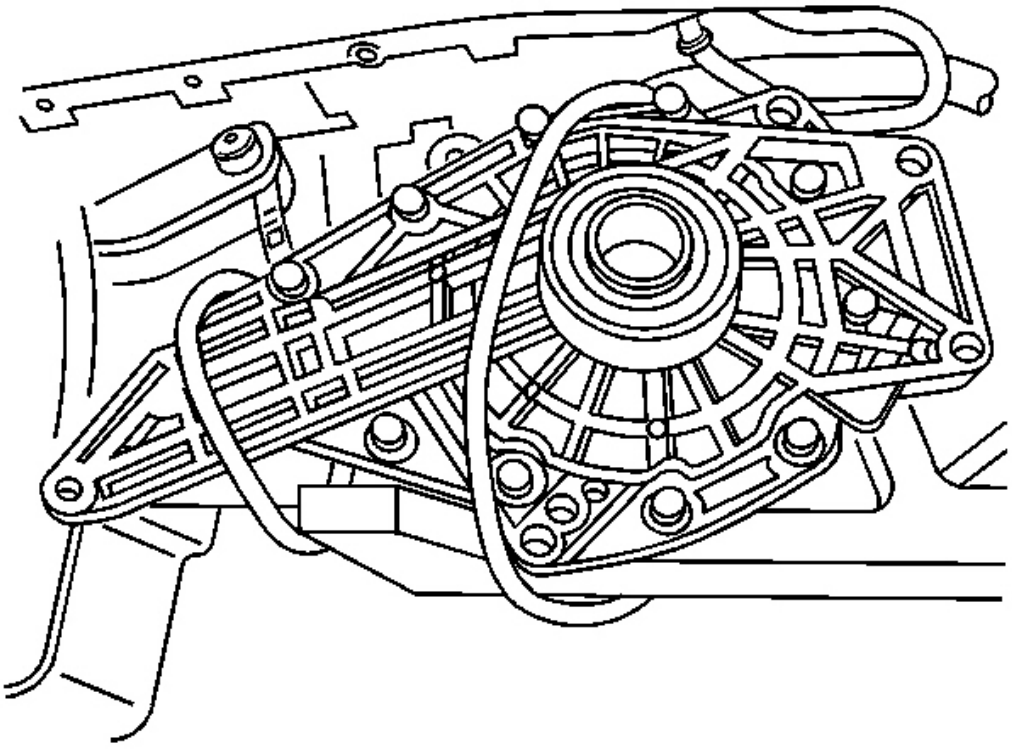


Fig. 92: Securing Front Differential To Frame
Courtesy of GENERAL MOTORS CORP.

2. Secure the front differential assembly.

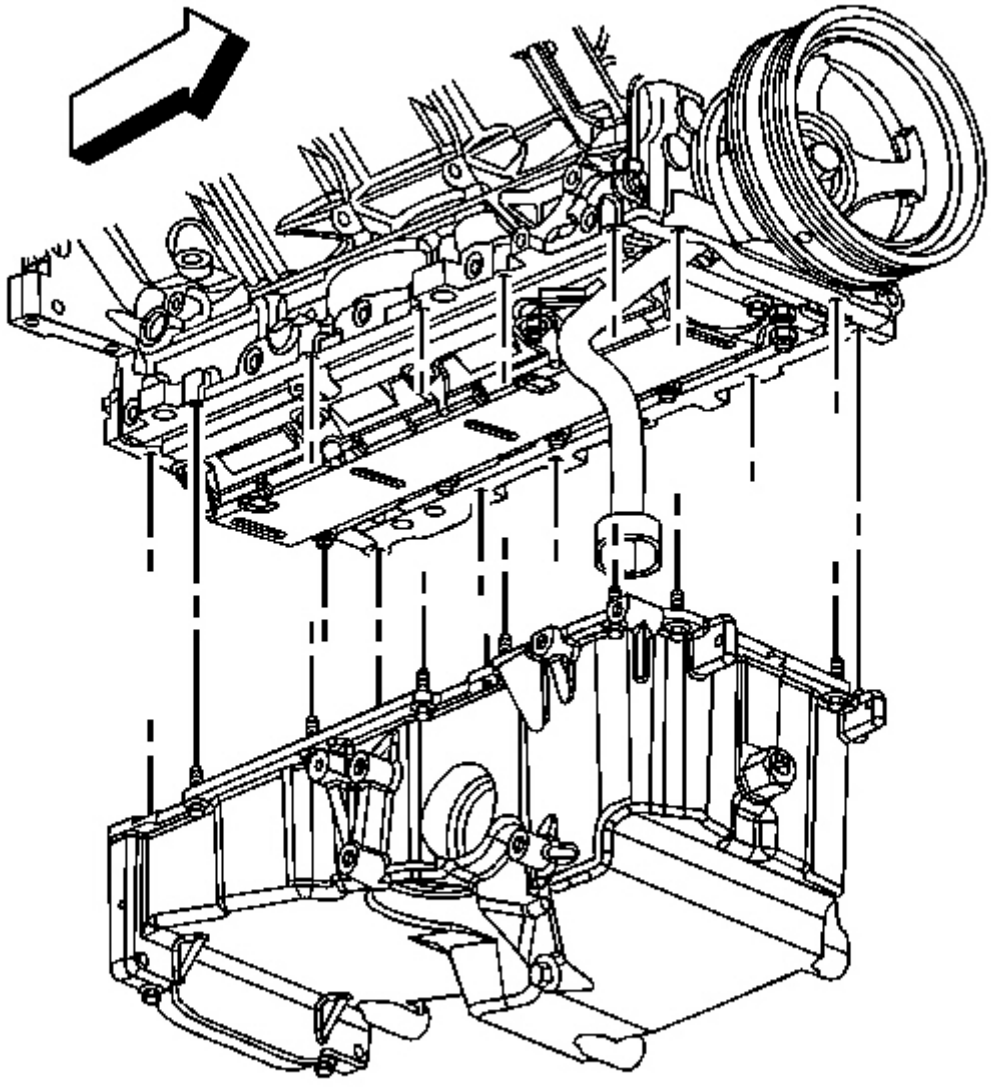


Fig. 93: View Of Oil Pan & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Install the oil pan assembly. Refer to Oil Pan Replacement .
4. Position the front differential on the oil pan.

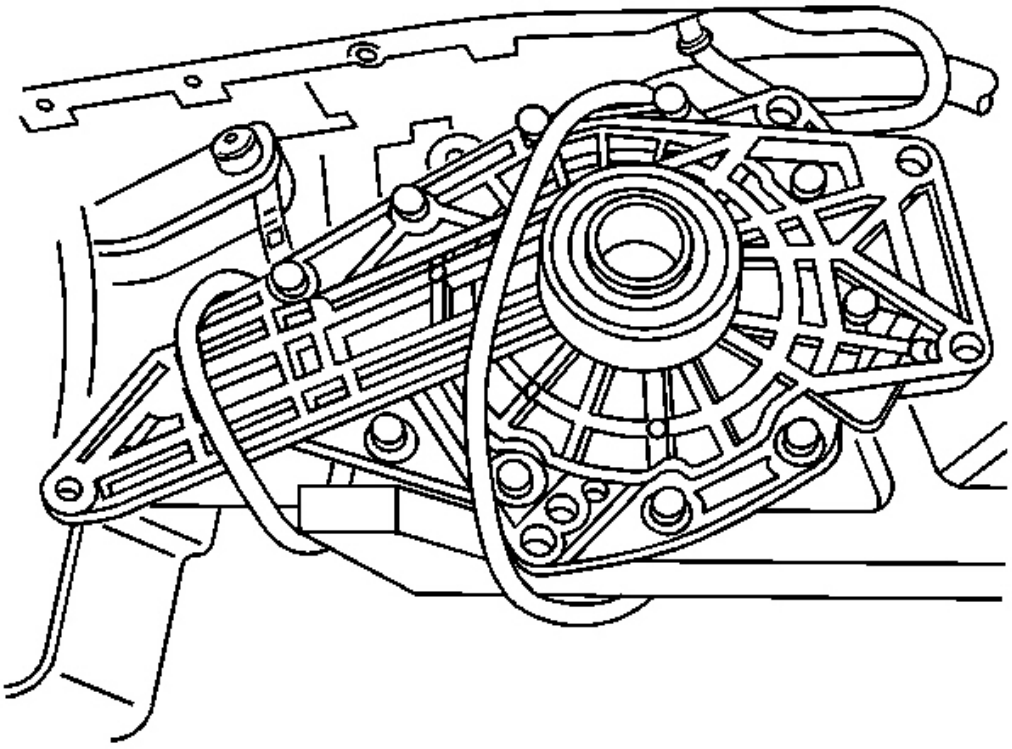


Fig. 94: Securing Front Differential To Frame
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Install the differential bolts.

   Tighten: Tighten the bolts to 85 N.m (63 lb ft).

6. Install the inner axle shaft. Refer to **Front Drive Axle Inner Shaft Replacement**.
7. Position the adjustable jack stand under the lower control arm.
8. Remove the shock module from the secure position.
9. Install the right wheel drive shaft in the inner drive shaft.
10. Rinse the jack stand to allow the installation of the steering knuckle in the upper control arm.

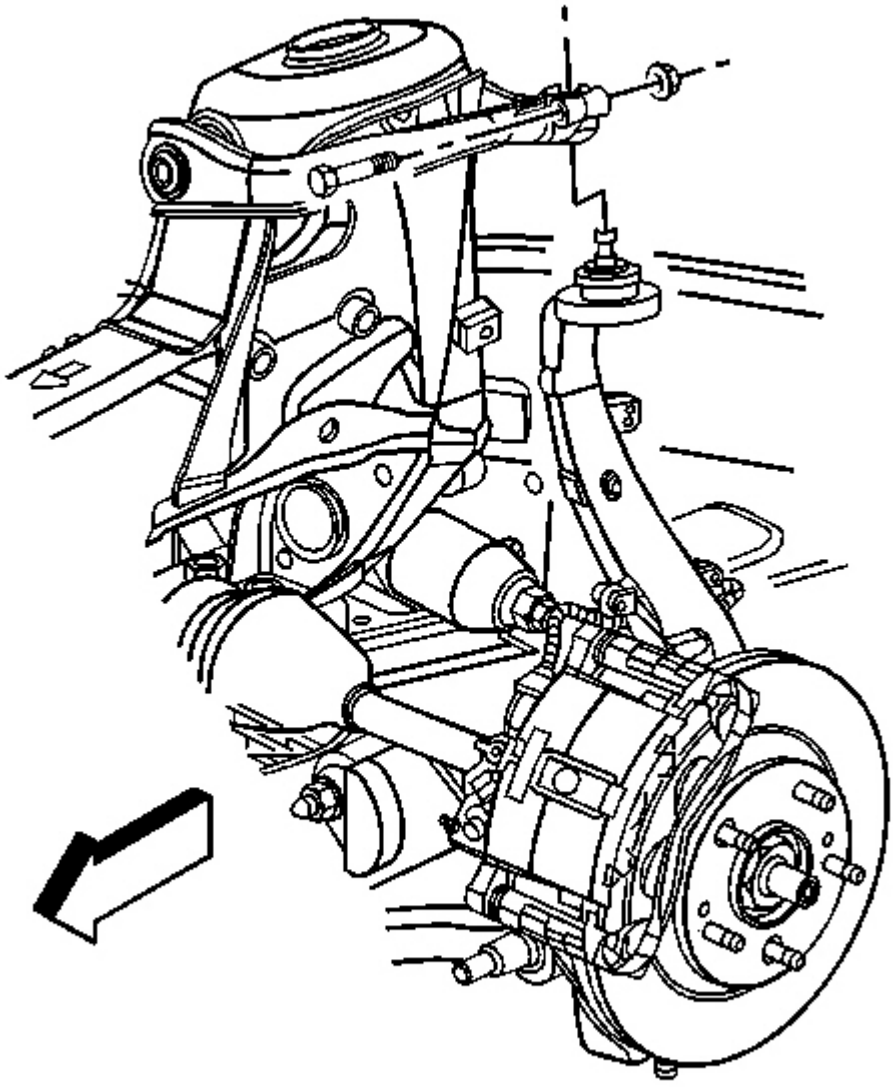


Fig. 95: View Of Upper Control Arm To Steering Knuckle Pinch Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

11. Install the upper ball joint pinch nut and bolt.

    Tighten: Tighten the bolt and nut to 40 N.m (30 lb ft).

12. Remove the jack stand from under the lower control arm.

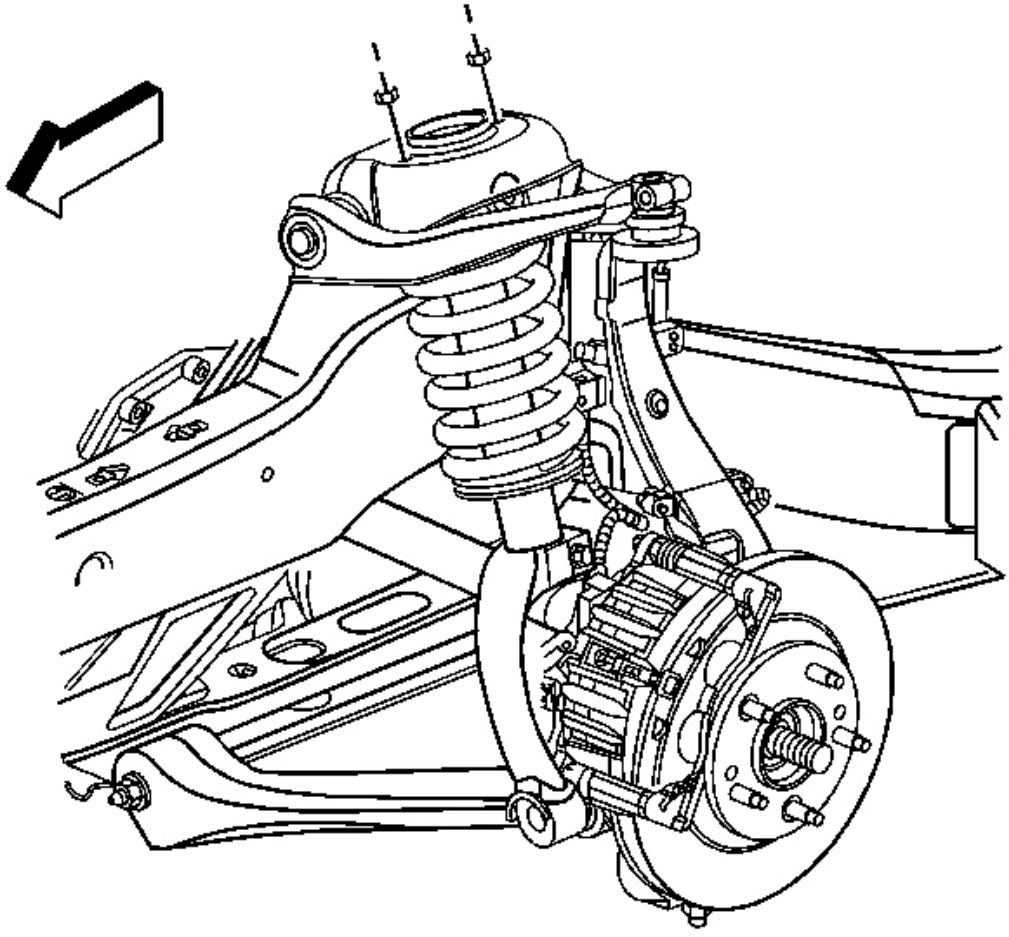


Fig. 96: View Of Upper Shock Module Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

13. Install the front shock upper retaining nuts.

    Tighten: Tighten the nuts to 45 N.m (33 lb ft).

14. Install the steering rack assembly. Refer to **Steering Gear Replacement** .

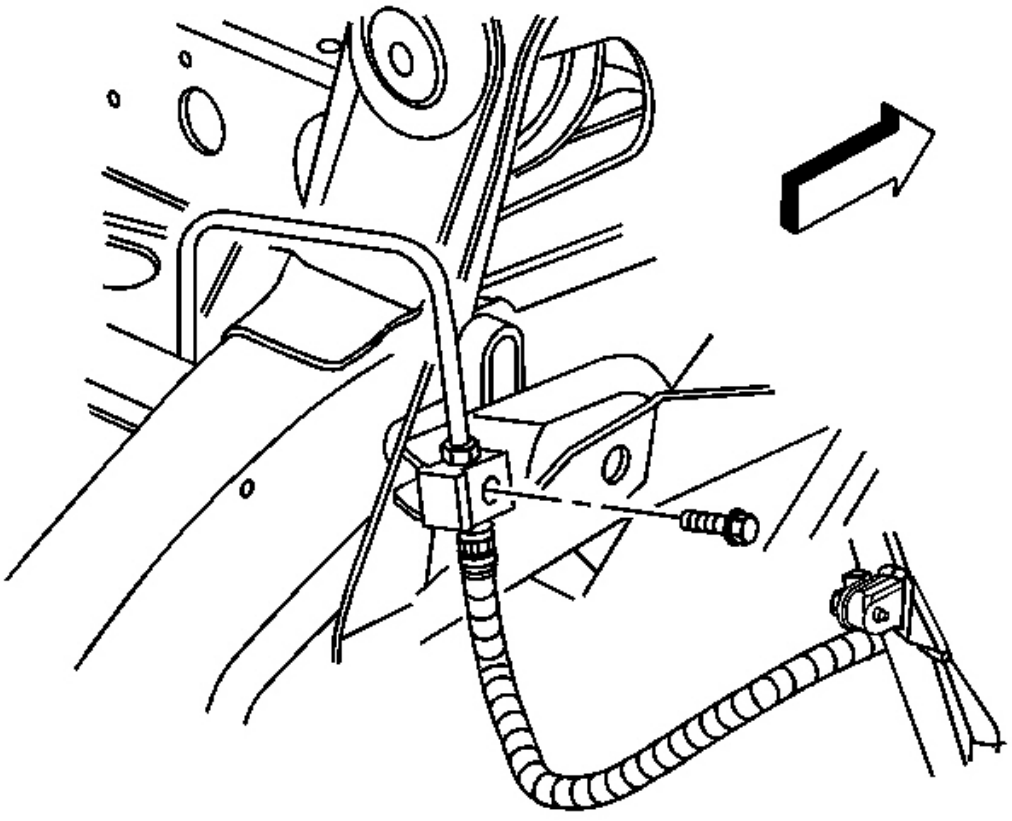


Fig. 97: Identifying Front Brake Hose Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

15. Install the brake hose retaining bolt.

    Tighten: Tighten the brake hose retaining bolt to 25 N.m (18 lb ft).

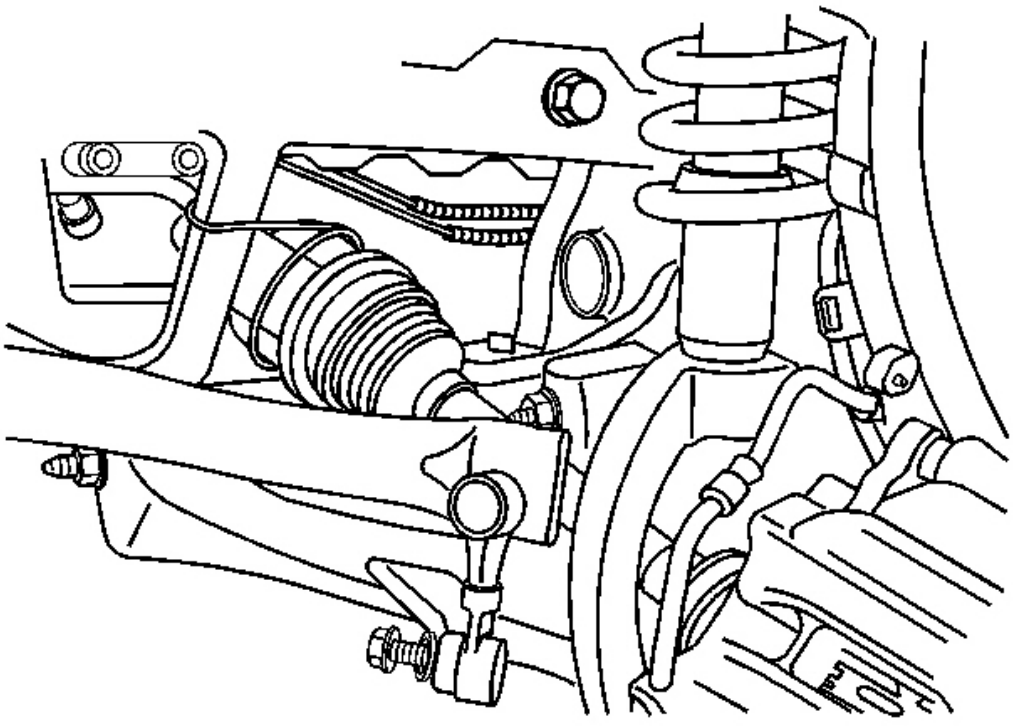


Fig. 98: View Of Lower Control Arm
Courtesy of GENERAL MOTORS CORP.

16. Install the sway bar links to the lower control arm. Refer to **Stabilizer Shaft Link Replacement** .

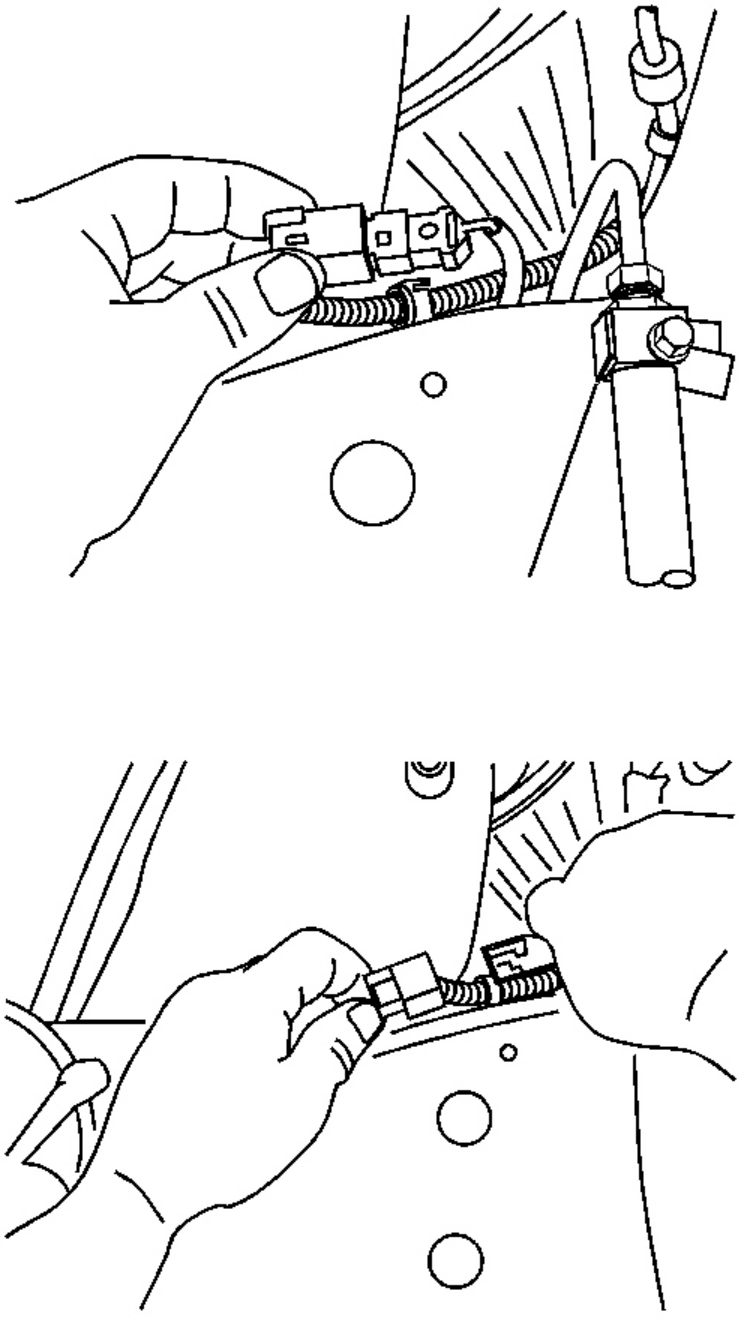


Fig. 99: Locating Connector
Courtesy of GENERAL MOTORS CORP.

17. Connect the wheel speed sensors electrical connectors.

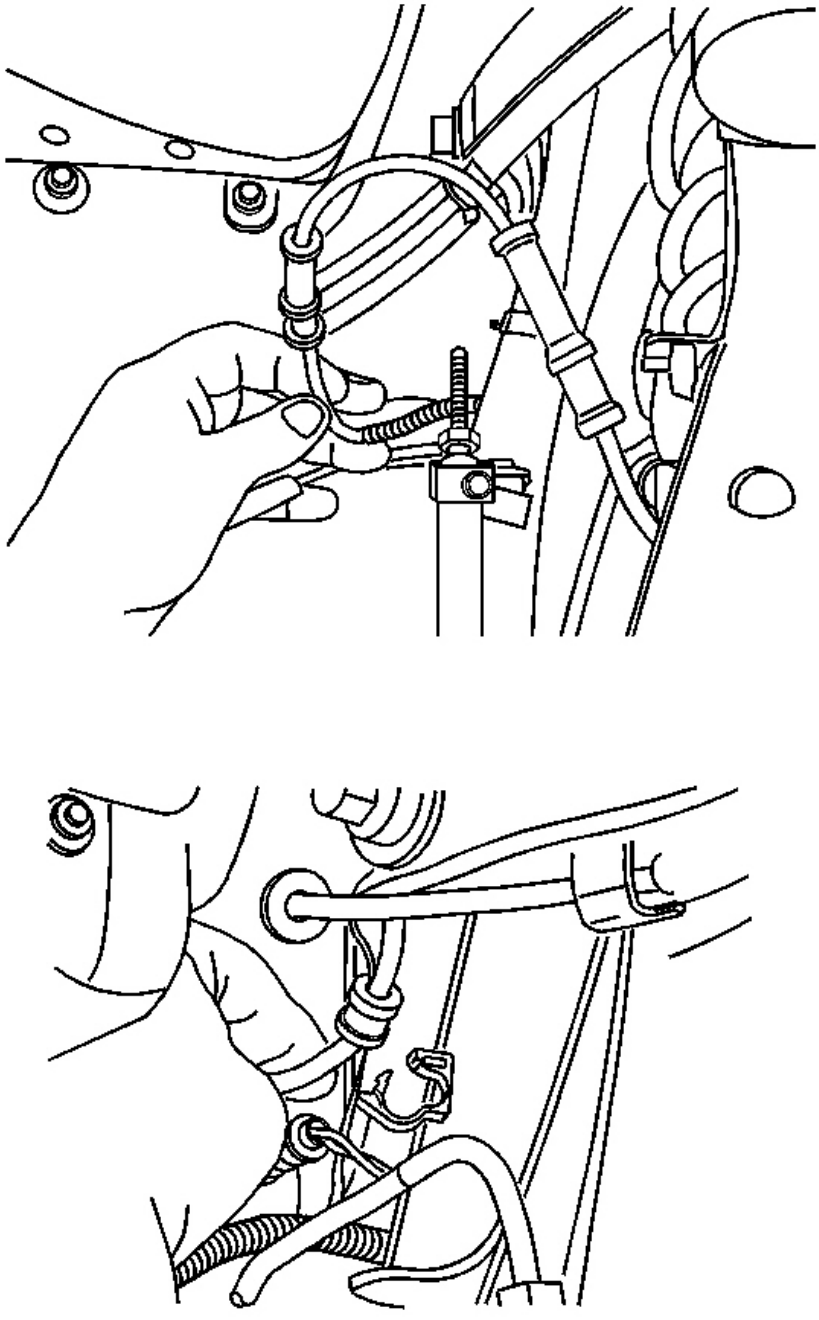


Fig. 100: Identifying Wheel Speed Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

18. Install the left and right ABS wiring harnesses in the retainers.

19. Install the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
20. Fill the front differential with fluid. Refer to **Front Axle Lubricant Replacement**.

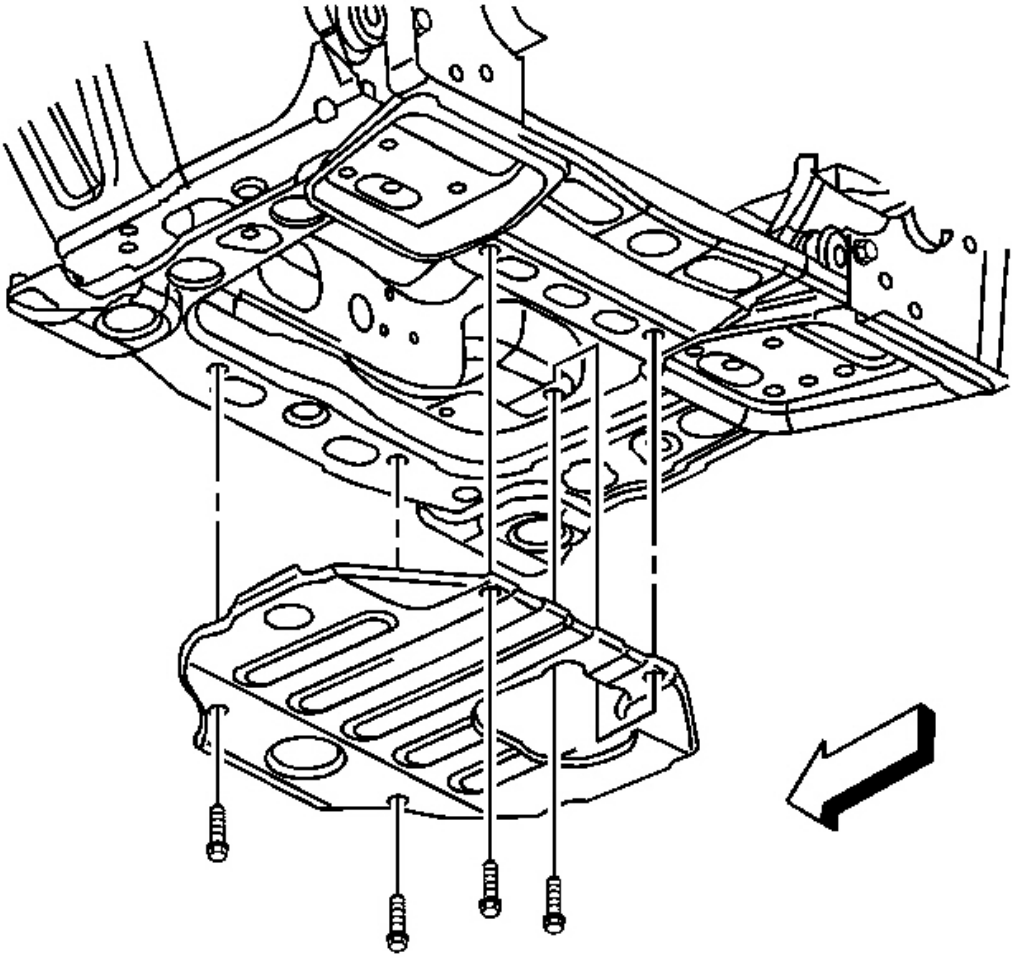


Fig. 101: View Of Engine Protection Shield
Courtesy of GENERAL MOTORS CORP.

21. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** .
22. Install the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .

DIFFERENTIAL CARRIER ASSEMBLY OIL SEAL AND/OR BEARING REPLACEMENT

Tools Required

- **J 2619-01** Slide Hammer with Adapter
- **J 29369-1** Bushing and Bearing Remover. See **Special Tools**.
- **J 29369-2** Bushing and Bearing Remover (2-3 in). See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Installer - LH. See **Special Tools**.
- **J 45233** Differential Bearing Adjuster Needle Bearing Installer - RH. See **Special Tools**.
- **J 45225** Axle Seal Installer. See **Special Tools**.
- **J 6125-B** Slide Hammer. See **Special Tools**.

Removal Procedure

IMPORTANT: The seals used in the differential carrier assembly have built in tabs that are used to retain the position of the differential side bearing adjusters. When removing the seal, do not twist or rotate the seal or the preload on the differential case side bearings may be affected.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the lubricant from the differential carrier assembly. Refer to **Front Axle Lubricant Replacement**.
3. Remove the left wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .

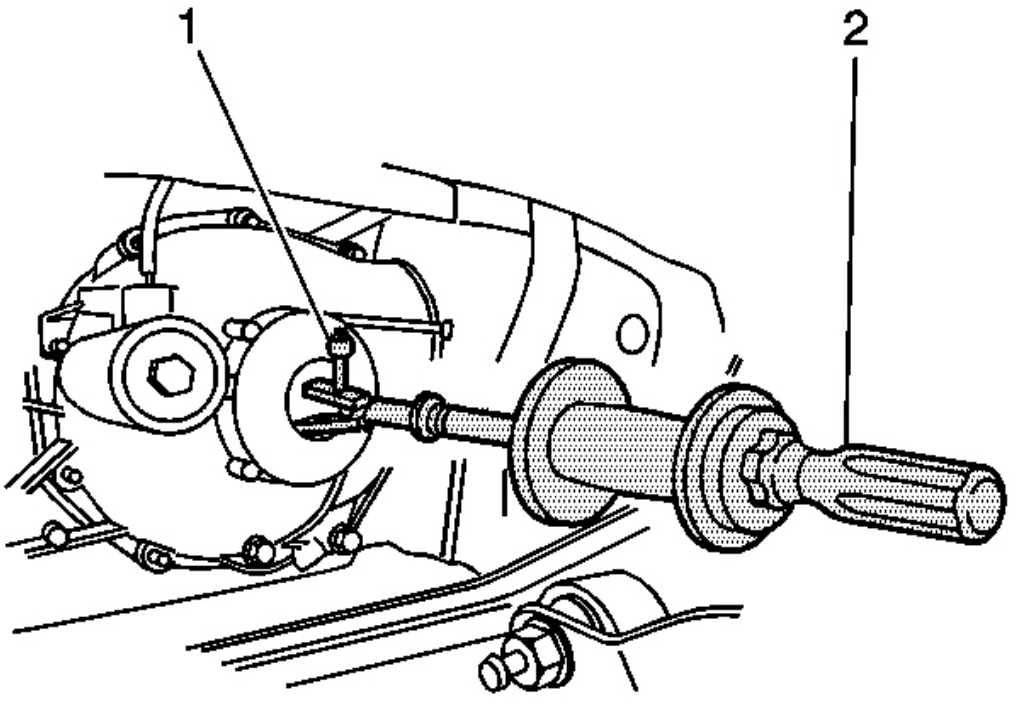


Fig. 102: Identifying Special Tools J 6125-B & J 29369-2
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 6125-B** (2) and the **J 29369-2** (1) onto the backside of the seal as shown. See **Special Tools**.
5. Remove the seal by pulling on the **J 6125-B** (1). See **Special Tools**.
6. Place an alignment mark between the differential bearing adjuster and the differential carrier assembly case.
7. Install the **J 6125-B** and the **J 29369-2** onto the backside of the bearing cage. See **Special Tools**.
8. Remove the bearing by pulling on the **J 6125-B** . See **Special Tools**.
9. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (4.2L In-Line Six Cylinder)** or **Differential Carrier Assembly Replacement (5.3L V-8)**.

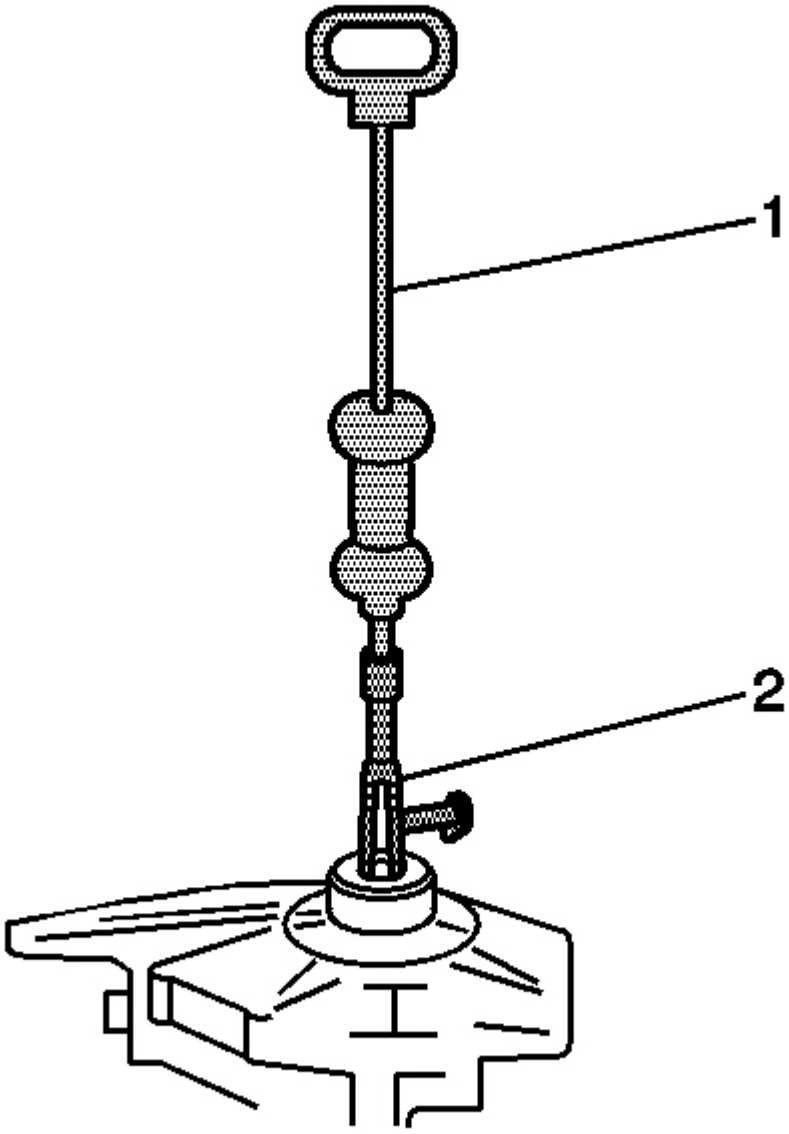


Fig. 103: Identifying Special Tools J 29369-1 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

10. Install the **J 29369-1** (2) and the **J 2619-01** (1) onto the backside of the seal as shown. See **Special Tools**.
11. Remove the seal by pulling on the **J 2619-01** (1).
12. Place an alignment mark between the differential bearing adjuster and the differential carrier assembly case.

13. Install the **J 6125-B** and the **J 29369-2** onto the backside of the bearing cage. See **Special Tools**.
14. Remove the bearing by pulling on the **J 6125-B** . See **Special Tools**.

Installation Procedure

IMPORTANT: The seals used in the differential carrier assembly have built in tabs that are used to retain the position of the differential side bearing adjusters. When installing the seal, it is not necessary to align the tabs to the slots on the differential side bearing adjuster. Two of the tabs on the seal will automatically align themselves with the slots on the differential side bearing adjuster when the seal is installed.

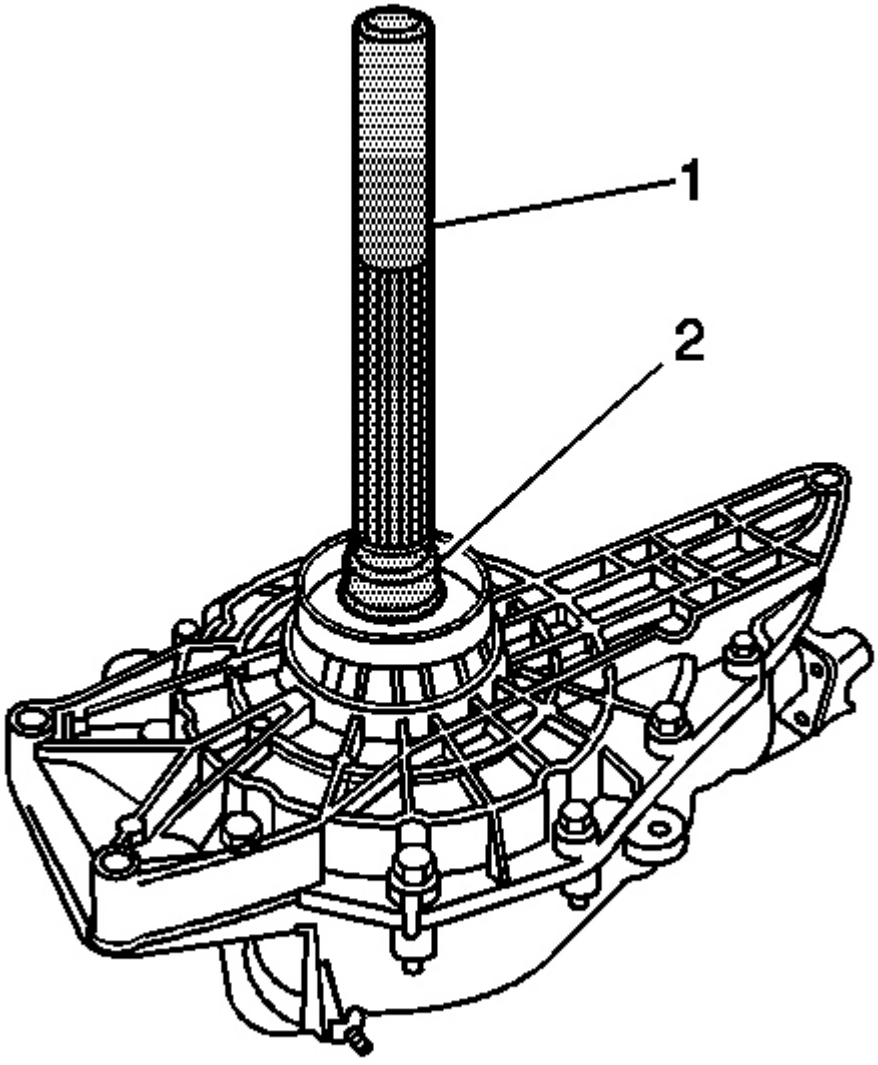


Fig. 104: Identifying Special Tools J 45233 & J 8092
Courtesy of GENERAL MOTORS CORP.

1. Install the bearing (print side out) using the **J 45233** (2) and the **J 8092** (1). See **Special Tools**.
2. Inspect the alignment between the differential bearing adjuster and the differential carrier assembly case. If the line between the differential bearing adjuster and the differential carrier assembly case is not aligned, re-align the 2 components as necessary.

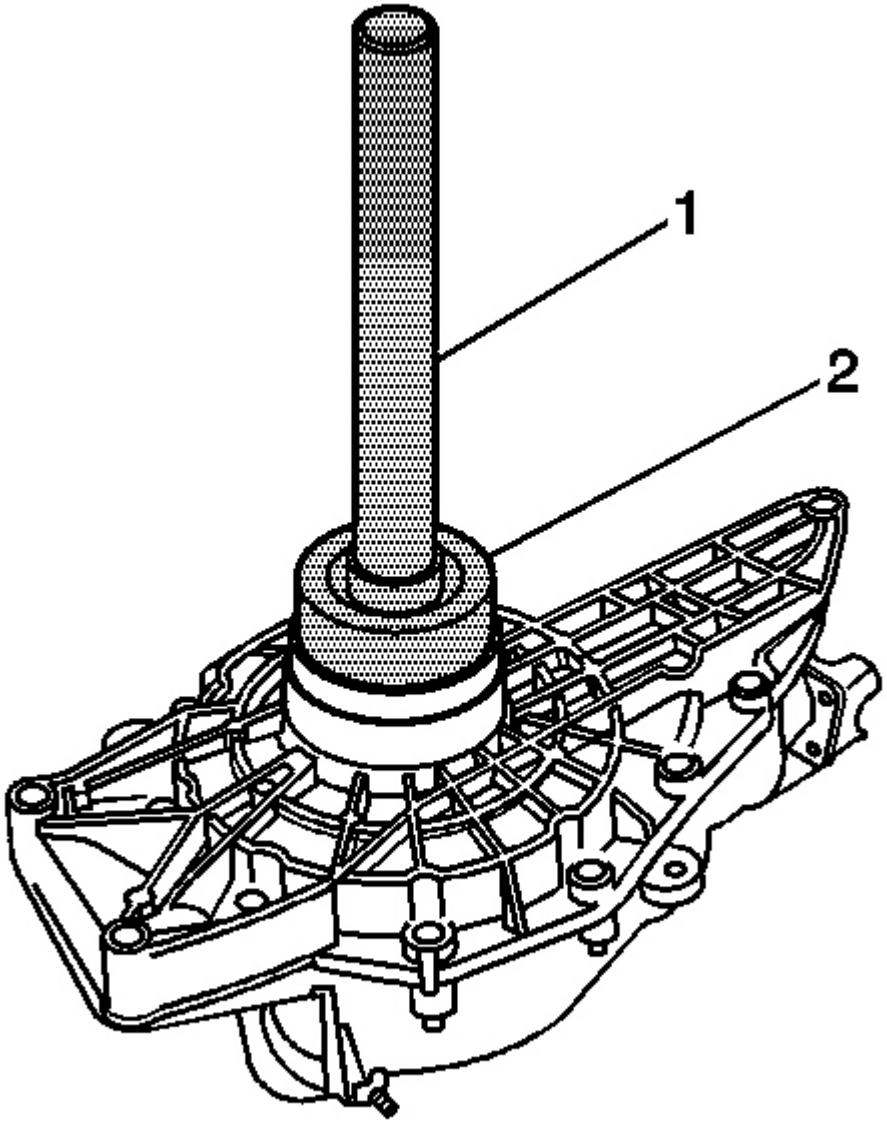


Fig. 105: Identifying Axle Seal Installer & Universal Driver Handle (Right)
Courtesy of GENERAL MOTORS CORP.

3. Install the new inner shaft seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.
4. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (4.2L In-Line Six Cylinder)** or **Differential Carrier Assembly Replacement (5.3L V-8)**.

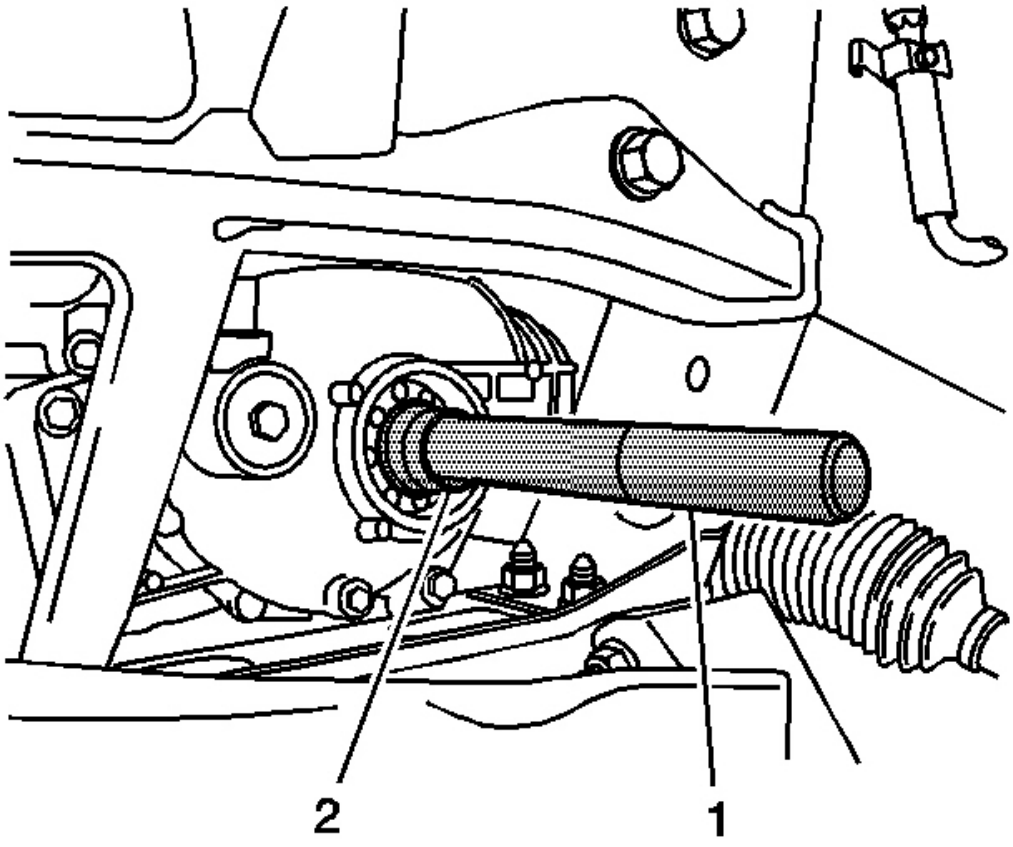


Fig. 106: Identifying Special Tools J 45233 & J 8092
Courtesy of GENERAL MOTORS CORP.

5. Install the bearing (print side out) using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.
6. Inspect the alignment mark between the differential bearing adjuster and the differential carrier assembly case. If the line between the differential bearing adjuster and the differential carrier assembly case is not aligned, re-align the 2 components as necessary.

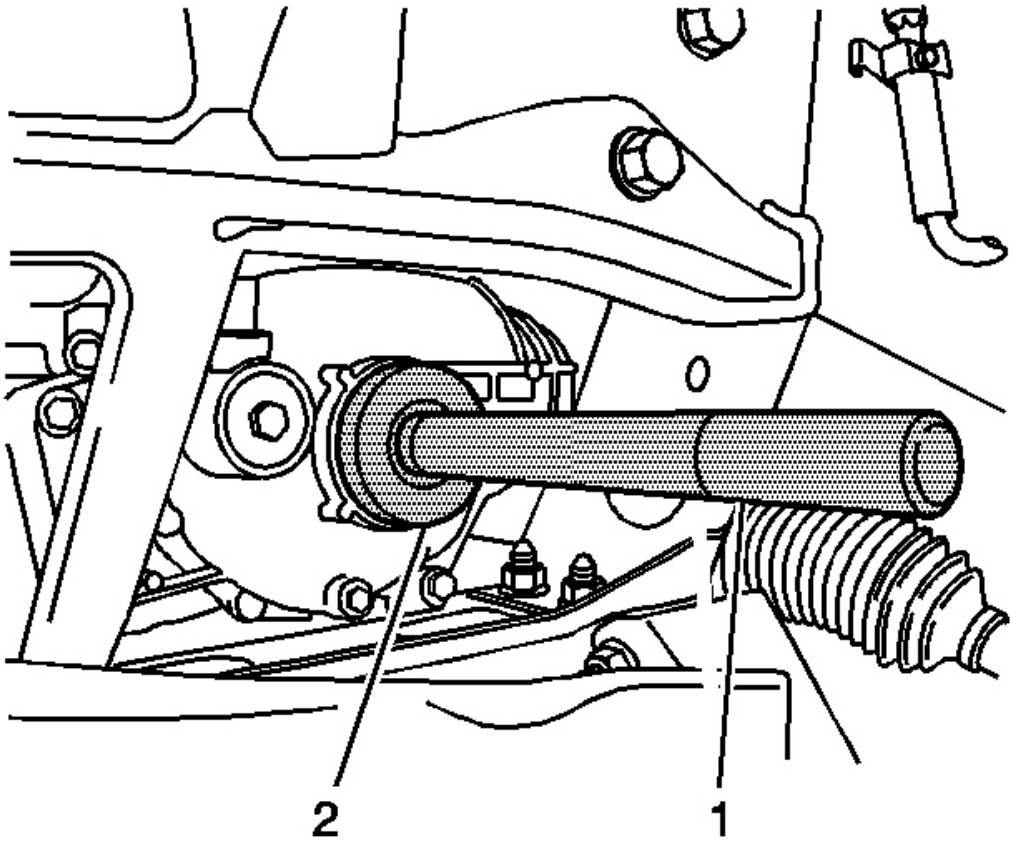


Fig. 107: Identifying Special Tools J 45233 & J 8092
Courtesy of GENERAL MOTORS CORP.

7. Install the new inner shaft seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.
8. Install the left wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** .
9. Fill the differential carrier assembly with axle lubricant. Use the proper lubricant. Refer to **Front Axle Lubricant Replacement**.
10. Lower the vehicle.

INTERMEDIATE SHAFT BEARING ASSEMBLY DISASSEMBLE (S4WD)

Disassembly Procedure

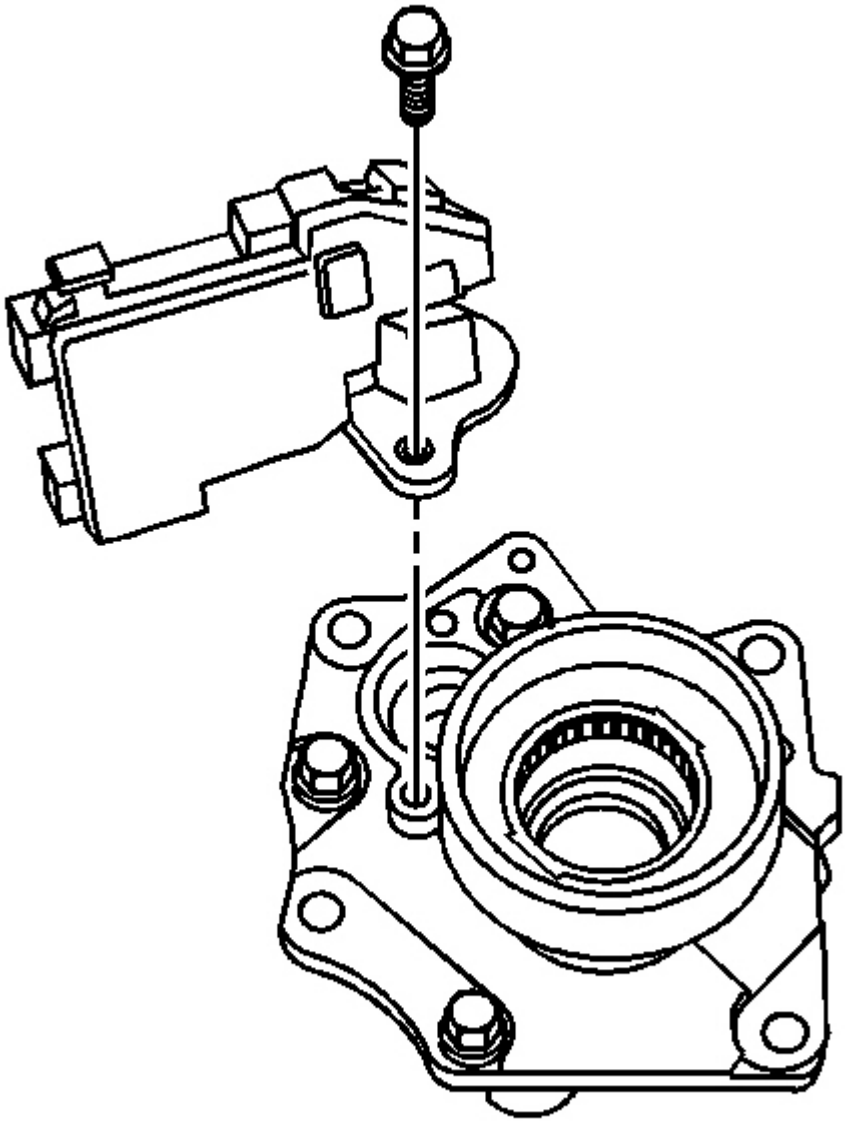


Fig. 108: View Of Actuator & Actuator Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the actuator assembly bolts.
2. Remove the actuator assembly.

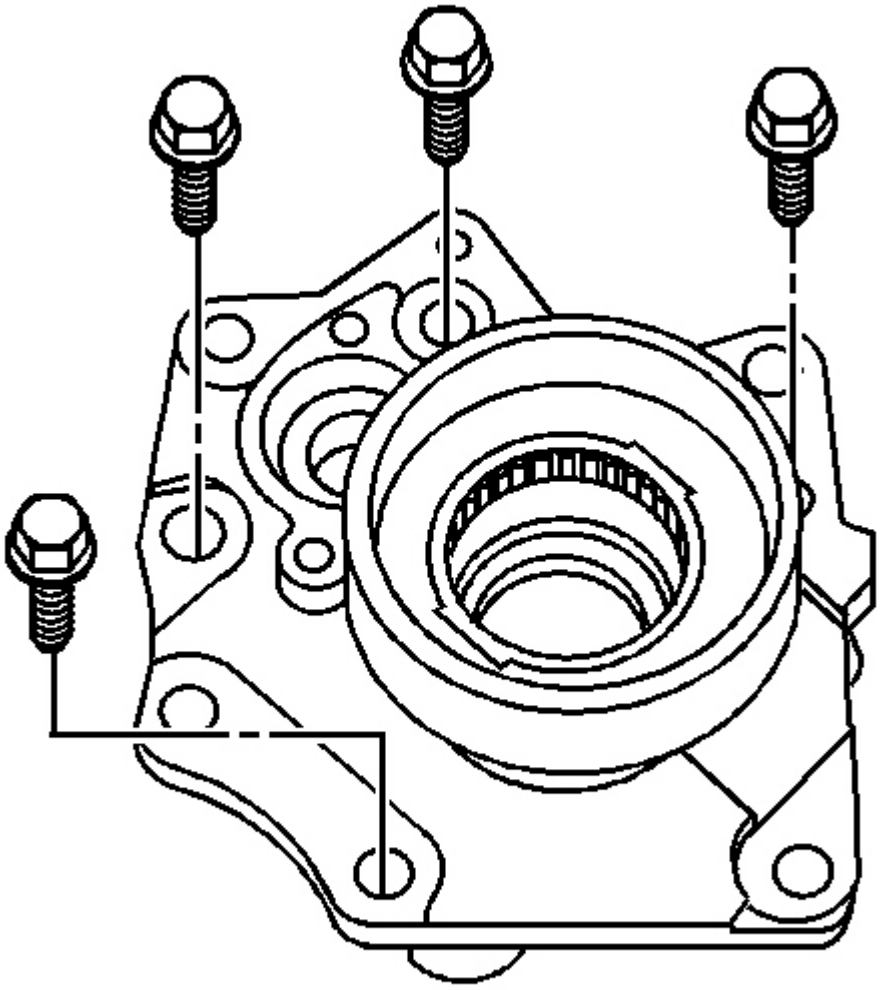


Fig. 109: View Of Intermediate Shaft Bearing Case Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the intermediate shaft bearing assembly bolts.
4. Separate the intermediate shaft bearing assembly case halves.

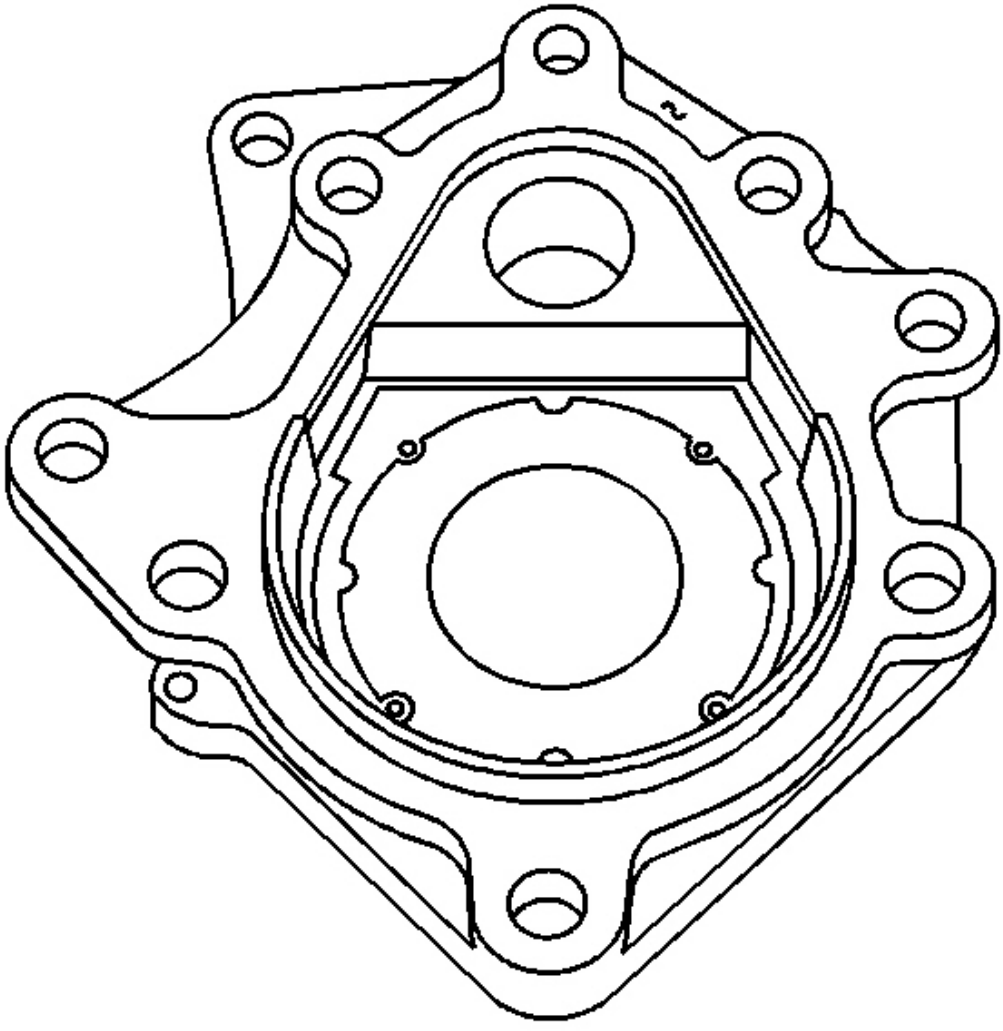


Fig. 110: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

5. Remove the thrust washer.

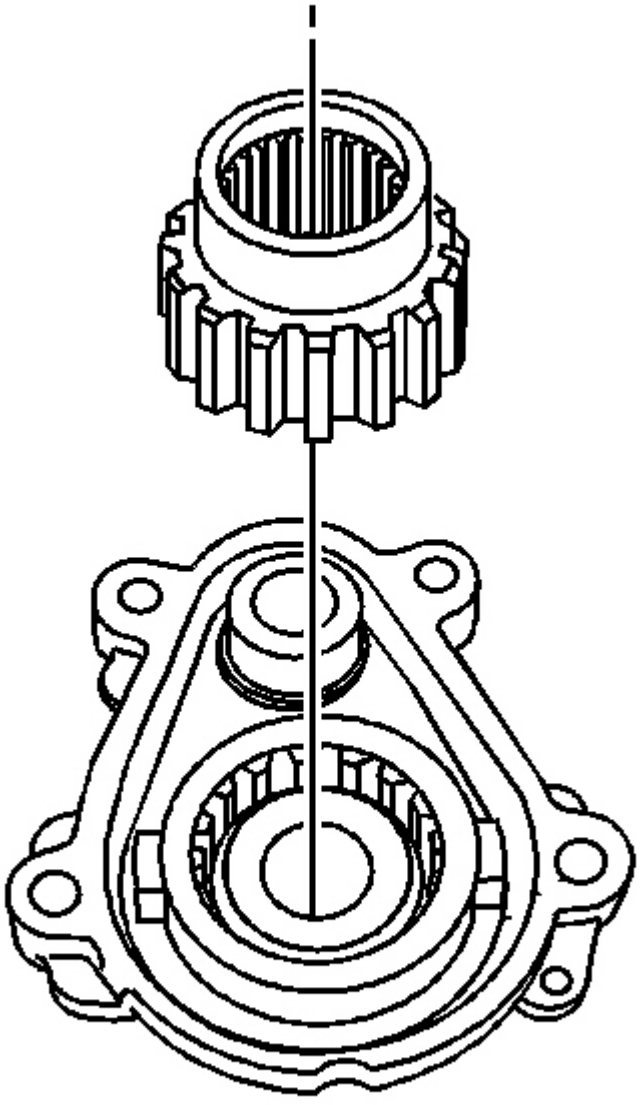


Fig. 111: View Of Outer Clutch Fork Gear
Courtesy of GENERAL MOTORS CORP.

6. Remove the clutch fork gear.

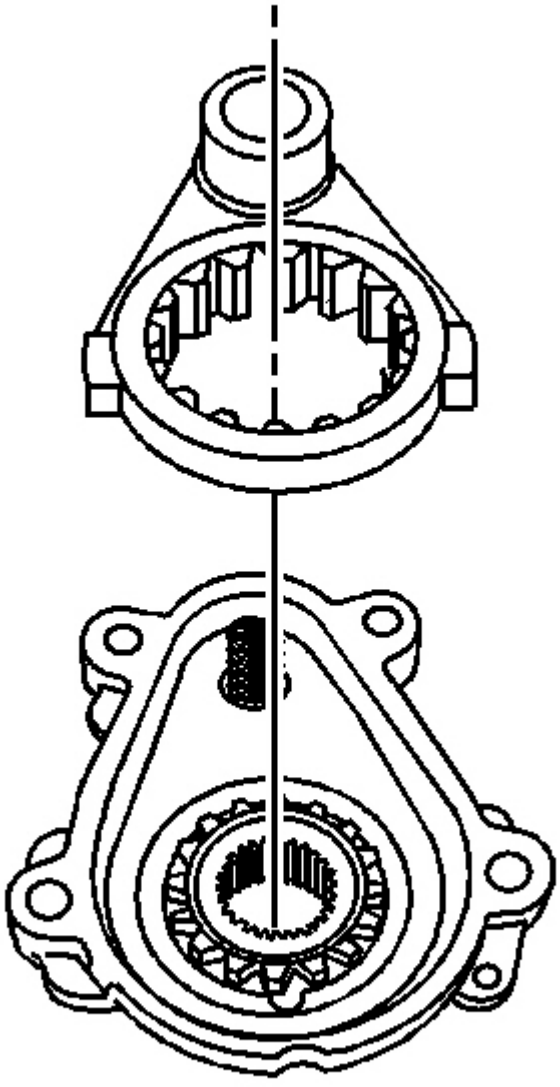


Fig. 112: View Of Clutch Fork & Clutch Fork Sleeve
Courtesy of GENERAL MOTORS CORP.

7. Remove the clutch fork and the clutch fork sleeve.

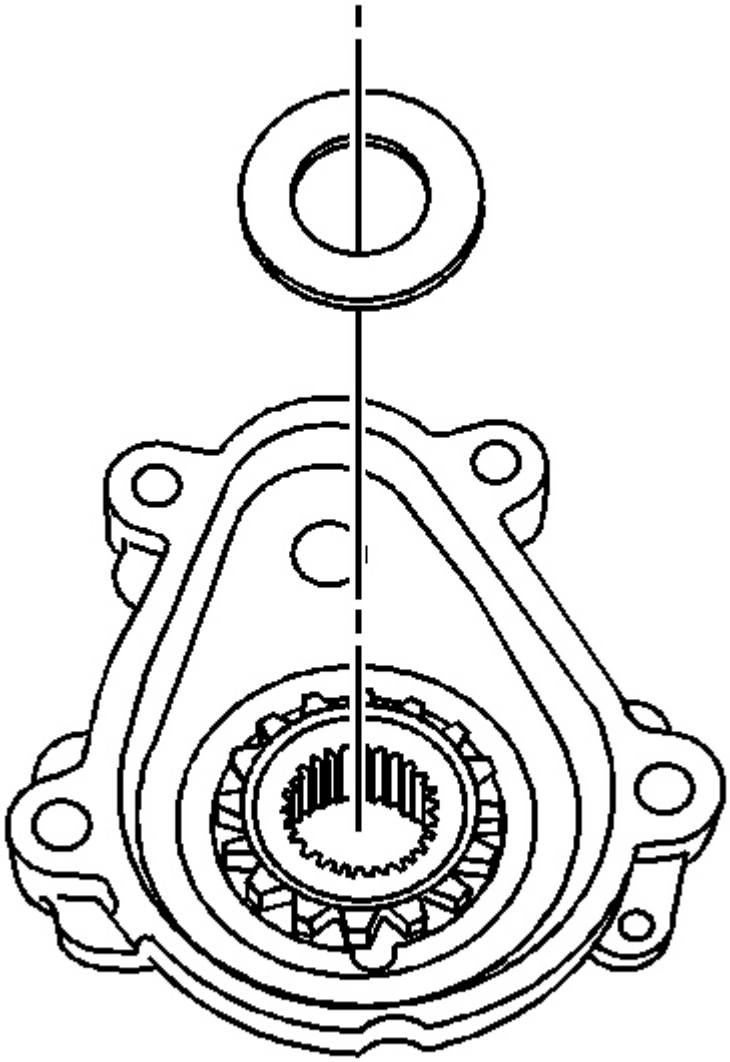


Fig. 113: Identifying Washer
Courtesy of GENERAL MOTORS CORP.

8. Remove the washer.

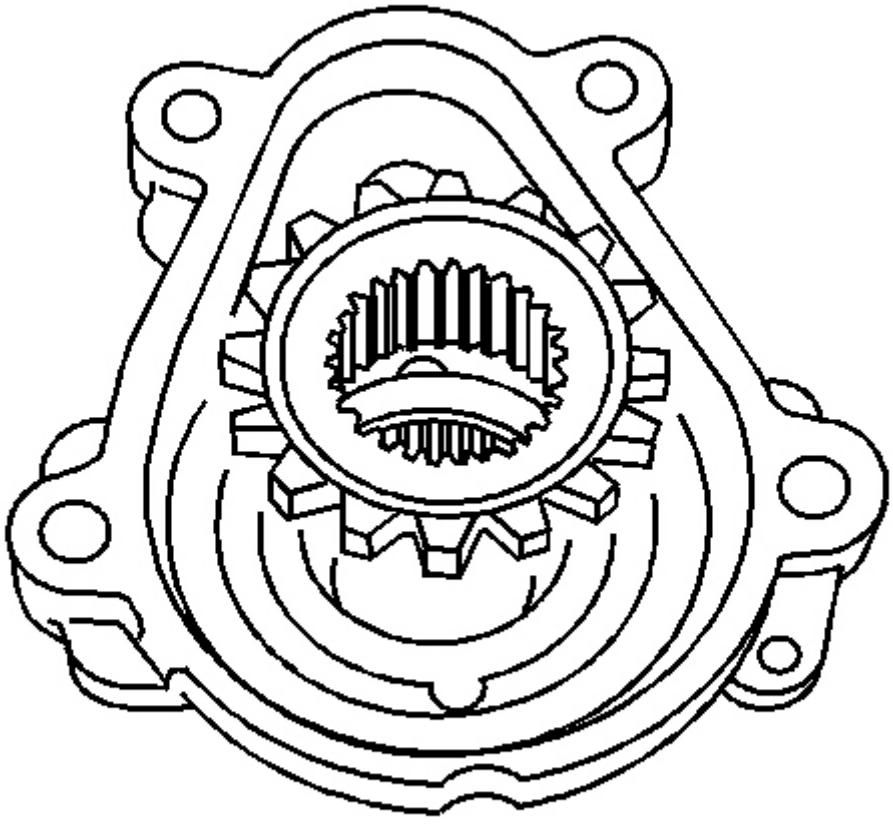


Fig. 114: View Of Inner Clutch Fork Gear
Courtesy of GENERAL MOTORS CORP.

9. Remove the clutch fork sleeve gear.

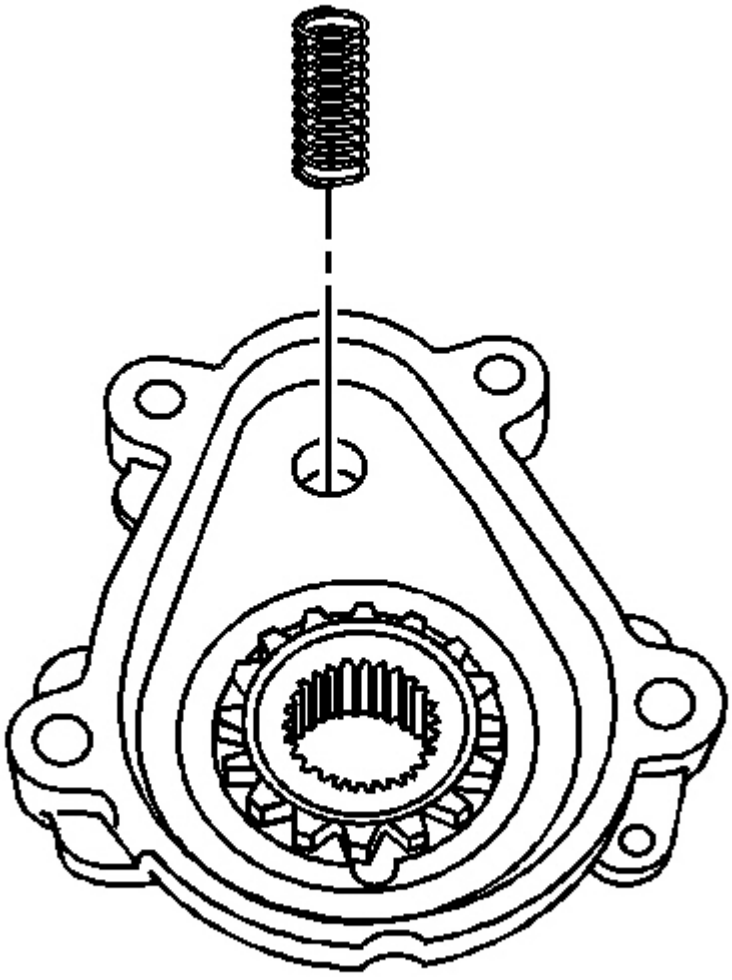


Fig. 115: View Of Clutch Fork Spring
Courtesy of GENERAL MOTORS CORP.

10. Remove the clutch fork spring.

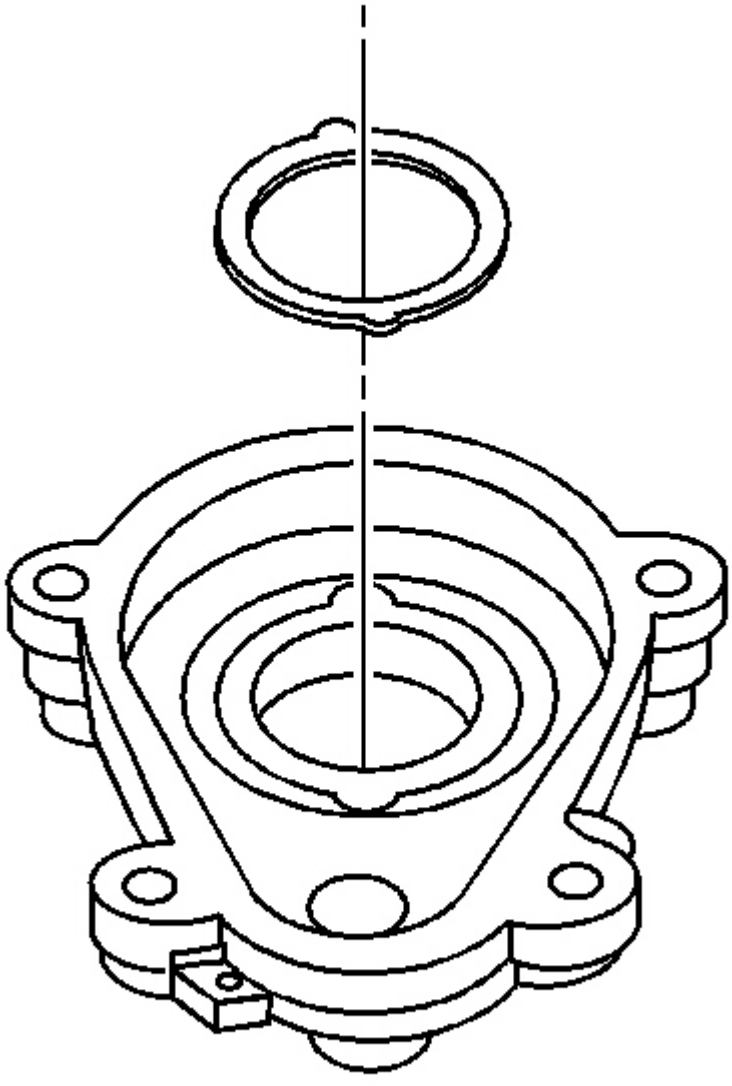


Fig. 116: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

11. Remove the thrust washer.

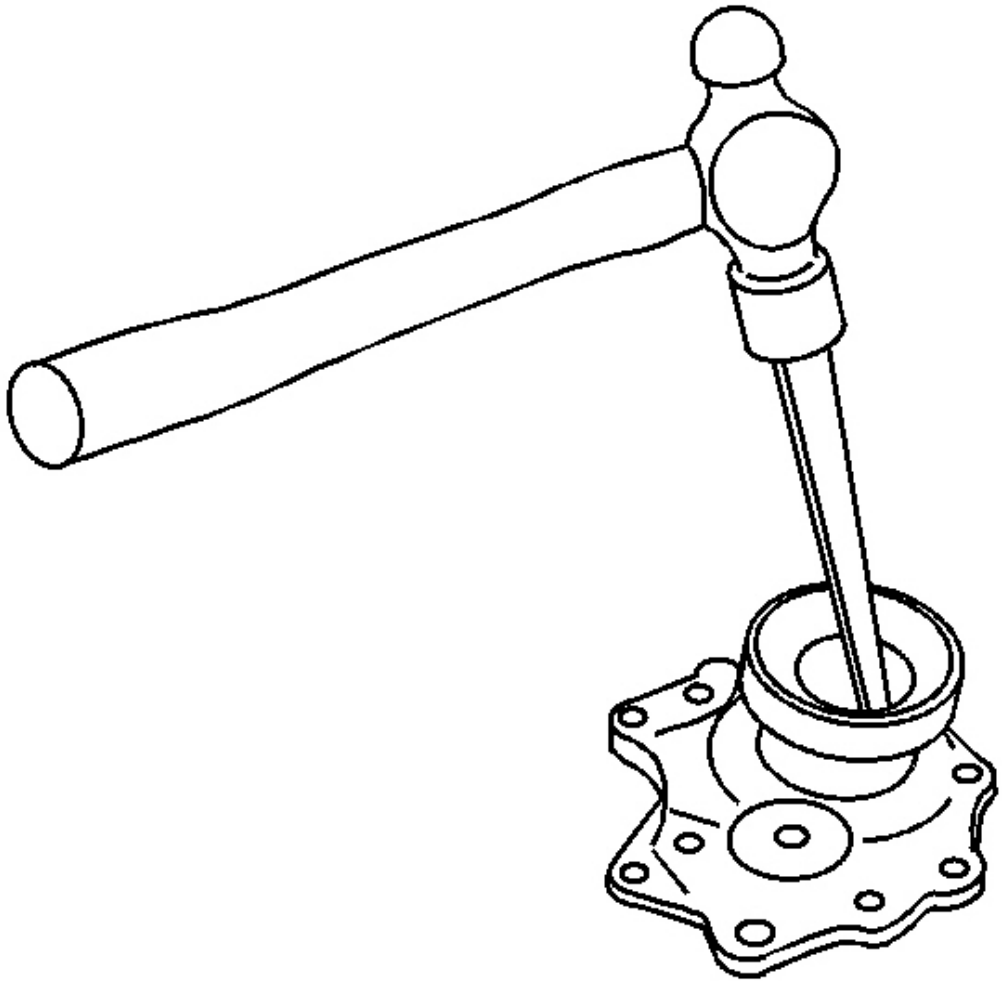


Fig. 117: Removing Inner Bearing From Outer Intermediate Shaft Bearing Case Half
Courtesy of GENERAL MOTORS CORP.

12. Remove the inner bearing from the outer intermediate shaft bearing case half using a hammer and a brass drift.
13. Remove the outer bearing from the outer intermediate shaft bearing case half using a hammer and a brass drift.

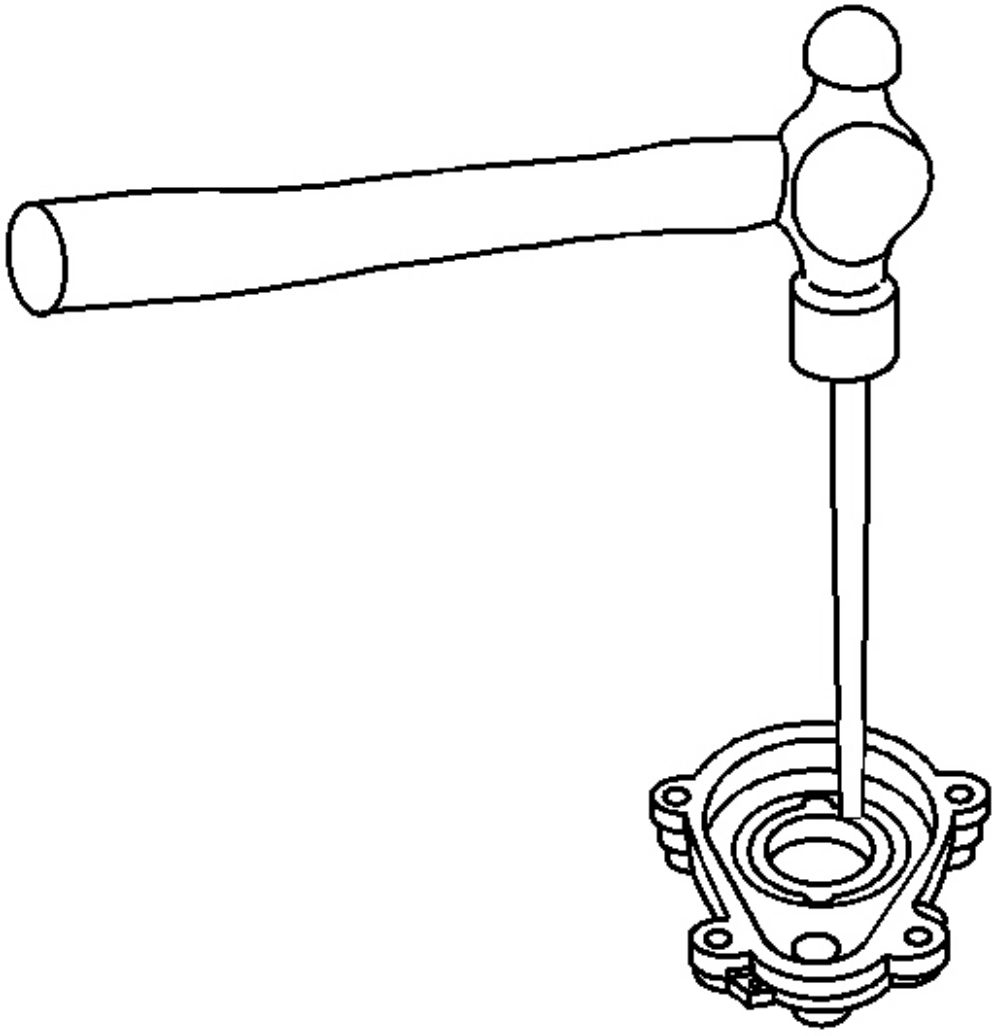


Fig. 118: Removing Bearing From Inner Intermediate Shaft Bearing Case Half
Courtesy of GENERAL MOTORS CORP.

14. Remove the bearing from the inner intermediate shaft bearing case half using a hammer and a brass drift.

INTERMEDIATE SHAFT BEARING ASSEMBLY DISASSEMBLE (A4WD)

Disassembly Procedure

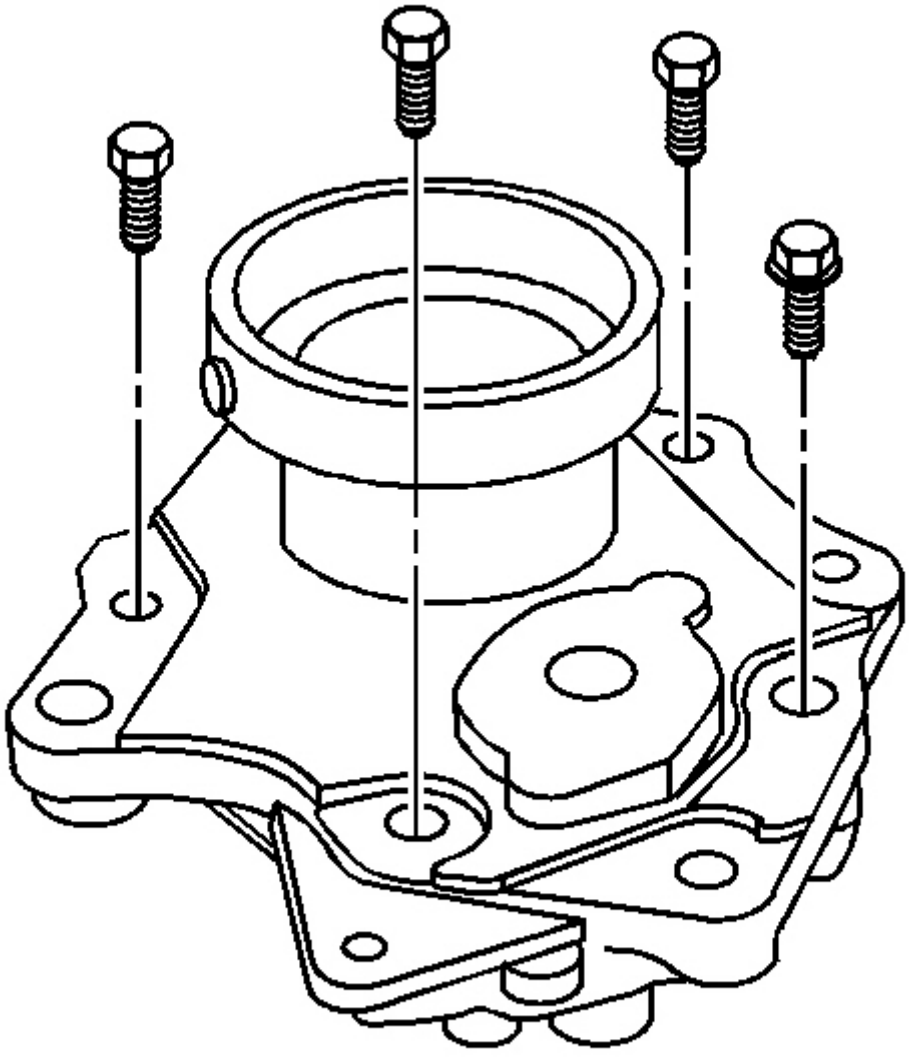


Fig. 119: View Of Intermediate Shaft Bearing Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the intermediate shaft bearing assembly bolts.
2. Separate the intermediate shaft bearing assembly case halves.

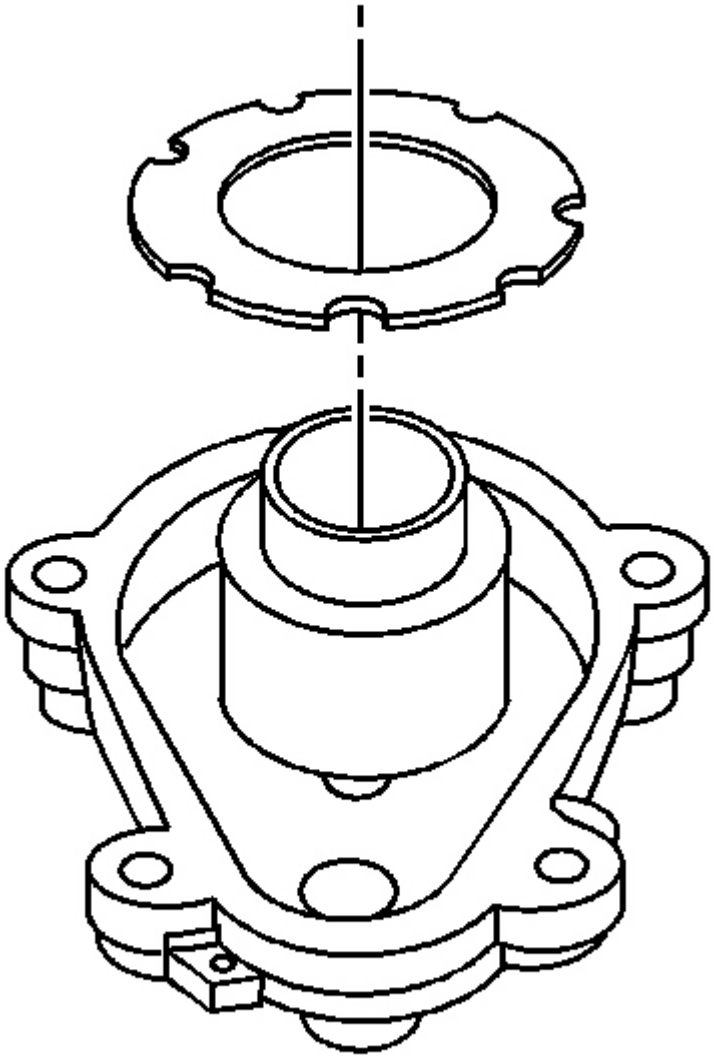


Fig. 120: Identifying Thrust Washer
Courtesy of GENERAL MOTORS CORP.

3. Remove the thrust washer.

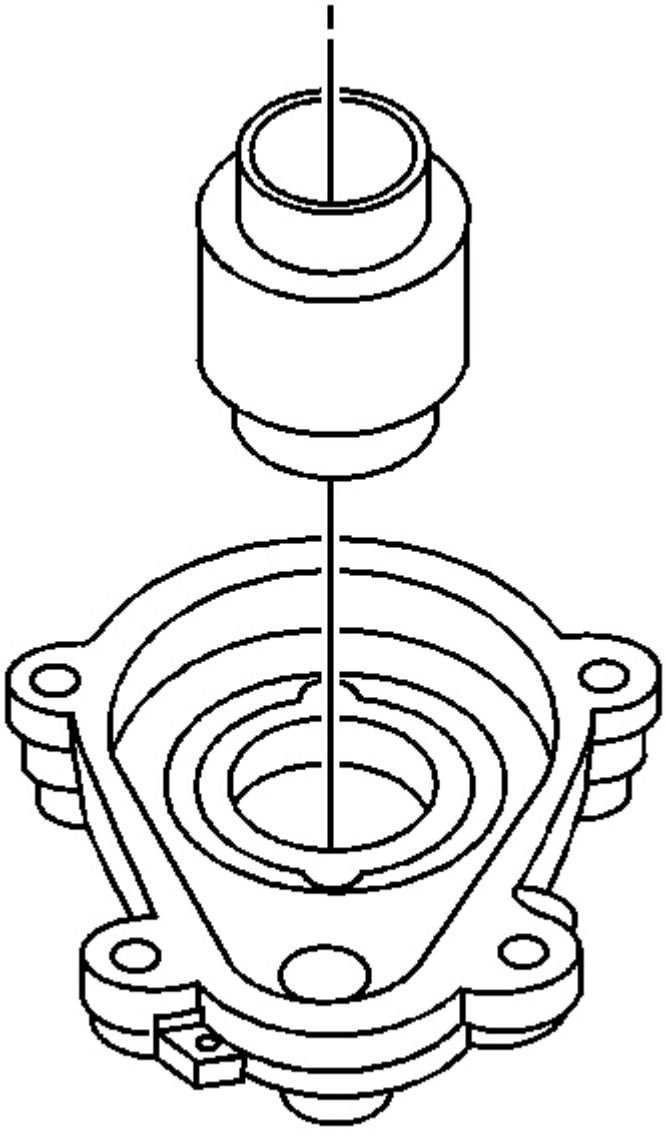


Fig. 121: Identifying Clutch Fork Sleeve
Courtesy of GENERAL MOTORS CORP.

4. Remove the clutch fork sleeve.

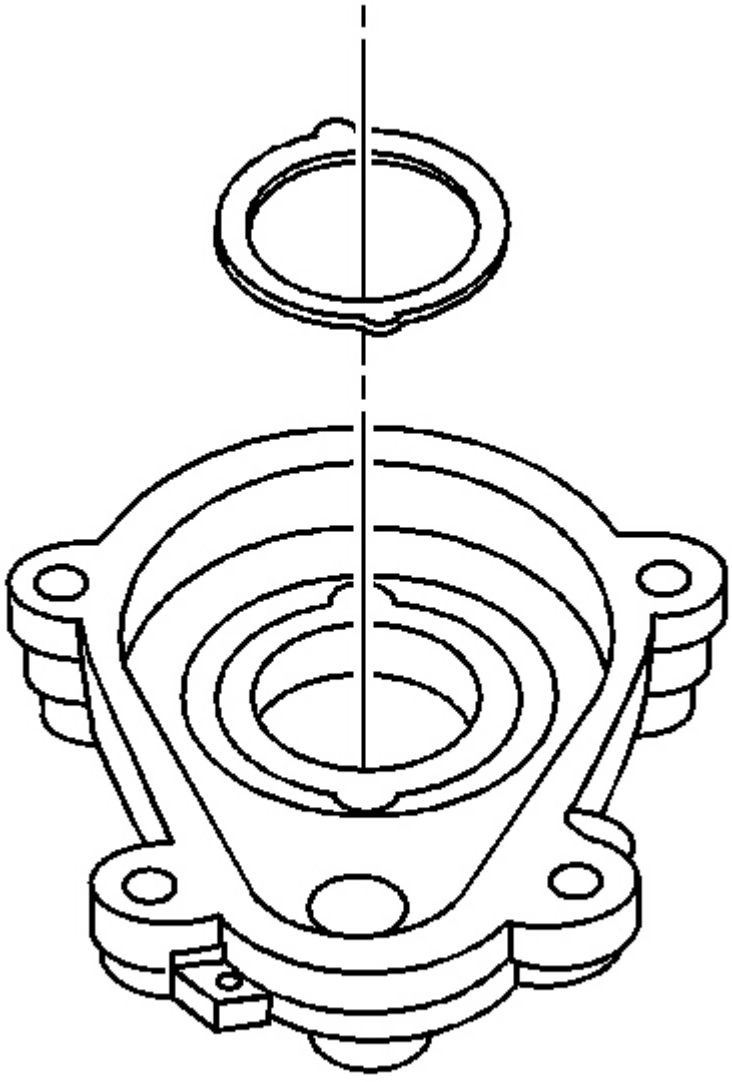


Fig. 122: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

5. Remove the thrust washer.

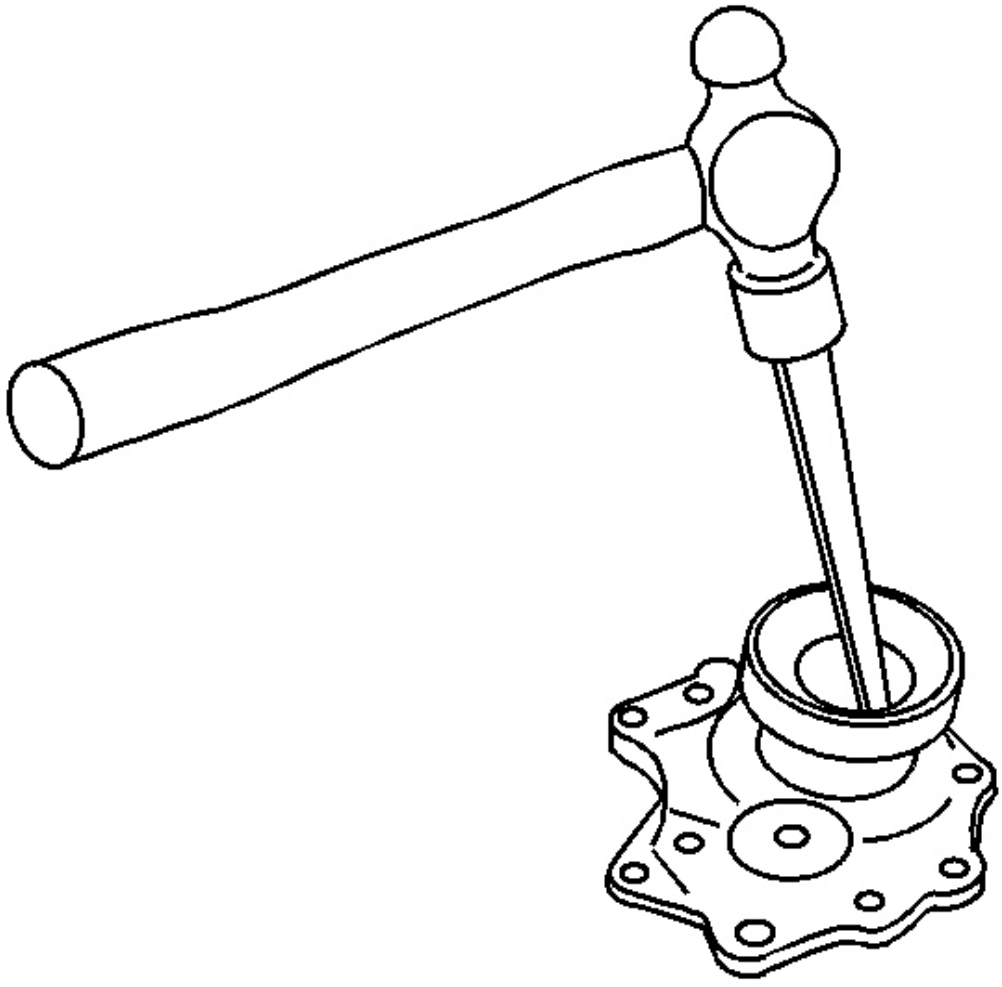


Fig. 123: Removing Inner Bearing From Outer Intermediate Shaft Bearing Case Half
Courtesy of GENERAL MOTORS CORP.

6. Remove the inner bearing from the outer intermediate shaft bearing case half using a hammer and a brass drift.
7. Remove the outer bearing from the outer intermediate shaft bearing case half using a hammer and a brass drift.

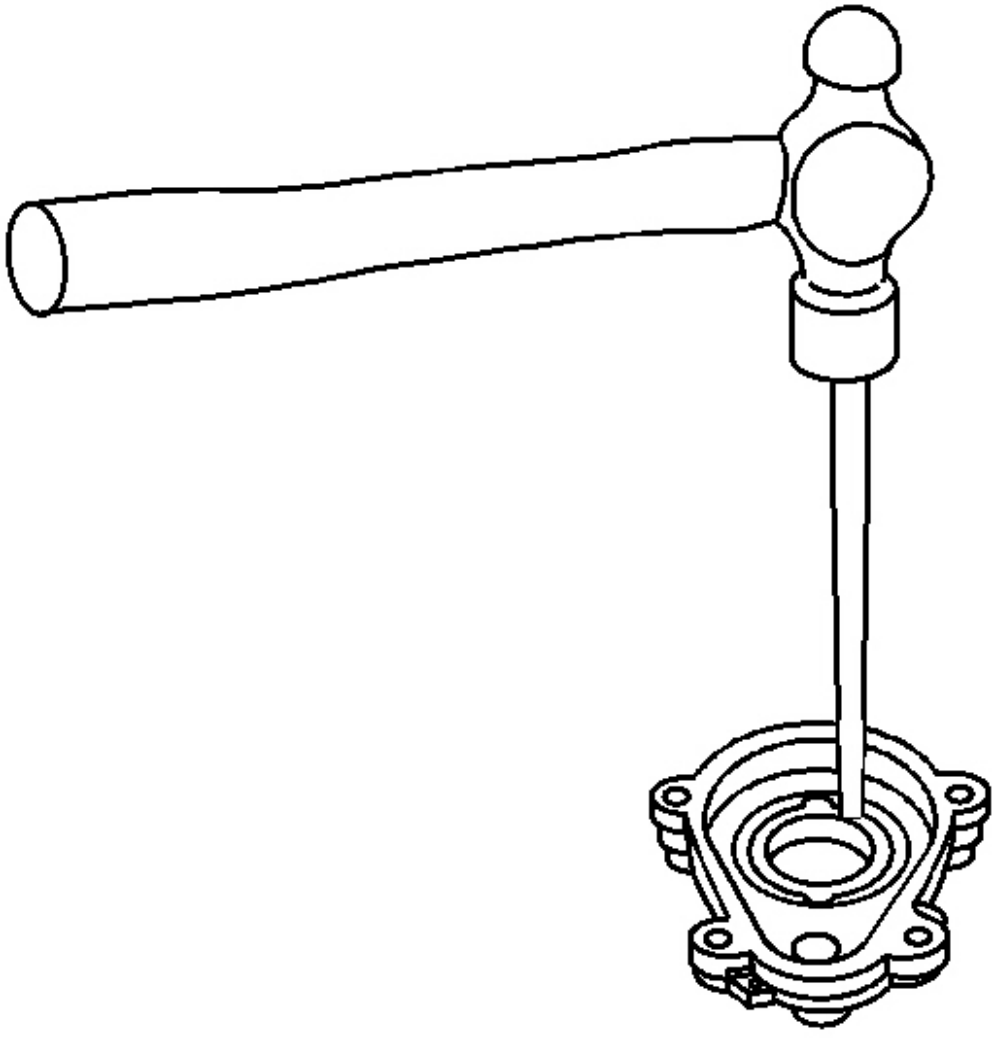


Fig. 124: Removing Bearing From Inner Intermediate Shaft Bearing Case Half
Courtesy of GENERAL MOTORS CORP.

8. Remove the bearing from the inner intermediate shaft bearing case half using a hammer and a brass drift.

FRONT AXLE LUBRICANT LEVEL INSPECTION

Front axle lubricant leaks can occur at the following locations:

- Axle shaft oil seals

- Differential carrier assembly mating surface
- Drain plug
- Fill plug
- Inner axle tube assembly to differential carrier assembly mating surface
- Pinion yoke oil seal
- Vent tube

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 cause 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.

INTERMEDIATE SHAFT BEARING ASSEMBLY CLUTCH FORK & SLEEVE INSPECTION

- Inspect the carrier connector for damaged splines and teeth. Replace as required.
- Inspect the clutch fork for wear, scoring, and damage to the thrust surfaces. Replace as required.
- Inspect the differential sleeve and the inner output shaft for damaged splines and teeth. Replace as required.
- Inspect the damper spring for breakage. Replace or repair the damper spring as needed.
- Inspect the differential actuator and the engagement switch for damage and frayed wiring.

INTERMEDIATE SHAFT BEARING ASSEMBLY CASE BEARINGS & THRUST WASHERS INSPECTION

1. Inspect the bearing rollers for wear.
2. Inspect the bearings for smooth rotation after oiling.
3. Inspect the thrust washers for wear.

DIFFERENTIAL CARRIER ASSEMBLY DISASSEMBLE

Tools Required

- **J 22912-B** Split-Plate Bearing Puller. See **Special Tools**.
- **J 2619-01** Slide Hammer with Adapter
- **J 29369-1** Bushing and Bearing Remover. See **Special Tools**.
- **J 29369-2** Bushing and Bearing Remover (2"-3"). See **Special Tools**.
- **J 42213** Adjuster Sleeve Socket. See **Special Tools**.
- **J 45224** Side Bearing Adjustment Wrench. See **Special Tools**.
- **J 45228** Pinion Bearing Cup Remover/Installer. See **Special Tools**.
- **J 45234** Pinion Remover. See **Special Tools**.
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.

Inspection Procedure

Perform the following before disassembling the differential carrier assembly:

1. Remove the drain plug from the axle.
2. Drain the axle lubricant.

3. Inspect the oil and the case for metal chips.

   Determine the source of the metal chips, such as a broken gear or bearing cage.

4. Inspect the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.
5. Measure the rotating torque of the pinion and differential case using an inch-pound torque wrench.

This information can be used in order to determine the cause of the axle problem. The information will also help when setting up and preloading the differential case.

Determine the cause of the axle problem before disassembly, if possible.

Disassembly Procedure

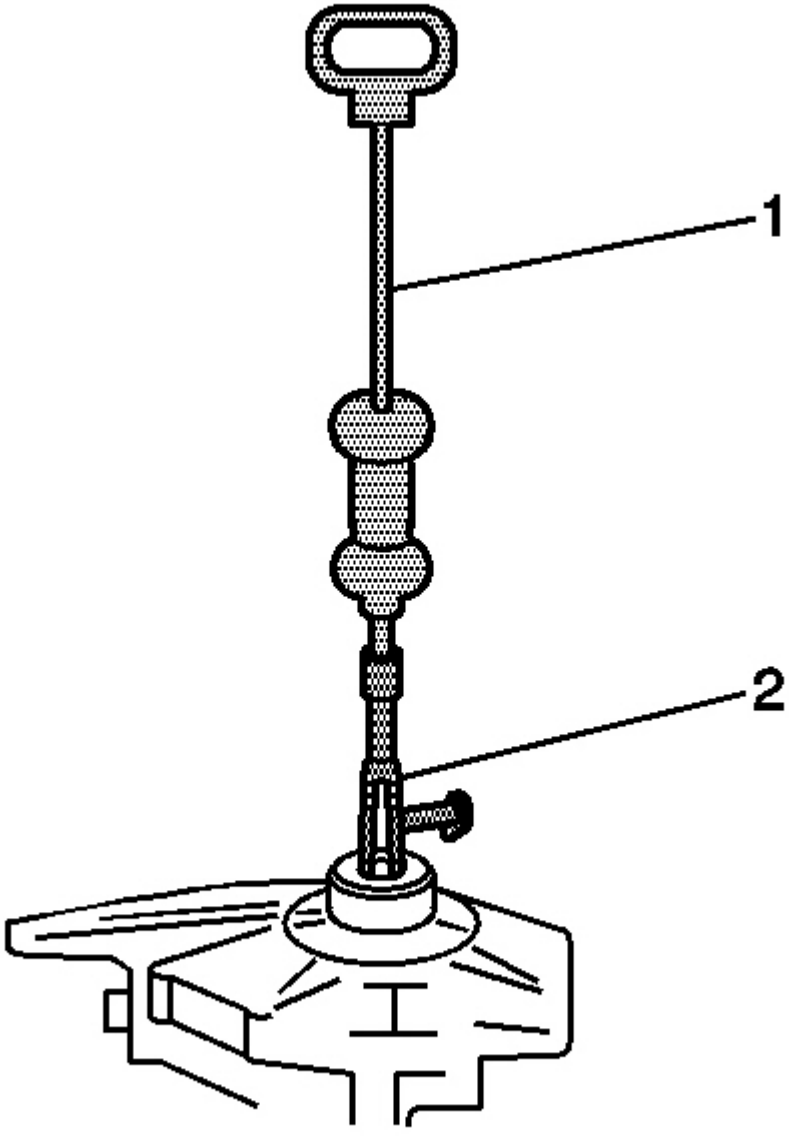


Fig. 125: Identifying Special Tools J 29369-1 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

1. Install the **J 29369-1** (2) and the **J 2619-01** (1) to the inboard or oil pan side seal as shown. See **Special Tools**.
2. Remove the seal by pulling on the **J 2619-01** (1).
3. Install the **J 29369-2** and the **J 2619-01** to the outboard or wheel drive shaft side seal. See **Special Tools**.

4. Remove the seal by pulling on the **J 2619-01** .

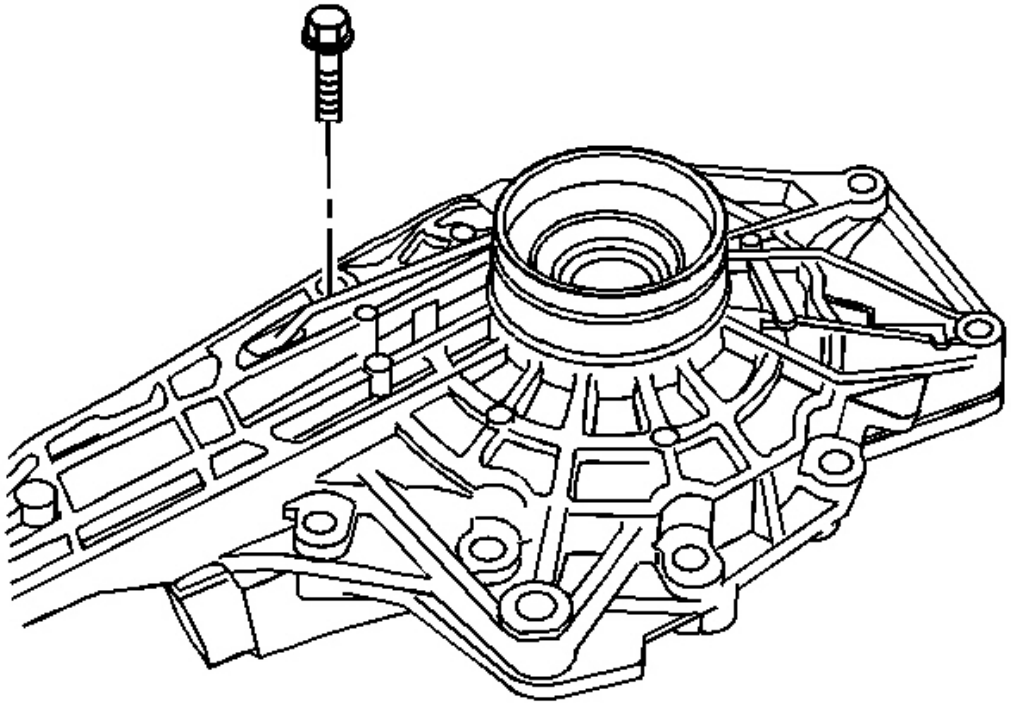


Fig. 126: View Of Differential Carrier Case Half Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the differential carrier case half bolts.
6. Separate the differential carrier case assembly case halves.

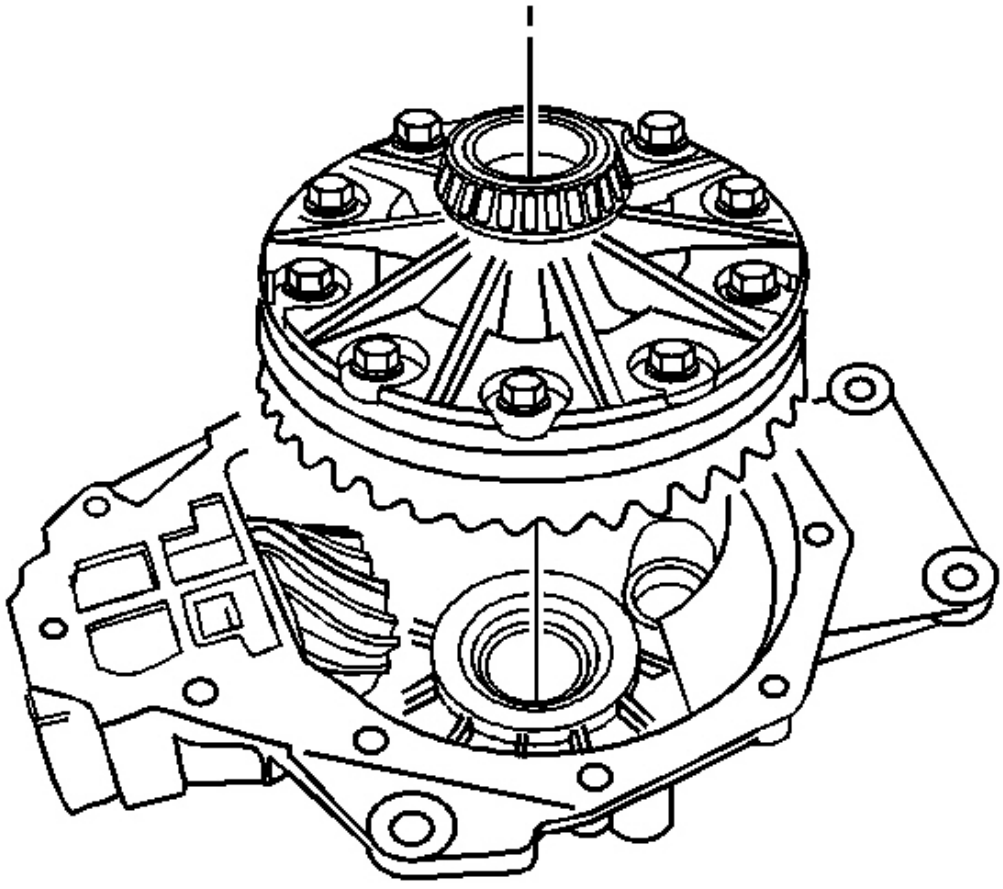


Fig. 127: View Of Differential Case Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the differential case assembly.

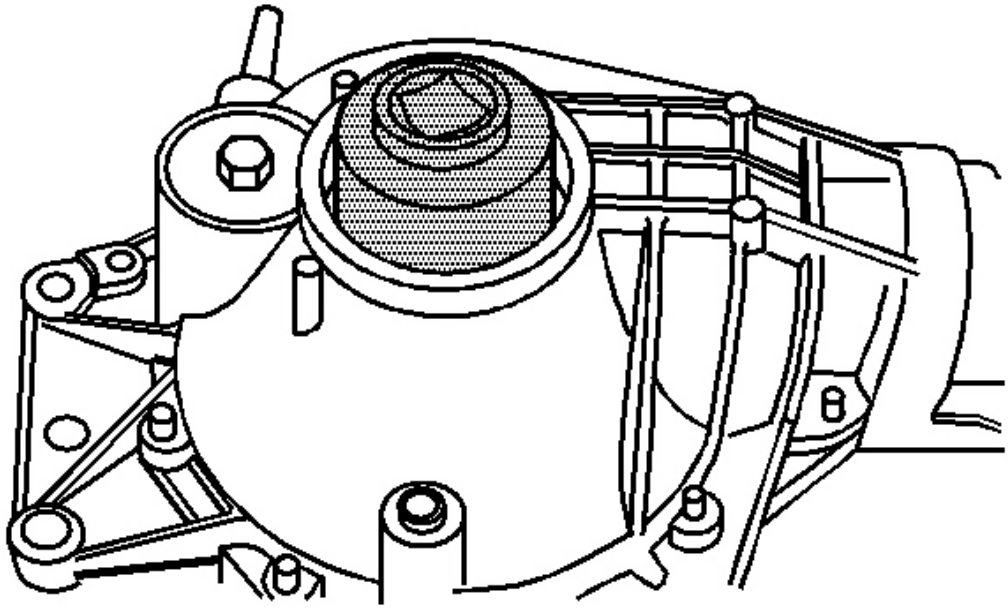


Fig. 128: Identifying Side Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

8. Install the **J 42213** to the left side differential bearing adjuster. See **Special Tools**.

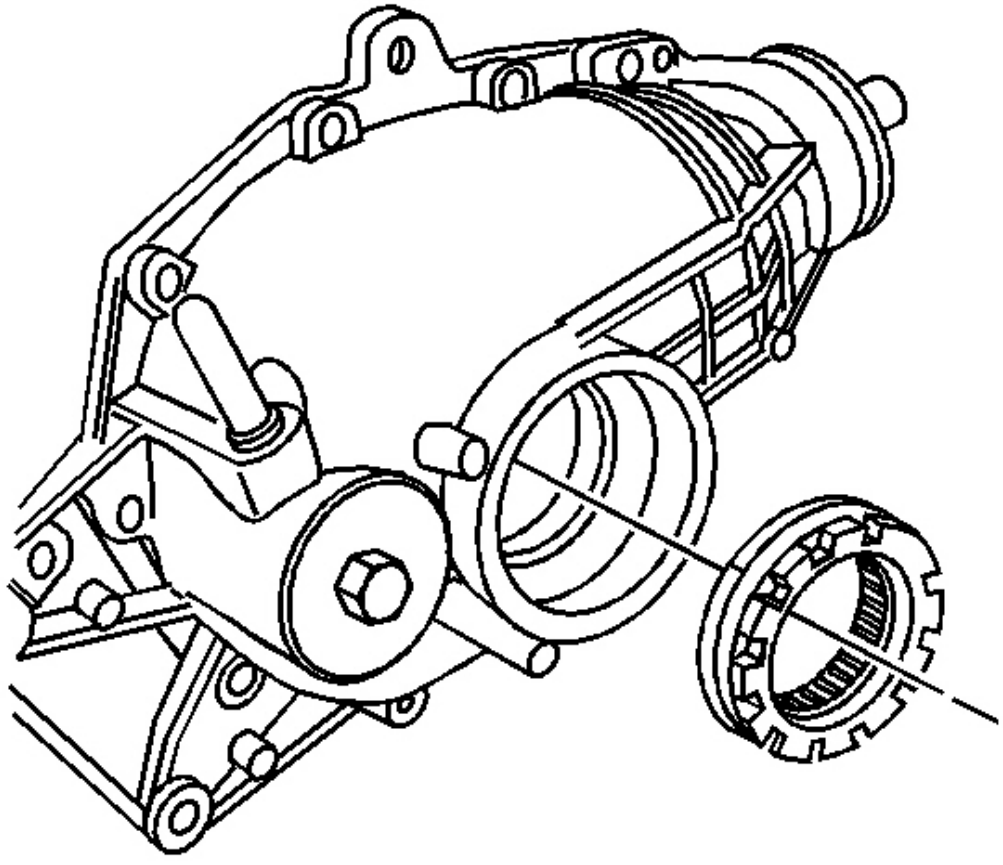


Fig. 129: View Of Left Side Differential Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing adjusters are not interchangeable. Mark the adjusters accordingly.

9. Remove the left side differential bearing adjuster using the **J 42213** . See **Special Tools**.

   Mark the adjuster.

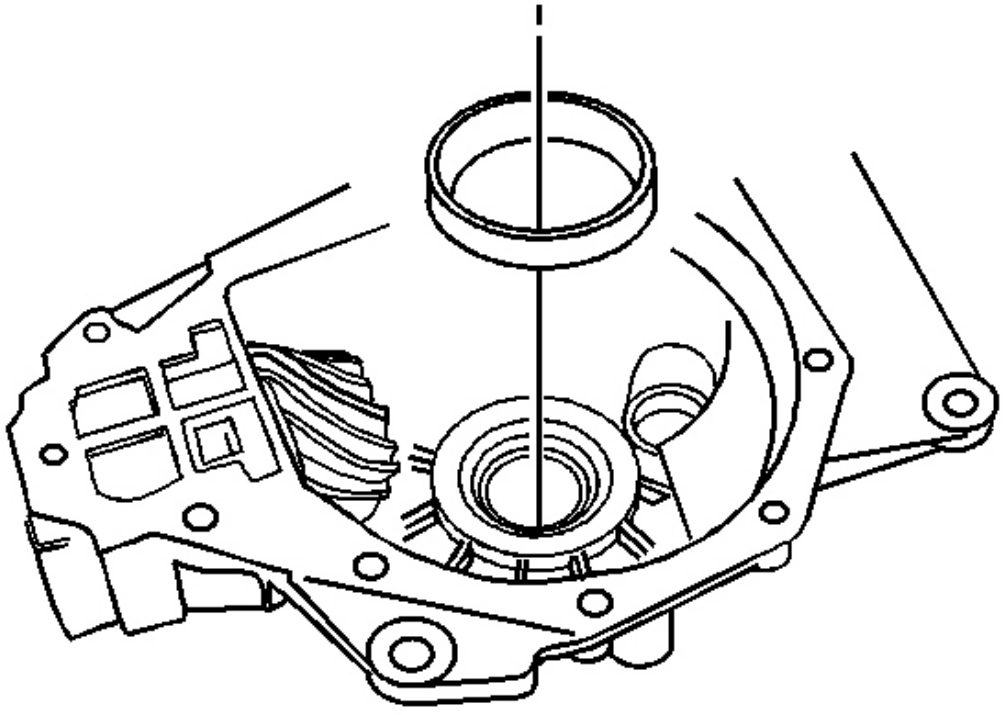


Fig. 130: View Of Left Differential Case Side Bearing Cup
Courtesy of GENERAL MOTORS CORP.

10. Remove the left side differential bearing cup.
11. Install the **J 45224** to the right side differential bearing adjuster. See **Special Tools**.

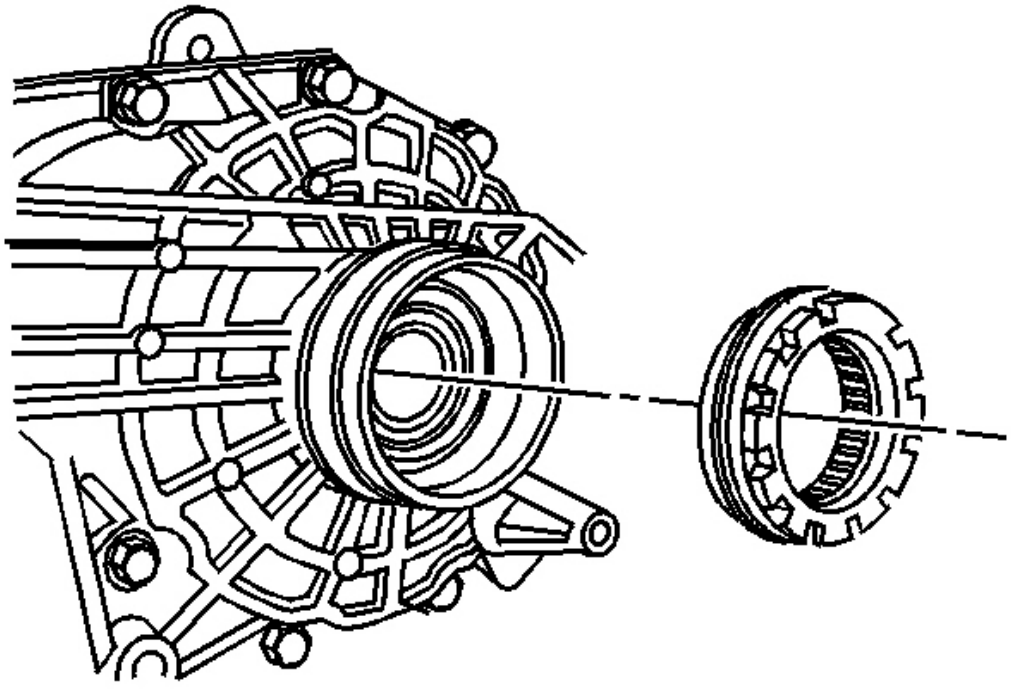


Fig. 131: View Of Right Side Differential Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing adjusters are not interchangeable. Mark the adjusters accordingly.

12. Remove the right side differential bearing adjuster using the **J 45224** . See **Special Tools**. Mark the adjuster.

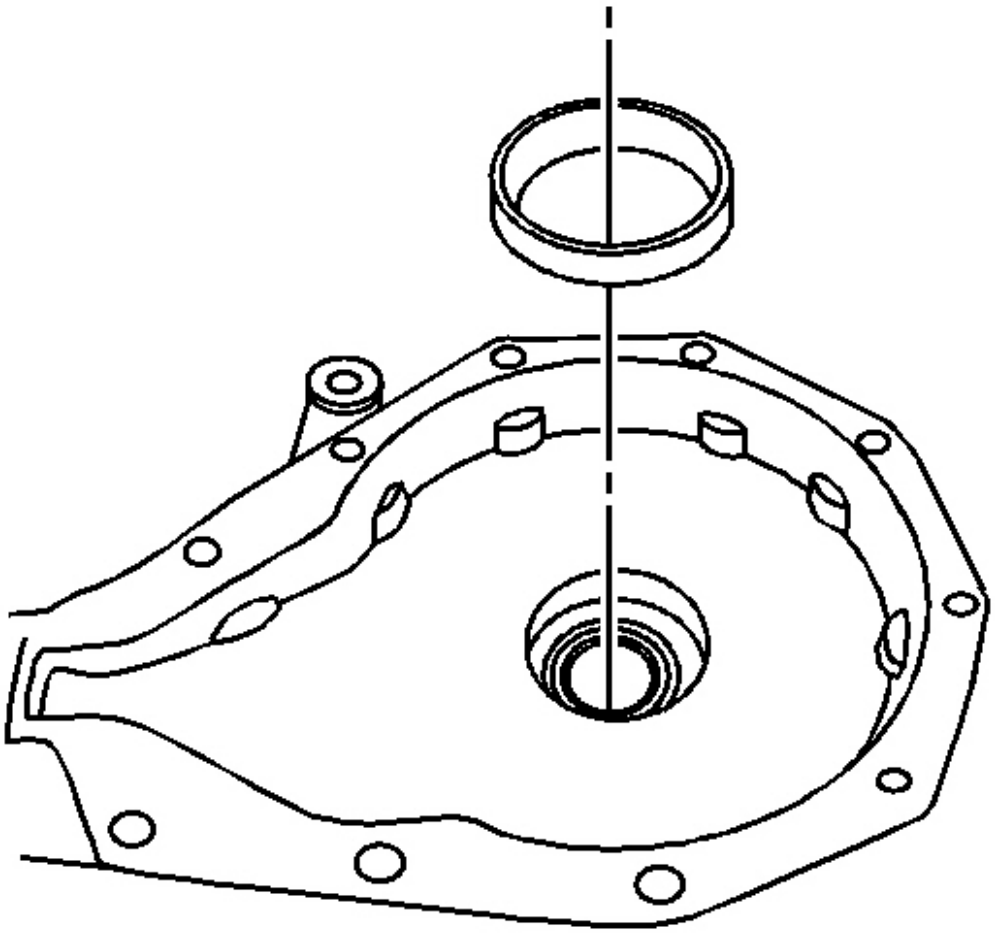


Fig. 132: View Of Right Side Differential Bearing Cup
Courtesy of GENERAL MOTORS CORP.

13. Remove the right side differential bearing cup.

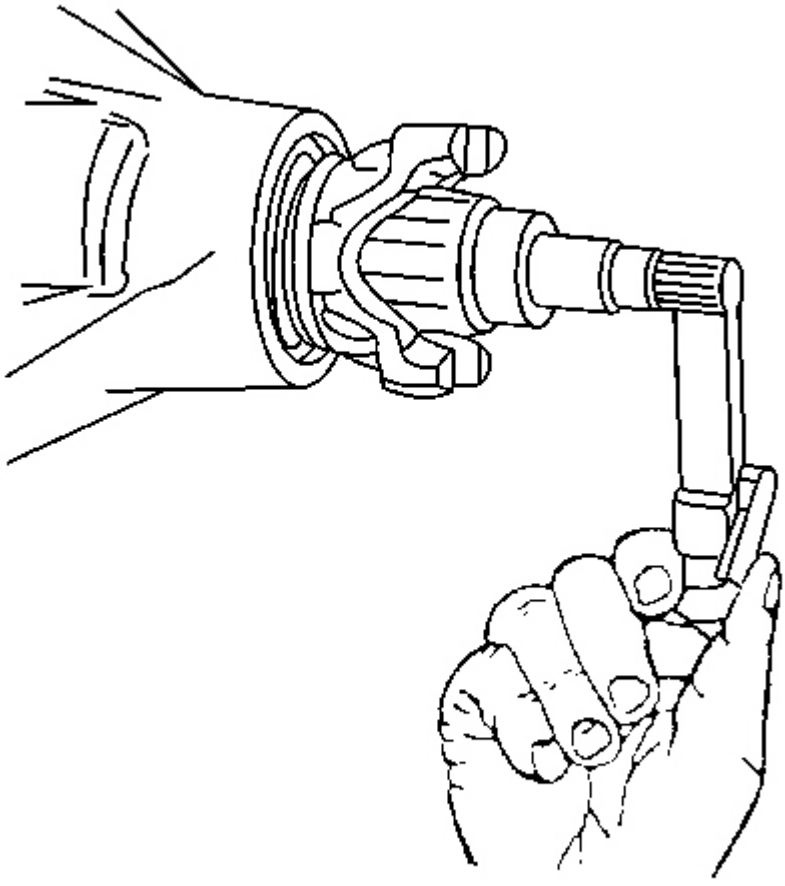


Fig. 133: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS CORP.

14. Measure the rotating torque of the drive pinion using an inch-pound torque wrench. Record the measurement.

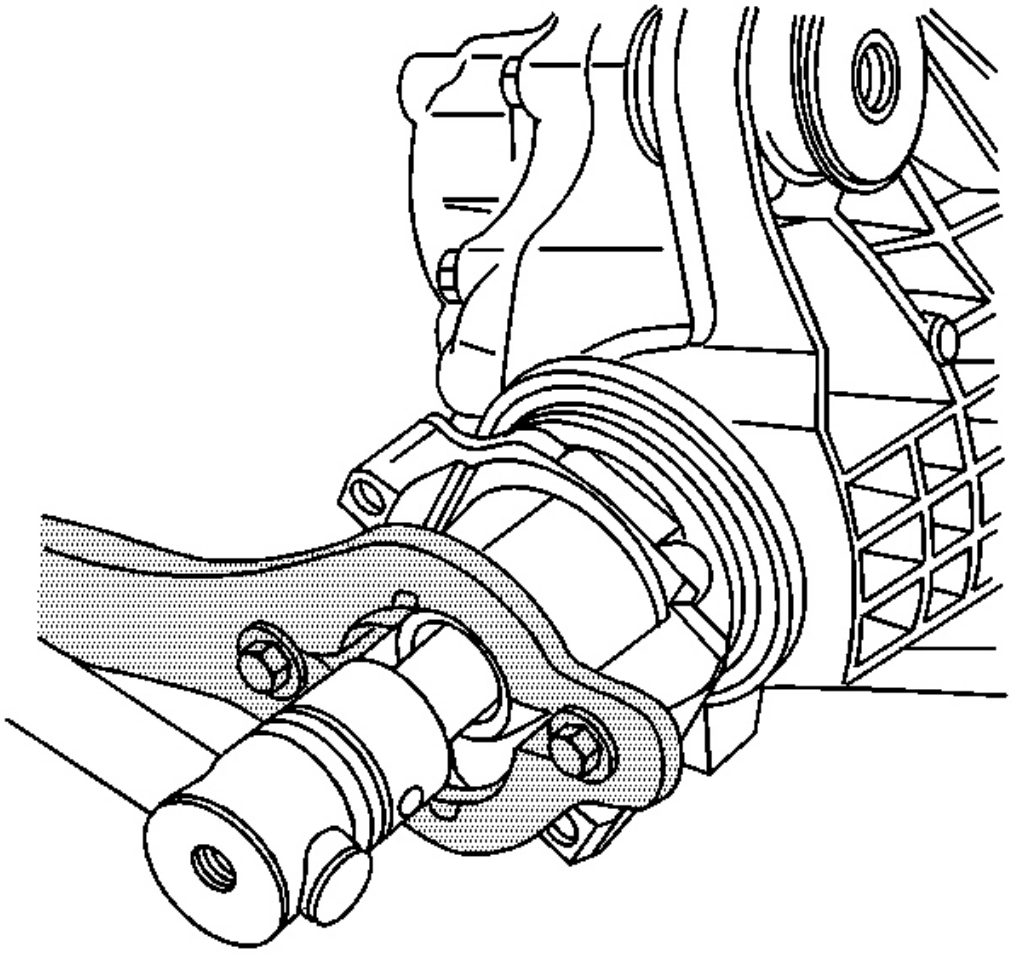


Fig. 134: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

15. Install the **J 8614-01** to the pinion yoke as shown. See **Special Tools**.
16. Remove the pinion nut while holding the **J 8614-01** . See **Special Tools**.

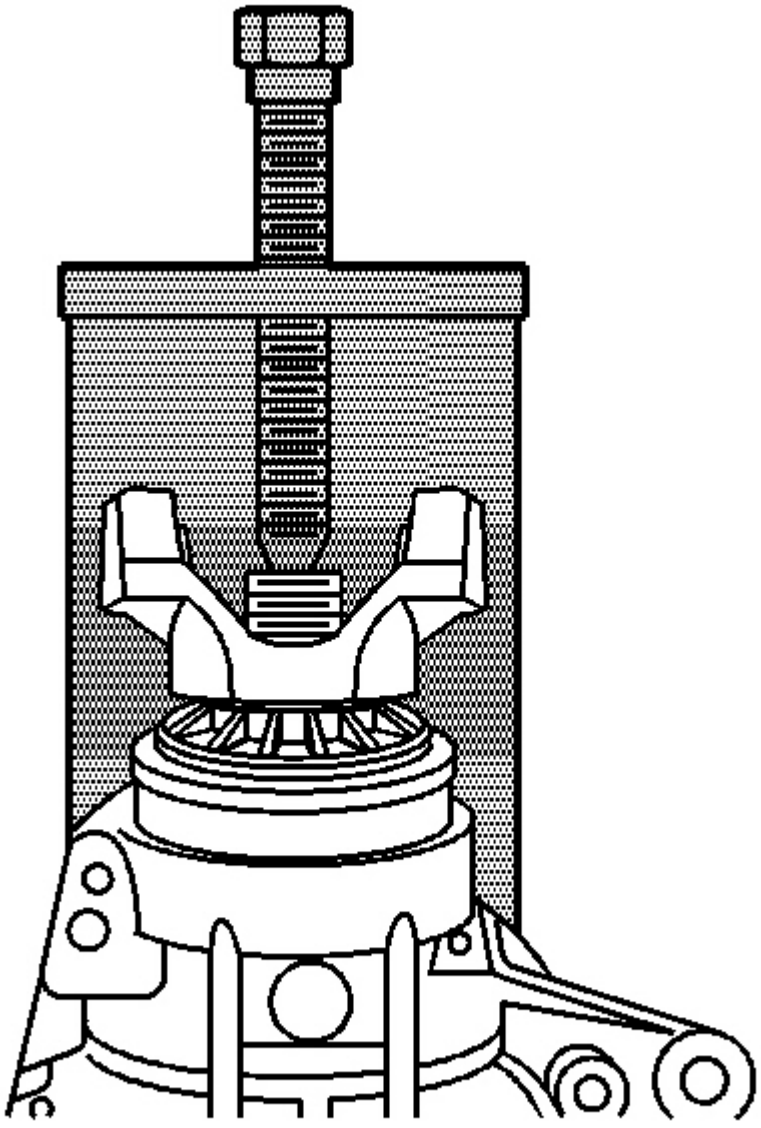


Fig. 135: Installing J 45234 To Left Differential Carrier Assembly Case Half
Courtesy of GENERAL MOTORS CORP.

17. Install the **J 45234** to the left differential carrier assembly case half as shown. See **Special Tools**.
18. Remove the pinion yoke, the washer, and the drive pinion by turning the screw of the **J 45234** clockwise. See **Special Tools**.

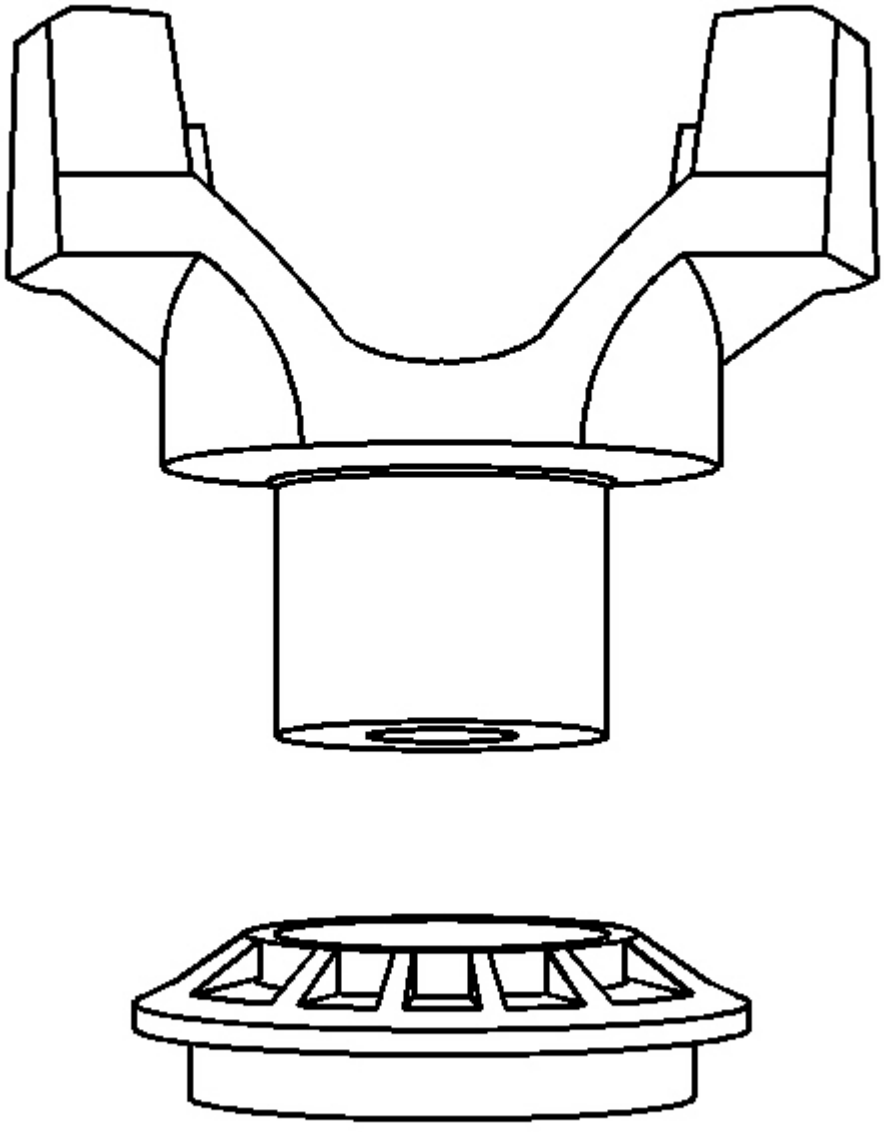


Fig. 136: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

19. Remove the dust deflector from the pinion yoke with a soft-faced hammer.

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

20. Remove the pinion oil seal using a suitable seal remover tool.
21. Remove the outer pinion bearing.

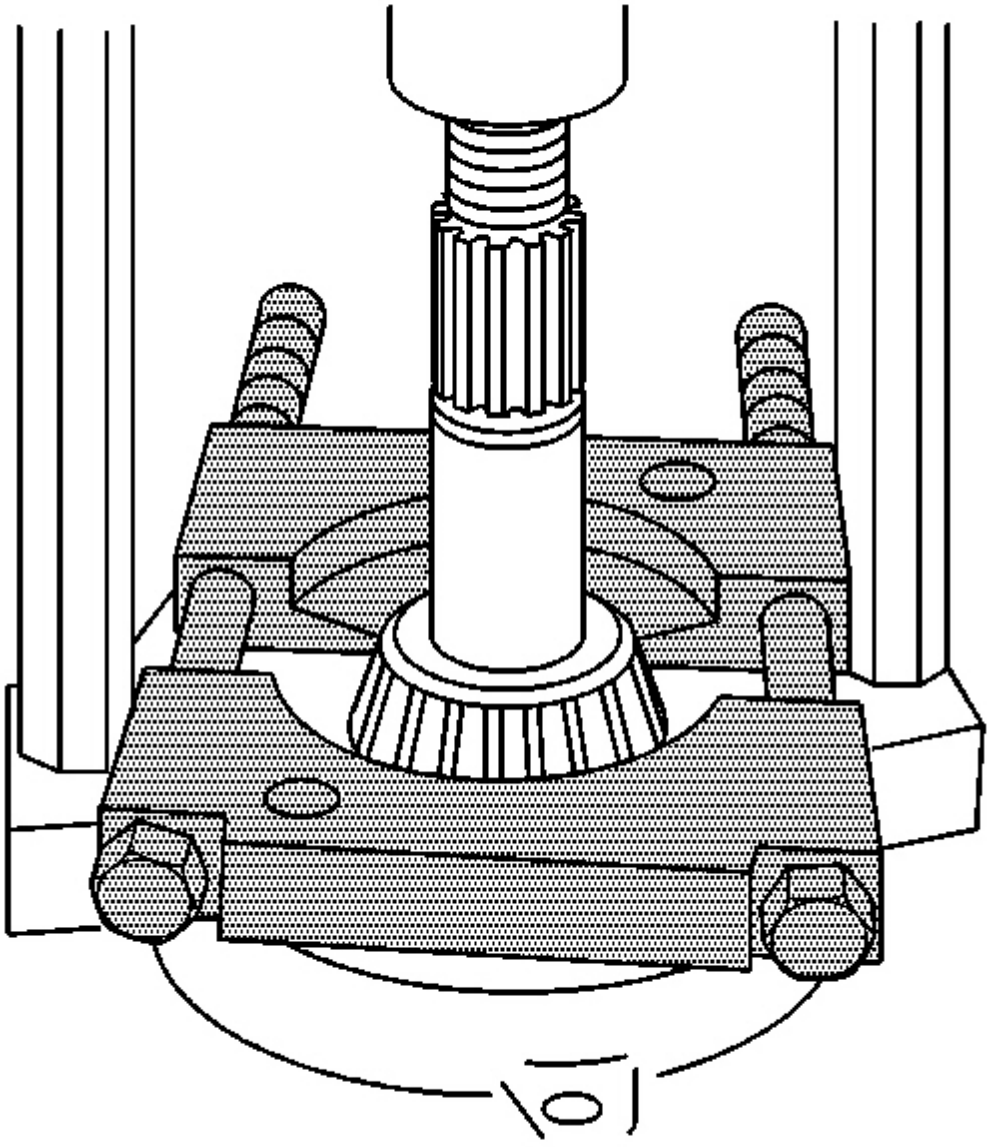


Fig. 137: View Of Inner Pinion Bearing & Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

22. Install the **J 22912-B** between the pinion bearing and the pinion gear as shown. See **Special Tools**.
23. Remove the inner pinion bearing using the **J 22912-B** and a hydraulic press. See **Special Tools**.
24. Remove the pinion gear selectable shim.

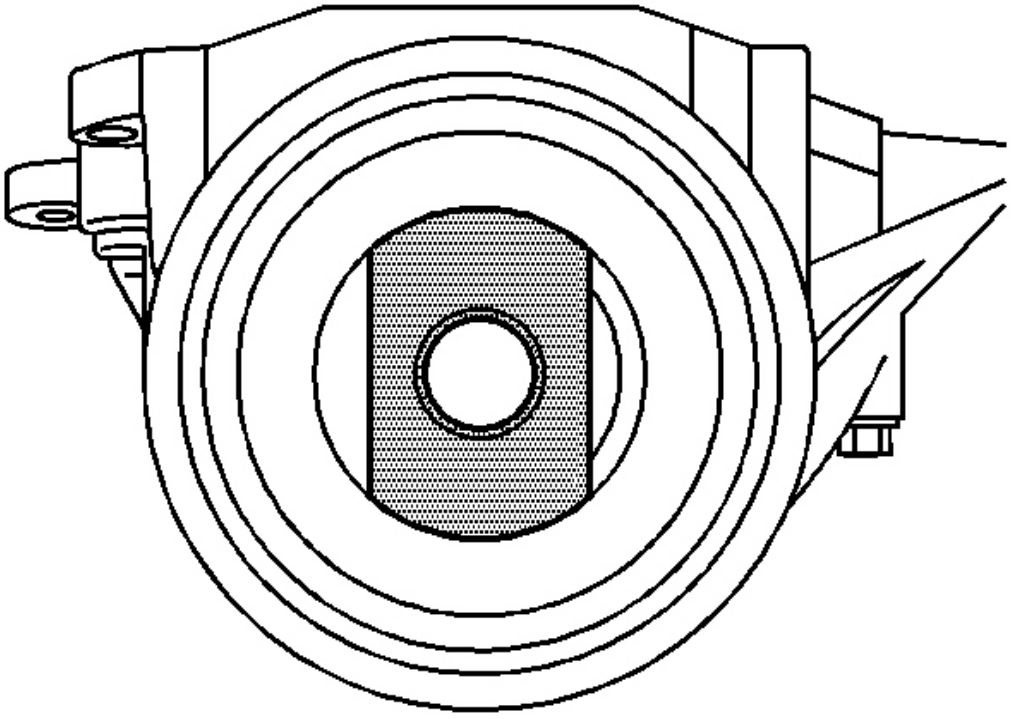


Fig. 138: View Of J 45228-4 & Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

25. Install the J 45228-4 to the outer pinion bearing cup as shown.

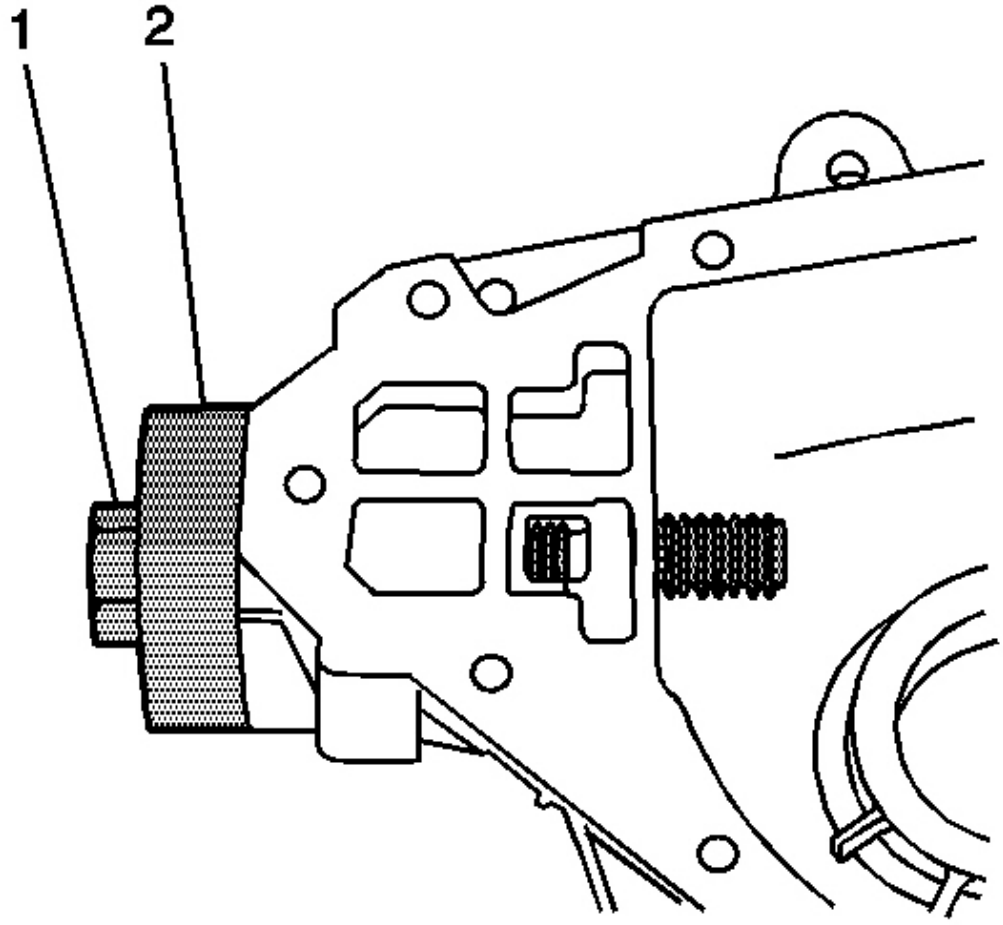


Fig. 139: View Of Special Tools J 45228-1, J 45228-5 & J 45228-4
Courtesy of GENERAL MOTORS CORP.

26. Install the J 45228-1 (2) and the J 45228-5 (1) to the J 45228-4.

    Seat the ridge of the J 45228-1 (2) into the outer pinion bearing cup bore.

27. Remove the outer pinion bearing cup by turning the J 45228-5 (1) clockwise.

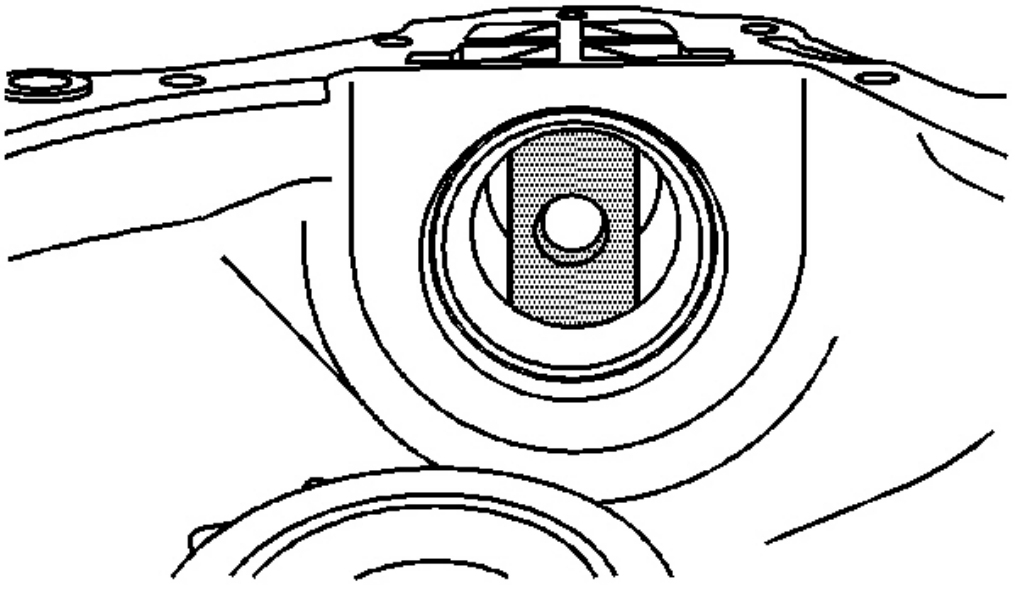


Fig. 140: View of Special Tool J 45228-4 & Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

28. Install the J 45228-4 to the inner pinion bearing cup as shown.

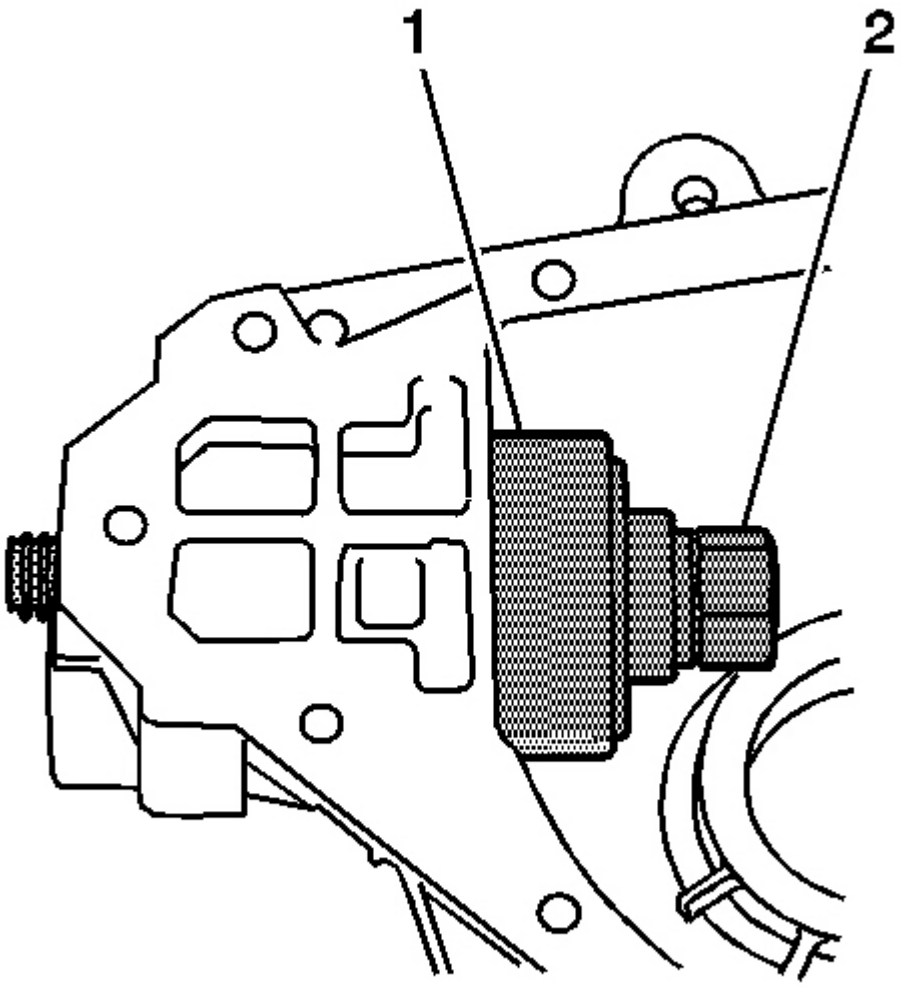


Fig. 141: View Of J 45228-1, J 45228-5 & J 45228-4
Courtesy of GENERAL MOTORS CORP.

29. Install the J 45228-1 (1) and the J 45228-5 (2) to the J 45228-4.
30. Remove the outer pinion bearing cup by turning the J 45228-5 (2) clockwise.

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.

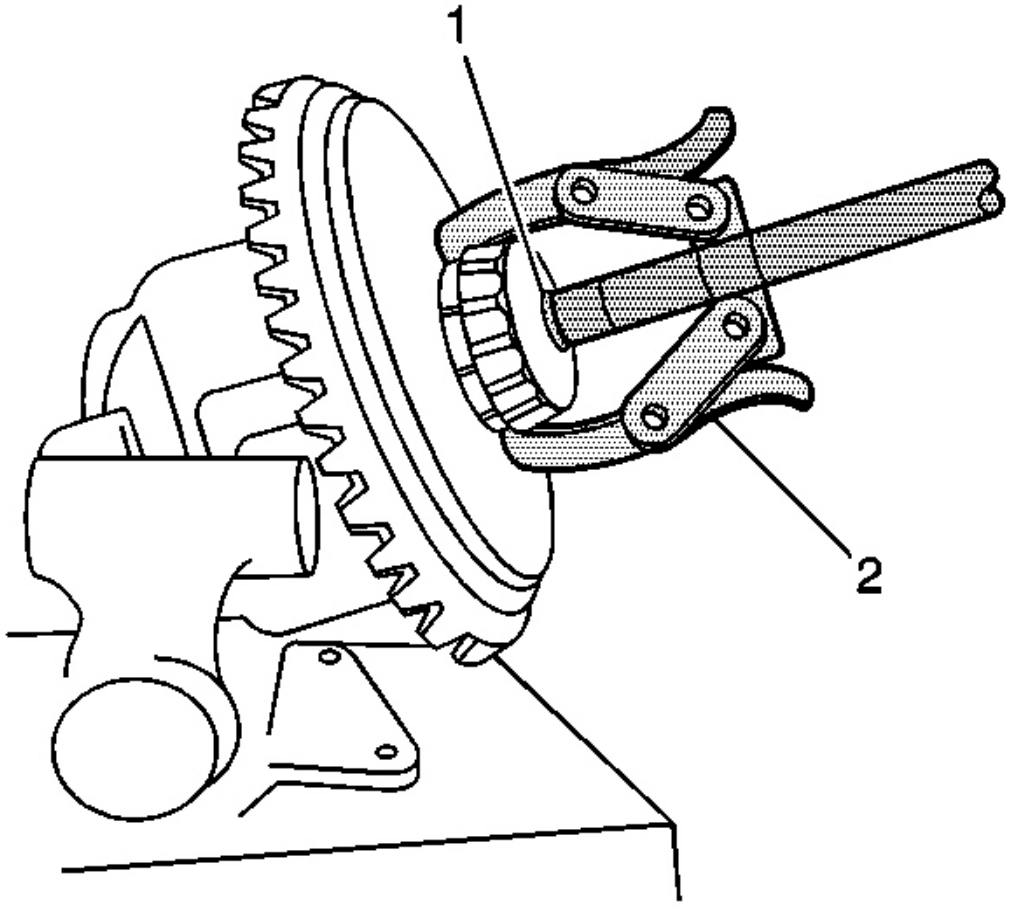


Fig. 142: Identifying Special Tool J 22888-20A & Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

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

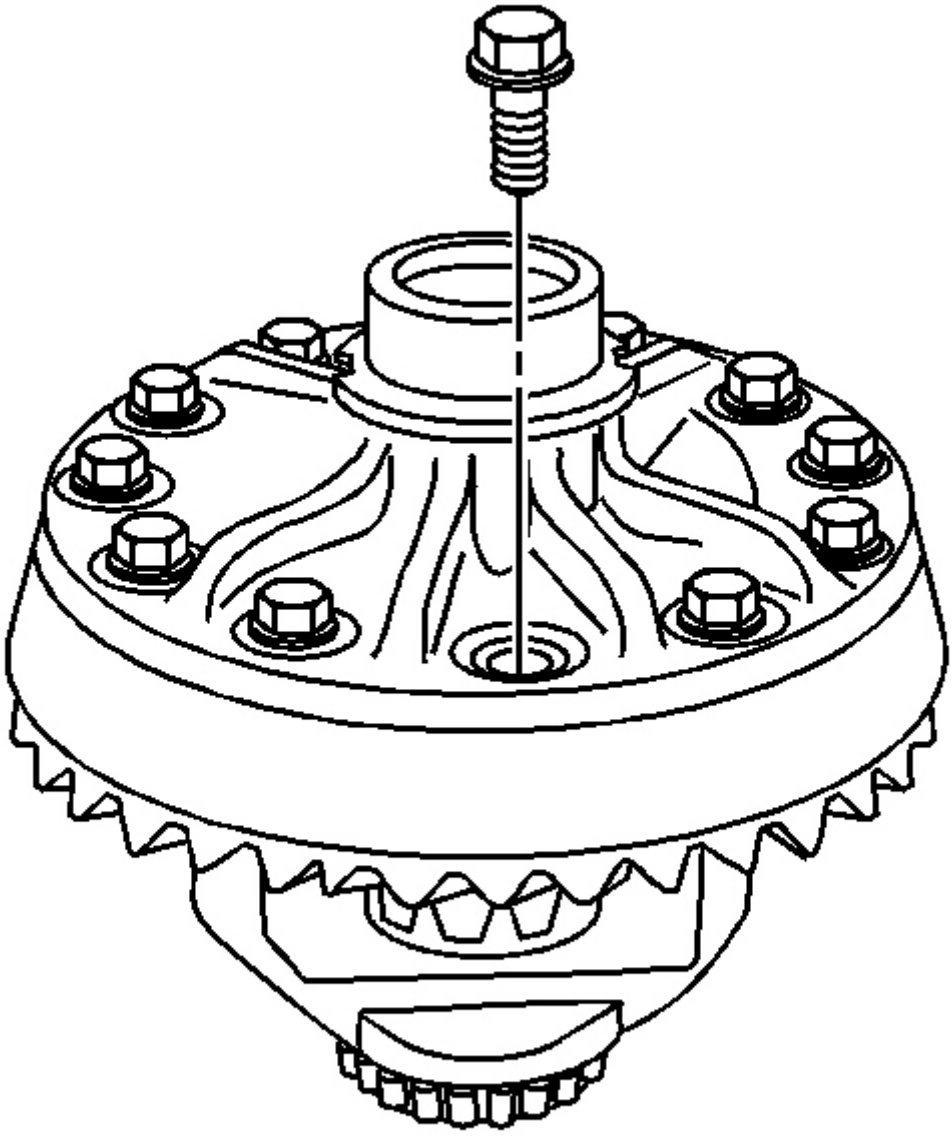


Fig. 143: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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.**

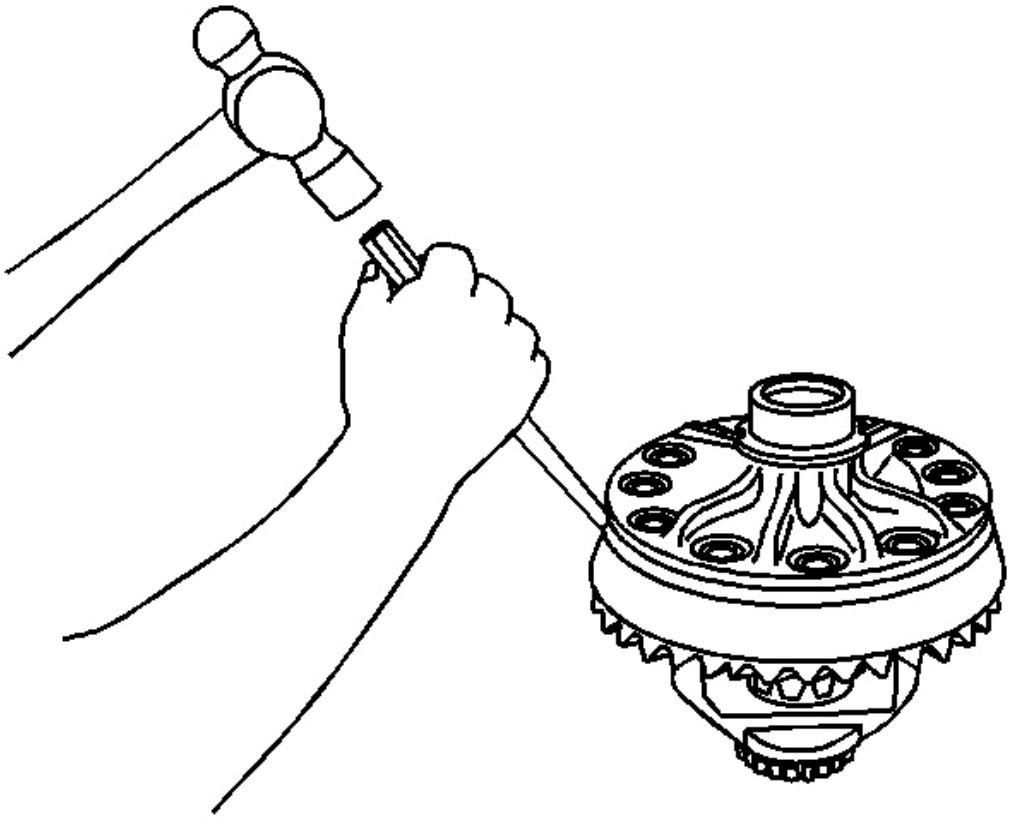


Fig. 144: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

5. Remove the ring gear from the differential case.

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

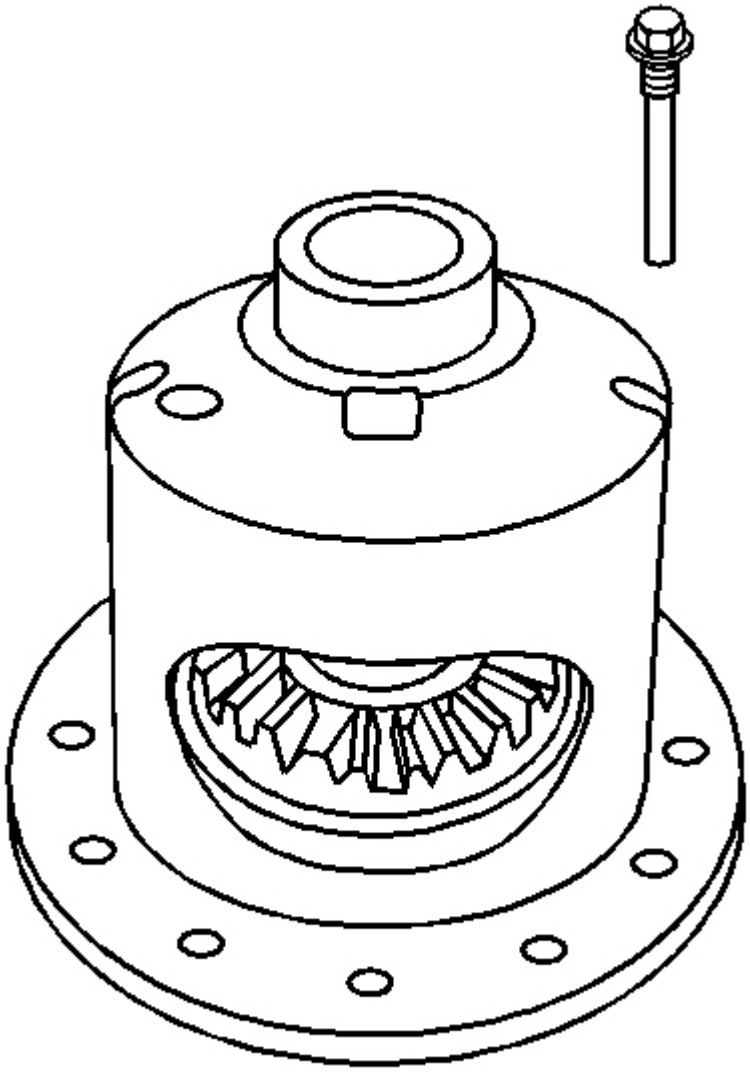


Fig. 145: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion shaft lock bolt.

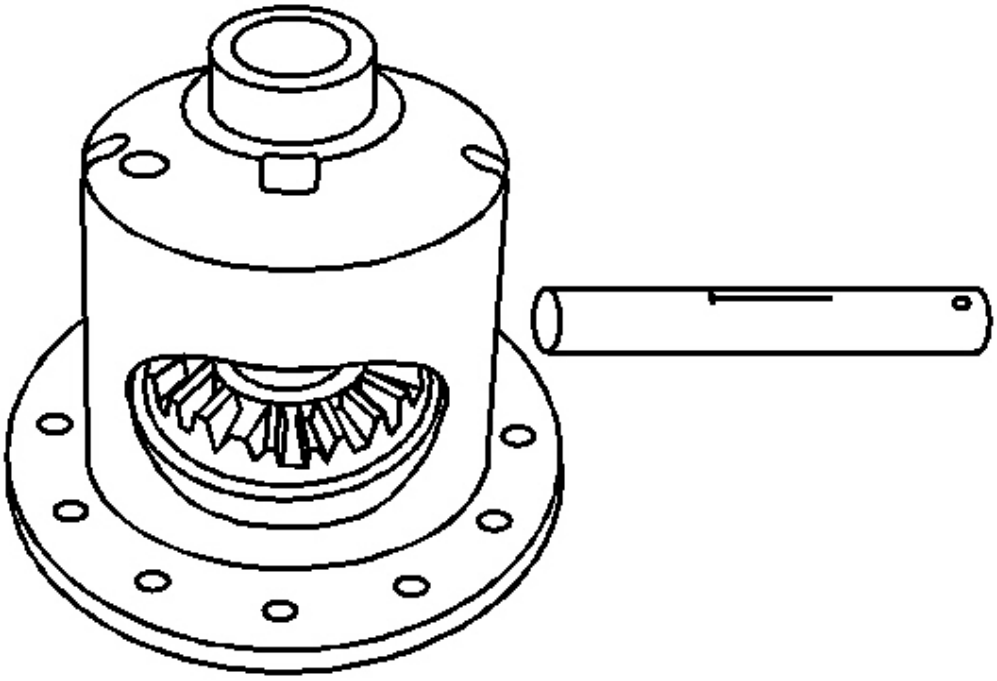


Fig. 146: View Of Differential & Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Remove the pinion shaft.

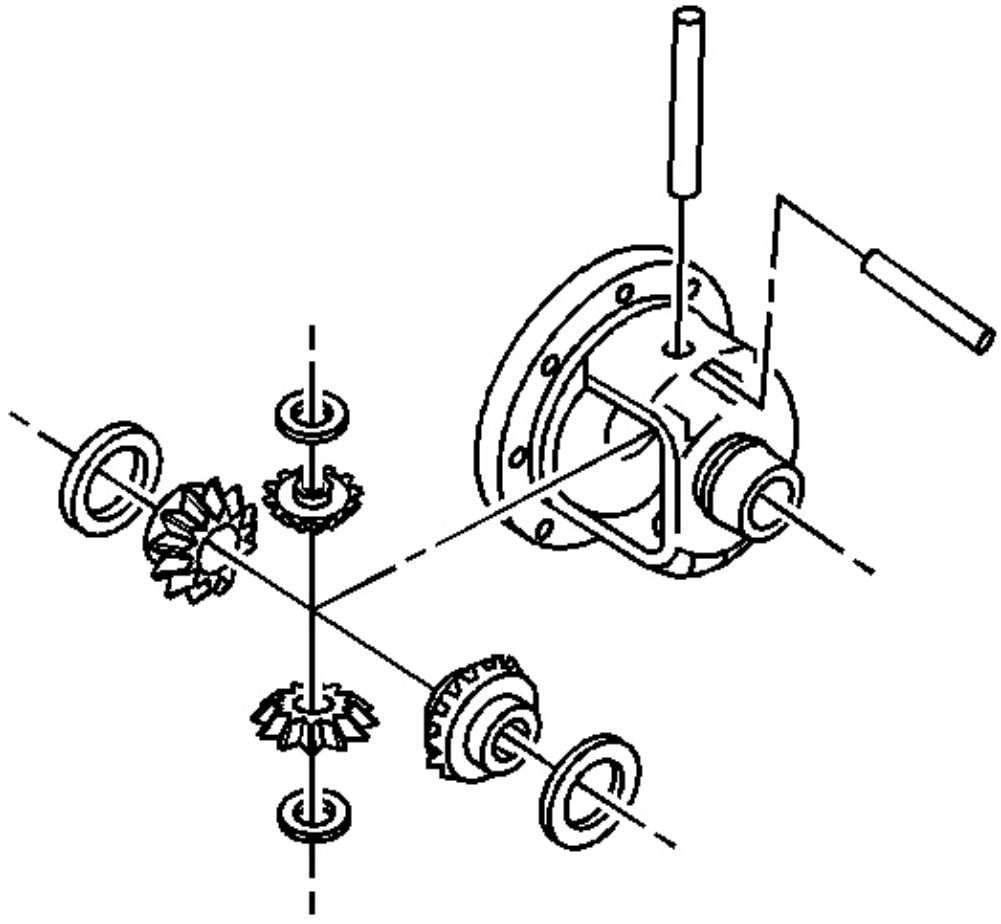


Fig. 147: View Of Differential Case Components
Courtesy of GENERAL MOTORS CORP.

8. Remove the differential pinion gears and the differential side gears.
    1. Roll the differential pinion gears out of the case with the pinion thrust washers.
    2. Remove the differential side gears and the side gear thrust washers.

    Mark the pinion gears top and bottom and the differential side gears left and right.

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 & 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 & RING GEAR INSPECTION

1. The ring and pinion gears are matched sets and must be replaced any time a replacement of either is necessary.
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 & 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
- **J 22888-D** Side Bearing Remover Kit. See **Special Tools**.
- **J 33790** Differential 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** .

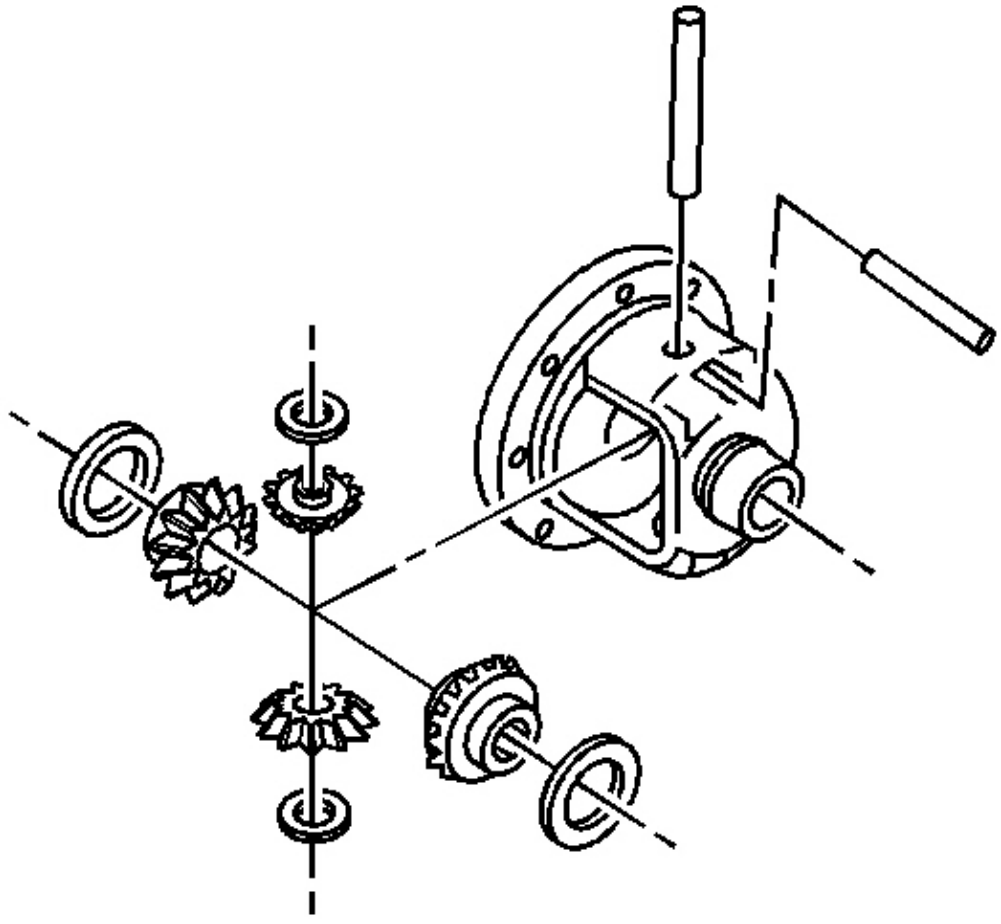


Fig. 148: View Of Differential Case Components
Courtesy of GENERAL MOTORS CORP.

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.
   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.
6. Install the new pinion gear shaft lock pin using a hammer and a brass drift.

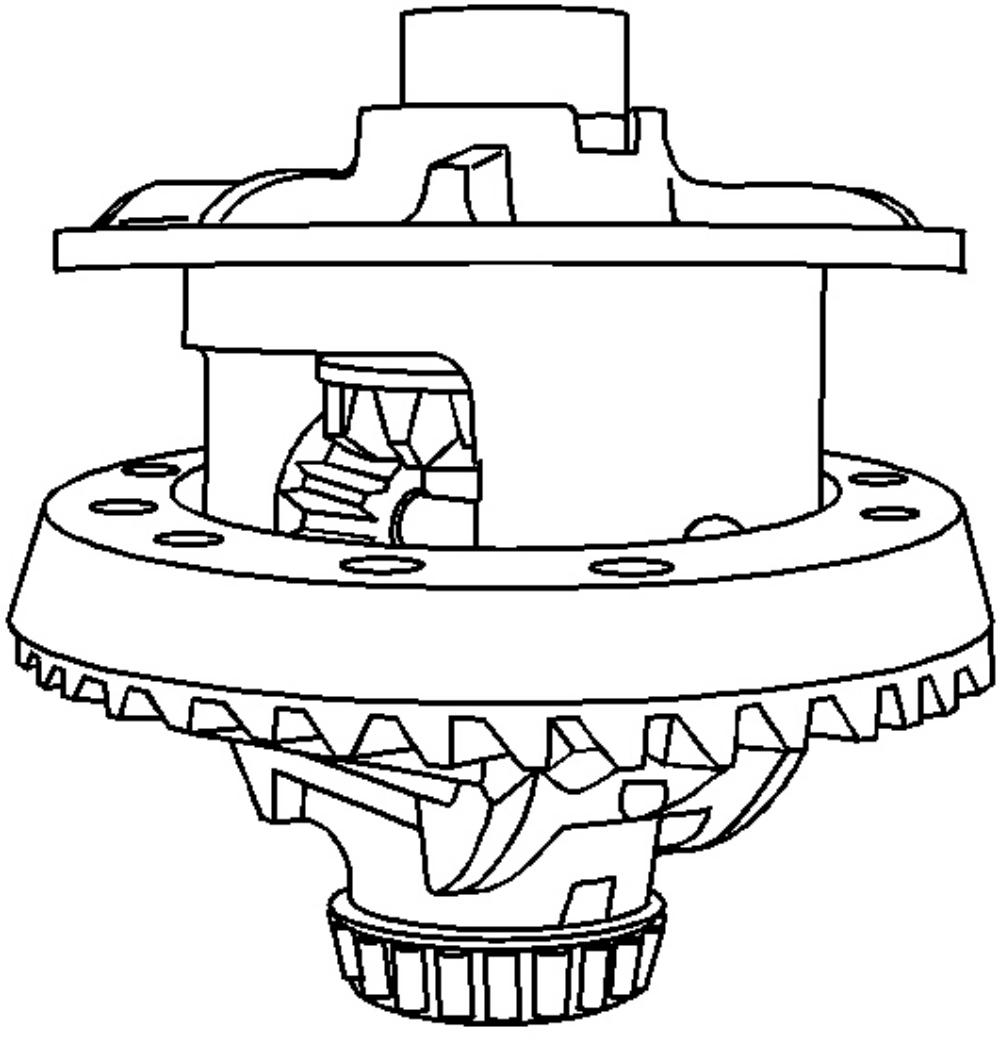


Fig. 149: View Of Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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.

NOTE: Refer to Fastener Notice .

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 83 N.m (61 lb ft).

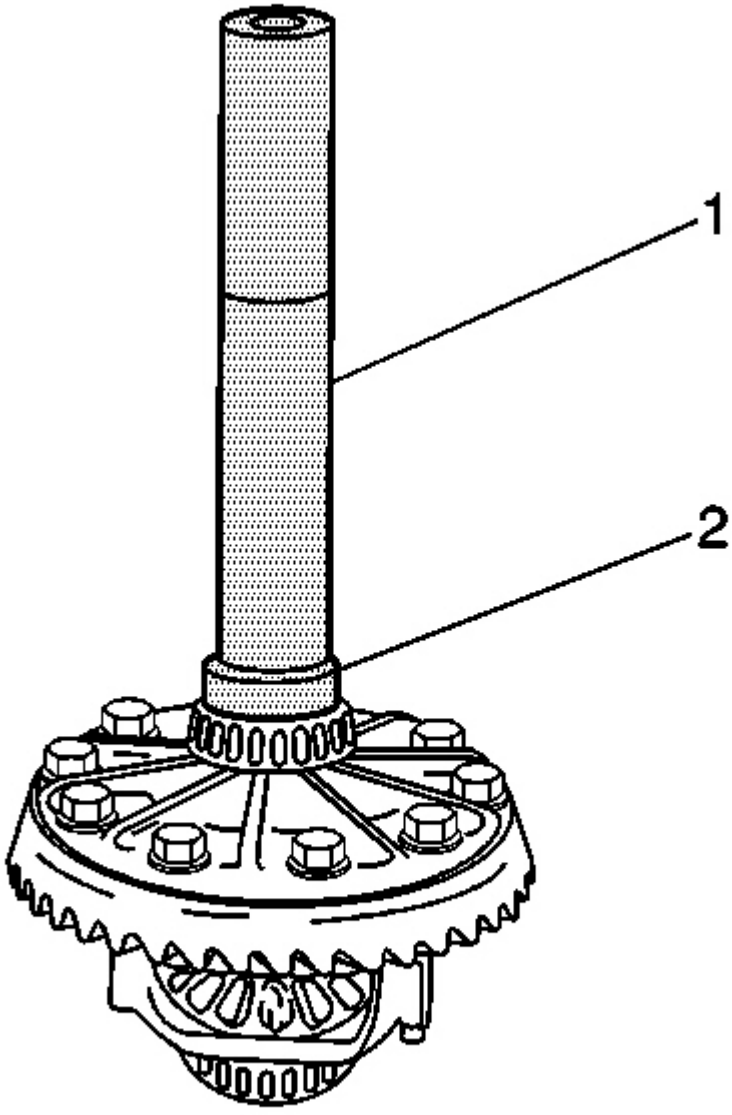


Fig. 150: Driving The Differential Case Bearing Onto The Case Using J 8092 & J 33790 (8.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

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.

2. Install the **J 33790** (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**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION

Tools Required

J 45228 Pinion Bearing Cup Remover and Installer. See **Special Tools**.

Installation Procedure

1. Install the inner pinion bearing cup into the inner pinion bearing cup bore.

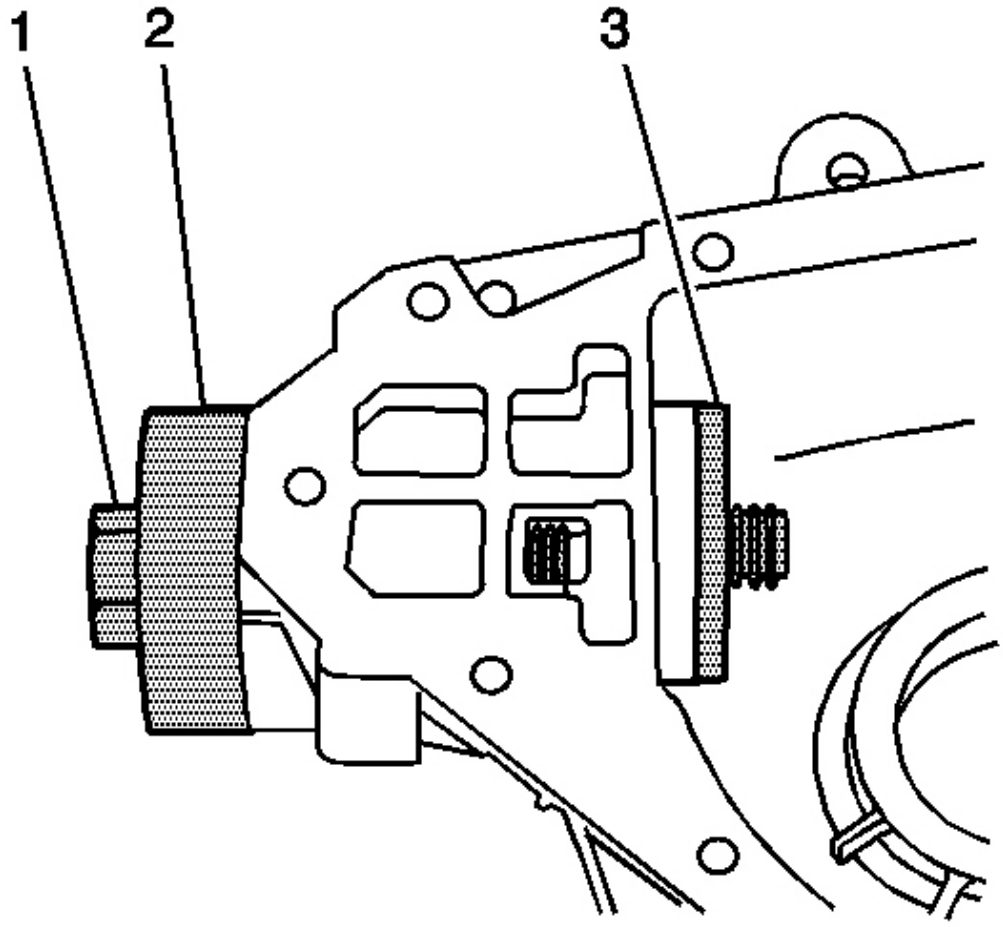


Fig. 151: Identifying Special Tools J 45228-1, J 45228-2, & J 45228-5
Courtesy of GENERAL MOTORS CORP.

2. Assemble the J 45228-1 (2), the J 45228-2 (3), and the J 45228-5 (1) into the pinion bearing cup bore as shown.
3. Tighten the J 45228-5 (1) slowly to draw the inner pinion cup into the inner pinion bearing cup bore.

   Inspect the position of the inner pinion bearing cup as it is being drawn into the pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J 45228** and the pinion bearing cup and reposition the inner pinion bearing cup. See **Special Tools**.

4. Tighten the J 45228-5 (1) until the inner pinion bearing cup is seated in the inner pinion bearing cup bore.

5. Remove the **J 45228** . See **Special Tools**.
6. Install the outer pinion bearing cup into the outer pinion bearing cup bore.

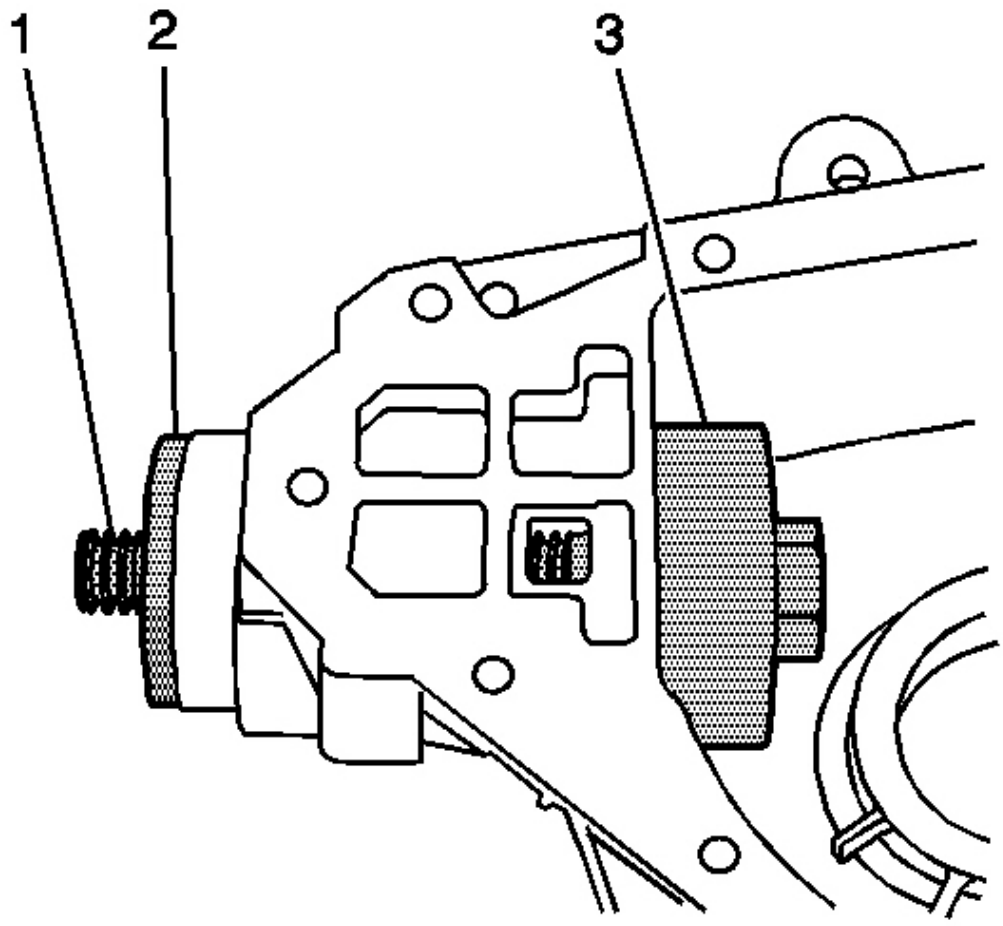


Fig. 152: J 45228-1, J 45228-2 And J 45228-5 Installed Into Pinion Bearing Cup Bore
Courtesy of GENERAL MOTORS CORP.

7. Assemble the J 45228-1 (3), the J 45228-2 (2), and the J 45228-5 (1) into the pinion bearing cup bore as shown.
8. Tighten the J 45228-5 (1) slowly to draw the outer pinion cup into the outer pinion bearing cup bore.

   Inspect the position of the outer pinion bearing cup as it is being drawn into the pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J 45228** and the pinion bearing cup

and reposition the outer pinion bearing cup. See **Special Tools**.

9. Tighten the J 45228-5 until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
10. Remove the **J 45228** . See **Special Tools**.

PINION DEPTH ADJUSTMENT

Tools Required

- **J 33838** Pinion Setting Gage. See **Special Tools**.
- **J 29763** Static Timing Gage. See **Special Tools**.

Adjustment

IMPORTANT: Make sure all of the tools, the pinion bearings, 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 J 33838-2 (1) and the bolt (2) to the outer pinion bearing.

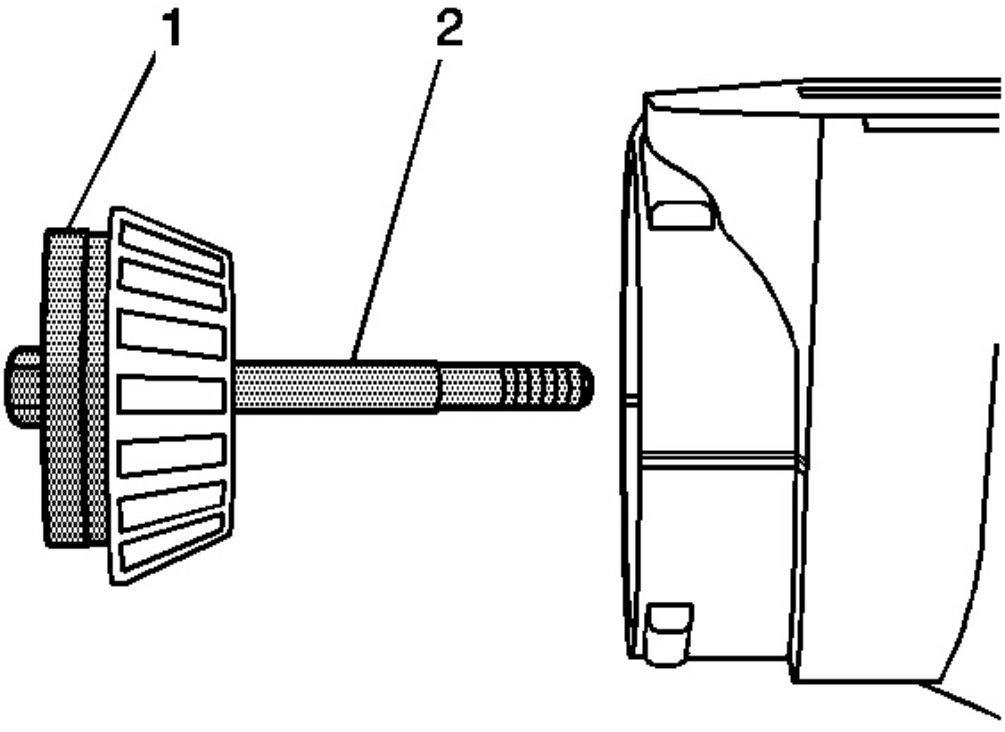


Fig. 153: View Of J 33838-2 & Outer Pinion Bearing
Courtesy of GENERAL MOTORS CORP.

3. Install the J 33838-2 (1) and the bolt (2) with the outer pinion bearing into the differential carrier assembly case half.

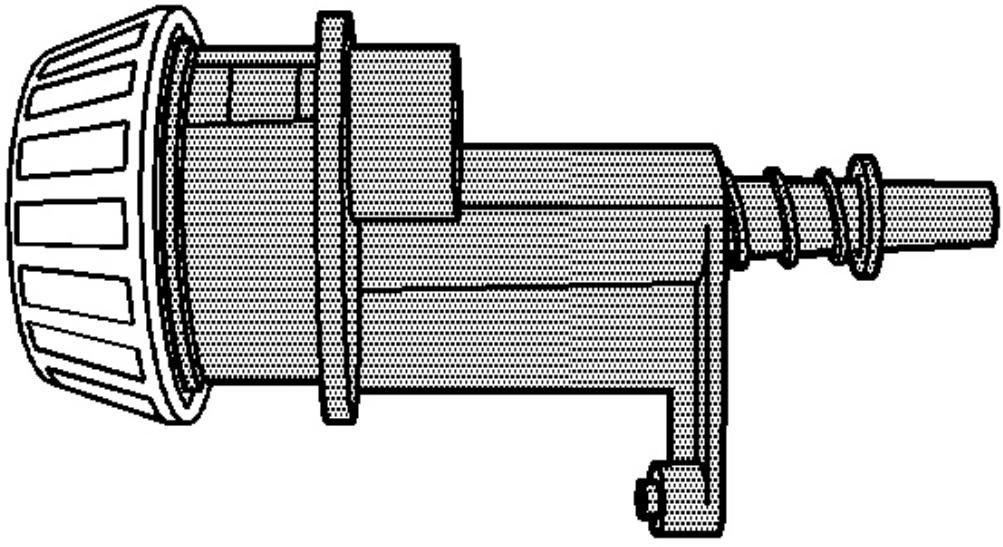


Fig. 154: Inner Pinion Bearing Installed Onto J 33838
Courtesy of GENERAL MOTORS CORP.

4. Install the inner pinion bearing onto the **J 33838** as shown. See **Special Tools**.

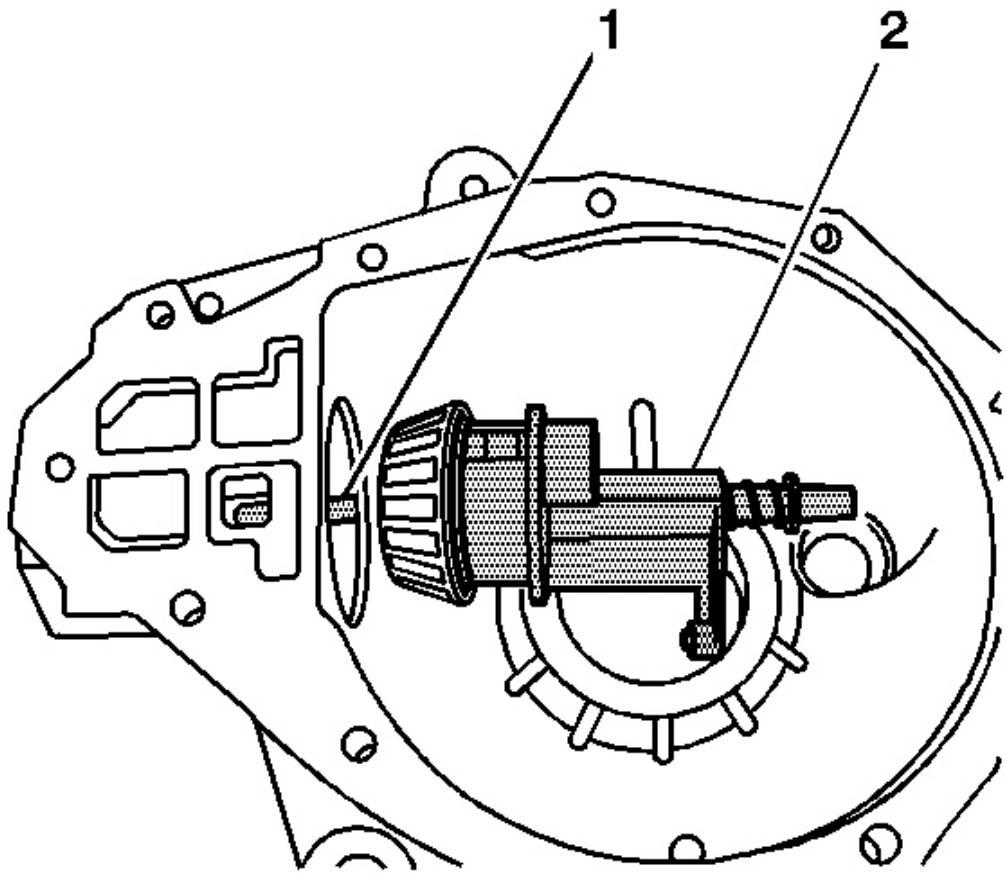


Fig. 155: Identifying J 33838, Inner Pinion Bearing & Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 33838** (2) with the inner pinion bearing into the differential carrier assembly and the bolt (1). See **Special Tools**.
6. While holding the **J 33838** stationary, install an inch-pound torque wrench on the bolt of the **J 33838** and tighten the bolt. See **Special Tools**.

   Tighten: Tighten the bolt until a rotating torque of 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.0-2.3 N.m (10-20 lb in) for used bearings is obtained.

7. Rotate the assembly several times in both directions in order to seat the pinion bearings.
8. Check the rotating torque of the assembly. If the torque is less than 1.7 N.m (15 lb in) for new bearings or 1.0 N.m (10 lb in) for used bearings, continue to tighten the bolt until a rotating torque of 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.0-2.3 N.m (10-20 lb in) for used bearings is obtained.

9. Place the contact pad of the **J 33838** into the differential side bearing bore. See **Special Tools**.
10. Install the **J 29763** to the **J 33838** by doing the following. See **Special Tools**.
    1. Install the collar and the lock nut onto the **J 33838** . See **Special Tools**.

       Do not tighten the lock nut at this time.

    2. Install the **J 29763** into the collar. See **Special Tools**.
    3. Place the stem of the **J 29763** onto the contact surface of the **J 33838** . See **Special Tools**.
    4. With the stem of the **J 29763** touching the contact surface of the **J 33838** , push down on the **J 29763** until the needle of the **J 29763** has turned 3/4 of a turn clockwise. See **Special Tools**.
    5. Tighten the lock nut of the **J 29763** finger tight. See **Special Tools**.
11. Rotate the **J 33838** back and forth until the needle of the **J 29763** indicates the lowest point in the differential side bearing bore. See **Special Tools**.

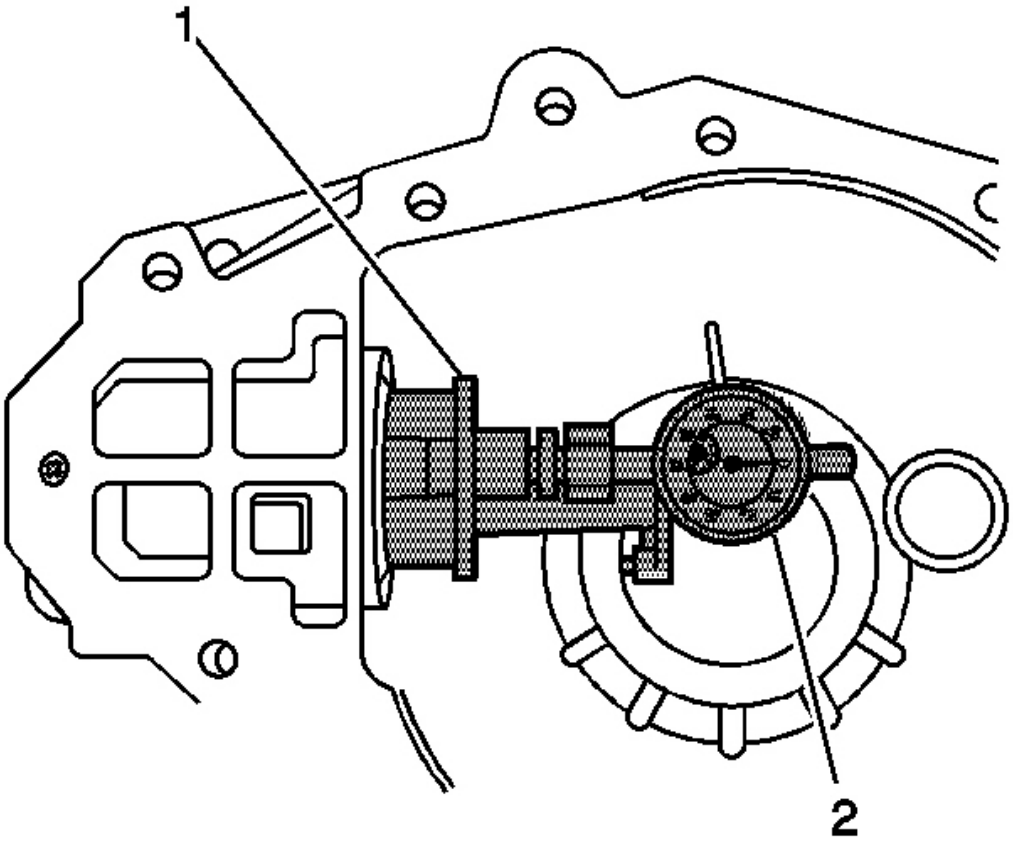


Fig. 156: J 29763 Housing Installed In Differential Carrier

Courtesy of GENERAL MOTORS CORP.

12. At the lowest point of deflection, move the housing of the **J 29763** until the needle indicates ZERO. See **Special Tools**.
13. Move the **J 33838** back and forth again to verify the ZERO setting. See **Special Tools**. Adjust the housing of the **J 29763** as necessary to set the needle to ZERO. See **Special Tools**.

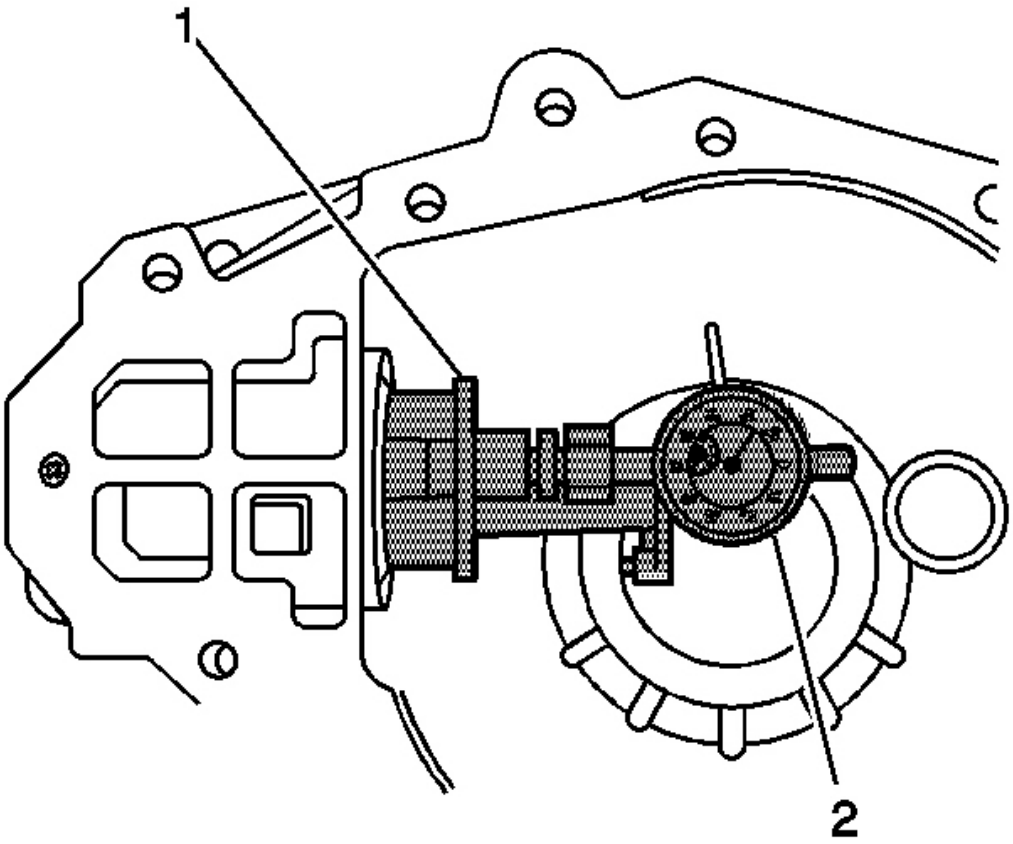


Fig. 157: Shim Thickness Indicated On J 29763
Courtesy of GENERAL MOTORS CORP.

14. After the ZERO setting is obtained and verified, grasp the **J 33838** by the flats and move the contact pad of the **J 33838** out of the differential side bearing bore. See **Special Tools**.
15. The value indicated on the **J 29763** 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 from the pinion depth setting tools.
19. Assemble the differential carrier assembly. Refer to **Differential Carrier Assembly Assemble**.

DIFFERENTIAL CARRIER ASSEMBLY ASSEMBLE

Tools Required

- **J 33782** Pinion Oil Seal Installer. See **Special Tools**.
- **J 33785** Pinion Bearing Installer. See **Special Tools**.
- **J 42213** Adjuster Sleeve Socket. See **Special Tools**.
- **J 45224** Side Bearing Adjuster. See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Installer - LH. See **Special Tools**.
- **J 45233** Differential Bearing Adjuster Needle Bearing Installer - RH. See **Special Tools**.
- **J 8092** Universal Driver Handle- 3/4 in - 10
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.

Assembly Procedure

1. Install the pinion bearing cups into the differential carrier assembly, if necessary. Refer to **Front Differential Drive Pinion Gear Bearing Cup Installation**.
2. Install the selective shim between the inner pinion bearing and the shoulder of the pinion gear.

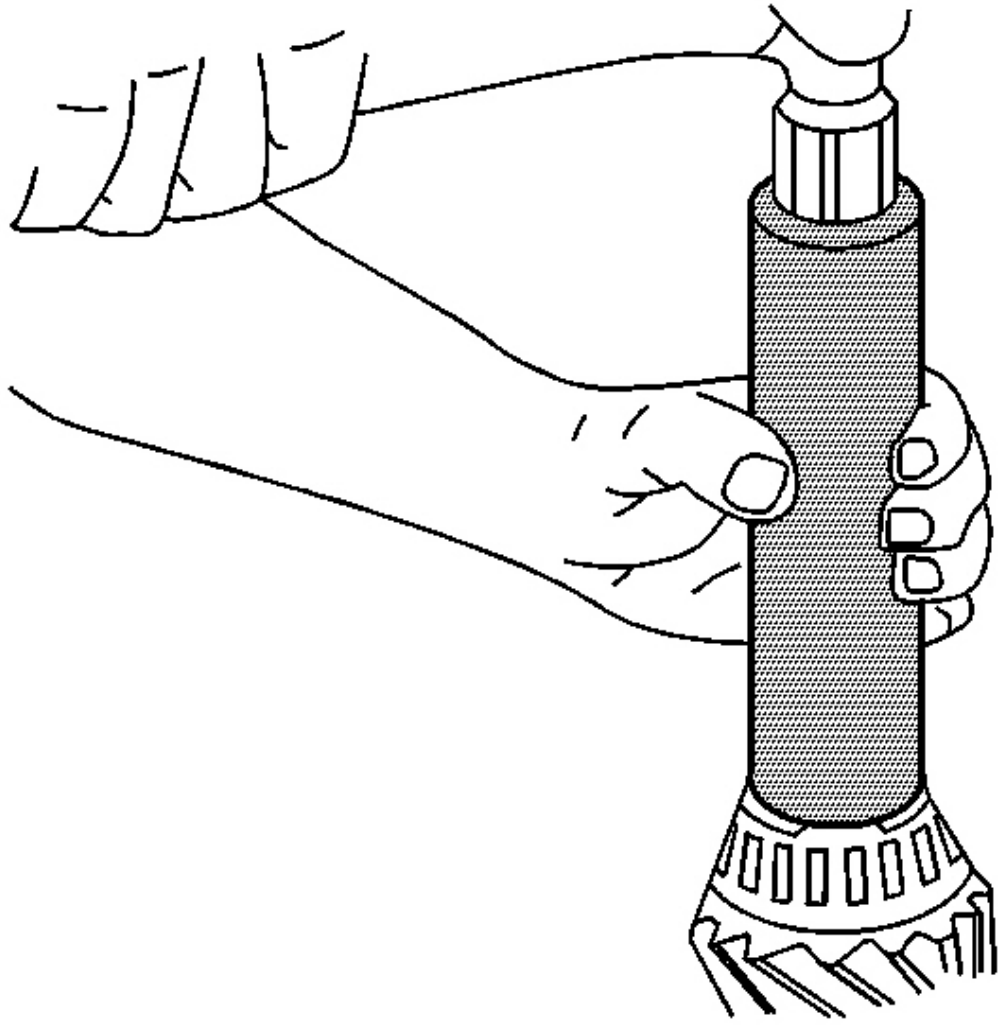


Fig. 158: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS CORP.

3. Install the inner pinion bearing onto the pinion gear using the **J 33785** . See **Special Tools**.
4. Install the new collapsible spacer onto the pinion gear.
5. Lubricate the inner and the outer pinion bearing with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

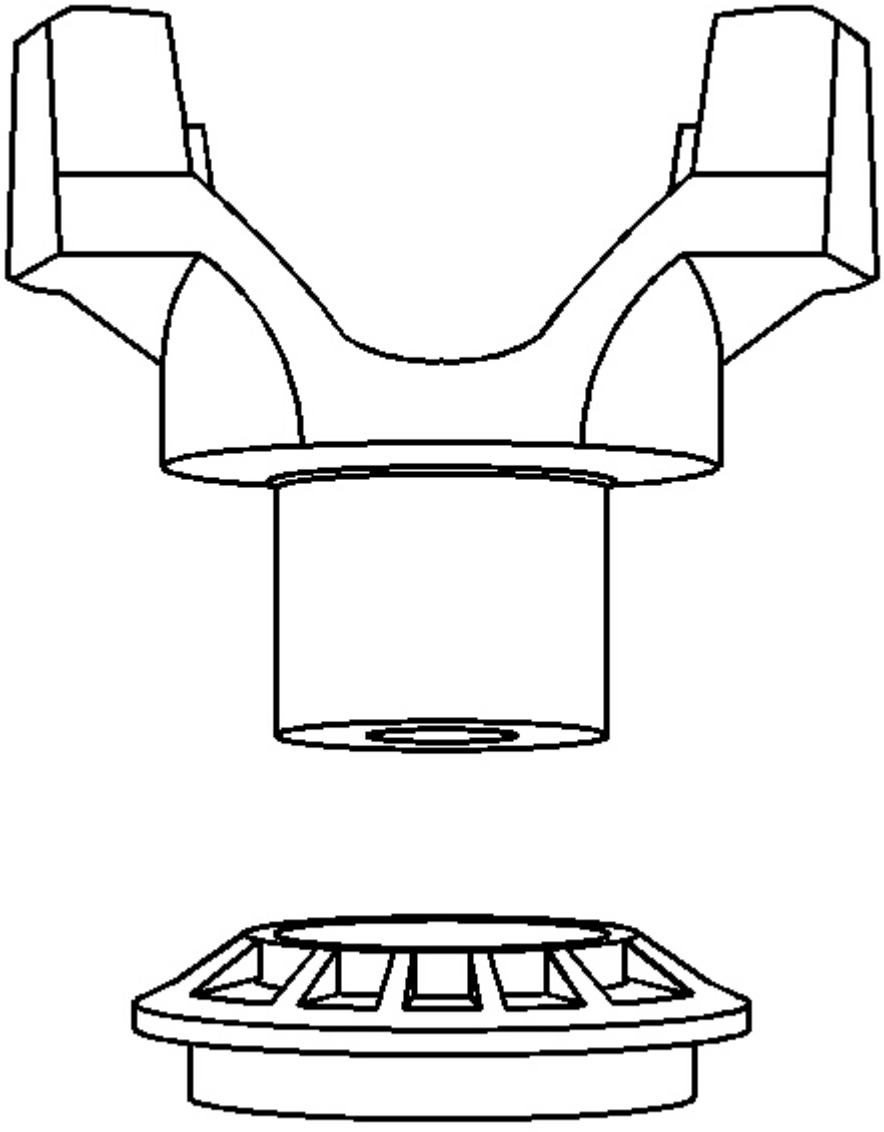


Fig. 159: View Of Dust Deflector
Courtesy of GENERAL MOTORS CORP.

6. Install the new deflector onto the pinion yoke using a soft-faced hammer.
7. Install the outer pinion bearing into the differential carrier half.

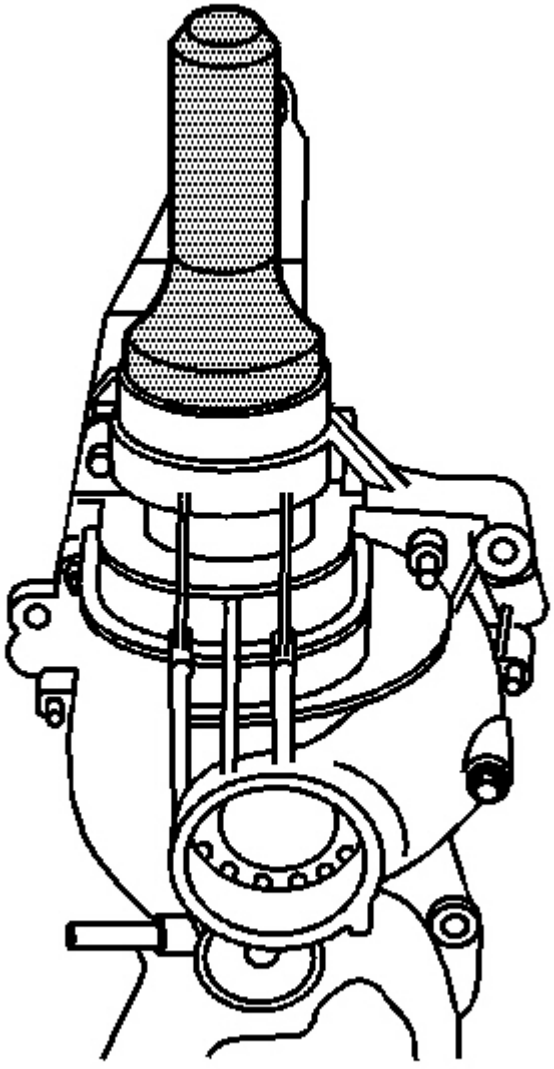


Fig. 160: View Of Pinion Oil Seal Installer
Courtesy of GENERAL MOTORS CORP.

8. Install the oil seal by doing the following:
    1. Install the differential carrier case half into a vise.

       Place shop towels in the vise in order to protect the differential carrier case.

    2. Install the seal using the **J 33782** . See **Special Tools**. Ensure the seal flange is seated on the axle

housing surface.

9. Apply sealant to the splines of the pinion yoke. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.
10. Install the pinion gear, with the inner pinion bearing and the new collapsible spacer, into the differential carrier case.
11. Install the pinion yoke.

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.

12. 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.
13. Install the washer and a new pinion nut.

If the new pinion nut cannot be installed, perform the following steps in order to seat the pinion yoke onto the pinion so that the washer and new pinion nut can be installed:

1. Remove the pinion nut washer.
2. Install the old pinion nut.
3. Tighten the nut until a few of the shaft threads show through the nut so that the washer and new pinion nut can be installed.
4. Remove the old pinon nut.
5. Install the pinion nut washer.
6. Install the new pinion nut.

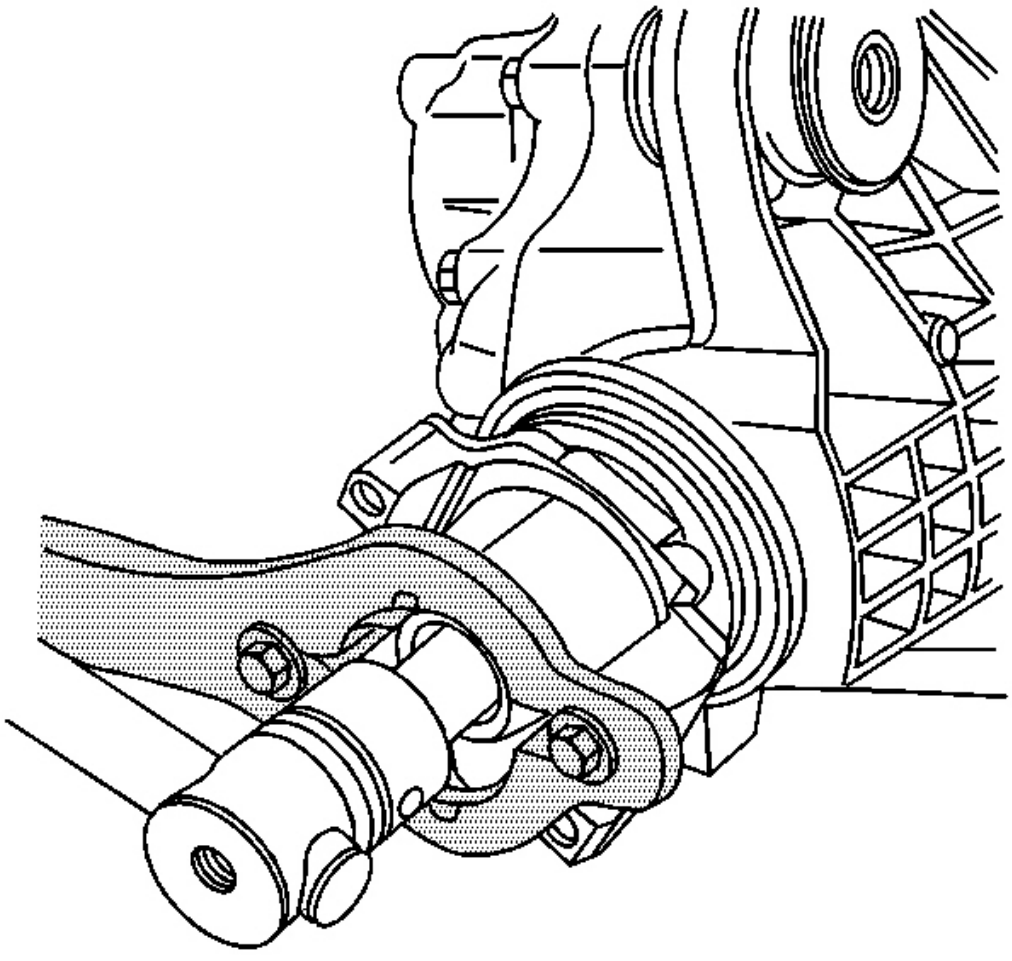


Fig. 161: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

14. 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.

15. 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.

16. Remove the **J 8614-01** . See **Special Tools**.
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, reinstall the **J 8614-01** and continue to tighten the pinion nut. See **Special Tools**.

    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. Remove the **J 8614-01** . See **Special Tools**.

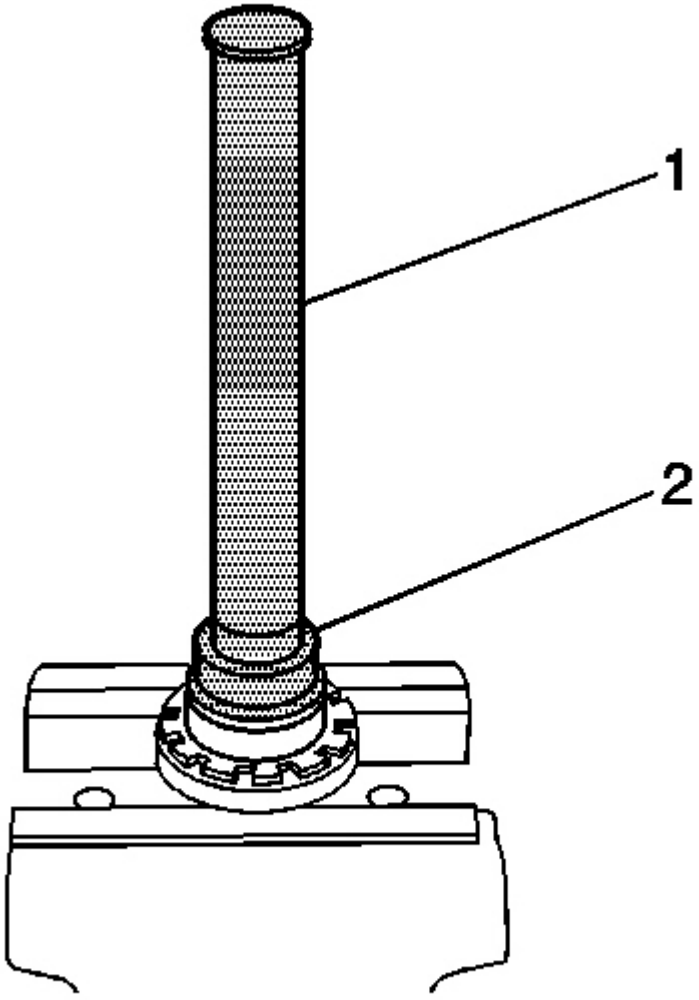


Fig. 162: Left Side Differential Carrier Bearing To Left Side Differential Adjuster
Courtesy of GENERAL MOTORS CORP.

21. Install the left side differential carrier bearing, print side out, to the left side differential adjuster nut using the **J 8092** (1) and the **J 45232** (2). See **Special Tools**.

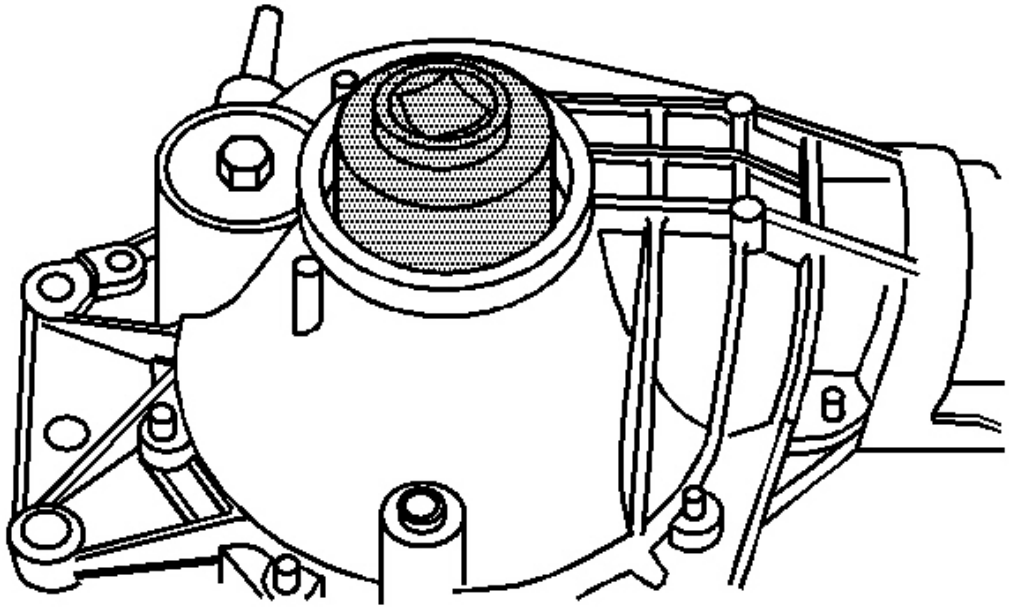


Fig. 163: Identifying Side Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

22. Install the left side differential bearing adjuster into the left differential carrier case half using the **J 42213** . See **Special Tools**.

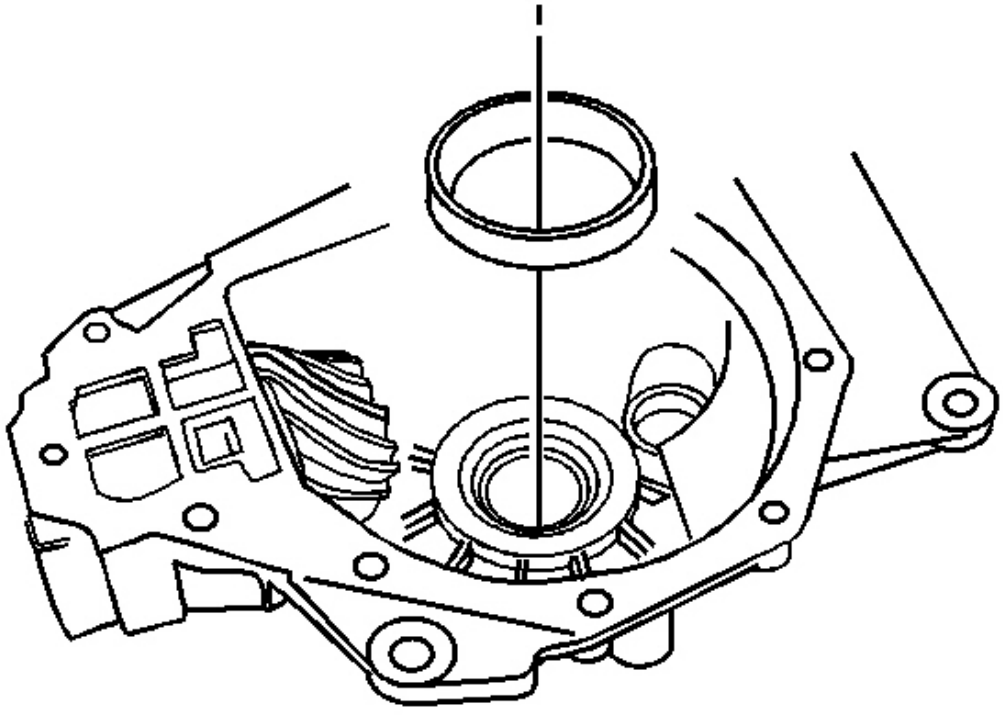


Fig. 164: View Of Left Differential Case Side Bearing Cup
Courtesy of GENERAL MOTORS CORP.

23. Install the left differential case side bearing cup into the left differential carrier case half using the **J 23423-A** and the **J 8092** . See **Special Tools**.

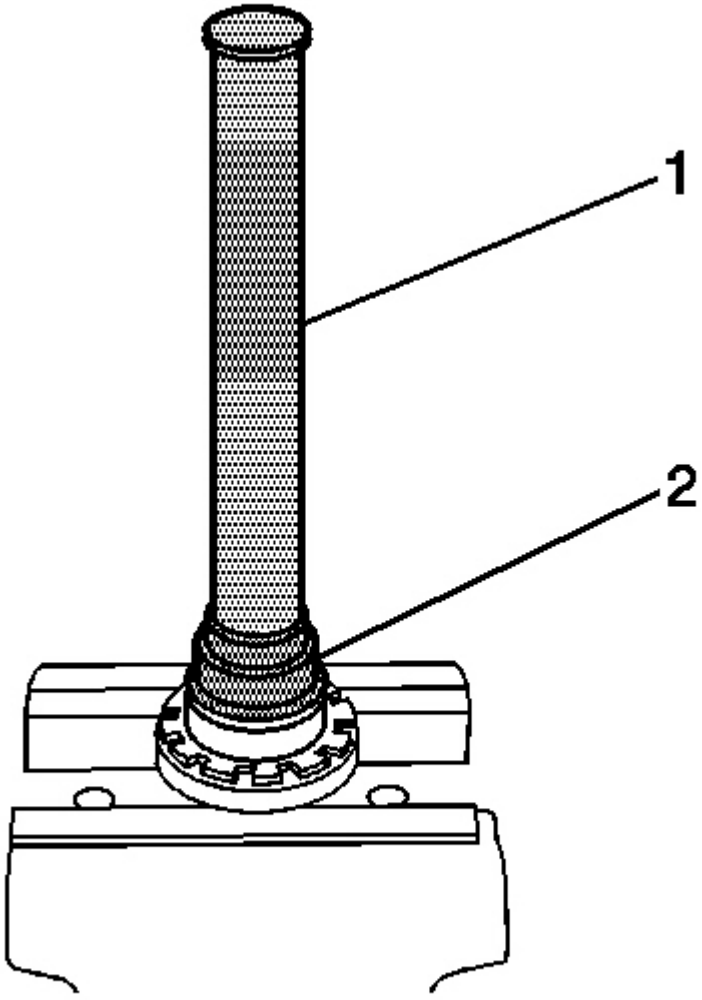


Fig. 165: View Of J 8092 & J 45233
Courtesy of GENERAL MOTORS CORP.

24. Install the right side differential carrier bearing, print side out, to the right side differential adjuster nut using the **J 8092** (1) and the **J 45233** (2). See **Special Tools**.

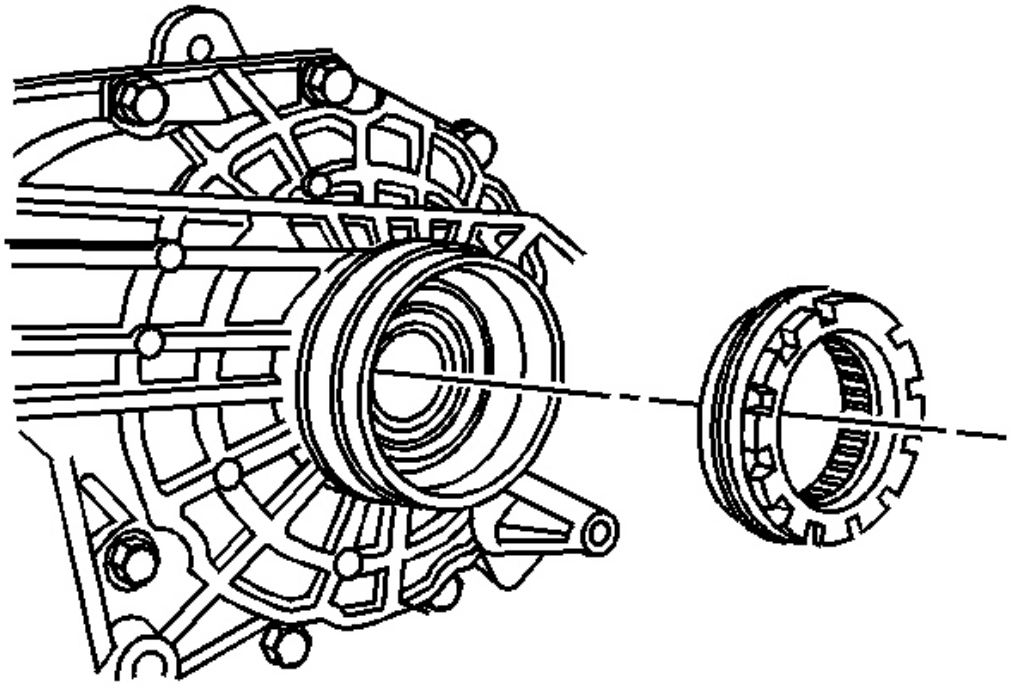


Fig. 166: View Of Right Side Differential Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

25. Install the right side differential bearing adjuster into the right side differential carrier case half using the **J 45224** . See **Special Tools**.
26. Install the right differential case side bearing cup into the right differential carrier case half using the **J 23423-A** and the **J 8092** .

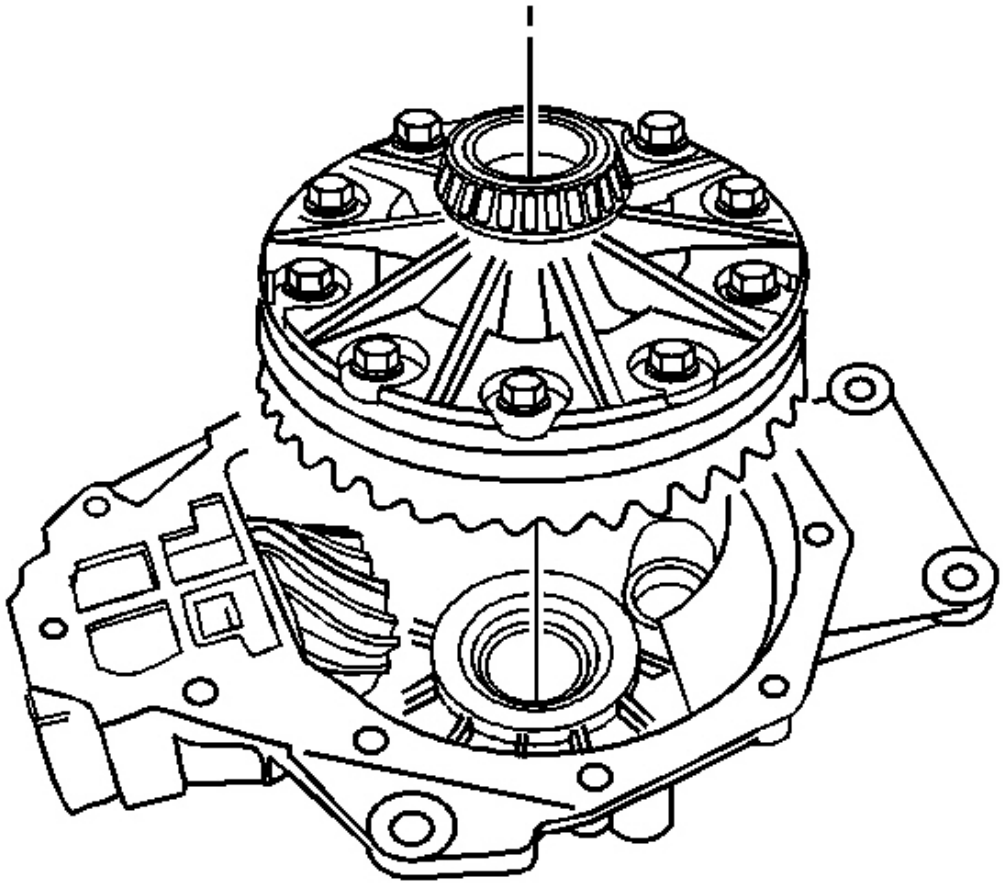


Fig. 167: View Of Differential Case Assembly
Courtesy of GENERAL MOTORS CORP.

27. Install the differential case assembly into the left differential carrier case half.
28. Clean the sealing surface of each half of the differential carrier case and the inner axle housing to differential carrier assembly.

    The surfaces must be clean of all grease and oil.

29. Apply a bead of sealer to one differential carrier case half sealing surface. Use the correct sealer. Refer to **Sealers, Adhesives, and Lubricants**.
30. Install the right differential carrier case half to the left differential carrier case half.

    If the carrier case halves do not make complete contact, back out the right side differential adjuster using

the **J 45224** . See **Special Tools**.

31. Install the differential carrier case bolts.

    Tighten: Tighten the differential carrier case bolts to 48 N.m (35 lb ft).

32. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut sleeve clockwise using the **J 45224** until 0. See **Special Tools**.0254-0.0762 mm (0.001-0.003 in) of backlash can be felt between the ring gear and the drive pinion.
33. Turn the left side differential adjuster nut sleeve clockwise using the **J 45224** in order to preload the differential side bearings against the differential side bearing cups. See **Special Tools**.

    Tighten: Tighten the differential adjuster nut to 75 N.m (55 lb ft).

34. Rotate the pinion several times in order to seat the pinion and differential side bearings.
35. Measure the rotating torque of the drive pinion and differential assembly using an inch-pound torque wrench.

    Specification: The rotating torque of the pinion and differential assembly should be 3.4-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.1 N.m (25-45 lb in) for used bearings.

36. If the rotating torque measurement is below 2.8 N.m (25 lb in) for used bearings, or 3.4 N.m (30 lb in) for new bearings, adjust the differential side bearing preload using the following steps:
    1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
    2. Using the **J 45224** , turn the left and the right side differential adjuster nut sleeves in or clockwise one notch. See **Special Tools**.
    3. Measure the rotating torque of the pinion and differential assembly using an inch-pound torque wrench.
    4. Compare the new measurement to the specification listed in step 35. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves one notch at a time on each side until the rotating torque of the pinion and differential assembly is within specifications
37. If the rotating torque measurement is above 5.1 N.m (45 lb in) for used bearings, or 6.2 N.m (55 lb in) for new bearings, adjust the differential side bearing preload using the following steps:
    1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
    2. Using the **J 45224** , turn the left and the right side differential adjuster nut sleeves out or counterclockwise one notch. See **Special Tools**.
    3. Measure the rotating torque of the pinion and differential assembly using an inch-pound torque wrench.
    4. Compare the new measurement to the specification listed in step 35. If the rotating torque of the pinion and differential assembly is not within specifications, continue to loosen the left and right side differential adjuster nut sleeves one notch at a time on each side until the rotating torque of the

pinion and differential assembly is within specifications.

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

    Recheck the rotating torque and adjust if necessary.

39. Measure the drive pinion to ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
40. Once the bearing preload and drive pinion to ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinion and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.
41. Complete the assembly of the differential carrier. Refer to **Differential Carrier Assembly Final Assembly**.

BACKLASH INSPECTION & ADJUSTMENT

Tools Required

- **J 42213** Adjuster Sleeve Socket. See **Special Tools**.
- **J 45224** Side Bearing Adjuster. See **Special Tools**.
- **J 8001** Dial Indicator Set

Adjustment Procedure

1. Remove all alignment marks made previously and re-mark the location of the differential adjuster nut sleeves in relation to the differential carrier assembly case halves.

   Ensure that the notches can be counted when turned.

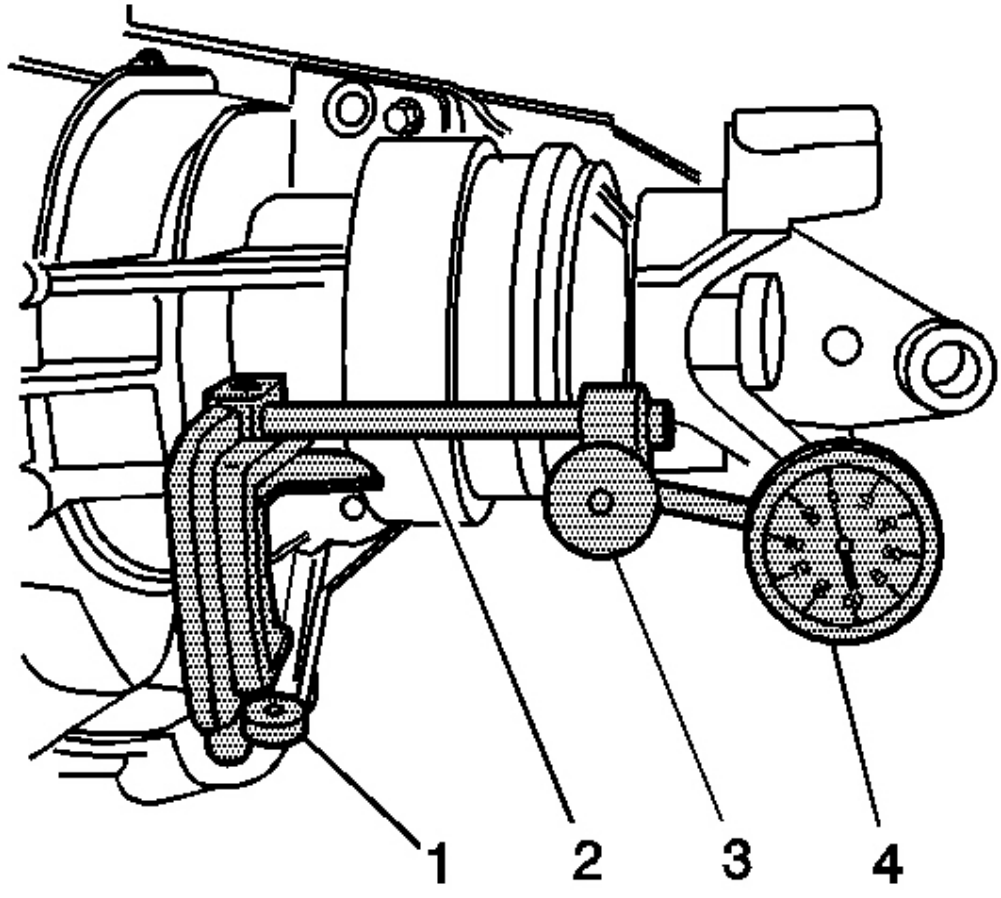


Fig. 168: View Of Dial Indicator Set
Courtesy of GENERAL MOTORS CORP.

2. Install the **J 8001** (1-4) so that the button contacts the outer edge of the pinion yoke.

   Ensure that the button contact the outer edge of the pinion yoke and that the plunger is at a right angle to the pinion yoke.

3. Move the pinion yoke back and forth through the pinion yoke's free play while not allowing the ring gear to move.
4. Record the dial indicator reading.
5. To determine the actual backlash, divide the dial indicator reading by 2.

   An actual dial indicator reading of 0.16 mm (0.006 in) means that there is actually 0.08 mm (0.003 in)

backlash.

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 specification of 0.13-0.18 mm (0.005-0.007 in).

IMPORTANT: When adjusting the backlash, observe the following:

- **Always turn the left and the right differential adjuster nut sleeves in equal amounts.**
- **Turning the differential adjuster nut sleeves one notch will change the backlash about 0.08 mm (0.003 in).**

6. If the backlash is too small, increase the backlash by turning the right differential adjuster nut sleeve out one notch using the **J 45224** , and the left differential adjuster nut sleeve in one notch using the **J 42213** until the correct backlash is obtained. See **Special Tools**.
7. If the backlash is too large, decrease the backlash by turning the left differential adjuster nut sleeve out one notch using the **J 42213** , and the right differential adjuster nut sleeve in one notch using the **J 45224** until the correct backlash is obtained. See **Special Tools**.
8. Recheck the rotating torque of the pinion and differential assembly and adjust, if necessary. Refer to **Differential Carrier Assembly Assemble**.
9. Once the backlash and bearing preload is within specifications, remove the alignment markings and place new alignment marks between the differential bearing adjuster nut and the differential carrier assembly case.
10. Continue the assembly of the differential carrier. Refer to **Differential Carrier Assembly Final Assembly**.

INTERMEDIATE SHAFT BEARING ASSEMBLY ASSEMBLE (S4WD)

Tools Required

- **J 45225** Axle Seal Installer. See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Replacer - LH. See **Special Tools**.
- **J 45359** Axle Seal Installer
- **J 8092** Universal Driver Handle- 3/4 in - 10

Assembly Procedure

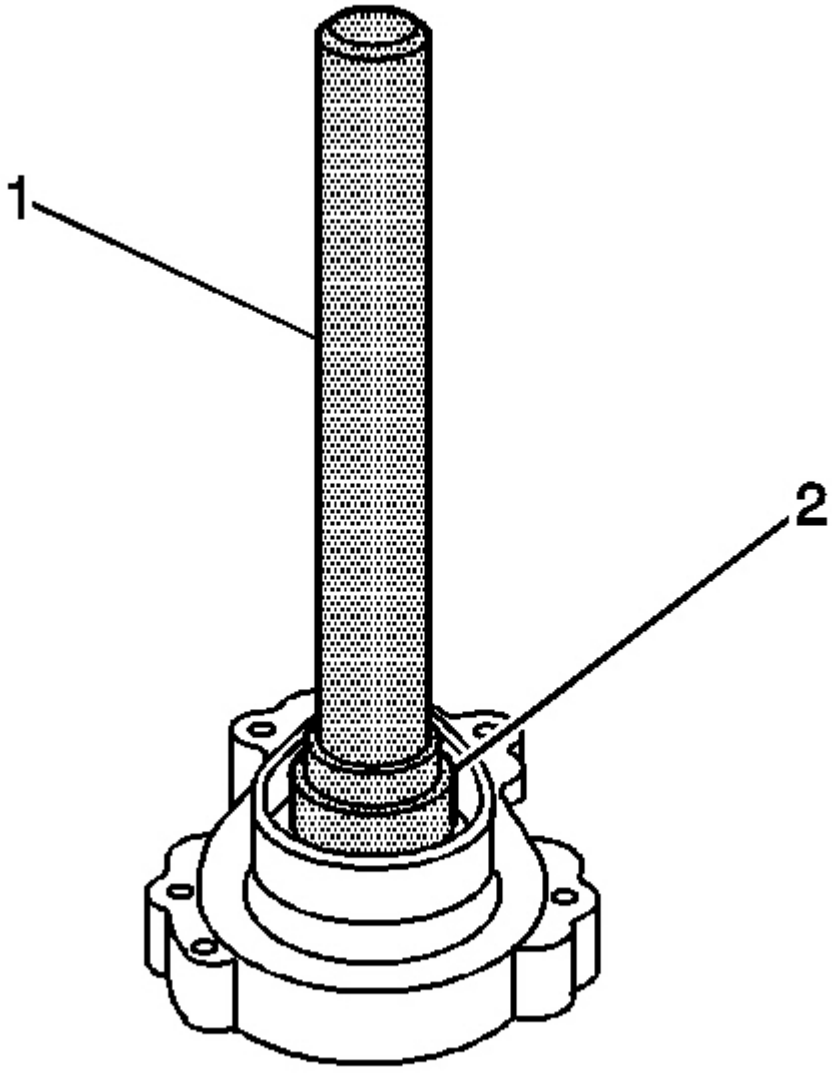


Fig. 169: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Inner Case Half)
Courtesy of GENERAL MOTORS CORP.

1. Install the inner shaft bearing, print side out, into the intermediate shaft bearing housing inner case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

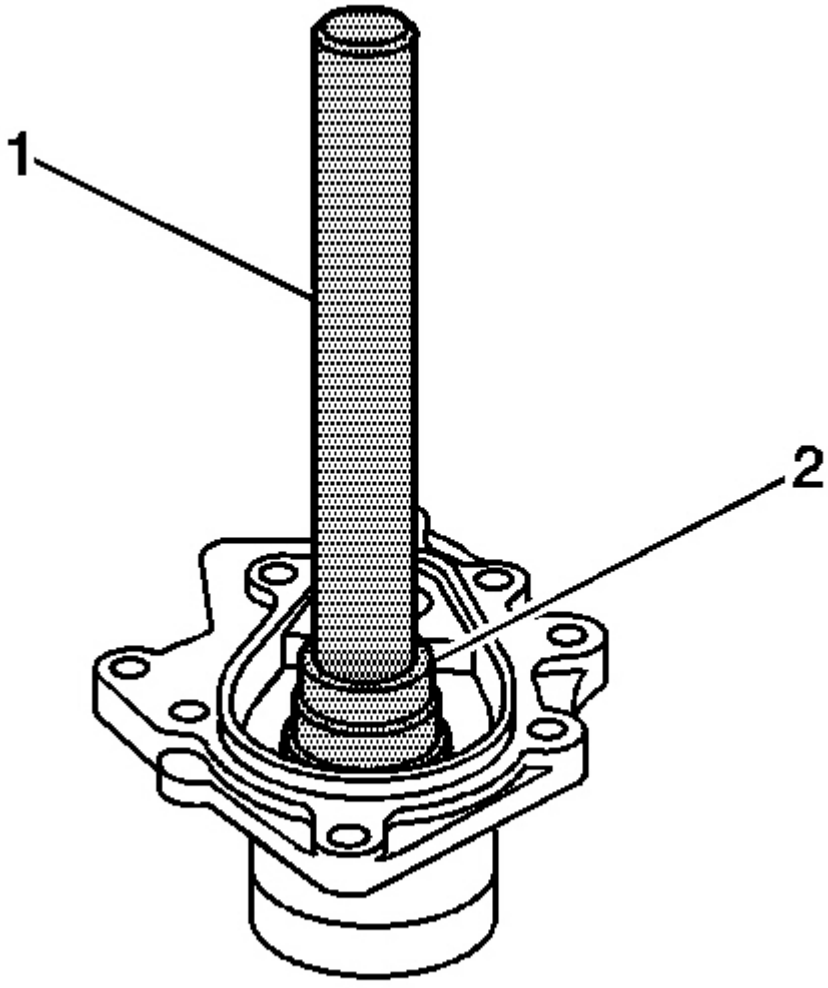


Fig. 170: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Outer Case Half)
Courtesy of GENERAL MOTORS CORP.

2. Install the inner shaft bearing, print side out, into the intermediate shaft bearing housing outer case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

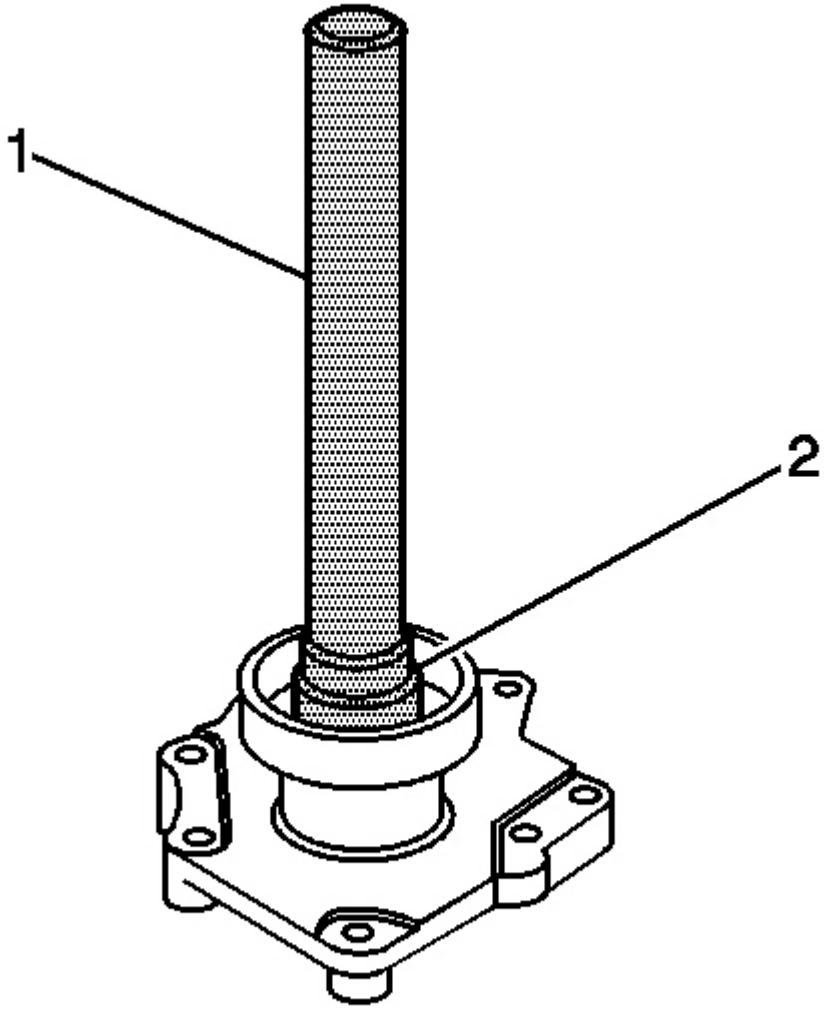


Fig. 171: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Inner Axle Bearing)
Courtesy of GENERAL MOTORS CORP.

3. Install the inner axle bearing, print side out, into the intermediate shaft bearing housing outer case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

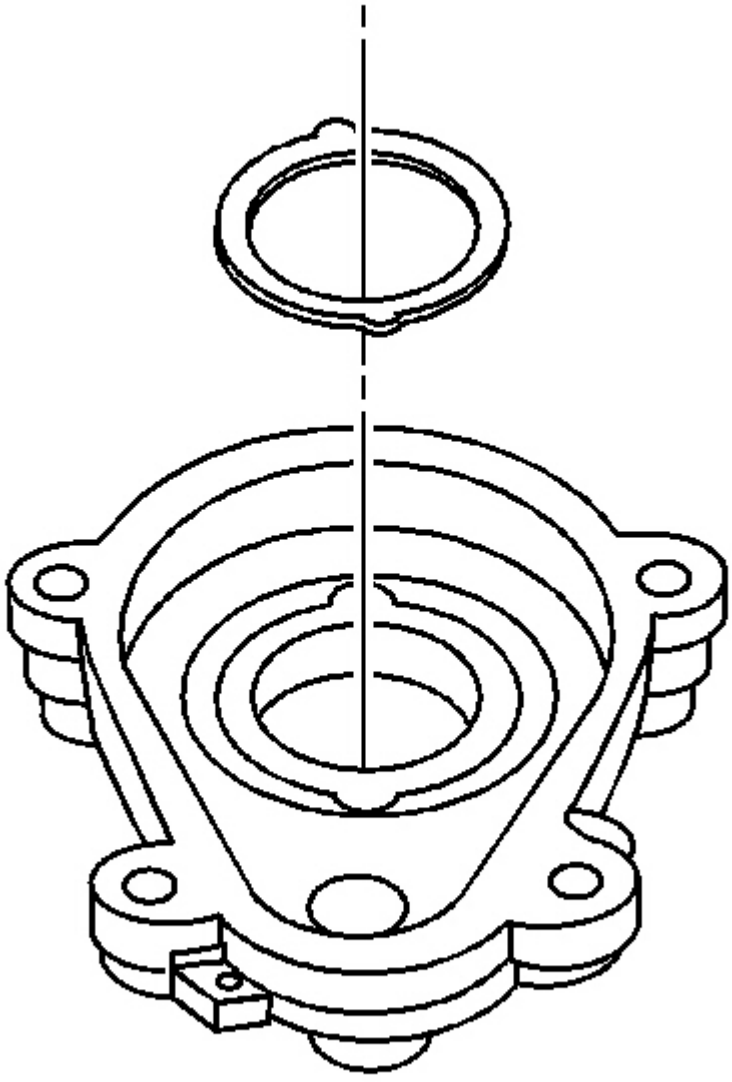


Fig. 172: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

4. Install the thrust washer.

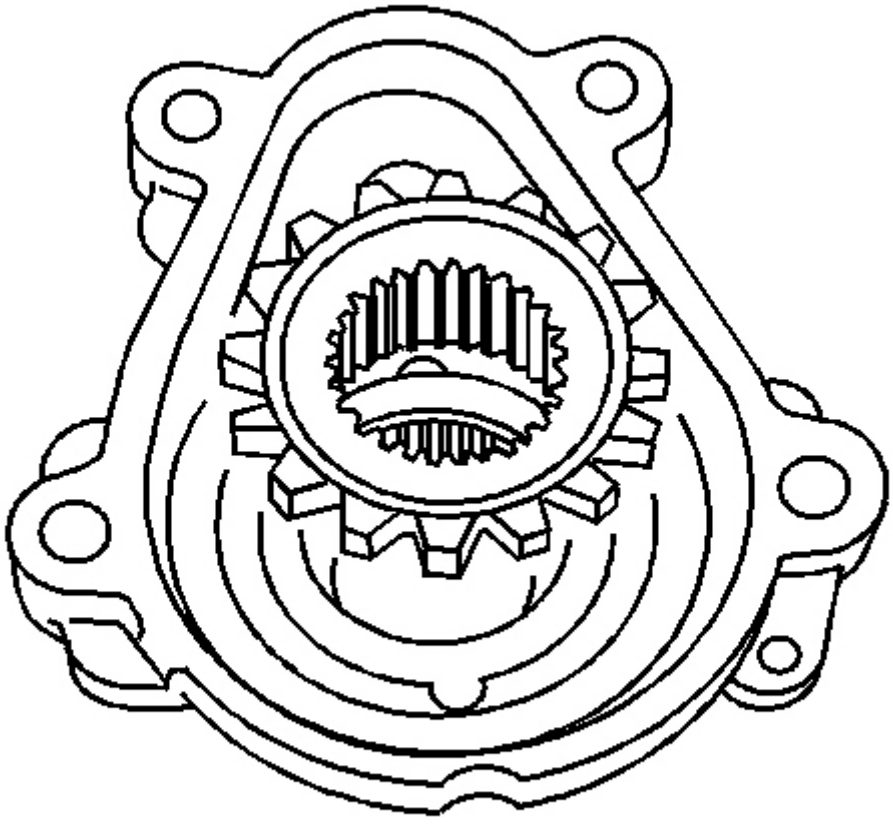


Fig. 173: View Of Inner Clutch Fork Gear
Courtesy of GENERAL MOTORS CORP.

5. Install the inner clutch fork gear.

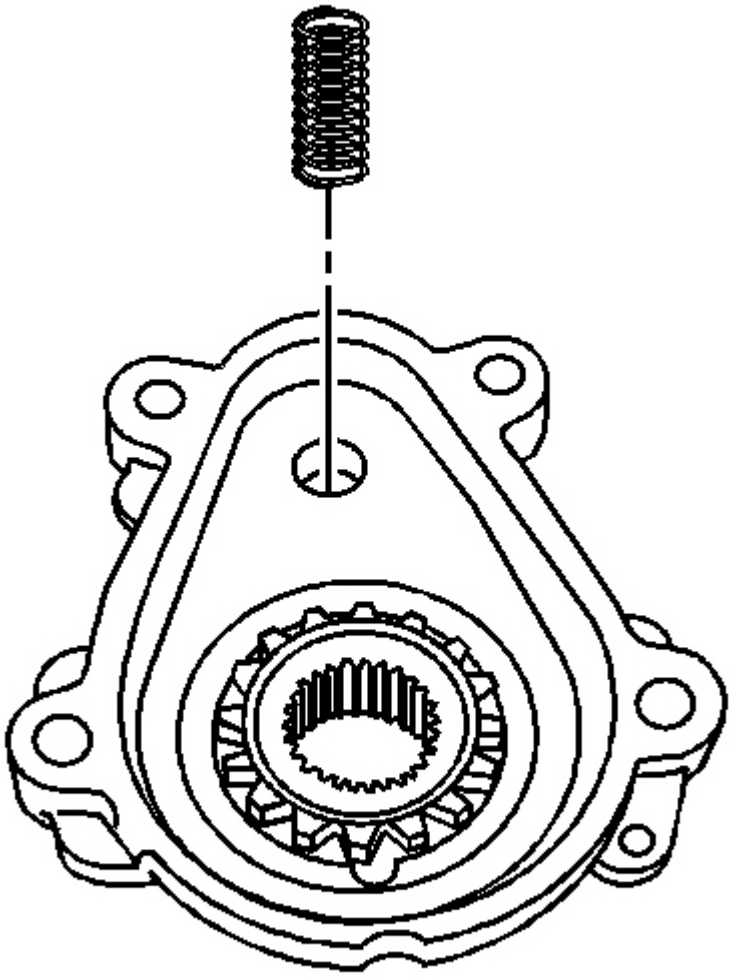


Fig. 174: View Of Clutch Fork Spring
Courtesy of GENERAL MOTORS CORP.

6. Install the clutch fork spring.

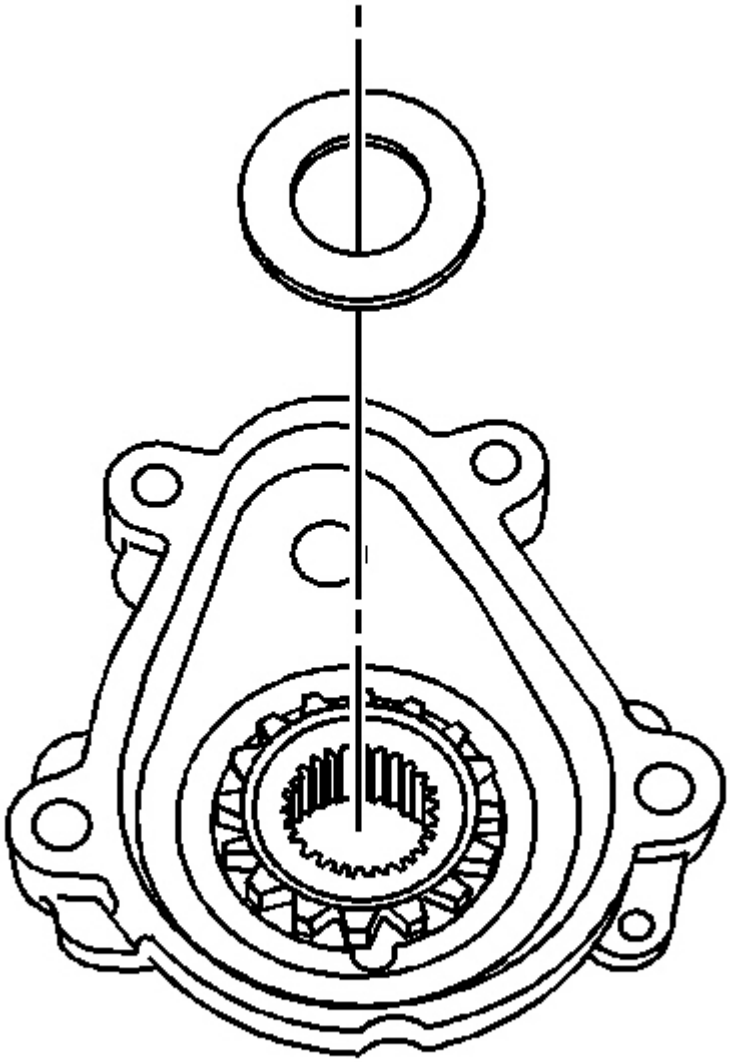


Fig. 175: Identifying Washer
Courtesy of GENERAL MOTORS CORP.

7. Install the washer.

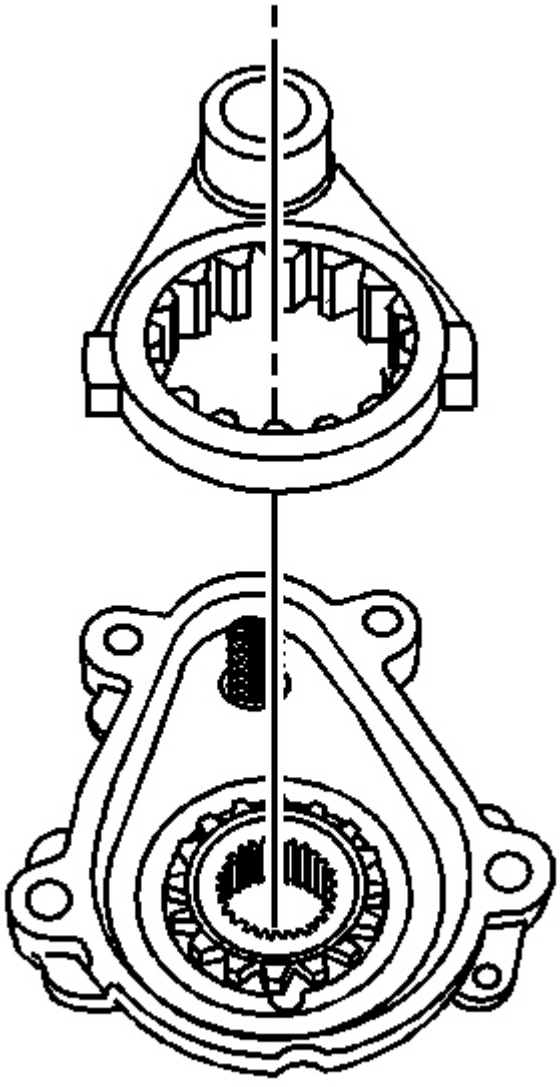


Fig. 176: View Of Clutch Fork & Clutch Fork Sleeve
Courtesy of GENERAL MOTORS CORP.

8. Install the clutch fork and clutch fork sleeve.

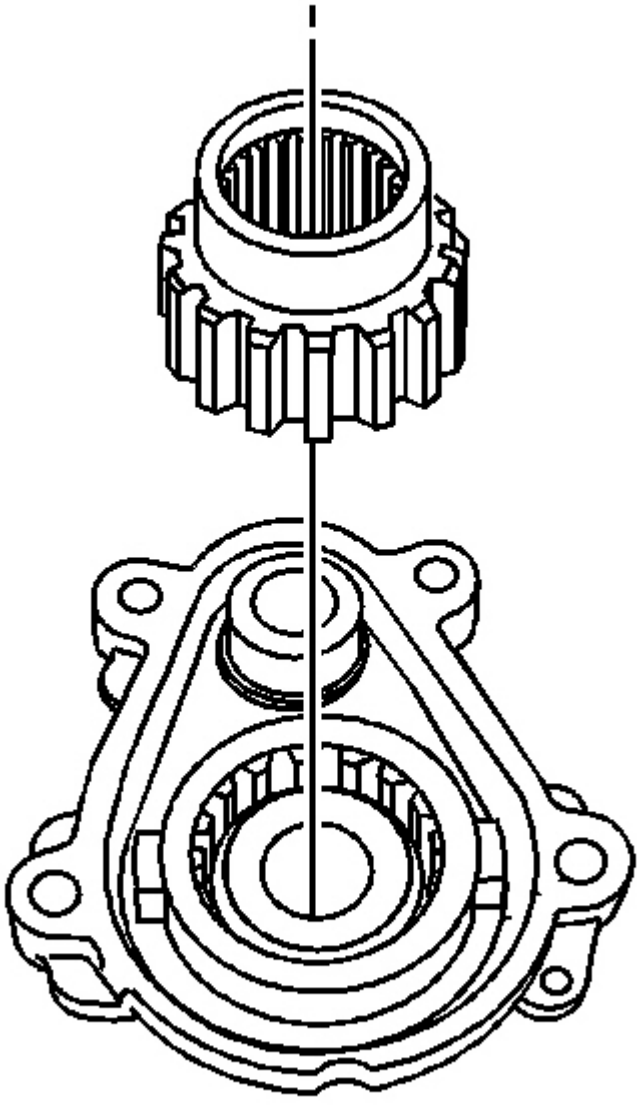


Fig. 177: View Of Outer Clutch Fork Gear
Courtesy of GENERAL MOTORS CORP.

9. Install the outer clutch fork gear.

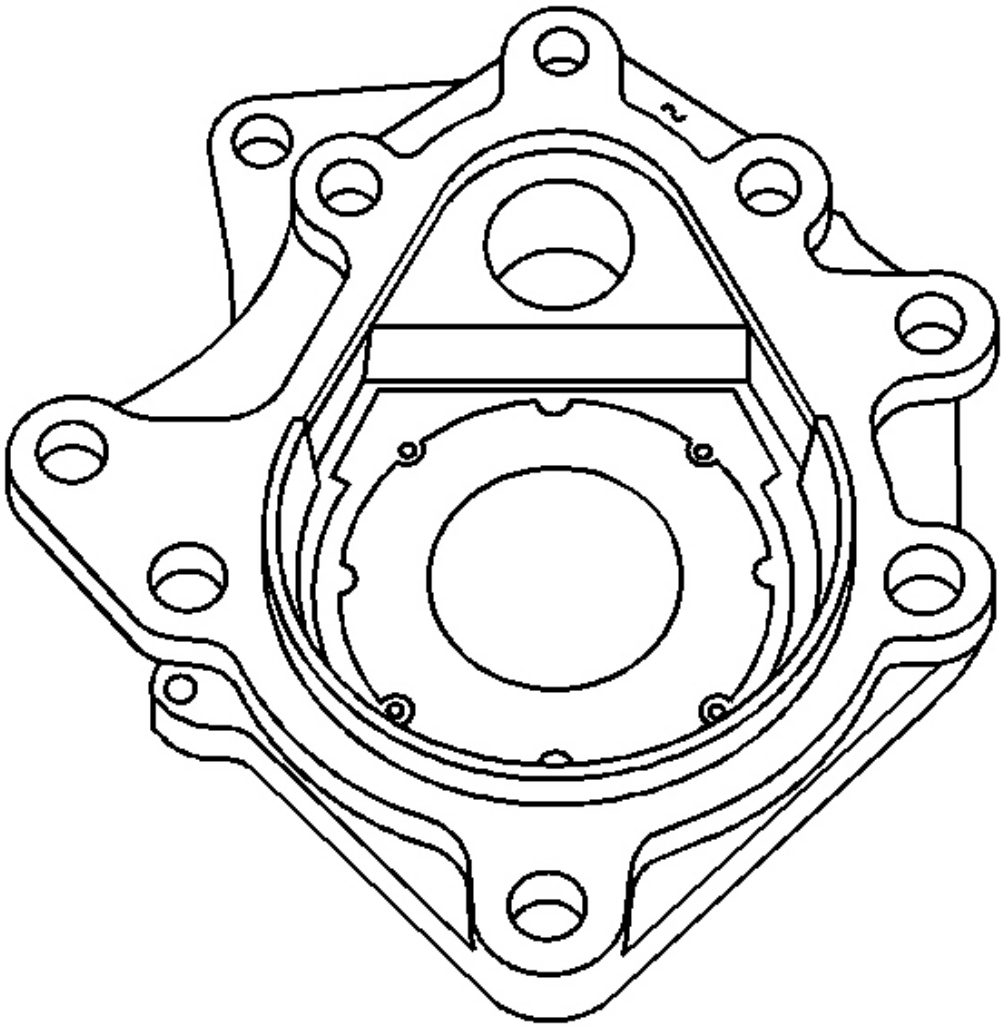


Fig. 178: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

10. Install the thrust washer to the outer intermediate shaft bearing housing case half.

    Use grease to hold the thrust washer in place.

11. Apply a bead of sealant, GM P/N 1052942 or equivalent, to the sealing surface of one side of the intermediate shaft bearing housing case.
12. Install the outer intermediate shaft bearing housing case to the inner intermediate shaft bearing housing case.

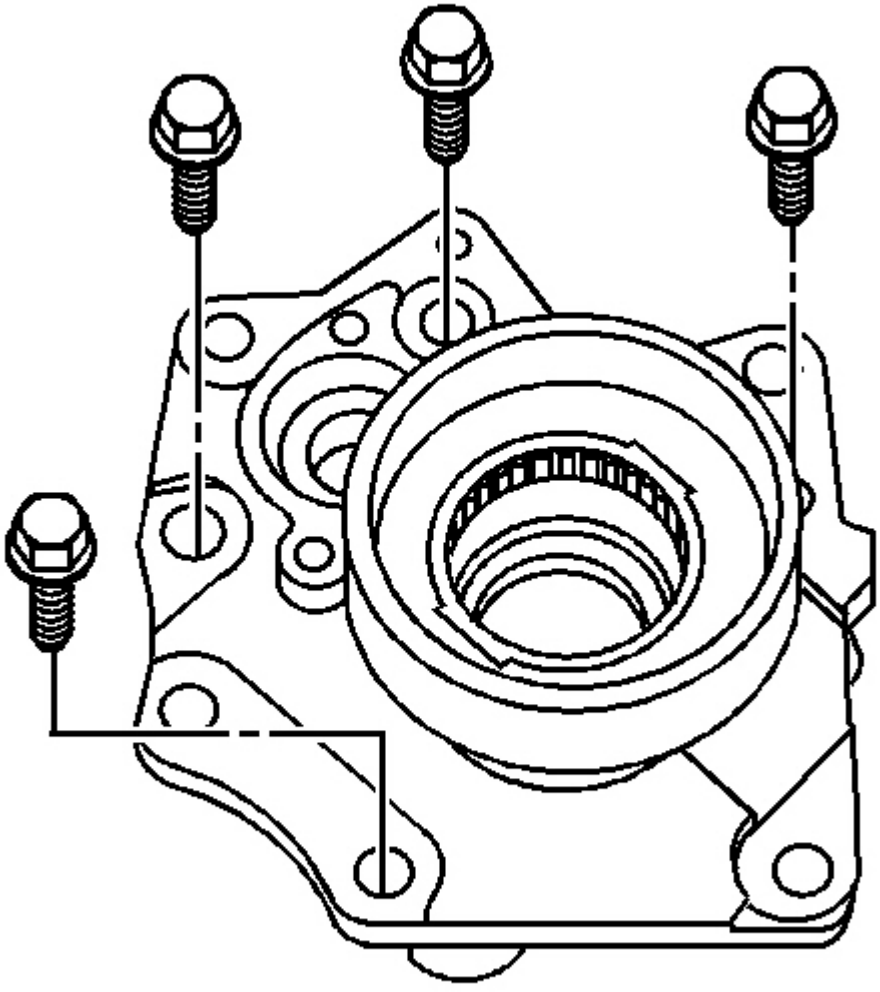


Fig. 179: View Of Intermediate Shaft Bearing Case Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

13. Install the intermediate shaft bearing case bolts.

    Tighten: Tighten the intermediate shaft bearing case bolts to 48 N.m (35 lb ft).

14. Install the new inboard, oil pan side, seal on top of the seal bore.

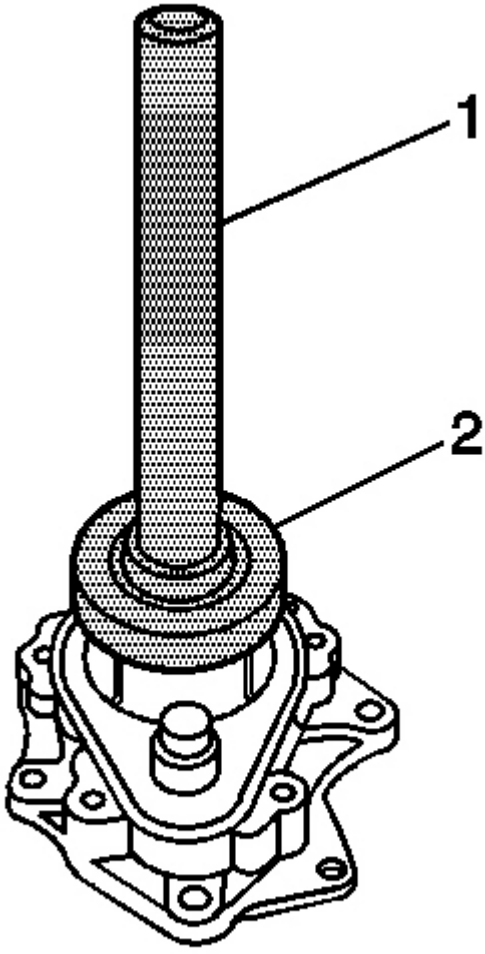


Fig. 180: Identifying Axle Seal Installer & Universal Driver Handle
Courtesy of GENERAL MOTORS CORP.

15. Install the new seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.

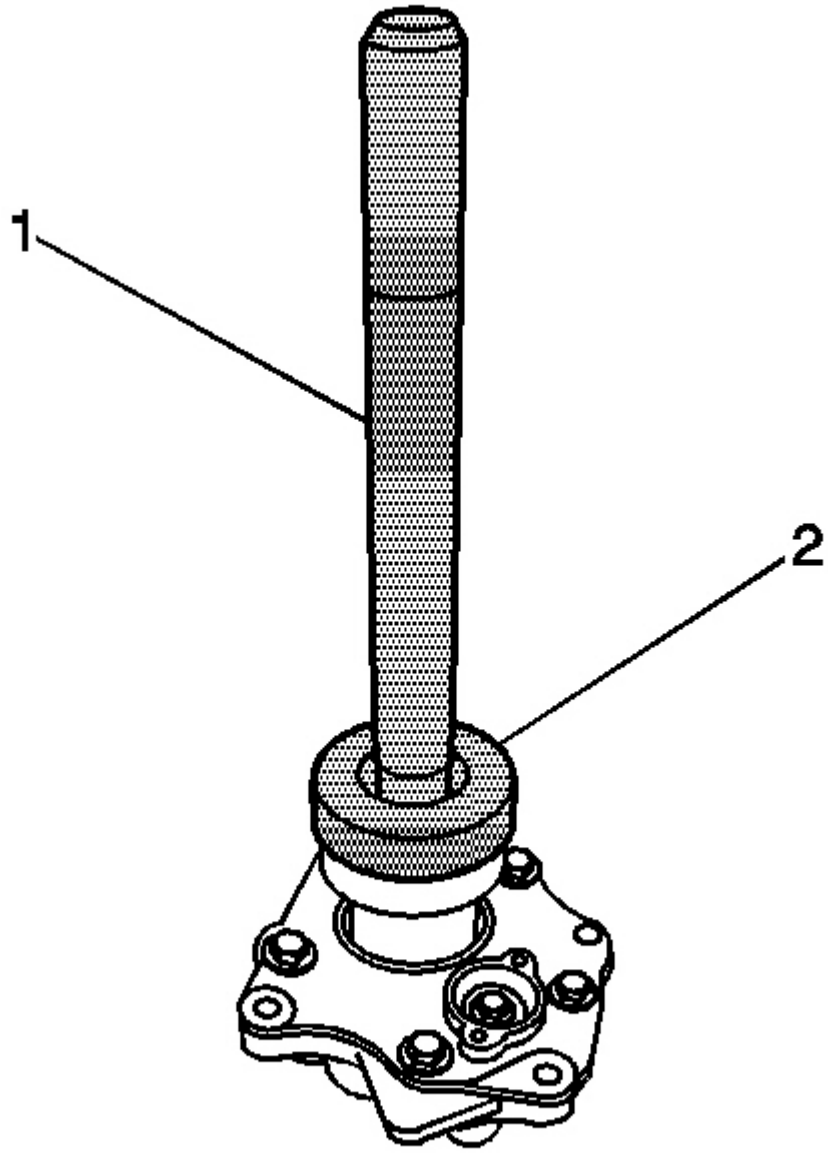


Fig. 181: Identifying Axle Seal Installer & Universal Driver Handle
Courtesy of GENERAL MOTORS CORP.

NOTE: The outboard intermediate shaft bearing assembly seal must be installed 0.9-1.1 mm (0.035-0.043 in) below the surface of the intermediate shaft bearing assembly housing bore. If the seal is not installed properly,

damage to the seal may occur.

16. Install the new seal using the **J 45359** (2) and the **J 8092** (1).

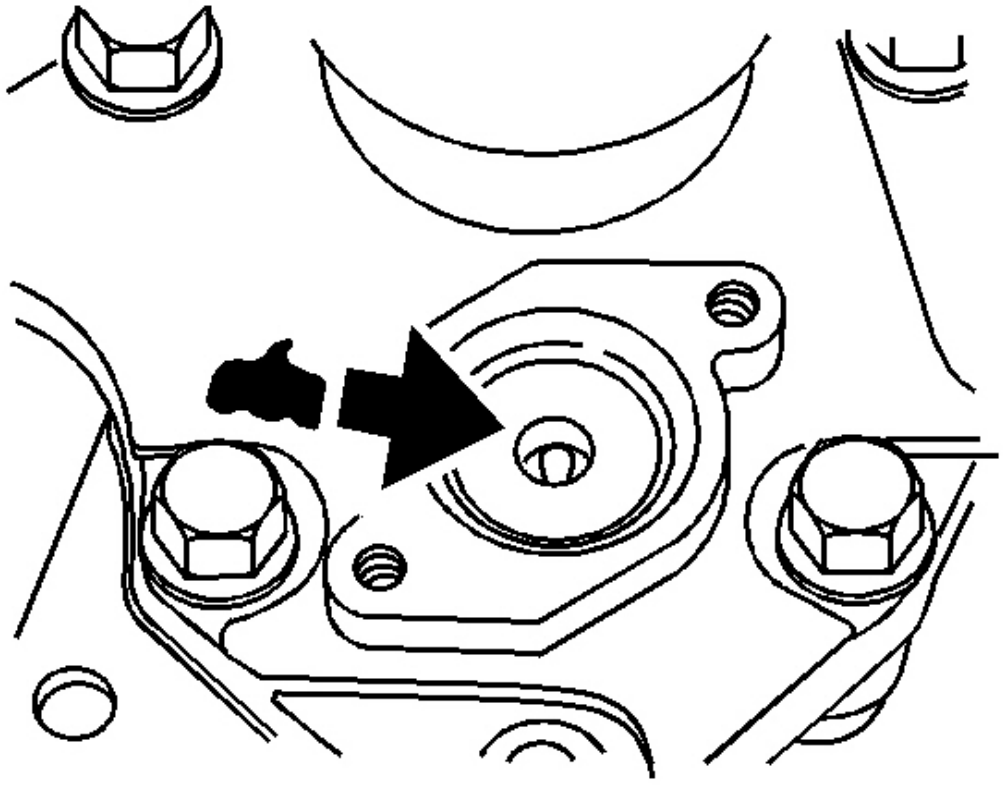


Fig. 182: Packing Cavity Of Inner Intermediate Shaft Bearing Housing With Grease
Courtesy of GENERAL MOTORS CORP.

17. Pack the cavity of the inner intermediate shaft bearing housing with 55-65 cc (1.86-2.20 oz) of grease, GM P/N 12377985 or equivalent.

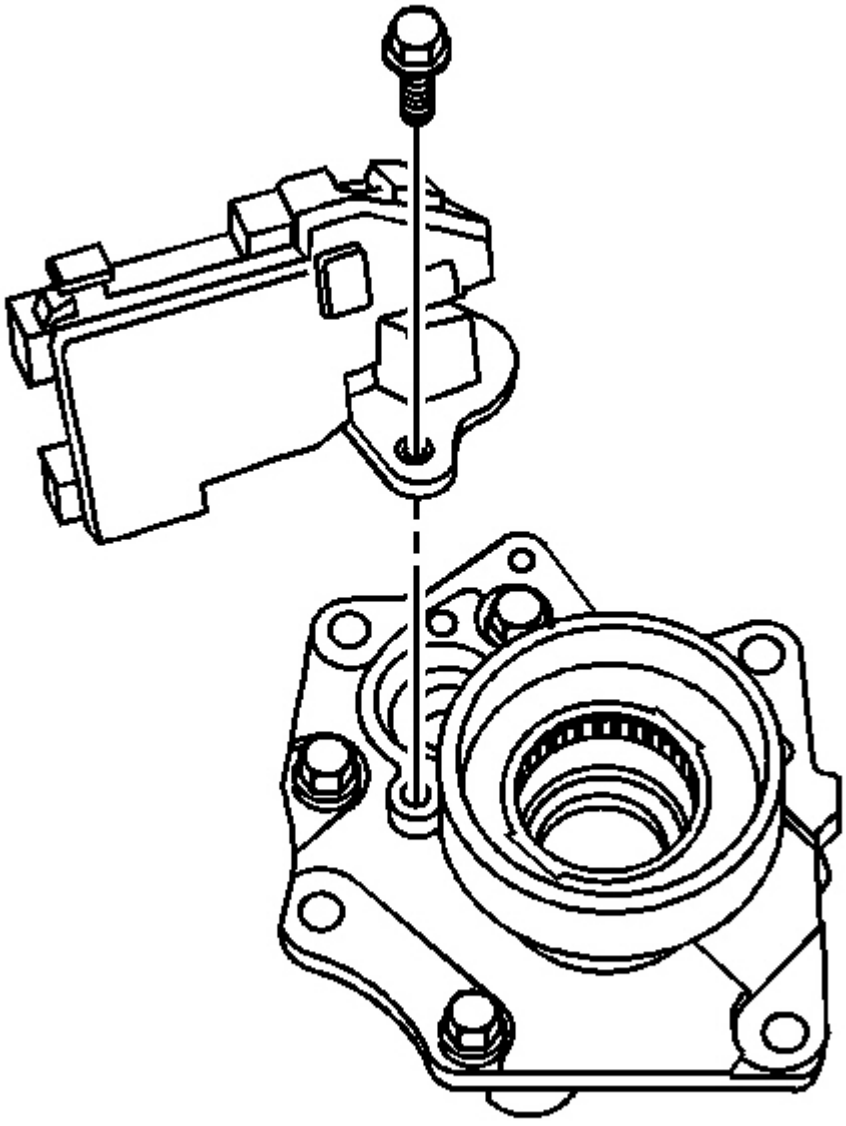


Fig. 183: View Of Actuator & Actuator Bolts
Courtesy of GENERAL MOTORS CORP.

18. Install the actuator.
19. Install the actuator bolts.

Tighten: Tighten the actuator bolts to 6 N.m (53 lb in).

INTERMEDIATE SHAFT BEARING ASSEMBLY ASSEMBLE (A4WD)

Tools Required

- **J 45225** Axle Seal Installer. See **Special Tools**.
- **J 45232** Differential Bearing Adjuster Needle Bearing Replacer - LH. See **Special Tools**.
- **J 45359** Axle Seal Installer
- **J 8092** Universal Driver Handle- 3/4 in - 10

Assembly Procedure

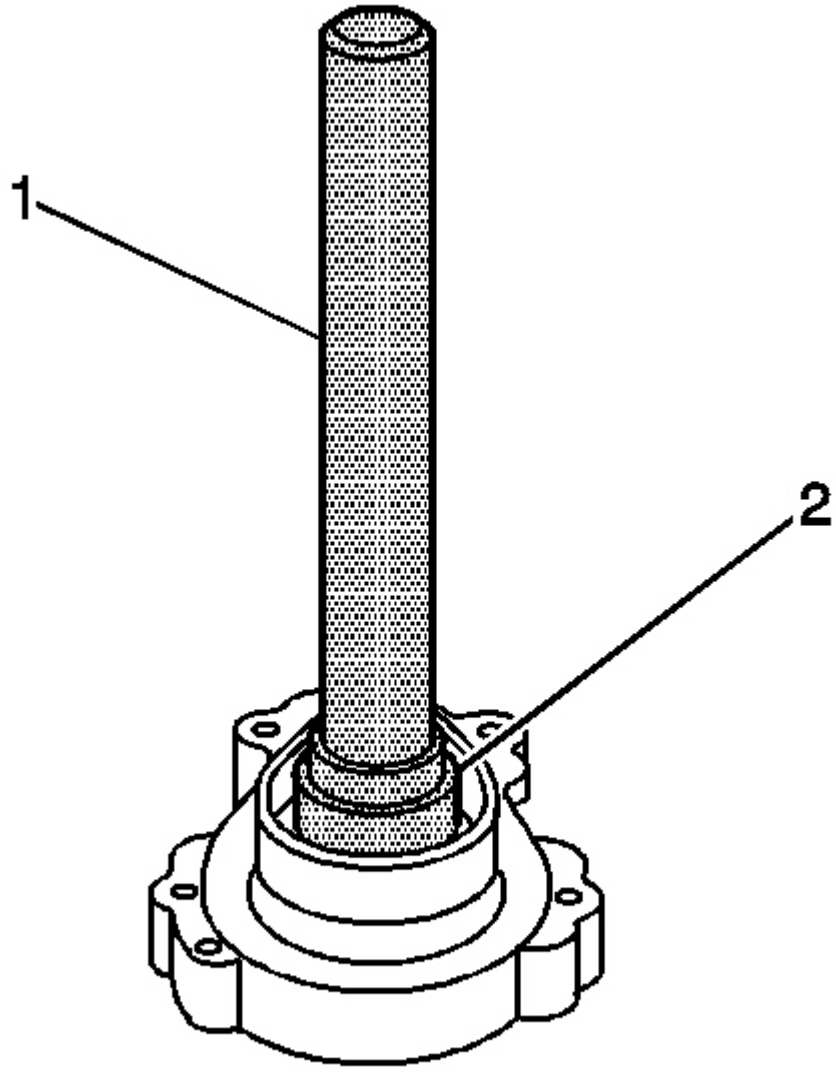


Fig. 184: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Inner Case Half)
Courtesy of GENERAL MOTORS CORP.

1. Install the inner shaft bearing, print side out, into the intermediate shaft bearing inner case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

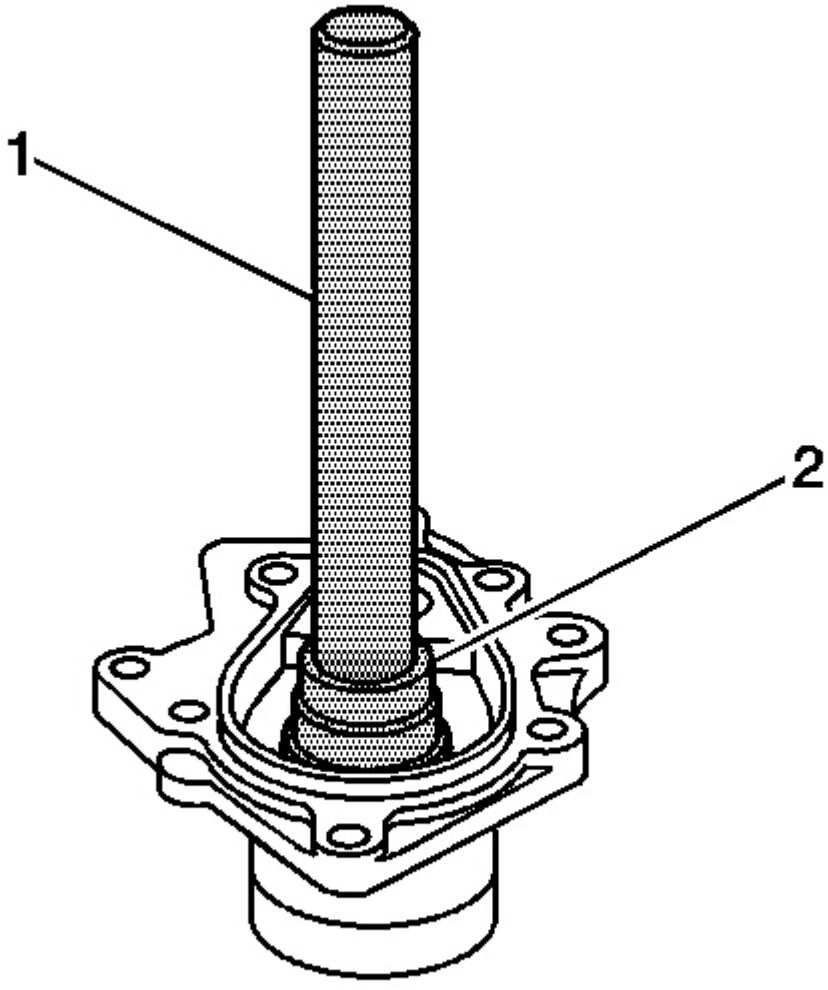


Fig. 185: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Outer Case Half)
Courtesy of GENERAL MOTORS CORP.

2. Install the inner shaft bearing, print side out, into the intermediate shaft bearing outer case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

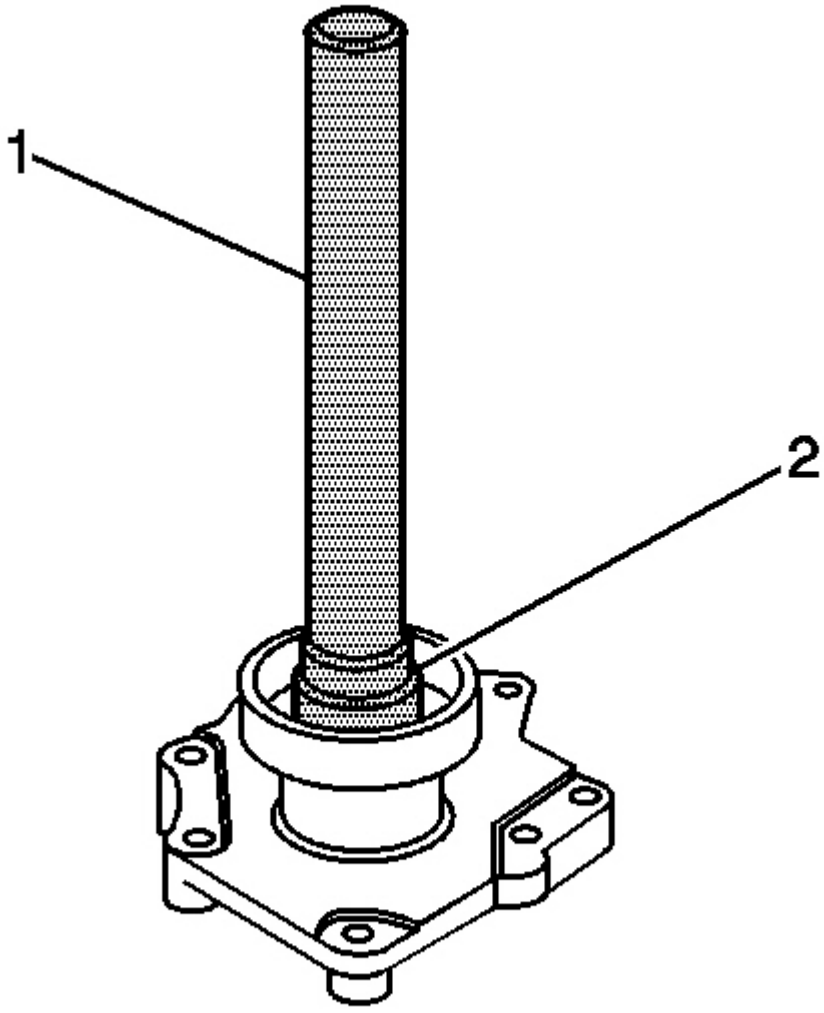


Fig. 186: Identifying Universal Driver Handle & Differential Bearing Adjuster Needle Bearing Replacer - LH (Inner Axle Bearing)
Courtesy of GENERAL MOTORS CORP.

3. Install the inner shaft bearing (print side out) into the intermediate shaft bearing outer case half using the **J 45232** (2) and the **J 8092** (1). See **Special Tools**.

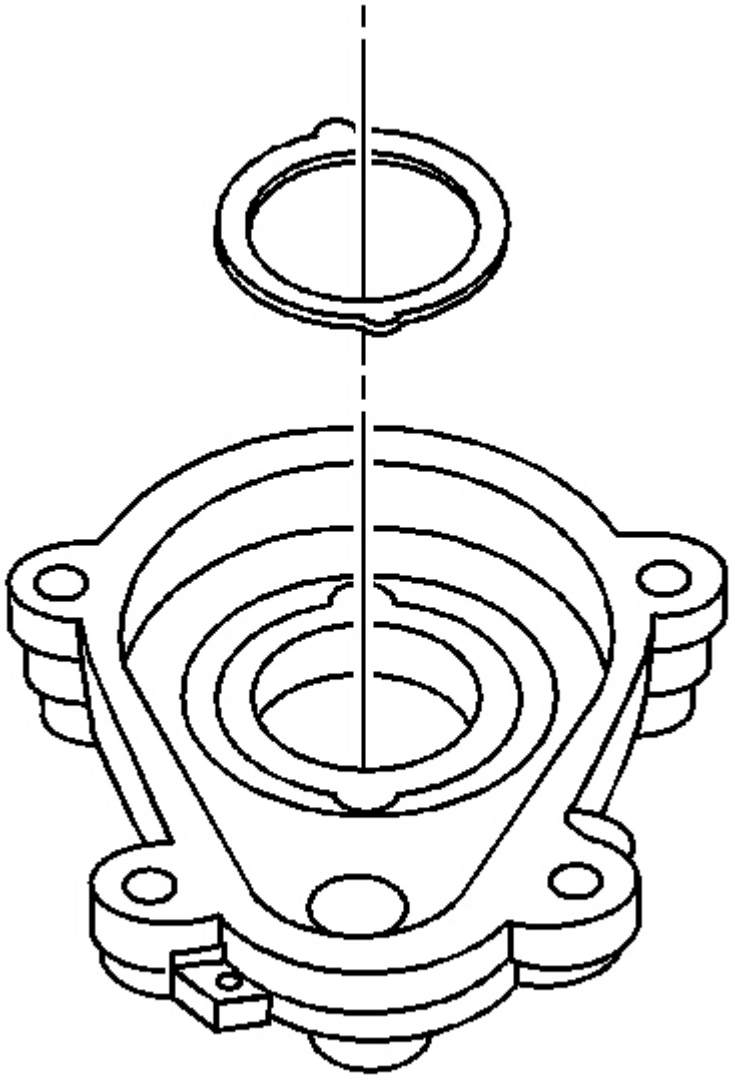


Fig. 187: View Of Thrust Washer
Courtesy of GENERAL MOTORS CORP.

4. Install the thrust washer.

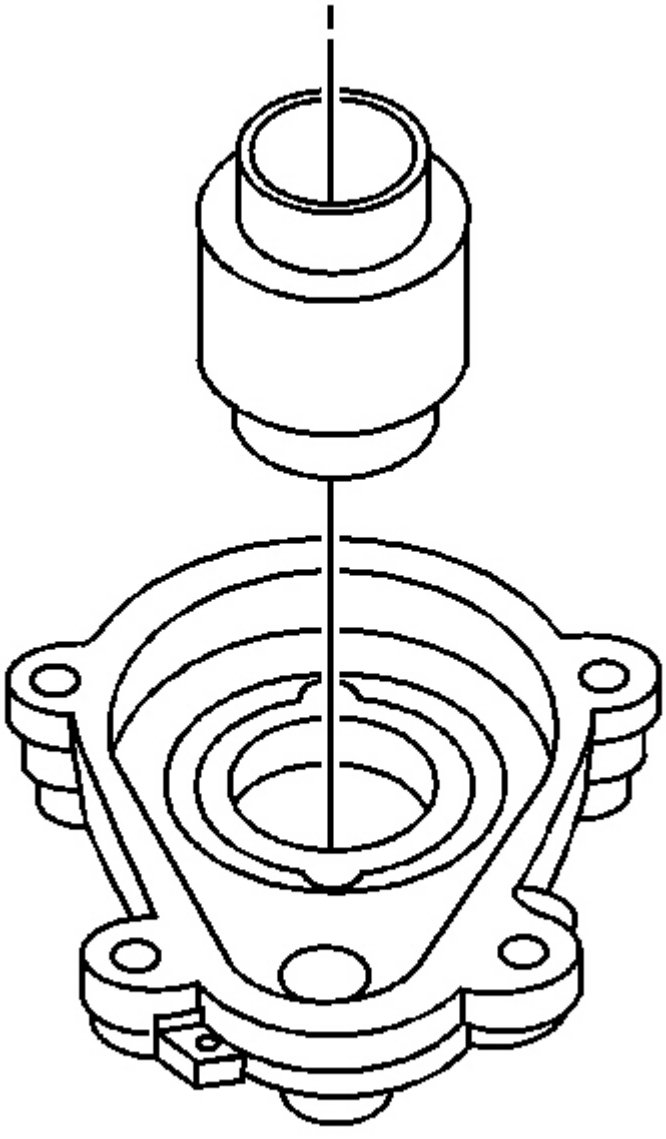


Fig. 188: Identifying Clutch Fork Sleeve
Courtesy of GENERAL MOTORS CORP.

5. Install the clutch fork sleeve.

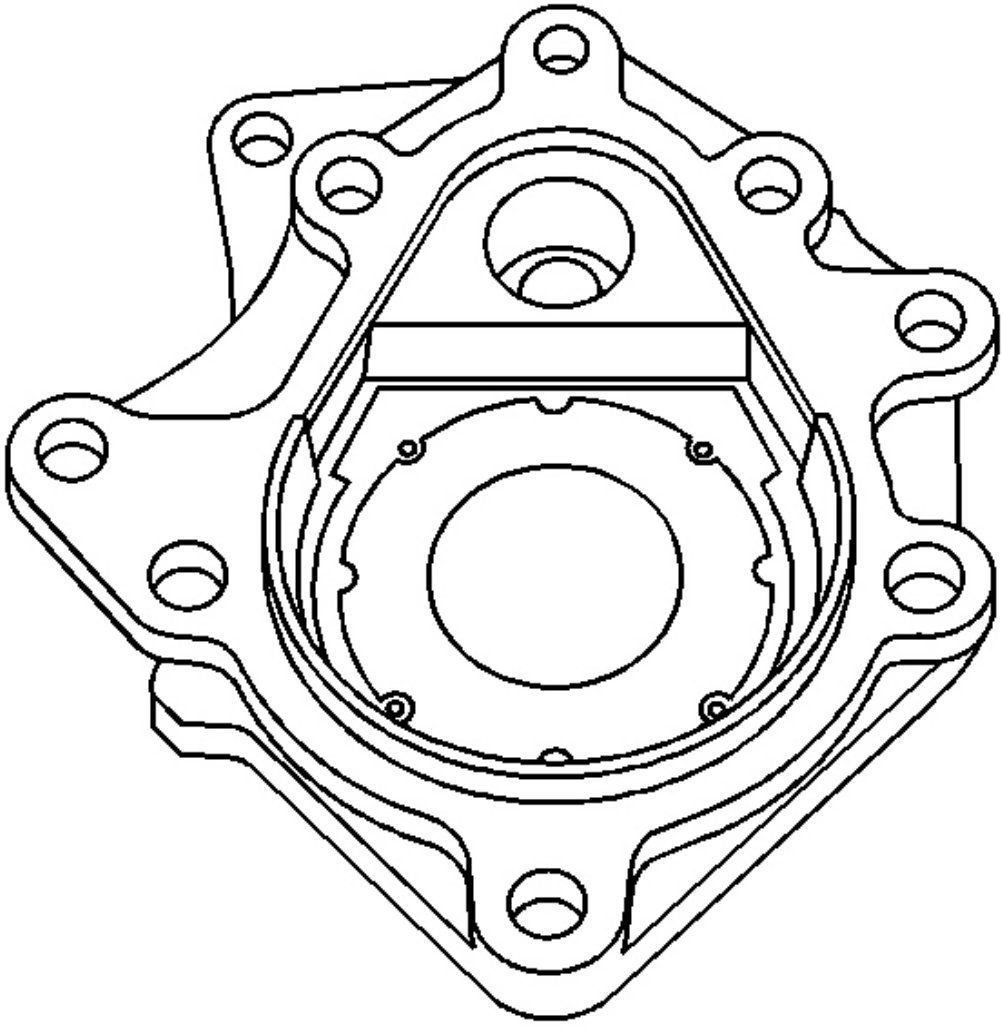


Fig. 189: View Of Thrust Washer & Outer Intermediate Shaft Bearing Case Half
Courtesy of GENERAL MOTORS CORP.

6. Install the thrust washer to the outer intermediate shaft bearing case half.

   Use grease to hold the thrust washer in place.

7. Apply a bead of sealant, GM P/N 1052942 or equivalent, to the sealing surface of one side of the intermediate shaft bearing housing case.
8. Install the outer intermediate shaft bearing housing case to the inner intermediate shaft bearing housing case.

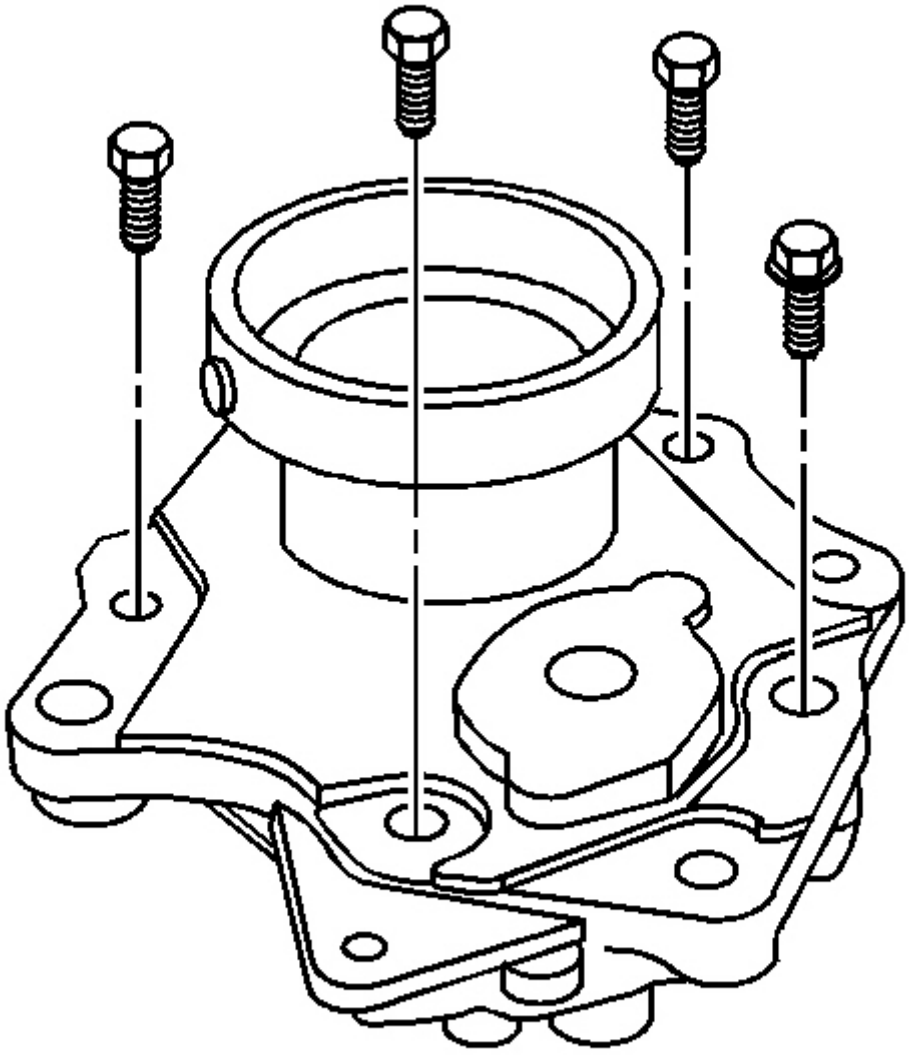


Fig. 190: View Of Intermediate Shaft Bearing Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

9. Install the intermediate shaft bearing case bolts.

   Tighten: Tighten the intermediate shaft bearing case bolts to 48 N.m (35 lb ft).

10. Install the new inboard, oil pan side, seal on top of the seal bore.

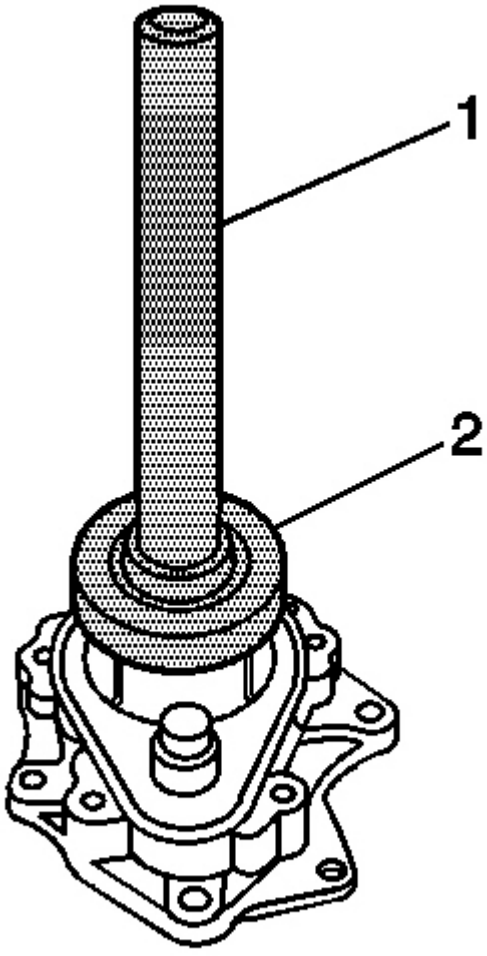


Fig. 191: Identifying Axle Seal Installer & Universal Driver Handle
Courtesy of GENERAL MOTORS CORP.

11. Install the new seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.

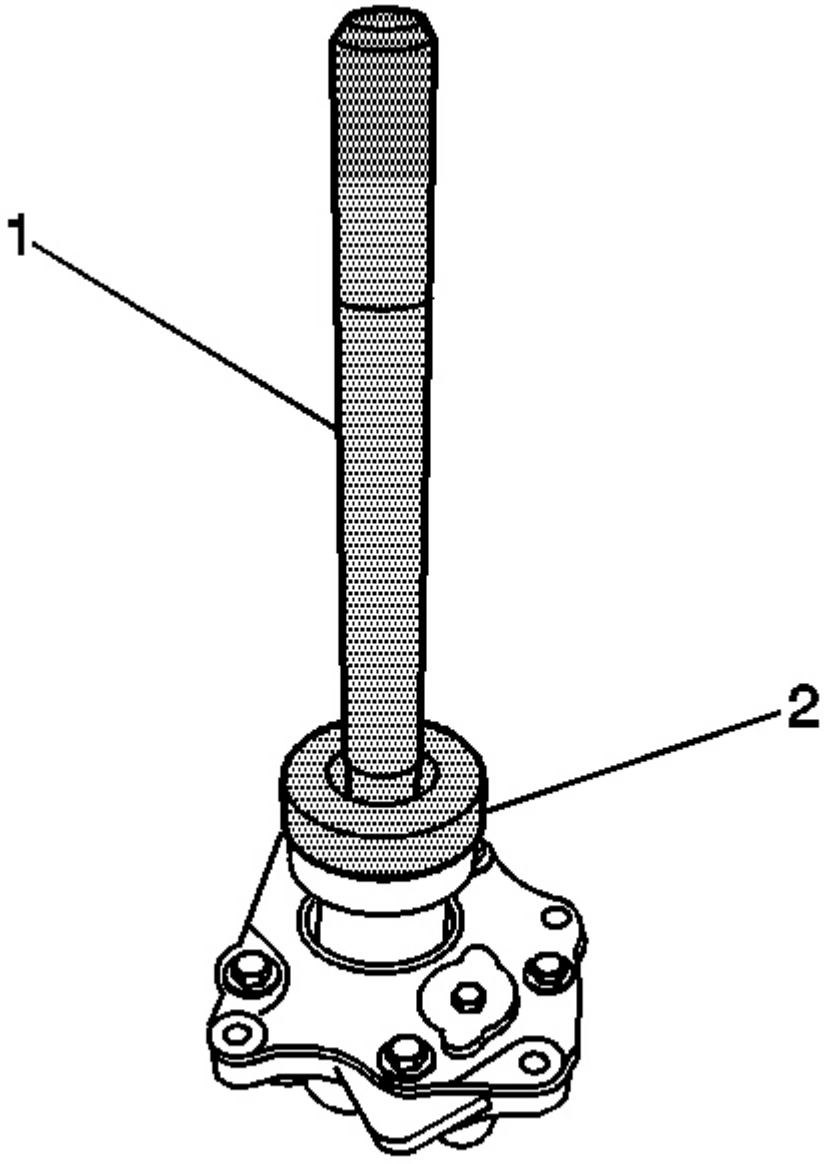


Fig. 192: Identifying Special Tools J 45359 & J 8092
Courtesy of GENERAL MOTORS CORP.

NOTE: The outboard intermediate shaft bearing assembly seal must be installed 0.9-1.1 mm (0.035-0.043 in) below the surface of the intermediate shaft bearing assembly housing bore. If the seal is not installed properly,

damage to the seal may occur.

12. Install the new seal using the **J 45359** (2) and the **J 8092** (1).

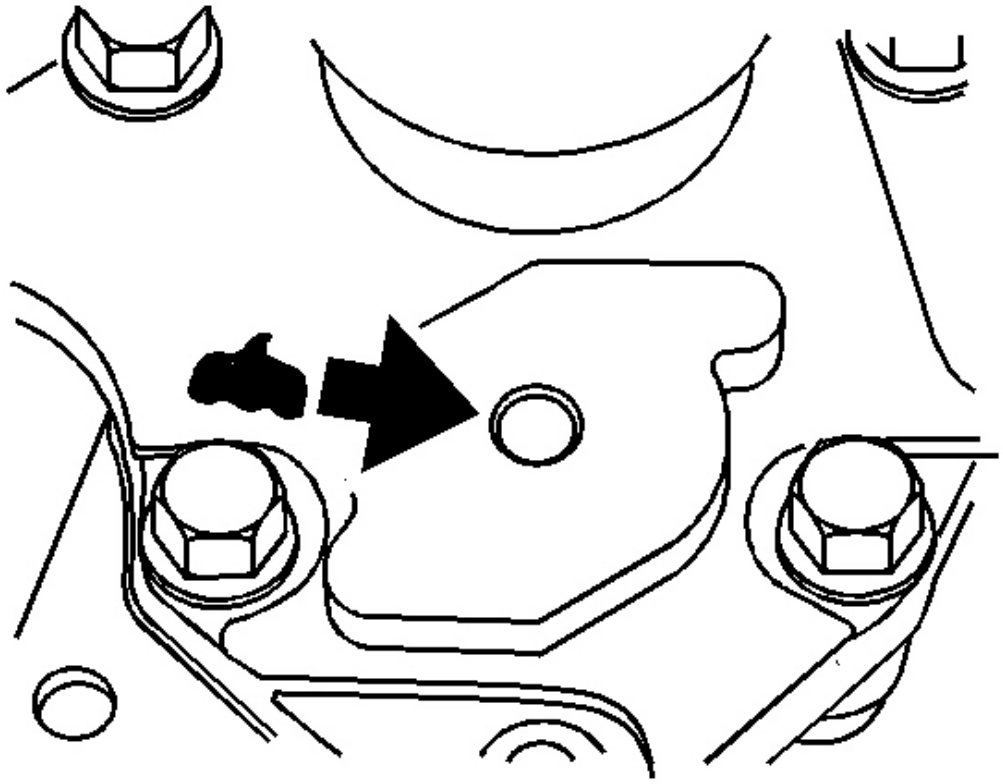


Fig. 193: Packing Cavity Of Inner Intermediate Shaft Bearing Housing With Grease
Courtesy of GENERAL MOTORS CORP.

13. Pack the cavity of the inner intermediate shaft bearing housing with 55-65 cc (1.86-2.20 oz) of grease, GM P/N 12377985 or equivalent.
14. Install the intermediate shaft bearing plug.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY

Tools Required

- **J 45225** Axle Seal Installer. See **Special Tools**.
- **J 8092** Universal Driver Handle - 3/4 in - 10

Assembly Procedure

1. Inspect the alignment mark between the differential bearing adjuster and the differential carrier assembly case. If the line between the differential bearing adjuster and the differential carrier assembly case is not aligned, re-align the 2 components as necessary.

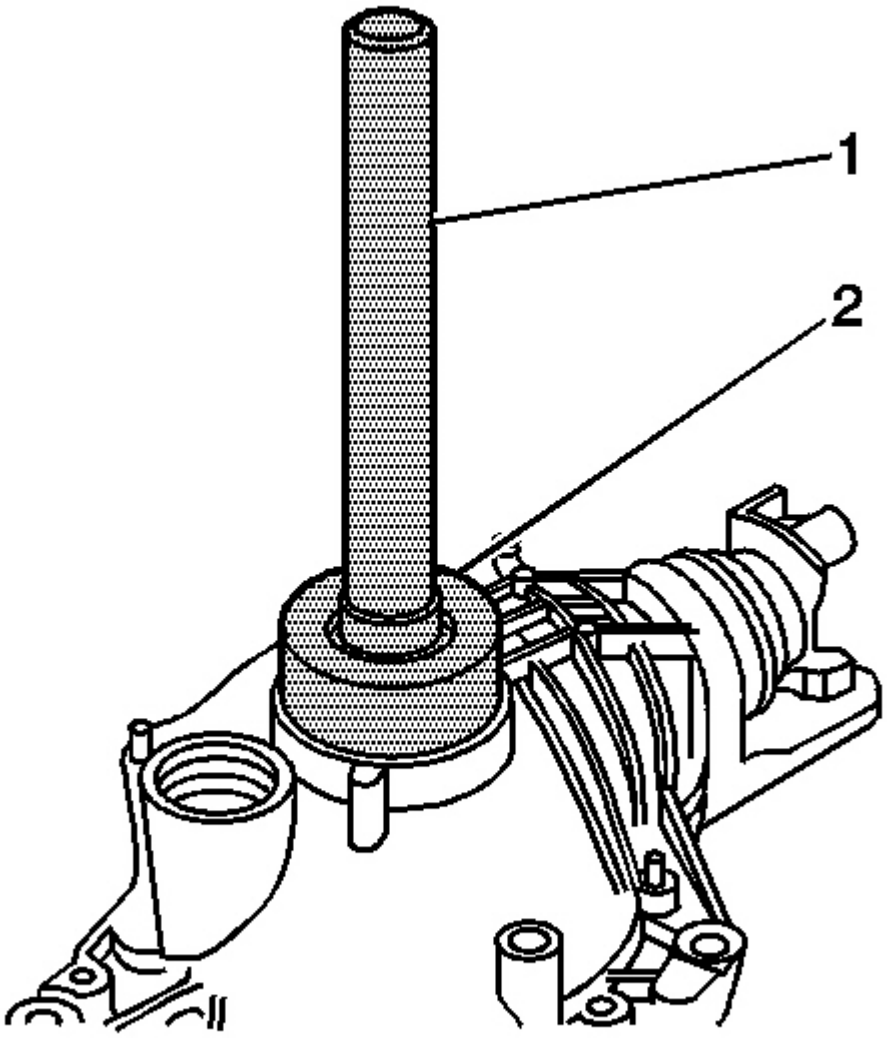


Fig. 194: Identifying Special Tools J 45225 & J 8092
Courtesy of GENERAL MOTORS CORP.

2. Install the left side inner shaft seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.

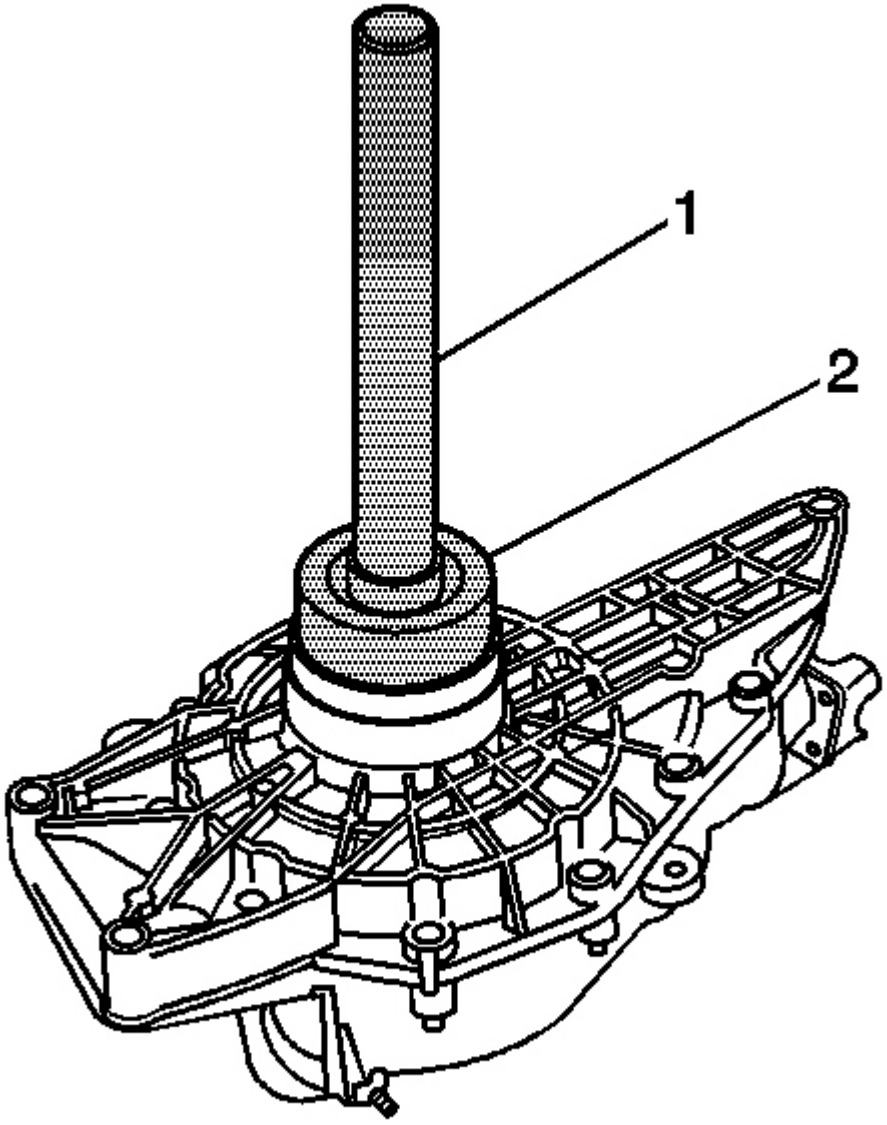


Fig. 195: Identifying Axle Seal Installer & Universal Driver Handle (Right)
Courtesy of GENERAL MOTORS CORP.

3. Install the right side inner shaft seal using the **J 45225** (2) and the **J 8092** (1). See **Special Tools**.

NOTE: **Refer to Component Fastener Tightening Notice .**

4. Install the drain plug.

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

5. Install the fill plug.

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

GEAR TOOTH CONTACT PATTERN INSPECTION

The 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. A pattern check ensures the best contact between the ring gear and the drive pinion for low noise and long life.

Gear Tooth Nomenclature

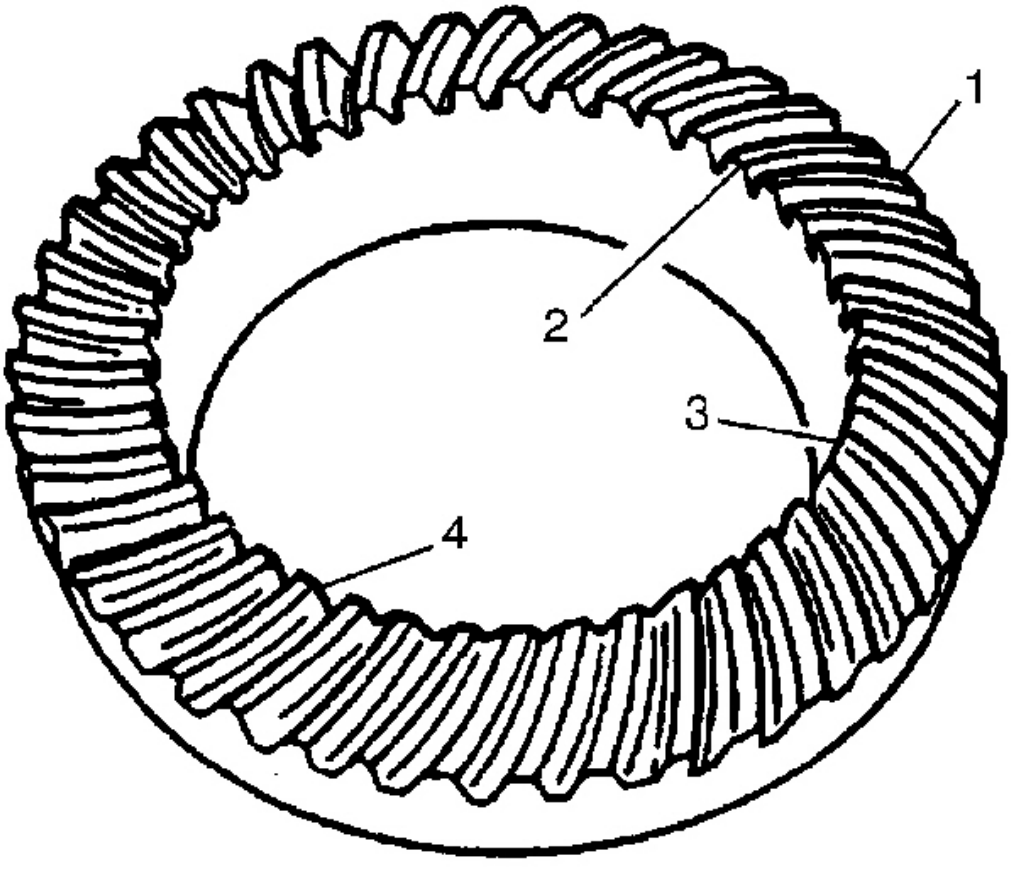


Fig. 196: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS CORP.

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 two adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

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

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.

Backlash Adjustment

Adjust the backlash by means of moving the side bearing adjuster sleeves which move the case and ring gear assembly closer to or farther from the pinion. Also use the adjuster sleeves in order to set the side bearing preload.

- If the left side adjuster sleeve is moved in, along with an equal outward movement of the right side adjuster, the backlash will increase.
- If the left side adjuster sleeve is moved out, along with an equal inward movement of the right side adjuster, the backlash will decrease.

Testing Procedure

1. Drain the differential carrier assembly of axle lubricant, if necessary. Refer to **Front Axle Lubricant Replacement**.
2. Wipe clean the ring gear of axle lubricant. Carefully clean each tooth of the ring gear.
3. Use a medium stiff brush in order to sparingly apply gear marking compound, GM P/N 1052351or equivalent, to all of the ring gear teeth.

   IMPORTANT: Performing the test without loading the gears will not produce a satisfactory pattern.

4. Apply a turning torque load of 14 N.m (10 lb ft) to the differential case and the drive pinion.

   IMPORTANT: Avoid turning the ring gear excessively or a poor quality gear pattern impression will result.

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

   Perform the recommended adjustments until the proper pattern is obtained.

8. Once the proper pattern is obtained, continue the assembly of differential carrier. Refer to **Differential Carrier Assembly Assemble**.

Correct Contact Pattern

Condition

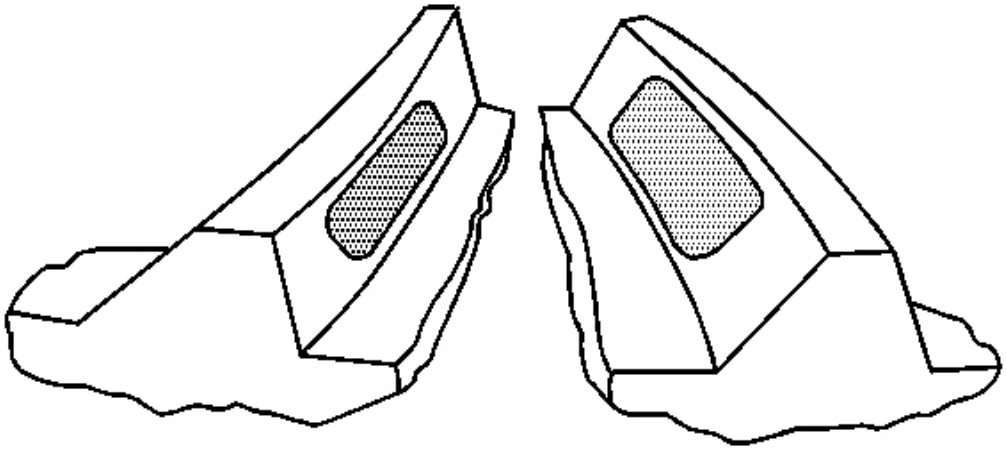


Fig. 197: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

The backlash and pinion depth is correct.

Correction

None required.

Service Hints

Loose bearing 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
- Drive pinion

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

Drive Side Heel - Coast Side Toe Contact Pattern

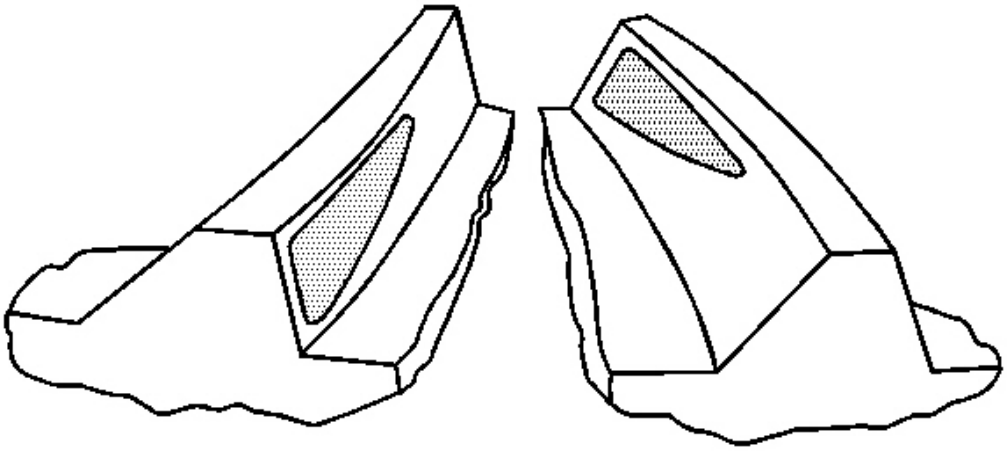


Fig. 198: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Decrease the backlash. Move the ring gear closer to the drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

Drive Side Toe - Coast Side Heel Contact Pattern

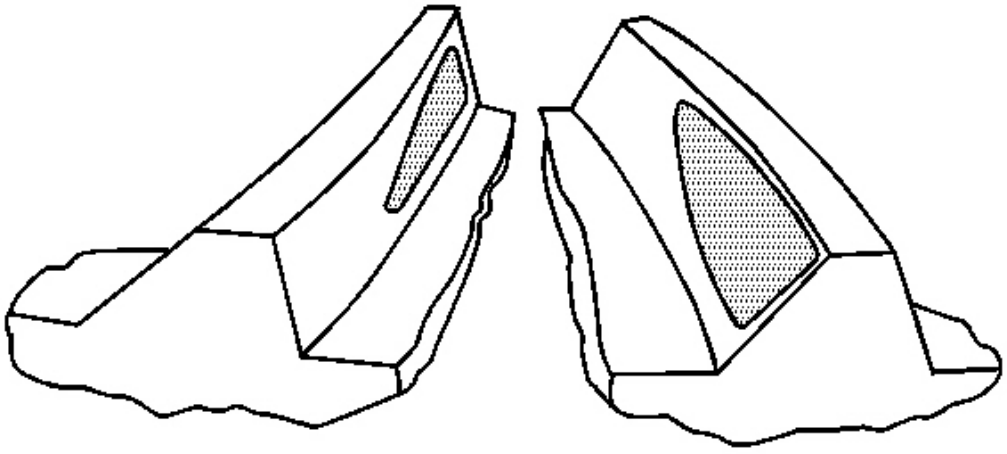


Fig. 199: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

Drive Side Heel - Coast Side Heel Contact Pattern

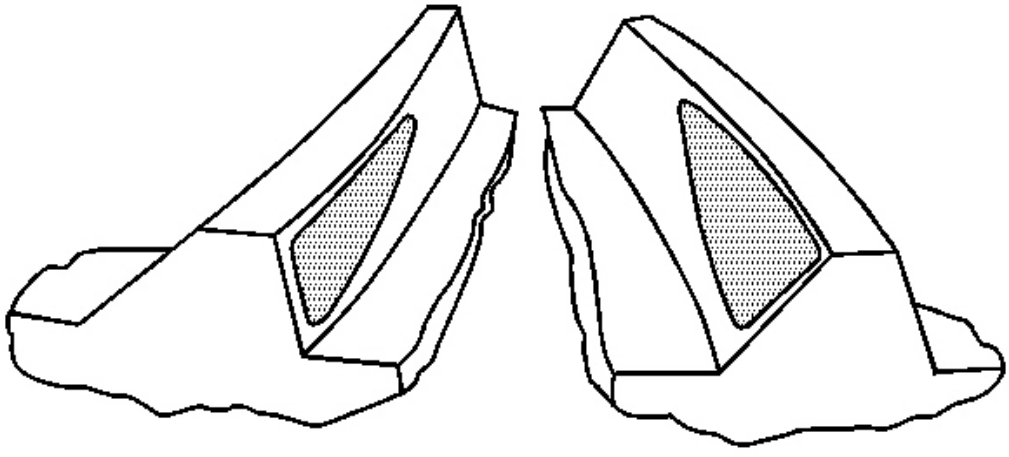


Fig. 200: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Decrease the backlash. Move the ring gear closer to the drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

Drive Side Toe - Coast Side Toe Contact Pattern

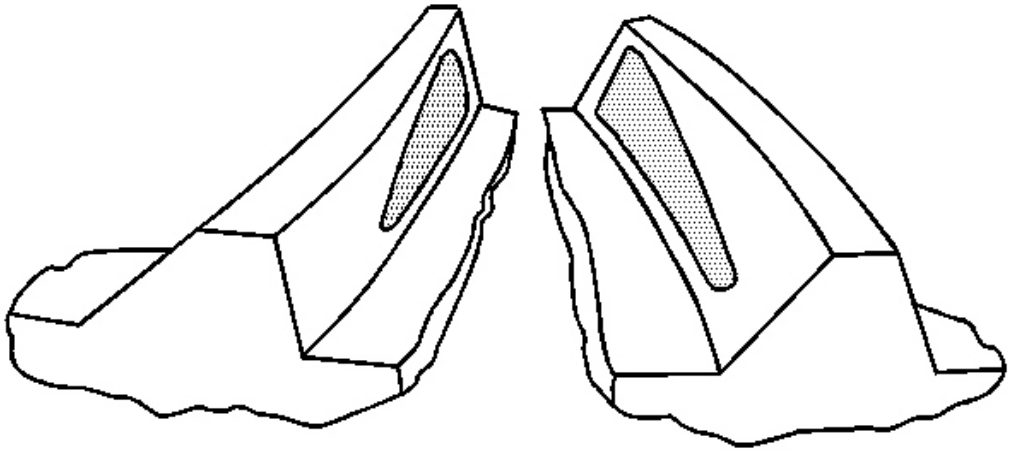


Fig. 201: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

High Flank Contact Pattern

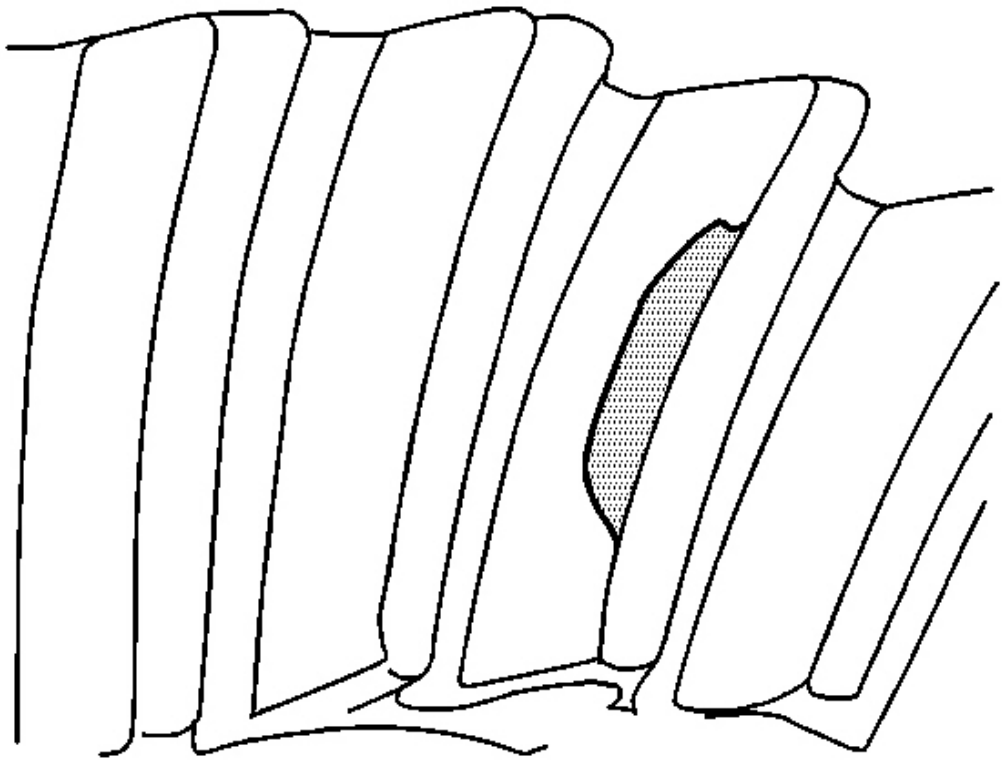


Fig. 202: Identifying High Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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

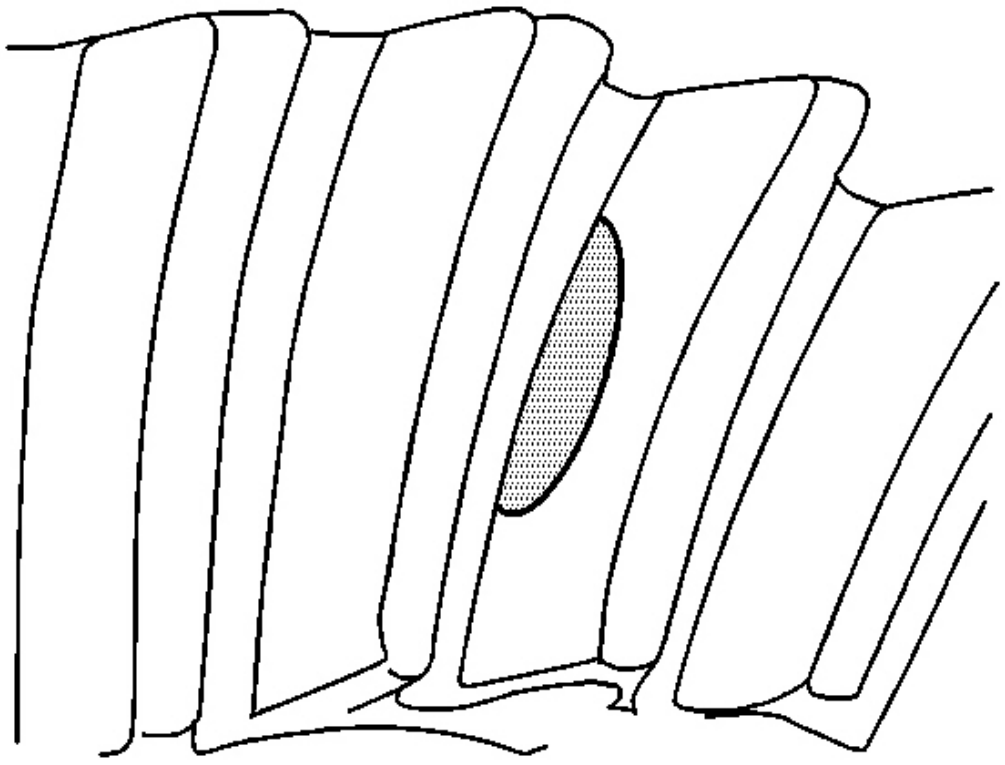


Fig. 203: Identifying Low Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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 & OPERATION

FRONT DRIVE AXLE DESCRIPTION & OPERATION

Selectable Four Wheel Drive (S4WD) Front Axle Description & Operation

The Selectable Four Wheel Drive (S4WD) Front Axle consist of the following components:

- Differential Carrier Housing
- Differential Case Assembly
- Inner Axle Shaft
- Intermediate Shaft Bearing Assembly (located on the right side of the oil pan)
- Electric Motor Actuator

The front axle on Selectable Four Wheel Drive (S4WD) model vehicles uses a disconnect feature mounted on the right side of the oil pan in order to engage and disengage the front axle. When the driver engages the 4WD system, the Transfer Case Control Module sends a signal to the electric motor actuator to energize and extend the plunger inside. The extended plunger moves the clutch fork and clutch fork sleeve across from the clutch fork outer gear that is splined to the right side wheel drive shaft to the clutch fork inner gear that is splined to the inner axle shaft. The locking of the two gears allows the axle to operate in the same manner as a semi-floating rear axle. A propeller shaft connects the transfer case to the front axle. The differential carrier assembly uses a conventional ring and pinion gear set 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 is located on top of the differential carrier assembly or on a label on the bottom of the right half of differential carrier assembly. The wheel drive shafts are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

Automatic Four Wheel Drive (A4WD) Front Axle Description & Operation

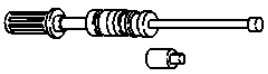
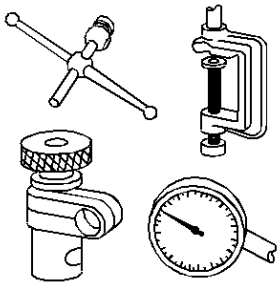
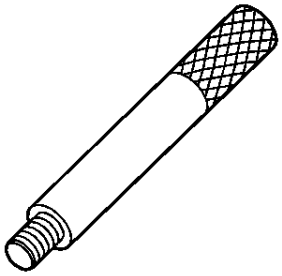
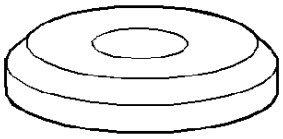
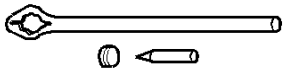
The Automatic Four Wheel Drive (A4WD) Front Axle consist of the following components:

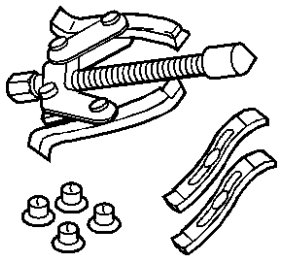
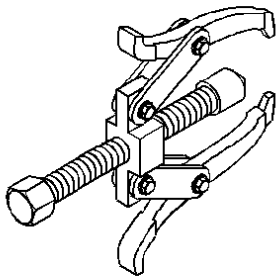
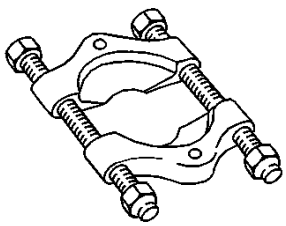
- Differential Carrier Housing
- Differential Case Assembly
- Inner Axle Shaft
- Intermediate Shaft bearing Assembly (located on the right side of the oil pan)

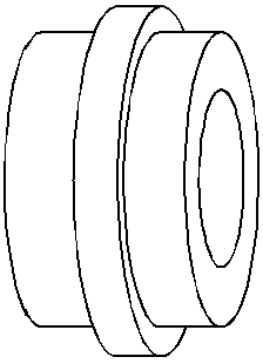
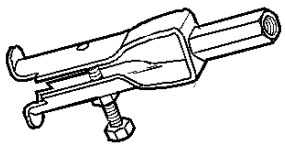
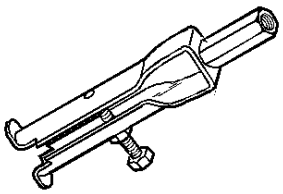
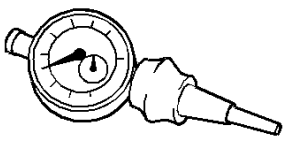
The front axle on Automatic Four Wheel Drive (A4WD) model vehicles do not have a disconnect feature in order to engage and disengage the front axle. The Automatic Four Wheel Drive system uses the same differential carrier assembly and intermediate shaft bearing assembly, but the clutch fork, the clutch fork sleeve and the inner/outer gears have been replaced with a single splined sleeve that connects the inner axle shaft directly to the right side wheel drive shaft. This connection allows the right side wheel drive shaft and the intermediate axle shaft to be directly connected to the differential case assembly. It also results in having the wheel drive shafts, the intermediate axle shaft and the propeller shaft to spin continuously. When the transfer case is active, the clutch assembly within the transfer case controls the amount of torque applied to the front axle. The remaining components are the same as the selectable four wheel drive axle.

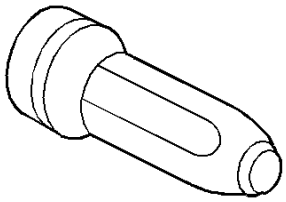
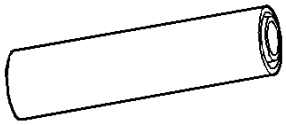
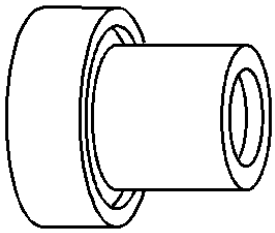
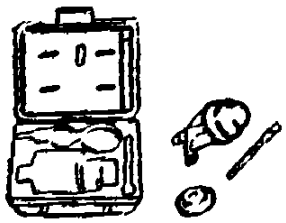
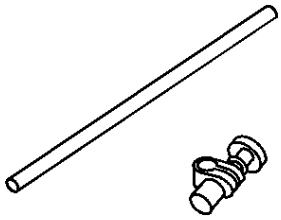
SPECIAL TOOLS & EQUIPMENT

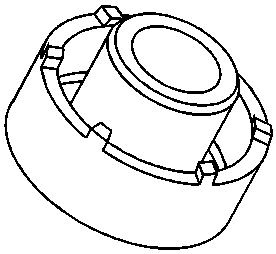
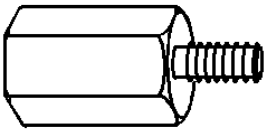
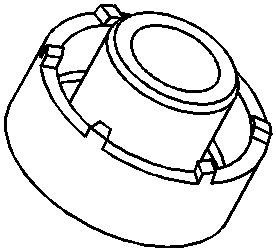
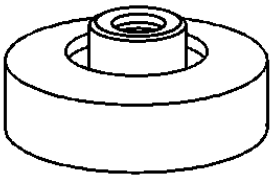
SPECIAL TOOLS

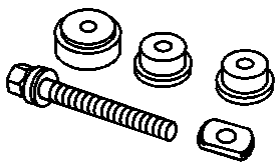
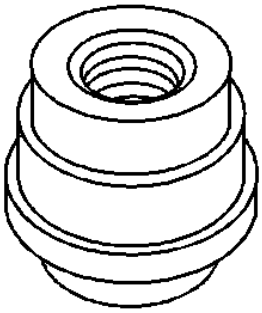
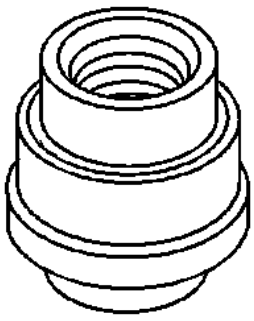
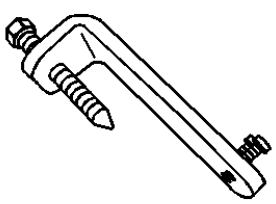
Illustration	Tool Number/Description
	J 6125-B Slide Hammer
	J 8001 Dial Indicator Set
	J 8092 Driver Handle
	J 8107-2 Side Bearing Puller Pilot
	J 8614-01 Flange and Pulley Holder Tool

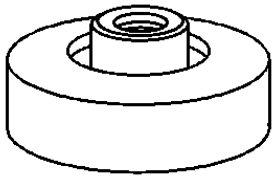
	J 22888-D Side Bearing Remover Kit
	J 22888-20A Universal Two Jaw Puller
	J 22912-01 Rear Pinion and Axle Bearing Remover
	J 23423-A Case Bearing Race Installer

	
	J 2619-01 Slide Hammer
	J 29369-1 Bushing and Bearing Remover
	J 29369-2 Bushing and Bearing Remover - 2-3 in
	J 29763 Static Timing Gage

	J 33782 Pinion Oil Seal Installer
	J 33785 Pinion Bearing Installer
	J 33790 Differential Side Bearing Installer
	J 33838 Pinion Setting Gage
	J 34178 Spreader Gage Adapter

	J 42213 Adjuster Sleeve Socket
	J 45104 Axle Remover Adapter
	J 45224 Side Bearing Adjuster
	J 45225 Axle Seal Installer
	J 45228 Pinion Bearing Cup Remover/Installer

	
	J 45232 Differential Bearing Adjuster Needle Bearing Replacer - LH
	J 45233 Differential Bearing Adjuster Needle Bearing Replacer - RH
	J 45234 Pinion Remover - 7.25 inch Axle

	J 45359 Axle Seal Installer